FCC &ISED Radio Test Report

FCC ID: 2AC23-DCT2C
IC: 12290A-DCT2C

The report concerns: Original Grant

Report Reference No. ..... :	21EFSS08055 07741
Date Sample(s) Received ..... :	2021-08-12
Date of Tested ..... :	2021-08-12 to 2021-09-13
Date of issue ..... :	2021-09-13
Testing Laboratory ..... :	DongGuanShuoXin Electronic Technology Co., Ltd.
Address ..... :	Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn District, ChangAn Town, DongGuan City, GuangDong, China
Applicant's name ..... :	Hui Zhou Gaoshengda Technology Co., LTD
Address ..... :	NO.75 Zhongkai Development Area, Huizhou, Guangdong,China
Manufacturer ..... :	Hui Zhou Gaoshengda Technology Co., LTD
Equipment ..... :	WIFI+BT Module
Trade Mark ..... :	GSD
Model ..... :	DCT2CM2101
Ratings ..... :	I/P: DC 3.3V

Test Engineer: Blue Qiu

Responsible Engineer : Smile Wang

Authorized Signatory: King Wang

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1TEST REPORT DECLARE

Applicant	Hui Zhou Gaoshengda Technology Co., LTD
Address	NO.75 Zhongkai Development Area, Huizhou, Guangdong,China
Manufacturer	Hui Zhou Gaoshengda Technology Co., LTD
Address	No.2,Jin-da Road, Huinan High-tech Industrial Park, Hui-ao Avenue, Huizhou City, Guangdong, China
Factory	Hui Zhou Gaoshengda Technology Co., LTD
Address	No.2,Jin-da Road, Huinan High-tech Industrial Park, Hui-ao Avenue, Huizhou City, Guangdong, China
Equipment	WIFI +BT Module
Model No.	DCT2CM2101
Trade Mark	GSD
Standard	FCC Part15, Subpart C (15.247) RSS-247 Issue 2, Feb. 2017 RSS-Gen Issue 5, Mar. 2019 ANSI C63.10-2013

We Declare:

The equipment described above is tested by DongGuan ShuoXin Electronic Technology Co., Ltd(ATT). and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and DongGuan ShuoXin Electronic Technology Co., Ltd.(ATT) is assumed of full responsibility for the accuracy and completeness of these tests.

ATT is not responsible for the sampling stage, so the results only apply to the sample as received.

ATT's reports apply only to the specific samples tested under conditions. It is manufacture’s responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. ATT shall have no liability for any declarations, inferences or generalizations drawn by the client or others from ATT issued reports.

2SUMMARY OF TEST RESULTS

The EUT have been tested according to the applicable standards as referenced below:

Standard(s) Section		Test Item	Judgment	Remark
FCC	ISED			
15.207	RSS-Gen8.8	AC Power Line Conducted Emissions	PASS	------
15.247(d) 15.205(a) 15.209(a)	RSS-247 5.5 RSS-Gen8.9 RSS-Gen8.10	Radiated Emissions	PASS	------
15.247(a)(2)	RSS-247 5.2 (a) RSS-Gen6.7	Bandwidth	PASS	------
15.247(b)(3)	RSS-247 5.4 (d)	Maximum Output Power	PASS	------
15.247(d)	RSS-247 5.5	ConductedSpurious Emission	PASS	------
15.247(e)	RSS-247 5.2 (b)	Power Spectral Density	PASS	------
-	RSS-Gen 6.11	Frequency Stability	PASS	------
15.203	-	Antenna Requirement	PASS	Note(2)

Note:

(1) “N/A” denotes test is not applicable to this device.

(2) The device what use a permanently attached antenna were considered sufficient tocomply with the provisions of 15.203.

2.1MEASUREMENT UNCERTAINTY

Test Item	Uncertainty
Uncertainty for Conductionemission test (9kHz-150kHz)	3.7 dB
Uncertainty for Conduction emission test (150kHz-30MHz)	3.3 dB
Uncertainty for Radiation Emission test (30MHz-200MHz)	4.60 dB (Polarize: V)
	4.60 dB (Polarize: H)
Uncertainty for Radiation Emission test (200MHz-1GHz)	6.10 dB (Polarize: V)
	5.08 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz-6GHz)	5.01 dB (Polarize: V)
	5.01 dB (Polarize: H)
Uncertainty for Radiation Emission test (6GHz-18GHz)	5.26 dB (Polarize: V)
	5.26 dB (Polarize: H)
Uncertainty for Radiation Emission test (18GHz-40GHz)	5.06 dB (Polarize: V)
	5.06 dB (Polarize: H)
Uncertainty for radio frequency	±0.048kHz
Uncertainty for conducted RF Power	±0.32dB

Note:

This uncertainty represents an expanded uncertainty expressed at approximately the 95%confidence level using a coverage factor of k=2.

Test Facility:

The Test site used by DongGuan ShuoXin Electronic Technology Co., Ltd. to collect test data is located on the Zone A, 1F, No. 6, XinGang Road YuanGang Street, XinAn District, ChangAn Town, DongGuan City, GuangDong, China

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

Item	Registration No.	Expiration Date
CNAS	L3098	2024-08-27
A2LA	4893.01	2022-06-30
Innovation, Science and Economic Development Canada (ISED)	11033A CAB identifier:CN0083	2022-06-30
Federal Communications Commission (FCC)	171688 Designation No.:CN1235	2022-06-30

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	WIFI+BT Module	
Brand Name	GSD	
Test Model	DCT2CM2101	
Series Model	N/A	
Model Difference(s)	N/A	
Hardware Version	V1.0	
Software Version	V1.0	
Power Source	Supplied from USB.	
Power Rating	DC 3.3V	
Operation Frequency	2402 MHz ~ 2480 MHz	
Modulation Technology	GFSK	
Bit Rate of Transmitter	1Mbps /2Mbps	
Antenna Information	Antenna Type:PIFA	Maximum Peak Gain:2.0dBi
Max. Output Power	7.806dBm(0.00603W)1Mbps 7.894dBm(0.00616W)2Mbps	

Note:

1. For a more detailed features description, please refer to the manufacturer’s specifications or the user's manual.

2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

3.2DESCRIPTION OF TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1	BLE 1M TX Mode**NOTE (1)**
Mode 2	BLE 2M TX Mode**NOTE (1)**
Mode 3	BLE 2M TX Mode Channel 39

Following mode(s) as (were) found to be the worst case(s) and selected for the final test.

AC power line conducted emissions test	
Final Test Mode	Description
Mode 3	BLE 2M TX Mode Channel 39

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 3	BLE 2M TX Mode Channel 39

Radiated emissions test - Above 1GHz	
Final Test Mode	Description
Mode 1	BLE 1M TX Mode**NOTE (1)**
Mode 2	BLE 2M TX Mode**NOTE (1)**

Conducted test	
Final Test Mode	Description
Mode 1	BLE 1M TX Mode**NOTE (1)**
Mode 2	BLE 2M TX Mode**NOTE (1)**

Note:

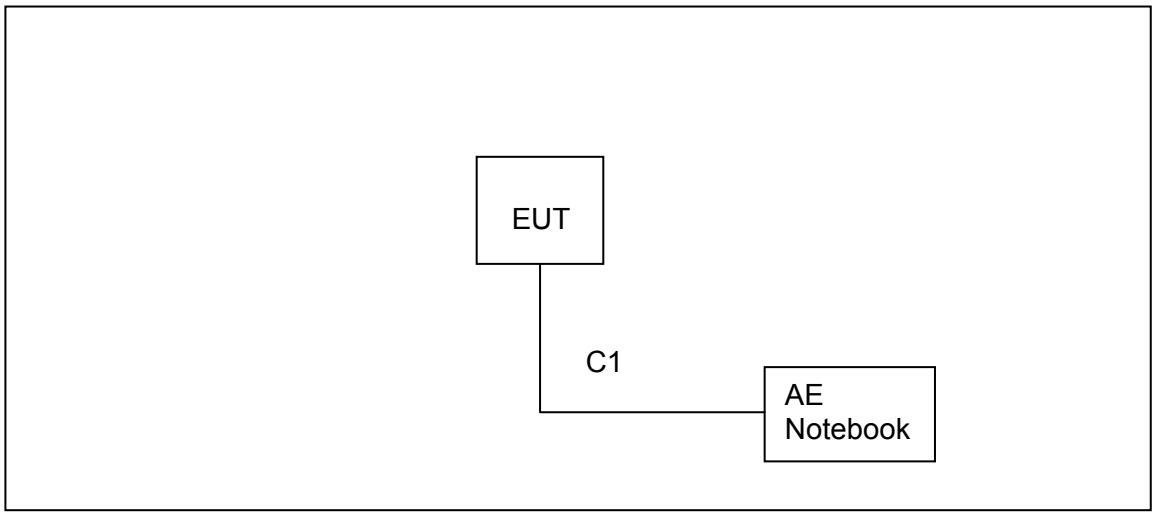
(1) The measurements are performed at the high, middle, low available channels.

3.3PARAMETERS OF TEST SOFTWARE

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 firmware of the final end product power parameters of BT LE

Test Software	BT_Combo_Tool		
Frequency (MHz)	2402	2440	2480
Parameters-1Mbps	Default	Default	Default
Parameters-2Mbps	Default	Default	Default

3.4BLOCKDIAGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTED



3.5SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
AE	Notebook	Lenovo	/	/

Item	Cable Type	Shielded Type	Ferrite Core	Length
C1	DC Cable	NO	NO	0.8m

3.6TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage
AC Power Line Conducted Emissions	23.1°C	52%	DC 3.3V
Radiated Emissions-9K-30MHz	22°C	60%	DC 3.3V
Radiated Emissions-30 MHz to 1GHz	23°C	54%	DC 3.3V
Radiated Emissions-Above 1000 MHz	23°C	54%	DC 3.3V
Bandwidth	20.6°C	51%	DC 3.3V
Maximum Output Power	20.6°C	51%	DC 3.3V
ConductedSpurious Emission	20.6°C	51%	DC 3.3V
Power Spectral Density	20.6°C	51%	DC 3.3V

4AC POWER LINE CONDUCTED EMISSIONS TEST

4.1LIMIT

Frequency of Emission (MHz)	Limit (dBμV)	
	Quasi-peak	Average
0.15 -0.50	66 to 56*	56 to 46*
0.50 -5.0	56	46
5.0 -30.0	60	50

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

4.2TEST 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 equipmentpowered 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 groundplane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

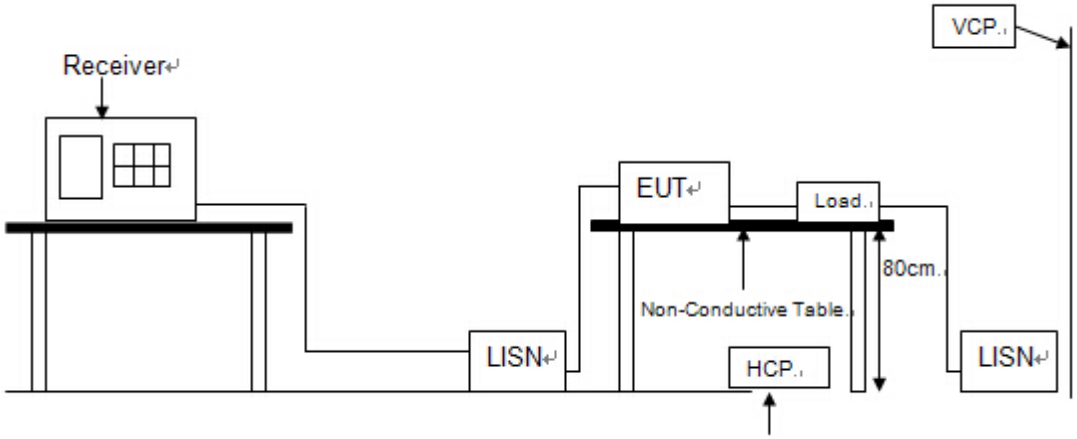
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

d. LISN at least 80 cm from nearest part of EUT chassis.

4.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-010-0024	12/11/2021
2	EMI Test Receiver	R&S	ESCI	101308	12/11/2021
3	LISN	AFJ	LS16	16011103219	06/09/2022
4	LISN	Schwarzbeck	NSLK 8127	8127-432	12/11/2021
5	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

4.4TESTSETUP



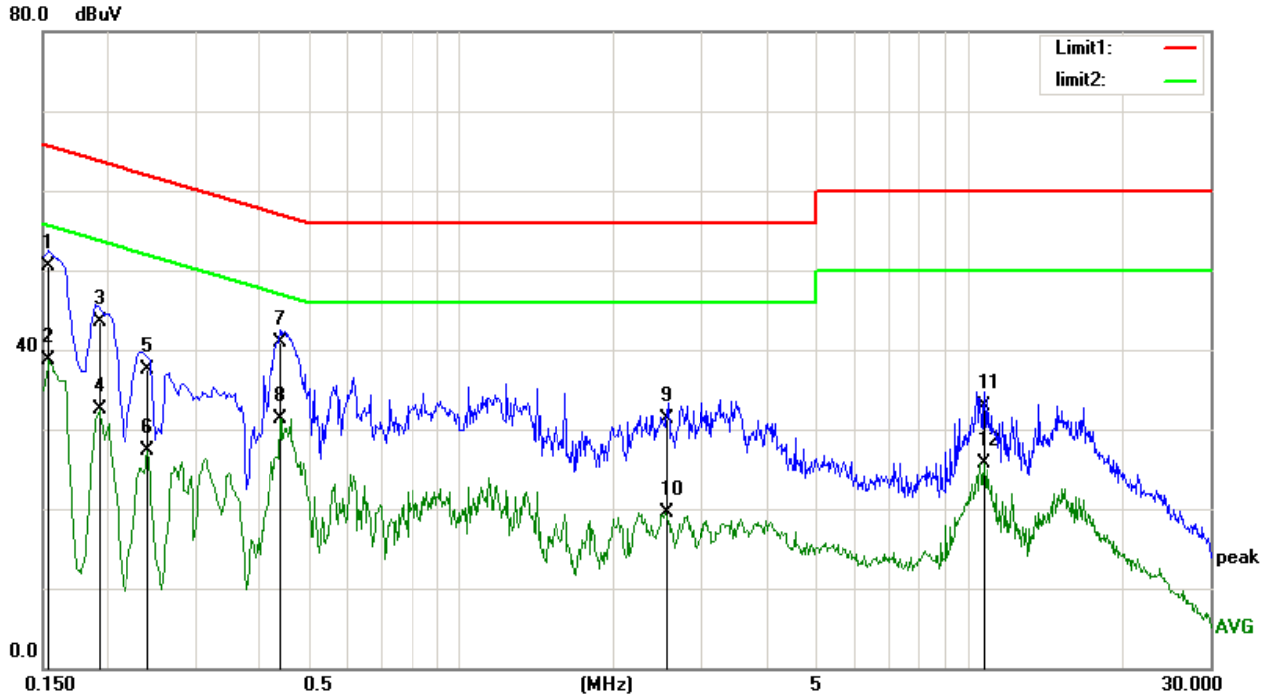
4.5EUT OPERATING CONDITIONS

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.

