IP54 Test Report

Applicant	: Topvision(Shenzhen) Technology Co., LTD.
Address	: Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China
Sample Description:	
Product	: Low power video doorbell
Brand Name/Trade Name	: N/A
Model No.	: V30, V20, V10, V50, V55, V60, V65, V70, M11, X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, X14, X15, X16, X17, X18, X19, X20, LB-W01, LB-W02
Electrical Rating	: N/A
Manufacturer	: Topvision(Shenzhen) Technology Co., LTD.
Address	: Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China
Date of receipt of test item	: Jan. 05, 2021
Date (s) of performance of test	: Jan. 05, 2021 to Jan. 07, 2021
Date of issue	: Jan. 07, 2021
Service Requested	: Perform the IP54 test as customer's requirement
Method	: As specified in EN 60529:1991+A1:2000+A2:2013
Conclusion	: Pass

Testing by: Kevin Yao

Kevin Yao
Testing Engineer
Shenzhen HUAK Testing Technology Co., Ltd.

Reviewed by:

Dendi Wei
Project Engineer
Shenzhen HUAK Testing Technology Co., Ltd.

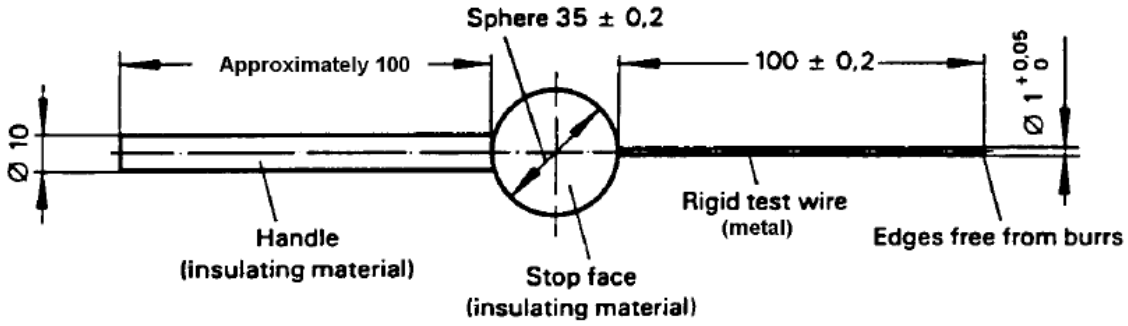
- The results reported in this test report shall refer only to the sample actually checked and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report shall not be reported except in full without prior authorization from Shenzhen HUAK Testing Technology Co., Ltd.
- The services are provided subject to the terms and condition of the company, which can be furnished upon request.

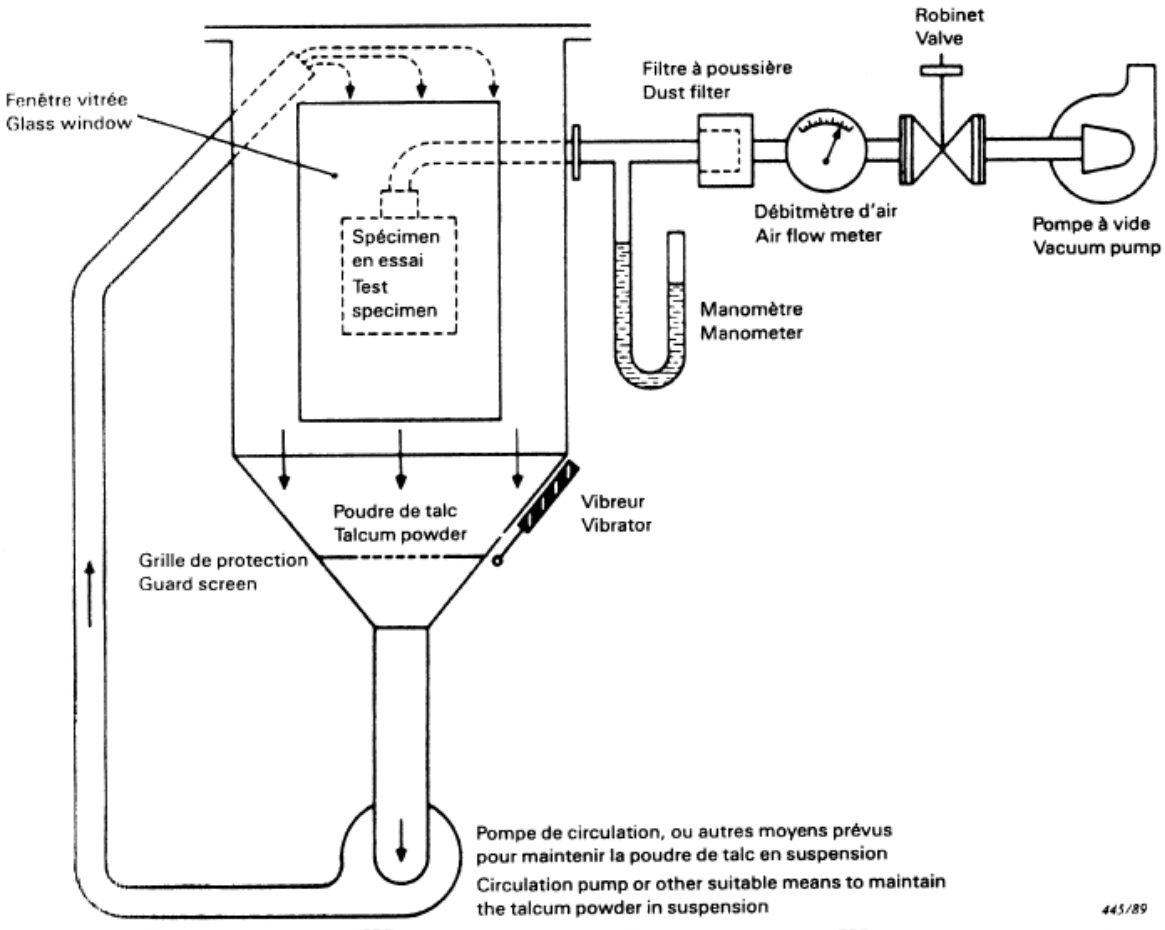
********** End of page **********

1. IP5X Dust-proof Test

1.1 Test requirement

Equipment	Model	Serial no.	Cal. Due date
Test probe	Probe D (100mm)	HK-066	2021-12-24
Push-pull scale	NK-500	HK-010	2021-12-24
Apparatus for Proving Protection Against Dust	SE-1150	HK-164	2021-12-24





1.2 Test method

1.2.1 The product (first characteristic IP numerals 5) shall be tested at every possible point (excluding gaskets) with a probe in accordance with test probe D of EN 61032, applied with a force 1N ±10%.
1.2.2 The test is made using a dust chamber.
Dust-proof sample (first characteristic IP numeral 5) shall be tested in a dust chamber similar to which talcum powder is maintained in suspension by an air current. The chamber shall contain 2 kg of powder for every cubic metre of its volume. The talcum powder used shall be able to pass through a square-meshed sieve whose nominal wire diameter is 50 μm and whose nominal free distance between wires is 75 μm. It shall not have been used for more than 20 tests.
The test shall proceed as follows:
a) Enclosure where no pressure difference relative to the surrounding air is present.
b) The enclosure under test is supported in its normal operating position inside the test chamber, but is not connected to a vacuum pump. Any drain-hole normally open shall be left open for the duration of the test .The test shall be continued for a period of 8h.
c) The enclosure is satisfactory if no deposit of dust is observable inside the enclosure at the end of the test.

All models are identical, only different in the model name and appearance, so the model V30 is selected as representative model for full tests.

1.3 Test Result

Conclusion: Pass

The sample complied with the requirements of the standard.

********** End of page **********

2. IPX4 Splash-proof Test

2.1 Test requirements

Equipment	Model	Serial no.	Cal. Due date
IP test chamber	KXT302B	HK-169	2021-12-24

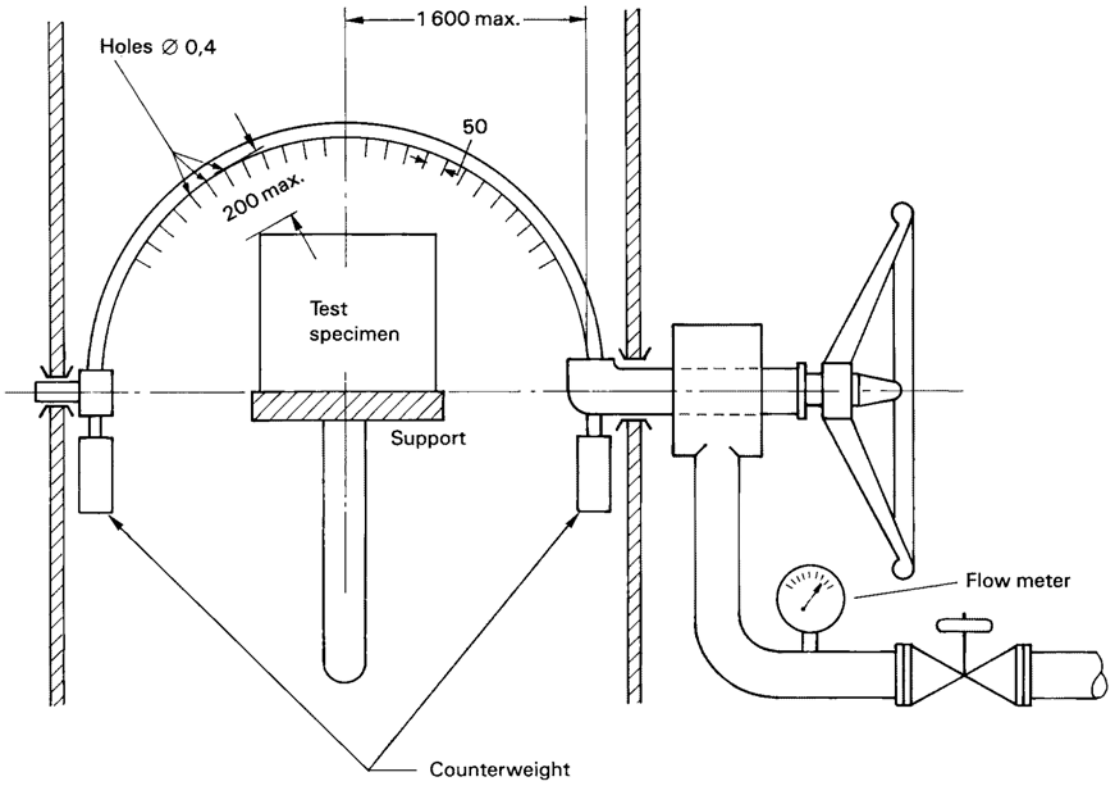


Figure 4

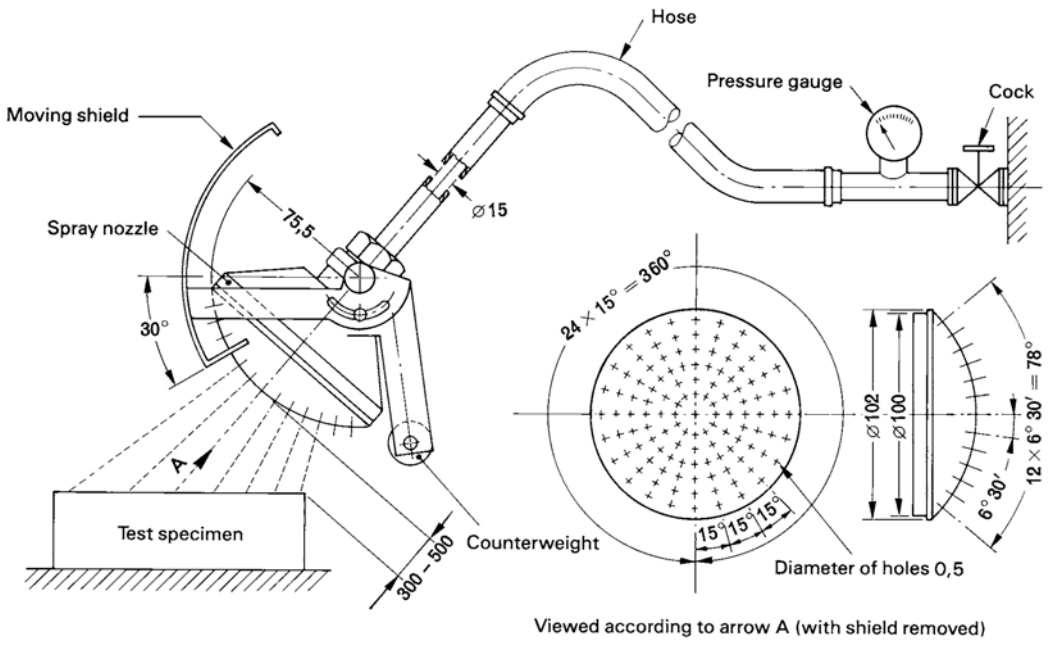


Figure 5

2.2 Test method

The test is made using one of the two test devices described in figure 4 and in figure 5 in accordance with the relevant product standard.

a) Conditions when using the test device as in figure 4 (oscillating tube):

The oscillating tube has spray holes over the whole 180” of the semicircle. The total flow rate is adjusted as specified in table 9 and is measured with a flow meter.

The tube is caused to oscillate through an angle of almost 360°, 180° on either side of the vertical, the time for one complete oscillation (2×360°) being about 12 s.

The duration of the test is 10 min.

If not specified otherwise in the relevant product standard, the support for the enclosure under test is perforated so as to avoid acting as a baffle and the enclosure is sprayed from every direction by oscillating the tube to the limit of its travel in each direction.

b) Conditions when using the test device as in figure 5 (spray nozzle):

The counterbalanced shield is removed from the spray nozzle and the enclosure is sprayed from all practicable directions.

The rate of water flow and the spraying time per unit area are as specified in 14.2.3.

All models are identical, only different in the model name and appearance, so the model V30 is selected as representative model for full tests.

2.3 Test Result

Conclusion: Pass

The sample complied with the requirements of the standard.

********** End of page **********

Product Photos

Photo 1: Overall view (before test)

Photo 2: Overall view (after test)

Photo 3: Internal view (after test)

----------End of report----------

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This certificate is responsible for testing sample only.
Please refer to this corresponding test report to get testing process and data.

CERTIFICATE

ATTESTATION
DECLARATION OF CONFORMITY

Technical file of the company mentioned below has been inspected and audit has been completed successfully

Certificate's Holder	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China
Manufacturer	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China
Product Name	:	Low power video doorbell
Product Model (S)	:	V30, V20, V10, V50, V55, V60, V65, V70, M11, X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, X14, X15, X16, X17, X18, X19, X20, LB-W01, LB-W02
Trade Mark	:	N/A

Complies with the requirements of the:

Related Standard(s) : EN 60529:1991 + A1:2000 + A2:2013

Certificate Number	:	HK2012291235S
Report No.	:	HK2012291235-SR
Registration Date	:	Jan. 07, 2021

HUAK TESTING CERTIFICATION HKTC APPROVAL

Certification Manager

General Remarks:

The tests were performed in normal operation mode.

The test results apply only to the particular sample tested.

We hereby declare that the appliances Complies with the related.

implementing measures and we fully understand the detail requirements.

IP54

Shenzhen HUAK Testing Technology Co., Ltd.

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TEST REPORT

Report No. : HK2012291037-1RR Date : January 07, 2021 Page 1 of 24

Applicant:	**Topvision(Shenzhen) Technology Co., LTD.**
Address:	**Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China**
Manufacturer:	**Topvision(Shenzhen) Technology Co., LTD.**
Address:	**Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China**

The following sample was submitted and identified by/on behalf of the client as:

Sample Name:	Low power video doorbell
Sample Model:	V30
Series No.:	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Brand Name:	NA
Sample Received Date:	December 30, 2020
Testing Period:	From December 30, 2020 to January 07, 2021
Test Result(s):	Please refer to the following page(s).

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Summary of Test Results:

Test Requested:	According to customer's requirements, Split the sample and determine the Pb, Cd, Hg, Cr(VI), PBBs & PBDEs, DBP, BBP, DEHP, DIBP content of the parts.
Conclusion:	Base upon the performed tests by submitted sample, the test results comply with the limits as set by Directive (EU) 2015/863 - Amendment of EU RoHS Directive 2011/65/EU (RoHS 2.0) Annex II.

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Signed for and on behalf of HUAK

Approved by: Jason Zhou

Lab Manager

Remark: Only selected materials were tested as per client's requirement.

Test Method:

1. Sample prepared with reference to IEC 62321-2:2013
2. Sample Screening testing with reference to IEC 62321-3-1:2013
3. Wet Chemical Test Method
   a. Determination of Lead ,Cadmium by ICP-OES with reference to IEC 62321-5:2013
   b. Determination of Mercury by ICP-OES with reference to IEC 62321-4:2013+AMD1:2017
   c. Determination of Hexavalent Chromium in colourless and coloured corrosion-protected coatings on metals by UV-VIS method reference to IEC 62321-7-1:2015
   d. Determination of Hexavalent Chromium in polymers and electronics by UV-Vis Method with reference to IEC 62321-7-2:2017.
   e. Determination of PBBs and PBDEs by GC-MS with reference to IEC 62321-6:2015
   f. Determination of DBP, BBP, DEHP and DIBP by GC-MS with reference to IEC 62321-8:2017

Test Results:

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
1	Black plastic case	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	N.D.	Comply
		BBP	---	N.D.	Comply
		DEHP	---	N.D.	Comply
		DIBP	---	N.D.	Comply
2	Black rubber button	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	N.D.	Comply
		BBP	---	N.D.	Comply
		DEHP	---	N.D.	Comply
		DIBP	---	N.D.	Comply

TEST REPORT

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
3	Black plastic	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	N.D.	Comply
		BBP	---	N.D.	Comply
		DEHP	---	N.D.	Comply
		DIBP	---	N.D.	Comply
4	Silver metal patch	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
5	Silver metal spring	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

TEST REPORT

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
6	Silver metal screw	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
7	Black metal screw	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
8	Black cloth net	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

TEST REPORT

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
9	Silver metal	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	IN	N.D.	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
10	Copper metal coil	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
11	Black plastic	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

TEST REPORT

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
12	Red wire cover	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	N.D.	Comply
		BBP	---	N.D.	Comply
		DEHP	---	N.D.	Comply
		DIBP	---	N.D.	Comply
13	Black wire cover	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	N.D.	Comply
		BBP	---	N.D.	Comply
		DEHP	---	N.D.	Comply
		DIBP	---	N.D.	Comply
14	Silver metal core	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

TEST REPORT

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
15	Silver metal pin	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
16	White plastic frame	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
17	camera	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

TEST REPORT

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
18	LED lights	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
19	Black plastic	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
20	Copper metal	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

TEST REPORT

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
21	Black plastic sleeve	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
22	Key switch	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	IN	N.D.	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
23	Silver metal solder joints	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
24	Black PCB	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	IN	N.D.	Comply
		PBDEs	IN	N.D.	Comply
		DBP	---	N.D.	Comply
		BBP	---	N.D.	Comply
		DEHP	---	N.D.	Comply
		DIBP	---	N.D.	Comply
25	Blue ribbon cable	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	IN	N.D.	Comply
		PBDEs	IN	N.D.	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
26	Black PCB	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	IN	N.D.	Comply
		PBDEs	IN	N.D.	Comply
		DBP	---	N.D.	Comply
		BBP	---	N.D.	Comply
		DEHP	---	N.D.	Comply
		DIBP	---	N.D.	Comply

TEST REPORT

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
27	Transparent glass sheet	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
28	Card slot	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	IN	N.D.	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA
29	Black IC	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	BL	---	Comply
		PBDEs	BL	---	Comply
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

Part No.	Part Name	Restricted Substances	Result of EDXRF (1)	Result of Chemical Testing (2) (mg/kg)	Conclusion on RoHS
30	Silver metal	Pb	BL	---	Comply
		Cd	BL	---	Comply
		Hg	BL	---	Comply
		Cr(VI)	BL	---	Comply
		PBBs	---	---	NA
		PBDEs	---	---	NA
		DBP	---	---	NA
		BBP	---	---	NA
		DEHP	---	---	NA
		DIBP	---	---	NA

Remark:

(1) (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^{6+}.

(b)Results are obtained by EDXRF for primary screening, and further chemical testing by ICP-OES (for Cd, Pb, Hg), UV-Vis (for Cr^{6+}) and GC/MS (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warning value according to IEC62321-3-1:2013 (unit: mg/kg)

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

(c) BL = Below Limit, OL = Over Limit, IN = Inconclusive, LOD = Limit of Detection, -- = Not Regulated, NA = Not Applicable.

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

(2) (a) 1mg/kg = 1ppm = 0.0001%, N.D.= Not Detected (<MDL), --- = Not Conducted.

(b) Unit and Method Detection Limit (MDL) in wet chemical test

Test Items	Pb	Cd	Hg
Units	mg/kg	mg/kg	mg/kg
MDL	2	2	2

The MDL for single compound of PBBs & PBDEs is 5 mg/kg, MDL of Cr^{6+} for polymer & composite sample is 2 mg/kg and MDL of DBP, BBP, DEHP and DIBP is 30mg/kg.

(c) When Cr^{6+} for metal sample is testing according to IEC 62321-7-1:2015, the unit is μg/cm^2, and the MDL is 0,10 μg/cm^2. When the Cr (VI) concentration is > the 0,13 μg/cm^2, the sample is positive for Cr(VI) and considered to contain Cr(VI); when the Cr (VI) concentration is N.D.(< the 0,10 μg/cm^2), the sample is negative for Cr(VI) and considered a non-Cr(VI) based coating; when the Cr (VI) concentration is ≥ the 0,10 μg/cm^2 and ≤ the 0,13 μg/cm^2, the result is considered to be inconclusive - Unavoidable coating variations may influence the determination.

(3) The maximum permissible limit is quoted from the Directive (EU) 2015/863 - Amendment of EU RoHS Directive 2011/65/EU (RoHS 2.0) Annex II.

RoHS Restricted Substances	Maximum Concentration Value (by weight in homogenous materials)
Lead (Pb)	0.1%
Cadmium (Cd)	0.01%
Mercury (Hg)	0.1%
Hexavalent Chromium (Cr VI)	0.1%
Polybrominated biphenyls (PBBs)	0.1%
Polybrominated diphenylethers (PBDEs)	0.1%
Dibutyl Phthalate (DBP)	0.1%
Benzylbutyl Phthalate (BBP)	0.1%
Bis-(2-ethylhexyl) Phthalate (DEHP)	0.1%
Diisobutyl Phthalate (DIBP)	0.1%

RoHS Exemptions

Exemptions	
RoHS Directive 2011/65/EU ANNEX III	
Exemption Items	**Expires Date**
1, Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):	
1(a), For general lighting purposes < 30 W:3.5 mg	2,5 mg shall be used per burner after 31 December 2012
1(b), For general lighting purposes≥ 30 W and < 50W:3.5mg	
1(c), For general lighting purposes ≥ 50 W and < 150 W: 5 mg	
1(d), For general lighting purposes ≥ 150 W: 15 mg	
1(e), For general lighting purposes with circular or square structural shape and tube diameter ≤ 17 mm: 7 mg	
1(f), For special purposes: 5 mg	
2(a), Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):	
2(a)(1), Tri-band phosphor with normal lifetime and a tube diameter < 9 mm (e.g. T2): 4 mg	
2(a)(2), Tri-band phosphor with normal lifetime and a tube diameter ≥ 9 mm and ≤ 17 mm (e.g. T5): 3 mg	
2(a)(3), Tri-band phosphor with normal lifetime and a tube diameter > 17 mm and ≤ 28 mm (e.g. T8):3.5mg	
2(a)(4), Tri-band phosphor with normal lifetime and a tube diameter > 28 mm (e.g. T12): 5 mg	Expires on 31 December 2012; 3,5 mg may be used per lamp after 31 December 2012
2(a)(5), Tri-band phosphor with long lifetime (≥ 25 000 h): 5 mg	
2(b), Mercury in other fluorescent lamps not exceeding (per lamp):	
2(b)(2), Non-linear halophosphate lamps (all diameters): 15 mg	Expires on 13 April 2016
2(b)(3), Non-linear tri-band phosphor lamps with tube diameter > 17 mm (e.g. T9):15mg	
2(b)(4), Lamps for other general lighting and special purposes (e.g. induction lamps):15mg	
3, Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):	
3(a), Short length (≤500 mm):3.5mg	
3(b), Medium length (> 500 mm and ≤ 1 500 mm):5mg	
3(c), Long length (> 1 500 mm):13mg	
4(a), Mercury in other low pressure discharge lamps (per lamp):15mg	
4(b), Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index Ra > 60:	
4(b) -I, P ≤155 W:30mg	
4(b) -II, 155 W < P ≤ 405 W:40mg	
4(b) -III, P > 405 W:40mg	
4(c), Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner):	
4(c)-I, P ≤ 155 W:25mg	

Exemptions	
RoHS Directive 2011/65/EU ANNEX III	
Exemption Items	**Expires Date**
4(c)-II, 155 W < P ≤ 405 W:30mg	
4(c)-III, P > 405 W:40mg	
4(d), Mercury in High Pressure Mercury (vapour) lamps (HPMV)	Expires on 13 April 2015
4(e), Mercury in metal halide lamps (MH)	
4(f), Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex	
5(a), Lead in glass of cathode ray tubes	
5(b), Lead in glass of fluorescent tubes not exceeding 0,2 % by weight	
6(a), Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0,35 % lead by weight	
6(b), Lead as an alloying element in aluminium containing up to 0,4 % lead by weight	
6(c), Copper alloy containing up to 4 % lead by weight	
7(a), Lead in high melting temperature type solders (i.e. lead- based alloys containing 85 % by weight or more lead)	
7(b), Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission, and network management for telecommunications	
7(c)-I, Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound	
7(c)-II, Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher	
7(c)-III, Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V DC	Expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013
7(c)-Ⅳ, Lead in PZT based dielectric ceramic materials for capacitors being part of integrated circuits or discrete semiconductors	Expires on 21 July 2016
8(a), Cadmium and its compounds in one shot pellet type thermal cut-offs	Expires on 1 January 2012 and after that date may be used in spare parts for EEE placed on the market before 1 January 2012
8(b), Cadmium and its compounds in electrical contacts	
9, Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0,75 % by weight in the cooling solution	
9(b), Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications	
11(a), Lead used in C-press compliant pin connector systems	May be used in spare parts for EEE placed on the market before 24 September 2010

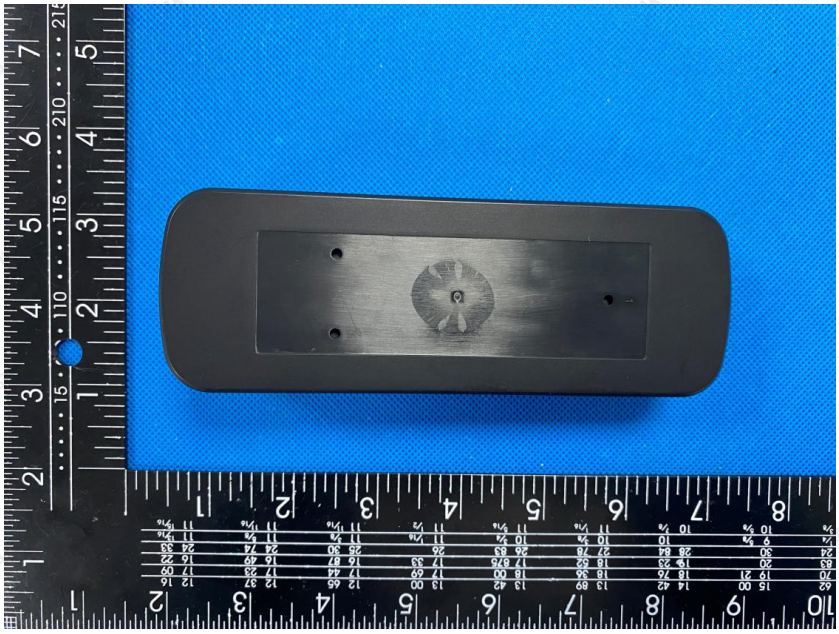
Exemptions	
RoHS Directive 2011/65/EU ANNEX III	
Exemption Items	**Expires Date**
11(b), Lead used in other than C-press compliant pin connector systems	Expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013
12, Lead as a coating material for the thermal conduction module C-ring	May be used in spare parts for EEE placed on the market before 24 September 2010
13(a), Lead in white glasses used for optical applications	
13(b), Cadmium and lead in filter glasses and glasses used for reflectance standards	
14, Lead in solders consisting of more than two elements for the connection between the pins and the package of micropro-cessors with a lead content of more than 80 % and less than 85 % by weight	Expires on 1 January 2011 and after that date may be used in spare parts for EEE placed on the market before 1 January 2011
15, Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages	
16, Lead in linear incandescent lamps with silicate coated tubes	Expires on 1 September 2013
17, Lead halide as radiant agent in high intensity discharge (HID) lamps used for professional reprography applications	
18(b), Lead as activator in the fluorescent powder (1 % lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP ($BaSi_2O_5$:Pb)	
21, Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses	
23, Lead in finishes of fine pitch components other than connectors with a pitch of 0,65 mm and less	May be used in spare parts for EEE placed on the market before 24 September 2010
24, Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors	
25, Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring	
29, Lead bound in crystal glass as defined in Annex I (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC ([1])	
30, Cadmium alloys as electrical/mechanical solder joints to elec-trical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more	
31, Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)	
32, Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes	
33, Lead in solders for the soldering of thin copper wires of 100 μm diameter and less in power transformers	

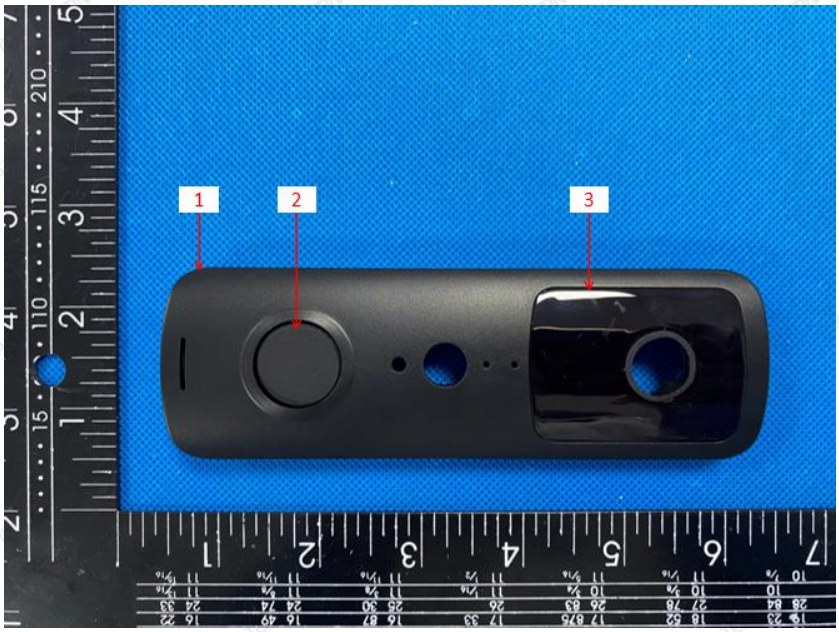
Exemptions	
RoHS Directive 2011/65/EU ANNEX III	
Exemption Items	**Expires Date**
34, Lead in cermet-based trimmer potentiometer elements	
37, Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body	
38, Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide	
39, Cadmium in colour converting II-VI LEDs (< 10 µg Cd per mm^2 of light-emitting area) for use in solid state illumination or display systems	Expires on 1 July 2014
40, Cadmium in photoresistors for analogue optocouplers applied in professional audio equipment	Expires on 31 December 2013
Note: 1. ([1]) OJ L 326, 29.12.1969, p.36. 2. For the purposes of Directive 2011/65/EU, a maximum concentration value of 0,1 % by weight in homogeneous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) and of 0,01 % by weight in homogeneous materials for cadmium shall be tolerated.	

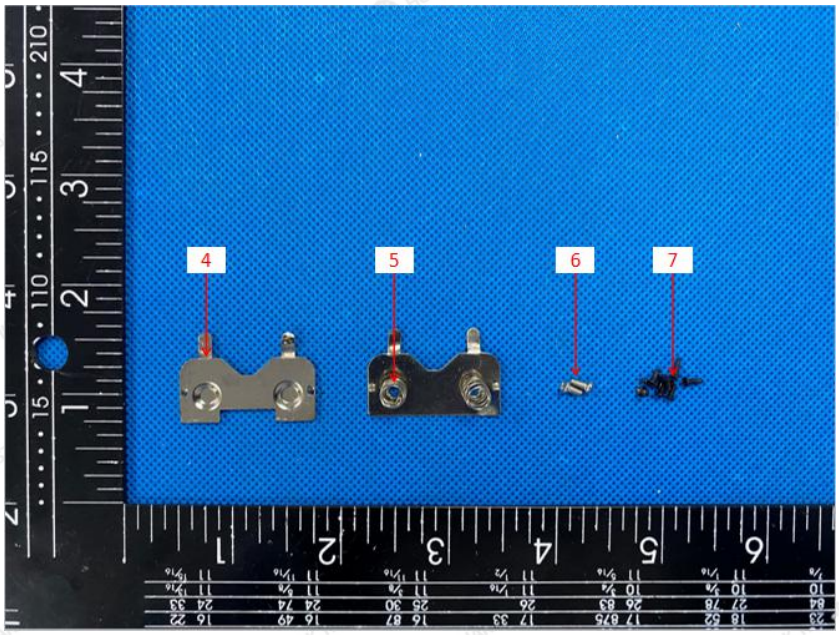
**** Modified History ****

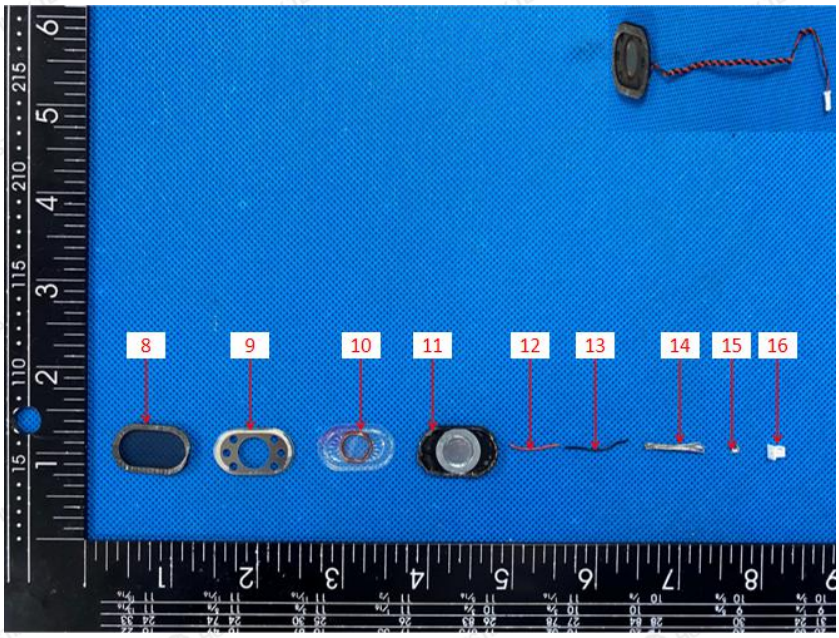
Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2021/01/07	Jason Zhou

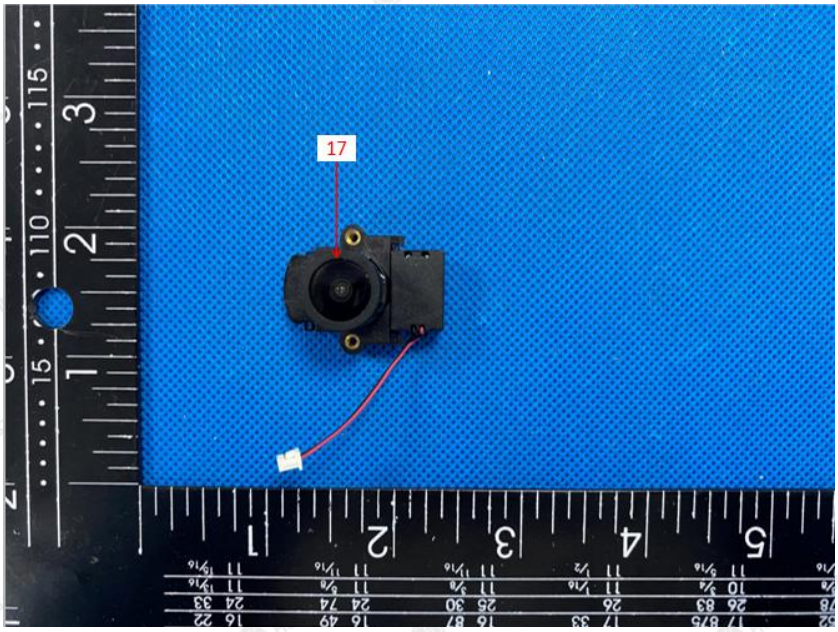
Photo(s) of the sample(s)

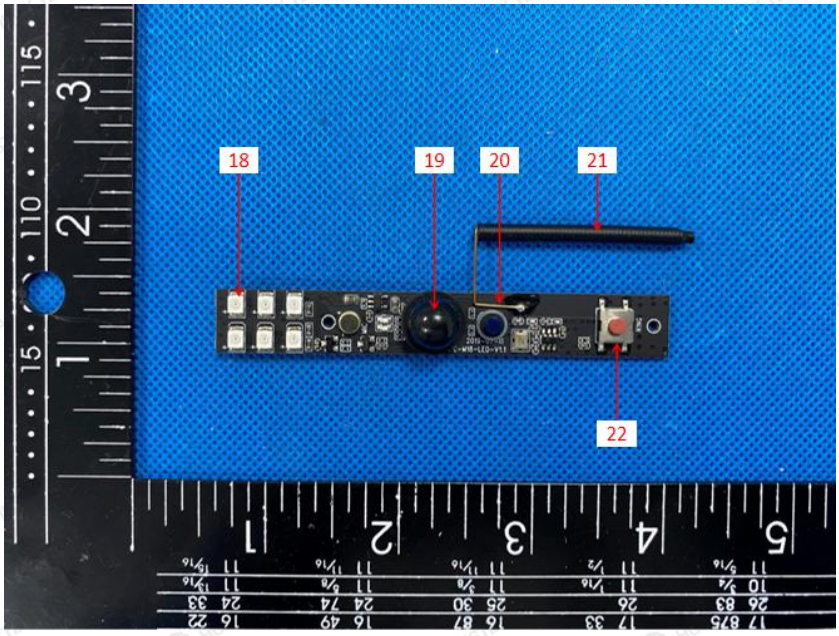


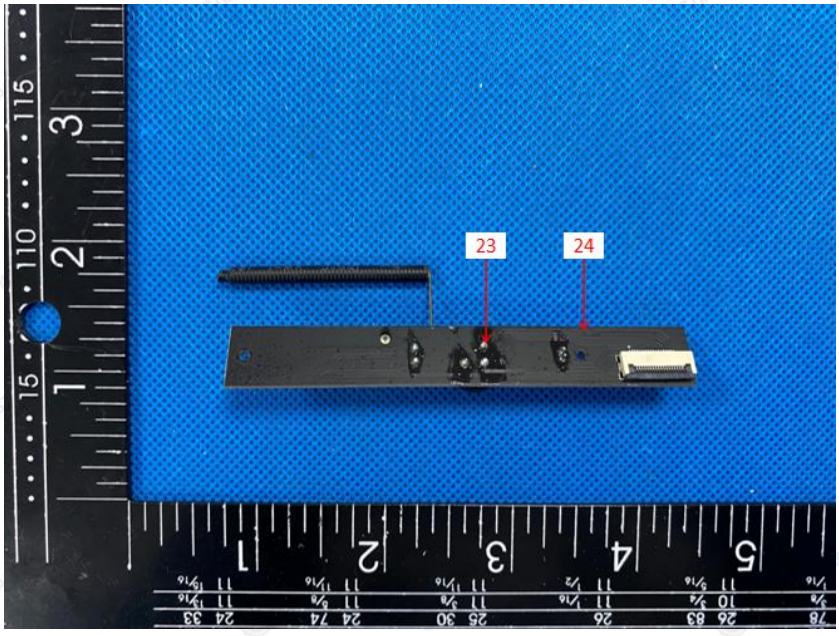


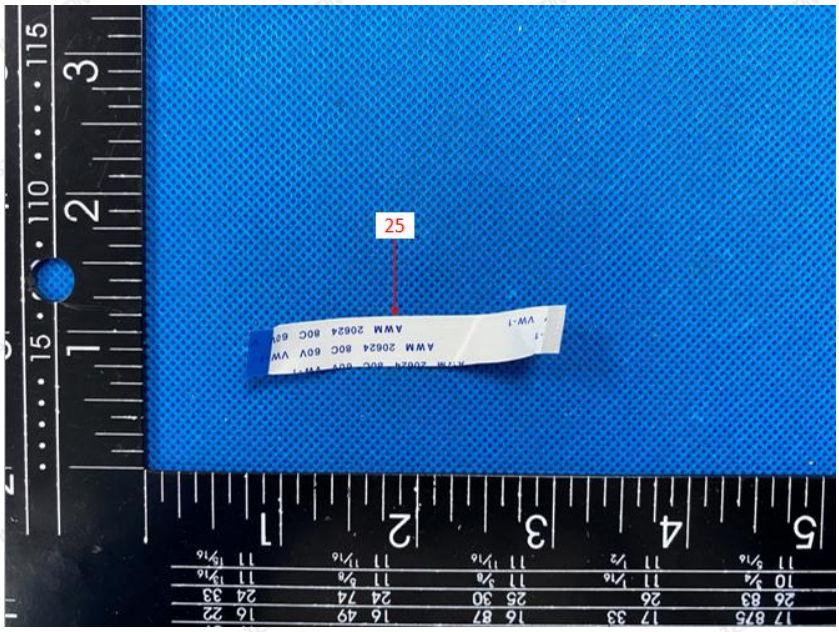


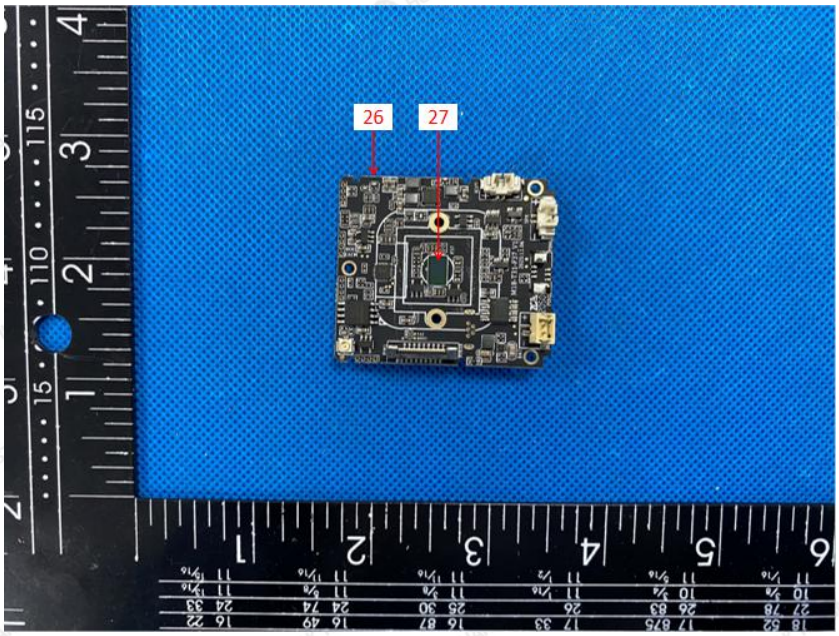


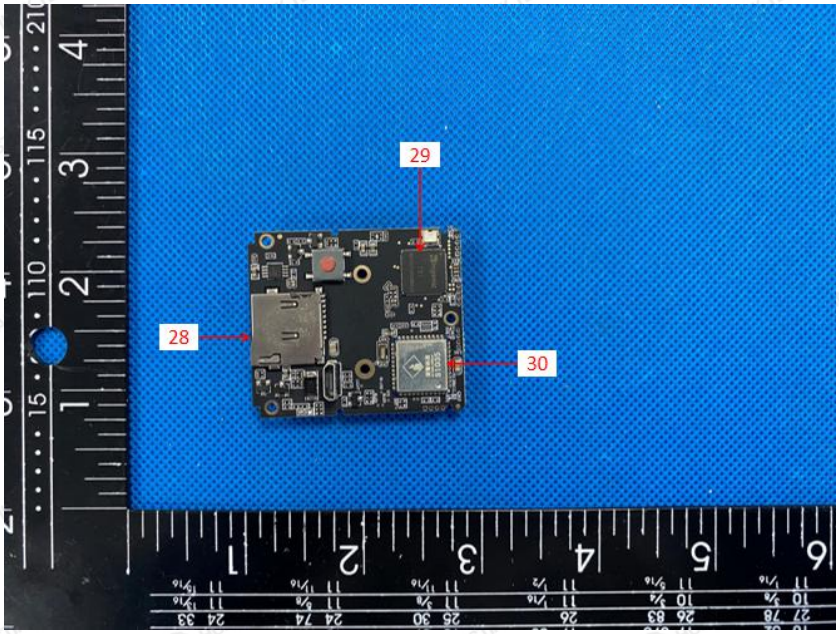












HUAK authenticate the photo on original report only

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

Remark：This report is considered invalidated without the Special Seal for Inspection of the HUAK. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of HUAK, this test report shall not be copied except in full and published as advertisement.

This certificate is responsible for testing sample only.
Please refer to this corresponding test report to get testing process and data.

CERTIFICATE

ATTESTATION
Certificate of Compliance

Technical file of the company mentioned below has been inspected and audit has been completed successfully

The RoHS Directive (EU)2015/863 amending Annex II to Directive 2011/65/EU has been taken as references for these processes.

Certificate's Holder	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China
Manufacturer	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China
Product Name	:	Low power video doorbell
Product Model (S)	:	V30, V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Trade Mark	:	N/A
Related Directive	:	Directive (EU)2015/863 amending Annex II to Directive 2011/65/EU
Certificate Number	:	HK2012291037R
Report No.	:	HK2012291037-1RR
Registration Date	:	Jan. 07, 2021

HUAK TESTING CERTIFICATION HKTC APPROVAL

Certification Manager

The information of the certificate can be checked through www.cer-mark.com. The CE mark which is shown on the certificate can only be used under the conditions that the products complete with all of the relevant Directives of EC Declaration of Conformity. The Manufacturer should be responsible for the internal production control so that the products complied with the essential requirements of the above mentioned Directive(s). Certificate holder must notify all changes to the original certification laboratory of HUAK.

CE

Shenzhen HUAK Testing Technology Co., Ltd.

Add: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Tel.:+86-755-2302 9901 Http:// www.cer-mark.com Postcode:518103 E-mail: service@cer-mark.com

HUAK TESTING

LVD TEST REPORT

CE-LVD

TEST REPORT

Prepared for :

Topvision(Shenzhen) Technology Co., LTD.

Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China

Product:	**Low power video doorbell**
Trade Name:	**N/A**
Model Name:	**See Page 2**
Date of Test:	**Dec. 30, 2020 to Jan. 07, 2021**
Date of Report:	**Jan. 07, 2021**
Report Number:	**HK2012294032-SR**

Prepared By :

Shenzhen HUAK Testing Technology Co., Ltd.

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

TEL: +86-755-2302 9901 **FAX: +86-755-2302 9901**

E-mail: service@cer-mark.com **http://www.cer-mark.com**

TEST REPORT
IEC 62368-1
Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number .....:	HK2012294032-SR
Date of issue.....:	2021-01-07
Total number of pages .....:	63
Applicant's name.....:	Topvision(Shenzhen) Technology Co., LTD.
Address .....:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China
Test specification:	
Standard .....:	EN 62368-1:2014 + A11:2017
Test procedure .....:	CE-LVD
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62368_1B
Test Report Form(s) Originator .....:	UL(US)
Master TRF.....:	2014-03

General disclaimer:

The test results presented in this report relate only to the object tested.

Test Item description .....:	Low power video doorbell
Trade Mark .....:	N/A
Manufacturer.....:	Same as applicant
Model/Type reference .....:	V30, V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12,M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Ratings .....:	Input: 1.5VDC, 0.025A or 5VDC, 0.025A

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1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Testing procedure and testing location:			
☒	**Testing Laboratory:**	Shenzhen HUAK Testing Technology Co., Ltd.	
Testing location/ address ..... :		1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China	
☐	**Associated Testing Laboratory:**		
Testing location/ address ..... :			
Tested by (name + signature)..... :		Jason Cheng	
Approved by (name + signature) ..... :		Dendi Wei	
☐	**Testing procedure: TMP/CTF Stage 1:**		
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Approved by (name + signature) ..... :			
☐	**Testing procedure: WMT/CTF Stage 2:**		
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Witnessed by (name + signature) ..... :			
Approved by (name + signature) ..... :			
☐	**Testing procedure: SMT/CTF Stage 3 or 4:**		
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Witnessed by (name + signature) ..... :			
Approved by (name + signature) ..... :			
Supervised by (name + signature)..... :			

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List of Attachments (including a total number of pages in each attachment):

-Appendix 1: For requirements of European group differences. (9 pages)

-Appendix 2: Photo attachments. (5 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
All clauses.	Shenzhen HUAK Testing Technology Co., Ltd. 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Summary of compliance with National Differences:

European group differences.

☒ **The product fulfils the requirements of** EN 62368-1:2014+A11:2017

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Copy of marking plate:

The artwork below may be only a draft.

Low power video doorbell

Model: V30

Input: 1.5VDC, 0.025A or 5VDC, 0.025A

Topvision(Shenzhen) Technology Co., LTD.

Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan district, Shenzhen City, China

IEC62368_1B

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:
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: _____
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 :	25°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) ..... :	☒ 0.1kg
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)

IEC62368_1B

GENERAL REMARKS:	
"(See Enclosure #)" refers to additional information appended to the report. **"(See appended table)" refers to a table appended to the report.** **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.** The related applicable OSM decisions have been considered and the quirements found fulfilled Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods.	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	Same as Manufacturer
GENERAL PRODUCT INFORMATION:	
Product Description – The products are Low power video doorbell to be indoor use, electronic components mounted on PCB, external enclosure is plastic material of min. V-1 grade. The product only suitable connected to the battery which has been certified. Maximum recommended ambient (Tmra): 25°C	
Model Differences – All models are identical, only different in the model name and appearance, so the model V30 is selected as representative model for full tests.	
Additional application considerations – (Considerations used to test a component or sub-assembly) – N/A	

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ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.	
Electrically-caused injury (Clause 5): (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input ES1	
Source of electrical energy	**Corresponding classification (ES)**
All circuit	ES1
Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2	
Source of power or PIS	**Corresponding classification (PS)**
All circuit	PS1
Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol	
Source of hazardous substances	**Corresponding chemical**
N/A	N/A
Mechanically-caused injury (Clause 8) (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit MS2	
Source of kinetic/mechanical energy	**Corresponding classification (MS)**
All circuit	MS1
Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1	
Source of thermal energy	**Corresponding classification (TS)**
All circuit	TS1
Radiation (Clause 10) (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product RS1	
Type of radiation	**Corresponding classification (RS)**
N/A	N/A

ENERGY SOURCE DIAGRAM
Indicate which energy sources are included in the energy source diagram. Insert diagram below
☒ **ES** ☒ **PS** ☒ **MS** ☒ **TS** ☐ **RS**

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OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	**Possible Hazard**			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	ES1: All circuits inside the equipment.	N/A	N/A	N/A
6.1	Electrically-caused fire			
Material part (e.g. Wireless Keyboard enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
All combustible materials within equipment fire enclosure	PS1: All circuits inside the equipment.	No excessive temperature	Suitable Material	N/A
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	MS1: no sharp edges and corners	N/A	N/A	N/A
Ordinary	MS1: equipment mass < 7kg	N/A	N/A	N/A
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	TS1: Accessible surfaces	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
Supplementary Information: (1) See attached energy source diagram for additional details. (2) “N” – Normal Condition; “A” – Abnormal Condition; “S” Single Fault				

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Clause	Requirement + Test	Result - Remark	Verdict
4	**GENERAL REQUIREMENTS**		P
4.1.1	Acceptance of materials, components and subassemblies	Components which are certified to IEC and/or national standards are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
4.1.2	Use of components	See table 4.1.2	P
4.1.3	Equipment design and construction	No accessible part which could cause injury	P
4.1.15	Markings and instructions.....:	(See Annex F)	P
4.4.4	Safeguard robustness	See below	N/A
4.4.4.2	Steady force tests.....:	(See Annex T.4, T.5)	N/A
4.4.4.3	Drop tests .....:	(See Annex T.7)	N/A
4.4.4.4	Impact tests .....:	(See Annex T.6)	N/A
4.4.4.5	Internal accessible safeguard enclosure and barrier tests.....:	No internal enclosure.	N/A
4.4.4.6	Glass Impact tests .....:	No such glass used.	N/A
4.4.4.7	Thermoplastic material tests .....:	(See Annex T.8)	N/A
4.4.4.8	Air comprising a safeguard.....:	(See Annex T)	N/A
4.4.4.9	Accessibility and safeguard effectiveness	After test, all safeguard remains effective, No damaged	N/A
4.5	Explosion	No requirements	P
4.6	Fixing of conductors		N/A
4.6.1	Fix conductors not to defeat a safeguard	All conductive parts are fixed on PCB by at least two soldering points;	N/A
4.6.2	10 N force test applied to .....:		N/A
4.7	Equipment for direct insertion into mains socket - outlets		N/A
4.7.2	Mains plug part complies with the relevant standard.....:		N/A
4.7.3	Torque (Nm) .....:		N/A
4.8	Products containing coin/button cell batteries	No lithium coin/button cell battery	N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery Compartment Construction		N/A
	Means to reduce the possibility of children removing the battery.....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
4.8.4	Battery Compartment Mechanical Tests .....:	(See Table 4.8.4)	N/A
4.8.5	Battery Accessibility		N/A
4.9	Likelihood of fire or shock due to entry of conductive object.....:	(See Annex P)	N/A
5	**ELECTRICALLY-CAUSED INJURY**		P
5.2.1	Electrical energy source classifications.....:	(See appended table 5.2)	P
5.2.2	ES1, ES2 and ES3 limits	ES1	P
5.2.2.2	Steady-state voltage and current.....:	5VDC	P
5.2.2.3	Capacitance limits .....:		N/A
5.2.2.4	Single pulse limits .....:	No such single pulses with the EUT	N/A
5.2.2.5	Limits for repetitive pulses .....:	No such repetitive pulses with the EUT	N/A
5.2.2.6	Ringing signals .....:	No such ringing signals with the EUT	N/A
5.2.2.7	Audio signals .....:	No such audio signals with the EUT	N/A
5.3	Protection against electrical energy sources		P
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	See below.	P
5.3.2.1	Accessibility to electrical energy sources and safeguards	Only ES1 could be accessible to ordinary person.	P
5.3.2.2	Contact requirements		P
	a) Test with test probe from Annex V.....:	The probe could not insert into the equipment as there is no ventilation on the product.	P
	b) Electric strength test potential (V) .....:	The probe could not insert into the equipment as there is no ventilation on the product.	N/A
	c) Air gap (mm) .....:	The probe could not insert into the equipment as there is no ventilation on the product.	N/A
5.3.2.4	Terminals for connecting stripped wire	No such terminals intended to be used by ordinary person.	N/A
5.4	Insulation materials and requirements		P
5.4.1.2	Properties of insulating material	The choice and application have taken into account as specified in this Clause 5 and Annex T except natural rubber, hygroscopic materials or asbestos are not used as insulation.	P
5.4.1.3	Humidity conditioning .....:	(See sub-clause 5.4.8)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.1.4	Maximum operating temperature for insulating materials ..... :	(See appended table 5.4.1.4)	N/A
5.4.1.5	Pollution degree ..... :	Pollution degree 2	—
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound	Pollution degree 2	N/A
5.4.1.5.3	Thermal cycling	Pollution degree 2	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		N/A
5.4.1.9	Insulating surfaces	Considered.	N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted	See below	N/A
5.4.1.10.2	Vicat softening temperature..... :	(See appended table 5.4.1.10.2)	N/A
5.4.1.10.3	Ball pressure ..... :	(See appended table 5.4.1.10.3)	N/A
5.4.2	Clearances		N/A
5.4.2.2	Determining clearance using peak working voltage	(See appended table 5.4.2.2)	N/A
5.4.2.3	Determining clearance using required withstand voltage ..... :	(See appended table 5.4.2.3)	N/A
	a) a.c. mains transient voltage..... :		—
	b) d.c. mains transient voltage ..... :		—
	c) external circuit transient voltage..... :		—
	d) transient voltage determined by measurement ..... :		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test	(See appended table 5.4.2.4)	N/A
5.4.2.5	Multiplication factors for clearances and test voltages ..... :		N/A
5.4.3	Creepage distances..... :	(See appended table 5.4.3)	N/A
5.4.3.1	General		N/A
5.4.3.3	Material Group ..... :	IIIb	—
5.4.4	Solid insulation		N/A
5.4.4.2	Minimum distance through insulation ..... :	(See appended table 5.4.4.2)	N/A
5.4.4.3	Insulation compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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
5.4.4.6.4	Standard test procedure for non-separable thin sheet material ..... :	(See appended Table 5.4.9)	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 ..... :		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
	Insulation resistance (MΩ)..... :		—
5.4.6	Insulation of internal wire as part of supplementary safeguard ..... :	(See appended table 5.4.4.2)	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 ..... :	(See appended table 5.4.9)	N/A
5.4.9.1	Test procedure for a solid insulation type test		N/A
5.4.9.2	Test procedure for routine tests		N/A
5.4.10	Protection against transient voltages between external circuit		N/A
5.4.10.1	Parts and circuits separated from external circuits	(See appended table 5.4.9)	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 ..... :	(See appended table 5.4.9)	N/A
5.4.10.2.3	Steady-state test..... :	(See appended table 5.4.9)	N/A
5.4.11	Insulation between external circuits and earthed circuitry ..... :	(See appended table 5.4.9)	N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	Rated operating voltage U_{op} (V)..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Nominal voltage U_{peak} (V).....:		—
	Max increase due to variation U_{sp} .....:		—
	Max increase due to ageing ΔU_{sa} .....:		—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$ .....:		—
5.5	Components as safeguards		
5.5.1	General		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.....:	(See appended table 5.5.2.2)	N/A
5.5.3	Transformers	(See Annex G.5.3)	N/A
5.5.4	Optocouplers	(See sub-clause 5.4 or Annex G.12)	N/A
5.5.5	Relays	(See Annex G.2)	N/A
5.5.6	Resistors	(See Annex G.10)	N/A
5.5.7	SPD's	(See Annex G.8)	N/A
5.5.7.1	Use of an SPD connected to reliable earthing		N/A
5.5.7.2	Use of an SPD between mains and protective earth		N/A
5.5.8	Insulation between the mains and external circuit consisting of a coaxial cable.....:	(See Annex G.10.3)	N/A
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) .....:		—
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2). .....:		—
	Protective current rating (A) ..... :		—
5.6.4.3	Current limiting and overcurrent protective devices		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Requirement		N/A
	Conductor size (mm^2), nominal thread diameter (mm). .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method Resistance (Ω).....:	(See appended table 5.6.6.2)	N/A
5.6.7	Reliable earthing		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 prospective touch voltage		N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A
	System of interconnected equipment (separate connections/single connection) .....:		—
	Multiple connections to mains (one connection at a time/simultaneous connections) .....:		—
5.7.4	Earthed conductive accessible parts.....:	(See appended Table 5.7.4)	N/A
5.7.5	Protective conductor current		N/A
	Supply Voltage (V).....:		—
	Measured current (mA).....:		—
	Instructional Safeguard.....:	(See F.4 and F.5)	N/A
5.7.6	Prospective touch voltage and touch current due to external circuits		N/A
5.7.6.1	Touch current from coaxial cables		N/A
5.7.6.2	Prospective touch voltage and touch current from external circuits		N/A
5.7.7	Summation of touch currents from external circuits		N/A
	a) Equipment with earthed external circuits Measured current (mA).....:		N/A
	b) Equipment whose external circuits are not referenced to earth. Measured current (mA).....:		N/A
6	**ELECTRICALLY- CAUSED FIRE**		P
6.2	Classification of power sources (PS) and potential ignition sources (PIS)		P
6.2.2	Power source circuit classifications		P
6.2.2.1	General		P
6.2.2.2	Power measurement for worst-case load fault ... :	(See appended table 6.2.2)	P

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Clause	Requirement + Test	Result - Remark	Verdict
6.2.2.3	Power measurement for worst-case power source fault ..... :	(See appended table 6.2.2)	P
6.2.2.4	PS1 ..... :	(See appended table 6.2.2)	P
6.2.2.5	PS2 ..... :	(See appended table 6.2.2)	N/A
6.2.2.6	PS3 ..... :	(See appended table 6.2.2)	N/A
6.2.3	Classification of potential ignition sources		N/A
6.2.3.1	Arcing PIS ..... :	(See appended table 6.2.3.1)	N/A
6.2.3.2	Resistive PIS ..... :	(See appended table 6.2.3.2)	N/A
6.3	Safeguards against fire under normal operating and abnormal operating conditions		N/A
6.3.1 (a)	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials ..... :	(See appended table 5.4.1.5, 6.3.2, 9.0, B.2.6)	N/A
6.3.1 (b)	Combustible materials outside fire enclosure	No such materials used.	N/A
6.4	Safeguards against fire under single fault conditions		P
6.4.1	Safeguard Method	Approved fire enclosure used	P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		P
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	General		N/A
6.4.3.2	Supplementary Safeguards	By equipped plastic fire enclosure.	N/A
	Special conditions if conductors on printed boards are opened or peeled	No such case happened.	N/A
6.4.3.3	Single Fault Conditions ..... :	(See appended table 6.4.3)	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 Annex G)	N/A
6.4.6	Control of fire spread in PS3 circuit		N/A
6.4.7	Separation of combustible materials from a PIS		N/A
6.4.7.1	General ..... :	(See tables 6.2.3.1 and 6.2.3.2)	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		N/A
6.4.8.1	Fire enclosure and fire barrier material properties		N/A
6.4.8.2.1	Requirements for a fire barrier		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.8.2.2	Requirements for a fire enclosure		N/A
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier		N/A
6.4.8.3.1	Fire enclosure and fire barrier openings	No requirements	N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top Openings in Fire Enclosure: dimensions (mm) .....:		N/A
	Needle Flame test		N/A
6.4.8.3.4	Bottom Openings in Fire Enclosure, condition met a), b) and/or c) dimensions (mm) .....:		N/A
	Flammability tests for the bottom of a fire enclosure .....:		N/A
6.4.8.3.5	Integrity of the fire enclosure, condition met: a), b) or c) .....:		N/A
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating.....:	V-0 plastic enclosure used and no distance between PIS and enclosure	N/A
6.5	Internal and external wiring		N/A
6.5.1	Requirements		N/A
6.5.2	Cross-sectional area (mm^2) .....:		—
6.5.3	Requirements for interconnection to building wiring .....:	(See Annex Q.)	N/A
6.6	Safeguards against fire due to connection to additional equipment		N/A
	External port limited to PS2 or complies with Clause Q.1		N/A
7	**INJURY CAUSED BY HAZARDOUS SUBSTANCES**		N/A
7.2	Reduction of exposure to hazardous substances	No hazardous chemicals within the equipment.	N/A
7.3	Ozone exposure		N/A
7.4	Use of personal safeguards (PPE)		N/A
	Personal safeguards and instructions ..... :		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010) .....:		—
7.6	Batteries .....:	(See Annex M)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8	**MECHANICALLY-CAUSED INJURY**		P
8.1	General	See the following details.	P
8.2	Mechanical energy source classifications	Sharp edges and corners, classified as MS1 Equipment maximum mass < 7 kg, classified as MS1	P
8.3	Safeguards against mechanical energy sources		N/A
8.4	Safeguards against parts with sharp edges and corners	Accessible edges and corners of the equipment are rounded and are classified as MS1.	P
8.4.1	Safeguards		N/A
8.5	Safeguards against moving parts	No moving parts within the equipment.	N/A
8.5.1	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
8.5.2	Instructional Safeguard ..... :		—
8.5.4	Special categories of equipment comprising moving parts		N/A
8.5.4.1	Large data storage equipment		N/A
8.5.4.2	Equipment having electromechanical device for destruction of media		N/A
8.5.4.2.1	Safeguards and Safety Interlocks .....:	(See Annex F.4 and Annex K)	N/A
8.5.4.2.2	Instructional safeguards against moving parts		N/A
	Instructional Safeguard .....:		—
8.5.4.2.3	Disconnection from the supply		N/A
8.5.4.2.4	Probe type and force (N) .....:		N/A
8.5.5	High Pressure Lamps		N/A
8.5.5.1	Energy Source Classification		N/A
8.5.5.2	High Pressure Lamp Explosion Test.....:	(See appended table 8.5.5.2)	N/A
8.6	Stability		N/A
8.6.1	Product classification		N/A
	Instructional Safeguard .....:		—
8.6.2	Static stability		N/A
8.6.2.2	Static stability test		N/A
	Applied Force .....:		—
8.6.2.3	Downward Force Test		N/A
8.6.3	Relocation stability test		N/A
	Unit configuration during 10° tilt .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test (Applied Force).....:		N/A
	Position of feet or movable parts.....:		—
8.7	Equipment mounted to wall or ceiling		N/A
8.7.1	Mounting Means (Length of screws (mm) and mounting surface) .....:		N/A
8.7.2	Direction and applied force.....:		N/A
8.8	Handles strength		N/A
8.8.1	Classification		N/A
8.8.2	Applied Force .....:		N/A
8.9	Wheels or casters attachment requirements		N/A
8.9.1	Classification		N/A
8.9.2	Applied force .....:		—
8.10	Carts, stands and similar carriers		N/A
8.10.1	General		N/A
8.10.2	Marking and instructions		N/A
	Instructional Safeguard.....:		—
8.10.3	Cart, stand or carrier loading test and compliance		N/A
	Applied force .....:		—
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Applied horizontal force (N).....:		—
8.10.6	Thermoplastic temperature stability (°C).....:		N/A
8.11	Mounting means for rack mounted equipment		N/A
8.11.1	General		N/A
8.11.2	Product Classification		N/A
8.11.3	Mechanical strength test, variable *N* .....:		N/A
8.11.4	Mechanical strength test 250N, including end stops		N/A
8.12	Telescoping or rod antennas.....	(See Annex T)	N/A
	Button/Ball diameter (mm).....:		—
9	**THERMAL BURN INJURY**		P
9.2	Thermal energy source classifications		P
9.3	Safeguard against thermal energy sources		P

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Clause	Requirement + Test	Result - Remark	Verdict
9.4	Requirements for safeguards		P
9.4.1	Equipment safeguard		N/A
9.4.2	Instructional safeguard .....:		N/A
10	**RADIATION**		N/A
10.2	Radiation energy source classification		N/A
10.2.1	General classification		N/A
10.3	Protection against laser radiation		N/A
	Laser radiation that exists equipment:		—
	Normal, abnormal, single-fault ..... :	(See attached laser test report)	N/A
	Instructional safeguard ..... :		—
	Tool..... :		—
10.4	Protection against visible, infrared, and UV radiation		N/A
10.4.1	General		N/A
10.4.1.a)	RS3 for Ordinary and instructed persons.....:		N/A
10.4.1.b)	RS3 accessible to a skilled person.....:		N/A
	Personal safeguard (PPE) instructional safeguard.....:		—
10.4.1.c)	Equipment visible, IR, UV does not exceed RS1 . :		N/A
10.4.1.d)	Normal, abnormal, single-fault conditions .....:	(See appended table B.3 & B.4)	N/A
10.4.1.e)	Enclosure material employed as safeguard is opaque.....:		N/A
10.4.1.f)	UV attenuation.....:		N/A
10.4.1.g)	Materials resistant to degradation UV .....:		N/A
10.4.1.h)	Enclosure containment of optical radiation.....:		N/A
10.4.1.i)	Exempt Group under normal operating conditions .....:		N/A
10.4.2	Instructional safeguard .....:		N/A
10.5	Protection against x-radiation		N/A
10.5.1	X- radiation energy source that exists equipment:	(See appended table B.3 & B.4)	N/A
	Normal, abnormal, single fault conditions		N/A
	Equipment safeguards.....:		N/A
	Instructional safeguard for skilled person..... :		N/A
10.5.3	Most unfavourable supply voltage to give maximum radiation .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Abnormal and single-fault condition ..... :	(See appended table B.3 & B.4)	N/A
	Maximum radiation (pA/kg)..... :		N/A
10.6	Protection against acoustic energy sources		N/A
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output, dB(A)..... :		N/A
	Output voltage, unweighted r.m.s..... :		N/A
10.6.4	Protection of persons		N/A
	Instructional safeguards ..... :		N/A
	Equipment safeguard prevent ordinary person to RS2..... :		—
	Means to actively inform user of increase sound pressure..... :		—
	Equipment safeguard prevent ordinary person to RS2..... :		—
10.6.5	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.5.1	Corded passive listening devices with analog input		N/A
	Input voltage with 94 dB(A) L_{Aeq} acoustic pressure output..... :		—
10.6.5.2	Corded listening devices with digital input		N/A
	Maximum dB(A)..... :		—
10.6.5.3	Cordless listening device		N/A
	Maximum dB(A)..... :		—
B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS**		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 ..... :		N/A
B.2.3	Supply voltage and tolerances		N/A
B.2.5	Input test..... :	(See appended table B.2.5)	P
B.3	Simulated abnormal operating conditions		N/A
B.3.1	General requirements..... :	(See appended table B.3)	N/A
B.3.2	Covering of ventilation openings	No ventilation openings provided.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
B.3.3	D.C. mains polarity test	The EUT is not connected to a D.C. mains	N/A
B.3.4	Setting of voltage selector ..... :	No setting of voltage selector within the EUT	N/A
B.3.5	Maximum load at output terminals .....:	(See appended table B.3&B.4)	N/A
B.3.6	Reverse battery polarity		N/A
B.3.7	Abnormal operating conditions as specified in Clause E.2.		N/A
B.3.8	Safeguards functional during and after abnormal operating conditions		N/A
B.4	Simulated single fault conditions		P
B.4.2	Temperature controlling device open or short-circuited ..... :	(See appended table B.4)	N/A
B.4.3	Motor tests	No motor within the EUT	N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature ..... :	(See Clause G.5)	N/A
B.4.4	Short circuit of functional insulation		N/A
B.4.4.1	Short circuit of clearances for functional insulation		N/A
B.4.4.2	Short circuit of creepage distances for functional insulation		N/A
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		P
B.4.6	Short circuit or disconnect of passive components		P
B.4.7	Continuous operation of components		N/A
B.4.8	Class 1 and Class 2 energy sources within limits during and after single fault conditions		P
B.4.9	Battery charging under single fault conditions ... :		N/A
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 apparatus		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
C.2.4	Xenon-arc light exposure apparatus		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**		N/A
E.1	Audio amplifier normal operating conditions		N/A
	Audio signal voltage (V) .....:		—
	Rated load impedance (Ω) .....:		
E.2	Audio amplifier abnormal operating conditions		N/A
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		P
F.1	General requirements		P
	Instructions – Language .....:	Evaluated the user manual in English version. The manufacturer commits to provide them in the language of the countries where the product will be distributed.	—
F.2	Letter symbols and graphical symbols		P
F.2.1	Letter symbols according to IEC60027-1		P
F.2.2	Graphic symbols IEC, ISO or manufacturer specific		P
F.3	Equipment markings		P
F.3.1	Equipment marking locations	On the product	P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification .....:	See marking	—
F.3.2.2	Model identification .....:	Marked	—
F.3.3	Equipment rating markings		P
F.3.3.1	Equipment with direct connection to mains	Considered	P
F.3.3.2	Equipment without direct connection to mains		N/A
F.3.3.3	Nature of supply voltage .....:	See marking	—
F.3.3.4	Rated voltage .....:	See marking	—
F.3.3.4	Rated frequency .....:		—
F.3.3.6	Rated current or rated power .....:	See marking	—
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device		N/A
F.3.5	Terminals and operating devices		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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
F.3.5.4	Replacement battery identification marking ..... :		N/A
F.3.5.5	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
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	Neutral conductor terminal		N/A
F.3.6.1.3	Protective bonding conductor terminals		N/A
F.3.6.2	Class II equipment (IEC60417-5172)		N/A
F.3.6.2.1	Class II equipment with or without functional earth		N/A
F.3.6.2.2	Class II equipment with functional earth terminal marking		N/A
F.3.7	Equipment IP rating marking ..... :	IPX0	—
F.3.8	External power supply output marking	Marked on the label	P
F.3.9	Durability, legibility and permanence of marking	Marking plate was provided on the enclosure and it was legible, permanent and easily discernible.	P
F.3.10	Test for permanence of markings	Complied	P
F.4	Instructions		P
	a) Equipment for use in locations where children not likely to be present - marking	The accessibility of equipment was evaluated by using test probe of Figure V.2.	P
	b) Instructions given for installation or initial use	Relevant safety caution texts and installation instruction are available.	P
	c) Equipment intended to be fastened in place	See above.	P
	d) Equipment intended for use only in restricted access area	The EUT is not such type equipment	N/A
	e) Audio equipment terminals classified as ES3 and other equipment with terminals marked in accordance F.3.6.1	No such terminals provided.	N/A
	f) Protective earthing employed as safeguard	Class III equipment	N/A
	g) Protective earthing conductor current exceeding ES 2 limits	Class III equipment	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	h) Symbols used on equipment	Complied	P
	i) Permanently connected equipment not provided with all-pole mains switch	The EUT is not a permanently connected equipment	N/A
j)	j) Replaceable components or modules providing safeguard function	No replaceable components	N/A
F.5	Instructional safeguards	No instructional safeguard is considered as necessary.	N/A
	Where “instructional safeguard” is referenced in the test report it specifies the required elements, location of marking and/or instruction	No instructional safeguard required in the equipment.	N/A
G	**COMPONENTS**		N/A
G.1	**Switches**		N/A
G.1.1	General requirements	No such switch as disconnect devices provided within the equipment.	N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.2	**Relays**		N/A
G.2.1	General requirements	No such relay provided within the equipment.	N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supply power		N/A
G.2.4	Mains relay, modified as stated in G.2		N/A
G.3	**Protection Devices**		N/A
G.3.1	Thermal cut-offs	No thermal cut-off provided within the equipment.	N/A
G.3.1.1a) &b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
G.3.1.1c)	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Thermal cut-off connections maintained and secure		N/A
G.3.2	Thermal links		N/A
G.3.2.1a)	Thermal links separately tested with IEC 60691		N/A
G.3.2.1b)	Thermal links tested as part of the equipment		N/A
	Aging hours (H) ..... :		—
	Single Fault Condition ..... :		—
	Test Voltage (V) and Insulation Resistance (Ω). :		—
G.3.3	PTC Thermistors	No PTC thermistor provided within the equipment.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.3.4	Overcurrent protection devices	.	N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		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.....	(See Annex J)	N/A
G.5.1.2 a)	Two wires in contact inside wound component, angle between 45° and 90°	Insulation tube used as physical separation	N/A
G.5.1.2 b)	Construction subject to routine testing		N/A
G.5.2	Endurance test on wound components		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Time (s) .....:		—
	Temperature (°C) .....:		—
G.5.2.3	Wound Components supplied by mains		N/A
G.5.3	**Transformers**		N/A
G.5.3.1	Requirements applied (IEC61204-7, IEC61558-1/-2, and/or IEC62368-1) .....:		N/A
	Position.....:		—
	Method of protection .....:		—
G.5.3.2	Insulation		N/A
	Protection from displacement of windings.....:		—
G.5.3.3	Overload test..... :		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding Temperatures testing in the unit		N/A
G.5.3.3.3	Winding Temperatures - Alternative test method		N/A
G.5.4	**Motors**		N/A
G.5.4.1	General requirements		N/A
	Position .....:		—
G.5.4.2	Test conditions		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.5.4.3	Running overload test		N/A
G.5.4.4	Locked-rotor overload test		N/A
	Test duration (days) .....:		—
G.5.4.5	Running overload test for d.c. motors in secondary circuits		N/A
G.5.4.5.2	Tested in the unit		N/A
	Electric strength test (V).....:		—
G.5.4.5.3	Tested on the Bench - Alternative test method; test time (h) .....:		N/A
	Electric strength test (V).....:		—
G.5.4.6	Locked-rotor overload test for d.c. motors in secondary circuits		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature .....:		N/A
	Electric strength test (V) .....:		N/A
G.5.4.6.3	Tested on the bench - Alternative test method; test time (h) .....:		N/A
	Electric strength test (V).....:		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
G.6.2	Solvent-based enamel wiring insulation		N/A
G.7	**Mains supply cords**		N/A
G.7.1	General requirements		N/A
	Type.....:		—
	Rated current (A).....:		—
	Cross-sectional area (mm^2), (AWG) ..... :		—
G.7.2	Compliance and test method		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) .....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)....:		—
G.7.3.2.4	Strain relief comprised of polymeric material		N/A
G.7.4	Cord Entry ..... :	(See appended table 5.4.11.1)	N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Mass (g) ..... :		—
	Diameter (m) ..... :		—
	Temperature (°C) ..... :		—
G.7.6	Supply wiring space		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Test with 8 mm strand		N/A
G.8	**Varistors**		N/A
G.8.1	General requirements		N/A
G.8.2	Safeguard against shock		N/A
G.8.3	Safeguard against fire		N/A
G.8.3.2	Varistor overload test .....:	(See appended table B.3)	N/A
G.8.3.3	Temporary overvoltage .....:	(See appended table B.3)	N/A
G.9	**Integrated Circuit (IC) Current Limiters**		N/A
G.9.1 a)	Manufacturer defines limit at max. 5A.		N/A
G.9.1 b)	Limiters do not have manual operator or reset		N/A
G.9.1 c)	Supply source does not exceed 250 VA .....:		—
G.9.1 d)	IC limiter output current (max. 5A) .....:		—
G.9.1 e)	Manufacturers' defined drift .....:		—
G.9.2	Test Program 1		N/A
G.9.3	Test Program 2		N/A
G.9.4	Test Program 3		N/A
G.10	**Resistors**		N/A
G.10.1	General requirements		N/A
G.10.2	Resistor test		N/A
G.10.3	Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable		N/A
G.10.3.1	General requirements		N/A
G.10.3.2	Voltage surge test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.10.3.3	Impulse test		N/A
G.11	**Capacitor 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 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results).....:		N/A
	Type test voltage Vini .....:		—
	Routine test voltage, Vini,b .....:		—
G.13	**Printed boards**		N/A
G.13.1	General requirements		N/A
G.13.2	Uncoated printed boards		N/A
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
	Compliance with cemented joint requirements (Specify construction).....:		—
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation.....:	(See appended table 5.4.4.5)	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.13.6.2a)	Thermal conditioning		N/A
G.13.6.2b)	Electric strength test		N/A
G.13.6.2c)	Abrasion resistance test		N/A
G.14	**Coating on components terminals**		N/A
G.14.1	Requirements .....:	(See G.13)	N/A
G.15	**Liquid filled components**		N/A
G.15.1	General requirements		N/A
G.15.2	Requirements		N/A
G.15.3	Compliance and test methods		N/A
G.15.3.1	Hydrostatic pressure test		N/A
G.15.3.2	Creep resistance test		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.15.3.3	Tubing and fittings compatibility test		N/A
G.15.3.4	Vibration test		N/A
G.15.3.5	Thermal cycling test		N/A
G.15.3.6	Force test		N/A
G.15.4	Compliance		N/A
G.16	**IC including capacitor discharge function (ICX)**		N/A
a)	Humidity treatment in accordance with sc5.4.8 – 120 hours		N/A
b)	Impulse test using circuit 2 with Uc = to transient voltage .....:		N/A
C1)	Application of ac voltage at 110% of rated voltage for 2.5 minutes		N/A
C2)	Test voltage .....:		—
D1)	10,000 cycles on and off using capacitor with smallest capacitance resistor with largest resistance specified by manufacturer		N/A
D2)	Capacitance .....:		—
D3)	Resistance .....:		—
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 complied with		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V) .....:		—
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		N/A
	General requirements	(See separate test report)	N/A
K	**SAFETY INTERLOCKS**		N/A
K.1	General requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
K.2	Components of safety interlock safeguard mechanism	(See Annex G)	N/A
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance .....:	(See appended table B.4)	N/A
K.6	Mechanically operated safety interlocks		N/A
K.6.1	Endurance requirement		N/A
K.6.2	Compliance and Test method .....:		N/A
K.7	Interlock circuit isolation		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements (type and circuit location) .....:		N/A
K.7.2	Overload test, Current (A).....:		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test .....:	(See appended table 5.4.11)	N/A
L	**DISCONNECT DEVICES**		N/A
L.1	General requirements	DC connector	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
M	**EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS**		N/A
M.1	General requirements		N/A
M.2	Safety of batteries and their cells		N/A
M.2.1	Requirements		N/A
M.2.2	Compliance and test method (identify method) .. :		N/A
M.3	Protection circuits		N/A
M.3.1	Requirements		N/A
M.3.2	Tests		N/A
	- Overcharging of a rechargeable battery		N/A
	- Unintentional charging of a non-rechargeable battery		N/A
	- Reverse charging of a rechargeable battery		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- Excessive discharging rate for any battery		N/A
M.3.3	Compliance .....:	(See appended Tables and Annex M and M.4)	N/A
M.4	Additional safeguards for equipment containing secondary lithium battery	Certified battery used	N/A
M.4.1	General		N/A
M.4.2	Charging safeguards		N/A
M.4.2.1	Charging operating limits		N/A
M.4.2.2a)	Charging voltage, current and temperature .....:	(See Table M.4)	—
M.4.2.2 b)	Single faults in charging circuitry .....:	(See Annex B.4)	—
M.4.3	Fire Enclosure		N/A
M.4.4	Endurance of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation		N/A
M.4.4.3	Drop and charge/discharge function tests		N/A
	Drop		N/A
	Charge		N/A
	Discharge		N/A
M.4.4.4	Charge-discharge cycle test		N/A
M.4.4.5	Result of charge-discharge cycle test		N/A
M.5	Risk of burn due to short circuit during carrying		N/A
M.5.1	Requirement		N/A
M.5.2	Compliance and Test Method (Test of P.2.3)		N/A
M.6	Prevention of short circuits and protection from other effects of electric current		N/A
M.6.1	Short circuits		N/A
M.6.1.1	General requirements		N/A
M.6.1.2	Test method to simulate an internal fault		N/A
M.6.1.3	Compliance (Specify M.6.1.2 or alternative method) .....:		N/A
M.6.2	Leakage current (mA) .....:		N/A
M.7	Risk of explosion from lead acid and NiCd batteries		N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
M.7.2	Compliance and test method		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.8	Protection against internal ignition from external spark sources of lead acid batteries		N/A
M.8.1	General requirements		N/A
M.8.2	Test method		N/A
M.8.2.1	General requirements		N/A
M.8.2.2	Estimation of hypothetical volume *Vz* (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 (Determination of compliance: inspection, data review; or abnormal testing) ..... :		N/A
N	**ELECTROCHEMICAL POTENTIALS**		N/A
	Metal(s) used ..... :	Pollution degree considered	—
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		N/A
	Figures O.1 to O.20 of this Annex applied..... :		—
P	**SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS**		N/A
P.1	General requirements		N/A
P.2.2	Safeguards against entry of foreign object		N/A
	Location and Dimensions (mm) ..... :	No openings	—
P.2.3	Safeguard against the consequences of entry of foreign object		N/A
P.2.3.1	Safeguards against the entry of a foreign object		N/A
	Openings in transportable equipment		N/A
	Transportable equipment with metalized plastic parts ..... :		N/A
P.2.3.2	Openings in transportable equipment in relation to metallized parts of a barrier or enclosure (identification of supplementary safeguard) ..... :		N/A
P.3	Safeguards against spillage of internal liquids		N/A
P.3.1	General requirements		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Safeguards effectiveness		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
P.4	Metallized coatings and adhesive securing parts		N/A
P.4.2 a)	Conditioning testing		N/A
	Tc (°C)..... :		—
	Tr (°C) ..... :		—
	Ta (°C)..... :		—
P.4.2 b)	Abrasion testing ..... :	(See G.13.6.2)	N/A
P.4.2 c)	Mechanical strength testing ..... :	(See Annex T)	N/A
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		N/A
Q.1	Limited power sources		N/A
Q.1.1 a)	Inherently limited output		N/A
Q.1.1 b)	Impedance limited output		N/A
	- Regulating network limited output under normal operating and simulated single fault condition		N/A
Q.1.1 c)	Overcurrent protective device limited output		N/A
Q.1.1 d)	IC current limiter complying with G.9		N/A
Q.1.2	Compliance and test method		N/A
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A) ..... :		—
	Current limiting method..... :		—
R	**LIMITED SHORT CIRCUIT TEST**		N/A
R.1	General requirements		N/A
R.2	Determination of the overcurrent protective device and circuit		N/A
R.3	Test method Supply voltage (V) and short-circuit current (A)). ..... :		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 ..... :		—
	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

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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).....:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	Test specimen does not show any additional hole		N/A
S.3	Flammability test for the bottom of a fire enclosure		N/A
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Cheesecloth did not ignite		N/A
S.4	Flammability classification of materials		N/A
S.5	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 .....:		—
	Wall thickness (mm).....:		—
	Conditioning (test condition), (°C).....:		—
	Test flame according to IEC 60695-11-20 with conditions as set out		N/A
	After every test specimen was not consumed completely		N/A
	After fifth flame application, flame extinguished within 1 min		N/A
T	**MECHANICAL STRENGTH TESTS**		N/A
T.1	General requirements		N/A
T.2	Steady force test, 10 N .....:	(See appended table T.2)	N/A
T.3	Steady force test, 30 N .....:	(See appended table T3)	N/A
T.4	Steady force test, 100 N .....:	(See appended table T4)	N/A
T.5	Steady force test, 250 N .....:	(See appended table T5)	N/A
T.6	Enclosure impact test	(See appended table T6)	N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test .....:	(See appended table T7)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
T.8	Stress relief test .....:	(See appended table T8)	N/A
T.9	Impact Test (glass)		N/A
T.9.1	General requirements		N/A
T.9.2	Impact test and compliance		N/A
	Impact energy (J).....:		—
	Height (m) .....:		—
T.10	Glass fragmentation test .....:	(See sub-clause 4.4.4.9)	N/A
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm) .....:		—
U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFECTS OF IMPLOSION**		N/A
U.1	General requirements		N/A
U.2	Compliance and test method for non-intrinsically protected CRTs		N/A
U.3	Protective Screen.....:	(See Annex T)	N/A
V	**DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)**		N/A
V.1	Accessible parts of equipment		N/A
V.2	Accessible part criterion		N/A

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IEC 62368-1			
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 (Edition / year)	Mark(s) of conformity1)
PCB	Fai Wong Electronic Pcb Co.	FW-4	V-0, 130°C, min. 1.0mm	EN 62368-1	UL E171766 and tested with appliance
Plastic enclosure	LG Chemical Ltd.	LUMID GP2251BFH(#)	V-0, 130°C	EN 62368-1	UL E67171 and tested with appliance
Internal wire	SHENZHEN HONGYA ELECTRONICS CO LTD	1007	VW-1, 80°C, 300Vac, Min. 24AWG	EN 62368-1	UL E346933 and tested with appliance

Supplementary information:

1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.

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Clause	Requirement + Test	Result - Remark	Verdict

4.8.4, 4.8.5	**TABLE: Lithium coin/button cell batteries mechanical tests**	N/A

(The following mechanical tests are conducted in the sequence noted.)

4.8.4.2	**TABLE: Stress Relief test**	—

Part	**Material**	**Oven Temperature (°C)**	**Comments**

4.8.4.3	**TABLE: Battery replacement test**	—
Battery part no. .....:		—

Battery Installation/withdrawal	Battery Installation/Removal Cycle	Comments
	1	
	2	
	3	
	4	
	5	
	6	
	8	
	9	
	10	

4.8.4.4	**TABLE: Drop test**	—

Impact Area	Drop Distance	Drop No.	Observations
		1	
		2	
		3	

4.8.4.5	**TABLE: Impact**	—

Impacts per surface	**Surface tested**	**Impact energy (Nm)**	**Comments**

4.8.4.6	**TABLE: Crush test**	—

Test position	**Surface tested**	**Crushing Force (N)**	**Duration force applied (s)**

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Clause	Requirement + Test	Result - Remark	Verdict

4.8.4, 4.8.5	**TABLE: Lithium coin/button cell batteries mechanical tests**	N/A
(The following mechanical tests are conducted in the sequence noted.)		
Supplementary information:		

4.8.5	**TABLE: Lithium coin/button cell batteries mechanical test result**		**N/A**
Test position	**Surface tested**	**Force (N)**	**Duration force applied (s)**
Supplementary information:			

5.2	**Table: Classification of electrical energy sources**					P
5.2.2.2 – Steady State Voltage and Current conditions						
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters		ES Class
				U (Vrms or Vpk)	I (Apk or Arms) / Hz	
1	5VDC	Input to accessible parts	Normal	5VDC	-- / --	ES1
			Abnormal	5VDC	-- / --	
			Single fault – SC/OC	5VDC	-- / --	

5.2.2.3 - Capacitance Limits						
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters		ES Class
				Capacitance, nF	Upk (V)	
--	--	--	Normal	--	--	--
			Abnormal	--	--	
			Single fault – SC/OC	--	--	

5.2.2.4 - Single Pulses							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Duration (ms)	Upk (V)	Ipk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	

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

5.2.2.5 - Repetitive Pulses

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	Ipk (mA)	
--	--	--	Normal	--	--	--	--
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	

Test Conditions:

Normal –

Abnormal -

Supplementary information: SC=Short Circuit, OC=Short Circuit

5.4.1.4, 6.3.2, 9.0, B.2.6	TABLE: Temperature measurements						P
	Supply voltage (V) ..... :	5VDC		1.5VDC		--	—
	Ambient T_{min} (°C) ..... :	23.2	25.0	23.1	25.0	--	—
	Ambient T_{max} (°C) ..... :	23.4	25.0	23.2	25.0	--	—
Maximum measured temperature T of part/at……:		T (°C)					Allowed T_{max} (°C)
PCB		26.4	28.2	25.5	27.4	--	130
Plastic enclosure		24.9	26.7	24.7	26.6	--	48
Internal wiring		25.1	26.9	24.8	26.7	--	80

Supplementary information:

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: N/A

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Clause	Requirement + Test	Result - Remark	Verdict

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics		N/A
Penetration (mm)..... :			—
Object/ Part No./Material		Manufacturer/trademark	T softening (°C)
supplementary information:			

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

5.4.2.2, 5.4.2.4 and 5.4.3	TABLE: Minimum Clearances/Creepage distance						N/A
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequency (kHz)[1]	Required cl (mm)	cl (mm)[2]	Required[3] cr (mm)	cr (mm)

Supplementary information:

Note 1: Only for frequency above 30 kHz

Note 2: See table 5.4.2.4 if this is based on electric strength test

Note 3: Provide Material Group

5.4.2.3	TABLE: Minimum Clearances distances using required withstand voltage			N/A
	Overvoltage Category (OV):			
	Pollution Degree:			
Clearance distanced between:		Required withstand voltage	Required cl (mm)	Measured cl (mm)
Supplementary information:				

5.4.2.4	TABLE: Clearances based on electric strength test			N/A
Test voltage applied between:		Required cl (mm)	Test voltage (kV) peak/ r.m.s. / d.c.	Breakdown Yes / No

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Clause	Requirement + Test	Result - Remark	Verdict
Supplementary information:			

5.4.4.2, 5.4.4.5 c) 5.4.4.9	TABLE: Distance through insulation measurements				N/A
Distance through insulation di at/of:	Peak voltage (V)	Frequency (kHz)	Material	Required DTI (mm)	DTI (mm)
Supplementary information:					

5.4.9	TABLE: Electric strength tests		N/A
Test voltage applied between:	Voltage shape (AC, DC)	Test voltage (V)	Breakdown Yes / No
Supplementary information:			

5.5.2.2	TABLE: Stored discharge on capacitors				N/A
Supply Voltage (V), Hz	Test Location	Operating Condition (N, S)	Switch position On or off	Measured Voltage (after 2 seconds)	ES Classification

Supplementary information:

X-capacitors installed for testing are:

☐ bleeding resistor rating:

☐ ICX:

Notes:

A. Test Location:

Phase to Neutral; Phase to Phase; Phase to Earth; and/or Neutral to Earth

B. Operating condition abbreviations:

N – Normal operating condition (e.g., normal operation, or open fuse); S –Single fault condition

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Clause	Requirement + Test	Result - Remark	Verdict

5.6.6.2	TABLE: Resistance of protective conductors and terminations			N/A
Accessible part	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)
Supplementary information:				

5.7.2.2, 5.7.4	TABLE: Earthed accessible conductive part	N/A
Supply voltage .....:		—
Location	Test conditions specified in 6.1 of IEC 60990 or Fault Condition No in IEC 60990 clause 6.2.2.1 through 6.2.2.8, except for 6.2.2.7	Touch current (mA)
	1	
	2*	
	3	
	4	
	5	
	6	
	8	

Supplementary Information:

Notes:
[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.

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Clause	Requirement + Test	Result - Remark	Verdict

6.2.2	Table: Electrical power sources (PS) measurements for classification				P
Source	Description	Measurement	Max Power after 3 s	Max Power after 5 s*)	PS Classification
Input	Input circuit	Power (W) :	--	0.038	PS1
		V_A (V) :	--	1.5	
		I_A (A) :	--	0.025	
Input	Input circuit	Power (W) :	--	0.105	PS1
		V_A (V) :	--	5	
		I_A (A) :	--	0.021	

Supplementary Information:
(*) Measurement taken only when limits at 3 seconds exceed PS1 limits

6.2.3.1	Table: Determination of Potential Ignition Sources (Arcing PIS)			N/A
Location	Open circuit voltage After 3 s (Vp)	Measured r.m.s current (Irms)	Calculated value (V_p x I_{rms})	Arcing PIS? Yes / No

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.

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

6.2.3.2	Table: Determination of Potential Ignition Sources (Resistive PIS)				N/A
Circuit Location (x-y)	Operating Condition (Normal / Describe Single Fault)	Measured wattage or VA During first 30 s (W / VA)	Measured wattage or VA After 30 s (W / VA)	Protective Circuit, Regulator, or PTC Operated? Yes / No (Comment)	Resistive PIS? Yes/No

Supplementary Information:

A combination of voltmeter, VA and ammeter IA may be used instead of a wattmeter.

If a separate voltmeter and ammeter are used, the product of (VA x IA) is used to determine Resistive PIS classification.

A Resistive PIS: (a) dissipates more than 15 W, measured after 30 s of normal operation, or (b) under single fault conditions has either a power exceeding 100 W measured immediately after the introduction of the fault if electronic circuits, regulators or PTC devices are used, or has an available power exceeding 15 W measured 30 s after introduction of the fault.

8.5.5	TABLE: High Pressure Lamp		N/A
Description		Values	Energy Source Classification
Lamp type.....:			—
Manufacturer .....:			—
Cat no. .....:			—
Pressure (cold) (MPa).....:			MS_
Pressure (operating) (MPa).....:			MS_
Operating time (minutes).....:			—
Explosion method .....:			—
Max particle length escaping enclosure (mm) .:			MS_
Max particle length beyond 1 m (mm).....:			MS_
Overall result .....:			
Supplementary information:			

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Clause	Requirement + Test	Result - Remark	Verdict

B.2.5	TABLE: Input test						P
U (V)	I (A)	Irated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
1.5	0.025	0.025	0.038	--	--	--	Max normal load
5	0.021	0.025	0.105	--	--	--	Max normal load

Supplementary information:
Equipment may be have rated current or rated power or both. Both should be measured

B.3	TABLE: Abnormal operating condition tests								N/A
Ambient temperature (°C) .....:									—
Power source for EUT: Manufacturer, model/type, output rating .:									—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation	

Supplementary information:
Test table is provided to record abnormal and fault conditions for all applicable energy sources including Thermal burn injury. Column “Abnormal/Fault.” Specify if test condition by indicating “Abnormal” then the condition for a Clause B.3 test or “Single Fault” then the condition for Clause B.4.

B.4	TABLE: Fault condition tests							P
Ambient temperature (°C) .....:				25				—
Power source for EUT: Manufacturer, model/type, output rating .:				See page 2				—
Component No.	Fault Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
Q1	S-C	5VDC	10 mins	--	--	--	--	The appliance can’t work, no harzard, no broken
U1	S-C	5VDC	10 mins	--	--	--	--	The appliance can’t work, no harzard, no broken
C2	S-C	5VDC	10 mins	--	--	--	--	The appliance can’t work, no harzard, no broken

Supplementary information:

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Clause	Requirement + Test	Result - Remark	Verdict

Annex M	**TABLE: Batteries**									N/A
The tests of Annex M are applicable only when appropriate battery data is not available										
Is it possible to install the battery in a reverse polarity position?..... :										
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition										
Max. current during fault condition										
Test results:										Verdict
- Chemical leaks										
- Explosion of the battery										
- Emission of flame or expulsion of molten metal										
- Electric strength tests of equipment after completion of tests										
Supplementary information:										

Annex M.4	**Table: Additional safeguards for equipment containing secondary lithium batteries**				N/A
Battery/Cell No.	Test conditions	Measurements			Observation
		U	I (A)	Temp (C)	
Supplementary Information:					

Battery identification	Charging at T_{lowest} (°C)	Observation	Charging at $T_{highest}$ (°C)	Observation

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Clause	Requirement + Test	Result - Remark	Verdict

Battery identification	Charging at T_{lowest} (°C)	Observation	Charging at $T_{highest}$ (°C)	Observation
Supplementary Information:				

Annex Q.1	**TABLE: Circuits intended for interconnection with building wiring (LPS)**					N/A
Note: Measured UOC (V) with all load circuits disconnected:						
Output Circuit	Components	U_{oc} (V)	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**				N/A
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation
Supplementary information:					

T.6, T.9	**TABLE: Impact tests**			**N/A**
Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation
Supplementary information:				

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Clause	Requirement + Test	Result - Remark	Verdict

T.7	TABLE: Drop tests				N/A
Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation	
Supplementary information:					

T.8	TABLE: Stress relief test					N/A
Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation	
Supplementary information:						

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Clause	Requirement + Test	Result - Remark	Verdict

-Appendix 1: For requirements of European group differences.

