RF TEST REPORT

IC :29805-U0322P

FCC ID:2A9OO-U0322P

Report Number	ZKT-240429L4557-1
Date of Test	Apr. 25, 2024 to May 08, 2024
Date of issue	May 08, 2024
Total number of pages	47
Test Result	PASS
Testing Laboratory	**Shenzhen ZKT Technology Co., Ltd.**
Address	1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China
Applicant's name	**Ultimea Technology (Shenzhen) Limited**
Address	20th Floor, Building 4, Tianan Cloud Park, Bantian St., Longgang District, Shenzhen, China(Peoples Republic Of)
Manufacturer's name	**Ultimea Technology (Shenzhen) Limited**
Address	20th Floor, Building 4, Tianan Cloud Park, Bantian St., Longgang District, Shenzhen, China(Peoples Republic Of)
Factory	**CRE Electronic Technology Co.,limited**
Address	Building 9#, 5G Intelligent Terminal Industrial Park, Wangcheng District, Changsha,Hunan, China
Test specification:	
Standard	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10:2013 RSS-Gen Issue 5, February 2021 RSS-247 Issue 3 August 2023
Test procedure	/
Non-standard test method	N/A
Test Report Form No	TRF-EL-111_V0
Test Report Form(s) Originator	ZKT Testing
Master TRF	Dated: 2020-01-06

This device described above has been tested by ZKT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Product name	**Nova C40 Smart Projector**
Trademark	ULTIMEA
Model/Type reference	U0322
Ratings	AC 100-240V, 50/60Hz, 1.5A

Testing procedure and testing location:

Testing Laboratory.....:	**Shenzhen ZKT Technology Co., Ltd.**
Address..... :	1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China
Tested by (name + signature)..... :	Alen He
Reviewer (name + signature).....:	Joe Liu
Approved (name + signature)..... :	Lake Xie

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1. VERSION

ReportNo.	Version	Description	Approved
ZKT-240429L4557-1	Rev.01	Initial issue of report	Apr. 27, 2024

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

RSS-Gen, RSS-247 Issue 3			
Standard Section	Test Item	Result	Remark
FCC part 15.203/15.247 (c) RSS-Gen Section 6.8 RSS-247 5.4	Antenna requirement	PASS	
FCC part 15.207 RSS-Gen Section 8.8	AC Power Line Conducted Emission	PASS	
FCC part 15.247 (b)(3) RSS-247 Section 5.4(d)	Conducted Peak Output Power	PASS	
RSS-247 Section 5.4(d)	equivalent isotropically radiated power (e.i.r.p.)	PASS	
FCC part 15.247 (a)(2) RSS-247 Section 5.2(a) RSS-Gen Section 6.7	Channel Bandwidth& 99% OCB	PASS	
FCC part 15.247 (e) RSS-247 Section 5.2(b)	Power Spectral Density	PASS	
FCC part 15.247(d) RSS-247 Section 5.5 RSS GEN 8.9	Band Edge	PASS	
FCC part 15.205/15.209/247 RSS-247 Section 5.5 RSS GEN 8.10	Spurious Emission	PASS	

NOTE:

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

2.1 TEST FACILITY

Shenzhen ZKT Technology Co., Ltd.
Add. : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 692225
Designation Number: CN1299
IC Registered No.: 27033

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	3m camber Radiated spurious emission(9KHz-30MHz)	U=4.5dB
2	3m camber Radiated spurious emission(30MHz-1GHz)	U=4.8dB
3	3m chamber Radiated spurious emission(1GHz-6GHz)	U=4.9dB
4	3m chamber Radiated spurious emission(6GHz-40GHz)	U=5.0dB
5	Conducted disturbance	U=3.2dB
6	RF Band Edge	U=1.68dB
7	RF power conducted	U=1.86dB
8	RF conducted Spurious Emission	U=2.2dB
9	RF Occupied Bandwidth	U=1.8dB
10	RF Power Spectral Density	U=1.75dB
11	humidity uncertainty	U=5.3%
12	Temperature uncertainty	U=0.59℃

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Applicant:	Ultimea Technology (Shenzhen) Limited
Address of applicant:	20th Floor, Building 4, Tianan Cloud Park, Bantian St., Longgang District, Shenzhen, China(Peoples Republic Of)
Manufacturer:	Ultimea Technology (Shenzhen) Limited
Address of manufacturer:	20th Floor, Building 4, Tianan Cloud Park, Bantian St., Longgang District, Shenzhen, China(Peoples Republic Of)
Factory:	CRE Electronic Technology Co.,limited
Address of manufacturer:	Building 9#, 5G Intelligent Terminal Industrial Park, Wangcheng District, Changsha,Hunan, China
Product Name:	Nova C40 Smart Projector
HVIN/Hardware version:	U0322
Model Different.:	N/A
Serial No.:	N/A
FVIN/Software version:	V1.0
Sample(s) Status:	Engineer sample
Operation Frequency:	2402MHz~2480MHz
Channel Numbers:	40
Channel Separation:	2MHz
Modulation Type:	GFSK
Antenna Type:	Patch ceramic antenna, Gain 2dBi
Power supply:	AC 100-240V, 50/60Hz, 1.5A
Note：	

Operation Frequency each of channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402 MHz	11	2422 MHz	21	2442 MHz	31	2462 MHz
2	2404 MHz	12	2424 MHz	22	2444 MHz	32	2464 MHz
3	2406 MHz	13	2426 MHz	23	2446 MHz	33	2466 MHz
4	2408 MHz	14	2428 MHz	24	2448 MHz	34	2468 MHz
5	2410 MHz	15	2430 MHz	25	2450 MHz	35	2470 MHz
6	2412 MHz	16	2432 MHz	26	2452 MHz	36	2472 MHz
7	2414 MHz	17	2434 MHz	27	2454 MHz	37	2474 MHz
8	2416 MHz	18	2436 MHz	28	2456 MHz	38	2476 MHz
9	2418 MHz	19	2438 MHz	29	2458 MHz	39	2478 MHz
10	2420 MHz	20	2440 MHz	30	2460 MHz	40	2480 MHz

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
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz

3.2 DESCRIPTION OF TEST MODES

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	BLE Test Tool
Power level setup	<0dBm

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission

AC Mains ——— EUT

Radiated Emission

AC Mains ——— EUT

Conducted Spurious

AC Mains ——— EUT

3.4 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	Mfr/Brand	Model/Type No.	Series No.	Note
/	/	/	/	/	/

Item	Shielded Type	Ferrite Core	Length	Note

Note:

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

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

3.5EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation emissions& Radio Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY55370835	A.17.05	Nov. 02, 2023	Nov. 01, 2024
2	Spectrum Analyzer (10kHz-39.9GHz)	R&S	FSV40-N	100363	1.71 SP2	Nov. 02, 2023	Nov. 01, 2024
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	100969	4.32	Nov. 02, 2023	Nov. 01, 2024
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	N/A	N/A	Nov. 13, 2023	Nov. 12, 2024
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	N/A	Nov. 13, 2023	Nov. 12, 2024
6	Horn Antenna (15GHz-40GHz)	A.H.System	SAS-574	588	N/A	Nov. 13, 2023	Nov. 12, 2024
7	Loop Antenna	TESEQ	HLA6121	58357	N/A	Nov. 16, 2023	Nov. 15, 2024
8	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	60747	N/A	Nov. 02, 2023	Nov. 01, 2024
9	Amplifier (1GHz-26.5GHz)	HuiPu	8449B	3008A00315	N/A	Nov. 02, 2023	Nov. 01, 2024
10	Amplifier (500MHz-40GHz)	QuanJuDa	DLE-161	097	N/A	Nov. 02, 2023	Nov. 01, 2024
11	Test Cable	N/A	R-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
12	Test Cable	N/A	R-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
13	Test Cable	N/A	R-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
14	Test Cable	N/A	RF-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
15	Test Cable	N/A	RF-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
16	Test Cable	N/A	RF-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
17	ESG Signal Generator	Agilent	E4421B	N/A	B.03.84	Nov. 02, 2023	Nov. 01, 2024
18	Signal Generator	Agilent	N5182A	N/A	A.01.87	Nov. 02, 2023	Nov. 01, 2024
19	Magnetic Field Probe Tester	Narda	ELT-400	0-0344	N/A	Nov. 16, 2023	Nov. 15, 2024
20	Wideband Radio Communication Test	R&S	CMW500	106504	V 3.7.22	Nov. 02, 2023	Nov. 01, 2024
21	MWRF Power Meter Test system	MW	MW100-RF CB	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
22	D.C. Power Supply	LongWei	TPR-6405D	N/A	N/A	\	\
23	EMC Software	Frad	EZ-EMC	Ver.EMC-CO N 3A1.1	N/A	\	\
24	RF Software	MW	MTS8310	V2.0.0.0	N/A	\	\
25	Turntable	MF	MF-7802BS	N/A	N/A	\	\
26	Antenna tower	MF	MF-7802BS	N/A	N/A	\	\

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	N/A	Nov. 14, 2023	Nov. 13, 2024
2	LISN	CYBERTEK	EM5040A	E1850400149	N/A	Nov. 02, 2023	Nov. 01, 2024
3	Test Cable	N/A	C-01	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
4	Test Cable	N/A	C-02	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
5	Test Cable	N/A	C-03	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
6	EMI Test Receiver	R&S	ESCI3	101393	4.42 SP3	Nov. 02, 2023	Nov. 01, 2024
7	Triple-Loop Antenna	N/A	RF300	N/A	N/A	Nov. 02, 2023	Nov. 01, 2024
8	Absorbing Clamp	DZ	ZN23201	15034	N/A	Nov. 07, 2023	Nov. 06, 2024
9	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	N/A	\	\

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207, RSS-Gen Section 8.8
Test Method:	ANSI C63.10:2013, RSS-Gen
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.

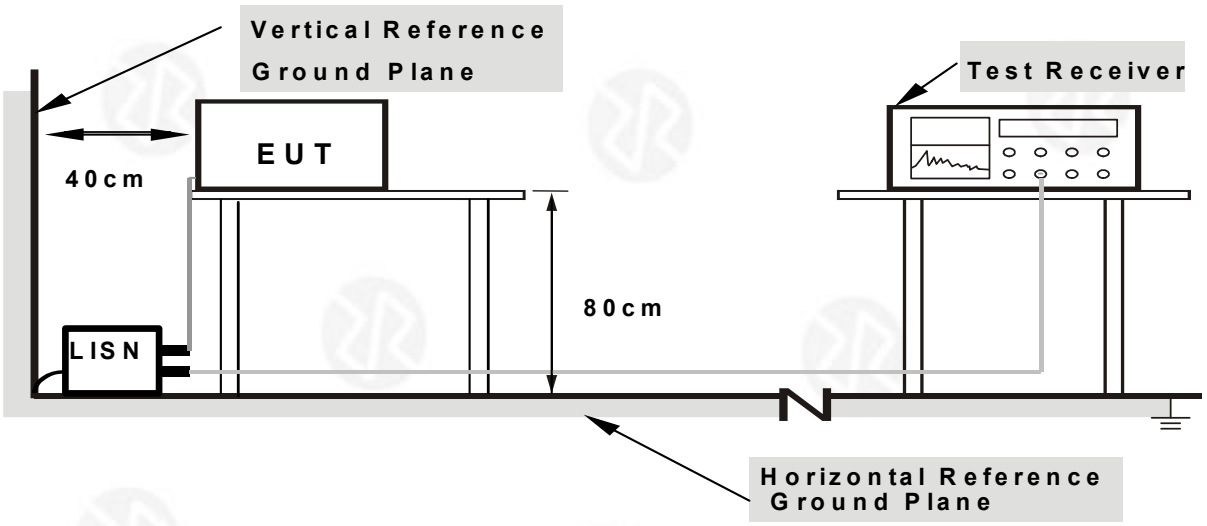
4.1.2 TEST PROCEDURE

a. The EUT was placed 0.1 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

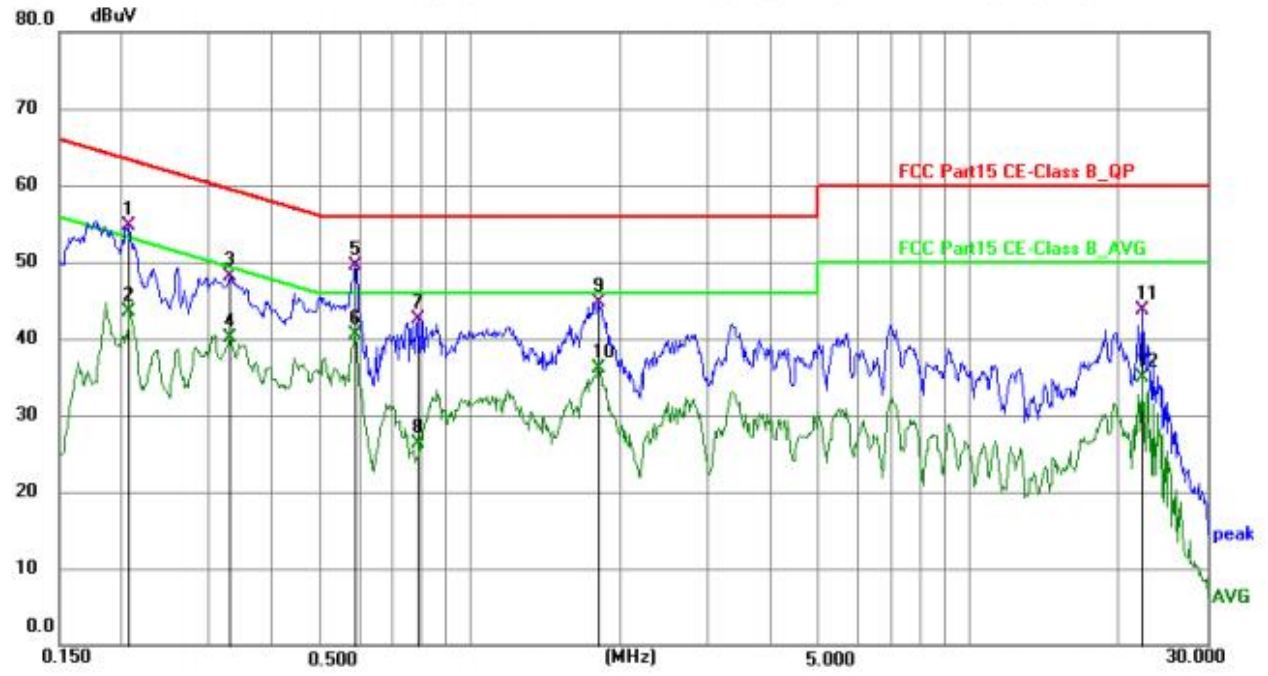
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

