



EMC Test Report

Report No.: ET-23121414E

Applicant's name: Guangzhou FriendlyELEC Technology Co., Ltd.

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Manufacture's Name: Guangzhou FriendlyELEC Technology Co., Ltd.

Address: Room 1106, 11F, East Tower, Top Plaza, No.22, Xingmin Road, Zhujiang New Town, Tianhe District, Guangzhou, China, 510000

Product name: Digital Media Player

model(s): FC5-C1, R5C

Trademark: N/A

Standards: EN 55032:2015/A11:2020, EN 55035:2017/A11:2020
EN IEC 61000-3-2:2019/A1:2021, EN 61000-3-3:2013/A2:2021

Date of testing: Oct.24, 2023- Oct.27, 2023

Date of issue: Dec.06, 2023

Test Result: PASS *

Remark:

* In the configuration tested, the EUT complied with the standards specified above.

1.The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full without prior written permission of the company.
The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2. On the basis of the report number "ET-23101199E-1", this report adds the series model and the description of the difference between series models, and the rest remains unchanged, which does not affect the electromagnetic compatibility of the products, so there is no need to re-test, just citing the data of the original report number "ET-23101199E-1".

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Dec.06, 2023

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Dec.06, 2023

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Dec.06, 2023



Report Revision History

	Description	Issue Date
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1 Summary of Test Result

No.	Test Standard	Description of Test	Result	Test by
Emission				
1	EN 55032:2015/A11:2020	Conducted emission of AC power ports	Pass	Qiao Li
2		Conducted emission of asymmetric mode	Pass	Qiao Li
3		Radiated emission	Pass	Qiao Li
4	EN IEC 61000-3-2:2019/A1:2021	Harmonic current emission	N/A	/
5	EN 61000-3-3:2013/A2:2021	Voltage fluctuations & flicker	N/A	/
Immunity				
1	EN 55035:2017/A11:2020	Electrostatic discharges (ESD)	Pass	Qiao Li
2		Radiated electromagnetic field disturbances (RS)	Pass*	Kyle zhou
3		Conducted disturbances (CS)	N/A	/
4		Power frequency magnetic field	N/A	/
5		Electrical fast transients/burst (EFT/S)	N/A	/
6		Surges	N/A	/
7		Voltage dips and interruptions	N/A	/
8		Broadband Impulse noise disturbances repetitive	N/A	/
9		Broadband Impulse noise disturbances isolated	N/A	/
N/A: Mean not applicable. Pass*: Test by Shenzhen TCT Testing Technology Co., Ltd.				

2 General Description

2.1 Description of EUT

Product name:	Digital Media Player
Test Model name:	FC5-C1
Series Model:	R5C
Different of series model:	Different sales areas, different models.
EUT Power Rating:	AC 100-240V 50/60Hz
Power supply of test:	AC 230V 50Hz
Adapter specification	N/A
Battery:	N/A
EUT Highest Frequency	Above 108MHz
Classification of equipment	Class B

2.2 Test mode

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.

Test Mode	Description
For Conducted Test (AC ports)	
Mode 1	System full load(WIFI+TF+HDMI)
For Conducted Test (asymmetric mode)	
Mode 1	RJ45 Link 10%
For Radiated Test	
Mode 1	System full load(WIFI+TF+HDMI)
For EMS Test	
Mode 1	System full load(WIFI+TF+HDMI)

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 Test conditions

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

2.4 Ancillary equipment

Equipment	Model	S/N	Manufacturer
Monitor	SE2416HC	/	DELL
Mouse + Keyboard	/	/	/
Adapter	HW-090200CHO	/	HUAWEI

3 Test Facilities and Accreditations

3.1 Test laboratory

Test laboratory:	Shenzhen ETR Standard Technology Co., Ltd.
Laboratory location:	No.103, No.10, Phase I, Zone 3, Xinxing Industrial Park, Xinhe, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.:	L11864
Telephone:	+86 755 85259392

FOR RS&CS test site:

Test laboratory:	Shenzhen TCT Testing Technology Co., Ltd.
Laboratory location:	2101&2201,Zhanchang Factory, Renshan Industrial Zone, Fuhai subdistrict, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.:	L6165

3.2 Environmental conditions

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

EUT:	15°C~35°C
Humidity	20%~75% (30%~60% for ESD)
Atmospheric pressure	98kPa~101kPa

3.3 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, $U=2xUc(y)$

Conducted emission of AC power port	± 3.02dB
Conducted emission of asymmetric mode	± 3.52dB
Radiated emission(30MHz~1GHz)	± 4.30 dB
Radiated emission (1GHz-18GHz)	± 4.35 dB
Temperature	±1 degree
Humidity	± 5 %

3.4 Test software

Software name	Manufacturer	Model	Version
Conducted	Farad	EZ-EMC	Ver.EMC-CON 3A1.1
Radiated	Farad	EZ-EMC	Ver.FA-03A2 RE
HTEC Harmonics & flicker test	HTEC	Harmonics & flicker	V1.5
EFT test	EMTEST	IEC .CONTROL	V6.02a01
Surge test	EMTEST	IEC .CONTROL	V6.02a01
Dips test	EMTEST	IEC .CONTROL	V6.02a01

4 List of test equipment

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESC17	100605	2023.3.02	2024.3.01
2	EMI Test Receiver	Rohde&schwarz	ESC13	102696	2023.3.02	2024.3.01
3	Loop Antenna	schwarabeck	FMZB 1519 B	FMZB 1519 B	2022.3.11	2024.3.10
4	Broadband antenna	schwarabeck	VULB9168	1064	2022.3.11	2024.3.10
5	Horn antenna	schwarabeck	BBHA9120D	2288	2022.3.11	2024.3.10
6	amplifier	EMtrace	RP01A	50117	2023.3.02	2024.3.01
7	Artificial power network	schwarabeck	NSLK8127	8127483	2023.3.02	2024.3.01
8	Artificial power network	ETS	3186/2NM	1132	2023.3.02	2024.3.01
9	10dB attenuator	HUBER+SUHNER	10dB	/	2023.3.02	2024.3.01
10	amplifier	Space-Dtronics	EWLAN0118 G-P40	19113001	2023.3.02	2024.3.01
11	Spectrum analyzer	KEYSIGHT	N9020A	MY55370280	2023.3.02	2024.3.01
12	Harmonic analysis and Voltage flicker tester	Laplace Instruments LTD	AC 2000A	311345	2023.3.06	2024.3.05
13	AC power source	MToni	HPF5010	632624	2023.3.02	2024.3.01
14	ESD Simulator	Noiseken	ESS-2002E X	ESS1070472	2023.3.03	2024.3.02
15	AC SOURCE	EMTEST	MV2616	V0523100467	2023.3.02	2024.3.01
16	Combined immunity simulator	EMTEST	UCS500-M	V0523100465	2023.3.02	2024.3.01
17	Impedance stabilized network	schwarabeck	NTFM 8158	#214	2023.3.02	2024.3.01

Note: the calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to international system unit (SI).



For RF Field Strength Susceptibility test equipment:

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Due
1.	Signal Generator	Agilent	N5182A	MY47070282	2024.06.25
2.	Power Sensor	Agilent	U2001A	MY53410013	2024.03.03
3.	Power Sensor	Agilent	U2001A	MZ254330012	2024.03.03
4.	Amplifier	SKET	HAP_80M01G-250W	/	2024.06.25
5.	Amplifier	SKET	HAP_01G03G-75W	202104180	2024.06.25
6.	Amplifier	SKET	HAP_03G06G-80W	202004044	2024.06.25
7.	Antenna	SKET	STLP9129-Plus	/	N/A
8.	Field probe	Narda	EP-601	611WX80256	2024.06.25

For Injected currents susceptibility test equipment:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1.	Conducted Immunity Test System	Schloder	CDG-6000-75	126B1290/2014	2024.06.25
2.	RF Attenuator	PE	75W 6dB	N/A	2024.06.25
3.	CDN	Schloder	CDN M2+M3-16	A2210281/2014	2024.06.25
4.	EM-Clamp	Schloder	EMCL-20	132A1194/2014	2024.06.25

Note: The calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to international system unit (SI).

5 Emission test

5.1 Conducted emission

5.1.1 Limits

Conducted Emissions were measured from 150KHz to 30MHz with a bandwidth of 9KHz and return leads of the EUT according to the methods defined in standard EN 55032.

Table A.9 – 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.8)	Detector type / bandwidth	Class A limits dB(μV)
A9.1	0,15 to 0,5	AMN	Quasi Peak / 9 kHz	79
	0,5 to 30			73
A9.2	0,15 to 0,5	AMN	Average / 9 kHz	66
	0,5 to 30			60
Apply A9.1 and A9.2 across the entire frequency range.				

Table A.10 – 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.8)	Detector type / bandwidth	Class B limits dB(μV)
A10.1	0,15 to 0,5	AMN	Quasi Peak / 9 kHz	66 to 56
	0,5 to 5			56
	5 to 30			60
A10.2	0,15 to 0,5	AMN	Average / 9 kHz	56 to 46
	0,5 to 5			46
	5 to 30			50
Apply A10.1 and A10.2 across the entire frequency range.				

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

Applicable to					
1. wired network ports (3.1.32) 2. optical fibre ports (3.1.25) with metallic shield or tension members 3. antenna ports (3.1.3)					
Table clause	Frequency range MHz	Coupling device (see Table A.8)	Detector type / bandwidth	Class A voltage limits dB(μV)	Class A current limits dB(μA)
A11.1	0,15 to 0,5	AAN	Quasi Peak / 9 kHz	97 to 87	n/a
	0,5 to 30			87	
	0,15 to 0,5	AAN	Average / 9 kHz	84 to 74	
	0,5 to 30			74	
A11.2	0,15 to 0,5	CVP and current probe	Quasi Peak / 9 kHz	97 to 87	53 to 43
	0,5 to 30			87	43
	0,15 to 0,5	CVP and current probe	Average / 9 kHz	84 to 74	40 to 30
	0,5 to 30			74	30
A11.3	0,15 to 0,5	Current Probe	Quasi Peak / 9 kHz	n/a	53 to 43
	0,5 to 30				43
	0,15 to 0,5	Current Probe	Average / 9 kHz		40 to 30
	0,5 to 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.9. The measurement 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 asymmetric mode conducted emissions from Class B equipment

Applicable to					
1. wired network ports (3.1.32) 2. optical fibre ports (3.1.25) with metallic shield or tension members 3. broadcast receiver tuner ports (3.1.8) 4. antenna ports (3.1.3)					
Table clause	Frequency range MHz	Coupling device (see Table A.8)	Detector type / bandwidth	Class B voltage limits dB(μV)	Class B current limits dB(μA)
A12.1	0,15 to 0,5	AAN	Quasi Peak / 9 kHz	84 to 74	n/a
	0,5 to 30			74	
	0,15 to 0,5	AAN	Average / 9 kHz	74 to 64	
	0,5 to 30			64	
A12.2	0,15 to 0,5	CVP and current probe	Quasi Peak / 9 kHz	84 to 74	40 to 30
	0,5 to 30			74	30
	0,15 to 0,5	CVP and current probe	Average / 9 kHz	74 to 64	30 to 20
	0,5 to 30			64	20
A12.3	0,15 to 0,5	Current Probe	Quasi Peak / 9 kHz	n/a	40 to 30
	0,5 to 30				30
	0,15 to 0,5	Current Probe	Average / 9 kHz		30 to 20
	0,5 to 30				20
The choice of coupling device and measurement procedure is defined in Annex C. Screened ports including TV broadcast receiver tuner ports are measured with a common-mode impedance of 150 Ω. This is typically accomplished with the screen terminated by 150 Ω to earth. AC mains ports that also have the function of a wired network port shall meet the limits given in Table A.10. The measurement 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. Measurement 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.					

5.1.2 Test Procedures

For table-top equipment

5.1.2.1 The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through an artificial mains networks (AMN). All other support equipment powered from additional AMN. The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the centre forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

5.1.2.2 The EUT was put on a wooden table which was 0.8 m high above the ground and connected to the PC through the Artificial Mains Network (ISN). Where the signal cable supplied by the manufacture was longer than 1 m, the excess was folded back and forth parallel to the cable at the center so as to form a bundle no longer than 0.4 m.

For floor standing equipment

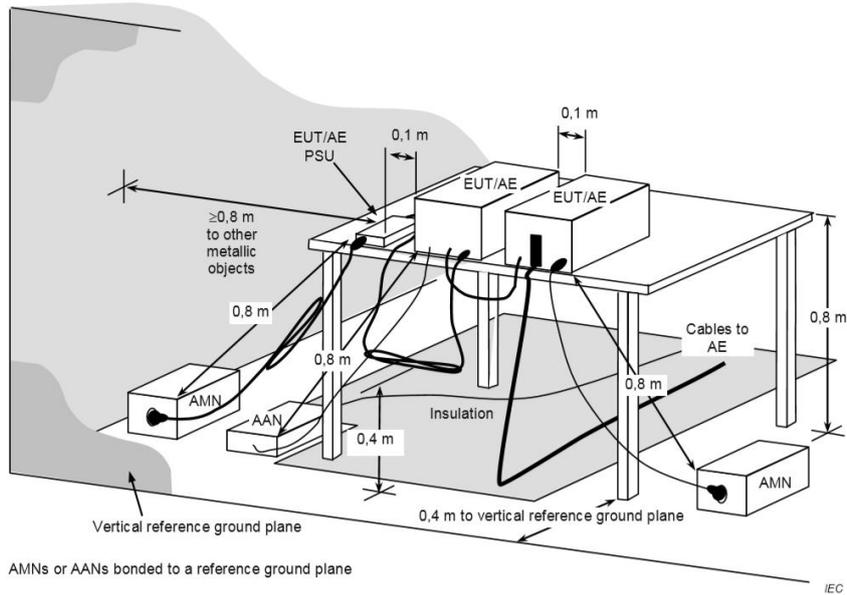
5.1.2.3 The EUT placed on the horizontal ground reference plane, orientated for normal use, but separated from metallic contact with the ground reference plane by up to 15 cm of insulation. EUT being connected to the power mains through an artificial mains networks (AMN). All other support equipment powered from additional AMN. The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

The cables shall be insulated (by up to 15 cm) from the horizontal ground reference plane. If the equipment requires a dedicated ground connection, then this shall be provided and bonded to the horizontal ground plane.

Intra-unit cables (between units forming the EUT or between the EUT and an associated equipment) shall drape to, but remain insulated from, the horizontal ground reference plane. Any excess shall either be folded at the cable center into a bundle no longer than 0,4 m or arranged in a serpentine fashion.

5.1.2.4 The EUT was put on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by up to 15 cm of insulation, EUT connected to the PC through the Artificial Mains Network (ISN). Where the signal cable supplied by the manufacture was longer than 1 m, the excess was folded back and forth parallel to the cable at the center so as to form a bundle no longer than 0.4 m.

5.1.3 Test setup



The 0,8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be $\geq 0,8$ m.

Figure D.2 – Example measurement arrangement for table-top EUT

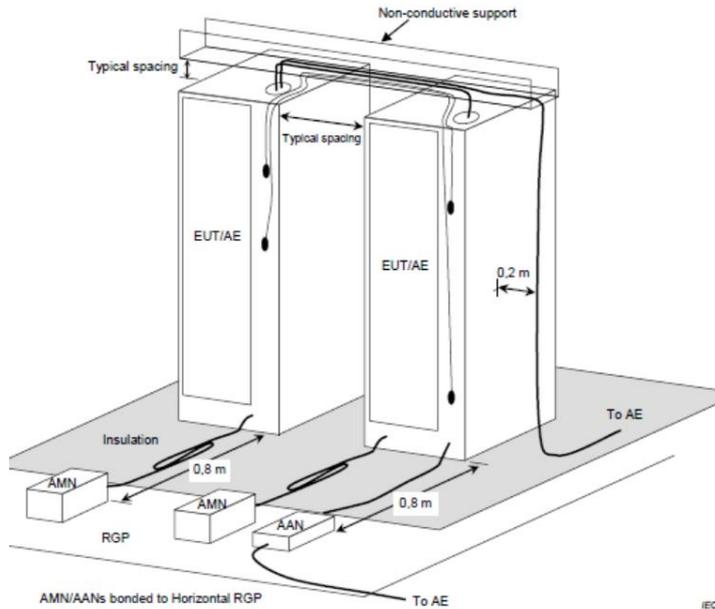
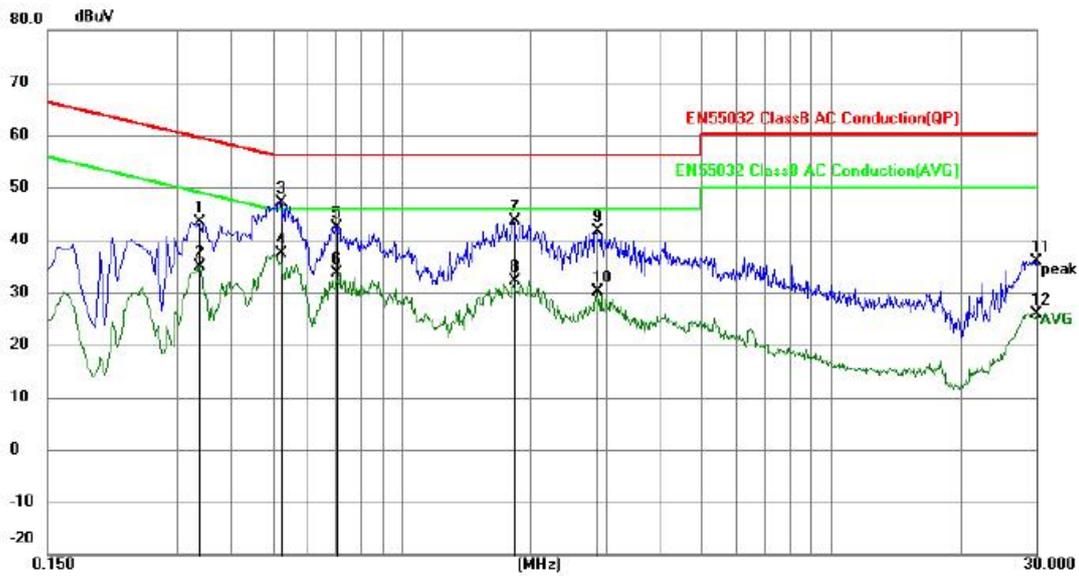