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 62368-1:2014+A11:2017
Attachment Form No.....:	EU_GD_IEC62368_1B_II
Attachment Originator .....:	Nemko AS
Master Attachment .....:	Date 2017-09-22
Copyright © 2017 IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components (IECEE)	

	CENELEC COMMON MODIFICATIONS (EN)	--
	Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2014 are prefixed "Z".	--
CONTENTS	**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	N/A
	Delete all the "country" notes in the reference document (IEC 62368-1:2014) according to the following list:	N/A
	For special national conditions, see Annex ZB.	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

0.2.1	Note	1	Note 3	4.1.15	Note
4.7.3	Note 1 and 2	5.2.2.2	Note	5.4.2.3.2.2 Table 13	Note c
5.4.2.3.2.4	Note 1 and 3	5.4.2.5	Note 2	5.4.5.1	Note
5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3
5.7.5	Note	5.7.6.1	Note 1 and 2	10.2.1 Table 39	Note 2, 3 and 4
10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3

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Clause	Requirement + Test	Result - Remark	Verdict
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; 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.		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
10.2.1	Add the following to [c] and [d] in table 39: For additional requirements, see 10.5.1.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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 presets 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.* NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		N/A
10.6.1	**Add** the following paragraph to the end of the subclause: EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		N/A
10.Z1	**Add** the following new subclause after 10.6.5. **10.Z1 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		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

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Clause	Requirement + Test	Result - Remark	Verdict

Bibliography	**Add** the following standards: **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.		N/A
ZB	**ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)**		N/A
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

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
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. 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 1,5kV. 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.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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
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
5.6.5.1	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
5.7.5	**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

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IEC 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.7.6.1	**Norway and Sweden** To the end of the subclause the following is added: 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 medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.		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

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Clause	Requirement + Test	Result - Remark	Verdict
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 poly-phase 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 *Justification:* Heavy Current Regulations, Section 6c		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
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 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		N/A

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-Appendix 2: Photo document.

Photo 1: Overall view

Photo 2: Side view

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Photo 3: Side view

Photo 4: Side view

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Photo 5: Internal view

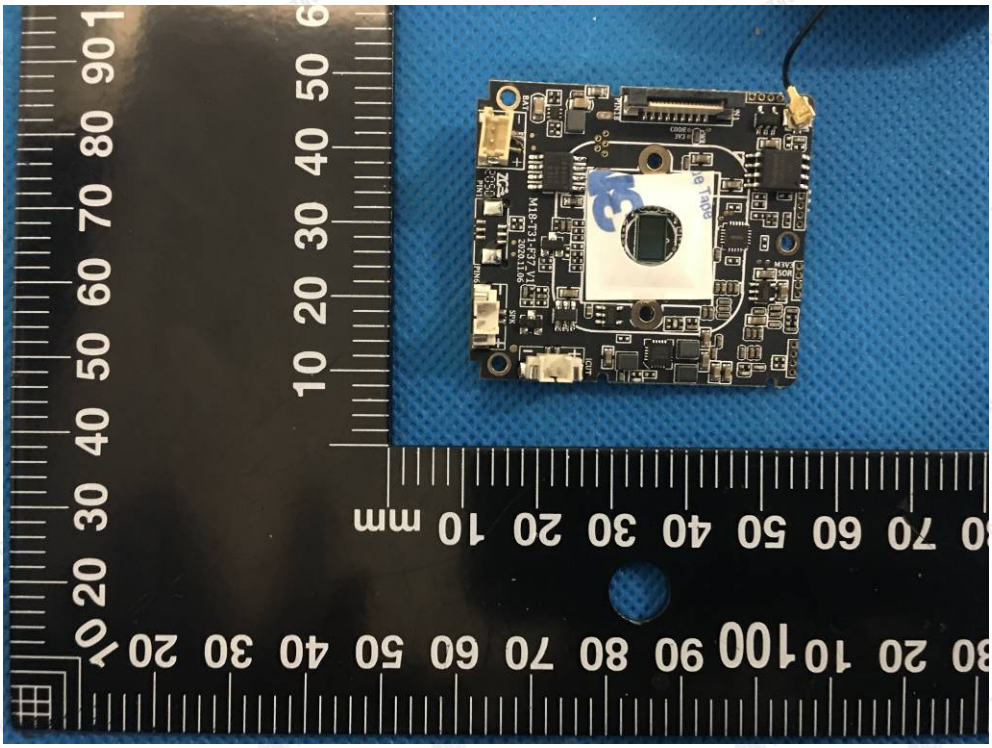

Photo 6: PCB view

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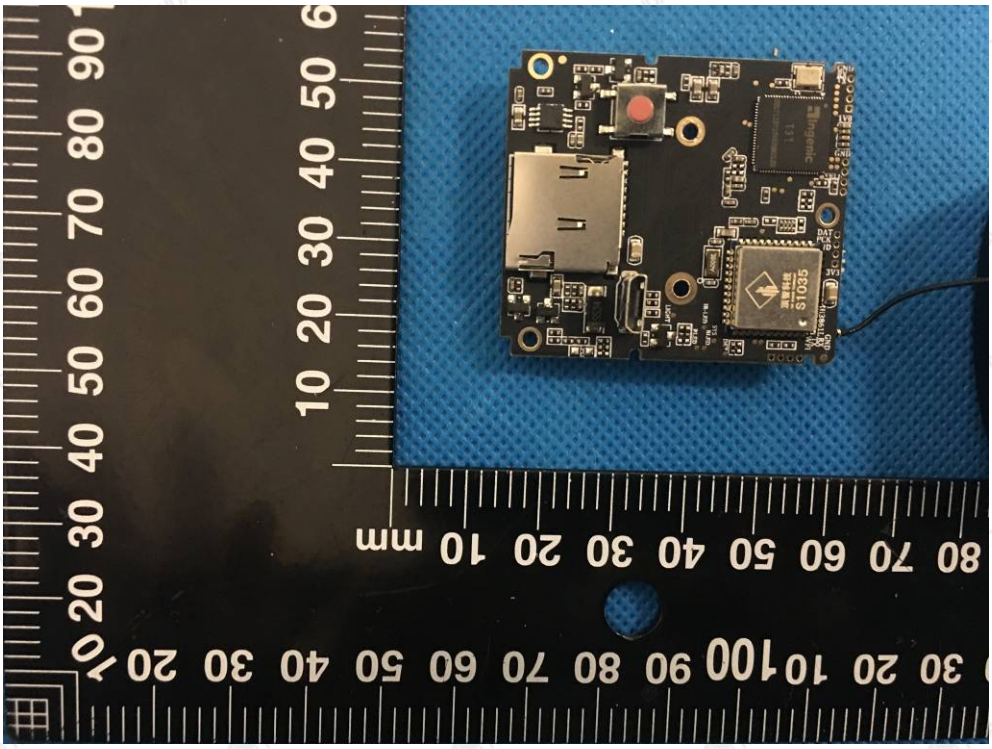

Photo 7: PCB view

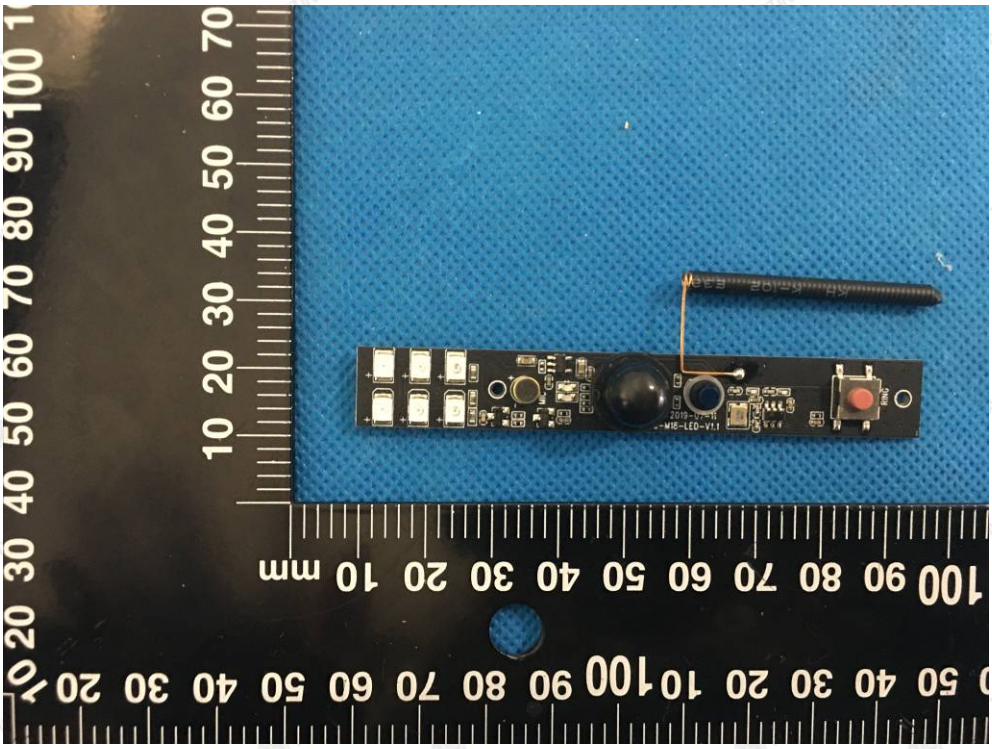

Photo 8: PCB view

HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com
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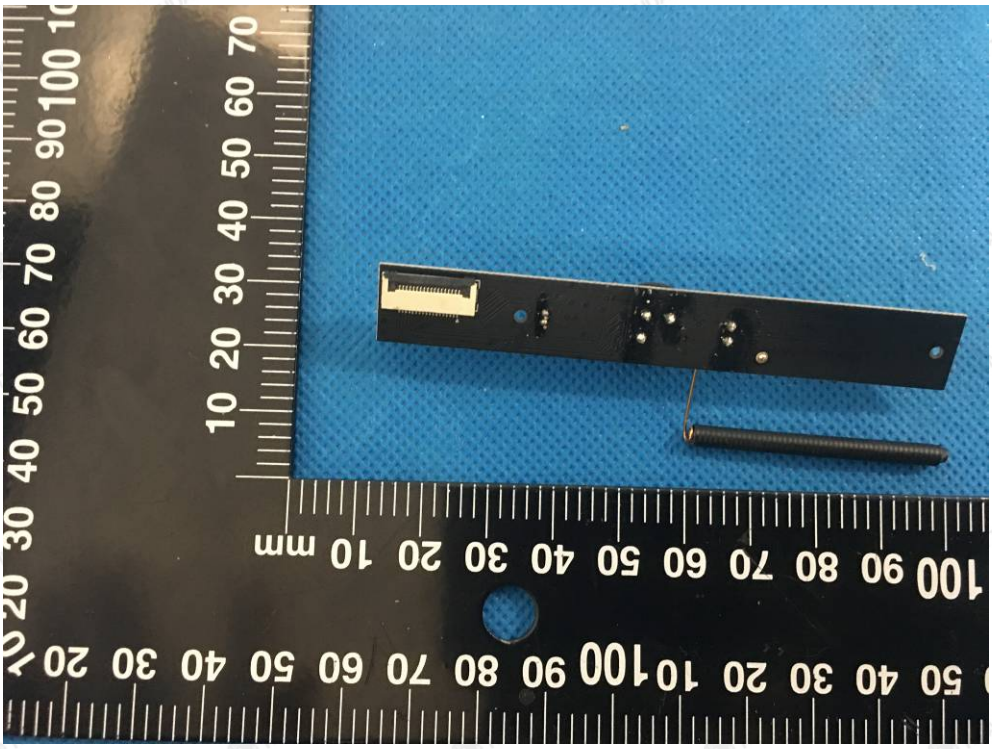

Photo 9: PCB view

----------End of report----------

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CERTIFICATE

ATTESTATION
Certificate of Compliance

Technical file of the company mentioned below has been inspected and audit has been completed successfully

The RED Directive 2014/53/EU has been taken as references for these processes.

Certificate's Holder	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Manufacturer	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Product Name	:	Low power video doorbell
Product Model (S)	:	V30, V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Trade Mark	:	N/A
Related Directive	:	2014/53/EU
Related Standards	:	Article 3.1a) : EN 62368-1:2014 + A11:2017 EN IEC 62311:2020 EN 50665:2017 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 EN 55035:2017 Article 3.2) : ETSI EN 300 328 V2.2.2 (2019-07) ETSI EN 300 220-1 V3.1.1 (2017-02) ETSI EN 300 220-2 V3.2.1 (2018-06)
Certificate Number	:	HK2012294032E
Report No.	:	HK2012294032-SR/-2EH/-1ER/-2ER/-3ER
Registration Date	:	Jan. 07, 2021

Certification Manager

The information of the certificate can be checked through www.cer-mark.com. The CE mark which is shown on the certificate can only be used under the conditions that the products complete with all of the relevant Directives of EC Declaration of Conformity. The Manufacturer should be responsible for the internal production control so that the products complied with the essential requirements of the above mentioned Directive(s). Certificate holder must notify all changes to the original certification laboratory of HUAK.

CE

Shenzhen HUAK Testing Technology Co., Ltd.

Add: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Tel.:+86-755-2302 9901 Http:// www.cer-mark.com Postcode:518103 E-mail: service@cer-mark.com

TEST REPORT

ETSI EN 300 220-1 V3.1.1 (2017-02) & ETSI EN 300 220-2 V3.2.1 (2018-06)

Report Reference No.....:	**HK2012294032-3ER**
Compiled by (position+printed name+signature)..:	Testing engineer Gary Qian
Supervised by (position+printed name+signature)..:	Technique principal Leo Zhong
Approved by (position+printed name+signature)..:	Manager Jason Zhou
Date of issue.....:	2021/01/07
Representative Laboratory Name ....:	Shenzhen HUAK Testing Technology Co., Ltd.
Address.....:	1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Applicant's name.....:	Topvision(Shenzhen) Technology Co., LTD.
Address.....:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Test specification:	
Standard .....:	**ETSI EN 300 220-1 V3.1.1 (2017-02) & ETSI EN 300 220-2 V3.2.1 (2018-06)**
TRF Originator.....:	Shenzhen HUAK Testing Technology Co., Ltd.
Master TRF.....:	Dated 2017-05

Test item description .....:	Low power video doorbell
Trade Mark .....:	N/A
Model/Type reference.....:	V30
Listed Models .....:	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Hardware Version.....:	V2.0
Software Version .....:	V2.0
Rating .....:	DC 5V From Micro USB or DC 1.5V From Battery
Result.....:	**Positive**

TEST REPORT

Test Report No. :	HK2012294032-3ER	2021/01/07 Date of issue

Equipment under Test	:	Low power video doorbell
Model /Type	:	V30
Listed Models	:	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Applicant	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Manufacturer	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China

Test Result	PASS

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2021/01/07	Jason Zhou

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Contents

1 SUMMARY

1.1 TEST STANDARDS

The tests were performed according to following standards:

ETSI EN 300 220-1 V3.1.1 (2017-02)—Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 1: Technical characteristics and methods of measurement

ETSI EN 300 220-2 V3.2.1 (2018-06) —Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU for non specific radio equipment

1.2 Test Description

Clause	Test Parameter	Condition	Result
All equipment conformance requirements			
4.2.1	Operating frequency	Apply to all equipment	PASS
4.2.2	Unwanted emissions in the spurious domain	Apply to all equipment	PASS
Transmitters conformance requirements			
4.3.1	Effective Radiated Power	Apply to transmitters	N/A
4.3.2	Maximum e.r.p. spectral density	Apply to transmitters using annex B bands I, L. Apply to transmitters using DSSS or wideband techniques other than FHSS modulation, in annex C band X.	N/A
4.3.3	Duty Cycle	Apply to all transmitters except EUT with polite spectrum access (described in clause 4.5) where permitted in annex B, table B.1 or annex C, table C.1 or any NRI.	N/A
4.3.4	Occupied Bandwidth	Apply to all transmitters.	N/A
4.3.5	Tx Out of Band Emissions	Apply to all transmitters with OCW > 25 kHz.	N/A
4.3.6	Transient power	Transient power applies to all transmitters.	N/A
4.3.7	Adjacent Channel Power	Apply to all transmitters with OCW ⩽ 25 kHz.	N/A
4.3.8	TX behaviour under Low Voltage Conditions	Apply to battery powered EUT.	N/A
4.3.9	Adaptive Power Control	Apply to all EUT with adaptive power control using annex C band AA.	N/A
4.3.10	FHSS equipment	Apply to all FHSS equipment.	N/A
4.3.11	Short term behaviour	Apply to EUT for operation in bands where T_{on} or T_{off} limits are specified in annex C, table C.1 or NRI.	N/A
Receivers conformance requirements			
4.4.1	RX sensitivity	Apply to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.	N/A
4.4.2	Blocking	Apply to all receivers	Pass
Polite spectrum access conformance requirement			
4.5.2	Clear Channel Assessment threshold	Apply to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.	N/A
4.5.3	Polite spectrum access timing parameters	Apply to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.	N/A
4.5.4	Adaptive Frequency Agility	Apply to EUT with AFA.	N/A

1.3 Test Facility

1.3.1 Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd.
Add. : 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

1.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“and is documented in the Beide (Shenzhen) Product Service Limitedacc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Beide (Shenzhen) Product Service Limitedfor Products Quality is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.90dB	(1)
Radiated Emission	Above 1GHz	4.26dB	(1)
Conducted Disturbance	0.15~30MHz	2.71dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2 GENERAL INFORMATION

2.1 General Remarks

Date of receipt of test sample	:	2020/12/31
Testing commenced on	:	2020/12/31
Testing concluded on	:	2021/01/07

2.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature	NT: Normal Temperature	25°C
	HT: High Temperature	40°C
	LV: Low Temperature	-10°C
Voltage	NV: Normal Voltage	DC 5V
	HV: High Voltage	DC 5.5V
	LV: Low Voltage	DC 4.5V
Other	Relative Humidity	55 %
	Air Pressure	101 kPa

2.3 General Description of EUT

Product Name:	Low power video doorbell	
Model/Type reference:	V30	
List model	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro	
Difference descrption	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: V30.	
Power supply:	DC 5V From Micro USB or DC 1.5V From Battery	
Wireless technology		
Frequency band:	433.050 - 434.790MHz	
Operating frequency:	433.92MHz	
Modulation type:	FSK	
Operating channel width:	8.083KHz	
Maximum RF power:	N/A	
Spread spectrum method:	☒ Duty cycle ☐Polite spectrum access	
Receiver category:	☐Category 1:	Category 1 is a high performance level of receiver. In particular to be used where the operation of a SRD may have inherent safety of human life implications.
	☐Category 1.5:	Category 1.5 is an improved performance level of receiver category 2.
	☒Category 2:	Category 2 is standard performance level of receiver.
	☐Category 3:	Category 3 is a low performance level of receiver. Manufacturers have to be aware that category 3 receivers are not able to work properly in case of coexistence with some services such as a mobile radio service in adjacent bands. The manufacturer shall provide another mean to overcome the weakness of the radio link or accept the failure.
Antenna type:	Internal Antenna	

Note: For more details, refer to the user's manual of the EUT.

2.4 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The user can control the EUT for staying in continuous transmitting & receiving mode for testing.

2.5 Equipments Used during the Test

Effective radiated power & Spurious Emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Cal.Due
1	Spectrum analyzer	Agilent	N9020A	HKE-048	2020/06/18	2021/06/17
2	Receiver	R&S	ESR-7	HKE-010	2020/06/18	2021/06/17
3	Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	2020/06/18	2021/06/17
4	Horn antenna	Schwarzbeck	9120D	HKE-013	2020/06/18	2021/06/17
5	Spectrum analyzer	R&S	FSP40	HKE-025	2020/06/18	2021/06/17
6	Preamplifier	EMCI	EMC0518 45SE	HKE-015	2020/06/18	2021/06/17
7	Preamplifier	Agilent	83051A	HKE-016	2020/06/18	2021/06/17
8	Power meter	Agilent	E4419B	HKE-085	2020/06/18	2021/06/17

Blocking						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Cal.Due
1	Spectrum Analyzer	Agilent	N9020	HKE-048	2020/06/18	2021/06/17
2	Wireless Communication Test Set	R&S	CMW500	HKE-027	2020/06/18	2021/06/17

PSD & TX Transient & OOB & OBW & Duty cycle & Adjacent channel power						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Cal.Due
1	Spectrum Analyzer	Agilent	N9020	HKE-048	2020/06/18	2021/06/17

TX behaviour under low voltage conditions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Cal.Due
1	Spectrum Analyzer	Agilent	N9020	HKE-048	2020/06/18	2021/06/17

The calibration interval is one year.The calibration interval is one year.

2.6 Modifications

No modifications were implemented to meet testing criteria.

3 TEST CONDITIONS AND RESULTS

3.1 All equipment conformance requirements

3.1.1 Operating frequency

Limit

The manufacturer may declare either one or more operating frequencies and operating channels.
Operating channel(s) shall be entirely within operational frequency bands allowed by annexes B, C or any NRI.

Manufacturer Declaration

Parameters	Value	Note
Operational Frequency band	433.050-434.790MHz (Refer to Annex B .H)	Declared by the manufacturer
Nominal Operating Frequency	433.92MHz	Declared by the manufacturer
Operating Channel width	8.083KHz	Declared by the manufacturer

3.1.2 Unwanted emissions in the spurious domain

Limit

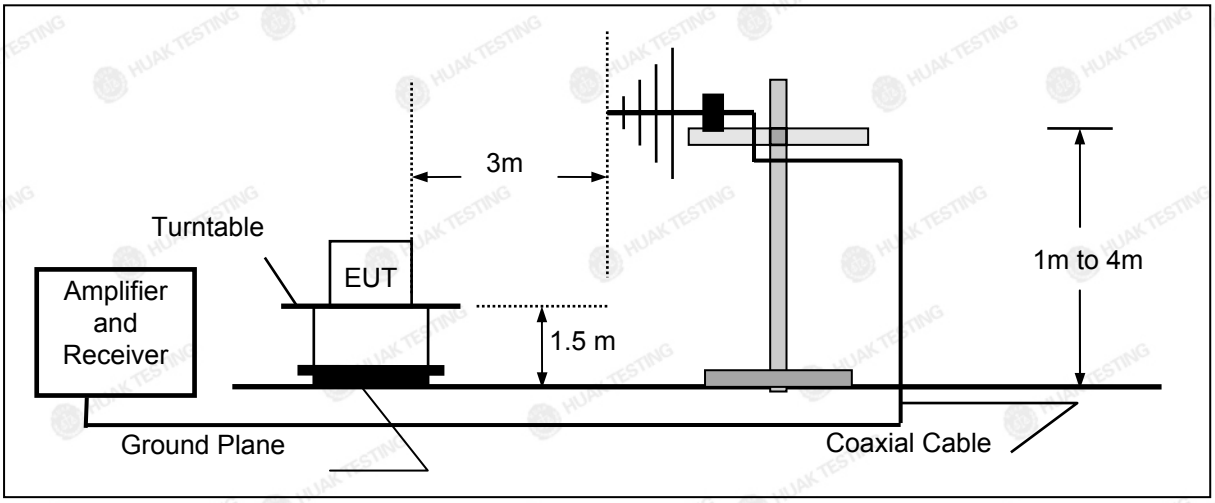
The power of any unwanted emission in the spurious domain shall not exceed the values given as bellow

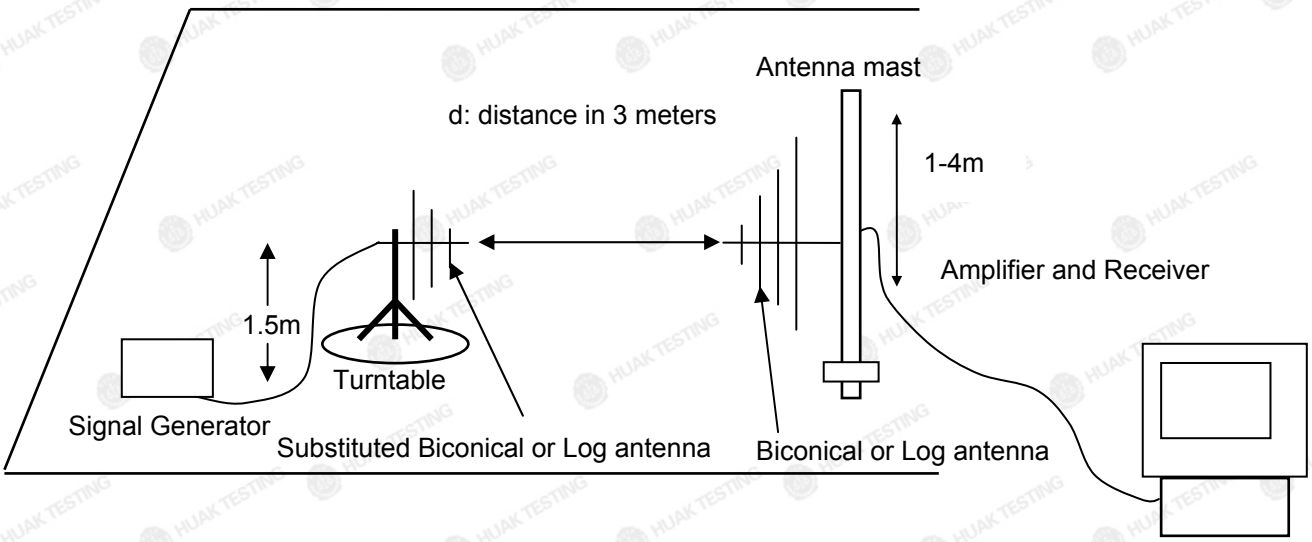
Spurious domain emission limits

Frequency / State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
TX mode	-54 dBm	-36 dBm	-30 dBm
RX and all other modes	-57 dBm	-57 dBm	-47 dBm

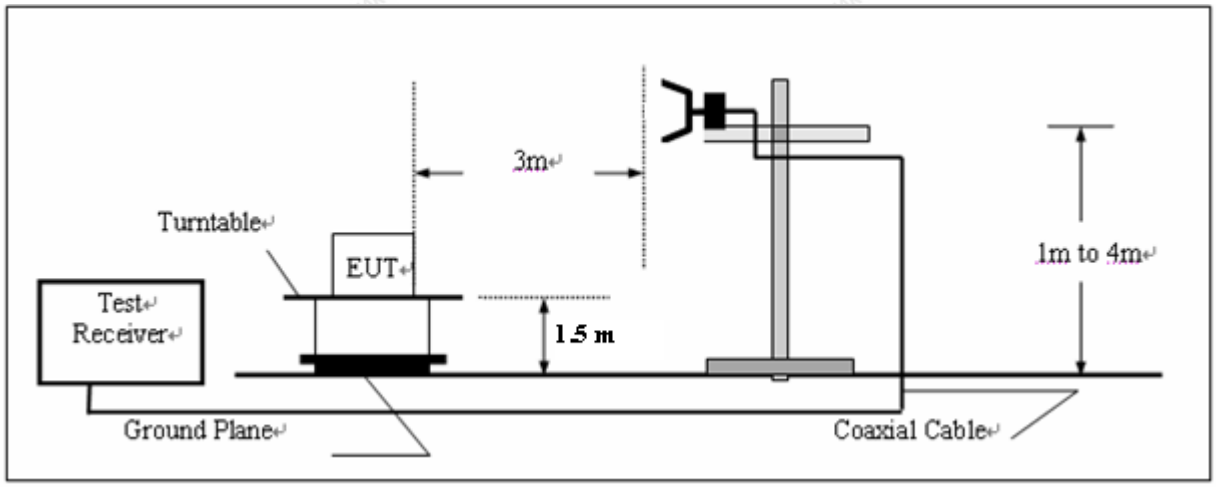
Test Configuration

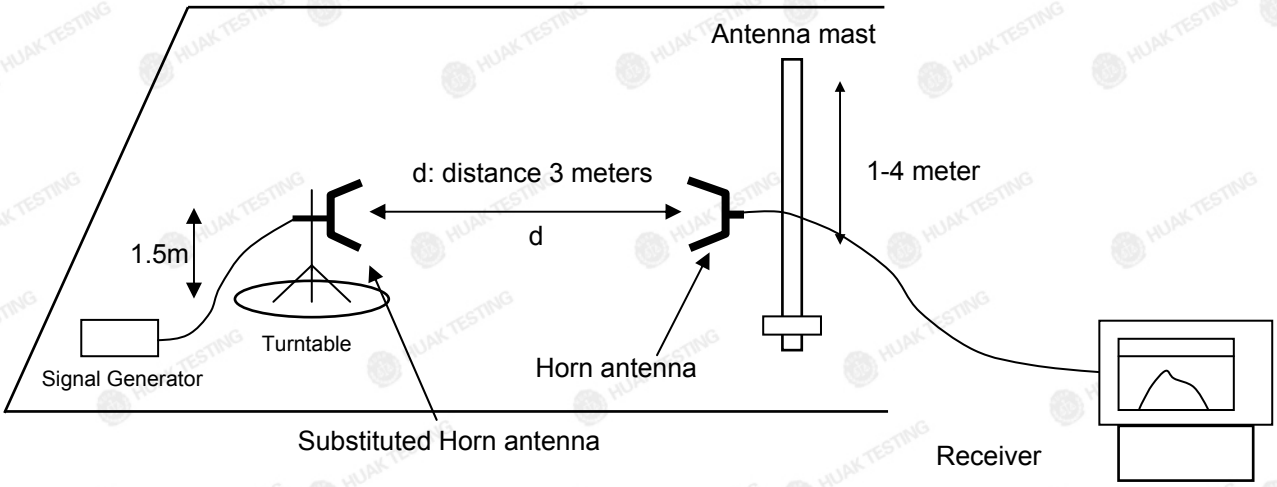
Below 1GHz





Above 1GHz





Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.9.3.3 for the measurement method.

Remark: Measurement frequency from 25MHz to 6GHz and recorded worst at below:

RX mode

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
227.21	V	-76.32	-57	-19.32	PASS
244.60	V	-76.49	-57	-19.49	PASS
304.95	V	-72.83	-57	-15.83	PASS
410.27	V	-75.56	-57	-18.56	PASS
485.92	V	-75.62	-57	-18.62	PASS
845.84	V	-77.95	-57	-20.95	PASS
179.15	H	-77.17	-57	-20.17	PASS
287.45	H	-75.76	-57	-18.76	PASS
359.93	H	-76.28	-57	-19.28	PASS
443.83	H	-71.69	-57	-14.69	PASS
562.26	H	-77.75	-57	-20.75	PASS
814.34	H	-79.89	-57	-22.89	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2.Other point of the measurements are below 20dB from the limit.					

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
1831.06	H	-65.51	-47	-18.51	PASS
2130.57	V	-67.76	-47	-20.76	PASS
3032.82	H	-60.28	-47	-13.28	PASS
2994.31	V	-66.59	-47	-19.59	PASS
3348.63	H	-64.43	-47	-17.43	PASS
3285.49	V	-68.04	-47	-21.04	PASS
4004.74	H	-62.19	-47	-15.19	PASS
4031.54	V	-65.37	-47	-18.37	PASS
4620.31	H	-65.29	-47	-18.29	PASS
4666.36	V	-64.45	-47	-17.45	PASS
5774.47	H	-67.87	-47	-20.87	PASS
6116.12	V	-59.66	-47	-12.66	PASS

Note: “--“Other emission levels were very low against the limit and not reported.

3.2 Transmitters conformance requirements

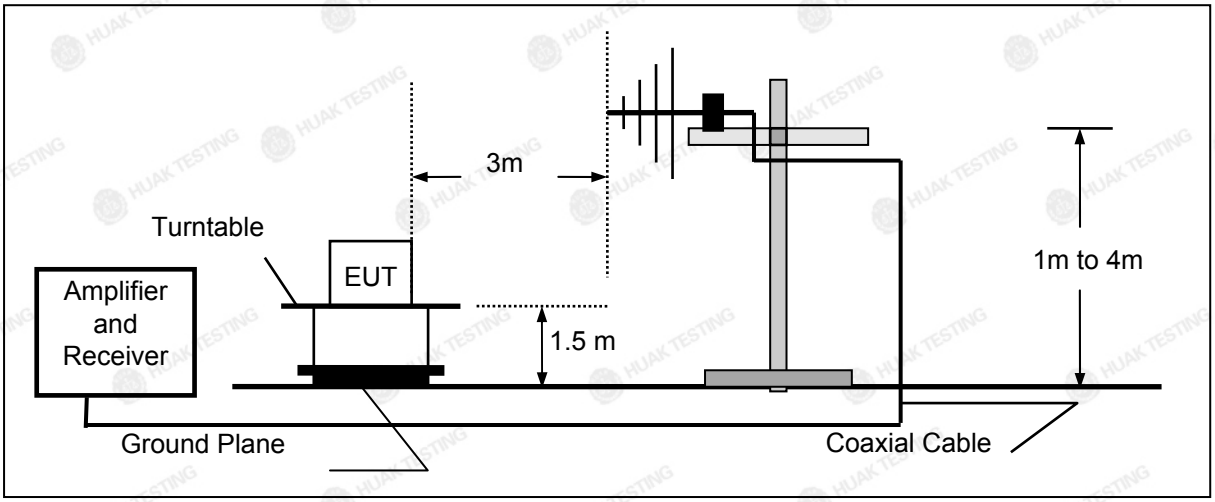
3.2.1 Effective Radiated Power

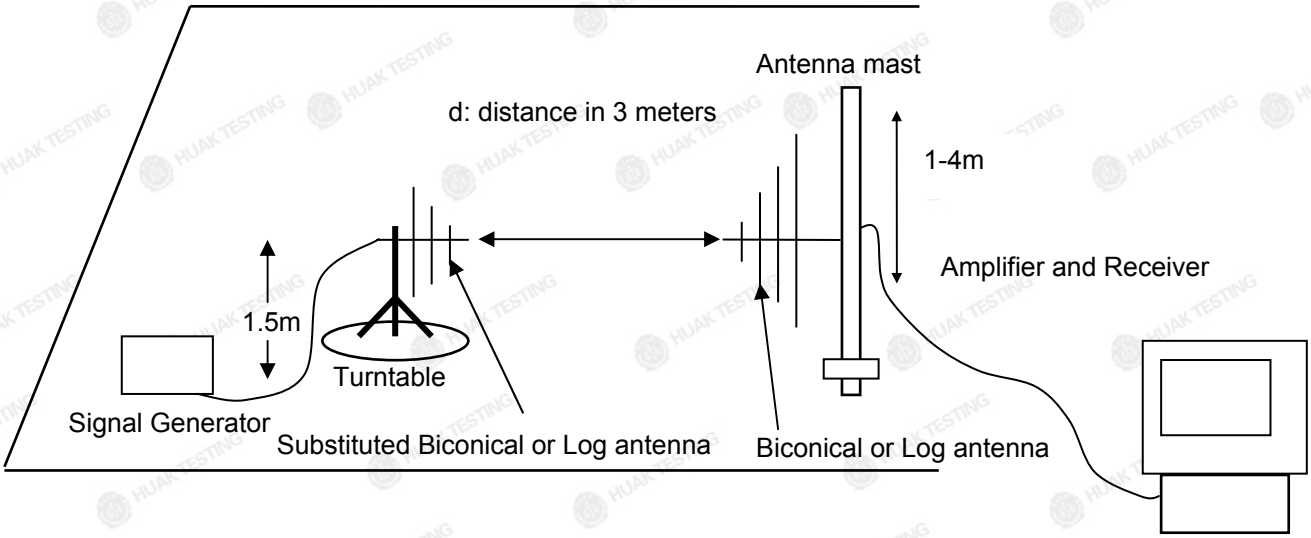
Limit

The effective radiated power shall not be greater than the value allowed in annexes B or C for the chosen operational frequency band(s).:

Frequency range	Radiated powr, e.r.p
433.050 - 434.790MHz	25 mW

Test Configuration





Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.2.2.2 for the measurement method.

Test Results

EUT only have receive function, so this test report is not applicable.

3.2.2 Duty cycle

Limit

The Duty Cycle at the operating frequency shall not be greater than values in annex B or C for the chosen operational frequency band(s).

Frequency range	Duty cycle
433.050 - 434.790MHz	up to 100%

Test Results

EUT only have receive function, so this test report is not applicable.

3.2.3 Occupied Bandwidth

Limit

The occupied bandwidth of the EUT according to ETSI EN 300 220-1 [1], clause 5.6.2 shall comply with the limits in annex B or C.
The Operating Channel shall be declared and shall reside entirely within the Operational Frequency Band.
The Maximum Occupied Bandwidth at 99 % shall reside entirely within the Operating Channel defined by F_{low} and F_{high}.

Test Configuration

Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.6.3.4 for the measurement method.

Test Results

EUT only have receive function, so this test report is not applicable.

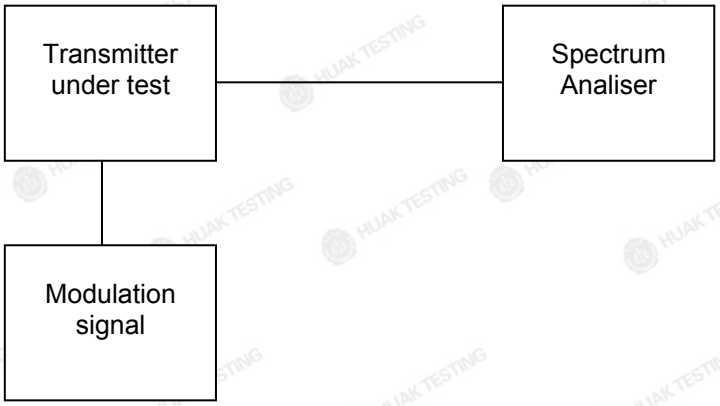
Transient power

Limit

The transient power shall not exceed the values given in Table below:

Absolute offset from centre frequency	RBW_{REF}	Peak power limit applicable at measurement points
≤ 400 kHz	1 kHz	0 dBm
> 400 kHz	1 kHz	-27 dBm

Test Configuration



Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.10.3.2 for the measurement method.

Test Results

EUT only have receive function, so this test report is not applicable.

3.2.4 Tx Out of Band Emissions

Limit

The EUT emissions level in OOB domains for the Operating Channel and the Operational Frequency Band shall be less or equal to Table 15 spectrum mask.

Table 15: Emission limits in the Out Of Band domains

Domain	Frequency Range	RBW_{REF}	Max power limit
OOB limits applicable to Operational Frequency Band (See Figure 6)	$f \le f_{low\_OFB}$ - 400 kHz	10 kHz	-36 dBm
	F_{low_OFB} - 400 kHz $\le f \le f_{low\_OFB}$ - 200 kHz	1 kHz	-36 dBm
	f_{low} - 200 kHz $\le f < f_{low\_OFB}$	1 kHz	See Figure 6
	$f = f_{low\_OFB}$	1 kHz	0 dBm
	$f = f_{high\_OFB}$	1 kHz	0 dBm
	$F_{high\_OFB} < f \le f_{high\_OFB}$ + 200 kHz	1 kHz	See Figure 6
	F_{high_OFB} + 200 kHz $\le f \le f_{high\_OFB}$ + 400 kHz	1 kHz	-36 dBm
	F_{high_OFB} + 400 kHz $\le f$	10 kHz	-36 dBm
OOB limits applicable to Operating Channel (See Figure 5)	$f = f_c$ - 2.5 x OCW	1 kHz	-36 dBm
	f_c - 2,5 x OCW $\le f \le f_c$ - 0,5 x OCW	1 kHz	See Figure 5
	$f = f_c$ - 0,5 x OCW	1 kHz	0 dBm
	$f = f_c$ + 0,5 x OCW	1 kHz	0 dBm
	f_c + 0,5 x OCW $\le f \le f_c$ + 2,5 x OCW	1 kHz	See Figure 5
	$f = f_c$ + 2,5 x OCW	1 kHz	-36 dBm
NOTE: f is the measurement frequency. f_c is the Operating Frequency. F_{low_OFB} is the lower edge of the Operational Frequency Band. F_{high_OFB} is the upper edge of the Operational Frequency Band. OCW is the operating channel bandwidth.			

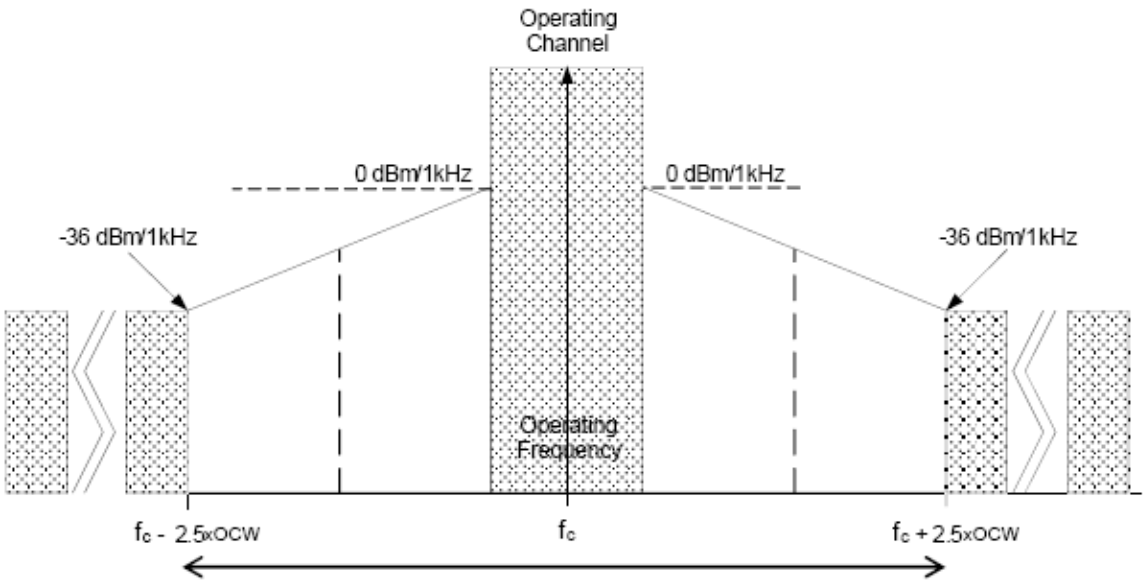


Figure 5: Out Of Band Domain for Operating Channel with reference BW

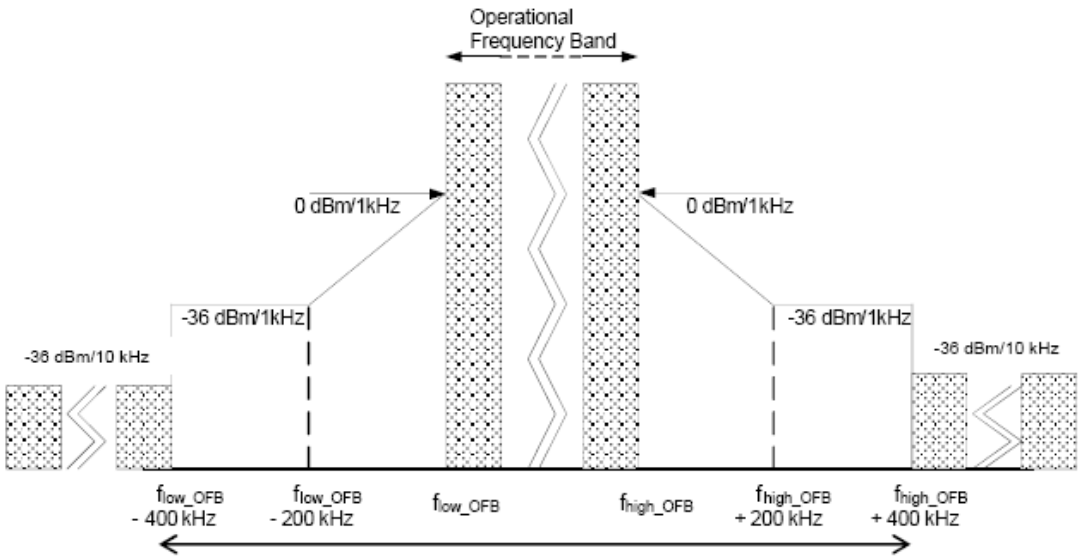


Figure 6: Out Of Band Domain for Operational Frequency Band with reference BW

Specific limits apply at frequencies immediately above and below the Operational Frequency Band as shown in Figure 6.

NOTE: f_{low_OFB} is the lower edge of the Operational Frequency Band.

f_{high_OFB} is the upper edge of the Operational Frequency Band.

Test Configuration

Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.11.3.2 for the measurement method.

Test Results

EUT only have receive function, so this test report is not applicable.

3.2.5 ADJACENT CHANNEL POWER

Limit

Table 26: Adjacent channel power limits for transmitters with OCW ≤ 25 kHz

		Adjacent Channel power integrated over 0,7 x OCW	Alternate Adjacent Channel power integrated over 0,7 x OCW
OCW < 20 kHz	Normal test conditions	-20 dBm	-20 dBm
	Extreme test conditions	-15 dBm	-20 dBm
OCW ≥ 20 kHz	Normal test conditions	-37 dBm	-40 dBm
	Extreme test conditions	-32 dBm	-37 dBm

Test Configuration

Test Procedure

3. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
4. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.11.3.2 for the measurement method.

Test Results

EUT only have receive function, so this test report is not applicable.

3.2.6 TX behaviour under Low Voltage Conditions

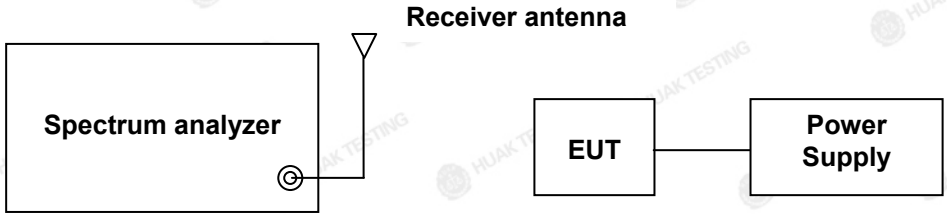
Limit

The equipment shall either:

a) remain in the Operating Channel OC without exceeding any applicable limits (e.g. Duty Cycle); or b) reduce its effective radiated power below the Spurious Emission limits without exceeding any applicable limits (e.g. Duty Cycle); or

c) shut down, (ceasing function); as the voltage falls below the manufacturers declared operating voltage.

Test Configuration



Test Procedure

5. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
6. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.12.3.2 for the measurement method.

Test Results

EUT only have receive function, so this test report is not applicable.

3.3 Receivers conformance requirements

3.3.1 Blocking

Limit

The blocking levels at the specified frequency offsets shall be equal to or greater than the limits show in below tables for each receiver category.

Limits for receiver category 3

Requirement	Limits
	Receiver category 3
Blocking at ±2 MHz from OC edge f_{high} and f_{low}	≥ -80 dBm
Blocking at ±10 MHz from OC edge f_{high} and f_{low}	≥ -60 dBm
Blocking at ±5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -60 dBm

Limits for receiver category 2

Requirement	Limits
	Receiver category 2
Blocking at ±2 MHz from OC edge f_{high} and f_{low}	≥ -69 dBm
Blocking at ±10 MHz from OC edge f_{high} and f_{low}	≥ -44 dBm
Blocking at ±5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -44 dBm

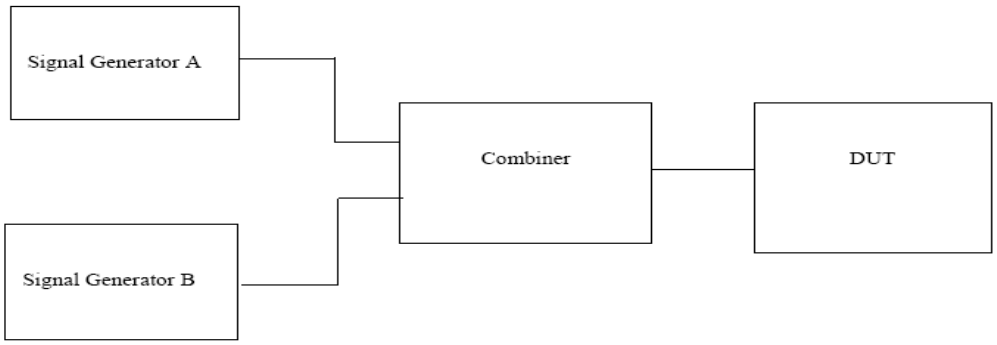
Limits for receiver category 1.5

Requirement	Limits
	Receiver category 1.5
Blocking at ±2 MHz from OC edge f_{high} and f_{low}	≥ -43 dBm
Blocking at ±10 MHz from OC edge f_{high} and f_{low}	≥ -33 dBm
Blocking at ±5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -33 dBm

Limits for receiver category 1

Requirement	Limits
	Receiver category 1
Blocking at ±2 MHz from Centre Frequency	≥ -20 dBm
Blocking at ±10 MHz from Centre Frequency	≥ -20 dBm
Blocking at ±5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -20 dBm

Test Configuration



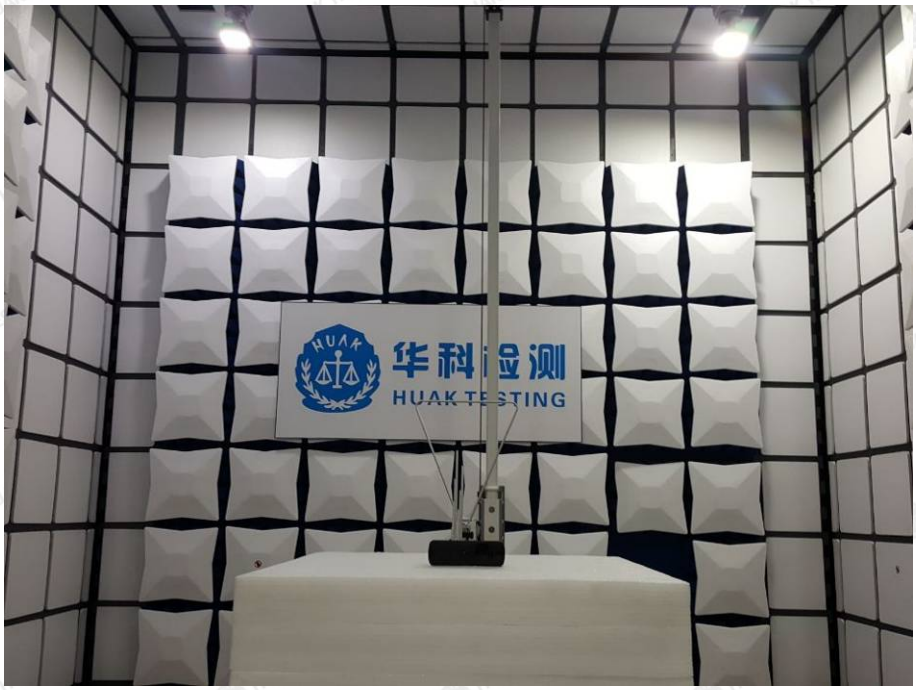
TEST PROCEDURE

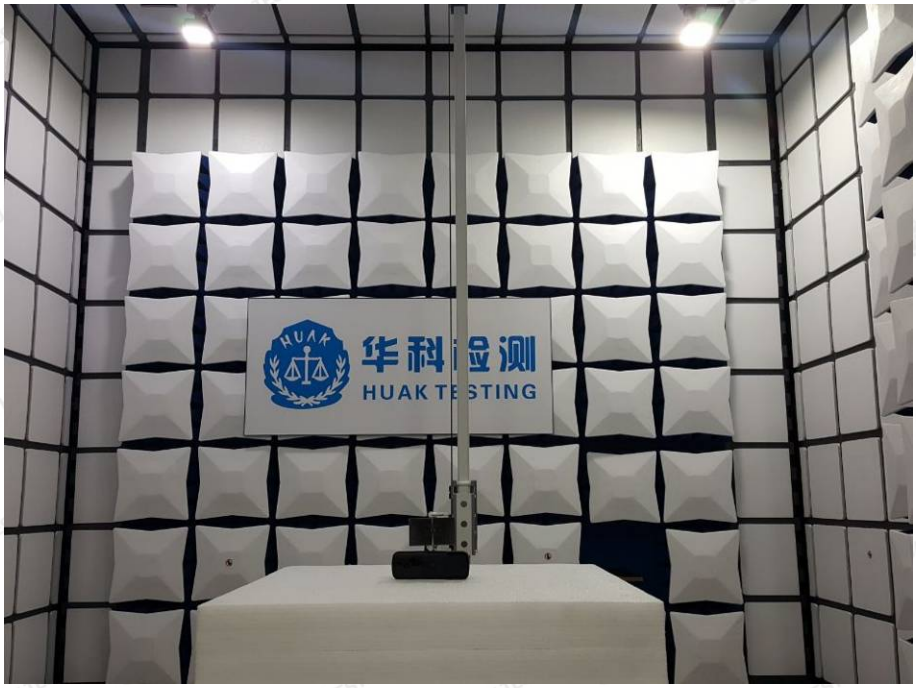
1. Please refer to ETSI EN 300 220-1 V 2.4.1 (2012-05) Sub-clause 6 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V 2.4.1 (2012-05) Sub-clause 8.4.2 for the measurement method.

