

EMC TEST REPORT

Product Name: detector

FCC ID: 2BO33-S

Trade mark: N/A

Model No.: S88, K95, K97, K98, S16, S18, S68, S668, KS11, GF01

S/N: /

Report No.: CTB25040906501RF01

Applicant: Shenzhen good friend Electronics Co., Ltd

Address: Building 6709, Building 7, Block A, Bao'an District Internet industrial base, Shenzhen, China

Manufacturer: Shenzhen good friend Electronics Co., Ltd

Address: Building 6709, Building 7, Block A, Bao'an District Internet industrial base, Shenzhen, China

Prepared by: Shenzhen CTB Testing Technology Co., Ltd.

Address: 1&2/F, Building A, No.26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China

Date of Receipt: Apr. 09, 2025

Date of Test(s): Apr. 09, 2025 ~ Apr. 22, 2025

Date of Issue: Apr. 22, 2025

Test Standard(s): CFR47, FCC Part 15 Subpart B, ANSI C63.4: 2014

Test Result: Pass

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

Compiled by:

Reviewed by:

Approved by:

Michael Niu

Bin Mei

Rita Xiao

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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1. Description of version

Report No.	Issue Date	Description	Approved
CTB25040906501RF01	Apr. 22, 2025	Original	Valid

2. Test summary

Test procedures according to the technical standards:

Standard	Test Item	Test Result
§15.107	Conducted Emission	PASS
§15.109	Radiated Emission	PASS

3. Measurement uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %

Test Item	Frequency	Expanded Uncertainty (U_{Lab})
Conducted Emission	150 kHz to 30 MHz	± 3.1 dB
Radiated Emission	30 MHz to 1000 MHz	± 4.1 dB
Radiated Emission	1000 MHz to 6000 MHz	± 4.8 dB

4. General information

4.1. Description of EUT

Product name	detector
Trade mark	N/A
Model No.	S88
Serial Model No.	K95, K97, K98, S16, S18, S68, S668, KS11, GF01
Model Difference	All the model are the same circuit and RF module, only the appearance color is different. Test sample model: S88
Configuration	☒ Table-top ☐ Floor-standing
The highest frequency of the internal sources of the EUT	☐ below 1.705 MHz, the measurement shall only be made up to 30 MHz. ☒ between 1.705 MHz and 108 MHz, the measurement shall only be made up to 1 GHz. ☐ between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. ☐ between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. ☐ above 1 GHz, the measurement shall be made up to 5th harmonic of the highest frequency or 40 GHz, whichever is lower.
Ratings:	DC 5V charging from adapter DC 3.7V by battery

Note: The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

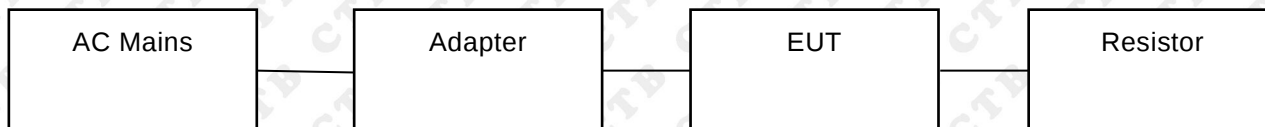
4.2. Description of accessory device

No.	Device Type	Brand	Model	Specification	Note
1	Adapter	JYIN	JY-05100C	/	AE

4.3. Test conditions

Temperature: 15-25°C
 Relative Humidity: 30-60 %
 Atmospheric pressure: 800hPa-1060hPa

4.4. Block diagram of EUT configuration



4.5. Operating condition of EUT

Operating condition	Mode 1	Working	Test Voltage	/
Note: This test covers all possible operating modes of the device, only the worst data are list in report. The worst				

data are shows (*)is the nearest standard limit which were recorded in this report.