Figure D.6 – Example measurement arrangement for floor standing EUT (conducted emission measurement)

5.1.4 Test Result

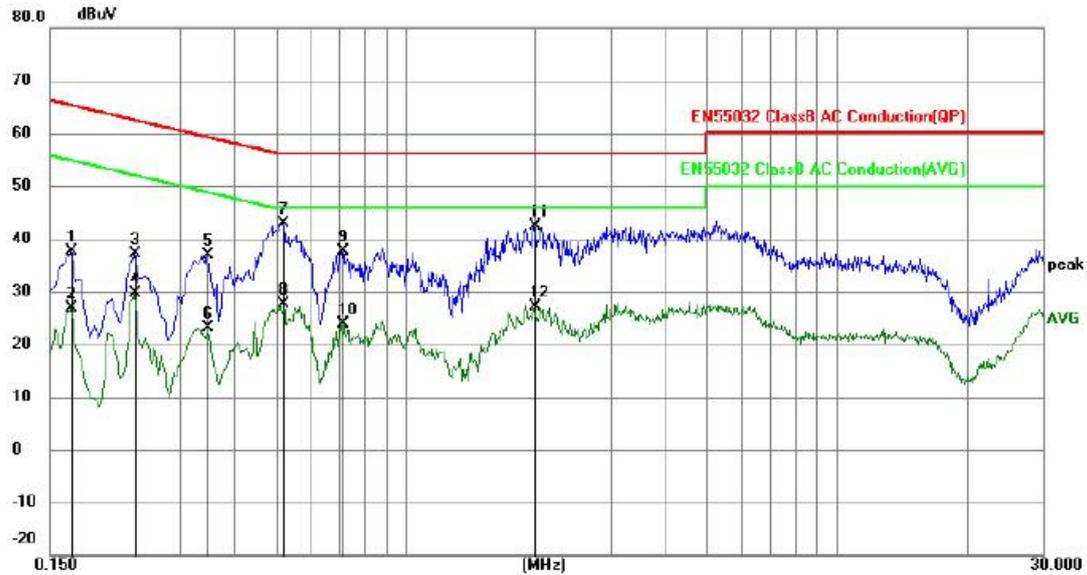
Level = Reading + Factor, Margin = Level- Limit

Test mode:	Mode 1		
Temperature:	25°C	Humidity:	46%RH
Pressure:	101kPa	Test voltage:	AC 230V 50Hz
Phase:	L	Test Result	PASS



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3390	33.41	9.88	43.29	59.23	-15.94	QP
2	0.3390	24.98	9.88	34.86	49.23	-14.37	AVG
3	0.5235	37.31	9.94	47.25	56.00	-8.75	QP
4	0.5235	27.50	9.94	37.44	46.00	-8.56	AVG
5	0.7080	32.41	9.94	42.35	56.00	-13.65	QP
6	0.7080	23.62	9.94	33.56	46.00	-12.44	AVG
7	1.8195	33.78	9.88	43.66	56.00	-12.34	QP
8	1.8195	22.19	9.88	32.07	46.00	-13.93	AVG
9	2.8410	31.89	9.85	41.74	56.00	-14.26	QP
10	2.8410	20.18	9.85	30.03	46.00	-15.97	AVG
11	29.9490	26.46	9.49	35.95	60.00	-24.05	QP
12	29.9490	16.45	9.49	25.94	50.00	-24.06	AVG

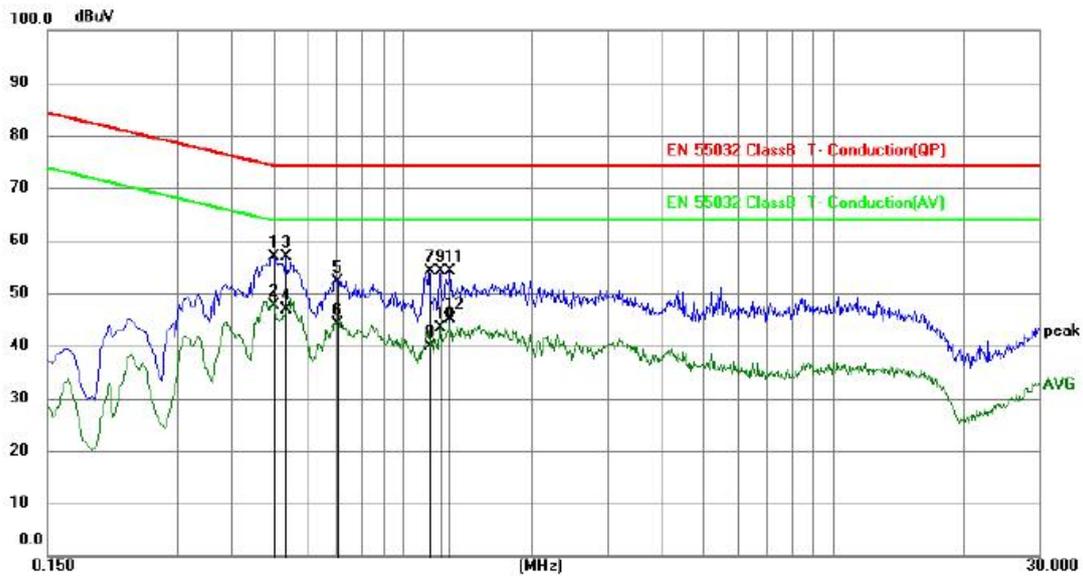
Test mode:	Mode 1		
Temperature:	25°C	Humidity:	46%RH
Pressure:	101kPa	Test voltage:	AC 230V 50Hz
Phase:	N	Test Result	PASS



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1680	27.83	9.81	37.64	65.06	-27.42	QP
2	0.1680	17.00	9.81	26.81	55.06	-28.25	AVG
3	0.2355	27.28	9.82	37.10	62.25	-25.15	QP
4	0.2355	19.77	9.82	29.59	52.25	-22.66	AVG
5	0.3480	27.05	9.88	36.93	59.01	-22.08	QP
6	0.3480	13.14	9.88	23.02	49.01	-25.99	AVG
7	0.5190	33.04	9.94	42.98	56.00	-13.02	QP
8	0.5190	17.69	9.94	27.63	46.00	-18.37	AVG
9	0.7125	27.75	9.94	37.69	56.00	-18.31	QP
10	0.7125	14.03	9.94	23.97	46.00	-22.03	AVG
11	1.9815	32.44	9.85	42.29	56.00	-13.71	QP
12	1.9815	17.40	9.85	27.25	46.00	-18.75	AVG

Conducted Test (RJ45 Port)

Test mode:	Mode 1		
Temperature:	25°C	Humidity:	46%RH
Pressure:	101kPa	Test voltage:	AC 230V 50Hz
Phase:	100Mbqs 10%	Test Result	PASS



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.5010	37.09	19.74	56.83	74.00	-17.17	QP
2	0.5010	27.80	19.74	47.54	64.00	-16.46	AVG
3	0.5369	37.18	19.74	56.92	74.00	-17.08	QP
4	0.5369	27.09	19.74	46.83	64.00	-17.17	AVG
5	0.7084	32.47	19.74	52.21	74.00	-21.79	QP
6	0.7084	24.48	19.74	44.22	64.00	-19.78	AVG
7	1.1579	34.42	19.74	54.16	74.00	-19.84	QP
8	1.1579	20.16	19.74	39.90	64.00	-24.10	AVG
9	1.2254	34.31	19.74	54.05	74.00	-19.95	QP
10	1.2254	23.63	19.74	43.37	64.00	-20.63	AVG
11	1.2884	34.40	19.72	54.12	74.00	-19.88	QP
12	1.2884	25.38	19.72	45.10	64.00	-18.90	AVG

5.2 Radiated emission

5.2.1 Limits

The EUT shall meet the limits of below Table when measured at the measuring distance R in accordance with the methods described in standard EN 55032.

Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz $< F_x \leq 500$ MHz	2 GHz
500 MHz $< F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz

NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.

NOTE 2 F_x is defined in 3.1.19.

Where the F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

Requirements for radiated emissions at frequencies above 1 GHz for Class A equipment

Table clause	Frequency range MHz	Measurement		Class A limits dB(μ V/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

NOTE 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.

Requirements for radiated emissions at frequencies up to 1 GHz for Class A equipment

Table clause	Frequency range MHz	Measurement		Class A limits dB(μ V/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

NOTE Apply only A2.1 or A2.2 across the entire frequency range.

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	

NOTE Apply only table clause A4.1 or A4.2 across the entire frequency range.

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	

NOTE 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.

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		Quasi peak/ 120 kHz	60	52
	230 – 300					52
	300 – 1 000					56

NOTE 1 Apply only A.6.1 or A.6.2 across the entire frequency range.

NOTE 2 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.

**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	46	46	46	See NOTE 1
	950 – 2 150		46	54	54	
A12.2	950 – 2 150	Quasi Peak/ 120 kHz	46	54	54	See NOTE 2
A12.3	30 – 300		For frequencies ≥1 GHz	46	54	50
	300 – 1 000	52				
A12.4	30 – 300	Peak/ 1 MHz	46	66	59	See NOTE 4
	300 – 1 000				52	
A12.5	30 – 950		46	76	46	See NOTE 5
	950 – 2 150			n/a	54	

NOTE 1 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.

NOTE 2 Tuner units (not the LNB) for satellite signal reception.

NOTE 3 Frequency modulation audio receivers and PC tuner cards.

NOTE 4 Frequency modulation car radios.

NOTE 5 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.

NOTE 6 Testing is required at only one EUT supply voltage and frequency.

NOTE 7 The term 'other' refers to all emissions other than the fundamental and the harmonics of the local oscillator.

NOTE 8 The test shall be performed with the device operating at each reception channel.

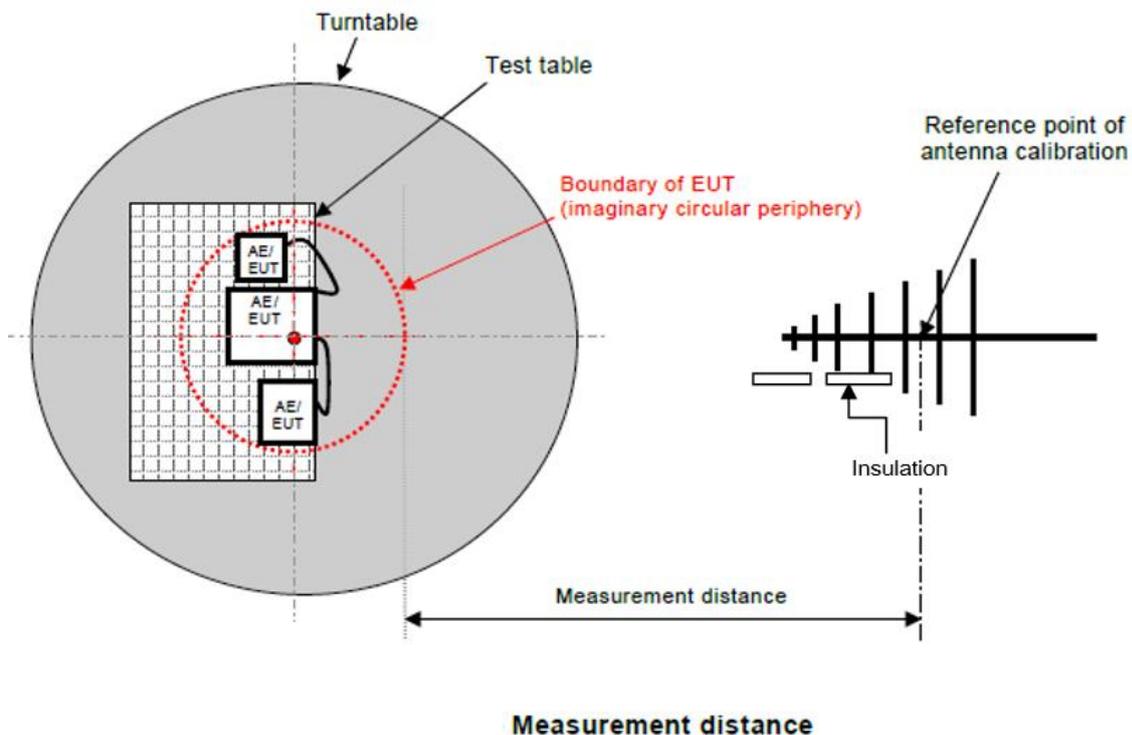
NOTE 9 The test shall cover the entire frequency range.

5.2.2 Test Procedures

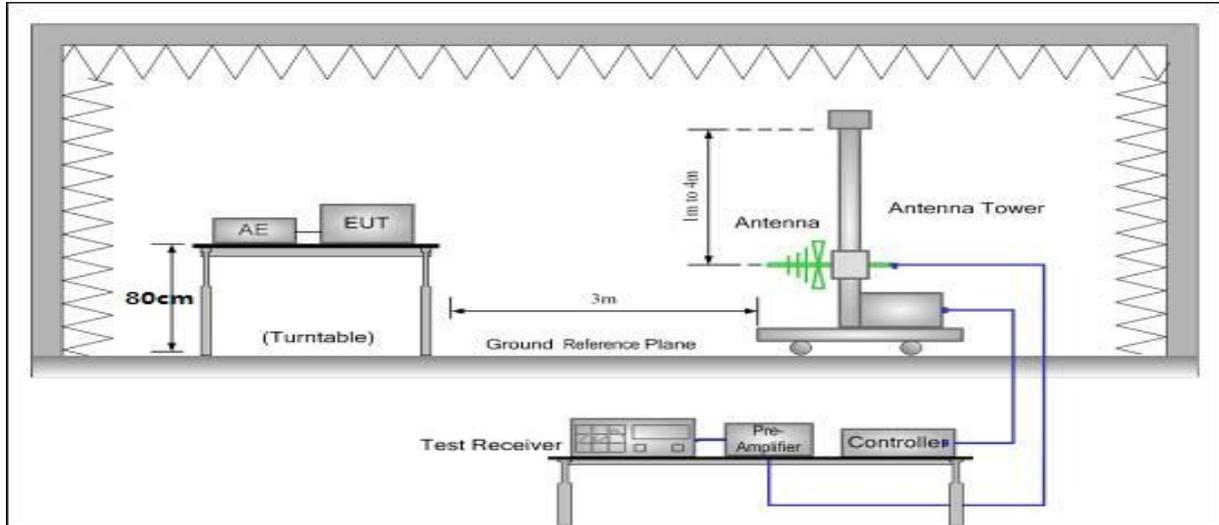
- a. The measuring distance of at 3/10 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter SAE test site. The table was rotated 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 table-top equipment, place on a table top 0.8 meter above ground. For floor standing equipment, placed on the horizontal ground reference plane, orientated for normal use, but separated from metallic contact with the ground reference plane by up to 15 cm of insulation. Please refer to the related item –EUT Test Photos.

