



Certificate of Conformity

Certificate No. : STL2025E0117284C

Applicant : SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community,

Address : Fucheng Street, Longhua District, Shenzhen City, Guangdong
Province, China

Manufacturer : SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community,

Address : Fucheng Street, Longhua District, Shenzhen City, Guangdong
Province, China

Product Name : Vehicle Player

Trade Name : ESSGOO

Model : AR7002

Test Standards : EN 300 328 V2.2.2, EN IEC 62311:2020
EN 301 489-1 V2.2.3, EN 301 489-17 V2.2.1
EN IEC 62368-1:2020+A11:2020

Report No. : STL2025E0117284C-Y1R01; STL2025E0117284C-Y2
STL2025E0117284C-Y3; STL2025E0117284C-Y4
STL2025E0117284C-S1

The EUT described above has been tested by us with the listed standards and found in compliance with the council **RED** directive 2014/53/EU. It is possible to use CE marking to demonstrate the compliance with this **RED** directive.



The results in this report are applicable only to the equipment tested. This report shall not be re-produced except in full without the written approval of Shenzhen STL Testing Technology Co., Ltd.

Shenzhen STL Testing Technology Co., Ltd.

Unit C, 4F, Building A, ShengHengji Industrial Park, No. 137 FuYuan 1 Road, Heping Community,
Fuyong Street, Baoan District, Shenzhen, China

Tel: +86-755-82593673 Fax: +86-755-82593673 <http://www.stl-test.com>



Certificate of Conformity

Certificate No. : STL2025R0117283C-Y1

Applicant : SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.

Address : Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community,
Fucheng Street, Longhua District, Shenzhen City, Guangdong
Province, China

Manufacturer : SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.

Address : Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community,
Fucheng Street, Longhua District, Shenzhen City, Guangdong
Province, China

Product Name : Vehicle Player

Trade Name : ESSGOO

Model : AR7002

Test Standards : EN 62321-5:2014, EN 62321-4:2014+A1:2017, EN 62321-7-1:2015
EN 62321-7-2:2017, IEC 62321-6:2015, IEC 62321-8:2017

The Certificate of Compliance is based on a test procedure or an evaluation of the above-mentioned product. This is to certify that the above-mentioned product is in compliance with the **RoHS 2.0** Directive -2011/65/EU Annex II (EU) 2015/863 as last amended by Directive (EU) 2017/2102.

RoHS



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Tel: +86-755-82593673 Fax: +86-755-82593673 <http://www.stl-test.com>



Report No.: STL2025R0117283C-Y1

RoHS TEST REPORT

Prepared for :

SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.

**Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community,
Fucheng Street,Longhua District, Shenzhen City, Guangdong Province,
China**

Product: Vehicle Player

Trade Name: ESSGOO

Model Name: AR7002

Date of Test: Jan .10-17,2025

Date of Report: Jan .17,2025

Report Number: STL2025R0117283C-Y1

Prepared By :

Shenzhen STL Testing Technology Co., Ltd.



TEST RESULT CERTIFICATION

Applicant : SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community,
Address : Fucheng Street,Longhua District, Shenzhen City, Guangdong Province,
China
Manufacturer : SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community,
Address : Fucheng Street,Longhua District, Shenzhen City, Guangdong Province,
China
Product name : Vehicle Player
Product model : AR7002
Trade Name : ESSGOO
Date of Sample Received : Jan .10,2025
Testing Period : Jan .10-17,2025

Test Requested:

Conclusion

Based on the performed test on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as bis-(2-ethylhexyl)-Phthalate (DEHP), Benzyl butyl phthalate (BBP), Dibutyl Phthalate (DBP), Diisobutyl Phthalate (DIBP) comply with the limits as set by RoHS Directive 2015/863/EU amending Annex II to Directive 2011/65/EU.

PASS

Prepared by:

Eris
Project Engineer

Checked By:

Lewis
Project Supervisor

Approved by:

Jeannah Lu
Technical Director



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	Jan .17,2025	

Test Method:

Heavy Metals and Flame Retardants Content – European Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

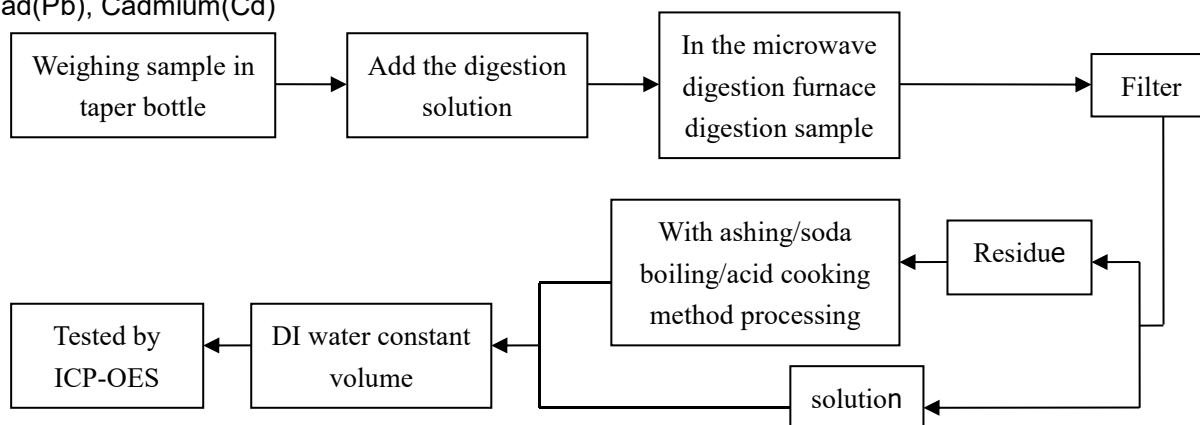
Testing item	Pretreatment method	Measuring instrument	MDL
Lead(Pb)	EN 62321-5:2014 EN 62321-4:2014+A1:2017	ICP-AES	2 mg/kg
Cadmium(Cd)			
Mercury(Hg)			
Chromium(Cr VI)	EN 62321-7-1:2015 EN 62321-7-2:2017 ISO17075-1:2017	UV-Vis	2 mg/kg
PBBs/ PBDEs	IEC 62321-6:2015	GC-MS	5 mg/kg

Phthalates content – European Council Directive 2011/65/EU and Change-Directive 2015/863/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Test Method: Sample was extracted with organic solvent and then analyzed by Gas Chromatograph Mass Spectrometer.

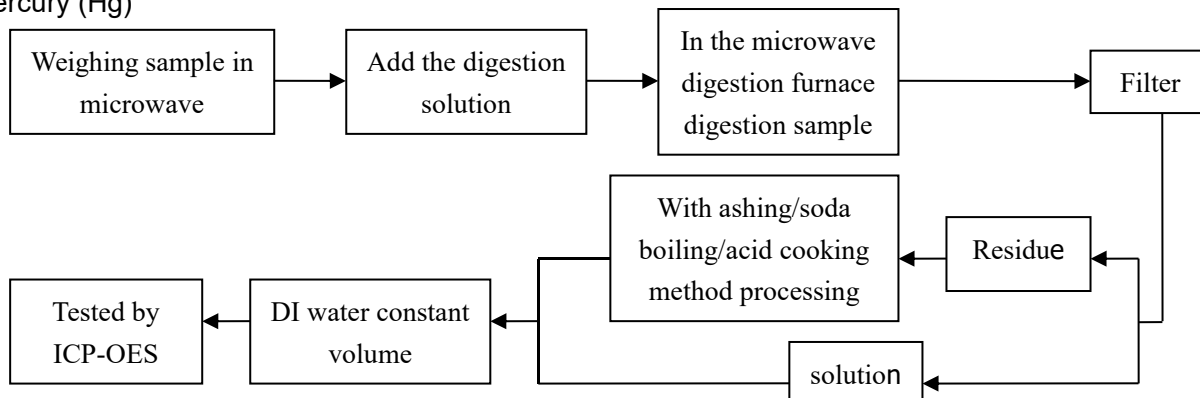
Testing item	Pretreatment method	Measuring instrument	MDL
DEHP/DBP/BBP/ DIBP	IEC 62321-8:2017	GC-MS	0.003 mg/kg

Test Flow:

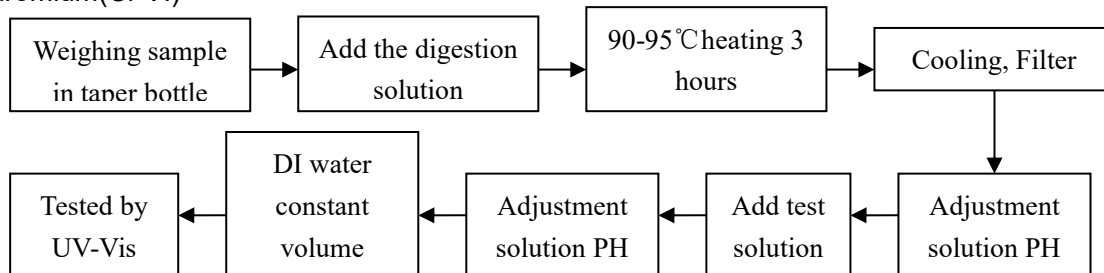
1. Lead(Pb), Cadmium(Cd)



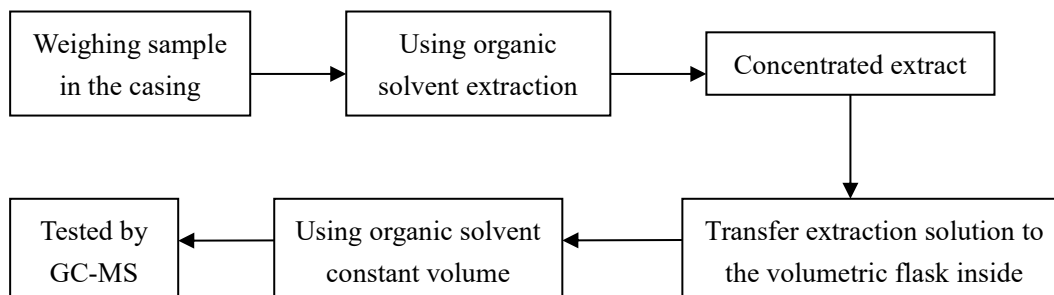
2. Mercury (Hg)



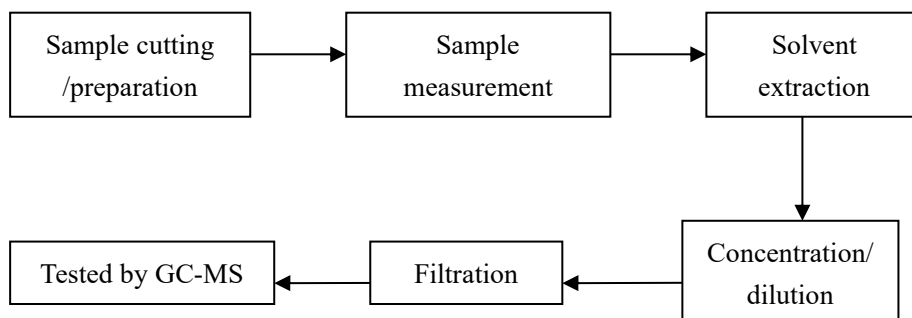
3. Chromium(Cr VI)



4. PBBs/ PBDEs



5. DEHP/ BBP/ DBP/ DIBP



Test Results:

Testing Item	Unit	ROHS Limit	Result					
			1	2	3	4	5	6
Lead(Pb)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium(Cd)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Mercury(Hg)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chromium(Cr VI)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Sum of PBBs/ PBDEs	mg/kg	1000	N.D.	N.D.	N.D.	/	N.D.	/
Monobromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Dibromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Tribromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Tetrabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Pentabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Hexabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Heptabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Octabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Nonabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Decabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Monobromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Dibromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Tribromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Tetrabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Pentabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Hexabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Heptabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Octabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Nonabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Decabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	/	N.D.	/
Bis-(2-ethylhexyl) Phthalate (DEHP)	mg/kg	1000	N.D.	N.D.	N.D.	/	N.D.	/
Benzylbutyl Phthalate (BBP)	mg/kg	1000	N.D.	N.D.	N.D.	/	N.D.	/
Dibutyl Phthalate (DBP)	mg/kg	1000	N.D.	N.D.	N.D.	/	N.D.	/
Di-isobutyl phthalate (DIBP)	mg/kg	1000	N.D.	N.D.	N.D.	/	N.D.	/

Sample Description:

- 1 Black plastic
- 2 White paint
- 3 Cable
- 4 Silver Buckle
- 5 PCB
- 6 Battery

Testing Item	Unit	ROHS Limit	Result					
			7	8	9	10	11	12
Lead(Pb)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium(Cd)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Mercury(Hg)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chromium(Cr VI)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Sum of PBBs/ PBDEs	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	/	/
Monobromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Dibromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Tribromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Tetrabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Pentabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Hexabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Heptabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Octabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Nonabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Decabromobiphenyl	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Monobromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Dibromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Tribromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Tetrabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Pentabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Hexabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Heptabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Octabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Nonabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Decabromodiphenyl ether	mg/kg	/	N.D.	N.D.	N.D.	N.D.	/	/
Bis-(2-ethylhexyl) Phthalate (DEHP)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	/	/
Benzylbutyl Phthalate (BBP)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	/	/
Dibutyl Phthalate (DBP)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	/	/
Di-isobutyl phthalate (DIBP)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	/	/

Sample Description:

- 7 Red interior line
- 8 Black interior line
- 9 Screen cable
- 10 IC
- 11 Welding
- 12 Screw

Testing Item	Unit	ROHS Limit	Result					
			13	14	15	16	17	18
Lead(Pb)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium(Cd)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Mercury(Hg)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chromium(Cr VI)	mg/kg	1000	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Sum of PBBs/ PBDEs	mg/kg	1000	N.D.	N.D.	/	N.D.	N.D.	/
Monobromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Dibromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Tribromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Tetrabromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Pentabromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Hexabromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Heptabromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Octabromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Nonabromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Decabromobiphenyl	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Monobromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Dibromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Tribromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Tetrabromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Pentabromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Hexabromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Heptabromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Octabromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Nonabromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Decabromodiphenyl ether	mg/kg	/	N.D.	N.D.	/	N.D.	N.D.	/
Bis-(2-ethylhexyl) Phthalate (DEHP)	mg/kg	1000	N.D.	N.D.	/	N.D.	N.D.	/
Benzylbutyl Phthalate (BBP)	mg/kg	1000	N.D.	N.D.	/	N.D.	N.D.	/
Dibutyl Phthalate (DBP)	mg/kg	1000	N.D.	N.D.	/	N.D.	N.D.	/
Di-isobutyl phthalate (DIBP)	mg/kg	1000	N.D.	N.D.	/	N.D.	N.D.	/

Sample Description:

- 13 Silica gel
- 14 Paint
- 15 Metals
- 16 Gluewater
- 17 Glass
- 18 Copper wire



Notes:

1mg/kg=1ppm = 0.0001%

N.D. = Not Detected (<MDL)

MDL = Method Detection Limit

/=Not Regulated

---=Not Applicable

FIGURE 1



FIGURE 2



FIGURE 3

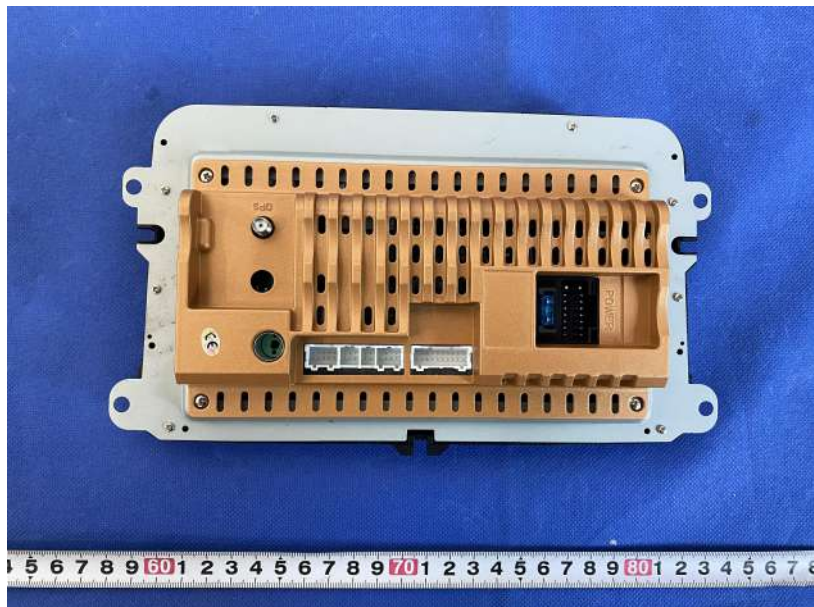


FIGURE 4

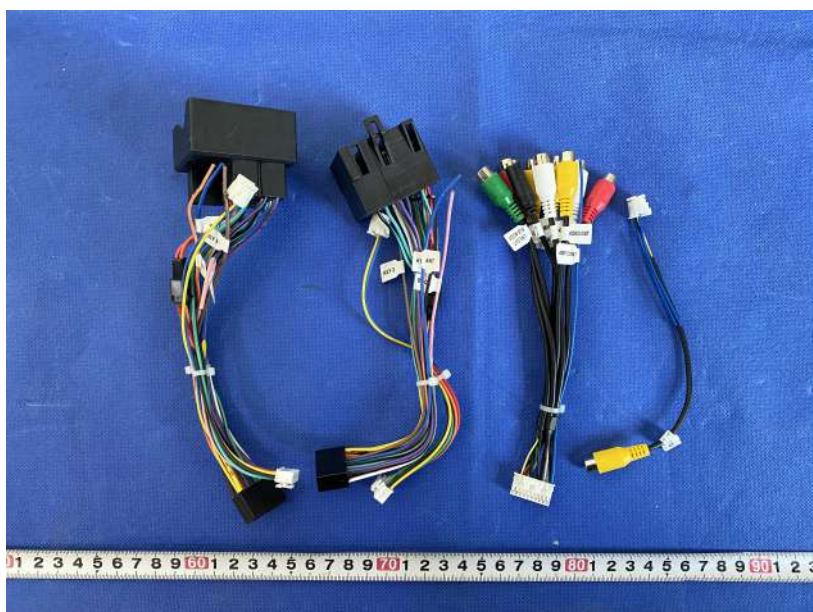


FIGURE 5

End of Report



LVD TEST REPORT EN 62368-1 Audio/video, information and communication technology equipment Part 1: Safety requirements	
Report Reference No	STL2025E0117284C-S1
Tested by (name and signature)	Sunny
Approved by (name and signature)	Barry
Date of issue	Jan .17,2025
Total number of pages	52 pages
Testing Laboratory	Shenzhen STL Testing Technology Co., Ltd.
Address	Unit C, 4F, Building A, ShengHengji Industrial Park, No. 137 FuYuan 1 Road, Heping Community, Fuyong Street, Baoan District, Shenzhen, China
Testing location	Same as above
Applicant's name	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street,Longhua District, Shenzhen City, Guangdong Province, China
Test specification:	
Standard	EN IEC 62368-1:2020+A11:2020
Test procedure	LVD Approval
Non-standard test method	N/A
Test Report Form No	IEC 62368_1
Test Report Form(s) Originator	UL(US)
Master TRF	Dated 2019-03
This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent of STL Test.	
Test item description	Vehicle Player
Trade Mark	ESSGOO
Manufacturer	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD. Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street,Longhua District, Shenzhen City, Guangdong Province, China
Model/Type reference	AR7002
Ratings	DC 12V ,10A



Summary of testing:

Tests performed (name of test and test clause):

EN IEC 62368-1:2020+A11:2020

The submitted samples were found to comply with the requirements of above specification.

Testing location:

Unit C, 4F, Building A, ShengHengji Industrial Park,
No. 137 FuYuan 1 Road, Heping Community,
Fuyong Street, Baoan District, Shenzhen, China

Copy of marking plate

Vehicle Player
Model:AR7002
Ratings:DC 12V ,10A



SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe
Community, Fucheng Street,Longhua District, Shenzhen City,
Guangdong Province, China

---The heights of graphical symbols aren't less than 5 mm.

---The heights of letters and numerals either shown separately or with or as part of symbols aren't less than 2 mm.

---The heights of WEEE symbol isn't less than 7mm.

--- The Importer name, address and Manufacturer name and address should indicate on marking label or packaging or in a document accompanying



TEST ITEM PARTICULARS:	
Classification 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% ☐ +25%/ -10% ☒ None
Supply Connection – Type.....:	☐ pluggable equipment type A - non-detachable supply cord appliance coupler direct plug-in mating connector ☐ pluggable equipment type B - non-detachable supply cord appliance coupler ☐ permanent connection ☐ mating connector ☒ other: not directly connected to the mains
Considered current rating of protective device as part of building or equipment installation	N/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: <u>not directly connected to the mains</u>
Manufacturer's specified maximum operating ambient:	<u>-10℃—40℃</u>
Class of equipment	☐ Class I ☐ Class II ☒ Class III ☐ Not classified
Access location	☐ restricted access location ☒ N/A
Pollution degree (PD)	☐ PD 1 ☒ PD 2 ☐ PD 3
IP protection class	☒ IP20 ☐ IPX0
Power systems	☐ TN ☐ TT ☐ IT - 230 V L-L
Altitude during operation (m)	☒ 2000 m or less ☐ _____ m
Altitude of test laboratory (m)	☒ < 500 m or less ☐ _____ m
Mass of equipment (kg)	☒ 0.016kg



POSSIBLE TEST CASE VERDICTS:

- test case does not apply to the test object..... N/A
- test object does meet the requirement..... P (Pass)
- test object does not meet the requirement..... F (Fail)

TESTING:

Date of receipt of test item..... Jan .10,2025

Date (s) of performance of tests..... Jan .10-17,2025

GENERAL REMARKS:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(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.

Name and address of factory.....: SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Room 303, Building 9, No. 54-6, Guanlan Avenue,
Xinhe Community, Fucheng Street,Longhua District,
Shenzhen City, Guangdong Province, China

GENERAL PRODUCT INFORMATION:

/



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: 4.2 V dc input ES1	
Source of electrical energy	Corresponding classification (ES)
USB port output	ES1
Battery pack output	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)
USB port output	PS1
Battery pack output	PS2
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
Complied with annex M	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)
Wheels easy to touch	N/A
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)
Thermoplastic enclosure	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)
LED	RS1



Clause	OVERVIEW OF EMPLOYED SAFEGUARDS			
5.2	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary person	ES1: EPS output	N/A	N/A	N/A
6.2.2	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary (e.g., PTC)	Reinforced
Enclosure	PS1: EPS output	N/A	N/A	N/A
7.1	Chemically-caused injury			
Body Part (e.g., skilled)	Energy Source (e.g., hazardous material)	Safeguards		
		Basic (e.g. gloves)	Supplementary	Reinforced
Complied with annex M	--	N/A	N/A	N/A
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3: Imploding part)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary person	MS1: Wheels	N/A	N/A	N/A
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic (e.g. Instructional)	Supplementary	Reinforced
Ordinary person	TS1: wood or plastic enclosure	N/A	N/A	N/A
10.2	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic (e.g., Instructional)	Supplementary	Reinforced
Ordinary person	RS1: LED	N/A	N/A	N/A
Supplementary Information: (1) A block diagram can be attached to further detail the identified safeguards. (2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Short Circuit				



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Clause	Requirement + Test	Result - Remark	Verdict
4	GENERAL REQUIREMENTS		P
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components	See appended table 4.1.2	P
4.1.3	Equipment design and construction		P
4.1.15	Markings and instructions	See Annex F	P
4.4.4	Safeguard robustness		P
4.4.4.2	Steady force tests	See Annex T	P
4.4.4.3	Drop tests	1000 mm	P
4.4.4.4	Impact tests	1 300 mm, 500g	N/A
4.4.4.5	Internal accessible safeguard enclosure and barrier tests	No such enclosure and barrier	N/A
4.4.4.6	Glass Impact tests	No glass used	N/A
4.4.4.7	Thermoplastic material tests.....		P
4.4.4.8	Air comprising a safeguard	Considered, but no such barrier or enclosure provided	N/A
4.4.4.9	Accessibility and safeguard effectiveness	All safeguards remain effective.	P
4.5	Explosion	No explosion	P
4.6	Fixing of conductors	No fixing of conductors	N/A
4.6.1	Fix conductors not to defeat a safeguard		N/A
4.6.2	10 N force test applied to		P
4.7	Equipment for direct insertion into mains socket - outlets	No such apparatus	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		N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery Compartment Construction		N/A
4.8.4	Means to reduce the possibility of children removing the battery		N/A
4.8.5	Battery Compartment Mechanical Tests		N/A
4.9	Likelihood of fire or shock due to entry of conductive object		P



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Clause	Requirement + Test	Result - Remark	Verdict
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		P
5.2.2.2	Steady-state voltage and current	See appended table 5.2	P
5.2.2.3	Capacitance limits	See appended table 5.2	P
5.2.2.4	Single pulses limits	No single pulse introduced	N/A
5.2.2.5	Limits for repetitive pulses	No repetitive pulses introduced	N/A
5.2.2.6	Ringing signals	No means for connection to telephone network and no ringing signal generated	N/A
5.2.2.7	Audio signals		P
5.3	Protection against electrical energy sources		P
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
5.3.2.2	Contact requirements	No openings on enclosures as received and after mechanical test.	N/A
	a) Test with test probe from Annex V		N/A
	b) Electric strength test potential (V)		N/A
	c) Air gap (mm)		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	Insulation materials and requirements		P
5.4.1.2	Properties of insulating material		P
5.4.1.3	Humidity conditioning	No hygroscopic insulation	N/A
5.4.1.4	Maximum operating temperature for insulating materials	See appended table 5.4.1.5	P
5.4.1.5	Pollution degree.....	Pollution degree 2 considered	—
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling		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		P
5.4.1.9	Insulating surfaces		P



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Clause	Requirement + Test	Result - Remark	Verdict
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat softening temperature (°C)..... :		N/A
5.4.1.10.3	Ball pressure	See appended table 5.4.1.11.3	N/A
5.4.2	Clearances		P
5.4.2.2	Determining clearance using peak working voltage	(See appended table 5.4.2.2)	P
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 :	No such transient voltage	—
	b) d.c. mains transient voltage :	No such transient voltage	—
	c) external circuit transient voltage :	No such transient voltage	—
	d) transient voltage determined by measurement.... :	No need to conduct this test	—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test		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	P
5.4.3.1	General		P
5.4.3.2.2	Material Group :	Material group IIIb is assumed to be used	—
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	Semiconductor solid insulation		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
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		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



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Clause	Requirement + Test	Result - Remark	Verdict
5.4.5.1	General		N/A
5.4.5.2	Antenna Terminal connections		N/A
	Insulation resistance (MΩ).....:		—
5.4.6	Insulation of internal wire as part of supplementary insulation		N/A
5.4.7	Tests for semiconductor components and for cemented joints		N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%) :	95 %.	—
	Temperature (°C) :	25°C	—
	Duration (h) :	48h	—
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	No transient voltage from external circuit	N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test :		N/A
5.4.10.2.3	Steady-state test :		N/A
5.4.11	Insulation between external circuits and earthed circuitry :		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).....:		—
	Nominal voltage U_{pea} (V).....:		—
	Max increase due to variation U_{sp}:		—
	Max increase due to ageing U_{sa} :		—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$:		—
5.5	Components as safeguards		N/A
5.5.1	General		N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector		N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers		N/A
5.5.5	Relay		N/A
5.5.6	Resistors		N/A
5.5.7	SPD as basic safeguard		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		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	Class III equipment	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		—
	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
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).....		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



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Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
5.7.5	Protective conductor current		N/A
	Supply Voltage (V).....:		—
	Measured current (mA).....:		—
	Instructional Safeguard	See Annex 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		N/A
6.2.2.1	General		N/A
6.2.2.2	Power measurement for worst-case load fault		N/A
6.2.2.3	Power measurement for worst-case power source fault		N/A
6.2.2.4	PS1		N/A
6.2.2.5	PS2	See appended table 6.2.2	N/A
6.2.2.6	PS3		N/A
6.2.3	Classification of potential ignition sources		P
6.2.3.1	Arcing PIS		P
	Component, location	Battery inside enclosure is claimed as Arcing PIS	—
6.2.3.2	Resistive PIS		P



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Clause	Requirement + Test	Result - Remark	Verdict
	Component, location	Battery inside enclosure is claimed as Resistive PIS	—
6.3	Safeguards against fire under normal operating and abnormal operating conditions		P
6.3.1	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials	(See appended table 5.4.1.5, 6.3.2, 9.0, B.2.6)	P
6.3.2	Combustible materials outside fire enclosure		P
6.4	Safeguards against fire under single fault conditions		P
6.4.1	Safeguard Method		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		P
6.4.3.1	General		N/A
6.4.3.2	Supplementary Safeguards		N/A
	Special conditions if conductors on printed boards are opened or peeled		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		P
6.4.5.2	Supplementary safeguards	See appended table 4.1.2 and Annex G	P
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		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		P
6.4.8.1	Fire enclosure and fire barrier material properties	Plastic enclosure	P
6.4.8.2.1	Requirements for a fire barrier		N/A
6.4.8.2.2	Requirements for a fire enclosure	V-1 or better	P
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		N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Fire Enclosure dimensions, top openings (mm) ...		N/A
	Needle Flame test		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
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): dimensions (mm)		N/A
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating.....		N/A
6.5	Internal and external wiring		N/A
6.5.1	General	See appended table 6.5	N/A
6.5.2	Cross-sectional area (mm ²)		N/A
6.5.3	Requirements for interconnection to building wiring	See Annex Q	N/A
6.6	Safeguards against fire due to connection to secondary equipment		N/A
	External port limited to PS2 or complies with Clause Q.1		N/A

7	CHEMICALLY-CAUSED INJURY		P
7.2	Reduction of exposure to hazardous chemicals	No such hazardous substances	N/A
7.3	Ozone exposure	No ozone production	N/A
7.4	Use of PPE		N/A
	Personal safeguards and instructions		—
7.5	Use of instructional safeguards and instructions		N/A
	Instruction Safeguard (ISO 7010)	See Annex F	N/A
7.6	Batteries		N/A

8	MECHANICALLY-CAUSED INJURY		N/A
8.1	General		N/A
8.2	Mechanical energy source classifications		N/A
8.3	Safeguards against mechanical energy sources		N/A
8.4	Safeguards against parts with sharp edges and corners		N/A
8.4.1	Safeguards		N/A
8.5	Safeguards against moving parts	See appended table 8.5	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.....		—



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Clause	Requirement + Test	Result - Remark	Verdict
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	Not high pressure lamps	N/A
8.5.5.1	Energy Source Classification		N/A
8.5.5.2	High Pressure Lamp Explosion Test:		N/A
8.6	Stability		N/A
8.6.1	Product classification		N/A
	Instructional Safeguard.....:		—
8.6.2	Static stability for floor standing equipment		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.....:		—
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	Moving equipment	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.....:		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
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 <i>N</i>		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	TS1	P
9.3	Protection against thermal energy sources		P
9.4	Requirements for safeguards		P
9.4.1	Equipment safeguard	See appended table 9.4.1.2 and B.3	P
9.4.2	Instructional safeguard		P

10	RADIATION		P
10.2	Radiation energy source classifications	Low power application of LEDs for the used	P
	General classification	RS1	P
10.3	Protection against laser radiation	No laser radiation	N/A
	Laser radiation that exists equipment:		—
	Normal, abnormal, single-fault.....:		N/A
	Instructional safeguard		—



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Clause	Requirement + Test	Result - Remark	Verdict
	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 :		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 : Normal, abnormal, single fault conditions Equipment safeguards : Instructional safeguard for skilled person :		N/A N/A N/A
10.5.3	Most unfavourable supply voltage to give maximum radiation : Abnormal and single-fault condition : Maximum radiation (pA/kg)..... :		— N/A N/A
10.6.	Protection against acoustic energy sources		N/A
10.6.1	General		N/A
10.6.2	Classification Acoustic output, dB(A) : Output voltage, unweighted r.m.s. :		N/A N/A
10.6.4	Protection of persons Instructional safeguards :		N/A N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	Equipment safeguard prevent ordinary person to RS2		—
	Means to actively inform user of increase sound pressure		—
	Equipment safeguard prevent ordinary person to RS2		—
	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) LAeq acoustic pressure output		—
10.6.5.2	Corded listening devices with digital input		N/A
	Maximum dB(A)		—
	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		P
B.2.3	Supply voltage and tolerances		P
B.2.5	Input test	See appended table B.2.5	P
B.3	Simulated abnormal operating conditions		P
B.3.1	General requirements	See appended table B.3	P
B.3.2	Covering of ventilation openings		N/A
B.3.3	D.C. mains polarity test		N/A
B.3.4	Setting of voltage selector.....	No such voltage selector	N/A
B.3.5	Maximum load at output terminals.....	No such voltage terminals	N/A
B.3.6	Reverse battery polarity	Complied with annex M	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



