

**TEST REPORT****ETSI EN 301 489-1 V2.2.3 (2019-11)/
ETSI EN 301 489-17 V3.2.4 (2020-09)****EN 55032:2015 + A1:2020 + A11:2020/ EN 55035:2017 + A11:2020****Report Reference No.**.....: HK2202150378-1ER**Compiled by**

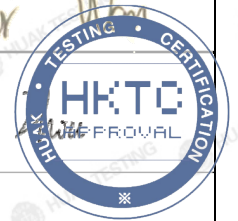
(position+printed name+signature)...: Testing engineer Bella Huang

*Bella Huang***Supervised by**

(position+printed name+signature)...: Technique principal Sliver Wan

*Sliver***Approved by**

(position+printed name+signature)...: Manager Jason Zhou

Jason**Date of issue**.....: 2022/02/18**Representative Laboratory Name**: Shenzhen HUAKE Testing Technology Co., Ltd.**Address**.....: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park,
Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**Applicant's name**.....: 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**Test specification:****Standard**: **ETSI EN 301 489-1 V2.2.3 (2019-11)/
ETSI EN 301 489-17 V3.2.4 (2020-09)/
EN 55032:2015 + A1:2020 + A11:2020/
EN 55035:2017 + A11:2020****TRF Originator**.....: Shenzhen HUAKE Testing Technology Co., Ltd.**Master TRF**.....: Dated 2017-05**Shenzhen HUAKE Testing Technology Co., Ltd. All rights reserved.**

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Equipment under Test.....: SwitchBot Remote**Trade Mark**: SwitchBot**Model/Type reference**.....: W0301700**Listed Models**: W0301701, W0301702, W0301703, W0301704, W0301705**Hardware Version**.....: V1.1**Software Version**: V4.3**Rating**: DC 3V From Battery**Result**.....: **PASS**

**TEST REPORT****Test Report No. :****HK2202150378-1ER**

2022/02/18

Date of issue

Equipment under Test : SwitchBot Remote

Model /Type : W0301700

Listed Models : W0301701, W0301702, W0301703, W0301704, W0301705

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

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

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

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2022/02/18	Jason Zhou



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1. TEST STANDARDS

The tests were performed according to following standards:

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

ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

ETSI EN 301 489-17 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 covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

EN 55032:2015 + A1:2020 + A11:2020 Electromagnetic compatibility of multimedia equipment – Emission Requirements

EN 55035:2017 + A11:2020 Electromagnetic compatibility of multimedia equipment – Immunity requirements



2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	2022/02/15
Testing commenced on	:	2022/02/15
Testing concluded on	:	2022/02/18

2.2. Product Description

Name of EUT	SwitchBot Remote
Model(s) Number	W0301700
List Models	W0301701, W0301702, W0301703, W0301704, W0301705
Difference description	All model's the function, software and electric circuit are the same, only with a product model named different. Test sample model: W0301700.
Hardware version	V1.1
Software version	V4.3
Antenna Type	PCB Antenna



2.3. Equipment under Test

Power supply system utilised

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

DC 3V From Battery

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

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



2.5. EUT operation mode

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

Test Item	
EMI	
Mode 1	Running
EMS	
Mode 1	Running

2.6. EUT configuration

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

● - Supplied by the manufacturer

○ - Supplied by the lab

○ Adapter information



2.7. Performance level

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

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

General performance criteria

- based on the used product standard
- based on the declaration of the manufacturer, requestor or purchaser
- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time. The equipment shall meet the minimum performance criteria as specified in the following clauses.

Performance table

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. May show degradation of performance (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 2). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 1). No unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 2).
NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended. NOTE 2: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.		

**Performance criteria for Continuous phenomena applied to Transmitters (CT)**

The performance criteria A shall apply.

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

Performance criteria for Transient phenomena applied to Transmitters (TT)

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

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

Performance criteria for Continuous phenomena applied to Receivers (CR)

The performance criteria A shall apply.

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

Performance criteria for Transient phenomena applied to Receivers (TR)

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

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

2.8. Modifications

No modifications were implemented to meet testing criteria.



3. TEST ENVIRONMENT

3.1. Information of the Test Laboratory

Shenzhen HUAKE Testing Technology Co., Ltd.

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

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

Testing Laboratory Authorization:

A2LA Accreditation Code is 4781.01.

FCC Designation Number is CN1229.

Canada IC CAB identifier is CN0045.

CNAS Registration Number is L9589.

3.2. Environmental conditions

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

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

3.3. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

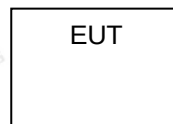


Table 2-1 Equipment Used in Tested System

No.	Product	Manufacturer	Model No.	FCC ID
/	/	/	/	/



3.4. Test Description

ETSI EN 301 489-1/-17 requirements		
Radiated Emission	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1 EN 55032:2015 + A1:2020+A11:2020 Annex A.2	PASS
Conducted Emission(AC Mains)	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1	N/A
Conducted Emission(Telecommunication Ports)	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1 EN 55032:2015 + A1:2020+A11:2020 Annex A.3	N/A
Harmonic Current Emissions	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1 EN IEC 61000-3-2:2019 + A1:2021	N/A
Voltage Fluctuations and Flicker	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.1 EN IEC 61000-3-2:2019 + A1:2021	N/A
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	PASS
Fast Transients Common Mode	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A
RF Common Mode 0,15 MHz to 80 MHz	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A
Transients and Surges	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A
Voltage Dips and Interruptions	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A
Surges, Line to Line and Line to Ground	ETSI EN 301 489-1 V2.2.3 (2019-11) Clause 7.2	N/A

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

3.5. Statement of the measurement uncertainty

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

Hereafter the best measurement capability for Shenzhen HUAKE Testing Technology Co., Ltd is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.90dB	(1)
Radiated Emission	1~18GHz	4.26dB	(1)
Radiated Emission	18-40GHz	5.54dB	(1)
Conducted Disturbance	0.15~30MHz	2.71dB	(1)

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

**3.6. Equipments Used during the Test****CONDUCTED EMISSION**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	LISN	R&S	ENV216	HKE-002	Dec. 09, 2021	Dec. 08, 2022	1 year
2	LISN	R&S	ENV216	HKE-029	Dec. 09, 2021	Dec. 08, 2022	1 year
3	EMI Test Receiver	R&S	ESR-7	HKE-005	Dec. 09, 2021	Dec. 08, 2022	1 year
4	Conducted test software	Tonscend	TS+ Rev 2.5.0.0	HKE-081	N/A	N/A	N/A

RADIATED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 09, 2021	Dec. 08, 2022	1 year
2	EMI Test Receiver	R&S	ESR-7	HKE-010	Dec. 09, 2021	Dec. 08, 2022	1 year
3	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 09, 2021	Dec. 08, 2022	1 year
4	Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 09, 2021	Dec. 08, 2022	1 year
5	Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 09, 2021	Dec. 08, 2022	1 year
6	Preamplifier	Agilent	83051A	HKE-016	Dec. 09, 2021	Dec. 08, 2022	1 year
7	Position controller	Taiwan MF	MF7802	HKE-011	Dec. 09, 2021	Dec. 08, 2022	1 year
8	Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A	N/A	N/A
9	Wireless Communication Test Set	R&S	CMU200	HKE-026	Dec. 09, 2021	Dec. 08, 2022	1 year
10	Wireless Communication Test Set	R&S	CMW500	HKE-027	Dec. 09, 2021	Dec. 08, 2022	1 year

HARMONICS AND FILCK

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Harmonic flicker tester	California Instruments	AC2000A	HKE-037	Dec. 09, 2021	Dec. 08, 2022	1 year

ESD

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	ESD device	Schloder	SESD 216	HKE-023	Dec. 09, 2021	Dec. 08, 2022	1 year

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**RS**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Power amplifier	Vectawave	100W1000M7	HKE-142	Dec. 09, 2021	Dec. 08, 2022	1 year
2	Power amplifier	Vectawave	MPA-1000-6000-100	HKE-143	Dec. 09, 2021	Dec. 08, 2022	1 year
3	Power Meter	KEYSIGHT	E4419B	HKE-144	Dec. 09, 2021	Dec. 08, 2022	1 year
4	Signal Generator	Agilent	N5181A	HKE-145	Dec. 09, 2021	Dec. 08, 2022	1 year
5	Field intensity probe	PMM	EP601	HKE-146	Dec. 09, 2021	Dec. 08, 2022	1 year
6	High gain antenna	Schwarzbeck	STPL9149	HKE-147	Dec. 09, 2021	Dec. 08, 2022	1 year

SURGE, EFT/BURST, VOLTAGE INTERRUPTION/DIPS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Full-featured immunity tester	HTEC	HV1P16T	HKE-017	Dec. 09, 2021	Dec. 08, 2022	1 year
2	Group pulse coupling clamp	HTEC	H3C	HKE-024	Dec. 09, 2021	Dec. 08, 2022	1 year

INJECTION CURRENT

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Integrated Conduction Sensitivity Test System	LIONCEL	RIS-6091	HKE-110	Dec. 09, 2021	Dec. 08, 2022	1 year
2	Magnetic clamp	LIONCEL	CDN-M3-16	HKE-111	Dec. 09, 2021	Dec. 08, 2022	1 year

PFMF

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Power frequency induction coil	LIONCEL	PMF-801C-C	HKE-115	Dec. 09, 2021	Dec. 08, 2022	1 year



4. TEST CONDITIONS AND RESULTS

4.1. REQUIREMENTS

4.1.1. Radiated Emission

LIMIT

Please refer to ETSI EN 301 489-1 Clause 8.2.3

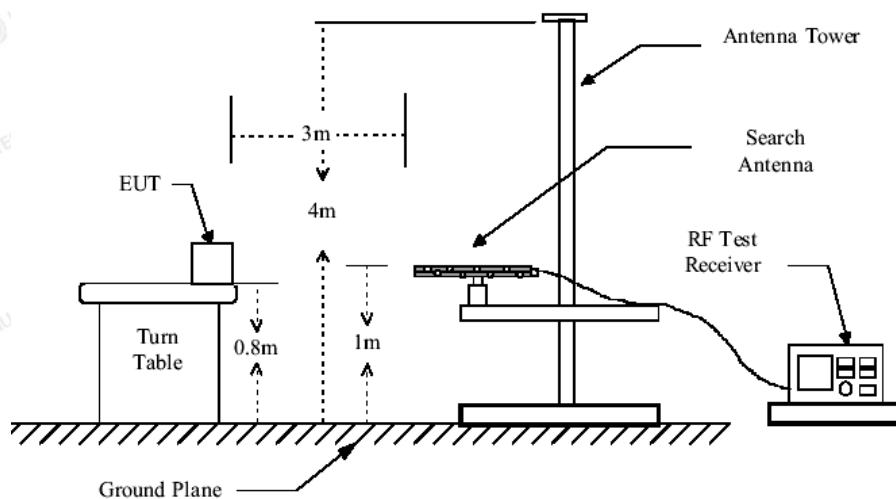
The ancillary equipment shall meet the class B limits given in CENELEC EN 55032 [1], annex A tables A.4 and A.5.

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

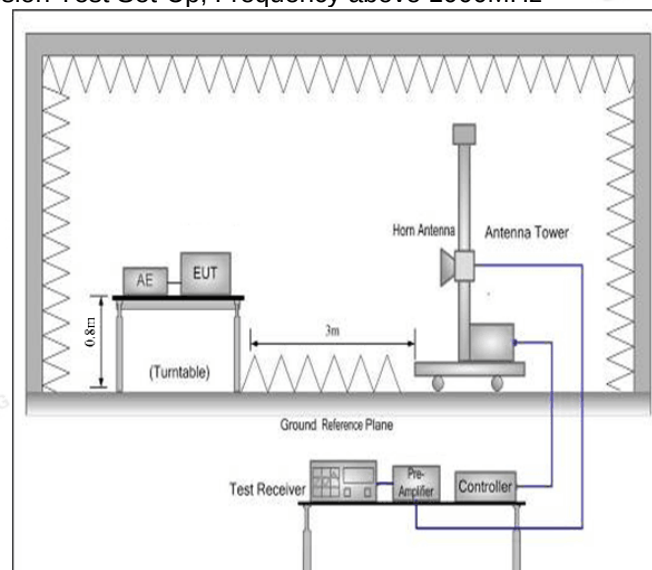
If EUT is also a FM Receiver, it shall meet CENELEC EN 55032 [3], annex A tables A.6

TEST CONFIGURATION

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



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



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TEST PROCEDURE

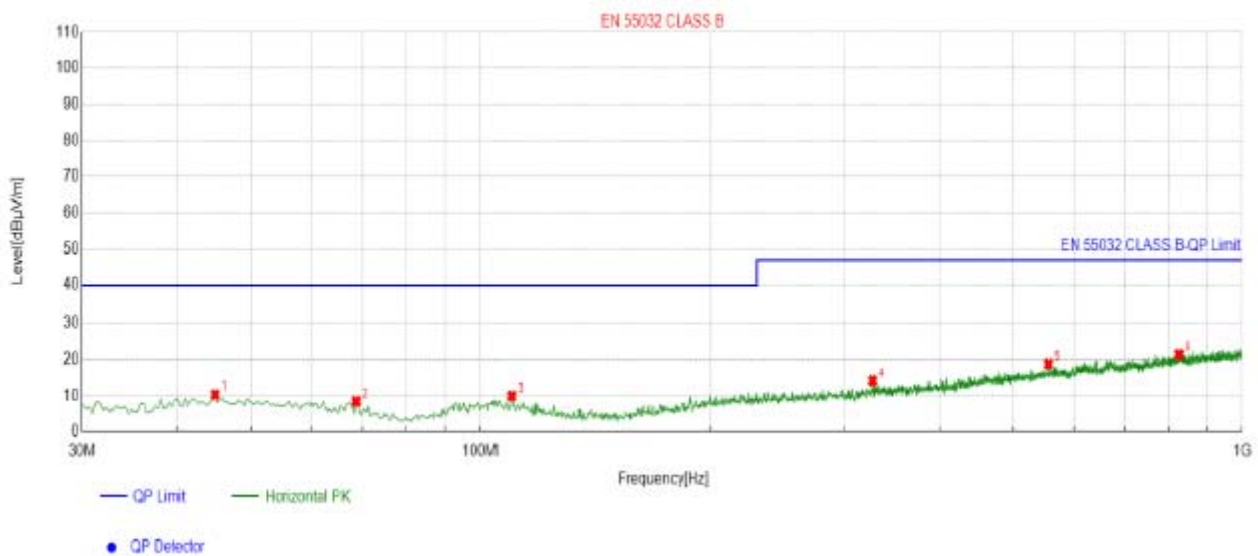
Please refer to ETSI EN 301 489-1 Clause 8.2.2 and The test method shall be in accordance with CENELEC EN 55032 [1], annex A.2. for the measurement methods.

Climatic conditions

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

TEST RESULTS

Below 1000MHz



Suspected List

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	44.8783	-13.67	23.96	10.29	40.00	29.71	100	260	Horizontal
2	68.8129	-17.37	25.76	8.39	40.00	31.61	100	94	Horizontal
3	109.5665	-15.43	25.37	9.94	40.00	30.06	100	264	Horizontal
4	326.5955	-11.76	25.91	14.15	47.00	32.85	100	0	Horizontal
5	556.2387	-6.79	25.51	18.72	47.00	28.28	100	7	Horizontal
6	825.9887	-2.54	23.90	21.36	47.00	25.64	100	132	Horizontal

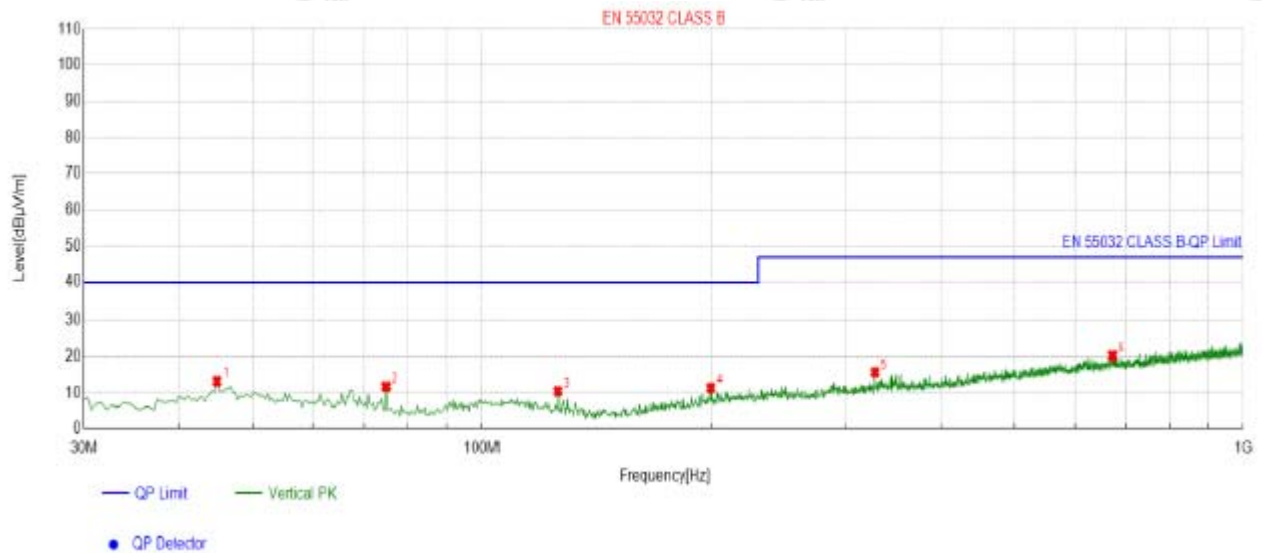
Remark:

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

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Suspected List

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	44.8783	-13.67	26.80	13.13	40.00	26.87	100	203	Vertical
2	74.9583	-18.56	30.27	11.71	40.00	28.29	100	224	Vertical
3	125.4151	-17.90	28.33	10.43	40.00	29.57	100	117	Vertical
4	199.1597	-15.14	26.54	11.40	40.00	28.60	100	100	Vertical
5	327.5659	-11.71	27.33	15.62	47.00	31.38	100	129	Vertical
6	673.0010	-4.66	24.87	20.21	47.00	26.79	100	84	Vertical

Remark:

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

Radiated Emission From 1 GHz to 6 GHz

Frequency (MHz)	PK (dBuV/m)	Average (dBuV/m)	MaxPeak Limit (dBuV/m)	Limit Average (dBuV/m)	Margin PK (dB)	Margin AC (dB)	Pol	Azimuth (deg)
1816.44	47.13	---	70	50	22.87	---	V	125
1952.56	45.89	---	70	50	24.11	---	H	18
2295.89	41.41	---	70	50	28.59	---	V	301
2227.12	45.67	---	70	50	24.33	---	H	247
3816.76	49.52	---	74	54	24.48	---	V	171
3951.05	46.91	---	74	54	27.09	---	H	233



4.1.2. Conducted Emission (AC Mains)

LIMIT

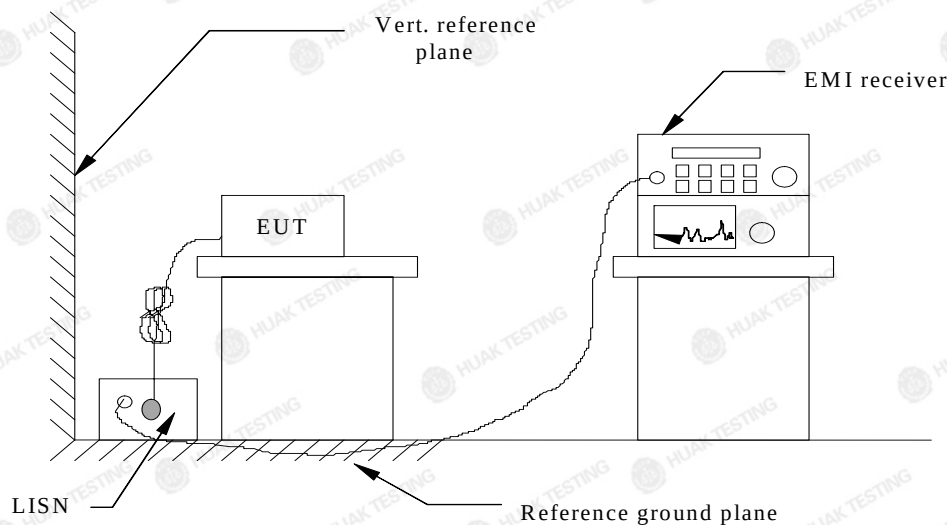
Please refer to ETSI EN 301 489-1 Clause 8.4.3

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

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

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

TEST CONFIGURATION



TEST PROCEDURE

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

Climatic conditions

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

TEST RESULTS

Not applicable.



4.1.3. Conducted Emission (Telecommunication Ports)

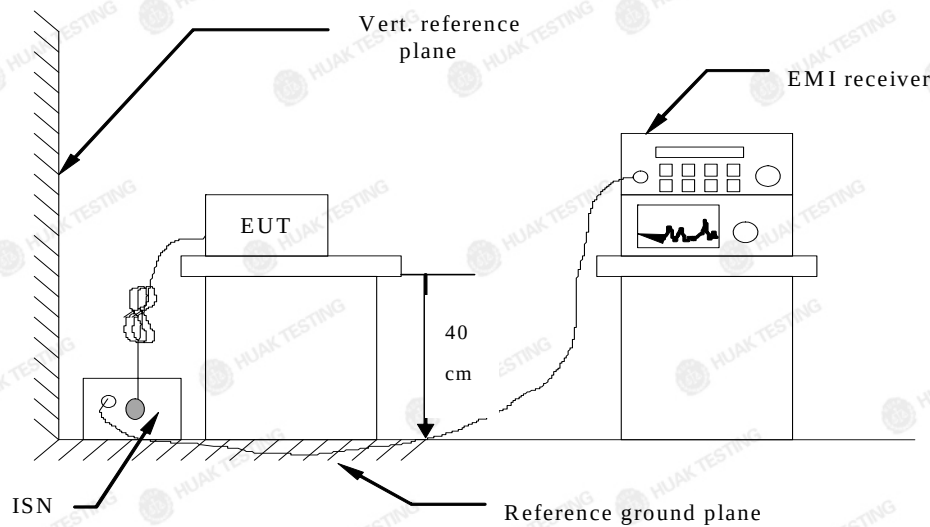
LIMIT

Please refer to ETSI EN 301 489-1 Clause 8.7.3

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

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

TEST CONFIGURATION



TEST PROCEDURE

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

Climatic conditions

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

TEST RESULTS

Not applicable.

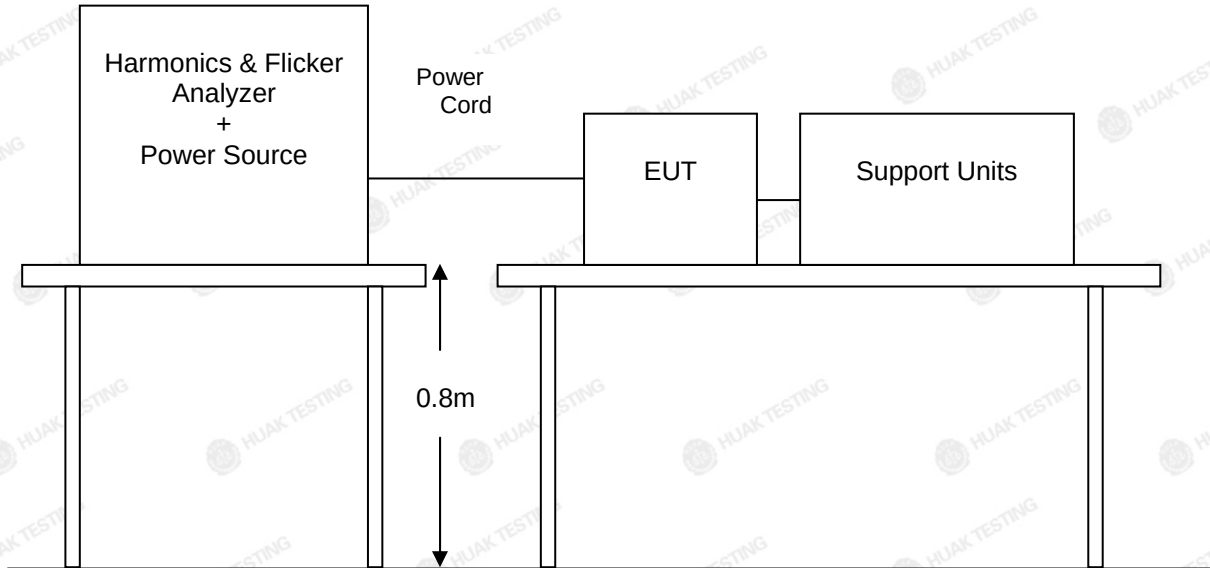


4.1.4. Harmonic Current Emission

LIMIT

Please refer to EN 61000-3-2

TEST CONFIGURATION



TEST PROCEDURE

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

Climatic conditions

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

TEST RESULTS

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



4.1.5. Voltage Fluctuation and Flicker

LIMIT

Please refer to EN 61000-3-3

TEST CONFIGURATION

Same as the configuration of the Harmonic Current Emission.