4.6 TEST RESULTS

Test Mode:	BLE 2M TX Mode Channel 39

Line

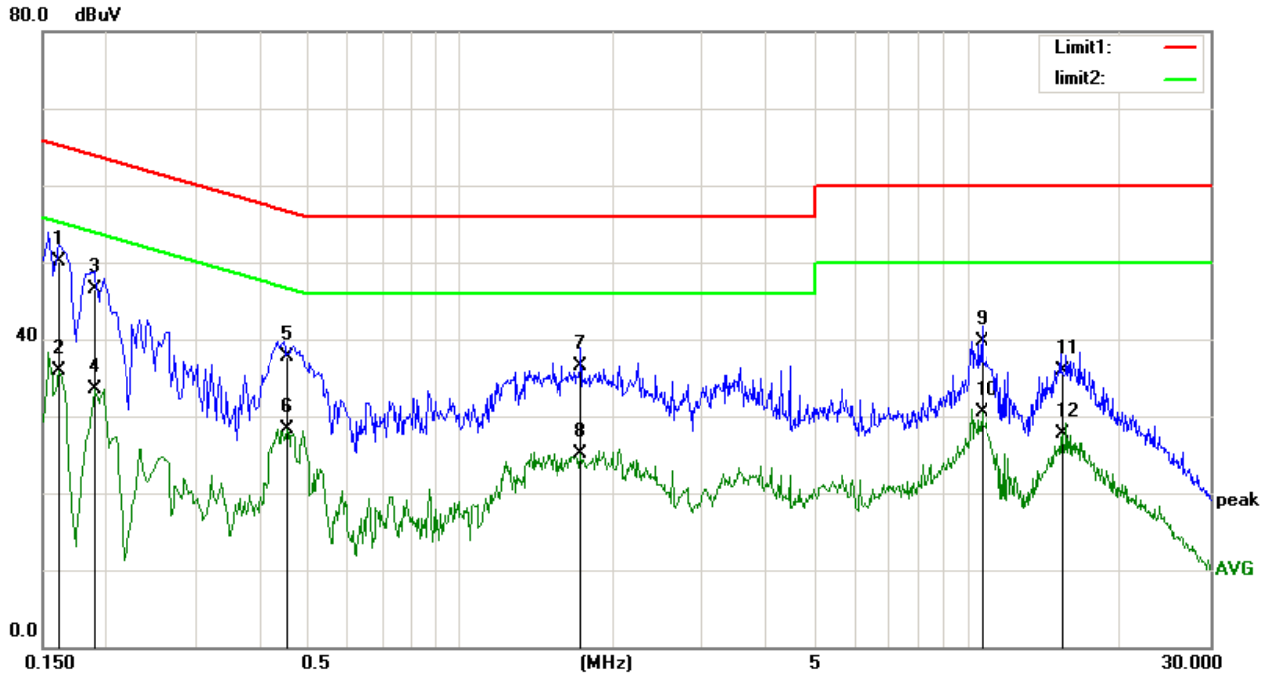


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1539	39.00	11.50	50.50	65.78	-15.28	QP
2	0.1539	27.29	11.50	38.79	55.78	-16.99	AVG
3	0.1940	32.18	11.23	43.41	63.86	-20.45	QP
4	0.1940	21.21	11.23	32.44	53.86	-21.42	AVG
5	0.2420	26.57	10.91	37.48	62.02	-24.54	QP
6	0.2420	16.35	10.91	27.26	52.02	-24.76	AVG
7	0.4420	30.46	10.36	40.82	57.02	-16.20	QP
8	0.4420	21.03	10.36	31.39	47.02	-15.63	AVG
9	2.5300	21.08	10.22	31.30	56.00	-24.70	QP
10	2.5300	9.33	10.22	19.55	46.00	-26.45	AVG
11	10.7500	22.75	10.20	32.95	60.00	-27.05	QP
12	10.7500	15.41	10.20	25.61	50.00	-24.39	AVG

Remarks:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

Test Mode:	BLE 2M TX Mode Channel 39

Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1620	38.63	11.45	50.08	65.36	-15.28	QP
2	0.1620	24.40	11.45	35.85	55.36	-19.51	AVG
3	0.1900	35.17	11.25	46.42	64.03	-17.61	QP
4	0.1900	22.31	11.25	33.56	54.03	-20.47	AVG
5	0.4580	27.28	10.33	37.61	56.73	-19.12	QP
6	0.4580	18.00	10.33	28.33	46.73	-18.40	AVG
7	1.7220	26.32	10.22	36.54	56.00	-19.46	QP
8	1.7220	14.81	10.22	25.03	46.00	-20.97	AVG
9	10.6660	29.46	10.20	39.66	60.00	-20.34	QP
10	10.6660	20.33	10.20	30.53	50.00	-19.47	AVG
11	15.4540	25.72	10.22	35.94	60.00	-24.06	QP
12	15.4540	17.41	10.22	27.63	50.00	-22.37	AVG

Remarks:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

5 RADIATED EMISSION TEST

5.1LIMIT

In case the emission fall within the restricted band specified on 15.205(a) and RSS-Gen 8.10, then the 15.209(a)and RSS-Gen 8.9limit in the table below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (9 kHz-1000MHz)

Frequency (MHz)	Field Strength (microvolts/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 (9 kHz-30 MHz)

Frequency (MHz)	Magnetic field strength (H-Field) (μA/m)	Measurement Distance (meters)
0.009-0.490	6.37/F(kHz)	300
0.490-1.705	6.37/F(kHz)	30
1.705-30.0	0.08	30

LIMITS OF RADIATED EMISSION MEASUREMENT (30 MHz-1000MHz)

Frequency (MHz)	Field Strength (μV/m at 3m)
30-88	100
88-216	150
216-960	200
Above 960	500

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency (MHz)	(dBuV/m at 3 m)	
	Peak	Average
Above 1000	74	54

Note:

(1) The limit for radiated test was performed according to FCC PART 15C and RSS-247.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

5.2TEST PROCEDURE

a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The measuring distance of 3 m or 1.5m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. 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 find the maximum reading (used Bore sight function).
e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (below 1GHz)
h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn‘t perform. (above 1GHz)
i. The test result is calculated as the following:
(1) Result = Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
(3) Margin = Result - Limit

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	RBW 1MHz VBW 3MHz peak detector for Pk value RMS detector for AV value

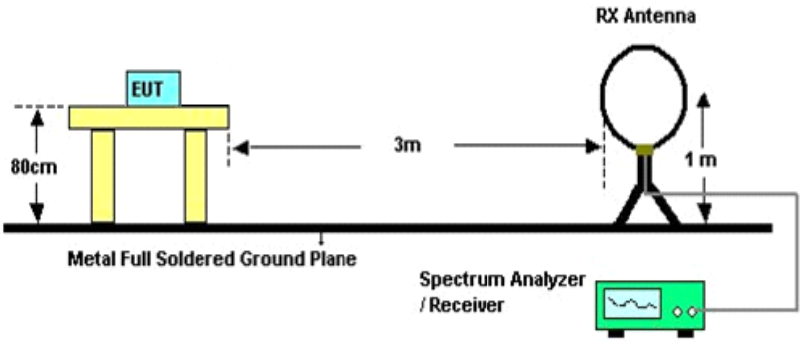
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

5.3MEASUREMENT INSTRUMENTS LIST

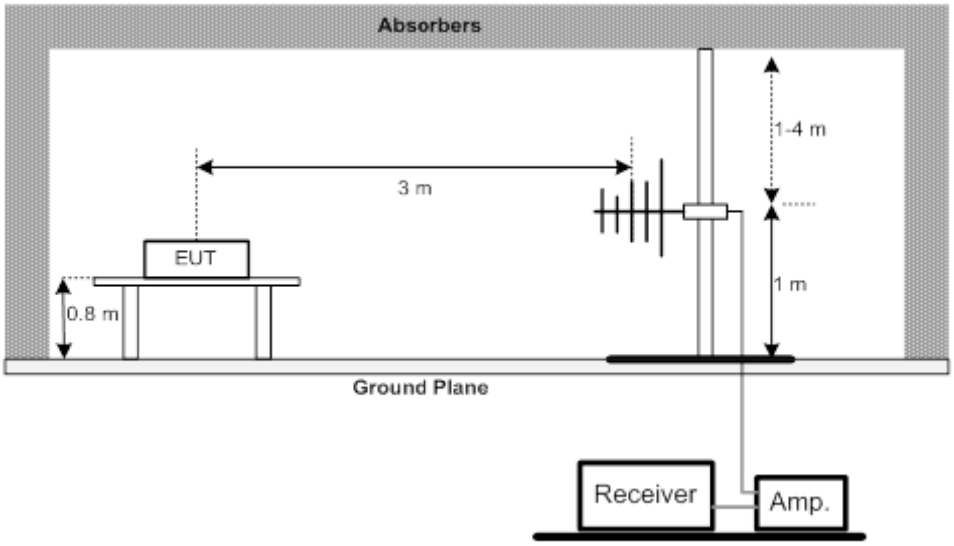
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	101307	12/12/2021
2	Spectrum Analyzer	Agilent	E4407B	US40240708	11/17/2021
3	Loop antenna	SCHWARZBECK K	FMZB1519	1519-062	12/14/2021
4	Broadband antenna	SCHWARZBECK	VULB9168	VULB9168-192	08/06/2021
5	HORN ANTENNA	SCHWARZBECK	BBHA9120D	9120D 1065	04/21/2022
6	Preamplifier Amplifier	HP	8447F	3113A05680	12/11/2021
7	PRE-AMPLIFIER	CY	EMC011830	980136	12/11/2021
8	RF Cable	R&S	Test Cable 4	4	12/11/2021
9	RF Cable	R&S	Test Cable 5	5	12/11/2021
10	RF Cable	R&S	Test Cable 9	9	04/21/2022
11	RF Cable	R&S	Test Cable 10	10	12/11/2021
12	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

5.4TESTSETUP

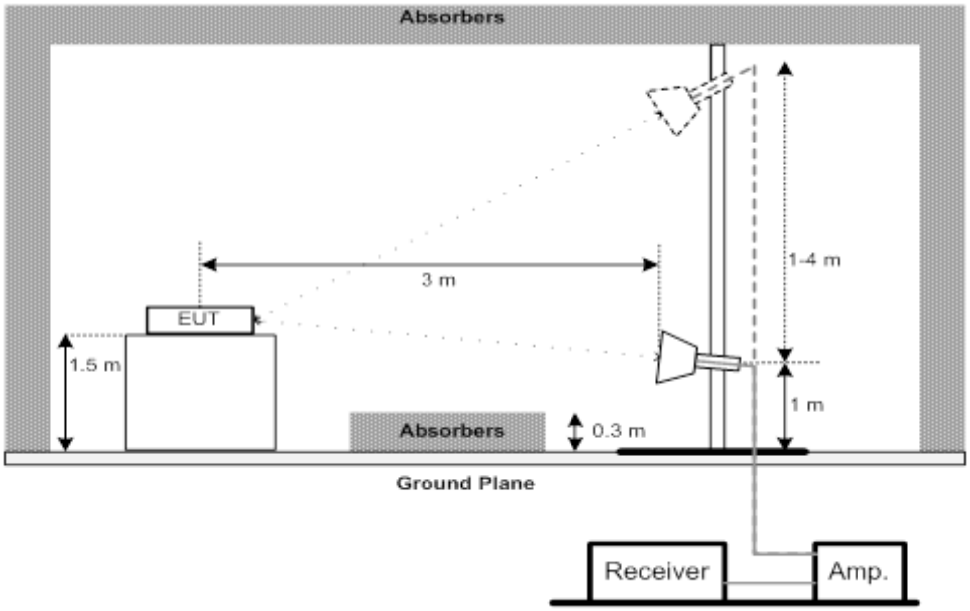
9 kHz-30 MHz



30 MHz to 1 GHz



Above 1 GHz



5.5EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

5.6 TEST RESULT- 9kHz TO 30MHz

Test Mode:	BLE 2M TX Mode Channel 39

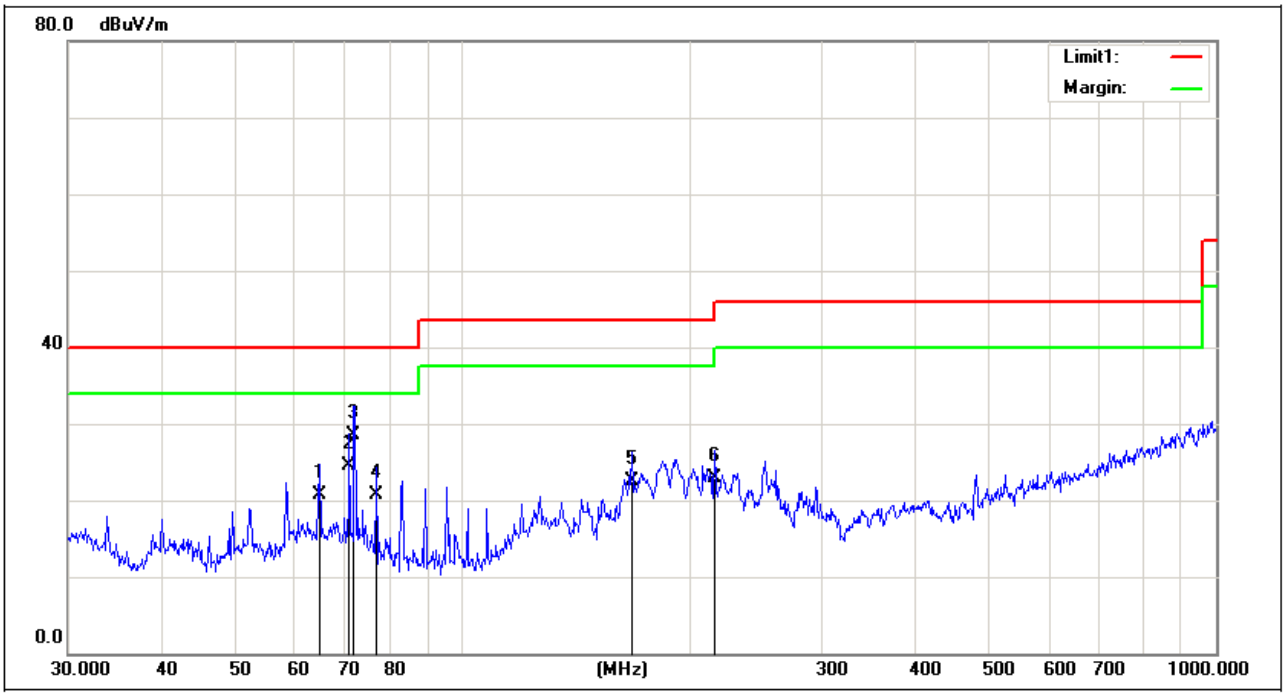
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

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 =20 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor

5.7 TEST RESULT- 30MHz TO 1000MHz

Test Mode :	BLE 2M TX Mode Channel 39

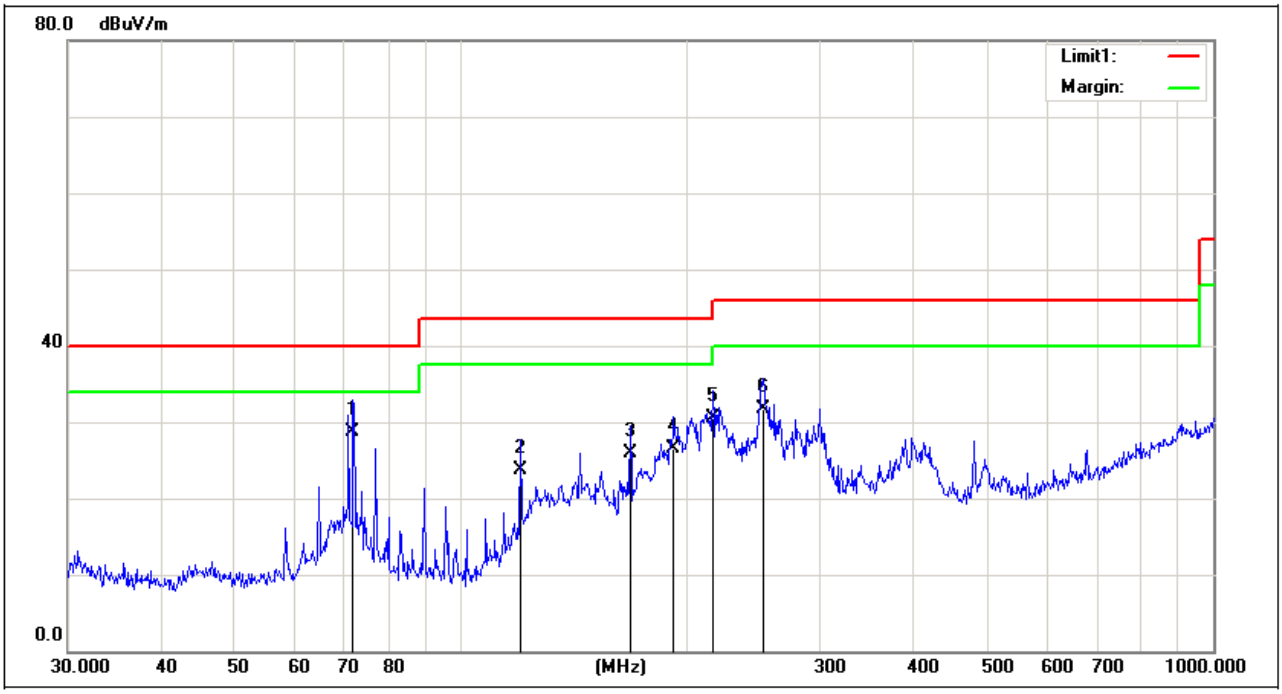
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	64.6594	33.07	-12.45	20.62	40.00	-19.38	QP
2	70.8315	39.39	-14.81	24.58	40.00	-15.42	QP
3	71.8320	43.27	-14.78	28.49	40.00	-11.51	QP
4	77.0505	35.78	-15.04	20.74	40.00	-19.26	QP
5	167.8243	32.99	-10.48	22.51	43.50	-20.99	QP
6	216.0240	33.45	-10.58	22.87	46.00	-23.13	QP

Test Mode :	BLE 2M TX Mode Channel 39

Horizontal

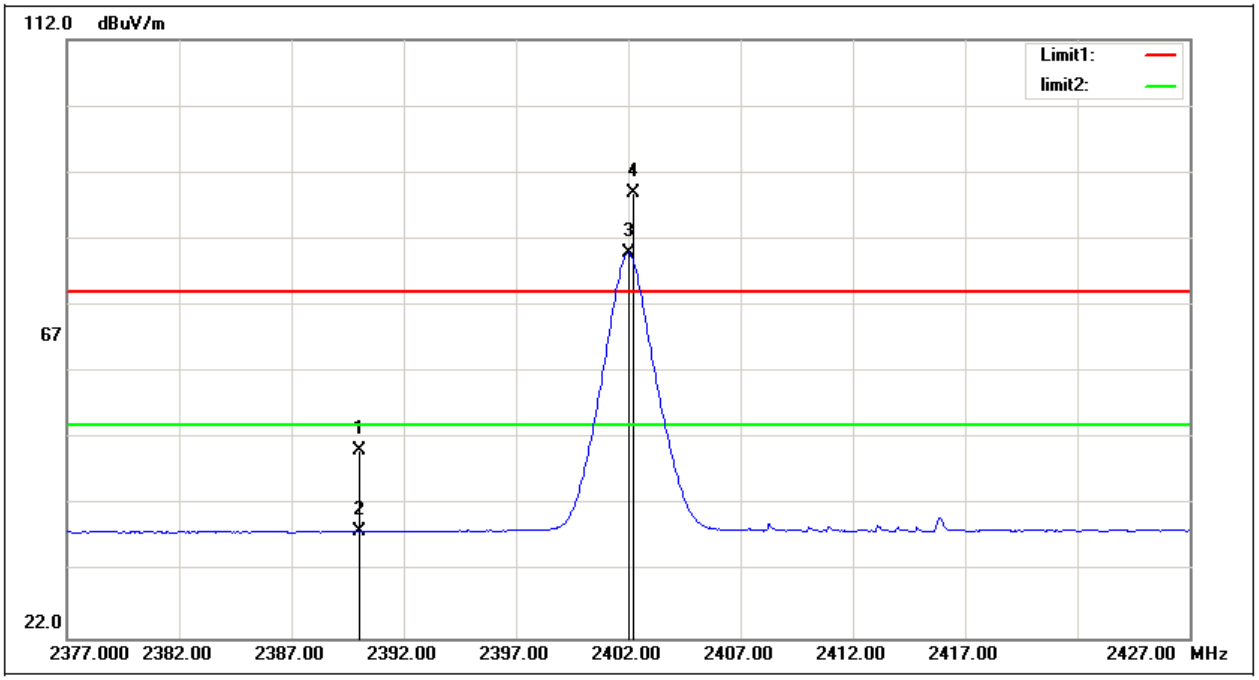


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	71.8320	44.80	-16.15	28.65	40.00	-11.35	QP
2	119.8556	37.64	-13.89	23.75	43.50	-19.75	QP
3	167.8243	36.85	-10.91	25.94	43.50	-17.56	QP
4	191.7450	36.02	-9.49	26.53	43.50	-16.97	QP
5	216.0240	39.83	-9.38	30.45	46.00	-15.55	QP
6	252.0627	37.77	-6.03	31.74	46.00	-14.26	QP

5.8 TEST RESULT- ABOVE 1000MHz(BAND EDGE)

Test Mode:	TX 2402 MHz_CH00_1Mbps

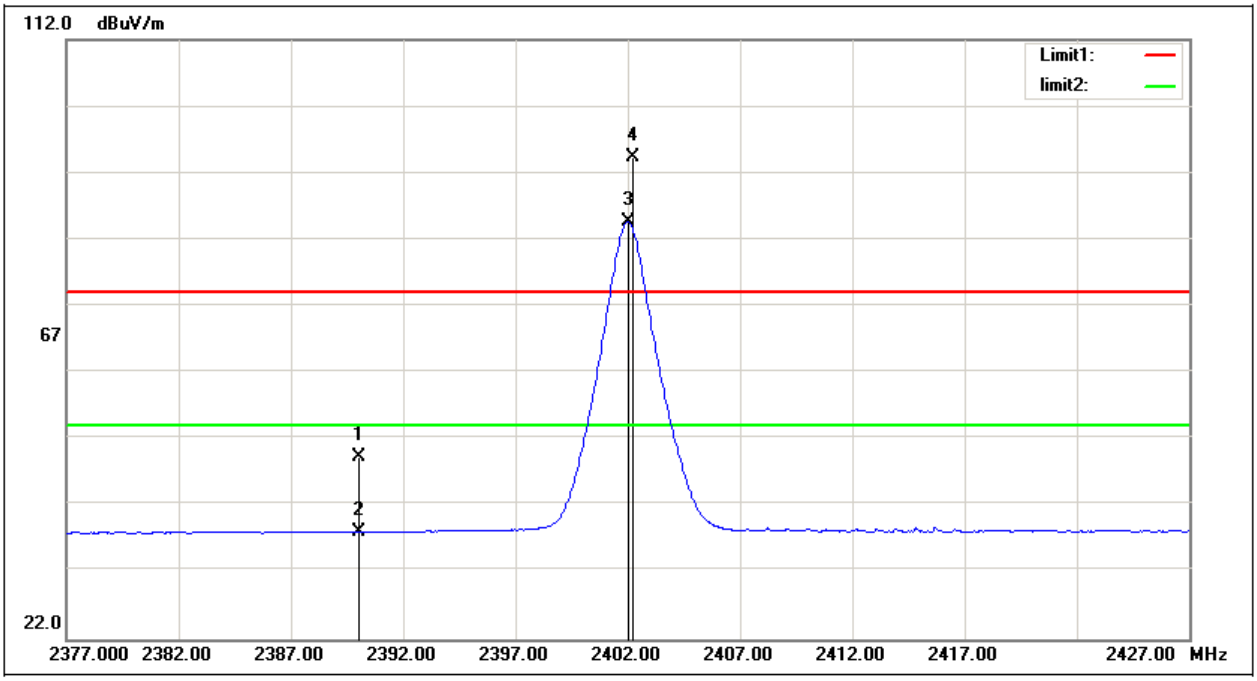
Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	22.11	28.19	50.30	74.00	-23.70	peak
2	2390.000	9.88	28.19	38.07	54.00	-15.93	AVG
3	2402.000	51.68	28.23	79.91	/	/	AVG
4	2402.250	60.61	28.23	88.84	/	/	peak

Test Mode:	TX 2402 MHz_CH00_1Mbps

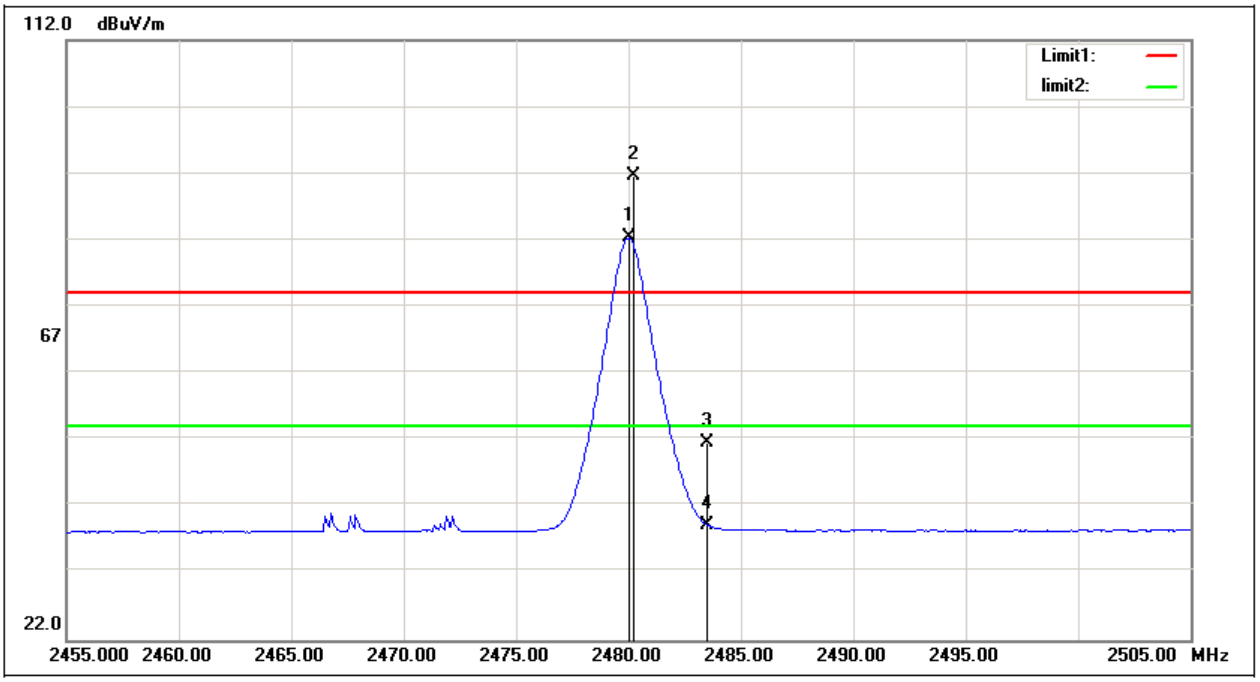
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	21.13	28.19	49.32	74.00	-24.68	peak
2	2390.000	9.83	28.19	38.02	54.00	-15.98	AVG
3	2402.000	56.43	28.23	84.66	/	/	AVG
4	2402.250	66.22	28.23	94.45	/	/	peak

Test Mode:	TX 2480 MHz_CH39_1Mbps

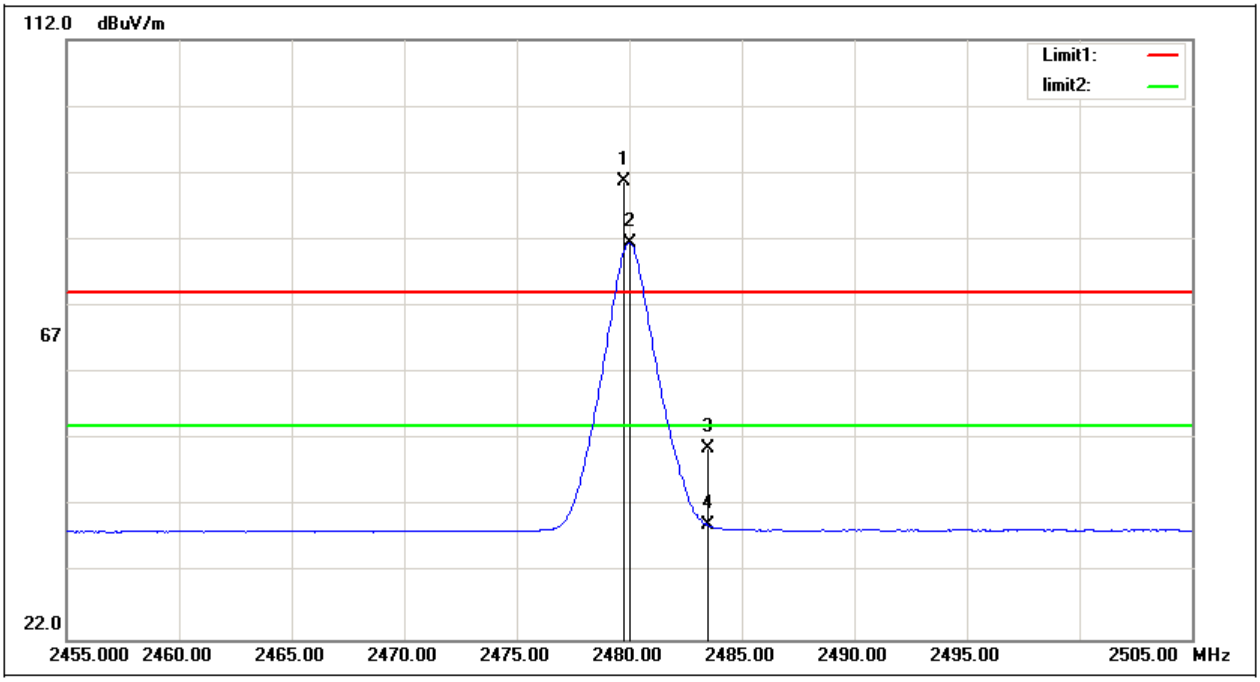
Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	53.91	28.42	82.33	/	/	AVG
2	2480.250	63.12	28.42	91.54	/	/	peak
3	2483.500	23.21	28.43	51.64	74.00	-22.36	peak
4	2483.500	10.88	28.43	39.31	54.00	-14.69	AVG