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Clause	Requirement + Test	Result - Remark	Verdict
B.4.2	Temperature controlling device open or short-circuited	No such controlling device	N/A
B.4.3	Motor tests		N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature	See Clause G.5.4	N/A
B.4.4	Short circuit of functional insulation		N/A
B.4.4.1	Short circuit of clearances for functional insulation	See appended table B.4	N/A
B.4.4.2	Short circuit of creepage distances for functional insulation	See appended table B.4	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	See appended table B.4	N/A
B.4.6	Short circuit or disconnect of passive components		N/A
B.4.7	Continuous operation of components	Not intermittent or short-time operation equipment	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	See Annex M	P

C	UV RADIATION		N/A
C.1	Protection of materials in equipment from UV radiation	No UV radiation within the EUT.	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
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



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Clause	Requirement + Test	Result - Remark	Verdict

E	TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS		P
E.1	Audio amplifier normal operating conditions		P
	Audio signal voltage (V).....:		—
E.2	Audio amplifier abnormal operating conditions		P

F	ANNEX F, EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS		P
F.1	General requirements		P
	Instructions – Language	English version checked	—
F.2	Letter symbols and graphical symbols		P
	Letter symbols		P
	Graphic symbols IEC, ISO or manufacturer specific		P
F.3	Equipment markings		P
F.3.1	Equipment marking locations	Located on the external enclosure surface	P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification.....:	See the copy of marking plate for detail.	—
F.3.2.2	Model identification.....:	See the copy of marking plate for detail.	—
F.3.3	Equipment rating markings		P
F.3.3.1	Equipment without direct connection to mains		N/A
F.3.3.2	Nature of supply voltage.....:		N/A
F.3.3.3	Rated voltage.....:	See the copy of marking plate for detail.	P
F.3.3.4	Rated frequency.....:		N/A
F.3.3.5	Rated current or rated power.....:	See the copy of marking plate for detail.	P
F.3.3.6	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device	No such device	N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings.....:		N/A
F.3.5.2	Switch position identification marking.....:		N/A
F.3.5.3	Replacement fuse identification and rating markings.....:		N/A
F.3.5.4	Replacement battery identification marking.....:		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	Language..... :		—
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I Equipment	Class III equipment	N/A
F.3.6.1.1	Protective earthing conductor terminal		N/A
	-Complete equipment (IEC60417-5017)		N/A
	-Sub-assembly/component (IEC60417-5017 or – 5019)		N/A
F.3.6.1.2	Neutral conductor terminal		N/A
F.3.6.1.3	Protective bonding conductor terminals		N/A
F.3.6.1.4	Terminal marking location		N/A
F.3.6.2	Class II equipment (IEC60417-5172)	Class III equipment	N/A
F.3.7	Equipment IP rating marking..... :	IPX0	N/A
F.3.8	External power supply output marking		P
F.3.9	Durability, legibility and permanence of markings		P
F.3.10	Test for permanence of markings		P
F.4	Instructions		P
	a) Equipment for use in locations where children not likely to be present - marking		N/A
	b) Instructions given for installation or initial use		P
	c) Equipment intended to be fastened in place		N/A
	d) Equipment intended for use only in restricted access area		N/A
	e) Audio equipment terminals classified as ES3 and other equipment with terminals marked in accordance F.3.6.1		N/A
	f) Protective earthing employed as safeguard		N/A
	g) Protective earthing conductor current exceeding ES 2 limits		N/A
	h) Symbols used on equipment		P
	i) Permanently connected equipment not provided with all-pole mains switch		N/A
	j) Replaceable components or modules providing safeguard function		N/A
F.5	Instructional safeguards		P
	Where “instructional safeguard” is referenced in the test report it specifies the required elements, location of marking and/or instruction		P



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Clause	Requirement + Test	Result - Remark	Verdict
G	COMPONENTS		P
G.1	Switches		N/A
G.1.1	General requirements		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.2	Relay		N/A
G.2.1	General requirements	No relays used	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-offs used	N/A
G.3.1 a), b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
G.3.1c)	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.3.2a)	Thermal links separately tested with IEC 60691		N/A
G.3.2b)	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		N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Protective devices 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.3.5.1	Single faults conditions :		N/A
G.4	Connectors		N/A
G.4.1	Spacings		N/A
G.4.2	Mains connector configuration :		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
G.5	Wound Components		N/A
G.5.1	Wire insulation in wound components :		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
G.5.1.2 a)	Two wires in contact inside wound component, angle between 45° and 90°		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.....		N/A
G.5.3.3	Overload test	See appended table B.4	N/A
G.5.3.1	Test conditions		N/A
G.5.3.2	Winding Temperatures testing in the unit		N/A
G.5.3.3	Winding Temperatures - Alternative test method		N/A
G.5.4	Motors		N/A
G.5.4.1	General requirements		N/A
	Position.....	Used in the wheels	—
G.5.4.2	Test conditions		N/A
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
G.5.4.5.3	Tested on the Bench - Alternative test method; test time (h).....		N/A
G.5.4.5.4	Electric strength test (V).....		N/A
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



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Clause	Requirement + Test	Result - Remark	Verdict
G.5.4.6.3	Tested on the bench - Alternative test method; test time (h) :		N/A
G.5.4.7	Motors with capacitors		N/A
G.5.4.9	Three-phase motors		N/A
G.5.4.10	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.7.3.1	General requirements		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N).....:		—
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



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Clause	Requirement + Test	Result - Remark	Verdict
G.8.2	Basic safeguard		N/A
G.8.3	Supplementary safeguard		N/A
G.8.3.2	Sudden failure		N/A
G.8.3.3	Gradual failure		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	No such resistors used	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
G.10.3.3	Impulse test		N/A
G.11	Capacitor and RC units		N/A
	General requirements		N/A
	Conditioning of capacitors and RC units		N/A
	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 V _{ini} :		—
	Routine test voltage, V _{ini,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



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Clause	Requirement + Test	Result - Remark	Verdict
G.13.4	Insulation between conductors on the same inner surface		N/A
	Compliance with cemented joint requirements (Specify construction).....:		N/A
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation		N/A
	Number of insulation layers (pcs):		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2 a)	Thermal conditioning		N/A
G.13.6.2 b)	Electric strength test		N/A
G.13.6.2 c)	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
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 $U_c =$ 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:		—



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Clause	Requirement + Test	Result - Remark	Verdict

D3)	Resistance		—
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H	CRITERIA FOR TELEPHONE RINGING SIGNALS		N/A
H.1	General requirements		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	—

K	SAFETY INTERLOCKS		N/A
K.1	General requirements	No safety interlocks inside the EUT	N/A
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 & circuit location)		N/A
K.7.2	Overload test, Current (A).....		N/A



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K.7.3	Endurance test		N/A
K.7.4	Electric strength test	See appended table 5.4.11.1	N/A

L	DISCONNECT DEVICES		N/A
L.1	General requirements		N/A
L.1.1	General		N/A
L.1.2	Permanently connected equipment		N/A
L.1.3	Parts that remain energized		N/A
L.1.4	Single phase equipment		N/A
L.1.5	Three-phase equipment		N/A
L.1.6	Switches as disconnect devices		N/A
L.1.7	Plugs as disconnect devices		N/A
L.1.8	Multiple power sources		N/A

M	BATTERIES AND FUEL CELLS		N/A
M.1	General requirements		N/A
M.2	Safety of battery cells and batteries		N/A
M.2.1	Requirements		N/A
M.2.2	Compliance and test method (identify method) ... :		N/A
M.3	Protection in battery circuits		N/A
M.3.1	Requirements		N/A
M.3.2	Test method		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
	- Excessive discharging rate for any battery		N/A
M.3.3	Compliance		N/A
M.4	Additional safeguards for equipment containing secondary lithium battery		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 :		—
M.4.2.2 b)	Single faults in charging circuitry :		—
M.4.3	Fire Enclosure		N/A
M.4.4	Endurance of equipment containing a secondary lithium battery		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
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.2.2.3)		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	No NiCd battery	N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
M.7.2	Compliance and test method		N/A
M.8	Protection against internal ignition from external spark sources of lead acid batteries	No lead acid battery	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 V_z (m ³ /s) :		—
M.8.2.3	Correction factors..... :		—
M.8.2.4	Calculation of distance d (mm) :		—
M.9	Preventing electrolyte spillage		N/A
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	Instructions to prevent reasonably foreseeable misuse (Determination of compliance: inspection, data review; or abnormal testing)		N/A



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Clause	Requirement + Test	Result - Remark	Verdict

N	ELECTROCHEMICAL POTENTIALS		N/A
	Metal(s) used.....:		—

P	SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS, FOREIGN LIQUIDS, AND SPILLAGE OF INTERNAL LIQUIDS		N/A
P.1	General requirements		N/A
P.2.2	Safeguards against entry of solid foreign objects		N/A
	Location and Dimensions (mm) :		—
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
P.4	Metallized coatings and adhesive securing parts		N/A
P.4.2 a)	Conditioning testing		N/A
	Tc (°C) :		N/A
	Tc (°C) :		N/A
	Tc (°C) :		N/A
P.4.2 b)	Abrasion testing :		N/A
P.4.2 c)	Mechanical strength testing :		N/A

Q	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



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Clause	Requirement + Test	Result - Remark	Verdict
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A)		—
	Current limiting method		N/A
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
	- 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



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Clause	Requirement + Test	Result - Remark	Verdict
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		P
T.1	General requirements		P
T.2	Steady force test, 10 N	The EUT is still complying with relevant requirements of this standard after 10 N force is applied to the components	P
T.3	Steady force test, 30 N	No internal enclosure.	N/A
T.4	Steady force test, 100 N		P
T.5	Steady force test, 250 N		P
T.6	Enclosure impact test		N/A
	Fall test	1 300 mm, 500g	N/A
	Swing test		N/A
T.7	Drop test	Height 750mm, No energy or other hazardous.	P
T.8	Stress relief test		P
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		N/A
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm) :		—



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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
U	MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS 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		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



ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

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 62368-1:2020+A11:2020 Attachment Form No. : EU_GD_IEC62368_1B Attachment Originator : Intertek Semko AB Master Attachment..... : Date (2015-08)			
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	CENELEC COMMON MODIFICATIONS (EN)		
	NOTE Z1		N/A
4.Z1	Protective devices included as integral parts of the equipment or as parts of the building installation:		N/A
	a) Included as parts of the equipment		N/A
	b) For components in series with the mains; by devices in the building installation		N/A
	c) For pluggable type B or permanently connected; by devices in the building installation		N/A
5.4.2.3.2.4	Interconnection with external circuit		N/A
10.2.1	Additional requirements in 10.5.1		N/A
10.5.1	RS1 compliance measurement conditions		N/A
10.6.2.1	EN 71-1:2011, 4.20 and methods and distances		N/A
10.Z1	Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz		N/A
G.7.1	NOTE Z1		N/A

ZB	ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)		
4.1.15	Denmark, Finland, Norway and Sweden: Class I pluggable equipment type A marking		N/A
4.7.3	United Kingdom: Torque test socket-outlet BS 1363, and the plug part BS 1363.		N/A
5.2.2.2	Denmark: Warning for high touch current		N/A
5.4.11.1 and Annex G	Finland and Sweden: Separation of the telecommunication network from earth		N/A



ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
5.5.2.1	Norway: Capacitors rated for the applicable line-to-line voltage (230 V).		N/A
5.5.6	Finland, Norway and Sweden: Resistors used as basic safeguard or bridging basic insulation comply with G.10.1 and G.10.2.		N/A
5.6.1	Denmark: Protection for pluggable equipment type A; integral part of the equipment		N/A
5.6.4.2.1	Ireland and United Kingdom: The protective current rating is taken to be 13 A		N/A
5.6.5.1	Ireland and United Kingdom: Conductor sizes of flexible cords to be accepted by terminals for equipment rated 10 A to 13 A		N/A
5.7.5	Denmark: The installation instruction affixed to the equipment if high protective conductor current		N/A
5.7.6.1	Norway and Sweden: Television distribution system isolation text in user manual		N/A
5.7.6.2	Denmark: Warning for high touch current		N/A
B.3.1 and B.4	Ireland and United Kingdom: Tests conducted using an external miniature circuit breaker or protective devices included as an integral part of the direct plug-in equipment		N/A
G.4.2	Denmark: Appliances rated ≤ 13 A provided with a plug according to DS 60884-2-D1:2011.		N/A
	Class I equipment provided with socket-outlets provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a.		N/A
	If a single-phase equipment having rated > 13 A or poly-phase equipment provided with a supply cord with a plug, plug in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2.		N/A
	Mains socket outlets intended for providing power to Class II apparatus rated 2,5 A in accordance with DS 60884-2-D1:2011 standard sheet DKA 1-4a .		N/A
	Other current rating socket outlets in compliance with Standard Sheet DKA 1-3a or DKA 1-1c.		N/A
	Mains socket-outlets with earth in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a		N/A

ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict
G.4.2	United Kingdom: The plug part of direct plug-in equipment assessed to BS 1363 G.4.2		N/A
G.7.1	United Kingdom: Equipment fitted with a 'standard plug' in accordance with the Plugs and Sockets etc (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768		N/A
G.7.1	Ireland: Apparatus provided with a plug in accordance with Statutory Instrument 525: 1997, "13 A Plugs and Conversion Adapters for Domestic Use		N/A
G.7.2	Ireland and United Kingdom: A power supply cord for equipment which is rated over 10 A and up to and including 13 A.		N/A

ZC	ANNEX ZC, NATIONAL DEVIATIONS (EN)		
10.5.2	Germany: Cathode ray tube intended for the display of visual images, authorization or application of type approval and marking.		N/A
F.1	Italy: The power consumption in Watts (W) indicated on TV receiver and in instruction for use		N/A
	TV receivers provided with an instruction for use, schematic diagrams and adjustments procedure in Italian language.		N/A
	Marking for controls and terminals in Italian language.		N/A
	Conformity declaration according to the above requirements in the instruction manual		N/A
	First importers of TV receivers manufactured outside EEC previous conformity certification to the Italian Post Ministry and Certification number on the backcover.		N/A



4.1.2	TABLE: List of critical components					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹	
PCB	GOLDENMAX INTERNATIONAL TECHNOLOGY (ZHUHAI) LTD	Various	V-0 or better,130°C Minimum.	UL 94, UL 796	UL E330731	
Enclosure	Shenzhen Mei Jie Plastic &Electronics Co., Ltd	Various	V-1	UL 94	UL	
Internal wire	Various	Various	VW-1,22AWG, 80°C	UL 758	UL	
Supplementary information: 1) Provided evidence ensures the agreed level of compliance. 2) Description line content is optional. Main line description needs to clearly detail the component used for testing						



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		—
—		7		—
—		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			—
Impact Area		Drop Distance	Impact energy (Nm)	Comments
—		—	—	—
4.8.4.6	TABLE: Crush test			—
Impact Area		Drop Distance	Crushing Force (N)	Duration force applied (s)
—		—	—	—
Supplementary information:				
4.8.5	TABLE: Lithium coin/button cell batteries mechanical test result			N/A
Impact Area		Drop Distance	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							
Source	Location (e.g., circuit designation)	Description (e.g., steady state, single pulse, etc.)	Test conditions	Parameters			ES Class
				U (Vrms or Vpk)	I (A _{pk} or A _{rms})	Hz	
A	Power supply	Power supply output	Normal	12.0	2.0	--	ES1
			Abnormal	12.01	3.80	--	
			Single fault Output SC	0	0	--	
B	Fully charged battery	Battery pack output	Normal	7.4	0.2	--	ES1
			Abnormal	7.65	0.6	--	
			Single fault MOS SC	0	0	--	
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	--	--		
5.2.2.4 – Single Pulses							
Source	Location (e.g., circuit designation)	Description (e.g., steady state, single pulse, etc.)	Test conditions	Parameters			ES Class
				Duration (ms)	Upk (V)	Ip _k (mA)	
--	--	--	Normal	--	--	--	---
			Abnormal	--	--	--	
			Single fault	--	--	--	
5.2.2.5 – Repetitive Pulses							
Source	Location (e.g., circuit designation)	Description (e.g., steady state, single pulse, etc.)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	Ip _k (mA)	
--	--	--	Normal	--	--	--	---
			Abnormal	--	--	--	
			Single fault	--	--	--	
Normal – Abnormal - Supplementary information: SC=Short Circuit, OC=Short Circuit							



5.4.1.5, 6.3.2, 9.0, B.2.6	TABLE: Thermal requirements						P	
	Supply voltage (V) :	12.0V		7.4V		--	—	
	Ambient T _{min} (°C) :	See below				--	—	
	Ambient T _{max} (°C) :					--	—	
Maximum measured temperature T of part/at::		T (°C)					Allowed T _{max} (°C)	
DC inlet		59.9		61.1		--	80	
C39 body		60.3		61.4		--	105	
L4 body		65.1		65.7		--	110	
PCB near IC2		60.5		60.7		--	130	
PCB near IC11		58.9		56.1		--	130	
C25 body		57.7		55.6		--	105	
PCB near LED1A		51.0		47.0		--	130	
PCB near U7		59.5		59.5		--	130	
Button		43.0		44.3		--	70	
Enclosure inside		52.1		52.7		--	Ref.	
Enclosure outside		43.2		45.2		--	95	
Ambient		40.0		40.0		--	--	
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 n class
--		--	--	--	--	--	--	--
--		--	--	--	--	--	--	--
--		--	--	--	--	--	--	--
Supplementary information:								



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5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics			N/A
	Penetration (mm)			—
Part		Test temperature (°C)	T softening (°C)	
--		--	--	
--		--	--	
Supplementary information:				

5.4.1.11.3	TABLE: Ball pressure test of thermoplastics			N/A
	Allowed impression diameter (mm)	≤ 2 mm		—
Part		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						P
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)
Battery B+ and B-	--	7.4	--	0.2	>1.4	0.4	>3.4
Input + and -	--	12.03	--	0.2	>1.0	0.4	>1.0
Supplementary information: Note 1: Only for frequency above 30 kHz Note 2: See table 5.4.2.8 if this is based on electric strength test (5.4.2.8) Note 3: Provide Material Group Note 4: BI: basic insulation; SI: supplementary insulation; DI: double insulation; RI: reinforced insulation.							

5.4.2.3	TABLE: Minimum Clearances distances using required withstand voltage			N/A
	Overvoltage Category (OV):			
Clearance distanced between:	Required withstand voltage	Required cl (mm)	Measured cl (mm)	
--	--	--	--	
--	--	--	--	
Supplementary information: 1. BI: basic insulation; SI: supplementary insulation; DI: double insulation; RI: reinforced insulation;				



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	
--	--	--	--	
--	--	--	--	
Supplementary information:				
1. BI: basic insulation; SI: supplementary insulation; DI: double insulation; RI: reinforced insulation;				

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:	Up (V)	Frequency (Hz)	Material	Required DI (mm)	DI (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	
Functional:				
--	--	--	--	
--	--	--	--	
Basic/supplementary:				
--	--	--	--	
--	--	--	--	
Reinforced:				
--	--	--	--	
--	--	--	--	
Routine Tests:				
--	--	--	--	
--	--	--	--	
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 *: Open-circuited bleeder resistor R1 inside power supply unit.						
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
Unearthed accessible part, at which the prospective touch voltage exceeds the ES2 limits		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)
Measured to protective earthing terminal		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.
 N: Normal condition, R: Reverse condition.

6.2.2	Table: Electrical power sources (PS) measurements for classification					N/A
Source	Description	Measurement	Max Power during the first 3 s	Max Power after 3 s	Max Power after 5 s*)	PS Classification
A	Li-ion Charger output	Power (W) :	--	--	--	--
		V _A (V) :	--	--	--	--
		I _A (A) :	--	--	--	--
B	USB port output	Power (W) :	--	--	--	--
		V _A (V) :	--	--	--	
		I _A (A) :	--	--	--	

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)			P
Location	Open circuit voltage After 3 s (V _p)	Measured r.m.s current (I _{rms})	Calculated value (V _p x I _{rms})	Arcing PIS? Yes / No
Battery Pack	7.4	1.96	7.25	Yes (declaration)

Supplementary Information:

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

6.2.3.2	Table: Electrical power sources (PS) measurements for classification				P
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)
Battery Pack	Normal Condition	7.25	7.21	Yes	Yes (declaration)



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



8.5	TABLE: Fan Blade Classification		N/A
Variable		Value	
Mass, m		kg	
Fan blade radius, r		mm	
Rotational speed, N		rpm	
K factor (figure 47), K			
Classification formula	$\square \frac{N}{15,000} + \frac{K}{2,400} \leq 1$	$\square \frac{N}{22,000} + \frac{K}{3,600} \leq 1$	
Classification calculation			
Classification: MS:			
Supplementary information:			

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:			

B.2.5	TABLE: Input test						P
U (V)	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
12	1.06	1	12.72	--	--	--	Max non-clipped output
12	0.62	1	7.44	--	--	--	1/8 max non-clipped output
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. S-C: short circuit, O-L: overload, O-C: open circuit; CD: Components damaged; The Hi-pot test conducted successfully after the completion of fault condition test.								

B.4	TABLE: Fault condition tests							P
Ambient temperature (°C)					See below			—
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
12V Powered by port								
C75	SC	12	0.5h	--	--	--	--	Unit shut down. No damage, no hazards.
port	SC	12	0.5h	--	--	--	--	Unit working normally. No damage, no hazards.
Powered by internal battery								
C31	SC	7.4	0.5h	--	--	--	--	Unit shut down. No damage, no hazards.
Q5 pin D-S	SC	7.4	0.5h	--	--	--	--	Unit shut down. No damage, no hazards.
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. S-C: short circuit, O-L: overload, O-C: open circuit; CD: Components damaged; The Hi-pot test conducted successfully after the completion of fault condition test.								



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Annex M	TABLE: Batteries								N/A
The tests of Annex M are applicable only when appropriate battery data is not available									N/A
Is it possible to install the battery in a reverse polarity position?						--			N/A
	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						No leaks			N/A
- Explosion of the battery						No explosion			N/A
- Emission of flame or expulsion of molten metal						No emission			N/A
- Electric strength tests of equipment after completion of tests						---			N/A
Supplementary information:									

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

Battery identification	Charging at $T_{\text{lowest}} (^{\circ}\text{C})$	Observation	Charging at $T_{\text{highest}} (^{\circ}\text{C})$	Observation
--	--	--	--	--
Supplementary information:				

Annex Q1	TABLE: Circuits intended for interconnection with building wiring (LPS)	N/A
Note: Measured UOC (V) with all load circuits disconnected:		



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Output Circuit	Components	U _{oc} (V)	I _{sc} (A)		S (VA)	
			Meas.	Limit	Meas.	Limit
--	--	--	--	--	--	--
Supplementary information:						

T.2, T.3, T.4, T.5	TABLE:Steady Force Test					P
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation	
Battery enclosure	Plastic	2.1	250N	5	No damaged, No hazard	
Supplementary information:						

T.6, T9	TABLE: Impact Test				N
Part/Location	Material	Thickness (mm)	Vertical distance (mm)	Observation	
--	--	--	--	--	
Supplementary information:					

T.7	TABLE: Drop Test				P
Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation	
Unit	--	--	1000	No damaged, No hazard	
Supplementary information:					

T.8	TABLE: Stress relief test					P
Part/Location	Material	Thickness (mm)	Oven Temperature (C)	Duration (h)	Observation	
Enclosure	plastic	2.1	70	7	No damage	
Supplementary information:						

Photos

FIGURE 1



FIGURE 2



FIGURE 3

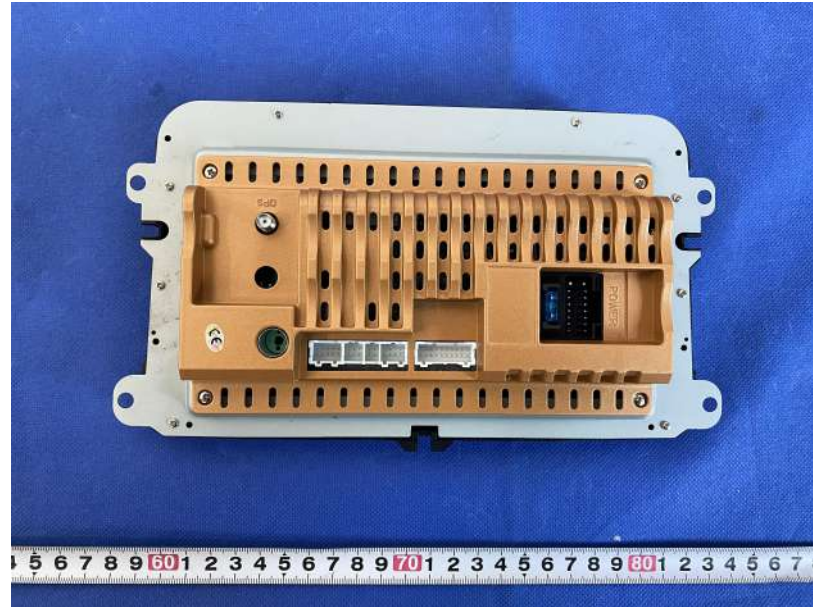


FIGURE 4

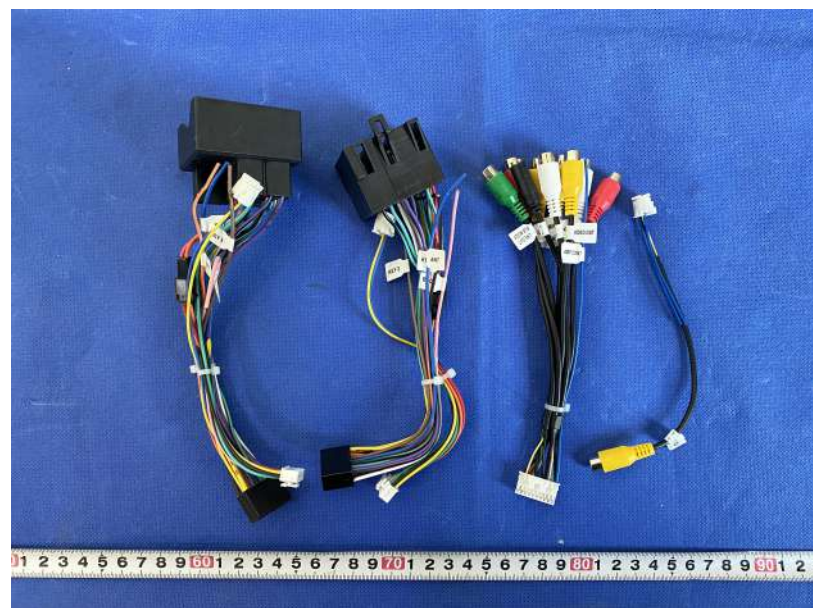


FIGURE 5



End of Report



RADIO TEST REPORT

For

SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.

Vehicle Player

Model Number : AR7002

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TEST REPORT DECLARATION

Applicant	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street, Longhua District, Shenzhen City, Guangdong Province, China
Manufacturer	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street, Longhua District, Shenzhen City, Guangdong Province, China
EUT Description	Vehicle Player
Model Number	AR7002

Test Standards:

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

The EUT described above is tested by Shenzhen STL Testing Technology Co., Ltd. to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen STL Testing Technology Co., Ltd. Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/53/EU directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Date of Test:

Jan .10-17,2025

Prepared by:

Eris

Project Engineer

Reviewed by:

Lewis

Project Manager

Approved by:





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 ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU



2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	2025/01/10
Testing commenced on	:	2025/01/11
Testing concluded on	:	2025/01/17

2.2. Product Description

Name of EUT	Vehicle Player
Model(s) Number	AR7002
List Models	N/A
Difference description	Only the product model name is different
Hardware version	V2.0
Software version	V2.0
Antenna Type	PCB Antenna

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)	

Description of the test mode

Bluetooth :79 channels are provided to the EUT.

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

2.4. Description of the Equipment under Test (EUT)

Reference documents:	Bluetooth® Core Specification
Special test descriptions:	None
Configuration descriptions:	TX tests: were performed with x-DH5 packets and static PRBS pattern payload. RX/Standby tests: BT test mode enabled, scan enabled, TX Idle
Test mode:	☒ Bluetooth Test mode loop back enabled (EUT is controlled over CBT/CMU) ☐ Special software is used. EUT is transmitting pseudo random data by itself
Bluetooth capabilities:	standard 79 channels FHSS channel separation 1 MHz used freq. range 2402-2480 MHz

	Modulation types: GFSK, $\pi/4$ DQPSK, 8DPSK
	Bandwidth appr. 1MHz, 1,5 MHz, 1.5 MHz for single hop frequency
	number of hopping channels > 15 all the time
	more than 70% of band used with more than 20 channels

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
	☐	Yes, non-LBT-based
	☐	Yes (but can be disabled)
	☐	No
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

N/A

2.7. Modifications

No modifications were implemented to meet testing criteria.



3. TEST ENVIRONMENT

3.1. Address of the test laboratory

1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

3.2. Environmental conditions

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

Normal Temperature: 15°C~35°C

High Temperature: 55°C

Low Temperature: -20°C

Normal Voltage: DC 3.7V

High Voltage: DC 4.2V

Low Voltage: DC 3.2V

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 and 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 Summary 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	GFSK	☒	☐	☐	☐	
		LT	$\pi/4$ DQPSK	☒	☐	☐	☐	
		HT	8 DPSK	☒	☐	☐	☐	
5.4.2	Duty Cycle, Tx-sequence, Tx-gap	NTC	---	☐	☐	☒	☐	
5.4.4	Dwell time, min Freq.Occupation and Hopping sequence	NTC	GFSK $\pi/4$ DQPSK 8 DPSK	☒	☐	☐	☐	
5.4.5	Hopping Separation	NTC	GFSK $\pi/4$ DQPSK 8 DPSK	☒	☐	☐	☐	
5.4.2	Medium Utilisation	NTC	---	☐	☐	☒	☐	
5.4.6	Adaptivity, Short Control Signalling Transmissions	NTC	GFSK $\pi/4$ DQPSK 8 DPSK	☐	☐	☒	☐	
5.4.7	Occupied Channel Bandwidth	NTC	GFSK $\pi/4$ DQPSK 8 DPSK	☒	☐	☐	☐	
5.4.8	Transmitter unwanted emissions in the out-of-band domain	NTC	GFSK $\pi/4$ DQPSK 8 DPSK	☒	☐	☐	☐	
		LT		☐	☐	☒	☐	
		HT		☐	☐	☒	☐	
5.4.9	Transmitter unwanted emissions in the spurious domain (conducted & radiated)	NTC	GFSK $\pi/4$ DQPSK 8 DPSK	☒	☐	☐	☐	
5.4.10	Receiver spurious emissions (conducted & radiated)	NTC	GFSK $\pi/4$ DQPSK 8 DPSK	☒	☐	☐	☐	
5.4.11	Receiver Blocking	NTC	----	☒	☐	☐	☐	

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

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 ETSI TR 100 028-1 [1], ETSI TS 103 051 [2] and ETSI TS 103 052 [3] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). and is documented in the 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

No.	Item	Uncertainty
1	Occupied Channel Bandwidth	$\pm 3.6\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Power Spectral Density, conducted	$\pm 1.3\text{dB}$
4	Unwanted Emissions, conducted	$\pm 1.3\text{dB}$
5	All emissions, radiated	$\pm 4.7\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$
8	DC and low frequency voltages	$\pm 1.5\%$
9	Time	$\pm 1.0\%$
10	Duty Cycle	$\pm 3.0\%$



3.5. Equipment 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	2024/10/27	2025/10/26
2	Signal generator	Agilent	83630A	HKE-028	2024/10/27	2025/10/26
3	Signal generator	Agilent	N5182A	HKE-029	2024/10/27	2025/10/26
4	RF automatic control unit	Tonscend	JS0806-2	HKE-060	2024/10/27	2025/10/26

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	2024/10/27	2025/10/26
2	Horn antenna	Schwarzbeck	9120D	HKE-013	2024/10/27	2025/10/26
3	Receiver	R&S	ESCI 7	HKE-010	2024/10/27	2025/10/26
4	Position controller	Taiwan MF	MF7802	HKE-011	2024/10/27	2025/10/26
5	Preamplifier	EMCI	EMC05184 5SE	HKE-015	2024/10/27	2025/10/26
6	Preamplifier	Agilent	83051A	HKE-016	2024/10/27	2025/10/26
7	High pass filter unit	Tonscend	JS0806-F	HKE-055	2024/10/27	2025/10/26
8	Spectrum analyzer	Agilent	N9020A	HKE-048	2024/10/27	2025/10/26

The calibration interval is 1 year.

4. TEST CONDITIONS AND RESULTS

4.1. ETSI EN 300 328 REQUIREMENTS

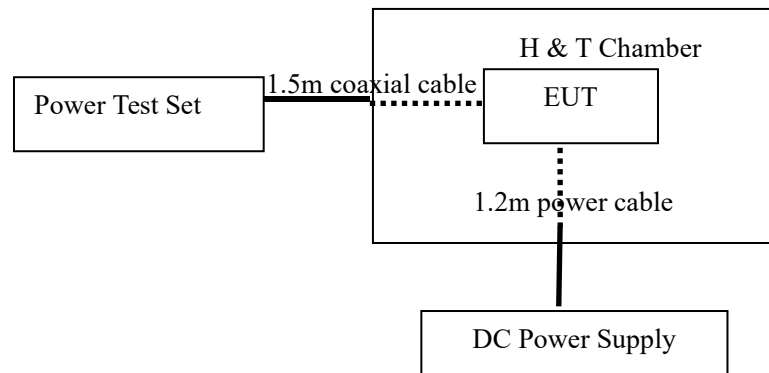
4.1.1. RF Output Power

LIMIT

ETSI EN 300 328 (V2.2.2) §4.3.2.2.2,

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 5.3.1 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) §5.4.2.2.1.1, conducted method.

