EMC TEST REPORT

ETSI EN 301 489-1 V2.2.3 (2019-11)
(Draft) ETSI EN 301 489-17 V3.2.2 (2019-12)
EN 55032:2015
EN 55035:2017
EN 61000-3-2:2014
EN 61000-3-3:2013

Product : Smart Humidity & Temperature Sensor

Trade Mark : Shelly®

Model Name : ShellyH&T

Family Model : SHHT-v1

Report No. : STE190920002001E

Prepared for

Allterco Robotics

1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria

Prepared by

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TEST RESULT CERTIFICATION

Applicant's Name	Allterco Robotics
Address	1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria
Manufacturer's Name	Allterco Robotics
Address	1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria
Product description	
Product name	Smart Humidity & Temperature Sensor
Trade Mark	Shelly®
Model Name	ShellyH&T
Family Model	SHHT-v1
Standards	ETSI EN 301 489-1 V2.2.3 (2019-11) (Draft) ETSI EN 301 489-17 V3.2.2 (2019-12) EN 55032:2015 EN 55035:2017 EN 61000-3-2:2014 EN 61000-3-3:2013

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the article 3.1(b) of the Directive 2014/53/EU requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test	
Date (s) of performance of tests	20 Dec. 2019 ~ 10 April. 2020
Date of Issue	10 April. 2020
Test Result	Pass

Testing Engineer : Korka Lin
(Korka Lin)

Technical Manager : Sky Zhang
(Sky Zhang)

Authorized Signatory : Sam Chen
(Sam Chen)

Shenzhen NTEK Testing Technology Co., Ltd. Report Seal

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1. TEST SUMMARY

Test procedures according to the technical standards:				
ETSI EN 301 489-1 V2.2.3 (2019-11) (Draft) ETSI EN 301 489-17 V3.2.2 (2019-12) EN 55032:2015; EN 55035:2017 EN 61000-3-2:2014;EN 61000-3-3:2013				
EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN 55032:2015	Conducted Emission On AC And Telecom Port 150kHz to 30MHz	Class B	PASS	
	Disturbance Voltage at The Antenna Terminals (30MHz To 2150MHz)	------	N/A	
	Wanted signal and disturbance voltage at the RF output terminals (30MHz To 2150MHz)	------	N/A	
	Radiated Emission 30MHz to 1000MHz	Class B	PASS	
	Radiated Emission 1GHz to 6GHz	Class B	PASS	
EN61000-3-2:2014	Harmonic Current Emission	Class D	N/A	NOTE (2)
EN 61000-3-3:2013	Voltage Fluctuations & Flicker	------	PASS	
EMC Immunity				
Section EN 55035:2017	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2:2009	Electrostatic Discharge	B	PASS	
EN 61000-4-3:2006+ A1:2008+A2:2010	RF electromagnetic field	A	PASS	
EN 61000-4-4:2012	Fast transients	B	PASS	
EN 61000-4-5:2006	Surges	B	PASS	
EN 61000-4-6:2009	Continuous radio frequency disturbances or Injected Current	A	PASS	
EN 61000-4-8:2010	Power Frequency Magnetic Field	A	N/A	NOTE (3)
EN 61000-4-11:2004	Volt. Interruptions Volt. Dips	B / C / C	PASS	NOTE (4)

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

(2) The power consumption of EUT is less than 75W and no Limits apply.

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

(4) Voltage dip: 100% reduction – Performance Criteria B

Voltage dip: 30% reduction – Performance Criteria C

Voltage Interruption: 100% Interruption – Performance Criteria C

(5) For client's request and manual description, the test will not be executed.

1.1 TEST FACILITY

Shenzhen NTEK Testing Technology Co., Ltd.
Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street Bao'an District, Shenzhen 518126 P.R. China

CNAS-Lab. : The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)
The Certificate Registration Number is L5516

IC-Registration : The Certificate Registration Number is CN0074

FCC- Accredited : Test Firm Registration Number: 463705
Designation Number: CN1184

A2LA-Lab. : The Certificate Registration Number is 4298.01
This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

1.2 MEASUREMENT UNCERTAINTY

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

Test Item	Measurement Frequency Range	K	U(dB)
AC Mains Conducted Emission	0.009kHz ~ 0.15MHz	2	2.66
AC Mains Conducted Emission	0.15MH ~ 30MHz	2	2.80
Telecom Conducted Emission(Cat 3)	0.15MHz ~ 30MHz	2	2.40
Telecom Conducted Emission(Cat 5)	0.15MHz ~ 30MHz	2	2.58
Radiated Emission	30MHz ~ 1000MHz	2	5.10
Radiated Emission	1000MHz ~ 6000MHz	2	2.40
Radiated Emission	6000MHz ~ 18000MHz	2	2.52

Revision History

Report No.	Version	Description	Issued Date
STE190920002001E	Rev.01	Initial issue of report	10 April. 2020

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Humidity & Temperature Sensor
Trade Mark	Shelly®
Model Name	ShellyH&T
Family Model	SHHT-v1
Model Difference	N/A
Frequency Bands	802.11b/g/n(20MHz): 2412~2472MHz
Modulation Mode:	IEEE 802.11b : DSSS (DBPSK, DQPSK, CCK) IEEE 802.11g/n (HT20) : OFDM
Power Rating	DC 3V From Battery or DC 5V From Adapter
Adapter	N/A
Battery	DC 3V
Connecting I/O Port(s)	Please refer to the User's Manual
Antenna	PCB Antenna
Hard Ware Version	ShellyH&T_v0.1.6
Soft Ware Version	1.6.0

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Normal Working
Mode 2	WIFI 2.4G

For Radiated Test	
Final Test Mode	Description
Mode 1	Normal Working

For EMS Test	
Pretest Mode	Description
Mode 1	Normal Working
Mode 2	WIFI 2.4G

NOTE: The test modes were carried out for all operation modes. The final test mode of the EUT was the worst test mode for EMI, and its test data was showed.

2.3 DESCRIPTION OF TEST SETUP

CE

RE

2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	Smart Humidity & Temperature Sensor	Shelly	Shelly Flood	SHHT-v1	EUT
E-2	Adapter	N/A	N/A	N/A	Peripherals

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.5 MEASUREMENT INSTRUMENTS LIST

2.5.1 RADIATED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Antenna Mast	EM	SC100_1	N/A	N/A	N/A	N/A
2	Turn Table	EM	SC100	060531	N/A	N/A	N/A
3	EMI Test Receiver	R&S	ESCI-7	101318	May 13, 2019	May 12, 2020	1 year
4	50Ω Switch	Anritsu Corp	MP59B	6200983705	May 13, 2019	May 12, 2020	1 year
5	Spectrum Analyzer	Aglient	E4407B	MY45108040	May 13, 2019	May 12, 2020	1 year
6	Unversal radio communication tester	R&S	CMU200	1100.008.02	May 13, 2019	May 12, 2020	1 year
7	Wideband Radio Communication Tester Specifications	R&S	CMW500	148500	May 13, 2019	May 12, 2020	1 year
8	Test Cable	N/A	R-01	N/A	Apr. 21, 2017	Apr. 20, 2020	3 years
9	Test Cable	N/A	R-02	N/A	Apr. 21, 2017	Apr. 20, 2020	3 years
10	Bilog Antenna	TESEQ	CBL6111D	31216	Apr. 15, 2019	Apr. 14, 2020	1 year
11	Horn Antenna	EM	EM-AH-10180	2011071402	Apr. 15, 2019	Apr. 14, 2020	1 year
12	Amplifier	EMC	EMC051835SE	980246	Aug. 06, 2019	Aug. 05, 2020	1 year

2.5.2 ESD

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Unversal radio communication tester	R&S	CMU200	1100.008.02	May 13, 2019	May 12, 2020	1 year
2	Wideband Radio Communication Tester Specifications	R&S	CMW500	148500	May 13, 2019	May 12, 2020	1 year
3	Electrostatic Discharge Generator	Lioncel	ESD-203B	ESD203B0150402	Aug. 28, 2019	Aug. 27, 2020	1 year

2.5.3 RS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Unversal radio communication tester	R&S	CMU200	1100.008.02	May 13, 2019	May 12, 2020	1 year
2	Wideband Radio Communication Tester Specifications	R&S	CMW500	148500	May 13, 2019	May 12, 2020	1 year
3	Audio Power Amplifier	Brüel & Kjær	4602B	2185667	May 13, 2019	May 12, 2020	1 year
4	Mouth Simulator	Brüel & Kjær	2669	2143265	May 13, 2019	May 12, 2020	1 year
5	Sound Calibrator	Brüel & Kjær	4185	2194825	May 13, 2019	May 12, 2020	1 year
6	1/2” Pressure-field Microphone	Brüel & Kjær	735	2641678	May 13, 2019	May 12, 2020	1 year
7	Telephone Test Head	Brüel & Kjær	4185	2631728	May 13, 2019	May 12, 2020	1 year
8	Audio Analyzer	R&S	UPV	100419	May 13, 2019	May 12, 2020	1 year
9	Ear Simulator for Telephonometry	Brüel & Kjær	4185	2553612	May 13, 2019	May 12, 2020	1 year
10	Bilog Antenna	ETS	3142E(Fequency range 30MHz to 6 GHz)	00214344	Aug. 06, 2019	Aug. 05, 2020	1 year
11	Broadband Amplifier	AR	60S1G6	0350414	Aug. 06, 2019	Aug. 05, 2020	1 year
12	PSG Analog Signal Generator	Agilent	E8257D	MY51110112	Aug. 06, 2019	Aug. 05, 2020	1 year
13	Power Amplifier	rflight	NTWPA-00810200	17063153	Aug. 06, 2019	Aug. 05, 2020	1 year
14	Power Amplifier	AR	25S1G4A	308598	Aug. 06, 2019	Aug. 05, 2020	1 year
15	Power Meter	Agilent	E4419B	MY45102538	Aug. 06, 2019	Aug. 05, 2020	1 year
16	Power Sensor	Agilent	M7301A	MY41495644	Aug. 06, 2019	Aug. 05, 2020	1 year
17	Power Sensor	Agilent	M7301A	US39212148	Aug. 06, 2019	Aug. 05, 2020	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION (Frequency Range 150KHz-30MHz)

Table A.10 – Requirements for asymmetric mode conducted emissions from Class A equipment

Applicable to

1. wired network ports (3.1.30)
2. optical fibre ports (3.1.24) with metallic shield or tension members
3. antenna ports (3.1.3)

Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class A voltage limits dB(µV)	Class A current limits dB(µA)
A10.1	0,15 – 0,5	AAN	Quasi Peak / 9 kHz	97 – 87	n/a
	0,5 – 30			87	
	0,15 – 0,5	AAN	Average / 9 kHz	84 – 74	
	0,5 – 30			74	
A10.2	0,15 – 0,5	CVP and current probe	Quasi Peak / 9 kHz	97 – 87	53 – 43
	0,5 – 30			87	43
	0,15 – 0,5	CVP and current probe	Average / 9 kHz	84 – 74	40 – 30
	0,5 – 30			74	30
A10.3	0,15 – 0,5	Current Probe	Quasi Peak / 9 kHz	n/a	53 – 43
	0,5 – 30				43
	0,15 – 0,5	Current Probe	Average / 9 kHz		40 – 30
	0,5 – 30				30

The choice of coupling device and measurement procedure is defined in Annex C.

AC mains ports that also have the function of a wired network port shall meet the limits given in Table A.8.

The test shall cover the entire frequency range.

The application of the voltage and/or current limits is dependent on the measurement procedure used. Refer to Table C.1 for applicability.

Testing is required at only one EUT supply voltage and frequency.

Applicable to ports listed above and intended to connect to cables longer than 3 m.

Table A.11 – Requirements for asymmetric mode conducted emissions from Class B equipment

Applicable to

1. wired network ports (3.1.30)
2. optical fibre ports (3.1.24) with metallic shield or tension members
3. broadcast receiver tuner ports (3.1.8)
4. antenna ports (3.1.3)

Table clause	Frequency range MHz	Coupling device (see Table A.7)	Detector type / bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
A11.1	0,15 – 0,5	AAN	Quasi Peak / 9 kHz	84 – 74	n/a
	0,5 – 30			74	
	0,15 – 0,5	AAN	Average / 9 kHz	74 – 64	
	0,5 – 30			64	
A11.2	0,15 – 0,5	CVP and current probe	Quasi Peak / 9 kHz	84 – 74	40 – 30
	0,5 – 30			74	30
	0,15 – 0,5	CVP and current probe	Average / 9 kHz	74 – 64	30 – 20
	0,5 – 30			64	20
A11.3	0,15 – 0,5	Current Probe	Quasi Peak / 9 kHz	n/a	40 – 30
	0,5 – 30				30
	0,15 – 0,5	Current Probe	Average / 9 kHz		30 – 20
	0,5 – 30				20

The choice of coupling device and measurement procedure is defined in Annex C.

Screened ports including TV broadcast receiver tuner ports are tested with a common-mode impedance of 150 Ω. This is typically accomplished with the screen terminated by 150 Ω to earth.

AC mains ports that also have the function of a wired network port shall meet the limits given in Table A.9.

The test shall cover the entire frequency range.

The application of the voltage and/or current limits is dependent on the measurement procedure used. Refer to Table C.1 for applicability.

Testing is required at only one EUT supply voltage and frequency.

Applicable to ports listed above and intended to connect to cables longer than 3 m.

Table A.12 – Requirements for conducted differential voltage emissions from Class B equipment

Applicable to
1. TV broadcast receiver tuner ports (3.1.8) with an accessible connector
2. RF modulator output ports (3.1.27)
3. FM broadcast receiver tuner ports (3.1.8) with an accessible connector

Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A12.1	30 – 950	For frequencies ≤1 GHz Quasi Peak/ 120 kHz	46	46	46	See a)
	950 – 2 150		46	54	54	
A12.2	950 – 2 150		46	54	54	See b)
A12.3	30 – 300		46	54	50	See c)
	300 – 1 000				52	
A12.4	30 – 300	For frequencies ≥1 GHz Peak/ 1 MHz	46	66	59	See d)
	300 – 1 000				52	
A12.5	30 – 950		46	76	46	See e)
	950 – 2 150			n/a	54	

a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.

b) Tuner units (not the LNB) for satellite signal reception.

c) Frequency modulation audio receivers and PC tuner cards.

d) Frequency modulation car radios.

e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.

Testing is required at only one EUT supply voltage and frequency.

The term 'other' refers to all emissions other than the fundamental and the harmonics of the local oscillator.

The test shall be performed with the device operating at each reception channel.

The test shall cover the entire frequency range.

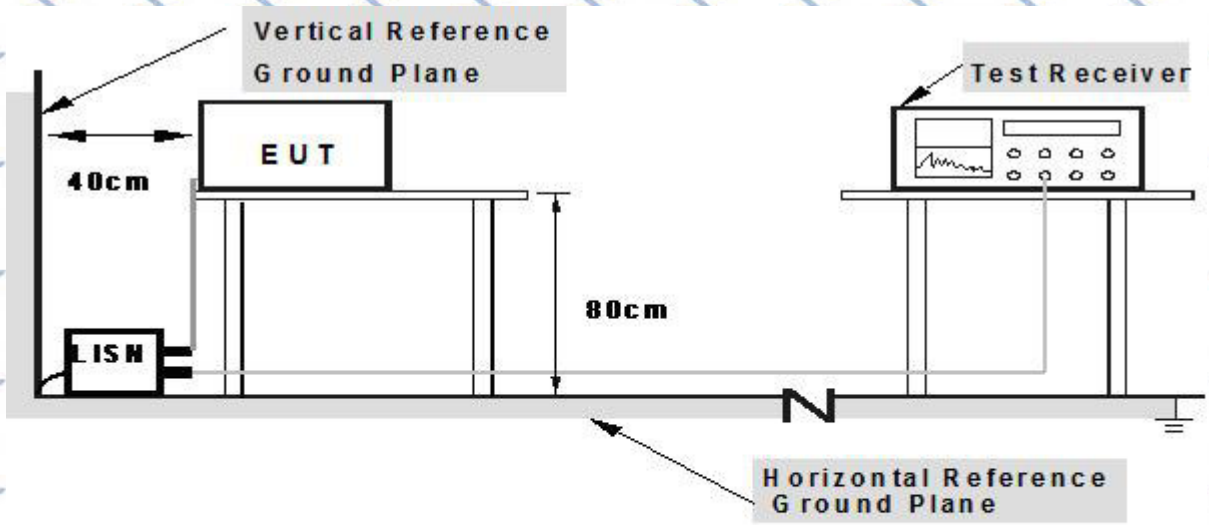
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.4 EUT OPERATING CONDITIONS

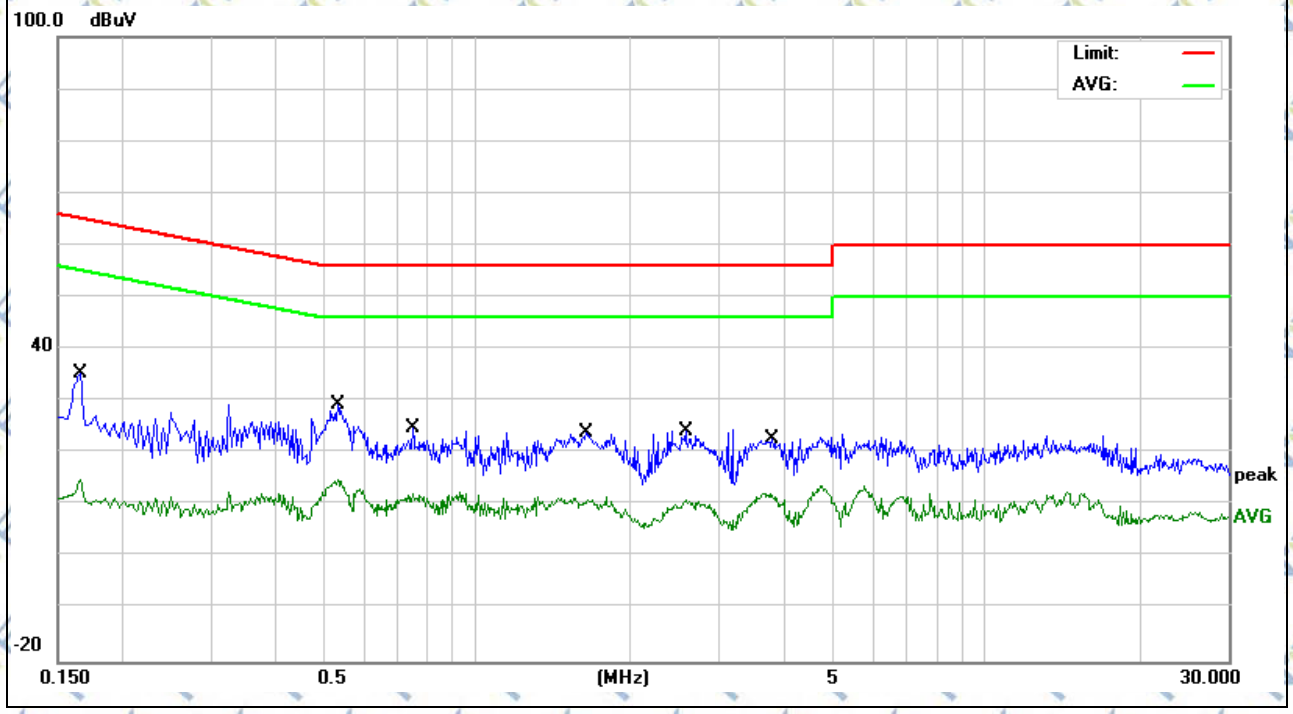
The EUT tested system was configured as the statements of 2.2 Unless otherwise a special operating condition is specified in the follows during the testing.

3.1.5 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	21℃	Relative Humidity:	65%
Pressure:	1010hPa	Phase:	L
Test Voltage:	N/A	Test Mode:	Mode 1

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1660	25.74	9.73	35.47	65.15	-29.68	QP
0.1660	5.29	9.73	15.02	55.15	-40.13	AVG
0.534	19.61	9.75	29.36	56.00	-26.64	QP
0.5340	5.13	9.75	14.88	46.00	-31.12	AVG
0.7500	15.02	9.75	24.77	56.00	-31.23	QP
0.7500	2.52	9.75	12.27	46.00	-33.73	AVG
1.6379	14.08	9.78	23.86	56.00	-32.14	QP
1.6379	1.49	9.78	11.27	46.00	-34.73	AVG
2.5779	14.46	9.83	24.29	56.00	-31.71	QP
2.5779	1.17	9.83	11.00	46.00	-35.00	AVG
3.8180	12.89	9.91	22.80	56.00	-33.20	QP
3.8180	2.48	9.91	12.39	46.00	-33.61	AVG

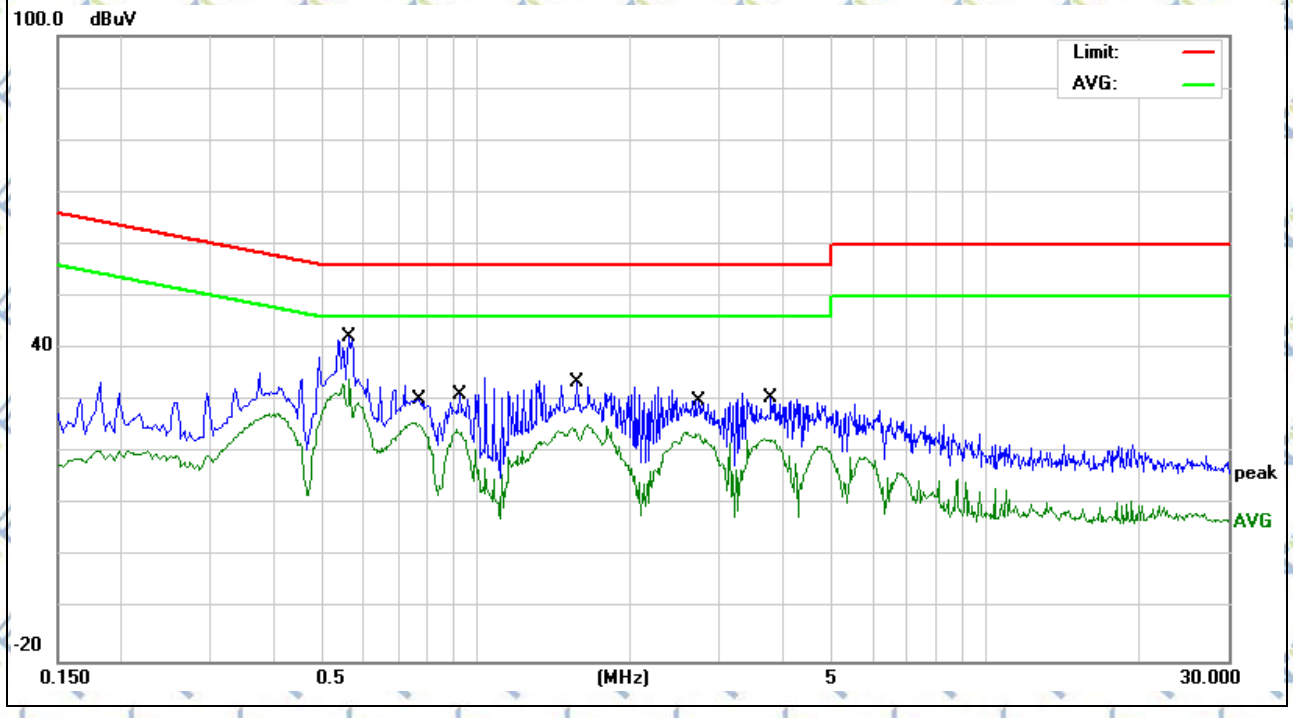
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	21℃	Relative Humidity:	65%
Pressure:	1010hPa	Phase:	N
Test Voltage:	N/A	Test Mode:	Mode 1

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.5620	32.56	9.75	42.31	56.00	-13.69	QP
0.562	24.40	9.75	34.15	46.00	-11.85	AVG
0.7740	20.54	9.75	30.29	56.00	-25.71	QP
0.7740	16.14	9.75	25.89	46.00	-20.11	AVG
0.9260	21.28	9.75	31.03	56.00	-24.97	QP
0.9260	14.71	9.75	24.46	46.00	-21.54	AVG
1.5740	23.89	9.78	33.67	56.00	-22.33	QP
1.5740	15.74	9.78	25.52	46.00	-20.48	AVG
2.7219	20.13	9.84	29.97	56.00	-26.03	QP
2.7219	13.97	9.84	23.81	46.00	-22.19	AVG
3.7820	20.56	9.91	30.47	56.00	-25.53	QP
3.7820	12.80	9.91	22.71	46.00	-23.29	AVG

Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Note: The test modes were carried out for all operation modes. The worst test mode for test data was showed in the report.

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT (Below 1000MHz)

Table A.2 – Requirements for radiated emissions at frequencies up to 1 GHz for Class A equipment

Table clause	Frequency range MHz	Measurement		Class A limits dB(μV/m)
		Distance m	Detector type/ bandwidth	OATS/SAC (see Table A.1)
A2.1	30 – 230	10	Quasi Peak / 120 kHz	40
	230 – 1 000			47
A2.2	30 – 230	3		50
	230 – 1 000			57
Apply only A2.1 or A2.2 across the entire frequency range.				

Table A.4 – Requirements for radiated emissions at frequencies up to 1 GHz for Class B equipment

Table clause	Frequency range MHz	Measurement		Class B limits dB(μV/m)
		Distance m	Detector type/ bandwidth	OATS/SAC (see Table A.1)
A4.1	30 – 230	10	Quasi Peak / 120 kHz	30
	230 – 1 000			37
A4.2	30 – 230	3		40
	230 – 1 000			47
Apply only table clause A4.1 or A4.2 across the entire frequency range.				

Table A.6 – Requirements for radiated emissions from FM receivers

Table clause	Frequency range MHz	Measurement		Class B limit dB(μV/m)	
		Distance m	Detector type/ bandwidth	Fundamental	Harmonics
				OATS/SAC (see Table A.1)	OATS/SAC (see Table A.1)
A6.1	30 – 230	10	Quasi peak/ 120 kHz	50	42
	230 – 300				42
	300 – 1 000				46
A6.2	30 – 230	3		60	52
	230 – 300				52
	300 – 1 000				56
Apply only A.6.1 or A.6.2 across the entire frequency range. These relaxed limits apply only to emissions at the fundamental and harmonic frequencies of the local oscillator. Signals at all other frequencies shall be compliant with the limits given in Table A.4.					

3.2.2 LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Table A.3 – Requirements for radiated emissions at frequencies above 1 GHz for Class A equipment

Table clause	Frequency range MHz	Measurement		Class A limits dB(μV/m)
		Distance m	Detector type/ bandwidth	FSOATS (see Table A.1)
A3.1	1 000 – 3 000	3	Average / 1 MHz	56
	3 000 – 6 000			60
A3.2	1 000 – 3 000		Peak / 1 MHz	76
	3 000 – 6 000			80
Apply A3.1 and A3.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1.				

Table A.5 – Requirements for radiated emissions at frequencies above 1 GHz for Class B equipment

Table clause	Frequency range MHz	Measurement		Class B limits dB(μV/m)
		Distance m	Detector type/ bandwidth	FSOATS (see Table A.1)
A5.1	1 000 – 3 000	3	Average/ 1 MHz	50
	3 000 – 6 000			54
A5.2	1 000 – 3 000		Peak/ 1 MHz	70
	3 000 – 6 000			74
Apply A5.1 and A5.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1.				

Notes:

(1) The limit for radiated test was performed according to as following: CISPR 32.

(2) The tighter limit applies at the band edges.

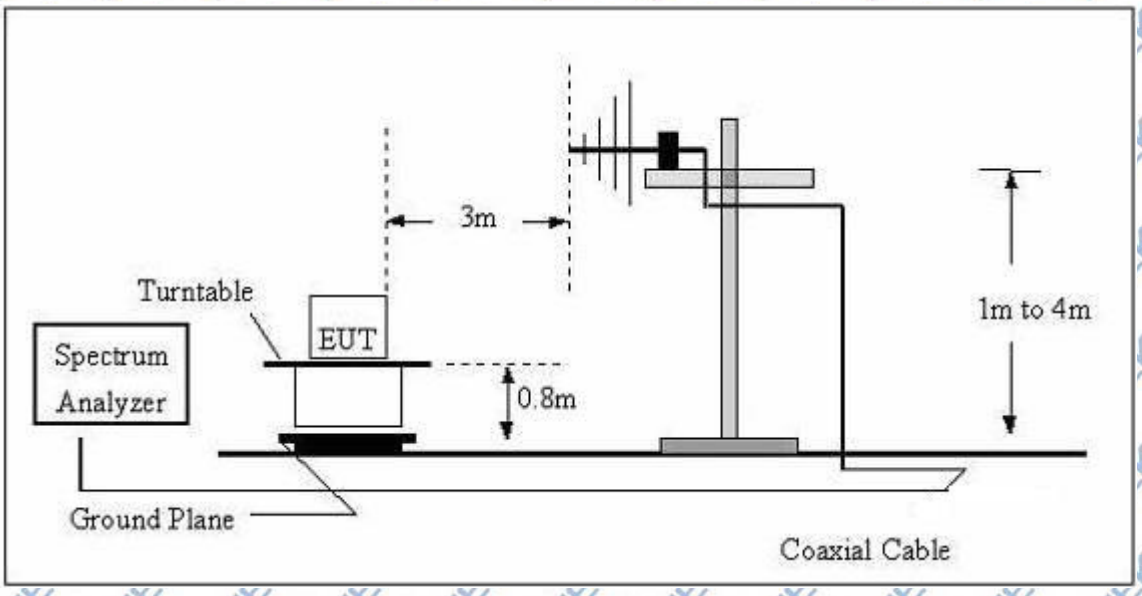
(3) Emission level (dBμV/m)=20log Emission level (uV/m).

3.2.3 TEST PROCEDURE

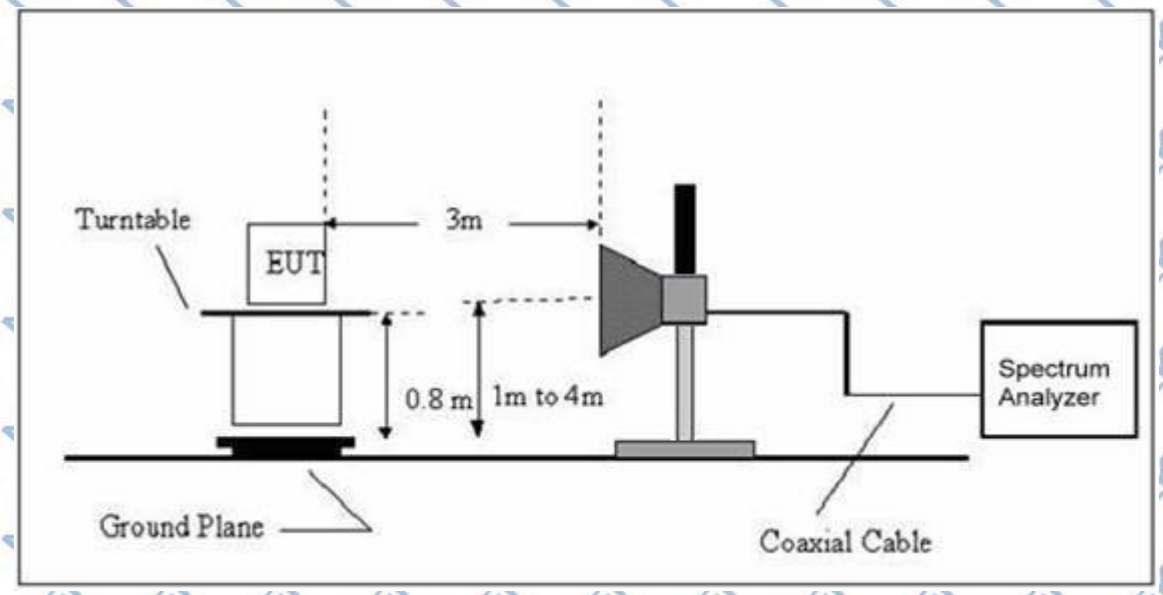
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz



(B) Radiated Emission Test Set-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

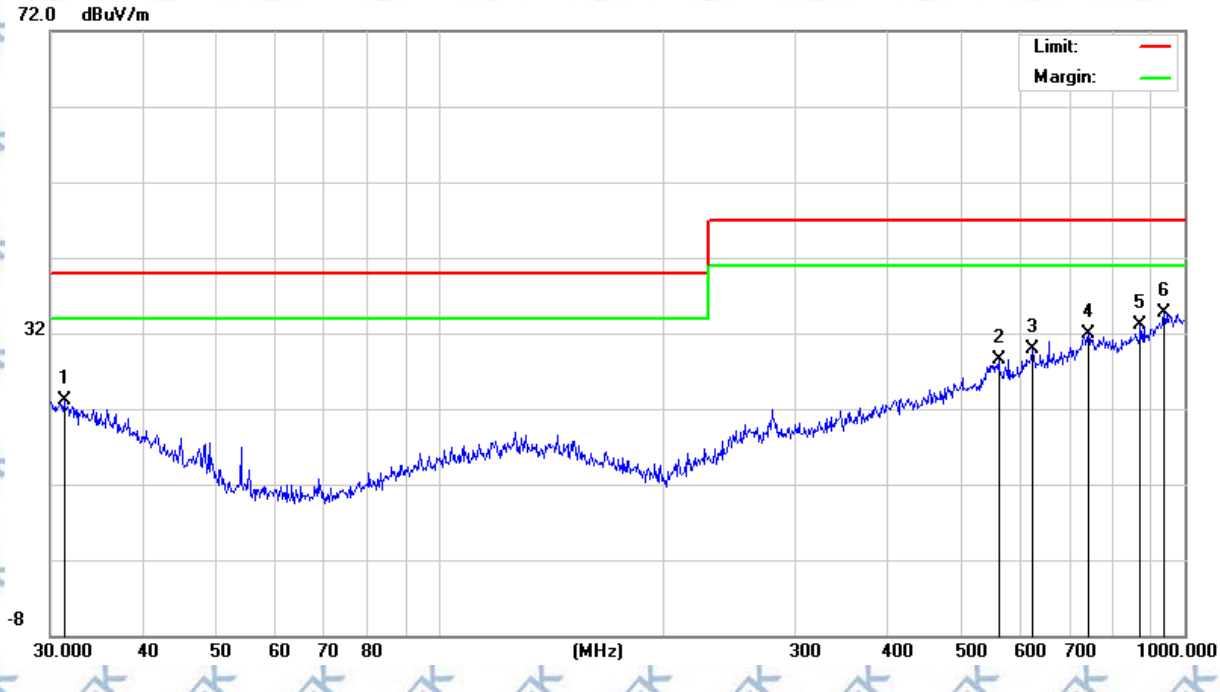
The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (30-1000MHz)

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	26℃	Relative Humidity:	52%
Pressure:	1010 hPa	Polarization:	Horizontal
Test Power:	DC 3V	Test Mode:	Mode 1

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
30.5304	5.63	18.39	24.02	40	-15.98	QP
35.375	5.6	16.14	21.74	40	-18.26	QP
558.73	6.36	22.29	28.65	47	-18.35	QP
734.4913	6.55	24.94	31.49	47	-15.51	QP
827.4932	7.87	25.34	33.21	47	-13.79	QP
952.0937	6.37	28.15	34.52	47	-12.48	QP

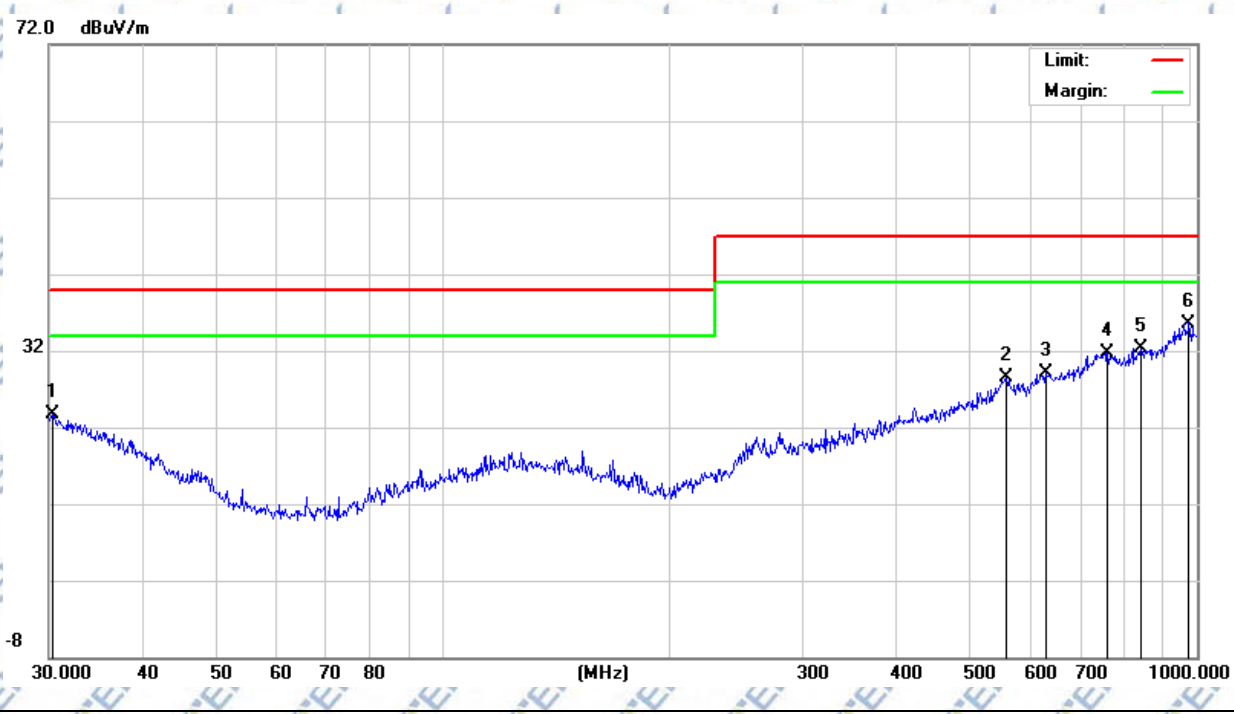
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	26℃	Relative Humidity:	52%
Pressure:	1010hPa	Polarization:	Vertical
Test Power:	DC 3V	Test Mode:	Mode 1

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
31.9544	7.03	17.87	24.9	40	-15.1	QP
49.0144	11.53	9.85	21.38	40	-18.62	QP
665.8034	7.06	22.57	29.63	47	-17.37	QP
747.4825	7.16	24.99	32.15	47	-14.85	QP
836.2441	7.23	25.76	32.99	47	-14.01	QP
945.4397	6.6	28.05	34.65	47	-12.35	QP

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Note: The test modes were carried out for all operation modes. The worst test mode for test data was showed in the report.

3.2.7 TEST RESULTS(1000-6000MHz)

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	26℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Mode:	Mode 1
Test Power:	DC 3V		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBμV/m)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark
V	1375	41.53	2.16	43.69	70	-26.31	peak
V	1562.5	41.5	2.51	44.01	70	-25.99	peak
V	2100	39.63	6.24	45.87	70	-24.13	peak
V	4237.5	37.33	11.37	48.7	74	-25.3	peak
V	4937.5	35.7	13.29	48.99	74	-25.01	peak
V	5600	35.46	13.33	48.79	74	-25.21	peak
H	1275	43.68	1.95	45.63	70	-24.37	peak
H	1750	40.66	3.47	44.13	70	-25.87	peak
H	2162.5	38.96	5.71	44.67	70	-25.33	peak
H	4175	37.3	11.16	48.46	74	-25.54	peak
H	4987.5	34.98	13.23	48.21	74	-25.79	peak
H	5500	36.27	13.11	49.38	74	-24.62	peak

Remark:
Absolute Level= Reading Level+ Factor, Margin= Absolute Level - Limit

Note: The test modes were carried out for all operation modes. The worst test mode for test data was showed in the report.

3.3 HARMONICS CURRENT

3.3.1LIMITS OF HARMONICS CURRENT

Table 1 – Limits for Class A equipment

Harmonic order (n)	Maximum permissible harmonic current (A)
Odd harmonics	
3	2.3
5	1.14
7	0.77
9	0.4
11	0.33
13	0.21
15≤n≤39	0.15*(15/n)
Even harmonics	
2	1.08
4	0.43
6	0.30
8≤n≤40	0.23*(8/n)

Note: Reference standard of the table above: EN61000-3-2.

3.3.2 TEST PROCEDURE

a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

b. The classification of EUT is according to section 5 of EN 61000-3-2. The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B: Portable tools. Portable tools.; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

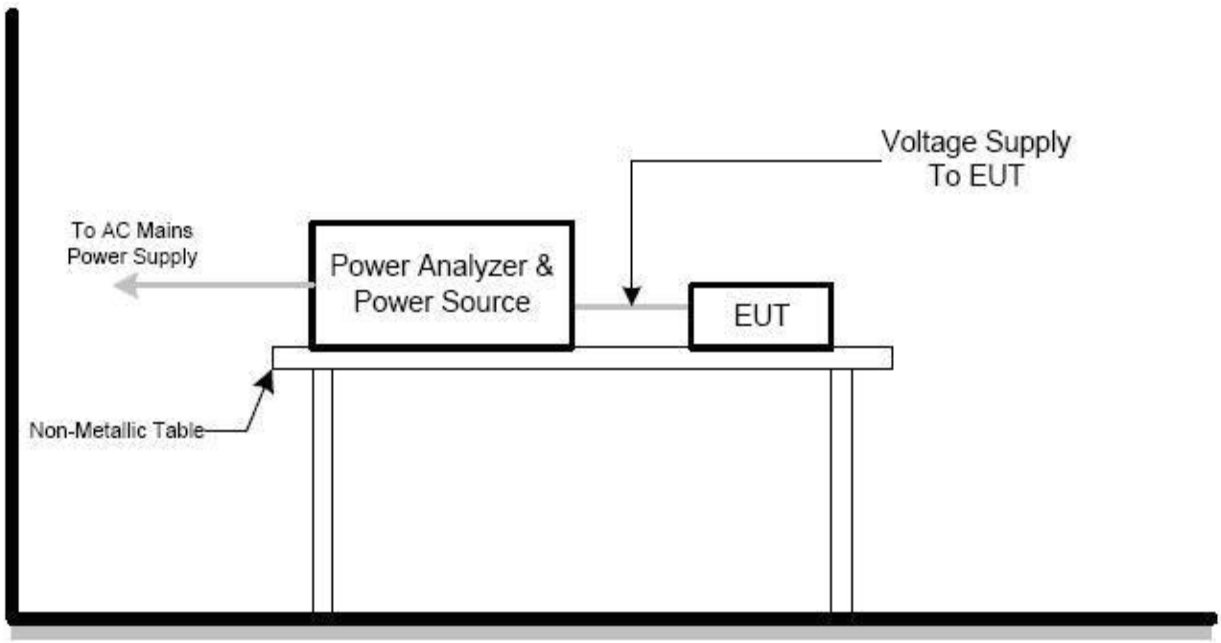
Class D: Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.

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

3.3.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.4 TEST SETUP



3.3.5 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1012hPa	Test duration:	150s
Classification:	Class D	Test Power:	N/A
Test Mode:	N/A		

Note: The active input power of the EUT is less than 75 W. No limits apply for equipment with an active input power up to and including 75W.

3.4 VOLTAGE FLUCTUATION AND FLICKERS

3.4.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKERS

Test items	Limits(EN61000-3-3)	Descriptions
P_{st}	≤1.0, T_p=10min	short-term flicker indicator
P_{lt}	≤0.65, T_p=2h	long-term flicker indicator
d_c	≤3.3%	relative steady-state voltage change
d_{max}	≤4%(or 6% Note(1), 7% Note(2))	maximum relative voltage change:
$d_{(t)}$	≤3.3%, more than 500ms	relative voltage change characteristic

Note:

1. 6 % for equipment which is:
   a. switched manually, or
   b. switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.
2. 7 % for equipment which is
   a. attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
   b. switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

3.4.2 TEST PROCEDURE

a. Harmonic Current Test:

Test was performed according to the procedures specified in Sub-clause 6.2 of IEC/EN 61000-3-2 depend on which standard adopted for compliance measurement.

b. Fluctuation and Flickers Test:

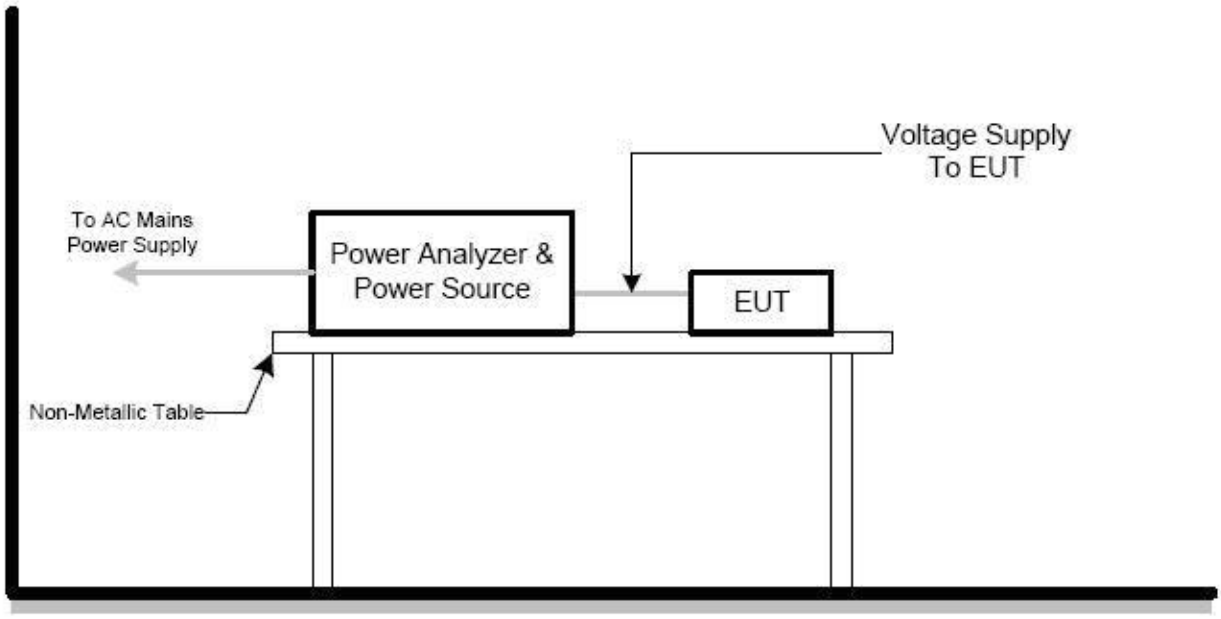
Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

c. All types of harmonic current and/or voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

3.4.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.4.4 TEST SETUP



3.4.5 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Power:	DC 5V From Adapter
Test Mode:	Mode 1		

	EUT values	Limit	Result
Pst	0.028	1.00	PASS
Plt	0.028	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.164	4.00	PASS
dt [%]	0.000	0.50	PASS

4. EMC IMMUNITY TEST

4.1 GENERAL PERFORMANCE CRITERIA

4.1.1 PERFORMANCE CRITERIA

According to **EN 55035** standard, the general performance criteria as following:

Criterion A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
Criterion B	After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.
Criterion C	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

According to **EN 301 489-17** standard, the general performance criteria as following:

Criteria	During the test	After the test
A	Shall operate as intended (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 3). 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 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). 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 3).