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

Test Result
PASS

4.1.6 test resultTest Result（Worst case GFSK 2402MHz）

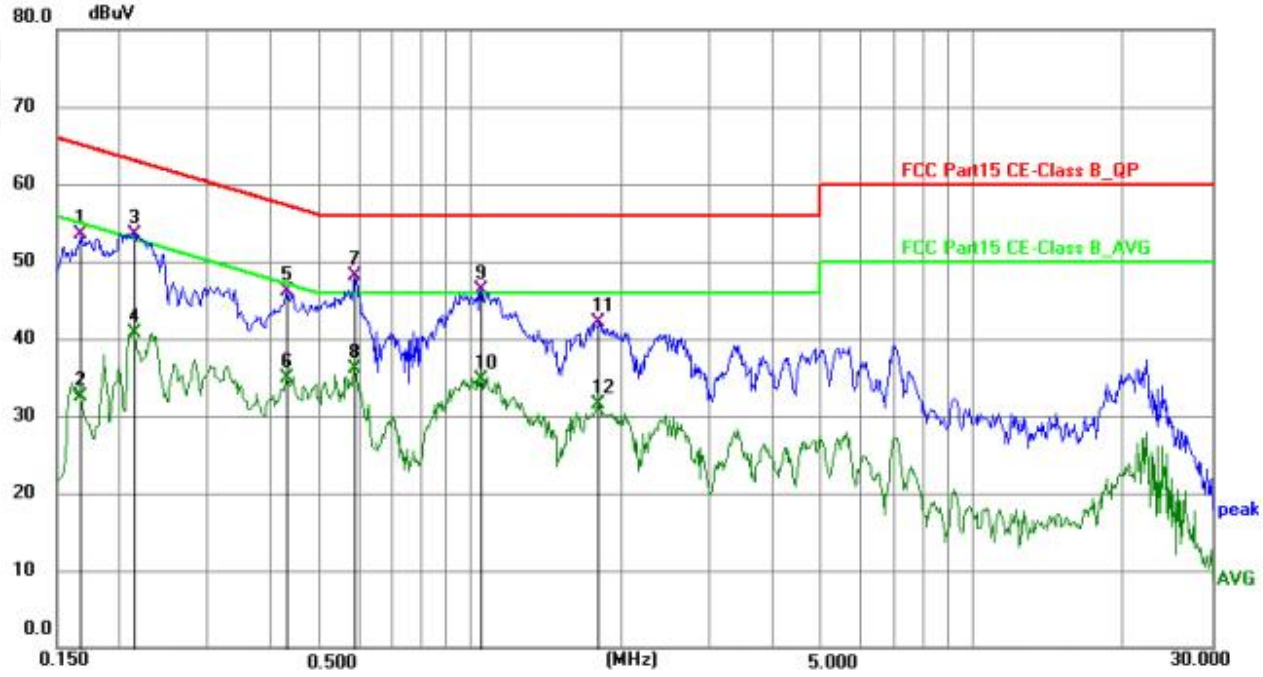
Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	L
Test Voltage ：	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2071	44.90	9.71	54.61	63.32	-8.71	QP	P	
2	0.2071	33.88	9.71	43.59	53.32	-9.73	AVG	P	
3	0.3300	38.44	9.67	48.11	59.45	-11.34	QP	P	
4	0.3300	30.39	9.67	40.06	49.45	-9.39	AVG	P	
5	0.5885	39.80	9.66	49.46	56.00	-6.54	QP	P	
6 *	0.5885	30.79	9.66	40.45	46.00	-5.55	AVG	P	
7	0.7890	32.84	9.66	42.50	56.00	-13.50	QP	P	
8	0.7890	16.66	9.66	26.32	46.00	-19.68	AVG	P	
9	1.8145	35.08	9.68	44.76	56.00	-11.24	QP	P	
10	1.8145	26.45	9.68	36.13	46.00	-9.87	AVG	P	
11	22.2134	34.04	9.62	43.66	60.00	-16.34	QP	P	
12	22.2134	25.35	9.62	34.97	50.00	-15.03	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 :	26℃	Relative Humidity:	54%
Pressure :	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1675	43.91	9.58	53.49	65.08	-11.59	QP	P	
2	0.1675	22.90	9.58	32.48	55.08	-22.60	AVG	P	
3	0.2129	43.82	9.71	53.53	63.09	-9.56	QP	P	
4	0.2129	30.98	9.71	40.69	53.09	-12.40	AVG	P	
5	0.4289	36.51	9.63	46.14	57.27	-11.13	QP	P	
6	0.4289	25.26	9.63	34.89	47.27	-12.38	AVG	P	
7 *	0.5885	38.36	9.66	48.02	56.00	-7.98	QP	P	
8	0.5885	26.51	9.66	36.17	46.00	-9.83	AVG	P	
9	1.0500	36.74	9.53	46.27	56.00	-9.73	QP	P	
10	1.0500	25.09	9.53	34.62	46.00	-11.38	AVG	P	
11	1.8015	32.51	9.68	42.19	56.00	-13.81	QP	P	
12	1.8015	21.73	9.68	31.41	46.00	-14.59	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

4.2 RADIATED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.209, RSS-247 Section 3.3 & RSS-Gen Section 8.9
Test Method:	ANSI C63.10:2013, RSS-Gen
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 0.1 meters above the ground at a 3 meter semi-anechoiccamber. 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 avariable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum valueof 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 toheights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1meter) 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 bestopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dBmargin would be re-tested one by one using peak, quasi-peak or average method as specified and then reportedin 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 andchange form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

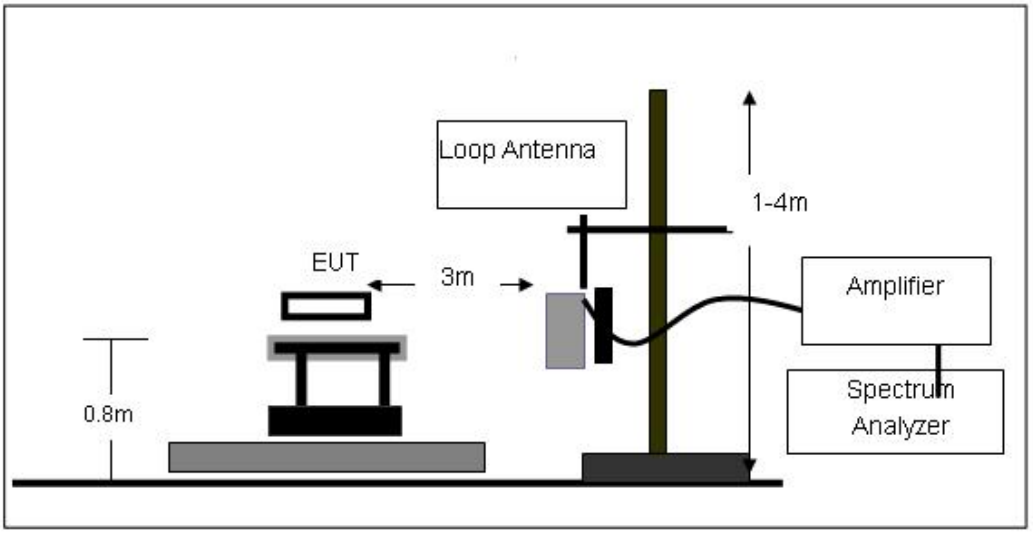
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

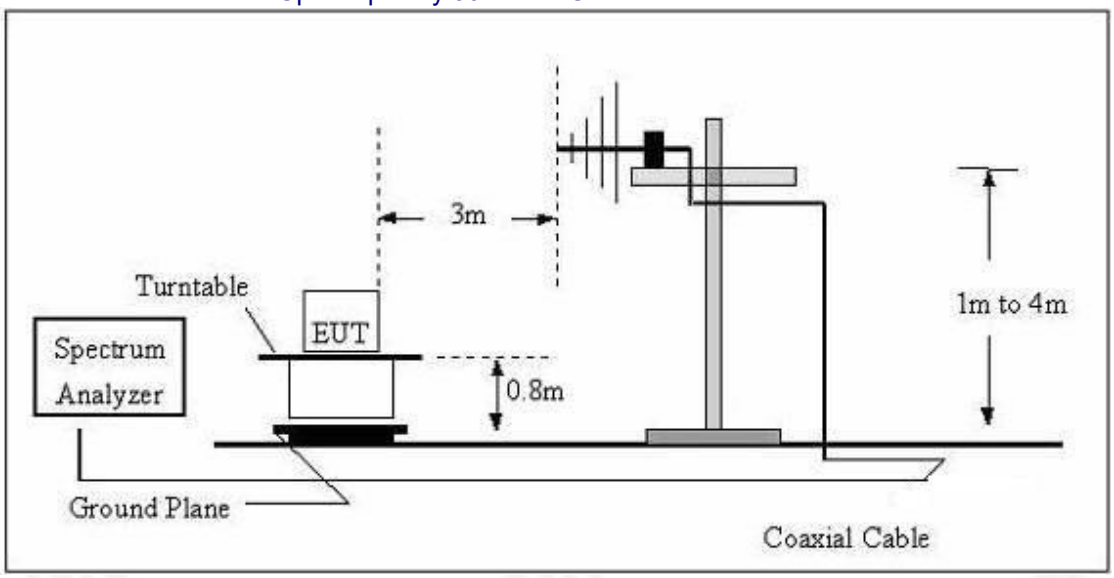
No deviation

4.2.4 TEST SETUP

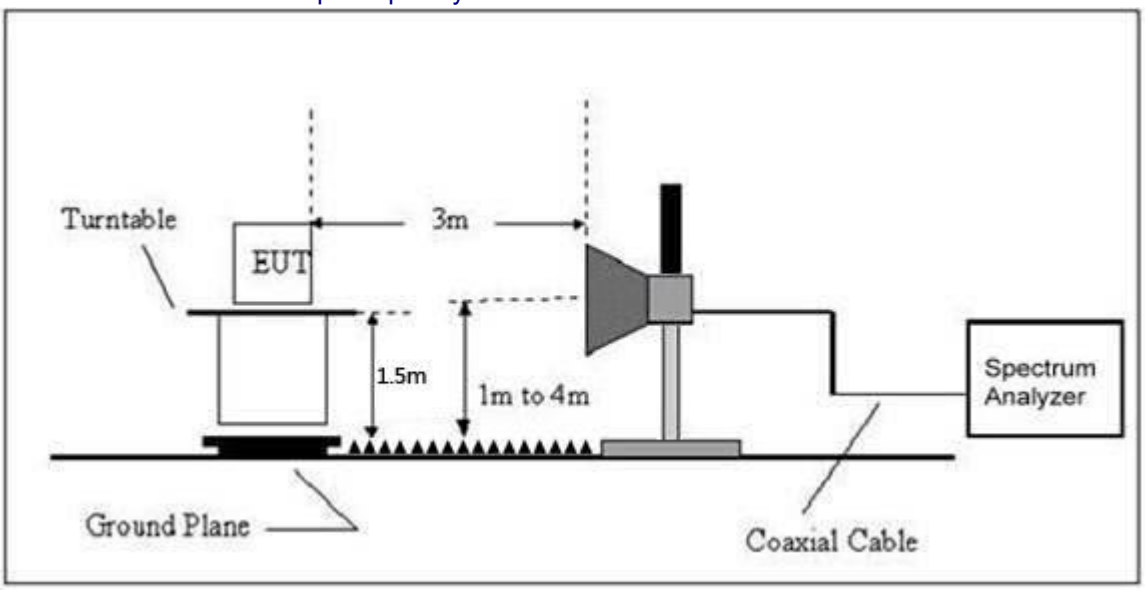
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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.