TEST RESULTS

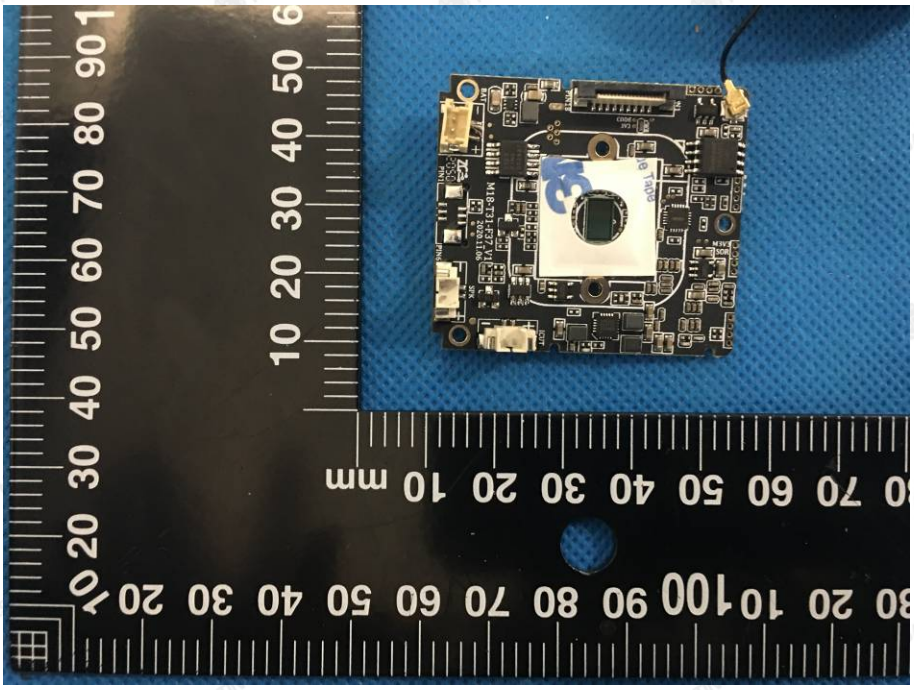
Test Channel	Blocking Signal Frequency(MHz)	Blocking Signal Power Level (dBm)	Limit (dBm)	Result
Low	431.92	-53.16	-69	PASS
	435.92	-44.03	-69	PASS
	423.92	-29.17	-44	PASS
High	443.92	-25.02	-44	PASS
	412.22	-29.54	-44	PASS
	455.62	-28.43	-44	PASS

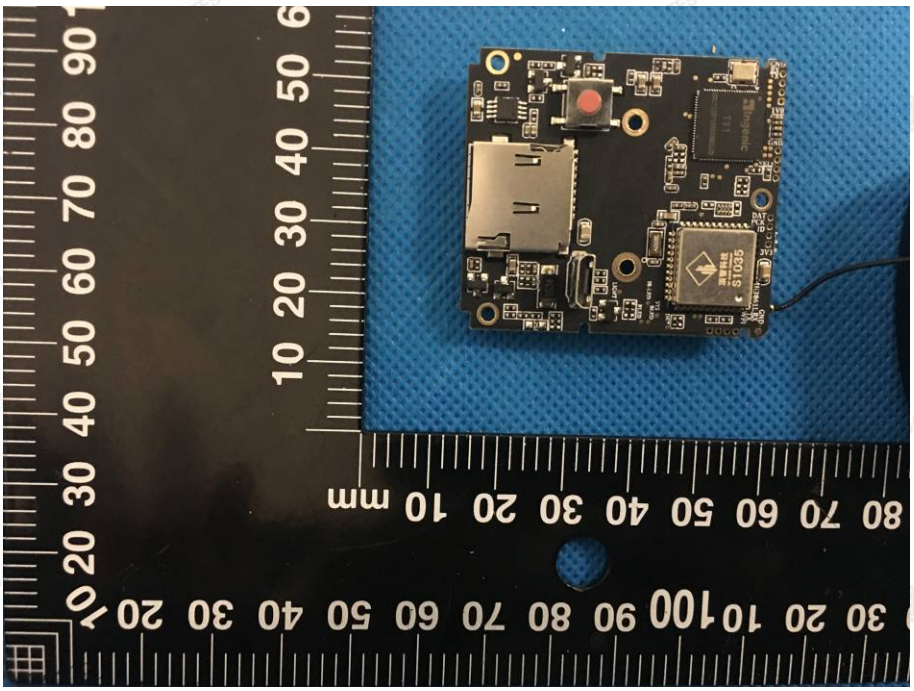
Test Setup Photos of the EUT

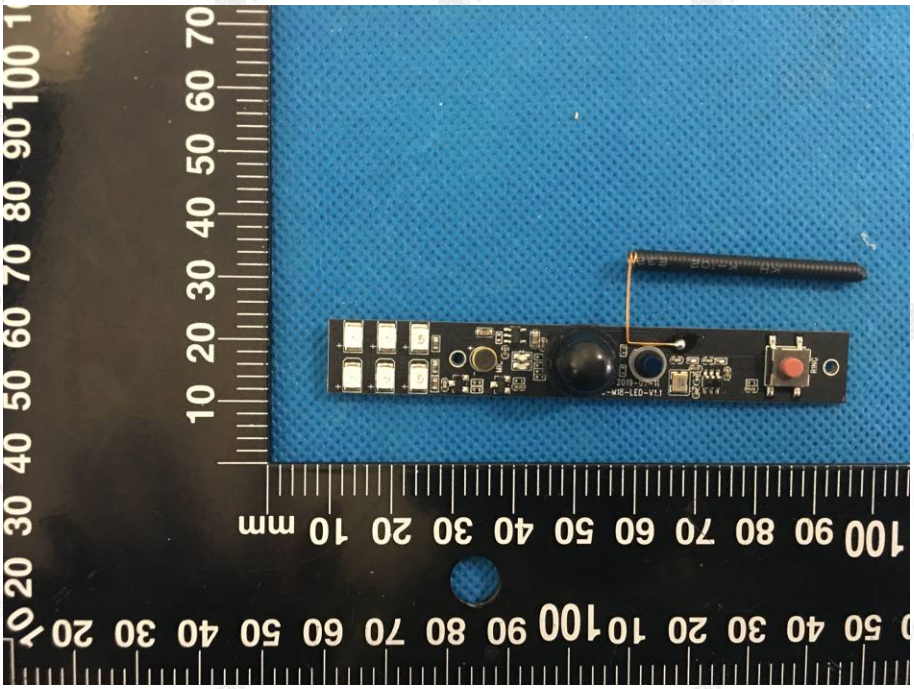


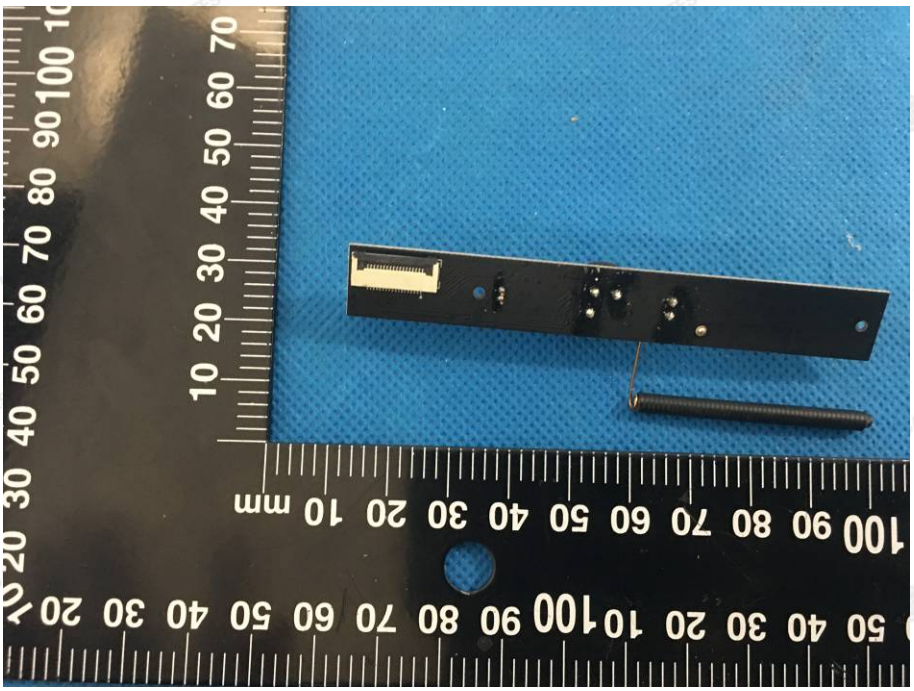


4 External and Internal Photos of the EUT









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

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1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

TEST REPORT

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

Report Reference No.....	**HK2012294032-2ER**
Compiled by (position+printed name+signature)..	Testing engineer Gary Qian
Supervised by (position+printed name+signature)..	Technique principal Leo Zhong
Approved by (position+printed name+signature)..	Manager Jason Zhou
Date of issue.....	2021/01/07

Testing Laboratory Name.....	Shenzhen HUAK Testing Technology Co., Ltd.
Address.....	1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Applicant's name.....	Topvision(Shenzhen) Technology Co., LTD.
Address.....	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Test specification ..... :	
Standard	**ETSI EN 300 328 V2.2.2 (2019-07)**
TRF Originator.....	Shenzhen HUAK Testing Technology Co., Ltd.
Master TRF.....	Dated 2017-01

Test item description .....:	Low power video doorbell
Trade Mark .....:	N/A
Model/Type reference.....:	V30
List Model(s).....:	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Hardware Version.....:	V2.0
Software Version .....:	V2.0
Operation Frequency.....:	From 2412MHz to 2472MHz
Ratings.....:	DC 5V From Micro USB or DC 1.5V From Battery
Result.....:	**Pass**

TEST REPORT

Test Report No. :	HK2012294032-2ER	2021/01/07 Date of issue

Equipment under Test	:	Low power video doorbell
Model/Type reference	:	V30
List Model(s)	:	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Applicant	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Manufacturer	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2021/01/07	Jason Zhou

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Contents

1. TEST STANDARDS

The tests were performed according to following standards:

ETSI EN 300 328 V2.2.2 (2019-07)
Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	2020/12/31
Testing commenced on	:	2020/12/31
Testing concluded on	:	2021/01/07

2.2. Product Description

Name of EUT	Low power video doorbell
Model(s) Number	V30
List Models	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Model diff:	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: V30.
Hardware version	V2.0
Software version	V2.0
Antenna Type	Internal Antenna
Antenna gain	1 dBi

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 5V From Micro USB or DC 1.5V From Battery

Description of the test mode

IEEE 802.11b/g/n: Thirteen channels are provided to the EUT.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442		

Test Frequency List

Modulation Type	Test Frequency					
	Low		Middle		High	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
802.11b	1	2412	7	2442	13	2472
802.11g	1	2412	7	2442	13	2472
802.11n HT20	1	2412	7	2442	13	2472
802.11n HT40	3	2422	7	2442	11	2462

2.4. Description of the Equipment under Test (EUT)

Reference documents:	802.11™ WLAN	
Special test descriptions:	None	
Configuration descriptions:	TX tests: performed at the lowest, the middle, and the highest channel	
	RX/Standby tests: WLAN test mode enabled, scan enabled, TX Idle	
Test mode:	☒ Special software is used. EUT is transmitting pseudo random data by itself	
802.11™ WLAN standard capabilities:	channel numbers:	☒ 802.11b:13; ☒ 802.11g:13; ☒ 802.11n HT20:13; ☒ 802.11n HT40:11
	channel separation:	5MHz
	used freq. range:	☒2412-2472MHz; ☒2422-2462MHz
	modulation types:	DSSS,OFDM
	Used Bandwidth:	☒20MHz; ☒40MHz

2.5. EUT Classification:

Type of equipment:	☒	stand alone equipment	
	☐	plug in radio equipment	
	☐	combined equipment	
Modulation types:	☒	Wide Band Modulation (None Hopping – e.g. DSSS, OFDM)	
	☐	Frequency Hopping Spread Spectrum (FHSS)	
Adaptive equipment:	☒	Yes, LBT-based	☐ Frame Based Equipment
			☒Load Based Equipment
	☐	Yes, non-LBT-based	
	☐	Yes (but can be disabled)	
	☐	No	
	☒	q value	N/A
	☐	COT value	
	☒	CCA value	18μs
Antennas and transmit operating modes:	☐	Operating mode 1 (single antenna)	
		Equipment with 1 antenna, Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used, Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)	
	☒	Operating mode 2 (multiple antennas, no beamforming)	
		Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.	
	☐	Operating mode 3 (multiple antennas, with beamforming)	
		Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously with beamforming. In addition to the antenna assembly gain (G), the beamforming gain (Y) may have to be taken into account when performing the measurements.	

2.6. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/

○Adapter information

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd.
Add.: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature/NT: 25 °C
High Temperature/HT: 40℃
Low Temperature/LT: -10℃
Normal Voltage: DC 1.5V
High Voltage/HV: DC 1.65V
Low Voltage/LV: DC 1.35V
Relative Humidity: 55 %
Air Pressure: 989 hPa

3.3. Test Description

3.4.1 Main Terms

Verdict	Verdict of each test cases.
Test Case	Test cases identification number description in ETSI specification.

3.4.2 Terms used in Condition column

NTC Normal voltage, Normal Temperature
HTHV High voltage, High Temperature
LTHV High voltage, Low Temperature
HTLV Low voltage, High Temperature
LTLV Low voltage, Low Temperature

3.4.3 Terms used in Verdict column

Pass	This test cases has been tested, and EUT is conformant to the applied standards in the given frequency band.
Fail	This test cases has been tested, but EUT is not conformant to the applied standards in the given frequency band.
N/A	This test case is either not required/not applicable in the specified band or is not applicable according to the specific PICS/PIXIT for the EUT.
Inc	Test case result is ambiguous in the given frequency band.
Decl	Declaration is received from the client to demonstrate the conformity to the relevant specification in the given frequency band.
BR	This test cases is not tested in the given frequency band, but this testcases was tested with pass result for the initial model in the given frequency band.

3.4.4 Sumarry of measurement results

☒ No deviations from the technical specifications were ascertained
☐ There were deviations from the technical specifications ascertained

Test Specification Clause	Test Case	Test Condition	Mode	Pass	Fail	N/A	NP	Remark
5.4.2	RF output power	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☒	☐	☐	☐	
		LTNV		☒	☐	☐	☐	
		HTNV		☒	☐	☐	☐	
5.4.3	Power Spectral Density	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☒	☐	☐	☐	
5.4.2	Duty Cycle, Tx-sequence, Tx-gap	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☐	☐	☒	☐	
5.4.2	Medium Utilisation (MU) factor	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☐	☐	☒	☐	
5.4.6	Adaptivity (adaptive equipment using modulations other than FHSS)	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☒	☐	☐	☐	
5.4.7	Occupied Channel Bandwidth	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☒	☐	☐	☐	
5.4.8	Transmitter unwanted emissions in the out-of-band domain	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☒	☐	☐	☐	
		LTNV		☐	☐	☒	☐	
		HTNV		☐	☐	☒	☐	
5.4.9	Transmitter unwanted emissions in the spurious domain (conducted & radiated)	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☒	☐	☐	☐	
5.4.10	Receiver spurious emissions (conducted & radiated)	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☒	☐	☐	☐	
5.4.11	Receiver Blocking	NTC	802.11b 802.11g 802.11n HT20 802.11n HT40	☒	☐	☐	☐	

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

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Mode	Data Rate
11b/CCK	1 Mbps
11g/OFDM	6 Mbps
11n HT20/OFDM	6.5 Mbps
11n HT40/OFDM	13.5 Mbps

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 2 " and is documented in the Shenzhen HUAK Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.
Hereafter the best measurement capability for Shenzhen HUAK Testing Technology Co., Ltd. is reported:

No.	Item	Uncertainty
1	Occupied Channel Bandwidth	±3.68%
2	RF power, conducted	±0.37dB
3	Power Spectral Density, conducted	±0.78dB
4	Unwanted Emissions, conducted	±2.71dB
5	All emissions, radiated	±4.28dB
6	Temperature	±0.5°C
7	Humidity	±2%
8	DC and low frequency voltages	±1.5%
9	Time	±1.0%
10	Duty Cycle	±3.0%

3.5. Equipments Used during the Test

RF output power & PSD & OOB & OBW & Hoping & Duty Cycle, Tx-sequence, Tx-gap & Adaptively&Blocking						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Spectrum analyzer	Agilent	N9020A	HKE-048	2020/06/18	2021/06/17
2	Signal generator	Agilent	83630A	HKE-028	2020/06/18	2021/06/17
3	Signal generator	Agilent	N5182A	HKE-029	2020/06/18	2021/06/17
4	RF automatic control unit	Tonscend	JS0806-2	HKE-060	2020/06/18	2021/06/17
5	Temperature and humidity meter	Boyang	HTC-1	HKE-075	2020/06/18	2021/06/17

Transmitter spurious emissions & Receiver spurious emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	2020/06/18	2021/06/17
2	Horn antenna	Schwarzbeck	9120D	HKE-013	2020/06/18	2021/06/17
3	Receiver	R&S	ESR-7	HKE-010	2020/06/18	2021/06/17
4	Position controller	Taiwan MF	MF7802	HKE-011	2020/06/18	2021/06/17
5	Preamplifier	EMCI	EMC051845SE	HKE-015	2020/06/18	2021/06/17
6	Preamplifier	Agilent	83051A	HKE-016	2020/06/18	2021/06/17
7	High pass filter unit	Tonscend	JS0806-F	HKE-055	2020/06/18	2021/06/17
8	Spectrum analyzer	Agilent	N9020A	HKE-048	2020/06/18	2021/06/17
9	Temperature and humidity meter	Boyang	HTC-1	HKE-077	2020/06/18	2021/06/17

The calibration interval is 1 year.

4. TEST CONDITIONS AND RESULTS

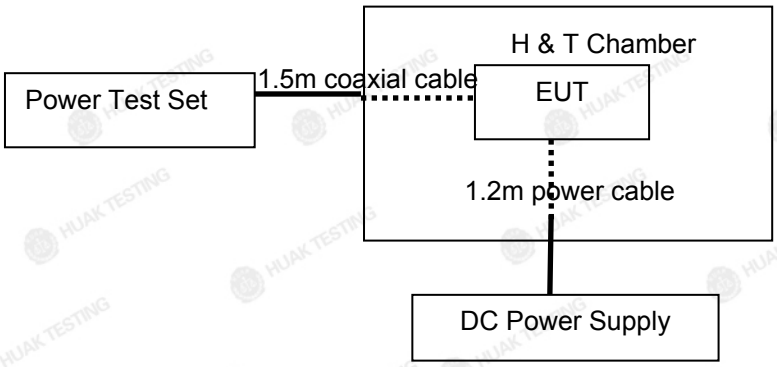
4.1. ETSI EN 300 328 REQUIREMENTS

4.1.1. RF Output Power

LIMIT

According to ETSI EN 300 328 V2.2.2 §4.3.1.2.3,
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.
The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.4.1 m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.
This limit shall apply for any combination of power level and intended antenna assembly.

TEST CONFIGURATION



TEST PROCEDURE

According to ETSI EN 300 328 V2.2.2(2019-07) §5.4.2.2.1.2, conducted method..
Step 1:
• Use a fast power sensor with a minimum sensitivity of -40 dBm and capable of minimum 1 MS/s.
• Use the following settings:
- Sample speed 1 MS/s or faster.
- The samples shall represent the RMS power of the signal.
- Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) is captured.
For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.
Step 2:
• 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.
• For conducted measurements on devices with multiple transmit chains:
- Connect one power sensor to each transmit port for a synchronous measurement on all transmit 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 500 ns.
- For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples as the new stored data set.

Step 3:
• Find the start and stop times of each burst in the stored measurement samples.
The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.
In case of insufficient sensitivity of the power sensor (e.g. in case of radiated measurements), the value of 30 dB may need to be reduced appropriately.
Step 4:
• Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. The start and stop points shall be included. Save these Pburst values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

with k being the total number of samples and n the actual sample number.
Step 5:
• The highest of all Pburst values (value A in dBm) will be used for maximum e.i.r.p. calculations.
Step 6:
• Add the (stated) antenna assembly gain G in dBi of the individual antenna.
• In case of smart antenna systems operating in mode with beamforming (see clause 5.3.2.2.4), add the additional beamforming gain Y in dB.
• If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.
• The RF Output Power (Pout) shall be calculated using the formula below:

Pout = A + G + Y

• This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

EUT DESCRIPTION:

Mode:	☒802.11b	☒802.11g	☒802.11n HT20	☒802.11n HT40
Test Channel	☒2412MHz ☒2442MHz ☒2472MHz	☒2412MHz ☒2442MHz ☒2472MHz	☒2412MHz ☒2442MHz ☒2472MHz	☒2422MHz ☒2442MHz ☒2462MHz
Bandwidth	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☐20MHz ☒40MHz
Modulation Type	☒DSSS ☐OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM
Channel Separation	☒5MHz	☒5MHz	☒5MHz	☒5MHz

MEASUREMENT DESCRIPTION

Instrument:	Power Meter measuring burst Power(RMS) of a least 10 packets	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

802.11b (1Mbps) Mode

Channel	Test Condition	Bursts	Power	Limit (dBm)	Test Result
Low	NTC	15	14.02	20	Compliant
	LT/NV	15	13.51	20	Compliant
	HT/NV	15	13.76	20	Compliant
Middle	NTC	15	14.55	20	Compliant
	LT/NV	15	14.32	20	Compliant
	HT/NV	15	14.11	20	Compliant
High	NTC	15	13.70	20	Compliant
	LT/NV	15	13.69	20	Compliant
	HT/NV	15	13.38	20	Compliant

802.11g (6Mbps) Mode

Channel	Test Condition	Bursts	Power	Limit (dBm)	Test Result
Low	NTC	15	14.38	20	Compliant
	LT/NV	15	14.19	20	Compliant
	HT/NV	15	13.92	20	Compliant
Middle	NTC	15	14.49	20	Compliant
	LT/NV	15	14.17	20	Compliant
	HT/NV	15	14.04	20	Compliant
High	NTC	15	13.79	20	Compliant
	LT/NV	15	13.66	20	Compliant
	HT/NV	15	13.53	20	Compliant

802.11n HT-20 (6.5Mbps) Mode

Channel	Test Condition	Bursts	Power	Limit (dBm)	Test Result
Low	NTC	15	14.38	20	Compliant
	LT/NV	15	14.10	20	Compliant
	HT/NV	15	14.03	20	Compliant
Middle	NTC	15	13.53	20	Compliant
	LT/NV	15	13.24	20	Compliant
	HT/NV	15	13.31	20	Compliant
High	NTC	15	13.65	20	Compliant
	LT/NV	15	13.39	20	Compliant
	HT/NV	15	13.94	20	Compliant

802.11n HT-40 (13.5Mbps) Mode

Channel	Test Condition	Bursts	Power	Limit (dBm)	Test Result
Low	NTC	15	13.59	20	Compliant
	LT/NV	15	13.22	20	Compliant
	HT/NV	15	13.34	20	Compliant
Middle	NTC	15	13.61	20	Compliant
	LT/NV	15	13.58	20	Compliant
	HT/NV	15	13.40	20	Compliant
High	NTC	15	13.61	20	Compliant
	LT/NV	15	13.43	20	Compliant
	HT/NV	15	13.08	20	Compliant

Note: 1. Cable loss and antenna gain was combined in the calculated result.

4.1.2. Duty Cycle,TX-sequence,TX-gap

LIMIT

ETSI EN 300 328 (V2.2.2) Sub-clause 4.3.1.3.3

The Duty Cycle shall be equal to or less than the maximum value declared by the manufacturer.
The Tx-sequence time shall be equal to or less than 10 ms. The minimum Tx-gap time following a Tx-sequence shall be equal to the duration of that proceeding Tx-sequence with a minimum of 3,5 ms.

TEST PROCEDURE

Please refer to ETSI EN 300 328 (V2.2.2) Sub-clause 5.4.2.2.1.3

For systems using wide band modulations other than FHSS, the measurement shall be performed at the lowest, the middle, and the highest channel on which the equipment can operate. These frequencies shall be recorded.
The test procedure, which shall only be performed for non-adaptive systems and only to be performed at normal environmental conditions, shall be as follows:

Step 1:

• Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
• The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples. In case of insufficient sensitivity of the power sensor (e.g. in case of radiated measurements), the value of 30 dB may need to be reduced appropriately.

Step 2:

• Between the saved start and stop times of each individual burst, calculate the TxOn time. Save these TxOn values.

Step 3:

• Duty Cycle (DC) is the sum of all TxOn times between the end of the first gap (which is the start of the first burst within the observation period) and the start of the last burst (within this observation period) divided by the observation period. The observation period is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2.

Step 4:

• For FHSS equipment using blacklisting, the TxOn time measured for a single (and active) hopping frequency shall be multiplied by the number of blacklisted frequencies. This value shall be added to the sum calculated in step 3 above. If the number of blacklisted frequencies cannot be determined, the minimum number of hopping frequencies (N) as defined in clause 4.3.1.4.3 shall be assumed.
• The calculated value for Duty Cycle (DC) shall be recorded in the test report. This value shall be equal to or less than the maximum value declared by the manufacturer.

Step 5:

• Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
• Identify any TxOff time that is equal to or greater than the minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3. These are the potential valid gap times to be further considered in this procedure.
• Starting from the second identified gap, calculate the time from the start of this gap to the end of the preceding gap. This time is the Tx-sequence time for this transmission. Repeat this procedure until the last identified gap within the observation period is reached.
• A combination of consecutive Tx-sequence times and Tx-gap times followed by a Tx-gap time, which is at least as long as the duration of this combination, may be considered as a single Tx-sequence time and in which case it shall comply with the limits defined in clause 4.3.1.3.3 or clause 4.3.2.4.3.
• It shall be noted in the test report whether the UUT complies with the limits for the maximum Tx-sequence time and minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3.

EUT DESCRIPTION:

Mode:	☒802.11b	☒802.11g	☒802.11n HT20	☒802.11n HT40
Test Channel	☒2412MHz ☒2442MHz ☒2472MHz	☒2412MHz ☒2442MHz ☒2472MHz	☒2412MHz ☒2442MHz ☒2472MHz	☒2422MHz ☒2442MHz ☒2462MHz
Bandwidth	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☐20MHz ☒40MHz
Modulation Type	☒DSSS ☐OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM
Channel Separation	☒5MHz	☒5MHz	☒5MHz	☒5MHz

MEASUREMENT DESCRIPTION

Instrument:	Power Meter measuring average burst Power of a least 10 packets	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

Not Applicable

4.1.3. Medium Utilisation (MU) factor

LIMIT

ETSI EN 300 328 V2.2.2(2019-07) Sub-clause 4.3.1.6.3
For non-adaptive equipment using wide band modulations other than FHSS, the maximum Medium Utilization factor shall be 10 %.
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.

TEST PROCEDURE

Please refer to ETSI EN 300 328 V2.2.2(2019-07) Sub-clause 5.4.2.2.1.4
Step 1:
• Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
Step 2:
• For each burst calculate the product of (Pburst / 100 mW) and the TxOn time. Pburst is expressed in mW. TxOn
time is expressed in ms.
Step 3:
• Medium Utilization is the sum of all these products divided by the observation period (expressed in ms) which is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. This value, which shall comply with the limit given in clause 4.3.1.6.3 or clause 4.3.2.5.3, shall be recorded in the test report.

If, in case of FHSS equipment, operation without blacklisted frequencies is not possible, the power of the bursts on blacklisted hopping frequencies (for the calculation of the Medium Utilization) is assumed to be equal to the average value of the RMS power of the bursts on all active hopping frequencies.

EUT DESCRIPTION:

Mode:	☒802.11b	☒802.11g	☒802.11n HT20	☒802.11n HT40
Test Channel	☒2412MHz ☒2442MHz ☒2472MHz	☒2412MHz ☒2442MHz ☒2472MHz	☒2412MHz ☒2442MHz ☒2472MHz	☒2422MHz ☒2442MHz ☒2462MHz
Bandwidth	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☐20MHz ☒40MHz
Modulation Type	☒DSSS ☐OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM
Channel Separation	☒5MHz	☒5MHz	☒5MHz	☒5MHz

MEASUREMENT DESCRIPTION

Instrument:	Power Meter measuring average burst Power of a least 10 packets	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

Not Applicable

4.1.4. Power Spectral Density

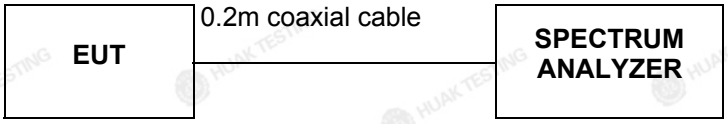
LIMIT

According to ETSI EN 300 328 V2.2.2(2019-07) §4.3.2.3.3,

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10dBm/MHz.

These measurements shall only be performed at normal test conditions.

TEST CONFIGURATION



TEST PROCEDURE

According to ETSI EN 300 328 V2.2.2(2019-07) §5.4.3.2.1, conducted method.

The test procedure shall be as follows:

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8 350; for spectrum analysers not supporting this number of sweep points, the frequency band may be segmented
- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: For non-continuous transmissions: 2 × Channel Occupancy Time × number of sweep Points
  For non-adaptive equipment use the maximum TX-sequence time in the formula above instead of the Channel Occupancy Time
  For continuous transmissions: 10 s; the sweep time may be increased further until a value where the sweep time has no further impact anymore on the RMS value of the signal

For non-continuous signals, wait for the trace to stabilize.

Save the data (trace data) set to a file.

Step 2:

For conducted measurements on smart antenna systems using either operating mode 2 or operating mode 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each sampling point (frequency domain), add up the coincident power values (in mW) for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for power for all the samples in the file using the formula below.

$$P_{Sum} = \sum_{n=1}^{k} P_{sample}(n)$$

with k being the total number of samples and n the actual sample number

Step 4:

Normalize the individual values for power (in dBm) so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2 and save the corrected data. The following formulas can be used:

$$C_{Corr} = P_{Sum} - P_{e.i.r.p.}$$

$$P_{Samplecorr}(n) = P_{Sample}(n) - C_{Corr}$$

with n being the actual sample number

Step 5:

Starting from the first sample PSamplecorr(n) (lowest frequency), add up the power (in mW) of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to sample #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:
Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to sample #101).
Step 7:
Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments.
From all the recorded results, the highest value is the maximum Power Spectral Density (PSD) 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.

EUT DESCRIPTION:

Mode:	☒802.11b	☒802.11g	☒802.11n HT20	☒802.11n HT40
Test Channel	☒2412MHz ☒2442MHz ☒2472MHz	☒2412MHz ☒2442MHz ☒2472MHz	☒2412MHz ☒2442MHz ☒2472MHz	☒2422MHz ☒2442MHz ☒2462MHz
Bandwidth	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☐20MHz ☒40MHz
Modulation Type	☒DSSS ☐OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM
Channel Separation	☒5MHz	☒5MHz	☒5MHz	☒5MHz

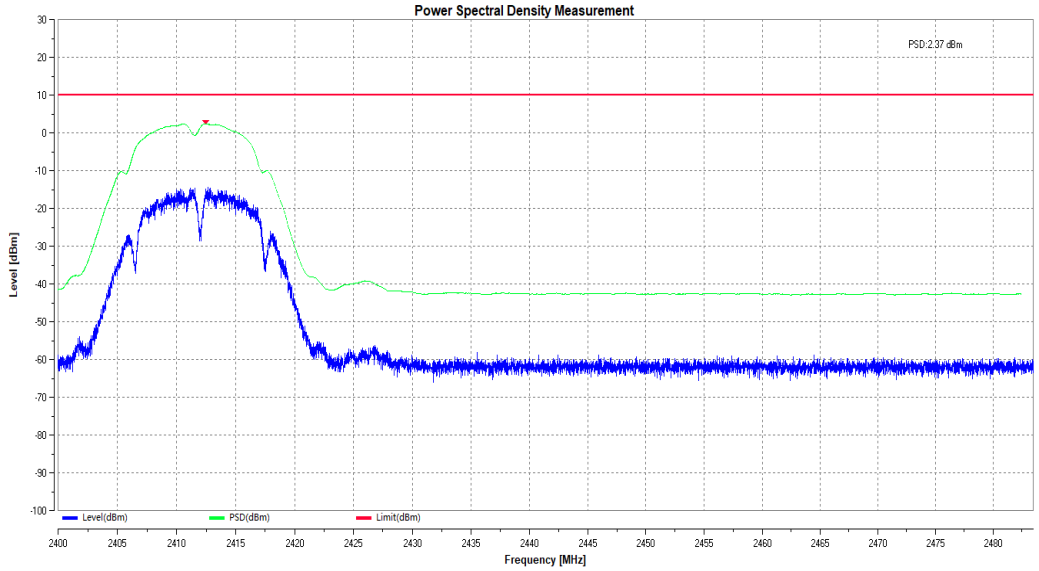
MEASUREMENT DESCRIPTION

Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	10S	
Video bandwidth:	30KHz	
Resolution bandwidth:	10KHz	
Span:	83.5MHz	
Frequency range	2400-2483.5MHz	
Sweep Points	15000	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

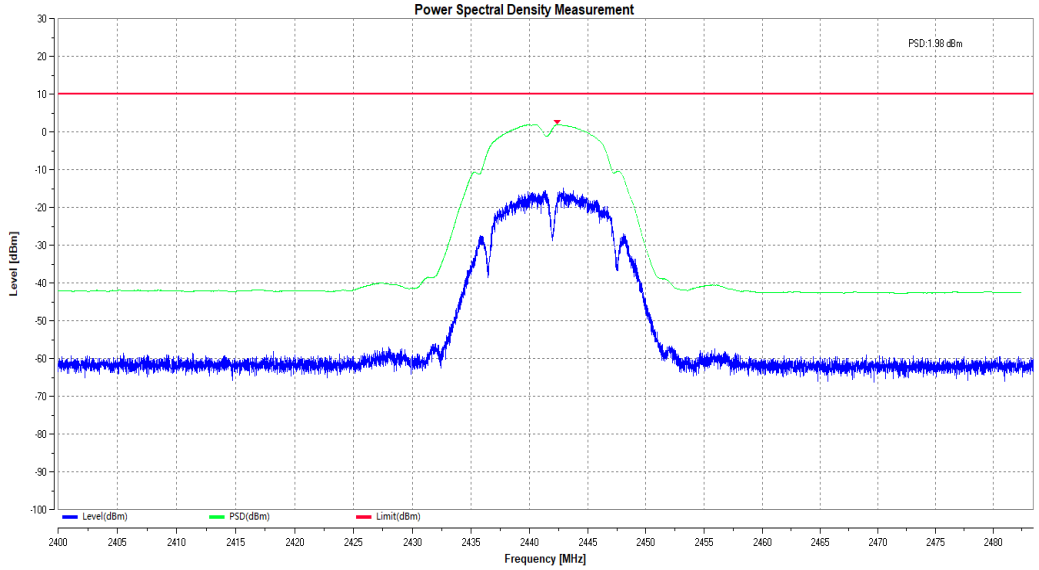
TEST RESULTS

Test mode	Spatial streams	Channel frequency(MHz)	Power Density (dBm/MHz)	Limit (dBm/MHz)
802.11b 1Mbps	1	Low	2.37	10
	1	Middle	1.98	10
	1	High	2.22	10
802.11g 6Mbps	1	Low	-1.09	10
	1	Middle	-1.05	10
	1	High	-0.82	10
802.11n HT-20 6.5Mbps	1	Low	-1.22	10
	1	Middle	-1.14	10
	1	High	1.13	10
802.11n HT-40 13.5Mbps	1	Low	-5.58	10
	1	Middle	-5.52	10
	1	High	-5.63	10