TEST PROCEDURE

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

Climatic conditions

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

TEST RESULTS

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



4.1.6. Electrostatic Discharge

LIMIT

Please refer to EN 61000-4-2

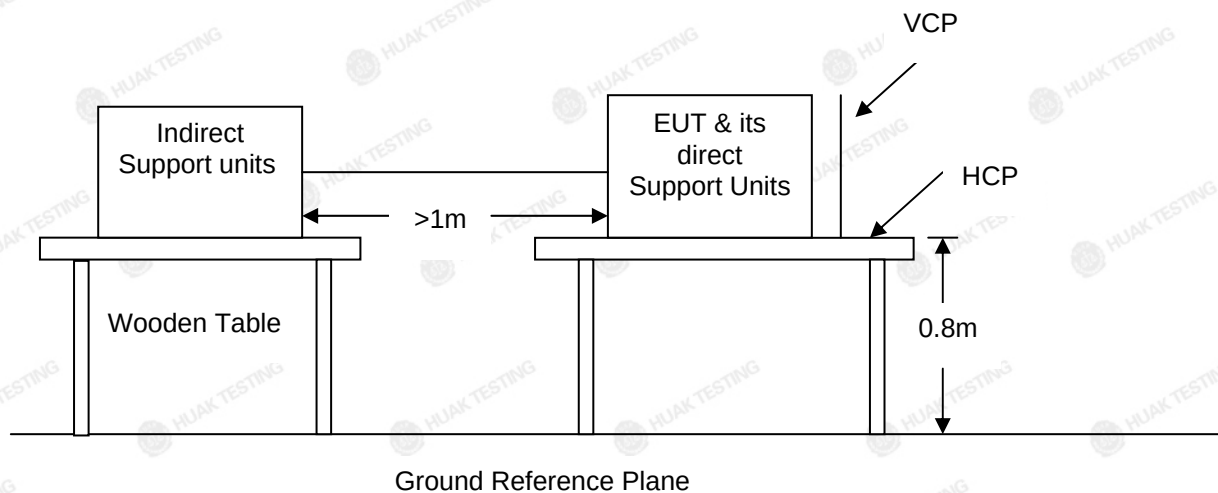
SEVERITY LEVELS OF ELECTROSTATIC DISCHARGE

Test level: Contact Discharge at $\pm 2\text{KV}, \pm 4\text{KV}$ Air Discharge at $\pm 2\text{KV}, \pm 4\text{KV}, \pm 8\text{KV}$

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

Performance criterion: **B**

Test Configuration



Test procedure

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

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

Test results

Contact Discharge:

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

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**Air Discharge:**

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

Indirect discharge for horizontal coupling plane:

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

Indirect discharge for vertical coupling plane:

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

Climatic conditions

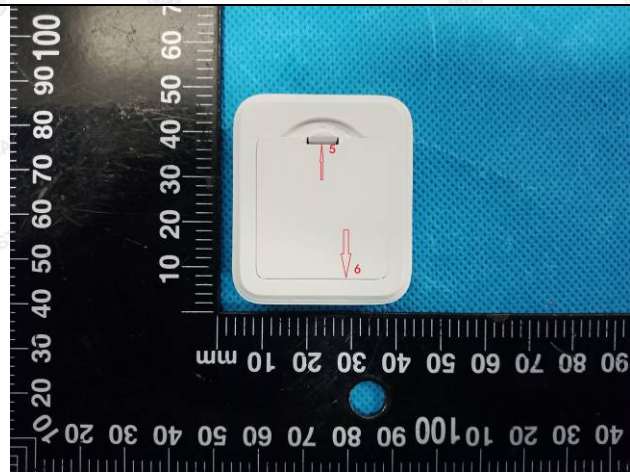
- ambient temperature : 25°C
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

Mode	Air Discharge								Contact Discharge								Criterion	Result
Test level (kV)	4		8		10		15		2		4		6		8			
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-		
HCP									A	A	A	A					B	PASS
VCP									A	A	A	A						PASS
Metallic parts									/	/	/	/						N/A
enclosure	A	A	A	A														PASS
slot	A	A	A	A														PASS

Note:

- 1) +/- denotes the Positive/Negative polarity of the output voltage.
- 2) Test condition:
Direct / Indirect (HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at each point. Air discharges: Minimum 10 times (Positive/Negative) at each point.
- 3) Test location(s) in which discharge (Air and contact discharge) to be applied illustrated by photos shown in next page(s)
- 4) The Indirect (HCP/VCP) discharges description of test point as following:
1.left side 2.right side 3.front side 4.rear side
- 5) N/A - denotes test is not applicable in this test report



Contact discharging points: N/A
Air discharge points: 1, 2, 3, 4, 5, 6

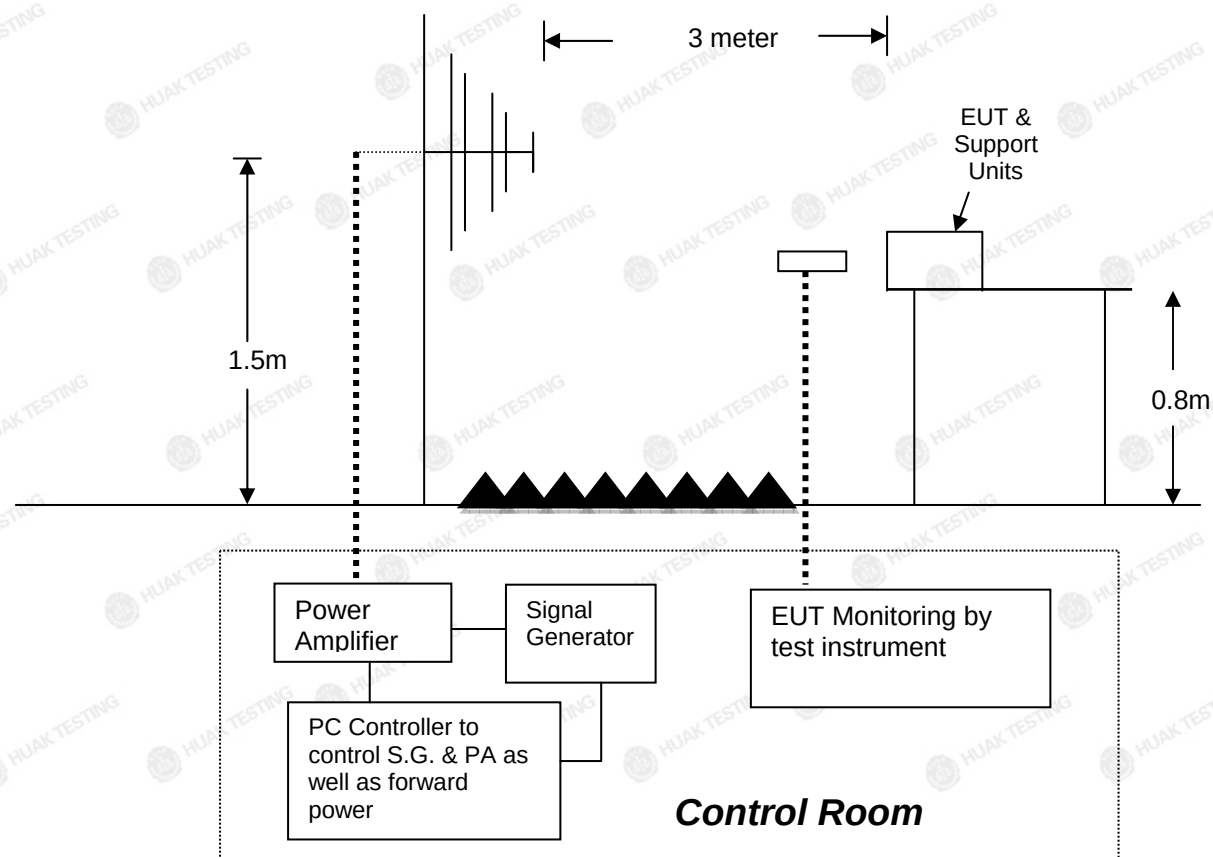


4.1.7. RF Electromagnetic Field

LIMIT

Please refer to EN 61000-4-3

Test Configuration



Test Levels of RF Electromagnetic Field

Test level: RF Field Strength: 3V/m

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

Performance criterion: A

TEST PROCEDURE

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

**Climatic conditions**

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

TEST RESULTS**☑ Result of Final Tests (Operating Mode& Standby (Receiving) Mode)**

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80MHz-6GHz 1800(±1%)MHz; 2600(±1%)MHz; 3500(±1%)MHz; 5000(±1%)MHz;	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass

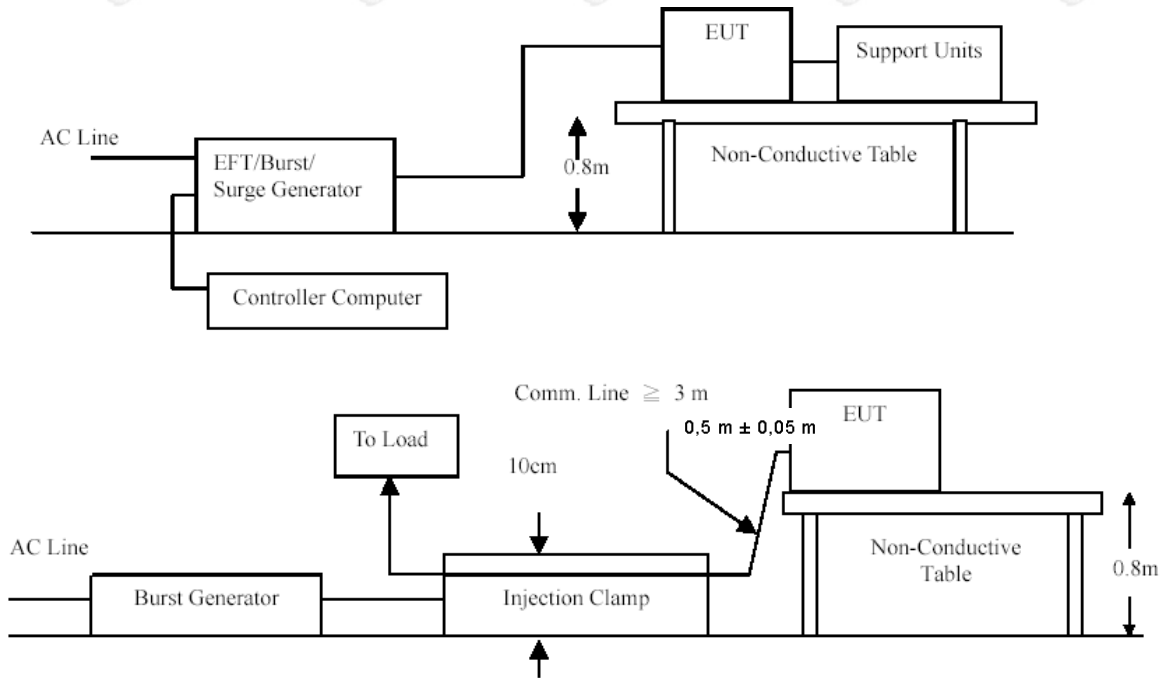


4.1.8. Fast Transients Common Mode

LIMIT

Please refer to EN 61000-4-4

TEST CONFIGURATION



TEST PROCEDURE

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

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

Climatic conditions

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

TEST RESULTS

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

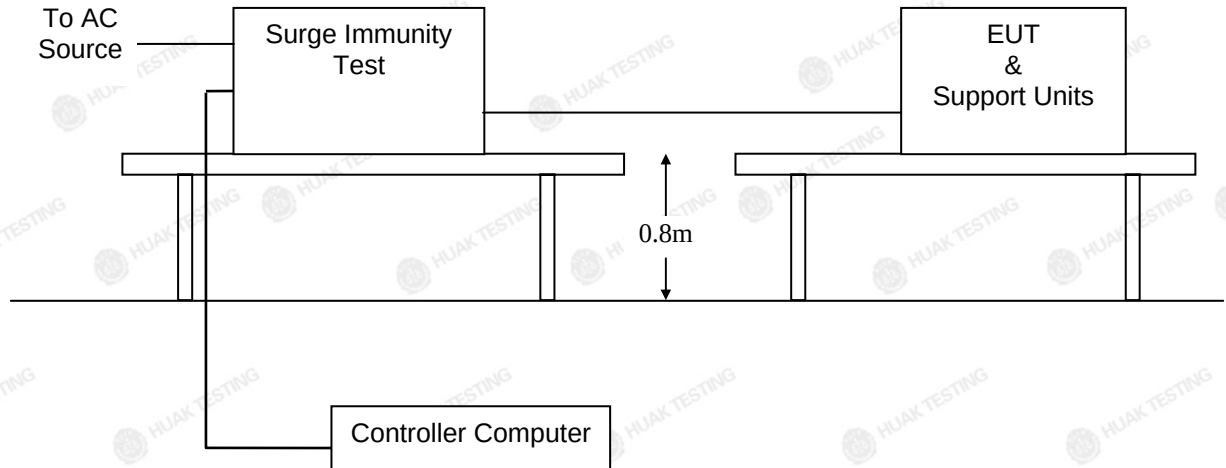


4.1.9. Surges, Line to Line and Line to Ground

LIMIT

Please refer to EN 61000-4-5

TEST CONFIGURATION



TEST PROCEDURE

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

Climatic conditions

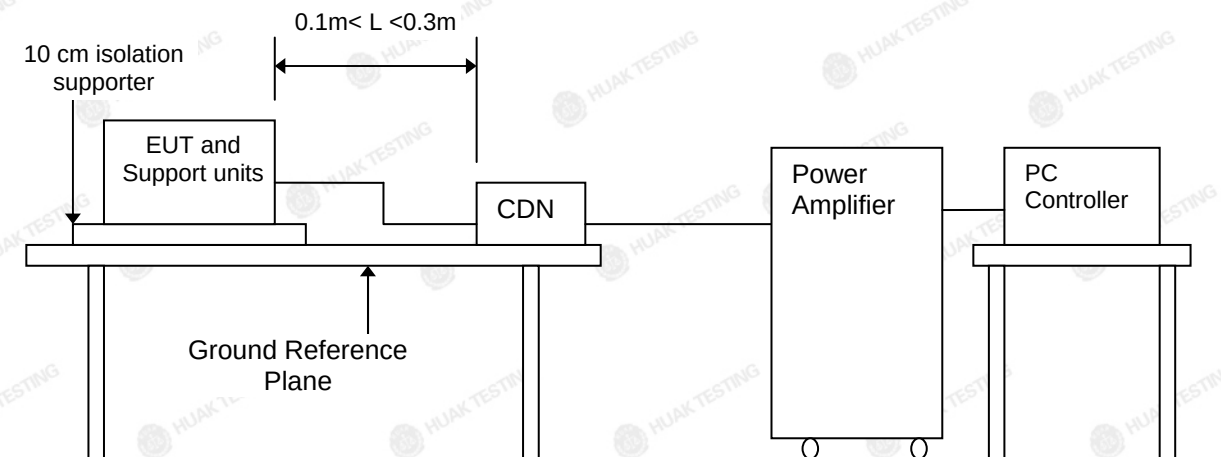
- ambient temperature : 25 °C
- relative humidity: 55%
- atmospheric pressure: 960 mbar

TEST RESULTS

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

**4.1.10. RF- Common Mode 0.15MHz to 80MHz****LIMIT**

Please refer to EN 61000-4-6

TEST CONFIGURATION**TEST PROCEDURE**

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

Climatic conditions

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

TEST RESULTS

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

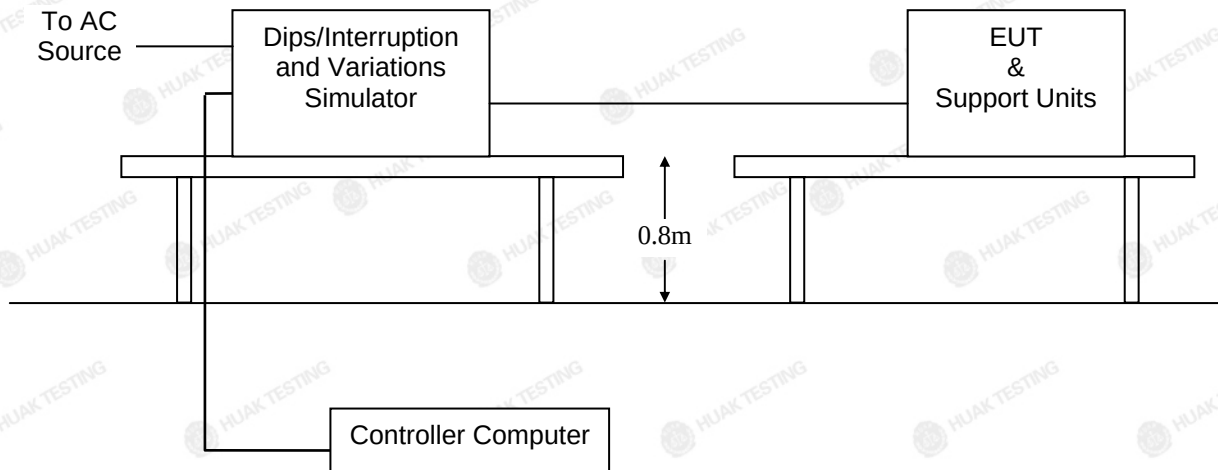


4.1.11. Voltage Dips and Interruptions

LIMIT

Please refer to EN 61000-4-11

TEST CONFIGURATION



TEST PROCEDURE

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

Climatic conditions

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

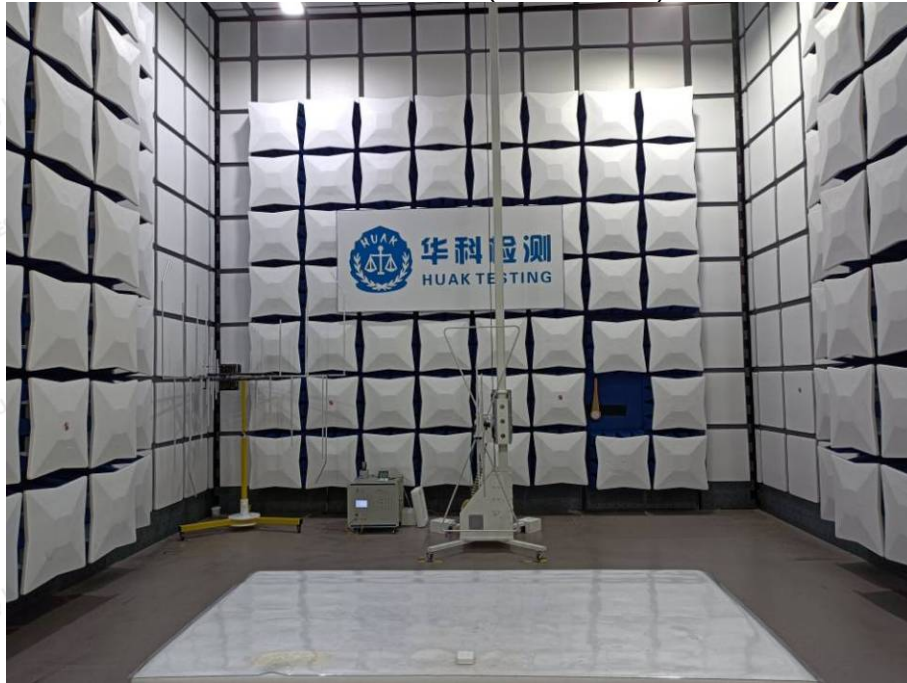
TEST RESULTS

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

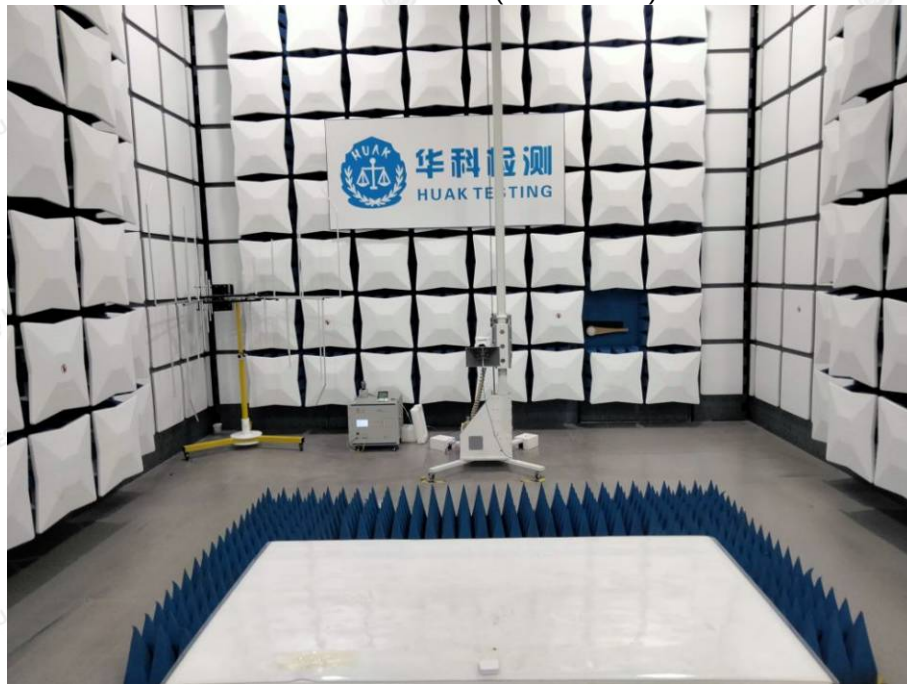


5. Test Set-up Photos of the EUT

Radiated Emission (30MHz-1GHz)



Radiated Emission (1GHz-6GHz)





Electrostatic Discharge





6. PHOTOS OF THE EUT



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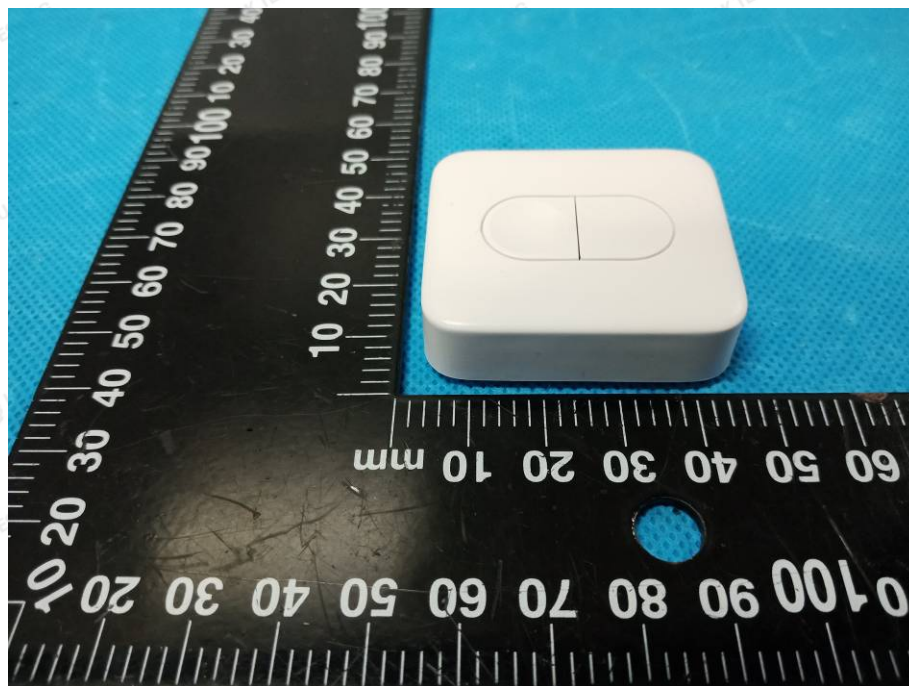
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



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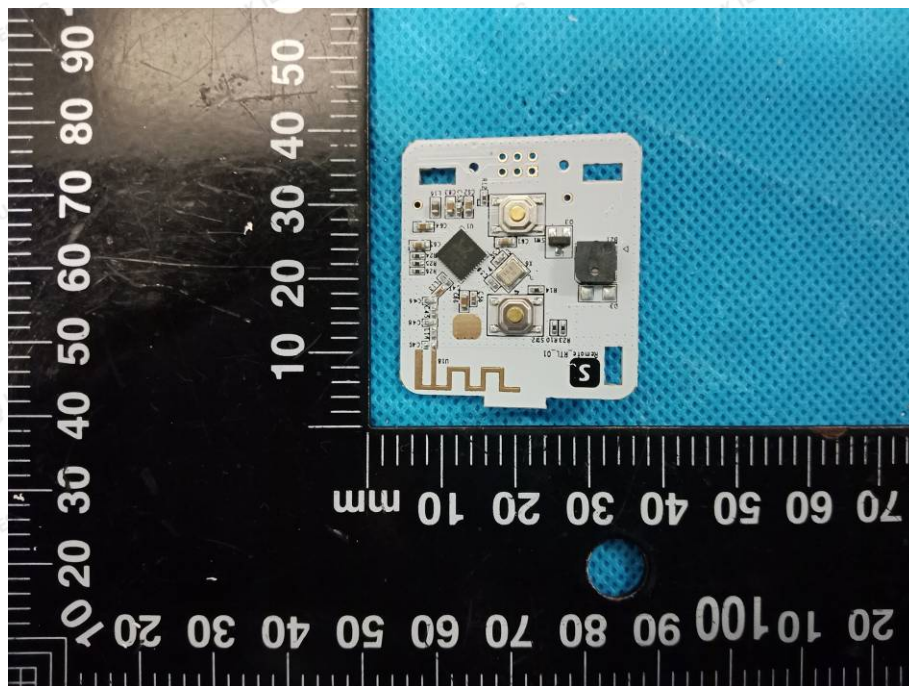
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



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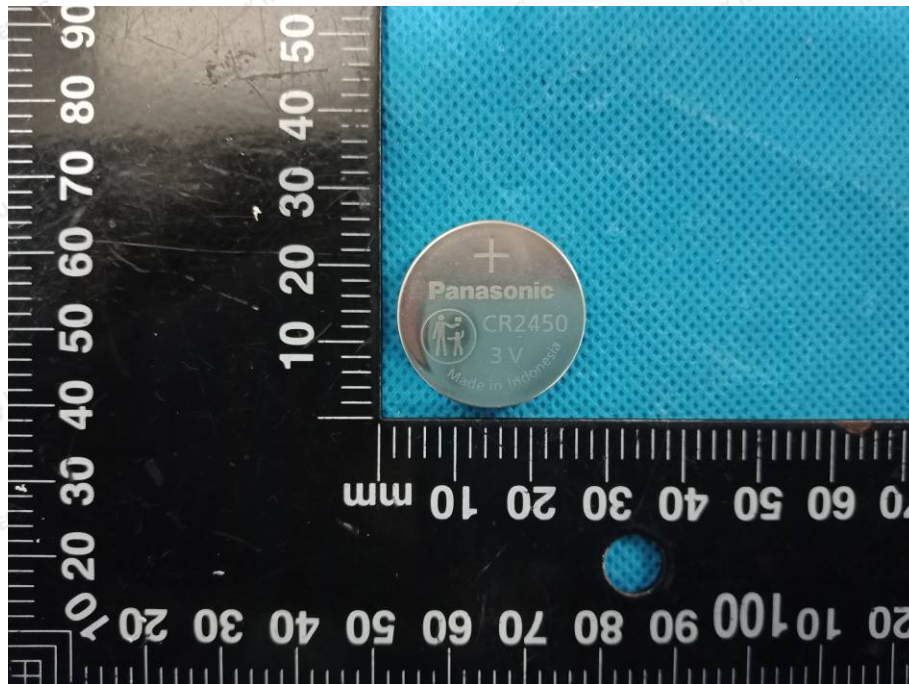
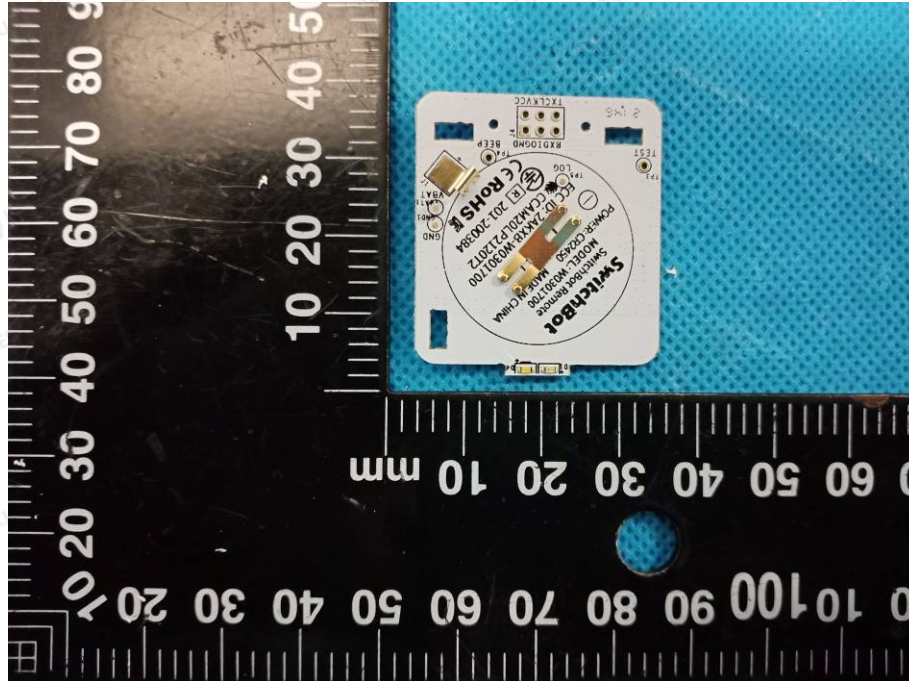
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.....End of Report.....