NOTE 1: Operate as intended during the test allows a level of degradation 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: 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 3: 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 FOR 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 FOR 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.

PERFORMANCE FOR 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 FOR 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.

4.2 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.2** Unless otherwise a special operating condition is specified in the follows during the testing.

4.3 ESD TESTING

4.3.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance	B
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV Contact Discharge: 2kV/4kV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total
Discharge Mode:	A/C Discharge
Discharge Period:	1 second minimum

4.3.2 TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

a. Indirect application of the discharge:

Vertical Coupling Plane (VCP):

At least 10 single discharges (in the most sensitive polarity) shall be applied to the centre of one vertical edge of the coupling plane. The coupling plane, of dimensions 0,5 m × 0,5 m, is placed parallel to, and positioned at a distance of 0,1 m from, the EUT.

Discharges shall be applied to the coupling plane, with sufficient different positions such that the four faces of the EUT are completely illuminated. One VCP position is considered to illuminate 0,5 m × 0,5 m area of the EUT surface.

Horizontal Coupling Plane (HCP):

Discharge to the HCP shall be made horizontally to the edge of the HCP.

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the centre point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

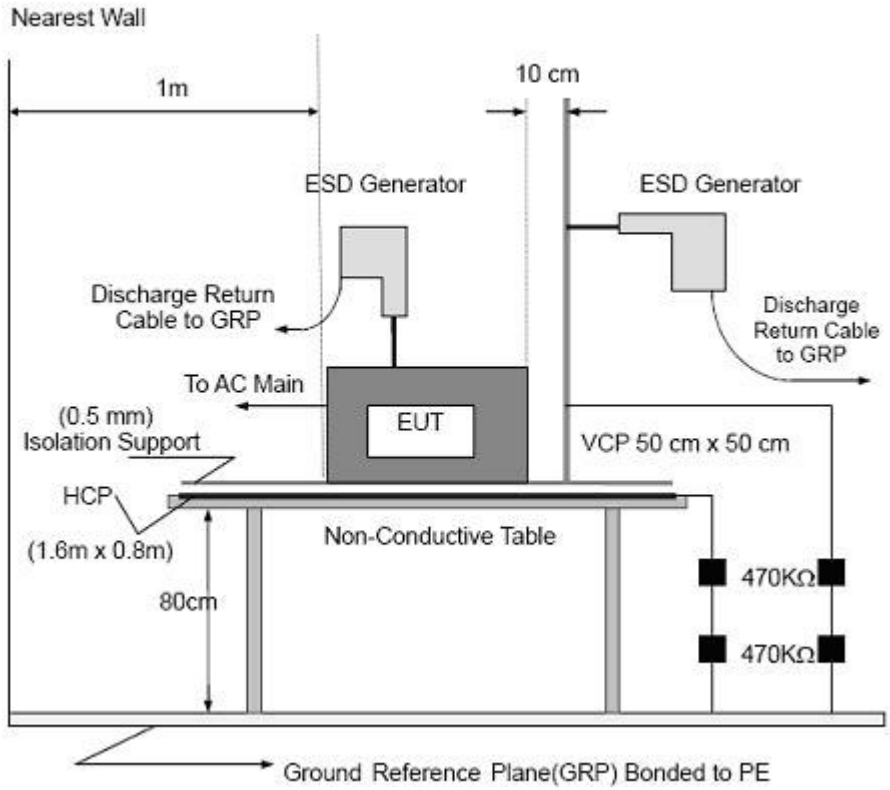
The discharge electrode shall be in contact with the edge of the HCP before the discharge switch is operated

b. Direct application of discharges to the EUT

The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.

For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

4.3.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.3.4 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Power:	DC 3V
Test Mode:	Mode 1/2		

Mode	Contact Discharge (Indirect)								Criterion	Result
Test level(kV)	Test Point	2		4		6				
Test Location		+	-	+	-	+	-			
HCP	Front	P	P	P	P				B	Complies
	Rear	P	P	P	P					
	Left	P	P	P	P					
	Right	P	P	P	P					
VCP	Front	P	P	P	P					
	Rear	P	P	P	P					
	Left	P	P	P	P					
	Right	P	P	P	P					

TEST RESULT

Mode1

Mode	Air Discharge								Contact Discharge								Criterion	Result
Test level(kV)	2		4		8		15		2		4		6		8			
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-		
A1	P	P	P	P	P	P											B	Complies

Mode 2

Mode	Air Discharge								Contact Discharge								WIFI Observation	Criterion	Result
Test level(kV)	2		4		8		15		2		4		6		8				
Test Location	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-			
A1	P	P	P	P	P	P											TT,TR	B	Complies


A1

4.4 RS TESTING

4.4.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance	A
Frequency Range:	According to EN 301 489-1: 80 MHz - 6000 MHz ; According to EN 55035: 80 MHz to 1000 MHz 1800 MHz 2600 MHz 3500 MHz 5000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	at least 3 seconds

4.4.2 TEST PROCEDURE

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

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

The other condition as following manner:

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

b. The frequency range is swept from 80 MHz to 6000 MHz, 1800 MHz, 2600 MHz, 3500 MHz, and 5000MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

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

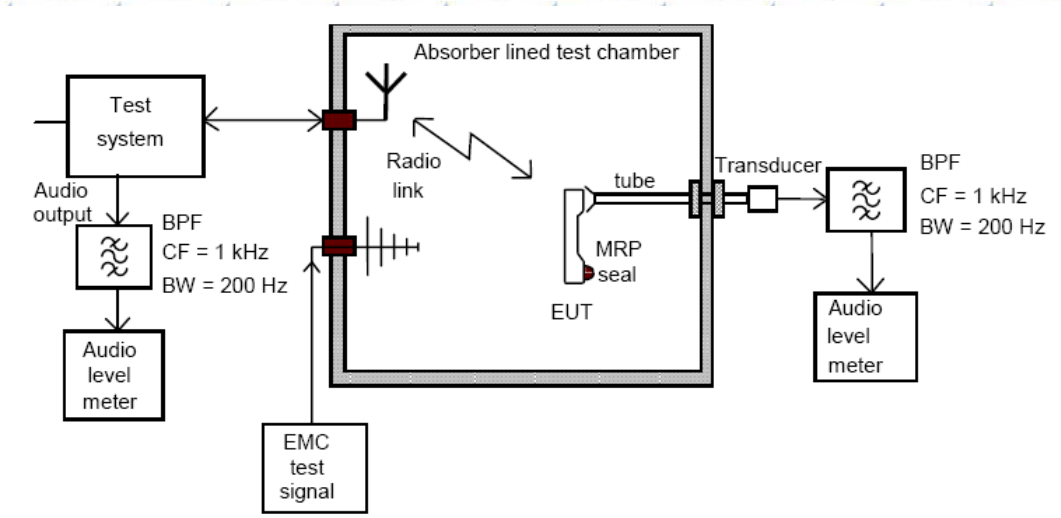
d. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

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

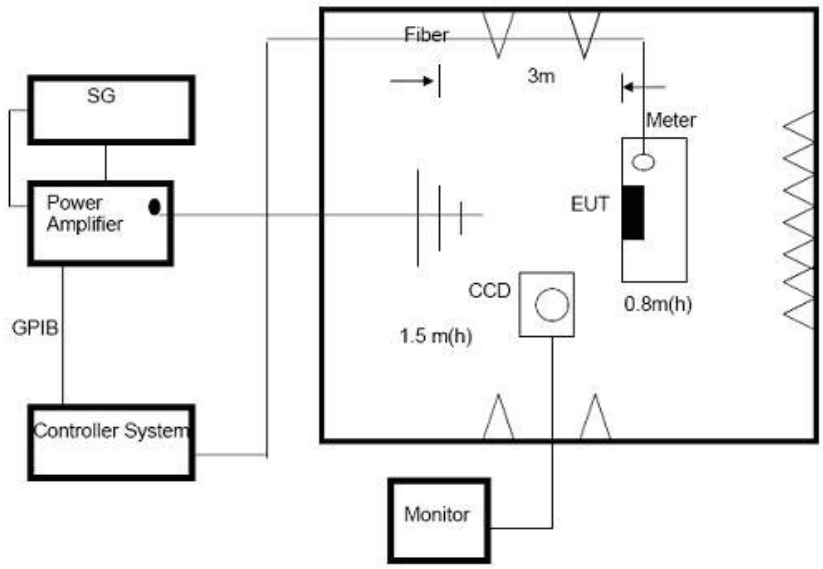
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.4.3 TEST SETUP

☐ Mobile Communication



☒ General Communication



Note:

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

TABLE-TOP EQUIPMENT

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

FLOOR-STANDING EQUIPMENT

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

4.4.4 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	24℃	Relative Humidity:	53%
Pressure:	1010hPa	Test Power:	DC 3V
Test Mode:	Mode 1/2		

TEST RESULT

Mode 2

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observation	Perform. Criteria	Results
80~1000 1000-6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	**CT,CR**	**A**	**P**
			Rear			
			Left			
			Right			

Note:

1. The exclusion band has not been tested in 80MHz~6GHz.
   The exclusion band for immunity testing of equipment operating in the 2,4 GHz band shall be: • lower limit of exclusion band = lowest allocated band edge frequency -120 MHz, i.e. 2 280 MHz; • upper limit of exclusion band = highest allocated band edge frequency +120 MHz, i.e. 2 603,5MHz.

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

Mode1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform. Criteria	Results
80~1000 1000~6000 1800 2600 3500 5000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	**A**	**P**
			Rear		
			Left		
			Right		

Note: "A" stand for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.
There was not any unintentional transmission in standby mode.

4.5 EFT/BURST TESTING

4.5.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-4
Required Performance	B
Test Voltage:	Power Line: 1 kV DC/Signal/ wired network Line: 0.5 KV
Polarity:	Positive & Negative
Impulse Frequency:	For xDSL wired network ports: 100 kHz For DC/AC ports: 5 kHz
Impulse Wave shape :	5/50 ns
Burst Duration:	15 ms
Burst Period:	300 ms
Test Duration:	Not less than 1 min.

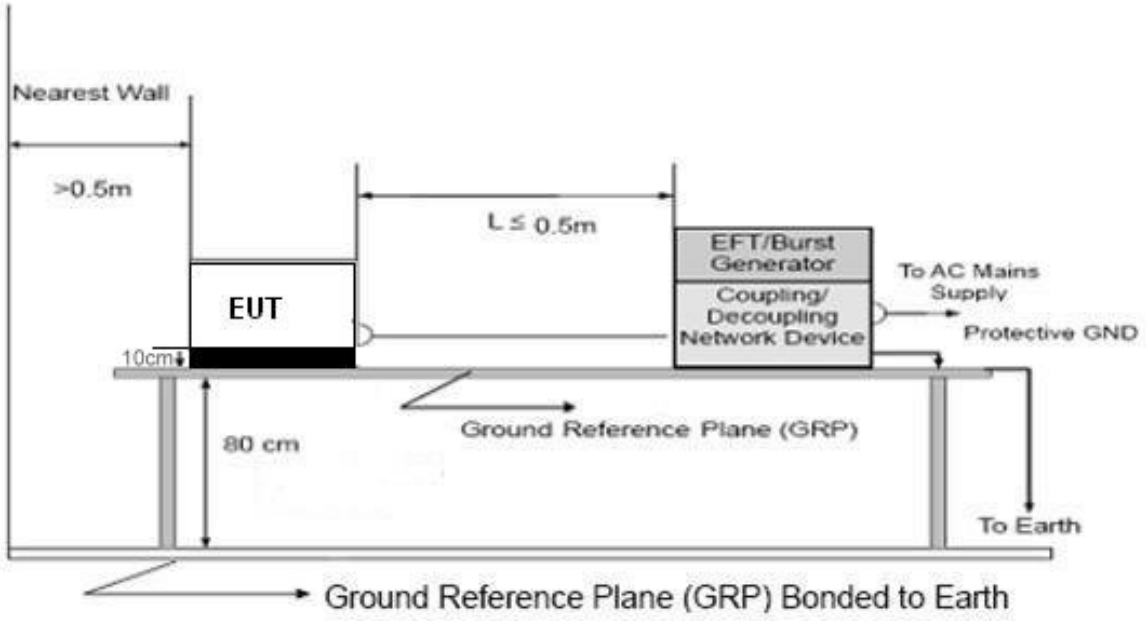
4.5.2 TEST PROCEDURE

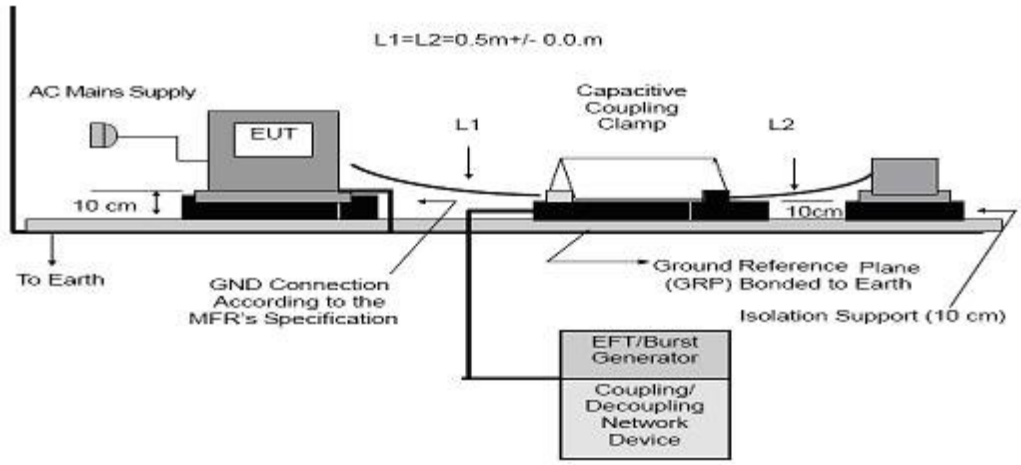
The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

The other condition as following manner:

a. The length of power cord between the coupling device and the EUT should not exceed 1 meter.
b. Both positive and negative polarity discharges were applied.
c. The duration time of each test sequential was 1 minute
d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.5.3 TEST SETUP





Note:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table (0.8m high) standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system. A minimum distance of 0.5m was provided between the EUT and the walls of the laboratory or any other metallic structure.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-4 and its cables were isolated from the Ground Reference Plane by an insulating support that is 0.1-meter thick. The GRP consisted of a sheet of aluminum (at least 0.25mm thick and 2.5m square) connected to the protective grounding system.

4.5.4 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Power:	DC 5V from Adapter AC 230V/50Hz
Test Mode:	Mode 1/2		

TEST RESULT

Mode 2

Coupling Line		Test level (kV)								WIFI Observation	Criterion	Result
		0.5		1		2		4				
		+	-	+	-	+	-	+	-			
AC line	L	P	P	P	P					**TT,TR**	**B**	**Complies**
	N	P	P	P	P							**Complies**
	PE											
	L+N	P	P	P	P							**Complies**
	L+PE											
	N+PE											
	L+N+PE											
DC Line												
Signal Line												

Mode 1

Coupling Line		Test level (kV)								Criterion	Result
		0.5		1		2		4			
		+	-	+	-	+	-	+	-		
AC line	L	P	P	P	P					B	**Complies**
	N	P	P	P	P						**Complies**
	PE										
	L+N	P	P	P	P						**Complies**
	L+PE										
	N+PE										
	L+N+PE										
DC Line											
Signal Line											

Note:

1)There was not any unintentional transmission in standby mode

2) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.

3) There was not any unintentional transmission in standby mode.

4.6 SURGE TESTING

4.6.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance	B
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
Test Voltage:	Power Line:0.5 kV, 1 kV, 2 kV
Surge Input / Output:	L-N, L-PE, N-PE
Generator Source:	2 ohm between networks
Impedance:	12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0 /90/180/270
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

4.6.2 TEST PROCEDURE

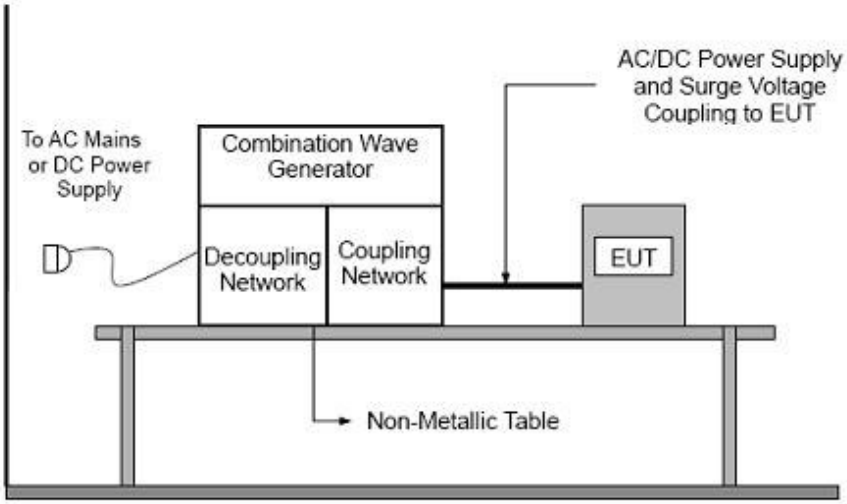
a. For EUT power supply:
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2meters in length (or shorter).

b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:
The surge is applied to the lines via the capacitive coupling. The coupling /decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

c. For test applied to unshielded symmetrically operated interconnection /telecommunication lines of EUT:
The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

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

4.6.3 TEST SETUP



4.6.4 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Power:	DC 5V from Adapter AC 230V/50Hz
Test Mode:	Mode 1/2		

TEST RESULT

Mode 2

Coupling Line			Test level								WIFI / Observation	Criterion	Result
			0.5kV		1kV		2kV		4kV				
			+	-	+	-	+	-	+	-			
AC line	L-N	0°	P	P	P	P					**TT,TR**	**B**	**Complies**
		90°	P	P	P	P							
		180°	P	P	P	P							
		270°	P	P	P	P							
	L-PE												
	N-PE												
DC Line													
Signal Line													

Mode 1

Coupling Line			Test level								Criterion	Result
			0.5 kV		1 kV		2 kV		4 kV			
			+	-	+	-	+	-	+	-		
AC line	L-N	0°	P	P	P	P					B	**Complies**
		90°	P	P	P	P						
		180°	P	P	P	P						
		270°	P	P	P	P						
	L-PE											
	N-PE											
DC Line												
Signal Line												

Note:

1) There was not any unintentional transmission in standby mode

2) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.

3) There was not any unintentional transmission in standby mode.

4.7 INJECTION CURRENT TESTING

4.7.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	3 Vr.m.s.
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	at least 3 seconds

4.7.2 TEST PROCEDURE

The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

The other condition as following manner:

a. The field strength level was 3V.

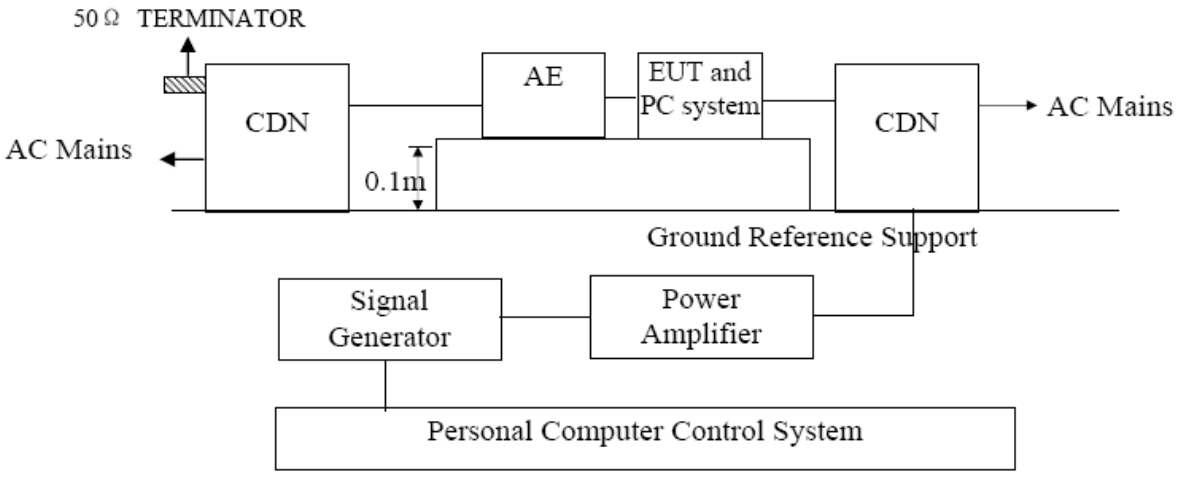
b. The frequency range is swept from 150 KHz to 80 MHz, with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5 x 10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

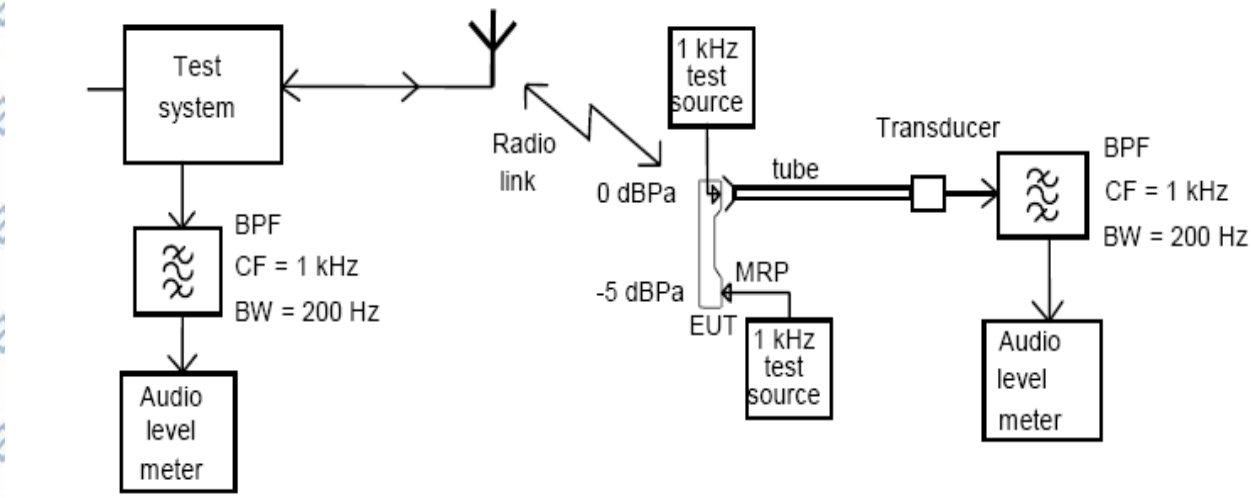
c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

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

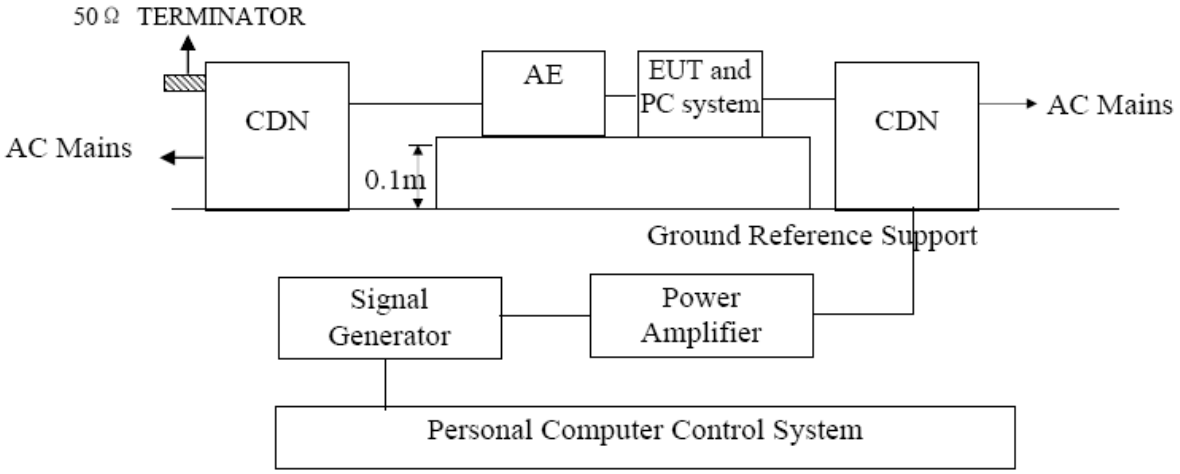
4.7.3 TEST SETUP

☐ Mobile Communication





☒ General Communication



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

NOTE:

FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

4.7.4 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Power:	DC 5V from Adapter AC 230V/50Hz
Test Mode:	Mode 1/2		

Mode 2

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	Observation	Perform. Criteria	Results
Input / Output AC. Power Port	0.15 ---80	3V(rms) AM Modulated 1000Hz, 80%	**CT, CR**	**A**	**P**
Input / Output DC. Power Port	0.15 --- 80		**N/A**	**N/A**	**N/A**
Signal Line	0.15 --- 80		**N/A**	**N/A**	**N/A**

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

Mode 1

Test Ports (Mode)	Freq. Range (MHz)	Field Strength	Perform. Criteria	Results
Input / Output AC. Power Port	0.15 ---80	3V(rms) AM Modulated 1000Hz, 80%	A	P
Input / Output DC. Power Port	0.15 --- 80		N/A	N/A
Signal Line	0.15 --- 80		N/A	N/A

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

Note:

1)There was not any unintentional transmission in standby mode

2) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.

3) There was not any unintentional transmission in standby mode.

4.8 VOLTAGE INTERRUPTION/DIPS TESTING

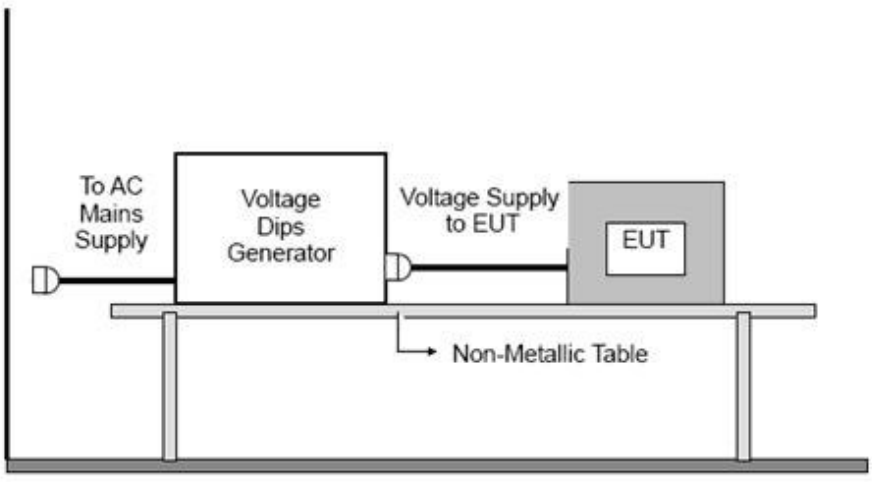
4.8.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance	100% reduction, 0.5 Cycle 100% reduction, 1.0 Cycle 30% reduction, 25 Cycles 30% reduction, 0.5 Cycle
Voltage Interruptions:	100% reduction, 250 Cycles
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/45°/90°/135°/180°/225°/270°/315°/360°
Test Cycle:	3 times

4.8.2 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

4.8.3 TEST SETUP



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

4.8.4 TEST RESULTS

EUT:	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1010hPa	Test Power:	DC 5V from Adapter AC 230V/50Hz
Test Mode:	Mode 1/2		

TEST RESULT

Mode 2

Voltage Reduction	Duration (ms)	WIFI Observation	Perform Criteria	Results
Voltage dip: 0%	10	**TT, TR**	**B**	**P**
Voltage dip: 0%	20	**TT, TR**	**B**	**P**
Voltage dip: 70%	10	**TT, TR**	**C**	**P**
Voltage dip: 70%	500	**TT, TR**	**C**	**P**
Voltage interruptions: 0%	5000	**TT, TR**	**C**	**P**

Mode 1

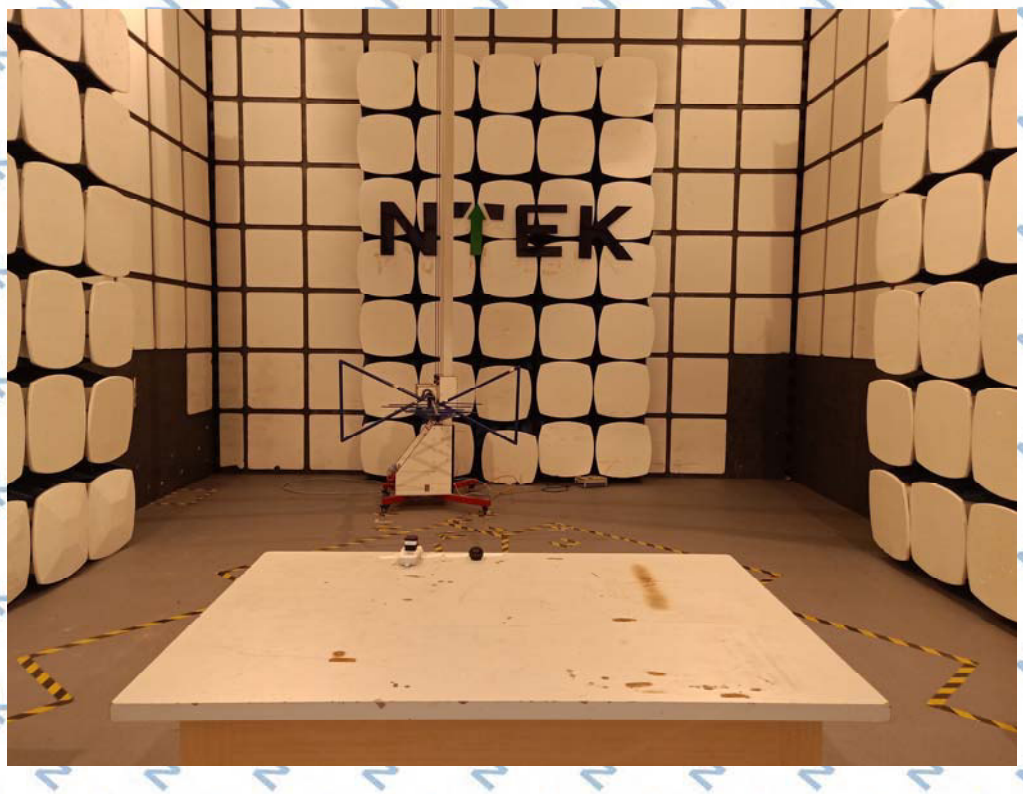
Voltage Reduction	Duration (ms)	Perform Criteria	Results
Voltage dip: 0%	10	**B**	**P**
Voltage dip: 0%	20	**B**	**P**
Voltage dip: 70%	10	**C**	**P**
Voltage dip: 70%	500	**C**	**P**
Voltage interruptions: 0%	5000	**C**	**P**

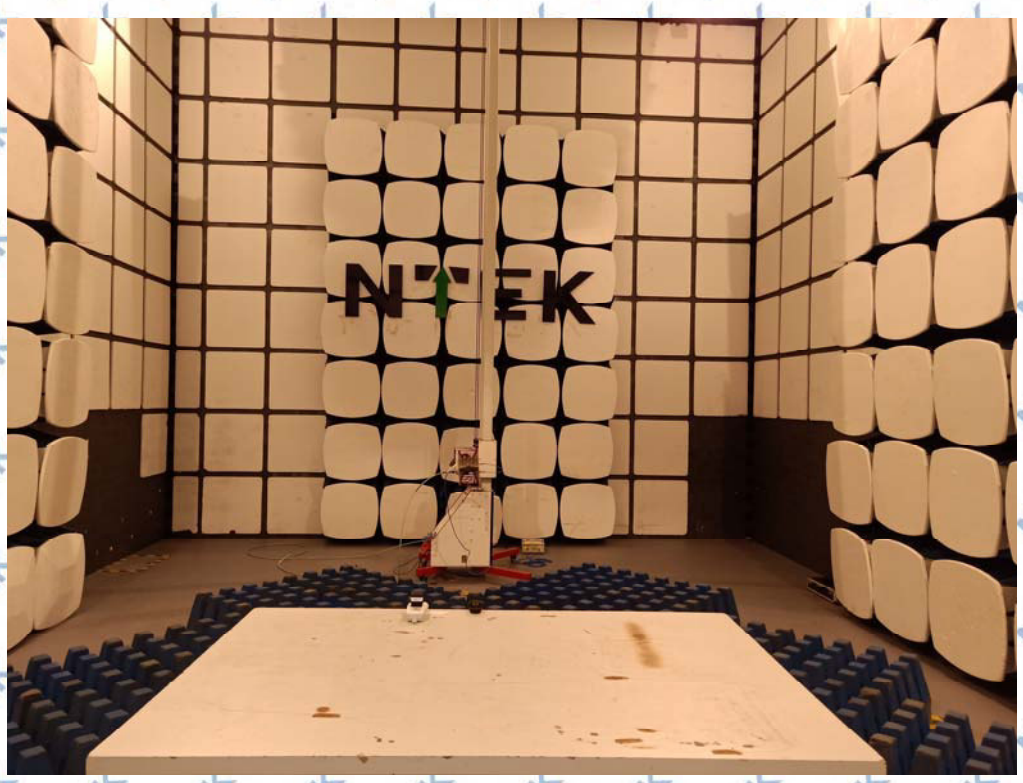
Note:

1) There was not any unintentional transmission in standby mode
2) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.
3) There was not any unintentional transmission in standby mode.

5. EUT TEST PHOTO

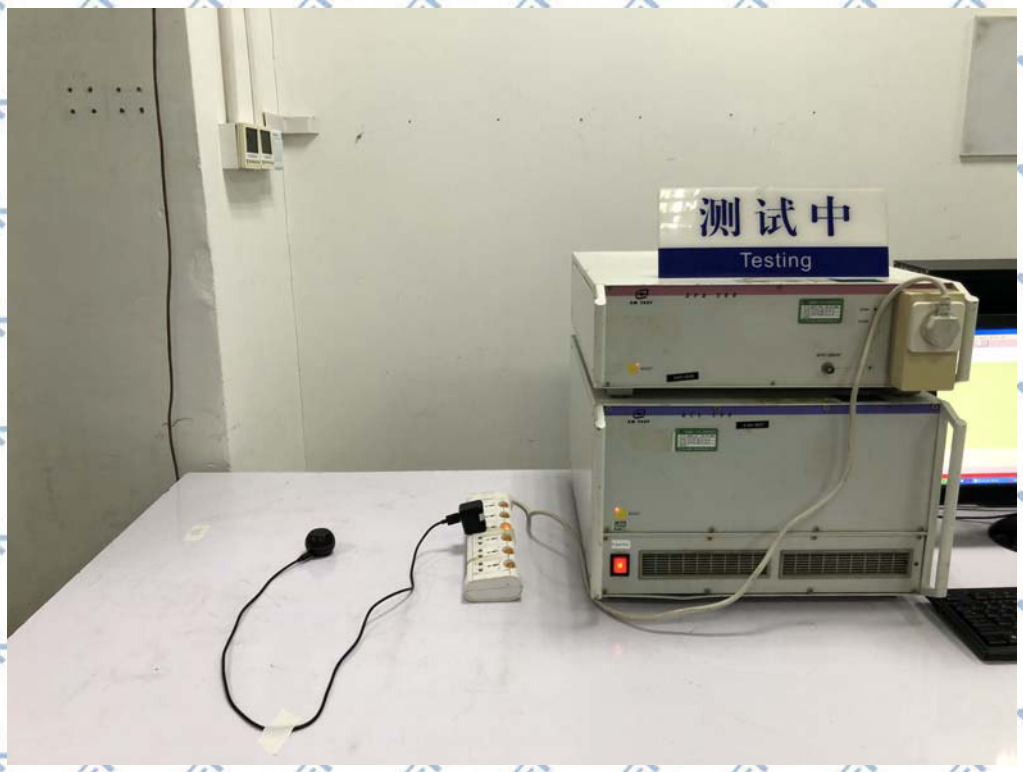
Radiated Measurement Photo





Conducted Measurement Photo

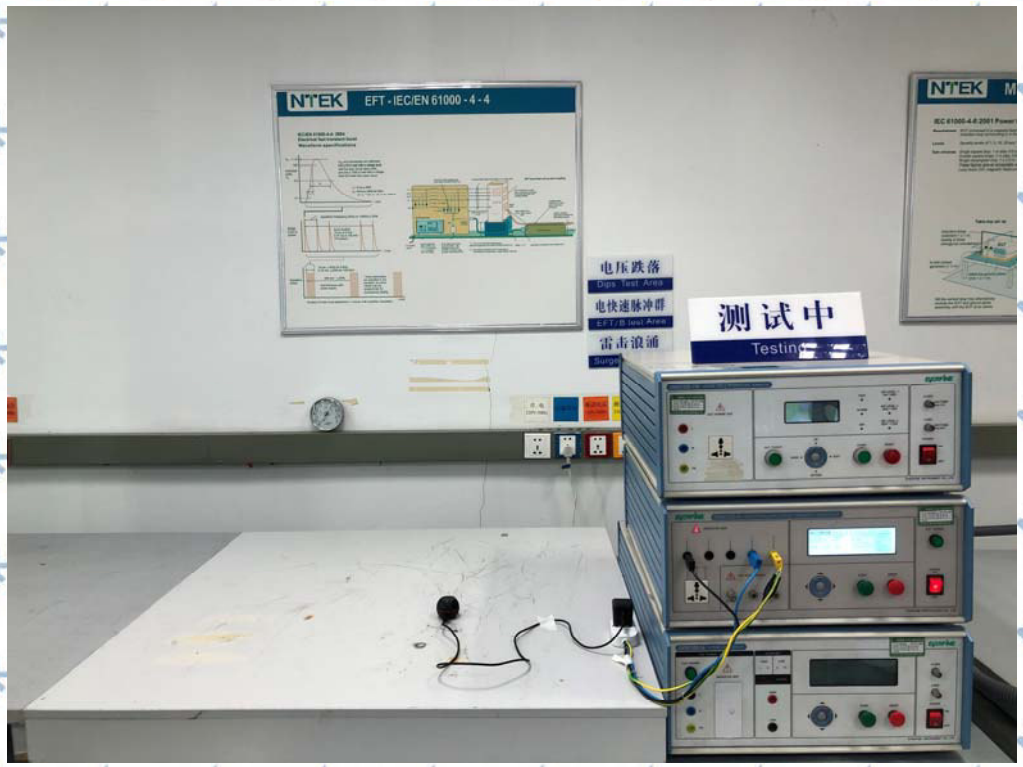
Flick Measurement Photo



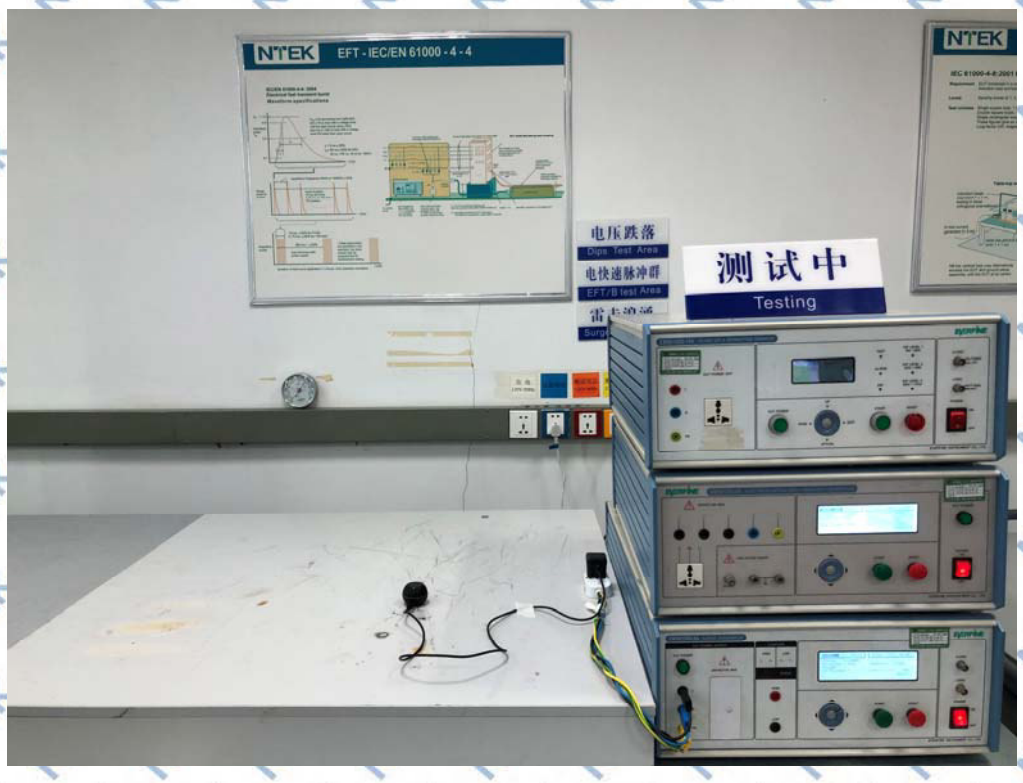
ESD Measurement Photo

RS Measurement Photo

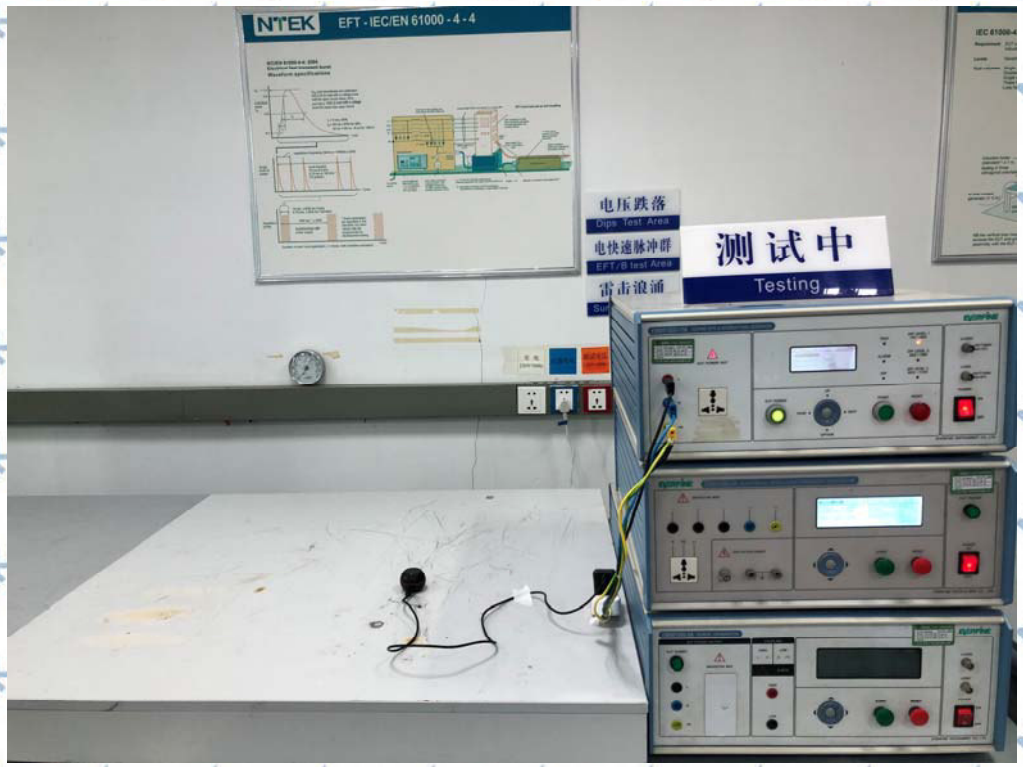
EFT Measurement Photo



SURGE Measurement Photo



DIP Measurement Photo



CS Measurement Photo

END OF REPORT

EN62311 TEST REPORT

Product： SMART HUMIDITY & TEMPERATURE SENSOR

Trade Mark： Shelly

Model Name： ShellyH&T

Family Model： SHHT-v1

Report No.： STR190920002001E

Prepared for

Allterco Robotics

1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

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Tel.: +86-755-6115 6588 Fax.: +86-755-6115 6599

Website:http://www.ntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name ..... Allterco Robotics

Address ..... 1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria

Manufacturer's Name ..... Allterco Robotics

Address ..... 1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria

Product description

Product name ..... SMART HUMIDITY & TEMPERATURE SENSOR

Trademark ..... Shelly®

Model Name ..... ShellyH&T

Family Model SHHT-v1

Standards ..... EN 62311:2008

This device described above has been tested by Shenzhen NTEK, and the test results show that the equipment under test (EUT) is in compliance with the 2014/53/EU Directive Art.3.1(a) requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of Shenzhen NTEK, this document may be altered or revised by Shenzhen NTEK, personnel only, and shall be noted in the revision of the document.

Date of Test .....

Date (s) of performance of tests ..... 20 Dec. 2019 ~ 8 April. 2020

Date of Issue..... 8 April. 2020

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

Testing Engineer : Allen Liu

(Allen Liu)

Technical Manager : Jason Chen

(Jason Chen)

Authorized Signatory : Sam Chen

(Sam Chen)

Shenzhen NTEK Testing Technology Co., Ltd. NTEK Report Seal

Table of Contents **Page**

Revision History

Report No.	Version	Description	Issued Date
STR190920002001E	Rev.01	Initial issue of report	10 April. 2020

1. General Information

1.1 General Description Of EUT

Equipment	SMART HUMIDITY & TEMPERATURE SENSOR
Trade Mark	Shelly®
Model Name.	ShellyH&T
Family Model	SHHT-v1
Model Difference	N/A
Product Description	The EUT is SMART HUMIDITY & TEMPERATURE SENSOR Operation Frequency: 802.11b/g/n(20MHz): 2412~2472MHz Antenna Designation: PCB Antenna Antenna Gain(Peak) 1dBi Modulation Type: ☒IEEE 802.11b : DSSS (CCK,DQPSK, DBPSK) ☒IEEE 802.11g/n: OFDM(64QAM, 16QAM, QPSK, BPSK)
Channel List	Refer to below
Power Rating	DC 3V From Battery or DC 5V From Adapter
Adapter	N/A
Battery	DC 3V
Hardware Version	ShellyH&T_v0.1.6
Software Version	1.6.0

Note:

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

2.

