



FCC Part 15C Test Report

FCC ID: ZHZ-LPS8V2A

Applicant: Dragino Technology Co., Limited

Address: Room 202, Block B, BCT Incubation Bases, No.8 CaiYunRoad LongCheng Street, LongGang District; Shenzhen 518116, China

Manufacturer: Dragino Technology Co., Limited

Address: Room 202, Block B, BCT Incubation Bases, No.8 CaiYunRoad LongCheng Street, LongGang District; Shenzhen 518116, China

EUT: LoRaWAN Gateway

Trade Mark: Dragino

Model Number: LPS8v2-EC25-A

Date of Receipt: Apr. 28, 2024

Test Date: Apr. 28, 2024 – May. 24, 2024

Date of Report: May. 24, 2024

Prepared By: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

Applicable Standards: FCC PART 15 C 15.247
ANSI C63.10:2013

Test Result: Pass

Report Number: DL-20240428079-2E

Prepared (Test Engineer): Alisa Song

Reviewer (Supervisor): Jack Bu

Approved (Manager): Jade Yang



This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.



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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.205, 15.209, 15.247(d)	Radiated Spurious Emission	PASS	
15.205, 15.247(d)	Band Edge Emission& Conducted Spurious Emissions	PASS	
15.247(b)	Peak Output Power	PASS	
15.247(a)(2)	-6dB Occupied Bandwidth&-20dB Occupied Bandwidth	PASS	
15.247(e)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	
15.247 (a)(i)	Hopping Channel Number	PASS	
15.247 (a)(1)	Dwell Time	PASS	
15.247 (a)(1)	Carrier Frequencies Separation	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

(2)The wireless function wcdma /LTE part of the test data, please refer to the 4G module (FCC ID: X MR201909EC25AFX) is report.

Test lab: Shenzhen DL Testing Technology Co., Ltd.

Address: 101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China

FCC Test Firm Registration Number: 854456

Designation Number: CN1307

IC Registered No.: 27485

CAB ID.: CN0118

1.1 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 2.56\text{dB}$
2	RF power,conducted	$\pm 0.42\text{dB}$
3	Spurious emissions,conducted	$\pm 2.76\text{dB}$
4	All emissions,radiated(<1G)	$\pm 3.65\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$
8	6dB Bandwidth	$\pm 0.2\text{MHz}$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	LoRaWAN Gateway
Trademark	Dragino
Model No.:	LPS8v2-EC25-A
Model Difference	N/A
Operation Frequency:	902.3MHz~927.7MHz for 125KHz bandwidth 923.3MHz~927.5MHz for 500KHz bandwidth
Channel numbers:	128 for 125KHz bandwidth 8 for 500KHz bandwidth
Modulation technology:	LoRa
Antenna Type:	External antenna
Antenna gain:	5.0dBi
Power supply:	DC 5V from adapter
Adapter	Model: QL010-0502000UU Input: 100-240V~ 50/60Hz 0.45A Output: 5V=2.0A

Note:

- 1.For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.The EUT's all information provided by client.
3. LoRa non-hybrid system.



3. Channel List

125KHz for FHSS:

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.3	33	908.7	65	915.1	97	921.5
2	902.5	34	908.9	66	915.3	98	921.7
3	902.7	35	909.1	67	915.5	99	921.9
4	902.9	36	909.3	68	915.7	100	922.1
~							
29	907.9	61	914.3	93	920.7	125	927.1
30	908.1	62	914.5	94	920.9	126	927.3
31	908.3	63	914.7	95	921.1	127	927.5
32	908.5	64	914.9	96	921.3	128	927.7

Channel	Frequency(125KHz)
The lowest channel	902.30MHz
The middle channel	915.10MHz
The Highest channel	927.70MHz

500KHz for DTS:

Operation Frequency each of channel					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	923.30	4	925.10	7	926.90
2	923.90	5	925.70	8	927.50
3	924.50	6	926.30		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency(500kHz)
The lowest channel	923.30MHz
The middle channel	925.70MHz
The Highest channel	927.50MHz



2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	125KHz CH1/ CH65/ CH128
Mode 2	500KHz CH1/ CH5/ CH8
Mode 3	Link Mode
For Conducted Emission	
Final Test Mode	Description
Mode 3	Link Mode
For Radiated Emission	
Final Test Mode	Description
Mode 1	125KHz CH1/ CH65/ CH128
Mode 2	500KHz CH1/ CH5/ CH8
Mode 3	Link Mode

Note: 1. The measurements are performed at the highest, middle, lowest available channels.

2. During the test, the duty cycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Spurious Emission Test





2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Model/Type No.	Series No.	Note
E-1	LoRaWAN Gateway	LPS8v2-EC25-A	N/A	EUT
E-2	Adapter	QL010-0502000UU	N/A	Input: 100-240V~ 50/60Hz 0.45A Output: 5V==2.0A
E-3	Notebook	Vostro 3420	N/A	Notebook (Provide by test lab): Manufacturer: DELL Model: Vostro 3420 I/P: 19.5V==3.34A

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the end product.

Max output power Setting	
Test software Version	Test program: Putty



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation test, Band-edge test and 6db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Nov. 04, 2023	Nov. 03, 2024
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 04, 2023	Nov. 03, 2024
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 04, 2023	Nov. 03, 2024
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 04, 2023	Nov. 03, 2024
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 04, 2023	Nov. 03, 2024
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 04, 2023	Nov. 03, 2024
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 04, 2023	Nov. 03, 2024
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 04, 2023	Nov. 03, 2024
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 04, 2023	Nov. 03, 2024
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 04, 2023	Nov. 03, 2024
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 04, 2023	Nov. 03, 2024
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 04, 2023	Nov. 03, 2024
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 04, 2023	Nov. 03, 2024
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 04, 2023	Nov. 03, 2024
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 04, 2023	Nov. 03, 2024
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 04, 2023	Nov. 03, 2024

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Sep. 20, 2022	Sep. 19, 2025
2	EMI Receiver	R&S	ESR	101421	Nov. 04, 2023	Nov. 03, 2024
3	LISN	R&S	ENV216	102417	Nov. 04, 2023	Nov. 03, 2024
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 04, 2023	Nov. 03, 2024

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMCC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMCC	FA-03A2
3	RF test system	MAIWEI	MTS8310	2.0.0.0
4	RF communication test system	MAIWEI	MTS8200	2.0.0.0



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

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

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.50	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

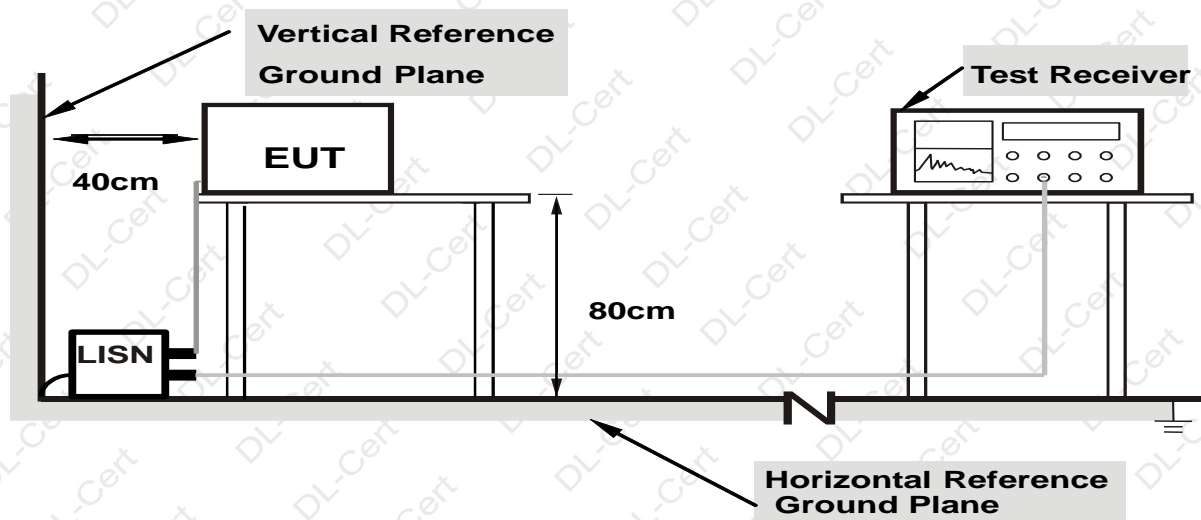
- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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 at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation



