

FCC TEST REPORT

Client Name : Beijing ManThink Technology Co., Ltd.

Address : Room 904, JingKai Building B, DiSheng North Road No.1, BDA, Beijing, China

Product Name : GDO31x

Date : Aug. 01, 2022

Shenzhen Anbotech Compliance Laboratory Limited



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TEST REPORT

Applicant : Beijing ManThink Technology Co., Ltd.

Manufacturer : Beijing ManThink Technology Co., Ltd.

Product Name : GDO31x

Model No. : GDO318

Trade Mark : N.A.

Rating(s) : Input: 48V==

Test Standard(s) : FCC Part15 Subpart, Section 15.247

Test Method(s) : ANSI C63.10: 2020, KDB558074 D01 DTS Meas Guidance v05r02

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of receipt

Jun. 08, 2022

Date of Test

Jun. 08~Jul. 14, 2022

Prepared By

Nianxiu Chen

(Nianxiu Chen)

Approved & Authorized Signer

Kingkong Jin

(Kingkong Jin)



1. General Information

1.1. Client Information

Applicant	:	Beijing ManThink Technology Co., Ltd.
Address	:	Room 904, JingKai Building B, DiSheng North Road No.1, BDA, Beijing, China
Manufacturer	:	Beijing ManThink Technology Co., Ltd.
Address	:	Room 904, JingKai Building B, DiSheng North Road No.1, BDA, Beijing, China
Factory	:	Beijing ManThink Technology Co., Ltd.
Address	:	Room 904, JingKai Building B, DiSheng North Road No.1, BDA, Beijing, China

1.2. Description of Device (EUT)

Product Name	:	GDO31x
Model No.	:	GDO318
Trade Mark	:	N.A.
Test Power Supply	:	AC 120V, 60Hz for adapter
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Product Description	Operation Frequency:	BLE: 2402~2480MHz WiFi 5.2G: 5180~5240MHz Lora: 923.3~927.5MHz
	Number of Channel:	BLE: 40 Channels WiFi 5.2G: 4 Channels for 802.11a/n(HT20)/ac(HT20) 2 Channels for 802.11n(HT40)/ac(HT40) 1 Channels for 802.11ac(HT80) Lora: 8 Channels
	Modulation Type:	BLE: GFSK WiFi 5.2G: OFDM with BPSK, QPSK, 16QAM, 64QAM, 256QAM Lora: Lora
	Antenna Type:	BLE & WiFi 5.2G: External Antenna Lora: External Antenna
	Antenna Gain(Peak):	BLE/ WiFi 5.2G: 6 dBi (Provided by customer) Lora: 3 dBi (Provided by customer)
	Adapter:	N/A
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2) This report for DTS only.		



1.3. Auxiliary Equipment Used During Test

Adapter	:	Model: WL-PSE803
		Electrical port parameters: 2Prot/ 10/ 100/ 1000Mbps
		Output: 48VDC

1.4. Description of Test Configuration

The system was configured for testing in testing mode, which was provided by manufacturer.

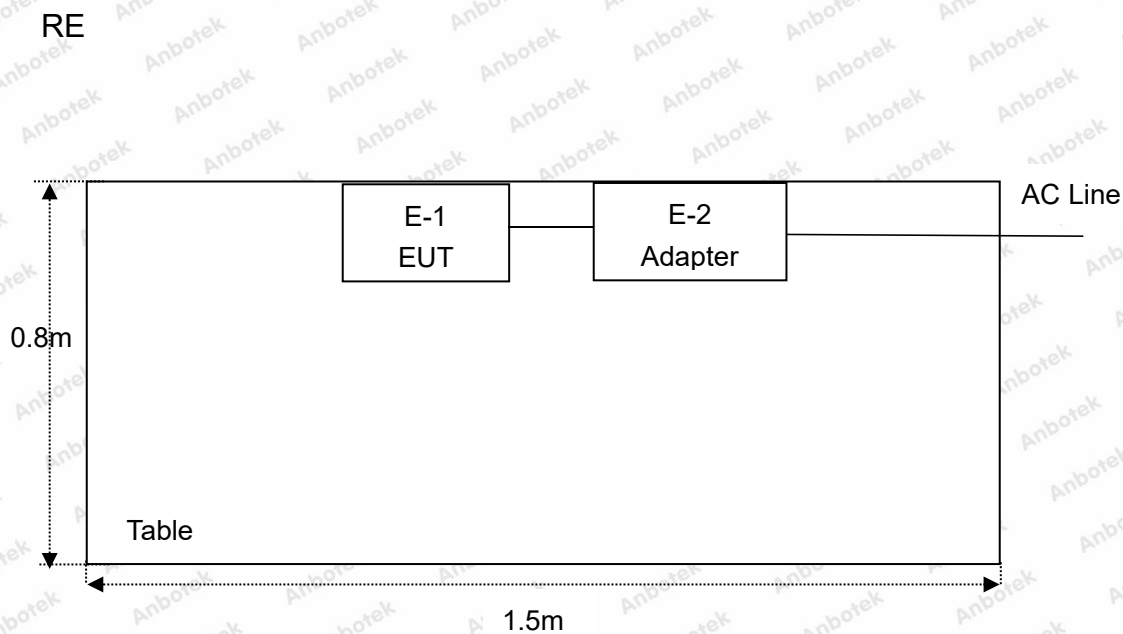
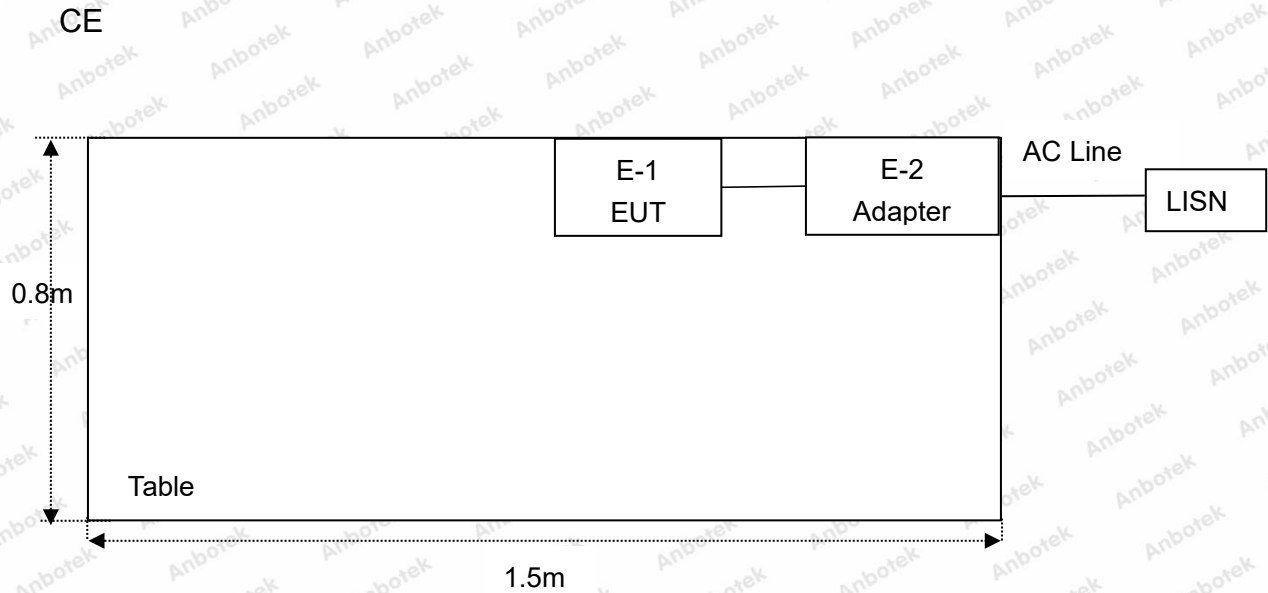
For LoRa mode, Detailed Frequency as below:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	923.3	05	925.7
02	923.9	06	926.3
03	924.5	07	926.9
04	925.1	08	927.5

Note: EUT was tested with Channel 1, 4 and 8.



1.5. Description Of Test Setup



1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040DT001	Jul. 05, 2022	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 22, 2021	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 22, 2021	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2021	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 22, 2021	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Oct. 22, 2021	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Oct. 22, 2021	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 22, 2021	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Oct. 22, 2021	2 Year
10.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Oct. 22, 2021	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 22, 2021	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Oct. 22, 2021	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 22, 2021	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 22, 2021	1 Year
16.	MXA Spectrum Analysis	KEYSIGHT	N9020A	MY53280032	Oct. 22, 2021	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 22, 2021	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 22, 2021	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 22, 2021	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Oct. 22, 2021	1 Year



1.7. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB

1.8. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotech Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111.