2.4GWIFI

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	05	2432	09	2452	13	2472
02	2417	06	2437	10	2457		
03	2422	07	2442	11	2462		
04	2427	08	2447	12	2467		

2.EN 62311 REQUIREMENT

2.1 GENERAL INFORMATION

The essential requirements of Directive 99/5/ec in the article 3.1(a) and the limits must be taken from Council Recommendation 99/519/EC for General Population or from the ICNIRP Guidelines for Occupational Exposure, EN 62311:2008 Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)

2.2 LIMIT

Basic Restrictions Reference levels

Council Recommendation 99/519/EC Annex II

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (Ma/m2) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density, S (W/m2)
0Hz	40	-	-	-	-	-
>0-1Hz	-	8	-	-	-	-
1-4Hz	-	8/f	-	-	-	-
4-1000Hz	-	2	-	-	-	-
1000Hz-100kHz	-	f/500	-	-	-	-
100kHz-10MHz	-	f/500	0.08	2	4	-
10MHz-10GHz	-	-	0.08	2	4	-
10-300GHz	-	-	-	-	-	10

Note:

(1)f is the frequency in Hz.

(2)The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.

(3)Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm2 perpendicular to the current direction.

(4)For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by $\sqrt{2}$(=1.414). For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp)

(5)For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.

(6)All SAR values are to be averaged over any six-minute period.

(7)Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.
(8)For pulses of duration tp the equivalent frequency to apply in the basic restrictions should be calculated as=1/(2tp). Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

Reference Levels
Council Recommendation 99/519/EC Annex III
Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq (W/m2)
0-1Hz	-	$3,2\times10^4$	4×10^4	-
1-8Hz	1000	$3,2\times10^4/f^2$	$4\times10^4/f^2$	-
8-25Hz	1000	4000/f	5000/f	-
0.025Hz-0,8kHz	250/f	4/f	5/f6,25	-
0,8-3kHz	250/f	5	6,25	-
3-150kHz	87	5	6,25	-
0,15-1MHz	87	0.73/f	0,92/f	-
1-10MHz	$87/f^{1/2}$	0.73/f	0,92/f	-
10-400MHz	28	0.073	0,092	2
400-2000MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046f^{1/2}$	f/200
2-300GHz	61	0,16	0,20	10

Note:
(1)As indicated in the frequency range column.
(2)For frequencies between 100kHz and 10GHz, Seq, E2, H2 and B2 are to be averaged over any six-minute period.
(3)For frequencies exceeding 10GHz, Seq, E2, H2 and B2 are to be averaged over any 68/.1.05-minute period (.in GHz).
(4)No E-field value is provided for frequencies <1Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 20kV/m. Spark discharges causing stress or annoyance should be avoided.

2.3 Limit calculations for radiated electric field strength measurement

For the calculation of the limits, the near field proportionality factor $1/d_3$ has been used. For ten times the distance, the level is decreased by the cubical, giving 60 dB.

Frequency range	Limit V/m @0.3m	Limit V/m @3m	Limit (add.span)
30MHz-400MHz	28V/m(149dBuV/m)	89dBuV/m	69 dBuV/m
400MHz-2GHz	27.5V/m-61.5V/m (149dBuV/m-155dBuV/m)	89dBuV/m	69dBuV/m
		95dBuV/m	75dBuV/m
2GHz-300GHz	61V/m(155dBuV/m)	95dBuV/m	75dBuV/m

To deal with reflexions, other effects due to the measurement in 3 m distance and to deal with a measurement uncertainty of at least 5 dB, an additional span of 20 dB has been added.

For additional three times the distance, the level is decreased by additional 30 dB.

Frequency range	Limit V/m @0.1m	Limit V/m @3m	Limit (add.span)
30MHz-400MHz	28V/m(149dBuV/m)	59dBuV/m	39 dBuV/m
400MHz-2GHz	27.5V/m-61.5V/m (149dBuV/m-155dBuV/m)	59dBuV/m	39dBuV/m
		65dBuV/m	45dBuV/m
2GHz-300GHz	61V/m(155dBuV/m)	65dBuV/m	45dBuV/m

To deal with reflexions, other effects due to the measurement in 3 m distance and to deal with a measurement uncertainty of at least 5 dB, an additional span of 20 dB has been added.
Limits for radiated field according to EN 55032 / CISPR 32 for a class B appliance:

Frequency range	Limit dBuV/m @3m Peak	Limit dBuV/m @3m QP or Average
30MHz-230MHz		40 dBuV/m QP
230MHz-1GHz		47dBuV/m QP
1GHz-3GHz	70dBuV/m Peak	50dBuV/m AV
3GHz-6GHz	74dBuV/m Peak	54dBuV/m AV

Conclusion: If the requirements for radiated emissions according to EN 55032 / CISPR 32 or other standards with the same limits are fulfilled, also the EMF requirements for the measured frequency range are fulfilled

3.Result

Pd= (Pout*G)\ (4*pi*R^2)

Where
Pd= Power density in mW/cm^2
Pout=output power to antenna in mW
G= Numeric gain of the antenna relative to isotropic antenna
Pi=3.1416
R= distance between observation point and center of the radiator in cm(20cm)
Pd the limit of MPE, 1mW/cm^2. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.
mW=10^(dBm/10)

Antenna gain: 1dBi,
R=20cm

2.4G WIFI

Mode	Channel	maximum output power (dBm)	maximum output power (mW)	Power Density (S) (mW/ cm^2)	Limit of Power Density (S) (mW/ cm^2)	Result
802.11b	CH13	9.84	9.64	0.0019	1	Pass
802.11g	CH13	9.58	9.08	0.0018	1	Pass
802.11n (20MHz)	CH13	9.45	8.81	0.0018	1	Pass

Note:

1. The Output power is the maximum eirp power of this EUT, and the data comes from the RF report for this EUT.
2. The assess distance is 20cm.

TIMCO ENGINEERING, Inc.
AN IIA COMPANY

INDUSTRIAL INSPECTION & ANALYSIS

EU – TYPE EXAMINATION CERTIFICATE
RADIO EQUIPMENT DIRECTIVE 2014/53/EU
Annex III Module B

MANUFACTURER

Name	:	Allterco Robotics
Address	:	1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria
Contact Name & Title	:	Svetozar Iliev / Managing Director
Phone number & Email	:	+359 2 957 1247/support@shelly.cloud

PRODUCT DESCRIPTION

Trademark/Trade Name	:	Shelly
Model Number	:	ShellyH&T, SHHT-v1
Product Description	:	Smart Humidity & Temperature Sensor

TECHNICAL DOCUMENTATION

Identification	:	Block Diagram, BOM, Label and its Location, Operational Description, PCB Layout, Schematics, User Manual, Parts Components		
Signed by (Name & Title)	:	Svetozar Iliev / Managing Director	Date :	April 21, 2020
Company Name	:	Allterco Robotics		

NOTIFIED BODY

Certificate issued by	:	Notified Body 1177, TIMCO Engineering, Inc.		
Certificate number	:	TCF-991CC20		
Name and Signature	:	Bruno Clavier	Date :	April 30, 2020

The device shall be marked as follows: CE

Based on the evidence presented in the Technical Documentation, TIMCO Engineering, Inc., as appointed Notified Body, has issued this EU-Type Examination Certificate in accordance with Annex III Module B. The product described appears to be in conformity with the essential requirements Article 3.1(a), 3.1(b), and 3.2 of RED 2014/53/EU. This certificate relates only to the documents as provided to Timco Engineering, Inc. and is valid up to (1) the date of cessation of presumption of conformity of any of the superseded standards which were used for testing this product and assessed by Notified Body or (2) the date of modifications to the approved type that may affect the conformity of the apparatus with the essential requirements of this Directive or the conditions for validity of that certificate, whichever comes first.

TIMCO ENGINEERING, INC.
P.O. BOX 370
NEWBERRY, FL 32669
www.timcoengr.com

EU – TYPE EXAMINATION CERTIFICATE
ANNEX 1
TCF-991CC20

Date: April 30, 2020

PRODUCT SPECIFICATIONS

Intended Use / Category	:	SRD – Wideband data transmission system
RF output power	:	9.87dBm (EIRP)
Frequency range (MHz)	:	2412~2472MHz
Modulation	:	IEEE 802.11b: DSSS(CCK, QPSK, DBPSK) IEEE 802.11g/n(HT20): OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna type	:	PCB Antenna

According to the Technical Documentation compiled by the Manufacturer, this radio equipment was assessed for compliance with the following standards, which were applied in full:

ESSENTIAL REQUIREMENTS ASSESSED

Aspects		**Standard Number**
Radio	:	ETSI EN 300 328 V2.1.1(2016-11)
EMC	:	ETSI EN 301 489-1 V2.2.3(2019-11) Draft ETSI EN 301 489-17 V3.2.2(2019-12) EN 55032 :2015 EN55035 :2017 EN 61000-3-2 :2014 EN 61000-3-3 :2013
Health	:	EN 62311:2008
Safety	:	EN 62368-1:2014+A11:2017

LIST OF DOCUMENTS REVIEWED

Item	**Exhibit Description**	
1.	Copy of the Declaration of Conformity	☑
2.	Agent/Representative authorization letter from Manufacturer (if application is filed by someone other than Manufacturer)	☑
3.	Attestation letter for compliance with Article 10(2)	☐
4.	Attestation letter and/or exhibits for compliance with Article 10(10) (i.e. info on packaging completed with users instructions)	☐
5.	A general description of the radio equipment (e.g. Operational Description)	☑
6.	Photographs or illustrations showing external features, marking and internal layout	☑
7.	RED Annex VI Point 8 - Versions of software or firmware affecting compliance with essential requirements	☑
8.	User information and installation instructions	☑
9.	Conceptual design and manufacturing drawings and schemes of components, sub-assemblies, circuits and other relevant similar elements	☑
10.	Descriptions and explanations necessary for the understanding of those drawings and schemes and the operation of the radio equipment	☑
11.	RED Annex III module B - Analysis and assessment of the risk(s)	☑
12.	Where the conformity assessment module in Annex III has been applied, copy of the EU-type examination certificate and its annexes as delivered by the notified body involved	☐

Item	Exhibit Description (Cont.)				
13.	Results of design calculations made, examinations carried out, and other relevant similar elements				☑
14.	Test reports	Item	Report No.	Issue Date/Rev #	☑
		Health	STR190920002001E	Apr. 10, 2020/Rev.01	
		EMC	STE190920002001E	Apr. 10, 2020/Rev.01	
		Radio	STR190920002002E	Apr. 10, 2020/Rev.01	
		Safety	STS190920002001E	Apr. 14, 2020	

RADIO TEST REPORT-WIFI

ETSI EN 300 328 V2.1.1 (2016-11)

Product : Smart Humidity & Temperature Sensor

Trade Mark : Shelly®

Model Name : ShellyH&T

Family Model : SHHT-v1

Report No. : STR190920002002E

Prepared for

Allterco Robotics

1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community,Xixiang Street
Bao'an District, Shenzhen 518126 P.R. China
Tel.: +86-755-6115 6588 Fax.: +86-755-6115 6599
Website:http://www.ntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name.....: Allterco Robotics

Address .....: 1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria

Manufacturer's Name.....: Allterco Robotics

Address .....: 1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria

Product description

Product name .....: Smart Humidity & Temperature Sensor

Trademark .....: Shelly®

Model Name .....: ShellyH&T

Family Model： SHHT-v1

Standards.....: ETSI EN 300 328 V2.1.1 (2016-11)

This device described above has been tested by Shenzhen NTEK, and the test results show that the equipment under test (EUT) is in compliance with the 2014/53/EU RED Directive Art.3.2 requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of Shenzhen NTEK, this document may be altered or revised by Shenzhen NTEK, personnel only, and shall be noted in the revision of the document.

Date of Test.....:

Date (s) of performance of tests.....: 20 Dec. 2019 ~ 6 April. 2020

Date of Issue .....: 09 April. 2020

Test Result .....: Pass

Testing Engineer : Allen liu

(Allen liu)

Technical Manager : Jason Chen

(Jason Chen)

Authorized Signatory : Sam Chen

(Sam Chen)

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Table of Contents **Page**

Revision History

Report No.	Version	Description	Issued Date
STR190920002002E	Rev.01	Initial issue of report	10 April. 2020

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Humidity & Temperature Sensor
Trade Mark	Shelly®
Model Name.	ShellyH&T
Family Model	SHHT-v1
Model Difference	N/A

The EUT is SMART FLOOD SENSOR

Operation Frequency:	802.11b/g/n(20MHz): 2412~2472MHz
Modulation Type:	IEEE 802.11b : DSSS (DBPSK, DQPSK, CCK) IEEE 802.11g/n (HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20MHz) use 800 ns GI: 65.0/58.5/52.0/39.0/26.0/19.5/13.0/6.5 Mbps (MCS0~MCS7)
Adaptive/non-adaptive	Adaptive equipment
Receiver categories	2
Number Of Channel	Please see Note 2.
Antenna Designation	PCB Antenna
Antenna Gain(Peak)	1 dBi

Channel List	Refer to below
Adapter	N/A
Battery	DC 3V
Rating	DC 3V from Battery or DC 5V From Adapter
I/O Ports	Refer to users manual
Hardware Version	ShellyH&T_v0.1.6
Software Version	1.6.0

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	05	2432	09	2452	13	2472
02	2417	06	2437	10	2457		
03	2422	07	2442	11	2462		
04	2427	08	2447	12	2467		

1.2 INFORMATION ABOUT THE EUT

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 (average) Dwell 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 maximum Channel Occupancy Time implemented by the equipment: 1.212ms

☒ The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐ The equipment is Frame Based equipment

☒ The equipment is Load Based equipment

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

The CCA time implemented by the equipment: / μs

☐ The equipment has implemented a 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.):

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

802.11 b

- Power Spectral Density

802.11 b

- Duty cycle, Tx-Sequence, Tx-gap

N/A

- Accumulated Transmit time, Frequency Occupation & Hopping Sequence (only for FHSS equipment)

N/A

- Hopping Frequency Separation (only for FHSS equipment)

N/A

- Medium Utilization

N/A

- Adaptivity

N/A

- Nominal Channel Bandwidth

802.11 n20

- Transmitter unwanted emissions in the OOB domain

802.11 n20

- Transmitter unwanted emissions in the spurious domain

802.11 b

- Receiver spurious emissions

802.11 b

- Receiver Blocking

802.11 b

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

☒ Operating mode 1: Single Antenna Equipment

☒ Equipment with only one antenna

☐ Equipment with two diversity antennas but only one antenna active at any moment in time

☐ Smart Antenna Systems with two or more antennas, but operating in a (legacy) mode where only one 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 Nominal Channel Bandwidth 1

☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2

NOTE 1: 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 Nominal Channel Bandwidth 1

☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2

NOTE 2: 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 (additional) beam forming gain: ..... dB

NOTE: The additional 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: 2412 MHz to 2472 MHz
- Operating Frequency Range 2: 2422 MHz to 2462 MHz

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

j) Nominal Channel Bandwidth(s):

- Nominal Channel Bandwidth 1: 17.714MHz (n20)
- Nominal Channel Bandwidth 2:

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 normal and the extreme operating conditions that apply to the equipment:

Normal operating conditions (if applicable):

Operating temperature: 15℃~35℃

Other (please specify if applicable): ……

Extreme operating conditions:

Operating temperature range: Minimum: -10℃ Maximum 40℃

Other (please specify if applicable): …… Minimum: …… Maximum ……

Details provided are for the:

☒ stand-alone equipment

☐ combined (or host) equipment

☐ test jig

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

● Antenna Type: FPC Antenna

☒ Integral Antenna (information to be provided in case of conducted measurements)

Antenna Gain: 1 dBi

If applicable, additional beamforming 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: ..... dBm

Number of antenna assemblies provided for this power level: .....

Assembly #	Gain (dBi)	e.i.r.p. (dBm)	Part number or model name
1	1	9.91	
2			
3			

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			

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			

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

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

Details provided are for the:

☒ stand-alone equipment

☐ combined (or host) equipment

☐ test jig

Supply Voltage ☐ AC mains State AC voltage …….. V

☒ 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], IEEE 802.15.4™ [i.4], proprietary, etc.):

IEEE 802.11™ [i.3]

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

(to be provided as separate attachment)

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

(to be provided as separate attachment)

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):

.....

.....

1.3 TEST CONDITIONS AND CHANNEL

	Normal Test Conditions	Extreme Test Conditions
Temperature	15℃ - 35℃	40℃ ~ -10℃ Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	DC 3V	/

802.11b/11g/11n(20M)

Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH01	2412
middle	CH07	2442
highest	CH13	2472

Note:
(1) The HT 40℃ and LT -10℃ was declarated by manufacturer, The EUT couldn't be operate normally with higher or lower temperature.
(2) The measurements are performed at the highest, middle, lowest available channels.

1.4 DESCRIPTION OF TEST CONDITIONS

E-1
EUT

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	Smart Humidity & Temperature Sensor	Shelly®	ShellyH&T	SHHT-v1	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

1.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

EQUIPMENT TYPE	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
EMI Test Receiver	R&S	ESPI7	101318	2019.05.13	2020.05.12	1 year
Bilog Antenna	TESEQ	CBL6111D	31216	2019.04.15	2020.04.14	1 year
Turn Table	EM	SC100_1	60531	N/A	N/A	N/A
Antnna Mast	EM	SC100	N/A	N/A	N/A	N/A
Horn Antenna	EM	EM-AH-10180	2011071402	2019.04.15	2020.04.14	1 year
Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2019.12.10	2020.12.09	1 year
Test Cable (30MHz-1GHz)	N/A	R-01	N/A	2017.04.21	2020.04.20	3 year
Test Cable (1-18GHz)	N/A	R-02	N/A	2017.04.21	2020.04.20	3 year
50Ω Coaxial Switch	Anritsu	MP59B	6200983705	2018.05.19	2020.05.18	2 year
Pre-Amplifier	EMC	EMC051835SE	980246	2019.08.06	2020.08.05	1 year
Spectrum Analyzer	Agilent	E4407B	MY45108040	2019.05.13	2020.05.12	1 year
Filter	TRILTHIC	2400MHz	29	2017.04.19	2020.04.18	3 year
Attenuator	Weinschel	33-10-33	AR4010	2017.04.19	2020.04.18	3 year
Attenuator	Weinschel	24-20-34	BP4485	2017.04.19	2020.04.18	3 year
MXA Signal Analyzer	Agilent	N9020A	MY49100060	2019.08.28	2020.08.27	1 year
ESG VETCTOR SIGNAL GENERAROR	Agilent	E4438C	MY45093347	2019.05.13	2020.05.12	1 year
PSG Analog Signal Generator	Agilent	E8257D	MY51110112	2019.08.06	2020.08.05	1 year
Power Splitter	Mini-Circuits/USA	ZN2PD-63-S+	SF025101428	2017.04.19	2020.04.18	3 year
Coupler	Mini-Circuits	ZADC-10-63-S+	SF794101410	2017.04.19	2020.04.18	3 year
Directional Coupler	MCLI/USA	CB11-20	0D2L51502	2017.08.16	2020.08.15	3 year
Attenuator	Agilent	8495B	MY42147029	2017.04.19	2020.04.18	3 year
Power Meter	DARE	RPR3006W	15I00041SNO84	2019.08.06	2020.08.05	1 year
MXG Vector Signal Generator	Agilent	N5182A	MY47070317	2019.05.13	2020.05.12	1 year
Wideband Radio Communication Tester Specifications	R&S	CMW500	148500	2019.05.13	2020.05.12	1 year
temporary antenna connector (Note)	NTS	R001	N/A	N/A	N/A	N/A

Note:
We will use the temporary antenna connector (soldered on the PCB board) When conducted test
And this temporary antenna connector is listed within the instrument list

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EN 300 328 V2.1.1 (2016-11)		
Clause	Test Item	Results
TRANSMITTER PARAMETERS		
4.3.2.2	RF Output Power	Pass
4.3.2.3	Power Spectral Density	Pass
4.3.2.4	Duty cycle, Tx-Sequence, Tx-gap	Not Applicable (See Note 1/2)
4.3.2.5	Medium Utilization (MU) factor	Not Applicable (See Note 1/2)
4.3.2.6	Adaptivity	Pass
4.3.2.7	Occupied Channel Bandwidth	Pass
4.3.2.8	Transmitter unwanted emission in the OOB domain	Pass
4.3.2.9	Transmitter unwanted emissions in the spurious domain	Pass
RECEIVER PARAMETERS		
4.3.2.10	Receiver Spurious Emissions	Pass
4.3.2.11	Receiver Blocking	Pass

Note:

1. These requirements do not apply for equipment with a maximum declared RF output power of less than 10 dBm EIRP or for equipment when operating in a mode where the RF output power is less than 10 dBm EIRP.
2. These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.

2.1 TEST FACILITY

Shenzhen NTEK Testing Technology Co., Ltd.
Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China
FCC Registered No.: 463705 IC Registered No.:9270A-1
CNAS Registration No.:L5516

2.2 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	Radio Frequency	±1.38dB
2	Total RF power, conducted	±0.16dB
3	RF power density, conducted	±0.16dB
4	All emissions,radiated	±0.21dB
5	Temperature	±0.5°C
6	Humidity	±2%
7	DC and low Frequency voltages	±0.04%

2.3 MAXIMUM MEASUREMENT UNCERTAINTY

(FOR ETSI EN 300 328)

For the test methods, according to ETSI EN 300 328 standard, the measurement uncertainty figures shall be calculated in accordance with ETR 100 028-1[4] 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)).

Maximum measurement uncertainty

No.	Item	Uncertainty
1	Occupied Channel Bandwidth	± 5%
2	RF output Power,conducted	±1.5dB
3	Power Spectral Density, conducted	± 3dB
4	Unwanted emissions, conducted	± 3dB
5	All emissions,radiated	± 6dB
6	Temperature	± 3°C
7	Humidity	± 3%
9	Time	± 5%

3. TEST PROCEDURES AND RESUTLS

3.1 EQUIVALENT ISOTROPIC RADIATED POWER

3.1.1 LIMITS OF EQUIVALENT ISOTROPIC RADIATED POWER

Refer to chapter 4.3.2.2.3 of ETSI EN EN 300 328 V2.1.1 (2016-11)

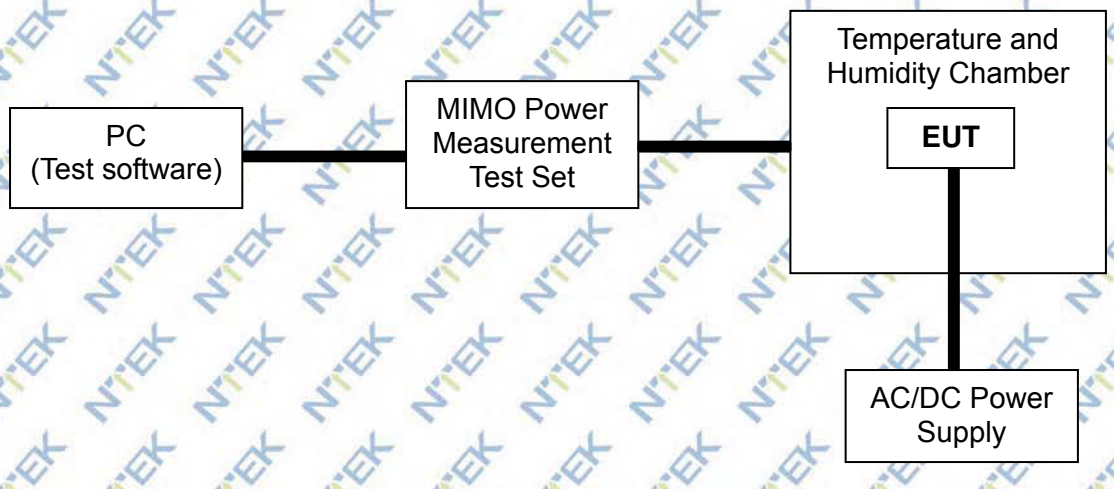
RF OUTPUT POWER	
Condition	Limit
☐ Non-adaptive wide band modulations systems	Equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20 dBm.
☒ Adaptive wide band modulations systems	≤20dBm

3.1.2 TEST PROCEDURE

Refer to chapter 5.4.2.2 of ETSI EN EN 300 328 V2.1.1 (2016-11)

Measurement	
☒Conducted measurement	☐Radiated measurement

3.1.3 TEST SETUP



3.1.4 TEST RESULTS

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	20°C	Relative Humidity：	55 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V(NORMAL)
Test Mode ：	802.11b/g/n20 Mode CH01 / CH07 / CH13		

Test data reference attachment

3.2. PEAK POWER DENSITY

3.2.1 LIMITS OF POWER SPECTRAL DENSITY

Refer to chapter 4.3.2.3.3 of ETSI EN EN 300 328 V2.1.1 (2016-11)

RF OUTPUT POWER	
Condition	Limit
For equipment using wide band modulations other than FHSS	⩽10 dBm/MHz

3.2.2 TEST PROCEDURE

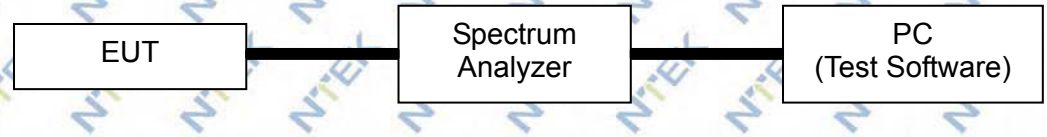
Refer to chapter 5.4.3.2 of ETSI EN EN 300 328 V2.1.1 (2016-11)

Measurement	
☒Conducted measurement	☐Radiated measurement

The setting of the Spectrum Analyzer

Start Frequency	2400MHz
Stop Frequency	2483.5MHz
Detector	RMS
Sweep Point	> 8 350; for spectrum analysers not supporting this number of sweep points, the frequency band may be segmented
Sweep time:	For non-continuous transmissions: 2 × Channel Occupancy Time × number of sweep points 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.
RBW / VBW	10KHz / 30KHz

3.2.3 TEST SETUP



3.2.4 TEST RESULTS

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	26°C	Relative Humidity：	60 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V
Test Mode ：	802.11.b Mode		

Test data reference attachment

3.3. OCCUPIED CHANNEL BANDWIDTH

3.3.1 LIMITS OF OCCUPIED CHANNEL BANDWIDTH

OCCUPIED CHANNEL BANDWIDTH		
Condition		Limit
All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz
Additional requirement	For non-adaptive using wide band modulations other than FHSS system and E.I.R.P >10 dBm	Less than 20 MHz
	For non-adaptive frequency hopping system and E.I.R.P >10 dBm	Less than 5 MHz

3.3.2 TEST PROCEDURE

Refer to chapter 5.3.8.2 of ETSI EN 300328 V1.9.1 (2015-02)

Measurement	
☒Conducted measurement	☐Radiated measurement

The setting of the Spectrum Analyzer

Center Frequency	The centre frequency of the channel under test
Frequency Span	2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
Detector	RMS
RBW	~ 1 % of the span without going below 1 %RBW (510KHz for 802.11b/g/ n 20, 1MHz for 802.11 n 40)
VBW	3 × RBW (1.5MHz for 802.11b/g/ n 20, 3MHz for 802.11 n 40)
Trace	Max hold

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

These measurements only were performed at normal test conditions. The measurement shall be performed only on the lowest and the highest frequency within the ststed frequency range. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. Controlling software has been activated to set the EUT on specific status.

3.3.5 TEST RESULTS

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	26°C	Relative Humidity：	60 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V
Test Mode ：	802.11b Mode CH1 / CH13		

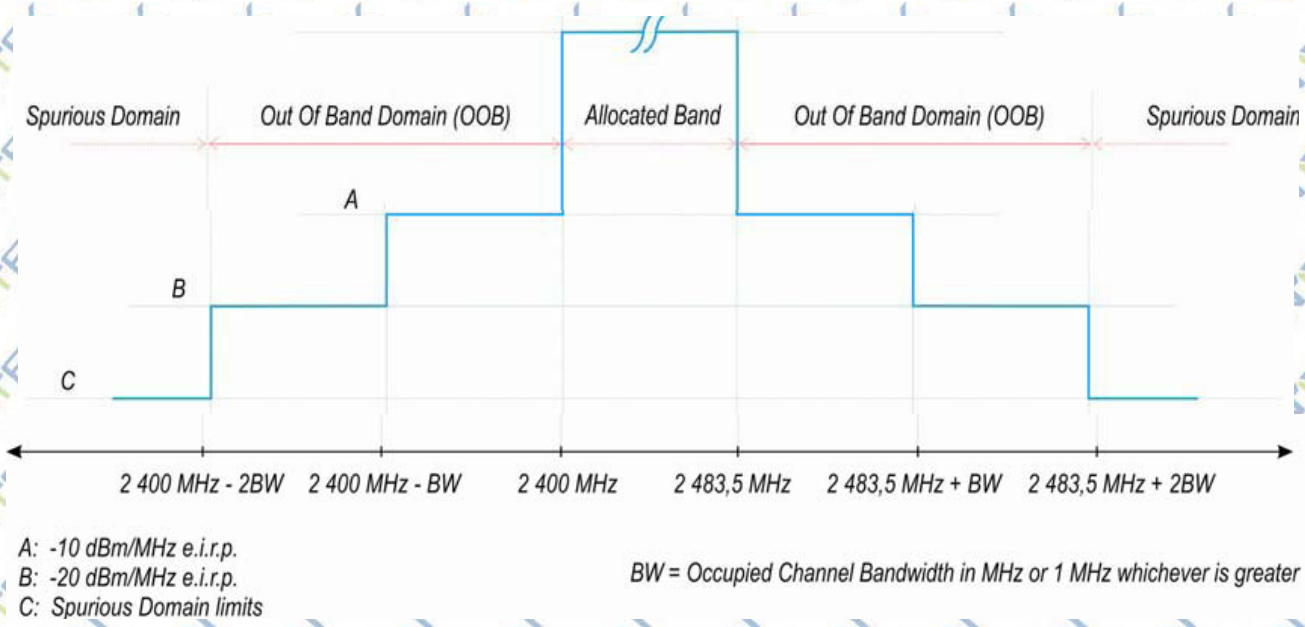
Test data reference attachment

3.4. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

3.4.1 LIMITS OF TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

Refer to chapter 4.3.2.8.3 of ETSI EN 300 328 V2.1.1 (2016-11)

TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN	
Condition	Limit
Under all test conditions	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 below figure.



A: -10 dBm/MHz e.i.r.p.
B: -20 dBm/MHz e.i.r.p.
C: Spurious Domain limits

BW = Occupied Channel Bandwidth in MHz or 1 MHz whichever is greater

3.4.2 TEST PROCEDURE

Refer to chapter 5.4.8.2 of ETSI EN 300 328 V2.1.1 (2016-11)

Measurement	
☒Conducted measurement	☐Radiated measurement

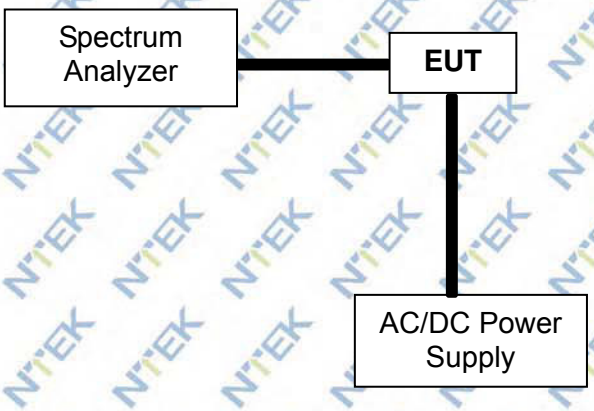
The setting of the Spectrum Analyzer

Span	0Hz
Filter Mode	Channel Filter
Trace Mode	Max Hold
Trigger Mode	Video trigger; in case video triggering is not possible, an external trigger source may be used
Detector	RMS
Sweep Point / Sweep Mode	Sweep Time [s] / (1 μs) or 5 000 whichever is greater/ Continuous
RBW / VBW	1MHz / 3MHz

3.4.3 DEVIATION FROM TEST STANDARD

No deviation

3.4.4 TEST SETUP



According to the EN 300328 V2.1.1 clause 5.4.8.1: These measurements shall only be performed at normal test conditions. For equipment using FHSS modulation, the measurements shall be performed during normal operation (hopping).

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 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 Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then each channel bandwidth shall be tested separately.

3.4.5 TEST RESULTS

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Power ：	DC 3V
Test Mode ：	802.11b Mode CH1 / CH13		

Test data reference attachment

3.5. ADAPTIVE (CHANNEL ACCESS MECHANISM)

3.5.1 APPLICABILITY OF ADAPTIVE REQUIREMENTS AND LILIT FOR WIDE BAND MODULATION TECHNIQUES

Refer to chapter 4.3.2.6 of ETSI EN 300 328 V2.1.1 (2016-11)

Requirement	Operational Mode			
	☐Non-LBT based Detect and Avoid	☒LBT based Detect and Avoid		
		☐Frame Based Equipment	☒Load Based Equipment (CCA using 'energy detect')	☐Load Based Equipment (CCA not using any of the mechanisms referenced as note 2)
Minimum Clear Channel Assessment (CCA) Time	NA	not less than 18 us (see note 1)	(see note 2)	not less than 18 us (see note 1)
Maximum Channel Occupancy (COT) Time	＜40 ms	1ms to 10 ms	(see note 2)	(13/32)*q ms (see note 3)
Minimum Idle Period	5 % minimum of 100 μs	5% of COT	(see note 2)	NA
Extended CCA check	NA	NA	(see note 2)	R*CCA (see note 4)
Short Control Signalling Transmissions	Maximum duty cycle of 10% within an observation period of 50 ms (see note 5)			

Note 1: The CCA time used by the equipment shall be declared by the supplier.
Note 2: Load Based Equipment may implement an LBT based spectrum sharing mechanism based on the Clear Channel Assessment (CCA) mode using energy detect as described in IEEE 802.11™-2012 [i.3], clause 9, clause 10, clause 16, clause 17, clause 19 and clause 20, or in IEEE 802.15.4™-2011 [i.4], clause 4, clause 5 and clause 8 providing the equipment complies with the conformance requirements referred to in clause 4.3.2.6.3.4.
Note 3: q is selected by the manufacturer in the range [4…32]
Note 4: The value of R shall be randomly selected in the range [1…q]
Note 5: Adaptive equipment may or may not have Short Control Signaling Transmissions.

Interference threshold level

The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p., the detection threshold level may be relaxed to:

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

Table 9: Unwanted Signal parameters

Wanted signal mean power from companion device (dBm)	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
-30/ sufficient to maintain the link(see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 2)
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.		

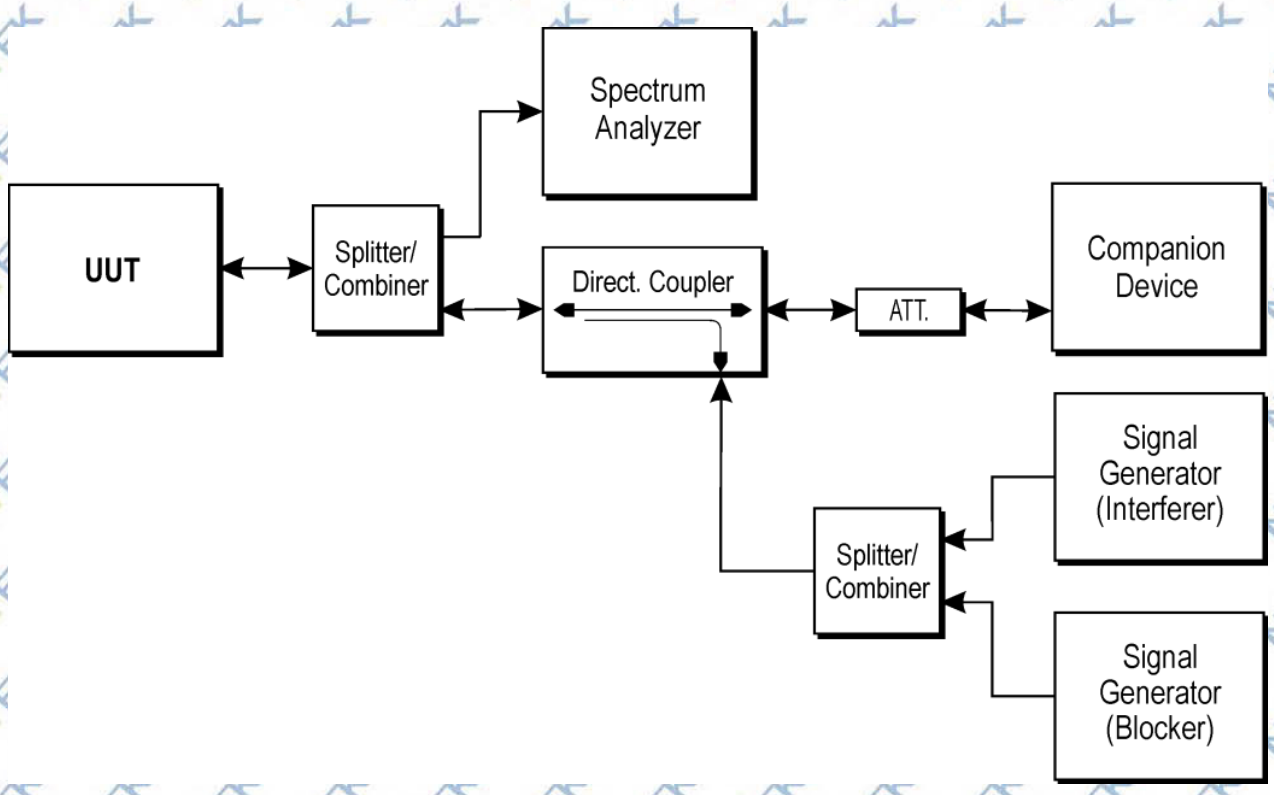
3.5.2 TEST PROCEDURE

Refer to chapter 5.4.6.2 of ETSI EN 300 328 V2.1.1 (2016-11)

Measurement	
☒Conducted measurement	☐Radiated measurement

Test method please refer to the 5.4.6.2.1.4 of ETSI EN 300 328 V2.1.1 (2016-11).

3.5.3 TEST SETUP CONFIGURATION



3.5.4 LIST OF MEASUREMENTS

UUT operational Mode		
Frame Based Equipment	Load Based Equipment (CCA using 'energy detect')	Load Based Equipment (CCA not using any of the mechanisms referenced)
	V	

Clause	Test Parameter	Remarks	PASS/FAIL
4.3.2.5.2.2.1	Adaptive (Frame Based Equipment)	Not Applicable	N/A
4.3.2.5.2.2.2	Adaptive (Load Based Equipment)	Applicable	PASS
4.3.2.5.3	Short Control Signaling Transmissions	Applicable	PASS

3.5.5 TEST RESULTS

ADAPTIVE RESULTS

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Power ：	DC 3V

Test data reference attachment

3.6. TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

3.6.1 LIMITS OF TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

Refer to chapter 4.3.2.9.3 of ETSI EN 300328 V2.1.1 (2016-11)

TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN		
Frequency Range	Maximum Power Limit (E.R.P.(≤1 GHz) E.I.R.P.(> 1 GHz))	Bandwidth
30 MHz to 47 MHz	-36dBm	100 kHz
47 MHz to 74 MHz	-54dBm	100 kHz
74 MHz to 87.5 MHz	-36dBm	100 kHz
87.5 MHz to 118 MHz	-54dBm	100 kHz
118 MHz to 174 MHz	-36dBm	100 kHz
174 MHz to 230 MHz	-54dBm	100 kHz
230 MHz to 470 MHz	-36dBm	100 kHz
470 MHz to 862 MHz	-54dBm	100 kHz
862 MHz to 1 GHz	-36dBm	100 kHz
1 GHz ~ 12.75 GHz	-30dBm	1 MHz

3.6.2 TEST PROCEDURE

Refer to chapter 5.4.9.2 of ETSI EN 300328 V2.1.1 (2016-11)

Measurement	
☒Conducted measurement	☒Radiated measurement

The setting of the Spectrum Analyzer

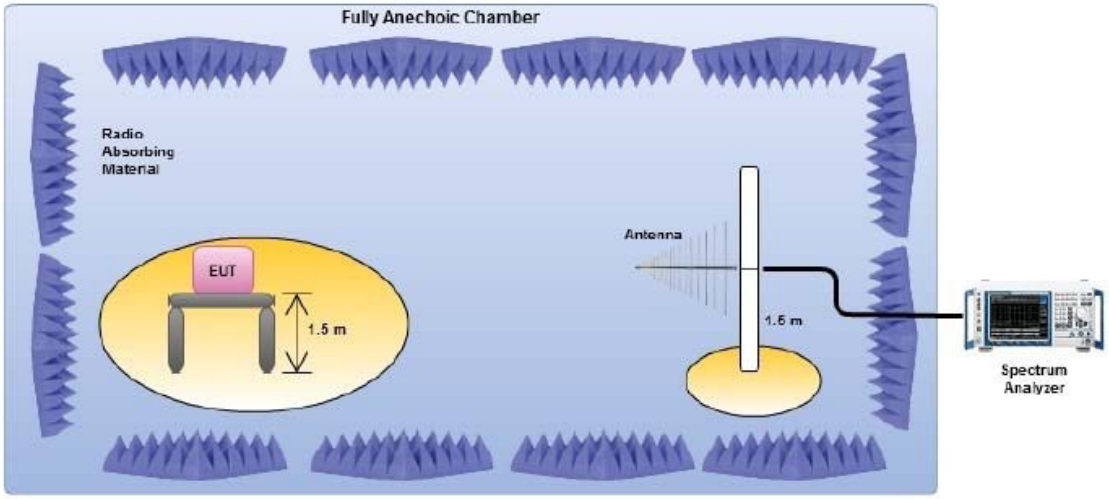
RBW	100K(＜1GHz) / 1M(＞1GHz)
VBW	300K(＜1GHz) / 3M(＞1GHz)

3.6.3 DEVIATION FROM TEST STANDARD

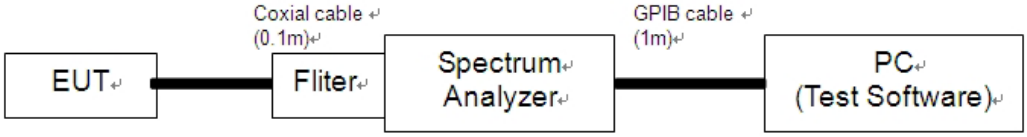
No deviation

3.6.4 TEST SETUP

Radiated measurement:



Conducted measurement:



1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
3. The equipment was configured to operate under its worst case situation with respect to output power.
4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.

3.6.5 TEST RESULTS

BELOW 1 GHz WORST- CASE DATA(30 MHz ~ 1GHz)

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	26°C	Relative Humidity：	60 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V
Test Mode ：	TX-802.11b Mode(CH13)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
V	50.5859	-80.02	9.38	-70.64	-54	-16.64	peak
V	92.787	-82.66	9.96	-72.7	-54	-18.7	peak
V	210.786	-83.78	11.02	-72.76	-54	-18.76	peak
V	416.1791	-85.12	14.68	-70.44	-36	-34.44	peak
V	636.134	-88.22	20.14	-68.08	-54	-14.08	peak
V	782.3451	-86.17	22.03	-64.14	-54	-10.14	peak
H	35.375	-91.57	17.14	-74.43	-36	-38.43	peak
H	186.4404	-85.38	11.66	-73.72	-54	-19.72	peak
H	338.4001	-85.21	13.88	-71.33	-36	-35.33	peak
H	658.836	-87.22	20.59	-66.63	-54	-12.63	peak
H	726.8052	-85.69	21.66	-64.03	-54	-10.03	peak
H	848.0561	-90.68	23.36	-67.32	-54	-13.32	peak

Remark:
1. Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level.
2. All the modes had been tested, but only the worst data recorded in the report.

ABOVE 1 GHz WORST- CASE DATA (1GHz ~ 12.75GHz)

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	26°C	Relative Humidity：	60 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V
Test Mode ：	TX-802.11b Mode(CH01/CH7/CH13)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
operation frequency:2412							
V	4824.000	-48.88	8.49	-40.39	-30.00	-10.39	peak
V	7236.000	-49.06	10.54	-38.52	-30.00	-8.52	peak
H	4824.000	-48.32	8.48	-39.84	-30.00	-9.84	peak
H	7236.000	-49.79	10.54	-39.25	-30.00	-9.25	peak
operation frequency:2442							
V	4884.000	-47.97	8.47	-39.50	-30.00	-9.50	peak
V	7326.000	-49.06	10.52	-38.54	-30.00	-8.54	peak
H	4884.000	-48.14	8.46	-39.68	-30.00	-9.68	peak
H	7326.000	-48.88	10.53	-38.35	-30.00	-8.35	peak
operation frequency:2472							
V	4944.000	-49.17	8.46	-40.71	-30.00	-10.71	peak
V	7416.000	-50.42	10.51	-39.91	-30.00	-9.91	peak
H	4944.000	-49.33	8.44	-40.89	-30.00	-10.89	peak
H	7416.000	-50.1	10.52	-39.58	-30.00	-9.58	peak

Remark:
1. Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level – Limit.
2. All the modes had been tested, but only the worst data recorded in the report.

