FCC Radio Test Report

FCC ID: 2BNU7-LEC-432DMX

The report concerns: Original Grant

Report Reference No.....:	25EFSS01044 03761
Date Sample(s) Received.....:	2025-02-14
Date of Tested.....:	From 2025-02-14 to 2025-02-28
Date of issue.....:	2025-03-01
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 .....:	Minar Illumination Electronic Ltd.
Address for .....:	Room 504, Building 3, Taohui Home Appliance Park, Sanle East Road 23, Shunjiang Community, Beijiao Town, Shunde District, Foshan City, Guangdong Province, China
Equipment.....:	LED Light Engine
Trade Mark .....:	/
Model .....:	LLE-001, LLE-002, LLE-003, LLE-004, LLE-005, LLE-006, LLE-007, LEA-501, LEA-501DMX, LEA-502, LEA-431DMX, LEB-431, LEB-431DMX, LEB-432, LEB-432DMX, LEC-431, LEC-431DMX, LEC-432, LEC-432DMX, LEE-1001DMX, LEF-502DMX, LEF-1002DMX, LEF-432DMX, LEG-501DMX, LEG-1001DMX, LET-2001DMX, LET-4061DMX, LEA-431
Ratings .....:	I/P: 12VDC (From power adapter)

Test Engineer: Jelena OuYang

Responsible Engineer : Leo Chen

Authorized Signatory: Smile Wang

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1. TEST REPORT DECLARE

Applicant	Minar Illumination Electronic Ltd.
Address	Room 504, Building 3, Taohui Home Appliance Park, Sanle East Road 23, Shunjiang Community, Beijiao Town, Shunde District, Foshan City, Guangdong Province, China
Manufacturer	Minar Illumination Electronic Ltd.
Address	Room 504, Building 3, Taohui Home Appliance Park, Sanle East Road 23, Shunjiang Community, Beijiao Town, Shunde District, Foshan City, Guangdong Province, China
Factory	Minar Illumination Electronic Ltd.
Address	Room 504, Building 3, Taohui Home Appliance Park, Sanle East Road 23, Shunjiang Community, Beijiao Town, Shunde District, Foshan City, Guangdong Province, China
Equipment	LED Light Engine
Model No.	LLE-001, LLE-002, LLE-003, LLE-004, LLE-005, LLE-006, LLE-007, LEA-501, LEA-501DMX, LEA-502, LEA-431DMX, LEB-431, LEB-431DMX, LEB-432, LEB-432DMX, LEC-431, LEC-431DMX, LEC-432, LEC-432DMX, LEE-1001DMX, LEF-502DMX, LEF-1002DMX, LEF-432DMX, LEG-501DMX, LEG-1001DMX, LET-2001DMX, LET-4061DMX, LEA-431
Trade Mark	/
Standard	FCC Part15, Subpart C (15.247) ANSI C63.10-2013

We Declare:

The equipment described above is tested by DongGuanShuoXin 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 DongGuanShuoXin 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.

2. SUMMARY OF TEST RESULTS

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

Standard(s) Section	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	------
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	PASS	------
15.247(a)(2)	Bandwidth	PASS	------
15.247(b)(3)	Maximum Output Power	PASS	------
15.247(d)	ConductedSpurious Emission	PASS	------
15.247(e)	Power Spectral Density	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.

2.1 MEASUREMENT 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 DongGuanShuoXin 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	2030-08-27
A2LA	4893.01	2026-06-30
Innovation, Science and Economic Development Canada (ISED)	11033A	2026-06-30
Federal Communications Commission (FCC)	171688 Designation No.:CN1235	2026-06-30

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	LED Light Engine	
Brand Name	N/A	
Test Model	LEC-432DMX	
Series Model	LLE-001, LLE-002, LLE-003, LLE-004, LLE-005, LLE-006, LLE-007, LEA-501, LEA-501DMX, LEA-502, LEA-431DMX, LEB-431, LEB-431DMX, LEB-432, LEB-432DMX, LEC-431, LEC-431DMX, LEC-432, LEC-432DMX, LEE-1001DMX, LEF-502DMX, LEF-1002DMX, LEF-432DMX, LEG-501DMX, LEG-1001DMX, LET-2001DMX, LET-4061DMX, LEA-431	
Model Difference(s)	The series products have the same circuit diagram, PCB layout and functionality. The differences are the model name and appearance	
Hardware Version	1.3	
Software Version	4.01	
Power Source	DC	
Power Rating	I/P: 12VDC by Adapter (model yczx-24W1258)	
Operation Frequency	2402 MHz ~ 2480 MHz	
Modulation Technology	GFSK	
Bit Rate of Transmitter	1Mbps /2Mbps	
Antenna Information	Antenna Type: Copper tube	Maximum Peak Gain:3dBi
Max. Output power	1Mbps: 6.543dBm (0.004511W) 2Mbps: 6.531dBm (0.004499W)	

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

3.2 DESCRIPTION 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:

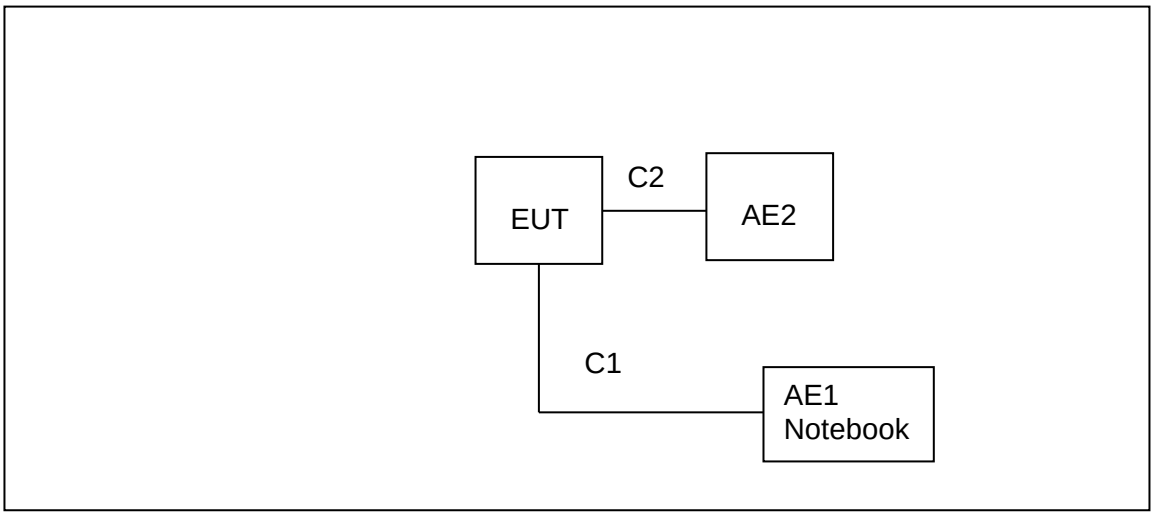
(1) The measurements are performed at the high, middle, low available channels.

3.3 PARAMETERS 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	EMI_Test_Tool		
Frequency (MHz)	2402	2440	2480
Parameters-1Mbps	Default	Default	Default
Parameters-2Mbps	Default	Default	Default

3.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



3.5 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
AE1	Notebook	Lenovo	/	/
AE2	AC/DC adapter	/	yczx-24W1258	/

Item	Cable Type	Shielded Type	Ferrite Core	Length
C1	DC Cable	NO	NO	0.8m
C2	DC Cable	NO	NO	1.15m

3.6 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage
AC Power Line Conducted Emissions	22.3°C	58%	DC 12V (AC 120V 60Hz)
Radiated Emissions-9K-30MHz	22°C	60%	DC 12V
Radiated Emissions-30 MHz to 1GHz	24.1°C	42%	DC 12V
Radiated Emissions-Above 1000 MHz	24.1°C	42%	DC 12V
Bandwidth	24°C	52%	DC 12V
Maximum Output Power	24°C	52%	DC 12V
ConductedSpurious Emission	24°C	52%	DC 12V
Power Spectral Density	24°C	52%	DC 12V

4 AC POWER LINE CONDUCTED EMISSIONS TEST

4.1 LIMIT

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

4.2 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 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.

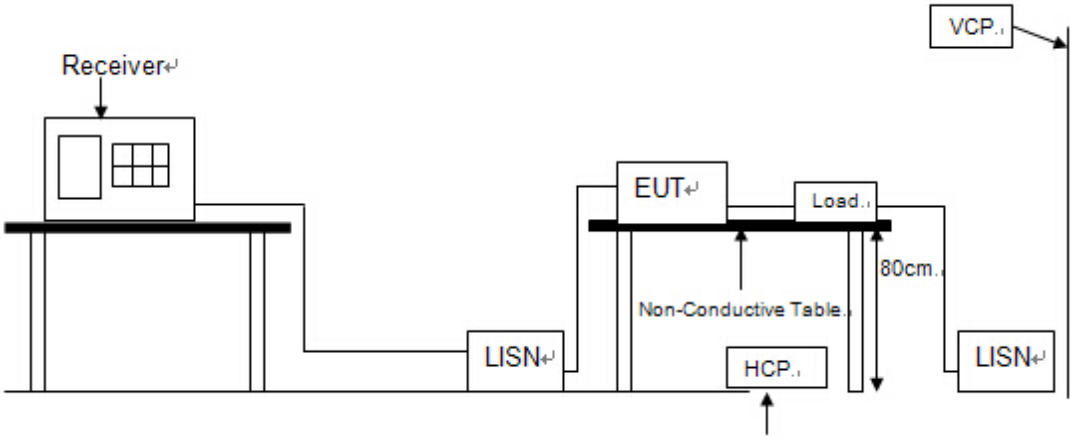
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

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

4.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-010-0024	11/17/2025
2	EMI Test Receiver	R&S	ESCI	101308	06/05/2025
3	LISN	AFJ	LS16	16011103219	06/05/2025
4	LISN	Schwarzbeck	NSLK 8127	8127-432	06/05/2025
5	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

4.4 TESTSETUP



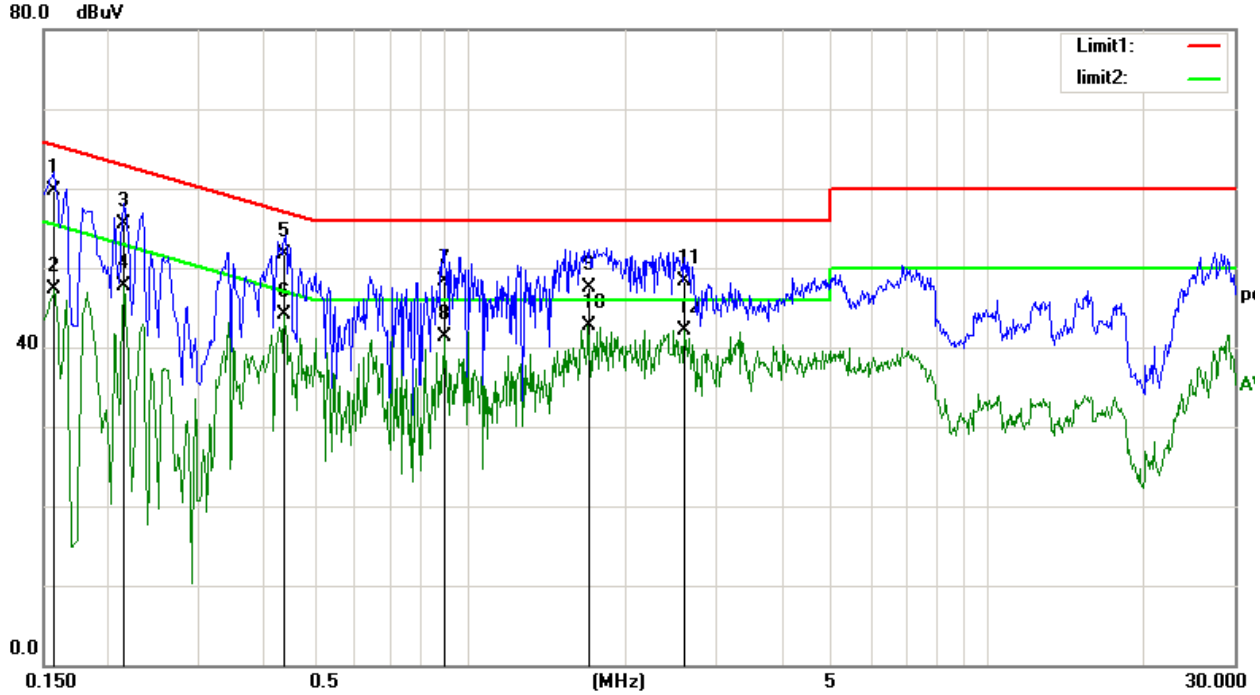
4.5 EUT OPERATING CONDITIONS

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.

