FCC PART 15C

Measurement and Test Report
For
Minami Medical Technology (Guangdong) Co., Ltd.

FCC ID: 2BOXI-M2212B

FCC Rule(s)/Methods:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10:2013
Product Description:	Hearing Aids
Trademark:	N/A
Model/Type reference.:	M2212B
Report No.:	MAX25042102750022F-1
Date of receipt of test item:	Apr 15, 2025
Date of sampling :	Apr 16, 2025
Tested Date:	Apr 17, 2025 to Apr 26, 2025
Issued Date:	May 6, 2025
Tested By:	Lris Yao/ Engineer
Reviewed By:	Levi Xiao/ EMC Manager
Approved & Authorized By:	Salon Ouyang / PSQ Manager

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1. VERSION

Report No.	Version	Description	Approved
MAX25042102750022F-1	Rev.01	Initial issue of report	May 6, 2025

2. TEST SUMMARY

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C KDB558074 D01 15.247 Meas Guidancev05r02			
Standard Section	Test Item	Result	Remark
15.203/15.247 (c)	Antenna Requirement	PASS	
15.207	AC Power Line Conducted Emission	PASS	
15.247 (b)(1)	Conducted Peak Output Power	PASS	
15.247 (a)(1)	20dB Occupied Bandwidth 99% OCB	PASS	
15.247 (a)(1)	Carrier Frequencies Separation	PASS	
15.247 (a)(1)(iii)	Hopping Channel Number	PASS	
15.247 (a)(1)(iii)	Dwell Time	PASS	
15.205/15.209	Radiated Emission and Restricted Band	PASS	
15.247(d)	Conducted Unwanted emissions and Band Edge	PASS	

NOTE:

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

2.1 TEST FACILITY

MAXLAB Testing Co.,Ltd.
Add. : 1/F, Building B, Xinshidai GR Park, Shiyan Street, Bao'an District, Shenzhen, Shiyan Stree Bao'an District, Shenzhen, Guangdong, 518052, People’s Republic of China

FCC Test Firm Registration Number: 562200
Designation Number: CN1338
IC Registered No.: 11093A
CAB identifier : CN0019

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± 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	±1.38dB
2	RF power conducted	±0.16dB
3	Spurious emissions conducted	±0.21dB
4	All emissions radiated(<1G)	±4.68dB
5	All emissions radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%
8	RF Occupied Bandwidth	±2.9%
9	Dwell Time	±3.3%

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Applicant:	Minami Medical Technology (Guangdong) Co., Ltd.
Address of applicant:	3F, No. 13, Maonan Road, Torch Development Zone, Zhongshan City, Guangdong Province
Manufacturer:	Minami Medical Technology (Guangdong) Co., Ltd.
Address of manufacturer:	3F, No. 13, Maonan Road, Torch Development Zone, Zhongshan City, Guangdong Province
Product Name:	Hearing Aids
Model No.:	M2212B
Hardware version	V1.0
Software version	V1.0
Sample(s) Status:	Engineer sample
Channel numbers:	79
Operation Frequency:	2402MHz~2480MHz
Modulation technology:	GFSK, π/4-DQPSK
Antenna Type:	Chip Antenna
Antenna gain:	+3.62dBi
Power supply:	DC 5V DC 3.7 from Battery

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

All Bluetooth units participating in the piconet are time and hop-synchronized to the channel.
Example of a 79 hopping sequence in data mode:
35, 27, 6, 44, 14, 61, 74, 32, 1, 11, 23, 2, 55, 65, 29, 3, 9, 52, 78, 58, 40, 25, 0, 7, 18, 26, 76, 60, 47, 50, 2, 5, 16, 37, 70, 63, 66, 54, 20, 13, 4, 8, 15, 21, 26, 10, 73, 77, 67, 69, 43, 24, 57, 39, 46, 72, 48, 33, 17, 31, 75, 19, 41, 62, 68, 28, 51, 66, 30, 56, 34, 59, 71, 22, 49, 64, 38, 45, 36, 53, 42
Each Frequency used equally on the average by each transmitter

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:

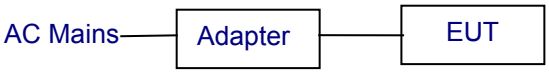
Test channel	Frequency
The lowest channel	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz

Note:This EUT supports DH1/DH3/DH5/2DH1/2DH3/2DH5, Only DH5/2DH5 record in this report

3.2 Test Setup Configuration

The PCB boards of the left and right earphones are the same, so only the right earphone was used in this test.

Conducted Emission



Radiated Emission

Conducted Spurious

3.3 Support Equipment

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	Mfr/Brand	Model/Type No.	Series No.	Note
1	Adapter	Chenyuanshi	G.S013A#1A	/	Input: 100-240V~ , 50/60Hz, 0.3A Output: DC 5V, 1A
2	Hearing Aids charging bin	Xinboyue	M2212B	/	Input: DC 5V Battery:DC 3.7V, 400mAh

Item	Shielded Type	Ferrite Core	Length	Note

Note:
(1) The support equipment was authorized by Declaration of Confirmation.

3.4 Test Mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, 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.	

Test Software	Test Tool
Power level setup	5dBm

3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Conducted Emission					
Test Equipment	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	BSL252	2024-10-27	2025-10-26
EMI Test Receiver	R&S	ESCI 7	BSL552	2024-10-27	2025-10-26
Coaxial Switch	ANRITSU CORP	MP59B	BSL225	2024-10-27	2025-10-26
ENV216 2-L-V-NETZNACH B.DE	ROHDE&SCHWARZ	ENV216	BSL226	2024-10-27	2025-10-26
Coaxial Cable	BSL	N/A	BSL227	N/A	N/A
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Thermo meter	KTJ	TA328	BSL233	2024-10-27	2025-10-26
Absorbing clamp	Elektronik-Feinmechanik	MDS21	BSL229	2024-10-27	2025-10-26
LISN	R&S	ENV216	308	2024-10-27	2025-10-26
LISN	R&S	ENV216	314	2024-10-27	2025-10-26

Radiation Test equipment					
Test Equipment	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)*6.4(H)	BSL250	2024-10-27	2025-10-26
Control Room	ZhongYu Electron	6.2(L)*2.5(W)*2.4(H)	BSL251	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESU26	BSL203	2024-10-27	2025-10-26
BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	BSL214	2024-10-27	2025-10-26
Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	BSL208	2024-10-27	2025-10-26
Horn Antenna	ETS-LINDGREN	3160	BSL217	2024-10-27	2025-10-26
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Coaxial Cable	BSL	N/A	BSL213	2024-10-27	2025-10-26
Coaxial Cable	BSL	N/A	BSL211	2024-10-27	2025-10-26
Coaxial cable	BSL	N/A	BSL210	2024-10-27	2025-10-26
Coaxial Cable	BSL	N/A	BSL212	2024-10-27	2025-10-26
Amplifier(100kHz-3 GHz)	HP	8347A	BSL204	2024-10-27	2025-10-26
Amplifier(2GHz-20 GHz)	HP	84722A	BSL206	2024-10-27	2025-10-26
Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	BSL218	2024-10-27	2025-10-26
Band filter	Amindeon	82346	BSL219	2024-10-27	2025-10-26
Power Meter	Anritsu	ML2495A	BSL540	2024-10-27	2025-10-26
Power Sensor	Anritsu	MA2411B	BSL541	2024-10-27	2025-10-26
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	BSL575	2024-10-27	2025-10-26
Splitter	Agilent	11636B	BSL237	2024-10-27	2025-10-26
Loop Antenna	ZHINAN	ZN30900A	BSL534	2024-10-27	2025-10-26
Breitband hornantenne	SCHWARZBECK	BBHA 9170	BSL579	2024-10-27	2025-10-26
Amplifier	TDK	PA-02-02	BSL574	2024-10-27	2025-10-26
Amplifier	TDK	PA-02-03	BSL576	2024-10-27	2025-10-26
PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	BSL578	2024-10-27	2025-10-26

RF Conducted Test:					
Test Equipment	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
MXA Signal Analyzer	Agilent	N9020A	BSL566	2024-10-27	2025-10-26
EMI Test Receiver	R&S	ESCI 7	BSL552	2024-10-27	2025-10-26
Spectrum Analyzer	Agilent	E4440A	BSL533	2024-10-27	2025-10-26
MXG vector Signal Generator	Agilent	N5182A	BSL567	2024-10-27	2025-10-26
ESG Analog Signal Generator	Agilent	E4428C	BSL568	2024-10-27	2025-10-26
USB RF Power Sensor	DARE	RPR3006W	BSL569	2024-10-27	2025-10-26
RF Switch Box	Shongyi	RFSW3003328	BSL571	2024-10-27	2025-10-26
Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	BSL572	2024-10-27	2025-10-26

4. EMC EMISSION TEST

4.1 Conducted emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	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) *Decreases with the logarithm of the frequency.

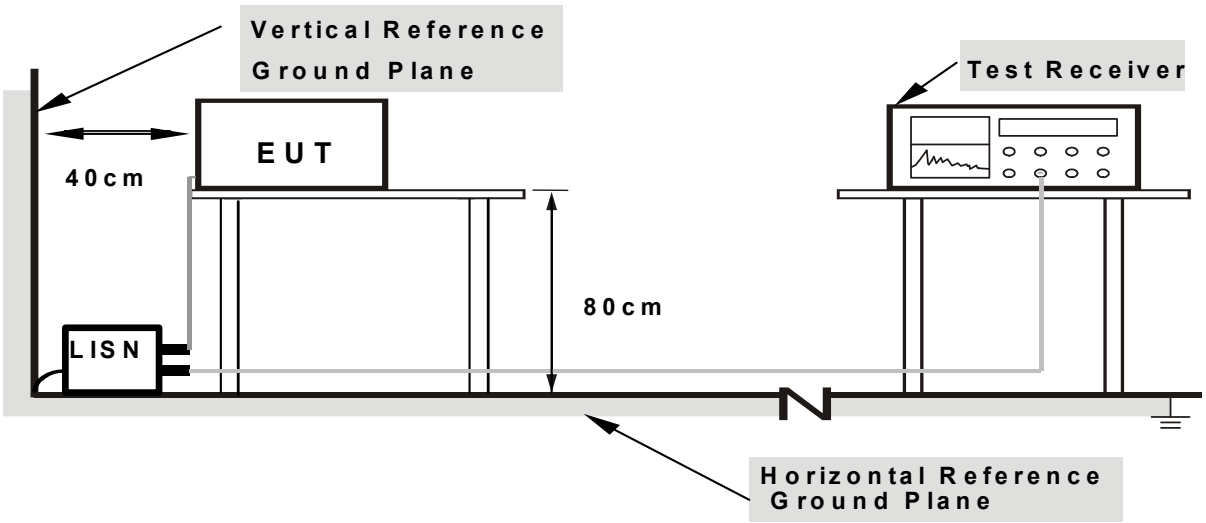
4.1.2 TEST PROCEDURE

a. 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.
b. 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.
c. 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.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 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