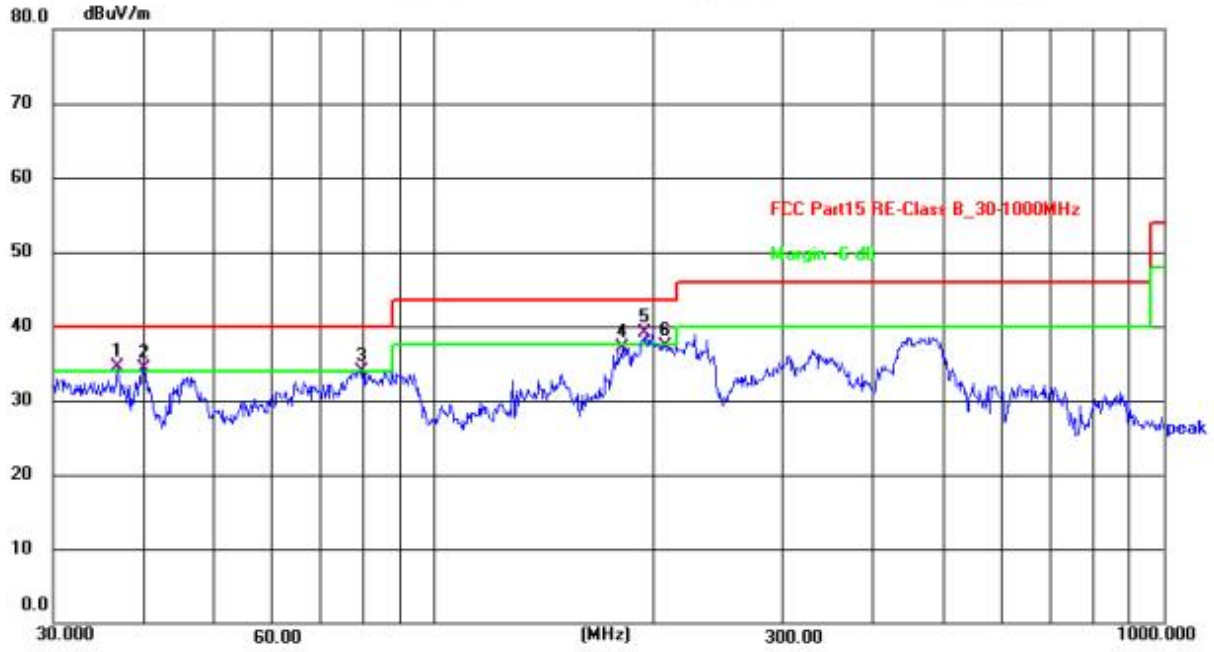
4.2.6 TEST RESULTS

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.

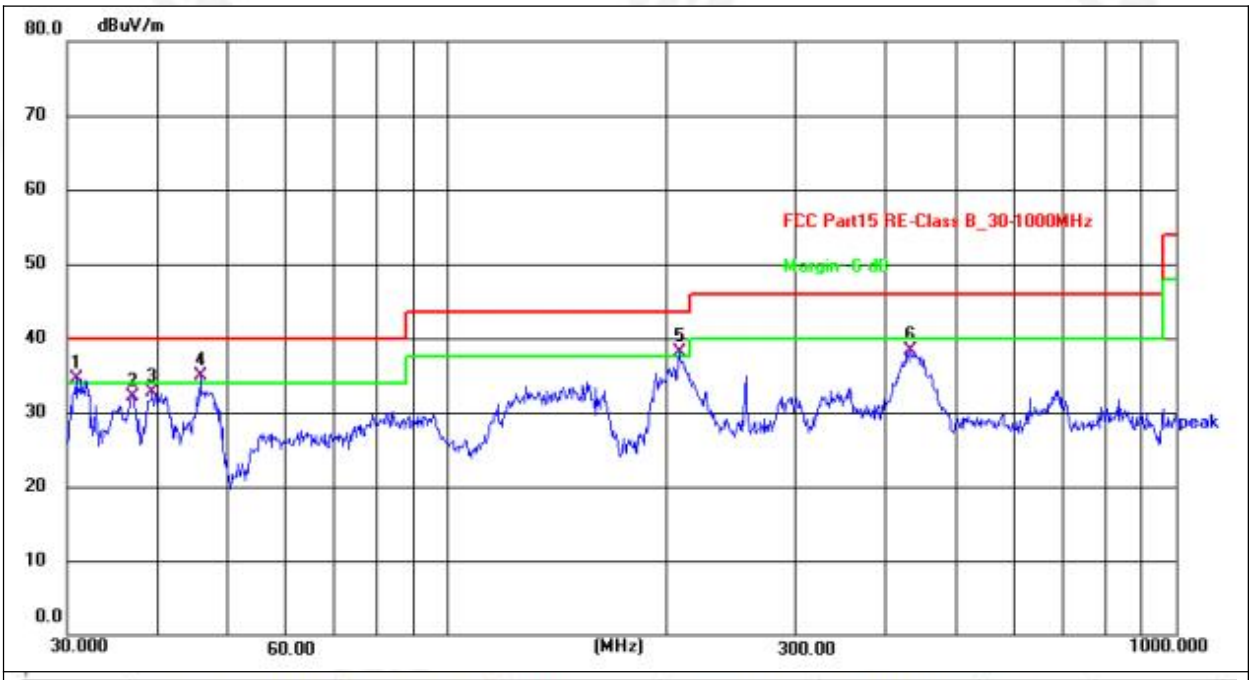
Between 30MHz – 1GHz (Worst case GFSK 2402MHz)

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 !	36.7661	50.64	-16.17	34.47	40.00	-5.53	QP
2 !	39.9941	50.05	-15.70	34.35	40.00	-5.65	QP
3	79.5210	54.68	-20.77	33.91	40.00	-6.09	QP
4	181.2834	55.28	-18.15	37.13	43.50	-6.37	QP
5 *	195.1363	58.08	-18.90	39.18	43.50	-4.32	QP
6	207.1225	56.39	-19.12	37.27	43.50	-6.23	QP

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 !	30.8534	51.86	-17.30	34.56	40.00	-5.44	QP
2	36.8952	48.23	-16.15	32.08	40.00	-7.92	QP
3	39.2991	48.53	-15.80	32.73	40.00	-7.27	QP
4 *	45.6946	51.03	-16.05	34.98	40.00	-5.02	QP
5 !	207.8500	57.20	-19.14	38.06	43.50	-5.44	QP
6	432.5455	50.58	-12.32	38.26	46.00	-7.74	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 802.11b and AC 120V mode

1GHz~25GHz

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	52.27	30.55	5.77	24.66	52.15	74.00	-21.85	Pk
V	4804.00	43.06	30.55	5.77	24.66	42.94	54.00	-11.06	AV
V	7206.00	53.45	30.33	6.32	24.55	53.99	74.00	-20.01	Pk
V	7206.00	43.80	30.33	6.32	24.55	44.34	54.00	-9.66	AV
V	9608.00	54.34	30.85	7.45	24.69	55.63	74.00	-18.37	Pk
V	9608.00	43.28	30.85	7.45	24.69	44.57	54.00	-9.43	AV
V	12010.00	53.13	31.02	8.99	25.57	56.67	74.00	-17.33	Pk
V	12010.00	43.40	31.02	8.99	25.57	46.94	54.00	-7.06	AV
H	4804.00	50.44	30.55	5.77	24.66	50.32	74.00	-23.68	Pk
H	4804.00	43.87	30.55	5.77	24.66	43.75	54.00	-10.25	AV
H	7206.00	52.75	30.33	6.32	24.55	53.29	74.00	-20.71	Pk
H	7206.00	43.46	30.33	6.32	24.55	44.00	54.00	-10.00	AV
H	9608.00	52.93	30.85	7.45	24.69	54.22	74.00	-19.78	Pk
H	9608.00	43.12	30.85	7.45	24.69	44.41	54.00	-9.59	AV
H	12010.00	51.86	31.02	8.99	25.57	55.40	74.00	-18.60	Pk
H	12010.00	43.01	31.02	8.99	25.57	46.55	54.00	-7.45	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:2440MHz									
V	4880.00	54.09	30.55	5.77	24.66	53.97	74.00	-20.03	Pk
V	4880.00	43.94	30.55	5.77	24.66	43.82	54.00	-10.18	AV
V	7320.00	50.06	30.33	6.32	24.55	50.60	74.00	-23.40	Pk
V	7320.00	43.77	30.33	6.32	24.55	44.31	54.00	-9.69	AV
V	9760.00	54.06	30.85	7.45	24.69	55.35	74.00	-18.65	Pk
V	9760.00	43.57	30.85	7.45	24.69	44.86	54.00	-9.14	AV
V	12200.00	50.26	31.02	8.99	25.57	53.80	74.00	-20.20	Pk
V	12200.00	43.56	31.02	8.99	25.57	47.10	54.00	-6.90	AV
H	4880.00	52.49	30.55	5.77	24.66	52.37	74.00	-21.63	Pk
H	4880.00	43.22	30.55	5.77	24.66	43.10	54.00	-10.90	AV
H	7320.00	54.35	30.33	6.32	24.55	54.89	74.00	-19.11	Pk
H	7320.00	43.28	30.33	6.32	24.55	43.82	54.00	-10.18	AV
H	9760.00	53.40	30.85	7.45	24.69	54.69	74.00	-19.31	Pk
H	9760.00	43.06	30.85	7.45	24.69	44.35	54.00	-9.65	AV
H	12200.00	51.18	31.02	8.99	25.57	54.72	74.00	-19.28	Pk
H	12200.00	43.98	31.02	8.99	25.57	47.52	54.00	-6.48	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	51.28	30.55	5.77	24.66	51.16	74.00	-22.84	Pk
V	4960.00	43.45	30.55	5.77	24.66	43.33	54.00	-10.67	AV
V	7440.00	54.88	30.33	6.32	24.55	55.42	74.00	-18.58	Pk
V	7440.00	43.84	30.33	6.32	24.55	44.38	54.00	-9.62	AV
V	9920.00	50.16	30.85	7.45	24.69	51.45	74.00	-22.55	Pk
V	9920.00	43.54	30.85	7.45	24.69	44.83	54.00	-9.17	AV
V	12400.00	50.37	31.02	8.99	25.57	53.91	74.00	-20.09	Pk
V	12400.00	43.76	31.02	8.99	25.57	47.30	54.00	-6.70	AV
H	4960.00	52.97	30.55	5.77	24.66	52.85	74.00	-21.15	Pk
H	4960.00	43.47	30.55	5.77	24.66	43.35	54.00	-10.65	AV
H	7440.00	52.15	30.33	6.32	24.55	52.69	74.00	-21.31	Pk
H	7440.00	43.14	30.33	6.32	24.55	43.68	54.00	-10.32	AV
H	9920.00	53.45	30.85	7.45	24.69	54.74	74.00	-19.26	Pk
H	9920.00	43.32	30.85	7.45	24.69	44.61	54.00	-9.39	AV
H	12400.00	51.82	31.02	8.99	25.57	55.36	74.00	-18.64	Pk
H	12400.00	43.92	31.02	8.99	25.57	47.46	54.00	-6.54	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 EMISSIONMEASUREMENT

5.1 TEST REQUIREMENT:

Test Requirement:	FCC Part15 C Section 15.209 and 15.205, RSS-247Section 3.3 & RSS-Gen Section 8.10
Test Method:	ANSI C63.10: 2013 & RSS-Gen
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)	Class B (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).

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 bestopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dBmargin would be re-tested one by one using peak, quasi-peak or average method as specified and then reportedin a data sheet.

g. Test the EUT in the lowest channel,the Highest channel

Note:

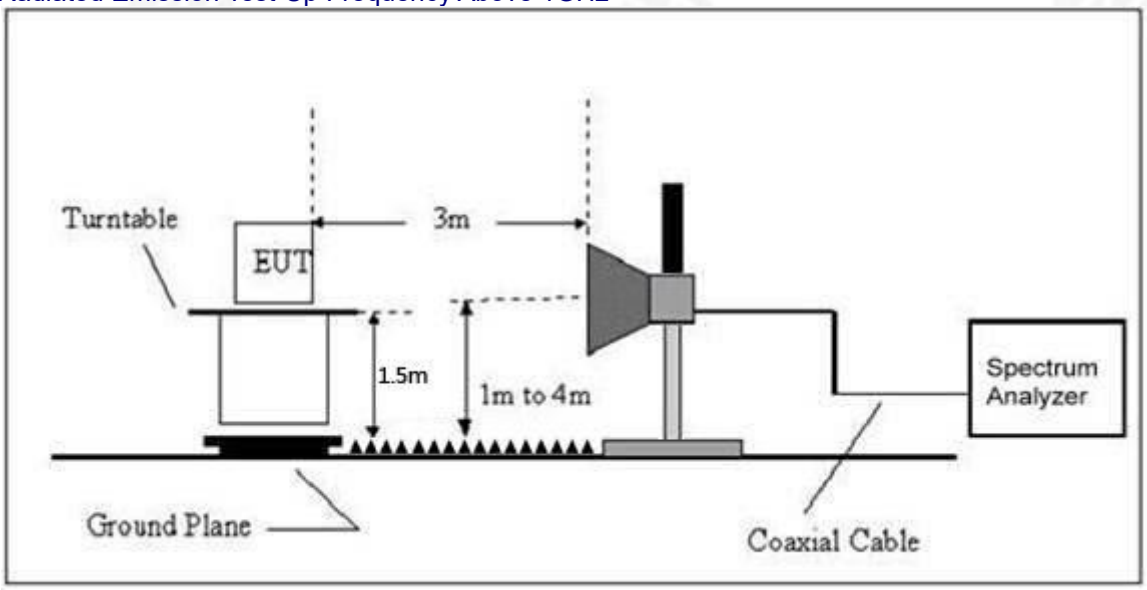
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz

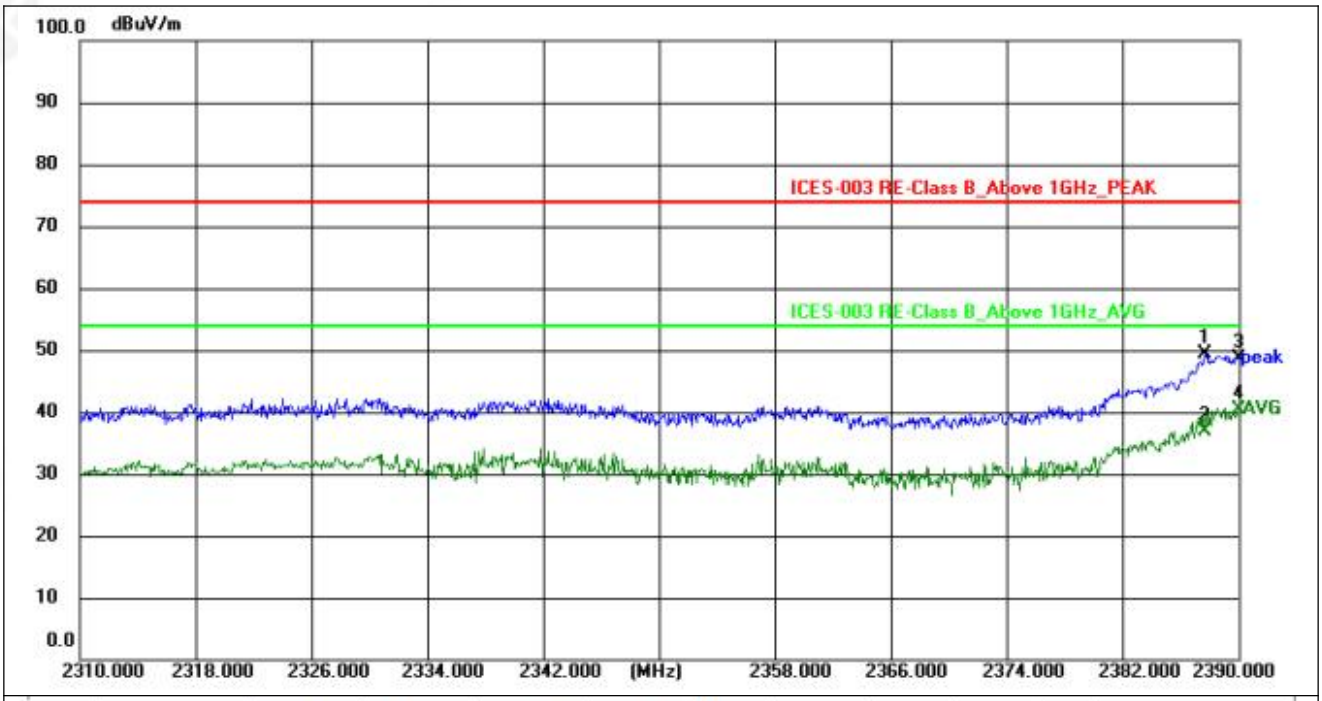


5.5 EUT OPERATING CONDITIONS

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.

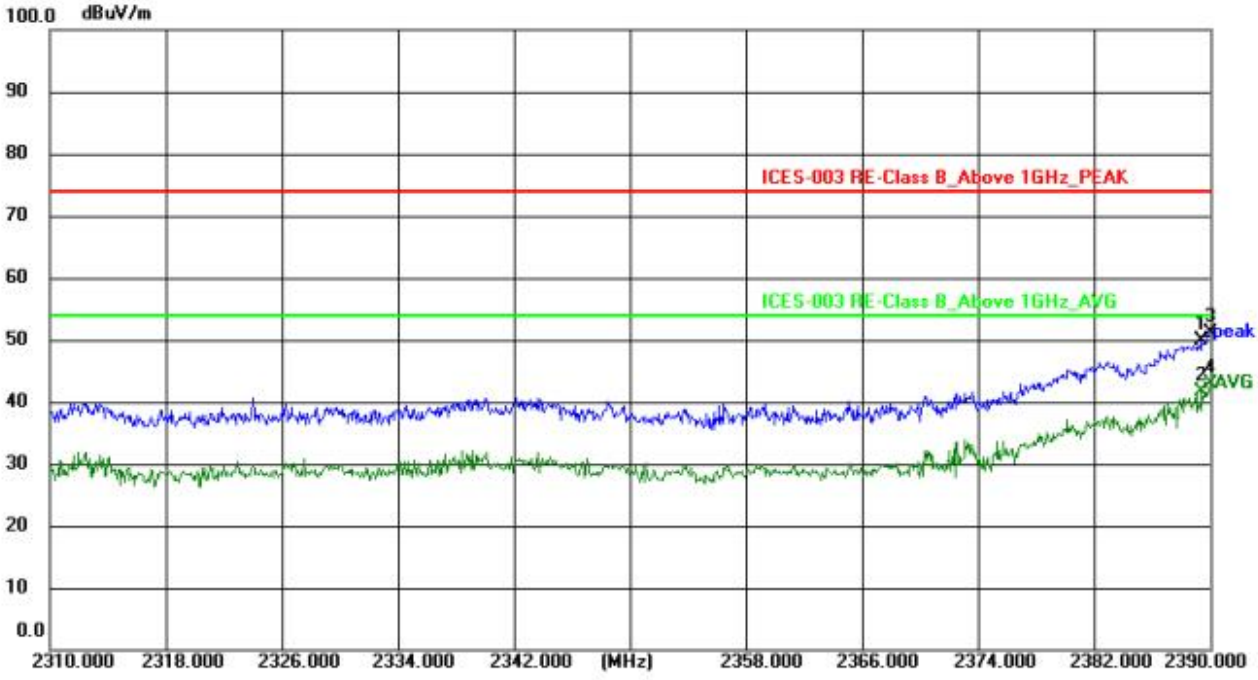
5.6 TEST RESULT

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz	Test channel	GFSK 2402MHz



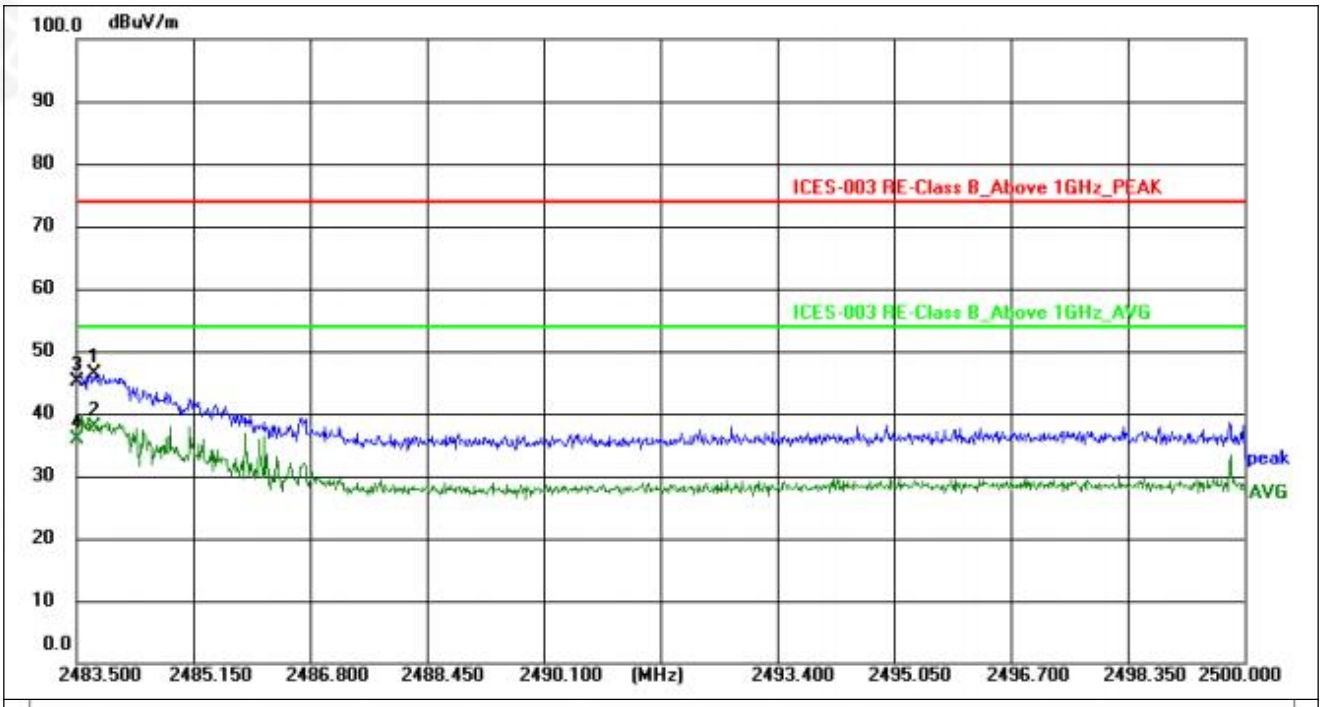
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2387.680	53.60	-4.12	49.48	74.00	-24.52	peak			P	
2	2387.680	40.95	-4.12	36.83	54.00	-17.17	AVG			P	
3	2390.000	52.86	-4.11	48.75	74.00	-25.25	peak			P	
4 *	2390.000	44.48	-4.11	40.37	54.00	-13.63	AVG			P	

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz	Test channel	GFSK 2402MHz



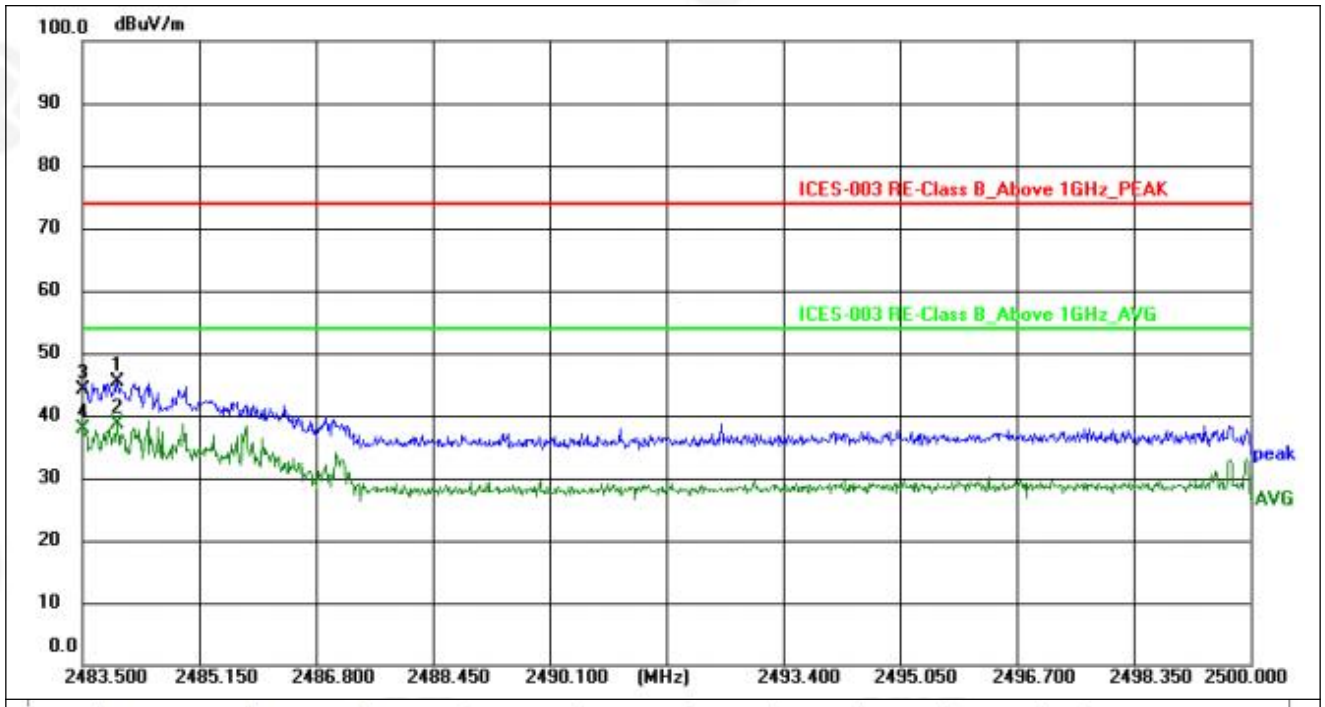
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2389.440	53.91	-4.11	49.80	74.00	-24.20	peak			P	
2	2389.440	45.70	-4.11	41.59	54.00	-12.41	AVG			P	
3	2390.000	55.36	-4.11	51.25	74.00	-22.75	peak			P	
4 *	2390.000	46.98	-4.11	42.87	54.00	-11.13	AVG			P	

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC 120V/60Hz	Test channel	GFSK 2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2483.776	49.84	-3.58	46.26	74.00	-27.74	peak			P	
2 *	2483.776	41.48	-3.58	37.90	54.00	-16.10	AVG			P	
3	2483.500	48.73	-3.58	45.15	74.00	-28.85	peak			P	
4	2483.500	39.55	-3.58	35.97	54.00	-18.03	AVG			P	

Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Vertical
Test Voltage:	AC 120V/60Hz	Test channel	GFSK 2480MHz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2484.002	48.88	-3.57	45.31	74.00	-28.69	peak			P	
2 *	2484.002	42.28	-3.57	38.71	54.00	-15.29	AVG			P	
3	2483.500	47.67	-3.58	44.09	74.00	-29.91	peak			P	
4	2483.500	41.43	-3.58	37.85	54.00	-16.15	AVG			P	

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.

