

TEST REPORT

Product Name: FM transmitter
FCC ID: 2A8OX-RSF-300W
Trademark: RS-RADIO
Model Number: RSF-300W, RSF-50W, RSF-100W, RSF-200W, RSF-500W RSF-1000W, RSF-1500W, RSF-2000W
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Sample Received Date: Aug. 16, 2022
Sample tested Date: Aug. 16, 2022 to Aug. 30, 2022
Issue Date: Aug. 30, 2022
Report No.: CTB220830019RF
Test Standards: FCC Part15.239
ANSI C63.10:2013
Test Results: PASS
Remark: This is FM radio test report.

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Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope

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(Note: N/A means not applicable)

**1. VERSION**

Report No.	Issue Date	Description	Approved
CTB220830019RF	Aug. 30, 2022	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A
Radiated Spurious emissions	47 CFR Part 15 Subpart C Section 15.205/15.209	ANSI C63.10-2013	PASS
Occupied Bandwidth	47 CFR Part 15 Subpart C Section 15.239a	ANSI C63.10-2013	PASS
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013	PASS
Band Edge Measurement	47 CFR Part 15 Subpart C Section 15.239a	ANSI C63.10-2013	PASS

Remark:

Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

3. MEASUREMENT UNCERTAINTY

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

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m chamber Radiated spurious emission(9KHz-30MHz)	4.8dB
3m chamber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63℃
frequency	1×10 ⁻⁷
Conducted Emission (150KHz-30MHz)	3.2 dB
Radiated Emission(30MHz ~ 1000MHz)	4.8 dB
Radiated Emission(1GHz ~6GHz)	4.9 dB

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	RSF-300W, RSF-50W, RSF-100W, RSF-200W, RSF-500W RSF-1000W, RSF-1500W, RSF-2000W
Model Description:	All the model are the same circuit and RF module, except model names and microphone number. Test sample model: RSF-300W
Hardware Version:	V1.01
Software Version:	V1.0
Operation Frequency:	88.1-107.7MHz
Type of Modulation:	FM
Antenna installation:	Internal Antenna(Non removable antenna)
Antenna Gain:	1.1dBi
Ratings:	AC 110-260V

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

Item	Equipment	Mfr /Brand	Model/Type No.	Series No.	Note

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

For All Emission	
Final Test Mode	Description
Mode 1	CH01
Mode 2	CH99
Mode 3	CH197
Mode 4	Link mode(conducted emission and Radiated emission)

Channel	Frequency (MHz)
01	88.1
02	88.2
03	88.3
~	~
196	107.6
197	107.7

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting	88.1	97.9	107.7

4.6 Test Environment

Humidity(%):	55
Atmospheric Pressure(kPa):	101.1
Normal Voltage(AC):	120V
Normal Temperature(°C)	25
Low Temperature(°C)	0
High Temperature(°C)	40

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Street, Baoan District, Shenzhen China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Item	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2023.07.19
2	Power Sensor	Agilent	U2021XA	MY56120032	2023.07.19
3	Power Sensor	Agilent	U2021XA	MY56120034	2023.07.19
4	Communication test set	R&S	CMW500	108058	2023.07.19
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	2023.07.19
6	Signal Generator	Agilent	N5181A	MY50140365	2023.07.19
7	Vector signal generator	Agilent	N5182A	MY47420195	2023.07.19
8	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	2023.07.19
10	5 GHz Filter	Shenxiang	MSF5150-5850 MS-1155	20181015001	2023.07.19
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	2023.07.19
12	BT&WI-FI Automatic test software	Microwave	MTS8000	Ver. 2.0.0.0	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2022.10.30
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2023.07.19
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	/
16	966 chamber	C.R.T.	966	/	2024.08.11
17	Receiver	R&S	ESPI	100362	2023.07.19
18	Amplifier	HP	8447E	2945A02747	2023.07.19
19	Amplifier	Agilent	8449B	3008A01838	2023.07.19
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2023.07.22
21	Double Ridged Broadband Horn	Schwarzbeck	BBHA9120D	01911	2023.07.22

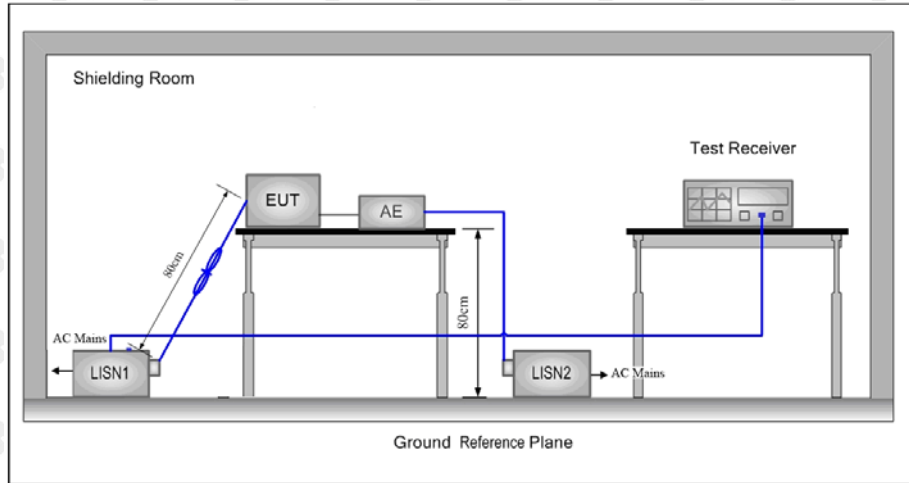
	Antenna				
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	2023.07.23
24	loop antenna	ZHINAN	ZN30900A	GTS534	/
25	40G Horn antenna	A/H/System	SAS-574	588	2024.10.30
26	Amplifier	AEROFLEX	Aeroflex	097	2024.10.30