4.1.5 EUT OPERATING CONDITIONS

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

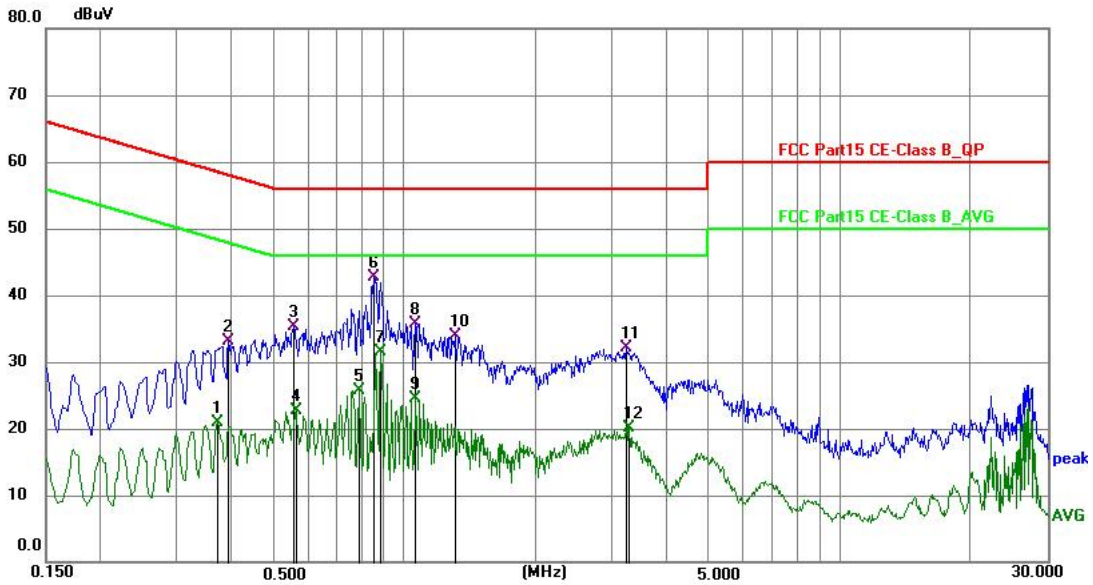
We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.
Bluetooth function is not supported when EUT is charging, So we only test charging mode for this test item.

4.1.6 TEST RESULTS

PASS

4.1.6 Test Result

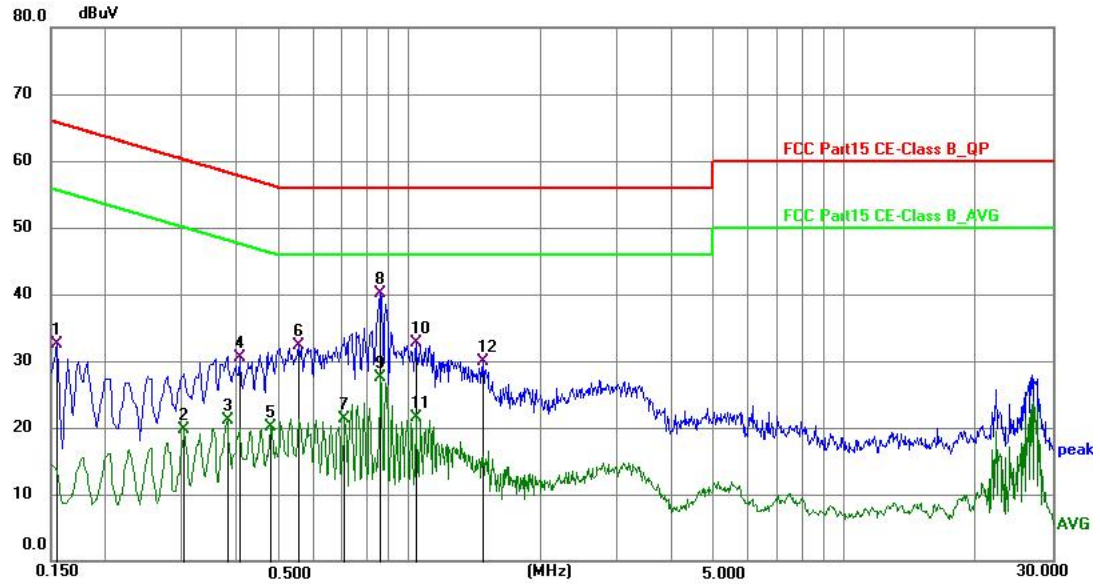
Temperature：	21℃	Relative Humidity：	55℃
Pressure：	101kPa	Phase：	L
Test Voltage ：	AC 120V/60Hz	Test Model:	Charging



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.3704	11.31	9.65	20.96	48.49	-27.53	AVG	P	
2	0.3930	23.49	9.65	33.14	58.00	-24.86	QP	P	
3	0.5550	25.59	9.65	35.24	56.00	-20.76	QP	P	
4	0.5639	13.05	9.65	22.70	46.00	-23.30	AVG	P	
5	0.7890	16.13	9.66	25.79	46.00	-20.21	AVG	P	
6 *	0.8520	33.13	9.62	42.75	56.00	-13.25	QP	P	
7	0.8835	21.81	9.60	31.41	46.00	-14.59	AVG	P	
8	1.0590	26.21	9.53	35.74	56.00	-20.26	QP	P	
9	1.0590	14.95	9.53	24.48	46.00	-21.52	AVG	P	
10	1.3065	24.41	9.58	33.99	56.00	-22.01	QP	P	
11	3.2280	22.50	9.61	32.11	56.00	-23.89	QP	P	
12	3.2775	10.54	9.60	20.14	46.00	-25.86	AVG	P	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

Temperature：	21℃	Relative Humidity：	55℃
Pressure：	101kPa	Phase：	N
Test Voltage ：	AC 120V/60Hz	Test Model:	Charging



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1544	22.89	9.53	32.42	65.76	-33.34	QP	P	
2	0.3029	9.94	9.68	19.62	50.16	-30.54	AVG	P	
3	0.3795	11.36	9.65	21.01	48.29	-27.28	AVG	P	
4	0.4063	20.83	9.64	30.47	57.72	-27.25	QP	P	
5	0.4784	10.39	9.62	20.01	46.37	-26.36	AVG	P	
6	0.5550	22.57	9.65	32.22	56.00	-23.78	QP	P	
7	0.7079	11.56	9.71	21.27	46.00	-24.73	AVG	P	
8 *	0.8565	30.45	9.62	40.07	56.00	-15.93	QP	P	
9	0.8609	17.98	9.61	27.59	46.00	-18.41	AVG	P	
10	1.0363	23.21	9.53	32.74	56.00	-23.26	QP	P	
11	1.0363	11.92	9.53	21.45	46.00	-24.55	AVG	P	
12	1.4730	20.30	9.61	29.91	56.00	-26.09	QP	P	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

4.2 Radiated emissions

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 25GHz
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

4.2.1 Radiated Emission Limits

Frequencies (MHz)	Field Strength (micorvolts/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

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).

4.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. 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.

d. 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.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. 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:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

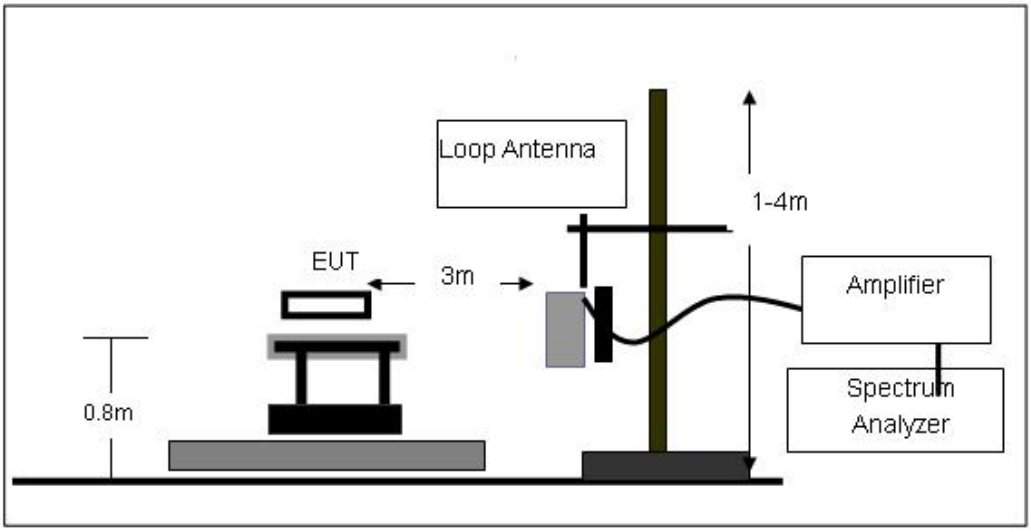
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