**EUT DESCRIPTION:**

Mode:	BT Test mode
Hopping:	On
Packet Type:	Longest supported
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK

MEASUREMENT DESCRIPTION

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

TEST RESULTS

Test environmental		Maximum conducted Burst Power in 15 measured Bursts (RMS) [dBm]		
Test Mode	Test Condition	Antenna Measured Power (dBm)	EIRP(dBm)	Limit(dBm)
GFSK	NTC	2.58	2.58	20
	LT/NV	1.31	1.31	20
	HT/NV	0.97	0.97	20
$\pi/4$ DQPSK	NTC	1.48	1.48	20
	LT/NV	1.21	1.21	20
	HT/NV	0.89	0.89	20
8DPSK	NTC	0.41	0.41	20
	LT/NV	0.18	0.18	20
	HT/NV	0.29	0.29	20
Result		Pass		

Note :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 (2019-07) Sub-clause 4.3.1.3

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.

The maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below:

$$\text{Maximum Tx-Sequence Time} = \text{Minimum Tx-gap Time} = M$$

where M is in the range of 3,5 ms to 10 ms.

Duty Cycle is defined as the ratio of the total transmitter 'on'-time to a 1 second observation period.

Tx-sequence is defined as a period in time during which a single or multiple transmissions may occur and which shall be followed by a Tx-gap.

Tx-gap is defined as a period in time during which no transmissions occur.

NOTE: The maximum Duty Cycle at which the equipment can operate, is declared by the supplier.

These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode. The equipment is using wide band modulations other than FHSS.

These requirements do not apply for equipment with a maximum declared RF Output power 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.

Medical devices requiring reverse compatibility with other medical devices placed on the market when earlier versions of the present document were harmonised, are allowed to have an operating mode in which they do not have to comply with the requirements for Duty Cycle, Tx-sequence and Tx-gap.

TEST PROCEDURE

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

For equipment using FHSS modulation, the measurements shall be performed during normal operation (hopping) and the equipment is assumed to have no blacklisted frequencies (operating on all hopping positions). These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode, 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 dynamic range, 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 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:	BT Testmode
Test Channel	Channel 00(2402MHz),Channel 39(2441MHz),Channel 78(2480MHz)
Modulation:	GFSK, $\Pi/4$ DQPSK, 8DPSK

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

This requirement do not apply for equipment with a maximum declared RF Output power level of less than 10 dBme.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. So This requirement do not apply for EUT

4.1.3. Dwell time, Min. Freq. Occupation and Hopping Sequence

LIMIT

According to ETSI EN 300 328 V2.2.2 (2019-07) §4.3.1.4.3

DWELL TIME	
Condition	Limit
☐ Non-adaptive frequency hopping systems	≤ 15 ms in any $[15 \text{ ms} * \text{the minimum number of hopping frequencies (N)}]$ time domain
☒ Adaptive frequency hopping systems	≤ 400 ms in any $[400 \text{ ms} * \text{the minimum number of hopping frequencies (N)}]$ time domain
MINIMUM FREQUENCY OCCUPATION TIME	
Condition	Limit
☐ Non-adaptive frequency hopping systems	Option 1: Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use.
☒ Adaptive frequency hopping systems	Option 2: The occupation probability for each frequency shall be between $((1 / U) \times 25 \%)$ and 77 % where U is the number of hopping frequencies in use.
HOPPING SEQUENCE (S)	
Condition	Limit
☐ Non-adaptive frequency hopping systems	≥ 15 hopping frequencies or 15/minimum Hopping Frequency Separation (MHz) whichever is greater.
☒ Adaptive frequency hopping systems	Operating over a minimum of 70% of the Operating in the band 2.4 GHz to 2.4835 GHz
	≥ 15 hopping frequencies or 15/minimum Hopping Frequency Separation (MHz) whichever is greater.

TEST PROCEDURE

According to ETSI EN 300 328 V2.2.2 (2019-07) §5.4.4.2.1 Conducted measurements.

Dwell time test procedure:

Step 1:

- The output of the transmitter shall be connected to a spectrum analyzer or equivalent.
- The analyzer shall be set as follows:
 - Centre Frequency: Equal to the hopping frequency being investigated
 - Frequency Span: 0 Hz
 - RBW: 1MHz (~ 50 % of the Occupied Channel Bandwidth)
 - VBW: 3MHz ($\geq$ RBW)
 - Detector Mode: RMS
 - Sweep time: 10ms
 - Number of sweep points: 30 000
 - Trace mode: Clear / Write
 - Trigger: Free Run

Step 2:

- Record the value of dwell time, repeat with different DH.

Minimum frequency occupation time and Accumulated Dwell Time

Step 1:

- The output of the transmitter shall be connected to a spectrum analyzer or equivalent

•The analyzer shall be set as follows:

- Centre Frequency: Equal to the hopping frequency being investigated
- Frequency Span: 0 Hz
- RBW: 1MHz (~ 50 % of the Occupied Channel Bandwidth)
- VBW: 3MHz ($\geq$ RBW)
- Detector Mode: RMS
- Sweep time: Equal to the Dwell Time $\times$ Minimum number of hopping frequencies (N)
(see clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2)
- Number of sweep points: 30 000
- Trace mode: Clear / Write
- Trigger: Free Run

Step 2:

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

Step 3:

•Identify the data points related to the frequency being investigated by applying a threshold.

The data points resulting from transmissions on the hopping frequency being investigated are assumed to have much higher levels compared to data points resulting from transmissions on adjacent hopping frequencies. If a clear determination between these transmissions is not possible, the RBW in step 1 shall be further reduced. In addition, a channel filter may be used.

•Count the number of data points identified as resulting from transmissions on the frequency being investigated and multiply this number by the time difference between two consecutive data points.

Step 4:

•The result in step 3 is the Accumulated Transmit Time which shall comply with the limit provided in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2 and which shall be recorded in the test report.

Step 5:

NOTE 1: This step is only applicable for equipment implementing Option 1 in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2 for complying with the Frequency Occupation requirement and the manufacturer decides to demonstrate compliance with this requirement via measurement.

•Make the following changes on the analyser and repeat step 2 and step 3.

Sweep time: $4 \times$ Dwell Time $\times$ Actual number of hopping frequencies in use

The hopping frequencies occupied by the equipment without having transmissions during the dwell time (blacklisted frequencies) should be taken into account in the actual number of hopping frequencies in use. If this number cannot be determined (number of blacklisted frequencies unknown) it shall be assumed that the equipment uses the maximum possible number of hopping frequencies.

•The result shall be compared to the limit for the Frequency Occupation defined in clause 4.3.1.4.3.1, option 1 or clause 4.3.1.4.3.2, option 1. The result of this comparison shall be recorded in the test report.

Step 6:

•Make the following changes on the analyzer:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- RBW: 500KHz [~ 50 % of the Occupied Channel Bandwidth (single hop)]
- VBW: 2MHz ($\geq$ RBW)
- Detector Mode: RMS
- Sweep time: 1s; this setting may result in long measuring times. To avoid such long measuring times, an FFT analyser may be used
- Trace Mode: Max Hold
- Trigger: Free Run

•Wait for the trace to stabilize. Identify the number of hopping frequencies used by the hopping sequence. The result shall be compared to the limit (value N) defined in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2. This value shall be recorded in the test report.

For equipment with blacklisted frequencies, it might not be possible to verify the number of hopping frequencies in use. However they shall comply with the requirement for Accumulated Transmit Time and Frequency Occupation assuming the minimum number of hopping frequencies (N) defined in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2 is used.

Step 7:

•For adaptive frequency hopping equipment, it shall be verified whether the equipment uses 70 % of the band specified in table 1. This verification can be done using the lowest and highest -20 dB points from the total spectrum envelope obtained in step 6. The result shall be recorded in the test report.

TEST RESULTS

Test Mode	Test Channel	Ant	Accumulated Dwell time [ms]	Limit [ms]	Result
DH5	2402	Ant1	283.574	≤ 400	PASS
DH5	2480	Ant1	301.361	≤ 400	PASS
2DH5	2402	Ant1	288.038	≤ 400	PASS
2DH5	2480	Ant1	286.544	≤ 400	PASS
3DH5	2402	Ant1	272.685	≤ 400	PASS
3DH5	2480	Ant1	292.977	≤ 400	PASS

Test Mode	Test Channel	Ant	Frequency occupation times [N]	Limit [N]	Result
DH5	2402	Ant1	4	≥ 1	PASS
DH5	2480	Ant1	2	≥ 1	PASS
2DH5	2402	Ant1	4	≥ 1	PASS
2DH5	2480	Ant1	3	≥ 1	PASS
3DH5	2402	Ant1	1	≥ 1	PASS
3DH5	2480	Ant1	2	≥ 1	PASS

Note: 1, The Minimum frequency occupation time observe is a period of $4 \times \text{Dwell time} \times \text{Hopping frequency}$
2, The Minimum Frequency Occupation Time shall be equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use.

Hopping Sequence:

HOPPING SEQUENCE							
Hopping Mode	Hopping Channel	Hopping Channel Limit	F _L 20Db	F _H 20Db	Hopping Range	Minimum Hopping Range Limit	Result
DH5	79	15	2401.262	2480.604	95.02%	70%	Pass
2DH5	79	15	2401.271	2480.616	95.02%	70%	Pass
3DH5	79	15	2401.158	2480.594	95.13%	70%	Pass

4.1.4. Hopping Frequency Separation

LIMIT

ETSI EN 300 328 V2.2.2 (2019-07) 4.3.1.5.3.2:

Adaptive frequency hopping systems The minimum Hopping Frequency Separation shall be 100 kHz.

TEST PROCEDURE

According to ETSI EN 300 328 V2.2.2 (2019-07) §5.4.5.2.1.3, option 2, conducted method.

Step 1:

- The output of the transmitter shall be connected to a spectrum analyzer or equivalent.
- The analyzer shall be set as follows:
 - Centre Frequency: Centre of the two adjacent hopping frequencies
 - Frequency Span: Sufficient to see the complete power envelope of both hopping frequencies
 - RBW: 30 KHz (1 % of the Span)
 - VBW: $\geq (3 \times \text{RBW})$
 - Detector Mode: Max Peak
 - Trace Mode: Max Hold
 - Sweep Time: Auto

Step 2:

- Wait for the trace to stabilize.
- Use the marker-delta function to determine the Hopping Frequency Separation between the peaks of the two adjacent hopping frequencies. This value shall be compared with the limits defined in clause 4.3.1.4.2 and shall be recorded in the test report.

EUT DESCRIPTION:

Mode:	BT Testmode
Hopping:	On
Packet Type:	Longest supported
Modulation:	GFSK, $\Pi/4$ DQPSK, 8DPSK

MEASUREMENT DESCRIPTION

Instrument:	Spectrum Analyzer	
Detector:	Max Peak	
Sweep time:	auto	
Video bandwidth:	100 KHz	
Resolution bandwidth:	30 KHz	
Span:	3 MHz	
Trace:	Max hold	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

**TEST RESULTS*****Mode (GFSK):***

Channel Number	Frequency(MHz)	Ch. Separation (MHz)	Limit (MHz)	PASS/FAIL
			Minimum	
39	2441	1.000	0.100	PASS

Mode ($\pi/4$ -DQPSK):

Channel Number	Frequency(MHz)	Ch. Separation (MHz)	Limit (MHz)	PASS/FAIL
			Minimum	
39	2441	1.000	0.100	PASS

Mode (8DPSK):

Channel Number	Frequency(MHz)	Ch. Separation (MHz)	Limit (MHz)	PASS/FAIL
			Minimum	
39	2441	1.000	0.100	PASS

4.1.5. Medium Utilisation (MU) factor

LIMIT

ETSI EN 300 328 V2.2.2 (2019-07) Sub-clause 4.3.2.5.3

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 ($P_{burst} / 100 \text{ mW}$) and the TxOn time. P_{burst} 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 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:	BT Test mode
Test Channel	Channel 00(2402MHz),Channel 39(2441MHz),Channel 78(2480MHz)
Modulation:	GFSK, $\Pi/4$ DQPSK, 8DPSK

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 according to ETSI EN 300 328 V2.2.2 (2019-07) Sub-clause 4.3.1.6.1

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.



4.1.6. Adaptivity (Adaptive Frequency Hopping)

LIMIT

Requirement	Type	
	Adaptive Frequency Hopping using LBT based DAA	Adaptive Frequency Hopping using other forms of DAA (non-LBT based)
Minimum Clear Channel Assessment (CCA) Time	At least of Max(18 us, 0.2% of COT) (Note 1)	N/A
Maximum Channel Occupancy (COT) Time	2.0ms _{note4} to 60ms/Dwell time (Note 3)	40 ms
Minimum Idle Period	5% of COT and should longer then 100us	At least 5% of COT and 100 μ s
Extended CCA check	(CCA, 5% of COT)	N/A
Short Control Signaling Transmissions	Short Control Signalling Transmissions shall have a maximum TxOn / (TxOn + TxOff) ratio of 10 % within any observation period of 50 ms or within an observation period equal to the dwell time, whichever is less. (Note 2)	

Note 1: The CCA time used by the equipment shall be declared by the supplier.

Note 2: Adaptive equipment may or may not have Short Control Signaling Transmissions.

Note 3: For LBT based adaptive frequency hopping equipment with a dwell time < 60 ms, the maximum Channel Occupancy Time is limited by the dwell time.

Note 4: according to 4.3.1.7.2.2 3) of ETSI EN 300 328 V2.2.0, the 5% of COT should longer then 100us, so the minimum COT should longer then 2.0ms.

Wanted signal mean power from companion device:

$$TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{\text{out}}) \quad (P_{\text{out}} \text{ in mW e.i.r.p.})$$

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

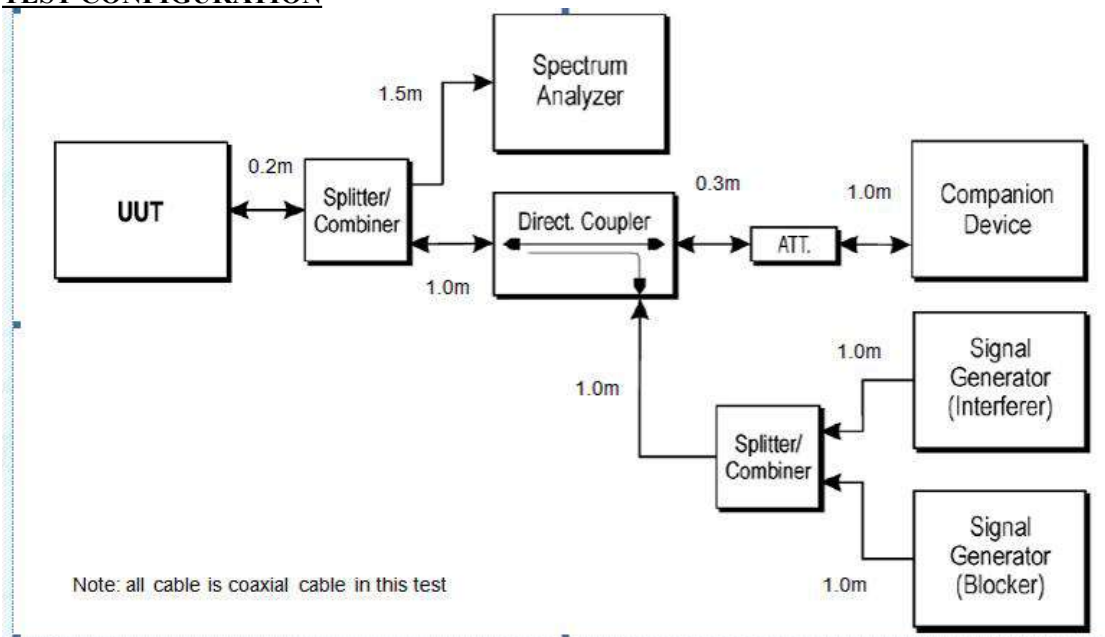


Figure 5: Test set-up for verifying the adaptivity of an equipment

MEASUREMENT DESCRIPTION

According to ETSI EN 300 328 V2.2.2 (2019-07) §5.4.6.2.1.2, Conducted measurements

Step 1 to step 7 below define the procedure to verify the efficiency of the DAA based adaptive mechanisms for frequency hopping equipment. These mechanisms are described in clause 4.3.1.7.

For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.

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 generators 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.

- For the hopping frequency to be tested, adjust the received signal level (wanted signal from the companion device) at the UUT to the value defined in table 2 and table 3 (clause 4).

Testing of Unidirectional equipment does not require a link to be established with a companion device.

- The analyser shall be set as follows:

- RBW: use next available RBW setting below the measured Occupied Channel Bandwidth
- Filter type: Channel Filter

- VBW: $\geq$ RBW
- Detector Mode: RMS
- Centre Frequency: Equal to the hopping frequency to be tested
- Span: 0 Hz
- Sweep time: > Channel Occupancy Time of the UUT. If the Channel Occupancy Time is non-contiguous (non-LBT based equipment), the sweep time shall be sufficient to cover the period over which the Channel Occupancy Time is spread out
- 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.
- Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that, for equipment with a dwell time greater than the maximum allowable Channel Occupancy Time, the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.1.7.2.2 or clause 4.3.1.7.3.2. When measuring the Idle Period of the UUT, it shall not include the transmission time of the companion device.

Step 3: Adding the interference signal

- An interference signal as defined in clause B.7 is injected centred on the hopping frequency being tested. 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 4.3.1.7.2.2 or clause 4.3.1.7.3.2.

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 hopping frequency 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 hopping frequency being tested.

The UUT is assumed to stop transmissions on this hopping frequency within a period equal to the maximum Channel Occupancy Time defined in clause 4.3.1.7.2.2 or clause 4.3.1.7.3.2. As stated in clause 4.3.1.7.3.2, step 3, the Channel Occupancy Time for non-LBT based frequency hopping equipment may be non-contiguous.

ii) For LBT based frequency hopping equipment, apart from Short Control Signalling Transmissions (see iii) below), there shall be no subsequent transmissions on this hopping frequency, as long as the interference signal remains present.

For non-LBT based frequency hopping equipment, apart from Short Control Signalling Transmissions (see iii) below), there shall be no subsequent transmissions on this hopping frequency for a (silent) period defined in clause 4.3.1.7.3.2, step 2. After that, the UUT may have normal transmissions again for the duration of a single Channel Occupancy Time period (which may be non-contiguous). Because the interference signal is still present, another silent period as defined in clause 4.3.1.7.3.2, step 2 needs to be included. This sequence is repeated as long as the interfering signal is present.

In case of overlapping channels, transmissions in adjacent channels may generate transmission bursts on the channel being investigated; however, they have a lower amplitude as on-channel transmissions. Care should be taken to only evaluate the on-channel transmissions. The Time Domain Power Option of the analyser may be used to measure the RMS power of the individual bursts to distinguish on-channel transmissions from transmissions on adjacent channels. In some cases, the RBW may need to be reduced. 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. If transmissions are detected during this period, the settings of the analyser may need to be adjusted to allow an accurate assessment to verify the transmissions comply with the limits for Short Control Signalling Transmissions.

iii) The UUT may continue to have Short Control Signalling Transmissions on the hopping frequency being tested while the interference signal is present. These transmissions shall comply with the limits defined in clause 4.3.1.7.4.2.

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 2 of clause 4.3.1.7.2.2, step 6 or table 3 of clause 4.3.1.7.3.2, step 6.

- The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected hopping frequency. 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 hopping frequency being tested 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. If transmissions are detected during this period, the settings of the analyser may need to be adjusted to allow an accurate assessment to verify the transmissions comply with the limits for Short Control Signalling Transmissions.

ii) The UUT may continue to have Short Control Signalling Transmissions on the hopping frequency being tested while the interference and unwanted signals are present. These transmissions shall comply with the limits defined in clause 4.3.1.7.4.2.

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 signal, the UUT is allowed to re-include any channel previously marked as unavailable; however, for non-LBT based equipment, it shall be verified that this shall only be done after the period defined in clause 4.3.1.7.3.2, step 2.

Step 7:

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

**MEASUREMENT DESCRIPTION**

Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	> Channel Occupancy Time	
Video bandwidth:	$\geq$ RBW	
Resolution bandwidth:	$\geq$ Occupied Channel Bandwidth	
Span:	0 Hz	
Center:	Equal to the hopping freq. to be tested	
Trace:	clear/write video triggered	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)
	☐	Short Control Signalling Transmissions available

TEST RESULTS

This requirement do not apply for equipment with a maximum declared RF Output power level of less than 10 dBme.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBme.i.r.p. So This requirement do not apply for EUT

4.1.7. Occupied Channel Bandwidth

LIMIT

According to ETSI EN 300 328 V2.2.2 (2019-07) 4.3.1.8.3

The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band given in clause 1. For non-adaptive Frequency Hopping equipment with e.i.r.p greater than 10 dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the Nominal Channel Bandwidth declared by the supplier. See clause 5.3.1 j). This declared value shall not be greater than 5 MHz.

TEST PROCEDURE

Please refer to ETSI EN 300 328 (V2.2.2) Sub-clause 5.3.8.2.1

According to ETSI EN 300 328 V2.2.2 (2019-07) §5.3.8.2.1 Conducted measurement

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: $3 \times \text{RBW}$
- Frequency Span for frequency hopping equipment: Lowest frequency separation that is used within the hopping sequence
- Frequency Span for other types of equipment: $2 \times \text{Nominal Channel Bandwidth}$ (e.g. 40 MHz for a 20 MHz channel)
- 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.

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

EUT DESCRIPTION:

Mode:	BT Testmode
Hopping:	Off
Packet Type:	Longest supported
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK

MEASUREMENT DESCRIPTION

Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	auto	
Video bandwidth:	100KHz	
Resolution bandwidth:	30KHz	
Span:	100KHz	
Center:	Transmit channel	
Trace:	Max hold	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

**TEST RESULTS****Test Data**

Type	CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)	Measured frequencies		Limit	PASS /FAIL
				F _L (MHz)	F _H (MHz)		
1DH5	00	2402	0.493	2401.371		FL>2.4GHz and FH<2.4835 GHz	PASS
	78	2480	0.482		2480.426		PASS
2DH5	00	2402	1.038	2401.394		FL>2.4GHz and FH<2.4835 GHz	PASS
	78	2480	1.064		2480.442		PASS
3DH5	00	2402	1.106	2401.318		FL>2.4GHz and FH<2.4835 GHz	PASS
	78	2480	1.129		2480.483		PASS

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

LIMIT

ETSI EN 300 328 V2.2.2 (2019-07) Sub-clause 4.3.1.9.3

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1.

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 4.3.1.8

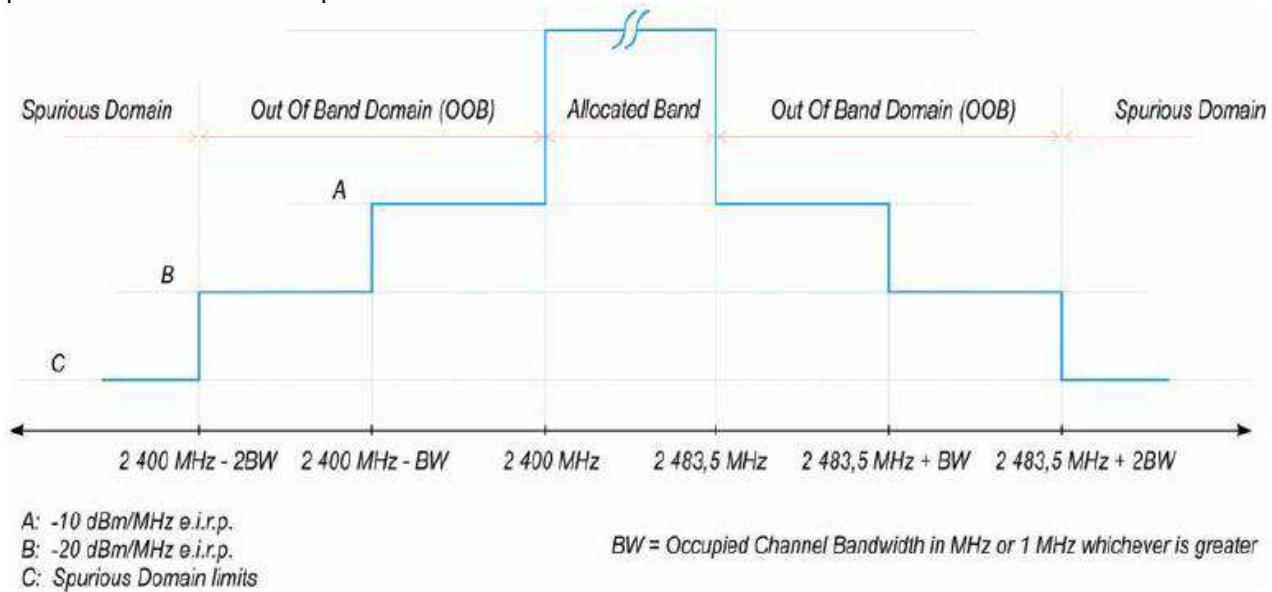


Figure 1: Transmit mask

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.

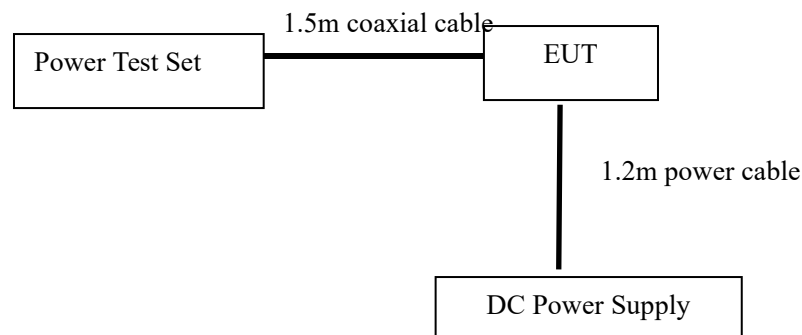
For systems using FHSS modulation, the measurements shall be performed during normal operation (hopping).

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.**

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

- Centre Frequency: evaluated frequency
- Span: 0 Hz
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep Mode: Continuous
- Sweep Points: Sweep Time [s] / (1 μ s) or 5 000 whichever is greater
- Trigger Mode: Video trigger

NOTE 1: In case video triggering is not possible, an external trigger source may be used.

- 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)

- Adjust the trigger level to select the transmissions with the highest power level.
- For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
- Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
- Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
- Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

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

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

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.

Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)

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

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 figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.

Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by $10 \times \log_{10}(A_{ch})$ 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:	BT Testmode
Hopping:	On
Packet Type:	Longest supported
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Assumed antenna gain:	0 dBi

MEASUREMENT DESCRIPTION

Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	depending on packet length	
Video bandwidth:	3MHz	
Resolution bandwidth:	1MHz	
Span:	0Hz	
Center:	fc (see result table)	
Trigger Mode:	Video trigger	
Sweep points:	Sweep Time [s] / (1 μ s) or 5 000 whichever is greater	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

Test Condition	Test Mode	Test Channel	Ant	Freq [MHz]	Result [dBm]	Limit [dBm]	Verdict
TNVN	DH5	2402	Ant1	2398.500	-53.95	≤ -20	PASS
TNVN	DH5	2402	Ant1	2399.500	-46.95	≤ -10	PASS
TNVN	DH5	2402	Ant1	2484.000	-54.8	≤ -10	PASS
TNVN	DH5	2402	Ant1	2485.000	-49.8	≤ -20	PASS
TNVN	DH5	2480	Ant1	2398.500	-30.6	≤ -20	PASS
TNVN	DH5	2480	Ant1	2399.500	-52.94	≤ -10	PASS
TNVN	DH5	2480	Ant1	2484.000	-52.24	≤ -10	PASS
TNVN	DH5	2480	Ant1	2485.000	-51.17	≤ -20	PASS
TNVN	2DH5	2402	Ant1	2398.113	-54.88	≤ -20	PASS
TNVN	2DH5	2402	Ant1	2398.307	-37.64	≤ -20	PASS
TNVN	2DH5	2402	Ant1	2399.307	-57.81	≤ -10	PASS
TNVN	2DH5	2402	Ant1	2399.500	-43.84	≤ -10	PASS
TNVN	2DH5	2402	Ant1	2484.000	-51.64	≤ -10	PASS
TNVN	2DH5	2402	Ant1	2484.193	-55.95	≤ -10	PASS
TNVN	2DH5	2402	Ant1	2485.193	-58.66	≤ -20	PASS



TNVN	2DH5	2402	Ant1	2485.387	-53.11	<=-20	PASS
TNVN	2DH5	2480	Ant1	2398.116	-48.59	<=-20	PASS

TNVN	2DH5	2480	Ant1	2398.308	-55.13	<=-20	PASS
TNVN	2DH5	2480	Ant1	2399.308	-49.37	<=-10	PASS
TNVN	2DH5	2480	Ant1	2399.500	-51.99	<=-10	PASS
TNVN	2DH5	2480	Ant1	2484.000	-48.41	<=-10	PASS
TNVN	2DH5	2480	Ant1	2484.192	-61.06	<=-10	PASS
TNVN	2DH5	2480	Ant1	2485.192	-60.48	<=-20	PASS
TNVN	2DH5	2480	Ant1	2485.384	-54.2	<=-20	PASS
TNVN	3DH5	2402	Ant1	2398.113	-53.8	<=-20	PASS
TNVN	3DH5	2402	Ant1	2398.307	-39.58	<=-20	PASS
TNVN	3DH5	2402	Ant1	2399.307	-55.92	<=-10	PASS
TNVN	3DH5	2402	Ant1	2399.500	-48.44	<=-10	PASS
TNVN	3DH5	2402	Ant1	2484.000	-51.36	<=-10	PASS
TNVN	3DH5	2402	Ant1	2484.193	-56.6	<=-10	PASS
TNVN	3DH5	2402	Ant1	2485.193	-58.33	<=-20	PASS
TNVN	3DH5	2402	Ant1	2485.387	-50.65	<=-20	PASS
TNVN	3DH5	2480	Ant1	2398.116	-52.95	<=-20	PASS
TNVN	3DH5	2480	Ant1	2398.308	-50.85	<=-20	PASS
TNVN	3DH5	2480	Ant1	2399.308	-55.9	<=-10	PASS
TNVN	3DH5	2480	Ant1	2399.500	-51.12	<=-10	PASS
TNVN	3DH5	2480	Ant1	2484.000	-58.03	<=-10	PASS
TNVN	3DH5	2480	Ant1	2484.192	-57.82	<=-10	PASS
TNVN	3DH5	2480	Ant1	2485.192	-57.33	<=-20	PASS
TNVN	3DH5	2480	Ant1	2485.384	-48.58	<=-20	PASS

4.1.9. Transmitter unwanted emissions in the spurious domain

Limit

According to ETSI EN 300 328 V2.2.0(2017-11) §4.3.1.10.3

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 4.

Table 1: 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 862 MHz	-54 dBm	100 KHz
862 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:

- 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
- 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.

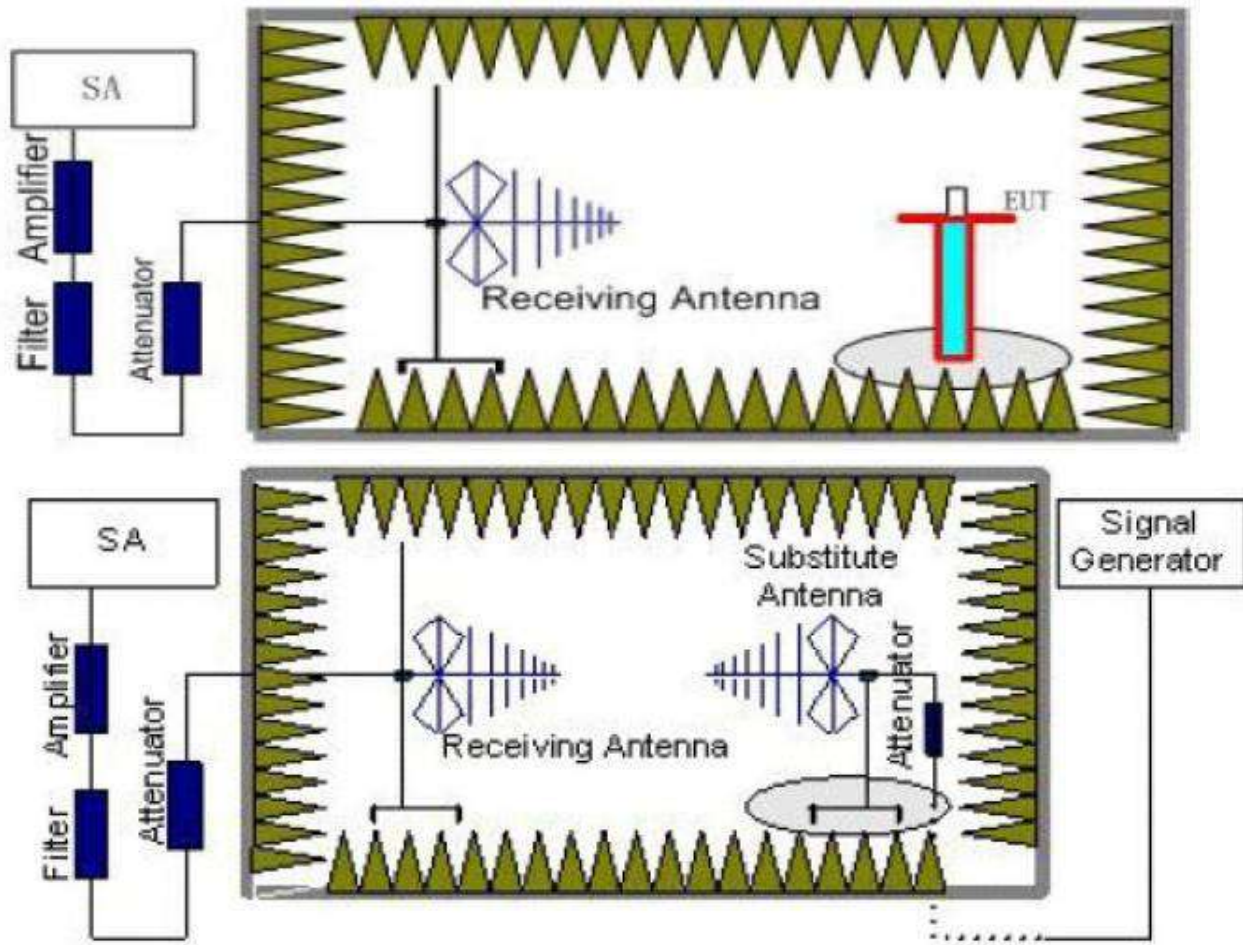
If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then the equipment shall be configured to operate under its worst case situation with respect to spurious emissions.

