



CERTIFICATE *of* EXAMINATION



Certificate Validation

NOTIFIED BODY EU-TYPE EXAMINATION CERTIFICATE

BALU485-EU / 14 Jul 2022 / Rev A

Radio Equipment Directive (RED) 2014/53/EU

MiCOM Labs Inc., Notified Body Number 2280 declares, on the basis of the assessment of the tests and the technical documentation provided by the applicant that the following product complies with the essential requirements of the above noted Directive.

Product Name:

SwitchBot Keypad

Approval Holder Name:

Woan Technology (Shenzhen) Co., Ltd.




Gordon Hurst, Product Certifier

This Certificate is Issued under the Authority of:

MiCOM Labs Inc., 575 Boulder Court, Pleasanton, California 94566, USA

Notified Body Number: 2280



Notified Body EU-Type Examination Certificate

BALU485-EU / 14 Jul 2022 / Rev A

for Radio Equipment Directive (RED) 2014/53/EU

Product Name:

SwitchBot Keypad

Product Model Numbers: **W2500020, W2500010, W2500011, W2500012, W2500013, W2500014, W2500015, W2500021, W2500022, W2500023, W2500024, W2500025**

Brand Name: **SwitchBot**

Approval Holder: **Woan Technology (Shenzhen) Co., Ltd.**, Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

Product Manufacturer: **Woan Technology (Shenzhen) Co., Ltd.**, Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

Standards

Group	Name
Article 3.1(a) Health & Safety	IEC 62368-1: 2014
	EN 62368-1:2014+A11:2017
	EN 62479: 2010
Article 3.1(b) Electromagnetic Compatibility	EN 301 489-1 V2.2.3
	Final draft EN 301 489-3 V2.2.0
	EN 301 489-17 V3.2.4
	EN 55032: 2015+A1:2020
	EN 55035: 2017+A11:2020
	EN IEC 61000-3-2: 2019
Article 3.2 Effective Use of Spectrum	EN 61000-3-3: 2013+A1:2019
	EN 300 328 V2.2.2
	EN 300 330 V2.1.1



Notified Body EU-Type Examination Certificate

BALU485-EU / 14 Jul 2022 / Rev A

for Radio Equipment Directive (RED) 2014/53/EU

Annex 1 to EU-Type Examination

EU-Type examination on the essential requirements Article 3

Article 3.1 - a) Health and Safety	Assessed
Article 3.1 - b) Electromagnetic compatibility	Assessed
Article 3.2 - Effective use of radio spectrum	Assessed
Article 3.3 - a) interworks with Accessories/Chargers	Not Applicable
Article 3.3 - b) interworks with Radio Networks	Not Applicable
Article 3.3 - c) can connect to interfaces	Not Applicable
Article 3.3 - d) does not harm the network, misuse network resources	Not Applicable
Article 3.3 - e) privacy protections	Not Applicable
Article 3.3 - f) fraud protections	Not Applicable
Article 3.3 - g) emergency services access	Not Applicable
Article 3.3 - h) assist users with disabilities	Not Applicable
Article 3.3 - i) integrity of software	Not Applicable

Description of Apparatus

Company Name	Woan Technology (Shenzhen) Co., Ltd.
Certification No.	BALU485-EU
Issue Date / Rev	14 Jul 2022 / Rev A
Equipment Description	SwitchBot Keypad
Hardware Version	V1.0
Firmware Version	V1.0



Notified Body EU-Type Examination Certificate

BALU485-EU / 14 Jul 2022 / Rev A

for Radio Equipment Directive (RED) 2014/53/EU

Emission Information

Technology	Frequency MHz		Emission Designator	RF Power		
	From	To		Max	Type	Field Strength
NFC	13.56	13.56	K1D	--	--	42.07dBuV/m @ 10m
BLE	2402	2480	F1D	3.2dBm	EIRP	--

Technical Construction File Details: (Documents Reviewed)

Technical Report(s):

Article 3.1(a) Health & Safety:

BL-SZ2230879-701

BL-SZ2230879-101

Article 3.1(b) Electromagnetic Compatibility:

BL-SZ2230879-401

BL-SZ2230879-402

Article 3.2 Effective Use of Spectrum:

BL-SZ2230879-403

BL-SZ2230879-601

Supporting Documentation:

Service Agreement

Agent Authorization

EU Application

EU Declaration of Conformity

Block Diagram

BOM or Parts List

External Photographs

Internal Photographs

Label and its Location

Operational Description

PCB Layout

Risk Assessment Report and other supporting documents (Radio)

Schematics

Test Setup - EU

User Manual

Declaration of Identity

Scope

This EU-Type Examination Certificate is given in respect of compliance of radio spectrum use Article 3 Paragraph 2 of the RED Directive 2014/53/EU. The scope of the evaluation and this certificate relates only to those items identified in 'Annex 1 to EU - Type Examination Certificate' for the specific product and Certificate number referenced above.

EU Type Examination was performed according to Module B: EU-type examination procedure per Annex III the Directive on the essential requirements in Article 3, for the specific product and Certificate Number referenced above.

This EU Type Examination Certificate is based upon the review of the Technical Documentation and supporting evidence for the adequacy of the technical design solution, it is only valid in conjunction with the attached Annexes. The scope of this statement relates to a single sample of the apparatus identified above and of the submitted documents only.



Annex 2 to EU-Type Examination Obligations of the Applicant

Ref RED 2014/53/EU Article 10 - Obligations of manufacturers

1. When placing their radio equipment on the market, manufacturers shall ensure that it has been designed and manufactured in accordance with the essential requirements set out in Article 3.
2. Manufacturers shall ensure that radio equipment shall be so constructed that it can be operated in at least one Member State without infringing applicable requirements on the use of radio spectrum.
3. Manufacturers shall draw up the technical documentation referred to in Article 21 and carry out the relevant conformity assessment procedure referred to in Article 17 or have it carried out. Where compliance of radio equipment with the applicable requirements has been demonstrated by that conformity assessment procedure, manufacturers shall draw up an EU declaration of conformity and affix the CE marking.
4. Manufacturers shall keep the technical documentation and the EU declaration of conformity for 10 years after the radio equipment has been placed on the market.
5. Manufacturers shall ensure that procedures are in place for series production to remain in conformity with this Directive. Changes in radio equipment design or characteristics and changes in the harmonised standards or in other technical specifications by reference to which conformity of radio equipment is declared shall be adequately taken into account.

When deemed appropriate with regard to the risks presented by radio equipment, manufacturers shall, to protect the health and safety of end-users, carry out sample testing of radio equipment made available on the market, investigate, and, if necessary, keep a register of complaints, of non-conforming radio equipment and radio equipment recalls, and shall keep distributors informed of any such monitoring.

6. Manufacturers shall ensure that radio equipment which they have placed on the market bears a type, batch or serial number or other element allowing its identification, or, where the size or nature of the radio equipment does not allow it, that the required information is provided on the packaging, or in a document accompanying the radio equipment.
7. Manufacturers shall indicate on the radio equipment their name, registered trade name or registered trade mark and the postal address at which they can be contacted or, where the size or nature of radio equipment does not allow it, on its packaging, or in a document accompanying the radio equipment. The address shall indicate a single point at which the manufacturer can be contacted. The contact details shall be in a language easily understood by end-users and market surveillance authorities.
8. Manufacturers shall ensure that the radio equipment is accompanied by instructions and safety information in a language which can be easily understood by consumers and other end-users, as determined by the Member State concerned. Instructions shall include the information required to use radio equipment in accordance with its intended use. Such information shall include, where applicable, a description of accessories and components, including software, which allow the radio equipment to operate as intended. Such instructions and safety information, as well as any labelling, shall be clear, understandable and intelligible.

The following information shall also be included in the case of radio equipment intentionally emitting radio waves:

- (a) frequency band(s) in which the radio equipment operates;
- (b) maximum radio-frequency power transmitted in the frequency band(s) in which the radio equipment operates.

9. Manufacturers shall ensure that each item of radio equipment is accompanied by a copy of the EU declaration of conformity or by a simplified EU declaration of conformity. Where a simplified EU declaration of conformity is provided, it shall contain the exact internet address where the full text of the EU declaration of conformity can be obtained.

10. In cases of restrictions on putting into service or of requirements for authorisation of use, information available on the packaging shall allow the identification of the Member States or the geographical area within a Member State where restrictions on putting into service or requirements for authorisation of use exist. Such information shall be completed in the instructions accompanying the radio equipment. The Commission may adopt implementing acts specifying how to present that information. Those implementing acts shall be adopted in accordance with the advisory procedure referred to in Article 45(2).



11. Manufacturers who consider or have reason to believe that radio equipment which they have placed on the market is not in conformity with this Directive shall immediately take the corrective measures necessary to bring that radio equipment into conformity, to withdraw it or recall it, if appropriate. Furthermore, where the radio equipment presents a risk, manufacturers shall immediately inform the competent national authorities of the Member States in which they made the radio equipment available on the market to that effect, giving details, in particular, of the noncompliance, of any corrective measures taken and of the results thereof.

12. Manufacturers shall, further to a reasoned request from a competent national authority, provide it with all the information and documentation in paper or electronic form necessary to demonstrate the conformity of the radio equipment with this Directive, in a language which can be easily understood by that authority. They shall cooperate with that authority, at its request, on any action taken to eliminate the risks posed by radio equipment which they have placed on the market.

Ref RED 2014/53/EU Article 11 - Authorised representatives

1. A manufacturer may, by a written mandate, appoint an authorised representative.

The obligations laid down in Article 10(1) and the obligation to draw up technical documentation laid down in Article 10(3) shall not form part of the authorised representative's mandate.

2. An authorised representative shall perform the tasks specified in the mandate received from the manufacturer. The mandate shall allow the authorised representative to do at least the following:

(a) keep the EU declaration of conformity and the technical documentation at the disposal of national market surveillance authorities for 10 years after the radio equipment has been placed on the market;

(b) further to a reasoned request from a competent national authority, provide that authority with all the information and documentation necessary to demonstrate the conformity of radio equipment;

(c) co-operate with the competent national authorities, at their request, on any action taken to eliminate the risks posed

Article 19 General principles of the CE marking

1. The CE marking shall be subject to the general principles set out in Article 30 of Regulation (EC) No 765/2008.

2. On account of the nature of radio equipment, the height of the CE marking affixed to radio equipment may be lower than 5 mm, provided that it remains visible and legible.

Article 20 Rules and conditions for affixing the CE marking and the identification number of the notified body

1. The CE marking shall be affixed visibly, legibly and indelibly to the radio equipment or to its data plate, unless that is not possible or not warranted on account of the nature of radio equipment. The CE marking shall also be affixed visibly and legibly to the packaging.

2. The CE marking shall be affixed before the radio equipment is placed on the market.

3. Member States shall build upon existing mechanisms to ensure correct application of the regime governing the CE marking and shall take appropriate action in the event of improper use of that marking.



UK TYPE EXAMINATION CERTIFICATE



Certificate Validation

APPROVED BODY UK-TYPE EXAMINATION CERTIFICATE

BALU485-UK / 14 Jul 2022 / Rev A

UK Radio Equipment Regulations (S.I. 2017 No. 1206)

MiCOM Labs Inc., Approved Body Number 2280 declares, on the basis of the assessment of the tests and the technical documentation provided by the applicant that the following product complies with the essential requirements of the above noted Regulations.

Product Name:

SwitchBot Keypad

Approval Holder Name:

Woan Technology (Shenzhen) Co., Ltd.



**UK
CA**


Gordon Hurst, Product Certifier

This Certificate is Issued under the Authority of:

MiCOM Labs Inc., 575 Boulder Court, Pleasanton, California 94566, USA

Approved Body Number: 2280



Approved Body UK-Type Examination Certificate

BALU485-UK / 14 Jul 2022 / Rev A

for UK Radio Equipment Regulations (S.I. 2017 No. 1206)

Product Name:

SwitchBot Keypad

Product Model Numbers: **W2500020, W2500010, W2500011, W2500012, W2500013, W2500014, W2500015, W2500021, W2500022, W2500023, W2500024, W2500025**

Brand Name: **SwitchBot**

Approval Holder: **Woan Technology (Shenzhen) Co., Ltd.**, Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

Product Manufacturer: **Woan Technology (Shenzhen) Co., Ltd.**, Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

Standards

Group	Name
Section 6(1)(a) Health & Safety	IEC 62368-1: 2014
	BS EN 62368-1: 2014+A11: 2017
	BS EN 62479: 2010
Section 6(1)(b) Electromagnetic Compatibility	EN 301 489-1 V2.2.3
	Final draft EN 301 489-3 V2.2.0
	EN 301 489-17 V3.2.4
	BS EN 55032: 2015+A1:2020
	BS EN 55035: 2017+A11:2020
	BS EN IEC 61000-3-2: 2019
	BS EN 61000-3-3: 2013+A1:2019
Section 6(2) Effective Use of Spectrum	EN 300 328 V2.2.2
	EN 300 330 V2.1.1



Approved Body UK-Type Examination Certificate

BALU485-UK / 14 Jul 2022 / Rev A

for UK Radio Equipment Regulations (S.I. 2017 No. 1206)

Annex 1 to UK-Type Examination

UK-Type examination on the essential requirements Section 6

Section 6(1) - a) Health and Safety Assessed

Section 6(1) - b) Electromagnetic compatibility Assessed

Section 6(2) - Effective use of radio spectrum Assessed

Description of Apparatus

Company Name	Woan Technology (Shenzhen) Co., Ltd.
Certification No.	BALU485-UK
Issue Date / Rev	14 Jul 2022 / Rev A
Equipment Description	SwitchBot Keypad
Hardware Version	V1.0
Firmware Version	V1.0

Emission Information

Technology	Frequency MHz		Emission Designator	RF Power		
	From	To		Max	Type	Field Strength
NFC	13.56	13.56	K1D	--	--	42.07dBuV/m @ 10m
BLE	2402	2480	F1D	3.2dBm	EIRP	--



Approved Body UK-Type Examination Certificate

BALU485-UK / 14 Jul 2022 / Rev A

for UK Radio Equipment Regulations (S.I. 2017 No. 1206)

Technical Construction File Details: (Documents Reviewed)

Technical Report(s):

Section 6(1)(a) Health & Safety:

BL-SZ2230879-701

BL-SZ2230879-101

Section 6(1)(b) Electromagnetic Compatibility:

BL-SZ2230879-401

BL-SZ2230879-402

Section 6(2) Effective Use of Spectrum:

BL-SZ2230879-403

BL-SZ2230879-601

Supporting Documentation:

Service Agreement

Agent Authorization

UK Application

UK Declaration of Conformity

Block Diagram

BOM or Parts List

External Photographs

Internal Photographs

Label and its Location

Operational Description

PCB Layout

Schematics

Test Setup - UK

UK Risk Assessment

User Manual

Declaration of Identity

Scope

This UK-Type Examination Certificate is given in respect of compliance of the noted Radio Equipment per Section 6 Essential Requirements of UK Radio Equipment Regulations (SI 2017 No. 1206). The scope of the evaluation and this certificate relates only to those items identified in 'Annex 1 to UK-Type Examination Certificate' for the specific product and Certificate number referenced above.

UK Type Examination was performed according to Module B: UK-type examination procedure per Schedule 3 of the Regulation on the essential requirements in Section 6, for the specific product and Certificate Number referenced above.

This UK-Type Examination Certificate is based upon the review of the Technical Documentation and supporting evidence for the adequacy of the technical design solution, it is only valid in conjunction with the attached Annexes. The scope of this statement relates to a single sample of the apparatus identified above and of the submitted documents only.

The obligations of the following parties; Manufacturers, Importers, Distributors; are as defined in the UK Radio Equipment Regulations (SI 2017 / 1206) in conjunction with amendments in UK Statutory Instruments 2019 No. 696 Schedule 29.

<https://www.legislation.gov.uk/ukqi/2017/1206/contents>

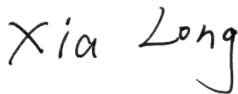
<https://www.legislation.gov.uk/ukqi/2019/696/schedule/29>

TEST REPORT

Applicant: Woan Technology (Shenzhen) Co., Ltd.
Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang
Address: Sub-district, Bao'an District, Shenzhen, Guangdong,
P.R.China, 518100
Equipment Type: SwitchBot Keypad
Model Name: W2500020 (refer section 2.4)
Brand Name: SwitchBot
Test Standard: EN 55032: 2015+A1:2020
EN 55035: 2017+A11:2020
EN IEC 61000-3-2: 2019
EN 61000-3-3: 2013+A1:2019
BS EN 55032: 2015+A1:2020
BS EN 55035: 2017+A11:2020
BS EN IEC 61000-3-2: 2019
BS EN 61000-3-3: 2013+A1:2019
Test Date: May 12, 2022 - May 26, 2022
Date of Issue: Jul. 12, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Xiong Chong**Checked by:** Xia Long**Approved by:** Liao Jianming
(Technical Director)

Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Jul. 12, 2022</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	Woan Technology (Shenzhen) Co., Ltd.
Address	Building A2, Zhengfeng Industrial Area, No.610 Fengtang Boulevard, Fuhai Sub-district, Bao'an District, Shenzhen

2.4 General Description for Equipment under Test (EUT)

EUT Name	SwitchBot Keypad	
Model Name Under Test	W2500020	
Series Model Name	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015, W2500021, W2500022, W2500023, W2500024, W2500025	
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only different on with fingerprint module or without fingerprint module.	
	No Fingerprints Version	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015
	Have Fingerprints Version	W2500021, W2500022, W2500023, W2500024, W2500025
Hardware Version	V1.0	
Software Version	V1.0	
Dimensions (Approx.)	N/A	
Weight (Approx.)	N/A	

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	FANSO
	Model No.	CR123A
	Serial No.	N/A
	Capacitance	Input: 6Vdc
	Rated Voltage	N/A
	Limited Voltage	N/A

2.6 Technical Information

Network and Wireless connectivity		Bluetooth, NFC
Interfaces present on the EUT	AC Ports	No AC Ports.
	DC Ports	No DC Ports.
	I/O Ports	No I/O Ports
	Telecom Ports	No Tel ports.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	EN 55032: 2015+A1:2020	Electromagnetic compatibility of multimedia equipment — Emission requirements
2	EN 55035: 2017+A11:2020	Electromagnetic compatibility of multimedia equipment - Immunity requirements
3	EN IEC 61000-3-2: 2019	Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
4	EN 61000-3-3: 2013+A1:2019	Electromagnetic Compatibility (EMC)– Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low – voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.
5	BS EN 55032: 2015+A1:2020	Electromagnetic compatibility of multimedia equipment — Emission requirements
6	BS EN 55035: 2017+A11:2020	Electromagnetic compatibility of multimedia equipment - Immunity requirements
7	BS EN IEC 61000-3-2: 2019	Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
8	BS EN 61000-3-3: 2013+A1:2019	Electromagnetic Compatibility (EMC)– Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low – voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

3.2 Referenced Standards

The following referenced standards are necessary for the report. For undated references in this report, the cited version applies.

No.	Identity	Document Title
1	IEC 61000-4-2 (2008)	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test.
2	IEC 61000-4-3 (2006),+A1 (2007)+A2 (2010)	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test.
3	IEC 61000-4-4 (2012)	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test.
4	IEC 61000-4-5 (2005)	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test.
5	IEC 61000-4-6 (2008)	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields.
6	IEC 61000-4-8 (2009)	Electromagnetic compatibility (EMC) - Part 4- 8: Testing and measurement techniques - Power frequency magnetic field immunity test
7	IEC 61000-4-11 (2004)	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests.

3.3 Verdict

No.	Base Standard	Description		Test Verdict	Result	Remark
Emission						
1	EN 55032	Radiated Emission	Below 1 GHz	Pass	ANNEX A.1	--
			Above 1 GHz	Pass		Note 1
2	EN 55032	Conducted Emission	Mains terminals	N/A	ANNEX A.2	--
			Asymmetric mode	N/A	ANNEX A.3	Note 2
			Differential voltage	N/A	ANNEX A.4	Note 3
3	EN 61000-3-2	Harmonic Current Emissions		N/A	ANNEX A.5	Note 4
4	EN 61000-3-3	Voltage Fluctuations & Flicker		N/A	ANNEX A.6	--
Immunity						
5	IEC 61000-4-2	Electrostatic Discharge Immunity		Pass	ANNEX A.7	--
6	IEC 61000-4-3	Radiated RF Electromagnetic Field Immunity		Pass	ANNEX A.8	--
7	IEC 61000-4-4	Electrical Fast Transient/Burst Immunity	AC Ports	N/A	ANNEX A.9	--
			DC Ports	N/A		--
			Analogue/ Digital data Ports	N/A		Note 5
8	IEC 61000-4-5	Surge Immunity	AC Ports	N/A	ANNEX A.10	Note 6
			DC Ports	N/A		Note 7
			Analogue/ Digital data Ports	N/A		Note 8
9	IEC 61000-4-6	Immunity to Conducted Disturbances Induced by RF Fields	AC Ports	N/A	ANNEX A.11	Note 9
			DC Ports	N/A		
			Analogue/ Digital data Ports	N/A		
10	IEC 61000-4-8	Power-frequency magnetic field		N/A	N/A	Note 10
11	IEC 61000-4-11	Voltage Dips and Short Interruptions Immunity		N/A	N/A	Note 11
12	EN 55035 (4.2.7)	Broadband impulsive conducted disturbances		N/A	ANNEX A.14	Note 12
Note 1: The highest frequency of the internal sources of the EUT is above 108 MHz, the measurement shall be made above 1 GHz.						
Note 2: For cables longer than 3 m only.						
Note 3: For Class B broadcasting receiver only.						
Note 4: There is no need for Harmonics test to be performed on this product (rated power is less than 75 W) in accordance with EN IEC 61000-3-2: 2019.						
For further details, please refer to Clause 7 of EN IEC 61000-3-2: 2019 which states:						
“For the following categories of equipment, limits are not specified in this edition of the standard: - equipment with a rated power of 75 W or less, other than lighting equipment.”						
For DC Ports and Analogue/ Digital data Ports, applicable only to ports which according to the						

manufacturer's specification support cable lengths greater than 3 m.

Note 5: The repetition frequency is 100 kHz for CPE, xDSL ports.

Note 6: The number of pulses applied shall be as follows:

- Five positive pulses line-to-neutral at 90° phase
- Five negative pulses line-to-neutral at 270° phase

The following additional pulses are required only if the EUT has an earth connection or if the EUT is earthed via any AE.

- Five positive pulses line-to-earth at 90° phase
- Five negative pulses line-to-earth at 270° phase
- Five negative pulses neutral-to-earth at 90° phase
- Five positive pulses neutral-to-earth at 270° phase

For multiple-phase systems where a neutral conductor is present, the test is applied (as defined above) to a single phase unless the other phases are connected to significantly different circuit arrangements.

For multiple-phase systems where a neutral conductor is not present, the test is applied as defined in the basic standard.

Note 7: Applicable only to ports which, according to the manufacturer's specification, may connect directly to outdoor cables.

Note 8: Surges are applicable to ports which satisfy all the following conditions:

- may connect directly to cables that leave the building structure.
- defined as an antenna port a wired network port or a broadcast receiver tuner port. Typical ports covered include xDSL, PSTN, CATV, antenna and similar. Excluded ports are LAN and similar.

Note 9: The level is 3V from 0.15 MHz to 10MHz, from 3V decrease to 1V when 10 MHz to 30 MHz with Logarithmic, and 1V from 30MHz to 80 MHz.

Note 10: Applicable only to equipment containing devices intrinsically susceptible to magnetic fields, such as CRT monitors, Hall effect elements electro-dynamic microphones magnetic field sensors or audio frequency transformers.

Note 11: Changes to occur at 0 degree crossover point of the voltage waveform. If the EUT does not demonstrate compliance when tested with 0 degree switching. The test shall be repeated with the switching occurring at both 90 degrees and 270 degrees. If EUT satisfies these alternative requirements, then it fulfils the requirements. This condition shall be recorded in the test report.

Note 12: Applicable only to CPE xDSL ports.

3.4 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Conducted emissions (9 kHz-30 MHz)-AMN	3.22 dB
Conducted emissions (150 kHz-30 MHz)-AAN_CAT3	3.66 dB
Conducted emissions (150 kHz-30 MHz)-AAN_CAT5	4.10 dB
Conducted emissions (150 kHz-30 MHz)-AAN_CAT6	4.58 dB
Radiated emissions (30 MHz-1 GHz)-10m	4.80 dB
Radiated emissions (30 MHz-1 GHz)-966#2	4.76 dB
Radiated emissions (30 MHz-1 GHz)-966#4	4.38 dB
Radiated emissions (1 GHz-18 GHz)-10m	4.72 dB
Radiated emissions (1 GHz-18 GHz)-966#2	4.88dB
Radiated emissions (1 GHz-18 GHz)-966#4	5.04 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments, Test Date and Test Engineer

Test items	Voltage	Temperature	Relative Humidity	Ambient Pressure	Test Date	Test Engineer
Radiated Emission	From battery	24.6℃ 23.5℃	52% 54%	101kPa	May 13, 2022 May 26, 2022	Bai Yaowei Huang Zehuai
Electrostatic Discharge Immunity	From battery	24.6℃	42%		May 23, 2022	Liu Chenfang
Radiated RF Electromagnetic Field Immunity	From battery	24.0℃	55%		May 24, 2022	Chen Jiali

4.2 Test Equipment

Radiated Emission Test For Frequency Below 1 GHz (10 m)						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.10.10	2022.10.09	☒
Amplifier (30-1GHz)	COM-MV	ZT30-1000M	B2018054558	2021.10.10	2022.10.09	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-01162	2020.08.12	2023.08.11	☒
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	N/A	2021.08.15	2024.08.14	☒
Description	Manufacturer	Name		Version		Use
Test Software	BALUN	BL410-E		V19.918		☒

Radiated Emission Test For Frequency Above 1 GHz (3m-966#4)						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	Agilent	N9038A	MY53220118	2021.09.13	2022.09.12	☒
Amplifier (1-12GHz)	COM-MV	DLNAB-1000-12000-002	18080279	2021.09.13	2022.09.12	☒
Amplifier (0.8-21GHz)	Mini-Circuits	ZVA-213-S+	619201336	2021.09.13	2022.09.12	☐
Amplifier (18-40GHz)	COM-MV	KA_LNA18-40G-01	18050001	2021.10.20	2022.10.19	☐
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	1201	2019.07.22	2022.07.21	☒
Anechoic Chamber	ChangNing	9m*6m*6m	966#4	2020.03.16	2023.03.15	☒
Description	Manufacturer	Name		Version		Use
Test Software	BALUN	BL410-E		V19.918		☒

Electrostatic Discharge Immunity Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
ESD Test System	AMETEK CTS	DITO	P18332 22423	2021.06.04	2022.06.03	☒

Radiated RF Electromagnetic Field Immunity Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
Anechoic Chamber	RAINFORD	7m*4m*3m	N/A	2019.11.24	2022.11.23	☒
Signal Generator	Agilent	N5181A	MY50141752	2022.01.08	2023.01.07	☒
Power Amplifier	OPHIR RF	5225F	1037	2022.02.16	2023.02.15	☒
Directional Coupler	Werlantone	C5982-10	109275	N/A	N/A	☒
Power Amplifier	OPHIR RF	5273F	1016	2022.02.16	2023.02.15	☒
Directional Coupler	Werlantone	CHP-273E	S00801z-01	N/A	N/A	☒
Power Amplifier	RFLIGHT	NTWPAS	2560025	2022.02.16	2023.02.15	☒
Power Meter	R&S	NRVD-B2	7250BJ-0112 /2011	2021.09.08	2022.09.07	☒
Feld Strength Meter	Narda	EP602	611WX80276	2021.09.26	2022.09.25	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-977	2022.02.16	2025.02.15	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	1917	2019.07.02	2022.07.01	☒
Mouth Simulator	B&K	4227	2423931	2021.10.14	2022.10.13	☐
Sound Calibrator	B&K	4231	2430337	2021.10.13	2022.10.12	☐
Sound Level Meter	B&K	NL-20	00844023	2021.10.13	2022.10.12	☐
Ear Simulator	B&K	4192 -L-001	3038758	2021.10.12	2022.10.11	☐
Audio analyzer	R&S	UPL 16	100129	2022.01.08	2023.01.07	☐
Description	Manufacturer	Name		Version		Use
Test Software	BALUN	BL410-E		V19.918		☒

4.3 Test Enclosure list

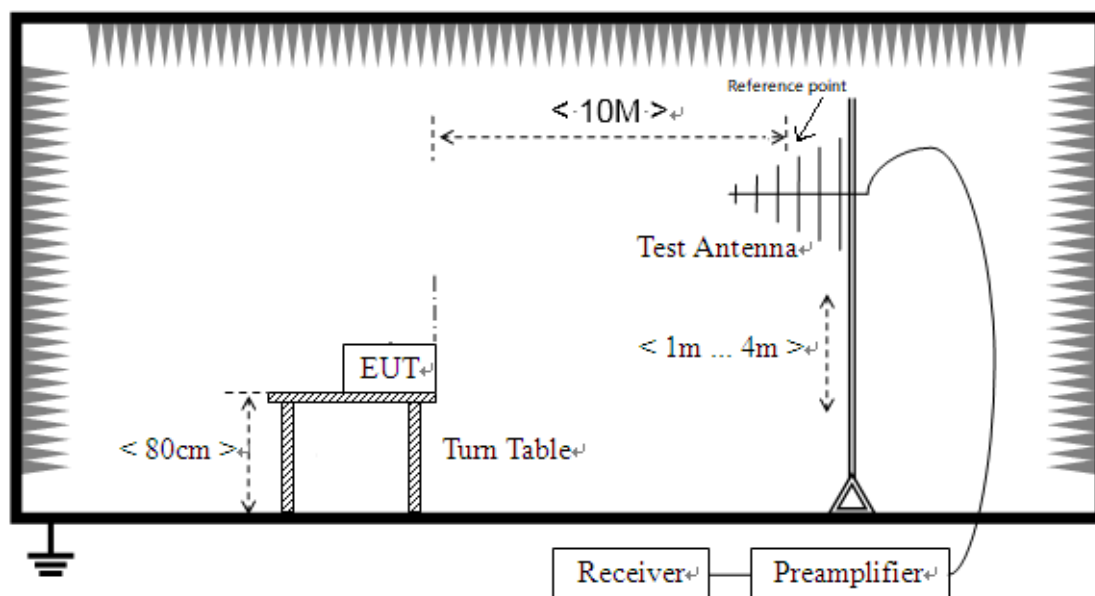
Note: Not applicable.

4.4 Test Configurations

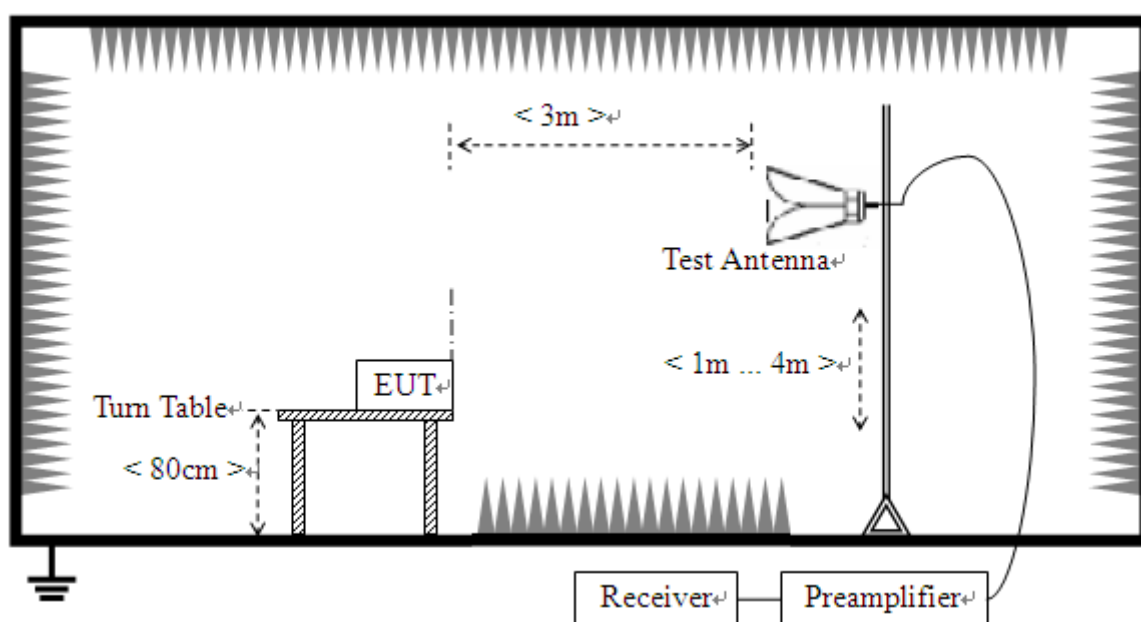
Test Configurations (TC) No.	Description
TC01	<u>The Working Test Mode</u> EUT + Battery

4.5 Test Setups

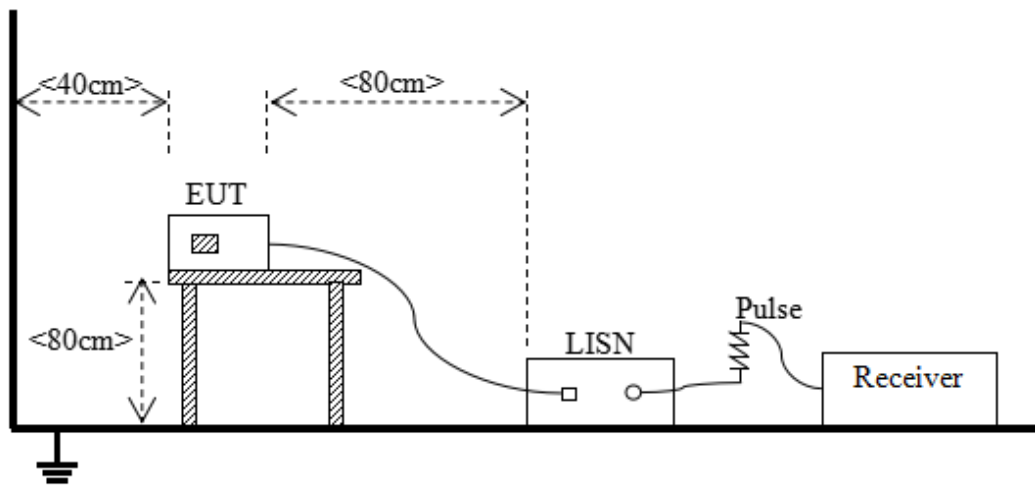
Test Setup 1



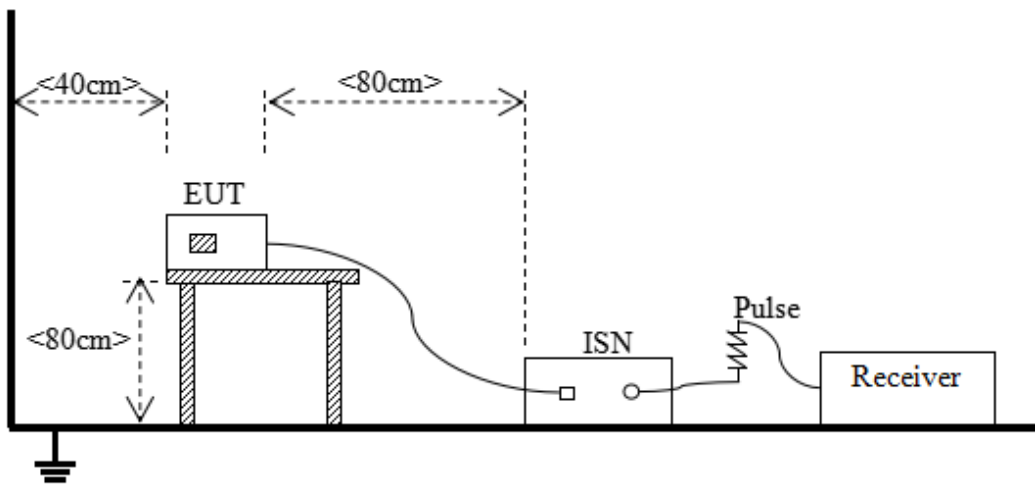
(For Radiated Emission Test (30 MHz-1 GHz))



(For Radiated Emission Test (above 1 GHz))

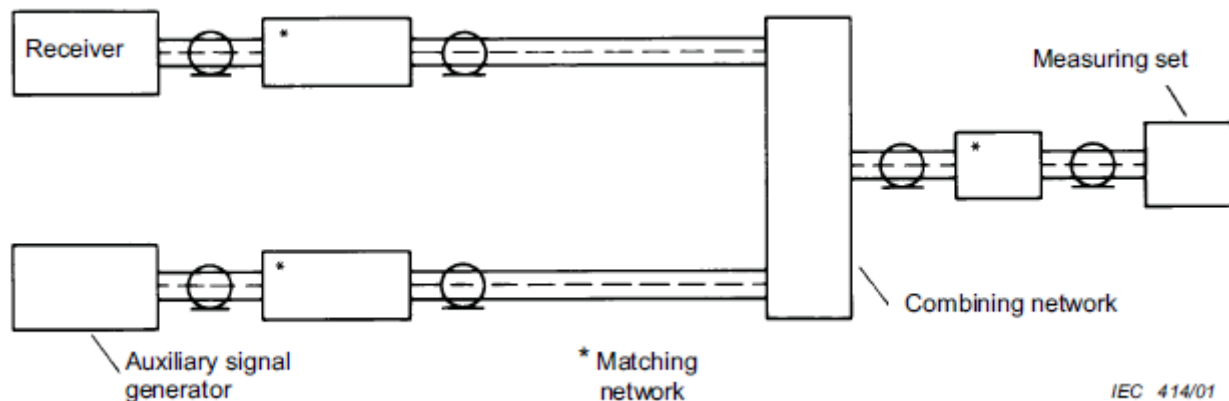
Test Setup 2

(For Conducted disturbance voltage at mains terminals Test)

Test Setup 3

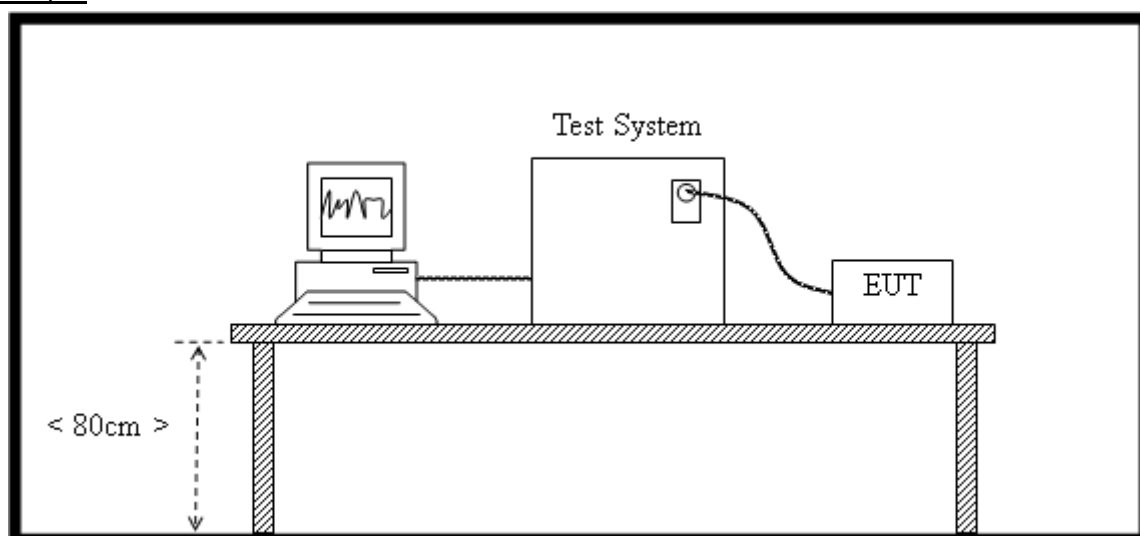
(For Conducted disturbance for asymmetric mode Test)

Test Setup 4



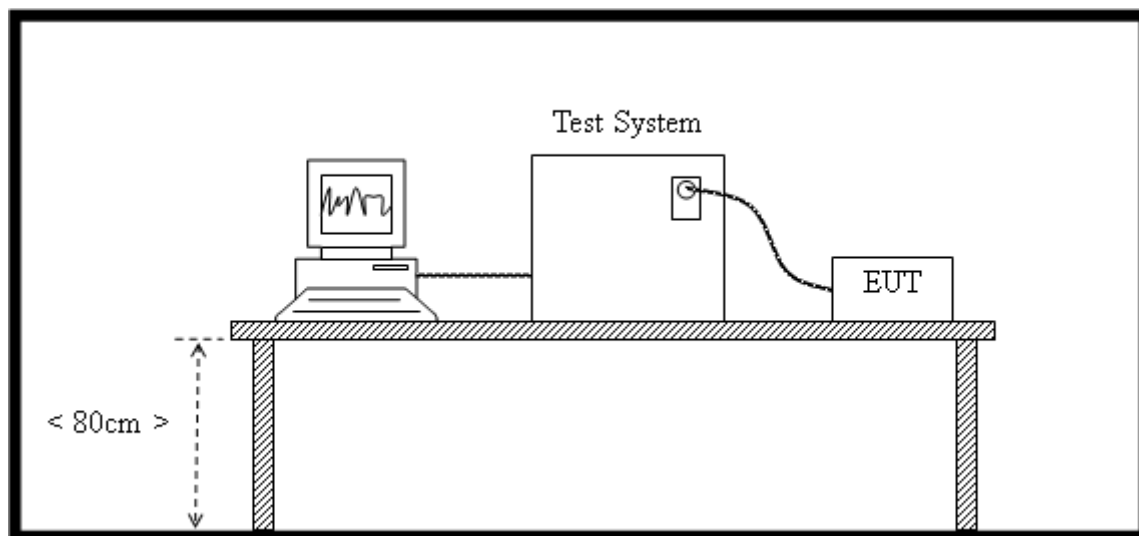
(For Conducted differential voltage emission (TV/FM broadcast receiver tuner ports))

Test Setup 5



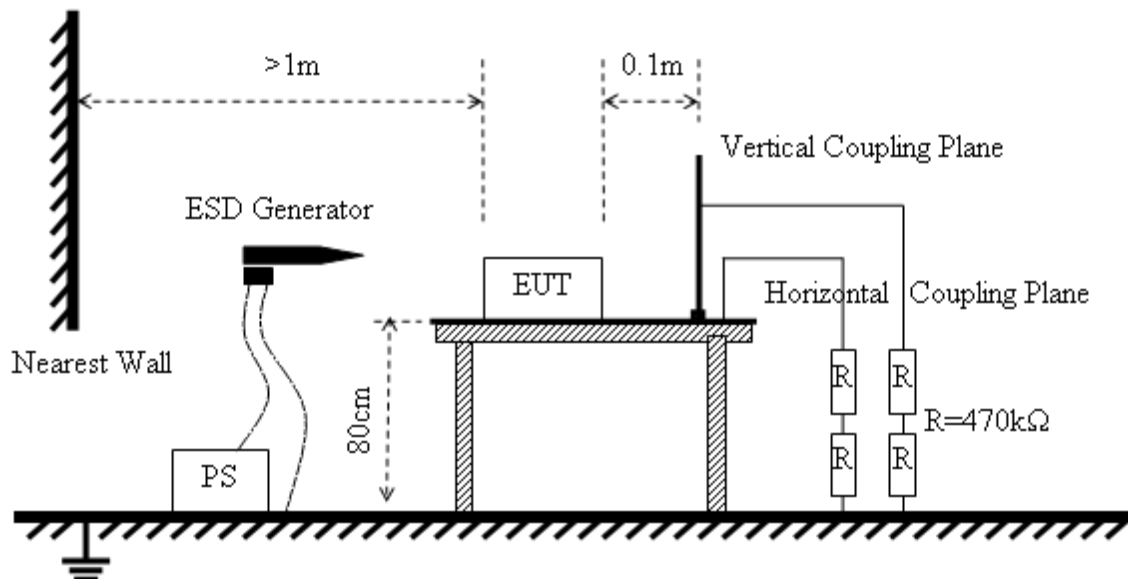
(For Harmonic Current Emissions Measurement Test)

Test Setup 6



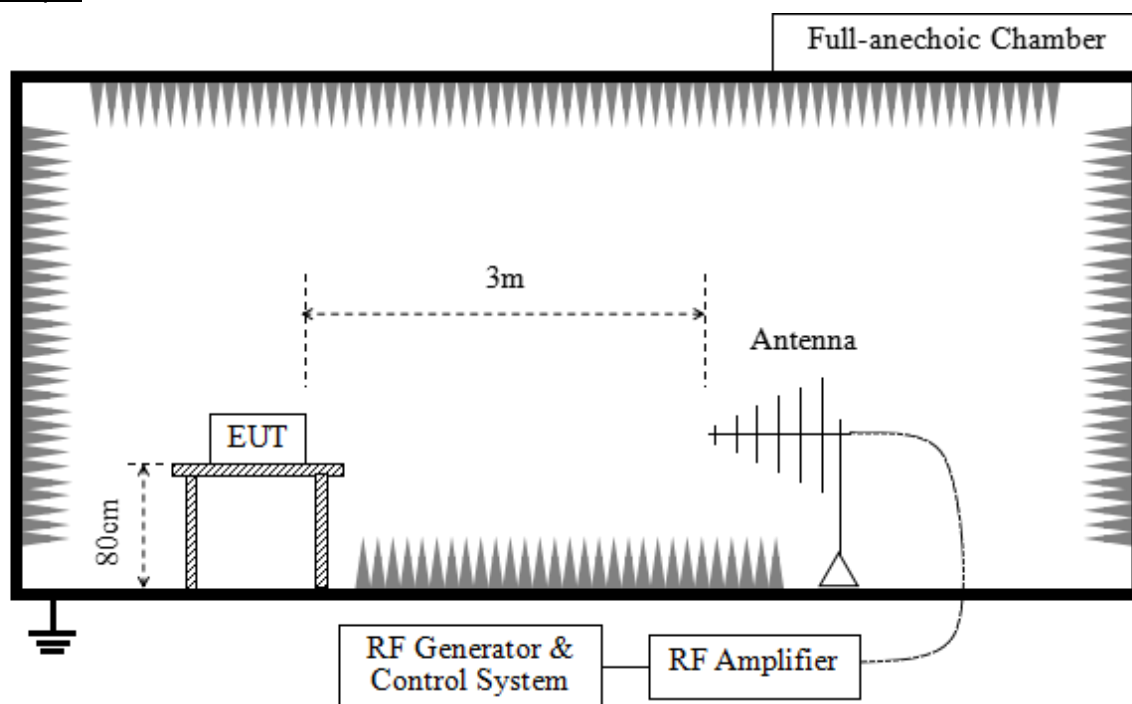
(For Voltage Fluctuations and Flicker Measurement Test)