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

3.6.6 TEST RESULTS (Conducted measurement)

Test data reference attachment

3.7. RECEIVER SPURIOUS RADIATION

3.7.1 LIMITS OF RECEIVER SPURIOUS RADIATION

Refer to chapter 4.3.2.10.3 of ETSI EN 300 328 V2.1.1 (2016-11))

RECEIVER SPURIOUS EMISSIONS		
Frequency Range	Maximum Power Limit (E.R.P.(≤1 GHz) E.I.R.P.(> 1 GHz))	Measurement Bandwidth
30 MHz ~ 1 GHz	-57dBm	100KHz
1 GHz ~ 12.75 GHz	-47dBm	1MHz

3.7.2 TEST PROCEDURE

Refer to chapter 5.4.10.2 of ETSI EN 300 328 V2.1.1 (2016-11)

Measurement	
☒Conducted measurement	☒Radiated measurement

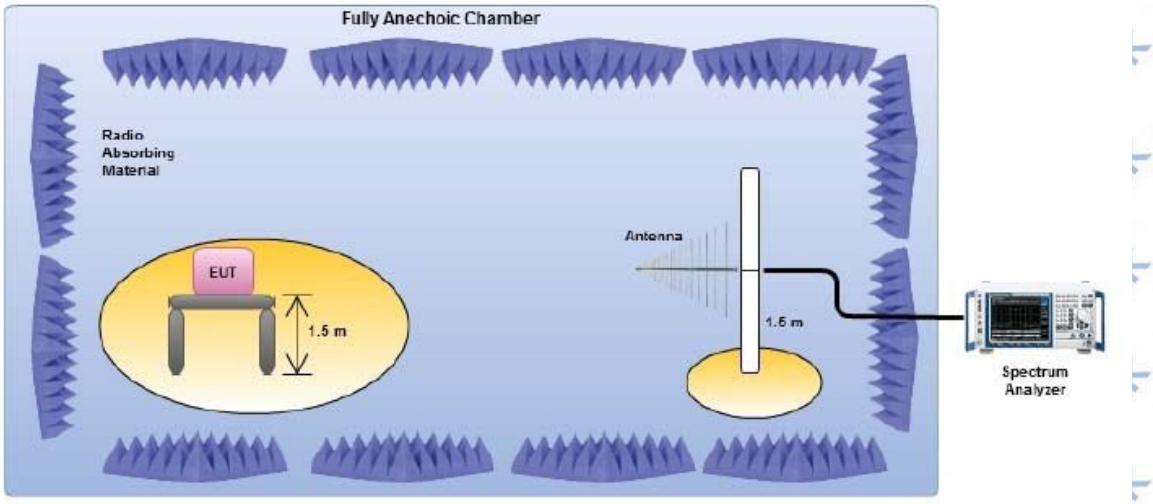
The setting of the Spectrum Analyzer

RBW	100K(＜1GHz) / 1M(＞1GHz)
VBW	300K(＜1GHz) / 3M(＞1GHz)

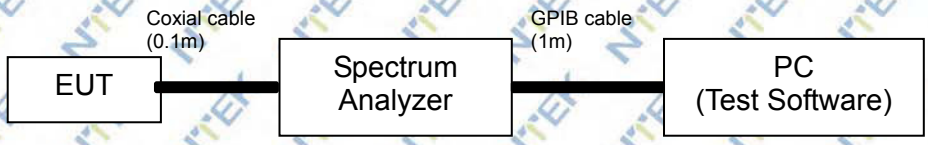
3.7.3 DEVIATION FROM TEST STANDARD

No deviation

Radiated measurement:



Conducted measurement:



1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. Testing was performed when the equipment was in a receive-only mode.
3. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.

3.7.4 TEST RESULTS

RX BELOW 1 GHz WORST- CASE DATA(30 MHz ~ 1GHz)

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	26°C	Relative Humidity：	60 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V
Test Mode ：	RX Mode-802.11b Mode(CH01)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
V	43.3534	-89.14	12.92	-76.22	-57	-19.22	peak
V	109.4116	-87.17	10.24	-76.93	-57	-19.93	peak
V	195.1365	-88.11	11.43	-76.68	-57	-19.68	peak
V	280.0237	-88.87	11.95	-76.92	-57	-19.92	peak
V	807.4288	-96.52	22.76	-73.76	-57	-16.76	peak
V	989.5353	-98.44	27.2	-71.24	-57	-14.24	peak
H	42.1542	-88.96	13.41	-75.55	-57	-18.55	peak
H	72.8465	-86.89	9.72	-77.17	-57	-20.17	peak
H	107.1337	-86.89	10.26	-76.63	-57	-19.63	peak
H	196.5098	-88.21	11.44	-76.77	-57	-19.77	peak
H	463.9696	-89.3	16.21	-73.09	-57	-16.09	peak
H	699.3046	-90.85	21.07	-69.78	-57	-12.78	peak

Remark:

1. Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level – Limit.
2. All the modes had been tested, but only the worst data recorded in the report.

RX ABOVE 1 GHz WORST- CASE DATA(1GHz ~ 12.75GHz)

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	24 ℃	Relative Humidity	54%
Pressure：	1010 hPa	Test Power ：	DC 3V
Test Mode ：	RX Mode-802.11b Mode(CH01)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
V	1127.5	-66.79	0.96	-65.83	-47	-18.83	peak
V	2020	-71.58	7.27	-64.31	-47	-17.31	peak
V	4187.5	-70.05	7.95	-62.1	-47	-15.1	peak
V	5165	-67.26	5.68	-61.58	-47	-14.58	peak
V	5632.5	-69.42	8.12	-61.3	-47	-14.3	peak
V	8607.5	-79.63	15.11	-64.52	-47	-17.52	peak
H	2020	-68.58	7.27	-61.31	-47	-14.31	peak
H	3465	-70.81	8.78	-62.03	-47	-15.03	peak
H	5250	-69.87	6.1	-63.77	-47	-16.77	peak
H	6100	-73.4	10.09	-63.31	-47	-16.31	peak
H	7630	-76.33	13.59	-62.74	-47	-15.74	peak
H	10690	-88.43	23.05	-65.38	-47	-18.38	peak

1. Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level – Limit.
2. All the modes had been tested, but only the worst data recorded in the report.

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

3.7.5 TEST RESULTS (Conducted measurement)

Test data reference attachment

3.8. RECEIVER BLOCKING

3.8.1 PERFORMANCE CRITERIA

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

3.8.2 LIMITS OF RECEIVER BLOCKING

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.

☐**Table 14: Receiver Blocking parameters for Receiver Category 1 equipment**

Wanted signal mean power from companion device (dBm)	Blocking signal Frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

☒**Table 15: Receiver Blocking parameters receiver category 2 equipment**

Wanted signal mean power from companion device (dBm)	Blocking signal Frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-57	CW
P_{min} + 6 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

☐**Table 16: Receiver Blocking parameters receiver category 3 equipment**

Wanted signal mean power from companion device (dBm)	**Blocking signal Frequency (MHz)**	**Blocking signal power (dBm) (see note 2)**	**Type of blocking signal**
P_{min} + 12 dB	2 380 2 503,5	-57	CW
P_{min} + 12 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

3.8.3 TEST PROCEDURE

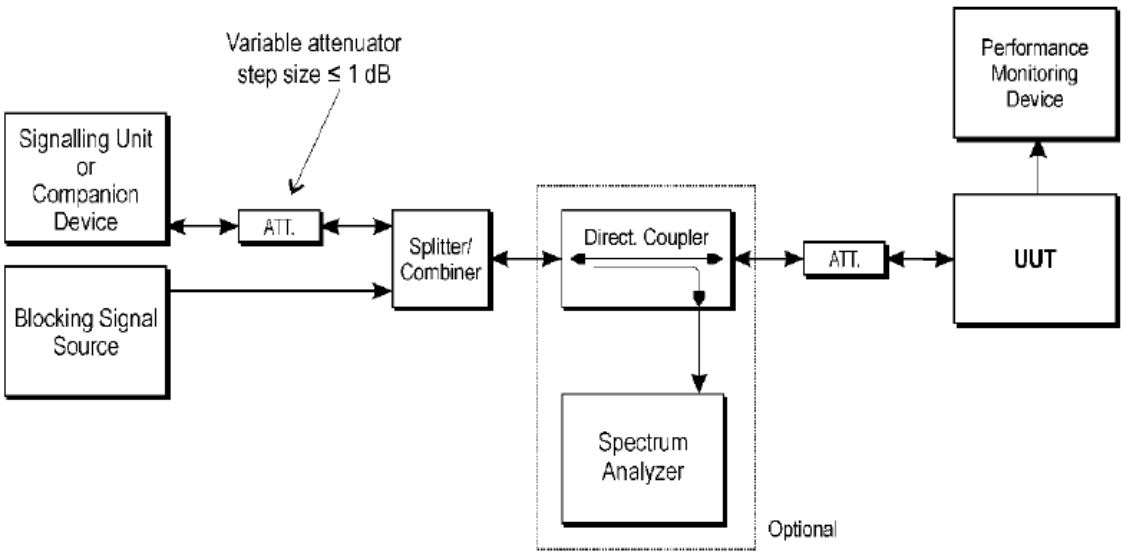
Refer to chapter 5.4.11.2 of ETSI EN 300 328 V2.1.1 (2016-11)

Measurement	
☒Conducted measurement	☐Radiated measurement

3.8.4 DEVIATION FROM TEST STANDARD

No deviation

3.8.5 TEST SETUP



3.8.6 TEST RESULTS

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	26°C	Relative Humidity：	60 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V
Test Mode ：	RX Mode(802.11b-CH01/CH13)		

CH01:

receiver category 2

Wanted signal mean power from companion device (dBm)Note(1)	Blocking signal Frequency (MHz)	Blocking signal power (dBm)	PER %Note(2)	PER Limit %
-71 + 6 dB	2 380	-57	3.53	⩽10%
	2 503,5		2.94	
-71 + 6 dB	2 300	-47	2.99	⩽10%
	2583.5		3.03	

CH13:

receiver category 2

Wanted signal mean power from companion device (dBm)Note(1)	Blocking signal Frequency (MHz)	Blocking signal power (dBm)	PER %Note(2)	PER Limit %
-71 + 6 dB	2 380	-57	3.48	⩽10%
	2 503,5		3.27	
-71 + 6 dB	2 300	-47	2.67	⩽10%
	2583.5		2.69	

Note: (1) The above results were obtained from laboratory tests.

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	26°C	Relative Humidity：	60 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V
Test Mode ：	RX Mode(802.11g-CH01/CH13)		

CH01:

receiver category 2

Wanted signal mean power from companion device (dBm)Note(1)	**Blocking signal Frequency (MHz)**	**Blocking signal power (dBm)**	**PER %Note(2)**	**PER Limit %**
-71 + 6 dB	2 380	-57	3.03	⩽10%
	2 503,5		2.84	
-71 + 6 dB	2 300	-47	2.16	⩽10%
	2583.5		3.11	

CH13:

receiver category 2

Wanted signal mean power from companion device (dBm)Note(1)	**Blocking signal Frequency (MHz)**	**Blocking signal power (dBm)**	**PER %Note(2)**	**PER Limit %**
-71 + 6 dB	2 380	-57	3.06	⩽10%
	2 503,5		3.03	
-71 + 6 dB	2 300	-47	2.74	⩽10%
	2583.5		2.71	

Note: (1) The above results were obtained from laboratory tests.

EUT：	Smart Humidity & Temperature Sensor	Model Name ：	ShellyH&T
Temperature：	26°C	Relative Humidity：	60 %
Pressure：	1012 hPa	Test Voltage ：	DC 3V
Test Mode ：	RX Mode(802.11n20-CH01/CH13)		

CH01:

receiver category 2

Wanted signal mean power from companion device (dBm)Note(1)	**Blocking signal Frequency (MHz)**	**Blocking signal power (dBm)**	**PER %Note(2)**	**PER Limit %**
-70 + 6 dB	2 380	-57	3.18	⩽10%
	2 503,5		3.96	
-71 + 6 dB	2 300	-47	2.92	⩽10%
	2583.5		2.32	

CH13:

receiver category 2

Wanted signal mean power from companion device (dBm)Note(1)	**Blocking signal Frequency (MHz)**	**Blocking signal power (dBm)**	**PER %Note(2)**	**PER Limit %**
-70 + 6 dB	2 380	-57	3.03	⩽10%
	2 503,5		2.75	
-70 + 6 dB	2 300	-47	2.19	⩽10%
	2583.5		2.09	

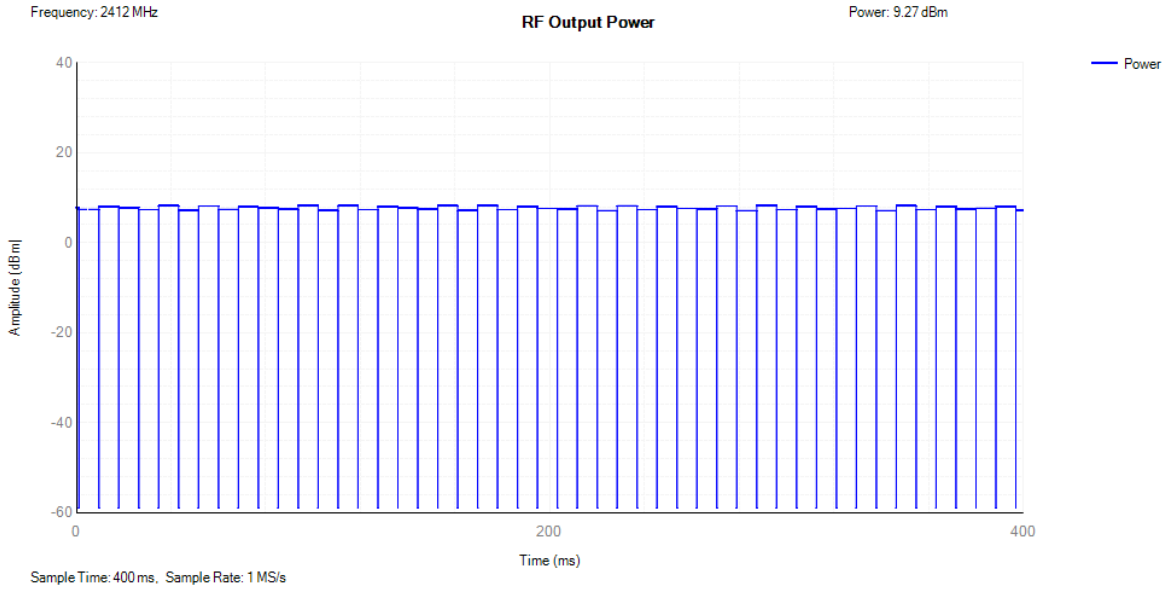
Note: (1) The above results were obtained from laboratory tests.

4. TEST RESULTS

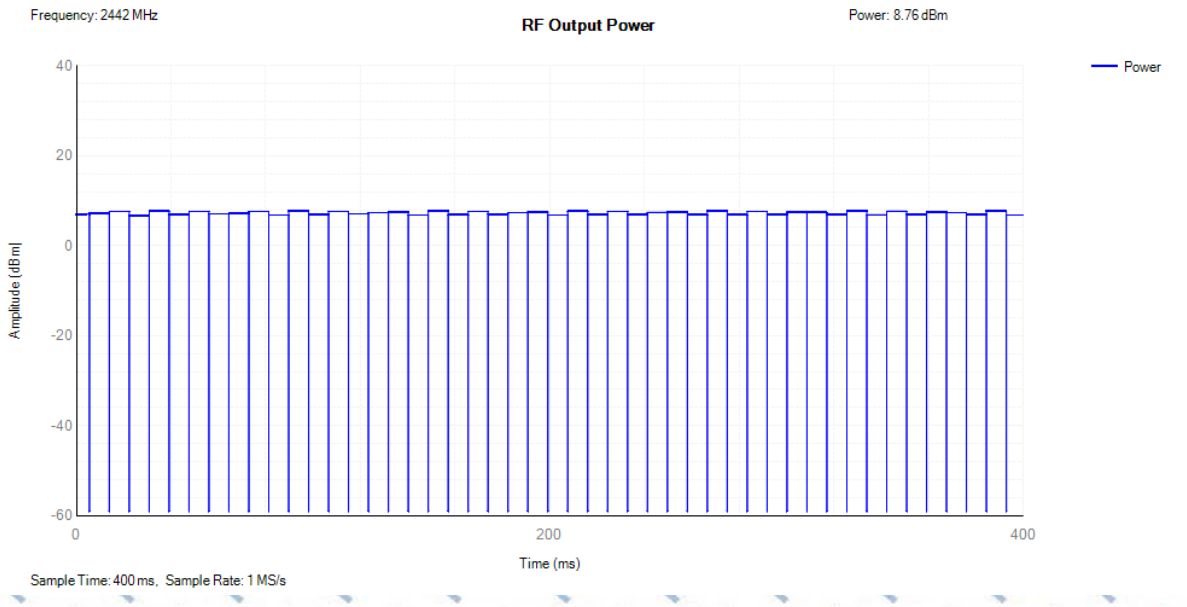
4.1 RF Output Power

Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Burst Number	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	802.11b	2412	8.27	49	9.27	20	Pass
NVLT	802.11b	2412	8.67	47	9.67	20	Pass
NVNHT	802.11b	2412	7.63	49	8.63	20	Pass
NVNT	802.11b	2442	7.76	48	8.76	20	Pass
NVLT	802.11b	2442	8.21	46	9.21	20	Pass
NVNHT	802.11b	2442	7.08	47	8.08	20	Pass
NVNT	802.11b	2472	8.62	49	9.62	20	Pass
NVLT	802.11b	2472	8.84	48	9.84	20	Pass
NVNHT	802.11b	2472	8.02	47	9.02	20	Pass
NVNT	802.11g	2412	8.21	279	9.21	20	Pass
NVLT	802.11g	2412	8.54	278	9.54	20	Pass
NVNHT	802.11g	2412	7.62	279	8.62	20	Pass
NVNT	802.11g	2442	8.02	280	9.02	20	Pass
NVLT	802.11g	2442	8.43	282	9.43	20	Pass
NVNHT	802.11g	2442	7.17	280	8.17	20	Pass
NVNT	802.11g	2472	8.58	279	9.58	20	Pass
NVLT	802.11g	2472	8.87	279	9.87	20	Pass
NVNHT	802.11g	2472	7.85	277	8.85	20	Pass
NVNT	802.11n(HT20)	2412	8.07	224	9.07	20	Pass
NVLT	802.11n(HT20)	2412	8.24	223	9.24	20	Pass
NVNHT	802.11n(HT20)	2412	7.41	222	8.41	20	Pass
NVNT	802.11n(HT20)	2442	7.91	224	8.91	20	Pass
NVLT	802.11n(HT20)	2442	8.16	222	9.16	20	Pass
NVNHT	802.11n(HT20)	2442	7.13	222	8.13	20	Pass
NVNT	802.11n(HT20)	2472	8.45	224	9.45	20	Pass
NVLT	802.11n(HT20)	2472	8.73	223	9.73	20	Pass
NVNHT	802.11n(HT20)	2472	7.74	222	8.74	20	Pass

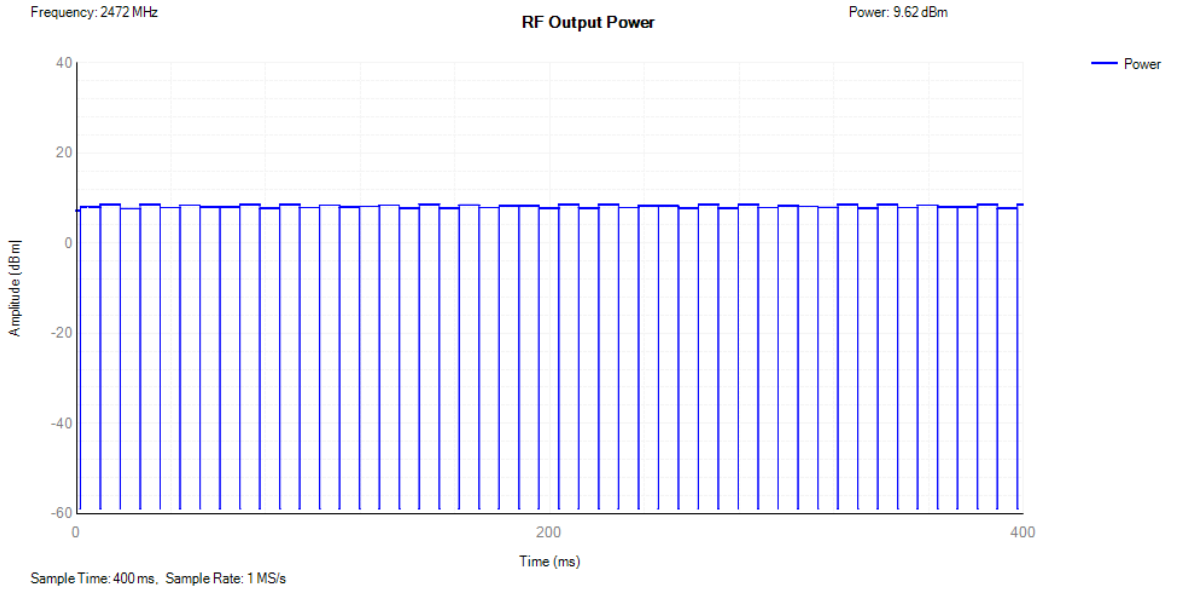
Power NVNT 802.11b 2412MHz



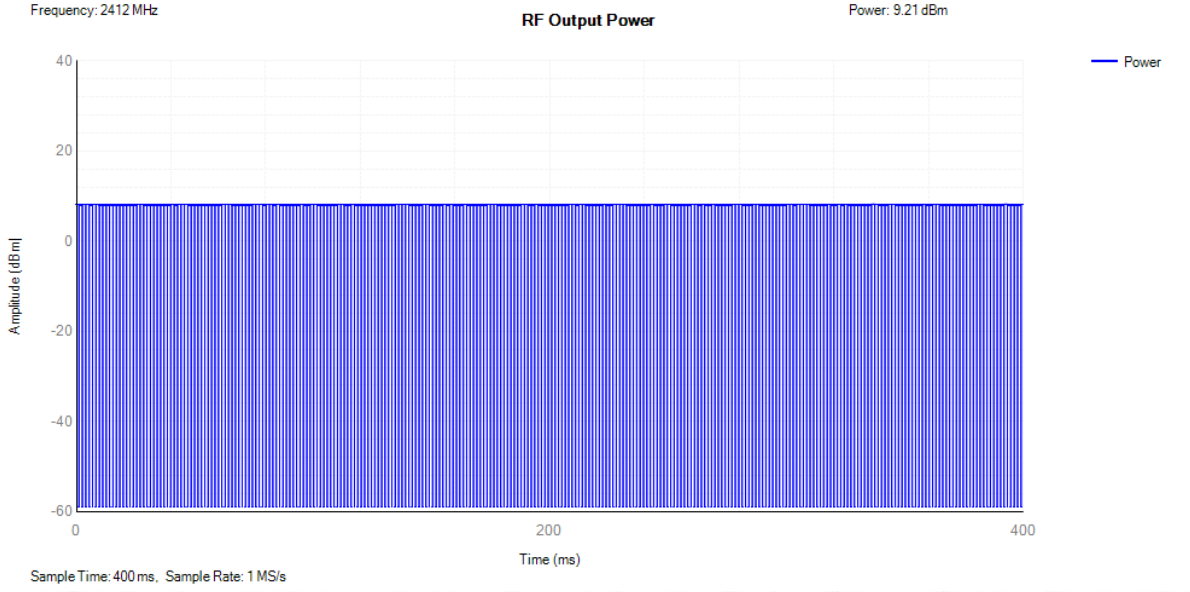
Power NVNT 802.11b 2442MHz


Frequency: 2442 MHz
RF Output Power
Power: 8.76 dBm
Power
40
20
0
-20
-40
-60
Amplitude (dBm)
0
200
400
Time (ms)
Sample Time: 400 ms, Sample Rate: 1 MS/s

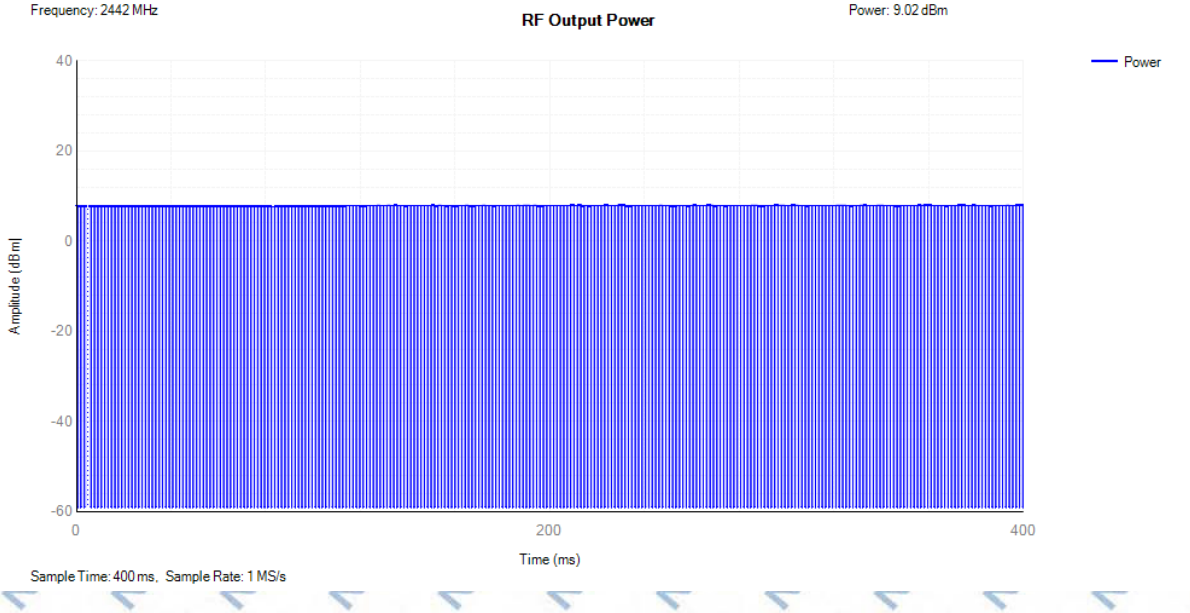
Power NVNT 802.11b 2472MHz



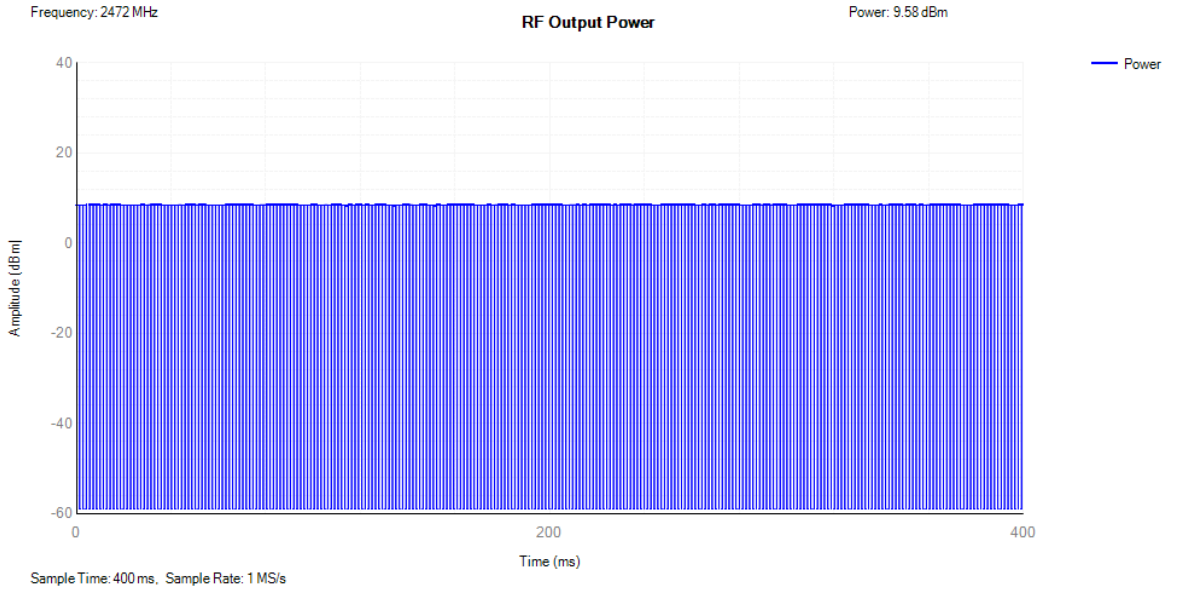
Power NVNT 802.11g 2412MHz



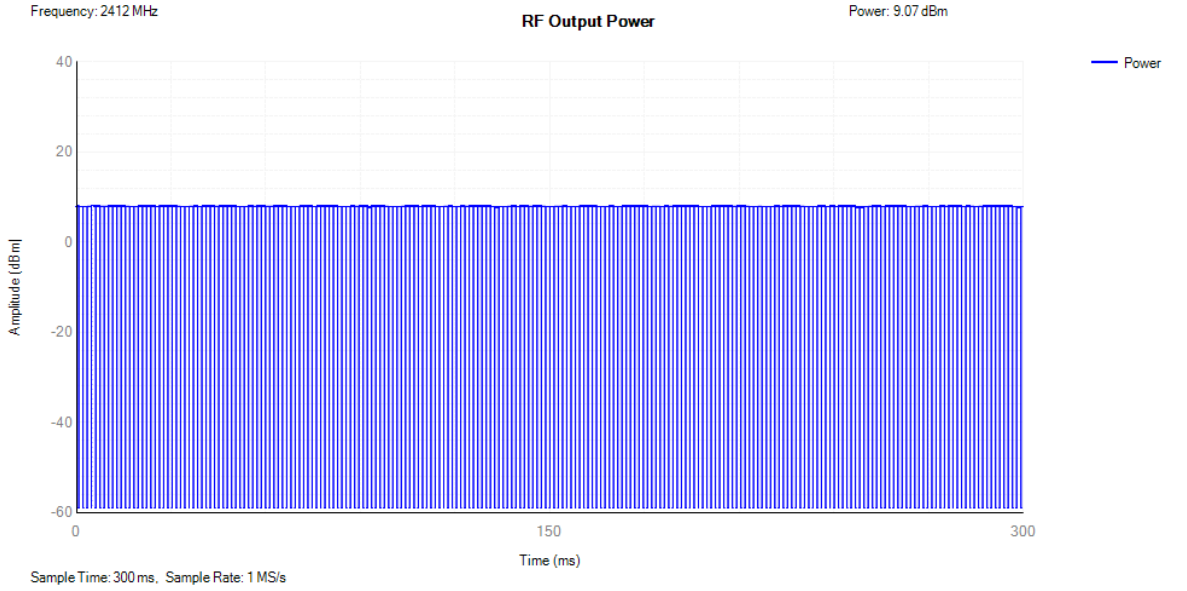
Power NVNT 802.11g 2442MHz



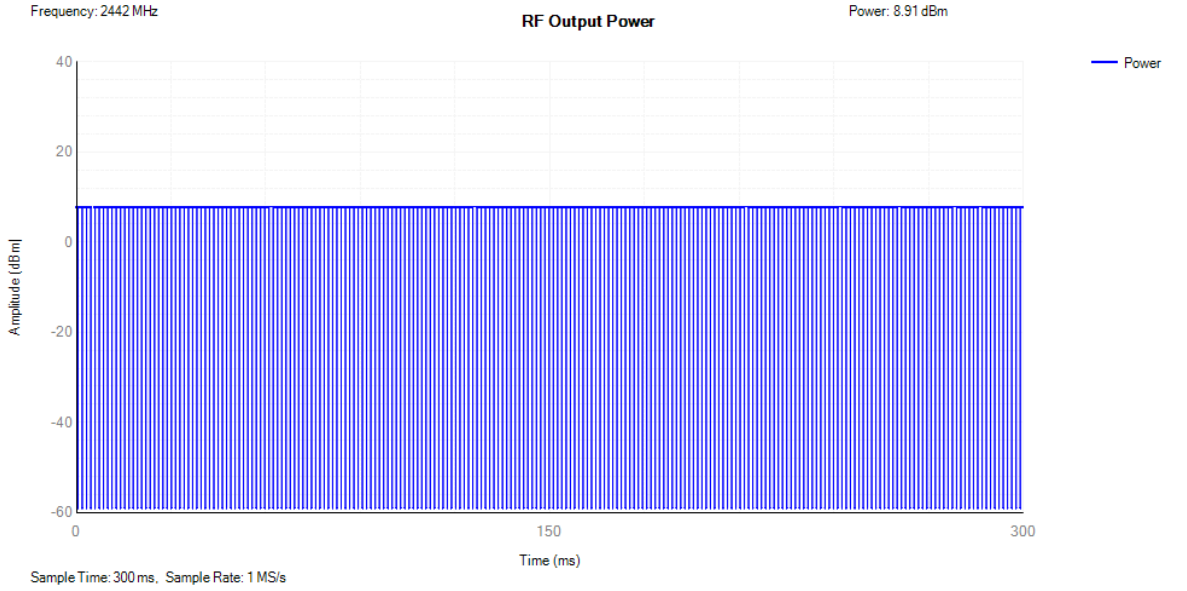
Power NVNT 802.11g 2472MHz



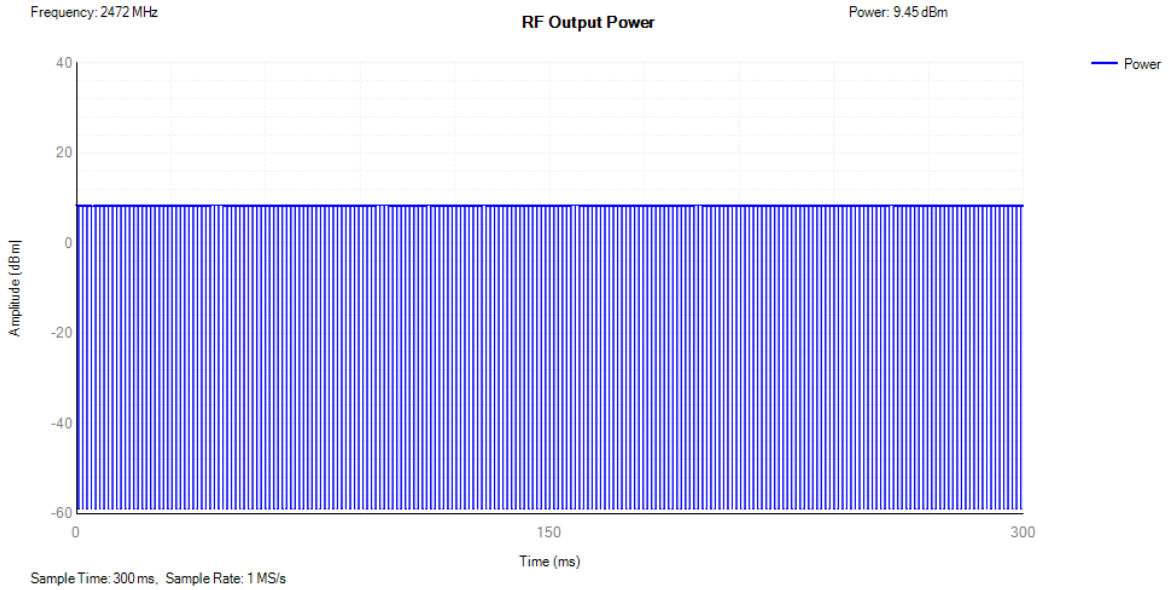
Power NVNT 802.11n(HT20) 2412MHz



Power NVNT 802.11n(HT20) 2442MHz



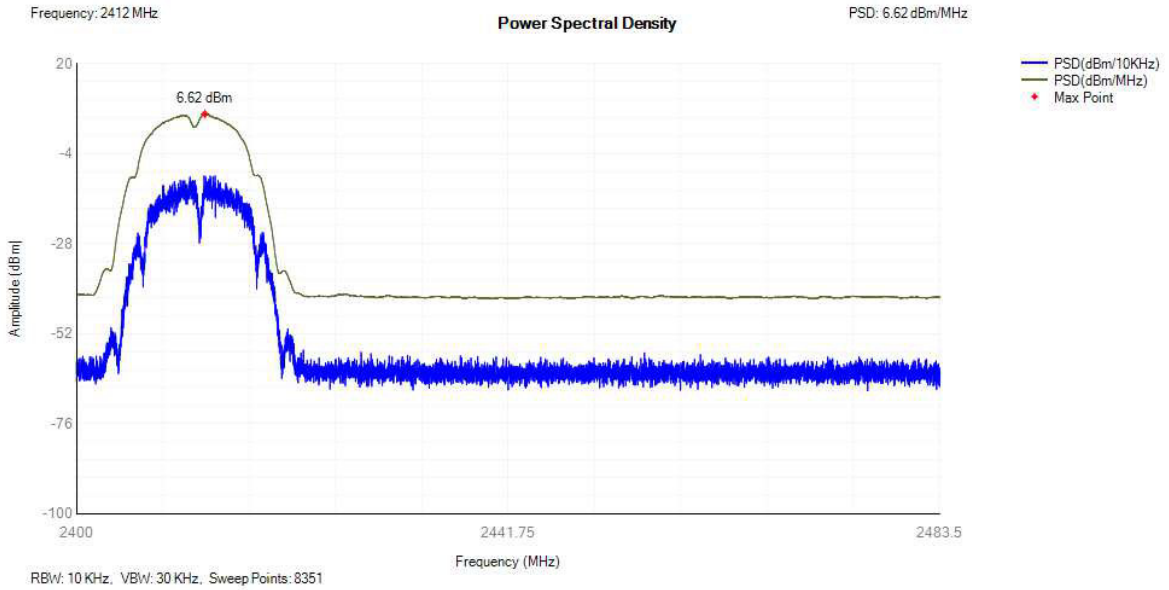
Power NVNT 802.11n(HT20) 2472MHz



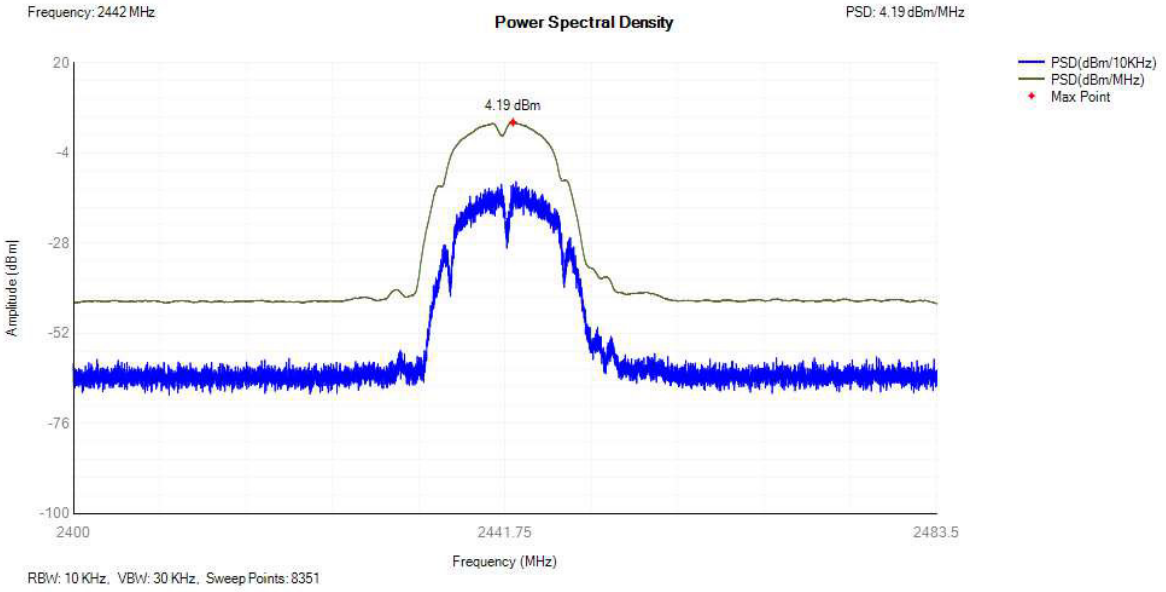
4.2 Power Spectral Density

Condition	Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	802.11b	2412	6.62	10	Pass
NVNT	802.11b	2442	4.19	10	Pass
NVNT	802.11b	2472	6.12	10	Pass
NVNT	802.11g	2412	1.88	10	Pass
NVNT	802.11g	2442	0.25	10	Pass
NVNT	802.11g	2472	1.18	10	Pass
NVNT	802.11n(HT20)	2412	1.64	10	Pass
NVNT	802.11n(HT20)	2442	-0.16	10	Pass
NVNT	802.11n(HT20)	2472	0.96	10	Pass