ISED-Registration No.: 8058A

Shenzhen Anbotech Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotech Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



2. Summary of Test Results

Standard Section	Test Item	Result
15.203/15.247(c)	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209	Spurious Emission	PASS
15.247(b)(3)	Conducted Peak Output Power	PASS
15.247(a)(2)	6dB Occupied Bandwidth	PASS
15.247(e)	Power Spectral Density	PASS
15.247(d)	Band Edge	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

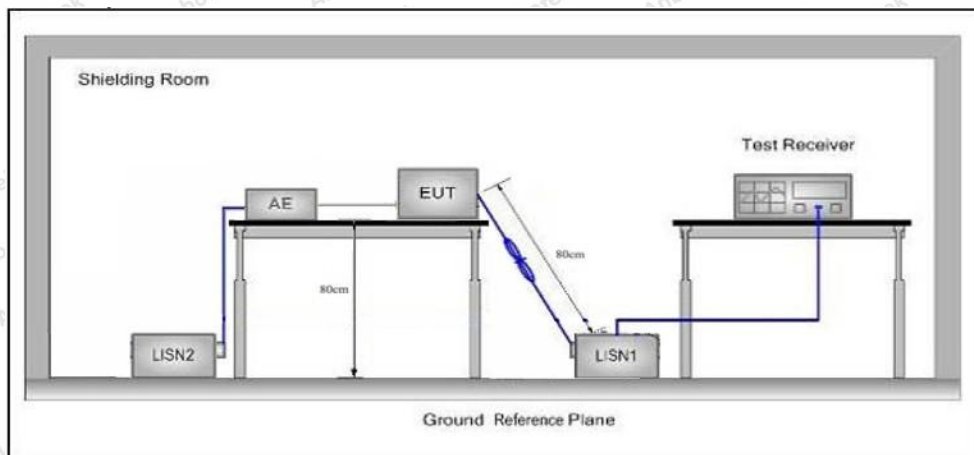


3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: (1) *Decreasing linearly with logarithm of the frequency. (2) The lower limit shall apply at the transition frequency.			

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

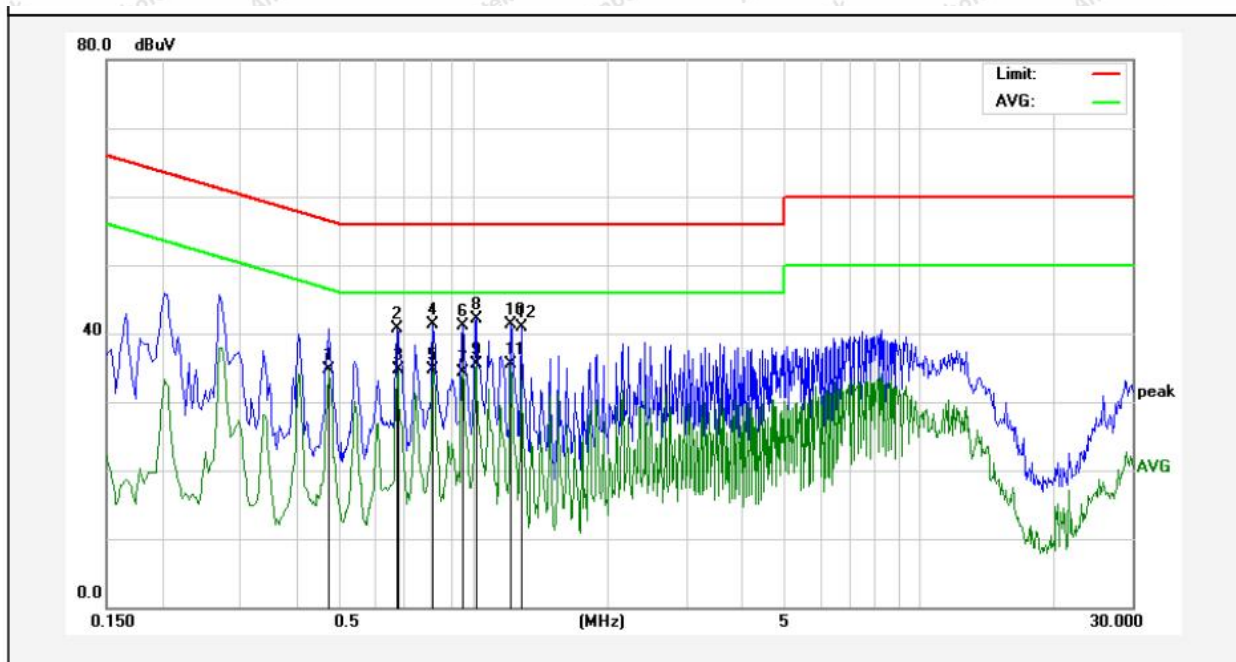
During the test, pre-scan all the modes, only the worst case is recorded in the report.

Please to see the following pages.



Conducted Emission Test Data

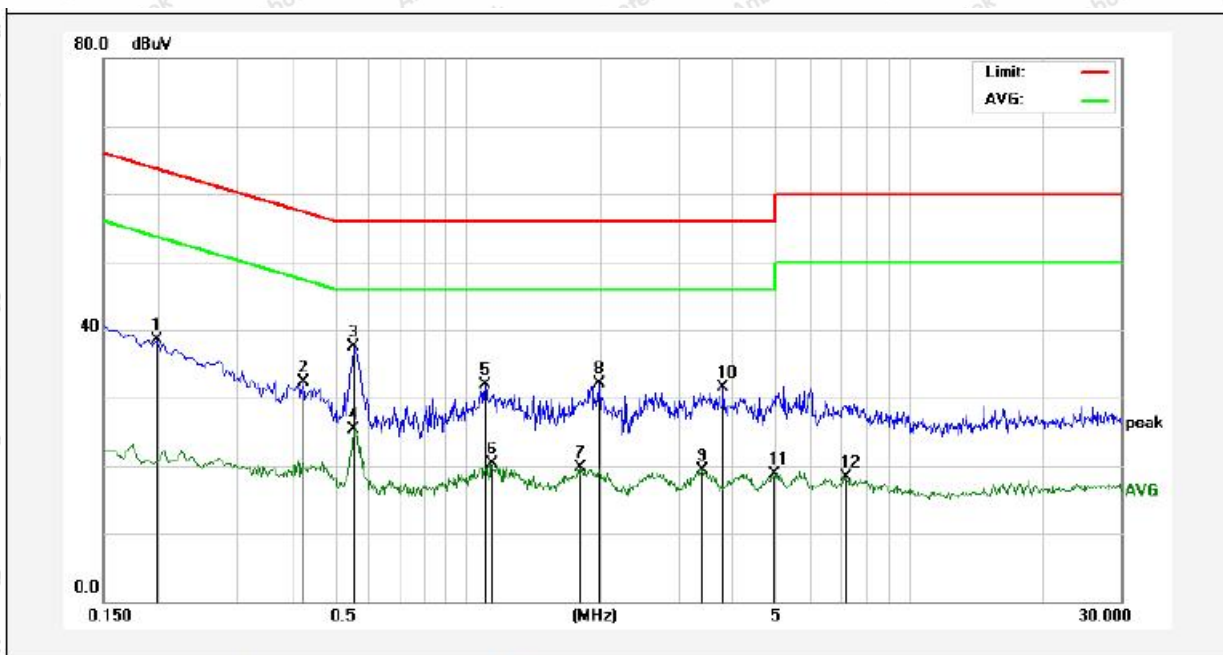
Test Site: 1# Shielded Room
Operating Condition: CH01
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Tem.: 23.9℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.4740	34.51	0.14	34.65	46.44	-11.79	AVG	
2	0.6740	40.52	0.15	40.67	56.00	-15.33	QP	
3	0.6780	34.60	0.15	34.75	46.00	-11.25	AVG	
4	0.8100	41.16	0.15	41.31	56.00	-14.69	QP	
5	0.8139	34.62	0.15	34.77	46.00	-11.23	AVG	
6	0.9460	40.86	0.15	41.01	56.00	-14.99	QP	
7	0.9460	34.15	0.15	34.30	46.00	-11.70	AVG	
8	1.0140	41.91	0.15	42.06	56.00	-13.94	QP	
9	1.0140	35.44	0.15	35.59	46.00	-10.41	AVG	
10	1.2140	41.12	0.14	41.26	56.00	-14.74	QP	
11	1.2140	35.39	0.14	35.53	46.00	-10.47	AVG	
12	1.2820	40.67	0.14	40.81	56.00	-15.19	QP	



Test Site: 1# Shielded Room
 Operating Condition: CH01
 Test Specification: AC 120V, 60Hz for adapter
 Comment: Neutral Line
 Tem.: 23.9°C Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1980	18.55	19.90	38.45	63.69	-25.24	QP	
2	0.4260	12.27	19.95	32.22	57.33	-25.11	QP	
3	0.5540	17.45	20.00	37.45	56.00	-18.55	QP	
4	0.5540	5.31	20.00	25.31	46.00	-20.69	AVG	
5	1.0940	11.73	20.12	31.85	56.00	-24.15	QP	
6	1.1300	0.24	20.12	20.36	46.00	-25.64	AVG	
7	1.7980	-0.53	20.14	19.61	46.00	-26.39	AVG	
8	1.9900	11.88	20.14	32.02	56.00	-23.98	QP	
9	3.4060	-0.87	20.17	19.30	46.00	-26.70	AVG	
10	3.7940	11.31	20.18	31.49	56.00	-24.51	QP	
11	4.9220	-1.53	20.20	18.67	46.00	-27.33	AVG	
12	7.1740	-1.87	20.26	18.39	50.00	-31.61	AVG	



4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/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~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

Remark:

(1)The lower limit shall apply at the transition frequency.

