CERTIFICATE OF RED COMPLIANCE

According toDirective: ***2014/53/EU***

Ref. No.: ***AIT22091613-C01***

Product:	Bluetooth headset
Trade Mark:	N/A
Model:	TG10, TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Applicant:	Guangzhou Langston Electronic Technology Co,Ltd
Address:	5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou
Manufacture:	Dongguan Doulan Electronic Technology Co. LTD
Address:	No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan

The test sample of product has passed the test according to requirements of the following standards:

Standard(s):Refer to attachment Test report(s) No.: Refer to attachment

Based on the voluntary assessment of the product sample and technical file, we confirm that the above-mentioned product meets the requirements of the RE directive.
The CE mark as show below can be used, under the responsibility of the manufacturer or the importer, after completion of an EC declaration of conformity and compliance with all relevant RE directives.

CE

Approved by/Date: Seal Chen *Sep. 22, 2022*
Department Manager

DONGGUAN YAXU (AIT) TECHNOLOGY APPROVED

The statement is based on a single evaluation of one sample of above mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lablogo.

AiT

Dongguan Yaxu (AiT) Technology Limited
No. 22, Jinqianling Third Street, Jitigang, Huangjiang, Dongguan, Guangdong, China.
Tel:+86.769.8202.0499/ Fax:+86.769.8202.0495
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According toDirective: ***2014/53/EU***

Ref. No.: ***AIT22091613-C01***

Product: Bluetooth headset

Trade Mark: N/A

Model: TG10, TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21

Applicant: Guangzhou Langston Electronic Technology Co,Ltd

Address: 5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou

Attachment:

Standard(s):		Test report(s) No.:
Article 3.1a)	EN 62368-1:2020+A11:2020	AIT22091613S
	EN 62479:2010 EN 50663:2017	AIT22091613H1
Article 3.1b)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.1.1 (2019-03) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020 EN 55035:2017+A11:2020 EN IEC 61000-3-2:2019 EN 61000-3-3: 2013+ A1:2019	AIT22091613E1
Article 3.2)	ETSI EN 300 328 V2.2.2 (2019-07)	AIT22091613W1 AIT22091613W2

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True Safety Testing

Certificate Of Compliance

Certificate No.	:	TST20220970118-3RC
Applicant	:	Guangzhou Langston Electronic Technology Co,Ltd 5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou
Manufacturer	:	Dongguan Doulan Electronic Technology Co. LTD No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan
Sample Name	:	TWS Bluetooth headset
Main Model	:	TG10
Additional Models	:	TG11 G30B T26B TG83 TG85 TH03 TN34 TN36 TS01 TS02 TE06 TN52 TA02 TN04 i21
Test Standard	:	IEC62321-1:2013 IEC62321-3-1:2013 IEC62321-4:2013/AMD1:2017 IEC62321-5:2013 IEC62321-6:2015 IEC62321-7-1:2015 IEC62321-7-2:2017 IEC62321-8:2017
As shown in the Test Report No.	:	TST20220970118-3RR

The EUT described above has been consolidated by us and found in compliance with the council RoHS 2.0 Directive (EU) 2015/863 and (EU)2017/2102 amending Annex II to Directive 2011/65/EU.

The certificate applies to the tested sample above mentioned only and shall not imply an assessment of the whole production. It is only valid in connection with the test report number. TST20220970118-3RR

RoHS

Andy

Certification Manager

Date:Sept.23,2022

True Safety Testing Dongguan Co., Ltd. Approve

Dongguan True Safety Testing Co., Ltd.
Room 201, No.20, East of Houjie Avenue, Houjie, Dongguan, Guangdong, China
Tel: 86-0769-85088050 4001086960 E-mail:tst@tst-test.com http://www.tst-test.com

Test Report
EN IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Reference No......................:	AIT22091613S
Date of issue....................................:	2022-10-17
Total number of pages	72 pages
Testing Laboratory name ....:	Dongguan Yaxu (AiT) Technology Limited
Address ....:	No. 22, Jinqianling Third Street, JitiGang, Huangjiang, Dongguan, Guangdong, China
Testing location ....:	Same as above
Tested by (+ signature) ....:	Dave Long
Approved by (+ signature)................:	Sandy Liang
Applicant's name...........................:	Guangzhou Langston Electronic Technology Co,Ltd
Address ....:	5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou, China
Manufacturer's name ....:	Dongguan Doulan Electronic Technology Co. LTD
Address ....:	No. 3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan, China
Factory's name………….. ....…..:	Same as Manufacturer
Address. ....:	Same as Manufacturer
Test specification:	
Standard ....:	EN IEC 62368-1:2020+A11:2020
Test procedure ....:	Service of CE Marking in LVD
Procedure deviation..........................:	N/A
Non-standard test method.................	N/A

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the specific product described herein. It must not be duplicated or used in part without prior written consent from Dongguan Yaxu (AiT) Technology Limited. Unless otherwise specified, the measurement uncertainty is not considered in this report.

Test Object:

Description...:	Bluetooth headset
Trademark ....:	N/A
Manufacturer ....:	Dongguan Doulan Electronic Technology Co. LTD
Model and/or type reference ....:	TG10, TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Serial number ....:	N/A
Rating(s)…………………………….…:	Input: 5V⎓1.0A

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Bluetooth headset
Model: TG10
Input: 5V⎓1.0A
MADE IN CHINA
Manufacturer: Dongguan Doulan Electronic Technology Co. LTD
Address: No. 3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan, China
CE

Note: --

1. The above marks are the minimum requirements required by the safety standard. For the final production, the additional marks which do not give rise to misunderstanding may be added.
2. Height of CE mark at least 5mm, height of WEEE mark at least 7mm, height of other marks at least 5mm, height of letters and numerals at least 2mm.
3. According to the EU directives which have been aligned with EU NLF (new legislative framework), both of manufacturer and importer’s name and address shall be affixed on the product or, where that is not possible, on its packaging or in a document accompanying the product before the product is placed on the EU market.

TEST ITEM PARTICULARS:	
Classification of use by ....:	☒ Ordinary person ☒ Instructed person ☒ Skilled person ☒ Children likely to be present
Supply Connection ....:	☐ AC Mains ☐ DC Mains ☒ External Circuit - not Mains connected - ☒ ES1 ☐ ES2 ☐ ES3
Supply % Tolerance ....:	☐ +10%/-10% ☐ +20%/-15% ☐ +____%/ -_____% ☒ None
Supply Connection – Type ....:	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: not directly connected to the mains
Considered current rating of protective device as part of building or equipment installation ....:	_______A; Installation location: ☐ building; ☐ equipment
Equipment mobility ....:	☒ movable ☐ hand-held ☒ transportable ☐ stationary ☐ for building-in ☐ direct plug-in ☐ rack-mounting ☐ wall-mounted
Over voltage category (OVC) ....:	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other: not directly connected to the mains
Class of equipment ....:	☐ Class I ☐ Class II ☒ Class III
Access location ....:	☐ restricted access location ☒ N/A
Pollution degree (PD) ....:	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified maxium operating ambient:	40°C
IP protection class ....:	☒ IPX0 ☐ IP___
Power Systems ....:	☐ TN ☐ TT ☐ IT - _____ V $_{L-L}$
Altitude during operation (m) ....:	☒ 2000 m or less ☐ _______ m
Altitude of test laboratory (m) ....:	☒ 2000 m or less ☐ __ m
Mass of equipment (kg) ....:	☒ Approx. 35g

POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object .... :	N/A
- test object does meet the requirement .... :	P (Pass)
- test object does not meet the requirement .... :	F (Fail)
TESTING:	
Date of receipt of test item... :	2022-09-16
Date (s) of performance of tests.................................. :	2022-09-16 to 2022-10-17
GENERAL REMARKS:	
"(see remark #)" refers to a remark appended to the report. (see appended table)" refers to a table appended to the report. The test results presented in this report relate only to the object tested. This report shall not be reproduced except in full without the written approval of the testing laboratory. **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**	
Summary of testing: All tests were performed on model TG10 at the worst case and all test results complied with the standard on cover page.	
General product information: 1. The EUT is a Bluetooth headset designed as audio/video, information and communication technology equipment, for indoor use only. 2. The EUT is composed of charging base and earbuds; The charging base is supplied by 5VDC SELV circuit or internal 3.7V/350mAh Polymer Lithium-ion battery; The earbuds is supplied by internal 3.7V/30mAh Polymer Lithium-ion battery. 3. All the circuits of EUT are considered as ES1 circuits. 4. All models are exactly the same except the model names. 5. Instructions and equipment marking related to safety is applied in the language that is acceptable in the country in which the equipment is to be sold.	

OVERVIEW OF ENERGY SOURCES AND SAFEGUARDS				
Clause	**Possible Hazard**			
5	Electrically-caused injury			
Class and Energy Source (e.g. ES3: Primary circuit)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
ES1: All circuits	Ordinary/ Instructed/ Skilled	N/A	N/A	N/A
6	Electrically-caused fire			
Class and Energy Source (e.g. PS2: 100 Watt circuit)	Material part (e.g. Printed board)	Safeguards		
		B	1st S	2nd S
PS3: Type C Input port PS3: All internal circuits	All combustible materials within equipment and enclosure	For normal conditionand abnormalconditions: 1. No ignition occurred. 2. No parts exceeding 90% of its spontaneous ignition temperature.	For control fire spread under single faultcondition: 1. PCB is complied with V-0 material. 2. All other components: at least V-2 except for mounted on min. V-1 material or small parts of combustible material. 3. V-0 plastic enclosure provided.	N/A
PS1: Battery cell (on the charging base) PS1: Battery cells (on the earbuds)	All combustible materials within equipment and enclosure	For normal conditionand abnormalconditions: 1. No ignition occurred. 2. No parts exceeding 90% of its spontaneous ignition temperature.	N/A	N/A
7	Injury caused by hazardous substances			
Class and Energy Source (e.g. Ozone)	Body Part (e.g., Skilled)	Safeguards		
		B	S	R
Polymer Lithium-ion	Ordinary/ Instructed/ Skilled	N/A	N/A	N/A
Polymer Lithium-ion	Ordinary/ Instructed/ Skilled	N/A	N/A	N/A
8	Mechanically-caused injury			
Class and Energy Source (e.g. MS3: Plastic fan blades)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R

MS1: Sharp edges and corners of accessible parts	Ordinary; Instructed; Skilled	N/A	N/A	N/A
MS1: Equipment mass	Ordinary; Instructed; Skilled	N/A	N/A	N/A
9	Thermal burn			
Class and Energy Source (e.g. TS1: Keyboard caps)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
TS1: Accessible parts surface	Ordinary/ Instructed/ Skilled	N/A	N/A	N/A
10	Radiation			
Class and Energy Source (e.g. RS1: PMP sound output)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
RS1: LEDs for indicating lights only	Ordinary; Instructed; Skilled	N/A	N/A	N/A
RS1: Acoustic energy sources	Ordinary; Instructed; Skilled	N/A	N/A	N/A
Supplementary Information: (1) “B” – Basic Safeguard; “S” – Supplementary Safeguard; “R” – Reinforced Safeguard. (2) “*” means that the equipment which is intended to be connected to the output shall also be considered.				

NERGY SOURCE DIAGRAM
Optional. Manufacturers are to provide the energy sources diagram identify declared energy sources and identifying the demarcations are between power sources. Recommend diagram be provided included in power supply and multipart systems. Insert diagram below. Example diagram designs are; Block diagrams; image(s) with layered data; mechanical drawings
☒ **ES** ☒ **PS** ☒ **MS** ☒ **TS** ☒ **RS.** Remark: see above table “OVERVIEW OF ENERGY SOURCES AND SAFEGUARDS” for details.

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4	**GENERAL REQUIREMENTS**		**P**
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components	(See appended table 4.1.2)	P
4.1.3	Equipment design and construction		P
4.1.4	Specified ambient temperature for outdoor use (°C) ....:		N/A
4.1.5	Constructions and components not specifically covered		N/A
4.1.8	Liquids and liquid filled components (LFC)		N/A
4.1.15	Markings and instructions	(See Annex F)	P
4.4.3	Safeguard robustness		P
4.4.3.1	General		P
4.4.3.2	Steady force tests	(See Clause T.4)	P
4.4.3.3	Drop tests	(See Annex T.7)	P
4.4.3.4	Impact tests		N/A
4.4.3.5	Internal accessible safeguard tests		N/A
4.4.3.6	Glass impact tests		N/A
4.4.3.7	Glass fixation tests	No glass used	N/A
	Glass impact test (1J)		N/A
	Push/pull test (10 N)		N/A
4.4.3.8	Thermoplastic material tests	(See Annex T.8)	P
4.4.3.9	Air comprising a safeguard	Considered, but no such barrier or enclosure provided	N/A
4.4.3.10	Accessibility, glass, safeguard effectiveness	All safeguards remain effective	P
4.4.4	Displacement of a safeguard by an insulating liquid		N/A
4.4.5	Safety interlocks	(See Annex K)	N/A
4.5	**Explosion**		**P**
4.5.1	General		P
4.5.2	No explosion during normal/abnormal operating condition	(See Clause B.2, B.3)	P
	No harm by explosion during single fault conditions	(See Clause B.4)	P
4.6	**Fixing of conductors**		**P**
	Fix conductors not to defeat a safeguard	The conductor cannot defeat a safeguard	P
	Compliance is checked by test ....:	(See Clause T.2)	P
4.7	**Equipment for direct insertion into mains socket–outlets**		**N/A**
4.7.2	Mains plug part complies with relevant standard...:		N/A
4.7.3	Torque (Nm)...:		N/A

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.8	**Equipment containing coin/button cell batteries**		**N/A**
4.8.1	General		N/A
4.8.2	Instructional safeguard...:		N/A
4.8.3	Battery compartment door/cover construction		N/A
	Open torque test		N/A
4.8.4.2	Stress relief test		N/A
4.8.4.3	Battery replacement test		N/A
4.8.4.4	Drop test		N/A
4.8.4.5	Impact test		N/A
4.8.4.6	Crush test		N/A
4.8.5	Compliance		N/A
	30N force test with test probe		N/A
	20N force test with test hook		N/A
4.9	**Likelihood of fire or shock due to entry of conductive object**		**N/A**
4.10	**Component requirements**		**N/A**
4.10.1	Disconnect Device		N/A
4.10.2	Switches and relays		N/A

5	**ELECTRICALLY-CAUSED INJURY**		**P**
5.2	**Classification and limits of electrical energy sources**		**P**
5.2.2	ES1, ES2 and ES3 limits		P
5.2.2.2	Steady-state voltage and current limits ....:	(See appended table 5.2)	P
5.2.2.3	Capacitance limits ....:		N/A
5.2.2.4	Single pulse limits...:		N/A
5.2.2.5	Limits for repetitive pulses ....:		N/A
5.2.2.6	Ringing signals	(See Annex H)	N/A
5.2.2.7	Audio signals	(See Clause E.1)	P
5.3	**Protection against electrical energy sources**		**N/A**
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	All internal circuits considered ES1	N/A
5.3.1 a)	Accessible ES1/ES2 derived from ES2/ES3 circuits		N/A
5.3.1 b)	Skilled persons not unintentional contact ES3 bare conductors		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
	Accessibility to outdoor equipment bare parts		N/A
5.3.2.2	Contact requirements		N/A

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Test with test probe from Annex V		—
5.3.2.2 a)	Air gap – electric strength test potential (V) ....:	(See appended table 5.4.9)	N/A
5.3.2.2 b)	Air gap – distance (mm) ....:		N/A
5.3.2.3	Compliance		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	**Insulation materials and requirements**		**P**
5.4.1.2	Properties of insulating material		P
5.4.1.3	Material is non-hygroscopic	Insulating material used	N/A
5.4.1.4	Maximum operating temperature for insulating materials ....:	(See appended table 5.4.1.4)	P
5.4.1.5	Pollution degrees...:	Pollution degree 2	--
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling test		N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage ....:	(See appended table)	P
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat test..:		N/A
5.4.1.10.3	Ball pressure test...:		N/A
5.4.2	Clearances		P
5.4.2.1	General requirements		P
	Clearances in circuits connected to AC Mains, Alternative method	(See Annex X)	N/A
5.4.2.2	Procedure 1 for determining clearance		N/A
	Temporary overvoltage ....:		—
5.4.2.3	Procedure 2 for determining clearance		N/A
5.4.2.3.2.2	a.c. mains transient voltage ....:		—
5.4.2.3.2.3	d.c. mains transient voltage ....:		—
5.4.2.3.2.4	External circuit transient voltage..............................:		—
5.4.2.3.2.5	Transient voltage determined by measurement ......:		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test ....:	(See appended table 5.4.2)	N/A
5.4.2.5	Multiplication factors for clearances and test voltages ....:	The multiplication factor for altitude up to 2000m is 1.0	P
5.4.2.6	Clearance measurement..:	(See appended table 5.4.2)	P

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4.3	Creepage distances		P
5.4.3.1	General		P
5.4.3.3	Material group...:	Assume to group IIIb	—
5.4.3.4	Creepage distances measurement ....:	(See appended table 5.4.3)	P
5.4.4	Solid insulation		N/A
5.4.4.1	General requirements		N/A
5.4.4.2	Minimum distance through insulation ....:		N/A
5.4.4.3	Insulating compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Insulating compound forming cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs)...:		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
	Number of layers (pcs) ....:		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material ....:		N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz, EP, KR, d, VPW (V) ....:		N/A
	Alternative by electric strength test, tested voltage (V), KR ....:		N/A
5.4.5	Antenna terminal insulation		N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
5.4.5.3	Insulation resistance (MΩ)....................................:		N/A
	Electric strength test...:		N/A
5.4.6	Insulation of internal wire as part of supplementary safeguard		N/A
5.4.7	Tests for semiconductor components and for cemented joints		N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%), temperature (°C), duration (h)..:		—
5.4.9	Electric strength test		N/A
5.4.9.1	Test procedure for type test of solid insulation.......:		N/A

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4.9.2	Test procedure for routine test		N/A
5.4.10	Safeguards against transient voltages from external circuits	No external circuits	N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test...:		N/A
5.4.10.2.3	Steady-state test ....:		N/A
5.4.10.3	Verification for insulation breakdown for impulse test ....:		N/A
5.4.11	Separation between external circuits and earth		N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	SPDs bridge separation between external circuit and earth		N/A
	Rated operating voltage U_{op} (V) ....:		—
	Nominal voltage U_{peak} (V) ....:		—
	Max increase due to variation ΔU_{sp} ....:		—
	Max increase due to ageing ΔU_{sa} ....:		—
5.4.11.3	Test method and compliance................................:		N/A
5.4.12	Insulating liquid		N/A
5.4.12.1	General requirements		N/A
5.4.12.2	Electric strength of an insulating liquid ....:		N/A
5.4.12.3	Compatibility of an insulating liquid........................:		N/A
5.4.12.4	Container for insulating liquid ....:		N/A
5.5	**Components as safeguards**		**N/A**
5.5.1	General	See Annex G	N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector ....:		N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers		N/A
5.5.5	Relays		N/A
5.5.6	Resistors		N/A
5.5.7	SPDs		N/A

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.8	Insulation between the mains and an external circuit consisting of a coaxial cable........................:		N/A
5.5.9	Safeguards for socket-outlets in outdoor equipment		N/A
	RCD rated residual operating current (mA) ....:		—
5.6	**Protective conductor**		**N/A**
5.6.2	Requirement for protective conductors		N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm^2) ....:		—
	Protective earthing conductor serving as a reinforced safeguard		N/A
	Protective earthing conductor serving as a double safeguard		N/A
5.6.4	Requirements for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2). ....:		—
5.6.4.2	Protective current rating (A)...................................:		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Terminal size for connecting protective earthing conductors (mm)...:		N/A
	Terminal size for connecting protective bonding conductors (mm) ....:		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective bonding system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method ....:		N/A
5.6.6.3	Resistance (Ω) or voltage drop ....:		N/A
5.6.7	Reliable connection of a protective earthing conductor		N/A
5.6.8	Functional earthing		N/A
	Conductor size (mm^2)...:		N/A
	Class II with functional earthing marking ....:		N/A
	Appliance inlet cl & cr (mm) ....:		N/A
5.7	**Prospective touch voltage, touch current and protective conductor current**		**N/A**
5.7.2	Measuring devices and networks		N/A
5.7.2.1	Measurement of touch current		N/A
5.7.2.2	Measurement of voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.7.3	Equipment set-up, supply connections and earth connections		N/A
5.7.4	Unearthed accessible parts ....:		N/A
5.7.5	Earthed accessible conductive parts ....:		N/A
5.7.6	Requirements when touch current exceeds ES2 limits		N/A
	Protective conductor current (mA).........................:		N/A
	Instructional Safeguard...:		N/A
5.7.7	Prospective touch voltage and touch current associated with external circuits		N/A
5.7.7.1	Touch current from coaxial cables		N/A
5.7.7.2	Prospective touch voltage and touch current associated with paired conductor cables		N/A
5.7.8	Summation of touch currents from external circuits		N/A
	a) Equipment connected to earthed external circuits, current (mA)...:		N/A
	b) Equipment connected to unearthed external circuits, current (mA)...:		N/A
5.8	**Backfeed safeguard in battery backed up supplies**		**N/A**
	Mains terminal ES ....:		N/A
	Air gap (mm)..:		N/A
6	**ELECTRICALLY- CAUSED FIRE**		**P**
6.2	**Classification of PS and PIS**		P
6.2.2	Power source circuit classifications..........................:	(See appended table 6.2.2)	P
6.2.3	Classification of potential ignition sources		P
6.2.3.1	Arcing PIS ....:		N/A
6.2.3.2	Resistive PIS ....:	(See appended table 6.2.3.2)	P
6.3	**Safeguards against fire under normal operating and abnormal operating conditions**		**P**
6.3.1	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials...:	(See appended table B.1.5 and B.3)	P
	Combustible materials outside fire enclosure ....:		N/A
6.4	**Safeguards against fire under single fault conditions**		**P**
6.4.1	Safeguard method	Control of fire spread	P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		N/A
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	Supplementary safeguards		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.3.2	Single Fault Conditions...:		N/A
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits		P
6.4.5	Control of fire spread in PS2 circuits		N/A
6.4.5.2	Supplementary safeguards	(See appended tables 4.1.2 and Clause G)	N/A
6.4.6	Control of fire spread in PS3 circuits	V-0 plastic enclosure used	P
6.4.7	Separation of combustible materials from a PIS	V-0 fire enclosure provided	N/A
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers	V-0 fire enclosure provided	P
6.4.8.2	Fire enclosure and fire barrier material properties		P
6.4.8.2.1	Requirements for a fire barrier		N/A
6.4.8.2.2	Requirements for a fire enclosure	V-0 fire enclosure provided	P
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier	No openings	N/A
6.4.8.3.1	Fire enclosure and fire barrier openings		N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top openings and properties		N/A
	Openings dimensions (mm).................................:		N/A
6.4.8.3.4	Bottom openings and properties		N/A
	Openings dimensions (mm).................................:		N/A
	Flammability tests for the bottom of a fire enclosure	(See Clause S.3)	N/A
	Instructional Safeguard ....:		N/A
6.4.8.3.5	Side openings and properties		N/A
	Openings dimensions (mm).................................:		N/A
6.4.8.3.6	Integrity of a fire enclosure, condition met: a), b) or c)...:		N/A
6.4.8.4	Separation of a PIS from a fire enclosure and a fire barrier distance (mm) or flammability rating ....:	V-0 fire enclosure provided	N/A
6.4.9	Flammability of insulating liquid.............................:		N/A
6.5	Internal and external wiring		**P**
6.5.1	General requirements	(See appended table 4.1.2)	P
6.5.2	Requirements for interconnection to building wiring ....:		N/A
6.5.3	Internal wiring size (mm^2) for socket-outlets..........:		N/A
6.6	Safeguards against fire due to the connection to additional equipment		**P**

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Clause	Requirement + Test	Result - Remark	Verdict

7	**INJURY CAUSED BY HAZARDOUS SUBSTANCES**		**P**
7.2	**Reduction of exposure to hazardous substances**		**N/A**
7.3	**Ozone exposure**		**N/A**
7.4	**Use of personal safeguards or personal protective equipment (PPE)**		**N/A**
	Personal safeguards and instructions....................:		—
7.5	**Use of instructional safeguards and instructions**		**N/A**
	Instructional safeguard (ISO 7010).........................:		—
7.6	**Batteries and their protection circuits**		**P**

8	**MECHANICALLY-CAUSED INJURY**		**P**
8.2	**Mechanical energy source classifications**		**P**
8.3	**Safeguards against mechanical energy sources**		**P**
8.4	**Safeguards against parts with sharp edges and corners**		**P**
8.4.1	Safeguards	MS1 classification	P
	Instructional Safeguard ....:		N/A
8.4.2	Sharp edges or corners	MS1 classification	N/A
8.5	**Safeguards against moving parts**		**N/A**
8.5.1	Fingers, jewellery, clothing, hair, etc., contact with MS2 or MS3 parts		N/A
	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
	Moving MS3 parts only accessible to skilled person		N/A
8.5.2	Instructional safeguard...:		N/A
8.5.4	Special categories of equipment containing moving parts		N/A
8.5.4.1	General		N/A
8.5.4.2	Equipment containing work cells with MS3 parts		N/A
8.5.4.2.1	Protection of persons in the work cell		N/A
8.5.4.2.2	Access protection override		N/A
8.5.4.2.2.1	Override system		N/A
8.5.4.2.2.2	Visual indicator		N/A
8.5.4.2.3	Emergency stop system		N/A
	Maximum stopping distance from the point of activation (m)...:		N/A
	Space between end point and nearest fixed mechanical part (mm) ....:		N/A
8.5.4.2.4	Endurance requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Mechanical system subjected to 100 000 cycles of operation		N/A
	- Mechanical function check and visual inspection		N/A
	- Cable assembly...:		N/A
8.5.4.3	Equipment having electromechanical device for destruction of media		N/A
8.5.4.3.1	Equipment safeguards		N/A
8.5.4.3.2	Instructional safeguards against moving parts.........:		N/A
8.5.4.3.3	Disconnection from the supply		N/A
8.5.4.3.4	Cut type and test force (N).......................................:		N/A
8.5.4.3.5	Compliance		N/A
8.5.5	High pressure lamps		N/A
	Explosion test ....:		N/A
8.5.5.3	Glass particles dimensions (mm) ....:		N/A
8.6	**Stability of equipment**		**N/A**
8.6.1	General	Mass classification: MS1	N/A
	Instructional safeguard...:		N/A
8.6.2	Static stability		N/A
8.6.2.2	Static stability test...:		N/A
8.6.2.3	Downward force test		N/A
8.6.3	Relocation stability		N/A
	Wheels diameter (mm)...:		—
	Tilt test		N/A
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test ....:		N/A
8.7	**Equipment mounted to wall, ceiling or other structure**		**N/A**
8.7.1	Mount means type..:		N/A
8.7.2	Test methods		N/A
	Test 1, additional downwards force (N)....................:		N/A
	Test 2, number of attachment points and test force (N)...:		N/A
	Test 3 Nominal diameter (mm) and applied torque (Nm)...:		N/A
8.8	**Handles strength**		**N/A**
8.8.1	General		N/A
8.8.2	Handle strength test		N/A
	Number of handles...:		—

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Clause	Requirement + Test	Result - Remark	Verdict

	Force applied (N)...:		—
8.9	**Wheels or casters attachment requirements**		**N/A**
8.9.2	Pull test		N/A
8.10	**Carts, stands and similar carriers**		**N/A**
8.10.1	General		N/A
8.10.2	Marking and instructions ....:		N/A
8.10.3	Cart, stand or carrier loading test		N/A
	Loading force applied (N)..:		N/A
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Force applied (N)...:		—
8.10.6	Thermoplastic temperature stability		N/A
8.11	**Mounting means for slide-rail mounted equipment (SRME)**		**N/A**
8.11.1	General		N/A
8.11.2	Requirements for slide rails		N/A
	Instructional Safeguard ....:		N/A
8.11.3	Mechanical strength test		N/A
8.11.3.1	Downward force test, force (N) applied ....:		N/A
8.11.3.2	Lateral push force test		N/A
8.11.3.3	Integrity of slide rail end stops		N/A
8.11.4	Compliance		N/A
8.12	**Telescoping or rod antennas**		**N/A**
	Button/ball diameter (mm)...:		—

9	**THERMAL BURN INJURY**		**P**
9.2	**Thermal energy source classifications**		**P**
9.3	**Touch temperature limits**		**P**
9.3.1	Touch temperatures of accessible parts ....:	(See appended table)	P
9.3.2	Test method and compliance		P
9.4	**Safeguards against thermal energy sources**		**N/A**
9.5	**Requirements for safeguards**		**N/A**
9.5.1	Equipment safeguard		N/A
9.5.2	Instructional safeguard..:		N/A
9.6	**Requirements for wireless power transmitters**		**N/A**
9.6.1	General		N/A
9.6.2	Specification of the foreign objects		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.6.3	Test method and compliance...................................:	(See appended table 9.6)	N/A
10	**RADIATION**		**P**
10.2	**Radiation energy source classification**		**P**
10.2.1	General classification	RS1	P
	Lasers ....:		—
	Lamps and lamp systems ....:		—
	Image projectors ....:		—
	X-Ray ....:		—
	Personal music player...:		—
10.3	**Safeguards against laser radiation**		**N/A**
	The standard(s) equipment containing laser(s) comply ....:		N/A
10.4	**Safeguards against optical radiation from lamps and lamp systems (including LED types)**		**P**
10.4.1	General requirements	LEDs for indicating lights only	P
	Instructional safeguard provided for accessible radiation level needs to exceed		N/A
	Risk group marking and location ....:		N/A
	Information for safe operation and installation		N/A
10.4.2	Requirements for enclosures		N/A
	UV radiation exposure...:		N/A
10.4.3	Instructional safeguard...:		N/A
10.5	**Safeguards against X-radiation**		**N/A**
10.5.1	Requirements		N/A
	Instructional safeguard for skilled persons ....:		—
10.5.3	Maximum radiation (pA/kg)....................................:	(See appended tables B.3 & B.4)	—
10.6	**Safeguards against acoustic energy sources**		**P**
10.6.1	General		P
10.6.2	Classification	RS1	P
	Acoustic output $L_{Aeq,T}$, dB(A)....................................:	< 85dB(A)	P
	Unweighted RMS output voltage (mV).....................:		N/A
	Digital output signal (dBFS) ....:		N/A
10.6.3	Requirements for dose-based systems		N/A
10.6.3.1	General requirements		N/A
10.6.3.2	Dose-based warning and automatic decrease		N/A
10.6.3.3	Exposure-based warning and requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	30 s integrated exposure level (MEL30)...................:		N/A
	Warning for MEL ≥ 100 dB(A)..................................:		N/A
10.6.4	Measurement methods		N/A
10.6.5	Protection of persons		N/A
	Instructional safeguards..:		N/A
10.6.6	Requirements for listening devices (headphones, earphones, etc.)		P
10.6.6.1	Corded listening devices with analogue input		N/A
	Listening device input voltage (mV).......................:		N/A
10.6.6.2	Corded listening devices with digital input		N/A
	Max. acoustic output $L_{Aeq,T}$, dB(A) ....:		N/A
10.6.6.3	Cordless listening devices		P
	Max. acoustic output $L_{Aeq,T}$, dB(A) ....:	80dB(A)	—

B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS**		**P**
B.1	**General**		**P**
B.1.5	Temperature measurement conditions	(See appended table B.1.5)	P
B.2	**Normal operating conditions**		**P**
B.2.1	General requirements ....:	(See Test Item Particulars and appended test tables)	P
	Audio Amplifiers and equipment with audio amplifiers...:	(See Annex E)	P
B.2.3	Supply voltage and tolerances		P
B.2.5	Input test ....:	(See appended table B.2.5)	P
B.3	**Simulated abnormal operating conditions**		**P**
B.3.1	General		P
B.3.2	Covering of ventilation openings	No ventilation openings	N/A
	Instructional safeguard..:		N/A
B.3.3	DC mains polarity test		N/A
B.3.4	Setting of voltage selector		N/A
B.3.5	Maximum load at output terminals		N/A
B.3.6	Reverse battery polarity		P
B.3.7	Audio amplifier abnormal operating conditions	Considered	P
B.3.8	Safeguards functional during and after abnormal operating conditions..:	(See appended table B.3)	P
B.4	**Simulated single fault conditions**		**P**
B.4.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
B.4.2	Temperature controlling device	No such controlling device	N/A
B.4.3	Blocked motor test		N/A
B.4.4	Functional insulation	(See appended table B.4)	P
B.4.4.1	Short circuit of clearances for functional insulation		P
B.4.4.2	Short circuit of creepage distances for functional insulation		P
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A
B.4.5	Short-circuit and interruption of electrodes in tubes and semiconductors	(See appended table B.4)	P
B.4.6	Short circuit or disconnection of passive components	(See appended table B.4)	P
B.4.7	Continuous operation of components		N/A
B.4.8	Compliance during and after single fault conditions ....:	(See appended table B.4)	P
B.4.9	Battery charging and discharging under single fault conditions	(See Annex M)	P
C	**UV RADIATION**		**N/A**
C.1	**Protection of materials in equipment from UV radiation**		**N/A**
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
C.2	**UV light conditioning test**		**N/A**
C.2.1	Test apparatus ....:		N/A
C.2.2	Mounting of test samples		N/A
C.2.3	Carbon-arc light-exposure test		N/A
C.2.4	Xenon-arc light-exposure test		N/A
D	**TEST GENERATORS**		**N/A**
D.1	**Impulse test generators**		**N/A**
D.2	**Antenna interface test generator**		**N/A**
D.3	**Electronic pulse generator**		**N/A**
E	**TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS**		**P**
E.1	**Electrical energy source classification for audio signals**		**P**
	Maximum non-clipped output power (W)...............:	Less than PS1 limit	—
	Rated load impedance (Ω) ....:	32Ω	—
	Open-circuit output voltage (V) ....:	Less than ES1 limit	—
	Instructional safeguard...:	See Clause F.5	—
E.2	**Audio amplifier normal operating conditions**		**N/A**
	Audio signal source type..:	Equipment does not contain any audio amplifier	—

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Clause	Requirement + Test	Result - Remark	Verdict
	Audio output power (W) ....:		—
	Audio output voltage (V) ....:		—
	Rated load impedance (Ω) ....:		—
	Requirements for temperature measurement	(See Table B.1.5)	N/A
E.3	Audio amplifier abnormal operating conditions	(See Table B.3, B.4)	P
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		**P**
F.1	**General**		**P**
	Language ....:	English version checked	—
F.2	**Letter symbols and graphical symbols**		**P**
F.2.1	Letter symbols according to IEC60027-1		P
F.2.2	Graphic symbols according to IEC, ISO or manufacturer specific		P
F.3	**Equipment markings**		**P**
F.3.1	Equipment marking locations	Located on the product surface	P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification ....:	See the label	P
F.3.2.2	Model identification ....:	See the label	P
F.3.3	Equipment rating markings		P
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains		P
F.3.3.3	Nature of the supply voltage ....:	⎓	P
F.3.3.4	Rated voltage ....:	See the page 2	P
F.3.3.5	Rated frequency...:	DC only	N/A
F.3.3.6	Rated current or rated power ....:	See the page 2	P
F.3.3.7	Equipment with multiple supply connections	No multiple supply connection	N/A
F.3.4	Voltage setting device	No such device	N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings ....:		N/A
F.3.5.2	Switch position identification marking ....:		N/A
F.3.5.3	Replacement fuse identification and rating markings ....:		N/A
	Instructional safeguards for neutral fuse................:		N/A
F.3.5.4	Replacement battery identification marking...........:	See Annex M.10	P
F.3.5.5	Neutral conductor terminal		N/A
F.3.5.6	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification	Class III equipment	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
F.3.6.1	Class I equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal ....:		N/A
F.3.6.1.2	Protective bonding conductor terminals ....:		N/A
F.3.6.2	Equipment class marking......................................:		N/A
F.3.6.3	Functional earthing terminal marking.....................:		N/A
F.3.7	Equipment IP rating marking.................................:	IP20, no marking is needed	N/A
F.3.8	External power supply output marking...................:		N/A
F.3.9	Durability, legibility and permanence of marking		P
F.3.10	Test for permanence of markings		P
F.4	**Instructions**		**P**
	a) Information prior to installation and initial use		P
	b) Equipment for use in locations where children not likely to be present		N/A
	c) Instructions for installation and interconnection		N/A
	d) Equipment intended for use only in restricted access area		N/A
	e) Equipment intended to be fastened in place		N/A
	f) Instructions for audio equipment terminals		N/A
	g) Protective earthing used as a safeguard		N/A
	h) Protective conductor current exceeding ES2 limits		N/A
	i) Graphic symbols used on equipment		P
	j) Permanently connected equipment not provided with all-pole mains switch		N/A
	k) Replaceable components or modules providing safeguard function		N/A
	l) Equipment containing insulating liquid		N/A
	m) Installation instructions for outdoor equipment		N/A
F.5	**Instructional safeguards**		**P**
G	**COMPONENTS**		**P**
G.1	**Switches**		**N/A**
G.1.1	General		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.1.3	Test method and compliance		N/A
G.2	**Relays**		**N/A**
G.2.1	Requirements		N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supplying power to other equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.2.4	Test method and compliance		N/A
G.3	**Protective devices**		**N/A**
G.3.1	Thermal cut-offs		N/A
	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Test method and compliance		N/A
G.3.2	Thermal links		N/A
G.3.2.1	a) Thermal links tested separately according to IEC 60691 with specifics		N/A
	b) Thermal links tested as part of the equipment		N/A
G.3.2.2	Test method and compliance		N/A
G.3.3	PTC thermistors		N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.4		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions ....:	(See appended table B.4)	N/A
G.4	**Connectors**		**N/A**
G.4.1	Spacings		N/A
G.4.2	Mains connector configuration ....:		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
G.5	**Wound components**		**N/A**
G.5.1	Wire insulation in wound components		N/A
G.5.1.2	Protection against mechanical stress		N/A
G.5.2	Endurance test		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Test time (days per cycle).....................................:		—
	Test temperature (°C) ....:		—
G.5.2.3	Wound components supplied from the mains		N/A
G.5.2.4	No insulation breakdown		N/A
G.5.3	Transformers		N/A
G.5.3.1	Compliance method ....:		N/A
	Position ....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Method of protection ....:		N/A
G.5.3.2	Insulation		N/A
	Protection from displacement of windings ....:		—
G.5.3.3	Transformer overload tests		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding temperatures		N/A
G.5.3.3.3	Winding temperatures - alternative test method		N/A
G.5.3.4	Transformers using FIW		N/A
G.5.3.4.1	General		N/A
	FIW wire nominal diameter ....:		—
G.5.3.4.2	Transformers with basic insulation only		N/A
G.5.3.4.3	Transformers with double insulation or reinforced insulation ....:		N/A
G.5.3.4.4	Transformers with FIW wound on metal or ferrite core		N/A
G.5.3.4.5	Thermal cycling test and compliance		N/A
G.5.3.4.6	Partial discharge test		N/A
G.5.3.4.7	Routine test		N/A
G.5.4	Motors		N/A
G.5.4.1	General requirements		N/A
G.5.4.2	Motor overload test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4.2	Locked-rotor overload test		N/A
	Test duration (days) ....:		—
G.5.4.5	Running overload test for DC motors		N/A
G.5.4.5.2	Tested in the unit		N/A
G.5.4.5.3	Alternative method		N/A
G.5.4.6	Locked-rotor overload test for DC motors		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature ....:		N/A
G.5.4.6.3	Alternative method		N/A
G.5.4.7	Motors with capacitors		N/A
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage ....:		—
G.6	**Wire Insulation**		**N/A**
G.6.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.6.2	Enamelled winding wire insulation		N/A
G.7	**Mains supply cords**		**N/A**
G.7.1	General requirements		N/A
	Type ....:		—
G.7.2	Cross sectional area (mm^2 or AWG).....................:		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N) ....:		N/A
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm) ......:		N/A
G.7.3.2.4	Strain relief and cord anchorage material		N/A
G.7.4	Cord Entry		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Test method and compliance		N/A
	Overall diameter or minor overall dimension, *D* (mm)..:		—
	Radius of curvature after test (mm) ....:		—
G.7.6	Supply wiring space		N/A
G.7.6.1	General requirements		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Requirements		N/A
G.7.6.2.2	Test with 8 mm strand		N/A
G.8	**Varistors**		**N/A**
G.8.1	General requirements		N/A
G.8.2	Safeguards against fire		N/A
G.8.2.1	General		N/A
G.8.2.2	Varistor overload test		N/A
G.8.2.3	Temporary overvoltage test		N/A
G.9	**Integrated circuit (IC) current limiters**		**N/A**
G.9.1	Requirements		N/A
	IC limiter output current (max. 5A).........................:		—
	Manufacturers' defined drift ....:		—
G.9.2	Test Program		N/A
G.9.3	Compliance		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.10	**Resistors**		**N/A**
G.10.1	General		N/A
G.10.2	Conditioning		N/A
G.10.3	Resistor test		N/A
G.10.4	Voltage surge test		N/A
G.10.5	Impulse test		N/A
G.10.6	Overload test		N/A
G.11	**Capacitors and RC units**		**N/A**
G.11.1	General requirements		N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	**Optocouplers**		**N/A**
	Optocouplers comply with IEC 60747-5-5 with specifics		N/A
	Type test voltage $V_{ini,a}$ ....:		—
	Routine test voltage, $V_{ini,\ b}$ ....:		—
G.13	**Printed boards**		**P**
G.13.1	General requirements		P
G.13.2	Uncoated printed boards		P
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation...................................:		N/A
	Number of insulation layers (pcs) ....:		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2	Test method and compliance		N/A
G.14	**Coating on components terminals**		**N/A**
G.14.1	Requirements ....:		N/A
G.15	**Pressurized liquid filled components**		**N/A**
G.15.1	Requirements		N/A
G.15.2	Test methods and compliance		N/A
G.15.2.1	Hydrostatic pressure test		N/A
G.15.2.2	Creep resistance test		N/A
G.15.2.3	Tubing and fittings compatibility test		N/A
G.15.2.4	Vibration test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.15.2.5	Thermal cycling test		N/A
G.15.2.6	Force test		N/A
G.15.3	Compliance		N/A
G.16	**IC including capacitor discharge function (ICX)**		**N/A**
G.16.1	Condition for fault tested is not required		N/A
	ICX with associated circuitry tested in equipment		N/A
	ICX tested separately		N/A
G.16.2	Tests		N/A
	Smallest capacitance and smallest resistance specified by ICX manufacturer for impulse test .....:		—
	Mains voltage that impulses to be superimposed on ....:		—
	Largest capacitance and smallest resistance for ICX tested by itself for 10000 cycles test...............:		—
G.16.3	Capacitor discharge test ....:		N/A
H	**CRITERIA FOR TELEPHONE RINGING SIGNALS**		**N/A**
H.1	**General**		**N/A**
H.2	**Method A**		**N/A**
H.3	**Method B**		**N/A**
H.3.1	Ringing signal		N/A
H.3.1.1	Frequency (Hz) ....:		—
H.3.1.2	Voltage (V) ....:		—
H.3.1.3	Cadence; time (s) and voltage (V) ....:		—
H.3.1.4	Single fault current (mA): ....:		—
H.3.2	Tripping device and monitoring voltage		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V)..:		N/A
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		**N/A**
J.1	**General**		**N/A**
	Winding wire insulation ....:		—
	Solid round winding wire, diameter (mm) ....:		N/A
	Solid square and rectangular (flatwise bending) winding wire, cross-sectional area (mm^2) ....:		N/A
J.2/J.3	Tests and Manufacturing	(See separate test report)	—
K	**SAFETY INTERLOCKS**		**N/A**
K.1	**General requirements**		**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
	Instructional safeguard...:		N/A
K.2	**Components of safety interlock safeguard mechanism**		**N/A**
K.3	**Inadvertent change of operating mode**		**N/A**
K.4	**Interlock safeguard override**		**N/A**
K.5	**Fail-safe**		**N/A**
K.5.1	Under single fault condition		N/A
K.6	**Mechanically operated safety interlocks**		**N/A**
K.6.1	Endurance requirement		N/A
K.6.2	Test method and compliance................................:		N/A
K.7	**Interlock circuit isolation**		**N/A**
K.7.1	Separation distance for contact gaps & interlock circuit elements		N/A
	In circuit connected to mains, separation distance for contact gaps (mm)..:		N/A
	In circuit isolated from mains, separation distance for contact gaps (mm)..:		N/A
	Electric strength test before and after the test of K.7.2..:		N/A
K.7.2	Overload test, Current (A).....................................:		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test		N/A
L	**DISCONNECT DEVICES**		N/A
L.1	**General requirements**		N/A
L.2	**Permanently connected equipment**		N/A
L.3	**Parts that remain energized**		N/A
L.4	**Single-phase equipment**		N/A
L.5	**Three-phase equipment**		N/A
L.6	**Switches as disconnect devices**		N/A
L.7	**Plugs as disconnect devices**		N/A
L.8	**Multiple power sources**		N/A
	Instructional safeguard...:		N/A
M	**EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS**		P
M.1	**General requirements**		P
M.2	**Safety of batteries and their cells**		P
M.2.1	Batteries and their cells comply with relevant IEC standards ....:	Complied with IEC/EN 62133-2	P
M.3	**Protection circuits for batteries provided within the equipment**		P

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Clause	Requirement + Test	Result - Remark	Verdict

M.3.1	Requirements		P
M.3.2	Test method		P
	Overcharging of a rechargeable battery		P
	Excessive discharging		P
	Unintentional charging of a non-rechargeable battery		N/A
	Reverse charging of a rechargeable battery	Not possible to happen reverse Charging	P
M.3.3	Compliance	(See appended table M.3)	P
M.4	**Additional safeguards for equipment containing a portable secondary lithium battery**		**P**
M.4.1	General		P
M.4.2	Charging safeguards		P
M.4.2.1	Requirements		P
M.4.2.2	Compliance ....:	(See appended table M.4.2)	P
M.4.3	Fire enclosure ....:	Fire enclosure provided	P
M.4.4	Drop test of equipment containing a secondary lithium battery		P
M.4.4.2	Preparation and procedure for the drop test		P
M.4.4.3	Drop, Voltage on reference and dropped batteries (V); voltage difference during 24 h period (%): ....:	Voltage difference less than 5%	P
M.4.4.4	Check of the charge/discharge function		P
M.4.4.5	Charge / discharge cycle test		P
M.4.4.6	Compliance		P
M.5	**Risk of burn due to short-circuit during carrying**		**N/A**
M.5.1	Requirement		N/A
M.5.2	Test method and compliance		N/A
M.6	**Safeguards against short-circuits**		**P**
M.6.1	External and internal faults		P
M.6.2	Compliance		P
M.7	**Risk of explosion from lead acid and NiCd batteries**		**N/A**
M.7.1	Ventilation preventing explosive gas concentration		N/A
	Calculated hydrogen generation rate.....................:		N/A
M.7.2	Test method and compliance		N/A
	Minimum air flow rate, Q (m^3/h) ....:		N/A
M.7.3	Ventilation tests		N/A
M.7.3.1	General		N/A
M.7.3.2	Ventilation test – alternative 1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Hydrogen gas concentration (%) ....:		N/A
M.7.3.3	Ventilation test – alternative 2		N/A
	Obtained hydrogen generation rate ....:		N/A
M.7.3.4	Ventilation test – alternative 3		N/A
	Hydrogen gas concentration (%) ....:		N/A
M.7.4	Marking ....:		N/A
M.8	**Protection against internal ignition from external spark sources of batteries with aqueous electrolyte**		**N/A**
M.8.1	General		N/A
M.8.2	Test method		N/A
M.8.2.1	General		N/A
M.8.2.2	Estimation of hypothetical volume V_Z (m^3/s)..........:		—
M.8.2.3	Correction factors..:		—
M.8.2.4	Calculation of distance *d* (mm) ....:		—
M.9	**Preventing electrolyte spillage**		**N/A**
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	Instructions to prevent reasonably foreseeable misuse	Provided the instructions includebattery charging, storage and transportation, and disposal and recycling.	P
	Instructional safeguard..:		N/A
N	**ELECTROCHEMICAL POTENTIALS**		**N/A**
	Material(s) used ....:		—
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		**P**
	Value of *X* (mm) ....:	Considered	—
P	**SAFEGUARDS AGAINST CONDUCTIVE OBJECTS**		**N/A**
P.1	**General**	No openings	**N/A**
P.2	**Safeguards against entry or consequences of entry of a foreign object**		**N/A**
P.2.1	General		N/A
P.2.2	Safeguards against entry of a foreign object		N/A
	Location and Dimensions (mm) ....:		—
P.2.3	Safeguards against the consequences of entry of a foreign object		N/A
P.2.3.1	Safeguard requirements		N/A
	The ES3 and PS3 keep-out volume in Figure P.3 not applicable to transportable equipment		N/A
	Transportable equipment with metalized plastic parts ....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
P.2.3.2	Consequence of entry test ....:		N/A
P.3	**Safeguards against spillage of internal liquids**		**N/A**
P.3.1	General		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Compliance		N/A
P.4	**Metallized coatings and adhesives securing parts**		**N/A**
P.4.1	General		N/A
P.4.2	Tests		N/A
	Conditioning, T_C (°C)...:		—
	Duration (weeks)...:		—
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		N/A
Q.1	**Limited power sources**		N/A
Q.1.1	Requirements		N/A
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Regulating network limited output		N/A
	d) Overcurrent protective device limited output		N/A
	e) IC current limiter complying with G.9		N/A
Q.1.2	Test method and compliance.................................:	(See appended table Q.1)	N/A
	Current rating of overcurrent protective device (A) ....:		N/A
Q.2	**Test for external circuits – paired conductor cable**		**N/A**
	Maximum output current (A) ....:		N/A
	Current limiting method..:		—
R	**LIMITED SHORT CIRCUIT TEST**		**N/A**
R.1	**General**		**N/A**
R.2	**Test setup**		**N/A**
	Overcurrent protective device for test....................:		—
R.3	**Test method**		**N/A**
	Cord/cable used for test...:		—
R.4	**Compliance**		**N/A**
S	**TESTS FOR RESISTANCE TO HEAT AND FIRE**		**N/A**
S.1	**Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W**		**N/A**
	Samples, material ....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Wall thickness (mm)...:		—
	Conditioning (°C)..:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	**Flammability test for fire enclosure and fire barrier integrity**		**N/A**
	Samples, material ....:		—
	Wall thickness (mm)...:		—
	Conditioning (°C)..:		—
S.3	**Flammability test for the bottom of a fire enclosure**		**N/A**
S.3.1	Mounting of samples		N/A
S.3.2	Test method and compliance		N/A
	Mounting of samples ....:		—
	Wall thickness (mm)...:		—
S.4	**Flammability classification of materials**		**N/A**
S.5	**Flammability test for fire enclosure materials of equipment with a steady state power exceeding 4 000 W**		**N/A**
	Samples, material ....:		—
	Wall thickness (mm)...:		—
	Conditioning (°C)..:		—
T	**MECHANICAL STRENGTH TESTS**		**P**
T.1	General		P
T.2	Steady force test, 10 N ....:	(See appended table T.2)	P
T.3	Steady force test, 30 N ....:		N/A
T.4	Steady force test, 100 N ....:	(See appended table T.4)	P
T.5	Steady force test, 250 N ....:		N/A
T.6	Enclosure impact test		N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test ....:	(See appended table T.7)	P
T.8	Stress relief test ....:	(See appended table T.8)	P
T.9	Glass Impact Test .... :		N/A
T.10	Glass fragmentation test		N/A
	Number of particles counted .... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm)...:		N/A
U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION**		**N/A**
U.1	**General**		**N/A**
	Instructional safeguard :		N/A
U.2	**Test method and compliance for non-intrinsically protected CRTs**		**N/A**
U.3	**Protective screen**		**N/A**
V	**DETERMINATION OF ACCESSIBLE PARTS**		**N/A**
V.1	**Accessible parts of equipment**		**N/A**
V.1.1	General		N/A
V.1.2	Surfaces and openings tested with jointed test probes		N/A
V.1.3	Openings tested with straight unjointed test probes		N/A
V.1.4	Plugs, jacks, connectors tested with blunt probe		N/A
V.1.5	Slot openings tested with wedge probe		N/A
V.1.6	Terminals tested with rigid test wire		N/A
V.2	**Accessible part criterion**		**N/A**
X	**ALTERNATIVE METHOD FOR DETERMINING CLEARANCES FOR INSULATION IN CIRCUITS CONNECTED TO AN AC MAINS NOT EXCEEDING 420 V PEAK (300 V RMS)**		**N/A**
	Clearance .... :	(See appended table X)	N/A
Y	**CONSTRUCTION REQUIREMENTS FOR OUTDOOR ENCLOSURES**		**N/A**
Y.1	**General**		**N/A**
Y.2	**Resistance to UV radiation**		**N/A**
Y.3	**Resistance to corrosion**		**N/A**
Y.3.1	Metallic parts of outdoor enclosures are resistant to effects of water-borne contaminants by.................:		N/A
Y.3.2	Test apparatus		N/A
Y.3.3	Water – saturated sulphur dioxide atmosphere		N/A
Y.3.4	Test procedure ....:		N/A
Y.3.5	Compliance		N/A
Y.4	**Gaskets**		**N/A**
Y.4.1	General		N/A
Y.4.2	Gasket tests		N/A
Y.4.3	Tensile strength and elongation tests		N/A
	Alternative test methods ....:		N/A
Y.4.4	Compression test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Y.4.5	Oil resistance		N/A
Y.4.6	Securing means		N/A
Y.5	**Protection of equipment within an outdoor enclosure**		**N/A**
Y.5.1	General		N/A
Y.5.2	Protection from moisture		N/A
	Relevant tests of IEC 60529 or Y.5.3.....................:		N/A
Y.5.3	Water spray test		N/A
Y.5.4	Protection from plants and vermin		N/A
Y.5.5	Protection from excessive dust		N/A
Y.5.5.1	General		N/A
Y.5.5.2	IP5X equipment		N/A
Y.5.5.3	IP6X equipment		N/A
Y.6	**Mechanical strength of enclosures**		**N/A**
Y.6.1	General		N/A
Y.6.2	Impact test...:	(See Table T.6)	N/A

ATTACHMENT TO TEST REPORT
IEC 62368-1
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES
(Audio/video, information and communication technology equipment - Part 1: Safety requirements)

Differences according to................:	EN IEC 62368-1:2020+A11:2020
Attachment Form No......................:	EU_GD_IEC62368_1E
Attachment Originator ....:	UL(Demko)
Master Attachment ....:	2021-02-04

	CENELEC COMMON MODIFICATIONS (EN)	P
	Clause numbers in the cells that are shaded light grey are clause references in EN IEC 62368-1:2020+A11:2020. All other clause numbers in that column, except for those in the paragraph below, refers to IEC 62368-1:2018. Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2018 are prefixed “Z”.	P
	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords	P
1	**Modification to Clause 3.**	N/A

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
3.3.19	**Sound exposure** *Replace 3.3.19 of IEC 62368-1 with the following definitions:*		N/A
3.3.19.1	**momentary exposure level, MEL** metric for estimating 1 s sound exposure level from the HD 483-1 S2 test signal applied to both channels, based on EN 50332-1:2013, 4.2. Note 1 to entry: MEL is measured as A-weighted levels in dB. Note 2 to entry: See B.3 of EN 50332-3:2017 for additional information.		N/A
3.3.19.3	**sound exposure, *E*** A-weighted sound pressure (*p*) squared and integrated over a stated period of time, *T* Note 1 to entry: The SI unit is Pa^2 s. $E = \int_0^T p(t)^2 \, dt$		N/A
3.3.19.4	**sound exposure level, *SEL*** logarithmic measure of sound exposure relative to a reference value, E_0, typically the 1 kHz threshold of hearing in humans. Note 1 to entry: *SEL* is measured as A-weighted levels in dB. $SEL = 10 \lg \left(\frac{E}{E_0}\right)$ dB Note 2 to entry: See B.4 of EN 50332-3:2017 for additional information.		N/A
3.3.19.5	**digital signal level relative to full scale, dBFS** levels reported in dBFS are always r.m.s. Full scale level, 0 dBFS, is the level of a dc-free 997-Hz sine wave whose undithered positive peak value is positive digital full scale, leaving the code corresponding to negative digital full scale unused Note 1 to entry: It is invalid to use dBFS for non-r.m.s. levels. Because the definition of full scale is based on a sine wave, the level of signals with a crest factor lower than that of a sine wave may exceed 0 dBFS. In particular, square wave signals may reach +3,01 dBFS.		N/A
2	**Modification to Clause 10**		
10.6	**Safeguards against acoustic energy sources** Replace 10.6 of IEC 62368-1 with the following:		P
10.6.1.1	**Introduction** **Safeguard** requirements for protection against long-term exposure to excessive sound pressure		P

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	levels from personal music players closely coupled to the ear are specified below. Requirements for earphones and headphones intended for use with personal music players are also covered. A personal music player is a portable equipment intended for use by an **ordinary person**, that: – is designed to allow the user to listen to audio or audiovisual content / material; and – uses a listening device, such as headphones or earphones that can be worn in or on or around the ears; and – has a player that can be body worn (of a size suitable to be carried in a clothing pocket) and is intended for the user to walk around with while in continuous use (for example, on a street, in a subway, at an airport, etc.). EXAMPLES Portable CD players, MP3 audio players, mobile phones with MP3 type features, PDAs or similar equipment. Personal music players shall comply with the requirements of either 10.6.2 or 10.6.3. NOTE 1 Protection against acoustic energy sources from telecom applications is referenced to ITU-T P.360. NOTE 2 It is the intention of the Committee to allow the alternative methods for now, but to only use the dose measurement method as given in 10.6.5 in future. Therefore, manufacturers are encouraged to implement 10.6.5 as soon as possible. Listening devices sold separately shall comply with the requirements of 10.6.6. These requirements are valid for music or video mode only. The requirements do not apply to: – professional equipment; NOTE 3 Professional equipment is equipment sold through special sales channels. All products sold through normal electronics stores are considered not to be professional equipment. – hearing aid equipment and other devices for assistive listening; – the following type of analogue personal music players: • long distance radio receiver (for example, a multiband radio receiver or world band radio receiver, an AM radio receiver), and • cassette player/recorder; NOTE 4 This exemption has been allowed because this technology is falling out of use and it is expected that within a few years it will no longer exist. This exemption will not be extended to other technologies. – a player while connected to an external amplifier that does not allow the user to walk around while in use.		

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For equipment that is clearly designed or intended primarily for use by children, the limits of the relevant toy standards may apply. The relevant requirements are given in EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		
10.6.1.2	**Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz** The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body mounted devices, attention is drawn to EN 50360 and EN 50566.		P
10.6.2	**Classification of devices without the capacity to estimate sound dose**		N/A
10.6.2.1	**General** This standard is transitioning from short-term based (30 s) requirements to long-term based (40 hour) requirements. These clauses remain in effect only for devices that do not comply with sound dose estimation as stipulated in EN 50332-3. For classifying the acoustic output $L_{Aeq,T}$, measurements are based on the A-weighted equivalent sound pressure level over a 30 s period. For music where the average sound pressure (long term $L_{Aeq,T}$) measured over the duration of the song is lower than the average produced by the programme simulation noise, measurements may be done over the duration of the complete song. In this case, *T* becomes the duration of the song. NOTE Classical music, acoustic music and broadcast typically has an average sound pressure (long term $L_{Aeq,T}$) which is much lower than the average programme simulation noise. Therefore, if the player is capable to analyse the content and compare it with the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song does not exceed the required limit. For example, if the player is set with the programme simulation noise to 85 dB, but the average music level of the song is only 65 dB, there is no need to give a warning or ask an acknowledgement as long as the average sound level of the song is not above the basic limit of 85 dB.		N/A
10.6.2.2	**RS1 limits (to be superseded, see 10.6.3.2)** RS1 is a class 1 acoustic energy source that does not exceed the following:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	– for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 85 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 27 mV (analogue interface) or -25 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1. – The RS1 limits will be updated for all devices as per 10.6.3.2.		
10.6.2.3	**RS2 limits (to be superseded, see 10.6.3.3)** RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or when the combination of player and listening device is known by other means such as setting or automatic 130 detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 100 dB(A) when playing the fixed “programme simulation noise” as described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 150 mV (analogue interface) or -10 dBFS (digital interface) when playing the fixed “programme simulation noise” as described in EN 50332-1.		N/A
10.6.2.4	**RS3 limits** RS3 is a class 3 acoustic energy source that exceeds RS2 limits.		N/A
10.6.3	**Classification of devices (new)**		N/A
10.6.3.1	**General** Previous limits (10.6.2) created abundant false negative and false positive PMP sound level warnings. New limits, compliant with The Commission Decision of 23 June 2009, are given below.		N/A
10.6.3.2	**RS1 limits (new)** RS1 is a class 1 acoustic energy source that does not exceed the following: – for equipment provided as a package (player		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 80 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1.		
10.6.3.3	**RS2 limits (new)** RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the weekly sound exposure level, as described in EN 50332-3, shall be ≤ 80 dB when playing the fixed "programme simulation noise" described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output level, integrated over one week, as described in EN50332-3, shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1.		N/A
10.6.4	**Requirements for maximum sound exposure**		N/A
10.6.4.1	**Measurement methods** All volume controls shall be turned to maximum during tests. Measurements shall be made in accordance with EN 50332-1 or EN 50332-2 as applicable.		N/A
10.6.4.2	**Protection of persons** Except as given below, protection requirements for parts **accessible** to **ordinary persons**, **instructed persons** and **skilled persons** are given in 4.3. NOTE 1 Volume control is not considered a **safeguard.** Between RS2 and an **ordinary person**, the **basic safeguard** may be replaced by an **instructional safeguard** in accordance with Clause F.5, except that the **instructional safeguard** shall be placed		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	on the equipment, or on the packaging, or in the instruction manual. Alternatively, the **instructional safeguard** may be given through the equipment display during use. The elements of the **instructional safeguard** shall be as follows: – element 1a: the symbol , IEC 60417-6044 (2011-01) – element 2: “High sound pressure” or equivalent wording – element 3: “Hearing damage risk” or equivalent wording – element 4: “Do not listen at high volume levels for long periods.” or equivalent wording An **equipment safeguard** shall prevent exposure of an **ordinary person** to an RS2 source without intentional physical action from the **ordinary person** and shall automatically return to an output level not exceeding what is specified for an RS1 source when the power is switched off. The equipment shall provide a means to actively inform the user of the increased sound level when the equipment is operated with an output exceeding RS1. Any means used shall be acknowledged by the user before activating a mode of operation which allows for an output exceeding RS1. The acknowledgement does not need to be repeated more than once every 20 h of cumulative listening time. NOTE 2 Examples of means include visual or audible signals. Action from the user is always needed. NOTE 3 The 20 h listening time is the accumulative listening time, independent of how often and how long the personal music player has been switched off. A **skilled person** shall not be unintentionally exposed to RS3.		
10.6.5	**Requirements for dose-based systems**		N/A
10.6.5.1	**General requirements** Personal music players shall give the warnings as provided below when tested according to EN 50332-3, using the limits from this clause. The manufacturer may offer optional settings to allow the users to modify when and how they wish to receive the notifications and warnings to promote a better user experience without defeating the safeguards. This allows the users to be informed in a method that best meets their physical capabilities and device usage needs. If such optional settings		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	are offered, an administrator (for example, parental restrictions, business/educational administrators, etc.) shall be able to lock any optional settings into a specific configuration. The personal music player shall be supplied with easy to understand explanation to the user of the dose management system, the risks involved, and how to use the system safely. The user shall be made aware that other sources may significantly contribute to their sound exposure, for example work, transportation, concerts, clubs, cinema, car races, etc.		
10.6.5.2	**Dose-based warning and requirements** When a dose of 100 % *CSD* is reached, and at least at every 100 % further increase of *CSD*, the device shall warn the user and require an acknowledgement. In case the user does not acknowledge, the output level shall automatically decrease to compliance with class RS1. The warning shall at least clearly indicate that listening above 100 % *CSD* leads to the risk of hearing damage or loss.		N/A
10.6.5.3	**Exposure-based requirements** With only dose-based requirements, cause and effect could be far separated in time, defying the purpose of educating users about safe listening practice. In addition to dose-based requirements, a PMP shall therefore also put a limit to the short-term sound level a user can listen at. The exposure-based limiter (EL) shall automatically reduce the sound level not to exceed 100 dB(A) or 150 mV integrated over the past 180 s, based on methodology defined in EN 50332-3. The EL settling time (time from starting level reduction to reaching target output) shall be 10 s or faster. Test of EL functionality is conducted according to EN 50332-3, using the limits from this clause. For equipment provided as a package (player with its listening device), the level integrated over 180 s shall be 100 dB or lower. For equipment provided with a standardized connector, the unweighted level integrated over 180 s shall be no more than 150 mV for an analogue interface and no more than -10 dBFS for a digital interface. NOTE In case the source is known not to be music (or test signal), the EL may be disabled.		N/A
10.6.6	**Requirements for listening devices (headphones, earphones, etc.)**		P
10.6.6.1	**Corded listening devices with analogue input**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	With 94 dB L_{Aeq} acoustic pressure output of the listening device, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the input voltage of the listening device when playing the fixed “programme simulation noise” as described in EN 50332-1 shall be ≥ 75 mV. NOTE The values of 94 dB and 75 mV correspond with 85 dB and 27 mV or 100 dB and 150 mV.		
10.6.6.2	**Corded listening devices with digital input** With any playing device playing the fixed “programme simulation noise” described in EN 50332-1, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.		N/A
10.6.6.3	**Cordless listening devices** In cordless mode, – with any playing and transmitting device playing the fixed programme simulation noise described in EN 50332-1; and – respecting the cordless transmission standards, where an air interface standard exists that specifies the equivalent acoustic level; and – with volume and sound settings in the receiving device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output for the above mentioned programme simulation noise, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.		P
10.6.6.4	**Measurement method** *Measurements shall be made in accordance with EN 50332-2 as applicable.*		P

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Clause	Requirement + Test	Result - Remark	Verdict

Clause	Requirement + Test	Result - Remark	Verdict
3	**Modification to the whole document**		P
	Delete all the “country” notes in the reference document according to the following list:		P

0.2.1	Note 1 and 2	1	Note 4 and 5	3.3.8.1	Note 2
3.3.8.3	Note 1	4.1.15	Note	4.7.3	Note 1 and 2
5.2.2.2	Note	5.4.2.3.2.2 Table 12	Note c	5.4.2.3.2.4	Note 1 and 3
5.4.2.3.2.4 Table 13	Note 2	5.4.2.5	Note 2	5.4.5.1	Note
5.4.10.2.1	Note	5.4.10.2.2	Note	5.4.10.2.3	Note
5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3 and 4
5.6.8	Note 2	5.7.6	Note	5.7.7.1	Note 1 and Note 2
8.5.4.2.3	Note	10.2.1 Table 39	Note 3 and 4 and 5	10.5.3	Note 2
10.6.1	Note 3	F.3.3.6	Note 3	Y.4.1	Note
Y.4.5	Note				

Clause	Requirement + Test	Result - Remark	Verdict
4	**Modification to Clause 1**		N/A
1	***Add*** *the following note:* *NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.*		N/A
5	**Modification to 4.Z1**		N/A
4.Z1	***Add*** *the following new subclause after 4.9:* To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. **mains**, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) it is permitted for **pluggable equipment type B** or **permanently connected equipment**, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for **pluggable equipment type A** the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		
6	**Modification to 5.4.2.3.2.4**		N/A
5.4.2.3.2.4	***Add*** *the following to the end of this subclause:* The requirement for interconnection with **external circuit** is in addition given in EN 50491-3:2009.		N/A
7	**Modification to 10.2.1**		N/A
10.2.1	Add the following to c) and d) in table 39: For additional requirements, see 10.5.1.		N/A
8	**Modification to 10.5.1**		N/A
10.5.1	***Add*** *the following after the first paragraph:* For RS 1 compliance is checked by measurement under the following conditions: In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or pre-sets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made. NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm², at any point 10 cm from the outer surface of the apparatus. Moreover, the measurement shall be made under fault conditions causing an increase of the high voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made. For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		
9	**Modification to G.7.1**		N/A
G.7.1	***Add*** *the following note:* NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A
10	**Modification to Bibliography**		P
	Add the following notes for the standards indicated: IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1. IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		P
11	**ADDITION OF ANNEXES**		N/A
ZB	**ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.1.15	**Denmark, Finland, Norway** and **Sweden** To the end of the subclause the following is added: **Class I pluggable equipment type A** intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and **accessible** parts, have a marking stating that the equipment shall be connected to an earthed **mains** socket-outlet. The marking text in the applicable countries shall be as follows: In **Denmark**: "Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord." In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: "Apparatet må tilkoples jordet stikkontakt" In **Sweden**: "Apparaten skall anslutas till jordat uttag"		N/A
4.7.3	**United Kingdom** To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex		N/A
5.2.2.2	**Denmark** After the 2nd paragraph add the following: A warning (marking safeguard) for high touch current is required if the touch current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.4.11.1 and Annex G	**Finland and Sweden** To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5 kV. It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: • the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; • the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		
5.5.2.1	**Norway** After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
5.5.6	**Finland, Norway** and **Sweden** To the end of the subclause the following is added: Resistors used as **basic safeguard** or bridging **basic insulation** in **class I pluggable equipment type A** shall comply with G.10.1 and the test of G.10.2.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.1	**Denmark** **Add** to the end of the subclause Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment. *Justification:* In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		N/A
5.6.4.2.1	**Ireland and United Kingdom** After the indent for **pluggable equipment type A**, the following is added: – the **protective current rating** is taken to be 13 A, this being the largest rating of fuse used in the **mains** plug.		N/A
5.6.4.2.1	**France** After the indent for **pluggable equipment type A**, the following is added: – in certain cases, the **protective current rating** of the circuit supplied from the mains is taken as 20 A instead of 16 A.		N/A
5.6.5.1	To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm^2 to 1,5 mm^2 in cross-sectional area.		N/A
5.6.8	**Norway** To the end of the subclause the following is added: Equipment connected with an earthed mains plug is classified as **class I equipment**. See the Norway marking requirement in 4.1.15. The symbol IEC 60417-6092, as specified in F.3.6.2, is accepted.		N/A
5.7.6	**Denmark** To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the **protective conductor current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.7.6.2	**Denmark** To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .		N/A
5.7.7.1	**Norway and Sweden** To the end of the subclause the following is added:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)” NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet.” Translation to Swedish: ”Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medfőra risk főr brand. Főr att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.		
8.5.4.2.3	**United Kingdom**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Add the following after the 2nd dash bullet in 3rd paragraph: An emergency stop system complying with the requirements of IEC 60204-1 and ISO 13850 is required where there is a risk of personal injury.		
B.3.1 and B.4	**Ireland and United Kingdom** The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of **direct plug-in equipment**, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the **direct plug-in equipment**, until the requirements of Annexes B.3.1 and B.4 are met		N/A
G.4.2	**Denmark** To the end of the subclause the following is added: Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a polyphase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Justification: Heavy Current Regulations, Section 6c		
G.4.2	**United Kingdom** To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N/A
G.7.1	**United Kingdom** To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a ‘standard plug’ in accordance with the Plugs and Sockets etc. (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations. NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		N/A
G.7.1	**Ireland** To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, “13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard		N/A
G.7.2	**Ireland and United Kingdom** To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm^2 is allowed for equipment which is rated over 10 A and up to and including 13 A.		N/A
ZC	**ANNEX ZC, NATIONAL DEVIATIONS (EN)**		N/A
10.5.2	**Germany** The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	is required, or application of type approval (Bauartzulassung) and marking. *Justification*: German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. **NOTE** Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int+49-531-592-6320, Internet: http://www.ptb.de		

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ZD	IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS (EN)	N/A
		N/A

Type of flexible cord	Code designations	
	IEC	CENELEC
PVC insulated cords		
Flat twin tinsel cord	60227 IEC 41	H03VH-Y
Light polyvinyl chloride sheathed flexible cord	60227 IEC 52	H03VV-F H03VVH2-F
Ordinary polyvinyl chloride sheathed flexible cord	60227 IEC 53	H05VV-F H05VVH2-F
Rubber insulated cords		
Braided cord	60245 IEC 51	H03RT-F
Ordinary tough rubber sheathed flexible cord	60245 IEC 53	H05RR-F
Ordinary polychloroprene sheathed flexible cord	60245 IEC 57	H05RN-F
Heavy polychloroprene sheathed flexible cord	60245 IEC 66	H07RN-F
Cords having high flexibility		
Rubber insulated and sheathed cord	60245 IEC 86	H03RR-H
Rubber insulated, crosslinked PVC sheathed cord	60245 IEC 87	H03RV4-H
Crosslinked PVC insulated and sheathed cord	60245 IEC 88	H03V4V4-H
Cords insulated and sheathed with halogen-free thermoplastic compounds		
Light halogen-free thermoplastic insulated and sheathed flexible cords		H03Z1Z1-F H03Z1Z1H2-F
Ordinary halogen-free thermoplastic insulated and sheathed flexible cords		H05Z1Z1-F H05Z1Z1H2-F

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Clause	Requirement + Test	Result - Remark	Verdict

4.1.2	TABLE: List of critical components				P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity[1]
Plastic enclosure (charging base)	CHI MEI CORPORATION	PA-765A(+)	Thickness min. 1.70mm, V-0, 80°C	UL 94, UL 746C	UL E56070
Plastic enclosure (ear buds)	Unic Technology Corp	UG-3102+	thickness: min. 0.80mm, V-0, 80°C	UL 94, UL 746C	UL E135175
PCB	SHENZHEN XUANSHENG TECHNOLOGY CO LTD	XS-1	V-0, 130°C	UL 94, UL 796	UL E366014
(Alternative)	Interchangeable	Interchangeable	V-0 or better, 130°C	UL 94, UL 796	UL
Battery pack on the charging base	Dongguan zhuoyifeng Technology Co., Ltd	ZYF 801235	3.7Vdc, 350mAh, 1.295Wh	IEC/EN 62133-2:2017	Test Report No: TSZ22090262-P01-R01 Issued by Shenzhen Tiansu Calibration and Testing Co., Ltd.
-Wire	Various	Various	Min. 36AWG, 80℃, VW-1, 600VAC	UL 758	UL
Battery pack on the ear buds	Dongguan zhuoyifeng Technology Co., Ltd.	ZYF 401012	3.7V, 30mAh, 0.111Wh	IEC/EN 62133-2:2017	Test Report No: TSZ22090262-P02-R01 Issued by Shenzhen Tiansu Calibration and Testing Co., Ltd.
Speakers (2pcs)	Shenzhen shengxiang electronic technology co., ltd	K9	32Ω, 3mW	EN IEC 62368-1	Tested with appliance
Supplementary information: 1) an asterisk indicates a mark which assures the agreed level of surveillance. License available upon request.					