HUAKE TESTING

LVD TEST REPORT

CE-LVD TEST REPORT

Prepared for :

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: SwitchBot Remote

Trade Name: SwitchBot

**Model Name: W0301700, W0301701, W0301702, W0301703,
W0301704, W0301705**

Date of Test: Feb. 10, 2022 to Feb. 18, 2022

Date of Report: Feb. 18, 2022

Report Number: HK2202150378-1SR

Prepared By :

Shenzhen HUAKE Testing Technology Co., Ltd.

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

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

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**TEST REPORT****EN 62368-1****Audio/video, information and communication technology equipment****Part 1: Safety requirements****Report Number**..... : HK2202150378-1SR**Date of issue**..... : 2022-02-18**Total number of pages**..... : 76 pages**Applicant's name**..... : 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**Test specification:****Standard** : EN IEC 62368-1:2020 + A11:2020**Test procedure**..... : CE-LVD**Non-standard test method** : N/A**Test Report Form No.**..... : IEC62368_1C**Test Report Form(s) Originator** : UL(US)**Master TRF**..... : 2019-01-17**Copyright © 2019 Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE), Geneva, Switzerland. All rights reserved.**

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General disclaimer:

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

Test Item description : SwitchBot Remote**Trade Mark** : SwitchBot**Manufacturer**..... : Woan Technology (Shenzhen) Co., Ltd.**Manufacturer Address** : Room 1101, Qiancheng Commercial Center, No. 5 Haicheng Road, Mabu Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, P.R.China, 518100**Model/Type reference** : W0301700, W0301701, W0301702, W0301703, W0301704, W0301705**Ratings** : Input: 3VDC (Powered by one 3VDC CR2450 Button cell)

IEC62368_1C

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

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List of Attachments (including a total number of pages in each attachment): -Appendix 1: For requirements of European group differences. (21 pages) -Appendix 2: Photo attachments. (4 pages)	
Summary of testing:	
Tests performed (name of test and test clause): All clauses.	Testing location: Shenzhen HUAKE Testing Technology Co., Ltd. 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Summary of compliance with National Differences: European group differences.	
☒ The product fulfils the requirements of <u>EN IEC 62368-1:2020+A11:2020.</u>	

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**Test item particulars:**

Product group	☒ end product	☐ built-in component
Classification of use by	☒ Ordinary person ☒ Children likely present ☒ Instructed person ☒ Skilled person	
Supply connection	☐ AC mains ☐ DC mains ☒ 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 ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: ☐ ____ A;	
Considered current rating of protective device	Location: ☐ building ☐ equipment ☐ N/A	
Equipment mobility	☐ movable ☐ hand-held ☒ transportable ☐ direct plug-in ☐ stationary ☐ for building-in ☐ wall/ceiling-mounted ☐ SRME/rack-mounted ☐ other:	
Overvoltage category (OVC)	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other:	
Class of equipment	☐ Class I ☐ Class II ☒ Class III ☐ Not classified ☐ other:	
Special installation location	☒ N/A ☐ restricted access area ☐ outdoor location ☐ other:	
Pollution degree (PD)	☐ PD 1 ☒ PD 2 ☐ PD 3	
Manufacturer's specified T_{ma}	40°C ☐ Outdoor: minimum ____ °C	
IP protection class	☒ IPX0 ☐ IP ____	
Power systems	☐ TN ☐ TT ☐ IT - ____ V _{L-L} ☒ not AC mains	
Altitude during operation (m)	☒ 2000 m or less ☐ ____ m	
Altitude of test laboratory (m)	☒ 2000 m or less ☐ ____ m	
Mass of equipment (kg)	19 g	

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POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement :	P (Pass)
- test object does not meet the requirement :	F (Fail)
GENERAL REMARKS:	
"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report. Throughout this report a ☐ comma / ☒ point is used as the decimal separator. The related applicable OSM decisions have been considered and the requirements found fulfilled Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60335-1:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)	Same as manufacturer
GENERAL PRODUCT INFORMATION:	
Product Description – The products are SwitchBot Remote to be in indoor use only, electronic components mounted on PWB, External enclosure is plastic material, the plastic material of min.V-1 grade.	
Model Differences – All models are identical, only different in the model name, so the model W0301700 is selected as representative model for full tests.	
Additional application considerations – (Considerations used to test a component or sub-assembly) – N/A	

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OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	Possible Hazard			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary; Instructed	ES1: Input terminal	N/A	N/A	N/A
Ordinary; Instructed	ES1: Internal circuits	N/A	N/A	N/A
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
All combustible materials within equipment	PS1: All internal circuits	N/A	N/A	N/A
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3:High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary; Instructed; Skilled	MS1: sharp edges and corners	N/A	N/A	N/A
Ordinary; Instructed; Skilled	MS1: weight	N/A	N/A	N/A
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary person	TS1: External enclosure	N/A	N/A	N/A
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
N/A	N/A	N/A	N/A	N/A
Supplementary Information:				
(1) See attached energy source diagram for additional details.				
(2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Single Fault				

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ENERGY SOURCE DIAGRAM

Optional. Manufacturers are to provide the energy sources diagram identify declared energy sources and identifying the demarcations are between power sources. Recommend diagram be provided included in power supply and multipart systems.

Insert diagram below. Example diagram designs are; Block diagrams; image(s) with layered data; mechanical drawings

☒ ES ☒ PS ☒ MS ☒ TS ☐ RS

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

4	GENERAL REQUIREMENTS		P
4.1.1	Acceptance of materials, components and subassemblies	Components which are certified to IEC and/or national standards are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	P
4.1.2	Use of components	See table 4.1.2	P
4.1.3	Equipment design and construction	No accessible part which could cause injury	P
4.1.4	Specified ambient temperature for outdoor use (°C)		N/A
4.1.5	Constructions and components not specifically covered		N/A
4.1.8	Liquids and liquid filled components (LFC)	(See G.15)	N/A
4.1.15	Markings and instructions	(See Annex F)	P
4.4.3	Safeguard robustness		N/A
4.4.3.1	General		N/A
4.4.3.2	Steady force tests	(See Clause T.3, T.4, T.5)	N/A
4.4.3.3	Drop tests		N/A
4.4.3.4	Impact tests		N/A
4.4.3.5	Internal accessible safeguard enclosure and barrier tests		N/A
4.4.3.6	Glass Impact tests	(See Clause T.9, Annex U)	N/A
4.4.3.7	Glass fixation tests		N/A
	Glass impact test (1J)		N/A
4.4.3.8	Thermoplastic material tests	(See Annex T.8)	N/A
4.4.3.9	Air comprising a safeguard	(See Annex T)	N/A
4.4.3.10	Accessibility, glass, safeguard effectiveness		N/A
4.4.4	Displacement of a safeguard by an insulating liquid		N/A
4.4.5	Safety interlocks		N/A
4.5	Explosion	No explosion	P
4.5.1	General	(See Annex M for batteries)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.5.2	No explosion during normal/abnormal operating condition	(See Clause B.2, B.3)	N/A
	No harm by explosion during single fault conditions	(See Clause B.4)	N/A
4.6	Fixing of conductors		N/A
	Fix conductors not to defeat a safeguard		N/A
	Compliance is checked by test.....	(See Clause T.2)	N/A
4.7	Equipment for direct insertion into mains socket - outlets		N/A
4.7.2	Mains plug part complies with the relevant standard..... :	See below	N/A
4.7.3	Torque (Nm) :		N/A
4.8	Products containing coin/button cell batteries		P
4.8.1	General		P
4.8.2	Instructional safeguard		P
4.8.3	Battery compartment door/cover construction		P
	Open torque test		N/A
4.8.4.2	Stress relief test		P
4.8.4.3	Battery replacement test		P
4.8.4.4	Drop test	(See Clause T.7)	P
4.8.4.5	Impact test		P
4.8.4.6	Crush test		P
4.8.5	Compliance		P
	30N force test with test probe		P
	20N force test with test hook		P
4.9	Likelihood of fire or shock due to entry of conductive object		N/A
4.10	Component requirements		N/A
4.10.1	Disconnect Device	(See Annex L)	N/A
4.10.2	Switches and relays	(See Annex G)	N/A
5	ELECTRICALLY-CAUSED INJURY		P
5.2	Classification and limits of electrical energy sources		P
5.2.2	ES1, ES2 and ES3 limits	ES1	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.2.2	Steady-state voltage and current..... :	(See appended table 5.2)	P
5.2.2.3	Capacitance limits		N/A
5.2.2.4	Single pulse limits	No such single pulses with the EUT	N/A
5.2.2.5	Limits for repetitive pulses	No such repetitive pulses with the EUT	N/A
5.2.2.6	Ringing signals	No such ringing signals with the EUT	N/A
5.2.2.7	Audio signals	No such audio signals with the EUT	N/A
5.3	Protection against electrical energy sources		P
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	See below.	P
5.3.1 a)	Accessible ES1/ES2 derived from ES2/ES3 circuits		P
5.3.1 b)	Skilled persons not unintentional contact ES3 bare conductors		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		P
	Accessibility to outdoor equipment bare parts		N/A
5.3.2.2	Contact requirements		N/A
	Test with test probe from Annex V		N/A
5.3.2.2 a)	Air gap – electric strength test potential (V)	(See appended table 5.4.9)	N/A
5.3.2.2 b)	Air gap – distance (mm)		N/A
5.3.2.4	Terminals for connecting stripped wire	No such terminals intended to be used by ordinary person.	N/A
5.4	Insulation materials and requirements		P
5.4.1.2	Properties of insulating material		P
5.4.1.3	Material is non-hygroscopic		P
5.4.1.4	Maximum operating temperature for insulating materials	(See appended table)	P
5.4.1.5	Pollution degree	Pollution degree 2	—
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound	Pollution degree 2	N/A
5.4.1.5.3	Thermal cycling	Pollution degree 2	N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage		N/A
5.4.1.9	Insulating surfaces		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted	See below	N/A
5.4.1.10.2	Vicat softening temperature	(See appended table 5.4.1.10.2)	N/A
5.4.1.10.3	Ball pressure	(See appended table 5.4.1.10.3)	N/A
5.4.2	Clearances		N/A
5.4.2.1	General requirements		N/A
	Clearances in circuits connected to AC Mains, Alternative method		N/A
5.4.2.2	Procedure 1 for determining clearance		N/A
	Temporary overvoltage		—
5.4.2.3	Procedure 2 for determining clearance		N/A
5.4.2.3.2.2	a.c. mains transient voltage		—
5.4.2.3.2.3	d.c. mains transient voltage		—
5.4.2.3.2.4	External circuit transient voltage.....		—
5.4.2.3.2.5	Transient voltage determined by measurement ..		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test		N/A
5.4.2.5	Multiplication factors for clearances and test voltages		N/A
5.4.2.6	Clearance measurement	(See appended table 5.4.2.6)	N/A
5.4.3	Creepage distances	(See appended table 5.4.3)	N/A
5.4.3.1	General		N/A
5.4.3.3	Material Group	IIIb	—
5.4.3.4	Creepage distances measurement	(See appended table 5.4.3)	N/A
5.4.4	Solid insulation		N/A
5.4.4.1	General requirements		N/A
5.4.4.2	Minimum distance through insulation	(See appended table 5.4.4.2)	N/A
5.4.4.3	Insulation compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Insulating compound forming cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Number of layers (pcs)		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material	(See appended Table 5.4.9)	N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz, EP, KR, d, VPW (V).....	(See appended Table 5.4.4.9)	N/A
	Alternative by electric strength test, tested voltage (V), KR.....	(See appended Tables 5.4.4.9 and 5.4.9)	N/A
5.4.5	Antenna terminal insulation		N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
5.4.5.3	Insulation resistance (MΩ).....		N/A
	Electric strength test	(See appended table 5.4.9)	N/A
5.4.6	Insulation of internal wire as part of supplementary safeguard	(See appended table 5.4.4.2)	N/A
5.4.7	Tests for semiconductor components and for cemented joints		N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%).....		—
	Temperature (°C)		—
	Duration (h)		—
5.4.9	Electric strength test	(See appended table 5.4.9)	N/A
5.4.9.1	Test procedure for a solid insulation type test		N/A
5.4.9.2	Test procedure for routine tests		N/A
5.4.10	Protection against transient voltages between external circuit		N/A
5.4.10.1	Parts and circuits separated from external circuits	(See appended table 5.4.9)	N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test	(See appended table 5.4.9)	N/A
5.4.10.2.3	Steady-state test.....	(See appended table 5.4.9)	N/A
5.4.10.3	Verification for insulation breakdown for impulse test		N/A
5.4.11	Separation between external circuits and earth		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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).....:		—
	Max increase due to variation U_{sp}		—
	Max increase due to ageing ΔU_{sa}		—
5.4.11.3	Test method and compliance	(See appended table 5.4.9)	N/A
5.4.12	Insulating liquid		N/A
5.4.12.1	General requirements		N/A
5.4.12.2	Electric strength of an insulating liquid	(See appended table 5.4.9)	N/A
5.4.12.3	Compatibility of an insulating liquid	(See appended table 5.4.9)	N/A
5.4.12.4	Container for insulating liquid		N/A
5.5	Components as safeguards		
5.5.1	General		N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector.....:	(See appended table 5.5.2.2)	N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers	(See sub-clause 5.4 or Annex G.12)	N/A
5.5.5	Relays	(See Annex G.2)	N/A
5.5.6	Resistors	(See Annex G.10)	N/A
5.5.7	SPD's	(See Annex G.8)	N/A
5.5.7.1	Use of an SPD connected to reliable earthing		N/A
5.5.7.2	Use of an SPD between mains and protective earth		N/A
5.5.8	Insulation between the mains and external circuit consisting of a coaxial cable.....:	(See Annex G.10.3)	N/A
5.5.9	Safeguards for socket-outlets in outdoor equipment		N/A
	RCD rated residual operating current (mA).....:		N/A
5.6	Protective conductor		N/A
5.6.2	Requirement for protective conductors		N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm ²)		—
	Protective earthing conductor serving as a reinforced safeguard		N/A
	Protective earthing conductor serving as a double safeguard		N/A
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm ²)		—
5.6.4.2	Protective current rating (A)		—
5.6.5	Terminal size for connecting protective earthing conductors (mm)		N/A
5.6.5.1	Terminal size for connecting protective bonding conductors (mm)		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective bonding system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method	(See appended table 5.6.6)	N/A
5.6.6.3	Resistance (Ω) or voltage drop	(See appended table 5.6.6)	N/A
5.6.7	Reliable connection of a protective earthing conductor		N/A
5.6.8	Functional earthing		N/A
	Conductor size (mm ²)		N/A
	Class II with functional earthing marking		N/A
	Appliance inlet cl & cr (mm)		N/A
5.7	Prospective touch voltage, touch current and protective conductor current		N/A
5.7.2	Measuring devices and networks	Figure 4 of IEC 60990 was used in determining of the limit of ES1.	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
5.7.4	Unearthed accessible parts	(See appended table 5.7.4)	N/A
5.7.5	Earthed accessible conductive parts	(See appended table 5.7.5)	N/A
5.7.6	Requirements when touch current exceeds ES2 limits		N/A
	Protective conductor current (mA)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Instructional Safeguard.....:		N/A
5.7.7	Prospective touch voltage and touch current due to external circuits		N/A
5.7.7.1	Touch current from coaxial cables		N/A
5.7.7.2	Prospective touch voltage and touch current from external circuits		N/A
5.7.8	Summation of touch currents from external circuits		N/A
	a) Equipment with earthed external circuits Measured current (mA).....:		N/A
	b) Equipment whose external circuits are not referenced to earth. Measured current (mA).....:		N/A
5.8	Backfeed safeguard in battery backed up supplies		N/A
	Mains terminal ES	(See appended table 5.8)	N/A
	Air gap (mm).....:		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.....:	(See appended table 6.2.2)	P
6.2.3	Classification of potential ignition sources		N/A
6.2.3.1	Arcing PIS	(See appended table 6.2.3.1)	N/A
6.2.3.2	Resistive PIS	(See appended table 6.2.3.2)	N/A
6.3	Safeguards against fire under normal operating and abnormal operating conditions		N/A
6.3.1	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials	(See appended table B.1.5 and B.3)	N/A
	Combustible materials outside fire enclosure	No such materials used.	N/A
6.4	Safeguards against fire under single fault conditions		P
6.4.1	Safeguard Method	Approved fire enclosure used	P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		P
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	Supplementary safeguards		N/A
6.4.3.2	Single Fault Conditions.....:	(See appended table B.4)	N/A
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits		P

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Clause	Requirement + Test	Result - Remark	Verdict
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
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers		N/A
6.4.8.2	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		N/A
6.4.8.3.1	Fire enclosure and fire barrier openings	No opening	N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top openings and properties	No opening	N/A
	Openings dimensions (mm).....		N/A
6.4.8.3.4	Bottom Openings in Fire Enclosure, condition met a), b) and/or c) dimensions (mm)		N/A
	Flammability tests for the bottom of a fire enclosure		N/A
6.4.8.3.5	Side openings and properties		N/A
	Openings dimensions (mm).....		N/A
6.4.8.3.6	Integrity of a fire enclosure, condition met: a), b) or c).....		N/A
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating.....	V-0 enclosure used	N/A
6.4.9	Flammability of insulating liquid.....		N/A
6.5	Internal and external wiring		N/A
6.5.1	Requirements		N/A
6.5.2	Requirements for interconnection to building wiring.....		N/A
6.5.3	Internal wiring size (mm ²) for socket-outlets.....		N/A
6.6	Safeguards against fire due to connection to additional equipment	(See Annex Q.)	N/A
7	INJURY CAUSED BY HAZARDOUS SUBSTANCES		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2	Reduction of exposure to hazardous substances	No hazardous chemicals within the equipment.	N/A
7.3	Ozone exposure		N/A
7.4	Use of personal safeguards (PPE)		N/A
	Personal safeguards and instructions		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010)		—
7.6	Batteries	(See Annex M)	N/A

8	MECHANICALLY-CAUSED INJURY		P
8.2	Mechanical energy source classifications	Sharp edges and corners, classified as MS1 Equipment maximum mass < 7 kg, classified as MS1	P
8.3	Safeguards against mechanical energy sources		N/A
8.4	Safeguards against parts with sharp edges and corners	Accessible edges and corners of the equipment are rounded and are classified as MS1.	P
8.4.1	Safeguards		P
	Instructional Safeguard		P
8.4.2	Sharp edges or corners		P
8.5	Safeguards against moving parts		N/A
8.5.1	Fingers, jewellery, clothing, hair, etc., contact with MS2 or MS3 parts		N/A
	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
	Moving MS3 parts only accessible to skilled person		N/A
8.5.2	Instructional Safeguard		—
8.5.4	Special categories of equipment comprising moving parts		N/A
8.5.4.1	General		N/A
8.5.4.2	Equipment containing work cells with MS3 parts		N/A
8.5.4.2.1	Protection of persons in the work cell		N/A
8.5.4.2.2	Access protection override		N/A
8.5.4.2.2.1	Override system		N/A
8.5.4.2.2.2	Visual indicator		N/A
8.5.4.2.3	Emergency stop system		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Maximum stopping distance from the point of activation (m)..... :		N/A
	Space between end point and nearest fixed mechanical part (mm) :		N/A
8.5.4.2.4	Endurance requirements		N/A
	Mechanical system subjected to 100 000 cycles of operation		N/A
	- Mechanical function check and visual inspection		N/A
	- Cable assembly :		N/A
8.5.4.3	Equipment having electromechanical device for destruction of media		N/A
8.5.4.3.1	Equipment safeguards		N/A
8.5.4.3.2	Instructional safeguards against moving parts ... :		N/A
8.5.4.3.3	Disconnection from the supply		N/A
8.5.4.3.4	Cut type and test force (N)..... :		N/A
8.5.4.3.5	Compliance		N/A
8.5.5	High Pressure Lamps		N/A
	Explosion test..... :		N/A
8.5.5.3	Glass particles dimensions (mm) :		N/A
8.6	Stability of equipment		N/A
8.6.1	Product classification		N/A
	Instructional Safeguard..... :		—
8.6.2	Static stability		N/A
8.6.2.2	Static stability test		N/A
8.6.2.3	Downward Force Test		N/A
8.6.3	Relocation stability test		N/A
	Wheels diameter (mm).....:		—
	Tilt test		
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test (Applied Force).....:		N/A
8.7	Equipment mounted to wall or ceiling		N/A
8.7.1	Mounting Means (Length of screws (mm) and mounting surface) :		N/A
8.7.2	Direction and applied force.....:		N/A
	Test 1, additional downwards force (N).....:		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Test 2, number of attachment points and test force (N).....:		N/A
	Test 3 Nominal diameter (mm) and applied torque (Nm).....:		N/A
8.8	Handles strength		N/A
8.8.1	Classification		N/A
8.8.2	Handle strength test		N/A
	Number of handles.....:		N/A
	Force applied (N)		N/A
8.9	Wheels or casters attachment requirements		N/A
8.9.2	Pull test		N/A
8.10	Carts, stands and similar carriers		N/A
8.10.1	General		N/A
8.10.2	Marking and instructions		N/A
8.10.3	Cart, stand or carrier loading test and compliance		N/A
	Loading force applied (N)		—
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Force applied (N)		—
8.10.6	Thermoplastic temperature stability		N/A
8.11	Mounting means for rack mounted equipment		N/A
8.11.1	General		N/A
8.11.2	Requirements for slide rails		N/A
	Instructional Safeguard.....:		N/A
8.11.3	Mechanical strength test		N/A
8.11.3.1	Downward force test, force (N) applied.....:		N/A
8.11.3.2	Lateral push force test		N/A
8.11.3.3	Integrity of slide rail end stops		N/A
8.11.4	Compliance		N/A
8.12	Telescoping or rod antennas		N/A
	Button/Ball diameter (mm).....:		—

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
9	THERMAL BURN INJURY		P
9.2	Thermal energy source classifications		P
9.3	Touch temperature limits		P
9.3.1	Touch temperatures of accessible parts.....:		P
9.3.2	Test method and compliance		P
9.4	Safeguard against thermal energy sources		P
9.5	Requirements for safeguards		N/A
9.5.1	Equipment safeguard		N/A
9.5.2	Instructional safeguard		N/A
9.6	Requirements for wireless power transmitters		N/A
9.6.1	General		N/A
9.6.2	Specification of the foreign objects		N/A
9.6.3	Test method and compliance	(See appended table 9.6)	N/A

10	RADIATION		N/A
10.2	Radiation energy source classification		N/A
10.2.1	General classification		N/A
	Lasers.....:		—
	Lamps and lamp systems.....:		—
	Image projectors		—
	X-Ray.....:		—
	Personal music player.....:		—
10.3	Safeguards against laser radiation		N/A
	The standard(s) equipment containing laser(s) comply		N/A
10.4	Safeguards against optical radiation from lamps and lamp systems (including LED types)		N/A
10.4.1	General requirements		N/A
	Instructional safeguard provided for accessible radiation level needs to exceed		N/A
	Risk group marking and locati.....:		N/A
	Information for safe operation and installation		N/A
10.4.2	Requirements for enclosures		N/A
	UV radiation exposure	(See Annex C)	N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
10.4.3	Instructional safeguard..... :		N/A
10.5	Safeguards against X-radiation		N/A
10.5.1	Requirements		N/A
	Instructional safeguard for skilled persons..... :		N/A
10.5.3	Maximum radiation (pA/kg)..... :	(See appended tables B.3 & B.4)	N/A
10.6	Protection against acoustic energy sources		N/A
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output LAeq,T, dB(A)		N/A
	Unweighted RMS output voltage (mV)..... :		N/A
	Digital output signal (dBFS)..... :		N/A
10.6.3	Requirements for dose-based systems		N/A
10.6.3.1	General requirements		N/A
10.6.3.2	Dose-based warning and automatic decrease		—
10.6.3.3	Exposure-based warning and requirements		—
	30 s integrated exposure level (MEL30)		—
	Warning for MEL ≥ 100 dB(A)		N/A
10.6.4	Measurement methods		N/A
10.6.5	Protection of persons		—
	Instructional safeguards..... :		N/A
10.6.6	Requirements for listening devices (headphones, earphones, etc.)		—
10.6.6.1	Corded listening devices with analogue input		N/A
	Listening device input voltage (mV)		—
10.6.6.2	Corded listening devices with digital input		—
	Max. acoustic output LAeq,T, dB(A)		—
10.6.6.3	Cordless listening devices		—
	Max. acoustic output LAeq,T, dB(A)		—