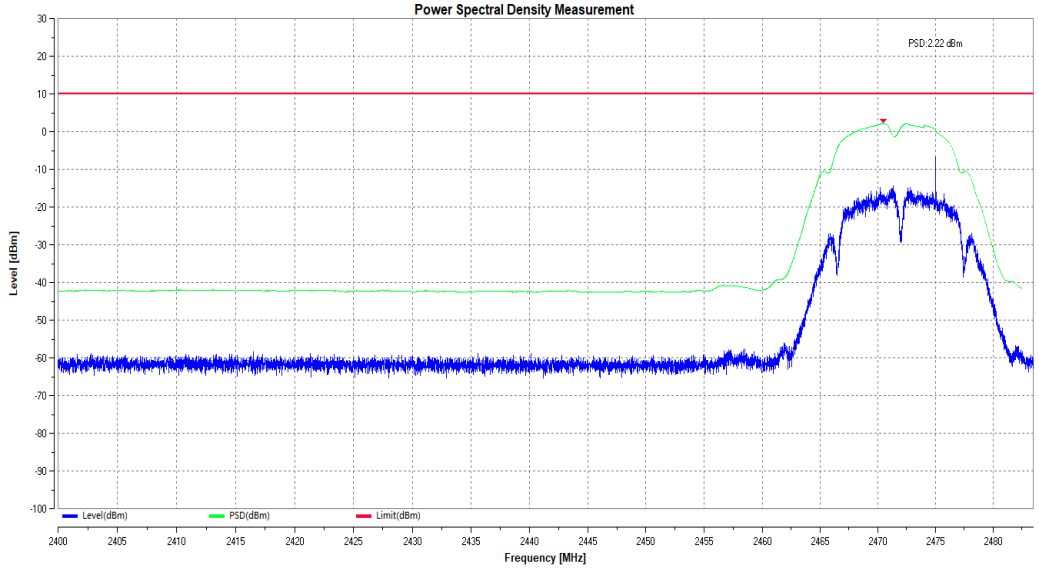
802.11b 2412



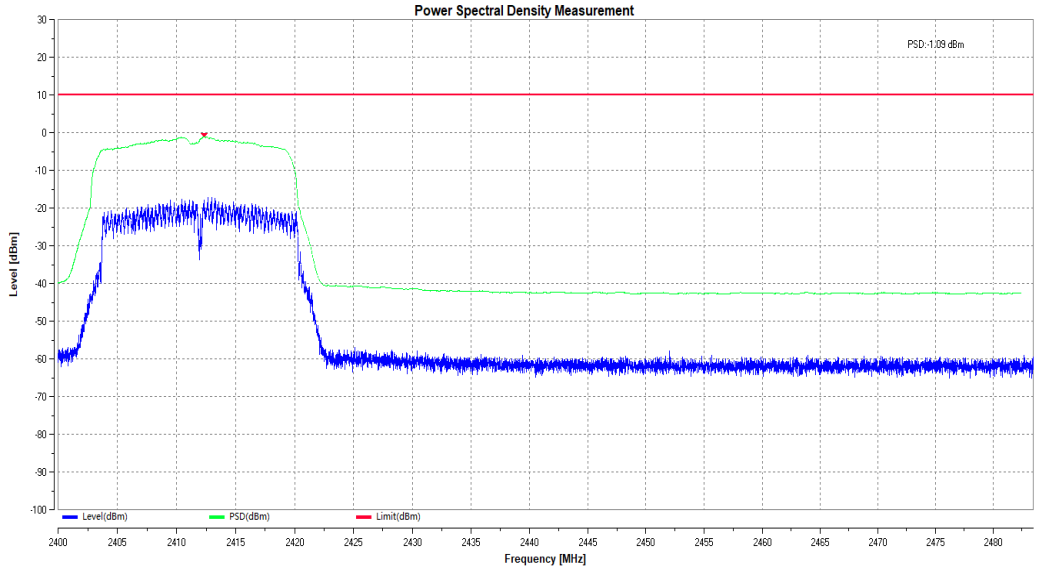
802.11b 2442



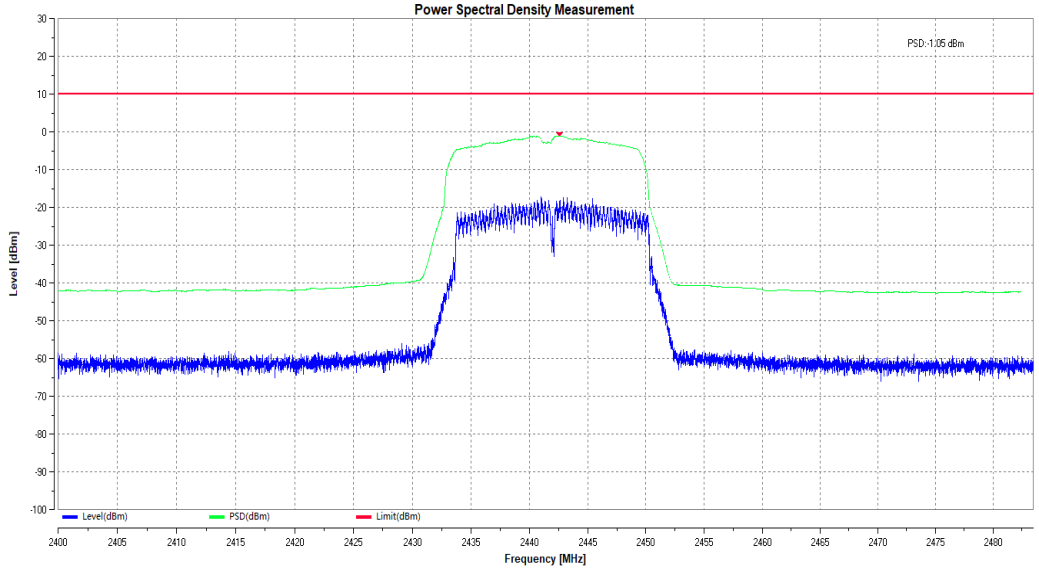
802.11b 2472



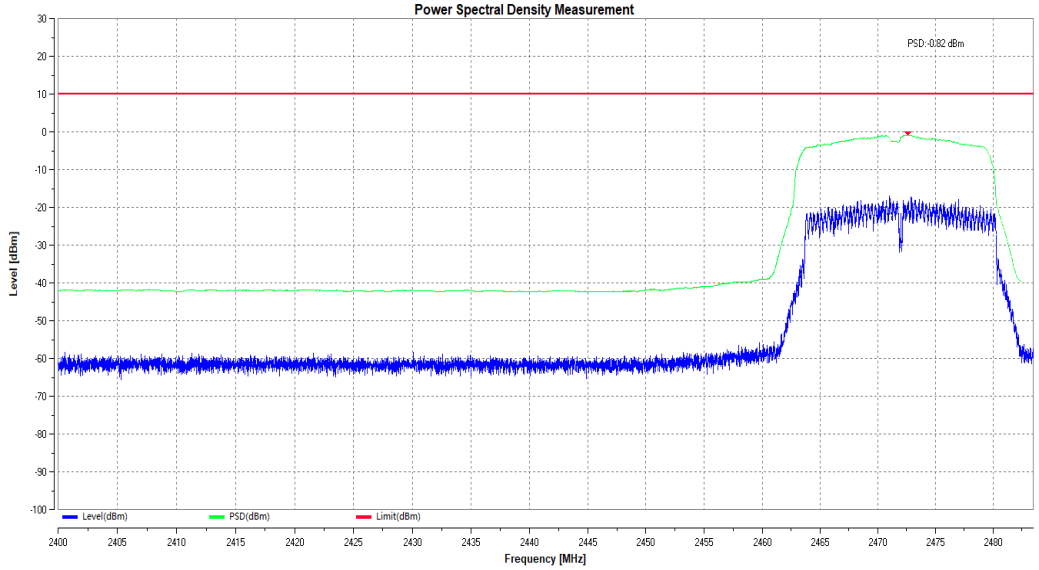
802.11g 2412



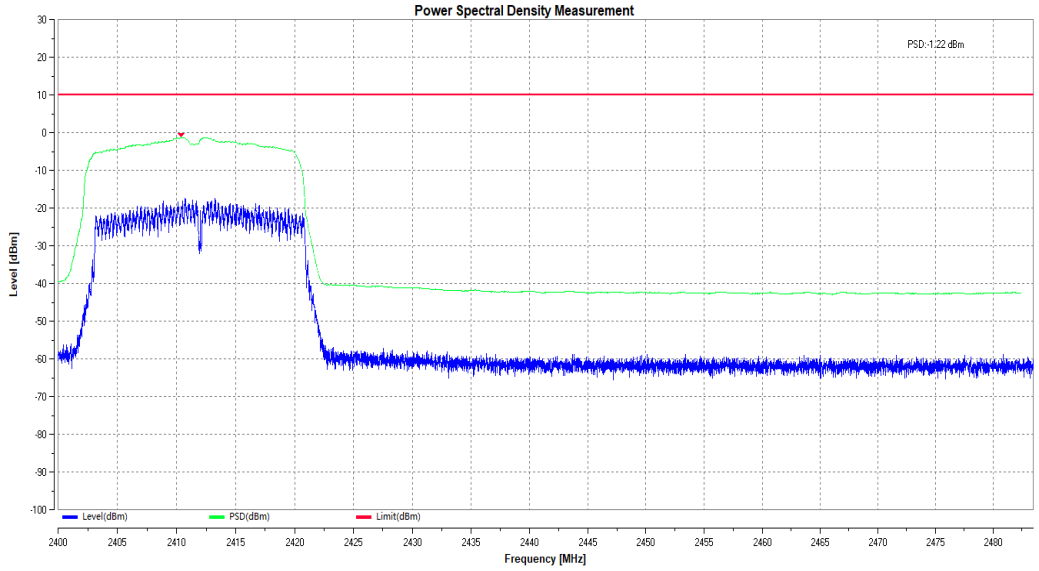
802.11g 2442



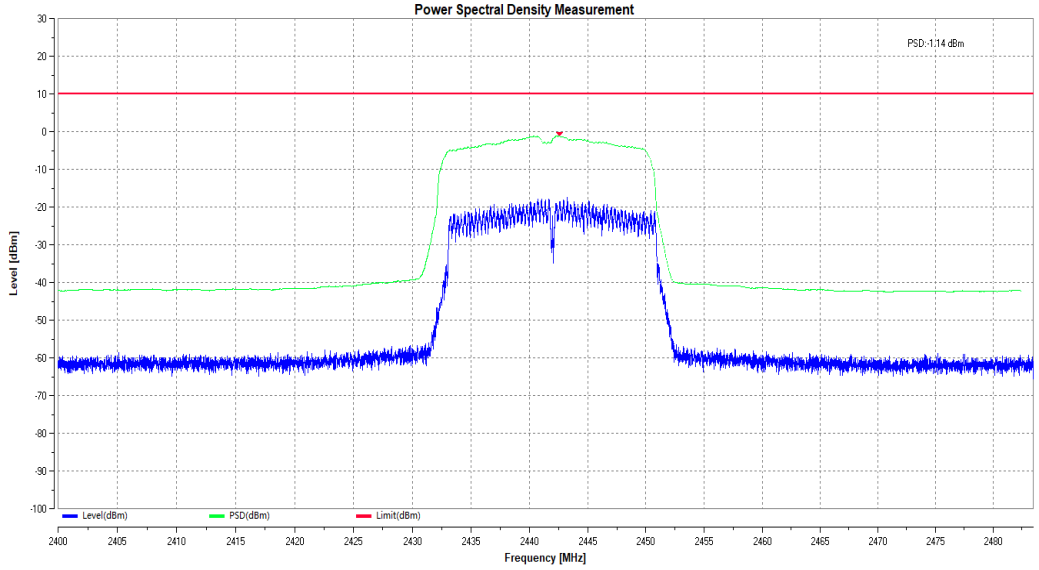
802.11g 2472



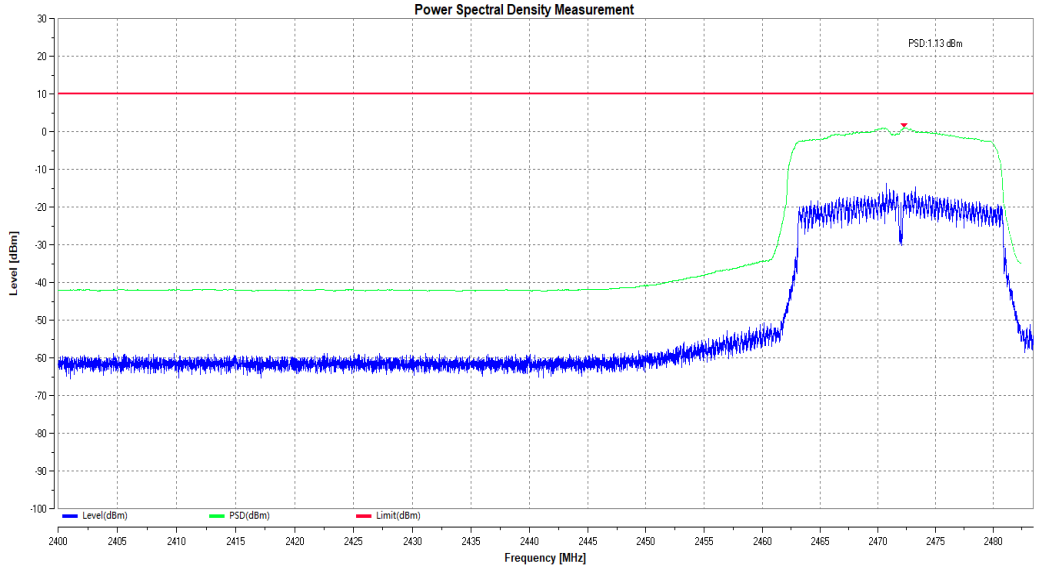
802.11n HT20 2412



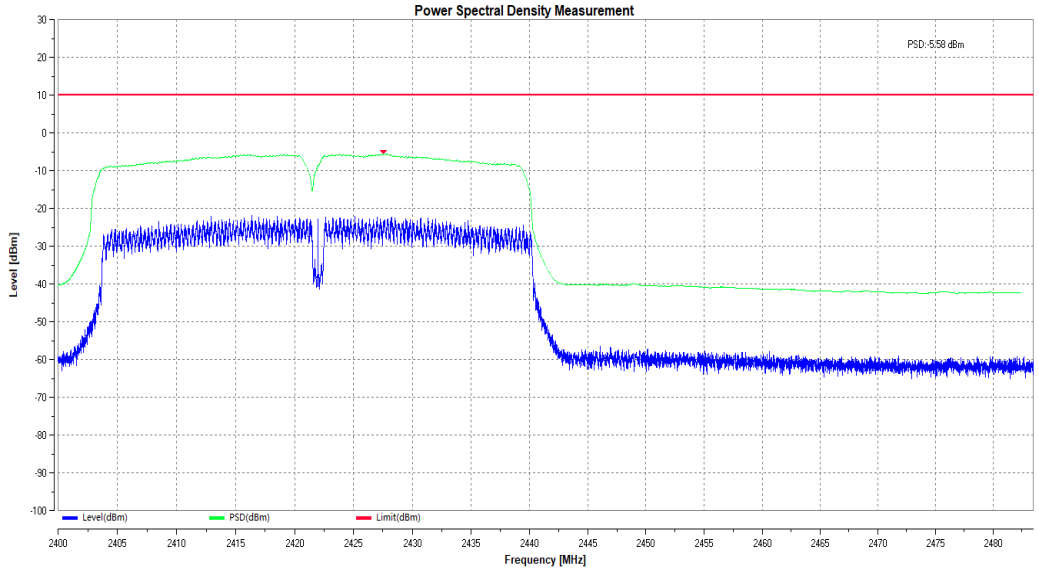
802.11n HT20 2442



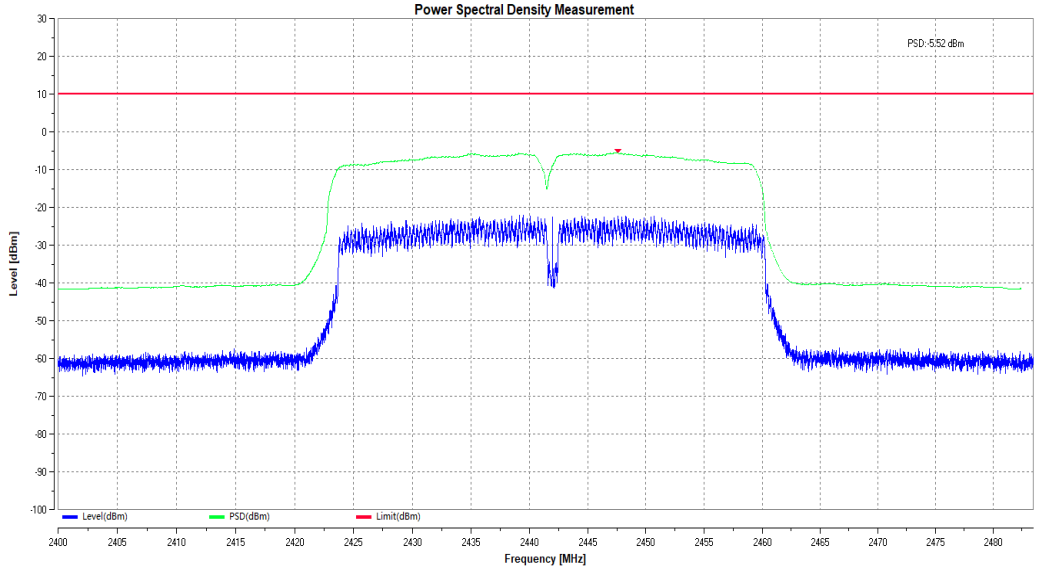
802.11n HT20 2472



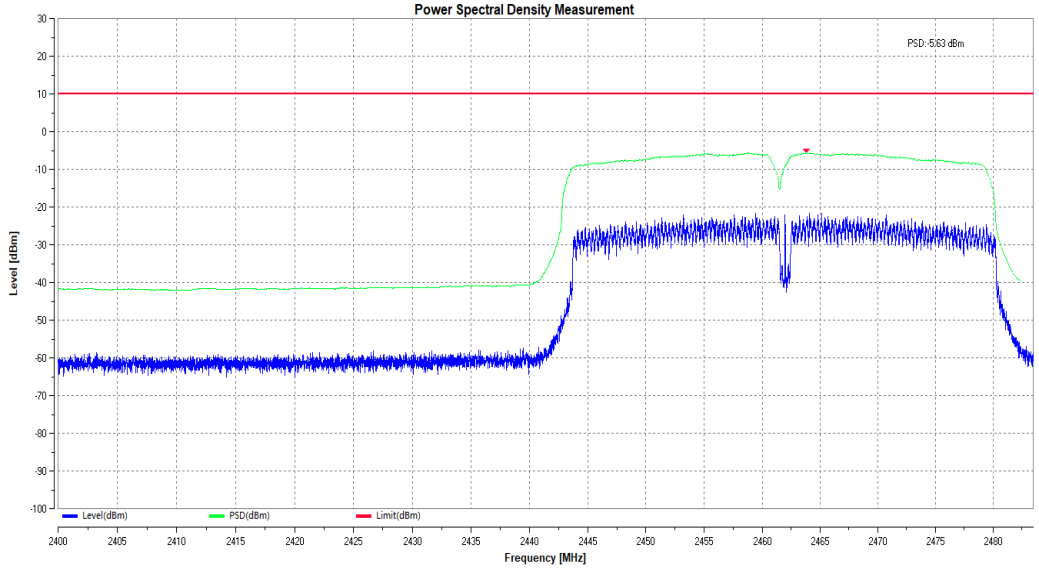
802.11n HT40 2422



802.11n HT40 2442



802.11n HT40 2462



4.1.5. Adaptivity (Adaptive equipment using modulations other than FHSS)

LIMIT

Requirement	Operational Mode			
	Non-LBT based Detect and Avoid	LBT based Detect and Avoid		
		Frame Based Equipment	Load Based Equipment (CCA using 'energy detect')	Load Based Equipment (CCA not using any of the mechanisms referenced as note 2)
Minimum Clear Channel Assessment (CCA) Time	NA	18 us (see note 1)	18 us (see note 2)	18 us (see note 2)
Maximum Channel Occupancy (COT) Time	40 ms	1ms to 10 ms	13ms (see note 2)	13ms
Minimum Idle Period	At least 5% of COT and 100 μs	5% of COT	(see note 2)	(see note 2)
Extended CCA check	NA	NA	(see note 2)	between 18 μs and at least 160 μs
Short Control Signaling Transmissions	Maximum duty cycle of 10% within an observation period of 50 ms (see note 3)			

Note 1: The CCA time used by the equipment shall be declared by the supplier.
Note 2: Load Based Equipment may implement an LBT based spectrum sharing mechanism based on the Clear Channel Assessment (CCA) mode using energy detect, as described in IEEE Std. 802.11™-2007 clauses 9,15,18 or 19, in IEEE Std. 802.11n ™ -2009 clauses 9,11 and 20 or in IEEE Std. 802.15.4 ™ -2011, clauses 4 and 5.
Note 3: Adaptive equipment may or may not have Short Control Signaling Transmissions.

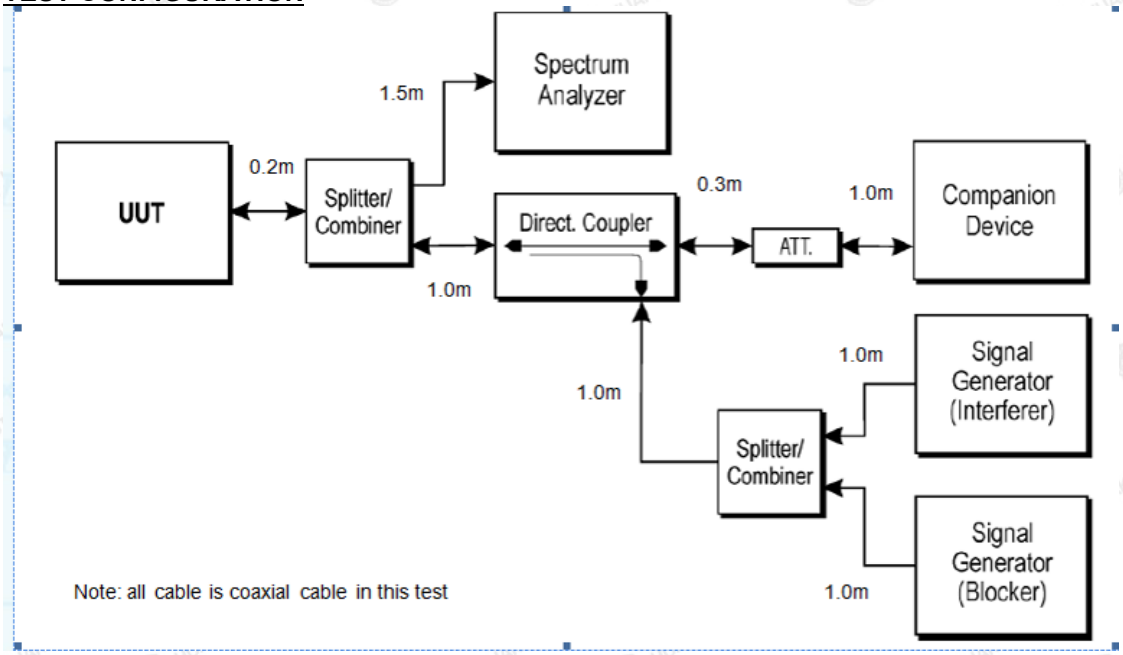
Wanted signal mean power from companion device:

TL = -70 dBm/MHz + 10 × log10 (100 mW / P_{out}) (Pout in mW e.i.r.p.)

Unwanted Signal parameters

Wanted signal mean power from companion device	Maximum transmit power (PH) EIRP mW	Threshold Level (TL)
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1. NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz. NOTE 3: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.		

TEST CONFIGURATION



MEASUREMENT DESCRIPTION

According to ETSI EN 300 328 V2.2.2(2019-07) §5.4.6.2.1.4, Conducted measurements

Step 1:

• The UUT shall connect to a companion device during the test. The interference signal generator, the unwanted signal generator, the spectrum analyser, the UUT and the companion device are connected using a set-up equivalent to the example given by figure 5 although the interference and unwanted signal generator do not generate any signals at this point in time. The spectrum analyser is used to monitor the transmissions of both the UUT and the companion device and it should be possible to distinguish between either transmission. In addition, the spectrum analyser is used to monitor the transmissions of the UUT in response to the interfering and the unwanted signals.

• Adjust the received signal level (wanted signal from the companion device) at the UUT to the value defined in table 10 (clause 4.3.2.6.3.2.2) for Frame Based Equipment or in table 11 (clause 4.3.2.6.3.2.3) for Load Based Equipment. Testing of Unidirectional equipment does not require a link to be established with a companion device.

• The analyser shall be set as follows:

- RBW: ⩾ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used)
- VBW: 3 × RBW (if the analyser does not support this setting, the highest available setting shall be used)
- Detector Mode: RMS
- Centre Frequency: Equal to the centre frequency of the operating channel
- Span: 0 Hz
- Sweep time: > maximum Channel Occupancy Time
- Trace Mode: Clear Write
- Trigger Mode: Video

Step 2:

• Configure the UUT for normal transmissions with a sufficiently high payload resulting in a minimum transmitter activity ratio (TxOn / (TxOn + TxOff)) of 0,3. Where this is not possible, the UUT shall be configured to the maximum payload possible.

• For Frame Based Equipment, using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.2, step 3. When measuring the Idle Period of the UUT, only transmissions from the UUT shall be considered.

• For Load Based equipment, using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.3, step 2 and step 3. When measuring the Idle Period of the UUT, only transmissions from the UUT shall be considered.

For the purpose of testing Load Based Equipment referred to in the first paragraph of clause 4.3.2.6.3.2.3 (IEEE 802.11™ [i.3] or IEEE 802.15.4™ [i.4] equipment), the limits to be applied for the minimum Idle Period and the maximum Channel Occupancy Time are the same as defined for other types of Load Based Equipment (see clause 4.3.2.6.3.2.3, step 2 and step 3). The Idle Period is considered to be equal to the CCA or Extended CCA time defined in clause 4.3.2.6.3.2.3, step 1 and step 2.

Step 3: Adding the interference signal

• An interference signal as defined in clause B.7 is injected on the current operating channel of the UUT. The power spectral density level (at the input of the UUT) of this interference signal shall be equal to the detection threshold defined in clause 4.3.2.6.3.2.2, step 5 (frame based equipment) or clause 4.3.2.6.3.2.3, step 5 (load based equipment).

Step 4: Verification of reaction to the interference signal

• The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel with the interfering signal injected. This may require the spectrum analyser sweep to be triggered by the start of the interfering signal.

• Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that:

i) The UUT shall stop transmissions on the current operating channel.

The UUT is assumed to stop transmissions within a period equal to the maximum Channel Occupancy Time defined in clause 4.3.2.6.3.2.2 (frame based equipment) or clause 4.3.2.6.3.2.3 (load based equipment).

ii) Apart from Short Control Signalling Transmissions, there shall be no subsequent transmissions while the interfering signal is present.

To verify that the UUT is not resuming normal transmissions as long as the interference signal is present, the monitoring time may need to be 60 s or more.

iii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interfering signal is present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2.

The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

iv) Alternatively, the equipment may switch to a non-adaptive mode.

Step 5: Adding the unwanted signal

• With the interfering signal present, a 100 % duty cycle CW signal is inserted as the unwanted signal. The frequency and the level are provided in table 10 (clause 4.3.2.6.3.2.2) for Frame Based Equipment or in table 11 (clause 4.3.2.6.3.2.3) for Load Based Equipment.

• The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel. This may require the spectrum analyser sweep to be triggered by the start of the unwanted signal.

• Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that:

i) The UUT shall not resume normal transmissions on the current operating channel as long as both the interference and unwanted signals remain present.

To verify that the UUT is not resuming normal transmissions as long as the interference and unwanted signals are present, the monitoring time may need to be 60 s or more.

ii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interfering and unwanted signals are present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2.

The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

Step 6: Removing the interference and unwanted signal

• On removal of the interference and unwanted signals the UUT is allowed to start transmissions again on this channel; however, this is not a requirement and, therefore, does not require testing.

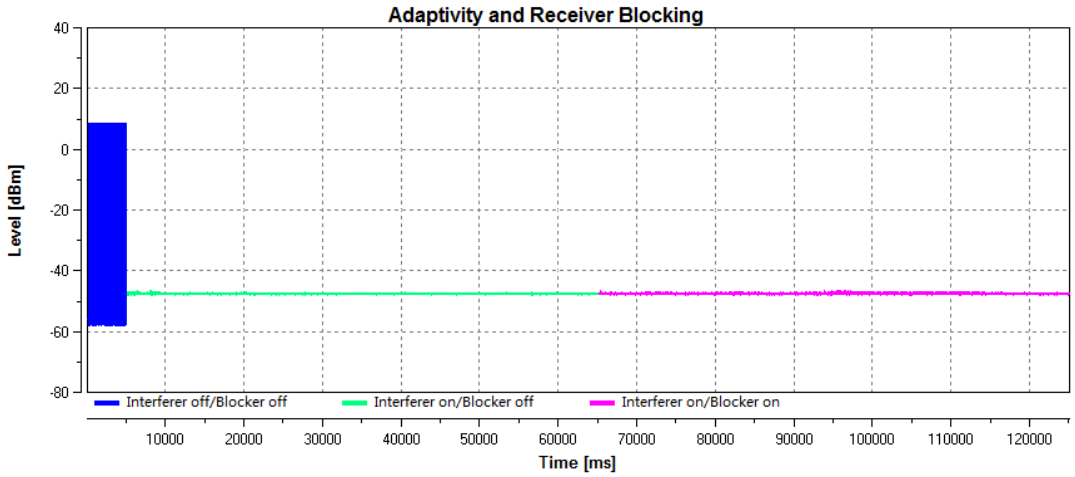
Step 7:

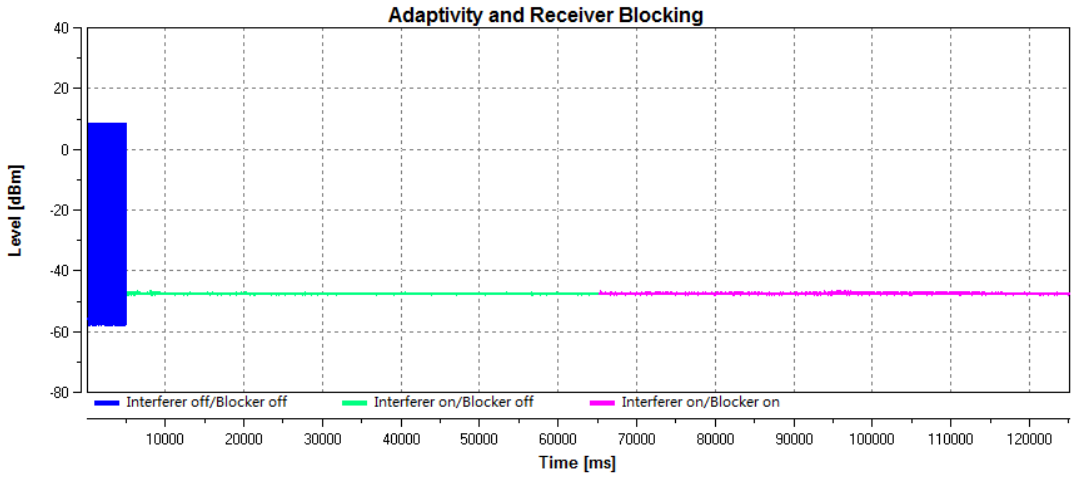
• Step 2 to step 6 shall be repeated for each of the frequencies to be tested.

TEST RESULTS

Mode	Channel	COT values(ms)	Idle values [ms]	Short Control (%)			Verdict
				Interferer values	CW values	Limit [%]	
802.11b	LCH	2.019	0.062	0	0	10	PASS
802.11b	HCH	2.227	0.087	0	0	10	PASS

Test Plot

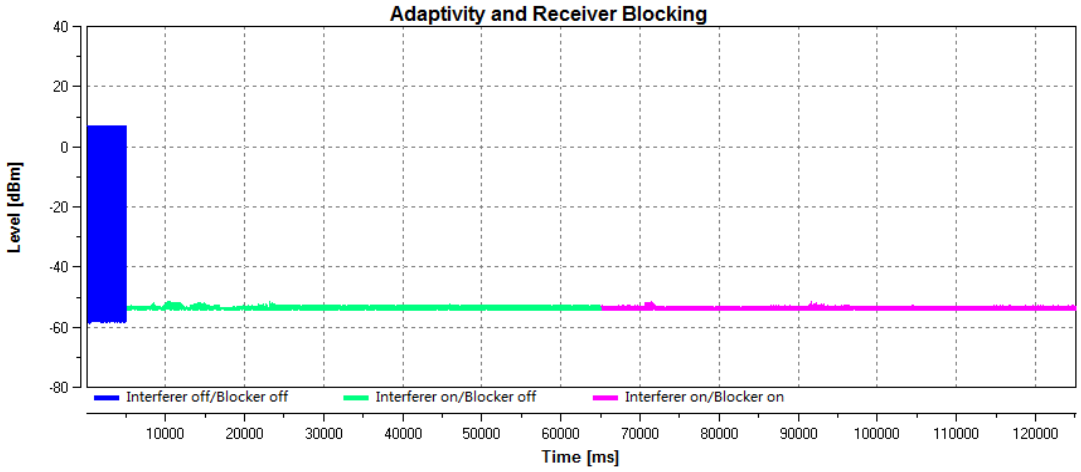


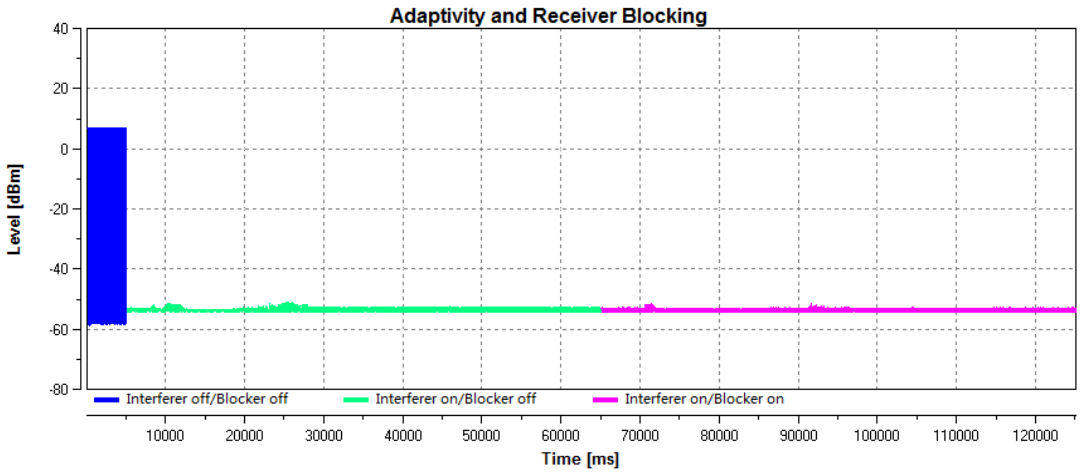


Note: Only the worst plots were recorded in this report.

Mode	Channel	COT values(ms)	Idle values [ms]	Short Control (%)			Verdict
				Interferer values	CW values	Limit [%]	
802.11g	LCH	2.31	0.042	0	0	10	PASS
802.11g	HCH	2.256	0.160	0	0	10	PASS

Test Plot

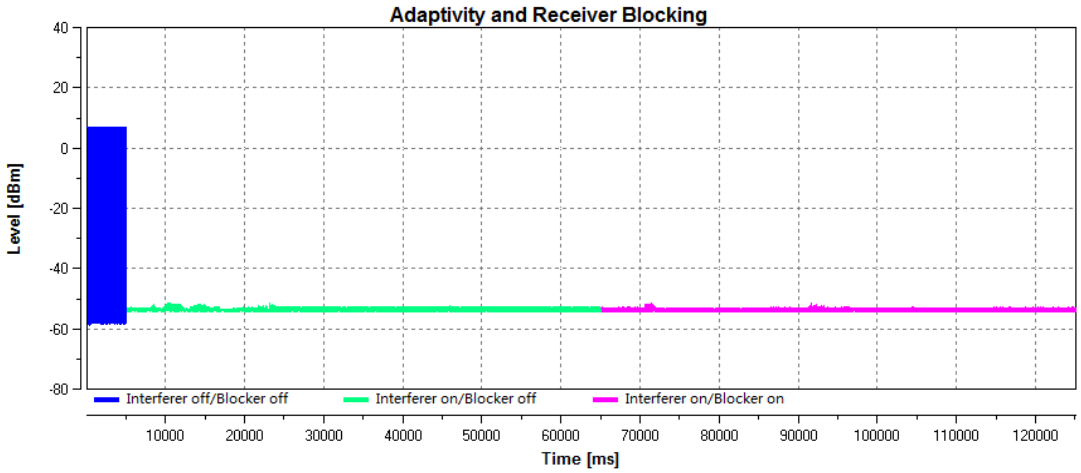


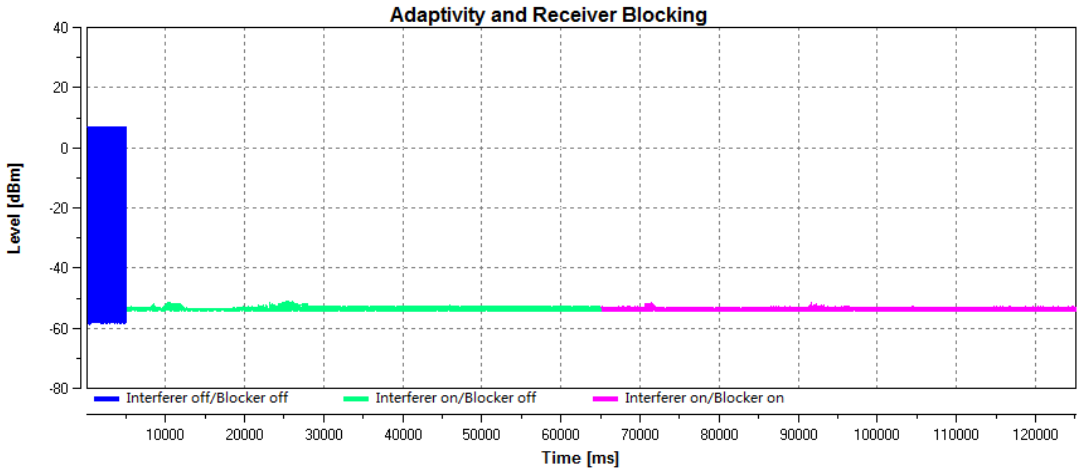


Note: Only the worst plots were recorded in this report.

Mode	Channel	COT values(ms)	Idle values [ms]	Short Control (%)			Verdict
				Interferer values	CW values	Limit [%]	
802.11n HT20	LCH	2.743	0.079	0	0	10	PASS
802.11n HT20	HCH	2.878	0.042	0	0	10	PASS

Test Plot

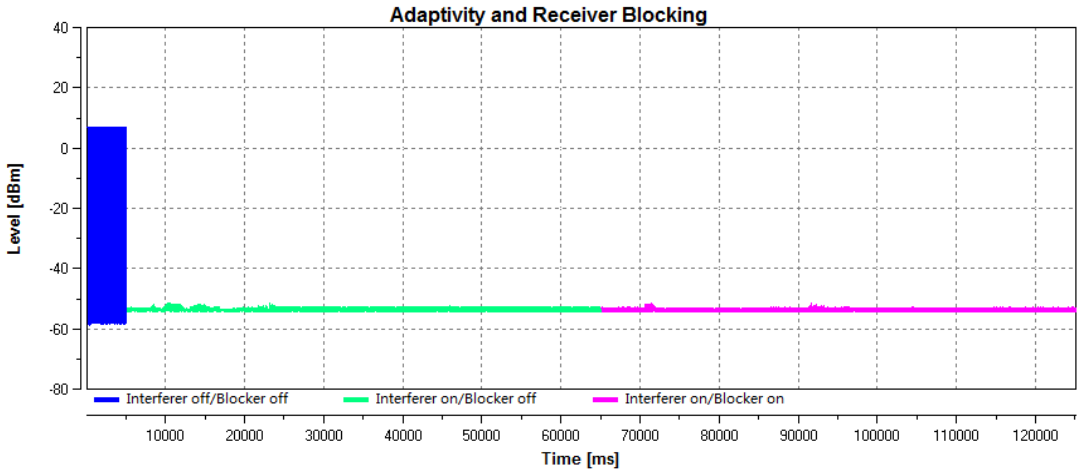


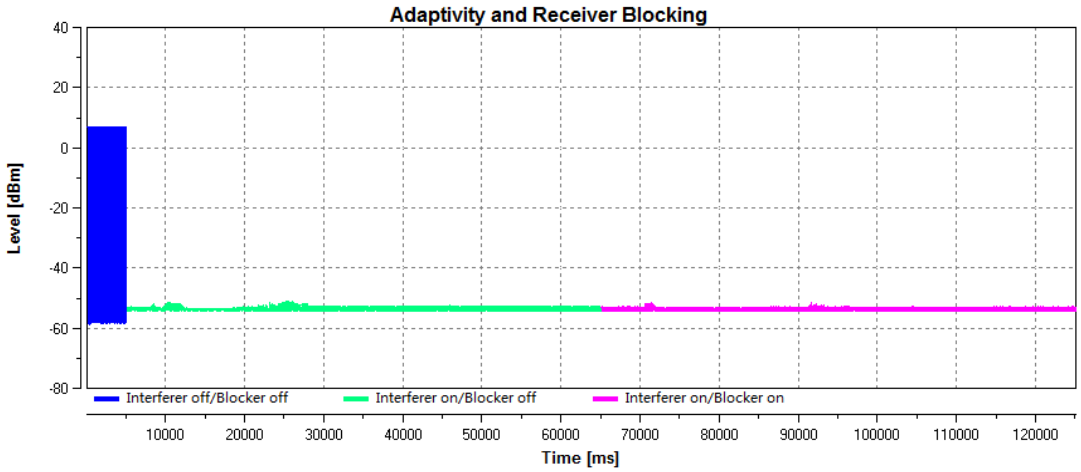


Note: Only the worst plots were recorded in this report.

Mode	Channel	COT values(ms)	Idle values [ms]	Short Control (%)			Verdict
				Interferer values	CW values	Limit [%]	
802.11n HT40	LCH	2.751	0.154	0	0	10	PASS
802.11n HT40	HCH	3.044	0.061	0	0	10	PASS

Test Plot





Note: Only the worst plots were recorded in this report.

4.1.6. Occupied Channel Bandwidth

LIMIT

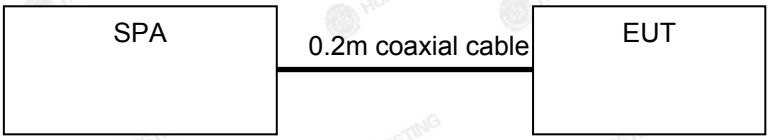
According to ETSI EN 300 328 V2.2.2(2019-07) 4.3.2.7.3,
The Occupied Channel Bandwidth shall fall completely within the band given in table 1.

Table 1: Service frequency bands

	Service frequency bands
Transmit	2 400 MHz to 2 483,5 MHz
Receive	2 400 MHz to 2 483,5 MHz

In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.
These measurements shall only be performed at normal test conditions.

TEST CONFIGURATION



TEST PROCEDURE

According to ETSI EN 300 328 V2.2.2(2019-07) §5.4.7.2.1, conducted method.
Step 1:
Connect the UUT to the spectrum analyser 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 × Nominal Channel Bandwidth
• Detector Mode: RMS
• Trace Mode: Max Hold
• Sweep time: 1 s
Step 2:
Wait for the trace to stabilize.
Find the peak value of the trace and place the analyser marker on this peak.
Step 3:
Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.
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 DESCRIPTION:

Mode:	☒802.11b	☒802.11g	☒802.11n HT20	☒802.11n HT40
Test Channel	☒2412MHz ☒2472MHz	☒2412MHz ☒2472MHz	☒2412MHz ☒2472MHz	☒2422MHz ☒2462MHz
Bandwidth	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☐20MHz ☒40MHz
Modulation Type	☒DSSS ☐OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM
Channel Separation	☒5MHz	☒5MHz	☒5MHz	☒5MHz

MEASUREMENT DESCRIPTION

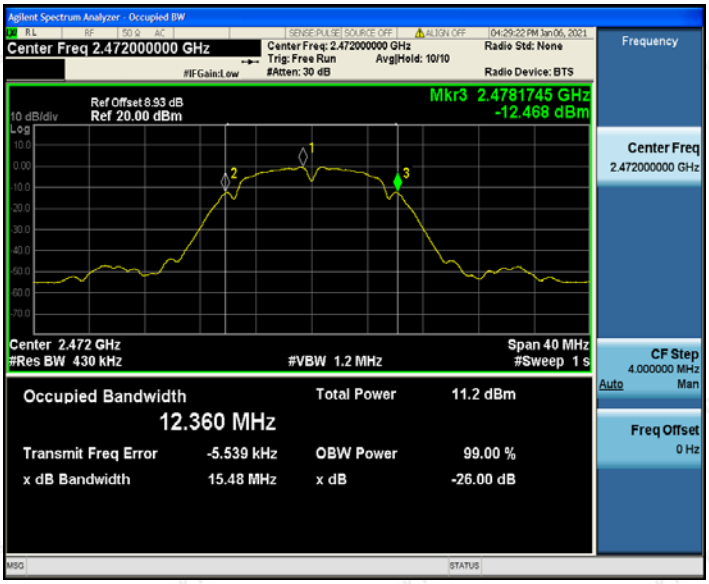
Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	auto	
Video bandwidth:	☒20 MHz(Bandwith):1.5MHz	☒40 MHz(Bandwith):3MHz
Resolution bandwidth:	☒20 MHz(Bandwith):410KHz	☒40 MHz(Bandwith):820KHz
Span:	☒20 MHz(Bandwith):40MHz	☒40 MHz(Bandwith):80MHz
Center:	Transmit channel	
Trace:	Max hold	
Performed:	☒ Conducted	
	☐ Radiated (only if no conducted sample is provided)	

TEST RESULTS

Test Condition	Test Mode	Test Channel	Ant	OBW [MHz]	FL OBW [MHz]	FH OBW [MHz]	Verdict
TNVN	11B	2412	Ant1	12.388	2405.816	---	PASS
TNVN	11B	2472	Ant1	12.360	---	2478.175	PASS
TNVN	11G	2412	Ant1	16.465	2403.767	---	PASS
TNVN	11G	2472	Ant1	16.474	---	2480.231	PASS
TNVN	11N20	2412	Ant1	17.636	2403.183	---	PASS
TNVN	11N20	2472	Ant1	17.658	---	2480.819	PASS
TNVN	11N40	2422	Ant1	35.882	2404.075	---	PASS
TNVN	11N40	2462	Ant1	35.883	---	2479.948	PASS

802.11b 2412

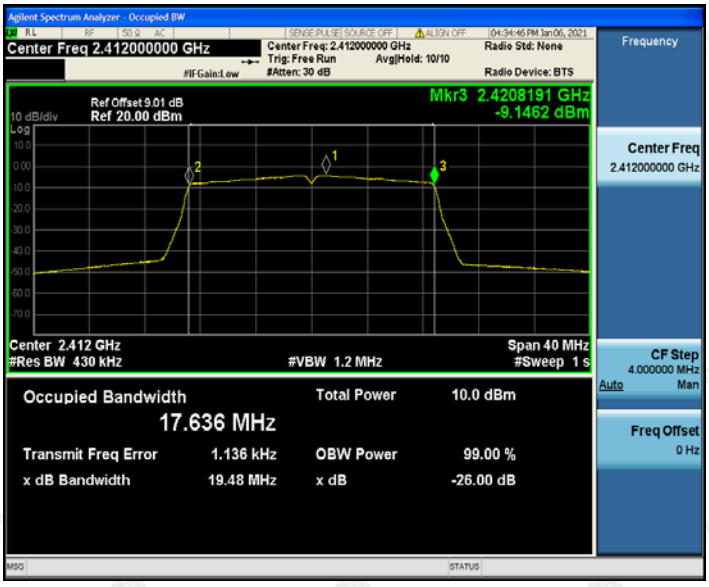
802.11b 2472



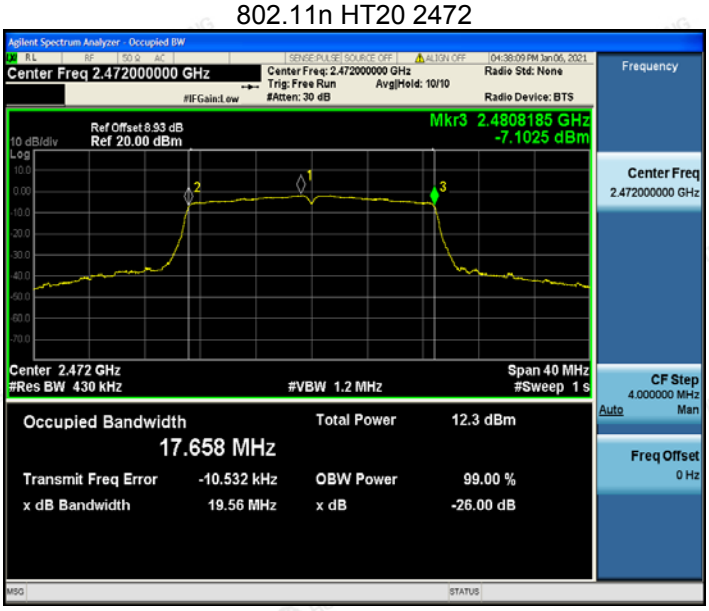
802.11g 2412

802.11g 2472

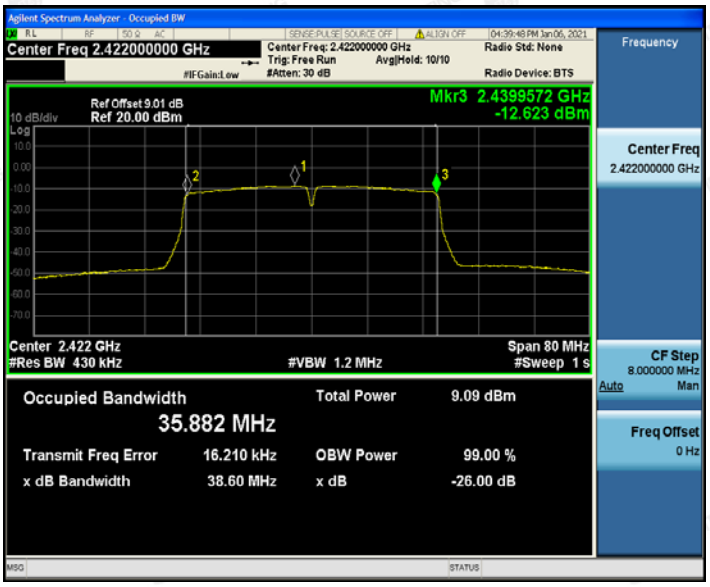
802.11n HT20 2412



802.11n HT20 2472



802.11n HT40 2422



802.11n HT40 2462

4.1.7. Transmitter unwanted emissions in the out-of-band domain

LIMIT

ETSI EN 300 328 (V2.2.2) Sub-clause 4.3.2.8.3
The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.
NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.2.7.

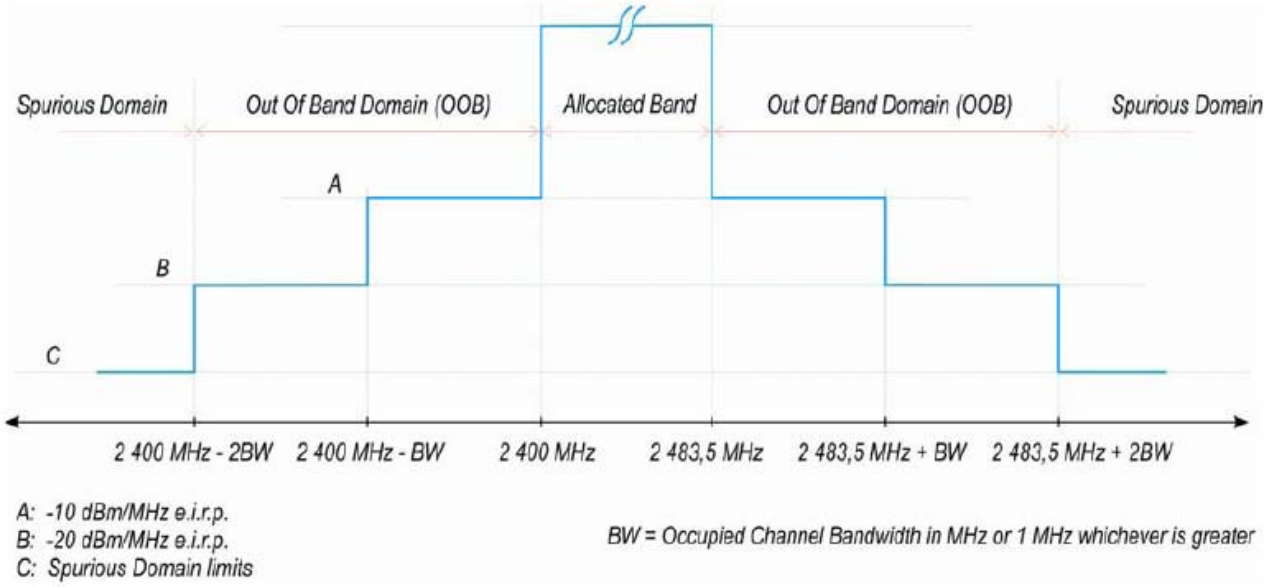
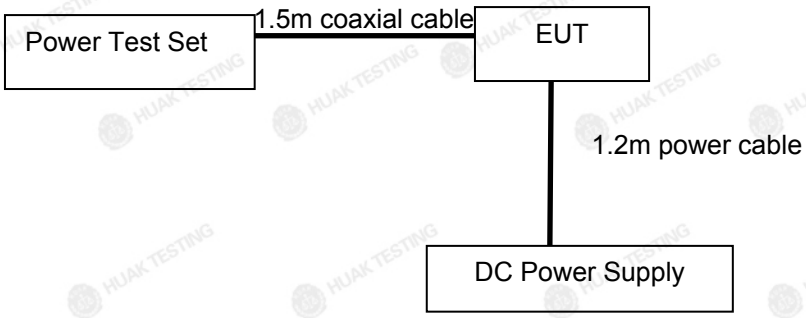


Figure 3: Transmit mask

Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious.
These measurements shall only be performed at normal test conditions.
For systems using FHSS modulation, the measurements shall be performed during normal operation (hopping).
For systems using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These operating channels shall be recorded.
The equipment shall be configured to operate under its worst case situation with respect to output power.
If the equipment can operate with different Occupied Channel Bandwidths (e.g. 20 MHz and 40 MHz), than each channel bandwidth shall be tested separately.

TEST CONFIGURATION



TEST PROCEDURE

According to ETSI EN 300 328 V2.2.2(2019-07) §5.4.8.2.1, conducted method.

Step 1:

• Connect the UUT to the spectrum analyser and use the following settings:
- Measurement Mode: Time Domain Power
- Centre Frequency: 2 484 MHz
- Span: Zero Span
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep Mode: Single Sweep
- Sweep Points: Sweep time [µs] / (1 µs) with a maximum of 30 000
- Trigger Mode: Video
- Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

Step 2 (segment 2 483,5 MHz to 2 483,5 MHz + BW):

• The measurement shall be performed and repeated while the trigger level is increased until no triggering takes place.
• For FHSS 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).

Step 3 (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2 BW):

• 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 + 2 BW. 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 (which means this may partly overlap with the previous 1 MHz segment).

Step 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 - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2 BW 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 - 2 BW 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 - 2 BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 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 figure 1 or figure 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 figure 1 or figure 3.

- Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by 10 × log10(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: Ach refers to the number of active transmit chains.
It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

EUT DESCRIPTION:

Mode:	☒802.11b	☒802.11g	☒802.11n HT20	☒802.11n HT40
Test Channel	☒2412MHz ☒2472MHz	☒2412MHz ☒2472MHz	☒2412MHz ☒2472MHz	☒2422MHz ☒2462MHz
Bandwidth	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☒20MHz ☐40MHz	☐20MHz ☒40MHz
Modulation Type	☒DSSS ☐OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM	☐DSSS ☒OFDM
Channel Separation	☒5MHz	☒5MHz	☒5MHz	☒5MHz

MEASUREMENT DESCRIPTION

Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	depending on packet length	
Video bandwidth:	3MHz	
Resolution bandwidth:	1MHz	
Span:	0Hz	
Trace:	Trigger to burst	
Sweep points:	Sweep Time [s] / (1 µs) or 5 000 whichever is greater	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

Note: Cable loss and antenna gain was combined in the calculated result.