Continuous disturbance					
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	ROHDE&SCHWARZ	ESH3-Z5	100318	2023.07.19
2	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	2023.07.19
3	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCS30	834115/006	2023.07.19
4	Coaxial cable	ZDECL	Z302S	18091904	2023.07.19
5	ISN	Schwarzbeck	NTFM8158	183	2023.07.19
6	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
7	Communication test set	R&S	CMW500	108058	2023.07.19
8	EZ-EMC	Frad	EMC-con3A1.1	/	/

Radiated emission					
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	1911	2023.07.22
2	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	869	2023.07.22
3	Amplifier	Agilent	8449B	3008A01838	2023.07.19
4	Amplifier	HP	8447E	2945A02747	2023.07.19
5	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI7	100362	2023.07.19
6	Coaxial cable	ETS	RFC-SNS-100-NMS-80 NI	/	2023.07.19
7	Coaxial cable	ETS	RFC-SNS-100-NMS-20 NI	/	2023.07.19
8	Coaxial cable	ETS	RFC-SNS-100-SMS-20 NI	/	2023.07.19
9	Coaxial cable	ETS	RFC-NNS-100-NMS-300 NI	/	2023.07.19
10	Communication test set	Agilent	E5515C	MY50102567	2023.07.19
11	Communication test set	R&S	CMW500	108058	2023.07.19
12	EZ-EMC	Frad	EMC-con3A1.1	/	/

6. AC POWER LINE CONDUCTED EMISSION

6.1 Block Diagram Of Test Setup



6.2 Limit

Frequency (MHz)	Maximum RF Line Voltage (dB μ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

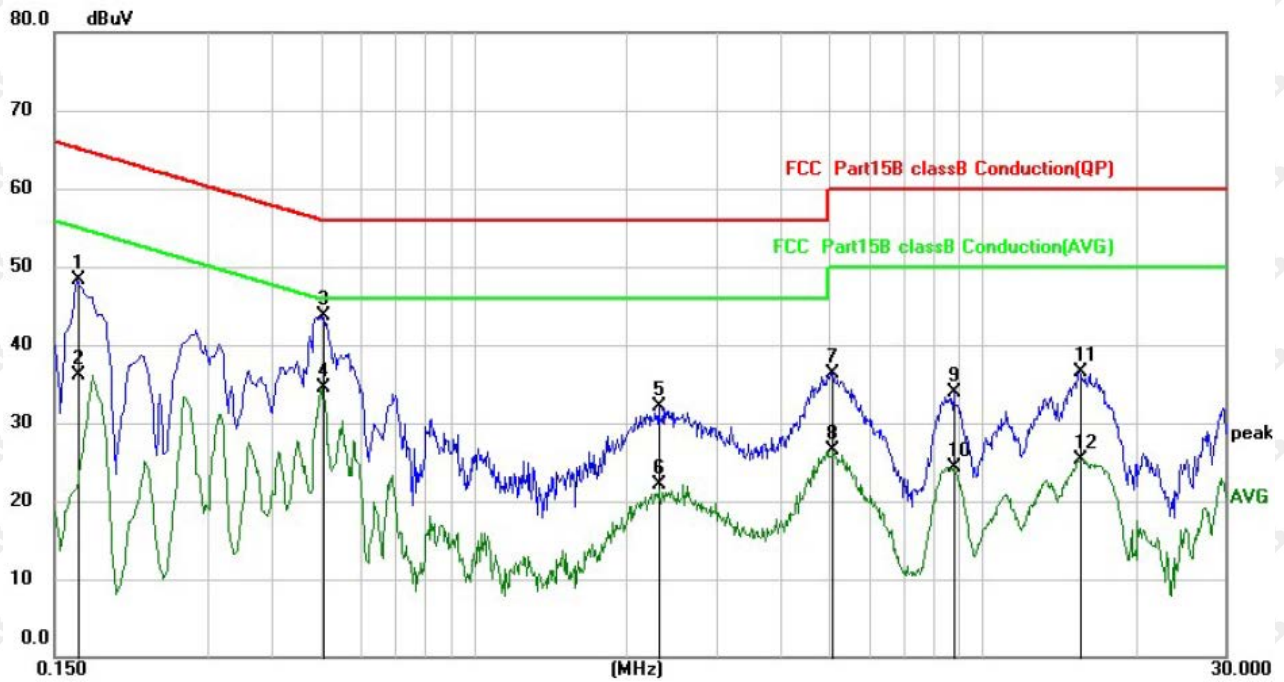
6.3 Test procedure

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50 Ω /50 μ H + 5 Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

- 6) All modes were tested at AC 120V and 240V, only the worst result of AC 120V 60Hz was reported.
- 7) If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.