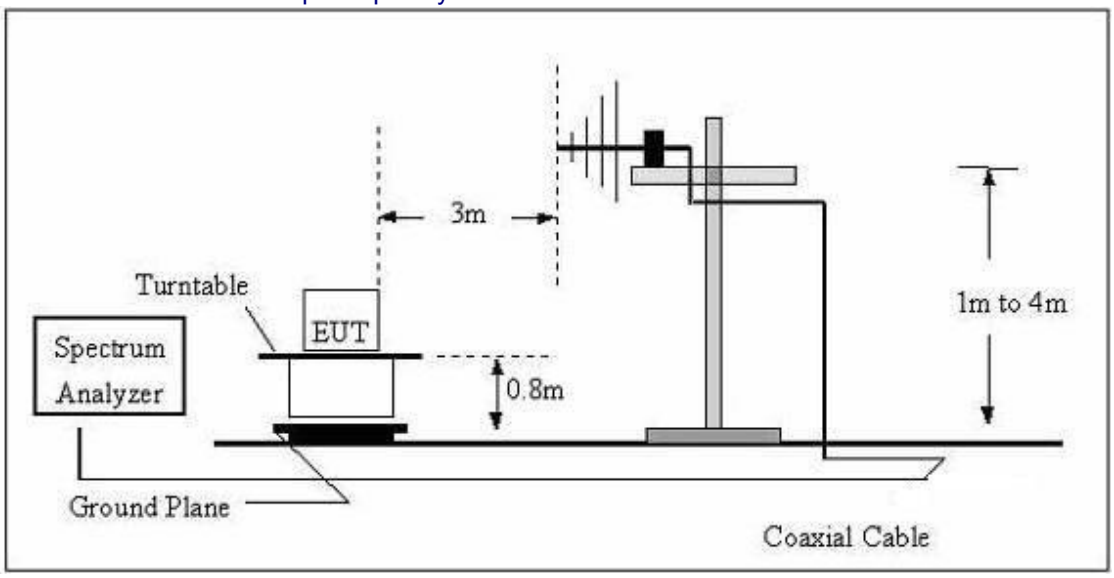
No deviation

4.2.4 TEST SETUP

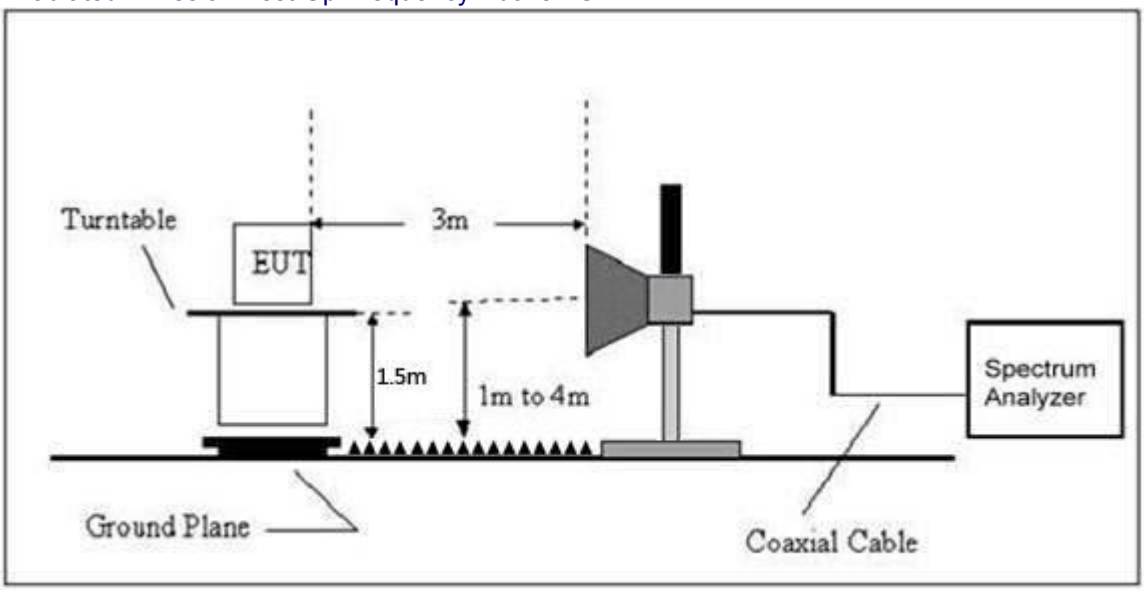
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.2.5 EUT OPERATING 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.

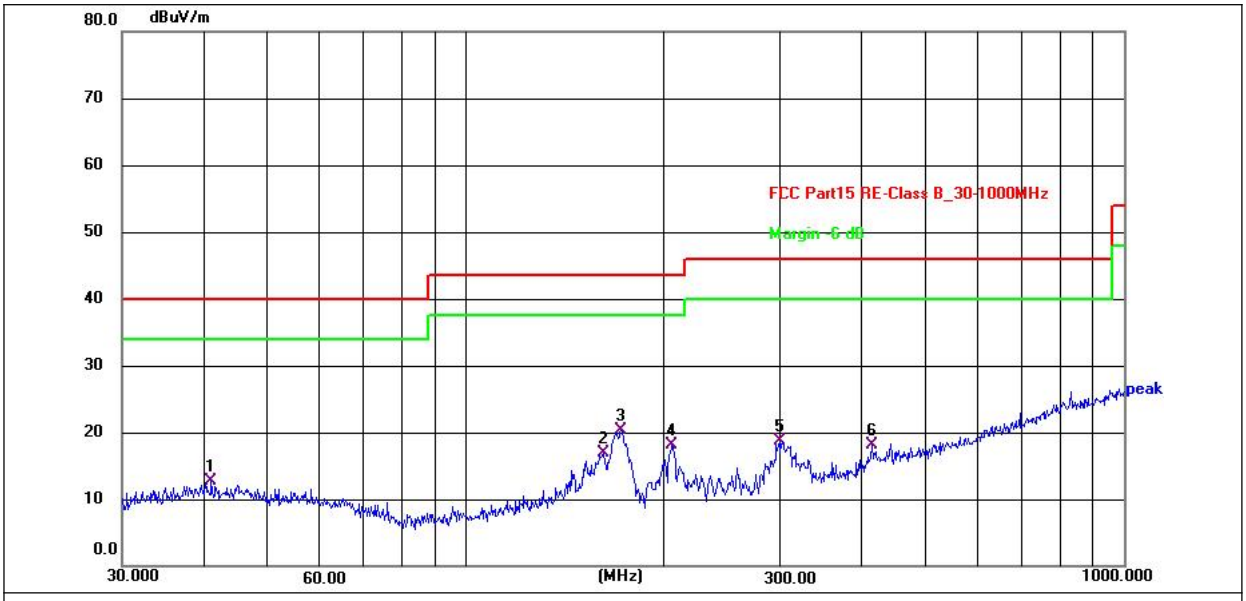
4.2.6 TEST RESULTS

Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

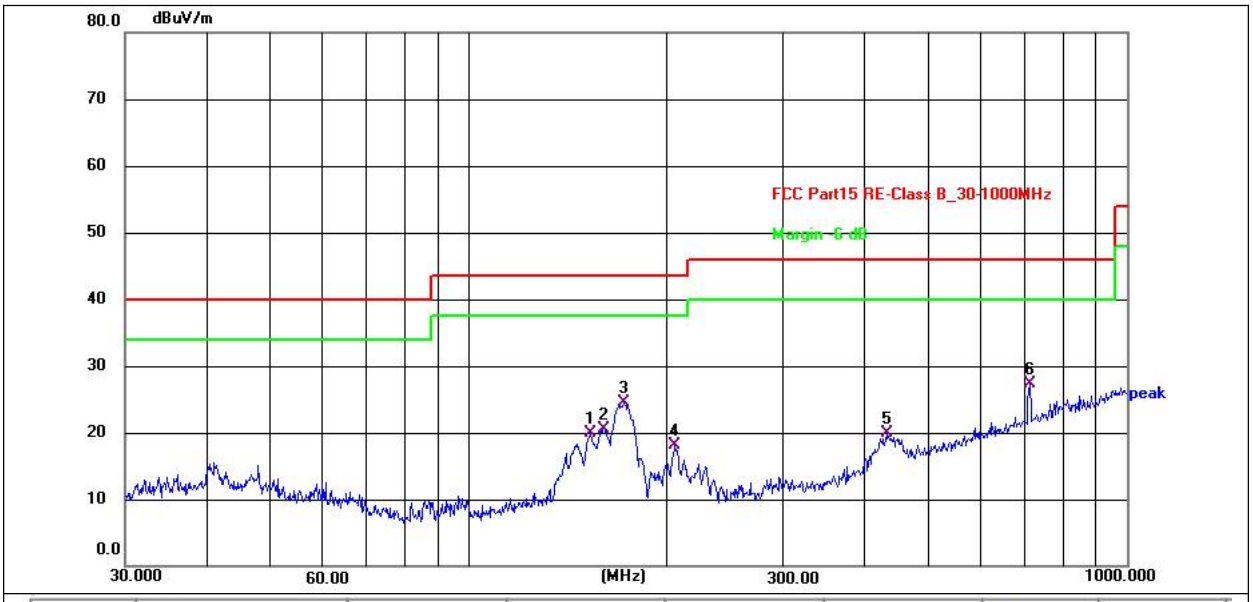
Between 30MHz – 1GHz（Worst case GFSK 2402MHz）

Temperature：	24℃	Relative Humidity：	51%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage:	DC 3.7V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	40.9881	28.54	-15.75	12.79	40.00	-27.21	QP
2	161.4742	32.95	-16.01	16.94	43.50	-26.56	QP
3 *	171.9946	36.95	-16.74	20.21	43.50	-23.29	QP
4	205.6751	37.32	-19.12	18.20	43.50	-25.30	QP
5	299.3158	34.43	-15.67	18.76	46.00	-27.24	QP
6	413.2706	30.92	-12.84	18.08	46.00	-27.92	QP

Temperature：	24℃	Relative Humidity：	51%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 3.7V		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	153.2004	35.82	-15.83	19.99	43.50	-23.51	QP
2	160.3456	36.56	-15.96	20.60	43.50	-22.90	QP
3	171.9946	41.17	-16.74	24.43	43.50	-19.07	QP
4	205.6751	37.31	-19.12	18.19	43.50	-25.31	QP
5	431.0316	32.21	-12.36	19.85	46.00	-26.15	QP
6 *	711.6734	33.80	-6.50	27.30	46.00	-18.70	QP

Remarks:
1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2.The emission levels of other frequencies are very lower than the limit and not show in test report.
3.The test data shows only the worst case GFSK mode

1GHz~25GHz

GFSK

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)	Detector Type
Low Channel:2402MHz									
V	4804.00	54.09	30.55	5.77	24.66	53.97	74.00	-20.03	Pk
V	4804.00	43.69	30.55	5.77	24.66	43.57	54.00	-10.43	AV
V	7206.00	53.61	30.33	6.32	24.55	54.15	74.00	-19.85	Pk
V	7206.00	43.72	30.33	6.32	24.55	44.26	54.00	-9.74	AV
V	9608.00	54.45	30.85	7.45	24.69	55.74	74.00	-18.26	Pk
V	9608.00	43.00	30.85	7.45	24.69	44.29	54.00	-9.71	AV
V	12010.00	51.60	31.02	8.99	25.57	55.14	74.00	-18.86	Pk
V	12010.00	43.65	31.02	8.99	25.57	47.19	54.00	-6.81	AV
H	4804.00	52.07	30.55	5.77	24.66	51.95	74.00	-22.05	Pk
H	4804.00	43.03	30.55	5.77	24.66	42.91	54.00	-11.09	AV
H	7206.00	54.46	30.33	6.32	24.55	55.00	74.00	-19.00	Pk
H	7206.00	43.35	30.33	6.32	24.55	43.89	54.00	-10.11	AV
H	9608.00	52.00	30.85	7.45	24.69	53.29	74.00	-20.71	Pk
H	9608.00	43.22	30.85	7.45	24.69	44.51	54.00	-9.49	AV
H	12010.00	54.45	31.02	8.99	25.57	57.99	74.00	-16.01	Pk
H	12010.00	43.11	31.02	8.99	25.57	46.65	54.00	-7.35	AV

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)	Detector Type
Middle Channel:2441MHz									
V	4882.00	54.38	30.55	5.77	24.66	54.26	74.00	-19.74	Pk
V	4882.00	43.04	30.55	5.77	24.66	42.92	54.00	-11.08	AV
V	7323.00	52.89	30.33	6.32	24.55	53.43	74.00	-20.57	Pk
V	7323.00	43.81	30.33	6.32	24.55	44.35	54.00	-9.65	AV
V	9764.00	51.85	30.85	7.45	24.69	53.14	74.00	-20.86	Pk
V	9764.00	43.70	30.85	7.45	24.69	44.99	54.00	-9.01	AV
V	12205.00	51.87	31.02	8.99	25.57	55.41	74.00	-18.59	Pk
V	12205.00	43.64	31.02	8.99	25.57	47.18	54.00	-6.82	AV
H	4882.00	52.17	30.55	5.77	24.66	52.05	74.00	-21.95	Pk
H	4882.00	43.14	30.55	5.77	24.66	43.02	54.00	-10.98	AV
H	7323.00	50.06	30.33	6.32	24.55	50.60	74.00	-23.40	Pk
H	7323.00	43.92	30.33	6.32	24.55	44.46	54.00	-9.54	AV
H	9764.00	51.42	30.85	7.45	24.69	52.71	74.00	-21.29	Pk
H	9764.00	43.80	30.85	7.45	24.69	45.09	54.00	-8.91	AV
H	12205.00	54.08	31.02	8.99	25.57	57.62	74.00	-16.38	Pk
H	12205.00	43.37	31.02	8.99	25.57	46.91	54.00	-7.09	AV

