EMC TEST REPORT

EN 301 489-1 V2.2.3:2019-11
EN 301 489-17 V3.3.1:2024-09
EN 55032:2015+A11:2020+A1:2020
EN 55035:2017+A11:2020
EN IEC 61000-3-2:2019+A1:2021+A2:2024
EN 61000-3-3:2013+A1:2019+A2:2021

Product : Smart Energy Sensor

Trade Mark : Matis/ Matismart

Model Name : BPM3113

Family Model : BPM3111, BPM3121, BPM3123

Report No. : DGE260616014R01

Prepared for

Shanghai Matis Electric Co.Ltd

Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306

Prepared by

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TEST RESULT CERTIFICATION

Applicant's Name.....:	Shanghai Matis Electric Co.Ltd
Address.....:	Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306
Manufacturer's Name.....:	Matismart Electrical (Suzhou) Co.,ltd
Address.....:	Room 201, Building 29, NO.369,Lushan Road, High-Tech Zone, Suzhou City, Jiangsu Province, China

Product description

Product name.....:	Smart Energy Sensor
Trade Mark.....:	Matis/ Matismart
Model Name.....:	BPM3113
Family Model:	BPM3111, BPM3121,BPM3123
Standards.....:	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.3.1 (2024-09) EN 55032:2015+A11:2020+A1:2020; EN 55035:2017+A11:2020 EN IEC 61000-3-2:2019+A1:2021+A2:2024; EN 61000-3-3:2013+A1:2019+A2:2021

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 of 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.....:	May 07, 2026~ May 12, 2026
Date of Issue.....:	Jun. 18, 2026
Test Result.....:	**Pass**

Note: All test data of this report are based on the original test report DGE260507024R01, *dated by* May 12,2026

Testing Engineer : (Matt Sun)

Technical Manager : (Brian Yang)

Authorized Signatory : (Bart Fang)

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1. TEST SUMMARY

Test procedures according to the technical standards:				
EN 55032:2015+A11:2020+A1:2020 EN 55035:2017+A11:2020 EN IEC 61000-3-2:2019+A1:2021+A2:2024 EN 61000-3-3:2013+A1:2019+A2:2021				
EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN 55032:2015+A11:2020+A1:2020	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	N/A	NOTE (1)
EN IEC 61000-3-2:2019+A1:2021+A2:2024	Harmonic Current Emission	Class A	N/A	NOTE (2)
EN 61000-3-3:2013+A1:2019+A2:2021	Voltage Fluctuations & Flicker	------	PASS	

EMC Immunity				
Section EN 55035:2017+A11:2020	Test Item	Performance Criteria	Judgment	Remark
EN 61000-4-2:2009	Electrostatic Discharge	B	PASS	
EN IEC61000-4-3: 2020	RF electromagnetic field	A	PASS	
EN 61000-4-4:2012	Fast transients	B	PASS	
EN 61000-4-5:2014+ A1:2017	Surges	B	PASS	
EN 61000-4-6:2023	Continuous radio frequency disturbances or Injected Current	A	PASS	
EN 61000-4-8:2010	Power Frequency Magnetic Field	A	N/A	NOTE (3)
EN IEC61000-4-11: 2020	Volt. Interruptions Volt. Dips	B / C / C	PASS	NOTE (4)

NOTE:

(1) If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.
If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.
If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, measurement shall only be made up to 5 GHz.
If the highest frequency of the internal sources of the EUT is above 1 GHz, the Measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

(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) “N/A” denotes test is not applicable in this Test Report

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

1.1 TEST FACILITY

Dongguan NTEK Testing Service Co., Ltd.

Add. : Room101/401, Building 3, No.1, Keji 8th Road, Songshan Lake High-Tech Industrial Development Zone, Dongguan, Guangdong, China

CNAS-Lab. : The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)
The Certificate Registration Number is L13824

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	2.64
Radiated Emission	1000MHz ~ 6000MHz	2	2.52
Radiated Emission	6000MHz ~ 18000MHz	2	2.52
Power Clamp	30MHz ~ 300MHz	2	2.20

Revision History

Report No.	Version	Description	Issued Date
DGE260616014R01	Rev.01	Initial issue of report	Jun. 18, 2026

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Energy Sensor
Trade Mark	Matis/ Matismart
Model Name	BPM3113
Family Model	BPM3111, BPM3121,BPM3123
Model Difference	All models of PCB layout and key components are the same.
Frequency Bands:	802.11b/g/n(20MHz): 2412~2472MHz
Modulation Mode:	IEEE 802.11b : DSSS (DBPSK, DQPSK, CCK) IEEE 802.11g/n (HT20) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Power Rating	208-415VAC, 50/60Hz, 2W
Adapter	N/A
Battery	N/A
Connecting I/O Port(s)	Please refer to the User's Manual
Antenna	PCB Antenna
Hardware Version	N/A
Firmware version	N/A
Software Version	N/A

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	Working

For Conducted Test	
Final Test Mode	Description
Mode 1	Working

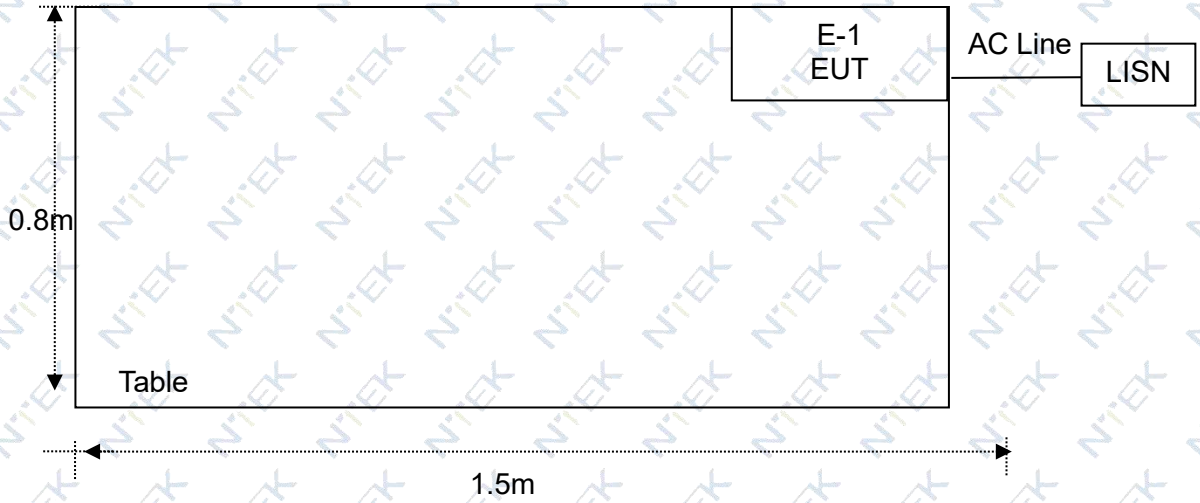
For Radiated Test	
Final Test Mode	Description
Mode 1	Working

For EMS Test	
Pretest Mode	Description
Mode 1	Working

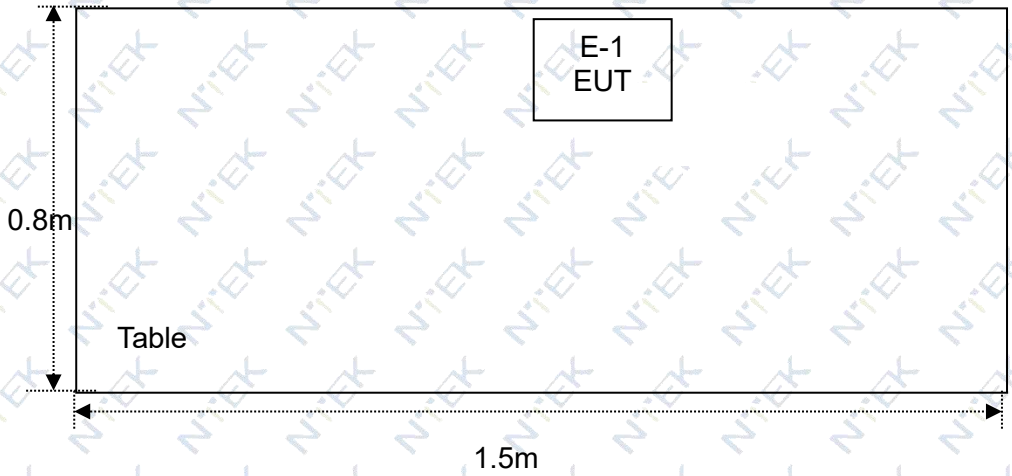
NOTE: The test modes were carried out for all operation modes. The final test mode of the EUT was the worst test mode for EMI, and its test data was showed.

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	Model/Type No.	Series No.	Note
E-1	Smart Energy Sensor	BPM3113	N/A	EUT

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

CONDUCTED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Single Phase LISN	SCHWARZBECK	NLSK 8127	831	Dec. 09, 2025	Dec. 08, 2026	1 year
2	Limiter	R&S	ESH3-Z2	101601	Jul. 02, 2025	Jul. 01, 2026	1 year
3	Test Cable	REBES	F2-NMNM-3M	1810C34	Jul. 02, 2025	Jul. 01, 2026	1 year
4	EMI Test Receiver	R&S	ESPI3	101121	Jul. 02, 2025	Jul. 01, 2026	1 year
5	Testing Software		EZ-EMC(Ver.EMC-CON 3A1.1)				

RADIATED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Antenna Mast	SKET	N/A	N/A	N/A	N/A	N/A
2	Test Cable	REBES	A50-NMNM-8M-A	1810C35	Jul. 02, 2025	Jul. 01, 2026	1 year
3	Test Cable	REBES	A50-NMNM-3M	1810C36	Jul. 02, 2025	Jul. 01, 2026	1 year
4	Test Cable	REBES	A50-NMNM-1M	1810C37	Jul. 02, 2025	Jul. 01, 2026	1 year
5	Bilog Antenna	TESEQ	CBL6112B	186604	Jul. 07, 2025	Jul. 06, 2026	1 year
6	Low Noise Pre-Amplifier	SCHWARZBECK	BBV 9743 B	00343	Dec. 09, 2025	Dec. 08, 2026	1 year
7	EMI Test Receiver	R&S	ESPI7	100268	Jul. 02, 2025	Jul. 01, 2026	1 year
8	Testing Software		EZ-EMC(Ver.FA-032ARE)				

HARMONICS AND FLICK

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Harmonic & Flicker	LAPLACE INSTRUMENTS	AC2000A	0303-04	Dec. 09, 2025	Dec. 08, 2026	1 year

ESD

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	ESD TEST GENERATOR	PRIMA	ESD61002TA	PR230825184	Dec. 10, 2025	Dec. 09, 2026	1 year

RS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Power Sensor	R&S	Z11	116655	Nov. 05, 2025	Nov. 04, 2026	1 year
2	Power Sensor	R&S	Z11	121896	Nov. 05, 2025	Nov. 04, 2026	1 year
3	Signal Generator	Agilent	N5181A	MY47070409	Nov. 05, 2025	Nov. 04, 2026	1 year
4	Power Amplifier	SKET	HAP_80M01G-250W	S202211402	Nov. 05, 2025	Nov. 04, 2026	1 year
5	Power Amplifier	SKET	HAP_010G060G-80W	S202211403	Nov. 05, 2025	Nov. 04, 2026	1 year
6	RS Test Antenna	SKET	STLP 9129 Plus	SK2022101 2006	Nov. 05, 2025	Nov. 04, 2026	1 year

SURGE, EFT/BURST, VOLTAGE INTERRUPTION/DIPS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Surge Generator	EMC PARTNER	TRA2000IN6	809	Dec. 06, 2025	Dec. 05, 2026	1 year
2	DIPS Generator	EMC PARTNER	TRA2000IN6	809	Dec. 06, 2025	Dec. 05, 2026	1 year
3	EFT/B Generator	EMC PARTNER	TRA2000IN6	809	Dec. 06, 2025	Dec. 05, 2026	1 year

CONTINUOUS RADIO FREQUENCY DISTURBANCES

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Conducted Radio-frequency Test System	Prima	CRF61006A-PC	PR9240281642	Jul. 02, 2025	Jul. 01, 2026	1 year
2	EM Clamp	Prima	PECL-100	PR240381648	Jul. 02, 2025	Jul. 01, 2026	1 year
3	Coupling and Decoupling Network	Prima	CRF-CDN-M216	PR9240381652	Jul. 02, 2025	Jul. 01, 2026	1 year
4	Coupling and Decoupling Network	Prima	CRF-CDN-M316	PR9240381655	Jul. 02, 2025	Jul. 01, 2026	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

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

Table A.8 – Requirements for conducted emissions from the AC mains power ports of Class A equipment

Applicable to 1. AC mains power ports (3.1.1)				
Table clause	**Frequency range** MHz	**Coupling device** (see Table A.7)	**Detector type / bandwidth**	**Class A limits dB(μV)**
A8.1	0,15 – 0,5	AMN	Quasi Peak / 9 kHz	79
	0,5 – 30			73
A8.2	0,15 – 0,5	AMN	Average / 9 kHz	66
	0,5 – 30			60
Apply A8.1 and A8.2 across the entire frequency range.				

Table A.9 – Requirements for conducted emissions from the AC mains power ports of Class B equipment

Applicable to 1. AC mains power ports (3.1.1)				
Table clause	**Frequency range** MHz	**Coupling device** (see Table A.7)	**Detector type / bandwidth**	**Class B limits dB(μV)**
A9.1	0,15 – 0,5	AMN	Quasi Peak / 9 kHz	66 – 56
	0,5 – 5			56
	5 – 30			60
A9.2	0,15 – 0,5	AMN	Average / 9 kHz	56 – 46
	0,5 – 5			46
	5 – 30			50
Apply A9.1 and A9.2 across the entire frequency range.				

Note:

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

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

3.1.2 TELECOMMUNICATION PORT CONDUCTED EMISSION(VOLTAGE LIMITS)

(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.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.

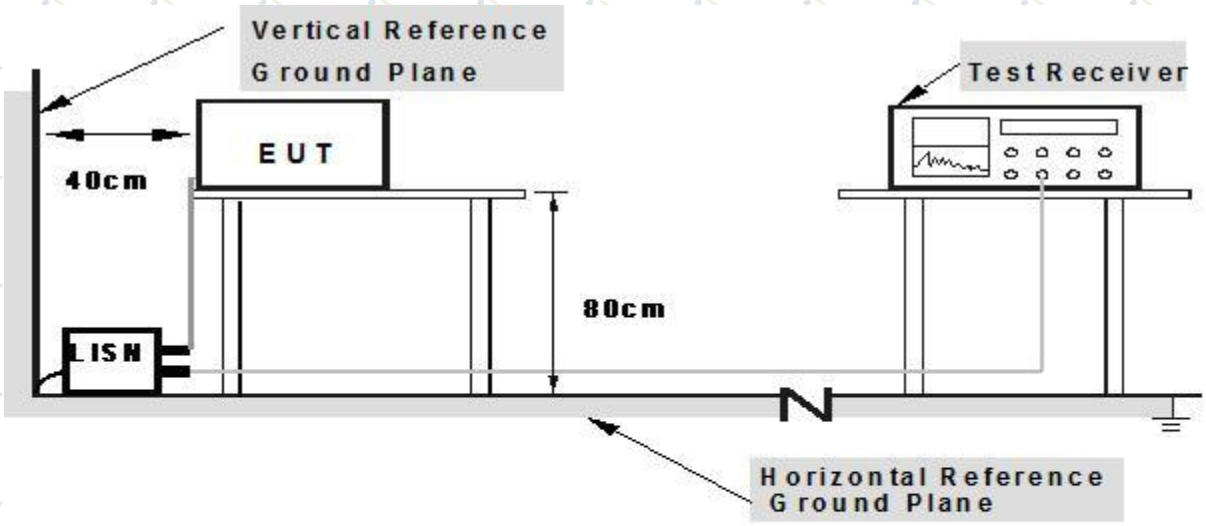
The following table is the setting of the receiver

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

3.1.3 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.

3.1.4 TEST SETUP



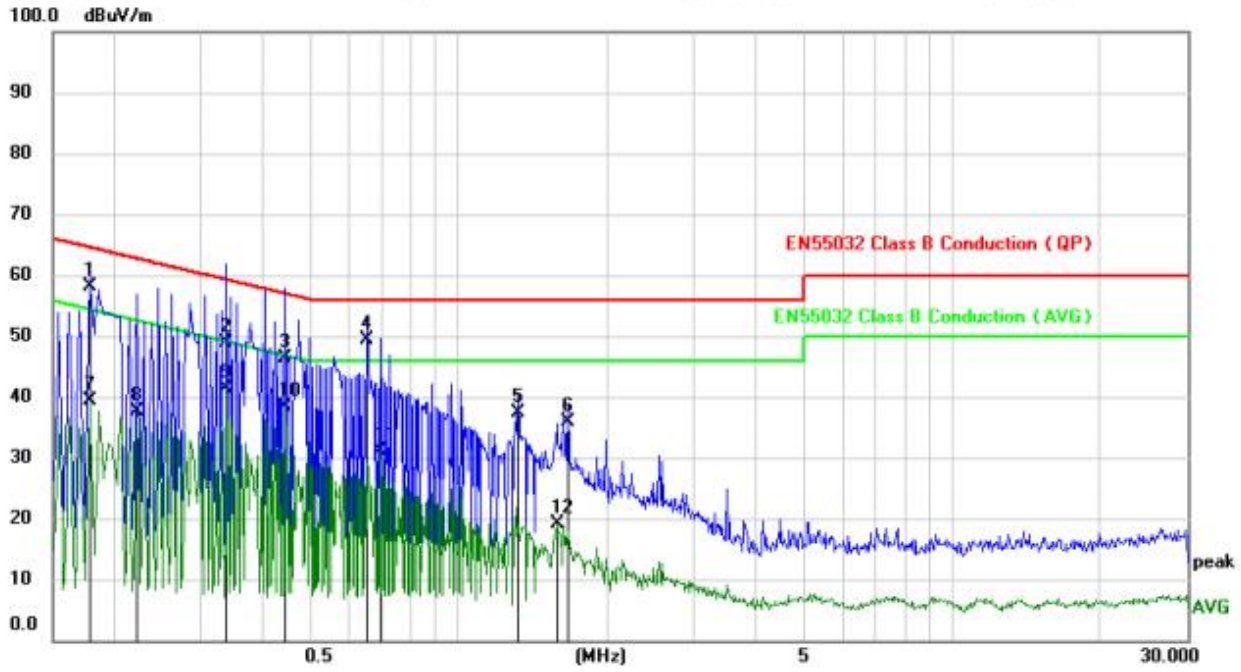
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 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.

3.1.6 TEST RESULTS

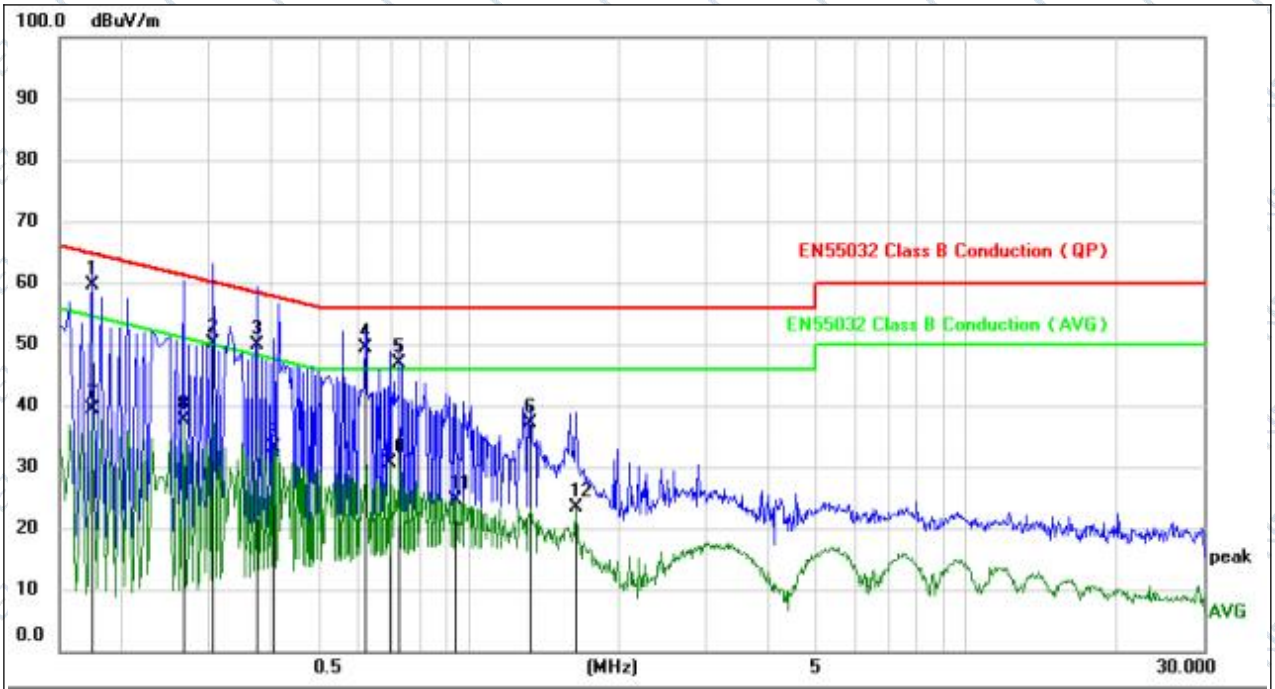
EUT:	Smart Energy Sensor	Model Name:	BPM3113
Temperature:	25℃	Relative Humidity:	52%
Pressure:	1010hPa	Phase:	N
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.1780	48.35	9.82	58.17	64.58	-6.41	QP	
2		0.3379	39.16	9.84	49.00	59.25	-10.25	QP	
3		0.4460	36.45	9.85	46.30	56.95	-10.65	QP	
4		0.6540	39.46	9.87	49.33	56.00	-6.67	QP	
5		1.3180	27.56	9.89	37.45	56.00	-18.55	QP	
6		1.6700	25.90	9.89	35.79	56.00	-20.21	QP	
7		0.1780	29.66	9.82	39.48	54.58	-15.10	AVG	
8		0.2220	27.91	9.82	37.73	52.74	-15.01	AVG	
9		0.3379	31.63	9.84	41.47	49.25	-7.78	AVG	
10		0.4460	28.65	9.85	38.50	46.95	-8.45	AVG	
11		0.6900	21.14	9.87	31.01	46.00	-14.99	AVG	
12		1.5780	9.19	9.89	19.08	46.00	-26.92	AVG	

Remark:
Factor = Insertion Loss + Cable Loss.

EUT:	Smart Energy Sensor	Model Name:	BPM3113
Temperature:	25℃	Relative Humidity:	52%
Pressure:	1010hPa	Phase:	L
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.1740	49.74	9.84	59.58	64.77	-5.19	QP	
2		0.3060	40.26	9.84	50.10	60.08	-9.98	QP	
3		0.3740	40.15	9.85	50.00	58.41	-8.41	QP	
4		0.6180	39.42	9.86	49.28	56.00	-6.72	QP	
5		0.7260	36.92	9.87	46.79	56.00	-9.21	QP	
6		1.3260	27.14	9.89	37.03	56.00	-18.97	QP	
7		0.1740	29.55	9.84	39.39	54.77	-15.38	AVG	
8		0.2660	27.76	9.83	37.59	51.24	-13.65	AVG	
9		0.4060	23.34	9.85	33.19	47.73	-14.54	AVG	
10		0.6900	20.80	9.87	30.67	46.00	-15.33	AVG	
11		0.9420	14.80	9.88	24.68	46.00	-21.32	AVG	
12		1.6380	13.51	9.89	23.40	46.00	-22.60	AVG	

Remark:
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.

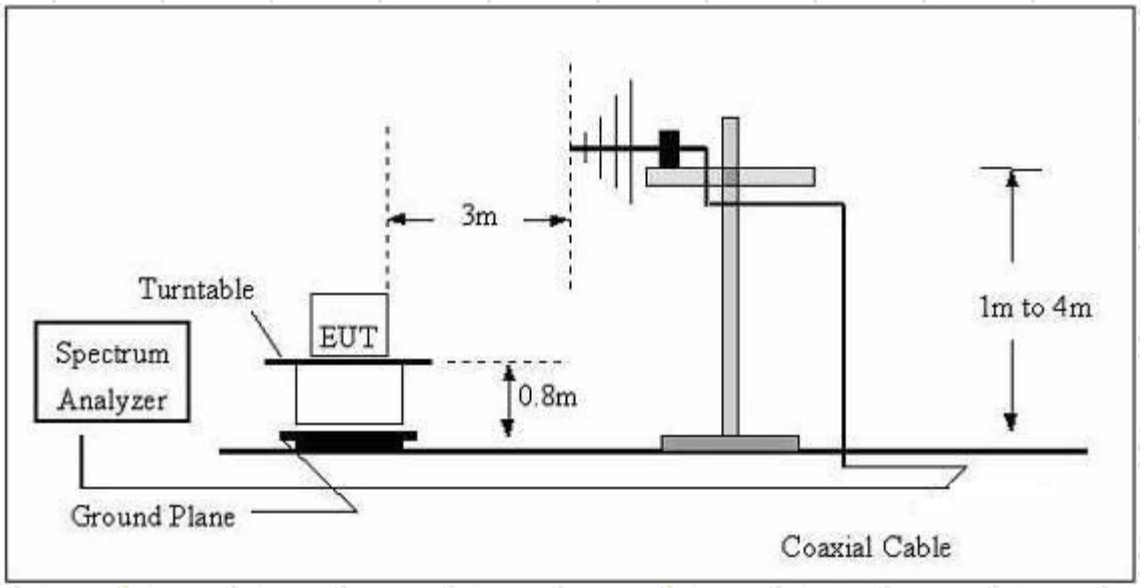
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

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.

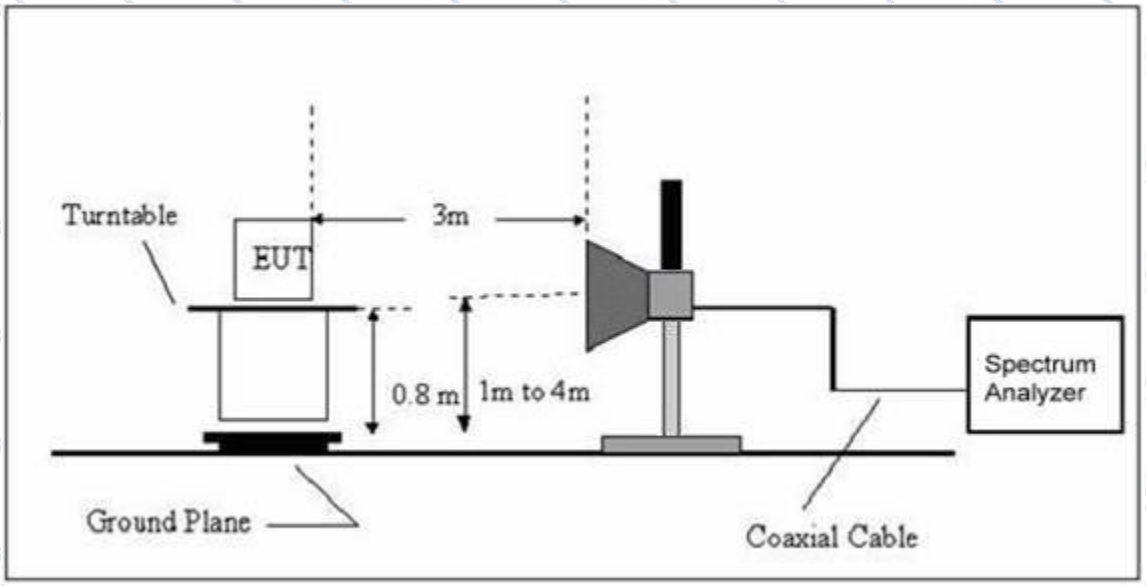
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.4 TEST SETUP

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



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

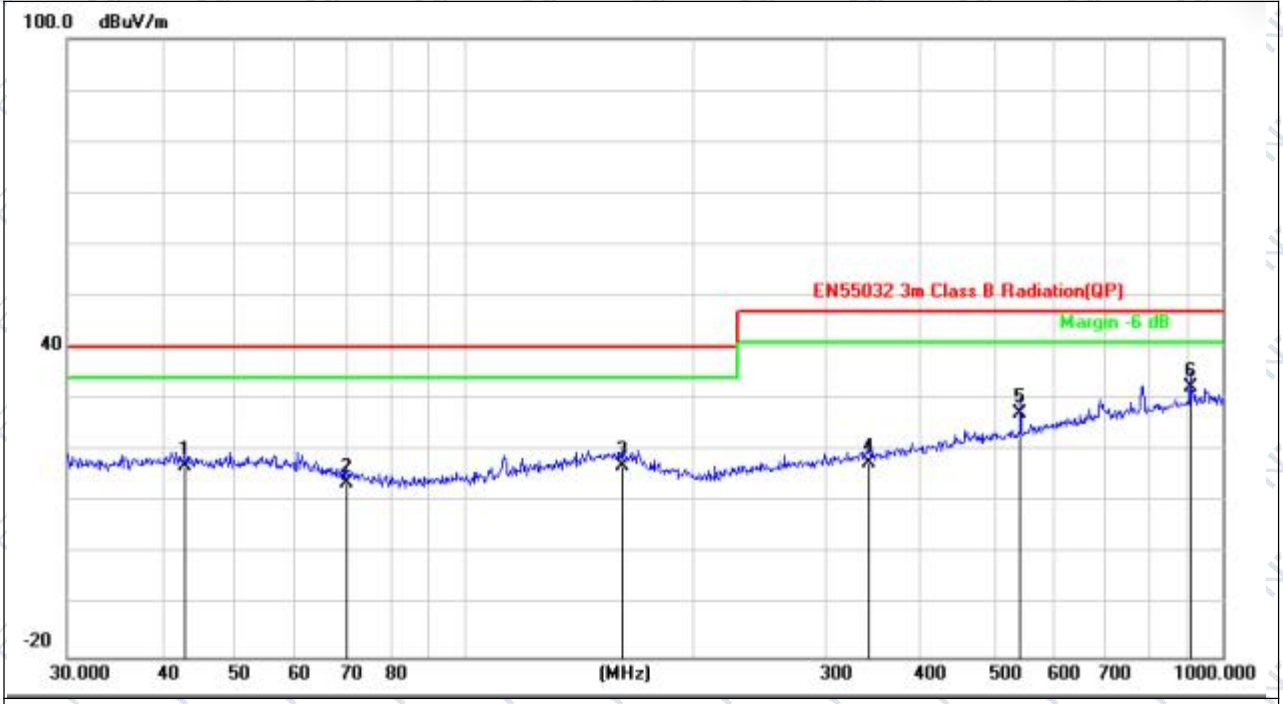


3.2.5 EUT OPERATING CONDITIONS

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)

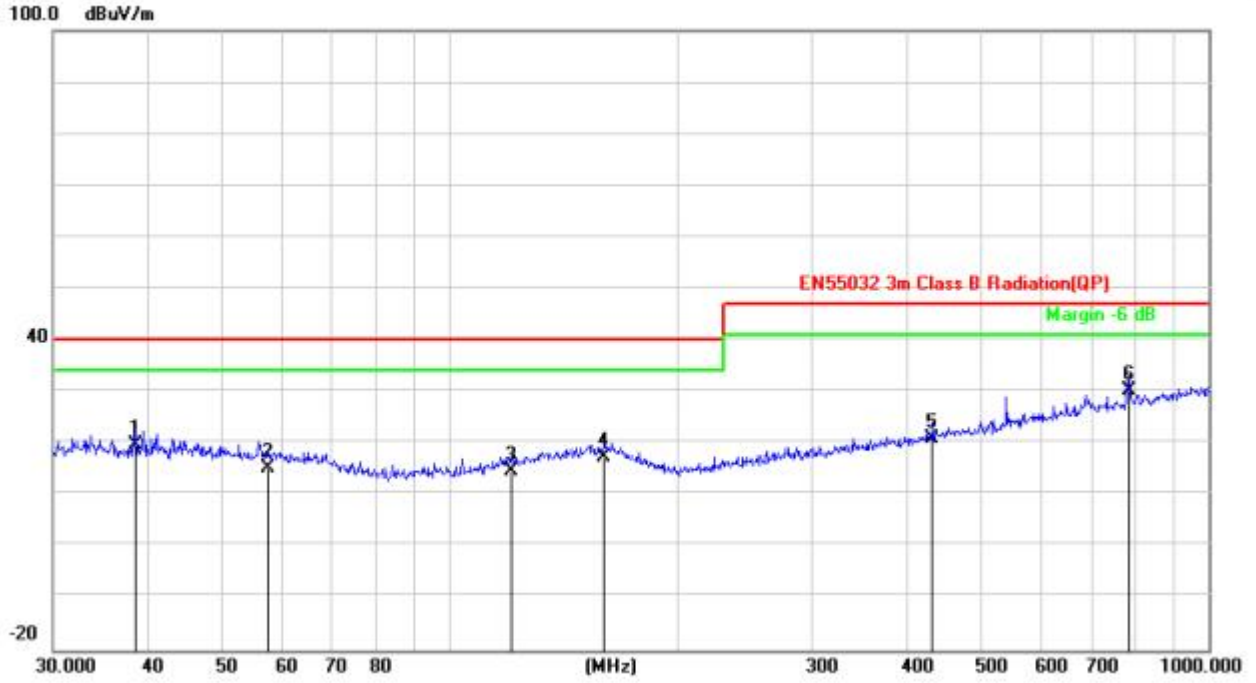
EUT:	Smart Energy Sensor	Model Name:	BPM3113
Temperature:	25℃	Relative Humidity:	52%
Pressure:	1010 hPa	Polarization:	Horizontal
Test Power:	AC 230V/50Hz	Test Mode:	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		42.8998	24.93	-7.81	17.12	40.00	-22.88	QP			
2		70.0903	24.50	-10.76	13.74	40.00	-26.26	QP			
3		162.0414	24.23	-7.27	16.96	40.00	-23.04	QP			
4		341.9786	24.46	-6.95	17.51	47.00	-29.49	QP			
5		541.3725	29.91	-2.73	27.18	47.00	-19.82	QP			
6	*	906.4824	29.31	3.07	32.38	47.00	-14.62	QP			

Remark:
Factor = Antenna Factor + Cable Loss.

EUT:	Smart Energy Sensor	Model Name:	BPM3113
Temperature:	25℃	Relative Humidity:	52%
Pressure:	1010 hPa	Polarization:	Vertical
Test Power:	AC 230V/50Hz	Test Mode:	Mode 1



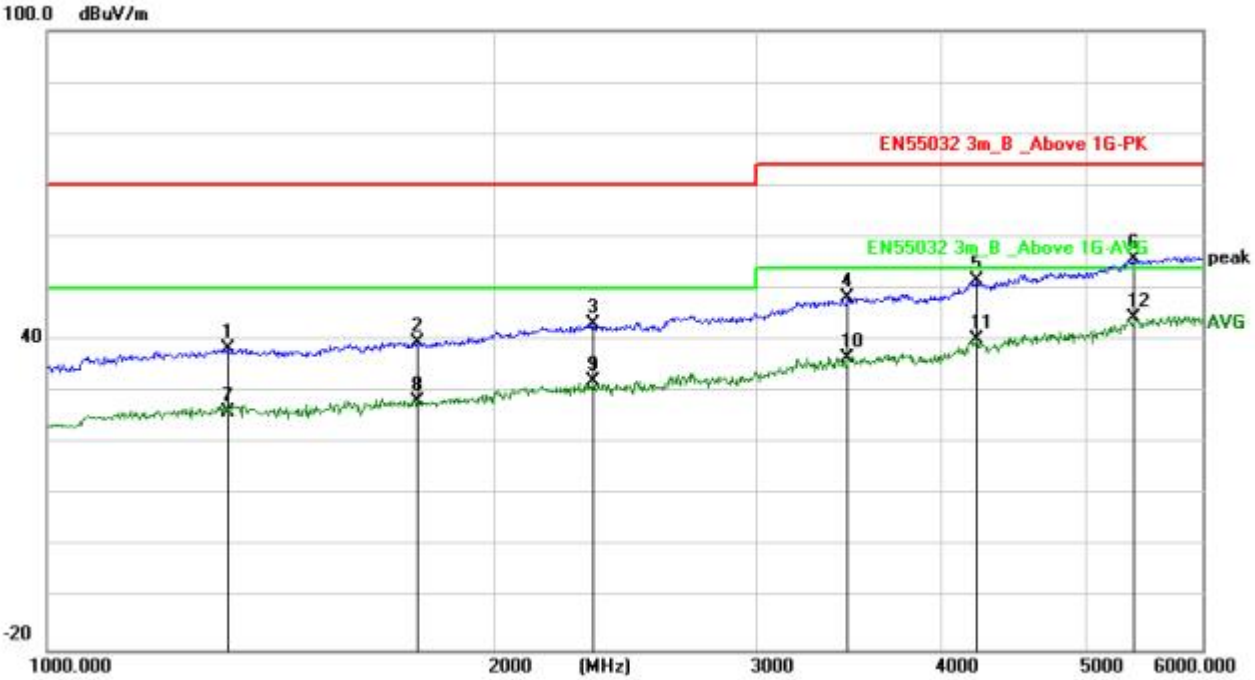
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		38.4809	27.42	-7.78	19.64	40.00	-20.36	QP			
2		57.5939	24.01	-8.68	15.33	40.00	-24.67	QP			
3		120.2766	23.76	-9.11	14.65	40.00	-25.35	QP			
4		159.7844	24.42	-7.08	17.34	40.00	-22.66	QP			
5		432.5457	25.85	-4.80	21.05	47.00	-25.95	QP			
6	*	785.0935	28.70	1.59	30.29	47.00	-16.71	QP			

Remark:
Factor = Antenna Factor + 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.

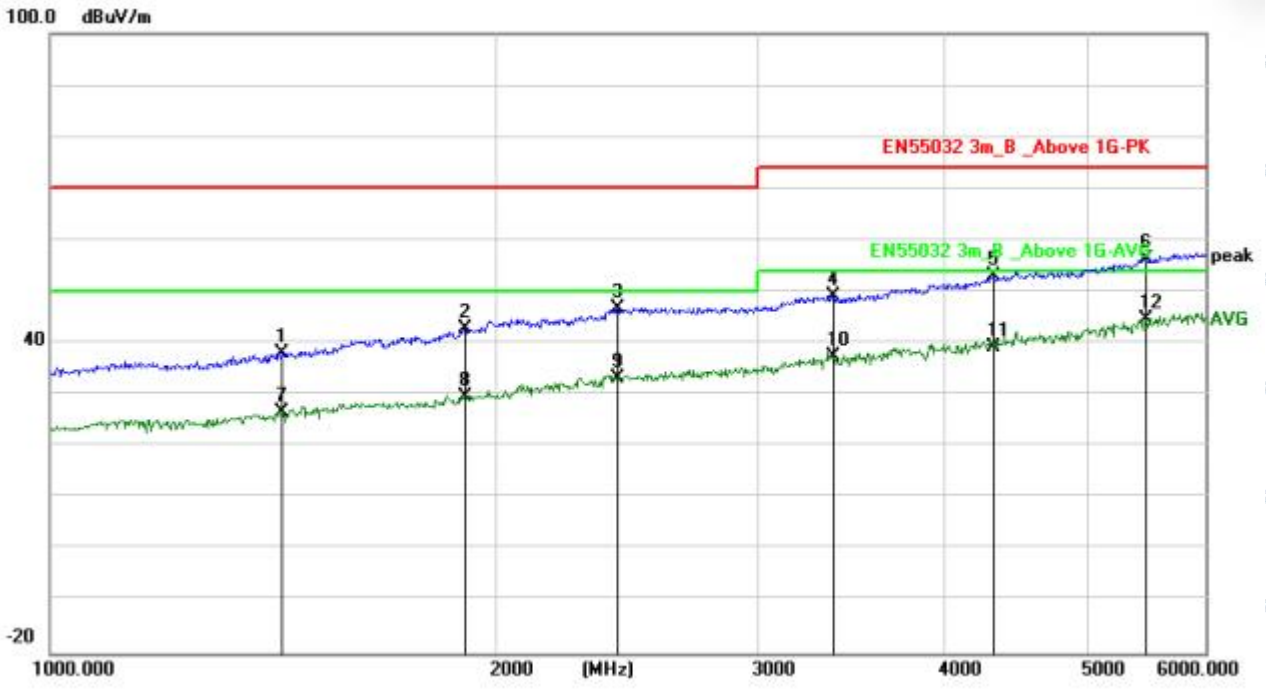
3.2.7 TEST RESULTS(1000-6000 MHz)

EUT：	Smart Energy Sensor	Model Name：	BPM3113
Temperature：	25℃	Relative Humidity：	53%
Pressure：	1010hPa	Polarization:	Horizontal
Test Power：	AC 230V/50Hz	Test Mode ：	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		1322.487	36.47	1.80	38.27	70.00	-31.73	peak			
2		1774.224	35.14	4.45	39.59	70.00	-30.41	peak			
3		2333.810	36.56	6.46	43.02	70.00	-26.98	peak			
4		3461.456	36.89	11.45	48.34	74.00	-25.66	peak			
5		4230.695	38.17	13.31	51.48	74.00	-22.52	peak			
6		5398.092	40.00	15.67	55.67	74.00	-18.33	peak			
7		1322.487	24.11	1.80	25.91	50.00	-24.09	AVG			
8		1774.224	23.69	4.45	28.14	50.00	-21.86	AVG			
9		2333.810	25.49	6.46	31.95	50.00	-18.05	AVG			
10		3461.456	25.12	11.45	36.57	54.00	-17.43	AVG			
11		4230.695	26.74	13.31	40.05	54.00	-13.95	AVG			
12	*	5398.092	28.79	15.67	44.46	54.00	-9.54	AVG			

EUT：	Smart Energy Sensor	Model Name：	BPM3113
Temperature：	25℃	Relative Humidity：	53%
Pressure：	1010hPa	Polarization:	Vertical
Test Power：	AC 230V/50Hz	Test Mode ：	Mode 1



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		1433.535	35.47	2.47	37.94	70.00	-32.06	peak			
2		1902.639	37.76	5.19	42.95	70.00	-27.05	peak			
3		2410.307	40.13	6.64	46.77	70.00	-23.23	peak			
4		3369.664	38.26	11.03	49.29	74.00	-24.71	peak			
5		4314.907	39.63	13.30	52.93	74.00	-21.07	peak			
6		5476.026	40.60	15.85	56.45	74.00	-17.55	peak			
7		1433.535	24.27	2.47	26.74	50.00	-23.26	AVG			
8		1902.639	24.48	5.19	29.67	50.00	-20.33	AVG			
9		2410.307	26.64	6.64	33.28	50.00	-16.72	AVG			
10		3369.664	26.47	11.03	37.50	54.00	-16.50	AVG			
11		4314.907	26.07	13.30	39.37	54.00	-14.63	AVG			
12	*	5476.026	28.74	15.85	44.59	54.00	-9.41	AVG			

3.3 HARMONICS CURRENT

3.3.1 LIMITS 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.

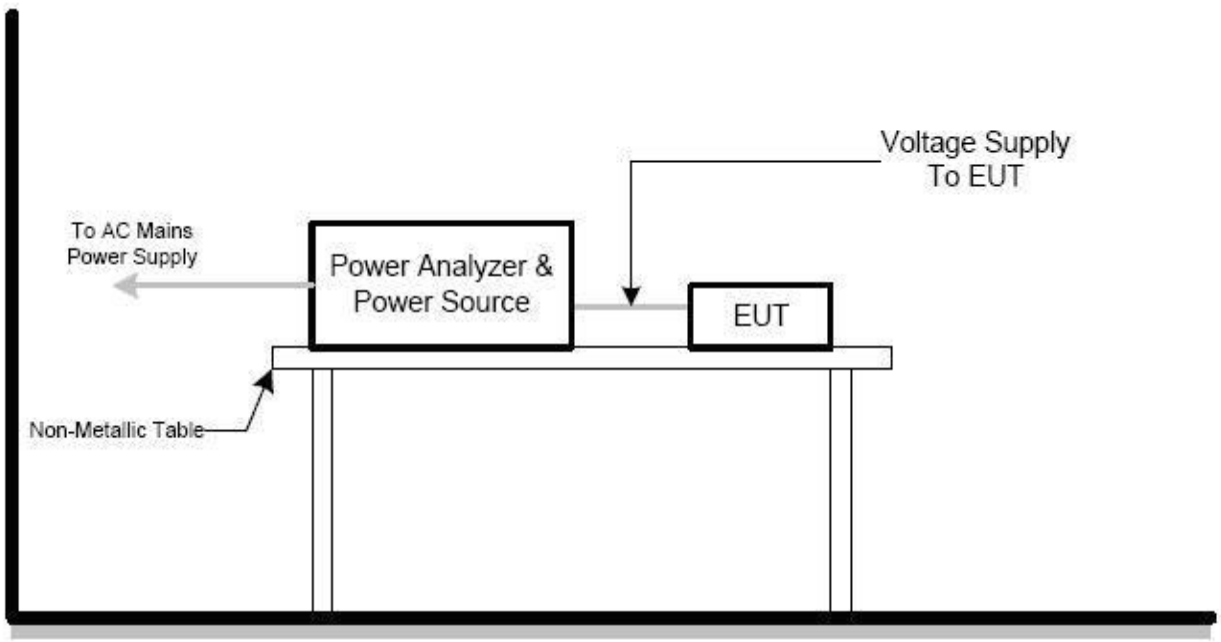
Class D: Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.

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 forthe 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 Energy Sensor	Model Name:	BPM3113
Temperature:	25℃	Relative Humidity:	52%
Pressure:	1010hPa	Test duration:	150s
Classification:	Class A	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.

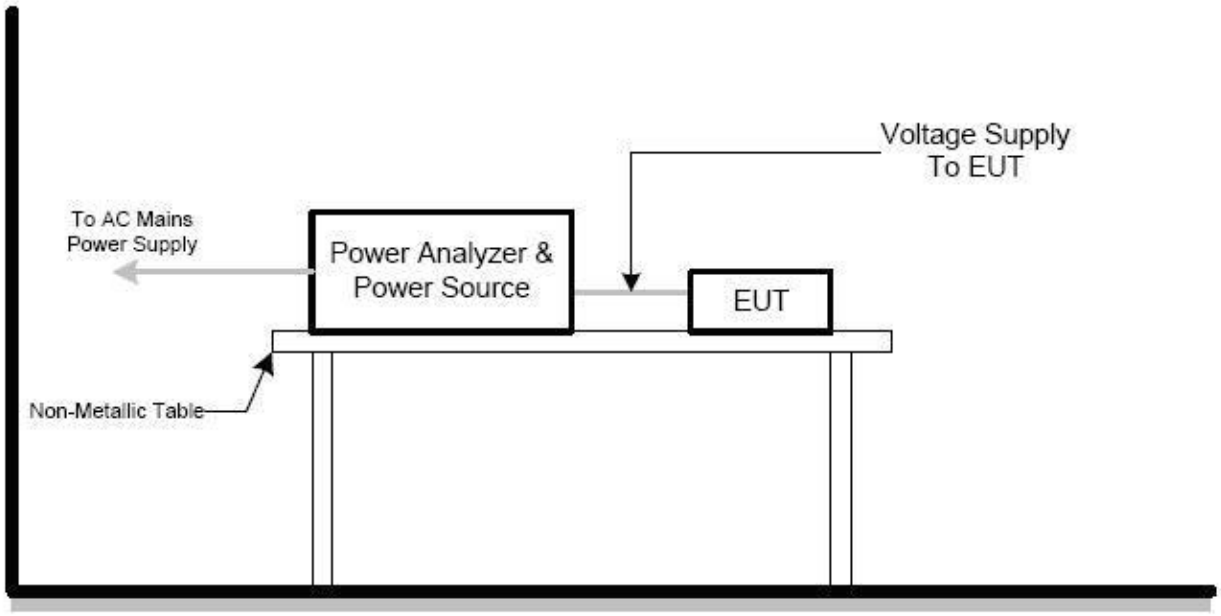
3.4.2 TEST PROCEDURE

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 Energy Sensor	Model Name:	BPM3113
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1012 hPa	Test Power:	AC 230V/50Hz
Test Mode:	Mode 1		

	EUT values	Limit	Result
Pst	0.018	1.00	PASS
Plt	0.102	0.65	PASS
dc [%]	0.000	3.30	PASS
dmax [%]	0.000	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 55035** standard, the general performance criteria as following:

Tests Standard No.	TEST SPECIFICATION	Test Mode Test Ports	Perform. Criteria
1. ESD IEC/EN 61000-4-2	8kV air discharge 4kV contact discharge	Direct Mode	B
	4kV HCP discharge 4kV VCP discharge	Indirect Mode	B
2. RS IEC/EN 61000-4-3	80 MHz to 1000 MHz 1800 MHz 2600 MHz 3500 MHz 5000 MHz 1000Hz, 80% AM modulated	Enclosure	A
3. EFT/Burst IEC/EN 61000-4-4	5/50ns Tr/Th 5kHz Repetition Freq.	AC Power Port	B
	5/50ns Tr/Th 5kHz Repetition Freq.	CTL/Signal Data Line Port	B
4. Surges IEC/EN 61000-4-5	1.2/50(8/20) Tr/Th us	L-N	B
	1.2/50(8/20) Tr/Th us	L-PE N-PE	B
5. Continuous radio frequency disturbances IEC/EN 61000-4-6	0.15 MHz to 80 MHz, 1000Hz 80％, AM Modulated 150Ω source impedance	CTL/Signal Port	A
	0.15 MHz to 80 MHz, 1000Hz 80％, AM Modulated 150Ω source impedance	AC Power Port	A
	0.15 MHz to 80 MHz, 1000Hz 80％, AM Modulated 150Ω source impedance	DC Power Port	A
6. Volt. Interruptions Volt. Dips IEC/EN 61000-4-11	Voltage dip 100% Voltage dip 30% Voltage Interruption 100%	AC Power Port	B C C

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.

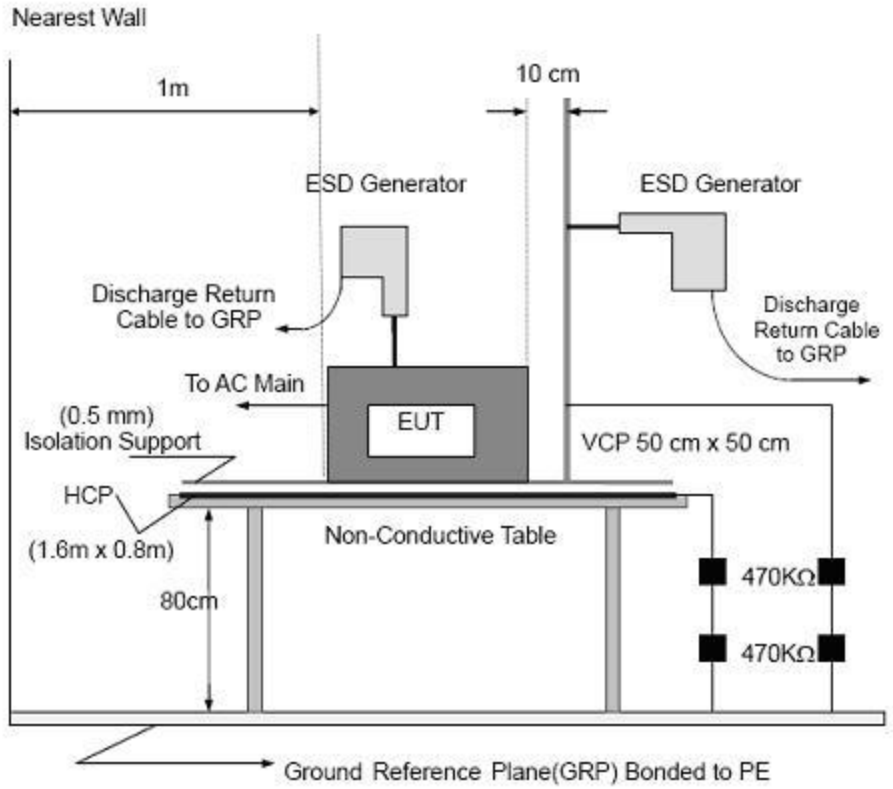
The discharge electrode shall be in contact with the edge of the HCP before the discharge switch is operated

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 Energy Sensor	Model Name:	BPM3113
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1012 hPa	Test Power:	AC 230V/50Hz
Test Mode	Mode 1		

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				

Mode 1

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

Note:

1) +/- denotes the Positive/Negative polarity of the output voltage.
2) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.

4.4 RS TESTING

4.4.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance	A
Frequency Range:	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

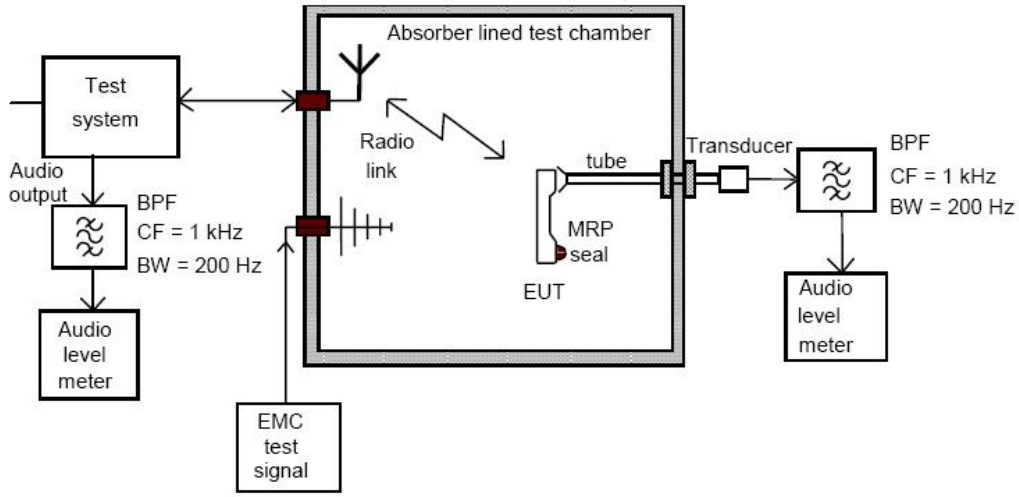
4.4.2 TEST PROCEDURE

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:

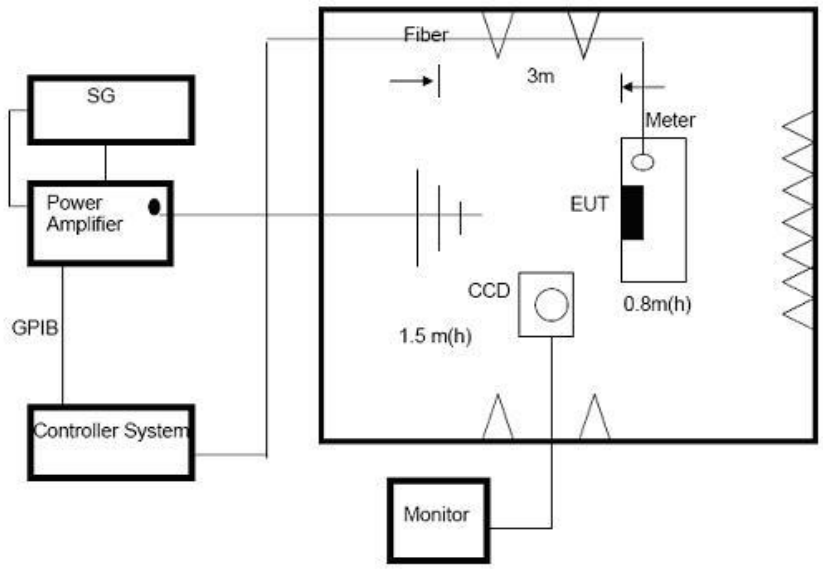
a. The frequency range is swept from 80 MHz to 1000 MHz, 1800 MHz, 2600 MHz, 3500 MHz, 5000 MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5x 10-3 decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
b. Sweep Frequency 900 MHz, with the Duty Cycle:1/8 and Modulation: Pulse 217 Hz(if applicable)
c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
d. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

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 Energy Sensor	Model Name:	BPM3113
Temperature:	25℃	Relative Humidity:	52%
Pressure:	1010 hPa	Test Power:	AC 230V/50Hz
Test Mode:	Mode 1		

TEST RESULT

Mode 1

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

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observation	Perform. Criteria	Results
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.

Note:

1) N/A - denotes test is not applicable in this test report.
2) There was not any unintentional transmission in standby mode
3) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.

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.

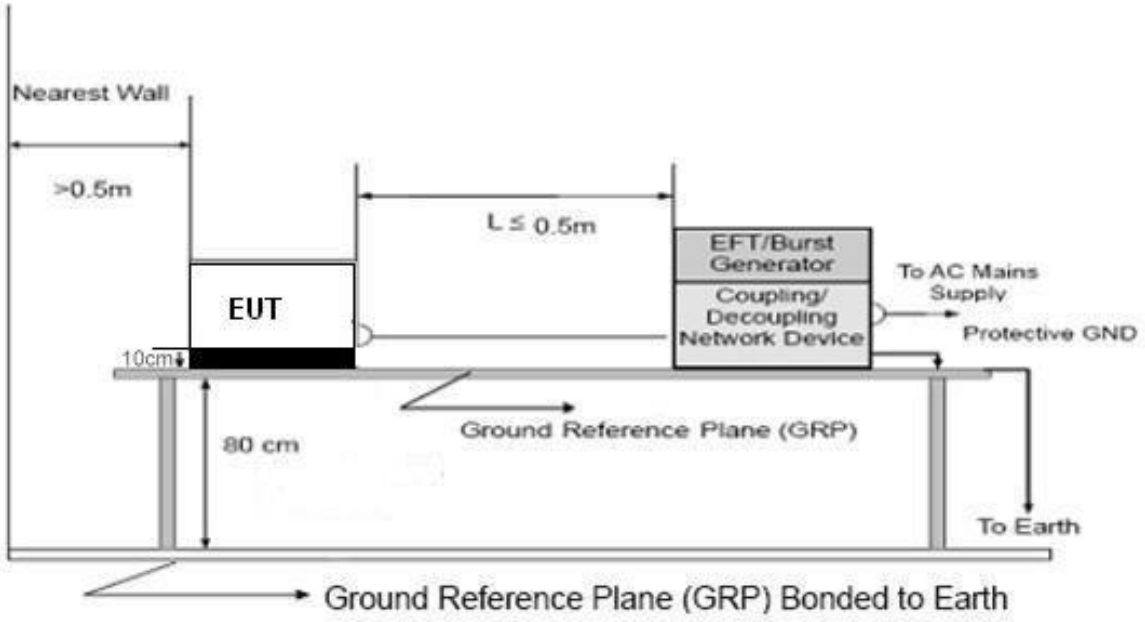
4.5.2 TEST PROCEDURE

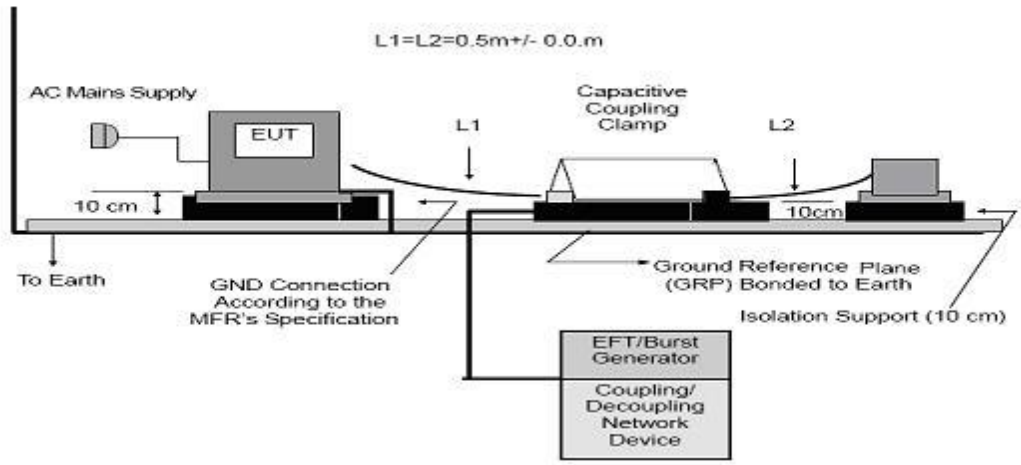
The EUT and support equipment, are placed on a table that is 0.8 meter above a metal ground plane measured 1m*1m min. and 0.65mm thick min.

