

FCC &ISED Radio Test Report

FCC ID: IPH-P1160

IC: 1792A-P1160

The report concerns: Original Grant

Report Reference No.....: 24EFSS01052 01571
Date Sample(s) Received.....: 2024-01-19
Date of Tested.....: 2024-01-19 to 2024-03-02
Date of issue.....: 2024-03-05
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: Garmin international, Inc.
Address: 1200 E.151st Street,Olathe, KS, 66062, USA
Manufacturer.....: Garmin international, Inc.

Equipment.....: Low Power Data Transceiver
Trade Mark: GARMIN
Model: A0P1160
Ratings: Input: DC 3V
Output: --

Test Engineer:



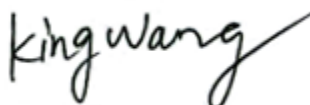
Blue Qiu

Responsible Engineer :



Smile Wang

Authorized Signatory:



King Wang

Table of Contents	Page
1 TEST REPORT DECLARE	4
2 SUMMARY OF TEST RESULTS	5
2.1 MEASUREMENT UNCERTAINTY	6
3 GENERAL INFORMATION	7
3.1 GENERAL DESCRIPTION OF EUT	7
3.2 DESCRIPTION OF TEST MODES	9
3.3 PARAMETERS OF TEST SOFTWARE	9
3.4 BLOCKDIAGRAMSHOWINGTHECONFIGURATIONOFSYSTEMTESTED	10
3.5 SUPPORT UNITS	10
3.6 TEST ENVIRONMENT CONDITIONS	10
4 RADIATED EMISSION TEST	11
4.1 LIMIT	11
4.2 TEST PROCEDURE	12
4.3 MEASUREMENT INSTRUMENTS LIST	13
4.4 TESTSETUP	13
4.5 EUT OPERATING CONDITIONS	14
4.6 TEST RESULT- 9KHZ TO 30MHZ	15
4.7 TEST RESULT- 30MHZ TO 1000MHZ	16
4.8 TEST RESULT- ABOVE 1000MHZ(BAND EDGE)	18
4.9 TEST RESULTS - ABOVE 1000MHZ(HARMONIC)	26
5 BANDWIDTH TEST	38
5.1 LIMIT	38
5.2 TEST PROCEDURE AND SETTING	38
5.3 MEASUREMENT INSTRUMENTS LIST	38
5.4 TEST SETUP	38
5.5 EUT OPERATION CONDITIONS	38
5.6 TESTRESULTS	39
6 MAXIMUM OUTPUT POWER	41
6.1 LIMIT	41
6.2 TEST PROCEDURE	41
6.3 MEASUREMENT INSTRUMENTS LIST	41
6.4 TEST SETUP	41
6.5 EUT OPERATION CONDITIONS	41
6.6 TESTRESULTS	42

Table of Contents	Page
7 CONDUCTED SPURIOUS EMISSION	44
7.1 LIMIT	44
7.2 TEST PROCEDURE	44
7.3 MEASUREMENT INSTRUMENTS LIST	44
7.4 TEST SETUP	44
7.5 EUT OPERATION CONDITIONS	44
7.6 TEST RESULTS	45
8 POWER SPECTRAL DENSITY TEST	49
8.1 LIMIT	49
8.2 TEST PROCEDURE	49
8.3 MEASUREMENT INSTRUMENTS LIST	49
8.4 TEST SETUP	49
8.5 EUT OPERATION CONDITIONS	49
8.6 TEST RESULTS	50
9 FREQUENCY STABILITY MEASUREMENT	52
9.1 LIMIT	52
9.2 TEST PROCEDURE	52
9.3 MEASUREMENT INSTRUMENTS LIST	52
9.4 TEST SETUP	52
9.5 EUT OPERATION CONDITIONS	52
9.6 TEST RESULTS	53

1TEST REPORT DECLARE

Applicant	Garmin international, Inc.
Address	1200 E.151st Street,Olathe, KS, 66062, USA
Manufacturer	Garmin international, Inc.
Address	1200 E.151st Street,Olathe, KS, 66062, USA
Factory	BURST TRANSMISSION CO., LTD
Address	Mandalay - Lashio Road, YatanarponMyothit, Plot No. 3,4,11, PyinOoLwinTownship, Mandalay Region, Myanmar.
Equipment	Low Power Data Transceiver
Model No.	A0P1160
Trade Mark	GARMIN
Standard	FCC Part15, Subpart C (15.247) RSS-247 Issue 3 August 2023 RSS-Gen Issue 5, Mar. 2019 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.

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	N/A	-----
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 to comply with the provisions of 15.203.

2.1 MEASUREMENT UNCERTAINTY

Test Item	Uncertainty
Uncertainty for Conduction emission 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	$\pm 0.048\text{kHz}$
Uncertainty for conducted RF Power	$\pm 0.32\text{dB}$

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

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Low Power Data Transceiver	
Brand Name	GARMIN	
Test Model	A0P1160	
Series Model	N/A	
Model Difference(s)	N/A	
Hardware Version	RGARB0453_MAIN_s20230829	
Software Version	V1.09	
PowerSource	Supplied from Battery.	
Power Rating	DC 3V	
Operation Frequency	2402 MHz ~ 2480 MHz	
Modulation Technology	GFSK	
Bit Rate of Transmitter	1Mbps/2Mbps	
Antenna Information	Antenna Type: Ceramic	Maximum Peak Gain: -0.65dBi
Max. Output Power	1Mbps: 1.931dBm(0.001560 W) 2Mbps: 1.700dBm(0.001479 W)	

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	TX Mode NOTE (1)
Mode 2	TX Mode Channel 39_2Mbps

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

Radiated emissions test - Below 1GHz	
Final Test Mode	Description
Mode 2	TX Mode Channel 39_2Mbps

Radiated emissions test - Above 1GHz	
Final Test Mode	Description
Mode 1	TX Mode NOTE (1)

Conducted test	
Final Test Mode	Description
Mode 1	TX Mode NOTE (1)

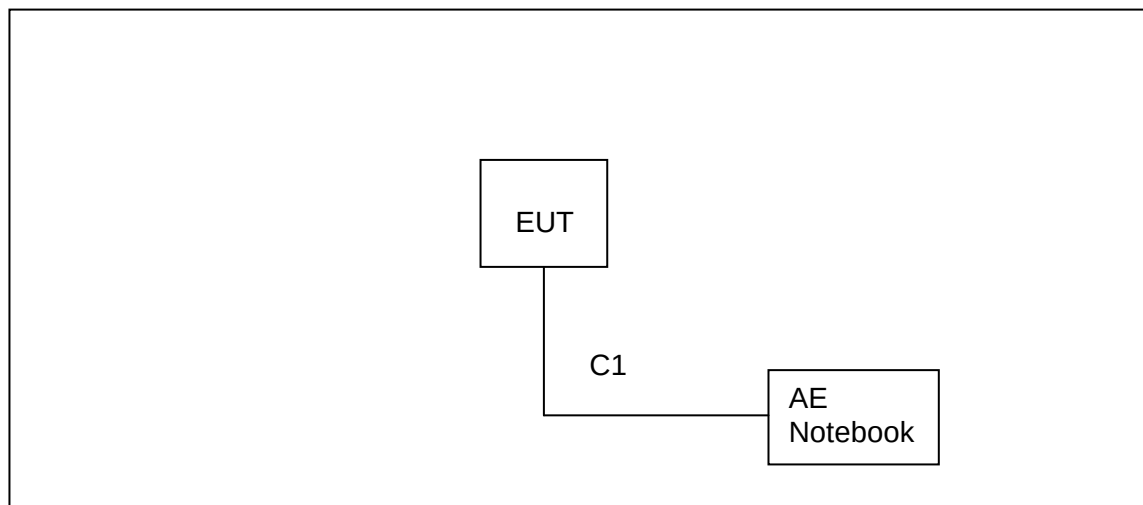
Note:

(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	CustomIOPButtonApp		
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.
AE	Notebook	Lenovo	/	/

Item	Cable Type	Shielded Type	Ferrite Core	Length
C1	DC Cable	/	/	0.8m

3.6 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage
AC Power Line Conducted Emissions	/	/	/
Radiated Emissions-9K-30MHz	23.5°C	53%	DC 3V
Radiated Emissions-30 MHz to 1GHz	23.5°C	53%	DC 3V
Radiated Emissions-Above 1000 MHz	23.5°C	53%	DC 3V
Bandwidth	24.1°C	55%	DC 3V
Maximum Output Power	24.1°C	55%	DC 3V
Conducted Spurious Emission	24.1°C	55%	DC 3V
Power Spectral Density	24.1°C	55%	DC 3V

4 RADIATED EMISSION TEST

4.1 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).

4.2 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 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

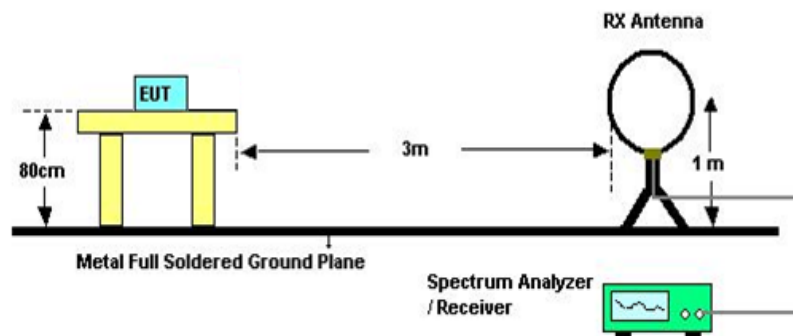
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz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

4.3 MEASUREMENT INSTRUMENTS LIST

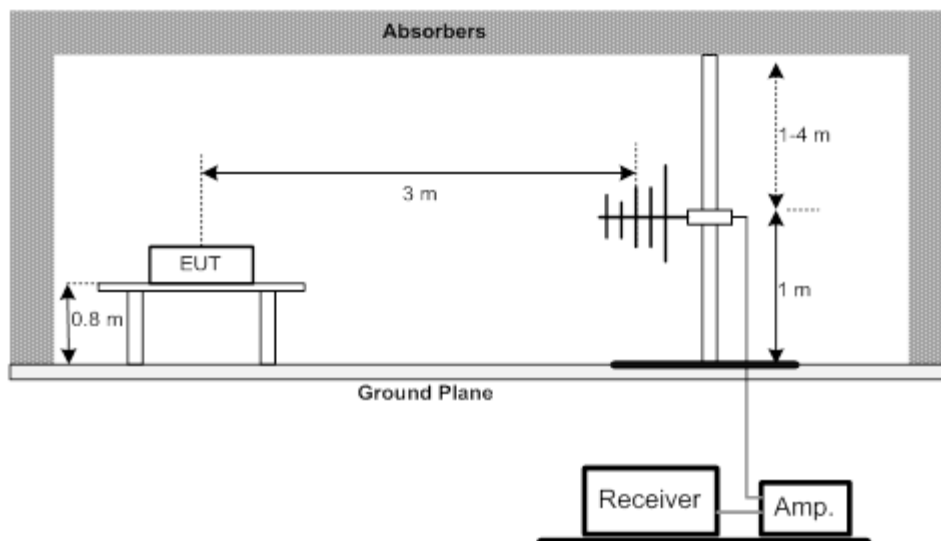
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	101307	12/04/2024
2	Spectrum Analyzer	Agilent	E4407B	US40240708	11/06/2024
3	Loop antenna	SCHWARZBECK K	FMZB1519	1519-062	01/14/2025
4	Broadband antenna	SCHWARZBECK	VULB9168	VULB9168-192	07/02/2024
5	HORN ANTENNA	SCHWARZBECK	BBHA9120D	9120D 1065	04/09/2024
6	Preamplifier Amplifier	HP	8447F	3113A05680	12/04/2024
7	PRE-AMPLIFIER	EMEC	EM01G26G	980136	04/05/2024
8	RF Cable	R&S	Test Cable 4	4	12/04/2024
9	RF Cable	R&S	Test Cable 5	5	12/04/2024
10	RF Cable	R&S	Test Cable 9	8	04/18/2024
11	RF Cable	R&S	Test Cable 10	9	04/18/2024
12	Measurement Software	Farad	EZ-EMC (Ver.ATT-03A)	N/A	N/A

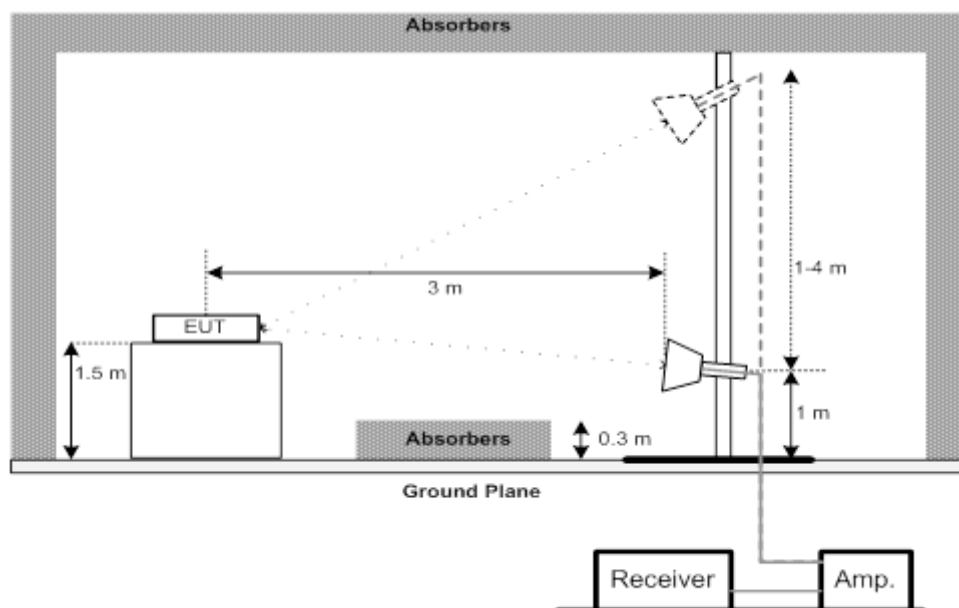
4.4 TEST SETUP

9 kHz-30 MHz



30 MHz to 1 GHz



Above 1 GHz**4.5 EUT OPERATING CONDITIONS**

The EUT was programmed to be in continuously transmitting mode.