6.POWER SPECTRAL DENSITY TEST

Test Requirement:	FCC Part15 C Section 15.247 (e), RSS-247 Section 5.2(b)
Test Method:	ANSI C63.10:2013 and KDB 558074 D01 15.247 Meas Guidance v05r02 and RSS-Gen KDB 662911 D01 Multiple Transmitter Output v02r01

6.1 APPLIED PROCEDURES / LIMIT

RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8dBm/3kHz	2400-2483.5	PASS

6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 DEVIATION FROM STANDARD

No deviation.

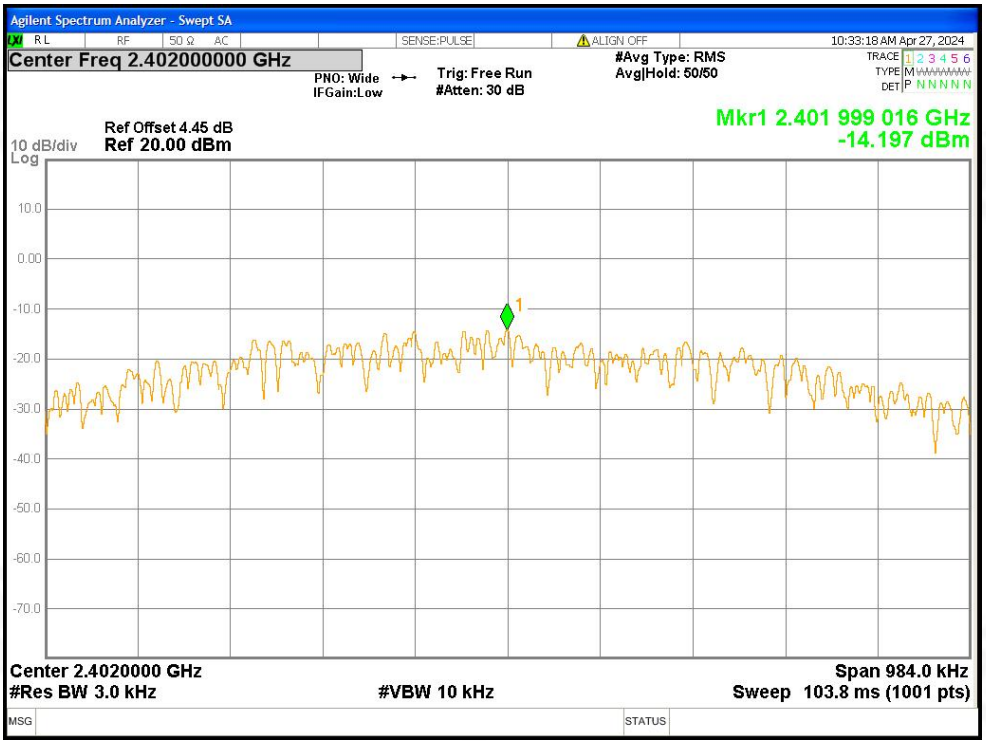
6.4 TEST SETUP

6.5 EUT OPERATION CONDITIONS

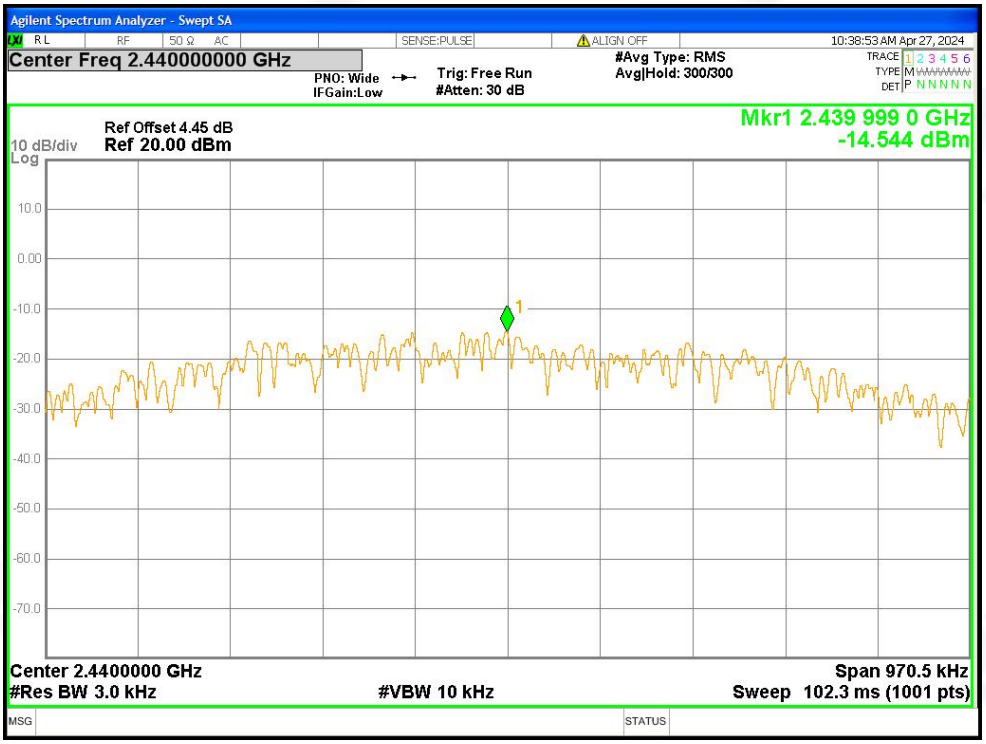
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULT

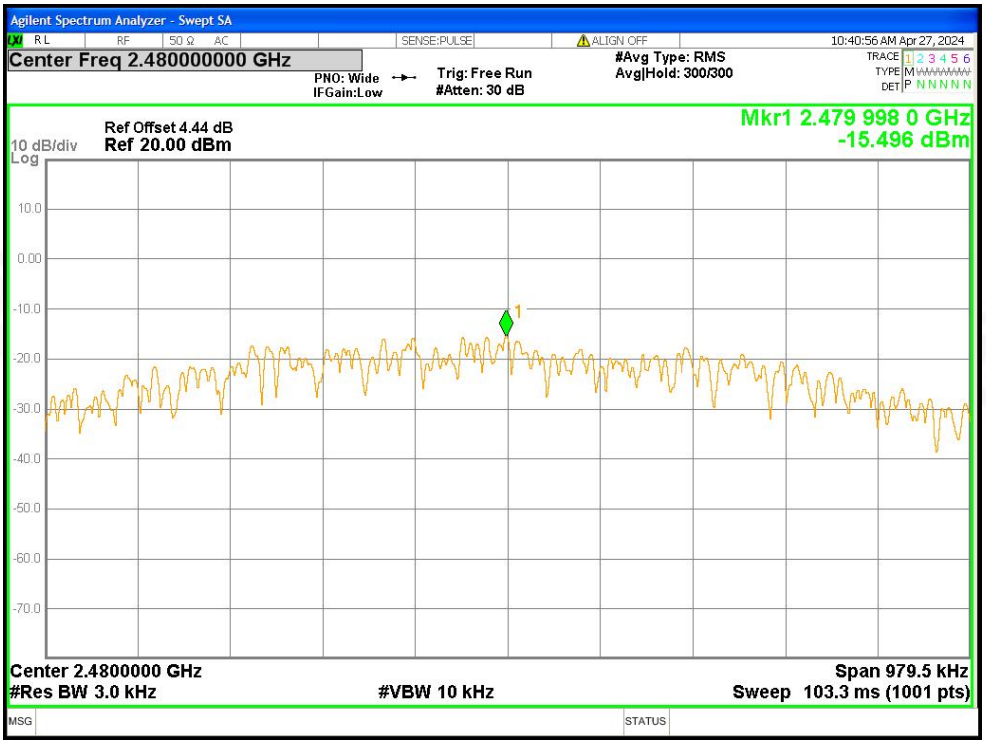
Frequency	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
2402 MHz	-14.2	8	PASS
2440 MHz	-14.54	8	PASS
2480 MHz	-15.5	8	PASS



PSD NVNT BLE 1M 2402MHz Ant1



PSD NVNT BLE 1M 2440MHz Ant1



PSD NVNT BLE 1M 2480MHz Ant1

7. CHANNEL BANDWIDTH& 99% OCCUPY BANDWIDTH

Test Requirement:	FCC Part15 C Section 15.247 (a)(2), RSS-247 Section 5.2(a)
Test Method:	ANSI C63.10:2013 and KDB558074 D01DTS Meas Guidancev05r02 and RSS-Gen

7.1 APPLIED PROCEDURES / LIMIT

RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

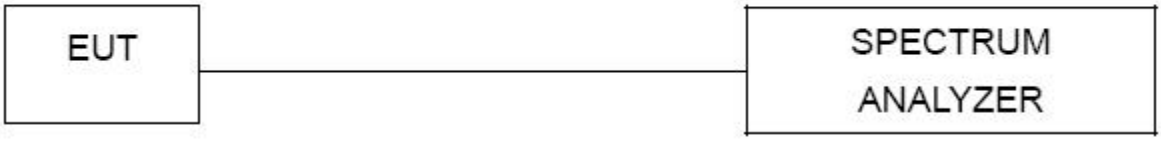
7.2 TEST PROCEDURE

1. Set RBW = 100 kHz For -6dB Bandwidth or 30kHz for 99% OBW
2. Set the video bandwidth (VBW) ≥ 3 xRBW.
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 Set RBW = 100 kHz For -6dB Bandwidth or 30kHz for OBW , or Test 99% OBW value with SA OBW function.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



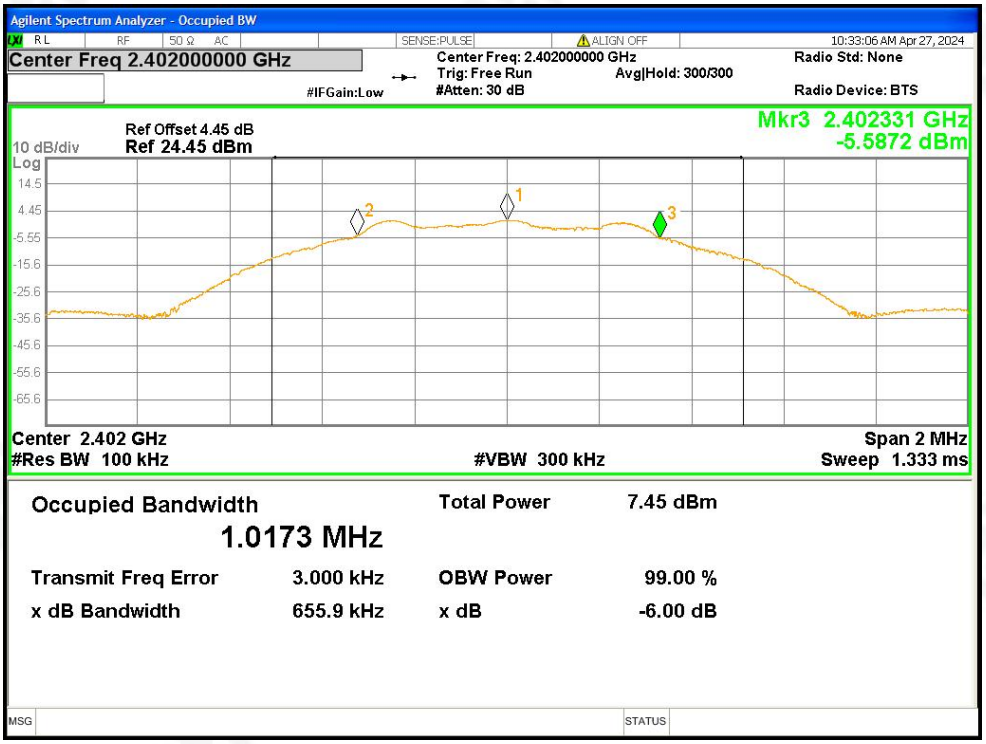
7.5 EUT OPERATION CONDITIONS

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.