(2) 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.

4.2. Test Setup

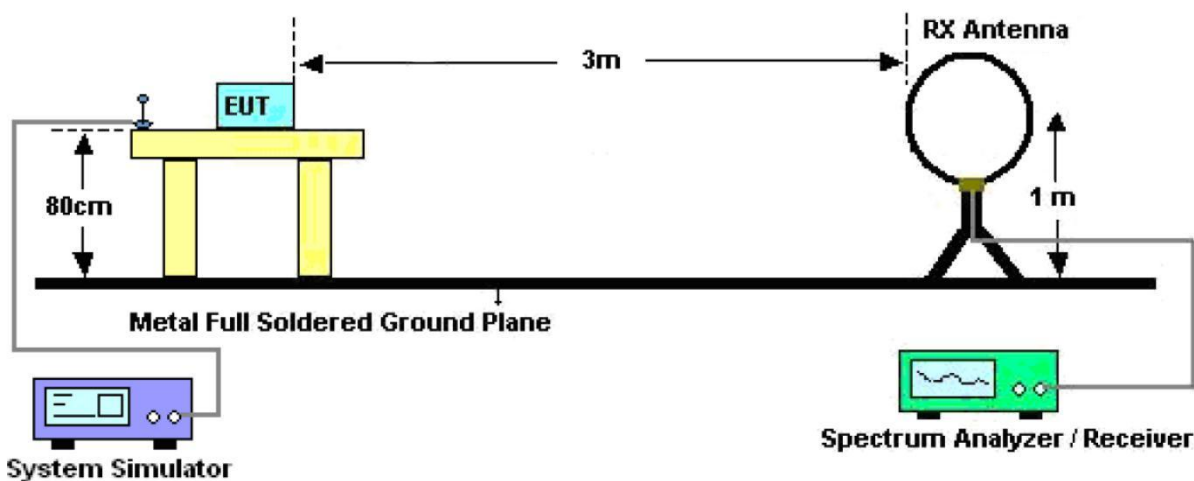


Figure 1. Below 30MHz



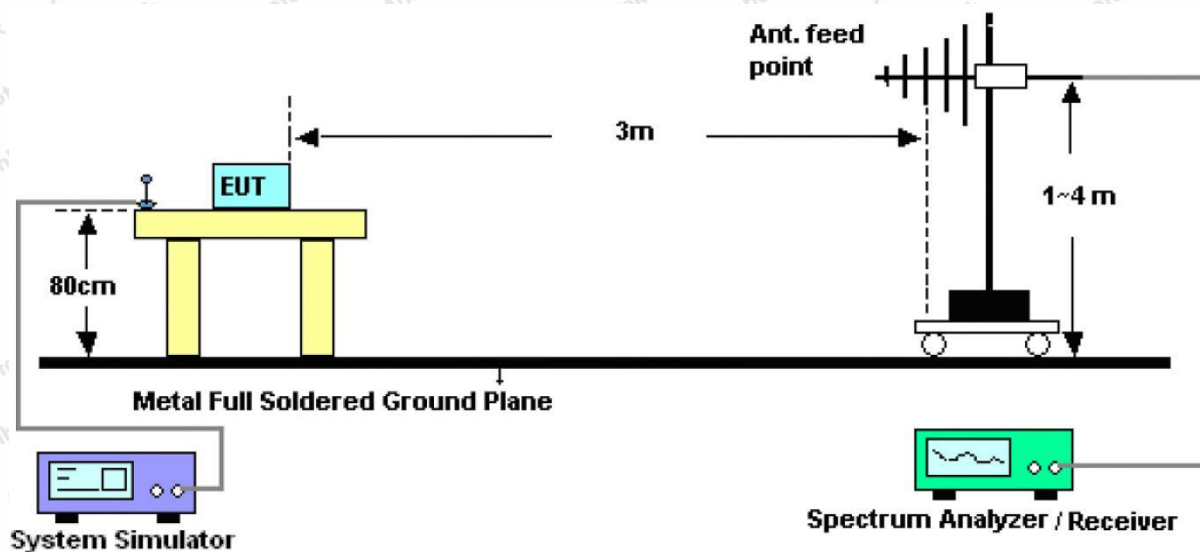


Figure 2. 30MHz to 1GHz

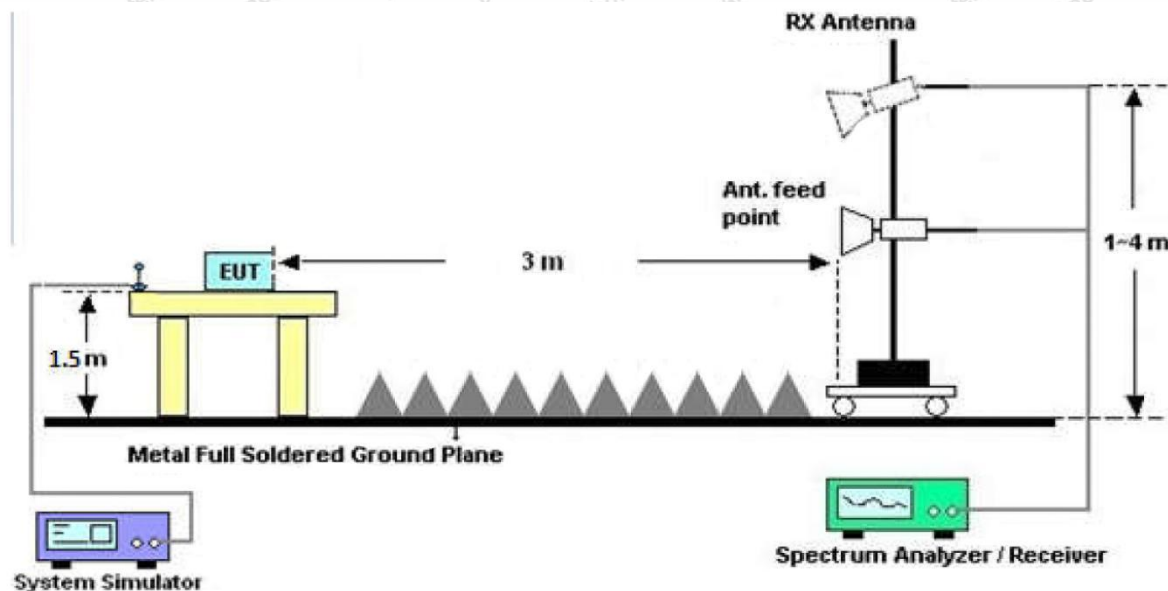


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.