5. List of Test and Measurement Instruments

Continuous disturbance						
No.	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Calibrated until
1	843 Shield Room	C/ R/ T	843	/	/	2027/6/21
2	AMN	ROHDE&SCHWARZ	ESH3-Z5	831551852	/	2025/6/30
3	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	/	2025/6/28
4	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428	V4.42.SP3	2025/6/30
5	Coaxial cable	ZDECL	Z302S	18091904	/	2025/6/30
6	ISN	Schwarzbeck	NTFM8158	183	/	2025/6/30
7	Voltage sensor	Schwarzbeck	TK 9420	01189	/	2025/10/25
8	EZ-EMC	Frad	EMC-con3A1.1	/	/	/
9	Current Probe	FCC	F-52B	199453	/	2025/5/27
10	Communication test set	R&S	CMW500	108058	B.19.07 (E1962B)	2025/6/28
11	Communication test set	Agilent	E5515C	MY50102567	V3.5.80	2025/6/28

Radiated emission(No.1 Chamber)						
No.	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Calibrated until
1	966 Chamber	C/ R/ T	966	/	/	2027/6/21
2	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	01911	/	2025/7/06
3	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2025/6/29
4	Amplifier	Agilent	8449B	3008A01838	/	2025/6/30
5	Amplifier	HP	8447E	2945A02747	/	2025/6/28
6	loop antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/29
7	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
8	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
9	Coaxial cable	ETS	RFC-SNS-100-NMS-80	/	/	2025/6/28

10	Coaxial cable	ETS	RFC-SN-100-NMS-20	/	/	2025/6/28
11	Coaxial cable	ETS	RFC-SNS-100-SMS-20	/	/	2025/6/28
12	Coaxial cable	ETS	RFC-NNS-100-NMS-300	/	/	2025/6/28
13	EMI test software	Frad	EZ-EMC	Ver/ FA-03A2 RE	/	/
14	Communication test set	R&S	CMW500	108058	B.19.07 (E1962B)	2025/6/28
15	Communication test set	Agilent	E5515C	MY50102567	V3.5.80	2025/6/28

6. Conducted Emission

6.1. Limit

Except for Class A devices:

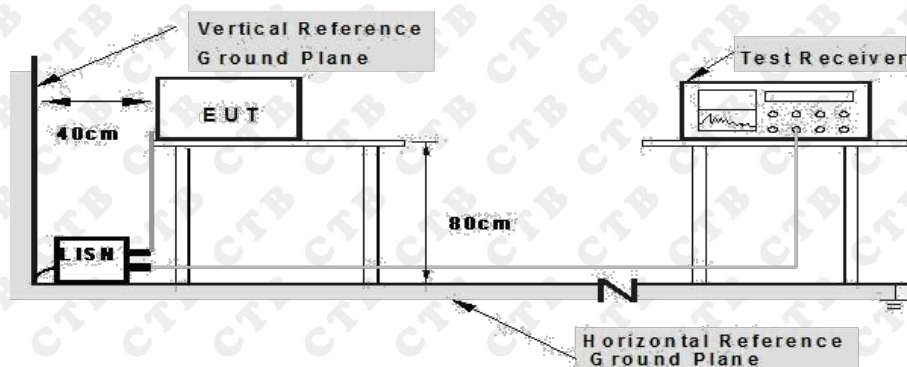
Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Note: Decreases with the logarithm of the frequency.

For Class A devices:

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	79	66
0.5-30	73	60

6.2. Test setup



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

The setup of EUT is according with ANSI C63.4 measurement procedure. Specification used with FCC Part 15 limits.

6.3. EMI test receiver setup

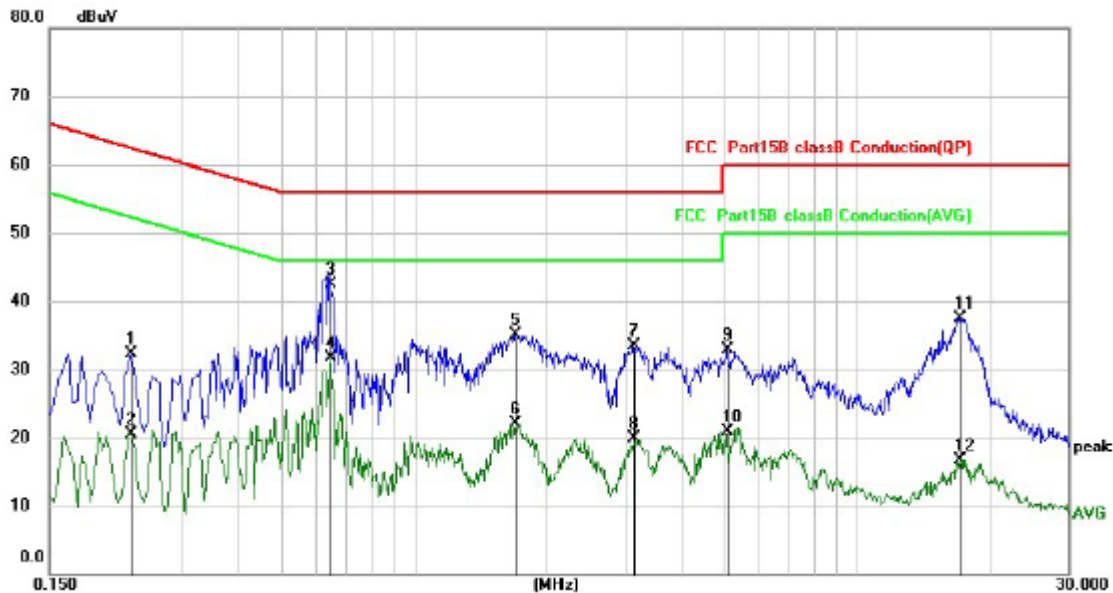
Frequency Range	9kHz-30MHz
Resolution Bandwidth	200Hz (9kHz-150kHz) 9kHz (150kHz-30MHz)