4.6 TEST RESULTS

Test Mode:	BLE 2M TX Mode Channel 39

Line

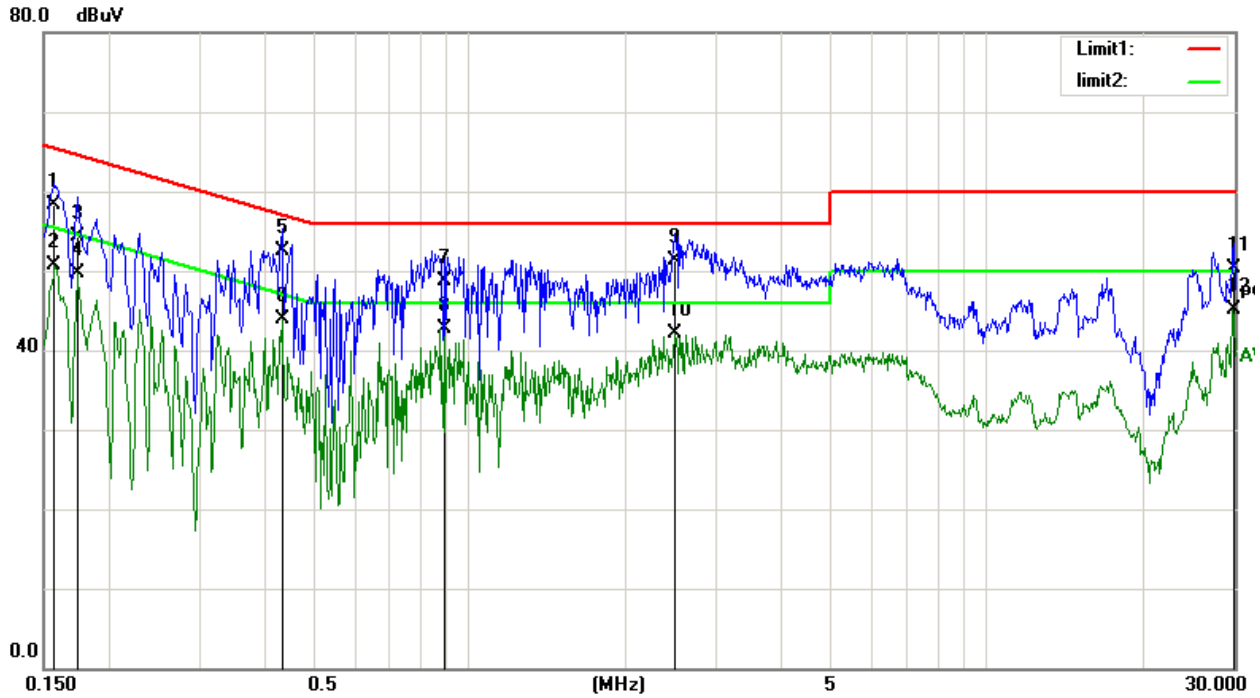


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1580	49.00	10.66	59.66	65.56	-5.90	QP
2	0.1580	36.68	10.66	47.34	55.56	-8.22	AVG
3	0.2140	44.82	10.59	55.41	63.04	-7.63	QP
4	0.2140	37.14	10.59	47.73	53.04	-5.31	AVG
5	0.4380	41.26	10.48	51.74	57.10	-5.36	QP
6	0.4380	33.53	10.48	44.01	47.10	-3.09	AVG
7	0.8980	37.85	10.51	48.36	56.00	-7.64	QP
8	0.8980	30.87	10.51	41.38	46.00	-4.62	AVG
9	1.6940	36.69	10.86	47.55	56.00	-8.45	QP
10	1.6940	31.89	10.86	42.75	46.00	-3.25	AVG
11	2.5980	37.30	10.96	48.26	56.00	-7.74	QP
12	2.5980	31.18	10.96	42.14	46.00	-3.86	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	0.1580	47.60	10.66	58.26	65.56	-7.30	QP
2	0.1580	40.03	10.66	50.69	55.56	-4.87	AVG
3	0.1740	43.63	10.59	54.22	64.76	-10.54	QP
4	0.1740	39.07	10.59	49.66	54.76	-5.10	AVG
5	0.4340	42.02	10.47	52.49	57.18	-4.69	QP
6	0.4340	33.39	10.47	43.86	47.18	-3.32	AVG
7	0.8940	38.23	10.52	48.75	56.00	-7.25	QP
8	0.8940	32.19	10.52	42.71	46.00	-3.29	AVG
9	2.4980	40.47	10.89	51.36	56.00	-4.64	QP
10	2.4980	31.27	10.89	42.16	46.00	-3.84	AVG
11	29.8740	36.15	14.09	50.24	60.00	-9.76	QP
12	29.8740	31.03	14.09	45.12	50.00	-4.88	AVG

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

5 RADIATED EMISSION TEST

5.1 LIMIT

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 8.9 limit 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).

5.2 TEST 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 metersemi-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

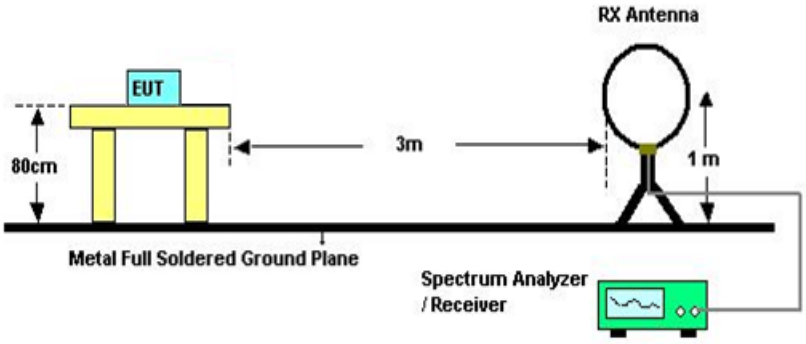
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz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

5.3 MEASUREMENT INSTRUMENTS LIST

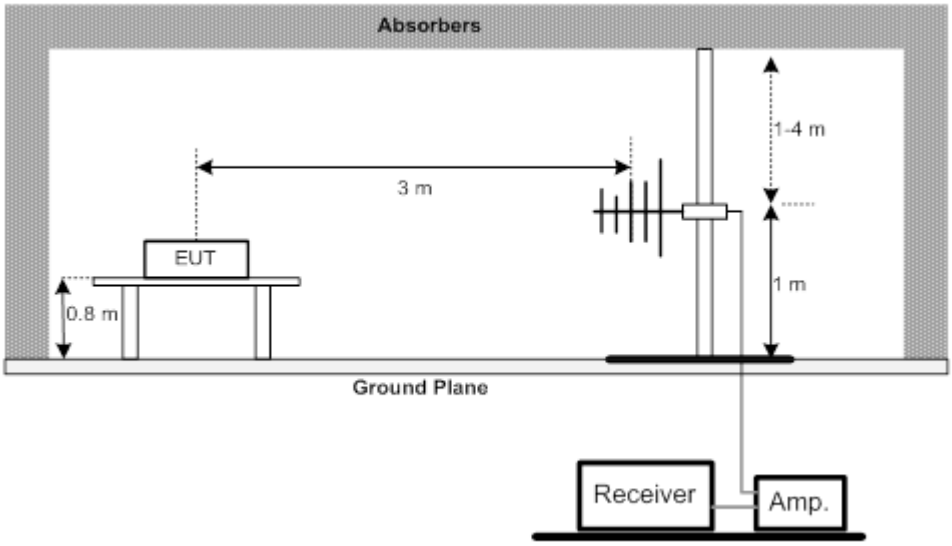
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	101307	06/05/2025
2	Spectrum Analyzer	Agilent	E4407B	US40240708	11/17/2025
3	Loop antenna	SCHWARZBECK K	FMZB1519	1519-062	03/30/2025
4	Broadband antenna	SCHWARZBECK	VULB9168	VULB9168-192	03/29/2025
5	HORN ANTENNA	SCHWARZBECK	BBHA9120D	9120D 1065	03/29/2025
6	Preamplifier Amplifier	HP	8447F	3113A05680	11/17/2025
7	PRE-AMPLIFIER	EMEC	EM01G26G	980136	03/29/2025
8	RF Cable	R&S	Test Cable 4	4	11/17/2025
9	RF Cable	R&S	Test Cable 5	5	11/17/2025
10	RF Cable	R&S	Test Cable 9	9	04/17/2025
11	RF Cable	R&S	Test Cable 10	10	04/17/2025
12	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

5.4 TESTSETUP

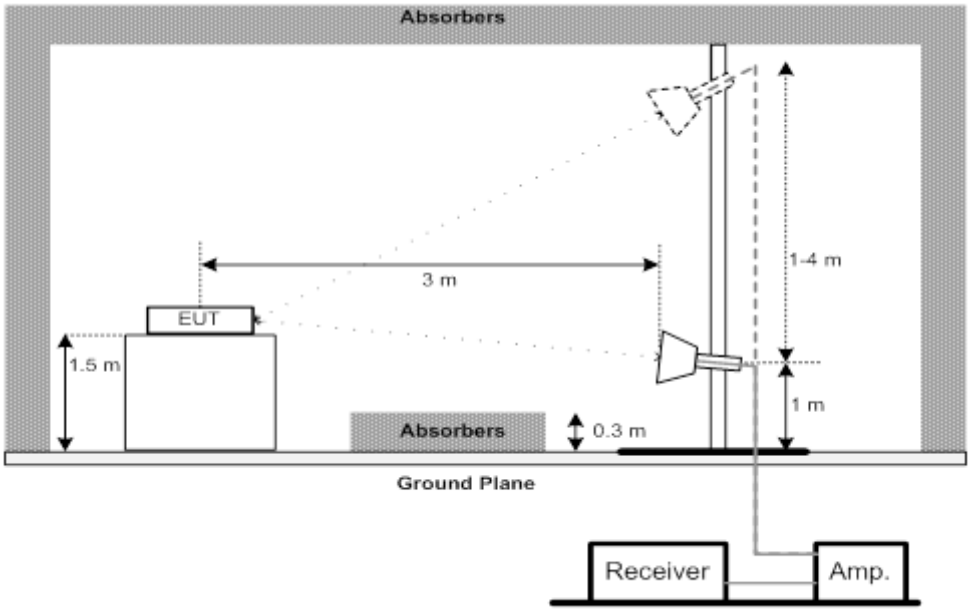
9 kHz-30 MHz



30 MHz to 1 GHz



Above 1 GHz



5.5 EUT 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

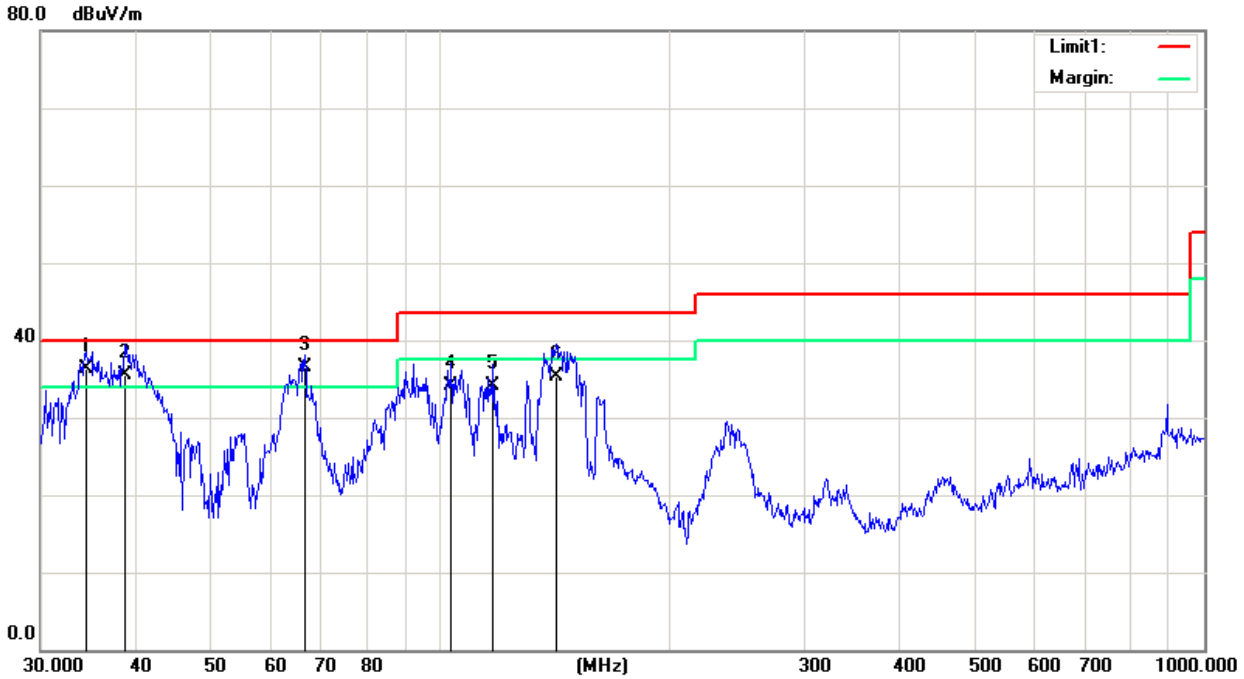
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

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

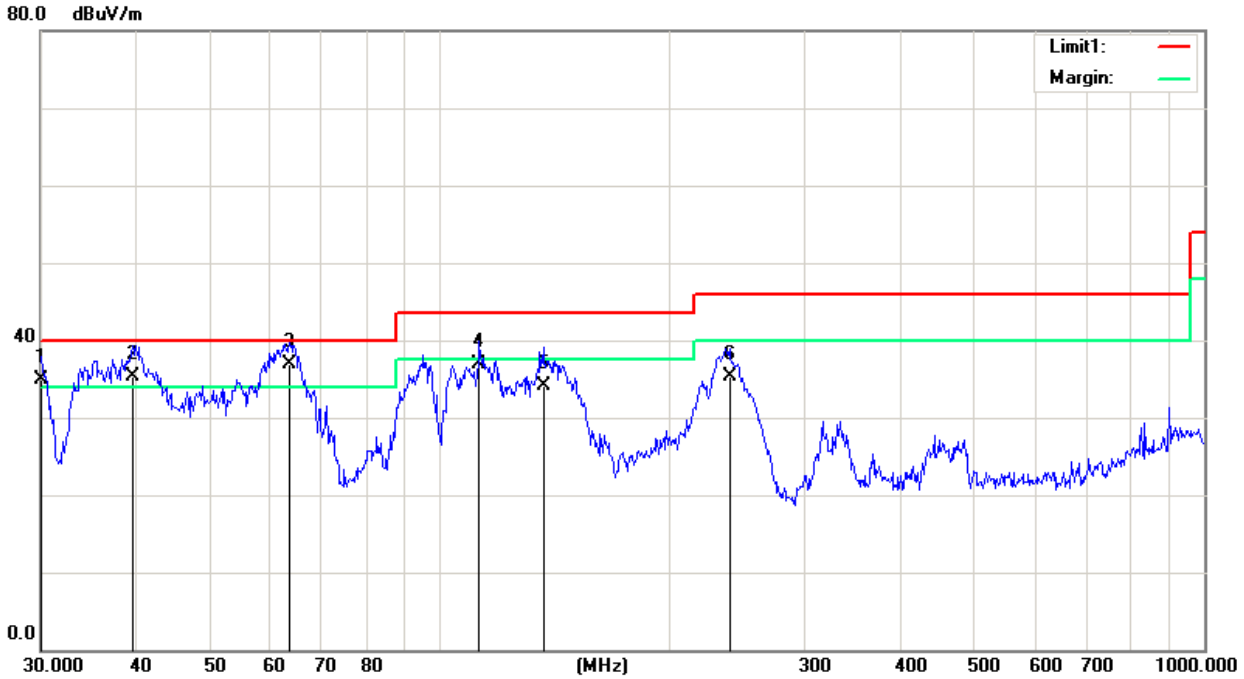
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	!	34.3962	50.78	-14.56	36.22	40.00	-3.78	QP	100	45	
2	!	38.7518	49.52	-14.08	35.44	40.00	-4.56	QP	300	236	
3	*	66.4989	52.14	-15.56	36.58	40.00	-3.42	QP	100	1	
4		103.4419	49.78	-15.63	34.15	43.50	-9.35	QP	200	25	
5		117.3602	48.11	-13.99	34.12	43.50	-9.38	QP	100	59	
6		141.8262	47.02	-11.80	35.22	43.50	-8.28	QP	1000	124	