5.2	TABLE: Classification of electrical energy sources			P
Supply	Location (e.g.	Test conditions	Parameters	ES

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Voltage	circuit designation)		U (V)	I (mA)	Type[1)]	Additional Info[2)]	Class
5VDC	DC IN	Normal	--	--	SS	DC	ES1
		Abnormal	--	--	SS	DC	
		Single fault –SC/OC	--	--	SS	DC	
Supplementary information:							
1) Type: Steady state (SS), Capacitance (CP), Single pulse (SP), Repetitive pulses (RP), etc. 2) Additional Info: Frequency, Pulse duration, Pulse off time, Capacitance value, etc. 3) SC=Short Circuit, OC=Open Circuit.							

5.4.1.8	**TABLE: Working voltage measurement**				**N/A**
Location	RMS voltage (V)	Peak voltage (V)	Frequency (Hz)	Comments	
--	--	--	--	--	
--	--	--	--	--	
Supplementary information:					

5.4.1.10.2	**TABLE: Vicat softening temperature of thermoplastics**			**N/A**
Method .... :		ISO 306 / B50		—
Object/ Part No./Material	Manufacturer/trademark	Thickness (mm)	T softening (°C)	
--	--	--	--	
--	--	--	--	
Supplementary information:				

5.4.1.10.3	**TABLE: Ball pressure test of thermoplastics**				**N/A**
Allowed impression diameter (mm) .... :		≤2mm			—
Object/Part No./Material	Manufacturer/trademark	Thickness (mm)	Test temperature (°C)	Impression diameter (mm)	
--	--	--	--	--	
Supplementary information:					

5.4.2, 5.4.3	**TABLE: Minimum Clearances/Creepage distance**	**P**

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Clause	Requirement + Test	Result - Remark	Verdict

Clearance (cl) and creepage distance (cr) at/of/between:	U_p (V)	U_{rms} (V)	Freq [1] (Hz)	Required cl (mm)	cl (mm)	E.S.[2] (V)	Required cr (mm)	cr (mm)
B+ to B- on the charging base PCB board	3.7Vdc	3.7Vdc	--	0.2	7.05	--	0.4	7.05
B+ to B- on the ear buds PCB board	3.7Vdc	3.7Vdc	--	0.2	1.02	--	0.4	1.02
Supplementary information:								
1) Only for frequency above 30 kHz; 2) Complete Electric Strength voltage (E.S. (V) when 5.4.2.4 applied); 3) Provide Material Group IIIa/IIIb; 4) BI: basic insulation; SI: supplementary insulation; DI: double insulation; RI: reinforced insulation								

5.4.4.2	**TABLE: Minimum distance through insulation**			**N/A**
Distance through insulation (DTI) at/of	Peak voltage (V)	Insulation	Required DTI (mm)	Measured DTI (mm)
--	--	--	--	--
Supplementary information:				

5.4.4.9	**TABLE: Solid insulation at frequencies >30 kHz**					**N/A**
Insulation material	E_P	Frequency (kHz)	K_R	Thickness d (mm)	Insulation	V_{PW} (Vpk)
--	--	--	--	--	--	--
Supplementary information:						

5.4.9	**TABLE: Electric strength tests**		**N/A**
Test voltage applied between:	Voltage shape (Surge, Impulse, AC, DC, etc.)	Test voltage (V)	Breakdown Yes/No
Functional:			
--	--	--	--
Basic/supplementary:			
--	--	--	--
Reinforced:			
--	--	--	--
Routine Tests:			

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Clause	Requirement + Test	Result - Remark	Verdict

--	--	--	--
Supplementary information:			

5.5.2.2	TABLE: Stored discharge on capacitors				N/A
Location	Supply voltage (V)	Operating and fault condition 1)	Switch position	Measured voltage (Vpk)	ES Class
--	--	--	--	--	--
Supplementary information:					
X-capacitors installed for testing: [ ] bleeding resistor rating: [ ] ICX: 1) Normal operating condition (e.g., normal operation, or open fuse), SC= short circuit, OC= open circuit					

5.6.6	TABLE: Resistance of protective conductors and terminations			N/A
Location	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)
--	--	--	--	--
Supplementary information:				

5.7.4	TABLE: Unearthed accessible parts					N/A
Location	Operating and fault conditions	Supply Voltage (V)	Parameters			ES class
			Voltage (V_{rms} or V_{pk})	Current (A_{rms} or A_{pk})	Freq. (Hz)	
--	--	--	--	--	--	--
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit						

5.7.5	TABLE: Earthed accessible conductive part			N/A
Supply voltage (V) .... :	--			—
Phase(s) .... :	[] Single Phase; [ ] Three Phase: [ ] Delta [ ] Wye			
Power Distribution System .... :	[ ] TN [ ]TT [ ] IT			
Location	Fault Condition No in IEC 60990 clause 6.2.2	Touch current (mA)	Comment	
	1	--	--	
	2*	--	--	

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Clause	Requirement + Test	Result - Remark	Verdict

	3	--	--
	4	--	--
	5	--	--
	6	--	--
	8	--	--
Supplementary Information:			
[1] Supply voltage is the anticipated maximum Touch Voltage. [2] Earthed neutral conductor [Voltage differences less than 1% or more]. [3] Specify method used for measurement as described in IEC 60990 sub-clause 4.3. [4] IEC60990, sub-clause 6.2.2.7, Fault 7 not applicable. [5] (*) IEC60990, sub-clause 6.2.2.2 is not applicable if switch or disconnect device (e.g., appliance coupler) provided.			

5.8	**TABLE: Backfeed safeguard in battery backed up supplies**					**N/A**
Location	Supply voltage (V)	Operating and fault condition	Time (s)	Open-circuit voltage (V)	Touch current (A)	ES Class
--	--	--	--	--	--	--
Supplementary information:						
Abbreviation: SC= short circuit, OC= open circuit						

6.2.2	**TABLE: Power source circuit classifications**					**P**
Location	Operating and fault condition	Voltage (V)	Current (A)	Max. Power[1] (W)	Time (S)	PS class
All internal circuits	--	--	--	--	--	Considered as PS3
DC IN	--	--	--	--	--	PS3
Battery cell output on the charging base	--	3.54	1.90	6.73	>3	PS1
Battery cell output on the ear buds	--	3.83	0.30	1.15	>3	PS1
Supplementary information: Abbreviation: SC= short circuit; OC= open circuit. 1) Measured after 3 s for PS1 and measured after 5 s for PS2 and PS3.						

6.2.3.1	**TABLE: Determination of Arcing PIS**			**N/A**
Location	Open circuit voltage after 3s(Vpk)	Measured r.m.s current(A)	Calculated value	Arcing PIS? Yes / No
--	--	--	--	--

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
An Arcing PIS requires a minimum of 50 V (peak) a.c. or d.c. An Arcing PIS is established when the product of the open circuit voltage (V_p) and normal operating condition rms current (I_{rms}) is greater than 15.

6.2.3.2	TABLE: Determination of resistive PIS		P
Location	Operating and fault condition	Dissipate power (W)	Arcing PIS? Yes / No
All internal circuits	--	>15	Yes*
Supplementary information:			
Abbreviation: SC= short circuit; OC= open circuit *All internal circuits were considered as resistive PIS.			

8.5.5	TABLE: High pressure lamp			N/A
Lamp manufacturer	Lamp type	Explosion method	Longest axis of glass particle (mm)	Particle found beyond 1 m Yes / No
--	--	--	--	--
Supplementary information:				

9.6	TABLE: Temperature measurements for wireless power transmitters							N/A
Supply voltage (V) ....:								—
Max. transmit power of transmitter (W)..........:								—
Foreign objects	w/o receiver and direct contact		with receiver and direct contact		with receiver and at distance of 2 mm		with receiver and at distance of 5 mm	
	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)
--	--	--	--	--	--	--	--	--
Supplementary information:								

5.4.1.4, 9.3, B.1.5, B.2.6	TABLE: Temperature measurements				P
Supply voltage (V)……………………………...:	5VDC[1)]	5VDC[2)]	3.7VDC[3)]	--	—
Ambient temperature during test T_{amb} (°C)..:	40.0	40.0	40.0	--	—
Maximum measured temperature T of part/at:	T (°C)				Allowed T_{max} (°C)
On the charging base					

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Clause	Requirement + Test	Result - Remark	Verdict

PCB near Type C input port	48.2	49.3	--	--	130
Internal wire connected to battery	44.5	44.9	--	--	80
Battery body	44.1	43.9	--	--	45/60[a)]
Plastic enclosure inside near battery	42.4	42.3	--	--	Ref.
Plastic enclosure inside near PCB	42.7	42.8	--	--	Ref.
On the ear buds					
PCB near U1	--	44.5	47.3	--	130
Battery body	--	42.8	44.2	--	45/60[a)]
Plastic enclosure inside near battery	--	41.1	42.6	--	Ref.
Plastic enclosure inside near PCB	--	41.6	43.5	--	Ref.
Ambient	40.0	40.0	40.0	--	--
Touch temperature for accessible parts					
On the charging base					
Plastic enclosure outside near battery	25.6	25.5	--	--	60
Plastic enclosure outside near PCB	25.5	25.5	--	--	60
On the ear buds					
Plastic enclosure outside near battery	--	25.5	25.7	--	48
Plastic enclosure outside near PCB	--	25.6	25.7	--	48
Ambient	25.0	25.0	25.0	--	--

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	T_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class
--	--	--	--	--	--	--	--

Supplementary information:
1) Charging base charging with empty battery only;
2) Charging base charging with empty battery and charge the ear buds with an empty battery.
3) Ear buds discharging with fully charged battery and operated under most unfavourable normal condition with max. non-clipped output volume at 1kHz sine wave.
a) Maximum charging temperature is 45°C and maximum discharging temperature is 60°C.

B.2.5	**TABLE: Input test**							**P**
U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
On the charging base								
5.0VDC	--	0.35	1.0	--	--	--	--	Charging with empty battery only; Battery charging current 0.25A

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Clause	Requirement + Test	Result - Remark	Verdict

5.0VDC	--	0.38	1.0	--	--	--	--	Charging with empty battery and operating under most unfavourable normal condition 1); Battery charging current 0.23A
3.7VDC	--	0.03	--	--	--	--	--	Discharging with fully charged battery and operating under most unfavourable normal condition 1)
On the ear buds								
5.0VDC	--	0.02	--	--	--	--	--	Charging with empty battery only; Battery charging current 0.01A
3.7VDC	--	0.01	--	--	--	--	--	Discharging with full battery and operating under most unfavourable normal condition 2)
Supplementary information:								
Normal operation: Bluetooth mode input, max. non-clipped output power at speakers with 1kHz sine wave signal input.								

B.3, B.4	TABLE: Fault condition tests						P
Ambient temperature T_{amb} (°C)..:				See below			—
Power source for EUT: Manufacturer, model/type, outputrating....:				See table 4.1.2			—
Component No.	Condition	Supply voltage (V)	Test time	Fuse no.	Fuse current (A)	Observation	
Disharging mode(for ear buds)							
Speaker	SC	5VDC	10min	--	--	After test, unit operated under abnormal condition, no damage, no hazard. Battery cell discharging current 0.01A.	
C1	SC	5VDC	10min	--	--	Unit shut down immediately. Battery cell discharging current 0A.	
R1	SC	5VDC	10min	--	--	Unit working normally, no hazard.	

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Clause	Requirement + Test	Result - Remark	Verdict

						Battery cell discharging current 0.01A.
Discharging mode(for charging base)						
D1	SC	5VDC	10min	--	--	Unit working normally, no hazard. Battery cell discharging current 0.03A.
C10	SC	5VDC	10min	--	--	Unit shut down immediately. Battery cell discharging current 0A.
R5	SC	5VDC	10min	--	--	Unit working normally, no hazard. Battery cell discharging current 0.03A.
Charging mode (for charging base)						
U2 pin 2/3 to 4/5 on battery pack	SC	3.7VDC	3h10min	--	--	Unit charging abnomally. Battery pack charging current 0.33A. Components/parts temperature(℃): Plastic enclosure outside near battery: 26.8; Plastic enclosure outside near PCB: 27.6; Ambient: 25.0. Battery body: 44.9; (at Ambient 40.0)
R1 on battery pack	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A.
C1 on battery pack	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A.
Cell + to cell -	SC	3.7VDC	10min	--	--	Unit stop charging and shut down immediately, no hazard.
Charging mode (for ear buds)						
U1 pin 1 to 4	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A
R5	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A
C6	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A.
Cell + to cell -	SC	3.7VDC	10min	--	--	Unit stop charging and shut down immediately, no hazard.
Supplementary information:						
1) O-L: overload; S-C: shirt circuit; O-C: open circuit. 2) Temperature limits under the fault condition: Battery cell: 45°C (for charging)/60°C (for discharging), Plastic enclosure(on ear buds): 58°C, Plastic enclosure(on charging base): 70°C. The following key and corresponding comments may be used to describe the final results.						

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Clause	Requirement + Test	Result - Remark	Verdict

NB No indication of dielectric breakdown
CD Component damaged
NCD No component damaged
NH No hazards

M.3	TABLE: Protection circuits for batteries provided within the equipment					P
Is it possible to install the battery in a reverse polarity position? ..... :			No			—
Equipment Specification	Charging					
	Voltage (V)			Current (A)		
	5V			1.0		
Manufacturer/type	Battery specification					
	Non-rechargeable batteries		Rechargeable batteries			
	Discharging current (A)	Unintentional charging current (A)	Charging		Discharging current (A)	Reverse charging current (A)
			Voltage (V)	Current (A)		
On the charging base						
Dongguan zhuoyifeng Technology Co., Ltd./ ZYF 801235	--	--	4.20	0.35	0.35	--
On the ear buds						
Dongguan zhuoyifeng Technology Co., Ltd./ ZYF 401012	--	--	4.20	0.03	0.03	--
Note: The tests of M.3.2 are applicable only when above appropriate data is not available.						
Specified battery temperature (°C).. :			0/10 °C to 45°C for charge mode; 0°C to 60°C for discharge mode			--

Component No.	Fault condition	Charge/ discharge mode	Test time	Temp. (°C)	Current (A)	Voltage (V)	Observation
On the charging base							
--	Normal	Charge mode	3h25min	44.1	0.25	4.20	No damaged, no hazard.
U2 pin 2/3 to 4/5 on battery pack	SC	Charge mode	3h10min	44.9	0.33	4.20	Unit charging abnomally.
--	Normal	Discharge mode	3h	43.9	0.03	4.20	No damaged, no hazard.
On the ear buds							
--	Normal	Charge mode	3h15min	42.8	0.01	4.20	Unit working normally, no hazard.
--	Normal	Discharge mode	3h10min	44.2	0.01	4.20	Unit working normally, no hazard.

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
Abbreviation: SC= short circuit; OC= open circuit NL= no chemical leakage; NS= no spillage of liquid; NE= no explosion; NF= no emission of flame or expulsion of molten metal.

M.4.2	**TABLE: Charging safeguards for equipment containing a secondary lithium battery**					P
Maximum specified charging voltage (V) ....:			4.20V			—
Maximum specified charging current (A) ....:			0.35A			—
Highest specified charging temperature (°C) ....:			45°C			—
Lowest specified charging temperature (°C) ....:			10°C			—
Battery manufacturer/type	Operating and fault condition	Measurement			Observation	
		Charging voltage (V)	Charging current (A)	Temp. (°C)		
Dongguan zhuoyifeng Technology Co., Ltd./ ZYF 801235	Normal	4.20	0.25	44.1	No damaged, no hazard.	
	Single fault: SC U2 pin 2/3 to 4/5 on battery pack	4.20	0.33	44.9	No damaged, no hazard.	
	LSCT	--	0	--	Stopping charging, no hazard.	
	HSCT	--	0	--	Stopping charging, no hazard.	
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit; MSCV= maximum specified charging voltage; MSCC= maximum specified charging current; HSCT= highest specified charging temperature; LSCT= lowest specified charging temperature.						

M.4.2	**TABLE: Charging safeguards for equipment containing a secondary lithium battery**					P
Maximum specified charging voltage (V) ....:			4.20V			—
Maximum specified charging current (A) ....:			0.03A			—
Highest specified charging temperature (°C) ....:			45°C			—
Lowest specified charging temperature (°C) ....:			0°C			—
Battery manufacturer/type	Operating and fault condition	Measurement			Observation	
		Charging voltage (V)	Charging current (A)	Temp. (°C)		
Dongguan zhuoyifeng Technology Co., Ltd./ ZYF 401012	Normal	4.20	0.01	42.8	No damaged, no hazard.	
	Single fault:	4.20	Max. 0.01	--	No damaged, no hazard.	
	LSCT	--	0	--	Stopping charging, no hazard.	
	HSCT	--	0	--	Stopping charging, no hazard.	
Supplementary information:						

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Clause	Requirement + Test	Result - Remark	Verdict

Abbreviation: SC= short circuit; OC= open circuit; MSCV= maximum specified charging voltage; MSCC= maximum specified charging current; HSCT= highest specified charging temperature; LSCT= lowest specified charging temperature.

Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**						**N/A**
Output Circuit	Condition	U_{oc} (V)	Time (s)	I_{sc} (A)		S (VA)	
				Meas.	Limit	Meas.	Limit
--	--	--	--	--	--	--	--
Supplementary Information:							
SC= short circuit; OC= open circuit							

T.2, T.3, T.4, T.5	**TABLE: Steady force test**					**P**
Part/Location	Material	Thickness (mm)	Probe	Force (N)	Test Duration (s)	Observation
On the charging base						
Internal components	--	--	--	10	5	No damage, no hazard
Top enclosure	Plastic	1.70	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Side enclosure	Plastic	1.70	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Bottom enclosure	Plastic	1.70	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
On the ear buds						
Internal components	--	--	--	10	5	No damage, no hazard
Top enclosure	Plastic	0.80	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Side enclosure	Plastic	0.80	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Bottom enclosure	Plastic	0.80	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Supplementary information:						

T.6, T.9	**TABLE: Impact test**	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict

Location/part	Material	Thickness (mm)	Height (mm)	Observation
--	--	--	--	--
Supplementary information:				

T.7	**TABLE: Drop test**			**P**
Location/part	Material	Thickness (mm)	Height (mm)	Observation
On the charging base				
Top enclosure	Plastic	1.70	1000	No damage, no hazard
Side enclosure	Plastic	1.70	1000	No damage, no hazard
Bottom enclosure	Plastic	1.70	1000	No damage, no hazard
On the ear buds				
Top enclosure	Plastic	0.80	1000	No damage, no hazard
Side enclosure	Plastic	0.80	1000	No damage, no hazard
Bottom enclosure	Plastic	0.80	1000	No damage, no hazard
Supplementary information:				

T.8	**TABLE: Stress relief test**				**P**
Location/Part	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation
Enclosure (On the charging base)	Plastic	1.70	70	7	No damage, no hazard
Enclosure (On the ear buds)	Plastic	0.80	70	7	No damage, no hazard
Supplementary information:					

X	**TABLE: Alternative method for determining minimum clearances distances**		**N/A**
Clearance distanced between:	Peak of working voltage (V)	Required cl (mm)	Measured cl (mm)
--	--	--	--
Supplementary information:			

Attachment 1 - EUT Photos

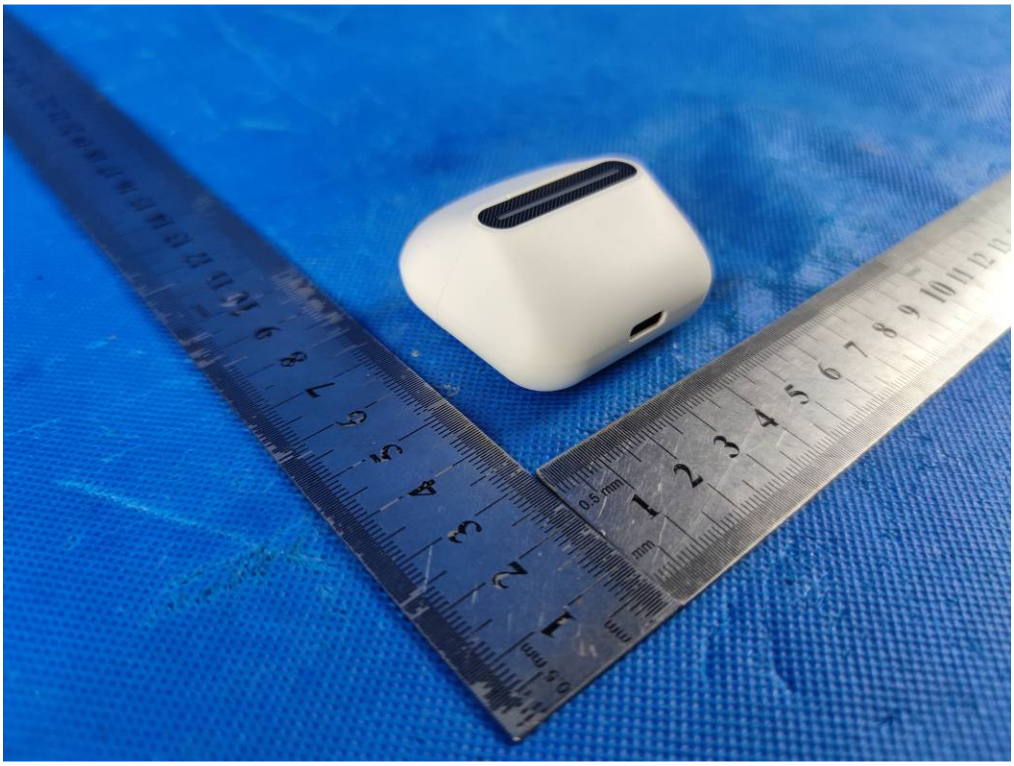


Photo 1 general view

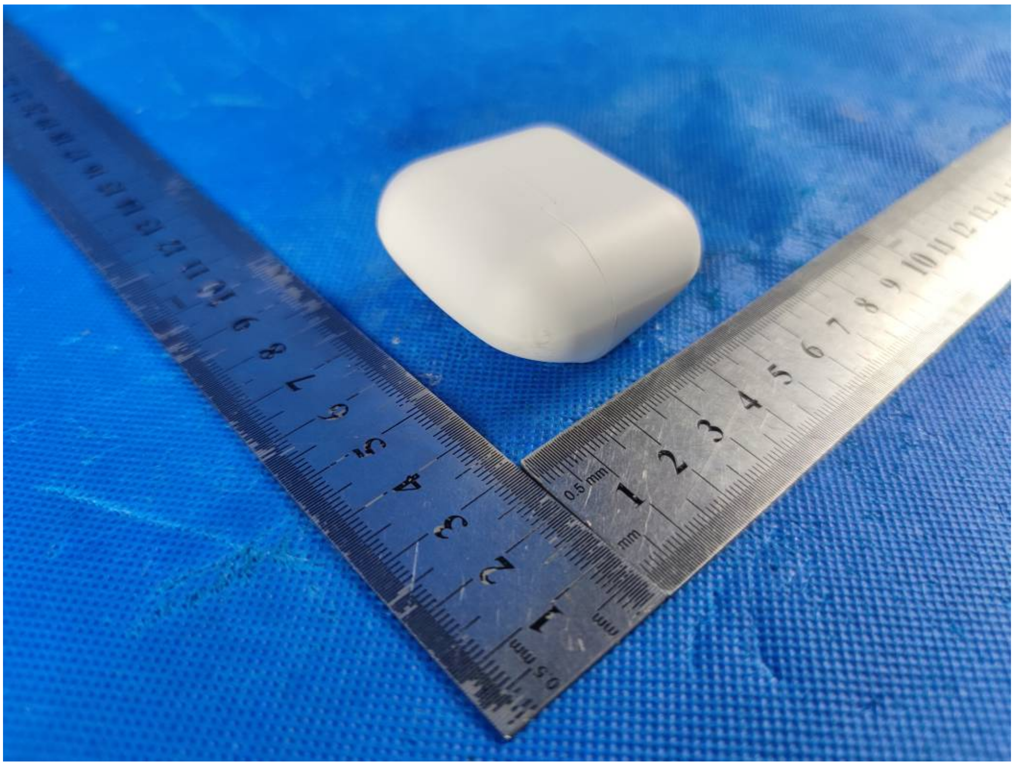


Photo 2 general view

Photo 3 terminal view

Photo 4 general view

Photo 5 internal view

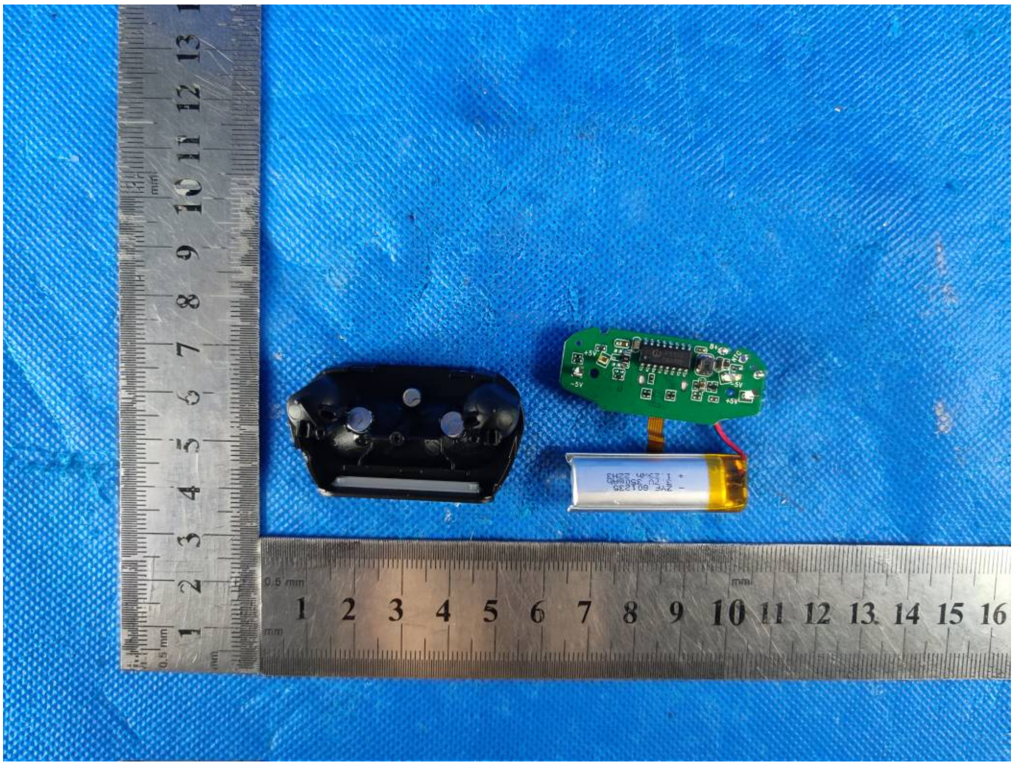


Photo 6 internal view

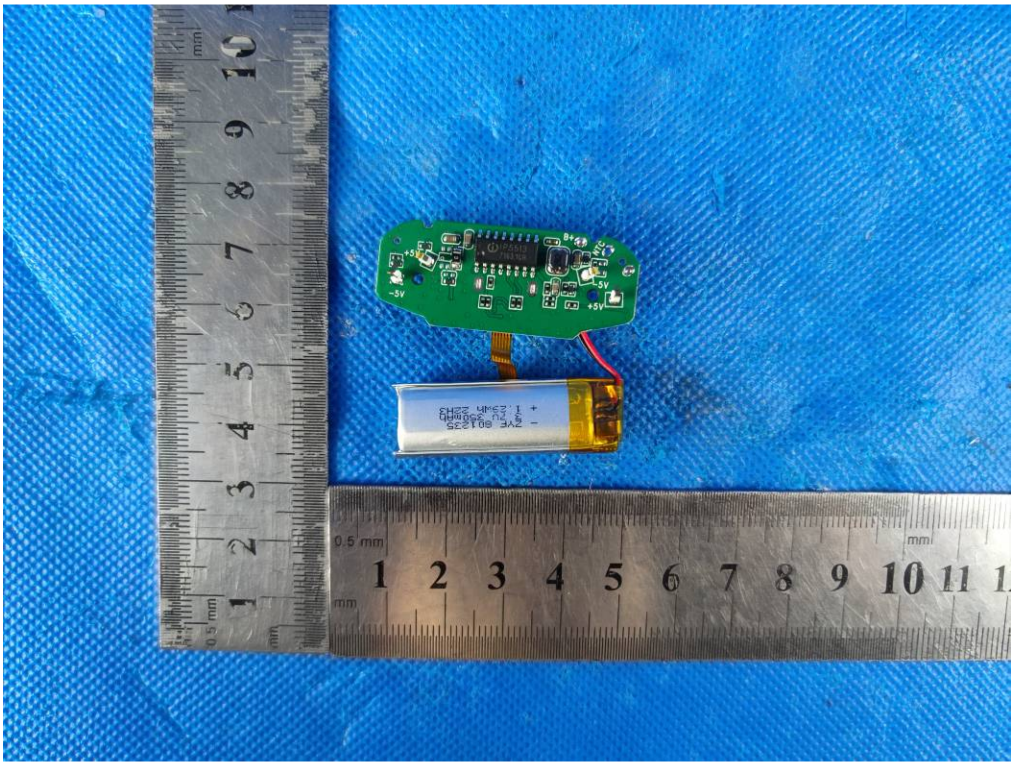


Photo 7 internal view

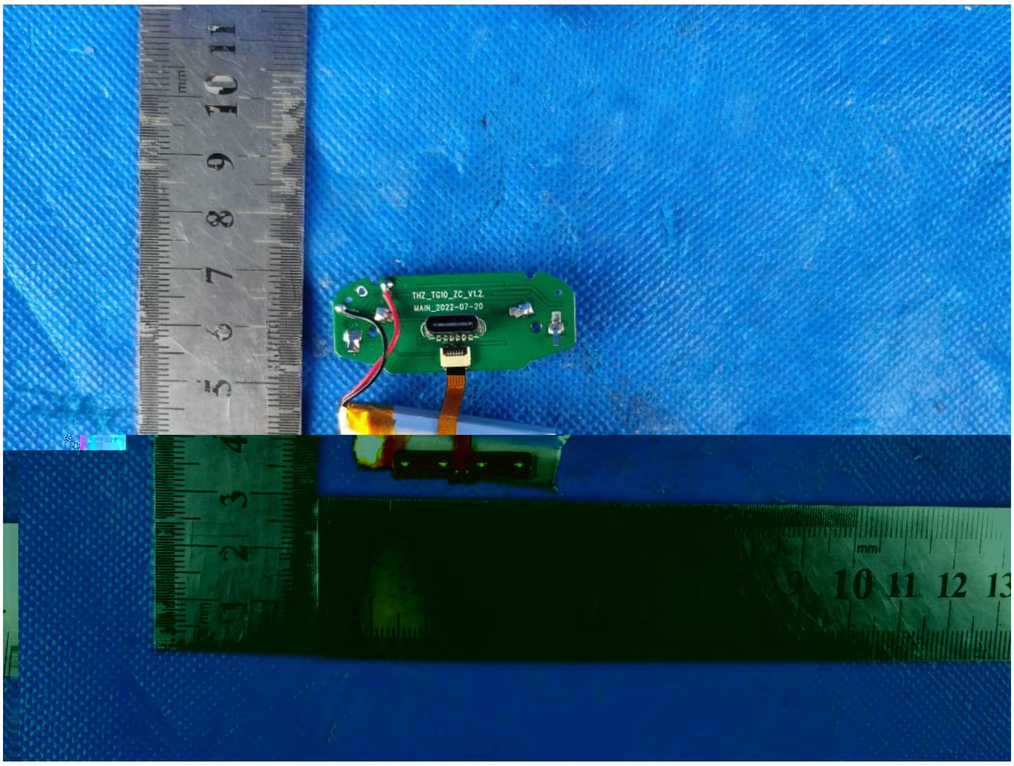
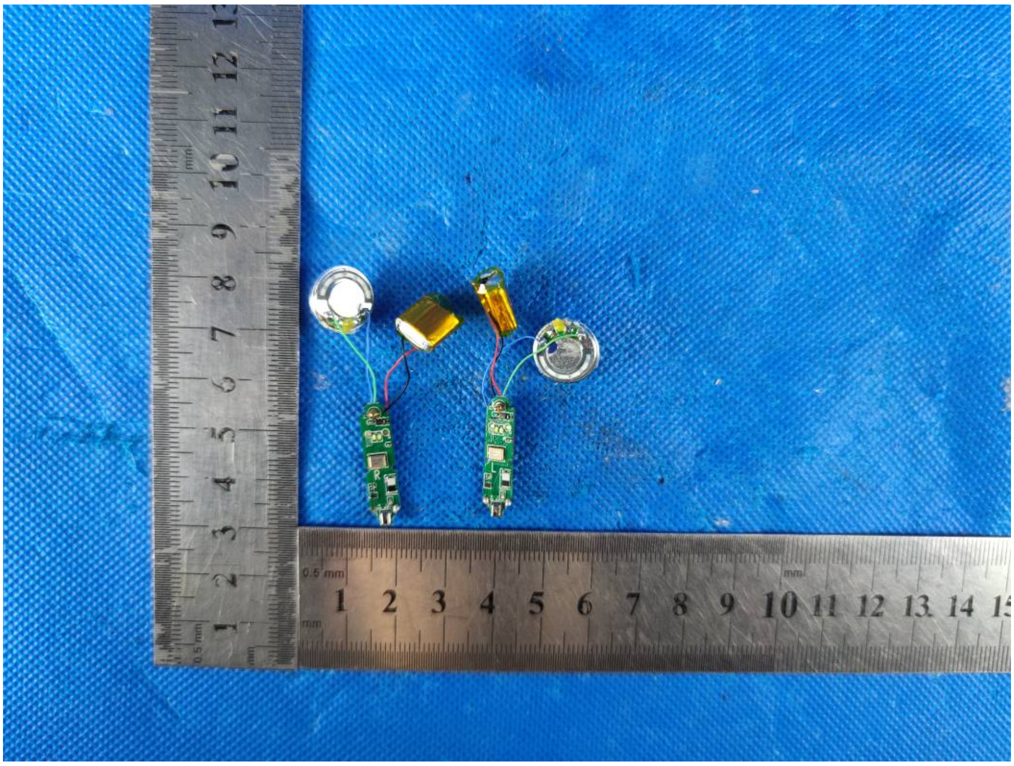


Photo 8 internal view

Photo 9 internal view



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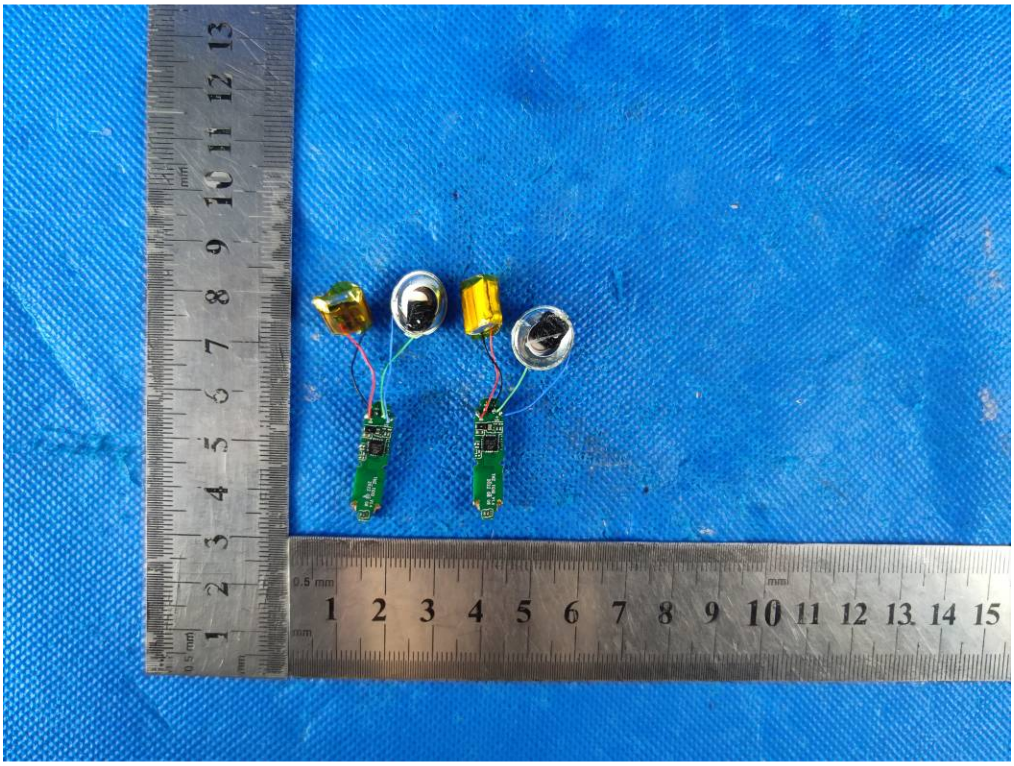


Photo 11 internal view

*****End of Report*****

APPENDIX-PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

Model No.: TG10

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

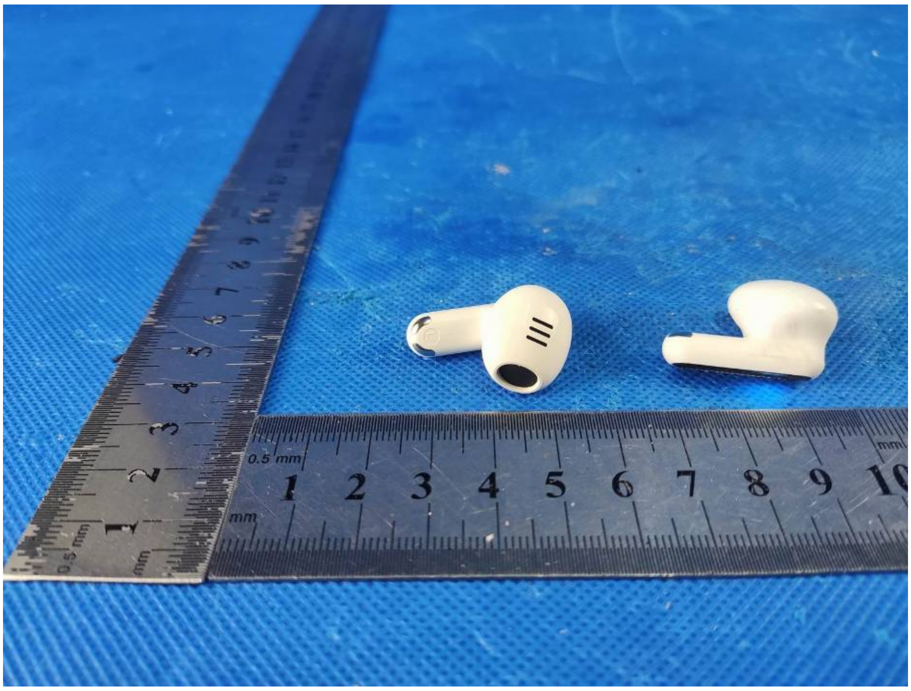


Photo 6

Photo 7

Photo 8

Photo 9

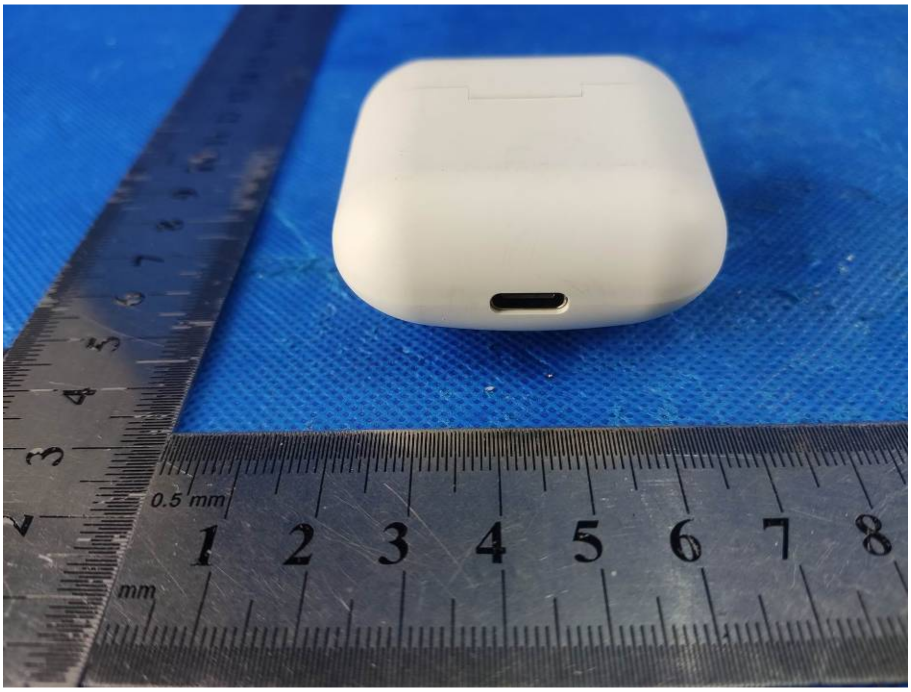
Photo 10

Photo 11

Photo 12

Photo 13

Photo 14



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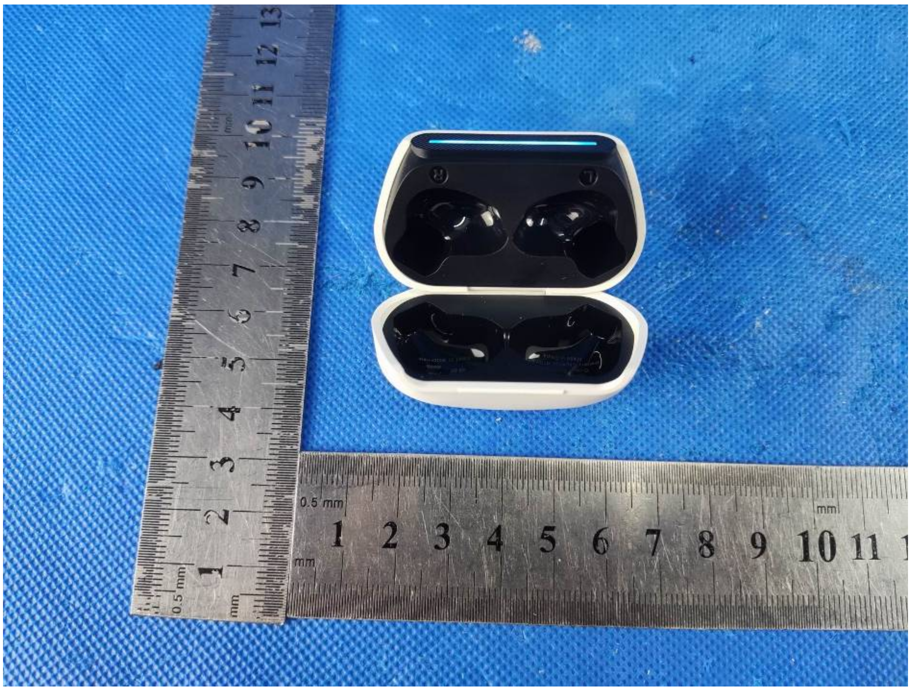
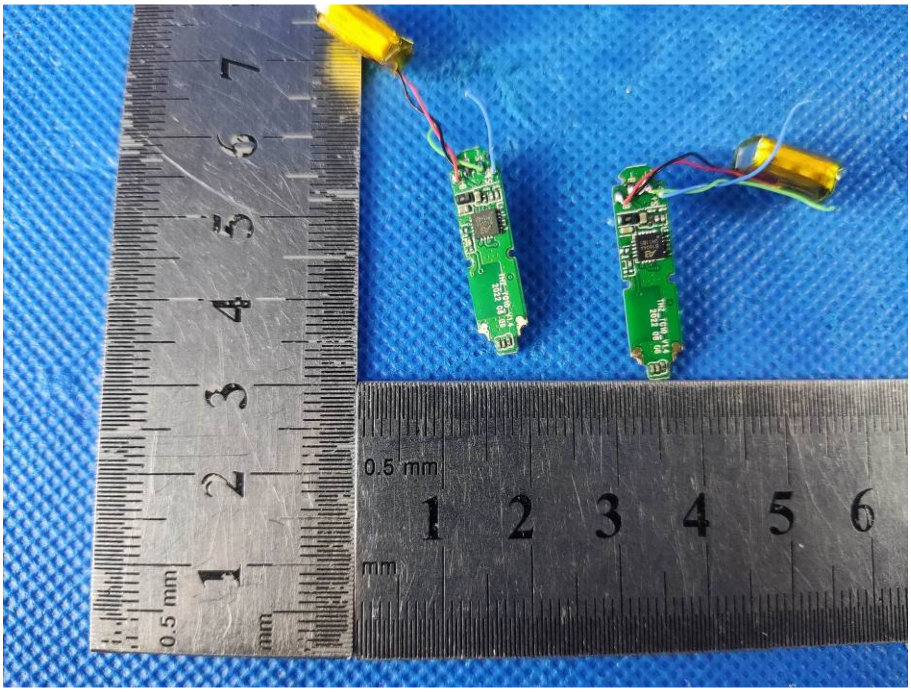


Photo 16

Photo 17

Photo 18



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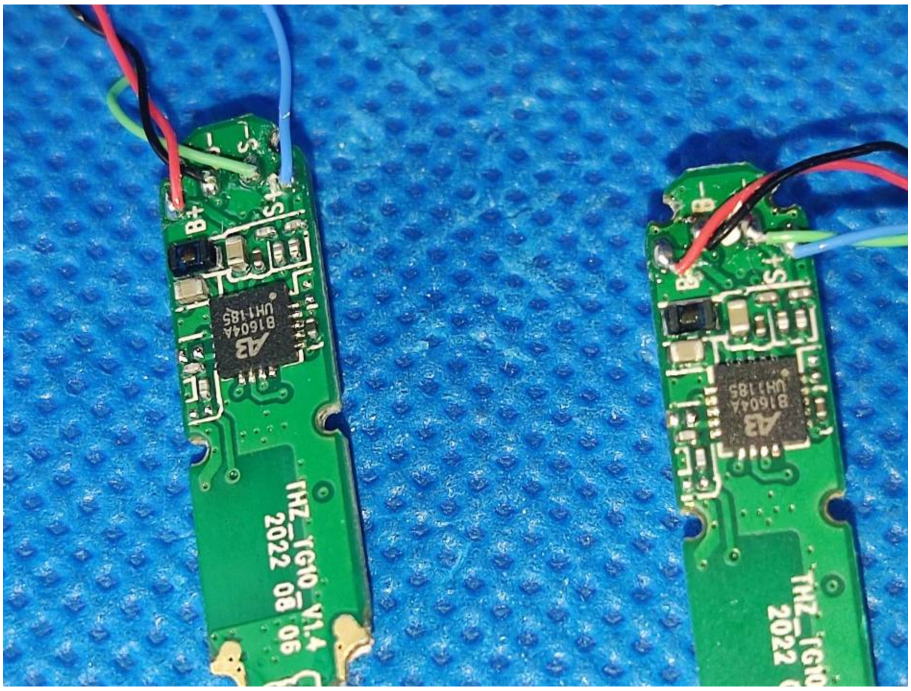

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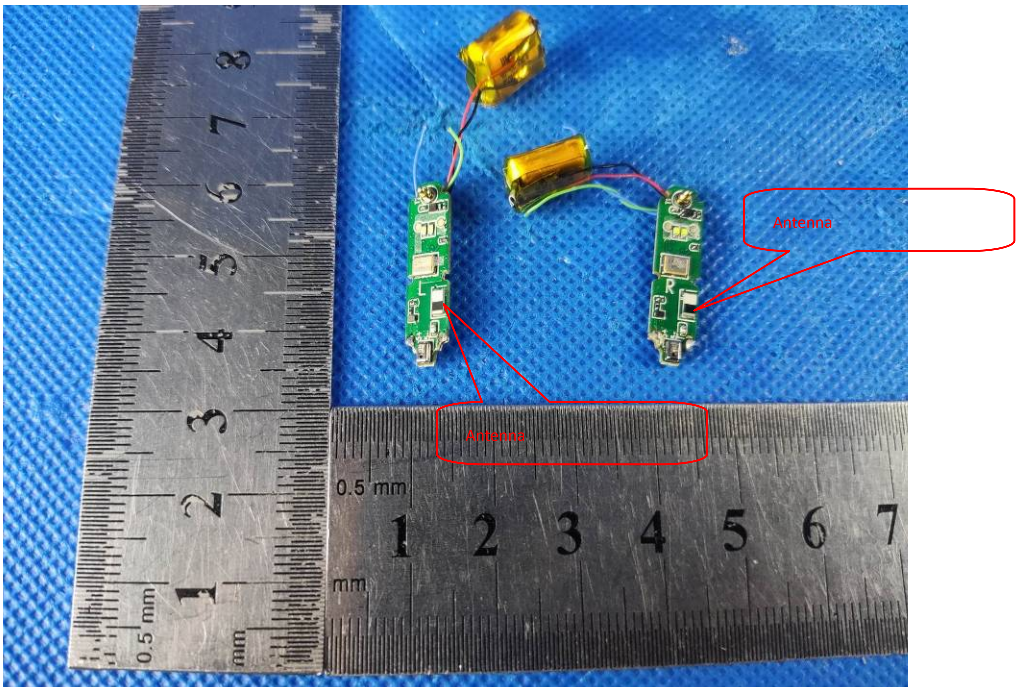

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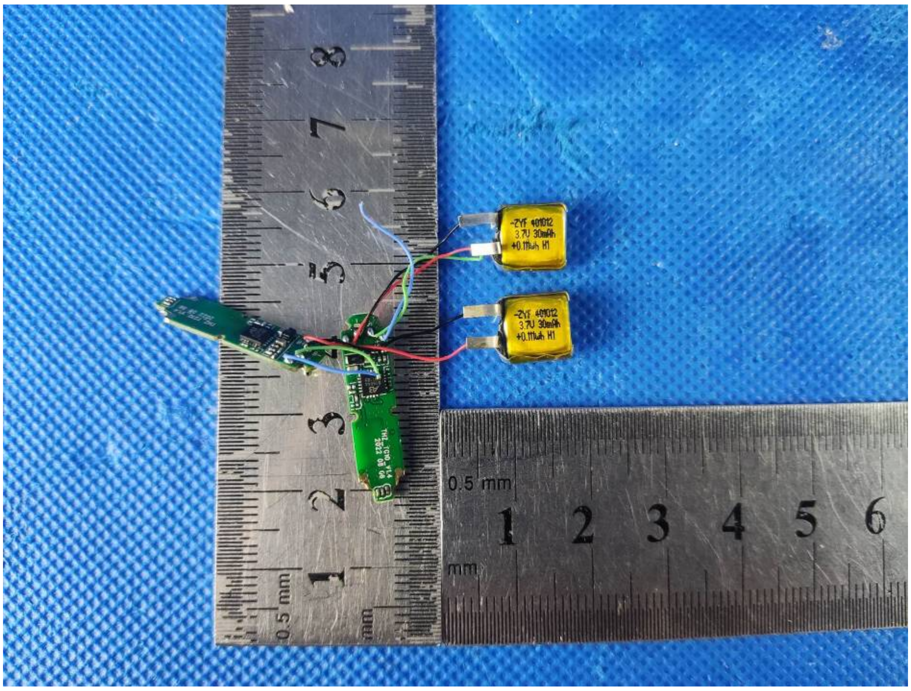

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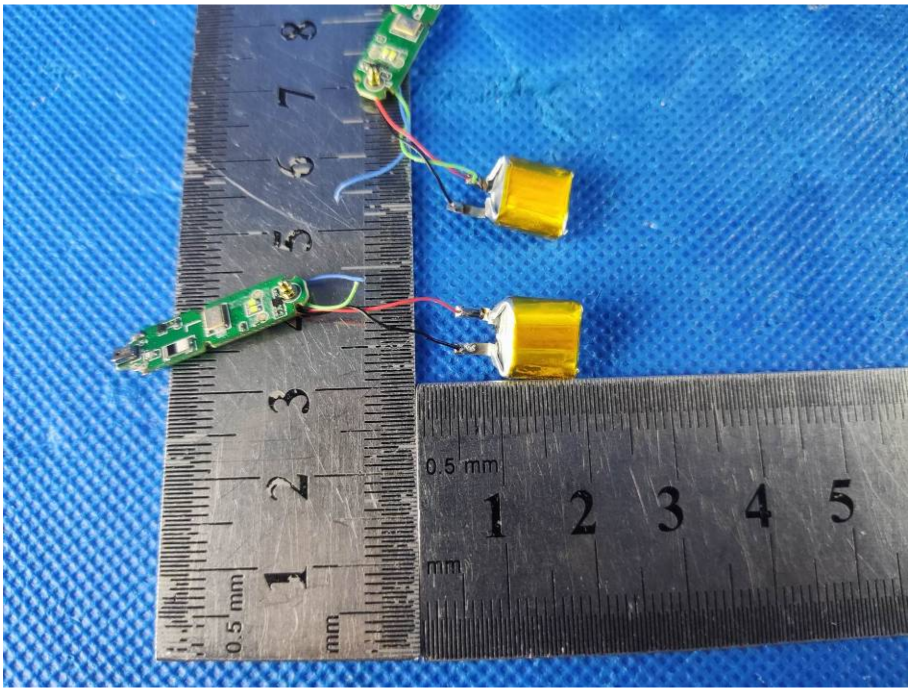

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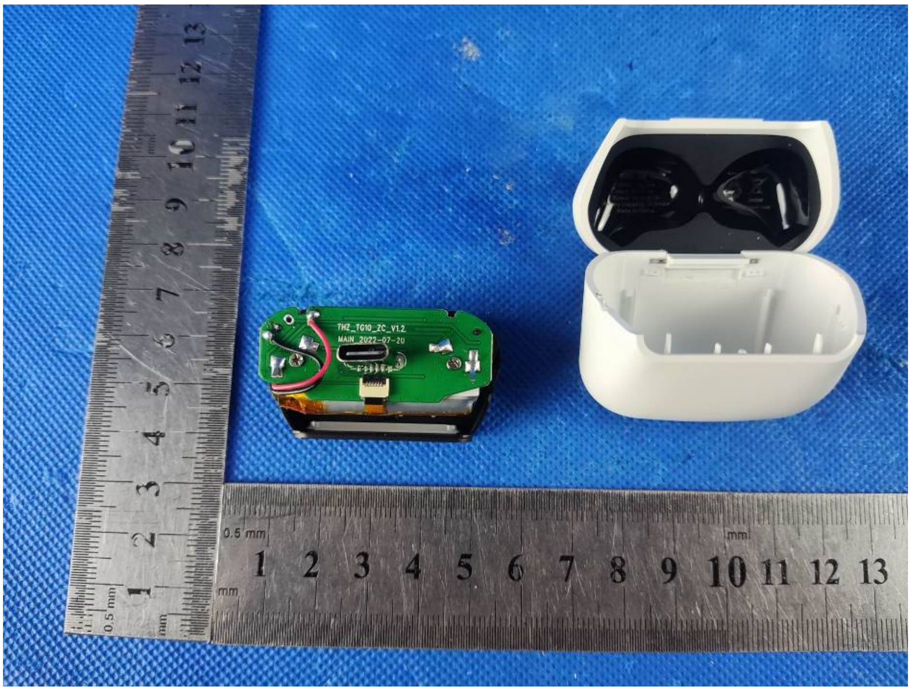
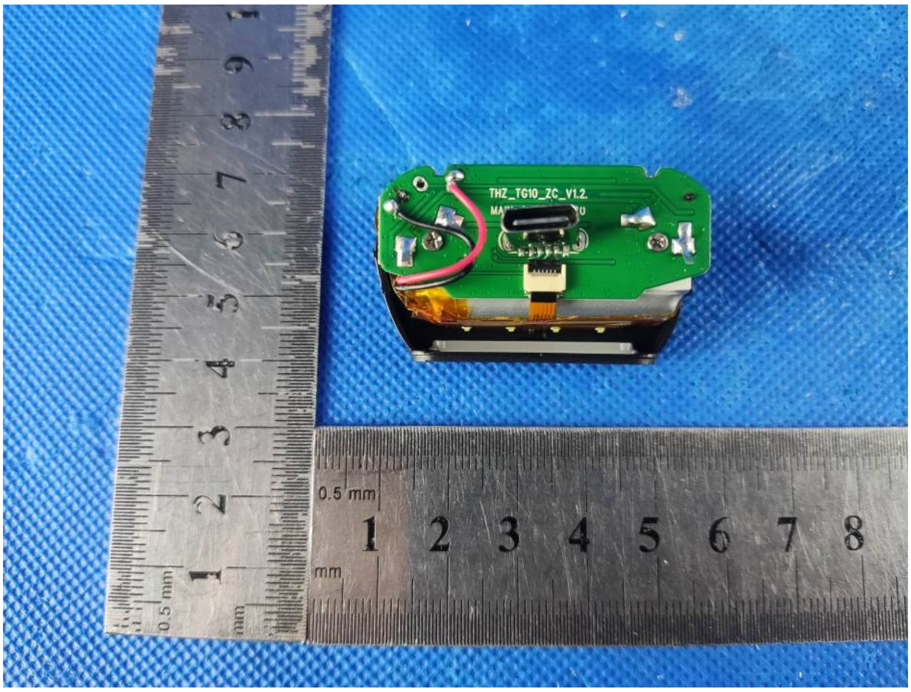


Photo 24



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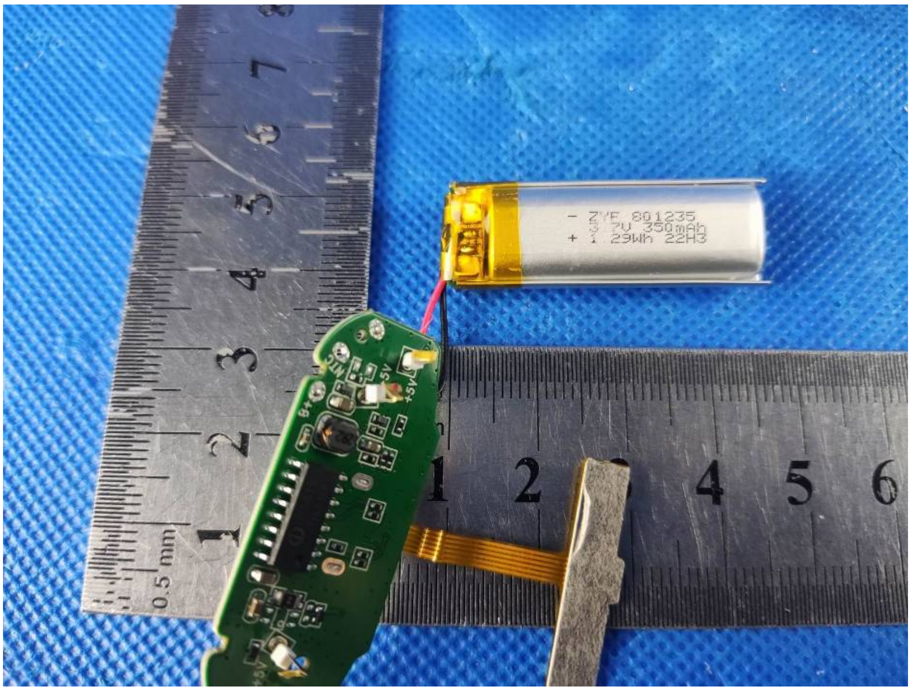

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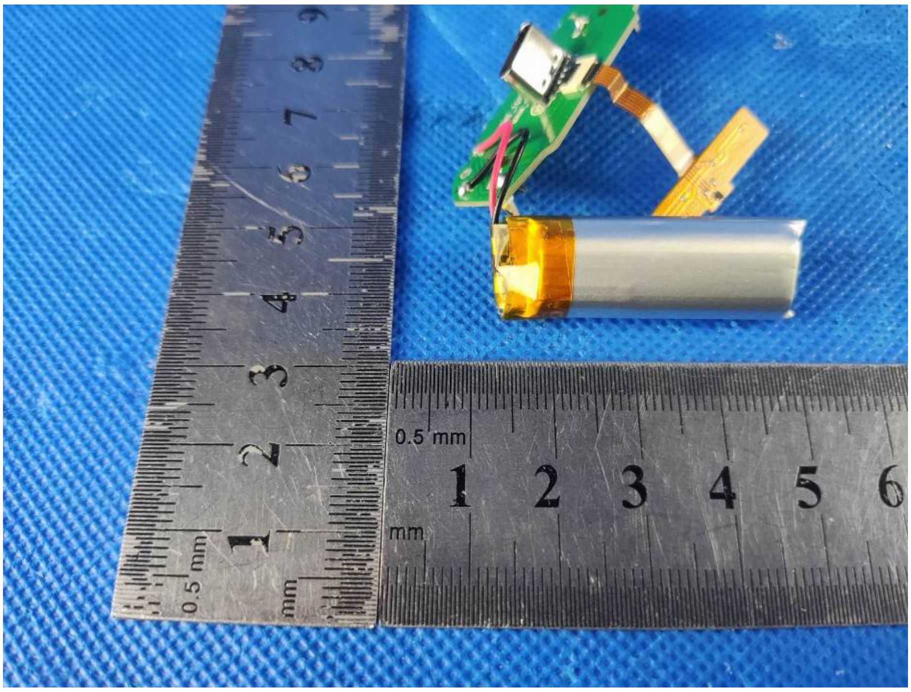


Photo 27

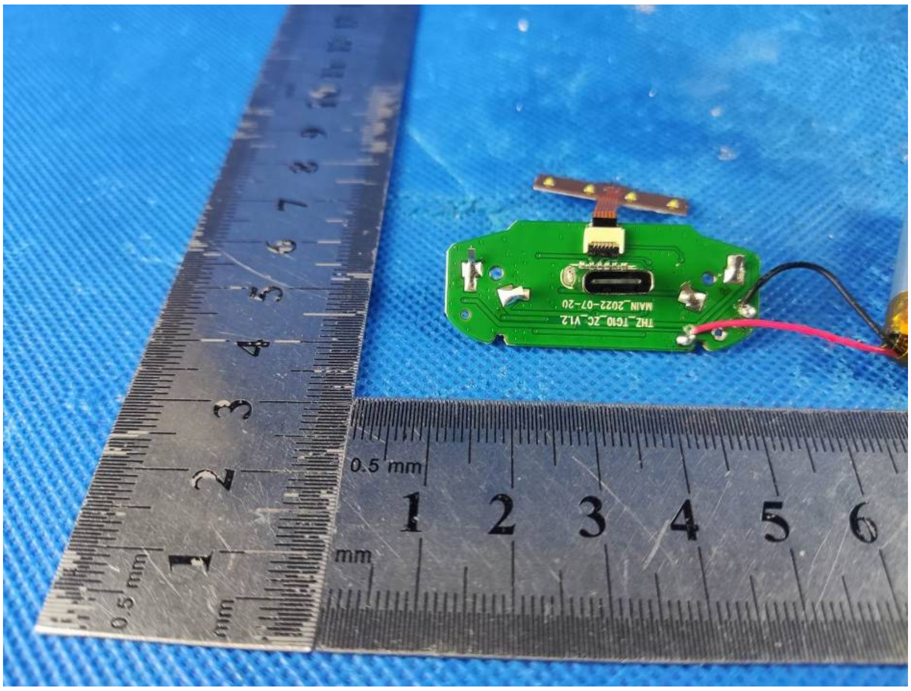
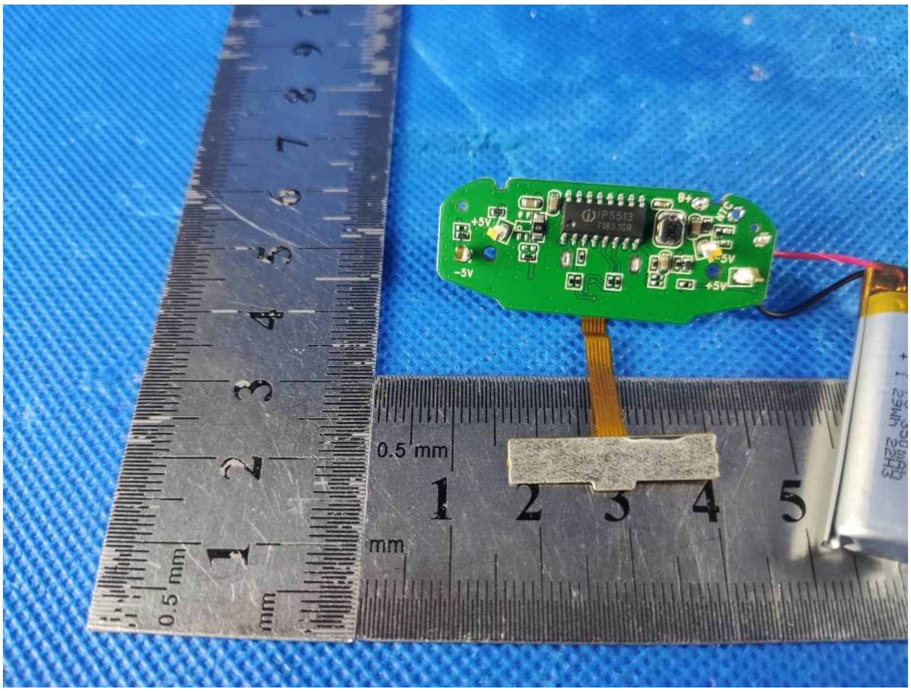


Photo 28



CERTIFICATE OF RED COMPLIANCE

According toDirective: ***2014/53/EU***

Ref. No.: ***AIT22091613-C01***

Product:	Bluetooth headset
Trade Mark:	N/A
Model:	TG10, TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Applicant:	Guangzhou Langston Electronic Technology Co,Ltd
Address:	5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou
Manufacture:	Dongguan Doulan Electronic Technology Co. LTD
Address:	No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan

The test sample of product has passed the test according to requirements of the following standards:

Standard(s):Refer to attachment Test report(s) No.: Refer to attachment

Based on the voluntary assessment of the product sample and technical file, we confirm that the above-mentioned product meets the requirements of the RE directive.
The CE mark as show below can be used, under the responsibility of the manufacturer or the importer, after completion of an EC declaration of conformity and compliance with all relevant RE directives.