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

B	NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS		P
B.1	General		P
B.1.5	Temperature measurement conditions	(See appended table B.1.5)	P
B.2	Normal Operating Conditions		P
B.2.1	General requirements..... :	(See Test Item Particulars and appended test tables)	P
	Audio Amplifiers and equipment with audio amplifiers	Not such equipment.	N/A
B.2.3	Supply voltage and tolerances		N/A
B.2.5	Input test..... :	(See appended table B.2.5)	P
B.3	Simulated abnormal operating conditions		P
B.3.1	General requirements..... :	(See appended table B.3)	N/A
B.3.2	Covering of 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		N/A
B.3.6	Reverse battery polarity	No battery within the EUT	N/A
B.3.7	Abnormal operating conditions as specified in Clause E.2.		N/A
B.3.8	Safeguards functional during and after abnormal operating conditions	All safeguards remained effectively.	P
B.4	Simulated single fault conditions		P
B.4.2	Temperature controlling device open or short-circuited	(See appended table B.4)	N/A
B.4.3	Motor tests		N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature	(See Clause G.5)	N/A
B.4.4	Short circuit of functional insulation		N/A
B.4.4.1	Short circuit of clearances for functional insulation		N/A
B.4.4.2	Short circuit of creepage distances for functional insulation		N/A
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
B.4.5	Short circuit and interruption of electrodes in tubes and semiconductors		N/A
B.4.6	Short circuit or disconnect of passive components		P
B.4.7	Continuous operation of components		N/A
B.4.8	Class 1 and Class 2 energy sources within limits during and after single fault conditions		P
B.4.9	Battery charging under single fault conditions ... :	No battery involved in the EUT	N/A
C	UV RADIATION		N/A
C.1	Protection of materials in equipment from UV radiation		N/A
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
C.2	UV light conditioning test		N/A
C.2.1	Test apparatus		N/A
C.2.2	Mounting of test samples		N/A
C.2.3	Carbon-arc light-exposure apparatus		N/A
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	Electrical energy source classification for audio signals		N/A
	Maximum non-clipped output power (W)		—
	Rated load impedance (Ω)		—
	Open-circuit output voltage (V)		—
	Instructional safeguard	See Clause F.5	—
E.2	Audio amplifier abnormal operating conditions		N/A
	Audio signal source type		N/A
	Audio output power (W).....		—
	Audio output voltage (V).....		—
	Rated load impedance (Ω)		—
	Requirements for temperature measurement	(See Table B.1.5)	N/A
E.3	Audio amplifier abnormal operating conditions	(See Table B.3, B.4)	N/A

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EN 62368-1			
Clause	Requirement + Test		Verdict
F	EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS		P
F.1	General requirements		P
	Instructions – Language	Evaluated the user manual in English version. The manufacturer commits to provide them in the language of the countries where the product will be distributed.	—
F.2	Letter symbols and graphical symbols		P
F.2.1	Letter symbols according to IEC60027-1		P
F.2.2	Graphic symbols IEC, ISO or manufacturer specific		P
F.3	Equipment markings		P
F.3.1	Equipment marking locations	On the product	P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification	See marking	—
F.3.2.2	Model identification	See marking	—
F.3.3	Equipment rating markings		P
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains		P
F.3.3.3	Nature of supply voltage	See marking	—
F.3.3.4	Rated voltage	See marking	—
F.3.3.4	Rated frequency	See marking	—
F.3.3.6	Rated current or rated power		—
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device		N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings		N/A
F.3.5.2	Switch position identification marking		N/A
F.3.5.3	Replacement fuse identification and rating markings		N/A
F.3.5.4	Replacement battery identification marking		N/A
F.3.5.5	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I Equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
F.3.6.1.2	Neutral conductor terminal		N/A
F.3.6.1.3	Protective bonding conductor terminals		N/A
F.3.6.2	Class II equipment (IEC60417-5172)		N/A
F.3.6.2.1	Class II equipment with or without functional earth		N/A
F.3.6.2.2	Class II equipment with functional earth terminal marking		N/A
F.3.7	Equipment IP rating marking	IPX0	—
F.3.8	External power supply output marking	Marked on the label	P
F.3.9	Durability, legibility and permanence of marking	Marking plate was provided on the enclosure and it was legible, permanent and easily discernible.	P
F.3.10	Test for permanence of markings	Complied	P
F.4	Instructions		P
	a)..... Information prior to installation and initial use		P
	b)..... Equipment for use in locations where children not likely to be present		P
	c)..... Instructions for installation and interconnection		P
	d)..... Equipment intended for use only in restricted access area		N/A
	e)..... Equipment intended to be fastened in place		N/A
	f)..... Instructions for audio equipment terminals		N/A
	g)..... Protective earthing used as a safeguard		N/A
	h)..... Protective conductor current exceeding ES2 limits		N/A
	i)..... Graphic symbols used on equipment		P
	j)..... Permanently connected equipment not provided with all-pole mains switch		N/A
	k)..... Replaceable components or modules providing safeguard function		N/A

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EN 62368-1			
Clause	Requirement + Test		Verdict
	l)..... Equipment containing insulating liquid		N/A
	m) Installation instructions for outdoor equipment		N/A
F.5	Instructional safeguards	No instructional safeguard is considered as necessary.	N/A
G	COMPONENTS		N/A
G.1	Switches		N/A
G.1.1	General requirements		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.1.3	Test method and compliance		N/A
G.2	Relays		N/A
G.2.1	General requirements		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		N/A
G.3.1.1a) &b)	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A
G.3.1.1c)	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Thermal cut-off connections maintained and secure		N/A
G.3.2	Thermal links		N/A
G.3.2.1a)	Thermal links separately tested with IEC 60691		N/A
G.3.2.1b)	Thermal links tested as part of the equipment		N/A
	Aging hours (H)		—
	Single Fault Condition		—
	Test Voltage (V) and Insulation Resistance (Ω) :		—
G.3.3	PTC Thermistors	No PTC thermistor provided within the equipment.	N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions.....	(See appended Table B.4)	N/A

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EN 62368-1			
Clause	Requirement + Test		Verdict
G.4	Connectors		N/A
G.4.1	Spacings		N/A
G.4.2	Mains connector configuration		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
G.5	Wound Components		N/A
G.5.1	Wire insulation in wound components.....		N/A
G.5.1.2 a)	Two wires in contact inside wound component, angle between 45° and 90°		N/A
G.5.1.2 b)	Construction subject to routine testing		N/A
G.5.2	Endurance test on wound components		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Time (s)		—
	Temperature (°C)		—
G.5.2.3	Wound Components supplied by mains		N/A
G.5.3	Transformers		N/A
G.5.3.1	Requirements applied (IEC61204-7, IEC61558-1/-2, and/or IEC62368-1)		N/A
	Position		—
	Method of protection		—
G.5.3.2	Insulation		N/A
	Protection from displacement of windings.....		—
G.5.3.3	Overload test		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding Temperatures testing in the unit		N/A
G.5.3.3.3	Winding Temperatures - Alternative test method		N/A
G.5.4	Motors		N/A
G.5.4.1	General requirements		N/A
	Position		—
G.5.4.2	Test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4	Locked-rotor overload test		N/A
	Test duration (days)		—

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
G.5.4.5	Running overload test for d.c. motors in secondary circuits		N/A
G.5.4.5.2	Tested in the unit		N/A
	Electric strength test (V)		—
G.5.4.5.3	Tested on the Bench - Alternative test method; test time (h)		N/A
	Electric strength test (V)		—
G.5.4.6	Locked-rotor overload test for d.c. motors in secondary circuits		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature		N/A
	Electric strength test (V)		N/A
G.5.4.6.3	Tested on the bench - Alternative test method; test time (h)		N/A
	Electric strength test (V)		N/A
G.5.4.7	Motors with capacitors		N/A
G.5.4.8	Three-phase motors		N/A
G.5.4.9	Series motors		N/A
	Operating voltage		—
G.6	Wire Insulation		N/A
G.6.1	General		N/A
G.6.2	Solvent-based enamel wiring insulation		N/A
G.7	Mains supply cords		N/A
G.7.1	General requirements		N/A
	Type.....		—
	Rated current (A)		—
	Cross-sectional area (mm ²), (AWG).....		—
G.7.2	Compliance and test method		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N)		—
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)....		—

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Clause	Requirement + Test	Result - Remark	Verdict
G.7.3.2.4	Strain relief comprised of polymeric material		N/A
G.7.4	Cord Entry		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Test method and compliance		—
	Overall diameter or minor overall dimension, D (mm).....:		—
	Radius of curvature after test (mm).....:		—
G.7.6	Supply wiring space		N/A
G.7.6.1	General requirements		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Requirements		N/A
G.7.6.2.2	Test with 8 mm strand		N/A
G.8	Varistors		N/A
G.8.1	General requirements		N/A
G.8.2	Safeguard against shock		N/A
G.8.2.1	General		N/A
G.8.2.2	Varistor overload test		N/A
G.8.2.3	Temporary overvoltage test		N/A
G.9	Integrated Circuit (IC) Current Limiters		N/A
G.9.1	Requirements		N/A
	IC limiter output current (max. 5A)		—
	Manufacturers' defined drift		—
G.9.2	Test Program		N/A
G.9.3	Compliance		N/A
G.10	Resistors		N/A
G.10.1	General		N/A
G.10.2	Conditioning		N/A
G.10.3	Resistor test		N/A
G.10.4	Voltage surge test		N/A
G.10.5	Impulse test		N/A
G.10.6	Overload test		N/A
G.11	Capacitor and RC units		N/A
G.11.1	General requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	Optocouplers		N/A
	Optocouplers comply with IEC 60747-5-5:2007 Spacing or Electric Strength Test (specify option and test results).....:		N/A
	Type test voltage Vini		—
	Routine test voltage, Vini,b		—
G.13	Printed boards		N/A
G.13.1	General requirements		N/A
G.13.2	Uncoated printed boards		N/A
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
	Compliance with cemented joint requirements (Specify construction).....:		—
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation	(See appended table 5.4.4.5)	N/A
	Number of insulation layers (pcs)		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2	Test method and compliance		N/A
G.14	Coating on components terminals		N/A
G.14.1	Requirements	(See G.13)	N/A
G.15	Liquid filled components		N/A
G.15.1	Requirements		N/A
G.15.2	Test methods and compliance		N/A
G.15.2.1	Hydrostatic pressure test		N/A
G.15.2.2	Creep resistance test		N/A
G.15.2.3	Tubing and fittings compatibility test		N/A
G.15.2.4	Vibration test		N/A
G.15.2.5	Thermal cycling test		N/A
G.15.2.6	Force test		N/A
G.15.3	Compliance		N/A
G.16	IC including capacitor discharge function (ICX)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.16.1	Condition for fault tested is not required		N/A
	ICX with associated circuitry tested in equipment		N/A
	ICX tested separately		N/A
G.16.2	Tests		—
	Smallest capacitance and smallest resistance specified by ICX manufacturer for impulse test:		N/A
	Mains voltage that impulses to be superimposed on.....:		—
	Largest capacitance and smallest resistance for ICX tested by itself for 10000 cycles test		—
G.16.3	Capacitor discharge test		
H	CRITERIA FOR TELEPHONE RINGING SIGNALS		N/A
H.1	General		N/A
H.2	Method A		N/A
H.3	Method B		N/A
H.3.1	Ringing signal		N/A
H.3.1.1	Frequency (Hz)		—
H.3.1.2	Voltage (V)		—
H.3.1.3	Cadence; time (s) and voltage (V)		—
H.3.1.4	Single fault current (mA):.....		—
H.3.2	Tripping device and monitoring voltage		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage complied with		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V)		—
J	INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION		P
	General requirements	(See separate test report)	P
K	SAFETY INTERLOCKS		N/A
K.1	General requirements		N/A
K.2	Components of safety interlock safeguard mechanism	(See Annex G)	N/A
K.3	Inadvertent change of operating mode		N/A
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance	(See appended table B.4)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
K.6	Mechanically operated safety interlocks		N/A
K.6.1	Endurance requirement		N/A
K.6.2	Compliance and Test method		N/A
K.7	Interlock circuit isolation		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements (type and circuit location)		N/A
K.7.2	Overload test, Current (A)		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test	(See appended table 5.4.11)	N/A
L	DISCONNECT DEVICES		N/A
L.1	General requirements		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		P
M.2.1	Batteries and their cells comply with relevant IEC standards		P
M.3	Protection circuits for batteries provided within the equipment		P
M.3.1	Requirements		P
M.3.2	Tests		P
	Overcharging of a rechargeable battery		N/A
	Excessive discharging		N/A
	Unintentional charging of a non-rechargeable battery		P
	Reverse charging of a rechargeable battery		N/A
M.3.3	Compliance	(See appended Tables and Annex M and M.3)	P
M.4	Additional safeguards for equipment containing secondary lithium battery		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.4.1	General		N/A
M.4.2	Charging safeguards		N/A
M.4.2.1	Charging operating limits		N/A
M.4.2.2	Compliance.....:	(See Table M.4.2)	—
M.4.3	Fire Enclosure		N/A
M.4.4	Endurance of equipment containing a secondary lithium battery		N/A
M.4.4	Drop test of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation and procedure for the drop test		N/A
M.4.4.3	Drop, Voltage on reference and dropped batteries (V); voltage difference during 24 h period (%):		N/A
M.4.4.4	Check of the charge/discharge function		N/A
M.4.4.5	Charge / discharge cycle test		N/A
M.4.4.6	Compliance		N/A
M.5	Risk of burn due to short circuit during carrying		N/A
M.5.1	Requirement		N/A
M.5.2	Compliance and Test Method (Test of P.2.3)		N/A
M.6	Safeguards against short-circuits		N/A
M.6.1	External and internal faults		N/A
M.6.2	Compliance		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
	Calculated hydrogen generation rate.....:		N/A
M.7.2	Test method and compliance		N/A
	Minimum air flow rate, Q (m3/h).....:		N/A
M.7.3	Ventilation tests		N/A
M.7.3.1	General		N/A
M.7.3.2	Ventilation test – alternative 1		N/A
	Hydrogen gas concentration (%).....:		N/A
M.7.3.3	Ventilation test – alternative 2		N/A
	Obtained hydrogen generation rate.....:		N/A
M.7.3.4	Ventilation test – alternative 3		N/A
	Hydrogen gas concentration (%).....:		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
M.7.4	Marking.....:		N/A
M.8	Protection against internal ignition from external spark sources of batteries with aqueous electrolyte		N/A
M.8.1	General 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		N/A
	Instructional safeguard.....:		N/A
N	ELECTROCHEMICAL POTENTIALS		N/A
	Metal(s) used	Pollution degree considered	—
O	MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES		P
	Value of X (mm)		—
P	SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS		N/A
P.1	General requirements	No openings	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

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

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Clause	Requirement + Test	Result - Remark	Verdict
	Conditioning (°C).....:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	Flammability test for fire enclosure and fire barrier integrity		N/A
	Samples, material		—
	Wall thickness (mm).....:		—
	Conditioning (°C).....:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	Test specimen does not show any additional hole		N/A
S.3	Flammability test for the bottom of a fire enclosure		N/A
	Samples, material		—
	Wall thickness (mm).....:		—
	Cheesecloth did not ignite		N/A
S.4	Flammability classification of materials		N/A
S.5	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W		N/A
	Samples, material		—
	Wall thickness (mm).....:		—
	Conditioning (test condition), (°C).....:		—
	Test flame according to IEC 60695-11-20 with conditions as set out		N/A
	After every test specimen was not consumed completely		N/A
	After fifth flame application, flame extinguished within 1 min		N/A
T	MECHANICAL STRENGTH TESTS		N/A
T.1	General requirements		N/A
T.2	Steady force test, 10 N	(See appended table T.2)	N/A
T.3	Steady force test, 30 N	(See appended table T.3)	N/A
T.4	Steady force test, 100 N	(See appended table T.4)	N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
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	(See appended table T.7)	N/A
T.8	Stress relief test	(See appended table T.8)	N/A
T.9	Impact Test (glass)		N/A
T.9.1	General requirements		N/A
T.9.2	Impact test and compliance		N/A
	Impact energy (J).....		—
	Height (m)		—
T.10	Glass fragmentation test	(See sub-clause 4.4.4.9)	N/A
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm)		—
U	MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION		N/A
U.1	General requirements		N/A
U.2	Compliance and test method for non-intrinsically protected CRTs		N/A
U.3	Protective Screen.....	(See Annex T)	N/A
V	DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)		N/A
V.1	Accessible parts of equipment		N/A
V.1.1	General		N/A
V.1.2	Surfaces and openings tested with jointed test probes		N/A
V.1.3	Openings tested with straight unjointed test probes		N/A
V.1.4	Plugs, jacks, connectors tested with blunt probe		N/A
V.1.5	Slot openings tested with wedge probe		N/A
V.1.6	Terminals tested with rigid test wire		N/A
V.2	Accessible part criterion		N/A
X	ALTERNATIVE METHOD FOR DETERMINING CLEARANCES FOR INSULATION IN CIRCUITS CONNECTED TO AN AC MAINS NOT EXCEEDING 420 V PEAK (300 V RMS)		N/A
	Clearance.....	(See appended table X)	N/A
Y	CONSTRUCTION REQUIREMENTS FOR OUTDOOR ENCLOSURES		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Y.1	General		N/A
Y.2	Resistance to UV radiation		N/A
Y.3	Resistance to corrosion		N/A
Y.3.1	Metallic parts of outdoor enclosures are resistant to effects of water-borne contaminants by :		N/A
Y.3.2	Test apparatus		N/A
Y.3.3	Water – saturated sulphur dioxide atmosphere		N/A
Y.3.4	Test procedure :		N/A
Y.3.5	Compliance		N/A
Y.4	Gaskets		N/A
Y.4.1	General		N/A
Y.4.2	Gasket tests		N/A
Y.4.3	Tensile strength and elongation tests		N/A
	Alternative test methods :		N/A
Y.4.4	Compression test		N/A
Y.4.5	Oil resistance		N/A
Y.4.6	Securing means	(See Annex P.4)	N/A
Y.5	Protection of equipment within an outdoor enclosure		N/A
Y.5.1	General		N/A
Y.5.2	Protection from moisture		N/A
	Relevant tests of IEC 60529 or Y.5.3 :		N/A
Y.5.3	Water spray test		N/A
Y.5.4	Protection from plants and vermin		N/A
Y.5.5	Protection from excessive dust		N/A
Y.5.5.1	General		N/A
Y.5.5.2	IP5X equipment		N/A
Y.5.5.3	IP6X equipment		N/A
Y.6	Mechanical strength of enclosures		N/A
Y.6.1	General		N/A
Y.6.2	Impact test :	(See Table T.6)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict

4.1.2	TABLE: List of critical components	P
-------	------------------------------------	---

Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity1)
PCB	KINGBOARD LAMINATES HOLDINGS LTD	KB-5150	V-0, 130°C	EN IEC 62368-1	UL E123995 and tested with appliance
Plastic enclosure	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	ANC161	V-0, 60°C, 1.2mm	EN IEC 62368-1	UL E162823 and tested with appliance
Lithium metal battery	Panasonic Corporation	CR2450	3.0VDC, 620mAh	IEC 60086-4	CB: NL-69054



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5.2	Table: Classification of electrical energy sources							P
5.2.2.2 – Steady State Voltage and Current conditions								
No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters				ES Class
				U (V)	I (mA)	Type ¹⁾	Additional Info ²⁾	
1	3VDC	Input terminal	Normal	3VDC	--	SS	--	ES1
			Abnormal	3VDC	--	SS	--	
			Single fault – SC/OC	3VDC	--	SS	--	
Supplementary information:								
1) Type: Steady state (SS), Capacitance (CP), Single pulse (SP), Repetitive pulses (RP), etc.								
2) Additional Info: Frequency, Pulse duration, Pulse off time, Capacitance value, etc.								

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

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

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Clause	Requirement + Test	Result - Remark	Verdict

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, 5.4.3	TABLE: Minimum Clearances/Creepage distance						N/A
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequency (kHz) ¹	Required cl (mm)	cl (mm) ²	Required ³ cr (mm)	cr (mm)
Supplementary information:							
Note 1: Only for frequency above 30 kHz							
Note 2: See table 5.4.2.4 if this is based on electric strength test							
Note 3: Provide Material Group							

5.4.4.2	TABLE: Minimum distance through insulation					N/A
Distance through insulation di at/of:	Peak voltage (V)	Frequency (kHz)	Material	Required DTI (mm)	DTI (mm)	
Supplementary information:						

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

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Clause	Requirement + Test	Result - Remark	Verdict

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

5.5.2.2	TABLE: Stored discharge on capacitors					N/A
Supply Voltage (V), Hz	Test Location	Operating Condition (N, S)	Switch position On or off	Measured Voltage (after 2 seconds)	ES Classification	
Supplementary information:						
X-capacitors installed for testing are:						
☐ bleeding resistor rating:						
☐ ICX:						
Notes:						
A. Test Location:						
Phase to Neutral; Phase to Phase; Phase to Earth; and/or Neutral to Earth						
B. Operating condition abbreviations:						
N – Normal operating condition (e.g., normal operation, or open fuse); S –Single fault condition						

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

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

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

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

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Clause	Requirement + Test	Result - Remark	Verdict

6.2.2	Table: Electrical power sources (PS) measurements for classification					P
Source	Description	Measurement	Max Power after 3 s	Max Power after 5 s ^{*)}	PS Classification	
Input	Normal	Power (mW):	28.62	--	PS1	
		V _A (V) :	3.0	--		
		I _A (mA) :	9.54	--		
Supplementary information: Abbreviation: SC= short circuit; OC= open circuit Measured after 3 s for PS1 and measured after 5 s for PS2 and PS3.						

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

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Clause	Requirement + Test	Result - Remark	Verdict

6.2.3.2	Table: Determination of Potential Ignition Sources (Resistive PIS)				N/A
Circuit Location (x-y)	Operating Condition (Normal / Describe Single Fault)	Measured wattage or VA During first 30 s (W / VA)	Measured wattage or VA After 30 s (W / VA)	Protective Circuit, Regulator, or PTC Operated? Yes / No (Comment)	Resistive PIS? Yes/No
--	--	--	--	--	--
Supplementary Information: A combination of voltmeter, VA and ammeter IA may be used instead of a wattmeter. If a separate voltmeter and ammeter are used, the product of (VA x IA) is used to determine Resistive PIS classification. A Resistive PIS: (a) dissipates more than 15 W, measured after 30 s of normal operation, <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.					

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

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Clause	Requirement + Test	Result - Remark	Verdict

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

5.4.1.4, 9.3, B.1.5, B.2.6	TABLE: Temperature measurements							P
Supply voltage (V)..... :		3VDC		--		--		—
Ambient T _{min} (°C)..... :		23.8	40.0	--	--	--	--	—
Ambient T _{max} (°C)..... :		23.9	40.0	--	--	--	--	—
Maximum measured temperature T of part/at.....:		T (°C)						Allowed T _{max} (°C)
PCB		28.9	45.1	--	--	--	--	130
Plastic enclosure		25.4	41.6	--	--	--	--	48
Q3 body		32.8	49.0	--	--	--	--	Ref.
U1 body		34.1	50.3	--	--	--	--	Ref.
Supplementary information:								
Temperature T of winding:		t ₁ (°C)	R ₁ (Ω)	t ₂ (°C)	R ₂ (Ω)	T (°C)	Allowed T _{max} (°C)	Insulation class
Supplementary information: N/A								

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Clause	Requirement + Test	Result - Remark	Verdict

B.2.5	TABLE: Input test						P
U (V)	I (mA)	I rated (mA)	P (mW)	P rated (mW)	Fuse No	I fuse (mA)	Condition/status
3.0	9.54	10.0	28.62	--	--	--	Max normal load

B.3, B.4	TABLE: Abnormal operating condition tests							P
Ambient temperature (°C)					25°C if not mentioned			—
Power source for EUT: Manufacturer, model/type, output rating ..					See page 2			—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
R23	S-C	3VDC	10min	--	--	--	--	No hazard, no broken
C65	S-C	3VDC	10min	--	--	--	--	No hazard, no broken
U1	S-C	3VDC	10min	--	--	--	--	No hazard, no broken
Q3	S-C	3VDC	10min	--	--	--	--	No hazard, no broken
Supplementary information:								

M.3	TABLE: Protection circuits for batteries provided within the equipment						P
Is it possible to install the battery in a reverse polarity position? :				No		—	
Equipment Specification	Charging						
	Voltage (V)			Current (A)			
--	--			--			
Manufacturer/type	Battery specification						
	Non-rechargeable batteries		Rechargeable batteries				
	Discharging current (A)	Unintentional charging current (A)	Charging		Discharging current (A)	Reverse charging current (A)	
			Voltage (V)	Current (A)			
CR2450	9.54mA	0.02mA	--	--	--	--	
Note: The tests of M.3.2 are applicable only when above appropriate data is not available.							
Specified battery temperature (°C)..... :				--		--	
Component No.	Fault condition	Charge/discharge mode	Test time	Temp. (°C)	Current (A)	Voltage (V)	Observation

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EN 62368-1							
Clause	Requirement + Test				Result - Remark		Verdict
--	--	--	--	--	--	--	--
Supplementary information: Abbreviation: SC= short circuit; OC= open circuit NL= no chemical leakage; NS= no spillage of liquid; NE= no explosion; NF= no emission of flame or expulsion of molten metal.							

M.4.2	TABLE: Charging safeguards for equipment containing a secondary lithium battery					N/A
Maximum specified charging voltage (V)						—
Maximum specified charging current (A)						—
Highest specified charging temperature (°C)						
Lowest specified charging temperature (°C)						
Battery manufacturer/type	Operating and fault condition	Measurement			Observation	
		Charging voltage (V)	Charging current (A)	Temp. (°C)		
Supplementary information:						
Abbreviation: SC= short circuit; OC= open circuit; MSCV= maximum specified charging voltage; MSCC= maximum specified charging current; HSCT= highest specified charging temperature; LSCT= lowest specified charging temperature						

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

T.2, T.3, T.4, T.5	TABLE: Steady force test					N/A
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation	

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Supplementary information:

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

Supplementary information:

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

Supplementary information:

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

Supplementary information:

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

Supplementary information:

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-Appendix 1: For requirements of European group differences.