Test Mode :	BLE 2M TX Mode Channel 39

Horizontal

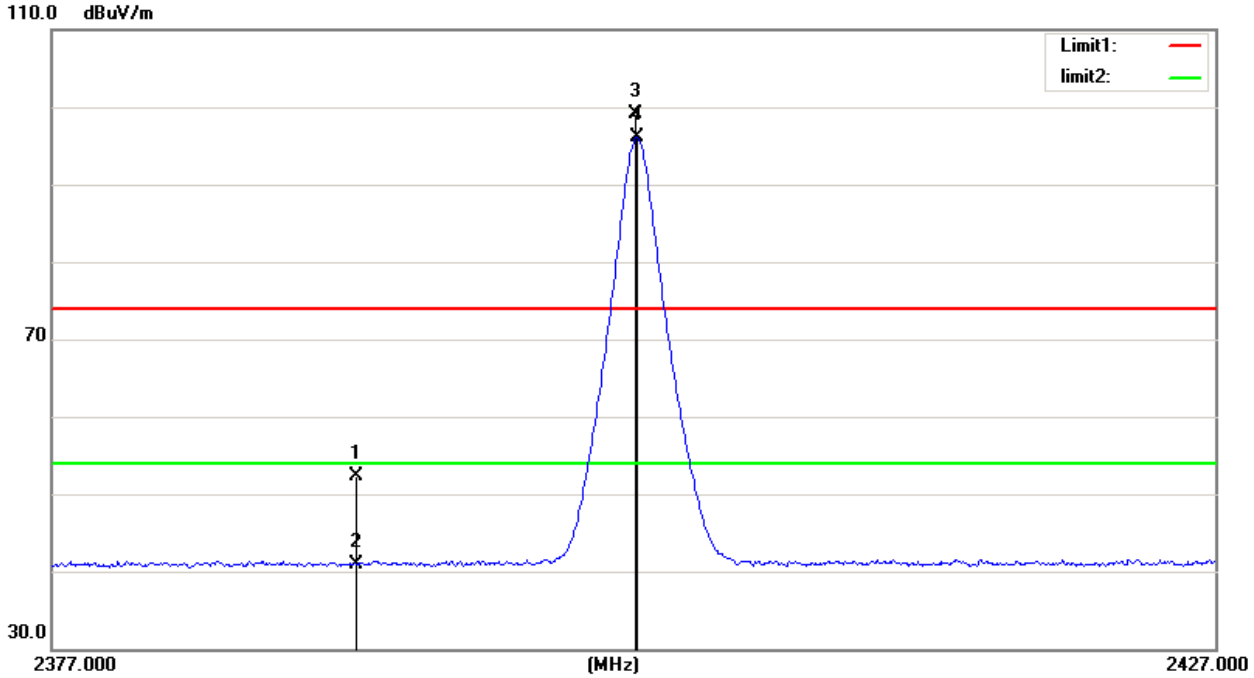


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	!	30.1051	50.59	-15.72	34.87	40.00	-5.13	QP	300	126	
2	!	39.5756	49.04	-13.82	35.22	40.00	-4.78	QP	100	54	
3	*	63.5356	51.59	-14.61	36.98	40.00	-3.02	QP	300	22	
4		112.5241	51.52	-14.65	36.87	43.50	-6.63	QP	200	159	
5		136.4598	46.63	-12.48	34.15	43.50	-9.35	QP	100	324	
6		239.1473	47.65	-12.43	35.22	46.00	-10.78	QP	200	20	

5.8 TEST RESULT- ABOVE 1000MHz (BAND EDGE)

Test Mode:	TX 2402 MHz_CH00_1Mbps

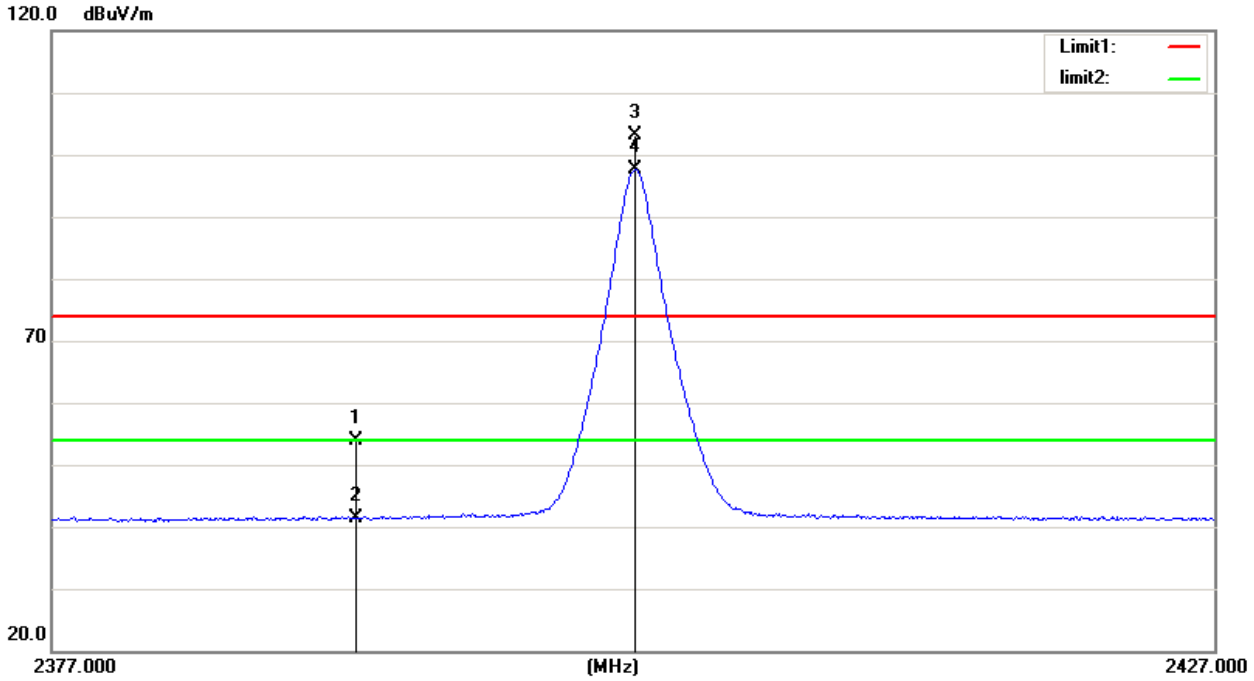
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		2390.000	22.07	30.14	52.21	74.00	-21.79	peak	150	170	
2		2390.000	10.83	30.14	40.97	54.00	-13.03	AVG	150	170	
3	X	2402.000	68.87	30.15	99.02	74.00	25.02	peak	150	170	No Limit
4	*	2402.050	65.89	30.15	96.04	54.00	42.04	AVG	150	170	No Limit

Test Mode:	TX 2402 MHz_CH00_1Mbps

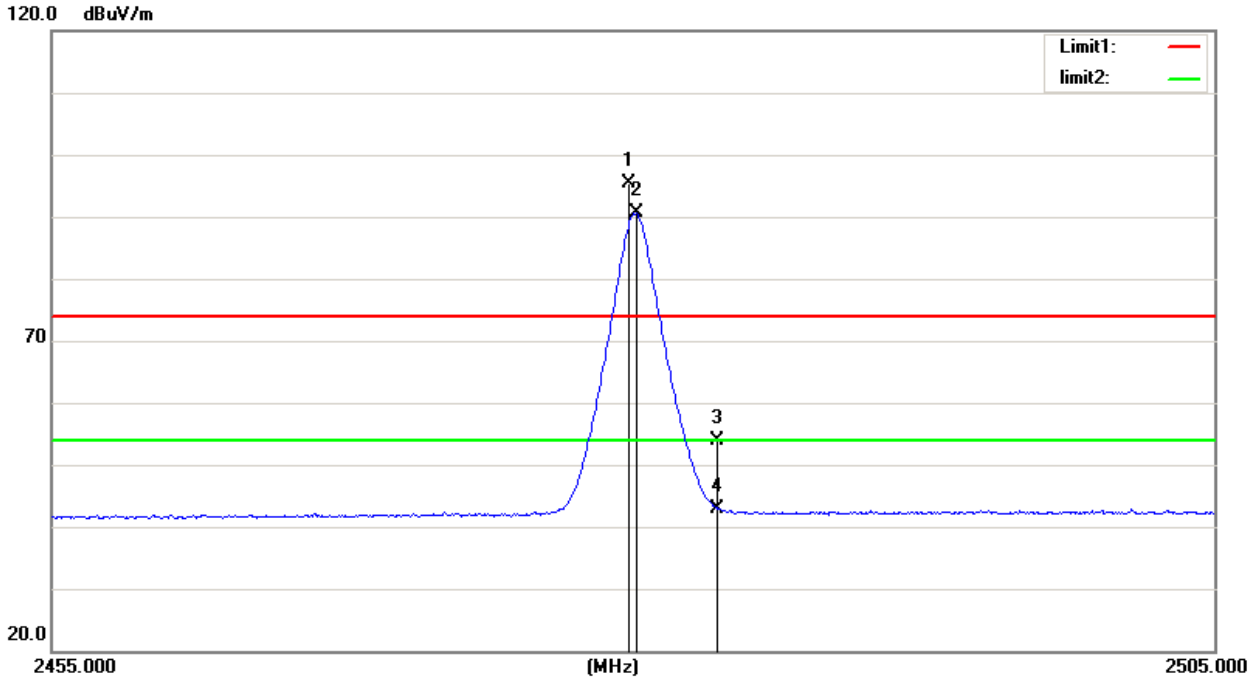
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		2390.000	23.69	30.14	53.83	74.00	-20.17	peak	150	19	
2		2390.000	11.12	30.14	41.26	54.00	-12.74	AVG	150	19	
3	X	2402.000	72.96	30.15	103.11	74.00	29.11	peak	150	19	No Limit
4	*	2402.000	67.50	30.15	97.65	54.00	43.65	AVG	150	19	No Limit

Test Mode:	TX 2480 MHz_CH39_1Mbps

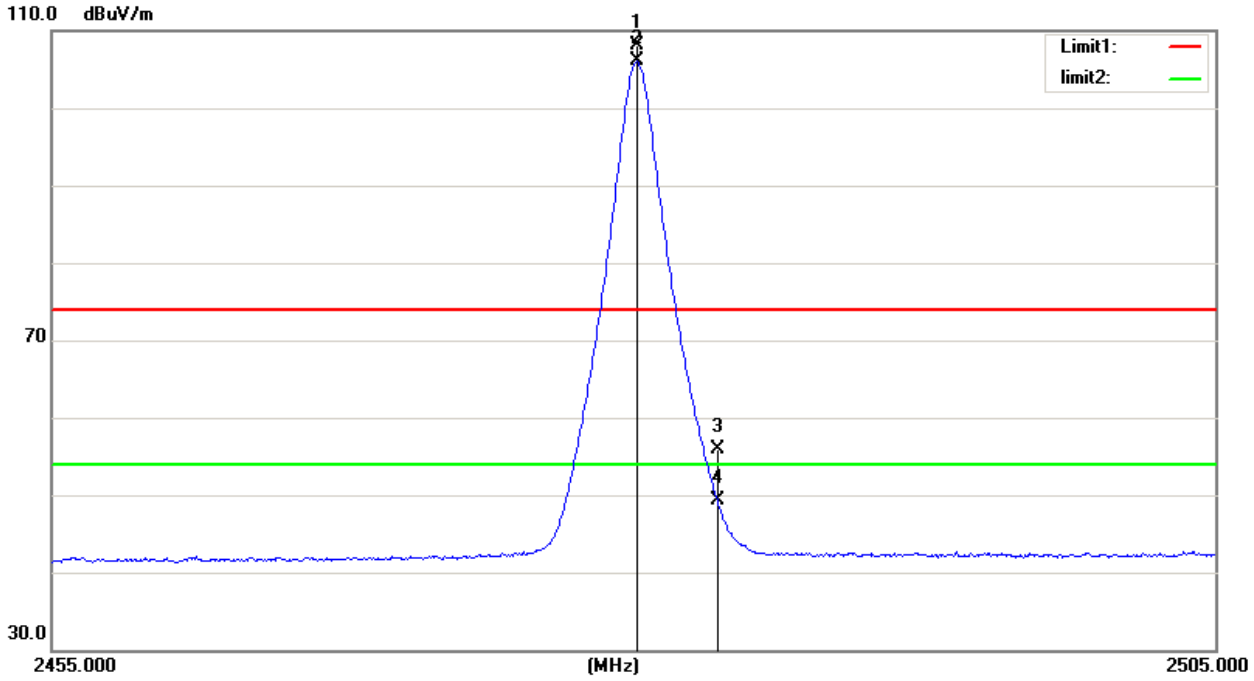
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	X	2480.050	66.20	30.67	96.87	74.00	22.87	peak	150	169	No Limit
2	*	2480.050	63.82	30.67	94.49	54.00	40.49	AVG	150	169	No Limit
3		2483.500	23.07	30.71	53.78	74.00	-20.22	peak	150	169	
4		2483.500	12.15	30.71	42.86	54.00	-11.14	AVG	150	169	