For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW = 1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW = 30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW = 300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz, Set the spectrum analyzer as:

RBW = 1MHz, VBW = 1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

RBW = 1MHz, VBW = 10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

PASS

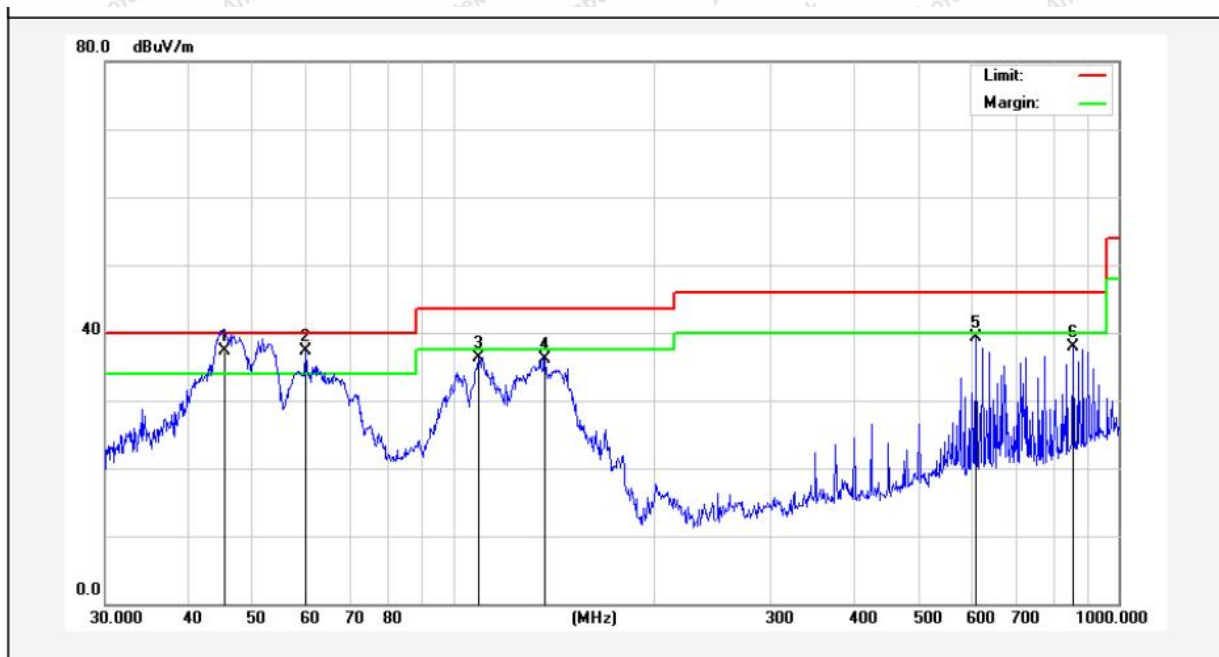
The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

During the test, pre-scan all the modes, only the worst case is recorded in the report.



Test Results (30~1000MHz)

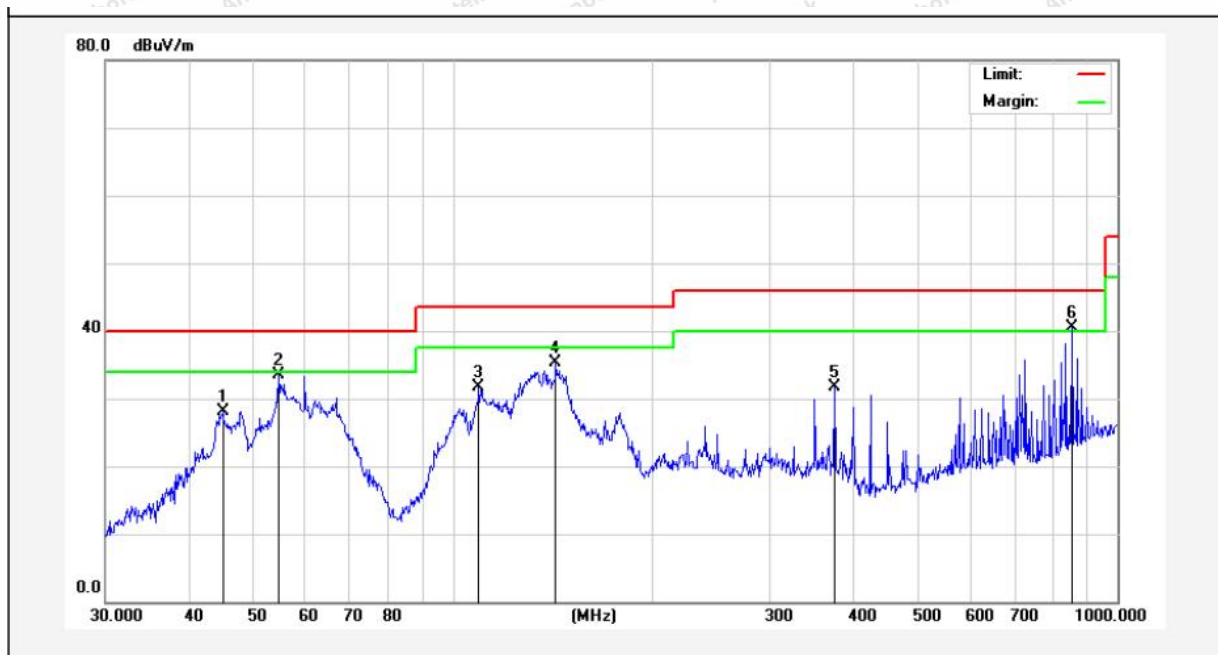
Test Mode: CH01
Power Source: AC 120V, 60Hz for adapter
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 24.1°C/48%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	45.3755	52.46	-15.11	37.35	40.00	-2.65	QP			
2	60.0691	54.82	-17.51	37.31	40.00	-2.69	QP			
3	109.0286	54.35	-18.03	36.32	43.50	-7.18	QP			
4	137.4202	58.07	-22.00	36.07	43.50	-7.43	QP			
5	609.9217	49.82	-10.55	39.27	46.00	-6.73	QP			
6	854.0247	45.32	-7.39	37.93	46.00	-8.07	QP			



Test Mode: CH01
Power Source: AC 120V, 60Hz for adapter
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 24.1°C/48%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	45.0583	43.41	-15.21	28.20	40.00	-11.80	QP			
2	54.6429	51.00	-17.50	33.50	40.00	-6.50	QP			
3	109.4116	54.78	-23.09	31.69	43.50	-11.81	QP			
4	142.8243	58.25	-23.01	35.24	43.50	-8.26	QP			
5	375.9385	47.71	-16.08	31.63	46.00	-14.37	QP			
6	854.0247	47.94	-7.39	40.55	46.00	-5.45	QP			



Test Results (1GHz-25GHz)

Test Mode: CH01				Test channel: Lowest		
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
1846.60	29.14	17.67	46.81	74.00	-27.19	Vertical
2769.90	29.08	20.94	50.02	74.00	-23.98	Vertical
3693.20	30.17	22.51	52.68	74.00	-21.32	Vertical
4616.50	*			74.00		Vertical
5539.80	*			74.00		Vertical
1846.60	28.75	17.67	46.42	74.00	-27.58	Horizontal
2769.90	29.86	20.94	50.80	74.00	-23.20	Horizontal
3693.20	28.40	22.51	50.91	74.00	-23.09	Horizontal
4616.50	*			74.00		Horizontal
5539.80	*			74.00		Horizontal
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
1846.60	17.41	17.67	35.08	54.00	-18.92	Vertical
2769.90	18.13	20.94	39.07	54.00	-14.93	Vertical
3693.20	19.64	22.51	42.15	54.00	-11.85	Vertical
4616.50	*			54.00		Vertical
5539.80	*			54.00		Vertical
1846.60	17.08	17.67	34.75	54.00	-19.25	Horizontal
2769.90	18.89	20.94	39.83	54.00	-14.17	Horizontal
3693.20	17.91	22.51	40.42	54.00	-13.58	Horizontal
4616.50	*			54.00		Horizontal
5539.80	*			54.00		Horizontal



Test Mode: CH04				Test channel: Middle		
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
1850.20	28.69	17.70	46.39	74.00	-27.61	Vertical
2775.30	29.05	20.97	50.02	74.00	-23.98	Vertical
3700.40	29.67	22.51	52.18	74.00	-21.82	Vertical
4625.50	*			74.00		Vertical
5550.60	*			74.00		Vertical
1850.20	28.56	17.70	46.26	74.00	-27.74	Horizontal
2775.30	29.73	20.97	50.70	74.00	-23.30	Horizontal
3700.40	28.12	22.51	50.63	74.00	-23.37	Horizontal
4625.50	*			74.00		Horizontal
5550.60	*			74.00		Horizontal
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
1850.20	17.50	17.70	35.20	54.00	-18.80	Vertical
2775.30	17.99	20.97	38.96	54.00	-15.04	Vertical
3700.40	19.49	22.51	42.00	54.00	-12.00	Vertical
4625.50	*			54.00		Vertical
5550.60	*			54.00		Vertical
1850.20	17.19	17.70	34.89	54.00	-19.11	Horizontal
2775.30	19.24	20.97	40.21	54.00	-13.79	Horizontal
3700.40	18.21	22.51	40.72	54.00	-13.28	Horizontal
4625.50	*			54.00		Horizontal
5550.60	*			54.00		Horizontal



Test Mode: CH08				Test channel: High		
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
1855.00	28.82	17.74	46.56	74.00	-27.44	Vertical
2782.50	29.21	20.99	50.20	74.00	-23.80	Vertical
3710.00	30.37	22.51	52.88	74.00	-21.12	Vertical
4637.50	*			74.00		Vertical
5565.00	*			74.00		Vertical
1855.00	28.70	17.74	46.44	74.00	-27.56	Horizontal
2782.50	29.94	20.99	50.93	74.00	-23.07	Horizontal
3710.00	28.50	22.51	51.01	74.00	-22.99	Horizontal
4637.50	*			74.00		Horizontal
5565.00	*			74.00		Horizontal
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
1855.00	18.62	17.74	36.36	54.00	-17.64	Vertical
2782.50	19.26	20.99	40.25	54.00	-13.75	Vertical
3710.00	20.14	22.51	42.65	54.00	-11.35	Vertical
4637.50				54.00		Vertical
5565.00				54.00		Vertical
1855.00	18.37	17.74	36.11	54.00	-17.89	Horizontal
2782.50	20.04	20.99	41.03	54.00	-12.97	Horizontal
3710.00	18.36	22.51	40.87	54.00	-13.13	Horizontal
4637.50	*			54.00		Horizontal
5565.00	*			54.00		Horizontal

Remark:

1. Result=Reading + Factor

2. "*" means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.