6.4. Test procedure

1. Measurement was performed in shielded room, and instruments used were followed clause 4 of ANSI C63.4.
2. Detailed test procedure was following clause 7 of ANSI C63.4.
3. Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9 kHz.

6.5. Test results

Temperature:	23°C	Relative Humidity:	54 %
Pressure:	101kPa	Phase :	Line
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1

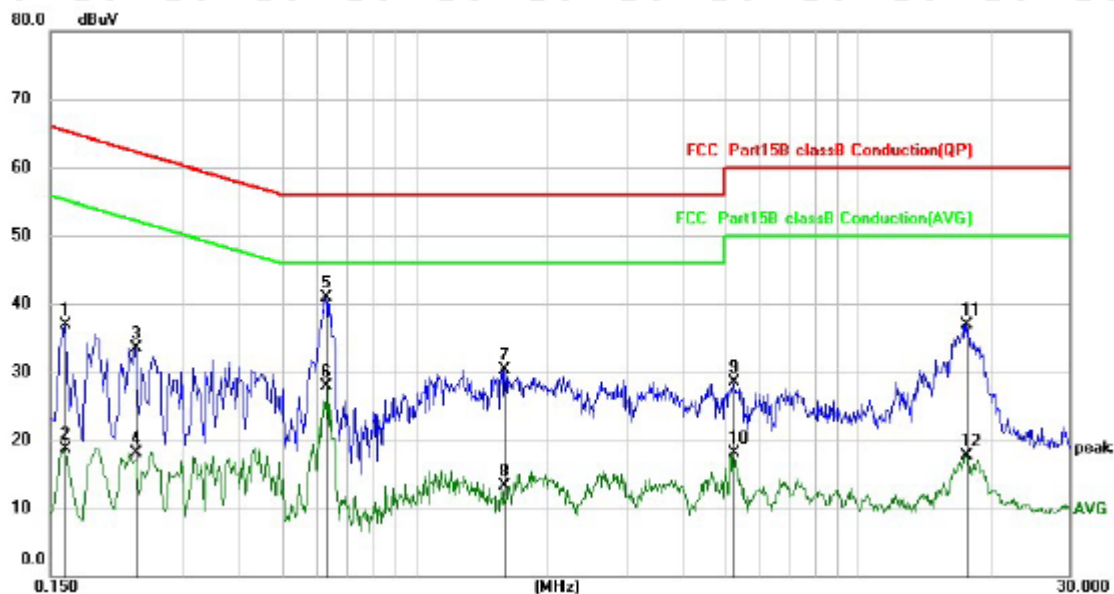


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
		MHz	Level	Factor	ment			Detector
			dBuV	dB	dBuV	dBuV	dB	
1		0.2300	21.71	10.69	32.40	62.45	-30.05	QP
2		0.2300	9.90	10.69	20.59	52.45	-31.86	AVG
3 *		0.6500	31.80	10.67	42.47	56.00	-13.53	QP
4		0.6500	21.01	10.67	31.68	46.00	-14.32	AVG
5		1.6980	23.78	11.39	35.17	56.00	-20.83	QP
6		1.6980	10.66	11.39	22.05	46.00	-23.95	AVG
7		3.1260	21.72	11.83	33.55	56.00	-22.45	QP
8		3.1260	8.14	11.83	19.97	46.00	-26.03	AVG
9		5.0979	20.58	12.27	32.85	60.00	-27.15	QP
10		5.0979	8.62	12.27	20.89	50.00	-29.11	AVG
11		17.0900	24.15	13.44	37.59	60.00	-22.41	QP
12		17.0900	3.36	13.44	16.80	50.00	-33.20	AVG