4.6 TEST RESULT- 9kHz TO 30MHz

Test Mode:	TX Mode Channel 39_2Mbps
------------	--------------------------

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.

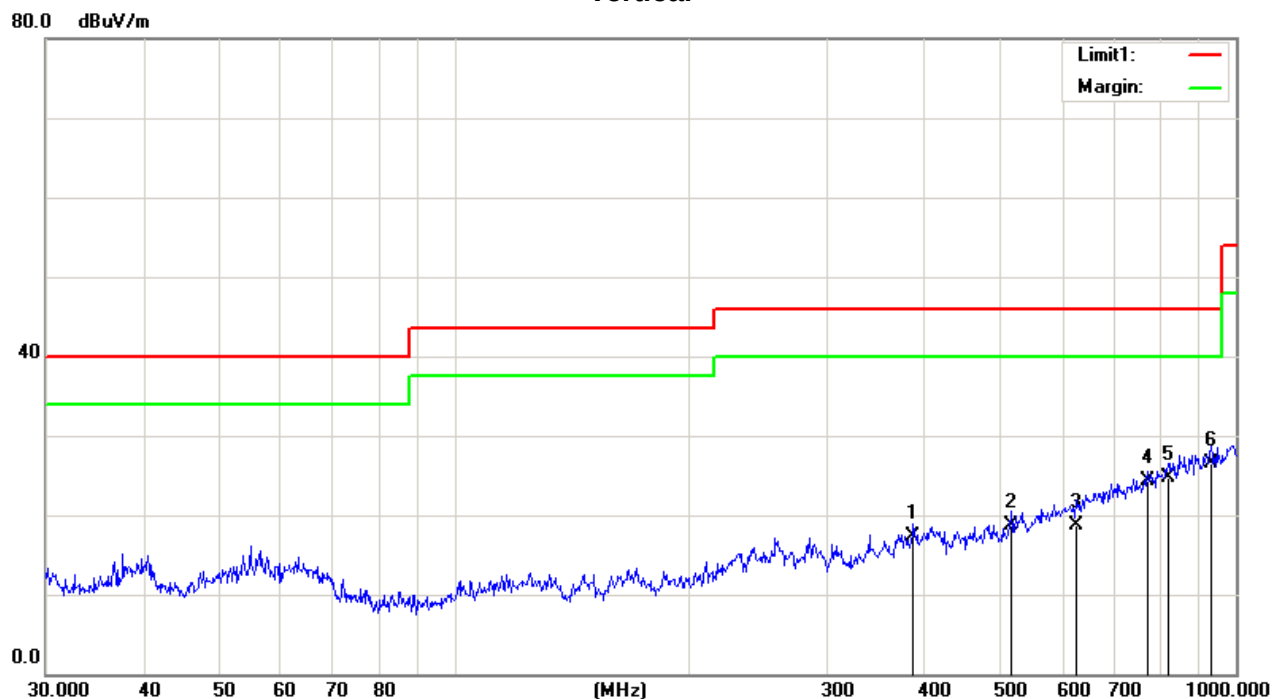
Distance extrapolation factor = $20 \log (\text{specific distance/test distance})(\text{dB})$;

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

4.7 TEST RESULT- 30MHz TO 1000MHz

Test Mode : TX Mode Channel 39_2Mbps

Vertical



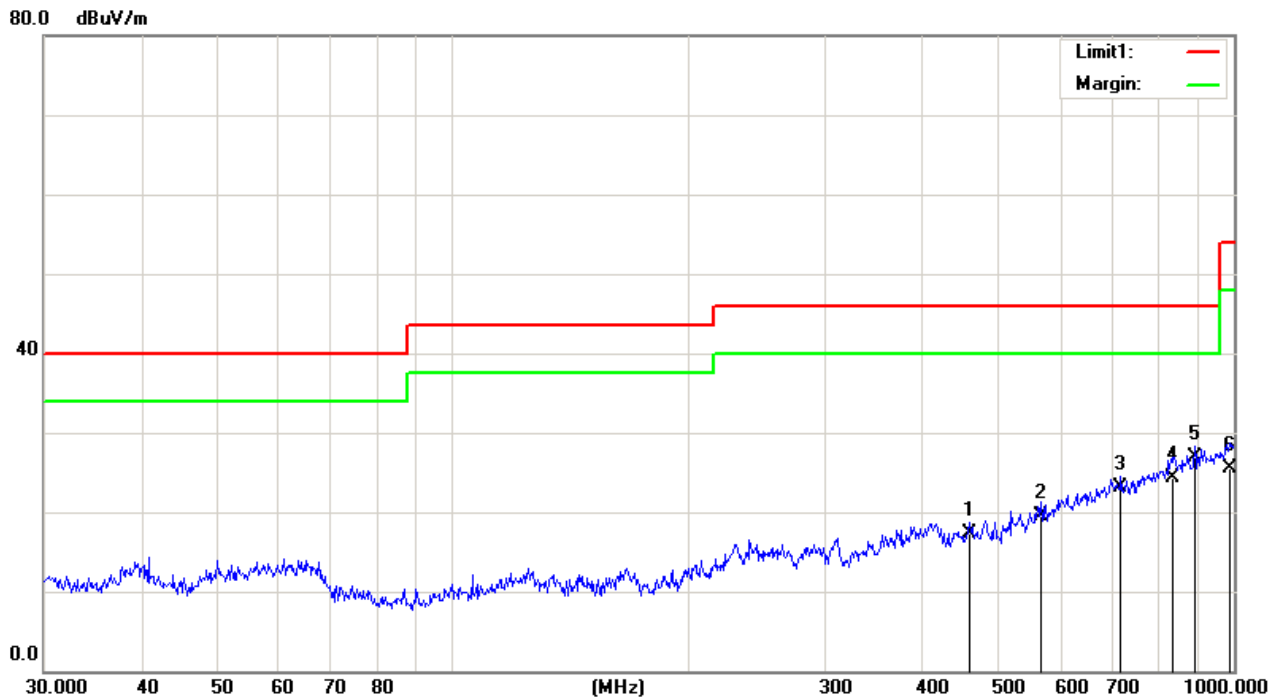
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		386.6338	24.46	-7.10	17.36	46.00	-28.64	QP	100	98
2		515.4374	25.99	-7.34	18.65	46.00	-27.35	QP	100	148
3		625.0779	22.81	-4.07	18.74	46.00	-27.26	QP	100	136
4		771.4486	25.53	-1.21	24.32	46.00	-21.68	QP	100	159
5		818.8341	24.40	0.29	24.69	46.00	-21.31	QP	100	147
6	*	929.0081	24.67	1.74	26.41	46.00	-19.59	QP	100	188

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode : TX Mode Channel 39_2Mbps

Horizontal



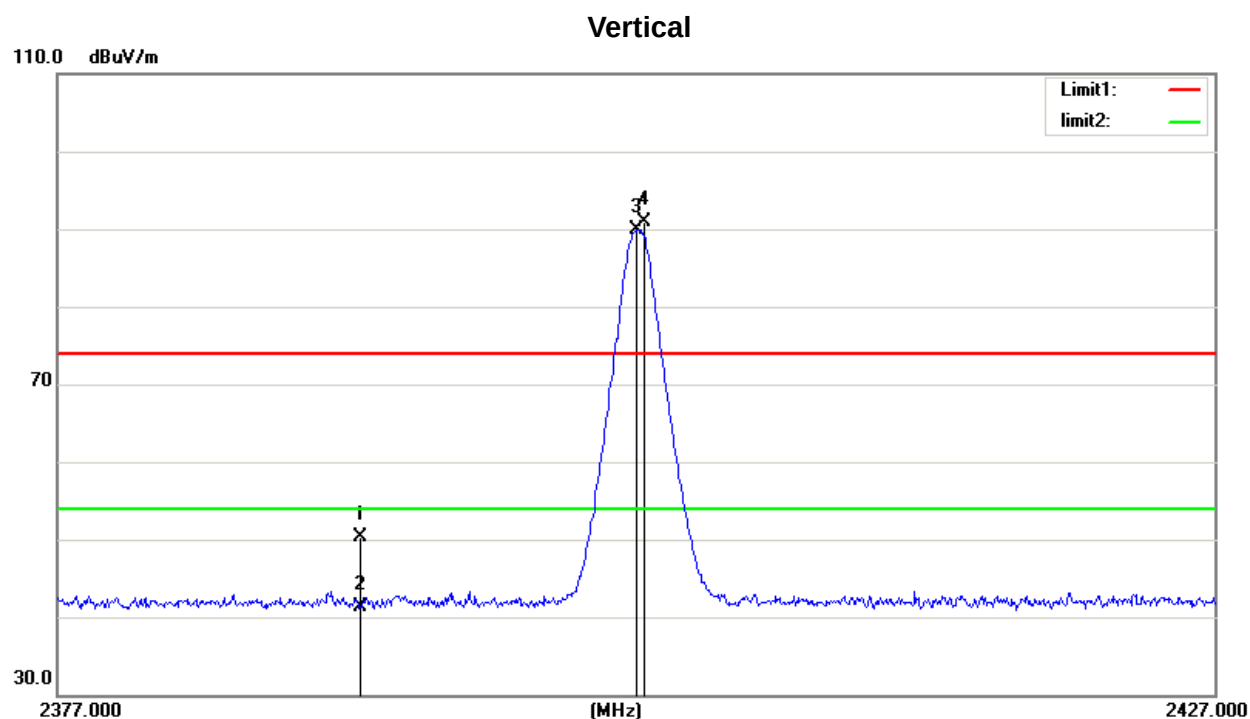
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		459.1143	24.53	-7.30	17.23	46.00	-28.77	QP	100	135
2		566.6221	25.36	-5.78	19.58	46.00	-26.42	QP	100	149
3		716.6820	25.32	-2.20	23.12	46.00	-22.88	QP	100	124
4		836.2441	24.09	0.27	24.36	46.00	-21.64	QP	100	168
5	*	890.7278	25.17	1.68	26.85	46.00	-19.15	QP	100	195
6		989.5353	21.90	3.51	25.41	54.00	-28.59	QP	100	234

*:Maximum data x:Over limit !:over margin

(Reference Only)

4.8 TEST RESULT- ABOVE 1000MHz(BAND EDGE)

Test Mode: TX 2402 MHz_CH00_1Mbps



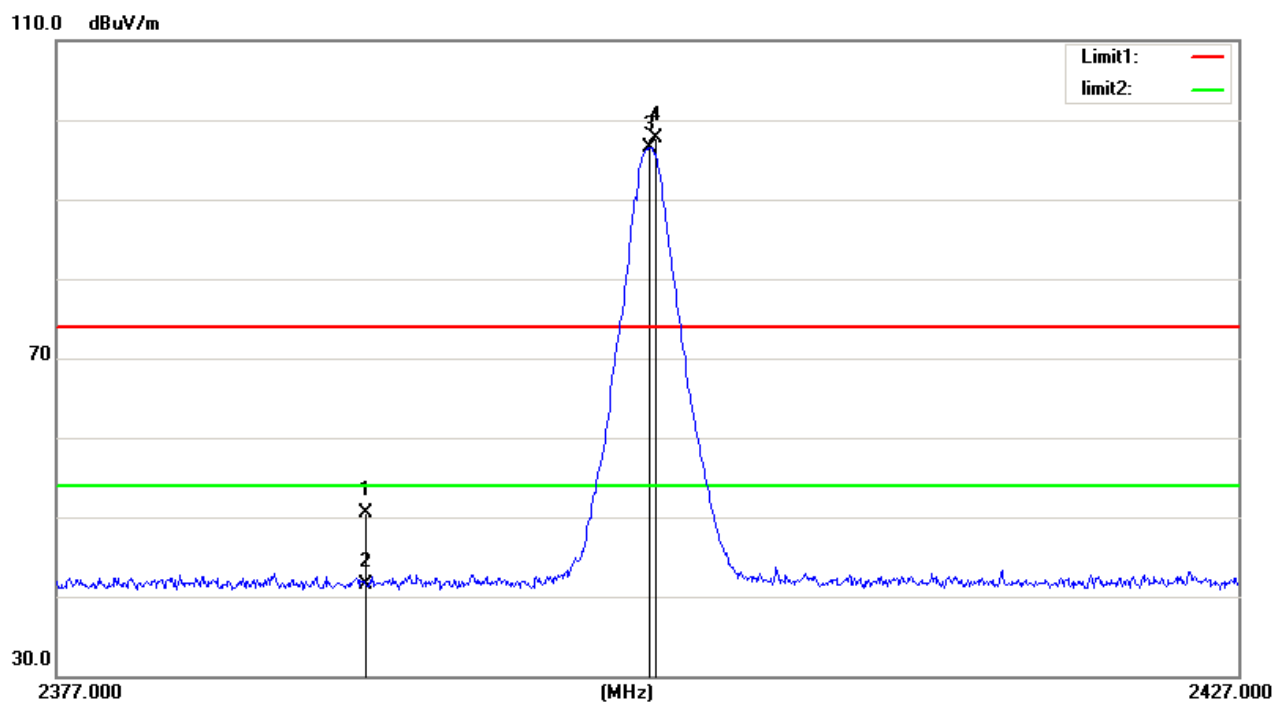
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		2390.000	20.09	30.14	50.23	74.00	-23.77	peak	150	190
2		2390.000	11.23	30.14	41.37	54.00	-12.63	AVG	150	190
3	*	2401.950	59.75	30.16	89.91	54.00	35.91	AVG	150	190 No Limit
4	X	2402.250	60.80	30.16	90.96	74.00	16.96	peak	150	190 No Limit