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 Energy Sensor	Model Name:	BPM3113
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1010 hPa	Test Power:	AC 230V/50Hz
Test Mode:	Mode 1		

TEST RESULT

Mode 1

Coupling Line		Test level (kV)								Observation	Criterion	Result
		0.5		1		2		4				
		+	-	+	-	+	-	+	-			
AC line	L	P	P	P	P					**TT,TR**	**A**	**Complies**
	N	P	P	P	P							
	PE											
	L+N	P	P	P	P							
	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'.

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

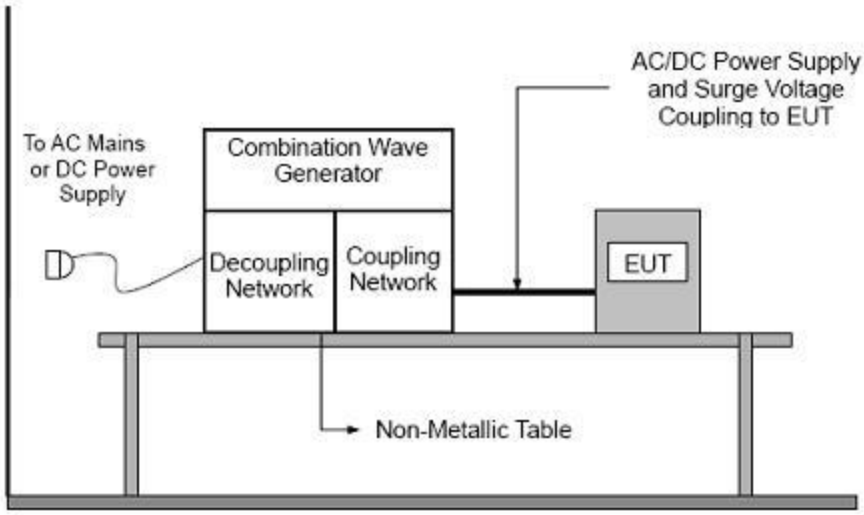
a. For EUT power supply:
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling 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 Energy Sensor	Model Name:	BPM3113
Temperature:	24℃	Relative Humidity:	52%
Pressure:	1010 hPa	Test Power:	AC 230V/50Hz
Test Mode:	Mode 1		

TEST RESULT

Mode 1

Coupling Line			Test level								Observation	Criterion	Result
			0.5 kV		1 kV		2 kV		4 kV				
			+	-	+	-	+	-	+	-			
AC line	L-N	0°	P	P	P	P					**TT,TR**	**A**	**Complies**
		90°	P	P	P	P							
		180°	P	P	P	P							
		270°	P	P	P	P							
	L-PE	0°											
		90°											
		180°											
		270°											
	N-PE	0°											
		90°											
		180°											
		270°											
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'.

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.

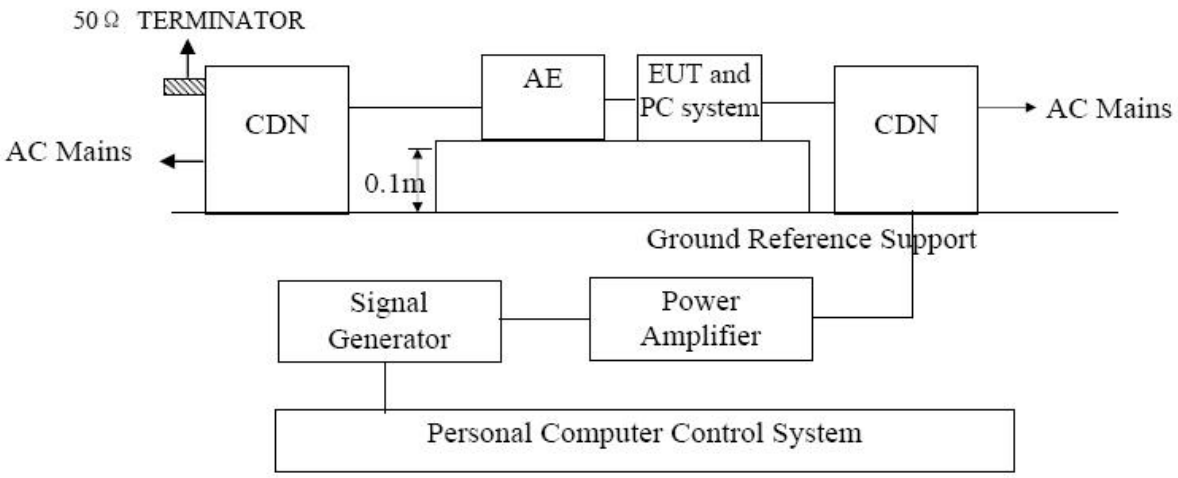
b. The frequency range is swept from 150 KHz to 80 MHz, with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5 x 10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.

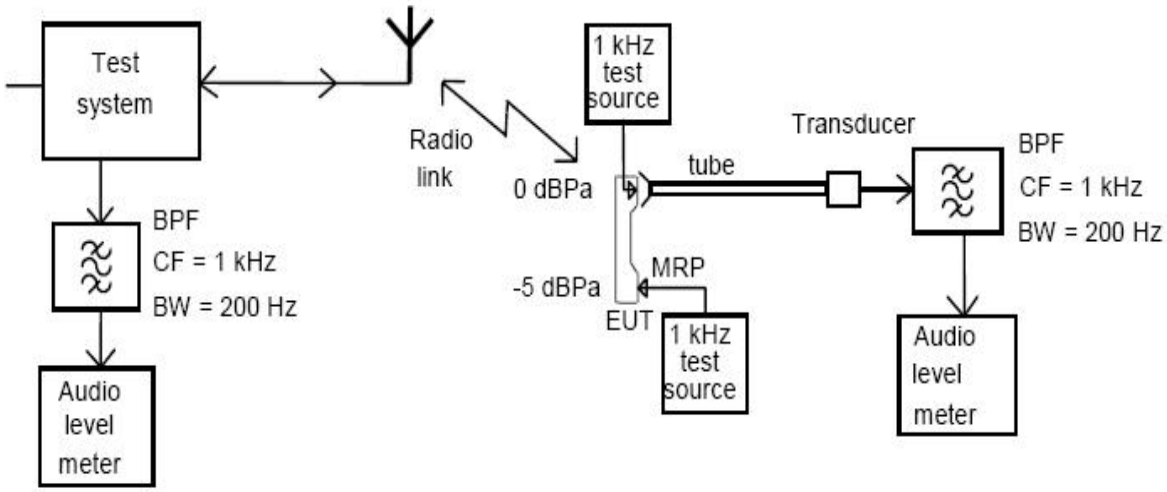
c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

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

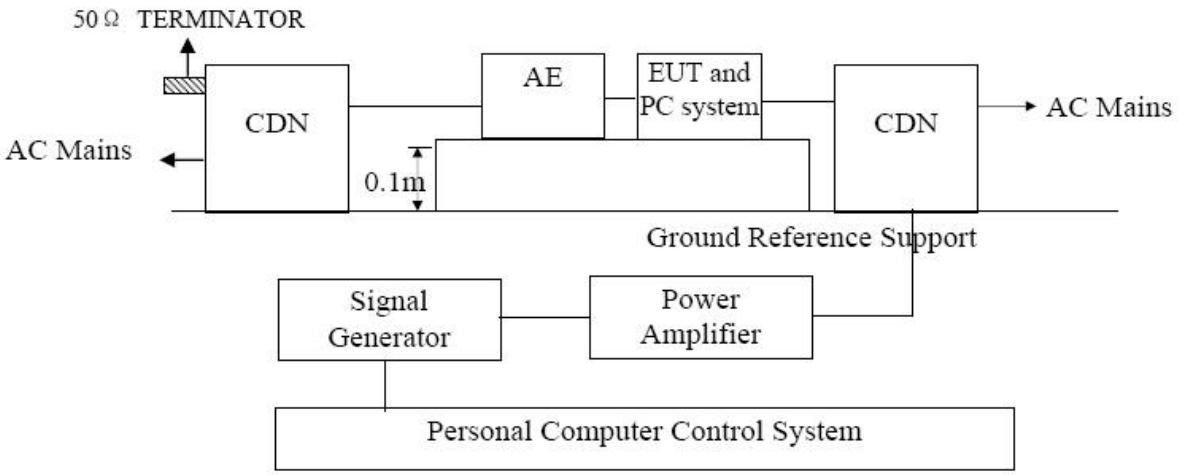
4.7.3 TEST SETUP

☐ 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 Energy Sensor	Model Name:	BPM3113
Temperature:	25℃	Relative Humidity:	52%
Pressure:	1010 hPa	Test Power:	AC 230V/50Hz
Test Mode:	Mode 1		

TEST RESULT

Mode 1

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.

4.8 VOLTAGE INTERRUPTION/DIPS TESTING

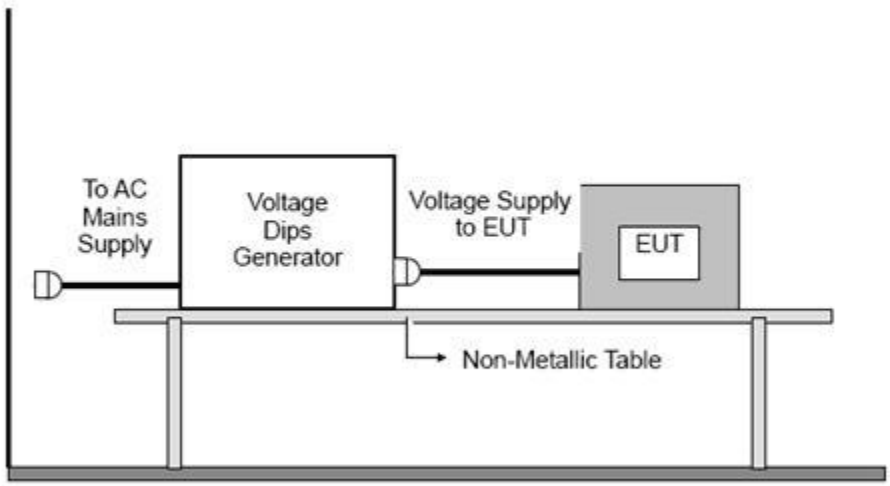
4.8.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance	B (For 100% Voltage Dips) C (For 30% Voltage Dips) C (For 100% Voltage Interruptions)
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 Energy Sensor	Model Name:	BPM3113
Temperature:	25℃	Relative Humidity:	54%
Pressure:	1010 hPa	Test Power:	AC 230V/50Hz
Test Mode:	Mode 1		

TEST RESULT

Mode 1

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

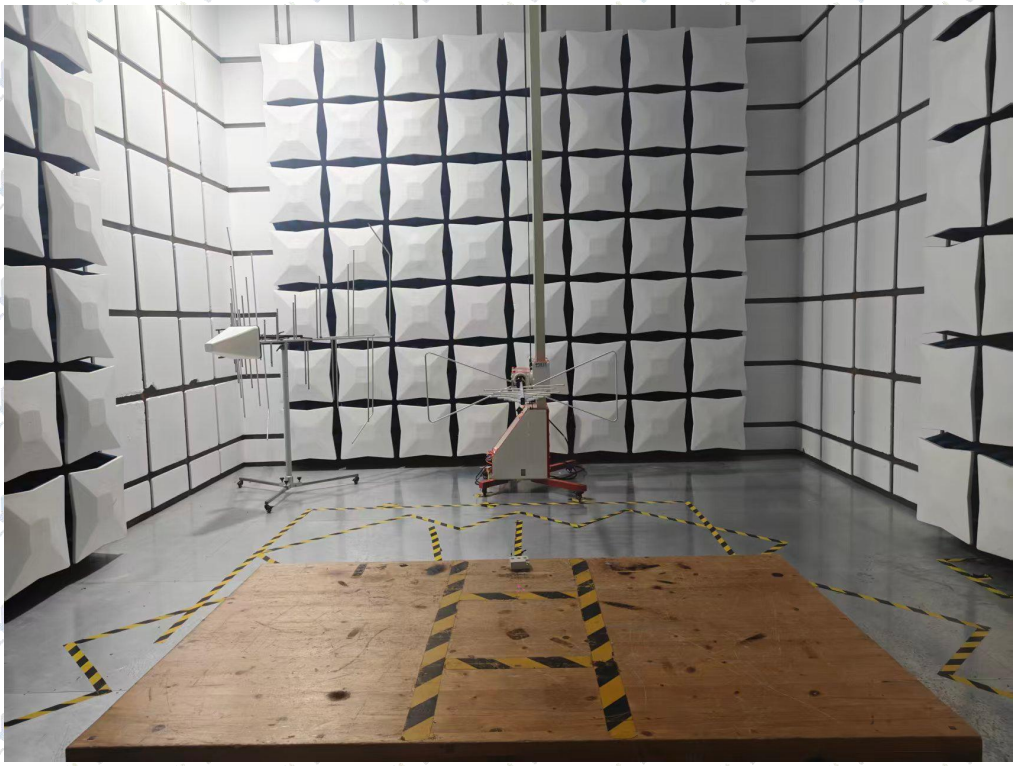
Note:

1) There was not any unintentional transmission in standby mode

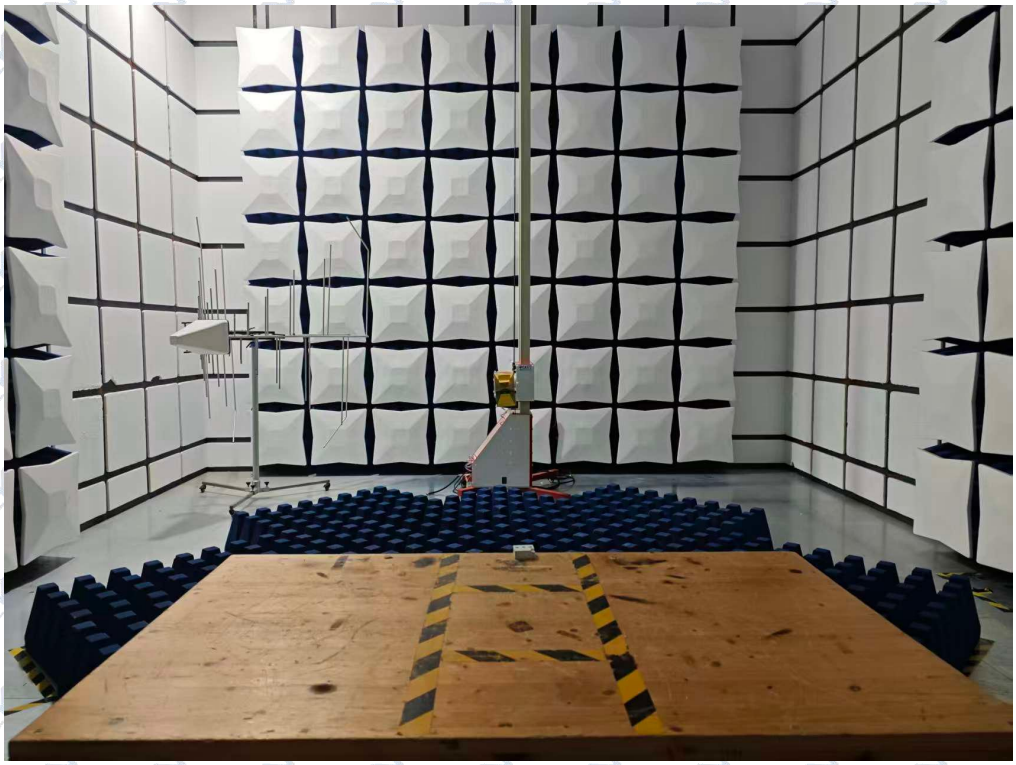
2) In the table: 'P' represents 'PASS'; 'F' represents 'FAIL'.

5. EUT TEST PHOTO

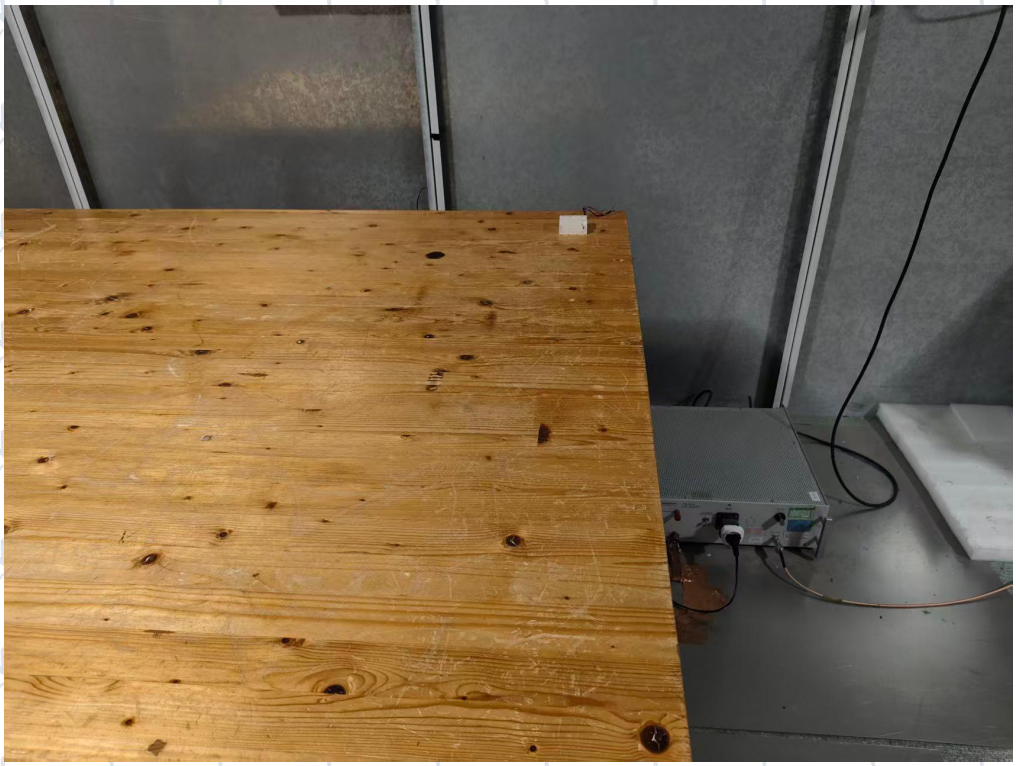
Radiated Measurement Photos(Below 1G)



Radiated Measurement Photos(Above 1G)



Conducted Measurement Photos



RADIO TEST REPORT-WIFI
ETSI EN 300 328 V2.2.2 (2019-07)

Product :	Smart Energy Sensor
Trade Mark :	Matis/ Matismart
Model Name :	BPM3113
Family Model :	BPM3111, BPM3121, BPM3123
Report No. :	DGE260616014R02

Prepared for

Shanghai Matis Electric Co.Ltd

Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306

Prepared by

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Tel: (86)-0769-2330 1624 Fax: (86)-0769-2330 1624

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

E-mail:cs-dg@gdntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name.....	Shanghai Matis Electric Co.Ltd
Address.....	Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306
Manufacturer's Name.....	Matismart Electrical (Suzhou) Co.,ltd
Address.....	Room 201, Building 29, NO.369,Lushan Road, High-Tech Zone, Suzhou City, Jiangsu Province, China

Product description

Product name.....	Smart Energy Sensor
Trademark	Matis/ Matismart
Model Name	BPM3113
Family Model.....	BPM3111, BPM3121,BPM3123
Standards.....	ETSI EN 300 328 V2.2.2 (2019-07)

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 of article 3.2 of the Directive 2014/53/EU 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 NTEK, this document may be altered or revised by NTEK, personnel only, and shall be noted in the revision of the document.

Date of Test..... :	
Date (s) of performance of tests.....:	May. 07, 2026~ May. 12, 2026
Date of Issue.....:	Jun. 18, 2026
Test Result..... :	**Pass**

Note: All test data of this report are based on the original test report DGE260507024R02*, dated by* May 12,2026

Testing Engineer : _____
(Matt Sun)

Technical Manager : _____
(Brian Yang)

Authorized Signatory : _____
(Bart Fang)

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Table of Contents **Page**

Revision History

Report No.	Version	Description	Issued Date
DGE260616014R02	Rev.01	Initial issue of report	Jun. 18, 2026

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Energy Sensor
Trade Mark	Matis/ Matismart
Model Name.	BPM3113
Family Model	BPM3111, BPM3121,BPM3123
Model Difference	All models of PCB layout and key components are the same.
The EUT is Smart Energy 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	1
Number Of Channel	Please see Note 2.
Antenna Designation	PCB Antenna
Antenna Gain(Peak)	-0.6 dBi
Channel List	Refer to below
Battery	N/A
Rating	208-415VAC, 50/60Hz, 2W
Adapter	N/A
I/O Ports	Refer to users manual
Hardware Version	N/A
Software Version	N/A

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:

☒ 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 n20

- Power Spectral Density

802.11 n20

- 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

802.11 b

- Nominal Channel Bandwidth

802.11 n20

- Transmitter unwanted emissions in the OOB domain

802.11 b

- Transmitter unwanted emissions in the spurious domain

802.11 b

- Receiver spurious emissions

802.11 n20

- Receiver Blocking

802.11 g

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:

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

j) Nominal Channel Bandwidth(s):

- Nominal Channel Bandwidth 1: 17.407MHz (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: -20℃ Maximum 50℃

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: PCB antenna

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

Antenna Gain: -0.6dBi

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	-0.6	16.49	
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:208-415VAC, 50/60Hz, 2W

☐ DC State DC voltage:

In case of DC, indicate the type of power source

☐ Internal Power Supply

☐ External Power Supply or AC/DC adapter:

☐ Battery:

☐ Other: .....

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

See section 1.3.

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):

PER has been monitored is 0.75%

.....

.....

1.3 TEST CONDITIONS AND CHANNEL

	Normal Test Conditions	Extreme Test Conditions
Temperature	15℃ - 35℃	50℃ ~ -20℃ Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	AC230V/50Hz	/

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 50℃ and LT -20℃ 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	Model/Type No.	Series No.	Note
E-1	Smart Energy Sensor	BPM3113	N/A	EUT

Item	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.

1.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Antenna Mast	SKET	N/A	N/A	N/A	N/A	N/A
2	Test Cable	REBES	A50-NMNM-8 M-A	1810C35	Jun. 12, 2025	Jun. 11, 2026	1 year
3	Test Cable	REBES	A50-NMNM-3 M	1810C36	Jun. 12, 2025	Jun. 11, 2026	1 year
4	Test Cable	REBES	A50-NMNM-1 M	1810C37	Jun. 12, 2025	Jun. 11, 2026	1 year
5	Bilog Antenna	SCHWARZB ECK	VBL6112B	01273	Jun. 12, 2025	Jun. 11, 2026	1 year
6	Low Noise Pre-Amplifier	SCHWARZB ECK	BBV 9743 B	00343	Dec. 06, 2025	Dec. 05, 2026	1 year
7	EMI Test Receiver	R&S	ESPI7	101318	Jun. 12, 2025	Jun. 11, 2026	1 year
8	Spectrum Analyzer	R&S	FSU26	200492	Dec. 08, 2025	Dec. 07, 2026	1 year
9	Broadband Horn Antenna	KAILAITUO	3115	20181226Z0 1	Jun. 12, 2025	Jun. 11, 2026	1 year
10	MXA Signal Analyzer	Agilent	N9020A	MY50531383	Oct. 26, 2025	Oct. 25, 2026	1 year
11	MXG Vector Signal Generator	Agilent	N5182A	MY50141210	Oct. 26, 2025	Oct. 25, 2026	1 year
12	Power Senor	DARE	RPR3006W	15I00041SNO 43	Oct. 26, 2025	Oct. 25, 2026	1 year
13	ESG VETCTOR SIGNAL GENERARO R	Hp	ESG-D3000A	/	Oct. 26, 2025	Oct. 25, 2026	1 year

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

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

Dongguan NTEK Testing Service Co., Ltd.

Add. : Room101/401, Building 3, No.1, Keji 8th Road, Songshan Lake High-Tech Industrial Development Zone, Dongguan, Guangdong, China

CNAS-Lab. : The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)
The Certificate Registration Number is L13824

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%

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 300 328 V2.2.2 (2019-07)

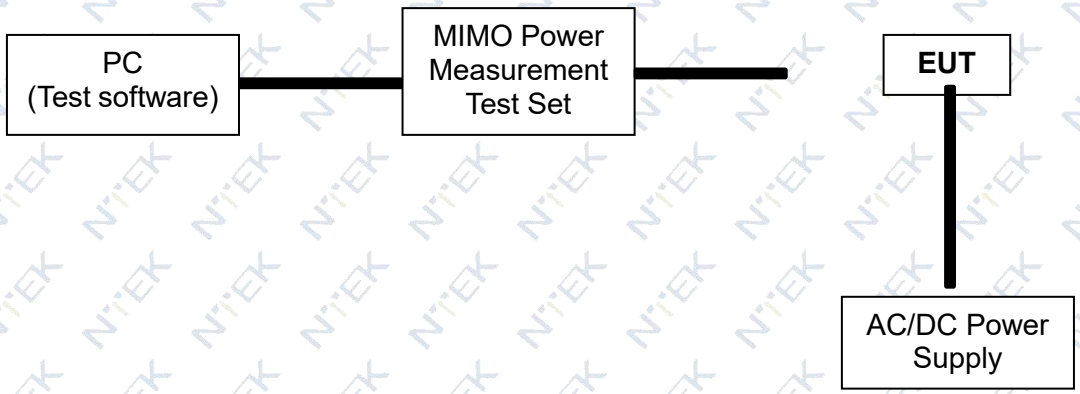
RF OUTPUT POWER	
Condition	Limit
☐ Non-adaptive wide band modulations systems	Equal to or less than the value declared by the supplier. This declared value shall be equal to or less than 20 dBm.
☒ Adaptive wide band modulations systems	⩽20dBm

3.1.2 TEST PROCEDURE

Refer to chapter 5.4.2.2 of ETSI EN 300 328 V2.2.2 (2019-07)

Measurement	
☒ Conducted measurement	☐ Radiated measurement

3.1.3 TEST SETUP



3.1.4 TEST RESULTS

EUT：	Smart Energy Sensor	Model Name ：	BPM3113
Temperature：	26°C	Relative Humidity：	56 %
Pressure：	1012 hPa	Test Voltage ：	AC230V/50Hz
Test Mode ：	802.11b/g/n(HT20)Mode		

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 300 328 V2.2.2 (2019-07)

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

3.2.2 TEST PROCEDURE

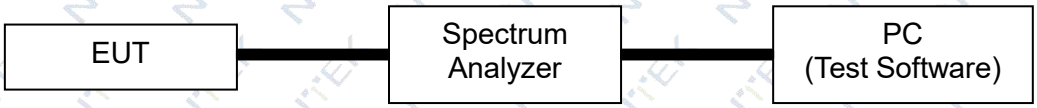
Refer to chapter 5.4.3.2 of ETSI EN 300 328 V2.2.2 (2019-07)

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 Energy Sensor	Model Name ：	BPM3113
Temperature：	26°C	Relative Humidity：	56 %
Pressure：	1012 hPa	Test Voltage ：	AC230V/50Hz
Test Mode ：	802.11b/g/n(HT20)Mode		

Test data reference attachment

3.3 OCCUPIED CHANNEL BANDWIDTH

3.3.1 LIMITS OF OCCUPIED CHANNEL BANDWIDTH

Refer to chapter 4.3.2.7.3 of ETSI EN 300 328 V2.2.2 (2019-07)

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

Measurement	
☒ Conducted measurement	☐ Radiated measurement

The setting of the Spectrum Analyzer

Center Frequency	The centre frequency of the channel under test
Frequency Span	2 × Nominal Channel Bandwidth
Detector	RMS
RBW	~ 1 % of the span without going below 1 %
VBW	3 × RBW
Trace	Max hold
Sweep time	1s

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 Energy Sensor	Model Name ：	BPM3113
Temperature：	26°C	Relative Humidity：	56 %
Pressure：	1012 hPa	Test Voltage ：	AC230V/50Hz
Test Mode ：	802.11b/g/n(HT20)Mode		

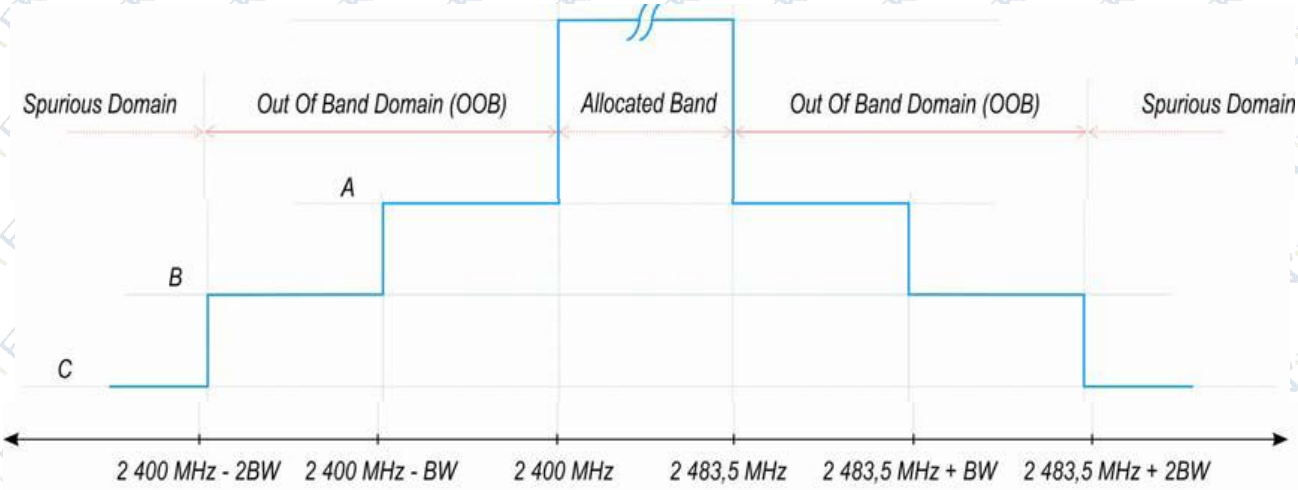
Test data reference attachment

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 V2.2.2 (2019-07)

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 V2.2.2 (2019-07)

Measurement	
☒ Conducted measurement	☐ Radiated measurement

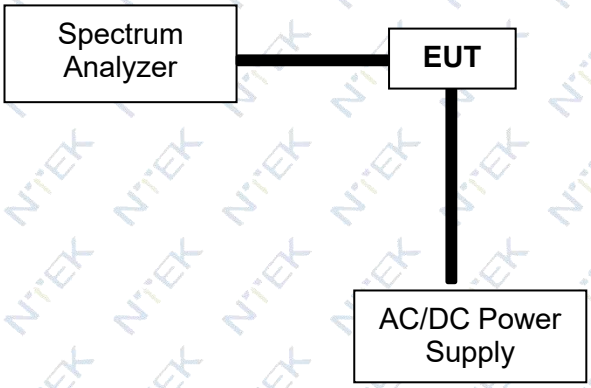
The setting of the Spectrum Analyzer

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 Energy Sensor	Model Name ：	BPM3113
Temperature：	26°C	Relative Humidity：	56 %
Pressure：	1012 hPa	Test Voltage ：	AC230V/50Hz
Test Mode ：	802.11b/g/n(HT20)Mode		

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 V2.2.2 (2019-07)

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.		

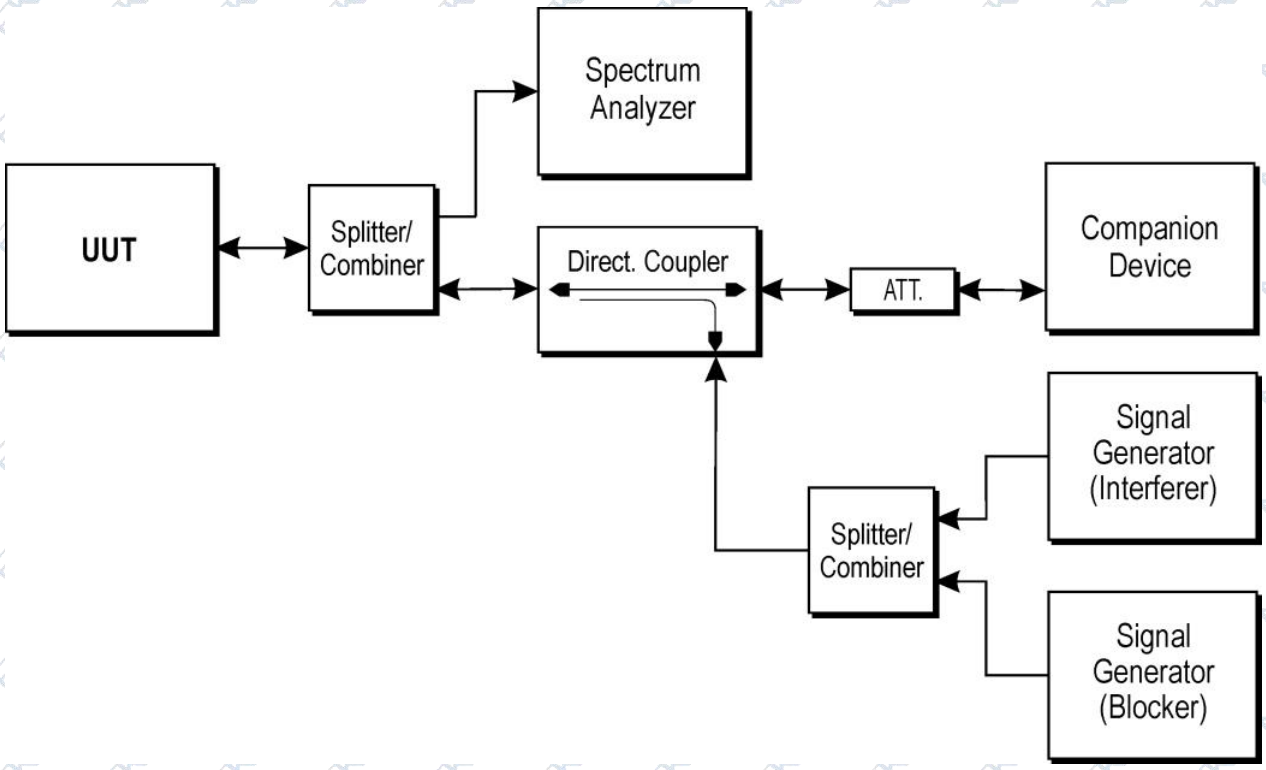
3.5.2 TEST PROCEDURE

Refer to chapter 5.4.6.2 of ETSI EN 300 328 V2.2.2 (2019-07)

Measurement	
☒ Conducted measurement	☐ Radiated measurement

Test method please refer to the 5.4.6.2.1.4 of ETSI EN 300 328 V2.2.2 (2019-07)

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 INTERFERENCE THRESHOLD LEVEL

EUT：	Smart Energy Sensor	Model Name ：	BPM3113
Temperature：	26°C	Relative Humidity：	56 %
Pressure：	1012 hPa	Test Voltage ：	AC230V/50Hz
Test Mode ：	802.11b Mode		

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 300 328 V2.2.2 (2019-07)

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 694 MHz	-54dBm	100 kHz
694 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 300 328 V2.2.2 (2019-07)

Measurement	
☒ Conducted measurement	☒ Radiated measurement

The setting of the Spectrum Analyzer

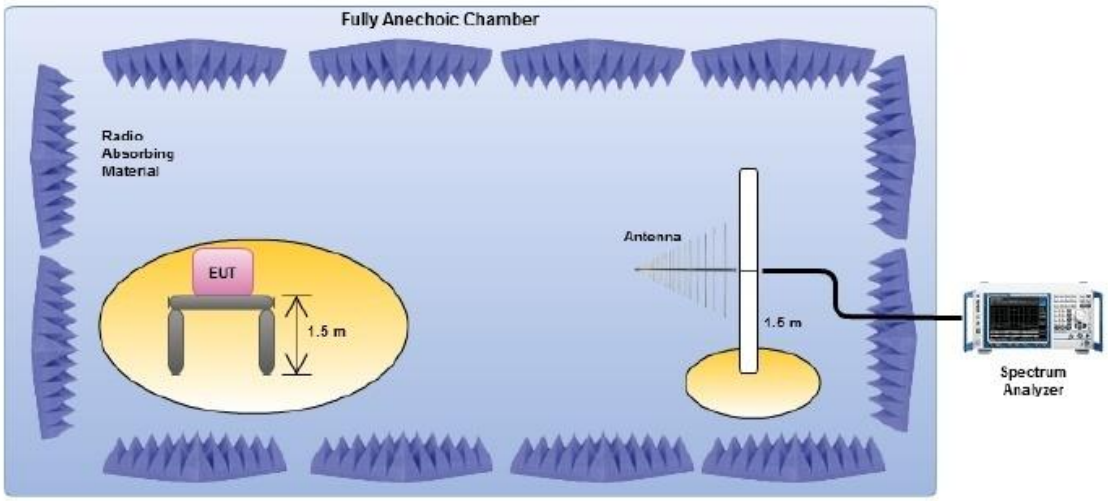
RBW	100K(＜1GHz) / 1M(＞1GHz)
VBW	300K(＜1GHz) / 3M(＞1GHz)

3.6.3 DEVIATION FROM TEST STANDARD

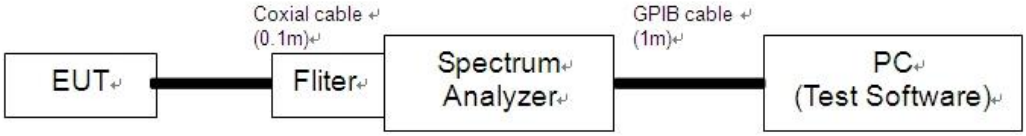
No deviation

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 (Radiated measurement)

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

EUT :	Smart Energy Sensor	Model Name :	BPM3113
Temperature :	26°C	Relative Humidity :	56 %
Pressure :	1012 hPa	Test Voltage :	AC230V/50Hz
Test Mode :	TX-802.11n20 Mode(CH07)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
V	92.175	-81.76	11.85	-69.91	-54	-15.91	peak
V	161.245	-78.89	15.54	-63.35	-36	-27.35	peak
V	234.548	-76.75	13.82	-62.93	-36	-26.93	peak
V	320.563	-73.52	14.94	-58.58	-36	-22.58	peak
V	577.233	-76.27	11.12	-65.15	-54	-11.15	peak
H	88.317	-75.62	13.57	-62.05	-54	-8.05	peak
H	150.169	-71.15	13.19	-57.96	-36	-21.96	peak
H	258.816	-75.44	14.77	-60.67	-36	-24.67	peak
H	460.44	-77.72	13.47	-64.25	-36	-28.25	peak
H	700.346	-76.69	13.91	-62.78	-36	-26.78	peak

Remark:
1. Emission Level= Meter Reading+ Factor, Margin= Emission Level – Limit.
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 Energy Sensor	Model Name :	BPM3113
Temperature :	26°C	Relative Humidity :	56 %
Pressure :	1012 hPa	Test Voltage :	AC230V/50Hz
Test Mode :	TX-802.11n20 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	3368.876	-55.03	13.05	-41.98	-30	-11.98	peak
V	6489.98	-66.38	12.51	-53.87	-30	-23.87	peak
V	3428.49	-58.92	14.29	-44.63	-30	-14.63	peak
V	4671.263	-63.9	13.61	-50.29	-30	-20.29	peak
H	2782.421	-57.07	15.69	-41.38	-30	-11.38	peak
H	5081.644	-66.31	10.13	-56.18	-30	-26.18	peak
H	3368.854	-60.36	12.64	-47.72	-30	-17.72	peak
H	4258.695	-65.53	17.55	-47.98	-30	-17.98	peak
operation frequency:2442							
V	3549.416	-51.55	11.88	-39.67	-30	-9.67	peak
V	6529.91	-65.41	13.13	-52.28	-30	-22.28	peak
V	3557.18	-60.6	14.22	-46.38	-30	-16.38	peak
V	4772.603	-63.34	14.9	-48.44	-30	-18.44	peak
H	2658.791	-59.63	16.69	-42.94	-30	-12.94	peak
H	5167.364	-67.21	11.46	-55.75	-30	-25.75	peak
H	3396.524	-59.08	14.66	-44.42	-30	-14.42	peak
H	4737.735	-65.89	15.09	-50.8	-30	-20.8	peak
operation frequency:2472							
V	3484.406	-53.28	13.25	-40.03	-30	-10.03	peak
V	6617.05	-66.03	12.68	-53.35	-30	-23.35	peak
V	3860.75	-58.08	15.1	-42.98	-30	-12.98	peak
V	5155.243	-64	13.63	-50.37	-30	-20.37	peak
H	2782.221	-59.95	17.35	-42.6	-30	-12.6	peak
H	4917.164	-65.96	9.77	-56.19	-30	-26.19	peak
H	3449.224	-60.78	14.08	-46.7	-30	-16.7	peak
H	4626.855	-63.4	16.59	-46.81	-30	-16.81	peak

Remark:

1. Emission Level= Meter Reading+ Factor, Margin= Emission Level – Limit.
2. All the modes had been tested, but only the worst data recorded in the 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 V2.2.2 (2019-07)

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 V2.2.2 (2019-07)

Measurement	
☒ Conducted measurement	☒ Radiated measurement

The setting of the Spectrum Analyzer

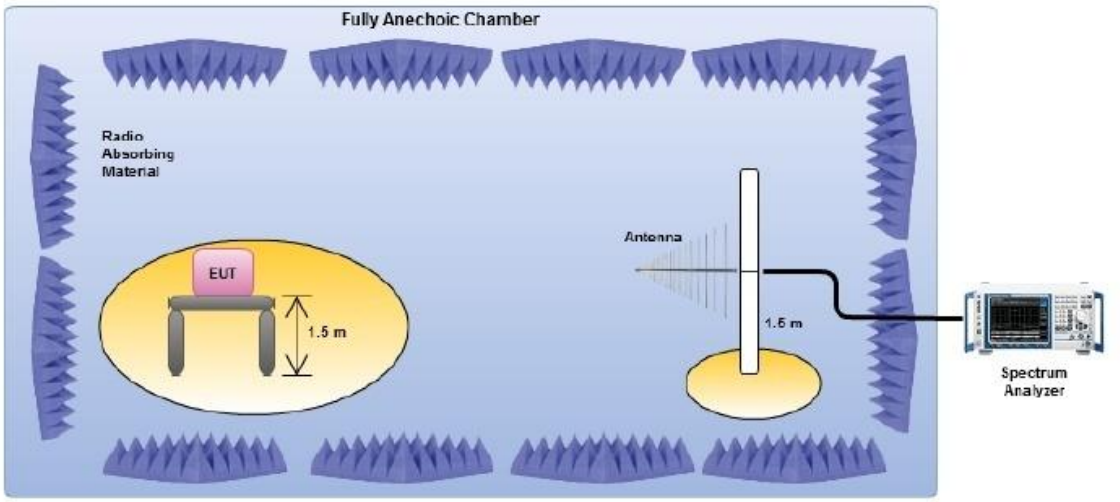
RBW	100K(＜1GHz) / 1M(＞1GHz)
VBW	300K(＜1GHz) / 3M(＞1GHz)

3.7.3 DEVIATION FROM TEST STANDARD

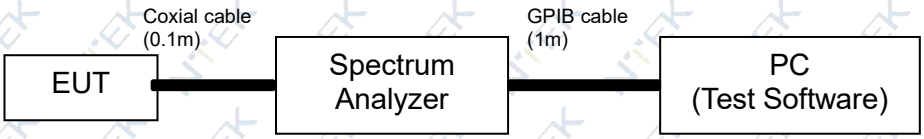
No deviation

3.7.4 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. 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.

3.7.5 TEST RESULTS (Radiated measurement)

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

EUT :	Smart Energy Sensor	Model Name :	BPM3113
Temperature :	26°C	Relative Humidity :	56 %
Pressure :	1012 hPa	Test Voltage :	AC230V/50Hz
Test Mode :	RX Mode-802.11n20 Mode(CH07)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
V	94.597	-80.18	12.29	-67.89	-57	-10.89	peak
V	159.601	-80.77	17.7	-63.07	-57	-6.07	peak
V	204.969	-77.69	11.39	-66.3	-57	-9.3	peak
V	278.979	-85.31	20.63	-64.68	-57	-7.68	peak
V	557.598	-84.79	13.89	-70.9	-57	-13.9	peak
H	86.781	-80.03	13.66	-66.37	-57	-9.37	peak
H	141.119	-84.59	15.35	-69.24	-57	-12.24	peak
H	252.87	-87.56	16.18	-71.38	-57	-14.38	peak
H	384.217	-78.41	10.54	-67.87	-57	-10.87	peak
H	795.46	-83.26	13.95	-69.31	-57	-12.31	peak

Remark:
1. Emission Level= Meter Reading+ Factor, Margin= Emission 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 Energy Sensor	Model Name ：	BPM3113
Temperature：	24 ℃	Relative Humidity	54%
Pressure：	1010 hPa	Test Power ：	AC230V/50Hz
Test Mode ：	RX Mode-802.11n20 Mode(CH07)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Remark
V	2896.94	-72.36	9.89	-62.47	-47	-15.47	peak
V	6209.219	-70.65	10.43	-60.22	-47	-13.22	peak
V	2846.367	-66.06	11.35	-54.71	-47	-7.71	peak
V	4425.945	-73.77	12.26	-61.51	-47	-14.51	peak
H	2511.427	-79.21	18.68	-60.53	-47	-13.53	peak
H	5400.148	-72.47	11.78	-60.69	-47	-13.69	peak
H	2544.365	-68.13	9.72	-58.41	-47	-11.41	peak
H	2923.89	-70.03	11.79	-58.24	-47	-11.24	peak

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

3.7.6 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) (see notes 1 and 4)	**Blocking signal Frequency (MHz)**	**Blocking signal power (dBm) (see note 4)**	**Type of blocking signal**
(-133 dBm + 10 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2524 2584 2674		

NOTE 1: OCBW is in Hz.

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

NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

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

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

NOTE 1: OCBW is in Hz.

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

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

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

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

NOTE 1: OCBW is in Hz.

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

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

3.8.3 TEST PROCEDURE

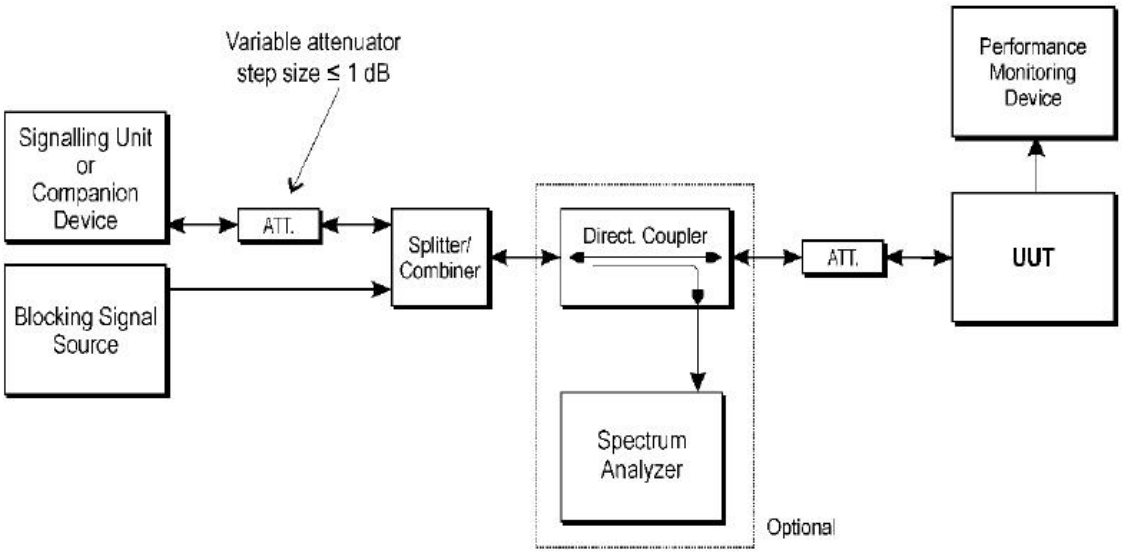
Refer to chapter 5.4.11.2 of ETSI EN 300 328 V2.2.2 (2019-07)

Measurement	
☒ Conducted measurement	☐ Radiated measurement

3.8.4 DEVIATION FROM TEST STANDARD

No deviation

3.8.5 TEST SETUP



3.8.6 TEST RESULTS

Wanted signal meanpower from companion device (dBm)	Test Channel	Blocking signal frequency (MHz)	Blocking signal power(dBm) CW	PER	Limit	Results
-68.00	Low	2380	-34	0.53%	⩽10%	PASS
	High	2504		0.62%		
-74.00	Low	2300		0.47%		
		2330		0.75%		
		2360		0.31%		
	High	2524		0.46%		
		2584		0.50%		
		2674		0.43%		

NOTE 1: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

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

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

4. TEST RESULTS

4.1 RF Output Power

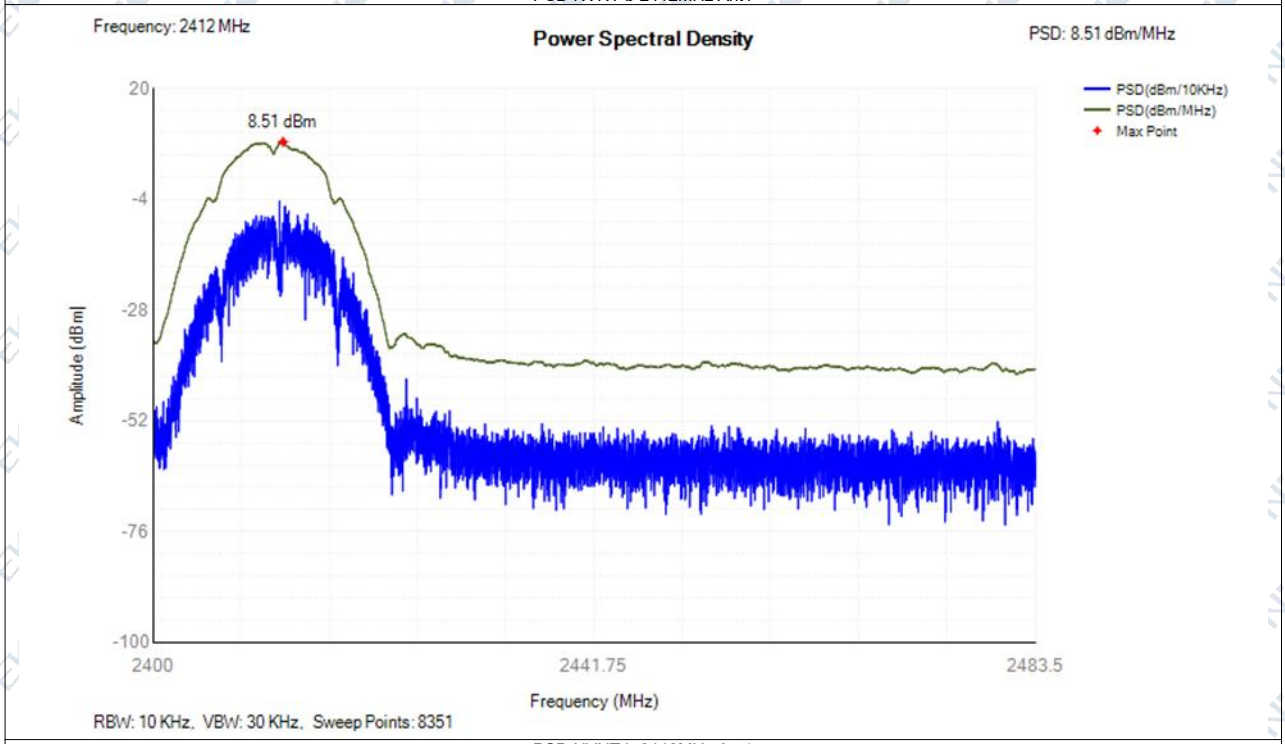
ENV	Mode	TX Type	Frequency (MHz)	ANT	Gain (dBi)	Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
NTNV	802.11b	SISO	2412	1	-0.60	17.09	16.49	<=20	Pass
			2442	1	-0.60	15.7	15.1	<=20	Pass
			2472	1	-0.60	16.14	15.54	<=20	Pass
	802.11g	SISO	2412	1	-0.60	10.58	9.98	<=20	Pass
			2442	1	-0.60	8.95	8.35	<=20	Pass
			2472	1	-0.60	9.73	9.13	<=20	Pass
	802.11n (HT20)	SISO	2412	1	-0.60	10.66	10.06	<=20	Pass
			2442	1	-0.60	8.77	8.17	<=20	Pass
			2472	1	-0.60	9.54	8.94	<=20	Pass
HTNV	802.11b	SISO	2412	1	-0.60	15.91	15.31	<=20	Pass
			2442	1	-0.60	15.18	14.58	<=20	Pass
			2472	1	-0.60	15.52	14.92	<=20	Pass
	802.11g	SISO	2412	1	-0.60	10.07	9.47	<=20	Pass
			2442	1	-0.60	8.73	8.13	<=20	Pass
			2472	1	-0.60	9.62	9.02	<=20	Pass
	802.11n (HT20)	SISO	2412	1	-0.60	9.78	9.18	<=20	Pass
			2442	1	-0.60	8.86	8.26	<=20	Pass
			2472	1	-0.60	8.79	8.19	<=20	Pass
LTNV	802.11b	SISO	2412	1	-0.60	15.33	14.73	<=20	Pass
			2442	1	-0.60	15.79	15.19	<=20	Pass
			2472	1	-0.60	15.42	14.82	<=20	Pass
	802.11g	SISO	2412	1	-0.60	9.33	8.73	<=20	Pass
			2442	1	-0.60	8.86	8.26	<=20	Pass
			2472	1	-0.60	9.59	8.99	<=20	Pass
	802.11n (HT20)	SISO	2412	1	-0.60	9.76	9.16	<=20	Pass
			2442	1	-0.60	9.13	8.53	<=20	Pass
			2472	1	-0.60	8.86	8.26	<=20	Pass

Note1: E.I.R.P = Measured Power + Antenna Gain

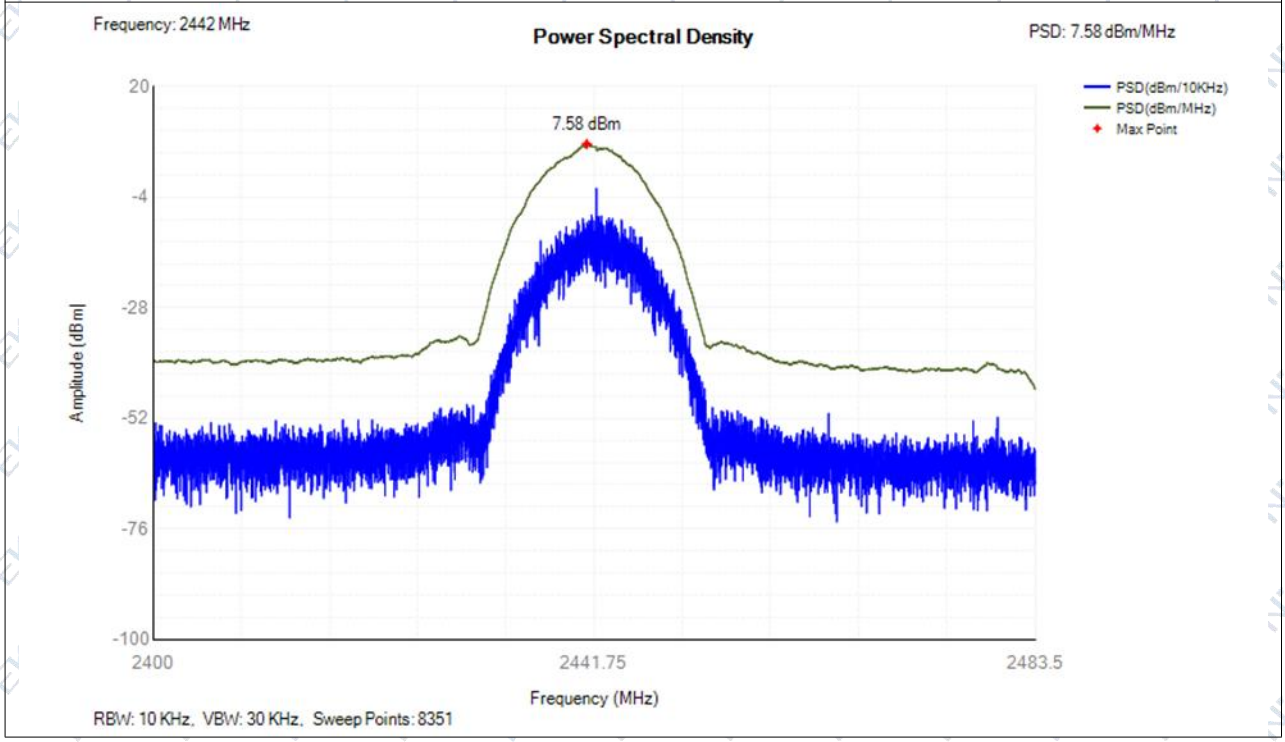
4.2 Power Spectral Density

ENV	Mode	TX Type	Frequency (MHz)	ANT	E.I.R.PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NTNV	802.11b	SISO	2412	1	8.51	<=10	Pass
			2442	1	7.58	<=10	Pass
			2472	1	7.39	<=10	Pass
	802.11g	SISO	2412	1	2.49	<=10	Pass
			2442	1	0.09	<=10	Pass
			2472	1	1.39	<=10	Pass
	802.11n (HT20)	SISO	2412	1	1.5	<=10	Pass
			2442	1	1.08	<=10	Pass
			2472	1	0.49	<=10	Pass