Radiated Band Edge:

Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Det.
902.0000	43.42	22.45	4.48	31.33	39.02	46.00	-6.98	H	QP
928.0000	39.37	22.59	4.54	31.35	35.15	46.00	-10.85	H	QP
902.0000	43.45	22.45	4.48	31.33	39.05	46.00	-6.95	V	QP
928.0000	40.15	22.59	4.54	31.35	35.93	46.00	-10.07	V	QP

Remark:

1. Level = Read level + Antenna Factor + Cable Loss – Preamp Factor

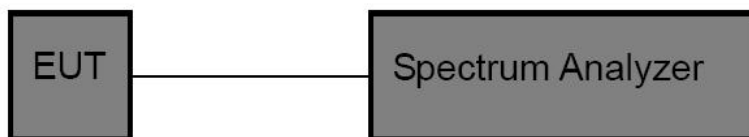


5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(3)
Test Limit	30dBm

5.2. Test Setup



5.3. Test Procedure

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

1. Set the RBW $\geq$ DTS bandwidth.
2. Set the VBW $\geq 3 \times$ RBW.
3. Set the span $\geq 3 \times$ RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.

5.4. Test Data

Test Item	:	Max. peak output power
Test Voltage	:	AC 120V, 60Hz for adapter
Test Result	:	PASS

Test Mode	:	CH Low ~ CH High
Temperature	:	23.6℃
Humidity	:	53 %

Channel Frequency (MHz)	Peak Power output (dBm)	Limit (dBm)	Results
923.3	18.812	30	PASS
925.1	18.650	30	PASS
927.5	18.469	30	PASS

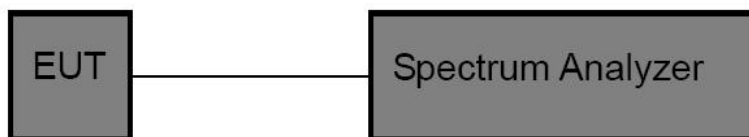


6. 6DB Occupy Bandwidth Test

6.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(2)
Test Limit	>500kHz

6.2. Test Setup



6.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
RBW = 100kHz, VBW $\geq$ 3*RBW =300kHz,
Detector= Peak
Trace mode= Max hold.
Sweep- auto couple.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

6.4. Test Data

Test Item : 6dB Bandwidth

Test Voltage : AC 120V, 60Hz for adapter

Test Result : PASS

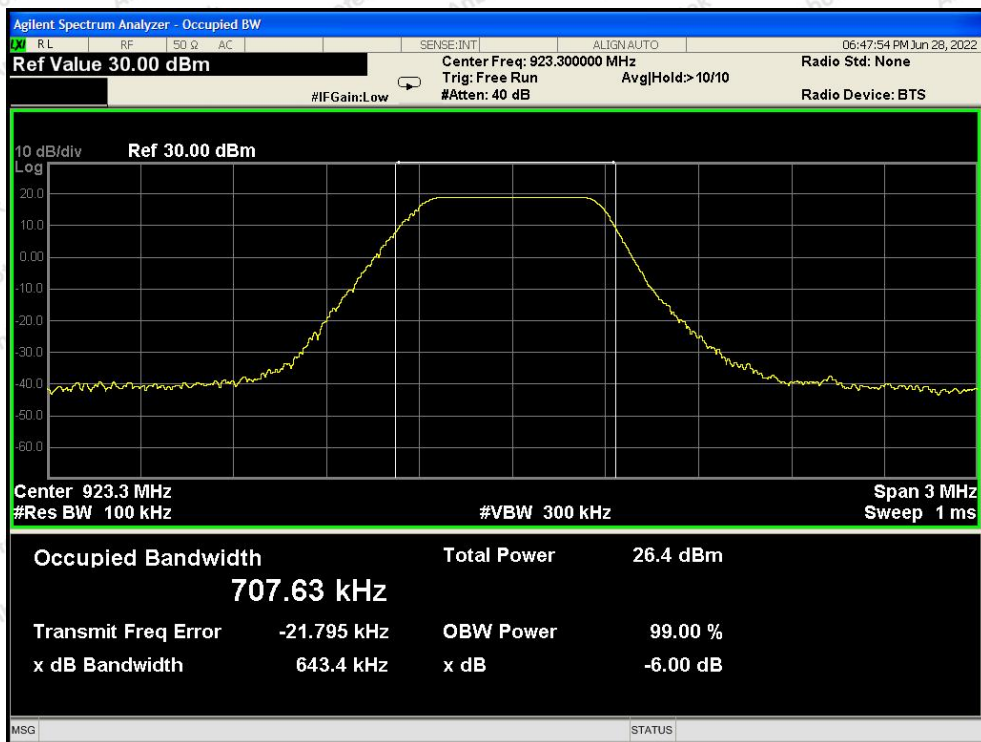
Test Mode : CH Low ~ CH High

Temperature : 23.6℃

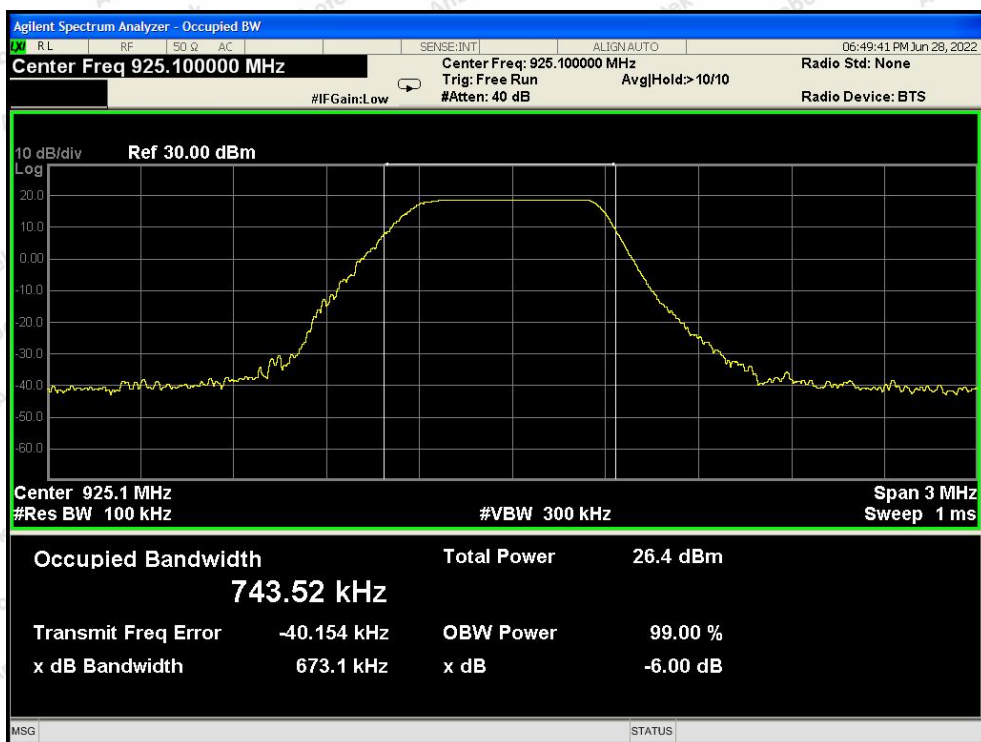
Humidity : 53 %

Channel	Frequency(MHz)	Bandwidth (kHz)	Limit (kHz)	Results
Low	923.3	643.4	>500	PASS
Middle	925.1	673.1		PASS
High	927.5	626.8		PASS