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

Remark: We test all modulation type, and recorded the worst case mode for BT test.



Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
158.56	V	-64.72	-54	10.72	PASS
643.28	H	-64.61	-54	10.61	PASS
Above 1GHz:					
Test Mode: Low Channel					
4804	H	-40.82	-30	10.82	PASS
4804	V	-43.78	-30	13.78	PASS
7206	H	-40.61	-30	10.61	PASS
7206	V	-39.11	-30	9.11	PASS
9608	H	-40.32	-30	10.32	PASS
9608	V	-38.45	-30	8.45	PASS
Test Mode: High Channel					
4960	H	-43.32	-30	13.32	PASS
4960	V	-38.35	-30	8.35	PASS
7440	H	-37.41	-30	7.41	PASS
7440	V	-40.04	-30	10.04	PASS
9920	H	-40.04	-30	10.04	PASS
9920	V	-41.38	-30	11.38	PASS
Note: 1. Cable loss and antenna gain was combined in the calculated result. 2. No record for margin above 20dB.					

4.1.10. Receiver spurious emissions

LIMIT

According to ETSI EN 300 328 V2.2.2 (2019-07) §4.3.2.11.3

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

Table 2: spurious emission limits for receivers

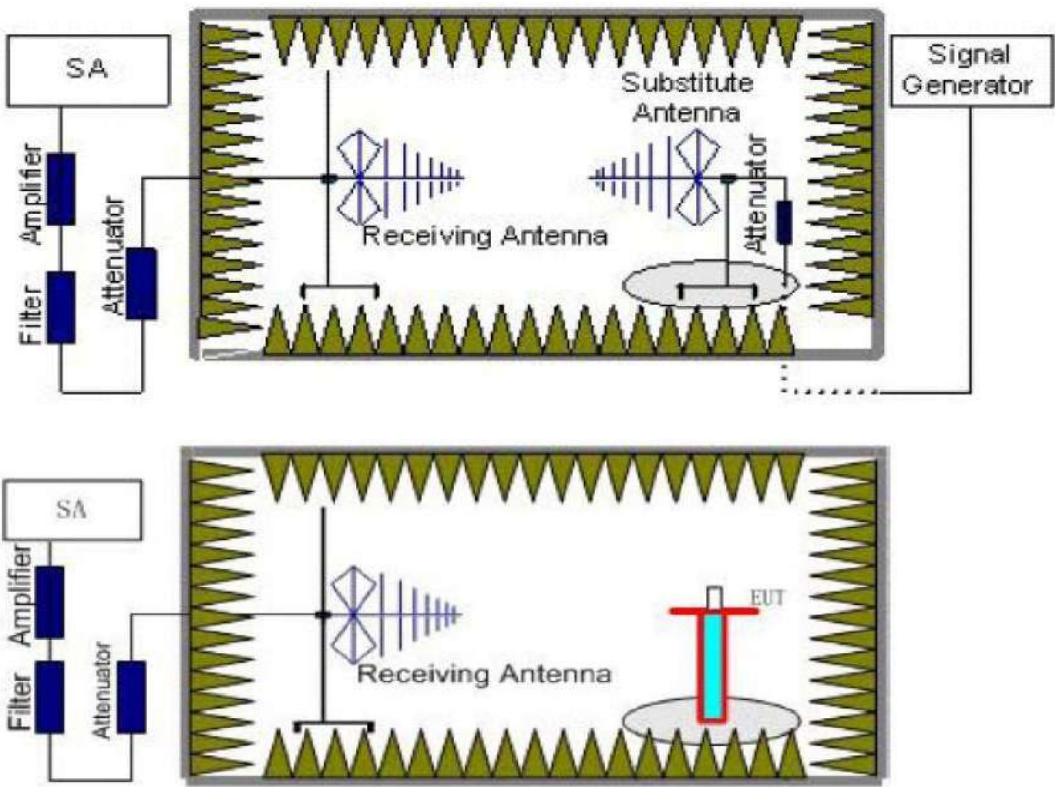
Frequency	Maximum power, e.r.p.	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 KHz
30 MHz to 12.75 GHz	-47 dBm	1 MHz

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

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

Fre. (MHz)	ANT. Pol.	ERP (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
173.05	V	-67.63	-57	10.63	PASS
683.61	H	-67.41	-57	10.41	PASS
Above 1GHz:					
Test Mode: Lowest frequency					
1529.57	H	-58.85	-47	11.85	PASS
1529.57	V	-59.32	-47	12.32	PASS
2434.03	H	-53.69	-47	6.69	PASS
2434.03	V	-57.27	-47	10.27	PASS
Test Mode: Highest frequency					
1677.69	H	-57.76	-47	10.76	PASS
1677.69	V	-56.66	-47	9.66	PASS
2418.72	H	-56.38	-47	9.38	PASS
2418.72	V	-57.63	-47	10.63	PASS
Note: 1. Cable loss and antenna gain was combined in the calculated result. 2. No record for margin above 20dB.					

4.1.11. Receiver Blocking

LIMIT

According to Draft 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 5)	Type of blocking signal
(-139 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 503,5	-34	CW
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300		
	2 330		
	2 360		
	2 523,5		
	2 553,5		
	2 583,5		
	2 613,5		
	2 643,5		
	2 673,5		
NOTE 1: OCBW is in Hz.			
NOTE 2: As an alternative the test may be performed using a wanted signal equal to P _{min} + 26 dB where P _{min} is the minimum level of wanted signal (in dBm) 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: As an alternative the test may be performed using a wanted signal equal to P _{min} + 20 dB where P _{min} is the minimum level of wanted signal (in dBm) 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: In case of radiated measurements, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector.			
NOTE 5: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.			

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 4)	Type of blocking signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10)$ or $(-74 \text{ dBm} + 10)$ whichever is less (see note 2)	2 380 2 503,5 2 300 2 583,5	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: As an alternative the test may be performed using a wanted signal equal to $P_{\min} + 26 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal (in dBm) 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, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector. NOTE 4: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m) ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.			

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 4)	Type of blocking signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 20)$ or $(-74 \text{ dBm} + 20)$ whichever is less (see note 2)	2 380 2 503,5 2 300 2 583,5	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: As an alternative the test may be performed using a wanted signal equal to $P_{\min} + 30 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal (in dBm) 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, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector. NOTE 4: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m) ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.			

According to Draft 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

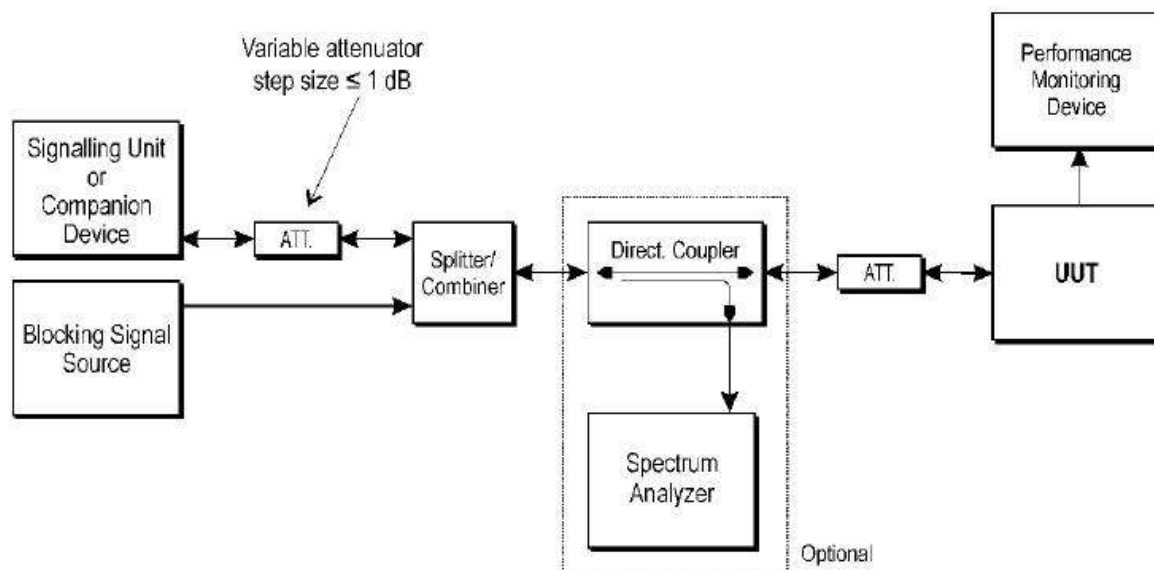


Figure 6: Test Set-up for receiver blocking

MEASUREMENT DESCRIPTION

According to Draft 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 has to 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.
- 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 P_{min} . This signal level (P_{min}) 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. Where the manufacturer has declared the actual antenna gain for each of the applicable blocking frequencies (see clause 5.4.1 m) ii)) this blocking level shall be adjusted for the difference between the in-band antenna assembly gain (G) and the actual antenna gain for the blocking frequency being tested. See also note 5 in table 6, note 4 in table 7 and note 4 in table 8 or note 5 in table 14, note 4 in table 15 and note 4 in table 16. Where the actual antenna gains at the blocking frequencies have not been declared, then the antenna gain at the blocking frequencies shall be assumed identical to the in-band antenna gain.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is 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 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****Channel 00@Result**

Wanted signal mean power form companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-75	2380	-34	0.00	10	Pass
-75	2503.5	-34	0.00	10	Pass
-75	2300	-34	0.00	10	Pass
-75	2583.5	-34	0.00	10	Pass
P_{min} = -81 dBm					

Channel 79@Result

Wanted signal mean power form companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-75	2380	-34	0.00	10	Pass
-75	2503.5	-34	0.00	10	Pass
-75	2300	-34	0.00	10	Pass
-75	2583.5	-34	0.00	10	Pass
P_{min} = -81 dBm					

Note: $P_{min} = \text{Conducted Power}(\text{generated by SG}) + \text{Antenna gain}$.

4.1.12. 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. External and Internal Photos of the EUT

FIGURE 1



FIGURE 2



FIGURE 3

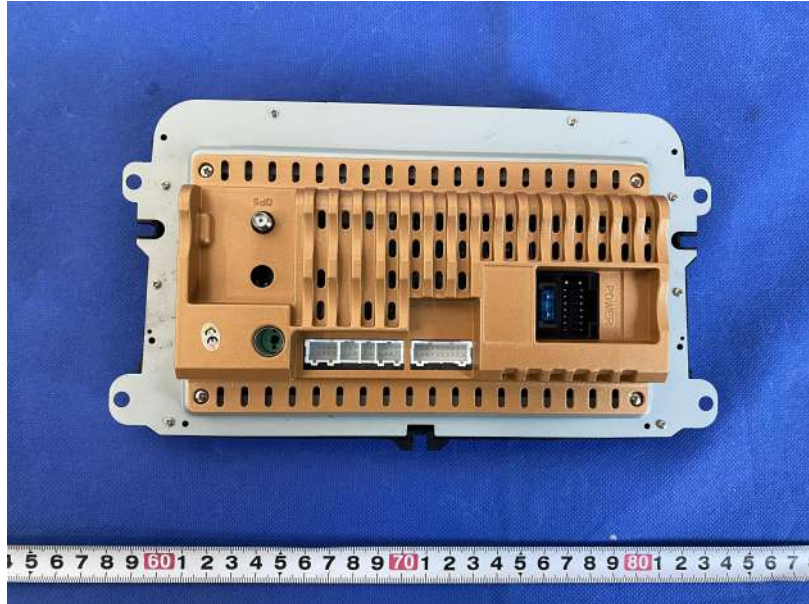


FIGURE 4

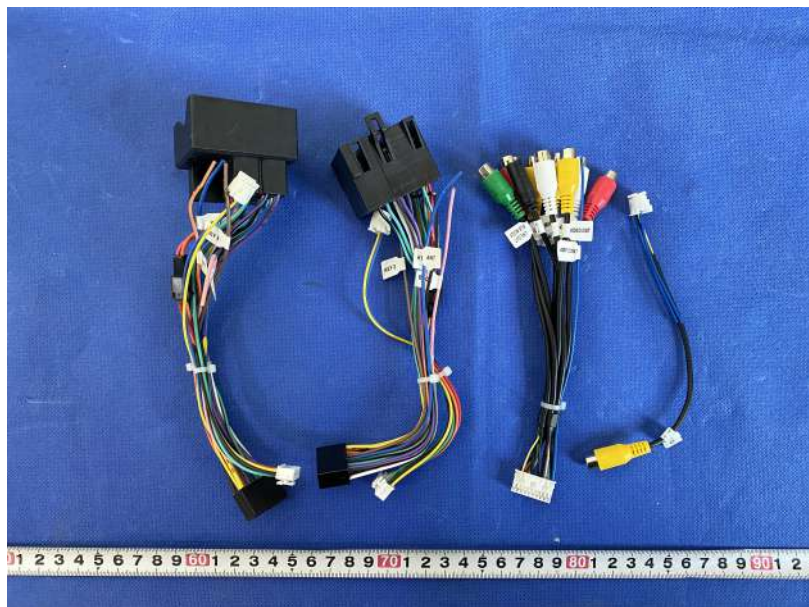


FIGURE 5



End of Report



SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.

RADIO TEST REPORT

Prepared For:	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD. Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street,Longhua District, Shenzhen City, Guangdong Province, China
Product Name:	Vehicle Player
Trade Mark:	ESSGOO
Model:	AR7002
Prepared By:	Shenzhen STL Testing Technology Co., Ltd. Unit C, 4F, Building A, ShengHengji Industrial Park, No. 137 FuYuan 1 Road, Heping Community, Fuyong Street, Baoan District, Shenzhen, China
Receipt Date	Jan .10,2025
Test Date:	Jan .10-17,2025
Date of Report:	Jan .17,2025
Report No.:	STL2025E0117284C-Y2



TEST REPORT DECLARATION

Applicant	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street, Longhua District, Shenzhen City, Guangdong Province, China
Manufacturer	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street, Longhua District, Shenzhen City, Guangdong Province, China
EUT Description	Vehicle Player
Model Number	AR7002

Test Standards:

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

The EUT described above is tested by Shenzhen STL Testing Technology Co., Ltd. to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen STL Testing Technology Co., Ltd. Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/53/EU directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Date of Test:

Jan .10-17,2025

Prepared by:

Eris

Project Engineer

Reviewed by:

Lewis

Project Manager

Approved by:

Jeemah

Technical Director

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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	:	2025/01/10
Testing commenced on	:	2025/01/11
Testing concluded on	:	2025/01/17

2.2. Product Description

Name of EUT	Vehicle Player
Model(s) Number	AR7002
List Models	/
Model diff:	/
Hardware version	V2.1
Software version	V2.1
Antenna Type	PCB Antenna
Antenna gain	0 dBi
Note:Antenna gain Refer to the antenna specifications. The cable loss data is obtained from the supplier. The test results in the report only apply to the tested sample.	

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)	

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

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: μ s

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)

- 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)

- 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)
 • 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)
 • 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)
 • 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)
 • 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)

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: 13.978MHz
802.11g: 16.330MHz
802.11n HT20: 17.439MHz

Occupied Channel Bandwidth 2: 802.11b:
802.11g:
802.11n HT20:

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: 11-24V ☐ 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

☒ Iron sheet Antenna

Antenna Gain: 3.04dBi

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: 11.43dBm

Number of antenna assemblies provided for this power level:

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1	3.04	14.47	
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 11-24V

In case of DC, indicate the type of power source

☐ Internal Power Supply

☒ External Power Supply or AC/DC adapter

☐ Battery:

☐ 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.

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;
	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

N/A

3. TEST ENVIRONMENT

3.1. Information of the Test Laboratory

Shenzhen STL Testing Technology Co., Ltd.

Add.: Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2. Environmental conditions

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

Normal Temperature/NT: 25 °C

High Temperature/HT: 40°C

Low Temperature/LT: -10°C

Normal Voltage: DC 12V

High Voltage/HV: DC 12.5V

Low Voltage/LV: DC 11.5V

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

NTV 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 Summary 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	NTV	802.11b	☒	☐	☐	☐	
		LTVN	802.11g	☒	☐	☐	☐	
		HTNV	802.11n HT20	☒	☐	☐	☐	
5.4.3	Power Spectral Density	NTV	802.11b 802.11g 802.11n HT20	☒	☐	☐	☐	
5.4.2	Duty Cycle, Tx-sequence, Tx-gap	NTV	802.11b 802.11g 802.11n HT20	☐	☐	☒	☐	
5.4.2	Medium Utilisation (MU) factor	NTV	802.11b 802.11g 802.11n HT20	☐	☐	☒	☐	
5.4.6	Adaptivity (adaptive equipment using modulations other than FHSS)	NTV	802.11b 802.11g 802.11n HT20	☒	☐	☐	☐	
5.4.7	Occupied Channel Bandwidth	NTV	802.11b 802.11g 802.11n HT20	☒	☐	☐	☐	
5.4.8	Transmitter unwanted emissions in the out-of-band domain	NTV	802.11b 802.11g 802.11n HT20	☒	☐	☐	☐	
		LTVN		☐	☐	☒	☐	
		HTNV		☐	☐	☒	☐	
5.4.9	Transmitter unwanted emissions in the spurious domain (conducted & radiated)	NTV	802.11b 802.11g 802.11n HT20	☒	☐	☐	☐	
5.4.10	Receiver spurious emissions (conducted & radiated)	NTV	802.11b 802.11g 802.11n HT20	☒	☐	☐	☐	
5.4.11	Receiver Blocking	NTV	802.11b 802.11g 802.11n HT20	☒	☐	☐	☐	

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

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 STL 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 STL 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 & Hopping & 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	2024/02/20	2025/02/19
2	Signal generator	Agilent	83630A	HKE-028	2024/02/20	2025/02/19
3	Signal generator	Agilent	N5182A	HKE-029	2024/02/20	2025/02/19
4	RF automatic control unit	Tonscend	JS0806-2	HKE-060	2024/02/20	2025/02/19
5	Temperature and humidity meter	Boyang	HTC-1	HKE-075	2024/02/20	2025/02/19
6	RF test software	Tonscend	JS1120-3 V3.5.39	HKE-083	/	/

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	2024/02/21	2025/02/20
2	Horn antenna	Schwarzbeck	9120D	HKE-013	2024/02/21	2025/02/20
3	Receiver	R&S	ESR-7	HKE-010	2024/02/20	2025/02/19
4	Position controller	Taiwan MF	MF7802	HKE-011	2024/02/20	2025/02/19
5	Preamplifier	Schwarzbeck	EMC05184 5SE	HKE-015	2024/02/20	2025/02/19
6	Preamplifier	Agilent	83051A	HKE-016	2024/02/20	2025/02/19
7	High pass filter unit	Tonscend	JS0806-F	HKE-055	2024/02/20	2025/02/19
8	Spectrum analyzer	Agilent	N9020A	HKE-048	2024/02/20	2025/02/19
9	Temperature and humidity meter	Boyang	HTC-1	HKE-077	2024/02/20	2025/02/19
10	RSE Test Software	Tonscend	JS36-RSE 5.0.0	HKE -184	/	/

4. TEST CONDITIONS AND RESULTS

4.1. ETSI EN 300 328 REQUIREMENTS

4.1.1. RF Output Power

LIMIT

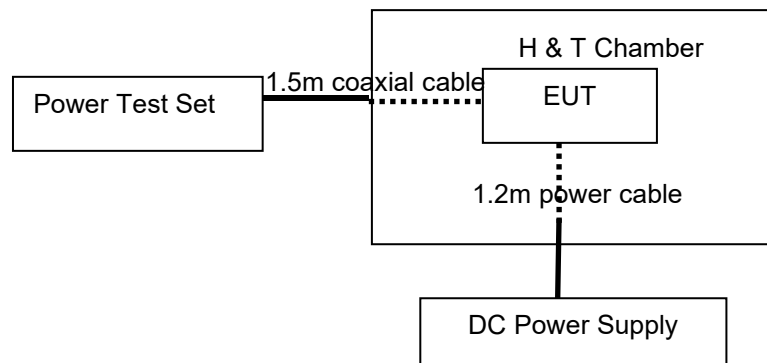
According to ETSI EN 300 328 V2.2.2 §4.3.1.2.3,

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:

$$P_{out} = A + G + Y$$

- 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
Test Channel	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz
Bandwidth	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz
Modulation Type	☒ DSSS ☐ OFDM	☐ DSSS ☒ OFDM	☐ DSSS ☒ OFDM
Channel Separation	☒ 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 (dBm)	Limit (dBm)	Test Result
Low	NTV	15	14.47	20	Compliant
	LT/NV	15	13.35	20	Compliant
	HT/NV	15	14.03	20	Compliant
Middle	NTV	15	13.57	20	Compliant
	LT/NV	15	13.73	20	Compliant
	HT/NV	15	13.45	20	Compliant
High	NTV	15	12.93	20	Compliant
	LT/NV	15	13.06	20	Compliant
	HT/NV	15	12.72	20	Compliant

802.11g (6Mbps) Mode

Channel	Test Condition	Bursts	Power (dBm)	Limit (dBm)	Test Result
Low	NTV	15	13.22	20	Compliant
	LT/NV	15	13.13	20	Compliant
	HT/NV	15	12.97	20	Compliant
Middle	NTV	15	13.05	20	Compliant
	LT/NV	15	13.12	20	Compliant
	HT/NV	15	12.02	20	Compliant
High	NTV	15	13.17	20	Compliant
	LT/NV	15	12.36	20	Compliant
	HT/NV	15	12.03	20	Compliant

802.11n HT-20 (6.5Mbps) Mode

Channel	Test Condition	Bursts	Power (dBm)	Limit (dBm)	Test Result
Low	NTV	15	11.04	20	Compliant
	LT/NV	15	10.92	20	Compliant
	HT/NV	15	10.42	20	Compliant
Middle	NTV	15	11.56	20	Compliant
	LT/NV	15	10.82	20	Compliant
	HT/NV	15	11.23	20	Compliant
High	NTV	15	12.45	20	Compliant
	LT/NV	15	10.46	20	Compliant
	HT/NV	15	10.47	20	Compliant

**802.11n HT-40 (13.5Mbps) Mode**

Channel	Test Condition	Bursts	Power (dBm)	Limit (dBm)	Test Result
Low	NTV	15	11.26	20	Compliant
	LT/NV	15	11.34	20	Compliant
	HT/NV	15	10.33	20	Compliant
Middle	NTV	15	12.04	20	Compliant
	LT/NV	15	10.63	20	Compliant
	HT/NV	15	10.14	20	Compliant
High	NTV	15	11.74	20	Compliant
	LT/NV	15	10.52	20	Compliant
	HT/NV	15	10.29	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
Test Channel	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz
Bandwidth	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz
Modulation Type	☒ DSSS ☐ OFDM	☐ DSSS ☒ OFDM	☐ DSSS ☒ OFDM
Channel Separation	☒ 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
Test Channel	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz
Bandwidth	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz
Modulation Type	☒ DSSS ☐ OFDM	☐ DSSS ☒ OFDM	☐ DSSS ☒ OFDM
Channel Separation	☒ 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

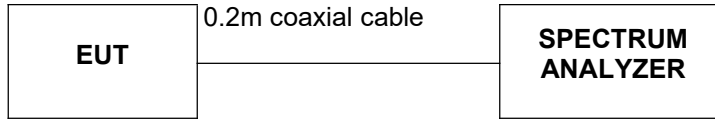
LIMIT

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: $2 \times \text{Channel Occupancy Time} \times \text{number of sweep Points}$
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 $P_{Samplecorr}(n)$ (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
Test Channel	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz	☒ 2412MHz ☒ 2442MHz ☒ 2472MHz
Bandwidth	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz
Modulation Type	☒ DSSS ☐ OFDM	☐ DSSS ☒ OFDM	☐ DSSS ☒ OFDM
Channel Separation	☒ 5MHz	☒ 5MHz	☒ 5MHz

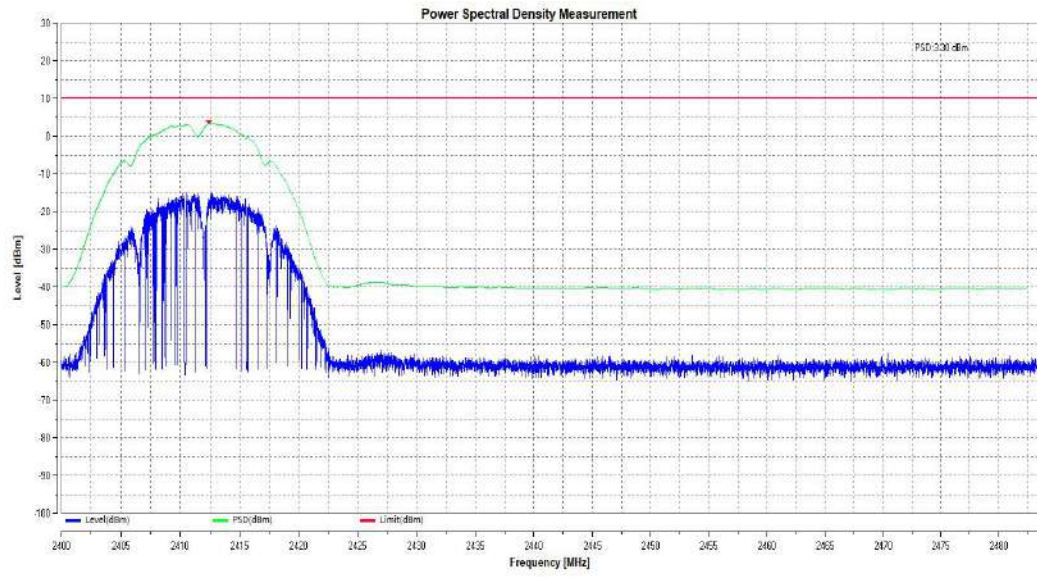
MEASUREMENT DESCRIPTION

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)

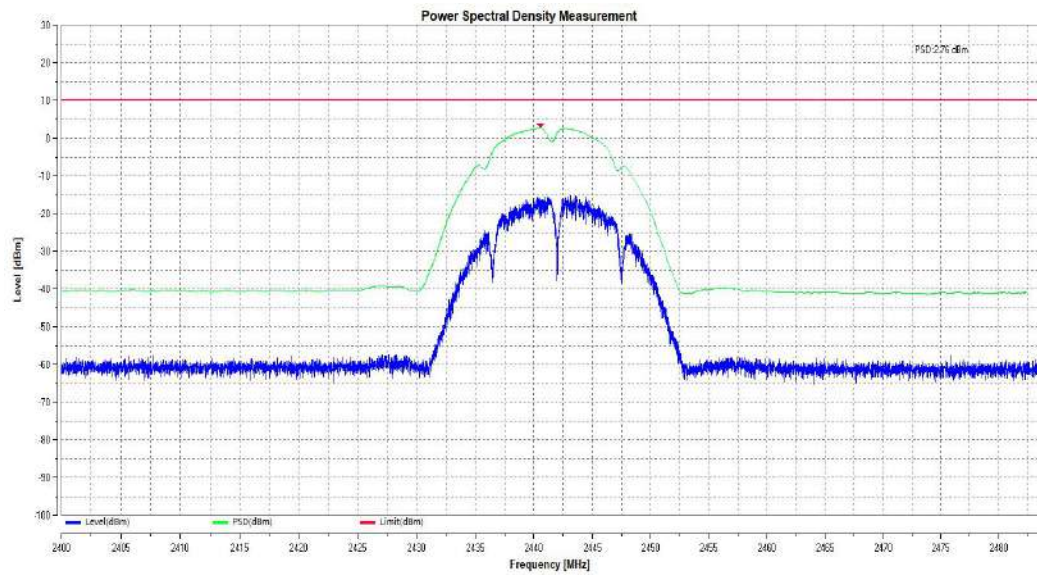
TEST RESULTS

Test mode	Spatial streams	Channel frequency(MHz)	Power Density (dBm/MHz)	Limit (dBm/MHz)
802.11b 1Mbps	1	Low	3.30	10
	1	Middle	2.76	10
	1	High	3.63	10
802.11g 6Mbps	1	Low	2.25	10
	1	Middle	1.96	10
	1	High	3.01	10
802.11n HT-20 6.5Mbps	1	Low	2.65	10
	1	Middle	1.52	10
	1	High	2.56	10