Frequency	Detector	Setting
30MHz – 1GHz	QP	IF bandwidth: 120kHz
Above 1GHz	Peak	RBW: 1MHz, VBW: 3MHz
	AV	RBW: 1MHz, VBW: 10Hz

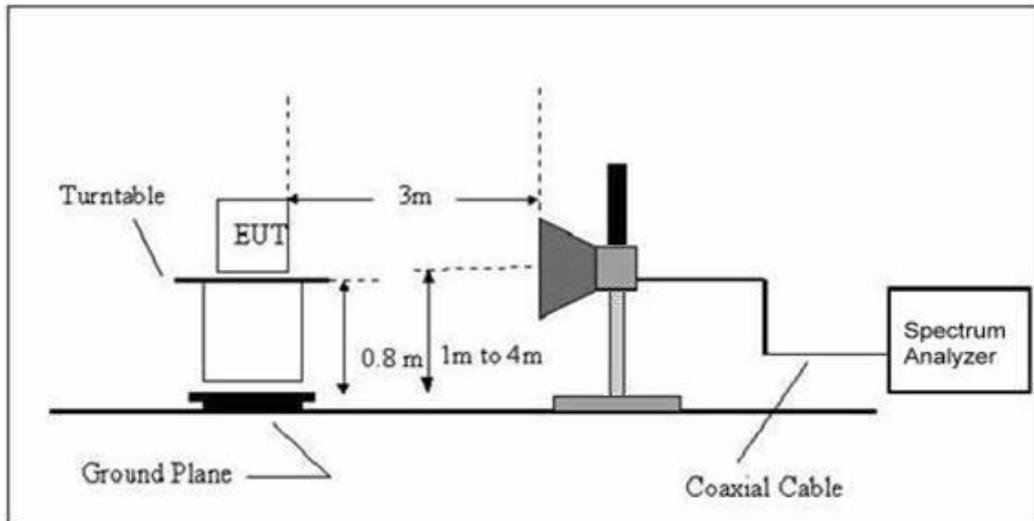
5.2.3 Test Setup



Radiated emission test-up frequency for 30MHz - 1GHz



Radiated emission test-up frequency for above 1GHz

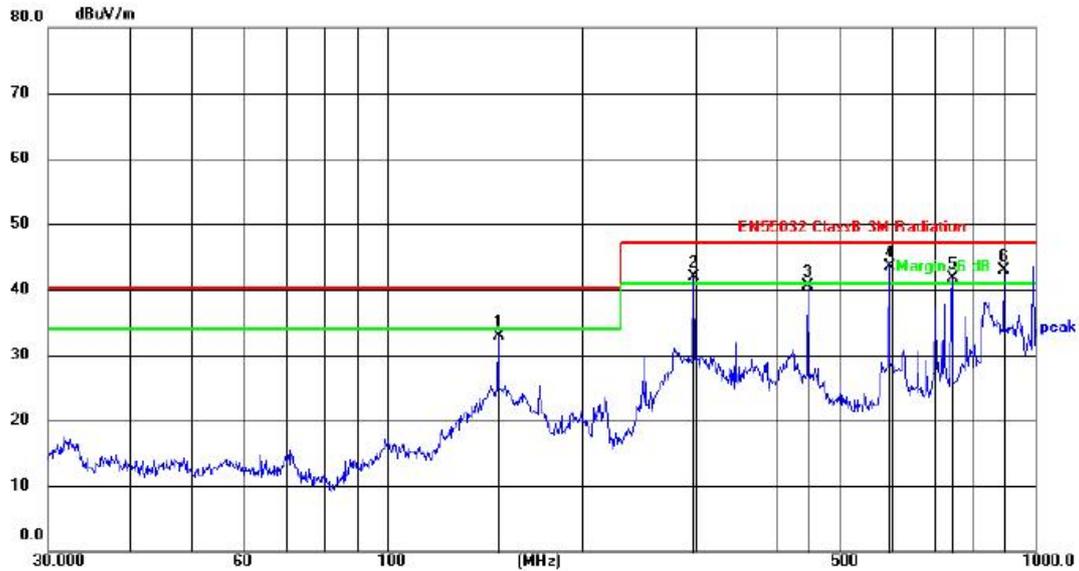


5.2.4 Test Result

Level = Reading + Factor, Margin = Level- Limit

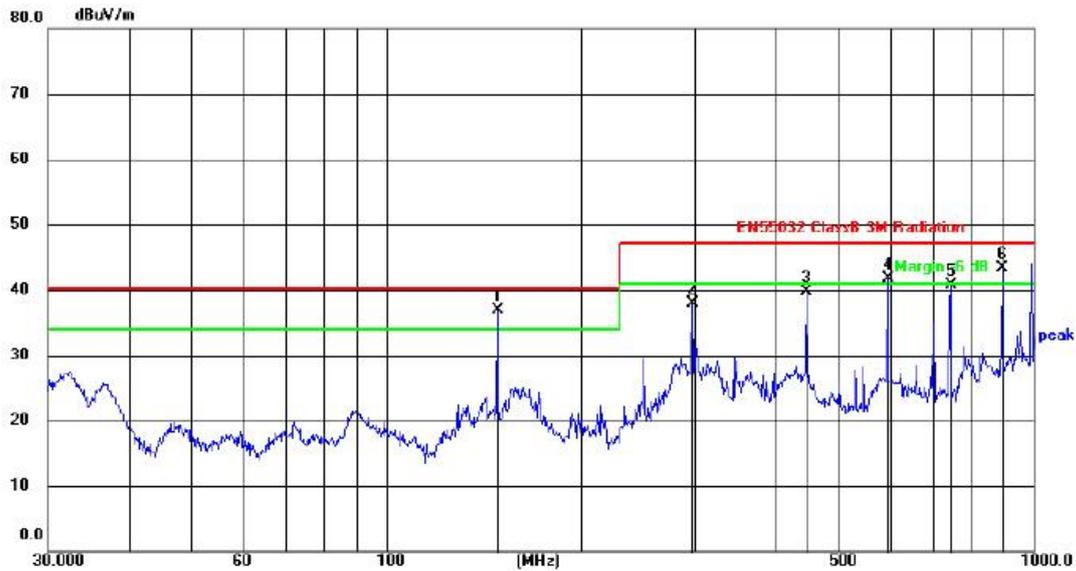
Below 1GHz

Test mode:	Mode 1		
Temperature:	25.8°C	Humidity:	51%RH
Pressure:	101kPa	Test voltage:	AC 230V 50Hz
Test polarization:	Horizontal	Test Result:	PASS



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	148.4410	53.65	-20.68	32.97	40.00	-7.03	QP
2	297.2240	62.37	-20.40	41.97	47.00	-5.03	QP
3	446.4140	56.25	-15.65	40.60	47.00	-6.40	QP
4	595.1327	55.46	-11.86	43.60	47.00	-3.40	QP
5	744.8660	49.84	-8.21	41.63	47.00	-5.37	QP
6	893.8566	48.42	-5.54	42.88	47.00	-4.12	QP

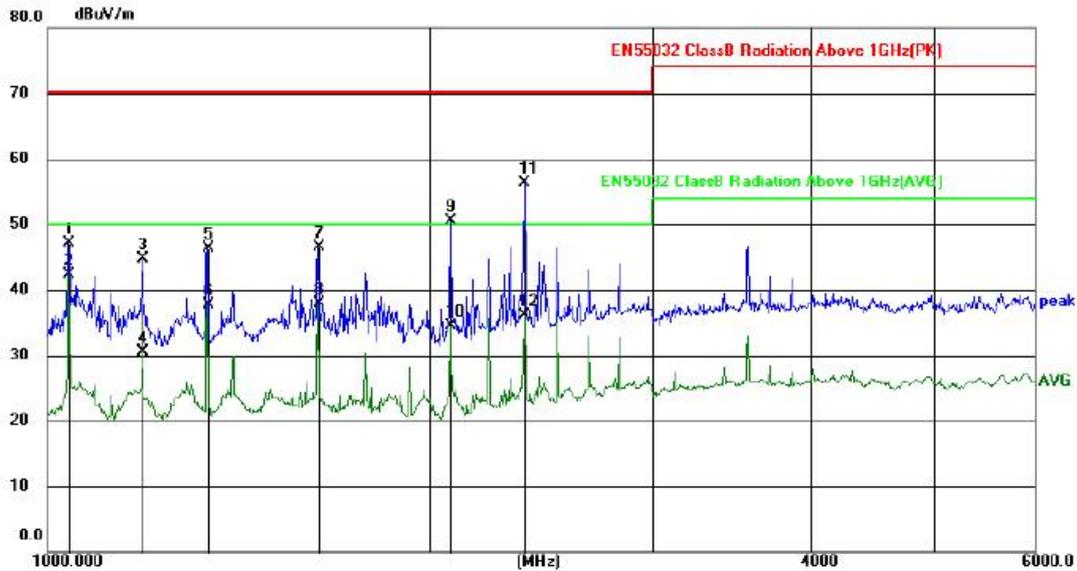
Test mode:	Mode 1		
Temperature:	25.8°C	Humidity:	51%RH
Pressure:	101kPa	Test voltage:	AC 230V 50Hz
Test polarization:	Vertical	Test Result:	PASS



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	148.4410	57.68	-20.68	37.00	40.00	-3.00	QP
2	297.2240	58.32	-20.40	37.92	47.00	-9.08	QP
3	446.4140	55.38	-15.65	39.73	47.00	-7.27	QP
4	595.1327	53.61	-11.86	41.75	47.00	-5.25	QP
5	744.8660	48.87	-8.21	40.66	47.00	-6.34	QP
6	893.8566	48.91	-5.54	43.37	47.00	-3.63	QP

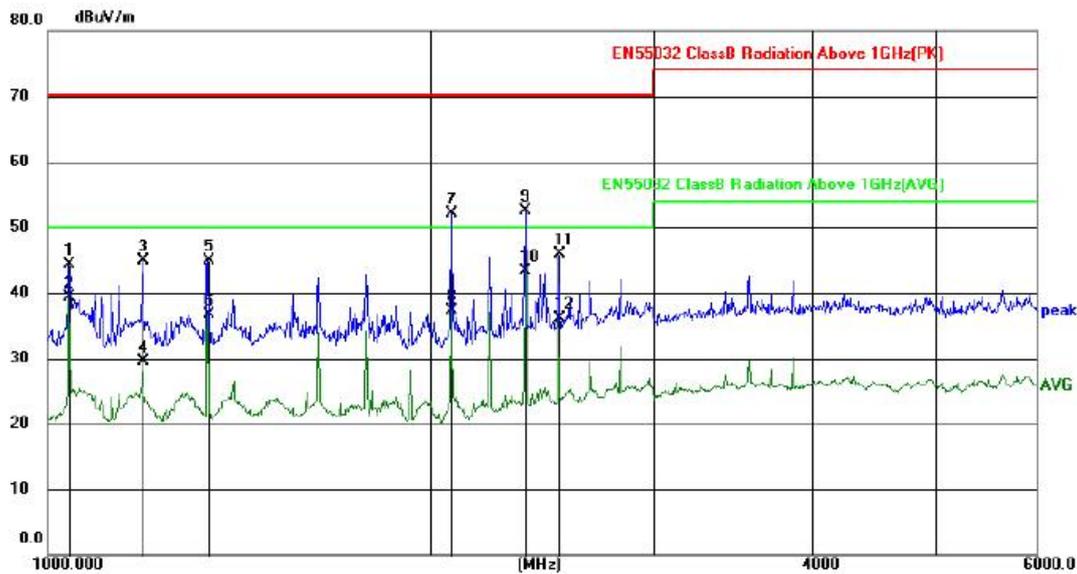
Above 1GHz

Test mode:	Mode 1		
Temperature:	25.8°C	Humidity:	51%RH
Pressure:	101kPa	Test voltage:	AC 230V 50Hz
Test polarization:	Horizontal	Test Result:	PASS



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1038.344	61.93	-14.84	47.09	70.00	-22.91	peak
2	1038.344	57.08	-14.84	42.24	50.00	-7.76	AVG
3	1187.688	59.58	-14.95	44.63	70.00	-25.37	peak
4	1187.688	45.43	-14.95	30.48	50.00	-19.52	AVG
5	1336.782	61.27	-15.06	46.21	70.00	-23.79	peak
6	1336.782	52.82	-15.06	37.76	50.00	-12.24	AVG
7	1633.855	61.70	-15.26	46.44	70.00	-23.56	peak
8	1633.855	53.13	-15.26	37.87	50.00	-12.13	AVG
9	2077.235	65.63	-15.22	50.41	70.00	-19.59	peak
10	2077.235	49.65	-15.22	34.43	50.00	-15.57	AVG
11	2376.003	70.31	-14.02	56.29	70.00	-13.71	peak
12	2376.003	50.04	-14.02	36.02	50.00	-13.98	AVG

Test mode:	Mode 1		
Temperature:	25.8°C	Humidity:	51%RH
Pressure:	101kPa	Test voltage:	AC 230V 50Hz
Test polarization:	Vertical	Test Result:	PASS



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1038.344	59.19	-14.84	44.35	70.00	-25.65	peak
2	1038.344	54.21	-14.84	39.37	50.00	-10.63	AVG
3	1187.688	59.89	-14.95	44.94	70.00	-25.06	peak
4	1187.688	44.39	-14.95	29.44	50.00	-20.56	AVG
5	1336.782	59.95	-15.06	44.89	70.00	-25.11	peak
6	1336.782	51.67	-15.06	36.61	50.00	-13.39	AVG
7	2077.235	67.23	-15.22	52.01	70.00	-17.99	peak
8	2077.235	52.48	-15.22	37.26	50.00	-12.74	AVG
9	2376.003	66.49	-14.02	52.47	70.00	-17.53	peak
10	2376.003	57.30	-14.02	43.28	50.00	-6.72	AVG
11	2525.249	59.33	-13.43	45.90	70.00	-24.10	peak
12	2525.249	49.61	-13.43	36.18	50.00	-13.82	AVG

Note 1: The test modes were carried out for all operation modes. The worst test mode for test data was showed in the report.

2: Exceeding the emission limit is the main frequency.

5.3 Harmonic current emission

5.3.1 Limits

Limits for Class A equipment

Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current A
Odd harmonics		Even harmonics	
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	6	0.30
9	0.40	8 ≤ n ≤ 40	0.23x8/n
11	0.33		
13	0.21		
15 ≤ n ≤ 39	0.15x15/n		

(b) Limits for Class B equipment

For Class B equipment, the harmonics of the input current shall not exceed the values given in Table that is the limit of Class A multiplied by a factor of 1,5.

(c) Limits for Class C equipment

Harmonics Order n	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$30 \cdot \lambda^2$
5	10
7	7
9	5
11 < n < 39 (odd harmonics only)	3

* λ is the circuit power factor

(d) Limits for Class D equipment

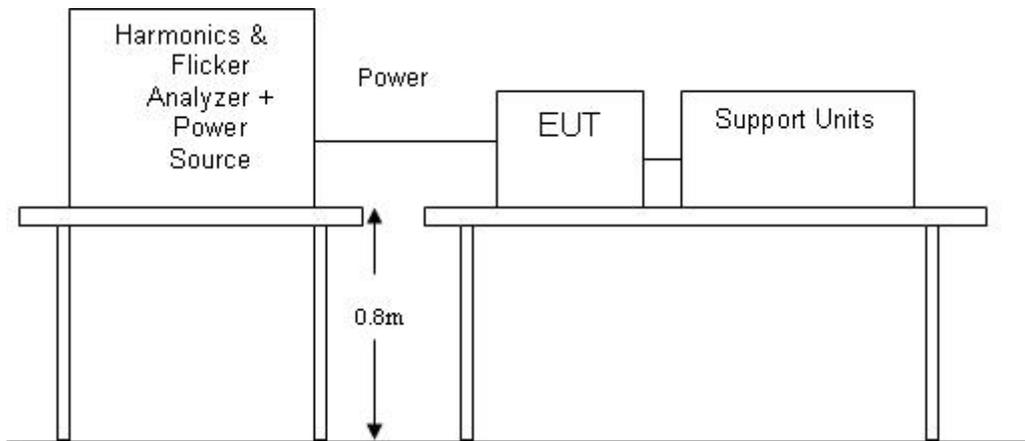
Harmonics Order n	Maximum permissible harmonic current per watt mA/W	Maximum permissible harmonic current A
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
11 < n < 39 (odd harmonics only)	3.85/n	See limit of Class A

NOTE: According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

5.3.2 Test Procedures

- a) The EUT was installed and placed on a non-conductive table and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- b) The correspondent test program of test instrument to measure the current harmonics / voltage fluctuations & flicker emanated from EUT. The measure time shall be not less than the time necessary for the EUT to be exercised.

5.3.3 Test Setup



5.3.4 Test Result: N/A

5.4 Voltage fluctuations & flicker

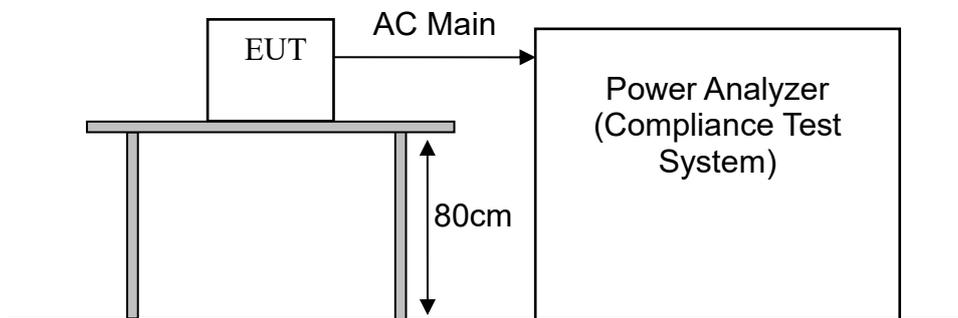
5.4.1 Limits

Test Item	Limit	Note
Pst	1.0	Pst means Short-term flicker indicator
Plt	0.65	Plt means long-term flicker indicator
Tdt	0.2	Tdt means maximum time that dt exceeds 3%
dmax(%)	4%	dmax means maximum relative voltage change.
dc(%)	3%	dc means relative steady-state voltage change.

5.4.2 Test Procedures

The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal conditions During the flick measurement, the measure time shall include that part of whole operation changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

5.4.3 Test Setup



5.4.4 Test Result and data : N/A

6 Immunity test

6.1 Performance criteria

Performance criteria	
Performance criterion	Description
A	<p>During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a minimum performance level specified by the manufacturer when the EUT 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 EUT if used as intended.</p>
B	<p>After the test, the EUT 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 EUT is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.</p> <p>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 EUT if used as intended.</p>
C	<p>During and after testing, a temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer's instructions.</p> <p>Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>
<p>Particular performance criteria:</p> <p>The particular performance criteria which are specified in the normative annexes take precedence over the corresponding parts of the general performance criteria. Where particular performance criteria for specific functions are not given, then the general performance criteria shall apply.</p>	

6.2 Electrostatic discharge (ESD)

6.2.1 Test Procedures

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

Contact discharge was applied to conductive surfaces and coupling planes of the EUT. During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

- b) Vertical Coupling Plane (VCP):

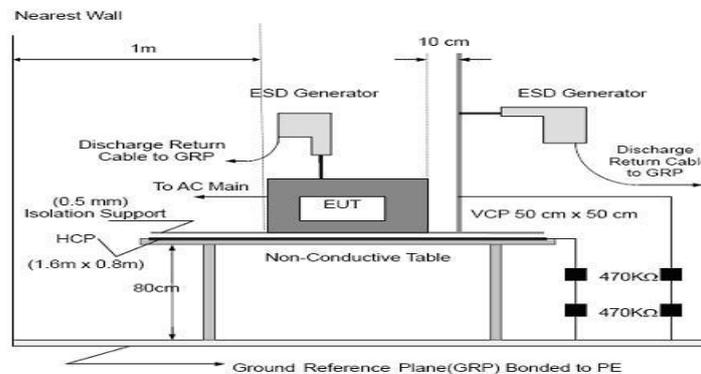
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

- c) Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

Air discharges at insulation surfaces of the EUT. It was at least ten single discharges with positive and negative at the same selected point. For the actual test configuration, please refer to the related Item –EUT Test Photos.