CE

Approved by/Date: Sean Chen Sep. 22, 2022

Department Manager

DONGGUAN YAXU (AIT) TECHNOLOGY APPROVED

The statement is based on a single evaluation of one sample of above mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lablogo.

AiT

Dongguan Yaxu (AiT) Technology Limited

No. 22, Jinqianling Third Street, Jitigang, Huangjiang, Dongguan, Guangdong, China.

Tel:+86.769.8202.0499/ Fax:+86.769.8202.0495

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E-mail: info@aitek.org.cn

CERTIFICATE OF RED COMPLIANCE

According toDirective: ***2014/53/EU***

Ref. No.: ***AIT22091613-C01***

Product: Bluetooth headset

Trade Mark: N/A

Model: TG10, TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21

Applicant: Guangzhou Langston Electronic Technology Co,Ltd

Address: 5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou

Attachment:

Standard(s):		Test report(s) No.:
Article 3.1a)	EN 62368-1:2020+A11:2020	AIT22091613S
	EN 62479:2010 EN 50663:2017	AIT22091613H1
Article 3.1b)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.1.1 (2019-03) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020 EN 55035:2017+A11:2020 EN IEC 61000-3-2:2019 EN 61000-3-3: 2013+ A1:2019	AIT22091613E1
Article 3.2)	ETSI EN 300 328 V2.2.2 (2019-07)	AIT22091613W1 AIT22091613W2

The statement is based on a single evaluation of one sample of above mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lablogo.

Dongguan Yaxu (AiT) Technology Limited
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Tel:+86.769.8202.0499/ Fax:+86.769.8202.0495
www.aitek.org.cn
E-mail: info@aitek.org.cn

EMC Test Report

Client Information:

Applicant: Guangzhou Langston Electronic Technology Co,Ltd

Applicant add.: 5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou

Product Information:

Product Name: Bluetooth headset

Model No.: TG10

Serial Model: TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21

Brand Name: N/A

Standards: ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.2.4 (2020-09)
EN 55032:2015+A11:2020; EN 55035:2017+A11:2020
EN IEC 61000-3-2:2019; EN 61000-3-3:2013+A1: 2019

Prepared By:

Dongguan Yaxu (AiT) Technology Limited

Add. : No.22, Jinqianling Third Street, Jitigang, Huangjiang, Dongguan, Guangdong, China

Date of Receipt:	Sep. 16, 2022	Date of Test:	Sep. 16, 2022~ Sep. 21, 2022
Date of Issue:	Sep. 22, 2022	Test Result:	Pass

This device has been tested and found to comply with the stated standard(s), which is (are) required by the council directive of 2014/53/EU and indicated in the test report and are applicable only to the tested sample identified in the report.

Reviewed by: Simba Huang
Simba Huang

Approved by: Seal Chen
Seal.chen

DONGGUAN YAXU (AiT) TECHNOLOGY LIMITED TEST REPORT

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Revision Record			
Version	**Date**	**Modifier**	**Remark**
00	Sep. 22, 2022	--	Original

2 Test Summary

Emission Measurement		
Radiated Emission	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020	PASS
Conducted Emission(AC Mains)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020	PASS
Conducted Emission(Wired network ports)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020	N/A
Harmonic Current Emissions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN IEC 61000-3-2:2019	N/A
Voltage Fluctuations and Flicker	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 61000-3-3:2013+A1:2019	N/A
Immunity Measurement		
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
Fast Transients Common Mode	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	N/A
RF Common Mode 0,15 MHz to 80 MHz	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	N/A
Voltage Dips and Interruptions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	N/A
Surges	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	N/A

Remark: The measurement uncertainty is not included in the test result.

2.1 Performance criteria

■ ETSI EN301489-3

General performance criteria

• performance criterion A applies for immunity tests with phenomena of a continuous nature;

• performance criterion B applies for immunity tests with phenomena of a transient nature.

•The equipment shall meet the minimum performance criteria as specified in the following.

Criteria	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
NOTE: Where "operate as intended" or "no loss of function" is specified, the EUT shall demonstrate correct functioning as described in clause 5.		

■ ETSI EN301489-17

General performance criteria

• Performance criteria A for immunity tests with phenomena of a continuous nature;

• Performance criteria B for immunity tests with phenomena of a transient nature;

• Performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following.

Criteria	During test	After test
A	Shall operate as intended. (See note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable.

		Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.		

Performance criteria for Continuous phenomena

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

■ Performance Criterion of EN55035

Criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance of loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

Criterion B: After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended.

Criterion C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

2.2 Monitoring EUT in Immunity Test

2.2.1 Monitoring for Continuous Phenomena Applied to the EUT

- **BT Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate BT protocol Analyzer);

During the test, observe whether the EUT operate as intended, no loss of function and no unintentional transmissions. Monitoring PER and shall exeed 10%

After the test, Check the function and critical stored date of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **2.4G/5G WIFI Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate WIFI protocol Analyzer);

During the test, observe whether the EUT operate as intended, no loss of function and no unintentional transmissions. Monitoring PER and shall exeed 10%

After the test, Check the function and critical stored data of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **other Mode**

During and after the test, observe the Screen status by eyes or monitor to see whether there is degration of performance

2.2.2 Monitoring for Transient Phenomena Applied to the EUT

- **BT Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate BT protocol Analyzer);

After the test, Check the function and critical stored date of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **2.4G/5G WIFI Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate WIFI protocol Analyzer);

After the test, Check the function and critical stored data of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **other Mode**

After the test, observe the Screen status by eyes or monitor to see whether there is degration of performance

2.3 Measurement Uncertainty

The report uncertainty of measurement **y** ± **U** , where expended uncertainty **U** is based on a standard uncertainty Multiplied by a coverage factor of **k=2** , providing a level of confidence of approximately 95% .

No.	Item	Frequency Range	U , Value
1	Power Line Conducted Emission	150KHz~30MHz	1.20 dB
2	Disturbance Power Emission	30MHz~300MHz	2.96 dB
3	Radiated Emission Test	30MHz~1GHz	3.75 dB
4	Radiated Emission Test	1GHz~18GHz	3.88 dB

3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

.CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Aug.04, 2020

FCC-Registration No.: 703111 Designation Number: CN1313

Dongguan Yaxu (AiT) technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 6819A CAB identifier: CN0122

The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01

Dongguan Yaxu (AiT) technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

3.1 Deviation from Standard

None

3.2 Abnormalities from Standard Conditions

None

4 General Information

4.1 General Description of EUT

Manufacturer:	Dongguan Doulan Electronic Technology Co. LTD
Manufacturer Address:	No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan
EUT Name:	Bluetooth headset
Model No:	TG10
Serial Model:	TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Brand Name:	N/A
Model difference:	N/A
Frequency Range:	BT Classic/BLE: 2402-2480MHz
Modulation Mode:	BLE:GFSK(1/2Mbps);
H/W No.:	N/A
S/W No.:	N/A
Adapter:	N/A
Battery:	DC3.7V

4.2 EUT Test Mode

Test mode	BT	Charge				-	-
1	■						
2		■					

Note:
1) ■ is operation mode.
2) Pre-scan above all test mode, found below test mode which it was worse case mode. Test results reported represents the worst case simultaneous transmission condition.
Pre-test conducted emission and radiated emission at both voltage AC 120V/60Hz and AC 230V/50Hz, recorded worst case.
Pre-test radiated emission with the EUT position at X-axis,Y-axis and Z-axis, recorded worst case.

Test item	Test mode (Worse case mode)
Conducted emission	Mode 2
Radiated emission	Mode 2
EMS	All Mode

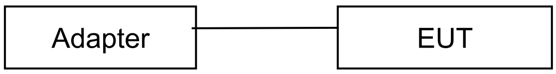
4.3 Description of Test Setup

EUT was tested in normal configuration (Please See following Block diagrams)

1. Block diagram of EUT configuration-EMI

Mode1:

Mode2:



2. Block diagram of EUT configuration-EMS

The same as above.

4.4 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	Remark
1	Adapter	NOKIA	CE	AD-10WU	N/A	N/A	N/A

4.5 EUT Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	signal cable	Remark
1	N/A	N/A	N/A	N/A	N/A	N/A

5 Equipments List for All Test Items

☒ Radiation Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	EMI Measuring Receiver	R&S	ESR	101160	2022.09.02	2023.09.01
2	Low Noise Pre Amplifier	HP	HP8447E	1205323	2022.09.02	2023.09.01
3	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3207	2022.09.02	2024.08.27
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2022.09.02	2023.09.01
5	Spectrum Analyzer	R&S	FSV40	101470	2022.09.02	2023.09.01
6	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2022.09.02	2023.09.01
7	Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	452	2022.09.02	2024.08.27
8	Filter	MICRO-TRONICS	BRM50702-02	16	2022.09.02	2023.09.01
9	Filter	MICRO-TRONICS	BRC50703-02	17	2022.09.02	2023.09.01
10	Filter	MICRO-TRONICS	BRC50705-02	18	2022.09.02	2023.09.01

☒ Conduction Test equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	EMI Test Receiver	R&S	ESCI	100124	2022.09.02	2023.09.01
2	LISN	Kyoritsu	KNW-242	8-837-4	2022.09.02	2023.09.01
3	LISN	R&S	ESH3-Z2	0357.8810.54-101161-S2	2022.09.02	2023.09.01
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2022.09.02	2023.09.01

☐ H/F Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Signal Conditioning Unit	Schaffner	CCN1000-1	72472	2022.09.02	2023.09.01
2	5KV AC Power Source	Schaffner	NSG1007-5-208-413	57227	2022.09.02	2023.09.01

☒ ESD Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	ESD Simulator	Schaffner	NSG435	5866	2022.09.02	2023.09.01

☒ R/S Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	MXG analog signal generator	Agilent	N5181A	MY46240859	2022.09.02	2023.09.01
2	Power Amplifier	Schaffner	CBA9433	T43574	2022.09.02	2023.09.01
3	Power Amplifier	Schaffner	CBA9409	T43605	2022.09.02	2023.09.01
4	Power Amplifier	Micotop	MPA-3000-6000-50	MPA03724	2022.09.02	2023.09.01
5	Logarithmic-periodic Antenna	Schwarzbeck	VULP9118E	820	2022.09.02	2023.09.01
6	Broadband Horn Antenna	Schwarzbeck	BBHA 9120LF	255	2022.09.02	2023.09.01
7	Power meter	Agilent	E4419B	MY45102079	2022.09.02	2023.09.01
8	Power sensor	Agilent	8481A	MY41097696	2022.09.02	2023.09.01
9	Power sensor	Agilent	8481A	MY41097697	2022.09.02	2023.09.01
10	RF Relay matrix	tsj	RFM-S621	04261	2022.09.02	2023.09.01

☐ EFT/B Test equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	INS6501 Step-transformer	Schaffner	INA 6501	136	2022.09.02	2023.09.01
2	MODULA GENERATOR	Schaffner	MODULA 6150	34475	2022.09.02	2023.09.01
3	Capacitive Coupling Clamp	Schaffner	CDN8014	22519	2022.09.02	2023.09.01

☐ Surge Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	INS6501 step-transformer	Schaffner	INA 6501	136	2022.09.02	2023.09.01
2	MODULA GENERATOR	Schaffner	MODULA 6150	34475	2022.09.02	2023.09.01

☐ C/S Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	SML01 Signal Generator	R&S	SML01	104531	2022.09.02	2023.09.01
2	Power Amplifier	Schaffner	CBA9437	T43660	2022.09.02	2023.09.01
3	Attenuator	Aeroflex / Weinschel	40-6-33	PA130	2022.09.02	2023.09.01
4	Power Line CDN	tsj	TSCDN-M1-16A	07010	2022.09.02	2023.09.01
5	Power Line CDN	tsj	TSCDN-M2-16A	07024	2022.09.02	2023.09.01
6	Power Line CDN	tsj	TSCDN-M3-16A	07032	2022.09.02	2023.09.01

☐ PFMF Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Magnetic field generator	Schaffner	MFO6501	34299	2022.09.02	2023.09.01
2	Magnetic Field Loop Antenna	Schaffner	INA 702	148	2022.09.02	2023.09.01

☐ Dips Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	INS6501 Step-transformer	Schaffner	INA 6501	136	2022.09.02	2023.09.01
2	MODULA GENERATOR	Schaffner	MODULA 6150	34475	2022.09.02	2023.09.01

☒ Others Test Equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Wideband communication tester	R&S	CMW500	1201.0002K5 0	2022.09.02	2023.09.01

Note:

1. ☐ is not applicable in this Test Report. ☒ is applicable in this Test Report.

6 Emission Test Results

6.1 Conducted Emission(AC Mains) Measurement

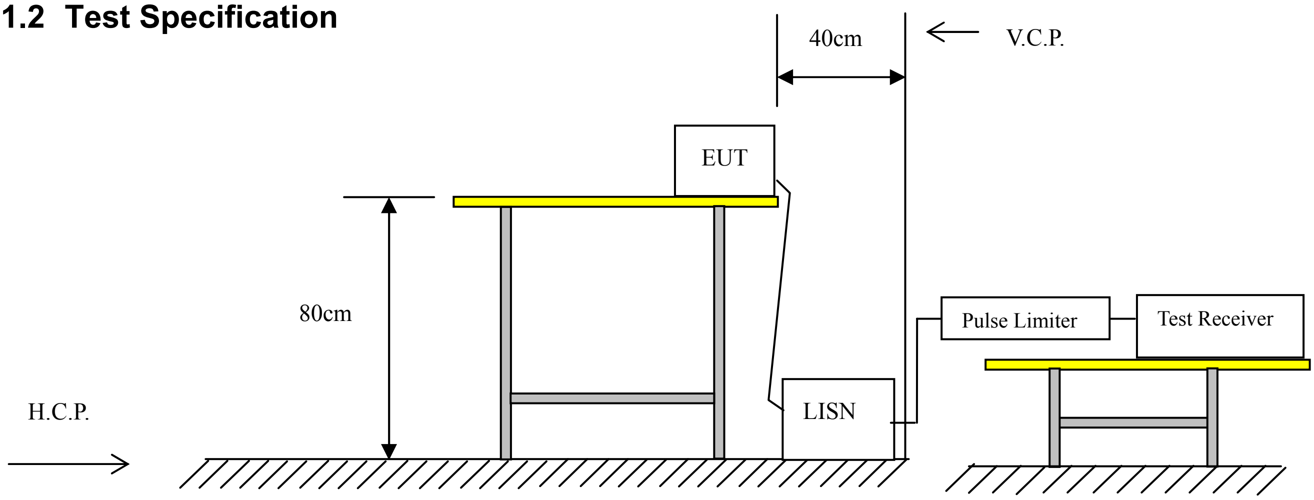
Frequency (MHz)	☐ Class A (dBμV)		☒ Class B (dBμV)	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 ~ 0.50	79	66	66 to 56	56 to 46
0.50 ~ 5.0	73	60	56	46
5.0 ~ 30	73	60	60	50

Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximized peak within 6dB of Average Limit

6.1.1 E.U.T. Operation

Temperature:	23°C	Humidity:	55% RH	Atmospheric Pressure:	101	Kpa
Test Mode:	All Modes			The Worst Mode reported:	Mode 2	

6.1.2 Test Specification



EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

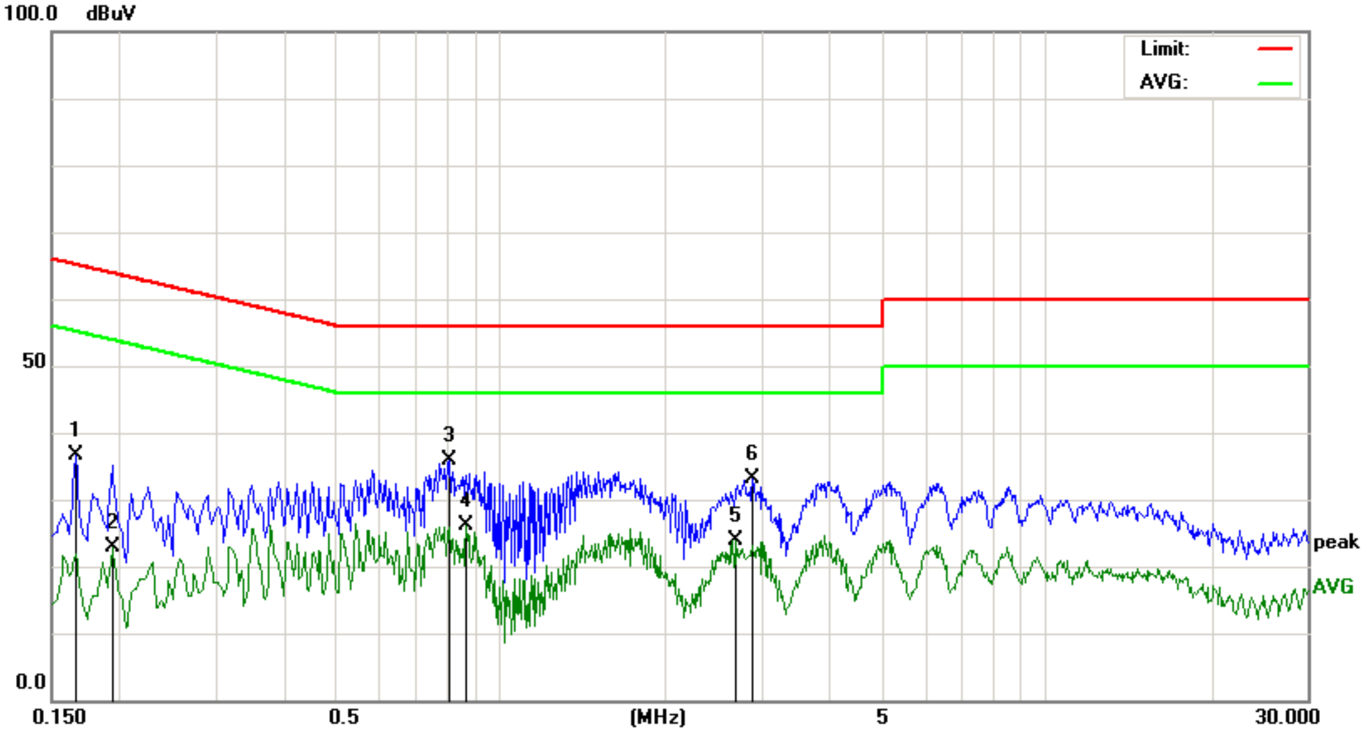
6.1.3 Measurement Data

An initial pre-scan was performed on the live and neutral lines.

Quasi-peak or average measurements were performed at the frequency which maximum peak emissions were detected.

Please refer to the attached quasi-peak & average measurement data.

Model name:	TG10	Test Date :	2022-09-19
Test Mode:	Mode 2	Phase :	Line
Test Voltage:	AC 230V/50Hz	Test Result:	☒ Pass ☐ Fail



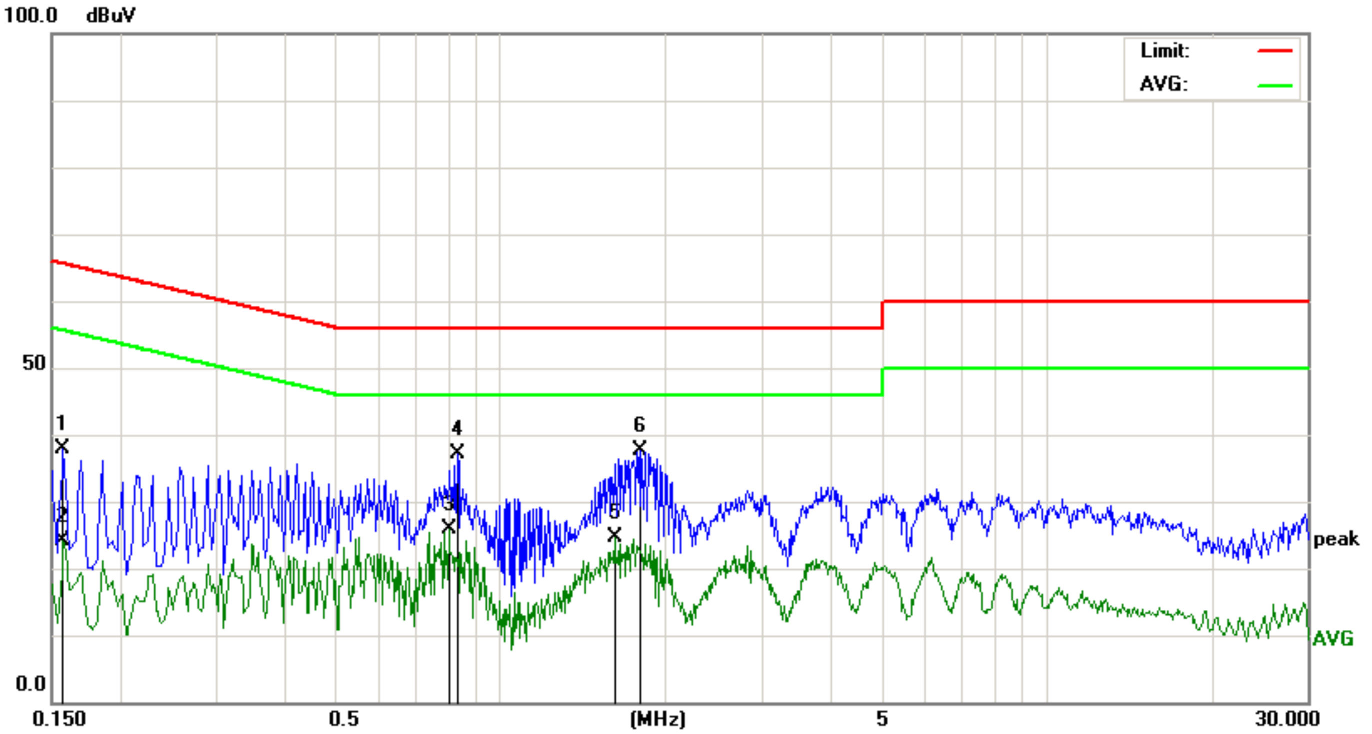
Remark: Correct Factor = LISN factor + Cable Loss + Pulse limiter factor.

Measurement Result=Reading Level +Correct Factor;

Over Limit= Measurement Result- Limit;

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1660	25.05	11.61	36.66	65.15	-28.49	QP
2		0.1940	11.68	11.21	22.89	53.86	-30.97	AVG
3		0.8059	25.80	9.96	35.76	56.00	-20.24	QP
4	*	0.8660	16.23	9.95	26.18	46.00	-19.82	AVG
5		2.6900	13.75	10.02	23.77	46.00	-22.23	AVG
6		2.8860	23.02	10.04	33.06	56.00	-22.94	QP

Model name:	TG10	Test Date :	2022-09-19
Test Mode:	Mode 2	Phase :	Neutral
Test Voltage:	AC 230V/50Hz	Test Result:	☒ Pass ☐ Fail



Remark: Correct Factor = LISN factor + Cable Loss + Pulse limiter factor.

Measurement Result=Reading Level +Correct Factor;

Over Limit= Measurement Result- Limit;

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1580	26.23	11.75	37.98	65.56	-27.58	QP
2		0.1580	12.29	11.75	24.04	55.56	-31.52	AVG
3		0.8020	15.91	9.96	25.87	46.00	-20.13	AVG
4		0.8340	27.09	9.96	37.05	56.00	-18.95	QP
5		1.6140	14.75	9.97	24.72	46.00	-21.28	AVG
6	*	1.8020	27.74	9.98	37.72	56.00	-18.28	QP

6.2 Radiated Emission Measurement

Limits of Radiated Emission Measurement (Below 1GHz)

Frequency (MHz)	☐ Class A (10m)	☒ Class B (3m)
	Quasi-Peak dB(μV/m)	Quasi-Peak dB(μV/m)
30 ~ 230	40.0	40.0
230 ~ 1000	47.0	47.0

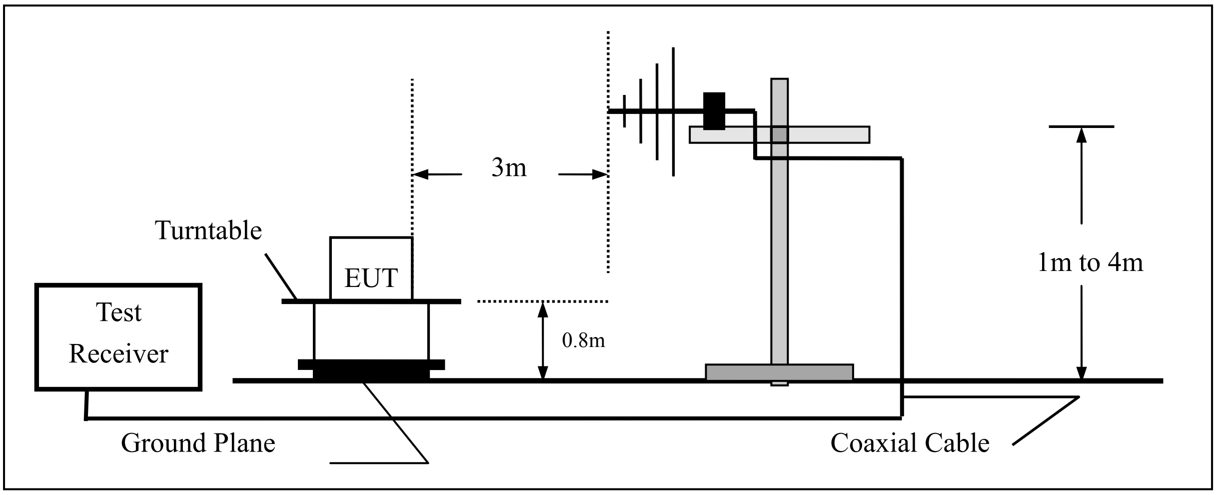
Limits of Radiated Emission Measurement (Above 1GHz)

Frequency (MHz)	☐ Class A (3m)		☒ Class B (3m)	
	Quasi-Peak dB(μV/m)	Average dB(μV/m)	Quasi-Peak dB(μV/m)	Average dB(μV/m)
1000~3000	76.0	56.0	70.0	50.0
3000 ~ 6000	80.0	60.0	74.0	54.0

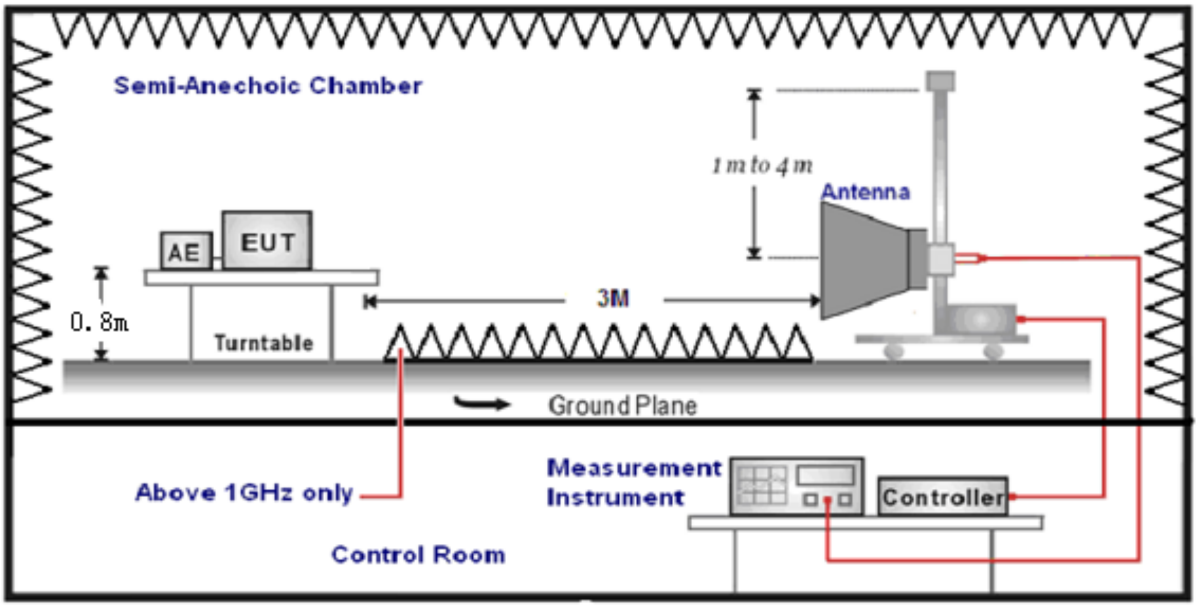
6.2.1 E.U.T. Operation

Temperature:	24°C	Humidity:	52% RH	Atmospheric Pressure:	101	Kpa
Test Mode:	All Modes			The Worst Mode reported:	Mode 2	

6.2.2 Test Specification



Radiated emission test set-up, frequency below 1000MHz:

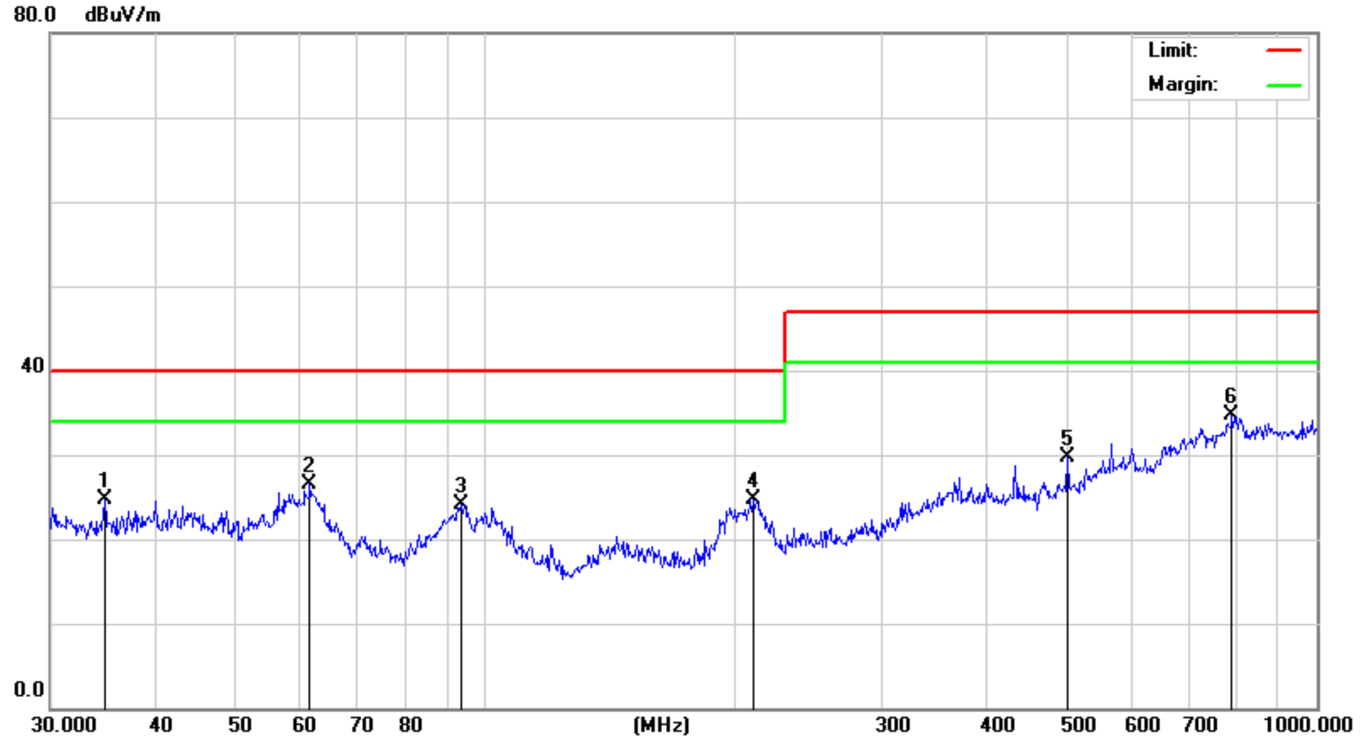


Radiated emission test set-up, frequency above 1000MHz

EUT was placed upon a wooden test table which was placed on the turn table 0.8m above the horizontal metal ground plane, and operating in the mode as mentioned above. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested.

6.2.3 Measurement Data

Model name:	TG10	Test Date :	2022-09-19
Test Mode:	Mode 2	Phase :	Vertical
Test Voltage:	AC 230V/50Hz	Test Result:	☒ Pass ☐ Fail

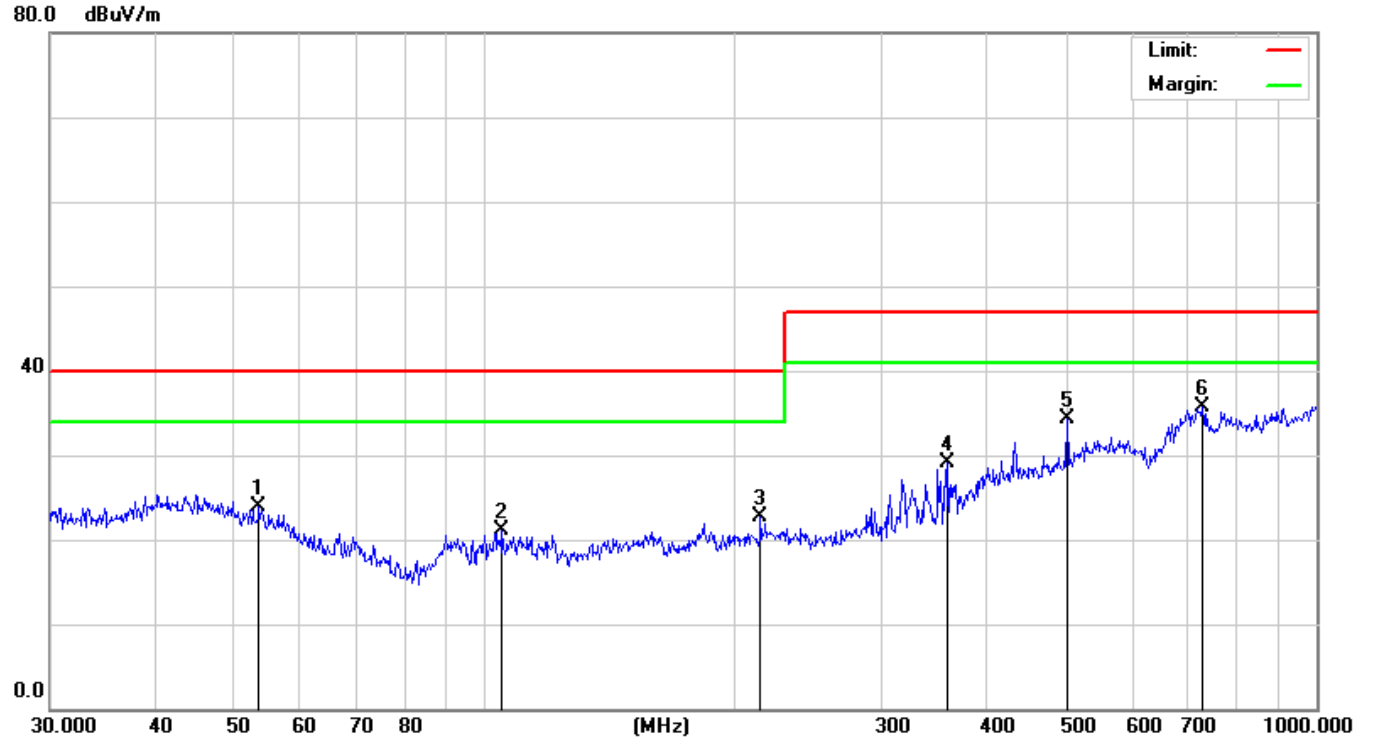


Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Measurement Result=Reading Level +Correct Factor;
Over Limit= Measurement Result- Limit;

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		34.8823	29.51	-4.79	24.72	40.00	-15.28	QP
2		61.5618	34.53	-7.93	26.60	40.00	-13.40	QP
3		93.4402	34.21	-10.06	24.15	40.00	-15.85	QP
4		210.0482	28.71	-3.93	24.78	40.00	-15.22	QP
5		501.1790	30.80	-1.01	29.79	47.00	-17.21	QP
6	*	790.6188	27.96	6.82	34.78	47.00	-12.22	QP

Note: While performing the testing, the notch filter is used for avoiding test instrument overload.

Model name:	TG10	Test Date :	2022-09-19
Test Mode:	Mode 2	Polarization :	Horizontal
Test Voltage:	AC 230V/50Hz	Test Result:	☒ Pass ☐ Fail

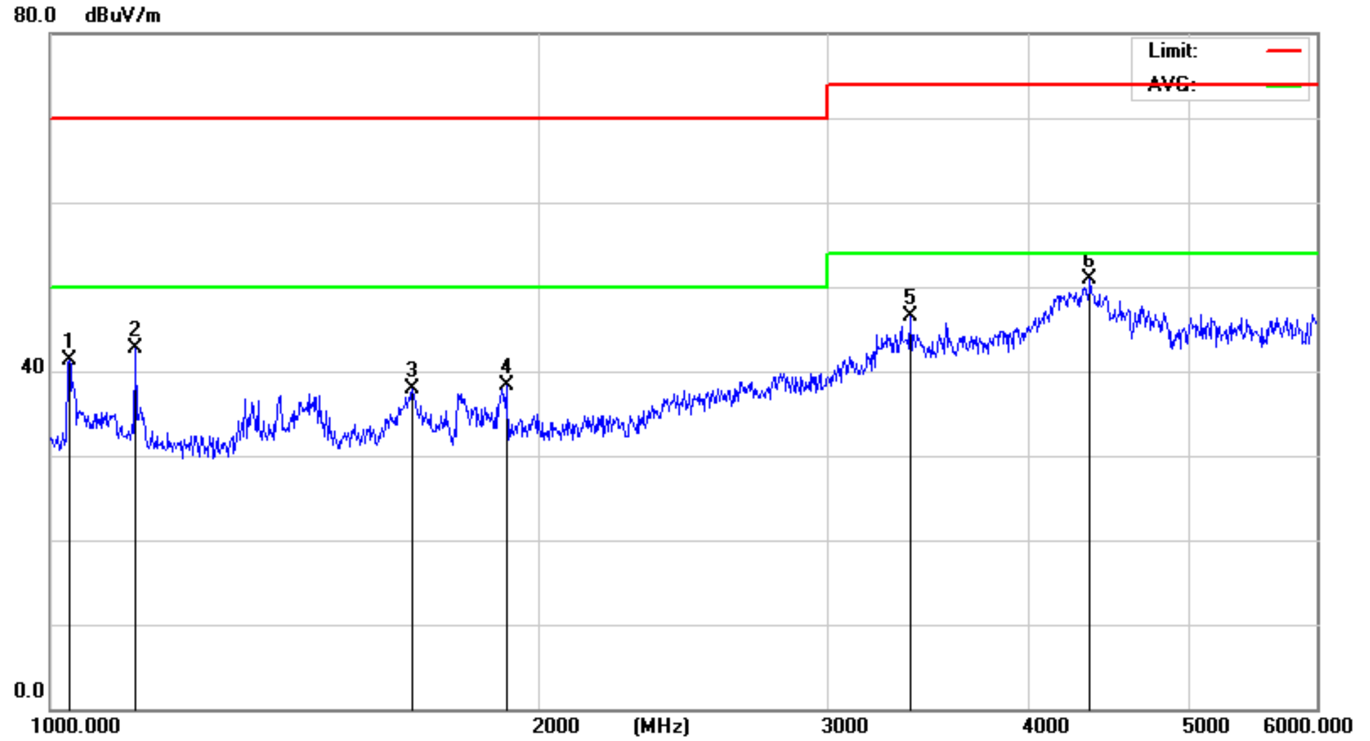


Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Measurement Result=Reading Level +Correct Factor;
Over Limit= Measurement Result- Limit;

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		53.5052	28.01	-4.08	23.93	40.00	-16.07	QP
2		104.9033	28.41	-7.34	21.07	40.00	-18.93	QP
3		214.5143	29.84	-7.13	22.71	40.00	-17.29	QP
4		360.4476	31.91	-2.84	29.07	47.00	-17.93	QP
5		501.1790	31.71	2.54	34.25	47.00	-12.75	QP
6	*	729.3583	29.28	6.45	35.73	47.00	-11.27	QP

Note: While performing the testing, the notch filter is used for avoiding test instrument overload.

Model name:	TG10	Test Date :	2022-09-19
Test Mode:	Mode 2	Phase :	Vertical
Test Voltage:	AC 230V/50Hz	Test Result:	☒ Pass ☐ Fail



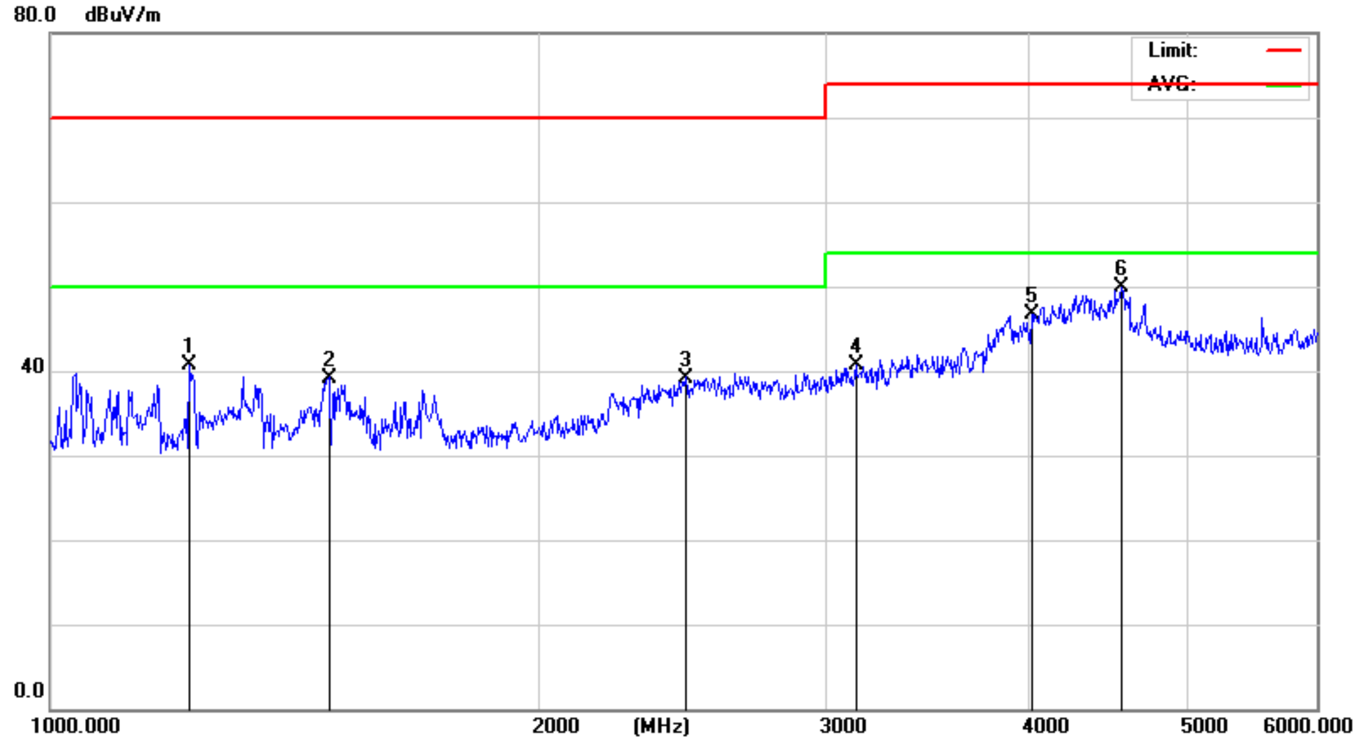
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Measurement Result=Reading Level +Correct Factor;
Over Limit= Measurement Result- Limit;

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		1027.241	52.31	-10.91	41.40	70.00	-28.60	peak
2		1127.551	53.47	-10.77	42.70	70.00	-27.30	peak
3		1669.365	47.71	-9.71	38.00	70.00	-32.00	peak
4		1906.051	47.89	-9.49	38.40	70.00	-31.60	peak
5		3375.706	47.45	-0.95	46.50	74.00	-27.50	peak
6	*	4353.737	46.46	4.44	50.90	74.00	-23.10	peak

Note: While performing the testing, the notch filter is used for avoiding test instrument overload.

Dongguan Yaxu (AiT) Technology Limited
No.22, Jinqianling Third Street, Jitigang,
Huangjiang,Dongguan, Guangdong, China

Model name:	TG10	Test Date :	2022-09-19
Test Mode:	Mode 2	Polarization :	Horizontal
Test Voltage:	AC 230V/50Hz	Test Result:	☒ Pass ☐ Fail



Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Measurement Result=Reading Level +Correct Factor;
Over Limit= Measurement Result- Limit;

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		1217.858	51.26	-10.56	40.70	70.00	-29.30	peak
2		1483.178	49.13	-9.93	39.20	70.00	-30.80	peak
3		2458.283	44.40	-5.20	39.20	70.00	-30.80	peak
4		3125.390	42.18	-1.38	40.80	74.00	-33.20	peak
5		4009.288	42.85	3.85	46.70	74.00	-27.30	peak
6	*	4553.192	45.03	4.97	50.00	74.00	-24.00	peak

Note: While performing the testing, the notch filter is used for avoiding test instrument overload.

7 Immunity Test Results

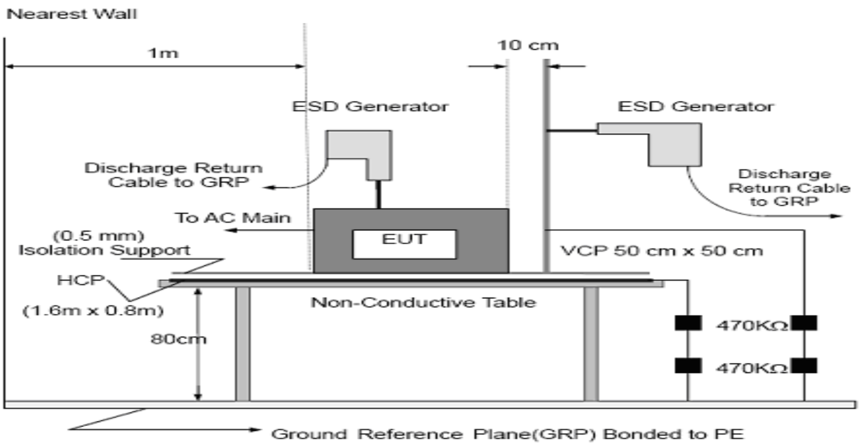
7.1 Electrostatic discharge immunity test

Acceptable Performance Criterion:	B	
Discharge Impedance:	330 Ω / 150 pF	
Discharge Voltage:	Air Discharge:	±4 KV, ±8 kV
	Contact Discharge:	±2 kV, ±4 kV
	VCP, HCP:	±2 kV, ±4 kV
Polarity:	Positive & Negative	
Minimum discharge Interval:	1 second	

7.1.1 E.U.T. Operation

Temperature:	25°C	Humidity:	50% RH	Atmospheric Pressure:	101	Kpa
Test Mode:	All Modes					

7.1.2 Test Specification



EUT was operated in the mode as mentioned above. Both contact and air discharge was executed. Contact discharge to the conductive surfaces and to coupling planes; air discharge at insulating surfaces. Each test point shall be subjected to 10 discharges at least (For each voltage and polarity).

7.1.3 Measurement Data

Test Record

Electrostatic Discharge Test Results

M/N:	TG10	Test Result: ☒ Pass ☐ Fail
Test Voltage:	AC 230V/50Hz	Test date: 2022-09-19
Discharge times	Contact discharge: minimum 10 times (+/-respectively) at each point, Air discharge: minimum 10 times (+/- respectively) at each point.	

Discharge Mode	Air Discharge								Contact Discharge								Performance Criterion	Result
Test level (kV)	4		8		10		15		2		4		6		8			
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-		
HCP	/	/	/	/	/	/	/	/	A	A	A	A	/	/	/	/	B	Pass
VCP	/	/	/	/	/	/	/	/	A	A	A	A	/	/	/	/		Pass
A1	A	A	A	A	/	/	/	/	/	/	/	/	/	/	/	/		Pass
A2	A	A	A	A	/	/	/	/	/	/	/	/	/	/	/	/		Pass
A3	A	A	A	A	/	/	/	/	/	/	/	/	/	/	/	/		Pass
A4	A	A	A	A	/	/	/	/	/	/	/	/	/	/	/	/		Pass

Note 1): Horizontal Coupling Plane (**HCP**) and Vertical Coupling plane (**VCP**).
Note 2): "**Cx**" means Contact Point ,x=1～N,"**Ax**" means Air Point, x=1～N.
Note 3): "A" stand for, No degradation in performance of the EUT was observed.
"B" stand for, Degradation in performance of the EUT occurred during the application of the disturbance, after the test, EUT can self-recovered and operate as intended.

7.2 RF Field Strength Immunity Test

Acceptable Performance Criterion:	A
Test Level	3 V/m
Test Distance	3 m
Frequency Range	80MHz~6000MHz
Polarity:	Horizontal & Vertical

7.2.1 E.U.T. Operation

Temperature:	26°C	Humidity:	54% RH	Atmospheric Pressure:	101	Kpa
Test Mode:	All Modes					

7.2.2 TEST PROCEDURE

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber.

The testing distance from antenna to the EUT was 3 meters.

The other condition as following manner:

a. The field strength level was 3V/m.

b. The frequency range is swept from 80 MHz to 1000 MHz, & 1000MHz - 6000MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

c. Sweep Frequency 900 MHz, with the Duty Cycle:1/8 and Modulation: Pulse 217 Hz(if applicable)

d. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

7.2.3 Test Specification

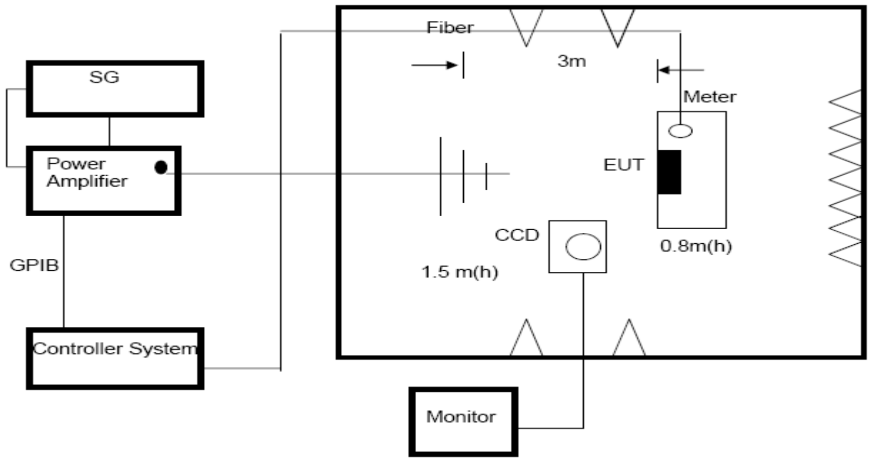


TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

7.2.4 Measurement Data

Radiated Frequency Field Strength Susceptibility Results		
M/N:	TG10	Test Result: ☒ Pass ☐ Fail
Test Voltage:	AC 230V/50Hz	Test date: 2022-09-19
Test Port	Enclosure	

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80 MHz-6 GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass

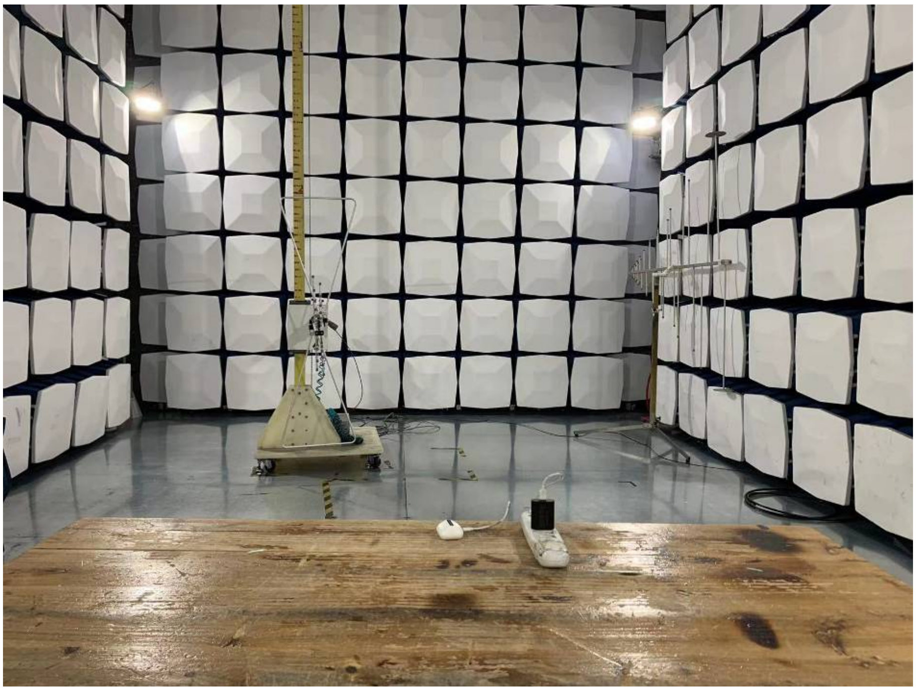
Note: “A” stand for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.

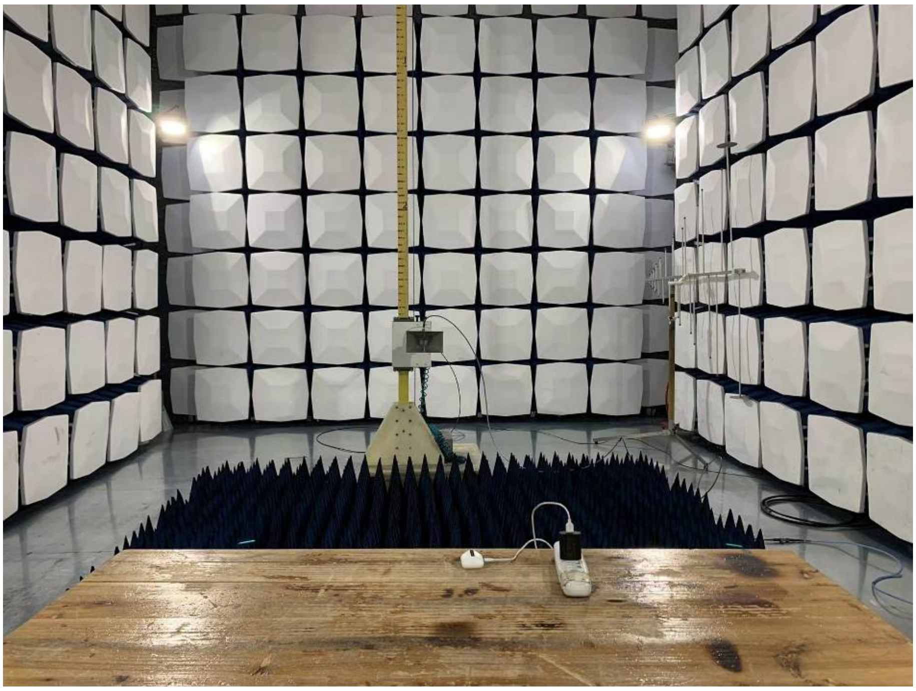
Special conditions for EMC immunity tests

EUT operating Mode	PER during test(Worst)	PER Limit	Result
BT	4.3%	10%	Pass

8 Test Setup Photos of The EUT

Radiated Emission

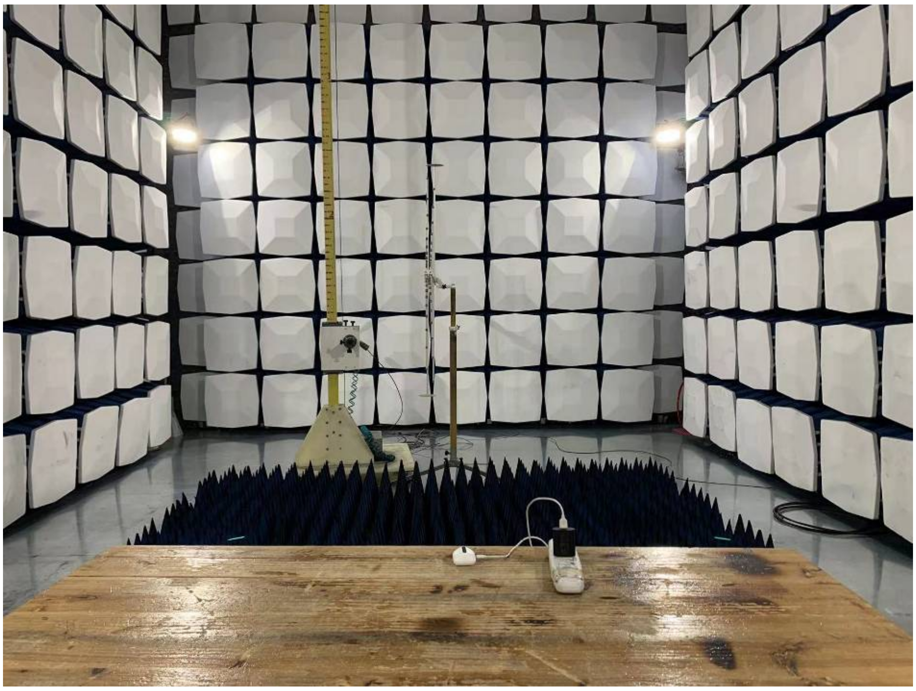




Conducted Emission(AC Mains)

Electrostatic Discharge

RF Electromagnetic Field



9 External And Internal Photos of The EUT

Please refer to the appendix for details

End of the report

Dongguan Yaxu (AiT) Technology Limited
No.22, Jinqianling Third Street, Jitigang,
Huangjiang,Dongguan, Guangdong, China

Test Report
EN IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Reference No......................:	AIT22091613S
Date of issue...................................:	2022-10-17
Total number of pages	72 pages
Testing Laboratory name ....:	Dongguan Yaxu (AiT) Technology Limited
Address ....:	No. 22, Jinqianling Third Street, JitiGang, Huangjiang, Dongguan, Guangdong, China
Testing location ....:	Same as above
Tested by (+ signature) ....:	Dave Long Dave Long
Approved by (+ signature)................:	Sandy Liang Sandy Liang
Applicant's name..........................:	Guangzhou Langston Electronic Technology Co,Ltd
Address ....:	5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou, China
Manufacturer's name ....:	Dongguan Doulan Electronic Technology Co. LTD
Address ....:	No. 3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan, China
Factory's name…………. ....…..:	Same as Manufacturer
Address. ....:	Same as Manufacturer
Test specification:	
Standard ....:	EN IEC 62368-1:2020+A11:2020
Test procedure ....:	Service of CE Marking in LVD
Procedure deviation..........................:	N/A
Non-standard test method.................	N/A

Note: The test data was only valid for the test sample(s). This test report is prepared for the customer shown above and for the specific product described herein. It must not be duplicated or used in part without prior written consent from Dongguan Yaxu (AiT) Technology Limited. Unless otherwise specified, the measurement uncertainty is not considered in this report.

Test Object:

Description.......................................:	Bluetooth headset
Trademark ....:	N/A
Manufacturer ....:	Dongguan Doulan Electronic Technology Co. LTD
Model and/or type reference ....:	TG10, TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Serial number ....:	N/A
Rating(s)……………………………..:	Input: 5V⎓1.0A

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Bluetooth headset
Model: TG10
Input: 5V⎓1.0A
MADE IN CHINA
Manufacturer: Dongguan Doulan Electronic Technology Co. LTD
Address: No. 3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan, China

Note: --

1. The above marks are the minimum requirements required by the safety standard. For the final production, the additional marks which do not give rise to misunderstanding may be added.
2. Height of CE mark at least 5mm, height of WEEE mark at least 7mm, height of other marks at least 5mm, height of letters and numerals at least 2mm.
3. According to the EU directives which have been aligned with EU NLF (new legislative framework), both of manufacturer and importer’s name and address shall be affixed on the product or, where that is not possible, on its packaging or in a document accompanying the product before the product is placed on the EU market.