ATTACHMENT TO TEST REPORT IEC 62368-1 EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES (Audio/video, information and communication technology equipment Part 1: Safety requirements)	
Differences according to	EN IEC 62368-1:2020+A11:2020
Attachment Form No	EU_GD_IEC62368_1C
Attachment Originator	UL(Demko)
Master Attachment	2020-03-10
Copyright © 2020 IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components (IECEE)	

	CENELEC COMMON MODIFICATIONS (EN)		P
	Clause numbers in the cells that are shaded light grey are clause references in EN IEC 62368-1:2020+A11:2020. All other clause numbers in that column, except for those in the paragraph below, refers to IEC 62368-1:2018. Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2018 are prefixed “Z”.		P
	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords		N/A
1	Modification to Clause 3 .		P
3.3.19	Sound exposure Replace 3.3.19 of IEC 62368-1 with the following definitions:		P
1	Add the following note: NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.		N/A

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

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Clause	Requirement + Test	Result - Remark	Verdict
	intended for use by an ordinary person, that: – is designed to allow the user to listen to audio or audiovisual content / material; and – uses a listening device, such as headphones or earphones that can be worn in or on or around the ears; and – has a player that can be body worn (of a size suitable to be carried in a clothing pocket) and is intended for the user to walk around with while in continuous use (for example, on a street, in a subway, at an airport, etc.). EXAMPLES Portable CD players, MP3 audio players, mobile phones with MP3 type features, PDAs or similar equipment. Personal music players shall comply with the requirements of either 10.6.2 or 10.6.3. NOTE 1 Protection against acoustic energy sources from telecom applications is referenced to ITU-T P.360. NOTE 2 It is the intention of the Committee to allow the alternative methods for now, but to only use the dose measurement method as given in 10.6.5 in future. Therefore, manufacturers are encouraged to implement 10.6.5 as soon as possible. Listening devices sold separately shall comply with the requirements of 10.6.6. These requirements are valid for music or video mode only. The requirements do not apply to: – professional equipment; NOTE 3 Professional equipment is equipment sold through special sales channels. All products sold through normal electronics stores are considered not to be professional equipment. – hearing aid equipment and other devices for assistive listening; – the following type of analogue personal music players: • long distance radio receiver (for example, a multiband radio receiver or world band radio receiver, an AM radio receiver), and • cassette player/recorder;		

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Clause	Requirement + Test	Result - Remark	Verdict
	NOTE 4 This exemption has been allowed because this technology is falling out of use and it is expected that within a few years it will no longer exist. This exemption will not be extended to other technologies. – a player while connected to an external amplifier that does not allow the user to walk around while in use. For equipment that is clearly designed or intended primarily for use by children, the limits of the relevant toy standards may apply. The relevant requirements are given in EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		
10.6.1.2	Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body mounted devices, attention is drawn to EN 50360 and EN 50566.		N/A
10.6.2	Classification of devices without the capacity to estimate sound dose		N/A
10.6.2.1	General This standard is transitioning from short-term based (30 s) requirements to long-term based (40 hour) requirements. These clauses remain in effect only for devices that do not comply with sound dose estimation as stipulated in EN 50332-3. For classifying the acoustic output $LA_{eq,T}$, measurements are based on the A-weighted equivalent sound pressure level over a 30 s period. For music where the average sound pressure (long term $LA_{eq,T}$) measured over the duration of the song is lower than the average produced by the programme simulation noise, measurements may be done over the duration of the complete song. In this case, T becomes the duration of the song. NOTE Classical music, acoustic music and broadcast		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	typically has an average sound pressure (long term $LA_{eq,T}$) which is much lower than the average programme simulation noise. Therefore, if the player is capable to analyse the content and compare it with the programme simulation noise, the warning does not need to be given as long as the average sound pressure of the song does not exceed the required limit. For example, if the player is set with the programme simulation noise to 85 dB, but the average music level of the song is only 65 dB, there is no need to give a warning or ask an acknowledgement as long as the average sound level of the song is not above the basic limit of 85 dB.		
10.6.2.2	RS1 limits (to be superseded, see 10.6.3.2) RS1 is a class 1 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $LA_{eq,T}$ acoustic output shall be ≤ 85 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 27 mV (analogue interface) or -25 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1. – The RS1 limits will be updated for all devices as per 10.6.3.2.		N/A
10.6.2.3	RS2 limits (to be superseded, see 10.6.3.3) RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or when the combination of player and listening device is known by other means such as setting or automatic detection, the $LA_{eq,T}$ acoustic output shall be ≤ 100 dB(A) when playing the fixed “programme simulation noise” as described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 150 mV (analogue interface) or -10 dBFS (digital interface) when playing the fixed “programme simulation noise”		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	as described in EN 50332-1.		
10.6.2.4	RS3 limits RS3 is a class 3 acoustic energy source that exceeds RS2 limits.		N/A
10.6.3	Classification of devices (new)		N/A
10.6.3.1	General Previous limits (10.6.2) created abundant false negative and false positive PMP sound level warnings. New limits, compliant with The Commission Decision of 23 June 2009, are given below.		N/A
10.6.3.2	RS1 limits (new) RS1 is a class 1 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the $L_{Aeq,T}$ acoustic output shall be ≤ 80 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output voltage shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1.		N/A
10.6.3.3	RS2 limits (new) RS2 is a class 2 acoustic energy source that does not exceed the following: – for equipment provided as a package (player with its listening device), and with a proprietary connector between the player and its listening device, or where the combination of player and listening device is known by other means such as setting or automatic detection, the weekly sound exposure level, as described in EN 50332-3, shall be ≤ 80 dB when playing the fixed “programme simulation noise” described in EN 50332-1. – for equipment provided with a standardized connector (for example, a 3,5 phone jack) that allows connection to a listening device for general use, the unweighted r.m.s. output level, integrated over one week, as described in EN50332-3, shall be ≤ 15 mV (analogue interface) or -30 dBFS (digital interface) when playing the fixed “programme simulation noise” described in EN 50332-1.		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
10.6.4	Requirements for maximum sound exposure		N/A
10.6.4.1	Measurement methods All volume controls shall be turned to maximum during tests. Measurements shall be made in accordance with EN 50332-1 or EN 50332-2 as applicable.		N/A
10.6.4.2	Protection of persons Except as given below, protection requirements for parts accessible to ordinary persons, instructed persons and skilled persons are given in 4.3. NOTE 1 Volume control is not considered a safeguard . Between RS2 and an ordinary person , the basic safeguard may be replaced by an instructional safeguard in accordance with Clause F.5, except that the instructional safeguard shall be placed on the equipment, or on the packaging, or in the instruction manual. Alternatively, the instructional safeguard may be given through the equipment display during use. The elements of the instructional safeguard shall be as follows:  – element 1a: the symbol  , IEC 60417-6044 (2011-01) – element 2: “High sound pressure” or equivalent wording – element 3: “Hearing damage risk” or equivalent wording – element 4: “Do not listen at high volume levels for long periods.” or equivalent wording An equipment safeguard shall prevent exposure of an ordinary person to an RS2 source without intentional physical action from the ordinary person and shall automatically return to an output level not exceeding what is specified for an RS1 source when the power is switched off. The equipment shall provide a means to actively inform the user of the increased sound level when the equipment is operated with an output exceeding RS1. Any means used shall be acknowledged by the user before activating a mode of operation which allows for an output exceeding RS1. The acknowledgement does not need to be repeated more than once every		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	20 h of cumulative listening time. NOTE 2 Examples of means include visual or audible signals. Action from the user is always needed. NOTE 3 The 20 h listening time is the accumulative listening time, independent of how often and how long the personal music player has been switched off. A skilled person shall not be unintentionally exposed to RS3.		
10.6.5	Requirements for dose-based systems		N/A
10.6.5.1	General requirements Personal music players shall give the warnings as provided below when tested according to EN 50332-3, using the limits from this clause. The manufacturer may offer optional settings to allow the users to modify when and how they wish to receive the notifications and warnings to promote a better user experience without defeating the safeguards. This allows the users to be informed in a method that best meets their physical capabilities and device usage needs. If such optional settings are offered, an administrator (for example, parental restrictions, business/educational administrators, etc.) shall be able to lock any optional settings into a specific configuration. The personal music player shall be supplied with easy to understand explanation to the user of the dose management system, the risks involved, and how to use the system safely. The user shall be made aware that other sources may significantly contribute to their sound exposure, for example work, transportation, concerts, clubs, cinema, car races, etc.		N/A
10.6.5.2	Dose-based warning and requirements When a dose of 100 % CSD is reached, and at least at every 100 % further increase of CSD, the device shall warn the user and require an acknowledgement. In case the user does not acknowledge, the output level shall automatically decrease to compliance with class RS1. The warning shall at least clearly indicate that listening above 100 % CSD leads to the risk of hearing damage or loss.		N/A
10.6.5.3	Exposure-based requirements With only dose-based requirements, cause and effect could be far separated in time, defying the purpose of		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	educating users about safe listening practice. In addition to dose-based requirements, a PMP shall therefore also put a limit to the short-term sound level a user can listen at. The exposure-based limiter (EL) shall automatically reduce the sound level not to exceed 100 dB(A) or 150 mV integrated over the past 180 s, based on methodology defined in EN 50332-3. The EL settling time (time from starting level reduction to reaching target output) shall be 10 s or faster. Test of EL functionality is conducted according to EN 50332-3, using the limits from this clause. For equipment provided as a package (player with its listening device), the level integrated over 180 s shall be 100 dB or lower. For equipment provided with a standardized connector, the unweighted level integrated over 180 s shall be no more than 150 mV for an analogue interface and no more than -10 dBFS for a digital interface. NOTE In case the source is known not to be music (or test signal), the EL may be disabled.		

10.6.6	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.6.1	Corded listening devices with analogue input With 94 dB LAeq acoustic pressure output of the listening device, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the input voltage of the listening device when playing the fixed "programme simulation noise" as described in EN 50332-1 shall be ≥ 75 mV. NOTE The values of 94 dB and 75 mV correspond with 85 dB and 27 mV or 100 dB and 150 mV.		N/A
10.6.6.2	Corded listening devices with digital input With any playing device playing the fixed "programme simulation noise" described in EN 50332-1, and with the volume and sound settings in the listening device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output, the LAeq,T acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.		N/A
10.6.6.3	Cordless listening devices		N/A

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EN 62368-1						
Clause	Requirement + Test			Result - Remark		Verdict
	In cordless mode, – with any playing and transmitting device playing the fixed programme simulation noise described in EN 50332-1; and – respecting the cordless transmission standards, where an air interface standard exists that specifies the equivalent acoustic level; and – with volume and sound settings in the receiving device (for example, built-in volume level control, additional sound features like equalization, etc.) set to the combination of positions that maximize the measured acoustic output for the above mentioned programme simulation noise, the $L_{Aeq,T}$ acoustic output of the listening device shall be ≤ 100 dB with an input signal of -10 dBFS.					
10.6.6.4	Measurement method <i>Measurements shall be made in accordance with EN 50332-2 as applicable.</i>					N/A
3	Modification to the whole document					N/A
	Delete all the “country” notes in the reference document according to the following list:					N/A
	0.2.1	Note 1 and 2	1	Note 4 and 5	3.3.8.1	Note 2
	3.3.8.3	Note 1	4.1.15	Note	4.7.3	Note 1 and 2
	5.2.2.2	Note	5.4.2.3.2.2 Table 12	Note c	5.4.2.3.2.4	Note 1 and 3
	5.4.2.3.2.4 Table 13	Note 2	5.4.2.5	Note 2	5.4.5.1	Note
	5.4.10.2.1	Note	5.4.10.2.2	Note	5.4.10.2.3	Note
	5.5.2.1	Note	5.5.6	Note	5.6.4.2.1	Note 2 and 3 and 4
	5.6.8	Note 2	5.7.6	Note	5.7.7.1	Note 1 and Note 2
	8.5.4.2.3	Note	10.2.1 Table 39	Note 3 and 4 and 5	10.5.3	Note 2
	10.6.4	Note 3	F.3.3.6	Note 3	Y.4.1	Note
	Y.4.5	Note				
4	Modification to Clause 1					N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
1	Add the following note: <i>NOTE Z1 The use of certain substances in electrical and electronic equipment is restricted within the EU: see Directive 2011/65/EU.</i>		N/A
5	Modification to 4.21		N/A
4.21	Add the following new subclause after 4.9: To protect against excessive current, short-circuits and earth faults in circuits connected to an a.c. mains, protective devices shall be included either as integral parts of the equipment or as parts of the building installation, subject to the following, a), b) and c): a) except as detailed in b) and c), protective devices necessary to comply with the requirements of B.3.1 and B.4 shall be included as parts of the equipment; b) for components in series with the mains input to the equipment such as the supply cord, appliance coupler, r.f.i. filter and switch, short-circuit and earth fault protection may be provided by protective devices in the building installation; c) it is permitted for pluggable equipment type B or permanently connected equipment, to rely on dedicated overcurrent and short-circuit protection in the building installation, provided that the means of protection, e.g. fuses or circuit breakers, is fully specified in the installation instructions. If reliance is placed on protection in the building installation, the installation instructions shall so state, except that for pluggable equipment type A the building installation shall be regarded as providing protection in accordance with the rating of the wall socket outlet.		N/A
6	Modification to 5.4.2.3.2.4		N/A
5.4.2.3.2.4	Add the following to the end of this subclause: The requirement for interconnection with external circuit is in addition given in EN 50491-3:2009.		N/A
7	Modification to 10.2.		N/A
10.2.1	Add the following to ^{c)} and ^{d)} in table 39: For additional requirements, see 10.5.1.		N/A
8	Modification to 10.5.1		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
10.5.1	Add the following after the first paragraph: For RS 1 compliance is checked by measurement under the following conditions: In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or pre-sets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made. NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm², at any point 10 cm from the outer surface of the apparatus. Moreover, the measurement shall be made under fault conditions causing an increase of the high voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made. For RS1, the dose-rate shall not exceed 1 µSv/h taking account of the background level. NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		N/A
9	Modification to G.7.1		N/A
G.7.1	Add the following note: NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A
10	Modification to Bibliography		N/A

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EN 62368-1			
Clause	Requirement + Test		Verdict
	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 61843-1 NOTE Harmonized as EN 61843-1. IEC 61843-21 NOTE Harmonized as EN 61843-21. IEC 61843-311 NOTE Harmonized as EN 61843-311. IEC 61843-321 NOTE Harmonized as EN 61843-321. IEC 61843-331 NOTE Harmonized as EN 61843-331.		N/A
11	ADDITION OF ANNEXES		N/A
ZB	ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)		N/A
4.1.15	Denmark, Finland, Norway and Sweden To the end of the subclause the following is added: Class I pluggable equipment type A intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and accessible parts, have a marking stating that the equipment shall be connected to an earthed mains socket-outlet. The marking text in the applicable countries shall be as follows: In Denmark : "Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord." In Finland : "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In Norway : "Apparatet må tilkoples jordet stikkontakt" In Sweden : "Apparaten skall anslutas till jordat uttag"		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.7.3	United Kingdom To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex		N/A
5.2.2.2	Denmark After the 2nd paragraph add the following: A warning (marking safeguard) for high touch current is required if the touch current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.4.11.1 and Annex G	Finland and Sweden To the end of the subclause the following is added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5 kV. It is permitted to bridge this insulation with a		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: - the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; - the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		
5.5.2.1	Norway After the 3rd paragraph the following is added: Due to the IT power system used, capacitors are required to be rated for the applicable line-to-line voltage (230 V).		N/A
5.5.6	Finland, Norway and Sweden To the end of the subclause the following is added: Resistors used as basic safeguard or bridging basic insulation in class I pluggable equipment type A shall comply with G.10.1 and the test of G.10.2.		N/A
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> In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		N/A
5.6.4.2.1	Ireland and United Kingdom After the indent for pluggable equipment type A, the following is added: – the protective current rating is taken to be 13 A, this being the largest rating of fuse used in the mains plug.		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.6.4.2.1	France After the indent for pluggable equipment type A , the following is added: – in certain cases, the protective current rating of the circuit supplied from the mains is taken as 20 A instead of 16 A.		N/A
5.6.5.1	To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm ² to 1,5 mm ² in cross-sectional area.		N/A
5.6.8	Norway To the end of the subclause the following is added: Equipment connected with an earthed mains plug is classified as class I equipment . See the Norway marking requirement in 4.1.15. The symbol IEC 60417-6092, as specified in F.3.6.2, is accepted.		N/A
5.7.6	Denmark To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the protective conductor current exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.7.6.2	Denmark To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .		N/A
5.7.7.1	Norway and Sweden To the end of the subclause the following is added: 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:		N/A

IEC62368_1C

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	“Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)” NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): “Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplede utstyr – og er tilkoplede 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.”		
8.5.4.2.3	United Kingdom Add the following after the 2nd dash bullet in 3rd paragraph: An emergency stop system complying with the requirements of IEC 60204-1 and ISO 13850 is required where there is a risk of personal injury.		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		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	equipment, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the direct plug-in equipment, until the requirements of Annexes B.3.1 and B.4 are met		
G.4.2	Denmark To the end of the subclause the following is added: Supply cords of single phase appliances having a rated current not exceeding 13 A shall be provided with a plug according to DS 60884-2-D1:2011. CLASS I EQUIPMENT provided with socket-outlets with earth contacts or which are intended to be used in locations where protection against indirect contact is required according to the wiring rules shall be provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having a RATED CURRENT exceeding 13 A or if a polyphase equipment is provided with a supply cord with a plug, this plug shall be in accordance with the standard sheets DK 6-1a in DS 60884-2-D1 or EN 60309-2. Mains socket outlets intended for providing power to Class II apparatus with a rated current of 2,5 A shall be in accordance DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets shall be in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth shall be in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a Justification: Heavy Current Regulations, Section 6c		N/A
G.4.2	United Kingdom To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an		N/A

IEC62368_1C

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	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)		N/A

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EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
10.5.2	Germany The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization is required, or application of type approval (Bauartzulassung) and marking. <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		N/A
ZD	IEC and CENELEC CODE DESIGNATIONS FOR FLEXIBLE CORDS (EN)		N/A

IEC62368_1C

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EN 62368-1								
Clause	Requirement + Test	Result - Remark	Verdict					
	<table><tr><th rowspan="2">Type of flexible cord</th><th colspan="2">Code designations</th></tr><tr><th>IEC</th><th>CENELEC</th></tr></table>		Type of flexible cord	Code designations		IEC	CENELEC	N/A
	Type of flexible cord	Code designations						
		IEC	CENELEC					
	PVC insulated cords							
	Flat twin tinsel cord	60227 IEC 41	H03VH-Y					
	Light polyvinyl chloride sheathed flexible cord	60227 IEC 52	H03VV-F H03VVH2-F					
	Ordinary polyvinyl chloride sheathed flexible cord	60227 IEC 53	H05VV-F H05VVH2-F					
	Rubber insulated cords							
	Braided cord	60245 IEC 51	H03RT-F					
	Ordinary tough rubber sheathed flexible cord	60245 IEC 53	H05RR-F					
	Ordinary polychloroprene sheathed flexible cord	60245 IEC 57	H05RN-F					
	Heavy polychloroprene sheathed flexible cord	60245 IEC 66	H07RN-F					
	Cords having high flexibility							
	Rubber insulated and sheathed cord	60245 IEC 86	H03RR-H					
	Rubber insulated, crosslinked PVC sheathed cord	60245 IEC 87	H03RV4-H					
	Crosslinked PVC insulated and sheathed cord	60245 IEC 88	H03V4V4-H					
	Cords insulated and sheathed with halogen-free thermoplastic compounds							
	Light halogen-free thermoplastic insulated and sheathed flexible cords		H03Z1Z1-F H03Z1Z1H2-F					
	Ordinary halogen-free thermoplastic insulated and sheathed flexible cords		H05Z1Z1-F H05Z1Z1H2-F					

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-Appendix 2: Photo document.



Photo 1: Overall view

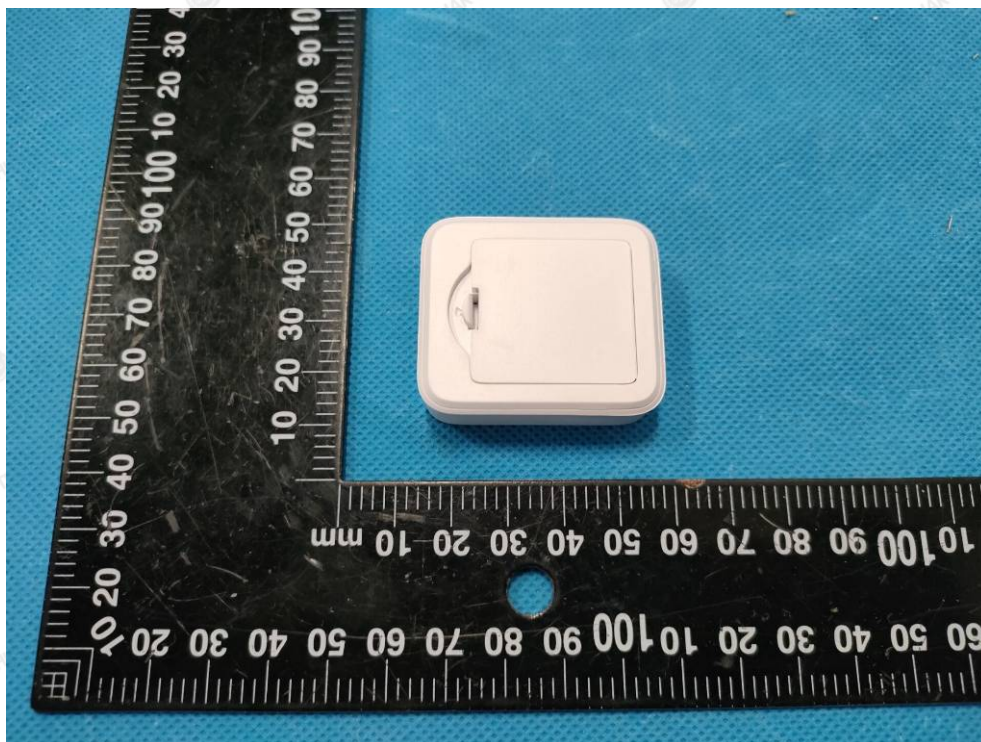


Photo 2: Overall view

IEC62368_1C

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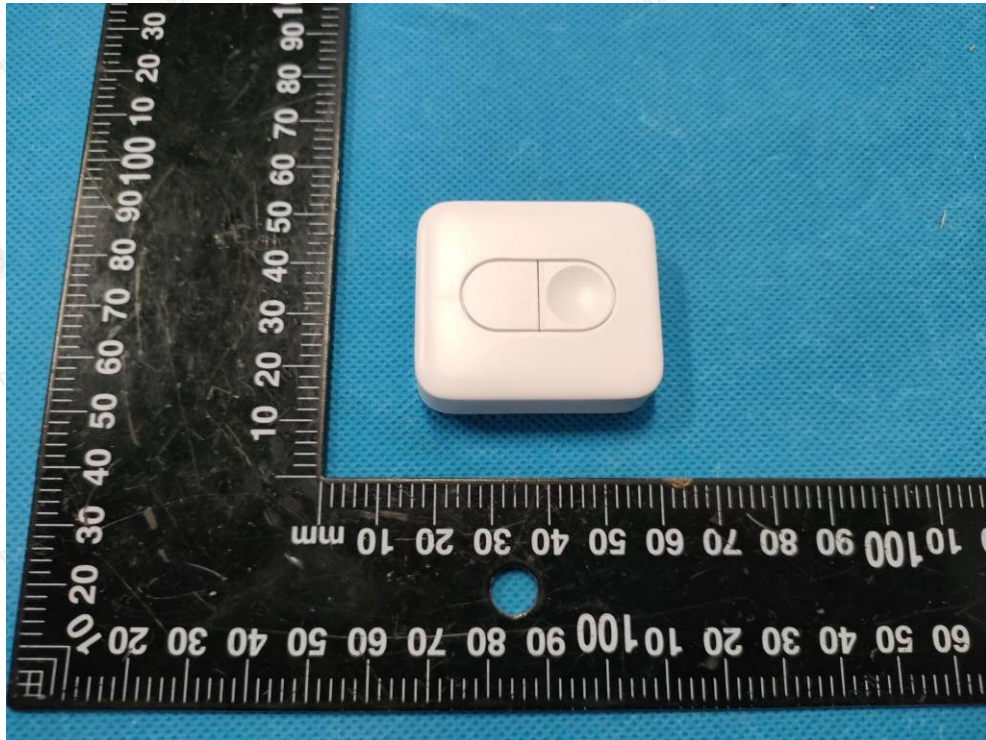