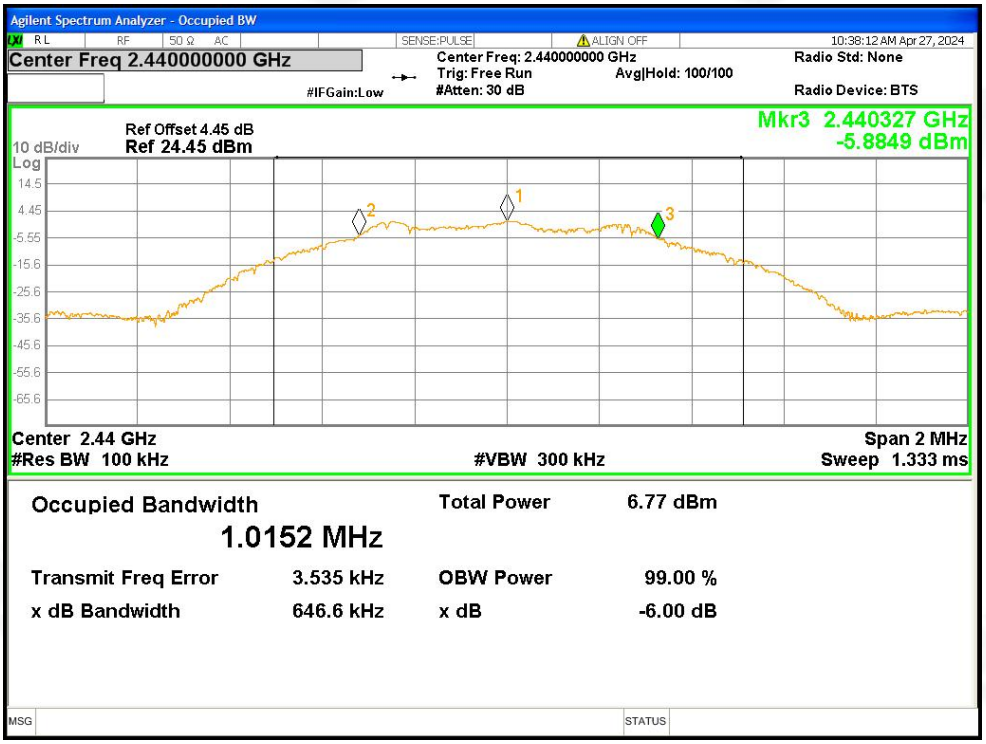
7.6 TEST RESULT

Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
BLE	2402	0.656	0.5	Pass
BLE	2440	0.647	0.5	Pass
BLE	2480	0.653	0.5	Pass

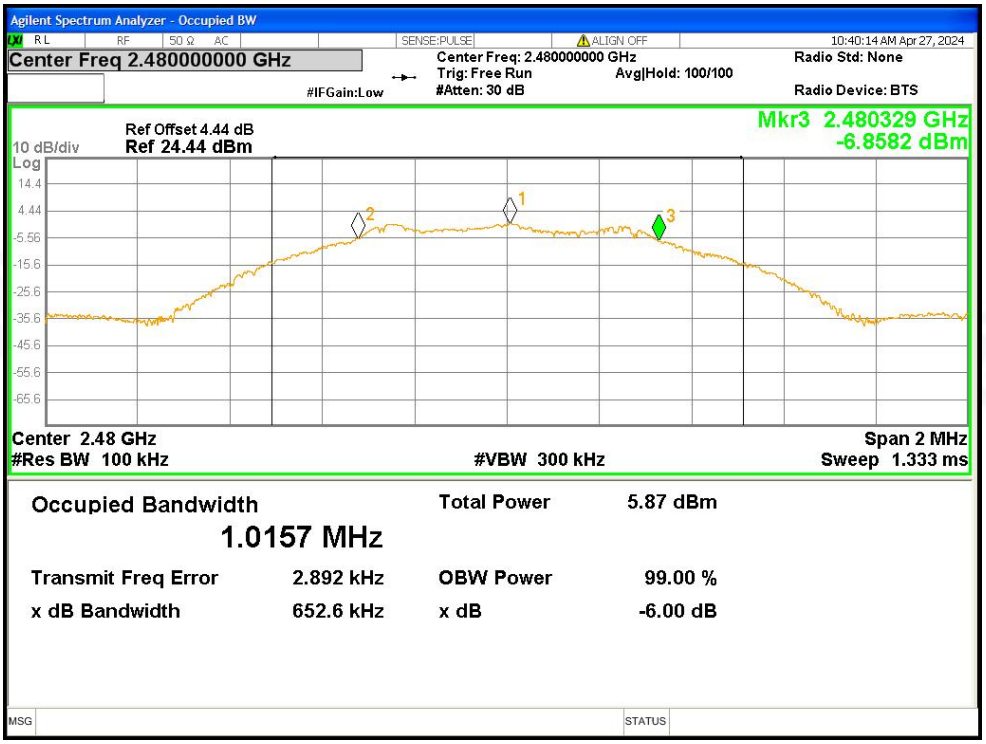
Mode	Frequency (MHz)	99% OBW (MHz)	Verdict
BLE	2402	1.011	Pass
BLE	2440	1.008	Pass
BLE	2480	1.008	Pass



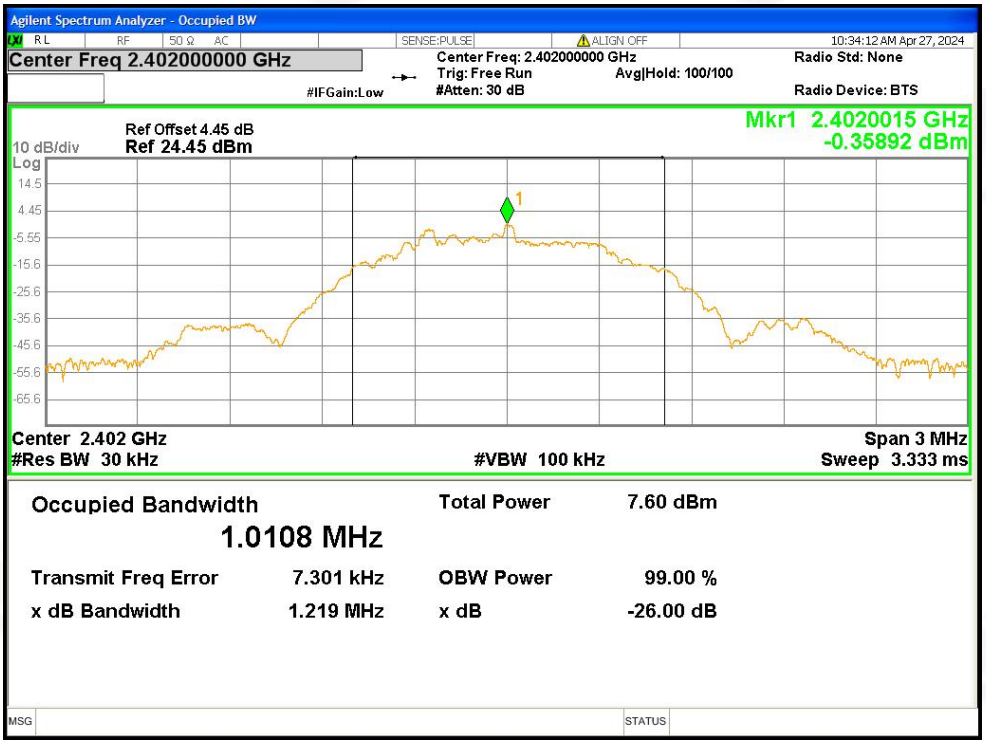
-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1



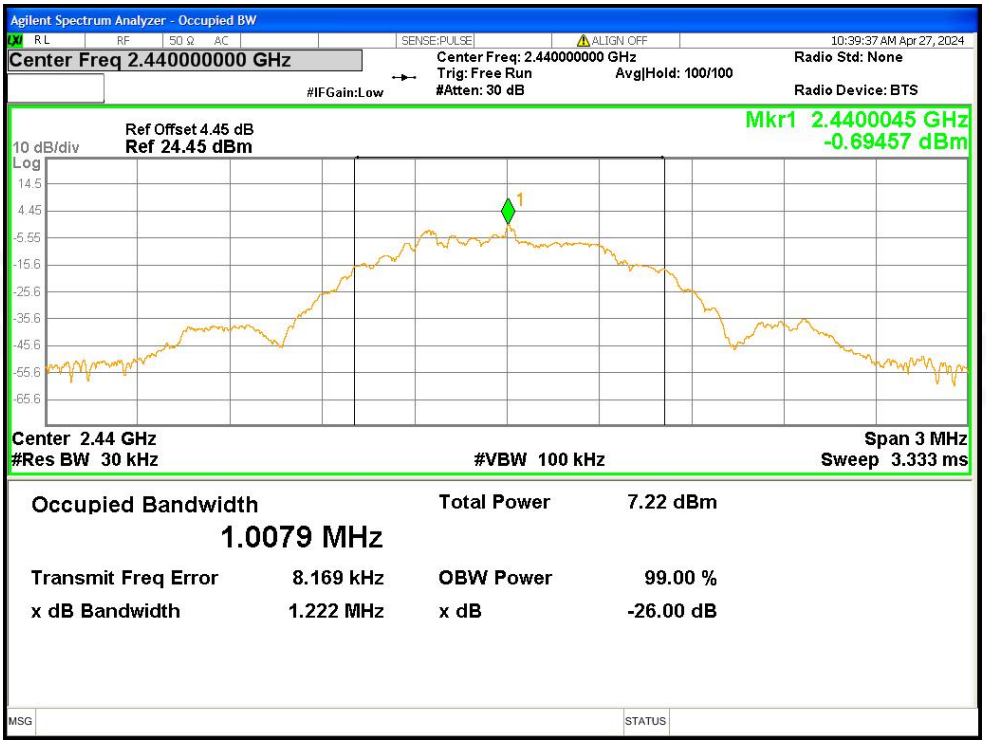
-6dB Bandwidth NVNT BLE 1M 2440MHz Ant1



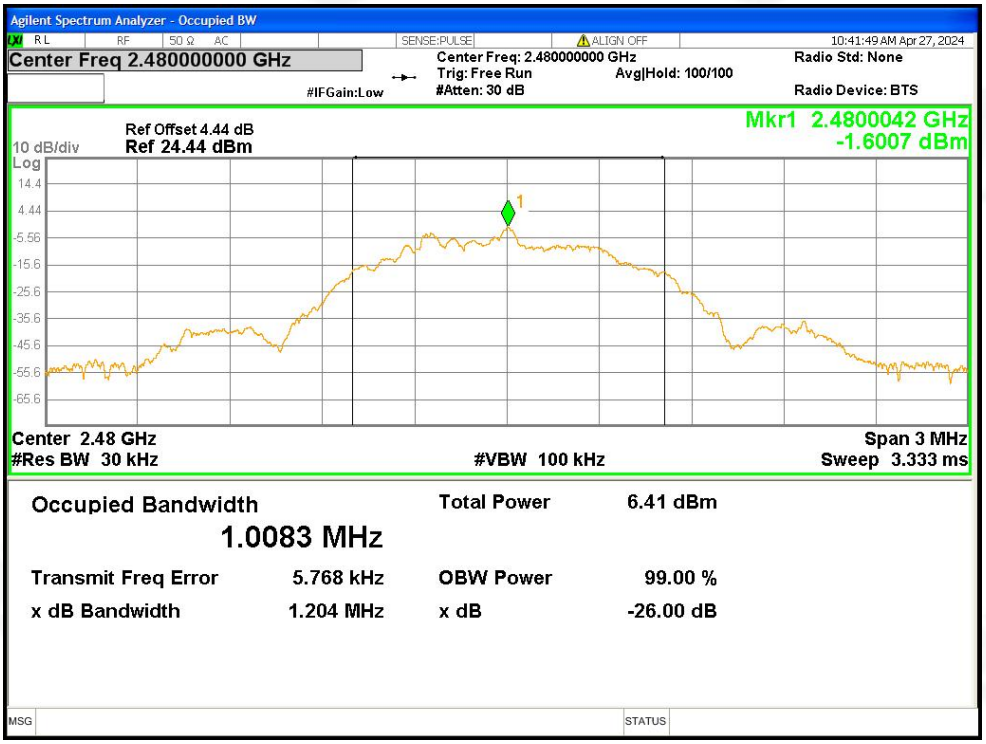
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



OBW NVNT BLE 1M 2402MHz Ant1



OBW NVNT BLE 1M 2440MHz Ant1



OBW NVNT BLE 1M 2480MHz Ant1

8.PEAK OUTPUT POWER TEST&EQUIVALENT ISOTROPICALLY RADIATED POWER (E.I.R.P.)

Test Requirement:	FCC Part15 C Section 15.247 (b)(3), RSS-247 Section 5.4(d)
Test Method:	ANSI C63.10:2013 and KDB558074 D01DTS Meas Guidancev05r02 and RSS-Gen KDB 662911 D01 Multiple Transmitter Output v02r01

8.1 APPLIED PROCEDURES/LIMIT

RSS-247				
Section	Test Item	Limit	Frequency Range (MHz)	Result
RSS-247 Section 5.4(d)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS
RSS-247 Section 5.4(d)	equivalent isotropically radiated power	4watt	2400-2483.5	PASS

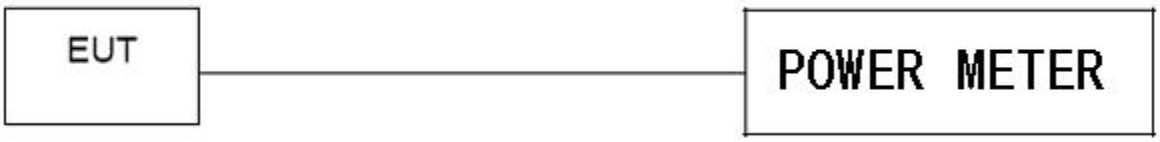
8.2 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 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.

8.6 TEST RESULT

Mode	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	e.i.r.p. (dBm)	Verdict
BLE	2402	1.56	30	3.56	Pass
BLE	2440	1.12	30	3.12	Pass
BLE	2480	0.19	30	2.19	Pass

Ant gain=2dBi
Note: EIRP= Conducted power + Antenna Gain

9. CONDUCTED BAND EDGE AND SPURIOUS EMISSION

Test Requirement:	FCC Part15 C Section 15.247 (d), RSS-247 Section 5.5
Test Method:	ANSI C63.10:2013 and KDB558074 D01DTS Meas Guidancev05r02 & RSS-Gen KDB 662911 D01 Multiple Transmitter Output v02r01

9.1 APPLICABLE STANDARD

in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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 in15.209(a).