Test Mode:	TX 2480 MHz_CH39_1Mbps

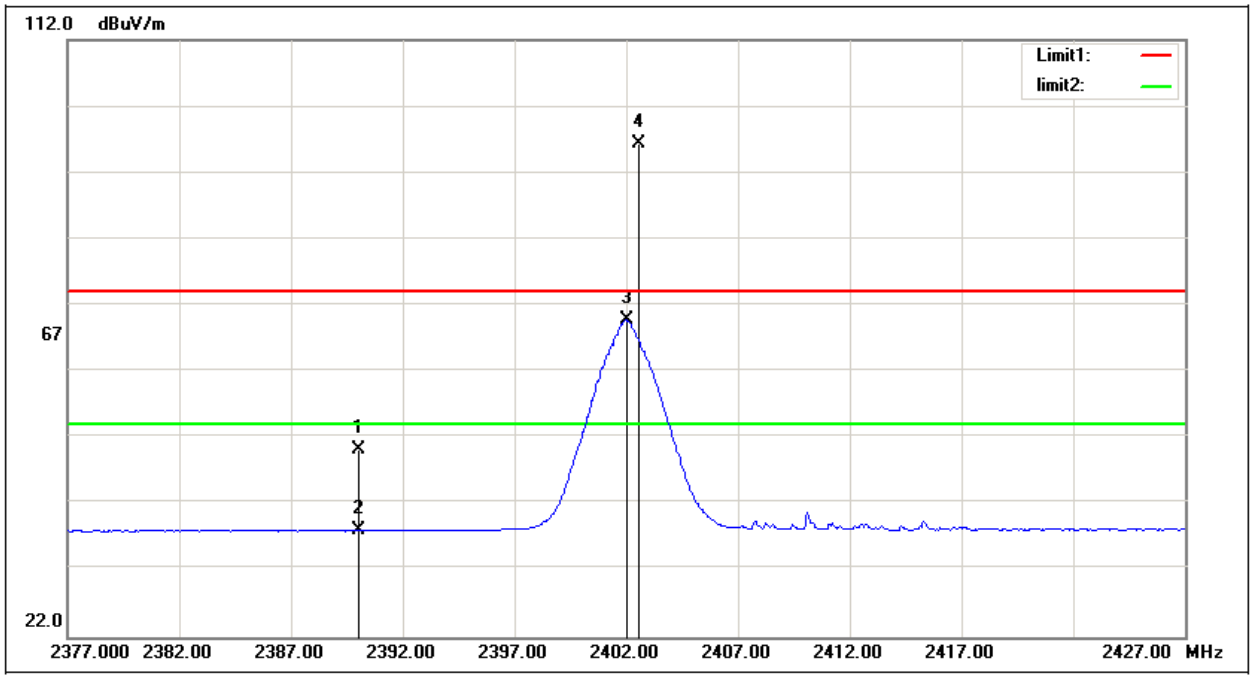
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2479.750	62.33	28.42	90.75	/	/	peak
2	2480.000	53.11	28.42	81.53	/	/	AVG
3	2483.500	22.21	28.43	50.64	74.00	-23.36	peak
4	2483.500	10.71	28.43	39.14	54.00	-14.86	AVG

Test Mode:	TX 2402 MHz_CH00_2Mbps

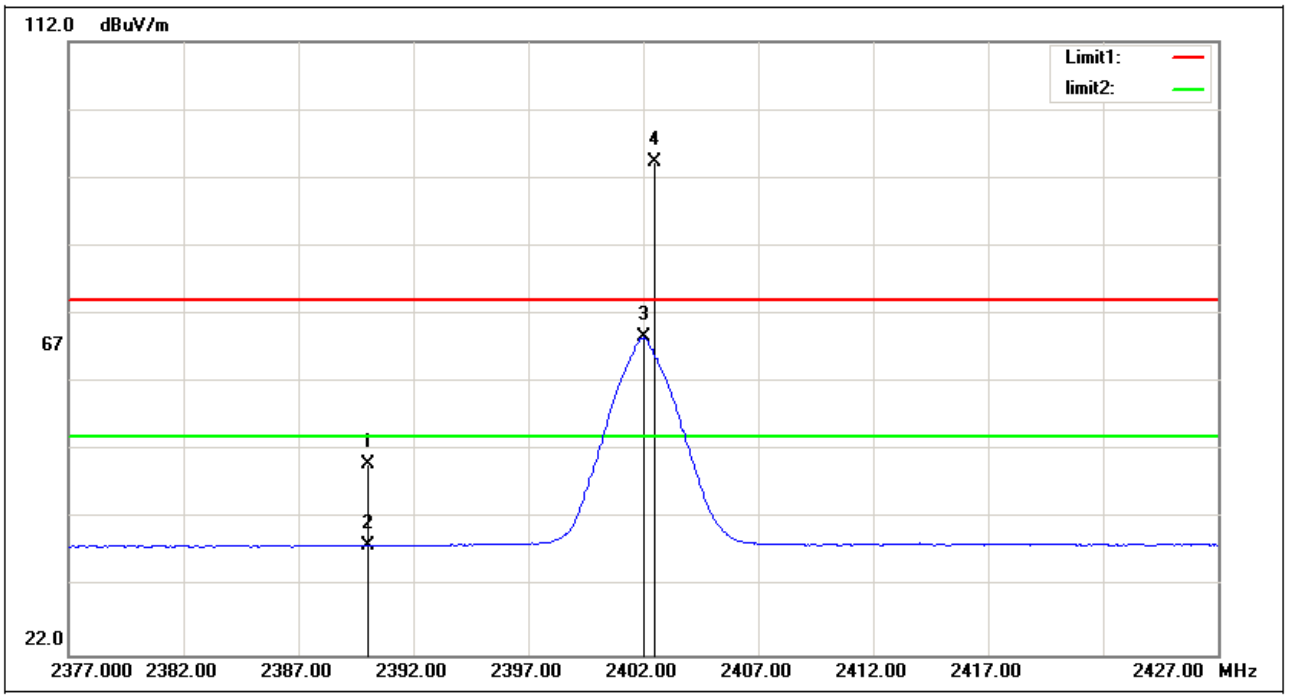
Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	21.96	28.19	50.15	74.00	-23.85	peak
2	2390.000	9.81	28.19	38.00	54.00	-16.00	AVG
3	2402.000	41.51	28.23	69.74	/	/	AVG
4	2402.550	68.17	28.23	96.40	/	/	peak

Test Mode:	TX 2402 MHz_CH00_2Mbps

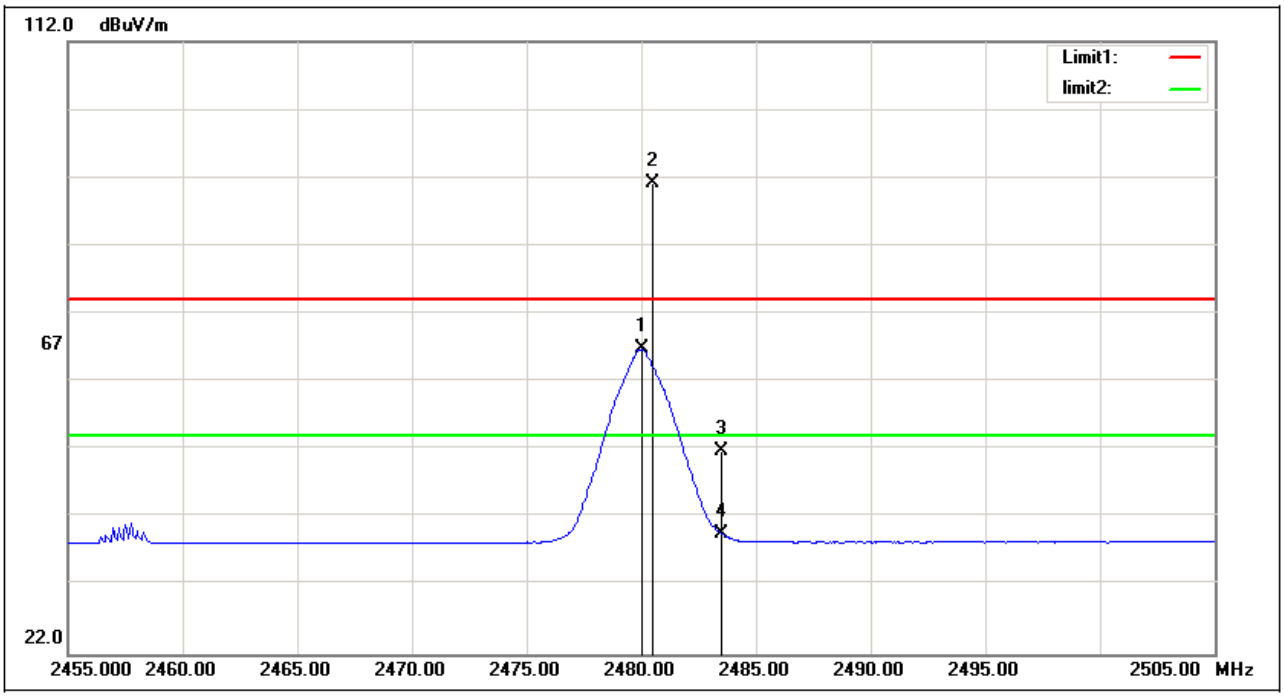
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2390.000	21.92	28.19	50.11	74.00	-23.89	peak
2	2390.000	9.88	28.19	38.07	54.00	-15.93	AVG
3	2402.000	40.37	28.23	68.60	/	/	AVG
4	2402.500	66.15	28.23	94.38	/	/	peak

Test Mode:	TX 2480 MHz_CH39_2Mbps

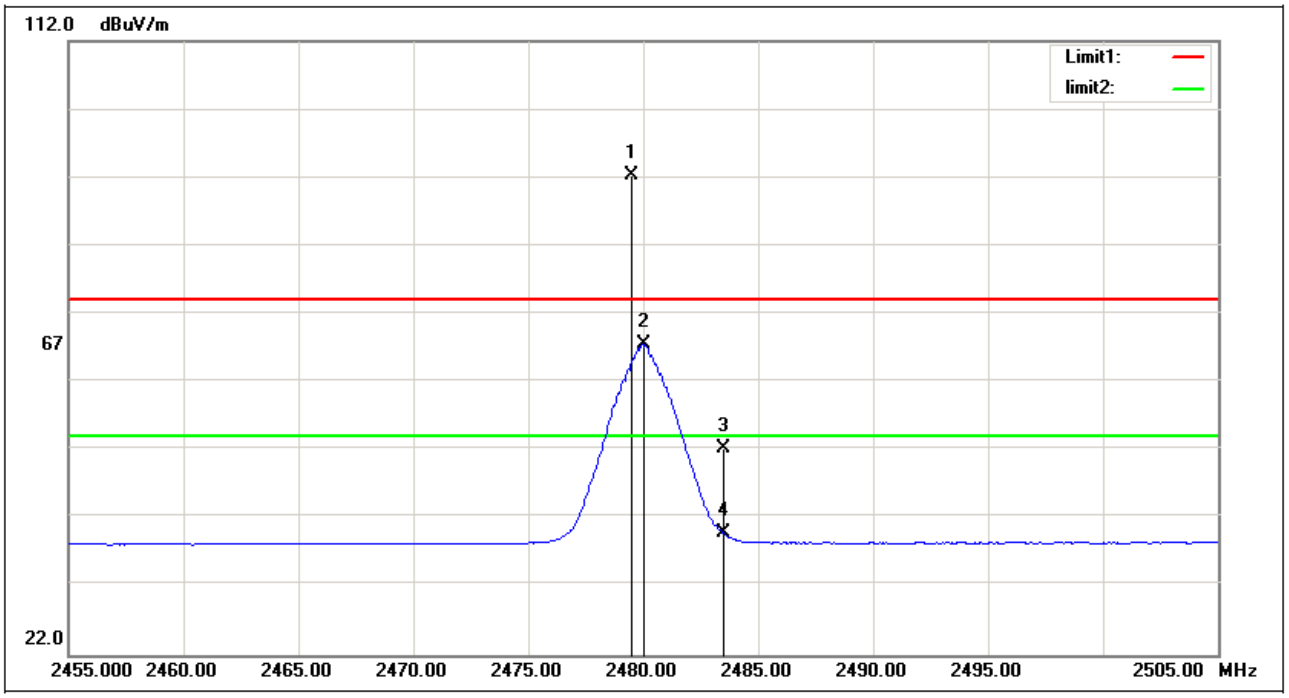
Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2480.000	38.37	28.42	66.79	/	/	AVG
2	2480.500	62.69	28.43	91.12	/	/	peak
3	2483.500	23.37	28.43	51.80	74.00	-22.20	peak
4	2483.500	11.24	28.43	39.67	54.00	-14.33	AVG

Test Mode:	TX 2480 MHz_CH39_2Mbps

Horizontal

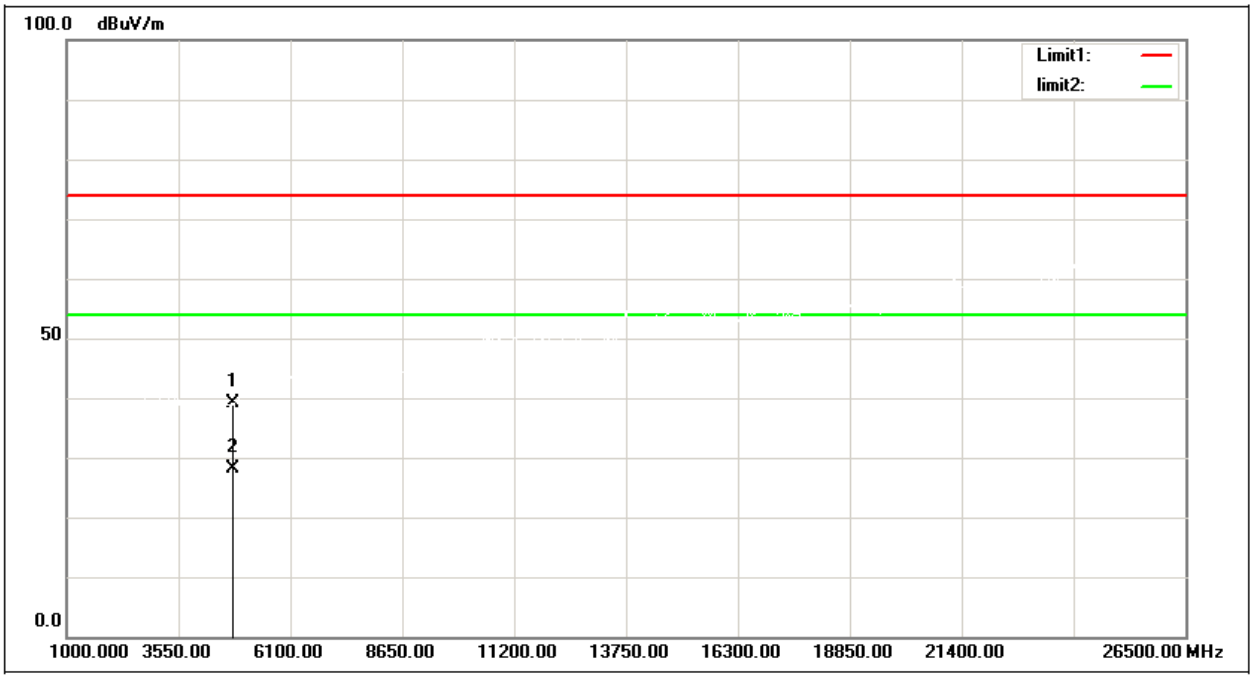


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2479.500	63.79	28.42	92.21	/	/	peak
2	2480.000	39.10	28.42	67.52	/	/	AVG
3	2483.500	23.88	28.43	52.31	74.00	-21.69	peak
4	2483.500	11.39	28.43	39.82	54.00	-14.18	AVG