6.2.2 Test Setup



6.2.3 Test Severity levels

Contact Discharge		Air Discharge	
Level	Test Voltage (kV) of Contact discharge	Level	Test Voltage (kV) of Air Discharge
1	±2	1	±2
2	±4	2	±4
3	±6	3	±8
4	±8	4	±15
X	Specified	X	Specified

Remark: "X" is an open level.

6.2.4 Test Result and data

Test method standard : EN 61000-4-2
 Product standard : EN 55035
 Temperature : 25.9°C
 Relative Humidity : 58%RH
 Test mode : Mode 1
 Performance requirements : B
 Test Result : PASS

Indirect discharge

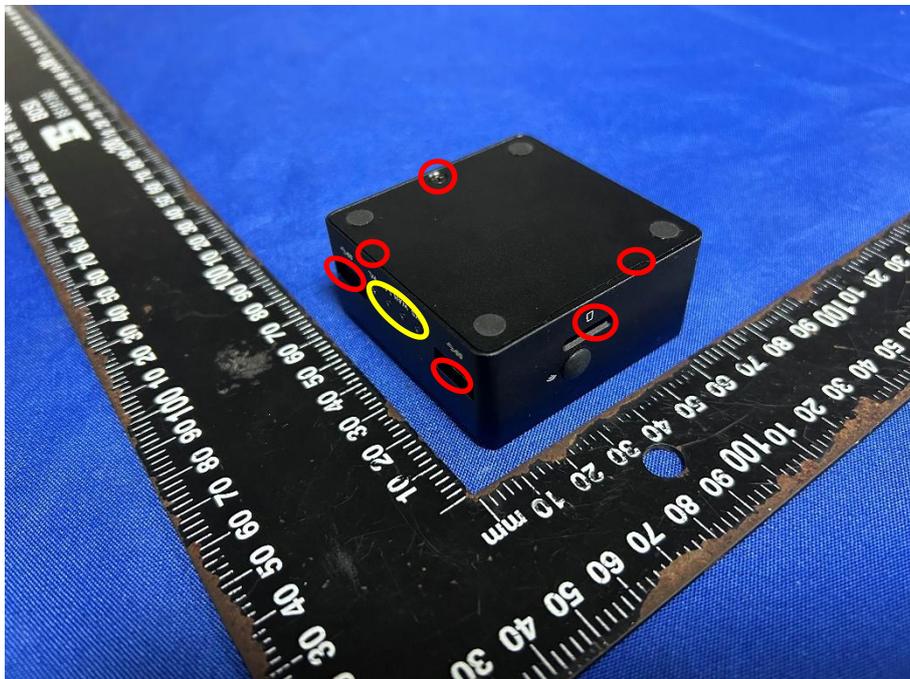
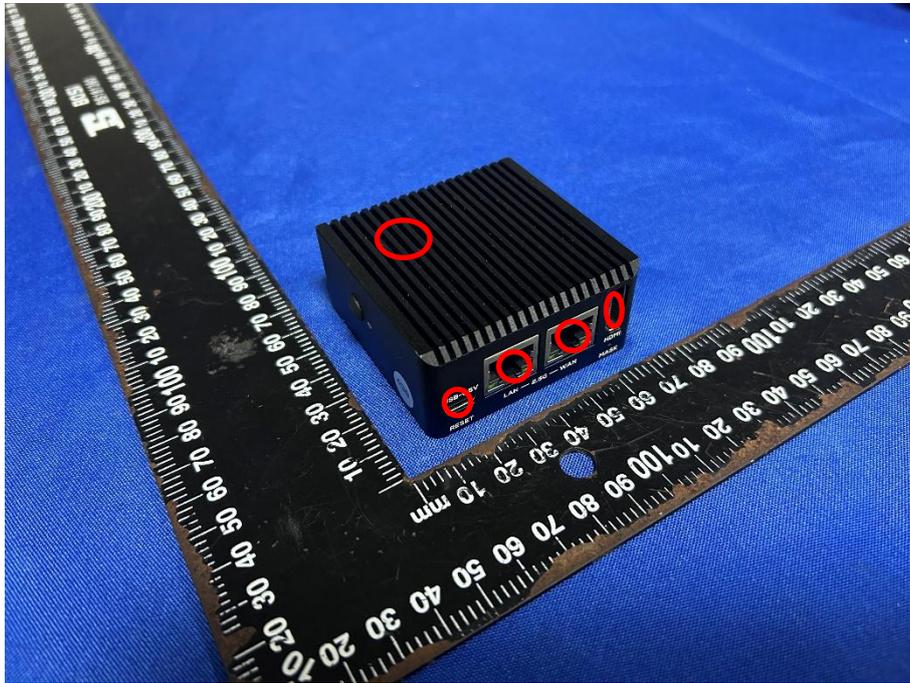
Test Point	Contact discharge level (kV)	Number and polarity	Result
1. VCP-Front side	<input checked="" type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A
2.VCP-Rear side	<input checked="" type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A
3.VCP-Left side	<input checked="" type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A
4. VCP-Right side	<input checked="" type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A
5. HCP	<input checked="" type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A

Direct discharge

Test Point	Contact discharge level (kV)	Air discharge level (kV)	Number and polarity	Result
1. Each nonconductive location touchable by hand	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	<input checked="" type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	10 (+)	A
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input checked="" type="checkbox"/> ..8	10 (-)	A
1. Each conductive location touchable by hand	<input checked="" type="checkbox"/> ..2 <input checked="" type="checkbox"/> ..4	<input type="checkbox"/> ..2 <input type="checkbox"/> ..4	10 (+)	A
	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	<input type="checkbox"/> ..6 <input type="checkbox"/> ..8	10 (-)	A

Note1: Please see the photographs below about the details of test points.

Test location:



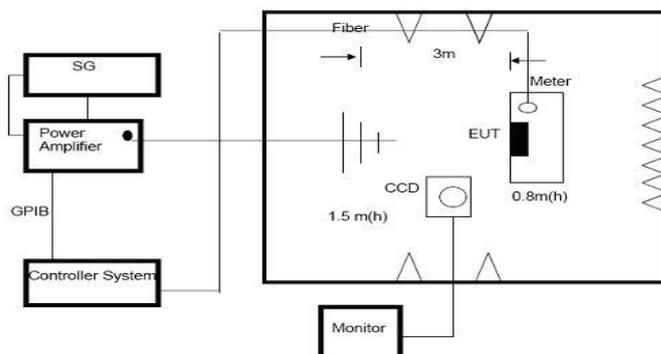
Note: Yellow circle for Air Discharge, Red circle for Contact Discharge.

6.3 Radiated electromagnetic field immunity (RS)

6.3.1 Test Procedures

- a) 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.
- b) The testing distance from antenna to the EUT was 3 meters.
- c) The other condition as following manner:
 - i. The field strength level was 3V/m.
 - ii. The frequency range is swept from 80 MHz to 5000 MHz with the signal 80%amplitude modulated with a 1kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1% of fundamental.
- d) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- e) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.
- f) For the actual test configuration, please refer to the related Item –EUT Test Photos.

6.3.2 Test setup



6.3.3 Test Severity levels

Frequency Band : 80-6000 MHz	
Level	Test field strength (V/m)
1	1
2	3
3	10
X	Specified
Remark: "X" is an open class.	

6.3.4 Test Result

Test method standard : EN 61000-4-3

Product standard : EN 55035

Temperature : 25.8°C

Relative Humidity : 51%RH

Test mode : Mode 1

Performance requirements : A

Test Result : PASS

Frequency (MHz)	Antenna polarization	Azimuth	Field Strength(V/m)	Result
80-1000	Vertical	Front	3 V/m	A
80-1000	Vertical	Rear	3 V/m	A
80-1000	Vertical	Left	3 V/m	A
80-1000	Vertical	Right	3 V/m	A
80-1000	Horizontal	Front	3 V/m	A
80-1000	Horizontal	Rear	3 V/m	A
80-1000	Horizontal	Left	3 V/m	A
80-1000	Horizontal	Right	3 V/m	A

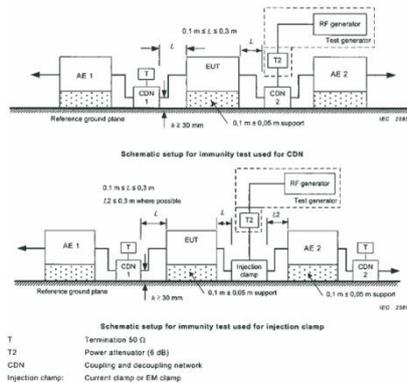
Frequency (MHz)	Antenna polarization	Azimuth	Field Strength(V/m)	Result
1800MHz,2500MHz 3500MHz,5000MHz	Vertical	Front	3 V/m	A
1800MHz,2500MHz 3500MHz,5000MHz	Vertical	Rear	3 V/m	A
1800MHz,2500MHz 3500MHz,5000MHz	Vertical	Left	3 V/m	A
1800MHz,2500MHz 3500MHz,5000MHz	Vertical	Right	3 V/m	A
1800MHz,2500MHz 3500MHz,5000MHz	Horizontal	Front	3 V/m	A
1800MHz,2500MHz 3500MHz,5000MHz	Horizontal	Rear	3 V/m	A
1800MHz,2500MHz 3500MHz,5000MHz	Horizontal	Left	3 V/m	A
1800MHz,2500MHz 3500MHz,5000MHz	Horizontal	Right	3 V/m	A

6.4 Conducted disturbances (CS)

6.4.1 Test Procedures

- The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- The disturbance signal described below is injected to EUT through CDN.
- The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
- The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

6.4.2 Test Setup



6.4.3 Test Severity level

Level	Voltage Level (EMF),
1	1 V
2	3 V
3	10 V
x	Specified

NOTE - x is an open class. This level can be specified in the product specification.

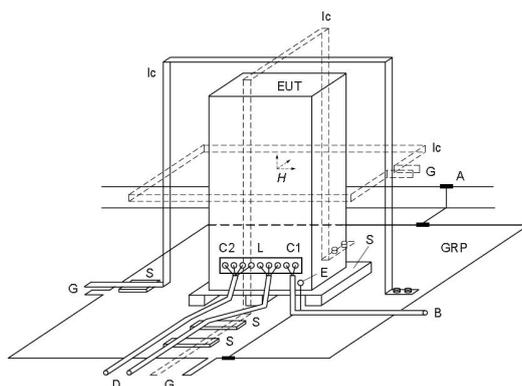
6.4.4 Test Result: N/A

6.5 Power frequency magnetic field

6.5.1 Test Procedures

- a) EUT connect the wires according to the typical configuration, and switch on the power supply for 15 minutes.
- b) Turn on the instrument power switch and wait for the instrument to start.
- c) When the device is started, click the Setup icon to enter the settings screen
- d) As shown below, for the settings screen, click the test time position and current position to set the test time and current
- e) Set the correct test time and test current
- f) Click Start to begin the test, while observing the status of EUT and recording

6.5.2 Test Setup



Components:

GRP	Ground plane	A	Safety earth
C1	Power supply circuit	C2	Signal circuit
S	Insulating support	L	Communication line
EUT	Equipment under test	B	To power supply source
Ic	Inductive coil	D	To signal source, simulator
E	Earth terminal	G	To the test generator

6.5.3 Test Severity level

Level	Magnetic field strength (A/m)
1	1
2	3
3	10
4	30
5	100
X ¹⁾	special
NOTE 1 "X" is an open level. This level can be given in the product specification.	

6.5.4 Test Result: N/A

6.6 Electrical fast transients/burst (EFT/S)

6.6.1 Test Procedures

a) The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables.

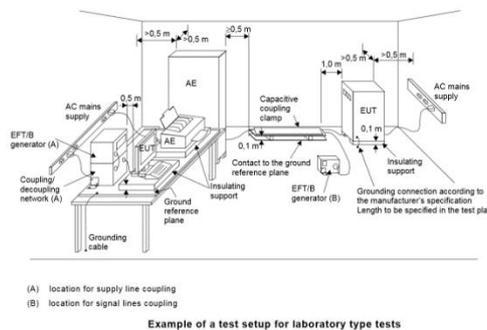
b) For input and AC power ports:

The EUT was connected to the power mains by using a coupling device that couples the EFT interference signal to AC power lines. Both positive transients and negative transients of test voltage were applied during compliance test and the duration of the test can't less than 1min.

c) For signal lines and control lines ports:

Ports which are intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks, local area networks and similar networks.)

6.6.2 Test Setup



6.6.3 Test Severity level

Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 kV	0.25 kV
2.	1 kV	0.5 kV
3.	2 kV	1 kV
4.	4 kV	2 kV
X	Special	Special

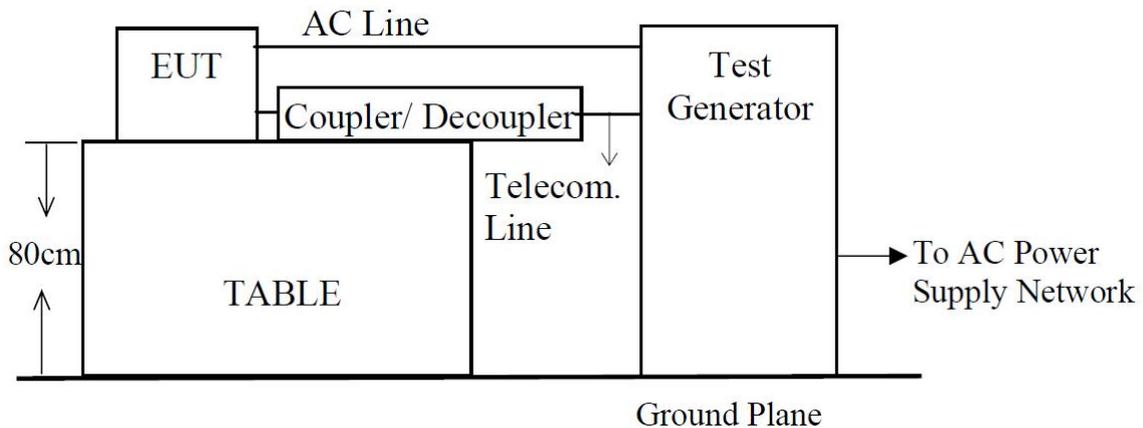
6.6.4 Test Result: N/A

6.7 Surges

6.7.1 Test Procedures

- a) For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV.
- b) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test.
- c) Different phase angles are done individually.
- d) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

6.7.2 Test Setup



6.7.3 Test Severity level

Level	Open-circuit test voltage, $\pm 10\%$, kV
1	0.5
2	1.0
3	2.0
4	4.0
X	Specified

NOTE: "X" is an open class. This level can be specified in the product specification.

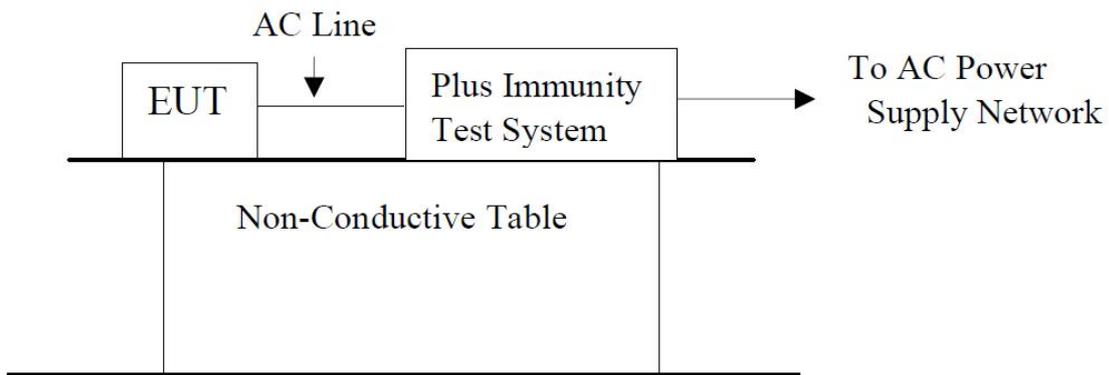
6.7.4 Test Result: N/A

6.8 Voltage dips and interruptions

6.8.1 Test procedures

- a) The interruptions are introduced at selected phase angles with specified duration.
- b) Record any degradation of performance

6.8.2 Test setup



6.8.3 Test Severity level

Test mode	Test level UT %	Durations (period)	Durations (period)
Voltage interruptions	>95%	250	300
Voltage dips	30%	25	30
	>95%	0.5	0.5

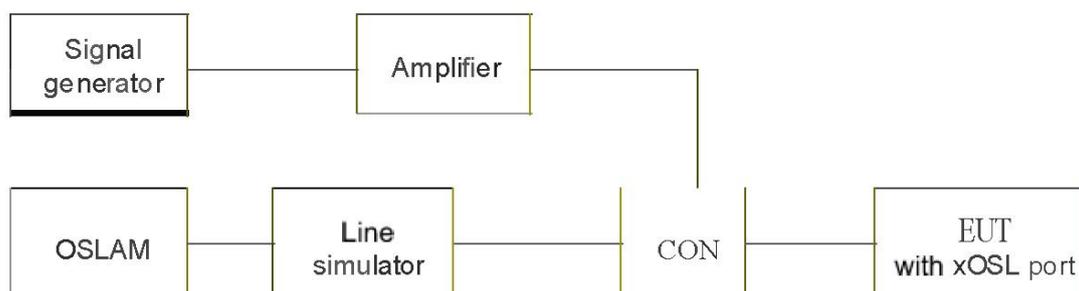
6.8.4 Test Result: N/A

6.9 Broadband Impulse noise disturbances repetitive

6.9.1 Test procedures

- a) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- b) The disturbance signal described below is injected to EUT through CDN.
- c) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- d) The xOSL technology or 30 MHz, whichever is the lowest using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 128 kHz sine wave.
- e) The rate of sweep shall not exceed $1.5 \cdot 10^{-3}$ decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- f) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