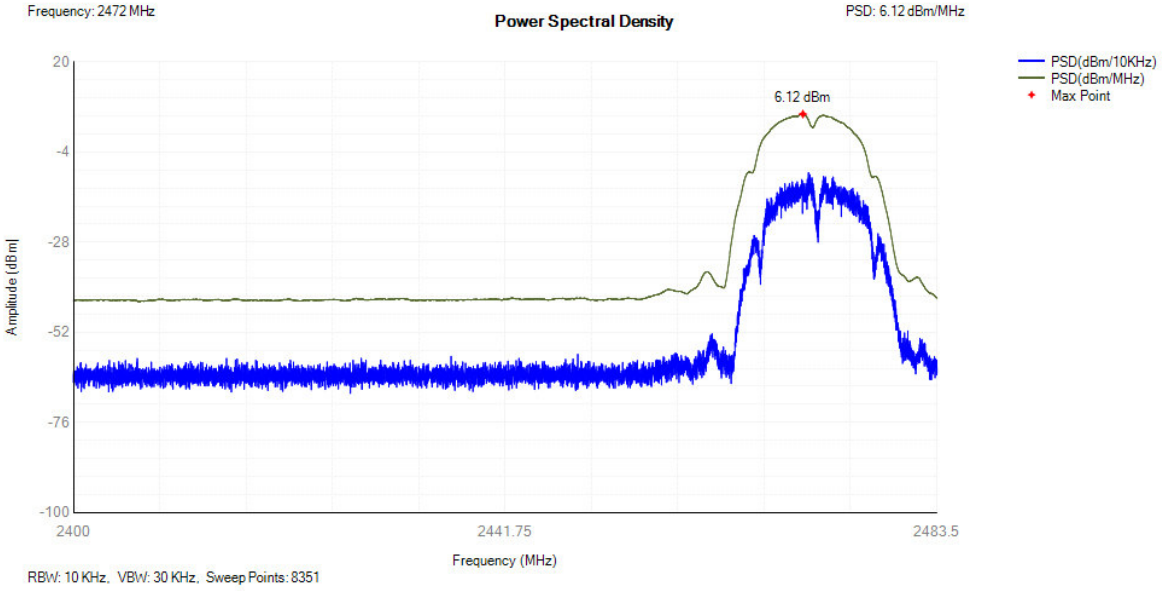
PSD NVNT 802.11b 2412MHz



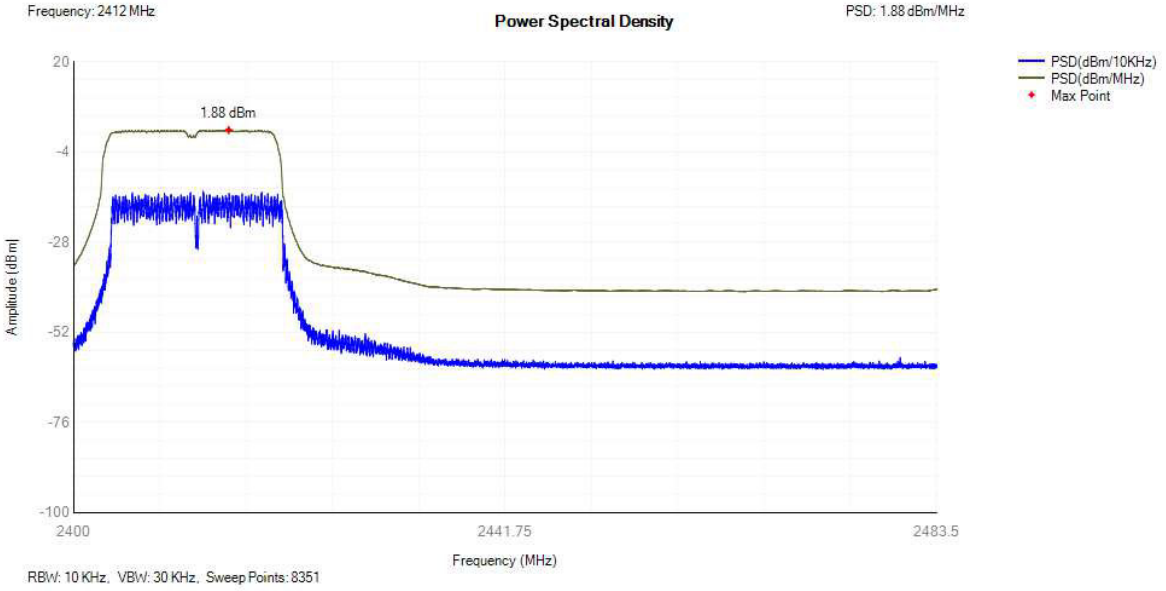
PSD NVNT 802.11b 2442MHz



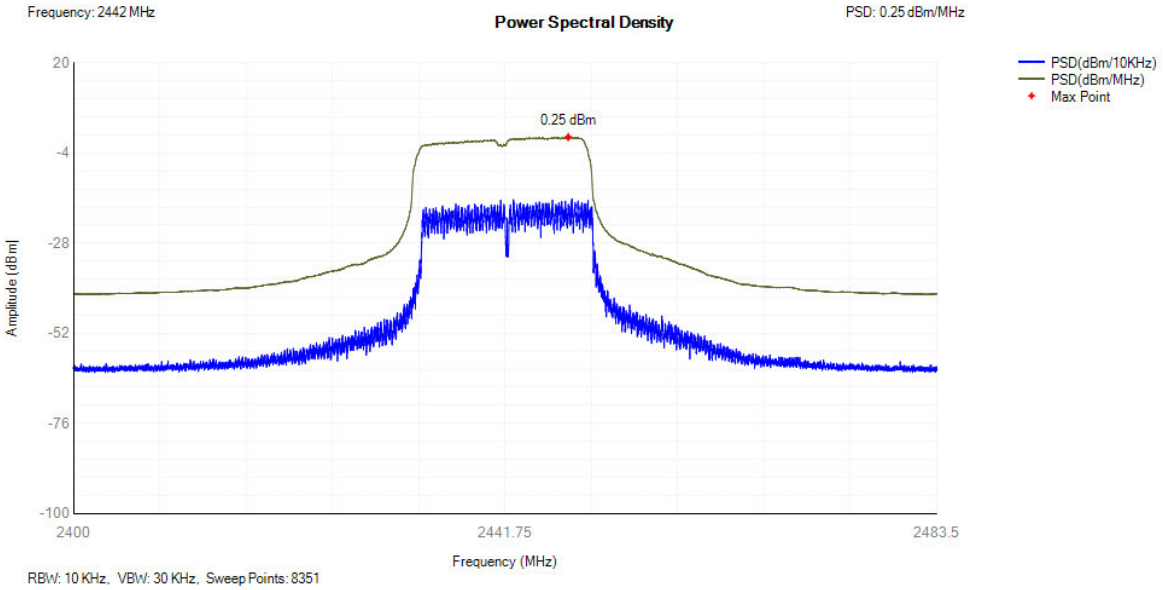
PSD NVNT 802.11b 2472MHz



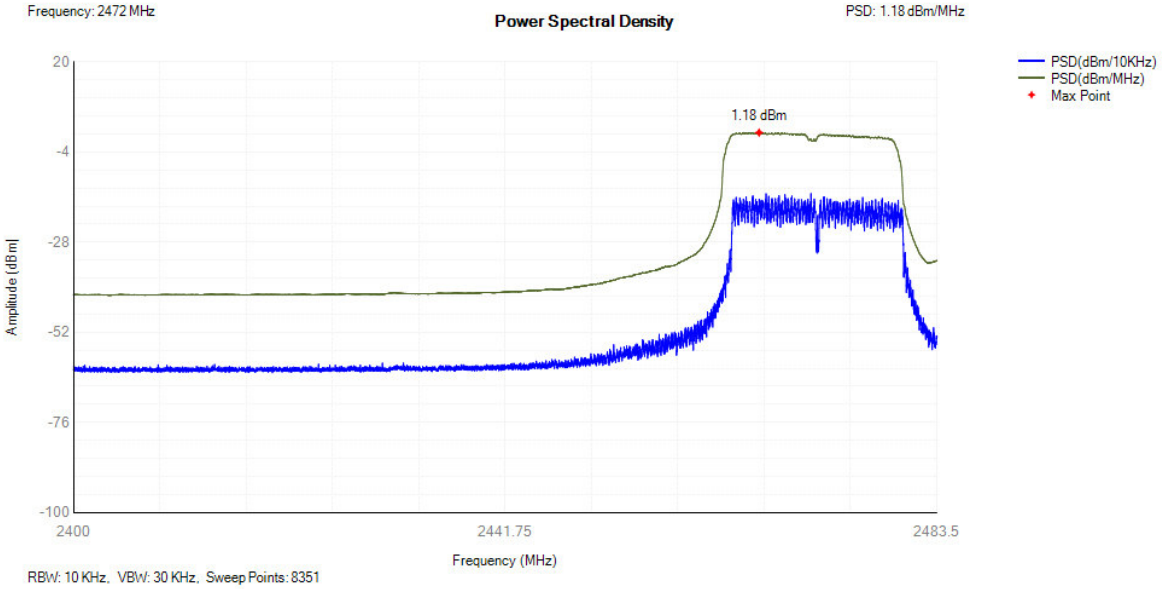
PSD NVNT 802.11g 2412MHz



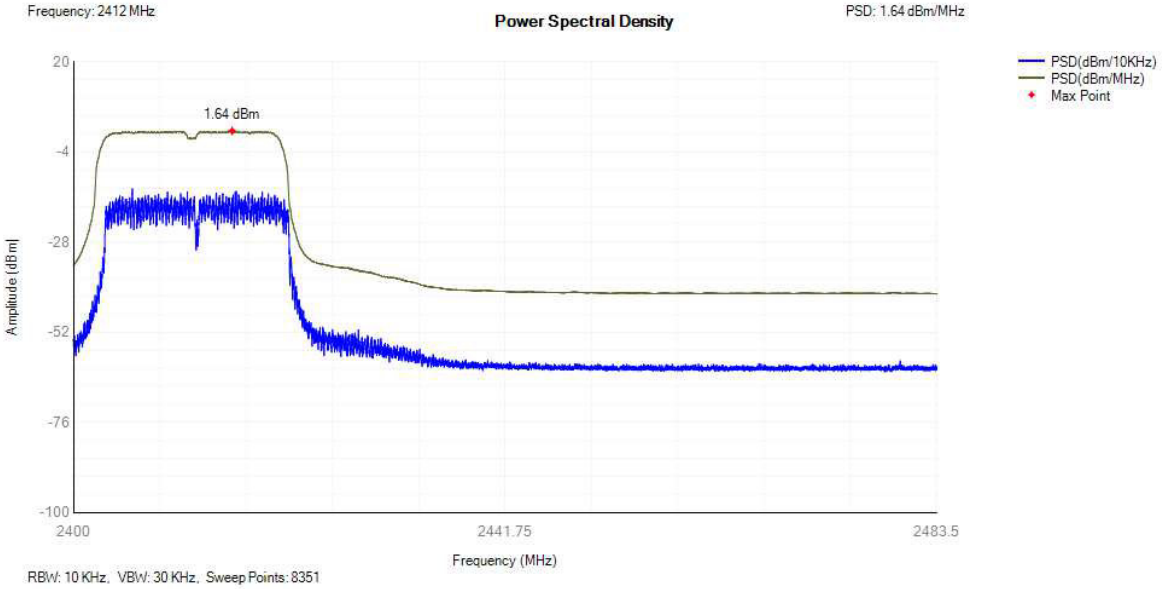
PSD NVNT 802.11g 2442MHz



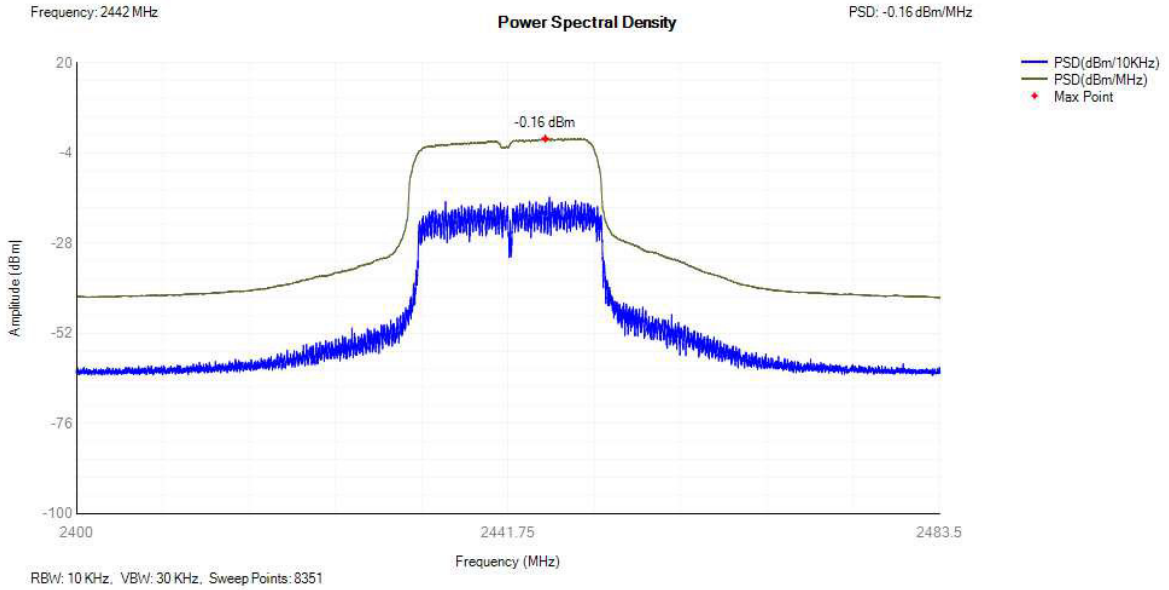
PSD NVNT 802.11g 2472MHz



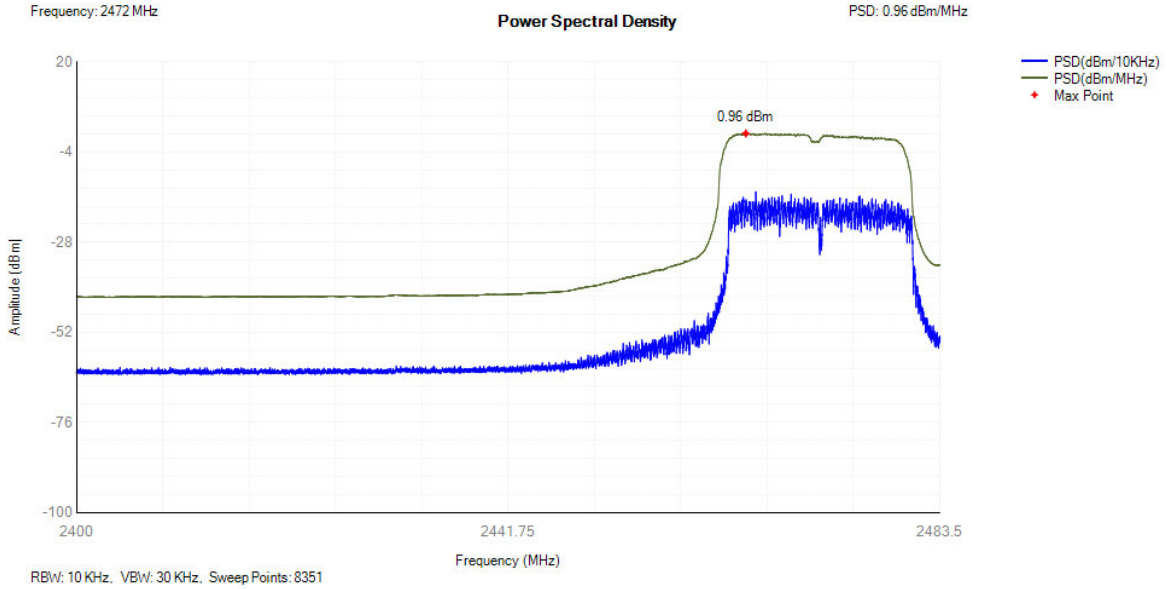
PSD NVNT 802.11n(HT20) 2412MHz



PSD NVNT 802.11n(HT20) 2442MHz



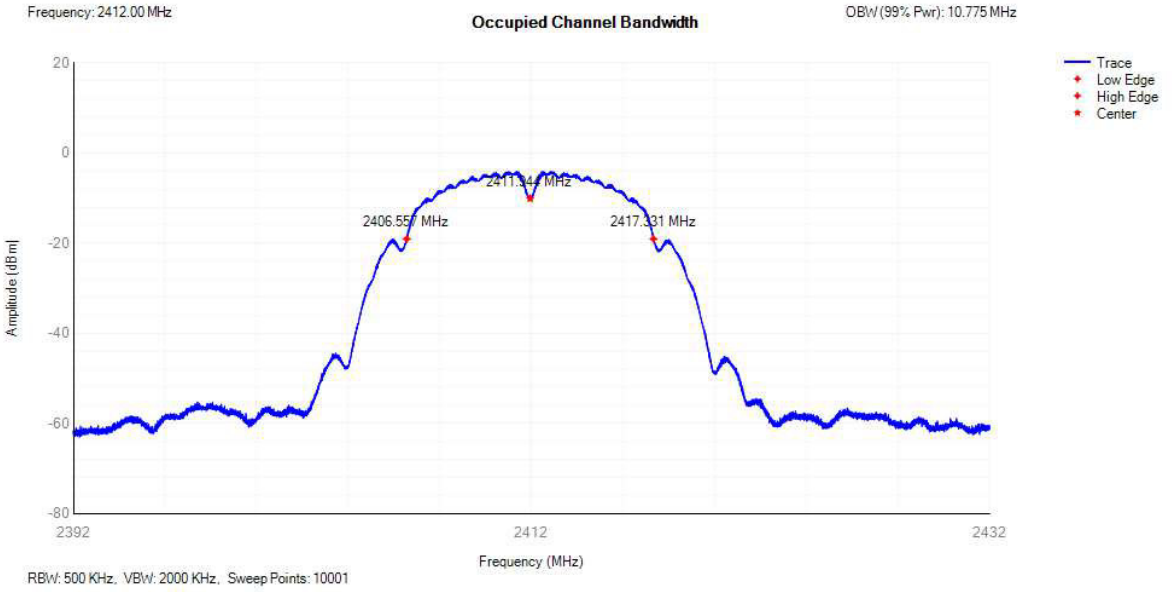
PSD NVNT 802.11n(HT20) 2472MHz



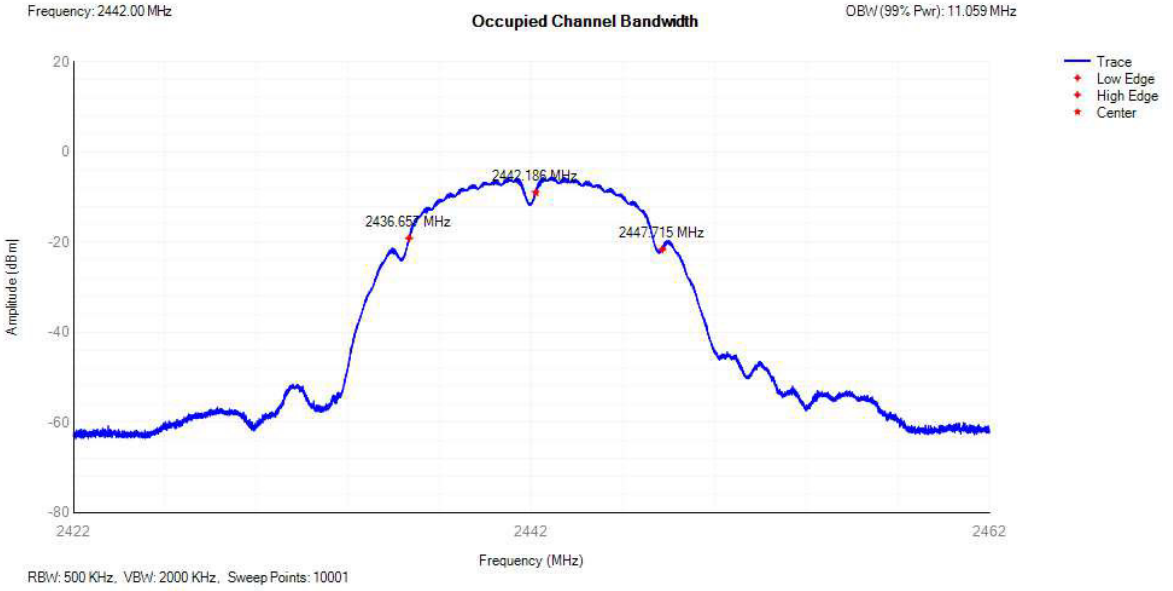
4.3 Occupied Channel Bandwidth

Condition	Mode	Frequency (MHz)	Center Frequency (MHz)	OBW (MHz)	Lower Edge (MHz)	Upper Edge (MHz)	Limit OBW (MHz)	Verdict
NVNT	802.11b	2412	2411.944	10.775	2406.557	2417.331	2400 - 2483.5MHz	Pass
NVNT	802.11b	2442	2442.186	11.059	2436.657	2447.715	2400 - 2483.5MHz	Pass
NVNT	802.11b	2472	2471.762	11.091	2466.217	2477.307	2400 - 2483.5MHz	Pass
NVNT	802.11g	2412	2411.936	16.646	2403.613	2420.259	2400 - 2483.5MHz	Pass
NVNT	802.11g	2442	2442.012	16.718	2433.653	2450.371	2400 - 2483.5MHz	Pass
NVNT	802.11g	2472	2471.884	16.662	2463.553	2480.215	2400 - 2483.5MHz	Pass
NVNT	802.11n(HT20)	2412	2411.938	17.674	2403.101	2420.775	2400 - 2483.5MHz	Pass
NVNT	802.11n(HT20)	2442	2442.022	17.714	2433.165	2450.879	2400 - 2483.5MHz	Pass
NVNT	802.11n(HT20)	2472	2471.892	17.662	2463.061	2480.723	2400 - 2483.5MHz	Pass

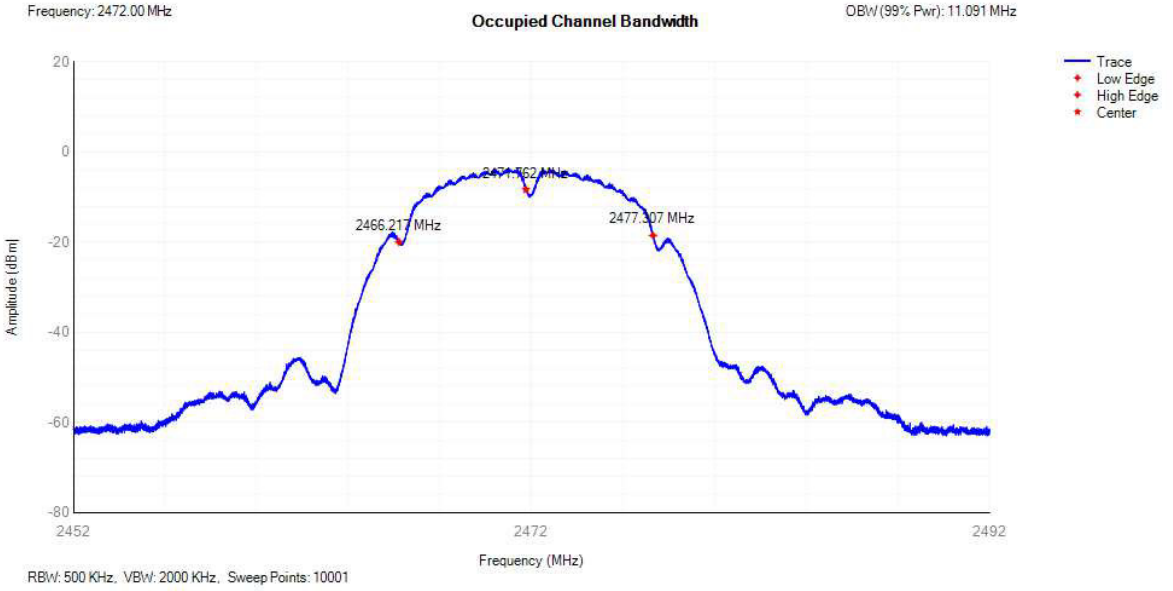
OBW NVNT 802.11b 2412MHz



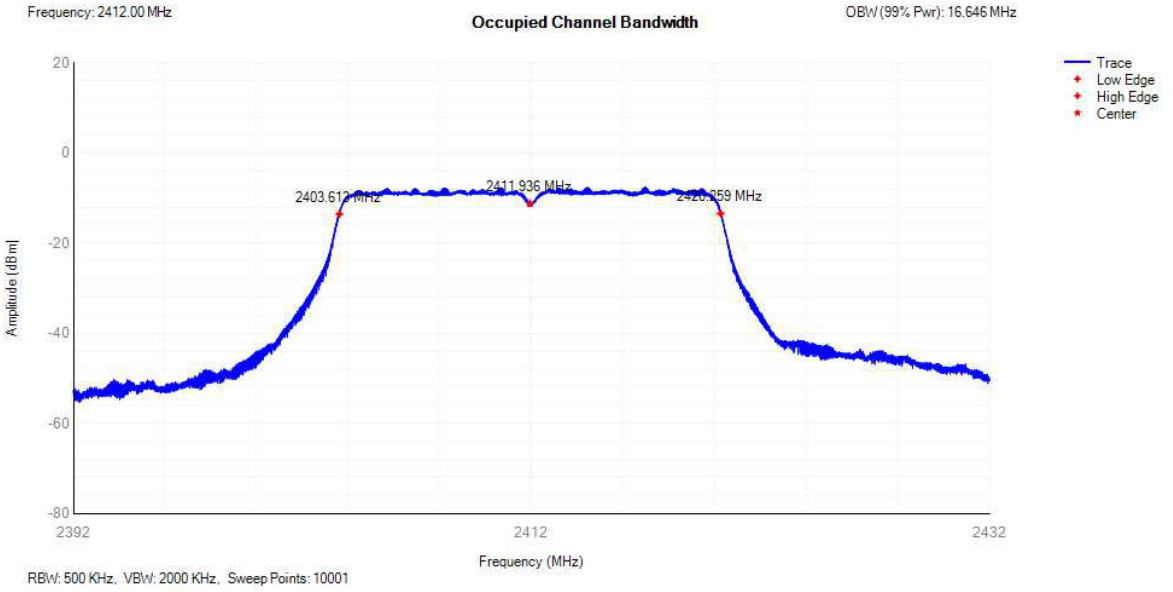
OBW NVNT 802.11b 2442MHz



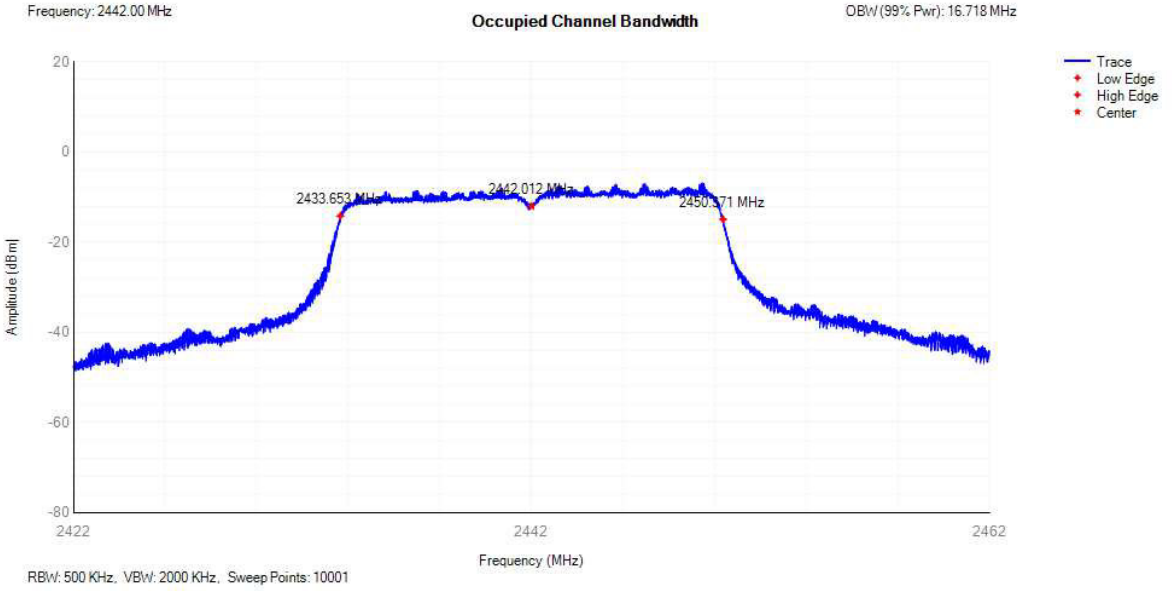
OBW NVNT 802.11b 2472MHz



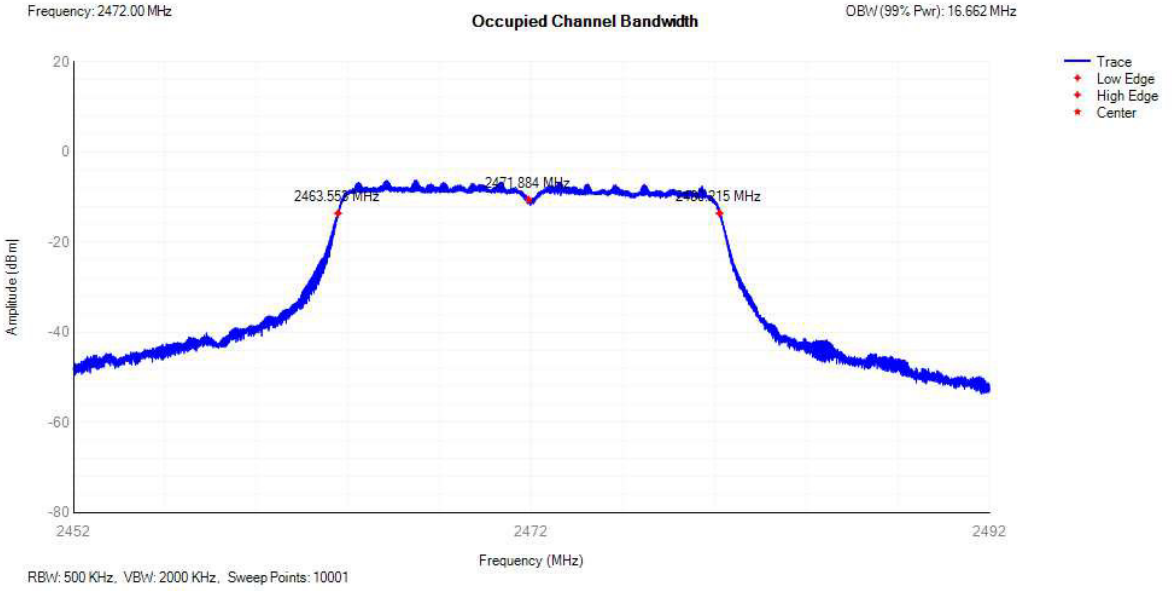
OBW NVNT 802.11g 2412MHz



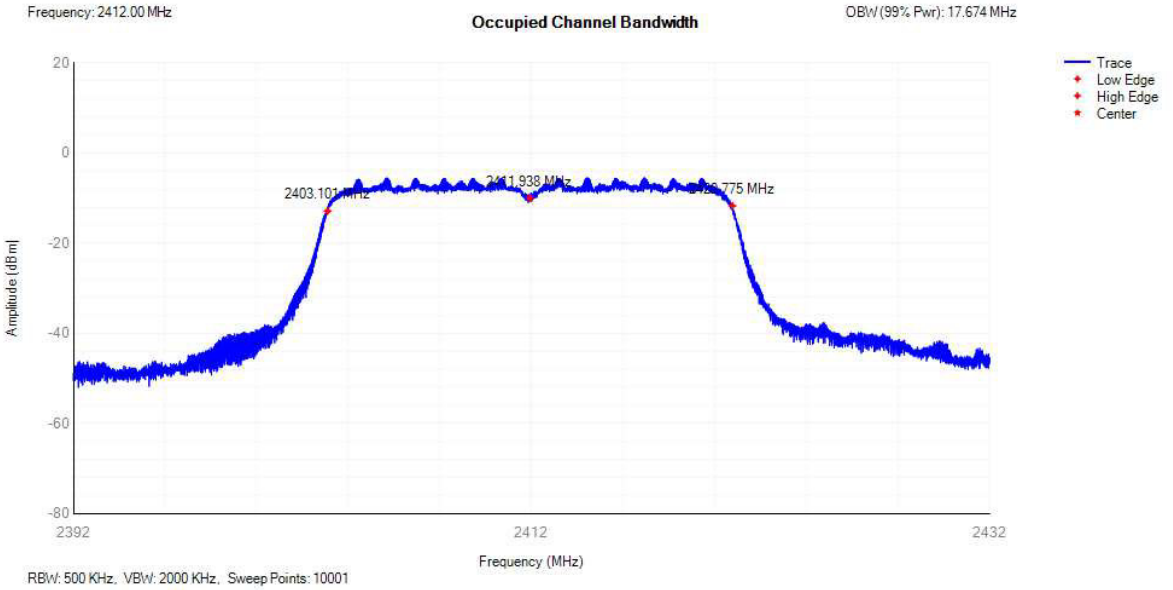
OBW NVNT 802.11g 2442MHz



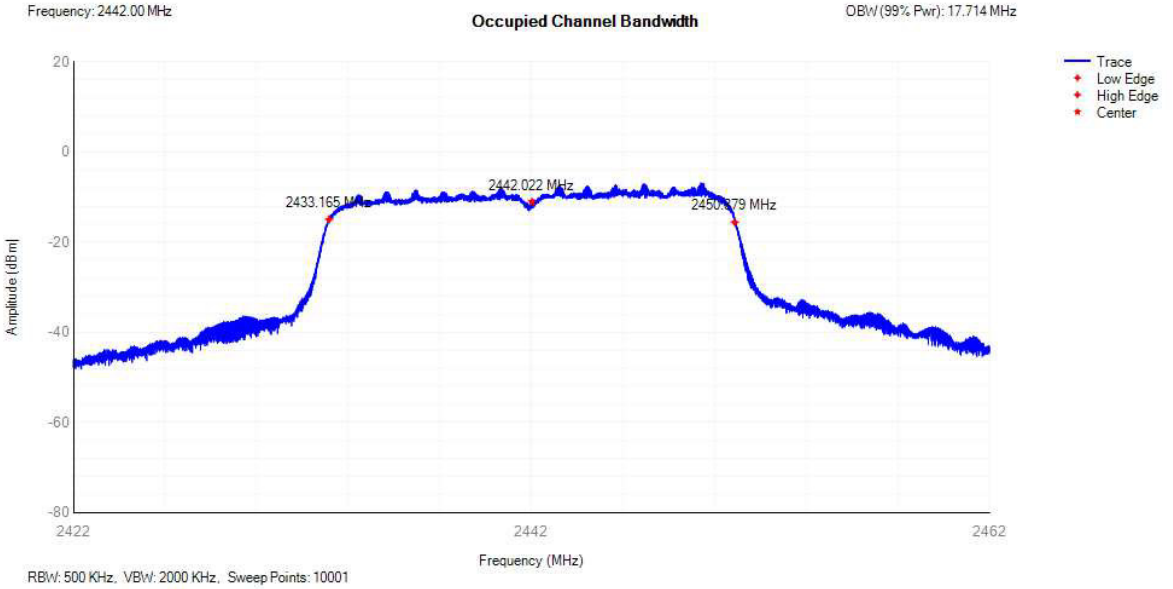
OBW NVNT 802.11g 2472MHz



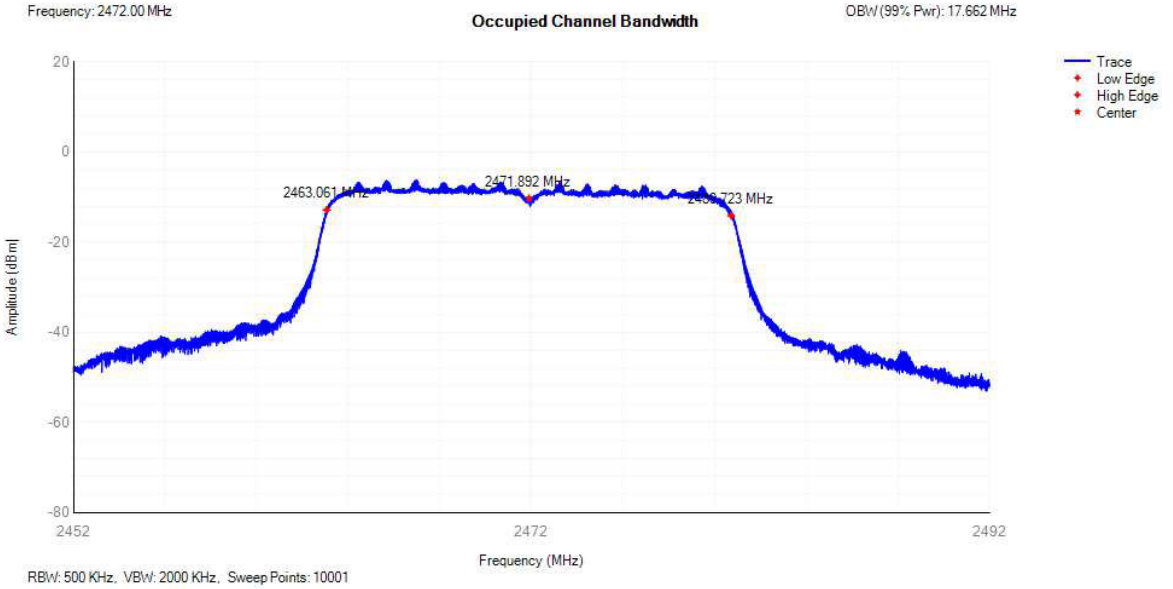
OBW NVNT 802.11n(HT20) 2412MHz



OBW NVNT 802.11n(HT20) 2442MHz



OBW NVNT 802.11n(HT20) 2472MHz



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

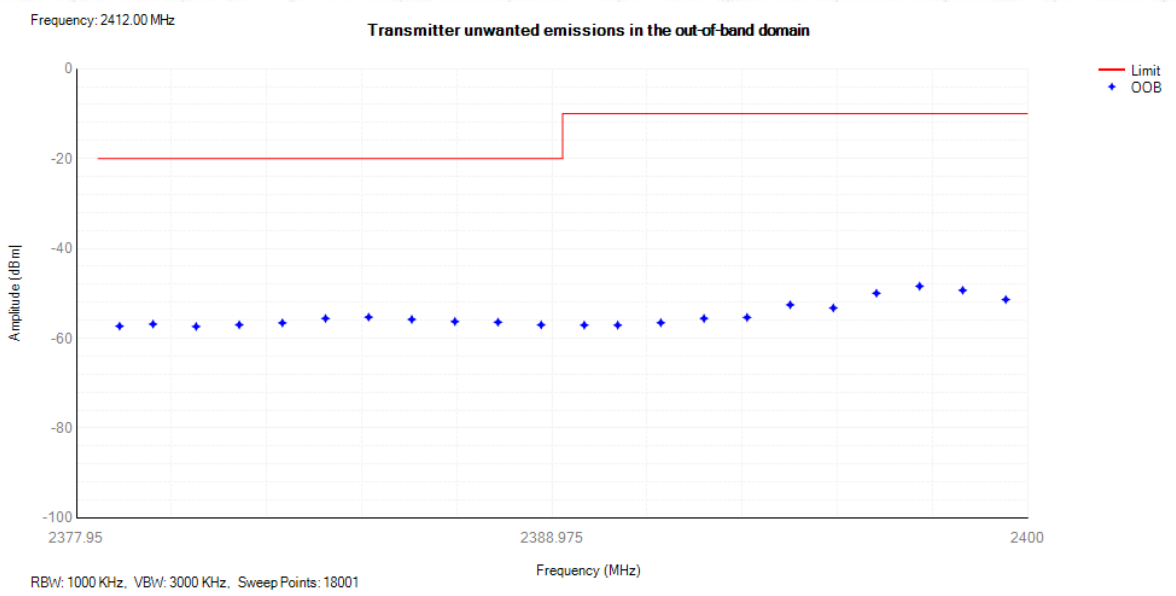
Condition	Mode	Frequency (MHz)	OOB Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	802.11b	2412	2399.5	-51.39	-10	Pass
NVNT	802.11b	2412	2398.5	-49.32	-10	Pass
NVNT	802.11b	2412	2397.5	-48.41	-10	Pass
NVNT	802.11b	2412	2396.5	-49.98	-10	Pass
NVNT	802.11b	2412	2395.5	-53.26	-10	Pass
NVNT	802.11b	2412	2394.5	-52.55	-10	Pass
NVNT	802.11b	2412	2393.5	-55.36	-10	Pass
NVNT	802.11b	2412	2392.5	-55.59	-10	Pass
NVNT	802.11b	2412	2391.5	-56.54	-10	Pass
NVNT	802.11b	2412	2390.5	-57.08	-10	Pass
NVNT	802.11b	2412	2389.725	-57.07	-10	Pass
NVNT	802.11b	2412	2388.725	-57.02	-20	Pass
NVNT	802.11b	2412	2387.725	-56.42	-20	Pass
NVNT	802.11b	2412	2386.725	-56.27	-20	Pass
NVNT	802.11b	2412	2385.725	-55.8	-20	Pass
NVNT	802.11b	2412	2384.725	-55.3	-20	Pass
NVNT	802.11b	2412	2383.725	-55.59	-20	Pass
NVNT	802.11b	2412	2382.725	-56.58	-20	Pass
NVNT	802.11b	2412	2381.725	-57	-20	Pass
NVNT	802.11b	2412	2380.725	-57.38	-20	Pass
NVNT	802.11b	2412	2379.725	-56.85	-20	Pass
NVNT	802.11b	2412	2378.95	-57.3	-20	Pass
NVNT	802.11b	2472	2484	-47.31	-10	Pass
NVNT	802.11b	2472	2485	-46.3	-10	Pass
NVNT	802.11b	2472	2486	-46.17	-10	Pass
NVNT	802.11b	2472	2487	-48.15	-10	Pass
NVNT	802.11b	2472	2488	-52.24	-10	Pass
NVNT	802.11b	2472	2489	-56.41	-10	Pass
NVNT	802.11b	2472	2490	-56.85	-10	Pass
NVNT	802.11b	2472	2491	-57.13	-10	Pass
NVNT	802.11b	2472	2492	-57.81	-10	Pass
NVNT	802.11b	2472	2493	-57.58	-10	Pass
NVNT	802.11b	2472	2494	-57.89	-10	Pass
NVNT	802.11b	2472	2494.091	-57.94	-10	Pass
NVNT	802.11b	2472	2495.091	-58.09	-20	Pass
NVNT	802.11b	2472	2496.091	-58.2	-20	Pass
NVNT	802.11b	2472	2497.091	-58.27	-20	Pass
NVNT	802.11b	2472	2498.091	-58.41	-20	Pass
NVNT	802.11b	2472	2499.091	-58.46	-20	Pass
NVNT	802.11b	2472	2500.091	-58.37	-20	Pass
NVNT	802.11b	2472	2501.091	-58.33	-20	Pass
NVNT	802.11b	2472	2502.091	-58.4	-20	Pass
NVNT	802.11b	2472	2503.091	-58.45	-20	Pass
NVNT	802.11b	2472	2504.091	-58.44	-20	Pass
NVNT	802.11b	2472	2505.091	-58.42	-20	Pass
NVNT	802.11b	2472	2505.182	-58.43	-20	Pass
NVNT	802.11g	2412	2399.5	-40.61	-10	Pass
NVNT	802.11g	2412	2398.5	-42.68	-10	Pass
NVNT	802.11g	2412	2397.5	-43.73	-10	Pass
NVNT	802.11g	2412	2396.5	-44.61	-10	Pass
NVNT	802.11g	2412	2395.5	-45.1	-10	Pass
NVNT	802.11g	2412	2394.5	-45.77	-10	Pass
NVNT	802.11g	2412	2393.5	-46.17	-10	Pass

NVNT	802.11g	2412	2392.5	-46.69	-10	Pass
NVNT	802.11g	2412	2391.5	-47.43	-10	Pass
NVNT	802.11g	2412	2390.5	-48.18	-10	Pass
NVNT	802.11g	2412	2389.5	-48.84	-10	Pass
NVNT	802.11g	2412	2388.5	-49.81	-10	Pass
NVNT	802.11g	2412	2387.5	-49.94	-10	Pass
NVNT	802.11g	2412	2386.5	-50.31	-10	Pass
NVNT	802.11g	2412	2385.5	-50.93	-10	Pass
NVNT	802.11g	2412	2384.5	-51.01	-10	Pass
NVNT	802.11g	2412	2383.854	-51.11	-10	Pass
NVNT	802.11g	2412	2382.854	-51.41	-20	Pass
NVNT	802.11g	2412	2381.854	-51.92	-20	Pass
NVNT	802.11g	2412	2380.854	-51.82	-20	Pass
NVNT	802.11g	2412	2379.854	-52.39	-20	Pass
NVNT	802.11g	2412	2378.854	-52.88	-20	Pass
NVNT	802.11g	2412	2377.854	-53.23	-20	Pass
NVNT	802.11g	2412	2376.854	-53.72	-20	Pass
NVNT	802.11g	2412	2375.854	-54.15	-20	Pass
NVNT	802.11g	2412	2374.854	-54.6	-20	Pass
NVNT	802.11g	2412	2373.854	-54.71	-20	Pass
NVNT	802.11g	2412	2372.854	-55.01	-20	Pass
NVNT	802.11g	2412	2371.854	-55.38	-20	Pass
NVNT	802.11g	2412	2370.854	-55.72	-20	Pass
NVNT	802.11g	2412	2369.854	-55.95	-20	Pass
NVNT	802.11g	2412	2368.854	-56.23	-20	Pass
NVNT	802.11g	2412	2367.854	-56.57	-20	Pass
NVNT	802.11g	2412	2367.208	-56.76	-20	Pass
NVNT	802.11g	2472	2484	-37.21	-10	Pass
NVNT	802.11g	2472	2485	-38.72	-10	Pass
NVNT	802.11g	2472	2486	-39.77	-10	Pass
NVNT	802.11g	2472	2487	-40.53	-10	Pass
NVNT	802.11g	2472	2488	-41.57	-10	Pass
NVNT	802.11g	2472	2489	-42.9	-10	Pass
NVNT	802.11g	2472	2490	-43.95	-10	Pass
NVNT	802.11g	2472	2491	-44.97	-10	Pass
NVNT	802.11g	2472	2492	-46.52	-10	Pass
NVNT	802.11g	2472	2493	-47.87	-10	Pass
NVNT	802.11g	2472	2494	-49.44	-10	Pass
NVNT	802.11g	2472	2495	-50.72	-10	Pass
NVNT	802.11g	2472	2496	-51.57	-10	Pass
NVNT	802.11g	2472	2497	-52.42	-10	Pass
NVNT	802.11g	2472	2498	-52.96	-10	Pass
NVNT	802.11g	2472	2499	-53.47	-10	Pass
NVNT	802.11g	2472	2499.662	-53.77	-10	Pass
NVNT	802.11g	2472	2500.662	-54.09	-20	Pass
NVNT	802.11g	2472	2501.662	-54.84	-20	Pass
NVNT	802.11g	2472	2502.662	-55.01	-20	Pass
NVNT	802.11g	2472	2503.662	-55.37	-20	Pass
NVNT	802.11g	2472	2504.662	-55.79	-20	Pass
NVNT	802.11g	2472	2505.662	-55.95	-20	Pass
NVNT	802.11g	2472	2506.662	-56.03	-20	Pass
NVNT	802.11g	2472	2507.662	-56.22	-20	Pass
NVNT	802.11g	2472	2508.662	-56.42	-20	Pass
NVNT	802.11g	2472	2509.662	-56.48	-20	Pass
NVNT	802.11g	2472	2510.662	-56.32	-20	Pass
NVNT	802.11g	2472	2511.662	-56.76	-20	Pass
NVNT	802.11g	2472	2512.662	-56.93	-20	Pass

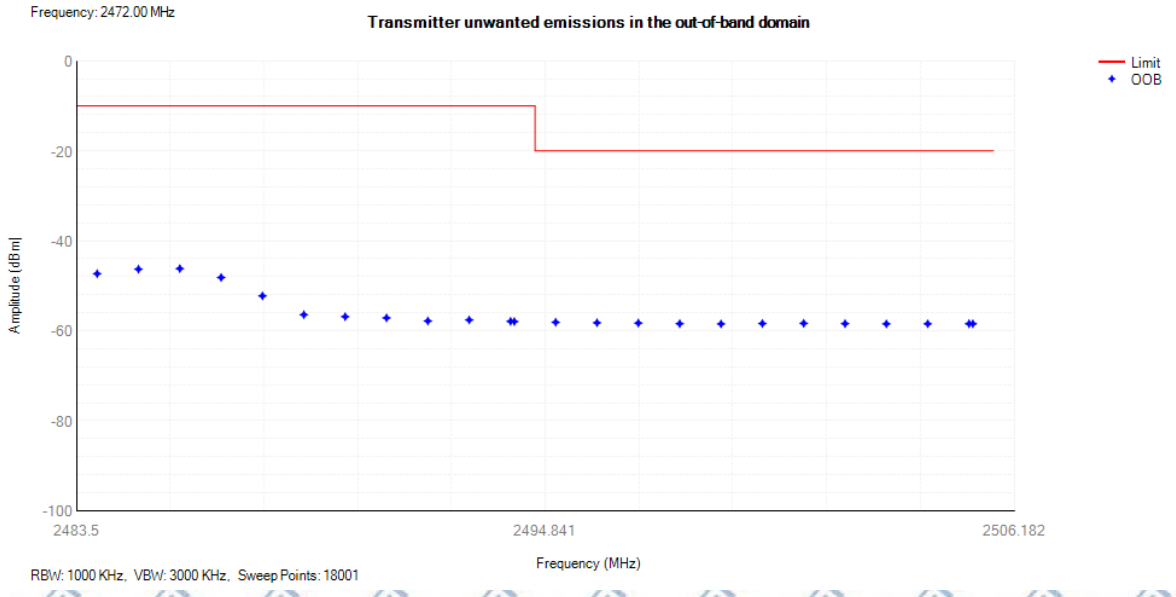
NVNT	802.11g	2472	2513.662	-57.06	-20	Pass
NVNT	802.11g	2472	2514.662	-57.1	-20	Pass
NVNT	802.11g	2472	2515.662	-57.29	-20	Pass
NVNT	802.11g	2472	2516.324	-57.3	-20	Pass
NVNT	802.11n(HT20)	2412	2399.5	-40.11	-10	Pass
NVNT	802.11n(HT20)	2412	2398.5	-42.01	-10	Pass
NVNT	802.11n(HT20)	2412	2397.5	-43.08	-10	Pass
NVNT	802.11n(HT20)	2412	2396.5	-43.97	-10	Pass
NVNT	802.11n(HT20)	2412	2395.5	-44.52	-10	Pass
NVNT	802.11n(HT20)	2412	2394.5	-44.85	-10	Pass
NVNT	802.11n(HT20)	2412	2393.5	-45.21	-10	Pass
NVNT	802.11n(HT20)	2412	2392.5	-45.7	-10	Pass
NVNT	802.11n(HT20)	2412	2391.5	-46.39	-10	Pass
NVNT	802.11n(HT20)	2412	2390.5	-46.87	-10	Pass
NVNT	802.11n(HT20)	2412	2389.5	-47.64	-10	Pass
NVNT	802.11n(HT20)	2412	2388.5	-48.59	-10	Pass
NVNT	802.11n(HT20)	2412	2387.5	-49.29	-10	Pass
NVNT	802.11n(HT20)	2412	2386.5	-49.65	-10	Pass
NVNT	802.11n(HT20)	2412	2385.5	-49.73	-10	Pass
NVNT	802.11n(HT20)	2412	2384.5	-50.18	-10	Pass
NVNT	802.11n(HT20)	2412	2383.5	-50.8	-10	Pass
NVNT	802.11n(HT20)	2412	2382.826	-51.05	-10	Pass
NVNT	802.11n(HT20)	2412	2381.826	-51.22	-20	Pass
NVNT	802.11n(HT20)	2412	2380.826	-51.44	-20	Pass
NVNT	802.11n(HT20)	2412	2379.826	-51.6	-20	Pass
NVNT	802.11n(HT20)	2412	2378.826	-51.84	-20	Pass
NVNT	802.11n(HT20)	2412	2377.826	-52.45	-20	Pass
NVNT	802.11n(HT20)	2412	2376.826	-53.1	-20	Pass
NVNT	802.11n(HT20)	2412	2375.826	-53.6	-20	Pass
NVNT	802.11n(HT20)	2412	2374.826	-53.99	-20	Pass
NVNT	802.11n(HT20)	2412	2373.826	-54.18	-20	Pass
NVNT	802.11n(HT20)	2412	2372.826	-54.5	-20	Pass
NVNT	802.11n(HT20)	2412	2371.826	-54.88	-20	Pass
NVNT	802.11n(HT20)	2412	2370.826	-55.43	-20	Pass
NVNT	802.11n(HT20)	2412	2369.826	-55.83	-20	Pass
NVNT	802.11n(HT20)	2412	2368.826	-56.2	-20	Pass
NVNT	802.11n(HT20)	2412	2367.826	-56.27	-20	Pass
NVNT	802.11n(HT20)	2412	2366.826	-56.61	-20	Pass
NVNT	802.11n(HT20)	2412	2365.826	-56.73	-20	Pass
NVNT	802.11n(HT20)	2412	2365.152	-56.97	-20	Pass
NVNT	802.11n(HT20)	2472	2484	-36.53	-10	Pass
NVNT	802.11n(HT20)	2472	2485	-37.87	-10	Pass
NVNT	802.11n(HT20)	2472	2486	-39.31	-10	Pass
NVNT	802.11n(HT20)	2472	2487	-40.18	-10	Pass
NVNT	802.11n(HT20)	2472	2488	-41.37	-10	Pass
NVNT	802.11n(HT20)	2472	2489	-42.16	-10	Pass
NVNT	802.11n(HT20)	2472	2490	-43.66	-10	Pass
NVNT	802.11n(HT20)	2472	2491	-44.78	-10	Pass
NVNT	802.11n(HT20)	2472	2492	-45.74	-10	Pass
NVNT	802.11n(HT20)	2472	2493	-46.99	-10	Pass
NVNT	802.11n(HT20)	2472	2494	-48.57	-10	Pass
NVNT	802.11n(HT20)	2472	2495	-49.94	-10	Pass
NVNT	802.11n(HT20)	2472	2496	-51.05	-10	Pass
NVNT	802.11n(HT20)	2472	2497	-52.07	-10	Pass
NVNT	802.11n(HT20)	2472	2498	-52.6	-10	Pass
NVNT	802.11n(HT20)	2472	2499	-53.35	-10	Pass
NVNT	802.11n(HT20)	2472	2500	-53.91	-10	Pass