6.4 Test Result

Test Specification: Line
AC 120V 60Hz

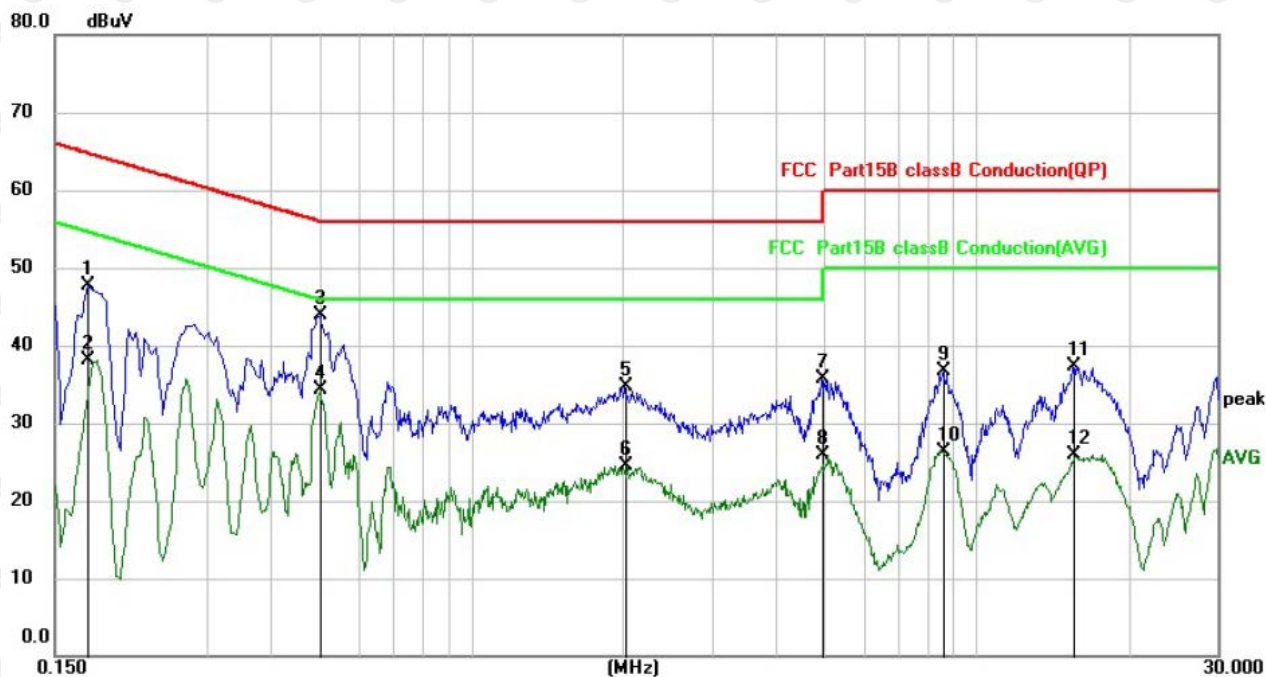


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	0.1660	37.68	10.71	48.39	65.16	-16.77	QP
2	0.1660	25.46	10.71	36.17	55.16	-18.99	AVG
3	0.5060	33.15	10.52	43.67	56.00	-12.33	QP
4 *	0.5060	24.00	10.52	34.52	46.00	-11.48	AVG
5	2.3140	21.42	10.63	32.05	56.00	-23.95	QP
6	2.3140	11.46	10.63	22.09	46.00	-23.91	AVG
7	5.0500	25.73	10.65	36.38	60.00	-23.62	QP
8	5.0500	15.93	10.65	26.58	50.00	-23.42	AVG
9	8.7820	23.07	10.78	33.85	60.00	-26.15	QP
10	8.7820	13.54	10.78	24.32	50.00	-25.68	AVG
11	15.5060	25.64	10.91	36.55	60.00	-23.45	QP
12	15.5060	14.45	10.91	25.36	50.00	-24.64	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

Test Specification: Neutral
AC 120V 60Hz



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1740	37.04	10.71	47.75	64.77	-17.02	QP
2		0.1740	27.38	10.71	38.09	54.77	-16.68	AVG
3		0.5020	33.37	10.52	43.89	56.00	-12.11	QP
4	*	0.5020	23.80	10.52	34.32	46.00	-11.68	AVG
5		2.0140	24.13	10.63	34.76	56.00	-21.24	QP
6		2.0140	13.88	10.63	24.51	46.00	-21.49	AVG
7		4.9500	24.97	10.65	35.62	56.00	-20.38	QP
8		4.9500	15.17	10.65	25.82	46.00	-20.18	AVG
9		8.6180	25.95	10.77	36.72	60.00	-23.28	QP
10		8.6180	15.62	10.77	26.39	50.00	-23.61	AVG
11		15.4980	26.43	10.91	37.34	60.00	-22.66	QP
12		15.4980	15.07	10.91	25.98	50.00	-24.02	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