6.9.2 Test setup



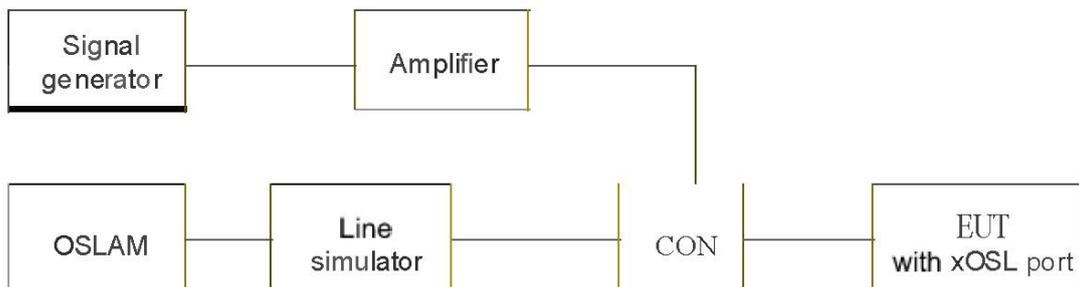
6.9.3 Test result: N/A

6.10 Broadband Impulse noise disturbances isolated

6.10.1 Test procedures

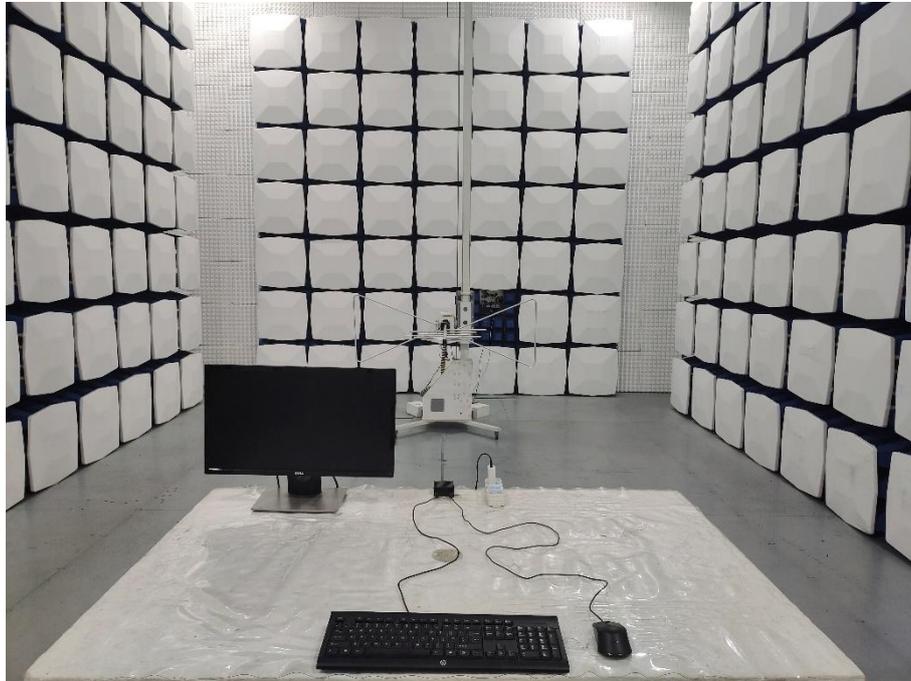
- a) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- b) The disturbance signal described below is injected to EUT through CDN.
- c) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- d) The xOSL technology or 30 MHz, whichever is the lowest using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 128 kHz sine wave.
- e) The rate of sweep shall not exceed $1.5 \cdot 10^{-3}$ decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- f) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

6.10.2 Test setup

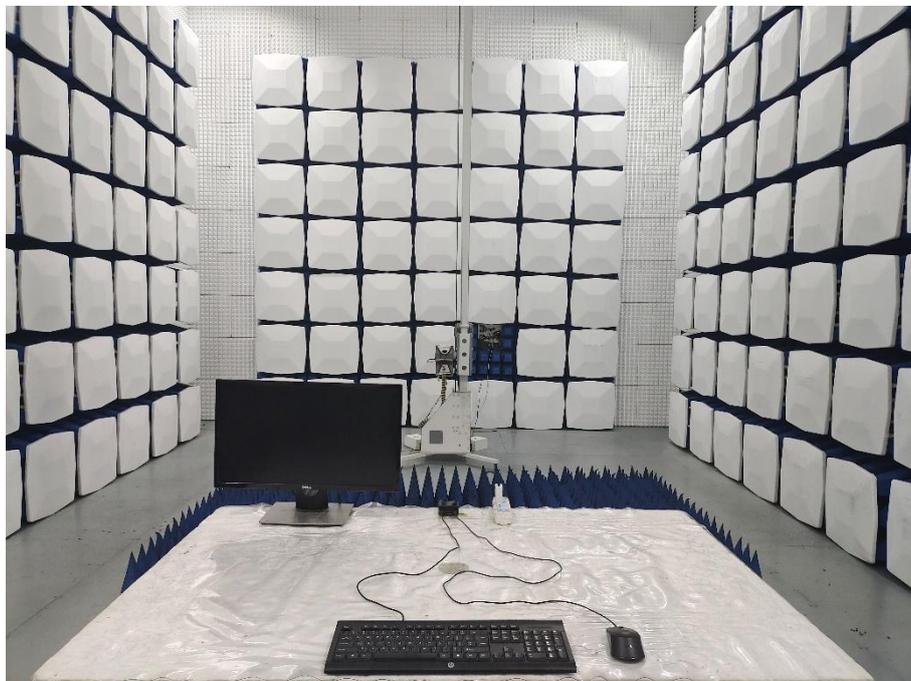


6.10.3 Test result: N/A

Photographs of the Test setup



30M-1GHz Radiated test



1G-6GHz Radiated test



Conducted test

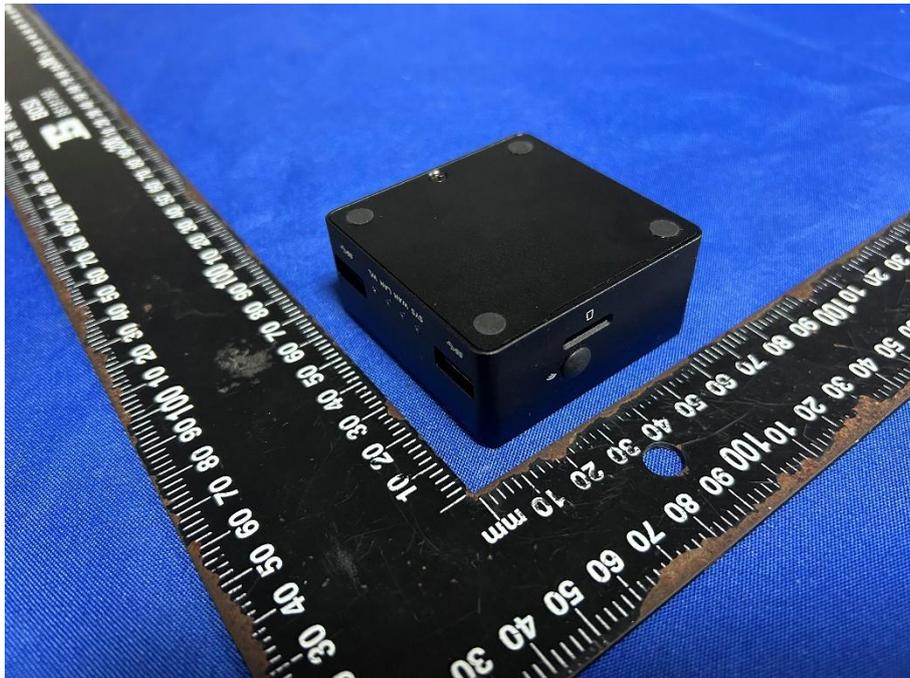
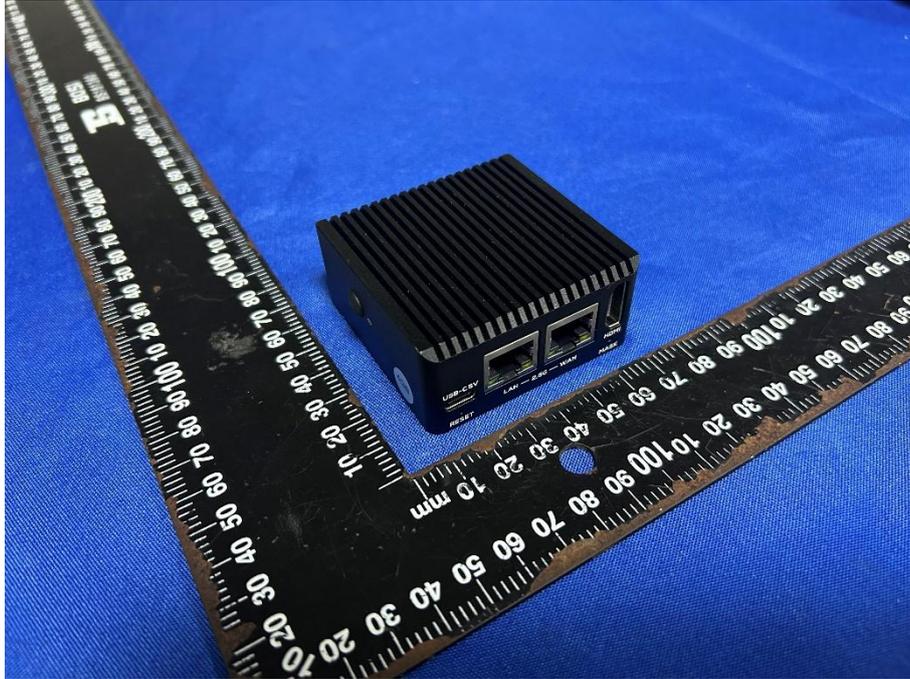


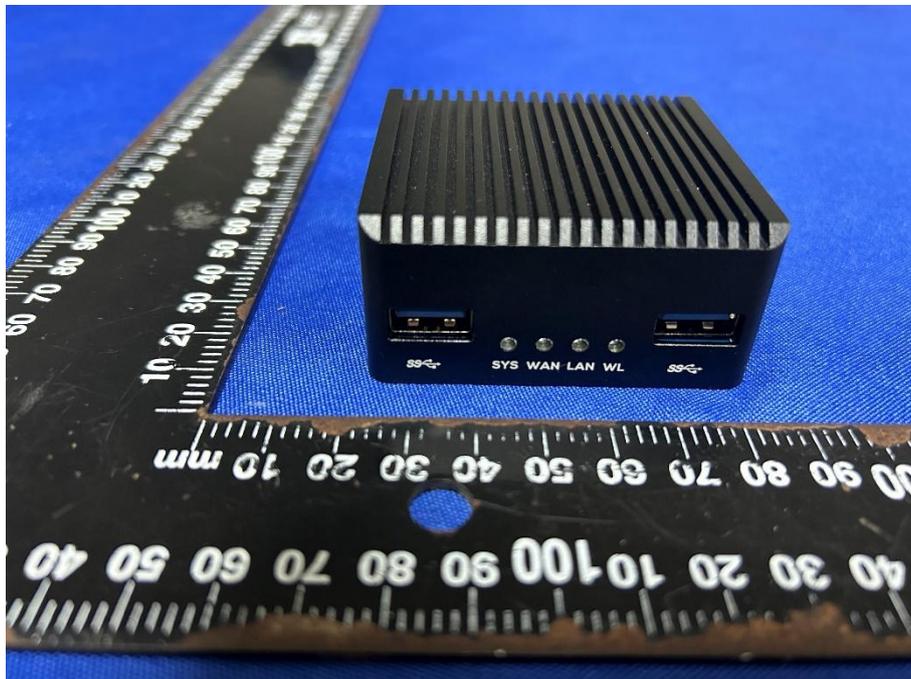
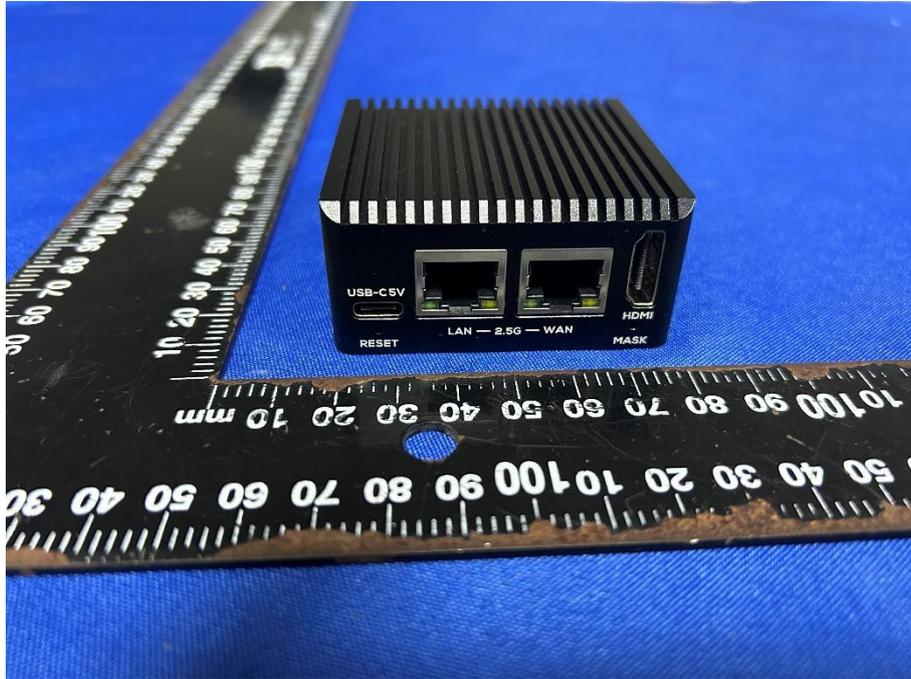
Conducted emission of asymmetric mode test

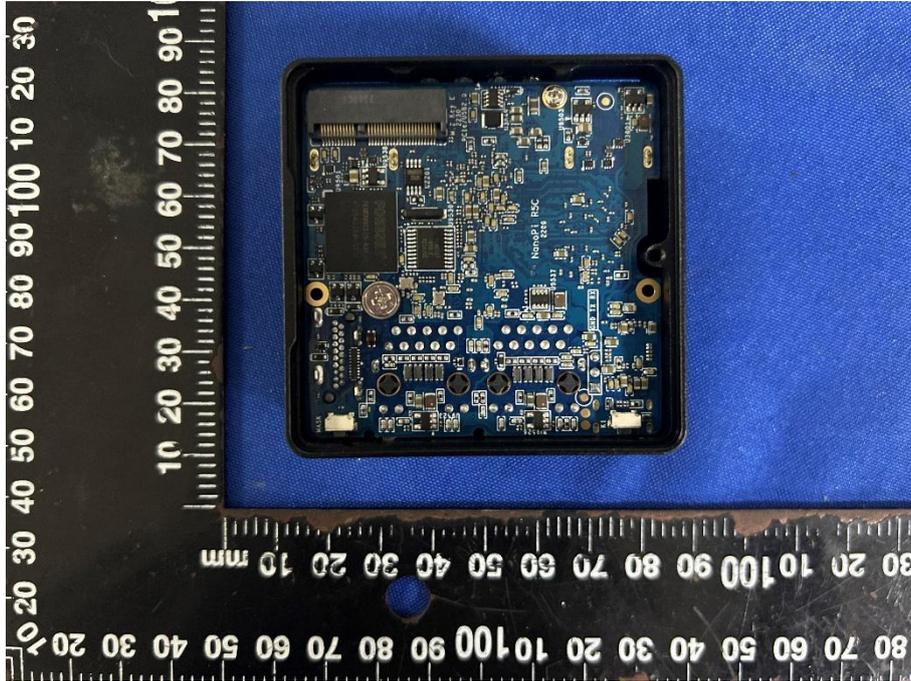
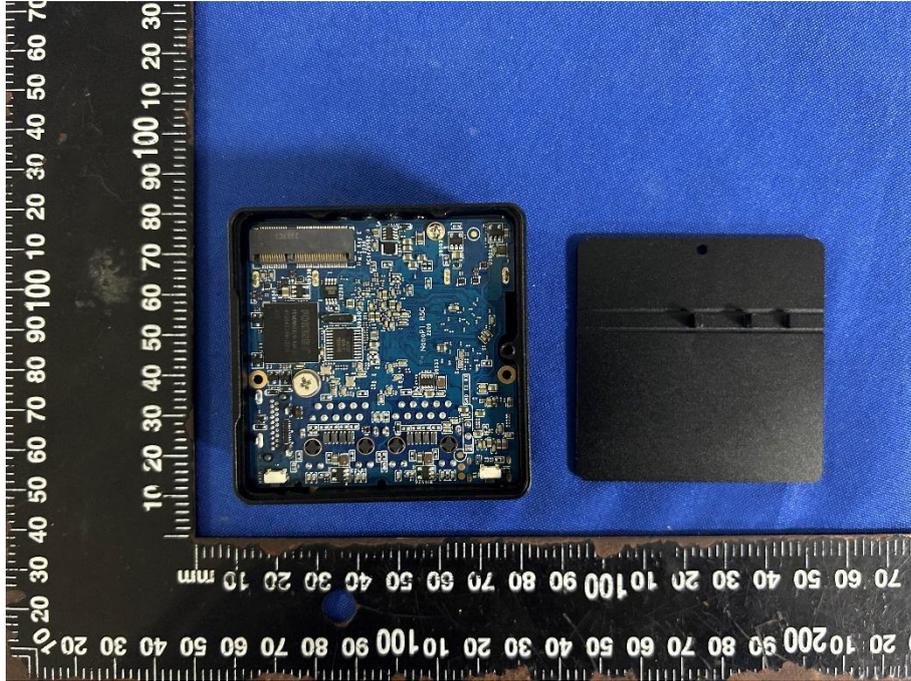


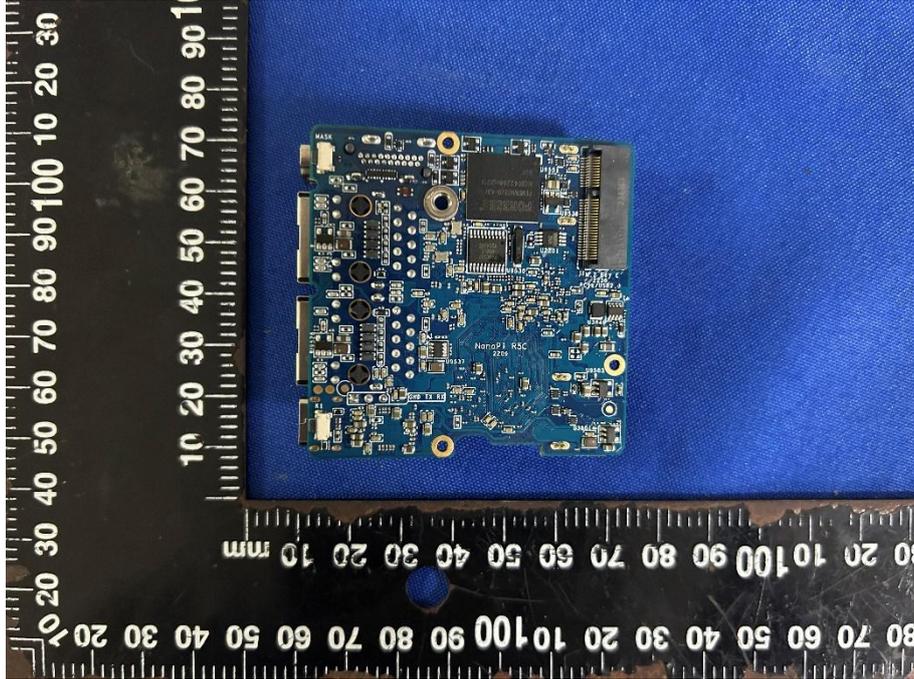
ESD test

Photographs of the EUT









----END OF REPORT----



Shenzhen ETR Standard Technology Co., Ltd.