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2402 MHz_CH00_1Mbps

Horizontal



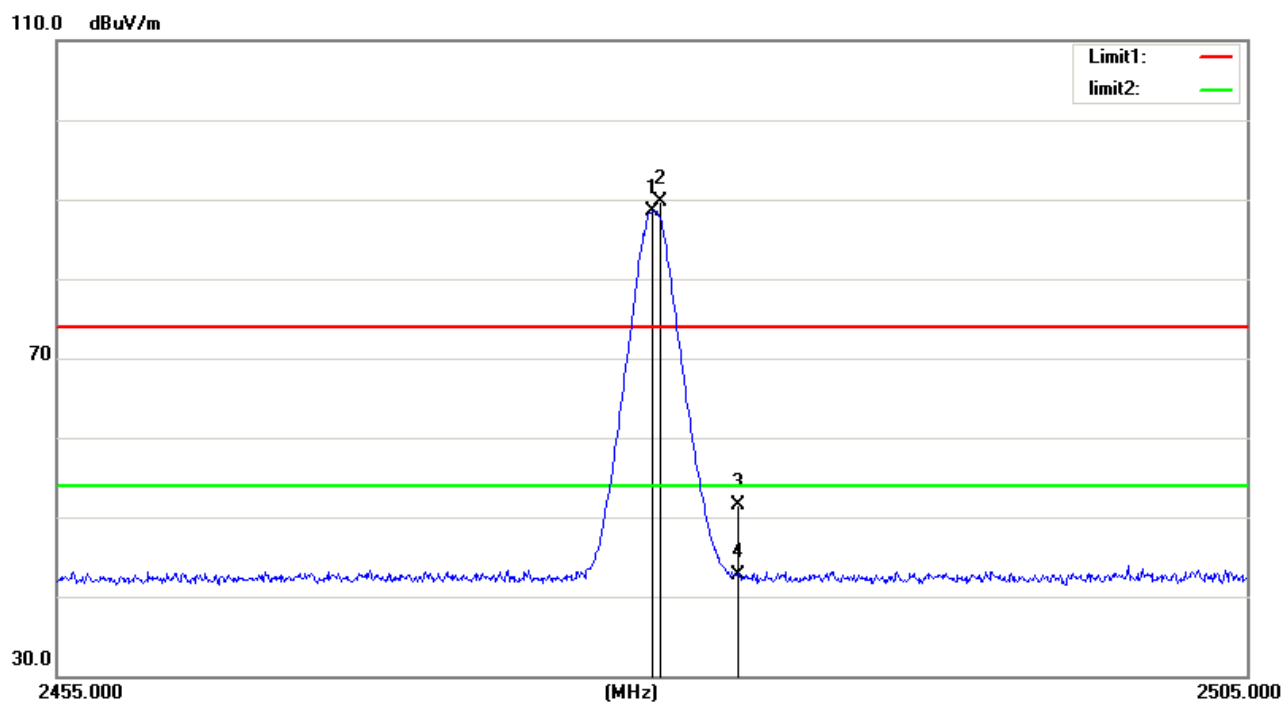
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		2390.000	20.30	30.14	50.44	74.00	-23.56	peak	150	66	
2		2390.000	11.44	30.14	41.58	54.00	-12.42	AVG	150	66	
3	*	2401.950	66.40	30.16	96.56	54.00	42.56	AVG	150	66	No Limit
4	X	2402.250	67.46	30.16	97.62	74.00	23.62	peak	150	66	No Limit

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2480 MHz_CH39_1Mbps

Vertical



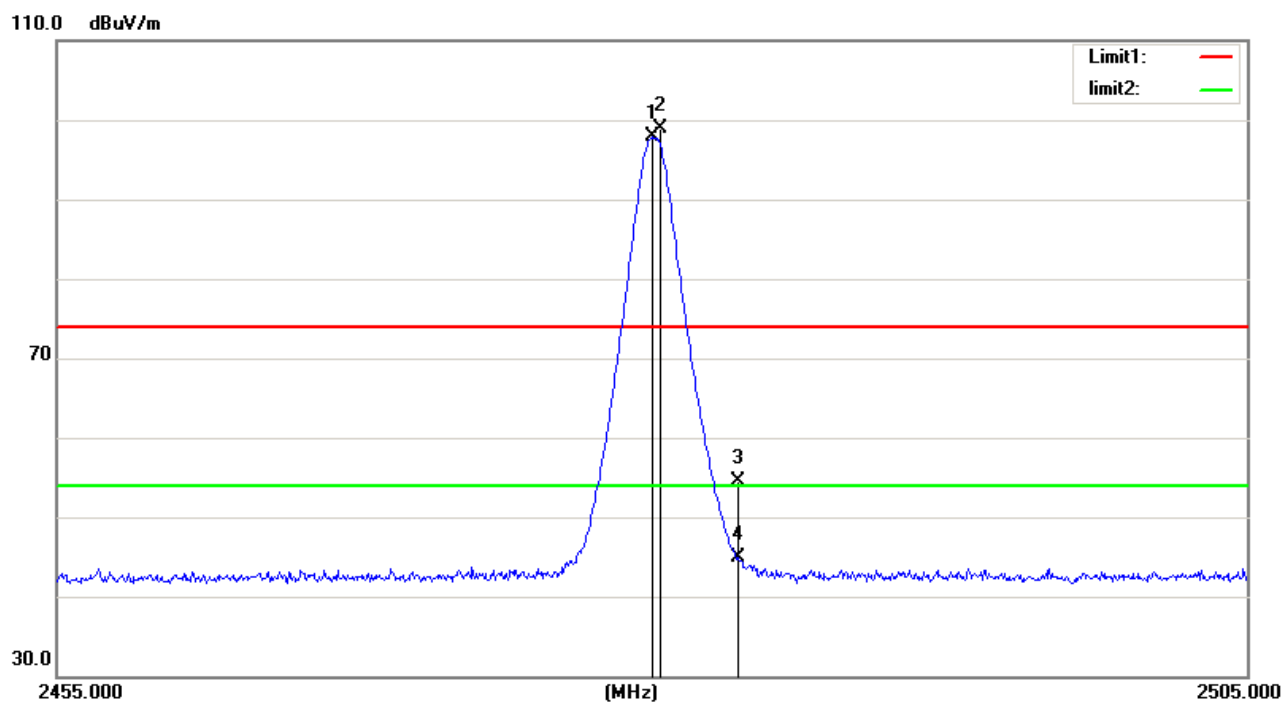
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1	*	2479.950	58.24	30.34	88.58	54.00	34.58	AVG	150	79	No Limit
2	X	2480.250	59.31	30.34	89.65	74.00	15.65	peak	150	79	No Limit
3		2483.500	21.23	30.34	51.57	74.00	-22.43	peak	150	79	
4		2483.500	12.37	30.34	42.71	54.00	-11.29	AVG	150	79	

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2480 MHz_CH39_1Mbps

Horizontal



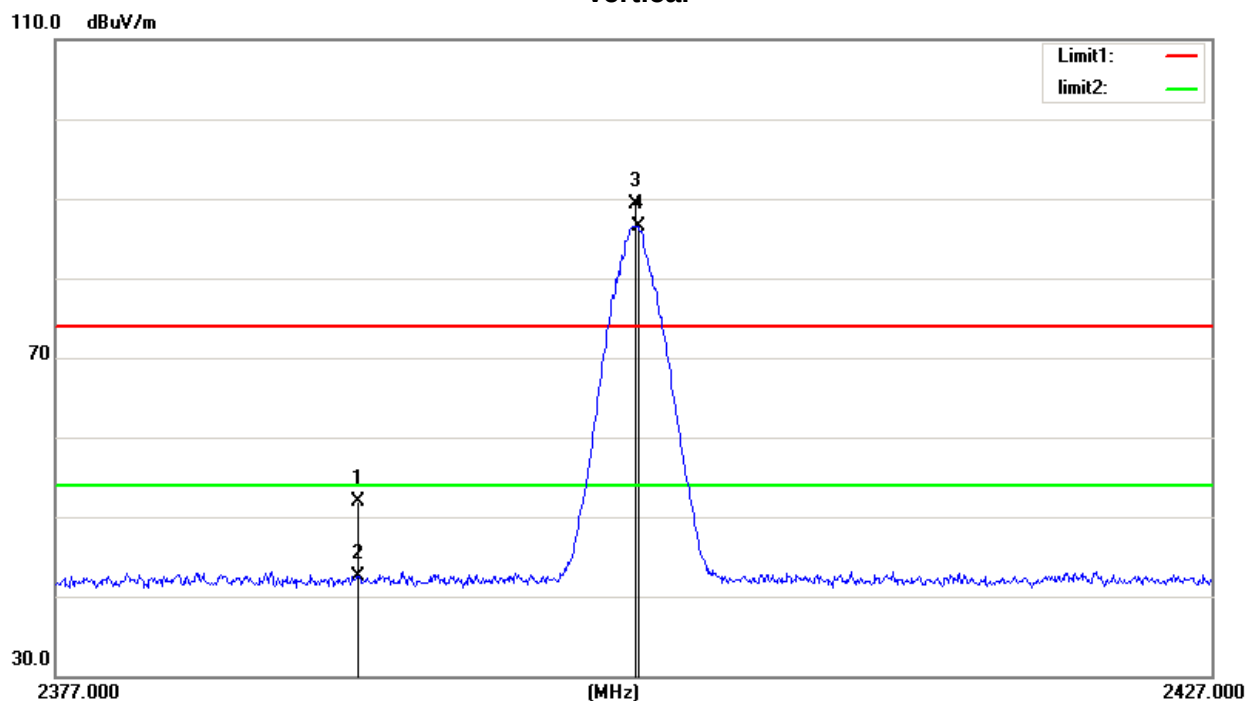
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	*	2479.950	67.53	30.34	97.87	54.00	43.87	AVG	150	28	No Limit
2	X	2480.250	68.62	30.34	98.96	74.00	24.96	peak	150	28	No Limit
3		2483.500	24.12	30.34	54.46	74.00	-19.54	peak	150	28	
4		2483.500	14.53	30.34	44.87	54.00	-9.13	AVG	150	28	

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2402 MHz_CH00_2Mbps

Vertical



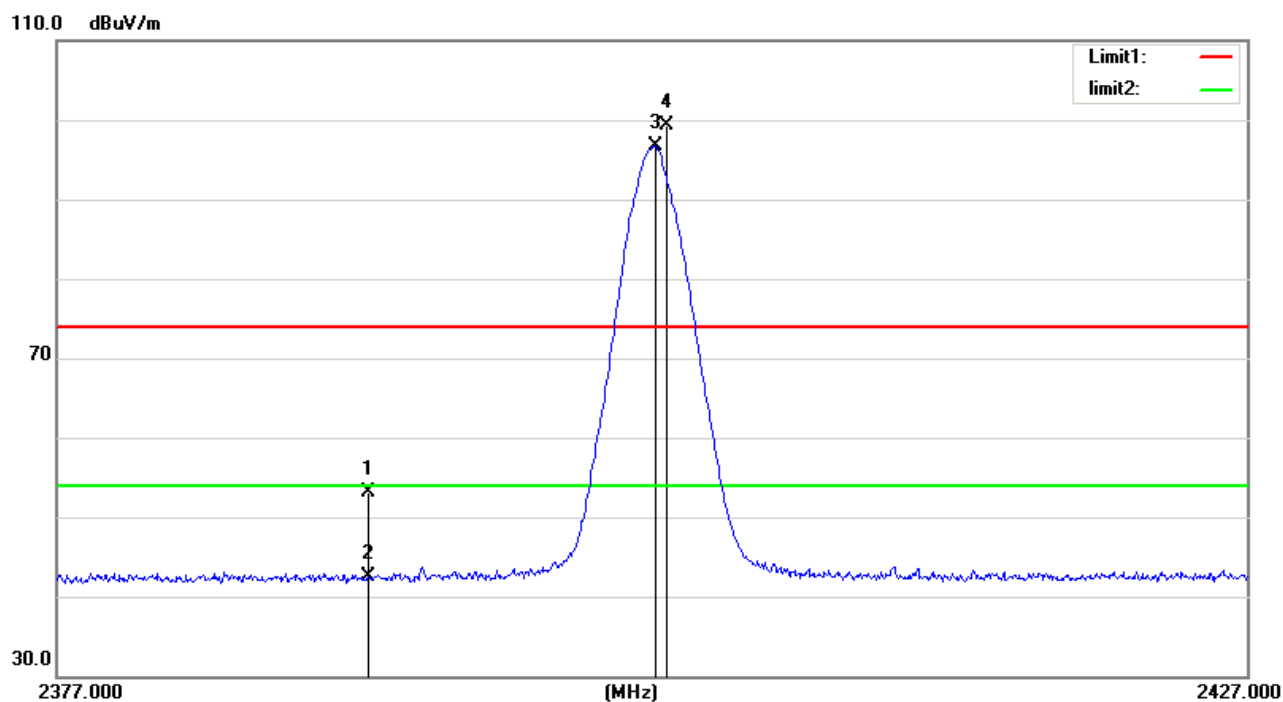
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree
1		2390.000	21.80	30.14	51.94	74.00	-22.06	peak	150	212
2		2390.000	12.33	30.14	42.47	54.00	-11.53	AVG	150	212
3	X	2402.000	59.15	30.16	89.31	74.00	15.31	peak	150	212
4	*	2402.100	56.42	30.16	86.58	54.00	32.58	AVG	150	212