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)	Detector Type
High Channel:2480MHz									
V	4960.00	50.42	30.55	5.77	24.66	50.30	74.00	-23.70	Pk
V	4960.00	43.97	30.55	5.77	24.66	43.85	54.00	-10.15	AV
V	7440.00	51.75	30.33	6.32	24.55	52.29	74.00	-21.71	Pk
V	7440.00	43.20	30.33	6.32	24.55	43.74	54.00	-10.26	AV
V	9920.00	54.68	30.85	7.45	24.69	55.97	74.00	-18.03	Pk
V	9920.00	43.46	30.85	7.45	24.69	44.75	54.00	-9.25	AV
V	12400.00	53.42	31.02	8.99	25.57	56.96	74.00	-17.04	Pk
V	12400.00	43.79	31.02	8.99	25.57	47.33	54.00	-6.67	AV
H	4960.00	53.49	30.55	5.77	24.66	53.37	74.00	-20.63	Pk
H	4960.00	43.02	30.55	5.77	24.66	42.90	54.00	-11.10	AV
H	7440.00	52.93	30.33	6.32	24.55	53.47	74.00	-20.53	Pk
H	7440.00	43.05	30.33	6.32	24.55	43.59	54.00	-10.41	AV
H	9920.00	53.48	30.85	7.45	24.69	54.77	74.00	-19.23	Pk
H	9920.00	43.44	30.85	7.45	24.69	44.73	54.00	-9.27	AV
H	12400.00	53.19	31.02	8.99	25.57	56.73	74.00	-17.27	Pk
H	12400.00	43.66	31.02	8.99	25.57	47.20	54.00	-6.80	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.

π/4-DQPSK

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)	Detector Type
Low Channel:2402MHz									
V	4804.00	51.20	30.55	5.77	24.66	51.08	74.00	-22.92	Pk
V	4804.00	43.61	30.55	5.77	24.66	43.49	54.00	-10.51	AV
V	7206.00	52.08	30.33	6.32	24.55	52.62	74.00	-21.38	Pk
V	7206.00	43.44	30.33	6.32	24.55	43.98	54.00	-10.02	AV
V	9608.00	50.45	30.85	7.45	24.69	51.74	74.00	-22.26	Pk
V	9608.00	43.80	30.85	7.45	24.69	45.09	54.00	-8.91	AV
V	12010.00	52.40	31.02	8.99	25.57	55.94	74.00	-18.06	Pk
V	12010.00	43.42	31.02	8.99	25.57	46.96	54.00	-7.04	AV
H	4804.00	54.81	30.55	5.77	24.66	54.69	74.00	-19.31	Pk
H	4804.00	43.01	30.55	5.77	24.66	42.89	54.00	-11.11	AV
H	7206.00	54.51	30.33	6.32	24.55	55.05	74.00	-18.95	Pk
H	7206.00	43.30	30.33	6.32	24.55	43.84	54.00	-10.16	AV
H	9608.00	50.33	30.85	7.45	24.69	51.62	74.00	-22.38	Pk
H	9608.00	43.35	30.85	7.45	24.69	44.64	54.00	-9.36	AV
H	12010.00	53.89	31.02	8.99	25.57	57.43	74.00	-16.57	Pk
H	12010.00	43.71	31.02	8.99	25.57	47.25	54.00	-6.75	AV

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)	Detector Type
Middle Channel:2441MHz									
V	4882.00	50.74	30.55	5.77	24.66	50.62	74.00	-23.38	Pk
V	4882.00	43.31	30.55	5.77	24.66	43.19	54.00	-10.81	AV
V	7323.00	50.26	30.33	6.32	24.55	50.80	74.00	-23.20	Pk
V	7323.00	43.45	30.33	6.32	24.55	43.99	54.00	-10.01	AV
V	9764.00	53.43	30.85	7.45	24.69	54.72	74.00	-19.28	Pk
V	9764.00	43.16	30.85	7.45	24.69	44.45	54.00	-9.55	AV
V	12205.00	54.50	31.02	8.99	25.57	58.04	74.00	-15.96	Pk
V	12205.00	43.85	31.02	8.99	25.57	47.39	54.00	-6.61	AV
H	4882.00	51.62	30.55	5.77	24.66	51.50	74.00	-22.50	Pk
H	4882.00	43.27	30.55	5.77	24.66	43.15	54.00	-10.85	AV
H	7323.00	52.36	30.33	6.32	24.55	52.90	74.00	-21.10	Pk
H	7323.00	43.65	30.33	6.32	24.55	44.19	54.00	-9.81	AV
H	9764.00	53.38	30.85	7.45	24.69	54.67	74.00	-19.33	Pk
H	9764.00	44.00	30.85	7.45	24.69	45.29	54.00	-8.71	AV
H	12205.00	53.11	31.02	8.99	25.57	56.65	74.00	-17.35	Pk
H	12205.00	43.10	31.02	8.99	25.57	46.64	54.00	-7.36	AV

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)	Detector Type
High Channel:2480MHz									
V	4960.00	51.26	30.55	5.77	24.66	51.14	74.00	-22.86	Pk
V	4960.00	43.09	30.55	5.77	24.66	42.97	54.00	-11.03	AV
V	7440.00	50.96	30.33	6.32	24.55	51.50	74.00	-22.50	Pk
V	7440.00	43.06	30.33	6.32	24.55	43.60	54.00	-10.40	AV
V	9920.00	52.93	30.85	7.45	24.69	54.22	74.00	-19.78	Pk
V	9920.00	43.57	30.85	7.45	24.69	44.86	54.00	-9.14	AV
V	12400.00	51.46	31.02	8.99	25.57	55.00	74.00	-19.00	Pk
V	12400.00	43.13	31.02	8.99	25.57	46.67	54.00	-7.33	AV
H	4960.00	53.64	30.55	5.77	24.66	53.52	74.00	-20.48	Pk
H	4960.00	43.59	30.55	5.77	24.66	43.47	54.00	-10.53	AV
H	7440.00	50.05	30.33	6.32	24.55	50.59	74.00	-23.41	Pk
H	7440.00	43.83	30.33	6.32	24.55	44.37	54.00	-9.63	AV
H	9920.00	53.66	30.85	7.45	24.69	54.95	74.00	-19.05	Pk
H	9920.00	43.34	30.85	7.45	24.69	44.63	54.00	-9.37	AV
H	12400.00	53.69	31.02	8.99	25.57	57.23	74.00	-16.77	Pk
H	12400.00	43.67	31.02	8.99	25.57	47.21	54.00	-6.79	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.

5. RADIATED BAND EMISSION MEASUREMENT

5.1 Test Requirement:

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

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	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

5.2 TEST PROCEDURE

Above 1GHz test procedure as below:

a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. 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.
g. Test the EUT in the lowest channel,the Highest channel

Note:

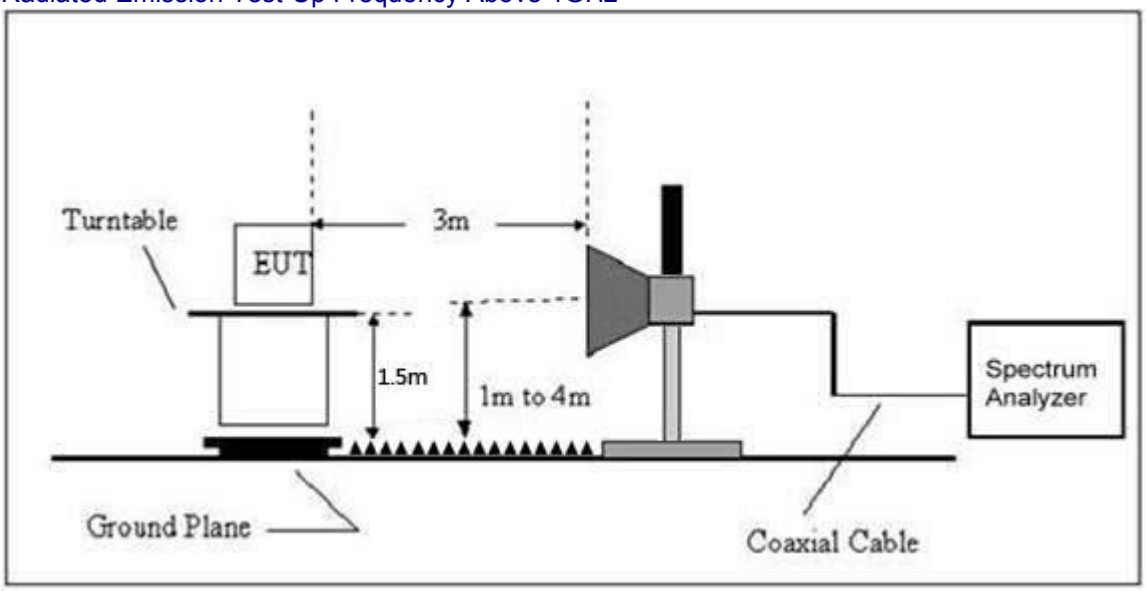
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



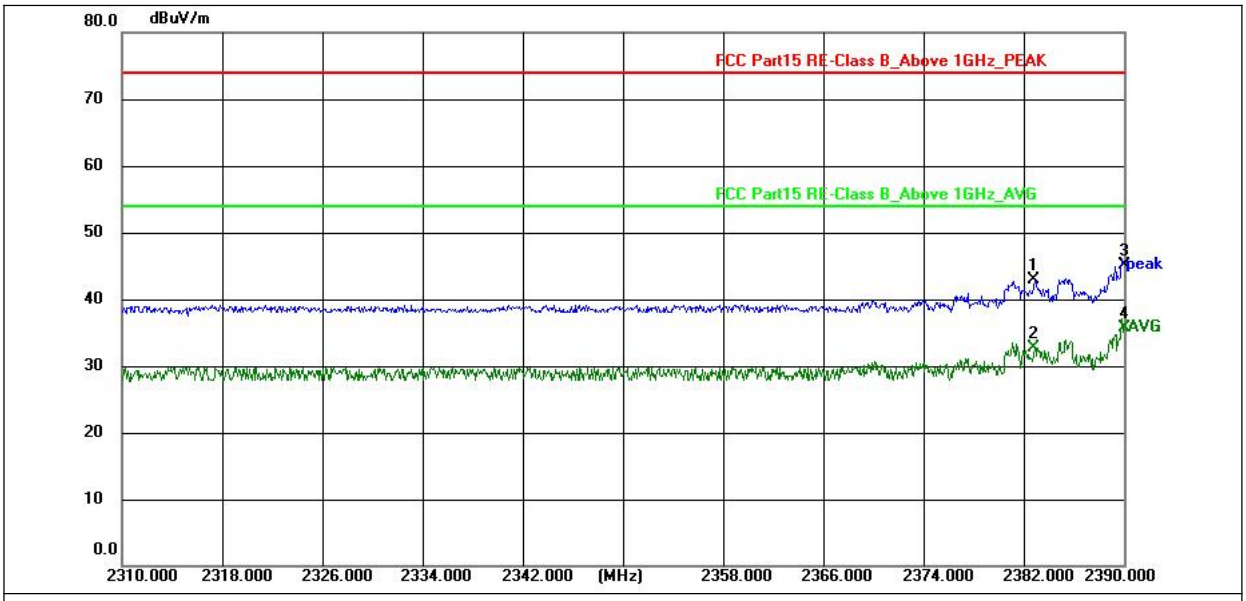
5.5 EUT OPERATING CONDITIONS

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.