103, No.10, Phase I, Zone 3, Xinhe Community, Fuhai Street, Bao'an District,
Shenzhen CHINA

Tel: +86-755-85259392 Email: etr800@etrtest.com http://www.etrlab.cn

CERTIFICATE OF CONFORMITY

No.: ET-23121414EC

Applicant : Guangzhou FriendlyELEC Technology Co., Ltd.
Address : Room 1106, 11F, East Tower, Top Plaza, No.22, Xingmin Road, Zhujiang New
Town, Tianhe District, Guangzhou, China, 510000
Manufacturer : Guangzhou FriendlyELEC Technology Co., Ltd.
Address : Room 1106, 11F, East Tower, Top Plaza, No.22, Xingmin Road, Zhujiang New
Town, Tianhe District, Guangzhou, China, 510000
Product : Digital Media Player
Model(s) : FC5-C1, R5C
Brand Name : N/A

Test Standards:

EN 55032:2015/A11:2020
EN 55035:2017/A11:2020
EN IEC 61000-3-2:2019/A1:2021
EN 61000-3-3:2013/A2:2021

The EUT described above has been tested by us with the listed standards and found in compliance with the Council EMC Directive 2014/30/EU. It is possible to use CE marking to demonstrate the compliance with this EMC Directive.

The certificate applies to the tested sample above mentioned only and shall not imply an assessment of the whole production. It is only valid in connection with the test report number: **ET-23121414E**.



Smith Chen

smith. Chen
(Manager)
Dec.06, 2023



TEST REPORT

Applicant's name: Guangzhou FriendlyELEC Technology Co., Ltd.
Address: Room 1106, 11F, East Tower, Top Plaza, No.22, Xingmin Road, Zhujiang New Town, Tianhe District, Guangzhou, China, 510000
Manufacture's Name: Guangzhou FriendlyELEC Technology Co., Ltd.
Address: Room 1106, 11F, East Tower, Top Plaza, No.22, Xingmin Road, Zhujiang New Town, Tianhe District, Guangzhou, China, 510000
Product name: Digital Media Player
Model/Type reference: FC5-C1, R5C
Trademark: N/A
Standards: FCC Part 15 Subpart B
Test methods: ANSI C63.4-2014
Date of testing: Oct.24, 2023- Oct.27, 2023
Date of issue: Dec.06, 2023
Test Result : PASS *



Remark: * In the configuration tested, the EUT complied with the standards specified above.

1.The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver

2. On the basis of the report number "ET-23101200E-1", this report adds the series model and the description of the difference between series models, and the rest remains unchanged, which does not affect the electromagnetic compatibility of the products, so there is no need to re-test, just citing the data of the original report number "ET-23101200E-1".

Prepared By

Shenzhen ETR Standard Technology Co., Ltd.

Address: No.103, No.10, Phase I, Zone 3, Xinxing Industrial Park, Xinhe, Fuhai Street, Bao'an District,

Shenzhen, Guangdong, China

Compiled by:

Reviewed by:

Approved by:

Project Engineer

Project Manager

Authorized Signature



Report Revision History

Report No.	Description	Issue Date
ET-23121415E	Original	Dec.06, 2023

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1 Summary of Test Result

Item	Description of Test	Result	Test by
1	Conducted emission	Pass	Qiao Li
2	Radiated emission	Pass	Qiao Li

2 General description

2.1 Description of EUT

Product name:	Digital Media Player
Model name:	FC5-C1, R5C
Different of series model:	Different sales areas, different models.
Test model:	FC5-C1
Power supply:	AC 100-240V 50/60Hz
Power supply of test:	AC 120V 60Hz
Battery:	N/A
EUT Highest Frequency	Above 108MHz
Classification of equipment	Class B

2.2 Test mode

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.

Test mode	Description
Mode 1	System full load(WIFI+TF+HDMI)
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 is showed.	

2.3 EUT test setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

2.4 Ancillary equipment

Equipment	Model	S/N	Manufacturer
Monitor	SE2416HC	/	DELL
Mouse + Keyboard	/	/	/
Adapter	HW-090200CH0	/	HUAWEI

3 Test Facilities and Accreditations

3.1 Test laboratory

Test laboratory:	Shenzhen ETR Standard Technology Co., Ltd.
Laboratory location:	No.103, No.10, Phase I, Zone 3, Xinxing Industrial Park, Xinhe, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
CNAS Registration No.:	L11864
Telephone:	+86 755 85259392

3.2 Environmental conditions

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

Temperature:	15°C~35°C
Humidity	20%~75%
Atmospheric pressure	98kPa~101kPa

3.3 Measurement uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, $U=2xUc(y)$

Conducted emission(150kHz~30MHz)	± 3.02 dB
Radiated emission(30MHz~1GHz)	±4.30 dB
Radiated emission (above 1GHz)	±4.35 dB
Temperature	±1 degree
Humidity	± 5 %

3.4 Test software

Software name	Manufacturer	Model	Version
Conducted test software	Farad	EZ-EMC	Ver.EMC-CON 3A1.1
Radiated test software	Farad	EZ-EMC	Ver.FA-03A2 RE

4 List of test equipment

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESC17	100605	2023.3.02	2024.3.01
2	EMI Test Receiver	Rohde&schwarz	ESC13	102696	2023.3.02	2024.3.01
3	Loop Antenna	schwarabeck	FMZB 1519 B	FMZB 1519 B	2022.3.11	2024.3.10
4	Broadband antenna	schwarabeck	VULB9168	1064	2022.3.11	2024.3.10
5	Horn antenna	schwarabeck	BBHA9120D	2288	2022.3.11	2024.3.10
6	amplifier	EMtrace	RP01A	50117	2023.3.02	2024.3.01
7	Artificial power network	schwarabeck	NSLK8127	8127483	2023.3.02	2024.3.01
8	Artificial power network	ETS	3186/2NM	1132	2023.3.02	2024.3.01
9	10dB attenuator	HUBER+SUHNER	10dB	/	2023.3.02	2024.3.01
10	amplifier	Space-Dtronics	EWLAN0118 G-P40	19113001	2023.3.02	2024.3.01
11	Spectrum analyzer	KEYSIGHT	N9020A	MY55370280	2023.3.02	2024.3.01
12	Spectrum analyzer	Rohde&schwarz	FSV40	102137	2023.3.02	2024.3.01
13	Amplifier	SKET	LNPA_1840-50	SK2019040302	2023.3.02	2024.3.01
14	Horn antenna	schwarabeck	BBHA 9170	946	2022.3.11	2024.3.10

Note: the calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

5 Test Results and test data

5.1 Conducted emission

Test Requirement:	FCC Part15 B Section 15.107
Test Method:	ANSI C63.4-2014
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

5.1.1 Limits

Frequency (MHz)	Class A (dB μ V)		Class B (dB μ V)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79	66	66 - 56 *	56 - 46 *
0.5 -5	73	60	56	46
5 -30	73	60	60	50

Note 1: the tighter limit applies at the band edges.

Note 2: the limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

5.1.2 Test Procedures

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 equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

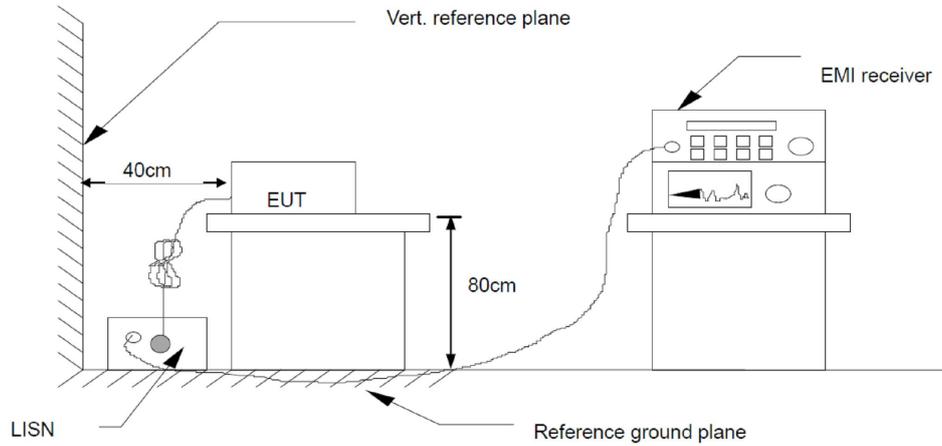
Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

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.

LISN is at least 80 cm from nearest part of EUT chassis.

For the actual test configuration, please refer to the related Item – photographs of the test setup.

5.1.3 Test Setup



5.1.4 EUT OPERATING CONDITIONS

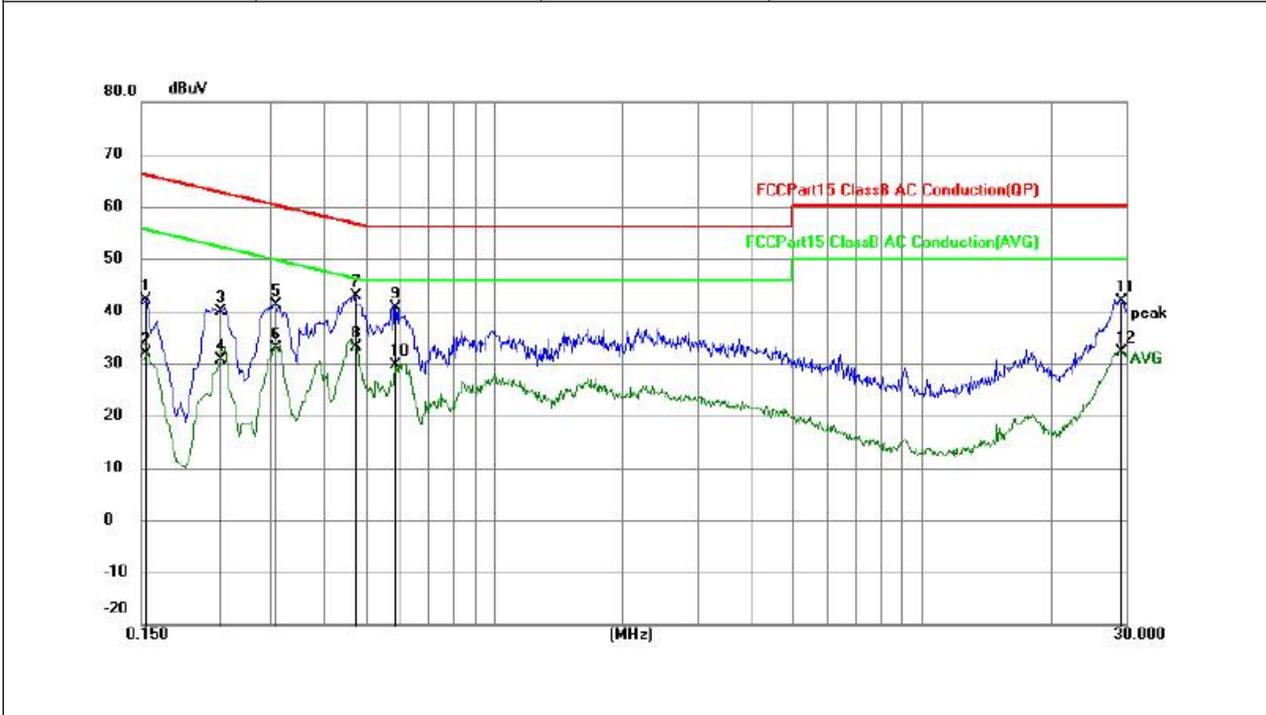
The EUT was configured for testing in a typical fashion (as a customer would normally use it). Test mode Refer to section 2.2 for details and only show the worst case.

5.1.5 Test Result

Level = Reading+ Factor

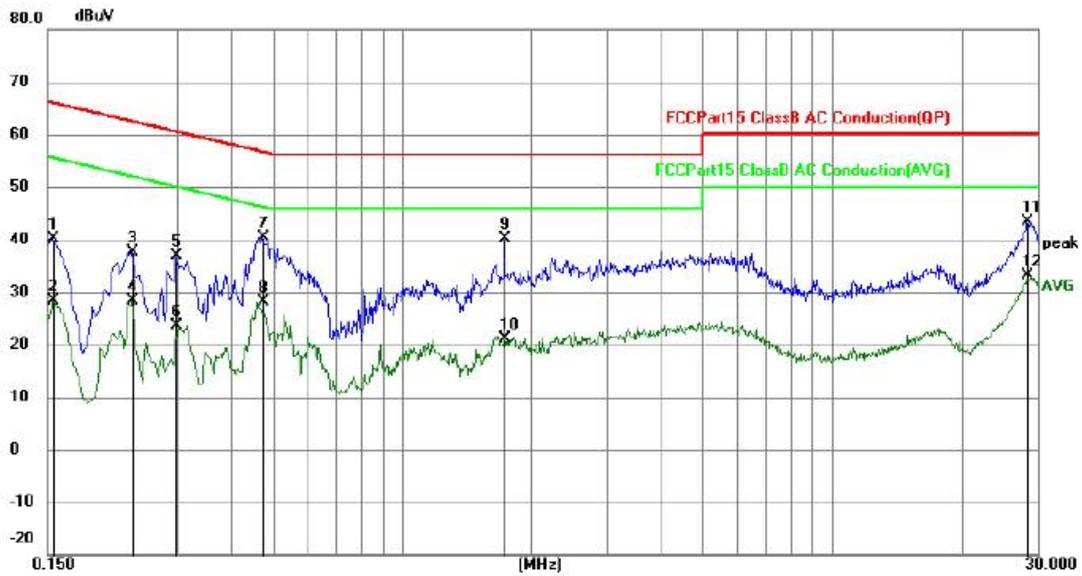
Factor= LISN Factor + Cable Loss+ Attenuator Factor

Test mode:	Mode 1	Phase:	L
Temperature:	25°C	Humidity:	46%RH
Pressure:	101kPa	Test voltage:	AC 120V 60Hz



No.	Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1532	32.34	9.80	42.14	65.82	-23.68	QP
2	0.1532	21.99	9.80	31.79	55.82	-24.03	AVG
3	0.2291	30.16	9.82	39.98	62.48	-22.50	QP
4	0.2291	20.82	9.82	30.64	52.48	-21.84	AVG
5	0.3075	31.33	9.87	41.20	60.04	-18.84	QP
6	0.3075	23.08	9.87	32.95	50.04	-17.09	AVG
7	0.4740	33.05	9.93	42.98	56.44	-13.46	QP
8	0.4740	23.13	9.93	33.06	46.44	-13.38	AVG
9	0.5864	30.66	9.94	40.60	56.00	-15.40	QP
10	0.5864	19.67	9.94	29.61	46.00	-16.39	AVG
11	29.1795	32.35	9.51	41.86	60.00	-18.14	QP
12	29.1795	22.56	9.51	32.07	50.00	-17.93	AVG

Test mode:	Mode 1	Phase:	N
Temperature:	25°C	Humidity:	46%RH
Pressure:	101kPa	Test voltage:	AC 120V 60Hz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1545	30.32	9.80	40.12	65.75	-25.63	QP
2	0.1545	18.47	9.80	28.27	55.75	-27.48	AVG
3	0.2355	27.85	9.82	37.67	62.25	-24.58	QP
4	0.2355	18.45	9.82	28.27	52.25	-23.98	AVG
5	0.2985	26.97	9.84	36.81	60.28	-23.47	QP
6	0.2985	13.77	9.84	23.61	50.28	-26.67	AVG
7	0.4740	30.47	9.93	40.40	56.44	-16.04	QP
8	0.4740	18.13	9.93	28.06	46.44	-18.38	AVG
9	1.7340	30.24	9.89	40.13	56.00	-15.87	QP
10	1.7340	11.22	9.89	21.11	46.00	-24.89	AVG
11	28.3965	33.86	9.52	43.38	60.00	-16.62	QP
12	28.3965	23.63	9.52	33.15	50.00	-16.85	AVG

5.2 Radiated emission

Test Requirement:	FCC Part15 B Section 15.109				
Test Method:	ANSI C63.4-2014				
Test Frequency Range:	5th harmonic of the highest frequency or 40 GHz, whichever is lower.				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average

5.2.1 Limits

Limits of radiated emission measurement

Frequency (MHz)	Class B device (at 3m) dB μ V/m	Class A device (at 3m) dB μ V/m	Detector
30-88	40	49	QP
88-216	43.5	53.5	QP
216-960	46	56.4	QP
960-1000	54	59.5	QP
Above 1000	54	59.5	AV
Above 1000	74	79.5	PK

5.2.2 Test Procedures

The radiated emission tests were performed in the 3 meters.