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2402 MHz_CH00_2Mbps

Horizontal



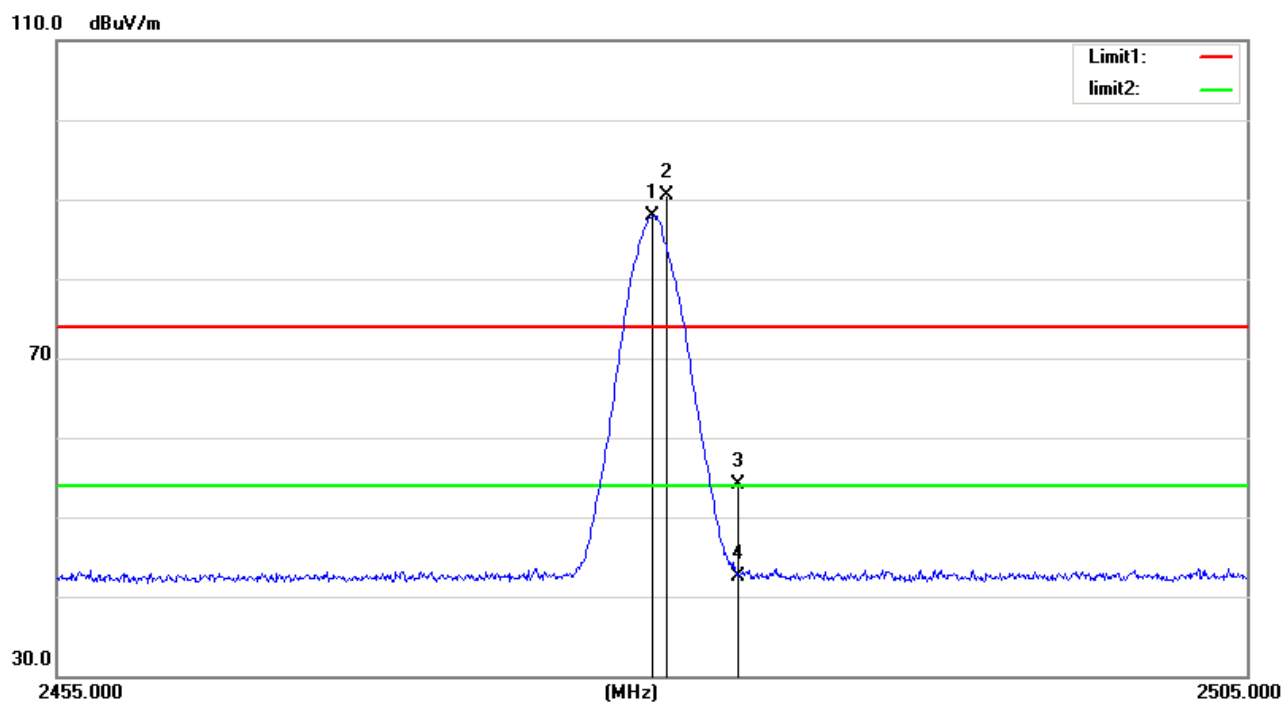
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		2390.000	23.02	30.14	53.16	74.00	-20.84	peak	150	294	
2		2390.000	12.36	30.14	42.50	54.00	-11.50	AVG	150	294	
3	*	2402.050	66.49	30.16	96.65	54.00	42.65	AVG	150	294	No Limit
4	X	2402.500	69.22	30.17	99.39	74.00	25.39	peak	150	294	No Limit

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2480 MHz_CH39_2Mbps

Vertical



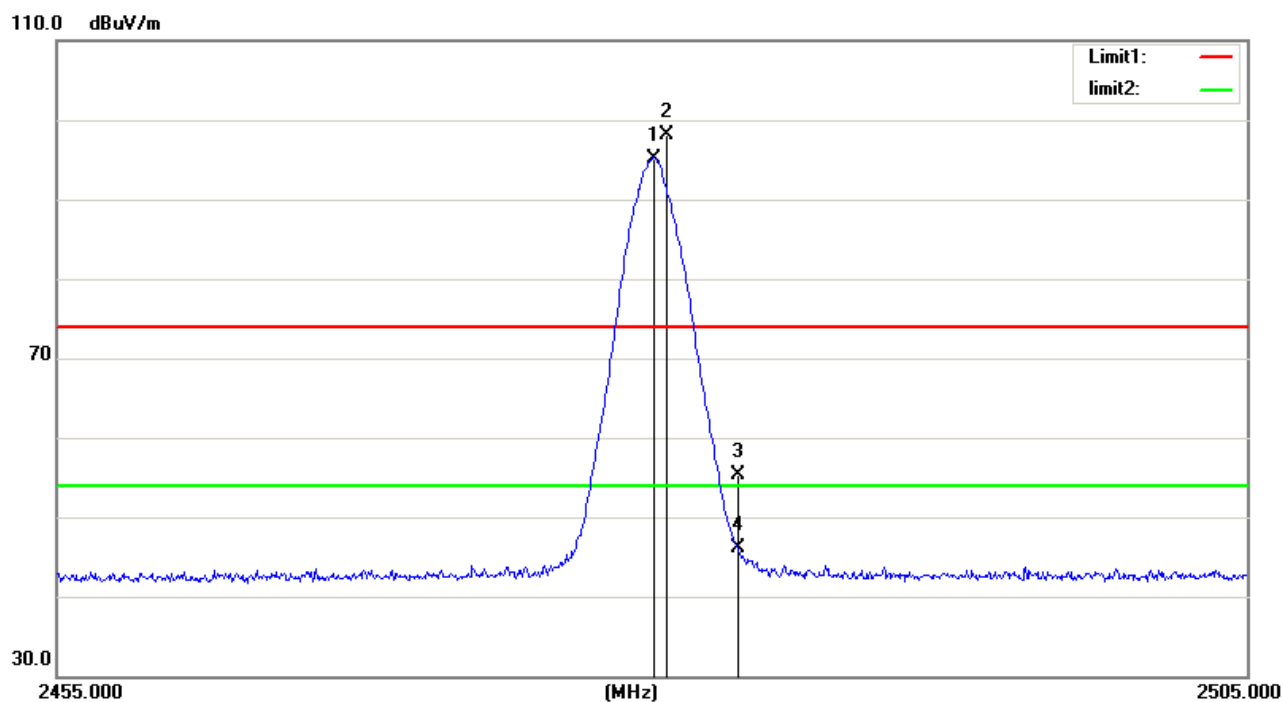
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	Antenna Height	Table Degree		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	*	2479.950	57.58	30.34	87.92	54.00	33.92	AVG	150	71	No Limit
2	X	2480.550	60.25	30.34	90.59	74.00	16.59	peak	150	71	No Limit
3		2483.500	23.81	30.34	54.15	74.00	-19.85	peak	150	71	
4		2483.500	12.24	30.34	42.58	54.00	-11.42	AVG	150	71	

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2480 MHz_CH39_2Mbps

Horizontal



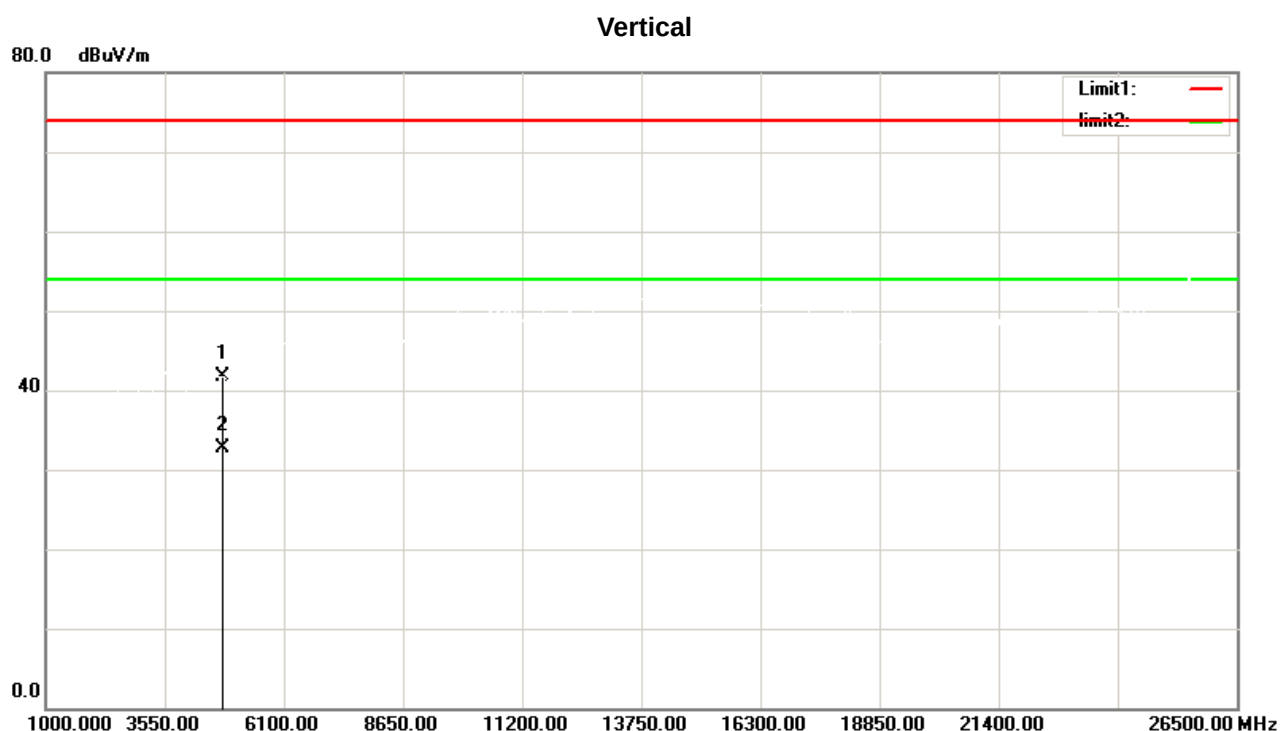
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree		
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	*	2480.000	64.86	30.34	95.20	54.00	41.20	AVG	150	32	No Limit
2	X	2480.500	67.68	30.34	98.02	74.00	24.02	peak	150	32	No Limit
3		2483.500	25.05	30.34	55.39	74.00	-18.61	peak	150	32	
4		2483.500	15.68	30.34	46.02	54.00	-7.98	AVG	150	32	

*:Maximum data x:Over limit !:over margin

(Reference Only)

4.9TEST RESULTS - ABOVE 1000MHz(HARMONIC)

Test Mode: TX 2402 MHz_CH00_1Mbps



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		4804.000	48.97	-7.26	41.71	74.00	-32.29	peak	150	148
2	*	4804.000	40.00	-7.26	32.74	54.00	-21.26	AVG	150	148

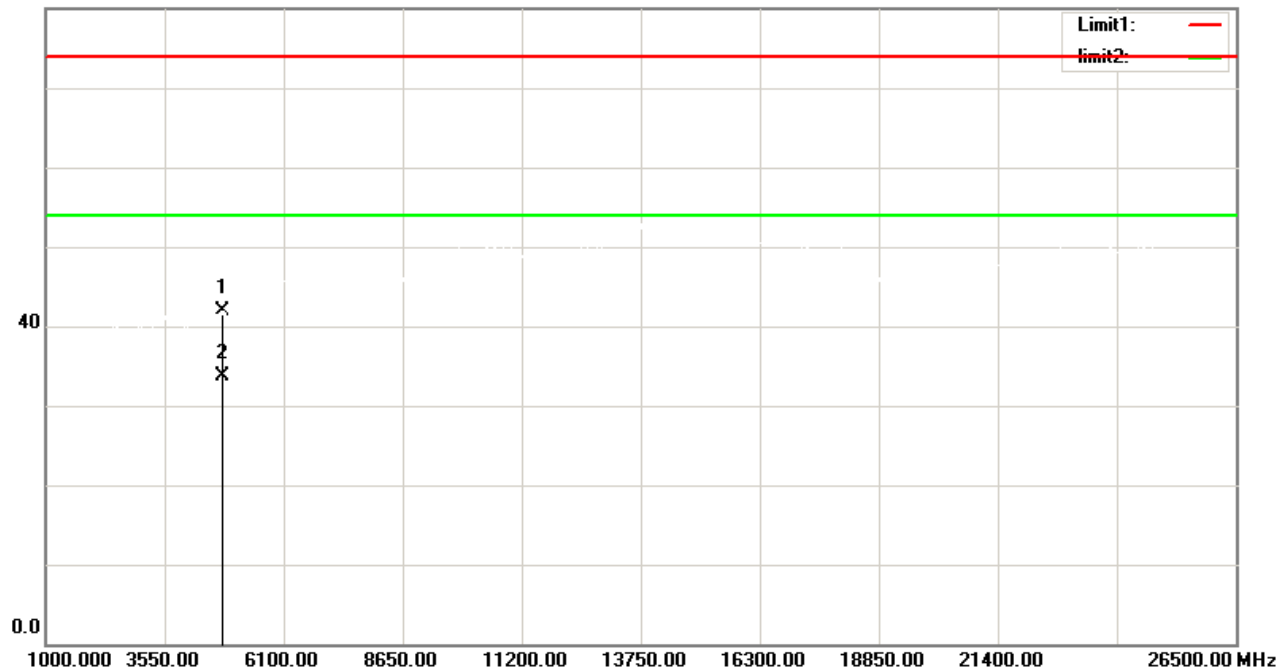
*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2402 MHz_CH00_1Mbps

Horizontal

80.0 dBuV/m



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		4804.000	49.09	-7.26	41.83	74.00	-32.17	peak	150	132
2	*	4804.000	40.95	-7.26	33.69	54.00	-20.31	AVG	150	132