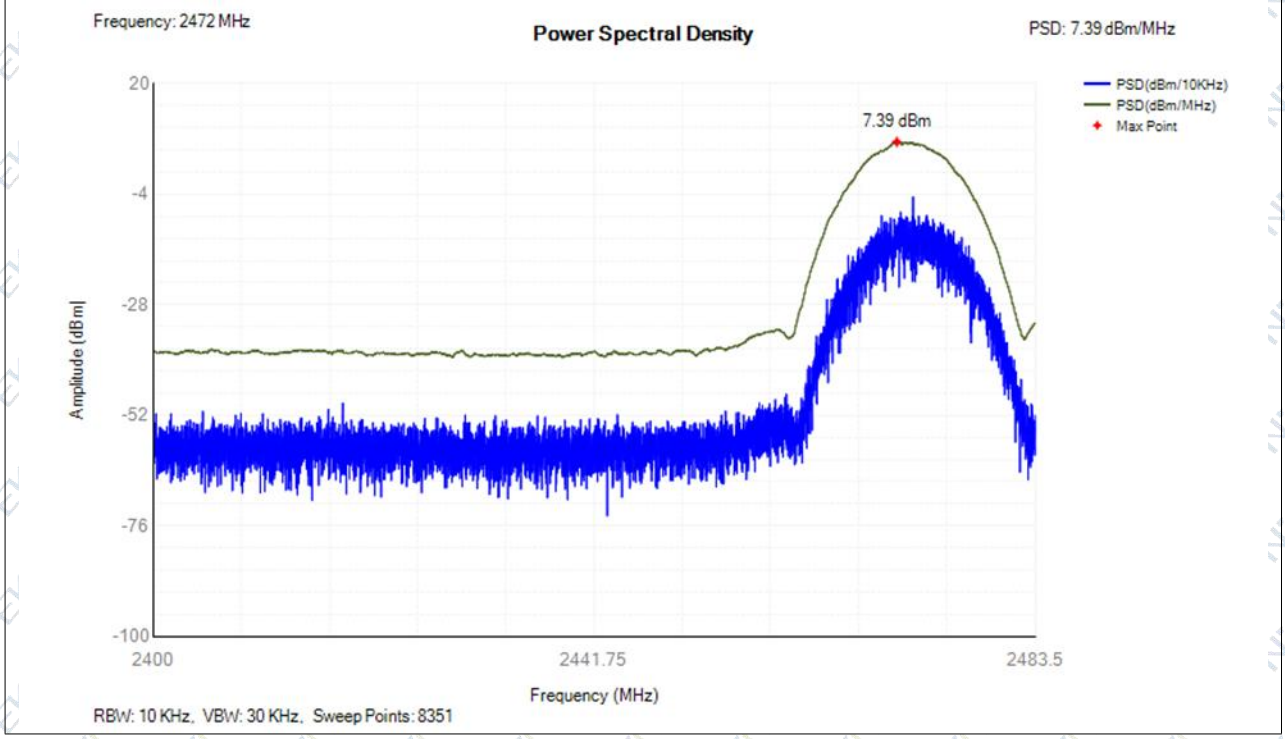
Test Graphs
PSD NVNT b 2412MHz Ant1



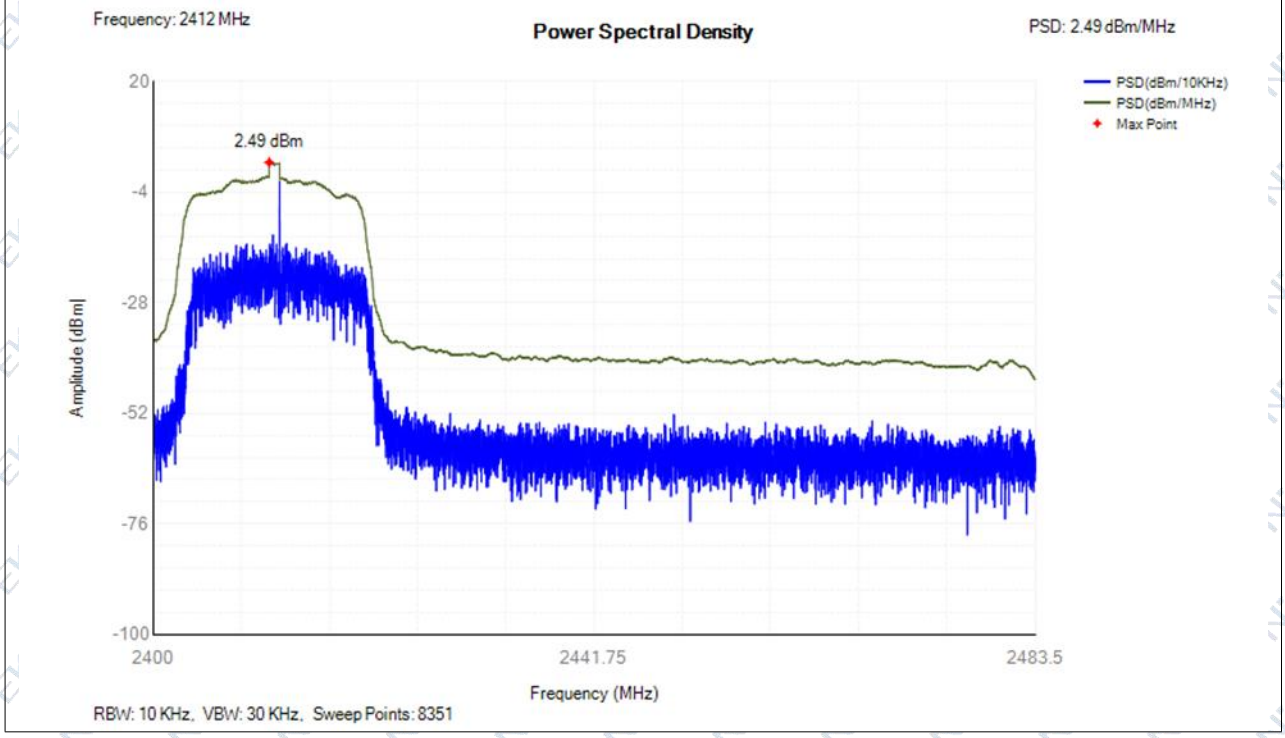
PSD NVNT b 2442MHz Ant1



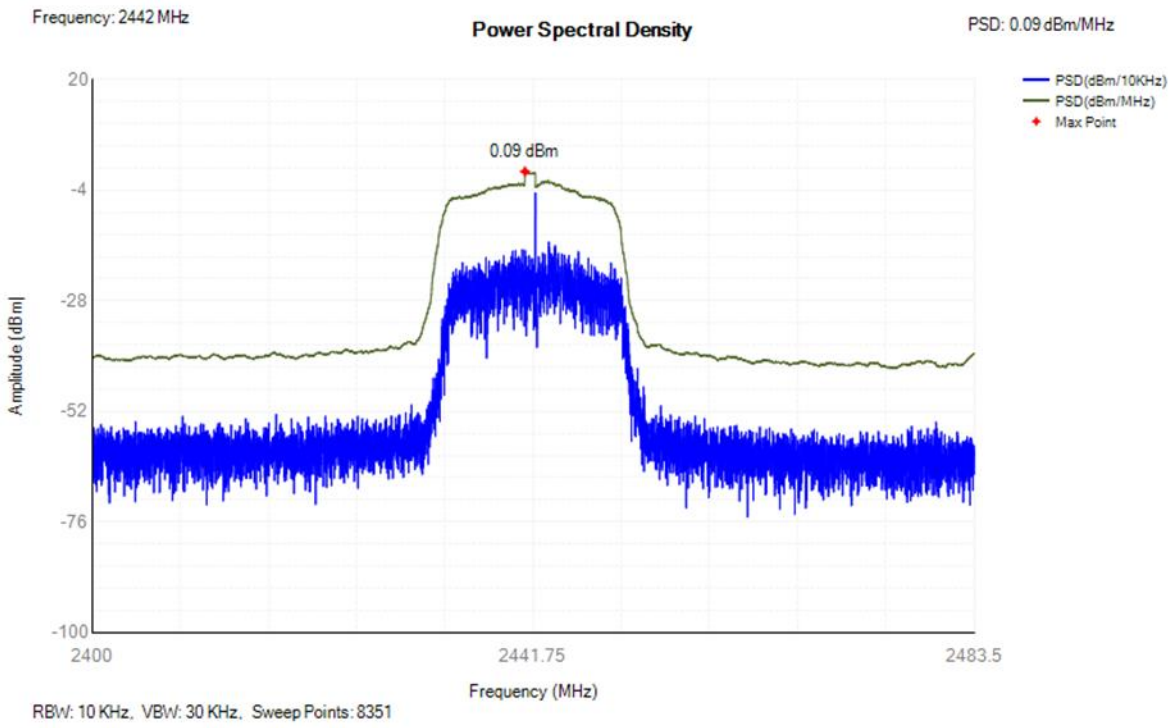
PSD NVNT b 2472MHz Ant1



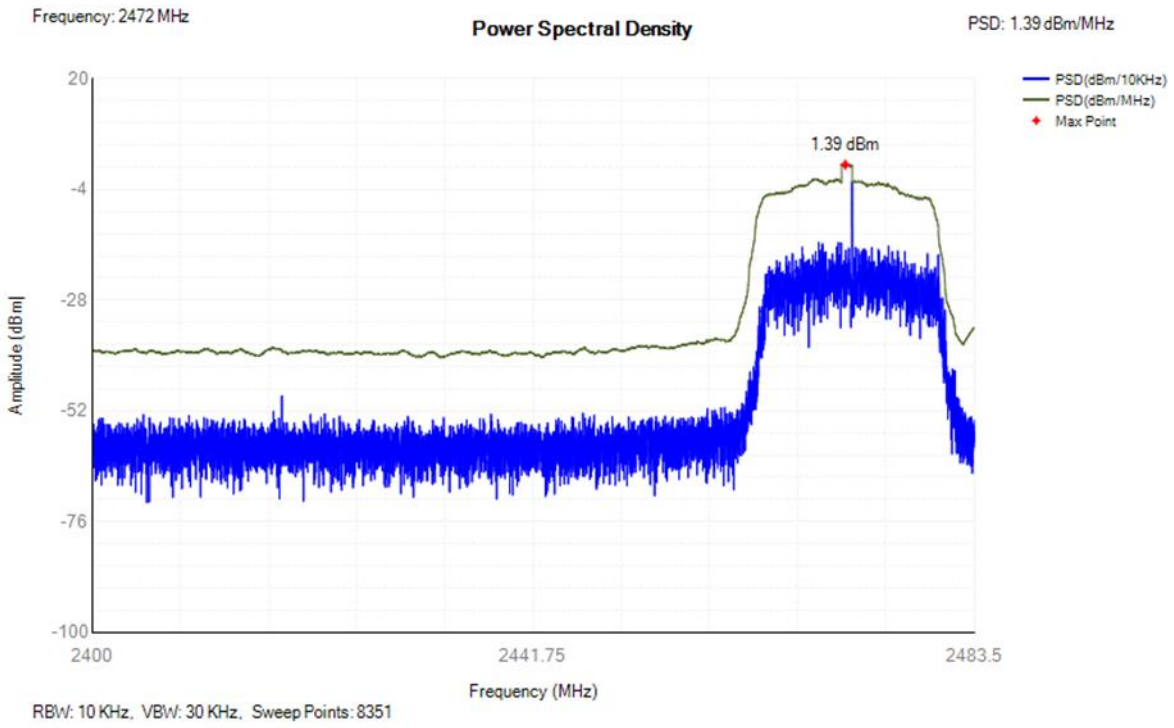
PSD NVNT g 2412MHz Ant1



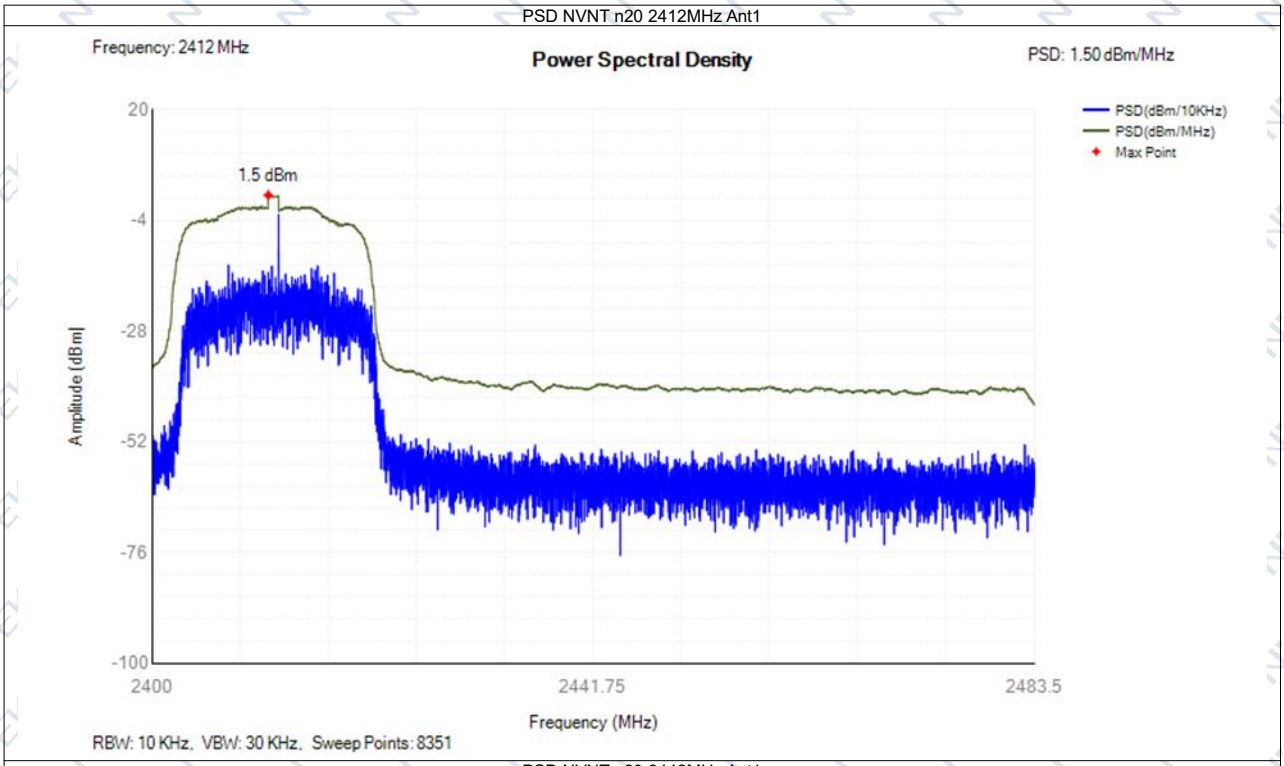
PSD NVNT g 2442MHz Ant1



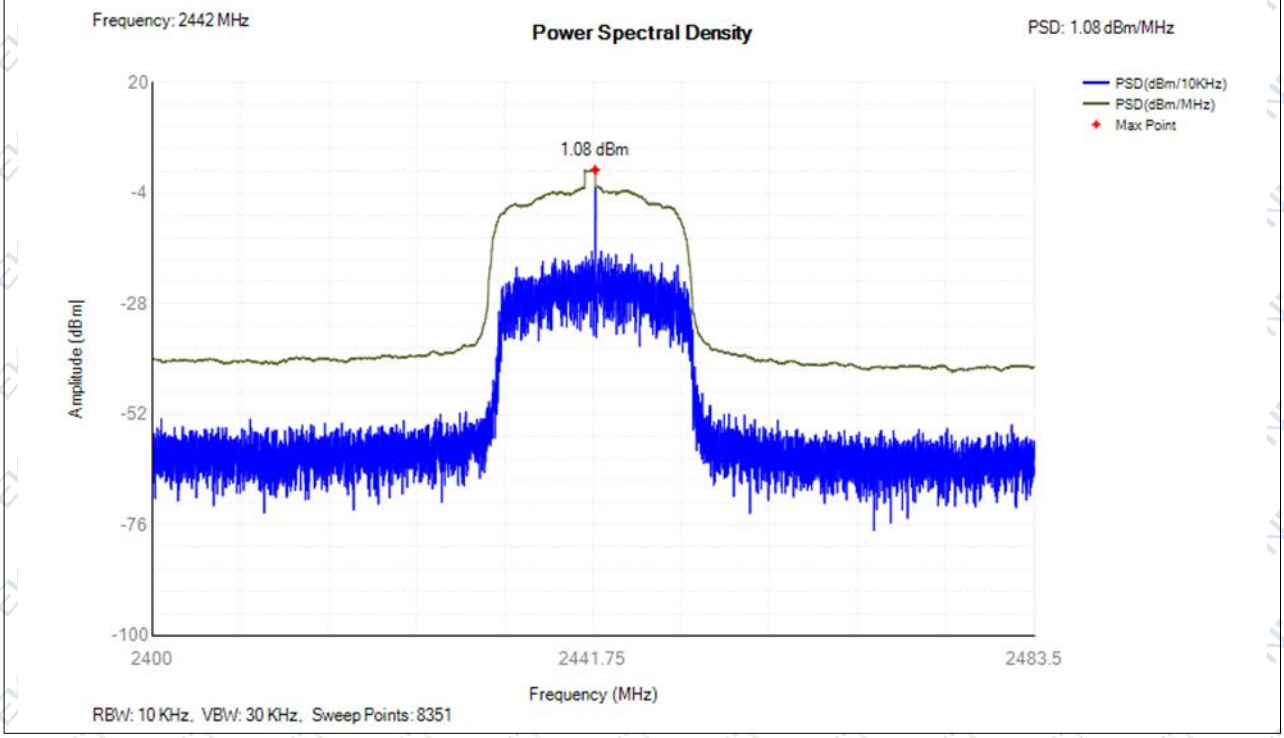
PSD NVNT g 2472MHz Ant1



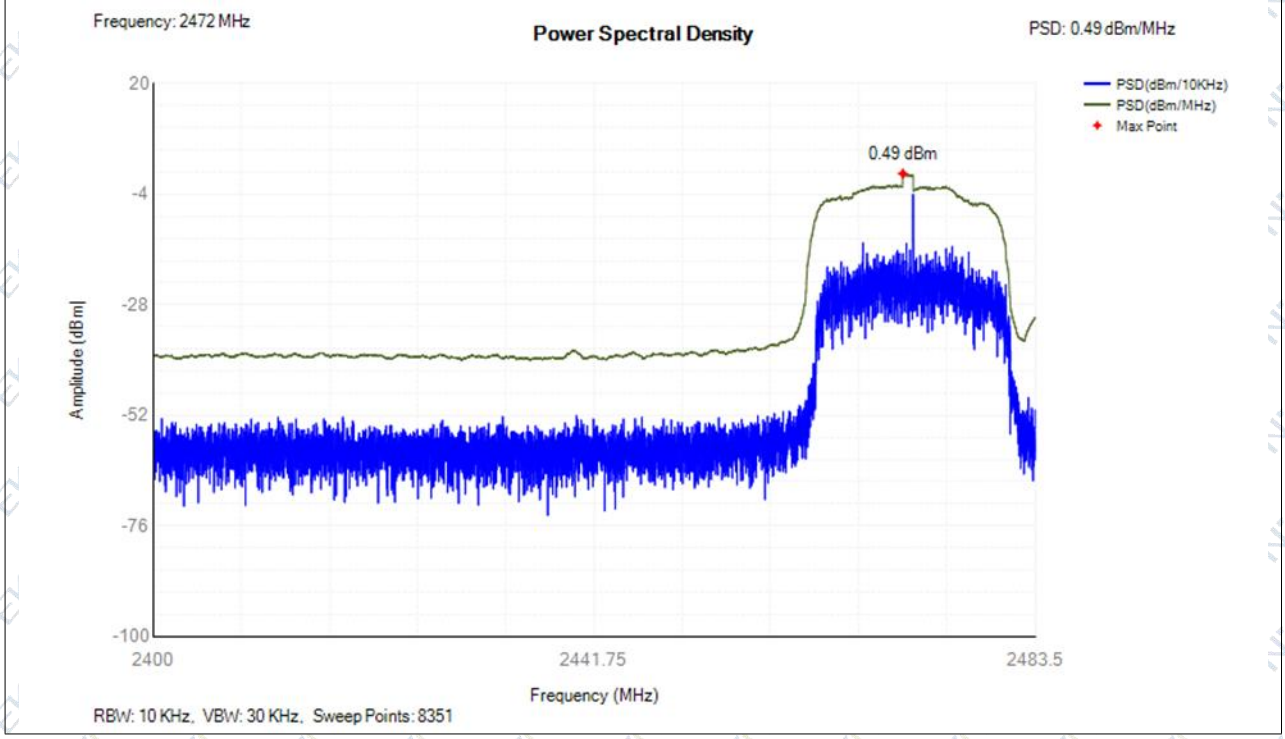
PSD NVNT n20 2412MHz Ant1



PSD NVNT n20 2442MHz Ant1



PSD NVNT n20 2472MHz Ant1



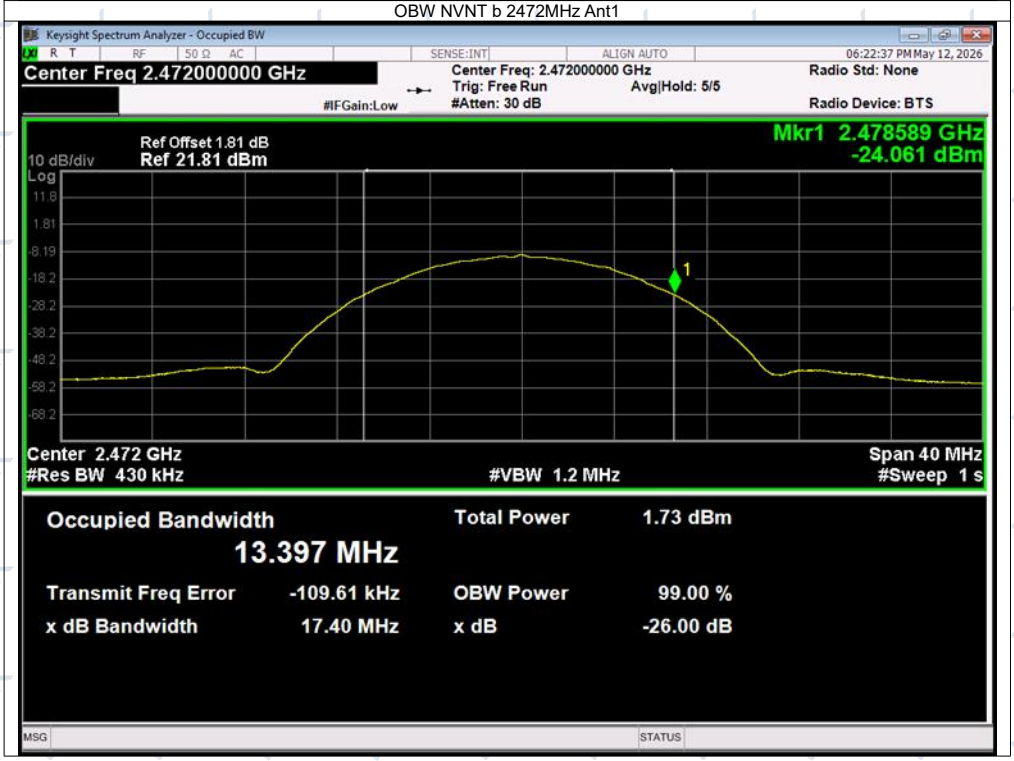
4.3 Occupied Channel Bandwidth

Ant1								
ENV	Mode	TX Type	Frequency (MHz)	OBW (MHz)	Frequency Range (MHz)			Verdict
				Result	FL	FH	Limit	
NTNV	802.11b	SISO	2412	13.407	2405.222	/	>=2400	Pass
			2472	13.397	/	2478.589	<=2483.5	Pass
	802.11g	SISO	2412	16.498	2403.705	/	>=2400	Pass
			2472	16.536	/	2480.204	<=2483.5	Pass
	802.11n (HT20)	SISO	2412	17.371	2403.252	/	>=2400	Pass
			2472	17.407	/	2480.621	<=2483.5	Pass

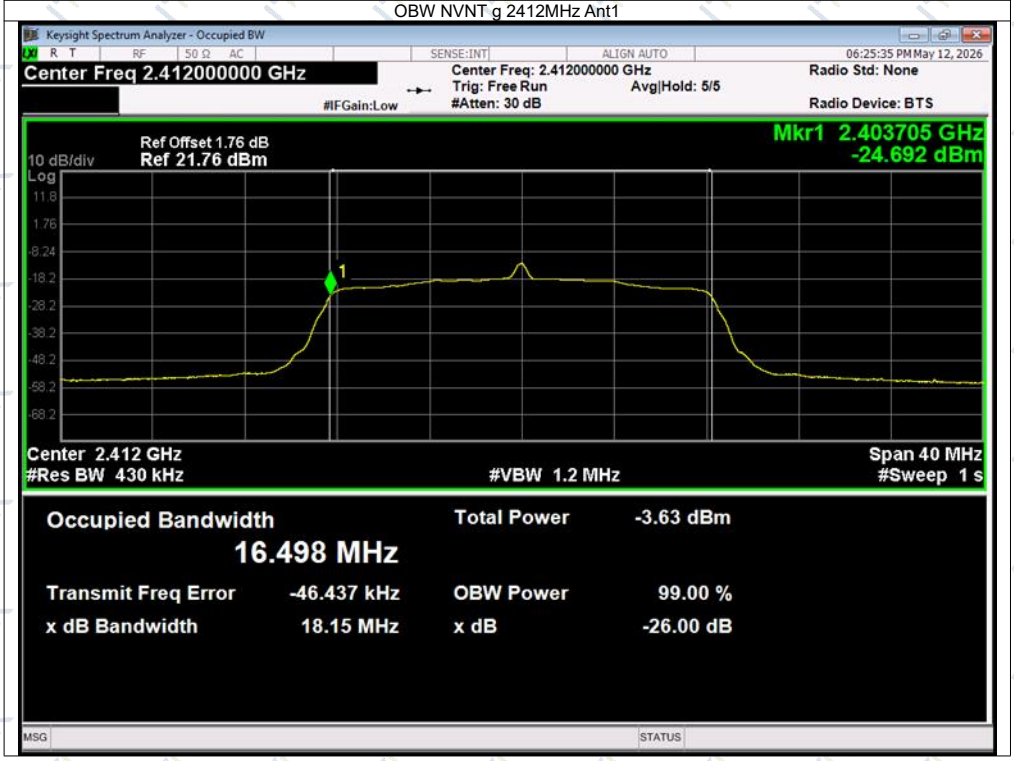
Test Graphs

OBW NVNT b 2412MHz Ant1

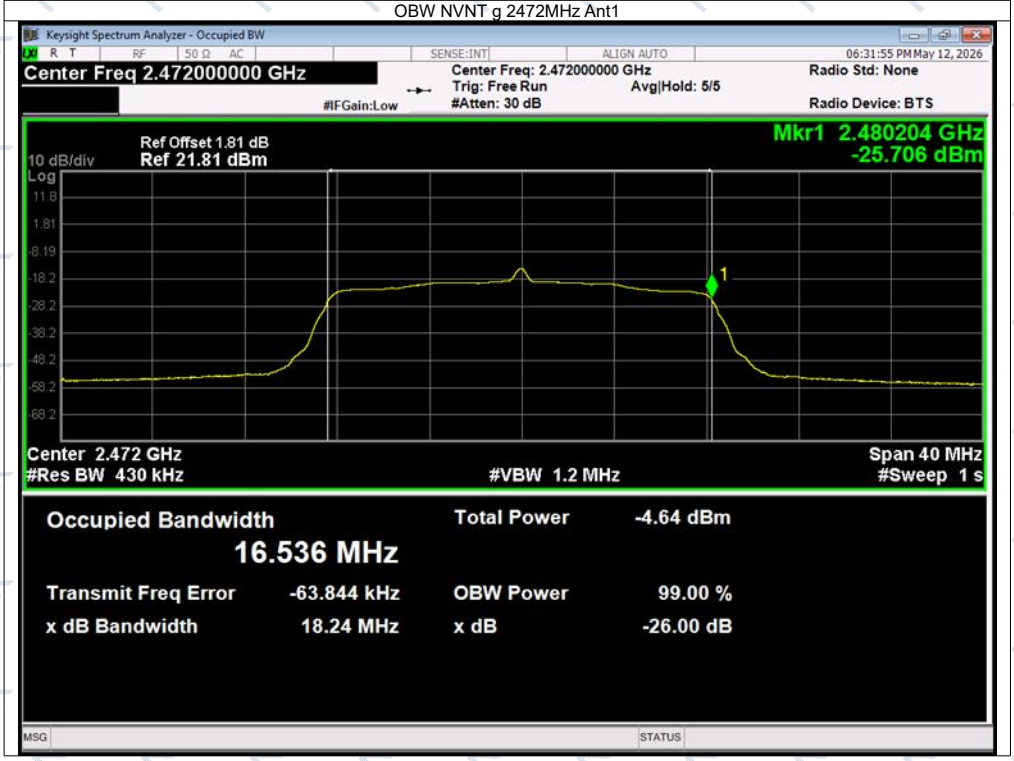
OBW NVNT b 2472MHz Ant1



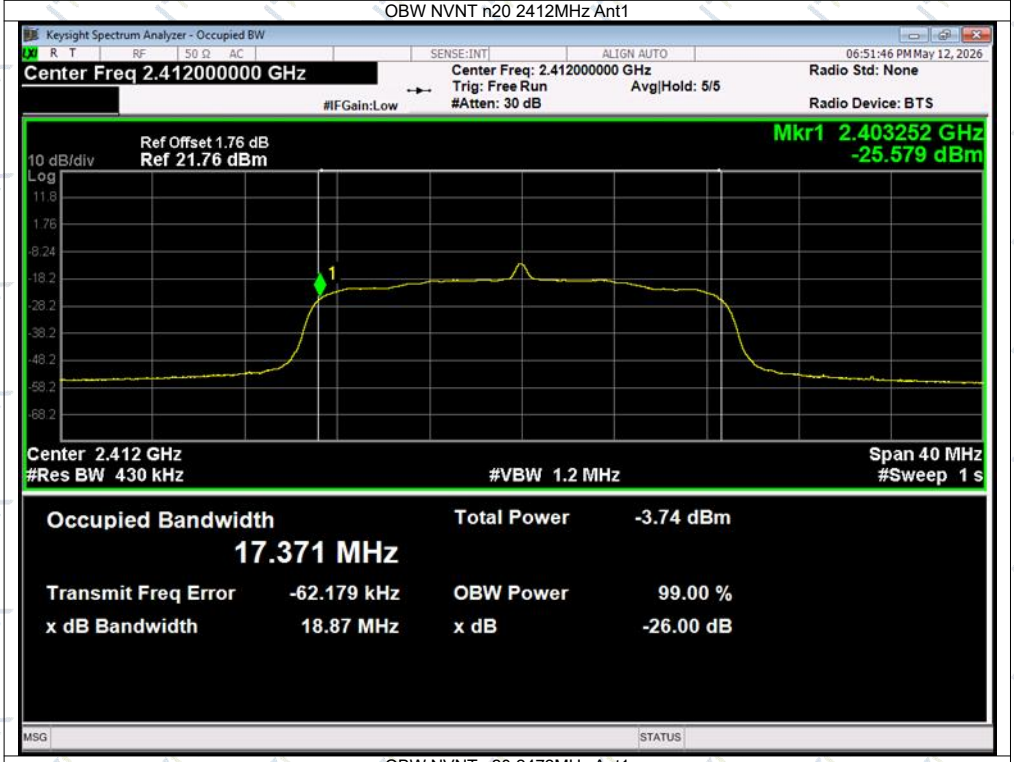
OBW NVNT g 2412MHz Ant1



OBW NVNT g 2472MHz Ant1



OBW NVNT n20 2412MHz Ant1



OBW NVNT n20 2472MHz Ant1

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

Condition	Mode	Frequency (MHz)	Antenna	OOB Frequency (MHz)	Level (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	b	2412	Ant1	2399.5	-33.78	-10	Pass
NVNT	b	2412	Ant1	2398.5	-35.04	-10	Pass
NVNT	b	2412	Ant1	2397.5	-35.43	-10	Pass
NVNT	b	2412	Ant1	2396.5	-36.34	-10	Pass
NVNT	b	2412	Ant1	2395.5	-38.26	-10	Pass
NVNT	b	2412	Ant1	2394.5	-39.01	-10	Pass
NVNT	b	2412	Ant1	2393.5	-38.88	-10	Pass
NVNT	b	2412	Ant1	2392.5	-39.18	-10	Pass
NVNT	b	2412	Ant1	2391.5	-39.41	-10	Pass
NVNT	b	2412	Ant1	2390.5	-39.75	-10	Pass
NVNT	b	2412	Ant1	2389.5	-40.05	-10	Pass
NVNT	b	2412	Ant1	2388.5	-40.08	-10	Pass
NVNT	b	2412	Ant1	2387.5	-40.1	-10	Pass
NVNT	b	2412	Ant1	2387.093	-40.07	-10	Pass
NVNT	b	2412	Ant1	2386.093	-40.22	-20	Pass
NVNT	b	2412	Ant1	2385.093	-40.27	-20	Pass
NVNT	b	2412	Ant1	2384.093	-40.27	-20	Pass
NVNT	b	2412	Ant1	2383.093	-40.49	-20	Pass
NVNT	b	2412	Ant1	2382.093	-40.46	-20	Pass
NVNT	b	2412	Ant1	2381.093	-40.44	-20	Pass
NVNT	b	2412	Ant1	2380.093	-40.46	-20	Pass
NVNT	b	2412	Ant1	2379.093	-40.57	-20	Pass
NVNT	b	2412	Ant1	2378.093	-40.58	-20	Pass
NVNT	b	2412	Ant1	2377.093	-40.63	-20	Pass
NVNT	b	2412	Ant1	2376.093	-40.74	-20	Pass
NVNT	b	2412	Ant1	2375.093	-40.72	-20	Pass
NVNT	b	2412	Ant1	2374.093	-40.76	-20	Pass
NVNT	b	2412	Ant1	2373.686	-40.73	-20	Pass
NVNT	b	2472	Ant1	2484	-36.28	-10	Pass
NVNT	b	2472	Ant1	2485	-36.06	-10	Pass
NVNT	b	2472	Ant1	2486	-37.09	-10	Pass
NVNT	b	2472	Ant1	2487	-37.93	-10	Pass
NVNT	b	2472	Ant1	2488	-39.25	-10	Pass
NVNT	b	2472	Ant1	2489	-40.36	-10	Pass
NVNT	b	2472	Ant1	2490	-40.94	-10	Pass
NVNT	b	2472	Ant1	2491	-41.33	-10	Pass
NVNT	b	2472	Ant1	2492	-41.63	-10	Pass
NVNT	b	2472	Ant1	2493	-41.88	-10	Pass
NVNT	b	2472	Ant1	2494	-41.95	-10	Pass
NVNT	b	2472	Ant1	2495	-42.23	-10	Pass
NVNT	b	2472	Ant1	2496	-42.19	-10	Pass
NVNT	b	2472	Ant1	2496.397	-42.4	-10	Pass
NVNT	b	2472	Ant1	2497.397	-42.67	-20	Pass
NVNT	b	2472	Ant1	2498.397	-42.74	-20	Pass
NVNT	b	2472	Ant1	2499.397	-42.87	-20	Pass
NVNT	b	2472	Ant1	2500.397	-43.02	-20	Pass
NVNT	b	2472	Ant1	2501.397	-43.26	-20	Pass
NVNT	b	2472	Ant1	2502.397	-43.27	-20	Pass
NVNT	b	2472	Ant1	2503.397	-43.32	-20	Pass
NVNT	b	2472	Ant1	2504.397	-43.38	-20	Pass
NVNT	b	2472	Ant1	2505.397	-43.5	-20	Pass
NVNT	b	2472	Ant1	2506.397	-43.55	-20	Pass
NVNT	b	2472	Ant1	2507.397	-43.73	-20	Pass
NVNT	b	2472	Ant1	2508.397	-43.64	-20	Pass
NVNT	b	2472	Ant1	2509.397	-43.82	-20	Pass
NVNT	b	2472	Ant1	2509.794	-43.72	-20	Pass
NVNT	g	2412	Ant1	2399.5	-37.7	-10	Pass
NVNT	g	2412	Ant1	2398.5	-38.22	-10	Pass
NVNT	g	2412	Ant1	2397.5	-38.77	-10	Pass
NVNT	g	2412	Ant1	2396.5	-39.13	-10	Pass
NVNT	g	2412	Ant1	2395.5	-39.46	-10	Pass
NVNT	g	2412	Ant1	2394.5	-39.78	-10	Pass
NVNT	g	2412	Ant1	2393.5	-39.96	-10	Pass
NVNT	g	2412	Ant1	2392.5	-40.08	-10	Pass
NVNT	g	2412	Ant1	2391.5	-40.21	-10	Pass
NVNT	g	2412	Ant1	2390.5	-40.46	-10	Pass
NVNT	g	2412	Ant1	2389.5	-40.63	-10	Pass
NVNT	g	2412	Ant1	2388.5	-40.72	-10	Pass
NVNT	g	2412	Ant1	2387.5	-40.87	-10	Pass
NVNT	g	2412	Ant1	2386.5	-40.92	-10	Pass
NVNT	g	2412	Ant1	2385.5	-40.99	-10	Pass
NVNT	g	2412	Ant1	2384.5	-41.02	-10	Pass

NVNT	g	2412	Ant1	2384.002	-41.11	-10	Pass
NVNT	g	2412	Ant1	2383.002	-41.08	-20	Pass
NVNT	g	2412	Ant1	2382.002	-41.14	-20	Pass
NVNT	g	2412	Ant1	2381.002	-41.23	-20	Pass
NVNT	g	2412	Ant1	2380.002	-41.24	-20	Pass
NVNT	g	2412	Ant1	2379.002	-41.31	-20	Pass
NVNT	g	2412	Ant1	2378.002	-41.38	-20	Pass
NVNT	g	2412	Ant1	2377.002	-41.39	-20	Pass
NVNT	g	2412	Ant1	2376.002	-41.44	-20	Pass
NVNT	g	2412	Ant1	2375.002	-41.47	-20	Pass
NVNT	g	2412	Ant1	2374.002	-41.49	-20	Pass
NVNT	g	2412	Ant1	2373.002	-41.59	-20	Pass
NVNT	g	2412	Ant1	2372.002	-41.51	-20	Pass
NVNT	g	2412	Ant1	2371.002	-41.59	-20	Pass
NVNT	g	2412	Ant1	2370.002	-41.65	-20	Pass
NVNT	g	2412	Ant1	2369.002	-41.67	-20	Pass
NVNT	g	2412	Ant1	2368.002	-41.73	-20	Pass
NVNT	g	2412	Ant1	2367.504	-41.67	-20	Pass
NVNT	g	2472	Ant1	2484	-38.75	-10	Pass
NVNT	g	2472	Ant1	2485	-39.52	-10	Pass
NVNT	g	2472	Ant1	2486	-40.05	-10	Pass
NVNT	g	2472	Ant1	2487	-40.5	-10	Pass
NVNT	g	2472	Ant1	2488	-40.9	-10	Pass
NVNT	g	2472	Ant1	2489	-41.31	-10	Pass
NVNT	g	2472	Ant1	2490	-41.61	-10	Pass
NVNT	g	2472	Ant1	2491	-41.88	-10	Pass
NVNT	g	2472	Ant1	2492	-42.16	-10	Pass
NVNT	g	2472	Ant1	2493	-42.34	-10	Pass
NVNT	g	2472	Ant1	2494	-42.56	-10	Pass
NVNT	g	2472	Ant1	2495	-42.73	-10	Pass
NVNT	g	2472	Ant1	2496	-42.87	-10	Pass
NVNT	g	2472	Ant1	2497	-43.06	-10	Pass
NVNT	g	2472	Ant1	2498	-43.26	-10	Pass
NVNT	g	2472	Ant1	2499	-43.32	-10	Pass
NVNT	g	2472	Ant1	2499.536	-43.41	-10	Pass
NVNT	g	2472	Ant1	2500.536	-43.5	-20	Pass
NVNT	g	2472	Ant1	2501.536	-43.69	-20	Pass
NVNT	g	2472	Ant1	2502.536	-43.75	-20	Pass
NVNT	g	2472	Ant1	2503.536	-43.87	-20	Pass
NVNT	g	2472	Ant1	2504.536	-43.95	-20	Pass
NVNT	g	2472	Ant1	2505.536	-43.99	-20	Pass
NVNT	g	2472	Ant1	2506.536	-44.07	-20	Pass
NVNT	g	2472	Ant1	2507.536	-44.13	-20	Pass
NVNT	g	2472	Ant1	2508.536	-44.22	-20	Pass
NVNT	g	2472	Ant1	2509.536	-44.25	-20	Pass
NVNT	g	2472	Ant1	2510.536	-44.28	-20	Pass
NVNT	g	2472	Ant1	2511.536	-44.34	-20	Pass
NVNT	g	2472	Ant1	2512.536	-44.36	-20	Pass
NVNT	g	2472	Ant1	2513.536	-44.39	-20	Pass
NVNT	g	2472	Ant1	2514.536	-44.43	-20	Pass
NVNT	g	2472	Ant1	2515.536	-44.45	-20	Pass
NVNT	g	2472	Ant1	2516.072	-44.44	-20	Pass
NVNT	n20	2412	Ant1	2399.5	-37.59	-10	Pass
NVNT	n20	2412	Ant1	2398.5	-38.15	-10	Pass
NVNT	n20	2412	Ant1	2397.5	-38.6	-10	Pass
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NVNT	n20	2412	Ant1	2395.5	-39.34	-10	Pass
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NVNT	n20	2412	Ant1	2383.5	-40.99	-10	Pass
NVNT	n20	2412	Ant1	2383.129	-41.03	-10	Pass
NVNT	n20	2412	Ant1	2382.129	-41.05	-20	Pass
NVNT	n20	2412	Ant1	2381.129	-41.08	-20	Pass
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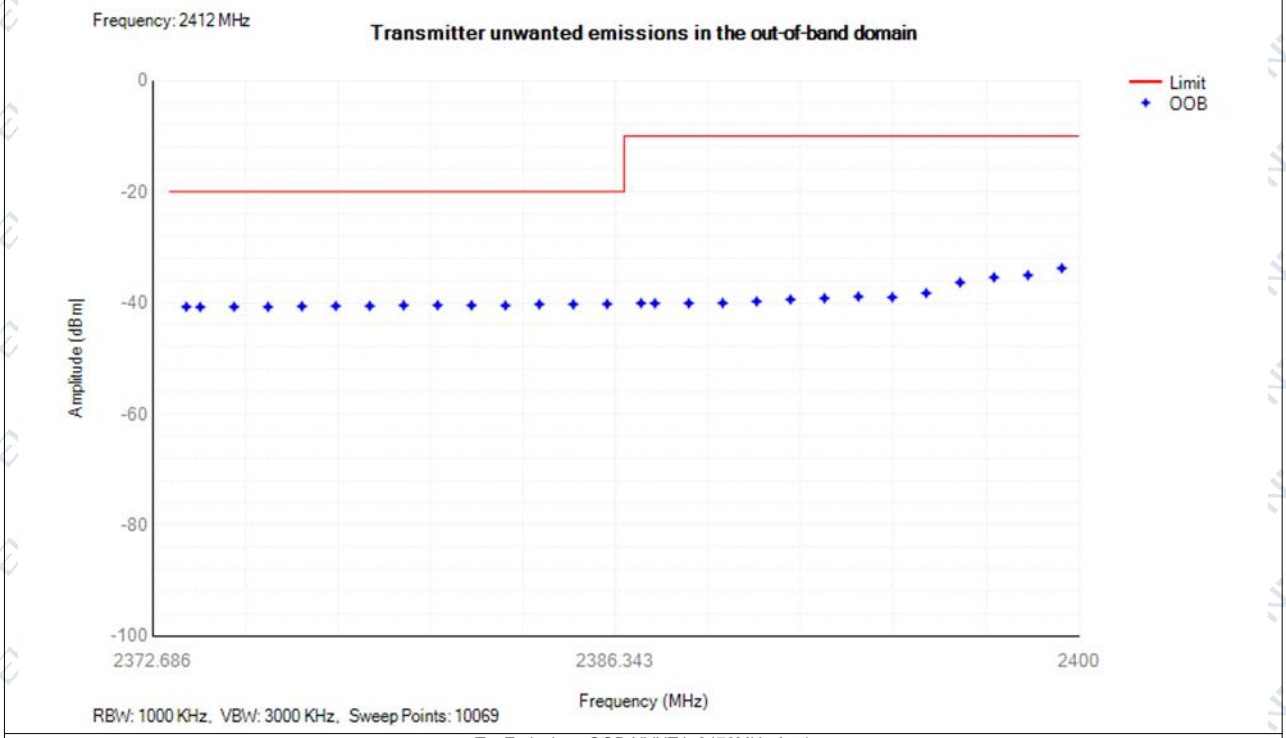
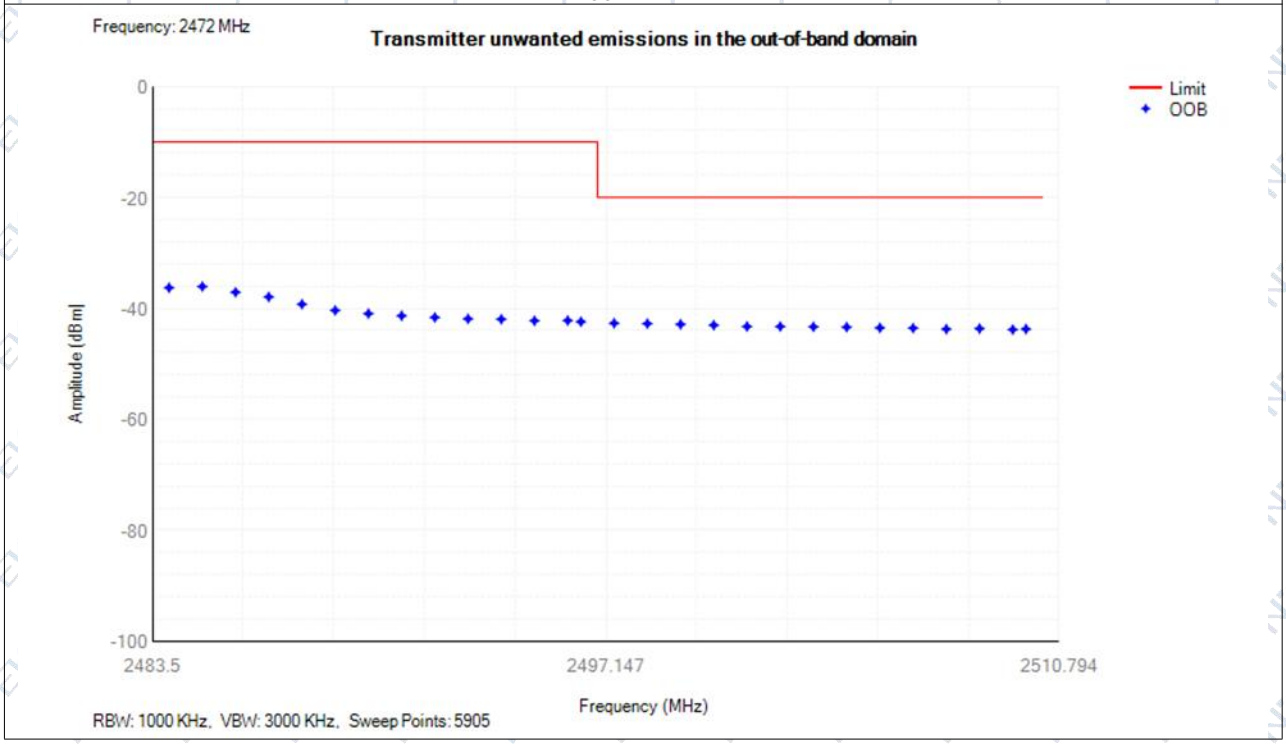
NVNT	n20	2412	Ant1	2379.129	-41.21	-20	Pass
NVNT	n20	2412	Ant1	2378.129	-41.26	-20	Pass
NVNT	n20	2412	Ant1	2377.129	-41.26	-20	Pass
NVNT	n20	2412	Ant1	2376.129	-41.35	-20	Pass

NVNT	n20	2412	Ant1	2375.129	-41.37	-20	Pass
NVNT	n20	2412	Ant1	2374.129	-41.43	-20	Pass
NVNT	n20	2412	Ant1	2373.129	-41.45	-20	Pass
NVNT	n20	2412	Ant1	2372.129	-41.51	-20	Pass
NVNT	n20	2412	Ant1	2371.129	-41.48	-20	Pass
NVNT	n20	2412	Ant1	2370.129	-41.56	-20	Pass
NVNT	n20	2412	Ant1	2369.129	-41.59	-20	Pass
NVNT	n20	2412	Ant1	2368.129	-41.61	-20	Pass
NVNT	n20	2412	Ant1	2367.129	-41.63	-20	Pass
NVNT	n20	2412	Ant1	2366.129	-41.38	-20	Pass
NVNT	n20	2412	Ant1	2365.758	-41.38	-20	Pass
NVNT	n20	2472	Ant1	2484	-38.6	-10	Pass
NVNT	n20	2472	Ant1	2485	-39.44	-10	Pass
NVNT	n20	2472	Ant1	2486	-40.02	-10	Pass
NVNT	n20	2472	Ant1	2487	-40.43	-10	Pass
NVNT	n20	2472	Ant1	2488	-40.92	-10	Pass
NVNT	n20	2472	Ant1	2489	-41.26	-10	Pass
NVNT	n20	2472	Ant1	2490	-41.55	-10	Pass
NVNT	n20	2472	Ant1	2491	-41.83	-10	Pass
NVNT	n20	2472	Ant1	2492	-42.13	-10	Pass
NVNT	n20	2472	Ant1	2493	-42.28	-10	Pass
NVNT	n20	2472	Ant1	2494	-42.55	-10	Pass
NVNT	n20	2472	Ant1	2495	-42.7	-10	Pass
NVNT	n20	2472	Ant1	2496	-42.88	-10	Pass
NVNT	n20	2472	Ant1	2497	-43.05	-10	Pass
NVNT	n20	2472	Ant1	2498	-43.2	-10	Pass
NVNT	n20	2472	Ant1	2499	-43.35	-10	Pass
NVNT	n20	2472	Ant1	2500	-43.48	-10	Pass
NVNT	n20	2472	Ant1	2500.407	-43.49	-10	Pass
NVNT	n20	2472	Ant1	2501.407	-43.62	-20	Pass
NVNT	n20	2472	Ant1	2502.407	-43.65	-20	Pass
NVNT	n20	2472	Ant1	2503.407	-43.85	-20	Pass
NVNT	n20	2472	Ant1	2504.407	-43.88	-20	Pass
NVNT	n20	2472	Ant1	2505.407	-44.03	-20	Pass
NVNT	n20	2472	Ant1	2506.407	-44.05	-20	Pass
NVNT	n20	2472	Ant1	2507.407	-44.11	-20	Pass
NVNT	n20	2472	Ant1	2508.407	-44.21	-20	Pass
NVNT	n20	2472	Ant1	2509.407	-44.19	-20	Pass
NVNT	n20	2472	Ant1	2510.407	-44.26	-20	Pass
NVNT	n20	2472	Ant1	2511.407	-44.36	-20	Pass
NVNT	n20	2472	Ant1	2512.407	-44.34	-20	Pass
NVNT	n20	2472	Ant1	2513.407	-44.31	-20	Pass
NVNT	n20	2472	Ant1	2514.407	-44.38	-20	Pass
NVNT	n20	2472	Ant1	2515.407	-44.42	-20	Pass
NVNT	n20	2472	Ant1	2516.407	-44.41	-20	Pass
NVNT	n20	2472	Ant1	2517.407	-44.42	-20	Pass
NVNT	n20	2472	Ant1	2517.814	-44.44	-20	Pass

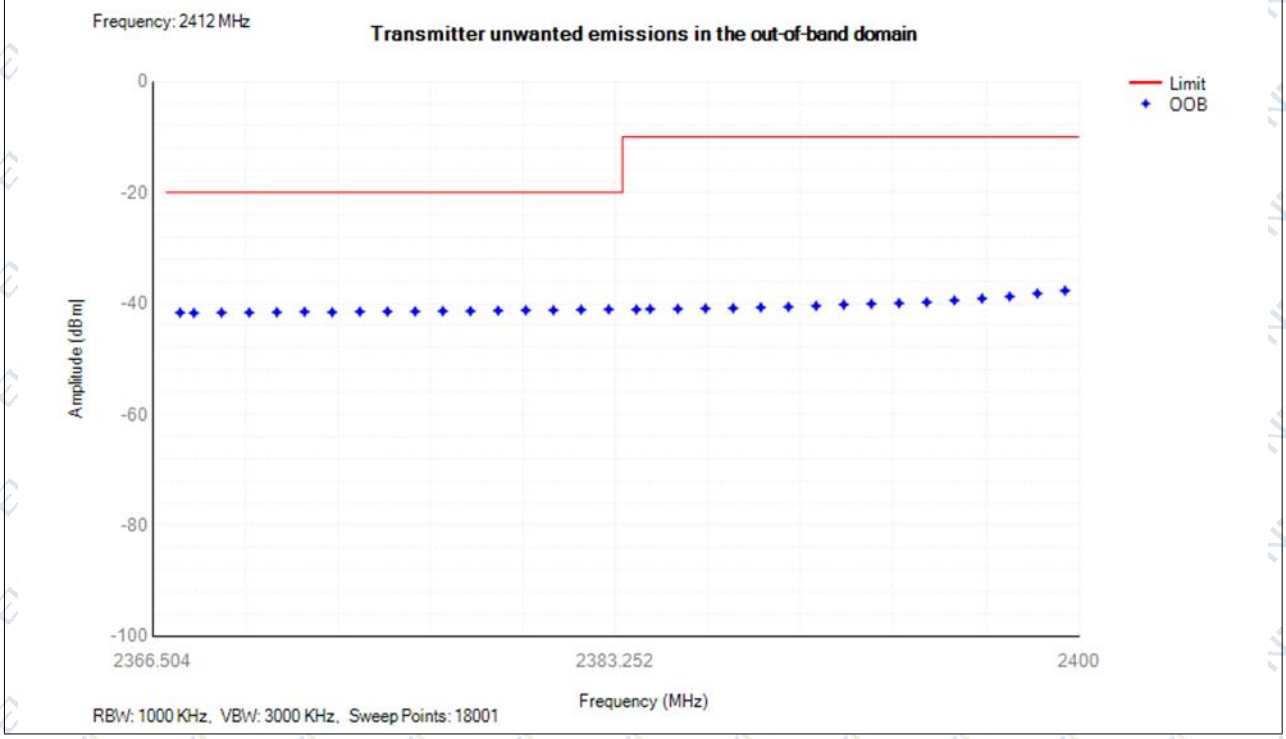
Test Graphs
Tx. Emissions OOB NVNT b 2412MHz Ant1