NVNT	802.11n(HT20)	2472	2500.662	-54.14	-10	Pass
NVNT	802.11n(HT20)	2472	2501.662	-54.58	-20	Pass
NVNT	802.11n(HT20)	2472	2502.662	-54.93	-20	Pass
NVNT	802.11n(HT20)	2472	2503.662	-55.23	-20	Pass
NVNT	802.11n(HT20)	2472	2504.662	-55.51	-20	Pass
NVNT	802.11n(HT20)	2472	2505.662	-55.71	-20	Pass
NVNT	802.11n(HT20)	2472	2506.662	-55.83	-20	Pass
NVNT	802.11n(HT20)	2472	2507.662	-55.95	-20	Pass
NVNT	802.11n(HT20)	2472	2508.662	-56.43	-20	Pass
NVNT	802.11n(HT20)	2472	2509.662	-56.6	-20	Pass
NVNT	802.11n(HT20)	2472	2510.662	-56.52	-20	Pass
NVNT	802.11n(HT20)	2472	2511.662	-56.93	-20	Pass
NVNT	802.11n(HT20)	2472	2512.662	-57.06	-20	Pass
NVNT	802.11n(HT20)	2472	2513.662	-57.12	-20	Pass
NVNT	802.11n(HT20)	2472	2514.662	-57.11	-20	Pass
NVNT	802.11n(HT20)	2472	2515.662	-57.17	-20	Pass
NVNT	802.11n(HT20)	2472	2516.662	-57.23	-20	Pass
NVNT	802.11n(HT20)	2472	2517.662	-57.3	-20	Pass
NVNT	802.11n(HT20)	2472	2518.324	-57.34	-20	Pass

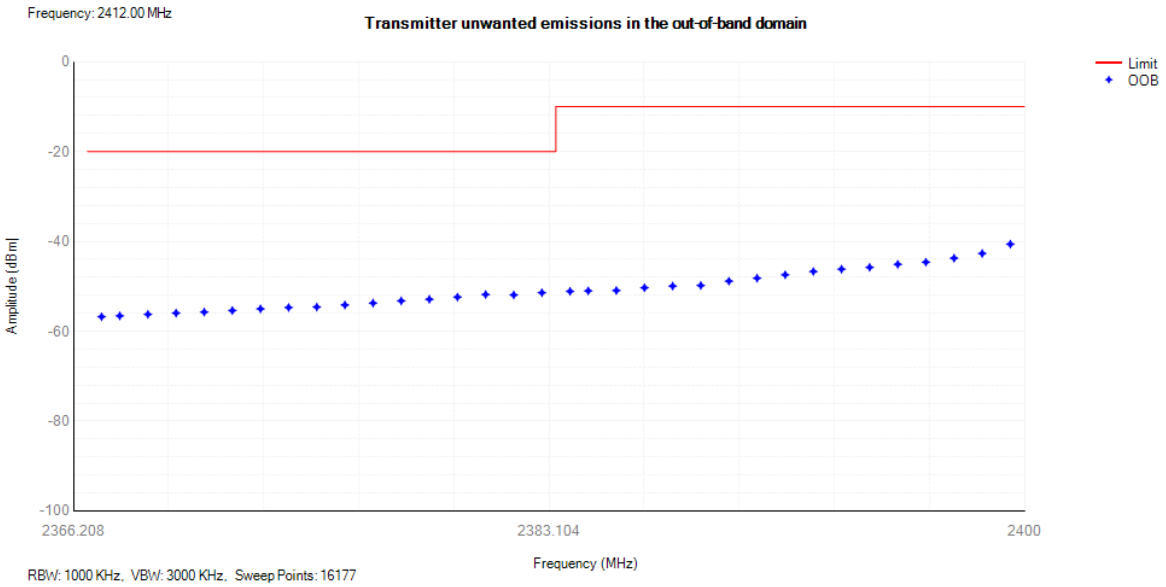
Tx. Emissions OOB NVNT 802.11b 2412MHz



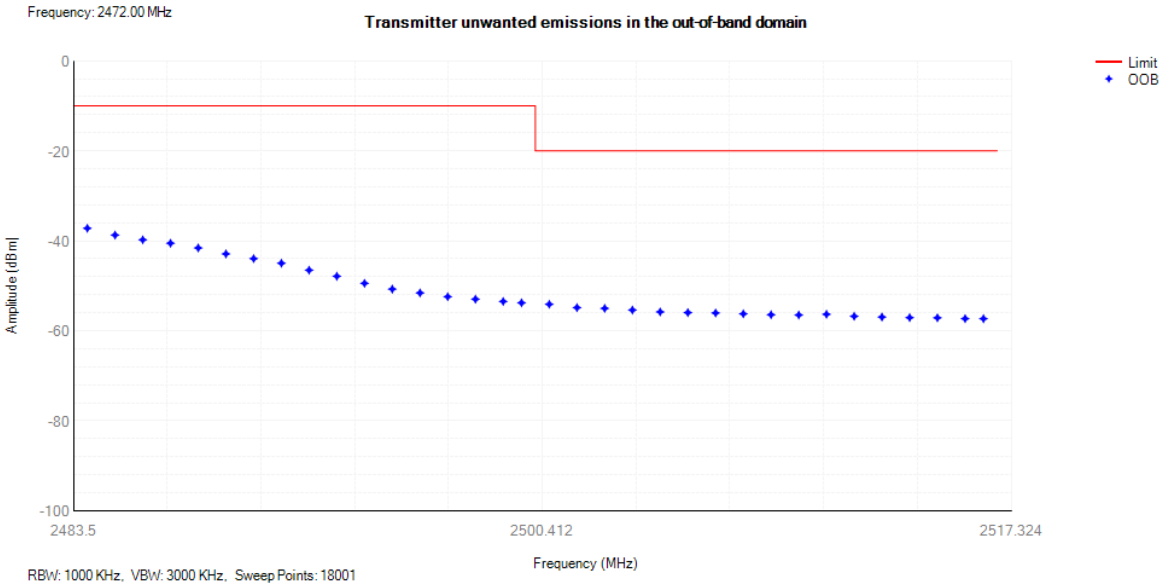
Tx. Emissions OOB NVNT 802.11b 2472MHz



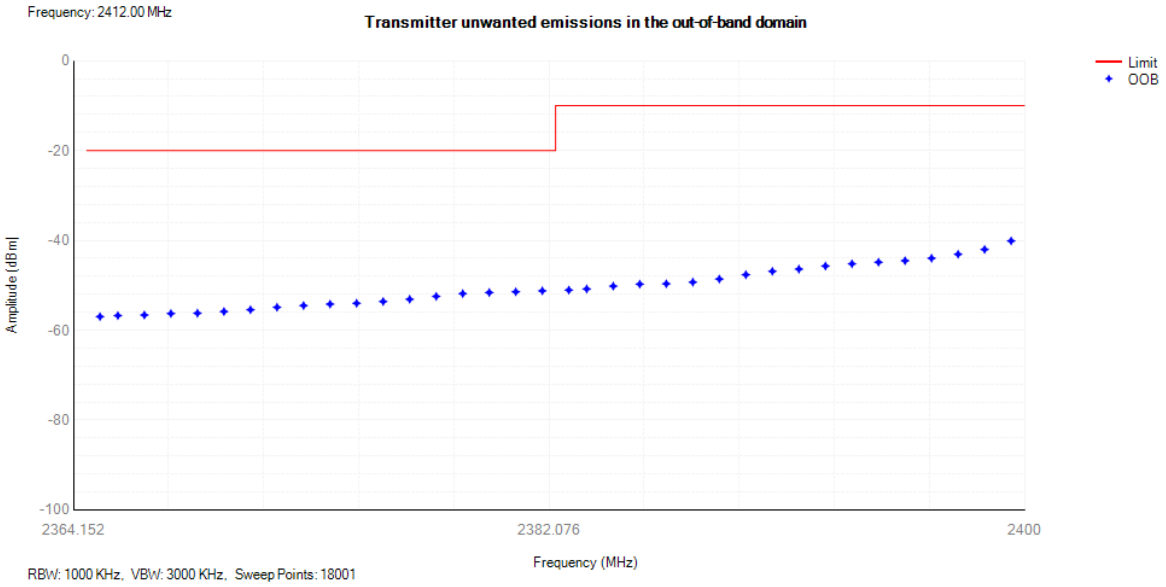
Tx. Emissions OOB NVNT 802.11g 2412MHz



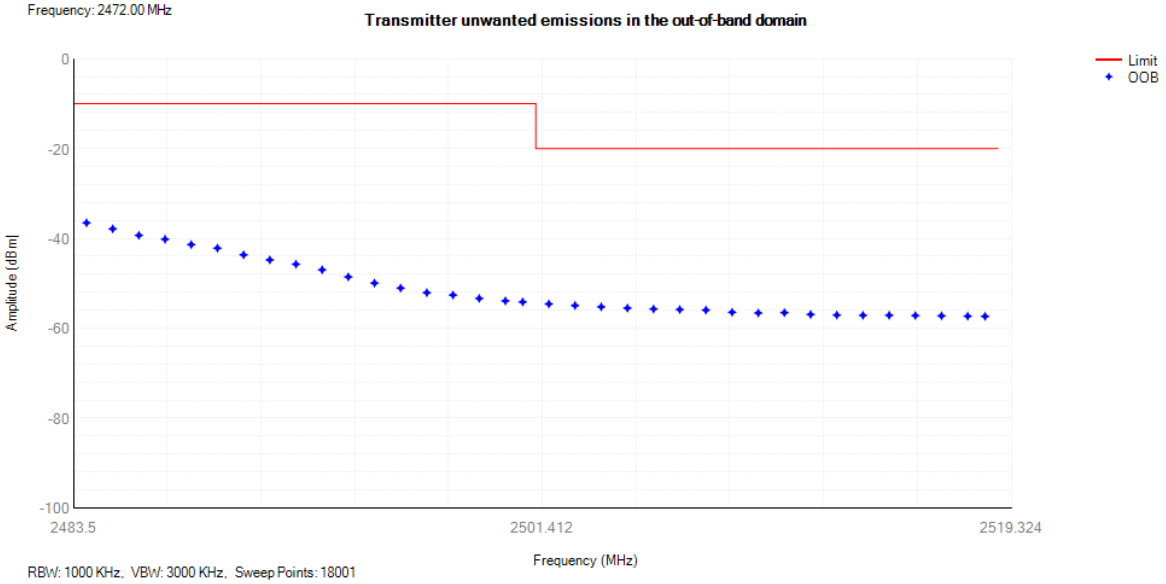
Tx. Emissions OOB NVNT 802.11g 2472MHz



Tx. Emissions OOB NVNT 802.11n(HT20) 2412MHz



Tx. Emissions OOB NVNT 802.11n(HT20) 2472MHz



4.5 Transmitter unwanted emissions in the spurious domain

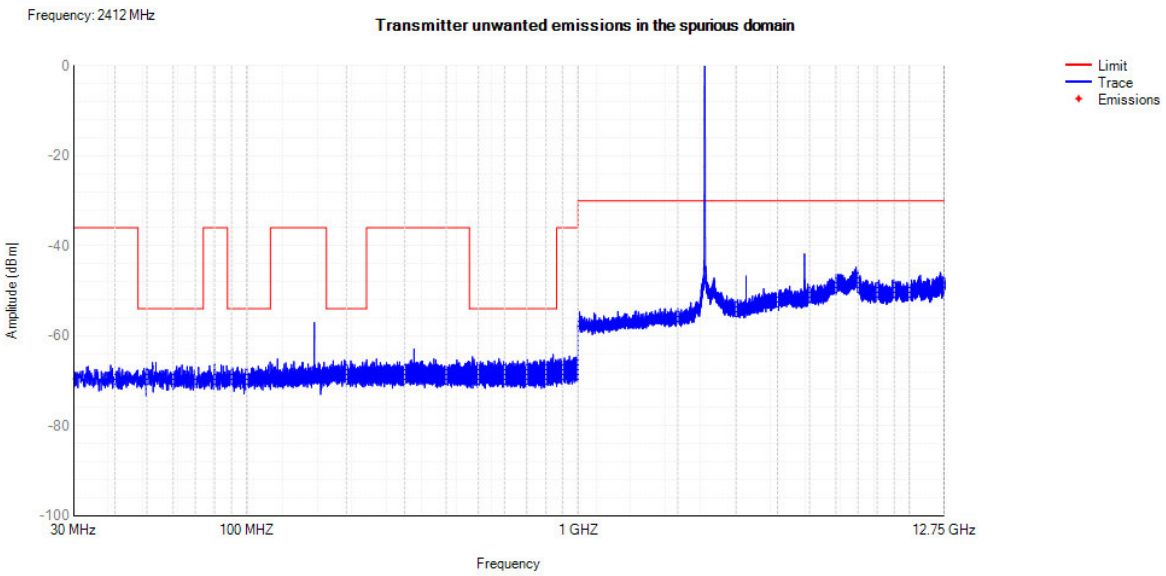
Condition	Mode	Frequency (MHz)	Range	Spur Freq (MHz)	Spur Level Peak(dBm)	Spur Level RMS(dBm)	Limit (dBm)	Verdict
NVNT	802.11b	2412	30 MHz -47 MHz	38.85	-66.55	NA	-36	Pass
NVNT	802.11b	2412	47 MHz -74 MHz	51.95	-65.94	NA	-54	Pass
NVNT	802.11b	2412	74 MHz -87.5 MHz	80.05	-66.29	NA	-36	Pass
NVNT	802.11b	2412	87.5 MHz -118 MHz	117.7	-65.82	NA	-54	Pass
NVNT	802.11b	2412	118 MHz -174 MHz	159.95	-57.05	NA	-36	Pass
NVNT	802.11b	2412	174 MHz -230 MHz	197.35	-65.37	NA	-54	Pass
NVNT	802.11b	2412	230 MHz -470 MHz	319.95	-62.92	NA	-36	Pass
NVNT	802.11b	2412	470 MHz -862 MHz	841	-64.15	NA	-54	Pass
NVNT	802.11b	2412	862 MHz -1000 MHz	941.65	-64.52	NA	-36	Pass
NVNT	802.11b	2412	1000 MHz -2360 MHz	2353	-49.79	NA	-30	Pass
NVNT	802.11b	2412	2523.5 MHz -12750 MHz	4824	-41.79	NA	-30	Pass
NVNT	802.11b	2442	30 MHz -47 MHz	42.95	-66.53	NA	-36	Pass
NVNT	802.11b	2442	47 MHz -74 MHz	51.95	-65.9	NA	-54	Pass
NVNT	802.11b	2442	74 MHz -87.5 MHz	74.5	-66.85	NA	-36	Pass
NVNT	802.11b	2442	87.5 MHz -118 MHz	116.9	-65.79	NA	-54	Pass
NVNT	802.11b	2442	118 MHz -174 MHz	160	-57.33	NA	-36	Pass
NVNT	802.11b	2442	174 MHz -230 MHz	187.6	-65.26	NA	-54	Pass
NVNT	802.11b	2442	230 MHz -470 MHz	319.95	-63.27	NA	-36	Pass
NVNT	802.11b	2442	470 MHz -862 MHz	850.25	-64.12	NA	-54	Pass
NVNT	802.11b	2442	862 MHz -1000 MHz	976.45	-64.39	NA	-36	Pass
NVNT	802.11b	2442	1000 MHz -2360 MHz	2351.5	-52.33	NA	-30	Pass
NVNT	802.11b	2442	2523.5 MHz -12750 MHz	6855.5	-44.18	NA	-30	Pass
NVNT	802.11b	2472	30 MHz -47 MHz	45.55	-66.36	NA	-36	Pass
NVNT	802.11b	2472	47 MHz -74 MHz	51.95	-65.35	NA	-54	Pass
NVNT	802.11b	2472	74 MHz -87.5 MHz	80	-65.67	NA	-36	Pass
NVNT	802.11b	2472	87.5 MHz -118 MHz	115.4	-66.4	NA	-54	Pass
NVNT	802.11b	2472	118 MHz -174 MHz	159.95	-58.43	NA	-36	Pass
NVNT	802.11b	2472	174 MHz -230 MHz	181.85	-65.01	NA	-54	Pass
NVNT	802.11b	2472	230 MHz -470 MHz	319.95	-62.75	NA	-36	Pass
NVNT	802.11b	2472	470 MHz -862 MHz	844.35	-64.33	NA	-54	Pass
NVNT	802.11b	2472	862 MHz -1000	970.25	-63.11	NA	-36	Pass

			MHz					
NVNT	802.11b	2472	1000 MHz -2360 MHz	2348	-52.36	NA	-30	Pass
NVNT	802.11b	2472	2523.5 MHz -12750 MHz	4944	-44.77	NA	-30	Pass
NVNT	802.11g	2412	30 MHz -47 MHz	37.55	-66.77	NA	-36	Pass
NVNT	802.11g	2412	47 MHz -74 MHz	59.2	-66.41	NA	-54	Pass
NVNT	802.11g	2412	74 MHz -87.5 MHz	86.55	-67	NA	-36	Pass
NVNT	802.11g	2412	87.5 MHz -118 MHz	116.7	-66.31	NA	-54	Pass
NVNT	802.11g	2412	118 MHz -174 MHz	159.95	-57.69	NA	-36	Pass
NVNT	802.11g	2412	174 MHz -230 MHz	184.6	-65.24	NA	-54	Pass
NVNT	802.11g	2412	230 MHz -470 MHz	320	-63.39	NA	-36	Pass
NVNT	802.11g	2412	470 MHz -862 MHz	516.3	-64.27	NA	-54	Pass
NVNT	802.11g	2412	862 MHz -1000 MHz	907.8	-64.35	NA	-36	Pass
NVNT	802.11g	2412	1000 MHz -2360 MHz	2357	-47.54	NA	-30	Pass
NVNT	802.11g	2412	2523.5 MHz -12750 MHz	4829	-44.17	NA	-30	Pass
NVNT	802.11g	2442	30 MHz -47 MHz	33.1	-60.8	NA	-36	Pass
NVNT	802.11g	2442	47 MHz -74 MHz	47.75	-64.85	NA	-54	Pass
NVNT	802.11g	2442	74 MHz -87.5 MHz	77.9	-65.78	NA	-36	Pass
NVNT	802.11g	2442	87.5 MHz -118 MHz	111.05	-65.68	NA	-54	Pass
NVNT	802.11g	2442	118 MHz -174 MHz	160	-58.64	NA	-36	Pass
NVNT	802.11g	2442	174 MHz -230 MHz	175.95	-64.95	NA	-54	Pass
NVNT	802.11g	2442	230 MHz -470 MHz	320	-62.59	NA	-36	Pass
NVNT	802.11g	2442	470 MHz -862 MHz	487.15	-64.93	NA	-54	Pass
NVNT	802.11g	2442	862 MHz -1000 MHz	998.5	-63.96	NA	-36	Pass
NVNT	802.11g	2442	1000 MHz -2360 MHz	2358.5	-48.95	NA	-30	Pass
NVNT	802.11g	2442	2523.5 MHz -12750 MHz	6957.5	-45.2	NA	-30	Pass
NVNT	802.11g	2472	30 MHz -47 MHz	31.1	-63.93	NA	-36	Pass
NVNT	802.11g	2472	47 MHz -74 MHz	48.7	-66.29	NA	-54	Pass
NVNT	802.11g	2472	74 MHz -87.5 MHz	83.25	-67.32	NA	-36	Pass
NVNT	802.11g	2472	87.5 MHz -118 MHz	90.8	-66.54	NA	-54	Pass
NVNT	802.11g	2472	118 MHz -174 MHz	160	-57.74	NA	-36	Pass
NVNT	802.11g	2472	174 MHz -230 MHz	208.45	-65.06	NA	-54	Pass
NVNT	802.11g	2472	230 MHz -470 MHz	320	-63.04	NA	-36	Pass
NVNT	802.11g	2472	470 MHz -862 MHz	645.7	-64.21	NA	-54	Pass
NVNT	802.11g	2472	862 MHz -1000 MHz	886.85	-63.89	NA	-36	Pass
NVNT	802.11g	2472	1000 MHz -2360 MHz	2300.5	-51.93	NA	-30	Pass
NVNT	802.11g	2472	2523.5 MHz -12750 MHz	6864.5	-45.07	NA	-30	Pass
NVNT	802.11n(HT20)	2412	30 MHz -47 MHz	32.45	-65.71	NA	-36	Pass
NVNT	802.11n(HT20)	2412	47 MHz -74 MHz	51.95	-65.76	NA	-54	Pass

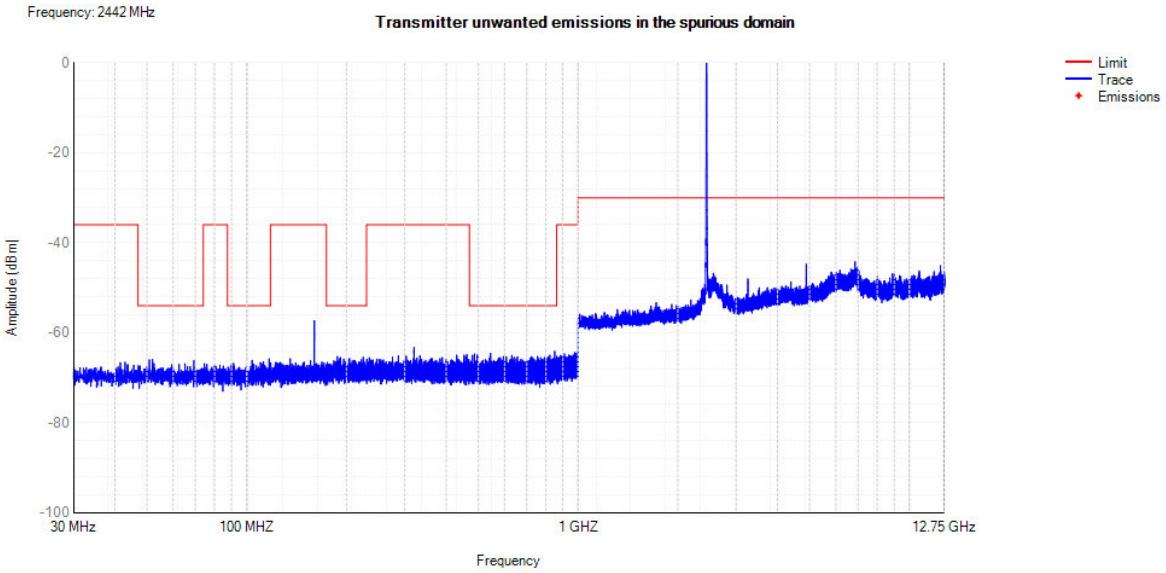
NVNT	802.11n(HT20)	2412	74 MHz -87.5 MHz	82.8	-66.83	NA	-36	Pass
NVNT	802.11n(HT20)	2412	87.5 MHz -118 MHz	103.3	-66.39	NA	-54	Pass
NVNT	802.11n(HT20)	2412	118 MHz -174 MHz	160	-58.23	NA	-36	Pass
NVNT	802.11n(HT20)	2412	174 MHz -230 MHz	199.8	-65.13	NA	-54	Pass
NVNT	802.11n(HT20)	2412	230 MHz -470 MHz	320	-62.56	NA	-36	Pass
NVNT	802.11n(HT20)	2412	470 MHz -862 MHz	654.45	-63.85	NA	-54	Pass
NVNT	802.11n(HT20)	2412	862 MHz -1000 MHz	928.65	-63.84	NA	-36	Pass
NVNT	802.11n(HT20)	2412	1000 MHz -2360 MHz	2359	-46.6	NA	-30	Pass
NVNT	802.11n(HT20)	2412	2523.5 MHz -12750 MHz	4827.5	-43.03	NA	-30	Pass
NVNT	802.11n(HT20)	2442	30 MHz -47 MHz	30.25	-61.15	NA	-36	Pass
NVNT	802.11n(HT20)	2442	47 MHz -74 MHz	47.75	-64.92	NA	-54	Pass
NVNT	802.11n(HT20)	2442	74 MHz -87.5 MHz	83.35	-66.77	NA	-36	Pass
NVNT	802.11n(HT20)	2442	87.5 MHz -118 MHz	113.65	-66.09	NA	-54	Pass
NVNT	802.11n(HT20)	2442	118 MHz -174 MHz	159.95	-57.32	NA	-36	Pass
NVNT	802.11n(HT20)	2442	174 MHz -230 MHz	192.3	-65.51	NA	-54	Pass
NVNT	802.11n(HT20)	2442	230 MHz -470 MHz	320	-62.81	NA	-36	Pass
NVNT	802.11n(HT20)	2442	470 MHz -862 MHz	479.95	-64.35	NA	-54	Pass
NVNT	802.11n(HT20)	2442	862 MHz -1000 MHz	984.1	-64.48	NA	-36	Pass
NVNT	802.11n(HT20)	2442	1000 MHz -2360 MHz	2342	-50.69	NA	-30	Pass
NVNT	802.11n(HT20)	2442	2523.5 MHz -12750 MHz	6999	-45	NA	-30	Pass
NVNT	802.11n(HT20)	2472	30 MHz -47 MHz	37.2	-64.74	NA	-36	Pass
NVNT	802.11n(HT20)	2472	47 MHz -74 MHz	57	-66.4	NA	-54	Pass
NVNT	802.11n(HT20)	2472	74 MHz -87.5 MHz	87.3	-66.26	NA	-36	Pass
NVNT	802.11n(HT20)	2472	87.5 MHz -118 MHz	104.4	-66.04	NA	-54	Pass
NVNT	802.11n(HT20)	2472	118 MHz -174 MHz	159.95	-57.57	NA	-36	Pass
NVNT	802.11n(HT20)	2472	174 MHz -230 MHz	192.15	-64.34	NA	-54	Pass

NVNT	802.11n(HT20)	2472	230 MHz -470 MHz	320	-61.92	NA	-36	Pass
NVNT	802.11n(HT20)	2472	470 MHz -862 MHz	635.75	-64.88	NA	-54	Pass
NVNT	802.11n(HT20)	2472	862 MHz -1000 MHz	929.9	-63.86	NA	-36	Pass
NVNT	802.11n(HT20)	2472	1000 MHz -2360 MHz	2359.5	-51.39	NA	-30	Pass
NVNT	802.11n(HT20)	2472	2523.5 MHz -12750 MHz	12400	-45.06	NA	-30	Pass

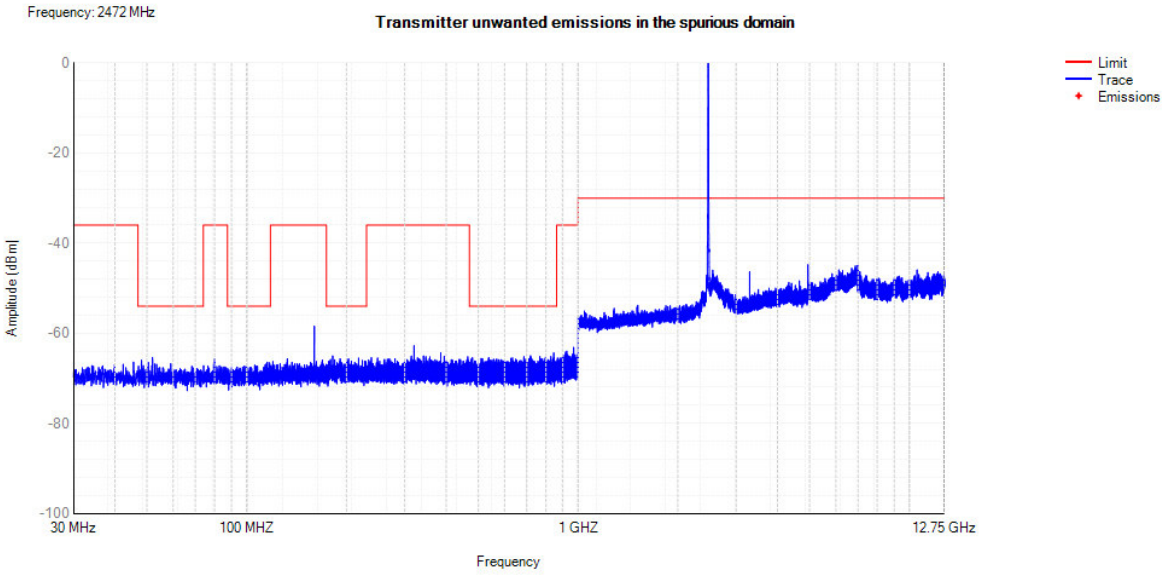
Tx. Spurious NVNT 802.11b 2412MHz



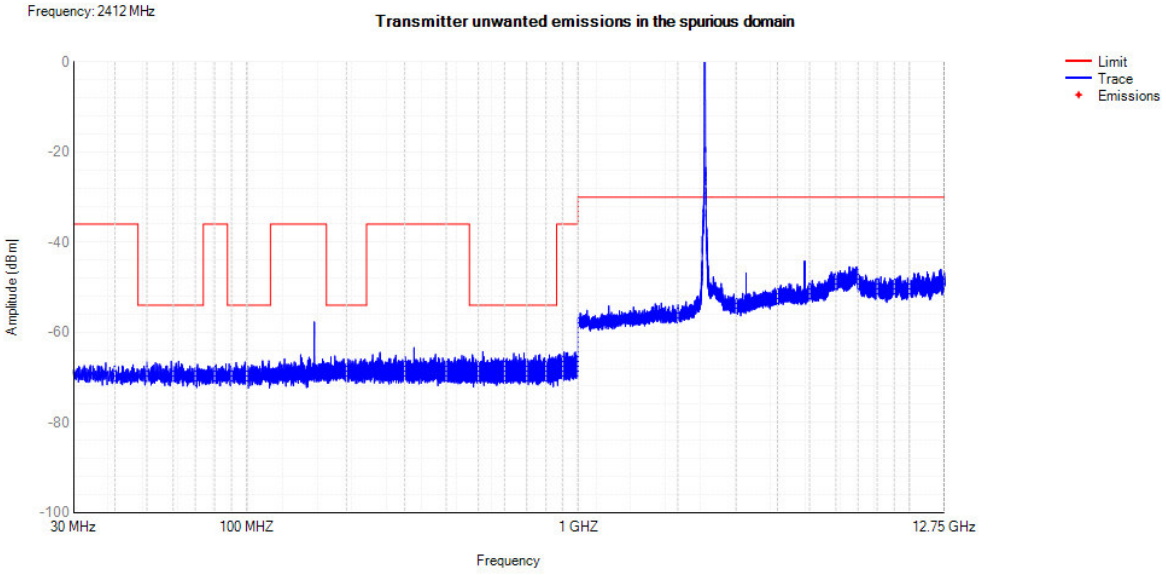
Tx. Spurious NVNT 802.11b 2442MHz



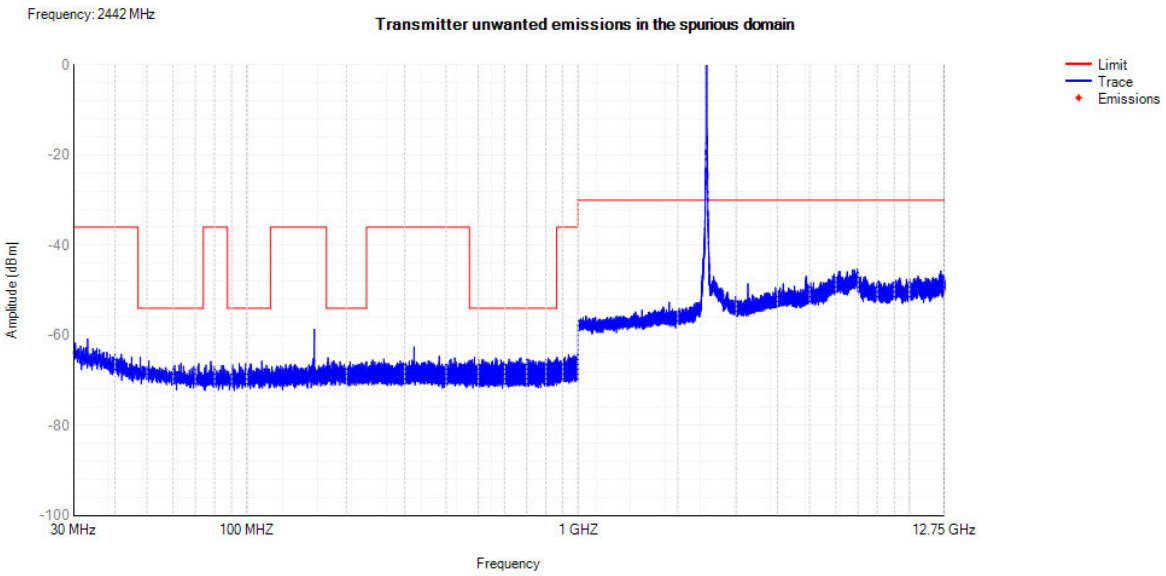
Tx. Spurious NVNT 802.11b 2472MHz



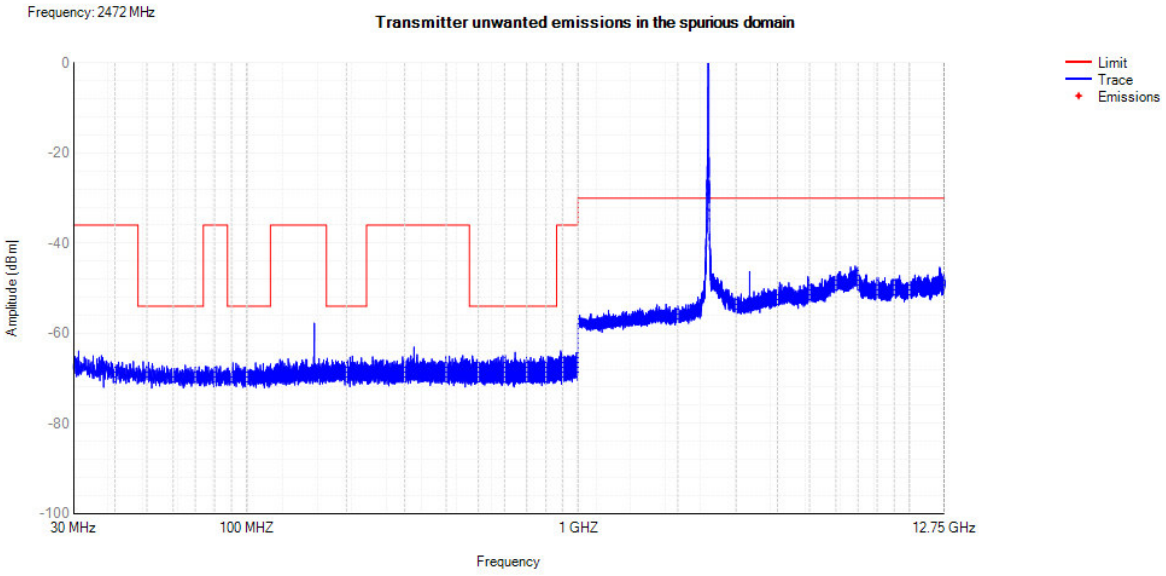
Tx. Spurious NVNT 802.11g 2412MHz



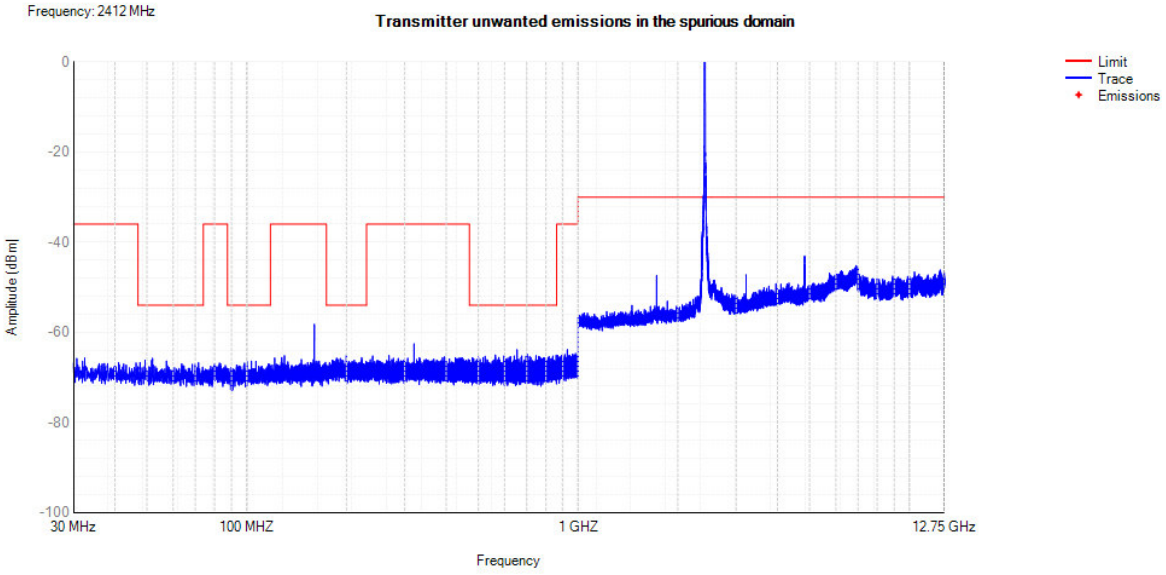
Tx. Spurious NVNT 802.11g 2442MHz



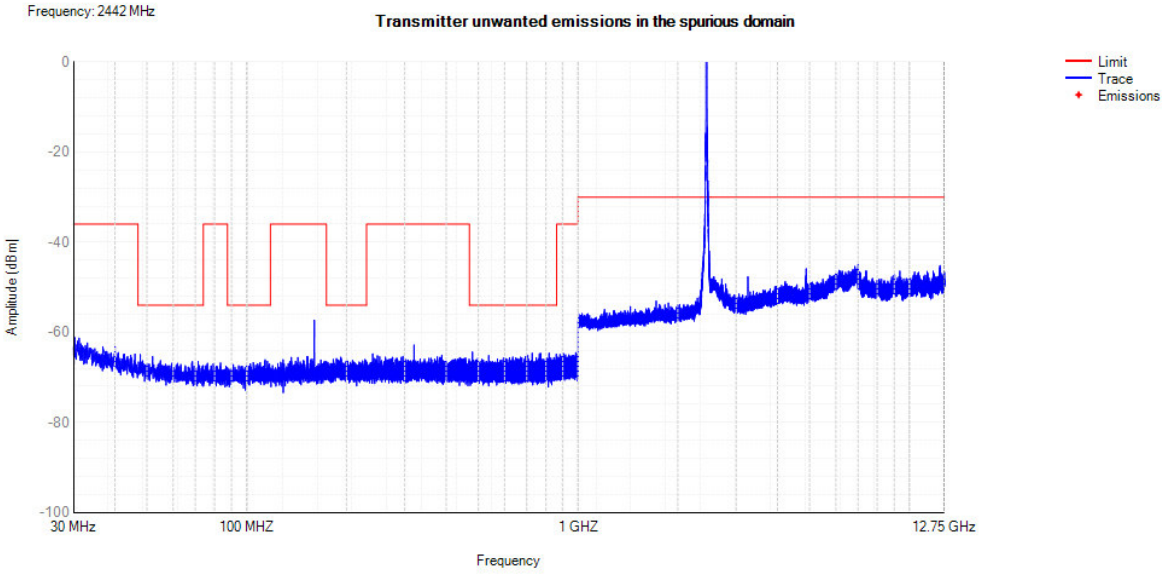
Tx. Spurious NVNT 802.11g 2472MHz



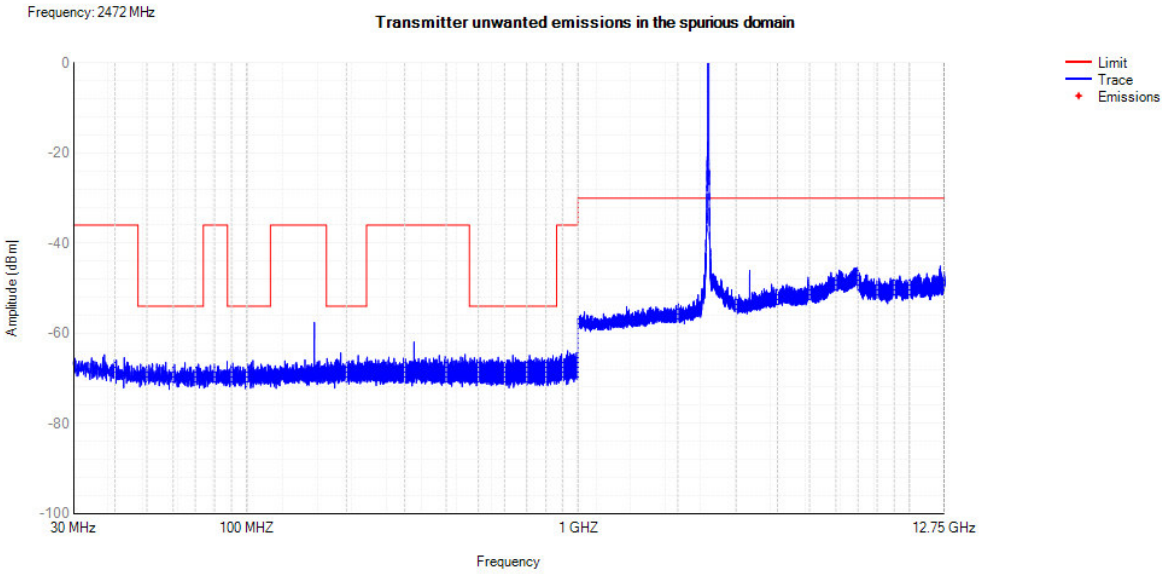
Tx. Spurious NVNT 802.11n(HT20) 2412MHz



Tx. Spurious NVNT 802.11n(HT20) 2442MHz



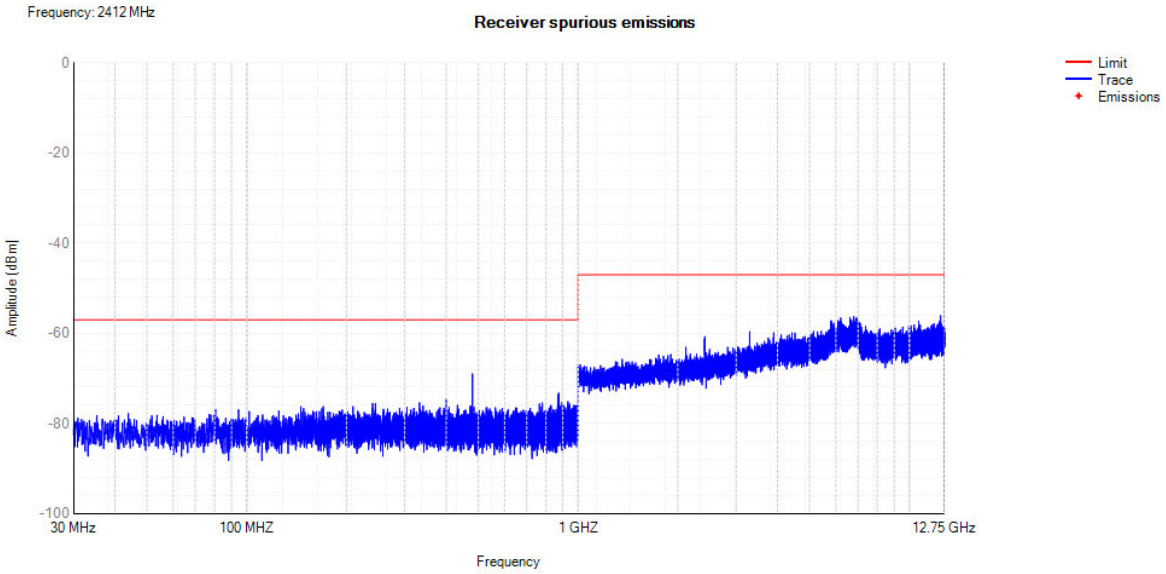
Tx. Spurious NVNT 802.11n(HT20) 2472MHz



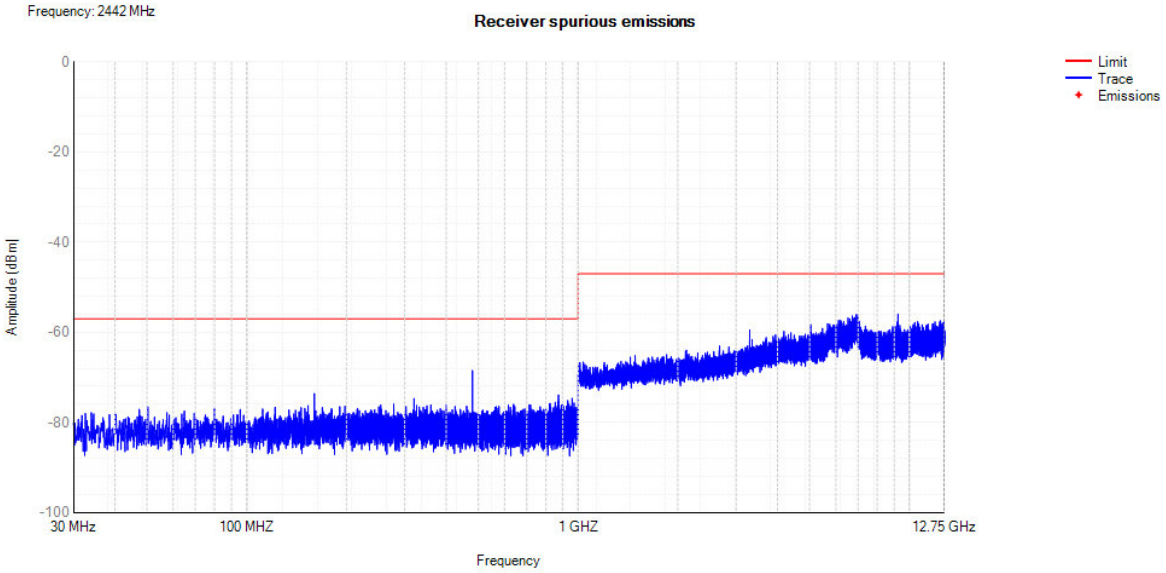
4.6 Receiver spurious emissions

Condition	Mode	Frequency (MHz)	Range	Spur Freq (MHz)	Spur Level Peak(dBm)	Spur Level RMS(dBm)	Limit (dBm)	Verdict
NVNT	802.11b	2412	30 MHz -1000 MHz	480	-68.99	NA	-57	Pass
NVNT	802.11b	2412	1000 MHz -12750 MHz	12416.5	-56.08	NA	-47	Pass
NVNT	802.11b	2442	30 MHz -1000 MHz	480	-68.49	NA	-57	Pass
NVNT	802.11b	2442	1000 MHz -12750 MHz	9244.5	-55.95	NA	-47	Pass
NVNT	802.11b	2472	30 MHz -1000 MHz	480	-68.81	NA	-57	Pass
NVNT	802.11b	2472	1000 MHz -12750 MHz	6700.5	-56.23	NA	-47	Pass
NVNT	802.11g	2412	30 MHz -1000 MHz	480	-67.89	NA	-57	Pass
NVNT	802.11g	2412	1000 MHz -12750 MHz	12436	-55.77	NA	-47	Pass
NVNT	802.11g	2442	30 MHz -1000 MHz	480	-69.11	NA	-57	Pass
NVNT	802.11g	2442	1000 MHz -12750 MHz	6951	-55.93	NA	-47	Pass
NVNT	802.11g	2472	30 MHz -1000 MHz	480	-67.09	NA	-57	Pass
NVNT	802.11g	2472	1000 MHz -12750 MHz	6754	-56.74	NA	-47	Pass
NVNT	802.11n(HT20)	2412	30 MHz -1000 MHz	480	-68.69	NA	-57	Pass
NVNT	802.11n(HT20)	2412	1000 MHz -12750 MHz	6704	-55.75	NA	-47	Pass
NVNT	802.11n(HT20)	2442	30 MHz -1000 MHz	480	-68.29	NA	-57	Pass
NVNT	802.11n(HT20)	2442	1000 MHz -12750 MHz	6839	-56.46	NA	-47	Pass
NVNT	802.11n(HT20)	2472	30 MHz -1000 MHz	480	-68.52	NA	-57	Pass
NVNT	802.11n(HT20)	2472	1000 MHz -12750 MHz	6850	-57.84	NA	-47	Pass