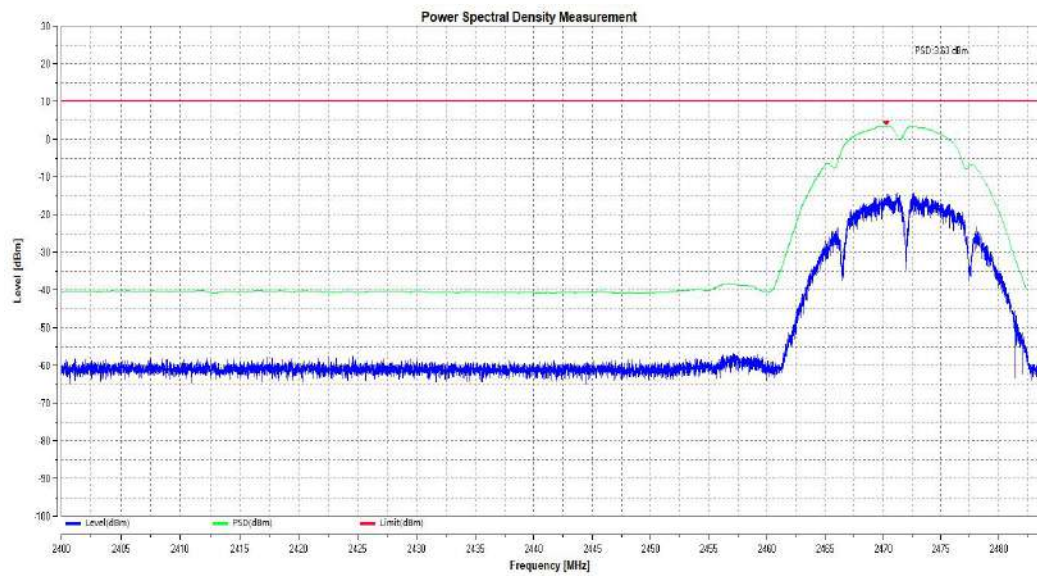
802.11b 2412



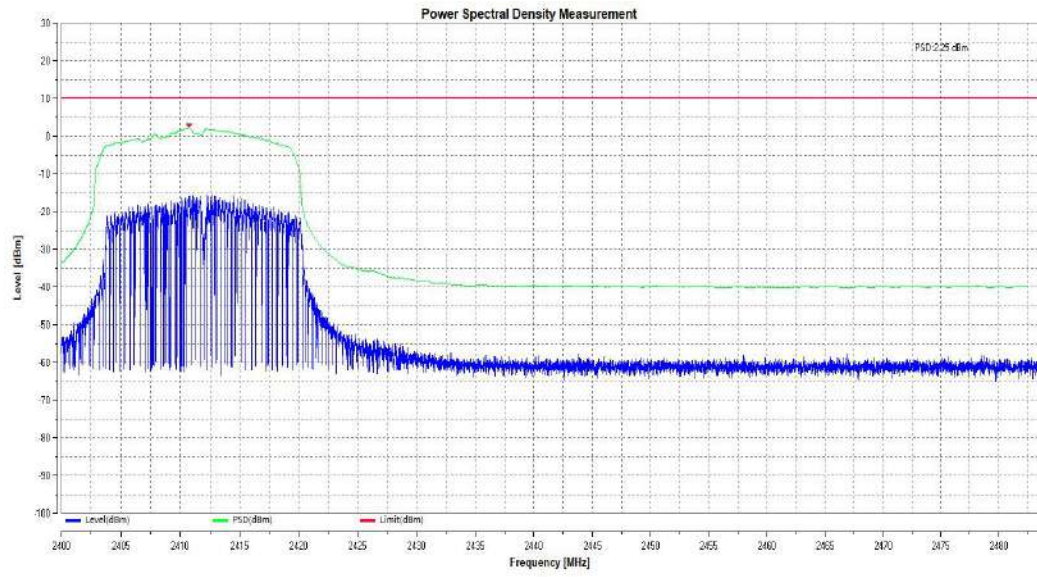
802.11b 2442



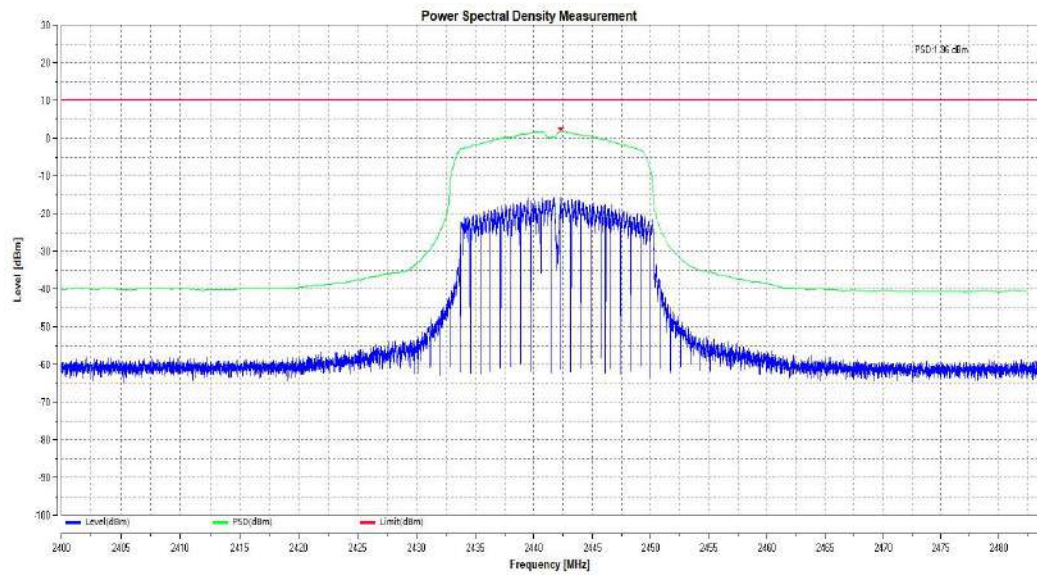
802.11b 2472



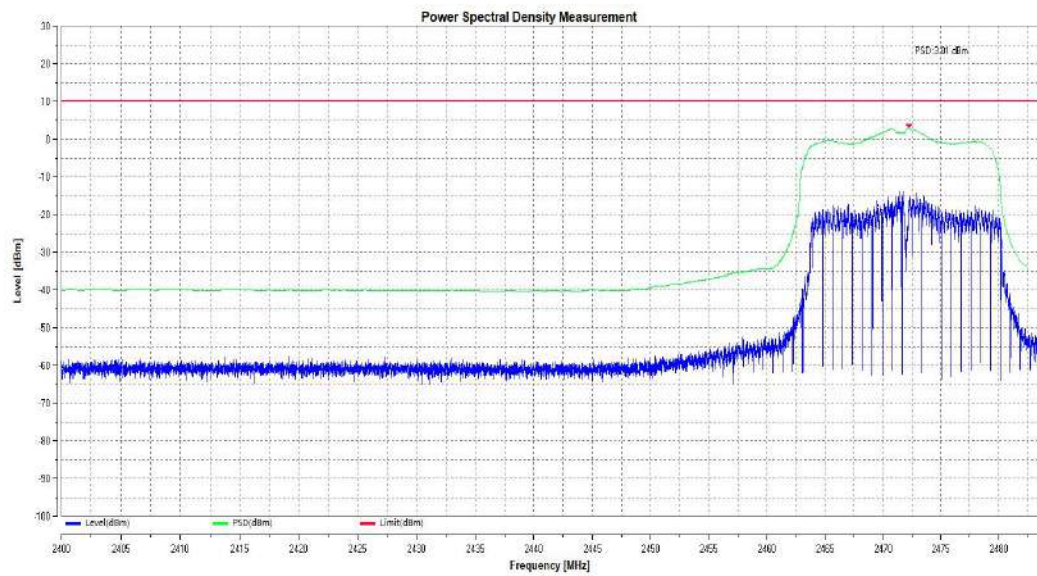
802.11g 2412



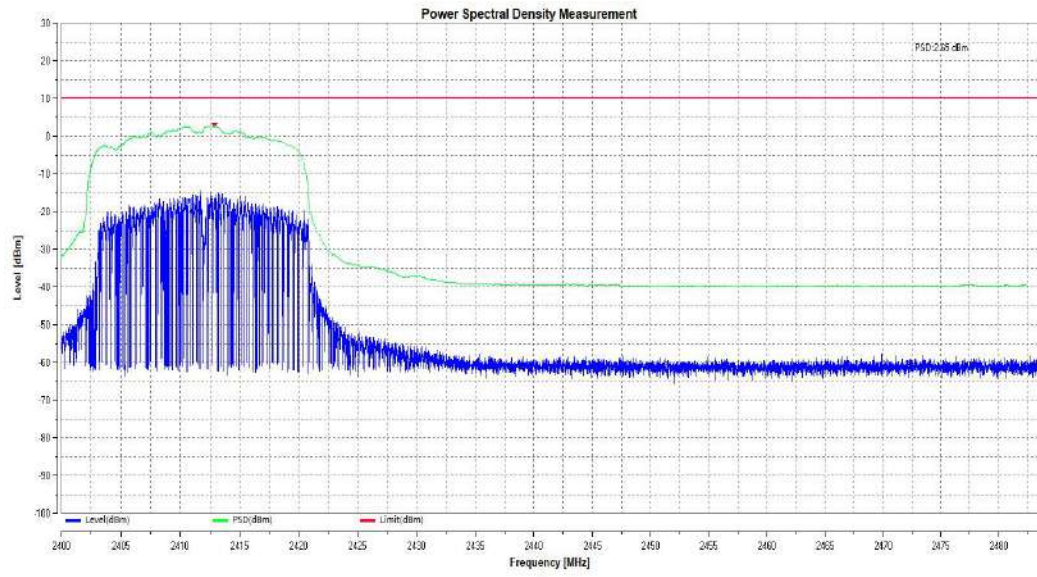
802.11g 2442



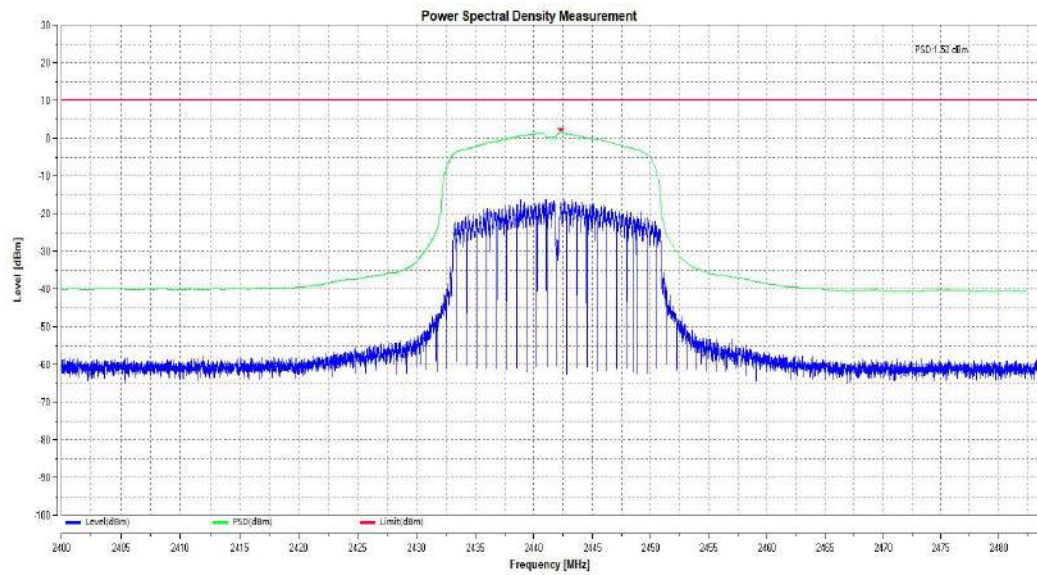
802.11g 2472



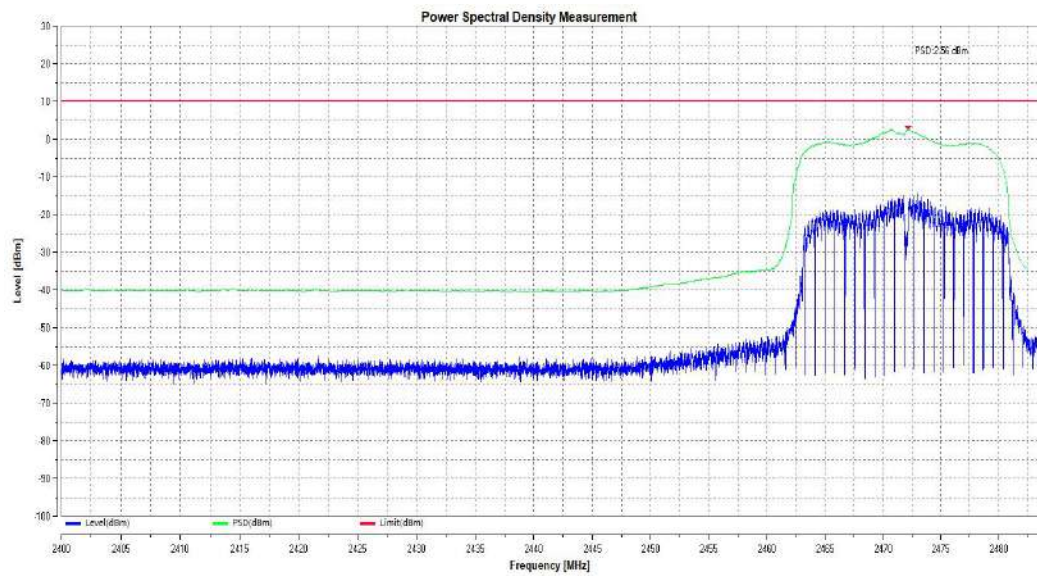
802.11n HT20 2412



802.11n HT20 2442



802.11n HT20 2472



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 μ s	5% of COT	(see note 2)	(see note 2)
Extended CCA check	NA	NA	(see note 2)	between 18 μ s and at least 160 μ s
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 TM -2007 clauses 9,15,18 or 19, in IEEE Std. 802.11n TM -2009 clauses 9,11 and 20 or in IEEE Std. 802.15.4 TM -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:

$$TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{\text{out}}) \quad (P_{\text{out}} \text{ in mW e.i.r.p.})$$

Unwanted Signal parameters

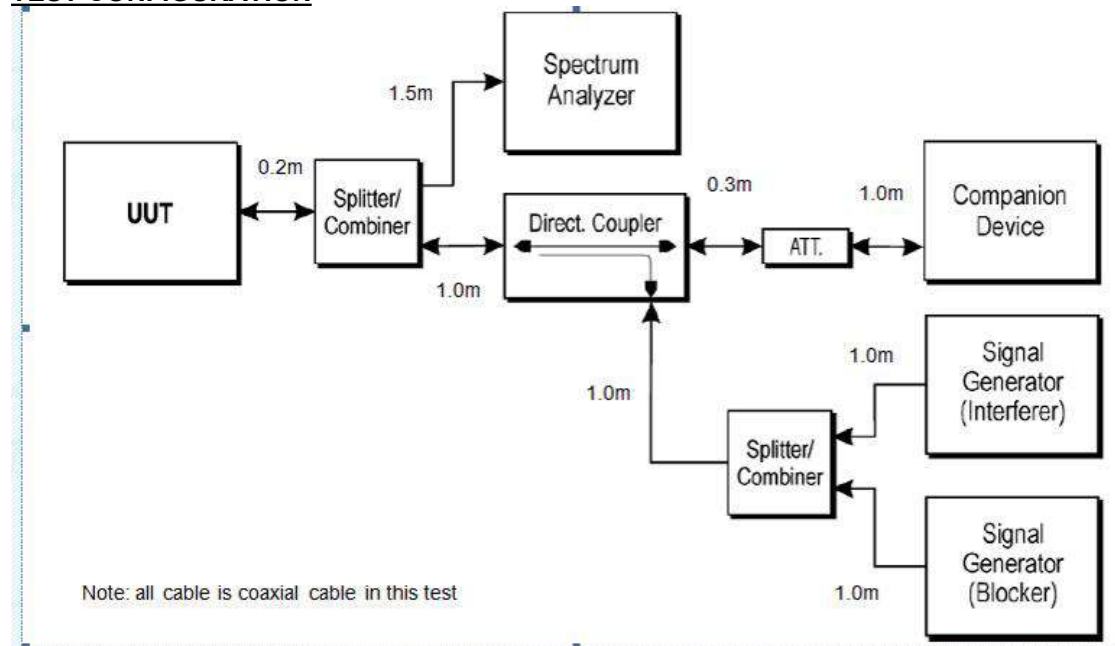
Wanted signal mean power from companion device	Maximum transmit power (PH) EIRP mW	Threshold Level (TL)
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)

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: $\geq$ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used)
- VBW: $3 \times$ 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.

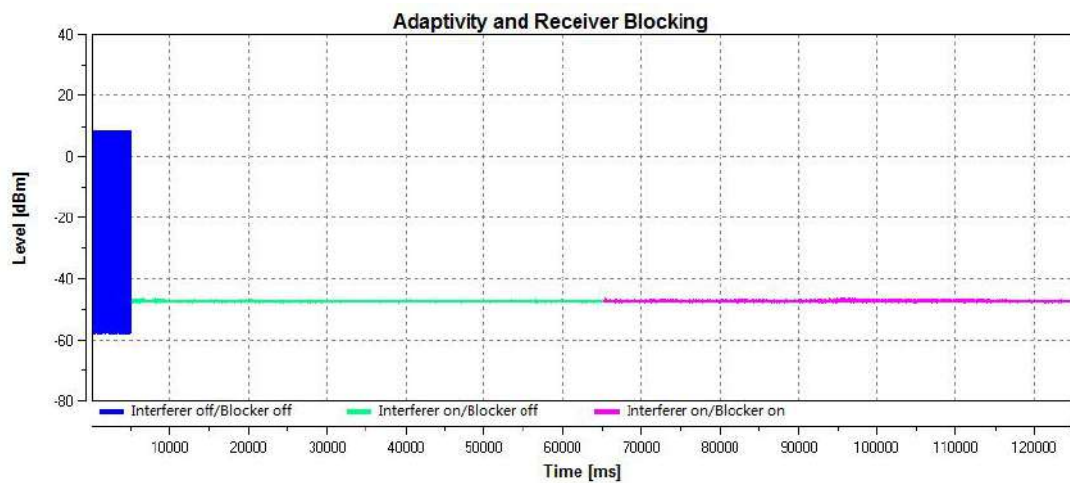
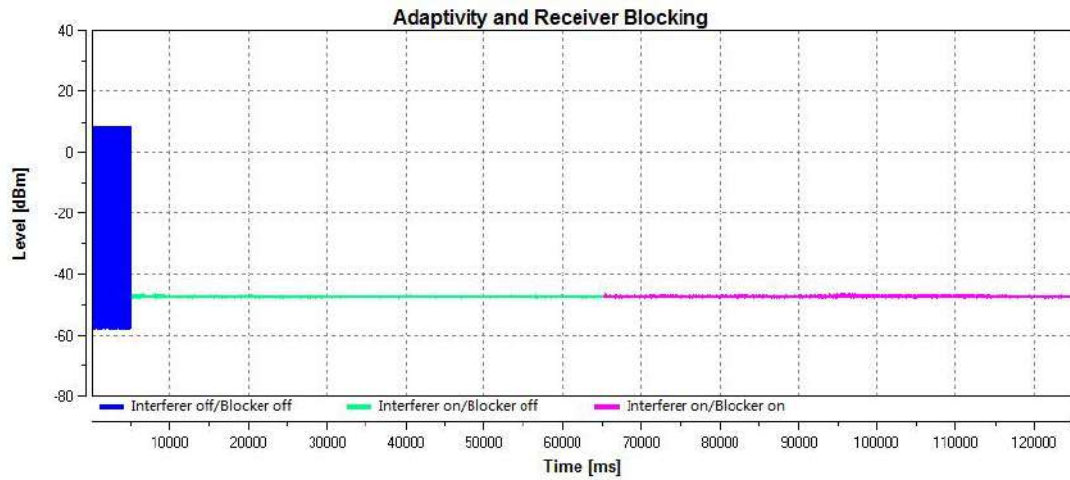
Step 7:

- 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	2.252	0.090	0	0	10	PASS
802.11b	HCH	2.137	0.076	0	0	10	PASS

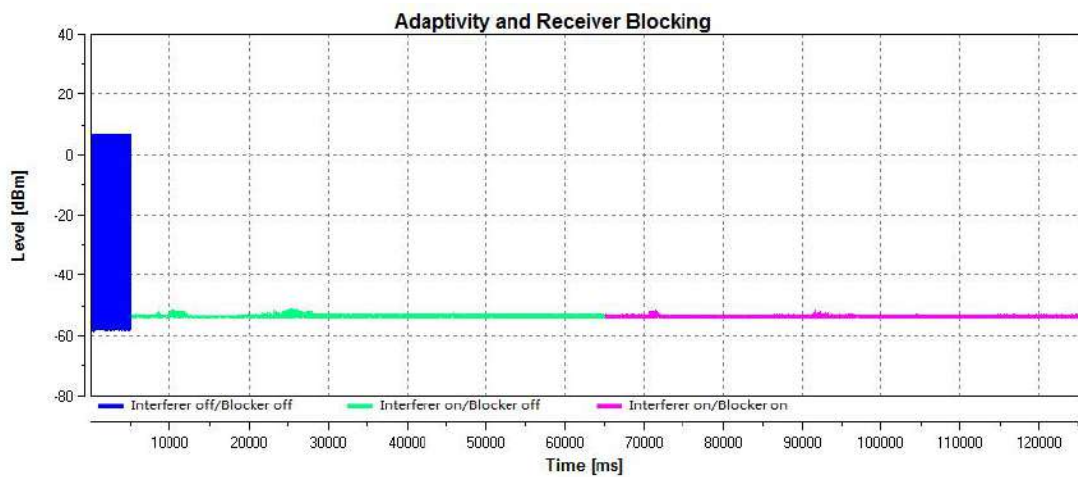
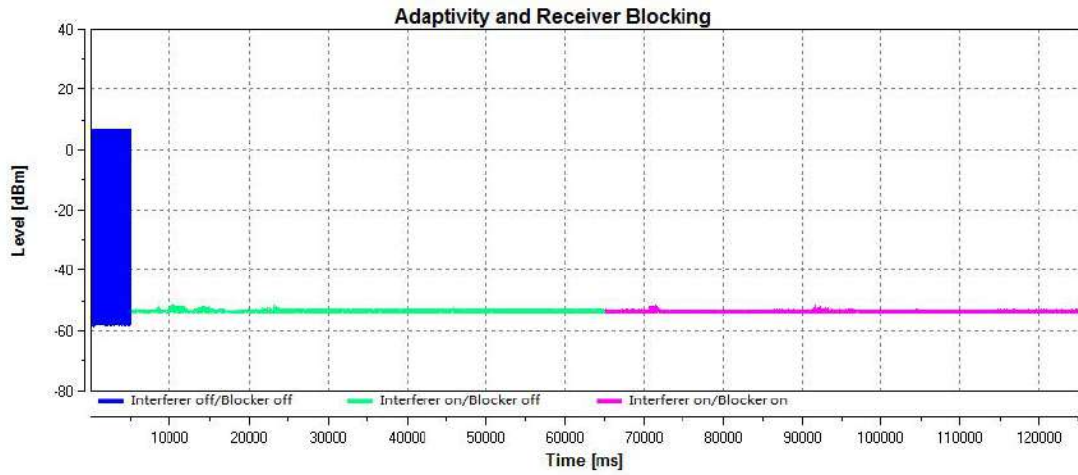
Test Plot



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	2.084	0.268	0	0	10	PASS
802.11g	HCH	2.353	0.196	0	0	10	PASS

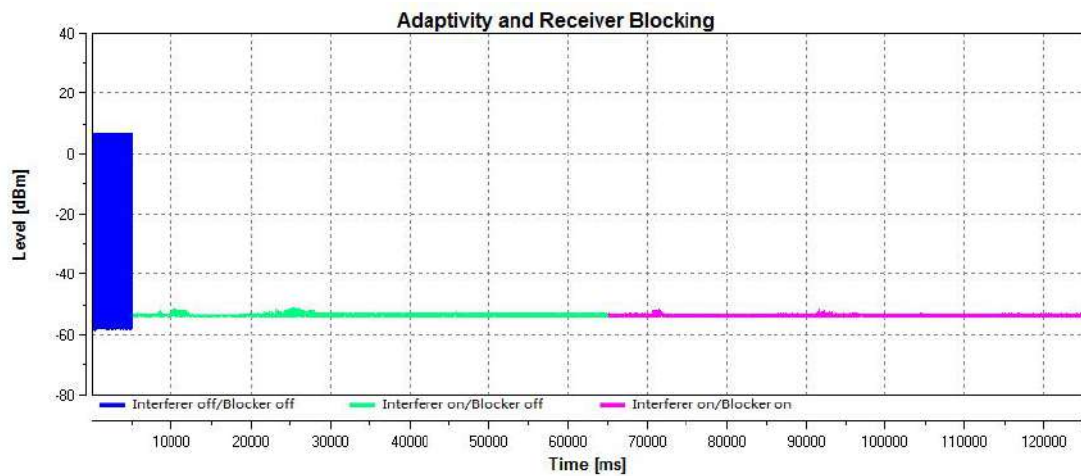
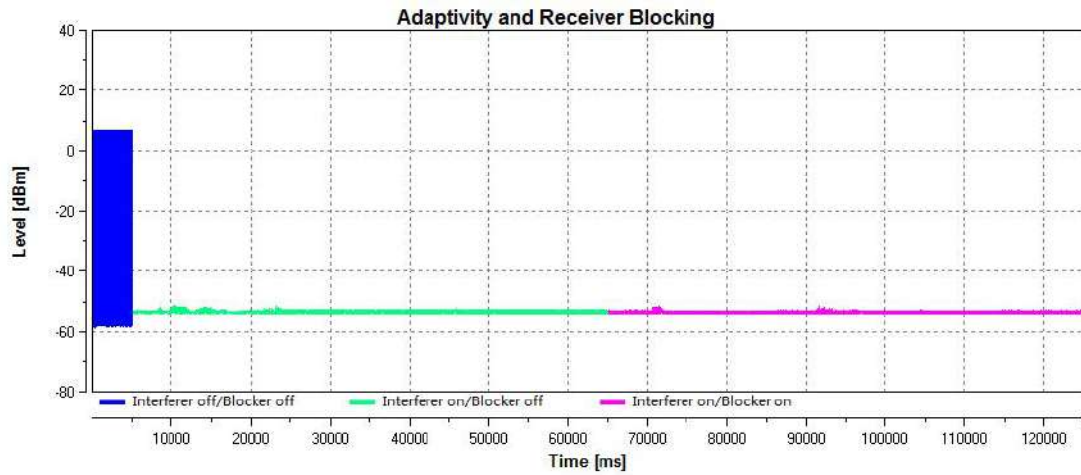
Test Plot



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	2.533	0.059	0	0	10	PASS
802.11n HT20	HCH	2.580	0.084	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,

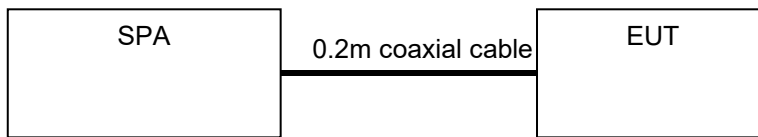
The Occupied Channel Bandwidth shall fall completely within the band given in table 1.

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
Test Channel	☒ 2412MHz ☒ 2472MHz	☒ 2412MHz ☒ 2472MHz	☒ 2412MHz ☒ 2472MHz
Bandwidth	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz
Modulation Type	☒ DSSS ☐ OFDM	☐ DSSS ☒ OFDM	☐ DSSS ☒ OFDM
Channel Separation	☒ 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	13.892	2405.028	---	PASS
TNVN	11B	2472	Ant1	13.978	---	2478.946	PASS
TNVN	11G	2412	Ant1	16.309	2403.846	---	PASS
TNVN	11G	2472	Ant1	16.330	---	2480.159	PASS
TNVN	11N20	2412	Ant1	17.439	2403.278	---	PASS
TNVN	11N20	2472	Ant1	17.326	---	2480.655	PASS

802.11b 2412



802.11b 2472



802.11g 2412





802.11g 2472



802.11n HT20 2412



802.11n HT20 2472



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.

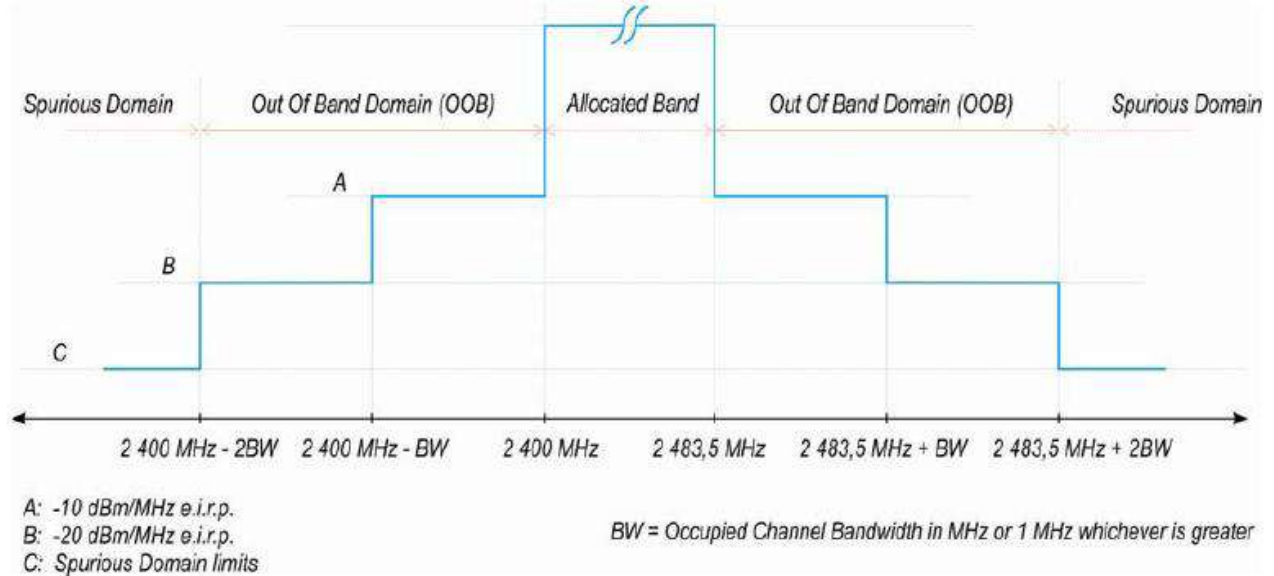


Figure 3: Transmit mask

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.

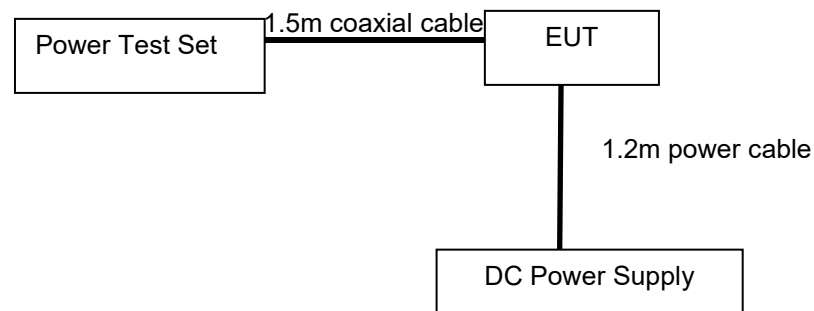
These measurements shall only be performed at normal test conditions.