Test Mode:	TX 2480 MHz_CH39_1Mbps

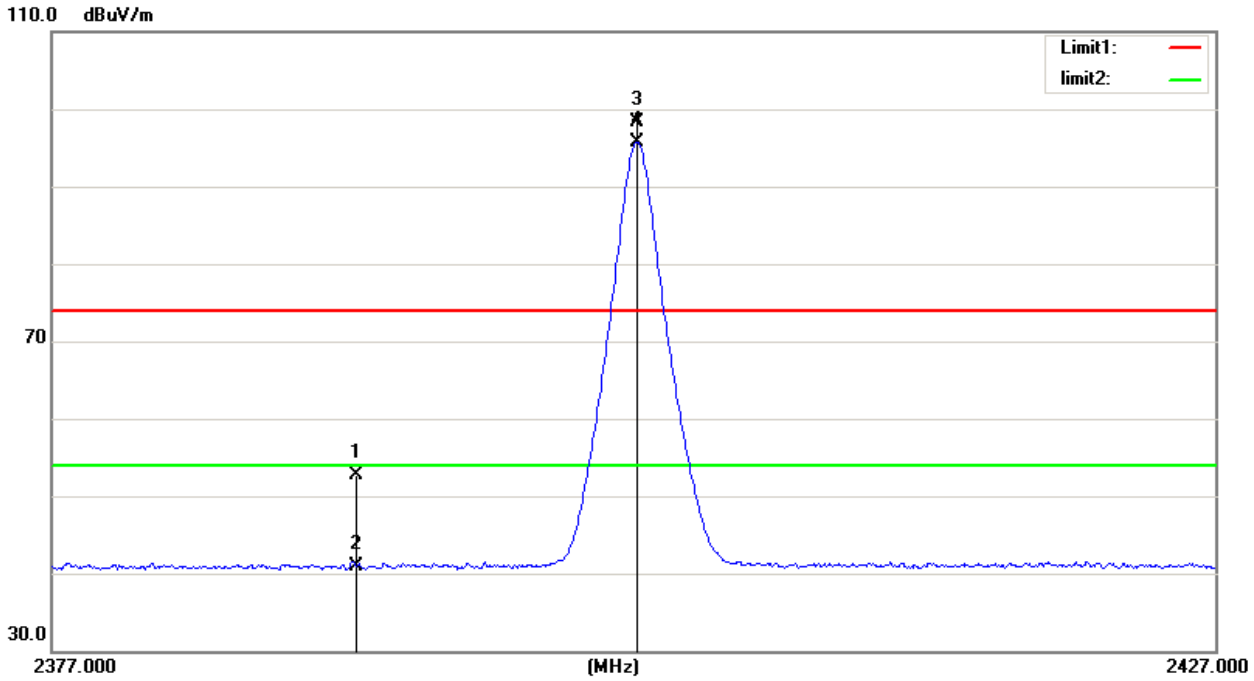
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	X	2480.050	77.50	30.67	108.17	74.00	34.17	peak	150	92	No Limit
2	*	2480.050	75.34	30.67	106.01	54.00	52.01	AVG	150	92	No Limit
3		2483.500	25.12	30.71	55.83	74.00	-18.17	peak	150	92	
4		2483.500	18.53	30.71	49.24	54.00	-4.76	AVG	150	92	

Test Mode:	TX 2402 MHz_CH00_2Mbps

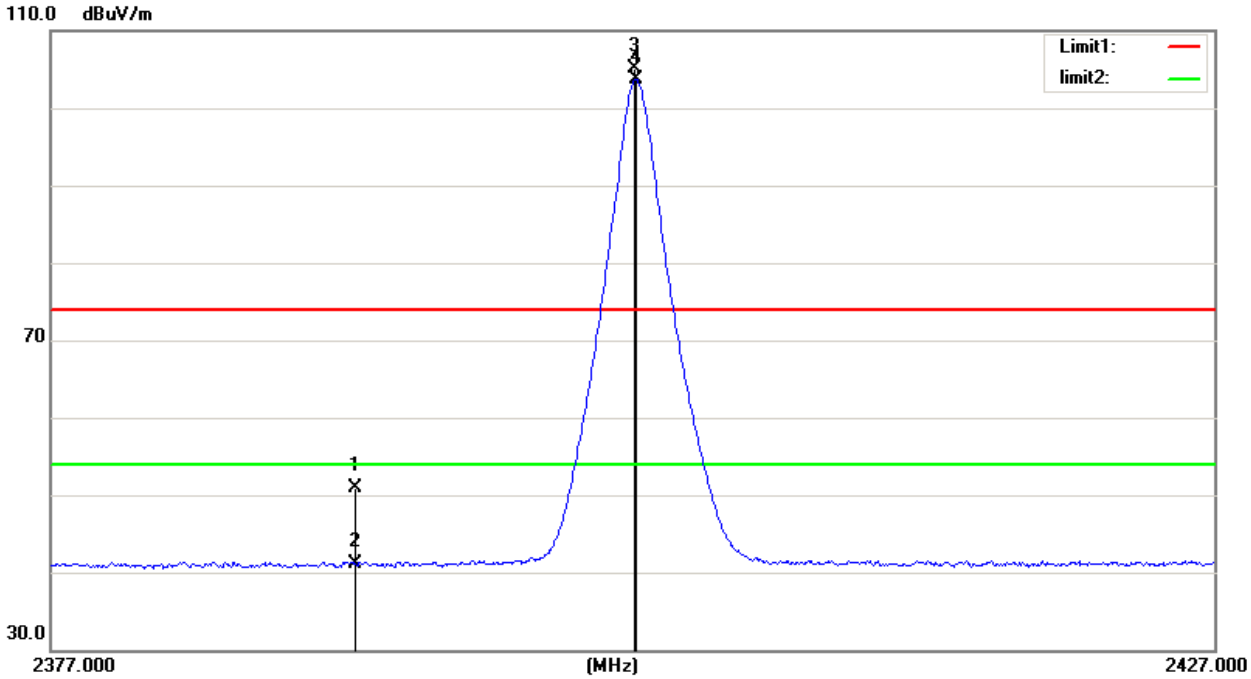
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		2390.000	22.49	30.14	52.63	74.00	-21.37	peak	150	175	
2		2390.000	10.84	30.14	40.98	54.00	-13.02	AVG	150	175	
3	X	2402.050	68.21	30.15	98.36	74.00	24.36	peak	150	175	No Limit
4	*	2402.050	65.58	30.15	95.73	54.00	41.73	AVG	150	175	No Limit

Test Mode:	TX 2402 MHz_CH00_2Mbps

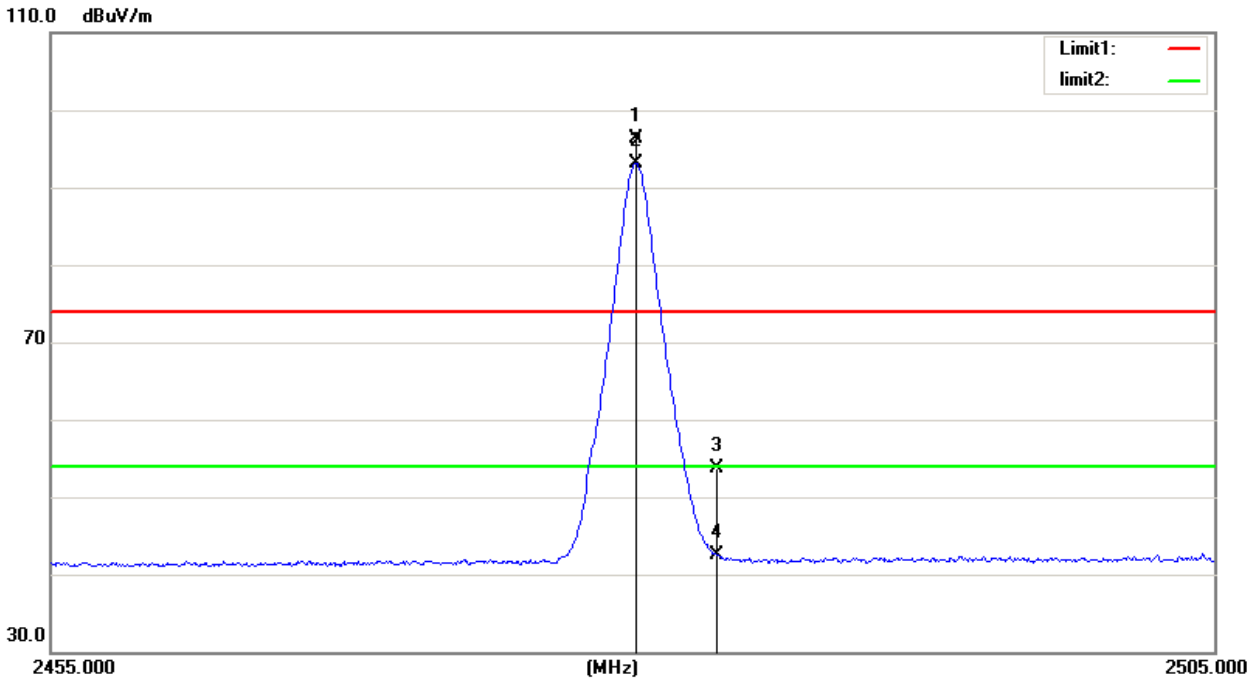
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		2390.000	20.85	30.14	50.99	74.00	-23.01	peak	150	99	
2		2390.000	10.96	30.14	41.10	54.00	-12.90	AVG	150	99	
3	X	2402.000	74.99	30.15	105.14	74.00	31.14	peak	150	99	No Limit
4	*	2402.050	73.57	30.15	103.72	54.00	49.72	AVG	150	99	No Limit

Test Mode:	TX 2480 MHz_CH39_2Mbps

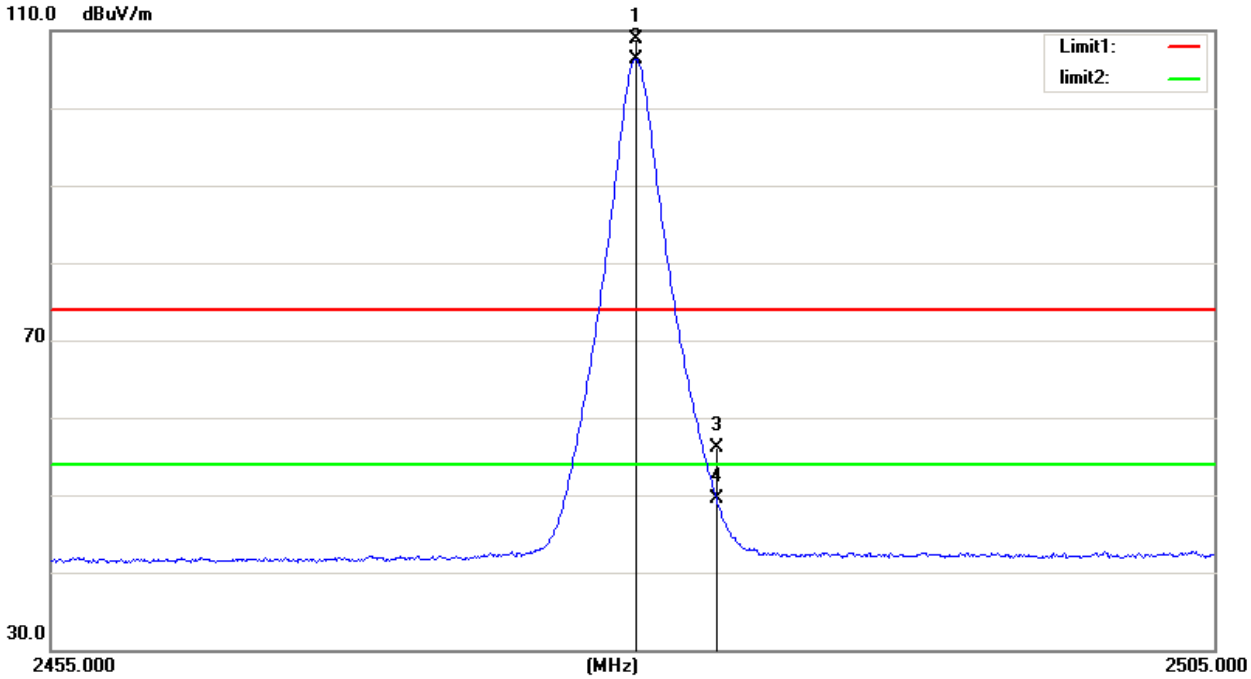
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	X	2480.050	65.68	30.67	96.35	74.00	22.35	peak	150	157	No Limit
2	*	2480.050	62.42	30.67	93.09	54.00	39.09	AVG	150	157	No Limit
3		2483.500	22.90	30.71	53.61	74.00	-20.39	peak	150	157	
4		2483.500	11.86	30.71	42.57	54.00	-11.43	AVG	150	157	

Test Mode:	TX 2480 MHz_CH39_2Mbps

Horizontal

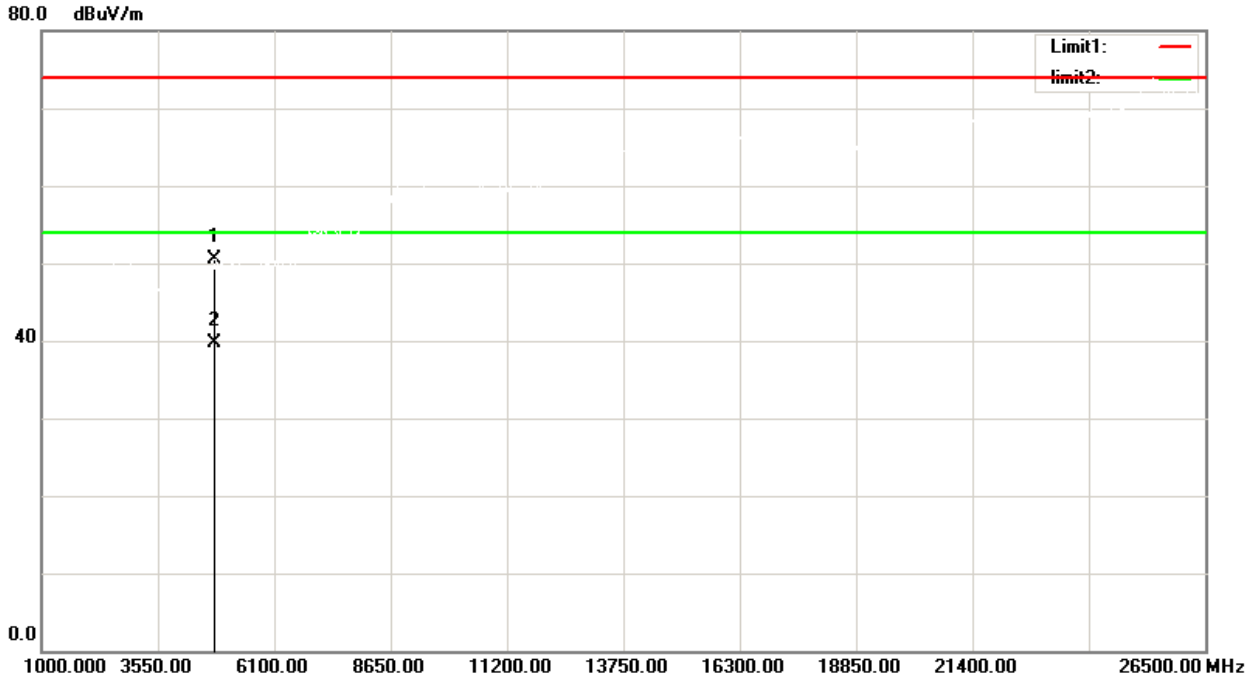


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	X	2480.050	78.18	30.67	108.85	74.00	34.85	peak	150	101	No Limit
2	*	2480.050	75.64	30.67	106.31	54.00	52.31	AVG	150	101	No Limit
3		2483.500	25.48	30.71	56.19	74.00	-17.81	peak	150	101	
4		2483.500	18.82	30.71	49.53	54.00	-4.47	AVG	150	101	