3.1.4 TEST SETUP



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

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

3.1.5 EUT OPERATING CONDITIONS

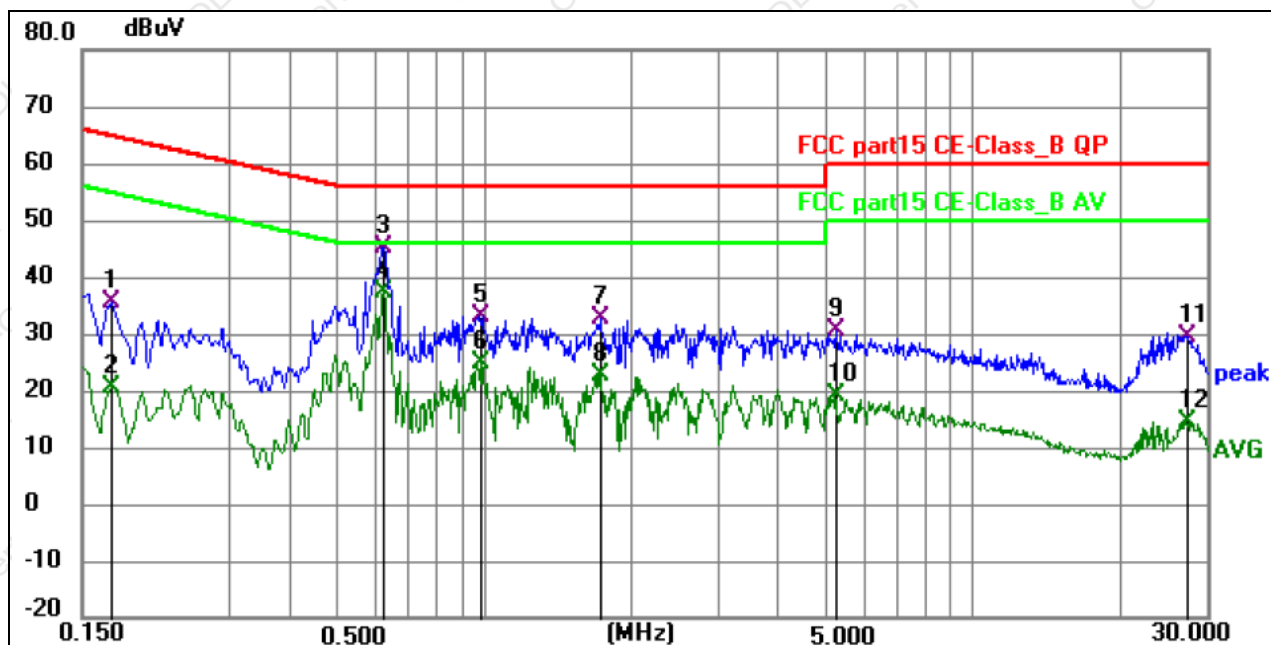
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

3.1.6 TEST RESULTS



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 3



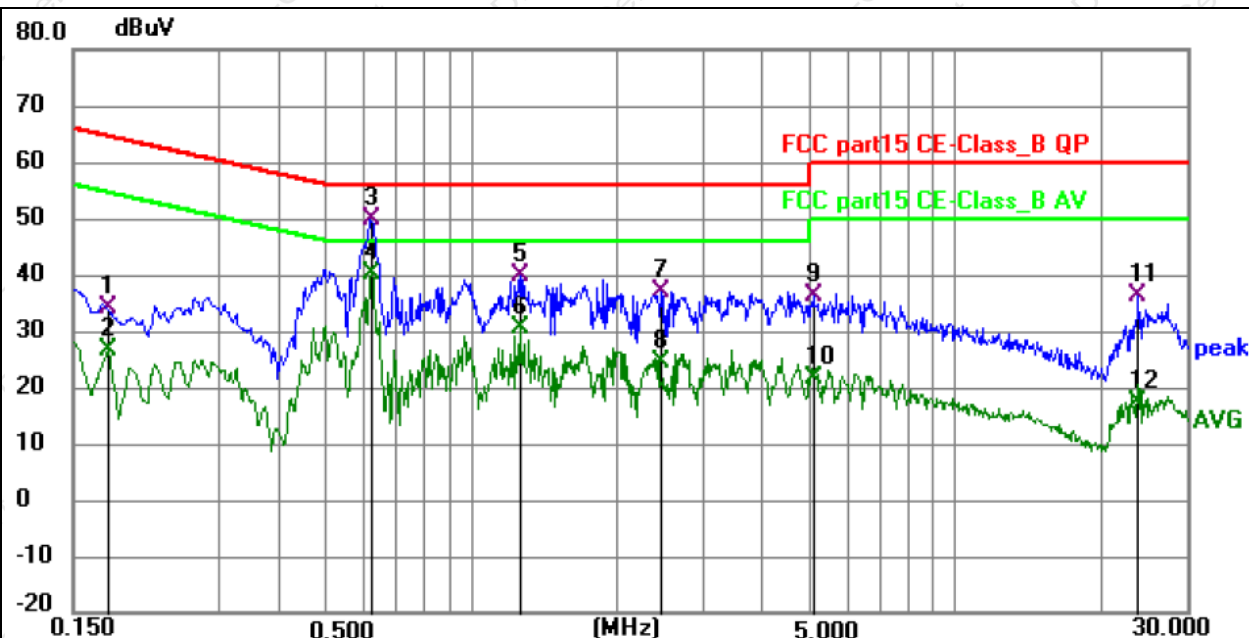
Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1725	25.31	10.09	35.40	64.84	-29.44	QP	P	
2	0.1725	10.44	10.09	20.53	54.84	-34.31	AVG	P	
3	0.6225	35.89	9.40	45.29	56.00	-10.71	QP	P	
4 *	0.6225	27.81	9.40	37.21	46.00	-8.79	AVG	P	
5	0.9870	23.71	9.33	33.04	56.00	-22.96	QP	P	
6	0.9870	15.34	9.33	24.67	46.00	-21.33	AVG	P	
7	1.7340	22.97	9.80	32.77	56.00	-23.23	QP	P	
8	1.7340	12.77	9.80	22.57	46.00	-23.43	AVG	P	
9	5.2260	20.47	9.96	30.43	60.00	-29.57	QP	P	
10	5.2260	9.29	9.96	19.25	50.00	-30.75	AVG	P	
11	27.5595	18.27	11.12	29.39	60.00	-30.61	QP	P	
12	27.5595	3.39	11.12	14.51	50.00	-35.49	AVG	P	



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 3



Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1770	24.69	9.59	34.28	64.63	-30.35	QP	P	
2	0.1770	16.95	9.59	26.54	54.63	-28.09	AVG	P	
3	0.6225	40.55	9.30	49.85	56.00	-6.15	QP	P	
4 *	0.6225	30.85	9.30	40.15	46.00	-5.85	AVG	P	
5	1.2570	30.20	9.58	39.78	56.00	-16.22	QP	P	
6	1.2570	20.83	9.58	30.41	46.00	-15.59	AVG	P	
7	2.4674	27.18	9.96	37.14	56.00	-18.86	QP	P	
8	2.4674	14.67	9.96	24.63	46.00	-21.37	AVG	P	
9	5.1044	26.00	10.08	36.08	60.00	-23.92	QP	P	
10	5.1044	11.41	10.08	21.49	50.00	-28.51	AVG	P	
11	23.8515	25.02	11.15	36.17	60.00	-23.83	QP	P	
12	23.8515	6.12	11.15	17.27	50.00	-32.73	AVG	P	



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micровolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



3.2.2 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 rotatable 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 metre to 0.8 metre(Above 1GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

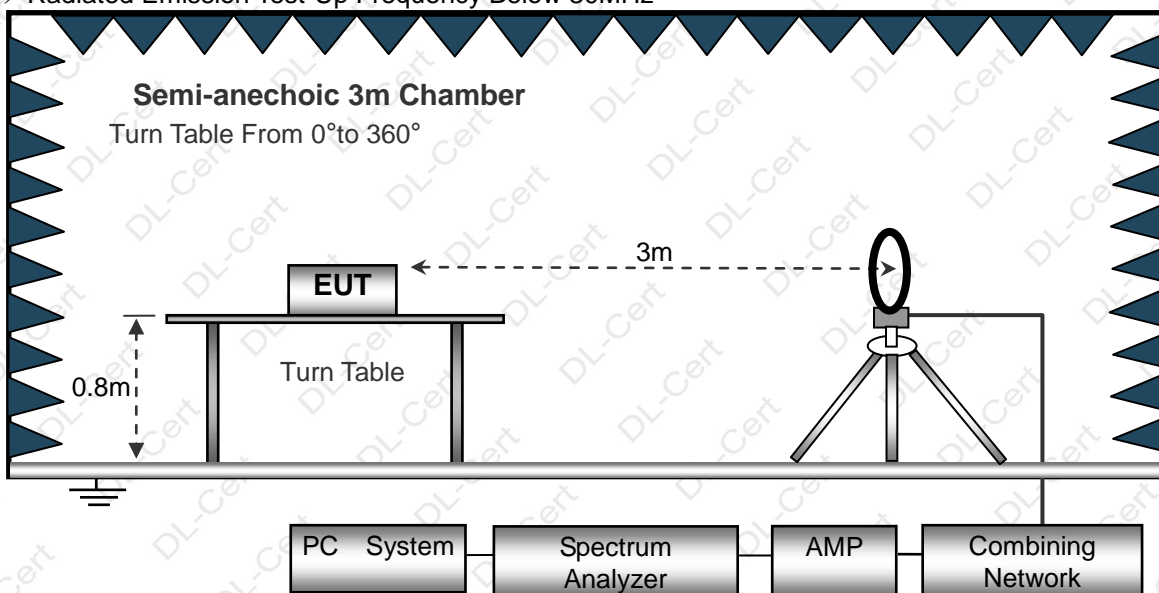
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