TEST ITEM PARTICULARS:	
Classification of use by ....:	☒ Ordinary person ☒ Instructed person ☒ Skilled person ☒ Children likely to be present
Supply Connection ....:	☐ AC Mains ☐ DC Mains ☒ External Circuit - not Mains connected - ☒ ES1 ☐ ES2 ☐ ES3
Supply % Tolerance ....:	☐ +10%/-10% ☐ +20%/-15% ☐ +____%/ -_____% ☒ None
Supply Connection – Type ....:	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: not directly connected to the mains
Considered current rating of protective device as part of building or equipment installation ....:	_______A; Installation location: ☐ building; ☐ equipment
Equipment mobility ....:	☒ movable ☐ hand-held ☒ transportable ☐ stationary ☐ for building-in ☐ direct plug-in ☐ rack-mounting ☐ wall-mounted
Over voltage category (OVC) ....:	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other: not directly connected to the mains
Class of equipment ....:	☐ Class I ☐ Class II ☒ Class III
Access location ....:	☐ restricted access location ☒ N/A
Pollution degree (PD) ....:	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified maxium operating ambient:	40°C
IP protection class ....:	☒ IPX0 ☐ IP___
Power Systems ....:	☐ TN ☐ TT ☐ IT - _____ V $_{L-L}$
Altitude during operation (m) ....:	☒ 2000 m or less ☐ _______ m
Altitude of test laboratory (m) ....:	☒ 2000 m or less ☐ __ m
Mass of equipment (kg) ....:	☒ Approx. 35g

POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object .... :	N/A
- test object does meet the requirement .... :	P (Pass)
- test object does not meet the requirement .... :	F (Fail)
TESTING:	
Date of receipt of test item... :	2022-09-16
Date (s) of performance of tests.................................. :	2022-09-16 to 2022-10-17

GENERAL REMARKS:

"(see remark #)" refers to a remark appended to the report.
(see appended table)" refers to a table appended to the report.
The test results presented in this report relate only to the object tested.

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Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Summary of testing:

All tests were performed on model TG10 at the worst case and all test results complied with the standard on cover page.

General product information:

1. The EUT is a Bluetooth headset designed as audio/video, information and communication technology equipment, for indoor use only.
2. The EUT is composed of charging base and earbuds; The charging base is supplied by 5VDC SELV circuit or internal 3.7V/350mAh Polymer Lithium-ion battery; The earbuds is supplied by internal 3.7V/30mAh Polymer Lithium-ion battery.
3. All the circuits of EUT are considered as ES1 circuits.
4. All models are exactly the same except the model names.
5. Instructions and equipment marking related to safety is applied in the language that is acceptable in the country in which the equipment is to be sold.

OVERVIEW OF ENERGY SOURCES AND SAFEGUARDS				
Clause	**Possible Hazard**			
5	Electrically-caused injury			
Class and Energy Source (e.g. ES3: Primary circuit)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R
ES1: All circuits	Ordinary/ Instructed/ Skilled	N/A	N/A	N/A
6	Electrically-caused fire			
Class and Energy Source (e.g. PS2: 100 Watt circuit)	Material part (e.g. Printed board)	Safeguards		
		B	1st S	2nd S
PS3: Type C Input port PS3: All internal circuits	All combustible materials within equipment and enclosure	For normal conditionand abnormalconditions: 1. No ignition occurred. 2. No parts exceeding 90% of its spontaneous ignition temperature.	For control fire spread under single faultcondition: 1. PCB is complied with V-0 material. 2. All other components: at least V-2 except for mounted on min. V-1 material or small parts of combustible material. 3. V-0 plastic enclosure provided.	N/A
PS1: Battery cell (on the charging base) PS1: Battery cells (on the earbuds)	All combustible materials within equipment and enclosure	For normal conditionand abnormalconditions: 1. No ignition occurred. 2. No parts exceeding 90% of its spontaneous ignition temperature.	N/A	N/A
7	Injury caused by hazardous substances			
Class and Energy Source (e.g. Ozone)	Body Part (e.g., Skilled)	Safeguards		
		B	S	R
Polymer Lithium-ion	Ordinary/ Instructed/ Skilled	N/A	N/A	N/A
Polymer Lithium-ion	Ordinary/ Instructed/ Skilled	N/A	N/A	N/A
8	Mechanically-caused injury			
Class and Energy Source (e.g. MS3: Plastic fan blades)	Body Part (e.g. Ordinary)	Safeguards		
		B	S	R

MS1: Sharp edges and corners of accessible parts	Ordinary; Instructed; Skilled	N/A	N/A	N/A
MS1: Equipment mass	Ordinary; Instructed; Skilled	N/A	N/A	N/A
9	Thermal burn			
Class and Energy Source (e.g. TS1: Keyboard caps)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
TS1: Accessible parts surface	Ordinary/ Instructed/ Skilled	N/A	N/A	N/A
10	Radiation			
Class and Energy Source (e.g. RS1: PMP sound output)	Body Part (e.g., Ordinary)	Safeguards		
		B	S	R
RS1: LEDs for indicating lights only	Ordinary; Instructed; Skilled	N/A	N/A	N/A
RS1: Acoustic energy sources	Ordinary; Instructed; Skilled	N/A	N/A	N/A
Supplementary Information: (1) “B” – Basic Safeguard; “S” – Supplementary Safeguard; “R” – Reinforced Safeguard. (2) “*” means that the equipment which is intended to be connected to the output shall also be considered.				

NERGY SOURCE DIAGRAM
Optional. Manufacturers are to provide the energy sources diagram identify declared energy sources and identifying the demarcations are between power sources. Recommend diagram be provided included in power supply and multipart systems. Insert diagram below. Example diagram designs are; Block diagrams; image(s) with layered data; mechanical drawings
☒ **ES** ☒ **PS** ☒ **MS** ☒ **TS** ☒ **RS.** Remark: see above table “OVERVIEW OF ENERGY SOURCES AND SAFEGUARDS” for details.

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Clause	Requirement + Test	Result - Remark	Verdict

4	**GENERAL REQUIREMENTS**		**P**
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components	(See appended table 4.1.2)	P
4.1.3	Equipment design and construction		P
4.1.4	Specified ambient temperature for outdoor use (°C) ....:		N/A
4.1.5	Constructions and components not specifically covered		N/A
4.1.8	Liquids and liquid filled components (LFC)		N/A
4.1.15	Markings and instructions	(See Annex F)	P
4.4.3	Safeguard robustness		P
4.4.3.1	General		P
4.4.3.2	Steady force tests	(See Clause T.4)	P
4.4.3.3	Drop tests	(See Annex T.7)	P
4.4.3.4	Impact tests		N/A
4.4.3.5	Internal accessible safeguard tests		N/A
4.4.3.6	Glass impact tests		N/A
4.4.3.7	Glass fixation tests	No glass used	N/A
	Glass impact test (1J)		N/A
	Push/pull test (10 N)		N/A
4.4.3.8	Thermoplastic material tests	(See Annex T.8)	P
4.4.3.9	Air comprising a safeguard	Considered, but no such barrier or enclosure provided	N/A
4.4.3.10	Accessibility, glass, safeguard effectiveness	All safeguards remain effective	P
4.4.4	Displacement of a safeguard by an insulating liquid		N/A
4.4.5	Safety interlocks	(See Annex K)	N/A
4.5	**Explosion**		**P**
4.5.1	General		P
4.5.2	No explosion during normal/abnormal operating condition	(See Clause B.2, B.3)	P
	No harm by explosion during single fault conditions	(See Clause B.4)	P
4.6	**Fixing of conductors**		**P**
	Fix conductors not to defeat a safeguard	The conductor cannot defeat a safeguard	P
	Compliance is checked by test ....:	(See Clause T.2)	P
4.7	**Equipment for direct insertion into mains socket–outlets**		**N/A**
4.7.2	Mains plug part complies with relevant standard...:		N/A
4.7.3	Torque (Nm)..:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

4.8	**Equipment containing coin/button cell batteries**		**N/A**
4.8.1	General		N/A
4.8.2	Instructional safeguard...:		N/A
4.8.3	Battery compartment door/cover construction		N/A
	Open torque test		N/A
4.8.4.2	Stress relief test		N/A
4.8.4.3	Battery replacement test		N/A
4.8.4.4	Drop test		N/A
4.8.4.5	Impact test		N/A
4.8.4.6	Crush test		N/A
4.8.5	Compliance		N/A
	30N force test with test probe		N/A
	20N force test with test hook		N/A
4.9	**Likelihood of fire or shock due to entry of conductive object**		**N/A**
4.10	**Component requirements**		**N/A**
4.10.1	Disconnect Device		N/A
4.10.2	Switches and relays		N/A

5	**ELECTRICALLY-CAUSED INJURY**		**P**
5.2	**Classification and limits of electrical energy sources**		**P**
5.2.2	ES1, ES2 and ES3 limits		P
5.2.2.2	Steady-state voltage and current limits ....:	(See appended table 5.2)	P
5.2.2.3	Capacitance limits ....:		N/A
5.2.2.4	Single pulse limits...:		N/A
5.2.2.5	Limits for repetitive pulses ....:		N/A
5.2.2.6	Ringing signals	(See Annex H)	N/A
5.2.2.7	Audio signals	(See Clause E.1)	P
5.3	**Protection against electrical energy sources**		**N/A**
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	All internal circuits considered ES1	N/A
5.3.1 a)	Accessible ES1/ES2 derived from ES2/ES3 circuits		N/A
5.3.1 b)	Skilled persons not unintentional contact ES3 bare conductors		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
	Accessibility to outdoor equipment bare parts		N/A
5.3.2.2	Contact requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test with test probe from Annex V		—
5.3.2.2 a)	Air gap – electric strength test potential (V) ....:	(See appended table 5.4.9)	N/A
5.3.2.2 b)	Air gap – distance (mm) ....:		N/A
5.3.2.3	Compliance		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	**Insulation materials and requirements**		**P**
5.4.1.2	Properties of insulating material		P
5.4.1.3	Material is non-hygroscopic	Insulating material used	N/A
5.4.1.4	Maximum operating temperature for insulating materials ....:	(See appended table 5.4.1.4)	P
5.4.1.5	Pollution degrees..:	Pollution degree 2	--
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling test		N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage ....:	(See appended table)	P
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat test ....:		N/A
5.4.1.10.3	Ball pressure test..:		N/A
5.4.2	Clearances		P
5.4.2.1	General requirements		P
	Clearances in circuits connected to AC Mains, Alternative method	(See Annex X)	N/A
5.4.2.2	Procedure 1 for determining clearance		N/A
	Temporary overvoltage ....:		—
5.4.2.3	Procedure 2 for determining clearance		N/A
5.4.2.3.2.2	a.c. mains transient voltage ....:		—
5.4.2.3.2.3	d.c. mains transient voltage ....:		—
5.4.2.3.2.4	External circuit transient voltage...............................:		—
5.4.2.3.2.5	Transient voltage determined by measurement ....:		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test ....:	(See appended table 5.4.2)	N/A
5.4.2.5	Multiplication factors for clearances and test voltages ....:	The multiplication factor for altitude up to 2000m is 1.0	P
5.4.2.6	Clearance measurement..:	(See appended table 5.4.2)	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.3	Creepage distances		P
5.4.3.1	General		P
5.4.3.3	Material group...:	Assume to group IIIb	—
5.4.3.4	Creepage distances measurement ....:	(See appended table 5.4.3)	P
5.4.4	Solid insulation		N/A
5.4.4.1	General requirements		N/A
5.4.4.2	Minimum distance through insulation ....:		N/A
5.4.4.3	Insulating compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Insulating compound forming cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs)...:		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
	Number of layers (pcs) ....:		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material ....:		N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz, EP, KR, d, VPW (V) ....:		N/A
	Alternative by electric strength test, tested voltage (V), KR ....:		N/A
5.4.5	Antenna terminal insulation		N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
5.4.5.3	Insulation resistance (MΩ)....................................:		N/A
	Electric strength test...:		N/A
5.4.6	Insulation of internal wire as part of supplementary safeguard		N/A
5.4.7	Tests for semiconductor components and for cemented joints		N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%), temperature (°C), duration (h)...:		—
5.4.9	Electric strength test		N/A
5.4.9.1	Test procedure for type test of solid insulation.......:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.9.2	Test procedure for routine test		N/A
5.4.10	Safeguards against transient voltages from external circuits	No external circuits	N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test...:		N/A
5.4.10.2.3	Steady-state test ....:		N/A
5.4.10.3	Verification for insulation breakdown for impulse test ....:		N/A
5.4.11	Separation between external circuits and earth		N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	SPDs bridge separation between external circuit and earth		N/A
	Rated operating voltage U_{op} (V) ....:		—
	Nominal voltage U_{peak} (V) ....:		—
	Max increase due to variation ΔU_{sp} ....:		—
	Max increase due to ageing ΔU_{sa} ....:		—
5.4.11.3	Test method and compliance................................:		N/A
5.4.12	Insulating liquid		N/A
5.4.12.1	General requirements		N/A
5.4.12.2	Electric strength of an insulating liquid ....:		N/A
5.4.12.3	Compatibility of an insulating liquid........................:		N/A
5.4.12.4	Container for insulating liquid ....:		N/A
5.5	**Components as safeguards**		**N/A**
5.5.1	General	See Annex G	N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector ....:		N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers		N/A
5.5.5	Relays		N/A
5.5.6	Resistors		N/A
5.5.7	SPDs		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.8	Insulation between the mains and an external circuit consisting of a coaxial cable........................:		N/A
5.5.9	Safeguards for socket-outlets in outdoor equipment		N/A
	RCD rated residual operating current (mA) ....:		—
5.6	**Protective conductor**		**N/A**
5.6.2	Requirement for protective conductors		N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm^2) ....:		—
	Protective earthing conductor serving as a reinforced safeguard		N/A
	Protective earthing conductor serving as a double safeguard		N/A
5.6.4	Requirements for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2). ....:		—
5.6.4.2	Protective current rating (A)...................................:		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Terminal size for connecting protective earthing conductors (mm)...:		N/A
	Terminal size for connecting protective bonding conductors (mm) ....:		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective bonding system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method ....:		N/A
5.6.6.3	Resistance (Ω) or voltage drop.............................:		N/A
5.6.7	Reliable connection of a protective earthing conductor		N/A
5.6.8	Functional earthing		N/A
	Conductor size (mm^2)..:		N/A
	Class II with functional earthing marking ....:		N/A
	Appliance inlet cl & cr (mm) ....:		N/A
5.7	**Prospective touch voltage, touch current and protective conductor current**		**N/A**
5.7.2	Measuring devices and networks		N/A
5.7.2.1	Measurement of touch current		N/A
5.7.2.2	Measurement of voltage		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.7.3	Equipment set-up, supply connections and earth connections		N/A
5.7.4	Unearthed accessible parts ....:		N/A
5.7.5	Earthed accessible conductive parts ....:		N/A
5.7.6	Requirements when touch current exceeds ES2 limits		N/A
	Protective conductor current (mA).........................:		N/A
	Instructional Safeguard ....:		N/A
5.7.7	Prospective touch voltage and touch current associated with external circuits		N/A
5.7.7.1	Touch current from coaxial cables		N/A
5.7.7.2	Prospective touch voltage and touch current associated with paired conductor cables		N/A
5.7.8	Summation of touch currents from external circuits		N/A
	a) Equipment connected to earthed external circuits, current (mA)...:		N/A
	b) Equipment connected to unearthed external circuits, current (mA)...:		N/A
5.8	**Backfeed safeguard in battery backed up supplies**		**N/A**
	Mains terminal ES ....:		N/A
	Air gap (mm)..:		N/A

6	**ELECTRICALLY- CAUSED FIRE**		**P**
6.2	**Classification of PS and PIS**		P
6.2.2	Power source circuit classifications ....:	(See appended table 6.2.2)	P
6.2.3	Classification of potential ignition sources		P
6.2.3.1	Arcing PIS ....:		N/A
6.2.3.2	Resistive PIS ....:	(See appended table 6.2.3.2)	P
6.3	**Safeguards against fire under normal operating and abnormal operating conditions**		**P**
6.3.1	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials ....:	(See appended table B.1.5 and B.3)	P
	Combustible materials outside fire enclosure ....:		N/A
6.4	**Safeguards against fire under single fault conditions**		**P**
6.4.1	Safeguard method	Control of fire spread	P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		N/A
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	Supplementary safeguards		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.3.2	Single Fault Conditions ....:		N/A
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits		P
6.4.5	Control of fire spread in PS2 circuits		N/A
6.4.5.2	Supplementary safeguards	(See appended tables 4.1.2 and Clause G)	N/A
6.4.6	Control of fire spread in PS3 circuits	V-0 plastic enclosure used	P
6.4.7	Separation of combustible materials from a PIS	V-0 fire enclosure provided	N/A
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers	V-0 fire enclosure provided	P
6.4.8.2	Fire enclosure and fire barrier material properties		P
6.4.8.2.1	Requirements for a fire barrier		N/A
6.4.8.2.2	Requirements for a fire enclosure	V-0 fire enclosure provided	P
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier	No openings	N/A
6.4.8.3.1	Fire enclosure and fire barrier openings		N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top openings and properties		N/A
	Openings dimensions (mm)..................................:		N/A
6.4.8.3.4	Bottom openings and properties		N/A
	Openings dimensions (mm)..................................:		N/A
	Flammability tests for the bottom of a fire enclosure	(See Clause S.3)	N/A
	Instructional Safeguard ....:		N/A
6.4.8.3.5	Side openings and properties		N/A
	Openings dimensions (mm)..................................:		N/A
6.4.8.3.6	Integrity of a fire enclosure, condition met: a), b) or c)..:		N/A
6.4.8.4	Separation of a PIS from a fire enclosure and a fire barrier distance (mm) or flammability rating ....:	V-0 fire enclosure provided	N/A
6.4.9	Flammability of insulating liquid..............................:		N/A
6.5	Internal and external wiring		**P**
6.5.1	General requirements	(See appended table 4.1.2)	P
6.5.2	Requirements for interconnection to building wiring ....:		N/A
6.5.3	Internal wiring size (mm^2) for socket-outlets..........:		N/A
6.6	Safeguards against fire due to the connection to additional equipment		**P**

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

7	**INJURY CAUSED BY HAZARDOUS SUBSTANCES**		**P**
7.2	**Reduction of exposure to hazardous substances**		**N/A**
7.3	**Ozone exposure**		**N/A**
7.4	**Use of personal safeguards or personal protective equipment (PPE)**		**N/A**
	Personal safeguards and instructions....................:		—
7.5	**Use of instructional safeguards and instructions**		**N/A**
	Instructional safeguard (ISO 7010)........................:		—
7.6	**Batteries and their protection circuits**		**P**

8	**MECHANICALLY-CAUSED INJURY**		**P**
8.2	**Mechanical energy source classifications**		**P**
8.3	**Safeguards against mechanical energy sources**		**P**
8.4	**Safeguards against parts with sharp edges and corners**		**P**
8.4.1	Safeguards	MS1 classification	P
	Instructional Safeguard ....:		N/A
8.4.2	Sharp edges or corners	MS1 classification	N/A
8.5	**Safeguards against moving parts**		**N/A**
8.5.1	Fingers, jewellery, clothing, hair, etc., contact with MS2 or MS3 parts		N/A
	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
	Moving MS3 parts only accessible to skilled person		N/A
8.5.2	Instructional safeguard...:		N/A
8.5.4	Special categories of equipment containing moving parts		N/A
8.5.4.1	General		N/A
8.5.4.2	Equipment containing work cells with MS3 parts		N/A
8.5.4.2.1	Protection of persons in the work cell		N/A
8.5.4.2.2	Access protection override		N/A
8.5.4.2.2.1	Override system		N/A
8.5.4.2.2.2	Visual indicator		N/A
8.5.4.2.3	Emergency stop system		N/A
	Maximum stopping distance from the point of activation (m)...:		N/A
	Space between end point and nearest fixed mechanical part (mm) ....:		N/A
8.5.4.2.4	Endurance requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Mechanical system subjected to 100 000 cycles of operation		N/A
	- Mechanical function check and visual inspection		N/A
	- Cable assembly...:		N/A
8.5.4.3	Equipment having electromechanical device for destruction of media		N/A
8.5.4.3.1	Equipment safeguards		N/A
8.5.4.3.2	Instructional safeguards against moving parts.........:		N/A
8.5.4.3.3	Disconnection from the supply		N/A
8.5.4.3.4	Cut type and test force (N).......................................:		N/A
8.5.4.3.5	Compliance		N/A
8.5.5	High pressure lamps		N/A
	Explosion test ....:		N/A
8.5.5.3	Glass particles dimensions (mm) ....:		N/A
8.6	**Stability of equipment**		**N/A**
8.6.1	General	Mass classification: MS1	N/A
	Instructional safeguard..:		N/A
8.6.2	Static stability		N/A
8.6.2.2	Static stability test..:		N/A
8.6.2.3	Downward force test		N/A
8.6.3	Relocation stability		N/A
	Wheels diameter (mm)...:		—
	Tilt test		N/A
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test ....:		N/A
8.7	**Equipment mounted to wall, ceiling or other structure**		**N/A**
8.7.1	Mount means type..:		N/A
8.7.2	Test methods		N/A
	Test 1, additional downwards force (N)....................:		N/A
	Test 2, number of attachment points and test force (N)..:		N/A
	Test 3 Nominal diameter (mm) and applied torque (Nm)...:		N/A
8.8	**Handles strength**		**N/A**
8.8.1	General		N/A
8.8.2	Handle strength test		N/A
	Number of handles...:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Force applied (N)...:		—
8.9	**Wheels or casters attachment requirements**		**N/A**
8.9.2	Pull test		N/A
8.10	**Carts, stands and similar carriers**		**N/A**
8.10.1	General		N/A
8.10.2	Marking and instructions ....:		N/A
8.10.3	Cart, stand or carrier loading test		N/A
	Loading force applied (N)..:		N/A
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Force applied (N)...:		—
8.10.6	Thermoplastic temperature stability		N/A
8.11	**Mounting means for slide-rail mounted equipment (SRME)**		**N/A**
8.11.1	General		N/A
8.11.2	Requirements for slide rails		N/A
	Instructional Safeguard ....:		N/A
8.11.3	Mechanical strength test		N/A
8.11.3.1	Downward force test, force (N) applied ....:		N/A
8.11.3.2	Lateral push force test		N/A
8.11.3.3	Integrity of slide rail end stops		N/A
8.11.4	Compliance		N/A
8.12	**Telescoping or rod antennas**		**N/A**
	Button/ball diameter (mm)...:		—

9	**THERMAL BURN INJURY**		**P**
9.2	**Thermal energy source classifications**		**P**
9.3	**Touch temperature limits**		**P**
9.3.1	Touch temperatures of accessible parts ....:	(See appended table)	P
9.3.2	Test method and compliance		P
9.4	**Safeguards against thermal energy sources**		**N/A**
9.5	**Requirements for safeguards**		**N/A**
9.5.1	Equipment safeguard		N/A
9.5.2	Instructional safeguard..:		N/A
9.6	**Requirements for wireless power transmitters**		**N/A**
9.6.1	General		N/A
9.6.2	Specification of the foreign objects		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
9.6.3	Test method and compliance.....................................:	(See appended table 9.6)	N/A
10	**RADIATION**		**P**
10.2	**Radiation energy source classification**		**P**
10.2.1	General classification	RS1	P
	Lasers ....:		—
	Lamps and lamp systems ....:		—
	Image projectors ....:		—
	X-Ray ....:		—
	Personal music player...:		—
10.3	**Safeguards against laser radiation**		**N/A**
	The standard(s) equipment containing laser(s) comply ....:		N/A
10.4	**Safeguards against optical radiation from lamps and lamp systems (including LED types)**		**P**
10.4.1	General requirements	LEDs for indicating lights only	P
	Instructional safeguard provided for accessible radiation level needs to exceed		N/A
	Risk group marking and location ....:		N/A
	Information for safe operation and installation		N/A
10.4.2	Requirements for enclosures		N/A
	UV radiation exposure...:		N/A
10.4.3	Instructional safeguard...:		N/A
10.5	**Safeguards against X-radiation**		**N/A**
10.5.1	Requirements		N/A
	Instructional safeguard for skilled persons ....:		—
10.5.3	Maximum radiation (pA/kg)....................................:	(See appended tables B.3 & B.4)	—
10.6	**Safeguards against acoustic energy sources**		**P**
10.6.1	General		P
10.6.2	Classification	RS1	P
	Acoustic output $L_{Aeq,T}$, dB(A)....................................:	< 85dB(A)	P
	Unweighted RMS output voltage (mV).....................:		N/A
	Digital output signal (dBFS) ....:		N/A
10.6.3	Requirements for dose-based systems		N/A
10.6.3.1	General requirements		N/A
10.6.3.2	Dose-based warning and automatic decrease		N/A
10.6.3.3	Exposure-based warning and requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	30 s integrated exposure level (MEL30)..................:		N/A
	Warning for MEL ≥ 100 dB(A).................................:		N/A
10.6.4	Measurement methods		N/A
10.6.5	Protection of persons		N/A
	Instructional safeguards..:		N/A
10.6.6	Requirements for listening devices (headphones, earphones, etc.)		P
10.6.6.1	Corded listening devices with analogue input		N/A
	Listening device input voltage (mV).......................:		N/A
10.6.6.2	Corded listening devices with digital input		N/A
	Max. acoustic output $L_{Aeq,T}$, dB(A) ....:		N/A
10.6.6.3	Cordless listening devices		P
	Max. acoustic output $L_{Aeq,T}$, dB(A) ....:	80dB(A)	—

B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS**		**P**
B.1	**General**		**P**
B.1.5	Temperature measurement conditions	(See appended table B.1.5)	P
B.2	**Normal operating conditions**		**P**
B.2.1	General requirements ....:	(See Test Item Particulars and appended test tables)	P
	Audio Amplifiers and equipment with audio amplifiers...:	(See Annex E)	P
B.2.3	Supply voltage and tolerances		P
B.2.5	Input test ....:	(See appended table B.2.5)	P
B.3	**Simulated abnormal operating conditions**		**P**
B.3.1	General		P
B.3.2	Covering of ventilation openings	No ventilation openings	N/A
	Instructional safeguard..:		N/A
B.3.3	DC mains polarity test		N/A
B.3.4	Setting of voltage selector		N/A
B.3.5	Maximum load at output terminals		N/A
B.3.6	Reverse battery polarity		P
B.3.7	Audio amplifier abnormal operating conditions	Considered	P
B.3.8	Safeguards functional during and after abnormal operating conditions ....:	(See appended table B.3)	P
B.4	**Simulated single fault conditions**		**P**
B.4.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
B.4.2	Temperature controlling device	No such controlling device	N/A
B.4.3	Blocked motor test		N/A
B.4.4	Functional insulation	(See appended table B.4)	P
B.4.4.1	Short circuit of clearances for functional insulation		P
B.4.4.2	Short circuit of creepage distances for functional insulation		P
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A
B.4.5	Short-circuit and interruption of electrodes in tubes and semiconductors	(See appended table B.4)	P
B.4.6	Short circuit or disconnection of passive components	(See appended table B.4)	P
B.4.7	Continuous operation of components		N/A
B.4.8	Compliance during and after single fault conditions ....:	(See appended table B.4)	P
B.4.9	Battery charging and discharging under single fault conditions	(See Annex M)	P
C	**UV RADIATION**		**N/A**
C.1	**Protection of materials in equipment from UV radiation**		**N/A**
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
C.2	**UV light conditioning test**		**N/A**
C.2.1	Test apparatus ....:		N/A
C.2.2	Mounting of test samples		N/A
C.2.3	Carbon-arc light-exposure test		N/A
C.2.4	Xenon-arc light-exposure test		N/A
D	**TEST GENERATORS**		**N/A**
D.1	**Impulse test generators**		**N/A**
D.2	**Antenna interface test generator**		**N/A**
D.3	**Electronic pulse generator**		**N/A**
E	**TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS**		**P**
E.1	**Electrical energy source classification for audio signals**		**P**
	Maximum non-clipped output power (W) ....:	Less than PS1 limit	—
	Rated load impedance (Ω) ....:	32Ω	—
	Open-circuit output voltage (V) ....:	Less than ES1 limit	—
	Instructional safeguard..:	See Clause F.5	—
E.2	**Audio amplifier normal operating conditions**		**N/A**
	Audio signal source type ....:	Equipment does not contain any audio amplifier	—

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Clause	Requirement + Test	Result - Remark	Verdict
	Audio output power (W) ....:		—
	Audio output voltage (V) ....:		—
	Rated load impedance (Ω) ....:		—
	Requirements for temperature measurement	(See Table B.1.5)	N/A
E.3	Audio amplifier abnormal operating conditions	(See Table B.3, B.4)	P
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		**P**
F.1	**General**		**P**
	Language ....:	English version checked	—
F.2	**Letter symbols and graphical symbols**		**P**
F.2.1	Letter symbols according to IEC60027-1		P
F.2.2	Graphic symbols according to IEC, ISO or manufacturer specific		P
F.3	**Equipment markings**		**P**
F.3.1	Equipment marking locations	Located on the product surface	P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification ....:	See the label	P
F.3.2.2	Model identification ....:	See the label	P
F.3.3	Equipment rating markings		P
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains		P
F.3.3.3	Nature of the supply voltage ....:	⎓	P
F.3.3.4	Rated voltage ....:	See the page 2	P
F.3.3.5	Rated frequency...:	DC only	N/A
F.3.3.6	Rated current or rated power ....:	See the page 2	P
F.3.3.7	Equipment with multiple supply connections	No multiple supply connection	N/A
F.3.4	Voltage setting device	No such device	N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings ....:		N/A
F.3.5.2	Switch position identification marking ....:		N/A
F.3.5.3	Replacement fuse identification and rating markings ....:		N/A
	Instructional safeguards for neutral fuse................:		N/A
F.3.5.4	Replacement battery identification marking...........:	See Annex M.10	P
F.3.5.5	Neutral conductor terminal		N/A
F.3.5.6	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification	Class III equipment	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
F.3.6.1	Class I equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal ....:		N/A
F.3.6.1.2	Protective bonding conductor terminals ....:		N/A
F.3.6.2	Equipment class marking.......................................:		N/A
F.3.6.3	Functional earthing terminal marking.....................:		N/A
F.3.7	Equipment IP rating marking.................................:	IP20, no marking is needed	N/A
F.3.8	External power supply output marking...................:		N/A
F.3.9	Durability, legibility and permanence of marking		P
F.3.10	Test for permanence of markings		P
F.4	**Instructions**		**P**
	a) Information prior to installation and initial use		P
	b) Equipment for use in locations where children not likely to be present		N/A
	c) Instructions for installation and interconnection		N/A
	d) Equipment intended for use only in restricted access area		N/A
	e) Equipment intended to be fastened in place		N/A
	f) Instructions for audio equipment terminals		N/A
	g) Protective earthing used as a safeguard		N/A
	h) Protective conductor current exceeding ES2 limits		N/A
	i) Graphic symbols used on equipment		P
	j) Permanently connected equipment not provided with all-pole mains switch		N/A
	k) Replaceable components or modules providing safeguard function		N/A
	l) Equipment containing insulating liquid		N/A
	m) Installation instructions for outdoor equipment		N/A
F.5	**Instructional safeguards**		**P**
G	**COMPONENTS**		**P**
G.1	**Switches**		**N/A**
G.1.1	General		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.1.3	Test method and compliance		N/A
G.2	**Relays**		**N/A**
G.2.1	Requirements		N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supplying power to other equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.2.4	Test method and compliance		N/A
G.3	**Protective devices**		**N/A**
G.3.1	Thermal cut-offs		N/A
	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Test method and compliance		N/A
G.3.2	Thermal links		N/A
G.3.2.1	a) Thermal links tested separately according to IEC 60691 with specifics		N/A
	b) Thermal links tested as part of the equipment		N/A
G.3.2.2	Test method and compliance		N/A
G.3.3	PTC thermistors		N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.4		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions ....:	(See appended table B.4)	N/A
G.4	**Connectors**		**N/A**
G.4.1	Spacings		N/A
G.4.2	Mains connector configuration ....:		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
G.5	**Wound components**		**N/A**
G.5.1	Wire insulation in wound components		N/A
G.5.1.2	Protection against mechanical stress		N/A
G.5.2	Endurance test		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Test time (days per cycle).....................................:		—
	Test temperature (°C) ....:		—
G.5.2.3	Wound components supplied from the mains		N/A
G.5.2.4	No insulation breakdown		N/A
G.5.3	Transformers		N/A
G.5.3.1	Compliance method ....:		N/A
	Position ....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Method of protection ....:		N/A
G.5.3.2	Insulation		N/A
	Protection from displacement of windings ....:		—
G.5.3.3	Transformer overload tests		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding temperatures		N/A
G.5.3.3.3	Winding temperatures - alternative test method		N/A
G.5.3.4	Transformers using FIW		N/A
G.5.3.4.1	General		N/A
	FIW wire nominal diameter ....:		—
G.5.3.4.2	Transformers with basic insulation only		N/A
G.5.3.4.3	Transformers with double insulation or reinforced insulation ....:		N/A
G.5.3.4.4	Transformers with FIW wound on metal or ferrite core		N/A
G.5.3.4.5	Thermal cycling test and compliance		N/A
G.5.3.4.6	Partial discharge test		N/A
G.5.3.4.7	Routine test		N/A
G.5.4	Motors		N/A
G.5.4.1	General requirements		N/A
G.5.4.2	Motor overload test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4.2	Locked-rotor overload test		N/A
	Test duration (days) ....:		—
G.5.4.5	Running overload test for DC motors		N/A
G.5.4.5.2	Tested in the unit		N/A
G.5.4.5.3	Alternative method		N/A
G.5.4.6	Locked-rotor overload test for DC motors		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature ....:		N/A
G.5.4.6.3	Alternative method		N/A
G.5.4.7	Motors with capacitors		N/A
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage ....:		—
G.6	**Wire Insulation**		**N/A**
G.6.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.6.2	Enamelled winding wire insulation		N/A
G.7	**Mains supply cords**		**N/A**
G.7.1	General requirements		N/A
	Type ....:		—
G.7.2	Cross sectional area (mm^2 or AWG).......................:		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N) ....:		N/A
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm) ......:		N/A
G.7.3.2.4	Strain relief and cord anchorage material		N/A
G.7.4	Cord Entry		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Test method and compliance		N/A
	Overall diameter or minor overall dimension, *D* (mm)...:		—
	Radius of curvature after test (mm) ....:		—
G.7.6	Supply wiring space		N/A
G.7.6.1	General requirements		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Requirements		N/A
G.7.6.2.2	Test with 8 mm strand		N/A
G.8	**Varistors**		**N/A**
G.8.1	General requirements		N/A
G.8.2	Safeguards against fire		N/A
G.8.2.1	General		N/A
G.8.2.2	Varistor overload test		N/A
G.8.2.3	Temporary overvoltage test		N/A
G.9	**Integrated circuit (IC) current limiters**		**N/A**
G.9.1	Requirements		N/A
	IC limiter output current (max. 5A).........................:		—
	Manufacturers' defined drift ....:		—
G.9.2	Test Program		N/A
G.9.3	Compliance		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.10	**Resistors**		**N/A**
G.10.1	General		N/A
G.10.2	Conditioning		N/A
G.10.3	Resistor test		N/A
G.10.4	Voltage surge test		N/A
G.10.5	Impulse test		N/A
G.10.6	Overload test		N/A
G.11	**Capacitors and RC units**		**N/A**
G.11.1	General requirements		N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	**Optocouplers**		**N/A**
	Optocouplers comply with IEC 60747-5-5 with specifics		N/A
	Type test voltage $V_{ini,a}$ ....:		—
	Routine test voltage, $V_{ini,\ b}$ ....:		—
G.13	**Printed boards**		**P**
G.13.1	General requirements		P
G.13.2	Uncoated printed boards		P
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation...................................:		N/A
	Number of insulation layers (pcs) ....:		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2	Test method and compliance		N/A
G.14	**Coating on components terminals**		**N/A**
G.14.1	Requirements ....:		N/A
G.15	**Pressurized liquid filled components**		**N/A**
G.15.1	Requirements		N/A
G.15.2	Test methods and compliance		N/A
G.15.2.1	Hydrostatic pressure test		N/A
G.15.2.2	Creep resistance test		N/A
G.15.2.3	Tubing and fittings compatibility test		N/A
G.15.2.4	Vibration test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.15.2.5	Thermal cycling test		N/A
G.15.2.6	Force test		N/A
G.15.3	Compliance		N/A
G.16	**IC including capacitor discharge function (ICX)**		**N/A**
G.16.1	Condition for fault tested is not required		N/A
	ICX with associated circuitry tested in equipment		N/A
	ICX tested separately		N/A
G.16.2	Tests		N/A
	Smallest capacitance and smallest resistance specified by ICX manufacturer for impulse test .....:		—
	Mains voltage that impulses to be superimposed on ....:		—
	Largest capacitance and smallest resistance for ICX tested by itself for 10000 cycles test...............:		—
G.16.3	Capacitor discharge test ....:		N/A
H	**CRITERIA FOR TELEPHONE RINGING SIGNALS**		**N/A**
H.1	**General**		**N/A**
H.2	**Method A**		**N/A**
H.3	**Method B**		**N/A**
H.3.1	Ringing signal		N/A
H.3.1.1	Frequency (Hz) ....:		—
H.3.1.2	Voltage (V) ....:		—
H.3.1.3	Cadence; time (s) and voltage (V) ....:		—
H.3.1.4	Single fault current (mA): ....:		—
H.3.2	Tripping device and monitoring voltage		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V)..:		N/A
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		**N/A**
J.1	**General**		**N/A**
	Winding wire insulation ....:		—
	Solid round winding wire, diameter (mm) ....:		N/A
	Solid square and rectangular (flatwise bending) winding wire, cross-sectional area (mm^2) ....:		N/A
J.2/J.3	Tests and Manufacturing	(See separate test report)	—
K	**SAFETY INTERLOCKS**		**N/A**
K.1	**General requirements**		**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
	Instructional safeguard......................................:		N/A
K.2	**Components of safety interlock safeguard mechanism**		**N/A**
K.3	**Inadvertent change of operating mode**		**N/A**
K.4	**Interlock safeguard override**		**N/A**
K.5	**Fail-safe**		**N/A**
K.5.1	Under single fault condition		N/A
K.6	**Mechanically operated safety interlocks**		**N/A**
K.6.1	Endurance requirement		N/A
K.6.2	Test method and compliance................................:		N/A
K.7	**Interlock circuit isolation**		**N/A**
K.7.1	Separation distance for contact gaps & interlock circuit elements		N/A
	In circuit connected to mains, separation distance for contact gaps (mm)..:		N/A
	In circuit isolated from mains, separation distance for contact gaps (mm)..:		N/A
	Electric strength test before and after the test of K.7.2..:		N/A
K.7.2	Overload test, Current (A).....................................:		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test		N/A
L	**DISCONNECT DEVICES**		N/A
L.1	**General requirements**		N/A
L.2	**Permanently connected equipment**		N/A
L.3	**Parts that remain energized**		N/A
L.4	**Single-phase equipment**		N/A
L.5	**Three-phase equipment**		N/A
L.6	**Switches as disconnect devices**		N/A
L.7	**Plugs as disconnect devices**		N/A
L.8	**Multiple power sources**		N/A
	Instructional safeguard...:		N/A
M	**EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS**		P
M.1	**General requirements**		P
M.2	**Safety of batteries and their cells**		P
M.2.1	Batteries and their cells comply with relevant IEC standards ....:	Complied with IEC/EN 62133-2	P
M.3	**Protection circuits for batteries provided within the equipment**		P

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Clause	Requirement + Test	Result - Remark	Verdict
M.3.1	Requirements		P
M.3.2	Test method		P
	Overcharging of a rechargeable battery		P
	Excessive discharging		P
	Unintentional charging of a non-rechargeable battery		N/A
	Reverse charging of a rechargeable battery	Not possible to happen reverse Charging	P
M.3.3	Compliance	(See appended table M.3)	P
M.4	**Additional safeguards for equipment containing a portable secondary lithium battery**		**P**
M.4.1	General		P
M.4.2	Charging safeguards		P
M.4.2.1	Requirements		P
M.4.2.2	Compliance ....:	(See appended table M.4.2)	P
M.4.3	Fire enclosure ....:	Fire enclosure provided	P
M.4.4	Drop test of equipment containing a secondary lithium battery		P
M.4.4.2	Preparation and procedure for the drop test		P
M.4.4.3	Drop, Voltage on reference and dropped batteries (V); voltage difference during 24 h period (%): ....:	Voltage difference less than 5%	P
M.4.4.4	Check of the charge/discharge function		P
M.4.4.5	Charge / discharge cycle test		P
M.4.4.6	Compliance		P
M.5	**Risk of burn due to short-circuit during carrying**		**N/A**
M.5.1	Requirement		N/A
M.5.2	Test method and compliance		N/A
M.6	**Safeguards against short-circuits**		**P**
M.6.1	External and internal faults		P
M.6.2	Compliance		P
M.7	**Risk of explosion from lead acid and NiCd batteries**		**N/A**
M.7.1	Ventilation preventing explosive gas concentration		N/A
	Calculated hydrogen generation rate.....................:		N/A
M.7.2	Test method and compliance		N/A
	Minimum air flow rate, Q (m^3/h) ....:		N/A
M.7.3	Ventilation tests		N/A
M.7.3.1	General		N/A
M.7.3.2	Ventilation test – alternative 1		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Hydrogen gas concentration (%) ....:		N/A
M.7.3.3	Ventilation test – alternative 2		N/A
	Obtained hydrogen generation rate ....:		N/A
M.7.3.4	Ventilation test – alternative 3		N/A
	Hydrogen gas concentration (%) ....:		N/A
M.7.4	Marking ....:		N/A
M.8	**Protection against internal ignition from external spark sources of batteries with aqueous electrolyte**		**N/A**
M.8.1	General		N/A
M.8.2	Test method		N/A
M.8.2.1	General		N/A
M.8.2.2	Estimation of hypothetical volume V_Z (m^3/s)..........:		—
M.8.2.3	Correction factors..:		—
M.8.2.4	Calculation of distance *d* (mm) ....:		—
M.9	**Preventing electrolyte spillage**		**N/A**
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	Instructions to prevent reasonably foreseeable misuse	Provided the instructions includebattery charging, storage and transportation, and disposal and recycling.	P
	Instructional safeguard..:		N/A
N	**ELECTROCHEMICAL POTENTIALS**		**N/A**
	Material(s) used ....:		—
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		**P**
	Value of *X* (mm) ....:	Considered	—
P	**SAFEGUARDS AGAINST CONDUCTIVE OBJECTS**		**N/A**
P.1	**General**	No openings	**N/A**
P.2	**Safeguards against entry or consequences of entry of a foreign object**		**N/A**
P.2.1	General		N/A
P.2.2	Safeguards against entry of a foreign object		N/A
	Location and Dimensions (mm) ....:		—
P.2.3	Safeguards against the consequences of entry of a foreign object		N/A
P.2.3.1	Safeguard requirements		N/A
	The ES3 and PS3 keep-out volume in Figure P.3 not applicable to transportable equipment		N/A
	Transportable equipment with metalized plastic parts ....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
P.2.3.2	Consequence of entry test ....:		N/A
P.3	**Safeguards against spillage of internal liquids**		**N/A**
P.3.1	General		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Compliance		N/A
P.4	**Metallized coatings and adhesives securing parts**		**N/A**
P.4.1	General		N/A
P.4.2	Tests		N/A
	Conditioning, T_C (°C)...:		—
	Duration (weeks)..:		—
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		N/A
Q.1	**Limited power sources**		N/A
Q.1.1	Requirements		N/A
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Regulating network limited output		N/A
	d) Overcurrent protective device limited output		N/A
	e) IC current limiter complying with G.9		N/A
Q.1.2	Test method and compliance.................................:	(See appended table Q.1)	N/A
	Current rating of overcurrent protective device (A) ....:		N/A
Q.2	**Test for external circuits – paired conductor cable**		**N/A**
	Maximum output current (A) ....:		N/A
	Current limiting method...:		—
R	**LIMITED SHORT CIRCUIT TEST**		**N/A**
R.1	**General**		**N/A**
R.2	**Test setup**		**N/A**
	Overcurrent protective device for test....................:		—
R.3	**Test method**		**N/A**
	Cord/cable used for test..:		—
R.4	**Compliance**		**N/A**
S	**TESTS FOR RESISTANCE TO HEAT AND FIRE**		**N/A**
S.1	**Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W**		**N/A**
	Samples, material ....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Wall thickness (mm)...:		—
	Conditioning (°C)..:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	**Flammability test for fire enclosure and fire barrier integrity**		**N/A**
	Samples, material ....:		—
	Wall thickness (mm)...:		—
	Conditioning (°C)..:		—
S.3	**Flammability test for the bottom of a fire enclosure**		**N/A**
S.3.1	Mounting of samples		N/A
S.3.2	Test method and compliance		N/A
	Mounting of samples ....:		—
	Wall thickness (mm)...:		—
S.4	**Flammability classification of materials**		**N/A**
S.5	**Flammability test for fire enclosure materials of equipment with a steady state power exceeding 4 000 W**		**N/A**
	Samples, material ....:		—
	Wall thickness (mm)...:		—
	Conditioning (°C)..:		—
T	**MECHANICAL STRENGTH TESTS**		**P**
T.1	General		P
T.2	Steady force test, 10 N ....:	(See appended table T.2)	P
T.3	Steady force test, 30 N ....:		N/A
T.4	Steady force test, 100 N ....:	(See appended table T.4)	P
T.5	Steady force test, 250 N ....:		N/A
T.6	Enclosure impact test		N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test ....:	(See appended table T.7)	P
T.8	Stress relief test ....:	(See appended table T.8)	P
T.9	Glass Impact Test .... :		N/A
T.10	Glass fragmentation test		N/A
	Number of particles counted .... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm)...:		N/A
U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION**		**N/A**
U.1	**General**		**N/A**
	Instructional safeguard :		N/A
U.2	**Test method and compliance for non-intrinsically protected CRTs**		**N/A**
U.3	**Protective screen**		**N/A**
V	**DETERMINATION OF ACCESSIBLE PARTS**		**N/A**
V.1	**Accessible parts of equipment**		**N/A**
V.1.1	General		N/A
V.1.2	Surfaces and openings tested with jointed test probes		N/A
V.1.3	Openings tested with straight unjointed test probes		N/A
V.1.4	Plugs, jacks, connectors tested with blunt probe		N/A
V.1.5	Slot openings tested with wedge probe		N/A
V.1.6	Terminals tested with rigid test wire		N/A
V.2	**Accessible part criterion**		**N/A**
X	**ALTERNATIVE METHOD FOR DETERMINING CLEARANCES FOR INSULATION IN CIRCUITS CONNECTED TO AN AC MAINS NOT EXCEEDING 420 V PEAK (300 V RMS)**		**N/A**
	Clearance .... :	(See appended table X)	N/A
Y	**CONSTRUCTION REQUIREMENTS FOR OUTDOOR ENCLOSURES**		**N/A**
Y.1	**General**		**N/A**
Y.2	**Resistance to UV radiation**		**N/A**
Y.3	**Resistance to corrosion**		**N/A**
Y.3.1	Metallic parts of outdoor enclosures are resistant to effects of water-borne contaminants by ....:		N/A
Y.3.2	Test apparatus		N/A
Y.3.3	Water – saturated sulphur dioxide atmosphere		N/A
Y.3.4	Test procedure ....:		N/A
Y.3.5	Compliance		N/A
Y.4	**Gaskets**		**N/A**
Y.4.1	General		N/A
Y.4.2	Gasket tests		N/A
Y.4.3	Tensile strength and elongation tests		N/A
	Alternative test methods ....:		N/A
Y.4.4	Compression test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Y.4.5	Oil resistance		N/A
Y.4.6	Securing means		N/A
Y.5	**Protection of equipment within an outdoor enclosure**		**N/A**
Y.5.1	General		N/A
Y.5.2	Protection from moisture		N/A
	Relevant tests of IEC 60529 or Y.5.3.....................:		N/A
Y.5.3	Water spray test		N/A
Y.5.4	Protection from plants and vermin		N/A
Y.5.5	Protection from excessive dust		N/A
Y.5.5.1	General		N/A
Y.5.5.2	IP5X equipment		N/A
Y.5.5.3	IP6X equipment		N/A
Y.6	**Mechanical strength of enclosures**		**N/A**
Y.6.1	General		N/A
Y.6.2	Impact test..:	(See Table T.6)	N/A

ATTACHMENT TO TEST REPORT
IEC 62368-1
EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES
(Audio/video, information and communication technology equipment - Part 1: Safety requirements)

Differences according to................:	EN IEC 62368-1:2020+A11:2020
Attachment Form No......................:	EU_GD_IEC62368_1E
Attachment Originator ....:	UL(Demko)
Master Attachment ....:	2021-02-04

	CENELEC COMMON MODIFICATIONS (EN)	P
	Clause numbers in the cells that are shaded light grey are clause references in EN IEC 62368-1:2020+A11:2020. All other clause numbers in that column, except for those in the paragraph below, refers to IEC 62368-1:2018. Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2018 are prefixed “Z”.	P
	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords	P
1	**Modification to Clause 3.**	N/A

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

3.3.19	**Sound exposure** *Replace 3.3.19 of IEC 62368-1 with the following definitions:*		N/A
3.3.19.1	**momentary exposure level, MEL** metric for estimating 1 s sound exposure level from the HD 483-1 S2 test signal applied to both channels, based on EN 50332-1:2013, 4.2. Note 1 to entry: MEL is measured as A-weighted levels in dB. Note 2 to entry: See B.3 of EN 50332-3:2017 for additional information.		N/A
3.3.19.3	**sound exposure, *E*** A-weighted sound pressure (p) squared and integrated over a stated period of time, T Note 1 to entry: The SI unit is Pa^2 s. $$E = \int_0^T p(t)^2 \, dt$$		N/A
3.3.19.4	**sound exposure level, *SEL*** logarithmic measure of sound exposure relative to a reference value, E_0, typically the 1 kHz threshold of hearing in humans. Note 1 to entry: *SEL* is measured as A-weighted levels in dB. $$SEL = 10 \lg \left(\frac{E}{E_0}\right) \text{ dB}$$ Note 2 to entry: See B.4 of EN 50332-3:2017 for additional information.		N/A
3.3.19.5	**digital signal level relative to full scale, dBFS** levels reported in dBFS are always r.m.s. Full scale level, 0 dBFS, is the level of a dc-free 997-Hz sine wave whose undithered positive peak value is positive digital full scale, leaving the code corresponding to negative digital full scale unused Note 1 to entry: It is invalid to use dBFS for non-r.m.s. levels. Because the definition of full scale is based on a sine wave, the level of signals with a crest factor lower than that of a sine wave may exceed 0 dBFS. In particular, square wave signals may reach +3,01 dBFS.		N/A
2	**Modification to Clause 10**		
10.6	**Safeguards against acoustic energy sources** Replace 10.6 of IEC 62368-1 with the following:		P
10.6.1.1	**Introduction** **Safeguard** requirements for protection against long-term exposure to excessive sound pressure		P

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	levels from personal music players closely coupled to the ear are specified below. Requirements for earphones and headphones intended for use with personal music players are also covered. A personal music player is a portable equipment intended for use by an **ordinary person**, that: – is designed to allow the user to listen to audio or audiovisual content / material; and – uses a listening device, such as headphones or earphones that can be worn in or on or around the ears; and – has a player that can be body worn (of a size suitable to be carried in a clothing pocket) and is intended for the user to walk around with while in continuous use (for example, on a street, in a subway, at an airport, etc.). EXAMPLES Portable CD players, MP3 audio players, mobile phones with MP3 type features, PDAs or similar equipment. Personal music players shall comply with the requirements of either 10.6.2 or 10.6.3. NOTE 1 Protection against acoustic energy sources from telecom applications is referenced to ITU-T P.360. NOTE 2 It is the intention of the Committee to allow the alternative methods for now, but to only use the dose measurement method as given in 10.6.5 in future. Therefore, manufacturers are encouraged to implement 10.6.5 as soon as possible. Listening devices sold separately shall comply with the requirements of 10.6.6. These requirements are valid for music or video mode only. The requirements do not apply to: – professional equipment; NOTE 3 Professional equipment is equipment sold through special sales channels. All products sold through normal electronics stores are considered not to be professional equipment. – hearing aid equipment and other devices for assistive listening; – the following type of analogue personal music players: • long distance radio receiver (for example, a multiband radio receiver or world band radio receiver, an AM radio receiver), and • cassette player/recorder; NOTE 4 This exemption has been allowed because this technology is falling out of use and it is expected that within a few years it will no longer exist. This exemption will not be extended to other technologies. – a player while connected to an external amplifier that does not allow the user to walk around while in use.		

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Clause	Requirement + Test	Result - Remark	Verdict
	For equipment that is clearly designed or intended primarily for use by children, the limits of the relevant toy standards may apply. The relevant requirements are given in EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		
10.6.1.2	**Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz** The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body mounted devices, attention is drawn to EN 50360 and EN 50566.		P
10.6.2	**Classification of devices without the capacity to estimate sound dose**		N/A
10.6.2.1	**General** This standard is transitioning from short-term based (30 s) requirements to long-term based (40 hour) requirements. These clauses remain in effect only for devices that do not comply with sound dose estimation as stipulated in EN 50332-3. For classifying the acoustic output $L_{Aeq,T}$, measurements are based on the A-weighted equivalent sound pressure level over a 30 s period. For music where the average sound pressure (long term $L_{Aeq,T}$) measured over the duration of the song is lower than the average produced by the programme simulation noise, measurements may be done over the duration of the complete song. In this case, *T* becomes the duration of the song. NOTE Classical music, acoustic music and broadcast typically has an average sound pressure (long term $L_{Aeq,T}$) which is much lower than the average programme simulation noise. Therefore, if the player is capable to analyse the content and compare it with the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song does not exceed the required limit. For example, if the player is set with the programme simulation noise to 85 dB, but the average music level of the song is only 65 dB, there is no need to give a warning or ask an acknowledgement as long as the average sound level of the song is not above the basic limit of 85 dB.		N/A
10.6.2.2	**RS1 limits (to be superseded, see 10.6.3.2)** RS1 is a class 1 acoustic energy source that does not exceed the following:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	– for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 85 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 27 mV (analogue interface) or -25 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1. – The RS1 limits will be updated for all devices as per 10.6.3.2.		
10.6.2.3	**RS2 limits (to be superseded, see 10.6.3.3)** RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or when the combination of player and listening device is known by other means such as setting or automatic 130 detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 100 dB(A) when playing the fixed “programme simulation noise” as described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 150 mV (analogue interface) or -10 dBFS (digital interface) when playing the fixed “programme simulation noise” as described in EN 50332-1.		N/A
10.6.2.4	**RS3 limits** RS3 is a class 3 acoustic energy source that exceeds RS2 limits.		N/A
10.6.3	**Classification of devices (new)**		N/A
10.6.3.1	**General** Previous limits (10.6.2) created abundant false negative and false positive PMP sound level warnings. New limits, compliant with The Commission Decision of 23 June 2009, are given below.		N/A
10.6.3.2	**RS1 limits (new)** RS1 is a class 1 acoustic energy source that does not exceed the following: – for equipment provided as a package (player		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 80 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1.		
10.6.3.3	**RS2 limits (new)** RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the weekly sound exposure level, as described in EN 50332-3, shall be ≤ 80 dB when playing the fixed "programme simulation noise" described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output level, integrated over one week, as described in EN50332-3, shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1.		N/A
10.6.4	**Requirements for maximum sound exposure**		N/A
10.6.4.1	**Measurement methods** All volume controls shall be turned to maximum during tests. Measurements shall be made in accordance with EN 50332-1 or EN 50332-2 as applicable.		N/A
10.6.4.2	**Protection of persons** Except as given below, protection requirements for parts **accessible** to **ordinary persons**, **instructed persons** and **skilled persons** are given in 4.3. NOTE 1 Volume control is not considered a **safeguard.** Between RS2 and an **ordinary person**, the **basic safeguard** may be replaced by an **instructional safeguard** in accordance with Clause F.5, except that the **instructional safeguard** shall be placed		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	on the equipment, or on the packaging, or in the instruction manual. Alternatively, the **instructional safeguard** may be given through the equipment display during use. The elements of the **instructional safeguard** shall be as follows: – element 1a: the symbol , IEC 60417-6044 (2011-01) – element 2: “High sound pressure” or equivalent wording – element 3: “Hearing damage risk” or equivalent wording – element 4: “Do not listen at high volume levels for long periods.” or equivalent wording An **equipment safeguard** shall prevent exposure of an **ordinary person** to an RS2 source without intentional physical action from the **ordinary person** and shall automatically return to an output level not exceeding what is specified for an RS1 source when the power is switched off. The equipment shall provide a means to actively inform the user of the increased sound level when the equipment is operated with an output exceeding RS1. Any means used shall be acknowledged by the user before activating a mode of operation which allows for an output exceeding RS1. The acknowledgement does not need to be repeated more than once every 20 h of cumulative listening time. NOTE 2 Examples of means include visual or audible signals. Action from the user is always needed. NOTE 3 The 20 h listening time is the accumulative listening time, independent of how often and how long the personal music player has been switched off. A **skilled person** shall not be unintentionally exposed to RS3.		
10.6.5	**Requirements for dose-based systems**		N/A
10.6.5.1	**General requirements** Personal music players shall give the warnings as provided below when tested according to EN 50332-3, using the limits from this clause. The manufacturer may offer optional settings to allow the users to modify when and how they wish to receive the notifications and warnings to promote a better user experience without defeating the safeguards. This allows the users to be informed in a method that best meets their physical capabilities and device usage needs. If such optional settings		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	are offered, an administrator (for example, parental restrictions, business/educational administrators, etc.) shall be able to lock any optional settings into a specific configuration. The personal music player shall be supplied with easy to understand explanation to the user of the dose management system, the risks involved, and how to use the system safely. The user shall be made aware that other sources may significantly contribute to their sound exposure, for example work, transportation, concerts, clubs, cinema, car races, etc.		
10.6.5.2	**Dose-based warning and requirements** When a dose of 100 % *CSD* is reached, and at least at every 100 % further increase of *CSD*, the device shall warn the user and require an acknowledgement. In case the user does not acknowledge, the output level shall automatically decrease to compliance with class RS1. The warning shall at least clearly indicate that listening above 100 % *CSD* leads to the risk of hearing damage or loss.		N/A
10.6.5.3	**Exposure-based requirements** With only dose-based requirements, cause and effect could be far separated in time, defying the purpose of educating users about safe listening practice. In addition to dose-based requirements, a PMP shall therefore also put a limit to the short-term sound level a user can listen at. The exposure-based limiter (EL) shall automatically reduce the sound level not to exceed 100 dB(A) or 150 mV integrated over the past 180 s, based on methodology defined in EN 50332-3. The EL settling time (time from starting level reduction to reaching target output) shall be 10 s or faster. Test of EL functionality is conducted according to EN 50332-3, using the limits from this clause. For equipment provided as a package (player with its listening device), the level integrated over 180 s shall be 100 dB or lower. For equipment provided with a standardized connector, the unweighted level integrated over 180 s shall be no more than 150 mV for an analogue interface and no more than -10 dBFS for a digital interface. NOTE In case the source is known not to be music (or test signal), the EL may be disabled.		N/A
10.6.6	**Requirements for listening devices (headphones, earphones, etc.)**		P
10.6.6.1	**Corded listening devices with analogue input**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	With 94 dB L_{Aeq} acoustic pressure output of the listening device, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the input voltage of the listening device when playing the fixed “programme simulation noise” as described in EN 50332-1 shall be ≥ 75 mV. NOTE The values of 94 dB and 75 mV correspond with 85 dB and 27 mV or 100 dB and 150 mV.		
10.6.6.2	**Corded listening devices with digital input** With any playing device playing the fixed “programme simulation noise” described in EN 50332-1, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.		N/A
10.6.6.3	**Cordless listening devices** In cordless mode, – with any playing and transmitting device playing the fixed programme simulation noise described in EN 50332-1; and – respecting the cordless transmission standards, where an air interface standard exists that specifies the equivalent acoustic level; and – with volume and sound settings in the receiving device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output for the above mentioned programme simulation noise, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.		P
10.6.6.4	**Measurement method** *Measurements shall be made in accordance with EN 50332-2 as applicable.*		P

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Clause	Requirement + Test	Result - Remark	Verdict
3	**Modification to the whole document**		P
	Delete all the "country" notes in the reference document according to the following list:		P

0.2.1	Note 1 and 2	1	Note 4 and 5	3.3.8.1	Note 2
3.3.8.3	Note 1	4.1.15	Note	4.7.3	Note 1 and 2
5.2.2.2	Note	5.4.2.3.2.2 Table 12	Note c	5.4.2.3.2.4	Note 1 and 3
5.4.2.3.2.4 Table 13	Note 2	5.4.2.5	Note 2	5.4.5.1	Note
5.4.10.2.1	Note	5.4.10.2.2	Note	5.4.10.2.3	Note
5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3 and 4
5.6.8	Note 2	5.7.6	Note	5.7.7.1	Note 1 and Note 2
8.5.4.2.3	Note	10.2.1 Table 39	Note 3 and 4 and 5	10.5.3	Note 2
10.6.1	Note 3	F.3.3.6	Note 3	Y.4.1	Note
Y.4.5	Note				

4	**Modification to Clause 1**		N/A
1	***Add*** *the following note:* *NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.*		N/A
5	**Modification to 4.Z1**		N/A
4.Z1	***Add*** *the following new subclause after 4.9:* To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. **mains**, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) it is permitted for **pluggable equipment type B** or **permanently connected equipment**, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for **pluggable equipment type A** the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		
6	**Modification to 5.4.2.3.2.4**		N/A
5.4.2.3.2.4	***Add** the following to the end of this subclause:* The requirement for interconnection with **external circuit** is in addition given in EN 50491-3:2009.		N/A
7	**Modification to 10.2.1**		N/A
10.2.1	Add the following to c) and d) in table 39: For additional requirements, see 10.5.1.		N/A
8	**Modification to 10.5.1**		N/A
10.5.1	***Add** the following after the first paragraph:* For RS 1 compliance is checked by measurement under the following conditions: In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or pre-sets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made. NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm², at any point 10 cm from the outer surface of the apparatus. Moreover, the measurement shall be made under fault conditions causing an increase of the high voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made. For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		
9	**Modification to G.7.1**		N/A
G.7.1	***Add*** *the following note:* NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A
10	**Modification to Bibliography**		P
	Add the following notes for the standards indicated: IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1. IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		P
11	**ADDITION OF ANNEXES**		N/A
ZB	**ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.1.15	**Denmark, Finland, Norway** and **Sweden** To the end of the subclause the following is added: **Class I pluggable equipment type A** intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and **accessible** parts, have a marking stating that the equipment shall be connected to an earthed **mains** socket-outlet. The marking text in the applicable countries shall be as follows: In **Denmark**: "Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord." In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: "Apparatet må tilkoples jordet stikkontakt" In **Sweden**: "Apparaten skall anslutas till jordat uttag"		N/A
4.7.3	**United Kingdom** To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex		N/A
5.2.2.2	**Denmark** After the 2nd paragraph add the following: A warning (marking safeguard) for high touch current is required if the touch current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.4.11.1 and Annex G	**Finland and Sweden** To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5 kV. It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: • the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; • the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		
5.5.2.1	**Norway** After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
5.5.6	**Finland, Norway** and **Sweden** To the end of the subclause the following is added: Resistors used as **basic safeguard** or bridging **basic insulation** in **class I pluggable equipment type A** shall comply with G.10.1 and the test of G.10.2.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.1	**Denmark** **Add** to the end of the subclause Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment. *Justification:* In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		N/A
5.6.4.2.1	**Ireland and United Kingdom** After the indent for **pluggable equipment type A**, the following is added: – the **protective current rating** is taken to be 13 A, this being the largest rating of fuse used in the **mains** plug.		N/A
5.6.4.2.1	**France** After the indent for **pluggable equipment type A**, the following is added: – in certain cases, the **protective current rating** of the circuit supplied from the mains is taken as 20 A instead of 16 A.		N/A
5.6.5.1	To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm^2 to 1,5 mm^2 in cross-sectional area.		N/A
5.6.8	**Norway** To the end of the subclause the following is added: Equipment connected with an earthed mains plug is classified as **class I equipment**. See the Norway marking requirement in 4.1.15. The symbol IEC 60417-6092, as specified in F.3.6.2, is accepted.		N/A
5.7.6	**Denmark** To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the **protective conductor current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.7.6.2	**Denmark** To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .		N/A
5.7.7.1	**Norway and Sweden** To the end of the subclause the following is added:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)” NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet.” Translation to Swedish: ”Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medfőra risk főr brand. Főr att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.		
8.5.4.2.3	**United Kingdom**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Add the following after the 2nd dash bullet in 3rd paragraph: An emergency stop system complying with the requirements of IEC 60204-1 and ISO 13850 is required where there is a risk of personal injury.		
B.3.1 and B.4	**Ireland and United Kingdom** The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of **direct plug-in equipment**, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the **direct plug-in equipment**, until the requirements of Annexes B.3.1 and B.4 are met		N/A
G.4.2	**Denmark** To the end of the subclause the following is added: Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a polyphase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Justification: Heavy Current Regulations, Section 6c		
G.4.2	**United Kingdom** To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N/A
G.7.1	**United Kingdom** To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a ‘standard plug’ in accordance with the Plugs and Sockets etc. (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations. NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		N/A
G.7.1	**Ireland** To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, “13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard		N/A
G.7.2	**Ireland and United Kingdom** To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm^2 is allowed for equipment which is rated over 10 A and up to and including 13 A.		N/A
ZC	**ANNEX ZC, NATIONAL DEVIATIONS (EN)**		N/A
10.5.2	**Germany** The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	is required, or application of type approval (Bauartzulassung) and marking. *Justification*: German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. **NOTE** Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int+49-531-592-6320, Internet: http://www.ptb.de		

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Clause	Requirement + Test	Result - Remark	Verdict

ZD	IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS (EN)		N/A
			N/A

Type of flexible cord	Code designations	
	IEC	CENELEC
PVC insulated cords		
Flat twin tinsel cord	60227 IEC 41	H03VH-Y
Light polyvinyl chloride sheathed flexible cord	60227 IEC 52	H03VV-F H03VVH2-F
Ordinary polyvinyl chloride sheathed flexible cord	60227 IEC 53	H05VV-F H05VVH2-F
Rubber insulated cords		
Braided cord	60245 IEC 51	H03RT-F
Ordinary tough rubber sheathed flexible cord	60245 IEC 53	H05RR-F
Ordinary polychloroprene sheathed flexible cord	60245 IEC 57	H05RN-F
Heavy polychloroprene sheathed flexible cord	60245 IEC 66	H07RN-F
Cords having high flexibility		
Rubber insulated and sheathed cord	60245 IEC 86	H03RR-H
Rubber insulated, crosslinked PVC sheathed cord	60245 IEC 87	H03RV4-H
Crosslinked PVC insulated and sheathed cord	60245 IEC 88	H03V4V4-H
Cords insulated and sheathed with halogen-free thermoplastic compounds		
Light halogen-free thermoplastic insulated and sheathed flexible cords		H03Z1Z1-F H03Z1Z1H2-F
Ordinary halogen-free thermoplastic insulated and sheathed flexible cords		H05Z1Z1-F H05Z1Z1H2-F

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Clause	Requirement + Test	Result - Remark	Verdict

4.1.2	TABLE: List of critical components				P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity[1]
Plastic enclosure (charging base)	CHI MEI CORPORATION	PA-765A(+)	Thickness min. 1.70mm, V-0, 80°C	UL 94, UL 746C	UL E56070
Plastic enclosure (ear buds)	Unic Technology Corp	UG-3102+	thickness: min. 0.80mm, V-0, 80°C	UL 94, UL 746C	UL E135175
PCB	SHENZHEN XUANSHENG TECHNOLOGY CO LTD	XS-1	V-0, 130°C	UL 94, UL 796	UL E366014
(Alternative)	Interchangeable	Interchangeable	V-0 or better, 130°C	UL 94, UL 796	UL
Battery pack on the charging base	Dongguan zhuoyifeng Technology Co., Ltd	ZYF 801235	3.7Vdc, 350mAh, 1.295Wh	IEC/EN 62133-2:2017	Test Report No: TSZ22090262-P01-R01 Issued by Shenzhen Tiansu Calibration and Testing Co., Ltd.
-Wire	Various	Various	Min. 36AWG, 80℃, VW-1, 600VAC	UL 758	UL
Battery pack on the ear buds	Dongguan zhuoyifeng Technology Co., Ltd.	ZYF 401012	3.7V, 30mAh, 0.111Wh	IEC/EN 62133-2:2017	Test Report No: TSZ22090262-P02-R01 Issued by Shenzhen Tiansu Calibration and Testing Co., Ltd.
Speakers (2pcs)	Shenzhen shengxiang electronic technology co., ltd	K9	32Ω, 3mW	EN IEC 62368-1	Tested with appliance
Supplementary information: 1) an asterisk indicates a mark which assures the agreed level of surveillance. License available upon request.					