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), then 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 $10 \times \log_{10}(A_{ch})$ 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: A_{ch} 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
Test Channel	☒ 2412MHz ☒ 2472MHz	☒ 2412MHz ☒ 2472MHz	☒ 2412MHz ☒ 2472MHz
Bandwidth	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz	☒ 20MHz ☐ 40MHz
Modulation Type	☒ DSSS ☐ OFDM	☐ DSSS ☒ OFDM	☐ DSSS ☒ OFDM
Channel Separation	☒ 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 μ s) 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	2373.634	-49.97	<=-20	PASS
TNVN	11B	2412	Ant1	2374.067	-51.27	<=-20	PASS
TNVN	11B	2412	Ant1	2375.067	-52.17	<=-20	PASS
TNVN	11B	2412	Ant1	2376.067	-50.43	<=-20	PASS
TNVN	11B	2412	Ant1	2377.067	-49.84	<=-20	PASS
TNVN	11B	2412	Ant1	2378.067	-49.55	<=-20	PASS
TNVN	11B	2412	Ant1	2379.067	-50.84	<=-20	PASS
TNVN	11B	2412	Ant1	2380.067	-49.35	<=-20	PASS
TNVN	11B	2412	Ant1	2381.067	-49.56	<=-20	PASS
TNVN	11B	2412	Ant1	2382.067	-52.15	<=-20	PASS
TNVN	11B	2412	Ant1	2383.067	-50.30	<=-20	PASS
TNVN	11B	2412	Ant1	2384.067	-47.79	<=-20	PASS
TNVN	11B	2412	Ant1	2385.067	-49.65	<=-20	PASS
TNVN	11B	2412	Ant1	2386.067	-48.07	<=-20	PASS
TNVN	11B	2412	Ant1	2373.634	-49.10	<=-20	PASS
TNVN	11B	2412	Ant1	2374.067	-50.97	<=-20	PASS
TNVN	11B	2412	Ant1	2385.500	-51.23	<=-10	PASS
TNVN	11B	2412	Ant1	2385.600	-47.63	<=-10	PASS
TNVN	11B	2412	Ant1	2386.500	-50.66	<=-10	PASS
TNVN	11B	2412	Ant1	2387.500	-49.17	<=-10	PASS
TNVN	11B	2412	Ant1	2388.500	-50.43	<=-10	PASS
TNVN	11B	2412	Ant1	2389.500	-47.26	<=-10	PASS
TNVN	11B	2412	Ant1	2390.500	-47.76	<=-10	PASS
TNVN	11B	2412	Ant1	2391.500	-45.66	<=-10	PASS
TNVN	11B	2412	Ant1	2392.500	-42.44	<=-10	PASS
TNVN	11B	2412	Ant1	2393.500	-44.57	<=-10	PASS
TNVN	11B	2412	Ant1	2394.500	-42.75	<=-10	PASS
TNVN	11B	2412	Ant1	2395.500	-44.26	<=-10	PASS
TNVN	11B	2412	Ant1	2396.500	-48.94	<=-10	PASS
TNVN	11B	2412	Ant1	2397.500	-50.86	<=-10	PASS
TNVN	11B	2412	Ant1	2398.500	-50.85	<=-10	PASS
TNVN	11B	2412	Ant1	2399.500	-51.17	<=-10	PASS



TNVN	11B	2412	Ant1	2484.000	-50.35	<=-10	PASS
TNVN	11B	2412	Ant1	2485.000	-51.17	<=-10	PASS
TNVN	11B	2412	Ant1	2486.000	-50.76	<=-10	PASS
TNVN	11B	2412	Ant1	2487.000	-48.73	<=-10	PASS
TNVN	11B	2412	Ant1	2488.000	-49.33	<=-10	PASS
TNVN	11B	2412	Ant1	2489.000	-49.40	<=-10	PASS
TNVN	11B	2412	Ant1	2490.000	-49.27	<=-10	PASS
TNVN	11B	2412	Ant1	2491.000	-50.53	<=-10	PASS
TNVN	11B	2412	Ant1	2492.000	-50.96	<=-10	PASS
TNVN	11B	2412	Ant1	2493.000	-49.78	<=-10	PASS
TNVN	11B	2412	Ant1	2494.000	-48.67	<=-10	PASS
TNVN	11B	2412	Ant1	2495.000	-52.09	<=-10	PASS
TNVN	11B	2412	Ant1	2496.000	-51.26	<=-10	PASS
TNVN	11B	2412	Ant1	2497.000	-49.47	<=-10	PASS
TNVN	11B	2412	Ant1	2497.900	-49.48	<=-10	PASS
TNVN	11B	2412	Ant1	2498.000	-50.19	<=-10	PASS
TNVN	11B	2412	Ant1	2498.900	-47.30	<=-20	PASS
TNVN	11B	2412	Ant1	2499.900	-49.35	<=-20	PASS
TNVN	11B	2412	Ant1	2500.900	-49.68	<=-20	PASS
TNVN	11B	2412	Ant1	2501.900	-47.48	<=-20	PASS
TNVN	11B	2412	Ant1	2502.900	-49.09	<=-20	PASS
TNVN	11B	2412	Ant1	2503.900	-48.84	<=-20	PASS
TNVN	11B	2412	Ant1	2504.900	-48.67	<=-20	PASS
TNVN	11B	2412	Ant1	2505.900	-50.57	<=-20	PASS
TNVN	11B	2412	Ant1	2506.900	-51.55	<=-20	PASS
TNVN	11B	2412	Ant1	2507.900	-51.29	<=-20	PASS
TNVN	11B	2412	Ant1	2508.900	-49.94	<=-20	PASS
TNVN	11B	2412	Ant1	2509.900	-49.40	<=-20	PASS
TNVN	11B	2412	Ant1	2510.900	-50.47	<=-20	PASS
TNVN	11B	2412	Ant1	2511.900	-49.49	<=-20	PASS
TNVN	11B	2412	Ant1	2512.800	-49.20	<=-20	PASS
TNVN	11B	2412	Ant1	2512.900	-48.76	<=-20	PASS
TNVN	11B	2472	Ant1	2368.906	-49.34	<=-20	PASS
TNVN	11B	2472	Ant1	2369.312	-50.94	<=-20	PASS



TNVN	11B	2472	Ant1	2369.906	-49.85	<=-20	PASS
TNVN	11B	2472	Ant1	2370.906	-50.86	<=-20	PASS
TNVN	11B	2472	Ant1	2371.906	-49.07	<=-20	PASS
TNVN	11B	2472	Ant1	2372.906	-50.07	<=-20	PASS
TNVN	11B	2472	Ant1	2373.906	-49.99	<=-20	PASS
TNVN	11B	2472	Ant1	2374.906	-48.49	<=-20	PASS
TNVN	11B	2472	Ant1	2375.906	-49.33	<=-20	PASS
TNVN	11B	2472	Ant1	2376.906	-49.77	<=-20	PASS
TNVN	11B	2472	Ant1	2377.906	-51.78	<=-20	PASS
TNVN	11B	2472	Ant1	2378.906	-50.94	<=-20	PASS
TNVN	11B	2472	Ant1	2379.906	-50.03	<=-20	PASS
TNVN	11B	2472	Ant1	2380.906	-51.85	<=-20	PASS
TNVN	11B	2472	Ant1	2381.906	-51.35	<=-20	PASS
TNVN	11B	2472	Ant1	2382.906	-49.60	<=-20	PASS
TNVN	11B	2472	Ant1	2383.906	-51.83	<=-20	PASS
TNVN	11B	2472	Ant1	2384.500	-49.40	<=-10	PASS
TNVN	11B	2472	Ant1	2384.906	-40.43	<=-10	PASS
TNVN	11B	2472	Ant1	2385.500	-39.33	<=-10	PASS
TNVN	11B	2472	Ant1	2386.500	-41.39	<=-10	PASS
TNVN	11B	2472	Ant1	2387.500	-39.59	<=-10	PASS
TNVN	11B	2472	Ant1	2388.500	-41.25	<=-10	PASS
TNVN	11B	2472	Ant1	2389.500	-41.87	<=-10	PASS
TNVN	11B	2472	Ant1	2390.500	-45.03	<=-10	PASS
TNVN	11B	2472	Ant1	2391.500	-44.39	<=-10	PASS
TNVN	11B	2472	Ant1	2392.500	-46.49	<=-10	PASS
TNVN	11B	2472	Ant1	2393.500	-45.60	<=-10	PASS
TNVN	11B	2472	Ant1	2394.500	-44.60	<=-10	PASS
TNVN	11B	2472	Ant1	2395.500	-46.40	<=-10	PASS
TNVN	11B	2472	Ant1	2396.500	-45.94	<=-10	PASS
TNVN	11B	2472	Ant1	2397.500	-45.93	<=-10	PASS
TNVN	11B	2472	Ant1	2398.500	-45.33	<=-10	PASS
TNVN	11B	2472	Ant1	2399.500	-45.76	<=-10	PASS
TNVN	11B	2472	Ant1	2484.000	-51.15	<=-10	PASS
TNVN	11B	2472	Ant1	2485.000	-51.48	<=-10	PASS



TNVN	11B	2472	Ant1	2486.000	-50.59	<=-10	PASS
TNVN	11B	2472	Ant1	2487.000	-46.97	<=-10	PASS
TNVN	11B	2472	Ant1	2488.000	-48.30	<=-10	PASS
TNVN	11B	2472	Ant1	2489.000	-48.95	<=-10	PASS
TNVN	11B	2472	Ant1	2490.000	-49.93	<=-10	PASS
TNVN	11B	2472	Ant1	2491.000	-49.23	<=-10	PASS
TNVN	11B	2472	Ant1	2492.000	-48.37	<=-10	PASS
TNVN	11B	2472	Ant1	2493.000	-48.24	<=-10	PASS
TNVN	11B	2472	Ant1	2494.000	-47.25	<=-10	PASS
TNVN	11B	2472	Ant1	2495.000	-48.93	<=-10	PASS
TNVN	11B	2472	Ant1	2496.000	-49.85	<=-10	PASS
TNVN	11B	2472	Ant1	2497.000	-50.96	<=-10	PASS
TNVN	11B	2472	Ant1	2498.000	-49.93	<=-10	PASS
TNVN	11B	2472	Ant1	2498.594	-50.50	<=-10	PASS
TNVN	11B	2472	Ant1	2499.000	-50.71	<=-10	PASS
TNVN	11B	2472	Ant1	2499.594	-50.57	<=-20	PASS
TNVN	11B	2472	Ant1	2500.594	-50.39	<=-20	PASS
TNVN	11B	2472	Ant1	2501.594	-52.33	<=-20	PASS
TNVN	11B	2472	Ant1	2502.594	-51.44	<=-20	PASS
TNVN	11B	2472	Ant1	2503.594	-51.95	<=-20	PASS
TNVN	11B	2472	Ant1	2504.594	-50.36	<=-20	PASS
TNVN	11B	2472	Ant1	2505.594	-50.30	<=-20	PASS
TNVN	11B	2472	Ant1	2506.594	-50.68	<=-20	PASS
TNVN	11B	2472	Ant1	2507.594	-51.44	<=-20	PASS
TNVN	11B	2472	Ant1	2508.594	-50.96	<=-20	PASS
TNVN	11B	2472	Ant1	2509.594	-49.10	<=-20	PASS
TNVN	11B	2472	Ant1	2510.594	-50.46	<=-20	PASS
TNVN	11B	2472	Ant1	2511.594	-49.69	<=-20	PASS
TNVN	11B	2472	Ant1	2512.594	-49.25	<=-20	PASS
TNVN	11B	2472	Ant1	2513.594	-50.68	<=-20	PASS
TNVN	11B	2472	Ant1	2514.188	-51.04	<=-20	PASS
TNVN	11B	2472	Ant1	2514.594	-50.97	<=-20	PASS
TNVN	11G	2412	Ant1	2366.922	-49.80	<=-20	PASS
TNVN	11G	2412	Ant1	2367.344	-46.60	<=-20	PASS



TNVN	11G	2412	Ant1	2367.922	-46.57	<=-20	PASS
TNVN	11G	2412	Ant1	2368.922	-47.94	<=-20	PASS
TNVN	11G	2412	Ant1	2369.922	-48.57	<=-20	PASS
TNVN	11G	2412	Ant1	2370.922	-46.97	<=-20	PASS
TNVN	11G	2412	Ant1	2371.922	-46.46	<=-20	PASS
TNVN	11G	2412	Ant1	2372.922	-44.03	<=-20	PASS
TNVN	11G	2412	Ant1	2373.922	-46.35	<=-20	PASS
TNVN	11G	2412	Ant1	2374.922	-43.56	<=-20	PASS
TNVN	11G	2412	Ant1	2375.922	-39.47	<=-20	PASS
TNVN	11G	2412	Ant1	2376.922	-41.13	<=-20	PASS
TNVN	11G	2412	Ant1	2377.922	-37.38	<=-20	PASS
TNVN	11G	2412	Ant1	2378.922	-51.39	<=-20	PASS
TNVN	11G	2412	Ant1	2379.922	-50.36	<=-20	PASS
TNVN	11G	2412	Ant1	2380.922	-48.26	<=-20	PASS
TNVN	11G	2412	Ant1	2381.922	-48.68	<=-20	PASS
TNVN	11G	2412	Ant1	2382.922	-47.27	<=-20	PASS
TNVN	11G	2412	Ant1	2383.500	-49.35	<=-10	PASS
TNVN	11G	2412	Ant1	2383.922	-49.19	<=-10	PASS
TNVN	11G	2412	Ant1	2384.500	-48.63	<=-10	PASS
TNVN	11G	2412	Ant1	2385.500	-50.03	<=-10	PASS
TNVN	11G	2412	Ant1	2386.500	-49.19	<=-10	PASS
TNVN	11G	2412	Ant1	2387.500	-51.63	<=-10	PASS
TNVN	11G	2412	Ant1	2388.500	-48.17	<=-10	PASS
TNVN	11G	2412	Ant1	2389.500	-48.78	<=-10	PASS
TNVN	11G	2412	Ant1	2390.500	-47.33	<=-10	PASS
TNVN	11G	2412	Ant1	2391.500	-49.03	<=-10	PASS
TNVN	11G	2412	Ant1	2392.500	-48.66	<=-10	PASS
TNVN	11G	2412	Ant1	2393.500	-50.36	<=-10	PASS
TNVN	11G	2412	Ant1	2394.500	-50.57	<=-10	PASS
TNVN	11G	2412	Ant1	2395.500	-48.75	<=-10	PASS
TNVN	11G	2412	Ant1	2396.500	-49.27	<=-10	PASS
TNVN	11G	2412	Ant1	2397.500	-49.53	<=-10	PASS
TNVN	11G	2412	Ant1	2398.500	-47.08	<=-10	PASS
TNVN	11G	2412	Ant1	2399.500	-48.25	<=-10	PASS



TNVN	11G	2412	Ant1	2484.000	-50.74	<=-10	PASS
TNVN	11G	2412	Ant1	2485.000	-49.28	<=-10	PASS
TNVN	11G	2412	Ant1	2486.000	-48.25	<=-10	PASS
TNVN	11G	2412	Ant1	2487.000	-47.94	<=-10	PASS
TNVN	11G	2412	Ant1	2488.000	-49.86	<=-10	PASS
TNVN	11G	2412	Ant1	2489.000	-49.57	<=-10	PASS
TNVN	11G	2412	Ant1	2490.000	-49.90	<=-10	PASS
TNVN	11G	2412	Ant1	2491.000	-48.29	<=-10	PASS
TNVN	11G	2412	Ant1	2492.000	-48.25	<=-10	PASS
TNVN	11G	2412	Ant1	2493.000	-47.76	<=-10	PASS
TNVN	11G	2412	Ant1	2494.000	-49.14	<=-10	PASS
TNVN	11G	2412	Ant1	2495.000	-49.55	<=-10	PASS
TNVN	11G	2412	Ant1	2496.000	-50.54	<=-10	PASS
TNVN	11G	2412	Ant1	2497.000	-50.96	<=-10	PASS
TNVN	11G	2412	Ant1	2498.000	-50.89	<=-10	PASS
TNVN	11G	2412	Ant1	2499.000	-51.09	<=-10	PASS
TNVN	11G	2412	Ant1	2499.578	-52.15	<=-10	PASS
TNVN	11G	2412	Ant1	2500.000	-52.38	<=-10	PASS
TNVN	11G	2412	Ant1	2500.578	-51.35	<=-20	PASS
TNVN	11G	2412	Ant1	2501.578	-50.93	<=-20	PASS
TNVN	11G	2412	Ant1	2502.578	-52.34	<=-20	PASS
TNVN	11G	2412	Ant1	2503.578	-51.73	<=-20	PASS
TNVN	11G	2412	Ant1	2504.578	-52.06	<=-20	PASS
TNVN	11G	2412	Ant1	2505.578	-49.36	<=-20	PASS
TNVN	11G	2412	Ant1	2506.578	-51.54	<=-20	PASS
TNVN	11G	2412	Ant1	2507.578	-49.28	<=-20	PASS
TNVN	11G	2412	Ant1	2508.578	-50.74	<=-20	PASS
TNVN	11G	2412	Ant1	2509.578	-50.73	<=-20	PASS
TNVN	11G	2412	Ant1	2510.578	-51.15	<=-20	PASS
TNVN	11G	2412	Ant1	2511.578	-51.90	<=-20	PASS
TNVN	11G	2412	Ant1	2512.578	-52.99	<=-20	PASS
TNVN	11G	2412	Ant1	2513.578	-49.45	<=-20	PASS
TNVN	11G	2412	Ant1	2514.578	-50.48	<=-20	PASS
TNVN	11G	2412	Ant1	2515.578	-49.00	<=-20	PASS



TNVN	11G	2412	Ant1	2516.156	-51.50	<=-20	PASS
TNVN	11G	2412	Ant1	2516.578	-50.35	<=-20	PASS
TNVN	11G	2472	Ant1	2366.828	-50.08	<=-20	PASS
TNVN	11G	2472	Ant1	2367.156	-50.83	<=-20	PASS
TNVN	11G	2472	Ant1	2367.828	-52.19	<=-20	PASS
TNVN	11G	2472	Ant1	2368.828	-50.35	<=-20	PASS
TNVN	11G	2472	Ant1	2369.828	-48.88	<=-20	PASS
TNVN	11G	2472	Ant1	2370.828	-50.90	<=-20	PASS
TNVN	11G	2472	Ant1	2371.828	-52.15	<=-20	PASS
TNVN	11G	2472	Ant1	2372.828	-49.24	<=-20	PASS
TNVN	11G	2472	Ant1	2373.828	-49.06	<=-20	PASS
TNVN	11G	2472	Ant1	2374.828	-51.94	<=-20	PASS
TNVN	11G	2472	Ant1	2375.828	-49.97	<=-20	PASS
TNVN	11G	2472	Ant1	2376.828	-50.06	<=-20	PASS
TNVN	11G	2472	Ant1	2377.828	-31.48	<=-20	PASS
TNVN	11G	2472	Ant1	2378.828	-33.25	<=-20	PASS
TNVN	11G	2472	Ant1	2379.828	-34.04	<=-20	PASS
TNVN	11G	2472	Ant1	2380.828	-34.48	<=-20	PASS
TNVN	11G	2472	Ant1	2381.828	-35.33	<=-20	PASS
TNVN	11G	2472	Ant1	2382.828	-36.02	<=-20	PASS
TNVN	11G	2472	Ant1	2383.500	-40.38	<=-10	PASS
TNVN	11G	2472	Ant1	2383.828	-40.28	<=-10	PASS
TNVN	11G	2472	Ant1	2384.500	-37.67	<=-10	PASS
TNVN	11G	2472	Ant1	2385.500	-40.88	<=-10	PASS
TNVN	11G	2472	Ant1	2386.500	-41.44	<=-10	PASS
TNVN	11G	2472	Ant1	2387.500	-42.05	<=-10	PASS
TNVN	11G	2472	Ant1	2388.500	-45.04	<=-10	PASS
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TNVN	11G	2472	Ant1	2394.500	-45.29	<=-10	PASS
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TNVN	11G	2472	Ant1	2398.500	-46.68	<=-10	PASS
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TNVN	11G	2472	Ant1	2485.000	-47.36	<=-10	PASS
TNVN	11G	2472	Ant1	2486.000	-47.98	<=-10	PASS
TNVN	11G	2472	Ant1	2487.000	-47.45	<=-10	PASS
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TNVN	11N20	2412	Ant1	2503.700	-50.84	<=-20	PASS
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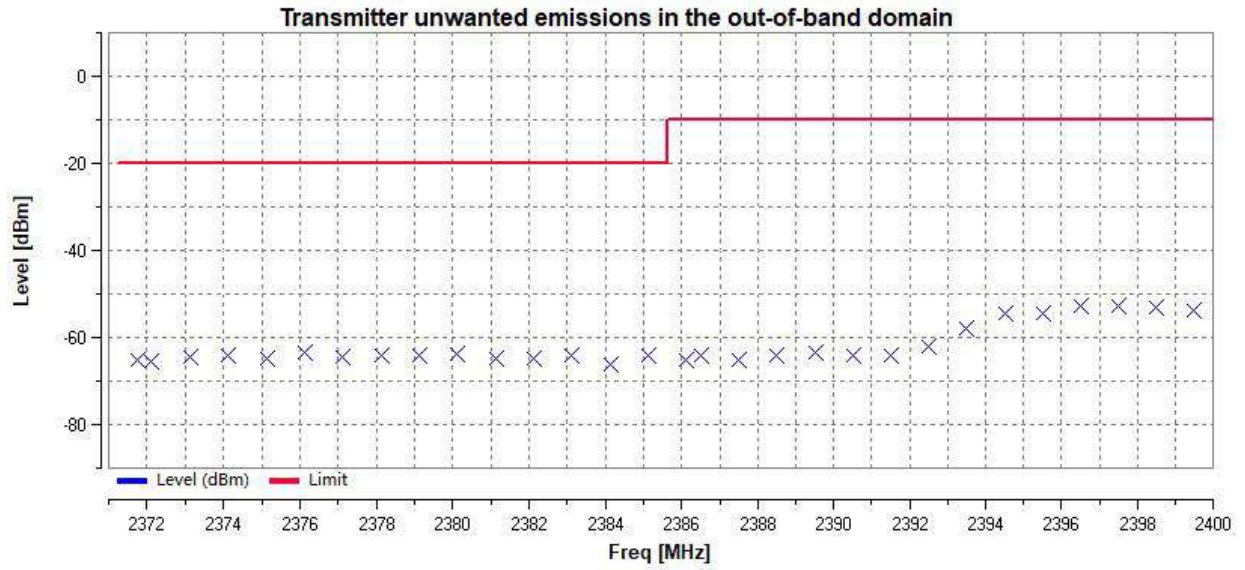


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TNVN	11N20	2472	Ant1	2386.500	-44.50	<=-10	PASS
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TNVN	11N20	2472	Ant1	2488.000	-49.20	<=-10	PASS
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TNVN	11N20	2472	Ant1	2492.000	-39.83	<=-10	PASS
TNVN	11N20	2472	Ant1	2493.000	-40.19	<=-10	PASS
TNVN	11N20	2472	Ant1	2494.000	-39.37	<=-10	PASS
TNVN	11N20	2472	Ant1	2495.000	-42.99	<=-10	PASS
TNVN	11N20	2472	Ant1	2496.000	-40.29	<=-10	PASS
TNVN	11N20	2472	Ant1	2497.000	-36.03	<=-10	PASS
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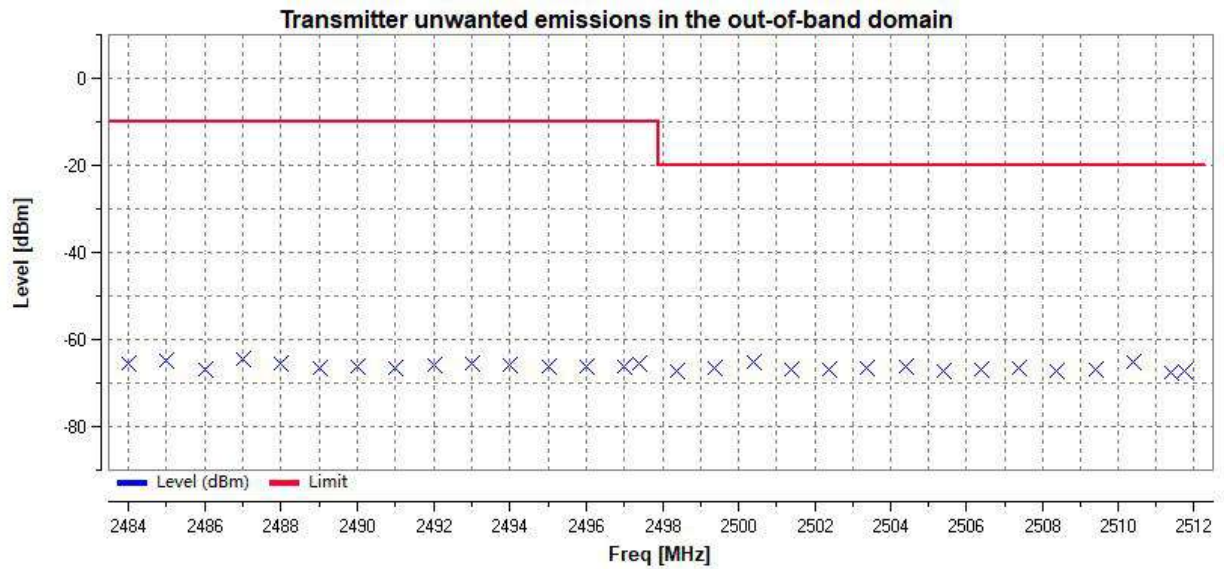


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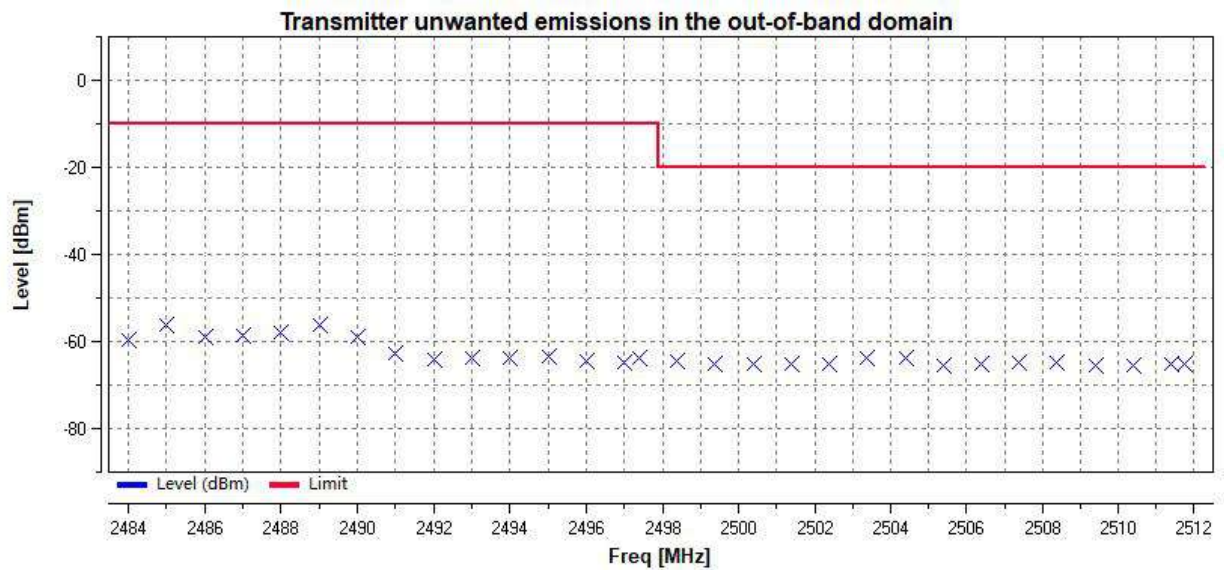
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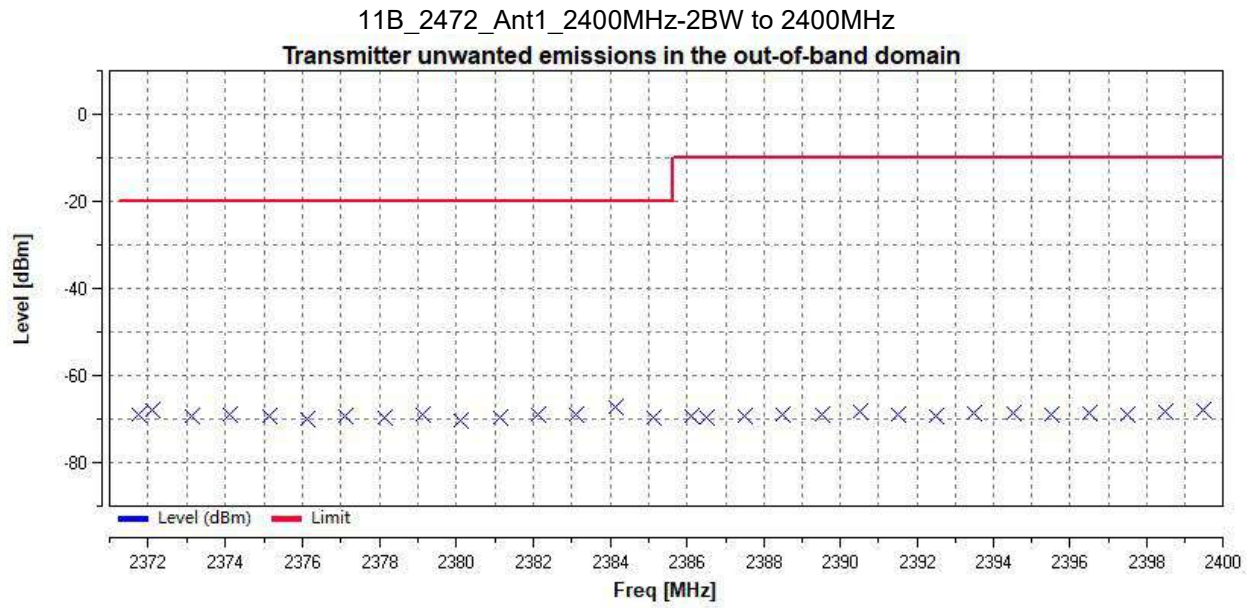


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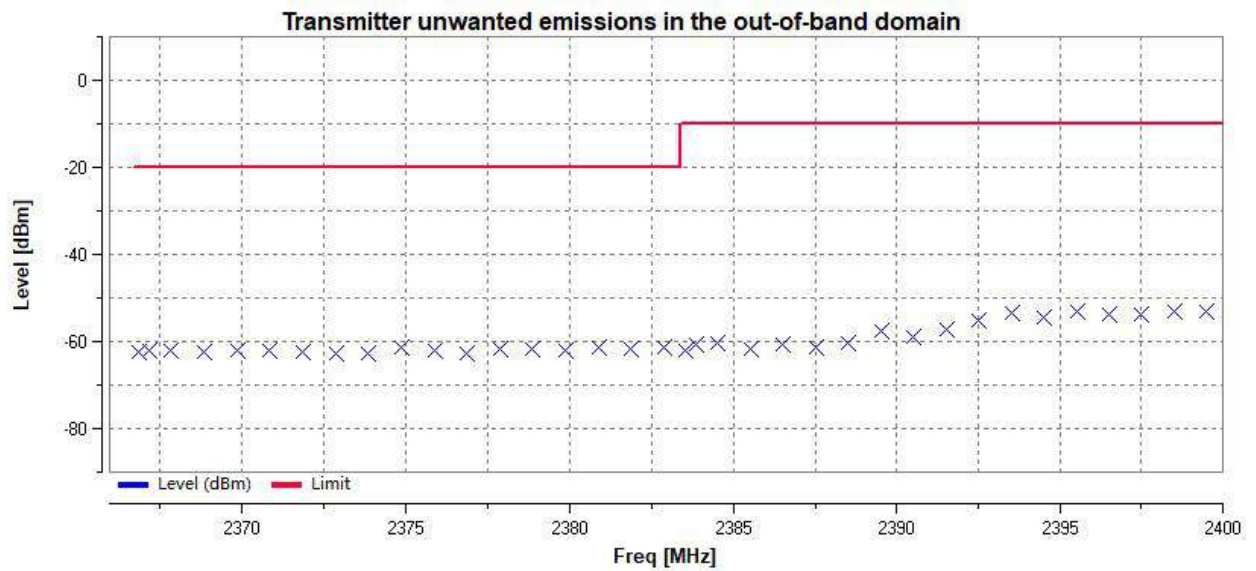


11B_2472_Ant1_2483.5MHz to 2483.5MHz+2BW

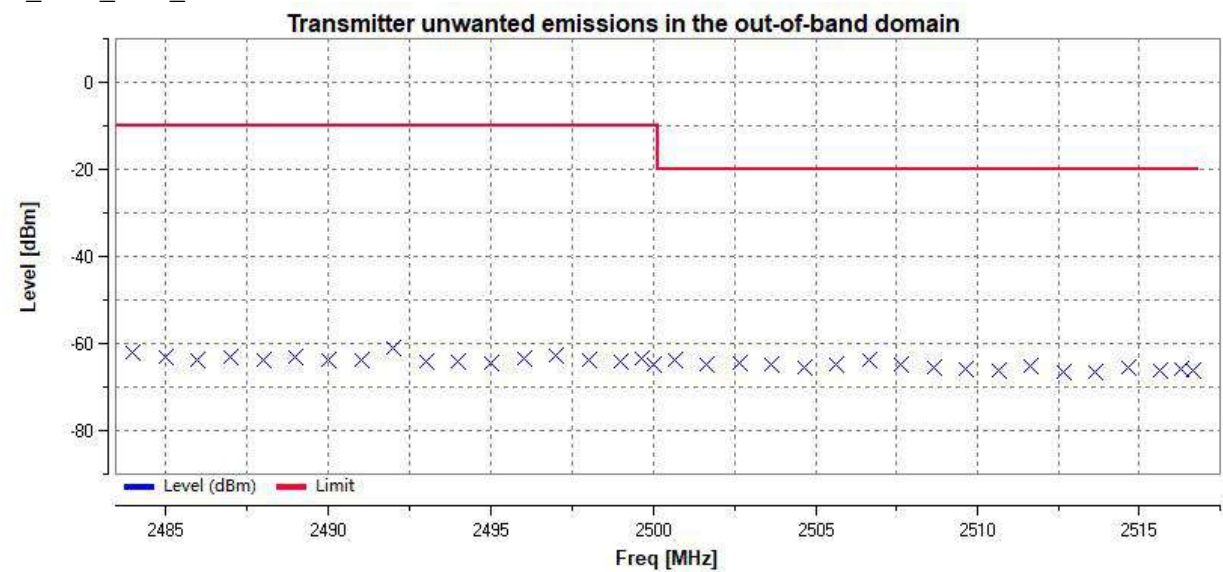




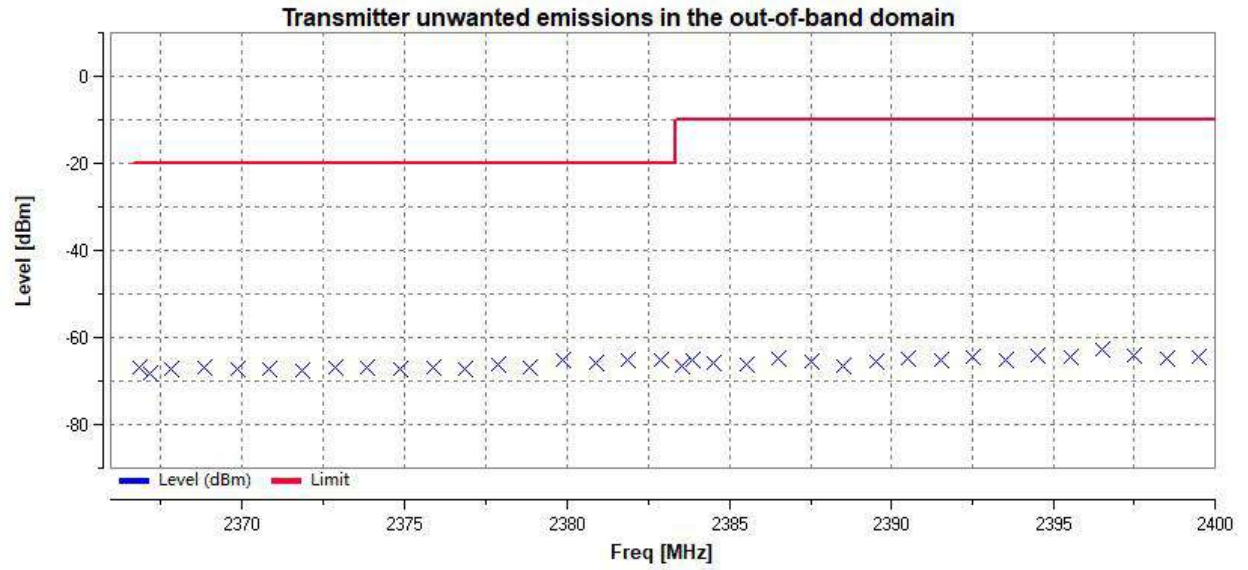
11G_2412_Ant1_2400MHz-2BW to 2400MHz



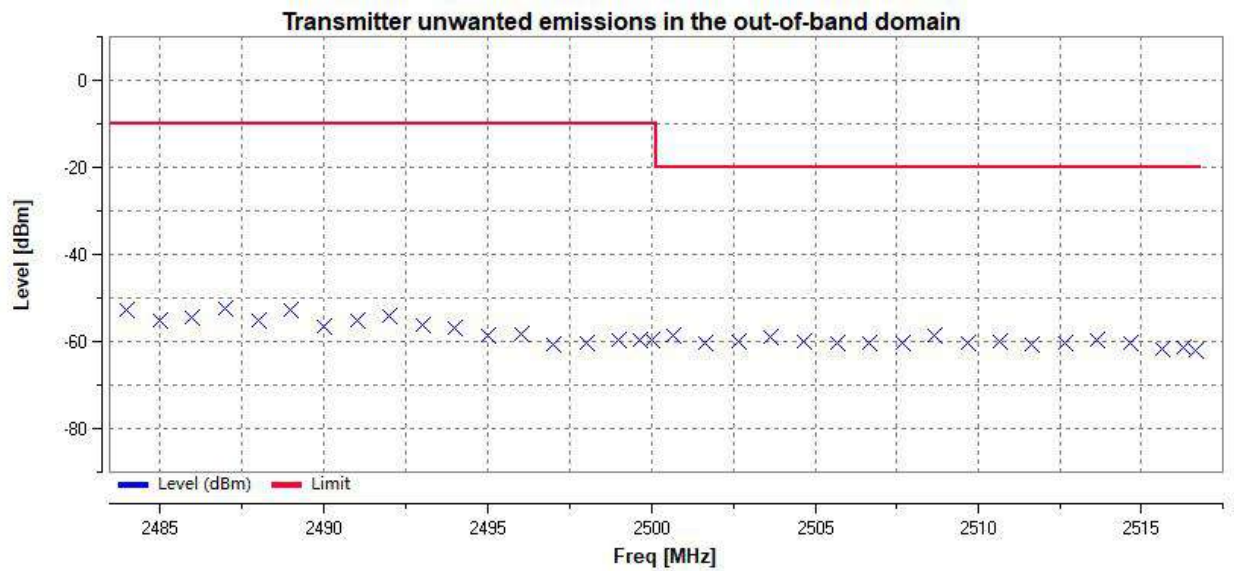
11G_2412_Ant1_2483.5MHz to 2483.5MHz+2BW