Test Setup 7



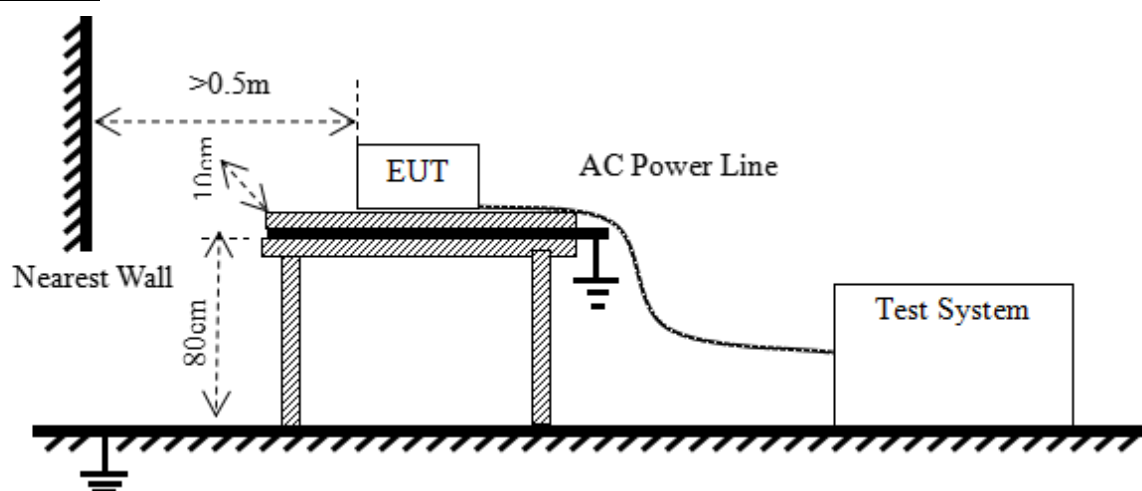
(For Electrostatic Discharge Immunity Test)

Test Setup 8



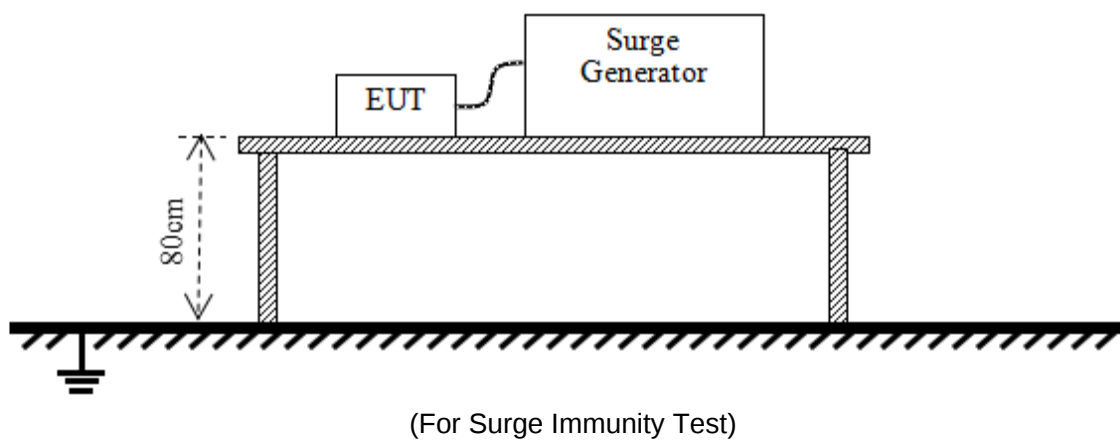
(For Radiated Immunity Test)

Test Setup 9

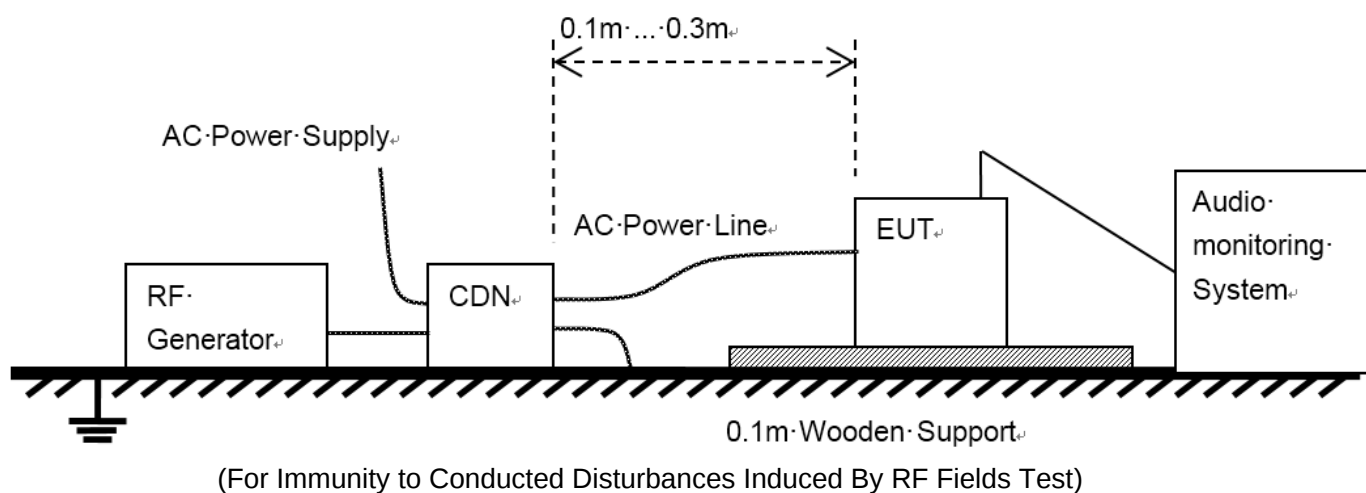


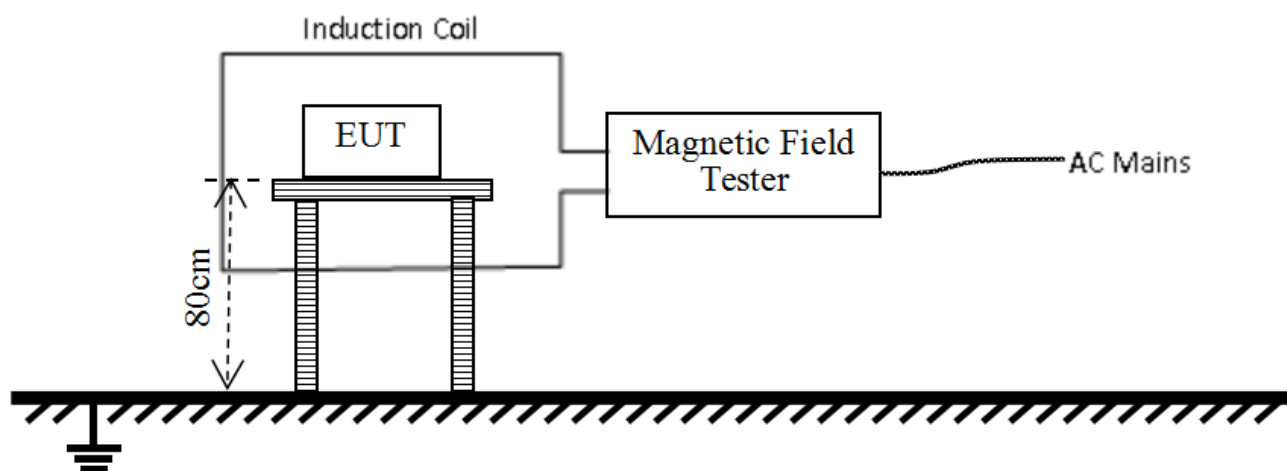
(For Electrical Fast Transient / Burst Immunity Test)

Test Setup 10

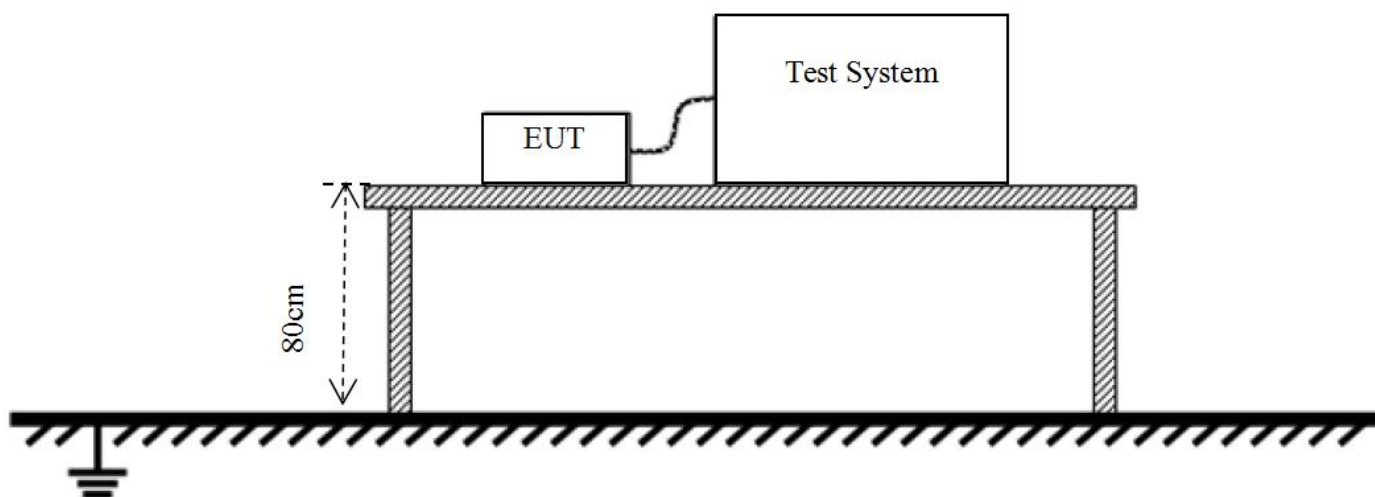


Test Setup 11

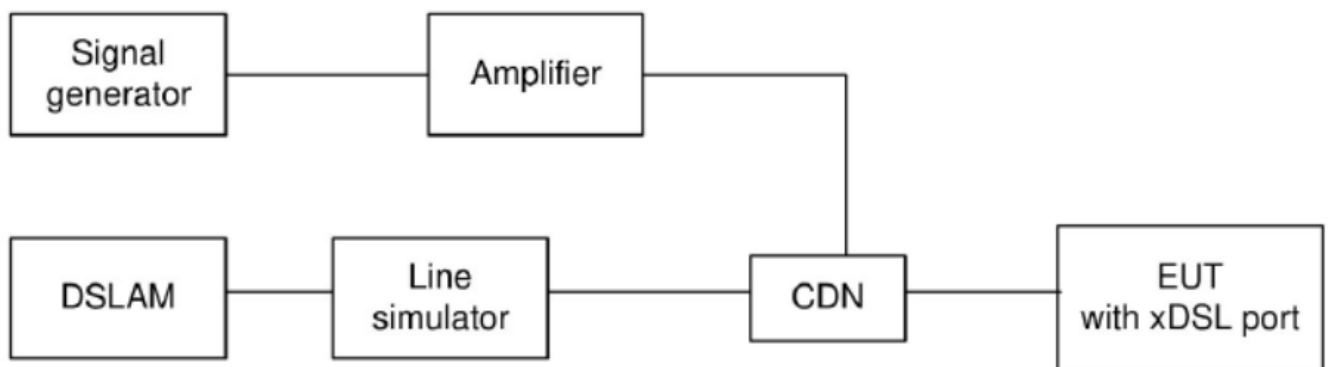


Test Setup 12

(Power Frequency Magnetic Fields)

Test Setup 13

(For Voltage Dips and Short Interruptions Immunity Test)

Test Setup 14

(For Broadband Impulse Noise Disturbances Repetitive Immunity Test)

4.6 Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Setup	Test Setup 1
	Test Configuration	TC01 Note
Electrostatic Discharge Immunity	Test Setup	Test Setup 7
	Test Configuration	TC01 Note
Radiated RF Electromagnetic Field Immunity	Test Setup	Test Setup 8
	Test Configuration	TC01 Note
Note: Based on client request, all normal using modes of the normal function were tested, but only the worst test data of test mode is reported in this report. The Working Mode is the worst mode in this report.		

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency range (MHz)	Class A (10 m)	Class A (3 m)	Class B (10 m)	Class B (3 m)
	Quasi-Peak Limit (dB μ V/m)		Quasi-Peak Limit (dB μ V/m)	
30 - 230	40	50	30	40
230 - 1000	47	57	37	47

Frequency range (MHz)	Class A (at 3 m)		Class B (at 3 m)	
	Peak Limit (dB μ V/m)	Average Limit (dB μ V/m)	Peak Limit (dB μ V/m)	Average Limit (dB μ V/m)
1000-6000	80	60	74	54

Requirements for radiated emissions from FM receivers

Frequency range (MHz)	Measurement		Quasi-Peak Limit (dB μ V/m) Fundamental	Quasi-Peak Limit (dB μ V/m) Harmonics	Quasi-Peak Limit (dB μ V/m) Other
	Facility	Distance (m)			
30-230	OATS/SAC	10	50	42	30
230-300				42	37
300-1000				46	37
30-230	OATS/SAC	3	60	52	40
230-300				52	47
300-1000				56	47

NOTE:

- 1) The lower limit shall apply at the transition frequency.
- 2) Additional provisions may be required for cases where interference occurs.

5.1.1.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 1. The photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by antenna with 2 orthogonal polarities.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak for $f < 1$ GHz, peak & RMS Average for $f \geq 1$ GHz

Trace = max hold

5.1.1.4 Test Result

Please refer to ANNEX A.1.

5.1.2 Conducted disturbance voltage at mains terminals

5.1.2.1 Test Limit

Frequency range (MHz)	Class A		Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	79	66	66-56	56-46
0.50 - 5	73	60	56	46
5 - 30	73	60	60	50

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 2. The photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω /50 μ H of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

Use the following spectrum analyzer settings:

RBW = 9 KHz

VBW $\geq$ RBW

Sweep = 10ms

Detector function = peak & Average

Trace = max hold

5.1.2.4 Test Result

Please refer to ANNEX A.2.

5.1.3 Conducted disturbance for asymmetric mode

5.1.3.1 Test Limit

Frequency range (MHz)	Class A		Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	97-87	84-74	84-74	74-64
0.50 - 30	87	74	74	64

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.3.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 3. The photo of test setup please refer to ANNEX B.

5.1.3.3 Test Procedure

Measurement of common mode (asymmetric mode) current or voltage emissions at wired network ports for attachment of unscreened balanced pairs shall be performed with the wired network port connected by a cable to an AAN. The AAN shall define the common mode termination impedance seen by the wired network port during the emission measurements.

The voltage division factor shall be added to the measured voltage measured by the receiver directly at the voltage measurement port of the AAN and the result compared with the voltage limits as applicable.

5.1.3.4 Test Result

Please refer to ANNEX A.3.

5.1.4 Conducted differential voltage emission

5.1.4.1 Test Limit

Applicability	Frequency range (MHz)	Differential voltage limit @75Ω(dBuV)		
		Local Oscillator Fundamental	Local Oscillator Harmonics	Other
Television receivers; video recorders; PC TV broadcast receiver tuner cards; Digital audio receivers	30 to 950	46	46	46
	950 to 2150	54	54	46
Tuner units (not the LNB) for satellite signal reception	950 to 2150	54	54	46
FM audio receivers and PC tuner cards	30 to 300	54	50	46
	300 to 1000	54	52	46
FM car radios	30 to 300	66	59	46
	300 to 1000	66	52	46
RF modulator output ports connect to TV broadcast receiver tuner ports	30 to 950	76	46	46
	950 to 2150	N/A	54	46

5.1.4.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 4. The photo of test setup please refer to ANNEX B.

5.1.4.3 Test Procedure

1. The impedance as seen from the TV/FM broadcast receiver tuner port of the EUT shall be equal to the nominal antenna input impedance for which the port has been designed. The EUT shall be tuned to the wanted signal from the AE (signal generator). The emission level shall be measured across the relevant frequency range taking into account the attenuation between the EUT TV/FM broadcast receiver tuner port and the measurement device.
2. The RF modulator output port of the EUT is connected to the input of the measuring device by means of a coaxial cable and a matching network (if necessary). The characteristic impedance of the cable shall be equal to the nominal output impedance of the EUT. The EUT shall produce an RF carrier modulated by a video signal defined. The RF output level shall be obtained by adding the insertion loss of the matching network to the indication of the measuring device (tuned to the video carrier frequency and its harmonics).

5.1.4.4 Test Result

Please refer to ANNEX A.4.

5.1.5 Harmonic Current Emissions

5.1.5.1 Limit

Limits for Class A equipment				Limits for Class D equipment		
odd harmonic		Even harmonics		Harmonic order (n)	Maximum permissible harmonic current per watt mA/W	Maximum permissible harmonic current A
Harmonic order (n)	Maximum permissible harmonic current A	Harmonic order (n)	Maximum permissible harmonic current A			
3	2.30	2	1.08	3	3.4	2.30
5	1.14	4	0.43	5	1.9	1.14
7	0.77	6	0.30	7	1.0	0.77
9	0.40	8≤n≤40	0.23X8/n	9	0.5	0.40
11	0.33			11	0.35	0.33
13	0.21			15≤n≤39	3.85/n	0.15X15/n
15≤n≤39	0.15X15/n					

Note: For Class B equipment, the harmonics of the input current shall not exceed the values given in Table “limits for Class A equipment” multiplied by a factor of 1,5.

For the purpose of harmonic current limitation, equipment is classified as follows: (Note: Class C equipment requirement not include in this standard.)

Class A:

- balanced three-phase equipment;
- household appliances, excluding equipment identified as class D;
- tools, excluding portable tools;
- dimmers for incandescent lamps;
- audio equipment.

Equipment not specified in one of the three other classes shall be considered as class A equipment.

Class B:

- portable tools;
- arc welding equipment which is not professional equipment.

Class C:

- lighting equipment.

Class D:

Equipment having a specified power according to 6.2.2 less than or equal to 600 W, of the following types:

- personal computers and personal computer monitors;
- television receivers.

5.1.5.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 5. The photo of test setup please refer to ANNEX B.

5.1.5.3 Test Procedure

The EUT is placed on the top of a wooden table 0.8m above the ground and operated to produce the

maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

5.1.5.4 Test Result

Please refer to ANNEX A.5.

5.1.6 Voltage Fluctuations and Flicker Measurement

5.1.6.1 Limit

Test Item	Limit	Note
Pst	1.0	Short-term flicker indicator
Plt	0.65	Long-term flicker indicator
Tdt	0.5	Maximum time that dt exceeds 3%
dmax (%)	4%	Maximum relative voltage change
dc (%)	3.3%	Relative steady-state voltage change

5.1.6.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 6. The photo of test setup please refer to ANNEX B.

5.1.6.3 Test Procedure

During the Flicker measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours. The test specifications refer the next table.

No.	Specification	Value
1	Test Frequency	50 Hz
2	Test Voltage	230 VAC
3	Waveform	Sine
4	Test Time	10 minutes for Pst; 2 hours for Plt

5.1.6.4 Test Result

Please refer to ANNEX A.6.

5.2 Immunity Tests

5.2.1 Test Performance Criteria for Immunity Test

5.2.1.1 General Performance Criteria

Type	Description
Criterion A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
Criterion B	During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, 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. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if 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. A reboot or re-start operation is allowed

5.2.2 Performance Criteria for CPE containing xDSL ports

Type	Description								
Criterion A	In the absence of impulsive noise: The modem shall operate without retraining at its target noise margin with a bit rate value depending on the line attenuation and the stationary noise being present on the line. (The actual value will be between the minimum and maximum bit rate values programmed in the port). With the impulsive noise applied: The modem shall operate without retraining and without SES at the bit rate established prior to the application of the impulsive noise. No extra CRC errors shall occur due to the impulsive noise.								
Criterion B	Modems shall withstand the application of the isolated impulsive noise events. The performance criteria defined in Table F.3 shall be applied. Table F.3 – Performance criteria against impulse duration <table> <tr> <th>Impulse duration ms</th><th>Performance criteria</th></tr> <tr> <td>0,24</td><td>The application of the impulse shall not cause the xDSL link to lose synchronisation. No CRC errors are permitted.</td></tr> <tr> <td>10</td><td>The application of the 5 impulses shall result in less than 75 CRC errors and shall not cause the link to lose synchronisation.</td></tr> <tr> <td>300</td><td>The application of the impulse shall not cause the xDSL link to lose synchronisation.</td></tr> </table>	Impulse duration ms	Performance criteria	0,24	The application of the impulse shall not cause the xDSL link to lose synchronisation. No CRC errors are permitted.	10	The application of the 5 impulses shall result in less than 75 CRC errors and shall not cause the link to lose synchronisation.	300	The application of the impulse shall not cause the xDSL link to lose synchronisation.
Impulse duration ms	Performance criteria								
0,24	The application of the impulse shall not cause the xDSL link to lose synchronisation. No CRC errors are permitted.								
10	The application of the 5 impulses shall result in less than 75 CRC errors and shall not cause the link to lose synchronisation.								
300	The application of the impulse shall not cause the xDSL link to lose synchronisation.								

5.2.3 Electrostatic Discharge Immunity

5.2.3.1 Test Specification

Specification	Value
Basic Standard	IEC 61000-4-2
Discharge Impedance	330 Ohm / 150 pF
Discharge Voltage	Air Discharge: 8 kV Contact Discharge: 4 kV
Polarity	Positive / Negative
Number of Discharge	Minimum 20 times at each test point
Discharge Mode	Single discharge
Discharge Period	1 second minimum

5.2.3.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 7. The photo of test setup please refer to ANNEX B.

5.2.3.3 Test Procedure

1. Electrostatic discharges are applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
2. The test is performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
3. The time interval between two successive single discharges is at least 1 second.
4. The ESD generator is held perpendicularly to the surface to which the discharge is applied and the return cable is at least 0.2 meters from the EUT.
5. Contact discharges are applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
6. Air discharges are applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator is removed from the EUT and re-triggered for a new single discharge. The test is repeated until all discharges were completed.
7. At least ten single discharges (in the most sensitive polarity) are applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator is positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
8. At least ten single discharges (in the most sensitive polarity) are applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m*0.5m) is placed vertically to and 0.1 meters from the EUT.

5.2.3.4 Test Result

Please refer to ANNEX A.7.

5.2.4 Radio Frequency Electromagnetic Field Immunity

5.2.4.1 Test Specification

Specification	Value
Basic Standard	IEC 61000-4-3
Frequency Range	80 MHz to 1000 MHz, 1800/2600/3500/5000 ($\pm 1\%$) MHz
Field Strength	1 V/m, 3 V/m (unmodulated, r.m.s)
Modulation	1 kHz sine wave, 80%, AM modulation
Frequency Step	1% of fundamental
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.5 m
Dwell Time	≤ 5 seconds

5.2.4.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 8. The photo of test setup please refer to ANNEX B.

5.2.4.3 Test Procedure

1. The testing is performed in a fully anechoic chamber. The transmit antenna is located at a distance of 3 meters from the EUT.
2. The test signal is 80% amplitude modulated with a 1 kHz sine wave.
3. The frequency range is swept from 80 MHz to 1000 MHz and 1800/2600/3500/5000 ($\pm 1\%$) MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep does not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size is 1% of fundamental.
4. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
5. The field strength level is 3 V/m.
6. The test is performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides, but only the worst side data is reported in this report.

5.2.4.4 Test Result

Please refer to ANNEX A.8.

5.2.5 Electrical Fast Transient / Burst Immunity

5.2.5.1 Test Specification

Specification	Value
Basic Standard	IEC 61000-4-4
Test Voltage	AC Power Port: 1 kV.
	DC Power Ports, Analogue/ Digital data Ports: 0.5 kV.
Polarity	Positive / Negative
Impulse Frequency	5 kHz, 100 kHz for CPE xDSL ports
Impulse Wave Shape	5/50 ns
Burst Duration	15 ms
Burst Period	300 ms
Test Duration	> 1 min

5.2.5.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 9. The photo of test setup please refer to ANNEX B.

5.2.5.3 Test Procedure

1. The EUT is tested with 1000 V discharges to the AC power input leads, and 500 V for DC Power Ports and Analogue/ Digital data Ports.
2. Both positive and negative polarity discharges are applied.
3. The length of the "hot wire" from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1 m.
4. The duration time of each test sequential is 1min.
5. The transient / burst waveform is in accordance with IEC 61000-4-4, 5/50 ns.

5.2.5.4 Test Result

Please refer to ANNEX A.9.

5.2.6 Surge Immunity

5.2.6.1 Test Specification

Specification	Value		
Ports class	AC Power Port	DC Power Port	Analogue/ Digital data Port
Basic Standard	IEC 61000-4-5		
Waveform	Voltage: 1.2/50 μ s; Current: 8/20 μ s	Voltage: 1.2/50 μ s; Current: 8/20 μ s	Voltage: 10/700 μ s
Test Voltage	line to ground 2 kV, line to line 1 kV	line to reference ground 0.5 kV	0.5KV, 1 kV or 4KV See note 1,2,3
Polarity	Positive / Negative		
Phase Angle	90°, 270°	N/A	N/A
Repetition Rate	60 seconds		
Times	5 times per condition		

Note1: Port type: unshielded symmetrical Apply: lines to ground; Port type: coaxial or shielded Apply: shield to ground.

Note2: The test level 1kV and 4kV should apply where primary protection is intended; The test level 1kV should apply where primary protection is not intended.

Note3: The test level 0.5kV apply to coaxial or shielded.

5.2.6.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 10. The photo of test setup please refer to ANNEX B.

5.2.6.3 Test Procedure

The EUT and the auxiliary equipment are placed on a table of 0.8 m heights above a metal ground reference plane. The size of ground plane is greater than 1m*1m and project beyond the EUT by at least 0.1 m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT is less than 2 meters (provided by the manufacturer).

The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise is applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).

The surges are applied line to line and line(s) to earth. When testing line to earth the test voltage is applied successively between each of the lines and earth. Set up to the test level specified increased the test voltage. All lower levels including the selected test level are tested. The polarity of each surge level included positive and negative test pulses.

5.2.6.4 Test Result

Please refer to ANNEX A.10.

5.2.7 Immunity to Conducted Disturbances Induced by RF Fields

5.2.7.1 Test Specification

Specification	Value
Basic Standard	IEC 61000-4-6
Frequency Range	0.15 MHz – 80 MHz
Field Strength	1 V rms, 3 V rms (unmodulated, r.m.s)
Modulation	1 kHz sine wave, 80% AM
Frequency Step	1% of fundamental
Coupled Cable	AC Power Line; DC Power Line; Analogue/ Digital data Line

5.2.7.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 11. The photo of test setup please refer to ANNEX B.

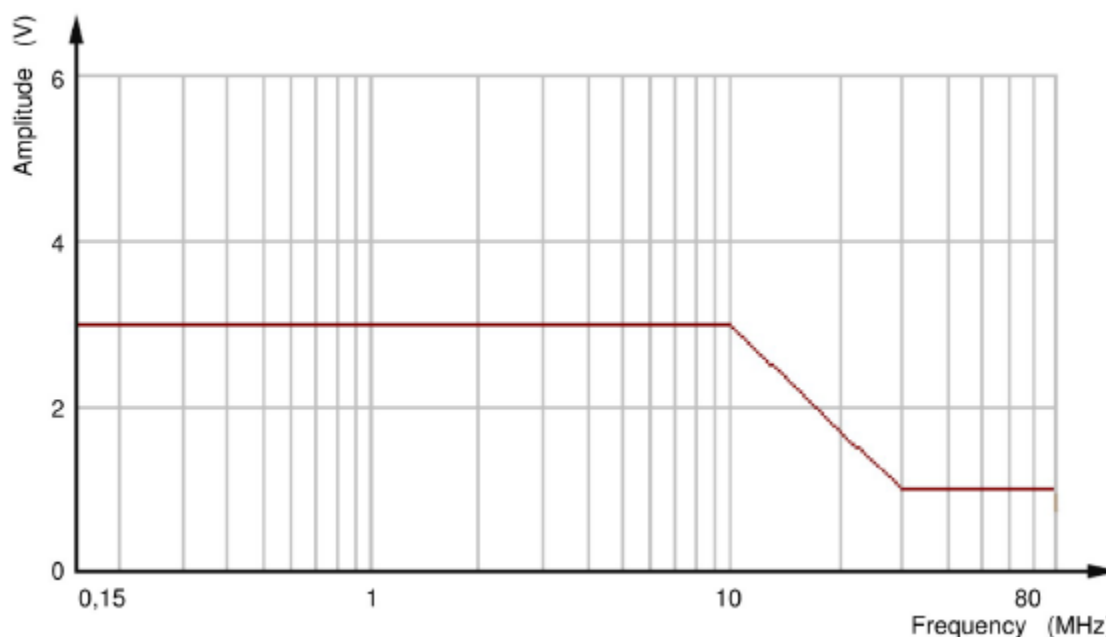
5.2.7.3 Test Procedure

The EUT shall be tested within its intended operating and climatic conditions.

The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50 Ohm load resistor.

The test signal is 80% amplitude modulated with a 1 kHz sine wave.

The field strength level refer follow figure.



The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding

frequency value where the frequency is swept incrementally.

The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.

Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

5.2.7.4 Test Result

Please refer to ANNEX A.11.

5.2.8 Power Frequency Magnetic Fields Immunity

5.2.8.1 Test Specification

Specification	Value
Basic Standard	IEC 61000-4-8
Field Frequency	50/60 Hz
Test Level	1 A/m
Test Duration	5 min

5.2.8.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 12. The photo of test setup please refer to ANNEX B.

5.2.8.3 Test Procedure

The EUT shall be subjected to the test magnetic field by using the induction coil of standard dimensions (1m*1m) and shown in Section 15.1. The induction coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.

5.2.8.4 Test Result

Please refer to ANNEX A.12.

5.2.9 Voltage Dips and Short Interruptions Immunity

5.2.9.1 Test Specification

Specification	Value
Basic Standard	IEC 61000-4-11
Voltage Dips	100% reduction: 10 ms; 30% reduction: 500 ms
Voltage Interruptions	100% reduction: 5000 ms
Voltage Phase Angle	0°, 90°, 270°

5.2.9.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 13. The photo of test setup please refer to ANNEX B.

5.2.9.3 Test Procedure

The power cord is used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.

The EUT is tested for a) 100% voltage dip of supplied voltage with duration of 10 ms; c) 30% voltage dip of supplied voltage and duration 500 ms. Both of the dip tests are carried out for a sequence of three voltage dips with intervals of 10 seconds.

100% voltage interruption of supplied voltage with duration of 5000 ms is followed, which is a sequence of three voltage interruptions with intervals of 10 seconds.

Changes to occur at 0 degree crossover point of the voltage waveform. If the EUT does not demonstrate compliance when tested with 0 degree switching. the test shall be repeated with the switching occurring at both 90 degrees and 270 degrees. If EUT satisfies these alternative requirements, then it fulfils the requirements. This condition shall be recorded in the test report.

5.2.9.4 Test Result

Please refer to ANNEX A.13.

ANNEX A TEST RESULTS

A.1 Radiated Emission

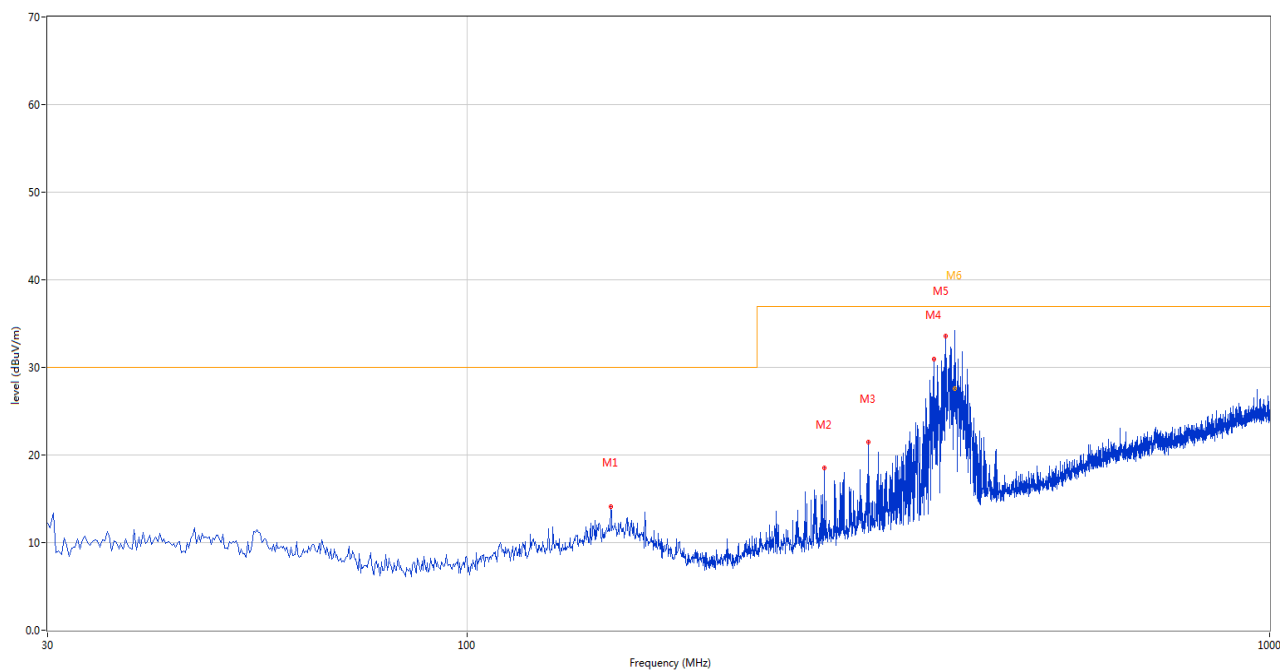
Note 1: The symbol of "--" in the table which means not application.

Note 2: Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 MHz to 1000 MHz. To reduce the testing time, a peak measuring receiver may be used instead of a quasi-peak measuring receiver. In case of dispute, measurement with a quasi-peak measuring receiver will take precedence.

Test Data and Plots (Below 1 GHz)

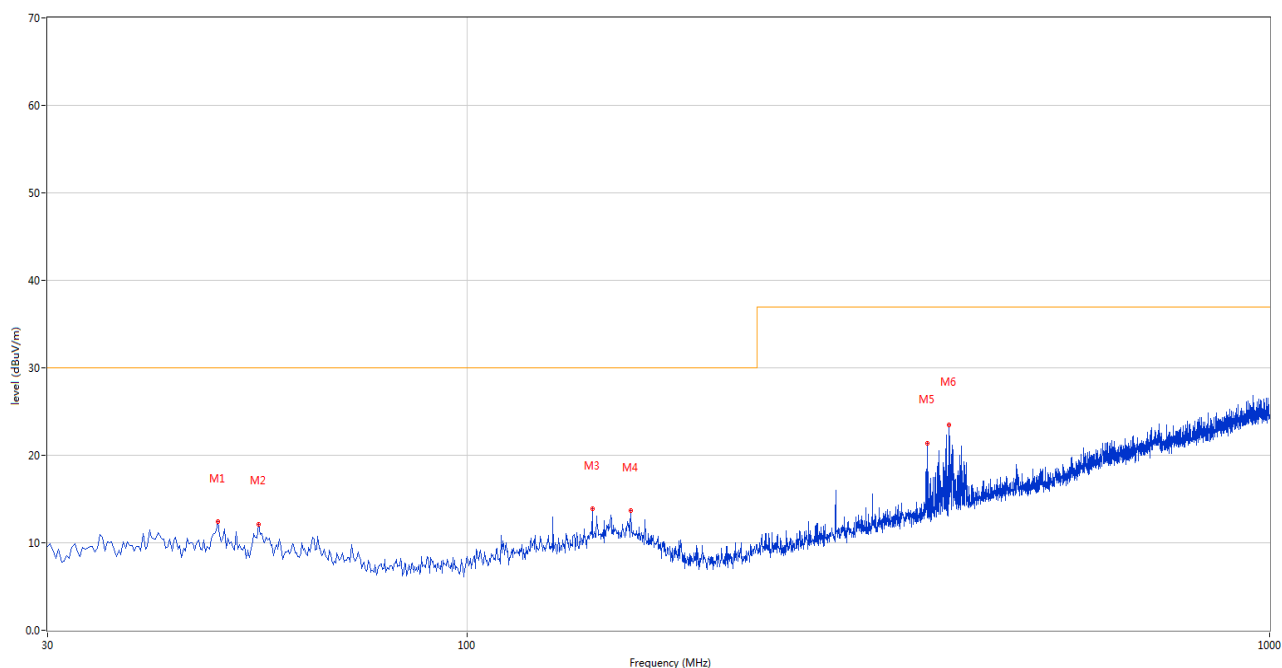
The Working Test Mode

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	150.977	14.07	-25.61	30.0	-15.93	Peak	266.00	200	Vertical	Pass
2	278.743	18.49	-26.19	37.0	-18.51	Peak	230.00	100	Vertical	Pass
3	315.836	21.46	-25.02	37.0	-15.54	Peak	275.00	100	Vertical	Pass
4	381.780	30.99	-23.34	37.0	-6.01	Peak	225.00	100	Vertical	Pass
5	394.386	33.53	-23.07	37.0	-3.47	Peak	320.00	100	Vertical	Pass
6	404.811	34.23	-22.67	37.0	-2.77	Peak	225.00	100	Vertical	N/A
6*	404.811	27.56	-22.67	37.0	-9.44	QP	225.00	100	Vertical	Pass

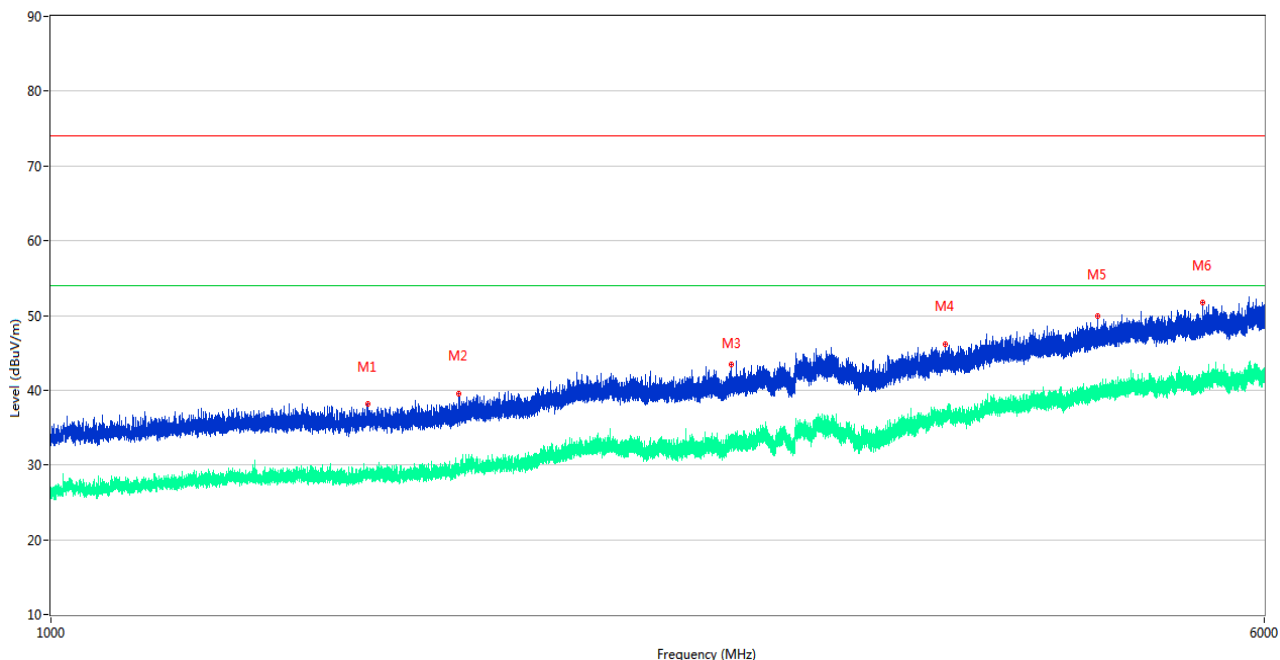
A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	48.910	12.38	-27.11	30.0	-17.62	Peak	300.00	100	Horizontal	Pass
2	54.971	12.13	-27.29	30.0	-17.87	Peak	292.00	200	Horizontal	Pass
3	143.219	13.87	-26.22	30.0	-16.13	Peak	0.00	200	Horizontal	Pass
4	159.948	13.68	-25.58	30.0	-16.32	Peak	130.00	200	Horizontal	Pass
5	374.749	21.34	-23.51	37.0	-15.66	Peak	256.00	200	Horizontal	Pass
6	398.023	23.42	-22.99	37.0	-13.58	Peak	256.00	200	Horizontal	Pass

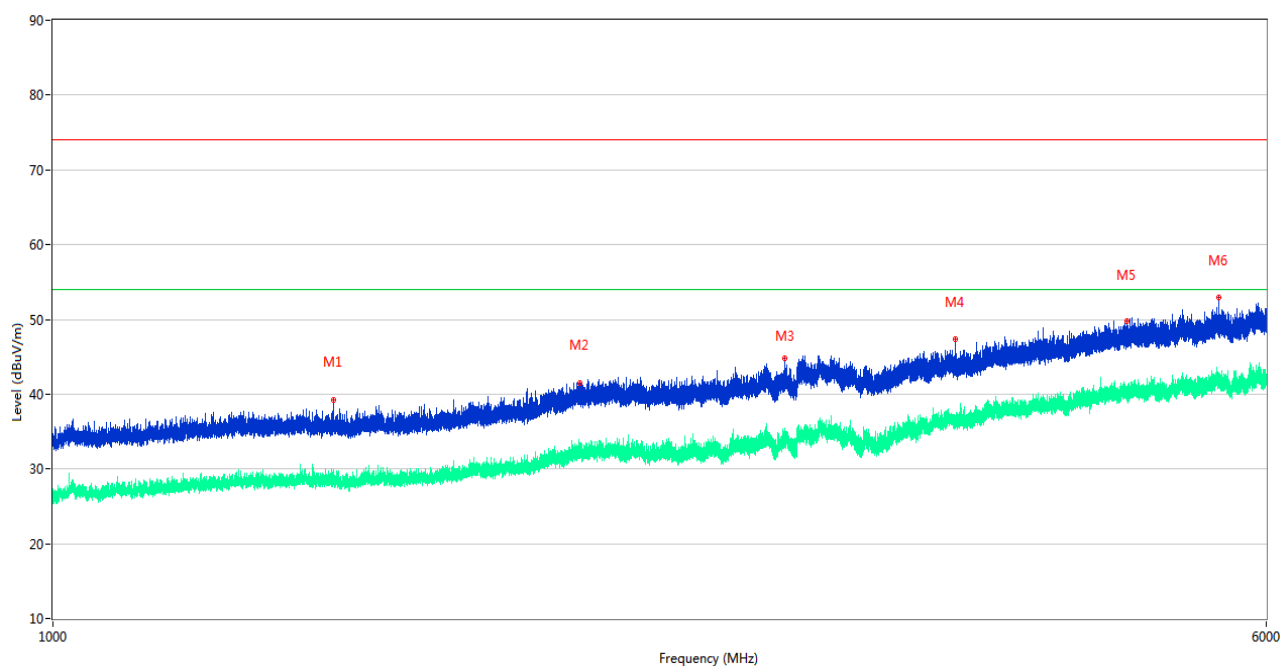
Test Data and Plots (Above 1 GHz)

A.1.3 Test Antenna Vertical, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1596.400	38.20	-15.11	74.0	-35.80	Peak	239.00	100	Vertical	Pass
1**	1596.400	28.47	-15.11	54.0	-25.53	AV	239.00	100	Vertical	Pass
2	1826.000	39.46	-14.67	74.0	-34.54	Peak	217.00	100	Vertical	Pass
2**	1826.000	28.94	-14.67	54.0	-25.06	AV	217.00	100	Vertical	Pass
3	2732.200	43.45	-8.98	74.0	-30.55	Peak	0.00	100	Vertical	Pass
3**	2732.200	33.10	-8.98	54.0	-20.90	AV	0.00	100	Vertical	Pass
4	3746.850	46.21	-4.80	74.0	-27.79	Peak	206.00	100	Vertical	Pass
4**	3746.850	36.14	-4.80	54.0	-17.86	AV	206.00	100	Vertical	Pass
5	4693.050	49.86	-2.50	74.0	-24.14	Peak	225.00	100	Vertical	Pass
5**	4693.050	40.50	-2.50	54.0	-13.50	AV	225.00	100	Vertical	Pass
6	5479.650	51.68	0.66	74.0	-22.32	Peak	165.00	100	Vertical	Pass
6**	5479.650	41.70	0.66	54.0	-12.30	AV	165.00	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1513.300	39.27	-14.79	74.0	-34.73	Peak	125.00	100	Horizontal	Pass
1**	1513.300	29.50	-14.79	54.0	-24.50	AV	125.00	100	Horizontal	Pass
2	2176.900	41.55	-10.53	74.0	-32.45	Peak	350.00	100	Horizontal	Pass
2**	2176.900	31.88	-10.53	54.0	-22.12	AV	350.00	100	Horizontal	Pass
3	2947.400	44.86	-7.92	74.0	-29.14	Peak	262.00	100	Horizontal	Pass
3**	2947.400	35.52	-7.92	54.0	-18.48	AV	262.00	100	Horizontal	Pass
4	3793.650	47.35	-5.47	74.0	-26.65	Peak	360.00	100	Horizontal	Pass
4**	3793.650	36.61	-5.47	54.0	-17.39	AV	360.00	100	Horizontal	Pass
5	4884.600	49.77	-1.03	74.0	-24.23	Peak	341.00	100	Horizontal	Pass
5**	4884.600	40.85	-1.03	54.0	-13.15	AV	341.00	100	Horizontal	Pass
6	5595.300	52.95	0.39	74.0	-21.05	Peak	204.00	100	Horizontal	Pass
6**	5595.300	41.96	0.39	54.0	-12.04	AV	204.00	100	Horizontal	Pass

A.2 Conducted disturbance voltage at mains terminals Test

Note: Not applicable.

A.3 Conducted disturbance for asymmetric mode

Note: Not applicable.

A.4 Conducted differential voltage emission

Note: Not applicable.

A.5 Harmonic Current Emissions

Note: Not applicable.

A.6 Voltage Fluctuations & Flicker

Note: Not applicable.

A.7 Electrostatic Discharge Immunity

Test Points	Discharge Level (kV)	Discharge Mode	Number of Discharge	Verdict
HCP	$\pm 2, \pm 4$	Contact	100	Pass
VCP	$\pm 2, \pm 4$	Contact	100	Pass
Metal Nail	$\pm 2, \pm 4$	Contact	40	Pass
Key	$\pm 2, \pm 4, \pm 8$	Air	240	Pass
Touch Control Area	$\pm 2, \pm 4, \pm 8$	Air	20	Pass
Shell and Crack	$\pm 2, \pm 4, \pm 8$	Air	100	Pass

Note: Performance of the all modes comply with the performance criteria in Criterion B.