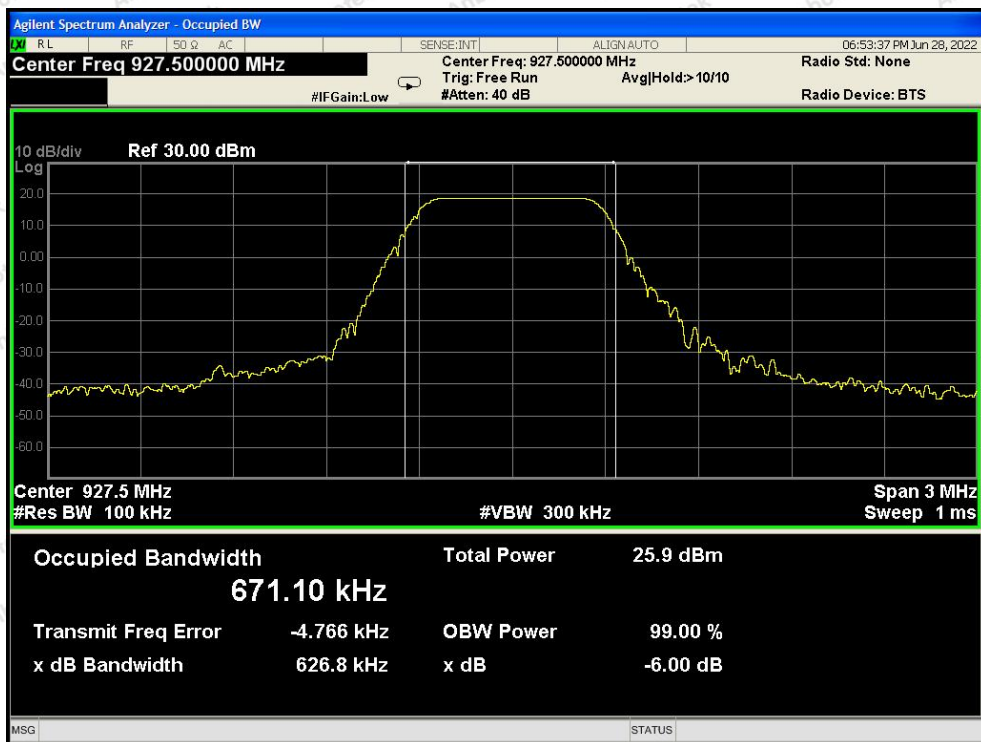


CH: Low



CH: Middle





CH: High

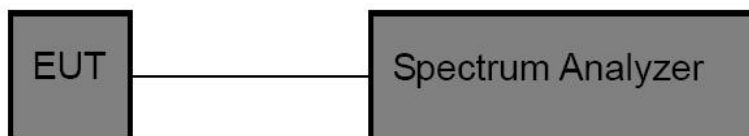


7. Power Spectral Density Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (e)
Test Limit	8dBm/3KHz

7.2. Test Setup



7.3. Test Procedure

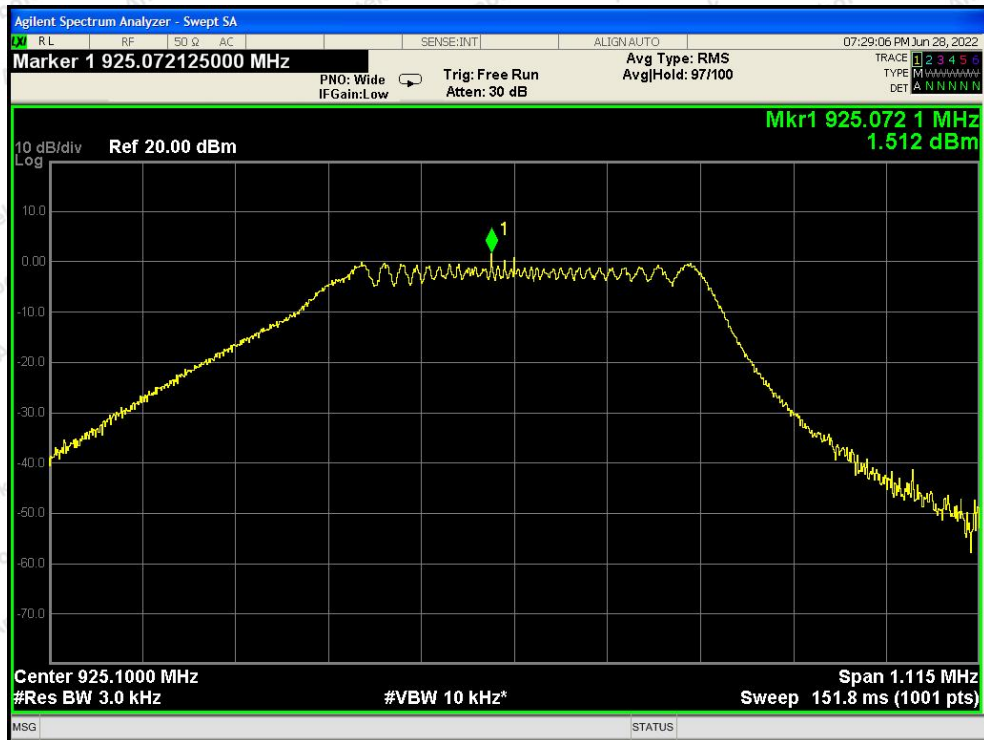
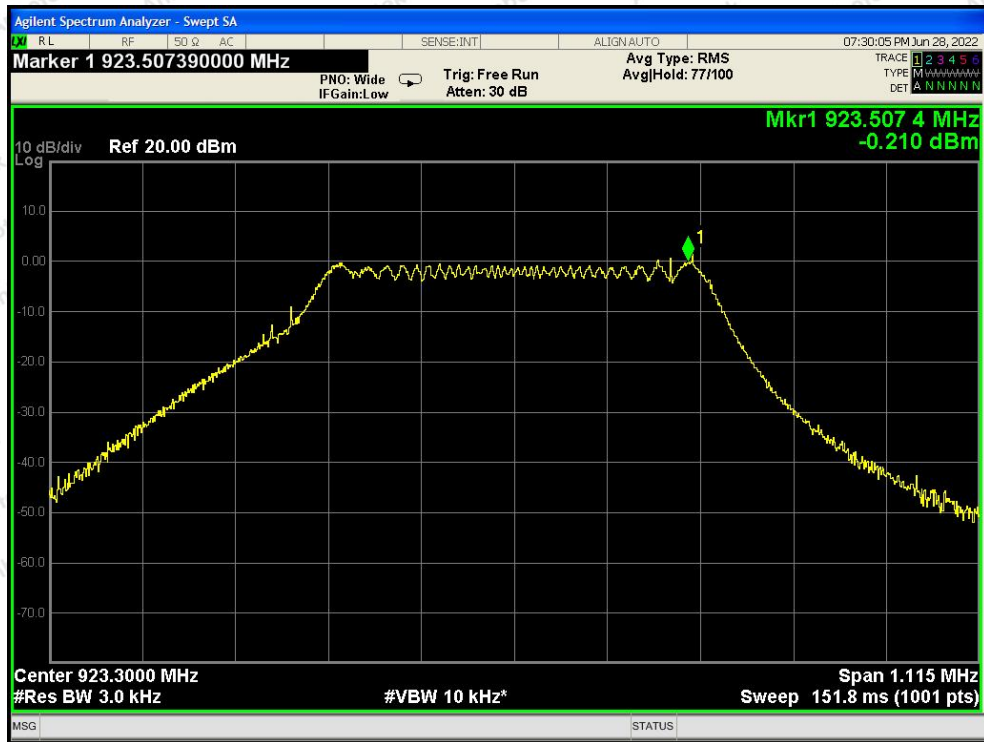
1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 1.5xDTS BW
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