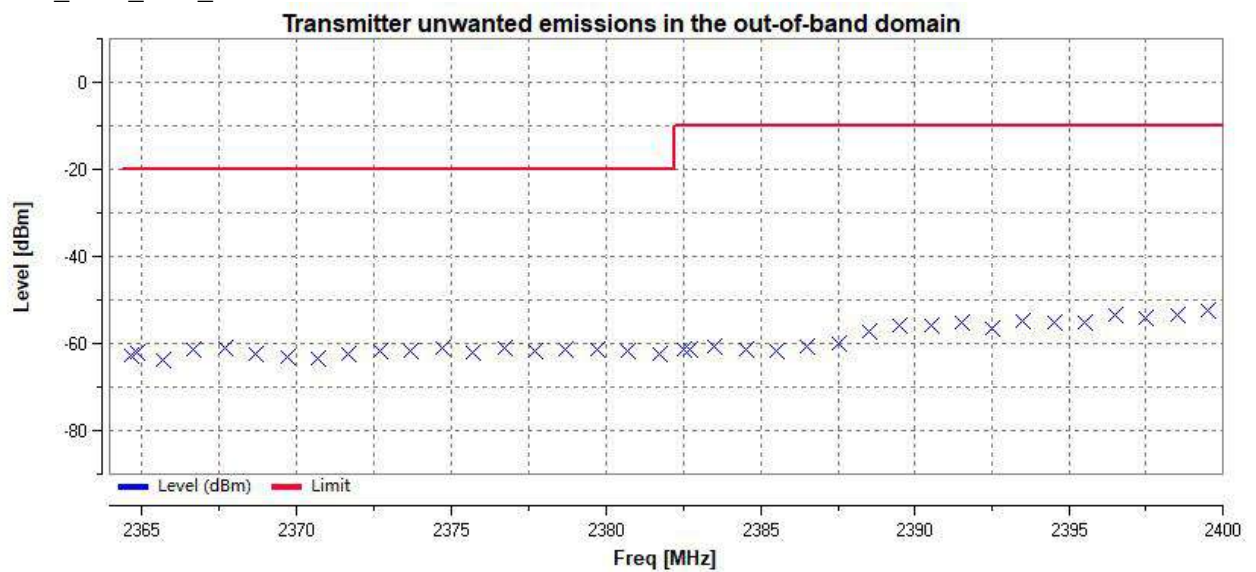
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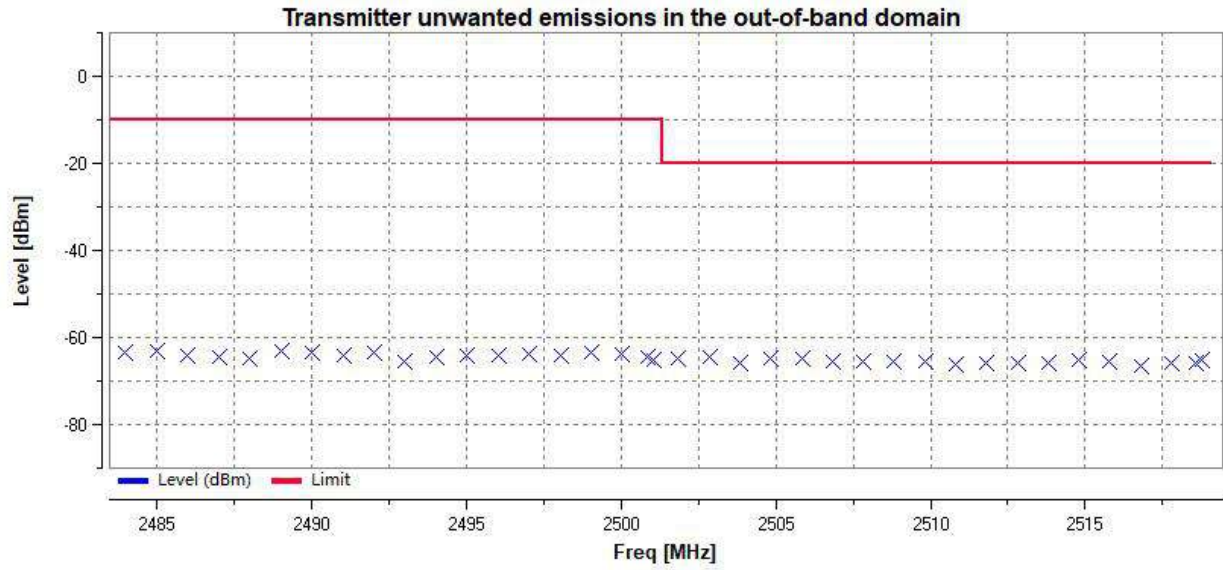
11G_2472_Ant1_2483.5MHz to 2483.5MHz+2BW



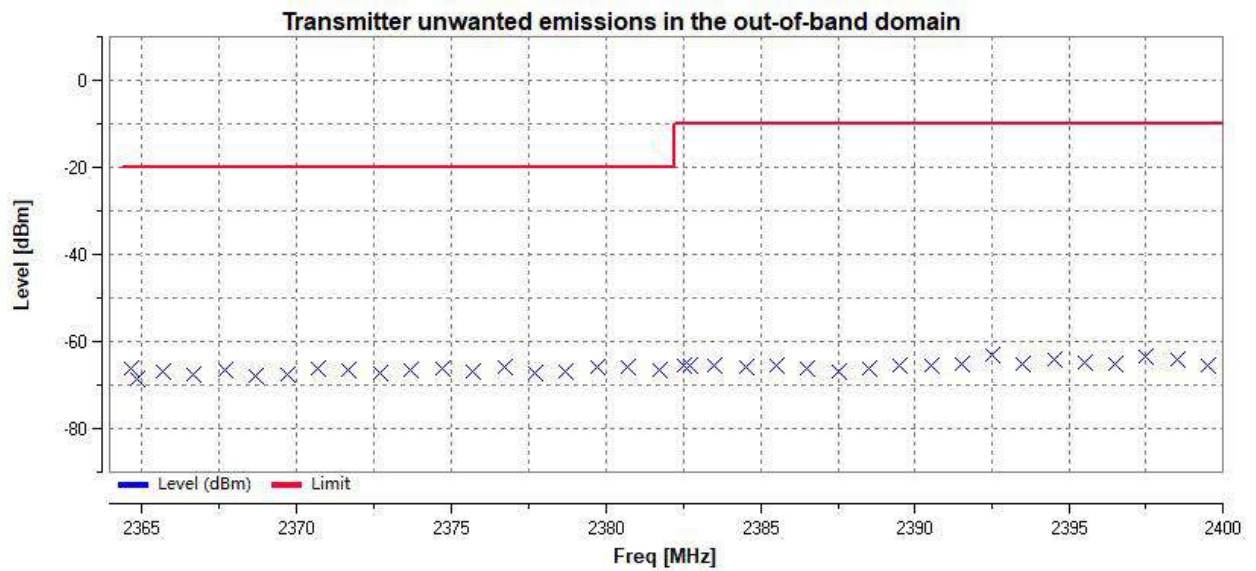
11N20_2412_Ant1_2400MHz-2BW to 2400MHz



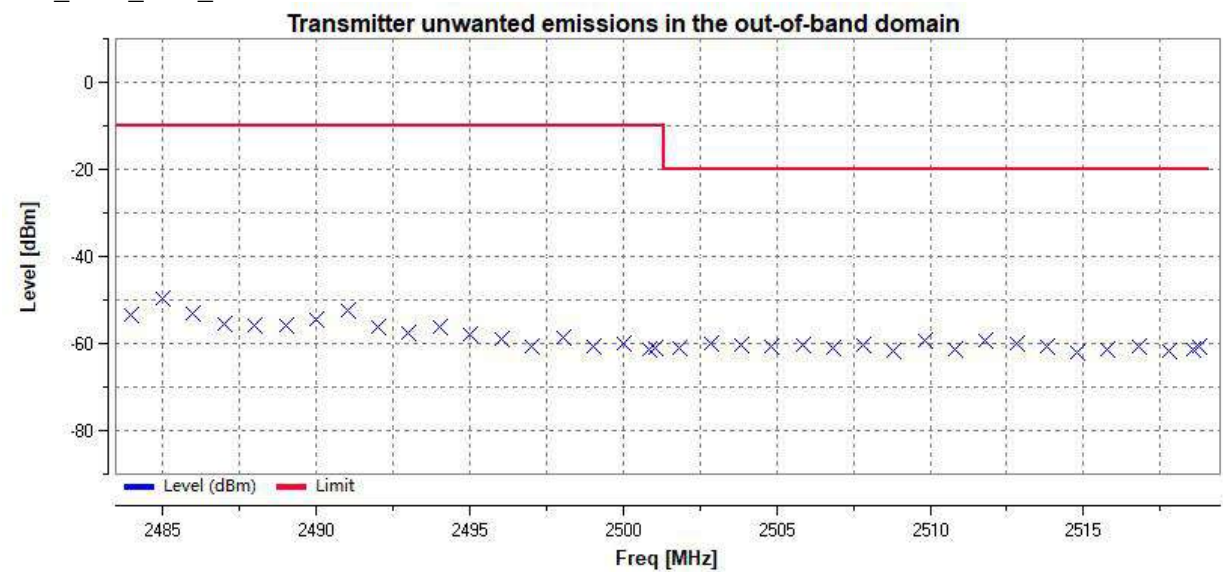
11N20_2412_Ant1_2483.5MHz to 2483.5MHz+2BW



11N20_2472_Ant1_2400MHz-2BW to 2400MHz



11N20_2472_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:

- 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
- 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.

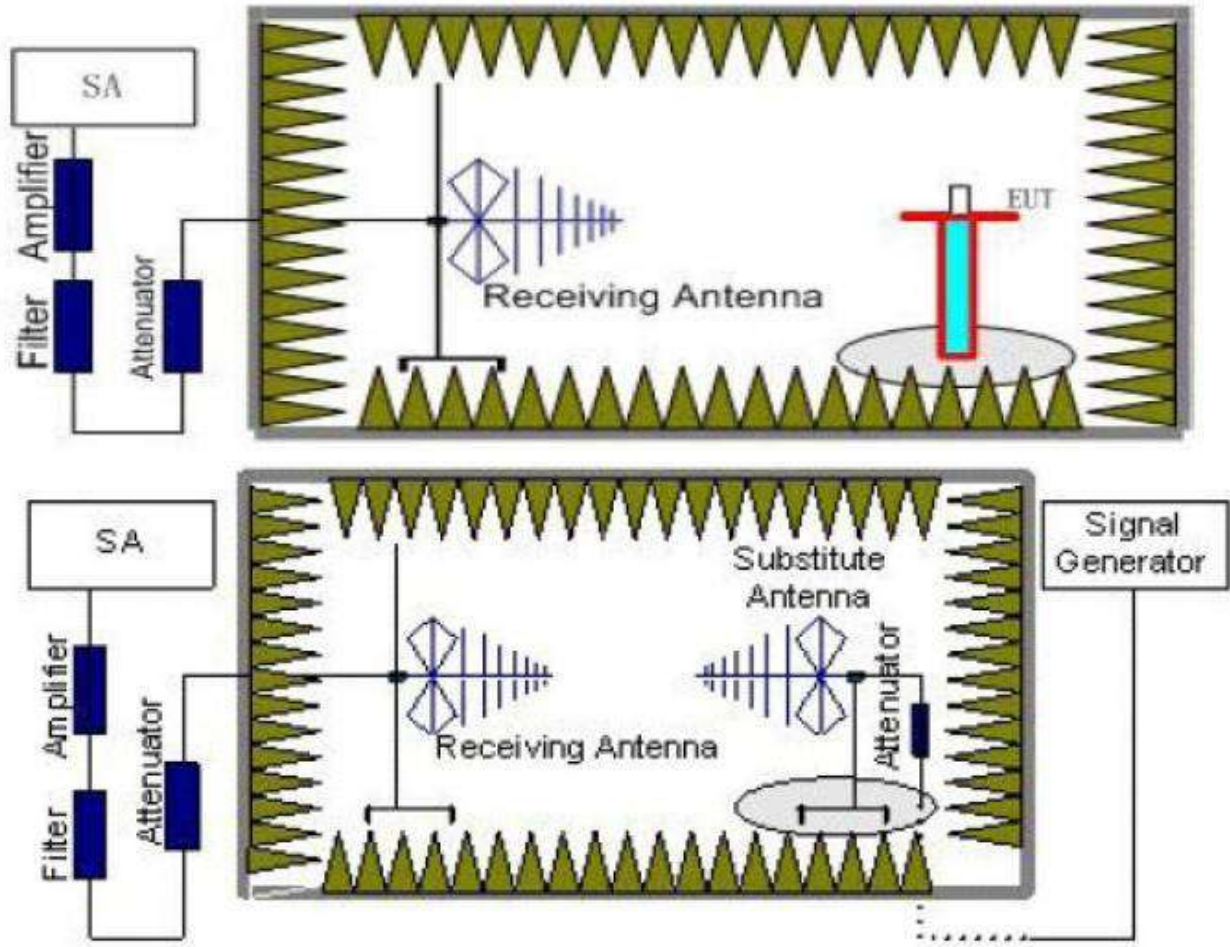
If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then the equipment shall be configured to operate under its worst case situation with respect to spurious emissions.

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:					
262.88	V	-74.29	-36	-38.29	PASS
299.16	V	-77.02	-36	-41.02	PASS
402.68	V	-80.19	-36	-44.19	PASS
461.70	V	-77.44	-36	-41.44	PASS
595.29	V	-75.56	-54	-21.56	PASS
916.42	V	-82.59	-36	-46.59	PASS
287.67	H	-70.50	-36	-34.50	PASS
319.63	H	-73.32	-36	-37.32	PASS
421.20	H	-76.40	-36	-40.40	PASS
518.96	H	-77.80	-54	-23.80	PASS
665.40	H	-73.20	-54	-19.20	PASS
953.08	H	-74.48	-36	-38.48	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					
2009.08	H	-53.56	-30	-23.56	PASS
1837.92	V	-58.18	-30	-28.18	PASS
3024.42	H	-58.77	-30	-28.77	PASS
2935.08	V	-56.12	-30	-26.12	PASS
3482.46	H	-50.12	-30	-20.12	PASS
3630.58	V	-51.20	-30	-21.20	PASS
4143.75	H	-54.54	-30	-24.54	PASS
4095.15	V	-49.65	-30	-19.65	PASS
5500.38	H	-46.07	-30	-16.07	PASS
5402.78	V	-49.66	-30	-19.66	PASS
6951.91	H	-48.89	-30	-18.89	PASS
6852.22	V	-50.76	-30	-20.76	PASS
Test Mode: High Channel					
1912.37	H	-57.96	-30	-27.96	PASS
1984.88	V	-56.17	-30	-26.17	PASS
2806.77	H	-57.98	-30	-27.98	PASS
2624.23	V	-57.16	-30	-27.16	PASS
3235.45	H	-56.49	-30	-26.49	PASS
3495.36	V	-49.89	-30	-19.89	PASS
4110.07	H	-53.48	-30	-23.48	PASS
4076.83	V	-53.87	-30	-23.87	PASS
5437.15	H	-49.65	-30	-19.65	PASS
5466.11	V	-52.35	-30	-22.35	PASS
6888.59	H	-50.90	-30	-20.90	PASS
7115.79	V	-51.66	-30	-21.66	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

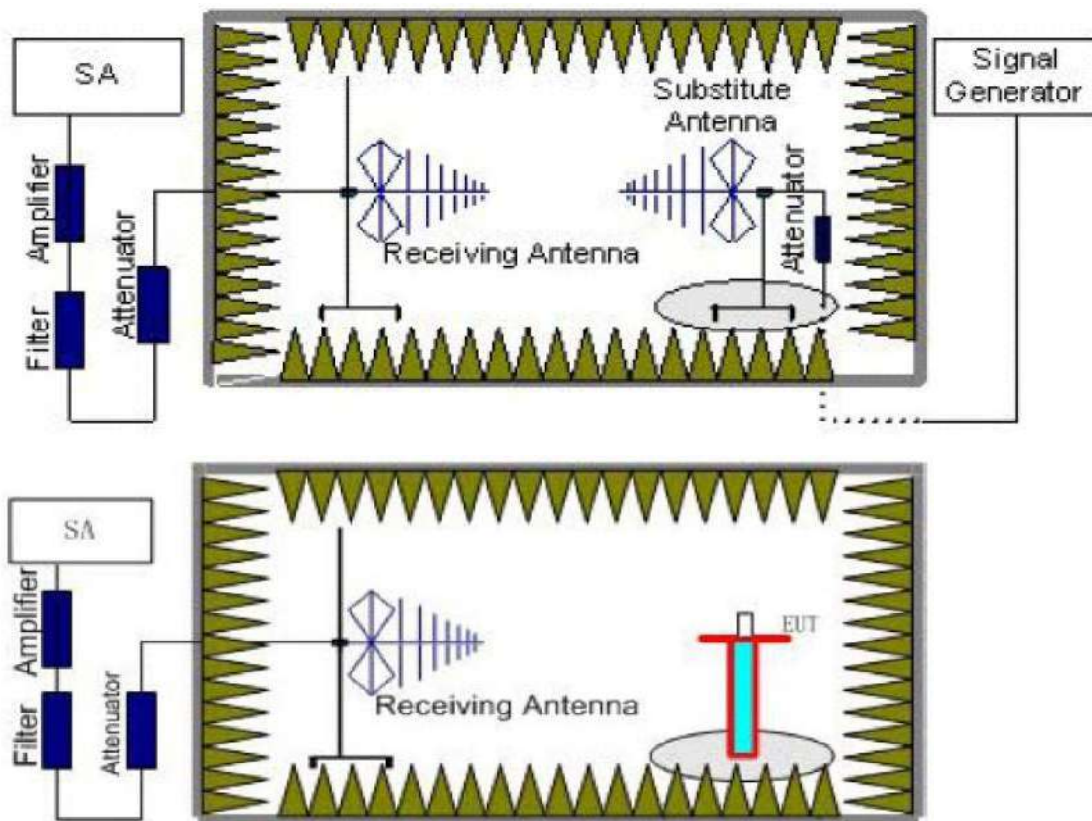
Frequency	Maximum power, e.r.p.	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 KHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

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 with no 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.	ERP (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
270.69	V	-73.30	-57	-16.30	PASS
314.31	V	-77.72	-57	-20.72	PASS
342.10	V	-78.69	-57	-21.69	PASS
429.86	V	-72.52	-57	-15.52	PASS
521.55	V	-75.99	-57	-18.99	PASS
905.36	V	-78.85	-57	-21.85	PASS
266.80	H	-71.79	-57	-14.79	PASS
379.08	H	-75.74	-57	-18.74	PASS
416.01	H	-72.20	-57	-15.20	PASS
526.37	H	-77.56	-57	-20.56	PASS
663.53	H	-75.40	-57	-18.40	PASS
907.10	H	-78.76	-57	-21.76	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.	ERP (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
Test Mode: Lowest frequency					
2250.48	H	-63.96	-47	-16.96	PASS
2236.18	V	-65.28	-47	-18.28	PASS
2824.62	H	-66.58	-47	-19.58	PASS
2975.38	V	-63.89	-47	-16.89	PASS
3345.85	H	-65.85	-47	-18.85	PASS
3749.49	V	-67.28	-47	-20.28	PASS
4470.29	H	-64.27	-47	-17.27	PASS
4357.48	V	-60.89	-47	-13.89	PASS
5187.86	H	-65.05	-47	-18.05	PASS
5231.11	V	-64.85	-47	-17.85	PASS
6611.61	H	-67.57	-47	-20.57	PASS
6708.25	V	-65.36	-47	-18.36	PASS
Test Mode: Highest frequency					
2122.83	H	-61.85	-47	-14.85	PASS
2188.71	V	-66.72	-47	-19.72	PASS
3028.52	H	-60.17	-47	-13.17	PASS
2857.38	V	-67.55	-47	-20.55	PASS
3582.68	H	-69.78	-47	-22.78	PASS
3381.59	V	-59.98	-47	-12.98	PASS
4316.57	H	-62.97	-47	-15.97	PASS
4021.06	V	-65.19	-47	-18.19	PASS
5606.25	H	-66.55	-47	-19.55	PASS
5656.71	V	-64.75	-47	-17.75	PASS
6675.48	H	-61.98	-47	-14.98	PASS
6836.42	V	-64.66	-47	-17.66	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
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ 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 $P_{\min} + 26 \text{ dB}$ 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
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB})$ or $(-74 \text{ dBm} + 20 \text{ dB})$ 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 $P_{\min} + 30 \text{ dB}$ 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

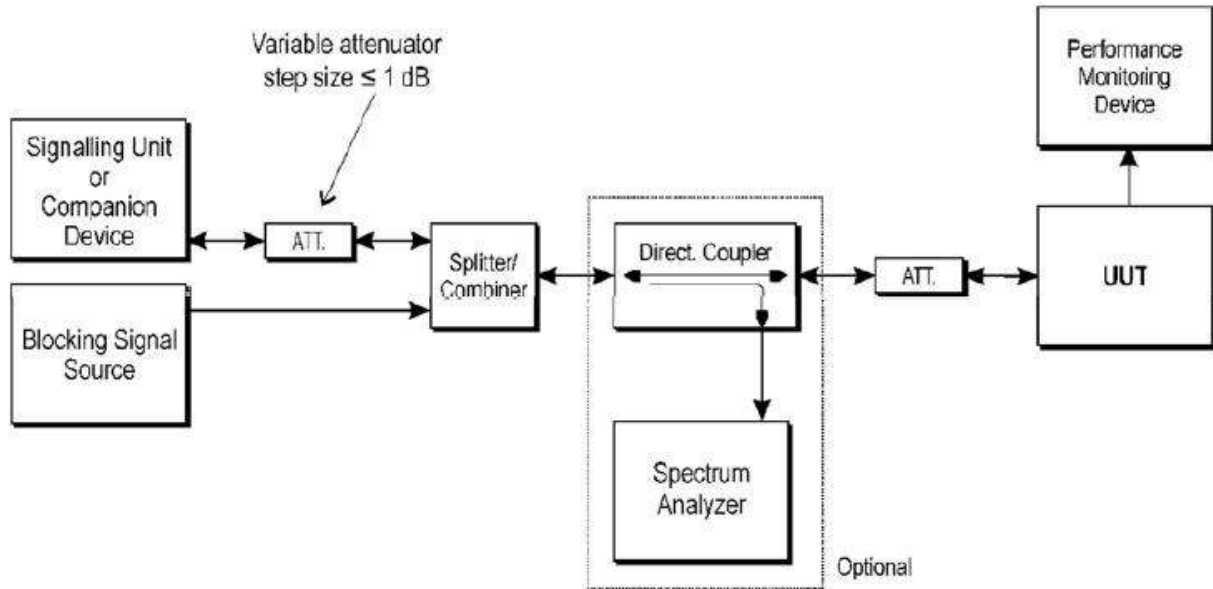


Figure 6: Test Set-up for receiver blocking

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 has to 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 P_{min} . This signal level (P_{min}) 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 signal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	0.56	10	Pass
-68	2504	-34	0.86	10	Pass
-74	2300	-34	0.92	10	Pass
-74	2330	-34	1.10	10	Pass
-74	2360	-34	0.19	10	Pass
-74	2524	-34	1.30	10	Pass
-74	2584	-34	0.18	10	Pass
-74	2674	-34	1.09	10	Pass

Channel 13

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	1.21	10	Pass
-68	2504	-34	0.32	10	Pass
-74	2300	-34	1.04	10	Pass
-74	2330	-34	0.24	10	Pass
-74	2360	-34	0.48	10	Pass
-74	2524	-34	0.89	10	Pass
-74	2584	-34	1.01	10	Pass
-74	2674	-34	0.70	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 signal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	0.38	10	Pass
-68	2504	-34	1.23	10	Pass
-74	2300	-34	0.63	10	Pass
-74	2330	-34	0.33	10	Pass
-74	2360	-34	1.26	10	Pass
-74	2524	-34	0.88	10	Pass
-74	2584	-34	1.13	10	Pass
-74	2674	-34	0.40	10	Pass

Channel 13

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	0.38	10	Pass
-68	2504	-34	1.27	10	Pass
-74	2300	-34	1.03	10	Pass
-74	2330	-34	0.73	10	Pass
-74	2360	-34	1.06	10	Pass
-74	2524	-34	0.39	10	Pass
-74	2584	-34	0.56	10	Pass
-74	2674	-34	0.30	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 signal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	0.98	10	Pass
-68	2504	-34	1.29	10	Pass
-74	2300	-34	0.98	10	Pass
-74	2330	-34	0.33	10	Pass
-74	2360	-34	0.44	10	Pass
-74	2524	-34	1.00	10	Pass
-74	2584	-34	0.44	10	Pass
-74	2674	-34	0.78	10	Pass

Channel 13

Wanted signal mean power form Companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-68	2380	-34	0.43	10	Pass
-68	2504	-34	0.79	10	Pass
-74	2300	-34	0.51	10	Pass
-74	2330	-34	0.99	10	Pass
-74	2360	-34	0.91	10	Pass
-74	2524	-34	0.38	10	Pass
-74	2584	-34	0.24	10	Pass
-74	2674	-34	0.40	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. External and Internal Photos of the EUT

FIGURE 1



FIGURE 2



FIGURE 3

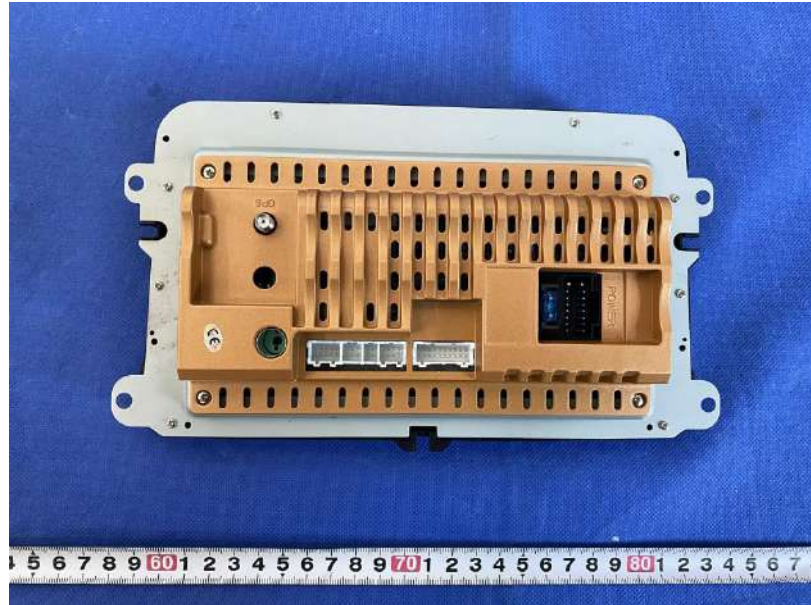


FIGURE 4

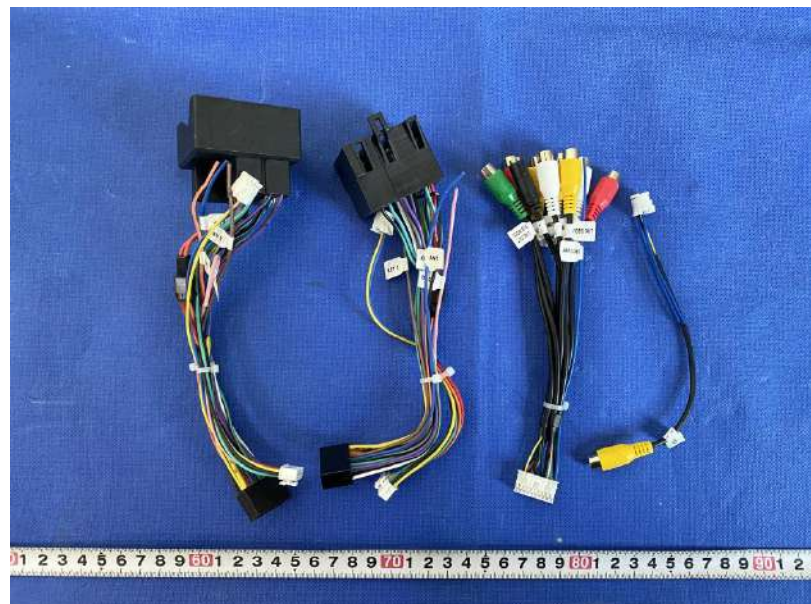


FIGURE 5



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



EMC TEST REPORT
For
SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Vehicle Player

Model Number : AR7002

Prepared for : SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
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Report No. : STL2025E0117284C-Y3

Date of Test : Jan .10-17,2025

Date of Rep. : Jan .17,2025



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TEST REPORT DECLARATION

Applicant:	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address:	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street,Longhua District, Shenzhen City, Guangdong Province, China
Manufacturer:	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address:	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street,Longhua District, Shenzhen City, Guangdong Province, China
EUT Description:	Vehicle Player
Model Number:	AR7002

Test Standards:

ETSI EN 301 489-1 V2.2.3 (2019-11)

ETSI EN 301 489-17 V2.2.1 (2012-09)

The EUT described above is tested by Shenzhen STL Testing Technology Co., Ltd. to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen STL Testing Technology Co., Ltd. Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/53/EU directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Date of Test:

Jan .10-17,2025

Prepared by:

Eris

Project Engineer

Reviewed by:

Lewis

Project Manager

Approved by:



Technical Director



1. TEST RESULTS SUMMARY

Test Results Summary

Test Items	Test Results
Conducted Disturbance	Pass
Radiated Emission	Pass
Harmonic Current	N/A
Voltage Fluctuation and Flicker	Pass
Electrostatic Discharge Immunity	Pass
Radiated Electromagnetic Fields Immunity	Pass
Electric Fast Transient Burst Immunity	Pass
Surge Immunity	Pass
Conducted Immunity	Pass
Voltage dips and interruptions Immunity	Pass

N/A* Please refer to Applicability overview tables in sections 7.1 and 7.2 of EN 301 489-1 requirements.

2. GENERAL INFORMATION

2.1. Report information

- 2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that STL approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that STL in any way guarantees the later performance of the product/equipment.
- 2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, STL therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through STL, unless the applicant has authorized STL in writing to do so.

2.2. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

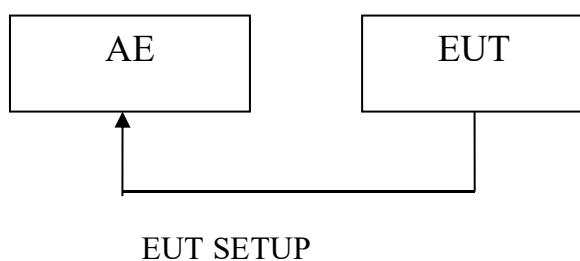
Test	Parameters	Expanded Uncertainty (U_{Lab})	Expanded Uncertainty (U_{Cispr})
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	± 3.42 dB ± 3.42 dB	± 4.0 dB ± 3.6 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB	N/A
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.40 dB	± 5.2 dB
Radiated Emission	Level Accuracy: Above 1000MHz	± 4.20 dB	N/A
Mains Harmonic	Voltage	$\pm 3.11\%$	N/A
Voltage Fluctuations & Flicker	Voltage	$\pm 3.25\%$	N/A

3. PRODUCT DESCRIPTION

3.1. EUT Description

Description	:	Vehicle Player
Applicant	:	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Model Number	:	AR7002

3.2. Block Diagram of EUT Configuration



3.3. Support Equipment List

Ancillary Equipment				
Name	Model No	S/N	Manufacturer	Used
LCD	U2414Hb	/	DELL	NO
Wireless Router	TL-WR742N	/	TP-LINK	NO

3.4. Operating Condition of EUT

Test mode 1: *Running*

3.5. Test Conditions

Temperature: 23-26℃

Relative Humidity: 50-60 %

3.6. Modifications

No modification was made.