9.2 TEST PROCEDURE

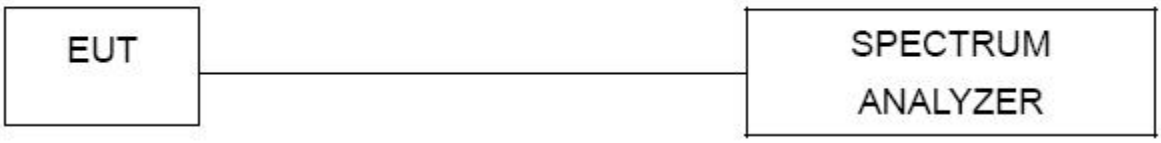
Using the following spectrum analyzer setting:

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.

9.3 DEVIATION FROM STANDARD

No deviation.

9.4 TEST SETUP

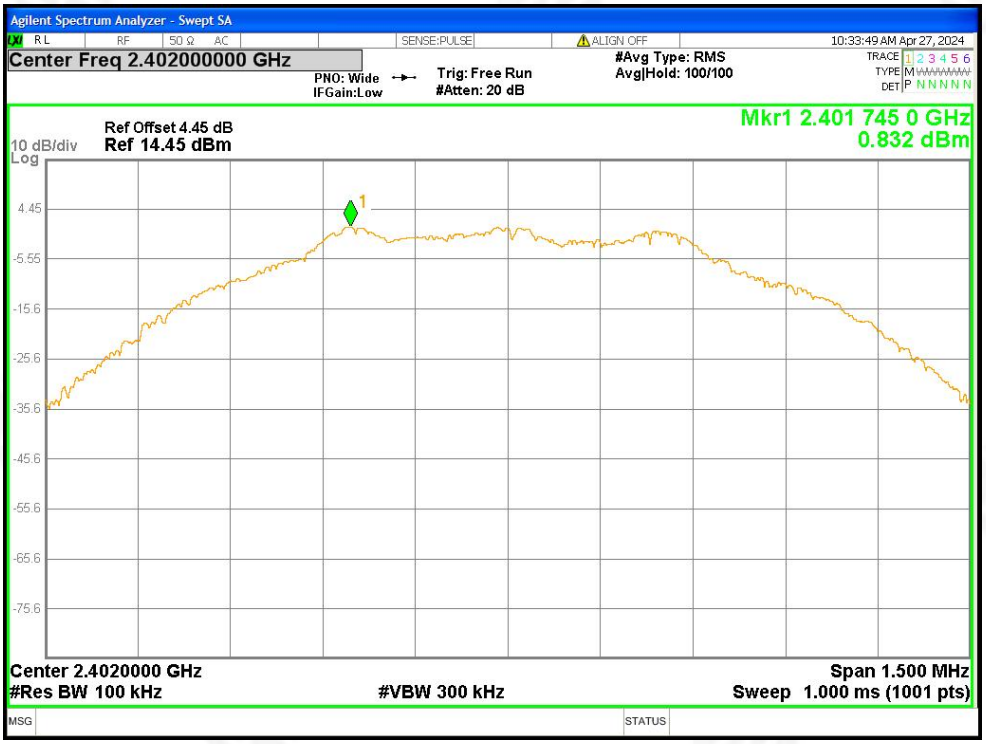


9.5 EUT OPERATION CONDITIONS

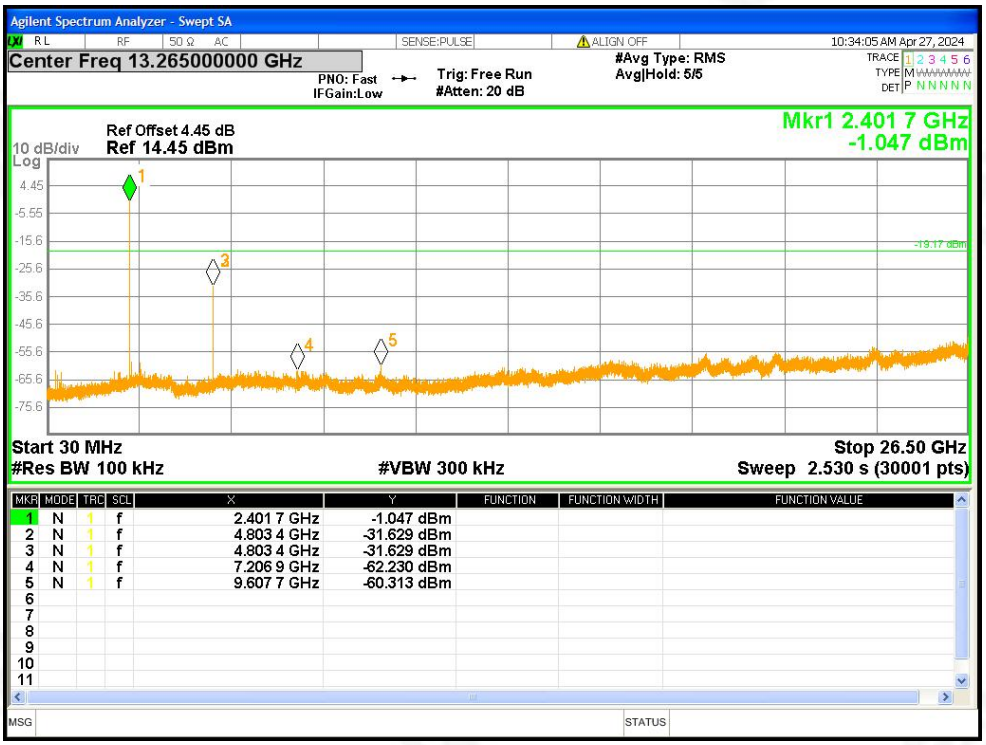
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

9.6 TEST RESULTS

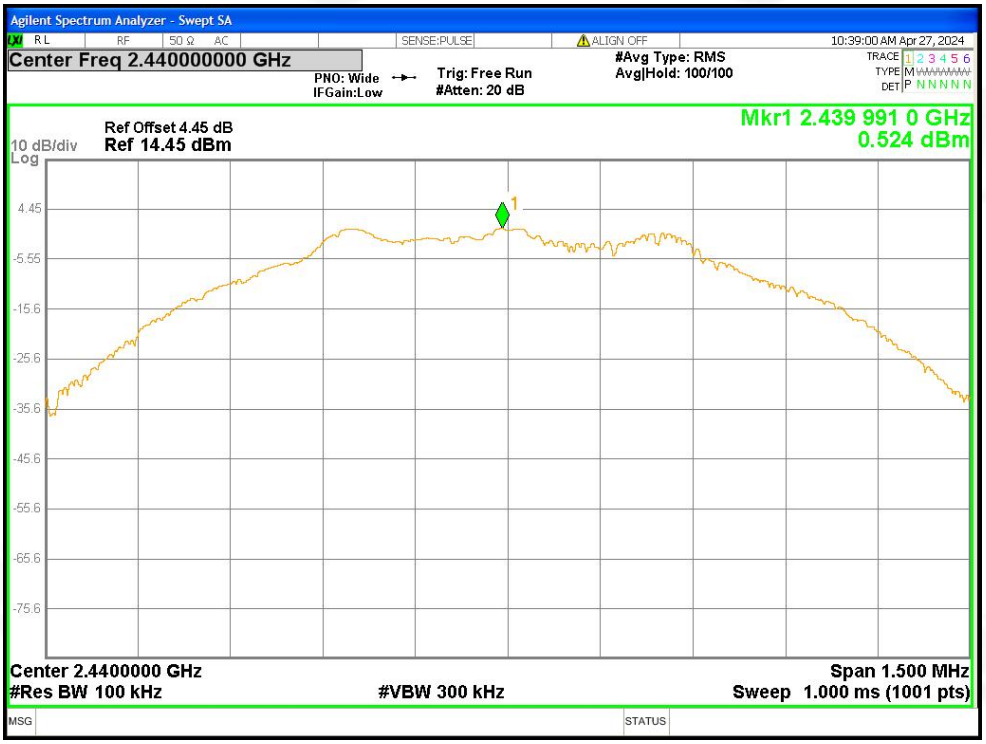
Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
b	2402	-32.45	-20	Pass
b	2440	-30.67	-20	Pass
b	2480	-32.87	-20	Pass



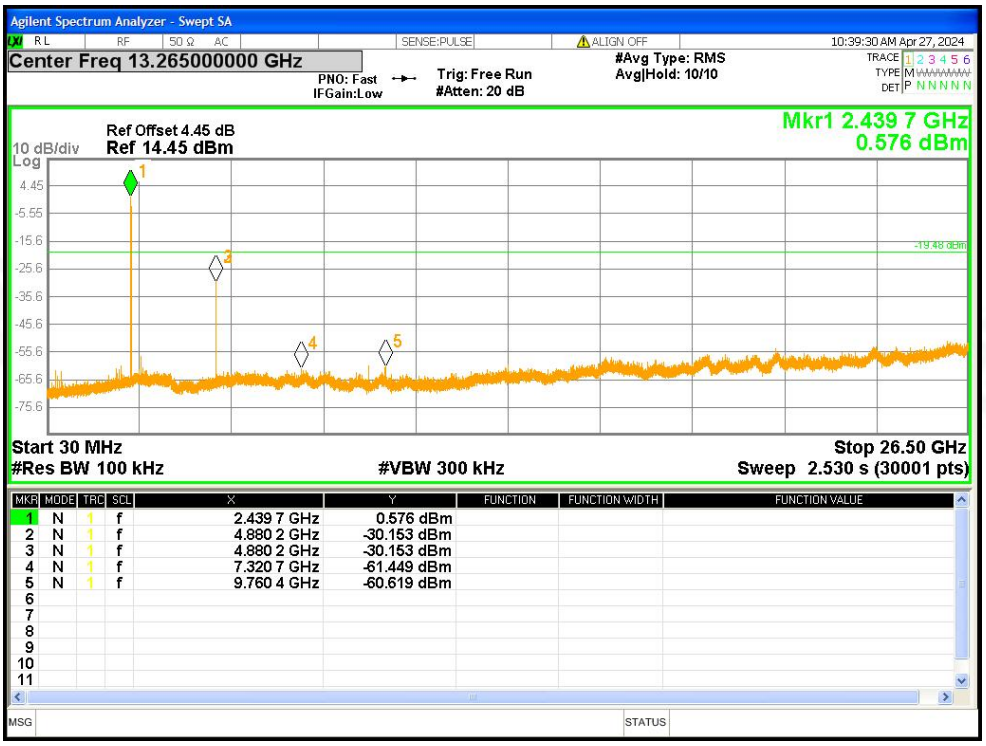
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Ref



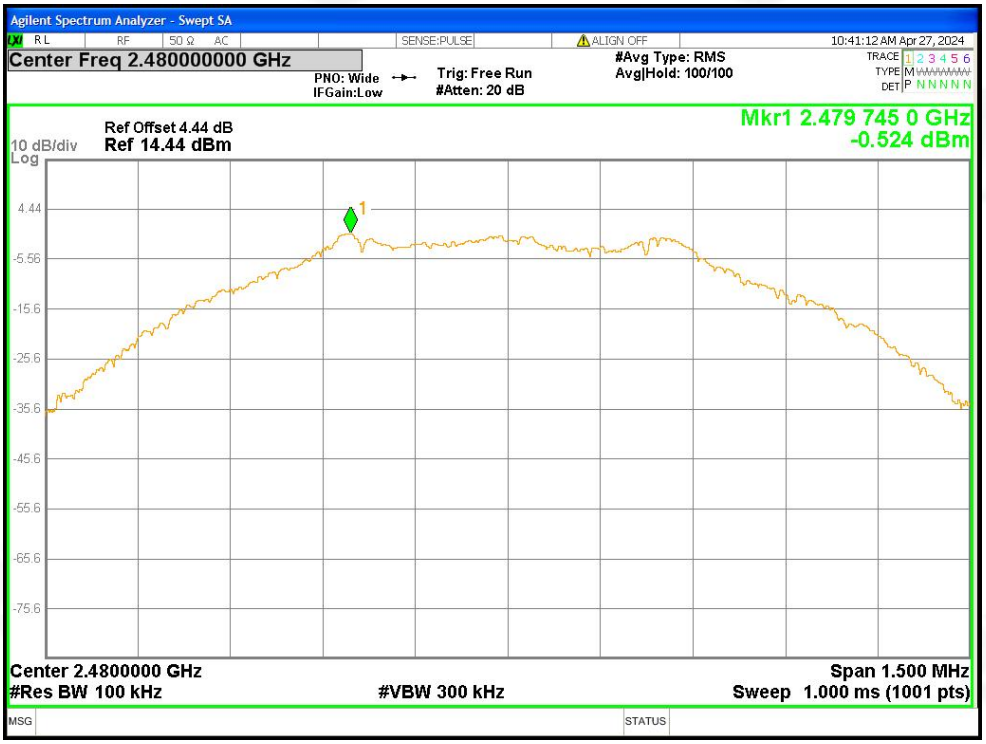
Tx. Spurious NVNT BLE 1M 2402MHz Ant1 Emission