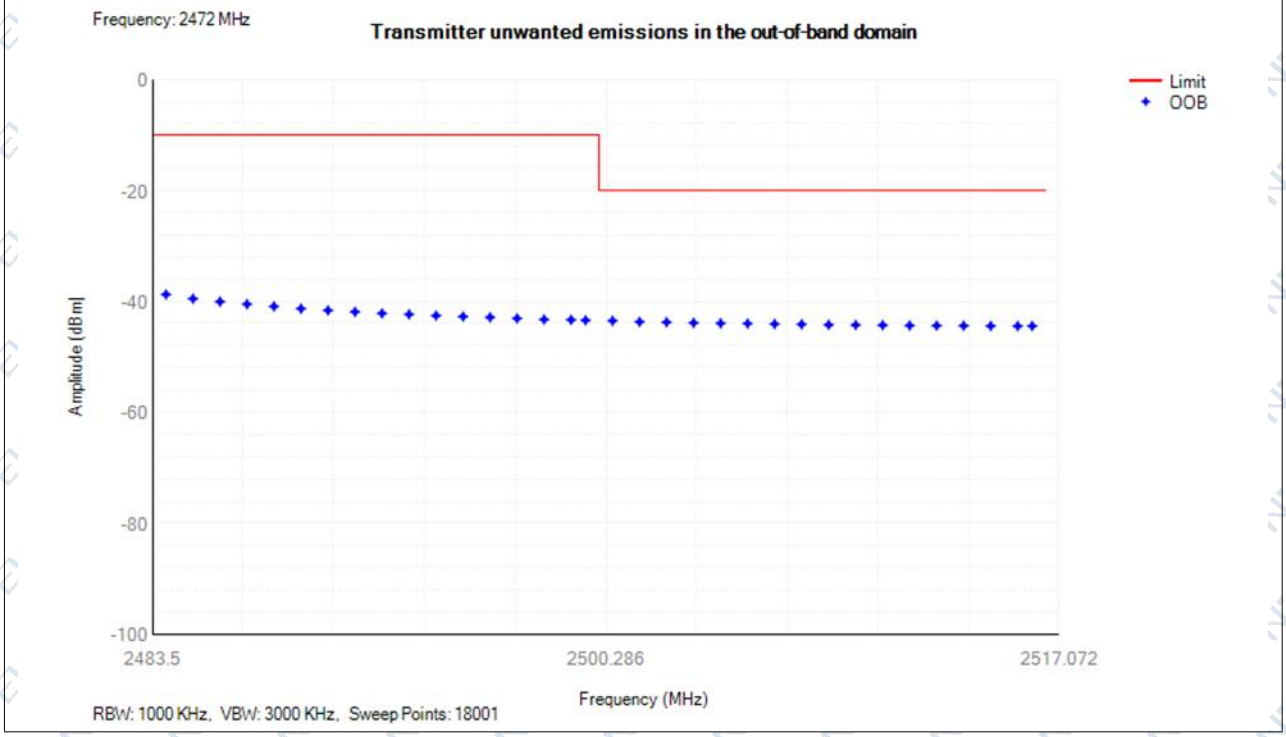
Tx. Emissions OOB NVNT b 2472MHz Ant1



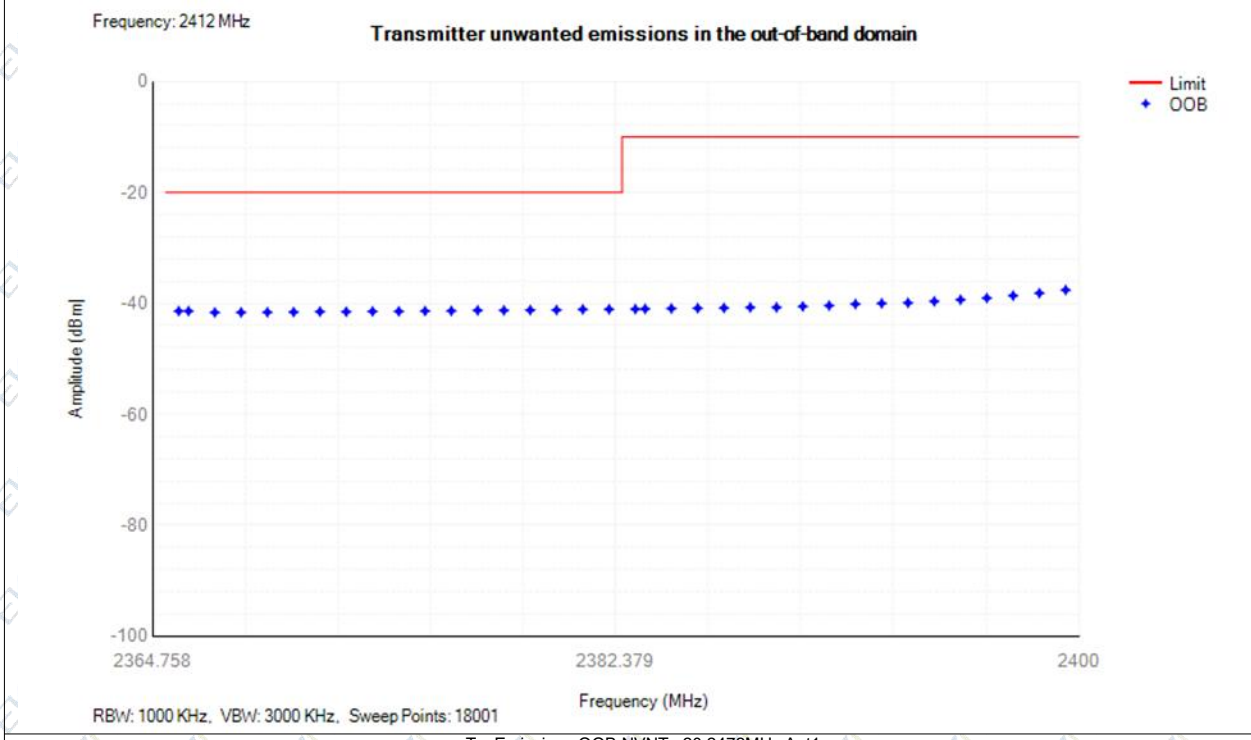
Tx. Emissions OOB NVNT g 2412MHz Ant1



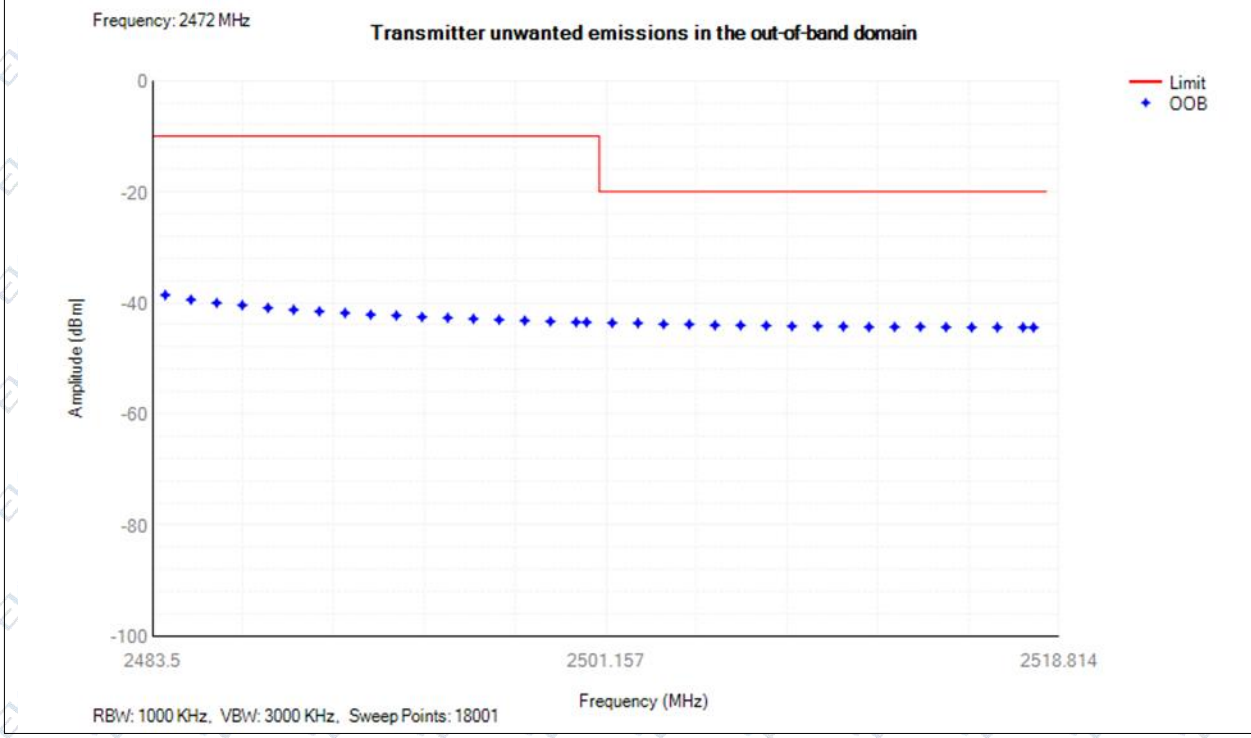
Tx. Emissions OOB NVNT g 2472MHz Ant1



Tx. Emissions OOB NVNT n20 2412MHz Ant1



Tx. Emissions OOB NVNT n20 2472MHz Ant1

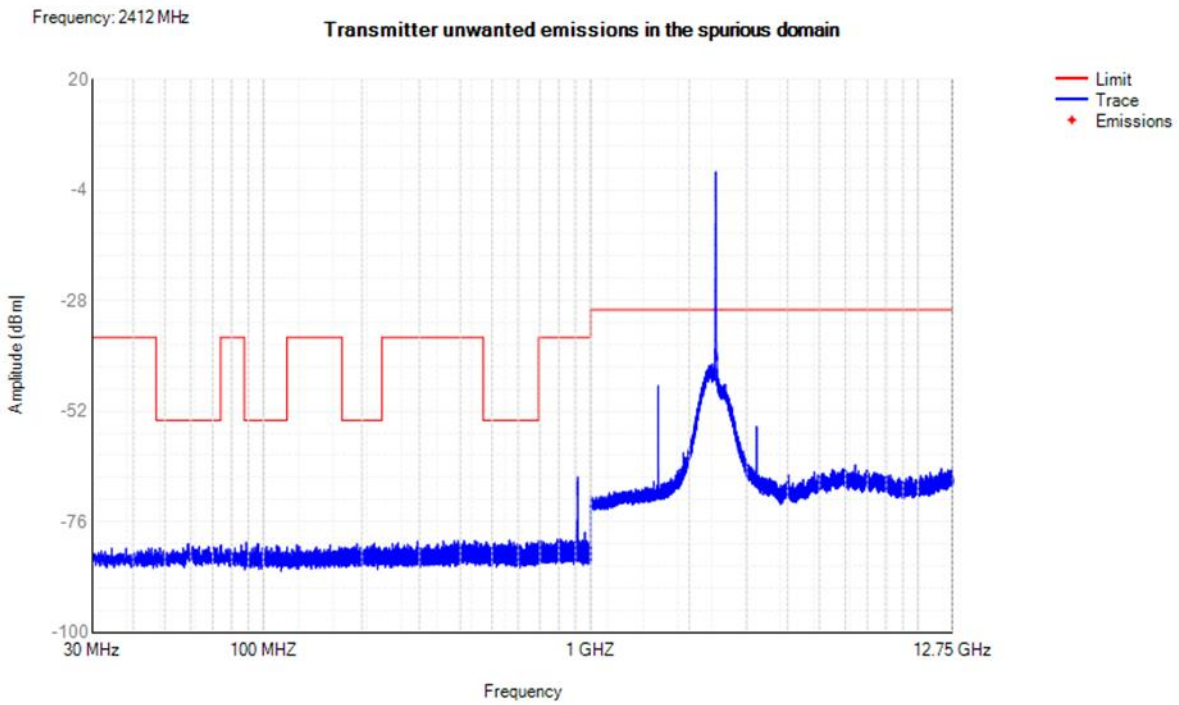


4.5 Transmitter unwanted emissions in the spurious domain

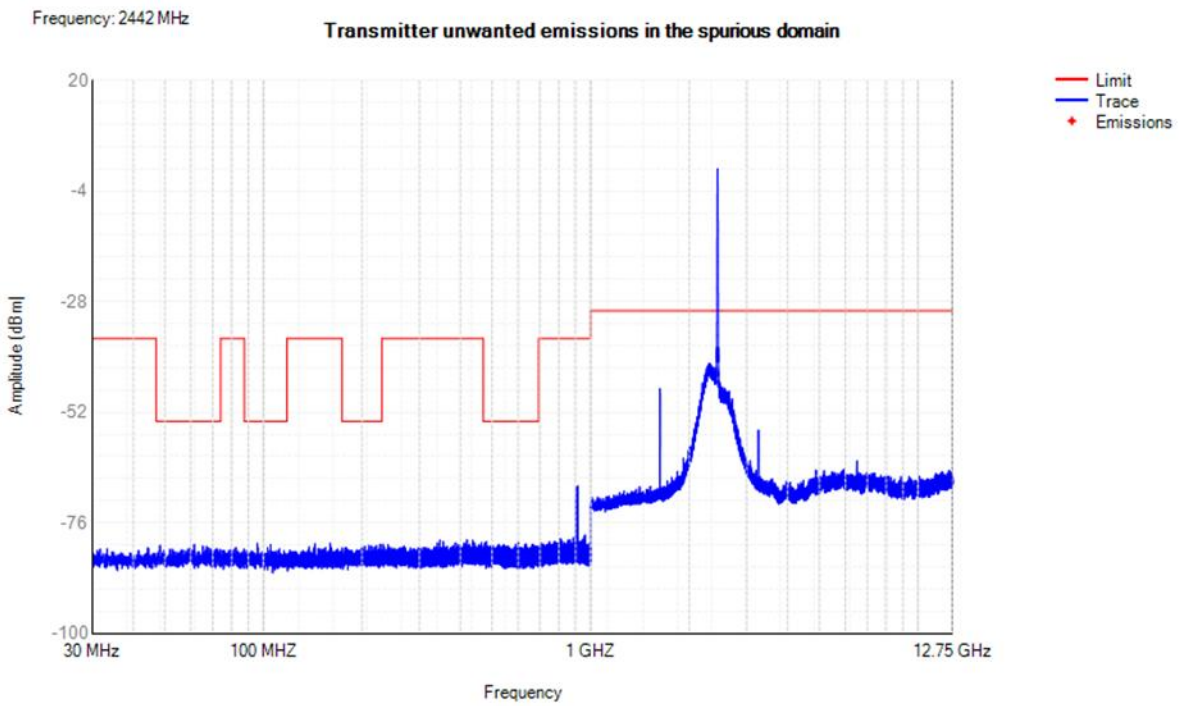
Condition	Mode	Frequency (MHz)	Range (MHz)	Spur Freq (MHz)	Peak (dBm)	RMS (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	30 -47	45.60	-81.69	NA	-36	Pass
NVNT	b	2412	47 -74	58.95	-80.72	NA	-54	Pass
NVNT	b	2412	74 -87.5	74.20	-80.97	NA	-36	Pass
NVNT	b	2412	87.5 -118	88.65	-80.43	NA	-54	Pass
NVNT	b	2412	118 -174	126.55	-80.96	NA	-36	Pass
NVNT	b	2412	174 -230	218.40	-80.60	NA	-54	Pass
NVNT	b	2412	230 -470	443.25	-80.03	NA	-36	Pass
NVNT	b	2412	470 -694	564.25	-79.94	NA	-54	Pass
NVNT	b	2412	694 -1000	912.50	-66.29	NA	-36	Pass
NVNT	b	2412	1000 -2360	2351.50	-41.75	NA	-30	Pass
NVNT	b	2412	2523.5 -12750	2582.00	-46.12	NA	-30	Pass
NVNT	b	2442	30 -47	44.30	-81.45	NA	-36	Pass
NVNT	b	2442	47 -74	61.45	-80.70	NA	-54	Pass
NVNT	b	2442	74 -87.5	82.35	-81.34	NA	-36	Pass
NVNT	b	2442	87.5 -118	95.80	-80.47	NA	-54	Pass
NVNT	b	2442	118 -174	160.00	-80.44	NA	-36	Pass
NVNT	b	2442	174 -230	227.45	-80.61	NA	-54	Pass
NVNT	b	2442	230 -470	419.15	-79.66	NA	-36	Pass
NVNT	b	2442	470 -694	480.00	-80.05	NA	-54	Pass
NVNT	b	2442	694 -1000	913.50	-67.99	NA	-36	Pass
NVNT	b	2442	1000 -2360	2313.00	-41.39	NA	-30	Pass
NVNT	b	2442	2523.5 -12750	2529.00	-46.55	NA	-30	Pass
NVNT	b	2472	30 -47	39.05	-81.16	NA	-36	Pass
NVNT	b	2472	47 -74	67.55	-79.83	NA	-54	Pass
NVNT	b	2472	74 -87.5	79.65	-80.64	NA	-36	Pass
NVNT	b	2472	87.5 -118	91.20	-80.35	NA	-54	Pass
NVNT	b	2472	118 -174	160.00	-81.12	NA	-36	Pass
NVNT	b	2472	174 -230	213.55	-80.37	NA	-54	Pass
NVNT	b	2472	230 -470	463.65	-80.07	NA	-36	Pass
NVNT	b	2472	470 -694	472.15	-80.32	NA	-54	Pass
NVNT	b	2472	694 -1000	913.30	-75.25	NA	-36	Pass
NVNT	b	2472	1000 -2360	2320.00	-40.62	NA	-30	Pass
NVNT	b	2472	2523.5 -12750	2612.50	-41.82	NA	-30	Pass
NVNT	g	2412	30 -47	37.20	-81.78	NA	-36	Pass
NVNT	g	2412	47 -74	62.20	-80.42	NA	-54	Pass
NVNT	g	2412	74 -87.5	83.20	-81.54	NA	-36	Pass
NVNT	g	2412	87.5 -118	96.10	-80.09	NA	-54	Pass
NVNT	g	2412	118 -174	128.85	-80.34	NA	-36	Pass
NVNT	g	2412	174 -230	214.60	-81.25	NA	-54	Pass
NVNT	g	2412	230 -470	248.65	-79.61	NA	-36	Pass
NVNT	g	2412	470 -694	519.20	-80.03	NA	-54	Pass
NVNT	g	2412	694 -1000	908.55	-72.04	NA	-36	Pass
NVNT	g	2412	1000 -2360	2319.50	-42.20	NA	-30	Pass
NVNT	g	2412	2523.5 -12750	2526.00	-46.10	NA	-30	Pass
NVNT	g	2442	30 -47	37.00	-81.35	NA	-36	Pass
NVNT	g	2442	47 -74	48.35	-80.52	NA	-54	Pass
NVNT	g	2442	74 -87.5	84.00	-82.01	NA	-36	Pass
NVNT	g	2442	87.5 -118	96.05	-80.47	NA	-54	Pass
NVNT	g	2442	118 -174	159.95	-80.27	NA	-36	Pass
NVNT	g	2442	174 -230	183.50	-80.83	NA	-54	Pass
NVNT	g	2442	230 -470	464.30	-79.96	NA	-36	Pass
NVNT	g	2442	470 -694	627.55	-79.93	NA	-54	Pass
NVNT	g	2442	694 -1000	905.90	-70.77	NA	-36	Pass
NVNT	g	2442	1000 -2360	2319.50	-41.18	NA	-30	Pass
NVNT	g	2442	2523.5 -12750	2602.50	-47.76	NA	-30	Pass
NVNT	g	2472	30 -47	41.20	-81.04	NA	-36	Pass
NVNT	g	2472	47 -74	59.50	-80.34	NA	-54	Pass
NVNT	g	2472	74 -87.5	84.30	-80.77	NA	-36	Pass
NVNT	g	2472	87.5 -118	96.15	-80.15	NA	-54	Pass
NVNT	g	2472	118 -174	139.55	-81.08	NA	-36	Pass
NVNT	g	2472	174 -230	207.20	-80.76	NA	-54	Pass
NVNT	g	2472	230 -470	458.45	-80.30	NA	-36	Pass
NVNT	g	2472	470 -694	531.50	-79.56	NA	-54	Pass
NVNT	g	2472	694 -1000	910.20	-69.38	NA	-36	Pass
NVNT	g	2472	1000 -2360	2313.50	-42.19	NA	-30	Pass
NVNT	g	2472	2523.5 -12750	2571.00	-44.75	NA	-30	Pass
NVNT	n20	2412	30 -47	42.00	-81.77	NA	-36	Pass
NVNT	n20	2412	47 -74	48.25	-79.63	NA	-54	Pass
NVNT	n20	2412	74 -87.5	75.50	-81.12	NA	-36	Pass
NVNT	n20	2412	87.5 -118	96.05	-80.85	NA	-54	Pass
NVNT	n20	2412	118 -174	160.00	-80.46	NA	-36	Pass
NVNT	n20	2412	174 -230	208.60	-80.86	NA	-54	Pass
NVNT	n20	2412	230 -470	454.70	-79.70	NA	-36	Pass

NVNT	n20	2412	470 -694	536.95	-79.38	NA	-54	Pass
NVNT	n20	2412	694 -1000	912.20	-75.41	NA	-36	Pass
NVNT	n20	2412	1000 -2360	2320.00	-42.81	NA	-30	Pass
NVNT	n20	2412	2523.5 -12750	2575.00	-42.28	NA	-30	Pass
NVNT	n20	2442	30 -47	42.10	-81.00	NA	-36	Pass
NVNT	n20	2442	47 -74	68.70	-80.47	NA	-54	Pass
NVNT	n20	2442	74 -87.5	79.15	-81.23	NA	-36	Pass
NVNT	n20	2442	87.5 -118	96.30	-80.19	NA	-54	Pass
NVNT	n20	2442	118 -174	173.80	-80.93	NA	-36	Pass
NVNT	n20	2442	174 -230	196.30	-80.38	NA	-54	Pass
NVNT	n20	2442	230 -470	371.80	-80.06	NA	-36	Pass
NVNT	n20	2442	470 -694	693.35	-80.23	NA	-54	Pass
NVNT	n20	2442	694 -1000	910.05	-76.27	NA	-36	Pass
NVNT	n20	2442	1000 -2360	2304.50	-42.07	NA	-30	Pass
NVNT	n20	2442	2523.5 -12750	2588.50	-40.63	NA	-30	Pass
NVNT	n20	2472	30 -47	33.85	-81.27	NA	-36	Pass
NVNT	n20	2472	47 -74	48.25	-80.54	NA	-54	Pass
NVNT	n20	2472	74 -87.5	79.25	-81.78	NA	-36	Pass
NVNT	n20	2472	87.5 -118	96.05	-80.11	NA	-54	Pass
NVNT	n20	2472	118 -174	160.05	-81.17	NA	-36	Pass
NVNT	n20	2472	174 -230	220.30	-80.65	NA	-54	Pass
NVNT	n20	2472	230 -470	426.15	-79.43	NA	-36	Pass
NVNT	n20	2472	470 -694	480.00	-80.07	NA	-54	Pass
NVNT	n20	2472	694 -1000	905.50	-73.91	NA	-36	Pass
NVNT	n20	2472	1000 -2360	2312.00	-41.24	NA	-30	Pass
NVNT	n20	2472	2523.5 -12750	2588.50	-46.27	NA	-30	Pass

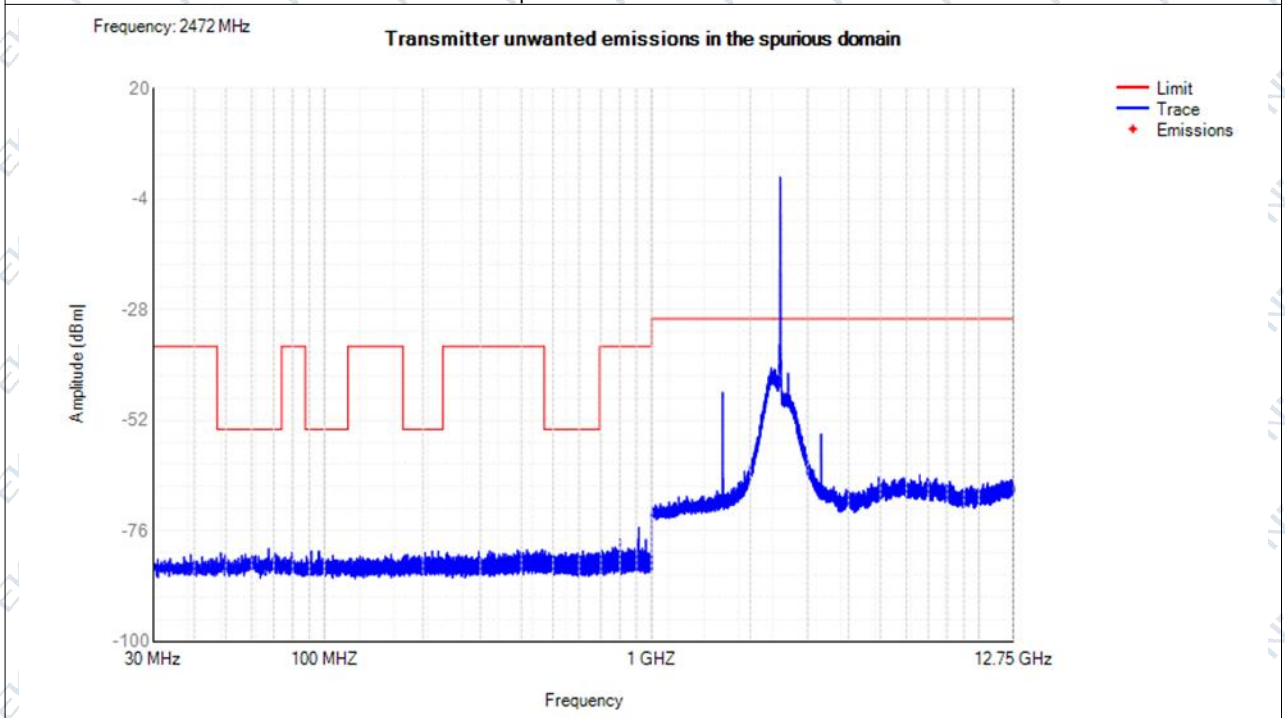
Test Graphs
Tx. Spurious NVNT b 2412MHz Ant1



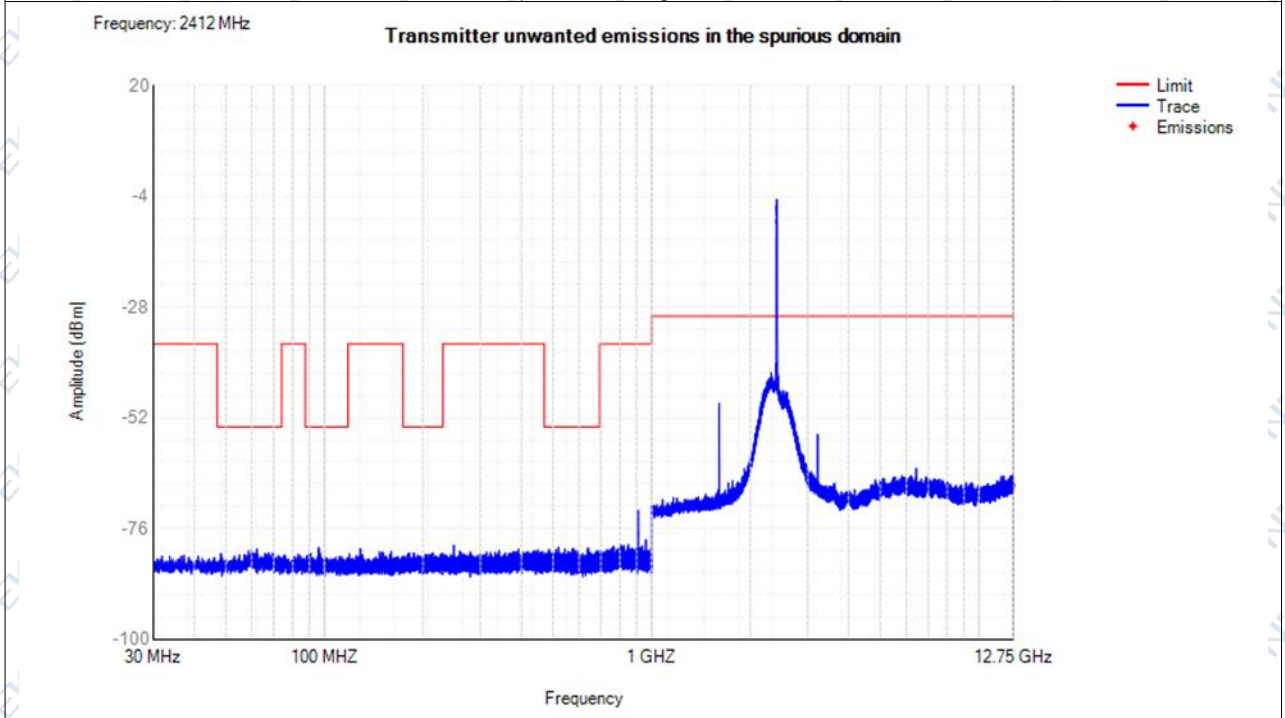
Tx. Spurious NVNT b 2442MHz Ant1



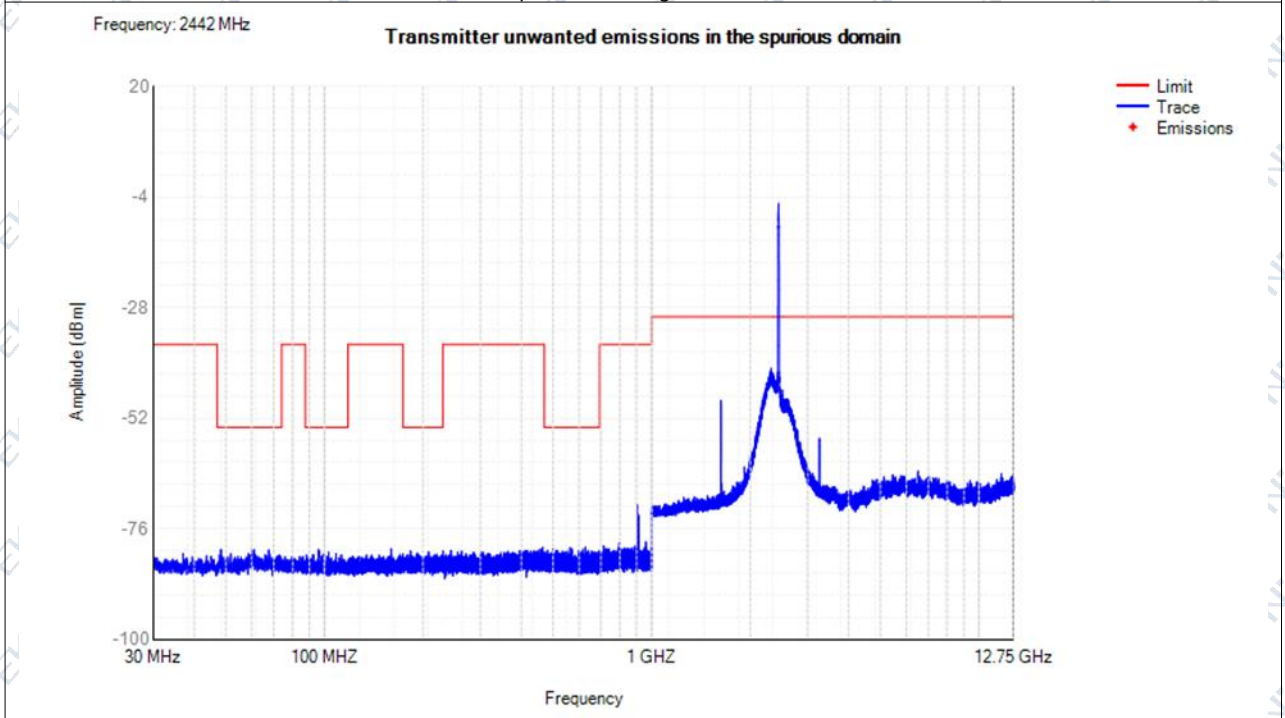
Tx. Spurious NVNT b 2472MHz Ant1



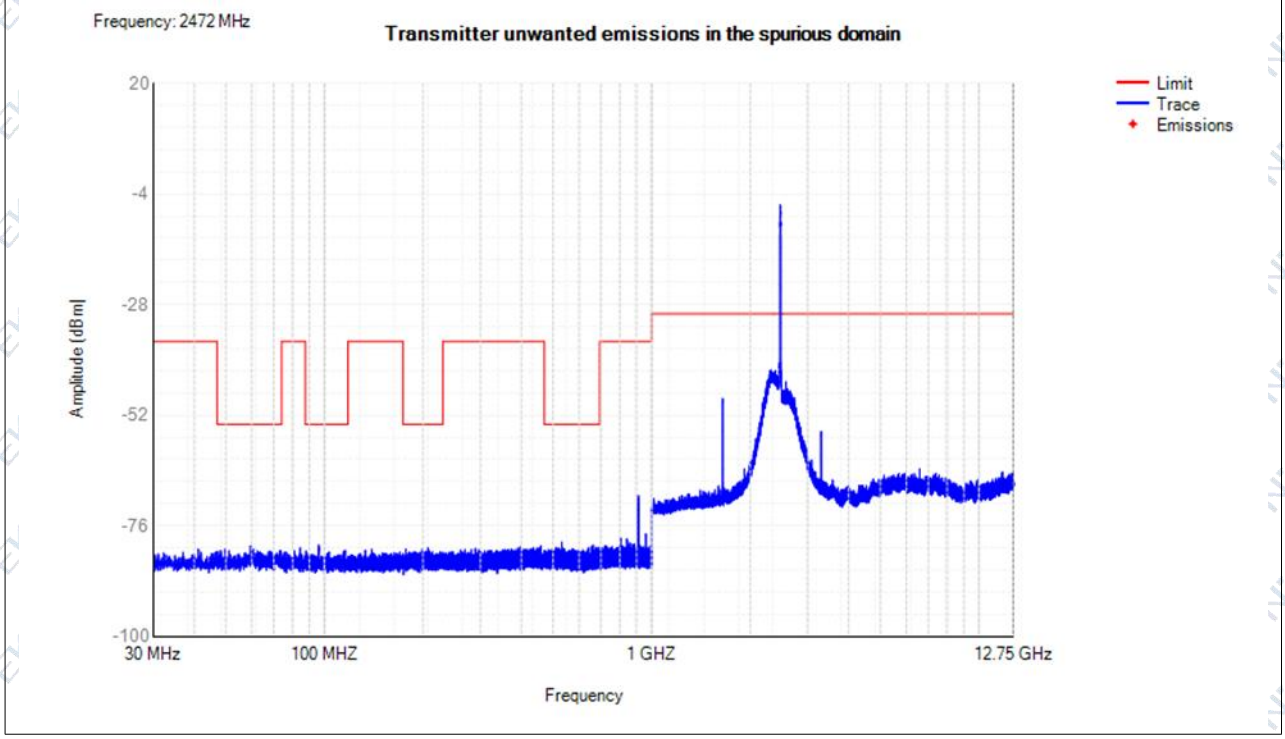
Tx. Spurious NVNT g 2412MHz Ant1



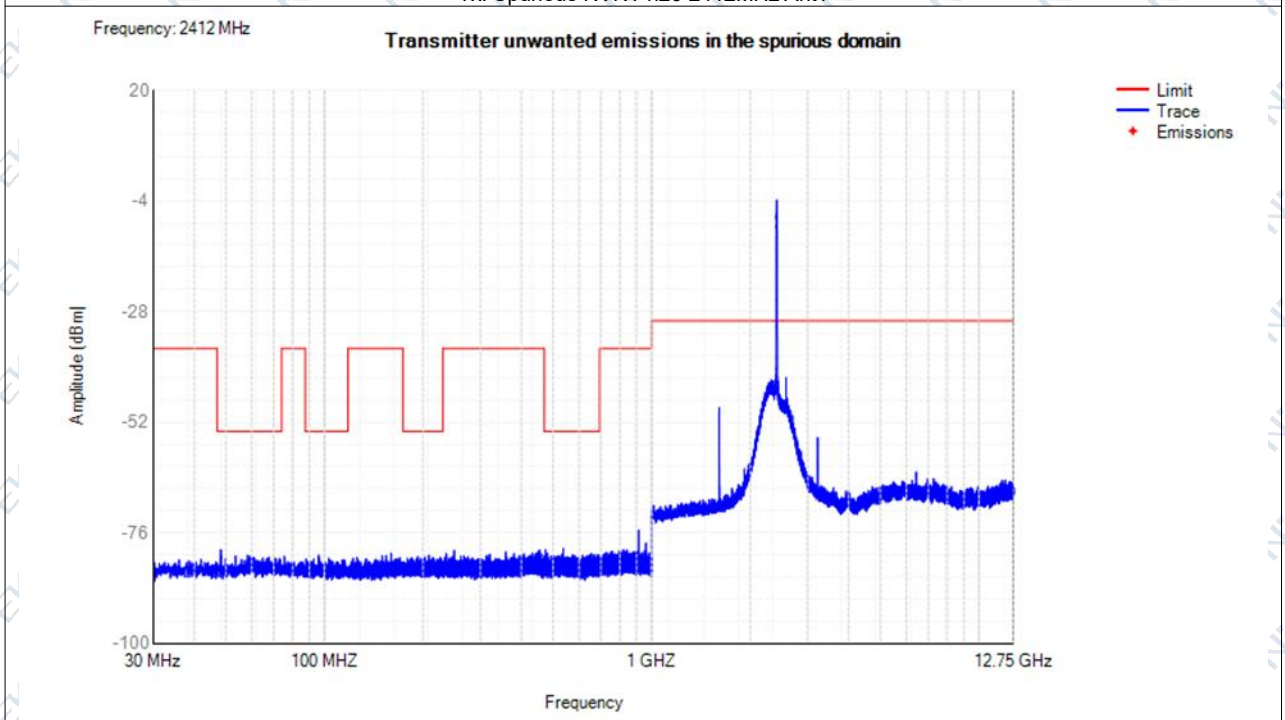
Tx. Spurious NVNT g 2442MHz Ant1



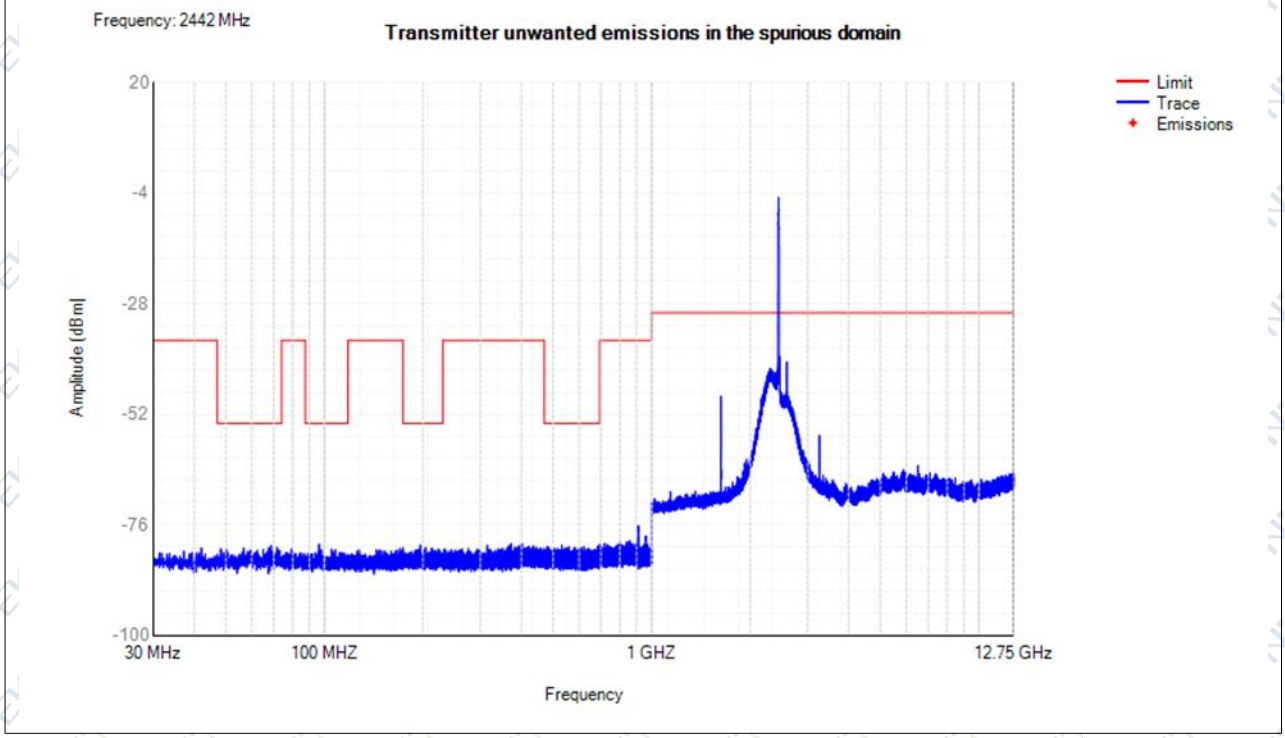
Tx. Spurious NVNT g 2472MHz Ant1



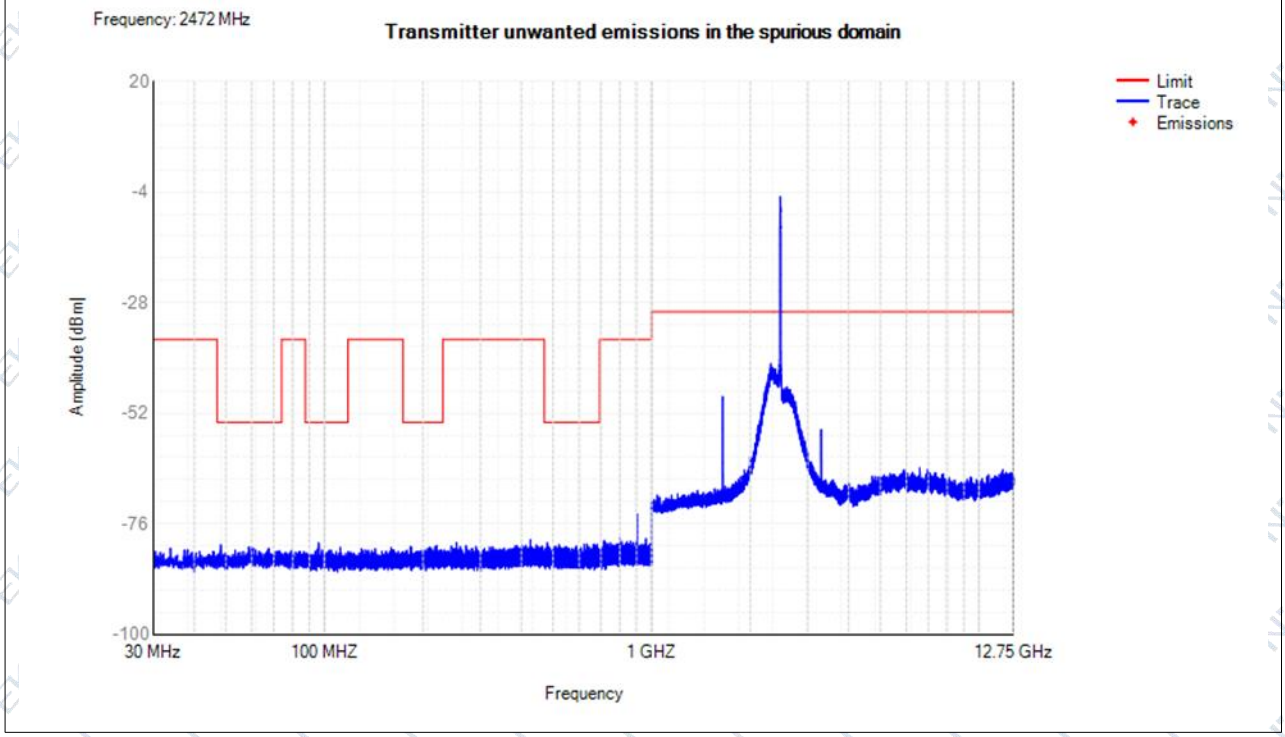
Tx. Spurious NVNT n20 2412MHz Ant1



Tx. Spurious NVNT n20 2442MHz Ant1



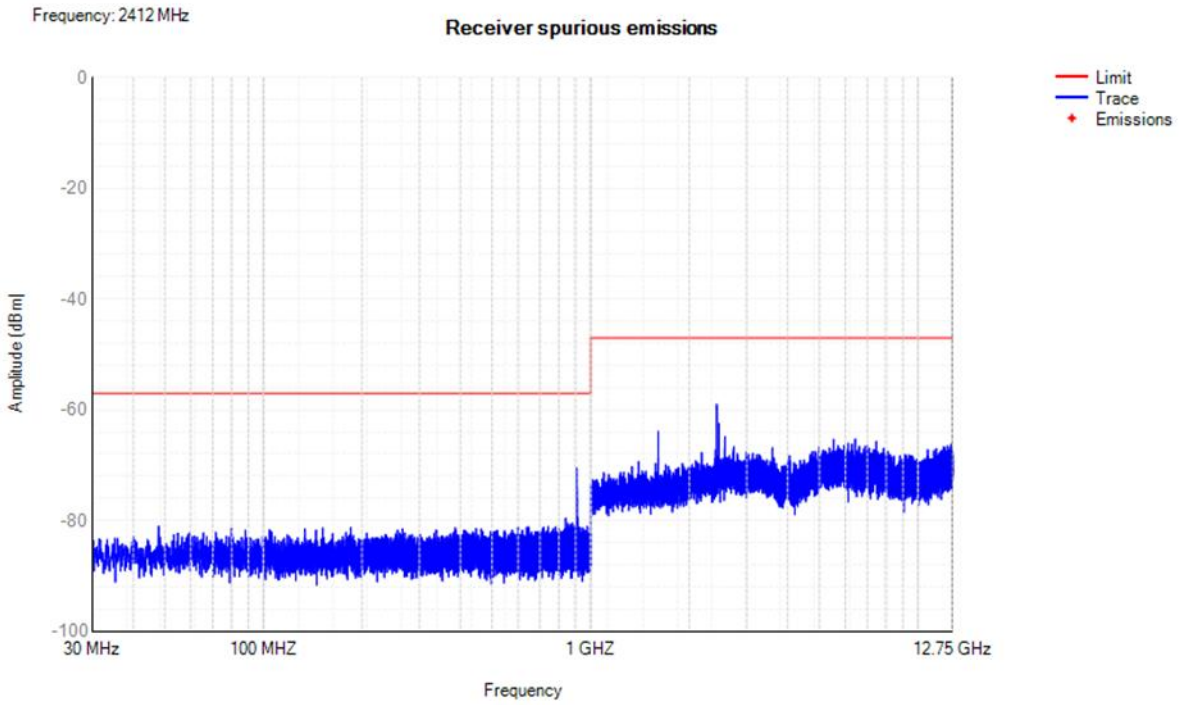
Tx. Spurious NVNT n20 2472MHz Ant1



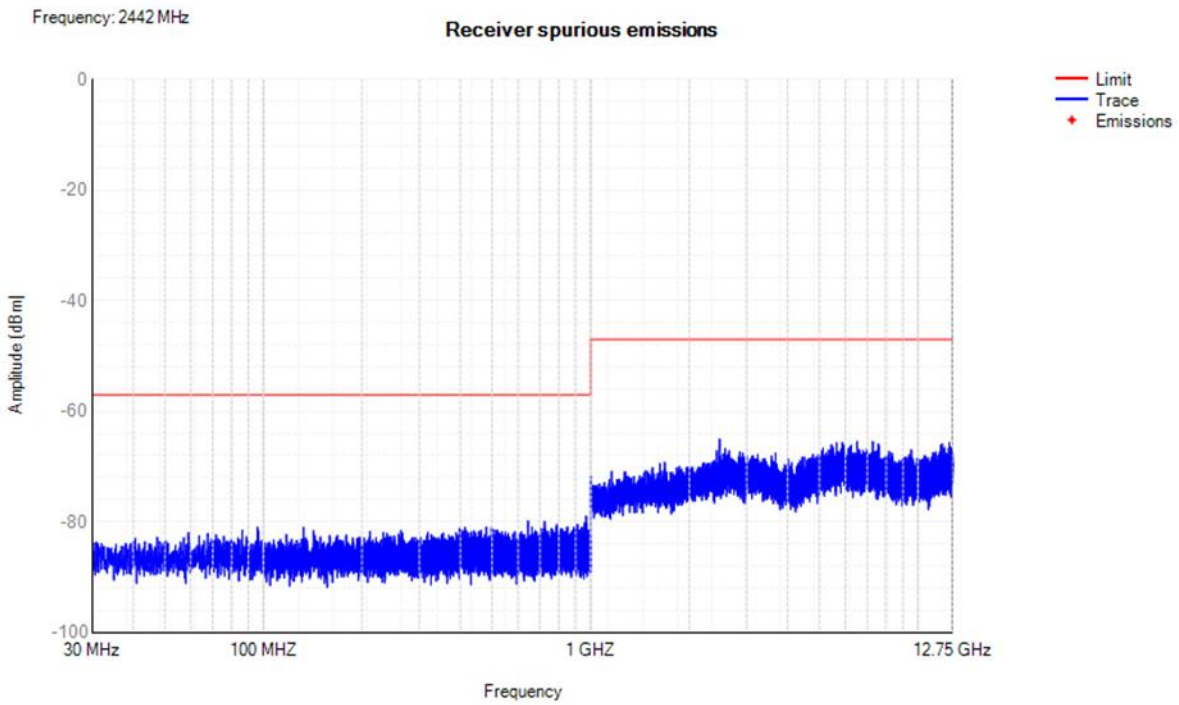
4.6 Receiver spurious emissions

Condition	Mode	Frequency (MHz)	Range	Spur Freq (MHz)	Spur Level Peak(dBm)	Spur Level RMS(dBm)	Limit (dBm)	Verdict
NVNT	802.11b	2412	30 -1000	906.4	-70.54	NA	-57	Pass
NVNT	802.11b	2412	1000 -12750	2428	-59.02	NA	-47	Pass
NVNT	802.11b	2442	30 -1000	968.7	-78.95	NA	-57	Pass
NVNT	802.11b	2442	1000 -12750	2478	-65.00	NA	-47	Pass
NVNT	802.11b	2472	30 -1000	949.1	-80.02	NA	-57	Pass
NVNT	802.11b	2472	1000 -12750	6592.5	-64.46	NA	-47	Pass
NVNT	802.11g	2412	30 -1000	428.3	-79.40	NA	-57	Pass
NVNT	802.11g	2412	1000 -12750	2462	-61.62	NA	-47	Pass
NVNT	802.11g	2442	30 -1000	711.95	-80.07	NA	-57	Pass
NVNT	802.11g	2442	1000 -12750	2454.5	-59.06	NA	-47	Pass
NVNT	802.11g	2472	30 -1000	520.05	-79.89	NA	-57	Pass
NVNT	802.11g	2472	1000 -12750	5797.5	-64.95	NA	-47	Pass
NVNT	802.11n(HT20)	2412	30 -1000	536.45	-79.82	NA	-57	Pass
NVNT	802.11n(HT20)	2412	1000 -12750	11824.5	-64.71	NA	-47	Pass
NVNT	802.11n(HT20)	2442	30 -1000	913.4	-76.32	NA	-57	Pass
NVNT	802.11n(HT20)	2442	1000 -12750	5565	-64.85	NA	-47	Pass
NVNT	802.11n(HT20)	2472	30 -1000	909.1	-75.29	NA	-57	Pass
NVNT	802.11n(HT20)	2472	1000 -12750	2404.5	-54.88	NA	-47	Pass

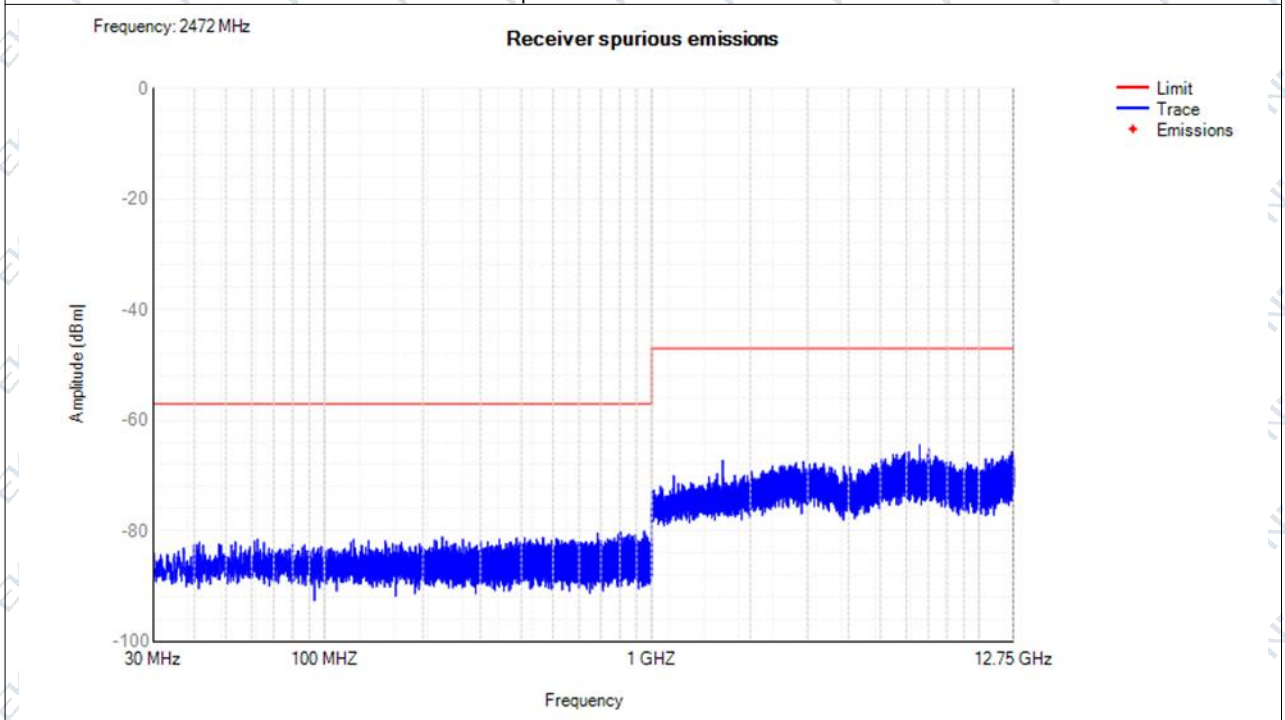
Test Graphs
Rx. Spurious NVNT b 2412MHz Ant1