Note: Result=Reading + Factor

Over Limit=Result – Limit

Temperature:	23°C	Relative Humidity:	54 %
Pressure:	101kPa	Phase :	Neutral
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1620	26.02	10.85	36.87	65.36	-28.49	QP
2		0.1620	7.93	10.85	18.78	55.36	-36.58	AVG
3		0.2340	22.74	10.69	33.43	62.31	-28.88	QP
4		0.2340	7.37	10.69	18.06	52.31	-34.25	AVG
5 *		0.6300	30.24	10.64	40.88	56.00	-15.12	QP
6		0.6300	17.28	10.64	27.92	46.00	-18.08	AVG
7		1.5859	19.05	11.32	30.37	56.00	-25.63	QP
8		1.5859	2.03	11.32	13.35	46.00	-32.65	AVG
9		5.2339	16.20	12.32	28.52	60.00	-31.48	QP
10		5.2339	5.81	12.32	18.13	50.00	-31.87	AVG
11		17.5619	23.39	13.47	36.86	60.00	-23.14	QP
12		17.5619	4.26	13.47	17.73	50.00	-32.27	AVG

Note: Result=Reading + Factor

Over Limit=Result – Limit

7. Radiated emissions

7.1. Limit

Except for Class A devices (at 3m):

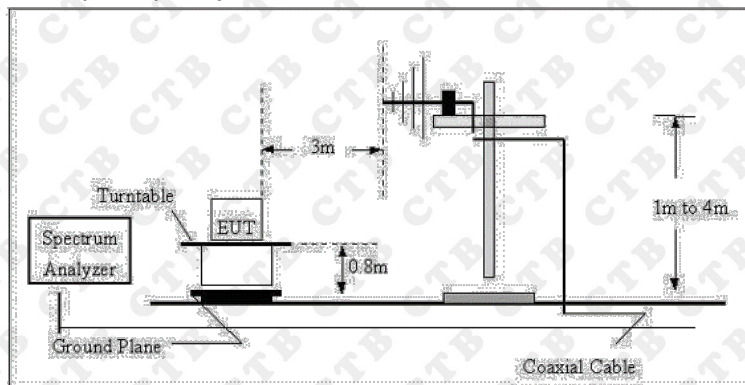
Frequency of emission (MHz)	Field strength (microvolts/meter)	
	(microvolts/meter)	(dB μ V/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

For Class A devices (at 10m):

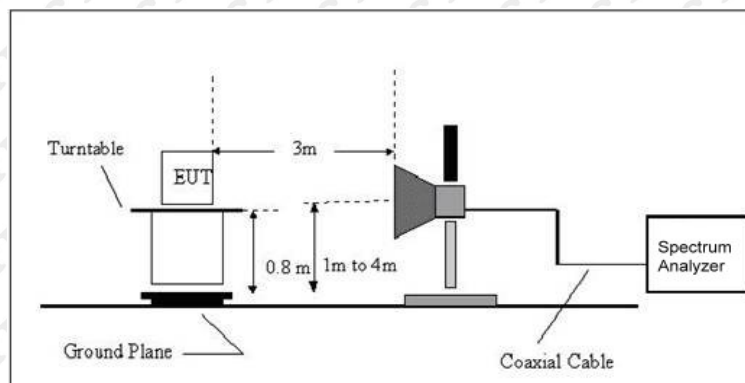
Frequency of emission (MHz)	Field strength (microvolts/meter)	
	(microvolts/meter)	(dB μ V/m)
30-88	90	39
88-216	150	43.5
216-960	210	46.4
Above 960	300	49.5

7.2. Test setup

Radiated Emission Test Set-Up Frequency Below 1 GHz



Radiated Emission Test Set-Up Frequency Above 1GHz



The radiated tests were performed in 3 meter Chamber test site, using the setup accordance with the ANSI C63.4:2014.