7. RADIATED SPURIOUS EMISSION

7.1 Block Diagram Of Test Setup

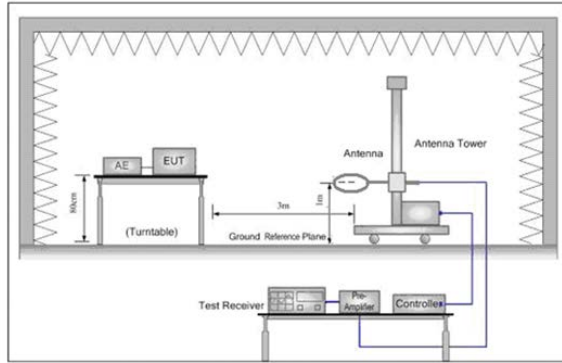


Figure 1. Below 30MHz

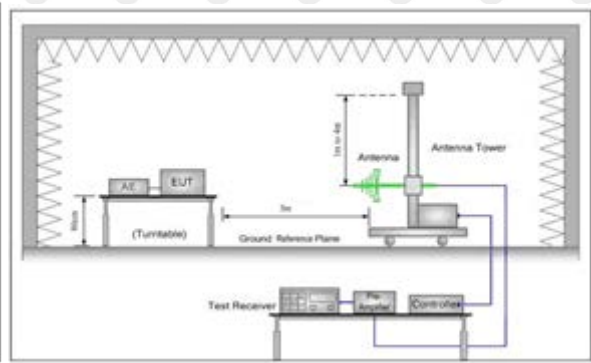


Figure 2. 30MHz to 1GHz

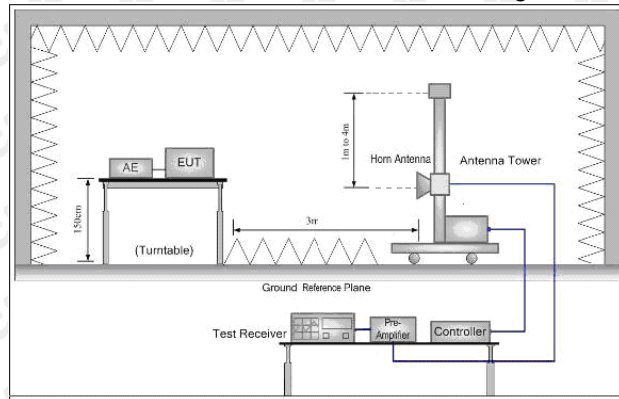


Figure 3. Above 1GHz

7.2 Limit

Spurious Emissions:

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	-	300
0.490MHz-1.705MHz	24000/F (kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

7.3 Test procedure

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel
- Repeat above procedures until all frequencies measured was complete.
- Full battery is used during test

Receiver set:

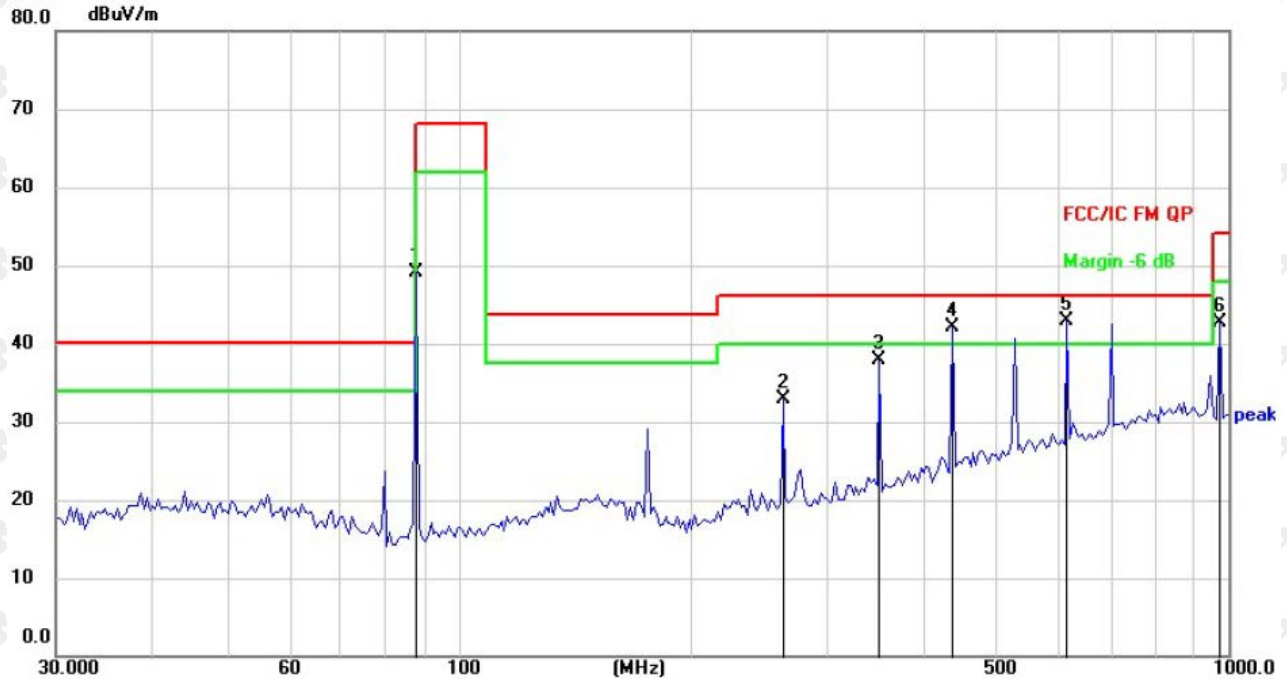
Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