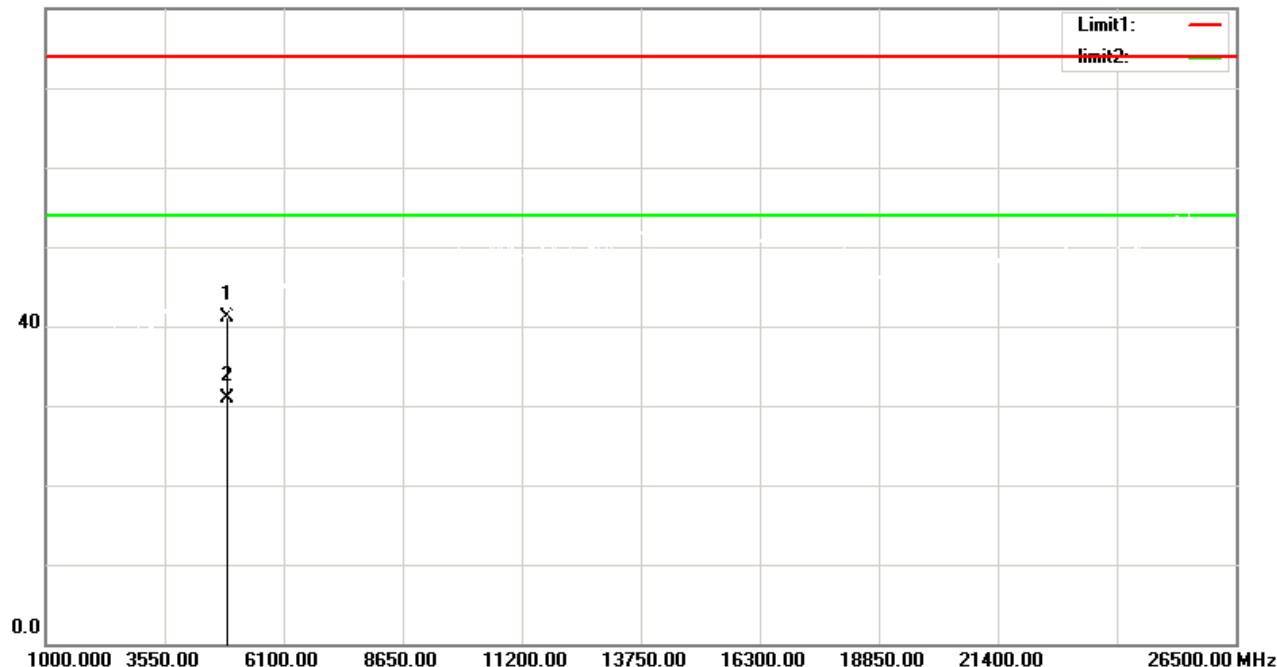
*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2440 MHz_CH19_1Mbps

Vertical

80.0 dBuV/m



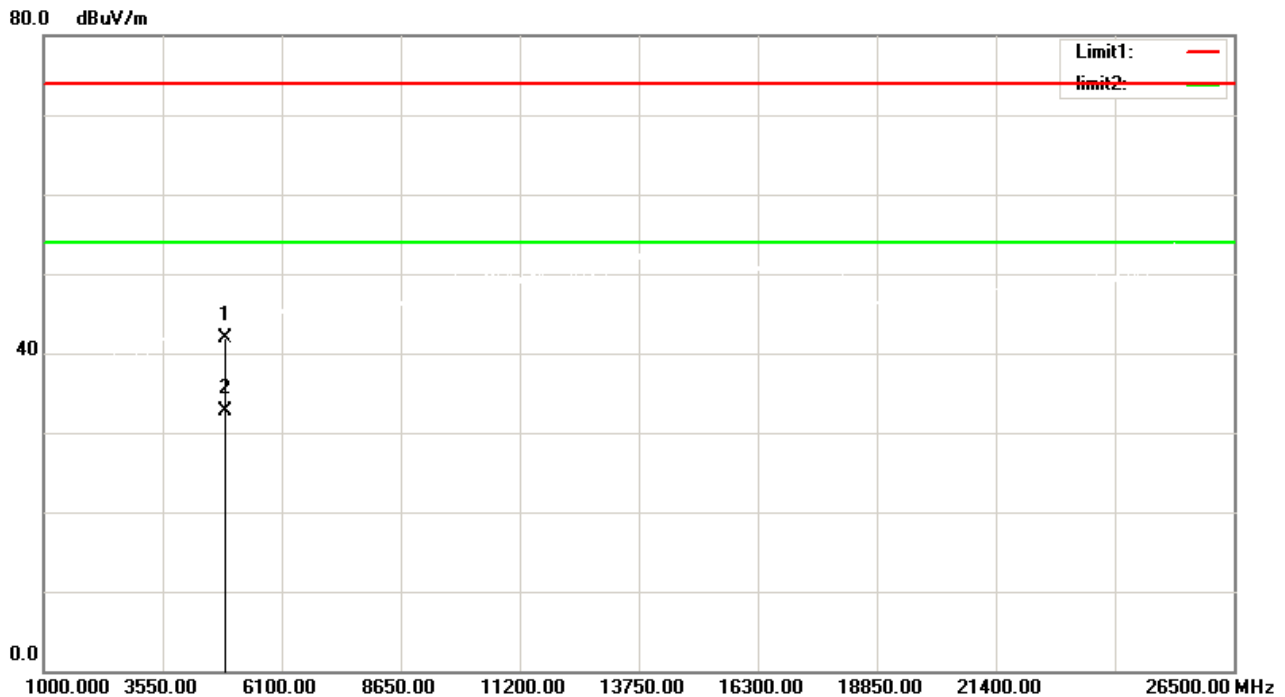
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		4880.000	48.07	-7.03	41.04	74.00	-32.96	peak	150	162
2	*	4880.000	37.98	-7.03	30.95	54.00	-23.05	AVG	150	162

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2440 MHz_CH19_1Mbps

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		4880.000	48.93	-7.03	41.90	74.00	-32.10	peak	150	125
2	*	4880.000	39.72	-7.03	32.69	54.00	-21.31	AVG	150	125

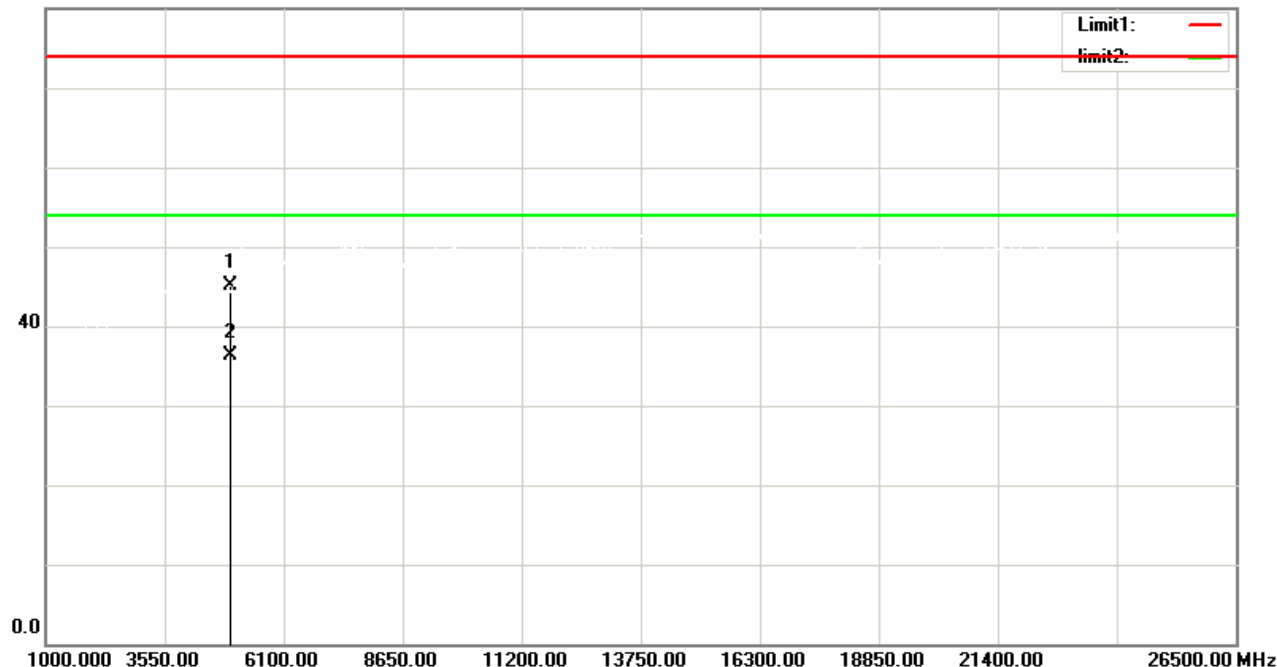
*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2480 MHz_CH39_1Mbps

Vertical

80.0 dBuV/m



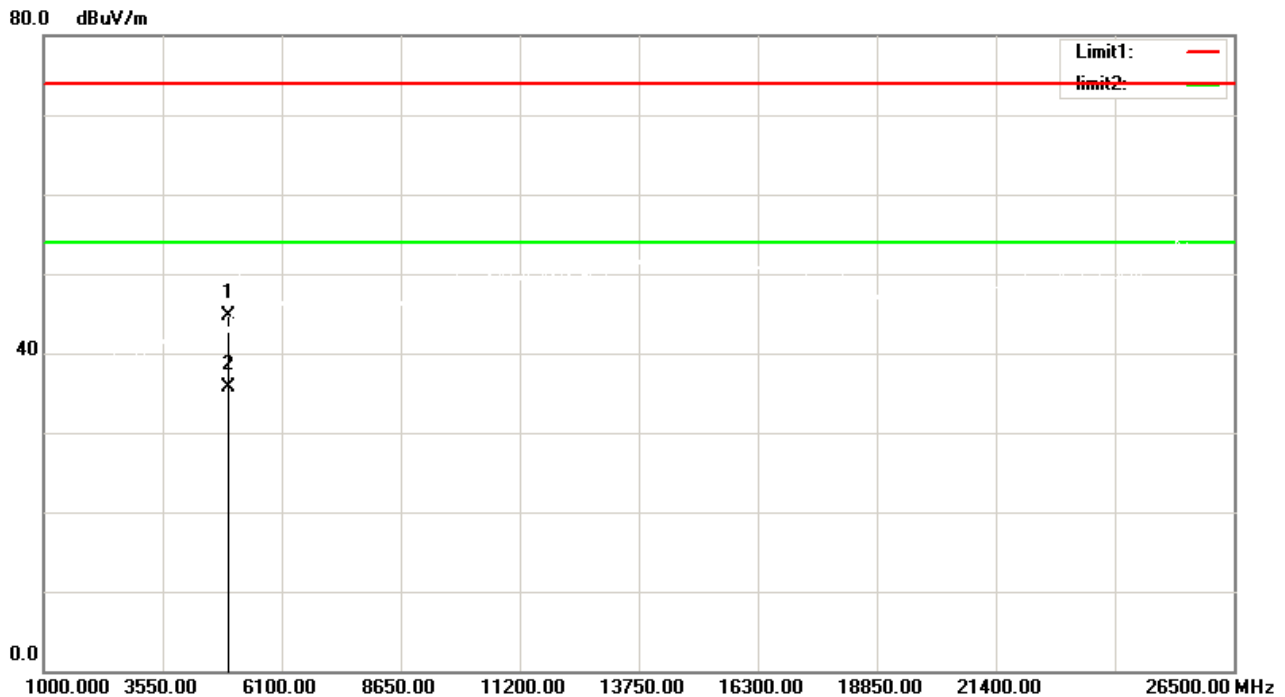
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		4960.000	51.80	-6.78	45.02	74.00	-28.98	peak	150	123
2	*	4960.000	43.02	-6.78	36.24	54.00	-17.76	AVG	150	123

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2480 MHz_CH39_1Mbps

Horizontal

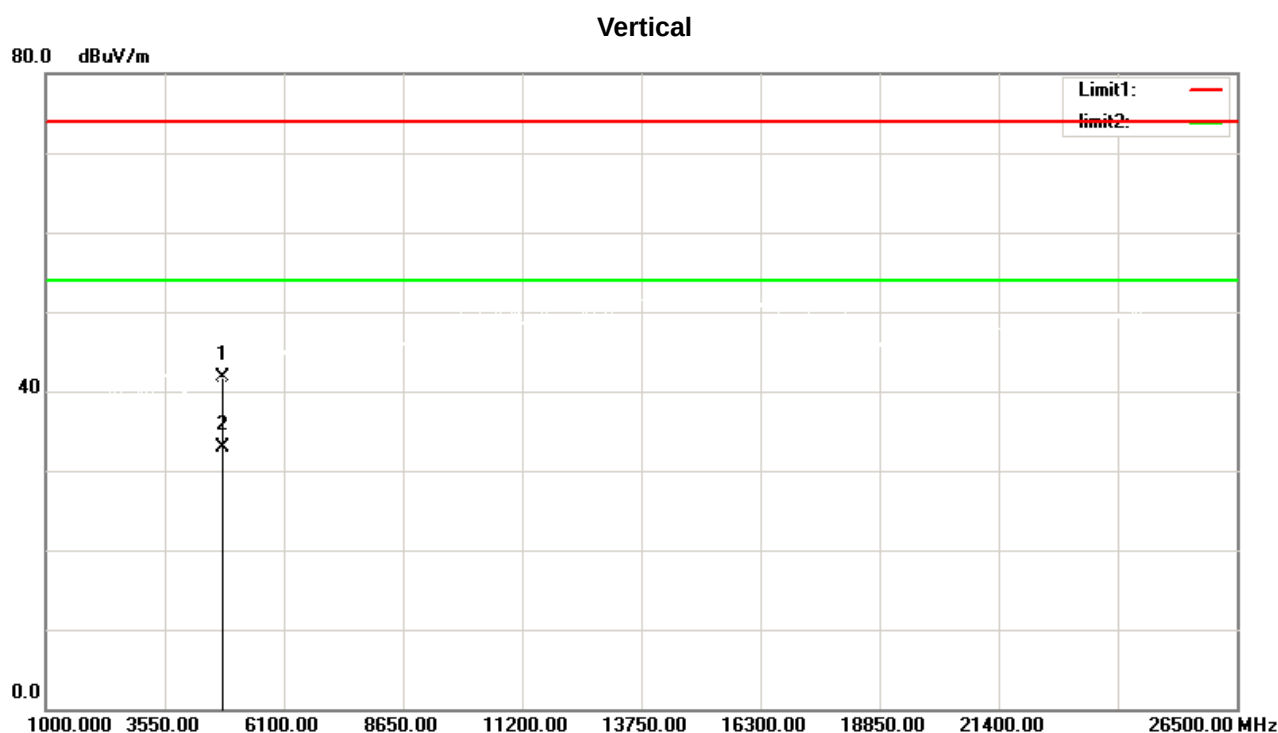


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		4960.000	51.56	-6.78	44.78	74.00	-29.22	peak	150	149
2	*	4960.000	42.42	-6.78	35.64	54.00	-18.36	AVG	150	149