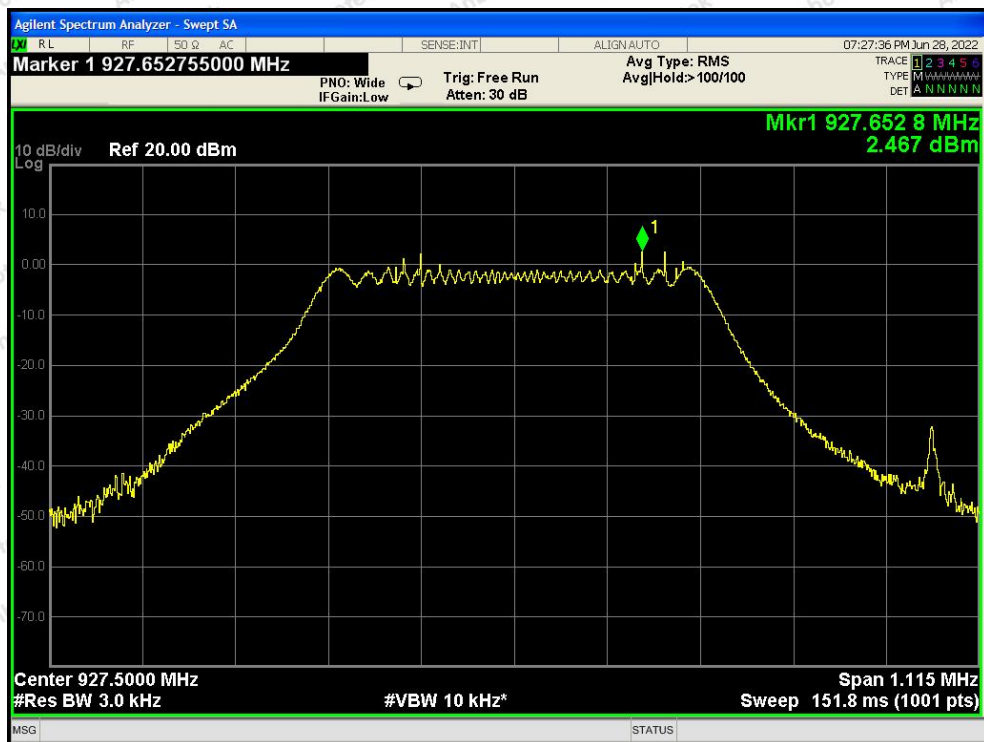
7.4. Test Data

Test Item	: Power Spectral Density	Test Mode	: CH Low ~ CH High
Test Voltage	: AC 120V, 60Hz for adapter	Temperature	: 23.6℃
Test Result	: PASS	Humidity	: 53 %

Channel	Frequency (MHz)	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Results
Low	923.3	-0.210	8.00	PASS
Middle	925.1	1.512	8.00	PASS
High	927.5	2.467	8.00	PASS







CH: High

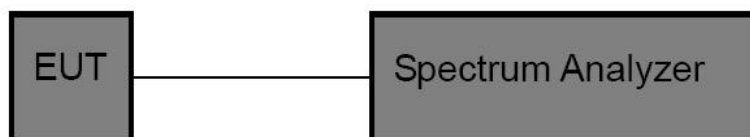


8. 100kHz Bandwidth of Frequency Band Edge Requirement

8.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

8.2. Test Setup



8.3. Test Procedure

Using the following spectrum analyzer setting:

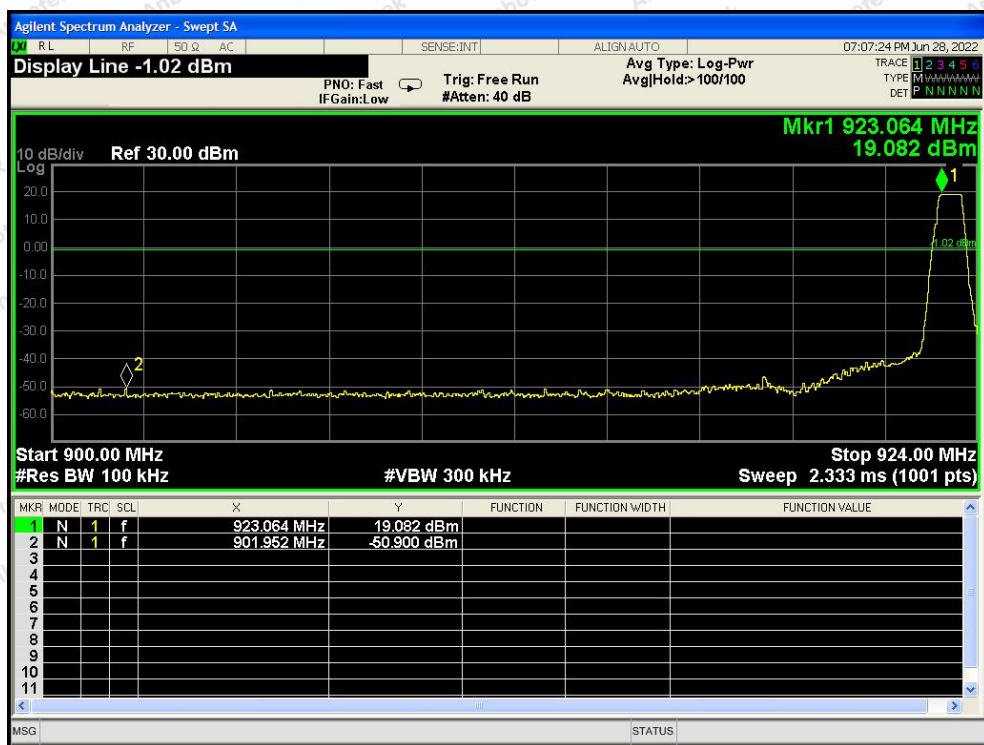
1. Set the RBW = 100KHz.
2. Set the VBW = 300KHz.
3. Sweep time = auto couple.
4. Detector function = peak.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.

8.4. Test Data

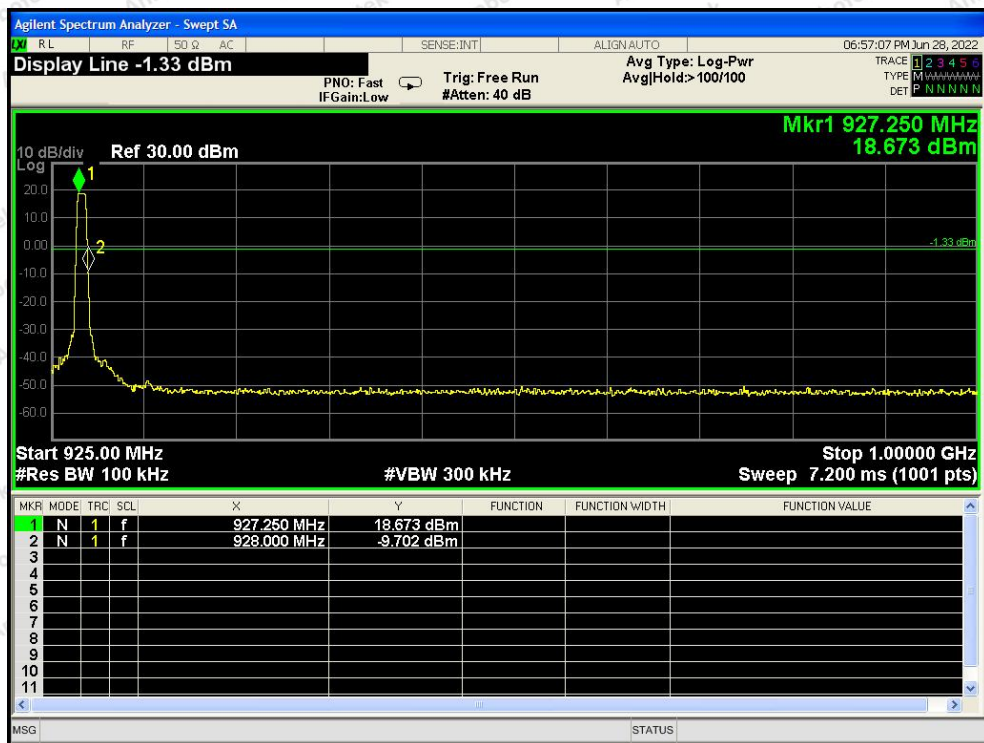
Test Item	:	Band edge
Test Voltage	:	AC 120V, 60Hz for adapter
Test Result	:	PASS