7.4 Test Result

Below 1GHz Test Results:

Antenna polarity: H

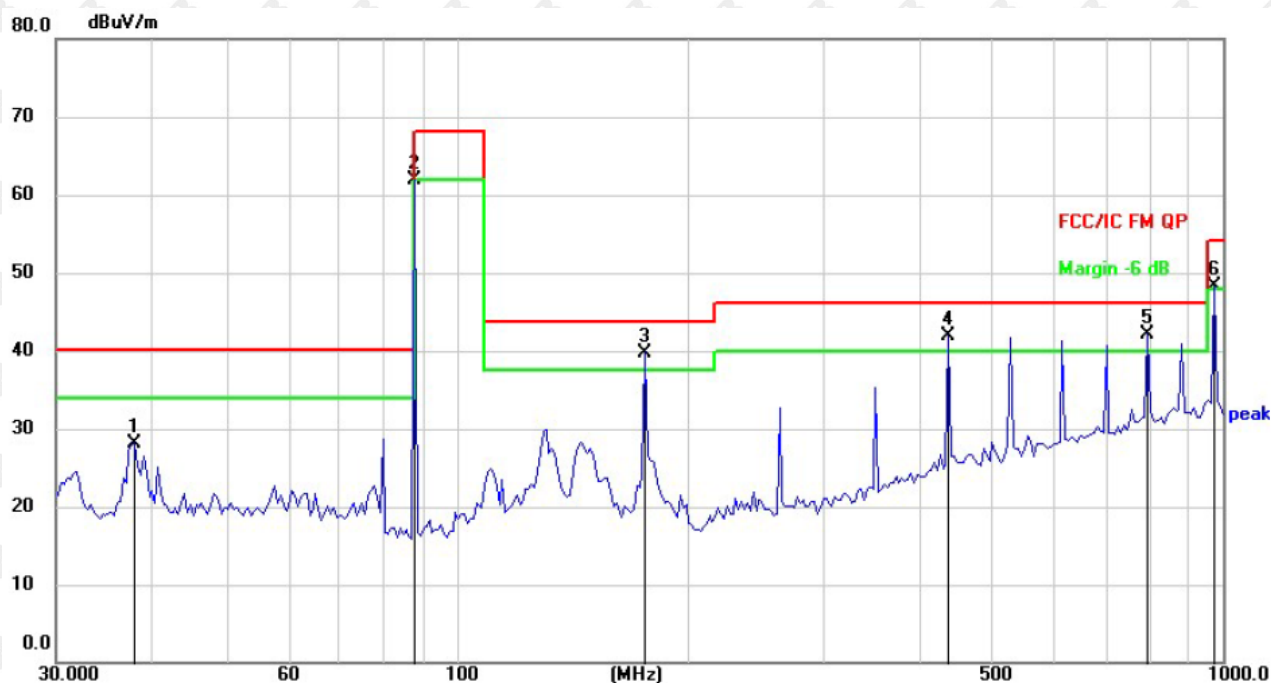
Mode 1-the worst



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		88.1872	58.85	-9.74	49.11	68.00	-18.89	QP
2		263.8190	38.39	-5.57	32.82	46.00	-13.18	QP
3		352.3249	41.25	-3.37	37.88	46.00	-8.12	QP
4	!	438.6553	42.95	-0.76	42.19	46.00	-3.81	QP
5	*	617.4533	40.12	2.81	42.93	46.00	-3.07	QP
6		974.0435	36.86	5.75	42.61	54.00	-11.39	QP

Remark: Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Measurement- Limit

Antenna polarity: V



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		38.0114	33.83	-5.75	28.08	40.00	-11.92	QP
2		88.1872	71.72	-9.74	61.98	68.00	-6.02	QP
3	*	176.2685	46.92	-7.18	39.74	43.50	-3.76	QP
4	!	438.6553	42.74	-0.76	41.98	46.00	-4.02	QP
5	!	796.1829	36.12	5.95	42.07	46.00	-3.93	QP
6	!	974.0435	42.65	5.75	48.40	54.00	-5.60	QP

Remark: Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Measurement- Limit

For average Emission

Frequency MHz	Average Level dBuV/m	Limit AV	Margin	Polarization
88.1	42.44	48.00	-5.56	Horizontal
88.1	42.05	48.00	-5.95	Vertical

Above 1 GHz Test Results:

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detect or Type
V	1057.2	51.17	39.55	7.77	25.66	45.05	74	-28.95	PK
V	1057.2	44.25	39.55	7.77	25.66	38.13	54	-15.87	AV
V	1174.8	51.36	38.33	7.3	24.55	44.88	74	-29.12	PK
V	1174.8	44.48	38.33	7.3	24.55	38	54	-16	AV
V	1292.4	52.57	38.33	7.6	24.55	46.39	74	-27.61	PK
V	1292.4	50.64	35.23	7.6	26.59	49.6	54	-4.4	AV
H	1145.3	52.74	39.55	7.77	25.66	46.62	74	-27.38	PK
H	1145.3	52.86	39.55	7.77	25.66	46.74	54	-7.26	AV
H	1272.7	42.96	38.33	7.3	23.55	35.48	74	-38.52	PK
H	1272.7	52.37	38.33	7.3	23.22	44.56	54	-9.44	AV
H	1400.1	52.57	38.33	7.6	24.55	46.39	74	-27.61	PK
H	1400.1	44.26	35.45	7.6	27.88	44.29	54	-9.71	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss - Pre-amplifier, Margin = Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Restricted bands around fundamental frequency (Radiated)

Horizontal

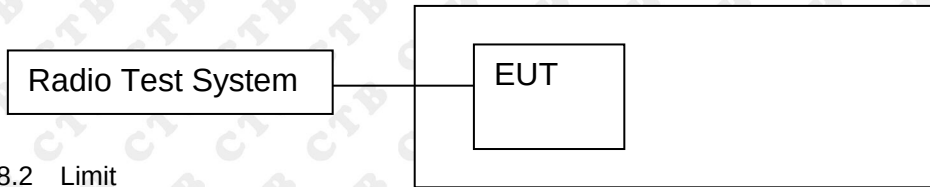
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
88.00	40.55	-15.83	24.72	40.00	-15.28	QP
108.00	38.53	-15.89	22.64	43.50	-20.86	QP
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
88.00	38.71	-15.85	22.86	40.00	-17.14	QP
108.00	39.79	-15.91	23.88	43.50	-19.62	QP
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

8. BANDWIDTH TEST

8.1 Block Diagram Of Test Setup



8.2 Limit

According to 15.209&15.239 requirement:
The bandwidth of the emission shall not exceed 200 kHz.