A.8 Radio Frequency Electromagnetic Field Immunity

Antenna Polarity	Frequency (MHz)	Side	Field Strength (V/m)	Verdict
Vertical	80 – 1000, 1800, 2600, 3500, 5000	Front	3	Pass
		Back	3	Pass
		Left	3	Pass
		Right	3	Pass
Horizontal	80 – 1000, 1800, 2600, 3500, 5000	Front	3	Pass
		Back	3	Pass
		Left	3	Pass
		Right	3	Pass

Note: Performance of the all modes comply with the performance criteria in Criterion A.

A.9 Electrical Fast Transient/Burst Immunity

Note: Not applicable.

A.10 Surge Immunity

Note: Not applicable.

A.11 Immunity to Conducted Disturbances Induced by RF Fields

Note: Not applicable.

A.12 Power Frequency Magnetic Fields Immunity

Note: Not applicable.

A.13 Voltage Dips and Short Interruptions Immunity

Note: Not applicable.

A.14 Broadband impulsive conducted disturbances

Note: Not applicable.

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2230879-AE-2.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2230879-AW-1.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2230879-AI-1.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--

TEST REPORT

Applicant: Woan Technology (Shenzhen) Co., Ltd.
Address: Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang
Sub-district, Bao'an District, Shenzhen, Guangdong,
P.R.China, 518100
Equipment Type: SwitchBot Keypad
Model Name: W2500020 (refer section 2.4)
Brand Name: SwitchBot
Test Standard: ETSI EN 300 330 V2.1.1 (2017-02)
Test Date: May 12, 2022 - May 13, 2022
Date of Issue: Jul. 12, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Xiong Chong**Checked by:** Xia Long**Approved by:** Liao Jianming
(Technical Director)

Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Jul. 12, 2022</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	Woan Technology (Shenzhen) Co., Ltd.
Address	Building A2, Zhengfeng Industrial Area, No.610 Fengtang Boulevard, Fuhai Sub-district, Bao'an District, Shenzhen

2.4 General Description for Equipment under Test (EUT)

EUT Name	SwitchBot Keypad	
Model Name Under Test	W2500020	
Series Model Name	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015, W2500021, W2500022, W2500023, W2500024, W2500025	
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only different on with fingerprint module or without fingerprint module.	
	No Fingerprints Version	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015
	Have Fingerprints Version	W2500021, W2500022, W2500023, W2500024, W2500025
Hardware Version	V1.0	
Software Version	V1.0	
Dimensions (Approx.)	N/A	
Weight (Approx.)	N/A	

2.5 Technical Information

Network and Wireless connectivity	Bluetooth, NFC
-----------------------------------	----------------

The requirement for the following technical information of the EUT was tested in this report:

Modulation Type	ASK
Frequency Range	13.56 MHz
Product Class	1
Receiver Categorization	3
Number of channel	1
Tested Channel	1
Antenna Type	FPC Antenna
About the Product	The equipment is SwitchBot Keypad, intended for used with information technology equipment. Only NFC was tested in this report.

Note: The above EUT information in section 2.4 and 2.5 was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

The EUT has been tested according to ETSI EN 300 330 V2.1.1 (2017-02).

No.	Identity	Document Title
1	ETSI EN 300 330 V2.1.1 (2017-02)	Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

3.2 Verdict

Report Section	Standard Rule	Description	Result
Transmitter requirements			
5.1.1	4.3.1	Permitted range of operating frequencies	Pass
5.1.2	4.3.2	Operating frequency ranges	Pass
5.1.3	4.3.3	Modulation bandwidth	Pass
5.1.4	4.3.4	Transmitter H-field requirements (only applies to product class 1 and class 2)	Pass
--	4.3.5	Transmitter RF carrier current (only applies to product class 3)	N/A
--	4.3.6	Transmitter radiated E-field (only applies to product class 4)	N/A
--	4.3.7	Transmitter conducted spurious emissions (only applies to product class 3 and their power or current level in an artificial antenna (conducted spurious emission))	N/A
5.1.5	4.3.8	Transmitter radiated spurious domain emission limits < 30 MHz	Pass
5.1.6	4.3.9	Transmitter radiated spurious domain emission limits > 30 MHz	Pass
--	4.3.10	Transmitter Frequency stability (only applies to channelized systems where channel limits are defined)	N/A
Receiver requirements			
5.2.1	4.4.2	Receiver spurious emissions	Pass
--	4.4.3	Adjacent channel selectivity (only for channelized systems in the 27 MHz range)	N/A
--	4.4.4	Receiver blocking or desensitization (only applicable for channelized systems where channel definitions are used.)	N/A

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Radiated emissions (9 kHz–30 MHz)	4.28 dB
Radiated emissions (30 MHz-1 GHz)	4.80 dB
Radiated emissions (1 GHz-18 GHz)	4.88 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

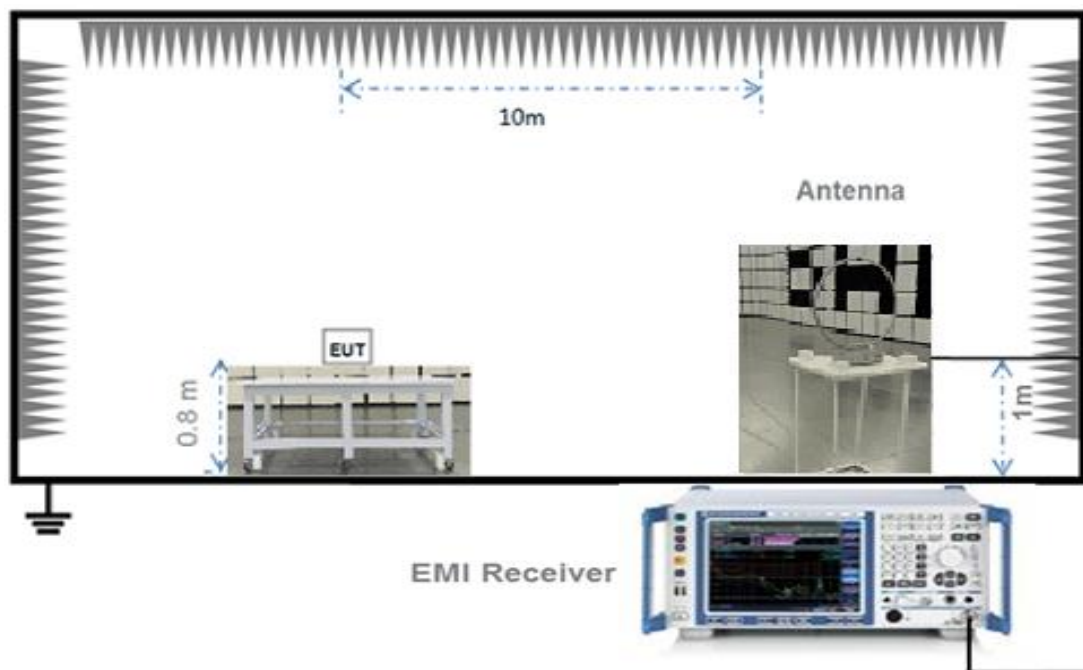
Relative Humidity	30% to 60%	
Atmospheric Pressure	100 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
	LT (Low Temperature)	-25°C
	HT (High Temperature)	+66°C
Working Voltage of the EUT	NV (Normal Voltage)	6.0 V
	LV (Low Voltage)	3.0 V
	HV (High Voltage)	6.5 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.10.10	2022.10.09
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.09.13	2022.09.12
EMI Receiver	KEYSIGHT	N9038A	MY55330120	2021.10.20	2022.10.19
DC Power Supply	ROHDE&SCHWARZ	HMP2020	018141664	2021.06.04	2022.06.03
Power Sensor	ROHDE&SCHWARZ	NRP-Z21	103971	2021.06.01	2022.05.31
Power Splitter	KMW	DCPD-LDC	1305003215	--	--
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	--	--
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	--	--
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2021.08.20	2024.08.19
Temperature Chamber	AHK	SP20	1412	2021.11.30	2022.11.29
Anechoic Chamber	EMC TECHNOLOGY LTD	21.1m*11.6 m*7.35m	N/A	2021.08.15	2024.08.14
Anechoic Chamber	CHANGNING	9m*6m*6m	N/A	2020.03.16	2023.03.15
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.5m*3.1m*2.8m	N/A	2022.02.19	2025.02.18

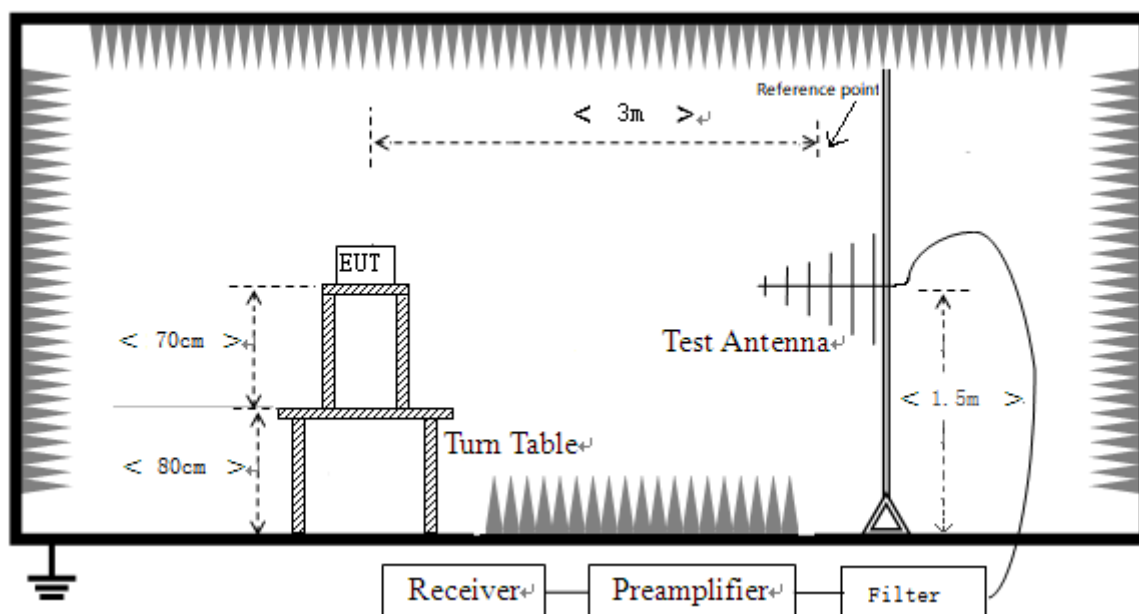
4.3 Description of Test Setup

4.3.2 For Radiated Test (Below 30 MHz)



(Diagram 1)

4.3.3 For Radiated Test (30 MHz-1 GHz)



(Diagram 2)

4.4 Receiver categorization

Technologies	Receiver spurious emission	Adjacent channel selectivity	Blocking or desensitization
tagging systems	yes	no (note 2)	no (note 1)
systems in the 27 MHz range	yes	yes	yes
all others	yes	no (note 2)	yes

NOTE 1: Blocking or desensitization not needed because of the physical co-location of RX to TX in tagging systems where the RX and TX operate simultaneously. The TX signal is used for the RX baseband mixing. The TX signal at the RX input is about 90 dB above the receiver sensitivity or tagging signal level the receiver (see ETSI TR 103 059 [i.9], figure 8). Furthermore given the very short communication ranges for most applications (e.g. NFC, RFID), a given interference blocking signal will have to be about 90 dB higher as the transmitter signal at the transceiver antenna, which is unlikely to happen.

NOTE 2: This requirement can only be required where a frequency plan with standard channel spacing is consistently used, for example in the 27 MHz band.

4.5 Product classes

Product Class	Description of transmitter	Antenna to be tested	Frequency range	Loop antenna area	Length of antenna (= maximum dimension of the antenna)	Customization of antenna design allowed	Transmitter carrier output limits	Spurious emissions limits
1	Inductive loop coil transmitter	Integral antenna (antenna type 1) or dedicated antenna supplied with the equipment (antenna type 2); (see note 1)	9 kHz to 30 MHz	< 30 m ²	< $\lambda/4$ (75 metres/f where f is in MHz) or < 30 m, whichever is shorter	No	H-field at 10 m (see clause 4.3.4.3)	H-field at 10 m (see clauses 4.3.8.3 and 4.3.9.3)
2	Inductive loop coil transmitter	Two representative antennas supplied with the equipment (see note 2)	9 kHz to 30 MHz	< 30 m ² (see note 3)	< $\lambda/4$ (75 metres/f where f is in MHz) or < 30 m, whichever is shorter	Yes (see note 3)	H-field at 10 m (see clause 4.3.4.3)	H-field at 10 m (see clauses 4.3.8.3 and 4.3.9.3)
3	Customized, large size loop antennas only	Test without an antenna by using an artificial antenna	9 kHz to 135 kHz	> 30 m ²	n.a.	Yes	Current in artificial antenna (see note 4 and clauses 4.3.4.3 and 4.3.6.3)	Current in artificial antenna (see note 4 and clauses 4.3.7.3 and 4.3.19.3)
4	E-field transmitter	Each type of antenna to be used	9 kHz to 30 MHz	n.a.	n.a.	n.a.	H-field at 10 m (see clause 4.3.6.3)	H-field at 10 m (see clauses 4.3.8.3 and 4.3.9.3)

NOTE 1: Where a manufacturer provides a range of standard antennas, the equipment will be tested as Product Class 1 equipment, with the antenna(s) attached.

The measurements shall be repeated for each antenna.

NOTE 2: The two antennas shall meet the manufacturer's design rules published in the equipment manual and shall have maximum and minimum loop areas respectively. Both antennas shall have the maximum magnetic dipole moment as declared by the manufacturer.

NOTE 3: Customization is only allowed according to the manufacturer's antenna design rules published in the equipment manual.

NOTE 4: ON-site measurements may be required.

4.6 Measuring receiver

Frequency	Detector type	Measurement receiver bandwidth	Spectrum analyzer bandwidth
9 kHz ≤ f < 150 kHz	Quasi Peak	200 Hz	300 Hz
150 kHz ≤ f < 30 MHz	Quasi Peak	9 kHz	10 kHz
30 MHz ≤ f < 1 GHz	Quasi Peak	120 kHz	100 kHz
NOTE: For the measurement of the ranges 6,765 MHz ≤ f ≤ 6,795 MHz and 11,810 MHz ≤ f ≤ 15,310 MHz, the measurement bandwidth has to be 200 Hz respectively 300 Hz.			

4.7 Short Range Devices within the 9 kHz to 30 MHz permitted frequency bands

	Frequency Bands/frequencies	Applications
Transmit and Receive	9 kHz to 90 kHz	Inductive devices, Generic use
Transmit and Receive	90 kHz to 119 kHz	Inductive devices, Generic use
Transmit and Receive	119 kHz to 140 kHz	Inductive devices, Generic use
Transmit and Receive	140 kHz to 148,5 kHz	Inductive devices, Generic use
Transmit and Receive	148,5 kHz to 5 MHz	Inductive devices, Generic use
Transmit and Receive	400 kHz to 600 kHz	RFID only
Transmit and Receive	5 MHz to 30 MHz	Inductive devices, Generic use
Transmit and Receive	3 155 kHz to 3 400 kHz	Inductive devices, Generic use
Transmit and Receive	984 kHz to 7 484 kHz (Note 3, Centre frequency is 4 234 kHz)	Inductive devices, Railway applications
Transmit and Receive	4 516 kHz	Inductive devices, Railway applications
Transmit and Receive	6 765 kHz to 6 795 kHz	Inductive devices, Generic use
Transmit and Receive	7 400 kHz to 8 800 kHz	Inductive devices, Generic use
Transmit and Receive	10 200 kHz to 11,000 MHz	Inductive devices, Generic use
Transmit and Receive	11,810 MHz to 15,310 MHz (Centre frequency is 13,56 MHz)	RFID only
Transmit and Receive	12,5 MHz to 20 MHz	Inductive devices, Wireless healthcare
Transmit and Receive	13,553 MHz to 13,567 MHz	Inductive devices, Generic use
Transmit and Receive	26,957 MHz to 27,283 MHz	Inductive devices, Generic use
Transmit and Receive	27,090 MHz to 27,100 MHz	Inductive devices, Railway applications
NOTE 1: In addition, it should be noted that other frequency bands may be available in a country within the frequency range 9 kHz to 30 MHz.		
NOTE 2: On non-harmonised parameters, national administrations may impose certain conditions such as the type of modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, and the inclusion of an automatic transmitter shut-off facility, as a condition for the issue of an Individual Rights for use of spectrum or General Authorization, or as a condition for use under "licence exemption" as it is in most cases for Short Range Devices.		
NOTE 3: Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.		

5. Test Type and Test Results

5.1. Transmitter Parameters

5.1.1. Permitted range of operating frequencies

5.1.1.1. Limit

The permitted range of operating frequency for intentional emissions shall be from 9 kHz to 30 MHz.

5.1.1.2. Test Setup

The section 4.3.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.1.3. Test Procedure

The permitted range of operating frequencies is the frequency range over which the equipment is authorized to operate.

If more than one modulation scheme can be generated by the EUT, then for each modulation scheme and one typical set of modulation parameters the maximum and minimum frequencies shall be measured and recorded separately.

5.1.1.4. Test Result

Please refer to ANNEX A.1.

5.1.2. Operating frequency ranges

5.1.2.1. Limit

The operating frequency ranges for intentional emissions shall be entirely within the frequency bands in table in section 4.7.

5.1.2.2. Test Setup

The section 4.3.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.2.3. Test Procedure

The operating frequency range (OFR) is the frequency range over which the EUT is transmitting. The operating frequency range of the EUT is determined by the lowest (fL) and highest frequency (fH) as occupied by the power envelope. With the centre frequency of the OFR as: $f_C = (f_H + f_L)/2$. An EUT could have more than one operating frequency range.

5.1.2.4. Test Result

Please refer to ANNEX A.2.

5.1.3. Modulation bandwidth

5.1.3.1. Limit

The modulation bandwidth shall be within the assigned frequency band or $\pm 7.5\%$ of the carrier frequency whichever is the smallest. For RFID and EAS Systems, the modulation bandwidth shall be within the transmitter emission boundary of figures I.1, I.2, I.3 and I.4. For further information, see CEPT/ERC/REC 70-03 [i.1] or ERC/ECC/CEPT Decisions as implemented through National Radio Interfaces (NRI) and additional NRI as relevant.

5.1.3.2. Test Setup

The section 4.3.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.3.3. Test Procedure

The transmitter shall be connected to an artificial antenna or if the transmitter has an integral antenna a test fixture shall be used. The RF output of the equipment shall be connected to a spectrum analyser via a $50\ \Omega$ variable attenuator.

The transmitter shall be operated at the nominal carrier power or field strength measured under normal test conditions.

The measurements shall be made during normal and extreme test conditions. During extreme test conditions, both extreme temperature and voltage apply simultaneously

5.1.3.4. Test Result

Please refer to ANNEX A.3.

5.1.4. Transmitter radiated H-field

5.1.4.1. Limit

The frequency ranges and limits shown in flow table.

H-field limits at 10 m

Frequency range (MHz)	H-field strength limit (H_f) dB μ A/m at 10 m or specified in mW e.r.p.
$0,009 \leq f < 0,090$	72 descending 3 dB/oct above 0,03 MHz or according to note 1 (see note 5)
$0,09 \leq f < 0,119$	42
$0,119 \leq f < 0,135$	66 descending 3 dB/oct above 0,119 MHz or according to note 1 (see notes 3 and 5)
$0,135 \leq f < 0,140$	42
$0,140 \leq f < 0,1485$	37,7
$0,1485 \leq f < 30$	-5 (see note 4)
$0,315 \leq f < 0,600$	-5
$3,155 \leq f < 3,400$	13,5
4,234	9 (see note 9)
4,516	7
$7,400 \leq f < 8,800$	9
$10,2 \leq f < 11,00$	9
$12,5 \leq f \leq 20$	-7
$6,765 \leq f \leq 6,795$	42 (see notes 3 and 7)
$26,957 \leq f \leq 27,283$	42 (see note 3)
$13,410 \leq f \leq 13,553, 13,567 \leq f \leq 13,710$	9 (see note 6)
$13,110 \leq f \leq 13,410, 13,710 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110, 14,010 \leq f \leq 14,460$	-10 (see note 6)
$11,810 \leq f \leq 12,660, 14,460 \leq f \leq 15,310$	-16 (see note 6)
$13,460 \leq f \leq 13,553, 13,567 \leq f \leq 13,660$	27 (see note 6)
$13,360 \leq f \leq 13,460, 13,660 \leq f \leq 13,760$	Linear transition from 27 to -3,5 (see note 6)
$13,110 \leq f \leq 13,360, 13,760 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110, 14,010 \leq f \leq 14,460$	-5 (see note 6)
$13,553 \leq f \leq 13,567$	42 (see note 3) or 60 (see notes 2 and 3)
27,095	42

26,995, 27,045, 27,095, 27,145, 27,195 (see note 8)	100 mW
NOTE 1: For the frequency ranges 9 kHz to 135 kHz, the following additional restrictions apply to limits above 42 dBμA/m: - for loop coil antennas with an area $\geq 0,16 \text{ m}^2$ this table and table B.1 with the antenna limitations apply; - for loop coil antennas with an area between $0,05 \text{ m}^2$ and $0,16 \text{ m}^2$ table B.1 applies with a correction factor. The limit is: table value + $10 \times \log(\text{area}/0,16 \text{ m}^2)$; - for loop coil antennas with an area $< 0,05 \text{ m}^2$ the limit is 10 dB below table B.1. NOTE 2: For RFID (incl. NFC) and EAS applications only. NOTE 3: Spectrum mask limit, see annex I. NOTE 4: For further information see annex G. NOTE 5: Limit is 42 dBμA/m for the following spot frequencies: 60 kHz $\pm$ 250 Hz, 66,6 kHz $\pm$ 750 Hz, 75 kHz $\pm$ 250 Hz, 77,5 kHz $\pm$ 250 Hz, and 129,1 kHz $\pm$ 500 Hz. NOTE 6: Only in conjunction with spectrum mask, see annex I. NOTE 7: The frequency range 6,765 MHz - 6,795 MHz is not a harmonised ISM frequency band according article 5.138 of the ITU Radio Regulations [i.13]. NOTE 8: Center frequencies for channelized systems by using ≤ 10 kHz bandwidth. NOTE 9: The limit is valid in the range 984 kHz - 7 484 kHz for Transmitting only on receipt of a Balise/Eurobalise tele-powering signal from a train.	

5.1.4.2. Test Setup

The section 4.3.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.4.3. Test Procedure

The conformance tests for Transmitter radiated H-field shall be as defined in clause 6.2.4 of the present document. Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.13.

5.1.4.4. Test Result

Please refer to ANNEX A.4.

5.1.5. Transmitter radiated spurious domain emission limits < 30 MHz

5.1.5.1. Limit

Limits for transmitters spurious emissions in the range from 9 kHz to 30 MHz

Limits for measurements at 10 m distance:

State	Frequency $9\text{ KHz} \leq f < 10\text{MHz}$	Frequency $10\text{ MHz} \leq f < 30\text{MHz}$
Transmit	27 dB μ A/m at 9 kHz descending 3 dB/oct	-3.5 dB μ A/m
Standby	5.5 dB μ A/m at 9 kHz descending 3 dB/oct	-25 dB μ A/m

5.1.5.2. Test Setup

The section 4.3.2 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.5.3. Test Procedure

The conformance tests for transmitter radiated spurious domain emission limits < 30 MHz shall be as defined in clause 6.2.8 of the present document. Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.13.

5.1.5.4. Test Result

Please refer to ANNEX A.5.

5.1.6. Transmitter radiated spurious domain emission limits > 30 MHz

5.1.6.1. Limit

Limits for transmitters spurious emissions in the range from 30 MHz to 1000 MHz

The power of any radiated emission shall not exceed the values as below.

State	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequency between 30 MHz to 1000 MHz
Operating	4 nW e.r.p	250 nW e.r.p
Standby	2 nW e.r.p	2 nW e.r.p

Note 1: The test limit has been transformed to the limit at 3m.

5.1.6.2. Test Setup

The section 4.3.2 (Diagram 2) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.6.3. Test Procedure

The conformance tests for transmitter radiated spurious domain emission limits > 30 MHz shall be as defined in clause 6.2.9 of the present document. Conformance shall be established under test conditions to be declared by the manufacturer according to clause 4.1. The interpretation of the results for the measurements uncertainty shall be as given in clause 5.13.

5.1.6.4. Test Result

Please refer to ANNEX A.6.

5.2. Receiver Parameters

5.2.1. Receiver Spurious Emissions

5.2.1.1. Limit

5.2.1.2. Limits for transmitters spurious emissions in the range from 9 kHz to 30 MHz

Limits for measurements at 10 m distance:

Frequency $9\text{ KHz} \leq f < 10\text{MHz}$	Frequency $10\text{ MHz} \leq f < 30\text{MHz}$
5.5dB μ A/m at 9kHz descending 3 dB/oct	-25 dB μ A/m

5.2.1.3. Limits for transmitters spurious emissions in the range from 30 MHz to 1000 MHz

The measured values shall not exceed 2 nW e.r.p.

5.2.1.4. Test Setup

See 4.3.1 and 4.3.2 (Diagram 1 and 2) for test setup description for the radiated test. The photo of test setup please refer to ANNEX B.

5.2.1.5. Test Procedure

The measurements of the radiated spurious emissions were made on an anechoic chamber. The spurious emissions produced by the equipment were measured at the distance of 3m. The spurious emissions are measured with a shielded loop antenna connected to a measurement receiver.

5.2.1.6. Test Result

Please refer to ANNEX A.7.

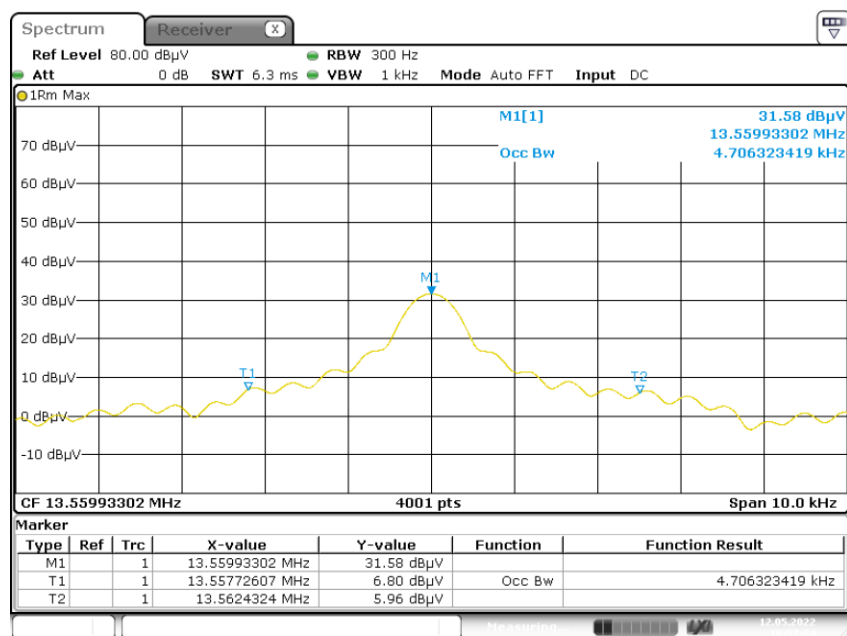
ANNEX A TEST RESULT

A.1 Permitted range of operating frequencies

Test Data

Test Method	Modulation	Test Conditions		operating frequencies (kHz)	limit
☒ Radiated ☐ Conducted	☒ ON ☐ OFF	NT	NV	13559.9330	13553 kHz to 13567 kHz
Test Result				Pass	

Test Plot



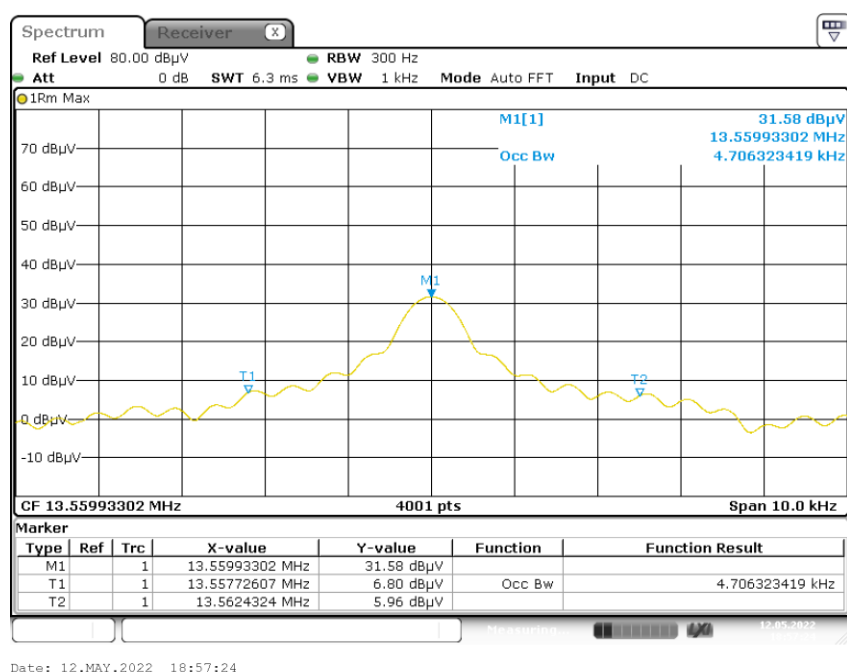
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A.2 Operating frequency ranges

Test Data and Plot

Test Conditions		Frequency band			
		Measured (kHz)			Limit
		Low frequency	High frequency	F _c	
NT	NV	13557.72607	13562.43240	13560.07924	13553 kHz to 13567 kHz
Test Result		Pass			

Test Plot

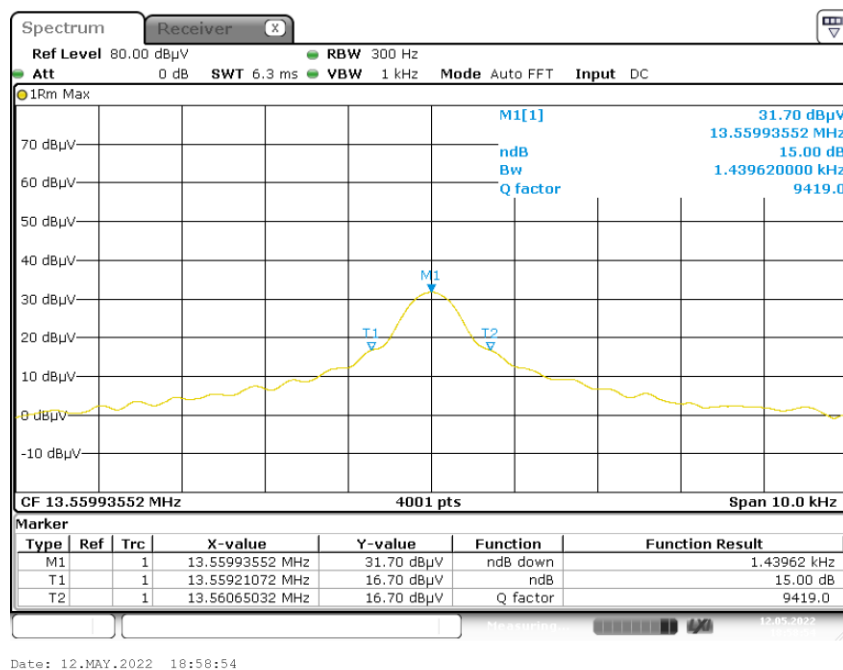


A.3 Modulation bandwidth

Test Data

Test Conditions		Frequency band		
		Measured (kHz)		limit
		Low frequency	High frequency	
NT	NV	13559.21072	13560.65032	±7,5 % of the carrier frequency
Test Result		Pass		

Test Plot

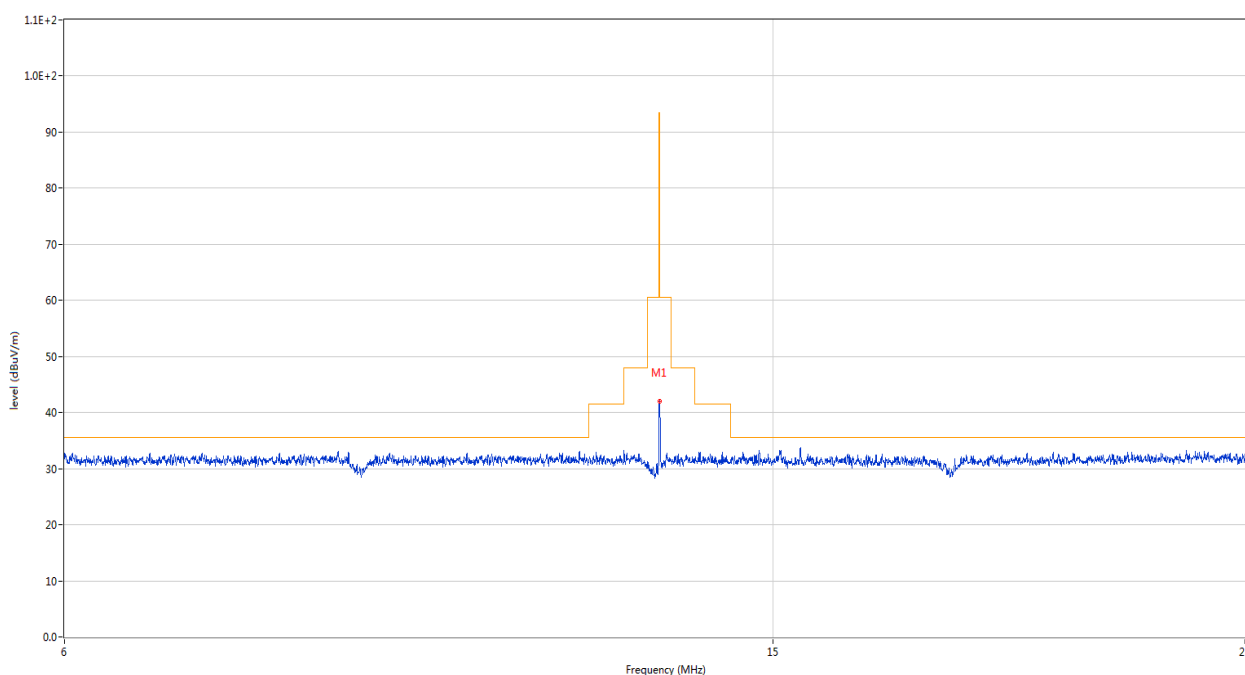


A.4 Transmitter radiated H-field

Test Data and Plot

Field Strength of Fundamental Emissions Value						
Frequency (MHz)	Field Strength @10m (dBuV/m)	Field Strength @10m (dBuA/m)	Limit @10m (dBuA/m)	Margin @10m (dB)	Antenna	Verdict
13.560	42.07	-9.43	42	51.43	Vertical	Pass

OPERATING ANT-V



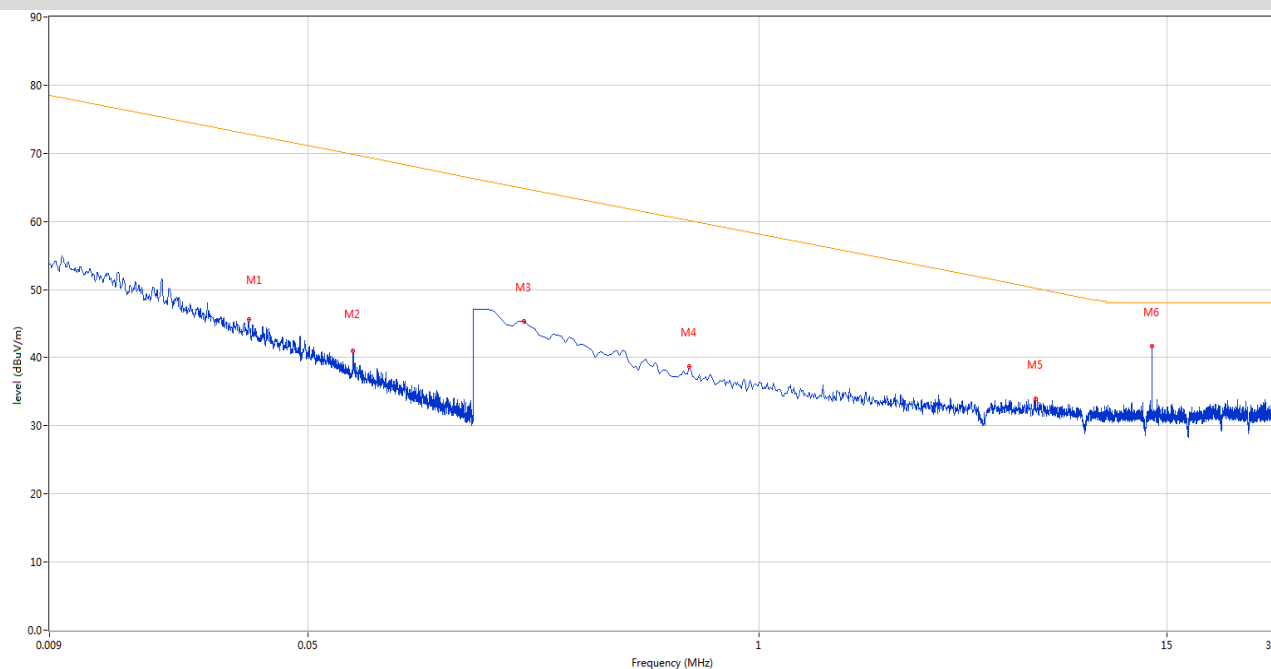
Note: For measuring equipment calibrated in dBμV, the reading should be reduced by 51.5 dB to be converted to dBμA/m.

A.5 Transmitter radiated spurious domain emission limits < 30 MHz

Note: This frequency which near 13.560 MHz with circle should be ignored because they are NFC carrier frequency.

Transmitters spurious emissions in the range from 9 kHz to 30 MHz

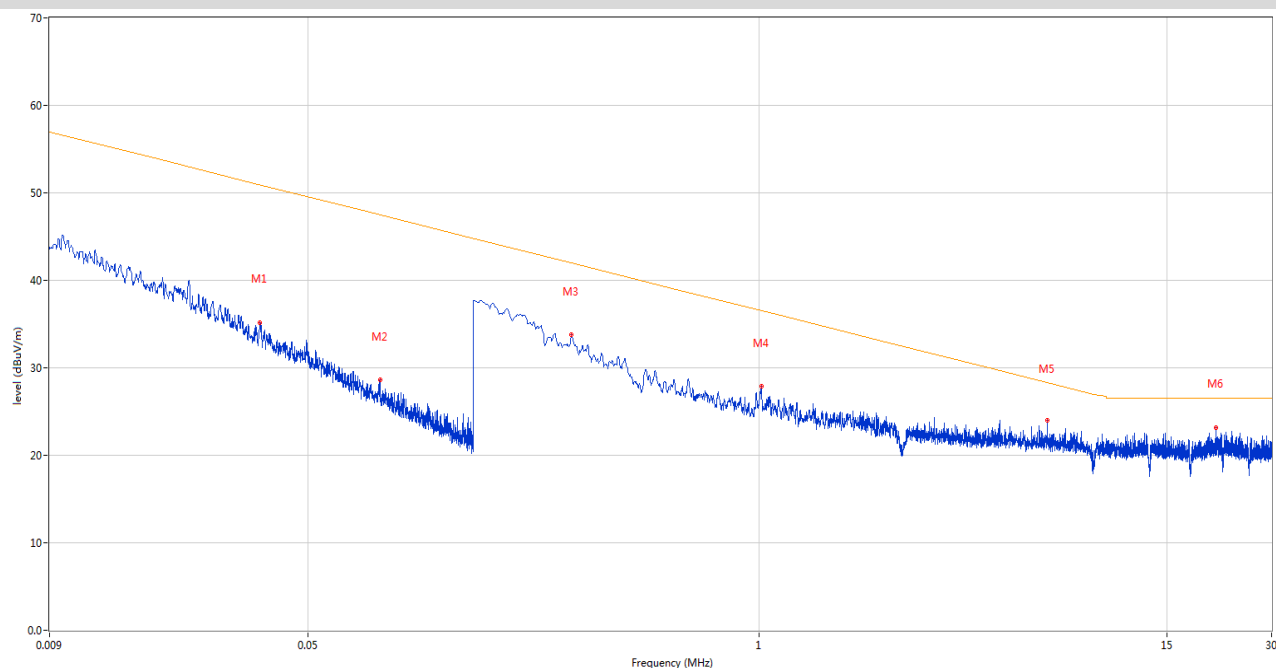
OPERATING ANT-V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.034	45.46	20.28	72.8	-27.34	Peak	318.00	100	Vertical	Pass
2	0.068	40.98	20.18	69.8	-28.82	Peak	167.00	100	Vertical	Pass
3	0.210	45.31	20.11	64.9	-19.59	Peak	34.00	100	Vertical	Pass
4	0.628	38.75	20.35	60.1	-21.35	Peak	113.00	100	Vertical	Pass
5	6.254	33.99	20.81	50.2	-16.21	Peak	43.00	100	Vertical	Pass
6	13.560	41.70	20.86	48.0	-6.30	Peak	78.00	100	Vertical	N/A

Note: For measuring equipment calibrated in dB μ V, the reading should be reduced by 51.5 dB to be converted to dB μ A/m.

STANDBY ANT-V



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.036	35.10	10.66	51.0	-15.90	Peak	356.00	100	Vertical	Pass
2	0.081	28.62	10.51	47.5	-18.88	Peak	211.00	100	Vertical	Pass
3	0.288	33.75	10.21	42.0	-8.25	Peak	343.00	100	Vertical	Pass
4	1.015	27.86	10.07	36.5	-8.64	Peak	316.00	100	Vertical	Pass
5	6.769	24.03	10.02	28.3	-4.27	Peak	359.00	100	Vertical	Pass
6	20.694	23.16	10.18	26.5	-3.34	Peak	300.00	100	Vertical	Pass

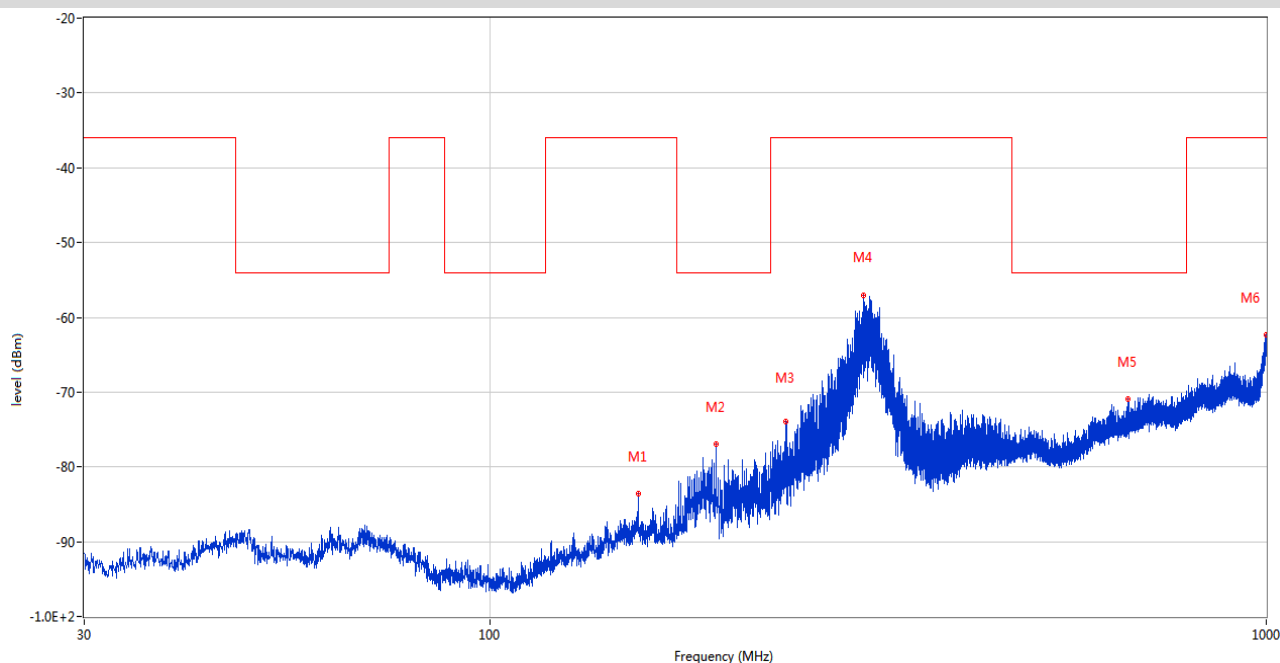
Note: For measuring equipment calibrated in dB μ V, the reading should be reduced by 51.5 dB to be converted to dB μ V/m.