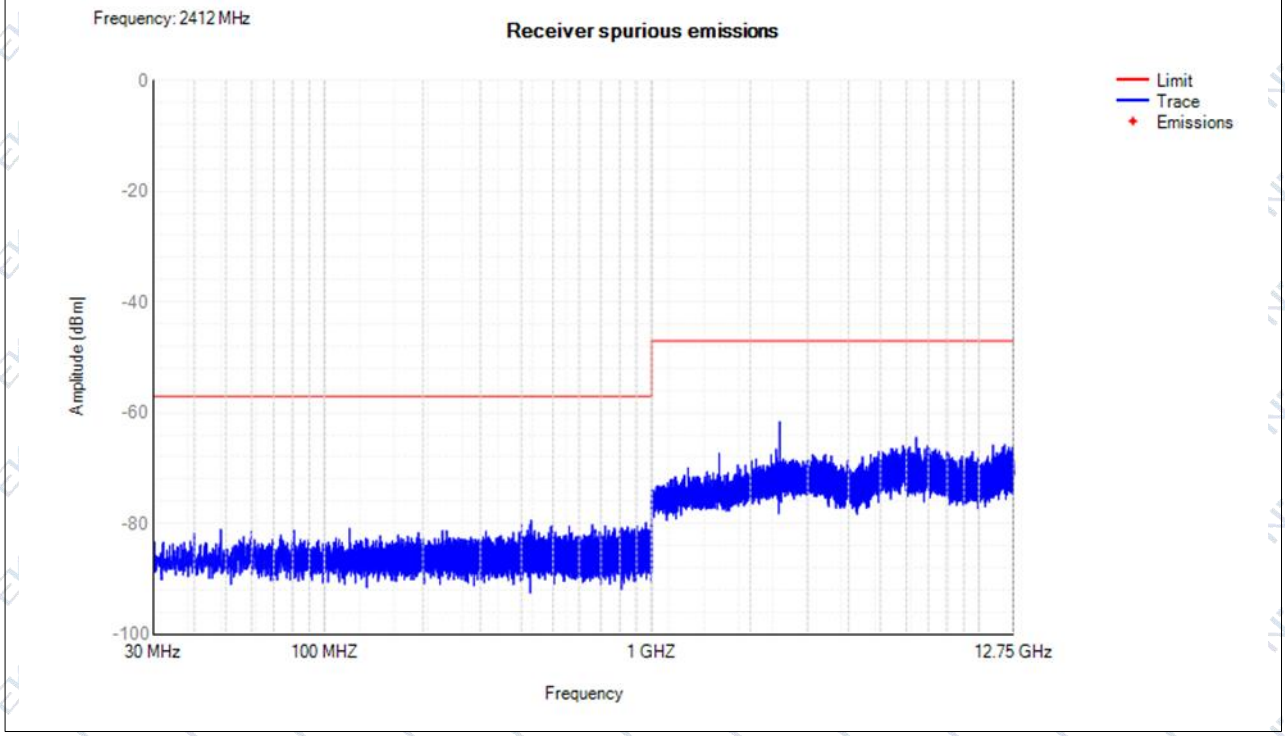
Rx. Spurious NVNT b 2442MHz Ant1



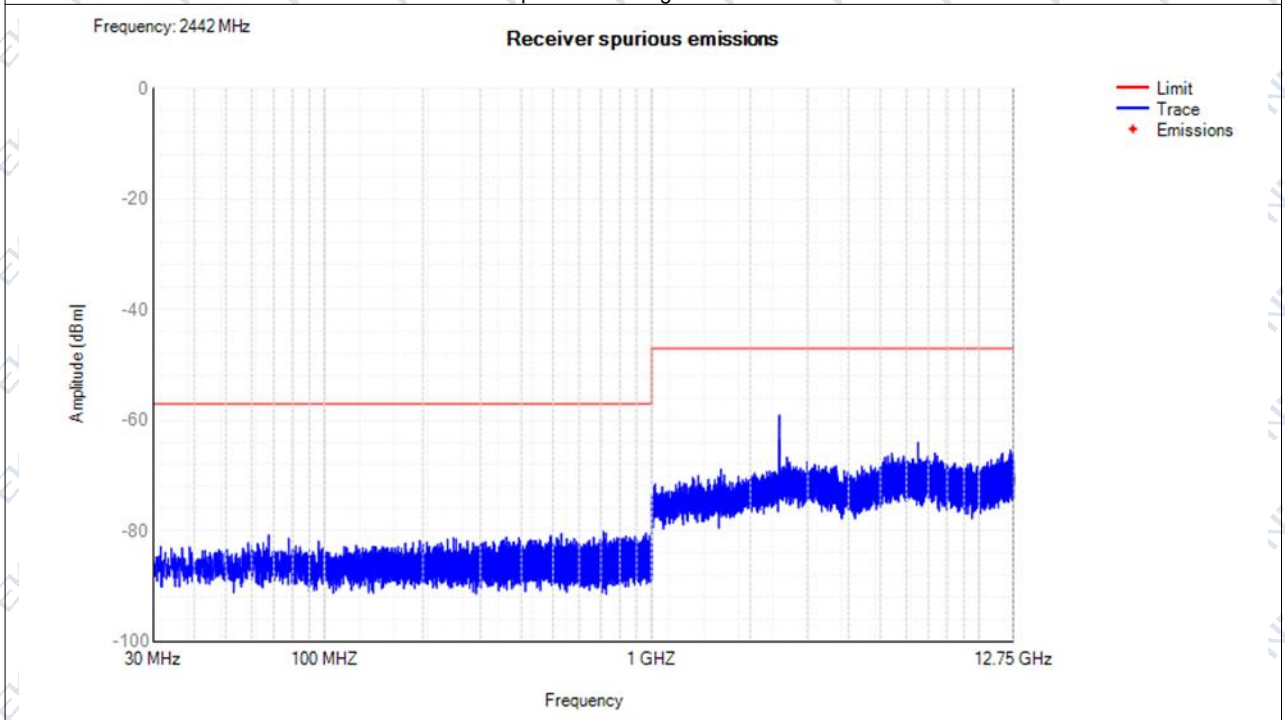
Rx. Spurious NVNT b 2472MHz Ant1



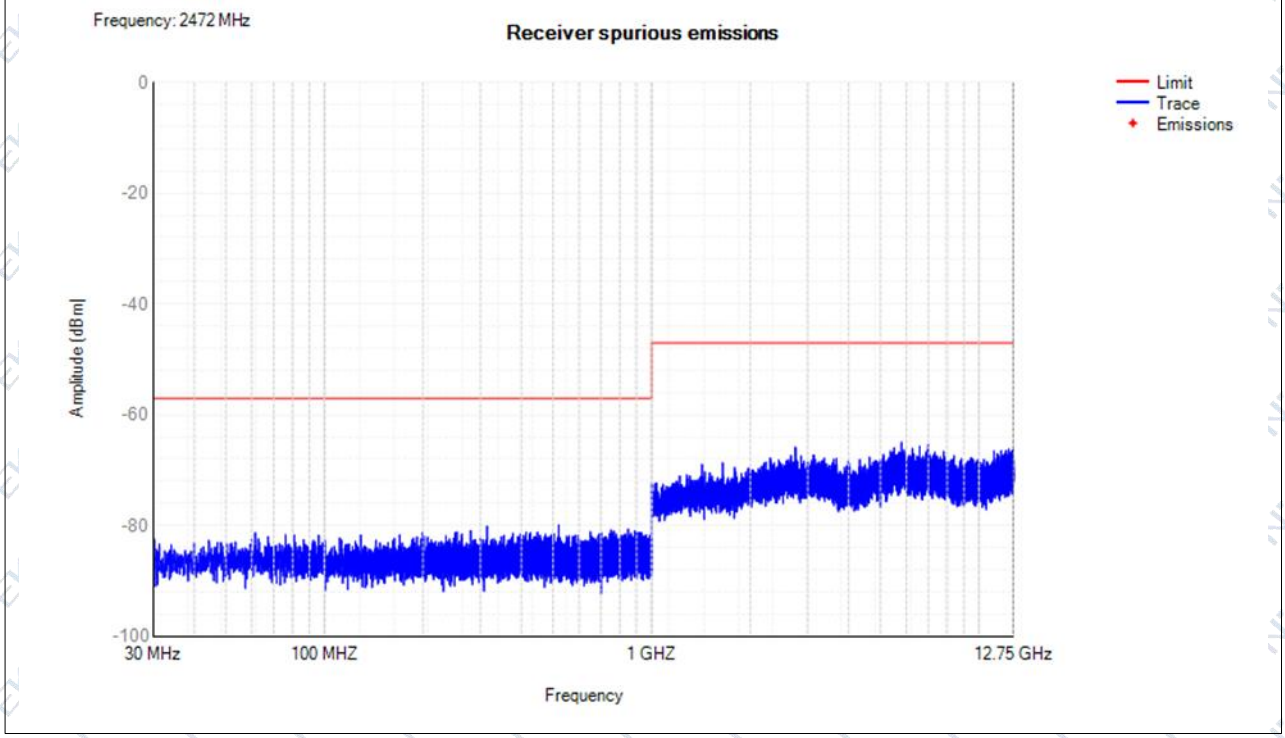
Rx. Spurious NVNT g 2412MHz Ant1



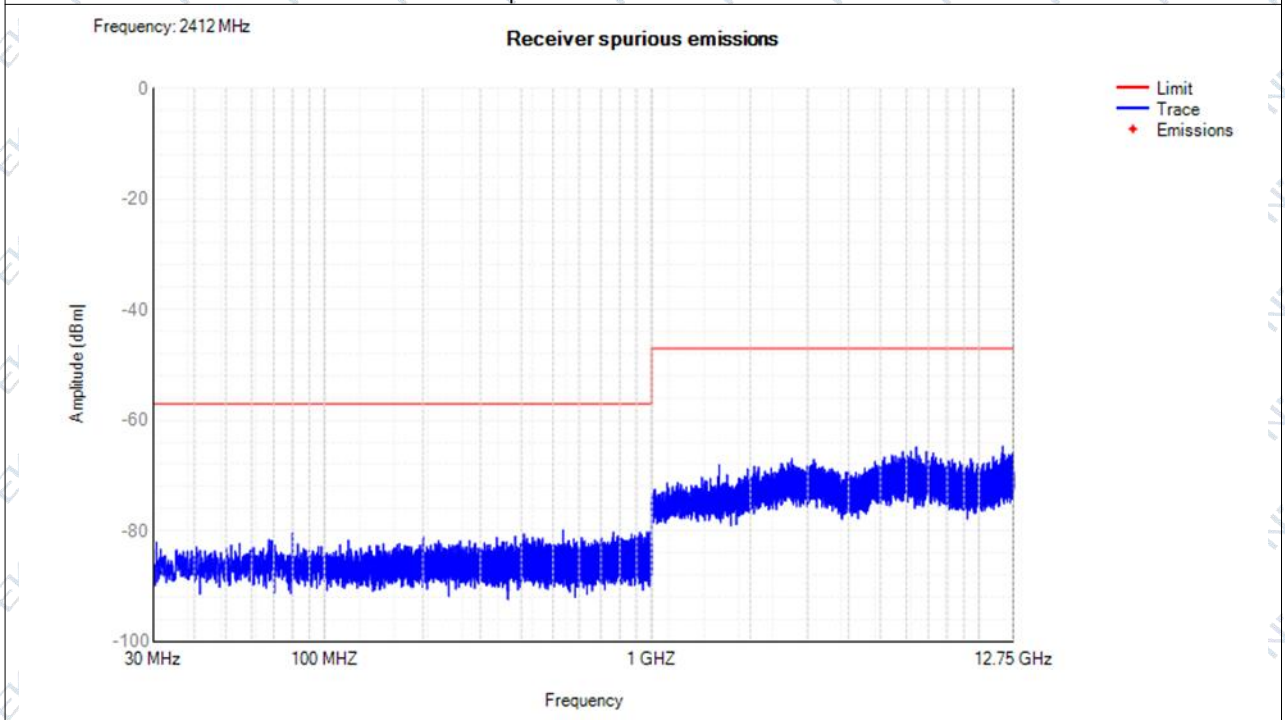
Rx. Spurious NVNT g 2442MHz Ant1



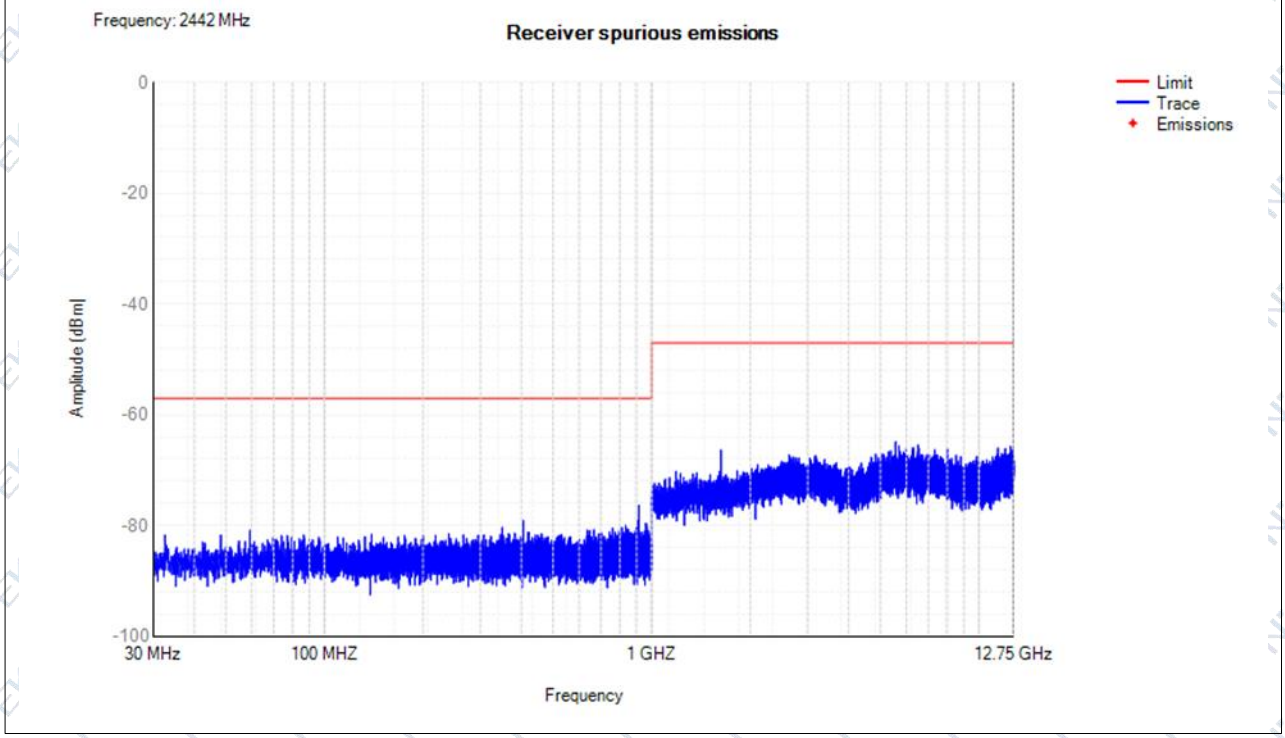
Rx. Spurious NVNT g 2472MHz Ant1



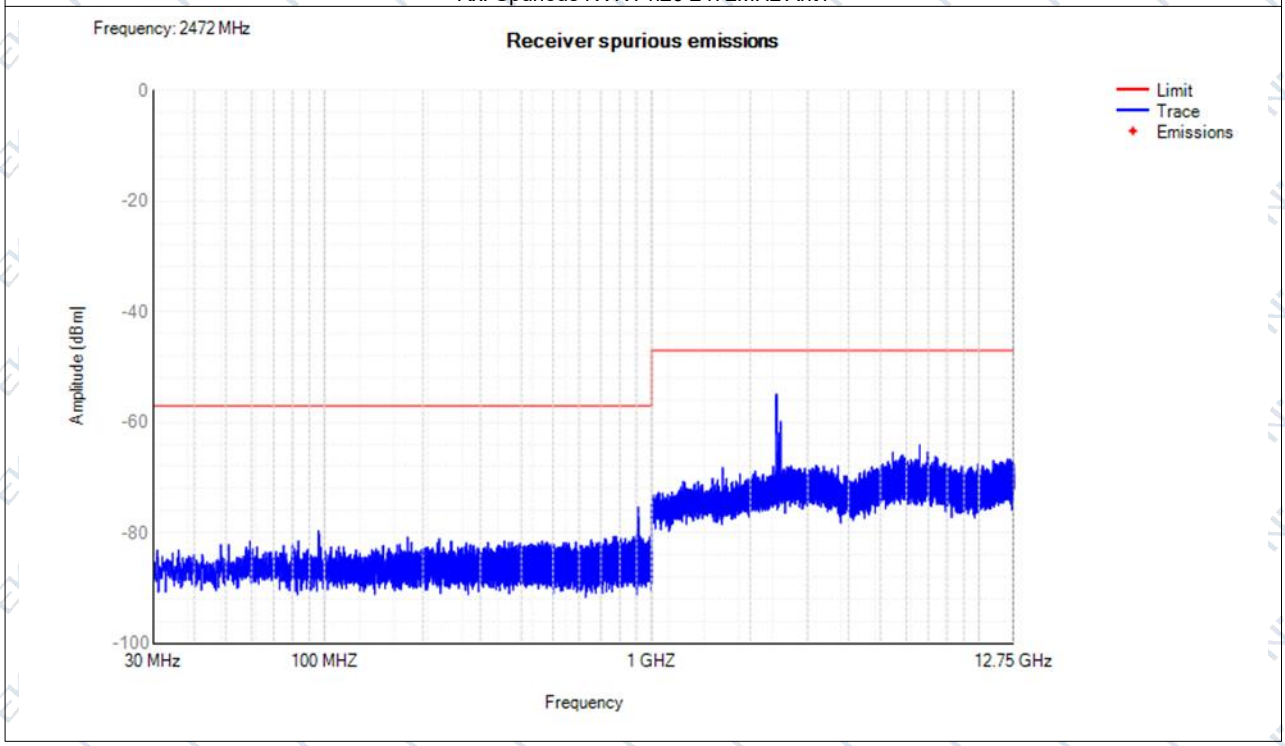
Rx. Spurious NVNT n20 2412MHz Ant1



Rx. Spurious NVNT n20 2442MHz Ant1



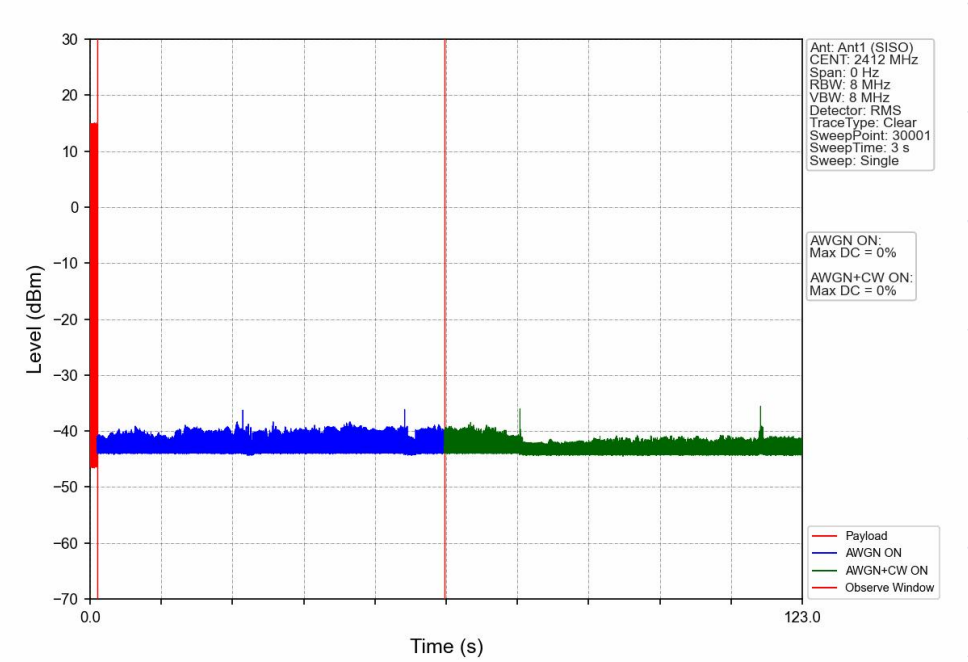
Rx. Spurious NVNT n20 2472MHz Ant1



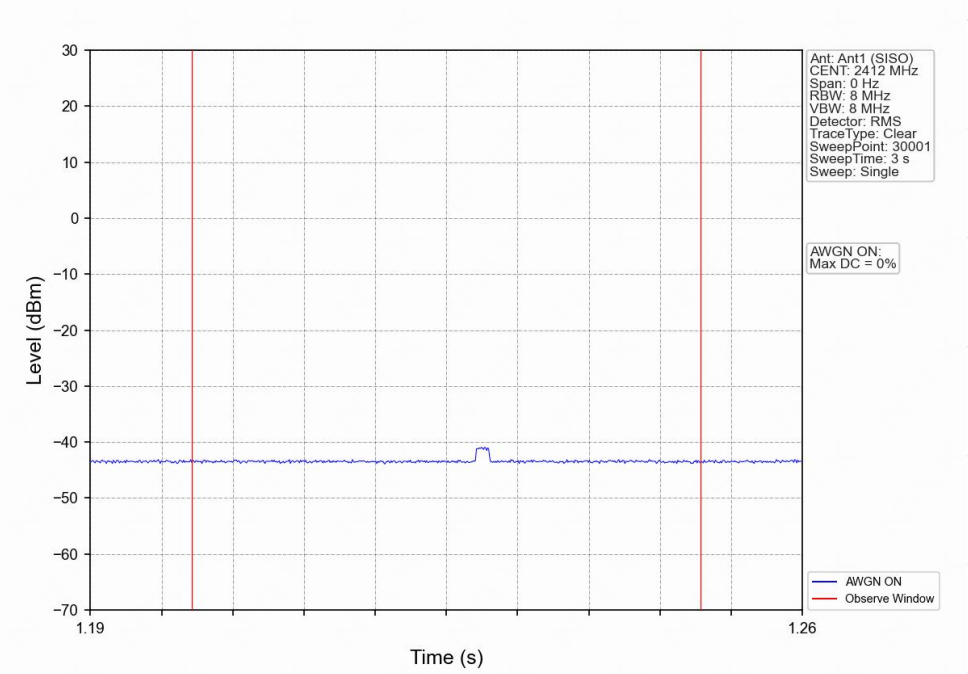
4.7 Adaptivity

ENV	Mode	TX Type	Frequency (MHz)	ANT	Interference Signal			Max. Short Control Signal		Verdict
					Type	Add Time (s)	Level (dBm/MHz)	Duty Cycle (%)	Limit (%)	
NTNV	802.11b	SISO	2412	1	AWGN	1.2	-62.92	0.00	<=10	Pass
					AWGN+CW	61.2	-62.92	0.00	<=10	Pass
			2472	1	AWGN	1.2	-61.98	0.00	<=10	Pass
					AWGN+CW	61.2	-61.98	0.00	<=10	Pass
	802.11g	SISO	2412	1	AWGN	1.2	-62.26	0.40	<=10	Pass
					AWGN+CW	61.2	-62.26	0.00	<=10	Pass
			2472	1	AWGN	1.2	-61.53	0.00	<=10	Pass
					AWGN+CW	61.2	-61.53	0.00	<=10	Pass
	802.11n (HT20)	SISO	2412	1	AWGN	1.2	-62.65	1.00	<=10	Pass
					AWGN+CW	61.2	-62.65	0.00	<=10	Pass
			2472	1	AWGN	1.2	-61.91	0.00	<=10	Pass
					AWGN+CW	61.2	-61.91	0.00	<=10	Pass

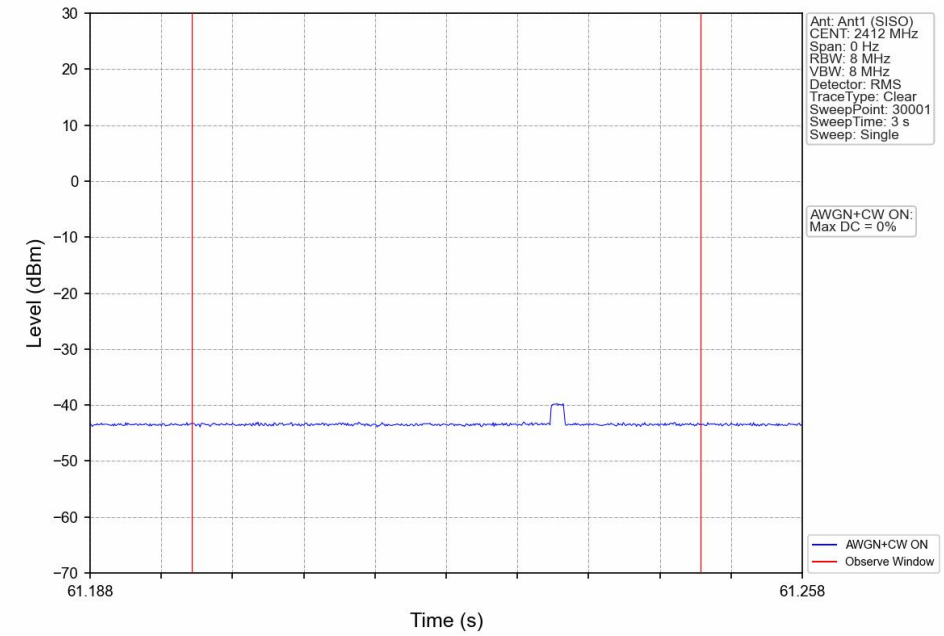
802.11b_2412MHz_Ant1 (SISO)_NTNV



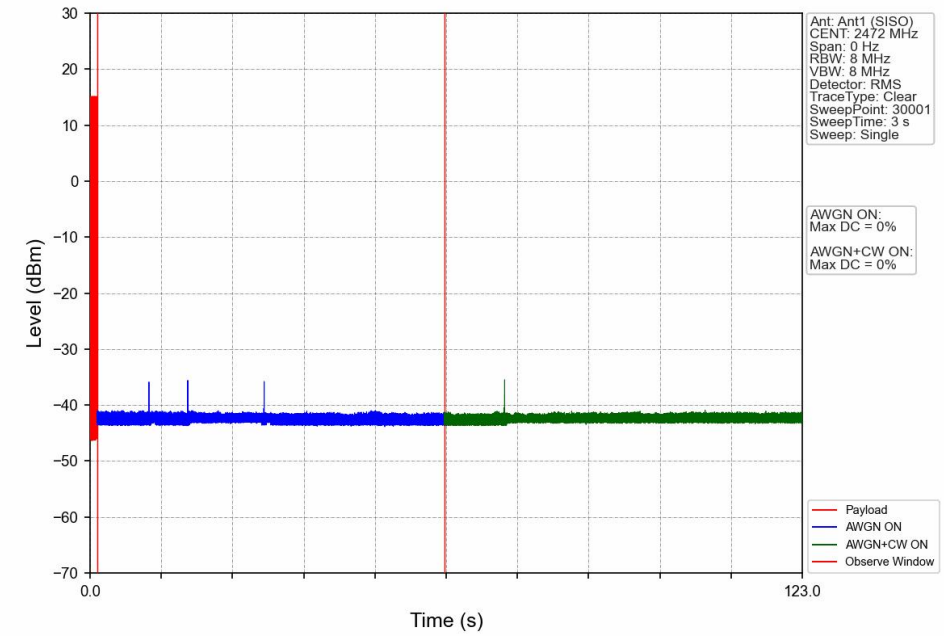
802.11b_2412MHz_Ant1 (SISO)_NTNV



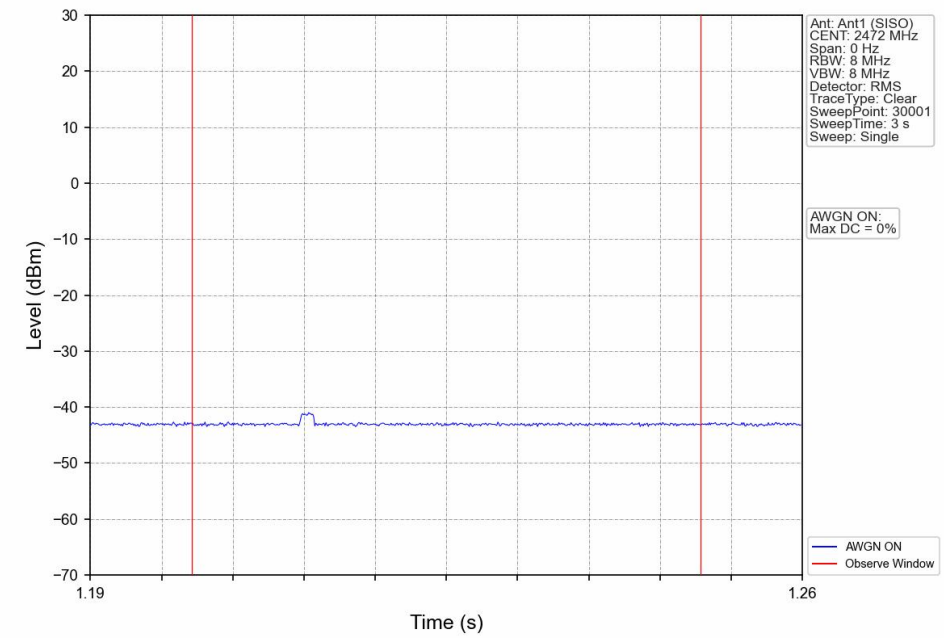
802.11b_2412MHz_Ant1 (SISO)_NTNV



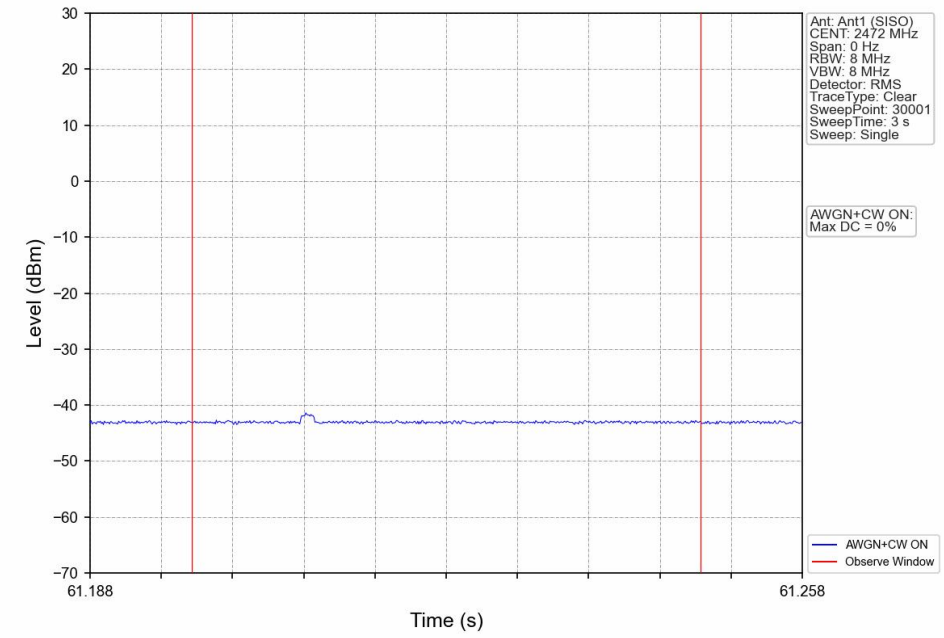
802.11b_2472MHz_Ant1 (SISO)_NTNV



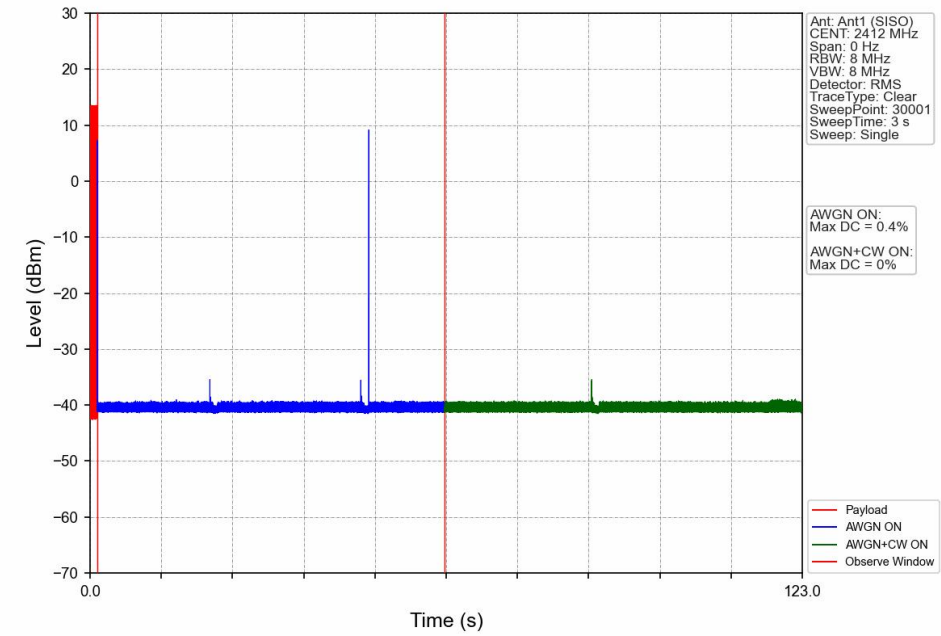
802.11b_2472MHz_Ant1 (SISO)_NTNV



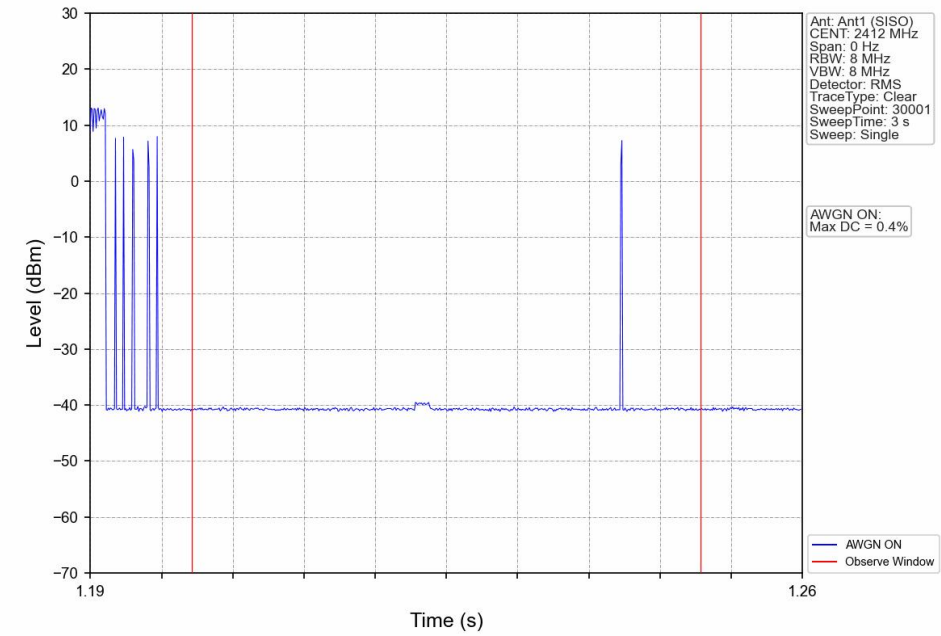
802.11b_2472MHz_Ant1 (SISO)_NTNV



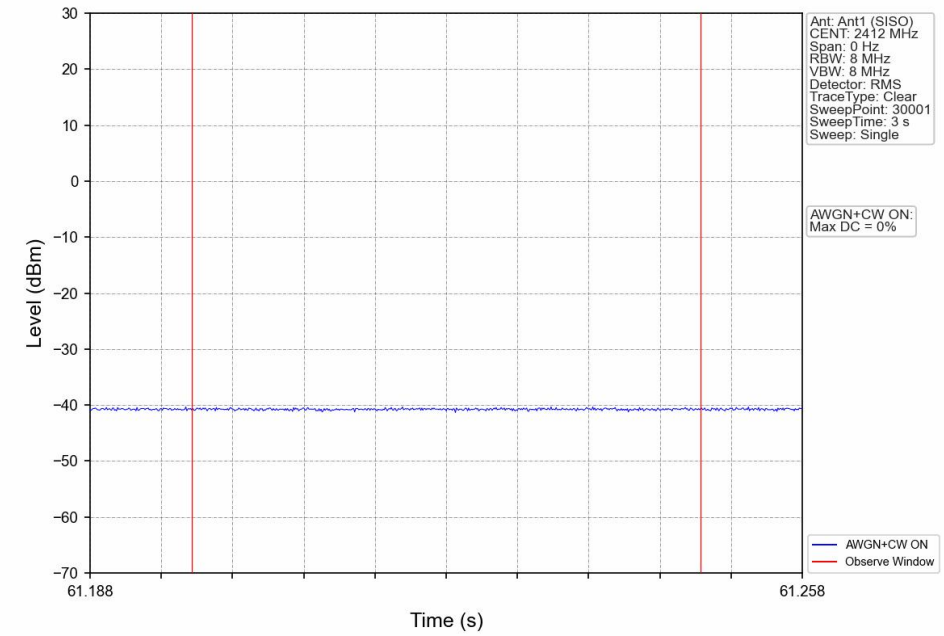
802.11g_2412MHz_Ant1 (SISO)_NTNV



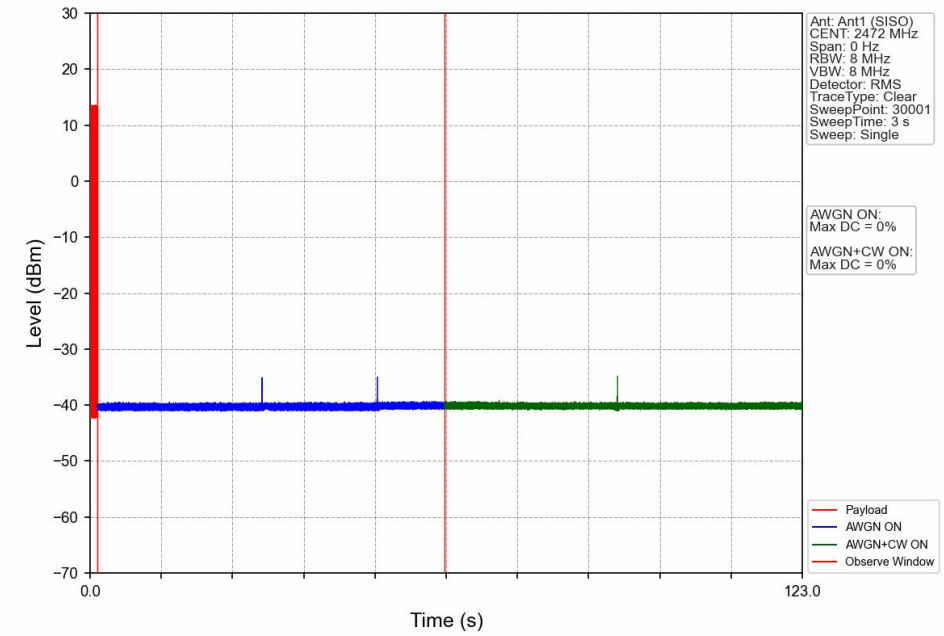
802.11g_2412MHz_Ant1 (SISO)_NTNV



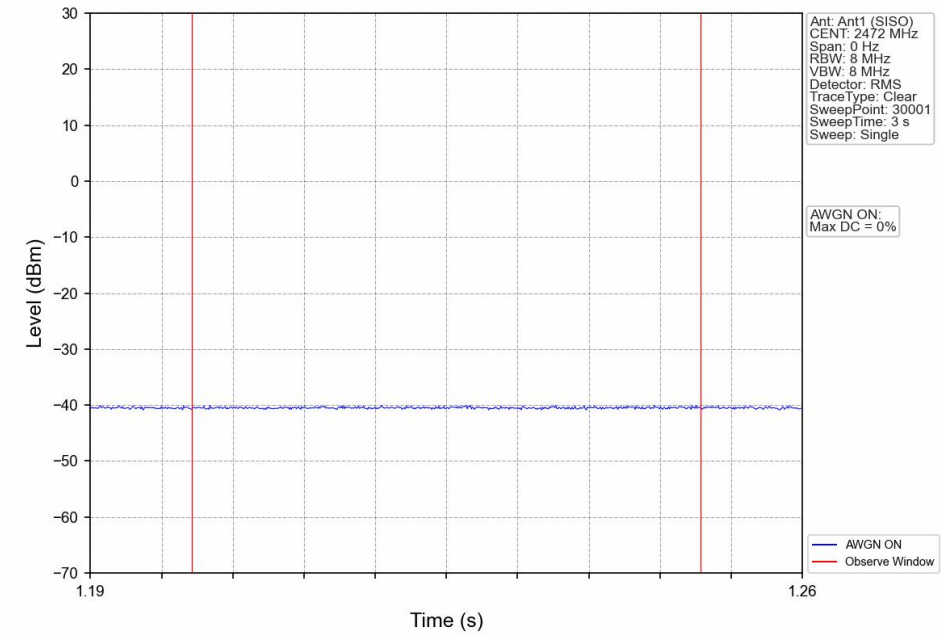
802.11g_2412MHz_Ant1 (SISO)_NTNV



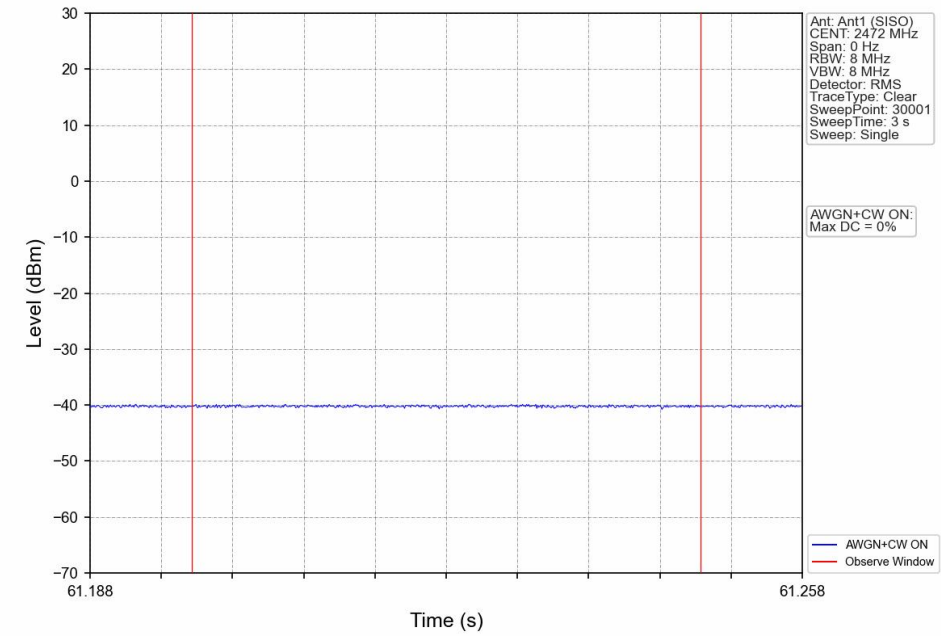
802.11g_2472MHz_Ant1 (SISO)_NTNV



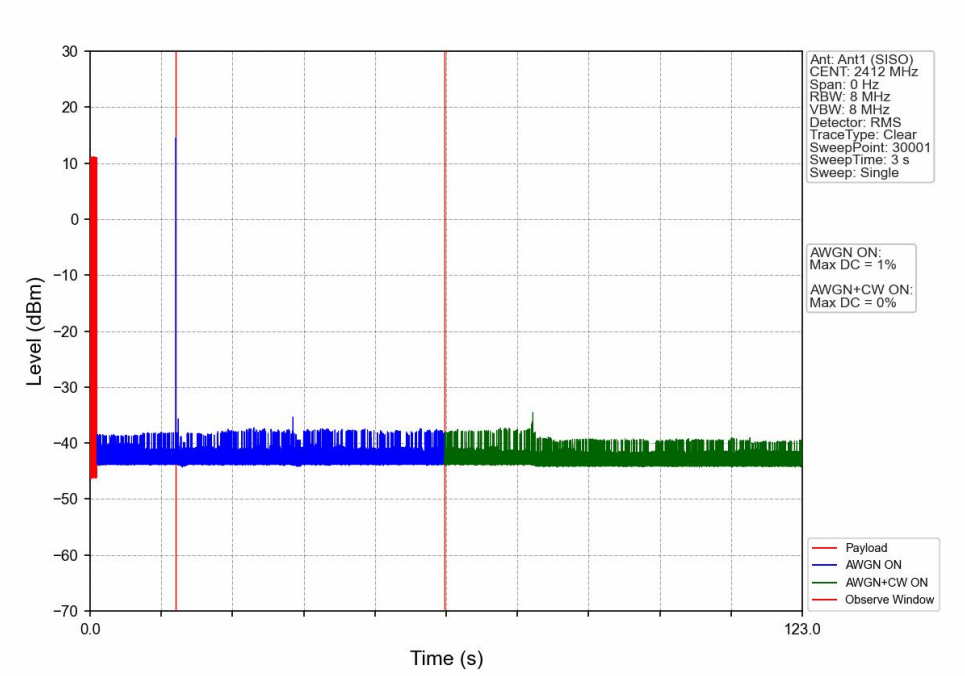
802.11g_2472MHz_Ant1 (SISO)_NTNV



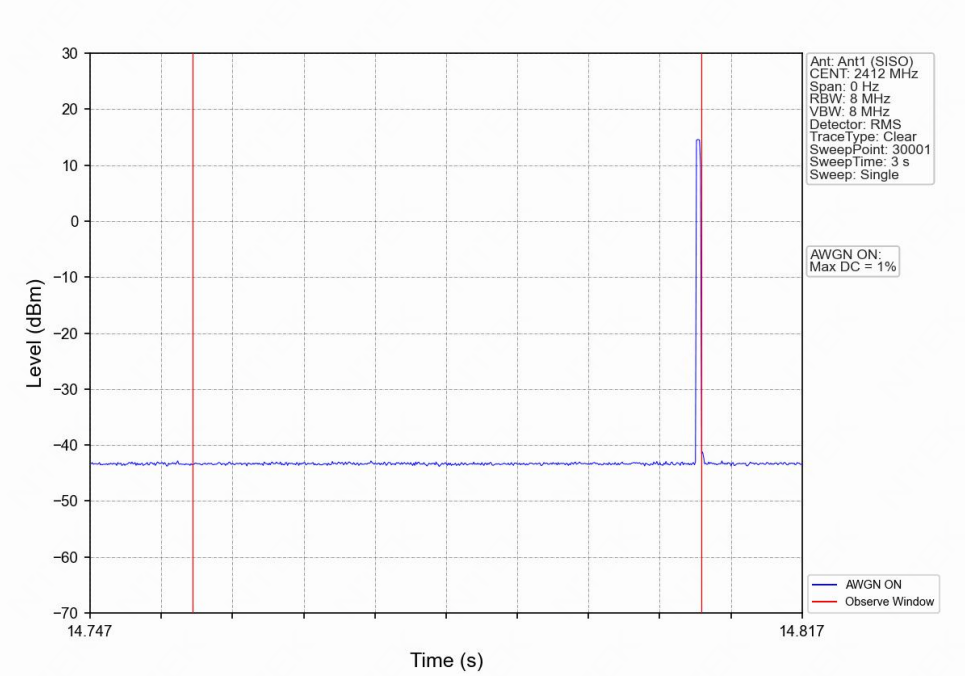
802.11g_2472MHz_Ant1 (SISO)_NTNV



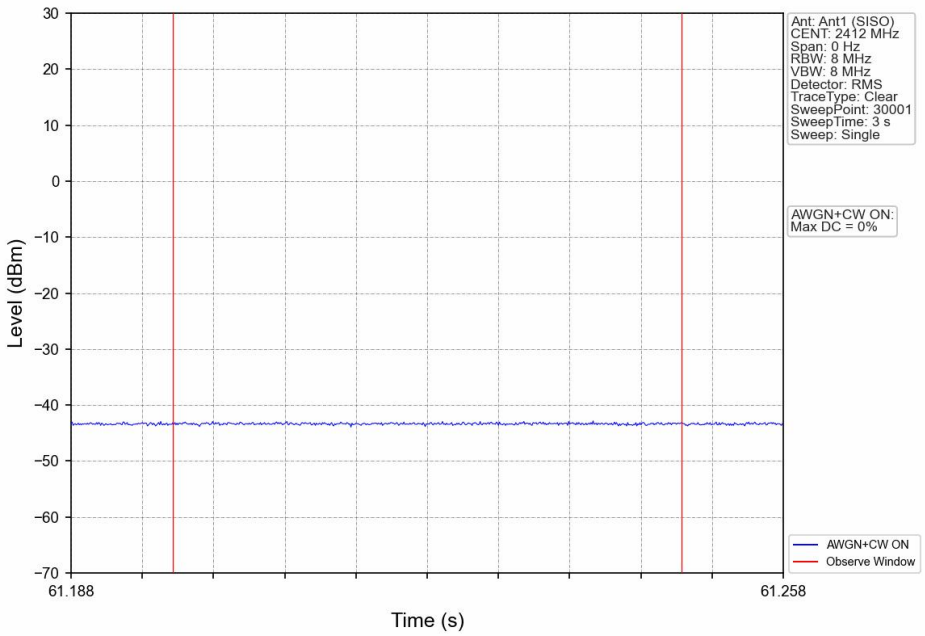
802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



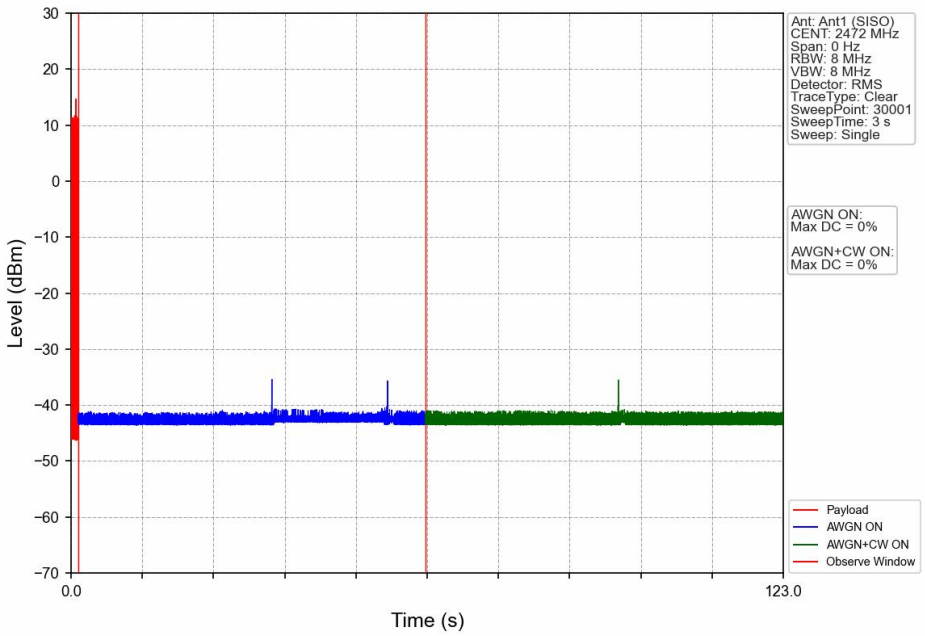
802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



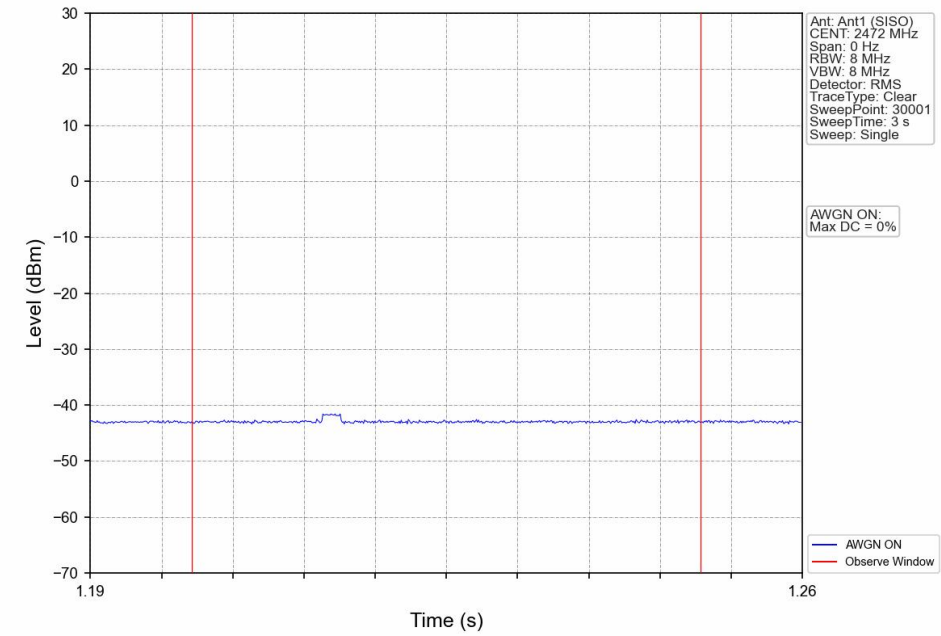
802.11n(HT20)_2412MHz_Ant1 (SISO)_NTNV



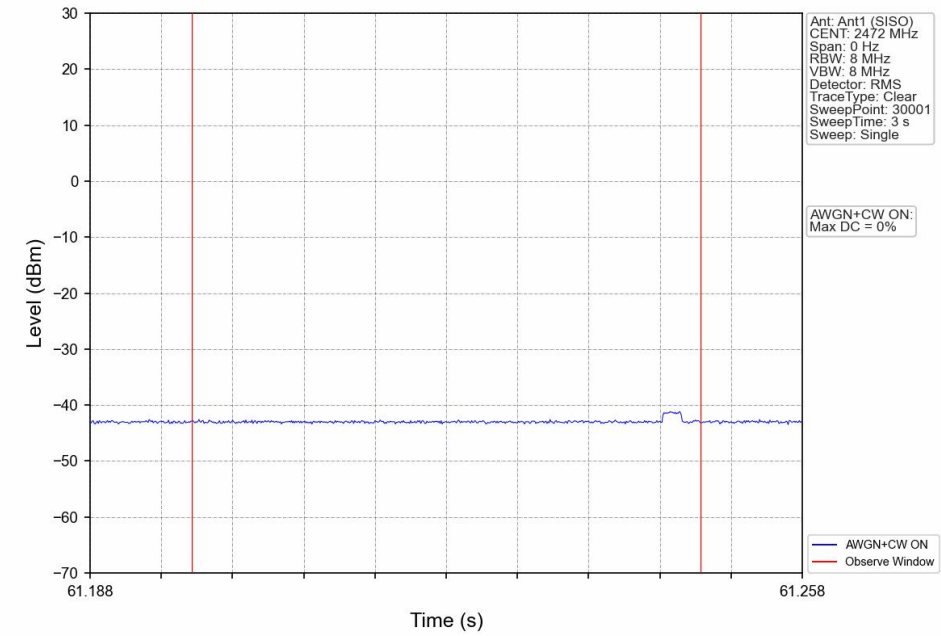
802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



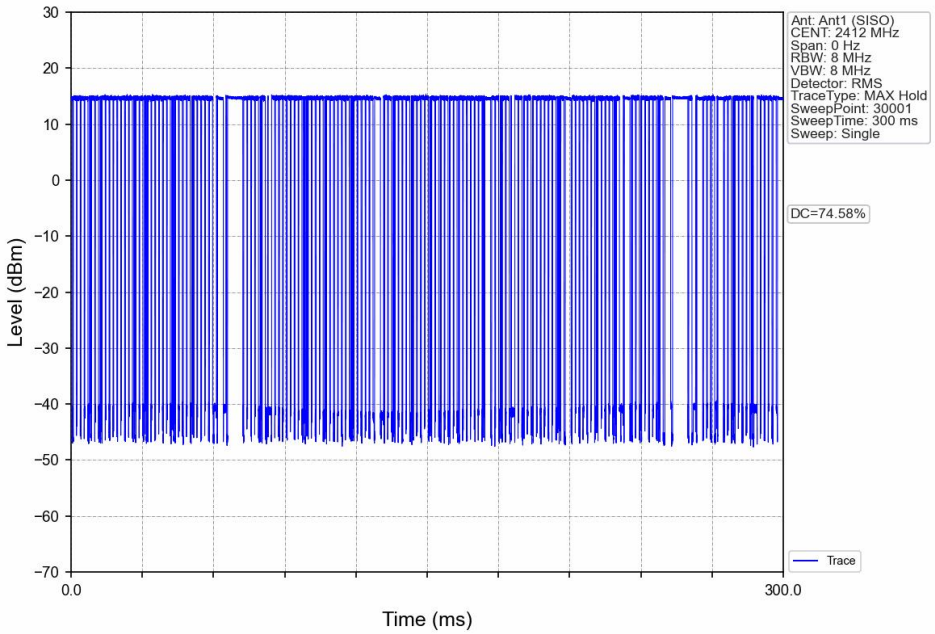
802.11n(HT20)_2472MHz_Ant1 (SISO)_NTNV



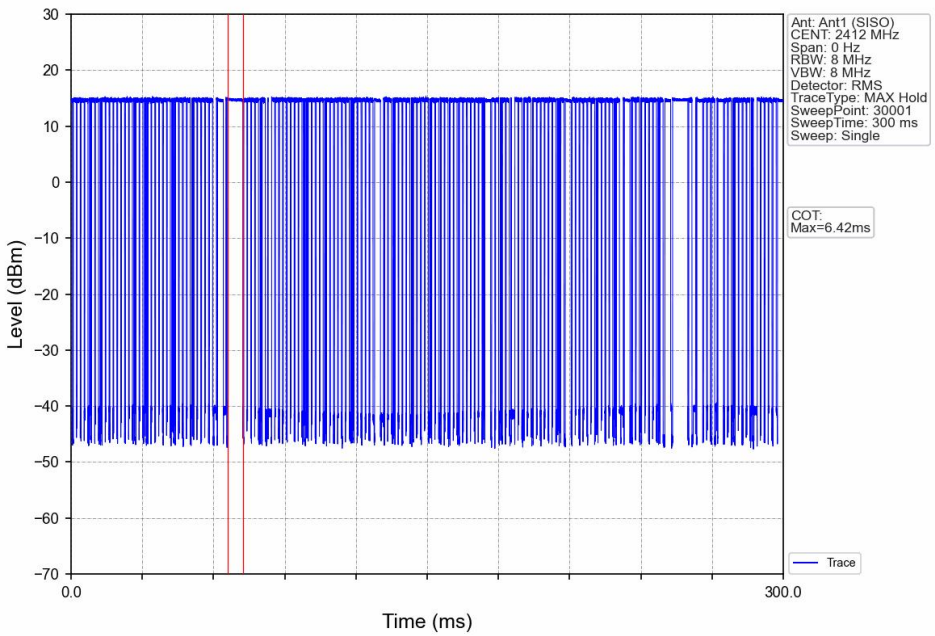
4.8 Adaptivity COT Channel Occupancy Time

ENV	Mode	TX Type	Frequency (MHz)	ANT	Min Idle Time (ms)		Max COT (ms)		Verdict
					Result	Limit	Result	Limit	
NTNV	802.11b	SISO	2412	1	0.030	>=0.018	6.420	<=13	Pass
			2472	1	0.030	>=0.018	2.460	<=13	Pass
	802.11g	SISO	2412	1	0.030	>=0.018	0.380	<=13	Pass
			2472	1	0.030	>=0.018	0.380	<=13	Pass
	802.11n (HT20)	SISO	2412	1	0.030	>=0.018	3.690	<=13	Pass
			2472	1	0.030	>=0.018	3.690	<=13	Pass