5.9 TEST RESULTS - ABOVE 1000MHz(HARMONIC)

Test Mode:	TX 2402 MHz_CH00_1Mbps

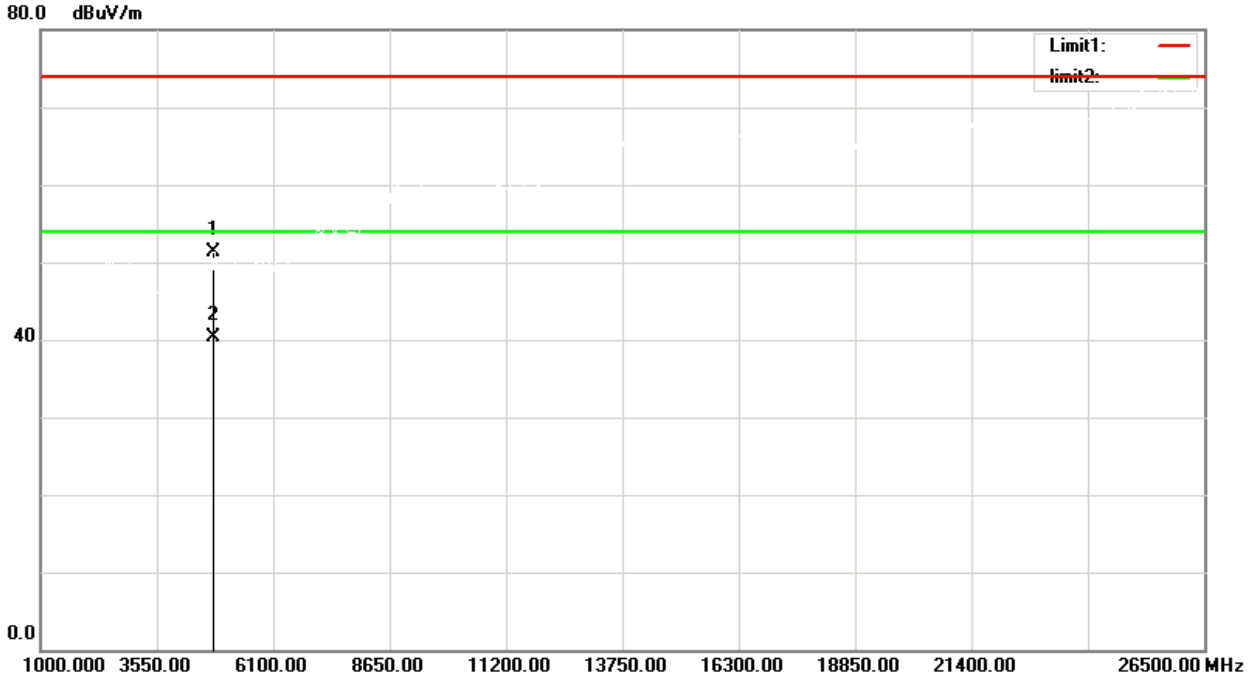
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4804.000	52.41	-1.90	50.51	74.00	-23.49	peak	150	109	
2	*	4804.000	41.67	-1.90	39.77	54.00	-14.23	AVG	150	109	

Test Mode:	TX 2402 MHz_CH00_1Mbps

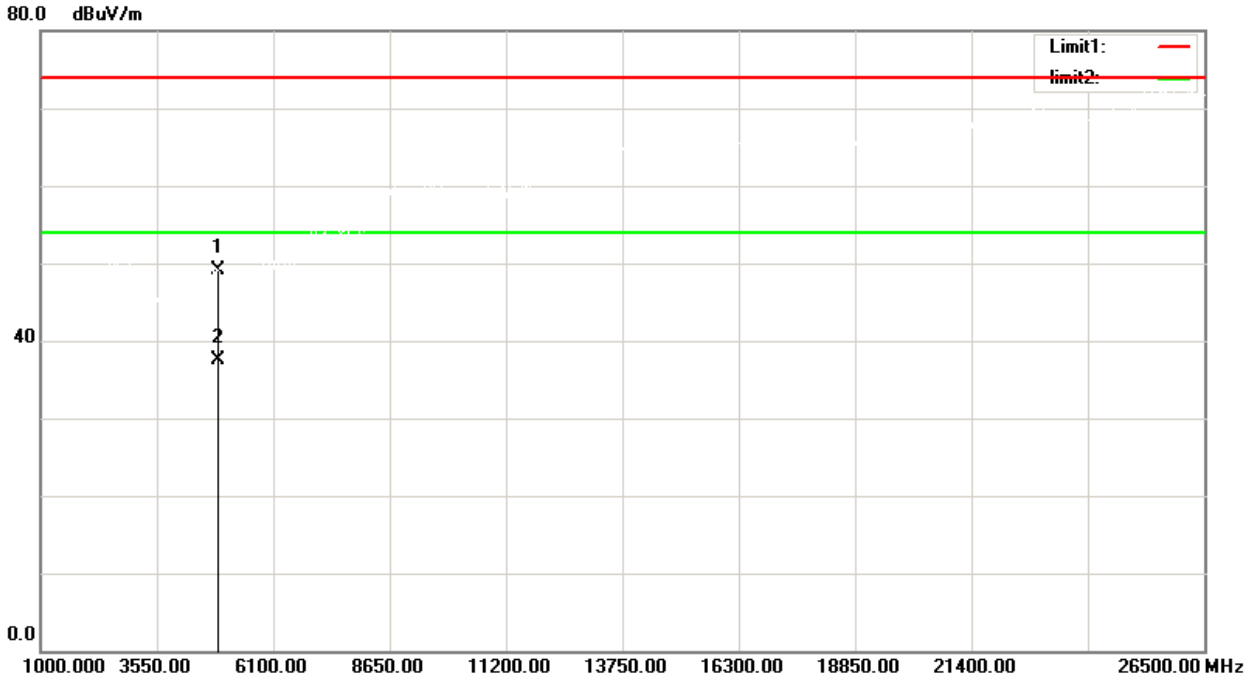
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4804.000	53.23	-1.90	51.33	74.00	-22.67	peak	150	69	
2	*	4804.000	42.26	-1.90	40.36	54.00	-13.64	AVG	150	69	

Test Mode:	TX 2440 MHz_CH19_1Mbps

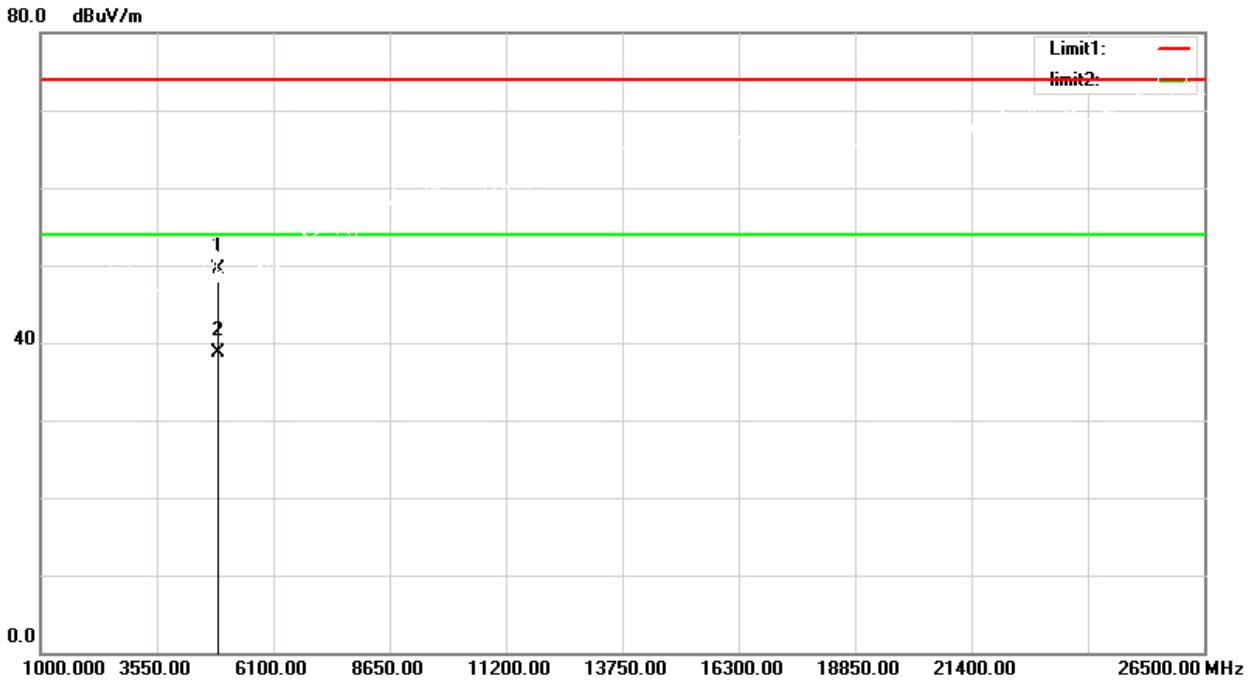
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4880.000	51.34	-2.18	49.16	74.00	-24.84	peak	150	57	
2	*	4880.000	39.72	-2.18	37.54	54.00	-16.46	AVG	150	57	

Test Mode:	TX 2440 MHz_CH19_1Mbps

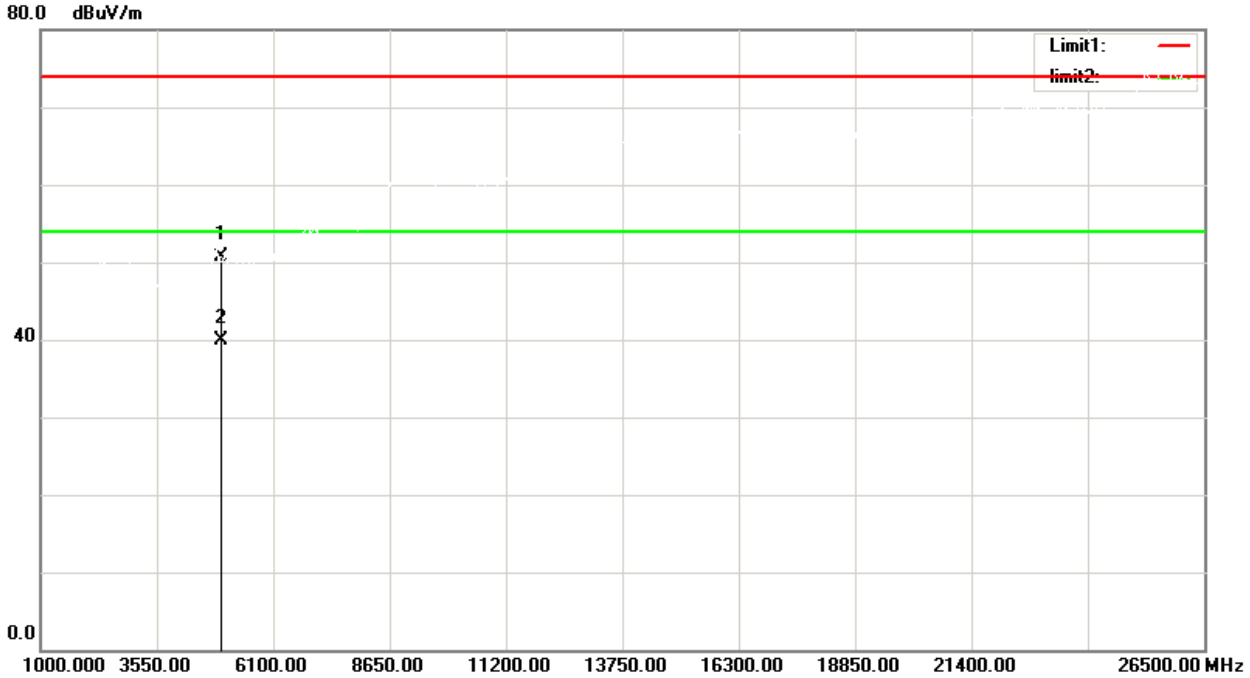
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4880.000	51.61	-2.18	49.43	74.00	-24.57	peak	150	54	
2	*	4880.000	40.92	-2.18	38.74	54.00	-15.26	AVG	150	54	