A.6 Transmitter radiated spurious domain emission limits > 30 MHz

Transmitter spurious emissions in the range from 30 MHz to 1 GHz

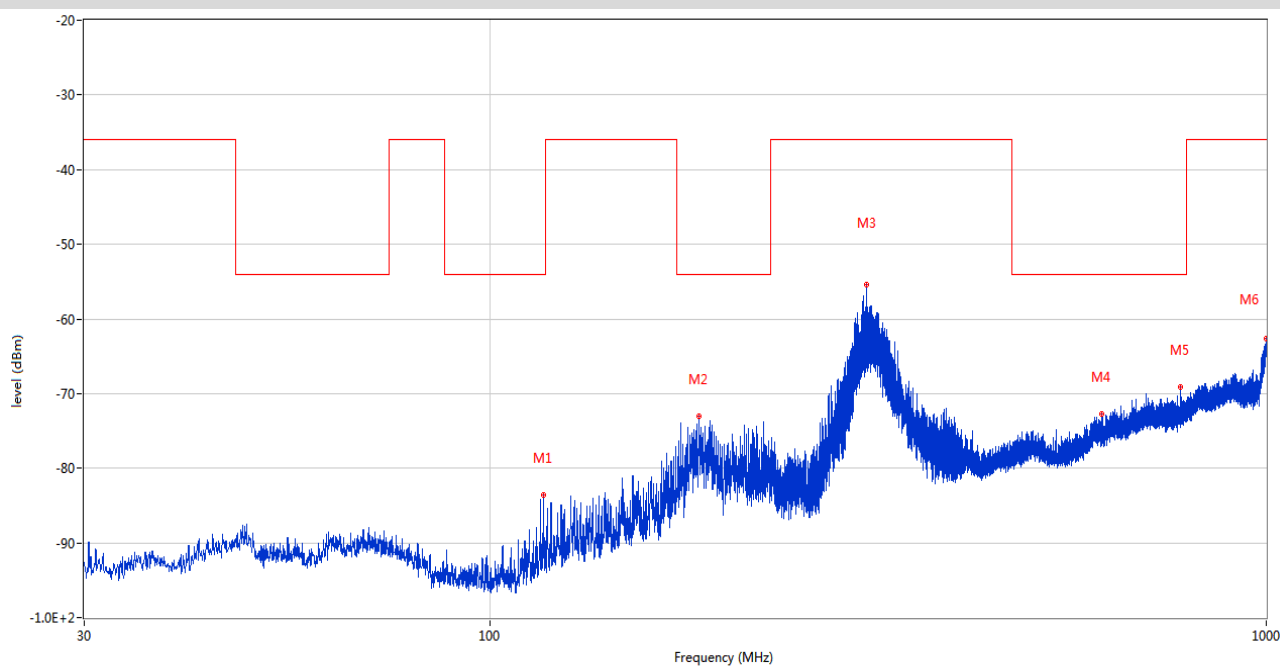
Test Data and Plot

OPERATING ANT-V



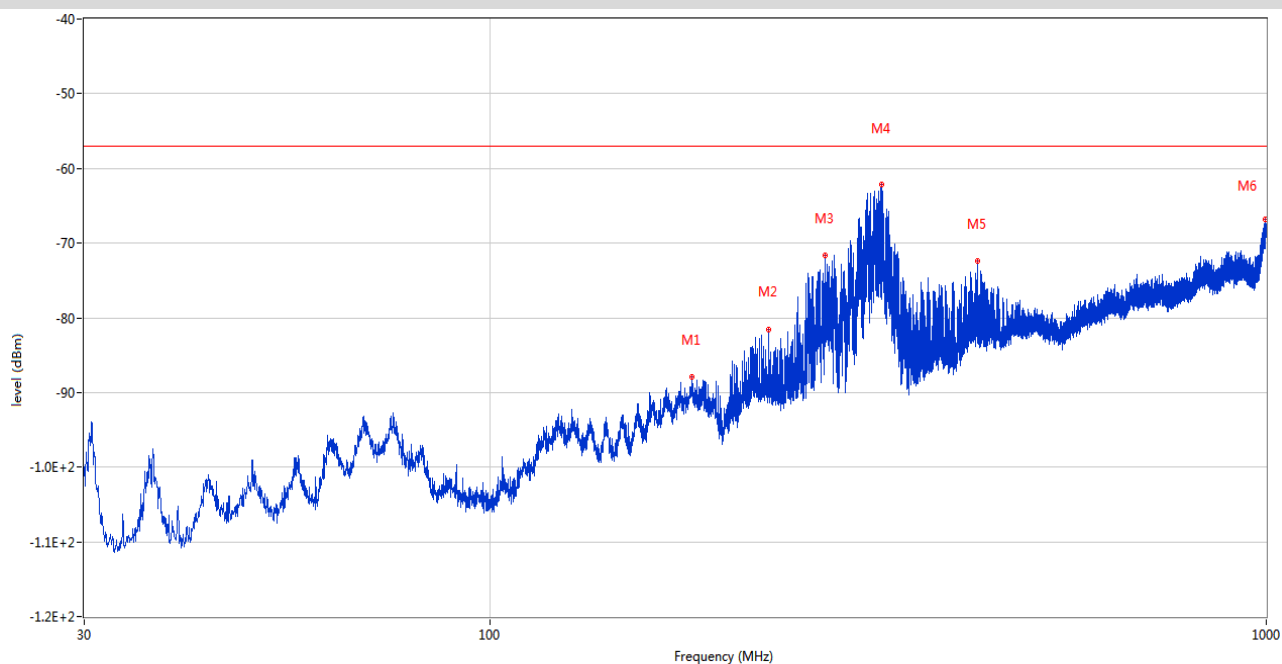
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
155.276	-83.58	-16.00	-36.0	-47.58	14.00	Vertical	Horizontal	Pass
195.579	-76.99	-16.35	-54.0	-22.99	250.00	Vertical	Horizontal	Pass
240.732	-73.99	-15.16	-36.0	-37.99	196.00	Vertical	Horizontal	Pass
303.152	-56.99	-12.74	-36.0	-20.99	282.00	Vertical	Horizontal	Pass
664.089	-70.99	-3.60	-54.0	-16.99	114.00	Vertical	Horizontal	Pass
998.885	-62.40	5.84	-36.0	-26.40	317.00	Vertical	Horizontal	Pass

OPERATING ANT-H



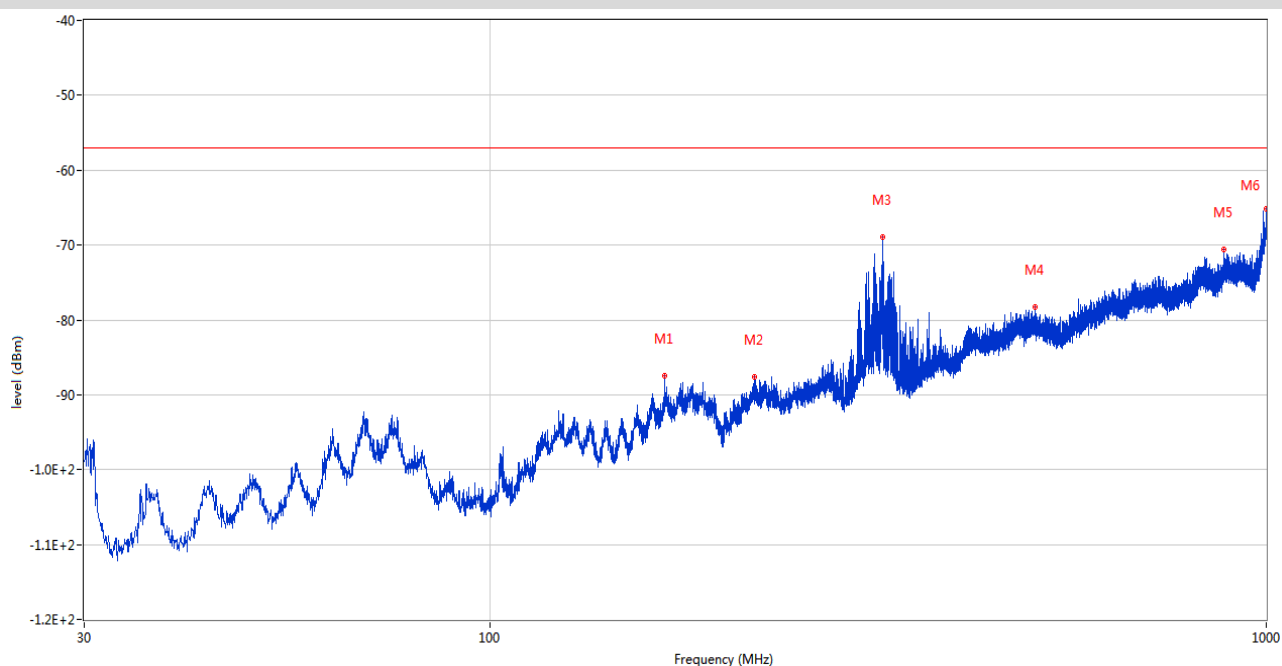
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
117.300	-83.62	-20.75	-54.0	-29.62	272.00	Horizontal	Horizontal	Pass
185.879	-73.04	-15.15	-54.0	-19.04	276.00	Horizontal	Horizontal	Pass
305.722	-55.47	-12.54	-36.0	-19.47	69.00	Horizontal	Horizontal	Pass
613.989	-72.80	-4.59	-54.0	-18.80	101.00	Horizontal	Horizontal	Pass
775.785	-69.13	-2.87	-54.0	-15.13	152.00	Horizontal	Horizontal	Pass
999.175	-62.68	5.91	-36.0	-26.68	22.00	Horizontal	Horizontal	Pass

STANDBY ANT-V



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
182.144	-87.86	-15.25	-57.0	-30.86	26.00	Vertical	Horizontal	Pass
228.608	-81.62	-15.09	-57.0	-24.62	18.00	Vertical	Horizontal	Pass
270.172	-71.64	-14.96	-57.0	-14.64	360.00	Vertical	Horizontal	Pass
319.060	-62.09	-12.97	-57.0	-5.09	111.00	Vertical	Horizontal	Pass
424.159	-72.38	-9.34	-57.0	-15.38	133.00	Vertical	Horizontal	Pass
998.302	-66.78	5.64	-57.0	-9.78	100.00	Vertical	Horizontal	Pass

STANDBY ANT-H



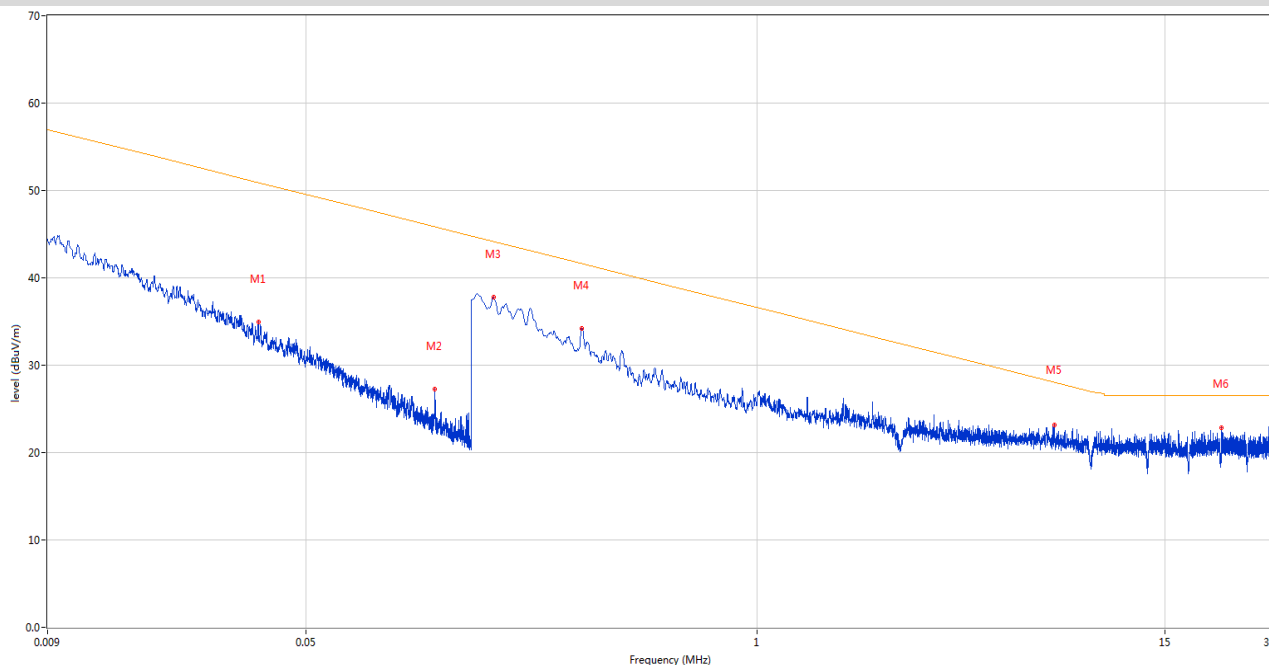
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
167.692	-87.44	-16.72	-57.0	-30.44	153.00	Horizontal	Horizontal	Pass
219.296	-87.65	-15.53	-57.0	-30.65	12.00	Horizontal	Horizontal	Pass
320.224	-68.90	-13.08	-57.0	-11.90	94.00	Horizontal	Horizontal	Pass
503.845	-78.33	-6.78	-57.0	-21.33	27.00	Horizontal	Horizontal	Pass
881.417	-70.53	-0.01	-57.0	-13.53	58.00	Horizontal	Horizontal	Pass
999.370	-65.12	5.97	-57.0	-8.12	102.00	Horizontal	Horizontal	Pass

A.7 Receiver spurious emissions

Receiver spurious emissions in the range from 9 kHz to 30 MHz

Test Data and Plot

RX ANT-H



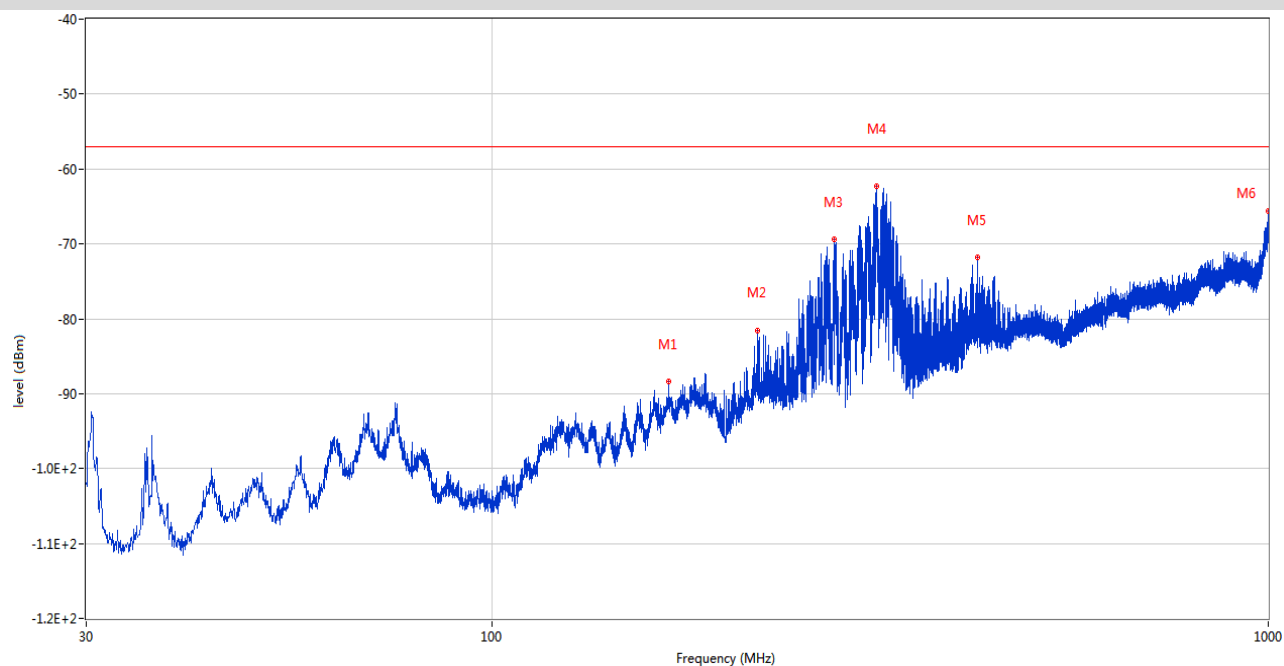
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	0.036	34.89	10.66	50.9	-16.01	Peak	105.00	100	Horizontal	Pass
2	0.118	27.22	10.43	45.9	-18.68	Peak	123.00	100	Horizontal	Pass
3	0.174	37.81	10.29	44.2	-6.39	Peak	15.00	100	Horizontal	Pass
4	0.312	34.18	10.19	41.7	-7.52	Peak	1.00	100	Horizontal	Pass
5	7.194	23.11	10.03	28.1	-4.99	Peak	53.00	100	Horizontal	Pass
6	21.781	22.85	10.15	26.5	-3.65	Peak	256.00	100	Horizontal	Pass

Note: For measuring equipment calibrated in dB μ V, the reading should be reduced by 51.5 dB to be converted to dB μ A/m.

Receiver spurious emissions in the range from 30 MHz to 1 GHz

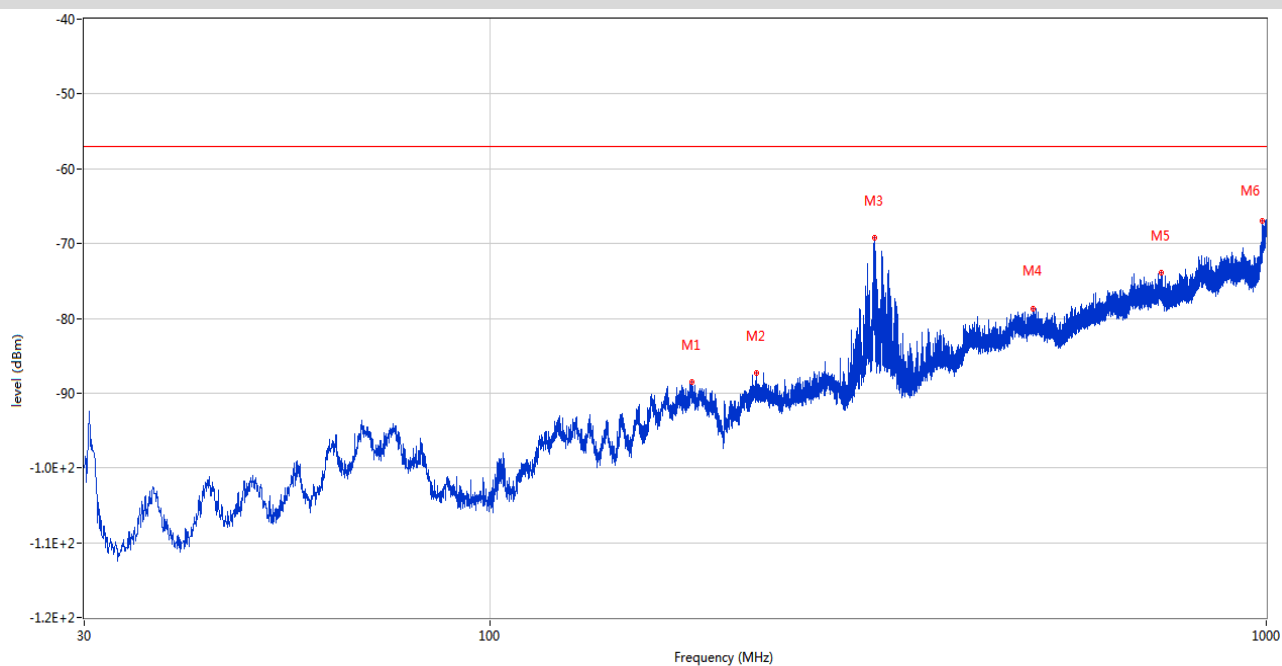
Test Data and Plots

RX ANT-V



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
168.758	-88.32	-16.77	-57.0	-31.32	255.00	Vertical	Horizontal	Pass
220.023	-81.52	-15.51	-57.0	-24.52	360.00	Vertical	Horizontal	Pass
276.234	-69.45	-14.44	-57.0	-12.45	108.00	Vertical	Horizontal	Pass
312.949	-62.36	-12.53	-57.0	-5.36	84.00	Vertical	Horizontal	Pass
421.686	-71.85	-9.17	-57.0	-14.85	73.00	Vertical	Horizontal	Pass
999.806	-65.57	6.08	-57.0	-8.57	131.00	Vertical	Horizontal	Pass

RX ANT-H



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
181.708	-88.58	-15.31	-57.0	-31.58	342.00	Horizontal	Horizontal	Pass
220.217	-87.35	-15.51	-57.0	-30.35	233.00	Horizontal	Horizontal	Pass
312.901	-69.26	-12.52	-57.0	-12.26	61.00	Horizontal	Horizontal	Pass
500.256	-78.65	-6.57	-57.0	-21.65	93.00	Horizontal	Horizontal	Pass
731.649	-73.86	-2.68	-57.0	-16.86	338.00	Horizontal	Horizontal	Pass
988.409	-66.93	3.21	-57.0	-9.93	260.00	Horizontal	Horizontal	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2230879-AE-3.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2230879-AW-1.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2230879-AI-1.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
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4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--

TEST REPORT

Applicant: Woan Technology (Shenzhen) Co., Ltd.
Address: Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang Sub-
district, Bao'an District, Shenzhen, Guangdong,
P.R.China, 518100
Equipment Type: SwitchBot Keypad
Model Name: W2500020 (refer section 2.4)
Brand Name: SwitchBot
Test Standard: ETSI EN 300 328 V2.2.2 (2019-07)
Test Date: Apr. 22, 2022 - May 26, 2022
Date of Issue: Jul. 12, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Chen Huiming**Checked by:** Ye Hongji**Approved by:** Liao Jianming
(Technical Director)

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Jul. 12, 2022</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	Woan Technology (Shenzhen) Co., Ltd.
Address	Building A2, Zhengfeng Industrial Area, No.610 Fengtang Boulevard, Fuhai Sub-district, Bao'an District, Shenzhen

2.4 General Description for Equipment under Test (EUT)

EUT Name	SwitchBot Keypad	
Model Name Under Test	W2500020	
Series Model Name	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015, W2500021, W2500022, W2500023, W2500024, W2500025	
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only different on with fingerprint module or without fingerprint module.	
	No Fingerprints Version	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015
	Have Fingerprints Version	W2500021, W2500022, W2500023, W2500024, W2500025
Hardware Version	V1.0	
Software Version	V1.0	
Dimensions (Approx.)	N/A	
Weight (Approx.)	N/A	

2.5 Technical Information

EUT Type	Stand-alone equipment
Network and Wireless connectivity	Bluetooth (BLE), NFC

The requirement for the following technical information of the EUT was tested in this report:

Modulation Technology	Bluetooth Low Energy: Wide band modulations other than FHSS
Modulation Type	Bluetooth Low Energy: GFSK
Transfer Rate	BLE: 1 Mbps
Frequency Range	The frequency range used is 2402 MHz – 2480 MHz; The frequency block is 2400 MHz to 2483.5 MHz.
Number of channel	Bluetooth Low Energy: 40 (at intervals of 2 MHz)
Tested Channel	Bluetooth Low Energy: 0 (2402 MHz), 19 (2440 MHz), 39 (2480 MHz)
Nominal Channel Bandwidth	1 MHz
Antenna Type	PIFA Antenna
Antenna Gain	3.52 dBi (In test items related to antenna gain, the final results reflect this figure. This value is provided by the applicant.)
Beamforming Gain	N/A
Adaptive or non-adaptive	Non-adaptive
LBT Based	Yes (Load Based)
The Max RF Output power	Bluetooth Low Energy: 3.2 dBm
Receiver Category	Bluetooth Low Energy: 2

Description	Modulation Type (BLE)	Transfer Rate (BLE)
Transmitter Parameters		
RF output power	GFSK	1 Mbps
Power Spectral Density	GFSK	1 Mbps
Duty Cycle, Tx-sequence, Tx-gap	N/A	N/A
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	--	--
Hopping Frequency Separation	--	--
Medium Utilization (MU) factor	N/A	N/A
Adaptivity	N/A	N/A
Occupied Channel Bandwidth	GFSK	1 Mbps
Transmitter unwanted emissions in the out-of-band domain	GFSK	1 Mbps
Transmitter unwanted emissions in the spurious domain	GFSK	1 Mbps
Receiver Parameters		
Receiver spurious emissions	GFSK	1 Mbps
Receiver Blocking	GFSK	1 Mbps
Other Parameters		
Geo-location capability	--	--

2.6 Additional Instructions

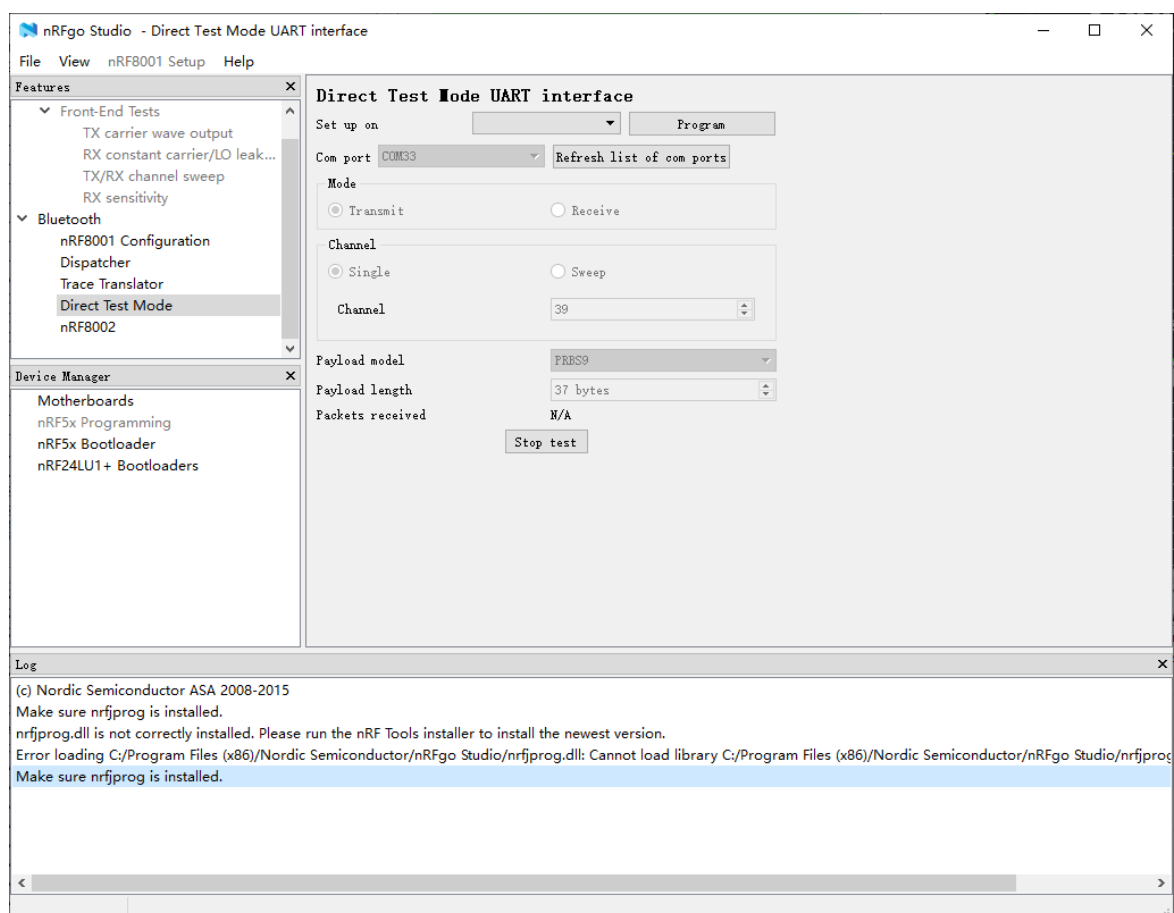
Bluetooth Low Energy

EUT Software Settings:

Mode	☒ Special software is used. The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.
------	--

Power level setup in software			
Test Software Version	nRFGo Studio		
Support Units (Software installation media)	Description	Manufacturer	Model
	Notebook	HP	N/A
Mode	Channel	Frequency (MHz)	Soft Set
GFSK (BLE 1Mbps)	CH0	2402	TX LEVEL is built-in set parameters and cannot be changed and selected.
	CH19	2440	
	CH39	2480	

Run Software



3 SUMMARY OF TEST RESULTS

The EUT has been tested according to ETSI EN 300 328 V2.2.2 (2019-07).

No.	Identity	Document Title
1	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

Test items and the results are as follows:

Report Section	Standard Rule	Description	Channel (BLE)	Test Result	Verdict	Remark
Transmitter Parameters						
5.1.1	4.3.1.2 4.3.2.2	RF output power	Low/Middle/High	ANNEX A.1	Pass	--
5.1.2	4.3.2.3	Power Spectral Density	Low/Middle/High	ANNEX A.2	Pass	Note ⁴
5.1.3	4.3.1.3 4.3.2.4	Duty Cycle, Tx-sequence, Tx-gap	N/A	ANNEX A.3	N/A	Note ² , Note ⁷
5.1.4	4.3.1.4	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	--	ANNEX A.4	N/A	Note ⁵
5.1.5	4.3.1.5	Hopping Frequency Separation	--	ANNEX A.5	N/A	Note ⁵
5.1.6	4.3.1.6 4.3.2.5	Medium Utilization (MU) factor	N/A	ANNEX A.6	N/A	Note ² , Note ⁷
5.1.7	4.3.1.7 4.3.2.6	Adaptivity	N/A	ANNEX A.7	N/A	Note ² , Note ³
5.1.8	4.3.1.8 4.3.2.7	Occupied Channel Bandwidth	Low/High	ANNEX A.8	Pass	--
5.1.9	4.3.1.9 4.3.2.8	Transmitter unwanted emissions in the out-of-band domain	Low/High	ANNEX A.9	Pass	--
5.1.10	4.3.1.10 4.3.2.9	Transmitter unwanted emissions in the spurious domain	Low/High	ANNEX A.10	Pass	--
Receiver Parameters						
5.2.1	4.2.3.2	Receiver categories	--	--	--	--
5.2.2	4.3.1.11 4.3.2.10	Receiver spurious emissions	Low/High	ANNEX A.11	Pass	--
5.2.3	4.3.1.12 4.3.2.11	Receiver Blocking	Low/High	ANNEX A.12	Pass	--
Other Parameters						
5.3.1	4.3.1.13 4.3.2.12	Geo-location capability	--	--	N/A	Note ⁶

Note ¹: This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.

Note ²: This test doesn't apply for the EUT which has the RF Output power is less than 10 dBm e.i.r.p.

Note ³: This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode.

Note ⁴: This requirement apply to the equipment is using wide band modulations other than FHSS.

Note ⁵: This requirement apply to the equipment is using FHSS.

Note ⁶: This requirement does not apply to devices that do not support Geo-location capability.

Note ⁷: These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

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

Relative Humidity	30% to 75%	
Atmospheric Pressure	98 kPa to 102 kPa	
Temperature	NT (Normal Temperature)	+22°C to +25°C
	LT (Low Temperature)	-25°C
	HT (High Temperature)	+66°C
Working Voltage of the EUT	NV (Normal Voltage)	6.0 V

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2021.08.09	2022.08.08
Spectrum Analyzer	KEYSIGHT	N9020A	MY56060183	2021.09.08	2022.09.07
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	260592	2022.02.09	2023.02.08
Signal Generator	ROHDE&SCHWARZ	SMB100A	177746	2021.08.24	2022.08.23
Switch Unit with OSP-B157	ROHDE&SCHWARZ	OSP120	101270	2021.06.01	2022.05.31
Signaling Unit	ROHDE&SCHWARZ	CMW270	100607	2021.06.01	2022.05.31
Signaling Unit	ROHDE&SCHWARZ	CMW500	142028	2021.06.01	2022.05.31
Signaling Unit	ROHDE&SCHWARZ	CBT	101005	2021.06.01	2022.05.31
DC Power Supply	ITECH	IT6720	60010301071 7610007	2021.09.22	2022.09.21
Temperature Chamber	AHK	NTH64-40A	1310	2022.01.05	2023.01.04
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2021.09.13	2022.09.12
Test Antenna-Loop(9 kHz-30 MHz)	SCHWARZBECK	FMZB 1519	1519-037	2021.04.16	2024.04.15
Test Antenna-Bi-Log(30 MHz-3 GHz)	SCHWARZBECK	VULB 9163	9163-624	2021.08.20	2024.08.19
Test Antenna-Horn(1-18 GHz)	SCHWARZBECK	BBHA 9120D	9120D-1917	2019.07.02	2022.07.01
Test Antenna-Horn (18-40 GHz)	A-INFO	LB-180400KF	J211060273	2021.07.02	2024.07.01
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2022.02.19	2024.09.03

4.3 Test Software List

Description	Manufacturer	Software Version	Serial No.
TS8997 EMC32	ROHDE&SCHWARZ	V10.01.00	N/A

4.4 Measurement Uncertainty

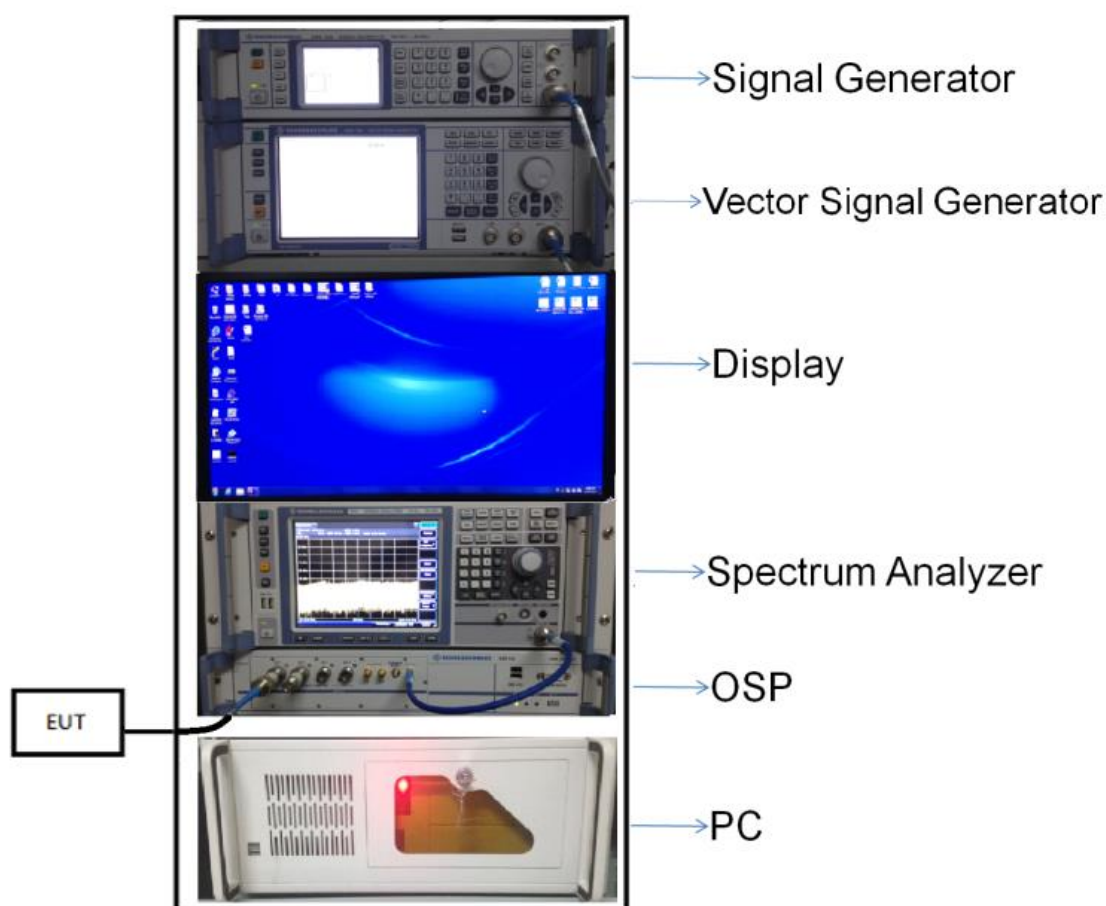
The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

Parameters	Uncertainty
Occupied Channel Bandwidth	3.6 %
RF output power, conducted	0.66 dB
Power Spectral Density, conducted	0.90 dB
Unwanted Emissions, conducted	1.78 dB
All emissions, radiated	5.36 dB
Temperature	0.82 °C
Humidity	4.1 %

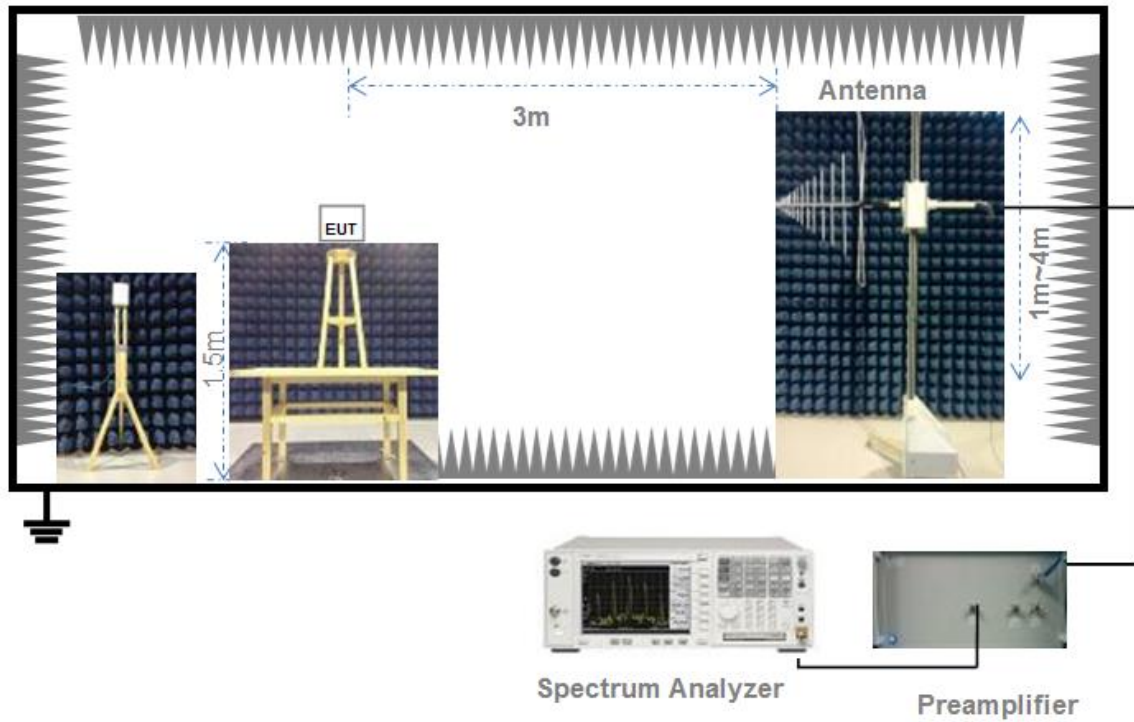
4.5 Description of Test Setup

4.5.1 For Conducted Test

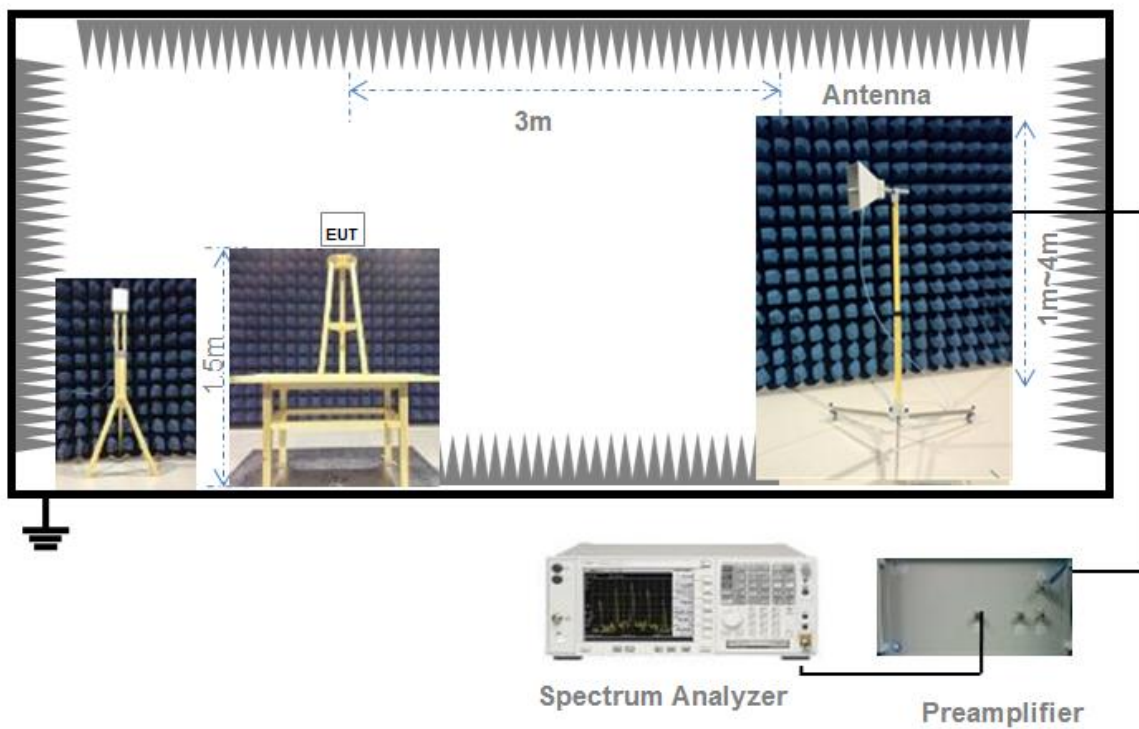


(Diagram 1)

4.5.2 For Radiated Test

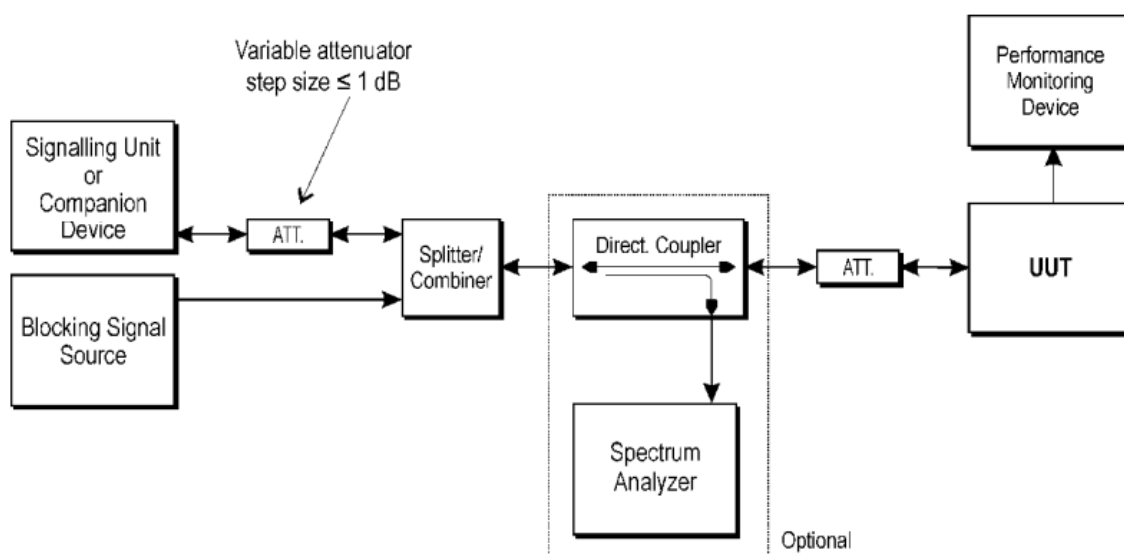


(Diagram 2)



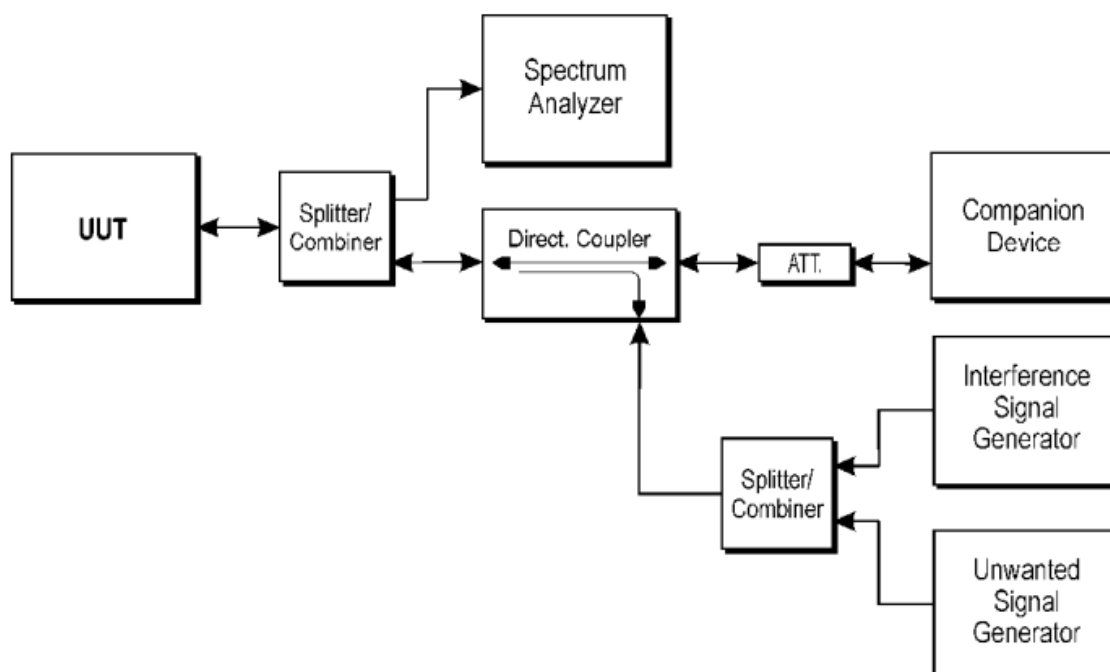
(Diagram 3)

4.5.3 For Receiver Blocking Test



(Diagram 4)

4.5.4 For Adaptivity Test



(Diagram 5)

5 Test Type and Test Results

5.1 Transmitter Parameters

5.1.1 RF output power

5.1.1.1 Limit

The maximum RF output power shall be equal to or less than 20 dBm.

5.1.1.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.2.2.

5.1.1.4 Test Result

Please refer to ANNEX A.1.

5.1.2 Power Spectral Density

5.1.2.1 Limit

The maximum Power Spectral Density for non-FHSS equipment is 10 dBm per MHz.

5.1.2.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.3.2.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

5.1.3 Duty Cycle, Tx-sequence, Tx-gap

5.1.3.1 Limit

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 Txsequence with a minimum of 3,5 ms.

5.1.3.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.3.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.2.2.

5.1.3.4 Test Result

Please refer to ANNEX A.3.

5.1.4 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

5.1.4.1 Limit

The Accumulated Transmit Time on any hopping frequency shall not be greater than 400 ms within any observation period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.

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

In order for the equipment to comply with the Frequency Occupation requirement, it shall meet either of the following two options:

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.

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.

5.1.4.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.4.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.4.2.

5.1.4.4 Test Result

Please refer to ANNEX A.4.

5.1.5 Hopping Frequency Separation

5.1.5.1 Limit

For adaptive frequency hopping systems, the minimum Hopping Frequency Separation shall be 100 kHz.

5.1.5.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.5.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.5.2.

5.1.5.4 Test Result

Please refer to ANNEX A.5.

5.1.6 Medium Utilization (MU) factor

5.1.6.1 Limit

The maximum Medium Utilization factor for non-adaptive equipment shall be 10 %.

5.1.6.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.6.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.2.2.

5.1.6.4 Test Result

Please refer to ANNEX A.6.

5.1.7 Adaptivity

5.1.7.1 Limit

Adaptive Frequency Hopping

Requirement	Operational Mode	
	Non-LBT based Detect and Avoid	LBT based Detect and Avoid
Minimum Clear Channel Assessment (CCA) Time	NA	18 us (see Note ¹)
Maximum Channel Occupancy (COT) Time	40 ms	60 ms
Minimum Idle Period	5% of COT	5% of COT
Extended CCA check	NA	NA
Short Control Signalling Transmissions	Maximum duty cycle of 10 % within an observation period of 50 ms (see 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 Signalling Transmissions.

Note 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.

Note ⁴: The Idle Period in between transmissions is considered to be the CCA or the Extended CCA check as there are no transmissions during this period.

Interference threshold level:

Maximum transmit power (P_H) EIRP dBm	Threshold level (TL) (see notes 1 and 2)
20	-70 dBm / MHz
Note ¹ : $TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{out})$ (P_{out} in mW e.i.r.p.).	
Note ² : transmitter the CCA threshold level (TL) shall be equal or lower than -70 dBm/MHz at the input to the receiver (assuming a 0 dBi receive antenna).	

Unwanted Signal parameters

Wanted signal mean power from companion device	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
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 2400 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.		