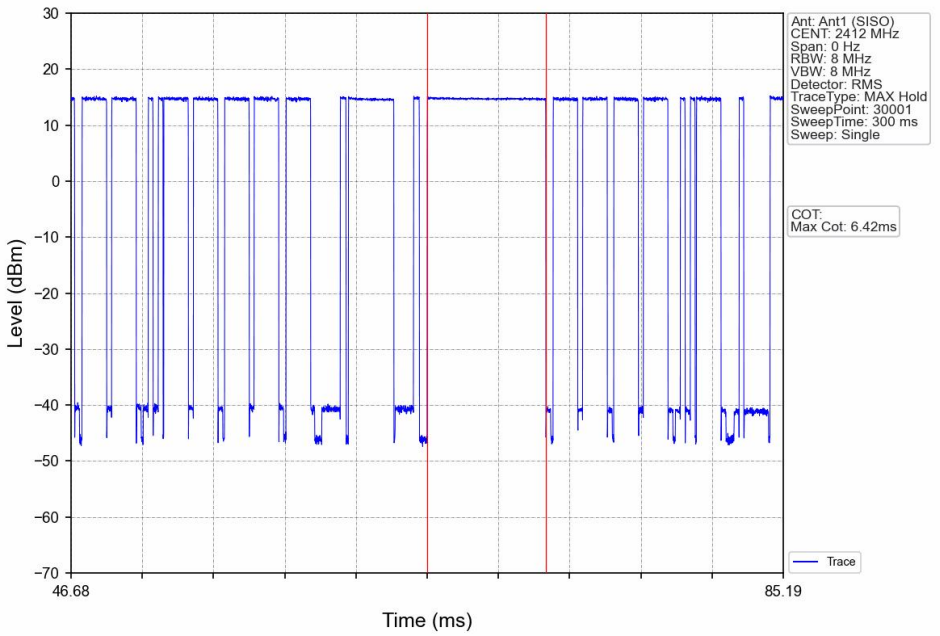
802.11b_2412MHz_Ant1 (SISO)_NTNV



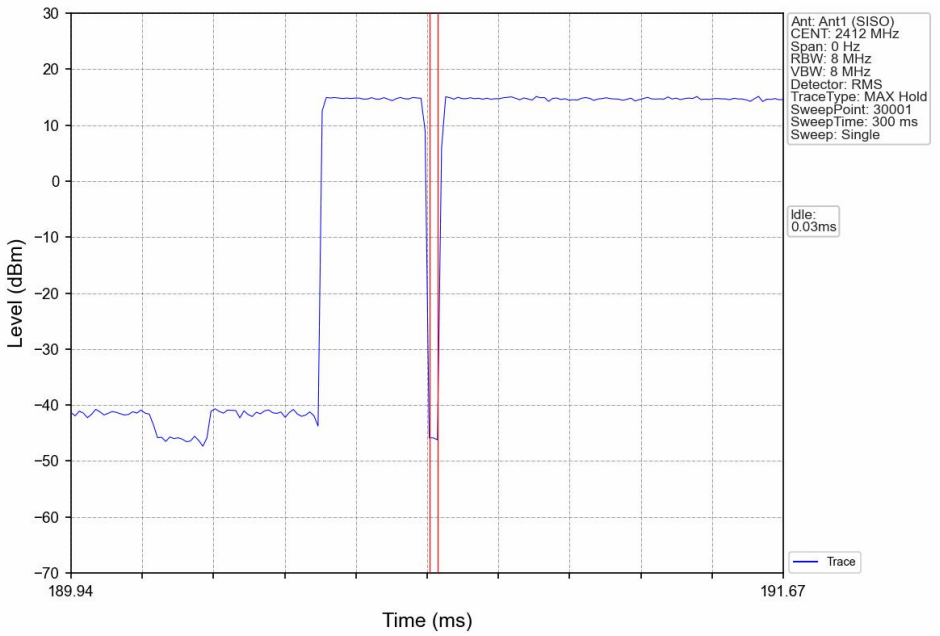
802.11b_2412MHz_Ant1 (SISO)_NTNV



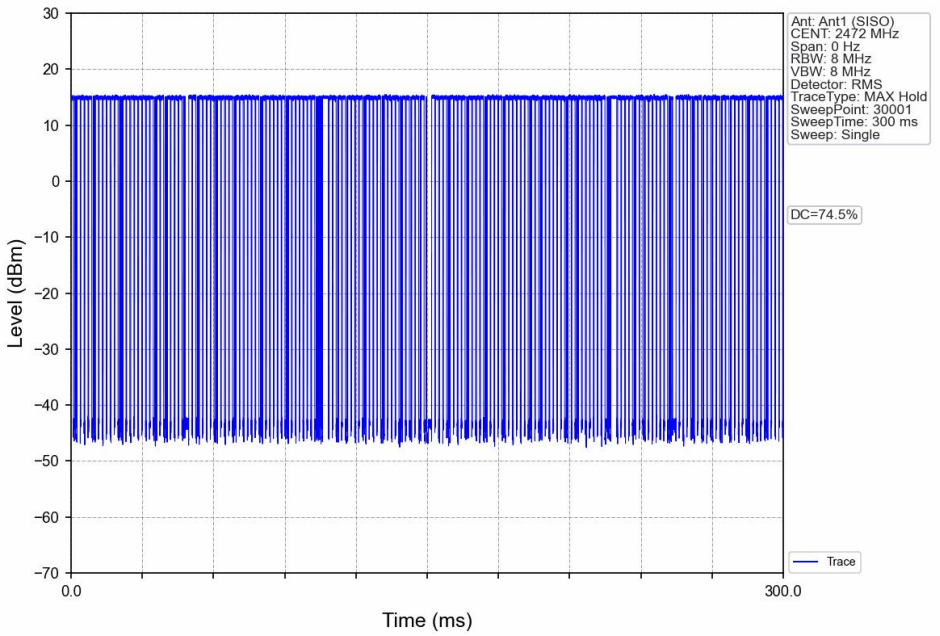
802.11b_2412MHz_Ant1 (SISO)_NTNV



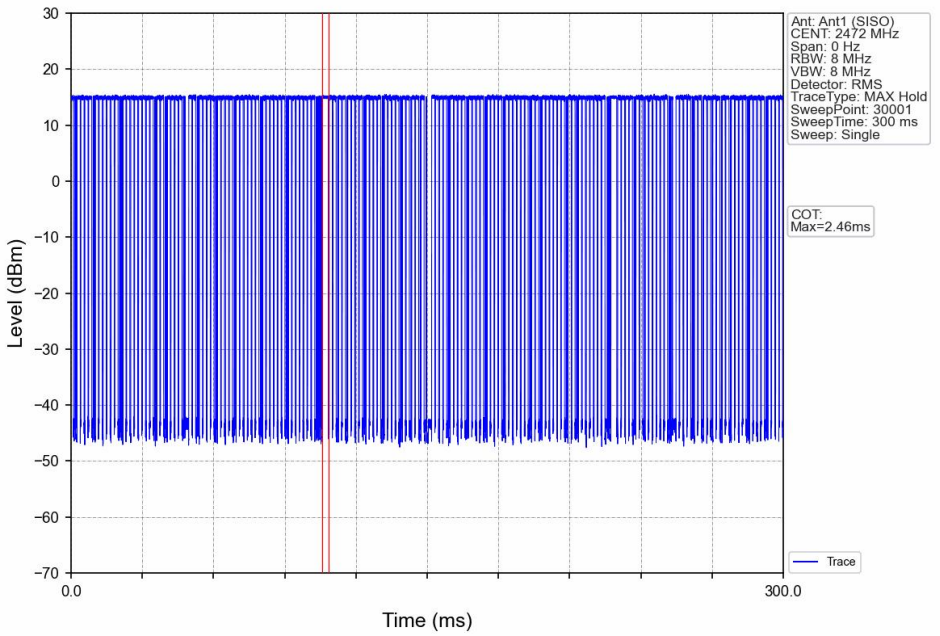
802.11b_2412MHz_Ant1 (SISO)_NTNV



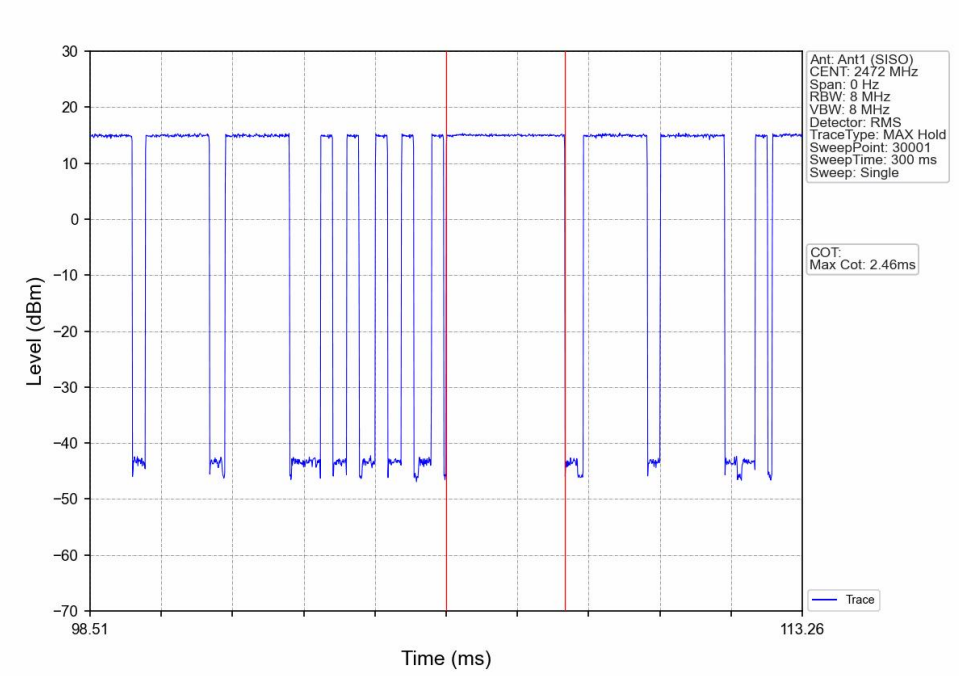
802.11b_2472MHz_Ant1 (SISO)_NTNV



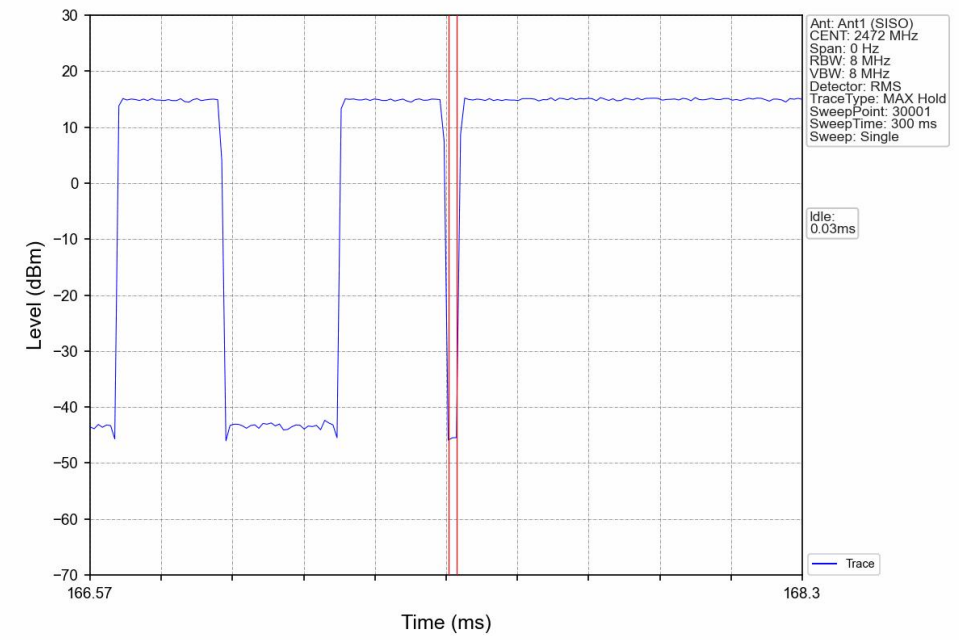
802.11b_2472MHz_Ant1 (SISO)_NTNV



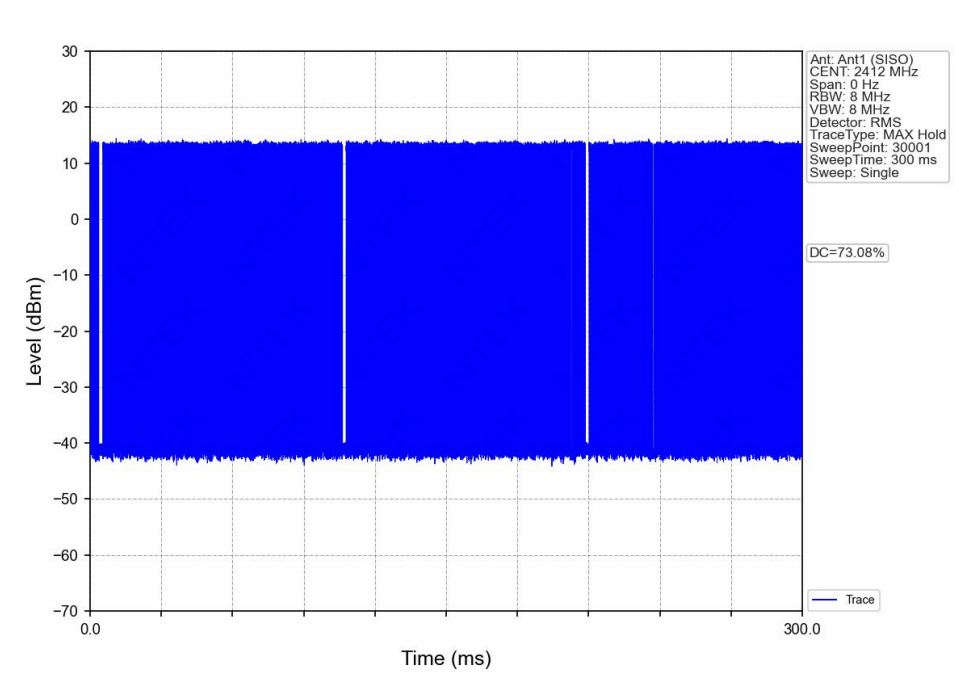
802.11b_2472MHz_Ant1 (SISO)_NTNV



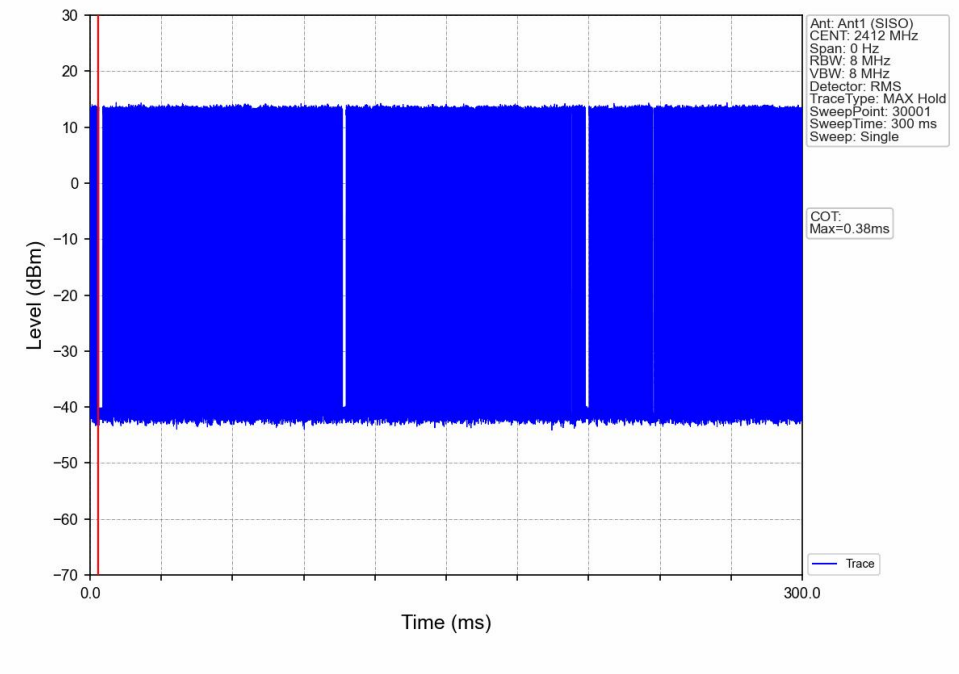
802.11b_2472MHz_Ant1 (SISO)_NTNV



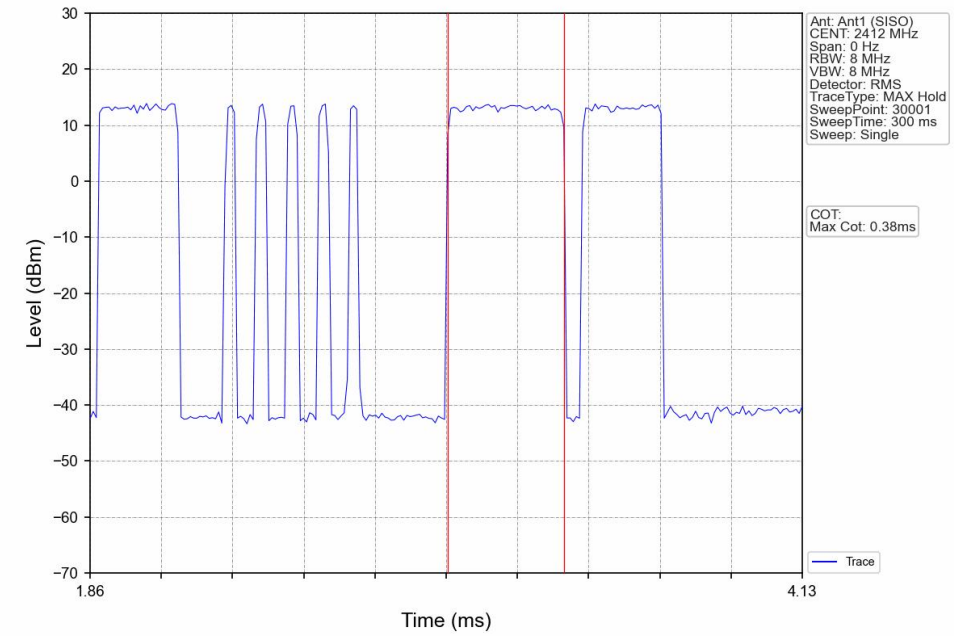
802.11g_2412MHz_Ant1 (SISO)_NTNV



802.11g_2412MHz_Ant1 (SISO)_NTNV



802.11g_2412MHz_Ant1 (SISO)_NTNV



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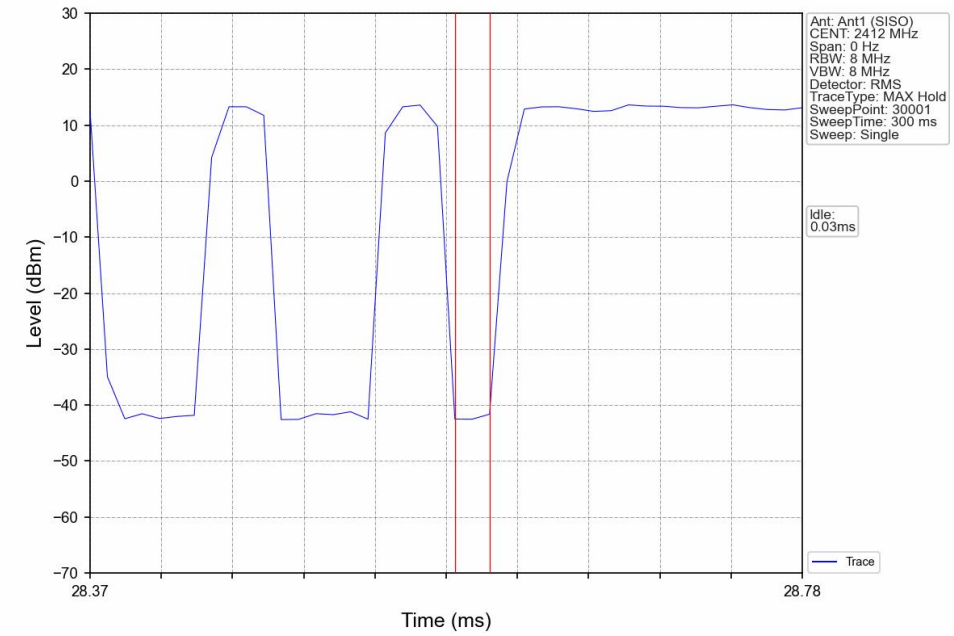

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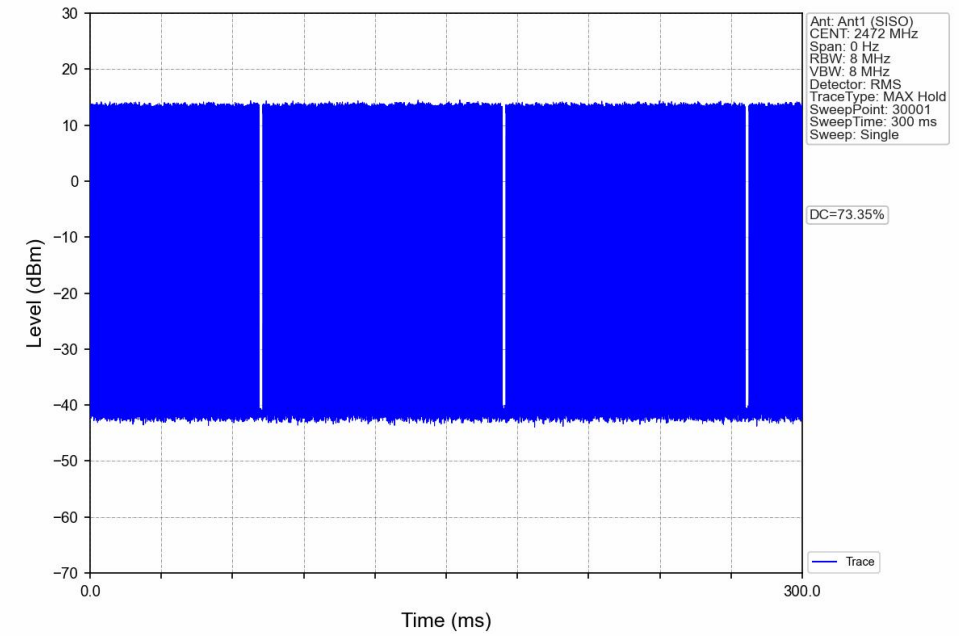

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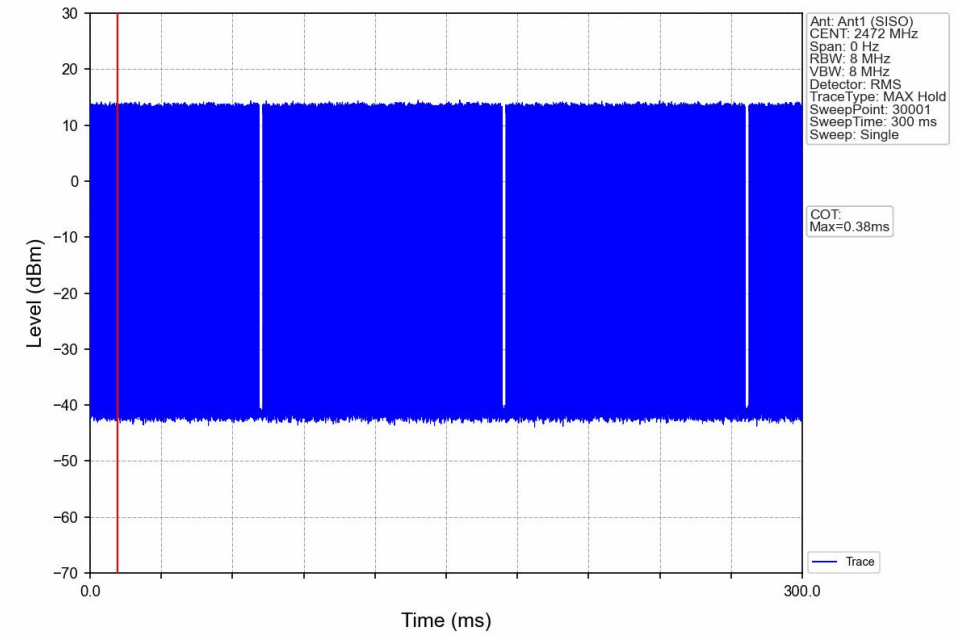

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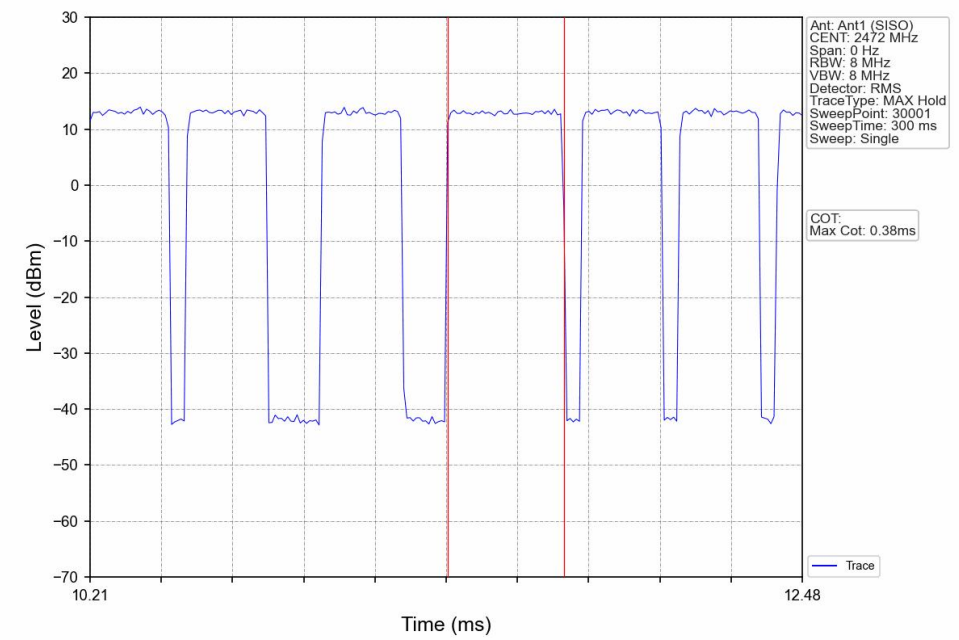

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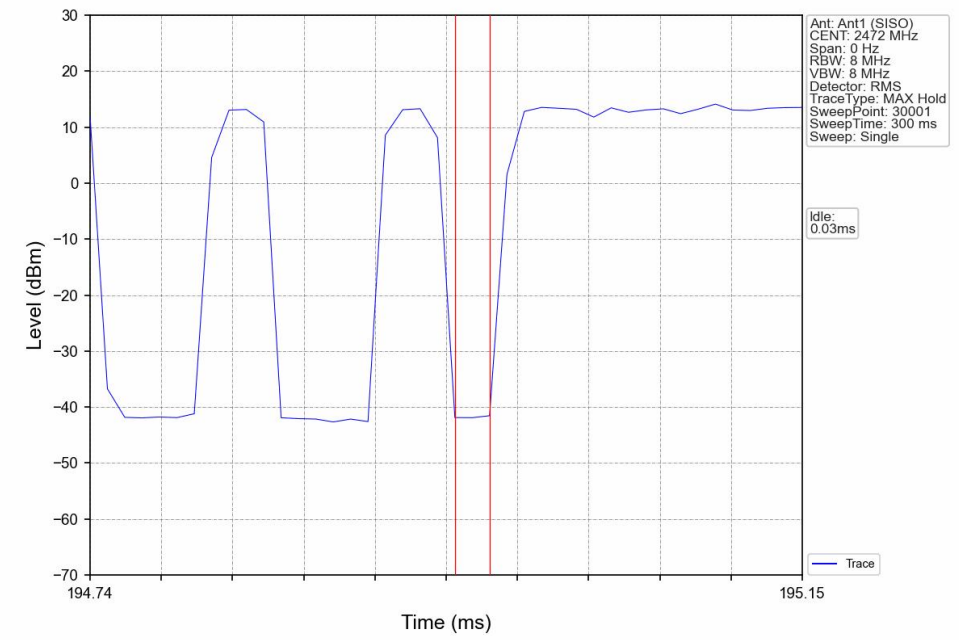

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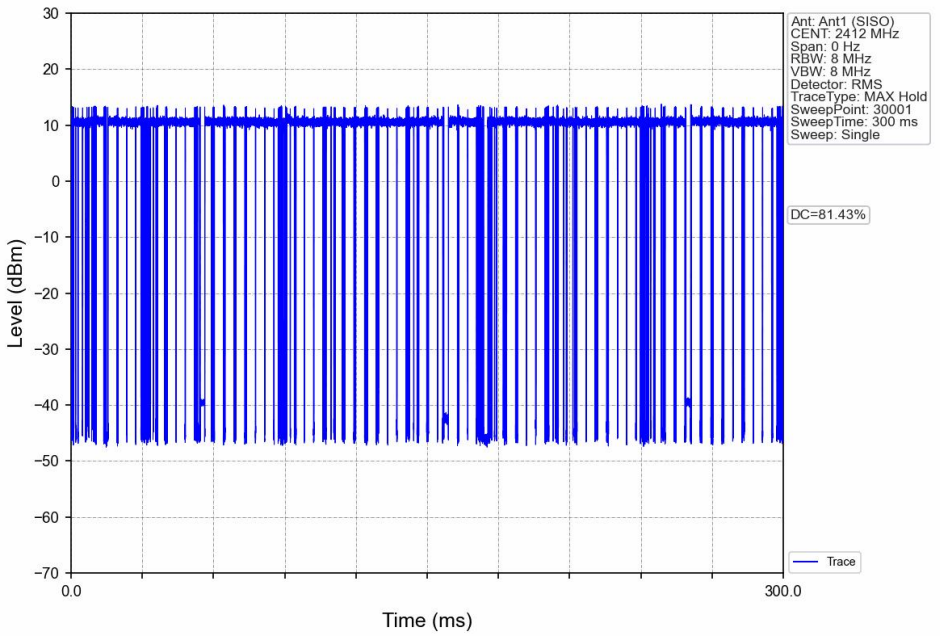

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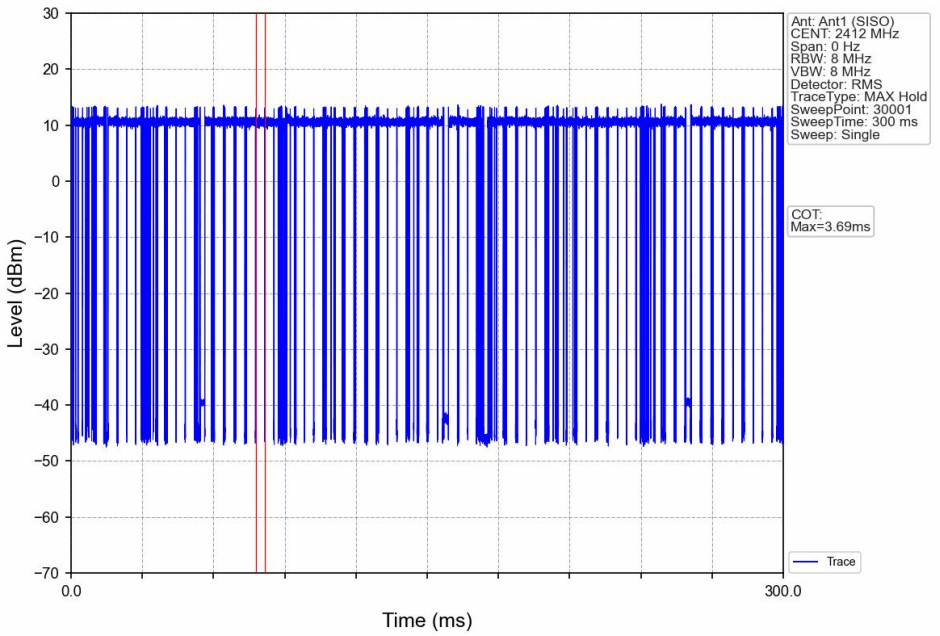

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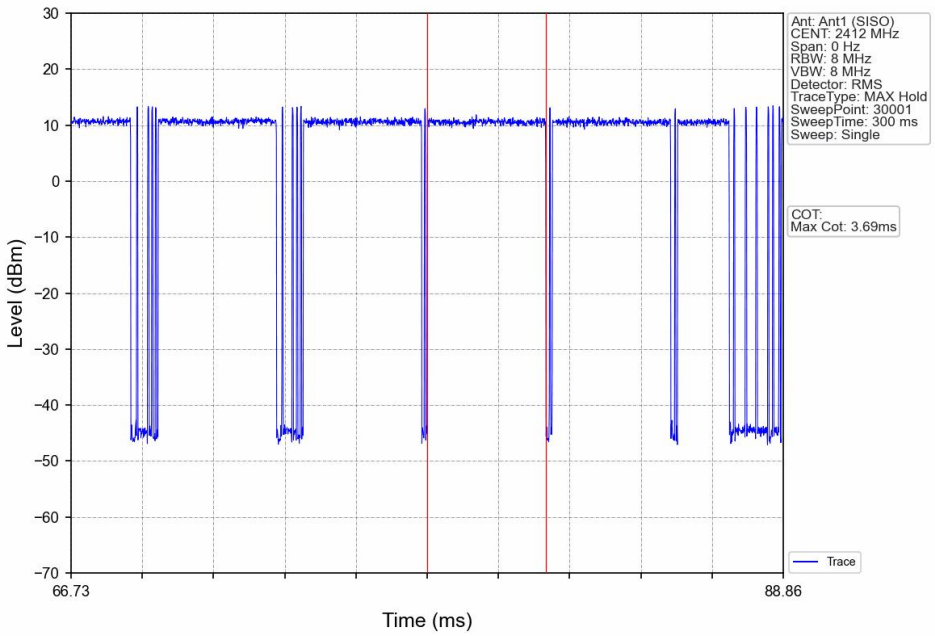

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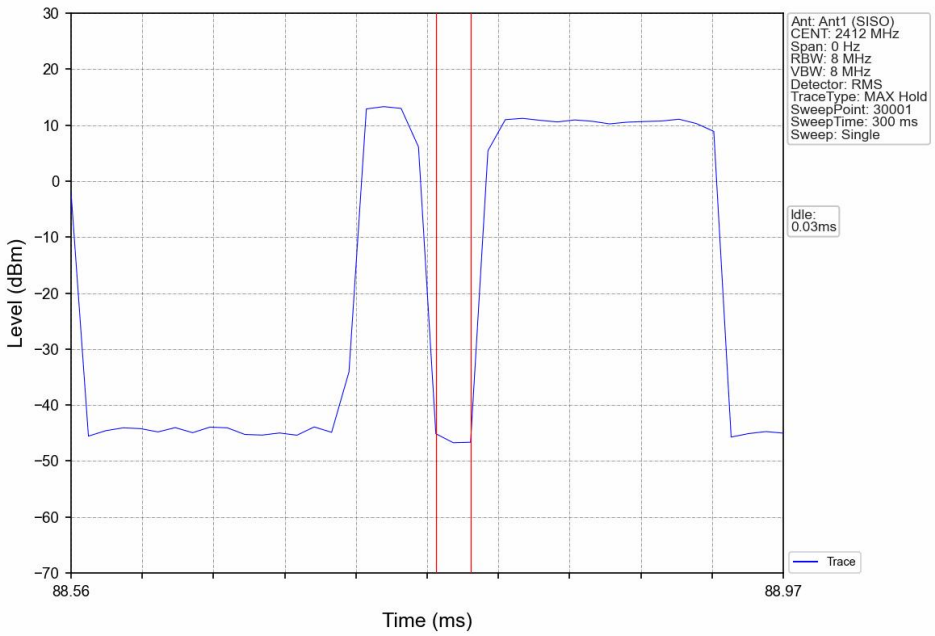

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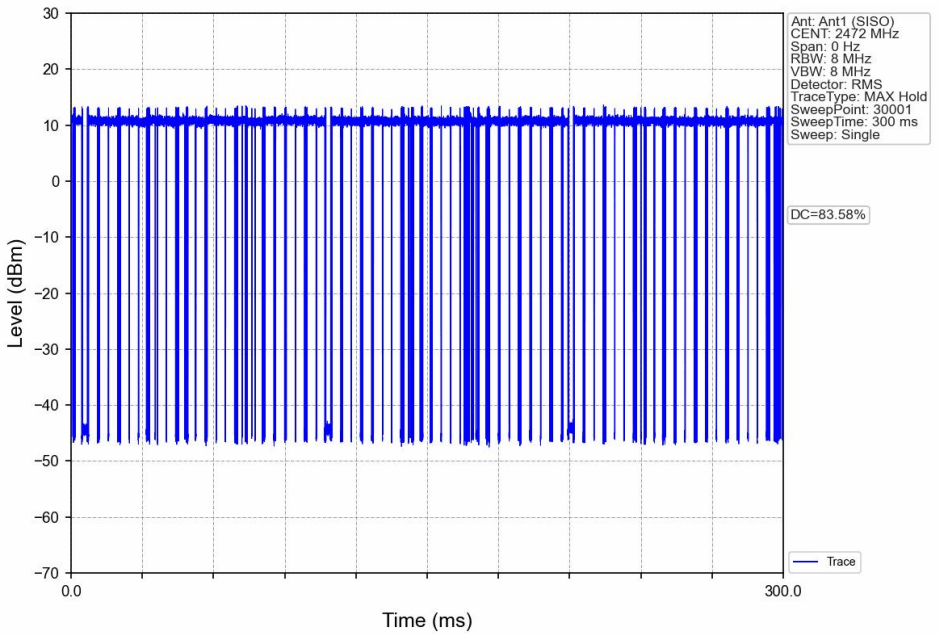

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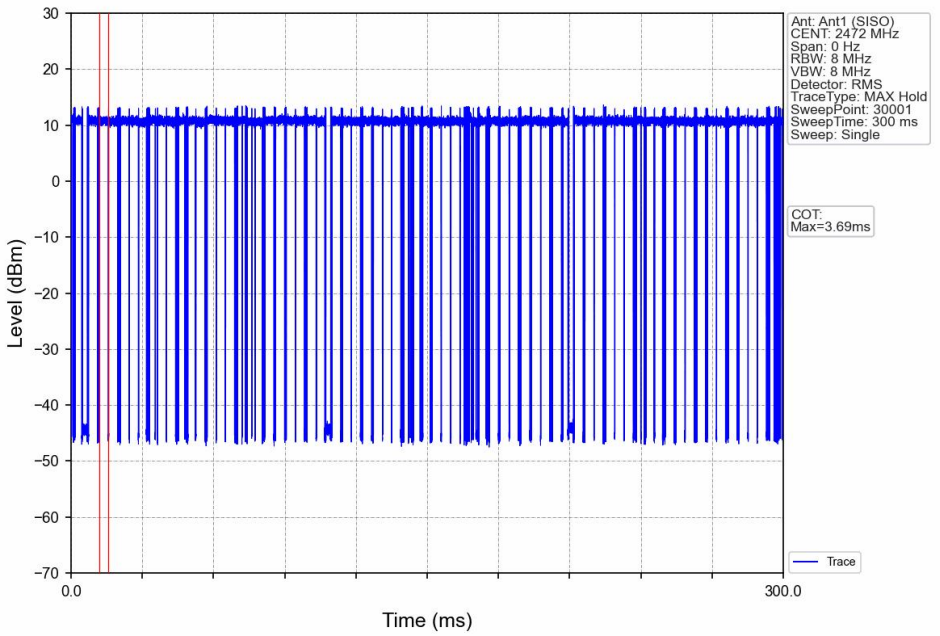

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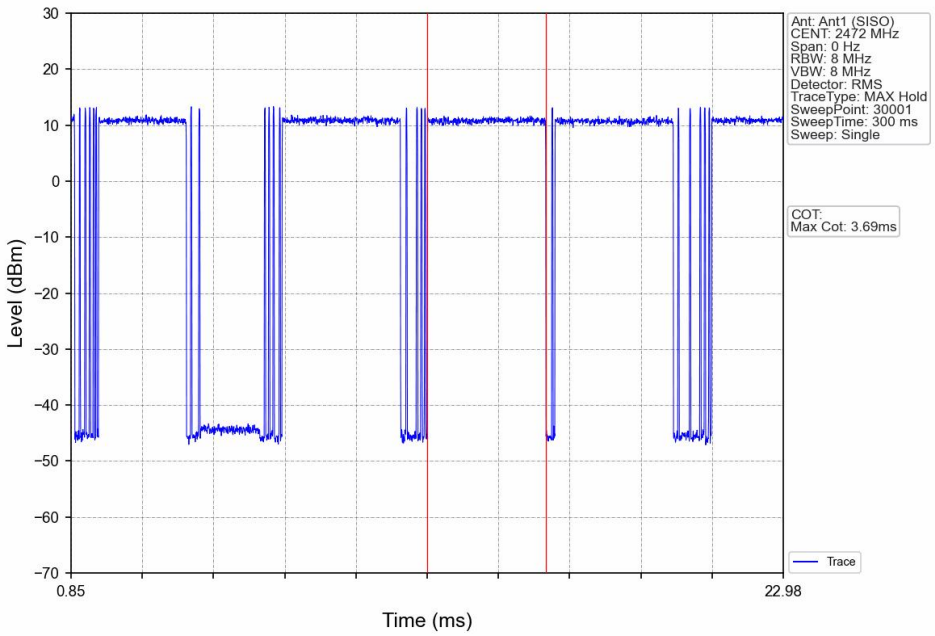

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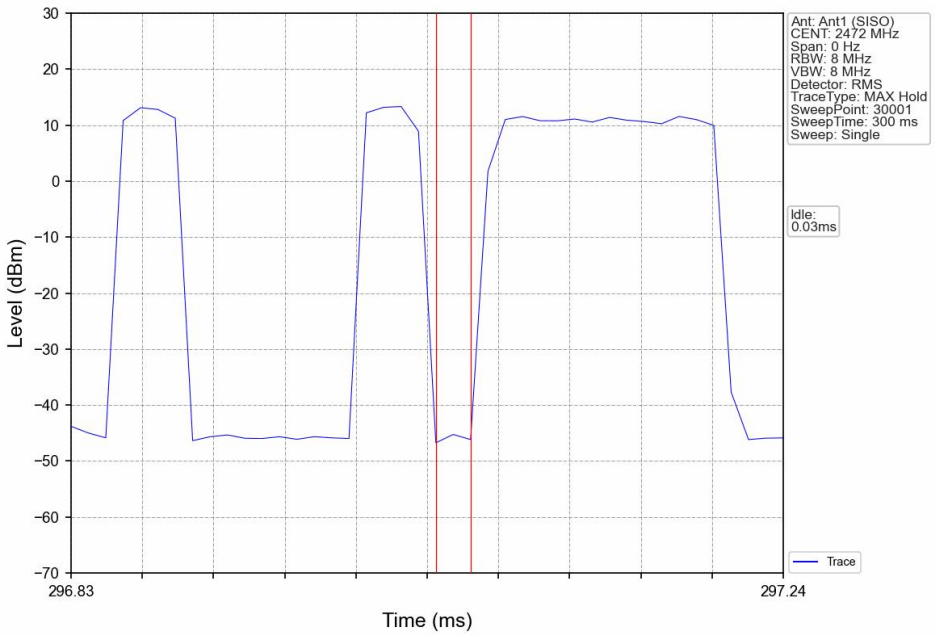
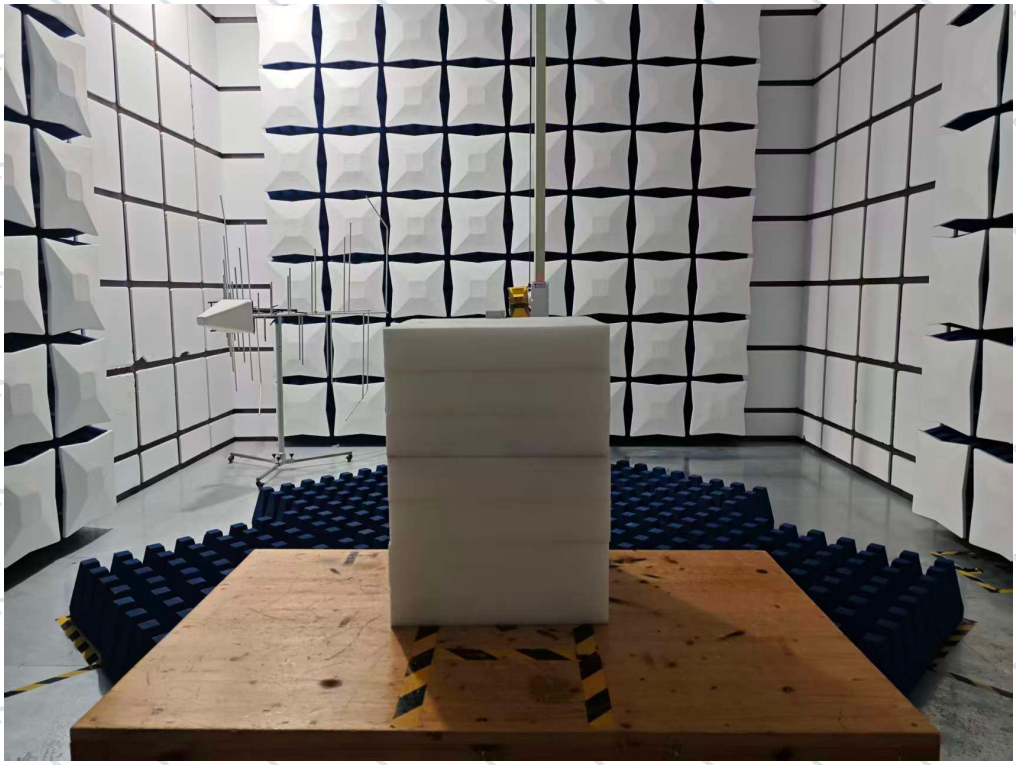
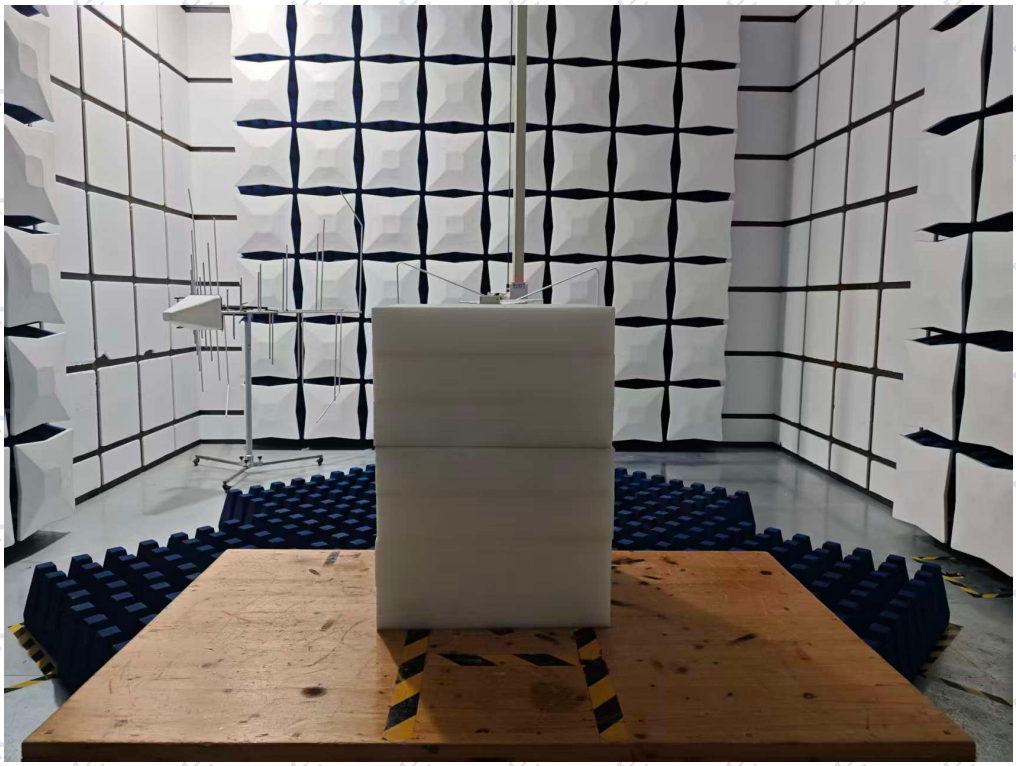


5. EUT TEST PHOTO

SPURIOUS EMISSIONS MEASUREMENT PHOTOS





END OF REPORT

EN62311 TEST REPORT

Product： Smart Energy Sensor

Trade Mark： Matis/ Matismart

Model Name： BPM3113

Family Model： BPM3111, BPM3121,BPM3123

Report No.： DGE260616014R03

Prepared for

Shanghai Matis Electric Co.Ltd

Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306

Prepared by

Dongguan NTEK Testing Service Co., Ltd.

Room101/401, Building 3, No.1, Keji 8th Road, Songshan Lake High-Tech Industrial Development Zone, Dongguan, Guangdong, China

Tel: (86)-0769-2330 1624 Fax: (86)-0769-2330 1624

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

E-mail:cs-dg@gdntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name.....	: Shanghai Matis Electric Co.Ltd
Address.....	: Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306
Manufacturer's Name.....	: Matismart Electrical (Suzhou) Co.,ltd
Address.....	: Room 201, Building 29, NO.369,Lushan Road, High-Tech Zone, Suzhou City, Jiangsu Province, China

Product description

Product name.....	: Smart Energy Sensor
Trademark	: Matis/ Matismart
Model Name	: BPM3113
Family Model.....	BPM3111, BPM3121,BPM3123
Standards.....	: EN IEC 62311:2020

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 of article 3.1 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.....	: May. 07, 2026~ May. 12, 2026
Date of Issue.....	: Jun. 18, 2026
Test Result.....	: **Pass**

Note: All test data of this report are based on the original test report DGE260507024R03, *dated by* May 12,2026

Testing Engineer : _____
(Matt Sun)

Technical Manager : _____
(Brian Yang)

Authorized Signatory : _____
(Bart Fang)

Table of Contents **Page**

Revision History

Report No.	Version	Description	Issued Date
DGE260616014R03	Rev.01	Initial issue of report	Jun. 18, 2026

1. General Information

1.1 General Description Of EUT

Equipment	Smart Energy Sensor
Trade Mark	Matis/ Matismart
Model Name.	BPM3113
Family Model	BPM3111, BPM3121,BPM3123
Model Difference	All models of PCB layout and key components are the same.
Frequency Bands:	802.11b/g/n(20MHz): 2412~2472MHz
Power Rating	208-415VAC, 50/60Hz, 2W
Adapter	N/A
Battery	N/A
Connecting I/O Port(s)	Please refer to the User's Manual
Hardware Version	N/A
Software Version	N/A
Firmware version	N/A

Note:

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

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 IEC 62311:2020 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 √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.

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

Mode	maximum eirp power (dBm)	maximum eirp power (mW)	Power Density (S) (mW/ cm^2)	Limit of Power Density (S) (mW/ cm^2)	Result
WIFI 2.4G	16.49	44.566	0.0089	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

END OF REPORT

Notified Body
Eurofins Electrical and Electronic Testing NA, Inc.

EU-TYPE EXAMINATION CERTIFICATE

Registration Number: 44129-07-2026-260373

Manufacturer:	Shanghai Matis Electric Co.Ltd Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306
Product Description:	Smart Energy Sensor
Model Number/Name:	BPM3113, BPM3111, BPM3121, BPM3123

Essential Requirement(s)	**Result**
Art. 3.1(a) Safety	Conform
Art. 3.1 (a) Health	Conform
Art. 3.1(b) EMC	Conform
Art. 3.2 Radio	Conform

Examination Result:

Based on the reports provided and the information therein, the equipment referenced above is compliant to these specifications.

The scope of evaluation relates to the submitted documents only.

This Certificate is issued in accordance with Annex III, Module B, of the RE directive 2014/53/EU of 16 April 2014 and is only valid in conjunction with the attached Annex.

7/14/2026
Date

Signed By Harvey Hu
Notified Body

For validation of this document's authenticity, please contact globalcertification@cpt.eurofinsus.com for verification.

Annex

Product specification

Hardware version:	N/A
Software version:	N/A
Frequency Band(s):	2412MHz-2472MHz
Transmit Power Range(s):	8.13-16.49dBm
Modulation Type(s):	DSSS,OFDM
Antenna type(s):	PCB Antenna

Technical Construction File (TCF) Details

To demonstrate conformity with Article 3.1(a) Health
Applied Standards
EN 62311:2020

Report or Certificate No.	Issue Date	Issued by
DGE260616014R03	06/18/2026	Dongguan NTEK Testing Service Co., Ltd.

To demonstrate conformity with Article 3.1(a) Safety
Applied Standards
EN 61010-1:2010+A1:2019

Report or Certificate No.	Issue Date	Issued by
WST26R060212-1SR	06/11/2026	Shenzhen WST Testing Co., Ltd.

To demonstrate conformity with Article 3.1(b) EMC
Applied Standards
ETSI EN 301 489-1 V2.2.3 :2019-11
ETSI EN 301 489-17 V3.3.1 :2024-09
EN 55032:2015+A11:2020+A1:2020
EN 55035:2017+A11:2020
EN IEC 61000-3-2:2019+A1:2021+A2:2024
EN 61000-3-3:2013+A1:2019+A2:2021

Report or Certificate No.	Issue Date	Issued by
DGE260616014R01	06/18/2026	Dongguan NTEK Testing Service Co., Ltd.

To demonstrate conformity with Article 3.2 Spectrum Efficiency
Applied Standards
ETSI EN 300 328 V2.2.2 (2019-07)

Report or Certificate No.	Issue Date	Issued by
DGE260616014R02	06/18/2026	Dongguan NTEK Testing Service Co., Ltd.

Appendix - External Photographs of EUT

Photo 1

Photo 2

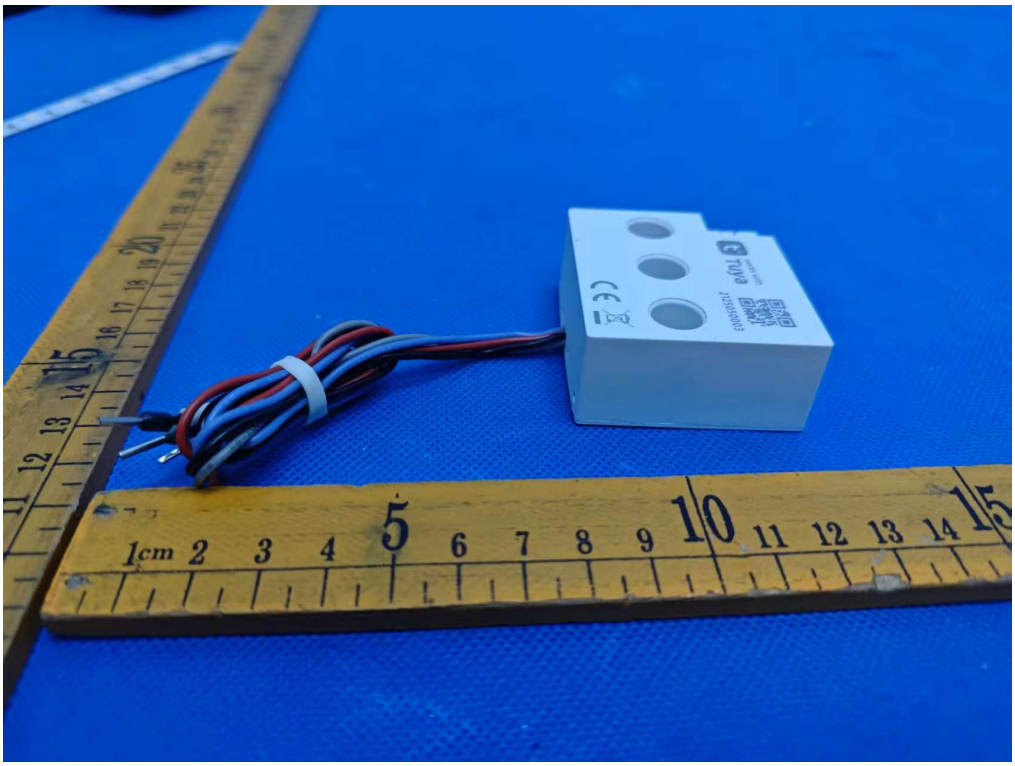
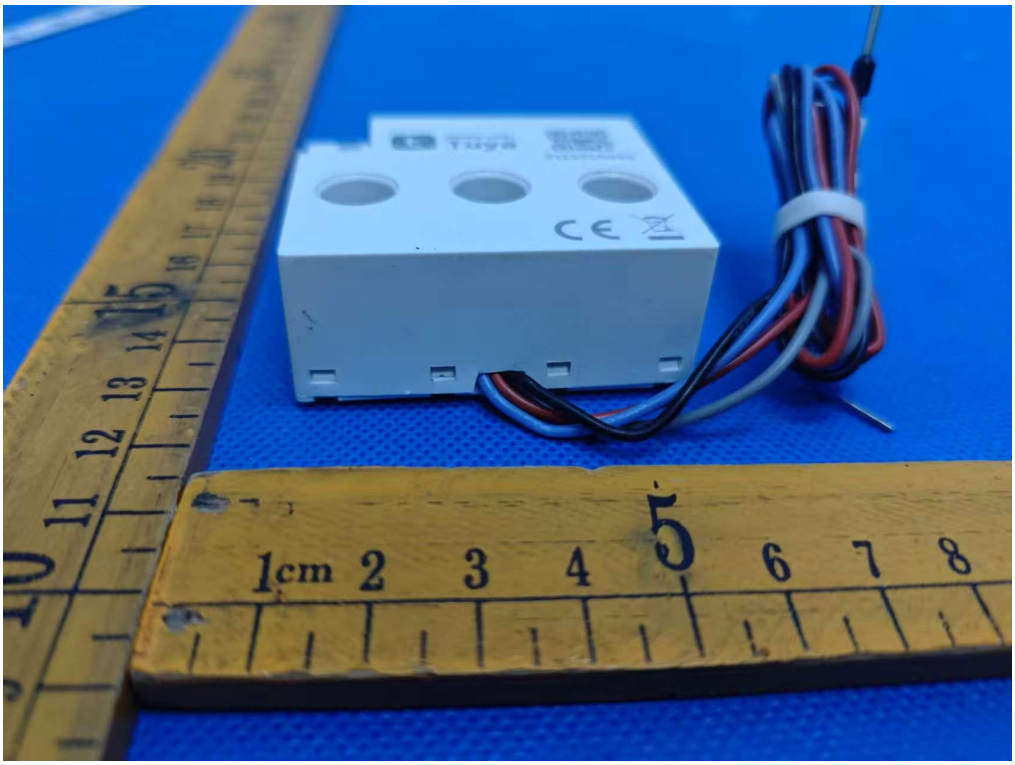


Photo 3



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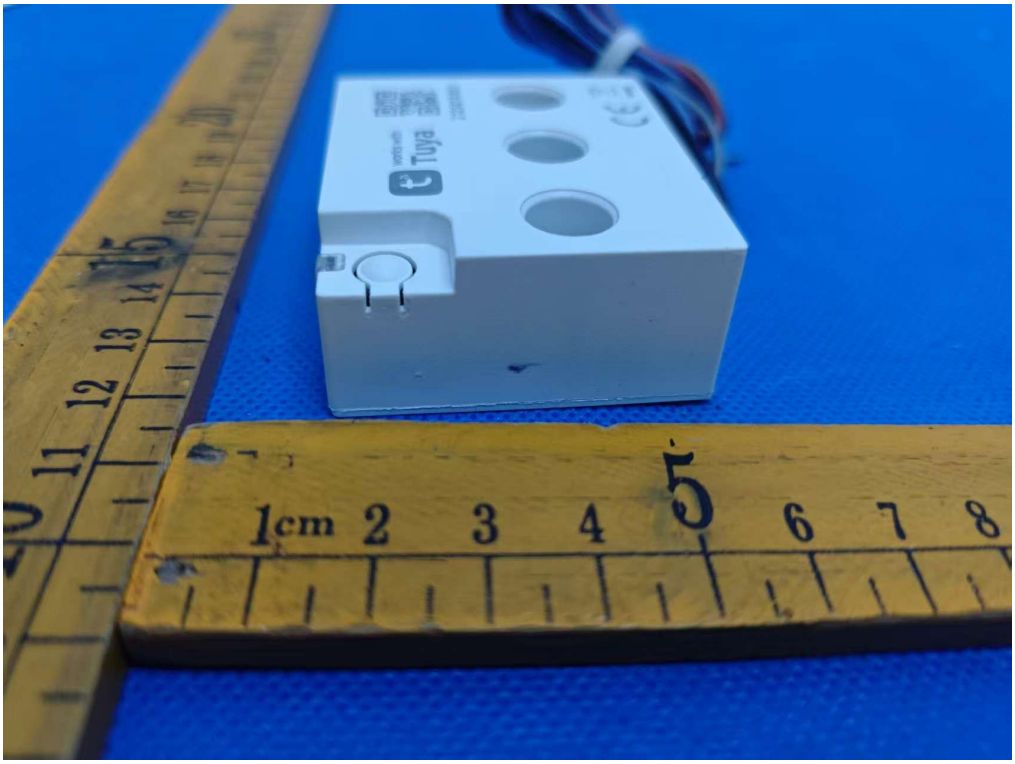
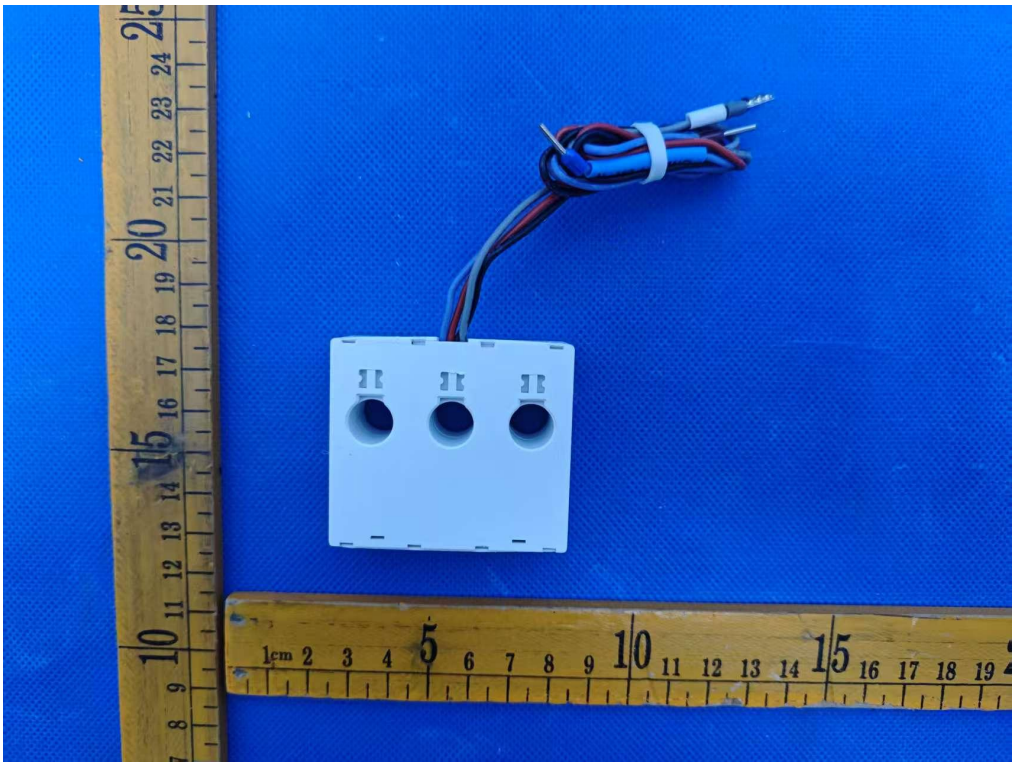


Photo 5

Photo 6



Appendix - Internal Photographs of EUT

Photo 1

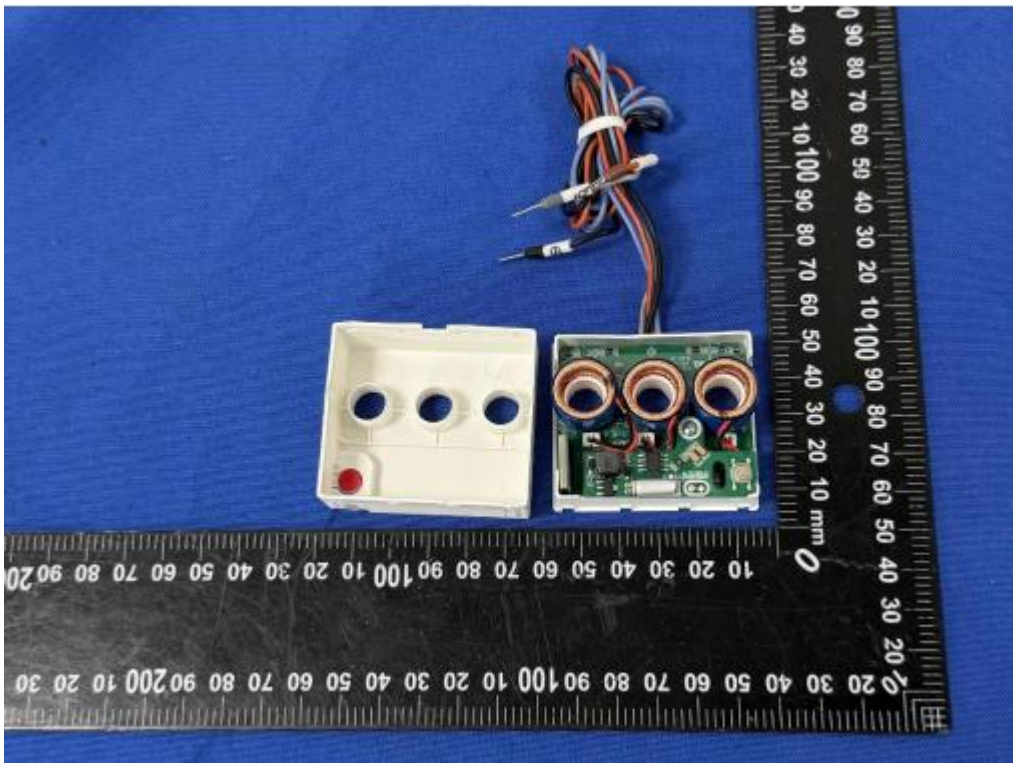


Photo 2

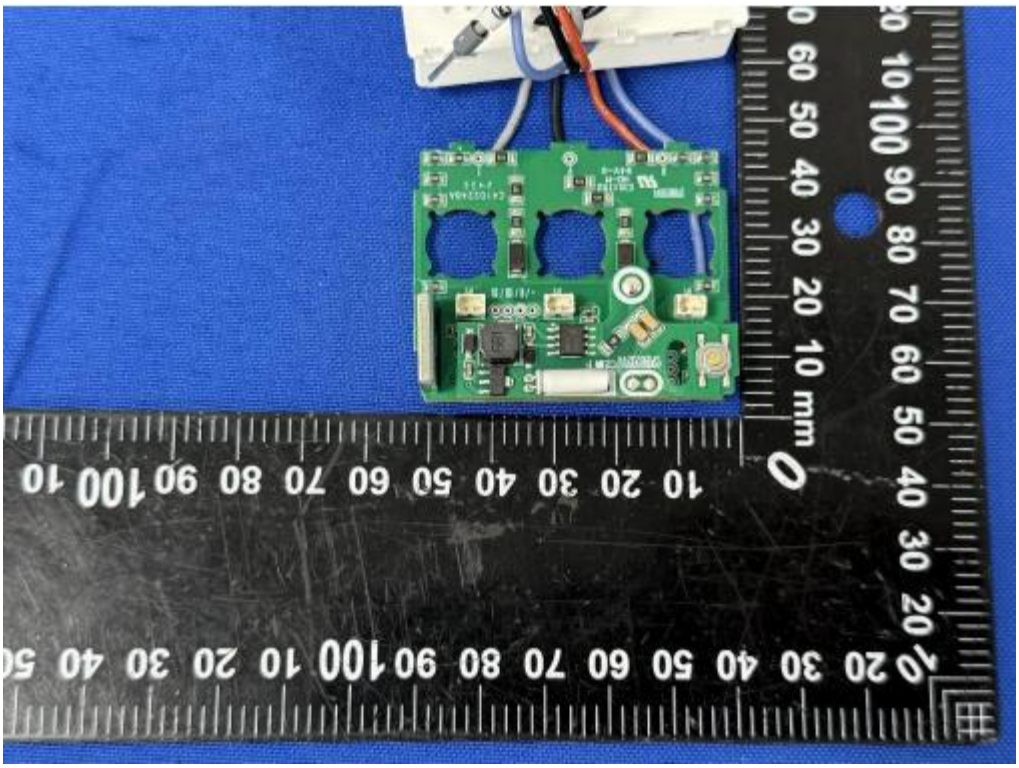


Photo 3

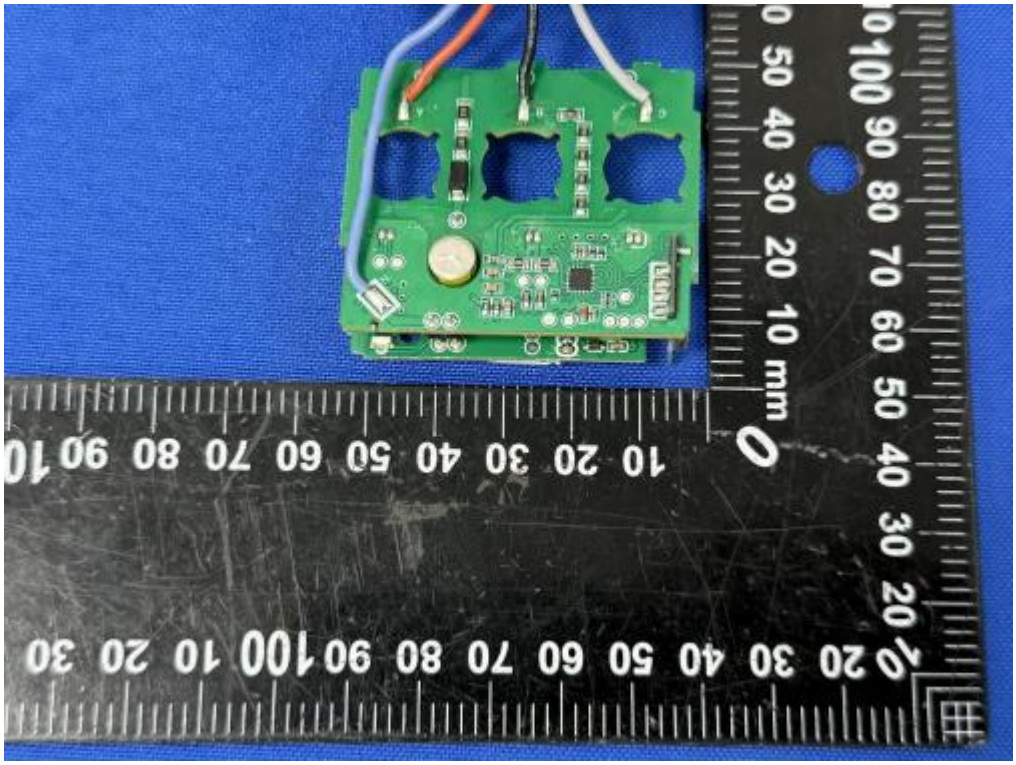


Photo 4

中国认可
国际互认
检测
TESTING
CNAS L9887

Test Report issued under the responsibility of:

TEST REPORT
EN 61010-1
Safety requirements for electrical equipment for measurement, control, and laboratory use
Part 1: General requirements

Report Number.....:	WST26R060212-1SR
Date of issue.....:	2026-06-11
Total number of pages.....:	84
Name of Testing Laboratory preparing the Report.....:	Shenzhen WST Testing Co., Ltd.
Applicant's name .....:	Shanghai Matis Electric Co.Ltd
Address.....:	Room318-320, No.83,West Huanghu Road, Pudong, Shanghai, China 201306
Test specification:	
Standard.....:	EN 61010-1:2010+A1: 2019
Test procedure .....:	CE-LVD
Non-standard test method .....:	N/A
TRF template used.....:	IECEE OD-2020-F1:2020, Ed.1.3
Test Report Form No. .....:	IEC61010_1P
Test Report Form(s) Originator ....:	VDE Prüf- und Zertifizierungsinstitut GmbH
Master TRF.....:	2021-04-12

General disclaimer:

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

Test item description..... :	Smart Energy Sensor
Trade Mark..... :	Matis/Matismart
Manufacturer ..... :	Matismart Electrical (Suzhou) Co.,ltd Room 201, Building 29, NO.369,Lushan Road, High-Tech Zone, Suzhou City, Jiangsu Province, China
Model/Type reference..... :	BPM3113, BPM3111, BPM3121, BPM3123
Ratings..... :	208-415VAC, 50/60Hz, 2W

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):

☒	**Testing Laboratory:**	Shenzhen WST Testing Co., Ltd.	
Testing location/ address ..... :		87 Guangshen Road, Baocheng 11st Zone, Xin'an Street, Bao'an, Shenzhen, Guangdong	
Tested by (name, function, signature)..... :		Dream Wang (Test Engineer)	
Approved by (name, function, signature) .. :		Michael Ling (Technical Manager)	
☐	**Testing procedure: CTF Stage 1:**	N/A	
Testing location/ address ..... :			
Tested by (name, function, signature)..... :			
Approved by (name, function, signature) .. :			
☐	**Testing procedure: CTF Stage 2:**	N/A	
Testing location/ address ..... :			
Tested by (name + signature)..... :			
Witnessed by (name, function, signature) . :			
Approved by (name, function, signature) .. :			
☐	**Testing procedure: CTF Stage 3:**	N/A	
☐	**Testing procedure: CTF Stage 4:**	N/A	
Testing location/ address ..... :			
Tested by (name, function, signature)..... :			
Witnessed by (name, function, signature) . :			
Approved by (name, function, signature) .. :			
Supervised by (name, function, signature) :			

List of Attachments (including a total number of pages in each attachment)		
Document No.	Documents included / attached to this report (description)	Page No.
1	Photo	3
2		

Documents referenced by this report (available on request):		
Document Name or No.	Documents description	Page No.
-	-	-

Summary of testing:
All tests were measured under the worst case.