5.6 TEST RESULT

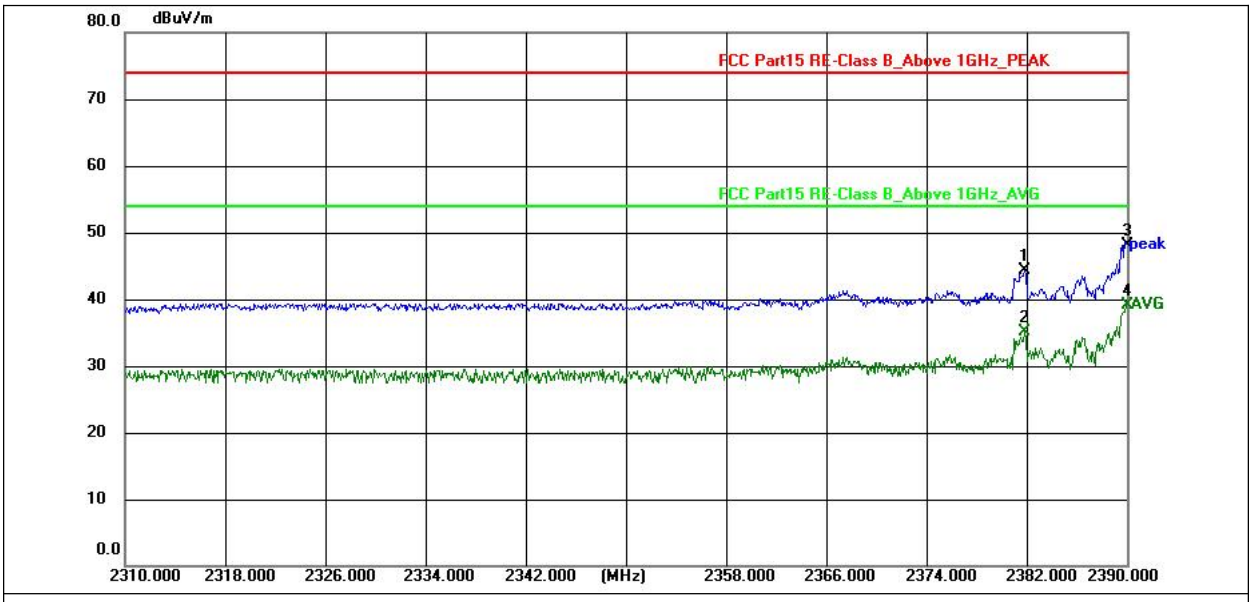
All modes were tested (Worst case π/4-DQPSK)

Temperature:	23℃	Relative Humidity:	52%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage:	DC 3.7V	Test channel	2402MHz



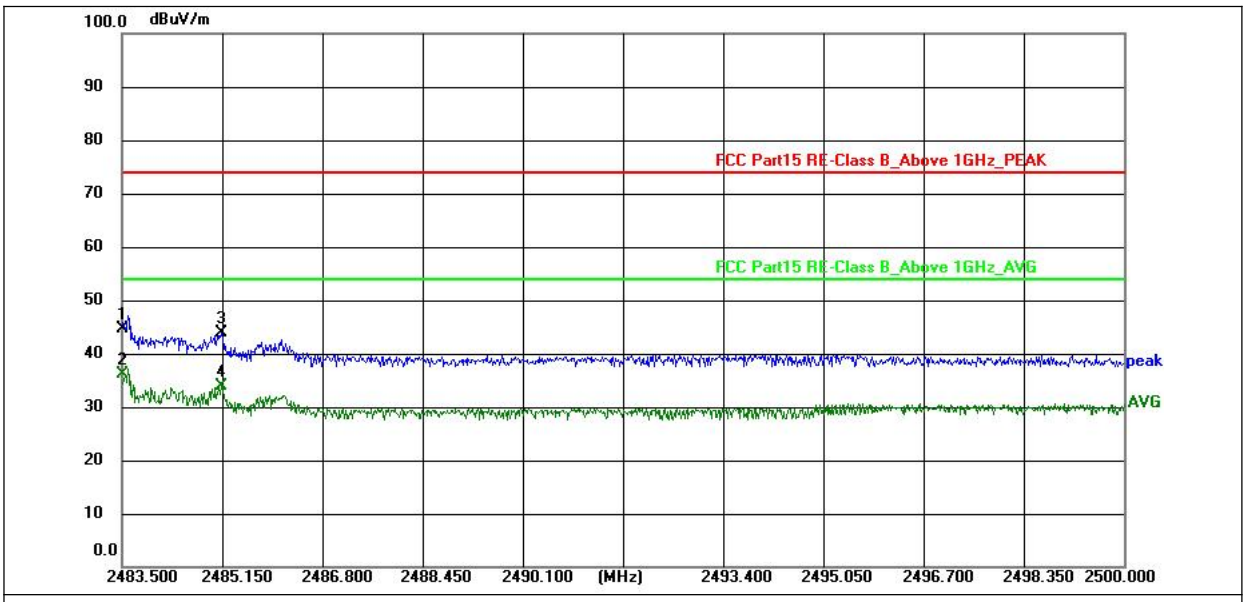
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2382.880	46.99	-4.00	42.99	74.00	-31.01	peak
2	2382.880	36.72	-4.00	32.72	54.00	-21.28	AVG
3	2390.000	49.15	-3.96	45.19	74.00	-28.81	peak
4 *	2390.000	39.57	-3.96	35.61	54.00	-18.39	AVG

Temperature:	23℃	Relative Humidity:	52%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 3.7V	Test channel	2402MHz



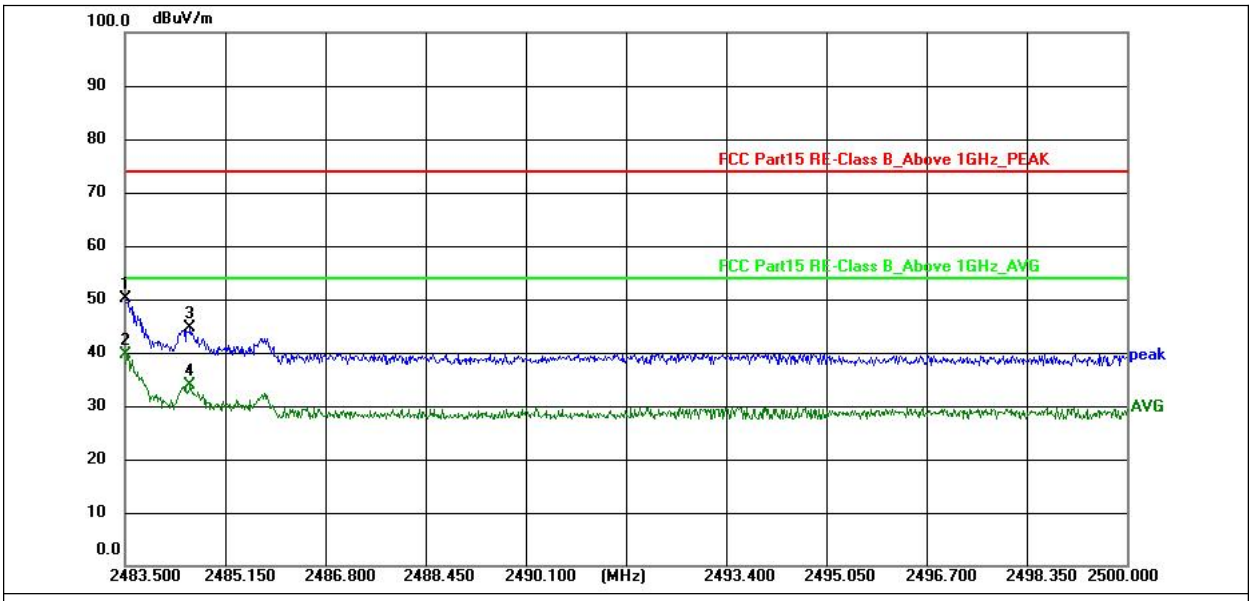
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2381.840	48.36	-4.00	44.36	74.00	-29.64	peak
2	2381.840	39.14	-4.00	35.14	54.00	-18.86	AVG
3	2390.000	52.15	-3.96	48.19	74.00	-25.81	peak
4 *	2390.000	43.07	-3.96	39.11	54.00	-14.89	AVG

Temperature:	23℃	Relative Humidity:	52%
Pressure:	101kPa	Polarization:	Horizontal
Test Voltage:	DC 3.7V	Test channel	2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	48.15	-3.58	44.57	74.00	-29.43	peak
2 *	2483.500	39.73	-3.58	36.15	54.00	-17.85	AVG
3	2485.158	47.44	-3.57	43.87	74.00	-30.13	peak
4	2485.158	37.42	-3.57	33.85	54.00	-20.15	AVG

Temperature:	23℃	Relative Humidity:	52%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 3.7V	Test channel	2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	53.65	-3.58	50.07	74.00	-23.93	peak
2 *	2483.500	43.23	-3.58	39.65	54.00	-14.35	AVG
3	2484.586	48.23	-3.57	44.66	74.00	-29.34	peak
4	2484.586	37.47	-3.57	33.90	54.00	-20.10	AVG

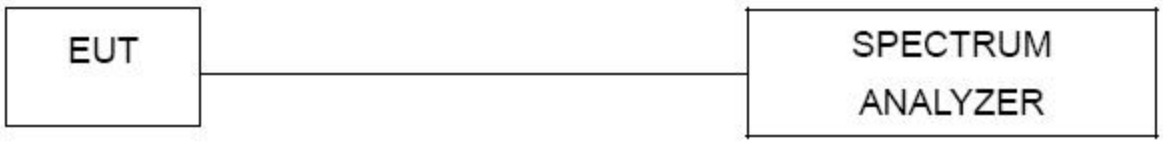
6. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	KDB558074 D0115.247 Meas Guidancev05r02

6.1 Limit

Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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) (see §15.205(c)).