Adaptive equipment using modulations other than FHSS

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)	(see Note ²)	18 us (see Note ¹)
Maximum Channel Occupancy (COT) Time	40 ms	1 ms to 10 ms	(see Note ²)	13 ms
Minimum Idle Period	5% of COT	5% of COT	(see Note ²)	NA
Extended CCA check	NA	NA	(see Note ²)	a random duration in the range between 18 μs and at least 160 μs
Short Control Signalling 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 802.11™-2012 [i.3] clause 9, clause 10, clause 16, clause 17, clause 19 and clause 20, or in IEEE 802.15.4™-2011 [i.4], clause 4, clause 5 and clause 8

Note ³: Adaptive equipment may or may not have Short Control Signalling Transmissions.

Note ⁴: 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.

Note ⁵: The Idle Period in between transmissions is considered to be the CCA or the Extended CCA check as there are no transmissions during this period.

Interference threshold level:

Maximum transmit power (P _H) EIRP dBm	Threshold level (TL) (see notes 1 and 2)
20	-70 dBm / MHz
Note 1: $TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{out})$ (P_{out} in mW e.i.r.p.). Note 2: transmitter the CCA threshold level (TL) shall be equal or lower than -70 dBm/MHz at the input to the receiver (assuming a 0 dBi receive antenna).	

Unwanted Signal parameters

Wanted signal mean power from companion device	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
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 2400 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.		

5.1.7.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.7.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.6.2.

5.1.7.4 Test Result

Please refer to ANNEX A.7.

5.1.8 Occupied Channel Bandwidth

5.1.8.1 Limit

The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band 2400 MHz to 2483.5 MHz.

In addition, for non-adaptive FHSS 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 5 MHz..

In addition, for non-adaptive non-FHSS equipment with e.i.r.p. greater than 10 dBm, the Occupied Channel Bandwidth shall be equal to or less than 20 MHz.

5.1.8.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.8.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.7.2.

5.1.8.4 Test Result

Please refer to ANNEX A.8.

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

5.1.9.1 Limit

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 2400 M Hz to 2483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.1.8.

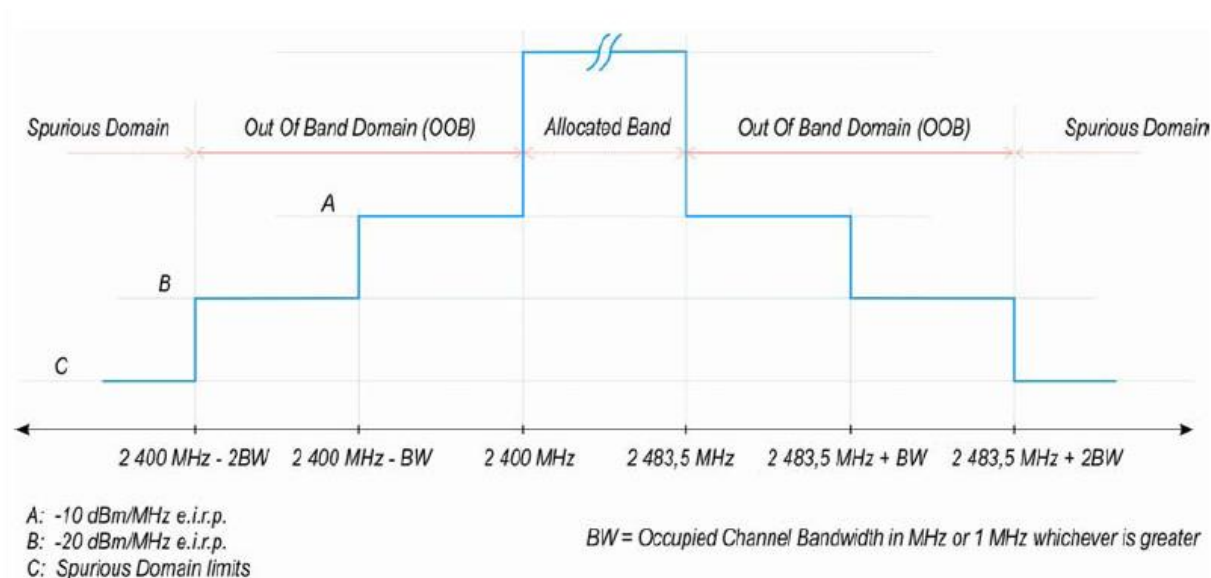


Figure 1: Transmit mask

5.1.9.2 Test Setup

The section 4.5.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.1.9.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.8.2.

5.1.9.4 Test Result

Please refer to ANNEX A.9.

5.1.10 Transmitter unwanted emissions in the spurious domain

5.1.10.1 Limit

The transmitter unwanted emissions in the spurious domain shall not exceed the values in following tables:

Frequency range	Maximum power (dBm)	Bandwidth
30 MHz to 47 MHz	-36	100 kHz
47 MHz to 74 MHz	-54	100 kHz
74 MHz to 87.5 MHz	-36	100 kHz
87.5 MHz to 118 MHz	-54	100 kHz
118 MHz to 174 MHz	-36	100 kHz
174 MHz to 230 MHz	-54	100 kHz
230 MHz to 470 MHz	-36	100 kHz
470 MHz to 694 MHz	-54	100 kHz
694 MHz to 1 GHz	-36	100 kHz
1 GHz to 12.75 GHz	-30	1 MHz

5.1.10.2 Test Setup

The section 4.5.1 and 4.5.2 (Diagram 1, 2, 3) for test setup description. The photo of test setup please refer to ANNEX B.

5.1.10.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.9.2.

5.1.10.4 Test Result

Please refer to ANNEX A.10.

5.2 Receiver Parameters

5.2.1 Receiver categories

There have three different receiver categories for which different receiver requirements and/or corresponding limits apply.

Receiver Category

Receiver Category	Definition
Category 1	Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p.
Category 2	Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment and non-adaptive with a maximum RF output power of 10 dBm e.i.r.p.
Category 3	Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment and non-adaptive with a maximum RF output power of 0 dBm e.i.r.p.

5.2.2 Receiver Spurious Emissions

5.2.2.1 Limit

Receiver spurious emissions are emissions at any frequency when the equipment is in receive mode.

The spurious emissions of the transmitter shall not exceed the values in following tables for the EUT in this report.

Frequency range	Maximum power (dBm)	Bandwidth
30 MHz to 1 GHz	-57	100 KHz
1 GHz to 12.75 GHz	-47	1 MHz

5.2.2.2 Test Setup

The section 4.5.1 (Diagram 1) for test setup description. The photo of test setup please refer to ANNEX B.

5.2.2.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.10.2.

5.2.2.4 Test Result

Please refer to ANNEX A.11.

5.2.3 Receiver Blocking

5.2.3.1 Limit

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

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	-34	CW
	2 504	-34	CW
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300	-34	CW
	2 330	-34	CW
	2 360	-34	CW
	2 524	-34	CW
	2 584	-34	CW
	2 674	-34	CW

Note ¹: OCBW is in Hz.

Note ²: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{min} + 26$ dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. 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 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.

Receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + $10 \times \log_{10}(\text{OCBW})$ + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380	-34	CW
	2 504	-34	CW
	2 300	-34	CW
	2 584	-34	CW

NOTE ¹: OCBW is in Hz.

NOTE ²: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 26$ dB where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE ³: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency(MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + $10 \times \log_{10}(\text{OCBW})$ + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380	-34	CW
	2 504	-34	CW
	2 300	-34	CW
	2 584	-34	CW

NOTE ¹: OCBW is in Hz.

NOTE ²: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 30$ dB where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE ³: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Categorization

Receiver category	Definition
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.
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.
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

5.2.3.2 Test Setup

See the section 4.5.3 (Diagram 4) for test setup description. The photo of test setup please refer to ANNEX B.

5.2.3.3 Test Procedure

Reference to ETSI EN 300 328 V2.2.2 clause 5.4.11.2.

5.2.3.4 Test Result

Please refer to ANNEX A.12.

5.3 Other Parameters

5.3.1 Geo-location capability

5.3.1.1 Requirements

The geographical location determined by the equipment as defined in following section (5.3.1.2) shall not be accessible to the user.

5.3.1.2 Definition

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.

5.3.1.3 Test Result

Note: Not applicable.

ANNEX A TEST RESULT

A.1 RF output power

Test Data

Note: EIRP Power = Conducted Power + Antenna Gain

Modulation Mode			GFSK (BLE 1Mbps)		
Limit			20 dBm		
Test Result					
Test Method	Test Conditions		Transmitter Power Level (dBm)		
☐ Radiated ☒ Conducted	Voltage	Temperature	Low Channel	Middle Channel	High Channel
			EIRP	EIRP	EIRP
	NV	NT	3.0	2.5	2.3
		LT	3.2	2.7	1.9
		HT	2.8	2.6	2.1
Test Verdict			Pass		

Bursts Power List

GFSK (BLE 1Mbps): Low Channel

Burst RMS Power	Start Time	Stop Time	Tx_on	Tx_off
dBm	ms	ms	ms	ms
3.0	0.000	0.395	0.395	0.230
3.0	0.625	1.020	0.395	0.230
3.0	1.250	1.645	0.395	0.230
3.0	1.875	2.270	0.395	0.230
3.2	2.500	2.895	0.395	0.230
3.0	3.125	3.520	0.395	0.230
3.0	3.750	4.145	0.395	0.230
3.0	4.375	4.770	0.395	0.230
3.0	5.000	5.395	0.395	0.230
3.0	5.625	6.020	0.395	0.230
3.0	6.250	6.645	0.395	0.230
3.0	6.875	7.270	0.395	0.230
3.0	7.500	7.895	0.395	0.230
3.0	8.125	8.520	0.395	0.230
3.0	8.750	9.145	0.395	0.230
3.0	9.375	9.770	0.395	0.230
3.0	10.000	10.395	0.395	0.230
3.0	10.625	11.020	0.395	0.230
3.0	11.250	11.645	0.395	0.230
3.0	11.875	12.270	0.395	0.230
3.1	12.500	12.895	0.395	0.230
3.0	13.125	13.520	0.395	0.230
3.0	13.750	14.145	0.395	0.230
3.0	14.375	14.770	0.395	0.230
3.0	15.000	15.395	0.395	0.230
3.0	15.625	16.020	0.395	0.230
3.0	16.250	16.645	0.395	0.230
3.0	16.875	17.270	0.395	0.230
3.0	17.500	17.895	0.395	0.230
3.0	18.125	18.520	0.395	0.230
3.0	18.750	19.145	0.395	0.230
3.0	19.375	19.770	0.395	0.230
3.0	20.000	20.395	0.395	0.230
3.0	20.625	21.020	0.395	0.230

GFSK (BLE 1Mbps): Middle Channel

Burst RMS Power	Start Time	Stop Time	Tx_on	Tx_off
dBm	ms	ms	ms	ms
2.7	0.000	0.394	0.394	0.231
2.7	0.625	1.019	0.394	0.231
2.7	1.250	1.644	0.394	0.231
2.7	1.875	2.269	0.394	0.231
2.7	2.500	2.894	0.394	0.231
2.7	3.125	3.519	0.394	0.231
2.7	3.750	4.144	0.394	0.231
2.7	4.375	4.769	0.394	0.231
2.7	5.000	5.394	0.394	0.231
2.7	5.625	6.019	0.394	0.231
2.7	6.250	6.644	0.394	0.231
2.7	6.875	7.269	0.394	0.231
2.7	7.500	7.894	0.394	0.231
2.7	8.125	8.519	0.394	0.231
2.7	8.750	9.144	0.394	0.231
2.7	9.375	9.769	0.394	0.231
2.7	10.000	10.394	0.394	0.231
2.7	10.625	11.019	0.394	0.231
2.7	11.250	11.644	0.394	0.231
2.7	11.875	12.270	0.395	0.230
2.7	12.500	12.894	0.394	0.231
2.7	13.125	13.519	0.394	0.231
2.7	13.750	14.144	0.394	0.231
2.7	14.375	14.770	0.395	0.230
2.7	15.000	15.394	0.394	0.231
2.7	15.625	16.020	0.395	0.230
2.7	16.250	16.644	0.394	0.231
2.7	16.875	17.269	0.394	0.231
2.7	17.500	17.895	0.395	0.230
2.7	18.125	18.520	0.395	0.230
2.7	18.750	19.145	0.395	0.230
2.7	19.375	19.770	0.395	0.230
2.7	20.000	20.395	0.395	0.230
2.7	20.625	21.020	0.395	0.230

GFSK (BLE 1Mbps): High Channel

Burst RMS Power	Start Time	Stop Time	Tx_on	Tx_off
dBm	ms	ms	ms	ms
2.2	0.000	0.394	0.394	0.231
2.2	0.625	1.019	0.394	0.231
2.2	1.250	1.644	0.394	0.231
2.2	1.875	2.269	0.394	0.231
2.2	2.500	2.894	0.394	0.231
2.2	3.125	3.519	0.394	0.231
2.3	3.750	4.144	0.394	0.231
2.2	4.375	4.769	0.394	0.231
2.2	5.000	5.394	0.394	0.231
2.2	5.625	6.019	0.394	0.231
2.2	6.250	6.644	0.394	0.231
2.2	6.875	7.269	0.394	0.231
2.2	7.500	7.894	0.394	0.231
2.2	8.125	8.519	0.394	0.231
2.2	8.750	9.144	0.394	0.231
2.2	9.375	9.769	0.394	0.231
2.2	10.000	10.394	0.394	0.231
2.2	10.625	11.019	0.394	0.231
2.2	11.250	11.644	0.394	0.231
2.2	11.875	12.269	0.394	0.231
2.2	12.500	12.894	0.394	0.231
2.2	13.125	13.519	0.394	0.231
2.2	13.750	14.144	0.394	0.231
2.2	14.375	14.769	0.394	0.231
2.2	15.000	15.394	0.394	0.231
2.2	15.625	16.019	0.394	0.231
2.2	16.250	16.644	0.394	0.231
2.2	16.875	17.269	0.394	0.231
2.2	17.500	17.894	0.394	0.231
2.2	18.125	18.519	0.394	0.231
2.2	18.750	19.145	0.395	0.230
2.2	19.375	19.769	0.394	0.231
2.2	20.000	20.394	0.394	0.231
2.2	20.625	21.019	0.394	0.231

A.2 Power spectral density

Measuring Parameter

Frequency Range		
2400 MHz to 2483.5 MHz	RBW (MHz)	10 kHz
	VBW (MHz)	30 kHz
	Sweep points	8351
	Detector mode	RMS
	Trace mode	Max Hold
	Sweep time	Auto

Test Data

Note: The Power density is EIRP Power density, which is contain antenna gain.

Modulation Mode			GFSK (BLE 1Mbps)		
Limit			10 dBm/MHz		
Test Result					
Test Method	Test Conditions		Power density (dBm/MHz)		
☐ Radiated ☒ Conducted	Temperature	Voltage	Low Channel	Middle Channel	High Channel
			Power Spectral density	Power Spectral density	Power Spectral density
	NT	NV	2.9	2.4	2.2
Test Verdict			Pass		

A.3 Duty Cycle, Tx-sequence, Tx-gap

Note ¹: The maximum value of Duty Cycle declared by the supplier.

Test Data

Duty Cycle (%)	Limit Duty Cycle (%) ^{Note1}	Number of Bursts	Minimum Tx-On (ms)	Maximum Tx-On (ms)	Minimum Tx-Off (ms)	Maximum Tx-Off (ms)	Measurement Time (ms)	Comment
--	--	--	--	--	--	--	--	--

Note ²: Not applicable.

A.4 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

Note: Not applicable.

A.5 Hopping Frequency Separation

Note: Not applicable.

A.6 Medium Utilization (MU) factor

Medium Utilization (MU) (%)	Limit Medium Utilization (MU) (%)	Verdict
--	10	--

Note: Not applicable.

A.7 Adaptivity

Note: Not applicable.

A.8 Occupied Channel Bandwidth

Measuring Parameter

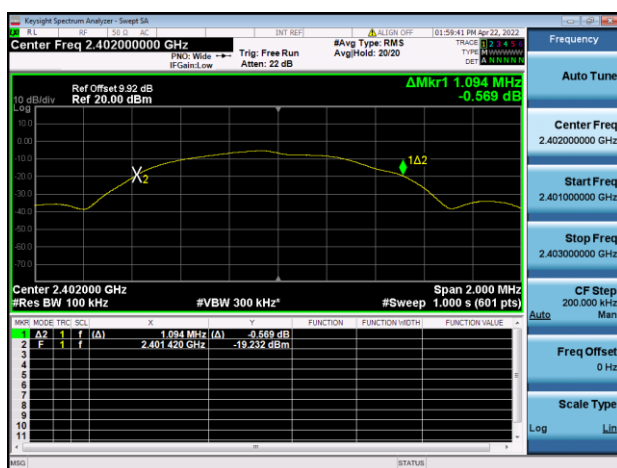
Centre Frequency	The centre frequency of the channel under test
RBW	~ 1 % of the span without going below 1 %
VBW	3 × RBW
Span	2 × Nominal Channel Bandwidth
Detector mode	RMS </td
Trace mode	Max Hold
Sweep time	Auto
Test Method	☐ Radiated ☒ Conducted

Test Data

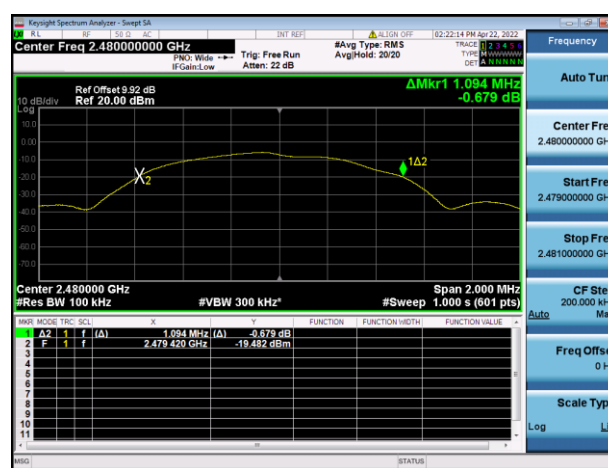
Test Conditions		Test Mode	DUT Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Lower Band Edge (MHz)	Upper Band Edge (MHz)	Limit (MHz)
Temperature	Voltage						
NT	NV	GFSK (BLE 1Mbps)	2402	1.094	2401.419922	2402.513922	Within The Band 2400 MHz to 2483.5 MHz
			2480	1.094	2479.419922	2480.513922	
Test Verdict		Pass					

Test Plots

GFSK (BLE 1Mbps): Low Channel



GFSK (BLE 1Mbps): High Channel



A.9 Transmitter unwanted emissions in the out-of-band domain

GFSK (BLE 1Mbps)

DUT Frequency (MHz)	Nominal Bandwidth (MHz)	Frequency (MHz)	Level (dBm)	Limit (dBm)	Result
2402	1	2398.5	-27.004	-20	PASS
2402	1	2399.5	-23.517	-10	PASS
2480	1	2484.0	-29.423	-10	PASS
2480	1	2485.0	-31.124	-20	PASS

A.10 Transmitter unwanted emissions in the spurious domain

Note ¹: The test method choose the conducted method. Which 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).

Note ²: The Frequency band was pre-scanned, the harmonic and other spurious which worst frequency are recorded in the report.

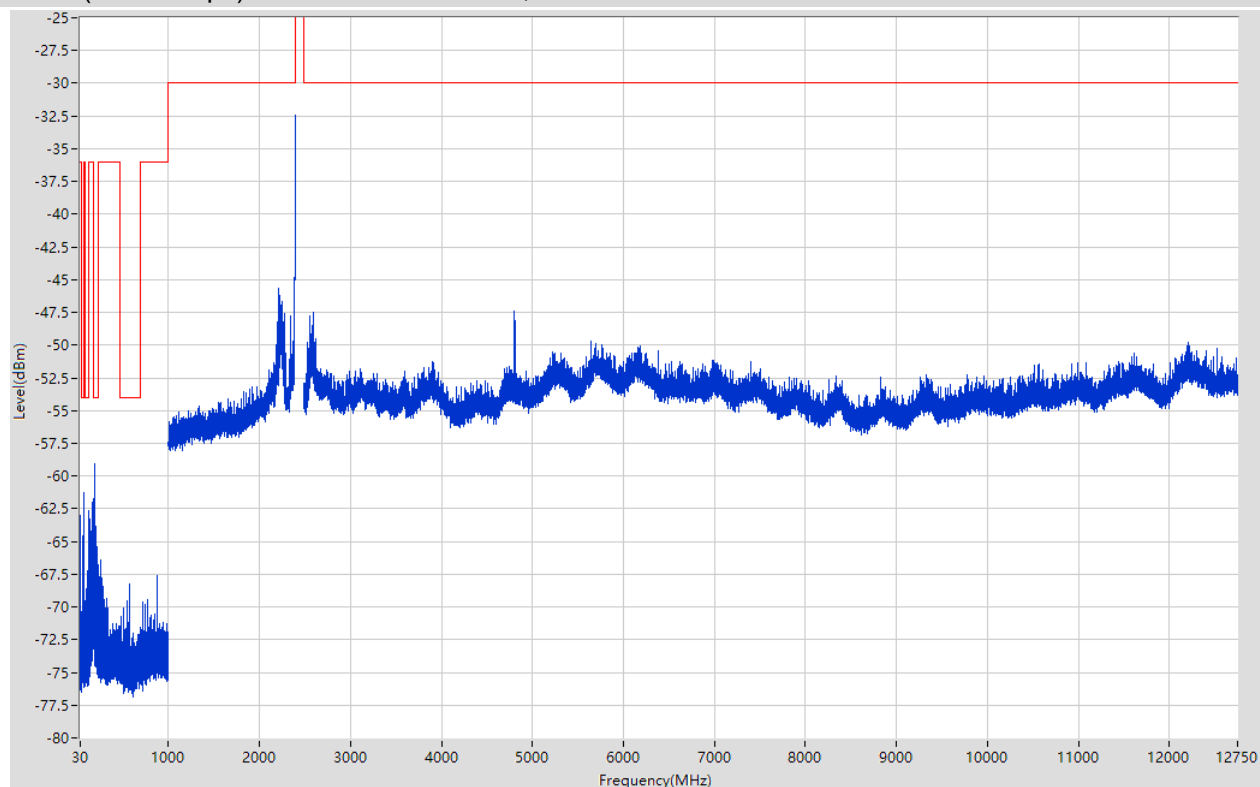
Note ³: The cabinet radiated test data is tested in the normal working mode of the product.

Measuring Parameter

Frequency Range		
30 MHz to 1 000 MHz	RBW (MHz)	100 kHz
	VBW (MHz)	300 kHz
	Sweep points	19400
	Detector mode	Peak
	Trace mode	Max Hold
1 GHz to 12,75 GHz	RBW (MHz)	1 MHz
	VBW (MHz)	3 MHz
	Sweep points	23500
	Detector mode	Peak
	Trace mode	Max Hold

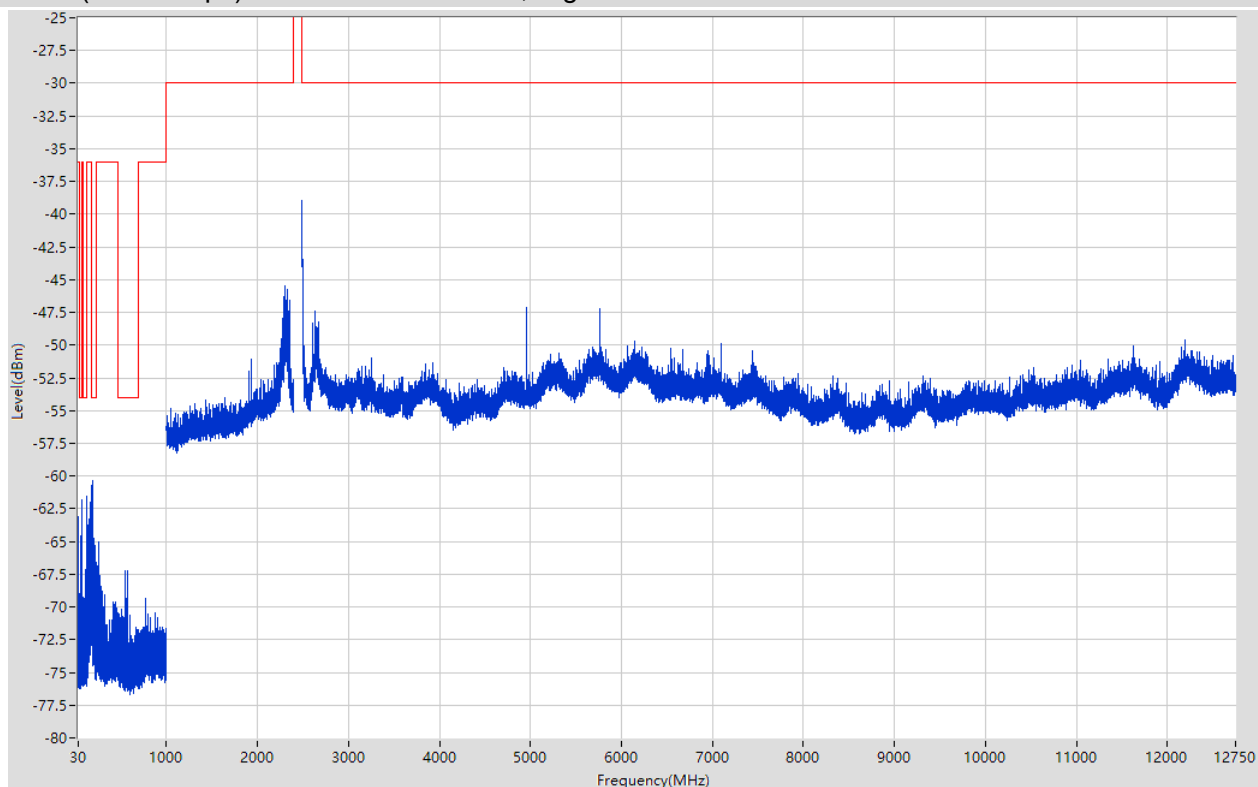
Conducted Test Data

GFSK (BLE 1Mbps) 30 MHz to 12.75 GHz, Low channel



Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	47	0.1	Peak	31.998	-63.05	-36	Pass	401
47	74	0.1	Peak	64	-61.22	-54	Pass	541
74	87.5	0.1	Peak	75.148	-69.47	-36	Pass	401
87.5	118	0.1	Peak	113.8	-67.2	-54	Pass	611
118	174	0.1	Peak	160	-62.02	-36	Pass	1121
174	230	0.1	Peak	192	-59.1	-54	Pass	1121
230	470	0.1	Peak	256	-66.44	-36	Pass	4801
470	694	0.1	Peak	576	-68.22	-54	Pass	4481
694	1000	0.1	Peak	879.85	-67.61	-36	Pass	6121
1000	2398	1	Peak	2398	-32.44	-30	N/A	2797
			RMS		-54.77		Pass	30000
2485.5	12750	1	Peak	4803.5	-47.37	-30	Pass	20530

GFSK (BLE 1Mbps) 30 MHz to 12.75 GHz, High channel

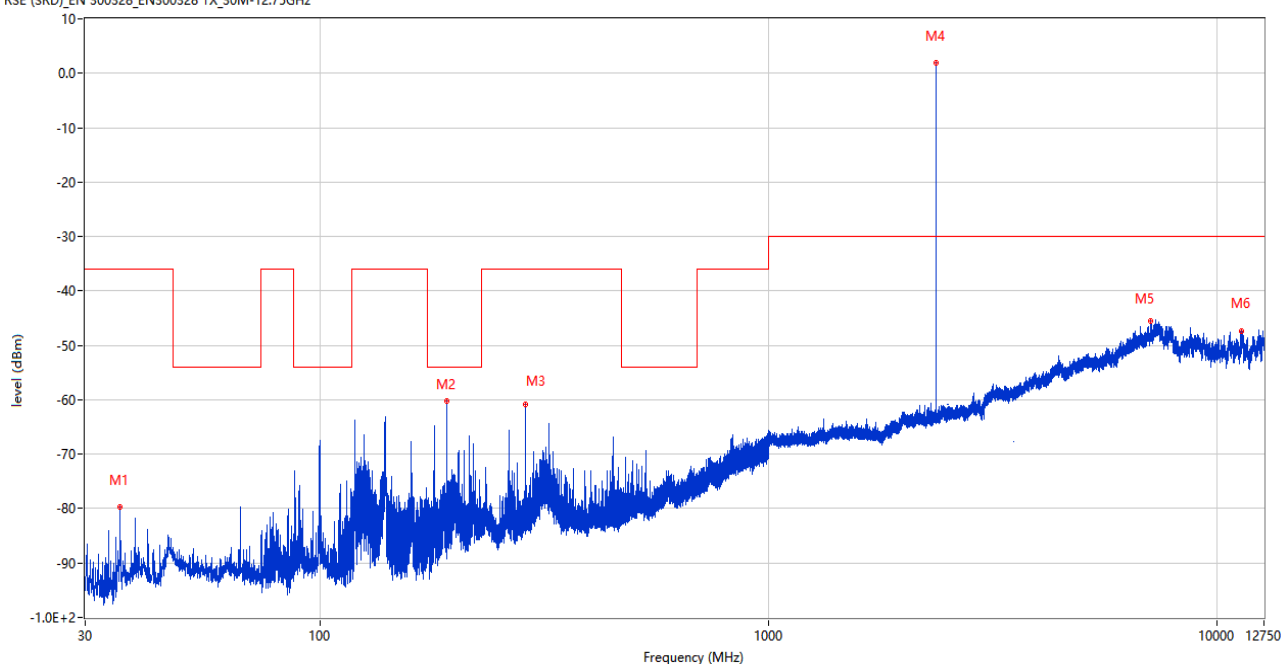


Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	47	0.1	Peak	31.998	-63.06	-36	Pass	401
47	74	0.1	Peak	64	-61.86	-54	Pass	541
74	87.5	0.1	Peak	76.531	-69.26	-36	Pass	401
87.5	118	0.1	Peak	113.8	-67.11	-54	Pass	611
118	174	0.1	Peak	128	-61.56	-36	Pass	1121
174	230	0.1	Peak	192	-60.34	-54	Pass	1121
230	470	0.1	Peak	256	-65.03	-36	Pass	4801
470	694	0.1	Peak	576	-67.24	-54	Pass	4481
694	1000	0.1	Peak	768.05	-69.39	-36	Pass	6121
1000	2398	1	Peak	2301.5	-45.48	-30	Pass	2797
2485.5	12750	1	Peak	2485.5	-38.98	-30	Pass	20530

Cabinet Radiated Test Data

30 MHz to 12.75 GHz, ANT H

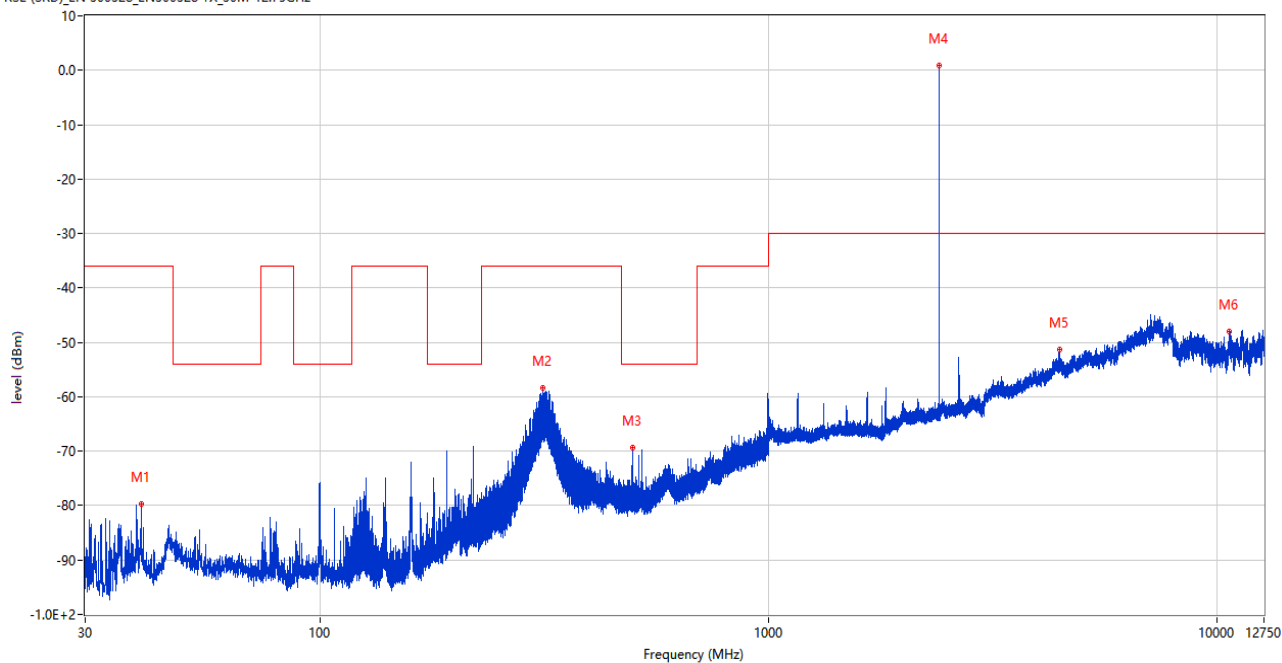
RSE (SRD)_EN 300328_EN300328_TX_30M-12.75GHz



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
35.917	-79.74	-20.30	-36.0	-43.74	225.00	Horizontal	Horizontal	Pass
191.990	-60.12	-17.41	-54.0	-6.12	178.00	Horizontal	Horizontal	Pass
287.971	-60.79	-14.14	-36.0	-24.79	32.00	Horizontal	Horizontal	Pass
2402.042	2.87	-0.40	-30.0	-32.87	204.00	Horizontal	Horizontal	N/A
7131.250	-45.50	17.43	-30.0	-15.50	292.00	Horizontal	Horizontal	Pass
11377.963	-47.29	15.03	-30.0	-17.29	354.00	Horizontal	Horizontal	Pass

30 MHz to 12.75 GHz, ANT V

RSE (SRD)_EN 300328_EN300328_TX_30M-12.75GHz



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
39.991	-79.67	-19.19	-36.0	-43.67	142.00	Vertical	Horizontal	Pass
314.355	-58.29	-13.28	-36.0	-22.29	222.00	Vertical	Horizontal	Pass
497.928	-69.31	-8.00	-54.0	-15.31	154.00	Vertical	Horizontal	Pass
2402.000	0.87	-1.52	-30.0	30.87	65.00	Vertical	Horizontal	N/A
4455.000	-51.28	8.88	-30.0	-21.28	170.00	Vertical	Horizontal	Pass
10690.875	-48.00	14.93	-30.0	-18.00	21.00	Vertical	Horizontal	Pass

A.11 Receiver Spurious Emissions

Note¹: The test method choose the conducted method. Which 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).

Note²: The Frequency band was pre-scanned, the harmonic and other spurious which worst frequency are recorded in the report.

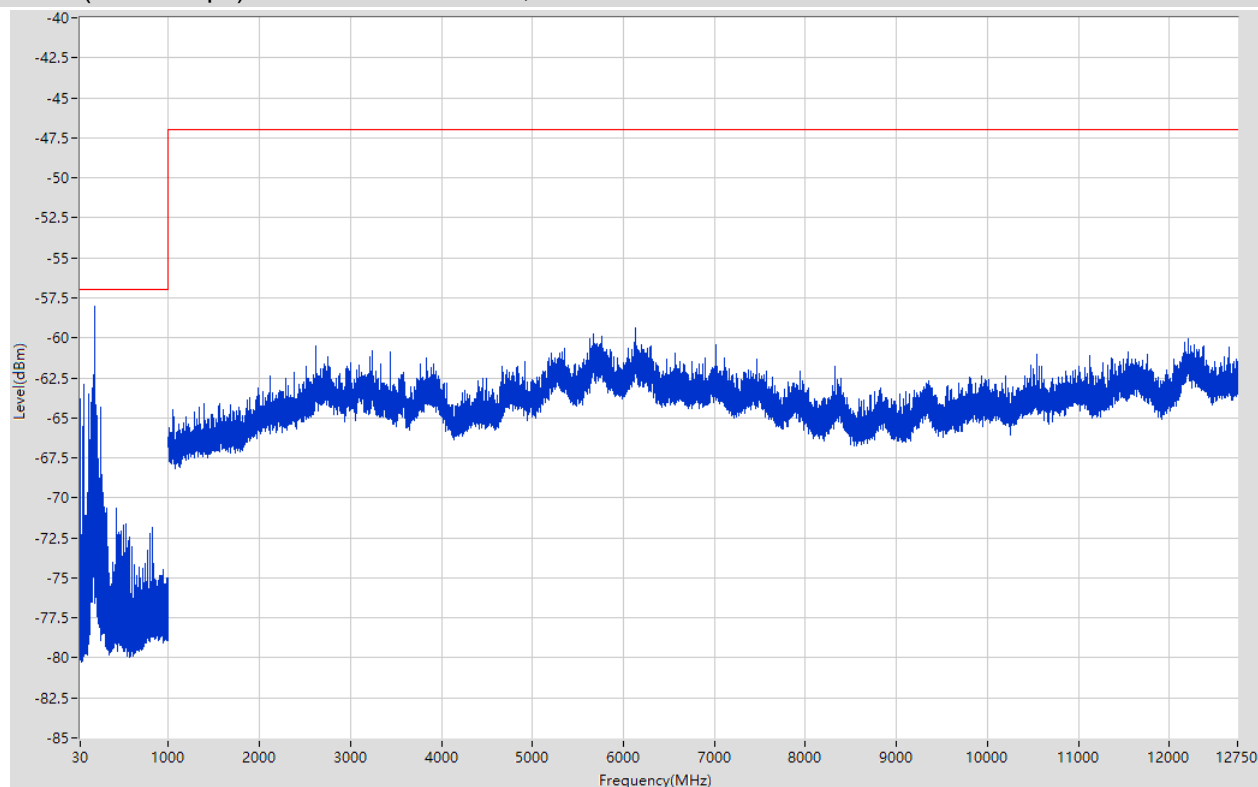
Note³: The cabinet radiated test data is tested in the normal working mode of the product.

Measuring Parameter

Frequency Range		
30 MHz to 1 000 MHz	RBW (MHz)	100 kHz
	VBW (MHz)	300 kHz
	Sweep points	19400
	Detector mode	Peak
	Trace mode	Max Hold
1 GHz to 12,75 GHz	RBW (MHz)	1 MHz
	VBW (MHz)	3 MHz
	Sweep points	23500
	Detector mode	Peak
	Trace mode	Max Hold

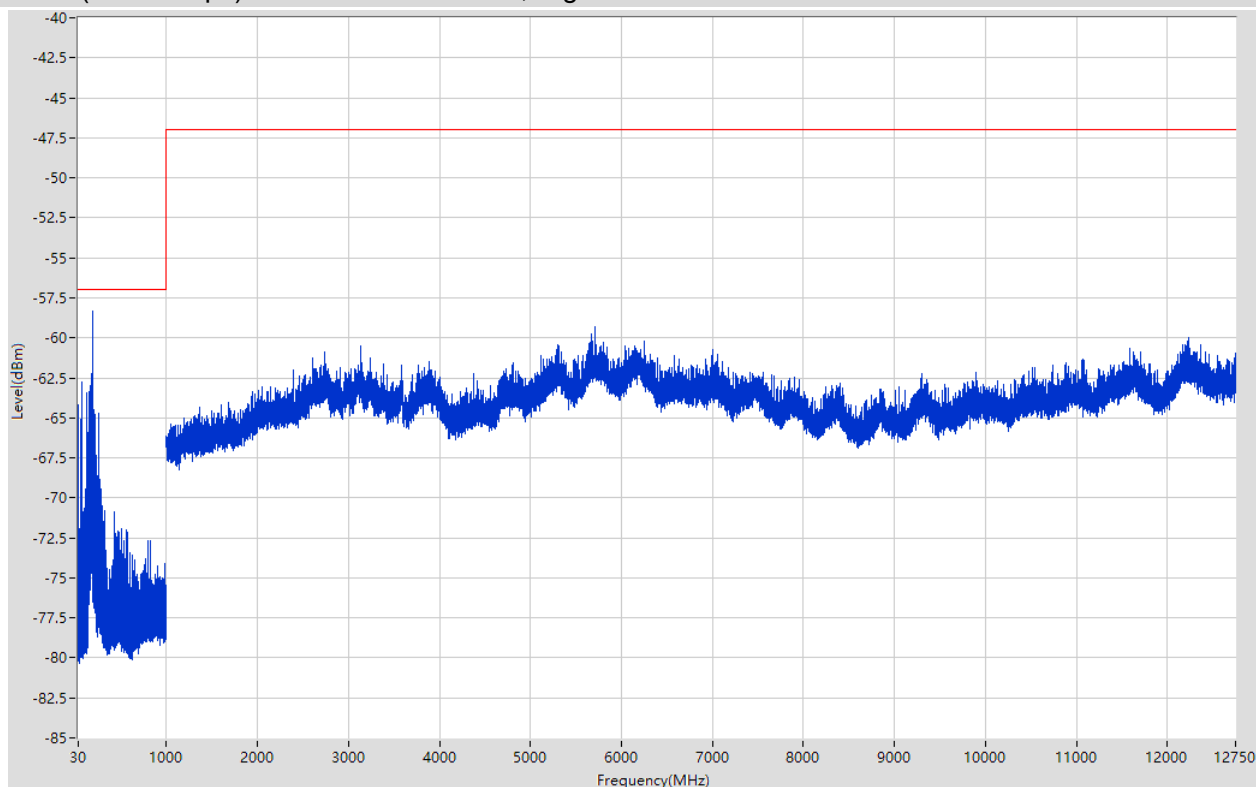
Conducted Test Data

GFSK (BLE 1Mbps) 30 MHz to 12.75 GHz, Low channel



Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	192	-58.06	-57	Pass	19401
1000	12750	1	Peak	6137.5	-59.39	-47	Pass	23501

GFSK (BLE 1Mbps) 30 MHz to 12.75 GHz, High channel

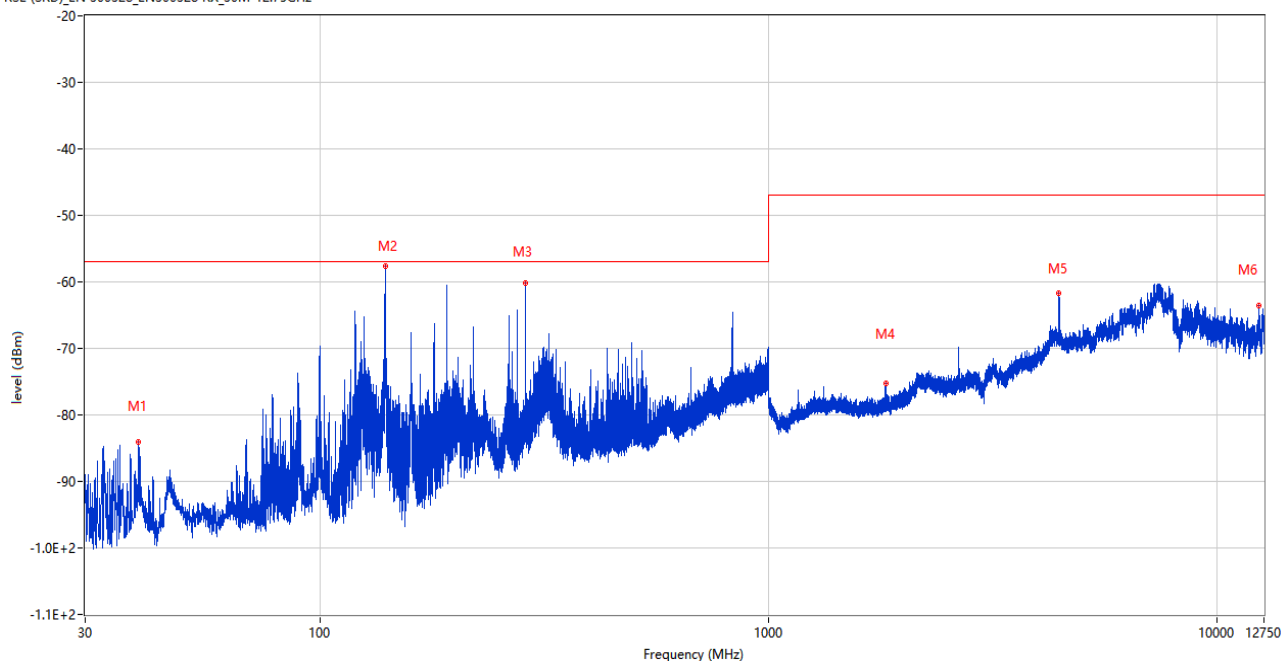


Start Frequency (MHz)	Stop Frequency (MHz)	RBW (MHz)	Detector	Frequency (MHz)	Power (dBm)	Limit (dBm)	Verdict	Sweep Point
30	1000	0.1	Peak	191.95	-58.3	-57	Pass	19401
1000	12750	1	Peak	5708.5	-59.28	-47	Pass	23501

Cabinet Radiated Test Data

30 MHz to 12.75 GHz, ANT H

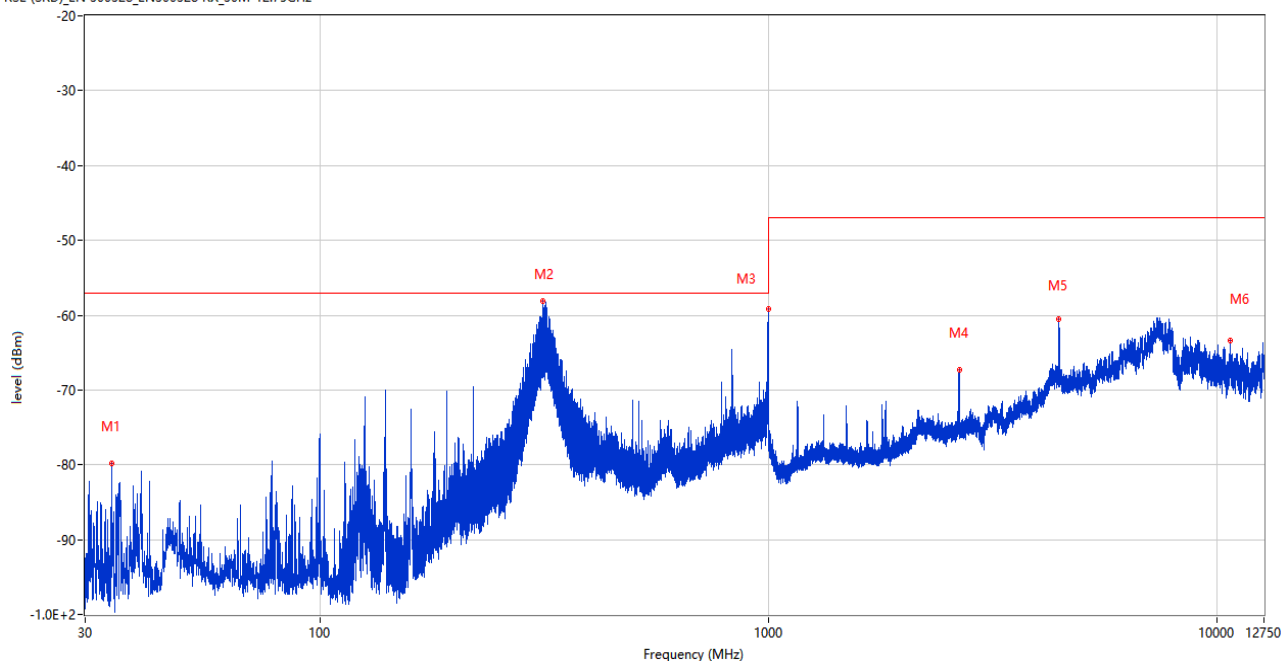
RSE (SRD)_EN 300328_EN300328 RX_30M-12.75GHz



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
39.361	-84.05	-19.29	-57.0	-27.05	229.00	Horizontal	Horizontal	Pass
139.901	-57.71	-22.06	-57.0	-0.71	161.00	Horizontal	Horizontal	N/A
287.971	-60.14	-14.14	-57.0	-3.14	47.00	Horizontal	Horizontal	Pass
1831.800	-75.19	-17.26	-47.0	-28.19	21.00	Horizontal	Horizontal	Pass
4454.750	-63.00	-4.60	-47.0	-16.00	343.00	Horizontal	Horizontal	Pass
12431.750	-63.60	0.28	-47.0	-16.60	51.00	Horizontal	Horizontal	Pass

30 MHz to 12.75 GHz, ANT V

RSE (SRD)_EN 300328_EN300328 RX_30M-12.75GHz



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
34.413	-79.76	-22.98	-57.0	-22.76	156.00	Vertical	Horizontal	Pass
314.550	-58.17	-13.27	-57.0	-1.17	54.00	Vertical	Horizontal	Pass
999.951	-59.12	3.29	-57.0	-2.12	161.00	Vertical	Horizontal	Pass
2665.900	-67.36	-13.20	-47.0	-20.36	6.00	Vertical	Horizontal	Pass
4454.500	-60.52	-4.61	-47.0	-13.52	251.00	Vertical	Horizontal	Pass
10716.049	-63.46	-1.80	-47.0	-16.46	4.00	Vertical	Horizontal	Pass

A.12 Receiver Blocking

Note: Equipment does not support a PER or a FER test to be performed. After adding interference, the device will not lose the wireless transmission function required for the intended use of the device, tests pass.