Test Mode:	TX 2480 MHz_CH39_1Mbps

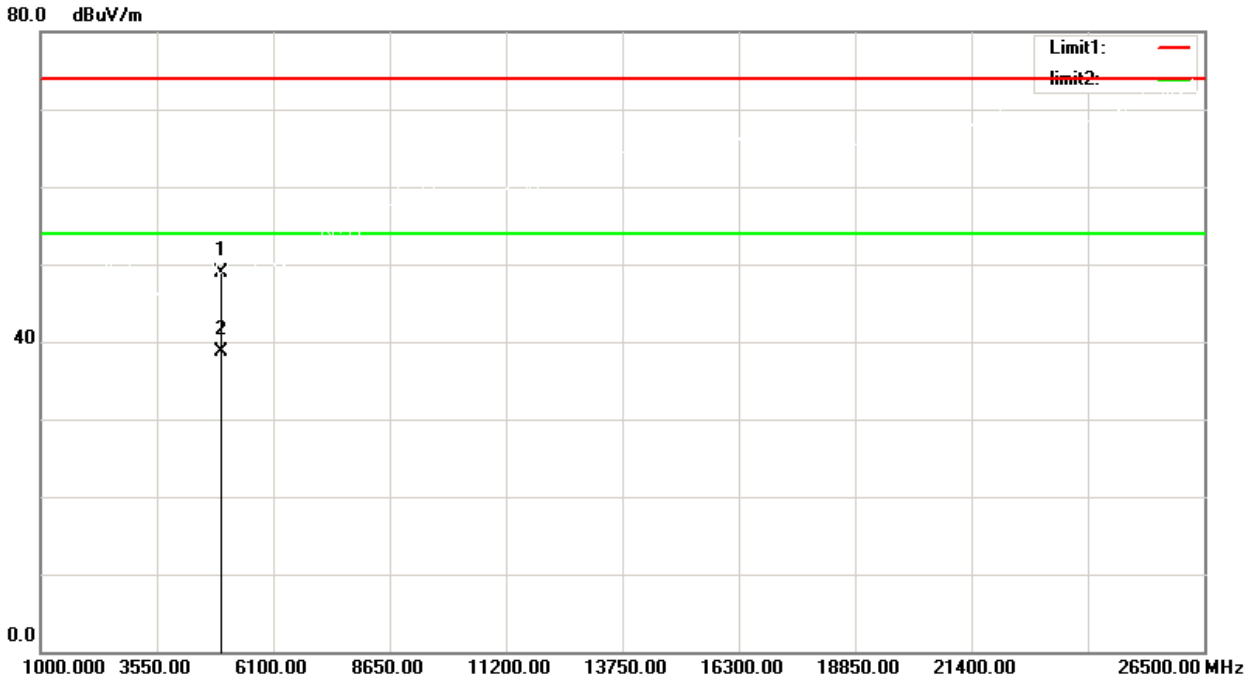
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4960.000	52.46	-1.76	50.70	74.00	-23.30	peak	150	23	
2	*	4960.000	41.63	-1.76	39.87	54.00	-14.13	AVG	150	23	

Test Mode:	TX 2480 MHz_CH39_1Mbps

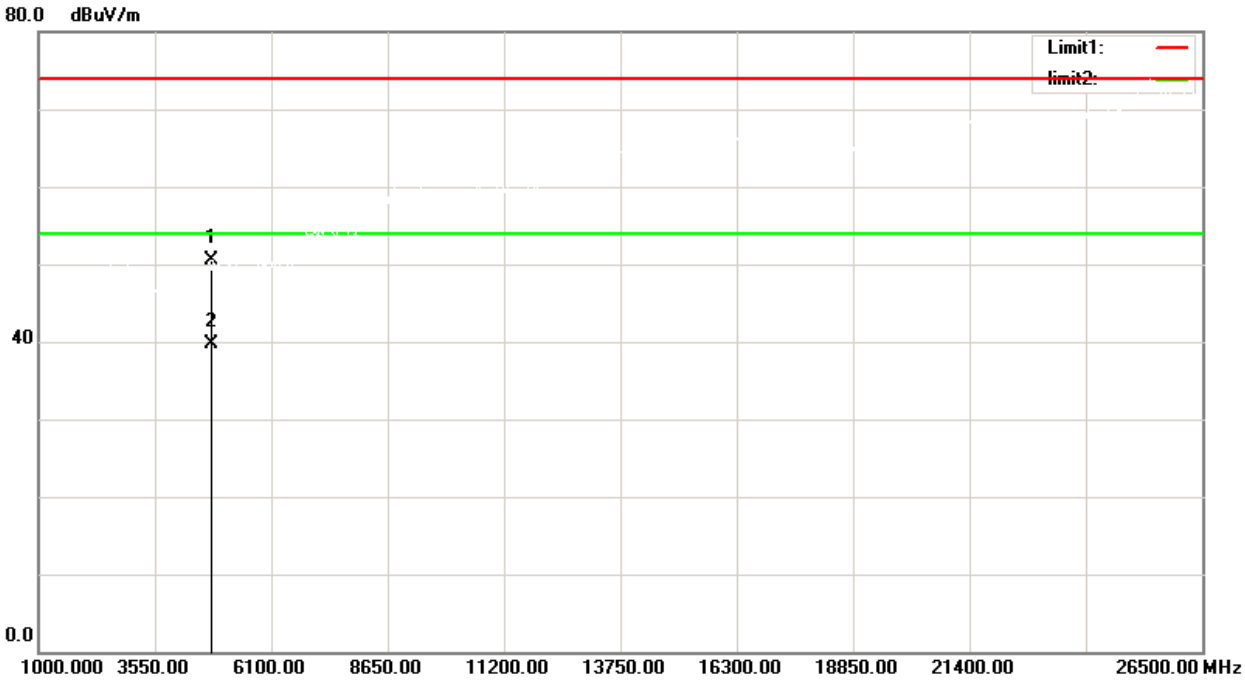
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4960.000	50.63	-1.76	48.87	74.00	-25.13	peak	150	106	
2	*	4960.000	40.46	-1.76	38.70	54.00	-15.30	AVG	150	106	

Test Mode:	TX 2402 MHz_CH00_2Mbps

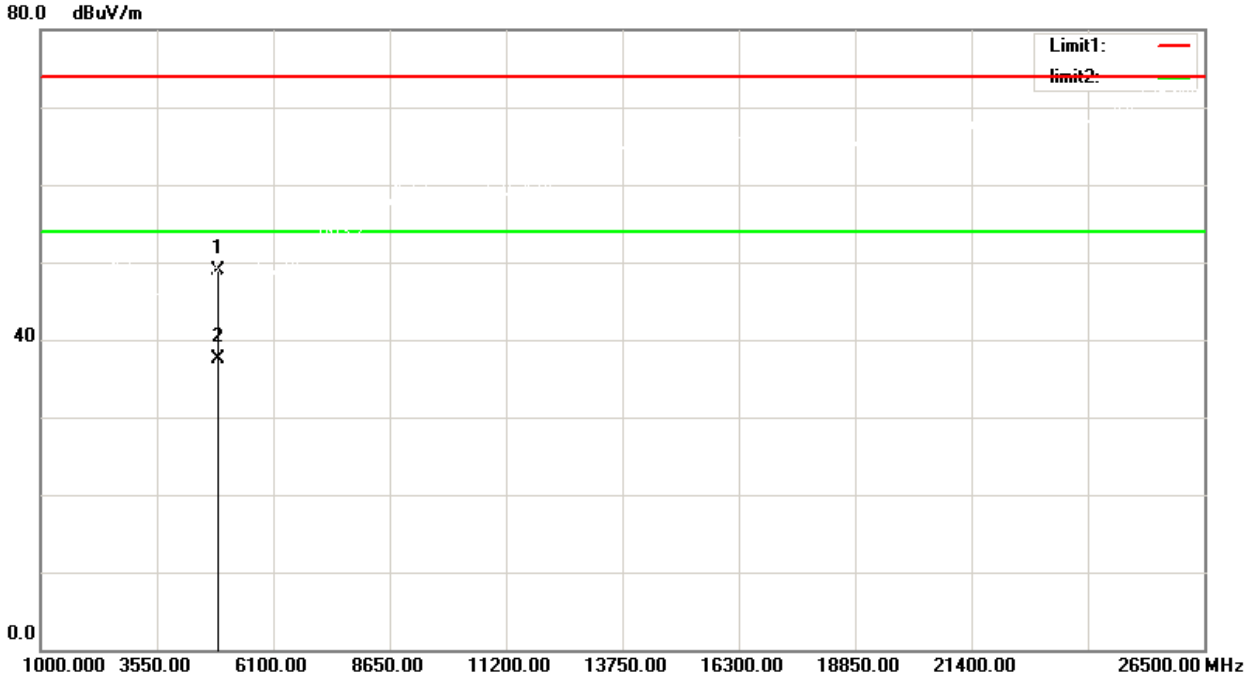
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4804.000	52.41	-1.90	50.51	74.00	-23.49	peak	150	109	
2	*	4804.000	41.67	-1.90	39.77	54.00	-14.23	AVG	150	109	

Test Mode:	TX 2402 MHz_CH00_2Mbps

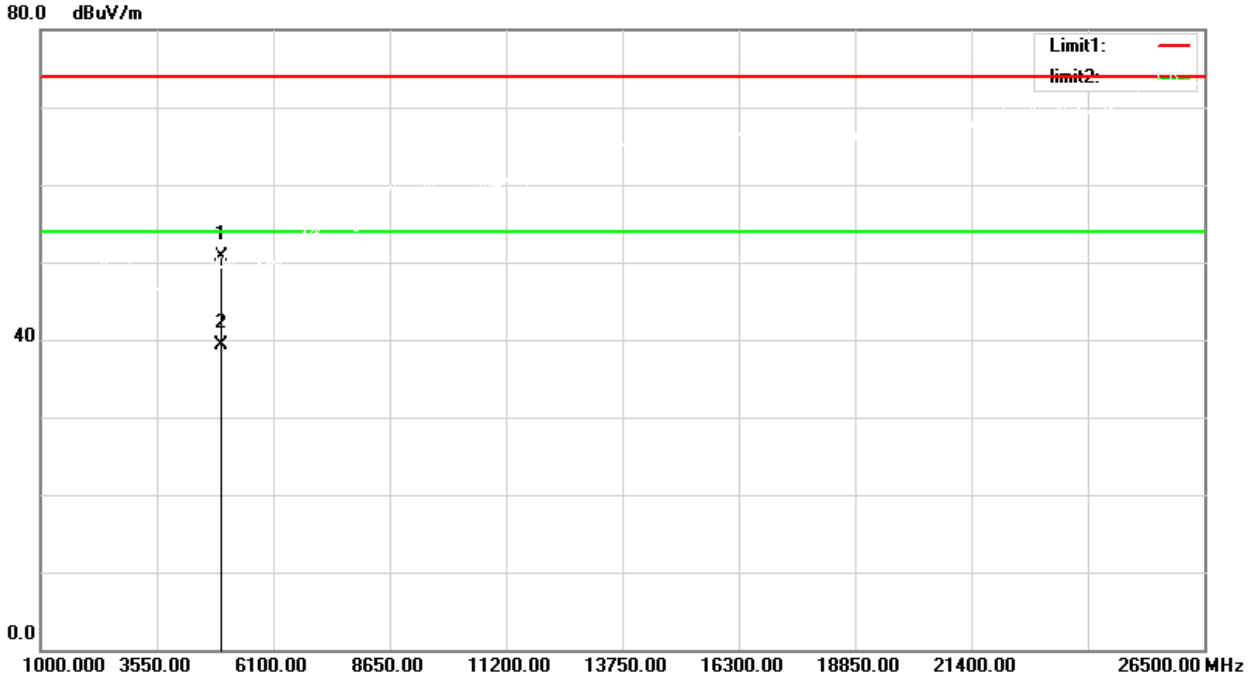
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4880.000	51.02	-2.18	48.84	74.00	-25.16	peak	150	89	
2	*	4880.000	39.77	-2.18	37.59	54.00	-16.41	AVG	150	89	

Test Mode:	TX 2440 MHz_CH19_2Mbps

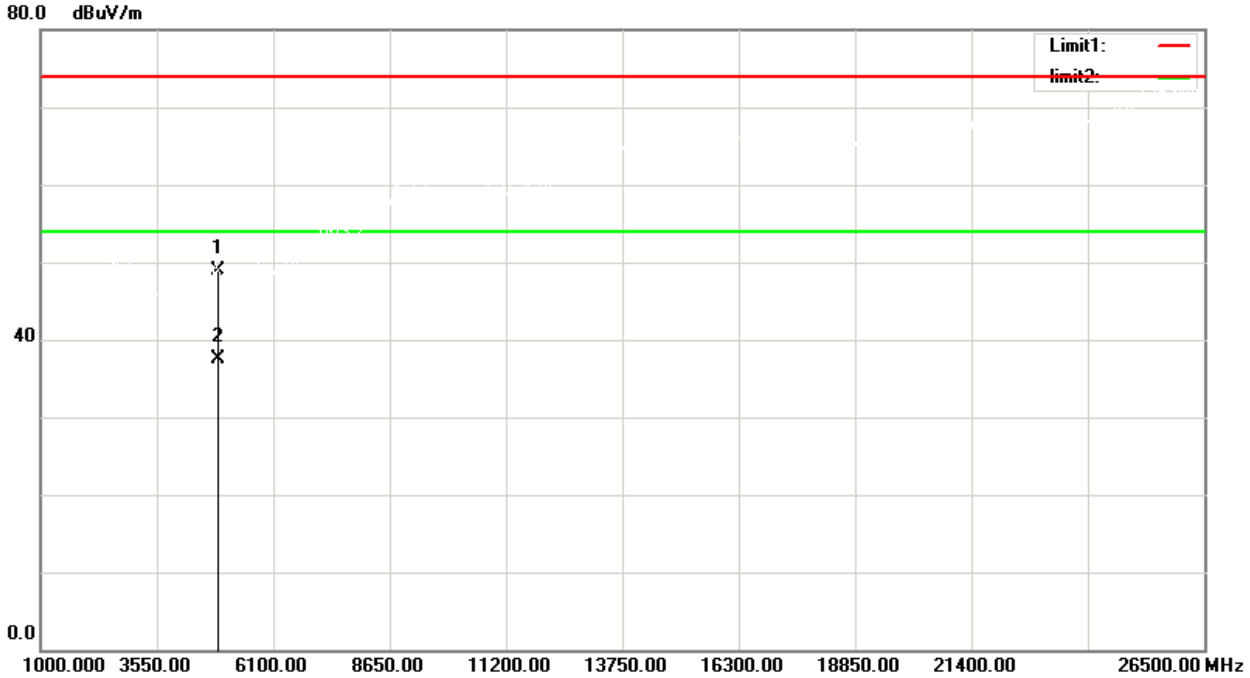
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4960.000	52.46	-1.76	50.70	74.00	-23.30	peak	150	114	
2	*	4960.000	41.09	-1.76	39.33	54.00	-14.67	AVG	150	114	