Test Condition	Test Mode	Test Channel	Ant	Freq [MHz]	Result [dBm]	Limit [dBm]	Verdict
TNVN	11B	2412	Ant1	2375.920	-49.24	<=-20	PASS
TNVN	11B	2412	Ant1	2376.210	-49.12	<=-20	PASS
TNVN	11B	2412	Ant1	2377.210	-48.44	<=-20	PASS
TNVN	11B	2412	Ant1	2378.210	-49.47	<=-20	PASS
TNVN	11B	2412	Ant1	2379.210	-48.21	<=-20	PASS
TNVN	11B	2412	Ant1	2380.210	-48.11	<=-20	PASS
TNVN	11B	2412	Ant1	2381.210	-48.70	<=-20	PASS
TNVN	11B	2412	Ant1	2382.210	-48.55	<=-20	PASS
TNVN	11B	2412	Ant1	2383.210	-48.38	<=-20	PASS
TNVN	11B	2412	Ant1	2384.210	-49.93	<=-20	PASS
TNVN	11B	2412	Ant1	2385.210	-49.49	<=-20	PASS
TNVN	11B	2412	Ant1	2386.210	-49.95	<=-20	PASS
TNVN	11B	2412	Ant1	2387.210	-47.16	<=-20	PASS
TNVN	11B	2412	Ant1	2388.210	-47.15	<=-20	PASS
TNVN	11B	2412	Ant1	2389.210	-48.85	<=-20	PASS
TNVN	11B	2412	Ant1	2390.210	-48.98	<=-20	PASS
TNVN	11B	2412	Ant1	2388.210	-46.61	<=-10	PASS
TNVN	11B	2412	Ant1	2388.500	-47.46	<=-10	PASS
TNVN	11B	2412	Ant1	2389.500	-46.23	<=-10	PASS
TNVN	11B	2412	Ant1	2390.500	-47.71	<=-10	PASS
TNVN	11B	2412	Ant1	2391.500	-47.98	<=-10	PASS
TNVN	11B	2412	Ant1	2392.500	-47.12	<=-10	PASS
TNVN	11B	2412	Ant1	2393.500	-48.09	<=-10	PASS
TNVN	11B	2412	Ant1	2394.500	-46.15	<=-10	PASS
TNVN	11B	2412	Ant1	2395.500	-43.82	<=-10	PASS
TNVN	11B	2412	Ant1	2396.500	-40.13	<=-10	PASS
TNVN	11B	2412	Ant1	2397.500	-38.55	<=-10	PASS
TNVN	11B	2412	Ant1	2398.500	-36.85	<=-10	PASS
TNVN	11B	2412	Ant1	2399.500	-34.52	<=-10	PASS
TNVN	11B	2412	Ant1	2484.000	-33.63	<=-10	PASS
TNVN	11B	2412	Ant1	2485.000	-33.26	<=-10	PASS
TNVN	11B	2412	Ant1	2486.000	-33.71	<=-10	PASS

TNVN	11B	2412	Ant1	2487.000	-46.75	<=-10	PASS
TNVN	11B	2412	Ant1	2488.000	-46.80	<=-10	PASS
TNVN	11B	2412	Ant1	2489.000	-46.94	<=-10	PASS
TNVN	11B	2412	Ant1	2490.000	-46.24	<=-10	PASS
TNVN	11B	2412	Ant1	2491.000	-46.08	<=-10	PASS
TNVN	11B	2412	Ant1	2492.000	-46.65	<=-10	PASS
TNVN	11B	2412	Ant1	2493.000	-46.69	<=-10	PASS
TNVN	11B	2412	Ant1	2494.000	-46.47	<=-10	PASS
TNVN	11B	2412	Ant1	2495.000	-47.03	<=-10	PASS
TNVN	11B	2412	Ant1	2495.290	-46.64	<=-10	PASS
TNVN	11B	2412	Ant1	2496.290	-47.24	<=-10	PASS
TNVN	11B	2412	Ant1	2497.290	-47.08	<=-10	PASS
TNVN	11B	2412	Ant1	2498.290	-46.83	<=-10	PASS
TNVN	11B	2412	Ant1	2499.290	-47.35	<=-10	PASS
TNVN	11B	2412	Ant1	2500.290	-47.40	<=-10	PASS
TNVN	11B	2412	Ant1	2501.290	-47.63	<=-10	PASS
TNVN	11B	2412	Ant1	2502.290	-47.14	<=-20	PASS
TNVN	11B	2412	Ant1	2503.290	-47.37	<=-20	PASS
TNVN	11B	2412	Ant1	2504.290	-47.17	<=-20	PASS
TNVN	11B	2412	Ant1	2505.290	-47.47	<=-20	PASS
TNVN	11B	2412	Ant1	2506.290	-47.40	<=-20	PASS
TNVN	11B	2412	Ant1	2507.290	-47.75	<=-20	PASS
TNVN	11B	2412	Ant1	2507.580	-47.75	<=-20	PASS
TNVN	11B	2412	Ant1	2374.961	-47.18	<=-20	PASS
TNVN	11B	2412	Ant1	2375.422	-47.00	<=-20	PASS
TNVN	11B	2412	Ant1	2375.961	-47.52	<=-20	PASS
TNVN	11B	2412	Ant1	2376.961	-47.16	<=-20	PASS
TNVN	11B	2412	Ant1	2377.961	-47.25	<=-20	PASS
TNVN	11B	2412	Ant1	2378.961	-47.04	<=-20	PASS
TNVN	11B	2412	Ant1	2379.961	-47.55	<=-20	PASS
TNVN	11B	2412	Ant1	2380.961	-47.57	<=-20	PASS
TNVN	11B	2412	Ant1	2381.961	-47.59	<=-20	PASS
TNVN	11B	2472	Ant1	2382.961	-49.42	<=-20	PASS
TNVN	11B	2472	Ant1	2383.961	-50.39	<=-20	PASS

TNVN	11B	2472	Ant1	2384.961	-50.54	<=-20	PASS
TNVN	11B	2472	Ant1	2385.961	-50.52	<=-20	PASS
TNVN	11B	2472	Ant1	2386.961	-50.22	<=-20	PASS
TNVN	11B	2472	Ant1	2387.500	-50.24	<=-20	PASS
TNVN	11B	2472	Ant1	2387.961	-50.20	<=-20	PASS
TNVN	11B	2472	Ant1	2388.500	-49.76	<=-20	PASS
TNVN	11B	2472	Ant1	2389.500	-50.15	<=-20	PASS
TNVN	11B	2472	Ant1	2390.500	-50.04	<=-20	PASS
TNVN	11B	2472	Ant1	2391.500	-49.66	<=-20	PASS
TNVN	11B	2472	Ant1	2392.500	-50.40	<=-20	PASS
TNVN	11B	2472	Ant1	2393.500	-50.08	<=-20	PASS
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TNVN	11B	2472	Ant1	2395.500	-49.58	<=-20	PASS
TNVN	11B	2472	Ant1	2396.500	-49.89	<=-20	PASS
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TNVN	11B	2472	Ant1	2399.500	-49.78	<=-10	PASS
TNVN	11B	2472	Ant1	2484.000	-49.80	<=-10	PASS
TNVN	11B	2472	Ant1	2485.000	-49.76	<=-10	PASS
TNVN	11B	2472	Ant1	2486.000	-49.93	<=-10	PASS
TNVN	11B	2472	Ant1	2487.000	-50.08	<=-10	PASS
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TNVN	11B	2472	Ant1	2489.000	-49.81	<=-10	PASS
TNVN	11B	2472	Ant1	2490.000	-49.42	<=-10	PASS
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TNVN	11B	2472	Ant1	2493.000	-48.68	<=-10	PASS
TNVN	11B	2472	Ant1	2494.000	-49.44	<=-10	PASS
TNVN	11B	2472	Ant1	2495.539	-48.79	<=-10	PASS
TNVN	11B	2472	Ant1	2496.000	-48.91	<=-10	PASS
TNVN	11B	2472	Ant1	2496.539	-34.43	<=-10	PASS
TNVN	11B	2472	Ant1	2497.539	-31.60	<=-10	PASS
TNVN	11B	2472	Ant1	2498.539	-32.03	<=-10	PASS
TNVN	11B	2472	Ant1	2499.539	-32.54	<=-10	PASS

TNVN	11B	2472	Ant1	2500.539	-34.47	<=-10	PASS
TNVN	11B	2472	Ant1	2501.539	-36.65	<=-10	PASS
TNVN	11B	2472	Ant1	2502.539	-37.61	<=-10	PASS
TNVN	11B	2472	Ant1	2503.539	-39.37	<=-10	PASS
TNVN	11B	2472	Ant1	2504.539	-43.40	<=-10	PASS
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TNVN	11B	2472	Ant1	2506.539	-47.22	<=-10	PASS
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TNVN	11B	2472	Ant1	2488.000	-46.19	<=-20	PASS
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TNVN	11G	2412	Ant1	2490.000	-45.31	<=-20	PASS

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TNVN	11G	2412	Ant1	2369.922	-43.23	<=-20	PASS
TNVN	11G	2412	Ant1	2370.922	-42.55	<=-20	PASS
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TNVN	11G	2412	Ant1	2376.922	-41.07	<=-20	PASS
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TNVN	11G	2412	Ant1	2379.922	-37.37	<=-20	PASS
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TNVN	11G	2412	Ant1	2396.500	-43.56	<=-10	PASS
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TNVN	11G	2412	Ant1	2486.000	-44.34	<=-10	PASS
TNVN	11G	2412	Ant1	2487.000	-44.02	<=-10	PASS
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TNVN	11G	2472	Ant1	2367.828	-48.75	<=-20	PASS
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TNVN	11G	2472	Ant1	2370.828	-47.64	<=-20	PASS
TNVN	11G	2472	Ant1	2371.828	-48.30	<=-20	PASS
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TNVN	11N20	2412	Ant1	2508.700	-52.47	<=-20	PASS
TNVN	11N20	2412	Ant1	2509.700	-48.40	<=-20	PASS
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TNVN	11N20	2412	Ant1	2513.700	-48.00	<=-20	PASS
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TNVN	11N40	2462	Ant1	2552.557	-49.71	<=-20	PASS
TNVN	11N40	2462	Ant1	2553.557	-46.58	<=-20	PASS
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TNVN	11N40	2462	Ant1	2555.557	-51.33	<=-20	PASS
TNVN	11N40	2462	Ant1	2556.114	-52.24	<=-20	PASS
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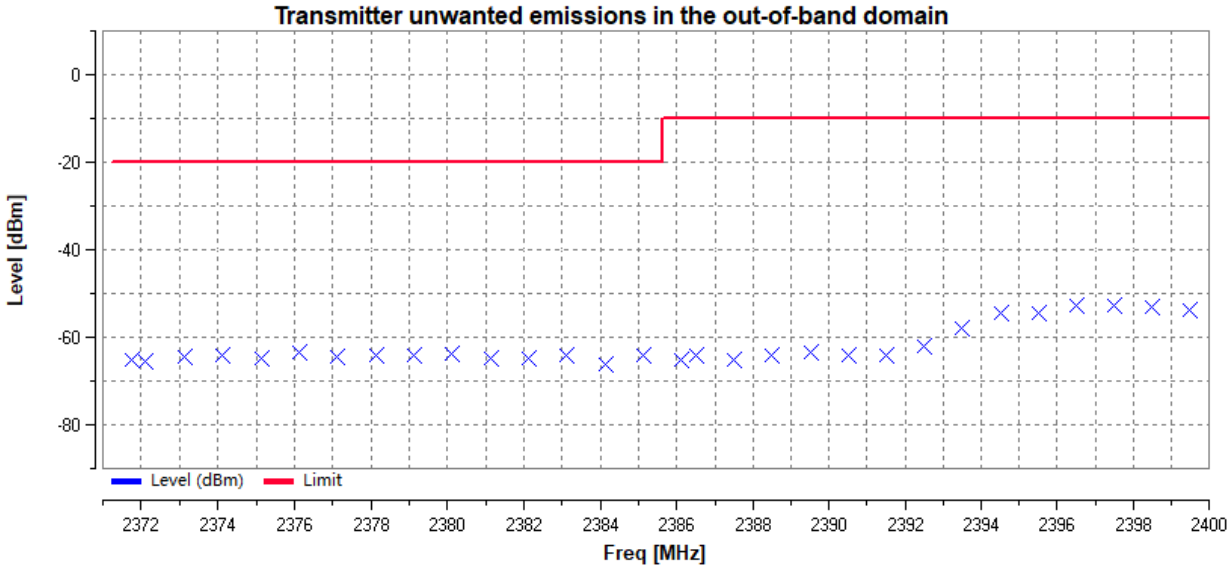
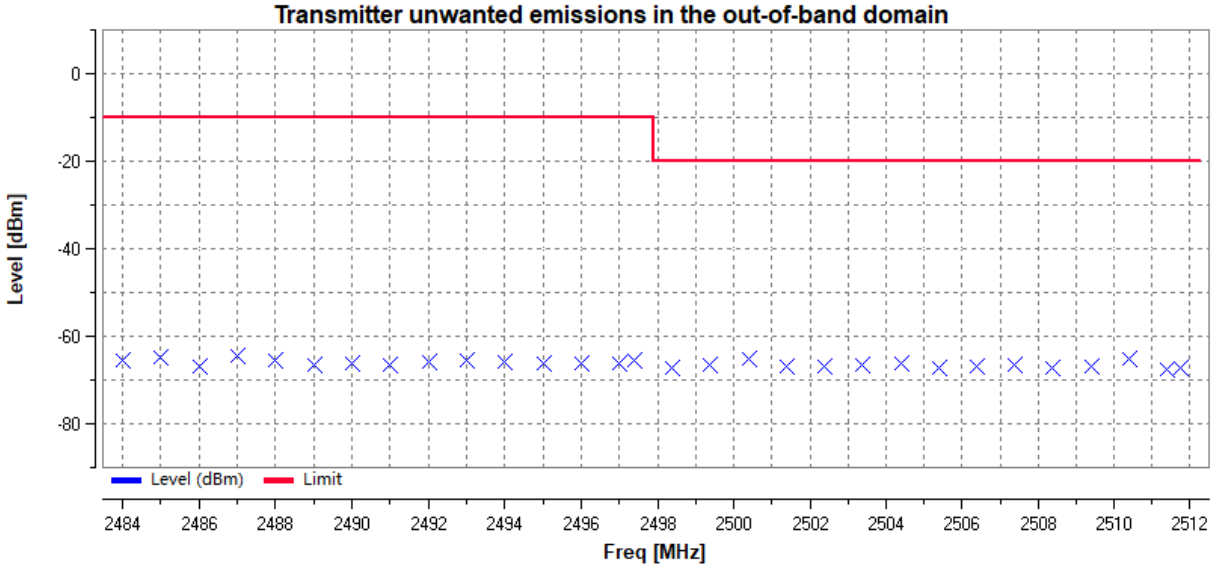
11B_2412_Ant1_2400MHz-2BW to 2400MHz



11B_2412_Ant1_2483.5MHz to 2483.5MHz+2BW



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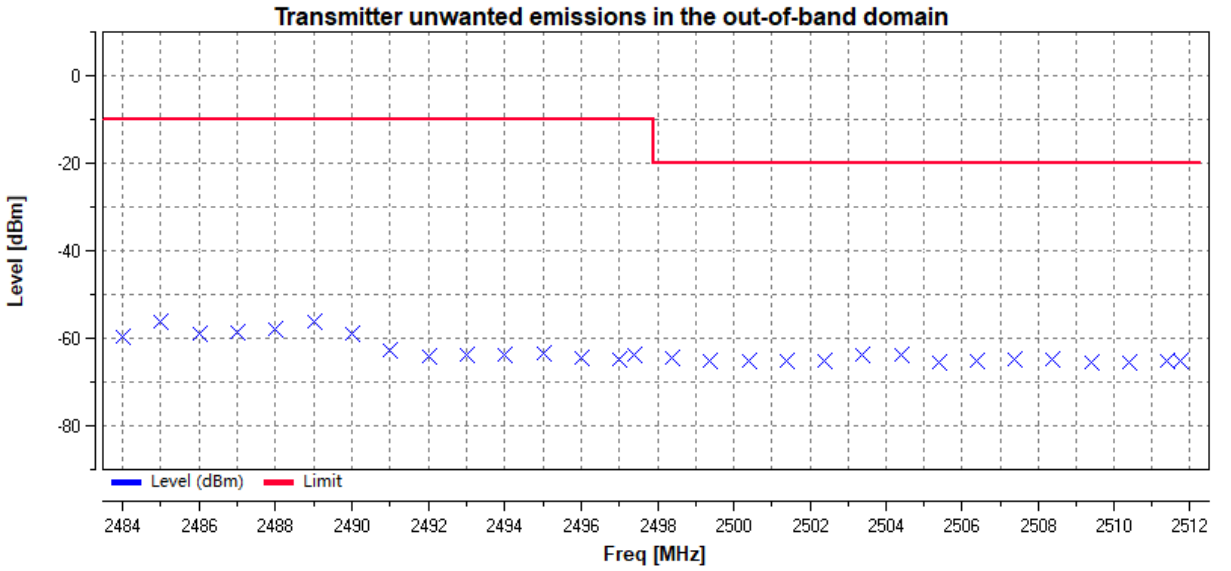

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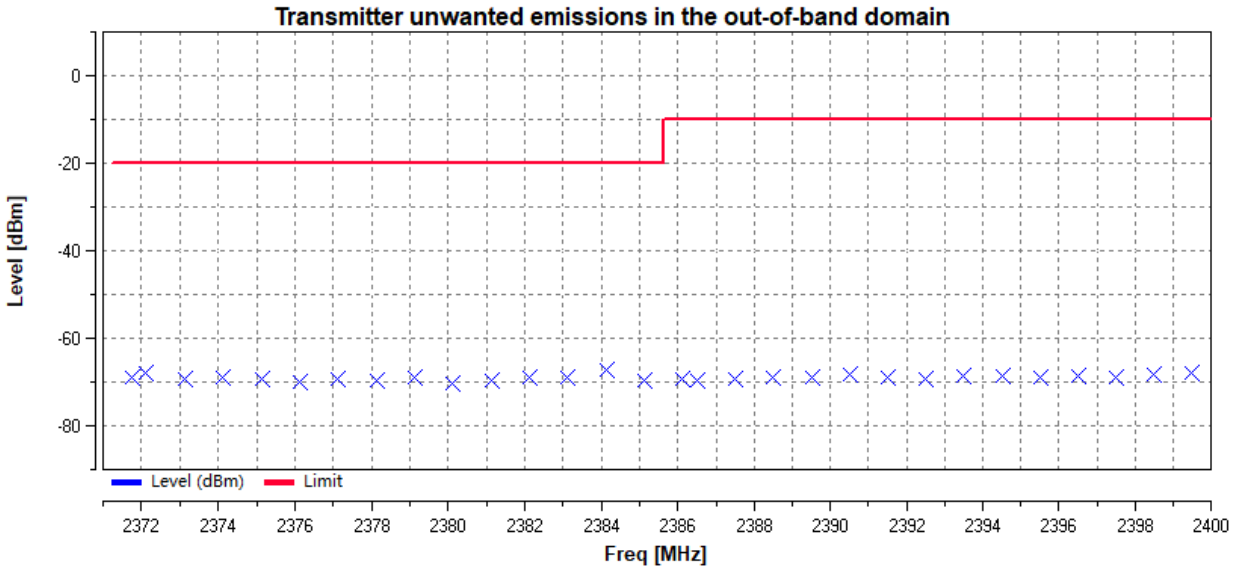
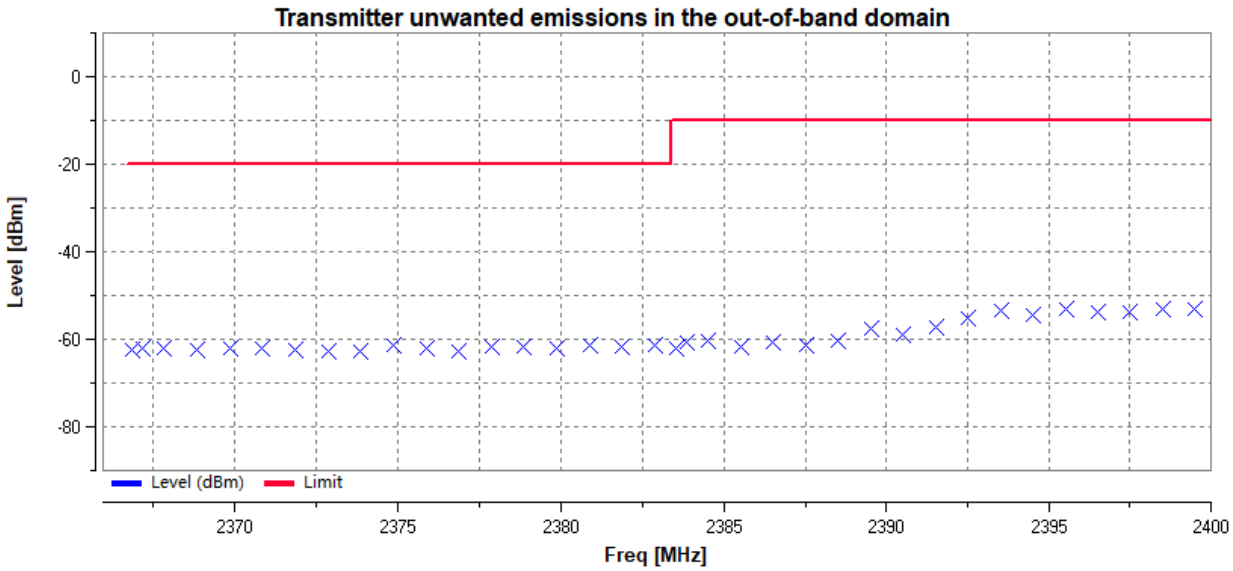
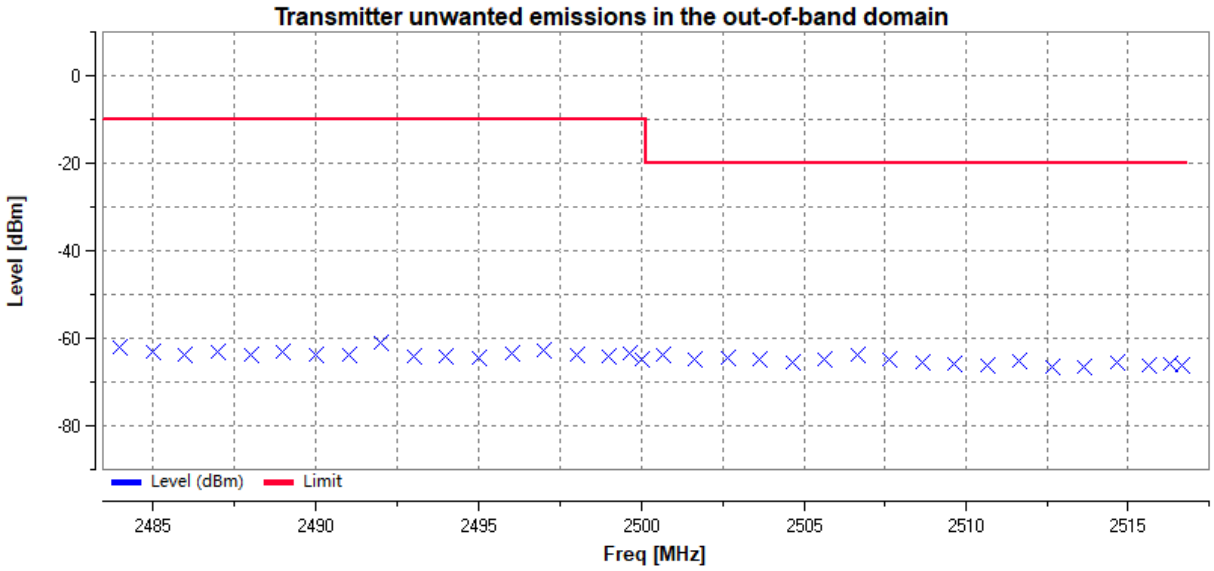


11G_2412_Ant1_2400MHz-2BW to 2400MHz



11G_2412_Ant1_2483.5MHz to 2483.5MHz+2BW



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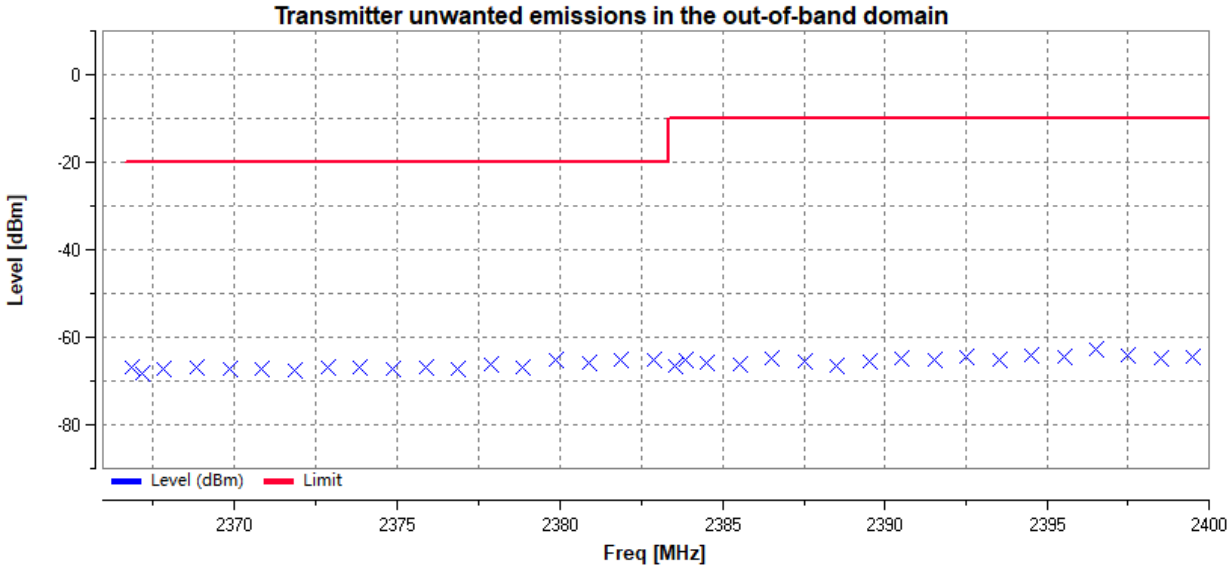
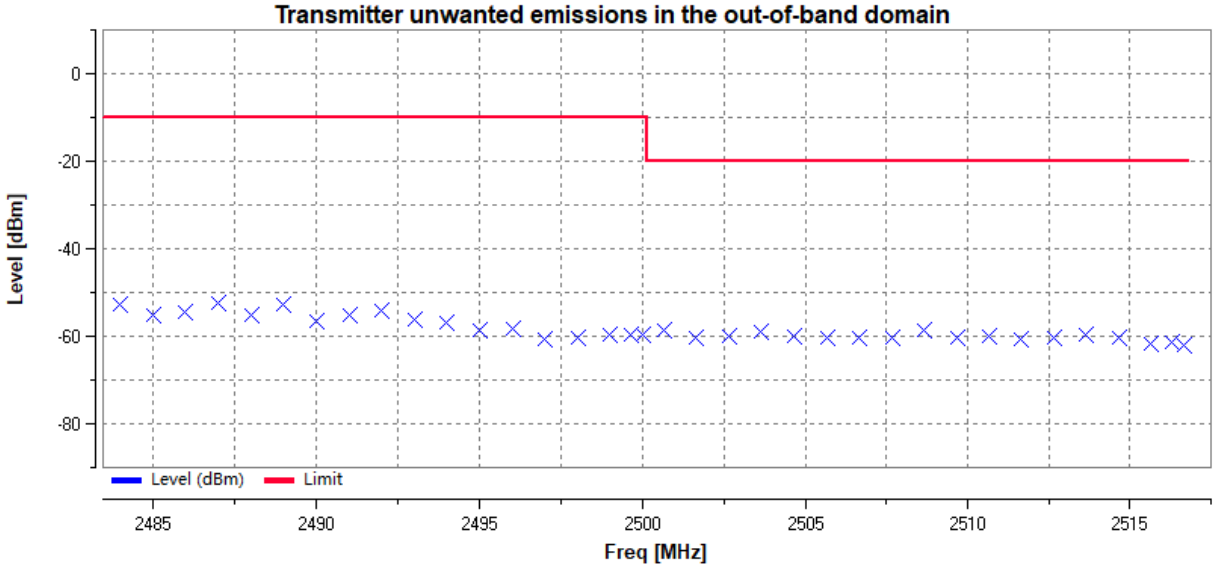


11G_2472_Ant1_2483.5MHz to 2483.5MHz+2BW



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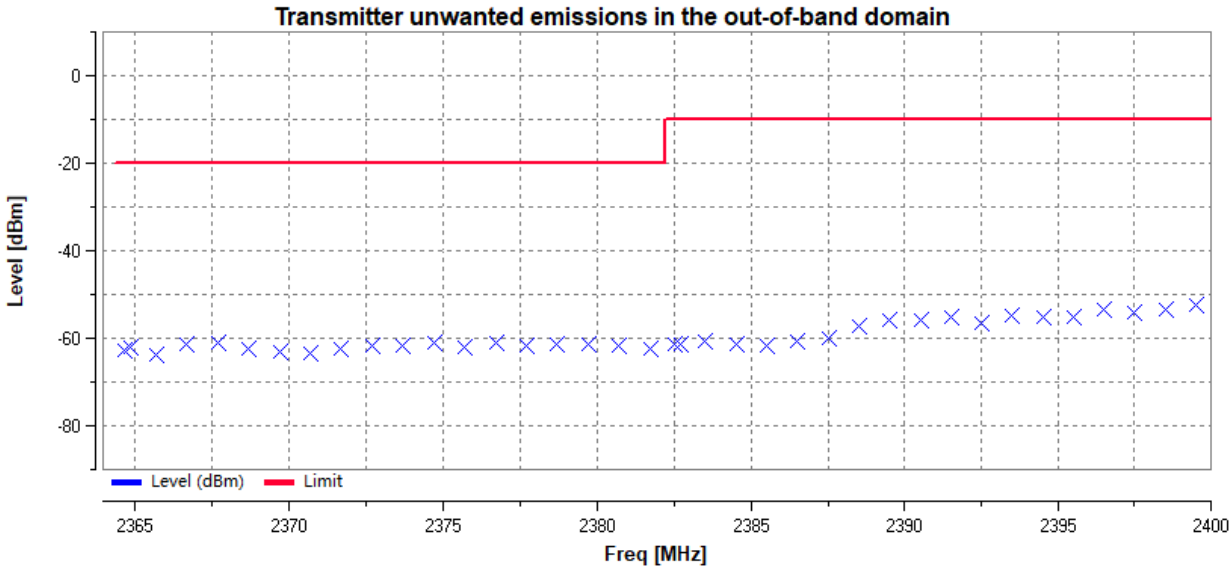
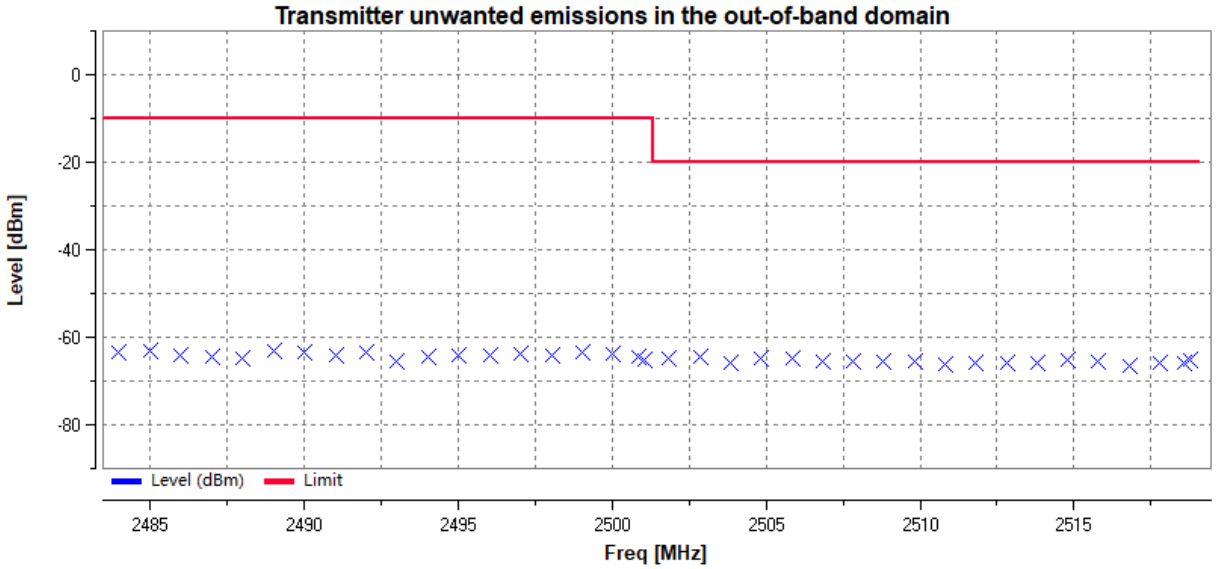


11N20_2412_Ant1_2483.5MHz to 2483.5MHz+2BW



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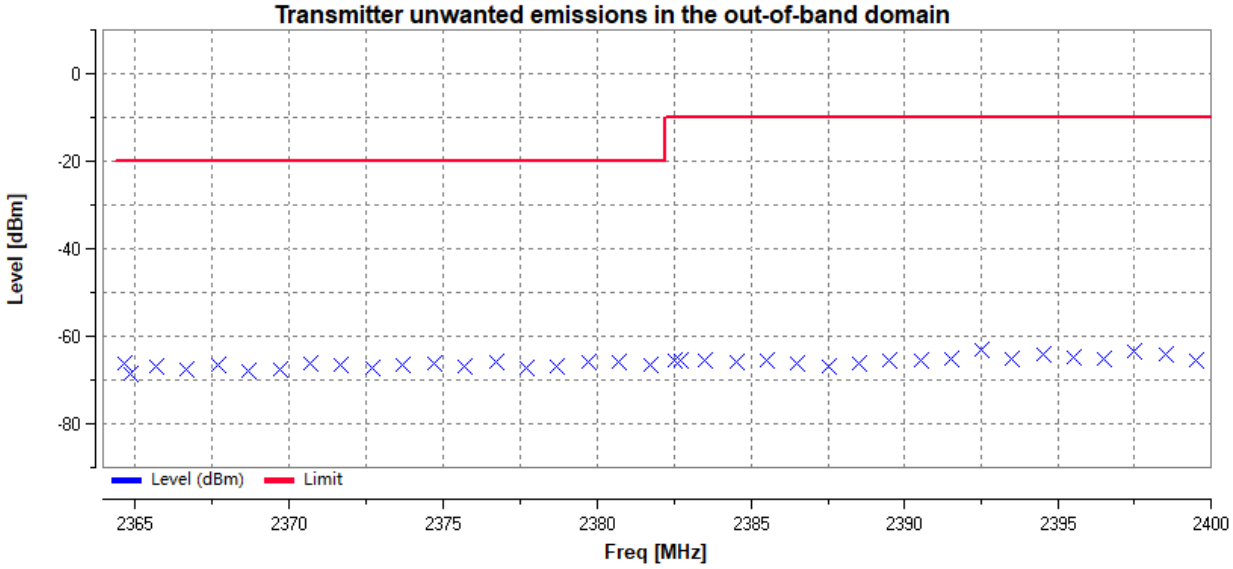
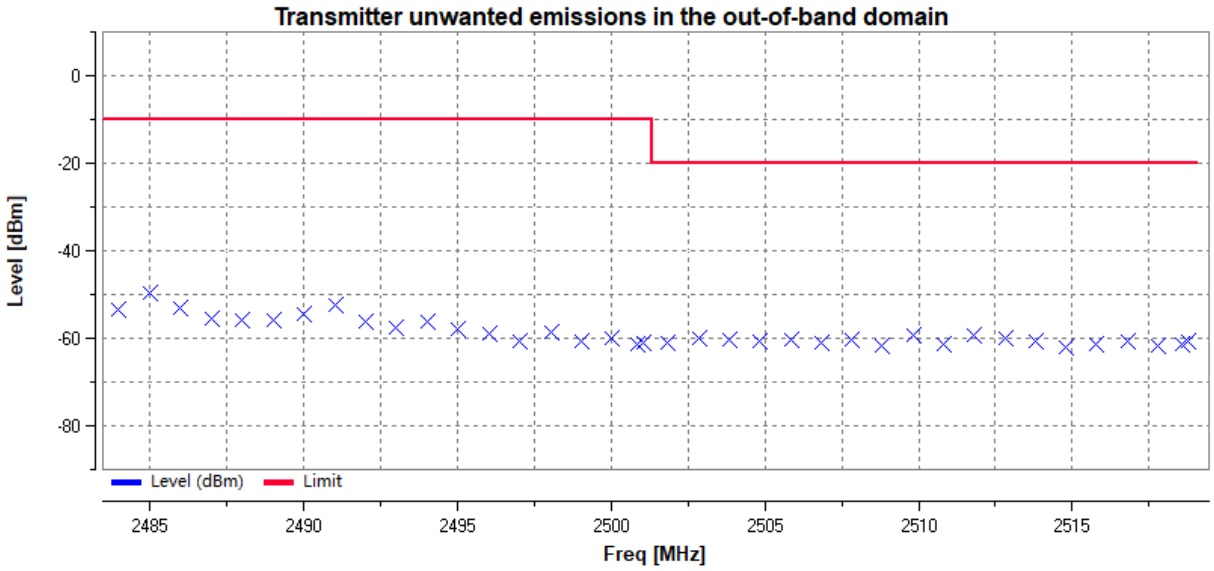
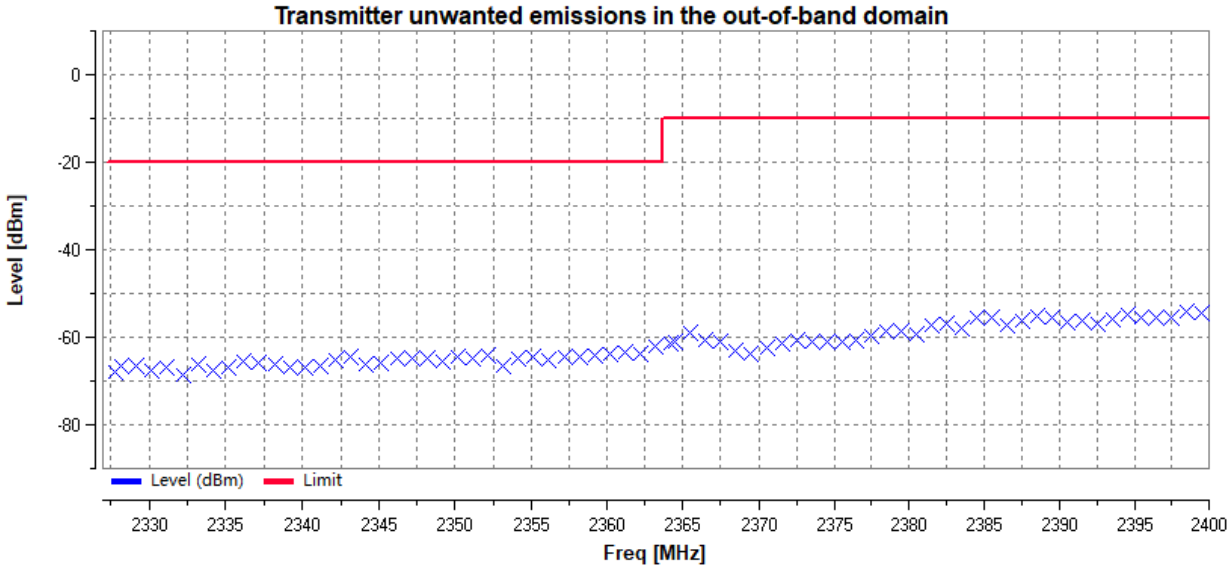


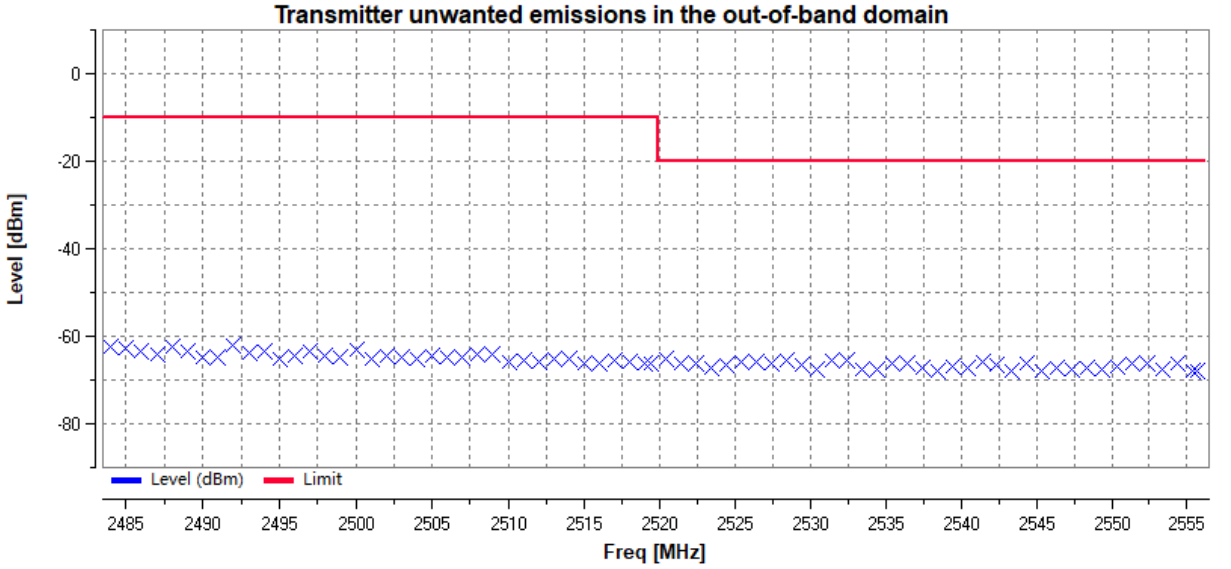
11N20_2472_Ant1_2483.5MHz to 2483.5MHz+2BW



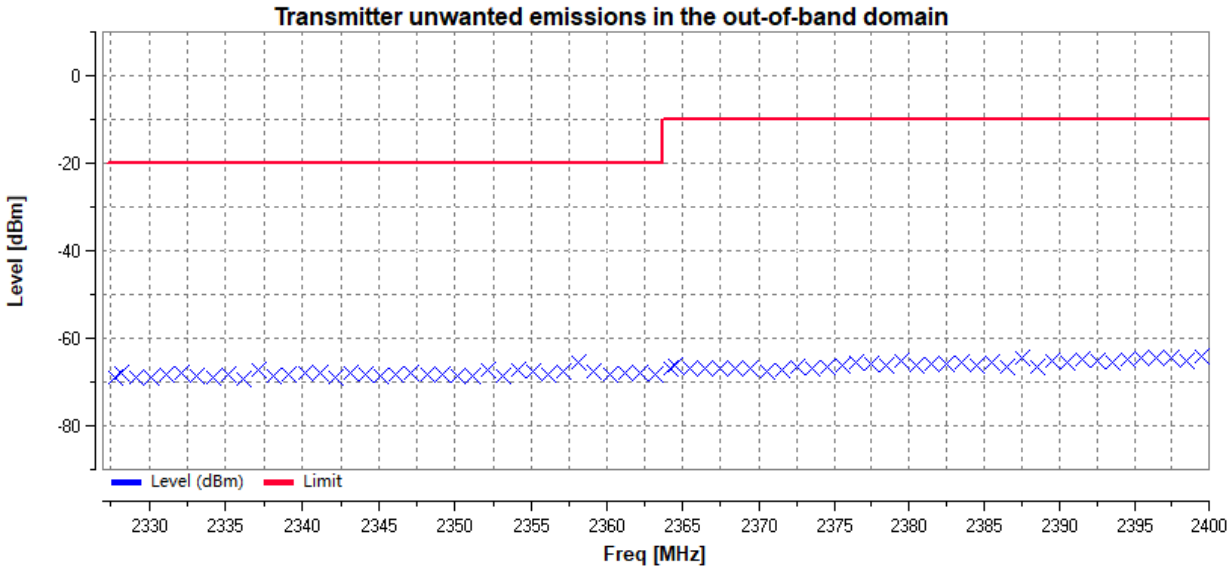
11N40_2422_Ant1_2400MHz-2BW to 2400MHz



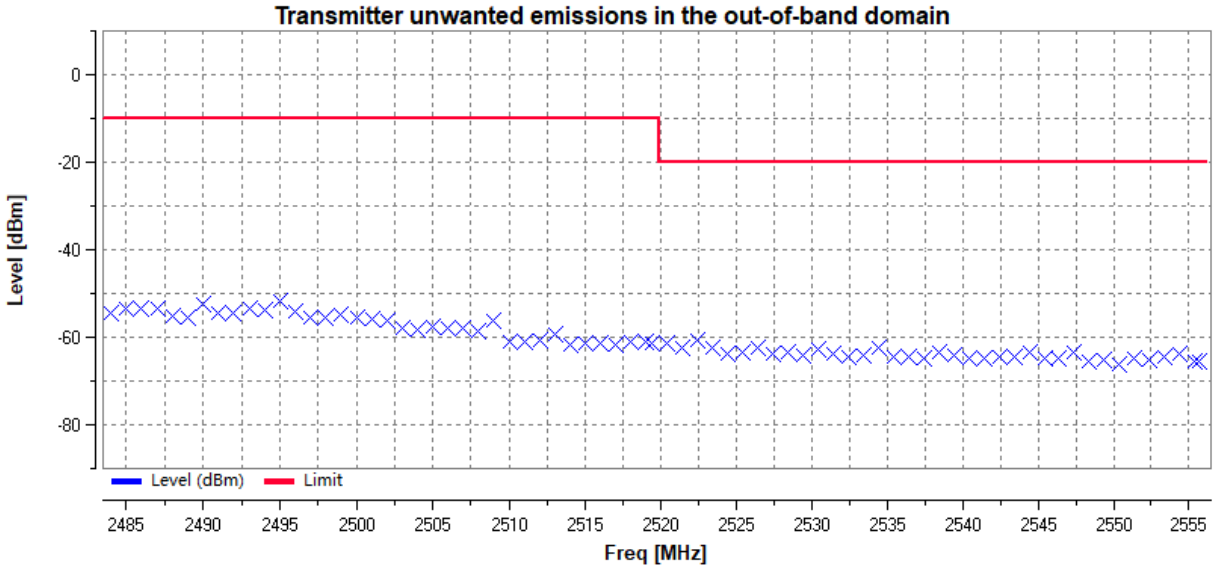
11N40_2422_Ant1_2483.5MHz to 2483.5MHz+2BW



11N40_2462_Ant1_2400MHz-2BW to 2400MHz



11N40_2462_Ant1_2483.5MHz to 2483.5MHz+2BW



4.1.8. Transmitter unwanted emissions in the spurious domain

Limit

According to ETSI EN 300 328 V2.2.2(2019-07) §4.3.2.9.3
The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 4.

Table 4: Transmitter limits for spurious emissions

Frequency Range	Maximum power e.r.p.(.≤1 GHz) e.i.r.p.(＞1 GHz)	Limit when Standby
30 MHz to 47 MHz	-36 dBm	100 KHz
47 MHz to 74 MHz	-54 dBm	100 KHz
74MHz to 87.5 MHz	-36 dBm	100 KHz
87.5 MHz to 118 MHz	-54 dBm	100 KHz
118 MHz to 174 MHz	-36 dBm	100 KHz
174 MHz to 230 MHz	-54 dBm	100 KHz
230 MHz to 470 MHz	-36 dBm	100 KHz
470 MHz to 694 MHz	-54 dBm	100 KHz
694 MHz to 1 GHz	-36 dBm	100 KHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

These measurements shall only be performed at normal test conditions.
The level of spurious emissions shall be measured as, either:
a) their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
b) their effective radiated power when radiated by cabinet and antenna in case of Integral antenna equipment with no antenna connectors.

For equipment using FHSS modulation, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. When this is not possible, the measurement shall be performed during normal operation (hopping).

For systems using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These frequencies shall be recorded.

The equipment shall be configured to operate under its worst case situation with respect to output power.

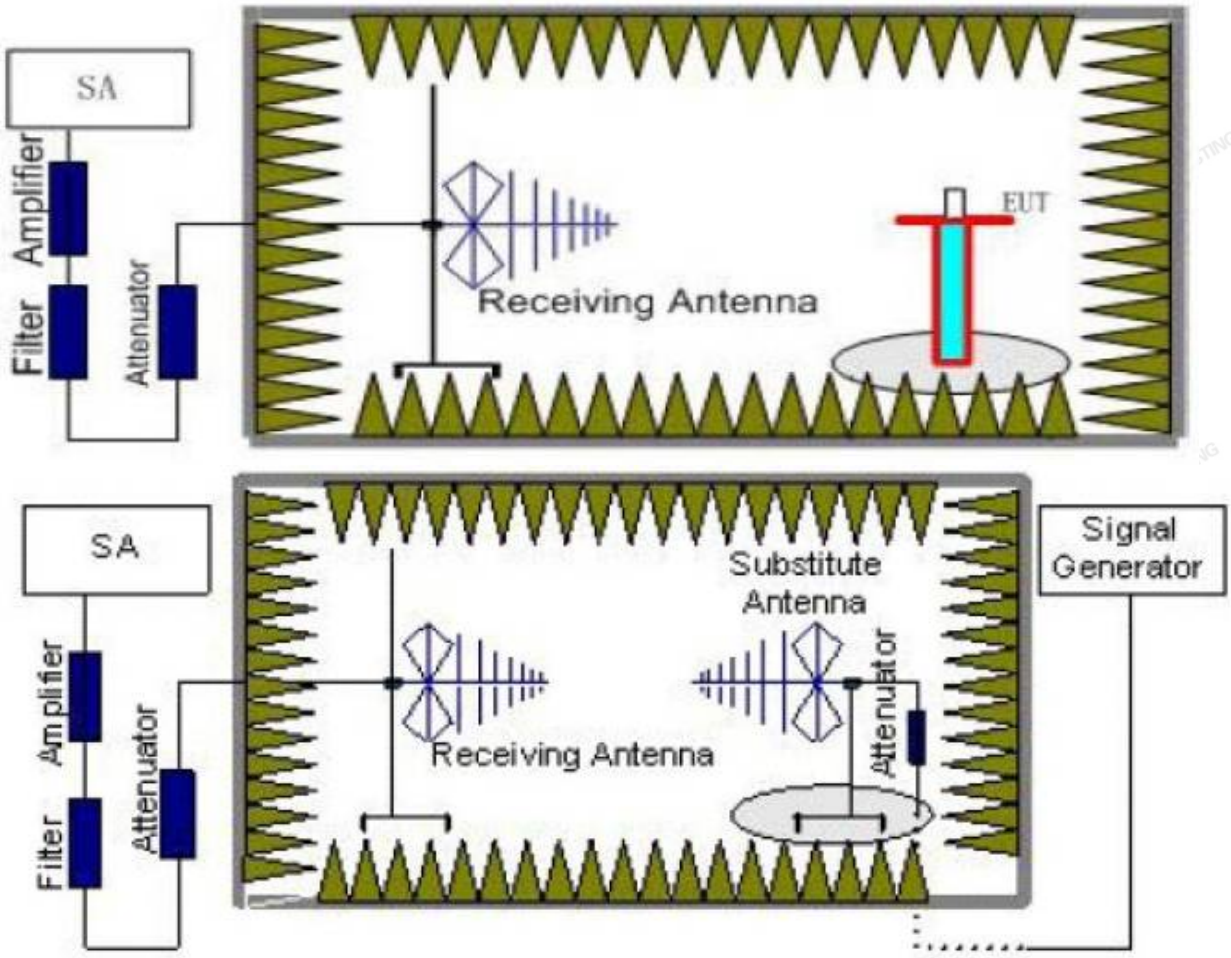
If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then the equipment shall be configured to operate under its worst case situation with respect to spurious emissions.

Test Procedure

According to ETSI EN 300 328 V2.2.2(2019-07) §5.4.9.2.2, Radiated measurement.

Test Configuration

Effective Radiated Power measurement (30 MHz to 12.75 GHz)



Test Results

PASS

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
269.65	V	-74.11	-36	-38.11	PASS
298.30	V	-77.51	-36	-41.51	PASS
395.24	V	-82.17	-36	-46.17	PASS
468.78	V	-76.93	-36	-40.93	PASS
598.64	V	-75.89	-54	-21.89	PASS
906.27	V	-80.49	-36	-44.49	PASS
281.51	H	-71.35	-36	-35.35	PASS
325.85	H	-74.61	-36	-38.61	PASS
413.45	H	-76.82	-36	-40.82	PASS
517.38	H	-78.91	-54	-24.91	PASS
664.42	H	-72.24	-54	-19.24	PASS
935.67	H	-74.57	-36	-38.57	PASS

Note:
1.Cable loss and antenna gain was combined in the calculated result.
2. Other point of the measurements are below 20dB from the limit.