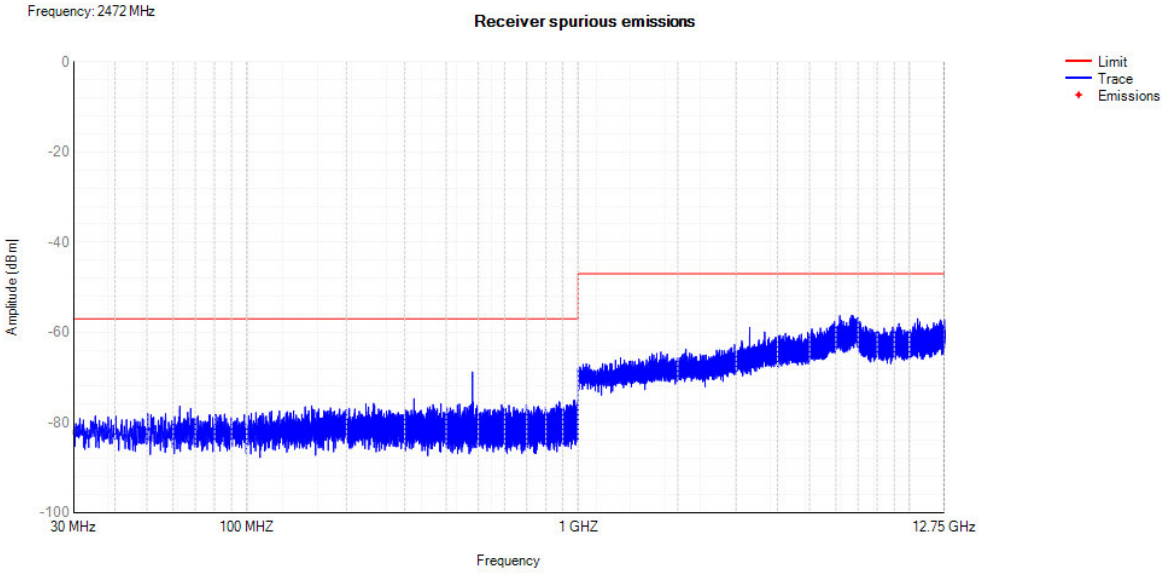
Rx. Spurious NVNT 802.11b 2412MHz



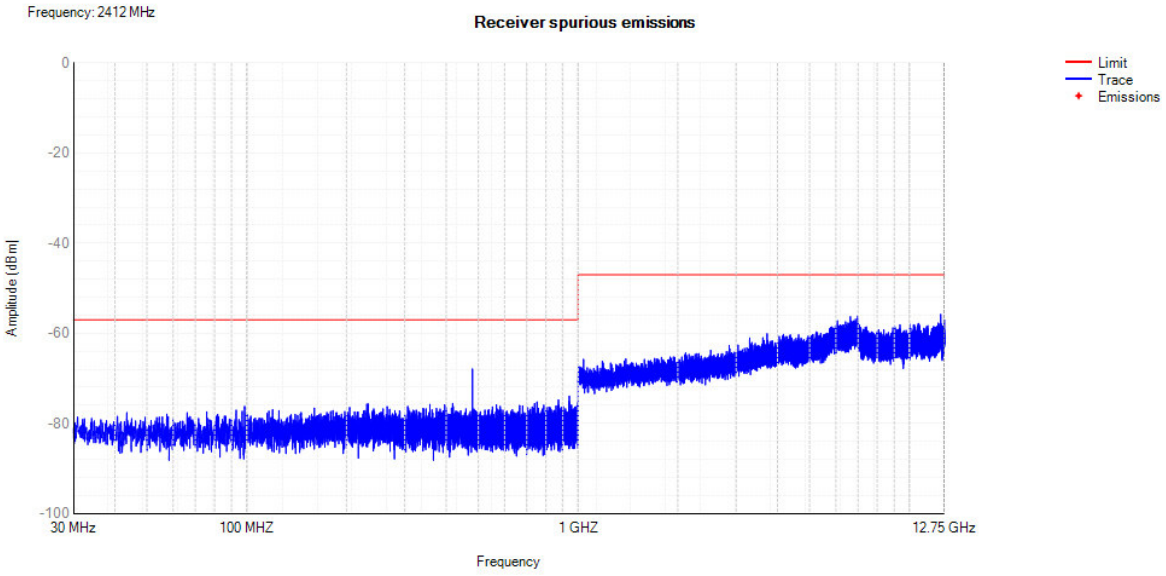
Rx. Spurious NVNT 802.11b 2442MHz



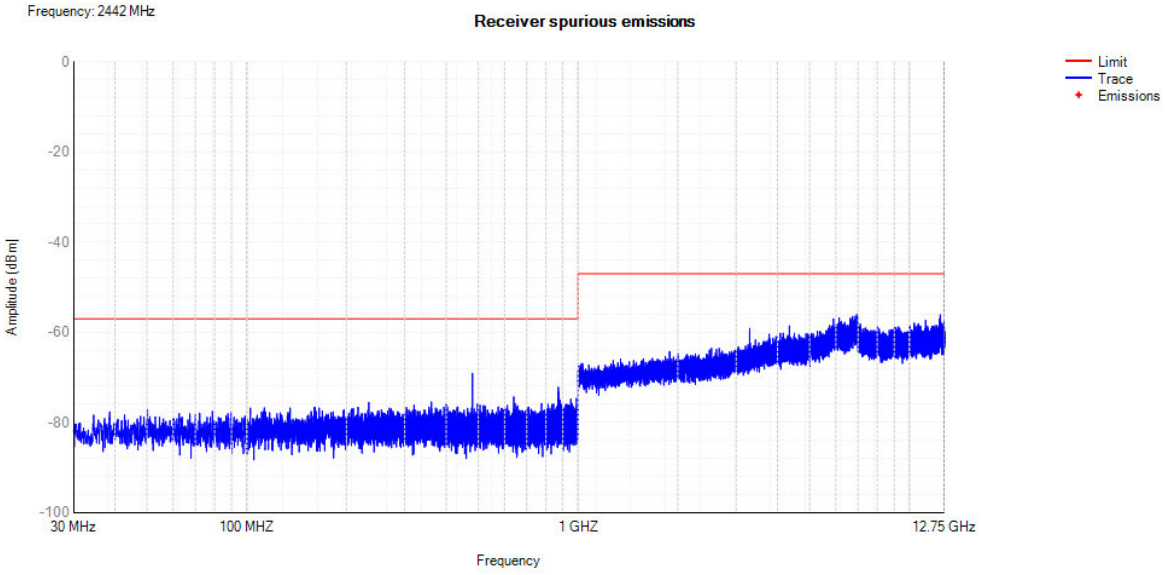
Rx. Spurious NVNT 802.11b 2472MHz



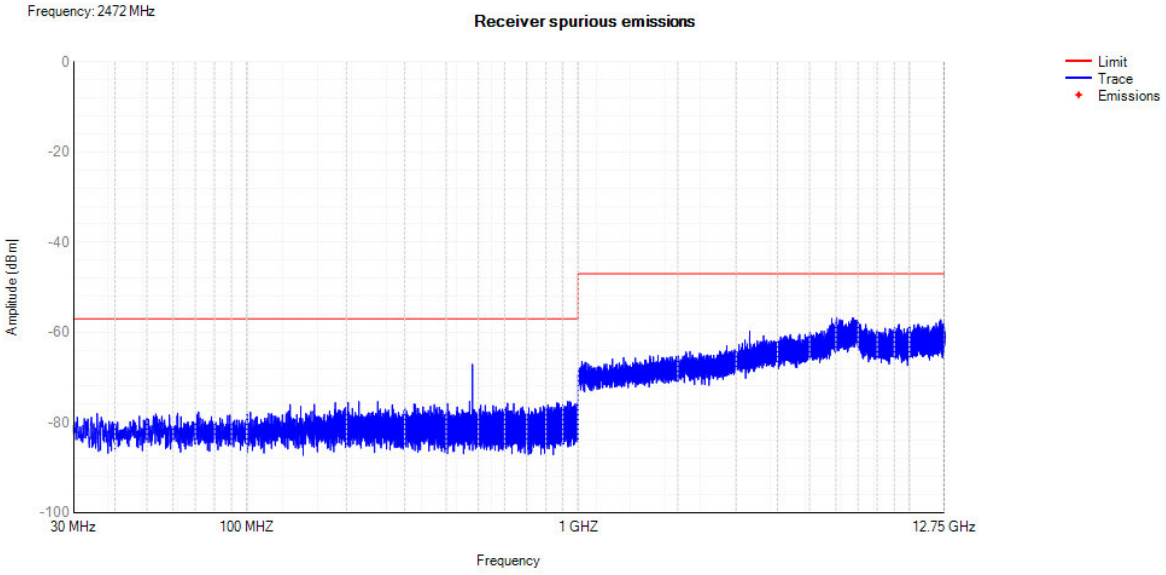
Rx. Spurious NVNT 802.11g 2412MHz



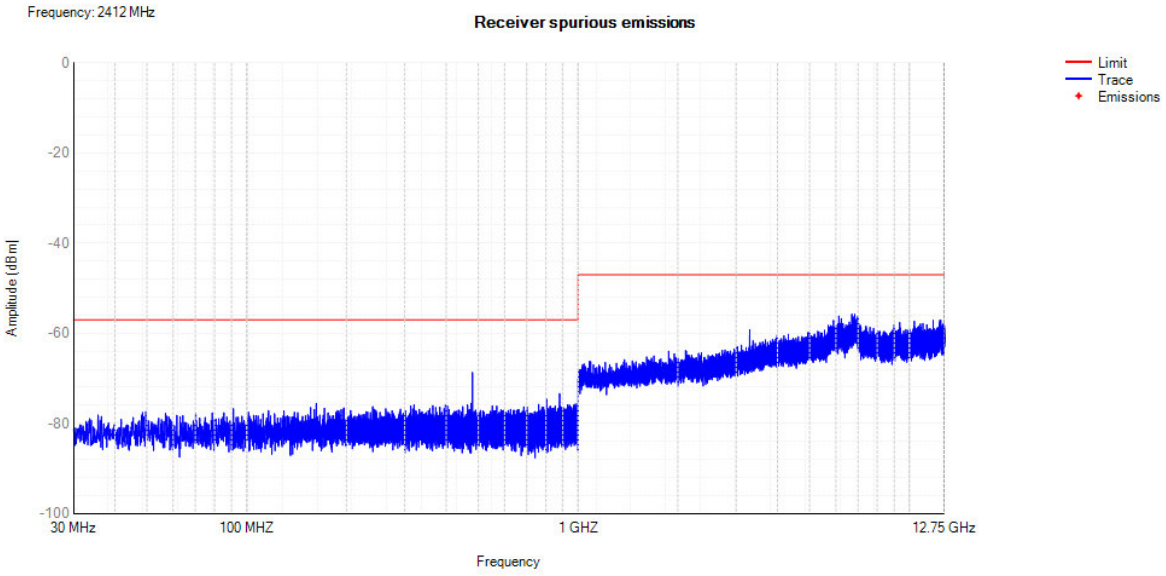
Rx. Spurious NVNT 802.11g 2442MHz



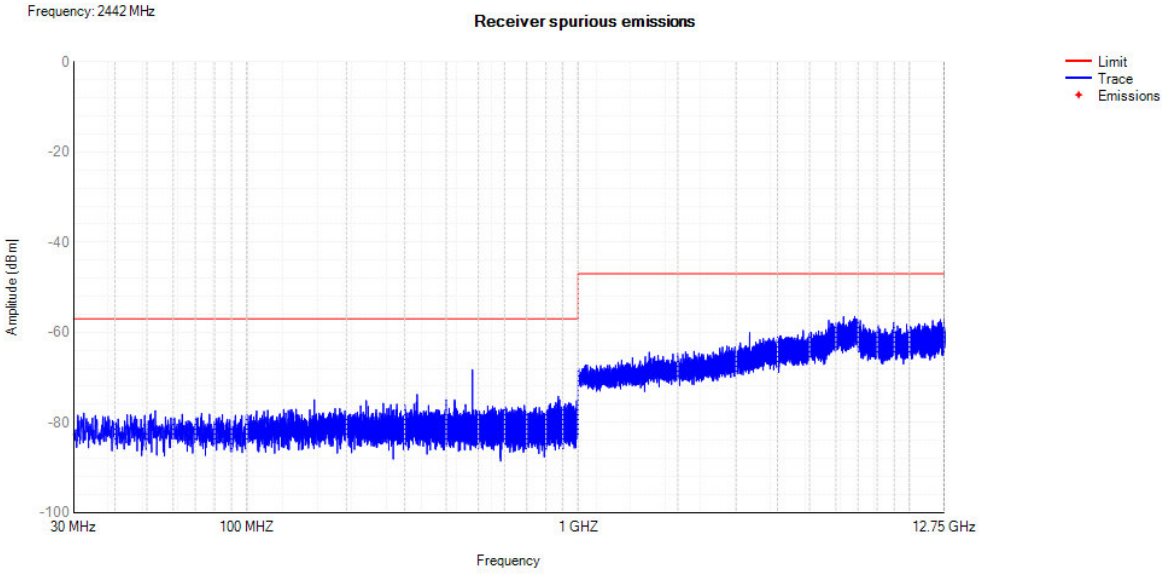
Rx. Spurious NVNT 802.11g 2472MHz



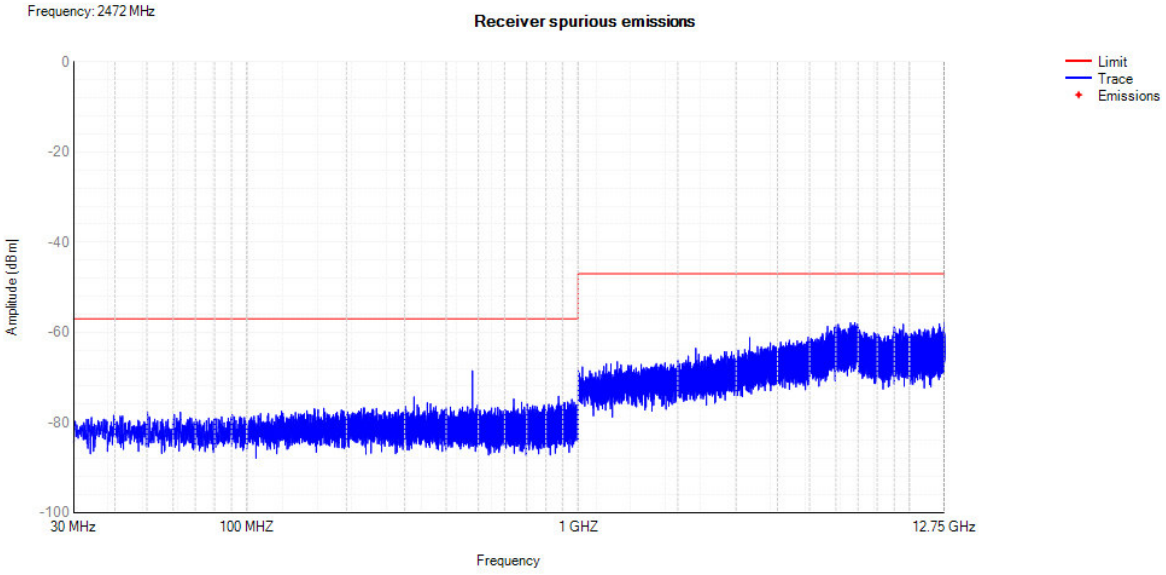
Rx. Spurious NVNT 802.11n(HT20) 2412MHz



Rx. Spurious NVNT 802.11n(HT20) 2442MHz



Rx. Spurious NVNT 802.11n(HT20) 2472MHz



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

SPURIOUS EMISSIONS MEASUREMENT PHOTOS

TEST REPORT

Report No.:	STS190920002001E
Product:	Smart Humidity & Temperature Sensor
Model No.:	ShellyH&T, SHHT-v1
Applicant:	Allterco Robotics
Address:	1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria
Issued by:	Shenzhen NTEK Testing Technology Co., Ltd.
Lab Location:	1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China
Tel：	+86-755-6115 6588 Fax: +86-755-6115 6599

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

Report Number..... :	STS190920002001E
Tested by (name + signature)..... :	Keny Fu
Approved by (name + signature) ..... :	Coco Li
Date of issue..... :	2020-04-14
Testing Laboratory.....	Shenzhen NTEK Testing Technology Co., Ltd.
Address.....	1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen 518126 P.R. China
Applicant's name ..... :	Allterco Robotics
Address..... :	1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria
Test specification:	
Standard ..... :	☐IEC 62368-1:2014 (Second Edition) ☒ EN 62368-1:2014+A11:2017
Test procedure..... :	CE Scheme
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62368_1B
Test Report Form(s) Originator ..... :	UL(US)
Master TRF..... :	2014-03

Test Item description	Smart Humidity & Temperature Sensor
Trade Mark	Shelly®
Manufacturer.....	Allterco Robotics
Manufacturer address.....	1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria
Model/Type reference	ShellyH&T, SHHT-v1
Ratings	5V⎓0.5A or DC3V, supplied by a CR123A Li-MnO2 battery

TEST ITEM PARTICULARS:	
Classification of use by ..... :	☒ Ordinary person ☐ Instructed person ☐ Skilled person ☒ Children likely to be present
Supply Connection..... :	☐ AC Mains ☐ DC Mains ☒ External Circuit - not Mains connected - ☒ ES1 ☐ ES2 ☐ ES3
Supply % Tolerance ..... :	☐ +10%/-10% ☐ +20%/-15% ☐ +25%/-15% ☒ None
Supply Connection – Type ..... :	☐ pluggable equipment type A - ☐ non-detachable supply cord ☐ appliance coupler ☐ direct plug-in ☐ mating connector ☐ pluggable equipment type B - ☐ non-detachable supply cord ☐ appliance coupler ☐ permanent connection ☐ mating connector ☒ other: Micro USB or Li-MnO2 battery
Considered current rating of protective device as part of building or equipment installation .....:	N/A (Not directly connected to mains) Installation location: ☐ building; ☐ equipment
Equipment mobility .....:	☒ movable ☐ hand-held ☒ transportable ☐ stationary ☐ for building-in ☐ direct plug-in ☐ rack-mounting ☐ wall-mounted
Over voltage category (OVC) .....:	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other: (Not directly connected to mains)
Class of equipment .....:	☐ Class I ☐ Class II ☒ Class III
Access location .....:	☐ restricted access location ☒ N/A
Pollution degree (PD) .....:	☐ PD 1 ☒ PD 2 ☐ PD 3
Manufacturer's specified maxium operating ambient:	40 °C
IP protection class .....:	☒ IP20 ☐ IP___
Power Systems .....:	☐ TN ☐ TT ☐ IT - 230 V $_{L-L}$
Altitude during operation (m) .....:	☒ 2000 m or less ☐ ____ m
Altitude of test laboratory (m) .....:	☒ 2000 m or less ☐ ____ m
Mass of equipment (kg) .....:	☒ approx. 0.035kg

POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement ..... :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)
TESTING:	
Date of receipt of test item..... :	2019-09-24
Date (s) of performance of tests..... :	2019-09-24 to 2019-10-12
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.**	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... :	☐ **Yes** ☒**Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) ..... :	Same as manufacturer
GENERAL PRODUCT INFORMATION:	
Product Description – -The product is a Smart Humidity & Temperature Sensor, there two kind of PCB board used for equipment: one supplied by a CR123A Li-MnO2 battery only; The other one supplied by 5V via micro USB only. -The maximum operating temperature is 40°C.	
Model Differences – Designation model is different only. All models are the same only except the model names.	
Additional application considerations – (Considerations used to test a component or sub-assembly) – - N/A	

Copy of marking plate:

Smart Humidity & Temperature Sensor

Model: ShellyH&T

Manufatuer: Allterco Robotics

Add.:
1407 Sofia, Bulgaria, 103 Cherni Vrah Blvd, Bulgaria

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

Indicate which energy sources are included in the energy source diagram. Insert diagram below
☒ ES ☒ PS ☒ MS ☒ TS ☒ RS Remark: N/A

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 person, Skilled person	ES1: Internal circuits ES1: Input USB port ES1: Battery output	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
Internal combustible material/ internal plastic enclosure	PS1: Internal circuits PS1: Battery output	1, No ignition occurred. 2, No parts exceeding 90% of its spontaneous ignition temperature.	N/A	N/A
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
Battery pack	Complied with annex M	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 person, Skilled person	MS1: Sharp edges and corners of accessible parts	N/A	N/A	N/A
Ordinary person, Skilled person	MS1: Product mass	N/A	N/A	N/A
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary person, Skilled person	TS1: Accessible parts	N/A	N/A	N/A
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced

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.

IEC/EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	**GENERAL REQUIREMENTS**		**P**
4.1.1	Acceptance of materials, components and subassemblies		P
4.1.2	Use of components	(See appended table 4.1.2)	P
4.1.3	Equipment design and construction		P
4.1.15	Markings and instructions.....:	(See Annex F)	P
4.4.4	Safeguard robustness		P
4.4.4.2	Steady force tests.....:	(See Annex T.4)	P
4.4.4.3	Drop tests .....:	(See Annex T.7)	P
4.4.4.4	Impact tests .....:		N/A
4.4.4.5	Internal accessible safeguard enclosure and barrier tests.....:	No such enclosure and barrier	N/A
4.4.4.6	Glass Impact tests.....:	Surface area not exceeding 0.1m^2	N/A
4.4.4.7	Thermoplastic material tests .....:		N/A
4.4.4.8	Air comprising a safeguard.....:	Considered, but no such barrier or enclosure provided	N/A
4.4.4.9	Accessibility and safeguard effectiveness	All safeguards remain effective	P
4.5	Explosion		P
4.6	Fixing of conductors		P
4.6.1	Fix conductors not to defeat a safeguard		P
4.6.2	10 N force test applied to .....:		P
4.7	Equipment for direct insertion into mains socket - outlets	No such apparatus	N/A
4.7.2	Mains plug part complies with the relevant standard.....:		N/A
4.7.3	Torque (Nm) .....:		N/A
4.8	Products containing coin/button cell batteries	No coin/button cell batteries used	N/A
4.8.2	Instructional safeguard		N/A
4.8.3	Battery Compartment Construction		N/A
	Means to reduce the possibility of children removing the battery.....:		—
4.8.4	Battery Compartment Mechanical Tests .....:		N/A
4.8.5	Battery Accessibility		N/A
4.9	Likelihood of fire or shock due to entry of conductive object.....:	(See Annex P)	P

IEC/EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5	**ELECTRICALLY-CAUSED INJURY**		**P**
5.2.1	Electrical energy source classifications..... :	(See appended table 5.2)	P
5.2.2	ES1, ES2 and ES3 limits		P
5.2.2.2	Steady-state voltage and current..... :	(See appended table 5.2)	P
5.2.2.3	Capacitance limits ..... :		N/A
5.2.2.4	Single pulse limits ..... :	No single pulse introduced	N/A
5.2.2.5	Limits for repetitive pulses ..... :	No repetitive pulses introduced	N/A
5.2.2.6	Ringing signals ..... :	No means for connection to telephone network and no ringing signal generated	N/A
5.2.2.7	Audio signals ..... :		N/A
5.3	Protection against electrical energy sources	All internal circuits considered ES1	N/A
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
5.3.2.2	Contact requirements		N/A
	a) Test with test probe from Annex V..... :		N/A
	b) Electric strength test potential (V) ..... :		N/A
	c) Air gap (mm) ..... :		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
5.4	Insulation materials and requirements		P
5.4.1.2	Properties of insulating material		P
5.4.1.3	Humidity conditioning ..... :		N/A
5.4.1.4	Maximum operating temperature for insulating materials ..... :		P
5.4.1.5	Pollution degree ..... :		—
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling		N/A
5.4.1.6	Insulation in transformers with varying dimensions		N/A
5.4.1.7	Insulation in circuits generating starting pulses		N/A
5.4.1.8	Determination of working voltage		N/A
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat softening temperature..... :		N/A

IEC/EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4.1.10.3	Ball pressure ..... :		N/A
5.4.2	Clearances		N/A
5.4.2.2	Determining clearance using peak working voltage		N/A
5.4.2.3	Determining clearance using required withstand voltage ..... :		N/A
	a) a.c. mains transient voltage ..... :		—
	b) d.c. mains transient voltage ..... :		—
	c) external circuit transient voltage ..... :		—
	d) transient voltage determined by measurement:		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test		N/A
5.4.2.5	Multiplication factors for clearances and test voltages ..... :		N/A
5.4.3	Creepage distances ..... :		N/A
5.4.3.1	General		N/A
5.4.3.3	Material Group ..... :		—
5.4.4	Solid insulation		N/A
5.4.4.2	Minimum distance through insulation ..... :		N/A
5.4.4.3	Insulation compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs) ..... :		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material ..... :		N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz ..... :		N/A
5.4.5	Antenna terminal insulation	Class III	N/A
5.4.5.1	General		N/A
5.4.5.2	Voltage surge test		N/A
	Insulation resistance (MΩ)..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
5.4.6	Insulation of internal wire as part of supplementary safeguard.....:		N/A
5.4.7	Tests for semiconductor components and for cemented joints		N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%).....:		—
	Temperature (°C) .....:		—
	Duration (h) .....:		—
5.4.9	Electric strength test.....:		N/A
5.4.9.1	Test procedure for a solid insulation type test		N/A
5.4.9.2	Test procedure for routine tests		N/A
5.4.10	Protection against transient voltages between external circuit	No transient voltage from external circuit	N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test .....:		N/A
5.4.10.2.3	Steady-state test.....:		N/A
5.4.11	Insulation between external circuits and earthed circuitry .....:	No such external circuit	N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	Rated operating voltage U_{op} (V).....:		—
	Nominal voltage U_{peak} (V).....:		—
	Max increase due to variation U_{sp} .....:		—
	Max increase due to ageing ΔU_{sa} .....:		—
	$U_{op} = U_{peak} + \Delta U_{sp} + \Delta U_{sa}$ .....:		—
5.5	Components as safeguards		
5.5.1	General		N/A
5.5.2	Capacitors and RC units		N/A
5.5.2.1	General requirement		N/A
5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector.....:		N/A
5.5.3	Transformers		N/A
5.5.4	Optocouplers		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
5.5.5	Relays		N/A
5.5.6	Resistors		N/A
5.5.7	SPD's		N/A
5.5.7.1	Use of an SPD connected to reliable earthing		N/A
5.5.7.2	Use of an SPD between mains and protective earth		N/A
5.5.8	Insulation between the mains and external circuit consisting of a coaxial cable.....:		N/A
5.6	Protective conductor		N/A
5.6.2	Requirement for protective conductors		N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm^2) .....:		—
5.6.4	Requirement for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm^2). .....:		—
5.6.4.2	Protective current rating (A) .....:		—
5.6.4.3	Current limiting and overcurrent protective devices		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Requirement		N/A
	Conductor size (mm^2), nominal thread diameter (mm). .....:		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method Resistance (Ω).....:		N/A
5.6.7	Reliable earthing		N/A
5.7	Prospective touch voltage, touch current and protective conductor current		N/A
5.7.2	Measuring devices and networks		N/A
5.7.2.1	Measurement of touch current .....:		N/A
5.7.2.2	Measurement of prospective touch voltage		N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	System of interconnected equipment (separate connections/single connection) .....:		—
	Multiple connections to mains (one connection at a time/simultaneous connections) .....:		—
5.7.4	Earthed conductive accessible parts.....:		N/A
5.7.5	Protective conductor current		N/A
	Supply Voltage (V).....:		—
	Measured current (mA).....:		—
	Instructional Safeguard.....:		N/A
5.7.6	Prospective touch voltage and touch current due to external circuits		N/A
5.7.6.1	Touch current from coaxial cables		N/A
5.7.6.2	Prospective touch voltage and touch current from external circuits		N/A
5.7.7	Summation of touch currents from external circuits	No such external circuits	N/A
	a) Equipment with earthed external circuits Measured current (mA).....:		N/A
	b) Equipment whose external circuits are not referenced to earth. Measured current (mA) .....:		N/A

6	**ELECTRICALLY- CAUSED FIRE**		**P**
6.2	Classification of power sources (PS) and potential ignition sources (PIS)		P
6.2.2	Power source circuit classifications		P
6.2.2.1	General		P
6.2.2.2	Power measurement for worst-case load fault ... :	(See appended table 6.2.2)	P
6.2.2.3	Power measurement for worst-case power source fault ..... :		N/A
6.2.2.4	PS1 .....:	(See appended table 6.2.2)	P
6.2.2.5	PS2 ..... :		N/A
6.2.2.6	PS3 .....:		N/A
6.2.3	Classification of potential ignition sources		P
6.2.3.1	Arcing PIS ..... :		N/A
6.2.3.2	Resistive PIS ..... :		N/A
6.3	Safeguards against fire under normal operating and abnormal operating conditions		P
6.3.1 (a)	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials ..... :	(See appended table 5.4.1.5, 6.3.2, 9.0, B.2.6)	P

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Clause	Requirement + Test	Result - Remark	Verdict
6.3.1 (b)	Combustible materials outside fire enclosure		N/A
6.4	Safeguards against fire under single fault conditions		P
6.4.1	Safeguard Method	Method of control fire spread used	P
6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		N/A
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	General		N/A
6.4.3.2	Supplementary Safeguards		N/A
	Special conditions if conductors on printed boards are opened or peeled		N/A
6.4.3.3	Single Fault Conditions ..... :		N/A
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits		P
6.4.5	Control of fire spread in PS2 circuits		N/A
6.4.5.2	Supplementary safeguards ..... :		N/A
6.4.6	Control of fire spread in PS3 circuit		N/A
6.4.7	Separation of combustible materials from a PIS		N/A
6.4.7.1	General ..... :		N/A
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers		N/A
6.4.8.1	Fire enclosure and fire barrier material properties		N/A
6.4.8.2.1	Requirements for a fire barrier		N/A
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		N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top Openings in Fire Enclosure: dimensions (mm) ..... :		N/A
	Needle Flame test		N/A
6.4.8.3.4	Bottom Openings in Fire Enclosure, condition met a), b) and/or c) dimensions (mm) ..... :		N/A
	Flammability tests for the bottom of a fire enclosure ..... :		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.4.8.3.5	Integrity of the fire enclosure, condition met: a), b) or c) .....:		N/A
6.4.8.4	Separation of PIS from fire enclosure and fire barrier distance (mm) or flammability rating.....:		N/A
6.5	Internal and external wiring		N/A
6.5.1	Requirements	PS1 only	N/A
6.5.2	Cross-sectional area (mm^2) .....:		—
6.5.3	Requirements for interconnection to building wiring .....:		N/A
6.6	Safeguards against fire due to connection to additional equipment		N/A
	External port limited to PS2 or complies with Clause Q.1		N/A
7	**INJURY CAUSED BY HAZARDOUS SUBSTANCES**		**P**
7.2	Reduction of exposure to hazardous substances	No such hazardous substances	N/A
7.3	Ozone exposure	No ozone production	N/A
7.4	Use of personal safeguards (PPE)		N/A
	Personal safeguards and instructions ..... :		—
7.5	Use of instructional safeguards and instructions		N/A
	Instructional safeguard (ISO 7010) .....:		—
7.6	Batteries .....:	(See appended tables Annex M)	P
8	**MECHANICALLY-CAUSED INJURY**		**P**
8.1	General		P
8.2	Mechanical energy source classifications		P
8.3	Safeguards against mechanical energy sources		P
8.4	Safeguards against parts with sharp edges and corners		P
8.4.1	Safeguards	MS1 classification	N/A
8.5	Safeguards against moving parts		N/A
8.5.1	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
8.5.2	Instructional Safeguard..... :		—
8.5.4	Special categories of equipment comprising moving parts		N/A
8.5.4.1	Large data storage equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.5.4.2	Equipment having electromechanical device for destruction of media		N/A
8.5.4.2.1	Safeguards and Safety Interlocks .....:		N/A
8.5.4.2.2	Instructional safeguards against moving parts		N/A
	Instructional Safeguard.....:		—
8.5.4.2.3	Disconnection from the supply		N/A
8.5.4.2.4	Probe type and force (N) .....:		N/A
8.5.5	High Pressure Lamps		N/A
8.5.5.1	Energy Source Classification		N/A
8.5.5.2	High Pressure Lamp Explosion Test.....:		N/A
8.6	Stability	Mass < 7kg	N/A
8.6.1	Product classification	MS1	N/A
	Instructional Safeguard.....:		—
8.6.2	Static stability		N/A
8.6.2.2	Static stability test		N/A
	Applied Force .....:		—
8.6.2.3	Downward Force Test		N/A
8.6.3	Relocation stability test		N/A
	Unit configuration during 10° tilt .....:		—
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test (Applied Force).....:		N/A
	Position of feet or movable parts.....:		—
8.7	Equipment mounted to wall or ceiling		N/A
8.7.1	Mounting Means (Length of screws (mm) and mounting surface) .....:		N/A
8.7.2	Direction and applied force.....:		N/A
8.8	Handles strength		N/A
8.8.1	Classification		N/A
8.8.2	Applied Force .....:		N/A
8.9	Wheels or casters attachment requirements		N/A
8.9.1	Classification		N/A
8.9.2	Applied force .....:		—
8.10	Carts, stands and similar carriers		N/A
8.10.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.10.2	Marking and instructions		N/A
	Instructional Safeguard..... :		—
8.10.3	Cart, stand or carrier loading test and compliance		N/A
	Applied force ..... :		—
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Applied horizontal force (N) ..... :		—
8.10.6	Thermoplastic temperature stability (°C)..... :		N/A
8.11	Mounting means for rack mounted equipment		N/A
8.11.1	General		N/A
8.11.2	Product Classification		N/A
8.11.3	Mechanical strength test, variable *N* .....:		N/A
8.11.4	Mechanical strength test 250N, including end stops		N/A
8.12	Telescoping or rod antennas.....		N/A
	Button/Ball diameter (mm) .....:		—
9	**THERMAL BURN INJURY**		**P**
9.2	Thermal energy source classifications	TS1: accessible parts	P
9.3	Safeguard against thermal energy sources		N/A
9.4	Requirements for safeguards		N/A
9.4.1	Equipment safeguard		N/A
9.4.2	Instructional safeguard .....:		N/A
10	**RADIATION**		**N/A**
10.2	Radiation energy source classification		N/A
10.2.1	General classification		N/A
10.3	Protection against laser radiation		N/A
	Laser radiation that exists equipment:		—
	Normal, abnormal, single-fault ..... :		N/A
	Instructional safeguard ..... :		—
	Tool..... :		—
10.4	Protection against visible, infrared, and UV radiation		N/A
10.4.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.4.1.a)	RS3 for Ordinary and instructed persons.....:		N/A
10.4.1.b)	RS3 accessible to a skilled person.....:		N/A
	Personal safeguard (PPE) instructional safeguard.....:		—
10.4.1.c)	Equipment visible, IR, UV does not exceed RS1 . :		N/A
10.4.1.d)	Normal, abnormal, single-fault conditions .....:		N/A
10.4.1.e)	Enclosure material employed as safeguard is opaque.....:		N/A
10.4.1.f)	UV attenuation.....:		N/A
10.4.1.g)	Materials resistant to degradation UV .....:		N/A
10.4.1.h)	Enclosure containment of optical radiation.....:		N/A
10.4.1.i)	Exempt Group under normal operating conditions .....:		N/A
10.4.2	Instructional safeguard .....:		N/A
10.5	Protection against x-radiation		N/A
10.5.1	X- radiation energy source that exists equipment :		N/A
	Normal, abnormal, single fault conditions		N/A
	Equipment safeguards.....:		N/A
	Instructional safeguard for skilled person..... :		N/A
10.5.3	Most unfavourable supply voltage to give maximum radiation .....:		—
	Abnormal and single-fault condition ..... :		N/A
	Maximum radiation (pA/kg).....:		N/A
10.6	Protection against acoustic energy sources		N/A
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output, dB(A)..... :		N/A
	Output voltage, unweighted r.m.s..... :		N/A
10.6.4	Protection of persons		N/A
	Instructional safeguards .....:		N/A
	Equipment safeguard prevent ordinary person to RS2..... :		—
	Means to actively inform user of increase sound pressure..... :		—
	Equipment safeguard prevent ordinary person to RS2..... :		—
10.6.5	Requirements for listening devices (headphones,		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	earphones, etc.)		
10.6.5.1	Corded passive listening devices with analog input		N/A
	Input voltage with 94 dB(A) L_{Aeq} acoustic pressure output..... :		—
10.6.5.2	Corded listening devices with digital input		N/A
	Maximum dB(A)..... :		—
10.6.5.3	Cordless listening device		N/A
	Maximum dB(A)..... :		—
B	**NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS**		**P**
B.2	Normal Operating Conditions		P
B.2.1	General requirements..... :	(See summary of testing & appended test tables)	P
	Audio Amplifiers and equipment with audio amplifiers..... :		N/A
B.2.3	Supply voltage and tolerances	(See appended table B.2.5)	P
B.2.5	Input test..... :	(See appended table B.2.5)	P
B.3	Simulated abnormal operating conditions		P
B.3.1	General requirements..... :	(See appended table B.3)	P
B.3.2	Covering of ventilation openings		N/A
B.3.3	D.C. mains polarity test		N/A
B.3.4	Setting of voltage selector..... :	No such voltage selector.	N/A
B.3.5	Maximum load at output terminals .....:	No such terminals	N/A
B.3.6	Reverse battery polarity		P
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		P
B.4	Simulated single fault conditions		P
B.4.2	Temperature controlling device open or short-circuited..... :		N/A
B.4.3	Motor tests		N/A
B.4.3.1	Motor blocked or rotor locked increasing the internal ambient temperature ..... :		N/A
B.4.4	Short circuit of functional insulation		P

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Clause	Requirement + Test	Result - Remark	Verdict
B.4.4.1	Short circuit of clearances for functional insulation	(See appended table B.4)	P
B.4.4.2	Short circuit of creepage distances for functional insulation	(See appended table B.4)	P
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A
B.4.5	Short circuit and interruption of electrodes in tubes and semiconductors	(See appended table B.4)	P
B.4.6	Short circuit or disconnect of passive components	(See appended table B.4)	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 ... :	(See appended table M)	N/A
C	**UV RADIATION**		**N/A**
C.1	Protection of materials in equipment from UV radiation	No UV radiation within the EUT.	N/A
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
C.2	UV light conditioning test		N/A
C.2.1	Test apparatus		N/A
C.2.2	Mounting of test samples		N/A
C.2.3	Carbon-arc light-exposure apparatus		N/A
C.2.4	Xenon-arc light exposure apparatus		N/A
D	**TEST GENERATORS**		**N/A**
D.1	Impulse test generators		N/A
D.2	Antenna interface test generator		N/A
D.3	Electronic pulse generator		N/A
E	**TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS**		**N/A**
E.1	Audio amplifier normal operating conditions		N/A
	Audio signal voltage (V) ..... :		—
	Rated load impedance (Ω) ..... :		
E.2	Audio amplifier abnormal operating conditions		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
F	**EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS**		**P**
F.1	General requirements		P
	Instructions – Language .....:	English checked	—
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		P
F.3.2	Equipment identification markings		P
F.3.2.1	Manufacturer identification .....:	See copy of marking plate	—
F.3.2.2	Model identification .....:	See copy of marking plate	—
F.3.3	Equipment rating markings		N/A
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains	Equipment without direct connection to mains	N/A
F.3.3.3	Nature of supply voltage .....:		—
F.3.3.4	Rated voltage .....:		—
F.3.3.4	Rated frequency .....:		—
F.3.3.6	Rated current or rated power .....:		—
F.3.3.7	Equipment with multiple supply connections	No multiple supply connection.	N/A
F.3.4	Voltage setting device	No such device.	N/A
F.3.5	Terminals and operating devices		N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings..... :	No mains appliance outlet.	N/A
F.3.5.2	Switch position identification marking ..... :	Not such switch.	N/A
F.3.5.3	Replacement fuse identification and rating markings..... :	Provided the user manual.	N/A
F.3.5.4	Replacement battery identification marking ..... :	Provided the user manual.	P
F.3.5.5	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification		N/A
F.3.6.1	Class I Equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal		N/A
F.3.6.1.2	Neutral conductor terminal		N/A
F.3.6.1.3	Protective bonding conductor terminals		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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 .....:	IP20, no marking is needed	—
F.3.8	External power supply output marking		N/A
F.3.9	Durability, legibility and permanence of marking	Marking is considered to be legible and easily discernible. See also the following details.	P
F.3.10	Test for permanence of markings	The label was subjected to the permanence of marking test. The label was rubbed with cloth soaked with water for 15 sec. And then again for 15 sec. With the cloth soaked with petroleum spirit. After this test there was no damage to the label. The marking on the label did not fade. There was no curling and lifting of the label edge. After each test, the marking remained legible.	P
F.4	Instructions		P
	a) Equipment for use in locations where children not likely to be present - marking		N/A
	b) Instructions given for installation or initial use		P
	c) Equipment intended to be fastened in place		N/A
	d) Equipment intended for use only in restricted access area	Not used in restricted access area.	N/A
	e) Audio equipment terminals classified as ES3 and other equipment with terminals marked in accordance F.3.6.1		N/A
	f) Protective earthing employed as safeguard		N/A
	g) Protective earthing conductor current exceeding ES2 limits		N/A
	h) Symbols used on equipment		P
	i) Permanently connected equipment not provided with all-pole mains switch		N/A
	j) Replaceable components or modules providing safeguard function		N/A
F.5	Instructional safeguards		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Where “instructional safeguard” is referenced in the test report it specifies the required elements, location of marking and/or instruction		P

G	COMPONENTS		P
G.1	**Switches**		N/A
G.1.1	General requirements		N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.2	**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	No thermal cut-off used.	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	No thermal link used.	N/A
G.3.2.1b)	Thermal links tested as part of the equipment		N/A
	Aging hours (H) ..... :		—
	Single Fault Condition ..... :		—
	Test Voltage (V) and Insulation Resistance (Ω). :		—
G.3.3	PTC Thermistors		N/A
G.3.4	Overcurrent protection devices		N/A
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.5		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions.....:		N/A
G.4	**Connectors**		N/A
G.4.1	Spacings	Not directly connected to mains	N/A
G.4.2	Mains connector configuration .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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) .....:		—
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).....:		—