5.2	TABLE: Classification of electrical energy sources			P
Supply	Location (e.g.	Test conditions	Parameters	ES

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Clause	Requirement + Test	Result - Remark	Verdict

Voltage	circuit designation)		U (V)	I (mA)	Type[1)]	Additional Info[2)]	Class
5VDC	DC IN	Normal	--	--	SS	DC	ES1
		Abnormal	--	--	SS	DC	
		Single fault –SC/OC	--	--	SS	DC	
Supplementary information:							
1) Type: Steady state (SS), Capacitance (CP), Single pulse (SP), Repetitive pulses (RP), etc. 2) Additional Info: Frequency, Pulse duration, Pulse off time, Capacitance value, etc. 3) SC=Short Circuit, OC=Open Circuit.							

5.4.1.8	TABLE: Working voltage measurement				N/A
Location		RMS voltage (V)	Peak voltage (V)	Frequency (Hz)	Comments
--		--	--	--	--
--		--	--	--	--
Supplementary information:					

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics			N/A
Method .... :		ISO 306 / B50		—
Object/ Part No./Material	Manufacturer/trademark	Thickness (mm)	T softening (°C)	
--	--	--	--	
--	--	--	--	
Supplementary information:				

5.4.1.10.3	TABLE: Ball pressure test of thermoplastics				N/A
Allowed impression diameter (mm) .... :		≤2mm			—
Object/Part No./Material	Manufacturer/trademark	Thickness (mm)	Test temperature (°C)	Impression diameter (mm)	
--	--	--	--	--	
Supplementary information:					

5.4.2, 5.4.3	TABLE: Minimum Clearances/Creepage distance	P

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Clause	Requirement + Test	Result - Remark	Verdict

Clearance (cl) and creepage distance (cr) at/of/between:	U_p (V)	U_{rms} (V)	Freq [1] (Hz)	Required cl (mm)	cl (mm)	E.S.[2] (V)	Required cr (mm)	cr (mm)
B+ to B- on the charging base PCB board	3.7Vdc	3.7Vdc	--	0.2	7.05	--	0.4	7.05
B+ to B- on the ear buds PCB board	3.7Vdc	3.7Vdc	--	0.2	1.02	--	0.4	1.02
Supplementary information:								
1) Only for frequency above 30 kHz; 2) Complete Electric Strength voltage (E.S. (V) when 5.4.2.4 applied); 3) Provide Material Group IIIa/IIIb; 4) BI: basic insulation; SI: supplementary insulation; DI: double insulation; RI: reinforced insulation								

5.4.4.2	TABLE: Minimum distance through insulation			N/A
Distance through insulation (DTI) at/of	Peak voltage (V)	Insulation	Required DTI (mm)	Measured DTI (mm)
--	--	--	--	--
Supplementary information:				

5.4.4.9	TABLE: Solid insulation at frequencies >30 kHz					N/A
Insulation material	E_P	Frequency (kHz)	K_R	Thickness d (mm)	Insulation	V_{PW} (Vpk)
--	--	--	--	--	--	--
Supplementary information:						

5.4.9	TABLE: Electric strength tests		N/A
Test voltage applied between:	Voltage shape (Surge, Impulse, AC, DC, etc.)	Test voltage (V)	Breakdown Yes/No
Functional:			
--	--	--	--
Basic/supplementary:			
--	--	--	--
Reinforced:			
--	--	--	--
Routine Tests:			

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

--	--	--	--
Supplementary information:			

5.5.2.2	TABLE: Stored discharge on capacitors				N/A
Location	Supply voltage (V)	Operating and fault condition [1)]	Switch position	Measured voltage (Vpk)	ES Class
--	--	--	--	--	--
Supplementary information:					
X-capacitors installed for testing: [ ] bleeding resistor rating: [ ] ICX: 1) Normal operating condition (e.g., normal operation, or open fuse), SC= short circuit, OC= open circuit					

5.6.6	TABLE: Resistance of protective conductors and terminations			N/A
Location	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)
--	--	--	--	--
Supplementary information:				

5.7.4	TABLE: Unearthed accessible parts					N/A
Location	Operating and fault conditions	Supply Voltage (V)	Parameters			ES class
			Voltage (V_{rms} or V_{pk})	Current (A_{rms} or A_{pk})	Freq. (Hz)	
--	--	--	--	--	--	--
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit						

5.7.5	TABLE: Earthed accessible conductive part			N/A
Supply voltage (V) .... :	--			—
Phase(s) .... :	[] Single Phase; [ ] Three Phase: [ ] Delta [ ] Wye			
Power Distribution System .... :	[ ] TN [ ]TT [ ] IT			
Location	Fault Condition No in IEC 60990 clause 6.2.2	Touch current (mA)	Comment	
	1	--	--	
	2*	--	--	

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

	3	--	--
	4	--	--
	5	--	--
	6	--	--
	8	--	--
Supplementary Information:			
[1] Supply voltage is the anticipated maximum Touch Voltage. [2] Earthed neutral conductor [Voltage differences less than 1% or more]. [3] Specify method used for measurement as described in IEC 60990 sub-clause 4.3. [4] IEC60990, sub-clause 6.2.2.7, Fault 7 not applicable. [5] (*) IEC60990, sub-clause 6.2.2.2 is not applicable if switch or disconnect device (e.g., appliance coupler) provided.			

5.8	**TABLE: Backfeed safeguard in battery backed up supplies**					**N/A**
Location	Supply voltage (V)	Operating and fault condition	Time (s)	Open-circuit voltage (V)	Touch current (A)	ES Class
--	--	--	--	--	--	--
Supplementary information:						
Abbreviation: SC= short circuit, OC= open circuit						

6.2.2	**TABLE: Power source circuit classifications**					**P**
Location	Operating and fault condition	Voltage (V)	Current (A)	Max. Power[1)] (W)	Time (S)	PS class
All internal circuits	--	--	--	--	--	Considered as PS3
DC IN	--	--	--	--	--	PS3
Battery cell output on the charging base	--	3.54	1.90	6.73	>3	PS1
Battery cell output on the ear buds	--	3.83	0.30	1.15	>3	PS1
Supplementary information: Abbreviation: SC= short circuit; OC= open circuit. 1) Measured after 3 s for PS1 and measured after 5 s for PS2 and PS3.						

6.2.3.1	**TABLE: Determination of Arcing PIS**			**N/A**
Location	Open circuit voltage after 3s(Vpk)	Measured r.m.s current(A)	Calculated value	Arcing PIS? Yes / No
--	--	--	--	--

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
An Arcing PIS requires a minimum of 50 V (peak) a.c. or d.c. An Arcing PIS is established when the product of the open circuit voltage (V_p) and normal operating condition rms current (I_{rms}) is greater than 15.

6.2.3.2	TABLE: Determination of resistive PIS		P
Location	Operating and fault condition	Dissipate power (W)	Arcing PIS? Yes / No
All internal circuits	--	>15	Yes*
Supplementary information:			
Abbreviation: SC= short circuit; OC= open circuit *All internal circuits were considered as resistive PIS.			

8.5.5	TABLE: High pressure lamp			N/A
Lamp manufacturer	Lamp type	Explosion method	Longest axis of glass particle (mm)	Particle found beyond 1 m Yes / No
--	--	--	--	--
Supplementary information:				

9.6	TABLE: Temperature measurements for wireless power transmitters								N/A
Supply voltage (V)..:									—
Max. transmit power of transmitter (W)..........:									—
Foreign objects	w/o receiver and direct contact		with receiver and direct contact		with receiver and at distance of 2 mm		with receiver and at distance of 5 mm		
	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	
--	--	--	--	--	--	--	--	--	
Supplementary information:									

5.4.1.4, 9.3, B.1.5, B.2.6	TABLE: Temperature measurements				P
Supply voltage (V)…………………………...:	5VDC 1)	5VDC 2)	3.7VDC 3)	--	—
Ambient temperature during test T_{amb} (°C)..:	40.0	40.0	40.0	--	—
Maximum measured temperature T of part/at:	T (°C)				Allowed T_{max} (°C)
On the charging base					

PCB near Type C input port	48.2	49.3	--	--	130
Internal wire connected to battery	44.5	44.9	--	--	80
Battery body	44.1	43.9	--	--	45/60[a)]
Plastic enclosure inside near battery	42.4	42.3	--	--	Ref.
Plastic enclosure inside near PCB	42.7	42.8	--	--	Ref.
On the ear buds					
PCB near U1	--	44.5	47.3	--	130
Battery body	--	42.8	44.2	--	45/60[a)]
Plastic enclosure inside near battery	--	41.1	42.6	--	Ref.
Plastic enclosure inside near PCB	--	41.6	43.5	--	Ref.
Ambient	40.0	40.0	40.0	--	--
Touch temperature for accessible parts					
On the charging base					
Plastic enclosure outside near battery	25.6	25.5	--	--	60
Plastic enclosure outside near PCB	25.5	25.5	--	--	60
On the ear buds					
Plastic enclosure outside near battery	--	25.5	25.7	--	48
Plastic enclosure outside near PCB	--	25.6	25.7	--	48
Ambient	25.0	25.0	25.0	--	--

Temperature T of winding:	t_1 (°C)	R_1 (Ω)	T_2 (°C)	R_2 (Ω)	T (°C)	Allowed T_{max} (°C)	Insulation class
--	--	--	--	--	--	--	--

Supplementary information:
1) Charging base charging with empty battery only;
2) Charging base charging with empty battery and charge the ear buds with an empty battery.
3) Ear buds discharging with fully charged battery and operated under most unfavourable normal condition with max. non-clipped output volume at 1kHz sine wave.
a) Maximum charging temperature is 45°C and maximum discharging temperature is 60°C.

B.2.5	**TABLE: Input test**							**P**
U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
On the charging base								
5.0VDC	--	0.35	1.0	--	--	--	--	Charging with empty battery only; Battery charging current 0.25A

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.0VDC	--	0.38	1.0	--	--	--	--	Charging with empty battery and operating under most unfavourable normal condition[1]; Battery charging current 0.23A
3.7VDC	--	0.03	--	--	--	--	--	Discharging with fully charged battery and operating under most unfavourable normal condition[1]
On the ear buds								
5.0VDC	--	0.02	--	--	--	--	--	Charging with empty battery only; Battery charging current 0.01A
3.7VDC	--	0.01	--	--	--	--	--	Discharging with full battery and operating under most unfavourable normal condition[2]
Supplementary information:								
Normal operation: Bluetooth mode input, max. non-clipped output power at speakers with 1kHz sine wave signal input.								

B.3, B.4	TABLE: Fault condition tests					P
Ambient temperature T_{amb} (°C)..:			See below			—
Power source for EUT: Manufacturer, model/type, outputrating...:			See table 4.1.2			—
Component No.	Condition	Supply voltage (V)	Test time	Fuse no.	Fuse current (A)	Observation
Disharging mode(for ear buds)						
Speaker	SC	5VDC	10min	--	--	After test, unit operated under abnormal condition, no damage, no hazard. Battery cell discharging current 0.01A.
C1	SC	5VDC	10min	--	--	Unit shut down immediately. Battery cell discharging current 0A.
R1	SC	5VDC	10min	--	--	Unit working normally, no hazard.

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

						Battery cell discharging current 0.01A.
Discharging mode(for charging base)						
D1	SC	5VDC	10min	--	--	Unit working normally, no hazard. Battery cell discharging current 0.03A.
C10	SC	5VDC	10min	--	--	Unit shut down immediately. Battery cell discharging current 0A.
R5	SC	5VDC	10min	--	--	Unit working normally, no hazard. Battery cell discharging current 0.03A.
Charging mode (for charging base)						
U2 pin 2/3 to 4/5 on battery pack	SC	3.7VDC	3h10min	--	--	Unit charging abnomally. Battery pack charging current 0.33A. Components/parts temperature(℃): Plastic enclosure outside near battery: 26.8; Plastic enclosure outside near PCB: 27.6; Ambient: 25.0. Battery body: 44.9; (at Ambient 40.0)
R1 on battery pack	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A.
C1 on battery pack	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A.
Cell + to cell -	SC	3.7VDC	10min	--	--	Unit stop charging and shut down immediately, no hazard.
Charging mode (for ear buds)						
U1 pin 1 to 4	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A
R5	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A
C6	SC	3.7VDC	10min	--	--	Unit shut down immediately. Battery pack charging current 0A.
Cell + to cell -	SC	3.7VDC	10min	--	--	Unit stop charging and shut down immediately, no hazard.
Supplementary information:						
1) O-L: overload; S-C: shirt circuit; O-C: open circuit. 2) Temperature limits under the fault condition: Battery cell: 45°C (for charging)/60°C (for discharging), Plastic enclosure(on ear buds): 58°C, Plastic enclosure(on charging base): 70°C. The following key and corresponding comments may be used to describe the final results.						

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Clause	Requirement + Test	Result - Remark	Verdict

NB	No indication of dielectric breakdown
CD	Component damaged
NCD	No component damaged
NH	No hazards

M.3	**TABLE: Protection circuits for batteries provided within the equipment**					**P**
Is it possible to install the battery in a reverse polarity position? ..... :			No			—
Equipment Specification	Charging					
	Voltage (V)			Current (A)		
	5V			1.0		
Manufacturer/type	Battery specification					
	Non-rechargeable batteries		Rechargeable batteries			
	Discharging current (A)	Unintentional charging current (A)	Charging		Discharging current (A)	Reverse charging current (A)
			Voltage (V)	Current (A)		
On the charging base						
Dongguan zhuoyifeng Technology Co., Ltd./ ZYF 801235	--	--	4.20	0.35	0.35	--
On the ear buds						
Dongguan zhuoyifeng Technology Co., Ltd./ ZYF 401012	--	--	4.20	0.03	0.03	--
Note: The tests of M.3.2 are applicable only when above appropriate data is not available.						
Specified battery temperature (°C).. :			0/10 °C to 45°C for charge mode; 0°C to 60°C for discharge mode			--

Component No.	Fault condition	Charge/ discharge mode	Test time	Temp. (°C)	Current (A)	Voltage (V)	Observation
On the charging base							
--	Normal	Charge mode	3h25min	44.1	0.25	4.20	No damaged, no hazard.
U2 pin 2/3 to 4/5 on battery pack	SC	Charge mode	3h10min	44.9	0.33	4.20	Unit charging abnomally.
--	Normal	Discharge mode	3h	43.9	0.03	4.20	No damaged, no hazard.
On the ear buds							
--	Normal	Charge mode	3h15min	42.8	0.01	4.20	Unit working normally, no hazard.
--	Normal	Discharge mode	3h10min	44.2	0.01	4.20	Unit working normally, no hazard.

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
Abbreviation: SC= short circuit; OC= open circuit NL= no chemical leakage; NS= no spillage of liquid; NE= no explosion; NF= no emission of flame or expulsion of molten metal.

M.4.2	TABLE: Charging safeguards for equipment containing a secondary lithium battery					P
Maximum specified charging voltage (V) ....:				4.20V		—
Maximum specified charging current (A) ....:				0.35A		—
Highest specified charging temperature (°C) ....:				45°C		—
Lowest specified charging temperature (°C) ....:				10°C		—
Battery manufacturer/type	Operating and fault condition	Measurement			Observation	
		Charging voltage (V)	Charging current (A)	Temp. (°C)		
Dongguan zhuoyifeng Technology Co., Ltd./ ZYF 801235	Normal	4.20	0.25	44.1	No damaged, no hazard.	
	Single fault: SC U2 pin 2/3 to 4/5 on battery pack	4.20	0.33	44.9	No damaged, no hazard.	
	LSCT	--	0	--	Stopping charging, no hazard.	
	HSCT	--	0	--	Stopping charging, no hazard.	
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit; MSCV= maximum specified charging voltage; MSCC= maximum specified charging current; HSCT= highest specified charging temperature; LSCT= lowest specified charging temperature.						

M.4.2	TABLE: Charging safeguards for equipment containing a secondary lithium battery					P
Maximum specified charging voltage (V) ....:				4.20V		—
Maximum specified charging current (A) ....:				0.03A		—
Highest specified charging temperature (°C) ....:				45°C		—
Lowest specified charging temperature (°C) ....:				0°C		—
Battery manufacturer/type	Operating and fault condition	Measurement			Observation	
		Charging voltage (V)	Charging current (A)	Temp. (°C)		
Dongguan zhuoyifeng Technology Co., Ltd./ ZYF 401012	Normal	4.20	0.01	42.8	No damaged, no hazard.	
	Single fault:	4.20	Max. 0.01	--	No damaged, no hazard.	
	LSCT	--	0	--	Stopping charging, no hazard.	
	HSCT	--	0	--	Stopping charging, no hazard.	
Supplementary information:						

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Abbreviation: SC= short circuit; OC= open circuit; MSCV= maximum specified charging voltage; MSCC= maximum specified charging current; HSCT= highest specified charging temperature; LSCT= lowest specified charging temperature.

Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**						**N/A**
Output Circuit	Condition	U_{oc} (V)	Time (s)	I_{sc} (A)		S (VA)	
				Meas.	Limit	Meas.	Limit
--	--	--	--	--	--	--	--
Supplementary Information:							
SC= short circuit; OC= open circuit							

T.2, T.3, T.4, T.5	**TABLE: Steady force test**					**P**
Part/Location	Material	Thickness (mm)	Probe	Force (N)	Test Duration (s)	Observation
On the charging base						
Internal components	--	--	--	10	5	No damage, no hazard
Top enclosure	Plastic	1.70	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Side enclosure	Plastic	1.70	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Bottom enclosure	Plastic	1.70	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
On the ear buds						
Internal components	--	--	--	10	5	No damage, no hazard
Top enclosure	Plastic	0.80	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Side enclosure	Plastic	0.80	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Bottom enclosure	Plastic	0.80	Circular plane surface 30 mm in diameter	100	5	No damage, no hazard
Supplementary information:						

T.6, T.9	**TABLE: Impact test**	**N/A**

EN IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict

Location/part	Material	Thickness (mm)	Height (mm)	Observation
--	--	--	--	--
Supplementary information:				

T.7	TABLE: Drop test			P
Location/part	Material	Thickness (mm)	Height (mm)	Observation
On the charging base				
Top enclosure	Plastic	1.70	1000	No damage, no hazard
Side enclosure	Plastic	1.70	1000	No damage, no hazard
Bottom enclosure	Plastic	1.70	1000	No damage, no hazard
On the ear buds				
Top enclosure	Plastic	0.80	1000	No damage, no hazard
Side enclosure	Plastic	0.80	1000	No damage, no hazard
Bottom enclosure	Plastic	0.80	1000	No damage, no hazard
Supplementary information:				

T.8	TABLE: Stress relief test				P
Location/Part	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation
Enclosure (On the charging base)	Plastic	1.70	70	7	No damage, no hazard
Enclosure (On the ear buds)	Plastic	0.80	70	7	No damage, no hazard
Supplementary information:					

X	TABLE: Alternative method for determining minimum clearances distances		N/A
Clearance distanced between:	Peak of working voltage (V)	Required cl (mm)	Measured cl (mm)
--	--	--	--
Supplementary information:			

Attachment 1 - EUT Photos

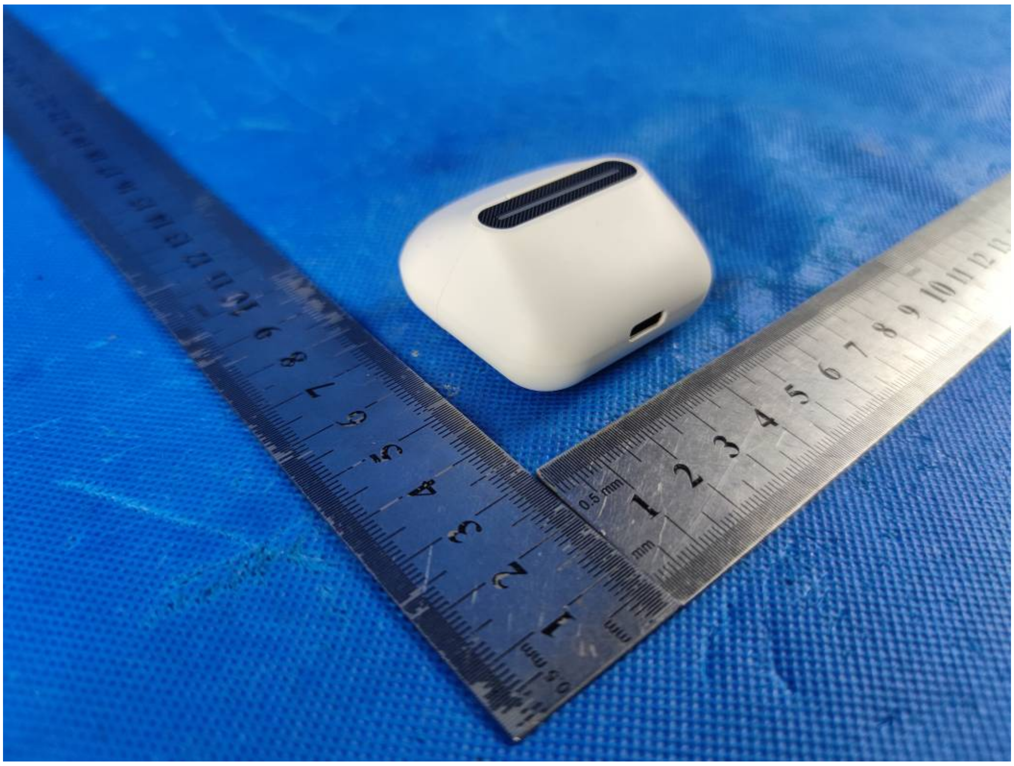

Photo 1 general view

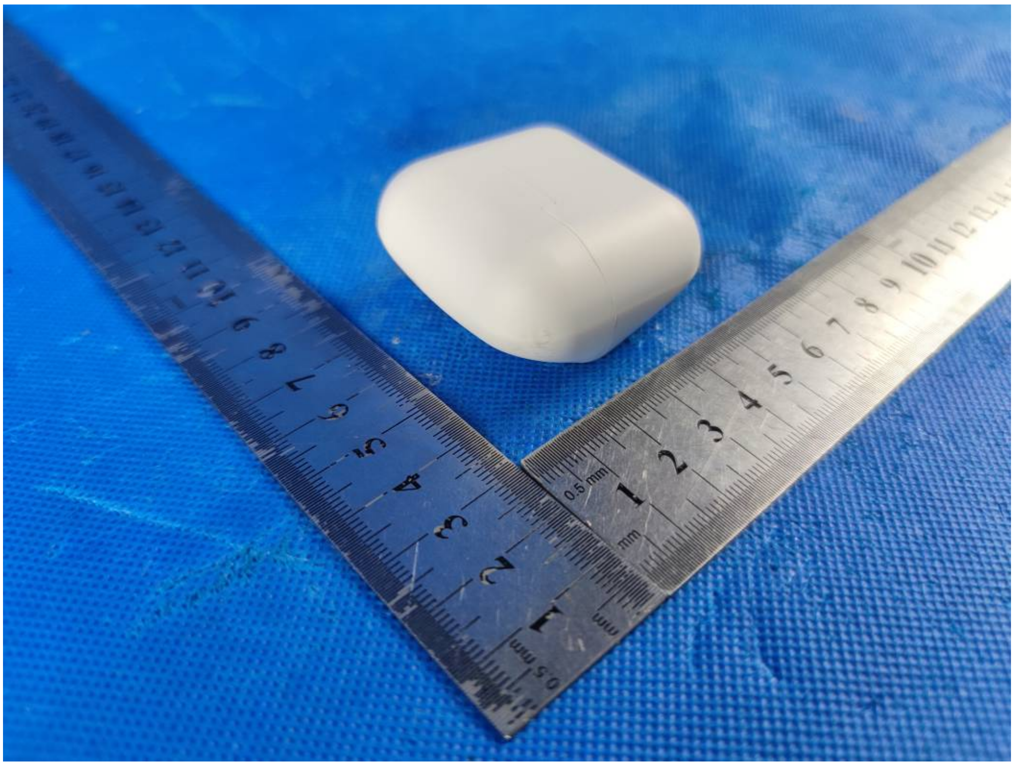

Photo 2 general view

Photo 3 terminal view

Photo 4 general view

Photo 5 internal view

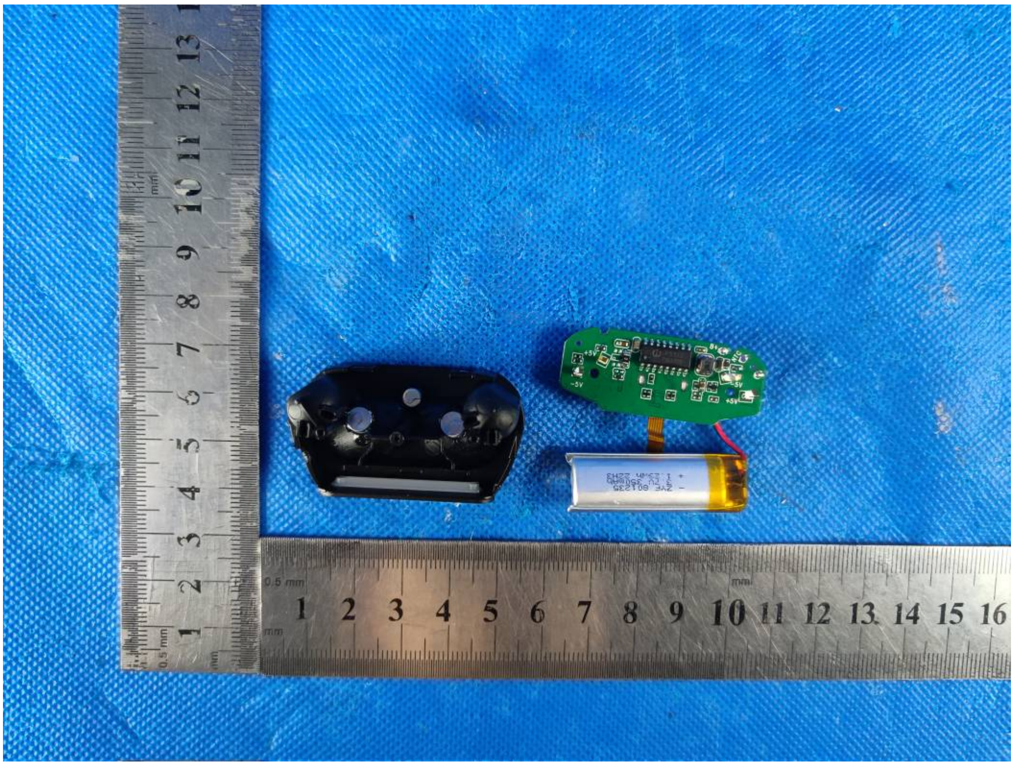

Photo 6 internal view

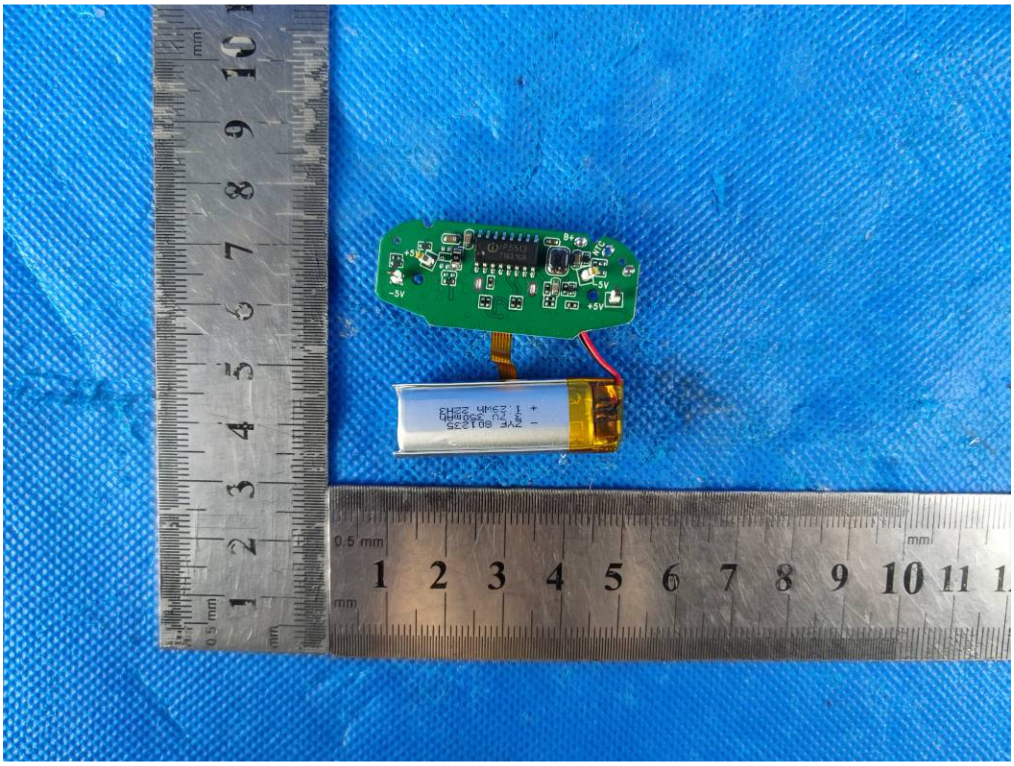

Photo 7 internal view

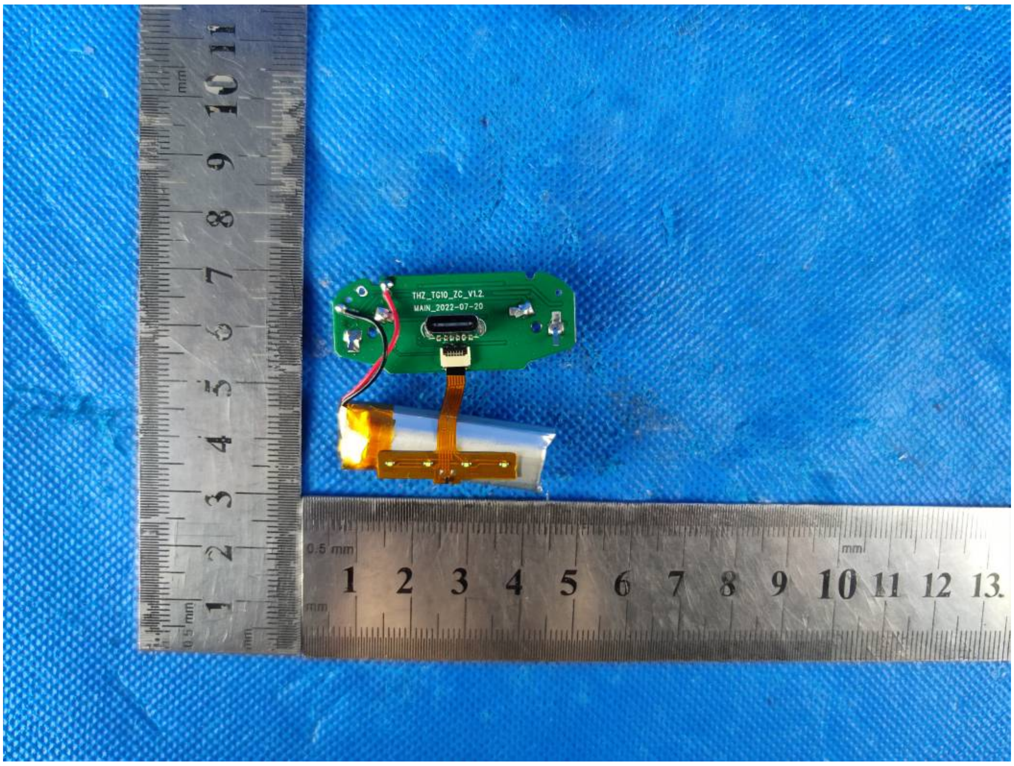

Photo 8 internal view

Photo 9 internal view

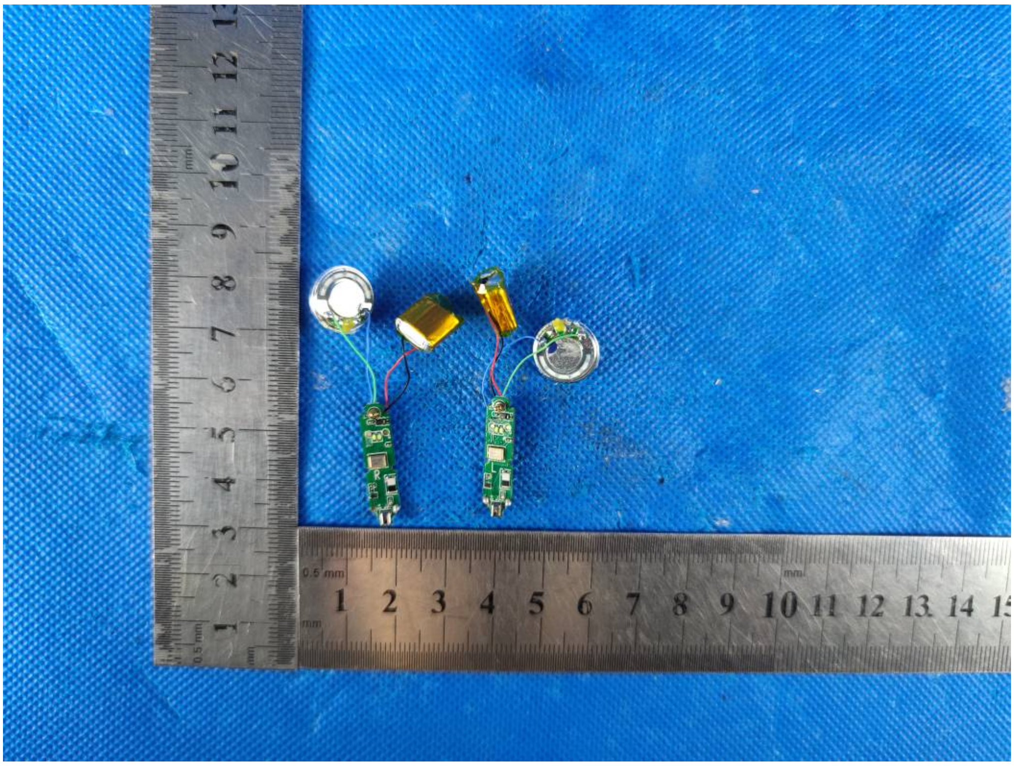

Photo 10 internal view

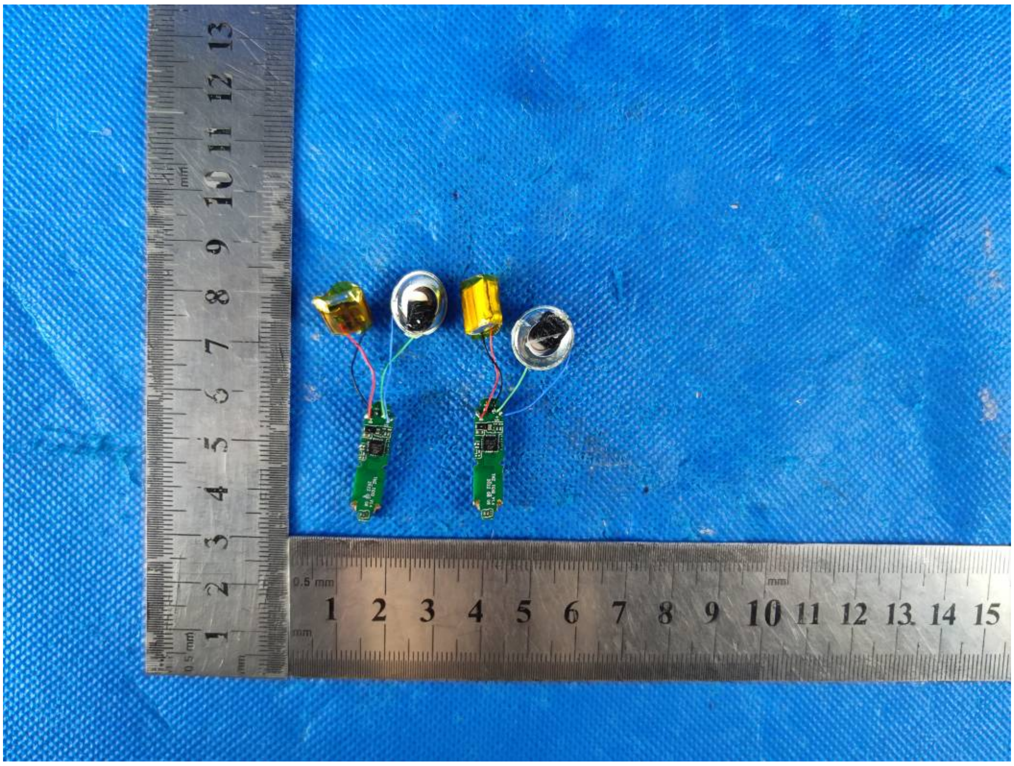

Photo 11 internal view

*****End of Report*****

Test Report

Client Information:

Applicant: Guangzhou Langston Electronic Technology Co,Ltd

Applicant add.: 5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou

Product Information:

Product Name: Bluetooth headset

Model No.: TG10

Serial Model: TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21

Brand Name: N/A

Applicable standards:

EN 62479: 2010
EN 50663: 2017

Prepared By:

Dongguan Yaxu (AiT) Technology Limited

No.22, Jinqianling Third Street, Jitigang, Huangjiang,Dongguan, Guangdong, China

Tel.: +86-769-8202 0499 Fax.: +86-769-8202 0495

Date of Receipt:	Sep. 16, 2022	Date of Test:	Sep. 16, 2022~ Sep. 21, 2022
Date of Issue:	Sep. 22, 2022	Test Result:	Pass

This device has been tested and found to comply with the stated standard(s) which is compliance and indicated in the test report. And the report is applicable only to the tested sample.

Reviewed by: Simba Huang
Simba huang

Approved by: Seal-Chen
Seal.chen

DONGGUAN YAXU (AIT) TECHNOLOGY LIMITED TEST REPORT

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2 Version

Revision Record			
Version	**Date**	**Modifier**	**Remark**
01	Sep. 22, 2022	--	Issue

3 Test Summary

RF Exposure Part for Tx & Rx				
Evaluation	**Evaluation Requirement**	**Evaluation Method**	**Class / Severity**	**Result**
RF Exposure	EN 62479 EN 50663	EN 62479 EN 50663	20 mW (13dBm)	PASS

4 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

.CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Aug.04, 2020

FCC-Registration No.: 703111 Designation Number: CN1313

Dongguan Yaxu (AiT) technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 6819A CAB identifier: CN0122

The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01

Dongguan Yaxu (AiT) technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

4.1 Deviation from standard

None

4.2 Abnormalities from standard conditions

None

5 General Information

5.1 General Description of EUT

Manufacturer:	Dongguan Doulan Electronic Technology Co. LTD
Manufacturer Address:	No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan
EUT Name:	Bluetooth headset
Model No:	TG10
Serial Model:	TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Brand Name:	N/A
Frequency Bands:	☒BT: 2402~2480 MHz ☐2.4G WIFI: 802.11b/g/n(20MHz): 2412~2472MHz 802.11n(40MHz): 2422~2462MHz ☐5G WIFI: 802.11a/n/ac-20: 5180-5320MHz, 5.745GHz-5.825GHz 802.11n/ac-40: 5190-5310MHz, 5.755 GHz-5.795GHz 802.11ac-80: 5210-5290MHz, 5.775 GHz
Modulation Mode:	☒BT(1Mbps)/BLE(1/2Mbps): GFSK ☒BT EDR(2Mbps):∏/4-DQPSK ☒BT EDR(3Mbps): 8-DPSK ☐IEEE 802.11b : DSSS (CCK, DQPSK, DBPSK) ☐IEEE 802.11g/n (HT20/HT40) : OFDM(64QAM, 16QAM, QPSK, BPSK) ☐IEEE 802.11a/n/ac: OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM ☐IEEE for 802.11ax:OFDM (QPSK/BPSK/16QAM/64QAM/256/1024QAM)
H/W No.:	N/A
S/W No.:	N/A
Adapter:	N/A
Battery:	DC3.7V
Note:	
1.	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

6 Test Requirements Specification

6.1 General Description of Applied Standards

Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

6.2 RF Exposure Evaluation

Equipment complying with the requirements for the general public is deemed to comply with the requirements for workers without further testing.
The conformity assessment to demonstrate equipment compliance shall be made according to EN 62479:2010, 4.1 and Clause 6.
If routes B, C or D of 4.1 of EN 62479:2010 are followed then the values of Pmax, as described in 4.2 of EN 62479:2010 and given in Annex A of EN 62479:2010, shall be meet in below Table

Table 1 — Values of *P*max

Exposure tier	Region of body	*P*max (mW)
General public	Head and trunk	20
	Limbs	40
Workers	Head and trunk	100
	Limbs	200

A. Typical usage, installation and the physical characteristics of equipment make itinherently compliant with the applicable EMF exposure levels such as those listed in thebibliography. This low-power equipment includes unintentional (or non-intentional)radiators, for example incandescent light bulbsand audio/visual (A/V) equipment,information technology equipment (ITE) and multimedia equipment (MME) that does not
contain radio transmitters.
NOTE: Equipment is described as A/V equipment, ITE or MME if its main use is playback/recording of music, voice or images, or processing of digital information.
B. The input power level to electrical or electronic components that are capable of radiatingelectromagnetic energy in the relevant frequency range is so low that the availableantenna power and/or the average total radiated power cannot exceed the low-powerexclusion level defined in 4.2.
C. The available antenna power and/or the average total radiated power are limited byproduct standards for transmitters to levels below the low-power exclusion level definedin 4.2.
D. Measurements or calculations show that the available antenna power and/or the averagetotal radiated power are below the low-power exclusion level defined in 4.2.

6.2.1.1 Measurement Record:

The available antenna power of this EUT is **BT(BR+EDR): 1.06mW(0.27dBm), BT(BLE): 1.01mW(0.05dBm)** the power are below the low-power exclusion level defined in 4.2(Pmax: 20mW)."

Radio Test Report-2.4G BT
ETSI EN 300 328 V2.2.2 (2019-07)

Client Information:

Applicant:	Guangzhou Langston Electronic Technology Co,Ltd
Applicant add.:	5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou

Product Information:

Product Name:	Bluetooth headset
Model No.:	TG10
Serial Model:	TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Brand Name:	N/A
Report No.:	AIT22091613W1

Prepared By:

Dongguan Yaxu (AiT) Technology Limited

No.22, Jinqianling Third Street, Jitigang, Huangjiang,Dongguan, Guangdong, China

Tel.: +86-769-8202 0499 Fax.: +86-769-8202 0495

Date of Receipt:	Sep. 16, 2022	Date of Test:	Sep. 16, 2022~ Sep. 21, 2022
Date of Issue:	Sep. 22, 2022	Test Result:	Pass

This device has been tested and found to comply with the stated standard(s), which is (are) required by the council directive of 2014/53/EU and indicated in the test report and are applicable only to the tested sample identified in the report.

Reviewed by: Simba Huang
Simba huang

Approved by: Seal Chen
Seal.chen

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2 Test Summary

2.1 Compliance with ETSI EN 300 328 V2.2.2 (2019-07)

No.	Description of Test Item	Basic Standard	Results
Transmitter Parameters			
1	RF Output Power	EN300328 clause 4.3.1.2	**Pass**
2	Duty cycle, Tx-Sequence, Tx-gap	EN300328 clause 4.3.1.3	**N/A**
3	Dwell time	EN300328 clause 4.3.1.4	**Pass**
4	Minimum Frequency Occupation	EN300328 clause 4.3.1.4	**Pass**
5	Hopping Sequence	EN300328 clause 4.3.1.4	**Pass**
6	Hopping Frequency Separation	EN300328 clause 4.3.1.5	**Pass**
7	Medium Utilisation (MU) factor	EN300328 clause 4.3.1.6	**N/A**
8	Adaptivity (Adaptive Frequency Hopping)	EN300328 clause 4.3.1.7	**N/A**
9	Occupied Channel Bandwidth	EN300328 clause 4.3.1.8	**Pass**
10	Transmitter unwanted emissions in the out-of-band domain	EN300328 clause 4.3.1.9	**Pass**
11	Transmitter unwanted emissions in the spurious domain	EN300328 clause 4.3.1.10	**Pass**
12	Geo-location capability	EN 300 328 Clause 4.3.2.12.2	**N/A**
Receiver Parameters			
13	Receiver spurious emissions	EN300328 clause 4.3.1.11	**Pass**
14	Receiver Blocking	EN300328 clause 4.3.1.12	**Pass**
N/A: not applicable. Refer to the relevant section for the details.			
EN 300 328: the detail version is ETSI EN 300 328 V2.2.2 (2019-07) in the whole report.			
Tx: In this whole report Tx (or tx) means Transmitter. Rx: In this whole report Rx (or rx) means Receiver. RF: In this whole report RF means Radio Frequency. The EUT belongs to the list of 'Class-1' equipment in accordance with the Commission Decision 2000/299/EC (6 April 2000). Temperature (Uncertainty): ±1℃ Humidity (Uncertainty): ±5%			

3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

.CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Aug.04, 2020

FCC-Registration No.: 703111 Designation Number: CN1313

Dongguan Yaxu (AiT) technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 6819A CAB identifier: CN0122

The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01

Dongguan Yaxu (AiT) technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

3.1 Deviation from Standard

None

3.2 Abnormalities from Standard Conditions

None

4 General Information

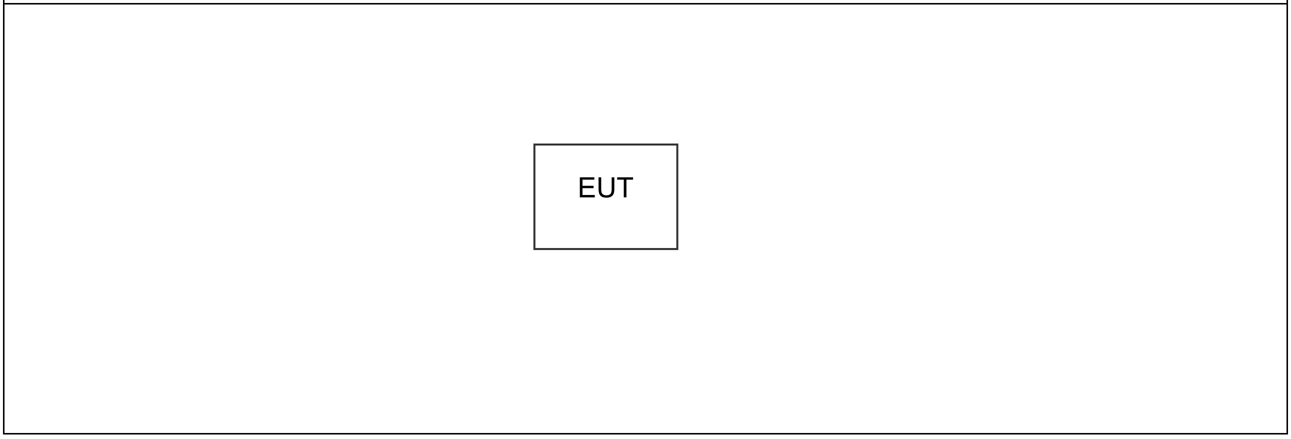
4.1 General Description of EUT

Manufacturer:	Dongguan Doulan Electronic Technology Co. LTD
Manufacturer Address:	No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan
EUT Name:	Bluetooth headset
Model No:	TG10
Serial Model:	TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Brand Name:	N/A
Bluetooth version:	V5.3
Operation frequency:	2402 MHz to 2480 MHz
Channel Number:	79
Modulation Type:	GFSK, π/4-DQPSK, 8DPSK
Modulation Technology:	FHSS
Antenna Type:	Chip antenna
Antenna Gain:	2.67dBi
H/W No.:	N/A
S/W No.:	N/A
Adapter:	N/A
Battery:	N/A
Model difference:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Note:	
1.	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

4.2 Description of Test setup

EUT was tested in normal configuration (Please See following Block diagrams)

1. Block diagram of EUT configuration (TX Mode)



4.3 EUT Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	signal cable	Remark
1	N/A	N/A	N/A	N/A	N/A	N/A

4.4 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

4.5 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	R&S	FSV40	101470	2022.09.02	2023.09.01
2	EMI Measuring Receiver	R&S	ESR	101160	2022.09.02	2023.09.01
3	Low Noise Pre Amplifier	HP	HP8447E	AiT-F01319	2022.09.02	2023.09.01
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2022.09.02	2023.09.01
5	Passive Loop	ETS	6512	00165355	2020.09.05	2022.09.04
6	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2021.08.29	2024.08.28
7	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2021.08.29	2024.08.28
8	SHF-EHF Horn Antenna 15-40GHz	SCHWARZBECK	BBHA9170	BBHA9170367d	2020.11.24	2023.11.23
9	EMI Test Receiver	R&S	ESCI	100124	2022.09.02	2023.09.01
10	LISN	Kyoritsu	KNW-242	8-837-4	2022.09.02	2023.09.01
11	LISN	R&S	ESH3-Z2	0357.8810.54-101161-S2	2022.09.02	2023.09.01
12	Pro.Temp&Humi.chamber	MENTEK	MHP-150-1C	MAA08112501	2022.09.02	2023.09.01
13	RF Automatic Test system	MW	MW100-RFCB	21033016	2022.09.02	2023.09.01
14	Signal Generator	Agilent	N5182A	MY50143009	2022.09.02	2023.09.01
15	Wideband Radio communication tester	R&S	CMW500	1201.0002K50	2022.09.02	2023.09.01
16	RF Automatic Test system	MW	MW100-RFCB	21033016	2022.09.02	2023.09.01
17	DC power supply	ZHAOXIN	RXN-305D-2	28070002559	N/A	N/A
18	RE Software	EZ	EZ-EMC_RE	Ver.AIT-03A	N/A	N/A
19	CE Software	EZ	EZ-EMC_CE	Ver.AIT-03A	N/A	N/A
20	RF Software	MW	MTS 8310	2.0.0.0	N/A	N/A

4.6 Measurement Uncertainty

No.	Item	Uncertainty
1	Conducted Emission Test	1.20dB
2	Radiated Emission Test	3.75dB
3	RF power,conducted	0.16dB
4	RF power density,conducted	0.24dB
5	Spurious emissions,conducted	0.21dB
6	All emissions,radiated(<1G)	4.68dB
7	All emissions,radiated(>1G)	4.89dB

5 Radio Technical Requirements Specification in EN 300 328

5.1 Transmitter Conditions

Item	EUT Type
1	stand-alone radio equipment with or without their own control provisions;
2	plug-in radio devices intended for use with or within a variety of host systems, e.g. personal computers, hand-held terminals, etc.;
3	plug-in radio devices intended for use within combined equipment, e.g. cable modems, set-top boxes, access points, etc.;
4	Combined equipment or a combination of a plug-in radio device and a specific type of host equipment.

Modulation
FHSS

EUT belongs to item 1 with FHSS modulation.

5.2 Test conditions

5.2.1 Normal conditions

Ambient:	Temperature:	+15°C to +35°C
	Relative humidity:	20% to 75%
	Press:	1010 mbar
Power supply:	AC	AC 230V for adapter
	DC	3.7V

5.2.2 Extreme conditions

Ambient:	Temperature:	-20 °C to +40 °C (Which declared by manufacture)
Power supply:	DC	3.7V

5.3 Test frequencies

EUT channels and frequencies list:

Description of Channel:					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454	--	--
26	2428	53	2455	--	--

Test frequencies are the lowest channel: 0 channel(2402MHz), middle channel: 39 channel(2441 MHz) and highest channel: 78 channel(2480 MHz)

6 Transmitter Requirements

6.1 RF Output Power

6.1.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.2.3)

For non-adaptive frequency hopping systems

The maximum RF output power for non-adaptive Frequency Hopping equipment, shall be declared by the supplier. The maximum RF output power for this equipment shall be equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20dBm.

For adaptive frequency hopping systems

The maximum RF output power for adaptive Frequency Hopping equipment shall be equal to or less than 20dBm.

6.1.2 Test procedure

ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.2

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Use a fast power sensor suitable for 2, 4 GHz and capable of 1 MS/s.
3. Sample speed 1 MS/s or faster, and must represent the power of the signal.
4. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured.
5. For conducted measurements on devices with one transmit chain:

   -Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. use these stored samples in all following steps.
6. For conducted measurements on devices with multiple transmit chains:

   - Connect one power sensor to each transmit port for a synchronous measurement on all transmits ports.

   -Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than half the time between two samples.

   -For each instant in time, sum the power of the individual samples of all ports and store them. Use these stored samples in all following steps.
7. Find the start and stop times of each burst in the stored measurement samples.
8. Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.

9. The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

10. Add the (stated) antenna assembly gain "G" in dBi of the individual antenna, If applicable, add the additional beamforming gain "Y" in dB.

11. If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.

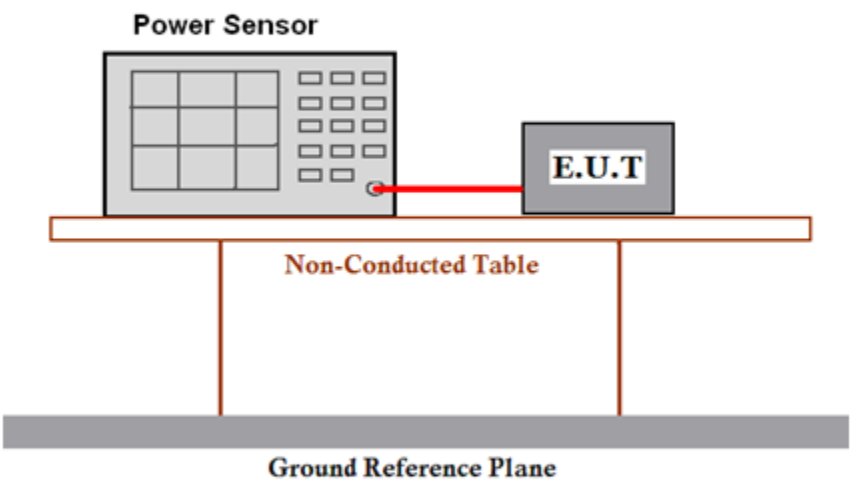
12. The RF Output Power (P) shall be calculated using the formula below: P = A + G + Y

Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

EUT Operation

Status:	Enter test mode for the product, keep EUT in continuously transmitting status with hoping on mode. Conducted measurement for this kind of products which be used for integral antenna equipment connect to the measuring equipment. Test the EUT in normal mode and EDR mode. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

6.1.3 TEST SETUP



6.1.4 Test record

Normal mode:

Measurement Conditions (in Normal & Extreme)		Limit =20dBm		
Temperature (°C)	Voltage (V DC)	Test result (dBm)	Test Limit (dBm)	Pass/Fail
GFSK				
T_{nom} = +25	V_{nom} = 3.7	0.27	**20**	**Pass**
T_{max} = +40	V_{nom} = 3.7	0.24	**20**	**Pass**
T_{min} = -20	V_{nom} = 3.7	0.25	**20**	**Pass**

EDR mode:

Measurement Conditions (in Normal & Extreme)		Limit =20dBm		
Temperature (°C)	Voltage (V DC)	Test result (dBm)	Test Limit (dBm)	Pass/Fail
π/4-DQPSK				
T_{nom} = +25	V_{nom} = 3.7	0.18	**20**	**Pass**
T_{max} = +40	V_{nom} = 3.7	0.13	**20**	**Pass**
T_{min} = -20	V_{nom} = 3.7	0.16	**20**	**Pass**
8DPSK				
T_{nom} = +25	V_{nom} = 3.7	0.19	**20**	**Pass**
T_{max} = +40	V_{nom} = 3.7	0.12	**20**	**Pass**
T_{min} = -20	V_{nom} = 3.7	0.18	**20**	**Pass**

Remark:

1) Test the RF output power in EUT continuously transmitting mode in normal conditions and read the relative value in extremely conditions.
2) Antenna gain(G): 1.0 dBi
   Cable loss: 0.5dB
   RF output power =A(RMS power)+G+Cable loss.
3) The number of bursts measurement is 15.

TEST RESULTS: The unit does meet the requirements.

6.2 Duty cycle, Tx-Sequence, Tx-gap

6.2.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.3.3)

For non-adaptive FHSS equipment, the Duty Cycle shall be equal to or less than the maximum value declared by the supplier. In addition, the maximum Tx-sequence time shall be 5 ms while the minimum Tx-gap time shall be 5 ms.

6.2.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.2

6.2.3 TEST SETUP

6.2.4 Test result

No applicable.

Refer to the EN 300 328 clause 4.3.1.3.1 section for the details.
These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.
These requirements do not apply for equipment with a maximum declared RF Output power of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.
As the EUT belongs to Adaptive equipment type, so the test is not applicable and skipped.

6.3 Dwell time, Minimum Frequency Occupation and Hopping Sequence

6.3.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.4.3)

The maximum accumulated dwell time on any hopping frequency shall be 400 ms within any period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.

6.3.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.2

1.Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

The analyzer shall be set as follows:

- Centre Frequency: Equal to the hopping frequency being investigated
- Frequency Span: 0 Hz
- RBW: ~ 50 % of the Occupied Channel Bandwidth
- VBW: ≥ RBW
- Detector Mode: RMS
- Sweep time: Equal to the Dwell Time × Minimum number of hopping frequencies (N) (see clause 4.3.1.4.2)
- Number of sweep points: 30 000
- Trace mode: Clear / Write
- Trigger: Free Run

2. Save the trace data to a file for further analysis by a computing device using an appropriate software application or program.

3. Indentify the data points related to the frequency being investigated by applying a threshold. the data points resulting from transmissions on the hopping frequency being investigated are assumed to have much higher levels compared to data points resulting from transmissions on adjacent hopping frequencies. If a clear determination between these transmissions is not possible, the RBW in step 1 shall be further reduced. In addition, a channel filter may be used, Count the number of data points identified as resulting from transmissions on the frequency being investigated and multiply this number by the time difference between two consecutive data points.

4. The result in step 3 is the accumulated Dwell Time which shall comply with the limit provided in clauses 4.3.1.3.2.1 or 4.3.1.3.2.2 and which shall be recorded in the test report.

5. Make the following changes on the analyzer and repeat steps 2 and 3. Sweep time: 4 × Dwell Time × Actual number of hopping frequencies in use.

The hopping frequencies occupied by the system without having transmissions during the dwell time (blacklisted frequencies) should be taken into account in the actual number of hopping frequencies in use. If this number can not be determined (number of blacklisted frequencies unknown) it shall be assumed that the equipment uses the minimum number of hopping frequencies as defined in clauses 4.3.1.4.2.1 or 4.3.1.4.2.2. The result shall be compared to the limit for the Minimum Frequency Occupation Time defined in clauses 4.3.1.3.2.1 or 4.3.1.3.2.2. This value shall be recorded in the test report.

6. Make the following changes on the analyzer:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- RBW: ~ 50 % of the Occupied Channel Bandwidth (single hop)
- VBW: ≥ RBW
- Detector Mode: RMS
- Sweep time: Auto
- Trace Mode: Max Hold
- Trigger: Free Run

• When the trace has completed, indentify the number of hopping frequencies used by the hopping sequence.

• The result shall be compared to the limit (value N) defined in clauses 4.3.1.3.2.1 or 4.3.1.3.2.2. This value shall be recorded in the test report.

For equipment with blacklisted frequencies, it might not be possible to verify the number of hopping frequencies in use. However they shall comply with the requirement for accumulated Dwell time and Minimum Frequency Occupation Time assuming the minimum number of hopping frequencies defined in clauses 4.3.1.3.2.1 or 4.3.1.3.2.2 are in use.

7. For adaptive systems, using the lowest and highest -20 dB points from the total spectrum envelope obtained in step 6, it shall be verified whether the system uses 70 % of the band specified in clause 1. The result shall be recorded in the test report.

Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). Repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

EUT Operation:

Test Status:	Enter test mode for the product, keep EUT in continuously transmitting status with hoping on mode with different packages; find the worst case is GFSK & 8DPSK mode. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

6.3.3 TEST SETUP

6.3.4 Test result

Measurement Data:

Dwell Time:

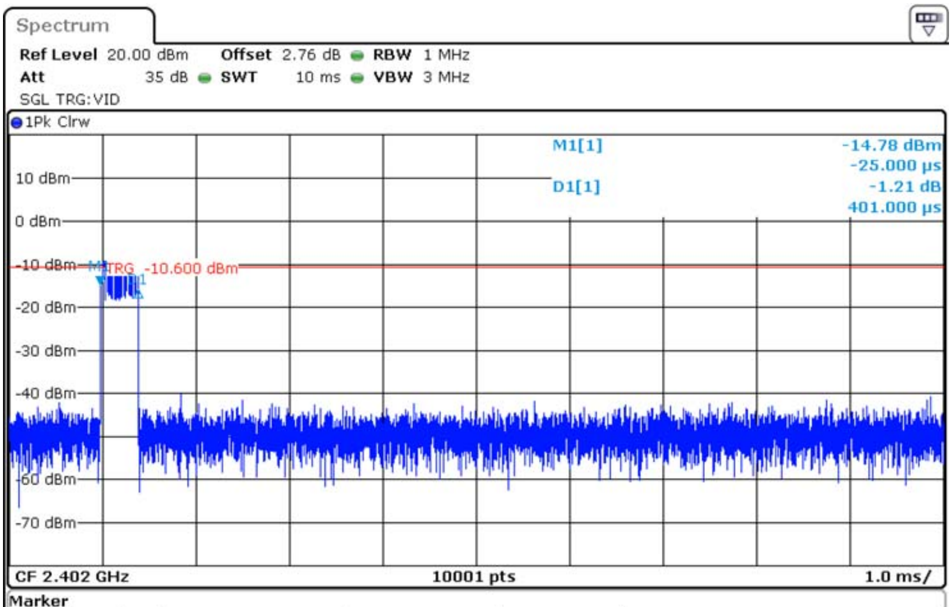
GFSK. Channel 00: 2.402GHz										
DH1 time slot	=	0.401	(ms)	*	33	*	(31.6/3.16)	=	128.320	ms
DH3 time slot	=	1.657	(ms)	*	15	*	(31.6/3.16)	=	265.120	ms
DH5 time slot	=	2.905	(ms)	*	11	*	(31.6/3.16)	=	309.867	ms
8DPSK. Channel 00: 2.402GHz										
3DH1 time slot	=	0.411	(ms)	*	32	*	(31.6/3.16)	=	131.520	ms
3DH3 time slot	=	1.66	(ms)	*	17	*	(31.6/3.16)	=	265.600	ms
3DH5 time slot	=	2.91	(ms)	*	8	*	(31.6/3.16)	=	310.400	ms

Note: Dwell time = (1600/(79*DHT))*79*0.4*Single hop time, where DHT=2/4/6 for DH1/DH3/DH5.

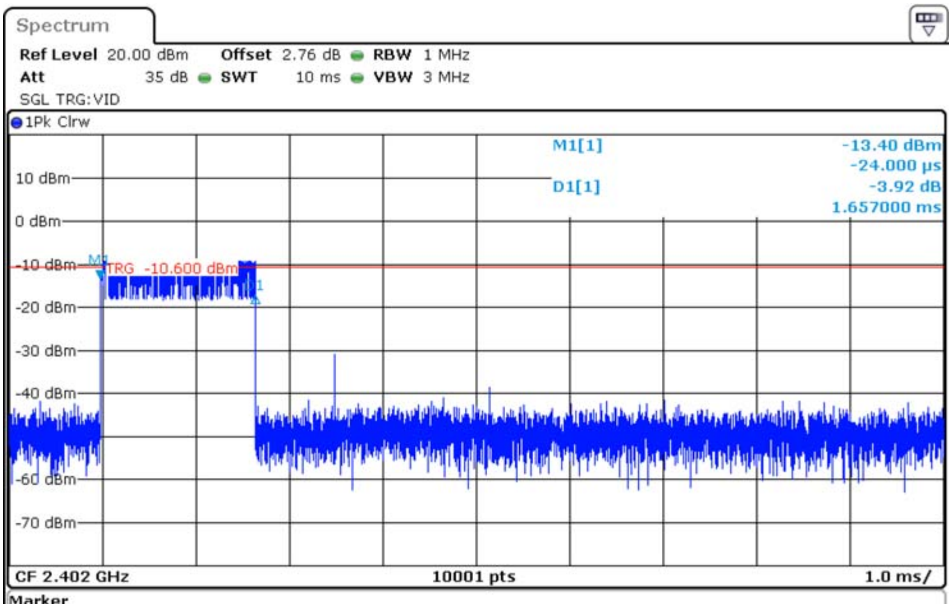
The results are not greater than 0.4 seconds.