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
Test Mode： Low Channel					
2037.78	H	-54.23	-30	-24.23	PASS
2007.54	V	-57.71	-30	-27.71	PASS
3070.89	H	-57.98	-30	-27.98	PASS
2925.84	V	-57.22	-30	-27.22	PASS
3510.65	H	-52.19	-30	-22.19	PASS
3797.23	V	-50.51	-30	-20.51	PASS
4239.69	H	-56.82	-30	-26.82	PASS
4120.17	V	-48.14	-30	-18.14	PASS
5412.21	H	-45.35	-30	-15.35	PASS
5420.26	V	-49.58	-30	-19.58	PASS
6941.98	H	-50.26	-30	-20.26	PASS
6936.45	V	-50.37	-30	-20.37	PASS
Test Mode： High Channel					
1915.63	H	-56.24	-30	-26.24	PASS
2036.21	V	-57.12	-30	-27.12	PASS
2984.68	H	-57.59	-30	-27.59	PASS
2727.73	V	-59.63	-30	-29.63	PASS
3398.35	H	-58.74	-30	-28.74	PASS
3594.70	V	-49.55	-30	-19.55	PASS
4222.35	H	-53.10	-30	-23.10	PASS
4186.87	V	-53.92	-30	-23.92	PASS
5458.60	H	-50.69	-30	-20.69	PASS
5535.59	V	-52.17	-30	-22.17	PASS
6907.28	H	-51.44	-30	-21.44	PASS
7147.48	V	-50.98	-30	-20.98	PASS

Note:
1.Cable loss and antenna gain was combined in the calculated result.
2. Other point of the measurements are below 20dB from the limit.

4.1.9. Receiver spurious emissions

LIMIT

According to ETSI EN 300 328 V2.2.2(2019-07) §4.3.2.10.3

The spurious emissions of the receiver shall not exceed the values given in table 5.

Table 5: spurious emission limits for receivers

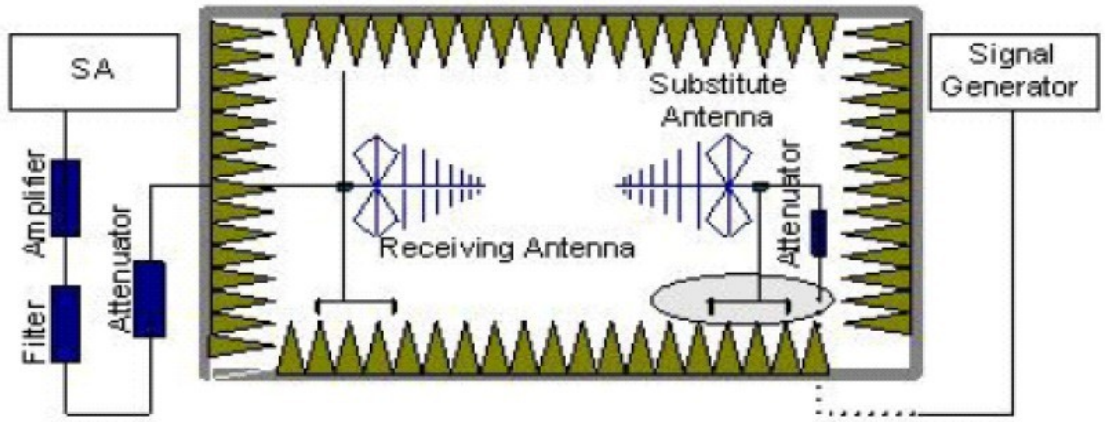
Frequency	Maximum power, e.r.p.	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 KHz
30 MHz to 12.75 GHz	-47 dBm	1 MHz

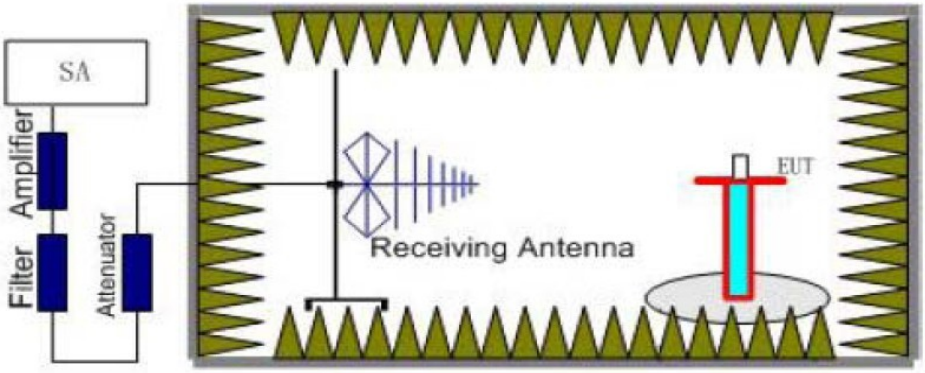
Test Procedure

The same as clause 4.1.8

Test Configuration

Effective Radiated Power measurement (30 MHz to 12.75 GHz)





The level of spurious emissions shall be measured as, either:

a) their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or

b) their effective radiated power when radiated by cabinet and antenna in case of Integral antenna equipment withno temporary antenna connectors.

Testing shall be performed when the equipment is in a receive-only mode.

For equipment using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These frequencies shall be recorded.

For equipment using FHSS modulation, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. These frequencies shall be recorded. When disabling the normal hopping is not possible, the measurement shall be performed during normal operation (hopping).

Test Results

Remark: We test all modulation type, and recorded the worst case at 802.11b mode for wifi test.

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
269.04	V	-74.24	-57	-17.24	PASS
314.91	V	-75.05	-57	-18.05	PASS
349.54	V	-78.81	-57	-21.81	PASS
417.49	V	-72.63	-57	-15.63	PASS
527.83	V	-76.26	-57	-19.26	PASS
893.57	V	-79.45	-57	-22.45	PASS
269.98	H	-71.67	-57	-14.67	PASS
376.12	H	-77.91	-57	-20.91	PASS
414.08	H	-72.32	-57	-15.32	PASS
514.36	H	-78.46	-57	-21.46	PASS
657.59	H	-76.78	-57	-19.78	PASS
892.81	H	-79.65	-57	-22.65	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2.Other point of the measurements are below 20dB from the limit.					

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
Test Mode：Lowest frequency					
2325.89	H	-62.17	-47	-15.17	PASS
2241.63	V	-65.65	-47	-18.65	PASS
2822.41	H	-67.83	-47	-20.83	PASS
3028.35	V	-63.58	-47	-16.58	PASS
3474.92	H	-65.82	-47	-18.82	PASS
3868.06	V	-65.90	-47	-18.90	PASS
4591.84	H	-62.44	-47	-15.44	PASS
4393.27	V	-61.23	-47	-14.23	PASS
5259.78	H	-66.95	-47	-19.95	PASS
5222.15	V	-65.46	-47	-18.46	PASS
6673.76	H	-70.58	-47	-23.58	PASS
6894.48	V	-67.72	-47	-20.72	PASS
Test Mode： Highest frequency					
2177.49	H	-63.31	-47	-16.31	PASS
2180.58	V	-66.95	-47	-19.95	PASS
2941.19	H	-61.78	-47	-14.78	PASS
2925.06	V	-67.86	-47	-20.86	PASS
3676.68	H	-71.15	-47	-24.15	PASS
3495.74	V	-61.29	-47	-14.29	PASS
4394.10	H	-64.04	-47	-17.04	PASS
4044.61	V	-66.33	-47	-19.33	PASS
5601.80	H	-65.58	-47	-18.58	PASS
5639.63	V	-66.72	-47	-19.72	PASS
6720.28	H	-62.90	-47	-15.90	PASS
6872.86	V	-64.47	-47	-17.47	PASS

Note:
1. Cable loss and antenna gain was combined in the calculated result.
2. Other point of the measurements are below 20dB from the limit.

4.1.10. Receiver Blocking

LIMIT

According to ETSI EN 300 328 V2.2.2(2019-07) §4.3.2.11.4
While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, 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 14, table 15 or table 16.

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.

Table 14: 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 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log_{10}$(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 P_{min} + 26 dB where P_{min} 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 P_{min} + 20 dB where P_{min} 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.

Table 15: 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 × $\log_{10}$(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 P_{min} + 26 dB where P_{min} 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.			

Table 16: 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 × $\log_{10}$(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 test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} 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.			

According to ETSI EN 300 328 V2.2.2(2019-07) § 4.2.3 Receiver categories

4.2.3.2.1 Receiver category 1

Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.

4.2.3.2.2 Receiver category 2

Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.

4.2.3.2.3 Receiver category 3

Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

These measurements shall only be performed at normal test conditions.

For non-frequency hopping equipment, having more than one operating channel, the equipment shall be tested operating at both the lowest and highest operating channels. Equipment which can change their operating channel automatically (adaptive channel allocation), and where this function cannot be disabled, shall be tested as a frequency hopping equipment.

If the equipment can be configured to operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz) and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used. This mode of operation shall be aligned with the performance criteria defined in clause 4.3.1.12.3 or clause 4.3.2.11.3 as declared by the manufacturer (see clause 5.4.1 t)) and shall be described in the test report. It shall be verified that this performance criteria as declared by the manufacturer is achieved.

TEST CONFIGURATION

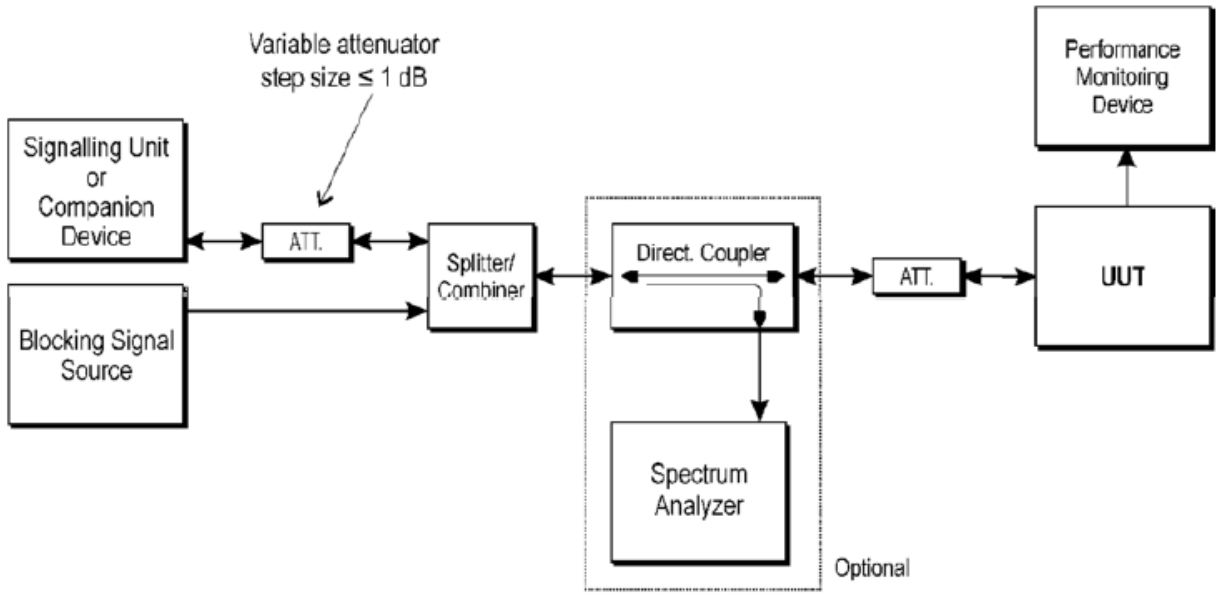


Figure 6: Test Set-up for receiver blocking

MEASUREMENT DESCRIPTION

According to ETSI EN 300 328 V2.2.2(2019-07) §5.4.11.2.1, Conducted measurements

Step 1:

• For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test hasto be performed (see clause 5.4.11.1).

Step 2:

• The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

• With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.

• Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.

When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin. This signal level (Pmin) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

• The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.

• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6.

Step 5:

 If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.
- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.
- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

• If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.

• It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

Step 6:

• Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 7:

• For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 8:

• It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

TEST RESULTS

Pass

Record 802.11b. 1mbps for this test item

Channel 1

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	0.41	10	Pass
-68	2504	-34	1.55	10	Pass
-74	2300	-34	1.17	10	Pass
-74	2330	-34	1.79	10	Pass
-74	2360	-34	0.38	10	Pass
-74	2524	-34	0.53	10	Pass
-74	2584	-34	0.65	10	Pass
-74	2674	-34	0.86	10	Pass

Channel 13

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	1.53	10	Pass
-68	2504	-34	1.11	10	Pass
-74	2300	-34	0.95	10	Pass
-74	2330	-34	0.39	10	Pass
-74	2360	-34	1.24	10	Pass
-74	2524	-34	1.31	10	Pass
-74	2584	-34	1.65	10	Pass
-74	2674	-34	0.72	10	Pass

Record 802.11g. 6mbps for this test item

Channel 1

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	1.23	10	Pass
-68	2504	-34	1.19	10	Pass
-74	2300	-34	1.05	10	Pass
-74	2330	-34	1.58	10	Pass
-74	2360	-34	0.77	10	Pass
-74	2524	-34	0.52	10	Pass
-74	2584	-34	0.58	10	Pass
-74	2674	-34	0.65	10	Pass

Channel 13

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	1.41	10	Pass
-68	2504	-34	0.82	10	Pass
-74	2300	-34	0.43	10	Pass
-74	2330	-34	1.51	10	Pass
-74	2360	-34	1.72	10	Pass
-74	2524	-34	1.45	10	Pass
-74	2584	-34	0.94	10	Pass
-74	2674	-34	0.57	10	Pass

Record 802.11n20. 6.5mbps for this test item

Channel 1

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	1.06	10	Pass
-68	2504	-34	1.28	10	Pass
-74	2300	-34	0.79	10	Pass
-74	2330	-34	1.35	10	Pass
-74	2360	-34	0.88	10	Pass
-74	2524	-34	1.17	10	Pass
-74	2584	-34	0.90	10	Pass
-74	2674	-34	0.42	10	Pass

Channel 13

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	1.32	10	Pass
-68	2504	-34	0.45	10	Pass
-74	2300	-34	0.87	10	Pass
-74	2330	-34	0.66	10	Pass
-74	2360	-34	1.53	10	Pass
-74	2524	-34	1.28	10	Pass
-74	2584	-34	1.59	10	Pass
-74	2674	-34	0.17	10	Pass

Record 802.11n40. 13.5mbps for this test item

Channel 1

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	1.06	10	Pass
-68	2504	-34	1.35	10	Pass
-74	2300	-34	1.44	10	Pass
-74	2330	-34	0.47	10	Pass
-74	2360	-34	0.85	10	Pass
-74	2524	-34	1.24	10	Pass
-74	2584	-34	0.13	10	Pass
-74	2674	-34	0.79	10	Pass

Channel 13

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	1.67	10	Pass
-68	2504	-34	0.32	10	Pass
-74	2300	-34	0.59	10	Pass
-74	2330	-34	0.26	10	Pass
-74	2360	-34	1.83	10	Pass
-74	2524	-34	1.74	10	Pass
-74	2584	-34	1.35	10	Pass
-74	2674	-34	0.19	10	Pass

Note: EUT is Receiver Category 1 equipment.

4.1.11. Geo-location capability

Definition& Requirements

ETSI EN 300 328 (V2.2.2) Sub-clause 4.3.2.12.2 & 4.3.2.12.3

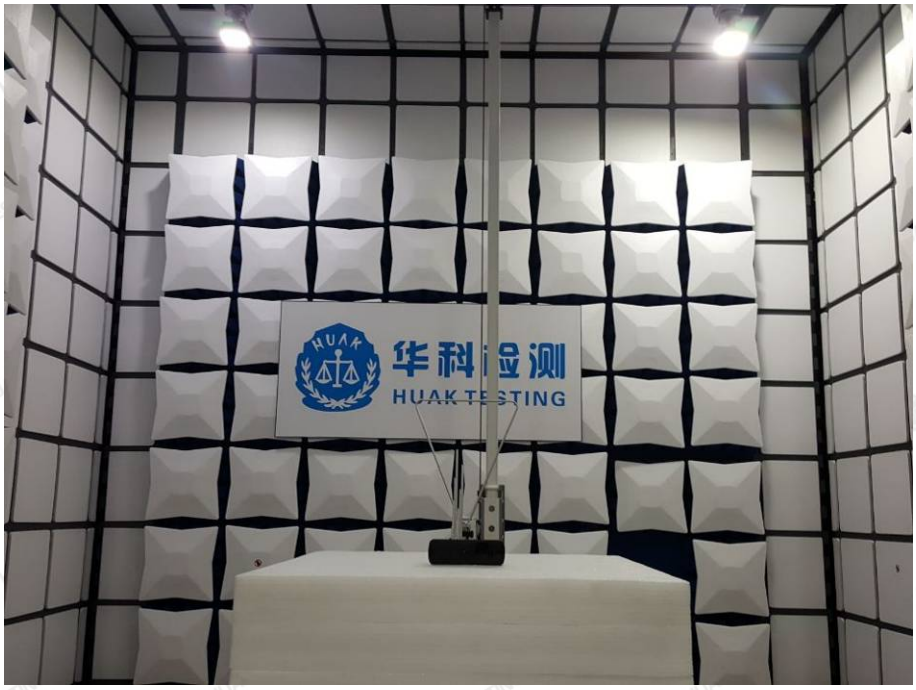
Geo-location capability is a feature of the equipment to determine its geographical location with the purpose to configure itself according to the regulatory requirements applicable at the geographical location where it operates.

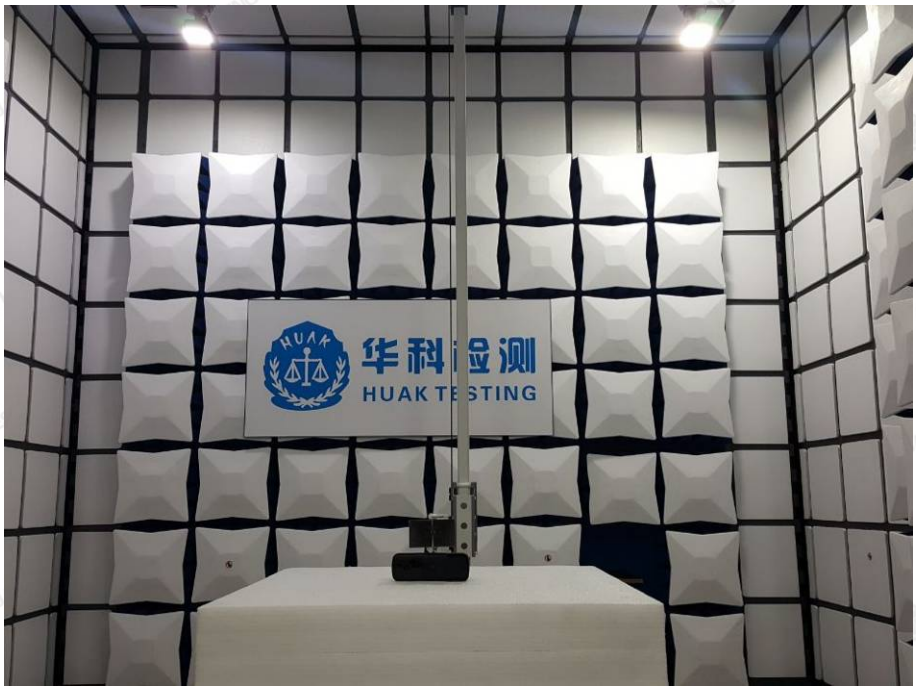
The geo-location capability may be present in the equipment or in an external device (temporary) associated with the equipment operating at the same geographical location during the initial power up of the equipment. The geographical location may also be available in equipment already installed and operating at the same geographical location

RESULTS

This equipment does not support Geo-location.

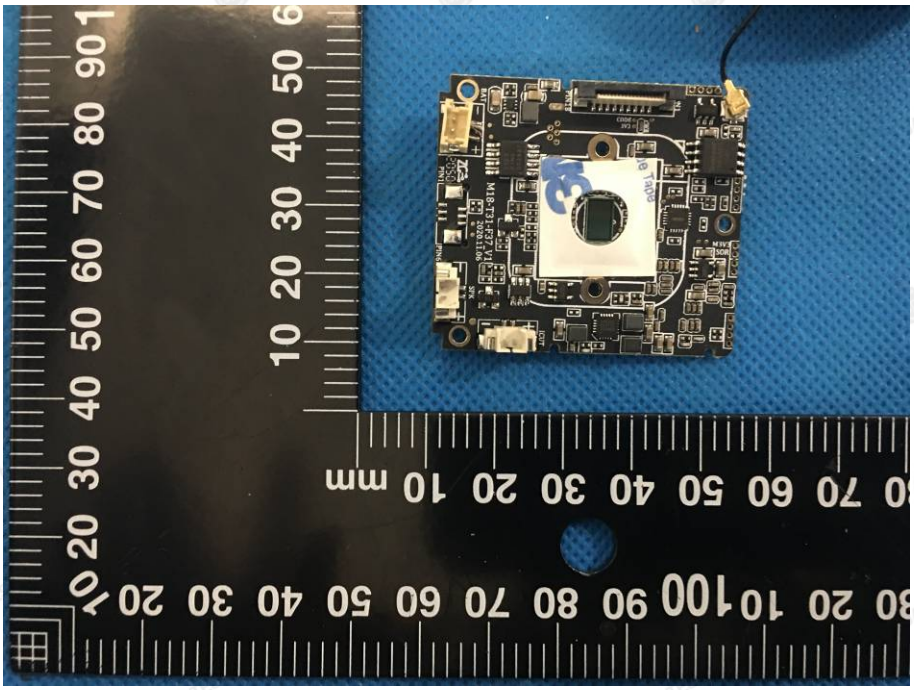
5. Test Setup Photos of the EUT

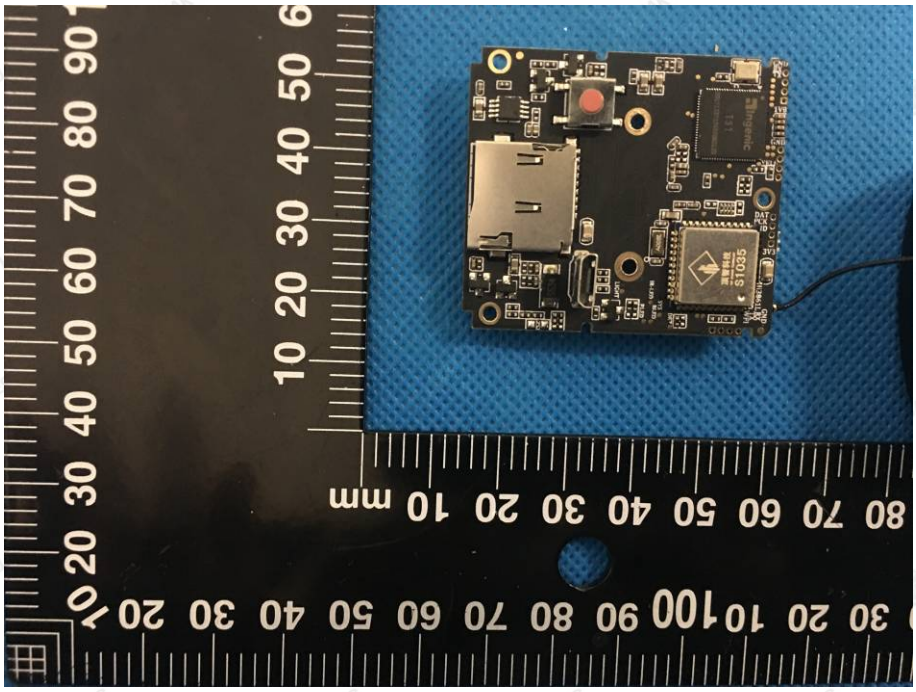


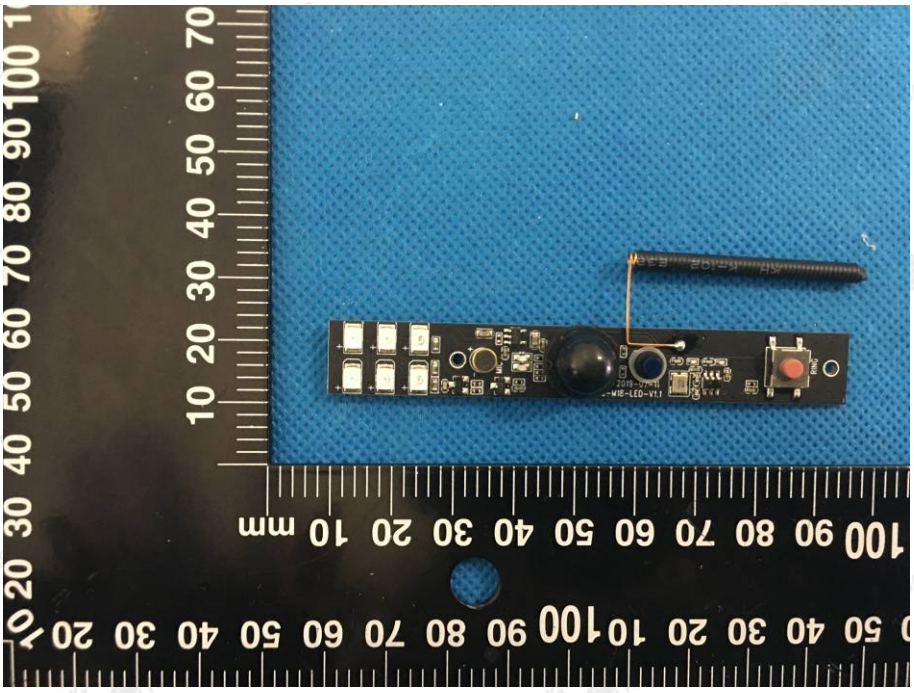


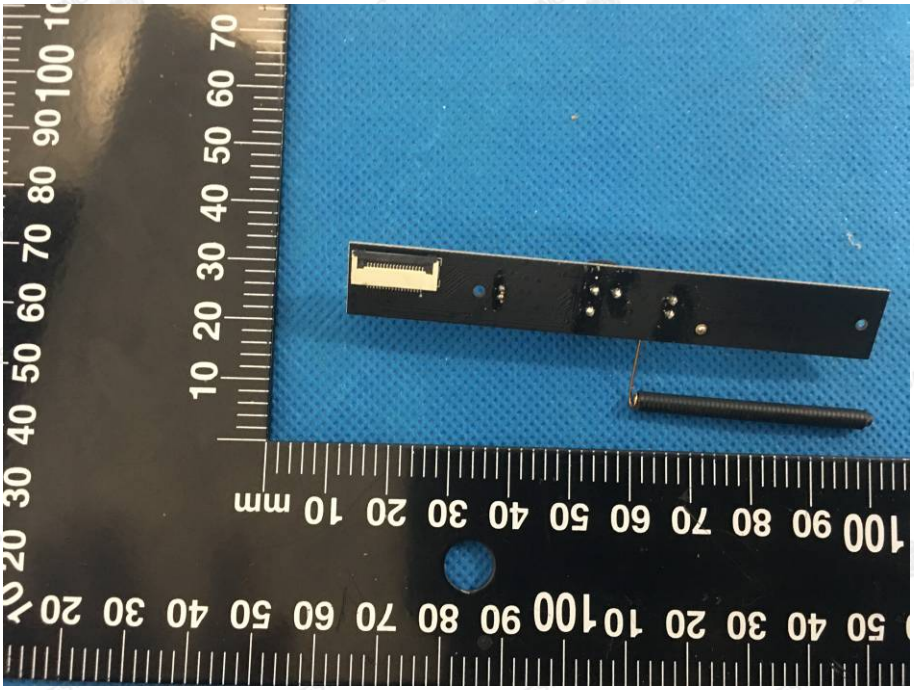
6. External and Internal Photos of the EUT

HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China









.....End of Report.....

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a) The type of modulation used by the equipment:

☐FHSS

■other forms of modulation

b) In case of FHSS modulation:

- In case of non-Adaptive Frequency Hopping equipment:
  The number of Hopping Frequencies:
- In case of Adaptive Frequency Hopping Equipment:
  The maximum number of Hopping Frequencies:
  The minimum number of Hopping Frequencies:
  The Dwell Time:
  The Minimum Channel Occupation Time:

c) Adaptive / non-adaptive equipment:

☐non-adaptive Equipment

■adaptive Equipment without the possibility to switch to a non-adaptive mode

☐adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment: ms

■The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐The equipment is Frame Based equipment

■The equipment is Load Based equipment

☐The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: ..... μs

The value q as referred to in clause 4.3.2.5.2.2.2 .....

☐The equipment has implemented an non-LBT based DAA mechanism

☐The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): dBm

The maximum (corresponding) Duty Cycle: …%

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power

IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)

- Power Spectral Density

IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)

- Duty cycle, Tx-Sequence, Tx-gap

.....

- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment)

.....

- Hopping Frequency Separation (only for FHSS equipment)

.....

- Medium Utilisation

IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)

- Adaptivity & Receiver Blocking

.....

- Occupied Channel Bandwidth

IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)

- Transmitter unwanted emissions in the OOB domain

IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)

- Transmitter unwanted emissions in the spurious domain

IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)

- Receiver spurious emissions

IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)

g) The different transmit operating modes (tick all that apply):

■Operating mode 1: Single Antenna Equipment
■Equipment with only 1 antenna
☐Equipment with 2 diversity antennas but only 1 antenna active at any moment in time
☐Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)
☐Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming
☐Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)
☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
NOTE: Add more lines if more channel bandwidths are supported.
☐Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming
☐Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)
☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
☐High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
NOTE: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

- The number of Receive chains: .....
- The number of Transmit chains: .....

☐symmetrical power distribution
☐asymmetrical power distribution

In case of beam forming, the maximum beam forming gain: .....
NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range 1: 2402 MHz to 2480 MHz
- Operating Frequency Range 2: ..... MHz to ..... MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

□ Occupied Channel Bandwidth 1: 802.11b: 12.388MHz
802.11g: 16.474MHz
802.11n HT20: 17.658MHz
802.11n HT40: 35.883MHz
□ Occupied Channel Bandwidth 2: 802.11b:
802.11g:
802.11n HT20:
802.11n HT40:
NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

■Stand-alone
☐Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
☐Plug-in radio device (Equipment intended for a variety of host systems)
Other .....

l) The extreme operating conditions that apply to the equipment:

Operating temperature range:-10° C to 40° C
Operating voltage range: 1.35V to 1.65V ☐AC ■DC
Details provided are for the: ■stand-alone equipment
☐combined (or host) equipment
☐test jig

m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type

■Integral Antenna
Antenna Gain: 1 dBi
If applicable, additional beam forming gain (excluding basic antenna gain): ..... dB
☐Temporary RF connector provided
☐No temporary RF connector provided
☐Dedicated Antennas (equipment with antenna connector)
☐Single power level with corresponding antenna(s)
☐Multiple power settings and corresponding antenna(s)
Number of different Power Levels: .....
Power Level 1: ..... dBm
Power Level 2: ..... dBm
Power Level 3: ..... dBm

NOTE 1: Add more lines in case the equipment has more power levels.
NOTE 2: These power levels are conducted power levels (at antenna connector).
For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the
resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable
Power Level 1: 13.55dBm
Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1	1	14.55	
2			
3			
4			

NOTE 3: Add more rows in case more antenna assemblies are supported for this power level.

Power Level 2: ..... dBm
Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 4: Add more rows in case more antenna assemblies are supported for this power level.
Power Level 3: ..... dBm
Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1			
2			
3			
4			

NOTE 5: Add more rows in case more antenna assemblies are supported for this power level.

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:
Details provided are for the: ■stand-alone equipment
☐combined (or host) equipment
☐test jig
Supply Voltage☐AC mains State AC voltage:
■DC State DC voltage : DC 1.5V

In case of DC, indicate the type of power source
☐Internal Power Supply
■External Power Supply or AC/DC adapter
■Battery: DC 1.5V
☐Other: .....

o) Describe the test modes available which can facilitate testing:

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):
Other: NO FHSS
q) If applicable, the statistical analysis referred to in clause 5.4.1 q)
Not apply

r) If applicable, the statistical analysis referred to in clause 5.4.1 r)
Not apply

s) Geo-location capability supported by the equipment:
☐Yes
☐The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user
■No

t) Describe the minimum performance criteria that apply to the equipment (see clause 4.3.1.12.3 or clause 4.3.2.11.3):
The minimum performance criterion shall be a PER less than or equal to 10 %.
The intended use of the equipment should be in the normal operation without lost the communication link or no unintentionally operation occurs.

TEST REPORT

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/ EN 55035:2017

Report Reference No.....	**HK2012294032-1ER**
Compiled by (position+printed name+signature) .	Testing engineer Gary Qian
Supervised by (position+printed name+signature) .	Technique principal Leo Zhong
Approved by (position+printed name+signature) .	Manager Jason Zhou
Date of issue	2021/01/07
Representative Laboratory Name	Shenzhen HUAK Testing Technology Co., Ltd.
Address	1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Applicant's name.....	Topvision(Shenzhen) Technology Co., LTD.
Address	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Test specification:	
Standard.....	**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/ EN 55035:2017**
TRF Originator.....	Shenzhen HUAK Testing Technology Co., Ltd.
Master TRF	Dated 2019-07

Test item description	Low power video doorbell
Trade Mark	N/A
Model/Type reference	V30
Listed Models	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Hardware Version.....	V2.0
Software Version	V2.0
Rating	DC 5V From Micro USB or DC 1.5V From Battery
Result	**PASS**

TEST REPORT

Test Report No. :	HK2012294032-1ER	2021/01/07 Date of issue

Equipment under Test	:	Low power video doorbell
Model /Type	:	V30
Listed Models	:	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Applicant	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Manufacturer	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China

Test Result according to the standards on page 5:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2021/01/07	Jason Zhou

Contents

1. TEST STANDARDS

The tests were performed according to following standards:

ETSI EN 301 489-1 V2.2.3 (2019-11)
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

ETSI EN 301 489-3 V2.1.1 (2019-03)
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

ETSI EN 301 489-17 V3.2.4 (2020-09)
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

EN 55032:2015 Electromagnetic compatibility of multimedia equipment – Emission Requirements

EN 55035:2017 Electromagnetic compatibility of multimedia equipment – Immunity requirements

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	2020/12/31
Testing commenced on	:	2020/12/31
Testing concluded on	:	2021/01/07

2.2. Product Description

Name of EUT	Low power video doorbell
Model(s) Number	V30
List Models	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
Difference descrption	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: V30.
Hardware version	V2.0
Software version	V2.0
Antenna Type	Internal Antenna
Antenna Gain	1 dBi

2.3. Equipment under Test

Power supply system utilised

Power supply voltage	:	○	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 5V From Micro USB or DC 1.5V From Battery

2.4. Short description of the Equipment under Test (EUT)

For details, refer to the user's manual of EUT.

2.5. EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

Test Item	
EMI	
Mode 1	Charging and Discharging +BT + Wireless Charging
EMS	
Mode 1	Charging and Discharging +BT + Wireless Charging

2.6. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - Supplied by the lab

●	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/

○Adapter information
N/A

2.7. Performance level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test relative to a performance criteria defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product. Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

— essential operational modes and states;
— tests of all peripheral access(hard disks, floppy disks, printers, keyboard, mouse, etc.);
— quality of software execution
— quality of data display and transmission
— quality of speech transmission

General performance criteria

● based on the used product standard
○ based on the declaration of the manufacturer, requestor or purchaser

● 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 clauses.

Performance table

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.
If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance criteria for Continuous phenomena applied to Transmitters (CT)

The performance criteria A shall apply.
Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Transmitters (TT)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.
Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.
Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Performance criteria for Transient phenomena applied to Receivers (TR)

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply.
Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

2.8. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd.
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping,
Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2014) and CISPR Publication 22.

3.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.3. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

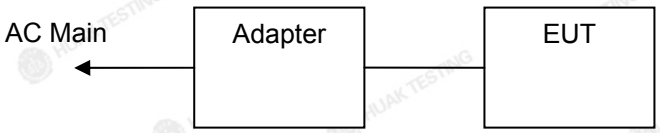


Table 2-1 Equipment Used in Tested System

No.	Product	Manufacturer	Model No.	FCC ID
1	Adapter	HUAWEI	HW-051000CHQ	/

3.4. Test Description

ETSI EN 301 489-1/-3/-17 requirements		
Radiated Emission	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1 EN 55032:2015 Annex A.2	PASS
Conducted Emission(AC Mains)	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1	PASS
Conducted Emission(Telcommunication Ports)	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1 EN 55032:2015 Annex A.3	N/A
Harmonic Current Emissions	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1 EN IEC 61000-3-2:2019	N/A
Voltage Fluctuations and Flicker	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1 EN 61000-3-3:2013 + A1:2019	N/A
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	PASS
Fast Transients Common Mode	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A
RF Common Mode 0,15 MHz to 80 MHz	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A
Transients and Surges	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A
Voltage Dips and Interruptions	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A
Surges, Line to Line and Line to Ground	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A

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

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Dongguan Dongdian Testing Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Dongguan Dongdian Testing Service Co.,Ltd is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.90dB	(1)
Radiated Emission	1~18GHz	4.28dB	(1)
Radiated Emission	18-40GHz	5.54dB	(1)
Conducted Disturbance	0.15~30MHz	2.71dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.6. Equipments Used during the Test

CONDUCTED EMISSION

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	LISN	R&S	ENV216	HKE-002	Jun. 18, 2020	Jun. 17, 2021	1 year
2	LISN	R&S	ENV216	HKE-029	Jun. 18, 2020	Jun. 17, 2021	1 year
3	EMI Test Receiver	R&S	ESR-7	HKE-005	Jun. 18, 2020	Jun. 17, 2021	1 year

RADIATED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Jun. 18, 2020	Jun. 17, 2021	1 year
2	EMI Test Receiver	R&S	ESR-7	HKE-010	Jun. 18, 2020	Jun. 17, 2021	1 year
3	Spectrum analyzer	Agilent	N9020A	HKE-048	Jun. 18, 2020	Jun. 17, 2021	1 year
4	Horn antenna	Schwarzbeck	9120D	HKE-013	Jun. 18, 2020	Jun. 17, 2021	1 year
5	Preamplifier	EMCI	EMC051845SE	HKE-015	Jun. 18, 2020	Jun. 17, 2021	1 year
6	Preamplifier	Agilent	83051A	HKE-016	Jun. 18, 2020	Jun. 17, 2021	1 year
7	Position controller	Taiwan MF	MF7802	HKE-011	Jun. 18, 2020	Jun. 17, 2021	1 year

HARMONICS AND FILCK

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Harmonic flicker tester	California Instruments	AC2000A	HKE-037	Jun. 18, 2020	Jun. 17, 2021	1 year

ESD

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	ESD device	Schloder	SESD 216	HKE-023	Jun. 18, 2020	Jun. 17, 2021	1 year

RS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Signal generator	Agilent	83630A	HKE-028	Jun. 18, 2020	Jun. 17, 2021	1 year
2	Hf antenna	Schwarzbeck	LB-180400-KF	HKE-031	Jun. 18, 2020	Jun. 17, 2021	1 year
3	Power amplifier	R&S	NTWPA-1060040E	HKE-035	Jun. 18, 2020	Jun. 17, 2021	1 year
4	Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Jun. 18, 2020	Jun. 17, 2021	1 year
5	Power amplifier	R&S	5225F	HKE-058	Jun. 18, 2020	Jun. 17, 2021	1 year

SURGE, EFT/BURST, VOLTAGE INTERRUPTION/DIPS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Full-featured immunity tester	HTEC	HV1P16T	HKE-017	Jun. 18, 2020	Jun. 17, 2021	1 year
2	Group pulse coupling clamp	HTEC	H3C	HKE-024	Jun. 18, 2020	Jun. 17, 2021	1 year

INJECTION CURRENT

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Sensitivity Test System	LIONCEL	RIS-6091	HKE-110	Jun. 18, 2020	Jun. 17, 2021	1 year
2	Magnetic clamp	LIONCEL	CDN-M3-16	HKE-111	Jun. 18, 2020	Jun. 17, 2021	1 year

PFMF

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Power frequency magnetic field testing system	LIONCEL	PMF-801C-C	HKE-115	Jun. 18, 2020	Jun. 17, 2021	1 year

4. TEST CONDITIONS AND RESULTS

4.1. REQUIREMENTS

4.1.1. Radiated Emission

LIMIT

Please refer to ETSI EN 301 489-1 Clause 8.2.3

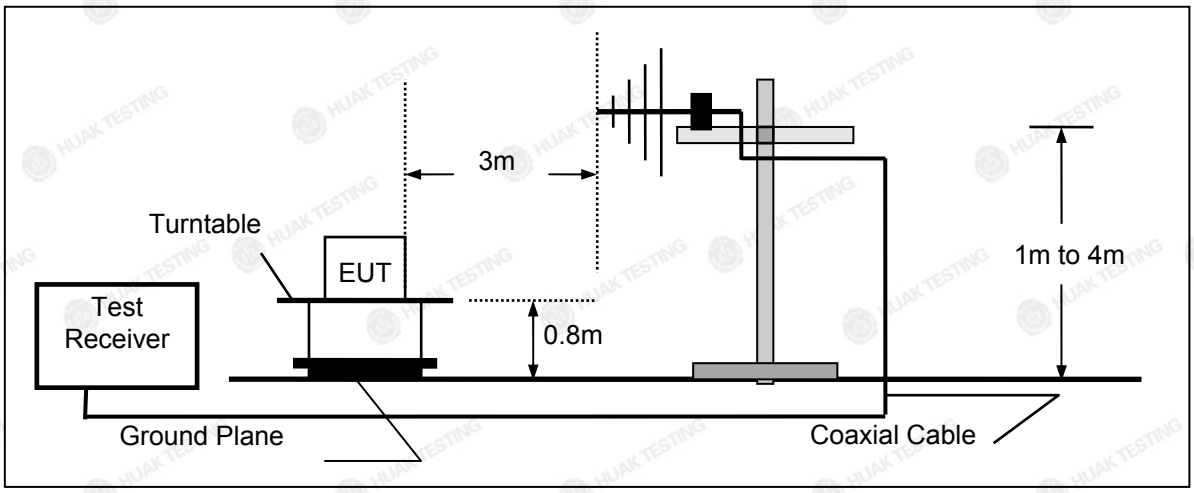
The ancillary equipment shall meet the class B limits given in CENELEC EN 55032 [1], annex A tables A.4 and A.5.

Alternatively, for ancillary equipment intended to be used exclusively in an industrial environment or telecommunication centres, the class A limits given in CENELEC EN 55032 [1], annex A tables A.2 and A.3 may be used.

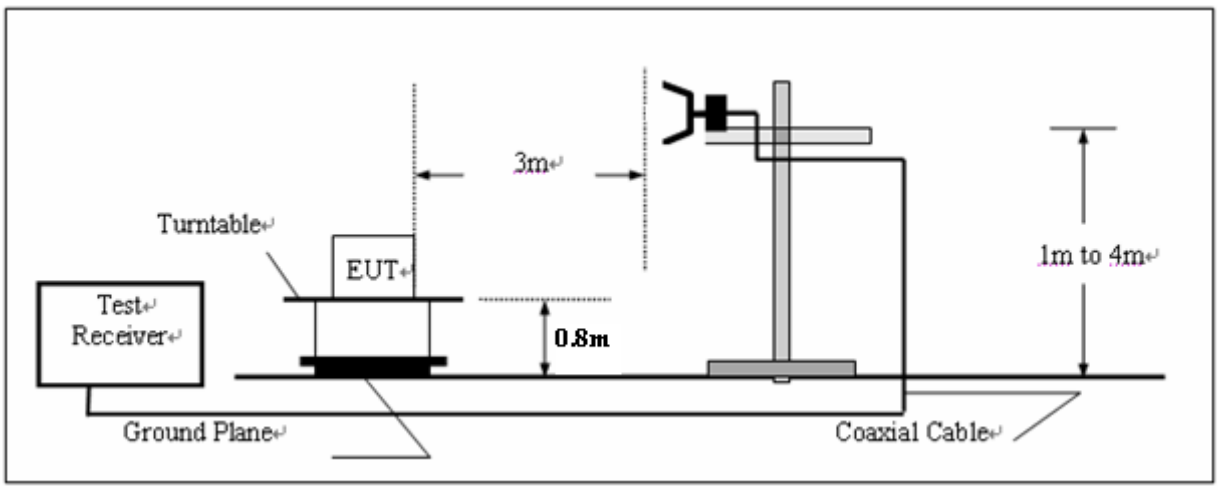
If EUT is also a FM Receiver, it shall meet CENELEC EN 55032 [3], annex A tables A.6

TEST CONFIGURATION

(a) Radiated Emission Test Set-Up, Frequency below 1000MHz



(b) Radiated Emission Test Set-Up, Frequency above 1000MHz



TEST PROCEDURE

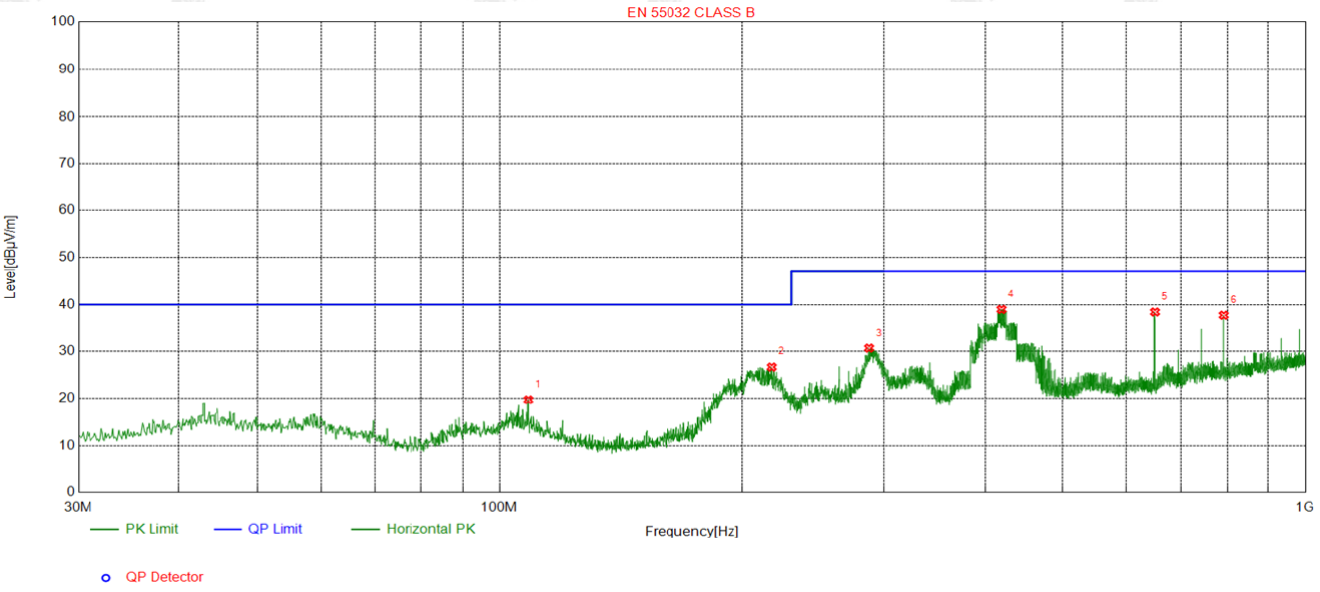
Please refer to ETSI EN 301 489-1 Clause 8.2.2 and The test method shall be in accordance with CENELEC EN 55032 [1], annex A.2. for the measurement methods.

Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

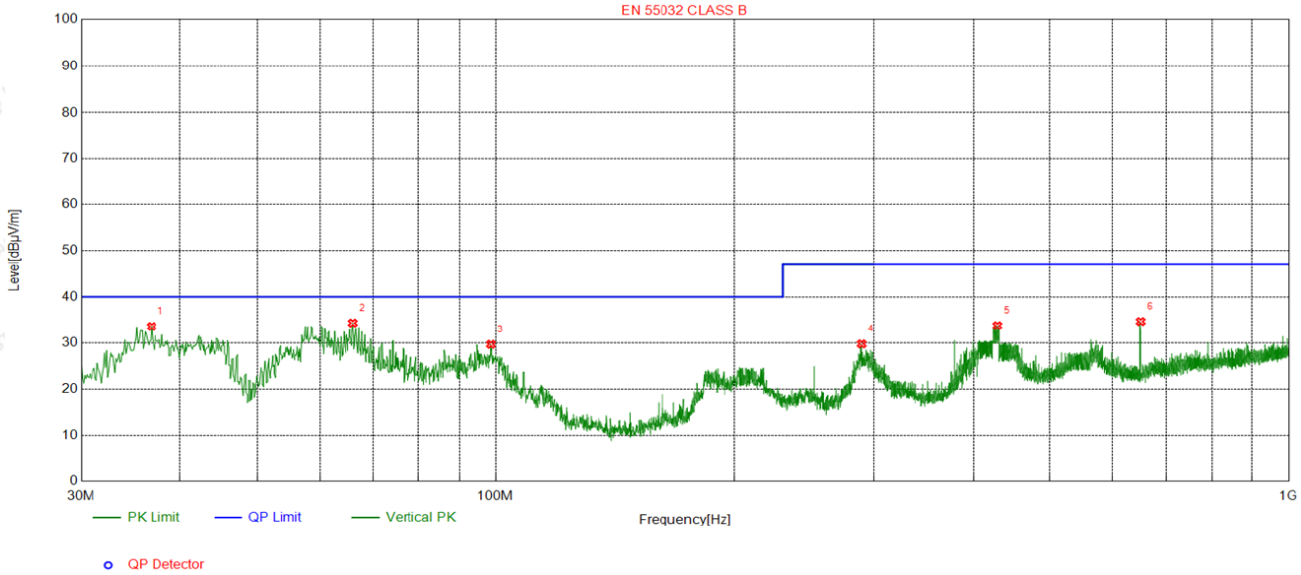
Below 1000MHz



Suspected List

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	108.4808	-15.43	35.16	19.73	40.00	20.27	100	0	Horizontal
2	217.6168	-14.62	41.28	26.66	40.00	13.34	100	71	Horizontal
3	287.8518	-12.93	43.59	30.66	47.00	16.34	100	343	Horizontal
4	420.2700	-10.03	49.01	38.98	47.00	8.02	100	348	Horizontal
5	650.9591	-5.76	44.20	38.44	47.00	8.56	100	0	Horizontal
6	792.1082	-3.24	41.00	37.76	47.00	9.24	100	3	Horizontal

Remark:
Factor = Cable loss + Antenna factor – Preamplifier; Level = Reading + Factor; Margin = Limit – Level;



Suspected List

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7907	-15.57	49.17	33.60	40.00	6.40	100	129	Vertical
2	66.0876	-16.69	51.05	34.36	40.00	5.64	100	92	Vertical
3	98.6829	-15.62	45.30	29.68	40.00	10.32	100	71	Vertical
4	289.7920	-12.85	42.61	29.76	47.00	17.24	100	342	Vertical
5	429.6800	-9.86	43.64	33.78	47.00	13.22	100	262	Vertical
6	650.9591	-5.76	40.45	34.69	47.00	12.31	100	113	Vertical

Remark:
Factor = Cable loss + Antenna factor – Preamplifier; Level = Reading + Factor; Margin = Limit – Level;
Remark: All tests have tested, the report only shows the worst mode.