5.9TEST RESULTS - ABOVE 1000MHz(HARMONIC)

Test Mode:	TX 2402 MHz_CH00_1Mbps

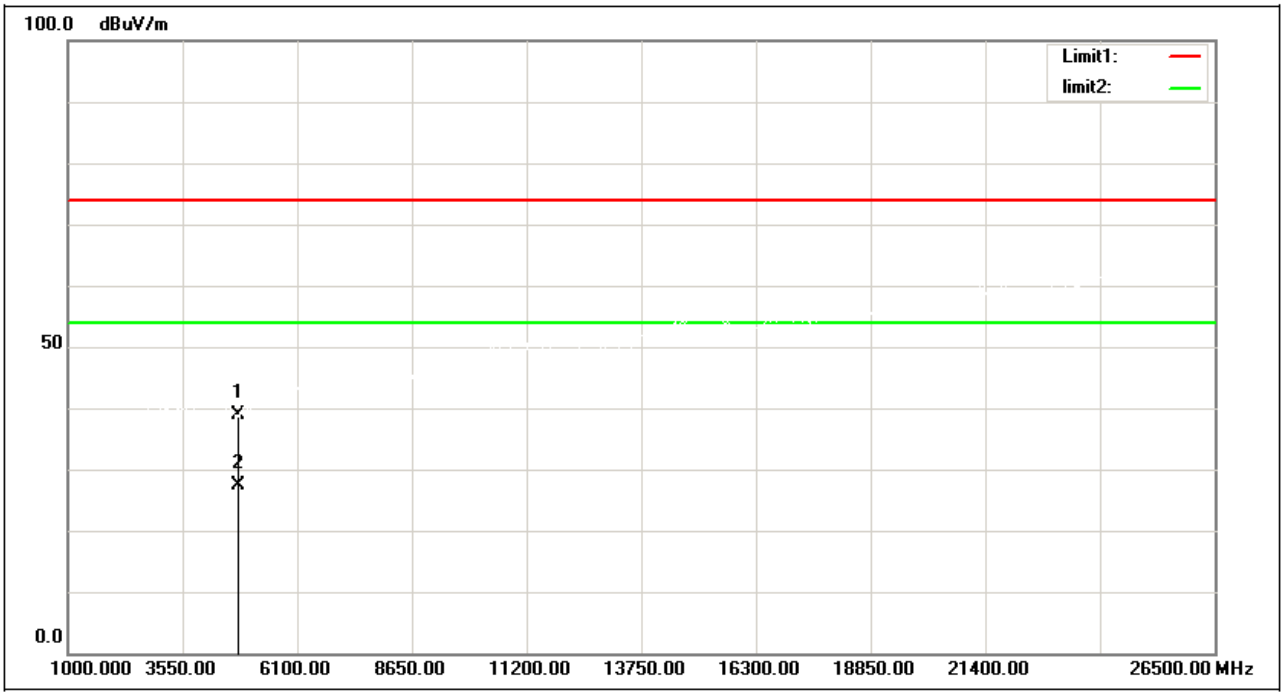
Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	48.34	-9.26	39.08	74.00	-34.92	peak
2	4804.000	37.38	-9.26	28.12	54.00	-25.88	AVG

Test Mode:	TX 2402 MHz_CH00_1Mbps

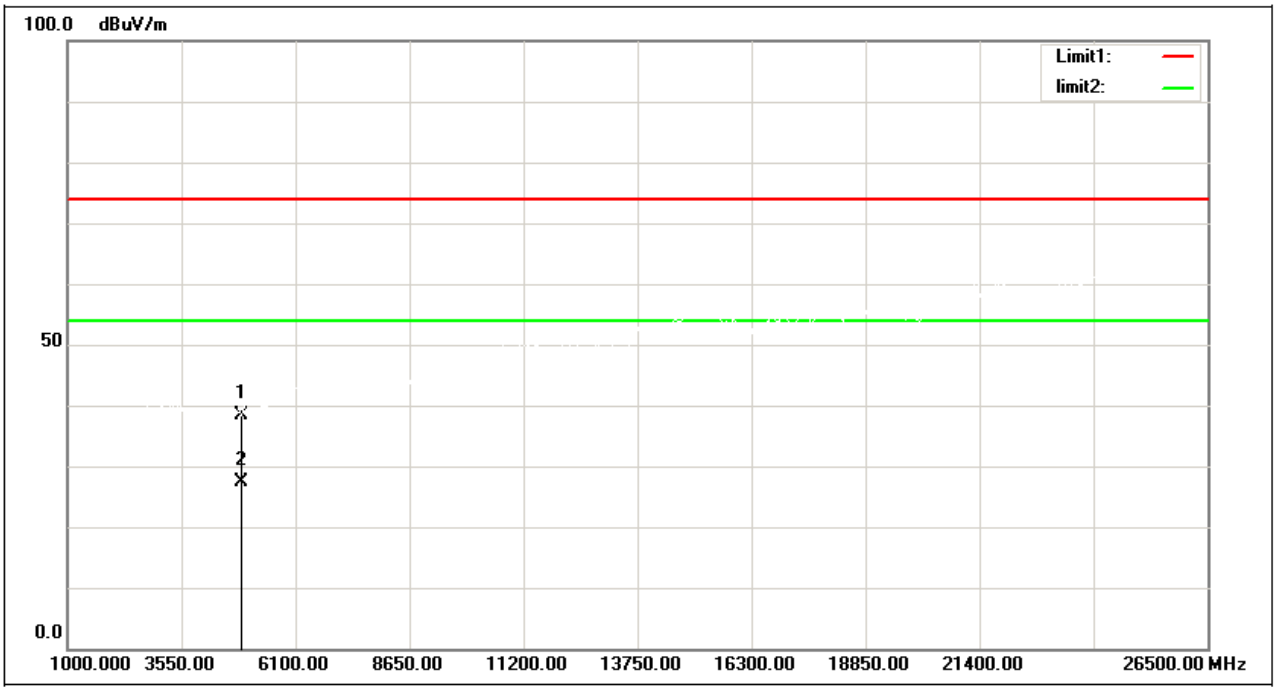
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	48.11	-9.26	38.85	74.00	-35.15	peak
2	4804.000	36.52	-9.26	27.26	54.00	-26.74	AVG

Test Mode:	TX 2440 MHz_CH19_1Mbps

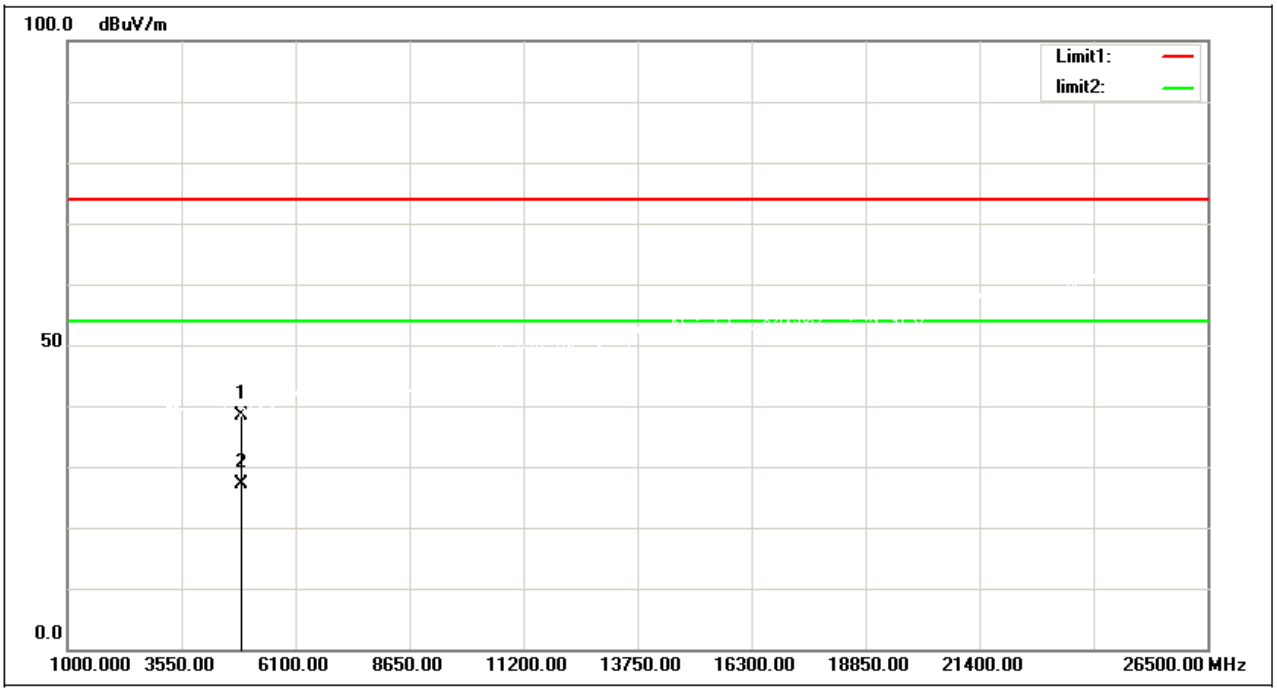
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4880.000	47.50	-9.02	38.48	74.00	-35.52	peak
2	4880.000	36.38	-9.02	27.36	54.00	-26.64	AVG

Test Mode:	TX 2440 MHz_CH19_1Mbps

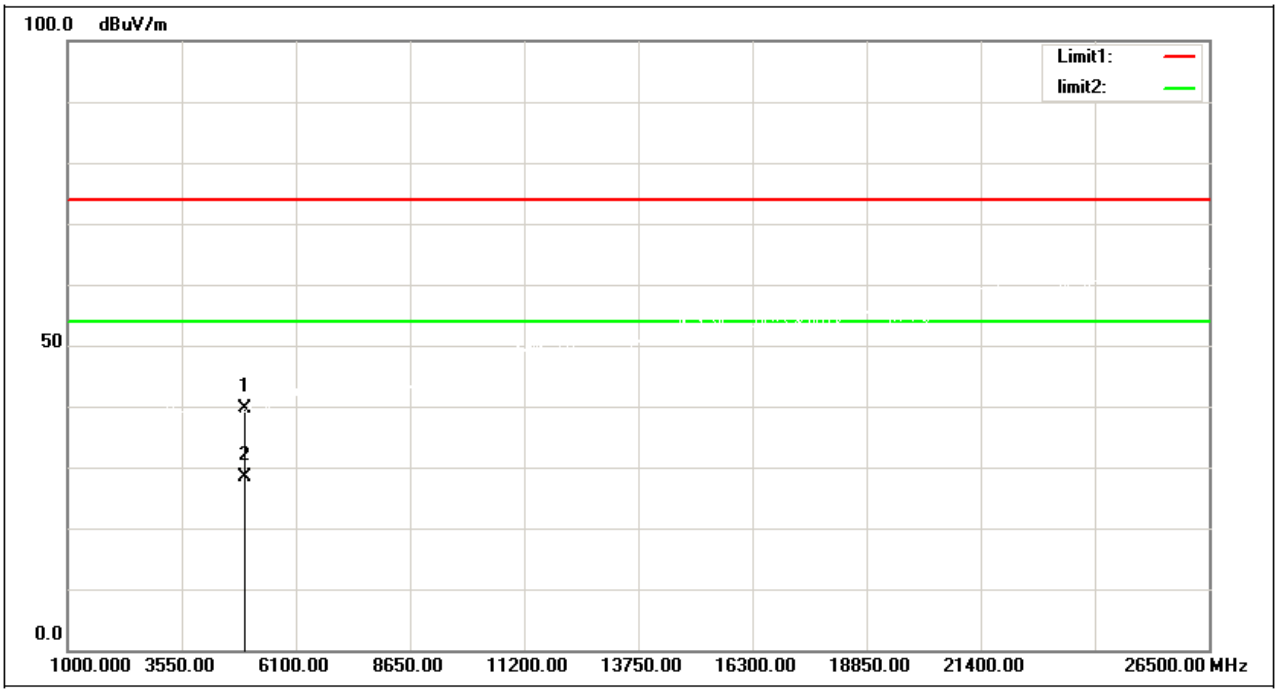
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4880.000	47.48	-9.02	38.46	74.00	-35.54	peak
2	4880.000	36.23	-9.02	27.21	54.00	-26.79	AVG