Test graph as below:

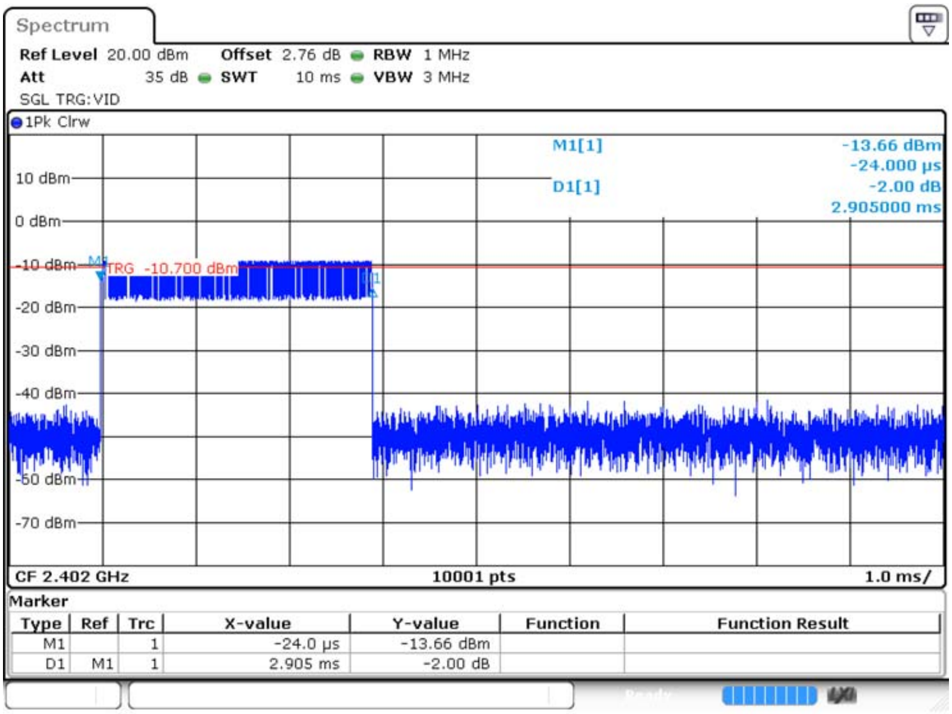
GFSK Normal mode (DH1/ DH3/ DH5**):**



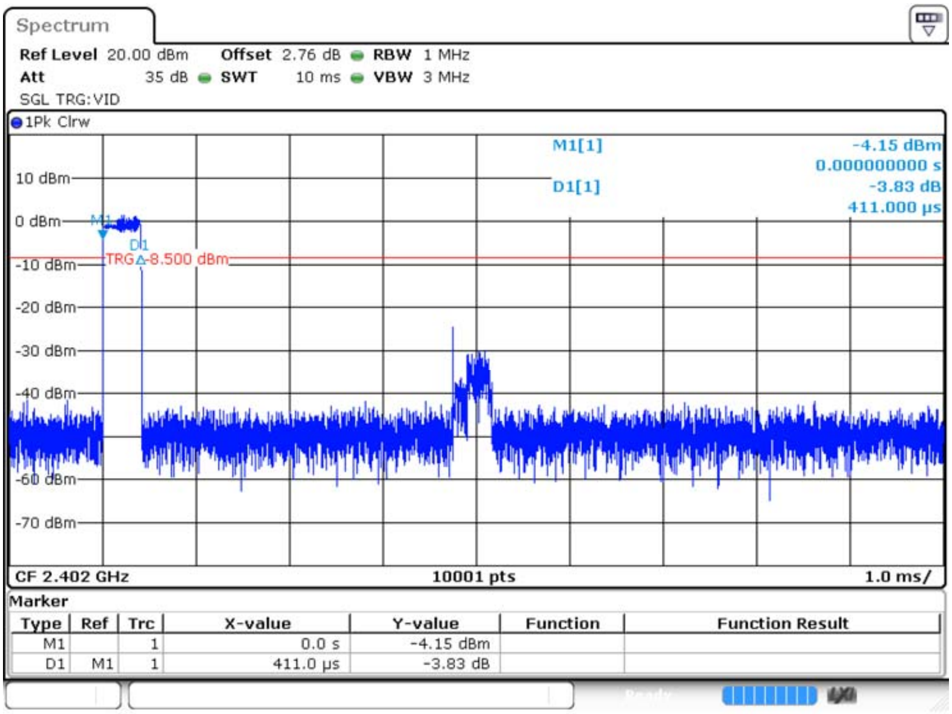
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-25.0 µs	-14.78 dBm		
D1	M1	1	401.0 µs	-1.21 dB		

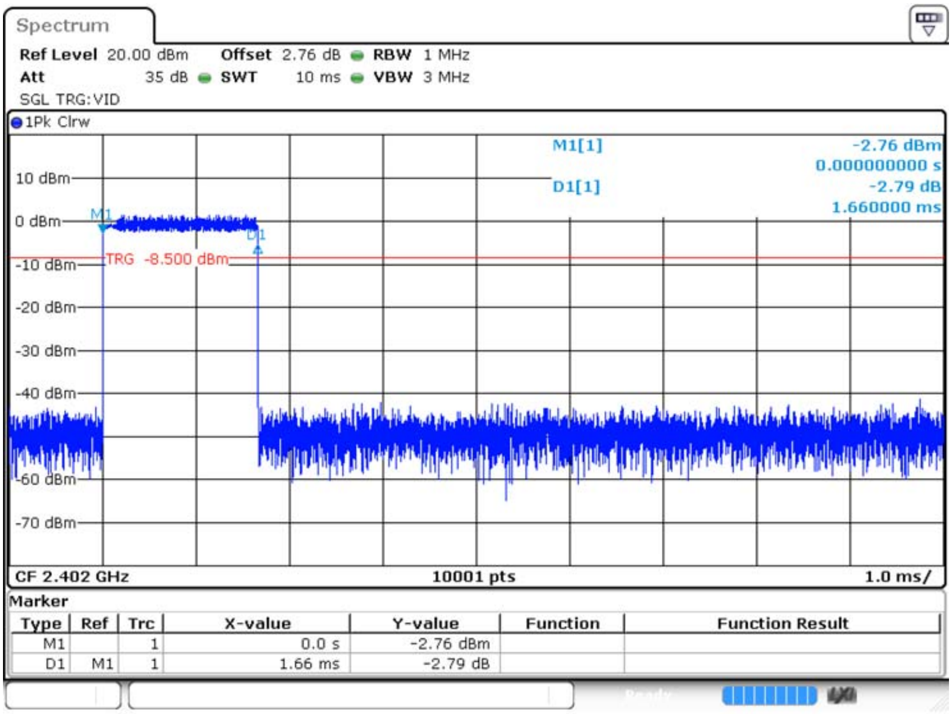


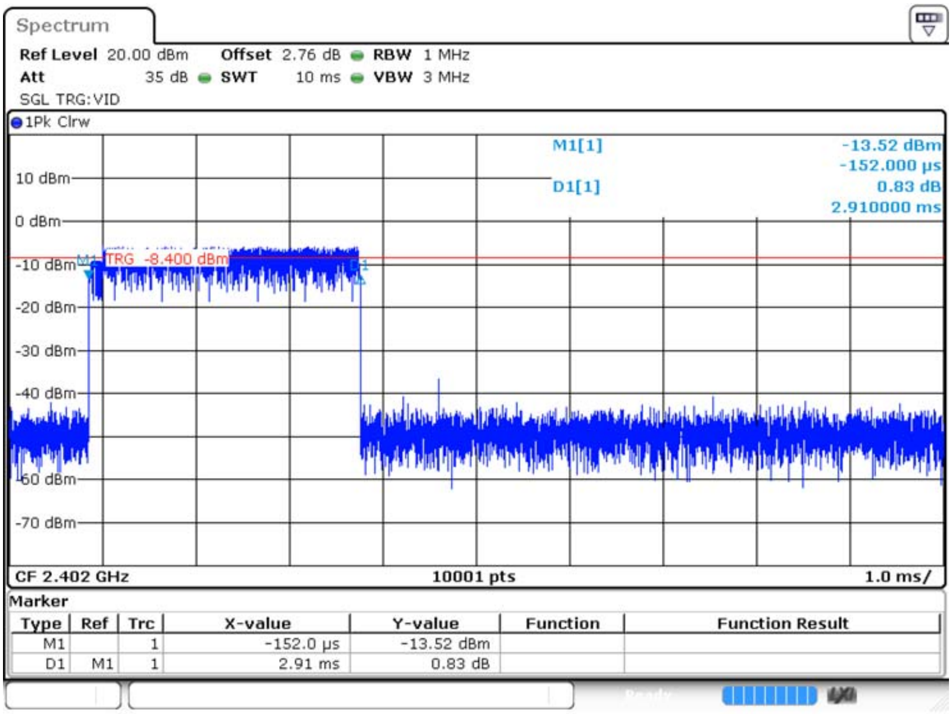
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-24.0 µs	-13.40 dBm		
D1	M1	1	1.657 ms	-3.92 dB		


Spectrum
Ref Level 20.00 dBm Offset 2.76 dB RBW 1 MHz
Att 35 dB SWT 10 ms VBW 3 MHz
SGL TRG:VID
1Pk Clrw
M1[1] -13.66 dBm
-24.000 µs
D1[1] -2.00 dB
2.905000 ms
10 dBm
0 dBm
-10 dBm
TRG -10.700 dBm
-20 dBm
-30 dBm
-40 dBm
-60 dBm
-70 dBm
CF 2.402 GHz
10001 pts
1.0 ms/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 -24.0 µs -13.66 dBm
D1 M1 1 2.905 ms -2.00 dB

8DPSK mode (DH1/ DH3/ DH5**):**






Spectrum
Ref Level 20.00 dBm Offset 2.76 dB RBW 1 MHz
Att 35 dB SWT 10 ms VBW 3 MHz
SGL TRG:VID
1Pk Clrw
M1[1] -13.52 dBm
-152.000 µs
D1[1] 0.83 dB
2.910000 ms
10 dBm
0 dBm
-10 dBm
TRG -8.400 dBm
-20 dBm
-30 dBm
-40 dBm
-60 dBm
-70 dBm
CF 2.402 GHz
10001 pts
1.0 ms/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 -152.0 µs -13.52 dBm
D1 M1 1 2.91 ms 0.83 dB

6.4 Minimum Frequency Occupation

6.4.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.4)

The Minimum Frequency Occupation Time shall be equal to one dwell time within a period not exceeding four timesthe product of the dwell time per hop and the number of hopping frequencies in use.

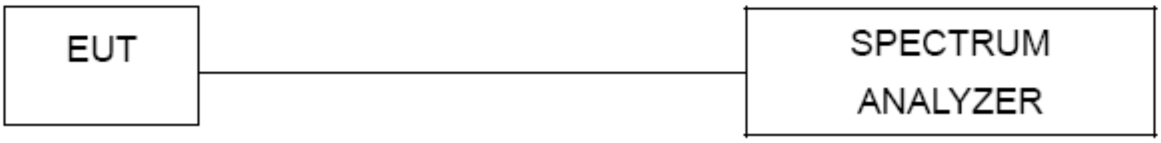
6.4.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.2.2

EUT Operation:

Test Status:	Enter test mode for the product, keep EUT in continuously transmitting status with hoping on mode with different packages; find the worst case is 8DPSK mode. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

6.4.3 TEST SETUP



6.4.4 Test result

Channel (MHz)	Packages	Dwell Time per hop (ms)	Testing period (ms)	Frequency Occupation period	Limit Dwell Times No.	Result
2402.0	DH1	0.401	126.716	1	one dwell time	Pass
	DH3	1.657	523.612	2		Pass
	DH5	2.905	917.980	3		Pass

Channel (MHz)	Packages	Dwell Time per hop (ms)	Testing period (ms)	Frequency Occupation period	Limit Dwell Times No.	Result
2402.0	3DH1	0.411	129.876	1	one dwell time	Pass
	3DH3	1.660	524.560	2		Pass
	3DH5	2.910	919.560	3		Pass

Testing period: 4 x Dwell time per hop x 79 Channels

6.5 Hopping Sequence

6.5.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.5.3)

The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.

6.5.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.4

EUT Operation:

Test Status:	Enter test mode for the product, keep EUT in continuously transmitting status with hoping on mode with different packages; find the worst case is 8DPSK mode. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

6.5.3 TEST SETUP

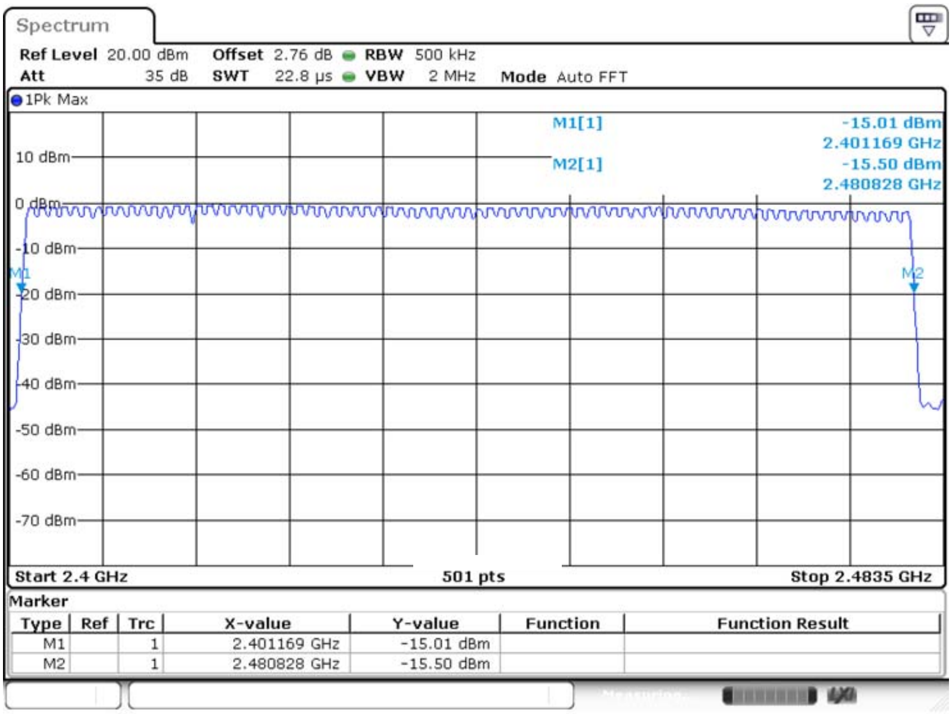
6.5.4 Test result

The unit does meet the requirements.

Hopping Sequence					
ISM band (MHz)	Operation band (MHz)	20dB Down Bandwidth (%)	Limit (%)	Channel number	Limit (N)
2400-2483.5	2402-2480	95.40	≥70%	79	≥15

Test graph as below:

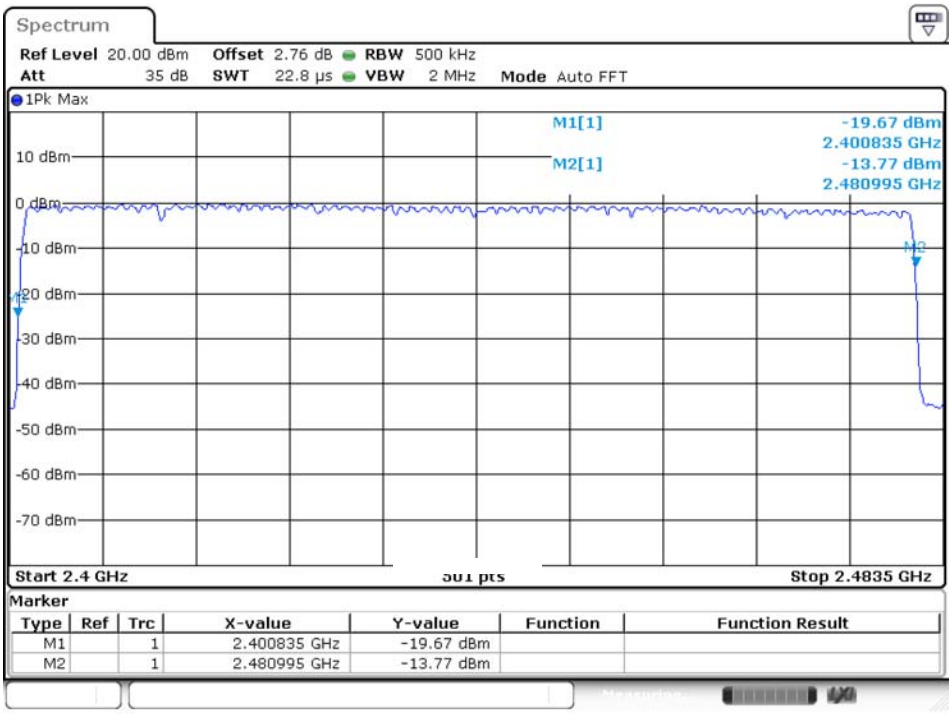
Normal mode:



Hopping Sequence					
ISM band (MHz)	Operation band (MHz)	20dB Down Bandwidth (%)	Limit (%)	Channel number	Limit (N)
2400-2483.5	2402-2480	96.00 %	≥70%	79	≥15

Test graph as below:

EDR mode:



6.6 Hopping Frequency Separation

6.6.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.5.3)

Non-adaptive frequency hopping systems

The minimum Hopping Frequency Separation shall be equal to Occupied Channel Bandwidth (see clause 4.3.1.7) of a single hop, with a minimum separation of 100 kHz.

Adaptive frequency hopping systems

The minimum Hopping Frequency Separation shall be 100 kHz.

6.6.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.5

Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

The analyzer shall be set as follows:

- Centre Frequency: Centre of the two adjacent hopping frequencies
- Frequency Span: Sufficient to see the complete power envelope of both hopping frequencies
- RBW: 1 % of the Span
- VBW: 3 × RBW
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep Time: Auto

• Allow the trace to stabilize.

•Use the marker-delta function to determine the Hopping Frequency Separation between the peaks of the two adjacent hopping frequencies. This value shall be compared with the limits defined in clause 4.3.1.5.3 and shall be recorded in the test report.

EUT Operation:

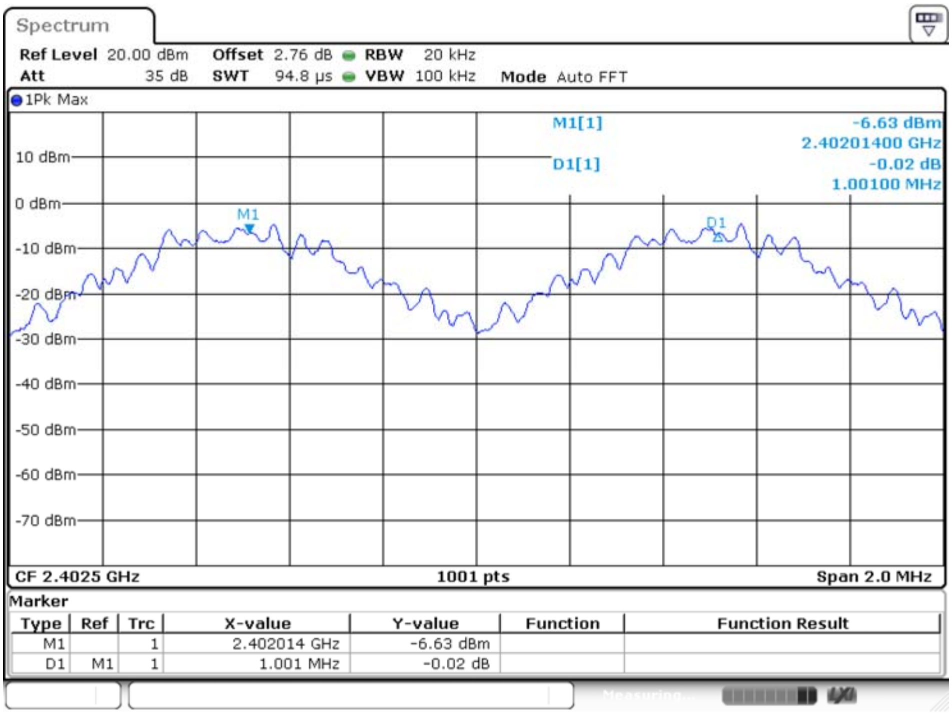
Test Status:	Test the EUT in hopping mode. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

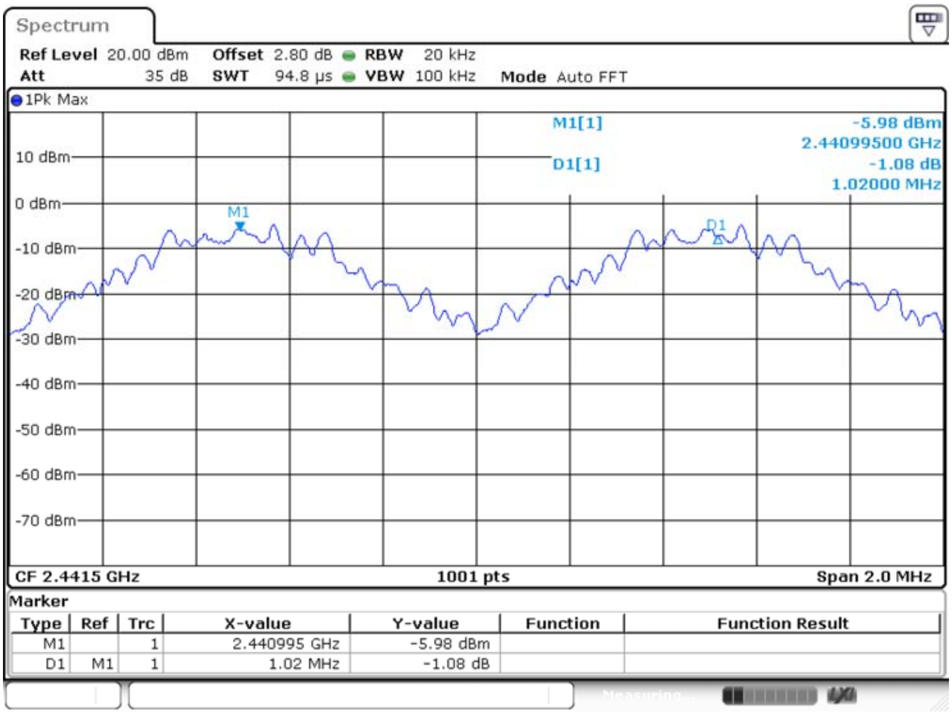
6.6.3 TEST SETUP

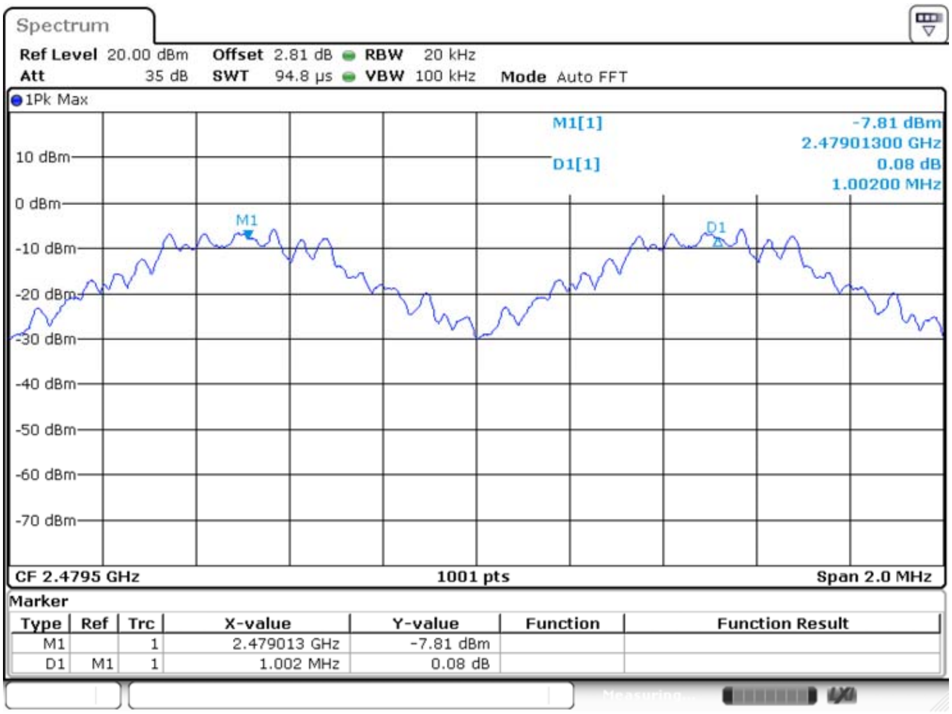
6.6.4 Test result

Normal mode:

Test Channel	Carrier Frequencies Separated (MHz)	Pass/Fail (limit 100 KHz)
Lower Channels (channel 0 and channel 1)	1.001	Pass
Middle Channels (channel 39 and channel 40)	1.02	Pass
Upper Channels (channel 77 and channel 78)	1.002	Pass

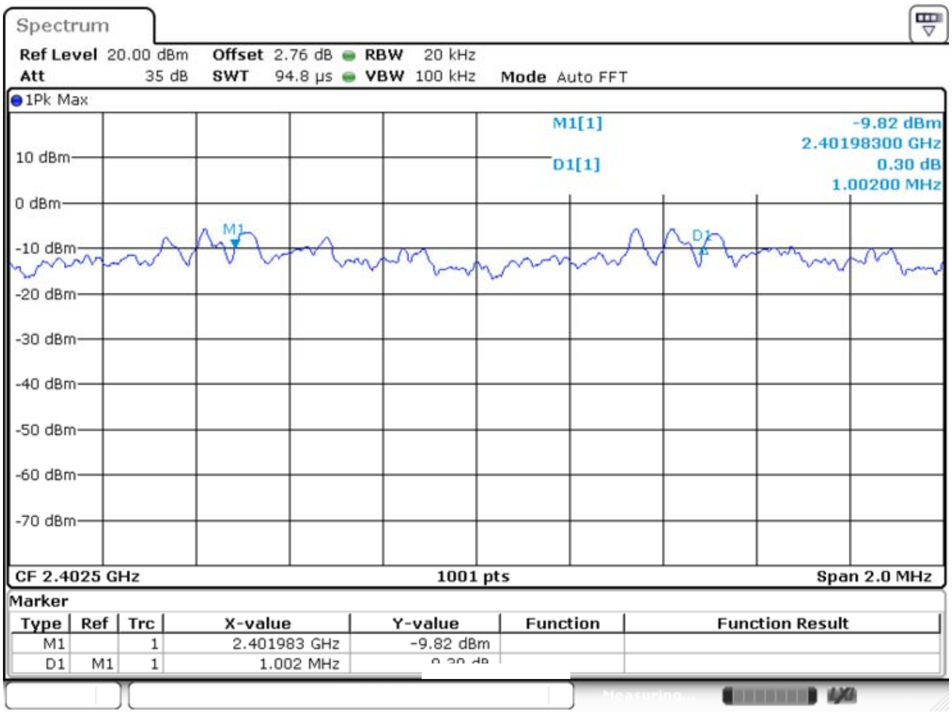


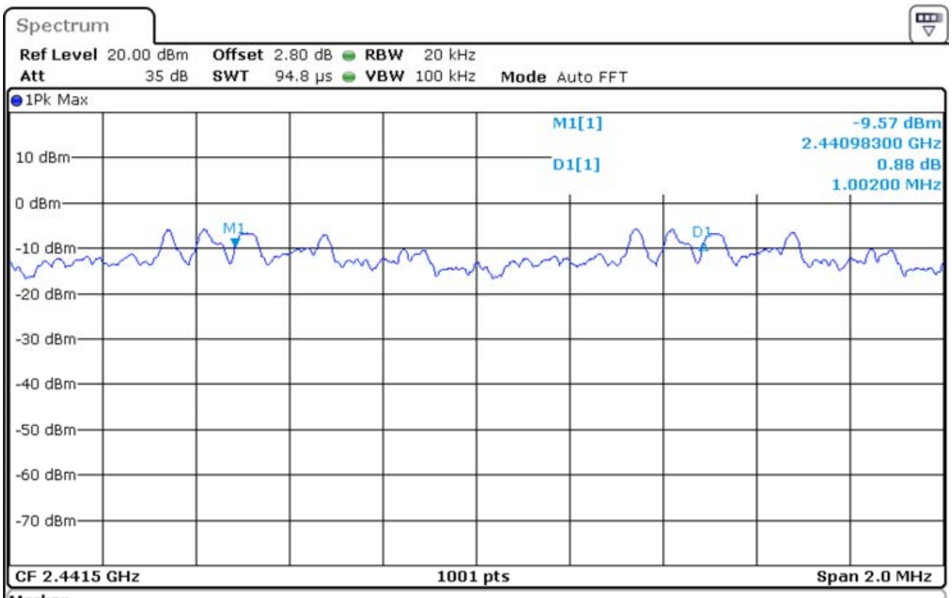

Spectrum
Ref Level 20.00 dBm Offset 2.80 dB RBW 20 kHz
Att 35 dB SWT 94.8 µs VBW 100 kHz Mode Auto FFT
1Pk Max
M1[1] -5.98 dBm
2.44099500 GHz
D1[1] -1.08 dB
1.02000 MHz
CF 2.4415 GHz 1001 pts Span 2.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.440995 GHz -5.98 dBm
D1 M1 1 1.02 MHz -1.08 dB


Spectrum
Ref Level 20.00 dBm Offset 2.81 dB RBW 20 kHz
Att 35 dB SWT 94.8 µs VBW 100 kHz Mode Auto FFT
1Pk Max
M1[1] -7.81 dBm
2.47901300 GHz
D1[1] 0.08 dB
1.00200 MHz
CF 2.4795 GHz 1001 pts Span 2.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.479013 GHz -7.81 dBm
D1 M1 1 1.002 MHz 0.08 dB

EDR mode:

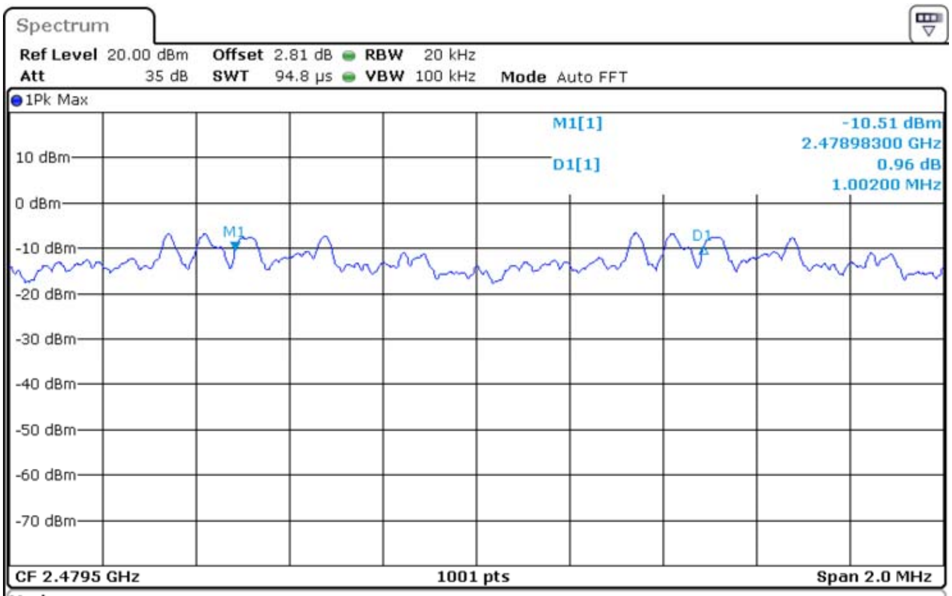
Test Channel	Carrier Frequencies Separated (MHz)	Pass/Fail (limit 100 KHz)
Lower Channels (channel 0 and channel 1)	1.002	Pass
Middle Channels (channel 39 and channel 40)	1.002	Pass
Upper Channels (channel 77 and channel 78)	1.002	Pass





Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.440983 GHz	-9.57 dBm		
D1	M1	1	1.002 MHz	0.88 dB		



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.478983 GHz	-10.51 dBm		
D1	M1	1	1.002 MHz	0.96 dB		

6.7 Medium Utilisation (MU) factor

6.7.1 Limit (ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.6.3)

For non-adaptive equipment

The maximum Medium Utilisation factor for non-adaptive Frequency Hopping equipment shall be 10 %.

6.7.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07)

6.7.3 Test result

No applicable.

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.

6.8 Medium Utilisation (MU) factor

6.8.1 Limit (ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.6.3)

For non-adaptive equipment

The maximum Medium Utilisation factor for non-adaptive Frequency Hopping equipment shall be 10 %.

6.8.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07)

6.8.3 Test result

No applicable.

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.

6.9 Adaptivity (Adaptive Frequency Hopping)

6.9.1 Limit (ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.7.4.2)

Adaptivity Limit

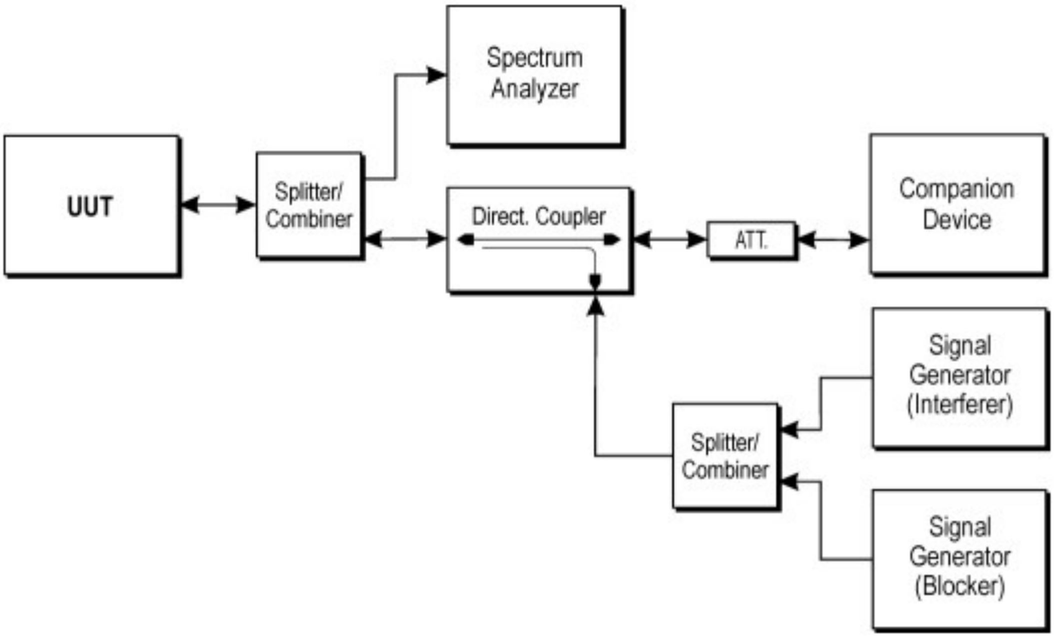
Non-LBT based Detect and Avoid

- The channel shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an ‘available’ channel;
- COT ≤ 40 ms;
- Idle Period shall be minimum 5% of COT with a minimum of 100us;
- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm); LBT based Detect and Avoid(Frame Based Equipment)
- The CCA observation time shall be not less than 20 us;
- The CCA time used by the equipment shall be declared by the supplier;
- COT = 1-10 ms;
- Idle Period = 5% of COT;
- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm); LBT based Detect and Avoid(Load Based Equipment)
- The CCA observation time shall be not less than 20 us;
- The CCA time used by the equipment shall be declared by the supplier;
- COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms;
- R = number of clear idle slots are randomly [1~q]. Every time an Extended CCA is required and the ‘R’ value stored in a counter.
- Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm); Short Control Signalling Transmissions:
- Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within an observation period of 50ms.

6.9.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.6

6.9.3 Test Setup



6.9.4 Test result

No applicable.

Adaptivity (Adaptive Frequency Hopping)

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

As the EUT about RF Output power level is less than 10 dBm e.i.r.p, so the test is not applicable and skipped.

6.10 Occupied Channel Bandwidth

6.10.1 Limit (ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.8.3)

For non-adaptive Frequency Hopping equipment with E.I.R.P greater than 10dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the value declared by the supplier. This declared value shall not be greater than 5 MHz.

6.10.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.7

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum and use the following settings:
   - Centre Frequency: The centre frequency of the channel under test
   - Resolution BW: ~ 1 % of the span without going below 1 %
   - Video BW: 3 × RBW
   - Frequency Span: 2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
   - Detector Mode: RMS
   - Trace Mode: Max Hold
2. Wait until the trace is completed, Find the peak value of the trace and place the analyser marker on this peak.
3. Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT, this value shall be recorded.

NOTE: Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

EUT Operation

Status: Enter test mode for the product. Test in Channel lowest (2402MHz), highest (2480MHz), keep in continuously transmitting status on a single Hopping Frequency.

Test the EUT in normal mode and EDR mode.

Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

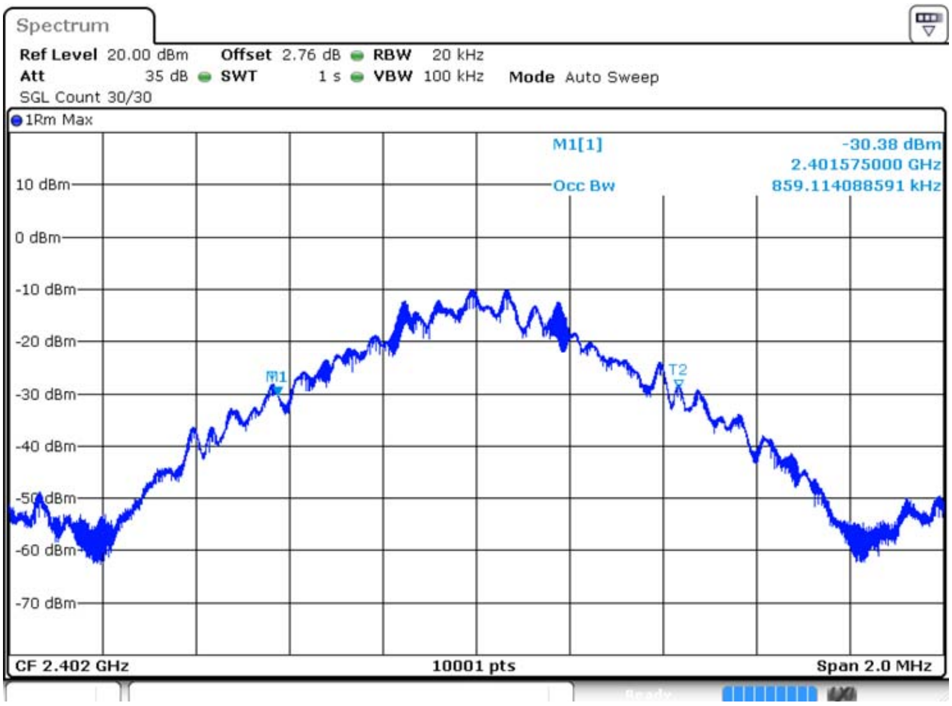
6.10.3 Test Setup

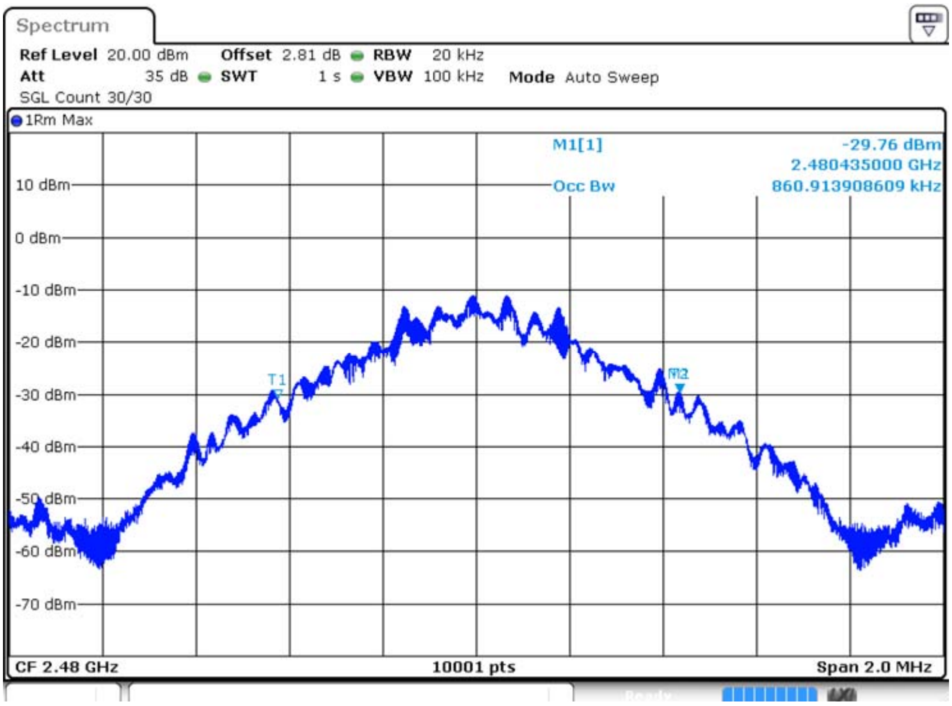
6.10.4Test result

Remark: These measurements shall only be performed at normal test conditions.

Normal mode: GFSK

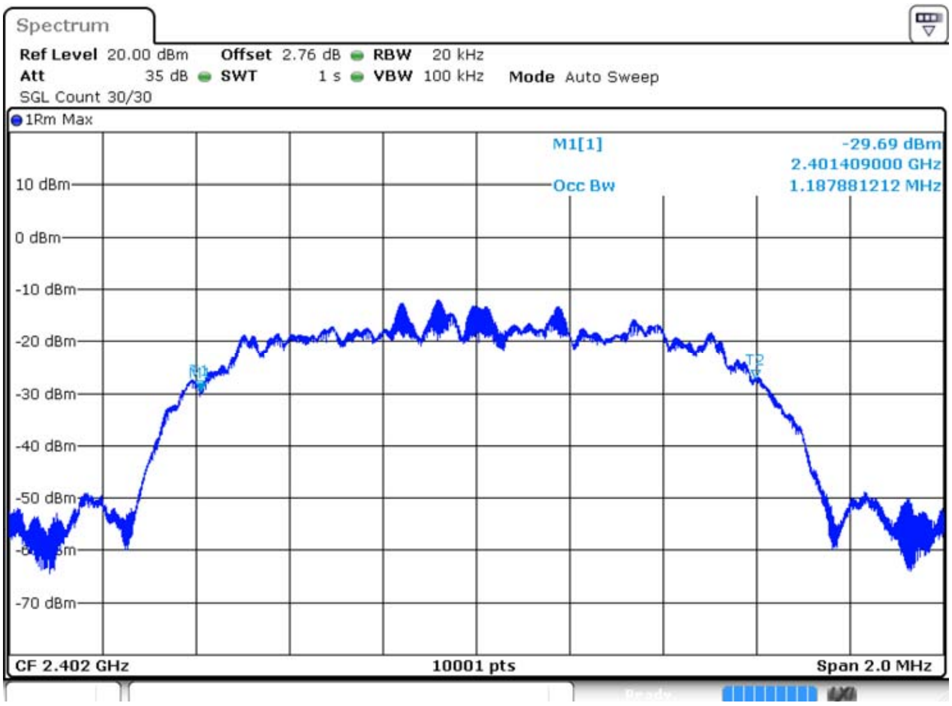
Test Channel	Bandwidth 99%(MHz)	FL (MHz) or FH (MHz)	Lower Limit (MHz)	Higher Limit (MHz)
Lowest	0.859	2401.575	> 2400.0	N/A
Highest	0.861	2480.435	N/A	< 2483.5

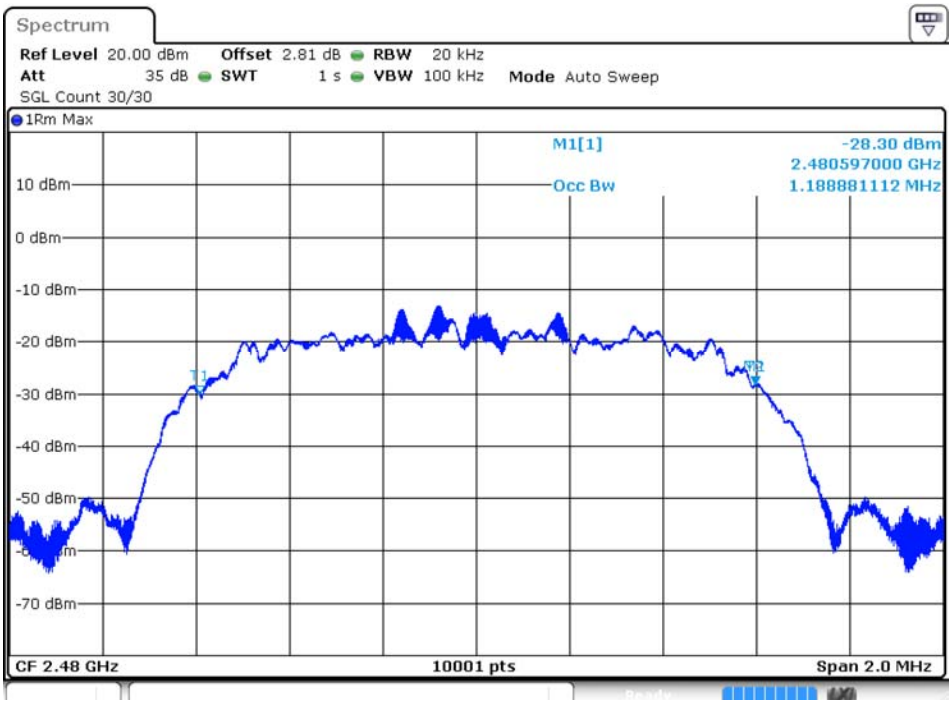




EDR mode:

Test Channel	Bandwidth 99%(MHz)	FL (MHz) or FH (MHz)	Lower Limit (MHz)	Higher Limit (MHz)
Lowest	1.188	2401.409	> 2400.0	N/A
Highest	1.189	2480.597	N/A	< 2483.5

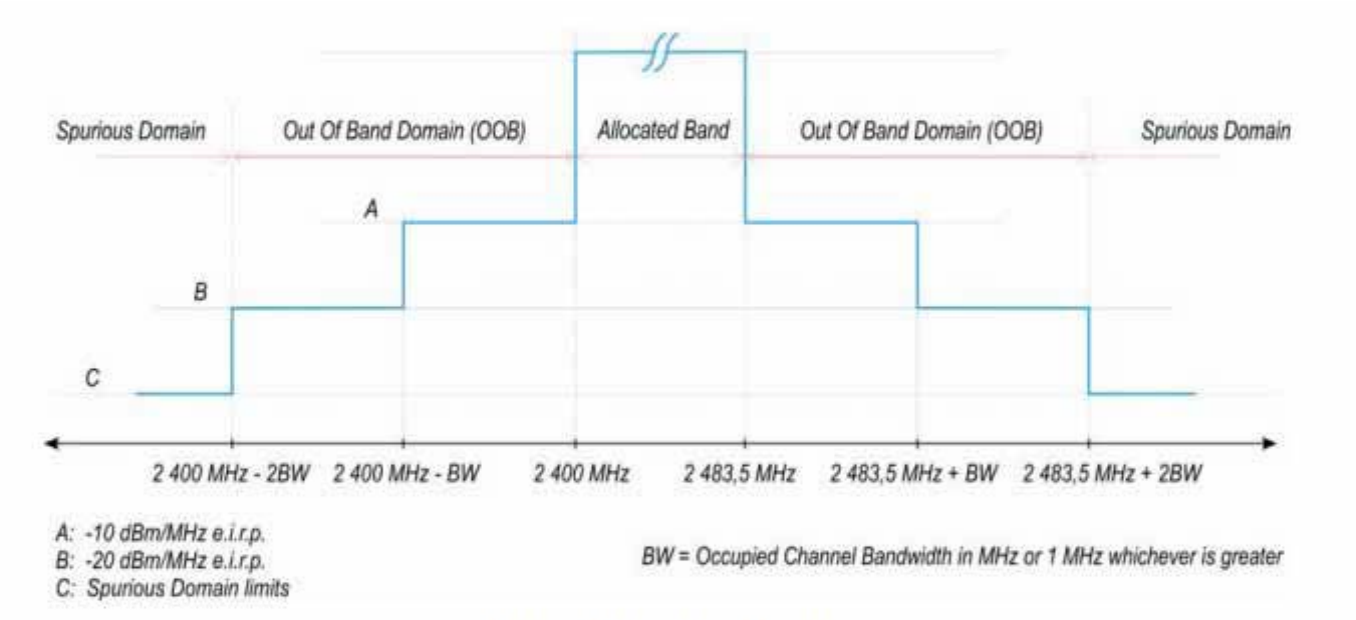




6.11 Transmitter unwanted emissions in the out-of-band domain

6.11.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.9.3)

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask.



6.11.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.8

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum and use the following settings:
   - Centre Frequency: 2 484 MHz
   - Span: 0 Hz
   - Resolution BW: 1 MHz
   - Filter mode: Channel filter
   - Video BW: 3 MHz
   - Detector Mode: RMS
   - Trace Mode: Clear / Write
   - Sweep Mode: Continuous
   - Sweep Points: 5 000
   - Trigger Mode: Video trigger

   NOTE 1: In case video triggering is not possible, an external trigger source may be used.
   - Sweep Time: Suitable to capture one transmission burst
2. segment 2 483,5 MHz to 2 483,5 MHz + BW
   - Adjust the trigger level to select the transmissions with the highest power level.
   - For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

•Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

• Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

•Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

3. segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW

   •Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

4. segment 2 400 MHz - BW to 2 400 MHz

   •Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

5. segment 2 400 MHz - 2BW to 2 400 MHz - BW

   •Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

6. In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

   •In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

   - Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
   - Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log 10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

   NOTE 2: Ach refers to the number of active transmit chains.

   It shall be recorded whether the equipment complies with the mask provided in figures 1 or 3.

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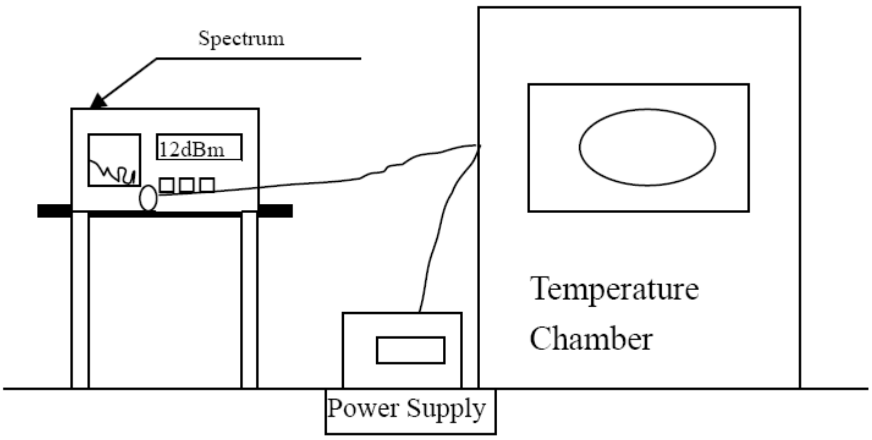
EUT Operation

Status: Enter test mode for the product, keep EUT in continuously transmitting status with hoping on mode with different packages; find the worst case is GFSK, 8DPSK mode.
Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

6.11.3 Test Setup

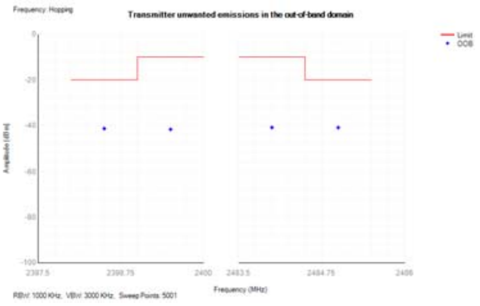
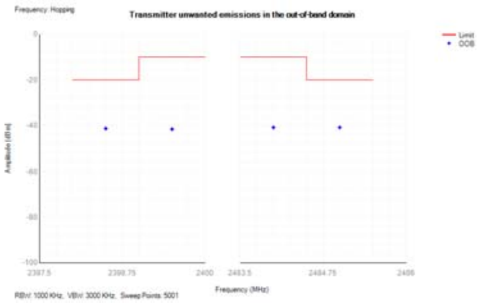
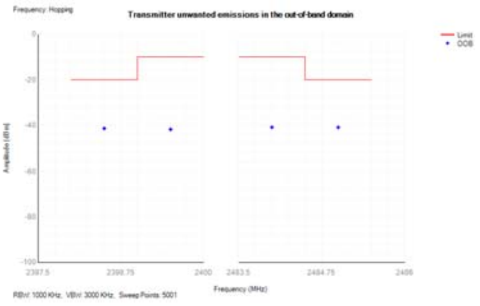
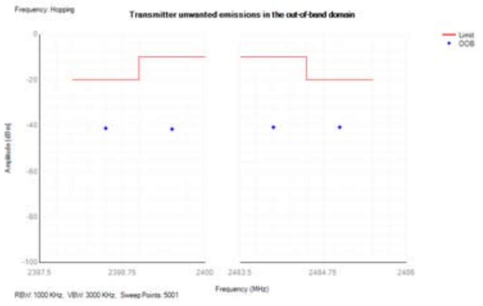
For Conducted Measurement



6.11.4Test result

Mode	Frequency (MHz)	OOB Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Verdict
1-DH5	Hopping	2399.5	-41.75	-10	Pass
1-DH5	Hopping	2398.5	-41.38	-20	Pass
1-DH5	Hopping	2484	-40.92	-10	Pass
1-DH5	Hopping	2485	-40.95	-20	Pass
1-DH5	Hopping	2399.5	-41.66	-10	Pass
1-DH5	Hopping	2398.5	-41.37	-20	Pass
1-DH5	Hopping	2484	-40.89	-10	Pass
1-DH5	Hopping	2485	-40.9	-20	Pass
3-DH5	Hopping	2399.5	-41.8	-10	Pass
3-DH5	Hopping	2398.5	-41.41	-20	Pass
3-DH5	Hopping	2484	-40.95	-10	Pass
3-DH5	Hopping	2485	-40.93	-20	Pass
3-DH5	Hopping	2399.5	-41.75	-10	Pass
3-DH5	Hopping	2398.5	-41.34	-20	Pass
3-DH5	Hopping	2484	-40.9	-10	Pass
3-DH5	Hopping	2485	-40.91	-20	Pass

Test plots at normal condition:

Condition:	Normal
CH Low (Normal Temp) 1M 	**CH High (Normal Temp) 1M** 
CH Low (Normal Temp) 3M 	**CH High (Normal Temp) 3M** 

6.12 Transmitter unwanted emissions in the spurious domain

6.12.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.10.3)

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 1.

Table 1: Transmitter limits for spurious emissions

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100KHz
47 MHz to 74 MHz	-54 dBm	100KHz
74 MHz to 87,5 MHz	-36 dBm	100KHz
87,5 MHz to 118 MHz	-54 dBm	100KHz
118 MHz to 174 MHz	-36 dBm	100KHz
174 MHz to 230 MHz	-54 dBm	100KHz
230 MHz to 470 MHz	-36 dBm	100KHz
470 MHz to 862 MHz	-54 dBm	100KHz
862 MHz to 1 GHz	-36 dBm	100KHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

6.12.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.9

Substitution method was performed to determine the actual spurious emission levels of the EUT.
The following test procedure as below:
1)Below 1GHz test procedure:

1. On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.
2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the test frequency of the transmitter. The output of the test antenna shall be connected to the measuring receiver.
3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the test frequency of the transmitter under test.
4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
5. Repeat step 4 for test frequency with the test antenna polarized horizontally.
6. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the

substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
8. Repeat step 7 with both antennas horizontally polarized for each test frequency.
9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

$$ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)$$

where:

Pg is the generator output power into the substitution antenna.

2) above 1GHz test procedure:

1.Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.

EUT Operation:

Status:	Enter test mode for the product. Test in Channel lowest (2402MHz) and highest (2480MHz); keep in continuously transmitting mode on a single Hopping Frequency. Pretest the EUT in normal mode and EDR mode, the worse case is EDR mode, compliance the worse case and reported it. Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

6.12.3 Test Setup

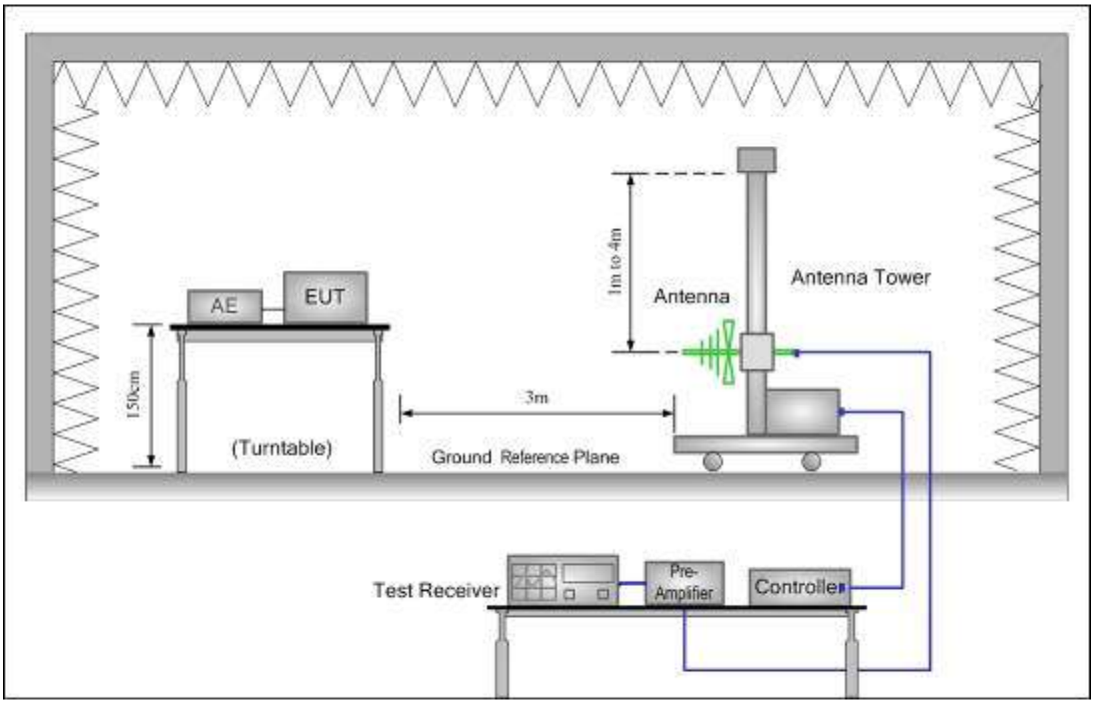


Figure 1. 30MHz to 1GHz

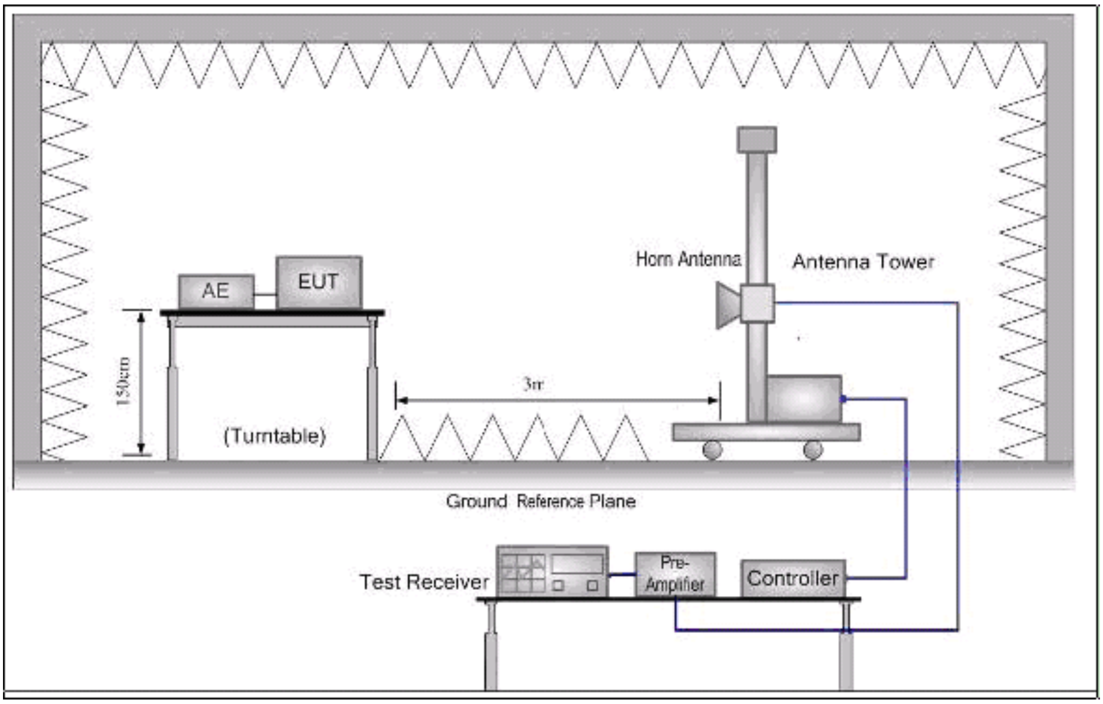


Figure 2. Above 1GHz

6.12.4 Radiated Test result

For BR Model:

1.Test in Channel lowest (2402 MHz)

below 1 GHz				
Maximum Frequency	**Spurious Emission polarization and Level**		**Limit**	**Over Limit**
MHz	**polarization**	**dBm**	**dBm**	**dB**
51.4087	Vertical	-67.31	-54.00	-13.31
203.0404	Vertical	-68.20	-54.00	-14.20
505.4236	Vertical	-65.17	-54.00	-11.17
76.0025	Horizontal	-65.60	-36.00	-29.60
310.0608	Horizontal	-65.22	-36.00	-29.22
693.9401	Horizontal	-62.35	-54.00	-8.35
Above 1 GHz				
Maximum Frequency	**Spurious Emission polarization and Level**		**Limit**	**Over Limit**
MHz	**polarization**	**dBm**	**dBm**	**dB**
4804.00	Vertical	-44.31	-30.00	-14.31
7206.00	Vertical	-45.21	-30.00	-15.21
4804.00	Horizontal	-44.82	-30.00	-14.82
7206.00	Horizontal	-43.50	-30.00	-13.50

2. Test in Channel highest (2480 MHz)

below 1 GHz				
Maximum Frequency	**Spurious Emission polarization and Level**		**Limit**	**Over Limit**
MHz	**polarization**	**dBm**	**dBm**	**dB**
59.2970	Vertical	-66.32	-54.00	-12.32
338.6588	Vertical	-63.68	-36.00	-27.68
690.4081	Vertical	-61.47	-54.00	-7.47
100.1935	Horizontal	-62.58	-54.00	-8.58
282.7267	Horizontal	-66.13	-36.00	-30.13
511.0861	Horizontal	-66.05	-54.00	-12.05
Above 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
4960.00	Vertical	-43.32	-30.00	-13.32
7440.00	Vertical	-42.95	-30.00	-12.95
4960.00	Horizontal	-41.12	-30.00	-11.12
7440.00	Horizontal	-40.48	-30.00	-10.48

Note: **Others emission at least have 20dBm margin. No recording in the test report.**

For EDR Model:

Test in Channel lowest (2402 MHz)

below 1 GHz				
Maximum Frequency	**Spurious Emission polarization and Level**		**Limit**	**Over Limit**
MHz	**polarization**	**dBm**	**dBm**	**dB**
78.2840	Vertical	-63.95	-36.00	-27.95
194.6027	Vertical	-68.48	-54.00	-14.48
693.9961	Vertical	-59.32	-54.00	-5.32
41.2791	Horizontal	-69.94	-36.00	-33.94
197.2755	Horizontal	-68.98	-54.00	-14.98
342.5490	Horizontal	-69.42	-36.00	-33.42
Above 1 GHz				
Maximum Frequency	**Spurious Emission polarization and Level**		**Limit**	**Over Limit**
MHz	**polarization**	**dBm**	**dBm**	**dB**
4804.00	Vertical	-40.95	-30.00	-10.95
7206.00	Vertical	-45.35	-30.00	-15.35
4804.00	Horizontal	-38.97	-30.00	-8.97
7206.00	Horizontal	-47.84	-30.00	-17.84

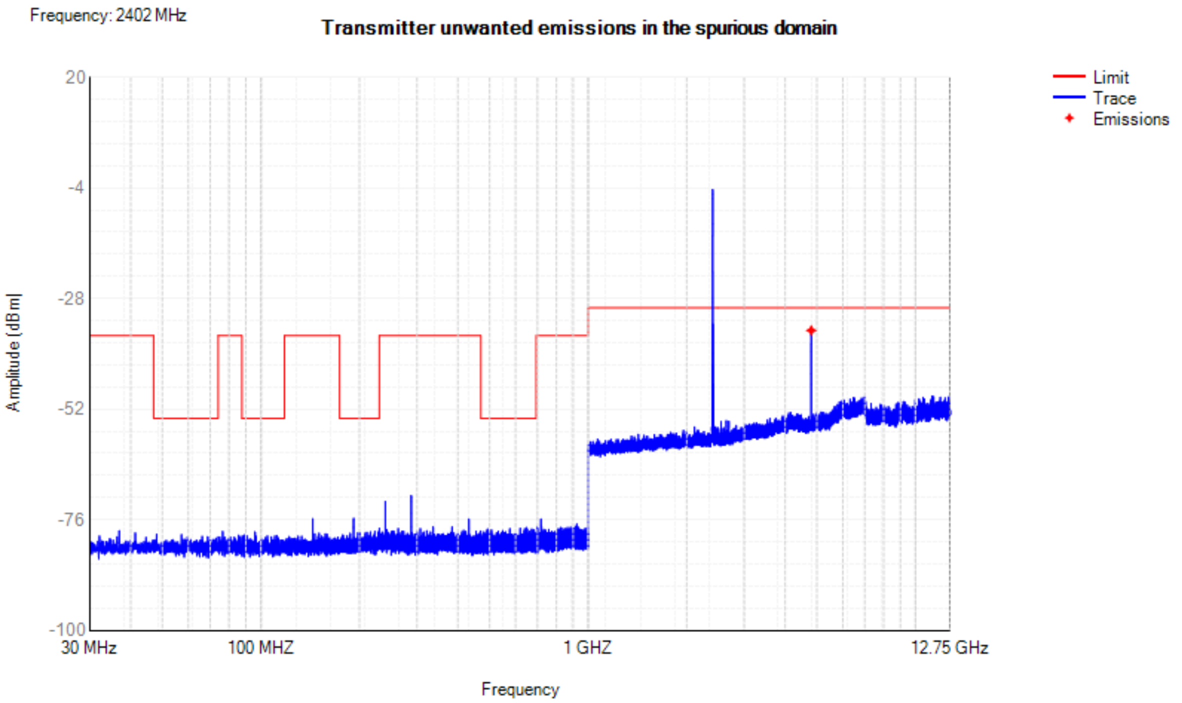
2. Test in Channel highest (2480 MHz)

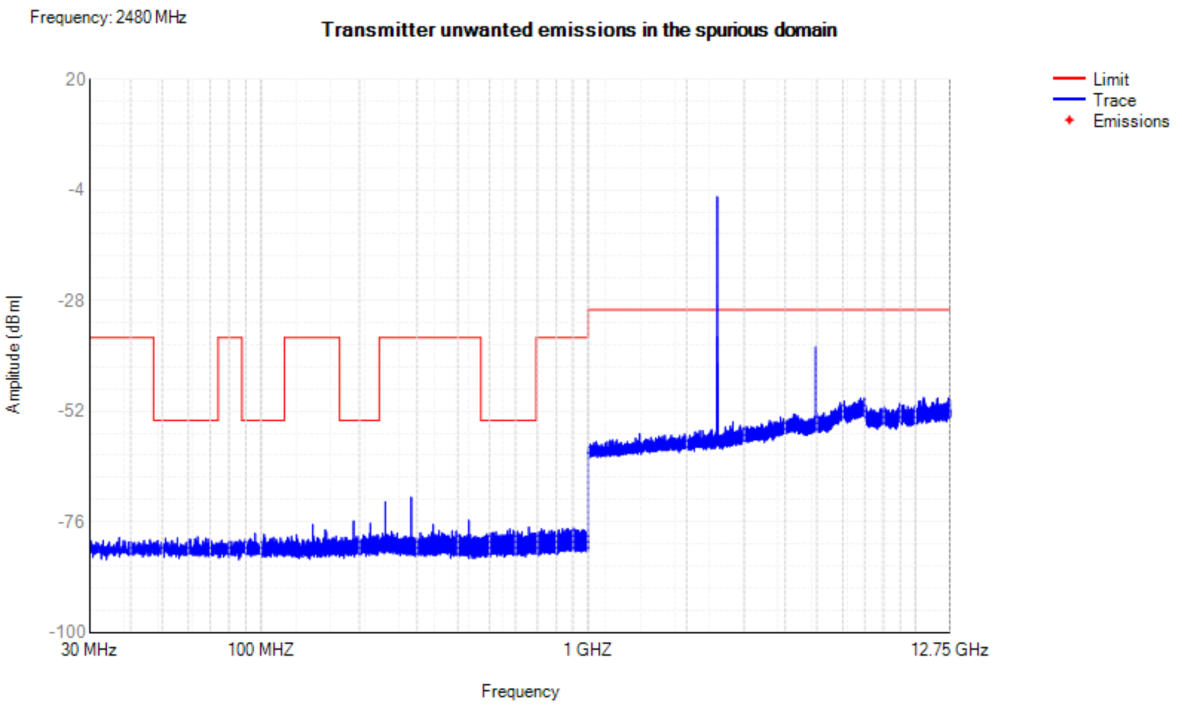
below 1 GHz				
Maximum Frequency	**Spurious Emission polarization and Level**		**Limit**	**Over Limit**
MHz	**polarization**	**dBm**	**dBm**	**dB**
84.1065	Vertical	-63.22	-36.00	-27.22
186.4990	Vertical	-68.75	-54.00	-14.75
658.6442	Vertical	-60.11	-54.00	-6.11
113.8135	Horizontal	-60.88	-54.00	-6.88
250.7701	Horizontal	-67.20	-36.00	-31.20
466.1033	Horizontal	-66.95	-36.00	-30.95
Above 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
4960.00	Vertical	-40.22	-30.00	-10.22
7440.00	Vertical	-45.49	-30.00	-15.49
4960.00	Horizontal	-39.76	-30.00	-9.76
7440.00	Horizontal	-38.78	-30.00	-8.78

Note: **Others emission at least have 20dBm margin. No recording in the test report.**

Test result(Conducted measurement)

BR Model(worst case)





6.13 Receiver spurious emissions

6.13.1 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.1.11.3)

The spurious emissions of the receiver shall not exceed the values given in table 2.