Photo 3: Overall view

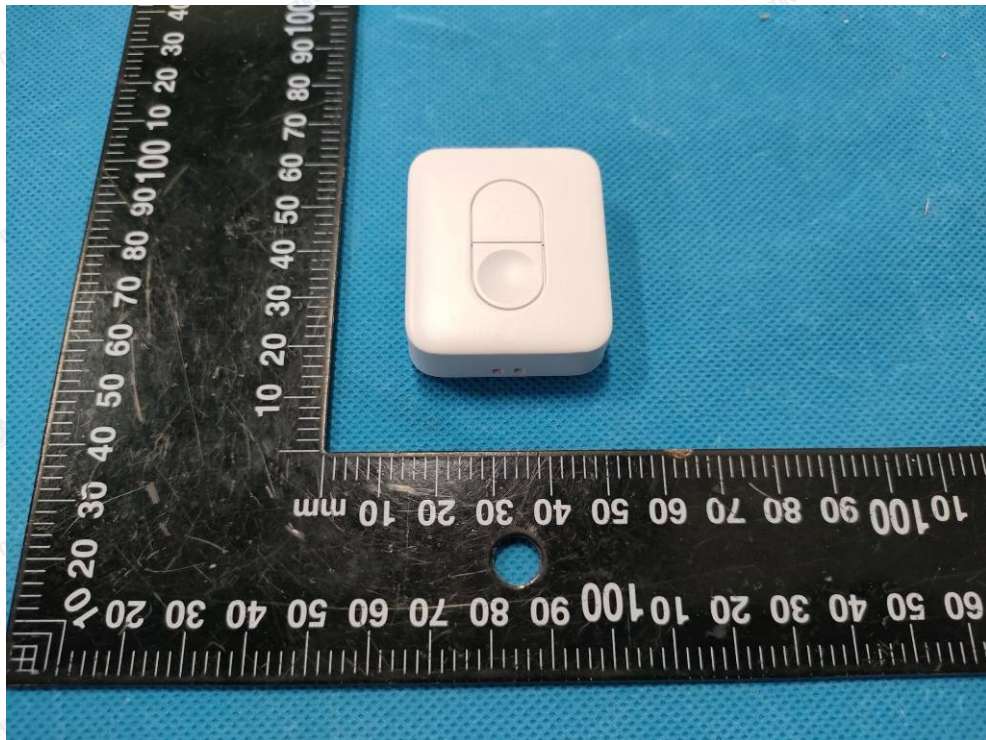


Photo 4: Overall view

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Photo 5: Overall view



Photo 6: Internal view

IEC62368_1C

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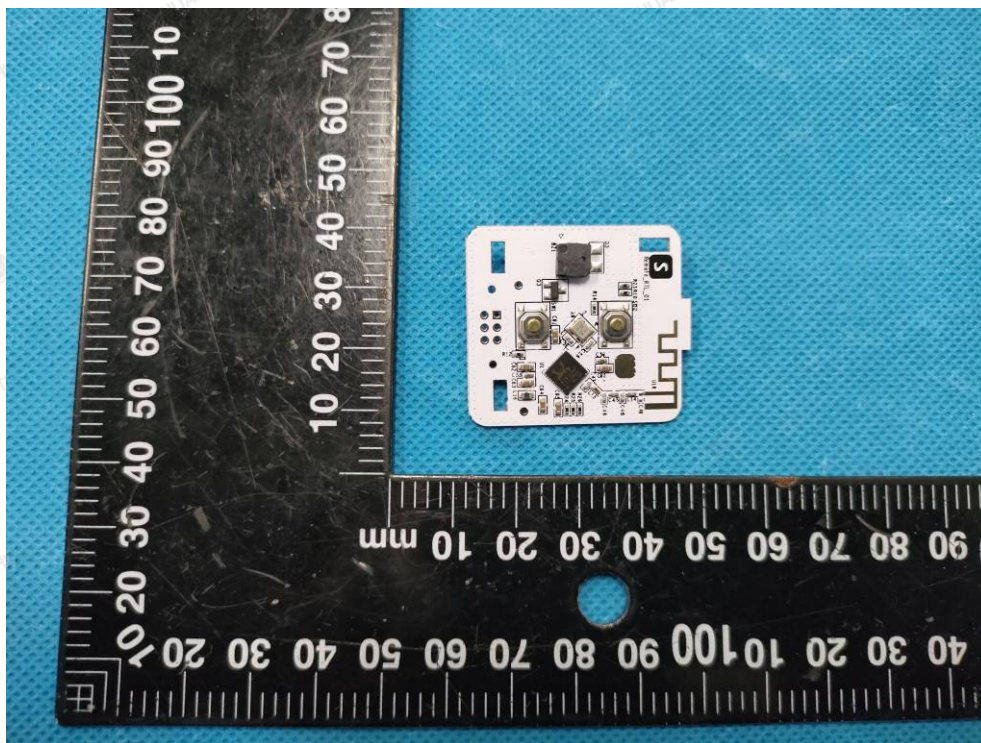


Photo 7: PCB view

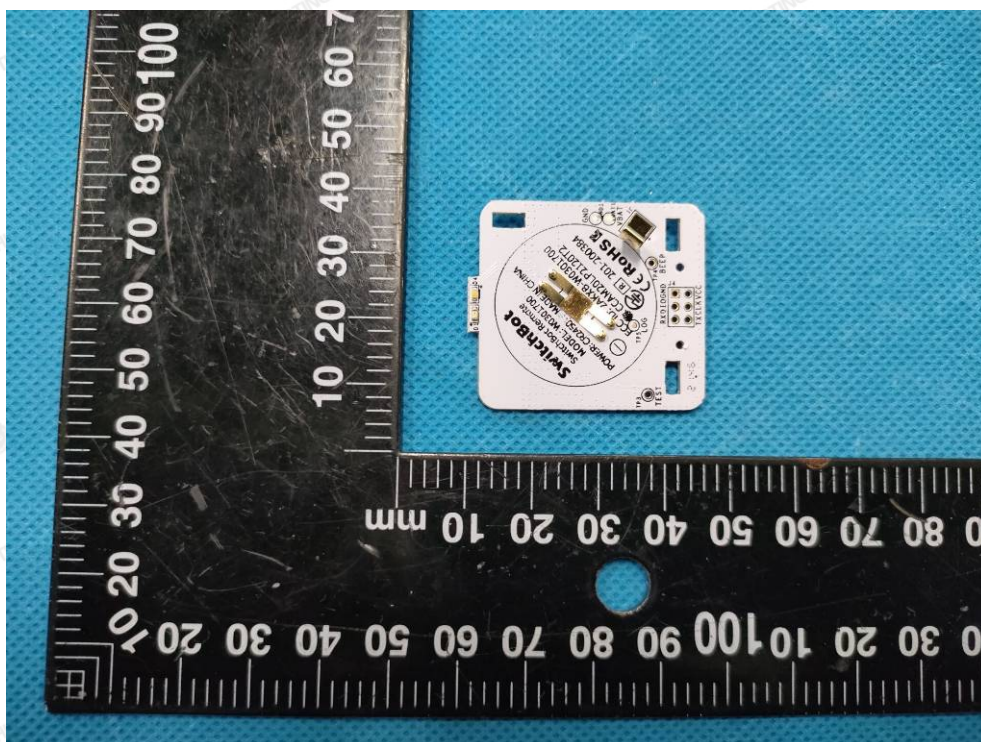


Photo 8: PCB view

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

IEC62368_1C

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CERTIFICATE *of* EXAMINATION



Certificate Validation

NOTIFIED BODY EU-TYPE EXAMINATION CERTIFICATE

SHEU1364-EU / 1 Mar 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 Remote

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

SHEU1364-EU / 1 Mar 2022 / Rev A

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

Product Name:

SwitchBot Remote

Product Model Numbers: **W0301700, W0301701, W0301702, W0301703, W0301704, W0301705**

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	EN IEC 62368-1:2020 + A11:2020
	EN 62479:2010
	EN 50663:2017
Article 3.1(b) Electromagnetic Compatibility	EN 301 489-1 V2.2.3
	EN 301 489-17 V3.2.4
	EN 55032:2015 + A1:2020 + A11:2020
	EN 55035:2017 + A11:2020
Article 3.2 Effective Use of Spectrum	EN 300 328 V2.2.2



Notified Body EU-Type Examination Certificate

SHEU1364-EU / 1 Mar 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.	SHEU1364-EU
Issue Date / Rev	1 Mar 2022 / Rev A
Equipment Description	SwitchBot Remote
Hardware Version	V1.1
Firmware Version	V4.3



Notified Body EU-Type Examination Certificate

SHEU1364-EU / 1 Mar 2022 / Rev A

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

Emission Information

Technology	Frequency MHz		Emission Designator	RF Power		Field Strength
	From	To		Max	Type	
Bluetooth BLE	2402MHz	2480MHz	F1D	-2.83dBm	EIRP	--

Technical Construction File Details: (Documents Reviewed)

Technical Report(s):

Article 3.1(a) Health & Safety:

HK2202150378-2EH

HK2202150378-1SR

Article 3.1(b) Electromagnetic Compatibility:

HK2202150378-1ER

Article 3.2 Effective Use of Spectrum:

HK2202150378-2ER

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

Schematics

Test Setup - EU

User Manual

Risk_analysis

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.

**TEST REPORT**
ETSI EN 300 328 V2.2.2 (2019-07)**Report Reference No.**..... **HK2202150378-2ER**

Compiled by

(position+printed
name+signature)

Testing engineer Bella Huang

Bella Huang

Supervised by

(position+printed
name+signature)

Technique principal Sliver Wan

Sliver Wan

Approved by

(position+printed
name+signature)

Manager Jason Zhou

Jason

Date of issue 2022/02/18

Testing Laboratory Name..... Shenzhen HUAKE Testing Technology Co., Ltd.

Address 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park,
Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China**Applicant's name**..... 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**Test specification** Standard..... **ETSI EN 300 328 V2.2.2 (2019-07)**

TRF Originator..... Shenzhen HUAKE Testing Technology Co., Ltd.

Master TRF Dated 2017-12

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Test item description SwitchBot Remote

Trade Mark SwitchBot

Model/Type reference W0301700

List Model W0301701, W0301702, W0301703, W0301704, W0301705

Hardware Version..... V1.1

Software Version..... V4.3

Modulation Type..... GFSK

Operation Frequency..... From 2402 MHz to 2480 MHz

Ratings DC 3V From Battery

Result **PASS**



TEST REPORT

Test Report No. :	HK2202150378-2ER	2022/02/18
		Date of issue

Equipment under Test : SwitchBot Remote

Model /Type : W0301700

Listed Models : W0301701, W0301702, W0301703, W0301704, W0301705

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

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

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2022/02/18	Jason Zhou



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1. TEST STANDARDS

The tests were performed according to following standards:

[ETSI EN 300 328 V2.2.2 \(2019-07\)](#)

Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum



2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	2022/02/15
Testing commenced on	:	2022/02/15
Testing concluded on	:	2022/02/18

2.2. Product Description

Name of EUT	SwitchBot Remote
Model(s) Number	W0301700
List Models	W0301701, W0301702, W0301703, W0301704, W0301705
Difference description	All model's the function, software and electric circuit are the same, only with a product model named different. Test sample model: W0301700.
Hardware version	V1.1
Software version	V4.3
Antenna Type	PCB Antenna
Antenna Gain	0.23 dBi



2.3. Equipment Under Test

Power supply system utilised

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

DC 3V From Battery



Description of the test mode

Bluetooth 4.0 used 40 channels and channel separation was 2MHz.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

Type	Test Frequency					
	Lowest		Middle		Highest	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
BLE	00	2402	19	2440	39	2480

2.4. Description of the Equipment under Test (EUT)

Reference documents:	Bluetooth® Core Specification
Special test descriptions:	None
Configuration descriptions:	TX tests: were performed with x-DH5 packets and static PRBS pattern payload. RX/Standby tests: BT test mode enabled, scan enabled, TX Idle
Test mode:	☐ Bluetooth Test mode loop back enabled (EUT is controlled over CBT/CMU) ☒ Special software is used. EUT is transmitting pseudo random data by itself
Bluetooth standard capabilities:	40 channels channel separation 2 MHz used freq. range 2402-2480 MHz Modulation types: GFSK Bandwidth appr. 2MHz for single

**2.5. EUT Classification:**

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

2.6. EUT configuration

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

● - Supplied by the manufacturer

○ - Supplied by the lab

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

○Adapter information

2.7. Modifications

No modifications were implemented to meet testing criteria.



3. TEST ENVIRONMENT

3.1. Information of the Test Laboratory

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

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

Testing Laboratory Authorization:
A2LA Accreditation Code is 4781.01.
FCC Designation Number is CN1229.
Canada IC CAB identifier is CN0045.
CNAS Registration Number is L9589.

3.2. Environmental conditions

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

Normal Temperature: 15°C~35°C
High Temperature: 40°C
Low Temperature: -10°C
Normal Voltage: DC 3V
High Voltage: DC 3.3V
Low Voltage: DC 2.7V
Relative Humidity: 55 %
Air Pressure: 989 hPa

3.3. Test Description

3.4.1 Main Terms

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

3.4.2 Terms used in Condition column

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

3.4.3 Terms used in Verdict column

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



3.4.4 Summary of measurement results



No deviations from the technical specifications were ascertained

There were deviations from the technical specifications ascertained

Test Specification Clause	Test Case	Test Condition	Mode	Pass	Fail	N/A	NP	Remark
5.4.2	RF output power	NTC	GFSK	☒	☐	☐	☐	
		LT		☒	☐	☐	☐	
		HT		☒	☐	☐	☐	
5.4.2	Duty Cycle, Tx-sequence, Tx-gap	NTC	---	☐	☐	☒	☐	
5.4.4	Dwell time, min Freq. Occupation and Hopping sequence	NTC	GFSK	☐	☐	☒	☐	
5.4.5	Hopping Separation	NTC	GFSK	☐	☐	☒	☐	
5.4.2	Medium Utilisation	NTC	---	☐	☐	☒	☐	
5.4.3	Power Spectral Density	NTC	GFSK	☒	☐	☐	☐	
5.4.6	Adaptivity, Short Control Signalling Transmissions	NTC	GFSK	☐	☐	☒	☐	
5.4.7	Occupied Channel Bandwidth	NTC	GFSK	☒	☐	☐	☐	
5.4.8	Transmitter unwanted emissions in the out-of-band domain	NTC	GFSK	☒	☐	☐	☐	
		LT		☐	☐	☒	☐	
		HT		☐	☐	☒	☐	
5.4.9	Transmitter unwanted emissions in the spurious domain (conducted & radiated)	NTC	GFSK	☒	☐	☐	☐	
5.4.10	Receiver spurious emissions (conducted & radiated)	NTC	GFSK	☒	☐	☐	☐	
5.4.11	Receiver Blocking	NTC	----	☒	☐	☐	☐	

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



3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to ETSI TR 100 028-1 [1], ETSI TS 103 051 [2] and ETSI TS 103 052 [3] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)). and is documented in the Shenzhen HUAKE Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device

Hereafter the best measurement capability for Shenzhen HUAKE Testing Technology Co., Ltd. is reported:

No.	Item	Uncertainty
1	Occupied Channel Bandwidth	$\pm 3.68\%$
2	RF power, conducted	$\pm 0.37\text{dB}$
3	Power Spectral Density, conducted	$\pm 0.78\text{dB}$
4	Unwanted Emissions, conducted	$\pm 2.71\text{dB}$
5	All emissions, radiated	$\pm 4.26\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$
8	DC and low frequency voltages	$\pm 1.5\%$
9	Time	$\pm 1.0\%$
10	Duty Cycle	$\pm 3.0\%$



3.5. Equipment Used during the Test

RF output power & PSD & OOB & OBW & Hoping & Duty Cycle, Tx-sequence, Tx-gap & Adaptively Blocking						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Spectrum analyzer	Agilent	N9020A	HKE-048	2021/12/09	2022/12/08
2	Signal generator	Agilent	83630A	HKE-028	2021/12/09	2022/12/08
3	Signal generator	Agilent	N5182A	HKE-029	2021/12/09	2022/12/08
4	RF automatic control unit	Tonscend	JS0806-2	HKE-060	2021/12/09	2022/12/08
5	Power meter	Agilent	E4419B	HKE-085	2021/12/09	2022/12/08
6	Temperature and humidity meter	Boyang	HTC-1	HKE-077	2021/12/09	2022/12/08
7	RF test software	Tonscend	JS1120-B Version 2.6	HKE-083	2021/12/09	2022/12/08

Transmitter spurious emissions & Receiver spurious emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	2021/12/09	2022/12/08
2	Horn antenna	Schwarzbeck	9120D	HKE-013	2021/12/09	2022/12/08
3	Receiver	R&S	ESR-7	HKE-010	2021/12/09	2022/12/08
4	Position controller	Taiwan MF	MF7802	HKE-011	2021/12/09	2022/12/08
5	Preamplifier	EMCI	EMC05184 5SE	HKE-015	2021/12/09	2022/12/08
6	Preamplifier	Agilent	83051A	HKE-016	2021/12/09	2022/12/08
7	High pass filter unit	Tonscend	JS0806-F	HKE-055	2021/12/09	2022/12/08
8	Spectrum analyzer	Agilent	N9020A	HKE-048	2021/12/09	2022/12/08
9	Temperature and humidity meter	Boyang	HTC-1	HKE-075	2021/12/09	2022/12/08
10	Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A	N/A

The calibration interval is 1 year.



4. TEST CONDITIONS AND RESULTS

4.1. ETSI EN 300 328 REQUIREMENTS

4.1.1. RF Output Power

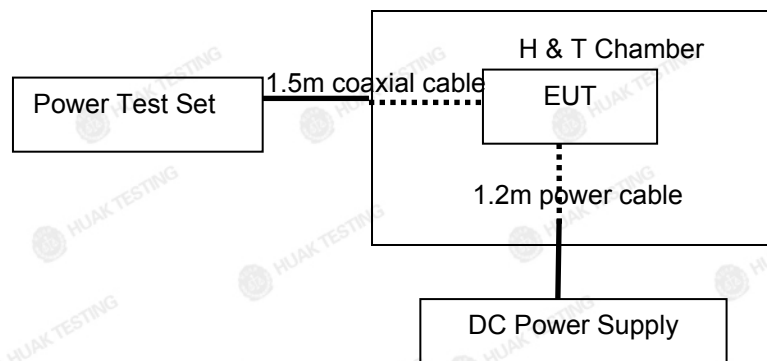
LIMIT

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

For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

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

TEST CONFIGURATION



TEST PROCEDURE

According to ETSI EN 300 328 V2.2.2 (2019-07) §5.4.2.2.1.2, conducted method.

Step 1:

- Use a fast power sensor with a minimum sensitivity of -40 dBm and capable of minimum 1 MS/s.
 - Use the following settings:
 - Sample speed 1 MS/s or faster.
 - The samples shall represent the RMS power of the signal.
 - Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) is captured.
- For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.

Step 2:

- For conducted measurements on devices with one transmit chain:
 - Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps.
- For conducted measurements on devices with multiple transmit chains:
 - Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
 - Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500 ns.
 - For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples as the new stored data set.

**Step 3:**

- Find the start and stop times of each burst in the stored measurement samples.

The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.

In case of insufficient sensitivity of the power sensor (e.g. in case of radiated measurements), the value of 30 dB may need to be reduced appropriately.

Step 4:

- Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. The start and stop points shall be included. Save these Pburst values, as well as the start and stop times for each burst.

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

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

Step 5:

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

Step 6:

- Add the (stated) antenna assembly gain G in dBi of the individual antenna.
- In case of smart antenna systems operating in mode with beamforming (see clause 5.3.2.2.4), add the additional beamforming gain Y in dB.
- If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.
- The RF Output Power (Pout) shall be calculated using the formula below:

$$P_{out} = A + G + Y$$
- This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
Packet Type:	Longest supported
Modulation:	GFSK

MEASUREMENT DESCRIPTION

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

TEST RESULTS

Test environmental		Maximum conducted Burst Power in 15 measured Bursts (RMS) [dBm]		
Test Mode	Test Condition	Antenna Measured Power (dBm)	EIRP(dBm)	Limit(dBm)
00	NTC	-3.06	-2.83	20
	LT/NV	-3.18	-2.95	20
	HT/NV	-3.24	-3.01	20
19	NTC	-3.72	-3.49	20
	LT/NV	-3.80	-3.57	20
	HT/NV	-3.85	-3.62	20
39	NTC	-4.36	-4.13	20
	LT/NV	-4.51	-4.28	20
	HT/NV	-4.58	-4.35	20
Result		Pass		

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

The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.



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

LIMIT

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

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

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

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

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

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

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

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

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

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

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

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

TEST PROCEDURE

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

For equipment using FHSS modulation, the measurements shall be performed during normal operation (hopping) and the equipment is assumed to have no blacklisted frequencies (operating on all hopping positions). These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode and only to be performed at normal environmental conditions, shall be as follows:

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

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

The test procedure, which shall only be performed for non-adaptive systems and only to be performed at normal environmental conditions, shall be as follows:

Step 1:

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

Step 2:

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

Step 3:

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

Step 4:

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

Step 5:

- Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
- Identify any TxOff time that is equal to or greater than the minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3. These are the potential valid gap times to be further considered in this procedure.



- Starting from the second identified gap, calculate the time from the start of this gap to the end of the preceding gap. This time is the Tx-sequence time for this transmission. Repeat this procedure until the last identified gap within the observation period is reached.
- A combination of consecutive Tx-sequence times and Tx-gap times followed by a Tx-gap time, which is at least as long as the duration of this combination, may be considered as a single Tx-sequence time and in which case it shall comply with the limits defined in clause 4.3.1.3.3 or clause 4.3.2.4.3.
- It shall be noted in the test report whether the UUT complies with the limits for the maximum Tx-sequence time and minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3.

EUT DESCRIPTION:

Mode:	BT Testmode
Test Channel	Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

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

TEST RESULTS**Not Applicable**



4.1.3. Medium Utilisation (MU) factor

LIMIT

ETSI EN 300 328 V2.2.2 (2019-07) Sub-clause 4.3.1.6.3

For non-adaptive equipment using wide band modulations other than FHSS, the maximum Medium Utilization factor shall be 10 %.

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

TEST PROCEDURE

Please refer to ETSI EN 300 328 V2.2.2 (2019-07) Sub-clause 5.4.2.2.1.4

Step 1:

- Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.

Step 2:

- For each burst calculate the product of (Pburst / 100 mW) and the TxOn time. Pburst is expressed in mW. TxOn time is expressed in ms.

Step 3:

- Medium Utilization is the sum of all these products divided by the observation period (expressed in ms) which is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. This value, which shall comply with the limit given in clause 4.3.1.6.3 or clause 4.3.2.5.3, shall be recorded in the test report.

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

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

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

TEST RESULTS

Not Applicable according to ETSI EN 300 328 V2.2.2 (2019-07) Sub-clause 4.3.2.5.1

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

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



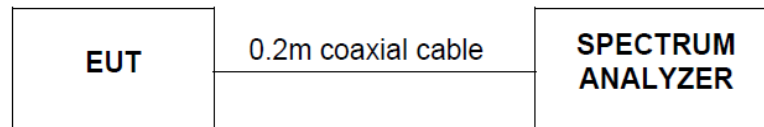
4.1.4. Power Spectral Density

LIMIT

According to ETSI EN 300 328 V2.2.2 (2019-07) §4.3.2.3.3, For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10dBm/MHz.

These measurements shall only be performed at normal test conditions.

TEST CONFIGURATION



TEST PROCEDURE

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

The test procedure shall be as follows:

Step 1:

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

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

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

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

Step 2:

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

Step 3:

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

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

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

Step 4:

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

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

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

with n being the actual sample number

**Step 5:**

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

Step 6:

Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to sample #101).

Step 7:

Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments.

From all the recorded results, the highest value is the maximum Power Spectral Density (PSD) for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report.

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

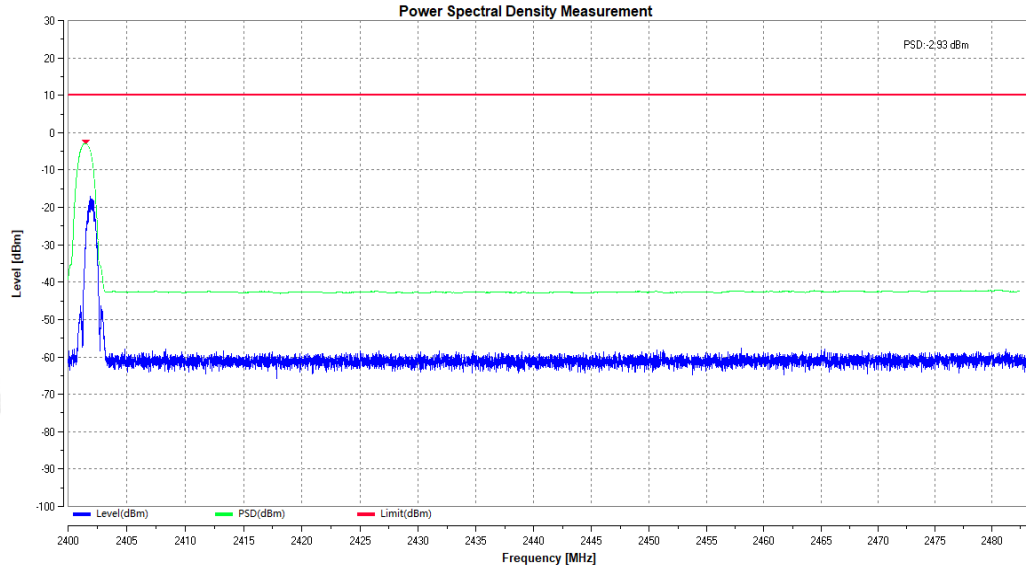
Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	10S	
Video bandwidth:	30KHz	
Resolution bandwidth:	10KHz	
Span:	83.5MHz	
Frequency range	2400-2483.5MHz	
Sweep Points	15000	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

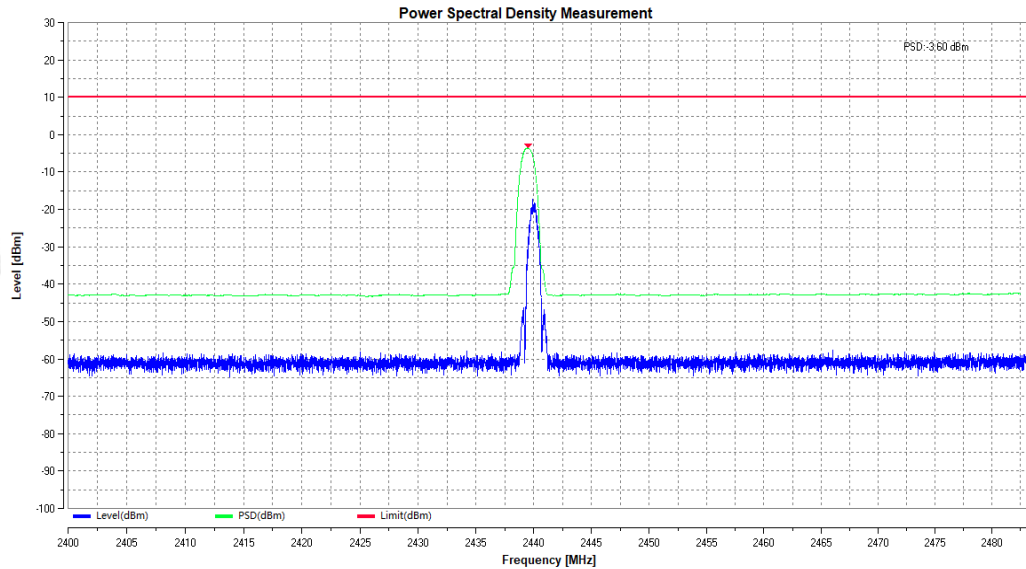
The Maximum Power Spectral Density				
Test Channel Number	Test Condition	Measured Power Density (dBm/MHz)	EIRP Density (dBm/MHz)	Limit(dBm/MHz)
00	NTC	-2.93	-2.93	10
19	NTC	-3.60	-3.60	10
39	NTC	-4.23	-4.23	10
Result		PASS		



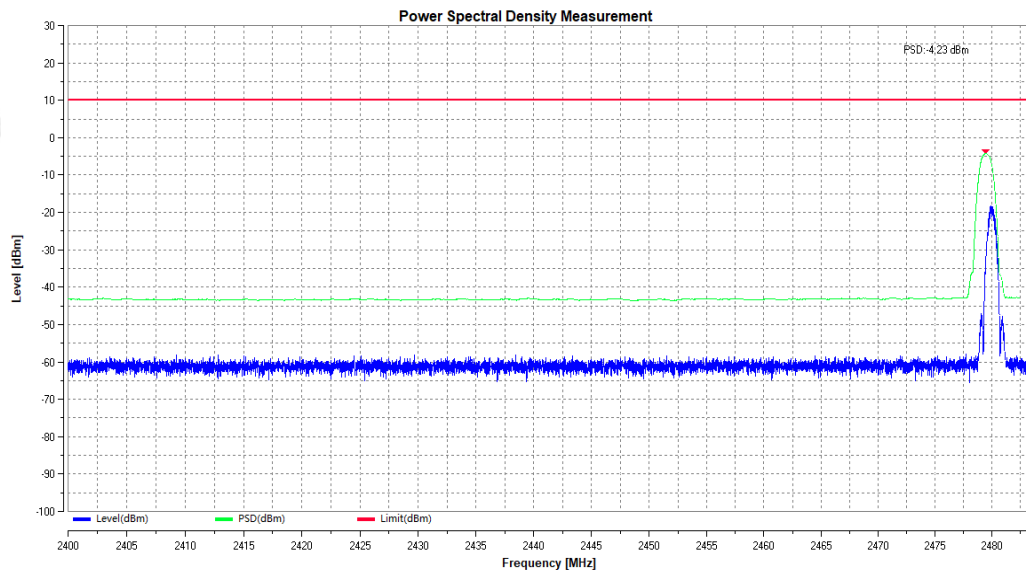
2402



2440



2480



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

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

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

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

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

Note 4: according to 4.3.1.7.2.2 3) of ETSI EN 300 328 V2.2.2, the 5% of COT should longer then 100us, so the minimum COT should longer then 2.0ms.