Radiated Emission From 1 GHz to 6 GHz

Frequency (MHz)	PK (dBuV/m)	Average (dBuV/m)	MaxPeak Limit (dBuV/m)	Limit Average (dBuV/m)	Margin PK (dB)	Margin AC (dB)	Pol	Azimuth (deg)
1814.93	47.63	---	70	50	22.37	---	V	45
1957.45	45.82	---	70	50	24.18	---	H	270
2296.26	41.96	---	70	50	28.04	---	V	172
2221.74	45.33	---	70	50	24.67	---	H	109
3816.18	49.47	---	74	54	24.53	---	V	334
3957.68	46.65	---	74	54	27.35	---	H	150

Remark: All tests have tested, the report only shows the worst mode.

4.1.2. Conducted Emission (AC Mains)

LIMIT

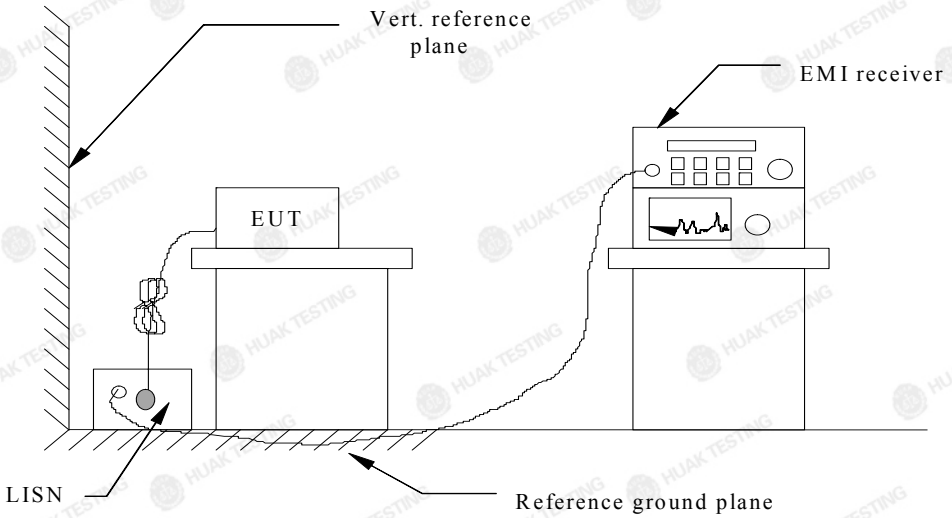
Please refer to ETSI EN 301 489-1 Clause 8.4.3

The equipment shall meet the class B limits given in CENELEC EN 55032 [1], annex A table A.10.

Alternatively, for equipment intended to be used in an industrial environment or a telecommunication centre, the class A limits given in CENELEC EN 55032 [1], annex A table A.9 can be used.

If EUT is also a FM Receiver, it shall meet CENELEC EN 55032 [3], annex A tables A.13

TEST CONFIGURATION



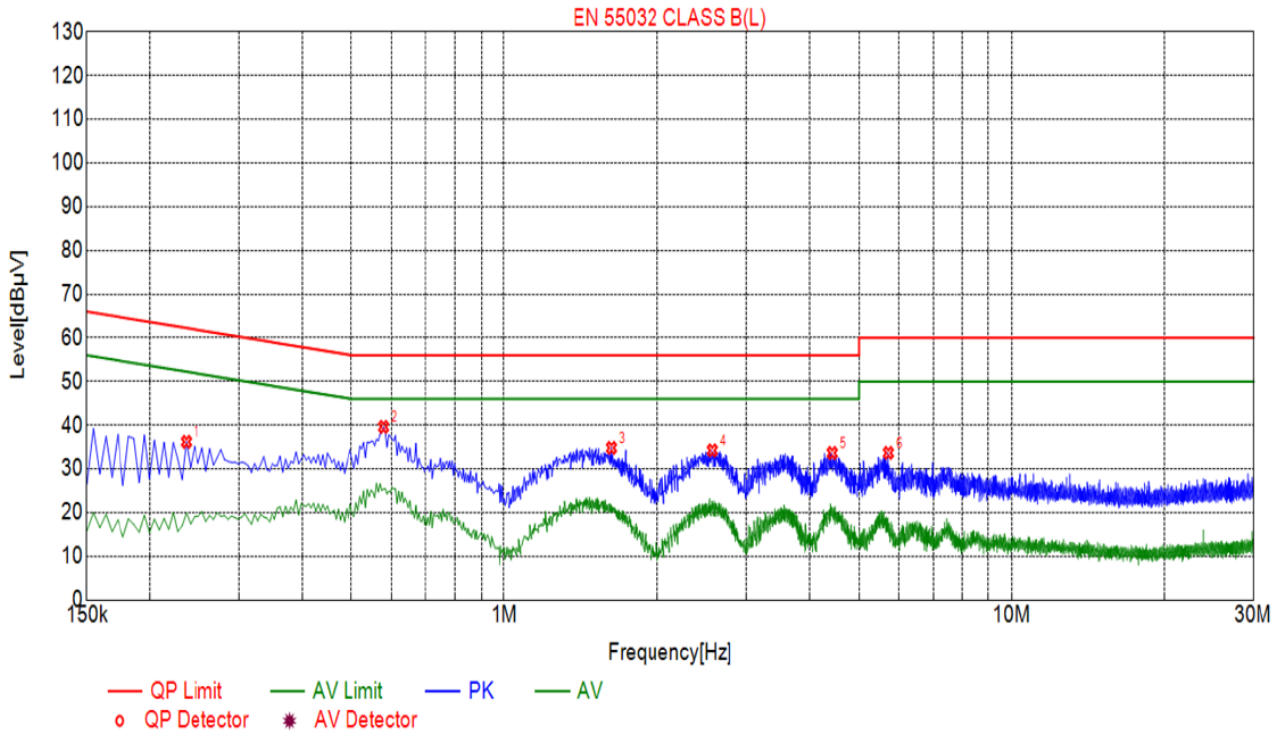
TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 8.4.3 and EN 55032 Clause 5 for the measurement methods.

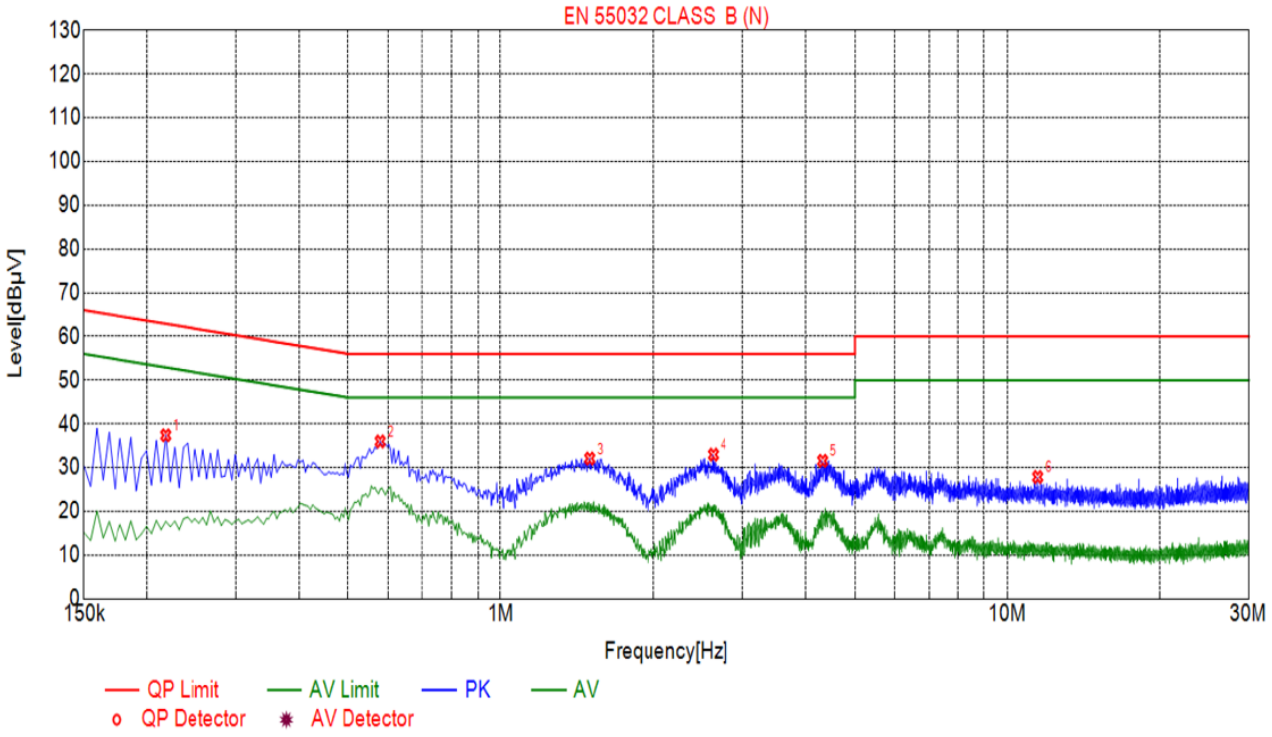
Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS



Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.2355	36.20	20.03	62.25	26.05	16.17	PK	L
2	0.5775	39.62	20.05	56.00	16.38	19.57	PK	L
3	1.6260	34.81	20.11	56.00	21.19	14.70	PK	L
4	2.5665	34.23	20.20	56.00	21.77	14.03	PK	L
5	4.4340	33.64	20.25	56.00	22.36	13.39	PK	L
6	5.7300	33.67	20.24	60.00	26.33	13.43	PK	L



Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Reading [dBµV]	Detector	Type
1	0.2175	37.39	20.05	62.91	25.52	17.34	PK	N
2	0.5775	35.98	20.05	56.00	20.02	15.93	PK	N
3	1.5000	32.08	20.10	56.00	23.92	11.98	PK	N
4	2.6250	32.97	20.21	56.00	23.03	12.76	PK	N
5	4.3260	31.55	20.25	56.00	24.45	11.30	PK	N
6	11.5170	27.85	20.00	60.00	32.15	7.85	PK	N

Remark: Margin = Limit – Level
Correction factor = Cable lose + LISN insertion loss
Level=Test receiver reading + correction factor

Remark: All tests have tested, the report only shows the worst mode.

4.1.3. Conducted Emission (Telecommunication Ports)

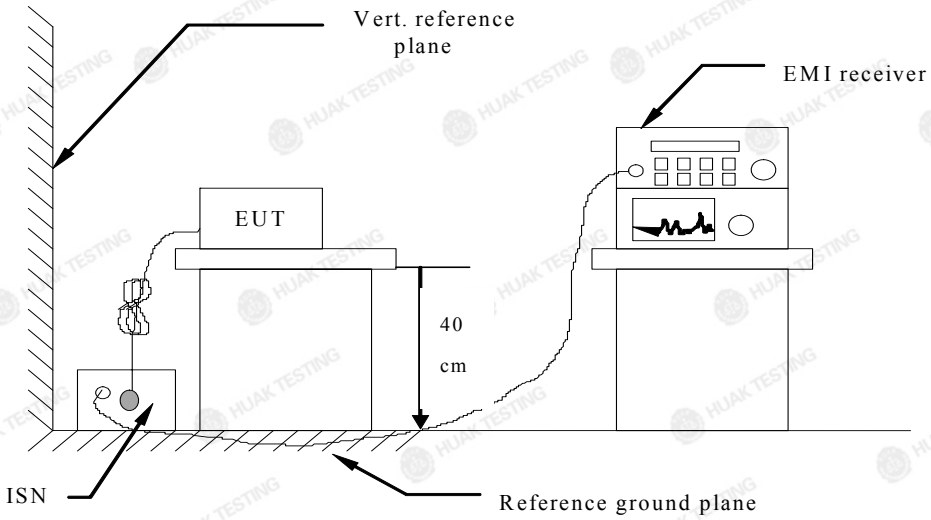
LIMIT

Please refer to ETSI EN 301 489-1 Clause 8.7.3

The wired network ports shall meet the class B limits given in CENELEC EN 55032 [1], annex A table A.12.

Alternatively, for equipment intended to be used exclusively in an industrial environment or a telecommunication centre, the class A limits given in CENELEC EN 55032 [1] annex A table A.11 can be used.

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 8.7.2 and The test method shall be in accordance with CENELEC EN 55032 [1], annex A.3. for the measurement methods.

Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

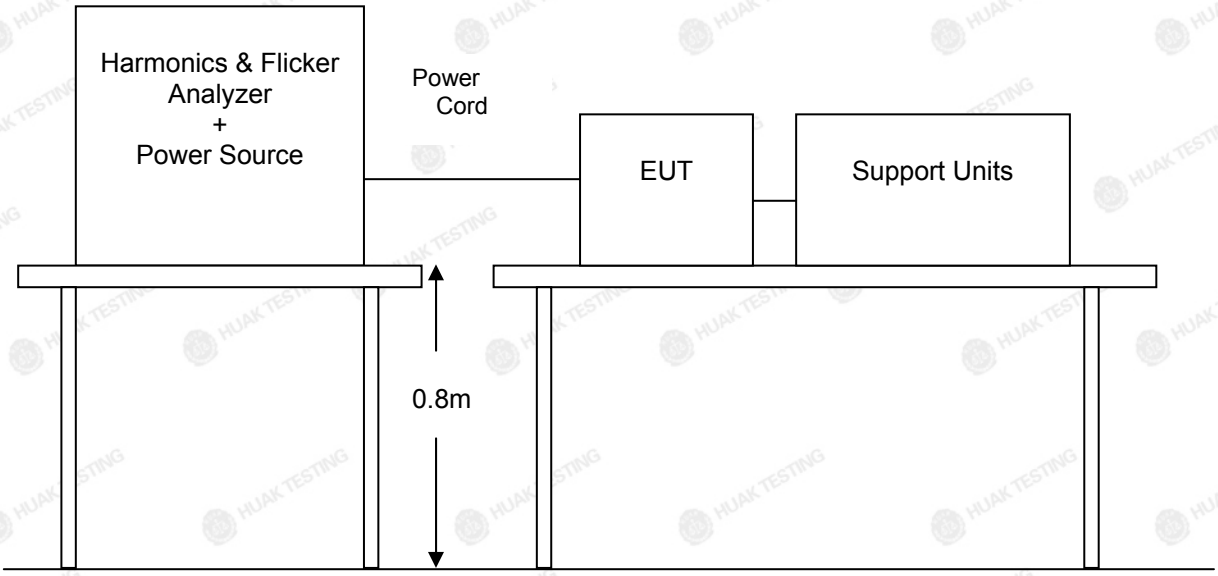
Not applicable

4.1.4. Harmonic Current Emission

LIMIT

Please refer to EN 61000-3-2

TEST CONFIGURATION



TEST PROCEDURE

Please refer to EN 61000-3-2 for the measurement methods.

Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

EUT is test by DC power supply, so it is not applicable.

4.1.5. Voltage Fluctuation and Flicker

LIMIT
Please refer to EN 61000-3-3

TEST CONFIGURATION
Same as the configuration of the Harmonic Current Emission.

TEST PROCEDURE
Please refer to EN 61000-3-3 for the measurement methods.

Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

EUT is test by DC power supply, so it is not applicable.

4.1.6. Electrostatic Discharge

LIMIT

Please refer to EN 61000-4-2

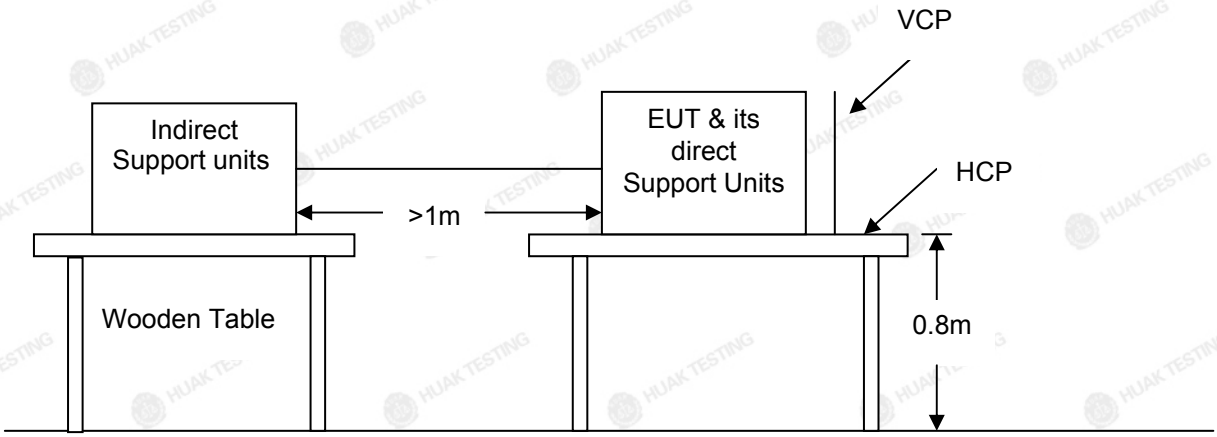
SEVERITY LEVELS OF ELECTROSTATIC DISCHARGE

Test level: Contact Discharge at ±2KV,±4KV Air Discharge at±2KV,±4KV,±8KV

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1	2	2
2	4	4
3	6	8
4	8	15
X	Special	Special

Performance criterion: **B**

Test Configuration



Ground Reference Plane

Test procedure

Please refer to ETSI EN 301 489-1 Clause 9.3.2 and EN 61000-4-2 for the measurement methods.

If EUT is also a FM Receiver, it shall refer to EN 55020:2007/A11:2011 Clause 5.9 for the measurement methods.

Test results

Contact Discharge:

The ESD generator is held perpendicular to the surface to which the discharge is applied and the tip of the discharge electrode touch the surface of EUT. Then turn the discharge switch. The generator is then re-triggered for a new single discharge and repeated at least 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

Air Discharge:

Air discharge is used where contact discharge can't be applied. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated at least 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Indirect discharge for horizontal coupling plane:

At least 10 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT.

Indirect discharge for vertical coupling plane:

At least 10 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Climatic conditions

- ambient temperature : 25℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

Description of the Electrostatic Discharges (ESD)

Point of Discharge	Applied Voltage (KV)	Total No. of Discharge (Each Point)	Results	Criteria Level	Remark
Air Test Point	±2	20	Pass	B	-
	±4	20	Pass	B	-
	±8	20	Pass	B	-
Contact Discharge Test Points	±2	50	Pass	B	
	±4	50	Pass	B	
VCP (4 sides)	±2	50	Pass	B	-
	±4	50	Pass	B	-
HCP (4 sides)	±2	50	Pass	B	-
	±4	50	Pass	B	-

The requirements are **Fulfilled** Performance Criterion: **B**

Remarks: The ancillary equipment's specification for an acceptable level of performance or degradation of performance during and/or after the ESD tests.

Description of Discharge Point

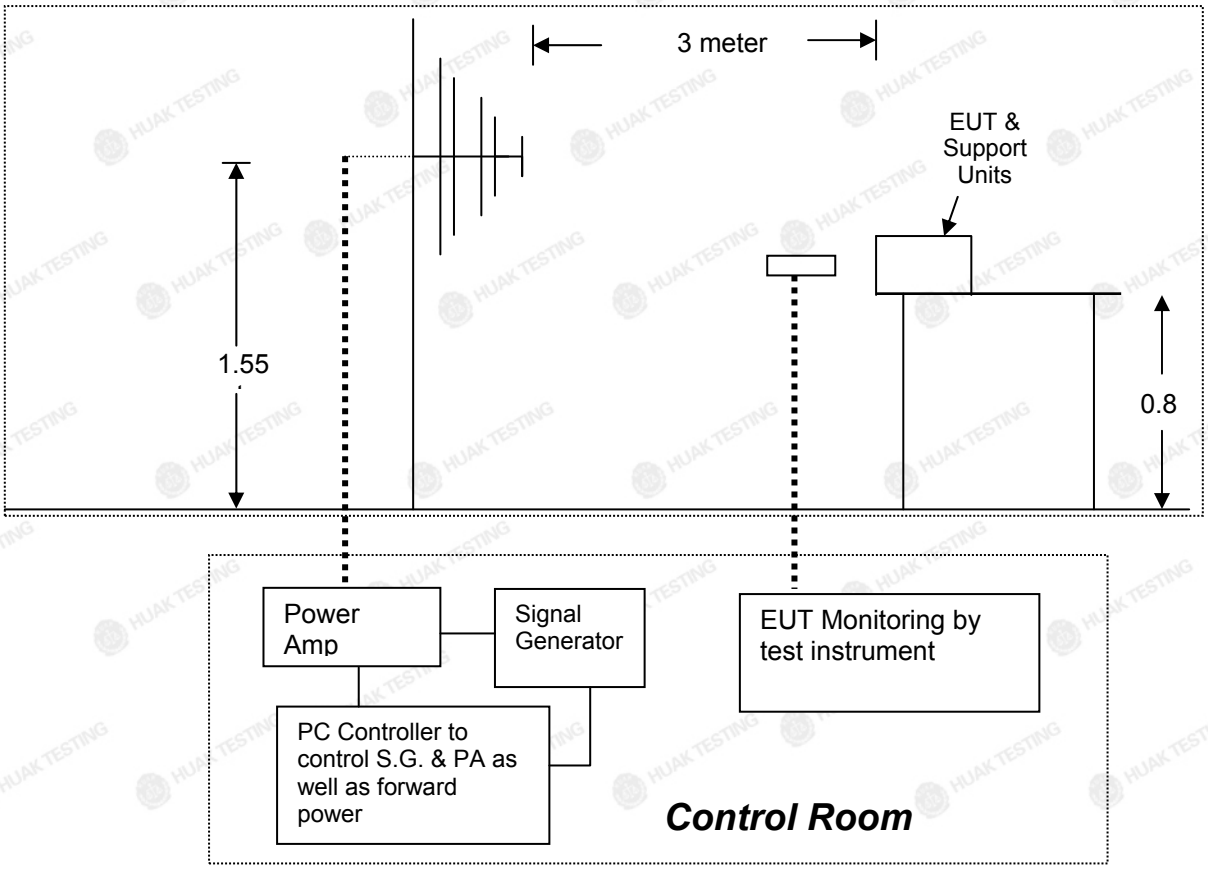
Contact Discharge		Air Discharge	
○	Metallic Screws	○	Plastic Screws
○	Metallic Case	●	Plastic Case(gap)
●	Metallic Connect ports	●	Plastic Connect Ports
●	Metallic Junctions	●	Plastic Junctions
○	Others (Antenna Port)	○	Others

4.1.7. RF Electromagnetic Field

LIMIT

Please refer to EN 61000-4-3

Test Configuration



Test Levels of RF Electromagnetic Field

Test level: RF Field Strength: 3V/m

Level	RF Field Strength(V/m)
1	1
2	3
3	10
X	Special

Performance criterion: **A**

TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.2.2 and EN 61000-4-3 for the measurement methods.

Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

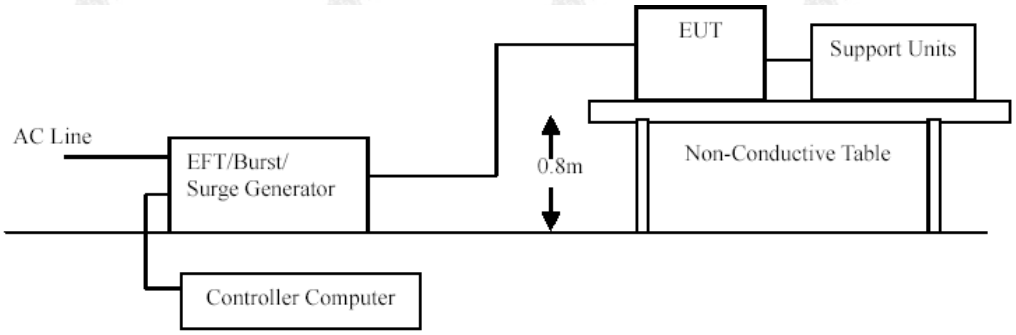
	Freq. Range (MHz)	Field	Modulation	Polarity	Position	Mode	Result (Pass/Fail)
1	80-6000	3V/m	Yes	H / V	Front	Normal Operating	Pass
	1800(±1%), 2600(±1%), 3500(±1%), 5000(±1%)	3V/m	Yes	H / V	Front		Pass
2	80-6000	3V/m	Yes	H / V	Right	Normal Operating	Pass
	1800(±1%), 2600(±1%), 3500(±1%), 5000(±1%)	3V/m	Yes	H / V	Right		Pass
3	80-6000	3V/m	Yes	H / V	Back	Normal Operating	Pass
	1800(±1%), 2600(±1%), 3500(±1%), 5000(±1%)	3V/m	Yes	H / V	Back		Pass
4	80-6000	3V/m	Yes	H / V	Left	Normal Operating	Pass
	1800(±1%), 2600(±1%), 3500(±1%), 5000(±1%)	3V/m	Yes	H / V	Left		Pass

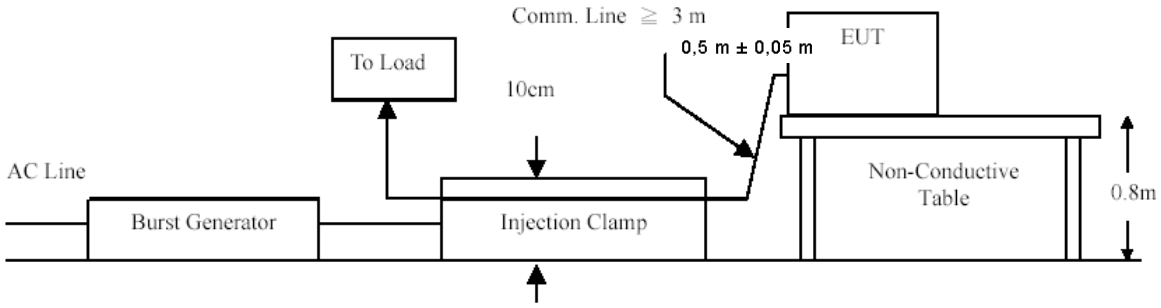
4.1.8. Fast Transients Common Mode

LIMIT

Please refer to EN 61000-4-4

TEST CONFIGURATION





TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.4.2 and EN 61000-4-4 for the measurement methods.

If EUT is also a FM Receiver, it shall refer to EN 55020:2007/A11:2011 Clause 5.6 for the measurement methods.

Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

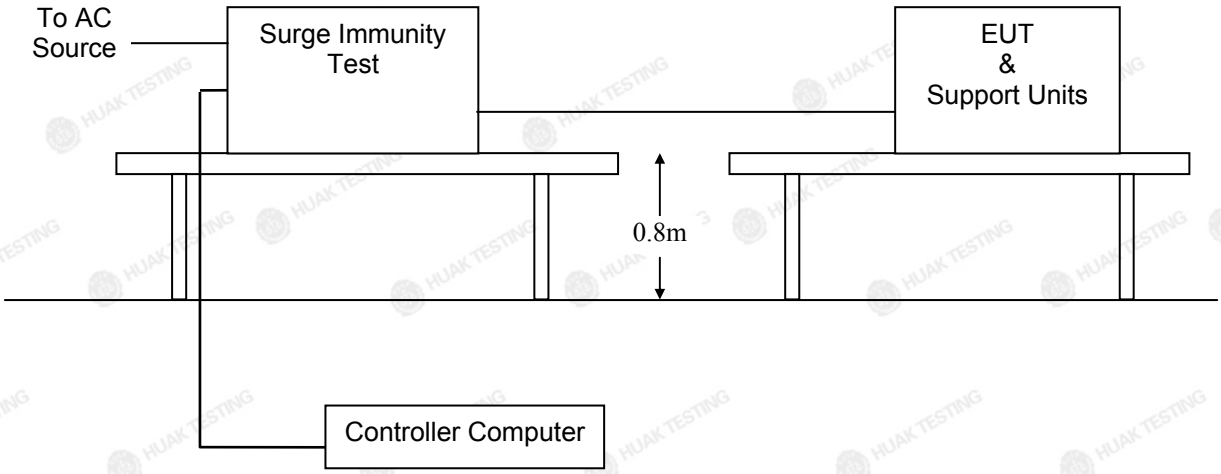
EUT is test by DC power supply, so it is not applicable.

4.1.9. Surges, Line to Line and Line to Ground

LIMIT

Please refer to EN 61000-4-5

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.4.2 and EN 61000-4-5 for the measurement methods.

Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

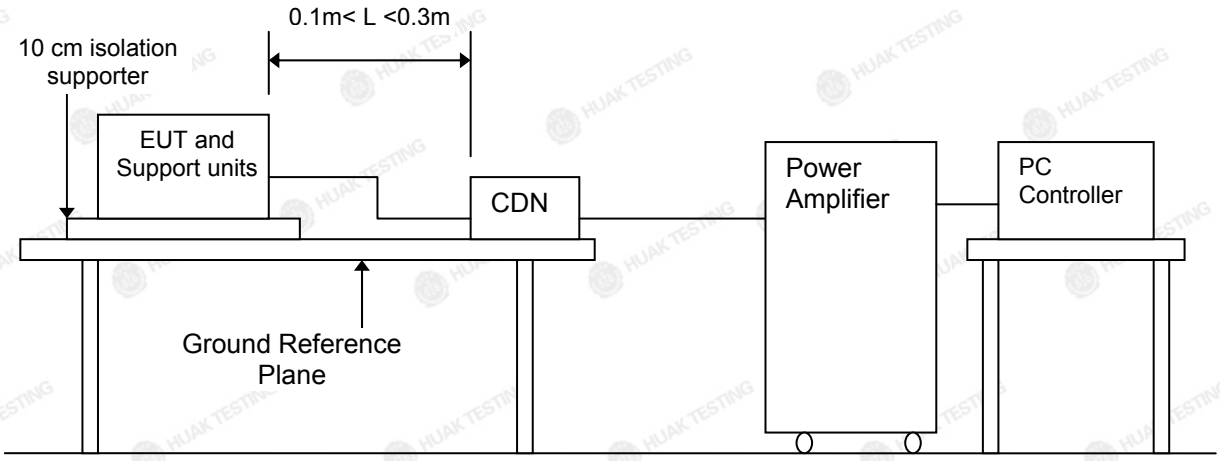
EUT is test by DC power supply, so it is not applicable.

4.1.10. RF- Common Mode 0.15MHz to 80MHz

LIMIT

Please refer to EN 61000-4-6

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.5.2 and EN 61000-4-6 for the measurement methods.

Climatic conditions

- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

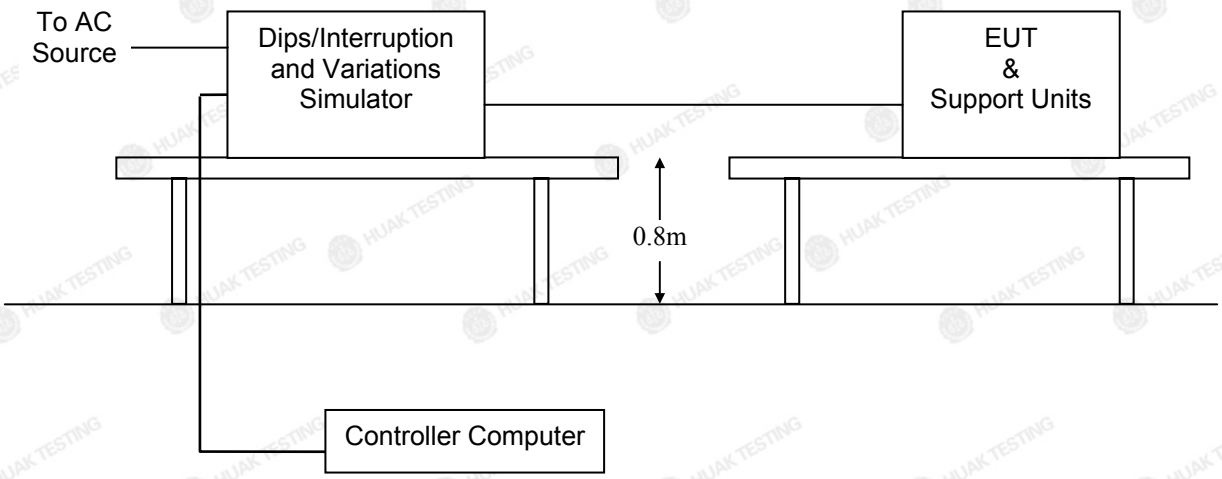
EUT is test by DC power supply, so it is not applicable.

4.1.11. Voltage Dips and Interruptions

LIMIT

Please refer to EN 61000-4-11

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.7.2 and EN 61000-4-11 for the measurement methods

Climatic conditions

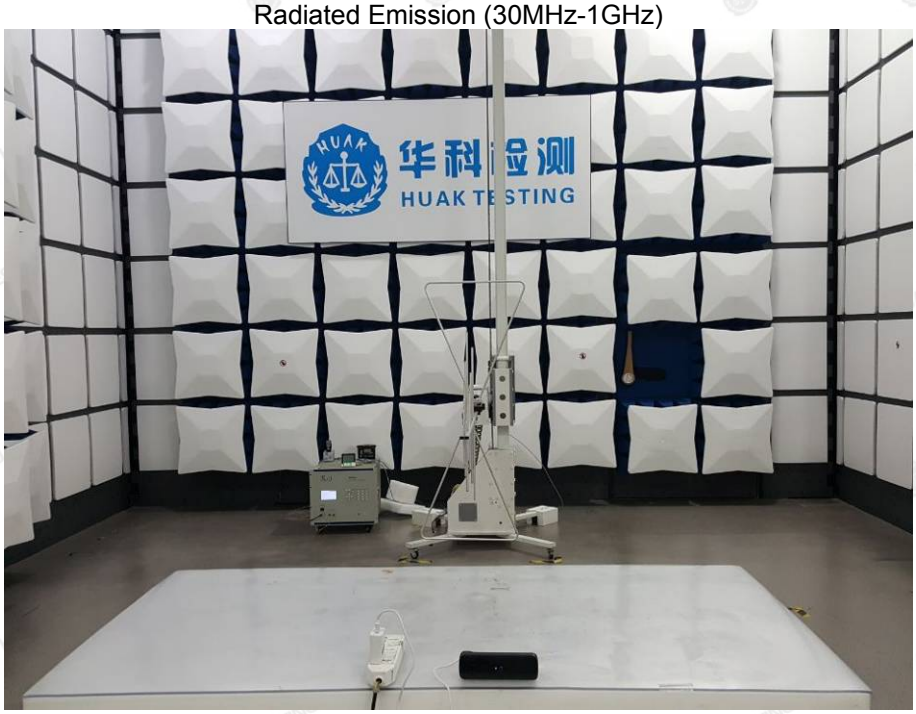
- ambient temperature : 25 ℃
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

EUT is test by DC power supply, so it is not applicable.

5. Test Set-up Photos of the EUT

Radiated Emission (30MHz-1GHz)



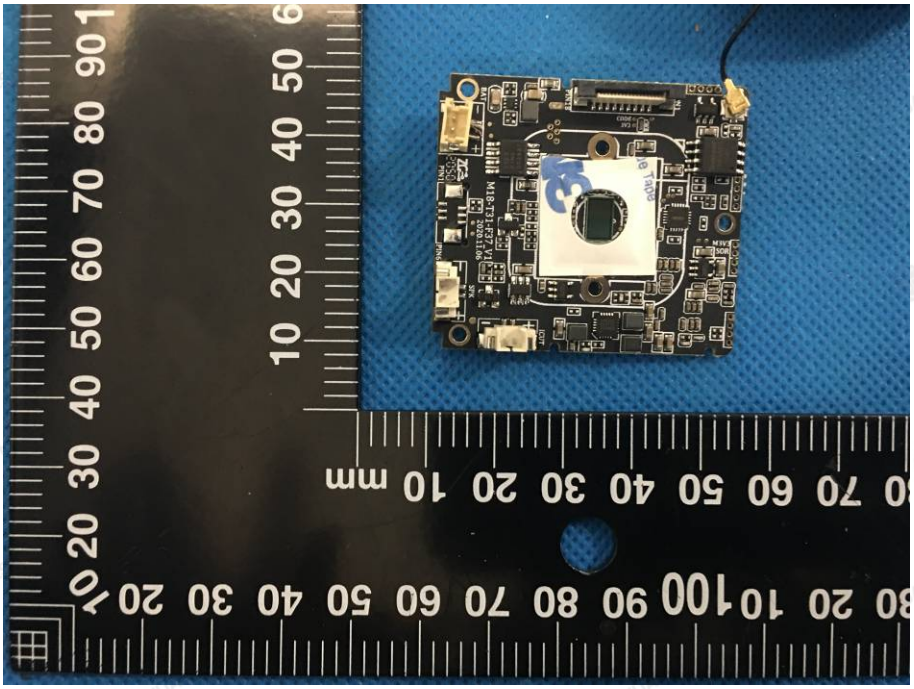
Radiated Emission (1GHz-6GHz)

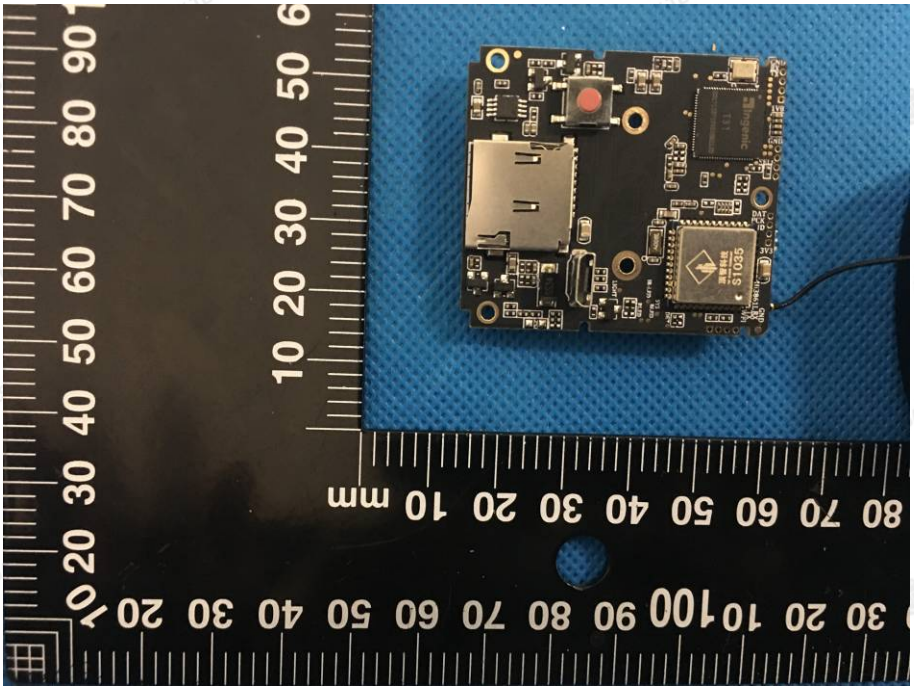
Conducted Emission

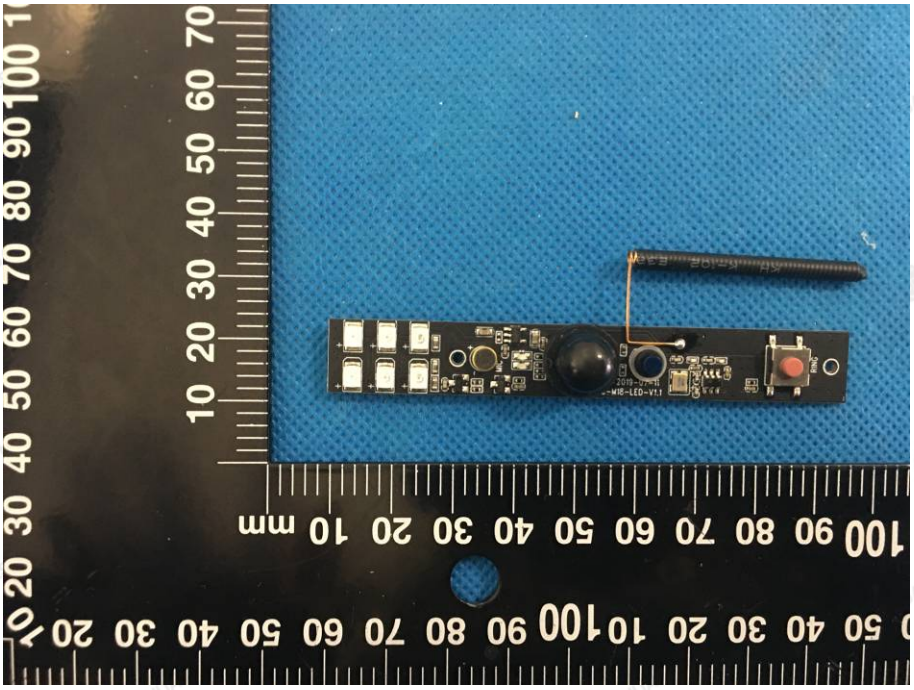
Electrostatic Discharge

6. PHOTOS OF THE EUT

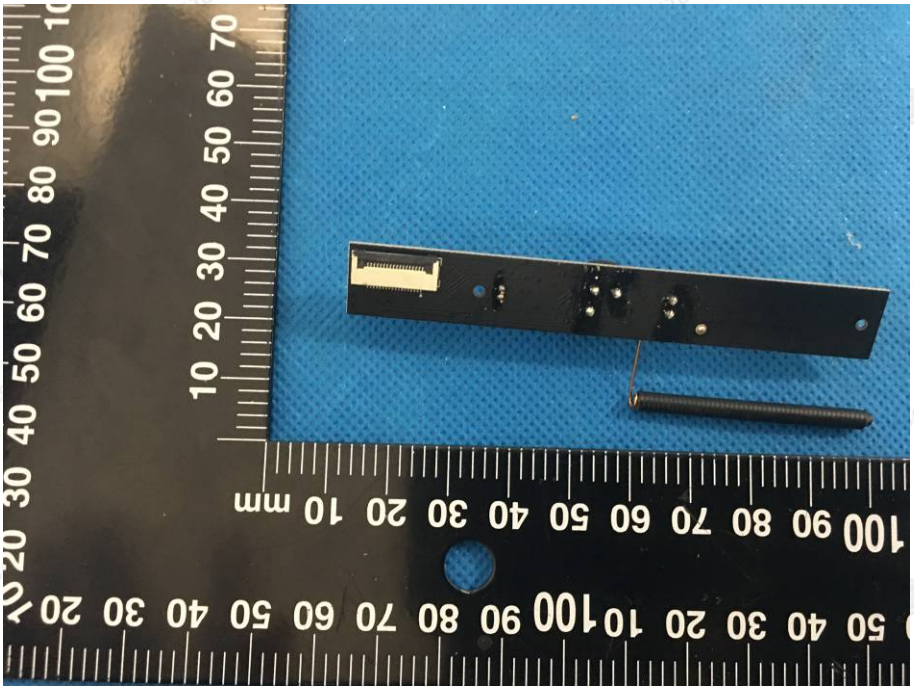
HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China







HUAK Testing Lab TEL : +86-755 2302 9901 FAX : +86-755 2302 9901 E-mail : service@cer-mark.com
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



.....End of Report.....

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1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

HUAK TESTING

TEST Report

EN IEC 62311:2020
EN 50665:2017

Prepared for :

Topvision(Shenzhen) Technology Co., LTD.

Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China

Product:	**Low power video doorbell**
Trade Name:	**N/A**
Model Name:	**V30, V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro**
Date of Test:	**Dec. 31, 2020 to Jan. 07, 2021**
Date of Report:	**Jan. 07, 2021**
Report Number:	**HK2012294032-2EH**

Prepared By :

Shenzhen HUAK Testing Technology Co., Ltd.

1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

TEL: +86-755-2302 9901 FAX: +86-755-2302 9901

E-mail: service@cer-mark.com http://www.cer-mark.com

Applicant	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
Manufacturer	:	Topvision(Shenzhen) Technology Co., LTD.
Address	:	Room 601, No. 213, Niucheng Road, Niucheng Village, Xili Street, Nanshan District, Shenzhen City, China
EUT Description	:	Low power video doorbell
(A) Model No.	:	V30
(B) Serial Model	:	V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro
(C) Power Supply	:	DC 5V From Micro USB or DC 1.5V From Battery

Standards ..... EN IEC 62311:2020
EN 50665:2017

This device described above has been tested by Shenzhen HUAK Testing Technology Co., Ltd. and the test results show that the equipment under test (EUT) is in compliance with the 2014/53/EU requirements. And it is applicable only to the tested sample identified in the report.

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Test Result..... **Pass**

Date of Test: Dec. 31, 2020 to Jan. 07, 2021

Prepared by: Gary Qian
Project Engineer

Reviewed by: Leo Zhang
Project Supervisor

Approved by: Jason Zhou
Technical Director

** Modified History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2021/01/07	Jason Zhou

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1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Table of Contents **Page**

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>Low power video doorbell</td></tr>
<tr><td>Model Name.</td><td>V30</td></tr>
<tr><td>Serial Model</td><td>V20, V10, V50, V55, V60, V65, V70, M6, M7, M8, M9, M10, M11, M12, M13, M1, M1Pro, M2, M3, M3Pro, M3se, M3s, M5, M6, M6Pro, M7, M8, M9, M9Pro, M10, M10Pro, M11, M12, M12Pro</td></tr>
<tr><td>Model Difference</td><td>All model’s the function, software and electric circuit are the same, only with a product color and model named different.
Test sample model: V30.</td></tr>
<tr><td>Product Description</td><td>The EUT is Low power video doorbell.

2.4G Wifi
<table>
<tr><td>Operation Frequency:</td><td>IEEE 802.11b/g/n20 2412-2472MHz
IEEE 802.11 n40 2422-2462MHz</td></tr>
<tr><td>Modulation Type:</td><td>DSSS, OFDM</td></tr>
<tr><td>Antenna Designation:</td><td>Internal Antenna</td></tr>
<tr><td>Antenna Gain(Peak)</td><td>1 dBi</td></tr>
</table>
433MHz:
<table>
<tr><td>Operation Frequency:</td><td>433.92MHz</td></tr>
<tr><td>Modulation Type:</td><td>FSK</td></tr>
<tr><td>Antenna Designation:</td><td>Internal Antenna</td></tr>
<tr><td>Antenna Gain(Peak)</td><td>1 dBi</td></tr>
</table>
More details of EUT technical specification, please refer to the User's Manual.</td></tr>
<tr><td>Channel List</td><td>Refer to below</td></tr>
<tr><td>Power Rating</td><td>DC 5V From Micro USB or DC 1.5V From Battery</td></tr>
<tr><td>Hardware Version</td><td>V2.0</td></tr>
<tr><td>Software Version</td><td>V2.0</td></tr>
</table>

Note:

1. For a more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.

2.EN IEC 62311 & EN 50665 REQUIREMENT

2.1 GENERAL INFORMATION

According to its specifications, the EUT must comply with the requirements of the following standards:

EN IEC 62311:2020 [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)]

EN 50665:2017 [Generic standard for assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)]

2.2 LIMIT

A. Typical usage, installation and the physical characteristics of equipment make it inherently compliant with the applicable EMF exposure levels such as those listed in the bibliography. This low-power equipment includes unintentional (or non-intentional) radiators, for example incandescent light bulbs and 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 radiating electromagnetic energy in the relevant frequency range is so low that the available antenna power and/or the average total radiated power cannot exceed the low-power exclusion level defined in 4.2.

C. The available antenna power and/or the average total radiated power are limited by product standards for transmitters to levels below the low-power exclusion level defined in 4.2.

D. Measurements or calculations show that the available antenna power and/or the average total radiated power are below the low-power exclusion level defined in 4.2.

3. RESULT

3.1 Summary of Results

Limit (W/ m²)	Result (W/ m²)	Verdict
10	0.058	passed

3.2 MPE Evaluation

$S = PG / 4\pi R^2$
P = Power input to antenna
G = Antenna Gain
R = distance to the center of radiation of antenna (in meter) = 0.2 m
π=3.142
The maximum power density at a distance of 0.2 m for EUT is shown as below:

Operation Mode	Max. EIRP (W)	Antenna Gain(dBi)	R (m)	S (W/m2)	Limit (W/m2)	Conclusion
2.4G WIFI	0.029	1	0.2	0.058	10	PASS

433MHz：

EUT only have receive function

3.3 Measurement Uncertainty

Extended Uncertainty (k=2) 95% 0.5dB

.....End of Report.....