Test Mode:	TX 2440 MHz_CH19_2Mbps

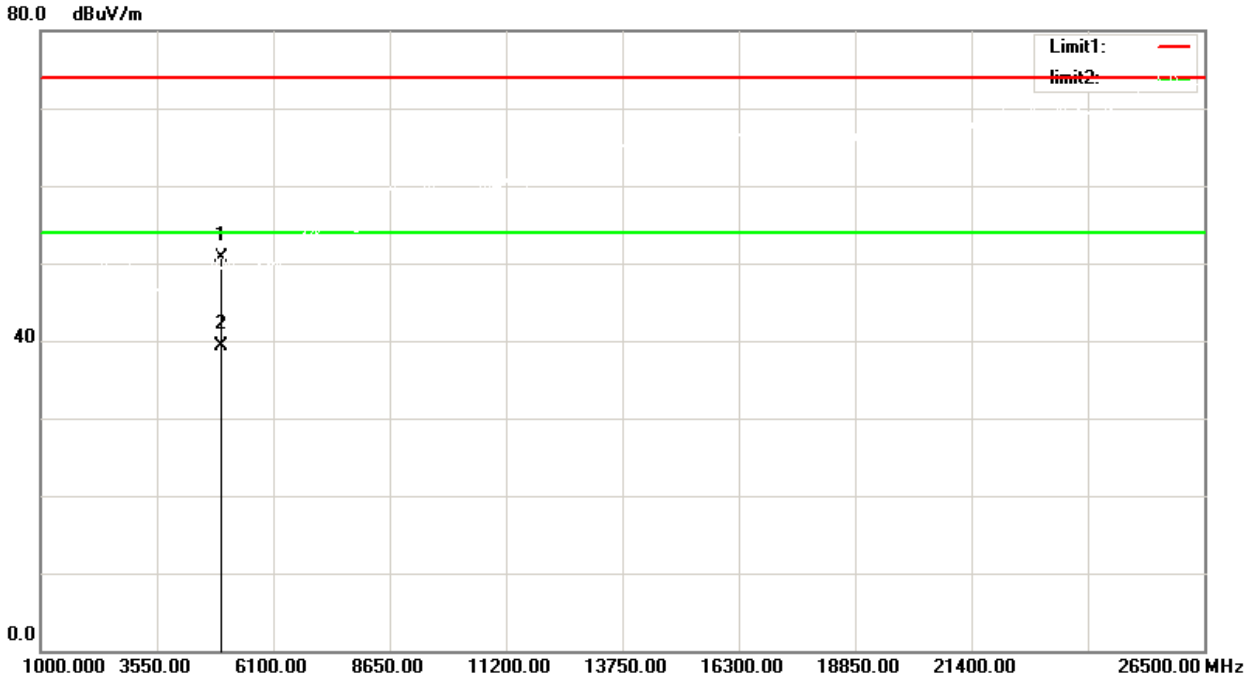
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4880.000	51.02	-2.18	48.84	74.00	-25.16	peak	150	89	
2	*	4880.000	39.77	-2.18	37.59	54.00	-16.41	AVG	150	89	

Test Mode:	TX 2480 MHz_CH39_2Mbps

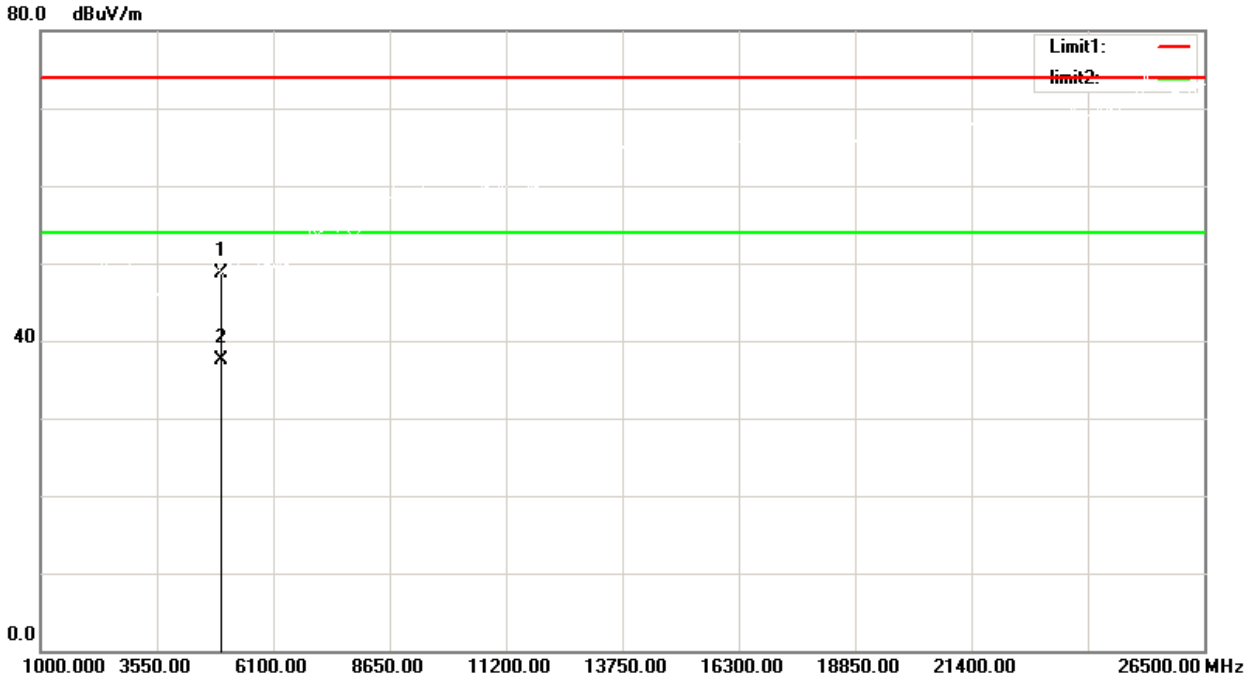
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4960.000	52.46	-1.76	50.70	74.00	-23.30	peak	150	114	
2	*	4960.000	41.09	-1.76	39.33	54.00	-14.67	AVG	150	114	

Test Mode:	TX 2480 MHz_CH39_2Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		4960.000	50.43	-1.76	48.67	74.00	-25.33	peak	150	167	
2	*	4960.000	39.32	-1.76	37.56	54.00	-16.44	AVG	150	167	

6 BANDWIDTH TEST

6.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(a)(2)	Bandwidth	>= 500 kHz (6dB bandwidth)

6.2 TEST PROCEDURE AND SETTING

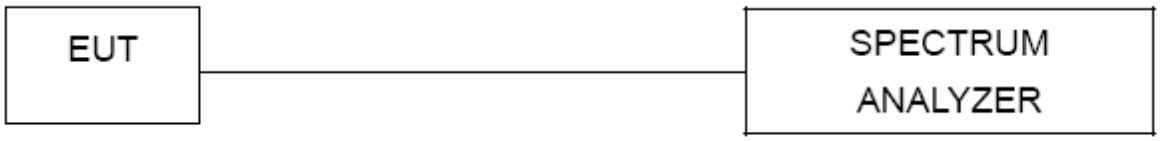
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

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.

6.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2025/05/22
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

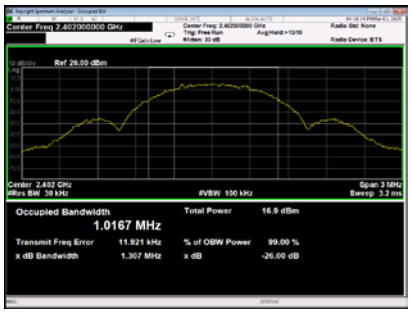
The EUT tested system was configured as the statements of 4.5 unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TESTRESULTS

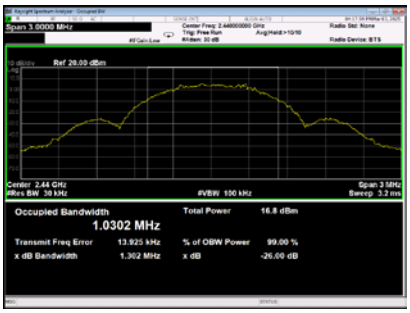
TX Mode_1Mbps				
Channel	Frequency (MHz)	6 dB bandwidth (MHz)	99%OBW (MHz)	Result
CH00	2402	0.688	1.0167	PASS
CH19	2440	0.676	1.0302	PASS
CH39	2480	0.683	1.0216	PASS

99%

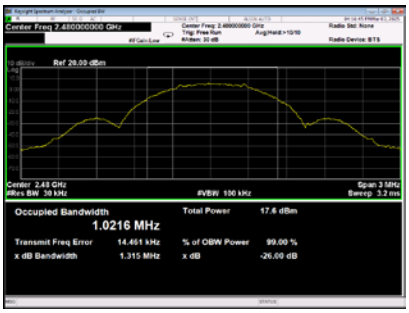
2402MHz



2440MHz

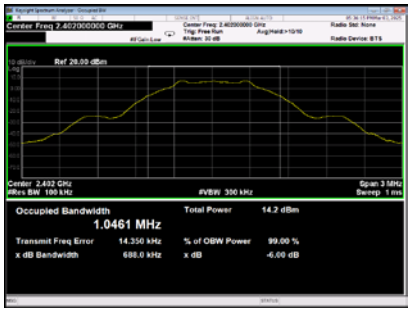


2480MHz

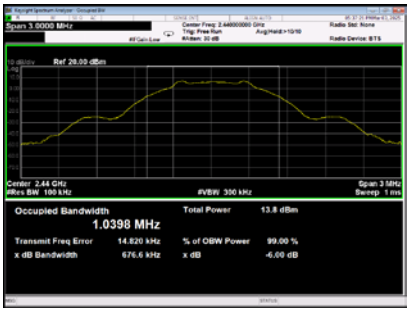


6dB

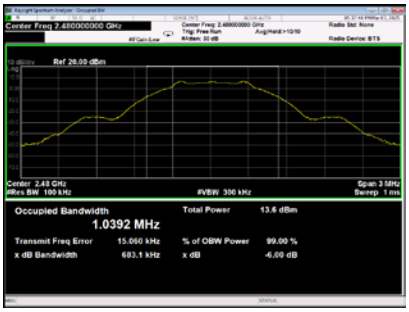
2402MHz



2440MHz

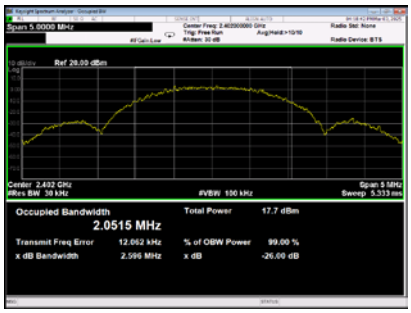


2480MHz

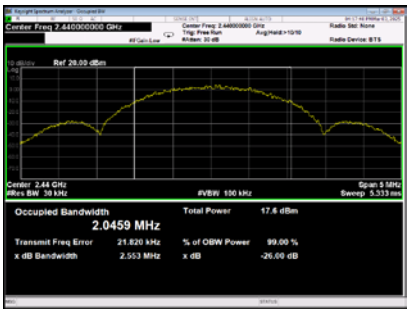


TX Mode_2Mbps				
Channel	Frequency (MHz)	6 dB bandwidth (MHz)	99%OBW (MHz)	Result
CH00	2402	1.450	2.0515	PASS
CH19	2440	1.444	2.0459	PASS
CH39	2480	1.401	2.0592	PASS

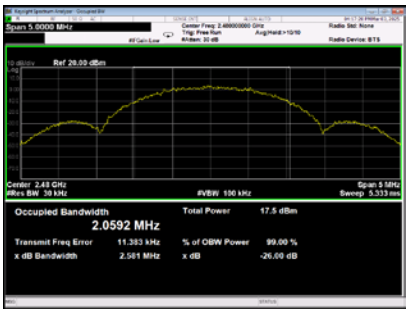
2402MHz



2440MHz

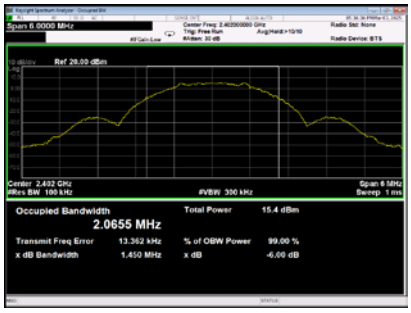


2480MHz

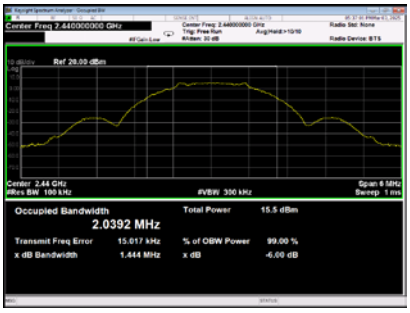


6dB

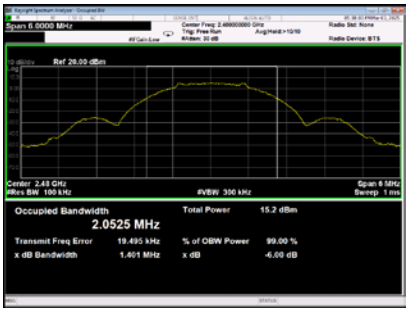
2402MHz



2440MHz



2480MHz



7. MAXIMUM OUTPUT POWER

7.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(b)(3)	Maximum Output Power	1 watt or 30dBm

7.2 TEST PROCEDURE

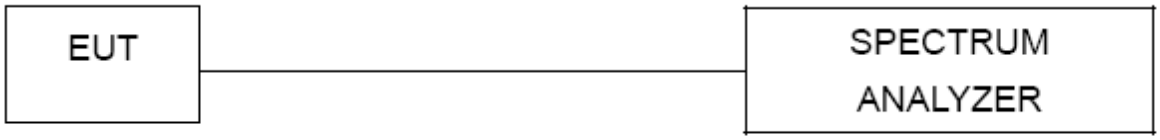
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

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

7.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2025/05/22
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

7.4 TEST SETUP



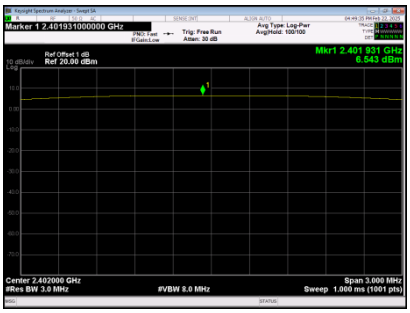
7.5 EUT OPERATION CONDITIONS

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.