Spurious emission limits for receivers

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 1 GHz	-57 dBm	100KHz
1 GHz to 12,75 GHz	-47 dBm	1MHz

6.13.2 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.10

EUT Operation:

Status: Enter test mode for the product, Test in Channel lowest (2402MHz) and highest (2480MHz), keep in continuously receiving status.
Pre-test the EUT in AC mode and B/O mode, find worse case in B/O mode.

6.13.3 Test Setup

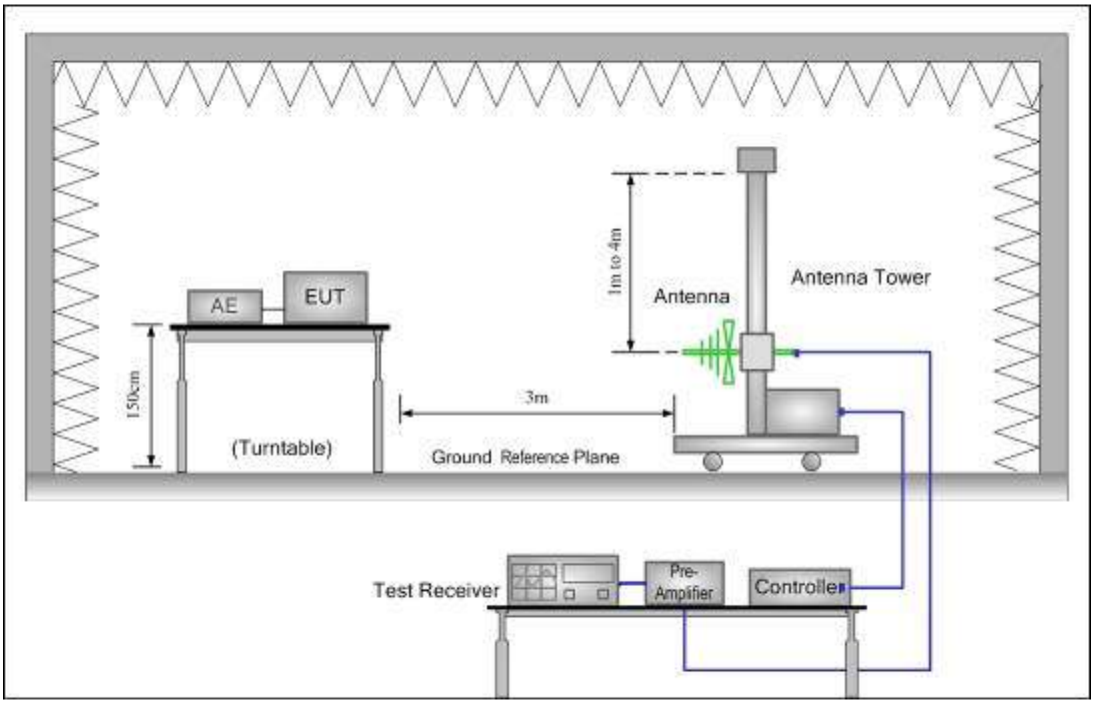


Figure 1. 30MHz to 1GHz

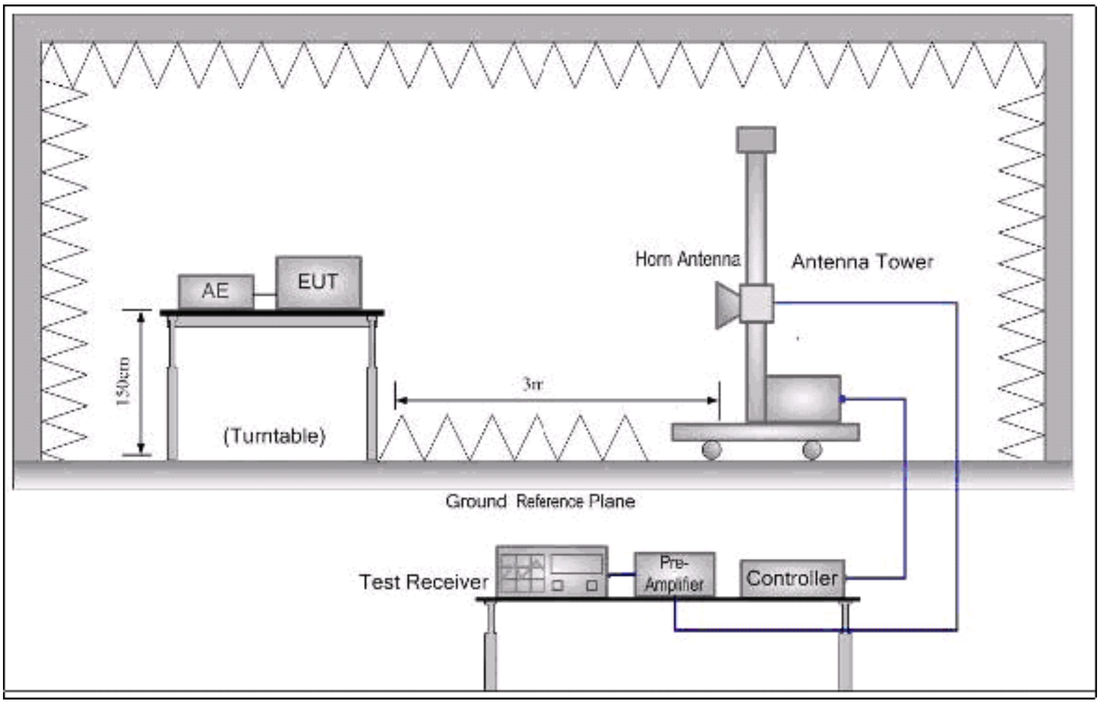


Figure 2. Above 1GHz

Test procedure:

Substitution method was performed to determine the actual spurious emission levels of the EUT. The following test procedure as below:

1)Below 1GHz test procedure:

1. On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.
2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the test frequency of the transmitter. The output of the test antenna shall be connected to the measuring receiver.
3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the test frequency of the transmitter under test.
4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
5. Repeat step 4 for test frequency with the test antenna polarized horizontally.

6. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
8. Repeat step 7 with both antennas horizontally polarized for each test frequency.
9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

$$ERP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$

where:

Pg is the generator output power into the substitution antenna.

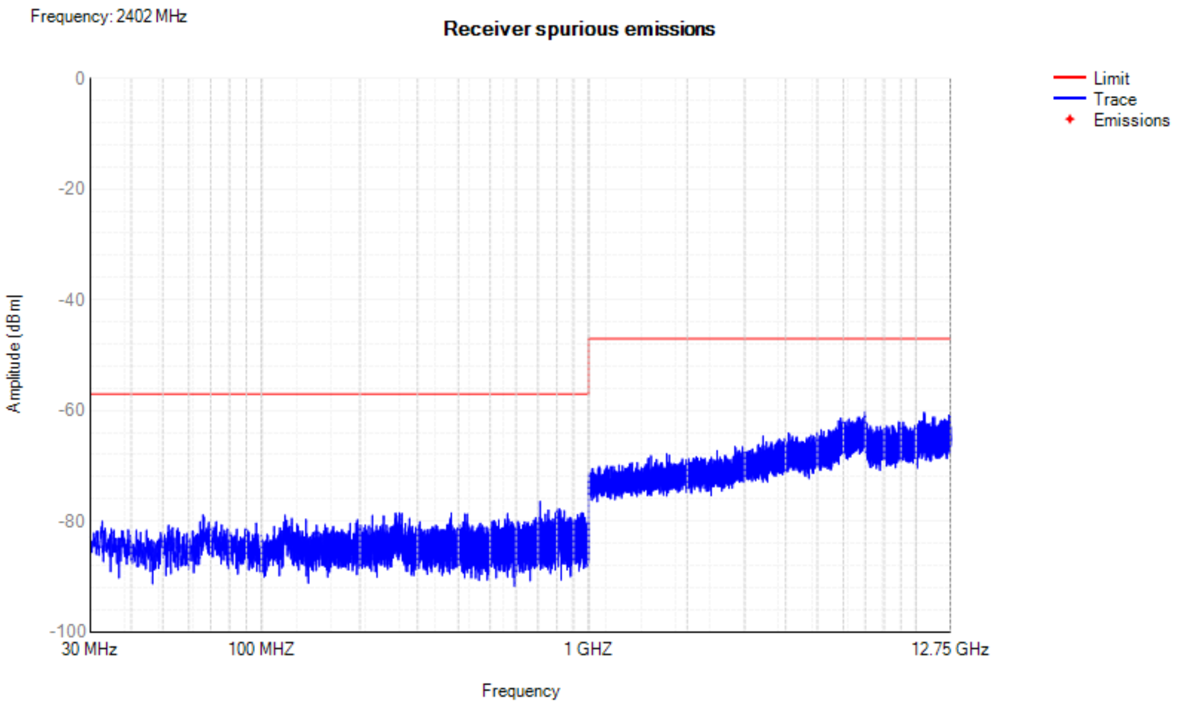
2) above 1GHz test procedure:

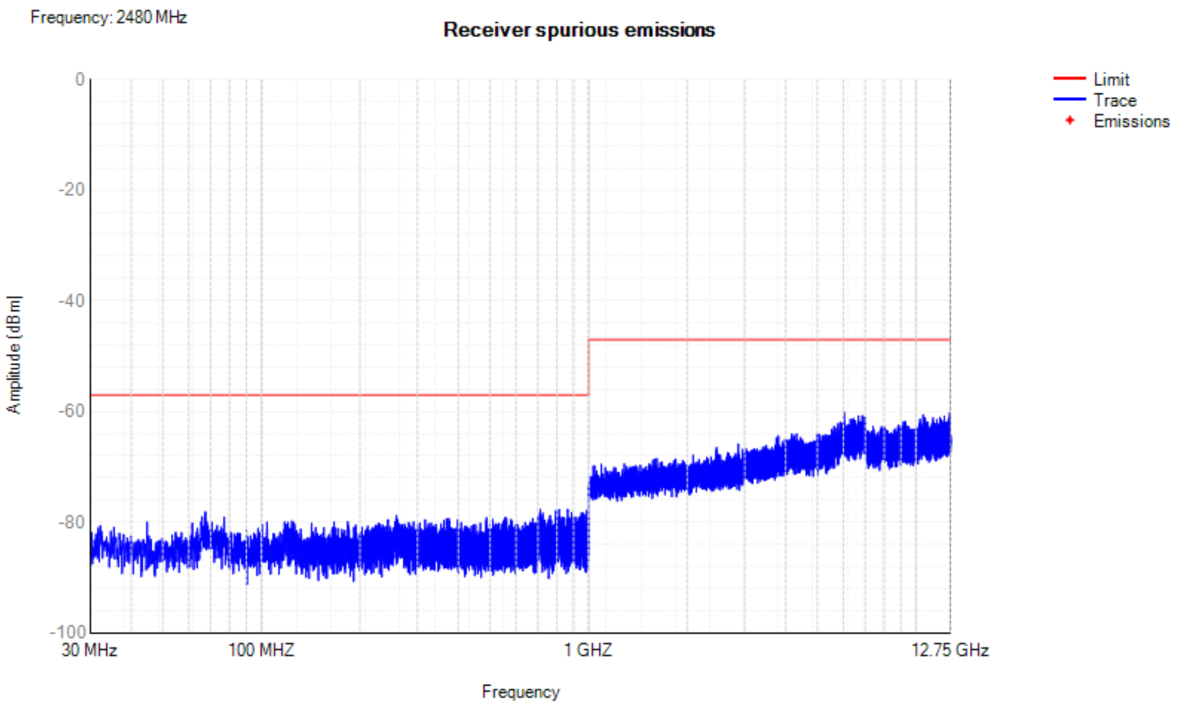
1. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.

6.13.4 Test result

below 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
84.107	Vertical	-70.82	-57.00	-13.82
469.303	Vertical	-70.74	-57.00	-13.74
477.914	Vertical	-63.59	-57.00	-6.59
113.813	Horizontal	-70.10	-57.00	-13.10
260.664	Horizontal	-70.00	-57.00	-13.00
531.933	Horizontal	-66.72	-57.00	-9.72
Above 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit	Over Limit
MHz	polarization	dBm	dBm	dB
1586.956	Vertical	-57.99	-47.00	-10.99
2730.607	Vertical	-58.61	-47.00	-11.61
4911.312	Vertical	-57.69	-47.00	-10.69
2478.788	Horizontal	-52.53	-47.00	-5.53
3252.591	Horizontal	-53.39	-47.00	-6.39
5224.647	Horizontal	-51.43	-47.00	-4.43

Test result(Conducted measurement)





6.14 Receiver Blocking

6.14.1 Performance Criteria

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment (see clause 5.4.1.t)).

6.14.2 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.2.11.4)

While maintaining the minimum performance criteria as defined in clause 4.3.1.12.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 6, table 7 or table 8.

Receiver Category 1

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log10(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log10(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Receiver Category 2

Table 7: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log10(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Receiver Category 3

Table 8: Receiver Blocking parameters receiver Category 3 equipment

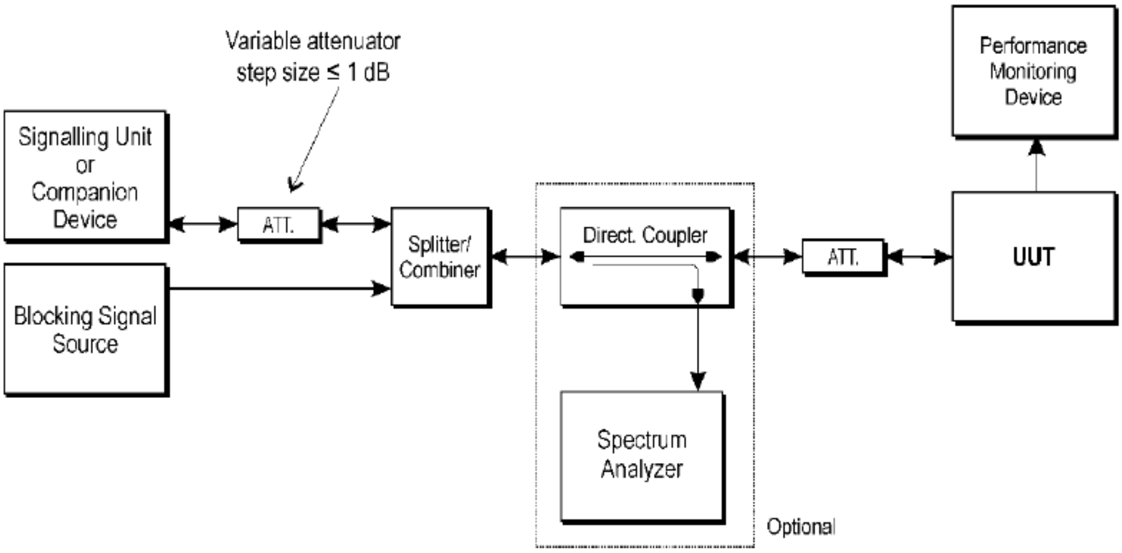
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking Signal
(-139 dBm + 10 × log10(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative the test may be performed using a wanted signal up to Pmin + 30 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

6.14.3 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.11.2

Measurement	
☒Conducted measurement	☐Radiated measurement

6.14.4 Test Setup



6.14.5Test result

Note: The power less than 10dBm, belong to category 2.

BR(GFSK):

Receiver category 2

Wanted signal mean power from companion device (dBm)Note(1)	Test Channel	Blocking signal Frequency (MHz)	Blocking signal power (dBm)	PER% Note(2)	PER Limit %
-70dB	low	2 380	-34	2.65	≤10%
	High	2 504		2.74	
	low	2 300		2.36	≤10%
	High	2 584		2.58	

NOTE 1: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Note: The above results were obtained from laboratory tests.

EDR(Pi/4-DQPSK, 8-DPSK):

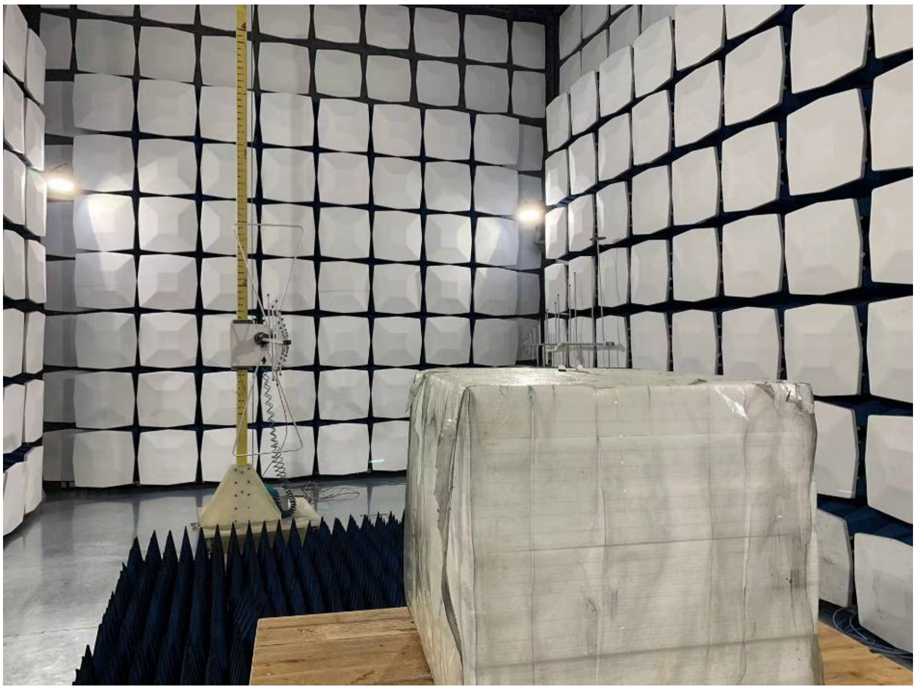
Receiver category 2

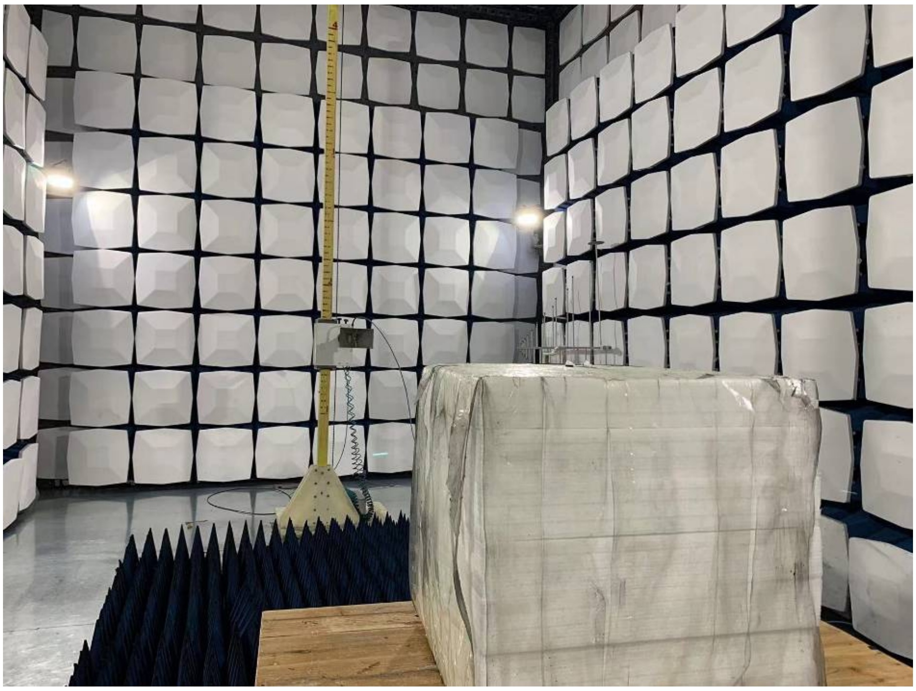
Wanted signal mean power from companion device (dBm)Note(1)	Test Channel	Blocking signal Frequency (MHz)	Blocking signal power (dBm)	PER% Note(2)	PER Limit %
-68dB	low	2 380	-34	2.19	≤10%
	High	2 504		2.65	
	low	2 300		2.38	≤10%
	High	2 584		2.41	

NOTE 1: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.
Note: The above results were obtained from laboratory tests.

7 Test Setup photograp

Spurious Emission Test Setup





**** End of report ****

Radio Test Report-BLE
ETSI EN 300 328 V2.2.2 (2019-07)

Client Information:

Applicant: Guangzhou Langston Electronic Technology Co,Ltd

Applicant add.: 5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou

Product Information:

Product Name: Bluetooth headset

Model No.: TG10

Serial Model: TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21

Brand Name: N/A

Report No.: AIT22091613W2

Prepared By:

Dongguan Yaxu (AiT) Technology Limited

No.22, Jinqianling Third Street, Jitigang, Huangjiang,Dongguan, Guangdong, China

Tel.: +86-769-8202 0499 Fax.: +86-769-8202 0495

Date of Receipt: Sep. 16, 2022 Date of Test: Sep. 16, 2022~ Sep. 21, 2022

Date of Issue: Sep. 22, 2022 Test Result: Pass

This device has been tested and found to comply with the stated standard(s), which is (are) required by the council directive of 2014/53/EU and indicated in the test report and are applicable only to the tested sample identified in the report.

Reviewed by: Simba Huang

Simba huang

Approved by: Seal. Chen

Seal.chen

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2 Test Summary

2.1 Compliance with ETSI EN 300 328 V2.2.2 (2019-07)

RADIO SPECTRUM MATTER (RSM) PART					
Test	**Test Requirement**	**Test method**	**Limit/Severity**	**Uncertainty**	**Result**
RF Output Power	EN 300 328 clause 4.3.1.2	EN 300 328 clause 5.4.2	≤20dBm	± 1.5dB	PASS
Power Spectral Density	EN 300 328 clause 4.3.2.3	EN 300 328 clause 5.4.3	10 dBm/MHz	± 3dB	PASS
Duty Cycle, Tx-sequence, Tx-gap	EN 300 328 clause 4.3.2.4	EN 300 328 clause 5.4.2	EN 300 328 clause 4.3.2.4.3	± 5 %	N/A
Medium Utilisation (MU) factor	EN 300 328 clause 4.3.2.5	EN 300 328 clause 5.4.2	EN 300 328 clause 4.3.2.5.3	±3dB	N/A
Adaptivity (adaptive equipment using modulations other than FHSS)	EN 300 328 clause 4.3.2.6	EN 300 328 clause 5.4.6	EN 300 328 clause 4.3.2.6	±3dB	PASS
Occupied Channel Bandwidth	EN 300 328 clause 4.3.2.7	EN 300 328 clause 5.4.7	Fall in band	± 5 %	PASS
Transmitter unwanted emissions in the out-of-band domain	EN 300 328 clause 4.3.2.8	EN 300 328 clause 5.4.8	figure 3	±3dB	PASS
Transmitter unwanted emission in the spurious domain	EN 300 328 clause 4.3.2.9	EN 300 328 clause 5.4.9	Table 12	± 3dB	PASS
Geo-location capability	EN 300 328 Clause 4.3.2.12.2	N/A	N/A	N/A	N/A
Radio Spectrum Matter (RSM) Part of Rx					
Test	**Test Requirement**	**Test method**	**Limit/Severity**	**Uncertainty**	**Result**
Receiver Spurious Emissions	EN 300 328 clause 4.3.2.10	EN 300 328 clause 5.4.10	Table 13	± 6dB	PASS
Receiver Blocking	EN 300 328 clause 4.3.2.11	EN 300 328 clause 5.4.11	Table 14, 15, 16	±3dB	PASS

Remark:

N/A: not applicable. Refer to the relevant section for the details.

EN 300 328: the detail version is ETSI EN 300 328 V2.2.2 (2019-07) in the whole report.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

The EUT belongs to the list of ‘Class-1’ equipment in accordance with the Commission Decision 2000/299/EC (6 April 2000).

Temperature (Uncertainty): ±1℃ Humidity (Uncertainty): ±5%

3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

.CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2017 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Aug.04, 2020

FCC-Registration No.: 703111 Designation Number: CN1313

Dongguan Yaxu (AiT) technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 6819A CAB identifier: CN0122

The 3m Semi-anechoic chamber of Dongguan Yaxu (AiT) technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 6819A

A2LA-Lab Cert. No.: 6317.01

Dongguan Yaxu (AiT) technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

3.1 Deviation from standard

None

3.2 Abnormalities from standard conditions

None

4 General Information

Manufacturer:	Dongguan Doulan Electronic Technology Co. LTD
Manufacturer Address:	No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan
EUT Name:	Bluetooth headset
Model No:	TG10
Serial Model：	TG11, G30B, T26B, TG83, TG85, TH03, TN34, TN36, TS01, TS02, TE06, TN52, TA02, TN04, i21
Brand Name:	N/A
Bluetooth version:	Bluetooth 5.3
Operation frequency:	2402 MHz to 2480 MHz
Channel Number:	40
Modulation Type:	GFSK
Modulation Technology:	DSSS
Antenna Designation	Chip antenna
Antenna Gain:	2.67dBi
H/W No.:	N/A
S/W No.:	N/A
Adapter:	N/A
Battery:	N/A
Model difference:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Note:	
1.	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

4.1 Description of Test setup

EUT was tested in normal configuration (Please See following Block diagrams)

1. Block diagram of EUT configuration (TX Mode)

EUT

4.2 EUT Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	signal cable	Remark
1	N/A	N/A	N/A	N/A	N/A	N/A

4.3 Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

5 Equipment Used during Test

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	R&S	FSV40	101470	2022.09.02	2023.09.01
2	EMI Measuring Receiver	R&S	ESR	101160	2022.09.02	2023.09.01
3	Low Noise Pre Amplifier	HP	HP8447E	AiT-F0131 9	2022.09.02	2023.09.01
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A047 38	2022.09.02	2023.09.01
5	Passive Loop	ETS	6512	00165355	2022.09.04	2024.09.03
6	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2021.08.29	2024.08.28
7	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2021.08.29	2024.08.28
8	SHF-EHF Horn Antenna 15-40GHz	SCHWARZBECK	BBHA9170	BBHA9170 367d	2020.11.24	2023.11.23
9	EMI Test Receiver	R&S	ESCI	100124	2022.09.02	2023.09.01
10	LISN	Kyoritsu	KNW-242	8-837-4	2022.09.02	2023.09.01
11	LISN	R&S	ESH3-Z2	0357.8810.54 - 101161-S2	2022.09.02	2023.09.01
12	Pro.Temp&Humi.chamber	MENTEK	MHP-150-1C	MAA08112 501	2022.09.02	2023.09.01
13	RF Automatic Test system	MW	MW100-RFCB	21033016	2022.09.02	2023.09.01
14	Signal Generator	Agilent	N5182A	MY501430 09	2022.09.02	2023.09.01
15	Wideband Radio communication tester	R&S	CMW500	1201.0002 K50	2022.09.02	2023.09.01
16	RF Automatic Test system	MW	MW100-RFCB	21033016	2022.09.02	2023.09.01
17	DC power supply	ZHAOXIN	RXN-305D-2	280700025 59	N/A	N/A
18	RE Software	EZ	EZ-EMC_RE	Ver.AIT-03 A	N/A	N/A
19	CE Software	EZ	EZ-EMC_CE	Ver.AIT-03 A	N/A	N/A
20	RF Software	MW	MTS 8310	2.0.0.0	N/A	N/A

6 Radio Technical Requirements Specification in EN 300 328

6.1 Transmitter Conditions

Item	EUT Type
1	stand-alone radio equipment with or without their own control provisions;
2	plug-in radio devices intended for use with or within a variety of host systems, e.g. personal computers, hand-held terminals, etc.;
3	plug-in radio devices intended for use within combined equipment, e.g. cable modems, set-top boxes, access points, etc.;
4	Combined equipment or a combination of a plug-in radio device and a specific type of host equipment.

Modulation
DSSS

EUT belongs to item 1 with DSSS modulation.

6.2 Test conditions

6.2.1 Normal conditions

Ambient:	Temperature:	+15°C to +35°C
	Relative humidity:	20% to 75%
	Press:	1010 mbar
Power supply:	AC:	AC 230V for adapter
	DC	3.7V

6.2.2 Extreme conditions

Ambient:	Temperature:	-20 °C to +40 °C (Which declared by manufacture)
Power supply:	DC	3.7V

6.3 Test frequencies

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

Test frequencies are the lowest channel: 0 channel(2402MHz), middle channel: 19 channel(2440 MHz) and highest channel: 39 channel(2480 MHz)

6.4 Transmitter Requirements

6.4.1 RF Output Power

Test requirement: EN 300 328 clause 4.3.2.2

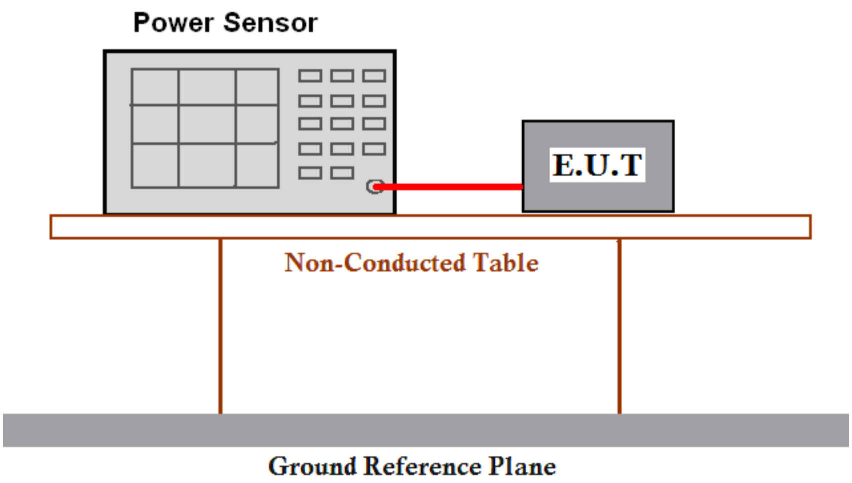
Test Method: EN 300 328 clause 5.4.2

EUT Operation:

Status: Enter test mode for the product. Test in lowest channel 2402 MHz, middle channel 2440 MHz and highest channel 2480 MHz, keep in continuously transmitting status with normal modulation.

Conducted measurement for this kind of products which be used for integral antenna equipment connect to the measuring equipment.

Test setup:



Test procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.
2. Use a fast power sensor suitable for 2, 4 GHz and capable of 1 MS/s.
3. Sample speed 1 MS/s or faster, and must represent the power of the signal.
4. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured.
5. For conducted measurements on devices with one transmit chain:

   -Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. use these stored samples in all following steps.
6. For conducted measurements on devices with multiple transmit chains:

   - Connect one power sensor to each transmit port for a synchronous measurement on all transmits ports.

-Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than half the time between two samples.

-For each instant in time, sum the power of the individual samples of all ports and store them. Use these stored samples in all following steps.

7. Find the start and stop times of each burst in the stored measurement samples.
8. Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.
9. The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.
10. Add the (stated) antenna assembly gain "G" in dBi of the individual antenna, If applicable, add the additional beamforming gain "Y" in dB.
11. If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.
12. The RF Output Power (P) shall be calculated using the formula below: P = A + G + Y
13. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

6.4.1.1 Measurement Record:

1M PHY:

TEST CONDITIONS				Total e.i.r.p (dBm)		
				CH00	CH19	CH39
T nom (°C)	25.00	V nom (V)	3.7	0.05	-0.57	-2.10
T min (°C)	-20.00	V nom (V)	3.7	0.00	-0.59	-2.14
T max (°C)	40.00	V nom (V)	3.7	0.01	-0.60	-2.13
Max e.i.r.p Power				**0.05**		
Limits				20dBm		
Result				**Complies**		

2M PHY:

TEST CONDITIONS				Total e.i.r.p (dBm)		
				CH00	CH19	CH39
T nom (°C)	25.00	V nom (V)	3.7	-0.09	-0.61	-2.19
T min (°C)	-20.00	V nom (V)	3.7	-0.14	-0.63	-2.21
T max (°C)	40.00	V nom (V)	3.7	-0.16	-0.65	-2.26
Max e.i.r.p Power				**-0.09**		
Limits				20dBm		
Result				**Complies**		

Note：Power measurement, actual measurement for 33 Burst power.

6.4.2 Power Spectral Density

Test requirement: EN 300 328 clause 4.3.2.3

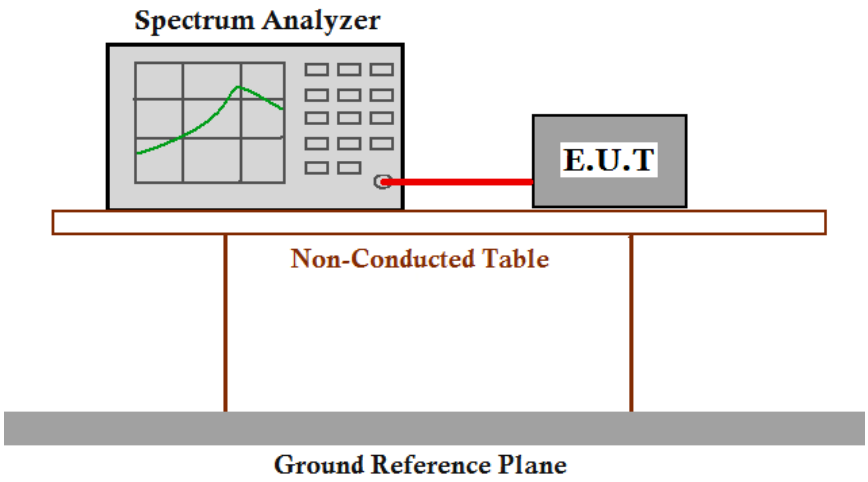
Test Method: EN 300 328 clause 5.4.3

EUT Operation:

Status: Enter test mode for the product. Test in lowest Channel 2402MHz, middle Channel 2440MHz and highest Channel 2480MHz, keep in continuously transmitting status.

Conducted measurement for this kind of products which be used for integral antenna equipment connect to the measuring equipment.

Test setup:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum.

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8 350

NOTE: For spectrum analysers not supporting this number of sweep points, the frequency band may be segmented.

- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: Auto

For non-continuous signals, wait for the trace to be completed. Save the (trace) data set to a file.

2. For conducted measurements on smart antenna systems using either operating mode 2 or 3 (see clause 5.1.3.2), repeat the measurement for each of the transmit ports. For each frequency point, add up the amplitude (power) values for the different transmit chains and use this as the new data set.
3. Add up the values for amplitude (power) for all the samples in the file.
4. Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2..
5. Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.
6. Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step 5 (i.e. sample #2 to #101).
7. Repeat step 6 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments. From all the recorded results, the highest value is the ma ximum Power Spectral Density for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report..
8. Keep the EUT in transmitting at lowest, middle and highest channel individually.

6.4.2.1 Measurement Record

Uncertainty: ± 3 Db

Antenna gain(G): 2.67dBi ; Cable loss: 0.5 Db

1M PHY:

Measurement Conditions (in Normal & Extreme)		Limit: 10dBm/MHz		
Temperature (°C)	**Voltage (V DC)**	**Lowest Frequency** 2402 MHz (dBm)	**Middle Frequency** 2440 MHz (dBm)	**Highest Frequency** 2480 MHz (dBm)
T_{nom} = +25	V_{nom} =3.7	-0.01	-0.63	-2.16

2M PHY:

Measurement Conditions (in Normal & Extreme)		Limit: 10dBm/MHz		
Temperature (°C)	**Voltage (V DC)**	**Lowest Frequency** 2402 MHz (dBm)	**Middle Frequency** 2440 MHz (dBm)	**Highest Frequency** 2480 MHz (dBm)
T_{nom} = +25	V_{nom} =3.7	-1.04	-1.57	-3.14

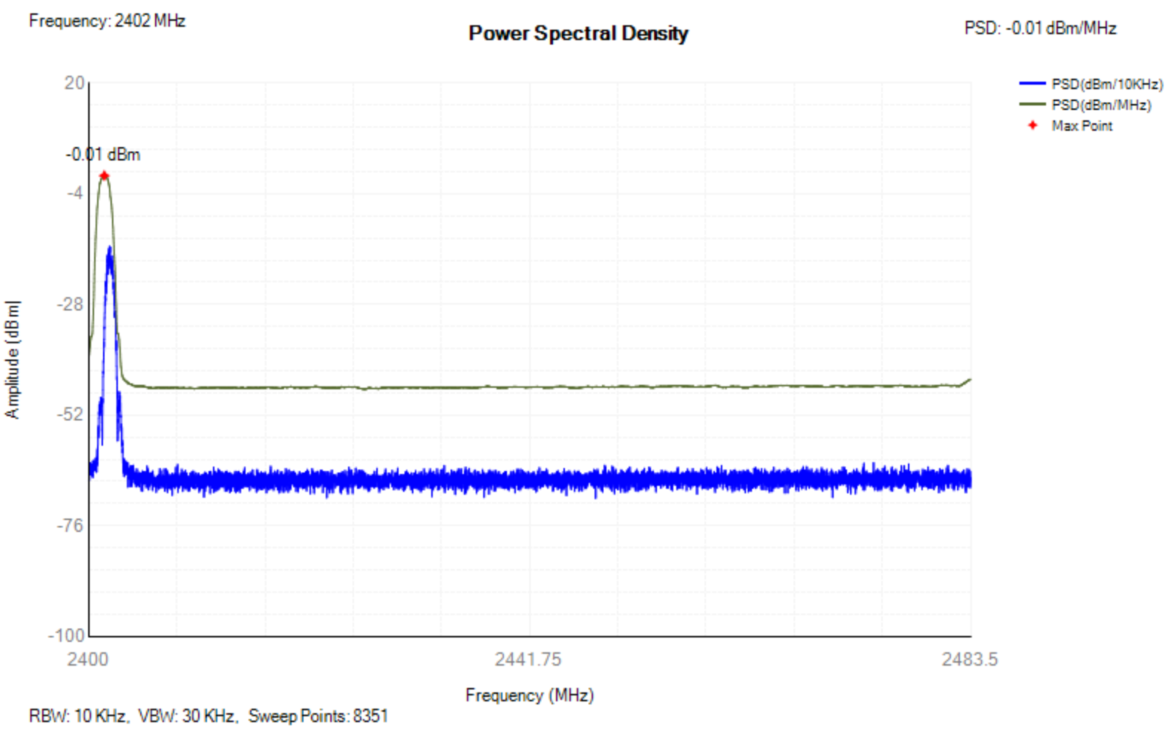
Remark:

The test only need to measure on normal conditions.

Please refer the graph as below:

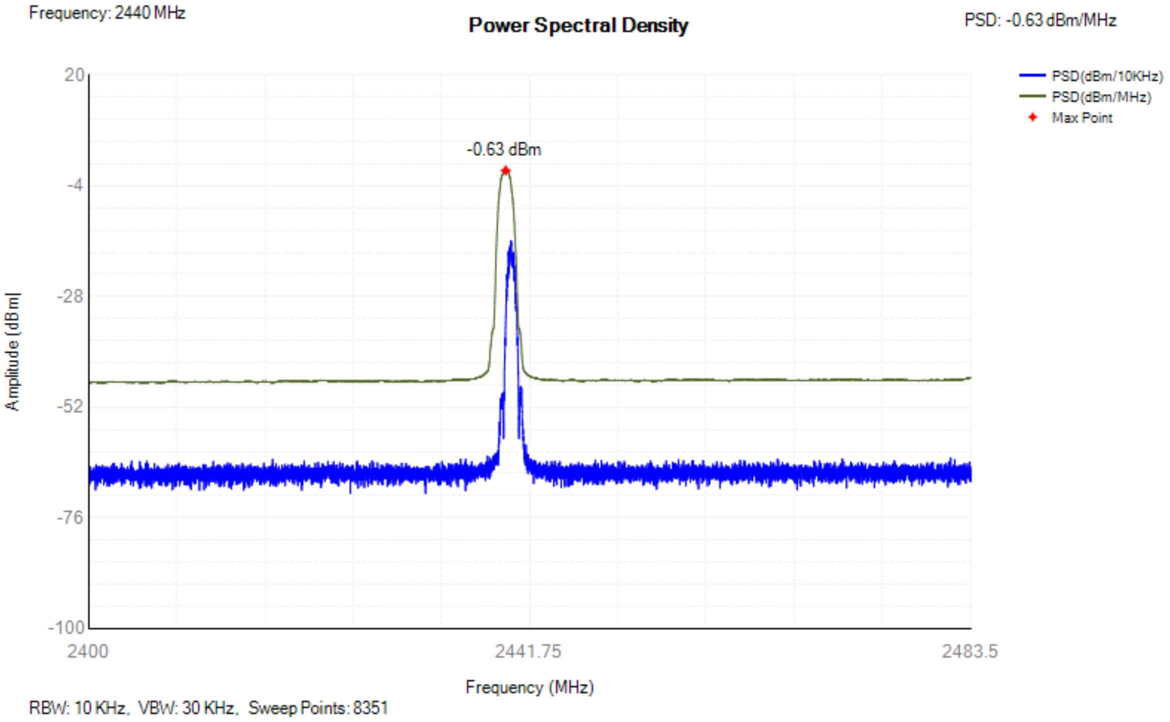
1M PHY:

CH: 2402 MHz Power Spectral Density

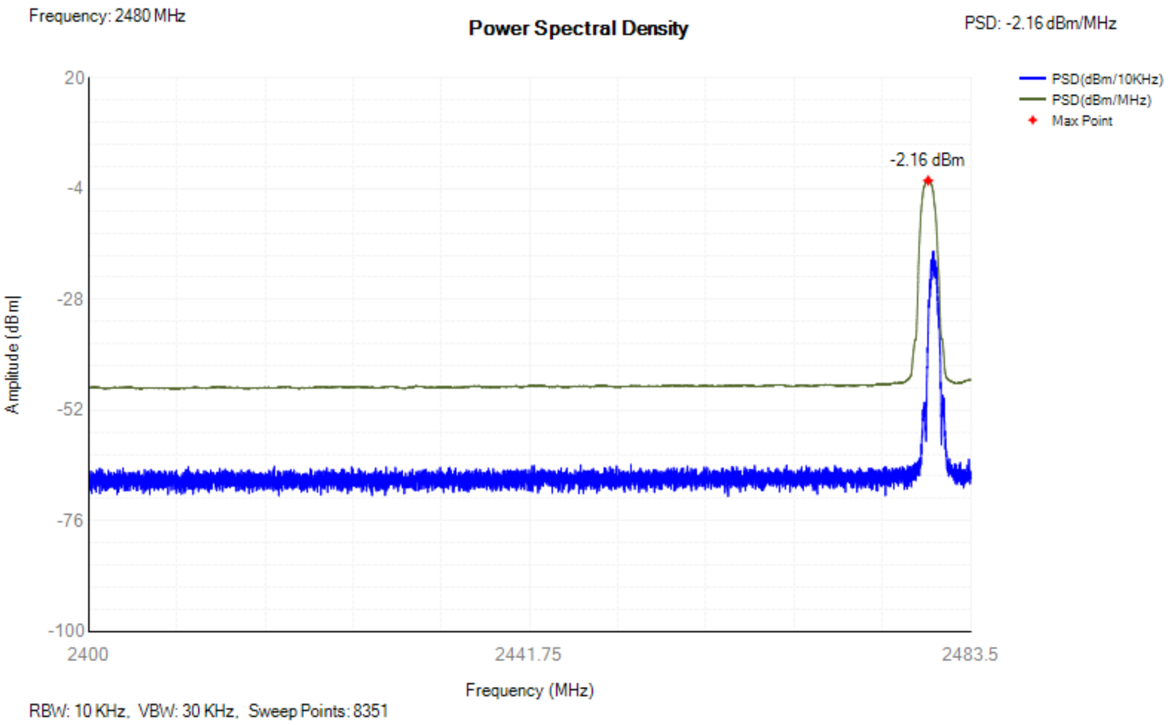


Dongguan Yaxu (AiT) Technology Limited
No.22, Jinqianling Third Street, Jitigang,
Huangjiang, Dongguan, Guangdong, China.

CH: 2440 MHz Power Spectral Density

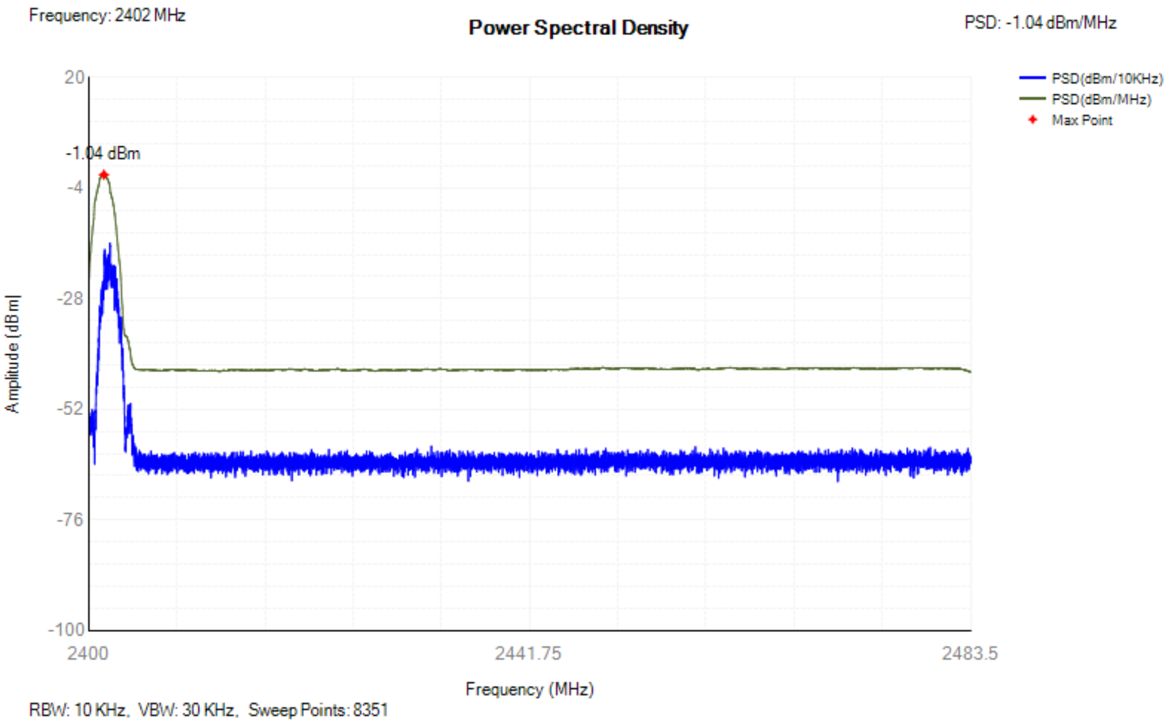


CH: 2480 MHz Power Spectral Density

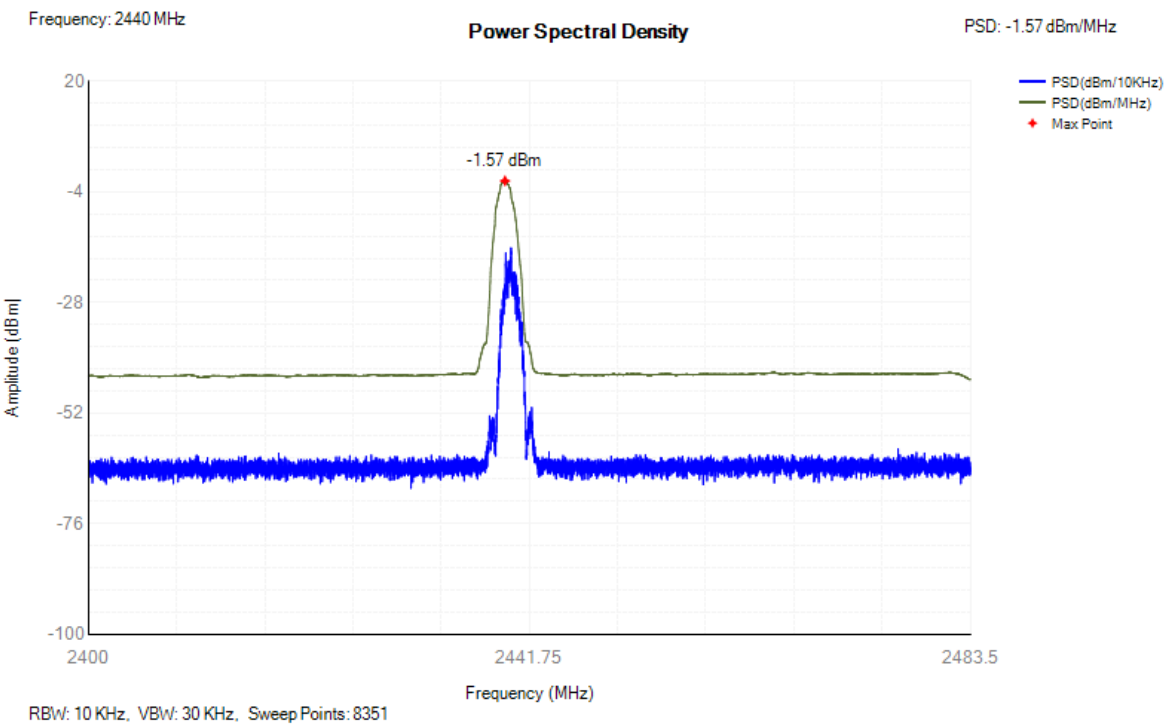


2M PHY:

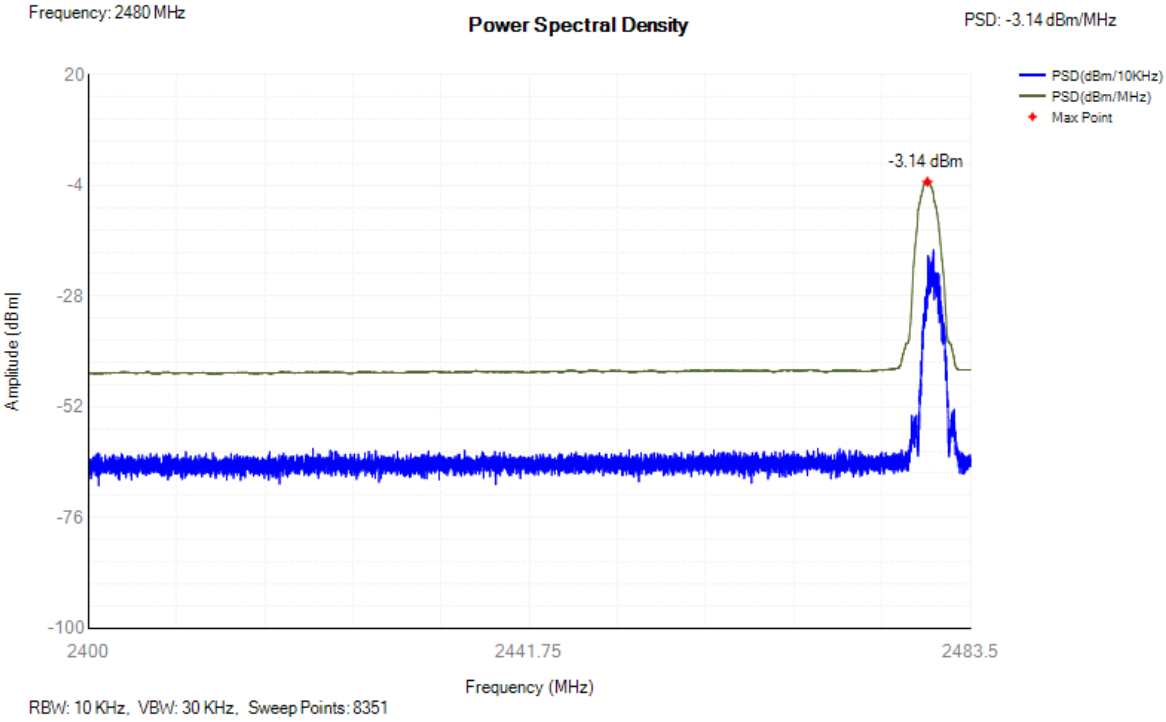
CH: 2402 MHz Power Spectral Density



CH: 2440 MHz Power Spectral Density



CH: 2480 MHz Power Spectral Density



6.4.3 Duty Cycle, Tx-sequence, Tx-gap

N/A: not applicable. Refer to the EN 300 328 clause 4.3.2.4 section for the details.
These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode.The equipment is using wide band modulations other than FHSS.

These requirements do not apply for equipment with a maximum declared RF Output power of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

As the EUT belongs to Adaptive equipment type, so the test is not applicable and skipped.

6.4.4 Medium Utilisation (MU) factor

N/A: not applicable. Refer to the EN 300 328 clause 4.3.1.6 section for the details.

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

As the EUT belongs to Adaptive equipment type, so the test is not applicable and skipped.

6.4.5 Occupied Channel Bandwidth

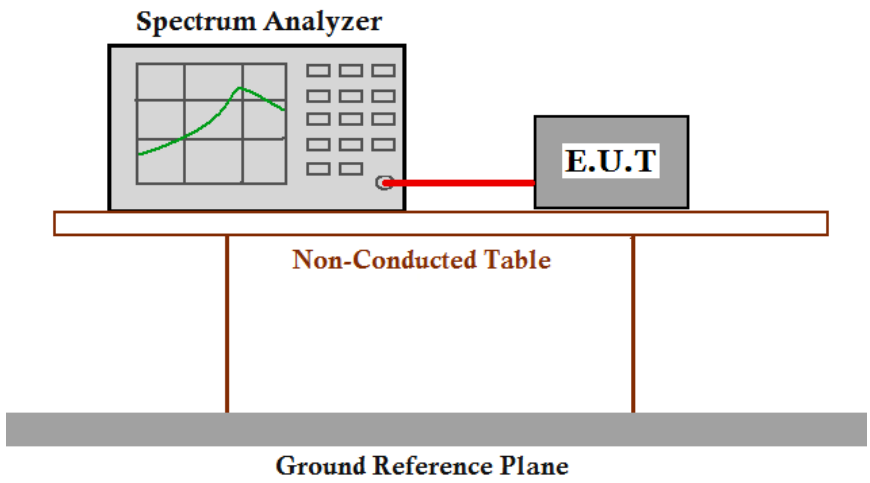
Test requirement: EN 300 328 clause 4.3.2.7

Test Method: EN 300 328 clause 5.4.7

EUT Operation:

Status: Enter test mode for the product. Test in lowest channel 2402 MHz, and highest channel 2480 MHz, keep in continuously transmitting status with normal modulation.

Test setup:



Test procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum and use the following settings:
   - Centre Frequency: The centre frequency of the channel under test
   - Resolution BW: ~ 1 % of the span without going below 1 %
   - Video BW: 3 × RBW
   - Frequency Span: 2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
   - Detector Mode: RMS
   - Trace Mode: Max Hold
2. Wait until the trace is completed, Find the peak value of the trace and place the analyser marker on this peak.
3. Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT, this value shall be recorded.

   NOTE: Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

Dongguan Yaxu (AiT) Technology Limited
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Huangjiang, Dongguan, Guangdong, China.

6.4.5.1 Measurement Record: Uncertainty: ± 5%

1M PHY:

Test Channel	Bandwidth 99%(MHz)	FL (MHz) or FH (MHz)	Lower Limit (MHz)	Higher Limit (MHz)
Lowest	1.007	2401.513	> 2400.0	N/A
Highest	1.006	2480.519	N/A	< 2483.5

2M PHY:

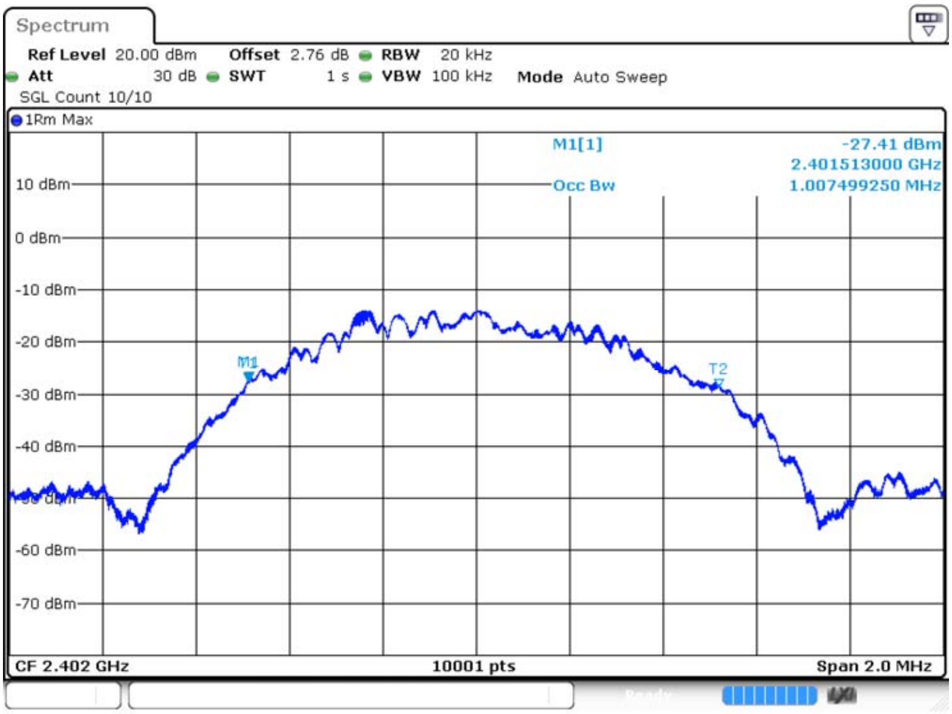
Test Channel	Bandwidth 99%(MHz)	FL (MHz) or FH (MHz)	Lower Limit (MHz)	Higher Limit (MHz)
Lowest	1.972	2401.036	> 2400.0	N/A
Highest	1.973	2481.008	N/A	< 2483.5

Remark: These measurements shall only be performed at normal test conditions.

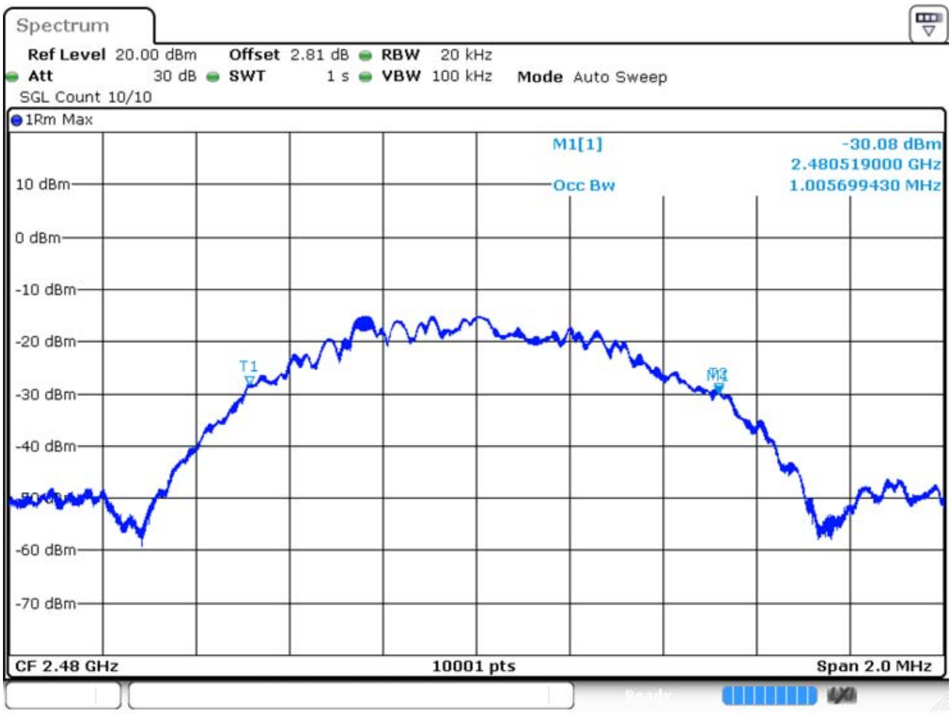
Please refer the graph as below:

1M PHY:

1. Lowest channel (2402 MHz):

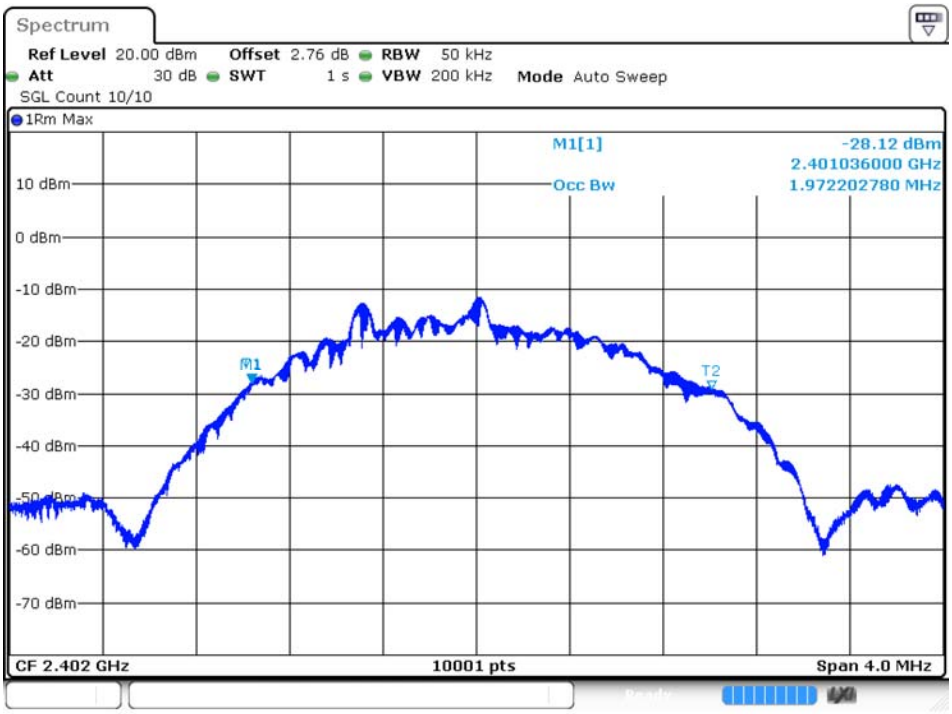


2. Highest channel (2480 MHz):

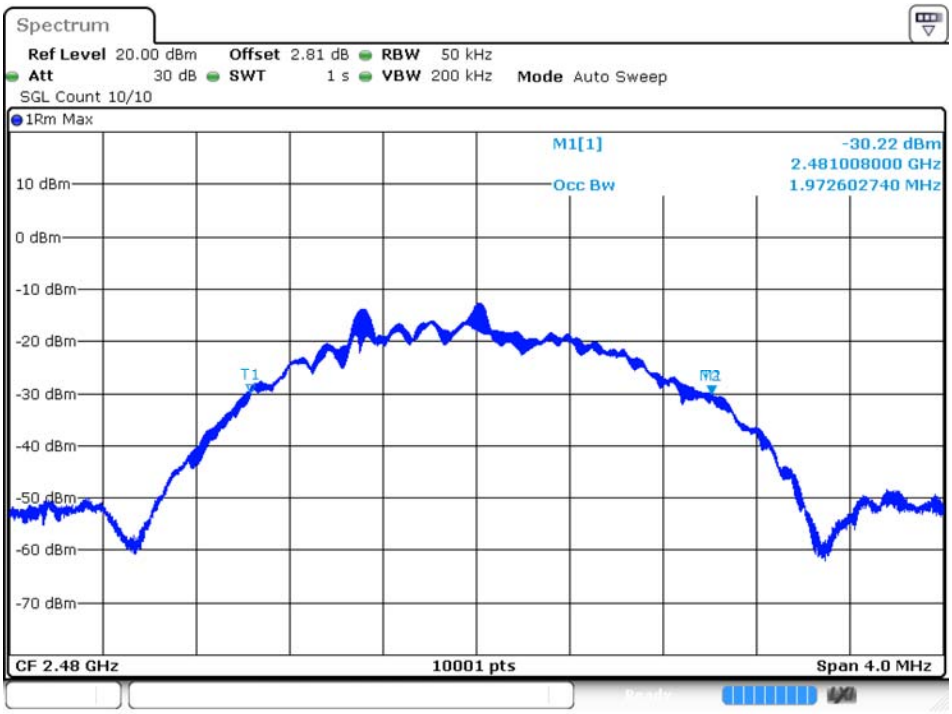


2M PHY:

1. Lowest channel (2402 MHz):



2. Highest channel (2480 MHz):



6.4.6 Transmitter unwanted emissions in the out-of-band domain

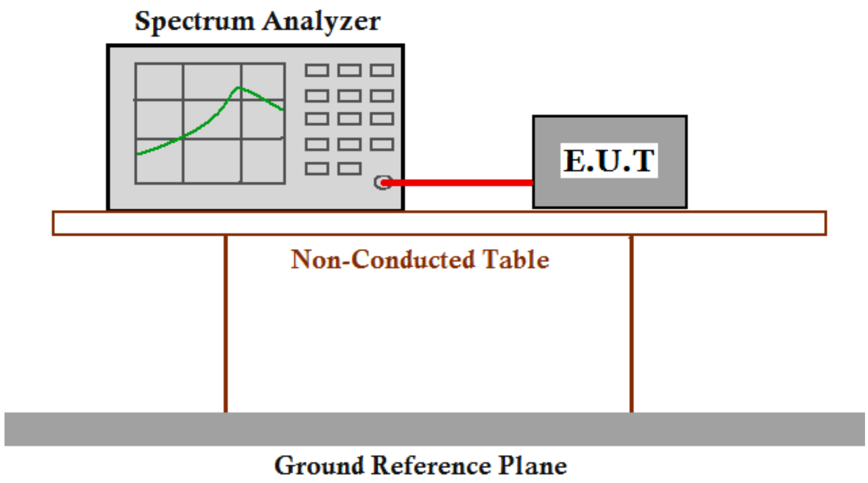
Test requirement: EN 300 328 clause 4.3.2.8

Test Method: EN 300 328 clause 5.4.8.2.1

EUT Operation:

Status: Enter test mode for the product. Test in lowest Channel 2402MHz, highest Channel 2480MHz, keep in continuously transmitting status.