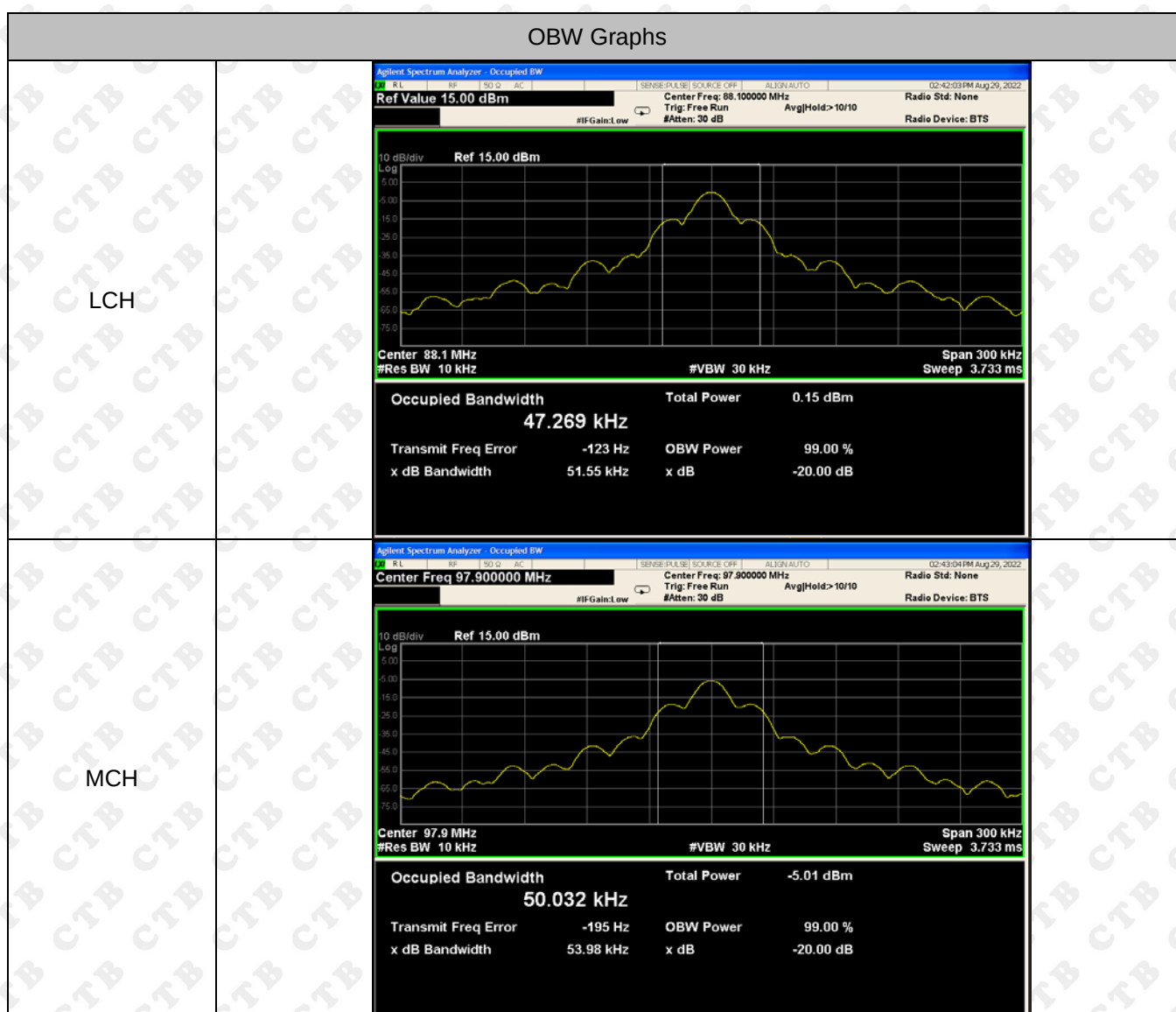
8.3 Test procedure

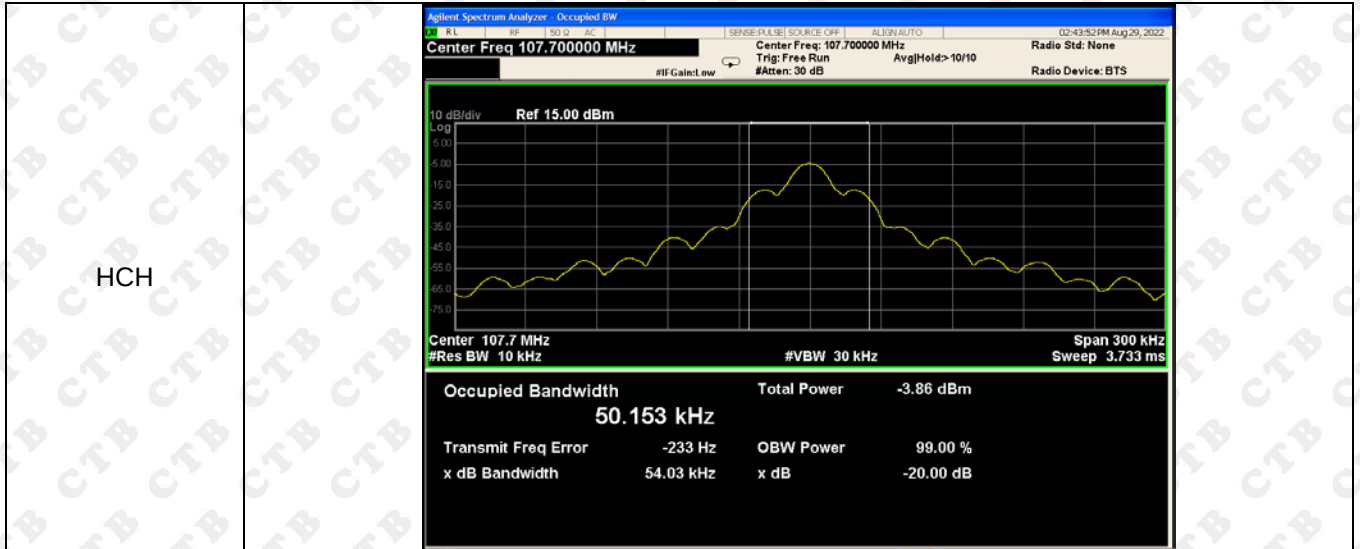
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:
RBW = 30kHz, VBW = 100kHz, Sweep = auto
Detector function = peak, Trace = max hold

8.4 Test Result

Temperature :	23 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	AC 120V
Test Mode :	TX Mode		

Frequency	20dBc bandwidth (kHz)	Limit (kHz)	Result
88.1MHz	51.55	200	PASS
97.9 MHz	53.98	200	PASS
107.7 MHz	54.03	200	PASS





9. ANTENNA REQUIREMENT

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

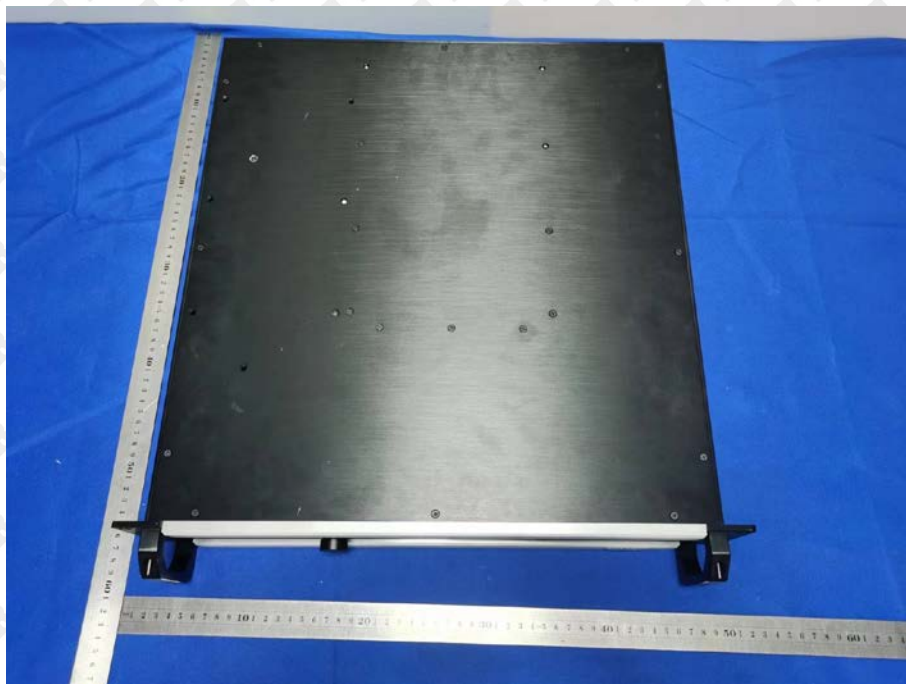
The antenna is Internal Antenna(Non removable antenna). The best case gain of the antenna is 1.1dBi.