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 2)	Limit	Verdict
(-139 dBm + 10 × log ₁₀ (OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less	2 380	-34	normal work	Pass
	2 504	-34		
	2 300	-34		
	2 584	-34		

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2230879-AR.pdf”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2230879-AW-1.pdf”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2230879-AI-1.pdf”.

ANNEX E INFORMATIVE

Application form for testing please refer to the document “BL-SZ2230879-AM.pdf”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--

TEST REPORT

Applicant: Woan Technology (Shenzhen) Co., Ltd.
Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

Address:

Equipment Type: SwitchBot Keypad

Model Name: W2500020 (refer section 2.4)

Brand Name: SwitchBot

Test Standard: EN 62479: 2010

Test Date: Apr. 22, 2022 - May 26, 2022

Date of Issue: Jul. 12, 2022

ISSUED BY:

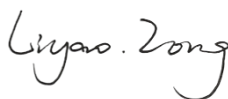
Shenzhen BALUN Technology Co., Ltd.



Tested by: Chen Huiming

Checked by: Liyao Zong

Approved by: Wei Yanquan
(Chief Engineer)



Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Jul. 12, 2022</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province, China

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	Woan Technology (Shenzhen) Co., Ltd.
Address	Building A2, Zhengfeng Industrial Area, No.610 Fengtang Boulevard, Fuhai Sub-district, Bao'an District, Shenzhen

2.4 General Description for Equipment under Test (EUT)

EUT Name	SwitchBot Keypad	
Model Name Under Test	W2500020	
Series Model Name	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015, W2500021, W2500022, W2500023, W2500024, W2500025	
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only different on with fingerprint module or without fingerprint module.	
	No Fingerprints Version	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015
	Have Fingerprints Version	W2500021, W2500022, W2500023, W2500024, W2500025
Hardware Version	V1.0	
Software Version	V1.0	
Dimensions (Approx.)	N/A	
Weight (Approx.)	N/A	

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	FANSO
	Model No.	CR123A
	Serial No.	N/A
	Capacitance	Input: 6Vdc
	Rated Voltage	N/A
	Limited Voltage	N/A

2.6 Technical Information

Network and Wireless connectivity	Bluetooth, NFC
-----------------------------------	----------------

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	Bluetooth
Frequency Range	2400 ~ 2483.5 MHz
Antenna Type	PIFA
Exposure Category	General Population/Uncontrolled Exposure
EUT Stage	Portable Device

Operating Mode	NFC
Frequency Range	13.56 MHz
Antenna Type	FPC Antenna
Exposure Category	General Population/Uncontrolled Exposure
EUT Stage	Portable Device

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	EN 62479:2010	Assesment of the compliance of low-power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

4 DEVICE CATEGORY AND LEVELS LIMITS

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the following limits.

For frequency range 10 MHz to 10 GHz

The basic restriction at frequencies between 10 MHz and 100 GHz is on localized SAR in the head. Any device with output power below 20 mW cannot produce an exposure exceeding this restriction under the most pessimistic exposure conditions. The basic restriction is 2 W/kg so any unit which supplies less than 20 mW ($=2/100W$) from its antenna port, averaged over 6 minutes, will meet the basic restriction.

For frequency range 10 GHz to 300 GHz

The most conservative assumption is that all the transmitted power is absorbed within the specified area, therefore any device which supplies less than 20 mW will meet the basic restriction. The average time is equal to $68/f-1.05$ minutes (where f is in GHz) In the frequency range 10 GHz to 300 GHz, the basic restriction is $10 Wm^{-2}$ averaged over any $20 cm^2$ of exposed area with a spatial maximum of $200 Wm^{-2}$ averaged over $1 cm^2$

Criteria A: All electromagnetic fields

If the average power emitted by apparatus operating in the frequency range 10 MHz – 300GHz is less than or equal to 20 mW and the transmitting peak power is less than 20W then the apparatus is deemed to comply with the basic restrictions without testing. Averaging time is 6 minutes in the frequency range 10 MHz to 10 GHz. The average time is equal to $68/f-1.05$ minutes (where f is in GHz) in the frequency range 10 GHz to 300 GHz.

If the total supply power or the input power to the circuitry producing the greatest emissions in the device is less than or equal to 20 mW then it is assumed that the emitted power is less than 20 mW.

Criteria B: Pulse modulated electromagnetic fields with pulse duration less than 30 microseconds

For pulses of duration less than 30 microseconds at frequencies between 300 MHz and 10 GHz, there is also a basic restriction on Specific energy absorption (SA). This is $2mJ kg^{-1}$ in any 10g of tissue in the head. For most pulses, the SAR restriction will be more stringent, but for pulses with a repetition frequency of less than 100 Hz, the SA restriction will predominate. For devices producing pulses with repetition rates below 100 Hz, the average power should be less than $20 \times prf$ mW (pulse repetition frequency, prf in Hz).

5 ASSESSMENT RESULT

5.1 Output Power

Bluetooth	
Mode	BLE
	GFSK
EIRP (dBm)	3.2
EIRP (mW)	2.09
Limit (mW)	20
Note: This report listed the maximal case EIRP power value, please refer to RF test report for more details.	

Mode	Field Strength (dBuV/m)	E-Filed (V/m)	Limit of E-Filed (V/m)	Verdict
13.560 MHz	42.07	0.0001	28	Pass
Note 1: The Field Strength please refer to the Report No. BL-SZ2230879-403, which issued by Shenzhen BALUN Technology Co., Ltd. on Jul. 12, 2022, Section A.4 Transmitter radiated H-field . Note 2: The main frequency signal is lower than the base noise and not shown in this report. The max value of base noise is 42.07 dBuV/m.				

5.2 Conclusion

Note 1: The EIRP Power of Bluetooth which are below the exempt condition, 20mW specified in EN62479: 2010. RF exposure assessment has been performed below to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation (1999/519/EC).

Note 2: The Field Strength at worst case is: 42.07 dBuV/m (0.0001 V/m) which is below the exempt condition 28 V/m. RF exposure assessment has been performed below to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation (1999/519/EC).

This EUT is deemed to comply with the reference level limits by Council Recommendation 1999/519/EC, therefore the basic restrictions are compliant with human exposure limits.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
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--END OF REPORT--

TEST REPORT

Applicant: Woan Technology (Shenzhen) Co., Ltd.
Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang
Sub-district, Bao'an District, Shenzhen, Guangdong,
P.R.China, 518100

Address:

Equipment Type: SwitchBot Keypad

Model Name: W2500020 (refer section 2.4)

Brand Name: SwitchBot

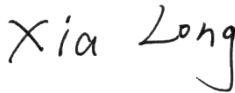
Test Standard: ETSI EN 301 489-1 V2.2.3(2019-11)
Final draft ETSI EN 301 489-3 V2.2.0(2021-11)
ETSI EN 301 489-17 V3.2.4 (2020-09)

Test Date: May 12, 2022 - May 26, 2022

Date of Issue: Jul. 12, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Xiong Chong**Checked by:** Xia Long**Approved by:** Liao Jianming
(Technical Director)

Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Jul. 12, 2022</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

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Address	Block B, 1/F, Baisha Science & Technology Park, Shahe West Road, Nanshan District, Shenzhen, Guangdong Province, China.
Phone Number	+86 755 6685 0100

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Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science & Technology Park, Shahe West Road, Nanshan District, Shenzhen, Guangdong Province, China.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

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2.4 General Description for Equipment under Test (EUT)

EUT Name	SwitchBot Keypad	
Model Name Under Test	W2500020	
Series Model Name	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015, W2500021, W2500022, W2500023, W2500024, W2500025	
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only different on with fingerprint module or without fingerprint module.	
	No Fingerprints Version	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015
	Have Fingerprints Version	W2500021, W2500022, W2500023, W2500024, W2500025
Hardware Version	V1.0	
Software Version	V1.0	
Dimensions (Approx.)	N/A	
Weight (Approx.)	N/A	

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	FANSO
	Model No.	CR123A
	Serial No.	N/A
	Capacitance	Input: 6Vdc
	Rated Voltage	N/A
	Limited Voltage	N/A
Ancillary Equipment 2	NFC Card	
Ancillary Equipment 3	SwitchBot Lock	

2.6 Technical Information

Network and Wireless connectivity		Bluetooth, NFC
Interfaces present on the EUT	AC Ports	No AC Ports.
	DC Ports	No DC Ports.
	Signal/Control Ports	No Signal/Control Ports.
	Wired Network Ports	No Wired Network ports.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

The objective of the report is to perform testing according to following standards:

No.	Identity	Document Title
1	ETSI EN 301 489-1 V2.2.3 (2019-11)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
2	Final draft ETSI EN 301 489-3 V2.2.0 (2021-11)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard for ElectroMagnetic Compatibility
3	ETSI EN 301 489-17 V3.2.4 (2020-09)	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

3.2 Referenced Standards

The following referenced standards are necessary for the report. For undated references in this report, the cited version applies.

No.	Identity	Document Title
1	CENELEC EN 55032 (2015)	Electromagnetic compatibility of multimedia equipment - Emission Requirements.
2	CENELEC EN 61000-3-2 (2014)	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
3	CENELEC EN 61000-3-3 (2013)	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.
4	CENELEC EN 61000-4-2 (2009)	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test.
5	CENELEC EN 61000-4-3 (2006), A1 (2008) and A2 (2010)	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test.
6	CENELEC EN 61000-4-4 (2012)	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test.
7	CENELEC EN 61000-4-5 (2014): + A1 (2017)	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test.
8	CENELEC EN 61000-4-6 (2014)	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields.
9	CENELEC EN 61000-4-11 (2004)	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests.
10	ISO 7637-2 (2004)	Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only.

3.3 Verdict

No.	Base Standard	Description		Verdict	Test Result	Remark
Emission						
1	EN 55032	Radiated Emission	Below 1 GHz	Pass	ANNEX A.1	--
			Above 1 GHz	Pass		Note 1
2	EN 55032	Conducted Emission	AC Mains Port	N/A	ANNEX A.2	--
			DC Power Port	N/A		Note 2
			Wired Network Port	N/A		--
3	EN 61000-3-2	Harmonic Current Emissions		N/A	ANNEX A.3	Note 3
4	EN 61000-3-3	Voltage Fluctuations & Flicker		N/A	ANNEX A.4	--
Immunity						
5	EN 61000-4-2	Electrostatic Discharge Immunity		Pass	ANNEX A.5	--
6	EN 61000-4-3	Radiated RF Electromagnetic Field Immunity		Pass	ANNEX A.6	--
7	EN 61000-4-4	Electrical Fast Transient/Burst Immunity	AC Ports	N/A	ANNEX A.7	--
			DC Ports	N/A		Note 4
			Signal Ports,Control Ports, Wired Network Port	N/A		Note 4
8	ISO 7637-2	Transients and Surges		N/A	ANNEX A.8	Note 5
9	EN 61000-4-5	Surge Immunity	AC Ports	N/A	ANNEX A.9	--
			Wired Network Port	N/A		Note 6
10	EN 61000-4-6	Immunity to Conducted Disturbances Induced by RF Fields	AC Ports	N/A	ANNEX A.10	--
			DC Ports	N/A		Note 4
			Signal Ports,Control Ports, Wired Network Port	N/A		Note 4
11	EN 61000-4-11	Voltage Dips and Short Interruptions Immunity		N/A	ANNEX A.11	--
Note 1: The highest frequency of the internal sources of the EUT is above 108 MHz, the measurement shall be made above 1 GHz. Note 2: This test is applicable for radio equipment and ancillary equipment for fixed use that are intended to be connected to a local DC power network or to local battery with connecting cables longer than 3 m. Note 3: There is no need for Harmonics test to be performed on this product (rated power is less than 75 W) in accordance with EN 61000-3-2: 2014. For further details, please refer to Clause 7 of EN 61000-3-2: 2014 which states: “For the following categories of equipment, limits are not specified in this edition of the standard: - equipment with a rated power of 75 W or less, other than lighting equipment.” Note 4: This test is applicable for the cables may be longer than 3 m.						

Note 5: These tests are applicable to radio and ancillary equipment intended for vehicular use.
Note 6: These tests are applicable to wired network ports intended to be connected to outdoor cables and indoor cables (longer than 30 m).

3.4 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Conducted emissions (9 kHz-30 MHz)-AMN	3.22 dB
Conducted emissions (150 kHz-30 MHz)-AAN_CAT3	3.66 dB
Conducted emissions (150 kHz-30 MHz)-AAN_CAT5	4.10 dB
Conducted emissions (150 kHz-30 MHz)-AAN_CAT6	4.58 dB
Radiated emissions (30 MHz-1 GHz)-10m	4.80 dB
Radiated emissions (30 MHz-1 GHz)-966#2	4.76 dB
Radiated emissions (30 MHz-1 GHz)-966#4	4.38 dB
Radiated emissions (1 GHz-18 GHz)-10m	4.72 dB
Radiated emissions (1 GHz-18 GHz)-966#2	4.88dB
Radiated emissions (1 GHz-18 GHz)-966#4	5.04 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments, Test Date and Test Engineer

Test items	Voltage	Temperature	Relative Humidity	Ambient Pressure	Test Date	Test Engineer
Radiated Emission	From battery	24.6℃ 23.5℃	52% 54%	101kPa	May 13, 2022 May 26, 2022	Bai Yaowei Huang Zehuai
Electrostatic Discharge Immunity	From battery	24.6℃	42%		May 23, 2022	Liu Chenfang
Radiated RF Electromagnetic Field Immunity	From battery	24.0℃	55%		May 24, 2022	Chen Jiali

4.2 Test Equipment

Radiated Emission Test For Frequency Below 1 GHz (10 m)						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2021.10.10	2022.10.09	☒
Amplifier (30-1GHz)	COM-MV	ZT30-1000M	B2018054558	2021.10.10	2022.10.09	☒
Test Antenna- Bi-Log	SCHWARZBECK	VULB 9168	9168-01162	2020.08.12	2023.08.11	☒
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60* 7.35m	N/A	2021.08.15	2024.08.14	☒
Description	Manufacturer	Name		Version		Use
Test Software	BALUN	BL410-E		V19.918		☒

Radiated Emission Test For Frequency Above 1 GHz (3m-966#4)						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	Agilent	N9038A	MY53220118	2021.09.13	2022.09.12	☒
Amplifier (1-12GHz)	COM-MV	DLNAB-1000 -12000-002	18080279	2021.09.13	2022.09.12	☒
Amplifier (0.8-21GHz)	Mini-Circuits	ZVA-213-S+	619201336	2021.09.13	2022.09.12	☐
Amplifier (18-40GHz)	COM-MV	KA_LNA18-4 0G-01	18050001	2021.10.20	2022.10.19	☐
Test Antenna- Horn	SCHWARZBECK	BBHA 9120D	1201	2019.07.22	2022.07.21	☒
Anechoic Chamber	ChangNing	9m*6m*6m	966#4	2020.03.16	2023.03.15	☒
Description	Manufacturer	Name		Version		Use
Test Software	BALUN	BL410-E		V19.918		☒

Electrostatic Discharge Immunity Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
ESD Test System	AMETEK CTS	DITO	P18332 22423	2021.06.04	2022.06.03	☒

Radiated RF Electromagnetic Field Immunity Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
Anechoic Chamber	RAINFORD	7m*4m*3m	N/A	2019.11.24	2022.11.23	☒
Signal Generator	Agilent	N5181A	MY50141752	2022.01.08	2023.01.07	☒
Power Amplifier	OPHIR RF	5225F	1037	2022.02.16	2023.02.15	☒
Directional Coupler	Werlantone	C5982-10	109275	N/A	N/A	☒
Power Amplifier	OPHIR RF	5273F	1016	2022.02.16	2023.02.15	☒
Directional Coupler	Werlantone	CHP-273E	S00801z-01	N/A	N/A	☒
Power Amplifier	RFLIGHT	NTWPAS	2560025	2022.02.16	2023.02.15	☒
Power Meter	R&S	NRVD-B2	7250BJ-0112 /2011	2021.09.08	2022.09.07	☒
Feld Strength Meter	Narda	EP602	611WX80276	2021.09.26	2022.09.25	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-977	2022.02.16	2025.02.15	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	1917	2019.07.02	2022.07.01	☒
Mouth Simulator	B&K	4227	2423931	2021.10.14	2022.10.13	☐
Sound Calibrator	B&K	4231	2430337	2021.10.13	2022.10.12	☐
Sound Level Meter	B&K	NL-20	00844023	2021.10.13	2022.10.12	☐
Ear Simulator	B&K	4192 -L-001	3038758	2021.10.12	2022.10.11	☐
Audio analyzer	R&S	UPL 16	100129	2022.01.08	2023.01.07	☐
Description	Manufacturer	Name		Version		Use
Test Software	BALUN	BL410-E		V19.918		☒

4.3 Test Enclosure list

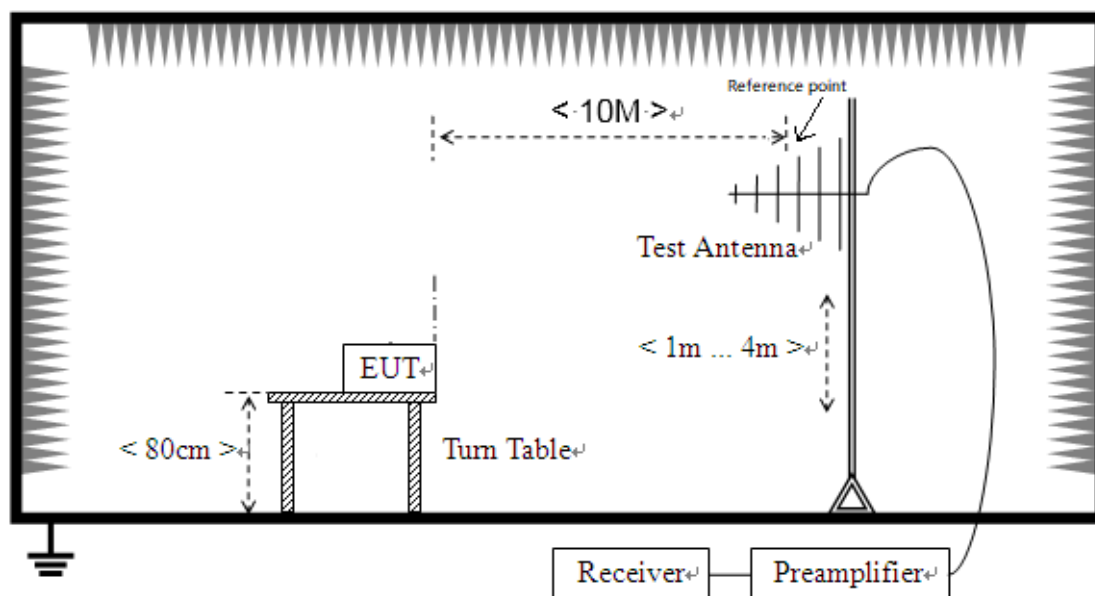
Description	Manufacturer	Model	Serial No.	Length	Description	Use
Phone	Redmi	M2003J15SC	N/A	N/A	N/A	☒

4.4 Test Configurations

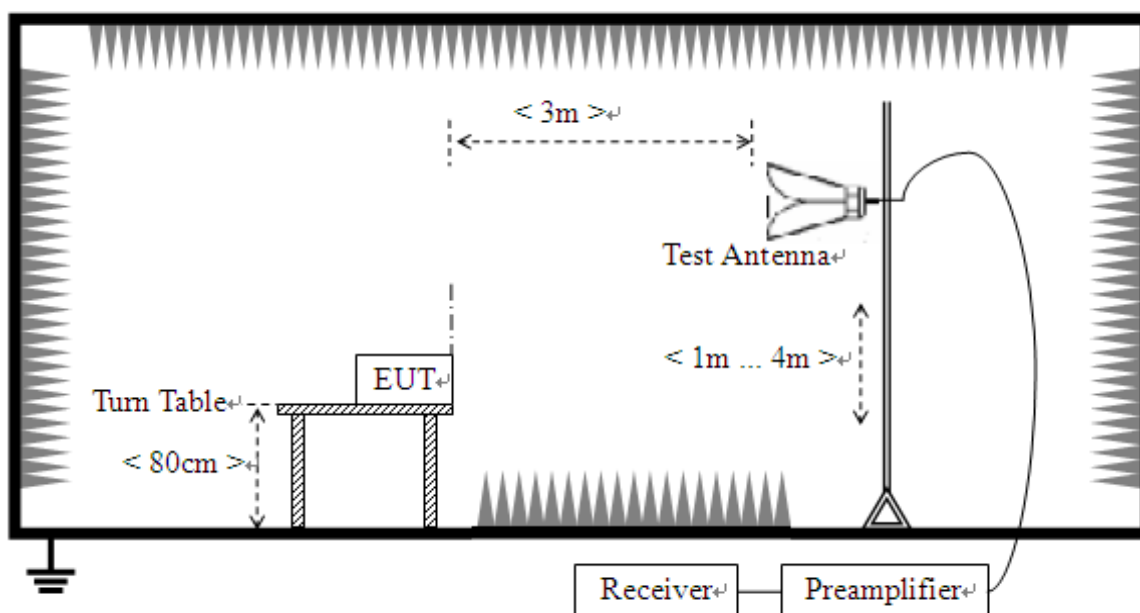
Test Configurations (TC) No.	Description
TC01	<u>The NFC Induction Test Mode</u> EUT + Battery + NFC Card + Phone+ SwitchBot Lock + NFC Induction + BT Link
TC02	<u>The Standby Test Mode</u> EUT + Battery + NFC Standby + BT Standby

4.5 Test Setups

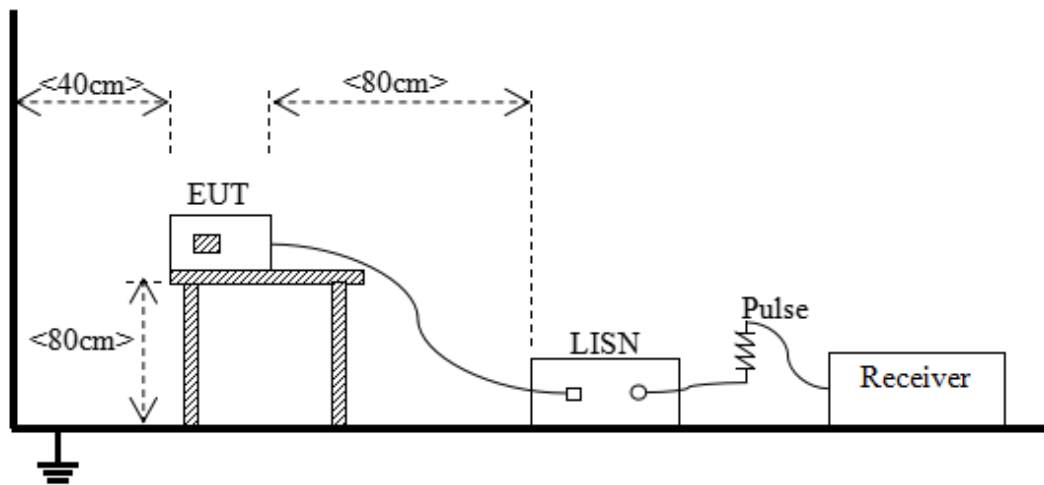
Test Setup 1



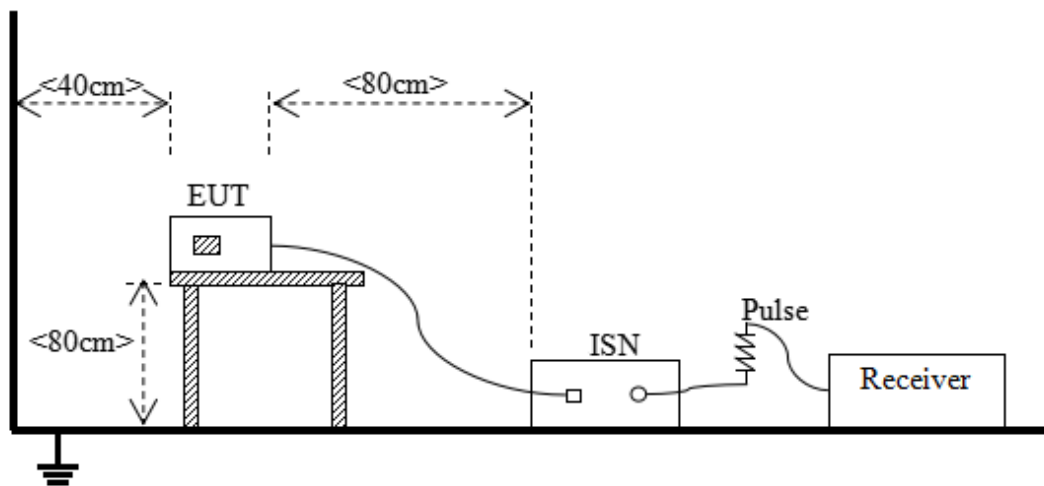
(For Radiated Emission Test (30 MHz-1 GHz))



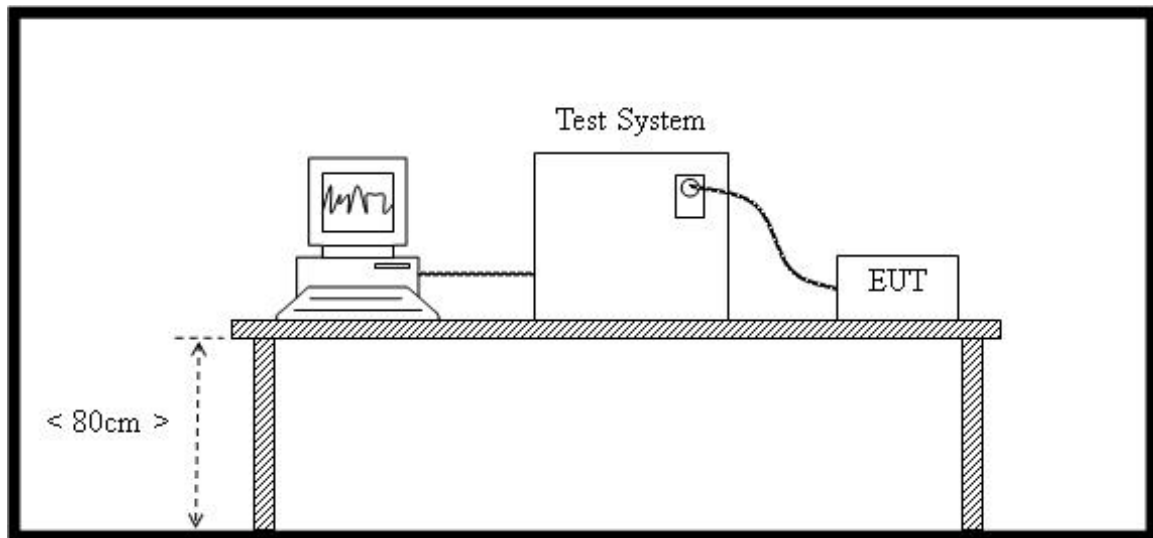
(For Radiated Emission Test (above 1 GHz))

Test Setup 2

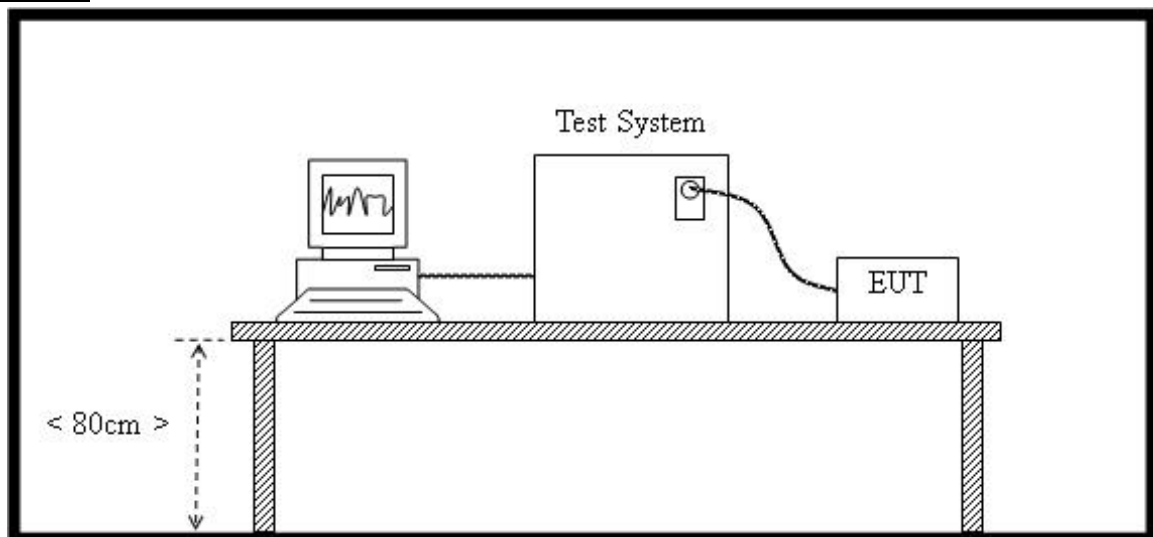
(For Conducted Emission at AC/DC Ports Test)

Test Setup 3

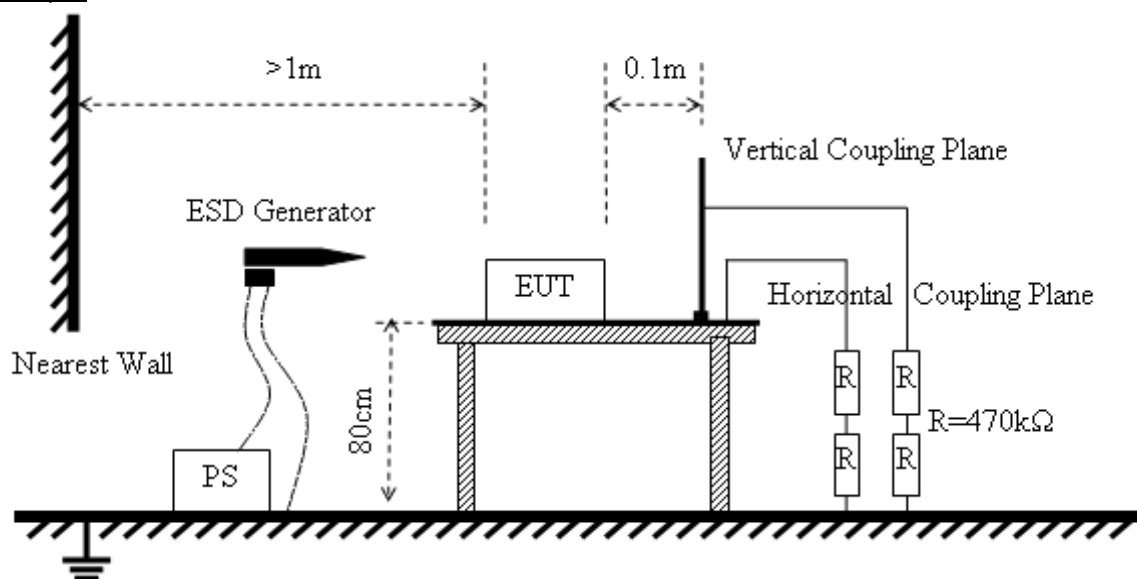
(For Conducted Emission for Wired Network Ports Test)

Test Setup 4

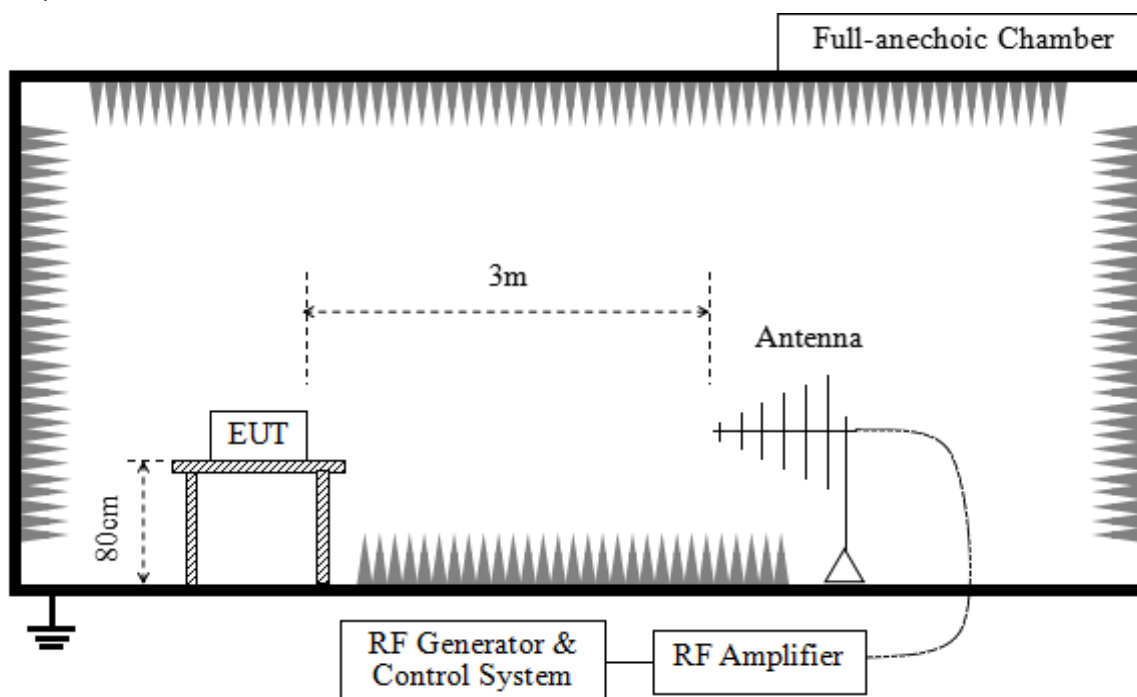
(For Harmonic Current Emissions Measurement Test)

Test Setup 5

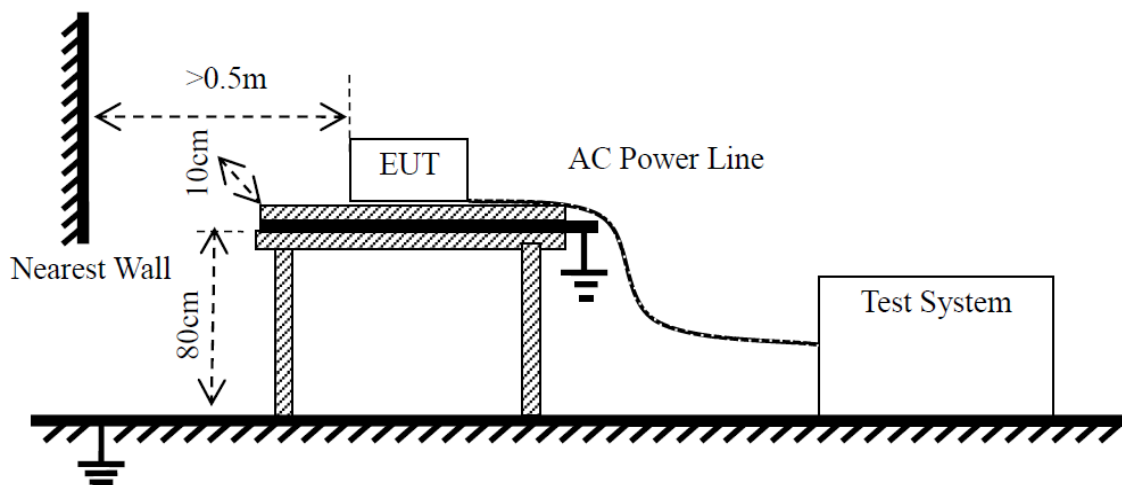
(For Voltage Fluctuations and Flicker Measurement Test)

Test Setup 6

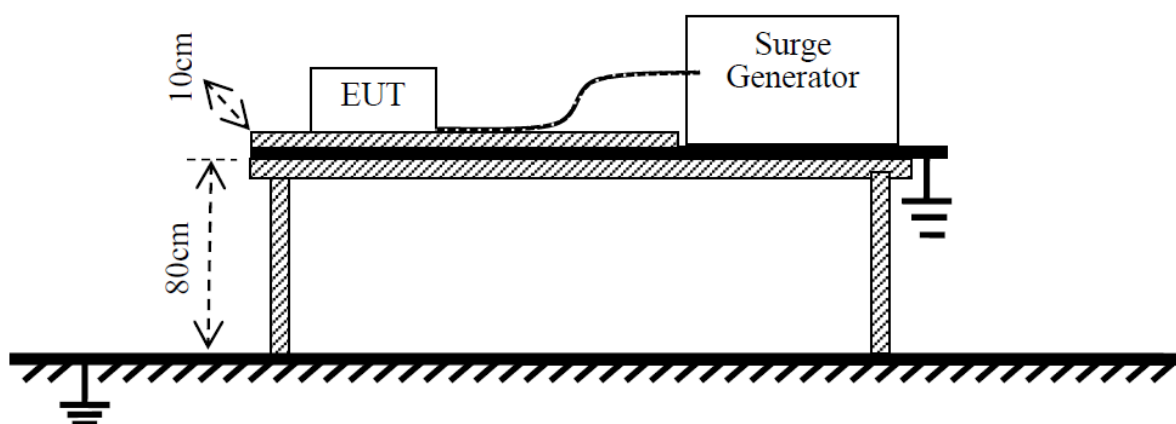
(For Electrostatic Discharge Immunity Test)

Test Setup 7

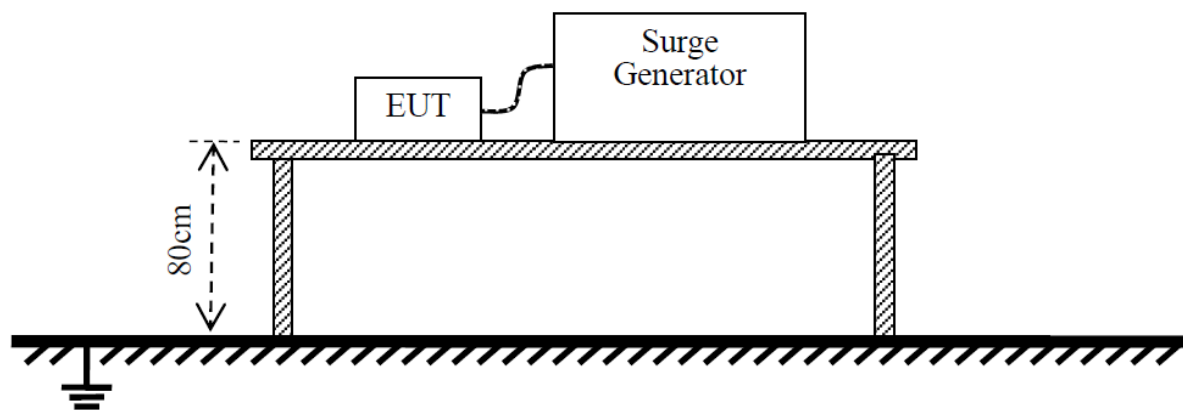
(For Radiated Immunity Test)

Test Setup 8

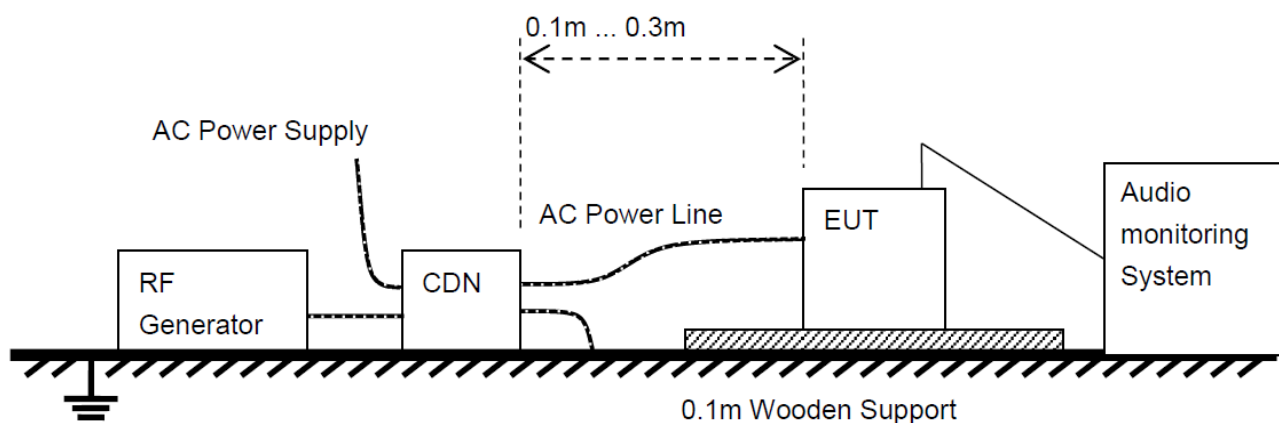
(For Electrical Fast Transient / Burst Immunity Test)

Test Setup 9

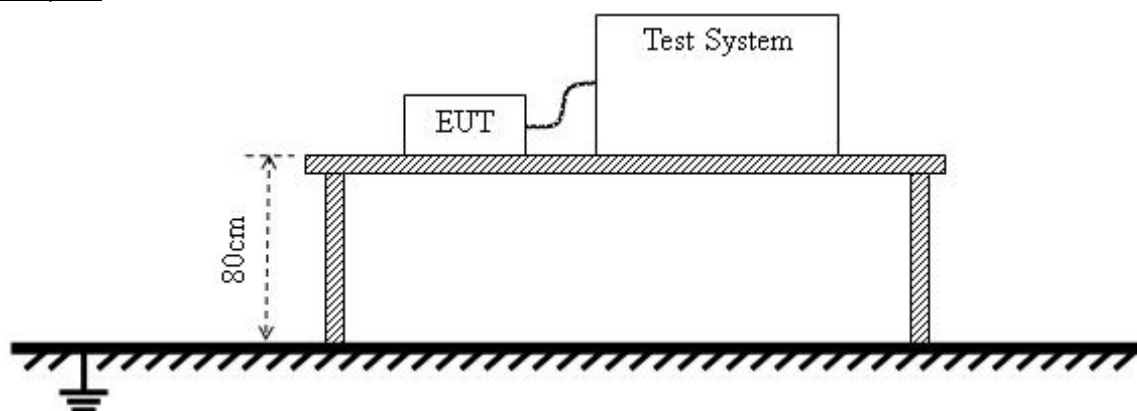
(Transients and Surges)

Test Setup 10

(For Surge Immunity Test)

Test Setup 11

(For Immunity to Conducted Disturbances Induced By RF Fields Test)

Test Setup 12

(For Voltage Dips and Short Interruptions Immunity Test)

4.6 Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Setup	Test Setup 1
	Test Configuration	TC01~TC02 ^{Note}
Electrostatic Discharge Immunity	Test Setup	Test Setup 6
	Test Configuration	TC01~TC02 ^{Note}
Radiated RF Electromagnetic Field Immunity	Test Setup	Test Setup 7
	Test Configuration	TC01~TC02 ^{Note}
Note: Based on client request, all normal using modes of the normal function were tested, but only the worst test data of test mode is reported in this report. The NFC Induction Test Mode is the worst mode in this report.		

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency range (MHz)	Class A (at 3 m)	Class B (at 3 m)
	Quasi-Peak Limit (dB μ V/m)	Quasi-Peak Limit (dB μ V/m)
30 - 230	50	40
230 - 1000	57	47

Frequency range (MHz)	Class A (at 3 m)		Class B (at 3 m)	
	Peak Limit (dB μ V/m)	Average Limit (dB μ V/m)	Peak Limit (dB μ V/m)	Average Limit (dB μ V/m)
1000-3000	76	56	70	50
3000-6000	80	60	74	54

NOTE:

- 1) The lower limit shall apply at the transition frequency.
- 2) Additional provisions may be required for cases where interference occurs.

5.1.1.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 1. The photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by antenna with 2 orthogonal polarities.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW $\geq$ RBW

Sweep = auto

Detector function = peak for $f < 1$ GHz, peak & RMS Average for $f \geq 1$ GHz

Trace = max hold

5.1.1.4 Test Result

Please refer to ANNEX A.1.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

AC Port

Frequency range (MHz)	Class A		Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	79	66	66-56	56-46
0.50 - 5	73	60	56	46
5 - 30	73	60	60	50

DC Port

Frequency range (MHz)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	79	66
0.50 - 30	73	60

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

Wired Network Port

Frequency range (MHz)	Class A		Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	97-87	84-74	84-74	74-64
0.50 - 30	87	74	74	64

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 2 or/and setup 3. The photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω /50 μ H of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

Measurement of common mode (asymmetric mode) voltage emissions at wired network ports for attachment of unscreened balanced pairs shall be performed with the wired network port connected by a cable to an AAN. The AAN shall define the common mode termination impedance seen by the wired network port during the emission measurements.

The voltage division factor shall be added to the measured voltage measured by the receiver directly at the voltage measurement port of the AAN and the result compared with the voltage limits as applicable.