**Wanted signal mean power from companion device:**

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

Unwanted Signal parameters

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

NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.

NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.

NOTE 3: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.

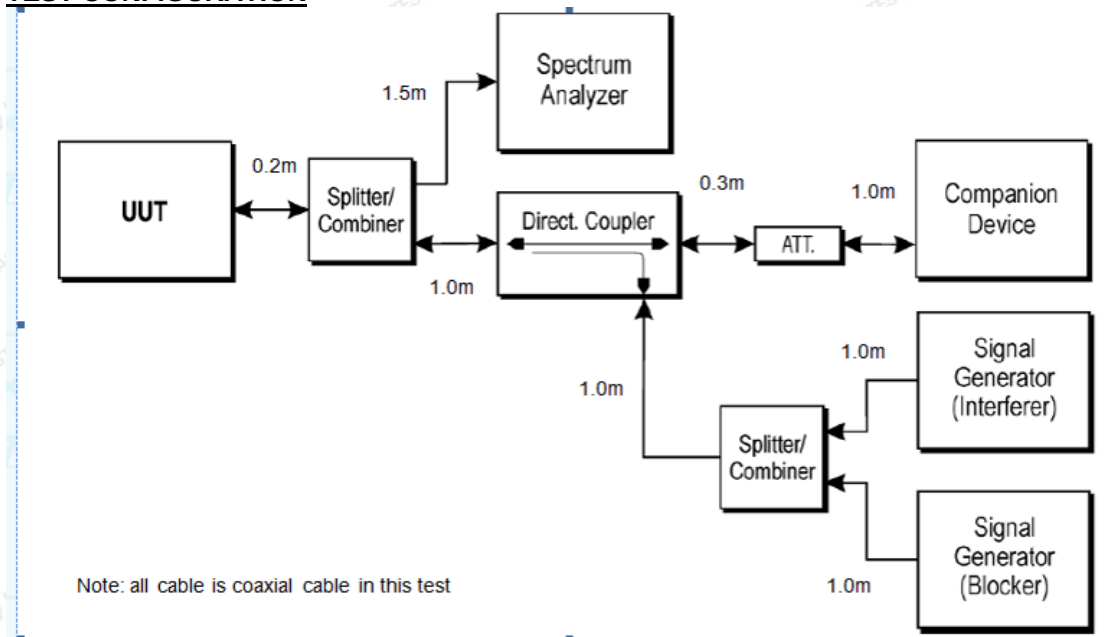
TEST CONFIGURATION

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

MEASUREMENT DESCRIPTION

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

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

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

Step 1:

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

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

- The analyser shall be set as follows:



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

Step 2:

- Configure the UUT for normal transmissions with a sufficiently high payload resulting in a minimum transmitter activity ratio (TxOn / (TxOn + TxOff)) of 0.3. Where this is not possible, the UUT shall be configured to the maximum payload possible.
- For Frame Based Equipment, using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.2, step 3. When measuring the Idle Period of the UUT, only transmissions from the UUT shall be considered.
- For Load Based equipment, using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.3, step 2 and step 3. When measuring the Idle Period of the UUT, only transmissions from the UUT shall be considered.

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

Step 3: Adding the interference signal

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

Step 4: Verification of reaction to the interference signal

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

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

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

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

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

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

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

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

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

Step 5: Adding the unwanted signal

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

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

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

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



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

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

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

Step 6: Removing the interference and unwanted signal

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

Step 7:

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

MEASUREMENT DESCRIPTION

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

TEST RESULTS

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



4.1.6. Occupied Channel Bandwidth

LIMIT

According to ETSI EN 300 328 V2.2.2 (2019-07) 4.3.2.7.3,

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

TEST PROCEDURE

According to ETSI EN 300 328 V2.2.2 (2019-07) §5.4.7.2.1, conducted method.

Step 1:

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

- Centre Frequency: The centre frequency of the channel under test
- Resolution BW: ~ 1 % of the span without going below 1 %
- Video BW: 3 × RBW
- Frequency Span: 2 × Nominal Channel Bandwidth
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep time: 1 s

Step 2:

Wait for the trace to stabilize.

Find the peak value of the trace and place the analyser marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

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

EUT DESCRIPTION:

Mode:	BT Testmode
Hopping:	Off
Packet Type:	Longest supported
Modulation:	GFSK

MEASUREMENT DESCRIPTION

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

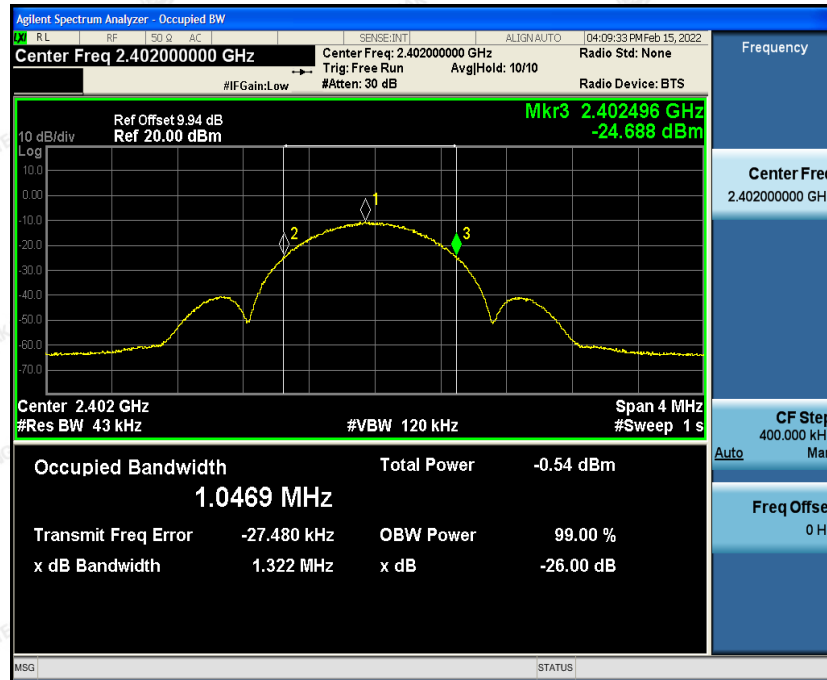


TEST RESULTS

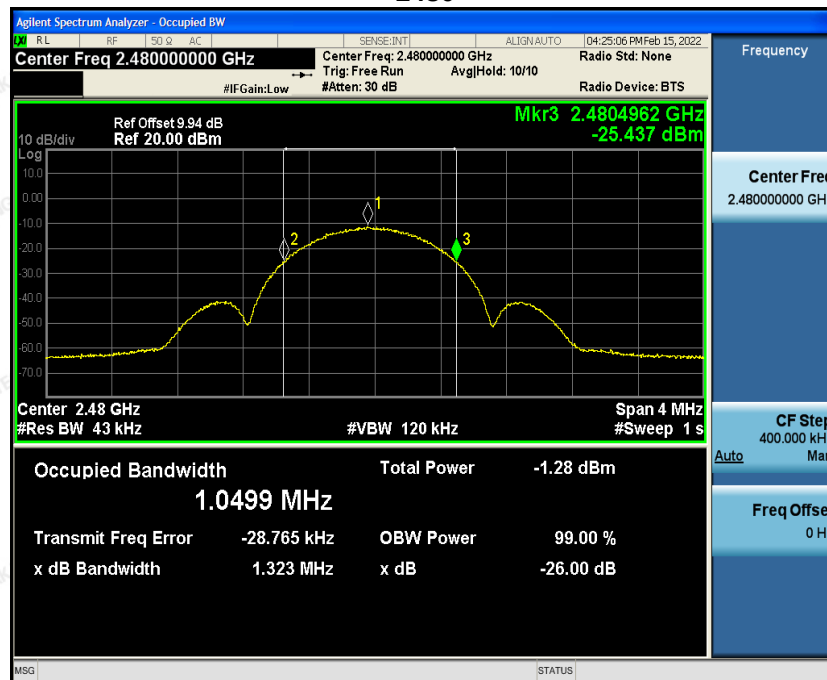
Test Data

Test Condition	Test Mode	Test Channel	Ant	OBW [MHz]	FL OBW [MHz]	FH OBW [MHz]	Verdict
TNVN	BLE	2402	Ant1	1.047	2401.449	---	PASS
TNVN	BLE	2480	Ant1	1.050	---	2480.496	PASS

2402



2480



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

LIMIT

ETSI EN 300 328 (V2.2.2) Sub-clause 4.3.2.8.3

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.

NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.2.7.

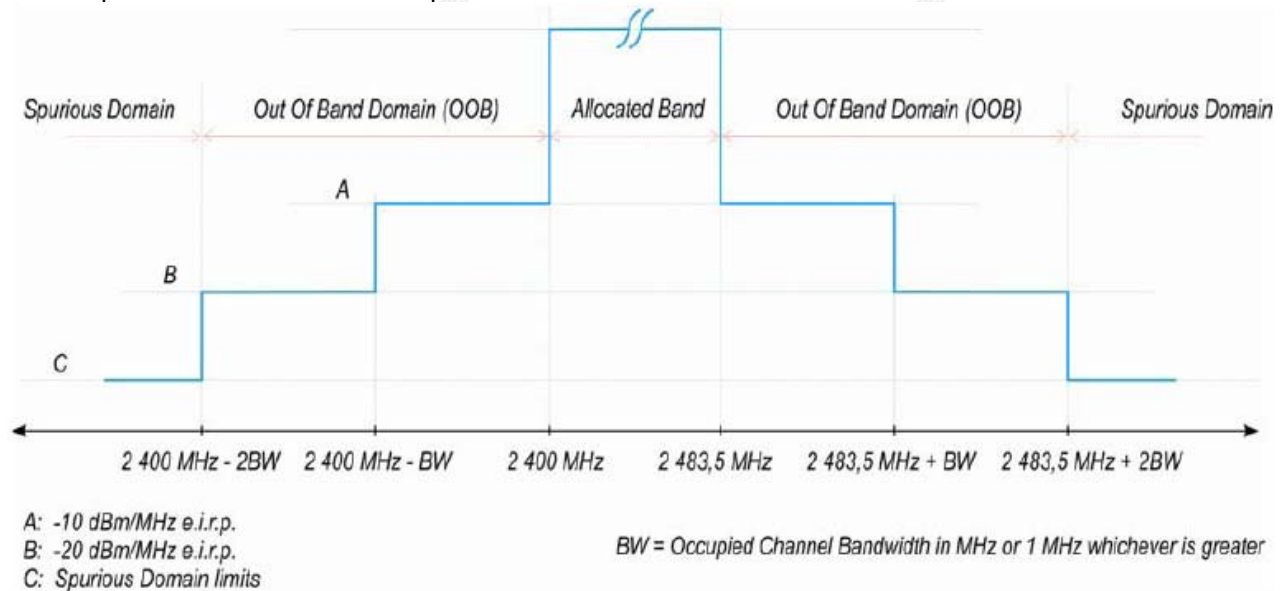


Figure 3: Transmit mask

Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious.

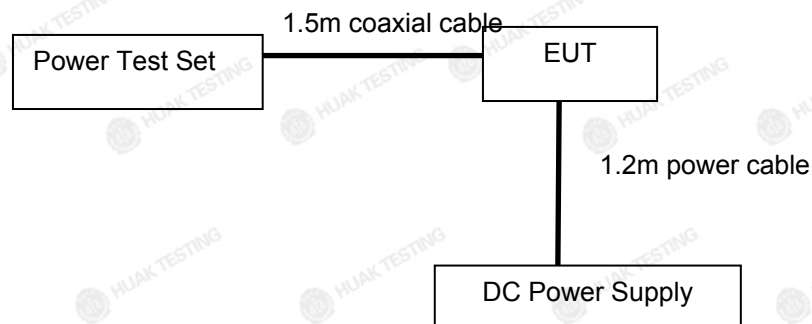
These measurements shall only be performed at normal test conditions.

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

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

The equipment shall be configured to operate under its worst case situation with respect to output power. If the equipment can operate with different Occupied Channel Bandwidths (e.g. 20 MHz and 40 MHz), then each channel bandwidth shall be tested separately.

TEST CONFIGURATION



**TEST PROCEDURE**

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

Step 1:

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

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

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

- The measurement shall be performed and repeated while the trigger level is increased until no triggering takes place.
- For FHSS equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
- Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
- Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
- Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

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

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

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

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

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

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

Step 6:

- In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain G in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain G in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.



Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain Y in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.
- Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by $10 \times \log_{10}(A_{ch})$ and the additional beamforming gain Y in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

**EUT DESCRIPTION:**

Mode:	BT Testmode
Hopping:	On
Packet Type:	Longest supported
Modulation:	GFSK

MEASUREMENT DESCRIPTION

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

TEST RESULTS

Test Condition	Test Mode	Test Channel	Ant	Freq [MHz]	Result [dBm]	Limit [dBm]	Verdict
TNVN	BLE	2402	Ant1	2398.406	-50.55	≤ -20	PASS
TNVN	BLE	2402	Ant1	2398.453	-61.04	≤ -20	PASS
TNVN	BLE	2402	Ant1	2399.453	-50.36	≤ -10	PASS
TNVN	BLE	2402	Ant1	2399.500	-49.64	≤ -10	PASS
TNVN	BLE	2402	Ant1	2484.000	-51.50	≤ -10	PASS
TNVN	BLE	2402	Ant1	2484.047	-61.16	≤ -10	PASS
TNVN	BLE	2402	Ant1	2485.047	-52.04	≤ -20	PASS
TNVN	BLE	2402	Ant1	2485.094	-51.15	≤ -20	PASS
TNVN	BLE	2480	Ant1	2398.400	-52.58	≤ -20	PASS
TNVN	BLE	2480	Ant1	2398.450	-52.07	≤ -20	PASS
TNVN	BLE	2480	Ant1	2399.450	-51.12	≤ -10	PASS
TNVN	BLE	2480	Ant1	2399.500	-50.56	≤ -10	PASS
TNVN	BLE	2480	Ant1	2484.000	-51.32	≤ -10	PASS
TNVN	BLE	2480	Ant1	2484.050	-60.97	≤ -10	PASS
TNVN	BLE	2480	Ant1	2485.050	-51.65	≤ -20	PASS
TNVN	BLE	2480	Ant1	2485.100	-50.63	≤ -20	PASS

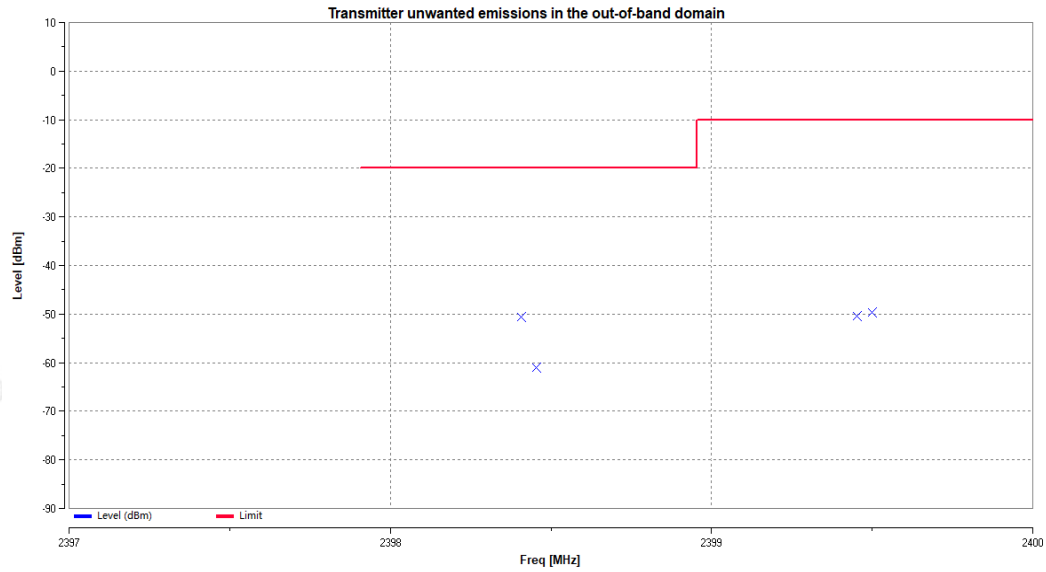
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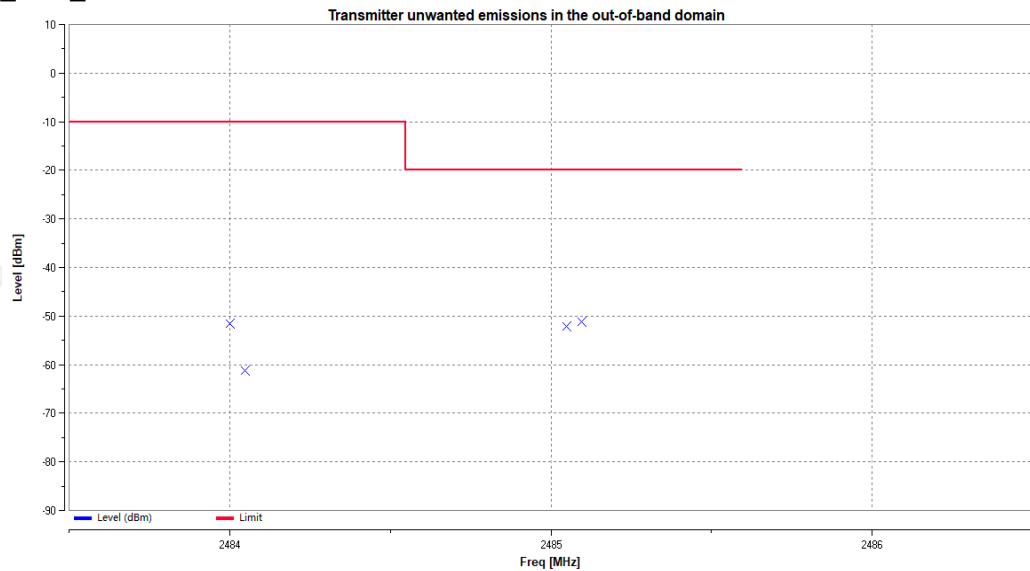
1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China



BLE_2402_Ant1_2400MHz-2BW to 2400MHz

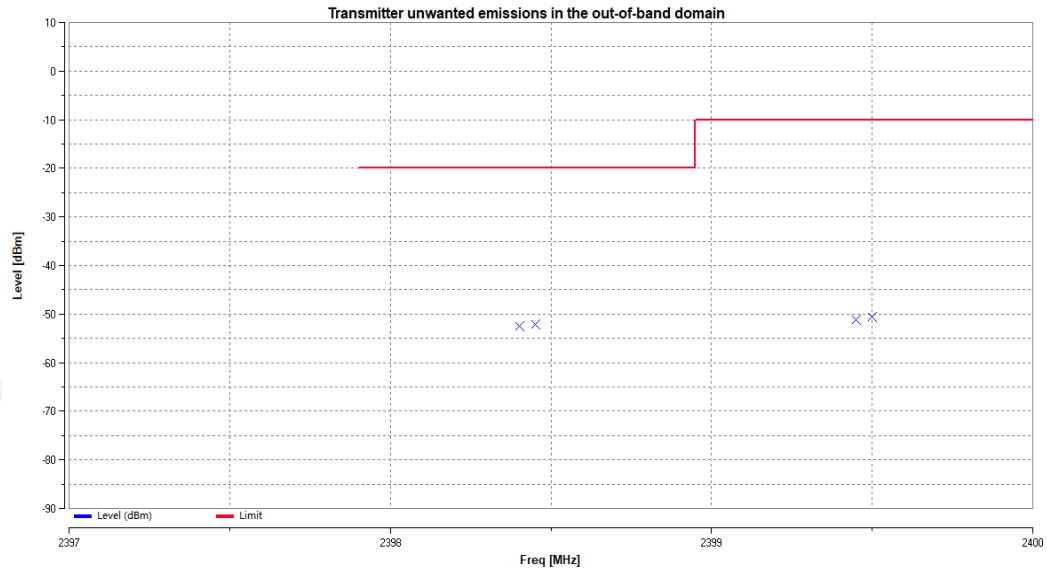


BLE_2402_Ant1_2483.5MHz to 2483.5MHz+2BW

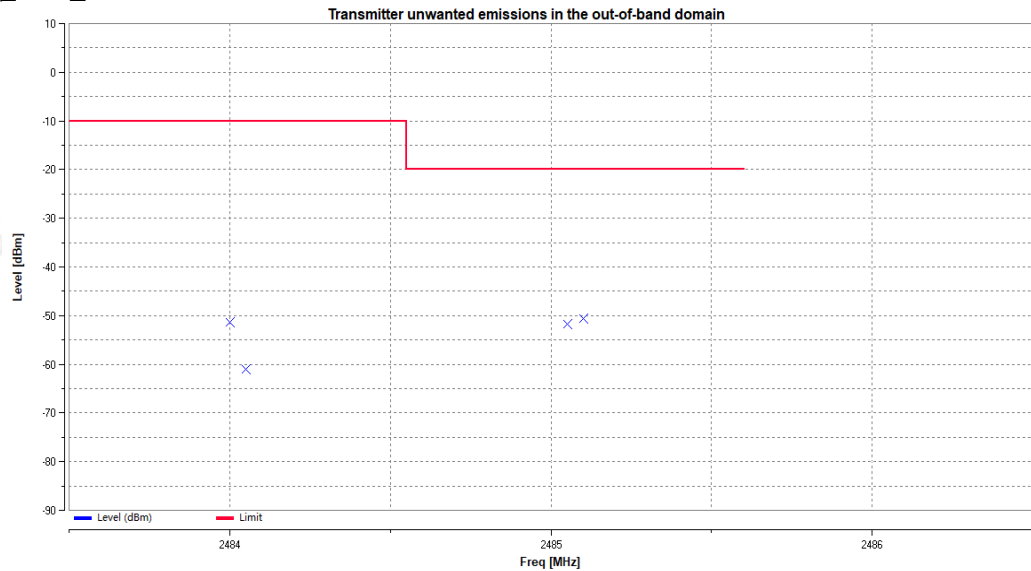




BLE_2480_Ant1_2400MHz-2BW to 2400MHz



BLE_2480_Ant1_2483.5MHz to 2483.5MHz+2BW





4.1.8. Transmitter unwanted emissions in the spurious domain

Limit

According to ETSI EN 300 328 V2.2.2 (2019-07) §4.3.2.9.3

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

Table 4: Transmitter limits for spurious emissions

Frequency Range	Maximum power e.r.p.(≤ 1 GHz) e.i.r.p.(> 1 GHz)	Limit when Standby
30 MHz to 47 MHz	-36 dBm	100 KHz
47 MHz to 74 MHz	-54 dBm	100 KHz
74MHz to 87.5 MHz	-36 dBm	100 KHz
87.5 MHz to 118 MHz	-54 dBm	100 KHz
118 MHz to 174 MHz	-36 dBm	100 KHz
174 MHz to 230 MHz	-54 dBm	100 KHz
230 MHz to 470 MHz	-36 dBm	100 KHz
470 MHz to 862 MHz	-54 dBm	100 KHz
862 MHz to 1 GHz	-36 dBm	100 KHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

These measurements shall only be performed at normal test conditions.

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

- a) their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
- b) their effective radiated power when radiated by cabinet and antenna in case of Integral antenna equipment with no antenna connectors.