7.3. EMI test receiver setup and spectrum analyzer setup

During the radiated emission test, the EMI test receiver and Spectrum Analyzer were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz-1000MHz	100kHz	300kHz	120kHz	QP
Above 1GHz	1MHz	3MHz	/	PK
	1MHz	10Hz	/	AVG

7.4. Test procedure

1. The measurement was performed in a semi-anechoic chamber, and instruments used were followed clause 4 of ANSI C63.4
2. Detailed test procedure was following clause 8 of ANSI C63.4.

7.5. Corrected Amplitude & Margin Calculation

1. The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

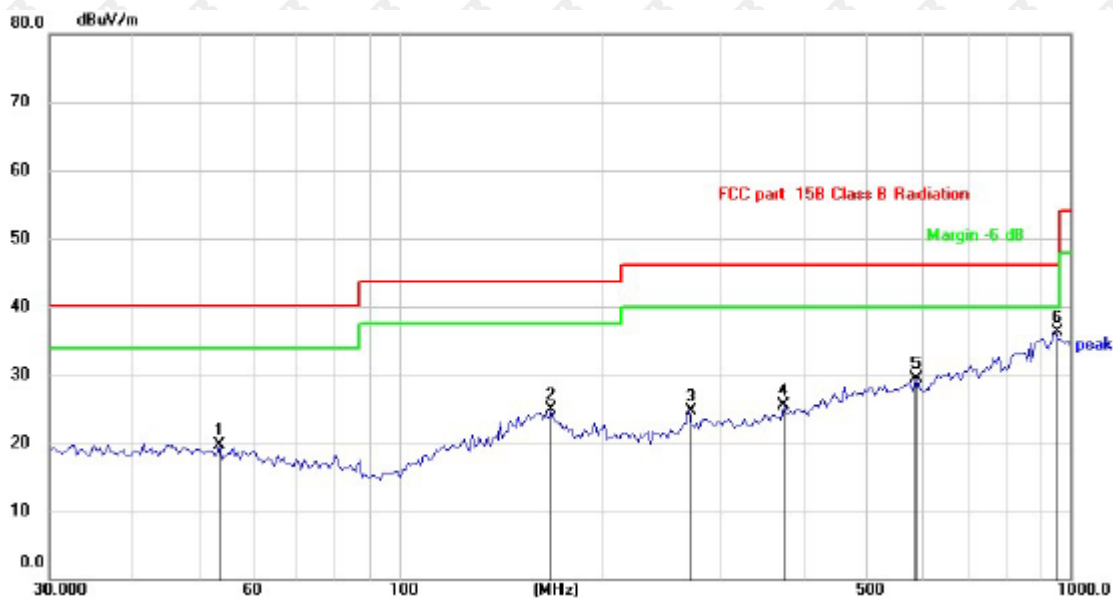
$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

2. The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

7.6. Test results

Temperature:	23°C	Relative Humidity:	54 %
Pressure:	101kPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		53.9763	26.69	-6.90	19.79	40.00	-20.21	QP
2		168.7093	26.73	-1.92	24.81	43.50	-18.69	QP
3		270.8493	28.04	-3.43	24.61	46.00	-21.39	QP
4		374.6225	26.74	-1.27	25.47	46.00	-20.53	QP
5		590.9737	26.10	3.43	29.53	46.00	-16.47	QP
6	*	948.7610	27.73	8.60	36.33	46.00	-9.67	QP

Note: Result=Reading+Factor

Over Limit=Result-Limit

Temperature:	23°C	Relative Humidity:	54 %
Pressure:	101kPa	Polarization :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1