Test Mode	:	CH Low ~ CH High
Temperature	:	23.6℃
Humidity	:	53 %





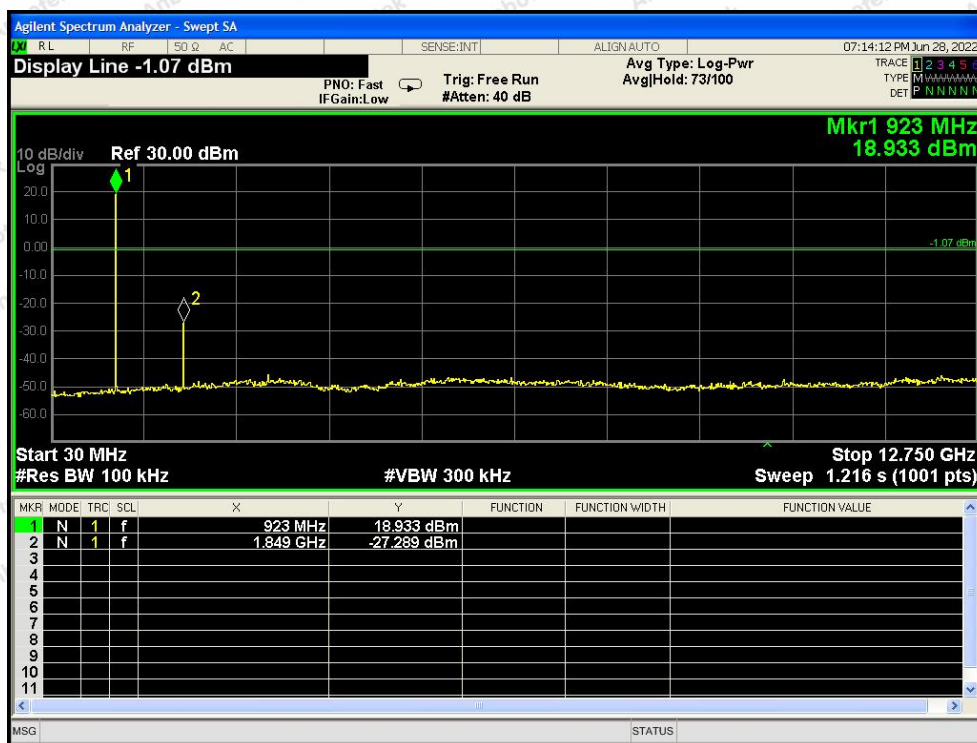
CH: Low



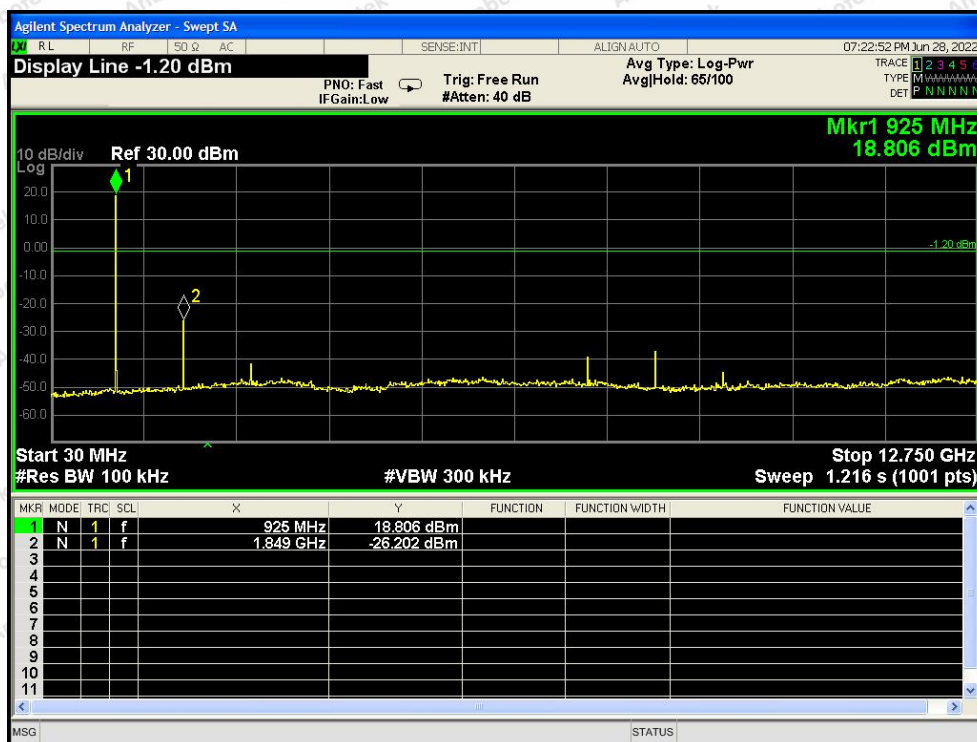
CH: High



Conducted Emission Method

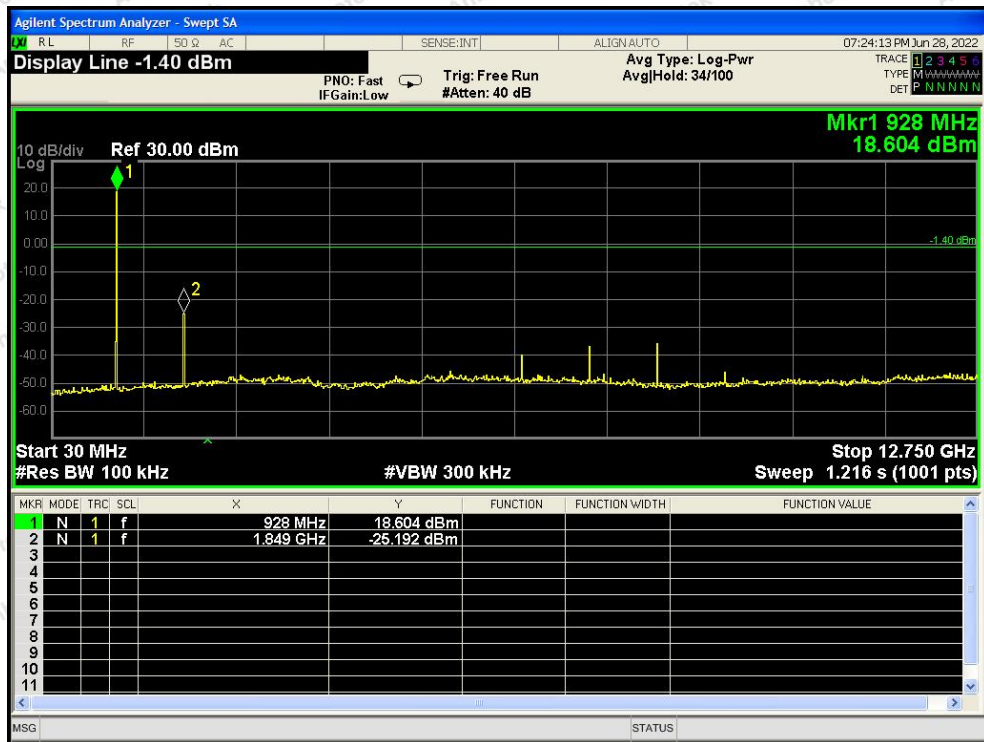


CH: Low



CH: Middle





CH: High



9. Antenna Requirement

9.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /247(c)
Requirement	1) 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. 2) 15.247(c) (1)(i) requirement: Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

9.2. Antenna Connected Construction

The antenna is a External Antenna which permanently attached, and the best case gain of the antenna is 3 dBi. It complies with the standard requirement.



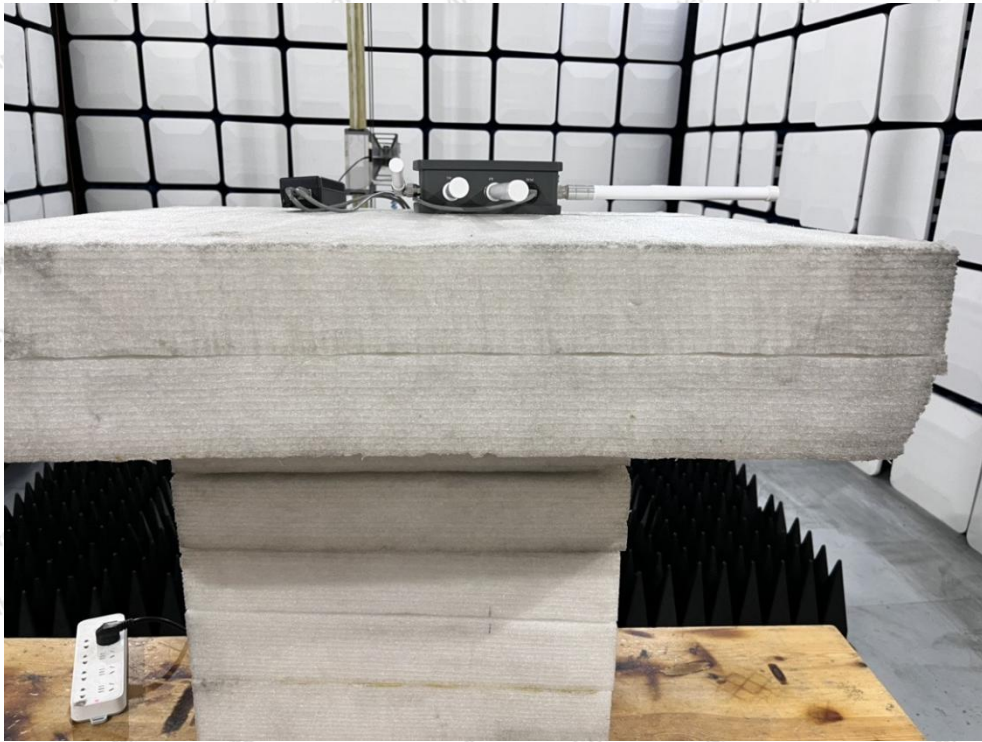
APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement



Photo of Radiation Emission Test





APPENDIX II -- EXTERNAL PHOTOGRAPH

Reference to the test report 18220WC20120601.

APPENDIX III -- INTERNAL PHOTOGRAPH

Reference to the test report 18220WC20120601.

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