Test Mode:	TX 2480 MHz_CH39_1Mbps

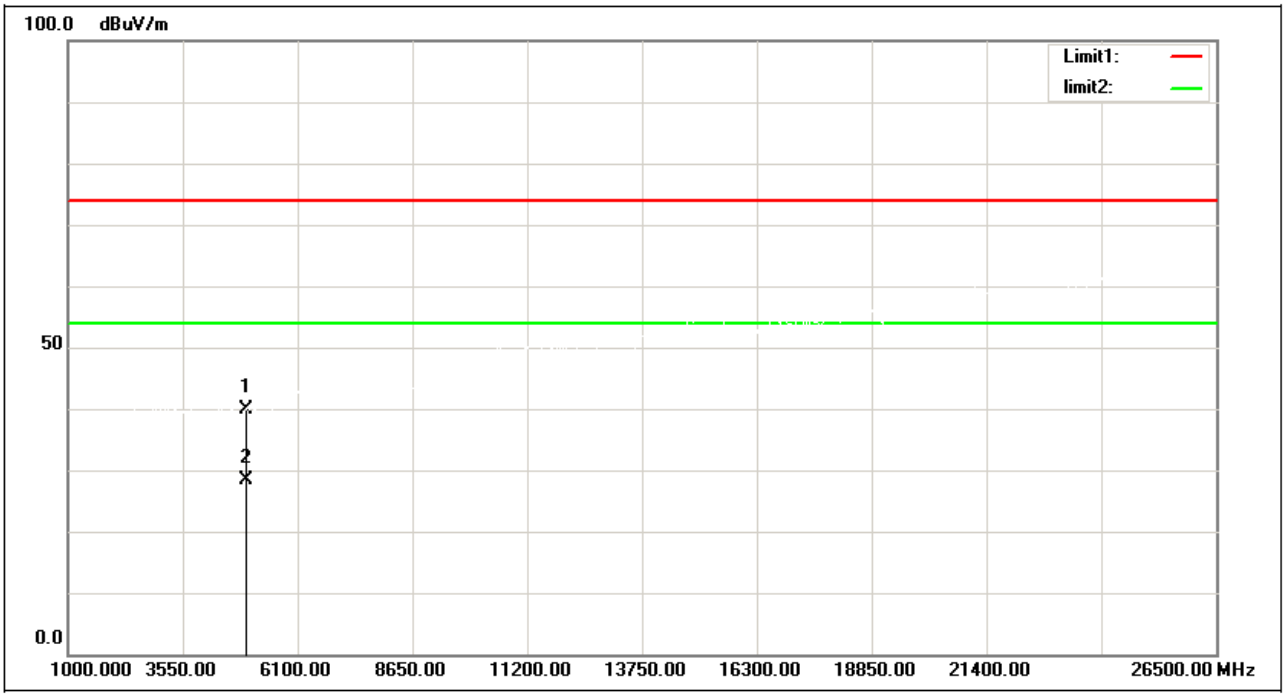
Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	48.31	-8.79	39.52	74.00	-34.48	peak
2	4960.000	37.05	-8.79	28.26	54.00	-25.74	AVG

Test Mode:	TX 2480 MHz_CH39_1Mbps

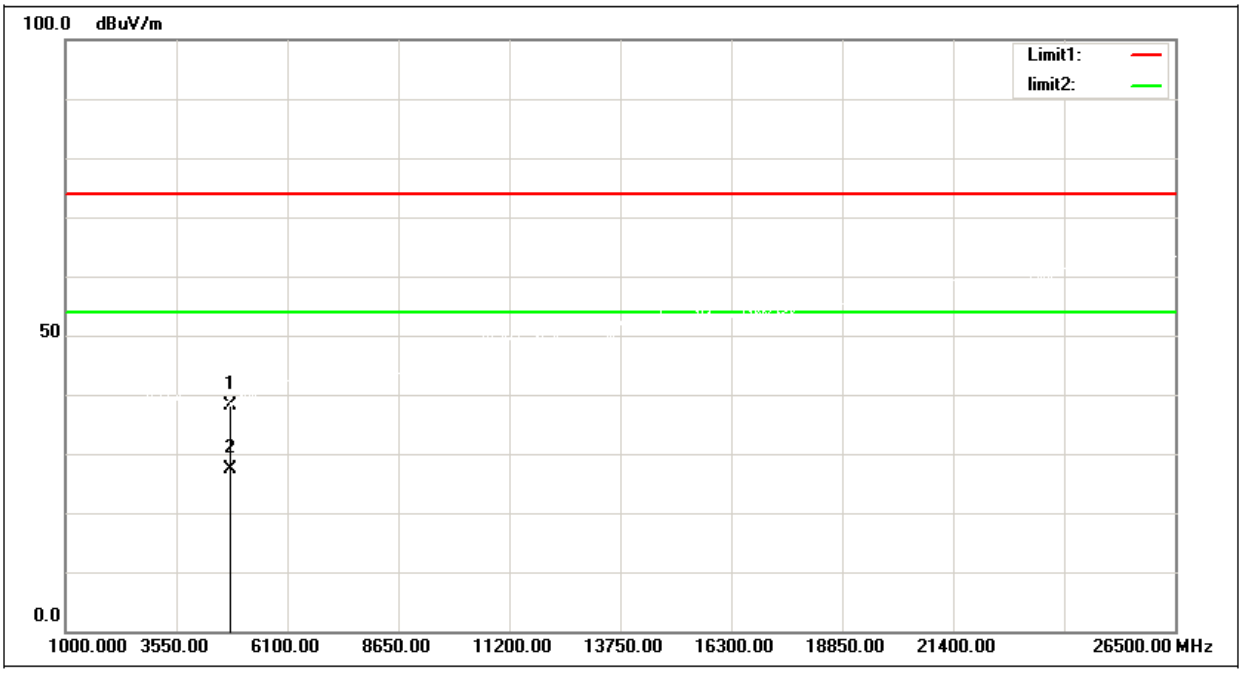
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	48.61	-8.79	39.82	74.00	-34.18	peak
2	4960.000	37.24	-8.79	28.45	54.00	-25.55	AVG

Test Mode:	TX 2402 MHz_CH00_2Mbps

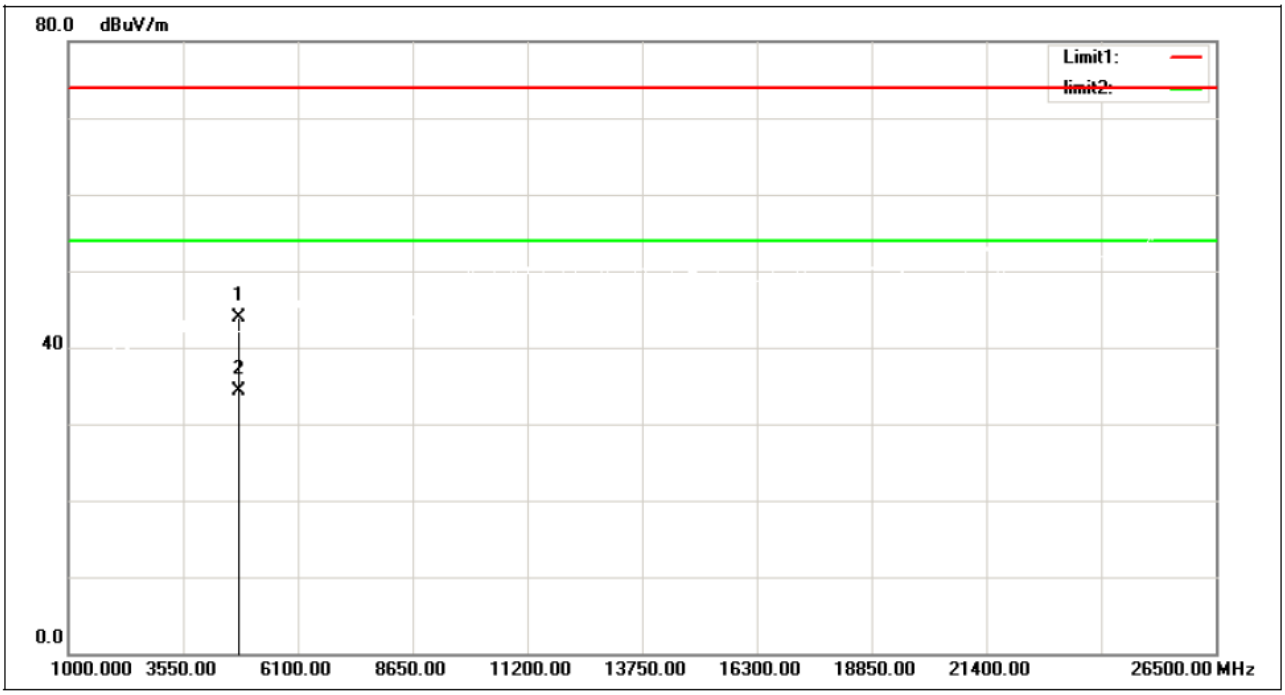
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4804.000	47.36	-9.26	38.10	74.00	-35.90	peak
2	4804.000	36.52	-9.26	27.26	54.00	-26.74	AVG

Test Mode:	TX 2402 MHz_CH00_2Mbps

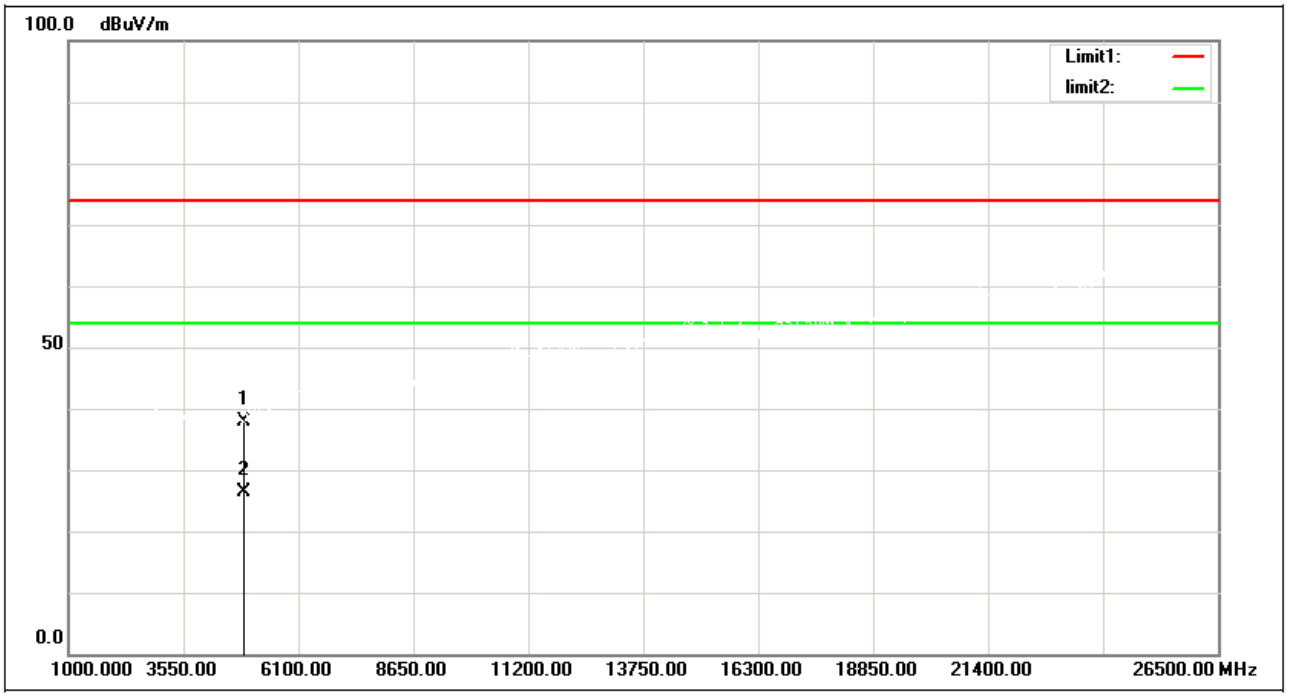
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804.000	51.43	-7.53	43.90	74.00	-30.10	peak
2	4804.000	41.79	-7.53	34.26	54.00	-19.74	AVG

Test Mode:	TX 2440 MHz_CH19_2Mbps

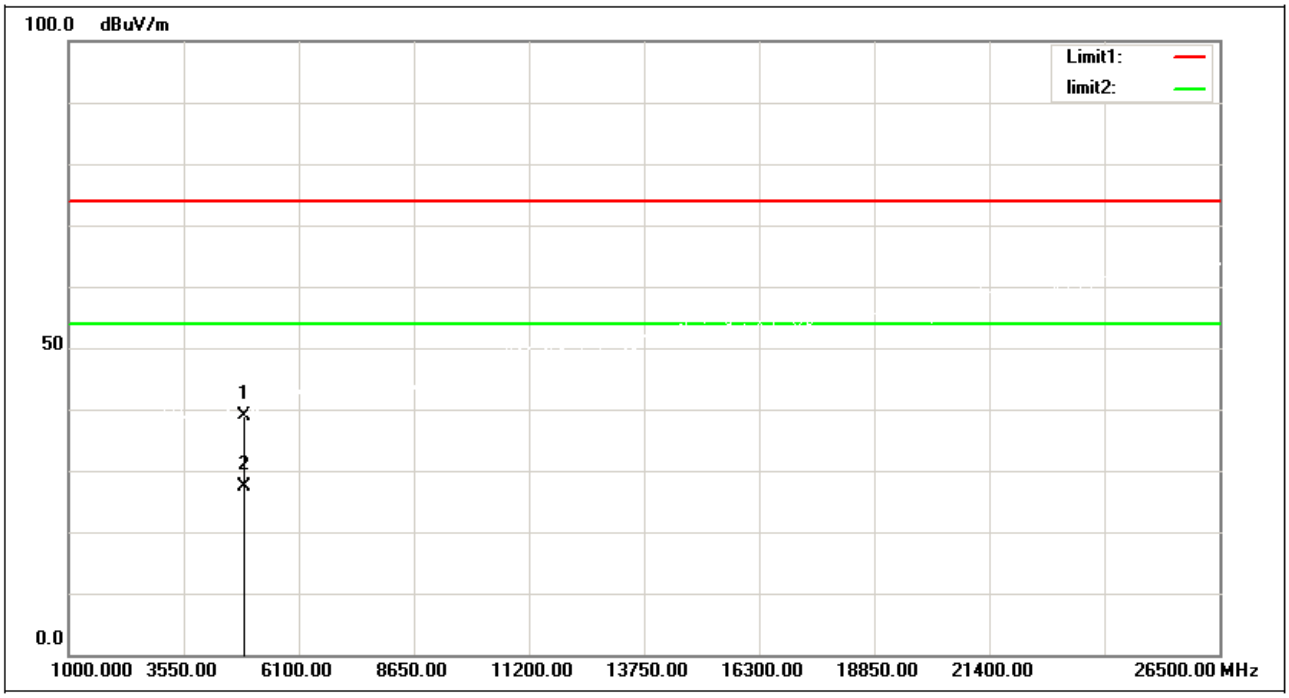
Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4880.000	46.98	-9.02	37.96	74.00	-36.04	peak
2	4880.000	35.38	-9.02	26.36	54.00	-27.64	AVG