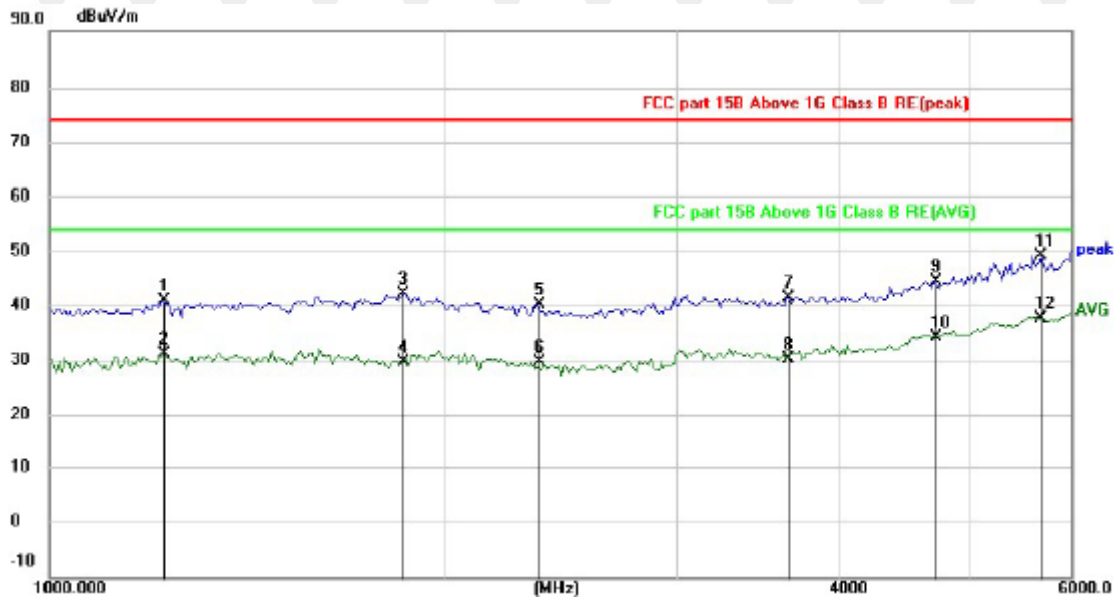


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		42.9750	28.29	-6.82	21.47	40.00	-18.53	QP
2		96.2672	28.53	-9.81	18.72	43.50	-24.78	QP
3		167.2368	27.34	-1.73	25.61	43.50	-17.89	QP
4		361.7139	26.50	-1.55	24.95	46.00	-21.05	QP
5		509.1501	25.97	2.27	28.24	46.00	-17.76	QP
6	*	957.1148	27.02	8.66	35.68	46.00	-10.32	QP

Note: Result=Reading+Factor
Over Limit=Result-Limit

Above 1GHz:

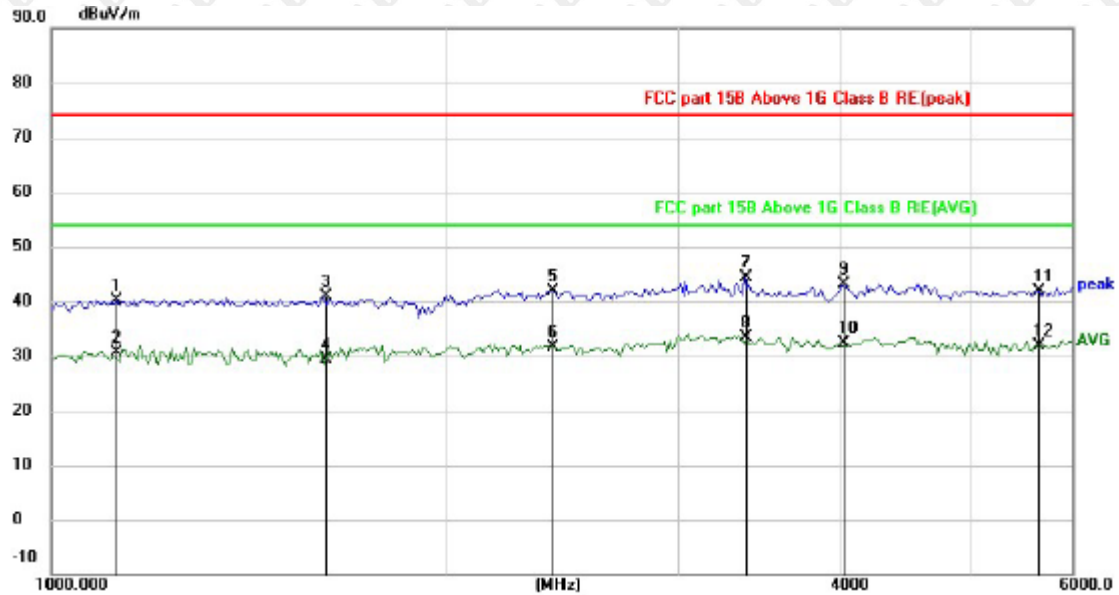
Temperature:	24°C	Relative Humidity:	54 %
Pressure:	101kPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1217.858	47.38	-6.53	40.85	74.00	-33.15	peak
2		1217.858	37.58	-6.53	31.05	54.00	-22.95	AVG
3		1863.835	44.29	-2.15	42.14	74.00	-31.86	peak
4		1863.835	31.88	-2.15	29.73	54.00	-24.27	AVG
5		2352.704	39.10	0.99	40.09	74.00	-33.91	peak
6		2352.704	28.57	0.99	29.56	54.00	-24.44	AVG
7		3649.340	34.83	6.50	41.33	74.00	-32.67	peak
8		3649.340	23.66	6.50	30.16	54.00	-23.84	AVG
9		4710.867	34.01	10.48	44.49	74.00	-29.51	peak
10		4710.867	23.70	10.48	34.18	54.00	-19.82	AVG
11		5685.998	35.66	13.41	49.07	74.00	-24.93	peak
12	*	5685.998	24.29	13.41	37.70	54.00	-16.30	AVG