Clause	Comment
Full test	**--**

Test Report History:
This report may consist of more than one report and is only valid with additional or previous issued reports:

Report Ref. No.	Item
-	-

Tests performed (name of test and test clause):	**Testing location:**
Full tests on model BPM3113.	Shenzhen WST Testing Co., Ltd. 87 Guangshen Road, Baocheng 11st Zone, Xin'an Street, Bao'an, Shenzhen, Guangdong

Summary of compliance with National Differences (List of countries addressed):

EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

☒ **The product fulfils the requirements of** EN 61010-1:2010+A1: 2019.

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

☒ **Statement not required by the standard used for type testing**

(Note: When IEC or ISO standard requires a statement concerning the uncertainty of the measurement systems used for tests, this should be reported above. The informative text in parenthesis should be delete in both cases after selecting the applicable option)

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Smart Energy Sensor
Matis/Matismart

Model: BPM3113

Input: 208-415V~, 50/60Hz, Max 2W

CAT III 63A

Matismart Electrical (Suzhou) Co.,ltd

Room 201, Building 29, NO.369,Lushan Road, High-Tech Zone, Suzhou City, Jiangsu Province, China

Test item particulars:	
Type of item .....:	Measurement ~~/ Control / Laboratory~~
Description of equipment function .....:	Energy Meter
Connection to MAINS supply .....:	Permanent ~~/ Detachable cord set / Non-detachable cord set / None / Battery operated~~
Overvoltage category.....:	~~II /~~ III ~~/ IV~~
Pollution degree.....:	3
Means of protection .....:	~~Class I (PE connected) /~~ Class II (isolated)
Environmental conditions .....:	~~Normal /~~ Extended (Specify):-25~70℃
For use in wet locations.....:	~~Yes /~~ No
Equipment mobility .....:	~~Portable / Hand-held / Floor standing /~~ Fixed ~~/ Built-in~~
Operating conditions .....:	Continuous ~~/ Short-time / Intermittent~~
Overall size of equipment (W x D x H) .....:	53.0mm×21.3mm×46mm
Mass of equipment (kg) .....:	0,050
Marked degree of protection to IEC 60529.....:	IPX0
Possible test case verdicts:	
- Test case does not apply to the test object.....:	N/A (Not Applicable)
- Test object does meet the requirement .....:	P (Pass)
- Test object does not meet the requirement.....:	F (Fail)
Testing:	
Date of receipt of test item .....:	2026-06-01
Date (s) of performance of tests.....:	2026-06-02 to 2026-06-10

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.
"(see ENCLOSURE #)" refers to additional information appended to the report.
"(see Form A.xx)" refers to a Table appended to the report.
Bottom lines for measurement Tables Forms A.xx are optional if used as record.

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 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) ..... :	Matismart Electrical (Suzhou) Co., ltd Room 201, Building 29, NO.369,Lushan Road, High-Tech Zone, Suzhou City, Jiangsu Province, China

General product information and other remarks: **Description of unit:** The tested product is a Smart Energy Sensor.
Description of model differences: All models of PCB layout and key components are the same.
Description of special features: (HV circuits, high pressure systems etc.) None

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Clause	Requirement + Test	Result - Remark	Verdict
4	**TESTS**		**P**
4.4	Testing in SINGLE FAULT CONDITIONS		P
4.4.1	Fault tests	(see Form A.1)	P
4.4.2	Application of SINGLE FAULT CONDITIONS		P
4.4.2.1	SINGLE FAULT CONDITIONS not covered by 4.4.2.2 to 4.4.2.14	(see Form A.1)	P
4.4.2.2	PROTECTIVE IMPEDANCE		N/A
4.4.2.3	PROTECTIVE CONDUCTOR	(see Form A.6)	N/A
4.4.2.4	Equipment or parts for short-term or intermittent operation		P
4.4.2.5	Motors		—
	– stopped while fully energized		N/A
	– prevented from starting		N/A
	– one phase interrupted (multi-phase)		N/A
4.4.2.6	Capacitors		N/A
4.4.2.7	MAINS transformers		N/A
4.4.2.7.2	Short circuit	(see Form A.39)	N/A
4.4.2.7.3	Overload	(see Forms A.26B and A.40)	N/A
4.4.2.8	Outputs		N/A
4.4.2.9	Equipment for more than one supply		N/A
4.4.2.10	Cooling	(see Form A.26A)	—
	– air holes closed		N/A
	– fans stopped		N/A
	– coolant stopped		N/A
	– loss of cooling liquid		N/A
4.4.2.11	Heating devices		—
	– timer overridden		N/A
	– temperature controller overridden		N/A
4.4.2.12	Insulation between circuits and parts		P
4.4.2.13	Interlocks		N/A
4.4.2.14	Voltage selectors		N/A
4.4.3	Duration of tests	(see Form A.1)	—
4.4.4	Conformity after application of fault conditions	(see Forms A.1, A.6 and A.18)	P
5	**MARKING AND DOCUMENTATION**		**P**
5.1	**Marking**		**P**

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.1	General		P
	Required equipment markings		—
	– Visible from the exterior; or		P
	– Visible after removing cover or opening door		N/A
	– Visible after removal from a rack or panel		N/A
	Not put on parts which can be removed by an operator		P
	Letter symbols (IEC 60027) used		P
	Graphic symbols of Table 1 used		P
5.1.2	Identification		P
	Equipment is identified by:		—
	a) Manufacturer's or supplier's name or trademark	Matis/Matismart	P
	b) Model number, name or other means	BPM3113, BPM3111, BPM3121, BPM3123	P
	Manufacturing location identified	Room 201, Building 29, NO.369,Lushan Road, High-Tech Zone, Suzhou City, Jiangsu Province, China	P
5.1.3	Mains supply		P
	Equipment is marked as follows:		—
	a) Nature of supply:		—
	1) a.c. RATED MAINS frequency or range of frequencies ..... :	50/60Hz	—
	2) d.c. with symbol 1 ..... :		N/A
	b) RATED supply voltage(s) or range ..... :	208-415V	—
	c) Max. RATED power (W or VA) or input current..... :	2W	—
	The marked value not less than 90 % of the maximum value	(see Form A.2)	P
	If more than one voltage range:		—
	Separate values marked; or		N/A
	Values differ by less than 20 %	(see Form A.2)	N/A
	d) OPERATOR-set for different RATED supply voltages:		—
	Indicates the equipment set voltage		N/A
	Portable equipment indication is visible from the exterior		N/A
	Changing the setting changes the indication		N/A
	e) Accessory MAINS socket-outlets accepting standard MAINS plugs are marked:		—
	With the voltage if it is different from the MAINS supply voltage..... :		—
	For use only with specific equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If not marked for specific equipment it is marked with:		—
	The maximum RATED current or power; or		N/A
	Symbol 14 with full details in the documentation		N/A
5.1.4	Fuses		N/A
	OPERATOR replaceable fuse marking (see also 5.4.5).....:		—
5.1.5	TERMINALS, connections and operating devices		P
5.1.5.1	General		P
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators marked		P
	If insufficient space, symbol 14 used		P
	Push-buttons and actuators of emergency stop devices and indicators:		—
	– used only to indicate a warning of danger; or		N/A
	– the need for urgent action		N/A
	– coloured red		N/A
	– coded as specified in IEC 60073		N/A
	Supplementary means of coding provided, if meaning of colour relates (see IEC 60073):		—
	– to safety of persons; or		N/A
	– safety of the environment		N/A
5.1.5.2	TERMINALS		—
	MAINS supply TERMINAL identified		N/A
	Other TERMINAL marking:		—
	a) FUNCTIONAL EARTH TERMINALS marked with symbol 5		N/A
	b) PROTECTIVE CONDUCTOR TERMINALS:		—
	Symbol 6 is placed close to or on the TERMINAL; or		N/A
	Part of appliance inlet		N/A
	c) TERMINALS of circuits (symbol 7 used)		N/A
	d) HAZARDOUS LIVE TERMINALS supplied from the interior		N/A
	Standard MAINS socket outlet used; or		N/A
	RATINGS marked; or		N/A
	Symbol 14 used		N/A
5.1.6	Switches and circuit-breakers		N/A
	If disconnecting device, off position clearly marked		N/A
	If push-button used as power supply switch:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	– Symbol 9 and 15 used for on-position		N/A
	– Symbol 10 and 16 used for off-position		N/A
	– Pair of symbols 9, 15 and 10, 16 close together		N/A
5.1.7	Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION		P
	Protected throughout (symbol 11 used)		N/A
	Only partially protected (symbol 11 not used)		P
5.1.8	Field-wiring TERMINAL boxes		N/A
	If TERMINAL or ENCLOSURE exceeds 60 °C:	(see Form A.26A)	—
	Cable temperature RATING marked ..... :		—
	Marking visible before and during connection or beside TERMINAL		N/A
5.2	**Warning markings**		**P**
	Visible when ready for NORMAL USE		P
	Are near or on applicable parts		P
	Symbols and text correct dimensions and colour:		—
	a) Symbols min 2,75 mm and text 1,5 mm high and contrasting in colour with background		P
	b) Symbols and text moulded, stamped or engraved in material min. 2,0 mm high and		N/A
	0,5 mm depth or raised if not contrasting in colour		N/A
	If necessary marked with symbol 14, or		P
	Additional symbols such as symbol 12, 13 or 17 used to indicate the nature of HAZARD		N/A
	Statement to place equipment in a safe state before access by using a tool to HAZARDOUS parts is permitted		P
5.3	**Durability of markings**		**P**
	The required markings remain clear and legible in NORMAL USE	(see Form A.3)	P
5.4	**Documentation**		**P**
5.4.1	General		P
	Equipment is accompanied by documentation for safety purposes for OPERATOR or RESPONSIBLE BODY		P
	Safety documentation for service personnel authorized by the manufacturer		P
	Documentation necessary for safe operation is provided in printed media or		P
	in electronic media if available at any time		P
	Documentation includes:		—
	a) Intended use		P

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Technical specification		P
	c) Name and address of manufacturer or supplier		P
	d) Information specified in 5.4.2 to 5.4.6		P
	e) Information to mitigate residual RISK (see also subclause 17)		P
	f) Accessories for safe operation of the equipment specified		P
	g) Guidance provided to check correct function of the equipment, if incorrect reading may cause a HAZARD from harmful or corrosive substances of HAZARDOUS live parts		P
	h) Instructions for lifting and carrying		N/A
	Warning statements and a clear explanation of warning symbols:		—
	– provided in the documentation; or		N/A
	– information is marked on the equipment		N/A
5.4.2	Equipment RATINGS		P
	Documentation includes:		—
	a) Supply voltage or voltage range ..... :	208-415V	—
	Frequency or frequency range ..... :	50/60Hz	—
	Power or current rating..... :	2W	—
	b) Description of all input and output connections in accordance to 6.6.1 a)		P
	c) RATING of insulation of external circuits in accordance to 6.6.1 b)		P
	d) Statement of the range of environmental conditions (refer to 1.4):		—
	1) indoor or outdoor use,	Indoor use	P
	2) altitude,		N/A
	3) temperature,	-25~70°C	P
	4) relative humidity,		N/A
	5) MAINS supply voltage fluctuations,		N/A
	6) OVERVOLTAGE CATEGORY,	III	P
	7) WET LOCATION, if applicable,		N/A
	8) POLLUTION DEGREE of the intended environment	3	P
	e) Degree of ingress protection (IEC 60529)	IP20	P
	f) If impact rating less than 5 J:		—
	IK code in accordance to IEC 62262 marked; or		N/A
	symbol 14 of Table 1 marked, with		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	RATED energy level and test method stated		N/A
5.4.3	Equipment installation		P
	Documentation includes instructions for:		—
	a) Assembly, location and mounting requirements		P
	b) Instructions for protective earthing		N/A
	c) Connections to supply		P
	d) Permanently connected equipment:		—
	1) Supply wiring requirements		N/A
	2) If external switch or circuit-breaker, requirements and location recommendation		N/A
	e) Ventilation requirements		N/A
	f) Safety characteristics for special external services (e. g. maximum and minimum temperature, pressure, flow of air, cooling liquid)		N/A
	g) Instructions relating to sound level		N/A
5.4.4	Equipment operation		P
	Instructions for use include:		—
	a) Identification and description of operating controls		P
	b) Positioning for disconnection		N/A
	c) Instructions for interconnection to accessories or other equipment		P
	d) Specification of intermittent operation limits		N/A
	e) Explanation of symbols used		P
	f) Replacement of consumable materials		N/A
	g) Cleaning and decontamination		P
	h) Listing of any poisonous or injurious gases and quantities		N/A
	i) RISK reduction procedures relating to flammable liquids (see 9.5 c)		N/A
	j) RISK reduction procedures relating burn from surfaces permitted to exceed limits of 10.1		N/A
	Additional precautions for IEC 60950 conforming equipment in regard to moistures and liquids		N/A
	A statement about protection impairment if used in a manner not specified by the manufacturer		P
5.4.5	Equipment maintenance and service		P
	Instructions for RESPONSIBLE BODY include:		—
	Instructions sufficient in detail permitting safe maintenance and inspection and continued safety:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	Instruction against the use of detachable MAINS supply cord with inadequate RATING		N/A
	Specific battery type of user replaceable batteries		N/A
	Any manufacturer specified parts		P
	RATING and characteristics of fuses		N/A
	Instructions include following subjects permitting safe servicing and continued safety:		—
	a) Product specific RISKS may affect service personnel		P
	b) Protective measures for these RISKS		P
	c) Verification of the safe state after repair		N/A
5.4.6	Integration into systems or effects resulting from special conditions		N/A
	Aspects described in documentation		N/A
6	**PROTECTION AGAINST ELECTRIC SHOCK**		**P**
6.1	**General**	(see Forms A.14 and A.15)	**P**
6.1.1	Requirements		P
	Protection against electric shock maintained in NORMAL CONDITION and SINGLE FAULT CONDITION		P
	ACCESSIBLE parts not HAZARDOUS LIVE		P
	Voltage, current, charge or energy below the limits in NORMAL CONDITION and in SINGLE FAULT CONDITION between:		—
	ACCESSIBLE parts and earth		P
	two ACCESSIBLE parts on same piece of the equipment within a distance of 1,8 m		P
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		P
6.1.2	Exceptions		P
	Following HAZARDOUS LIVE parts may be ACCESSIBLE to an OPERATOR:		—
	a) parts of lamps and lamp sockets after lamp removal		N/A
	b) parts to be replaced by OPERATOR only by the use of tool and warning marking		P
	Those parts not HAZARDOUS LIVE 10 s after interruption of supply	(see Form A.5)	P
	Capacitance test if charge is received from internal capacitor	(see Forms A.4 and A.5)	N/A
6.2	**Determination of ACCESSIBLE parts**	(see Form A.4)	**P**
6.2.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Unless obviously determination of ACCESSIBLE parts as specified in 6.2.2 to 6.2.4		P
6.2.2	Examination		P
	– with jointed test finger (as specified B.2)		P
	– with rigid test finger (as specified B.1) and a force of 10 N		P
6.2.3	Openings above parts that are hazardous live		N/A
	– test pin with length of 100 mm and 4 mm in diameter applied		N/A
6.2.4	Openings for pre-set controls		N/A
	– test pin with length of 100 mm and 3 mm in diameter applied		N/A
6.3	**Limit values for accessible parts**		**P**
6.3.1	Levels in normal condition	(see Form A.5)	P
	a) Voltage limits less than 30 V r.m.s. and 42,4 V peak or 60 V d.c.		P
	for WET LOCATIONS voltage limits less than 16 V r.m.s. and 22,6 V peak or 35 V d.c.		P
	Voltages are not HAZARDOUS LIVE the levels of:		—
	b) Current less than 0,5 mA r.m.s. for sinusoidal, 0,7 mA peak non-sinusoidal or mixed frequencies or 2 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz		N/A
	for WET LOCATIONS measuring circuit A.4 used		N/A
	70 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	c) Levels of capacitive charge or energy less:		—
	1) 45 µC for voltages up to 15 kV peak or d.c. or line A of Figure 3		N/A
	2) 350 mJ stored energy for voltages above 15 kV peak or d.c.		N/A
6.3.2	Levels in SINGLE FAULT CONDITION	(see Form A.6)	P
	a) Voltage limits less than 50 V r.m.s. and 70 V peak or 120 V d.c.		P
	for WET LOCATIONS voltage limits less than 33 V r.m.s. and 46,7 V peak or 70 V d.c.		P
	Voltages are not HAZARDOUS LIVE the levels of:		—
	b) Current less than 3,5 mA r.m.s. for sinusoidal, 5 mA peak non-sinusoidal or mixed frequencies or 15 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz		N/A
	for WET LOCATIONS measuring circuit A.4 used		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	500 mA r.m.s. when measured with circuit A.3 for higher frequencies		N/A
	c) Levels of capacitive charge or energy less line B of Figure 3		N/A
6.4	**Primary means of protection**		**P**
6.4.1	General		P
	ACCESSIBLE parts prevented from being HAZARDOUS LIVE by one or more of following means:		—
	a) ENCLOSURES or PROTECTIVE BARRIERS (see 6.4.2)		P
	b) BASIC INSULATION (see 6.4.3)		P
	c) Impedance (see 6.4.4)		N/A
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	(see Forms A.15 and A.16)	P
	– meet rigidity requirements of 8.1		P
	– meet requirements for BASIC INSULATION, if protection is provided by insulation		P
	– meet requirements of 6.7 for CREEPAGE and – CLEARANCES between ACCESSIBLE parts and – HAZARDOUS live parts, if protection is provided by – limited access		P
6.4.3	BASIC INSULATION	(see Forms A.15 and A.16)	P
	– meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		P
6.4.4	Impedance	(see Forms A.12 and A.15)	N/A
	Impedance used as primary means of protection meets all the following requirements:		—
	a) limits current or voltage to level of 6.3.2	(see Form A.6)	N/A
	b) RATED for maximum WORKING VOLTAGE and the amount of power it will dissipate		N/A
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of BASIC INSULATION of 6.7	(see Form A.15)	N/A
6.5	**Additional means of protection in case of SINGLE FAULT CONDITION**		**P**
6.5.1	General		P
	ACCESSIBLE parts are prevented from becoming HAZARDOUS live by the primary means of protection and supplemented by one of:		—
	a) PROTECTIVE BONDING (see 6.5.2)		N/A
	b) SUPPLEMENTARY INSULATION (see 6.5.3)		N/A
	c) automatic disconnection of the supply (see 6.5.5)		N/A
	d) current- or voltage-limiting device (see 6.5.6)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Alternatively one of the single means of protection is used:		—
	e) REINFORCED INSULATION (see 6.5.3)		P
	f) PROTECTIVE IMPEDANCE (see 6.5.4)		N/A
6.5.2	PROTECTIVE BONDING	(see Forms A.7, A.8, A.9, A.10 or A.11)	N/A
6.5.2.1	General		N/A
	ACCESSIBLE conductive parts, may become HAZARDOUS LIVE in SINGLE FAULT CONDITION:		—
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or		N/A
	Separated by conductive screen or barrier bonded to PROTECTIVE CONDUCTOR TERMINAL		N/A
6.5.2.2	Integrity of PROTECTIVE BONDING		—
	a) PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		N/A
	b) Soldered connections:		—
	Independently secured against loosening		N/A
	Not used for other purposes		N/A
	c) Screw connections are secured		N/A
	d) PROTECTIVE BONDING not interrupted; or		N/A
	except as removable part that carries MAINS SUPPLY input connection to the whole equipment		N/A
	e) Any movable PROTECTIVE BONDING connection specifically designed, and meets 6.5.2.4		N/A
	f) No external metal braid of cables used (not regarded as PROTECTIVE BONDING)		N/A
	g) IF MAINS SUPPLY passes through:		—
	Means provided for passing protective conductor;		N/A
	Impedance meets 6.5.2.4		N/A
	h) Protective conductors bare or insulated, if insulated, green/yellow		N/A
	Exceptions:		—
	1) earthing braids;		N/A
	2) internal protective conductors etc.;		N/A
	Green/yellow not used for other purposes		N/A
	TERMINAL suitable for connection of a PROTECTIVE CONDUCTOR, and meets 6.5.2.3		N/A
6.5.2.3	PROTECTIVE CONDUCTOR TERMINAL		—
	a) Contact surfaces are metal		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Appliance inlet used		N/A
	c) For rewirable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to MAINS supply TERMINALS		N/A
	d) If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:		—
	Is near terminals of circuit for which protective earthing is necessary		N/A
	External if other terminals external		N/A
	e) Equivalent current-carrying capacity to MAINS supply TERMINALS	(see Form A.7)	N/A
	f) If plug-in, makes first and breaks last		N/A
	g) If also used for other bonding purposes, PROTECTIVE CONDUCTOR:		—
	Applied first;		N/A
	Secured independently;		N/A
	Unlikely to be removed by servicing		N/A
	h) PROTECTIVE CONDUCTOR of measuring circuit:		—
	1) Current RATING equivalent to measuring circuit TERMINAL;		N/A
	2) PROTECTIVE BONDING: not interrupted by any switch or interrupting device		N/A
	i) FUNCTIONAL EARTH TERMINALS allow independent connection		N/A
	j) If a binding screw used for PROTECTIVE CONDUCTOR TERMINAL:		—
	Suitable size for bond wire		N/A
	Not smaller than M 4		N/A
	At least 3 turns of screw engaged		N/A
	Passes tightening torque test	(see Form A.8)	N/A
	k) Contact pressure not capable being reduced by deformation of materials		N/A
6.5.2.4	Impedance of PROTECTIVE BONDING of plug-connected equipment	(see Form A.9)	N/A
	Impedance between PROTECTIVE CONDUCTOR TERMINAL and each ACCESSIBLE part where PROTECTIVE BONDING is specified, is:		—
	– less than 0,1 Ohm; or		N/A
	– less than 0,2 Ohm if equipment is provided with non-detachable cord		N/A
6.5.2.5	Impedance of PROTECTIVE BONDING of PERMANENTLY CONNECTED EQUIPMENT	(see Form A.10)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.5.2.6	Transformer PROTECTIVE BONDING screen	(see Form A.11)	N/A
	Transformer provided with screen for PROTECTIVE BONDING:		—
	screen bonding consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses (see 6.5.2.2 a)		N/A
	screen bonding with soldered connection (see 6.5.2.2 b) is:		—
	– Independently secured against loosening		N/A
	– Not used for other purposes		N/A
6.5.3	SUPPLEMENTARY and REINFORCED INSULATION		P
	Meet CLEARANCE, CREEPAGE DISTANCE and solid insulation requirements of 6.7		P
6.5.4	PROTECTIVE IMPEDANCE	(see Form A.12)	N/A
	Limits current or voltage to level of 6.3.1 in NORMAL and to level of 6.3.2 in SINGLE FAULT CONDITION		N/A
	CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of DOUBLE or REINFORCED INSULATION of 6.7	(see Form A.15)	N/A
	The PROTECTIVE IMPEDANCE consists of one or more of the following:	(see TABLE 1.A and Form A.12)	—
	a) appropriate single component suitable for safety and reliability for protection, it is:		—
	1) RATED twice the maximum WORKING VOLTAGE		N/A
	2) resistor RATED for twice the power dissipation for maximum WORKING VOLTAGE		N/A
	b) combination of components		N/A
	Single electronic device not used as PROTECTIVE IMPEDANCE		N/A
6.5.5	Automatic disconnection of the supply		N/A
	a) RATED to disconnect the load within time specified in Figure 2		N/A
	b) RATED for the maximum load conditions of the equipment		N/A
6.5.6	Current- or voltage-limiting devices	(see Form A.13)	N/A
	Device complies with all of:		—
	a) RATED to limit the current or voltage to the level of 6.3.2	(see Form A.6)	N/A
	b) RATED for the maximum WORKING VOLTAGE; and		N/A
	RATED for the maximum operational current if applicable		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) CLEARANCE, CREEPAGE DISTANCE between terminations of the impedance meet requirements of SUPPLEMENTARY INSULATION of 6.7	(see Forms A.14 and A.15)	N/A
6.6	**Connections to external circuits**		**N/A**
6.6.1	General		N/A
	Connections do not cause ACCESSIBLE parts of the following to become HAZARDOUS LIVE in NORMAL CONDITION or SINGLE FAULT CONDITION:		—
	– the external circuits		N/A
	– the equipment		N/A
	Protection achieved by separation of circuits; or		N/A
	short circuit of separation does not cause a HAZARD		N/A
	Instructions or markings for each terminal include:		—
	a) RATED conditions for TERMINAL		N/A
	b) Required RATING of external circuit insulation		N/A
6.6.2	TERMINALS for external circuits		N/A
	TERMINALS which receive a charge from an internal capacitor are not HAZARDOUS LIVE after 10 s of interrupting supply connection	(see Form A.5)	N/A
6.6.3	Circuits with terminals which are HAZARDOUS LIVE		N/A
	These circuits are:		—
	Not connected to ACCESSIBLE conductive parts; or		N/A
	Connected to ACCESSIBLE conductive parts, but are not MAINS CIRCUITS and have one TERMINAL contact at earth potential		N/A
	No ACCESSIBLE conductive parts are HAZARDOUS LIVE		N/A
6.6.4	Terminals for stranded conductors		N/A
	No RISK of accidental contact because:		—
	– Located or shielded		N/A
	– Self-evident or marked whether or not connected to ACCESSIBLE conductive parts		N/A
	Complies as applicable:		—
	a) Manufacturer's specified maximum length of removed insulation, or		N/A
	b) 8 mm length of insulation removed		N/A
6.7	**Insulation requirements**	(see Form A.14)	**P**
6.7.1	The nature of insulation		P
6.7.1.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Insulation between ACCESSIBLE parts or between separate circuits consist of CLEARANCES, CREEPAGE DISTANCES and solid insulation if provided as protection against a HAZARD		P
6.7.1.2	CLEARANCES		P
	Required CLEARANCES reflecting factors of 6.7.1.1	(see Forms A.14 and A.15)	P
	Equipment rated for operating altitude greater than 2000 m correction factor of Table 3 of 61010-1 applied		P
6.7.1.3	CREEPAGE DISTANCES		P
	Required CREEPAGE DISTANCES reflecting factors of 6.7.1.1 a) to d)	(see Forms A.14 and A.15)	P
	CTI material group reflected by requirements		P
	CTI test performed		N/A
6.7.1.4	Solid insulation		N/A
	Required solid insulation reflecting factors of 6.7.1.1 a) to d)	(see Forms A.14 and A.15)	N/A
6.7.1.5	Requirements for insulation according to type of circuit	(see Forms A.14 and A.15)	P
	a) 6.7.2 MAINS circuits of OVERVOLTAGE CATEGORY II up to nominal supply voltage of 300 V		N/A
	b) 6.7.3 secondary circuits separated from circuits defined in a) by transformer		N/A
	c) K.1 MAINS circuits of OVERVOLTAGE CATEGORY III and IV or OVERVOLTAGE CATEGORY II over 300 V		P
	d) K.2 secondary circuits separated from circuits defined in c) by transformer		N/A
	e) K.3 circuits having one or more of:		—
	1) maximum TRANSIENT OVERVOLTAGE is limited to known level below the level of MAINS CIRCUIT		N/A
	2) maximum TRANSIENT OVERVOLTAGE above the level of MAINS CIRCUIT		N/A
	3) WORKING VOLTAGE is the sum of more than one circuit or a mixed voltage		N/A
	4) WORKING VOLTAGE includes recurring peak voltage, may include non-sinusoidal or non-periodic waveform		N/A
	5) WORKING VOLTAGE with a frequency above 30 kHz		N/A
6.7.2	Insulation for MAINS CIRCUITS of OVERVOLTAGE CATEGORY II with a nominal supply voltage up to 300 V		N/A
6.7.2.1	CLEARANCES and CREEPAGE DISTANCES	(see Forms A.14 and A.15)	—
	Values for MAINS CIRCUITS of Table 4 are met		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.7.2.2	Solid insulation		N/A
6.7.2.2.1	General		N/A
	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		N/A
	Equipment passed voltage tests of 6.8.3 with values of Table 5	(see Form A.18)	N/A
	Complies as applicable:		—
	a) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	b) moulded and potted parts requirements of 6.7.2.2.2		N/A
	c) inner layers of printed wiring boards requirements of 6.7.2.2.3		N/A
	d) thin-film insulation requirements of 6.7.2.2.4		N/A
6.7.2.2.2	Moulded and potted parts		—
	Conductors between same two layers are separated by at least 0,4 mm after moulding is completed		N/A
6.7.2.2.3	Inner insulating layers of printed wiring boards		—
	Separated by at least 0,4 mm between same two layers		N/A
	REINFORCED INSULATION has adequate electric strength; one of following methods used:		—
	a) thickness of insulation is at least 0,4 mm		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION		N/A
	c) insulation is assembled of minimum two separate layers, where the combination is rated for test voltage of Table 5 for REINFORCED INSULATION		N/A
6.7.2.2.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.2.1		N/A
	REINFORCED INSULATION have adequate electric strength; one of the following methods used:		—
	a) thickness through the insulation at least 0,4 mm		N/A
	b) insulation is assembled of min. two separate layers, each RATED for test voltage of Table 5 for BASIC INSULATION	(see Form A.18)	N/A
	c) insulation is assembled of min. three separate layers, where the combination of two layers passed voltage tests of 6.8.3 with values of Table 5 for REINFORCED INSULATION	(see Form A.18)	N/A
6.7.3	Insulation for secondary circuits derived from MAINS CIRCUITS of OVERVOLTAGE CATEGORY II up to 300 V		N/A
6.7.3.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Secondary circuits where separation from MAINS CIRCUITS is achieved by a transformer providing:		—
	– REINFORCED INSULATION		N/A
	– DOUBLE INSULATION		N/A
	– screen connected to the PROTECTIVE CONDUCTOR TERMINAL		N/A
6.7.3.2	CLEARANCES	(see Forms A.14 and A.15)	N/A
	a) meet the values of Table 6 for BASIC INSULATION and SUPPLEMENTARY INSULATION; or		N/A
	twice the values of Table 6 for REINFORCED INSULATION; or		N/A
	b) pass the voltage tests of 6.8 with values of Table 6;	(see Form A.18)	N/A
	with following adjustments:		—
	1) values for reinforced insulation are 1,6 times the values for basic insulation		N/A
	2) if operating altitude is greater than 2000 m values of CLEARANCES multiplied with factor of Table 3		N/A
	3) minimum CLEARANCE is 0,2 mm for POLLUTION DEGREE 2 and 0,8 mm for POLLUTION DEGREE 3		N/A
6.7.3.3	CREEPAGE DISTANCES	(see Forms A.14 and A.15)	N/A
	Based on WORKING VOLTAGE meets the values of Table 7 for BASIC and SUPPLEMENTARY INSULATION		N/A
	Values for REINFORCED INSULATION are twice the values of BASIC INSULATION		N/A
	Coatings to achieve reduction to POLLUTION DEGREE 1 comply with requirements of Annex H		N/A
6.7.3.4	Solid insulation		N/A
6.7.3.4.1	General		N/A
	Withstands electrical and mechanical stresses in normal use and all RATED environmental conditions of 1.4		—
	a) Equipment passed voltage test of 6.8.3.1 for 5 s with VALUES of Table 6 for BASIC and SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	values for REINFORCED INSULATION are 1,6 times the values of BASIC INSULATION		N/A
	b) if WORKING VOLTAGE exceeds 300 V, equipment passed voltage test of 6.8.3.1 for 1 min with a test voltage of 1,5 times working voltage for BASIC or SUPPLEMENTARY INSULATION	(see Form A.18)	N/A
	value for REINFORCED INSULATION are twice the WORKING VOLTAGE		N/A
	Complies as applicable:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	1) ENCLOSURE or PROTECTIVE BARRIER of Clause 8		N/A
	2) moulded and potted parts requirements of 6.7.3.4.2		N/A
	3) inner layers of printed wiring boards requirements of 6.7.3.4.3		N/A
	4) thin-film insulation requirements of 6.7.3.4.4		N/A
6.7.3.4.2	Moulded and potted parts		—
	Conductors between same two layers are separated by applicable distances of Table 8		N/A
6.7.3.4.3	Inner insulation layers of printed wiring boards		—
	Separated by at least the applicable distances of Table 8 between same two layers		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		—
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of minimum two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION	(see Form A.18)	N/A
	c) insulation is assembled of min. two separate layers, where the combination is RATED for 1,6 times the test voltage of Table 6	(see Form A.18)	N/A
6.7.3.4.4	Thin-film insulation		—
	Conductors between same two layers are separated by applicable CLEARANCES and CREEPAGE DISTANCE of 6.7.3.2 and 6.7.3.3		N/A
	REINFORCED INSULATION have adequate electric strength; one of following methods used:		—
	a) thickness at least applicable distance of Table 8		N/A
	b) insulation is assembled of min. two separate layers, each RATED for test voltage of Table 6 for BASIC INSULATION	(see Form A.18)	N/A
	c) insulation is assembled of min. three separate layers, where the combination of two layers passed voltage tests with 1,6 time values of Table 6:	(see Form A.18)	—
	a.c. test of 6.8.3.1; or		N/A
	d.c. test of 6.8.3.2 for circuits stressed only by d.c. voltages		N/A
6.8	**Procedure for voltage tests**	(see Forms A.14 and A.18)	**P**
6.9	**Constructional requirements for protection against electric shock**		**P**
6.9.1	General		P
	If a failure could cause a HAZARD:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) security of wiring connections		P
	b) screws securing removable covers		P
	c) accidental loosening		P
	d) CLEARANCES and CREEPAGE DISTANCES not reduced below the values of basic insulation by loosening of parts or wires		P
6.9.2	Insulating materials		P
	Material not to be used for safety relevant insulation:		—
	a) easily damaged materials not used		P
	b) non-impregnated hygroscopic materials not used		P
6.9.3	Colour coding		N/A
	Green-and-yellow insulation shall not be used except:		—
	a) protective earth conductors;		N/A
	b) PROTECTIVE BONDING conductors;		N/A
	c) potential equalization conductors;		N/A
	d) functional earth conductors		N/A
6.10	**Connection to MAINS supply source and connections between parts of equipment**		**P**
6.10.1	MAINS supply cords		P
	RATED for maximum equipment current (see 5.1.3 c)		P
	Cable complies with IEC 60227 or IEC 60245		N/A
	Cords certified or approved by a recognized testing authority are regarded as meeting this requirement.	UL certified	P
	Heat-resistant if likely to contact hot parts		N/A
	Temperature RATING (cord and inlet).....:		—
	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		N/A
	Detachable cords with IEC 60320 MAINS connectors:		—
	Conform to IEC 60799; or		N/A
	Have the current RATING of the MAINS connector		N/A
6.10.2	Fitting of non-detachable MAINS supply cords		P
6.10.2.1	Cord entry		—
	a) inlet or bushing with a smoothly rounded opening; or		P
	b) insulated cord guard protruding >5 D (diameter)		N/A
6.10.2.2	Cord anchorage		—
	Protective earth conductor is the last to take the strain		N/A
	a) cord is not clamped by direct pressure from a screw		P
	b) knots are not used		P

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Clause	Requirement + Test	Result - Remark	Verdict
	c) cannot push the cord into the equipment to cause a HAZARD		P
	d) no failure of cord insulation in anchorage with metal parts		N/A
	e) not to be loosened without a tool		P
	f) cord replacement does not cause a HAZARD and method of strain relief is clear		P
	Push-pull and or torque test	(see Form A.19)	N/A
6.10.3	Plugs and connectors		P
	MAINS supply plugs, connectors etc., conform with relevant specifications		P
	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		—
	Plugs of supply cords do not fit MAINS sockets above rated SUPPLY voltage		N/A
	MAINS type plugs used only for connection to MAINS supply		N/A
	Plug pins which receive a charge from an internal capacitor	(see Form A.5)	N/A
	Accessory MAINS socket outlets:		—
	a) marking if accepts a standard MAINS supply plug (see 5.1.3e)		N/A
	b) input has a protective earth conductor if outlet has EARTH TERMINAL CONTACT		N/A
6.11	**Disconnection from supply source**		**P**
6.11.1	Disconnects all current-carrying conductors		P
6.11.2	Exceptions		P
6.11.3	Requirements according to type of equipment		P
6.11.3.1	PERMANENTLY CONNECTED EQUIPMENT and multi-phase equipment		P
	Employs switch or circuit-breaker		P
	If switch or circuit-breaker is not part of the equipment, documentation requires:		—
	a) switch or circuit-breaker to be included in building installation		P
	b) suitable location easily reached		P
	c) marking as disconnecting for the equipment		P
6.11.3.2	Single-phase cord-connected equipment		N/A
	Equipment is provided with one of the following:		—
	a) switch or circuit-breaker		N/A
	b) appliance coupler (disconnectable without tool)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) separable plug (without locking device)		N/A
6.11.4	Disconnecting devices		P
6.11.4.1	General		P
	Disconnecting device part of equipment		N/A
	Electrically close to the SUPPLY		P
	Power-consuming components not electrically located between the supply source and the disconnecting device		P
	Except electromagnetic interference suppression circuits permitted to be located on the supply side of the disconnecting device		N/A
6.11.4.2	Switches and circuit-breakers		P
	When used as disconnection device:		—
	Circuit breaker meets the relevant requirements IEC 60947-2 and is suitable for the application		P
	Switch meets the relevant requirements IEC 60947-3 and is suitable for the application		P
	Marked to indicate function .....:		—
	Not incorporated in MAINS cord		P
	Does not interrupt PROTECTIVE EARTH CONDUCTOR		N/A
6.11.4.3	Appliance couplers and plugs		N/A
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.11.3.2):		—
	Readily identifiable and easily reached by the operator		N/A
	Single-phase portable equipment cord length not more than 3 m		N/A
	PROTECTIVE EARTH CONDUCTOR connected first and disconnected last		N/A
7	**PROTECTION AGAINST MECHANICAL HAZARDS**		**P**
7.1	**General**		**P**
	Equipment does not cause a mechanical HAZARD in NORMAL nor in SINGLE FAULT CONDITION		P
	Conformity is checked by 7.2 to 7.7		P
7.2	**Sharp edges**		**P**
	Easily-touched parts are smooth and rounded		P
	Do not cause injury during NORMAL USE and		P
	Do not cause injury during SINGLE FAULT CONDITION		P
7.3	**Moving parts**		**N/A**
7.3.1	General		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	HAZARDS from moving parts limited to a tolerable level with the conditions specified in 7.3.2 and 7.3.5		N/A
	RISK assessment in accordance with 7.3.3 carried out		N/A
7.3.2	Exceptions		N/A
	Access to HAZARDOUS moving parts permitted under following circumstances:		—
	a) obviously intended to operate on parts or materials external of the equipment		N/A
	inadvertent touching of moving parts minimized by equipment design (e .g. guards or handles)		N/A
	b) If OPERATOR access is unavoidable outside NORMAL USE following precautions have been taken:		—
	1) access requires TOOL		N/A
	2) statement about training in the instructions		N/A
	3) warning markings on covers prohibiting access by untrained OPERATORS		N/A
	or symbol 14 with full details in documentation		N/A
7.3.3	RISK assessment for mechanical HAZARDS to body parts		N/A
	RISK is reduced to a tolerable level by protective measures as specified in Table 12		N/A
	Minimum protective measures:		—
	A. Low level measures		N/A
	B. Moderate measures		N/A
	C. Stringent measures		N/A
7.3.4	Limitation of force and pressure	(see Form A.20)	N/A
	Following levels are met in NORMAL and SINGLE FAULT CONDITION:		—
	Continuous contact pressure below 50 N / cm² with force below 150 N		N/A
	Temporary force below 250 N for an area at least of 3 cm² for a maximum duration of 0,75 s		N/A
7.3.5	Gap limitations between moving parts	(see Form A.20)	N/A
7.3.5.1	Access normally allowed		—
	If levels of 7.3.4 exceeded and a body part may be inserted minimum gap as specified in Table 13 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.3.5.2	Access normally prevented		—
	Maximum gap as specified in Table 14 assured in NORMAL and in SINGLE FAULT CONDITION		N/A
7.4	**Stability**		**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
	Equipment not secured to building structure is physical stable		N/A
	Stability maintained after opening of drawers etc. by automatic means, or		N/A
	warning marking requires the application of means		N/A
	Compliance checked by following tests as applicable:	(see Form A.20A)	—
	a) 10° tilt test for other than handheld equipment		N/A
	b) multi-directional force test for equipment exceeds height of 1 m and mass of 25 kg		N/A
	c) downward force test for floor-standing equipment		N/A
	d) overload test with 4 times maximum load for castor or support foot that supports greatest load, or		N/A
	e) castor or support foot that supports greatest load removed from equipment		N/A
7.5	**Provisions for lifting and carrying**		**N/A**
7.5.1	General		N/A
	Equipment more than 18 kg.....:		N/A
	Has means for lifting or carrying; or		N/A
	Directions are given in documentation		N/A
7.5.2	Handles and grips		N/A
	Handles or grips withstand four times weight		N/A
7.5.3	Lifting devices and supporting parts		N/A
	RATED for maximum load; or		N/A
	Tested with four times maximum static load		N/A
7.6	**Wall mounting**		**P**
	Mounting brackets withstand four times weight	(see Form A.20B)	P
	One fastener removed and test repeated with two times weight	(see Form A.20B)	P
7.7	**Expelled parts**		**N/A**
	Equipment contains or limits the energy		N/A
	Protection not removable without the aid of a tool		N/A

8	**RESISTANCE TO MECHANICAL STRESSES**		**P**
8.1	**General**		**P**
	Equipment does not cause a HAZARD when subjected to mechanical stresses in NORMAL USE		P
	Normal protection level is 5 J		P
	Levels below 5 J but not less than 1 J are acceptable if all of the following criteria are met:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Lower level justified by RISK assessment of manufacturer		N/A
	b) Equipment installed in its intended application is not easily touched		N/A
	c) Only occasional access during NORMAL USE		N/A
	d) IK code in accordance to IEC 62262 marked or symbol 14 used with full information in the documentation		N/A
	for non-metallic ENCLOSURES rated below 2 °C ambient temperature value chosen for minimum RATED temperature		N/A
	impact energies between IK values, the IK code marked for nearest lower value		N/A
	Conformity is checked by performing following tests:	(see Form A.16)	—
	1) Static test of 8.2.1		P
	2) Impact test of 8.2.2 with 5 J except for HAND-HELD EQUIPMENT		P
	if specified impact energy is not 5 J alternate method of IEC 62262 used		N/A
	3) Drop test of 8.3.1 or 8.3.2 except for FIXED EQUIPMENT and equipment with mass over 100 kg		N/A
	Equipment RATED with an impact rating of IK 08 that obviously meets the criteria		N/A
	After the tests inspection with following results:		—
	– HAZARDOUS LIVE parts above the limits of 6.3.2 not ACCESSIBLE		P
	– insulation pass the voltage tests of 6.8	(see Form A.30)	P
	i) No leaks of corrosive and harmful substances		P
	ii) ENCLOSURE shows no cracks resulting in a HAZARD		P
	iii) CLEARANCES not less than their permitted values		P
	iv) Insulation of internal wiring remains undamaged		P
	v) PROTECTIVE BARRIERS not damaged or loosened		N/A
	vi) No moving parts exposed, except permitted by 7.3		N/A
	vii) No damage which could cause spread of fire		P
8.2	**Enclosure rigidity test**		**P**
8.2.1	Static test	(see Form A.21A)	P
	– 30 N with 12 mm rod applied to each part of ENCLOSURE		P
	– in case of doubt test conducted at maximum RATED ambient temperature		N/A
8.2.2	Impact test	(see Form A.21A)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Impact applied to any part of enclosure causing a hazard if damaged		P
	Impact energy level and corresponding IK code.....:		—
	Non-metallic enclosures cooled to minimum rated ambient temperature if below 2 °C		N/A
8.3	**Drop test**	(see Form A.21B)	**N/A**
8.3.1	Other than hand-held and direct-plug-in equipment		N/A
	Tests conducted with a drop height or angle of .....:		—
8.3.2	hand-held and direct-plug-in equipment		N/A
	Non-metallic enclosures cooled to minimum rated ambient temperature if below 2 °C		N/A
	Drop test conducted with an height of 1 m		N/A
9	**PROTECTION AGAINST THE SPREAD OF FIRE**		**P**
9.1	**General**		**P**
	No spread of fire in normal and single fault condition		P
	mains supplied equipment meets requirements of 9.6 additionally		P
	Conformity is checked by minimum one or a combination of the following (see Figure 11):	(see Form A.22)	—
	Single Fault test of 4.4; or	(see Form A.1)	P
	Application of 9.2 (eliminating or reducing the sources of ignition); or		P
	Application of 9.3 (containment of fire within the equipment)		P
9.2	**Eliminating or reducing the sources of ignition within the equipment**		**P**
	a) 1) Limited-energy circuit (see 9.4); or		P
	2) BASIC INSULATION provided for parts of different potential; or	(see Forms A.14 and A.18)	P
	Bridging the insulation does not cause ignition	(see Form A.1)	P
	b) Surface temperature of liquids and parts (see 9.5)		N/A
	c) No ignition in circuits designed to produce heat	(see Form A.1)	P
9.3	**Containment of the fire within the equipment, should it occur**		**P**
9.3.1	General		P
	Spread of fire outside equipment reduced to a tolerable level if:		—
	a) Energizing of the equipment is controlled by an OPERATOR held switch		N/A
	b) ENCLOSURE is conform with constructional requirements of 9.3.2; and		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Requirements of 9.5 are met		P
9.3.2	Constructional requirements		P
	a) Connectors and insulating material have flammability classification V-2 or better	(see TABLE 1.A or Form A.23)	P
	b) Insulated wires and cables are flame retardant (VW-1 or equivalent)	(see TABLE 1.A or Form A.23)	P
	c) ENCLOSURE meets following requirements:	(see Form A.22)	—
	1) Bottom and sides in arc of 5 ° (see Figure 13) to non-limited circuits (9.4) meets:		—
	i) no openings; or		P
	ii) perforated as specified in Table 16; or		N/A
	iii) metal screen with a mesh; or		N/A
	iv) baffles as specified in Figure 12		N/A
	2) Material of ENCLOSURE and any baffle or flame barrier is made of:		—
	Metal (except magnesium); or		N/A
	Non-metallic materials have flammability classification V-1 or better	(see TABLE 1.A or Form A.22)	P
	3) ENCLOSURE and any baffle or flame barrier have adequate rigidity		N/A
9.4	**Limited-energy circuit**	(see Form A.24)	**N/A**
	a) Potential not more than 30 r.m.s. and 42,4 V peak, or 60 V d.c.		N/A
	b) Current limited by one of following means:		—
	1) Inherently or by impedance (see Table 17); or		N/A
	2) Overcurrent protective device (see Table 18); or		N/A
	3) A regulating network limits also in SINGLE FAULT CONDITION (see Table 17)		N/A
	c) Is separated by at least BASIC INSULATION		N/A
	Fuse or a nonadjustable electromechanical device is used		N/A
9.5	**Requirements for equipment containing or using flammable liquids**		**N/A**
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire	(see Form A.25)	N/A
	RISK is reduced to a tolerable level:		—
	a) The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point		N/A
	b) The quantity of liquid is limited		N/A
	c) Flames are contained within the equipment		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Detailed instructions for RISK-reduction provided		N/A
9.6	**Overcurrent protection**		**P**
9.6.1	General		P
	MAINS supplied equipment protected		P
	BASIC INSULATION between MAINS parts of opposite polarity provided	(see Forms A.14 and A.15)	P
	Overcurrent protection devices not fitted in the protective conductor		P
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase equipment)		P
9.6.2	PERMANENTLY CONNECTED EQUIPMENT		N/A
	Overcurrent protection device:		—
	Fitted within the equipment; or		N/A
	Specified in manufacturer's instructions		N/A
9.6.3	Other equipment		N/A
	Protection within the equipment		N/A
10	**EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT**		**P**
10.1	**Surface temperature limits for protection against burns**		**P**
	Easily touched surfaces within the limits in NORMAL and in SINGLE FAULT CONDITION:	(see Form A.26A)	—
	– at an specified ambient temperature of 40 °C		N/A
	– for equipment rated above 40 °C ambient temperature limits not exceeded raised by the difference to 40 °C		P
	Heated surfaces necessary for functional reasons exceeding specified values:		—
	– Are recognizable as such by appearance or function; or		N/A
	– Are marked with symbol 13		N/A
	– Guards are not removable without tool		N/A
10.2	**Temperatures of windings**		**P**
	Limits not exceeded in:	(see Form A.26B)	—
	NORMAL CONDITION		P
	SINGLE FAULT CONDITION		P
10.3	**Other temperature measurements**		**P**
	Following measurements conducted if applicable:	(see Form A.26A)	—
	a) Value of 60 °C of field-wiring terminal box not exceeded		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b) Surface of flammable liquids and parts in contact with this liquids		N/A
	c) Surface of non-metallic ENCLOSURES		P
	d) Parts made of insulating material supporting parts connected to MAINS supply		N/A
	e) Terminals carrying a current more than 0,5 A		N/A
10.4	**Conduct of temperature tests**		**P**
10.4.1	General		P
	Tests conducted under reference test conditions and manufacturer's instructions	(see Form A.26A)	P
	Tests alternatively conducted at the least favourable ambient temperature within the RATED ambient temperature .....:	70℃	—
10.4.2	Temperature measurement of heating equipment		N/A
	Tests conducted in test corner	(see Form A.26A)	N/A
10.4.3	Equipment intended for installation in a cabinet or wall		P
	Equipment built in as specified in installation instructions	(see Form A.26A)	N/A
10.5	**Resistance to heat**		**P**
10.5.1	Integrity of clearance and creepage distances	(see Form A.16)	P
10.5.2	Non-metallic enclosures	(see Form A.27)	P
	Within 10 min after treatment:		—
	Equipment subjected to suitable stresses of 8.2 and 8.3 complying with criteria of 8.1		P
10.5.3	Insulating material		P
	Parts supporting parts connected to mains supply		P
	terminals carrying a current more than 0,5 A		N/A
	Examination of material data; or		N/A
	in case of doubt:		P
	1) Ball pressure test; or	(see Form A.28)	P
	2) Vicat softening test of ISO 306	(see Form A.29)	N/A