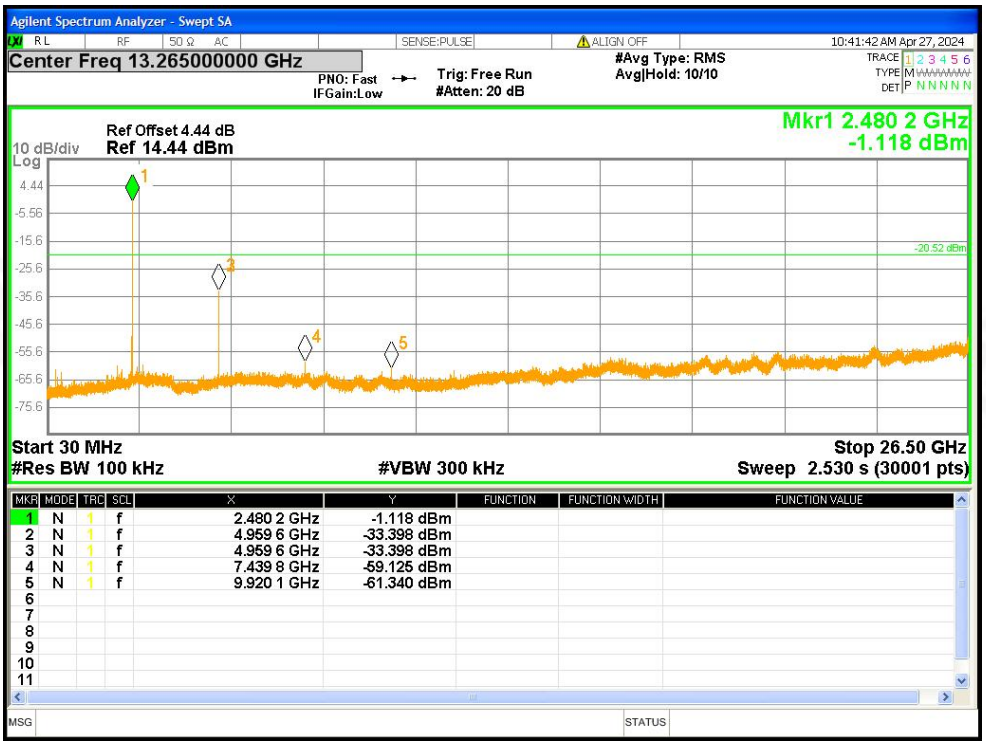
Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Ref



Tx. Spurious NVNT BLE 1M 2440MHz Ant1 Emission

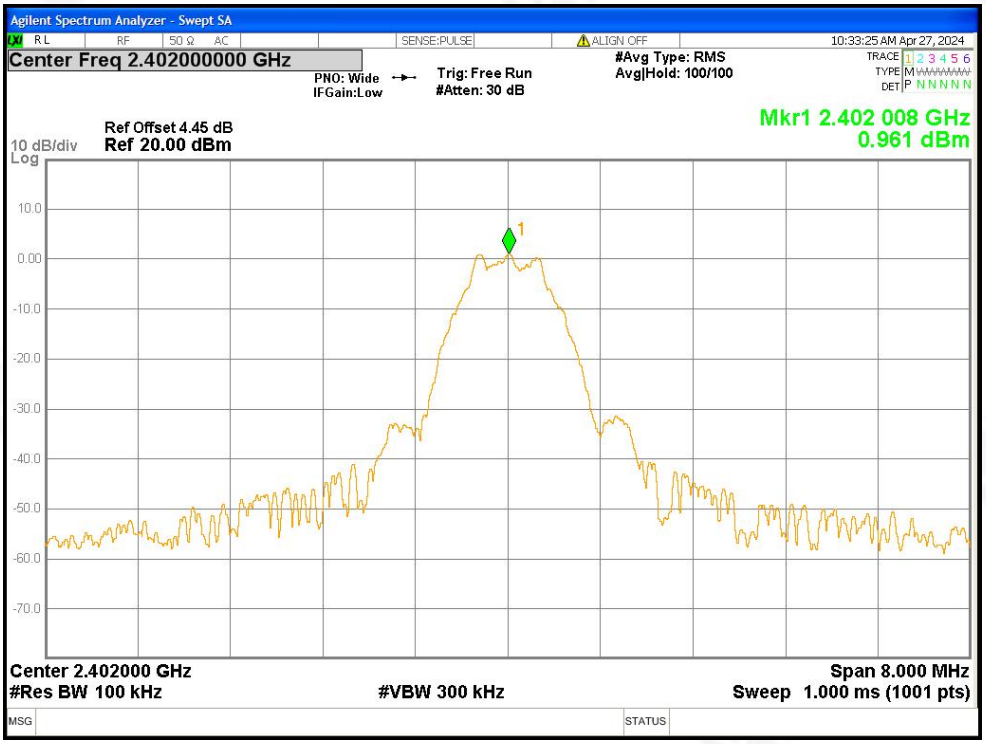


Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Ref

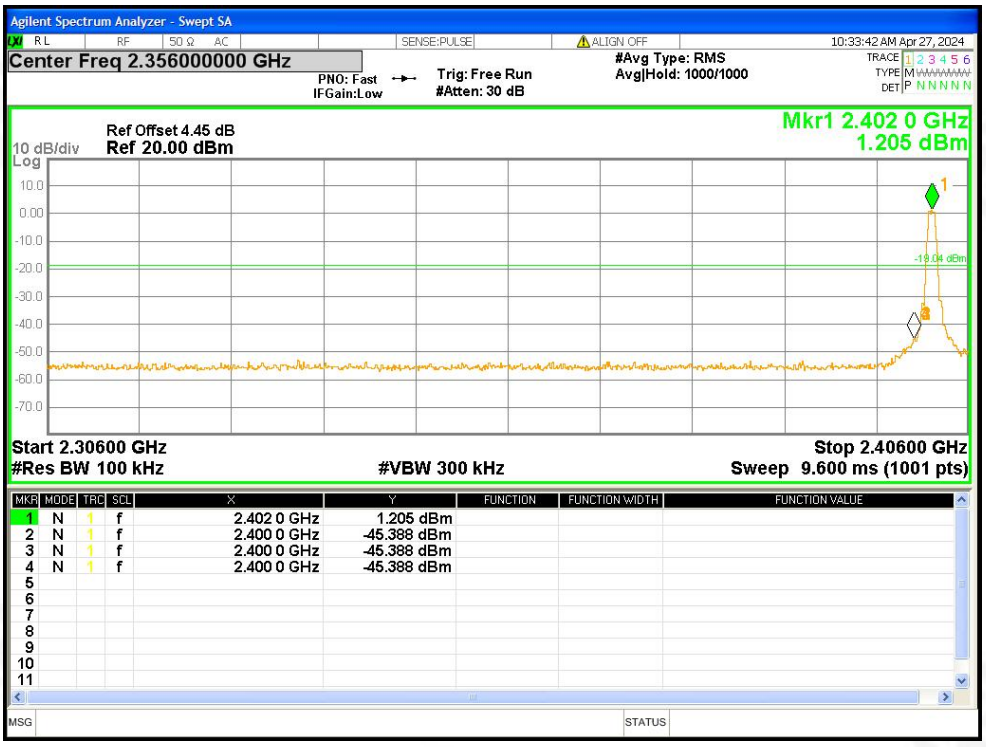


Tx. Spurious NVNT BLE 1M 2480MHz Ant1 Emission

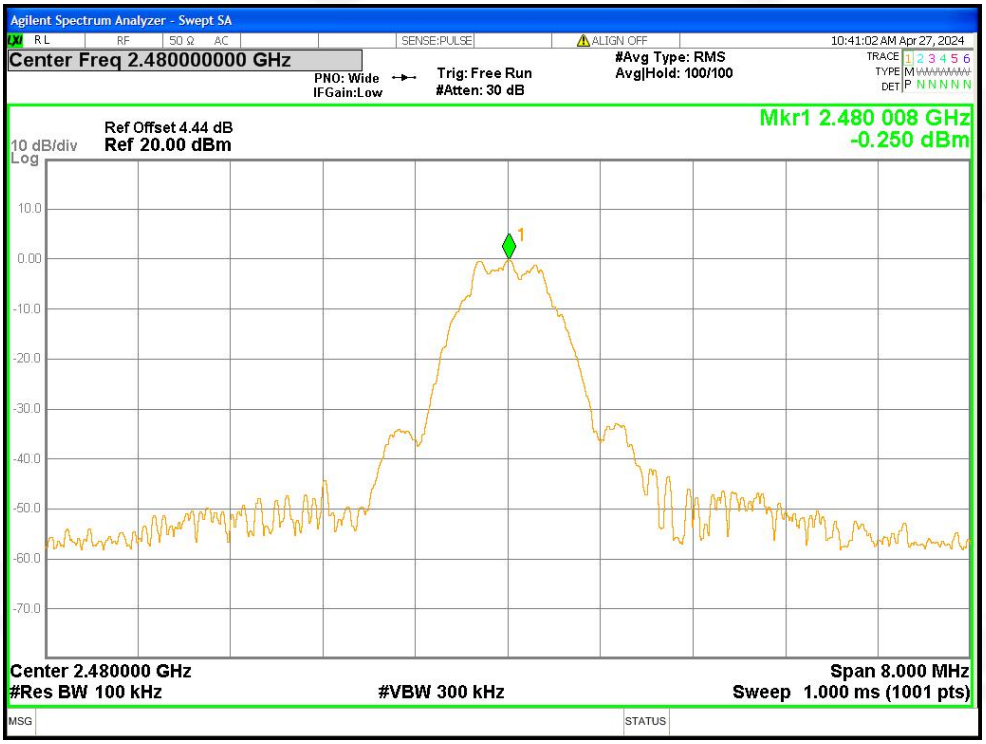
Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
BLE	2402	Ant1	-46.34	-20	Pass
BLE	2480	Ant1	-52.41	-20	Pass



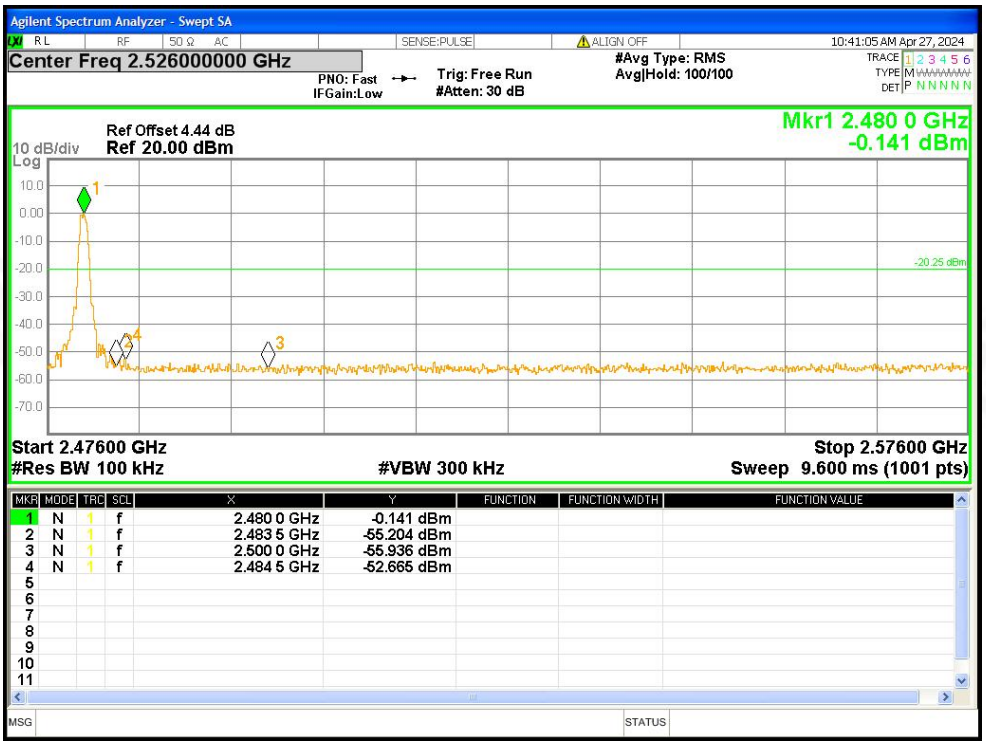
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.480 0 GHz	-0.141 dBm			
2	N	1	f	2.483 5 GHz	-55.204 dBm			
3	N	1	f	2.500 0 GHz	-55.936 dBm			
4	N	1	f	2.484 5 GHz	-52.665 dBm			

Band Edge NVNT BLE 1M 2480MHz Ant1 Emission

10. ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203 /247(c)/RSS-Gen Section 6.8
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(c) (1)(i) requirement: (i) 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 6dBi. When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device’s antenna shall be stated, based on measurement or on data from the antenna manufacturer. For transmitters of RF output power of 10 milliwatts or less, only the portion of the antenna gain that is in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power to demonstrate compliance with the radiated power limits specified in the applicable standard. For transmitters of output power greater than 10 milliwatts, the total antenna gain shall be added to the measured RF output power to demonstrate compliance to the specified radiated power RSS-Gen requirement: According to the RSS-Gen Section 6.8, 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.	
EUT Antenna:	
2.4G BLE antenna is Patch ceramic Antenna, the best case gain is 2dBi, reference to the appendix II for details	

11. TEST SETUP PHOTO

Reference to the appendix I for details.

12. EUT CONSTRUCTIONAL DETAILS

Reference to the appendix II for details.

※※※※※ END OF REPORT ※※※※※