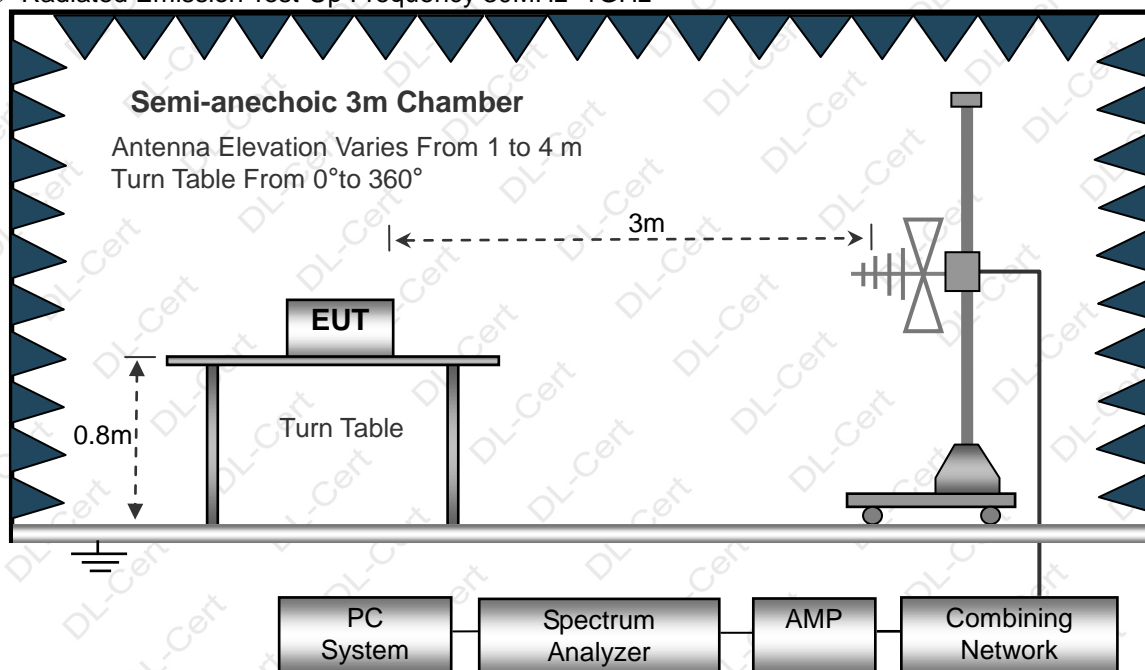
No deviation

3.2.4 TEST SETUP

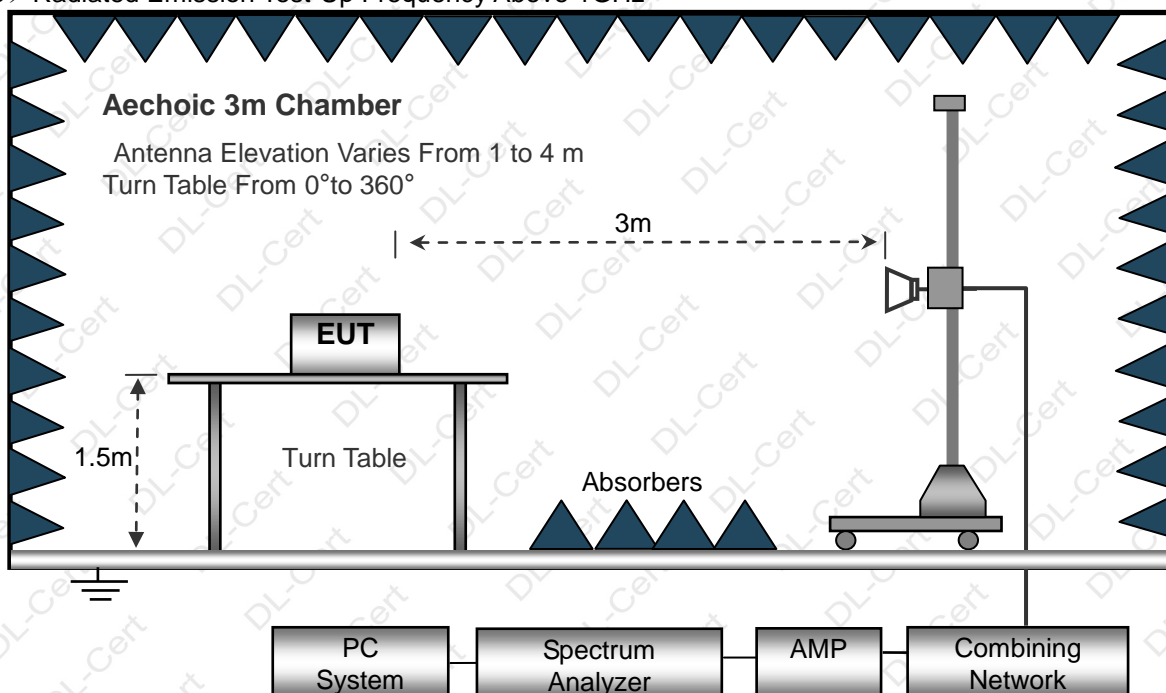
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)**

Temperature:	20℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Mode 3	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

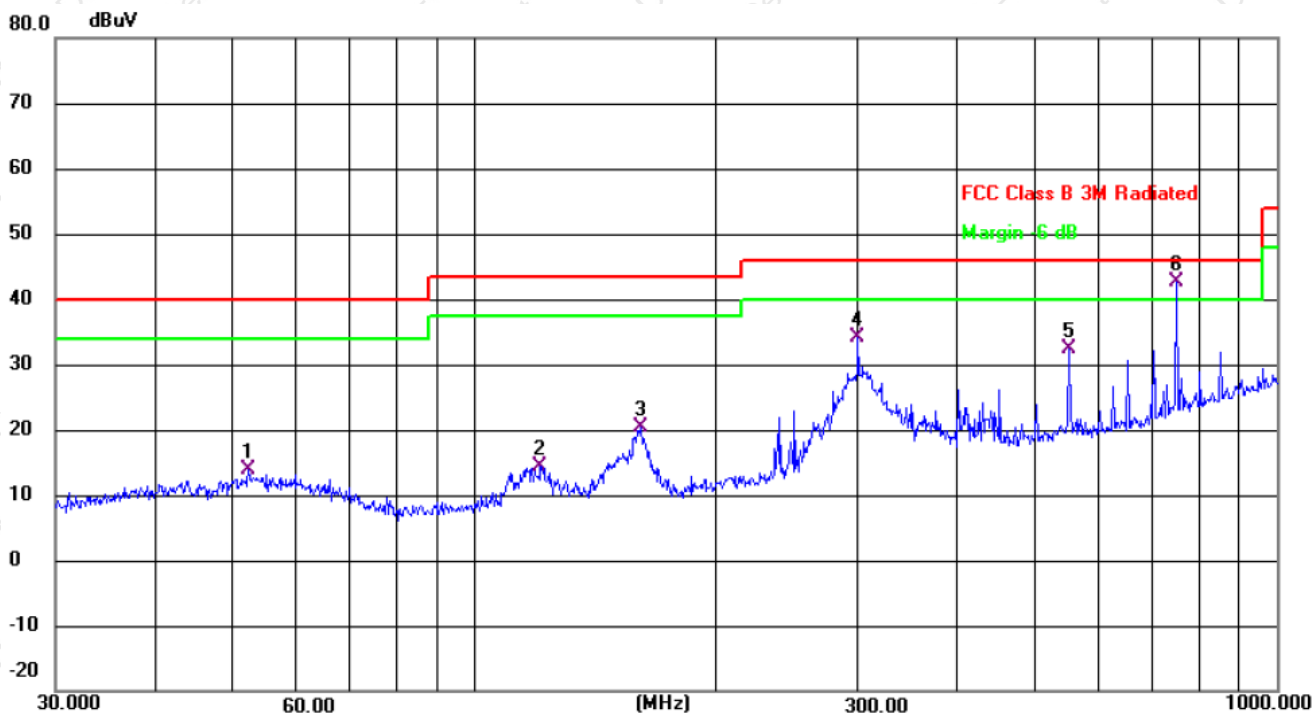
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuV) + distance extrapolation factor.

**3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)**

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 3		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Detector
		MHz	dBuV	dB	dBuV	dB	dB	
1		52.2078	26.94	-13.09	13.85	40.00	-26.15	QP
2		120.6991	31.00	-16.53	14.47	43.50	-29.03	QP
3		160.9089	37.64	-17.14	20.50	43.50	-23.00	QP
4		300.3672	45.50	-11.41	34.09	46.00	-11.91	QP
5		550.9480	39.18	-6.81	32.37	46.00	-13.63	QP
6	*	750.1082	45.61	-3.06	42.55	46.00	-3.45	QP

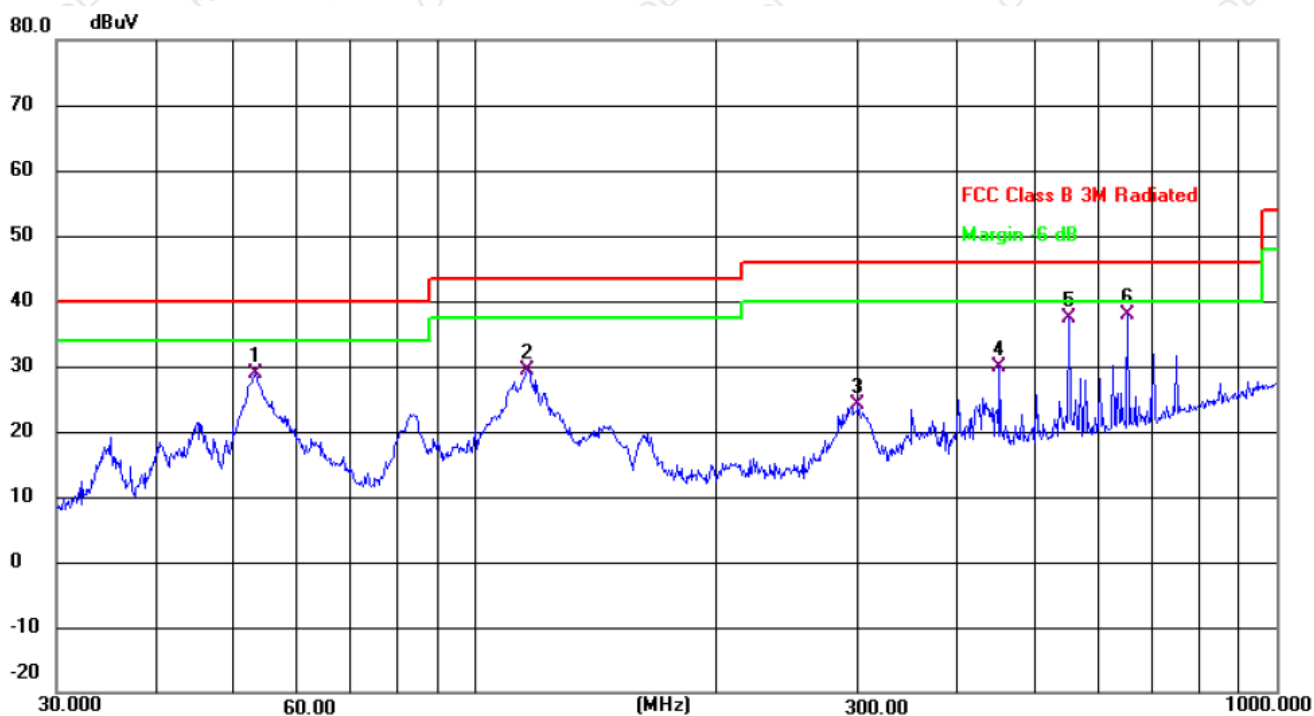
Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Level - Limit;



Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 3		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	
		MHz	dBuV	dB	dBuV	dB	dB	Detector
1		53.1313	41.83	-13.06	28.77	40.00	-11.23	QP
2		116.1321	45.98	-16.50	29.48	43.50	-14.02	QP
3		300.3672	35.46	-11.41	24.05	46.00	-21.95	QP
4		451.1350	38.47	-8.64	29.83	46.00	-16.17	QP
5		550.9480	44.21	-6.81	37.40	46.00	-8.60	QP
6	*	651.9417	42.84	-4.95	37.89	46.00	-8.11	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

Level = Reading Level + Correct Factor; Margin = Level - Limit;

**3.2.8 TEST RESULTS (1GHZ~10GHZ)**

125K

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency: 902.30MHz									
V	1804.60	68.07	50.24	6.81	31.22	55.86	74.00	-18.14	PK
V	1804.60	55.53	50.24	6.81	31.22	43.32	54.00	-10.68	AV
V	2706.90	67.16	49.87	7.13	36.65	61.07	74.00	-12.93	PK
V	2706.90	46.52	49.87	7.13	36.65	40.43	54.00	-13.57	AV
V	9087.00	48.89	51.45	11.31	41.55	50.30	74.00	-23.70	PK
H	1804.60	66.74	50.24	6.81	31.22	54.53	74.00	-19.47	PK
H	1804.60	55.27	50.24	6.81	31.22	43.06	54.00	-10.94	AV
H	2706.90	69.46	49.87	7.13	36.65	63.37	74.00	-10.63	PK
H	2706.90	45.96	49.87	7.13	36.65	39.87	54.00	-14.13	AV
H	9087.00	48.43	51.45	11.31	41.55	49.84	74.00	-24.16	PK
operation frequency: 915.10MHz									
V	1830.20	67.72	50.27	6.82	31.24	55.51	74.00	-18.49	PK
V	1830.20	55.76	50.27	6.82	31.24	43.55	54.00	-10.45	AV
V	2745.30	69.69	49.88	7.15	36.63	63.59	74.00	-10.41	PK
V	2745.30	46.47	49.88	7.15	36.63	40.37	54.00	-13.63	AV
V	9083.00	48.58	51.48	11.31	41.52	49.93	74.00	-24.07	PK
H	1830.20	67.14	50.27	6.82	31.24	54.93	74.00	-19.07	PK
H	1830.20	55.92	50.27	6.82	31.24	43.71	54.00	-10.29	AV
H	2745.30	69.11	49.88	7.15	36.63	63.01	74.00	-10.99	PK
H	2745.30	47.56	49.88	7.15	36.63	41.46	54.00	-12.54	AV
H	9083.00	48.67	51.48	11.31	41.52	50.02	74.00	-23.98	PK
operation frequency: 927.70MHz									
V	1855.40	68.21	50.28	6.85	31.41	56.19	74.00	-17.81	PK
V	1855.40	55.26	50.28	6.85	31.41	43.24	54.00	-10.76	AV
V	2783.10	69.39	49.89	7.17	36.58	63.25	74.00	-10.75	PK
V	2783.10	46.53	49.89	7.17	31.28	35.09	54.00	-18.91	AV
V	9085.00	49.24	51.45	11.33	41.57	50.69	74.00	-23.31	PK
H	1855.40	67.57	50.28	6.85	31.41	55.55	74.00	-18.45	PK
H	1855.40	55.53	50.28	6.85	31.41	43.51	54.00	-10.49	AV
H	2783.10	67.06	49.89	7.17	36.58	60.92	74.00	-13.08	PK
H	2783.10	48.16	49.89	7.17	31.28	36.72	54.00	-17.28	AV
H	9085.00	49.52	51.45	11.33	41.57	50.97	74.00	-23.03	PK

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.



500kHz

Polar (H/V)	Frequency	Meter Reading	Pre- amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency: 923.30MHz									
V	1846.60	67.62	50.24	6.81	31.25	55.44	74.00	-18.56	PK
V	1846.60	55.83	50.24	6.81	31.25	43.65	54.00	-10.35	AV
V	2769.90	66.33	49.87	7.13	36.53	60.12	74.00	-13.88	PK
V	2769.90	46.76	49.87	7.13	36.53	40.55	54.00	-13.45	AV
V	9813.00	50.01	51.45	11.31	41.57	51.44	74.00	-22.56	PK
H	1846.60	69.53	50.24	6.81	31.25	57.35	74.00	-16.65	PK
H	1846.60	52.56	50.24	6.81	31.25	40.38	54.00	-13.62	AV
H	2769.90	66.34	49.87	7.13	36.53	60.13	74.00	-13.87	PK
H	2769.90	47.9	49.87	7.13	36.53	41.69	54.00	-12.31	AV
H	9813.00	47.97	51.45	11.31	41.57	49.40	74.00	-24.60	PK
operation frequency: 925.70MHz									
V	1851.40	67.34	50.27	6.82	31.24	55.13	74.00	-18.87	PK
V	1851.40	55.45	50.27	6.82	31.24	43.24	54.00	-10.76	AV
V	2777.10	69.29	49.88	7.15	36.63	63.19	74.00	-10.81	PK
V	2777.10	46.21	49.88	7.15	36.63	40.11	54.00	-13.89	AV
V	9815.00	48.30	51.48	11.31	41.52	49.65	74.00	-24.35	PK
H	1851.40	66.76	50.27	6.82	31.24	54.55	74.00	-19.45	PK
H	1851.40	55.61	50.27	6.82	31.24	43.40	54.00	-10.60	AV
H	2777.10	69.71	49.88	7.15	36.63	63.61	74.00	-10.39	PK
H	2777.10	47.29	49.88	7.15	36.63	41.19	54.00	-12.81	AV
H	9815.00	48.39	51.48	11.31	41.52	49.74	74.00	-24.26	PK
operation frequency: 927.50MHz									
V	1855.00	68.52	50.28	6.85	31.26	56.35	74.00	-17.65	PK
V	2782.50	55.51	50.28	6.85	31.26	43.34	54.00	-10.66	AV
V	1855.00	69.71	49.89	7.17	36.65	63.64	74.00	-10.36	PK
V	2782.50	46.74	49.89	7.17	36.65	40.67	54.00	-13.33	AV
V	9815.00	49.47	51.45	11.33	41.56	50.91	74.00	-23.09	PK
H	1855.00	67.88	50.28	6.85	31.26	55.71	74.00	-18.29	PK
H	2782.50	55.79	50.28	6.85	31.26	43.62	54.00	-10.38	AV
H	1855.00	67.37	49.89	7.17	36.65	61.30	74.00	-12.70	PK
H	2782.50	48.38	49.89	7.17	36.65	42.31	54.00	-11.69	AV
H	9815.00	49.75	51.45	11.33	41.56	51.19	74.00	-22.81	PK

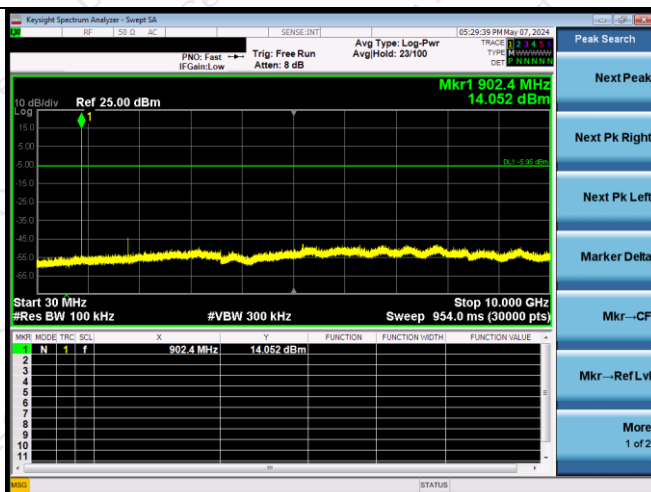
Remark:

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.