10. EUT PHOTOGRAPHS

EUT Photo 1

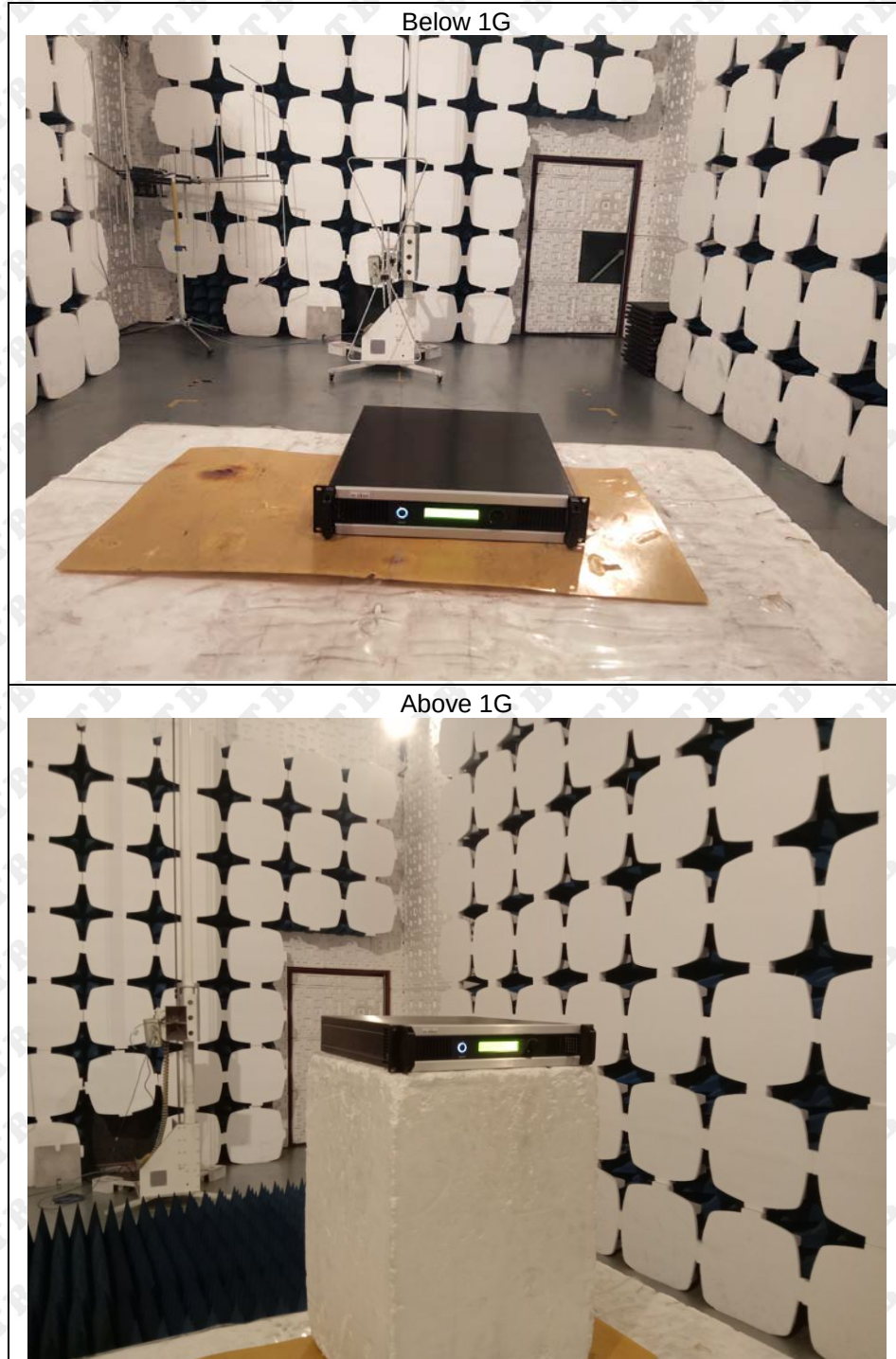


EUT Photo 2



11. EUT TEST SETUP PHOTOGRAPHS

Radiated Emission



Conducted Emission



***** END OF REPORT *****