Test Mode:	TX 2440 MHz_CH19_2Mbps

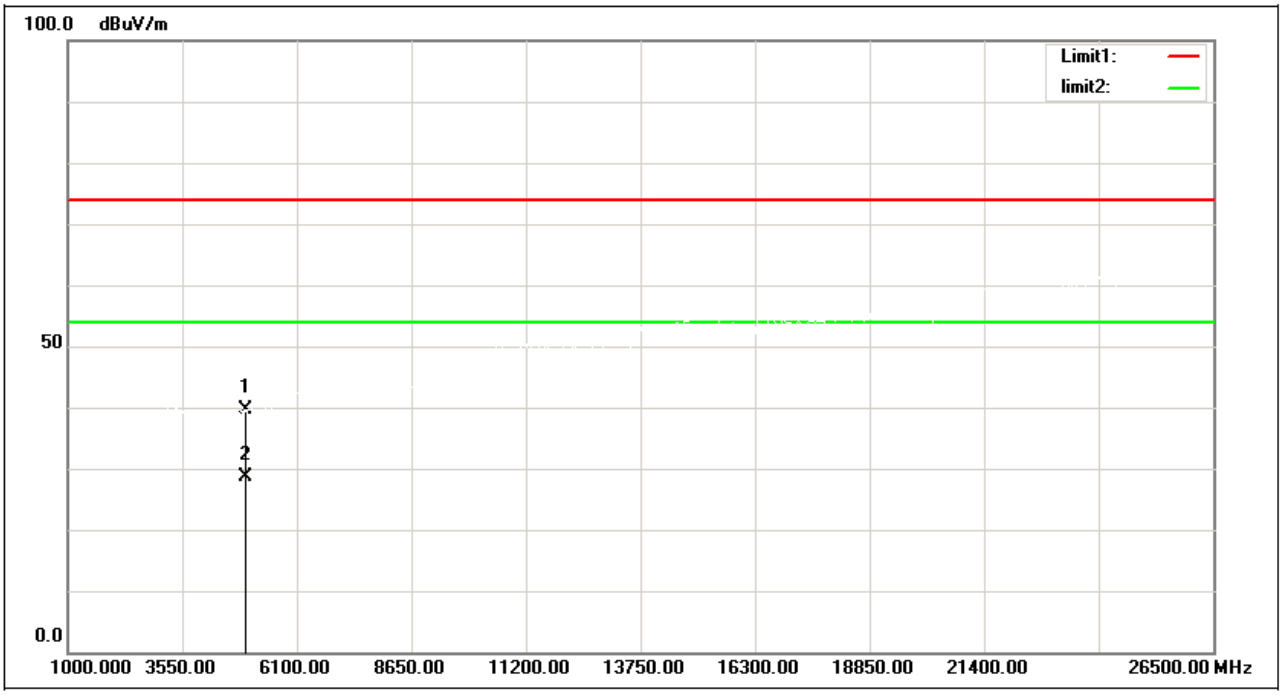
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4880.000	48.01	-9.02	38.99	74.00	-35.01	peak
2	4880.000	36.28	-9.02	27.26	54.00	-26.74	AVG

Test Mode:	TX 2480 MHz_CH39_2Mbps

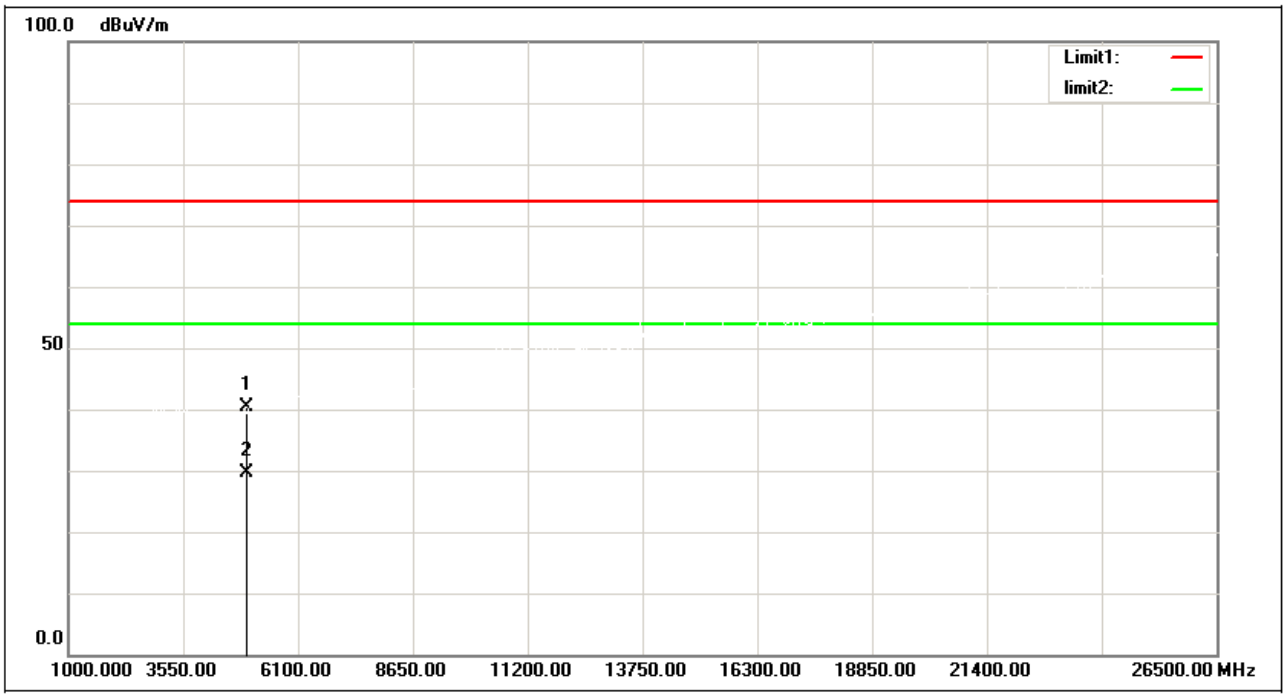
Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	48.42	-8.79	39.63	74.00	-34.37	peak
2	4960.000	37.35	-8.79	28.56	54.00	-25.44	AVG

Test Mode:	TX 2480 MHz_CH39_2Mbps

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960.000	49.06	-8.79	40.27	74.00	-33.73	peak
2	4960.000	38.35	-8.79	29.56	54.00	-24.44	AVG

6BANDWIDTH TEST

6.1LIMIT

FCC Part15, Subpart C (15.247)& RSS-Gen/ RSS-247		
Section	Test Item	Limit
15.247(a)(2) RSS-Gen6.7 RSS-247 5.2 (a)	Bandwidth	>= 500 kHz (6dB bandwidth)

6.2TEST PROCEDURE AND SETTING

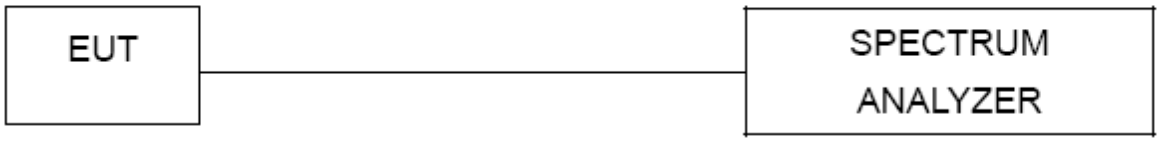
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting:
For 6dB Bandwidth RBW= 100 kHz, VBW=300 kHz, Sweep time =Auto.
For 99% Bandwidth RBW=30kHz, VBW=100kHz, Sweep time =Auto for 1Mbps.
RBW=100kHz, VBW=300kHz, Sweep time =Auto for 2Mbps.

6.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2022/05/28
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

6.4TEST SETUP



6.5EUT OPERATION CONDITIONS

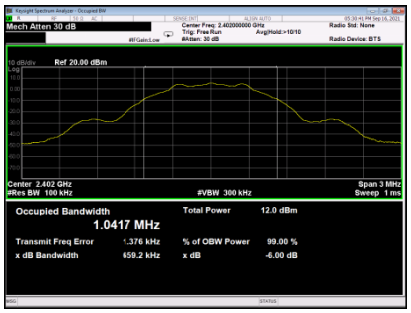
The EUT tested system was configured as the statements of 4.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.6TESTRESULTS

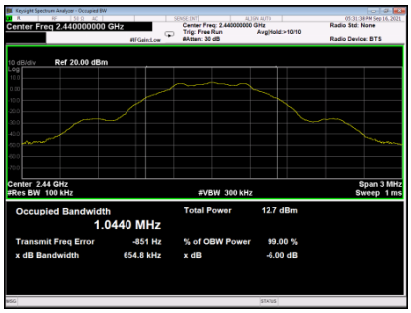
TX Mode_1Mbps				
Channel	Frequency (MHz)	6 dB bandwidth (MHz)	99%OBW (MHz)	Result
CH00	2402	0.6592	1.0379	PASS
CH19	2440	0.6548	1.0469	PASS
CH39	2480	0.6614	1.0520	PASS

6dB

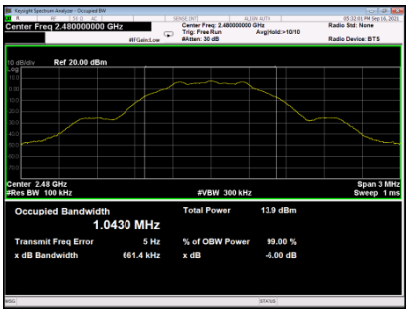
2402MHz



2440MHz

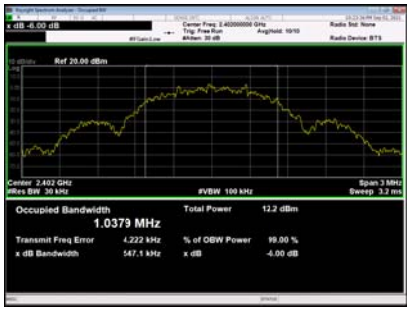


2480MHz



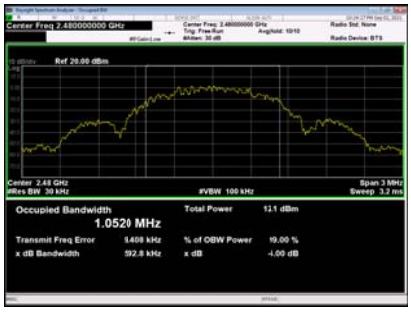
99%

2402MHz



2440MHz

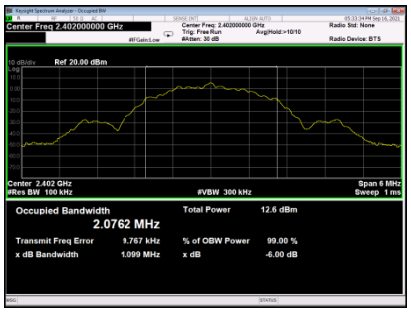
2480MHz



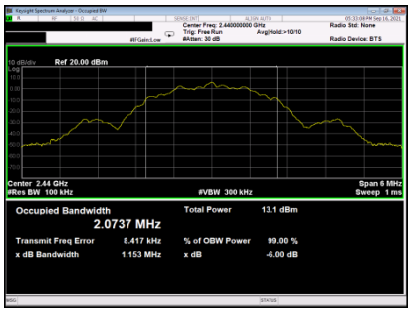
TX Mode_2Mbps				
Channel	Frequency (MHz)	6 dB bandwidth (MHz)	99%OBW (MHz)	Result
CH00	2402	1.009	2.0761	PASS
CH19	2440	1.153	2.1106	PASS
CH39	2480	1.152	2.1101	PASS

6dB

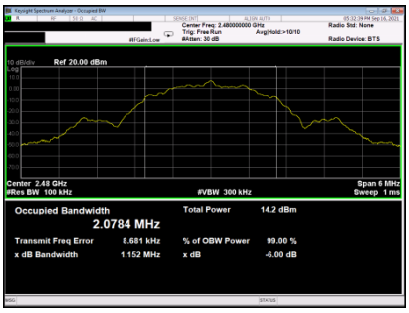
2402MHz



2440MHz

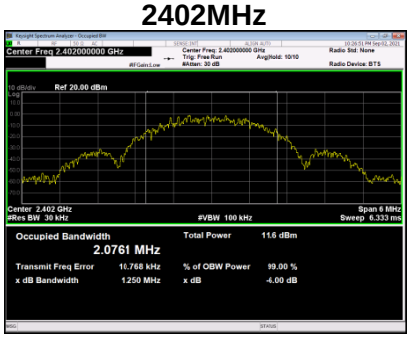


2480MHz

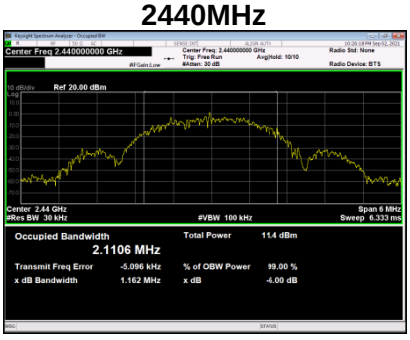


99%

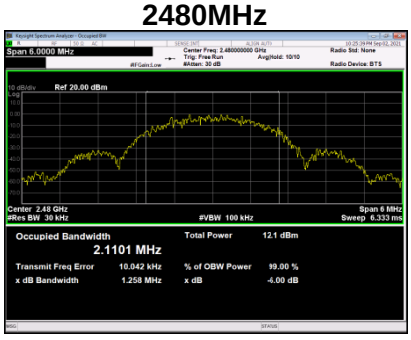
2402MHz



2440MHz



2480MHz



7MAXIMUM OUTPUT POWER

7.1LIMIT

FCC Part15, Subpart C (15.247)&RSS-247		
Section	Test Item	Limit
15.247(b)(3) RSS-2475.4 (d)	Maximum Output Power	1 watt or 30dBm

7.2TEST PROCEDURE

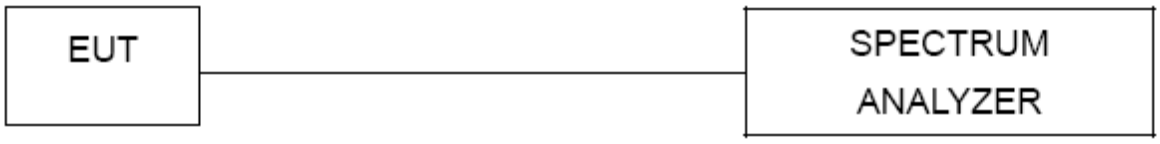
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. The maximum conducted output power was performed in accordance with method 11.9.1.3(for peak power)ofANSI C63.10-2013.

7.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2022/05/28
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

7.4TEST SETUP



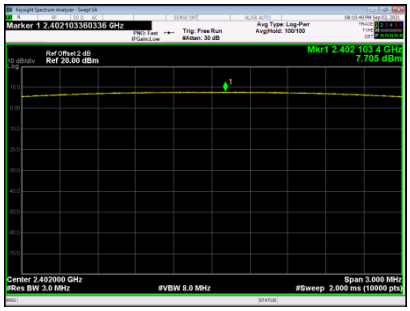
7.5EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.5 unless otherwise a special operating condition is specified in the follows during the testing.