The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

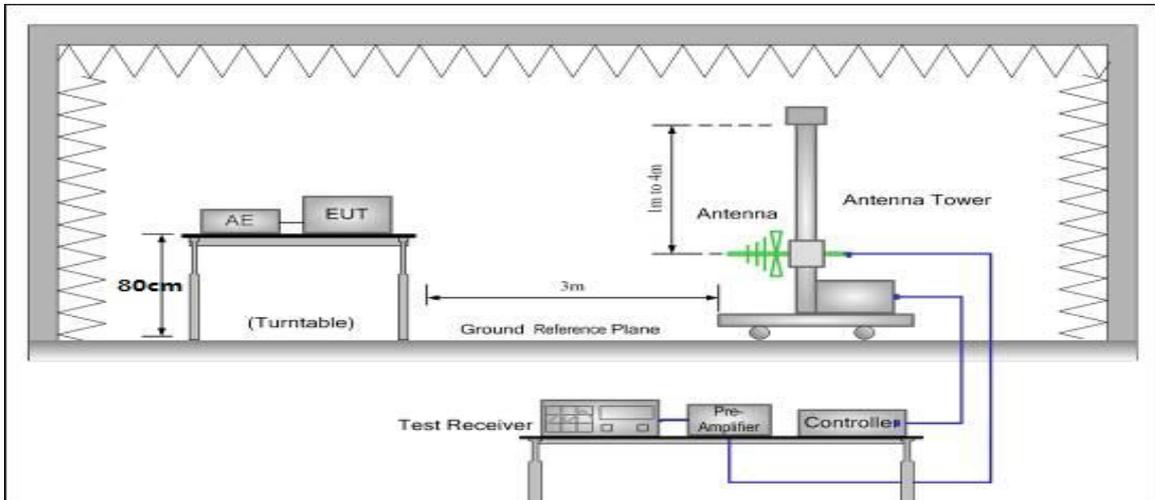
If the peak mode measured value compliance with and lower than quasi peak mode limit, the EUT shall be deemed to meet QP limits and then no additional QP mode measurement performed.

If the peak mode measured value compliance with and lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.

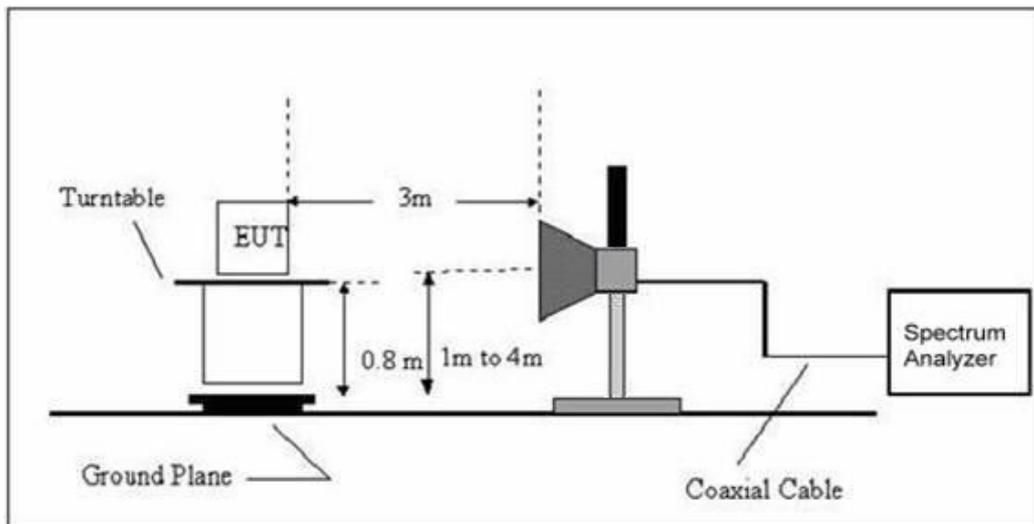
For the actual test configuration, please refer to the related item – EUT test photos.

5.2.3 Test Setup

Radiated emission test-up frequency for below 1GHz



Radiated emission test-up frequency for above 1GHz



5.2.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). Test mode Refer to section 2.2 for details and only show the worst case.

5.2.5 Test Result

Level = Reading + Factor

Factor= Antenna Factor + Cable Factor – Preamplifier Factor

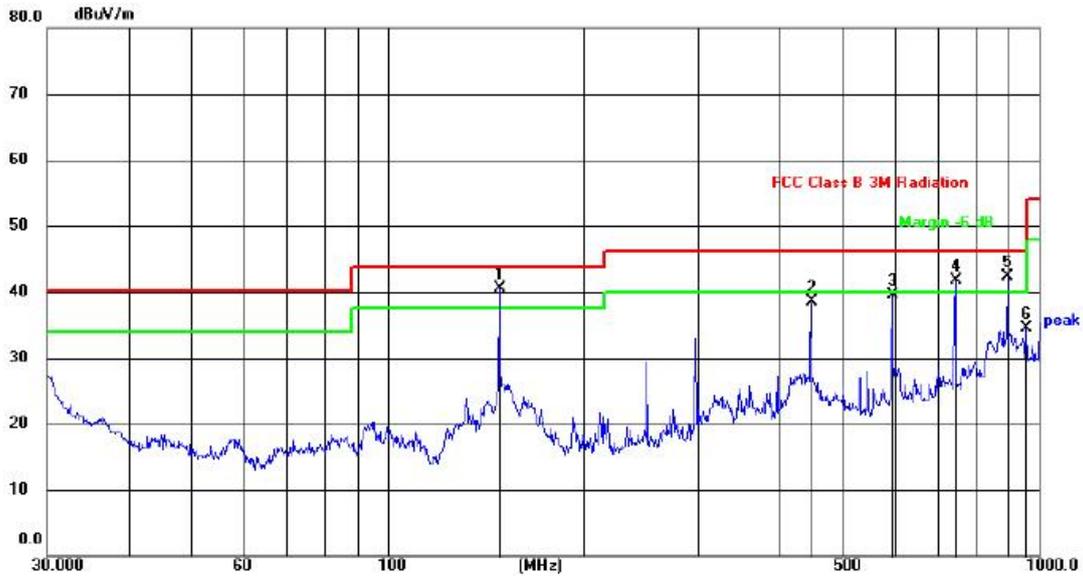
Below 1GHz

Test mode:	Mode 1	Test polarization:	Horizontal
Temperature:	25.8°C	Humidity:	51%RH
Pressure:	101kPa	Test voltage:	AC 120V 60Hz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	148.4410	55.19	-20.68	34.51	43.50	-8.99	QP
2	297.2238	59.03	-20.40	38.63	46.00	-7.37	QP
3	446.4139	54.80	-15.65	39.15	46.00	-6.85	QP
4	595.1327	51.66	-11.86	39.80	46.00	-6.20	QP
5	744.8659	47.96	-8.21	39.75	46.00	-6.25	QP
6	893.8565	48.25	-5.54	42.71	46.00	-3.29	QP

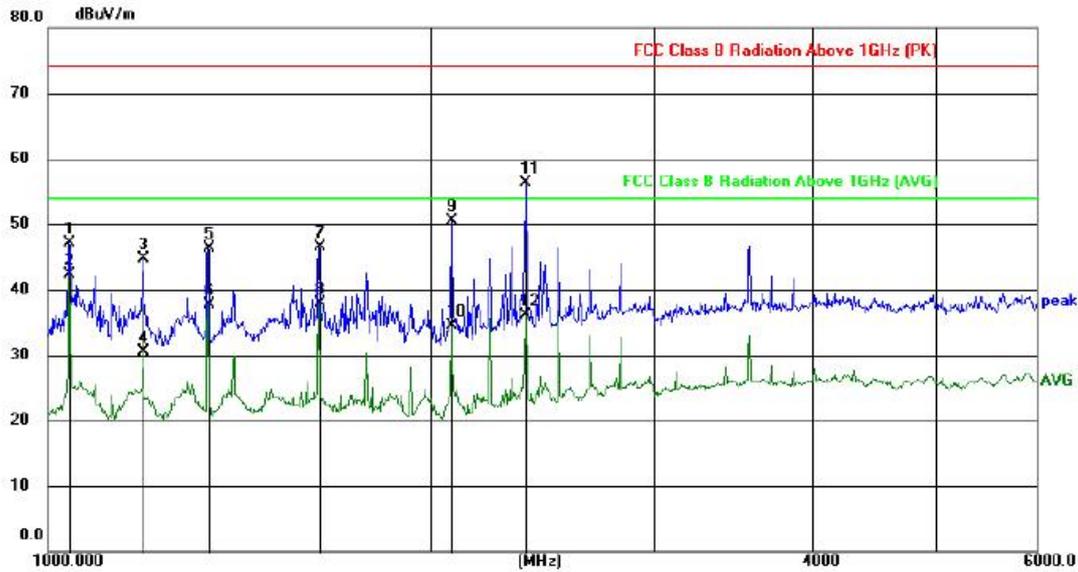
Test mode:	Mode 1	Test polarization:	Vertical
Temperature:	25.8°C	Humidity:	51%RH
Pressure:	101kPa	Test voltage:	AC 120V 60Hz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	148.4410	61.09	-20.68	40.41	43.50	-3.09	QP
2	446.4141	54.06	-15.65	38.41	46.00	-7.59	QP
3	595.1327	51.33	-11.86	39.47	46.00	-6.53	QP
4	744.8661	49.98	-8.21	41.77	46.00	-4.23	QP
5	893.8566	47.75	-5.54	42.21	46.00	-3.79	QP
6	955.4381	38.31	-3.76	34.55	46.00	-11.45	QP

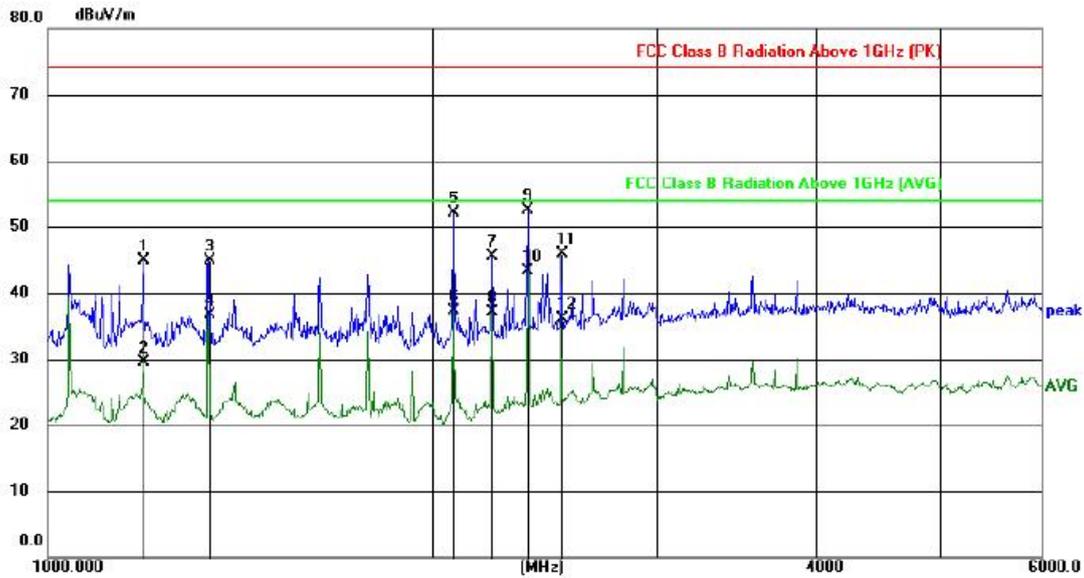
Above 1GHz

Test mode:	Mode 1		
Temperature:	25.8°C	Humidity:	51%RH
Pressure:	101kPa	Test voltage:	AC 120V 60Hz
Test polarization:	Horizontal	Test Result:	PASS



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1038.344	61.93	-14.84	47.09	74.00	-26.91	peak
2	1038.344	57.08	-14.84	42.24	54.00	-11.76	AVG
3	1187.688	59.58	-14.95	44.63	74.00	-29.37	peak
4	1187.688	45.43	-14.95	30.48	54.00	-23.52	AVG
5	1336.782	61.27	-15.06	46.21	74.00	-27.79	peak
6	1336.782	52.82	-15.06	37.76	54.00	-16.24	AVG
7	1633.855	61.70	-15.26	46.44	74.00	-27.56	peak
8	1633.855	53.13	-15.26	37.87	54.00	-16.13	AVG
9	2077.235	65.63	-15.22	50.41	74.00	-23.59	peak
10	2077.235	49.65	-15.22	34.43	54.00	-19.57	AVG
11	2376.003	70.31	-14.02	56.29	74.00	-17.71	peak
12	2376.003	50.04	-14.02	36.02	54.00	-17.98	AVG

Test mode:	Mode 1		
Temperature:	25.8°C	Humidity:	50%RH
Pressure:	101kPa	Test voltage:	AC 120V 60Hz
Test polarization:	Vertical	Test Result:	PASS

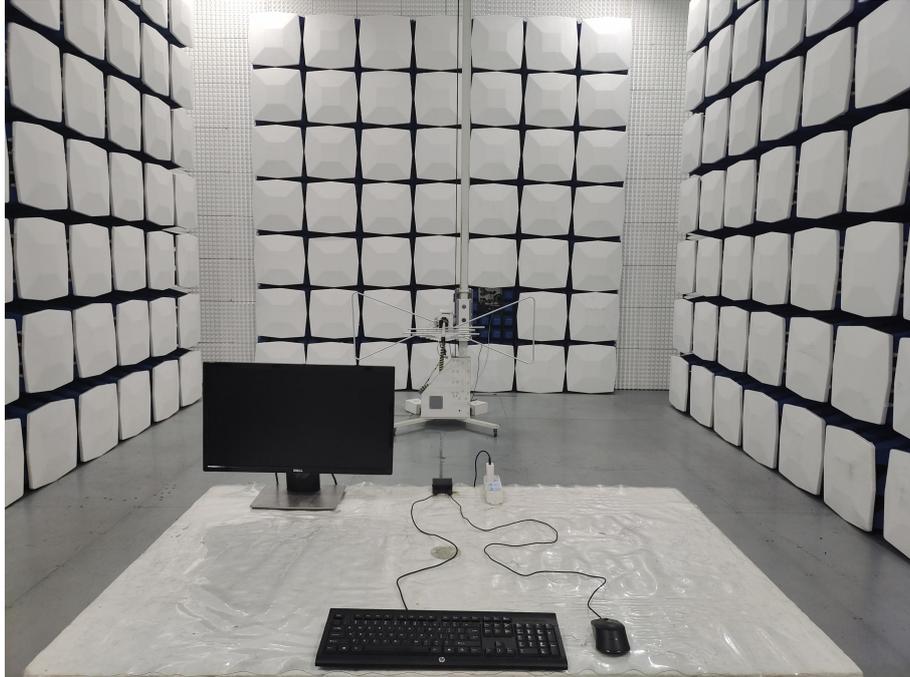


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1187.688	59.89	-14.95	44.94	74.00	-29.06	peak
2	1187.688	44.39	-14.95	29.44	54.00	-24.56	AVG
3	1336.782	59.95	-15.06	44.89	74.00	-29.11	peak
4	1336.782	51.67	-15.06	36.61	54.00	-17.39	AVG
5	2077.235	67.23	-15.22	52.01	74.00	-21.99	peak
6	2077.235	52.48	-15.22	37.26	54.00	-16.74	AVG
7	2227.581	60.09	-14.62	45.47	74.00	-28.53	peak
8	2227.581	51.63	-14.62	37.01	54.00	-16.99	AVG
9	2376.003	66.49	-14.02	52.47	74.00	-21.53	peak
10	2376.003	57.30	-14.02	43.28	54.00	-10.72	AVG
11	2525.249	59.33	-13.43	45.90	74.00	-28.10	peak
12	2525.249	49.61	-13.43	36.18	54.00	-17.82	AVG

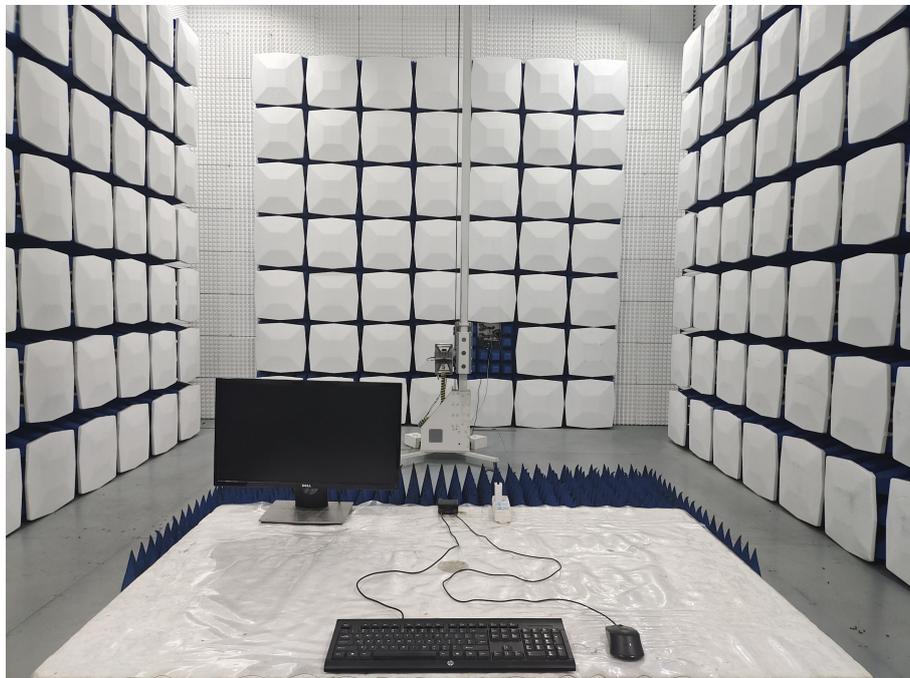
Note 1: The test modes were carried out for all operation modes. The worst test mode for test data was showed in the report.