Test Setup:



Test procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum and use the following settings:
   - Centre Frequency: 2 484 MHz
   - Span: 0 Hz
   - Resolution BW: 1 MHz
   - Filter mode: Channel filter
   - Video BW: 3 MHz
   - Detector Mode: RMS
   - Trace Mode: Clear / Write
   - Sweep Mode: Continuous
   - Sweep Points: 5 000
   - Trigger Mode: Video trigger

   NOTE 1: In case video triggering is not possible, an external trigger source may be used.
   - Sweep Time: Suitable to capture one transmission burst
2. segment 2 483,5 MHz to 2 483,5 MHz + BW
   - Adjust the trigger level to select the transmissions with the highest power level.
   - For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

   •Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
   - Select RMS power to be measured within the selected window and note the result which is the

RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

•Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

3. segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW

   •Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

4. segment 2 400 MHz - BW to 2 400 MHz

   •Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

5. segment 2 400 MHz - 2BW to 2 400 MHz - BW

   •Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

6. In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

   •In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

   - Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
   - Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log 10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

   NOTE 2: Ach refers to the number of active transmit chains.

   It shall be recorded whether the equipment complies with the mask provided in figures 1 or 3.

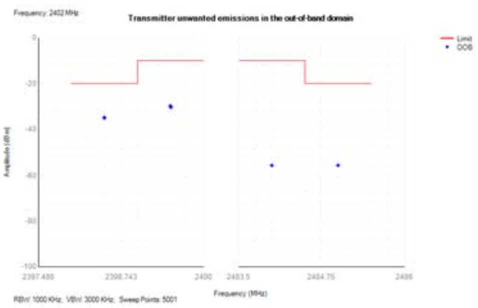
6.4.6.1 Measurement Record: Uncertainty: ± 3dB

Mode	Frequency (MHz)	OOB Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Verdict
BLE 1M	2402	2399.5	-30.45	-10	Pass
BLE 1M	2402	2399.493	-29.83	-10	Pass
BLE 1M	2402	2398.493	-35.04	-20	Pass
BLE 1M	2402	2398.486	-35	-20	Pass
BLE 1M	2402	2484	-55.6	-10	Pass
BLE 1M	2402	2485	-55.56	-20	Pass
BLE 1M	2480	2399.5	-56.23	-10	Pass
BLE 1M	2480	2398.5	-55.95	-20	Pass
BLE 1M	2480	2484	-38.33	-10	Pass
BLE 1M	2480	2484.006	-38.4	-10	Pass
BLE 1M	2480	2485.006	-42.98	-20	Pass
BLE 1M	2480	2485.012	-42.97	-20	Pass
BLE 2M	2402	2399.5	-32.53	-10	Pass
BLE 2M	2402	2398.528	-37.25	-10	Pass
BLE 2M	2402	2397.528	-41.35	-20	Pass
BLE 2M	2402	2396.556	-46.14	-20	Pass
BLE 2M	2402	2484	-55.53	-10	Pass
BLE 2M	2402	2485	-55.54	-20	Pass
BLE 2M	2480	2399.5	-56.11	-10	Pass
BLE 2M	2480	2398.5	-55.93	-20	Pass
BLE 2M	2480	2484	-40.11	-10	Pass
BLE 2M	2480	2484.973	-44.94	-10	Pass
BLE 2M	2480	2485.973	-48.4	-20	Pass
BLE 2M	2480	2486.946	-53.06	-20	Pass

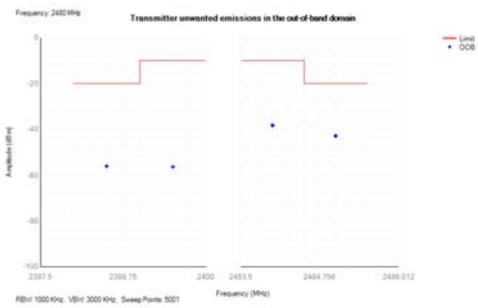
Test plots at normal condition are followed:

Condition:	Normal
1M PHY	

CH Low (Normal Temp)

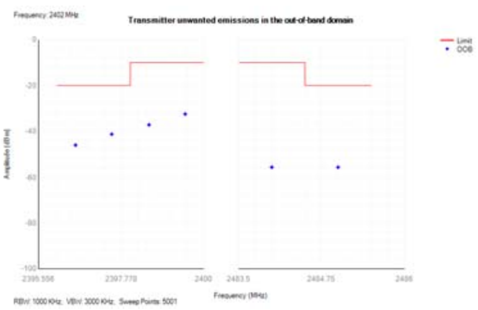


CH High (Normal Temp)

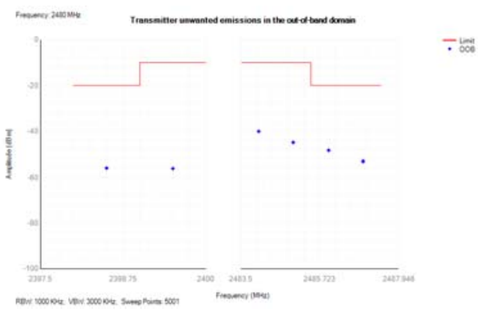


2M PHY

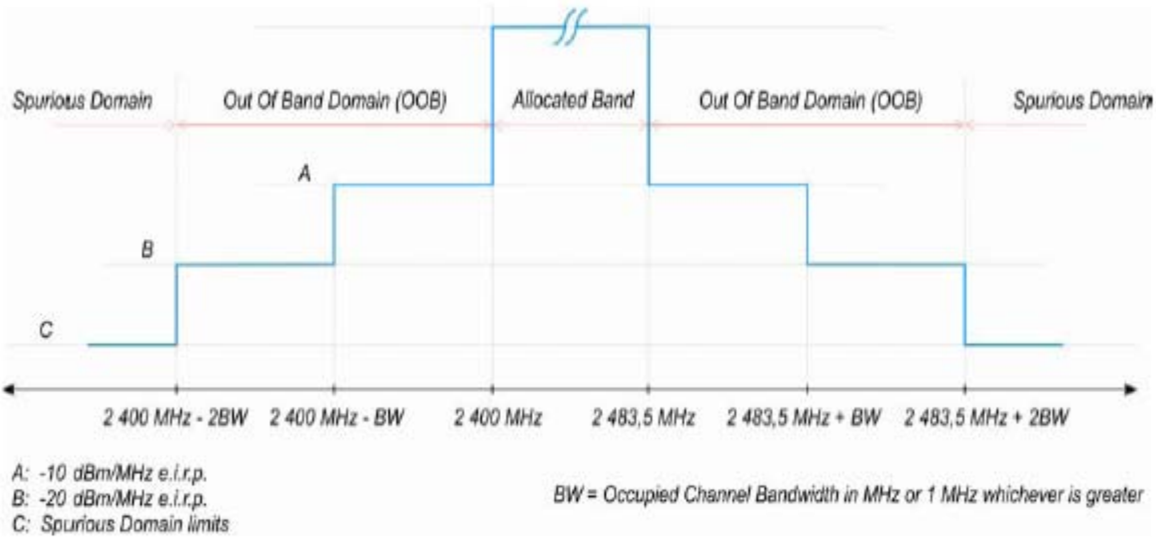
CH Low (Normal Temp)



CH High (Normal Temp)



Remark:



These measurements have to be performed at normal environmental conditions and shall be repeated at the extremes of the operating temperature range.

6.4.7 Transmitter unwanted emission in the spurious domain

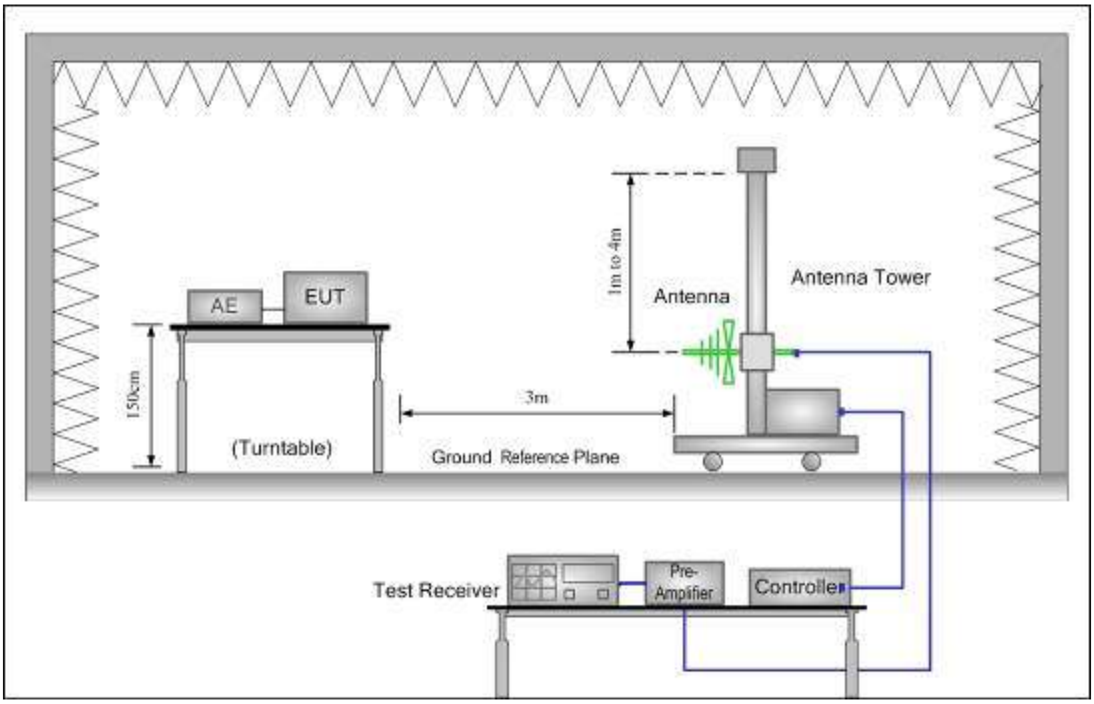
Test requirement: EN 300 328 clause 4.3.2.9

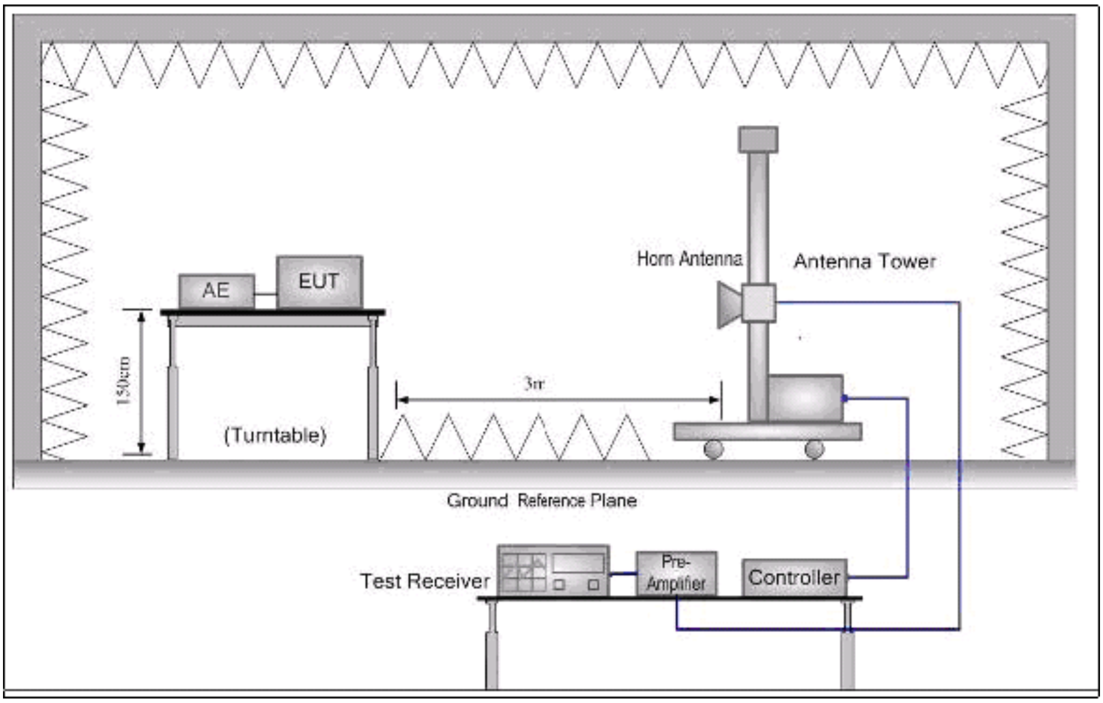
Test Method: EN 300 328 clause 5.4.9.2.2

EUT Operation:

Status: Enter test mode for the product. Test in lowest Channel 2402MHz, highest Channel 2480MHz, keep in continuously transmitting status.

Test Setup:





Test procedure:

1. Remove the antenna from the EUT and then connect a low attenuation RF cable from the antenna port to the spectrum;
2. Pre-scan

The test procedure below shall be used to identify potential unwanted emissions of the UUT.

Pre-scan: The test procedure below shall be used to identify potential unwanted emissions of the UUT.
Step 1: The sensitivity of the spectrum analyzer should be such that the noise floor is at least 12 dB below the limits given in tables 4 or 12.
Step 2: The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyzer settings :
- Resolution bandwidth : 100 kHz
- Video bandwidth : 300 kHz
- Detector mode : Peak
- Filter type : 3 dB (Gaussian)
- Trace Mode : Max Hold
- Sweep Points : ≥ 19 400

NOTE 1: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
- Sweep time:

•For non-continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT.
•For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences.
Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in tables 4 or 12.
Step 3: The emissions over the range 1 GHz to 12,75 GHz shall be identified.
Spectrum analyzer settings:
- Resolution bandwidth : 1 MHz
- Video bandwidth : 3 MHz
- Filter type : 3 dB (Gaussian)
- Detector mode : Peak
- Trace Mode : Max Hold
- Sweep Points : ≥ 23 500

NOTE 2: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
- Sweep time:

•For non-continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.
•For Frequency Hopping equipment operating in a normal operating (hopping not disabled)

mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences.

Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in tables 4 or 12.

Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.9.2.1.3.

Step 4: In case of conducted measurements on smart antenna systems (equipment with multiple transmit
chains), the steps 2 and 3 need to be repeated for each of the active transmit chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active transmit chains).

Measurement of the emissions identified during the pre-scan

Step 1: The level of the emissions shall be measured using the following spectrum analyzer settings:

- Measurement Mode : Time Domain Power
- Centre Frequency : Frequency of emission identified during the pre-scan
- Resolution Bandwidth : 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz)
- Video Bandwidth : 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz)
- Frequency Span : Zero Span
- Sweep mode : Single Sweep
- Sweep time : >120 % of the duration of the longest burst detected during the measurement of the RF Output Power
- Sweep points : Sweep time [μs] / (1 μs) with a maximum of 30 000
- Trigger : Video (burst signals) or Manual (continuous signals)
- Detector : RMS

Step 2: Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window.

If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.

Step 3: In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (Ach).

Sum the measured power (within the observed window) for each of the active transmit chains.

Step 4: The value defined in step 3 shall be compared to the limits defined in tables 4 or 12.

6.4.7.1 Measurement Record

Uncertainty: ± 3 dB

Low channel:

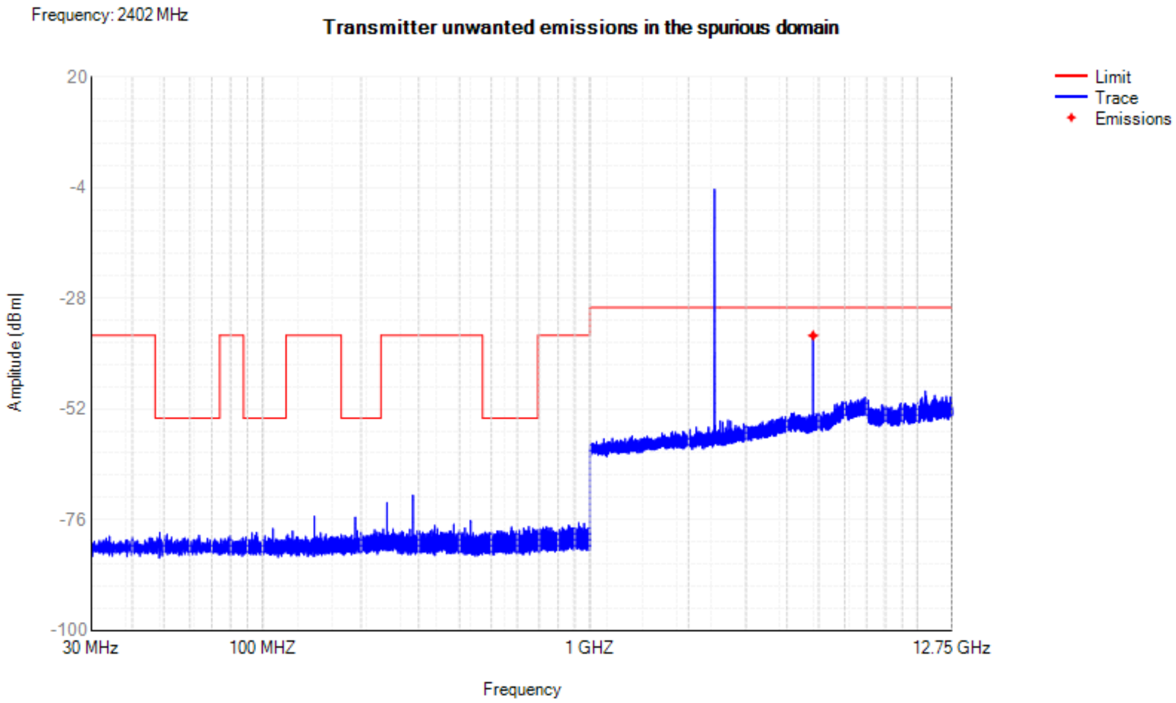
below 1 GHz				
Maximum Frequency	Test result Level		Limit of Table 1	Over Limit
MHz	polarization	dBm	dBm	dB
64.4261	Vertical	-65.68	-54.00	-11.68
324.9020	Vertical	-64.14	-36.00	-28.14
391.2779	Vertical	-67.46	-36.00	-31.46
64.5285	Horizontal	-67.04	-54.00	-13.04
305.9294	Horizontal	-65.36	-36.00	-29.36
613.5926	Horizontal	-64.00	-54.00	-10.00
Above 1 GHz				
Maximum Frequency	Test result Level		Limit of Table 1	Over Limit
MHz	polarization	dBm	-30 dBm	dB
4804.00	Vertical	-42.68	-30.00	-12.68
7206.00	V	-43.18	-30.00	-13.18
9608.00	V	-47.11	-30.00	-17.11
4804.00	Horizontal	-44.94	-30.00	-14.94
7206.00	H	-43.83	-30.00	-13.83
9608.00	H	-43.06	-30.00	-13.06

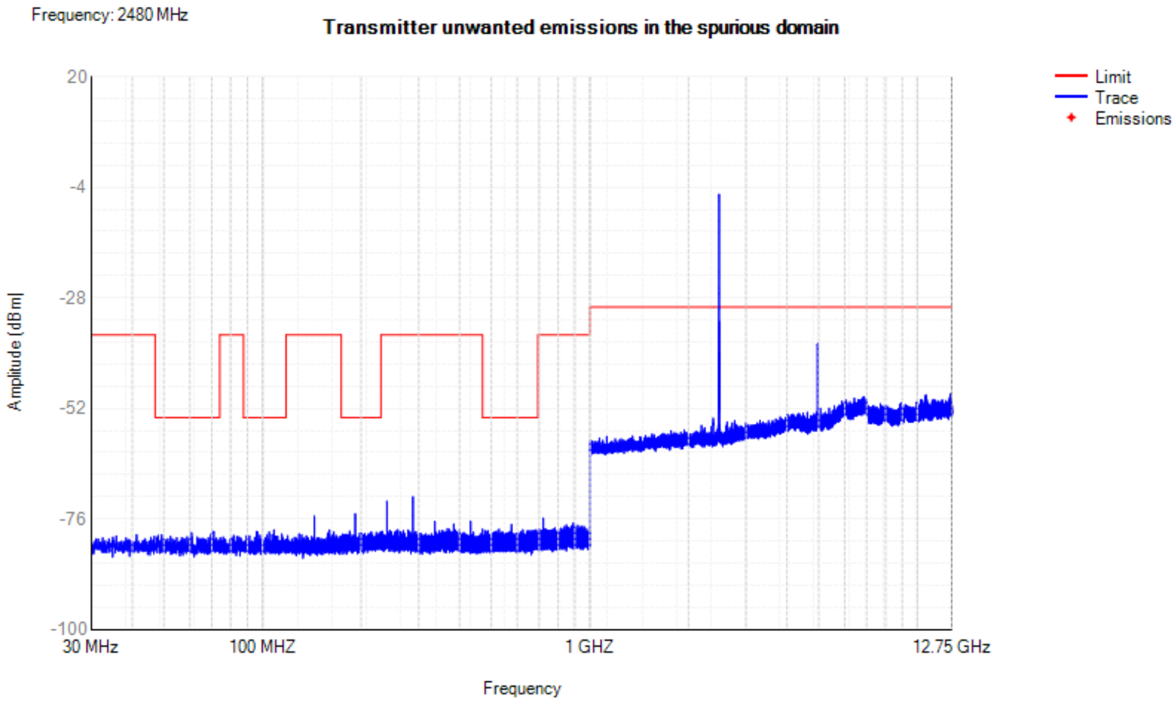
High channel:

below 1 GHz				
Maximum Frequency	Test result Level		Limit of Table 1	Over Limit
MHz	polarization	dBm	dBm	dB
88.1888	Vertical	-62.71	-54.00	-8.71
327.1396	Vertical	-64.07	-36.00	-28.07
510.1442	Vertical	-65.08	-54.00	-11.08
42.6455	Horizontal	-69.77	-36.00	-33.77
261.9326	Horizontal	-66.83	-36.00	-30.83
521.2464	Horizontal	-65.85	-54.00	-11.85
Above 1 GHz				
Maximum Frequency	Test result Level		Limit of Table 1	Over Limit
MHz	polarization	dBm	-30 dBm	dB
4880.00	Vertical	-39.71	-30.00	-9.71
7320.00	V	-43.14	-30.00	-13.14
9760.00	V	-44.73	-30.00	-14.73
4880.00	Horizontal	-47.67	-30.00	-17.67
7320.00	H	-44.56	-30.00	-14.56
9760.00	H	-44.91	-30.00	-14.91

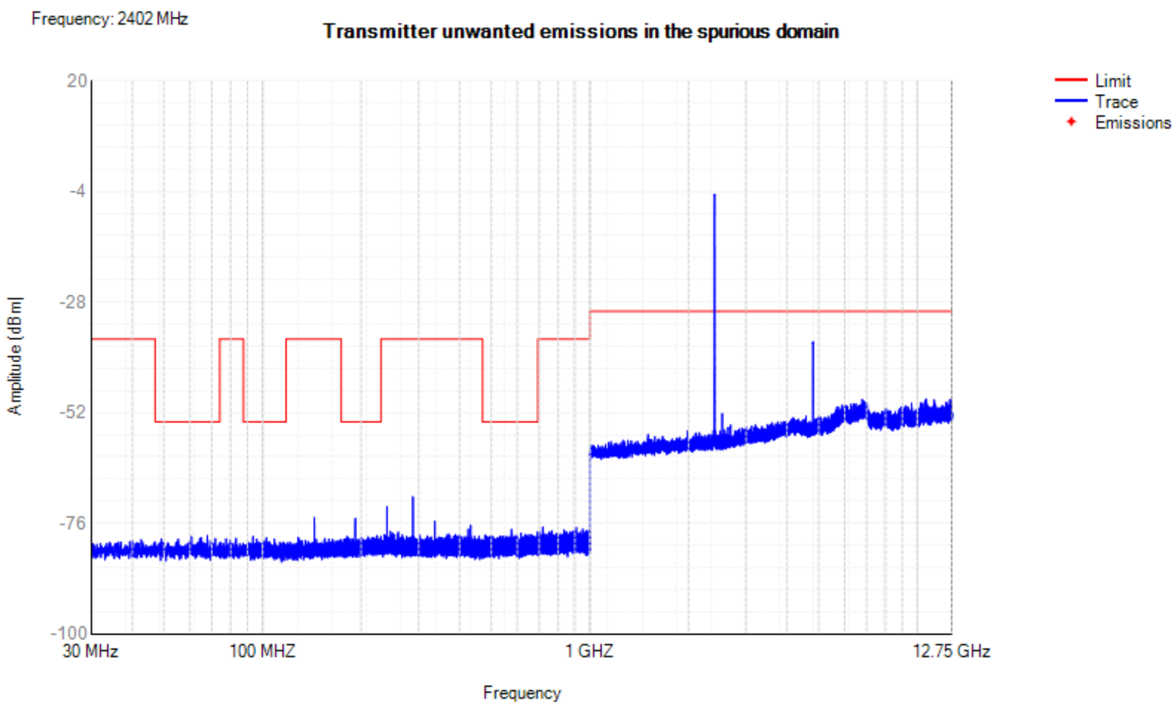
Test result(Conducted measurement)

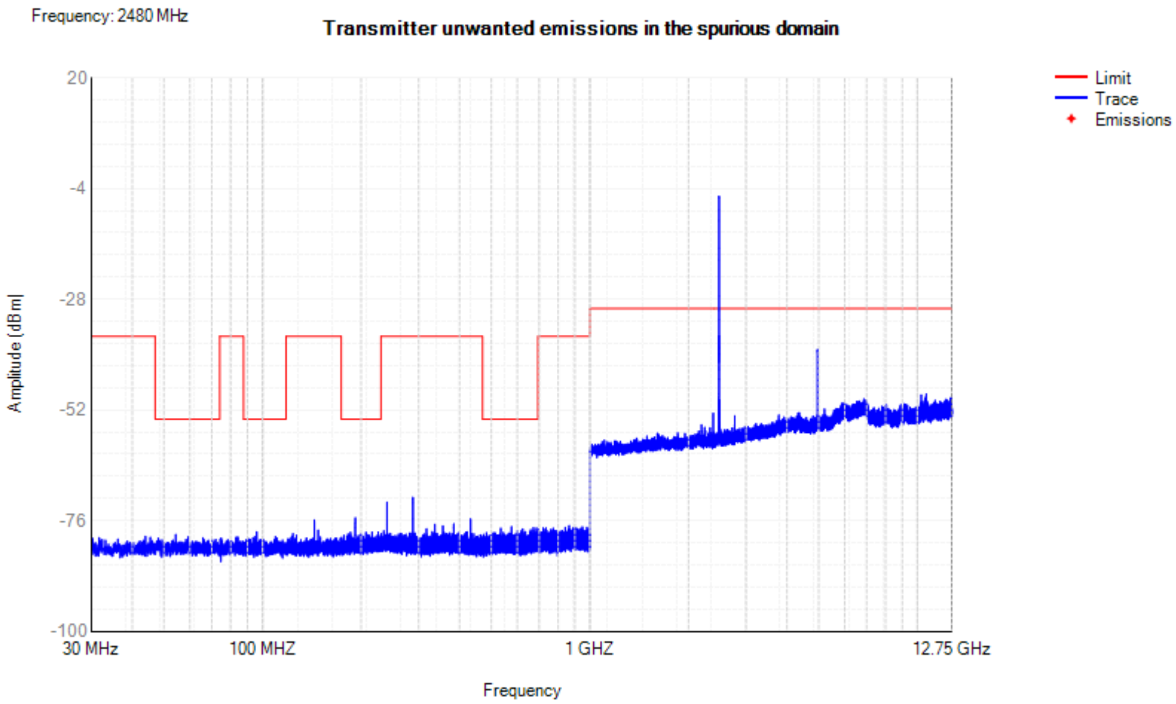
1M PHY:





2M PHY:


Frequency: 2402 MHz
Transmitter unwanted emissions in the spurious domain
Limit
Trace
Emissions
Amplitude [dBm]
20
-4
-28
-52
-76
-100
30 MHz
100 MHZ
1 GHZ
12.75 GHz
Frequency


Frequency: 2480 MHz
Transmitter unwanted emissions in the spurious domain
Limit
Trace
Emissions
Amplitude [dBm]
20
-4
-28
-52
-76
-100
30 MHz
100 MHZ
1 GHZ
12.75 GHz
Frequency

Remark:

Table 1: Transmitter limits for spurious emissions

Frequency range	Maximum power, e.r.p.(≦1 GHz) e.i.r.p(>1 GHz)	Measurement bandwidth
30 MHz to 47 MHz 74 MHz to 87,5 MHz 118 MHz to 174 MHz 230 MHz to 470 MHz 694 MHz to 1 GHz	-36 dBm	100 KHz
47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 694 MHz	-54 dBm	100 KHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

6.5 Receiver Requirements

6.5.1 Receiver Spurious Emissions

Test requirement: EN 300 328 clause 4.3.2.10

Test Method: EN 300 328 clause 5.4.10.2.2

EUT Operation:

Status: Enter test mode for the product, Test in Channel lowest (2402MHz) and highest (2480MHz), keep in continuously receiving status.

Test Setup:

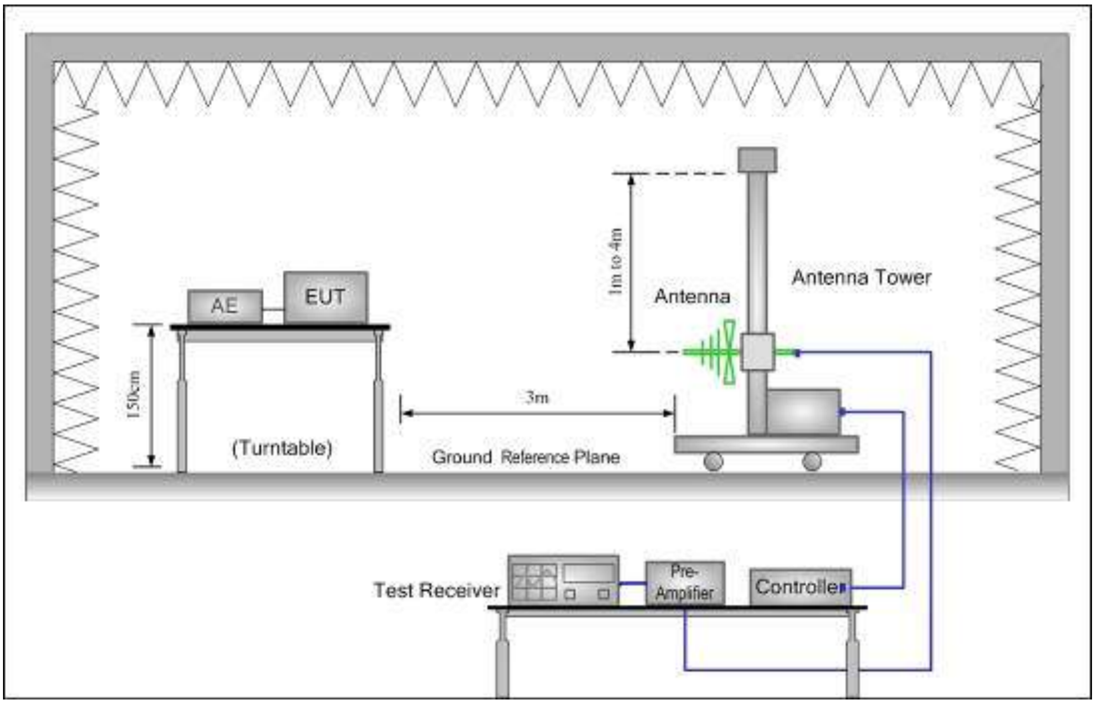


Figure 1. 30MHz to 1GHz

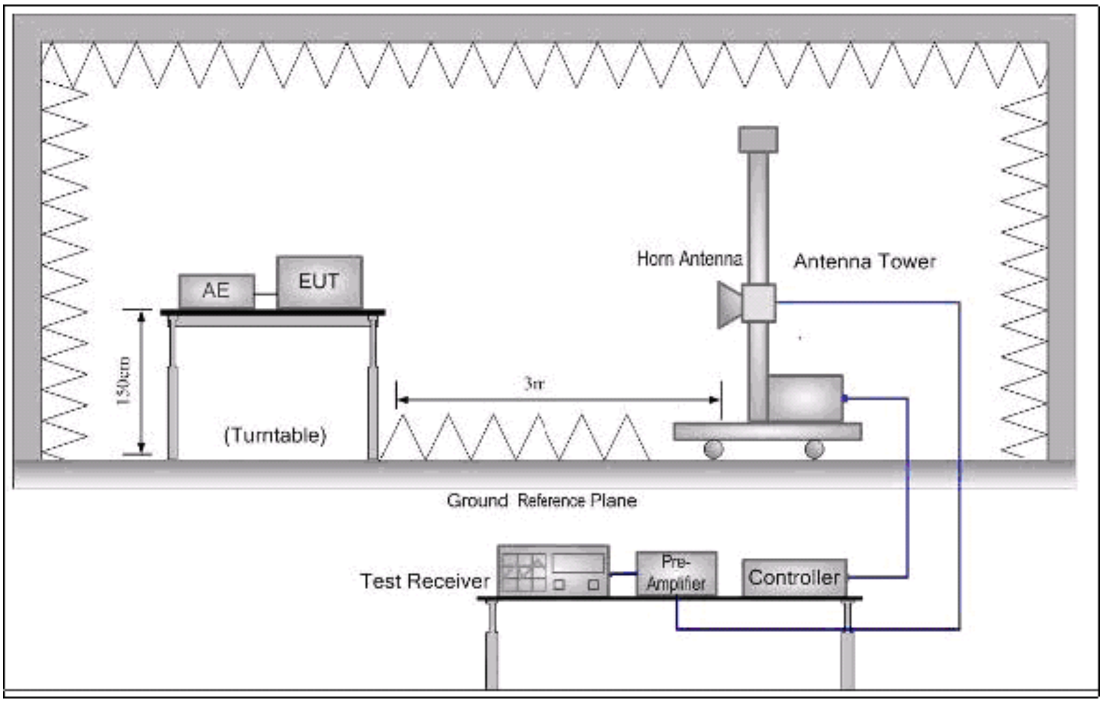


Figure 2. Above 1GHz

Test procedure:

Substitution method was performed to determine the actual spurious emission levels of the EUT.

The following test procedure as below:

1)Below 1GHz test procedure:

1. On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.
2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the test frequency of the transmitter. The output of the test antenna shall be connected to the measuring receiver.
3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the test frequency of the transmitter under test.
4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
5. Repeat step 4 for test frequency with the test antenna polarized horizontally.

6. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
8. Repeat step 7 with both antennas horizontally polarized for each test frequency.
9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

$$ERP(dBm) = Pg(dBm) – cable\ loss\ (dB) + antenna\ gain\ (dBd)$$

where:

Pg is the generator output power into the substitution antenna.

2) above 1GHz test procedure:

1. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.

6.5.1.1 Measurement Record Uncertainty: ± 5 dB

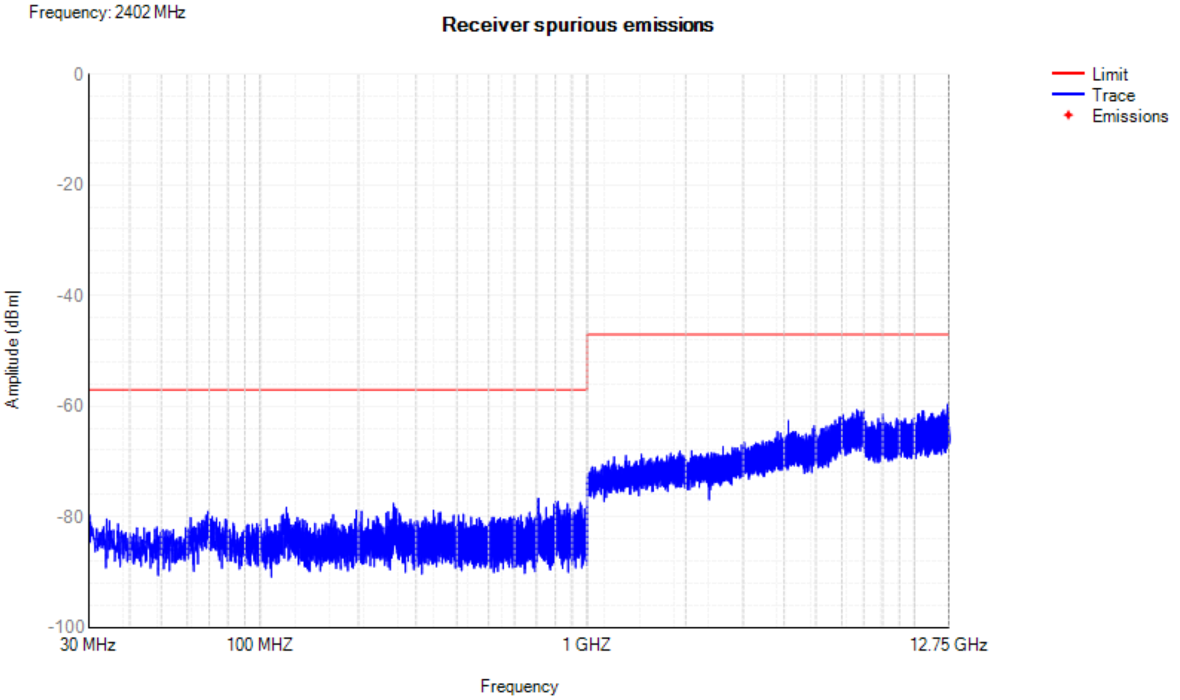
Low channel:

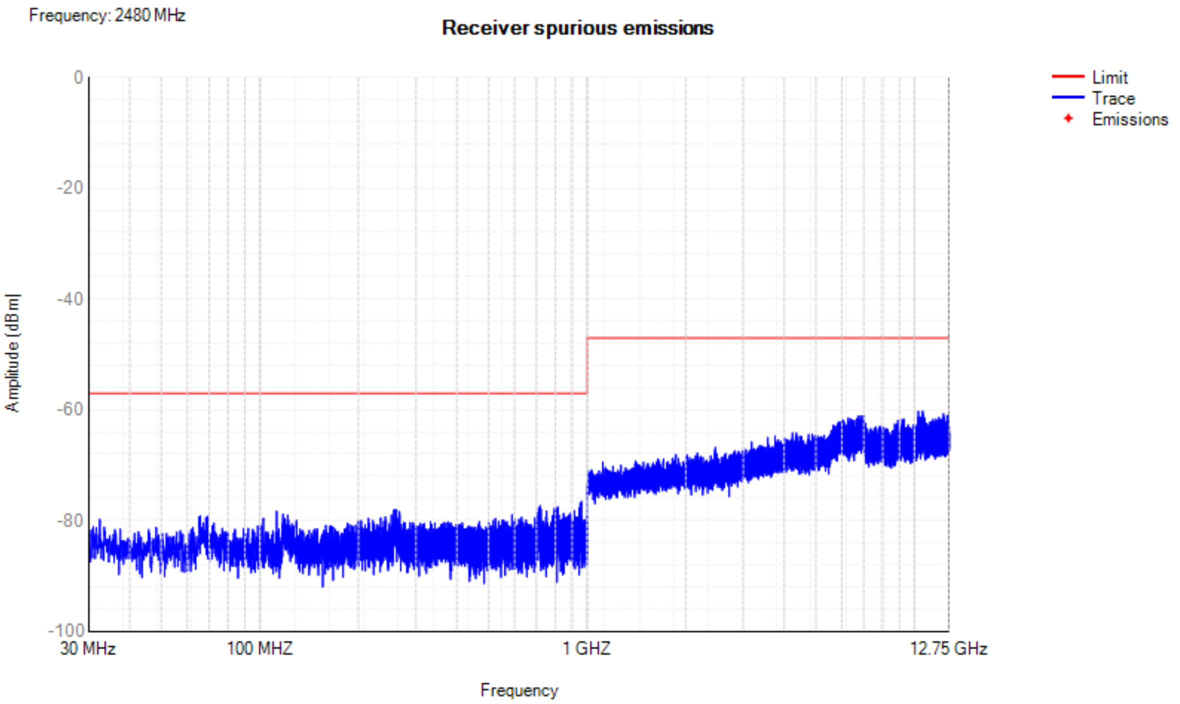
below 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit of Table 2	Over Limit
MHz	polarization	dBm	dBm	dB
88.189	Vertical	-70.57	-57.00	-13.57
287.481	Vertical	-68.39	-57.00	-11.39
500.913	Vertical	-66.08	-57.00	-9.08
42.646	Horizontal	-74.55	-57.00	-17.55
301.011	Horizontal	-69.81	-57.00	-12.81
502.678	Horizontal	-66.16	-57.00	-9.16
Above 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit of Table 2	Over Limit
MHz	polarization	dBm	dBm	dB
2641.585	Vertical	-52.71	-47.00	-5.71
3155.334	Vertical	-54.37	-47.00	-7.37
5009.487	Vertical	-55.73	-47.00	-8.73
1849.770	Horizontal	-60.67	-57.00	-3.67
2871.231	Horizontal	-57.21	-47.00	-10.21
5000.612	Horizontal	-55.91	-47.00	-8.91

High channel:

below 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit of Table 2	Over Limit
MHz	polarization	dBm	dBm	dB
49.011	Vertical	-73.01	-57.00	-16.01
473.143	Vertical	-70.83	-57.00	-13.83
536.009	Vertical	-63.54	-57.00	-6.54
65.814	Horizontal	-73.10	-57.00	-16.10
362.581	Horizontal	-67.32	-57.00	-10.32
622.771	Horizontal	-65.32	-57.00	-8.32
Above 1 GHz				
Maximum Frequency	Spurious Emission polarization and Level		Limit of Table 2	Over Limit
MHz	polarization	dBm	dBm	dB
1662.143	Vertical	-57.61	-47.00	-10.61
2667.744	Vertical	-59.24	-47.00	-12.24
5263.235	Vertical	-50.66	-47.00	-3.66
1428.982	Horizontal	-57.78	-47.00	-10.78
3370.028	Horizontal	-52.22	-47.00	-5.22
5084.760	Horizontal	-54.22	-47.00	-7.22

Test result(Conducted measurement)





Remark:

Table 2: Spurious emission limits for receivers

Frequency range	**Maximum power e.r.p.(≦1 GHz) e.i.r.p(>1 GHz)**	**Measurement bandwidth**
30 MHz to 1 GHz	-57 dBm	100 KHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

-70dBm or -120dBm/Hz is the minimum level can be detected by measuring receiver when below 1GHz, -60dBm or -110dBm/Hz at over 1GHz.

6.6 Adaptivity

Test Requirement:	EN 300 328 Clause 4.3.2.6					
Test Method:	EN 300 328 Clause 5.4.6					
EUT Operation:						
Ambient:	Temp.: 26	°C	Humid.: 52	%	Press.: 1010	mbar
Test Status:	1) Keep the EUT operating at the lowest and the highest frequency. The measurement shall be performed during normal operation 2) Test EUT in normal conditions.					
Equipment Used:	Refer to section 5 for details.					
Test Setup:						

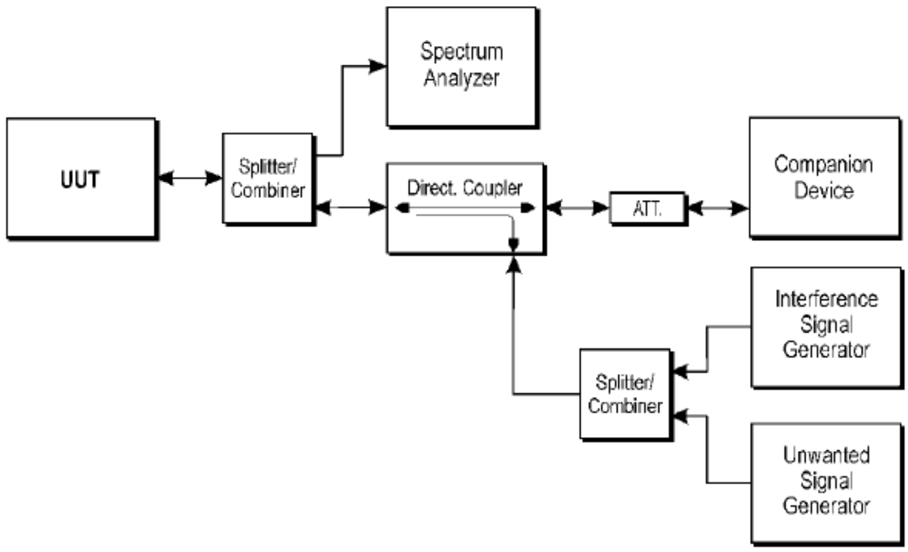


Figure 5: Test set-up for verifying the adaptivity of an equipment

6.6.1.1 Measurement Record

N/A: not applicable.

Refer to the EN 300 328 clause 4.3.2.6 section for the details.

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

As the EUT about RF Output power level is less than 10 dBm e.i.r.p, so the test is not applicable and skipped.

6.7 Receiver Blocking

6.7.1 Performance Criteria

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment (see clause 5.4.1.t)).

6.7.2 Limit(ETSI EN 300 328 V2.2.2 (2019-07) Clause 4.3.2.11.4)

While maintaining the minimum performance criteria as defined in clause 4.3.1.12.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 6, table 7 or table 8.

Receiver Category 1

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log10(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log10(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Receiver Category 2

Table 7: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log10(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Receiver Category 3

Table 8: Receiver Blocking parameters receiver Category 3 equipment

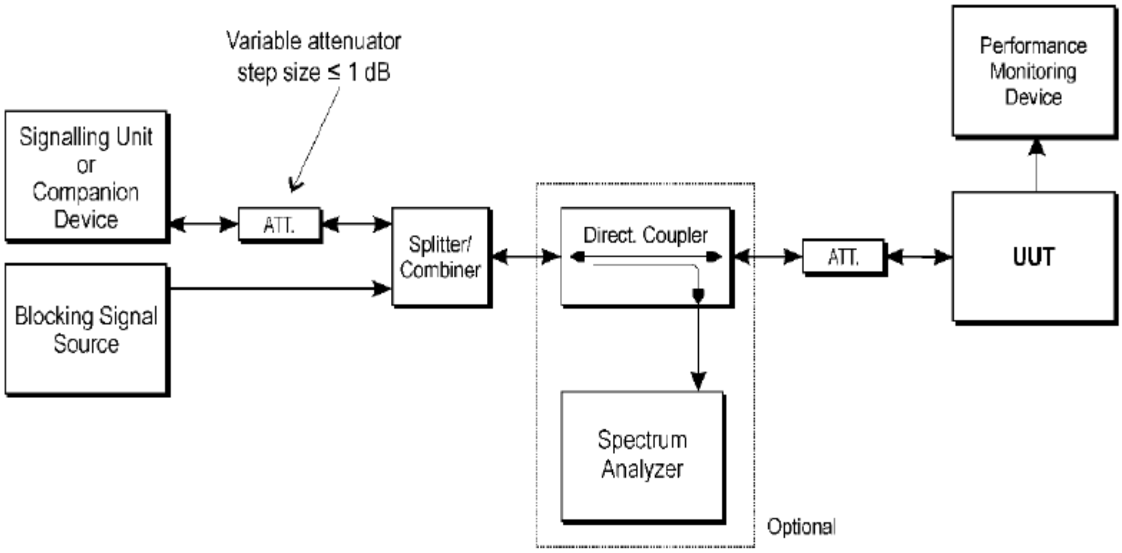
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking Signal
(-139 dBm + 10 × log10(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative the test may be performed using a wanted signal up to Pmin + 30 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

6.7.3 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.11.2

Measurement	
☒Conducted measurement	☐Radiated measurement

6.7.4 Test Setup



6.7.5 Test result

Note: The power less than 10dBm, belong to category 2.

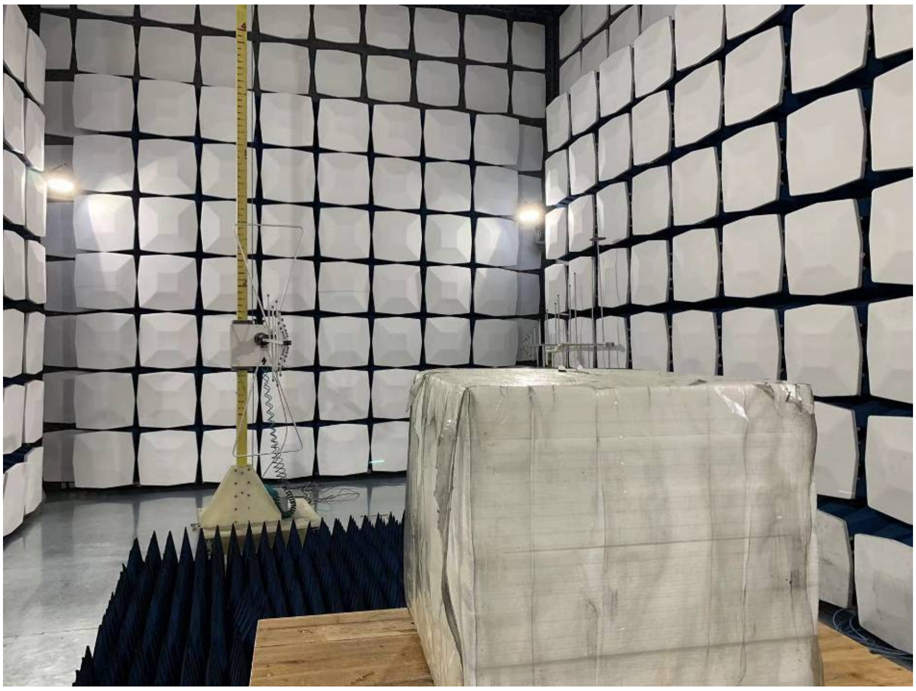
Receiver category 2

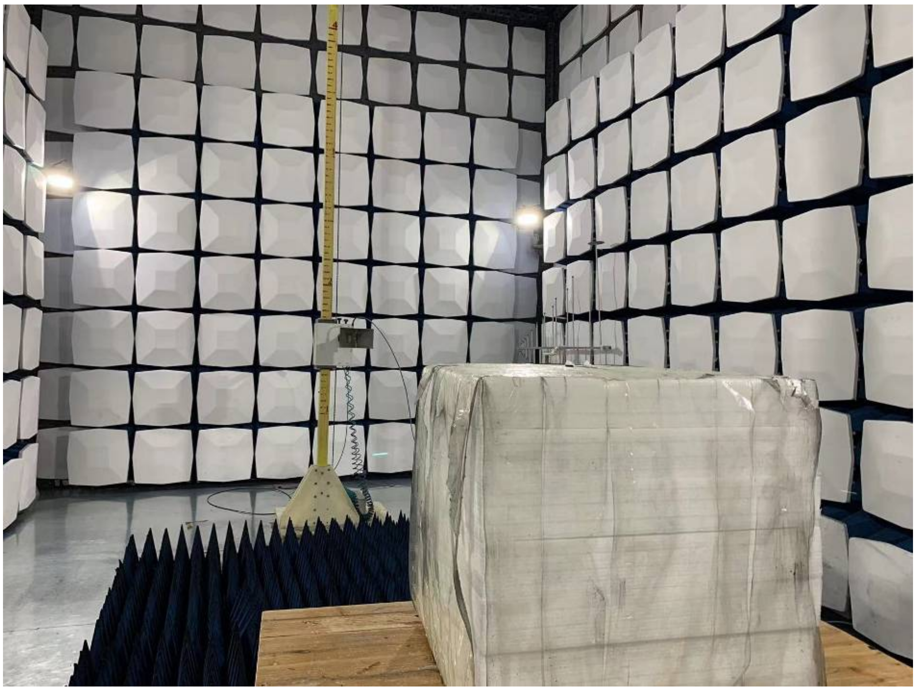
Wanted signal mean power from companion device (dBm)Note(1)	Test Channel	Blocking signal Frequency (MHz)	Blocking signal power (dBm)	PER% Note(2)	PER Limit %
-69dB	low	2 380	-34	2.7	≤10%
	High	2 504		2.6	
	low	2 300		2.3	≤10%
	High	2 584		2.5	

NOTE 1: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.
Note: The above results were obtained from laboratory tests.

7 Test Setup Photographs

Spurious Emission Test Setup





**** End of report ****

Dongguan Yaxu (AiT) Technology Limited
No.22, Jinqianling Third Street, Jitigang,
Huangjiang, Dongguan, Guangdong, China.

True Safety Testing

Certificate Of Compliance

Certificate No.	:	TST20220970118-3RC
Applicant	:	Guangzhou Langston Electronic Technology Co,Ltd 5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou
Manufacturer	:	Dongguan Doulan Electronic Technology Co. LTD No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan
Sample Name	:	TWS Bluetooth headset
Main Model	:	TG10
Additional Models	:	TG11 G30B T26B TG83 TG85 TH03 TN34 TN36 TS01 TS02 TE06 TN52 TA02 TN04 i21
Test Standard	:	IEC62321-1:2013 IEC62321-3-1:2013 IEC62321-4:2013/AMD1:2017 IEC62321-5:2013 IEC62321-6:2015 IEC62321-7-1:2015 IEC62321-7-2:2017 IEC62321-8:2017
As shown in the Test Report No.	:	TST20220970118-3RR

The EUT described above has been consolidated by us and found in compliance with the council RoHS 2.0 Directive (EU) 2015/863 and (EU)2017/2102 amending Annex II to Directive 2011/65/EU.
The certificate applies to the tested sample above mentioned only and shall not imply an assessment of the whole production. It is only valid in connection with the test report number. TST20220970118-3RR

RoHS

Andy

Certification Manager
Date:Sept.23,2022

True Safety Testing Dongguan Co., Ltd. Approve

Dongguan True Safety Testing Co., Ltd.
Room 201, No.20, East of Houjie Avenue, Houjie, Dongguan, Guangdong, China
Tel: 86-0769-85088050 4001086960 E-mail:tst@tst-test.com http://www.tst-test.com

Test Report

Applicant:	Guangzhou Langston Electronic Technology Co,Ltd
Address:	5/ F, building 4 Fenghuang Creative Industrial Park, No. 67, North Industrial Avenue, Haizhu District, Guangzhou
Manufacture:	Dongguan Doulan Electronic Technology Co. LTD
Address:	No.3, Tangzhou Road, Lijiafang, Shipai Town, Dongguan

The following sample(s) was /were submitted and identified on behalf of the clients as :

Sample Name:	TWS Bluetooth headset
Main Model:	TG10
Additional Models:	TG11 G30B T26B TG83 TG85 TH03 TN34 TN36 TS01 TS02 TE06 TN52 TA02 TN04 i21
Sample Received Date:	Sept.19,2022
Testing Period:	Sept.19,2022 To Sept.23,2022
Test Requested:	1. As specified by client ,to screen Lead(Pb),Cadmium(Cd),Mercury(Hg), Chromium(Cr)and Bromine(Br)in the submitted sample(s)by XRF. 2. As specified by client ,when screening results exceed the XRF screening limit in IEC62321:2013 Edition 1.0,further use of wet chemical methods are required to test Lead(Pb),Cadmium(Cd),Mercury(Hg),Hexavalent Chromium(Cr(VI)),Polybrominated Biphenyls(PBBs),Polybrominated Diphenyl Ethers(PBDEs),and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) ,Butyl benzyl phthalate (BBP), Dibutylphthalate (DBP) , and Diisobutyl phthalate (DIBP) in the submitted sample(s).
Test Method:	Please refer to next page(s).
Test Result:	Please refer to next page(s).
Test Conclusion:	The test results comply with the limits of RoHS 2.0 Directive (EU) 2015/863 and (EU)2017/2102 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of

Andy

Dongguan True Safety Testing Co., Ltd. Approve

Andy Zheng
Technical Director

1. Pb, Cd, Cr(VI), Hg, PBBs&PBDEs

Test Method:

A. Disassembly, disjointment and mechanical sample preparation

—Ref. to IEC 62321-2:2021, Disassembly, disjointment and mechanical sample preparation.

B. With reference to IEC 62321-1:2013, tests were performed for the samples indicated by the photos in this report.

(1) Screening – Lead, mercury, cadmium, total chromium and total bromine

—Ref. to IEC 62321-3-1:2013, Screening for Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry.

(2) Wet chemical test method

Test Item(s)	Test Method	Test Equipment	Unit	MDL	Limit
Pb	IEC62321-5:2013	ICP-AES	mg/kg	2	1000
Cd	IEC62321-5:2013	ICP-AES	mg/kg	2	100
Hg	IEC 62321-4:2013 /AMD1:2017	ICP-AES	mg/kg	2	1000
Cr(VI) (Metal)	IEC62321-7-1:2015	UV-Vis	μg/cm2	0.1	0.13
Cr(VI) (Nonmetal)	IEC62321-7-2:2017	UV-Vis	mg/kg	8	1000
PBBs	IEC62321-6:2015	GC-MS	mg/kg	5	1000
PBDEs	IEC62321-6:2015	GC-MS	mg/kg	5	1000

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Tel:86-769-85088050 4001086960 E-mail:tst@tst-test.com http://www.tst-test.com

Test result(s):

No.	Sample Description	Results of XRF					Chemical confirmation results (mg/kg)	Conclusion
		Pb	Cd	Hg	Cr	Br		
1	black plastic case	BL	BL	BL	BL	BL	---	Pass
2	black plastic terminal	BL	BL	BL	BL	BL	---	Pass
3	black plastic	BL	BL	BL	BL	BL	---	Pass
4	black plastic button	BL	BL	BL	BL	BL	---	Pass
5	black wire	BL	BL	BL	BL	BL	---	Pass
6	PCB	BL	BL	BL	BL	X	PBBs:N.D. PBDEs:N.D.	Pass
7	IC	BL	BL	BL	BL	BL	---	Pass
8	LED	BL	BL	BL	BL	BL	---	Pass
9	trumpet	BL	BL	BL	BL	---	---	Pass
10	magnet	BL	BL	BL	BL	---	---	Pass
11	resistance	BL	BL	BL	BL	BL	---	Pass
12	inductance	BL	BL	BL	BL	BL	---	Pass
13	triode	BL	BL	BL	BL	BL	---	Pass
14	diode	BL	BL	BL	BL	BL	---	Pass
15	PIN	BL	BL	BL	BL	---	---	Pass
16	metal coating	BL	BL	BL	BL	---	---	Pass

Remark:

a. It is the result on total Br while test item on restricted substances is PBBs/PBDEs. It is the result on total Cr while test item on restricted substances is Cr(VI).

b. The XRF screening test for RoHS elements-The reading may be different to the actual content in the sample be of non-uniformity composition.

c. Results are obtained by EDXRF for primary screening, and further chemical testing by ICP-AES (for Pb, Cd, Hg), UV-VIS for Cr(VI) and GC/MSD (for PBBs/PBDEs) is recommended to be performed if the concentration exceeds the below warming value according to IEC 62321-3-1:2013.

Attached table 1, XRF screening limits in mg/kg for regulated elements in various matrices:

Element	Polymer Material	Metallic Material	Composite Material
Pb	BL≤700-3σ≤X＜1300+3σ≤OL	BL≤700-3σ≤X＜1300+3σ≤OL	BL≤500-3σ≤X＜1500+3σ≤OL
Cd	BL≤70-3σ≤X＜130+3σ≤OL	BL≤70-3σ≤X＜130+3σ≤OL	LOD＜X＜150+3σ≤OL
Hg	BL≤700-3σ≤X＜1300+3σ≤OL	BL≤700-3σ≤X＜1300+3σ≤OL	BL≤500-3σ≤X＜1500+3σ≤OL
Cr	BL≤700-3σ＜X	BL≤700-3σ＜X	BL≤500-3σ＜X
Br	BL≤300-3σ＜X	--	BL≤250-3σ＜X

XRF detection limits in mg/kg for regulated elements in various material

Element	Polymer Material	Metallic Material	Composite Material
Pb	10	50	50
Cd	10	50	50
Hg	10	50	50
Cr	10	50	50
Br	10	50	50

Note: -BL = Under the XRF screening limit

-OL = Furture chemical test will be conducted while result is above the screening limit

-X = inconclusive, the region where need further chemical testing by ICP-AES (for Pb, Cd, Hg), UV-VIS (for Cr(VI)) and GC/MSD (for PBBs, PBDEs).

-3σ=The reproducibility of analytical instruments

-LOD=Detection limit

"---" = Not Applicable

- mg/kg=0.0001%

- N.D.=Not Detected(<MDL)

- MDL = Method Detection Limit

-Negative = Absence of Cr(VI), the detected Cr(VI) concentration in the boiling water extraction solution is less than 0.02 mg/kg with 50cm2 sample surface area used.

-*=According to 2011/65/EU Annex,Lead as an alloying element is steel containing up to 0.35% lead by weight, aluminum containing up to 0.4% lead by weight and as a copper alloy, containing up to 4% lead by weight can be exempted.

2. Phthalates—DBP, BBP, DEHP & DIBP

Test Item(s)	Test Method	Test Equipment	Unit	MDL	Limit
Dibutyl Phthalate(DBP)	IEC62321-8:2017	GC-MS	mg/kg	30	1000
Benzylbutyl Phthalate (BBP)	IEC62321-8:2017	GC-MS	mg/kg	30	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	IEC62321-8:2017	GC-MS	mg/kg	30	1000
Diisobutyl phthalate (DIBP)	IEC62321-8:2017	GC-MS	mg/kg	30	1000

Test Report

Test result(s):

Part No.	Test item (mg/kg)				Conclusion
	DBP	BBP	DEHP	DIBP	
1+2+3	N.D.	N.D.	N.D.	N.D.	Pass
4	N.D.	N.D.	N.D.	N.D.	Pass
5	N.D.	N.D.	N.D.	N.D.	Pass
6+7	N.D.	N.D.	N.D.	N.D.	Pass
8	N.D.	N.D.	N.D.	N.D.	Pass
11+12	N.D.	N.D.	N.D.	N.D.	Pass
13+14	N.D.	N.D.	N.D.	N.D.	Pass

Note: - mg/kg=0.0001%

-ND=Not Detected(<MDL)

-*1 = The samples were resubmitted on

Test Process:

1. Test for Cd/Pb Content

Weigh sample and Place in a conical flask ⇨ Add digestion reagent ⇨ Digest samples on hot plate ⇩ Transfer the digestive solution into a volumetric flask ⇦ Make up with deionized water ⇦ Analyze by ICP-AES

2. Test for Hg Content

Weigh sample and place in a microwave digestion vessel ⇨ Add digestion reagent ⇨ Digest samples in microwave digestion oven ⇩ Transfer the digestive solution into a volumetric flask ⇦ Make up with deionized water ⇦ Analyze by ICP-AES

3. Test for Chromium (VI) Content

Nonmetal material

Adding digestion reagent ⇒ Heat to a suitable temperature for extraction ⇒ Filtration and PH adjustment ⇓ Adding 1,5-diphenylcarbazide for color development ⇒ UV-Vis ⇒ DATA

Metal material

Measure the surface area ⇒ Boiling water extraction ⇒ Adding 1,5-diphenylcarbazide for color development ⇓ A red color indicates the presence of Cr^{6+}. If necessary, confirm with UV-Vis. ⇒ DATA

4.Test for DBP, BBP, DEHP, DIBP, PBB, PBDE Content

Cutting / Preparation ⇒ Weigh sample ⇒ Sample solvent extraction ⇓ Concentration / Dilution of extracted solution ⇒ Fitration ⇒ Analyze by GC-MS

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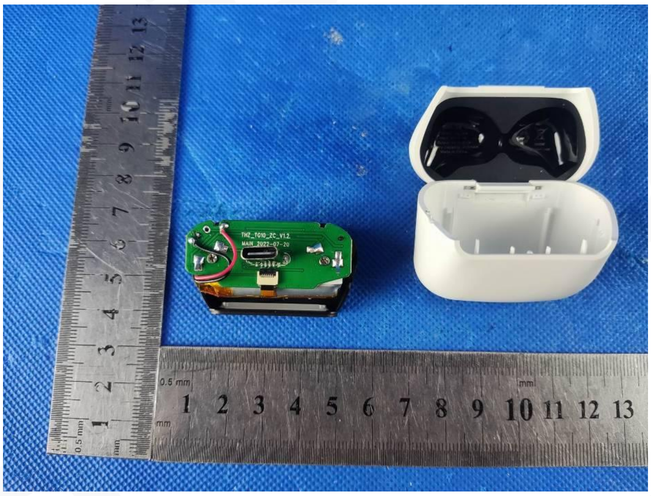
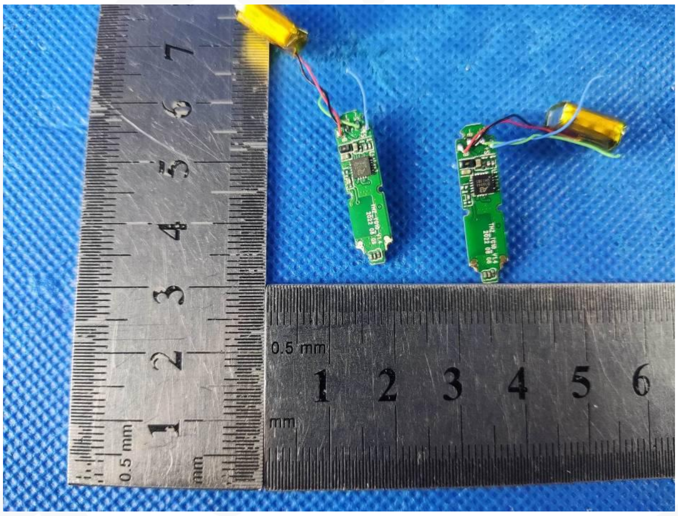
Sample photo:



*** End of Report **

True Safety Testing

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RoHS

Andy

Certification Manager
Date:Sept.23,2022

True Safety Testing Dongguan Co., Ltd. Approve

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