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

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

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

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

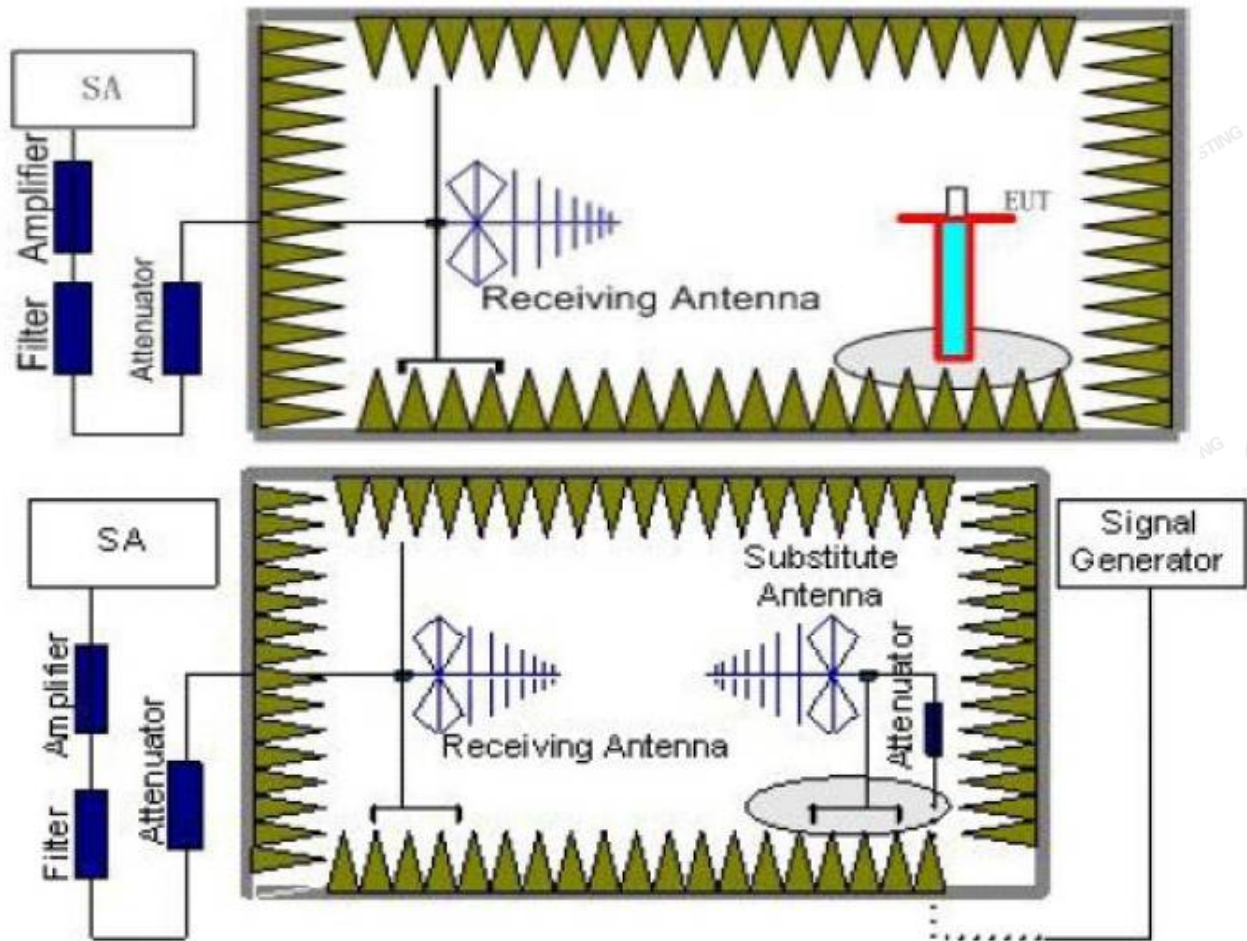
Test Procedure

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



Test Configuration

Effective Radiated Power measurement (30 MHz to 12.75 GHz)



Test Results

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



Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
165.15	V	-52.15	-36	16.15	PASS
265.59	V	-55.64	-36	19.64	PASS
340.29	V	-56.03	-36	20.03	PASS
423.83	V	-73.77	-36	37.77	PASS
535.93	V	-77.46	-54	23.46	PASS
861.83	V	-76.19	-36	40.19	PASS
202.72	H	-72.55	-54	18.55	PASS
283.54	H	-63.07	-36	27.07	PASS
367.81	H	-74.94	-36	38.94	PASS
466.43	H	-78.13	-36	42.13	PASS
600.23	H	-68.26	-54	14.26	PASS
904.58	H	-58.08	-36	22.08	PASS
Note: 1. Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					



Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
Test Mode: Low Channel					
1766.38	H	-54.86	-30	-24.86	PASS
1878.29	V	-54.93	-30	-24.93	PASS
2967.22	H	-59.71	-30	-29.71	PASS
3179.39	V	-53.98	-30	-23.98	PASS
3744.45	H	-53.26	-30	-23.26	PASS
3998.91	V	-56.75	-30	-26.75	PASS
4445.50	H	-55.04	-30	-25.04	PASS
4653.13	V	-50.91	-30	-20.91	PASS
5171.61	H	-52.55	-30	-22.55	PASS
5371.28	V	-49.67	-30	-19.67	PASS
5940.86	H	-54.18	-30	-24.18	PASS
6154.72	V	-56.21	-30	-26.21	PASS
Test Mode: High Channel					
1876.76	H	-53.07	-30	-23.07	PASS
2198.15	V	-54.18	-30	-24.18	PASS
2952.06	H	-53.32	-30	-23.32	PASS
3256.33	V	-56.47	-30	-26.47	PASS
3878.52	H	-53.22	-30	-23.22	PASS
3968.01	V	-55.18	-30	-25.18	PASS
4673.63	H	-54.73	-30	-24.73	PASS
4782.45	V	-52.65	-30	-22.65	PASS
5101.07	H	-51.59	-30	-21.59	PASS
5252.42	V	-54.74	-30	-24.74	PASS
5975.96	H	-52.03	-30	-22.03	PASS
6178.61	V	-49.79	-30	-19.79	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					

4.1.9. Receiver spurious emissions

LIMIT

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

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

Table 5: spurious emission limits for receivers

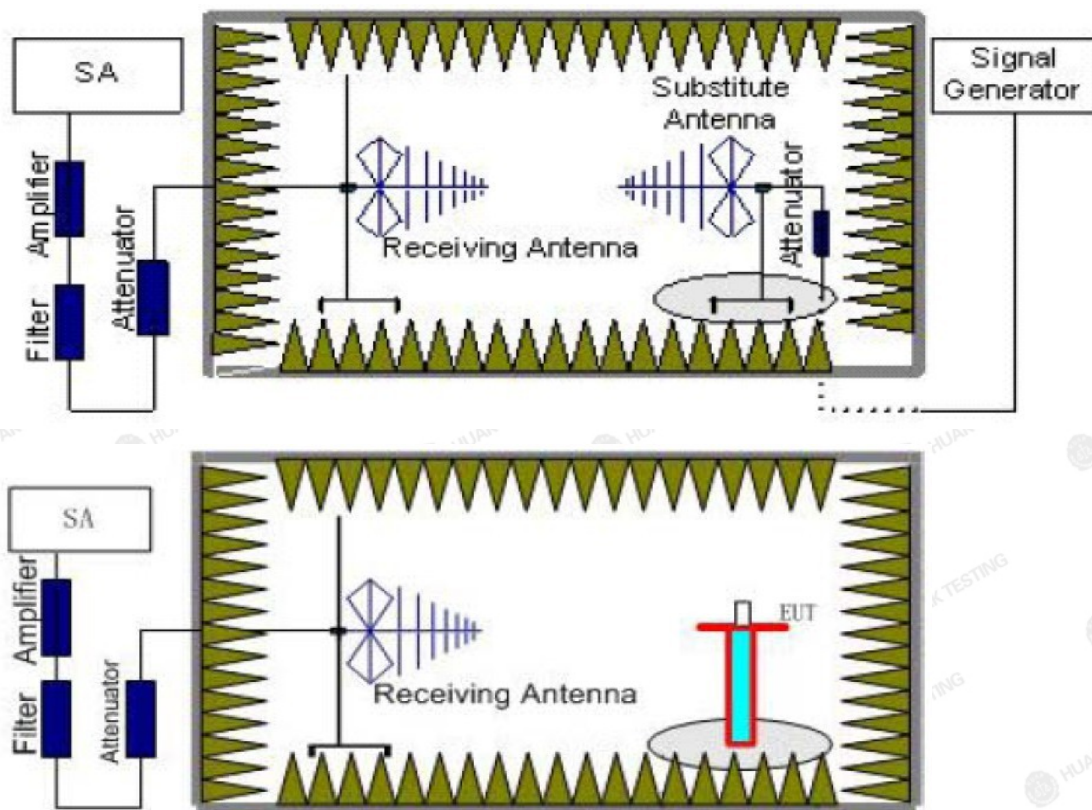
Frequency	Maximum power, e.r.p.	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 KHz
30 MHz to 12.75 GHz	-47 dBm	1 MHz

Test Procedure

The same as clause 4.1.8

Test Configuration

Effective Radiated Power measurement (30 MHz to 12.75 GHz)



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

- their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
- their effective radiated power when radiated by cabinet and antenna in case of Integral antenna equipment withno temporary antenna connectors.

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

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

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

**Test Results**

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

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
231.54	V	-76.41	-57	-19.41	PASS
260.66	V	-78.49	-57	-21.49	PASS
332.21	V	-76.22	-57	-19.22	PASS
409.01	V	-74.98	-57	-17.98	PASS
488.67	V	-77.17	-57	-20.17	PASS
868.58	V	-75.65	-57	-18.65	PASS
202.32	H	-74.32	-57	-17.32	PASS
353.04	H	-72.75	-57	-15.75	PASS
371.17	H	-73.14	-57	-16.14	PASS
474.14	H	-77.68	-57	-20.68	PASS
614.06	H	-75.35	-57	-18.35	PASS
859.29	H	-75.96	-57	-18.96	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2.Other point of the measurements are below 20dB from the limit.					



Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
Above 1GHz:					
Test Mode: Lowest frequency					
2187.58	H	-63.68	-47	-16.68	PASS
2238.83	V	-69.31	-47	-22.31	PASS
3115.46	H	-67.15	-47	-20.15	PASS
3196.38	V	-67.92	-47	-20.92	PASS
3257.24	H	-66.47	-47	-19.47	PASS
3427.58	V	-65.03	-47	-18.03	PASS
4027.36	H	-64.65	-47	-17.65	PASS
4285.34	V	-63.88	-47	-16.88	PASS
4801.64	H	-67.91	-47	-20.91	PASS
5044.03	V	-67.25	-47	-20.25	PASS
6149.23	H	-68.36	-47	-21.36	PASS
6278.87	V	-66.14	-47	-19.14	PASS
Test Mode: Highest frequency					
2076.71	H	-62.49	-47	-15.49	PASS
2155.29	V	-64.33	-47	-17.33	PASS
2239.42	H	-65.02	-47	-18.02	PASS
2487.96	V	-67.65	-47	-20.65	PASS
3260.41	H	-69.87	-47	-22.87	PASS
3483.87	V	-66.35	-47	-19.35	PASS
3875.63	H	-63.89	-47	-16.89	PASS
3949.72	V	-67.47	-47	-20.47	PASS
5223.58	H	-65.16	-47	-18.16	PASS
5368.04	V	-66.94	-47	-19.94	PASS
6374.53	H	-65.62	-47	-18.62	PASS
6463.18	V	-65.51	-47	-18.51	PASS
Note: 1. Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					



4.1.10. Receiver Blocking

LIMIT

According to ETSI EN 300 328 V2.2.2 (2019-07) §4.3.2.11.4

While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16.

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

Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		
NOTE 1: OCBW is in Hz.			
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P _{min} + 26 dB where P _{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P _{min} + 20 dB where P _{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

**Table 15: Receiver Blocking parameters receiver Category 2 equipment**

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

Table 16: Receiver Blocking parameters receiver Category 3 equipment

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

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

4.2.3.2.1 Receiver category 1

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

4.2.3.2.2 Receiver category 2

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

4.2.3.2.3 Receiver category 3

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

These measurements shall only be performed at normal test conditions.

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

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

TEST CONFIGURATION

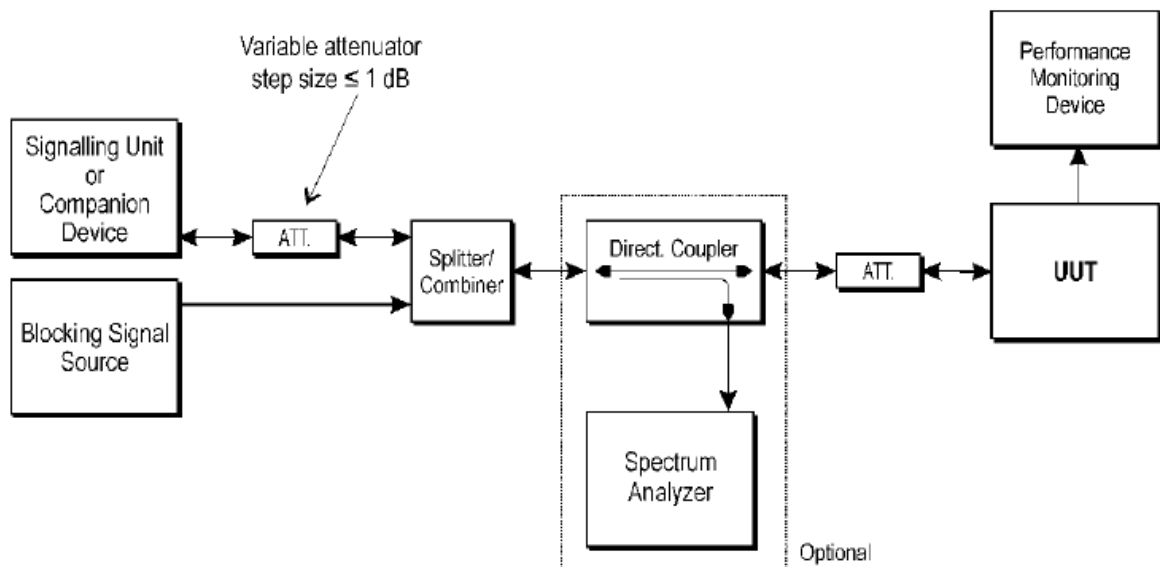


Figure 6: Test Set-up for receiver blocking

MEASUREMENT DESCRIPTION

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

Step 1:

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

Step 2:

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

Step 3:

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



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

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

Step 4:

The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. Where the manufacturer has declared the actual antenna gain for each of the applicable blocking frequencies (see clause 5.4.1 m) ii)) this blocking level shall be adjusted for the difference between the in-band antenna assembly gain (G) and the actual antenna gain for the blocking frequency being tested. See also note 5 in table 6, note 4 in table 7 and note 4 in table 8 or note 5 in table 14, note 4 in table 15 and note 4 in table 16. Where the actual antenna gains at the blocking frequencies have not been declared, then the antenna gain at the blocking frequencies shall be assumed identical to the in-band antenna gain. If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met then proceed to step 6.

Step 5:

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

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

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

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

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

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

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

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

Step 6:

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

Step 7:

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

Step 8:

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

**TEST RESULTS****Record GFSK for this test item****Channel 00@Result**

Wanted signal mean power form companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-58.80	2380	-34	0.49	10	Pass
-58.80	2504	-34	0.33	10	Pass
-58.80	2300	-34	0.02	10	Pass
-58.80	2584	-34	0.65	10	Pass

Channel 39@Result

Wanted signal mean power form companion device(dBm)	Blocking signal frequency(MHz)	Blocking signal power(dBm)	PER (%)	Limit (%)	Result
-58.79	2380	-34	0.52	10	Pass
-58.79	2504	-34	0.07	10	Pass
-58.79	2300	-34	0.18	10	Pass
-58.79	2584	-34	0.36	10	Pass

Note: EUT is Receiver Category 3 equipment.



4.1.11. Geo-location capability

Definition& Requirements

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

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

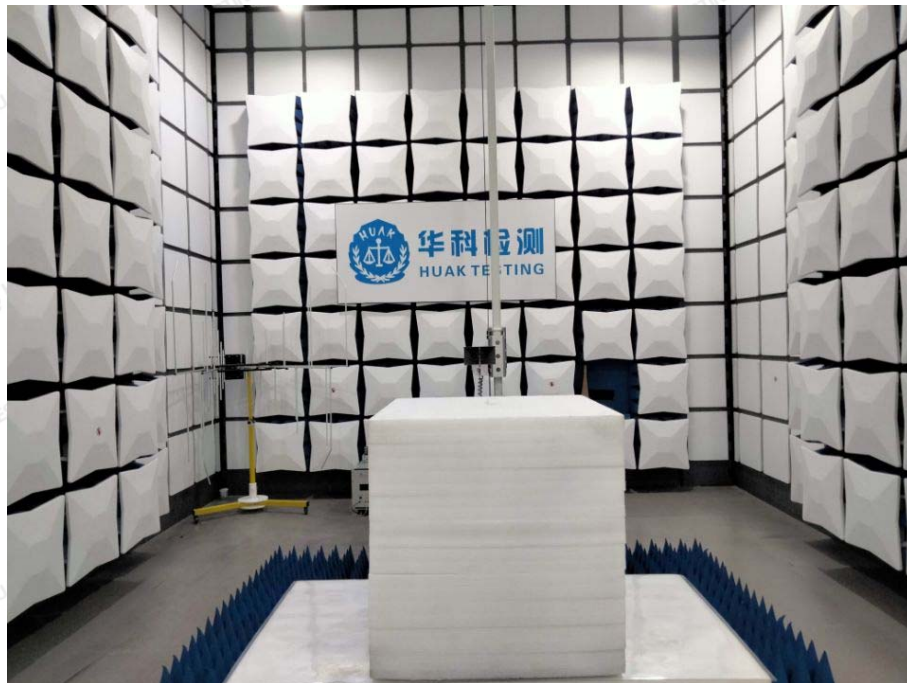
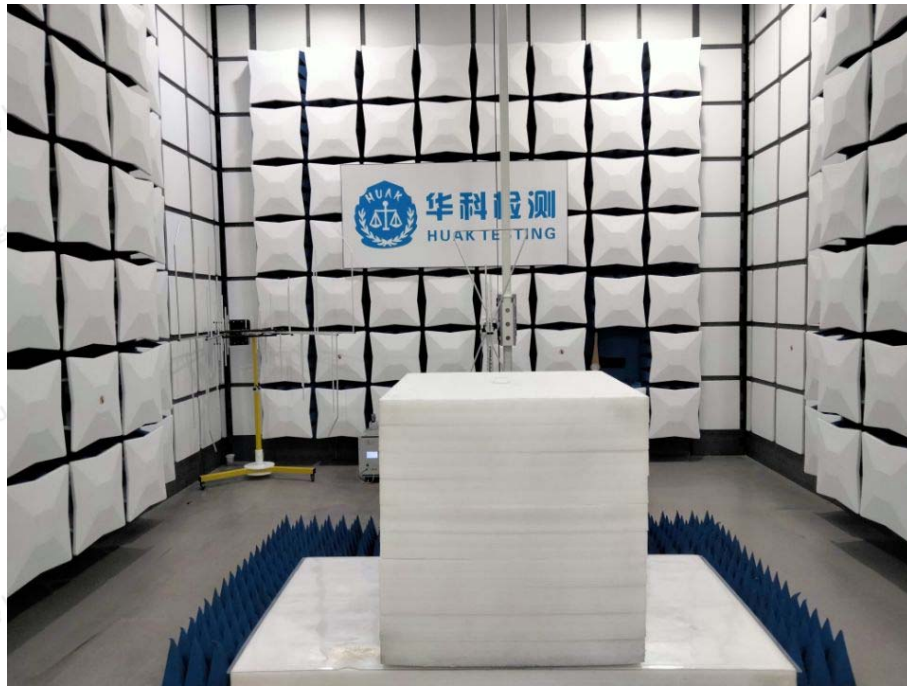
The geo-location capability may be present in the equipment or in an external device (temporary) associated with the equipment operating at the same geographical location during the initial power up of the equipment. The geographical location may also be available in equipment already installed and operating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

RESULTS

This equipment does not support Geo-location.



5. Test Setup Photos of the EUT



The results shown in this test report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by HUAKE, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at <http://www.cer-mark.com>.

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6. External and Internal Photos of the EUT

Reference to the test report No. HK2202150378-1ER.

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



Annex

a) The type of modulation used by the equipment:

☐ FHSS

☒ other forms of modulation

b) In case of FHSS modulation:

- In case of non-Adaptive Frequency Hopping equipment:

The number of Hopping Frequencies:

- In case of Adaptive Frequency Hopping Equipment:

The maximum number of Hopping Frequencies:

The minimum number of Hopping Frequencies:

The Dwell Time:

The Minimum Channel Occupation Time:

c) Adaptive / non-adaptive equipment:

☐ non-adaptive Equipment

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

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

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment: ms

☒ The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐ The equipment is Frame Based equipment

☒ The equipment is Load Based equipment

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

The CCA time implemented by the equipment: μ s

The value q as referred to in clause 4.3.2.5.2.2.2

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

☐ The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

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

The maximum (corresponding) Duty Cycle: ...%

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

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

- RF Output Power

GFSK

- Power Spectral Density

GFSK

- Duty cycle, Tx-Sequence, Tx-gap

.....

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

.....

- Hopping Frequency Separation (only for FHSS equipment)

.....

- Medium Utilisation

GFSK

- Adaptivity & Receiver Blocking

.....

- Occupied Channel Bandwidth

GFSK

- Transmitter unwanted emissions in the OOB domain

GFSK

- Transmitter unwanted emissions in the spurious domain

GFSK



- Receiver spurious emissions
GFSK

g) The different transmit operating modes (tick all that apply):**■ Operating mode 1: Single Antenna Equipment****■ Equipment with only 1 antenna**☐ Equipment with 2 diversity antennas but only 1 antenna active at any moment in time☐ Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)☐ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

☐ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming☐ Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2

NOTE: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

• The number of Receive chains:

• The number of Transmit chains:

☐ symmetrical power distribution☐ asymmetrical power distribution

In case of beam forming, the maximum beam forming gain:

NOTE: Beam forming gain does not include the basic gain of a single antenna.

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

• Operating Frequency Range 1: 2402 MHz to 2480 MHz

• Operating Frequency Range 2: MHz to MHz

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

j) Occupied Channel Bandwidth(s):☐ Occupied Channel Bandwidth 1: 1.050MHz☐ Occupied Channel Bandwidth 2: MHz

NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):**■ Stand-alone**☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)☐ Plug-in radio device (Equipment intended for a variety of host systems)

Other

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

Operating temperature range: -10° C to 40° C

Operating voltage range: 2.7V to 3.3V ☐ AC **■** DCDetails provided are for the: **■** stand-alone equipment☐ combined (or host) equipment☐ test jig**m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:**



• Antenna Type

■ Integral Antenna

Antenna Gain: -0.23 dBi

If applicable, additional beam forming gain (excluding basic antenna gain): dB

☐ Temporary RF connector provided☐ No temporary RF connector provided☐ Dedicated Antennas (equipment with antenna connector)☐ Single power level with corresponding antenna(s)☐ Multiple power settings and corresponding antenna(s)

Number of different Power Levels:

Power Level 1: dBm

Power Level 2: dBm

Power Level 3: dBm

NOTE 1: Add more lines in case the equipment has more power levels.

NOTE 2: These power levels are conducted power levels (at antenna connector).

For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the

resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable

Power Level 1: -3.06dBm

Number of antenna assemblies provided for this power level:

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1	-0.23	-2.83	
2			
3			
4			

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

Power Level 2: dBm

Number of antenna assemblies provided for this power level:

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

NOTE 4: Add more rows in case more antenna assemblies are supported for this power level.

Power Level 3: dBm

Number of antenna assemblies provided for this power level:

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

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

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ■ stand-alone equipment

☐ combined (or host) equipment☐ test jigSupply Voltage ☐ AC mains State AC voltage:

■ DC State DC voltage : DC 3V

In case of DC, indicate the type of power source

☐ Internal Power Supply

■ External Power Supply or AC/DC adapter

■ Battery: DC 3V

☐ Other:



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

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):

Other: NO FHSS

q) If applicable, the statistical analysis referred to in clause 5.4.1 q)

Not apply

r) If applicable, the statistical analysis referred to in clause 5.4.1 r)

Not apply

s) Geo-location capability supported by the equipment:

☐ Yes

☐ The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user

☒ No

t) Describe the minimum performance criteria that apply to the equipment (see clause 4.3.1.12.3 or clause 4.3.2.11.3):

The minimum performance criterion shall be a PER less than or equal to 10 %.

The intended use of the equipment should be in the normal operation without lost the communication link or no unintentionally operation occurs.





TEST REPORT

EN 62479:2010

EN 50663:2017

Report Reference No. : HK2202150378-2EH

Compiled by

(position+printed name+signature) . : Testing engineer Bella Huang

Bella Huang

Supervised by

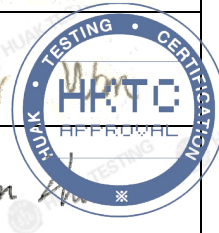
(position+printed name+signature) . : Technique principal Sliver Wan

Sliver

Approved by

(position+printed name+signature) . : Manager Jason Zhou

Jason Zhou



Date of issue : 2022/02/18

Testing Laboratory Name : Shenzhen HUAKE Testing Technology Co., Ltd.

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

Applicant's name : 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

Test specification

Standard : EN 62479:2010

EN 50663:2017

TRF Originator : Shenzhen HUAKE Testing Technology Co., Ltd.

Master TRF : Dated 2020-05

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Test item description : SwitchBot Remote

Trade Mark : SwitchBot

Model/Type reference : W0301700

List Model(s) : W0301701, W0301702, W0301703, W0301704, W0301705

Hardware Version : V1.1

Software Version : V4.3

Ratings : DC 3V From Battery

Result : Pass

**TEST REPORT**

Test Report No. :	HK2202150378-2EH	2022/02/18
		Date of issue

Equipment under Test : SwitchBot Remote

Model/Type reference : W0301700

List Model(s) : W0301701, W0301702, W0301703, W0301704, W0301705

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

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



**** Modified History ****

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2022/02/18	Jason Zhou



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1. GENERAL INFORMATION

1.1 GENERAL REMARKS

Date of receipt of test sample	:	2022/02/15
Testing commenced on	:	2022/02/15
Testing concluded on	:	2022/02/18

1.2 GENERAL DESCRIPTION OF EUT

Equipment	SwitchBot Remote		
Model Name.	W0301700		
Serial Model	W0301701, W0301702, W0301703, W0301704, W0301705		
Difference description	All model's the function, software and electric circuit are the same, only with a product model named different. Test sample model: W0301700.		
Product Description	The EUT is SwitchBot Remote.		
	BT-BLE:		
	Operation Frequency:	2402 MHz ~ 2480 MHz	
	Modulation Type:	GFSK	
	Antenna Designation:	PCB Antenna	
	Antenna Gain(Peak)	0.23 dBi	
	More details of EUT technical specification, please refer to the User's Manual.		
Channel List	Refer to below		
Power Rating	DC 3V From Battery		
Hardware Version	V1.1		
Software Version	V4.3		
Note:	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		



2.EN 62479 & EN 50663 REQUIREMENT

2.1 GENERAL INFORMATION

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

EN 62479:2010 [Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)]

EN 50663:2017 [Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz - 300 GHz)]

2.2 LIMIT

A. Typical usage, installation and the physical characteristics of equipment make it inherently compliant with the applicable EMF exposure levels such as those listed in the bibliography. This low-power equipment includes unintentional (or non-intentional) radiators, for example incandescent light bulbs and audio/visual (A/V) equipment, information technology equipment (ITE) and multimedia equipment (MME) that does not contain radio transmitters.

NOTE Equipment is described as A/V equipment, ITE or MME if its main use is playback/recording of music, voice or images, or processing of digital information.

B. The input power level to electrical or electronic components that are capable of radiating electromagnetic energy in the relevant frequency range is so low that the available antenna power and/or the average total radiated power cannot exceed the low-power exclusion level defined in 4.2.

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

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



3. RESULT

PASS.

BT-BLE:

The available antenna power of this EUT is 0.52mW (-2.83dBm), the power are below the low-power exclusion level defined in 4.2(Pmax: 20mW)."
The power see the test report HK2202150378-2ER.