11	**PROTECTION AGAINST HAZARDS FROM FLUIDS AND SOLID FOREIGN OBJECTS**		**N/A**
11.1	**General**		**N/A**
	Protection to OPERATORS and surrounding area provided by EQUIPMENT		N/A
	All fluids specified by manufacturer considered		N/A
11.2	**Cleaning**	(see Form A.30)	**N/A**
11.3	**Spillage**	(see Form A.30)	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict
11.4	**Overflow**	(see Form A.30)	**N/A**
11.5	**Battery electrolyte**		**N/A**
	Battery electrolyte leakage presents no HAZARD		N/A
11.6	**Equipment RATED with a degree of ingress protection (IP code)**	(see Form A.30)	**N/A**
11.6.1	General		N/A
	Equipment marked with IP code ..... :		—
	Conditions specified in the documentation		N/A
11.6.2	Conditions for testing		N/A
	Equipment in clean and new condition, all parts in place and mounted as specified by manufacturer		N/A
	Complete equipment tested, or		N/A
	representative parts tested		N/A
	HAND-HELD EQUIPMENT and PORTABLE EQUIPMENT placed in least favourable position of NORMAL use		N/A
	Other equipment positioned or installed as specified		N/A
	TERMINALS provided with protective cap or cover, are installed as specified by manufacturer		N/A
	The equipment is operating (energized) during the treatment except:		—
	a) If manufacturer specifies degrees of protection for non-operating (de-energized) equipment, or		N/A
	b) Equipment is operating or non-operating during the treatment with does not affect the test results		N/A
11.6.3	Protection against solid foreign objects (including dust)		N/A
	Applicable test of IEC 60529 for protection against solid foreign objects conducted		N/A
	Additionally inspection of equipment resulted:		—
	a) No deposit on insulation parts that could lead to a HAZARD		N/A
	b) No created accumulations that have the potential to cause spread of fire		N/A
11.6.4	Protection against water		N/A
	Applicable test of IEC 60529 for protection against water conducted		N/A
	If any water has entered, safety is not impaired, inspection of equipment resulted:		—
	a) No deposit on insulation parts that could lead to a HAZARD		N/A
	b) Water has not reached hazardous live parts or windings which are not designed to operate when wet		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	c) No accumulations near the end of cable nor enter the cable where it could cause a HAZARD		N/A
	d) No accumulations where it could lead to a HAZARD taking in consideration movement of the equipment		N/A
11.7	**Fluid pressure and leakage**		**N/A**
11.7.1	Maximum pressure ..... :	(see Form A.31)	—
	Maximum pressure of any part does not exceed P_{RATED}		N/A
11.7.2	Leakage and rupture at high pressure		N/A
	Fluid-containing parts checked by inspection or if a HAZARD could arise subjected to hydraulic test, if:	(see Form A.31)	—
	a) product of pressure and volume > 200 kPa·l; and		N/A
	b) pressure > 50 kPa		N/A
	Safety evidence established by calculation in acc. to national authorities (e.g. Pressure Equipment Directive 2014/68/EU)		N/A
	Parts of refrigerating systems meets pressure-related requirements of EN 378-2 or IEC 60335-2-89 as applicable		N/A
11.7.3	Leakage from low-pressure parts	(see Form A.32)	N/A
11.7.4	Overpressure safety device		N/A
	Does not operate in NORMAL USE		N/A
	a) Connected as close as possible to parts intended to be protected		N/A
	b) Easy access for inspection, maintenance and repair		N/A
	c) Adjustment only with TOOL		N/A
	d) No discharge towards person		N/A
	e) No HAZARD from deposit of discharged material		N/A
	f) Adequate discharge capacity		N/A
	No shut-off valve between overpressure safety device and protected parts		N/A
12	**PROTECTION AGAINST RADIATION, INCLUDING LASER SOURCES, AND AGAINST SONIC AND ULTRASONIC PRESSURE**		**N/A**
12.1	**General**		**N/A**
	Equipment provides protection		N/A
12.2	**Equipment producing ionizing radiation**		**N/A**
12.2.1	Ionizing radiation	(see Form A.33)	N/A
12.2.1.1	General		N/A
	Equipment meets the following requirements:		—

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Clause	Requirement + Test	Result - Remark	Verdict
	a) if intended to emit radiation meets requirements of 12.2.1.2; or		N/A
	tested, classified and marked in accordance to IEC 62598		N/A
	b) if only emits stray radiation meets requirements of 12.2.1.3		N/A
12.2.1.2	Equipment intended to emit radiation		—
	Effective dose rate of radiation measured.....:		—
	If dose rate exceeds 5 µSv/h marked with the following:		—
	a) symbol 17 (ISO 361)		N/A
	b) abbreviations of the radionuclides.....:		—
	c) with maximum dose at 1 m; or.....:		—
	with dose rate value between 1 µSv/h and 5 µSv/h in m.....:		—
12.2.1.3	Equipment not intended to emit radiation	(see Form A.34)	—
	Limit for unintended stray radiation of 1 µSv/h at any easily reached point kept .....:		N/A
12.2.2	Accelerated electrons		N/A
	Compartments opened only by the use of a TOOL		N/A
12.3	**Optical radiation**		**N/A**
	No unintentional HAZARDOUS escape of optical radiation as ultraviolet, visible or infrared radiation, including light emitting diodes:		—
	– Checked by inspection; and		N/A
	– Radiation sources assessed in acc. to the requirements of IEC 62471, except for sources considered to be safe (Table 22) or conditionally safe (Table 23).		N/A
	– Lamp and lamp systems assessed to Risk Groups 1, 2, or 3 of IEC 62471 are labelled in acc. to IEC 62471-2		N/A
	– If labelling impractical, lamp or lamp systems marked with symbol 14		N/A
	– Protective measures, restrictions on use, and operating instructions that may be necessary are provided, including the applicable conditions of use of Table 23.		N/A
12.4	**Microwave radiation**		**N/A**
	Power density does not exceed 10 W/m^2.....:		N/A
12.5	**Sonic and ultrasonic pressure**		**N/A**
12.5.1	Sound level	(see Form A.35)	N/A
	No HAZARDOUS sound emission		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Maximum sound pressure level measured and calculated for maximum sound power level as specified in ISO 3746 or ISO 9614-1		N/A
	Instruction describes measures for protection		N/A
12.5.2	Ultrasonic pressure	(see Form A.36)	N/A
	Equipment not intended to emit ultrasound does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	Equipment intended to emit ultrasound:		N/A
	Outside useful beam does not exceed limit of 110 dB between 20 kHz and 100 kHz		N/A
	If inside useful beam above values exceeded:		—
	Marked with Symbol 14 of Table 1		N/A
	and following information in the documentation:		—
	a) dimensions of useful beam		N/A
	b) area where ultrasonic pressure exceed 110 dB		N/A
	c) maximum sound pressure inside beam area		N/A
12.6	**Laser sources**		**N/A**
	Equipment meets requirements of IEC 60825-1		N/A
13	**PROTECTION AGAINST LIBERATED GASES AND SUBSTANCES, EXPLOSION AND IMPLOSION**		**P**
13.1	**Poisonous and injurious gases and substances**		**P**
	No hazardous substances liberated in NORMAL CONDITION and in SINGLE FAULT CONDITION		P
	If potentially-hazardous substances are liberated:		—
	Operator is not directly exposed to a quantity of the substance that could cause harm		P
	Requirements to discharge of hazardous substances during NORMAL operation in accordance to manufacturer's instructions not considered as liberation		P
	Attached data/test reports demonstrate conformity		P
13.2	**Explosion and implosion**		**P**
13.2.1	Components		P
	Components liable to explode:		—
	Pressure release device provided; or		N/A
	Apparatus incorporates operator protection (see also 7.7)		N/A
	Pressure release device:		—
	Discharge without danger		N/A
	Cannot be obstructed		P

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Clause	Requirement + Test	Result - Remark	Verdict
13.2.2	Batteries and battery charging	(see Form A.37)	N/A
	If explosion or fire HAZARD could occur:		—
	Protection incorporated in the equipment; or		N/A
	Instructions specify batteries with built-in protection		N/A
	In case of wrong type of battery used:		—
	No HAZARD; or		N/A
	Warning by marking and within instructions		N/A
	Equipment with means to charge rechargeable batteries:		—
	Warning against the charging of non-rechargeable batteries; and		N/A
	Type of rechargeable battery indicated; or		N/A
	Symbol 14 used		N/A
	Battery compartment design		N/A
	Single component failure		N/A
	Polarity reversal test		N/A
13.2.3	Implosion of cathode ray tubes		N/A
	If maximum face dimensions > 160 mm.....:		—
	Intrinsically protected and correctly mounted; or		N/A
	ENCLOSURE provides protection:		N/A
	If non-intrinsically protected:		—
	Screen not removable without TOOL		N/A
	If glass screen, not in contact with surface of tube		N/A
14	**COMPONENTS AND SUBASSEMBLIES**		**P**
14.1	**General**		**P**
	Where safety is involved, components and subassemblies meet relevant requirements	(see TABLE 1.A)	P
14.2	**Motors**		**N/A**
14.2.1	Motor temperatures		N/A
	Does not present a HAZARD when stopped or prevented from starting; or	(see Forms A.1 and A.26B)	N/A
	Protected by over-temperature or thermal protection device conform with 14.3		N/A
14.2.2	Series excitation motors		N/A
	Connected direct to device, if overspeeding causes a HAZARD		N/A
14.3	**Overtemperature protection devices**		**N/A**
	Devices operating in a SINGLE FAULT CONDITION	(see Form A.38)	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a) Reliable function is ensured		N/A
	b) RATED to interrupt maximum current and voltage		N/A
	c) Does not operate in NORMAL USE		N/A
	If self-resetting device used to prevent a HAZARD, protected part requires intervention before restarting		N/A
14.4	**Fuse holders**		**N/A**
	No access to HAZARDOUS LIVE parts		N/A
14.5	**MAINS voltage selecting devices**		**N/A**
	Accidental change not possible		N/A
14.6	**MAINS transformers tested outside equipment**	(see Forms A.39 and A.40)	**N/A**
14.7	**Printed wiring boards**		**P**
	Data shows conformity with V-1 of IEC 60695-11-10 or better; or	V-0 used.	P
	Test shows conformity with V-1 of IEC 60695-11-10 or better	(see Form A.23)	N/A
	Not applicable for printed wiring boards with limited-energy circuits (9.4)		N/A
14.8	**Circuits used to limit TRANSIENT OVERVOLTAGES**		**N/A**
	Test conducted between each pair of MAINS SUPPLY TERMINALS	(see Form A.41)	N/A
	No ignition or overheating of other materials :		—
	– no ignition		N/A
	– no heat to other parts above the self-ignition points		N/A
	Safely suppressing and properly functional after applied tests		N/A
15	**PROTECTION BY INTERLOCKS**		**N/A**
15.1	**General**		**N/A**
	Interlocks are designed to remove a HAZARD before OPERATOR exposed		N/A
15.2	**Prevention of reactivation**		**N/A**
15.3	**Reliability**		**N/A**
	Single fault unlikely to occur; or		N/A
	Cannot cause a HAZARD		N/A
16	**HAZARDS RESULTING FROM APPLICATION**		**P**
16.1	**REASONABLY FORESEEABLE MISUSE**		**P**
	No HAZARDS arising from settings not intended and not described in the instructions		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Other cases of REASONABLY FORESEEABLE MISUSE addressed by RISK assessment		N/A
16.2	**Ergonomic aspects**		**N/A**
	Factors giving rise to a HAZARD the RISK assessment is reflecting those aspects:		—
	a) limitation of body dimensions		N/A
	b) displays and indicators		N/A
	c) accessibility and conventions of controls		N/A
	d) arrangement of TERMINALS		N/A
17	**RISK ASSESSMENT**		**P**
	RISK assessment conducted, if HAZARD might arise and not covered by Clauses 6 to 16		P
	TOLERABLE RISK achieved by iterative documented process covering the following:		—
	a) RISK analysis		P
	Identifies HAZARDS and estimates RISK		P
	b) RISK evaluation		P
	Plan to judge acceptability of resulting RISK level based on the estimated severity and likelihood of a RISK		P
	c) RISK reduction		P
	Initial RISK reduced by counter measures;		P
	Repeated RISK evaluation without new RISKS introduced		P
	RISKS remaining after RISK assessment addressed in instructions to RESPONSIBLE BODY:		—
	Information contained how to mitigate these RISKS		P
	Following principles in methods of RISK reduction applied by manufacturer in given order:		—
	1) RISKS eliminated or reduced as far as possible		P
	2) Protective measures taken for RISKS that cannot be eliminated		P
	3) User information about residual RISK due to any defect of the protective measures		P
	Indication of particular training is required		P
	Specification of the need for personal protective equipment		P
	Conformity checked by evaluation of the RISK assessment documentation		P

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Clause	Requirement + Test	Result - Remark	Verdict
ANNEX F	**ROUTINE TESTS**		**P**
	Manufacturer's declaration		P
ANNEX H	**QUALIFICATION OF CONFORMAL COATINGS FOR PROTECTION AGAINST POLLUTION**		**N/A**
H.1	**General**		**N/A**
	Conformal coatings meet the requirements of Clause H.2 and H.3.		N/A
H.2	**Technical properties**		**N/A**
	Technical properties of conformal coatings are suitable for the intended application. In particular:		—
	a) Manufacturer indicate that it is a coating for PWBs;		N/A
	b) RATED operating temperature include the temperature range of the indicated application;		N/A
	c) CTI, insulation resistance and dielectric strength are suitable for the intended application;		N/A
	d) Coating have adequate UV resistance, if it is exposed to sunlight;		N/A
	e) Flammability RATING of the coating is at least the required flammability RATING of the applied PWB.		N/A
H.3	**Qualification of coatings**	(see Form A.42)	**N/A**
	Coating complies with the conformity requirements.		N/A
ANNEX K	**INSULATION REQUIREMENTS NOT COVERED BY CLAUSE 6.7**	(see Forms A.15 and A.18)	**N/A**

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Clause	Requirement + Test	Result - Remark	Verdict

4.4	TABLE: Testing in SINGLE FAULT CONDITION – Results			Form A.1	P
Test subclause	Fault No.	Fault description	Td 4.4.3 (NOTE)	How was test terminated Comments	Meets 4.4.4
4.4.1-4.4.4	1	C24 short circuit	1s	Unit shutdown, no hazard.	P
4.4.1-4.4.4	1	C25 short circuit	1s	Unit shutdown, no hazard.	P
4.4.1-4.4.4	1	D3 short circuit	1s	Unit shutdown, no hazard.	P
4.4.1-4.4.4	1	U1 short circuit	10min	Unit shutdown, no hazard.	P
4.4.1-4.4.4	1	C18 short circuit	10min	Unit shutdown, no hazard.	P
4.4.1-4.4.4	1	C20 short circuit	10min	Unit shutdown, no hazard.	P

NOTE Td = Test duration in hh:mm:ss
Record dielectric strength test on Form A.18 and temperature tests on Forms A.26A and / or A.26B.
Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.

Supplementary information:

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Clause	Requirement + Test	Result - Remark	Verdict

5.1.3c)	TABLE: MAINS SUPPLY		Form A.2	P
	Marked rating..... :	208-415	V	—
	Phase..... :	3		—
	Frequency ..... :	50/60	Hz	—
	Current ..... :	-	A	—
	Power ..... :	2	W	—
	Power ..... :	-	VA	—

Test No.	Voltage [V]	Frequency [Hz]	Current [A]	Power [W]	Power [VA]	Comments
1	208	50	--	1.75	N/A	Normal load
2	208	60	--	1.73	N/A	Normal load
3	415	50	--	1.83	N/A	Normal load
4	415	60	--	1.81	N/A	Normal load

NOTE – Measurements are only required for marked ratings. Initial inrush currents are not regarded.

Supplementary information:

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Clause	Requirement + Test	Result - Remark	Verdict

5.3	TABLE: Durability of markings	Form A.3	P

Marking method (see NOTE)	Agent
1) Adhesive label	A Water
2) Ink printed	B Isopropyl alcohol 70%
3) Laser marked	C (specify agent)
4) Film-coated (plastic foil control panel)	D (specify agent)
5) Imprinted on plastic (moulded in)	E (specify agent)

NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Marking location	Marking method (see above)
Identification (5.1.2)	2
MAINS supply (5.1.3)	2
Fuses (5.1.4)	N/A
Terminals and operating devices (5.1.5.2)	N/A
Switches and circuit breakers (5.1.6)	N/A
Double/reinforced equipment (5.1.7)	2
Field wiring Terminal boxes (5.1.8)	N/A
Warning marking (5.2)	2
Battery charging (13.2.2)	N/A

Method	Test agent	Remains legible	Label loose	Curled edges	Comments
		Verdict	Verdict	Verdict	
2	A, B	Yes	No	No	P

Supplementary information:

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Clause	Requirement + Test	Result - Remark	Verdict

6.2	**TABLE: List of accessible parts**		**Form A.4**	**P**
6.1.2	Exceptions			—
6.2	Determination of ACCESSIBLE parts			—
Item	Description	Determination method (NOTE 5)	Exception under 6.1.2 (NOTE 4)	
1	Enclosure	V, R, J, P3, P4	--	
2	Button	V, R	--	

NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.2)
NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)
NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see 6.4).
NOTE 4 – Capacitance test may be required (see Form A.5).
NOTE 5 – The determination methods are:
V = visual; R = rigid test finger; J = jointed test finger; P3 = pin 3 mm diameter; P4 = pin 4 mm diameter.

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6	TABLE: Values in normal condition												Form A.5	P
6.1.2	Exceptions							11.2	Cleaning and decontamination					—
6.3.1	Values in NORMAL CONDITION (see NOTE 1)							11.3	Spillage					—
6.6.2	Terminals for external circuit							11.4	Overflow					—
6.10.3	Plugs and connections													—

Item	Voltage			Current				Capacitance		10 s / 5 s test (NOTE)			Comments
(see Form A.4)	V r.m.s.	V peak	V d.c.	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	µC	mJ	V	µC	mJ	
1	--	0.01 max	--	--	--	--	--	--	--	--	--	--	Not hazardous live.
2	--	0.01 max	--	--	--	--	--	--	--	--	--	--	Not hazardous live.

NOTE – A 10 s test is specified in 6.1.2 a) b). A. 5 s test is specified in 6.10.3. The capacitance level versus voltage below the limits given from figure 3 of IEC 61010-1.

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.3.2	TABLE: Values in single fault condition										Form A.6	P
Item	Subclause and	Voltage			Transient (see NOTE)		Current				Capacitance	Comments
(see Form A.4)	fault No. (see Form A.1)	V r.m.s.	V peak	V d.c.	V	s	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	µF (see NOTE)	
1	1	--	0.01 Max	--	--	--	--	--	--	--	--	Not hazardous Live.
2	2	--	0.01 Max	--	--	--	--	--	--	--	--	Not hazardous live.
NOTE – Transient voltages must be below the limits given from Figure 2 and the capacitance below the limits from figure 3 of IEC 61010-1.												
Supplementary information:												

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.5.2.2	TABLE: Cross-sectional area of bonding conductors	Form A.7	N/A
Conductor location	CROSS-SECTIONAL AREA [mm²]		Verdict

Supplementary information:

6.5.2.3	TABLE: Tightening torque test	Form A.8	N/A
Conductor location	Size of screw	Tightening torque [Nm]	Verdict

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.5.2.4	TABLE: BONDING IMPEDANCE Of plug-connected equipment Form A.9			N/A
ACCESSIBLE part under test	Test current [A]	Voltage attained after 1 min [V]	Calculated resistance (Maximum 0,1 or 0,2 Ω) [Ω] (NOTE 1)	Verdict

NOTE 1 – For none-detachable power cord the impedance between protective conductor plug pin of MAINS cord and each ACCESSIBLE part shall not exceed 0,2 Ohm.

Supplementary information:

6.5.2.5	TABLE: Bonding impedance of permanently connected equipment Form A.10			N/A
ACCESSIBLE part under test	Test current [A]	Voltage attained after 1 min (maximum 10 V) [V]		Verdict

Supplementary information:

6.5.2.6	TABLE: Transformer PROTECIVE BONDING screen Form A.11				N/A
ACCESSIBLE part under test	Test current (see NOTE) [A]	Voltage attained after 1 min (maximum 10 V) [V]	Calculated resistance (maximum 0,1 Ω) [Ω]		Verdict

NOTE – Test current must be twice the value of the overcurrent protection means of the winding. Test is specified in 6.5.2.6 a) or b).

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.5.4	TABLE: PROTECTIVE IMPEDANCE	Form A.12	N/A

A single component

Component	Location	Measured		Calculated	Rated		Verdict	Comments
		Working voltage [V]	Current [A]	Power dissipation [W]	Working voltage [V]	Power dissipation [W]		

A combination of components

Component	Location	Comments

NOTE – A PROTECTIVE IMPEDANCE shall not be a single electronic device that employs electron conduction in a vacuum, gas or semiconductor.

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

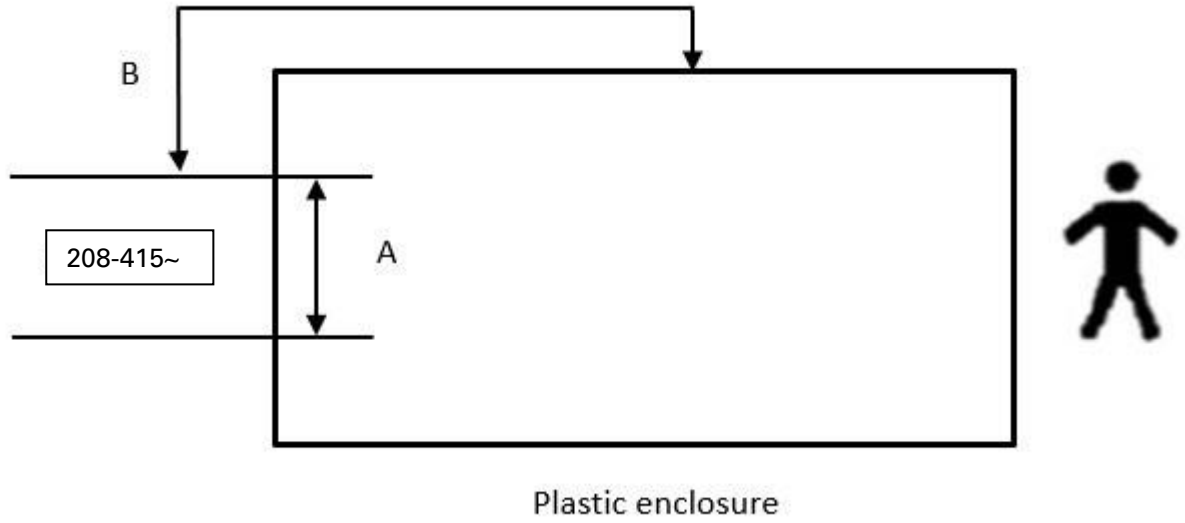
6.5.6	**TABLE: Current- or voltage-limiting device**	**Form A.13**	**N/A**

Component	Location	Measured		Rated		Verdict	Comments
		Working voltage [V]	Current [A]	Working voltage [V]	Current [A]		

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.7	TABLE: Insulation requirements - Block diagram of system -	Form A.14	P



Pollution degree..... : 3 Overvoltage category.....: III

Area	Location	Insulation type (NOTE 1)	WORKING VOLTAGE			CLEARANCE (NOTE 3)	CREEPAGE DISTANCE (NOTE 3)				Test voltage (NOTE 2)	Comments (NOTE 3)
			RMS [V]	Peak [V]	Freq. [kHz]	[mm]	PWB [mm]	CTI	Other [mm]	CTI	[V]	
A	Live parts and N	BI/DI	415	--	0.06	5.5	5.5	500	8.3	500	2210 V r.m.s	P
B	Live parts and enclosure	RI	415	--	0.06	11.0	11.0	500	16.6	500	3510 V r.m.s	P

NOTE 1 – Type of insulation:
BI = BASIC INSULATION
DI = DOUBLE INSULATION
PI = PROTECTIVE IMPEDANCE
RI = Reinforced INSULATION
SI = Supplementary INSULATION
see also Form A.15 for further details

NOTE 2 - Types of voltage
Peak impulse test voltage (pulse)
r.m.s.
d.c.
peak

NOTE 3 - OVERVOLTAGE CATEGORIES or POLLUTION DEGREES which differ should be shown under "Comments"

Supplementary Information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.7	**TABLE: Insulation requirements - Clearances and Creepages**			**Form A.15**	**P**
6.2.2	Examination	6.5.4	Protective impedance		—
6.4.2	ENCLOSURES and protective barriers	6.5.6	Current- or voltage-limiting device		—
6.4.4	Impedance	9.6.1	BASIC INSULATION between opposite polarity		—

Area	Location (See Form A.14)	Insulation type (NOTE 1)	WORKING VOLTAGE (NOTE 2)			CLEARANCE		CREEPAGE DISTANCE		CTI	Verdict	Comments
			RMS [V]	Peak [V]	Frequency [kHz]	Required [mm]	Measured [mm]	Required [mm]	Measured [mm]			
A	Live parts and N	BI/DI	415	--	0.06	5.5	>8.3	8.3	>8.3	500	P	No insulation breakdown. No reduction of clearances and creepage distance.
B	Live parts and enclosure	RI	415	--	0.06	11.0	>11.0	16.6	>16.6	500	P	No insulation breakdown. No reduction of clearances and creepage distance.

NOTE 1 – refer to Form A.14 for type of insulation shown in the insulation diagram NOTE 2 - to be used for definition of required insulation (see Form A.14)

Input supply voltage…….:	415	V	60	Hz

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.7	**TABLE: Insulation requirements - Clearances and Creepages**		**Form A.16**	**P**
6.4.2	ENCLOSURES or PROTECTIVE BARRIERS	9.6.1	Overcurrent protection basic insulation between MAINS parts	—
8	Mechanical resistance to shock and impact	10.5.1	Integrity of CLEARANCES and CREEPAGE DISTANCES	—

Area	Location (See Form A.14)	Insulation type	Mechanical tests (NOTE)					Test at max.	Measured after test (if required)		Verdict	Comments
			Applied force [N]	Rigidity (8.2)		Drop (8.3)		RATED ambient (10.5.1)	CLEARANCE [mm]	CREEPAGE DISTANCE [mm]		
				Static (8.2.1)	Impact (8.2.2)	Normal (8.3.1)	Hand-held/ Plug-in					
B	Live parts of different polarity	BI	30	P	P	P	N/A	70	>8.3	>8.3	P	No insulation breakdown. No reduction of clearances and creepage distance.
B	Live parts and enclosure	RI	30	P	P	P	N/A	70	>11.0	>16.6	P	No insulation breakdown. No reduction of clearances and creepage distance.

NOTE – Refer to Form A.18 for dielectric strength tests following the above tests.

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.7.2.2.2	**TABLE: Reliability of potted components** **Form A.17 (optional)**	**N/A**
14.1 b)	**Components and subassemblies**	

Temperature Cycling Test	
Manufacturer:	
Type:	
Construction:	
Potting compound:	
CREEPAGE DISTANCES measured:	
CLEARANCES measured:	
Thickness through insulation:	
Adhesive test Pass/Fail:	
Test temperature T °C:	

Cycles at U= AC 500 V				Leakage current (at AC 500 V) mA			
Number of cycles	Date			68 h / 125 °C	1 h / 25 °C	2 h / 0 °C	1 h / 25 °C
1. Cycle from		to					
2. Cycle from		to					
3. Cycle from		to					
4. Cycle from		to					
5. Cycle from		to					

After Cycling Test:		
Humidity conditioning	48 h	
Requirements for dielectric strength (s. insulation diagram)	Test voltage V r.m.s.	Verdict
Basic insulation _____ V r.m.s.		
Supplementary insulation _____ V r.m.s.		
Reinforced insulation _____ V r.m.s.		
NOTE - to be used for evaluation of components containing insulation through solid insulation, when the component standard require thermal cycling test. Ref Clause 14.1 and Figure 15, option b)		
Supplementary information:		

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

6.8	**TABLE: Dielectric strength tests**	**Form A.18**	**P**
4.4.4.1 b)	Conformity after application of SINGLE FAULT CONDITIONS[1]		P
6.4	Primary means of protection[2]		P
6.6	Connections to external circuits		N/A
6.7	Insulation requirements[2] (see Annex K)		P
6.10.2	Fitting of non-detachable MAINS supply cords[1]		P
9.2 a) 2)	Eliminating or reducing the sources of ignition within the equipment		P
9.4 c)	Limited-energy circuit		N/A
9.6.1	Overcurrent protection basic insulation between MAINS - parts		P
	Test site altitude .....:	2000m	—
	Test voltage correction factor (see table 10) .....:	1,00	—

Location or references from Forms A.1 and A.14	Clause or sub-clause	Humidity Yes/No	Working voltage [r.m.s./d.c.]	Test voltage [r.m.s./peak/d.c.]	Comments (NOTE)	Verdict
L and N	See above	No	208-415Vac	2210V r.m.s.	No insulation breakdown. No reduction of clearances and creepage distance.	P
L/N and enclosure	See above	Yes	208-415Vac	3510V r.m.s.	No insulation breakdown. No reduction of clearances and creepage distance.	P

[1] Record the fault, test or treatment applied before the dielectric strength test. [2] Humidity preconditioning required.
NOTE: Test duration may be recorded.

Supplementary information:

6.10.2	**TABLE: Cord anchorage**					**Form A.19**	**P**
Location	Mass [kg]	Pull [N]	Verdict	Torque [Nm]	Verdict	Comment	
Supply cord	<1.0	30	P	0.10	P	No damaged, no movement, Clearances and Creepage Distances no reduced, the cord passed the voltage test of 6.8.	

Dielectric strength test for 1 min. (6.8.3.1) ..... :	3510	V r.m.s.	P

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

7.	**TABLE: Protection against mechanical HAZARDS** **Form A.20**	**N/A**
7.3.4	Limitation of force and pressure	—
7.3.5	Gap limitations between moving parts No moving parts	—

Part / Location	Clause 7.3.4		Clause 7.3.5.1								Clause 7.3.5.2			Verdict	Comments
	Continuous	Temporary	Minimum gaps [mm]								Maximum gaps [mm]				
	Contact pressure max. 50 N /cm² @ max. 150 N	max. 250 N / 3 cm² @ max. 0,75 s	Torso 500	Head 300	Leg 180	Foot 120	Toes 50	Arm 120	Hand 100	Finger 25	Head 120	Foot 35	Finger 4		
Supplementary information:															

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

7.4	**TABLE: Stability**			**Form A.20A**	**N/A**
	Equipment height / mass ..... :	mm	kg		—
	Equipment (Containers) loaded ..... :	[yes / no]			—
	Castors at unfavourable position ..... :	[yes / no]			—
	Doors, drawers and movable arms closed ..... :	[yes / no]			—
	Doors and drawers at unfavourable position ..... :	[yes / no]			—

Location	Tilt angle	Applied force				Comments	Verdict
	10°	250 N	20% [N]	800 N	4 times load [N]		
Front side				—			
Left side				—			
Rear side				—			
Right side				—			
Top side	—						
Working surface	—	—	—				

Supplementary information:

7.6	**TABLE: Wall mounting**		**Form A.20B**	**P**
	Equipment weight ..... :	0.050 kg		—
	Equipment mounted as specified by manufacturer .. :	[yes / ~~no~~]		—
	Equipment mounted at plasterboard (drywall) ..... :	[~~yes~~ / no]		—
	More than one fastener used ..... :	[~~yes~~ / no]		—
	Test maintained (after 5 s to 10 s to full load) ..... :	1 min		—

Location	Applied weight		Comments	Verdict
	4 times weight [kg]	2 times weight [kg]		
Mounting brackets	0.20	--	No damage to the bracket or the mounting surface	P

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Enclosure rigidity test**		**Form A.21A**	**P**
8.2.1	Static test			P
	Material of enclosure ..... :	~~Metal /~~ non-metallic		—
	Preparation for the test:			—
	Operated at ambient temperature ..... :	70 °C	1 h	—
Location		Comments		Verdict
1) Complete machine		No damage		P
Supplementary information:				

8.2.2	**TABLE: Impact test**			P
	Material of enclosure ..... :	~~Metal /~~ non-metallic		—
	Corresponding IK-code ..... :	-		—
	Preparation for the test:	-		—
	Cooled to (temperature) ..... :	25 °C		—
Location		Comments		Verdict
1) Top		No damage		P
2) Side left / right		No damage		P
3) Bottom		No damage		P
Supplementary information:				

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

8.3	**TABLE: Drop test**		**Form A.21B**	**N/A**
8.3.1	Other equipment			N/A
Location	Raised up to [mm]	Raised up to 30 °	Comments	—
Supplementary information:				
8.3.2	Hand-held equipment and direct plug-in equipment			N/A
	Material of enclosure ..... :		Metal / non-metallic	—
	Preparation for the test:			—
	Cooled to (temperature)..... :		25 °C	—
Location			Comments	Verdict
1) Side				
2) Edge				
3) Corner				
Supplementary information:				

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

9	**TABLE: Protection against the spread of fire**		**Form A.22**	**P**
Item	Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)	Protection Method (9.1 a, b or c)	Protection details	Verdict
1	Power board	a	V-0	P
2	Component	a	V-0	P
3	Mutual inductor coil bobbin	a	V-0	P
Supplementary information:				

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.3.2	**TABLE: Constructional requirements** **Form A.23**	**P**
14.7	Printed wiring boards	P

Material tested .....:	PCB	—
Generic name .....:	See components table	—
Material manufacturer .....:	See components table	—
Type.....:	See components table	—
Colour .....:	See components table	—
Conditioning details .....:	25°C	—

		Sample					
		1	2	3	4	5	6
Thickness of specimen	mm	1.0	1.0	1.0	1.0	1.0	1.0
Duration of flaming after first Application	s	0	1	1	1	0	0
Duration of flaming plus glowing After second application	s	1	1	1	1	1	0
Specimen burns to holding clamp	Yes/No	No	No	No	No	No	No
Cotton ignited	Yes/No	No	No	No	No	No	No
Sample result	Pass/Fail	Pass	Pass	Pass	Pass	Pass	Pass
Supplementary information:							

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

9.4	TABLE: Limited-energy circuit				Form A.24	N/A
Item or Location (see Form A.22)	9.4 a)	9.4 b) Current limitation (NOTE)		9.4 c)	Decision	Comments
	Maximum potential in circuit voltage r.m.s./d.c. [V]	Maximum available current [A]	Overload protection after 120 s [A]	Circuit separation	Yes/No	
NOTE – Maximum values see Tables 17 and 18 of IEC 61010-1						
Supplementary information:						

9.5	TABLE: Requirements for equipment containing or using flammable liquids	Form A.25	N/A
Type of liquid	9.5 Flammable liquids		Verdict
	b) Quantity	c) Containment	
Supplementary information:			

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

10.	**TABLE: Temperature Measurements** **Form A.26A**	**P**
10.1	Surface temperature limits – normal condition and ~~/ or single fault condition~~	P
10.2	Temperature of windings – normal condition and / or single fault condition	N/A
10.3	Other temperature measurements	P

Operating conditions:	Normal working		
Frequency.....:	50 Hz	Test room ambient temperature (ta)...:	70 °C
Voltage .....:	456.5 V	Test duration.....:	1 h 43 min

Part / Location	t_m [°C]		t_c [°C]		t_{max} [°C]	Verdict	Comments
Input wire	--	70.7	--	70.7	200	P	--
E-capacitor (C28)	--	74.2	--	74.2	105	P	--
PCB near U5	--	78.1	--	78.1	130	P	--
PCB near U1	--	75.6	--	75.6	130	P	--
Plastic enclosure inside	--	71.9	--	71.9	Ref.	P	--
Plastic enclosure outside	--	70.8	--	70.8	85	P	--
Mutual inductor coil	--	72.3	--	72.3	110	P	--

NOTE 1 - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)
t_{max} = maximum permitted temperature
NOTE 2 - see also 14.1 with reference to component operating conditions
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary
NOTE 4 - see Form A.26B for details of winding temperature measurements

Supplementary information:

10.	**TABLE: Temperature Measurements** **Form A.26A**	**P**
10.1	~~Surface temperature limits – normal condition and /~~ or single fault condition	P
10.2	Temperature of windings – normal condition and / or single fault condition	N/A
10.3	Other temperature measurements	P

Operating conditions:	Abnormal working		
Frequency.....:	50 Hz	Test room ambient temperature (ta) .. :	70 °C
Voltage .....:	456.5 V	Test duration .....:	1 h 28 min

Part / Location	t_m [°C]	t_c [°C]	t_{max} [°C]	Verdict	Comments
Plastic enclosure outside	72.0	72.0	105	P	--

NOTE 1 - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or max. RATED ambient)
t_{max} = maximum permitted temperature
NOTE 2 - see also 14.1 with reference to component operating conditions
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary
NOTE 4 - see Form A.26B for details of winding temperature measurements

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

10.2	**TABLE: Temperature of windings** **Form A.26B** **Resistance method Temperature Measurements**	**N/A**
4.4.2.7	MAINS transformers	
14.2.1	Motor temperatures	

Operating conditions.. :			
Frequency..... :	Hz	Test room ambient temperature (ta1/ta2). :	/ °C (initial / final)
Voltage ..... :	V	Test duration..... :	h min

Part / Designation	Rcold [Ω]	Rwarm [Ω]	Current [A]	t_r [K]	t_c [°C]	t_{max} [°C]	Verdict	Comments

NOTE 1- R_{cold} = initial resistance R_{warm} = final resistance
t_r = temperature rise t_c = t_r corrected (t_c= t_r + [40 °C or max RATED ambient])
t_{max} = maximum permitted temperature
NOTE 2 - Indicate insulation class (IEC 60085) under comments (optional)
NOTE 3 - Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary

Supplementary information:

EN 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.5.2	**TABLE: Resistance to heat of non-metallic enclosures**	**Form A.27**	**P**
	Test method used:		—
	Non-operative treatment ..... :	[✓]	P
	Empty enclosure ..... :	[✓]	P
	Operative treatment ..... :	[✓]	P
	Temperature during tests ..... :	25	—

Description	Material	Comments	Verdict
Enclosure	Plastic	No HAZARDOUS LIVE PARTS can be ACCESSIBLE, the equipment passed the tests of 8.1 and 8.2	P

Dielectric strength test (6.8) ..... :	3510	V	[r.m.s./peak/d.c.]	P

NOTE – Within 10 minutes of the end of treatment suitable tests in acc. to 8.2 and 8.3 must be conducted and pass criteria of 8.1.

Supplementary information:

EN 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

10.5.3	**TABLE: Insulating material**	**Form A.28**	**P**
10.5.3 1)	Ball-pressure test		P
	Max. allowed impression diameter ..... :	2 mm	—

Part	Test temperature [°C]	Impression diameter [mm]	Verdict
PCB	125	<1.0	P
Enclosure	75	<1.0	P

Supplementary information:

10.5.3 2)	**Vicat softening test (ISO 306)**	**Form A.29**	**N/A**

Part	Vicat softening temperature [°C]	Thickness of sample [mm]	Verdict

Supplementary information:

EN 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

8	**TABLE: Mechanical resistance to shock and impact** **Form A.30**	**P**
11	**Protection against HAZARDS from fluids and solid foreign objects**	**N/A**

Voltage tests can be carried out once after performing the tests of clause **8** and clause **11**. However, if voltage tests are carried out separately after each set of tests, two forms can be used.

Location (see Form A.14)	Clause 8 tests				Clause 11 tests				Working voltage [r.m.s./d.c.]	Test voltage [r.m.s./peak/d.c.]	Verdict	Comments
	Static (8.2.1) 30 N	Impact (8.2.2)	Normal (8.3.1)	Handheld Plug-in (8.3.2)	Cleaning (11.2)	Spillage (11.3)	Overflow (11.4)	IEC 60529 (11.6)				
Enclosure	30N	5J	100mm	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No damage	P

NOTE – Use r.m.s., d.c. or peak to indicate the used test voltage.

Supplementary information:

EN 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

11.7.2	TABLE: Leakage and rupture at high pressure	Form A.31	N/A

Part	Maximum permissible working pressure [MPa]	Test pressure [MPa]	Leakage Yes / No	Deformation Yes / No	Burst Yes / No	Comments

NOTE – see also Annex G with requirements for USA and Canada.

Supplementary information:

11.7.3	TABLE: Leakage from low-pressure parts	Form A.32	N/A

Part	Test pressure [MPa]	Leakage Yes / No	Comments

Supplementary information:

EN 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

12.2.1	**TABLE: Ionizing radiation**	**Form A.33**	**N/A**
12.2.1.2	Equipment intended to emit radiation		

Locations tested	Measured values [μSv/h]	Verdict	Comments

Supplementary information:

12.2.1.3	**Equipment not intended to emit radiation**	**Form A.34**	**N/A**
	Max. allowed effective dose rate at 100 mm……:	1 μSv/h	—

Locations tested	Measured values [μSv/h]	Verdict	Comments

Supplementary information:

EN 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

12.5.1	TABLE: Sound level	Form A.35	N/A

Locations tested	Measured maximum sound pressure level dB(A)	Calculated maximum sound power level
At operator's normal position and at bystanders' positions		
a)		
b)		
c)		
d)		
e)		
f)		

Supplementary information:

12.5.2	TABLE: Ultrasonic pressure	Form A.36	N/A

Locations tested	Measured values		Comments
	[dB]	[kHz]	
At operator's normal position			
At 1 m from the ENCLOSURE			
a)			
b)			
c)			
d)			
e)			

NOTE – No limit is specified at present, but a limit of 110 dB above the reference pressure value of 20 μPa is under consideration for applicable frequencies between 20 kHz and 100 kHz.

Supplementary information:

EN 61010-1			
Clause	Requirement — Test	Result — Remark	Verdict

13.2.2	**TABLE: Batteries and battery charging**	**Form A.37**	**N/A**
	Battery load and charging circuit diagram:		
	Battery type..... :		—
	Battery manufacturer/model/catalogue No. ..... :		—
	Battery ratings..... :		—
	Reverse polarity instalment test		N/A

Single component failures	Verdict	
Component	Open circuit	Short circuit
Supplementary information:		

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

14.3	TABLE: Overtemperature protection devices	Form A.38	N/A

Reliability test

Component	Type (NOTE)	Verdict	Comments

NOTE:
NSR = non-self-resetting (10 times)
NR = non-resetting (1 time)
SR = self-resetting (200 times)

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.4.2.7	**TABLE: MAINS transformer**			**Form A.39**	**N/A**
4.4.2.7.2	Short circuit				
14.6	MAINS transformers tested outside equipment				
Type..... :					—
Manufacturer ..... :					—
Test in equipment					
Test on bench					
Test repeated inside equipment (see 14.6)					
Optional – Insulation class (IEC 60085) of the lowest rated winding .....:					—
Winding identification					
Type of Protector for winding (NOTE 1)					
Elapsed time					
Current, A primary					
secondary					
Winding temperature, °C primary					
(see NOTE 2) secondary					
Tissue paper / cheesecloth OK ? (Pass / Fail)					
Voltage tests (see NOTE 3)					
Primary to secondary	_____ V ____				
Primary to core	_____ V ____				
Secondary to secondary	_____ V ____				
Secondary to core	_____ V ____				
Verdict					

NOTE 1: Primary fuse - PF / ( ) A
Secondary fuse - SF / ( ) A
Overtemperature protection - OP / ( ) °C
Impedance protection - Z

NOTE 2: Indicate method of measurement - TC = with thermocouple
- R = resistance method
If resistance method is used, record resistance in cold and warm condition in Form A.26B.

NOTE 3: Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

4.4.2.7	**TABLE: MAINS transformer**				**Form A.40**	**N/A**
4.4.2.7.3	Overload tests (for MAINS transformers)					
14.6	MAINS transformers tested outside equipment					
Type .....:						—
Manufacturer .....:						—
Test in equipment						
Test on bench						
Test repeated inside equipment (see 14.6)						
Optional – Insulation class (IEC 60085) of the lowest rated winding .....:						—
Winding identification						
Type of Protector for winding (NOTE 1)						
Elapsed time						
Current, A primary						
secondary						
Winding temperature, °C primary						
(see NOTE 2) secondary						
Tissue paper / cheesecloth OK ? (Pass / Fail)						
Voltage tests (see NOTE 3)						
Primary to secondary	_____ V ____					
Primary to core	_____ V ____					
Secondary to secondary	_____ V ____					
Secondary to core	_____ V ____					
Verdict						

NOTE 1: Primary fuse - PF / ( ) A
Secondary fuse - SF / ( ) A
Overtemperature protection - OP / ( ) °C
Impedance protection - Z

NOTE 2: Indicate method of measurement TC = with thermocouple
R = resistance method
If resistance method is used, record resistance in cold and warm condition in Form A.26B.

NOTE 3: Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use NB = no breakdown or B = breakdown

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

14.8	**TABLE: Circuits used to limit TRANSIENT OVERVOLTAGES**	**Form A.41**	**N/A**

Circuit / Designation	Overvoltage Category	MAINS voltage [V r.m.s.]	Test voltage [V]	t_m [°C]	t_c [°C]	t_{max} [°C]	Ignited Yes / No	Safely suppressed Yes / No	Properly functional Yes / No	Verdict	Comments

Test room ambient temperature:		°C

NOTE - t_m = measured temperature
t_c = t_m corrected (t_m–t_a+ **40 °C** or
t_{max} = maximum permitted

Conformity is checked by applying 5 positive and 5 negative impulses with the applicable impulse withstand voltage, spaced up to 1 min apart, from a hybrid impulse generator (see IEC 61180-1).

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

Annex H	**TABLE: Qualification of conformal coating for protection against pollution**	**Form A.42**	**N/A**
Technical properties			
Manufacturer:			—
Type:			—
Meet requirements of ANSI / UL 746E:	[yes / no]		
Manufacturer declaration of coating material:	[yes / no]		
Operating temperature of coating:	[ ] °C		
Comparative tracking index (CTI):	[ ]		
Insulation resistance:	[ ] MΩ		
Dielectric strength:	[ ] V		
UV resistance (if required):	[yes / no]		
Flammability rating:			
Preparation of the test specimens conducted:	[yes / no]		

Item	Test conditioning	Parameter	Td h	Samples						Verdict	Comments
				1	2	3	4	5	6		
1	Cold		24								
2	Dry heat		48								
3	Rapid temp. change										
4	Damp heat		24								
5	Adhesion of coating	5 N									
	Visual inspection										
6	Humidity		48								
7	Insulation resistance	≥ 100 MΩ									
	Visual inspection										

NOTE Td = Test duration time

Supplementary information:

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Additional or special tests conducted	Form A.43	N/A
Clause and name of test	Test type and condition	Observed results	—
Supplementary information:			

EN 61010-1			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 1.A: List of components and circuits relied on for safety — **P**

Unique component reference or location	Manufacturer / trademark (NOTE 1)	Type / model	Technical data (NOTE 2)	Standard	Mark(s) of conformity evidence of acceptance (NOTE 3 and 4)
PCB	Jiangsu Bomin Electronic Co Ltd	BM8	V-0, 130°C	UL 94 UL 796	UL E469716
PCB	Guangde Oukeda Electronic Co Ltd	HD-M, HD-2	V-0, 130°C	UL 94 UL 796	UL E311152
Inductor	Shenzhen Sunlord Electronics Co., Ltd.	SWPA	Class B	IEC 61010-1	Tested with appliance
- Magnet wire	Dong Guan Yida Industrial Co., Ltd.	2UEW	130°C	UL 1446	UL E344055
- Insulation tape	Jingjiang Yahua Pressure Sensitive Glue Co., Ltd.	PZ, CT	130°C	UL 510	UL E165111
Input wire	Huizhou Tongxing Wire and Cable Co Ltd	3239	200°C, 3KVDC, 24AWG, VW-1	UL 758	UL E514976
-Alt	DONGGUAN DANYANG ELECTRONIC WIRE CO LTD	3239	24AWG, 200°C, 6KVDC, VW-1	UL 758	UL E332522
Internal wire	DONGGUAN DANYANG ELECTRONIC WIRE CO LTD	1007	24AWG, 80°C, 300Vac, VW-1	UL 758	UL E332522
Plastic enclosure	Shanghai Matis Electric Co.Ltd	PA6	Min. 1,0mm	IEC 61010-1	Tested with appliance
Mylar film	SICHUAN DONGFANG INSULATING MATERIAL CO LTD	DFR700	V-0, 80°C Min. 0.4mm	UL 94 UL 746	UL E199019

NOTE → 1 List all different manufacturers of the above components
→ 2 May include electrical, mechanical values
→ 3 List licence no or method of acceptance
→ 4 asterisk indicates mark assuring agreed level of surveillance

IEC61010_1O ATTACHMENT			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT

IEC 61010-1

EUROPEAN GROUP DIFFERENCES AND NATIONAL DIFFERENCES

(ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE; PART1: GENERAL REQUIREMENTS)

Differences according to ..... : EN 61010-1:2010/A1

Attachment Form No. ..... : EU_GD_IEC61010_1O

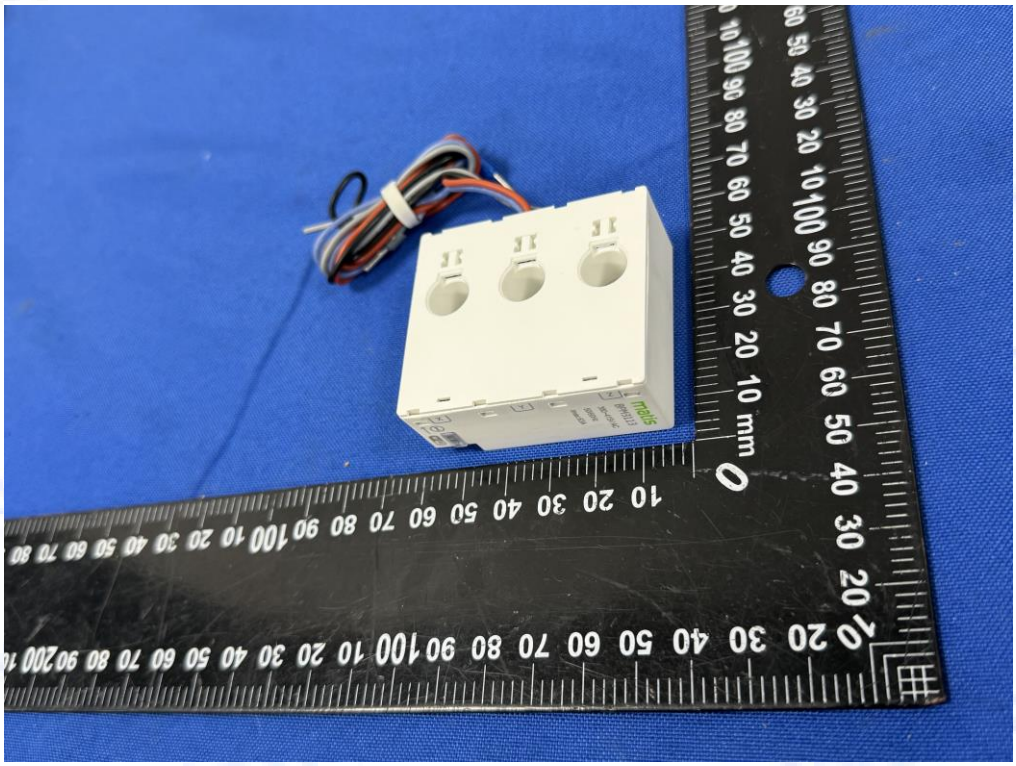
Attachment Originator..... : TÜV Rheinland LGA Products GmbH

Master Attachment..... : Date 2020-04-22

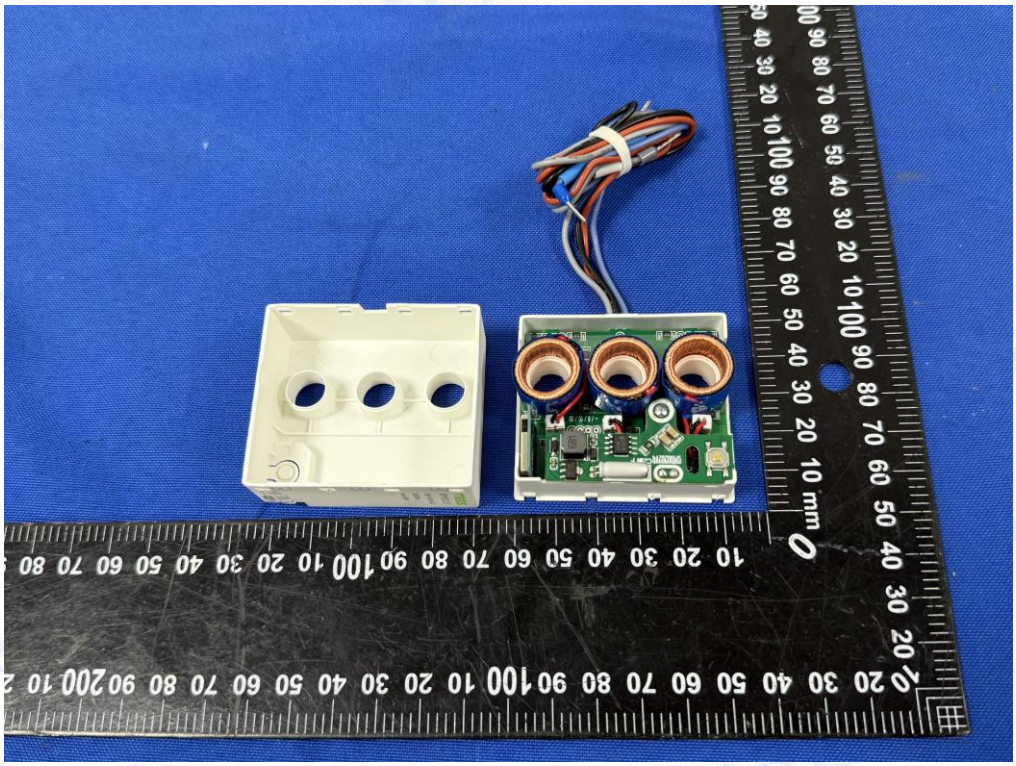
	CENELEC COMMON MODIFICATIONS (EN)		P
	Procedure for voltage tests		P
6.8.3.1	**The a.c. voltage test** *Replace the first sentence by the following sentence:* The voltage tester shall be capable of maintaining the test voltage throughout the test within +/- 5 % of the specified value.	208-415V	P
Annex ZA (normative)	The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.		P
Annex ZZ (informative)	Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered		P

Photo:

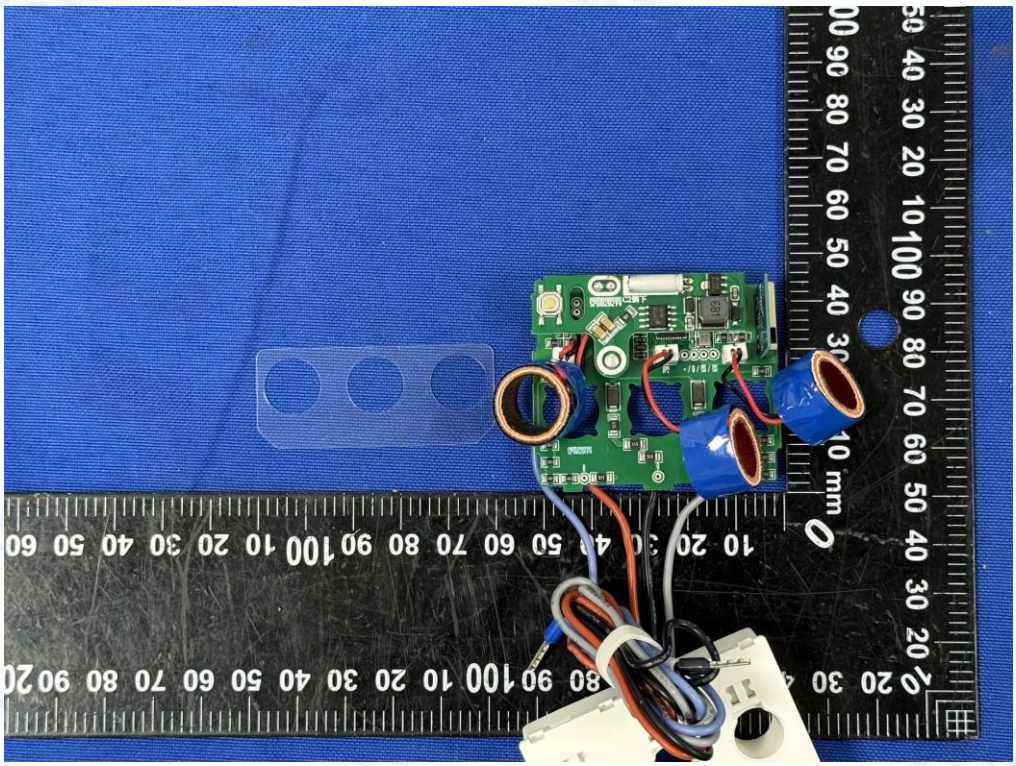
Overall view



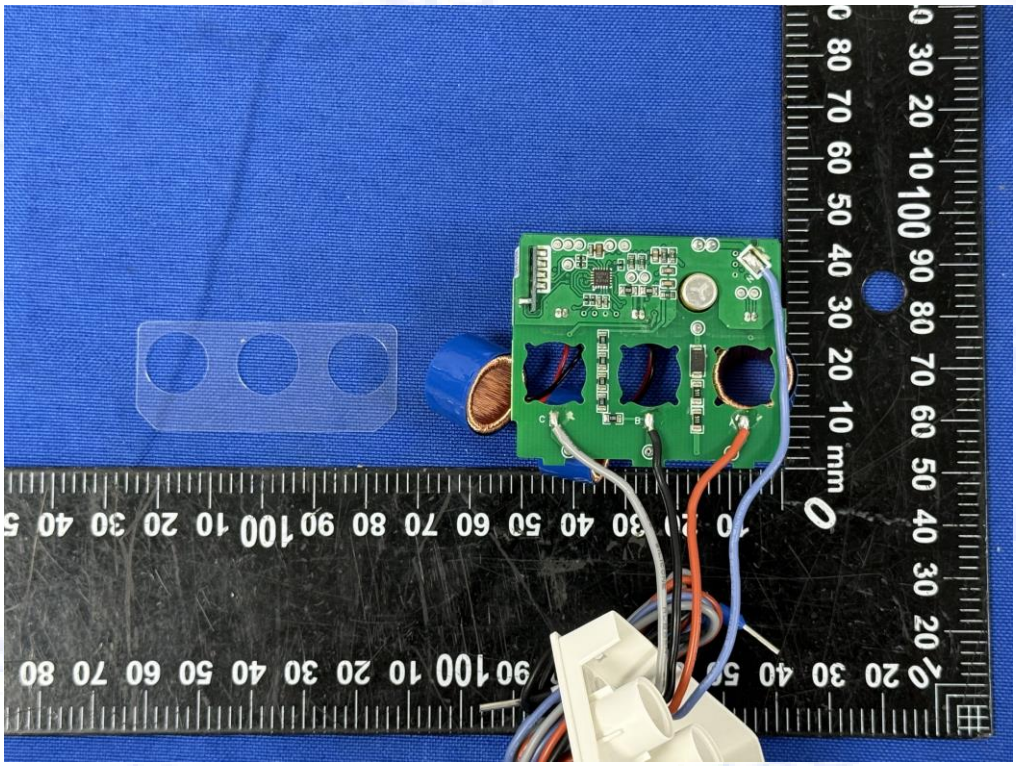
Overall view



Internal view



PCB view



PCB view

-----End of Report-----