2: Exceeding the emission limit is the main frequency.

Photographs of the Test setup



30M-1GHz Radiated test

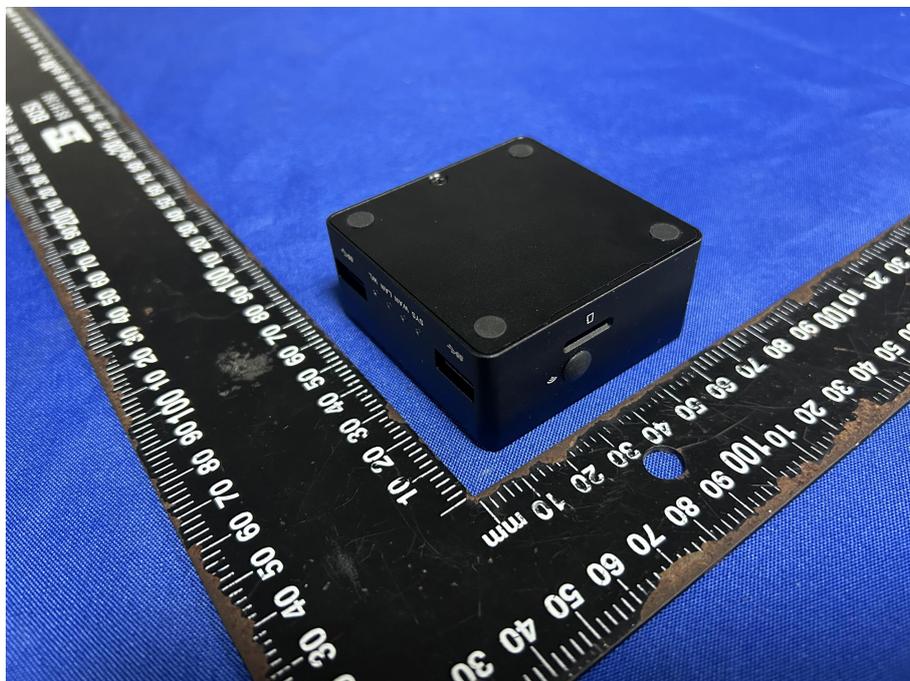
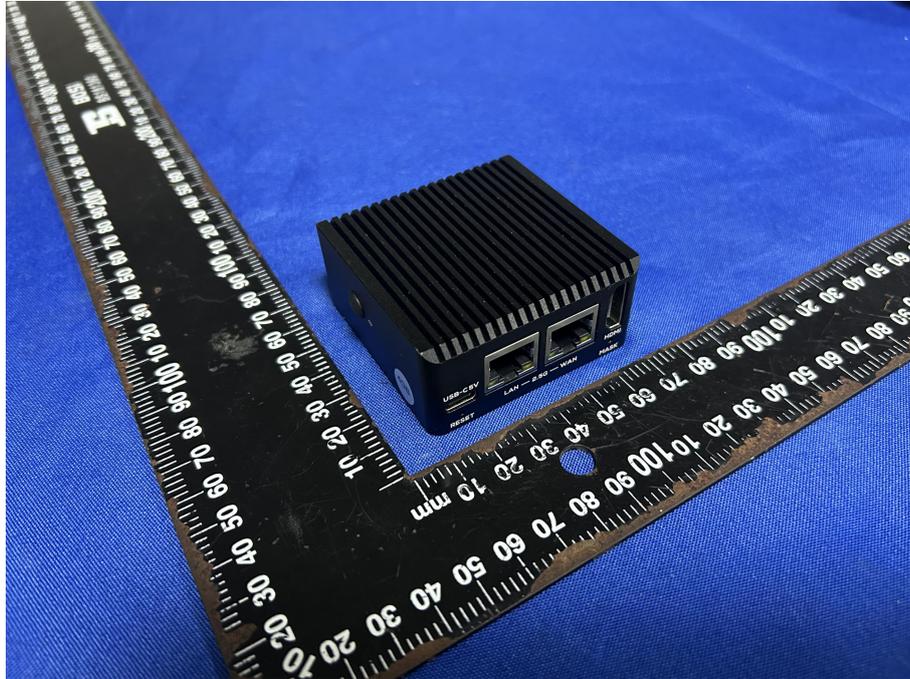


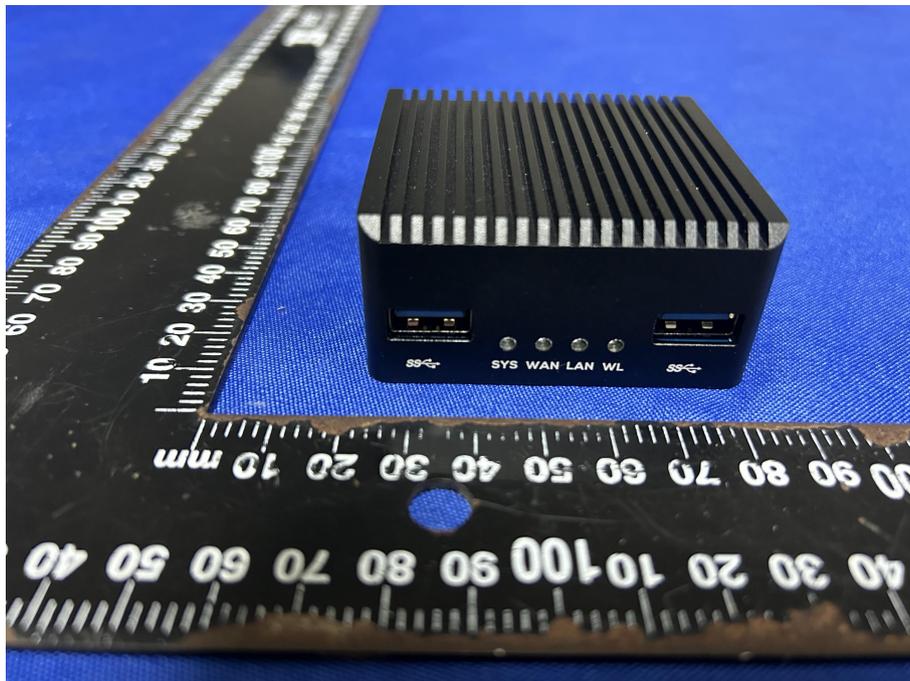
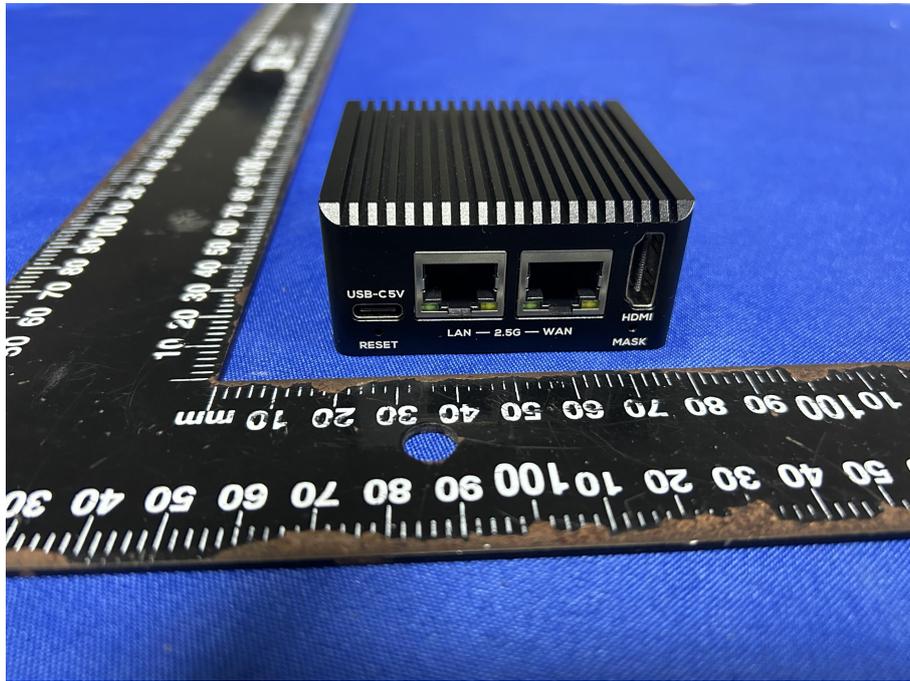
Above 1GHz Radiated test

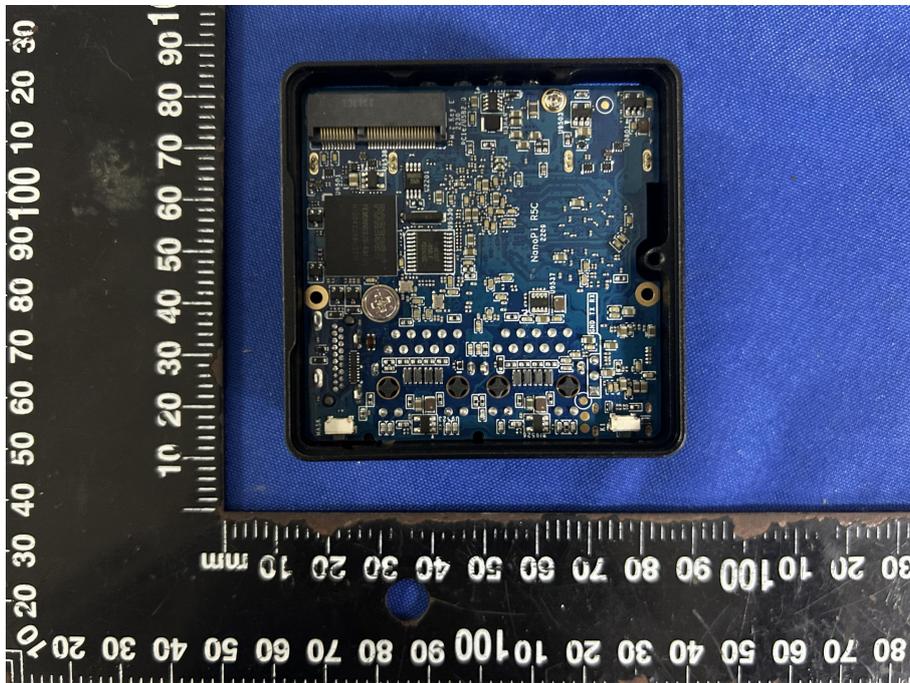
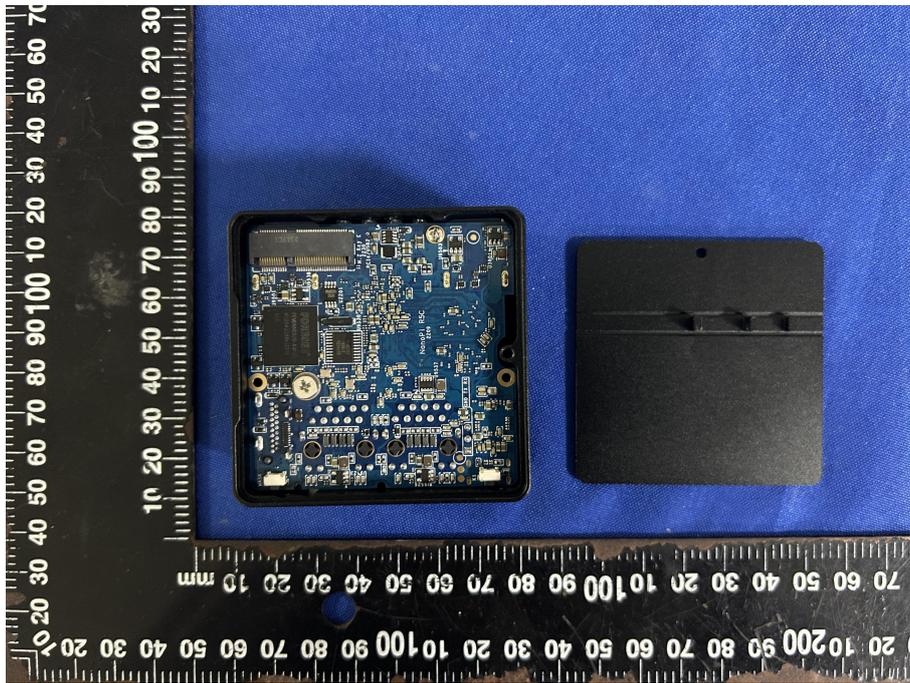


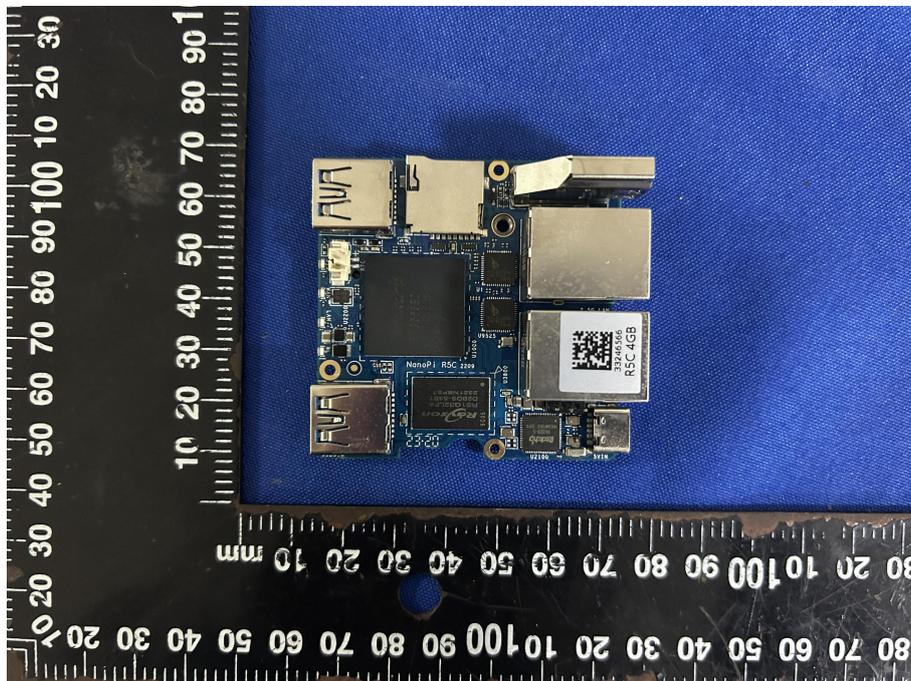
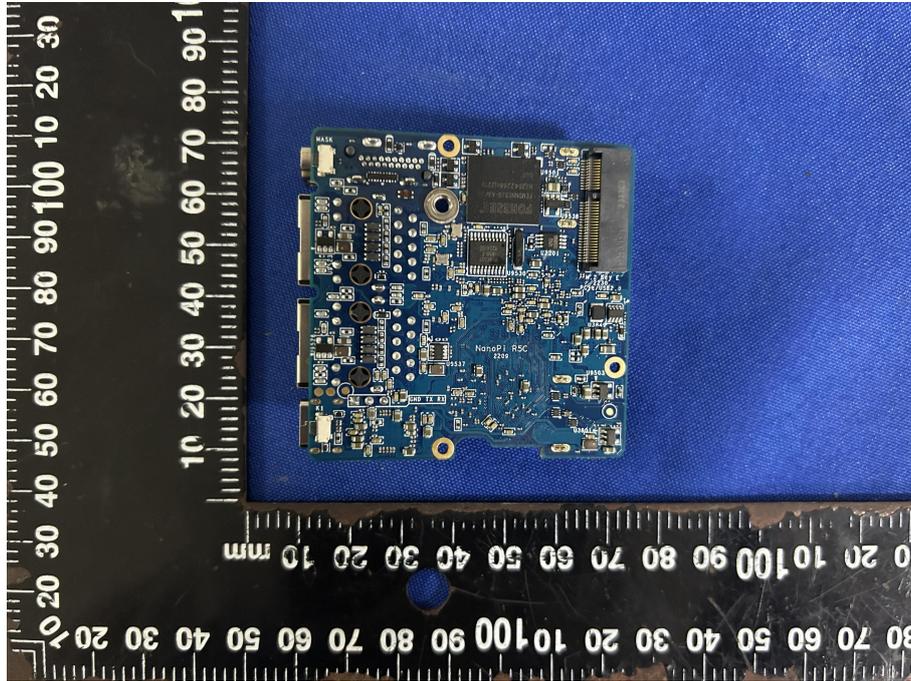
Conducted test

Photographs of the EUT









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