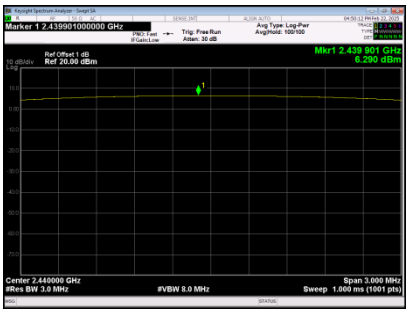
7.6 TESTRESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
CH00	2402	6.543	0.004511	PASS
CH19	2440	6.290	0.004256	PASS
CH39	2480	6.091	0.004065	PASS
Limit	30dBm /1W			

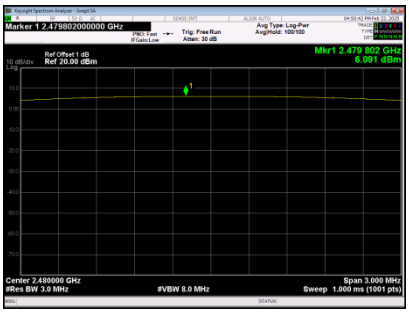
2402MHz



2440MHz

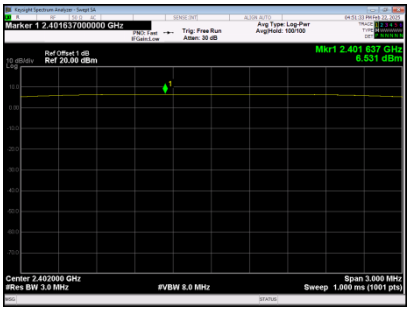


2480MHz

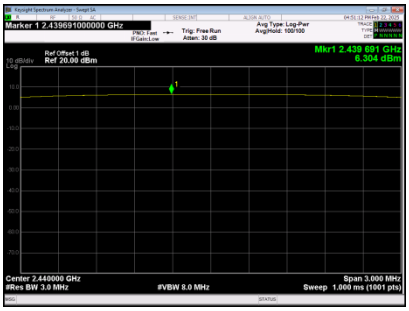


TX Mode_2Mbps				
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
CH00	2402	6.531	0.004499	PASS
CH19	2440	6.304	0.004270	PASS
CH39	2480	6.104	0.004078	PASS
Limit	30dBm /1W			

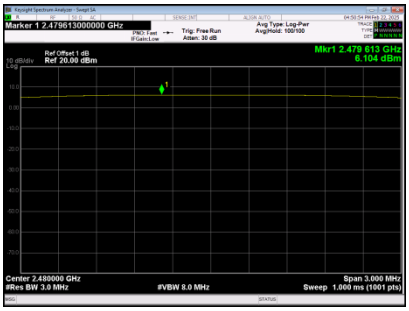
2402MHz



2440MHz



2480MHz



8 CONDUCTED SPURIOUS EMISSION

8.1 LIMIT

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.

8.2 TEST PROCEDURE

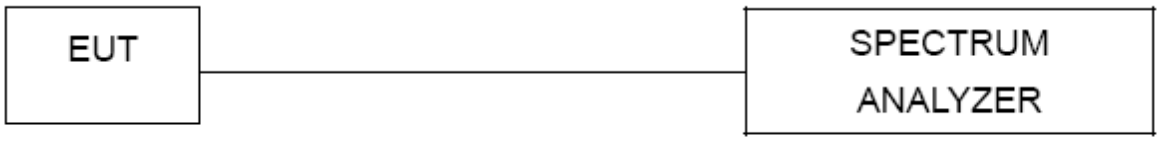
a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting : RBW= 100 kHz, VBW=300 kHz, Sweep time = Auto.

8.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2025/05/22
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

8.4 TEST SETUP



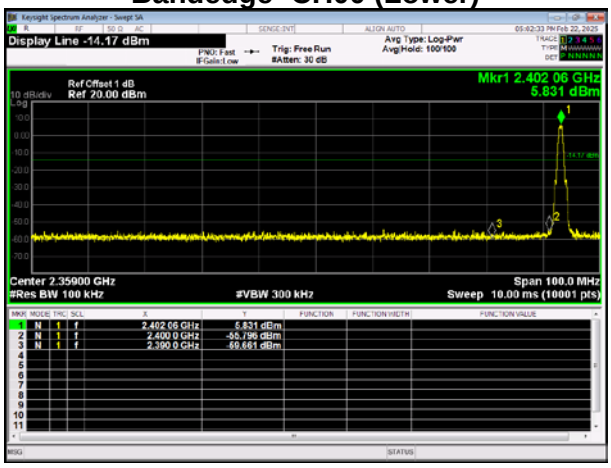
8.5 EUT OPERATION CONDITIONS

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.

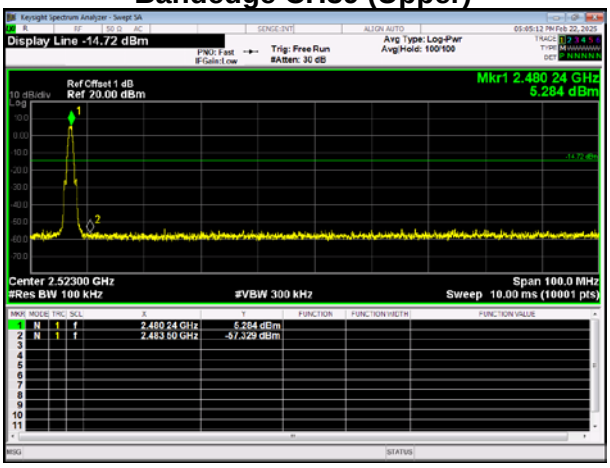
8.6 TEST RESULTS

TX Mode_1Mbps

Bandedge- CH00 (Lower)

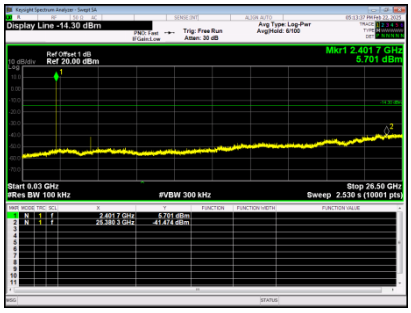


Bandedge CH39 (Upper)

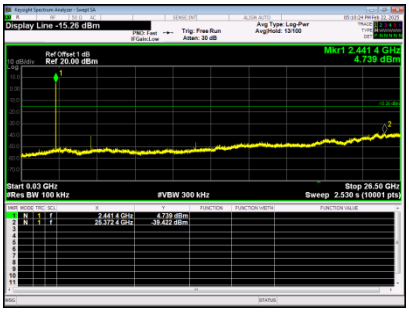


CH00 – 10th Harmonic of the fundamental frequency

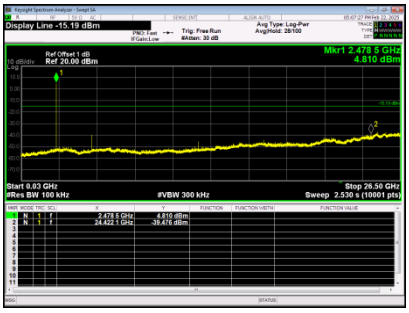
2402MHz



2440MHz

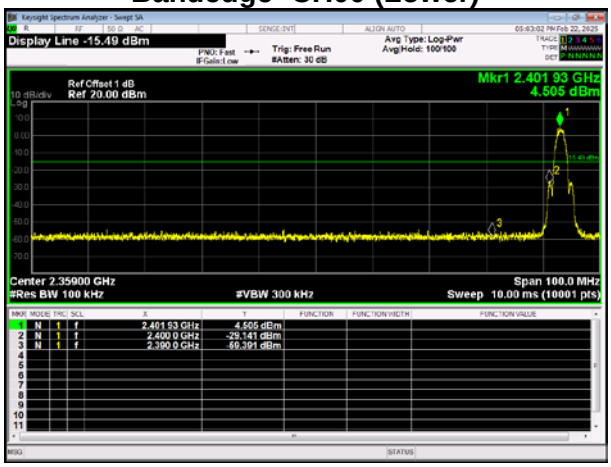


2480MHz

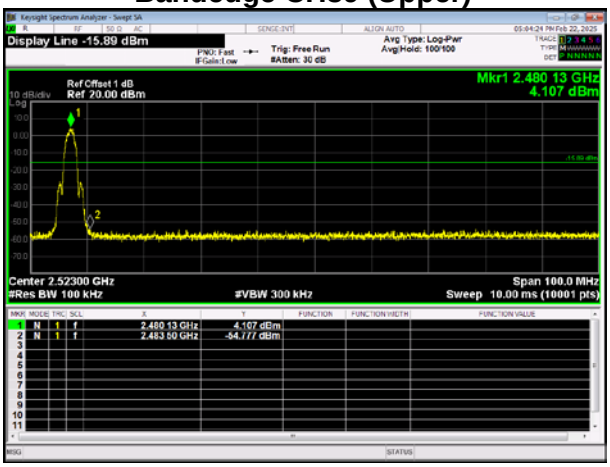


TX Mode_2Mbps

Bandedge- CH00 (Lower)

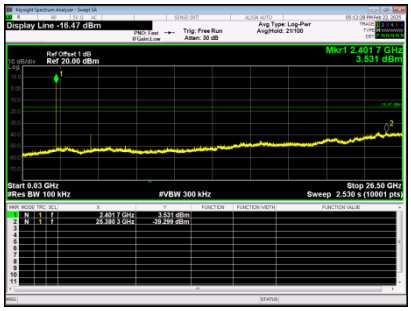


Bandedge CH39 (Upper)

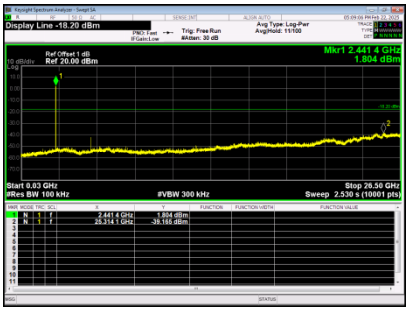


CH00 – 10th Harmonic of the fundamental frequency

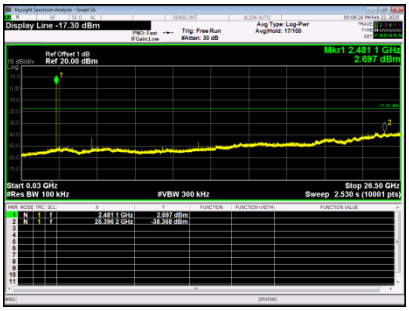
2402MHz



2440MHz



2480MHz



9 POWER SPECTRAL DENSITY TEST

9.1 LIMIT

FCC Part15, Subpart C (15.247)		
Section	Test Item	Limit
15.247(e)	Power Spectral Density	8 dBm (in any 3 kHz)

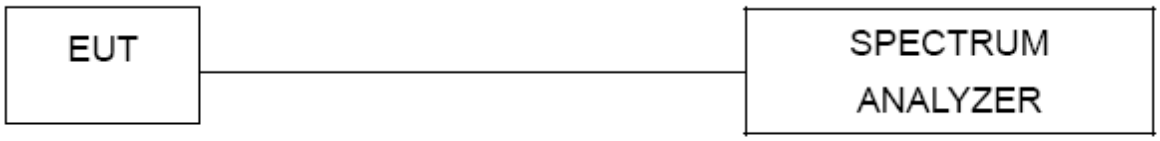
9.2 TEST PROCEDURE

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.

9.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2025/05/22
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

9.4 TEST SETUP



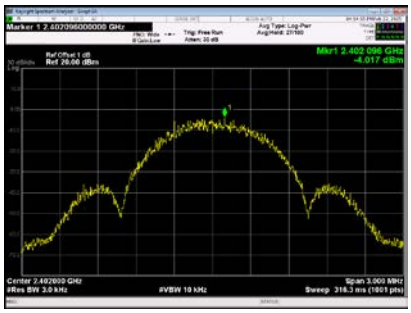
9.5 EUT OPERATION CONDITIONS

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.

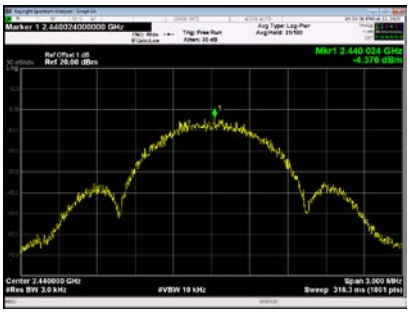
9.6 TEST RESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	Power SpectralDensity (dBm/3 kHz)	Limit: <dBm/3kHz	Result
CH00	2402	-4.017	8	PASS
CH19	2440	-4.376	8	PASS
CH39	2480	-5.419	8	PASS

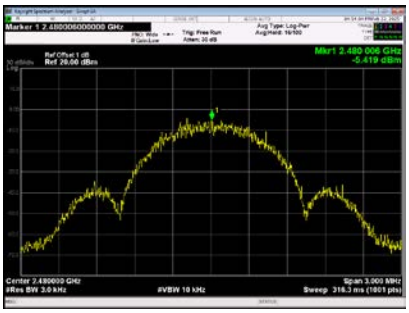
CH00



CH19

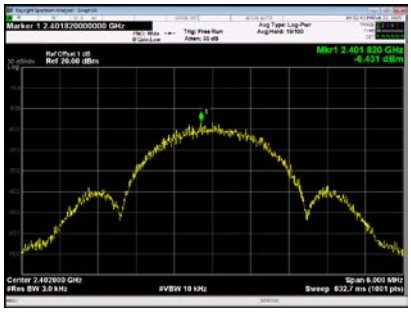


CH39

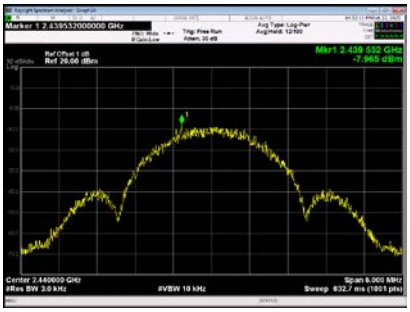


TX Mode_2Mbps				
Channel	Frequency (MHz)	Power SpectralDensity (dBm/3 kHz)	Limit: <dBm/3kHz	Result
CH00	2402	-6.431	8	PASS
CH19	2440	-7.965	8	PASS
CH39	2480	-6.864	8	PASS

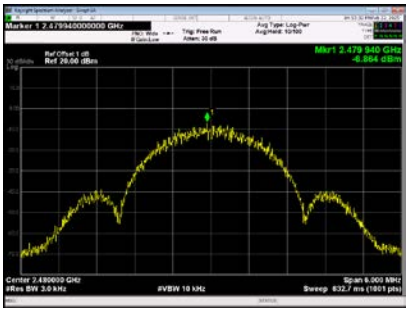
CH00



CH19



CH39



END OF TEST REPORT