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Clause	Requirement + Test	Result - Remark	Verdict
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	Not directly connected to mains	N/A
	Type..... :		—
	Rated current (A)..... :		—
	Cross-sectional area (mm^2), (AWG) ..... :		—
G.7.2	Compliance and test method		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A
	Strain relief test force (N) ..... :		—
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm)..... :		—
G.7.3.2.4	Strain relief comprised of polymeric material		N/A
G.7.4	Cord Entry ..... :		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
G.7.5.2	Mass (g) ..... :		—
	Diameter (m) ..... :		—
	Temperature (°C) ..... :		—
G.7.6	Supply wiring space		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Test with 8 mm strand		N/A
G.8	**Varistors**		N/A
G.8.1	General requirements	No varistors used.	N/A
G.8.2	Safeguard against shock		N/A
G.8.3	Safeguard against fire		N/A
G.8.3.2	Varistor overload test ..... :		N/A
G.8.3.3	Temporary overvoltage ..... :		N/A
G.9	**Integrated Circuit (IC) Current Limiters**		N/A
G.9.1 a)	Manufacturer defines limit at max. 5A.	No such IC used.	N/A
G.9.1 b)	Limiters do not have manual operator or reset		N/A
G.9.1 c)	Supply source does not exceed 250 VA ..... :		—
G.9.1 d)	IC limiter output current (max. 5A) ..... :		—
G.9.1 e)	Manufacturers' defined drift ..... :		—
G.9.2	Test Program 1		N/A
G.9.3	Test Program 2		N/A
G.9.4	Test Program 3		N/A
G.10	**Resistors**		N/A
G.10.1	General requirements		N/A
G.10.2	Resistor test		N/A
G.10.3	Test for resistors serving as safeguards between the mains and an external circuit consisting of a coaxial cable		N/A
G.10.3.1	General requirements		N/A
G.10.3.2	Voltage surge test		N/A
G.10.3.3	Impulse test		N/A
G.11	**Capacitor and RC units**		N/A
G.11.1	General requirements	No such components used	N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A
G.12	**Optocouplers**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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**		P
G.13.1	General requirements		P
G.13.2	Uncoated printed boards		P
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
	Compliance with cemented joint requirements (Specify construction) ..... :		—
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation ..... :		N/A
	Number of insulation layers (pcs) ..... :		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2a)	Thermal conditioning		N/A
G.13.6.2b)	Electric strength test		N/A
G.13.6.2c)	Abrasion resistance test		N/A
G.14	**Coating on components terminals**		N/A
G.14.1	Requirements ..... :		N/A
G.15	**Liquid filled components**		N/A
G.15.1	General requirements		N/A
G.15.2	Requirements		N/A
G.15.3	Compliance and test methods		N/A
G.15.3.1	Hydrostatic pressure test		N/A
G.15.3.2	Creep resistance test		N/A
G.15.3.3	Tubing and fittings compatibility test		N/A
G.15.3.4	Vibration test		N/A
G.15.3.5	Thermal cycling test		N/A
G.15.3.6	Force test		N/A
G.15.4	Compliance		N/A
G.16	**IC including capacitor discharge function (ICX)**		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
a)	Humidity treatment in accordance with sc5.4.8 – 120 hours		N/A
b)	Impulse test using circuit 2 with Uc = to transient voltage .....:		N/A
C1)	Application of ac voltage at 110% of rated voltage for 2.5 minutes		N/A
C2)	Test voltage .....:		—
D1)	10,000 cycles on and off using capacitor with smallest capacitance resistor with largest resistance specified by manufacturer		N/A
D2)	Capacitance .....:		—
D3)	Resistance .....:		—
H	**CRITERIA FOR TELEPHONE RINGING SIGNALS**		**N/A**
H.1	General		N/A
H.2	Method A		N/A
H.3	Method B		N/A
H.3.1	Ringing signal		N/A
H.3.1.1	Frequency (Hz) .....:		—
H.3.1.2	Voltage (V) .....:		—
H.3.1.3	Cadence; time (s) and voltage (V) .....:		—
H.3.1.4	Single fault current (mA):.....:		—
H.3.2	Tripping device and monitoring voltage .....:		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage complied with		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V) .....:		—
J	**INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION**		**N/A**
	General requirements		N/A
K	**SAFETY INTERLOCKS**		**N/A**
K.1	General requirements	No safety interlocks inside the EUT	N/A
K.2	Components of safety interlock safeguard mechanism		N/A
K.3	Inadvertent change of operating mode		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
K.4	Interlock safeguard override		N/A
K.5	Fail-safe		N/A
	Compliance .....:		N/A
K.6	Mechanically operated safety interlocks		N/A
K.6.1	Endurance requirement		N/A
K.6.2	Compliance and Test method .....:		N/A
K.7	Interlock circuit isolation		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements (type and circuit location) .....:		N/A
K.7.2	Overload test, Current (A) .....:		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test .....:		N/A
L	**DISCONNECT DEVICES**		**N/A**
L.1	General requirements		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	Requirements		P
M.2.2	Compliance and test method (identify method) .. :	Li-MnO2 battery used	P
M.3	Protection circuits		P
M.3.1	Requirements		P
M.3.2	Tests		P
	- Overcharging of a rechargeable battery		N/A
	- Unintentional charging of a non-rechargeable battery		N/A
	- Reverse charging of a rechargeable battery		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- Excessive discharging rate for any battery		P
M.3.3	Compliance ..... :	After above test have not created a hazard in the meaning of this standard	P
M.4	Additional safeguards for equipment containing secondary lithium battery		N/A
M.4.1	General		N/A
M.4.2	Charging safeguards		N/A
M.4.2.1	Charging operating limits		N/A
M.4.2.2a)	Charging voltage, current and temperature .....:		—
M.4.2.2 b)	Single faults in charging circuitry .....:		—
M.4.3	Fire Enclosure		N/A
M.4.4	Endurance of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation		N/A
M.4.4.3	Drop and charge/discharge function tests		N/A
	Drop		N/A
	Charge		N/A
	Discharge		N/A
M.4.4.4	Charge-discharge cycle test		N/A
M.4.4.5	Result of charge-discharge cycle test		N/A
M.5	Risk of burn due to short circuit during carrying		N/A
M.5.1	Requirement		N/A
M.5.2	Compliance and Test Method (Test of P.2.3)		N/A
M.6	Prevention of short circuits and protection from other effects of electric current		N/A
M.6.1	Short circuits		N/A
M.6.1.1	General requirements		N/A
M.6.1.2	Test method to simulate an internal fault		N/A
M.6.1.3	Compliance (Specify M.6.1.2 or alternative method) ..... :		N/A
M.6.2	Leakage current (mA) ..... :		N/A
M.7	Risk of explosion from lead acid and NiCd batteries		N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
M.7.2	Compliance and test method		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
M.8	Protection against internal ignition from external spark sources of lead acid batteries		N/A
M.8.1	General requirements		N/A
M.8.2	Test method		N/A
M.8.2.1	General requirements		N/A
M.8.2.2	Estimation of hypothetical volume *Vz* (m^3/s)..... :		—
M.8.2.3	Correction factors..... :		—
M.8.2.4	Calculation of distance *d* (mm) ..... :		—
M.9	Preventing electrolyte spillage		N/A
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
M.10	Instructions to prevent reasonably foreseeable misuse (Determination of compliance: inspection, data review; or abnormal testing) ..... :		N/A
N	**ELECTROCHEMICAL POTENTIALS**		**N/A**
	Metal(s) used ..... :		—
O	**MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES**		**N/A**
	Figures O.1 to O.20 of this Annex applied..... :	Considered	—
P	**SAFEGUARDS AGAINST ENTRY OF FOREIGN OBJECTS AND SPILLAGE OF INTERNAL LIQUIDS**		N/A
P.1	General requirements	Not required any safeguard	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

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Clause	Requirement + Test	Result - Remark	Verdict
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Safeguards effectiveness		N/A
P.4	Metallized coatings and adhesive securing parts		N/A
P.4.2 a)	Conditioning testing		N/A
	Tc (°C) ..... :		—
	Tr (°C) ..... :		—
	Ta (°C) ..... :		—
P.4.2 b)	Abrasion testing ..... :		N/A
P.4.2 c)	Mechanical strength testing ..... :		N/A
Q	**CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING**		**N/A**
Q.1	Limited power sources		N/A
Q.1.1 a)	Inherently limited output		N/A
Q.1.1 b)	Impedance limited output		N/A
	- Regulating network limited output under normal operating and simulated single fault condition		N/A
Q.1.1 c)	Overcurrent protective device limited output		N/A
Q.1.1 d)	IC current limiter complying with G.9		N/A
Q.1.2	Compliance and test method		N/A
Q.2	Test for external circuits – paired conductor cable		N/A
	Maximum output current (A) ..... :		—
	Current limiting method ..... :		—
R	**LIMITED SHORT CIRCUIT TEST**		**N/A**
R.1	General requirements		N/A
R.2	Determination of the overcurrent protective device and circuit		N/A
R.3	Test method Supply voltage (V) and short-circuit current (A)). ..... :		N/A
S	**TESTS FOR RESISTANCE TO HEAT AND FIRE**		**N/A**
S.1	Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W		N/A
	Samples, material ..... :		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Wall thickness (mm).....:		—
	Conditioning (°C).....:		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	Flammability test for fire enclosure and fire barrier integrity		N/A
	Samples, material .....:		—
	Wall thickness (mm).....:		—
	Conditioning (°C).....:		—
	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**		**P**
T.1	General requirements		P
T.2	Steady force test, 10 N .....:		N/A
T.3	Steady force test, 30 N .....:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
T.4	Steady force test, 100 N .....:	(See appended table T.4)	P
T.5	Steady force test, 250 N .....:		N/A
T.6	Enclosure impact test		N/A
	Fall test		N/A
	Swing test		N/A
T.7	Drop test .....:	(See appended table T.7)	P
T.8	Stress relief test .....:	Metal enclosure	N/A
T.9	Impact Test (glass)	Surface area not exceeding 0.1m^2	N/A
T.9.1	General requirements		N/A
T.9.2	Impact test and compliance		N/A
	Impact energy (J).....:		—
	Height (m) .....:		—
T.10	Glass fragmentation test .....:		N/A
T.11	Test for telescoping or rod antennas		N/A
	Torque value (Nm) .....:		—

U	**MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFECTS OF IMPLOSION**		**N/A**
U.1	General requirements		N/A
U.2	Compliance and test method for non-intrinsically protected CRTs		N/A
U.3	Protective Screen.....:		N/A

V	**DETERMINATION OF ACCESSIBLE PARTS (FINGERS, PROBES AND WEDGES)**		**P**
V.1	Accessible parts of equipment		P
V.2	Accessible part criterion		P

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

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

Differences according to	EN 62368-1:2014+A11:2017
Attachment Form No.	EU_GD_IEC62368_1B_II
Attachment Originator	Nemko AS
Master Attachment	Date 2017-09-22

	CENELEC COMMON MODIFICATIONS (EN)		P
	Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62368-1:2014 are prefixed "Z".		P
CONTENTS	**Add** the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions Annex ZC (informative) A-deviations Annex ZD (informative) IEC and CENELEC code designations for flexible cords		P
	Delete all the "country" notes in the reference document (IEC 62368-1:2014) according to the following list:		P
Special	For special national conditions, see Annex ZB.		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.		P
4.Z1	Protective devices included as integral parts of the equipment or as parts of the building installation:		N/A
	a) Included as parts of the equipment		N/A
	b) For components in series with the mains; by devices in the building installation		N/A
	c) For pluggable type B or permanently connected; by devices in the building installation		N/A

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

EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.4.2.3.2.4	**Add** the following to the end of this subclause: The requirement for interconnection with **external circuit** is in addition given in EN 50491-3:2009.		N/A
10.2.1	**Add** the following to c) and d) in table 39: For additional requirements, see 10.5.1.		N/A
10.5.1	**Add** the following after the first paragraph: For RS 1 compliance is checked by measurement under the following conditions: In addition to the normal operating conditions, all controls adjustable from the outside by hand, by any object such as a tool or a coin, and those internal adjustments or presets which are not locked in a reliable manner, are adjusted so as to give maximum radiation whilst maintaining an intelligible picture for 1 h, at the end of which the measurement is made. NOTE Z1 Soldered joints and paint lockings are examples of adequate locking. The dose-rate is determined by means of a radiation monitor with an effective area of 10 cm^2, at any point 10 cm from the outer surface of the apparatus. Moreover, the measurement shall be made under fault conditions causing an increase of the high-voltage, provided an intelligible picture is maintained for 1 h, at the end of which the measurement is made. For RS1, the dose-rate shall not exceed 1 μSv/h taking account of the background level. NOTE Z2 These values appear in Directive 96/29/Euratom of 13 May 1996.		N/A
10.6.1	**Add** the following paragraph to the end of the subclause: EN 71-1:2011, 4.20 and the related tests methods and measurement distances apply.		N/A
10.Z1	**Add** the following new subclause after 10.6.5. **10.Z1 Non-ionizing radiation from radio frequencies in the range 0 to 300 GHz** The amount of non-ionizing radiation is regulated by European Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz). For intentional radiators, ICNIRP guidelines should be taken into account for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). For hand-held and body-mounted devices, attention is drawn to EN 50360 and EN 50566		N/A
G.7.1	**Add** the following note: NOTE Z1 The harmonized code designations corresponding to the IEC cord types are given in Annex ZD.		N/A
Bibliography	**Add** the following standards: **Add** the following notes for the standards indicated:		P

EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	IEC 60130-9 NOTE Harmonized as EN 60130-9. IEC 60269-2 NOTE Harmonized as HD 60269-2. IEC 60309-1 NOTE Harmonized as EN 60309-1. IEC 60364 NOTE some parts harmonized in HD 384/HD 60364 series. IEC 60601-2-4 NOTE Harmonized as EN 60601-2-4. IEC 60664-5 NOTE Harmonized as EN 60664-5. IEC 61032:1997 NOTE Harmonized as EN 61032:1998 (not modified). IEC 61508-1 NOTE Harmonized as EN 61508-1. IEC 61558-2-1 NOTE Harmonized as EN 61558-2-1. IEC 61558-2-4 NOTE Harmonized as EN 61558-2-4. IEC 61558-2-6 NOTE Harmonized as EN 61558-2-6. IEC 61643-1 NOTE Harmonized as EN 61643-1. IEC 61643-21 NOTE Harmonized as EN 61643-21. IEC 61643-311 NOTE Harmonized as EN 61643-311. IEC 61643-321 NOTE Harmonized as EN 61643-321. IEC 61643-331 NOTE Harmonized as EN 61643-331.		
ZB	**ANNEX ZB, SPECIAL NATIONAL CONDITIONS (EN)**		P
4.1.15	**Denmark, Finland, Norway and Sweden** To the end of the subclause the following is added: **Class I pluggable equipment type A** intended for connection to other equipment or a network shall, if safety relies on connection to reliable earthing or if surge suppressors are connected between the network terminals and **accessible** parts, have a marking stating that the equipment shall be connected to an earthed **mains** socket-outlet. The marking text in the applicable countries shall be as follows: In **Denmark**: “Apparatets stikprop skal tilsluttes en stikkontakt med jord som giver forbindelse til stikproppens jord.” In **Finland**: "Laite on liitettävä suojakoskettimilla varustettuun pistorasiaan" In **Norway**: “Apparatet må tilkoples jordet stikkontakt” In **Sweden**: “Apparaten skall anslutas till jordat uttag”		N/A
4.7.3	**United Kingdom** To the end of the subclause the following is added: The torque test is performed using a socket-outlet complying with BS 1363, and the plug part shall be assessed to the relevant clauses of BS 1363. Also see Annex G.4.2 of this annex		N/A
5.2.2.2	**Denmark** After the 2nd paragraph add the following: A warning (marking **safeguard**) for high **touch current** is required if the **touch current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.4.11.1 and	**Finland and Sweden** To the end of the subclause the following is		N/A

EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
Annex G	added: For separation of the telecommunication network from earth the following is applicable: If this insulation is solid, including insulation forming part of a component, it shall at least consist of either • two layers of thin sheet material, each of which shall pass the electric strength test below, or • one layer having a distance through insulation of at least 0,4 mm, which shall pass the electric strength test below. If this insulation forms part of a semiconductor component (e.g. an optocoupler), there is no distance through insulation requirement for the insulation consisting of an insulating compound completely filling the casing, so that clearances and creepage distances do not exist, if the component passes the electric strength test in accordance with the compliance clause below and in addition • passes the tests and inspection criteria of 5.4.8 with an electric strength test of 1,5 kV multiplied by 1,6 (the electric strength test of 5.4.9 shall be performed using 1,5 kV), and • is subject to routine testing for electric strength during manufacturing, using a test voltage of 1,5kV. It is permitted to bridge this insulation with a capacitor complying with EN 60384-14:2005, subclass Y2. A capacitor classified Y3 according to EN 60384-14:2005, may bridge this insulation under the following conditions: • the insulation requirements are satisfied by having a capacitor classified Y3 as defined by EN 60384-14, which in addition to the Y3 testing, is tested with an impulse test of 2,5 kV defined in 5.4.11; • the additional testing shall be performed on all the test specimens as described in EN 60384-14; the impulse test of 2,5 kV is to be performed before the endurance test in EN 60384-14, in the sequence of tests as described in EN 60384-14.		
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		N/A

EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	the test of G.10.2.		
5.6.1	**Denmark** **Add** to the end of the subclause Due to many existing installations where the socket-outlets can be protected with fuses with higher rating than the rating of the socket-outlets the protection for pluggable equipment type A shall be an integral part of the equipment. *Justification:* In Denmark an existing 13 A socket outlet can be protected by a 20 A fuse.		N/A
5.6.4.2.1	**Ireland and United Kingdom** After the indent for **pluggable equipment type A**, the following is added: – the **protective current rating** is taken to be 13 A, this being the largest rating of fuse used in the **mains** plug.		N/A
5.6.5.1	**Ireland and United Kingdom** To the second paragraph the following is added: The range of conductor sizes of flexible cords to be accepted by terminals for equipment with a rated current over 10 A and up to and including 13 A is: 1,25 mm^2 to 1,5 mm^2 in cross-sectional area.		N/A
5.7.5	**Denmark** To the end of the subclause the following is added: The installation instruction shall be affixed to the equipment if the **protective conductor current** exceeds the limits of 3,5 mA a.c. or 10 mA d.c.		N/A
5.7.6.1	**Norway and Sweden** To the end of the subclause the following is added: The screen of the television distribution system is normally not earthed at the entrance of the building and there is normally no equipotential bonding system within the building. Therefore the protective earthing of the building installation needs to be isolated from the screen of a cable distribution system. It is however accepted to provide the insulation external to the equipment by an adapter or an interconnection cable with galvanic isolator, which may be provided by a retailer, for example. The user manual shall then have the following or similar information in Norwegian and Swedish language respectively, depending on in what country the equipment is intended to be used in: “Apparatus connected to the protective earthing of the building installation through the mains connection or through other apparatus with a connection to protective earthing – and to a television distribution system using coaxial cable, may in some circumstances create a fire hazard.		N/A

EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Connection to a television distribution system therefore has to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11)" NOTE In Norway, due to regulation for CATV-installations, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1,5 kV r.m.s., 50 Hz or 60 Hz, for 1 min. Translation to Norwegian (the Swedish text will also be accepted in Norway): "Apparater som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et koaksialbasert kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av apparater til kabel-TV nett installeres en galvanisk isolator mellom apparatet og kabel-TV nettet." Translation to Swedish: "Apparater som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av apparaten till kabel-TV nät galvanisk isolator finnas mellan apparaten och kabel-TV nätet.".		
5.7.6.2	**Denmark** To the end of the subclause the following is added: The warning (marking safeguard) for high touch current is required if the touch current or the protective current exceed the limits of 3,5 mA .		N/A
B.3.1 and B.4	**Ireland and United Kingdom** The following is applicable: To protect against excessive currents and short-circuits in the primary circuit of **direct plug-in equipment**, tests according to Annexes B.3.1 and B.4 shall be conducted using an external miniature circuit breaker complying with EN 60898-1, Type B, rated 32A. If the equipment does not pass these tests, suitable protective devices shall be included as an integral part of the **direct plug-in equipment**, until the requirements of Annexes B.3.1 and B.4 are met		N/A
G.4.2	**Denmark:** Appliances rated ≤13 A provided with a plug according to DS 60884-2-D1:2011. Class I equipment provided with socket-outlets provided with a plug in accordance with standard sheet DK 2-1a or DK 2-5a. If a single-phase equipment having rated >13 A or poly-phase equipment provided with a supply		N/A

EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
	cord with a plug, plug 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 rated 2,5 A in accordance with DS 60884-2-D1:2011 standard sheet DKA 1-4a. Other current rating socket outlets in compliance with Standard Sheet DKA 1-3a or DKA 1-1c. Mains socket-outlets with earth in compliance with DS 60884-2-D1:2011 Standard Sheet DK 1-3a, DK 1-1c, DK1-1d, DK 1-5a or DK 1-7a		
G.4.2	**United Kingdom** To the end of the subclause the following is added: The plug part of direct plug-in equipment shall be assessed to BS 1363: Part 1, 12.1, 12.2, 12.3, 12.9, 12.11, 12.12, 12.13, 12.16, and 12.17, except that the test of 12.17 is performed at not less than 125 °C. Where the metal earth pin is replaced by an Insulated Shutter Opening Device (ISOD), the requirements of clauses 22.2 and 23 also apply.		N/A
G.7.1	**United Kingdom** To the first paragraph the following is added: Equipment which is fitted with a flexible cable or cord and is designed to be connected to a mains socket conforming to BS 1363 by means of that flexible cable or cord shall be fitted with a 'standard plug' in accordance with the Plugs and Sockets etc (Safety) Regulations 1994, Statutory Instrument 1994 No. 1768, unless exempted by those regulations. NOTE "Standard plug" is defined in SI 1768:1994 and essentially means an approved plug conforming to BS 1363 or an approved conversion plug.		N/A
G.7.1	**Ireland** To the first paragraph the following is added: Apparatus which is fitted with a flexible cable or cord shall be provided with a plug in accordance with Statutory Instrument 525: 1997, "13 A Plugs and Conversion Adapters for Domestic Use Regulations: 1997. S.I. 525 provides for the recognition of a standard of another Member State which is equivalent to the relevant Irish Standard		N/A
G.7.2	**Ireland and United Kingdom** To the first paragraph the following is added: A power supply cord with a conductor of 1,25 mm^2 is allowed for equipment which is rated over 10 A and up to and including 13 A.		N/A

EN 62368-1			
Clause	Requirement + Test	Result - Remark	Verdict
ZC	**ANNEX ZC, NATIONAL DEVIATIONS (EN)**		N/A
10.5.2	**Germany** The following requirement applies: For the operation of any cathode ray tube intended for the display of visual images operating at an acceleration voltage exceeding 40 kV, authorization is required, or application of type approval (Bauartzulassung) and marking. *Justification:* German ministerial decree against ionizing radiation (Röntgenverordnung), in force since 2002-07-01, implementing the European Directive 96/29/EURATOM. **NOTE** Contact address: Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, Tel.: Int +49-531-592-6320, Internet: http://www.ptb.de		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

4.1.2	TABLE: List of critical components				P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity[1]
PCB	Interchangeable	Interchangeable	V-0, 130°C	UL 796	UL
Enclosure	Interchangeable	Interchangeable	Min. HB, 60°C	UL 94	UL
Battery	Interchangeable	CR123A	Rated DC3 V, max. abnormal charging current 10 mA	EN 62368	Test with appliance

Supplementary information:

1) an asterisk indicates a mark which assures the agreed level of surveillance.

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Clause	Requirement + Test	Result - Remark	Verdict

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

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

4.8.4.2	**TABLE: Stress Relief test**	—

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

4.8.4.3	**TABLE: Battery replacement test**	—

Battery part no.....:		—
Battery Installation/withdrawal	Battery Installation/Removal Cycle	Comments
	1	--
	2	--
	3	--
	4	--
	5	--
	6	--
	8	--
	9	--
	10	--

4.8.4.4	**TABLE: Drop test**	—

Impact Area	Drop Distance	Drop No.	Observations
--	--	1	--
--	--	2	--
--	--	3	--

4.8.4.5	**TABLE: Impact**	—

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

4.8.4.6	**TABLE: Crush test**	—

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

Supplementary information:

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

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

5.2	Table: Classification of electrical energy sources	P

5.2.2.2 – Steady State Voltage and Current conditions

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				U (Vrms or Vpk)	I (Apk or Arms)	Hz	
1	Full battery or 5V	All internal circuits	Normal	--	--	--	ES1 (declared)
			Abnormal: --	--	--	--	
			Single fault: --	--	--	--	

5.2.2.3 - Capacitance Limits

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

5.2.2.4 - Single Pulses

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

5.2.2.5 - Repetitive Pulses

No.	Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters			ES Class
				Off time (ms)	Upk (V)	Ipk (mA)	
--	--	--	Normal	--	--	--	--

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Clause	Requirement + Test	Result - Remark	Verdict

		Abnormal	--	--	--
		Single fault – SC/OC	--	--	--

Test Conditions:

Normal –

Abnormal -

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

The prospective touch voltage was measured when the flash device was ignited.

5.4.1.4, 6.3.2, 9.0, B.2.6	TABLE: Thermal requirements					P
	Supply voltage (V) ..... :	Condition 1	Condition 2	--	--	—
	Ambient T_{min} (°C) ..... :	See below	See below	--	--	—
	Ambient T_{max} (°C) ..... :	See below	See below	--	--	—
	Tma (°C) ..... :	See below	See below	--	--	
Maximum measured temperature T of part/at.....:		T (°C)				Allowed T_{max} (°C)
DC inlet		--	47.1	--	--	Ref.130
PCB near U1		--	47.9	--	--	130
PCB near U1&IC		56.9	55.0	--	--	130
PCB near Q1		53.0	51.4	--	--	130
Battery body		49.0	--	--	--	Ref.
Enclosure inside near IC		50.9	47.1	--	--	130
Ambient		40.0	--	--	--	--
Touch temperature clause 9.0						
Button		34.0	33.3	--	--	77
Enclosure outside near IC		35.9	31.6	--	--	77
Ambient		25.0	--	--	--	--

Supplementary information:

Condition 1: discharging full battery, normal operation;

Condition 2: Supplied by DC5V, normal operation;

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Clause	Requirement + Test	Result - Remark	Verdict

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:							

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

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

5.4.2.2, 5.4.2.4 and 5.4.3	TABLE: Minimum Clearances/Creepage distance						N/A
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	U r.m.s. (V)	Frequency (kHz)#	Required cl (mm)	cl (mm)	Required cr (mm)	cr (mm)
Basic/supplementary insulation							
--	--	--	--	--	--	--	--
Reinforced insulation							
--	--	--	--	--	--	--	--

Supplementary information:

(#) Frequencies above and below 30 kHz

Note 2: BI: basic insulation; SI: supplementary insulation; DI: double insulation; RI: reinforced insulation.

*: According to 5.4.1.8.1 i), the working voltage to determine minimun creepage distances was measured after the ignition of the lamp.

5.4.2.3	TABLE: Minimum Clearances distances using required withstand voltage	N/A
	Overvoltage Category (OV):	--

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Clause	Requirement + Test	Result - Remark	Verdict

	Pollution Degree:			--
Clearance distanced between:		Required withstand voltage	Required cl (mm)	Measured cl (mm)
Basic / supplementary insulation				
--		--	--	--
Reinforced insulation				
--		--	--	--
Supplementary information:				
1. BI: basic insulation; SI: supplementary insulation; DI: double insulation; RI: reinforced insulation;				

5.4.2.4	**TABLE: Clearances based on electric strength test**			**N/A**
Test voltage applied between:		Required cl (mm)	Test voltage (Kv) peak/ r.m.s. / d.c.	Breakdown Yes / No
--		--	--	--
Supplementary information: Not used the alternative method to determine the clearances.				

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

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

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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
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

OC- Opened circuit

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

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

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Clause	Requirement + Test	Result - Remark	Verdict
		5	N/A
		6	N/A
		8	N/A

Supplementary Information:

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

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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
Battery	normal	Power (W) :	10.6	--	PS1
		V_A (V) :	1.9	--	
		I_A (A) :	5.4	--	

Supplementary Information: SC: short circuit

(*) Measurement taken only when limits at 3 seconds exceed PS1 limits.

(&) Power measurement for worst-case fault.

(#) Power measurement for worst-case power source fault.

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

Supplementary information:

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

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:

All internal circuits were considered as resistive PIS.

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

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

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

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Clause	Requirement + Test	Result - Remark	Verdict

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

B.2.5	TABLE: Input test						P
U (V)	I (A)	Irated (A)	P (W)	P rated (W)	Fuse No	Ifuse (A)	Condition/status
5Vdc	0.06	0.5	0.3	--	--	--	Normal operation
Supplementary information: the most unfavorable charging condition was considered.							

B.3	TABLE: Abnormal operating condition tests							P
Ambient temperature (°C) ..... :					See below			—
Power source for EUT: Manufacturer, model/type, output rating . :					See cover page for details			—
Component No.	Abnormal Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
Battery polarity	Reverse	Full battery discharge	10mins	--	--	--	--	EUT shut down. No damaged, no hazards.
Supplementary information:								

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

B.4	TABLE: Fault condition tests							P
Ambient temperature (°C) .....:						25.0		—
Power source for EUT: Manufacturer, model/type, output rating .:						See cover page for details		—
Component No.	Fault Condition	Supply voltage, (V)	Test time (ms)	Fuse no.	Fuse current, (A)	T-couple	Temp. (°C)	Observation
C1	SC	Full batteries discharge	10mins	--	--	--	--	Unit shut down, recoverable, no damage, no hazards.
R36	SC	Full batteries discharge	10mins	--	--	--	--	Unit operation normally. No damage. No hazard.
Q1	SC	Full batteries discharge	10mins	--	--	--	--	Unit shut down, recoverable, no damage, no hazards.
C1	SC	5VDC	10mins	--	--	--	--	Unit shut down, recoverable, no damage, no hazards.
R36	SC	5VDC	10mins	--	--	--	--	Unit operation normally. No damage. No hazard.
Q1	SC	5VDC	10mins	--	--	--	--	Unit shut down, recoverable, no damage, no hazards.

Supplementary information:

CD - Components damaged (list damaged components)

NB - No indication of dielectric breakdown.

NC - Cheesecloth remained intact.

NT - Tissue paper remained intact.

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

Annex M	**TABLE: Batteries**									**P**
The tests of Annex M are applicable only when appropriate battery data is not available										--
Is it possible to install the battery in a reverse polarity position? ..... :							No			--
	Non-rechargeable batteries			Rechargeable batteries						
	Discharging		Un-intentional charging	Charging		Discharging		Reversed charging		
	Meas. current	Manuf. Specs.		Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	Meas. current	Manuf. Specs.	
Max. current during normal condition	0.101A	--	--	--	--	--	--	--	--	
Max. current during fault condition	0.112A	--	--	--	--	--	--	--	--	
Test results:							--			Verdict
- Chemical leaks							--			NO
- Explosion of the battery							--			NO
- Emission of flame or expulsion of molten metal							--			NO
- Electric strength tests of equipment after completion of tests							--			--
Supplementary information:										

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

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

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Clause	Requirement + Test	Result - Remark	Verdict

Annex Q.1	TABLE: Circuits intended for interconnection with building wiring (LPS)	N/A

Note:

Output Circuit	Components	U_{oc} (V)	I_{sc} (A)		S (VA)	
			Meas.	Limit	Meas.	Limit

Supplementary Information:

T.2, T.3, T.4, T.5	TABLE: Steady force test				P
Part/Location	Material	Thickness (mm)	Force (N)	Test Duration (sec)	Observation
Top of enclosure	Plastic	1.3	100N	5	No damaged, no hazard
Bottom of enclosure	Plastic	1.3	100N	5	No damaged, no hazard
Side of enclosure	Plastic	1.3	100N	5	No damaged, no hazard
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			P
Part/Location	Material	Thickness (mm)	Drop Height (mm)	Observation
Top	Plastic	1.3	1000	No damage, no hazard.
Side	Plastic	1.3	1000	No damage, no hazard.
Bottom	Plastic	1.3	1000	No damage, no hazard.
Supplementary information:				

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

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Clause	Requirement + Test		Result - Remark		Verdict
Enclosure	Plastic	1.3	75	7	Enclosure remained intact, no crack/opening developed.
Supplementary information:					

Attachment 1 – Photo Documentation

Fig.1

Fig.2

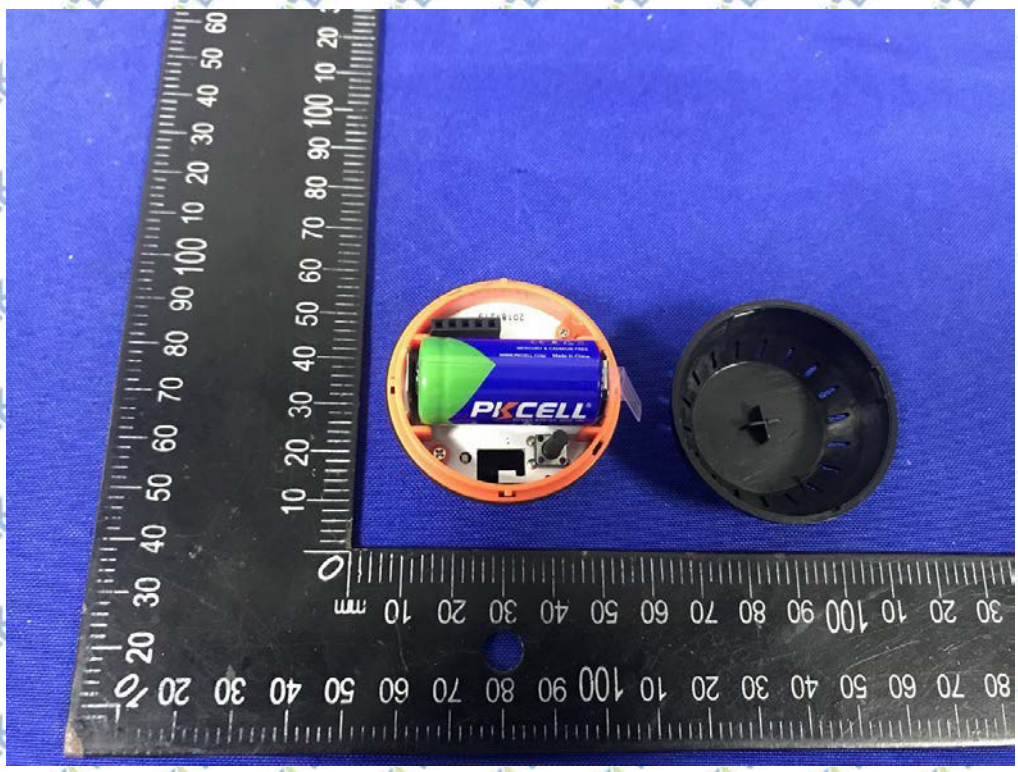

Fig.3

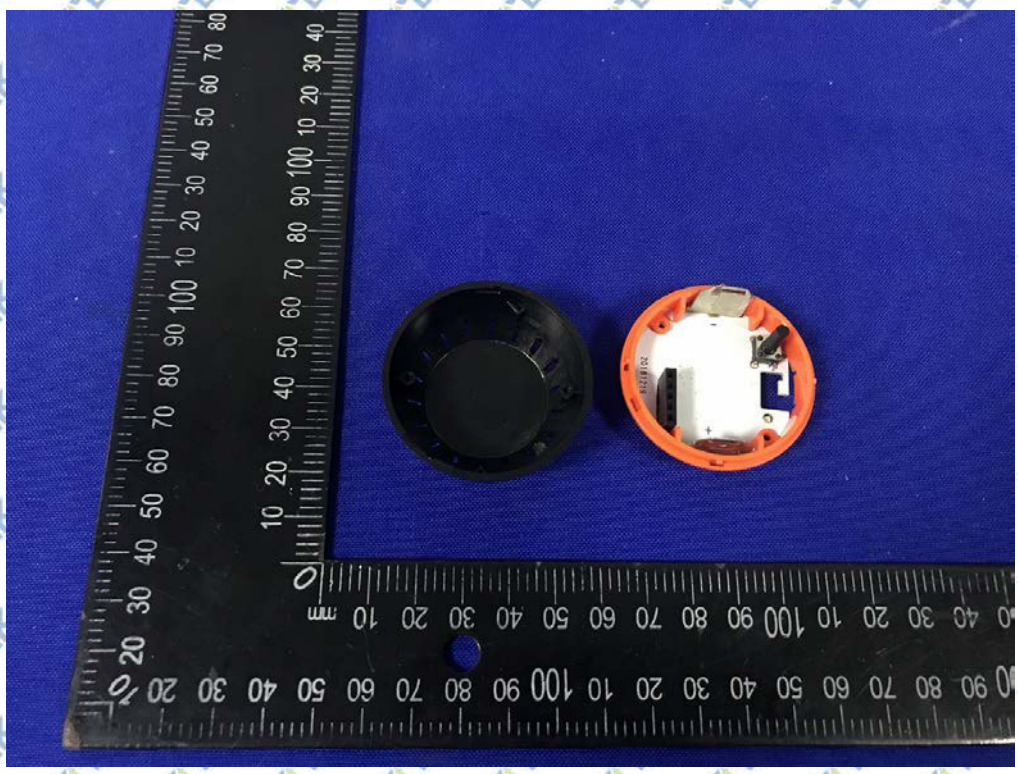

Fig.4

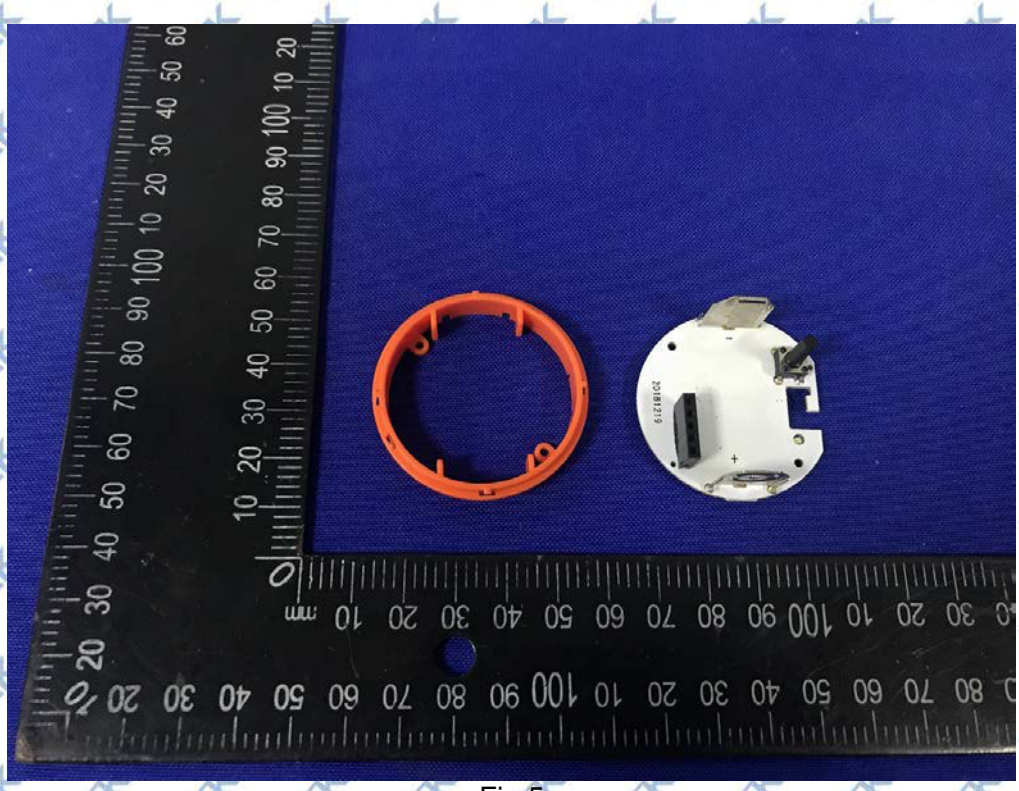

Fig.5

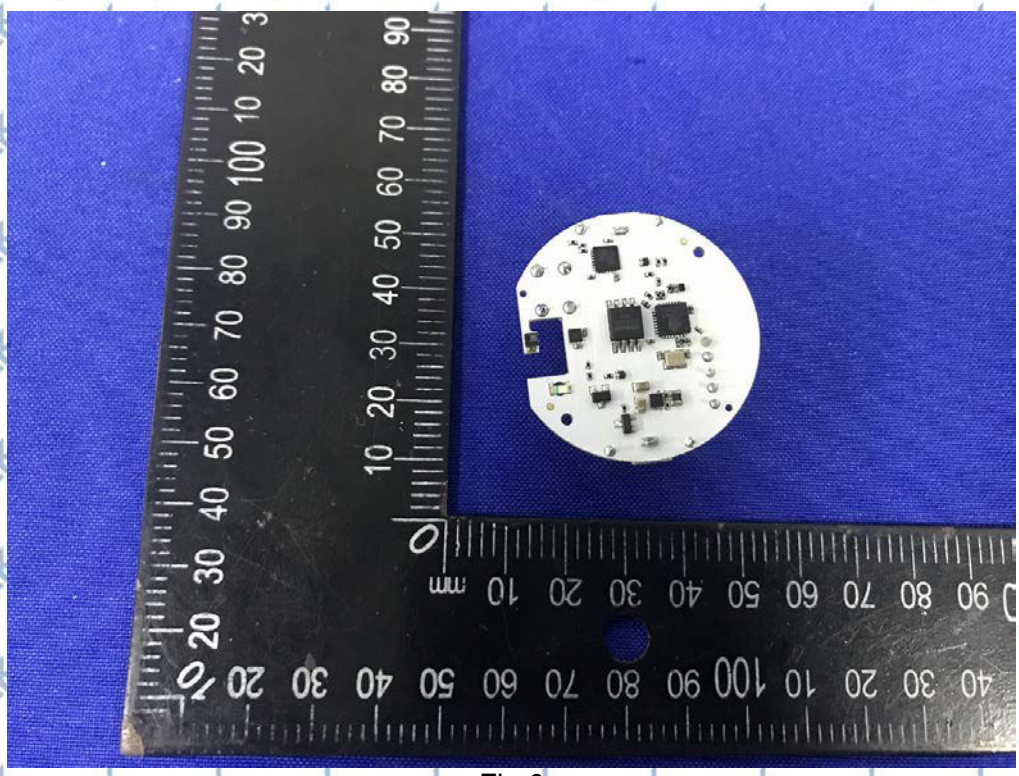

Fig.6

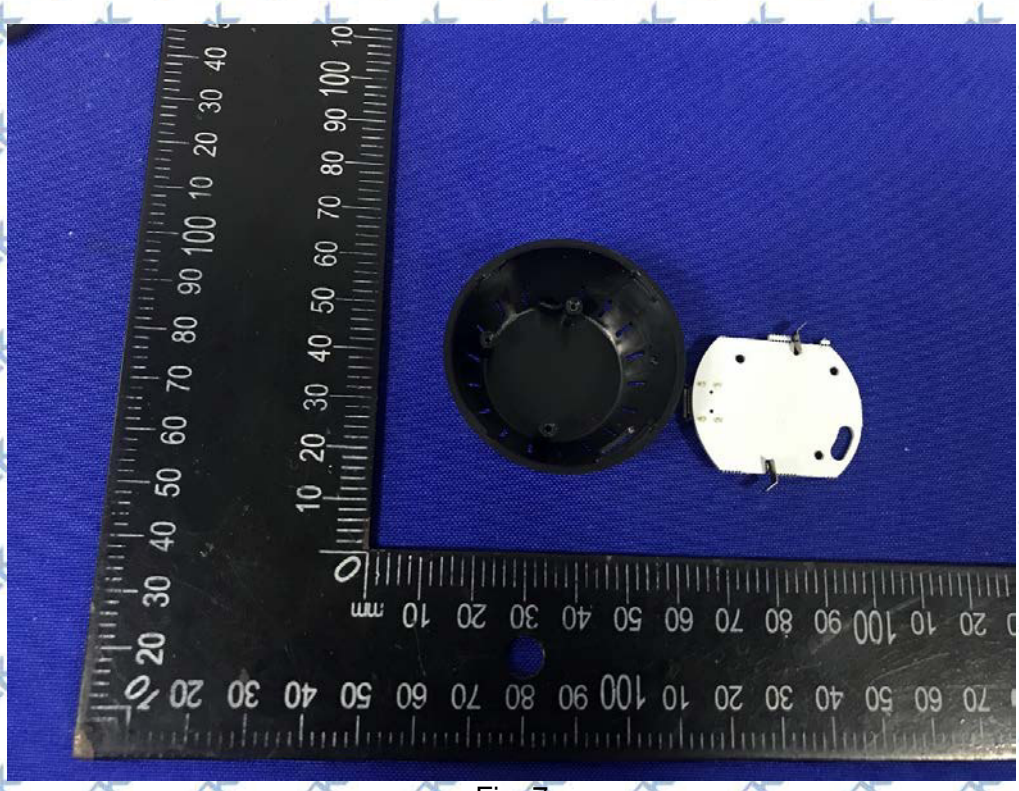

Fig. 7

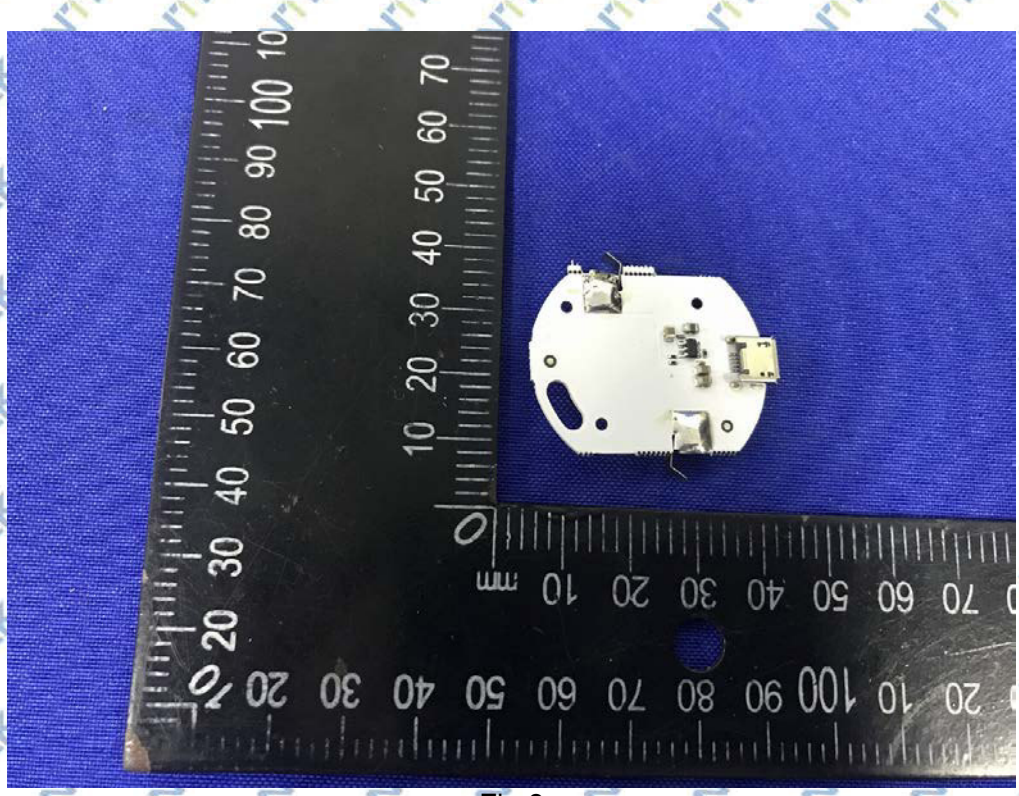

Fig.8

END OF REPORT