6.2 Test Setup



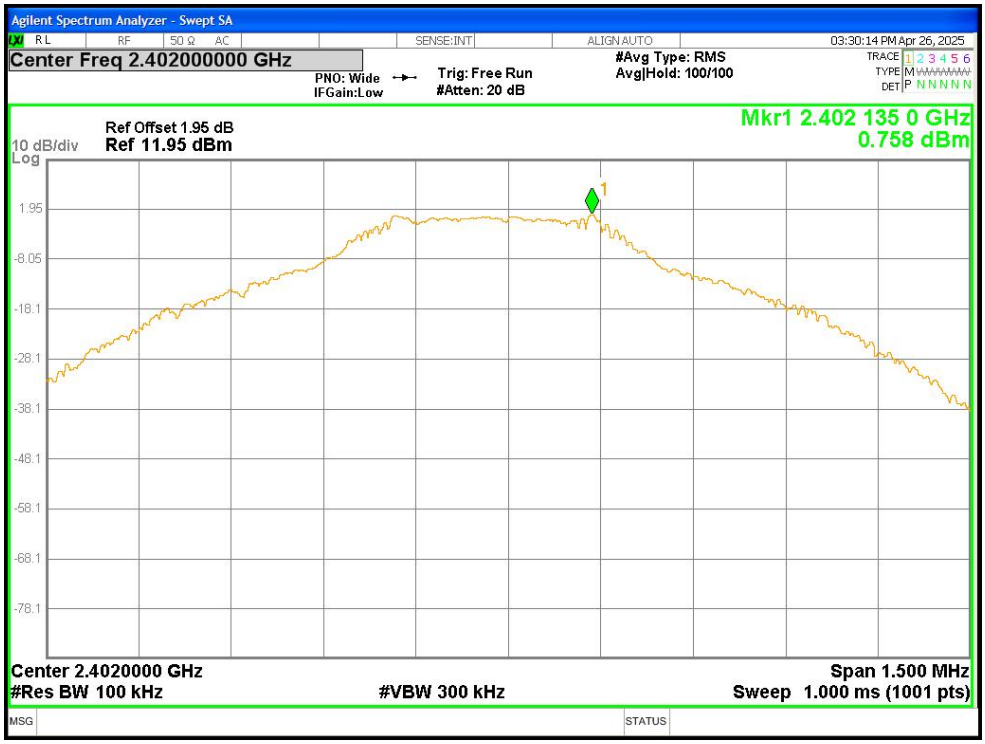
6.3 Test procedure

Using the following spectrum analyzer setting:
A) Set the RBW = 100KHz.
B) Set the VBW = 300KHz.
C) Sweep time = auto couple.
D) Detector function = peak.
E) Trace mode = max hold.
F) Allow trace to fully stabilize.

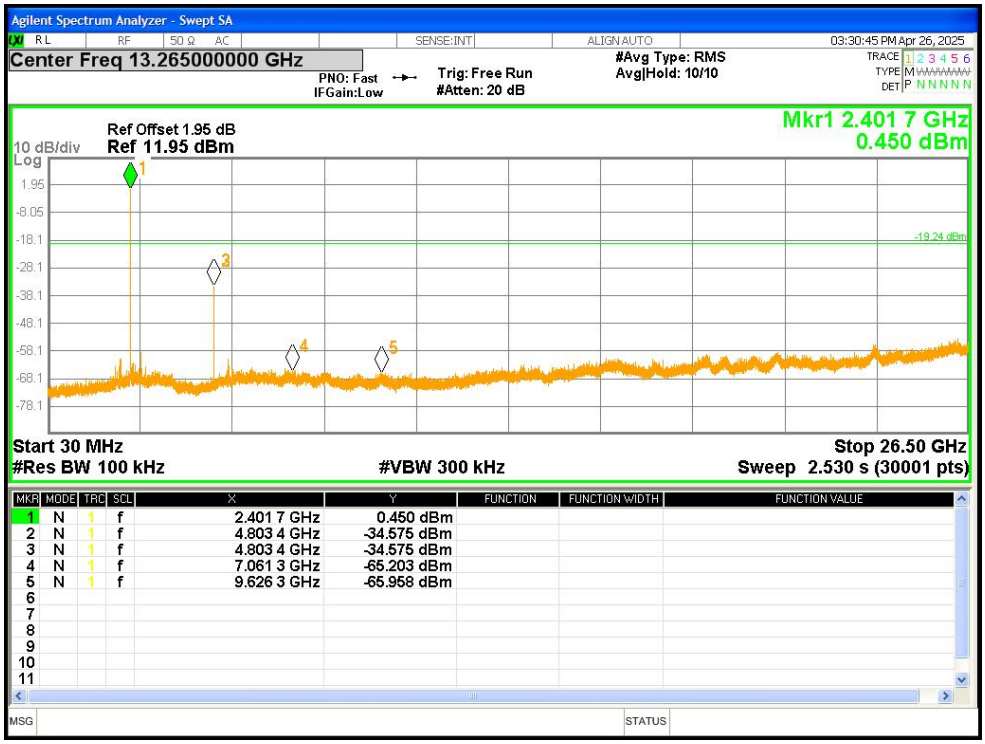
6.4 DEVIATION FROM STANDARD

No deviation.

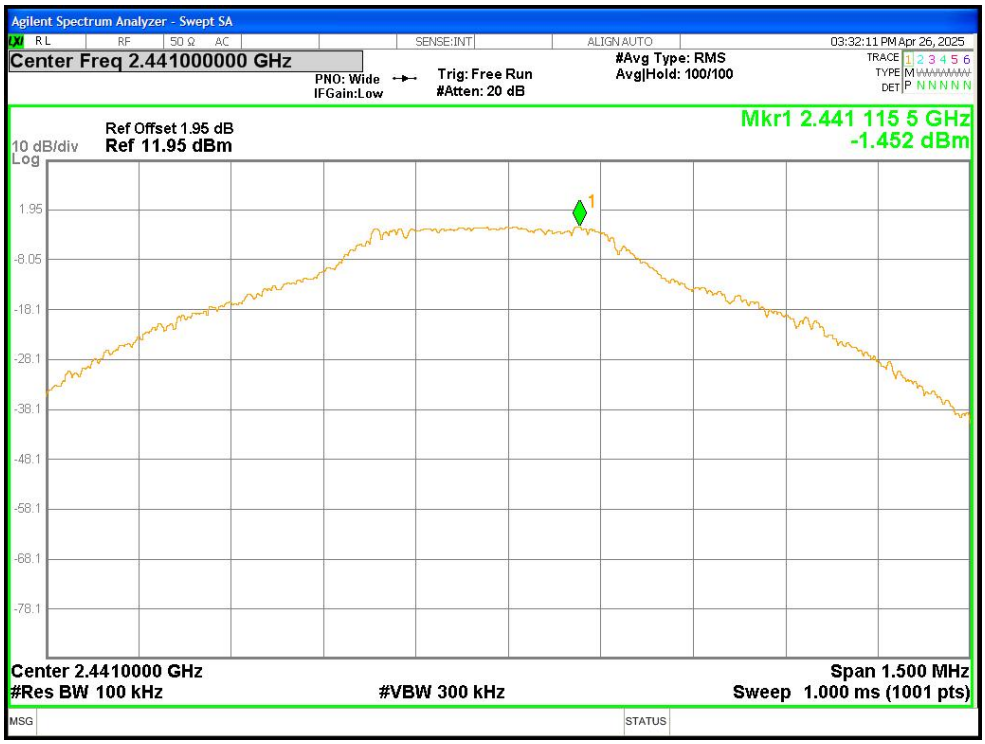
6.5 Test Result



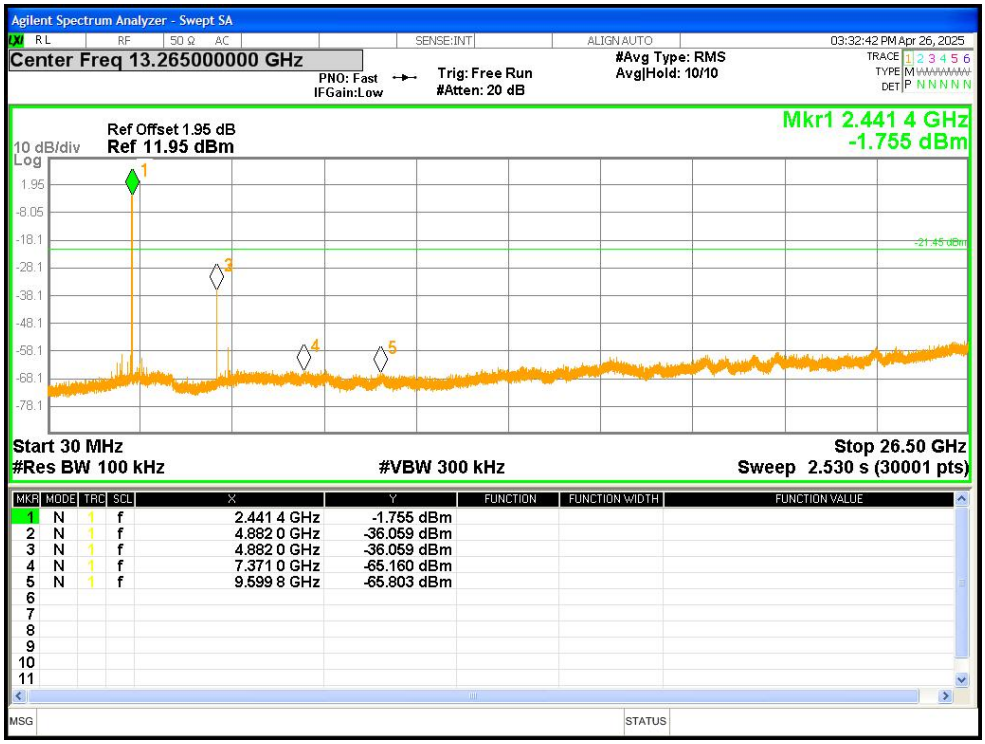
Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Ref