*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2402 MHz_CH00_2Mbps



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		4804.000	49.02	-7.26	41.76	74.00	-32.24	peak	150	112	
2	*	4804.000	40.24	-7.26	32.98	54.00	-21.02	AVG	150	112	

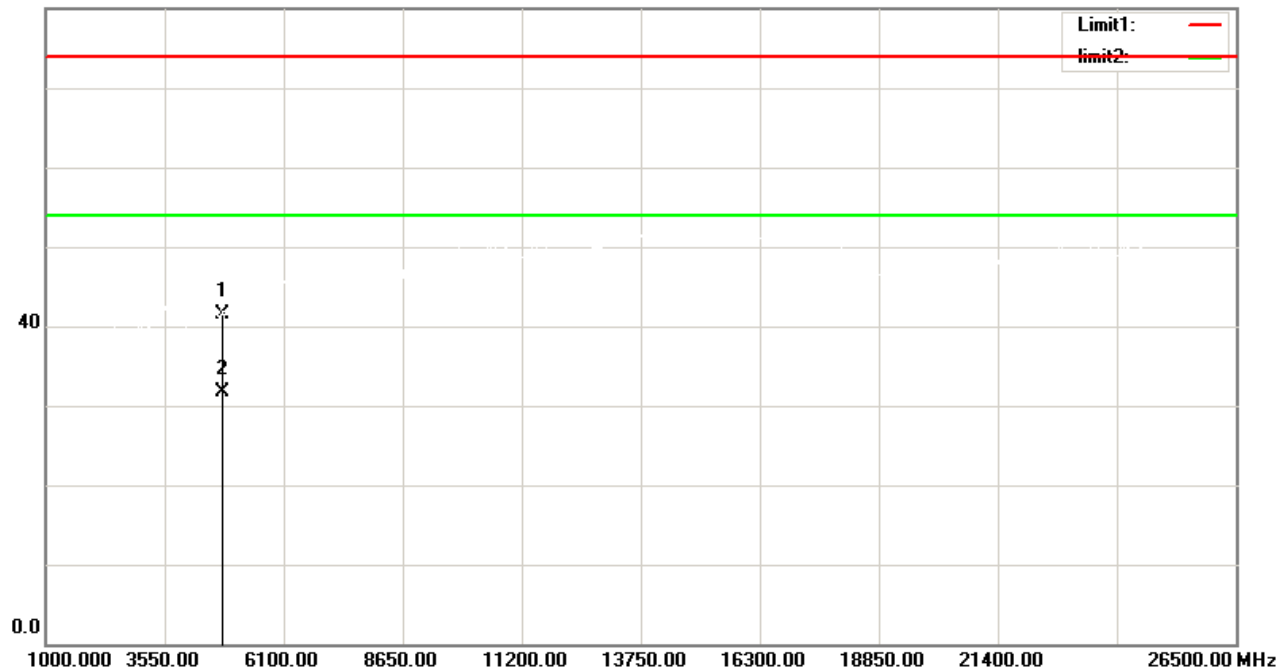
*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2402 MHz_CH00_2Mbps

Horizontal

80.0 dBuV/m



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		4804.000	48.72	-7.26	41.46	74.00	-32.54	peak	150	143
2	*	4804.000	38.95	-7.26	31.69	54.00	-22.31	AVG	150	143

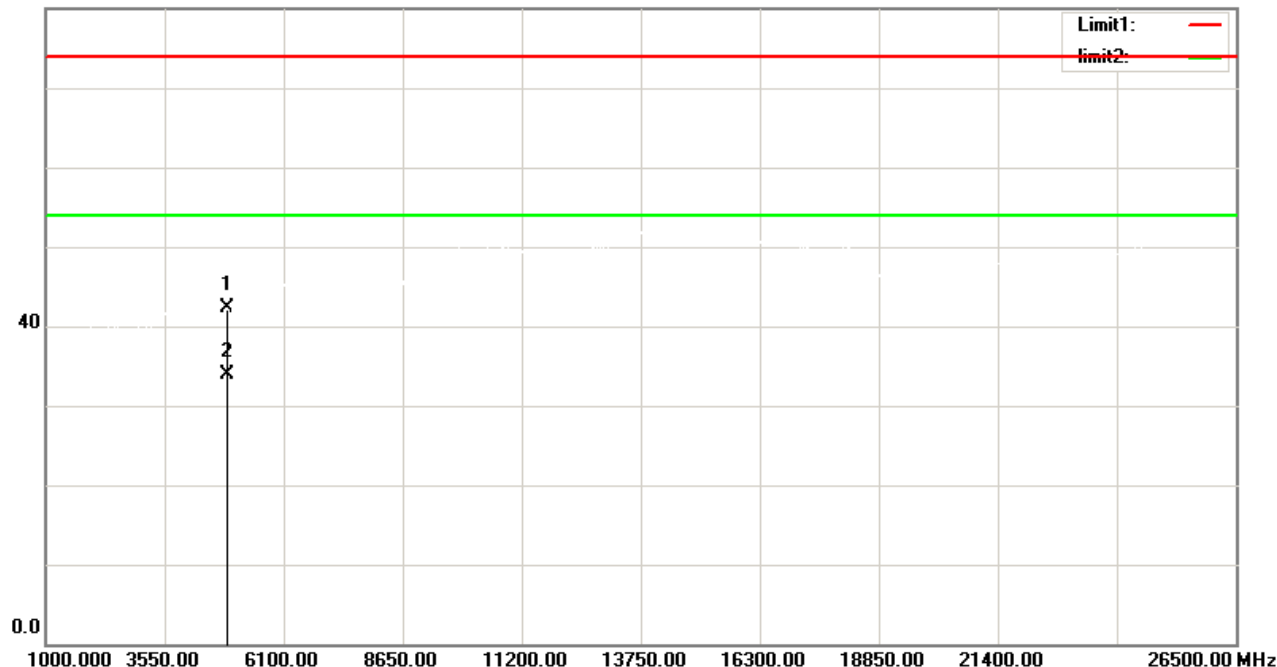
*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2440 MHz_CH19_2Mbps

Vertical

80.0 dBuV/m



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
1	4880.000	49.31	-7.03	42.28	74.00	-31.72	peak	150	104
2 *	4880.000	41.01	-7.03	33.98	54.00	-20.02	AVG	150	104

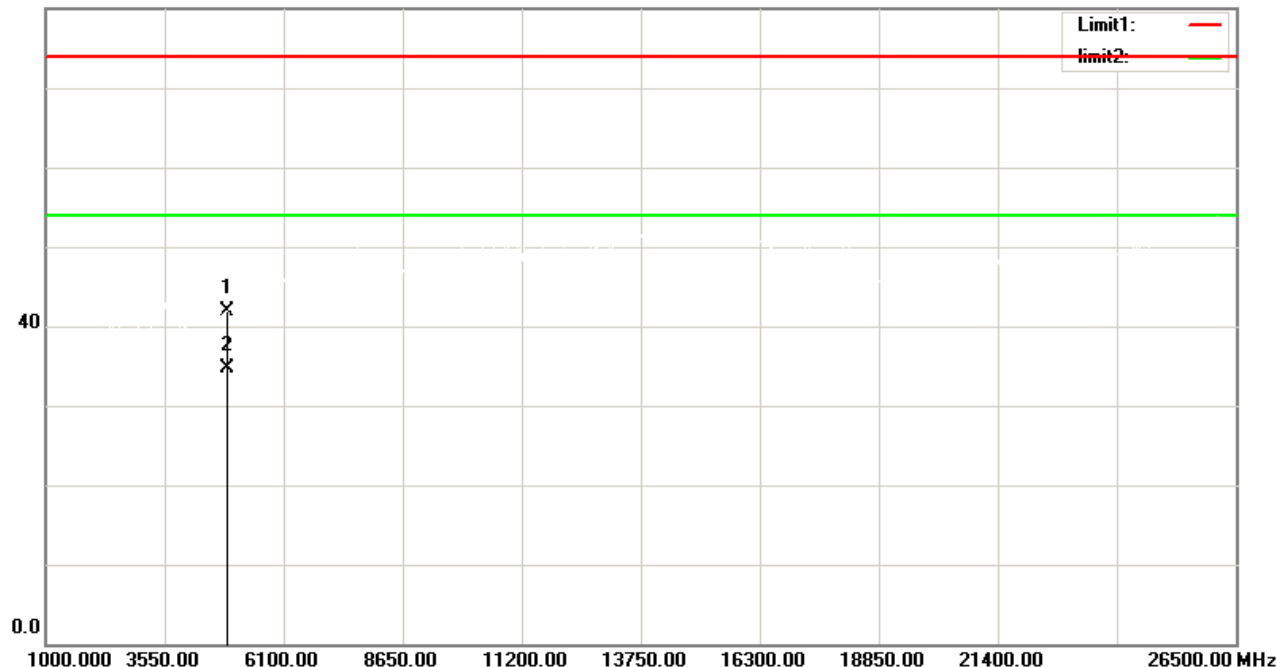
*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2440 MHz_CH19_2Mbps

Horizontal

80.0 dBuV/m



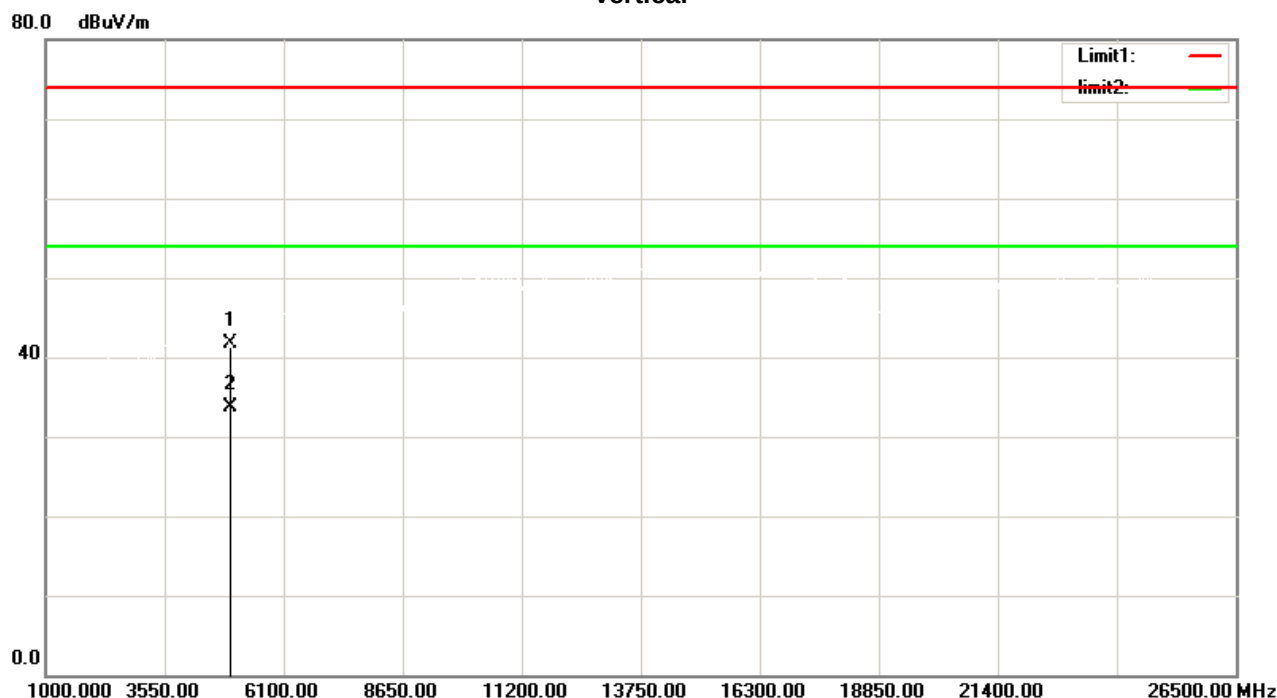
No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	Comment
			dBuV	dB	dBuV/m	dB/m	dB	cm	degree	
1		4880.000	48.93	-7.03	41.90	74.00	-32.10	peak	150	94
2	*	4880.000	41.72	-7.03	34.69	54.00	-19.31	AVG	150	94

*:Maximum data x:Over limit !:over margin

(Reference Only)

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	cm	degree	Comment
1		4960.000	48.51	-6.78	41.73	74.00	-32.27	peak	150	148
2	*	4960.000	40.47	-6.78	33.69	54.00	-20.31	AVG	150	148