Use the following spectrum analyzer settings:

RBW = 9 KHz

VBW $\geq$ RBW

Sweep = 10ms

Detector function = peak & Average

Trace = max hold

5.1.2.4 Test Result

Please refer to ANNEX A.2.

5.1.3 Harmonic Current Emissions

5.1.3.1 Limit

Limits for Class A equipment				Limits for Class D equipment		
odd harmonic		Even harmonics		Harmonic order (n)	Maximum permissible harmonic current per watt mA/W	Maximum permissible harmonic current A
Harmonic order (n)	Maximum permissible harmonic current A	Harmonic order (n)	Maximum permissible harmonic current A			
3	2.30	2	1.08	3	3.4	2.30
5	1.14	4	0.43	5	1.9	1.14
7	0.77	6	0.30	7	1.0	0.77
9	0.40	8≤n≤40	0.23X8/n	9	0.5	0.40
11	0.33			11	0.35	0.33
13	0.21			15≤n≤39	3.85/n	0.15X15/n
15≤n≤39	0.15X15/n					

Note: For Class B equipment, the harmonics of the input current shall not exceed the values given in Table “limits for Class A equipment” multiplied by a factor of 1,5.

For the purpose of harmonic current limitation, equipment is classified as follows : (Note: Class C equipment requirement not include in this standard.)

Class A:

- balanced three-phase equipment;
- household appliances, excluding equipment identified as class D;
- tools, excluding portable tools;
- dimmers for incandescent lamps;
- audio equipment.

Equipment not specified in one of the three other classes shall be considered as class A equipment.

Class B:

- portable tools;
- arc welding equipment which is not professional equipment.

Class C:

- lighting equipment.

Class D:

Equipment having a specified power according to 6.2.2 less than or equal to 600 W, of the following types:

- personal computers and personal computer monitors;
- television receivers.

5.1.3.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 4. The photo of test setup please refer to ANNEX B.

5.1.3.3 Test Procedure

The EUT is placed on the top of a wooden table 0.8 m above the ground and operated to produce the

maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the necessary for the EUT to be exercised.

5.1.3.4 Test Result

Please refer to ANNEX A.3.

5.1.4 Voltage Fluctuations and Flicker Measurement

5.1.4.1 Limit

Test Item	Limit	Note
Pst	1.0	Short-term flicker indicator
Plt	0.65	Long-term flicker indicator
Tdt	0.5	Maximum time that dt exceeds 3%
dmax (%)	4%	Maximum relative voltage change
dc (%)	3.3%	Relative steady-state voltage change

5.1.4.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 5. The photo of test setup please refer to ANNEX B.

5.1.4.3 Test Procedure

During the Flicker measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours. The test specifications refer the next table.

No.	Specification	Value
1	Test Frequency	50 Hz
2	Test Voltage	230 VAC
3	Waveform	Sine
4	Test Time	10 minutes for Pst; 2 hours for Plt

5.1.4.4 Test Result

Please refer to ANNEX A.4.

5.2 Immunity Tests

5.2.1 Test Performance Criteria for Immunity Test

5.2.1.1 Performance Criteria (EN 301489-1)

5.2.1.1.1 General Performance Criteria

Type	Description
Criterion A	The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion B	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.
Criterion C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

5.2.1.2 Performance criteria (EN 301489-3)

5.2.1.2.1 General Performance Criteria

The performance criteria are used to make an assessment whether a radio equipment passes or fails immunity tests.

Only the performance criteria specified in the present document or in ETSI EN 301 489-1 [1] where referenced shall apply.

The provisions of ETSI EN 301 489-1 [1], clause 6, shall apply together with the following.

Continuous and non-continuous operation	Operating modes
Latency is the time delay between the initiation and the completion of operation of the EUT. Correct functioning requires completing the relevant operation within the maximum latency time. Where the maximum latency is specified in the applicable harmonised radio standard (in the wanted performance criterion, or an acknowledge requirement), that value shall be used. Where this is not the case, then the maximum latency is that required by the intended use of the EUT.	Where the EUT has more than one mode of operation (see clause 4.4.1), an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in all modes to confirm there are no such unintentional responses.

5.2.1.3 Performance criteria (EN 301489-17)

5.2.1.3.1 General Performance Criteria

Type	During test	After test
Criterion A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
Criterion B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
Criterion C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data
NOTE: For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %. For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.		

About Bluetooth function Performance Criteria

Type	During test	After test
Criterion A	Shall operate as intended. May show degradation of performance (For example have noise or transmission short time interruption). Shall be no loss of Bluetooth function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (For example have noise or transmission short time interruption) Shall be no loss of Bluetooth function. Shall be no loss of stored data or user programmable functions.
Criterion B	May show loss of function (For example Bluetooth transmission interruption). May show degradation of performance (For example have noise or transmission short time interruption). No unintentional transmissions.	Bluetooth Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (For example have noise or transmission short time interruption). Shall be no loss of stored data or user programmable functions.
Criterion C	May be loss of function (For example Bluetooth transmission interruption).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (For example have noise or transmission short time interruption).

5.2.1.3.2 Performance criteria for Continuous phenomena

The performance criteria A shall apply.

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

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

5.2.1.3.3 Performance criteria for Transient phenomena

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

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

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

5.2.2 Electrostatic Discharge Immunity

5.2.2.1 Test Specification

Specification	Value
Basic Standard	EN 61000-4-2
Discharge Impedance	330 Ohm / 150 pF
Discharge Voltage	Air Discharge: 2 kV; 4 kV; 8 kV; Contact Discharge: 2 kV; 4 kV
Polarity	Positive / Negative
Number of Discharge	Minimum 20 times at each test point
Discharge Mode	Single discharge
Discharge Period	1 second minimum

5.2.2.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 6. The photo of test setup please refer to ANNEX B.

5.2.2.3 Test Procedure

1. Electrostatic discharges are applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
2. The test is performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
3. The time interval between two successive single discharges is at least 1 second.
4. The ESD generator is held perpendicularly to the surface to which the discharge is applied and the return cable is at least 0.2 meters from the EUT.
5. Contact discharges are applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
6. Air discharges are applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator is removed from the EUT and re-triggered for a new single discharge. The test is repeated until all discharges were completed.
7. At least ten single discharges (in the most sensitive polarity) are applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator is positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
8. At least ten single discharges (in the most sensitive polarity) are applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5 m*0.5 m) is placed vertically to and 0.1 meters from the EUT.

5.2.2.4 Test Result

Please refer to ANNEX A.5.

5.2.3 Radio Frequency Electromagnetic Field Immunity

5.2.3.1 Test Specification

Specification	Value
Basic Standard	EN 61000-4-3
Frequency Range	80 MHz to 6000 MHz
Field Strength	3 V/m (unmodulated, r.m.s)
Modulation	1 kHz sine wave, 80%, AM modulation
Frequency Step	1% of fundamental
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.5 m
Dwell Time	3 seconds

5.2.3.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 7. The photo of test setup please refer to ANNEX B.

5.2.3.3 Test Procedure

PER Test:

Before testing, we should set the base station(CMW500) to the mode that needs to be tested, such as Bluetooth, then set EUT to the corresponding mode and connect to Base station. Adjust the base station interface to the PER interface, and observe the PER value on the base station interface by adding interference signal during the test.

The test procedure was in accordance with EN 61000-4-3.

1. The testing is performed in a fully anechoic chamber. The transmit antenna is located at a distance of 3 meters from the EUT.
2. The test signal is 80% amplitude modulated with a 1 kHz sine wave.
3. The frequency range is swept from 80 MHz to 6000 MHz with the exception of the exclusion band for transmitters, receivers and duplex transceivers. The rate of sweep does not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size is 1% of fundamental.
4. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
5. The field strength level is 3 V/m.
6. The test is performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides, but only the worst side data is reported in this report.

5.2.3.4 Test Result

Please refer to ANNEX A.6.

5.2.4 Electrical Fast Transient / Burst Immunity

5.2.4.1 Test Specification

Specification	Value
Basic Standard	EN 61000-4-4
Test Voltage	AC Power Port: 1 kV.
	DC Power Ports, Signal Ports, Control Ports, Wired Network Ports: 0.5 kV.
Polarity	Positive / Negative
Impulse Frequency	5 kHz
Impulse Wave Shape	5/50 ns
Burst Duration	15 ms
Burst Period	300 ms
Test Duration	> 1 min

5.2.4.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 8. The photo of test setup please refer to ANNEX B.

5.2.4.3 Test Procedure

1. The EUT is tested with 1000 V discharges to the AC power input leads, and 500 V for wired network port.
2. Both positive and negative polarity discharges are applied.
3. The length of the "hot wire" from the coaxial output of the EFT generator to the terminals on the EUT should not exceed 1m.
4. The duration time of each test sequential is 1min.
5. The transient / burst waveform is in accordance with IEC 61000-4-4, 5/50 ns.

5.2.4.4 Test Result

Please refer to ANNEX A.7.

5.2.5 Transients and Surges

Specification	Value
Basic Standard	ISO 7637-2
Immunity test level	III
Voltage	12 V
Test pulse number	1, 2a, 2b, 3a / 3b,4
Repetition Rate	For the purpose of EMC testing it is sufficient to apply pulses 1, 2a, 2b and 4, 10 times each, and apply the test pulses 3a and 3b for 20 minutes each.

5.2.5.1 Test Setup

Please refer to 4.5 section description of test setup of test setup 9. The photo of test setup please refer to ANNEX B.

5.2.5.2 Test Procedure

1. The immunity of ESA representative of its type shall be tested by the method(s) according to ISO 7637-2: 2011.
2. For test pulses 3a and 3b, the leads between the terminals of the test pulse generator and the DUT shall be laid out in a straight parallel line at a height of (500+10 mm) above the ground plane and shall have a length of (0,5 ± 0,1) m.
3. Please refer to Annex B for the photographs of the Test Configuration.

5.2.5.3 Test Result

Please refer to ANNEX A.8.

5.2.6 Surge Immunity

5.2.6.1 Test Specification

AC Power Port and Wired Network Port

Specification	Value	
Ports class	AC Power Port	Wired Network Port
Basic Standard	EN 61000-4-5	
Waveform	Voltage: 1.2/50 μ s	Voltage: 1.2/50 μ s, or 10/700 μ s See Note 2,3,4
Test Voltage	line to ground 2 kV, line to line 1 kV; line to ground 1 kV, line to line 0.5 kV (Note 1)	0.5 kV, or 1 kV See Note 2,3,4
Polarity	Positive / Negative	
Phase Angle	0°, 90°, 180°, 270°	N/A
Repetition Rate	60 seconds	
Times	5 times per condition	

Note 1: The test level for AC mains ports, in telecommunications centres.

Note 2: The test level for wired network ports, intended to be connected to indoor cables (longer than 30 m) shall be 0,5 kV (applied line to ground, or shield to ground). The test generator shall provide the 1,2/50 μ s pulse.

Note 3: The test level for symmetrically operated, wired network ports, intended to be directly connected to wired network ports via outdoor cables, shall be 1 kV (applied lines to ground). The test generator shall provide the 10/700 μ s pulse.

Note 4: The test level for non-symmetrically operated wired network ports, intended to be directly connected to wired network ports via outdoor cables, shall be 1 kV (applied line to ground, or shield to ground) and 0,5 kV (applied line to line). The test generator shall provide the 1,2/50 μ s pulse.

5.2.6.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 10. The photo of test setup please refer to ANNEX B.

5.2.6.3 Test Procedure

The EUT and the auxiliary equipment are placed on a table of 0.8 m heights above a metal ground reference plane. The size of ground plane is greater than 1 m*1 m and project beyond the EUT by at least 0.1 m on all sides. The ground plane is connected to the protective earth. The length of power cord between the coupling device and the EUT is less than 2 meters (provided by the manufacturer).

The EUT is connected to the power mains through a coupling device that directly couples the surge interference signal. The surge noise is applied synchronized to the voltage phase at the zero crossing and the peak value of the AC voltage wave (positive and negative).

The surges are applied line to line and line(s) to earth. When testing line to earth the test voltage is applied successively between each of the lines and earth. Set up to the test level specified increased the test voltage. All lower levels including the selected test level are tested. The polarity of each surge level included positive and negative test pulses.

5.2.6.4 Test Result

Please refer to ANNEX A.9.

5.2.7 Immunity to Conducted Disturbances Induced by RF Fields

5.2.7.1 Test Specification

Specification	Value
Basic Standard	EN 61000-4-6
Frequency Range	0.15 MHz – 80 MHz
Field Strength	3 V rms (unmodulated, r.m.s)
Modulation	1 kHz sine wave, 80% AM
Frequency Step	1% of fundamental
Coupled Cable	AC Power Line; DC Power Line; Wired Network Line
Coupling Device	CDN-M2+3

5.2.7.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 11. The photo of test setup please refer to ANNEX B.

5.2.7.3 Test Procedure

PER Test:

Before testing, we should set the base station(CMW500) to the mode that needs to be tested, such as Bluetooth, then set EUT to the corresponding mode and connect to Base station. Adjust the base station interface to the PER interface, and observe the PER value on the base station interface by adding interference signal during the test.

The test procedure was in accordance with EN 61000-4-6.

1. The EUT shall be tested within its intended operating and climatic conditions.
2. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50 Ohm load resistor.
3. The test signal is 80% amplitude modulated with a 1 kHz sine wave.
4. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80% amplitude. The sweep rate shall not exceed 1.5×10^{-3} decades/s. The step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value where the frequency is swept incrementally.
5. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequencies and harmonics or frequencies of dominant interest, shall be analyzed separately.
6. Attempts should be made to fully exercise the EUT during test, and to fully interrogate all exercise modes selected for susceptibility.

5.2.7.4 Test Result

Please refer to ANNEX A.10.

5.2.8 Voltage Dips and Short Interruptions Immunity

5.2.8.1 Test Specification

Specification	Value
Basic Standard	EN 61000-4-11
Voltage Dips	100% reduction: 10 ms; 100% reduction: 20 ms; 30% reduction: 500 ms
Voltage Interruptions	100% reduction: 5000 ms
Voltage Phase Angle	0°

5.2.8.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 12. The photo of test setup please refer to ANNEX B.

5.2.8.3 Test Procedure

The power cord is used as supplied by the manufacturer. The EUT was connected to the line output of the Voltage Dips and Interruption Generator.

The EUT is tested for a) 100% voltage dip of supplied voltage with duration of 10 ms; b) 100% voltage dip of supplied voltage with duration of 20 ms; c) 30% voltage dip of supplied voltage and duration 500 ms. Both of the dip tests are carried out for a sequence of three voltage dips with intervals of 10 seconds.

100% voltage interruption of supplied voltage with duration of 5000 ms is followed, which is a sequence of three voltage interruptions with intervals of 10 seconds.

Voltage reductions occur at 0 degrees crossover point of the voltage waveform. The performance of the EUT is checked after the voltage dip or interruption.

5.2.8.4 Test Result

Please refer to ANNEX A.11.

ANNEX A TEST RESULTS

A.1 Radiated Emission

Note 1: The symbol of "--" in the table which means not application.

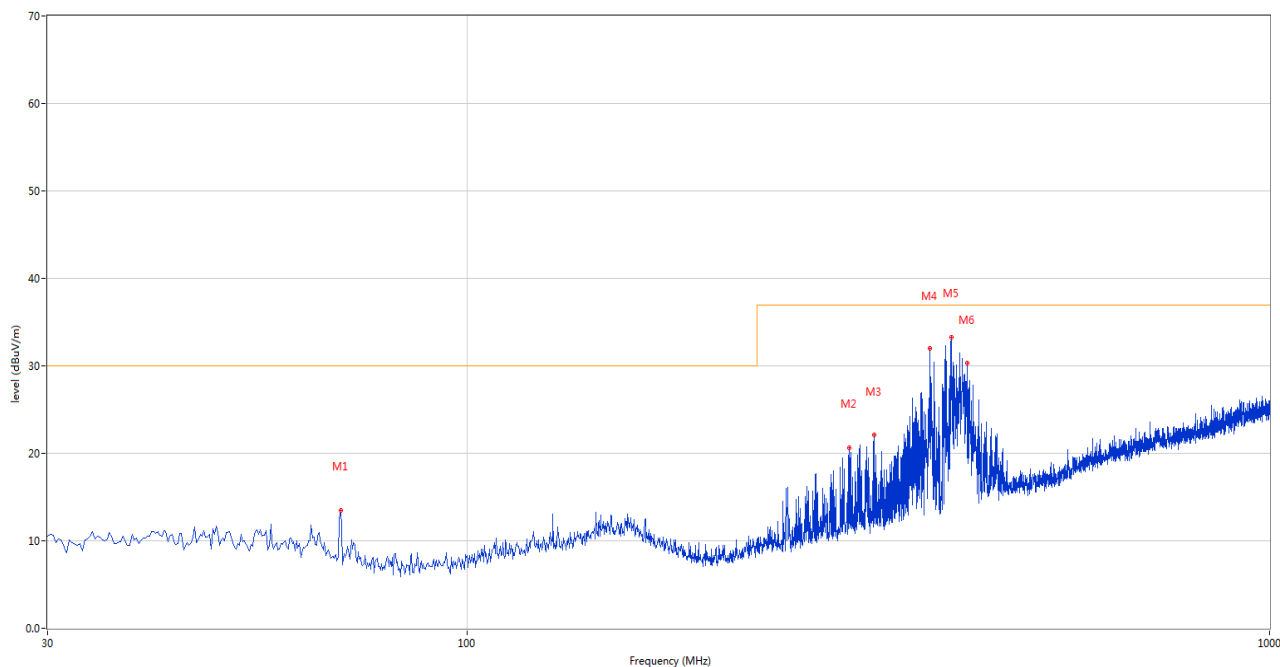
Note 2: Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 MHz to 1000 MHz. To reduce the testing time, a peak measuring receiver may be used instead of a quasi-peak measuring receiver. In case of dispute, measurement with a quasi-peak measuring receiver will take precedence.

Note 3: The marked spikes near 2400 MHz with circle should be ignored because they are Bluetooth carrier frequency.

Test Data and Plots (Below 1 GHz)

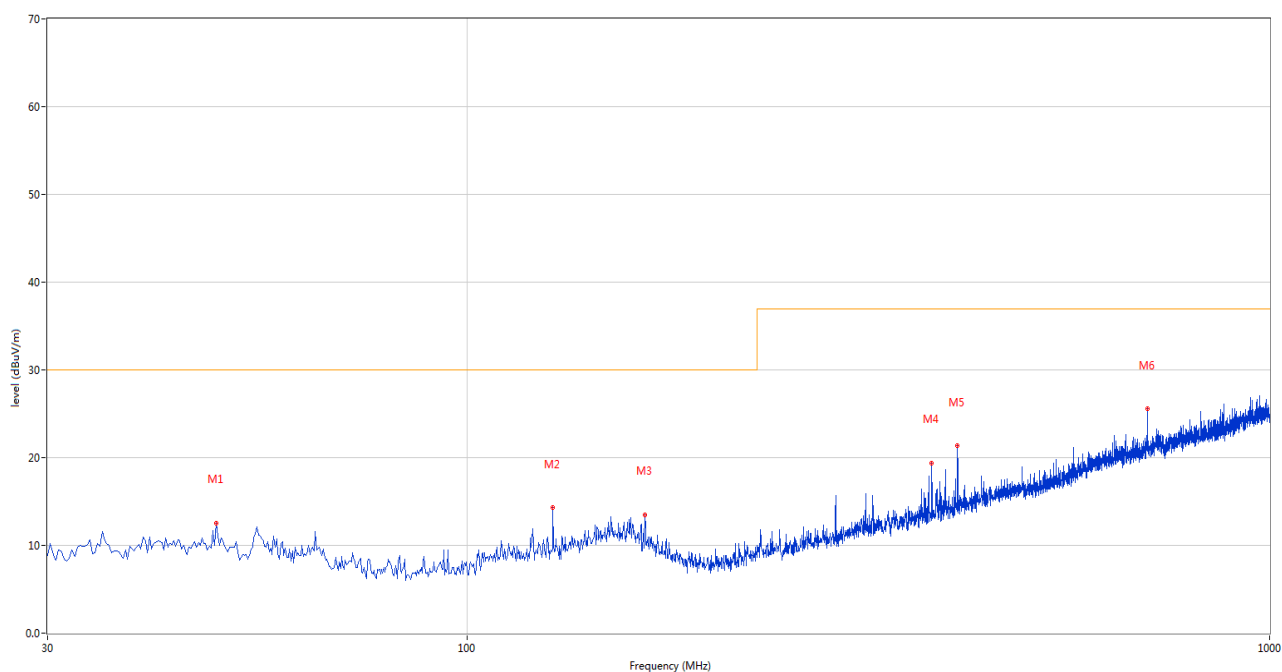
The NFC Induction Test Mode

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	69.518	13.46	-29.64	30.0	-16.54	Peak	134.00	100	Vertical	Pass
2	299.593	20.65	-25.63	37.0	-16.35	Peak	43.00	100	Vertical	Pass
3	321.655	22.10	-24.93	37.0	-14.90	Peak	199.00	100	Vertical	Pass
4	377.173	32.01	-23.42	37.0	-4.99	Peak	139.00	100	Vertical	Pass
5	401.417	33.29	-22.79	37.0	-3.71	Peak	290.00	100	Vertical	Pass
6	419.843	30.26	-22.32	37.0	-6.74	Peak	290.00	100	Vertical	Pass

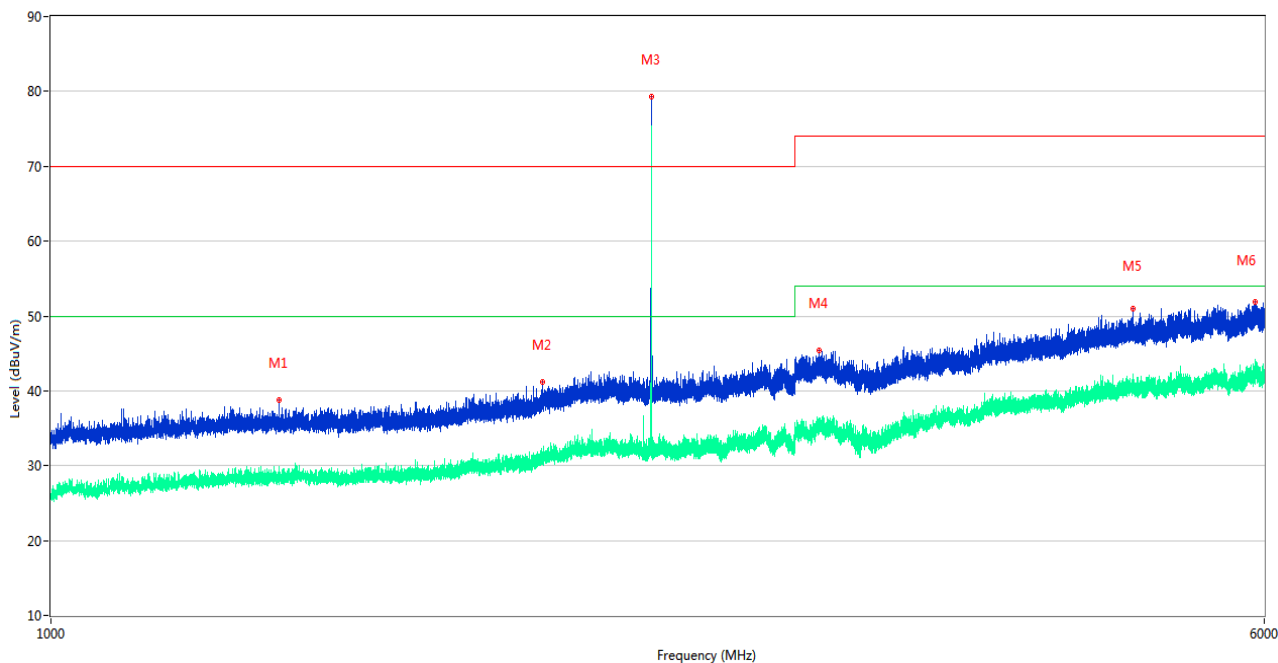
A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	48.668	12.57	-27.08	30.0	-17.43	Peak	125.00	200	Horizontal	Pass
2	127.946	14.29	-27.33	30.0	-15.71	Peak	0.00	200	Horizontal	Pass
3	166.493	13.48	-26.20	30.0	-16.52	Peak	211.00	200	Horizontal	Pass
4	379.355	19.42	-23.40	37.0	-17.58	Peak	261.00	200	Horizontal	Pass
5	408.448	21.33	-22.65	37.0	-15.67	Peak	241.00	200	Horizontal	Pass
6	704.951	25.56	-15.55	37.0	-11.44	Peak	89.00	100	Horizontal	Pass

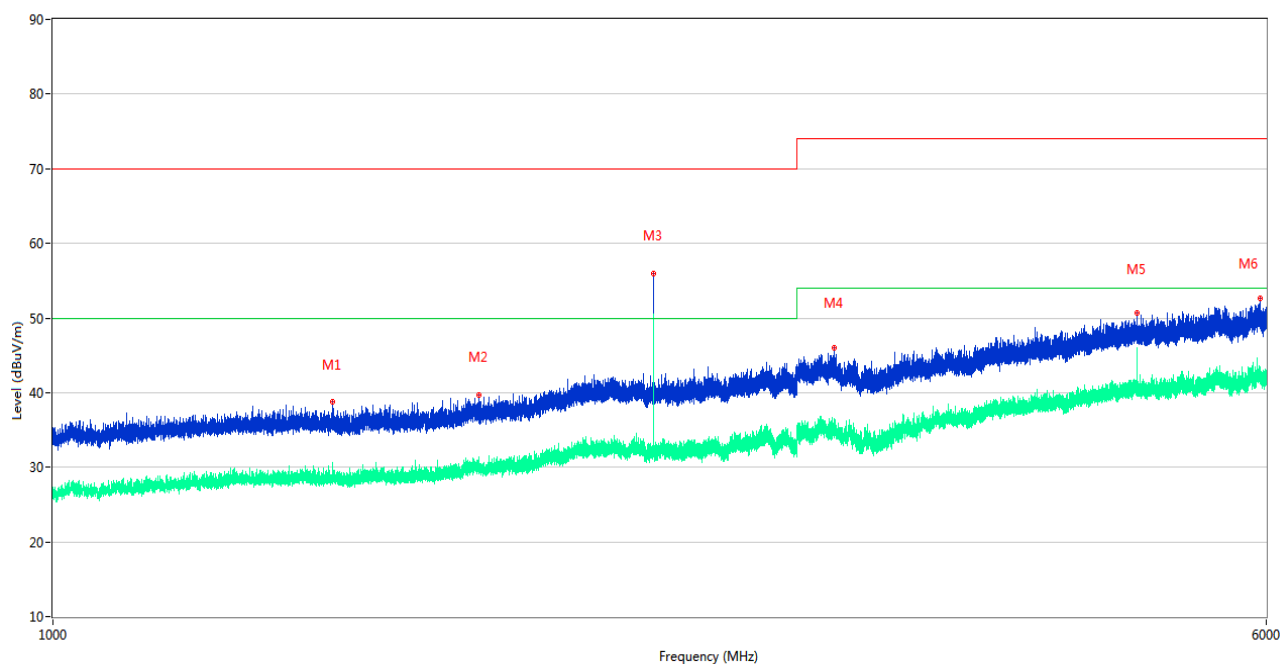
Test Data and Plots (Above 1 GHz)

A.1.3 Test Antenna Vertical, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1401.500	38.83	-14.90	70.0	-31.17	Peak	251.00	100	Vertical	Pass
1**	1401.500	28.01	-14.90	50.0	-21.99	AV	251.00	100	Vertical	Pass
2	2066.600	41.17	-12.43	70.0	-28.83	Peak	355.00	100	Vertical	Pass
2**	2066.600	30.48	-12.43	50.0	-19.52	AV	355.00	100	Vertical	Pass
3	2427.100	79.30	-10.13	70.0	9.30	Peak	185.00	100	Vertical	N/A
3**	2427.100	75.39	-10.13	50.0	25.39	AV	185.00	100	Vertical	N/A
4	3111.300	45.40	-6.56	74.0	-28.60	Peak	312.00	100	Vertical	Pass
4**	3111.300	34.79	-6.56	54.0	-19.21	AV	312.00	100	Vertical	Pass
5	4940.250	50.91	-1.36	74.0	-23.09	Peak	99.00	100	Vertical	Pass
5**	4940.250	40.46	-1.36	54.0	-13.54	AV	99.00	100	Vertical	Pass
6	5917.950	51.95	1.83	74.0	-22.05	Peak	233.00	100	Vertical	Pass
6**	5917.950	42.25	1.83	54.0	-11.75	AV	233.00	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	1510.300	38.76	-15.02	70.0	-31.24	Peak	360.00	100	Horizontal	Pass
1**	1510.300	28.37	-15.02	50.0	-21.63	AV	360.00	100	Horizontal	Pass
2	1876.200	39.61	-13.84	70.0	-30.39	Peak	360.00	100	Horizontal	Pass
2**	1876.200	30.37	-13.84	50.0	-19.63	AV	360.00	100	Horizontal	Pass
3	2427.800	56.02	-10.19	70.0	-13.98	Peak	360.00	100	Horizontal	N/A
3**	2427.800	47.16	-10.19	50.0	-2.84	AV	360.00	100	Horizontal	N/A
4	3172.350	46.02	-6.23	74.0	-27.98	Peak	317.00	100	Horizontal	Pass
4**	3172.350	35.38	-6.23	54.0	-18.62	AV	317.00	100	Horizontal	Pass
5	4960.200	50.62	-1.72	74.0	-23.38	Peak	268.00	100	Horizontal	Pass
5**	4960.200	45.50	-1.72	54.0	-8.50	AV	268.00	100	Horizontal	Pass
6	5944.950	52.68	1.99	74.0	-21.32	Peak	360.00	100	Horizontal	Pass
6**	5944.950	42.62	1.99	54.0	-11.38	AV	360.00	100	Horizontal	Pass

A.2 Conducted Emissions

Note: Not applicable.

A.3 Harmonic Current Emissions

Note: Not applicable.

A.4 Voltage Fluctuations and Flicker Measurement

Note: Not applicable.

A.5 Electrostatic Discharge Immunity

Test Points	Discharge Level (kV)	Discharge Mode	Number of Discharge	Verdict
HCP	$\pm 2, \pm 4$	Contact	100	Pass
VCP	$\pm 2, \pm 4$	Contact	100	Pass
Metal Nail	$\pm 2, \pm 4$	Contact	40	Pass
Key	$\pm 2, \pm 4, \pm 8$	Air	240	Pass
Touch Control Area	$\pm 2, \pm 4, \pm 8$	Air	20	Pass
NFC Card	$\pm 2, \pm 4, \pm 8$	Air	20	Pass
Shell and Crack	$\pm 2, \pm 4, \pm 8$	Air	100	Pass

Note: The performance comply with the performance criteria in Criterion B.

A.6 Radio Frequency Electromagnetic Field Immunity

Antenna Polarity	Frequency (MHz)	Side	Field Strength (V/m)	Verdict
Vertical	80 – 1000, 1000 – 3000, 3000 – 6000	Front	3	Pass
		Back	3	Pass
		Left	3	Pass
		Right	3	Pass
Horizontal	80 – 1000, 1000 – 3000, 3000 – 6000	Front	3	Pass
		Back	3	Pass
		Left	3	Pass
		Right	3	Pass

Note 1: The performance comply with the performance criteria in Criterion A.

Note 2: During the test, the PER of Bluetooth is less than 10%.

A.7 Electrical Fast Transient / Burst Immunity

Note: Not applicable.

A.8 Transients and Surges

Note: Not applicable.

A.9 Surge Immunity

Note: Not applicable.

A.10 Immunity to Conducted Disturbances Induced by RF Fields

Note: Not applicable.

A.11 Voltage Dips and Short Interruptions Immunity

Note: Not applicable.

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-SZ2230879-AE-1.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-SZ2230879-AW-1.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-SZ2230879-AI-1.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--

TEST REPORT

Applicant: Woan Technology (Shenzhen) Co., Ltd.
Room 1101, Qiancheng Commercial Center, No. 5
Haicheng Road, Mabu Community, Xixiang
Address: Sub-district, Bao'an District, Shenzhen, Guangdong,
P.R.China, 518100
Equipment Type: SwitchBot Keypad
Model Name: W2500020 (Series model see section 2.4)
Brand Name: SwitchBot
Test Standard: IEC 62368-1: 2014
EN 62368-1:2014+A11:2017
BS EN 62368-1:2014+A11: 2017
Test Date : May 9, 2022 - May 16, 2022
Date of Issue: Jul. 12, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Jack Zhang**Checked by:** Terry Wen**Approved by:** Liao Jianming
(Technical Director)*Jack Zhang**Terry Wen**Liao Jianming*

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Jul. 12, 2022</u>	<u>Initial Issue</u>

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province
Description	All measurement facilities used to collect the measurement data are located at Block B, 1/F, Baisha Science and Technology Park, Shahe West Road, Nanshan District, ShenZhen, GuangDong Province

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.2 Manufacturer Information

Manufacturer	Woan Technology (Shenzhen) Co., Ltd.
Address	Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100

2.3 Factory Information

Factory	Woan Technology (Shenzhen) Co., Ltd.
Address	Building A2, Zhengfeng Industrial Area, No.610 Fengtang Boulevard, Fuhai Sub-district, Bao'an District, Shenzhen

2.4 General Description for Equipment under Test (EUT)

Equipment Type:	SwitchBot Keypad
Model Name Under Test	W2500020
Series Model Name	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015, W2500021, W2500022, W2500023, W2500024, W2500025
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only different on with fingerprint module or without fingerprint module, see page 9 for detail.
Hardware Version	V1.0
Software Version	V1.0
Dimensions(Approx.)	N/A
Weight(Approx.)	123g

2.5 Ancillary Equipment

N/A

2.6 Technical Information

The requirement for the following technical information of the EUT was tested in this report:

Ratings	Input: 6Vdc, (supply by 2* CR123A Battery)
Classification of use by	☒ Ordinary person ☐ Instructed person ☐ Skilled person ☒ Children likely to be present
Supply Connection	☐ AC Mains ☐ DC Mains ☒ External Circuit - not Mains connected - ☒ ES1 ☐ ES2 ☐ ES3
Supply % Tolerance	☐ +10%/-10% ☐ +20%/-15% ☐ +____%/ -____% ☒ None
Supply Connection – Type	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: Not directly connect to mains
Considered current rating of protective device as part of building or equipment installation	_____ A; Installation location: ☐ building; ☐ equipment ☒ N/A
Equipment mobility	☐ movable ☐ hand-held ☒ transportable ☐ stationary ☐ for building-in ☐ direct plug-in ☐ rack-mounting ☐ wall-mounted
Over voltage category (OVC)	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other: Not directly connect to mains
Class of equipment	☐ Class I ☐ Class II ☒ Class III ☐ Class II with functional earthing ☐ Not classified
Access location	☐ restricted access area ☒ N/A
Pollution degree (PD)	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified	66°C

maximum operating ambient	
IP protection class	☒ IPX0 ☐ IP <u>X</u>
Power Systems	☐ TN ☐ TT ☐ IT - ____ V _{L-L} ; ☐ dc mains ☒ N/A
Altitude during operation (m)	☒ 2000m or less ☐ <u>5000</u> m
Altitude of test laboratory (m)	☒ 2000m or less ☐ ____ m
Mass of equipment (kg)	☒ 123g
Note: The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.	

3 SUMMARY OF TEST

3.1 Test Standards

No.	Identity	Document Title
1	IEC 62368-1:2014	Audio/video, information and communication technology equipment –Part 1: Safety requirements
2	EN 62368-1:2014+A11:2017	Audio/video, information and communication technology equipment –Part 1: Safety requirements
3	BS EN 62368-1:2014+A11:2017	Audio/video, information and communication technology equipment –Part 1: Safety requirements

3.2 Possible test box verdict

Possible test box verdicts:
-test box 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)

3.3 Test item

Tests performed (name of test and test clause):

All applicable tests as described in Test Case and Measurement Sections were performed.

4	General requirements
5.2	Electrical energy source classifications
5.4.1.4, 6.3.2, 9.0, B.2.6	Maximum operating temperatures for materials, components and systems
6.2.2	Electrical power sources (PS) measurements for classification
9.4.1	Equipment safeguards for thermal burn
B.2.5	Input tests
B.3	Simulated Abnormal operating condition tests
B.4	Simulated single fault conditions
F.3.9	Durability, legibility and permanence of markings
Annex M	Batteries
Annex T.4	Steady force test, 100N
Annex T.7	Drop tests
Annex T.8	Stress relief test

The specified Max. ambient temperature is 66°C

Summary of compliance with National Differences:

List of countries addressed:

1. European group
2. Ireland and United Kingdom

3.4 General information

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.

GENERAL PRODUCT INFORMATION:

1. The equipment with model no. W2500020 is a SwitchBot Keypad to be tested as a audio/video, information and communication technology equipment.
2. EUT operation temperature specified by manufacturer: 66°C max.
3. Instructions and equipment marking related to safety is applied in the language that is acceptable in the country in which the equipment is to be sold.
4. All models are different on with fingerprint module or without fingerprint module, differences do not affect the test, So select model W2500020 to test on behalf of all models, see table A for detail.
Table A: model difference

No Fingerprints Version	W2500010, W2500011, W2500012, W2500013, W2500014, W2500015
Have Fingerprints Version	W2500021, W2500022, W2500023, W2500024, W2500025

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 box 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: 5Vdc input

Source of electrical energy	Corresponding classification (ES)
Internal Circuit	ES1

Electrically-caused fire (Clause 6):

(Note: List sub-assembly or circuit designation and corresponding energy source classification)

Example: Battery pack (maximum 85 watts): PS1

Source of power or PIS	Corresponding classification (PS)
Internal circuit	PS1

Injury caused by hazardous substances (Clause 7)

(Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.)

Example: Liquid in filled component Glycol

Source of hazardous substances	Corresponding chemical
Non-rechargeable lithium battery	Complied with Annex M
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 MS1	
Source of kinetic/mechanical energy	Corresponding classification (MS)
Edges and corners of accessible parts	MS1
Mass of EUT	MS1
Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1	
Source of thermal energy	Corresponding classification (TS)
Accessible parts	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	
Type of radiation	Corresponding classification (RS)
LEDs use as indicating lights of EUT	RS1

OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	Possible Hazard			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	ES1: Internal Circuit	N/A	N/A	N/A
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source	Safeguards		
		Basic	Supplementary	Reinforced
PCB	PS1: <15W circuit	See table 6.3	N/A	N/A
Plastic enclosure	PS1: <15W circuit	See table 6.3	N/A	N/A
7.1	Injury caused by hazardous substances			

Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	Non-rechargeable lithium battery	N/A	Comply with annex M	N/A
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary	MS1: Corner and edge are smooth	N/A	N/A	N/A
Ordinary	MS1: Mass of EUT<7kg	N/A	N/A	N/A
9.1	Thermal Burn –			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	TS1: Accessible parts	N/A	N/A	N/A
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary	LED indicating light (RS1)	N/A	N/A	N/A
Supplementary Information:				
(1) See attached energy source diagram for additional details.				
(2) “N” – Normal Condition; “A” – Abnormal Condition; “S” Single Fault				

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Temperature (°C)	15°C to 35°C
Relative Humidity (%)	35% to 75%
Atmospheric Pressure (kPa)	100kPa to 102kPa

4.2 Test Equipment List

No.	Equipment name	Manufacture	Serial No.	Calibration Due Data	Usage
1	Digital Caliper	AIRAJ	BZ-SFT-L228	2022/10/11	√
2	Heating Recorder	Agilent	BZ-SFT-L131	2023/01/04	√
3	Digital Multimeter	Fluke	BZ-SFT-L198	2022/10/11	√
4	Electronic Scale	YINGHENG	BZ-SFT-L107	2022/10/11	√
5	Drop test board	BALUN	BZ-SFT-L059	--	√
6	Pull and push Tester	HANDPI	BZ-SFT-L045	2022/10/11	√
7	Stop Watch	HUIBO	BZ-SFT-L068	2023/05/24	√
8	Temperature and humidity meter	CEM	BZ-SFT-L196	2022/10/12	√

Clause	Requirement-Test	Result-Remark	Verdict
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5 TEST RESULTS

4	General Requirements		P
4.1.1	Acceptance of materials, components and subassemblies	See appended table 4.1.2	P
4.1.2	Use of components	Components which are certified to EN and/or national standards are used correctly within their ratings. Components not covered by EN standards are tested under the conditions present in the equipment. See also Annex G	P
4.1.3	Equipment design and construction	Evaluation of safeguards regarding limiting the outputs to fulfill ES1 and protection in regard to risk of spread of fire, mechanical and thermal burn injury considered.	P
4.1.15	Markings and instructions	(See Annex F)	P
4.4.4	Safeguard robustness	See below.	P
4.4.4.2	Steady force tests	(See Annex T.5)	P
4.4.4.3	Drop tests	(See Annex T.7)	P
4.4.4.4	Impact tests.....	(See Annex T.6)	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 such glass used.	N/A
4.4.4.7	Thermoplastic material tests	(See Annex T.8)	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	After tests of 4.4.4.2, 4.4.4.3, 4.4.4.7, no safeguard damaged.	P
4.5	Explosion	No explosion occurs during normal/abnormal operation and	P

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Clause	Requirement-Test	Result-Remark	Verdict
		single fault conditions	
4.6	Fixing of conductors	Only ES1 for internal circuits, no safeguard affected by conductor displacement.	N/A
4.6.1	Fix conductors not to defeat a safeguard		N/A
4.6.2	10 N force test applied to		N/A
4.7	Equipment for direct insertion into mains socket - outlets	The EUT is not for direct insertion into mains socket outlets, class III equipment	N/A
4.7.2	Mains plug part complies with the relevant standard		N/A
4.7.3	Torque (Nm).....		N/A
4.8	Products containing coin/button cell batteries	No coin/button cell batteries	N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery Compartment Construction		N/A
	Means to reduce the possibility of children removing the battery.....		—
4.8.4	Battery Compartment Mechanical Tests		N/A
4.8.5	Battery Accessibility		N/A
4.9	Likelihood of fire or shock due to entry of conductive object		N/A

5	Electrically-caused injury		P
5.2.1	Electrical energy source classifications	(See appended table 5.2)	P
5.2.2	ES1, ES2 and ES3 limits	ES1	P
5.2.2.2	Steady-state voltage and current.....	(See appended table 5.2)	P
5.2.2.3	Capacitance limits.....	Class III equipment	N/A
5.2.2.4	Single pulse limits	No such single pulses generated in the EUT or applied to it.	N/A
5.2.2.5	Limits for repetitive pulses	No such repetitive pulses within the EUT.	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
5.2.2.6	Ringing signals	No such ringing signals within the EUT	N/A
5.2.2.7	Audio signals	(See annex E.1)	N/A
5.3	Protection against electrical energy sources	See below	P
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	Only ES1 circuit can be accessed for this product.	P
5.3.2.1	Accessibility to electrical energy sources and safeguards	Only ES1 circuit can be accessed for this product.	P
5.3.2.2	Contact requirements	No ES3 circuit.	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	No such terminals.	N/A
5.4	Insulation materials and requirements		P
5.4.1.2	Properties of insulating material	No such material	N/A
5.4.1.3	Humidity conditioning	No hygroscopic material used.	N/A
5.4.1.4	Maximum operating temperature for insulating materials	See table 5.4.1.4	P
5.4.1.5	Pollution degree	2	—
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound	Pollution degree 2 is applied. No insulating compound applied (however see 5.5.4).	N/A
5.4.1.5.3	Thermal cycling	See above	N/A
5.4.1.6	Insulation in transformers with varying dimensions	No such transformer within the EUT	N/A
5.4.1.7	Insulation in circuits generating starting pulses	No such starting pulses within the EUT	N/A
5.4.1.8	Determination of working voltage		N/A
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat softening temperature		N/A

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Clause	Requirement-Test	Result-Remark	Verdict
5.4.1.10.3	Ball pressure		N/A
5.4.2	Clearances		N/A
5.4.2.2	Determining clearance using peak working voltage		N/A
5.4.2.3	Determining clearance using required withstand voltage		N/A
	a) a.c. mains transient voltage		—
	b) d.c. mains transient voltage		—
	c) external circuit transient voltage		—
	d) transient voltage determined by measurement :		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test		N/A
5.4.2.5	Multiplication factors for clearances and test voltages		N/A
5.4.3	Creepage distances		N/A
5.4.3.1	General		N/A
5.4.3.3	Material Group		—
5.4.4	Solid insulation		N/A
5.4.4.2	Minimum distance through insulation		N/A
5.4.4.3	Insulation compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs)		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material	See above	N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A

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Clause	Requirement-Test	Result-Remark	Verdict
5.4.4.9	Solid insulation at frequencies >30 kHz		N/A
5.4.5	Antenna terminal insulation	No such antenna terminal used.	N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
	Insulation resistance (MΩ).....		N/A
5.4.6	Insulation of internal wire as part of supplementary safeguard.....	No such insulation of internal wire as part of supplementary safeguard.	N/A
5.4.7	Tests for semiconductor components and for cemented joints	No tests necessary – see only 5.4.4.4.	N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%)		—
	Temperature (°C)		—
	Duration (h)		—
5.4.9	Electric strength test		N/A
5.4.9.1	Test procedure for 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 such external circuits	N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test.....		N/A
5.4.10.2.3	Steady-state test		N/A
5.4.11	Insulation between external circuits and earthed circuitry	No such external circuits	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_{peak} (V).....		—

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Clause	Requirement-Test	Result-Remark	Verdict
	Max increase due to variation U_{sp}		—
	Max increase due to ageing ΔU_{sa}		—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$		—
5.5	Components as safeguards		
5.5.1	General		N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector.....		N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers		N/A
5.5.5	Relays		N/A
5.5.6	Resistors		N/A
5.5.7	SPD's		N/A
5.5.7.1	Use of an SPD connected to reliable earthing	No such construction.	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	No such external circuits.	N/A
5.6	Protective conductor		N/A
5.6.2	Requirement for protective conductors	Class III equipment with no means of earthing	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		NA
	Protective earthing conductor size (mm^2)		—
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2).....		—
	Protective current rating (A)		—

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Clause	Requirement-Test	Result-Remark	Verdict
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
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		N/A
5.7.6	Prospective touch voltage and touch current due to external circuits	No 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

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Clause	Requirement-Test	Result-Remark	Verdict