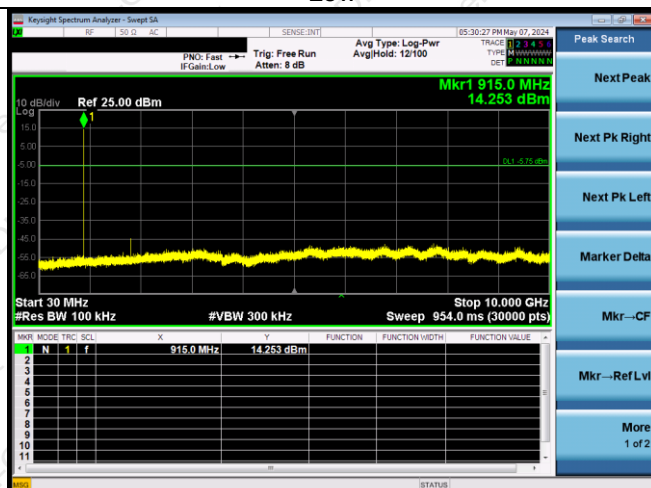


For Conducted(30MHz-10GHz):

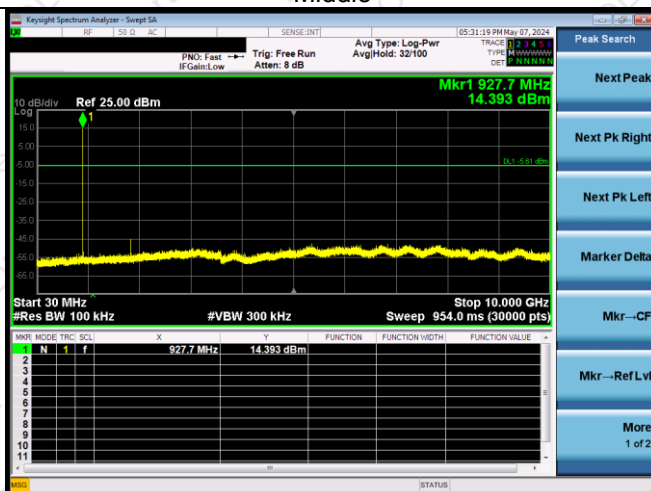
125KHz



Low



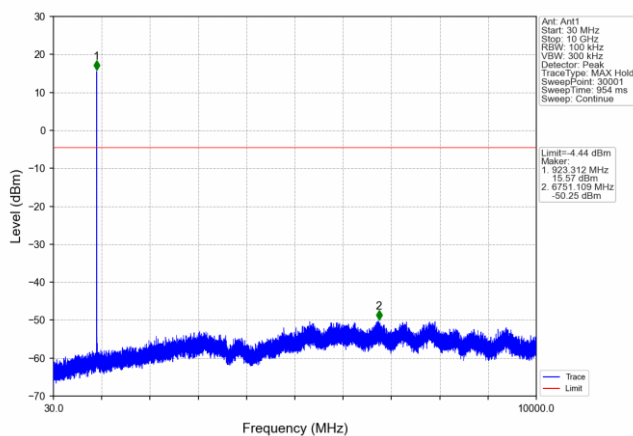
Middle



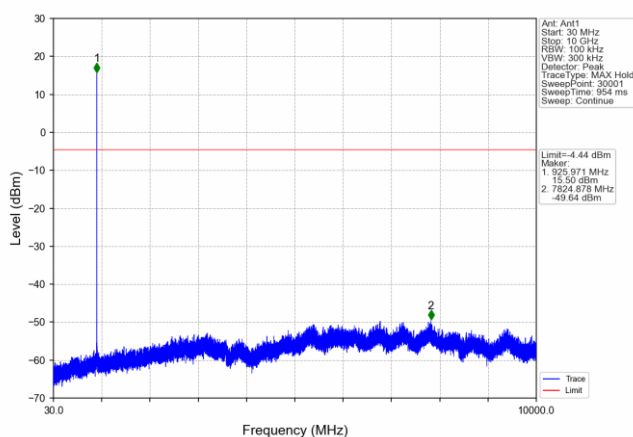
High



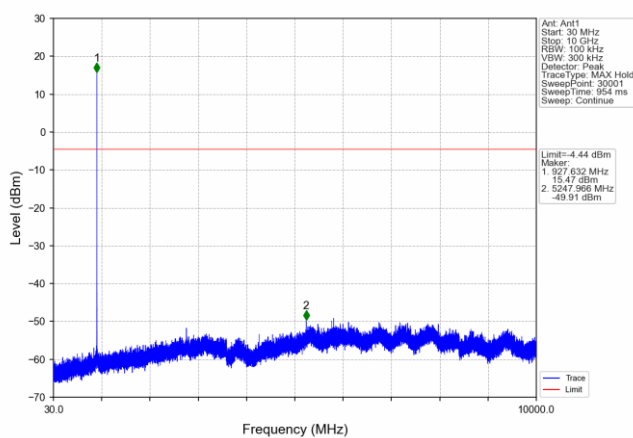
500KHz



Low



Middle



High



3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)
	QP
Below 1GHz	46.0

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	902MHz
Stop Frequency	928MHz
RB / VB (emission in restricted band)	100K/300K

3.3.2 TEST PROCEDURE

Above 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 rotatable 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.
- Test the EUT in the lowest channel,the Highest channel

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

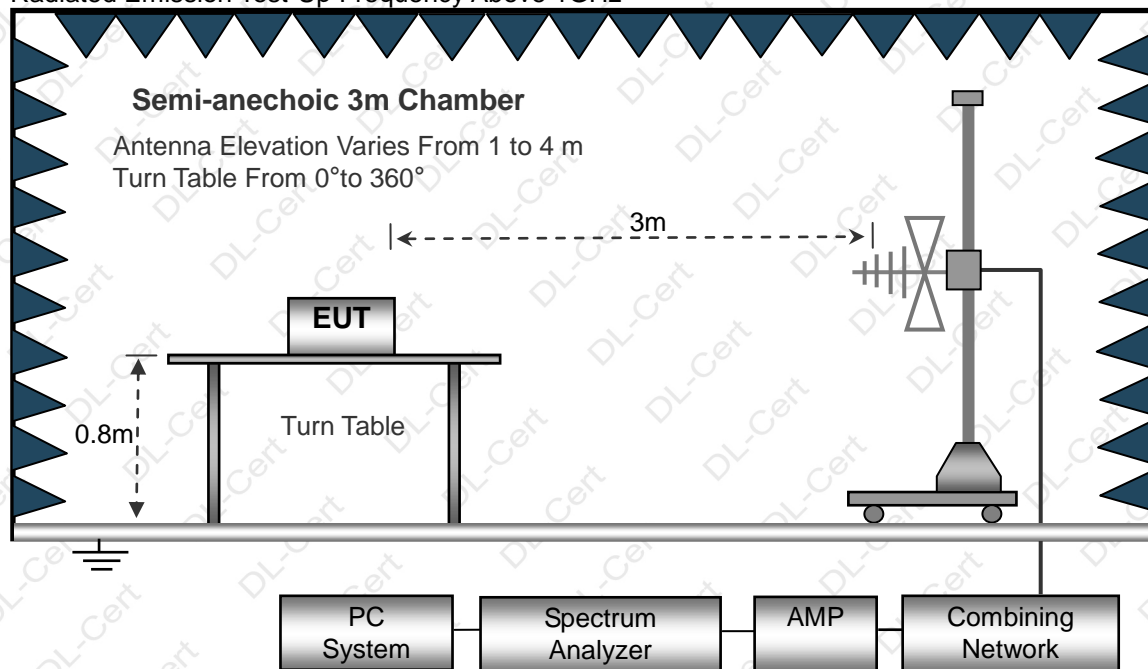


3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

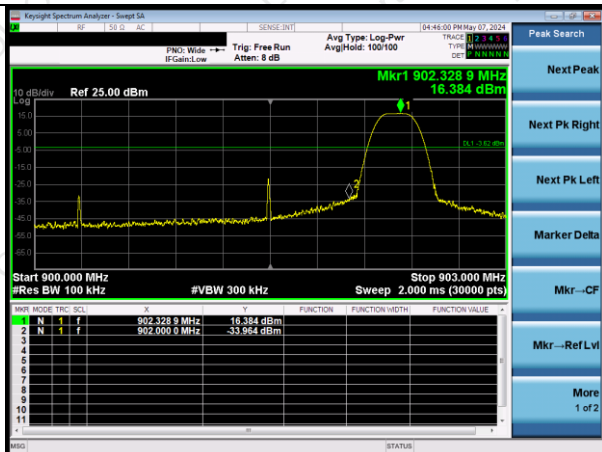


3.3.6 TEST RESULT

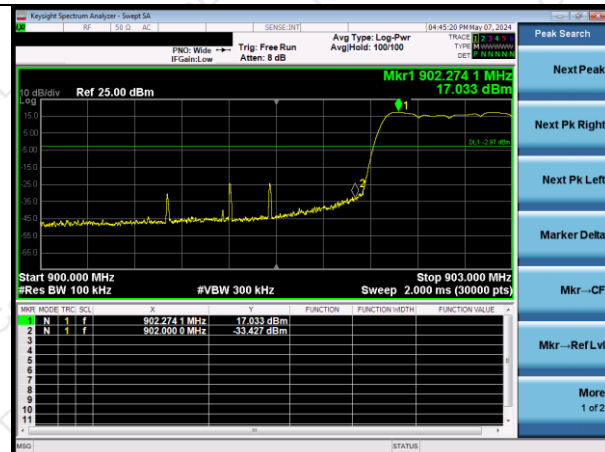
For Conducted:

125KHz Bandwidth

Test channel: Low channel

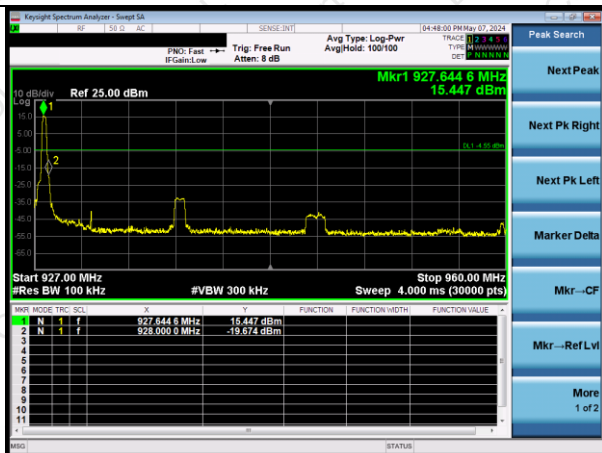


No-hopping mode

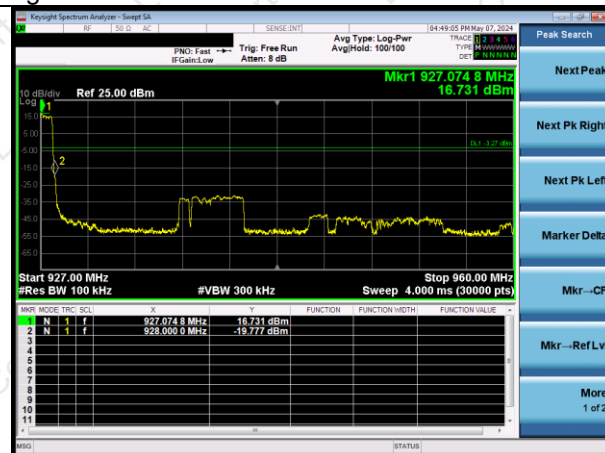


Hopping mode

Test channel: High channel

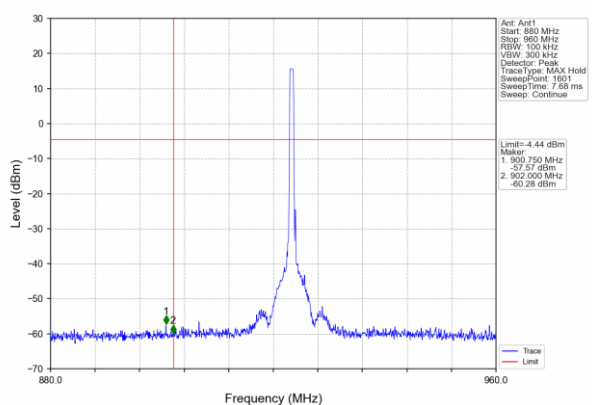


No-hopping mode

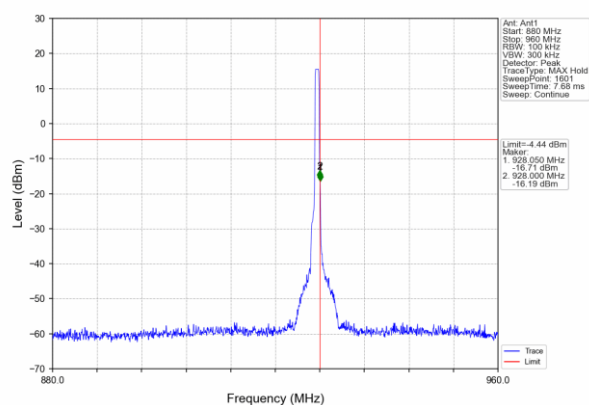


Hopping mode

500KHz Bandwidth



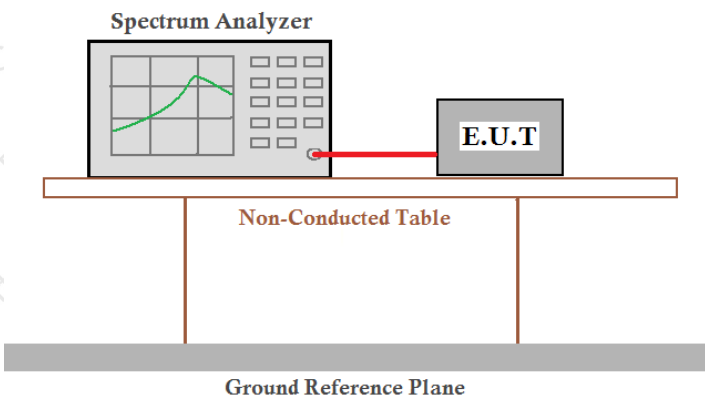
Low channel



High channel



4. PEAK OUTPUT POWER

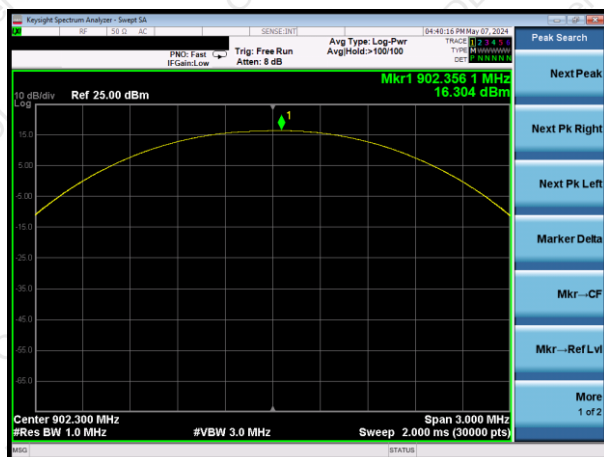
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.10:2013
Limit:	30dBm
Test setup:	
Test results:	Pass

4.1 TEST RESULTS

Mode	Test Channel	Peak Output Power (dBm)	LIMIT (dBm)
125KHz Bandwidth	Low	16.304	30.00
	Middle	16.731	30.00
	High	15.608	30.00
500KHz Bandwidth	Low	15.66	30.00
	Middle	15.50	30.00
	High	15.46	30.00

**125KHz:**

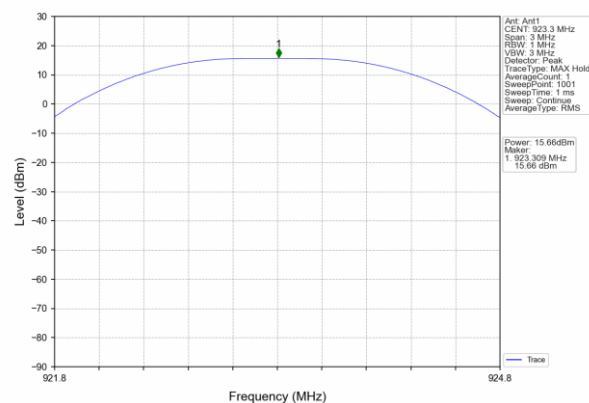
Test plot as follows:



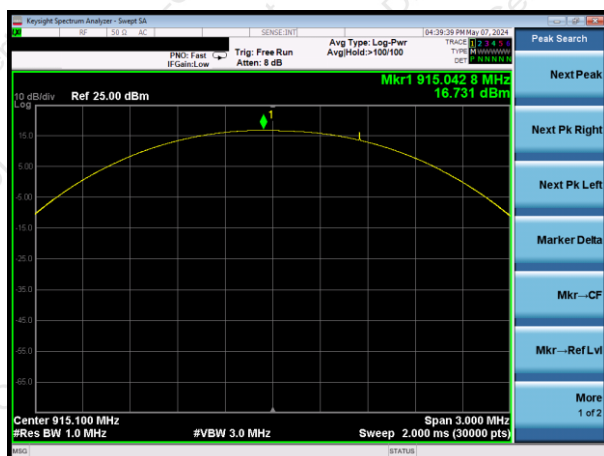
Low

500KHz:

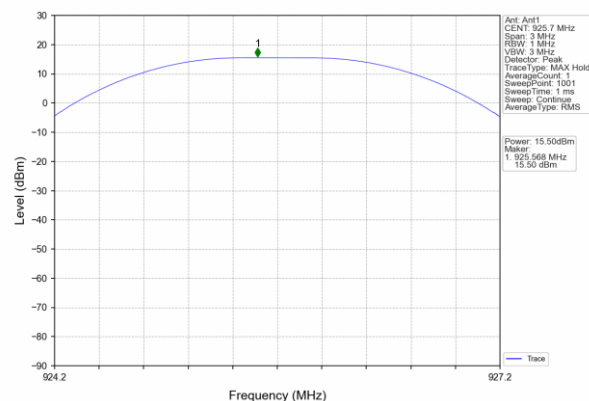
Test plot as follows:



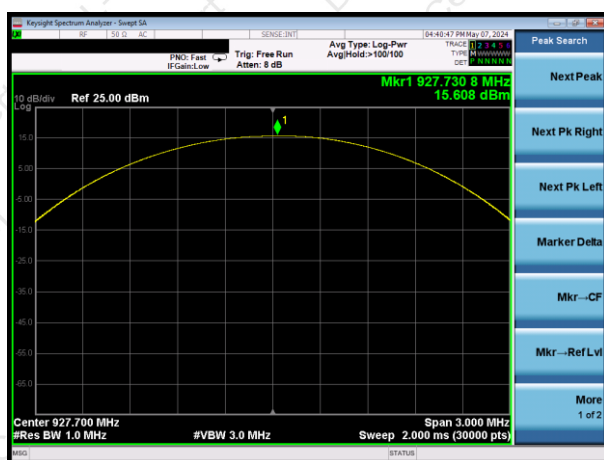
Low



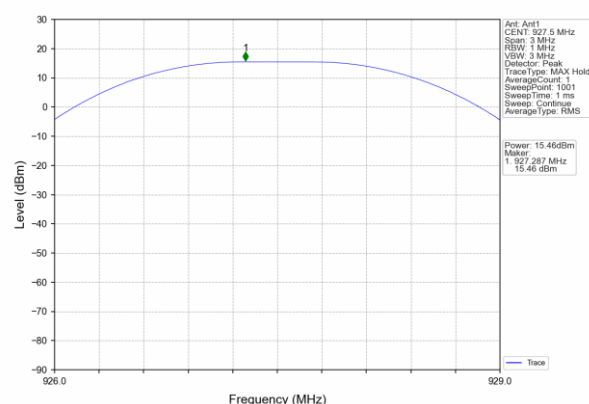
Middle



Middle



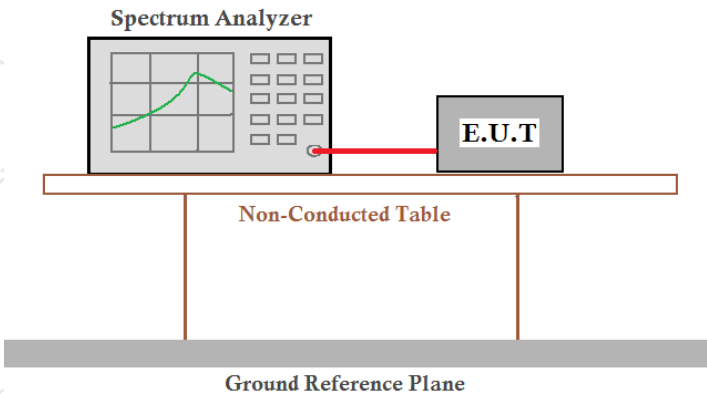
High



High



5. POWER SPECTRAL DENSITY TEST

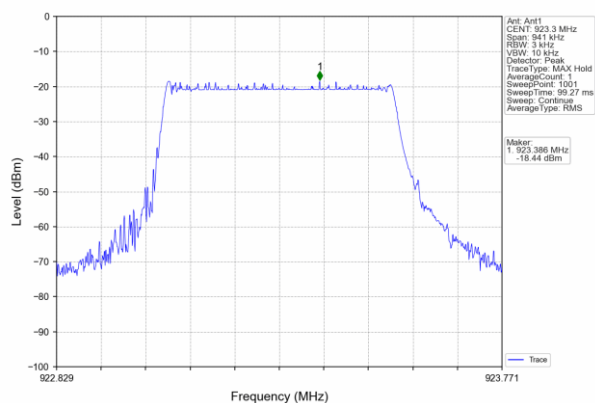
Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.10:2013 and KDB558074 D01 DTS Meas Guidance v05r02
Limit:	8dBm/3kHz
Test setup:	
Test results:	Pass

5.1 TEST RESULTS

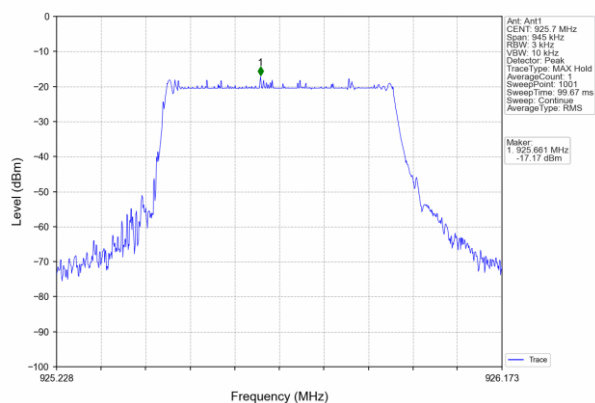
Mode	Test Channel	Power Spectral Density (dBm/3kHz)	LIMIT (dBm)
500KHz Bandwidth	Low	-18.44	≤ 8
	Middle	-17.17	≤ 8
	High	-14.05	≤ 8

**500KHz:**

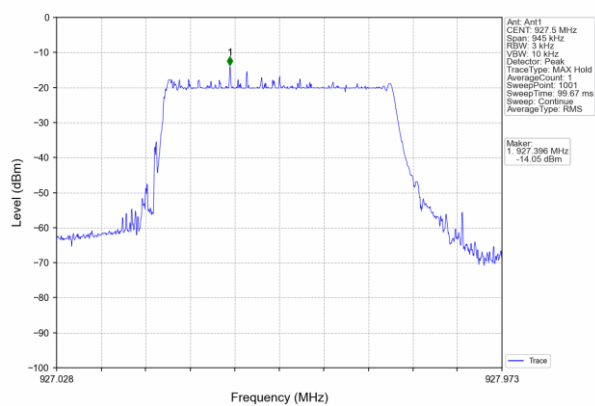
Test plot as follows:



Low



Middle



High



6. -6DB BANDWIDTH TEST& -20DB OCCUPIED BANDWIDTH

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range(MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	920-928	PASS

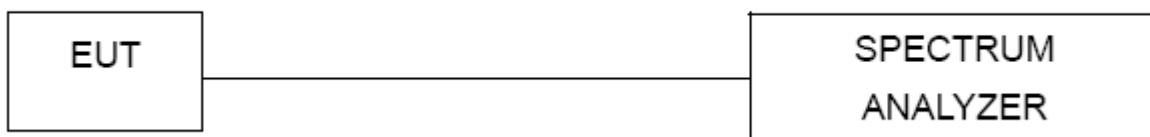
6.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) \geq RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

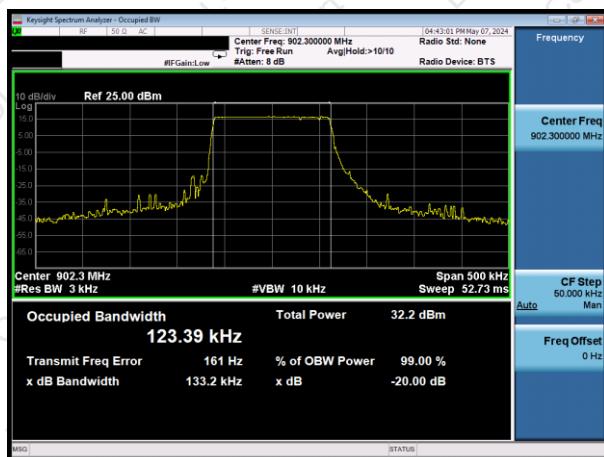
**6.1.5 TEST RESULTS**

Mode	Test Channel	20dB Bandwidth (MHz)	Limit (MHz)	Result
125kHz	Low	0.133	0.5	Pass
	Middle	0.133	0.5	Pass
	High	0.134	0.5	Pass

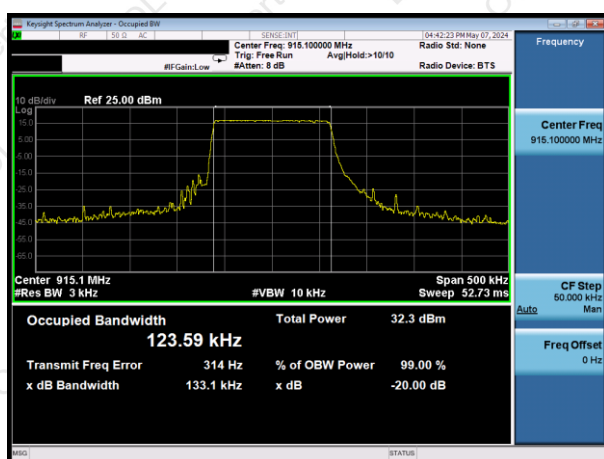
Mode	Test Channel	6dB Bandwidth (MHz)	Limit (MHz)	Result
500kHz	Low	0.627	0.5	Pass
	Middle	0.630	0.5	Pass
	High	0.630	0.5	Pass

**125KHz:**

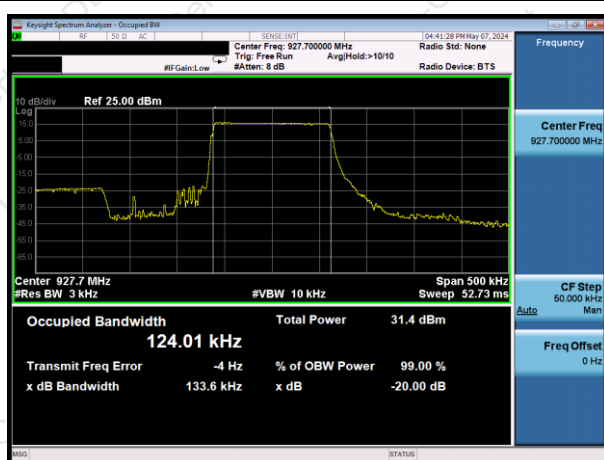
Test plot as follows:



Low



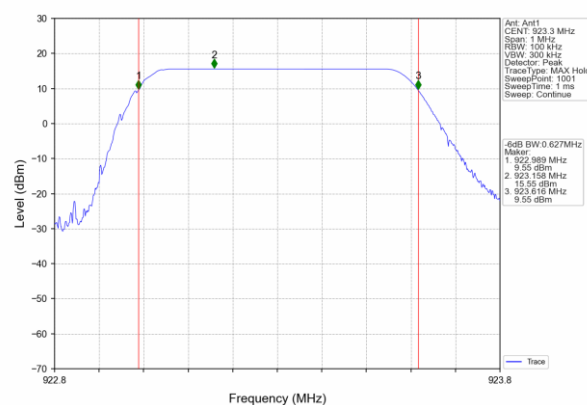
Middle



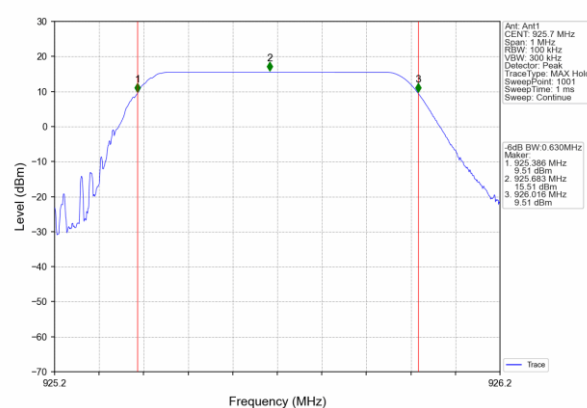
High

500KHz:

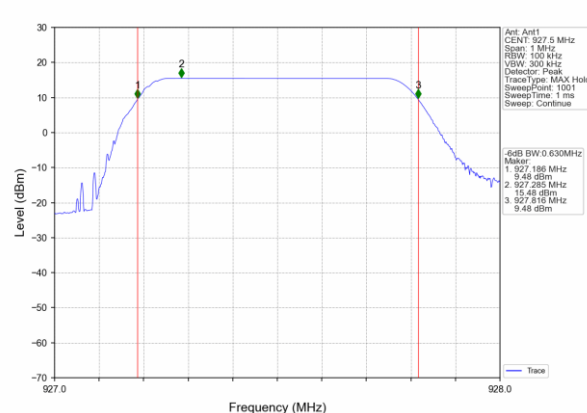
Test plot as follows:



Low



Middle



High



7. NUMBER OF HOPPING CHANNEL

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥ 50	902-928	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	$RBW \geq 1\%$ of the span
VB	$VBW \geq RBW$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

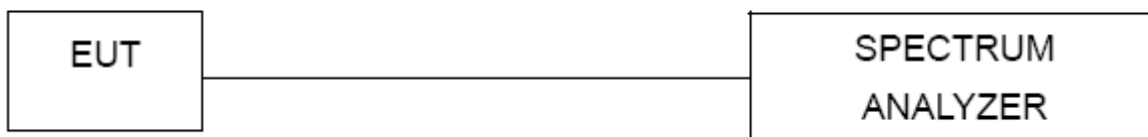
7.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : $RBW = 100\text{KHz}$, $VBW = 100\text{KHz}$, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

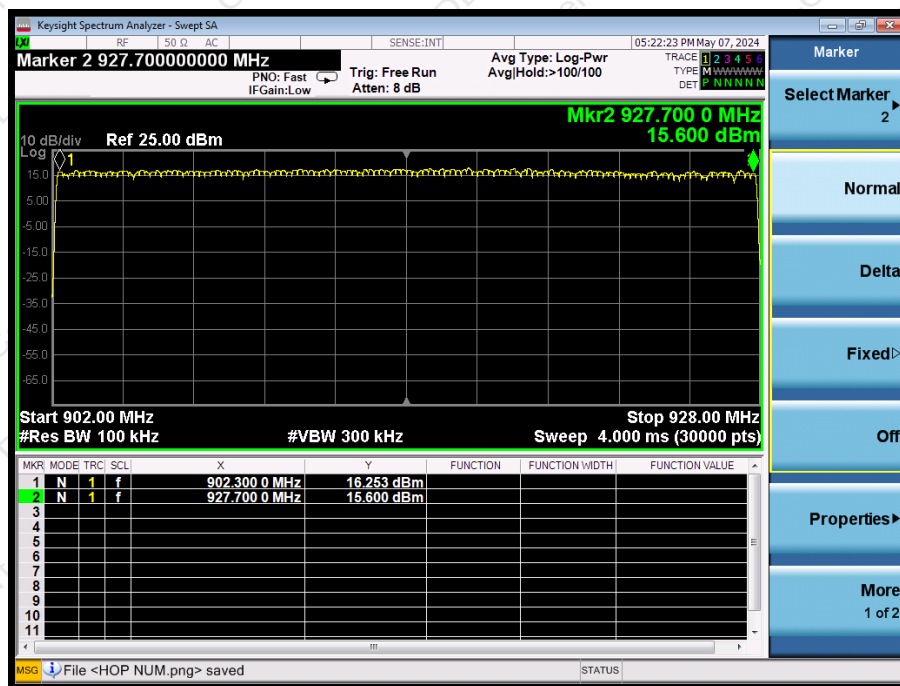
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



7.1.5 TEST RESULTS

Test Mode :	Hopping Mode
Number of Hopping Channel	128

125KHz Bandwidth





8. HOPPING CHANNEL SEPARATION MEASUREMENT

8.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 902-928 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (Channel Separation)
VB	300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

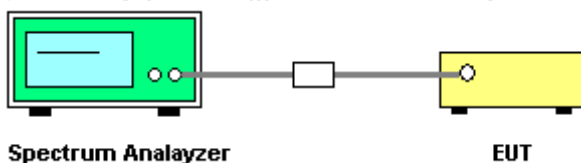
8.1.1 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

8.1.5 TEST RESULTS

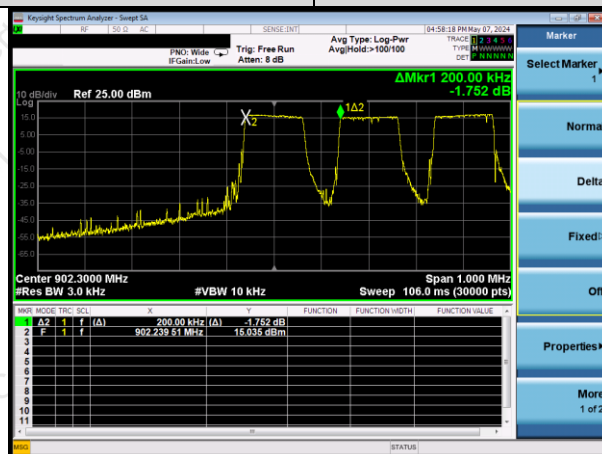
Test Mode	Ch. Separation (KHz)	Limit (KHz)	Result
125KHz Bandwidth	200.0	25KHz or 20dB Bandwidth	Complies
	200.0		
	200.0		



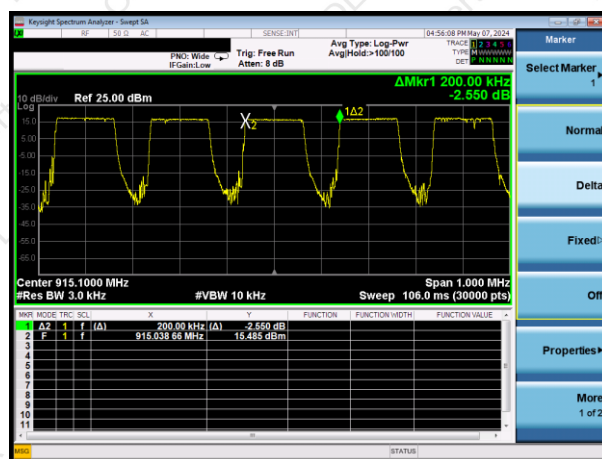
Test plot as follows:

Modulation mode:

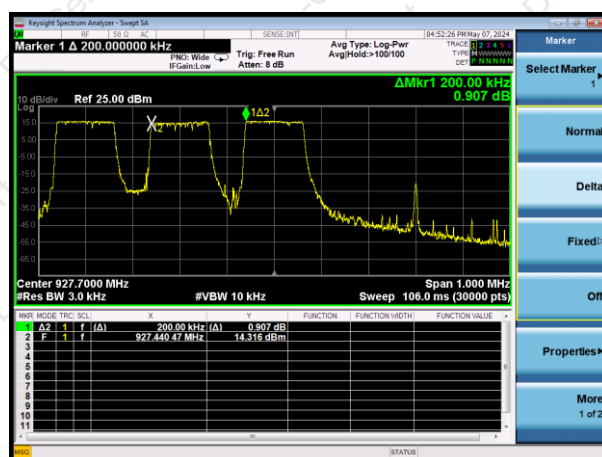
125KHz Bandwidth



Lowest channel



Middle channel





9. DWELL TIME OF OCCUPANCY

9.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	902-928	PASS

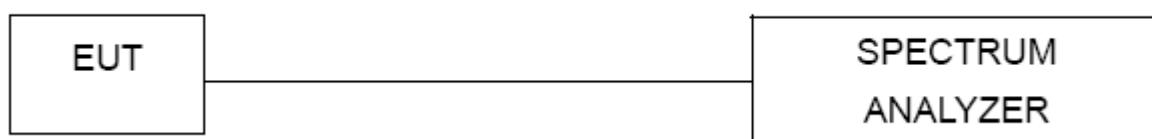
9.1.1 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.

9.1.2 DEVIATION FROM STANDARD

No deviation.

9.1.3 TEST SETUP



9.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



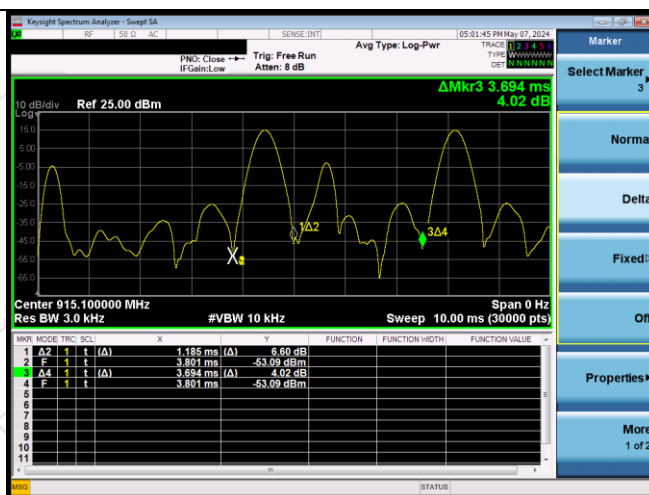
9.1.5 TEST RESULTS

Mode	Ton(ms)	Tcycle(ms)	Dwell time(ms)	Limit(ms)	Result
125KHz Bandwidth	1.185	3.694	118.179	400	Pass

Note: Transmit numbers= Continue TX Time/Tcycle

Dwell time=Transmit numbers*Ton

Ton&Tcycle



Continue TX Time





10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: 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.

10.2 EUT ANTENNA

The EUT antenna is external antenna, It comply with the standard requirement.

11. TEST SEUUP PHOTO

Reference to the appendix I for details.

12. EUT PHOTO

Reference to the appendix II for details.

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