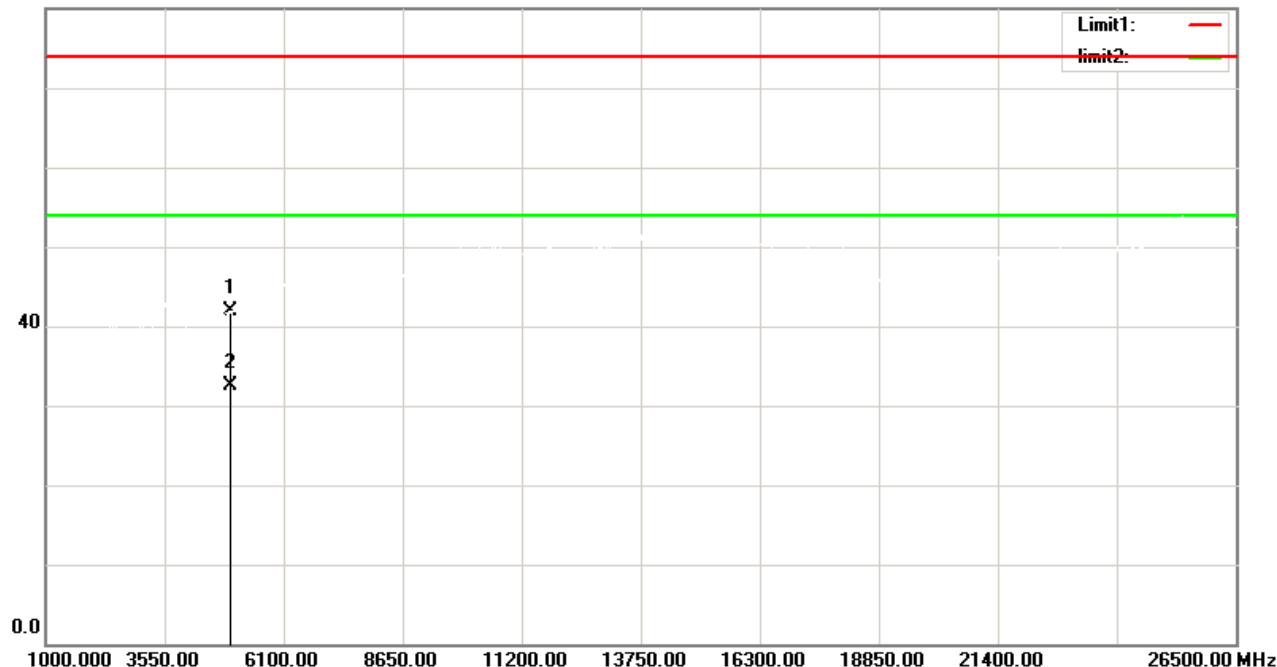
*:Maximum data x:Over limit !:over margin

(Reference Only)

Test Mode: TX 2480 MHz_CH39_2Mbps

Horizontal

80.0 dBuV/m



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	cm	degree	Comment
1		4960.000	48.76	-6.78	41.98	74.00	-32.02	peak	150	132
2	*	4960.000	39.27	-6.78	32.49	54.00	-21.51	AVG	150	132

*:Maximum data x:Over limit !:over margin

(Reference Only)

5BANDWIDTH TEST

5.1LIMIT

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)

5.2TEST PROCEDURE AND SETTING

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

5.3MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2024/05/23
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

5.4TEST SETUP

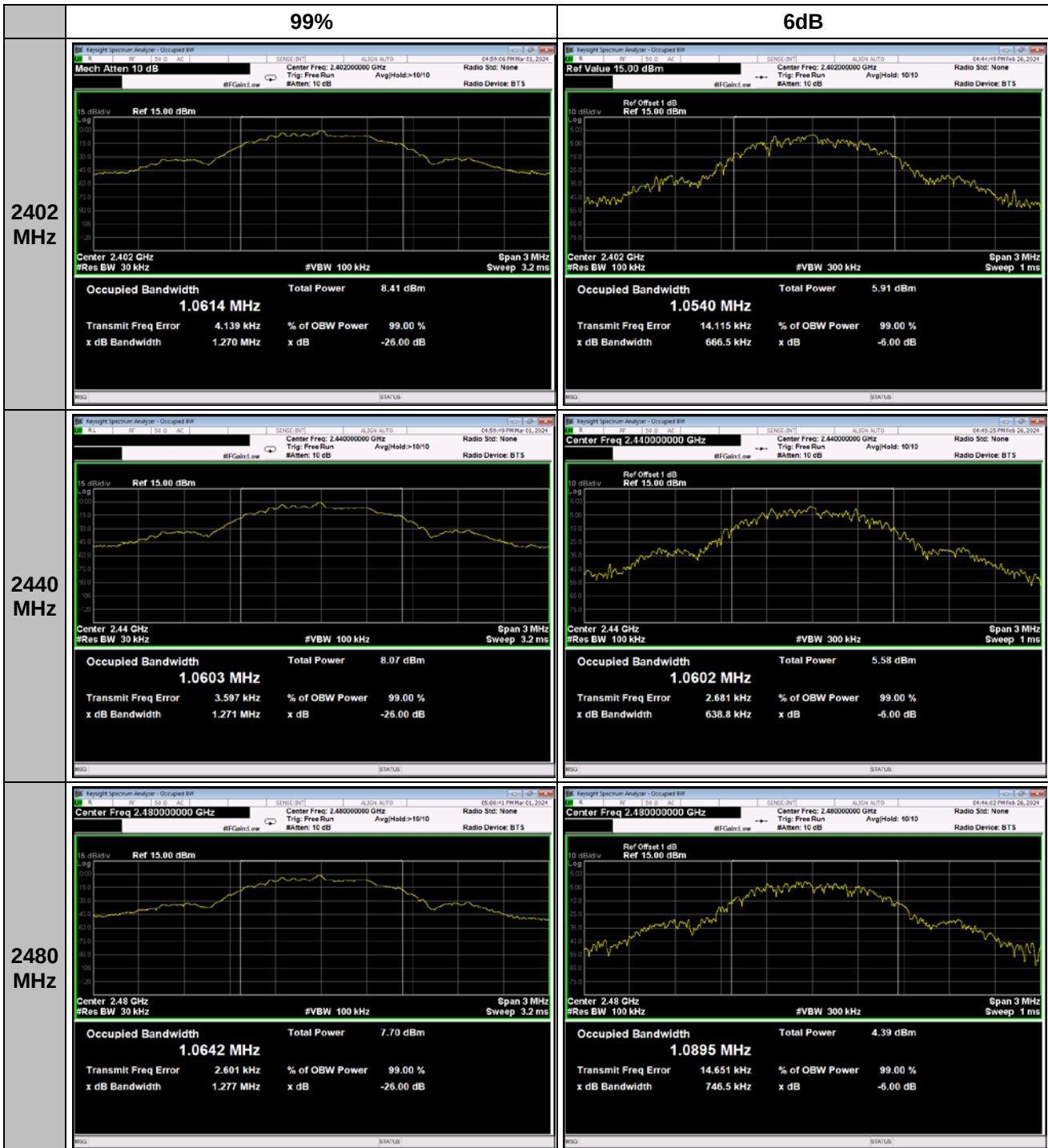


5.5EUT OPERATION CONDITIONS

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.

5.6 TEST RESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	6 dB bandwidth (MHz)	99%OBW (MHz)	Result
CH00	2402	0.6665	1.0614	PASS
CH19	2440	0.6388	1.0603	PASS
CH39	2480	0.7465	1.0642	PASS



TX Mode 2Mbps				
Channel	Frequency (MHz)	6 dB bandwidth (MHz)	99%OBW (MHz)	Result
CH00	2402	1.0780	2.0465	PASS
CH19	2440	1.3430	2.0505	PASS
CH39	2480	1.2610	2.0525	PASS



6 MAXIMUM OUTPUT POWER

6.1 LIMIT

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

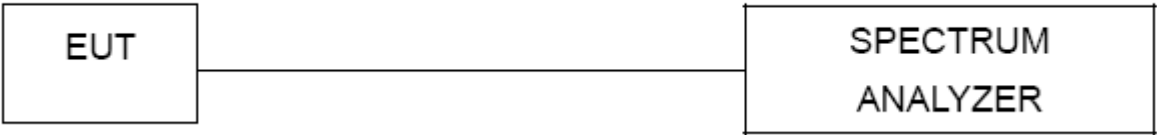
6.2 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- Spectrum Setting : RBW= 3MHz, VBW=8MHz, Sweep time = Auto.

6.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2024/05/23
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

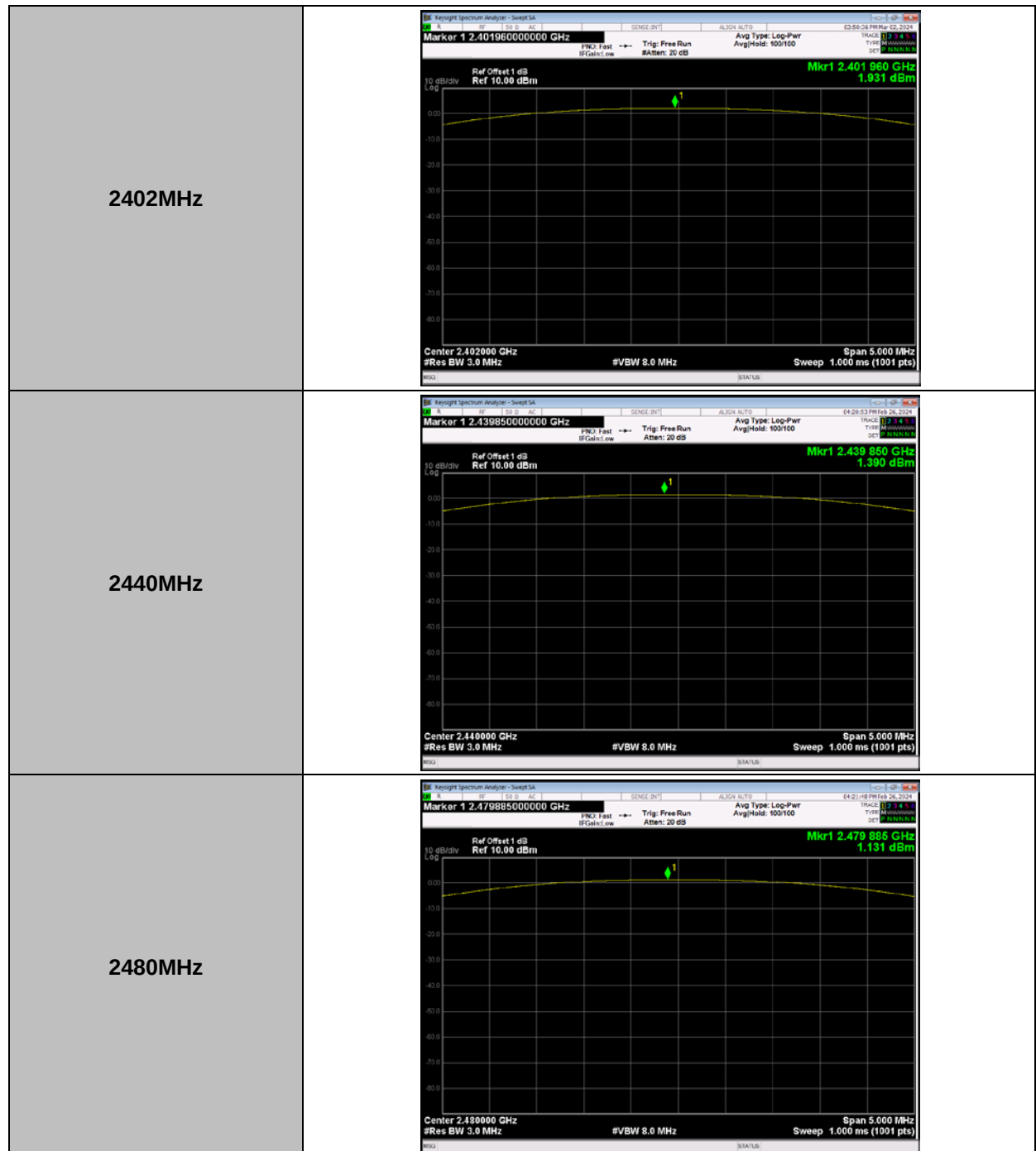


6.5 EUT OPERATION CONDITIONS

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 TEST RESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
CH00	2402	1.931	0.001560	PASS
CH19	2440	1.390	0.001377	PASS
CH39	2480	1.131	0.001297	PASS
Limit	30dBm / 1W			



TX Mode_2Mbps				
Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Result
CH00	2402	1.700	0.001479	PASS
CH19	2440	1.514	0.001417	PASS
CH39	2480	1.229	0.001327	PASS
Limit	30dBm / 1W			



7 CONDUCTED SPURIOUS EMISSION

7.1 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.

For ISCED

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.

7.2 TEST PROCEDURE

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

7.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2024/05/23
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



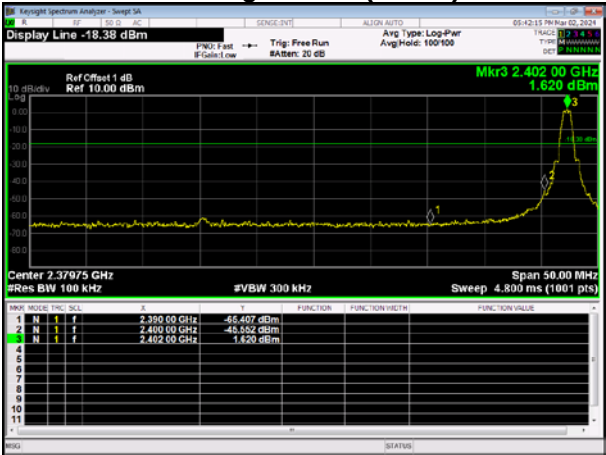
7.5 EUT OPERATION CONDITIONS

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.