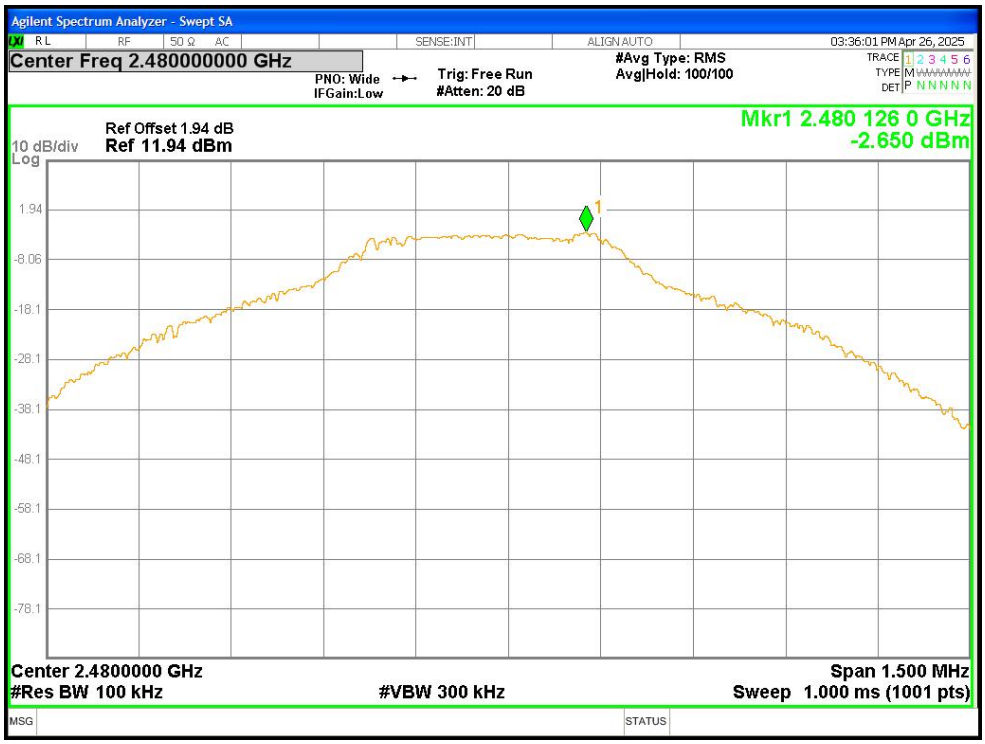
Tx. Spurious NVNT 1-DH5 2402MHz Ant1 Emission



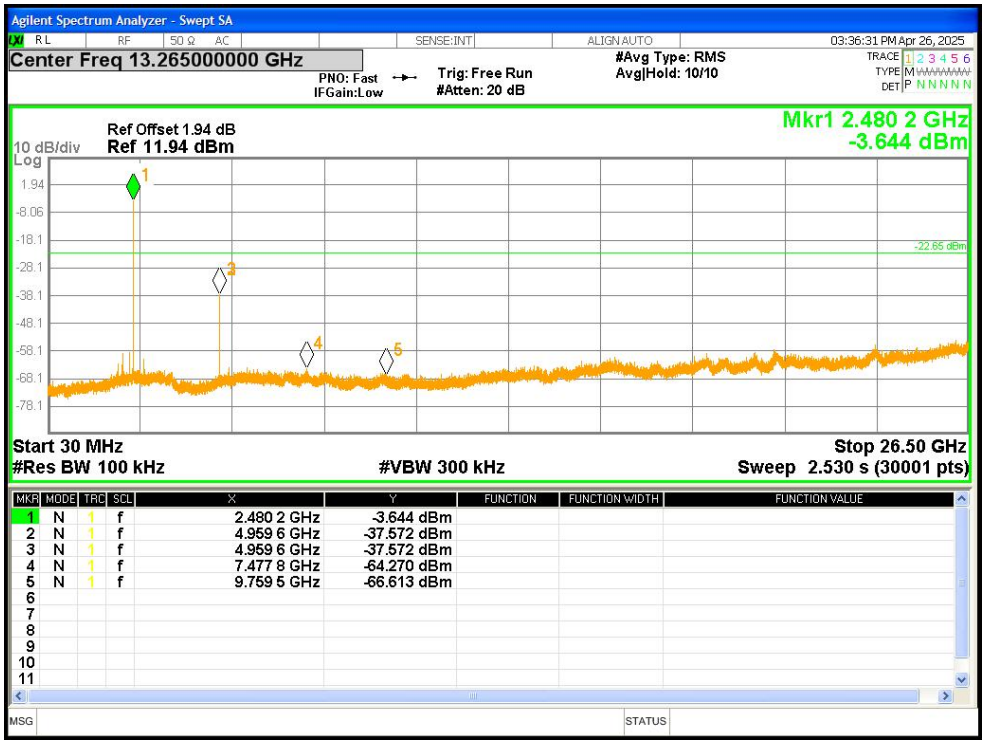
Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Ref



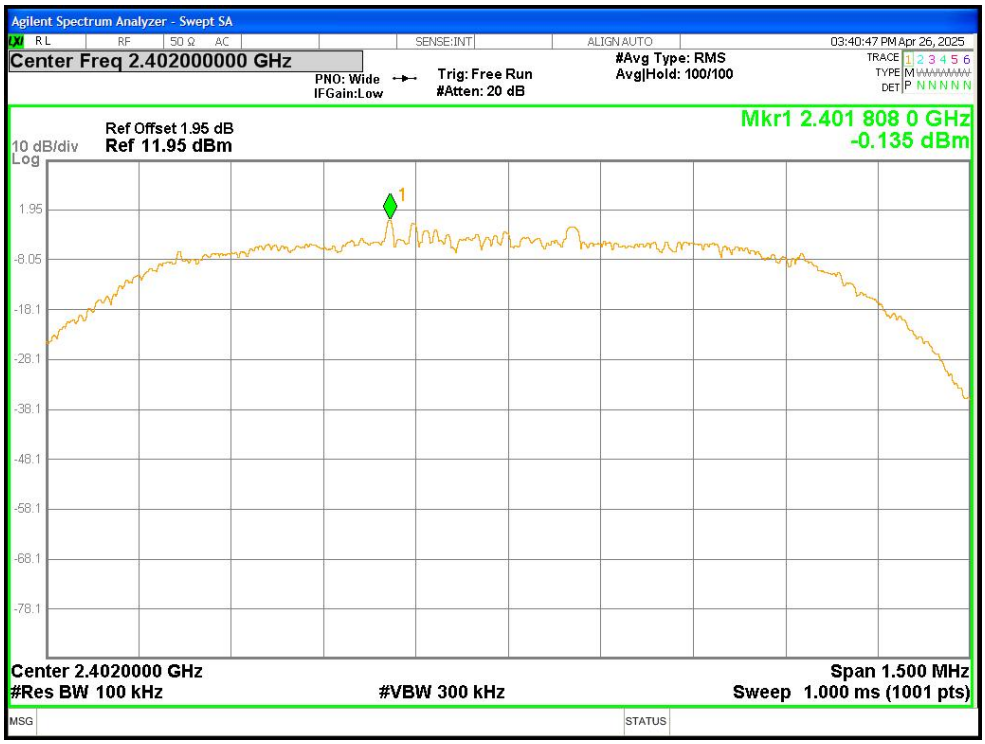
Tx. Spurious NVNT 1-DH5 2441MHz Ant1 Emission



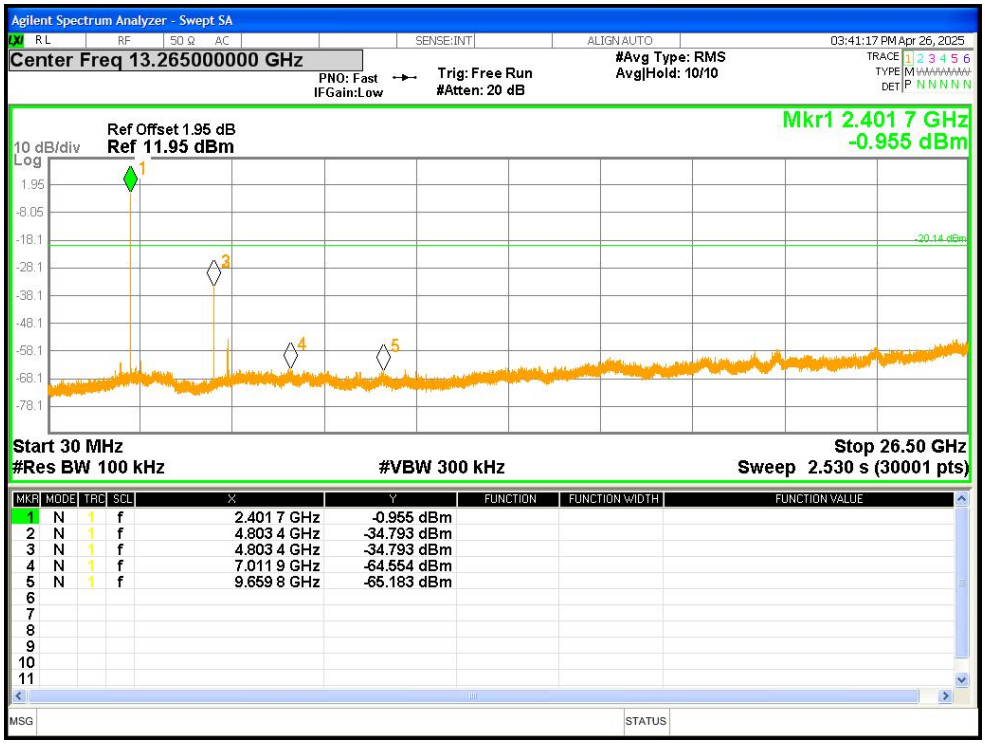
Tx. Spurious NVNT 1-DH5 2480MHz Ant1 Ref



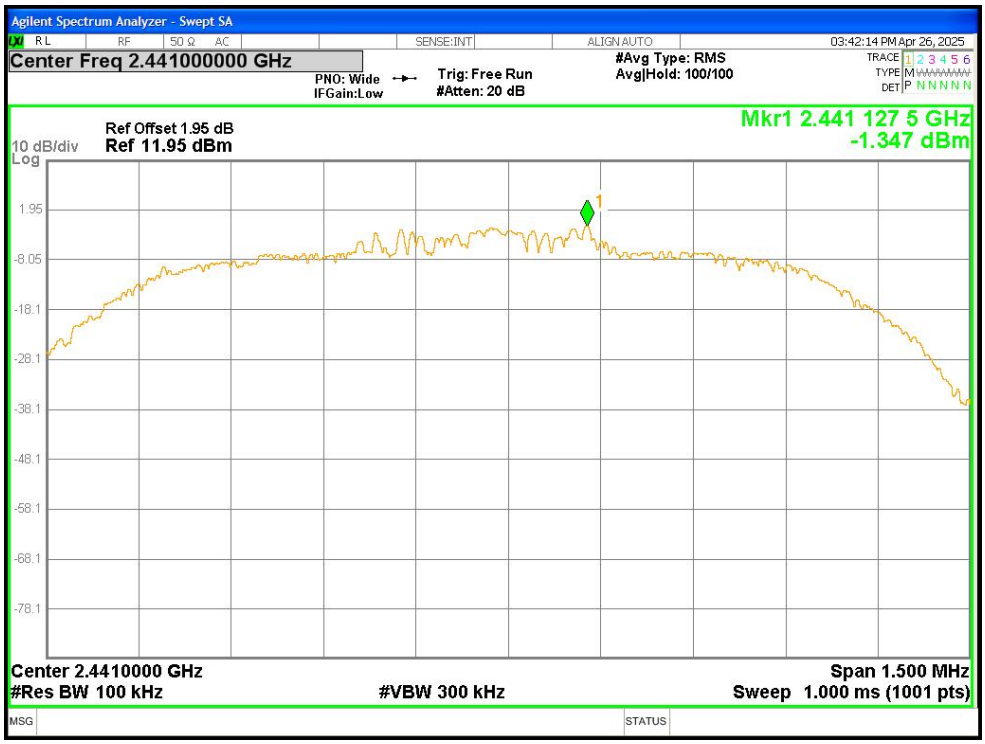
Tx. Spurious NVNT 1-DH5 2480MHz Ant1 Emission