Note: Result=Reading+Factor
Over Limit=Result-Limit

Temperature:	24°C	Relative Humidity:	54 %
Pressure:	101kPa	Polarization :	Vertical
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		1123.517	46.73	-6.62	40.11	74.00	-33.89	peak
2		1123.517	37.30	-6.62	30.68	54.00	-23.32	AVG
3		1614.937	45.72	-4.91	40.81	74.00	-33.19	peak
4		1614.937	34.29	-4.91	29.38	54.00	-24.62	AVG
5		2405.992	40.70	1.23	41.93	74.00	-32.07	peak
6		2405.992	30.28	1.23	31.51	54.00	-22.49	AVG
7		3381.761	38.88	5.46	44.34	74.00	-29.66	peak
8	*	3381.761	27.90	5.46	33.36	54.00	-20.64	AVG
9		4009.288	35.19	7.89	43.08	74.00	-30.92	peak
10		4009.288	24.43	7.89	32.32	54.00	-21.68	AVG
11		5660.585	28.61	13.34	41.95	74.00	-32.05	peak
12		5660.585	18.64	13.34	31.98	54.00	-22.02	AVG

Note: Result=Reading+Factor
Over Limit=Result-Limit

8. Photographs of test setup

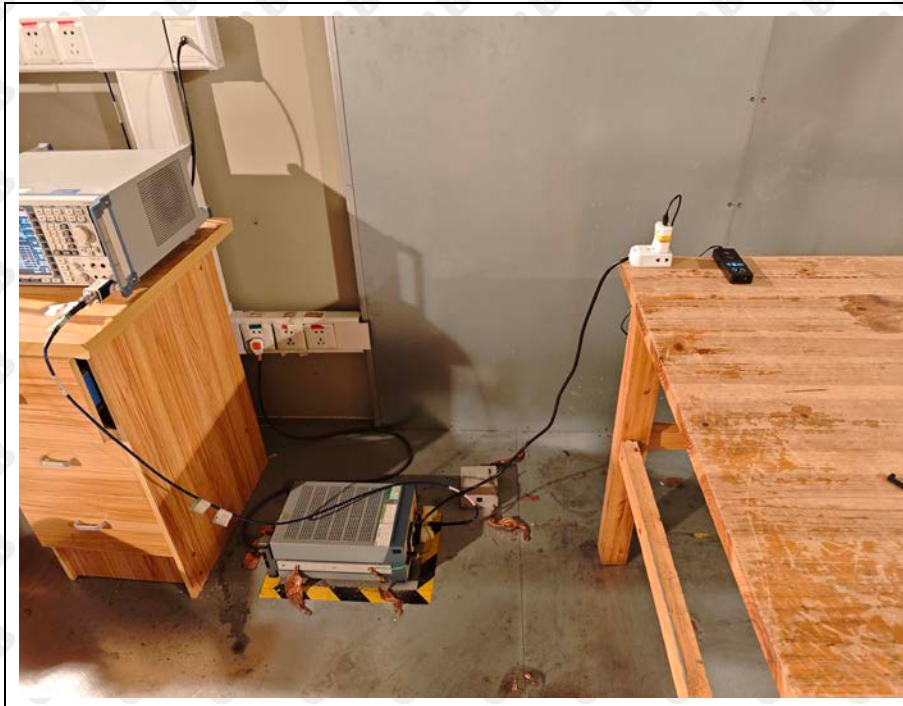
Radiated Emission



Radiated Emission Above 1GHz



CE



End of report