5.7.7	Summation of touch currents from external circuits	No 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	PS (power source) classification determined by measuring the maximum power in Figures 34 and 35 for load and power source circuits.	P
6.2.2.1	General		P
6.2.2.2	Power measurement for worst-box load fault..... :	(See appended table 6.2.2)	P
6.2.2.3	Power measurement for worst-box power source fault..... :	(See appended table 6.2.2)	P
6.2.2.4	PS1	(See appended table 6.2.2)	P
6.2.2.5	PS2	(See appended table 6.2.2)	N/A
6.2.2.6	PS3	(See appended table 6.2.2)	N/A
6.2.3	Classification of potential ignition sources		P
6.2.3.1	Arcing PIS	(See appended table 6.2.3.1)	N/A
6.2.3.2	Resistive PIS	(See appended table 6.2.3.2)	P
6.3	Safeguards against fire under normal operating and abnormal operating conditions		P
6.3.1 (a)	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials	No ignition and no such temperature attained within the equipment. (See appended table 5.4.1.4, 6.3.2, 9.0, B.2.6)	P
6.3.1 (b)	Combustible materials outside fire enclosure	(See appended table 5.4.1.4, 6.3.2, 9.0, B.2.6)	N/A
6.4	Safeguards against fire under single fault conditions		P

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Clause	Requirement-Test	Result-Remark	Verdict
6.4.1	Safeguard Method	Method by control of fire spread applied.	P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		N/A
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	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 :		N/A
	Special conditions for temperature limited by fuse	No such consideration.	N/A
6.4.4	Control of fire spread in PS1 circuits		P
6.4.5	Control of fire spread in PS2 circuits		N/A
6.4.5.2	Supplementary safeguards :		N/A
6.4.6	Control of fire spread in PS3 circuit		N/A
6.4.7	Separation of combustible materials from a PIS		N/A
6.4.7.1	General :		N/A
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier	No specific barrier provided.	N/A
6.4.8	Fire enclosures and fire barriers	See below.	N/A
6.4.8.1	Fire enclosure and fire barrier material properties		N/A
6.4.8.2.1	Requirements for a fire barrier		N/A
6.4.8.2.2	Requirements for a fire enclosure		N/A
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier	See below	N/A
6.4.8.3.1	Fire enclosure and fire barrier openings	No openings.	N/A
6.4.8.3.2	Fire barrier dimensions	No fire barrier.	N/A
6.4.8.3.3	Top Openings in Fire Enclosure: dimensions (mm) :	No openings	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
	Needle Flame test		N/A
6.4.8.3.4	Bottom Openings in Fire Enclosure, condition met a), b) and/or c) dimensions (mm)	No openings	N/A
	Flammability tests for the bottom of a fire enclosure		N/A
6.4.8.3.5	Integrity of the fire enclosure, condition met: a), b) or c).....		N/A
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating.....		N/A
6.5	Internal and external wiring		N/A
6.5.1	Requirements		N/A
6.5.2	Cross-sectional area (mm ²)		—
6.5.3	Requirements for interconnection to building wiring		N/A
6.6	Safeguards against fire due to connection to additional equipment		N/A
	External port limited to PS2 or complies with Clause Q.1	Comply with clause Q.1	N/A

7	INJURY CAUSED BY HAZARDOUS SUBSTANCES		P
7.2	Reduction of exposure to hazardous substances	No such hazardous substances	N/A
7.3	Ozone exposure	No ozone production	N/A
7.4	Use of personal safeguards (PPE)		N/A
	Personal safeguards and instructions		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010)		—
7.6	Batteries	(See Annex M)	P

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Clause	Requirement-Test	Result-Remark	Verdict
8	MECHANICALLY-CAUSED INJURY		P
8.1	General	No moving parts in the equipment – see below regarding edges and corners.	P
8.2	Mechanical energy source classifications	MS1	P
8.3	Safeguards against mechanical energy sources		P
8.4	Safeguards against parts with sharp edges and corners	Edges and corners of the enclosure are rounded.	N/A
8.4.1	Safeguards	MS1 classification	N/A
8.5	Safeguards against moving parts	No moving parts.	N/A
8.5.1	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
8.5.2	Instructional Safeguard..... :		—
8.5.4	Special categories of equipment comprising moving parts		N/A
8.5.4.1	Large data storage equipment		N/A
8.5.4.2	Equipment having electromechanical device for destruction of media		N/A
8.5.4.2.1	Safeguards and Safety Interlocks..... :		N/A
8.5.4.2.2	Instructional safeguards against moving parts		N/A
	Instructional Safeguard..... :		—
8.5.4.2.3	Disconnection from the supply		N/A
8.5.4.2.4	Probe type and force (N)		N/A
8.5.5	High Pressure Lamps		N/A
8.5.5.1	Energy Source Classification		N/A
8.5.5.2	High Pressure Lamp Explosion Test..... :		N/A
8.6	Stability	Classification MS1 according to table 35, line 5 and no stability requirements.	N/A
8.6.1	Product classification	MS1	N/A
	Instructional Safeguard..... :	Not required	—

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Clause	Requirement-Test	Result-Remark	Verdict
8.6.2	Static stability		N/A
8.6.2.2	Static stability test		N/A
	Applied Force.....:		—
8.6.2.3	Downward Force Test		N/A
8.6.3	Relocation stability test		N/A
	Unit configuration during 10° tilt		—
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	Not such 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	No wheels or casters.	N/A
8.9.1	Classification		N/A
8.9.2	Applied force.....:		—
8.10	Carts, stands and similar carriers	No carts, stands or 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

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Clause	Requirement-Test	Result-Remark	Verdict
8.11	Mounting means for rack mounted equipment	Not such equipment.	N/A
8.11.1	General		N/A
8.11.2	Product Classification		N/A
8.11.3	Mechanical strength test, variable N		N/A
8.11.4	Mechanical strength test 250N, including end stops		N/A
8.12	Telescoping or rod antennas	No such parts.	N/A
	Button/Ball diameter (mm)		—

9	Thermal burn injury		P
9.2	Thermal energy source classifications	No part considered to be accessible other than enclosure. The equipment evaluated by temperature test (see table 5.4.1.4).	P
9.3	Safeguard against thermal energy sources	Temperature of enclosure classed as TS1.	N/A
9.4	Requirements for safeguards		N/A
9.4.1	Equipment safeguard	Enclosure provided to limit the transfer of thermal energy of internal parts under normal operating conditions and abnormal operating conditions.	N/A
9.4.2	Instructional safeguard		N/A

10	RADIATION		P
10.2	Radiation energy source classification	Led used as indicating light	P
10.2.1	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		P
10.4.1	General	RS1	P
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	LED only used for indicating light.	P
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:	LED only used for indicating light.	P
10.4.2	Instructional safeguard.....:		N/A
10.5	Protection against x-radiation	No such x-radiation generated from the equipment	N/A
10.5.1	X- radiation energy source that exists equipment:		N/A
	Normal, abnormal, single fault conditions		N/A
	Equipment safeguards		N/A
	Instructional safeguard for skilled person		N/A
10.5.3	Most unfavourable supply voltage to give maximum radiation.....:		—
	Abnormal and single-fault condition		N/A
	Maximum radiation (pA/kg)		N/A
10.6	Protection against acoustic energy sources	Not such an equipment.	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output, dB(A)..... :	See clause 10.6.5.3	N/A
	Output voltage, unweighted r.m.s. :		N/A
10.6.4	Protection of persons		N/A
	Instructional safeguards :		N/A
	Equipment safeguard prevent ordinary person to RS2..... :		—
	Means to actively inform user of increase sound pressure :		—
	Equipment safeguard prevent ordinary person to RS2..... :		—
10.6.5	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.5.1	Corded passive listening devices with analog input		N/A
	Input voltage with 94 dB(A) L_{Aeq} acoustic pressure output..... :		—
10.6.5.2	Corded listening devices with digital input		N/A
	Maximum dB(A)..... :		—
10.6.5.3	Cordless listening device		N/A
	Maximum dB(A)..... :		—

B	NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS		P
B.2	Normal Operating Conditions	See the following details.	P
B.2.1	General requirements :	Maximum rated output applied (See appended table)	P
	Audio Amplifiers and equipment with audio amplifiers :		N/A
B.2.3	Supply voltage and tolerances		N/A
B.2.5	Input test..... :	(See appended table B.2.5)	P

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Clause	Requirement-Test	Result-Remark	Verdict
B.3	Simulated abnormal operating conditions		P
B.3.1	General requirements	(See appended table B.3 & B.4)	P
B.3.2	Covering of ventilation openings	No ventilation openings.	N/A
B.3.3	D.C. mains polarity test	The EUT is not connected to a D.C. mains	N/A
B.3.4	Setting of voltage selector	No setting of voltage selector within the EUT	N/A
B.3.5	Maximum load at output terminals	No output terminals	N/A
B.3.6	Reverse battery polarity	No reverse battery polarity	N/A
B.3.7	Abnormal operating conditions as specified in Clause E.2.	Not such equipment.	N/A
B.3.8	Safeguards functional during and after abnormal operating conditions	All safeguards remained effective.	P
B.4	Simulated single fault conditions		P
B.4.2	Temperature controlling device open or short-circuited	No such device used.	N/A
B.4.3	Motor tests	No motor used	N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature		N/A
B.4.4	Short circuit of functional insulation	See the following details.	P
B.4.4.1	Short circuit of clearances for functional insulation	(See appended table B.3 & B.4)	P
B.4.4.2	Short circuit of creepage distances for functional insulation		P
B.4.4.3	Short circuit of functional insulation on coated printed boards	No coated printed boards within the EUT	N/A
B.4.5	Short circuit and interruption of electrodes in tubes and semiconductors	(See appended table B.3 & B.4)	P
B.4.6	Short circuit or disconnect of passive components	(See appended table B.3 & B.4)	P
B.4.7	Continuous operation of components	The EUT is continuous operating type and no such components intended for short time operation or intermittent operation	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
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B.4.8	Class 1 and Class 2 energy sources within limits during and after single fault conditions	No change to circuits classified in 5.3.	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 such UV generated from the equipment.	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

E	TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS		N/A
E.1	Audio amplifier normal operating conditions	Not such equipment.	N/A
	Audio signal voltage (V).....:		—
	Rated load impedance (Ω):		—
E.2	Audio amplifier abnormal operating conditions		N/A

F	EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS		P
F.1	General requirements	See the following details.	P
	Instructions – Language:	English checked	—

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Clause	Requirement-Test	Result-Remark	Verdict
F.2	Letter symbols and graphical symbols	See the following details.	P
F.2.1	Letter symbols according to IEC60027-1	Letter symbols for quantities and units are complied with IEC 60227-1.	P
F.2.2	Graphic symbols IEC, ISO or manufacturer specific	Graphical symbols are complied with IEC 60417, ISO 3864-2, ISO 7000 or ISO 7010.	P
F.3	Equipment markings		P
F.3.1	Equipment marking locations	Equipment marking located on charging box body.	P
F.3.2	Equipment identification markings	See the following details.	P
F.3.2.1	Manufacturer identification	See copy of marking plate	—
F.3.2.2	Model identification	See page 4 for details.	—
F.3.3	Equipment rating markings	See the following details.	P
F.3.3.1	Equipment with direct connection to mains	Class III equipment	N/A
F.3.3.2	Equipment without direct connection to mains	Power rating mark not required, however see above for actual markings	P
F.3.3.3	Nature of supply voltage.....		—
F.3.3.4	Rated voltage	See page 5	—
F.3.3.4	Rated frequency	DC supply	—
F.3.3.6	Rated current or rated power	N/A	—
F.3.3.7	Equipment with multiple supply connections	No multiple supply connection.	N/A
F.3.4	Voltage setting device	No such device.	N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings	No mains appliance outlet.	N/A
F.3.5.2	Switch position identification marking	Not such switch.	N/A
F.3.5.3	Replacement fuse identification and rating markings		N/A
F.3.5.4	Replacement battery identification marking.....	No such battery	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
F.3.5.5	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I Equipment	Class III equipment	N/A
F.3.6.1.1	Protective earthing conductor terminal		N/A
F.3.6.1.2	Neutral conductor terminal		N/A
F.3.6.1.3	Protective bonding conductor terminals		N/A
F.3.6.2	Class II equipment (IEC60417-5172)	Class III equipment	N/A
F.3.6.2.1	Class II equipment with or without functional earth		N/A
F.3.6.2.2	Class II equipment with functional earth terminal marking		N/A
F.3.7	Equipment IP rating marking	IPX0	—
F.3.8	External power supply output marking	No external power supply output	N/A
F.3.9	Durability, legibility and permanence of marking	Marking is considered to be legible and easily discernible. See also the following details.	P
F.3.10	Test for permanence of markings	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15 sec. And then again for 15 sec. With the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking on the label did not fade. There was no curling and lifting of the label edge. After each test, the marking remained legible.	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

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Clause	Requirement-Test	Result-Remark	Verdict
	d) Equipment intended for use only in restricted access area	Not used 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 ES2 limits		N/A
	h) Symbols used on equipment	No such symbols used as a safeguard considered.	N/A
	i) Permanently connected equipment not provided with all-pole mains switch	Not permanently connected equipment.	N/A
	j) Replaceable components or modules providing safeguard function	No such markings.	N/A
F.5	Instructional safeguards	See user manual	N/A
	Where “instructional safeguard” is referenced in the test report it specifies the required elements, location of marking and/or instruction		N/A

G	COMPONENTS		P
G.1	Switches		N/A
G.1.1	General requirements	No switch used.	N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.2	Relays		N/A
G.2.1	General requirements	No such relay provided within the equipment.	N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supply power		N/A
G.2.4	Mains relay, modified as stated in G.2		N/A
G.3	Protection Devices		N/A
G.3.1	Thermal cut-offs	No thermal cut-off provided within the equipment.	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
G.3.1.1a) &b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
G.3.1.1c)	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Thermal cut-off connections maintained and secure		N/A
G.3.2	Thermal links		N/A
G.3.2.1a)	Thermal links separately tested with IEC 60691	No thermal link provided within the equipment.	N/A
G.3.2.1b)	Thermal links tested as part of the equipment		N/A
	Aging hours (H)..... :		—
	Single Fault Condition..... :		—
	Test Voltage (V) and Insulation Resistance (Ω) . :		—
G.3.3	PTC Thermistors		N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided	No such component.	N/A
G.3.5.2	Single faults conditions.....:		N/A
G.4	Connectors		N/A
G.4.1	Spacings	Not directly connected to mains	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	No Wound Components	N/A
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

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Clause	Requirement-Test	Result-Remark	Verdict
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).....:	No Transformers	N/A
	Position.....:		—
	Method of protection		—
G.5.3.2	Insulation		N/A
	Protection from displacement of windings		—
G.5.3.3	Overload test.....:		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding Temperatures testing in the unit		N/A
G.5.3.3.3	Winding Temperatures - Alternative test method		N/A
G.5.4	Motors		N/A
G.5.4.1	General requirements	No motors used.	N/A
	Position		—
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
	Electric strength test (V)		—
G.5.4.5.3	Tested on the Bench - Alternative test method; test time (h)		N/A
	Electric strength test (V)		—

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Clause	Requirement-Test	Result-Remark	Verdict
G.5.4.6	Locked-rotor overload test for d.c. motors in secondary circuits		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature		N/A
	Electric strength test (V)		N/A
G.5.4.6.3	Tested on the bench - Alternative test method; test time (h).....		N/A
	Electric strength test (V)		N/A
G.5.4.7	Motors with capacitors		N/A
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage		—
G.6	Wire Insulation		N/A
G.6.1	General	No Wire Insulation	N/A
G.6.2	Solvent-based enamel wiring insulation		N/A
G.7	Mains supply cords		N/A
G.7.1	General requirements	No mains cord provided.	N/A
	Type.....		—
	Rated current (A)		—
	Cross-sectional area (mm ²), (AWG)		—
G.7.2	Compliance and test method		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N).....		—
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

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Clause	Requirement-Test	Result-Remark	Verdict
G.7.4	Cord Entry..... :		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Mass (g)		—
	Diameter (m)		—
	Temperature (°C)		—
G.7.6	Supply wiring space		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Test with 8 mm strand		N/A
G.8	Varistors		N/A
G.8.1	General requirements		N/A
G.8.2	Safeguard against shock		N/A
G.8.3	Safeguard against fire		N/A
G.8.3.2	Varistor overload test		N/A
G.8.3.3	Temporary overvoltage.....		N/A
G.9	Integrated Circuit (IC) Current Limiters		N/A
G.9.1 a)	Manufacturer defines limit at max. 5A.	No IC current limiter provided within the equipment.	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	N/A
G.10.2	Resistor test		N/A

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Clause	Requirement-Test	Result-Remark	Verdict
G.10.3	Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable	No such resistors	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
G.11.1	General requirements	No such Capacitor and RC units	N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	Optocouplers		N/A
	Optocouplers comply with IEC 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results).....:	No such Optocouplers	N/A
	Type test voltage Vini, a		—
	Routine test voltage, Vini,b		—
G.13	Printed boards		P
G.13.1	General requirements	See the following details.	P
G.13.2	Uncoated printed boards	Only need to comply with functional insulation, see annex B.4.4	P
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
	Compliance with cemented joint requirements (Specify construction).....:		—
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation.....:		N/A
	Number of insulation layers (pcs)		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2a)	Thermal conditioning		N/A

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Clause	Requirement-Test	Result-Remark	Verdict
G.13.6.2b)	Electric strength test		N/A
G.13.6.2c)	Abrasion resistance test		N/A
G.14	Coating on components terminals		N/A
G.14.1	Requirements	No coating on component terminals considered to affect creepage or clearances.	N/A
G.15	Liquid filled components		N/A
G.15.1	General requirements	No such device provided within the equipment.	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		—
D3)	Resistance		—

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Clause	Requirement-Test	Result-Remark	Verdict
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H	CRITERIA FOR TELEPHONE RINGING SIGNALS		N/A
H.1	General	No such signals.	N/A
H.2	Method A		N/A
H.3	Method B		N/A
H.3.1	Ringling 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	No such windings.	N/A

K	SAFETY INTERLOCKS		N/A
K.1	General requirements	No safety interlocks.	N/A
K.2	Components of safety interlock safeguard mechanism		N/A
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance		N/A
K.6	Mechanically operated safety interlocks		N/A
K.6.1	Endurance requirement		N/A

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Clause	Requirement-Test	Result-Remark	Verdict
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K.6.2	Compliance and Test method.....:		N/A
K.7	Interlock circuit isolation		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements (type and circuit location)		N/A
K.7.2	Overload test, Current (A)		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test		N/A

L	DISCONNECT DEVICES		N/A
L.1	General requirements	Not directly connect to mains.	N/A
L.2	Permanently connected equipment		N/A
L.3	Parts that remain energized		N/A
L.4	Single phase equipment		N/A
L.5	Three-phase equipment		N/A
L.6	Switches as disconnect devices		N/A
L.7	Plugs as disconnect devices		N/A
L.8	Multiple power sources		N/A

M	EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS		P
M.1	General requirements		P
M.2	Safety of batteries and their cells	UL1642 approved non-rechargeable lithium battery used.	P
M.2.1	Requirements		P
M.2.2	Compliance and test method (identify method)...		P
M.3	Protection circuits	Safeguards considered during charging and discharging cycles as determined for expected and foreseeable use according to the user instructions.	P

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Clause	Requirement-Test	Result-Remark	Verdict
M.3.1	Requirements		P
M.3.2	Tests		P
	- Overcharging of a rechargeable battery	(see appended table Annex M)	N/A
	- Unintentional charging of a non-rechargeable battery	No such battery used.	N/A
	- Reverse charging of a rechargeable battery	Because of the limitation of structure, Reverse charging is impossible.	N/A
	- Excessive discharging rate for any battery	(See appended table Annex M)	P
M.3.3	Compliance	No chemical leakage, no spillage of liquid, no explosion of the battery, no emission of flame or expulsion of molten metal.	P
M.4	Additional safeguards for equipment containing secondary lithium battery		N/A
M.4.1	General		N/A
M.4.2	Charging safeguards	Non-rechargeable battery used.	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
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

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Clause	Requirement-Test	Result-Remark	Verdict
M.5.1	Requirement		N/A
M.5.2	Compliance and Test Method (Test of P.2.3)		N/A
M.6	Prevention of short circuits and protection from other effects of electric current	UL1642 approved non-rechargeable lithium battery used.	P
M.6.1	Short circuits		N/A
M.6.1.1	General requirements		N/A
M.6.1.2	Test method to simulate an internal fault		N/A
M.6.1.3	Compliance (Specify M.6.1.2 or alternative method) :		N/A
M.6.2	Leakage current (mA) :		N/A
M.7	Risk of explosion from lead acid and NiCd batteries		N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
M.7.2	Compliance and test method		N/A
M.8	Protection against internal ignition from external spark sources of lead acid batteries		N/A
M.8.1	General requirements		N/A
M.8.2	Test method		N/A
M.8.2.1	General requirements		N/A
M.8.2.2	Estimation of hypothetical volume 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) :	Provided the instructions include battery charging, storage and transportation, and disposal and recycling.	P

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Clause	Requirement-Test	Result-Remark	Verdict
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N	ELECTROCHEMICAL POTENTIALS		N/A
	Metal(s) used :	Class III equipment.	—

O	MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES		N/A
	Figures O.1 to O.20 of this Annex applied :	Class III equipment.	—

P	SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS		N/A
P.1	General requirements	No openings of enclosure.	N/A
P.2.2	Safeguards against entry of foreign object		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).....:		—
	Tr (°C).....:		—
	Ta (°C).....:		—

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Clause	Requirement-Test	Result-Remark	Verdict
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P.4.2 b)	Abrasion testing		N/A
P.4.2 c)	Mechanical strength testing		N/A

Q	CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING		N/A
Q.1	Limited power sources		N/A
Q.1.1 a)	Inherently limited output		N/A
Q.1.1 b)	Impedance limited output	See appended table Q.1.2	N/A
	- Regulating network limited output under normal operating and simulated single fault condition	See appended table Q.1.2	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	See appended table Q.1.2	N/A
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A)		—
	Current limiting method		—

R	LIMITED SHORT CIRCUIT TEST		N/A
R.1	General requirements	No such consideration.	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)		—

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Clause	Requirement-Test	Result-Remark	Verdict
	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
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

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Clause	Requirement-Test	Result-Remark	Verdict
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T	MECHANICAL STRENGTH TESTS		N/A
T.1	General requirements		N/A
T.2	Steady force test, 10 N		N/A
T.3	Steady force test, 30 N		N/A
T.4	Steady force test, 100 N	(See appended table T.4)	N/A
T.5	Steady force test, 250 N	(See appended table T.5)	N/A
T.6	Enclosure impact test	(See appended table T.6)	N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test		N/A
T.8	Stress relief test		N/A
T.9	Impact Test (glass)	No glass used.	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	No such antennas provided within the equipment.	N/A
	Torque value (Nm)		—

U	MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION		N/A
U.1	General requirements	No CRT provided within the equipment.	N/A
U.2	Compliance and test method for non-intrinsically protected CRTs	See above.	N/A
U.3	Protective Screen..... :	See above.	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
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V	DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)		N/A
V.1	Accessible parts of equipment		N/A
V.2	Accessible part criterion		N/A

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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 62368-1:2014+A11:2017
Attachment Form No.	EU_GD_IEC62368_1D_II
Attachment Originator.....	Nemko AS
Master Attachment	Date 2021-02-04
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	CENELEC COMMON MODIFICATIONS (EN)					P																																				
	Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2014 are prefixed “Z”.					P																																				
CONTENTS	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords					P																																				
	Delete all the “country” notes in the reference document (IEC 62368-1:2014) according to the following list: <table><tr><td>0.2.1</td><td>Note</td><td>1</td><td>Note 3</td><td>4.1.15</td><td>Note</td></tr><tr><td>4.7.3</td><td>Note 1 and 2</td><td>5.2.2.2</td><td>Note</td><td>5.4.2.3.2.2 Table 13</td><td>Note c</td></tr><tr><td>5.4.2.3.2.4</td><td>Note 1 and 3</td><td>5.4.2.5</td><td>Note 2</td><td>5.4.5.1</td><td>Note</td></tr><tr><td>5.5.2.1</td><td>Note</td><td>5.5.6</td><td>Note</td><td>5.6.4.2.1</td><td>Note 2 and 3</td></tr><tr><td>5.7.5</td><td>Note</td><td>5.7.6.1</td><td>Note 1 and 2</td><td>10.2.1 Table 39</td><td>Note 2, 3 and 4</td></tr><tr><td>10.5.3</td><td>Note 2</td><td>10.6.2.1</td><td>Note 3</td><td>F.3.3.6</td><td>Note 3</td></tr></table>					0.2.1	Note	1	Note 3	4.1.15	Note	4.7.3	Note 1 and 2	5.2.2.2	Note	5.4.2.3.2.2 Table 13	Note c	5.4.2.3.2.4	Note 1 and 3	5.4.2.5	Note 2	5.4.5.1	Note	5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3	5.7.5	Note	5.7.6.1	Note 1 and 2	10.2.1 Table 39	Note 2, 3 and 4	10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3	P
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5.7.5	Note	5.7.6.1	Note 1 and 2	10.2.1 Table 39	Note 2, 3 and 4																																					
10.5.3	Note 2	10.6.2.1	Note 3	F.3.3.6	Note 3																																					
	For special national conditions, see Annex ZB.					P																																				
1	Add the following note:					P																																				

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Clause	Requirement-Test	Result-Remark	Verdict
	NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.		
4.Z1	Add the following new subclause after 4.9: To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. mains, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for pluggable equipment type B or permanently connected equipment, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for pluggable equipment type A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.	See below.	N/A
5.4.2.3.2.4	Add the following to the end of this subclause: The requirement for interconnection with external circuit is in addition given in EN 50491-3:2009.	No external circuits.	N/A
10.2.1	Add the following to ^{c)} and ^{d)} in table 39: For additional requirements, see 10.5.1.	No such radiation from the equipment.	N/A
10.5.1	Add the following after the first paragraph: <i>For RS 1 compliance is checked by measurement under the following conditions:</i>		N/A

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Clause	Requirement-Test	Result-Remark	Verdict
	<i>In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or presets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made.</i> NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. <i>The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm², at any point 10 cm from the outer surface of the apparatus.</i> <i>Moreover, the measurement shall be made under fault conditions causing an increase of the high-voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made.</i> <i>For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level.</i> NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		
10.6.1	Add the following paragraph to the end of the subclause: EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.	No such x-radiation generated from the equipment.	N/A
10.Z1	Add the following new subclause after 10.6.5. 10.Z1 Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body-mounted devices, attention is	No such consideration for the purpose of personal music players.	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
	drawn to EN 50360 and EN 50566		
G.7.1	Add the following note: NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		P
Bibliography	Add the following standards: Add the following notes for the standards indicated: IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1. IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		
ZB	ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)		P
4.1.15	Denmark, Finland, Norway and Sweden To the end of the subclause the following is added: Class I pluggable equipment type A intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment shall be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In Denmark : "Apparatets stikprop skal tilsluttes en		N/A

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Clause	Requirement-Test	Result-Remark	Verdict
	stikkontakt med jord som giver forbindelse til stikproppens jord.” In Finland : "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In Norway : "Apparatet må tilkoples jordet stikkontakt" In Sweden : "Apparaten skall anslutas till jordat uttag"		
4.7.3	United Kingdom To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex	The equipment is not direct plug-in equipment.	N/A
5.2.2.2	Denmark After the 2nd paragraph add the following: A warning (marking safeguard) for high touch current is required if the touch current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.	No high touch current.	N/A
5.4.11.1 and Annex G	Finland and Sweden To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with	No TNV circuits.	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
	an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5kV. It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: • the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; • the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		
5.5.2.1	Norway After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
5.5.6	Finland, Norway and Sweden To the end of the subclause the following is added: Resistors used as basic safeguard or bridging basic insulation in class I pluggable equipment type A shall comply with G.10.1 and the test of G.10.2.	No such resistors.	N/A
5.6.1	Denmark Add to the end of the subclause Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment. <i>Justification:</i>		N/A

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Clause	Requirement-Test	Result-Remark	Verdict
	In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		
5.6.4.2.1	Ireland and United Kingdom After the indent for pluggable equipment type A , the following is added: – the protective current rating is taken to be 13 A, this being the largest rating of fuse used in the mains plug.		N/A
5.6.5.1	To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm ² to 1,5 mm ² in cross-sectional area.	See above.	N/A
5.7.5	Denmark To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the protective conductor current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.	No high protective conductor current.	N/A
5.7.6.1	Norway and Sweden To the end of the subclause the following is added: The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to	Not such system.	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
	protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)” NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet.” Translation to Swedish: ”Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.”.		
5.7.6.2	Denmark To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .	No external circuits.	N/A
B.3.1 and B.4	Ireland and United Kingdom The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of direct plug-in equipment, tests according to Annexes B.3.1 and	The equipment is not direct plug-in equipment.	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
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	B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the direct plug-in equipment , until the requirements of Annexes B.3.1 and B.4 are met		
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G.4.2	Denmark To the end of the subclause the following is added: Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a poly-phase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a <i>Justification:</i> Heavy Current Regulations, Section 6c		N/A
G.4.2	United Kingdom To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be	The equipment is not direct plug-in equipment.	N/A

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

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	is required, or application of type approval (Bauartzulassung) and marking. <i>Justification:</i> German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. NOTE Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int +49-531-592-6320, Internet: http://www.ptb.de		
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4.1.2		TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity ¹⁾	
PCB	Interchangeable	Interchangeable	HB or better, 85°C or above	UL 94 UL 796	UL	
Plastic enclosure	Interchangeable	Interchangeable	HB, 80°C or above, min.thickness 1.09mm	UL 94 UL 796	UL	
Non-rechargeable lithium battery	WUHAN FANSO TECHNOLOGY CO LTD	CR123A	3Vdc,1500mAh	UL 1642	UL MH46165	
Supplementary information:						

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

4.8.4.2	TABLE: Stress relief test	—
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Part	Material	Oven Temperature (°C)	Comments

4.8.4.3	TABLE: Battery replacement test	—
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Battery part no. :		—
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Battery Installation/withdrawal	Battery Installation/Removal Cycle	Comments
---------------------------------	------------------------------------	----------

4.8.4.4	TABLE: Drop test	—
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Impact Area	Drop Distance	Drop No.	Observations
-------------	---------------	----------	--------------

4.8.4.5	TABLE: Impact	—
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Impacts per surface	Surface tested	Impact energy (Nm)	Comments
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			N/A
4.8.4.6	TABLE: Crush test		—
Test position	Surface tested	Crushing Force (N)	Duration force applied (s)

Supplementary information:

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

Supplementary information:

5.2	Table: Classification of electrical energy sources						P
5.2.2.2 – Steady State Voltage and Current conditions							
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions ¹⁾	Parameters			ES Class
				U (Vrms or Vpk)	I (Apk or Arms)	Hz	
1	6.0Vd.c.	supply by 2* CR123A Battery	Normal	6Vd.c.	--	DC	ES1
			Abnormal	--	--	--	
			Single fault – SC/OC	--	--	--	

5.2.2.3 - Capacitance Limits

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

5.2.2.4 - Single Pulses

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

5.2.2.5 - Repetitive Pulses

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

Test Conditions:

Normal – Full load and no load.

Abnormal – Overload output

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

5.4.1.4, 6.3.2, 9.0, B.2.6		TABLE: Temperature measurements						P
	Supply voltage (V) :	6Vd.c.		--		--		—
	Ambient T _{min} (°C) :	--	--	--	--	--	--	—
	Ambient T _{max} (°C) :	--	--	--	--	--	--	—
	Tma (°C) :	--	66.0	--	--	--	--	—
Maximum measured temperature T of part/at:		T (°C)						Allowed T _{max} (°C)
PCB near U2		27.2	69.5	--	--	--	--	130
PCB near U3		26.5	68.8	--	--	--	--	130
PCB near U1		26.8	69.1	--	--	--	--	130
PCB near Q5		26.3	68.6	--	--	--	--	130

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Clause	Requirement-Test				Result-Remark		Verdict

Buttery surface	28.5	70.8	--	--	--	--	--
Internal enclosure near PCB	25.7	68.0	--	--	--	--	Ref.
Internal enclosure near Buttery	25.6	67.9	--	--	--	--	Ref.
Ambient	23.7	66.0	--	--	--	--	--

Touch temperature:

Button	23.8	25.1	--	--	--	--	48
Plastic enclosure outside near Buttery	23.9	25.2	--	--	--	--	48
Plastic enclosure outside near PCB	24.1	25.4	--	--	--	--	48
Ambient	23.7	25.0	--	--	--	--	—

Supplementary information: * Temperature limit for TS1 of accessible enclosure according to Table 38.

Note 1: The apparatus was submitted and evaluated for maximum manufacturer's recommended ambient (T_{ma}) of 66°C.

Note 2: The temperatures were measured under the worst box normal mode defined in clause B.2.1.

Note 3: All values for T(C) are re-calculated from T_{amb} respectively.

Temperature T of winding:	t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class
--	--	--	--	--	--	--	--

5.4.1.8	Table: working voltage measurement				N/A
Location		RMS voltage (V)	Peak voltage (V)	Comments	
--		--	--	--	
supplementary information:					

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

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

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

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

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

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

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Clause	Requirement-Test	Result-Remark	Verdict
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Supplementary information:

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

Supplementary information:

5.5.2.2	TABLE: Stored discharge on capacitors	N/A
----------------	--	-----

Supply Voltage (V), Hz	Test Location	Operating Condition (N, S)	Switch position On or off	Measured Voltage (after 2 seconds)	ES Classification
--	--	--	--	--	--

Supplementary information:

5.6.6.2	TABLE: Resistance of protective conductors and terminations	N/A
----------------	--	-----

Accessible part	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)
--	--	--	--	--

Supplementary Information:

5.7.2.2, 5.7.4	TABLE: Earthed accessible conductive part	N/A
---------------------------	--	-----

Supply voltage.....:		—
Location	Test conditions specified in 6.1 of IEC 60990 or Fault Condition No in IEC 60990 clause 6.2.2.1 through 6.2.2.8, except for 6.2.2.7	Touch current (mA)
	1 (e closed, normal and reverse polarity p)	
	2* (netural open (switch n), earth intact and normal polarity, again in reverse polarity (switch p)	

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	3 (for IT system, each phase conductor faulted to earth, one at a time (switch g))	
	4 (for three-phase, each phase conductor open, one at a time switches l)	
	5 (IT power system or three phase delta system)	
	6 (three-phase for use on centre-earthed dalta supply system)	
	8 (incidental electrically connected to other parts)	

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.

a) Not considered IT power system.

b) Not three phase equipment.

c) Not IT power system or three phase delta system.

d) Not three-phase for use on centre-earthed dalta supply system.

e) Not such parts.

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Clause	Requirement-Test	Result-Remark	Verdict
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6.2.2	Table: Electrical power sources (PS) measurements for classification					P
Source	Description	Measurement	Max Power after 3 s	Max Power after 5 s	PS Classification	
2* CR123A Battery output	Max load	Power (W) :	0.3	--	PS1	
		V _A (V) :	4.9	--		
		I _A (A) :	0.06	--		
Supplementary Information:						
(*) Measurement taken only when limits at 3 seconds exceed PS2 limits.						

6.2.3.1	Table: Determination of Potential Ignition Sources (Arcing PIS)				N/A
Location	Open circuit voltage After 3 s (V _p)	Measured r.m.s current (I _{rms})	Calculated value (V _p × I _{rms})	Arcing PIS? Yes / No	
See below	--	--	--	--	
Supplementary information:					

6.2.3.2	Table: Determination of Potential Ignition Sources (Resistive PIS)				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
Internal part/ component	--	--	<15	No	No
Supplementary Information:					
All power dissipating components in primary and secondary circuit which are supplied by a source exceeding 15W (since the output rating is higher than 15VA) are considered as resistive PIS.					
A combination of voltmeter, VA and ammeter I _A may be used instead of a wattmeter.					
If a separate voltmeter and ammeter are used, the product of (VA × I _A) is used to determine Resistive PIS classification.					
A Resistive PIS: (a) dissipates more than 15 W, measured after 30 s of normal operation, <u>or</u> (b) under single fault conditions has either a power exceeding 100 W measured immediately after the introduction of the fault if electronic circuits, regulators or PTC devices are used, or has an available power exceeding 15 W measured 30 s after introduction of the fault.					

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Clause	Requirement-Test	Result-Remark	Verdict
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B.2.5		TABLE: Input test						P
U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
6Vdc (supply by 2* CR123A Battery)	--	0.065	--	0.039	--	--	--	Max normal load
Supplementary information:								

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Clause	Requirement-Test	Result-Remark	Verdict
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B.3, B.4	TABLE: Abnormal operating condition and fault condition tests							P
Ambient temperature (°C)					See below			—
Power source for EUT: Manufacturer, model/type, output rating ..					--			—
Component No.	Fault Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-co uple	Temp. (°C)	Observation
U3 pin 3-4	SC	6VDC	10mins	--	--	--	Battery surface: 29.4°C Ambient: 23.2°C	Battery discharging current: 0.104A Normal operation No damaged. No hazard
Q4 pin D-S	SC	6VDC	10mins	--	--	--	--	Battery discharging current: 0.065A Normal operation No damaged. No hazard
Q9 pin D-S	SC	6VDC	10mins	--	--	--	Battery surface: 30.8°C Ambient: 23.4°C	Battery discharging current: 0.202 A Normal operation No damaged. No hazard
C94	SC	6VDC	10mins	--	--	--	--	Battery discharging current: 0A Normal operation No damaged. No hazard
Supplementary information:								
1) S-C: Short-circuited; O-C: Open-circuited; O-L: Overloaded; OVC=Overcharge.								
2) The test result shown all safeguards remained effective and didn't lead to a single fault condition during abnormal operating condition; In addition all safeguards complied with applicable requirements in this standard after restoration of normal operating conditions.								

Annex M	TABLE: Batteries	P
The tests of Annex M are applicable only when appropriate battery data is not available		P
Is it possible to install the battery in a reverse polarity position?	Impossible	N/A

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Clause	Requirement-Test	Result-Remark	Verdict
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	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	0.065m A	--	--	--	--	--	--	--	--
Max. current during fault condition U3 pin 3-4 SC	0.104m A	--	--	--	--	--	--	--	--
Test results:								Verdict	
- Chemical leaks						No leak		P	
- Explosion of the battery						No explosion		P	
- Emission of flame or expulsion of molten metal						No emission		P	
- Electric strength tests of equipment after completion of tests						No need		N/A	
Supplementary information:									
S-C: Short-circuited									

Annex M.4	TABLE: Additional safeguards for equipment containing secondary lithium batteries					N/A
Battery/Cell No.	Test conditions	Measurements			Observation	
		U	I (A)	Temp (°C)		
	Normal				No damaged, no hazard.	
	Abnormal(After drop test)				No damage, No hazard	
	Single fault –SC/OC				No damage, No hazard	
	Single fault –SC/OC				No damaged, no hazard.	
Supplementary Information:						
SC: Short-circuited						

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

Annex Q.1	TABLE: Circuits intended for interconnection with building wiring (LPS)					N/A	
Note: Measured UOC (V) with all load circuits disconnected:							
Output Circuit	Components	U _{oc} (V)	I _{sc} (A)		S (VA)		
			Meas.	Limit	Meas.	Limit	
Supplementary Information:							
S-C: Short-circuited; O-C: Open-circuited							

T.2, T.3, T.4, T.5	TABLE: Steady force test					P
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation	
Enclosure	Plastic	1.09	100	5	Enclosure remained intact, no crack/ opening developed. No hazard.	
Supplementary information:						

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

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Clause	Requirement-Test	Result-Remark	Verdict
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T.7	TABLE: Drop tests				P
Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation	
Enclosure	Plastic	1.09	1000	Enclosure remained intact, no crack/ opening developed. No hazard.	
Supplementary information:					

T.8	TABLE: Stress relief test					P
Part/Location	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation	
Enclosure	Plastic	1.09	70	7	Enclosure remained intact, no crack/ opening developed. No hazard.	
Supplementary information:						

6 Product Marking Label



Label of main unit

7 PHOTO DOCUMENT



Figure 1. Overall view



Figure 2. Overall view



Figure 3. Overall view



Figure 4. Overall view



Figure 5. Overall view



Figure 6. Internal view



Figure 7. Internal view

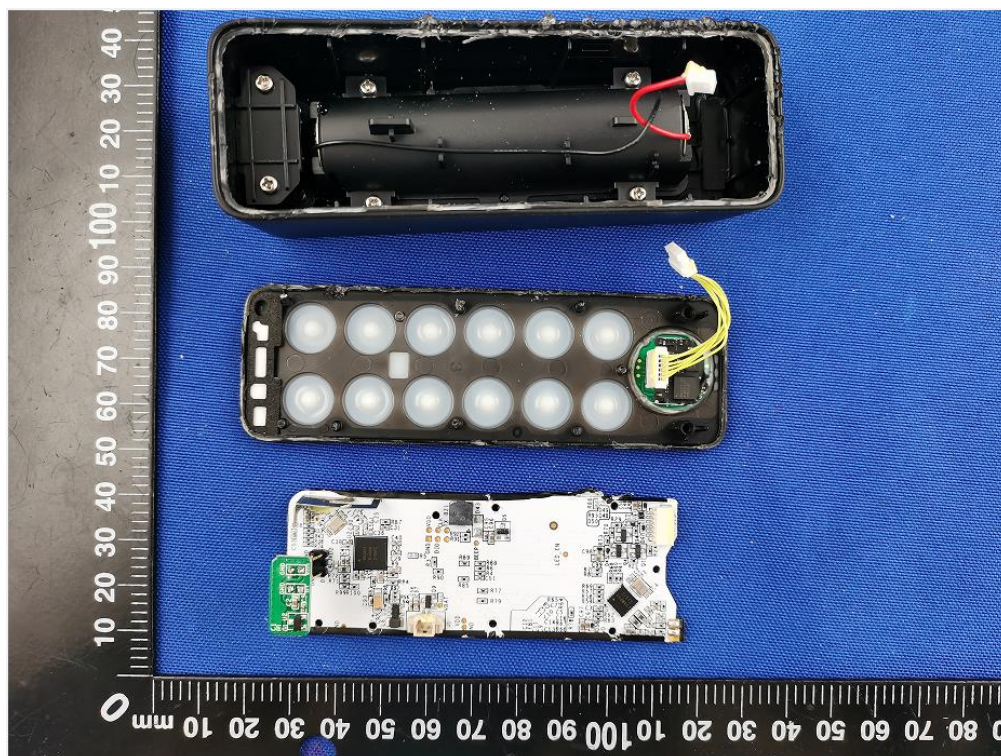


Figure 8. Internal view

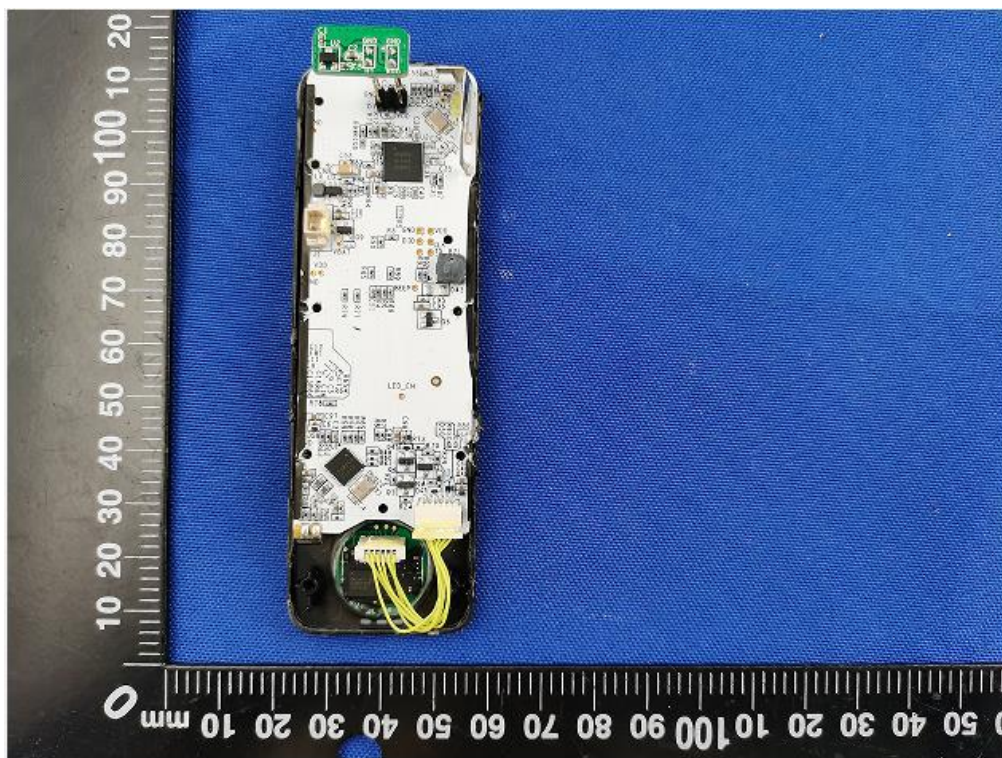


Figure 9. PCB view

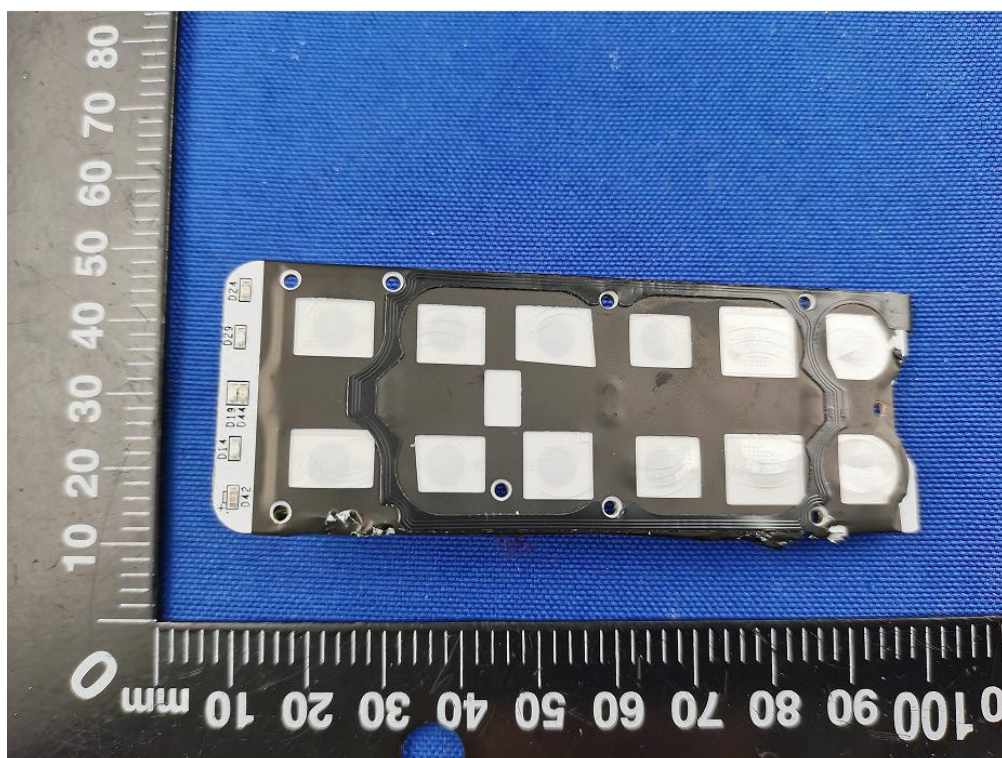


Figure 10. PCB view

Statement

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