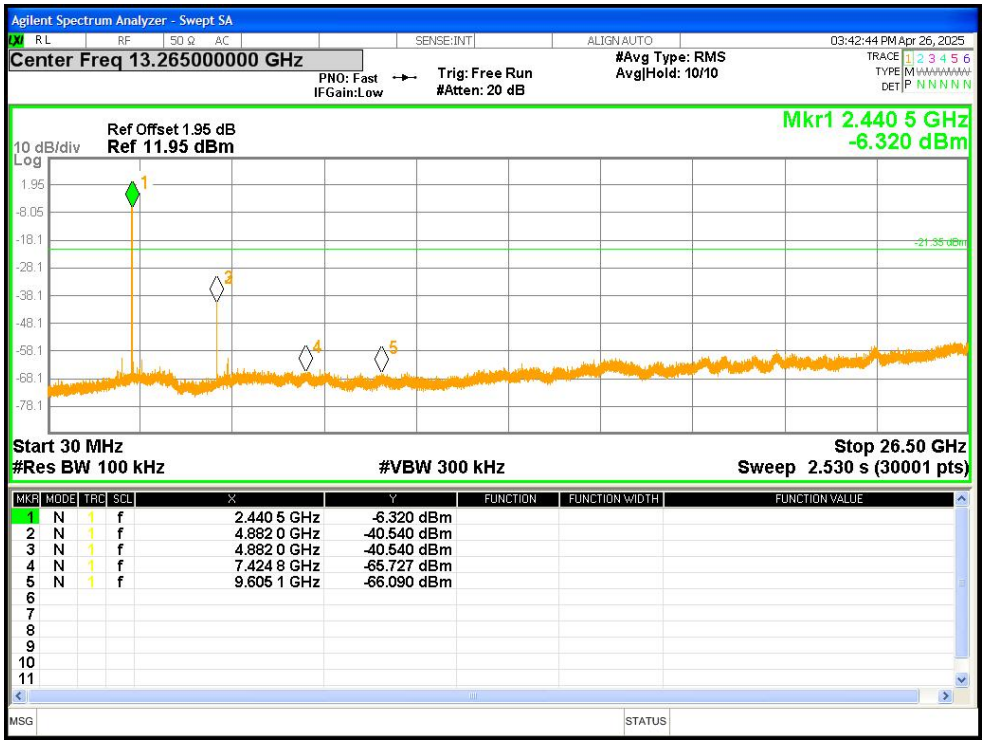
Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Ref



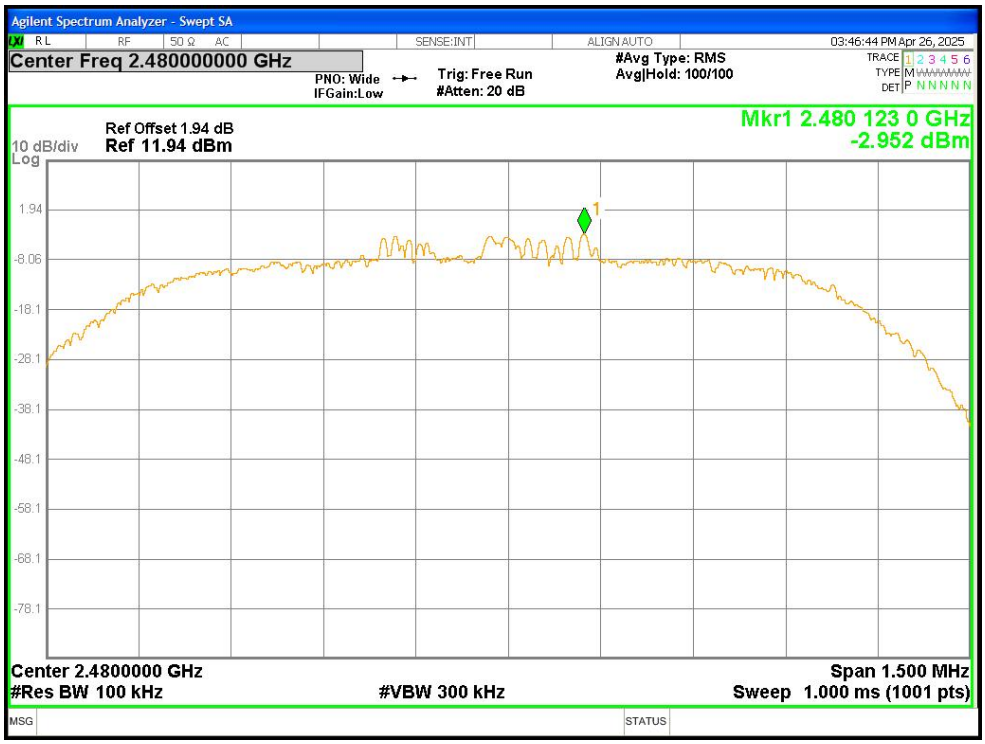
Tx. Spurious NVNT 2-DH5 2402MHz Ant1 Emission



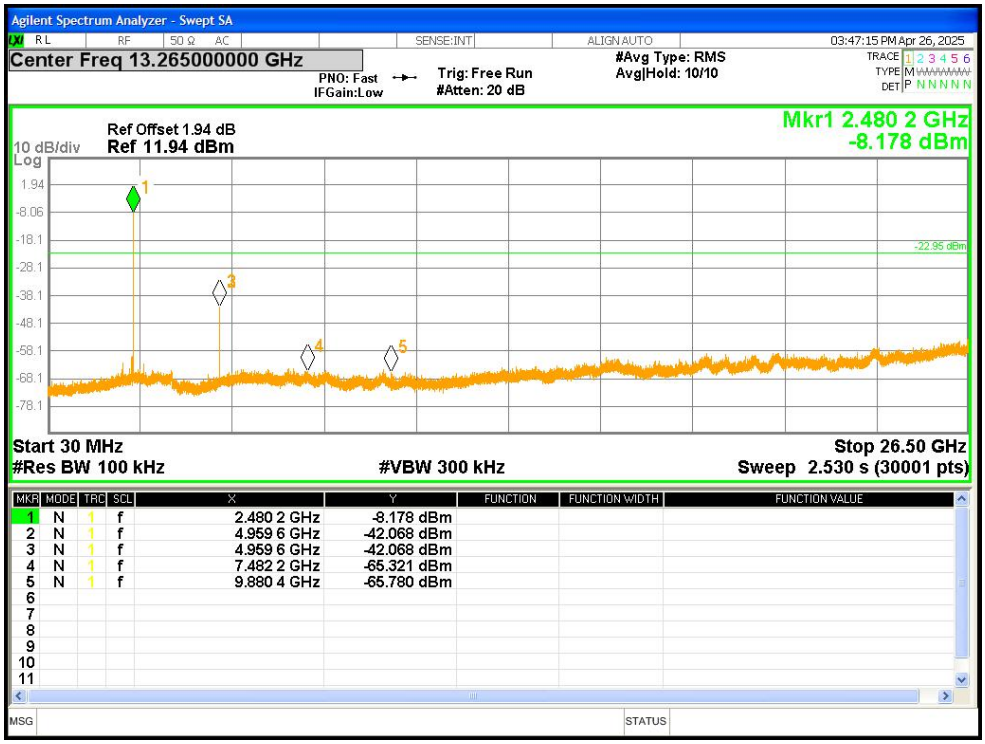
Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Ref



Tx. Spurious NVNT 2-DH5 2441MHz Ant1 Emission



Tx. Spurious NVNT 2-DH5 2480MHz Ant1 Ref



Tx. Spurious NVNT 2-DH5 2480MHz Ant1 Emission

7. 20dB&99% Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013

7.1 Test Setup

7.2 Limit

N/A

7.3 Test procedure

1. Set RBW = 30 kHz.

2. Set the video bandwidth (VBW) ≥ 3 x 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 6 dB relative to the maximum level measured in the fundamental emission.

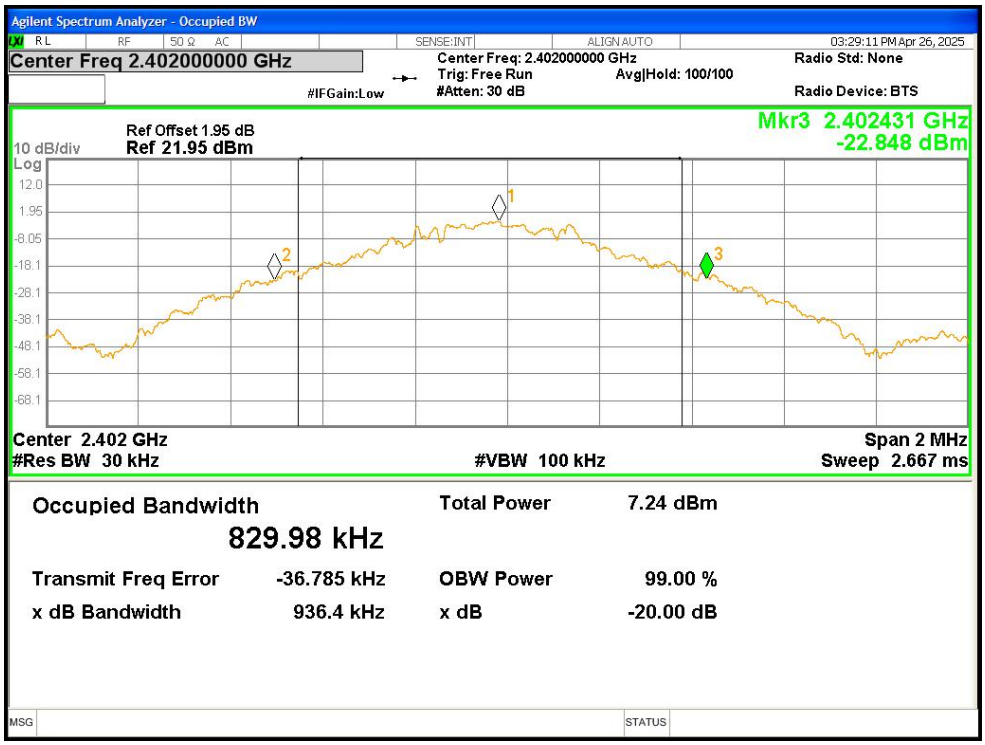
7.4 DEVIATION FROM STANDARD

No deviation.

7.5 Test Result

Mode	Test channel	20dB Emission Bandwidth (MHz)	99%Bandwidth (MHz)	Result
GFSK	Lowest	0.936	0.830	Pass
	Middle	0.932	0.826	
	Highest	0.943	0.823	
π/4-DQPSK	Lowest	1.267	1.158	Pass
	Middle	1.278	1.162	
	Highest	1.274	1.170	

Test plots



-20dB Bandwidth NVNT 1-DH5 2402MHz Ant1