3.7. Abbreviations

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
IF	Intermediate Frequency
RF	Radio Frequency
rms	root mean square
EMI	Electromagnetic Interference
EMS	Electromagnetic Susceptibility

3.8. Performance Criterion

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

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

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

4. TEST EQUIPMENT USED

4.1. Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	AMN	SCHWARZBECK	NNLK8121	8121370	2025.11.9
2	AMN	ETS	3810/2	00020199	2025.11.9
3	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	101210	2025.11.9
4	AAN	TESEQ	T8-Cat6	38888	2025.11.9

4.2. Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Horn Antenna	Sunol	DRH-118	A101415	2025.11.29
2	Broadband Hybrid Antenna	Sunol	JB1 Antenna	A090215	2025.11.29
3	Amplifier	HP	8449B	3008A00160	2025.11.9
4	Amplifier	HP	8447D	2944A07999	2025.11.9
5	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESR3	101891	2025.11.9
6	MXA Signal Analyzer	Keysight	N9020A	MY51110104	2025.11.9
7	Biconical antenna	Schwarzbeck	VHA 9103	91032360	2025.11.8
8	Biconical antenna	Schwarzbeck	VHA 9103	91032361	2025.11.8
9	Broadband Hybrid Antenna	Schwarzbeck	VULB9163	VULB9163#958	2025.11.8
10	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2025.11.12
11	Active Receive Loop Antenna	Schwarzbeck	FMZB 1919B	00023	2025.11.02
12	Loop Antenna	Beijing daze Technology	ZN30401	13015	2025.11.9
13	EM CAMLP	SCHWARZBECK	MDS21	03350	2025.11.12
14	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170651	2025.11.14
15	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2025.10.24

4.3. Harmonic / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Power Analyzer	California Instrumnets	PACS-1	X71719	2025.11.28
2	AC Power Source	California Instrumnets	5001ix	HK53570	2025.11.9

4.4. Electrostatic Discharge Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	ESD Simulator	EM TEST	ESD30C/P30	1202-17	2025.11.9

4.5. Surge Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Surge Generator	Shanghai Lioncel	LSG-506S	LSG506S0160601	2025.11.7
2	CDN	Shanghai Lioncel	CDN-532S	CDN532S0160601	2025.11.7



4.6. Electrical Fast Transient/Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EFT/B Generator	Shanghai Lioncel	EFT-404S	EFT404S0160601	2025.11.7

4.7. Power-frequency magnetic fields Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Magnetic Field Test System	Shanghai Lioncel	PMF801C-T	PMF801C-T	2025.11.9

4.8. Voltage dips and interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	AC Power Source	California Instrumnets	5001ix	HK53570	2025.11.9

5. CONDUCTED DISTURBANCE TEST

5.1. Test Standard and Limit

5.1.1. Test Standard

ETSI EN 301 489-1 V2.2.3 (2019-11)

ETSI EN 301 489-17 V2.2.1 (2012-09)

5.1.2. Test Limit

Conducted Disturbance Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency

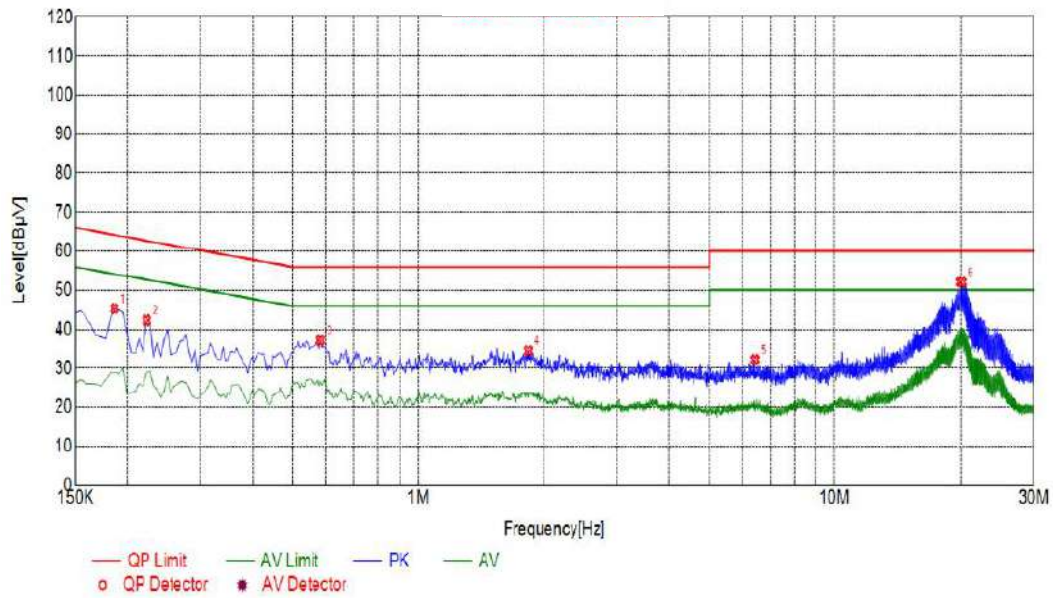
5.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver is used to test the emissions from both sides of AC line. The bandwidth of EMI test receiver is set at 9kHz.

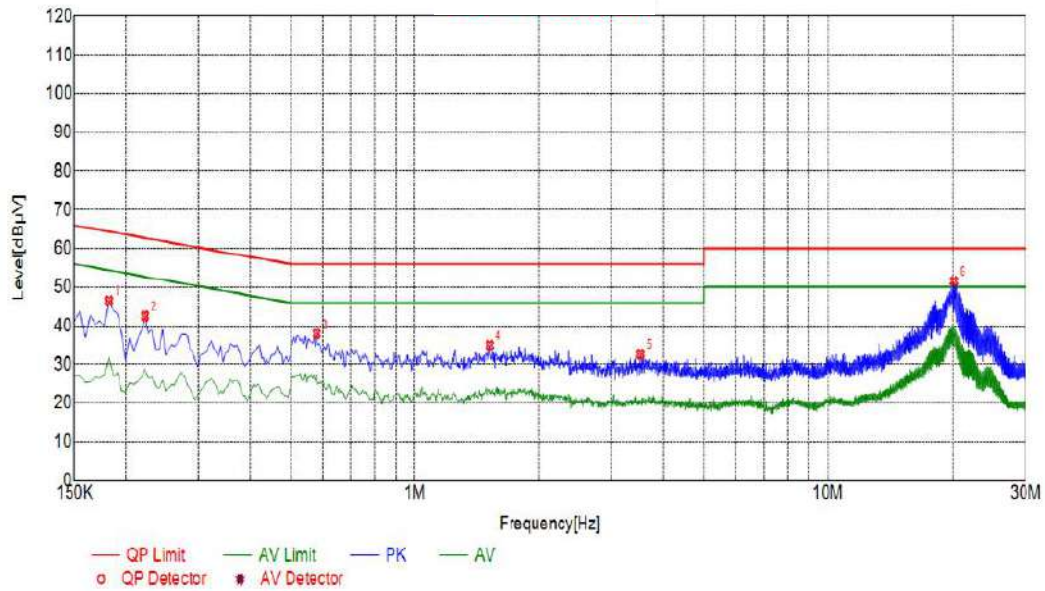
5.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

5.4. Test Data



Suspected List						
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.1860	45.33	10.05	64.21	18.88	PK
2	0.2220	42.37	10.04	62.74	20.37	PK
3	0.5820	37.20	10.05	56.00	18.80	PK
4	1.8375	34.58	10.14	56.00	21.42	PK
5	6.4455	32.28	10.22	60.00	27.72	PK
6	20.0985	52.13	10.11	60.00	7.87	PK



Suspected List						
NO.	Freq. [MHz]	Level [dBμV]	Factor [dB]	Limit [dBμV]	Margin [dB]	Detector
1	0.1815	46.49	10.06	64.42	17.93	PK
2	0.2220	42.53	10.04	62.74	20.21	PK
3	0.5775	37.98	10.05	56.00	18.02	PK
4	1.5180	35.04	10.11	56.00	20.96	PK
5	3.5205	32.71	10.25	56.00	23.29	PK
6	20.1255	51.58	10.11	60.00	8.42	PK

6. RADIATED DISTURBANCE TEST

6.1. Test Standard and Limit

6.1.1. Test Standard

ETSI EN 301 489-1 V2.2.3 (2019-11)

ETSI EN 301 489-17 V2.2.1 (2012-09)

6.1.2. Test Limit

Radiated Disturbance Test Limit (Class B)

Frequency	Limit (dB μ V/m)
	Quasi-peak Level
30MHz~230MHz	40
230MHz~1000MHz	47

* The lower limit shall apply at the transition frequency.

* The test distance is 3m.

Frequency range	Average Limit (dB μ V/m)	Peak Limit (dB μ V/m)
1000MHz~3000MHz	50	70
3000MHz~6000MHz	54	74

NOTE: The lower limit applies at the transition frequency

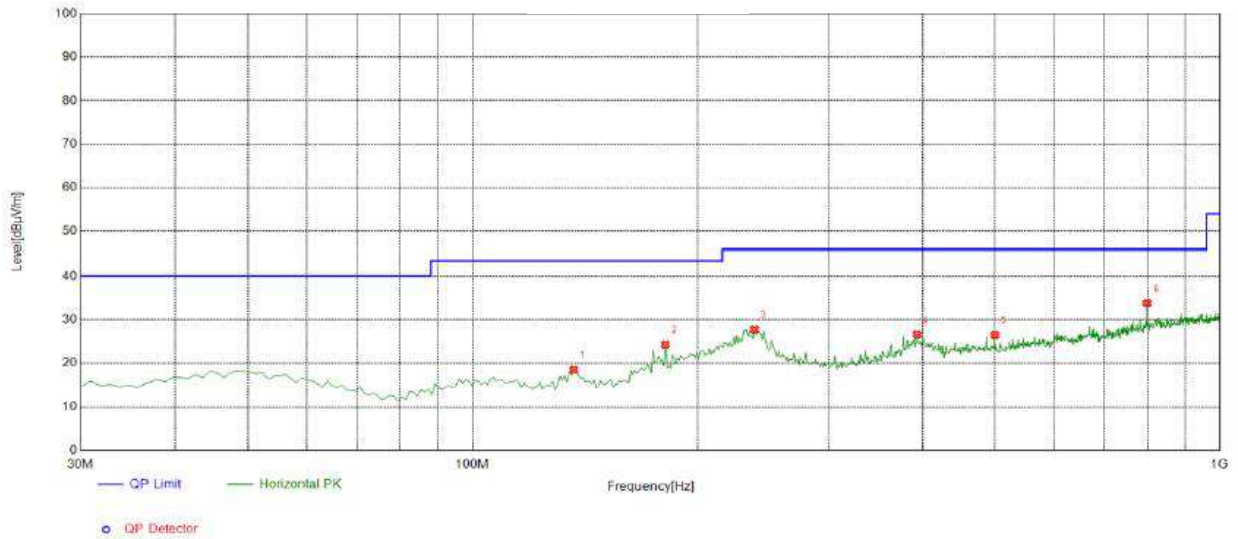
6.2. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

6.3. Test Arrangement

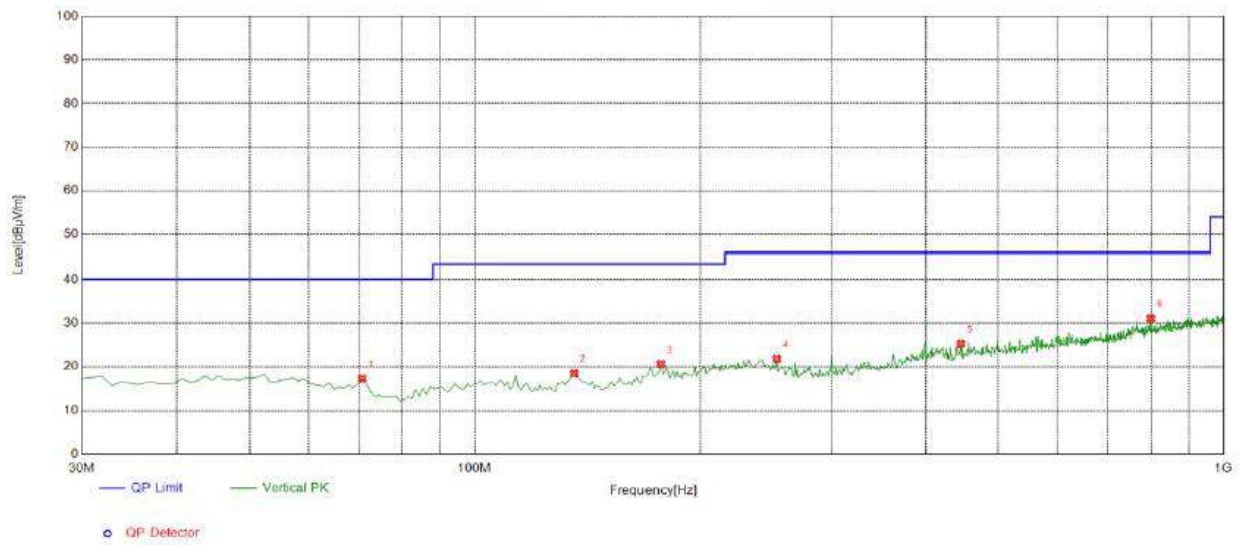
The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

6.4. Test Data



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	136.700	18.49	-18.98	43.50	25.01	100	348	Horizontal
2	181.320	24.32	-16.74	43.50	19.18	100	94	Horizontal
3	238.550	27.72	-13.92	46.00	18.28	100	119	Horizontal
4	393.750	26.65	-10.56	46.00	19.35	100	240	Horizontal
5	500.450	26.53	-8.29	46.00	19.47	100	224	Horizontal
6	800.180	33.81	-3.12	46.00	12.19	100	100	Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	70.7400	17.32	-17.80	40.00	22.68	100	88	Vertical
2	135.730	18.48	-18.92	43.50	25.02	100	338	Vertical
3	177.440	20.65	-16.97	43.50	22.85	100	338	Vertical
4	253.100	21.77	-13.43	46.00	24.23	100	195	Vertical
5	446.130	25.25	-9.16	46.00	20.75	100	50	Vertical
6	800.180	31.02	-3.12	46.00	14.98	100	34	Vertical

7. HARMONIC CURRENT EMISSION TEST

7.1. Test Standard and Limit

7.1.1. Test Standard

EN IEC 61000-3-2:2019

7.1.2. Limits

Harmonic Current Test Limit (Class A)

Harmonic order (n)	Maximum permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq$	$0.15 \times 15/n$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq$	$0.23 \times 8/n$

7.2. Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the Power of the EUT and use the test system to test the harmonic current level.

7.3. Test Data

Note:

Not Applicable, Equipment with a rated power less than 75 W

8. VOLTAGE FLUCTUATION AND FLICKER TEST

8.1. Test Standard and Limit

8.1.1. Test Standard

EN61000-3-3: 2013+A1: 2019

8.1.2. Limit

Flicker Test Limit

Test items	Limits
Pst	1.0
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

8.2. Test Procedure

The power cord of the EUT is connected to the output of the test system. Turn on the power of the EUT and use the test system to test the harmonic current level.

8.3. Test Data

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

EUT: XZL20-11-1
Test category: All parameters (European limits)
Test date: 2020-09-18 Start time: 16:20:22
Test duration (min): 10 Data file name: F-000023.cts_data
Comment: Keep Transmitting

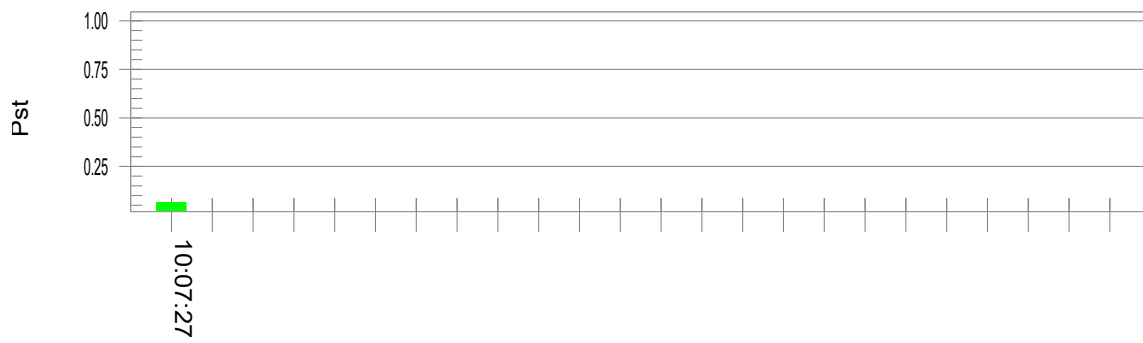
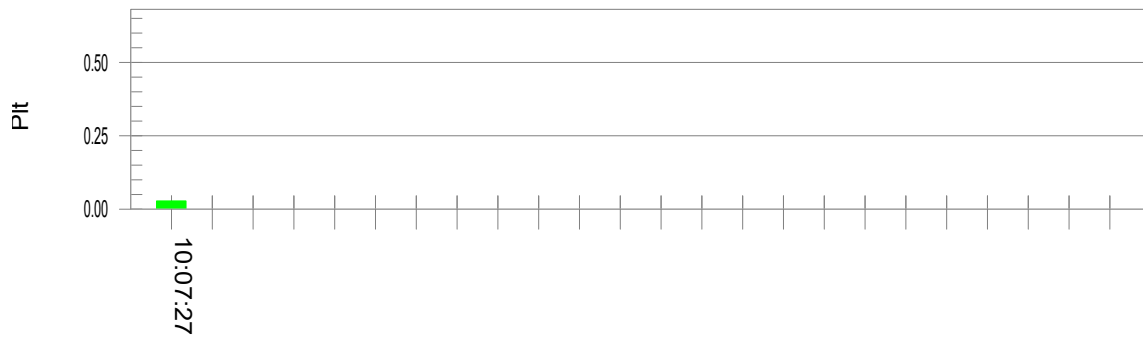
Tested by: Bill
Test Margin: 100
End time: 16:30:46

Test Result: Pass

Status: Test Completed

Pst_i and limit line

European Limits

**Plt and limit line****Parameter values recorded during the test:****Vrms at the end of test (Volt):DC4.2V**

Highest dt (%):	-0.16	Test limit (%):	3.30	Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	-0.15	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.062	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.022	Test limit:	0.650	Pass

9. ELECTROSTATIC DISCHARGE IMMUNITY TEST

9.1. Test Requirements

9.1.1. Test Standard

EN 61000-4-2: 2009

9.1.2. Test Level

Test Level for ESD Immunity Test

Port	Test Specification
Enclosure Port	8kV air discharge 4kV contact discharge

9.1.3. Performance criterion: B

9.2. Test Procedure

9.2.1. 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 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.2.2. 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 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

9.2.3. 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.

9.2.4. 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.



9.3. Test Data

ESD Immunity Test Data

Location	Voltage(kV)	Amount of test points	Discharge Method	Results
Slots	$\pm 2, \pm 4, \pm 8$	10	A	Pass
Enclosure	$\pm 2, \pm 4, \pm 8$	10	A	Pass
VCP	$\pm 2, \pm 4$	8	C	Pass
HCP	$\pm 2, \pm 4$	8	C	Pass

10. RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST

10.1. Test Requirements

10.1.1. Test Standard

EN 61000-4-3: 2006+A2: 2010

10.1.2. Test Level

Test Level for Radiated Electromagnetic Field Immunity Test

Port	Test Specification
Enclosure Port	80-1000MHz, 1.4GHz-2.7GHz 3 V/m 80 % AM (1kHz)

10.1.3. Performance criterion: A

10.2. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually .In order to judge the EUT performance.

10.3. Test Data

Radiated Electromagnetic Field Immunity Test Data

Frequency Rang (MHz)	80 MHz –1GHz, 1.4GHz-2.7GHz	
Field Strength (V/m)	3V/m	
Steps (%)	1%	
	Horizontal	Vertical
Front	Pass	Pass
Rear	Pass	Pass
Left	Pass	Pass
Right	Pass	Pass

11. ELECTRICAL FAST TRANSIENTS/BURSTS IMMUNITY TEST

11.1. Test Requirements

11.1.1. Test Standard

EN 61000-4-4: 2012

11.1.2. Level

Test Level for EFT Immunity Test

Port	Test Specification
AC Power input	1kV (peak) 5/50 ns Tr/Th 5kHz repetition frequency
Signal line	1kV (peak) 5/50 ns Tr/Th 5kHz repetition frequency

11.1.3. Performance criterion: B

11.2. Test Procedure

11.2.1. For AC mains power ports:

The EUT is connected to the power mains by using a coupling device, which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 1minute.

11.3. Test Data

EFT Test Data

Injected Line	Voltage (kV)	Test Time (s)	Injected Method	Result
L	+1	60	Direct	Pass
	-1	60	Direct	Pass
N	+1	60	Direct	Pass
	-1	60	Direct	Pass
L,N	+1	60	Direct	Pass
	-1	60	Direct	Pass

12. TRANSIENTS AND SURGES TEST

12.1. Test Requirements

12.1.1. Test Standard

EN 61000-4-5:2014+A1:2017

12.1.2. Level

Test Level for Surge	
Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

12.1.3. Performance criterion: B

12.2. Test Procedure

Set up the EUT and test generator For line to line coupling mode, provide a 0.5KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test. Different phase angles are done individually. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

12.3. Test Data

Surge Test Data						
Injected Line	Wave Form	Voltage (kV)	Phase	Number of Pulse	Interval time	Result
L-N	1.2/50 μ s	+1.0	0° ,90° ,270°	15	60s	Pass
		-1.0	0° ,90° ,270°	15	60s	Pass

13. CONDUCTED IMMUNITY TEST

13.1. Test Requirements

13.1.1. Test Standard

EN 61000-4-6: 2014+AC: 2015

13.1.2. Level

Test Level for Conducted Immunity

Port	Test Specification
Input and output AC power port	0.15MHz~80MHz 3V(r.m.s.) (unmodulated)

13.1.3. Performance criterion: A

13.2. Test Procedure

Set up the EUT, CDN and test generators as shown above. The test is performed with the generator connected to each CDN in turn. The frequency range is swept from 150kHz to 230MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

13.3. Test Data

Conducted Immunity Test Data

Frequency Range (MHz)	Injected Position	Strength	Result
0.15MHz ~ 230MHz	AC Lines	3V(rms), Unmodulated	Pass
Dwell time: 1s; Steps: 1%			

14. VOLTAGE DIPS AND INTERRUPTIONS IMMUNITY TEST

14.1. Test Requirements

14.1.1. Test Standard

EN 61000-4-11:2004+A1:2017

14.1.2. Level

Test Level for Voltage Dips and Interruptions

Port	Environmental phenomenon	Voltage dip and short interruptions %U _T	Cycle
Input AC power port	Voltage dips	0 %	0.5
		0 %	1
	Voltage interruptions	70 %	25
		0 %	250

14.2. Test Procedure

Refer to EN 61000-4-11

14.3. Test Data

Level	U ₂	T _d (Periods)	Phase Angle	N	Result
1	0%	0.5	0/90/180/270	3	A
2	0%	1	0/90/180/270	3	A
3	70%	25	0/90/180/270	3	A
4	0%	250	0/90/180/270	3	B



APPENDIX I

FIGURE 1



FIGURE 2



FIGURE 3

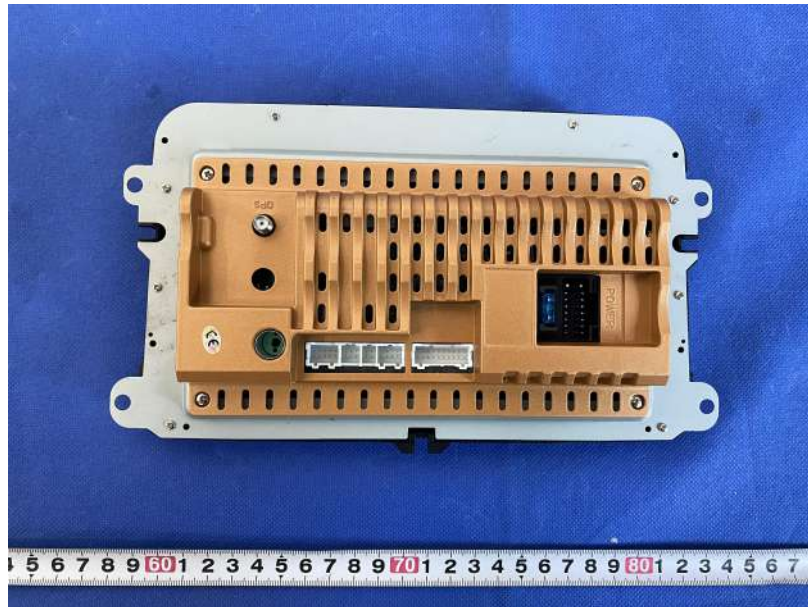


FIGURE 4

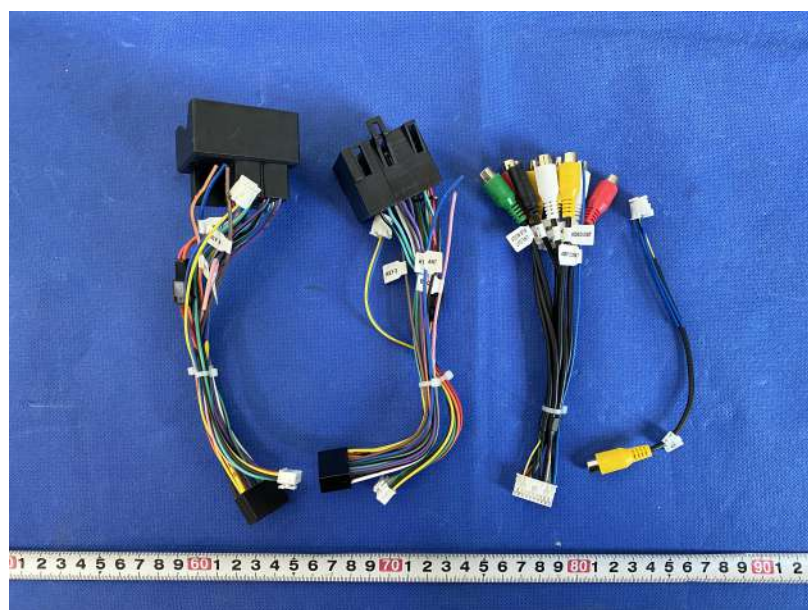


FIGURE 5



End of Report



SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.

HEALTH TEST REPORT

Prepared For:	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD. Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street,Longhua District, Shenzhen City, Guangdong Province, China
Product Name:	Vehicle Player
Trade Mark:	ESSGOO
Model:	AR7002
Prepared By:	Shenzhen STL Testing Technology Co., Ltd. Unit C, 4F, Building A, ShengHengji Industrial Park, No. 137 FuYuan 1 Road, Heping Community, Fuyong Street, Baoan District, Shenzhen, China
Receipt Date	Jan .10,2025
Test Date:	Jan .10-17,2025
Date of Report:	Jan .17,2025
Report No.:	STL2025E0117284C-Y4



TEST REPORT DECLARATION

Applicant	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street, Longhua District, Shenzhen City, Guangdong Province, China
Manufacturer	SHEN ZHEN XIN SHENG SHANG TECHNOLOGY CO.,LTD.
Address	Room 303, Building 9, No. 54-6, Guanlan Avenue, Xinhe Community, Fucheng Street, Longhua District, Shenzhen City, Guangdong Province, China
EUT Description	Vehicle Player
Model Number	AR7002

Test Standards:

EN IEC 62311:2020

The EUT described above is tested by Shenzhen STL Testing Technology Co., Ltd. to determine the maximum emissions from the EUT and ensure the EUT to be compliance with the immunity requirements of the EUT. Shenzhen STL Testing Technology Co., Ltd. Laboratory is assumed full responsibility for the accuracy of the test results. Also, this report shows that the EUT technically complies with the 2014/53/EU directive and its amendment requirements.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Date of Test:

Jan .10-17,2025

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Lewis

Project Manager

Approved by:



Technical Director

Introduction

EN 62311 Generic standard to demonstrate the compliance of electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0 Hz–300 GHz) is to demonstrate the compliance of apparatus with the basic restrictions or reference levels on exposure of the general public related to electric, magnetic, electromagnetic fields as well as induced and contact current.

Limit

According to EN 62311, the criteria listed in the below table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in the table.

Reference levels for electric, magnetic and electromagnetic fields
(0 Hz to 300 GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)
0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—
0,8-3 kHz	$250/f$	5	6,25	—
3-150 kHz	87	5	6,25	—
0,15-1 MHz	87	$0,73/f$	$0,92/f$	—
1-10 MHz	$87/f^{1/2}$	$0,73/f$	$0,92/f$	—
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046\ f^{1/2}$	$f/200$
2-300 GHz	61	0,16	0,20	10

Notes:

1. f as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any $68/f^{1.05}$ -minute period (f in GHz).
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.

RF EXPOSURE MEASUREMENT

Introduction

The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement of the user for keeping 20cm separation distance and the prohibition of operating to a person has been printed on the user manual. So, this product under normal use is located on electromagnetic far field between the human body.

Far Field Calculation Formula

$$E = \frac{\sqrt{30PG(\theta, \phi)}}{r}$$

G = antenna gain relative to an isotropic antenna
 θ, ϕ = elevation and azimuth angles to point of investigation
 r = distance from observation point to the antenna

Test data

The EUT was tested: **46V/m < 87V/m**, the E-field are below the low E-field exclusion level defined in the table.

Test results

The measurement results comply with the limit of EN IEC 62311:2020



APPENDIX I

FIGURE 1



FIGURE 2



FIGURE 3

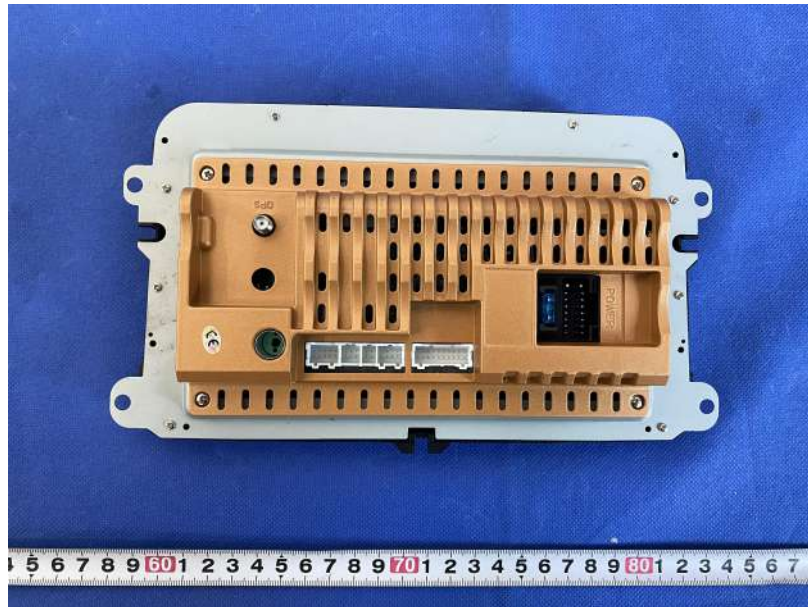


FIGURE 4

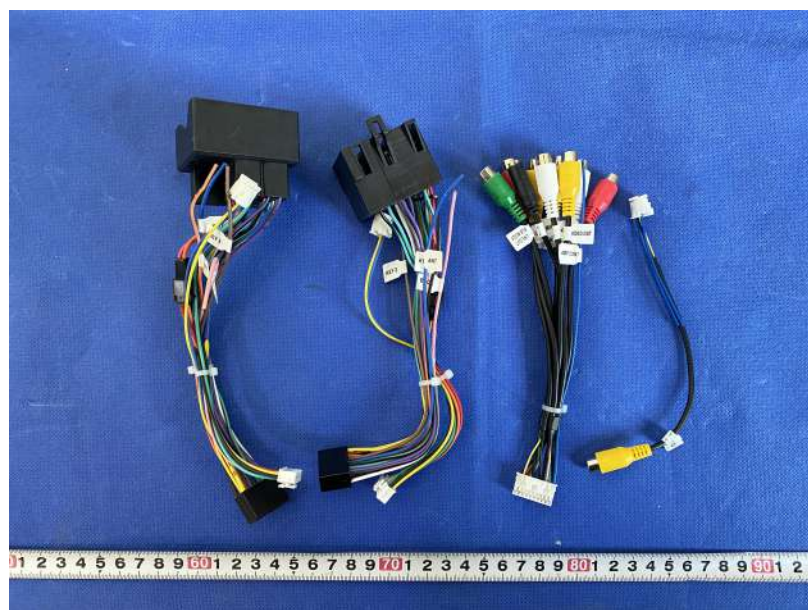


FIGURE 5



End of Report