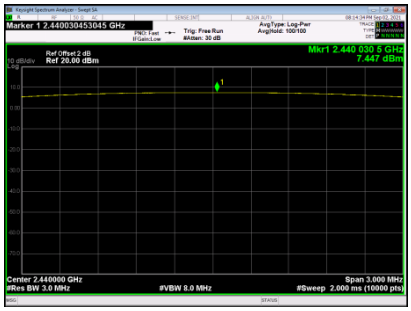
7.6TESTRESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
CH00	2402	7.705	0.005895	PASS
CH19	2440	7.447	0.005555	PASS
CH39	2480	7.806	0.006034	PASS
Limit				

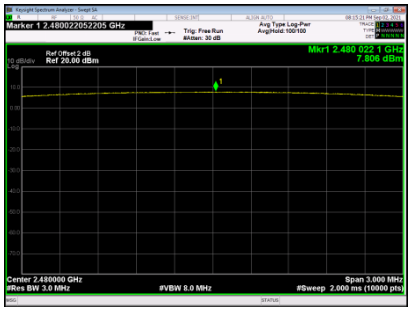
2402MHz



2440MHz

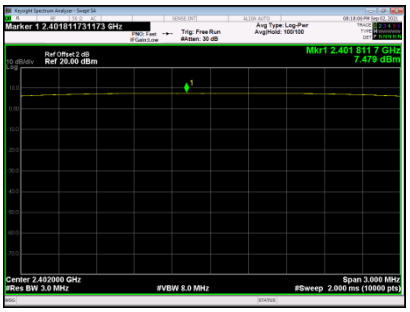


2480MHz

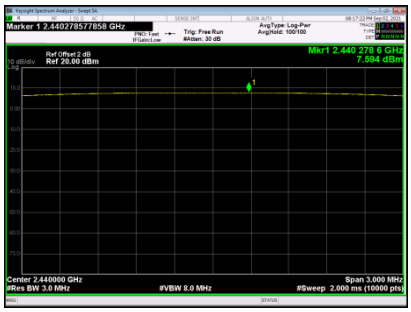


TX Mode_2Mbps				
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
CH00	2402	7.479	0.005596	PASS
CH19	2440	7.594	0.005746	PASS
CH39	2480	7.894	0.006157	PASS
Limit	30dBm / 1W			

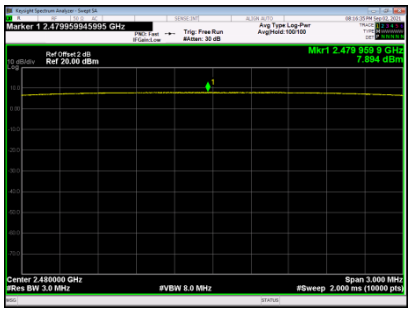
2402MHz



2440MHz



2480MHz



8CONDUCTED SPURIOUS EMISSION

8.1LIMIT

For FCC

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 Output Power limits. If the transmitter complies with the Output 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 Section 15.209(a) is not required.

For ISED

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

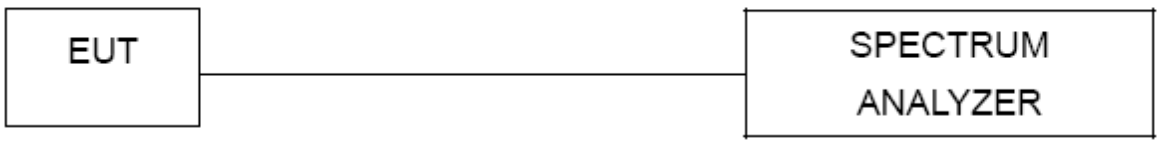
8.2TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting : RBW= 100 kHz, VBW=300 kHz, Sweep time = Auto.

8.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2022/05/28
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

8.4TEST SETUP



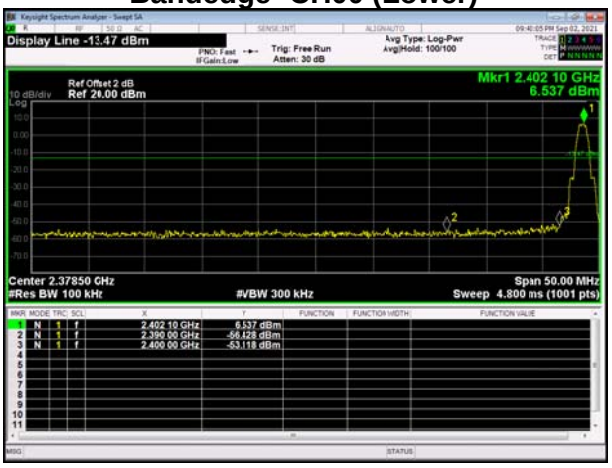
8.5EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.5unless otherwise a special operating condition is specified in the follows during the testing.

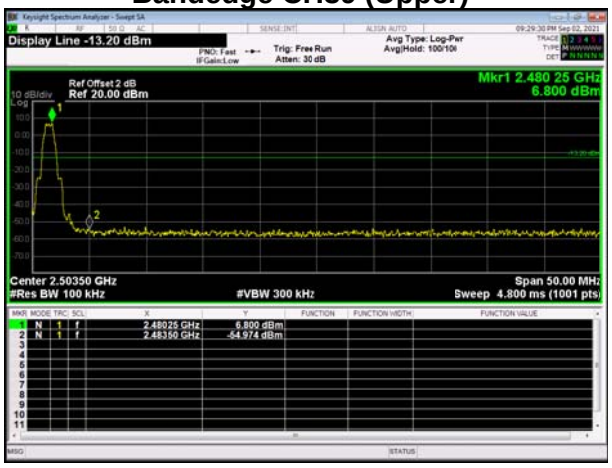
8.6 TEST RESULTS

TX Mode_1Mbps

Bandedge- CH00 (Lower)

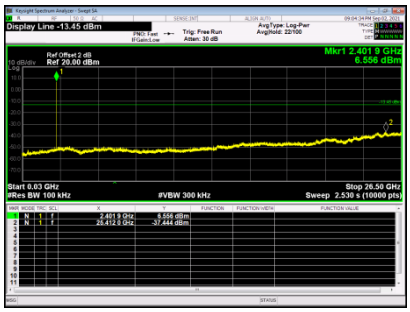


Bandedge CH39 (Upper)

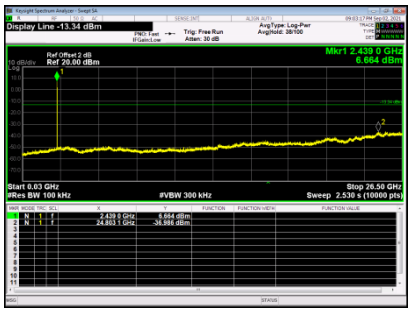


CH00 – 10th Harmonic of the fundamental frequency

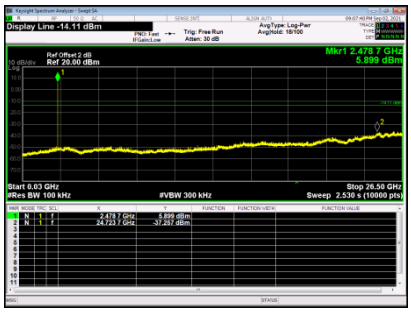
2402MHz



2440MHz

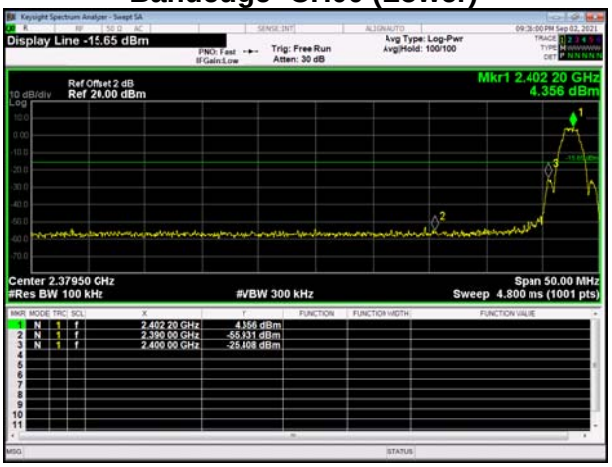


2480MHz

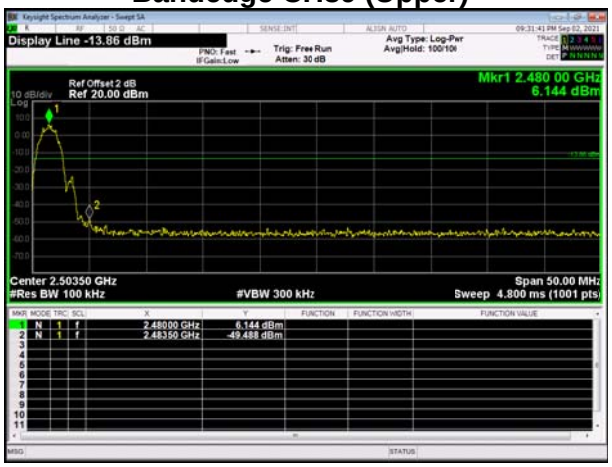


TX Mode_2Mbps

Bandedge- CH00 (Lower)

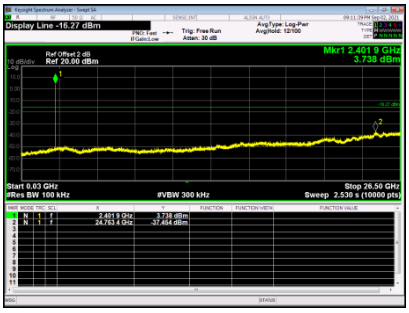


Bandedge CH39 (Upper)

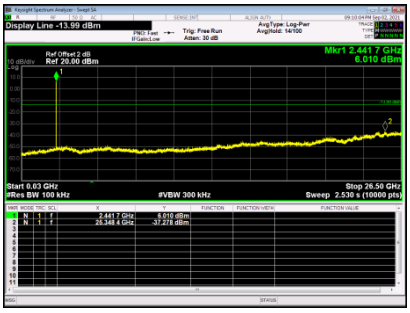


CH00 – 10th Harmonic of the fundamental frequency

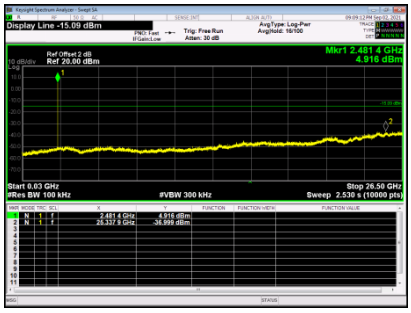
2402MHz



2440MHz



2480MHz



9POWER SPECTRAL DENSITY TEST

9.1LIMIT

FCC Part15, Subpart C (15.247)&RSS-247		
Section	Test Item	Limit
15.247(e) RSS-2475.2 (b)	Power Spectral Density	8 dBm (in any 3 kHz)

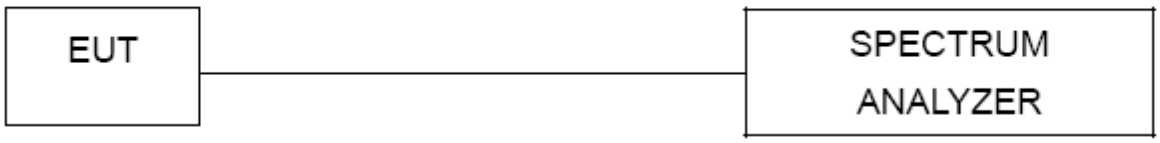
9.2TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Spectrum Setting: RBW=3 kHz, VBW=10kHz, Sweep time = auto.

9.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2022/05/28
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

9.4TEST SETUP



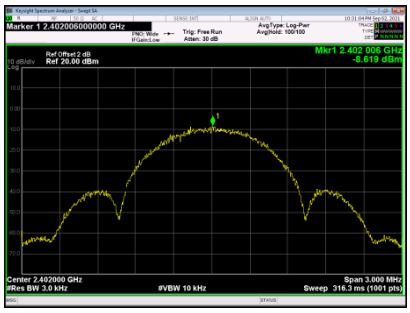
9.5EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

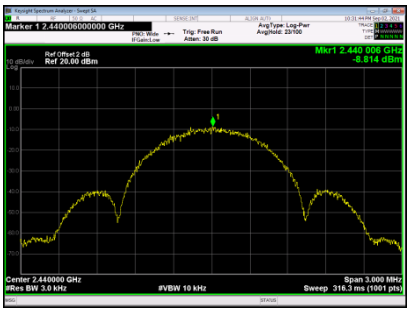
9.6 TEST RESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	Power SpectralDensity (dBm/3 kHz)	Limit: <dBm/3KHz	Result
CH00	2402	-8.619	8	PASS
CH19	2440	-8.814	8	PASS
CH39	2480	-8.638	8	PASS

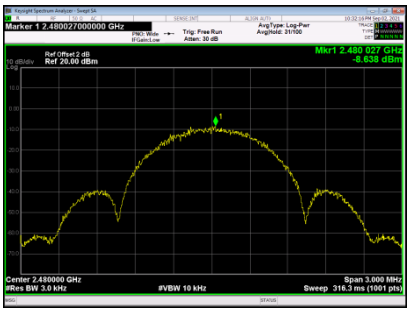
CH00



CH19

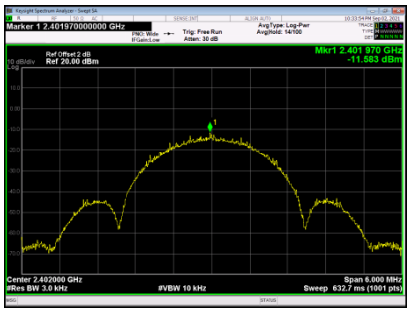


CH39

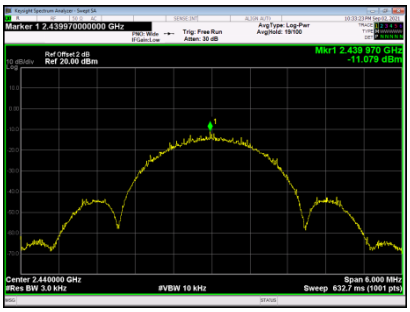


TX Mode_2Mbps				
Channel	Frequency (MHz)	Power SpectralDensity (dBm/3 kHz)	Limit: <dBm/3KHz	Result
CH00	2402	-11.583	8	PASS
CH19	2440	-11.079	8	PASS
CH39	2480	-10.781	8	PASS

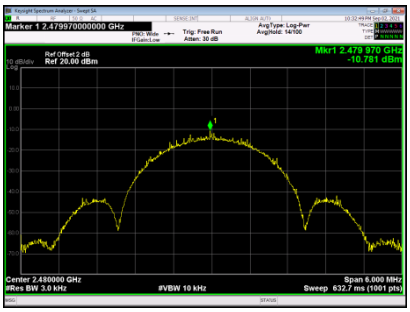
CH00



CH19



CH39



10FREQUENCY STABILITY MEASUREMENT

10.1LIMIT

RSS-Gen			
Section	Test Item	Limit	Frequency Range (MHz)
RSS-Gen 6.11	Frequency Stability	Specified in the user's manual	2402-2480

10.2TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

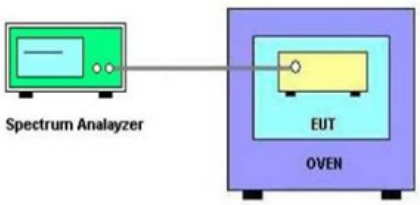
b. Spectrum Setting:

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulationemissionsbandwidth
RBW	10 kHz
VBW	10kHz
Sweep Time	Auto

10.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2022/05/28
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A
4	Temperature conditioning	Guan Jian.HTH1000	-20-130℃	GJ1000-10D001	N/A
5	DC Power Supply	G.KE	IPR-10010D	010931954	N/A

10.4TEST SETUP



10.5EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

10.6 TEST RESULTS

	Temperature vs. Frequency Stability	
Voltage	Temperature	Measurement Frequency (MHz)
3.3V	(℃)	2402
	-20	2401.9934
	25	2401.9933
	50	2401.9937
2.2V	25	2401.9935
Max. Deviation (MHz)		-2.79
Max. Deviation (ppm)		-0.0067

Note: 2.2V is the end point voltage, and products below 2.2V will cease working.

END OF TEST REPORT