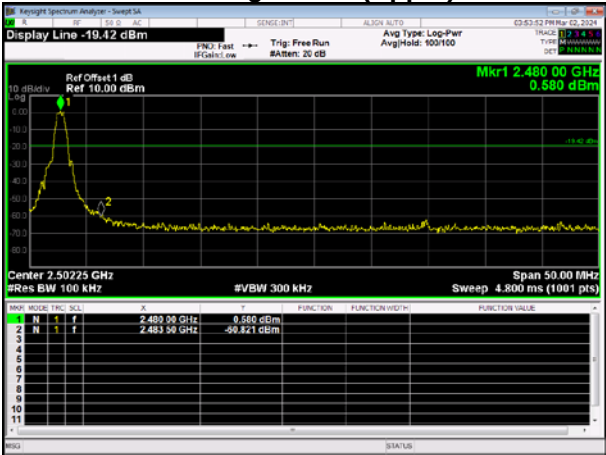
7.6 TEST RESULTS

TX Mode_1Mbps

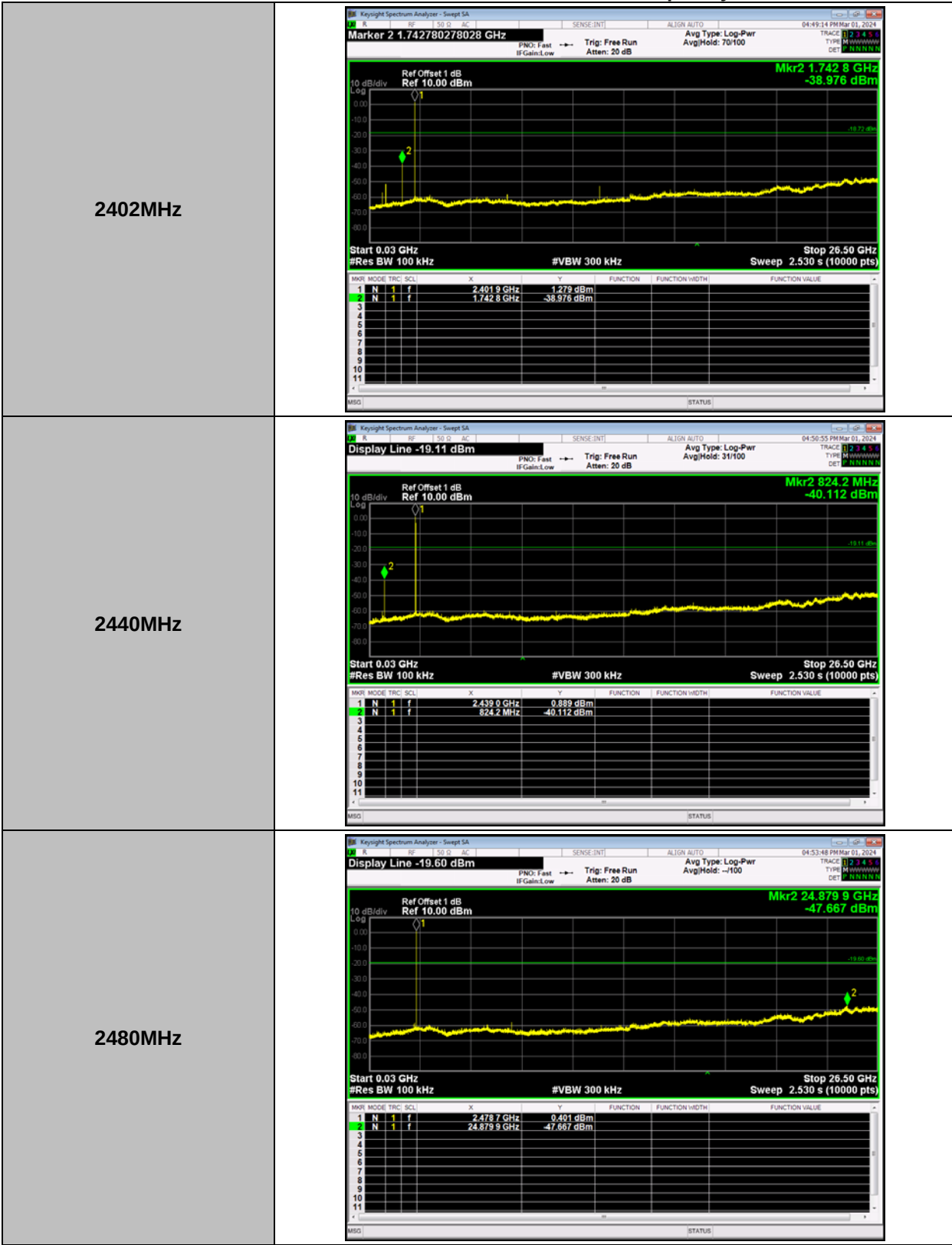
Bandedge- CH00 (Lower)



Bandedge CH39 (Upper)

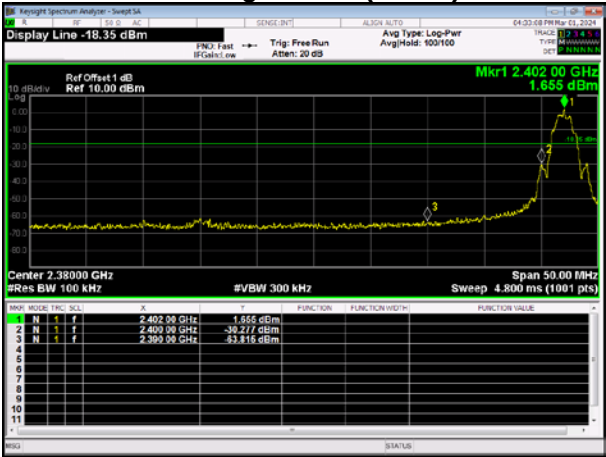


CH00 – 10th Harmonic of the fundamental frequency

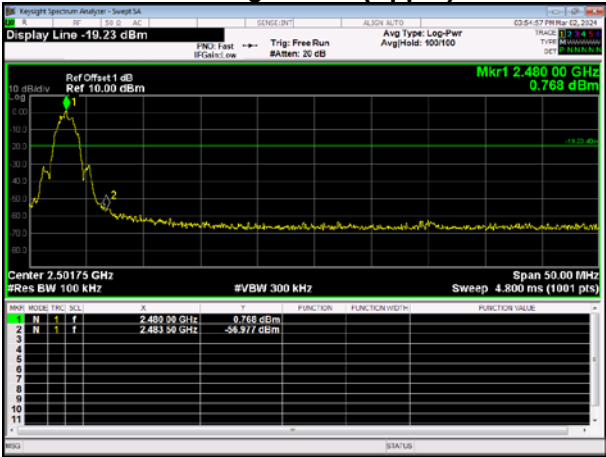


TX Mode_2Mbps

Bandedge- CH00 (Lower)

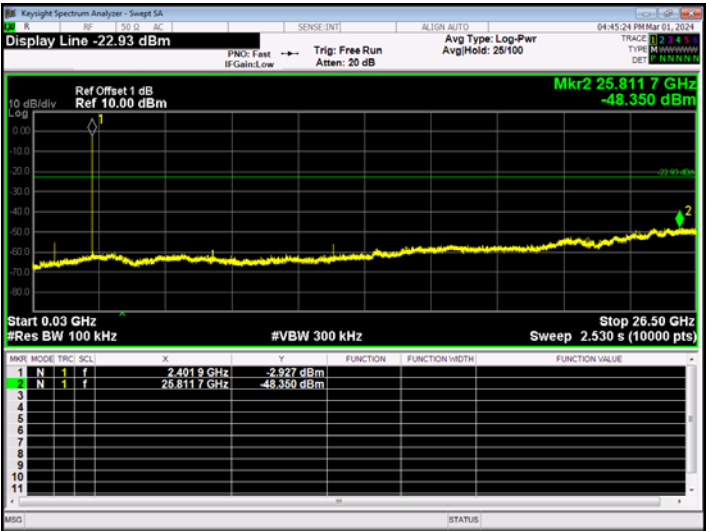


Bandedge CH39 (Upper)

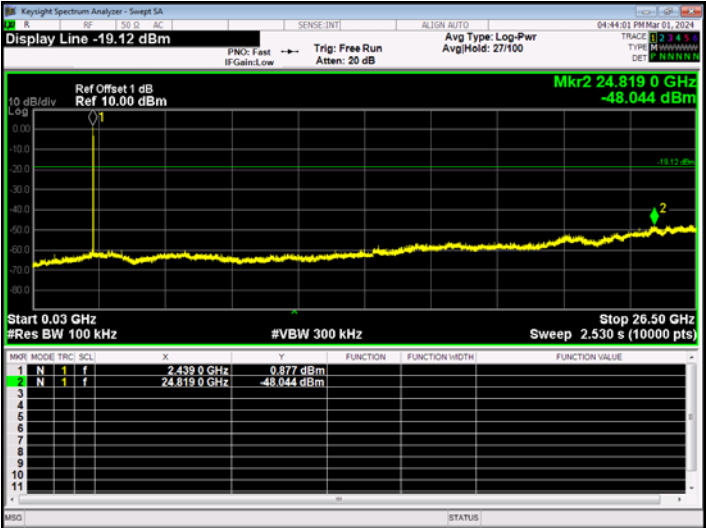


CH00 – 10th Harmonic of the fundamental frequency

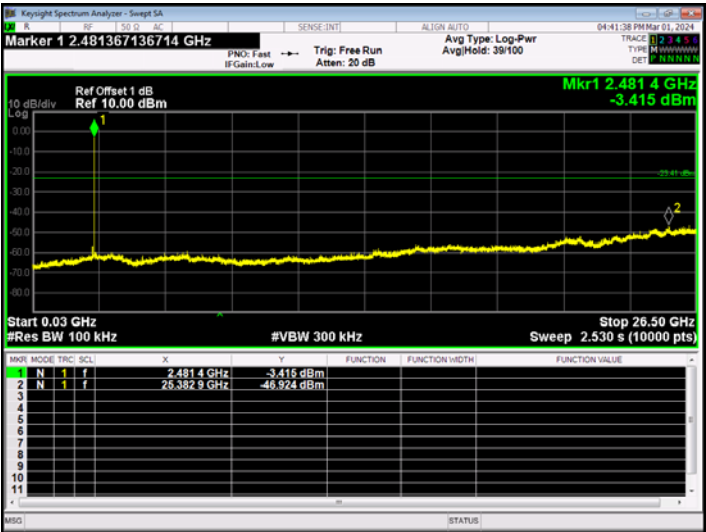
2402MHz



2440MHz



2480MHz



8 POWER SPECTRAL DENSITY TEST**8.1 LIMIT**

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)

8.2 TEST PROCEDURE

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

8.3 MEASUREMENT INSTRUMENTS LIST

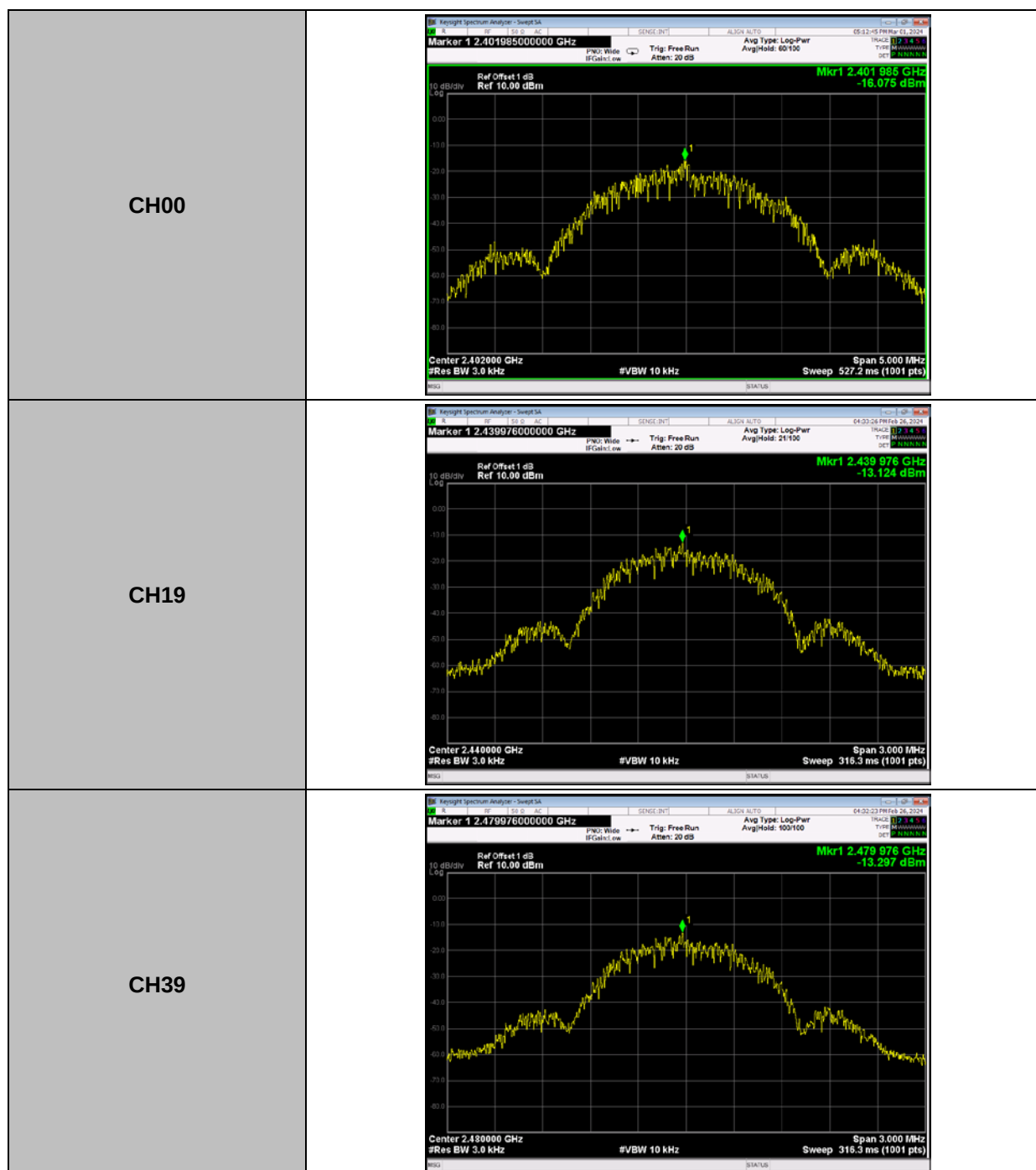
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2024/05/23
2	Attenuator	Mini-Circuits	BW-S10W2	101109	N/A
3	RF Cable	Mi-cable	C10-01-01-1	100309	N/A

8.4 TEST SETUP**8.5 EUT OPERATION CONDITIONS**

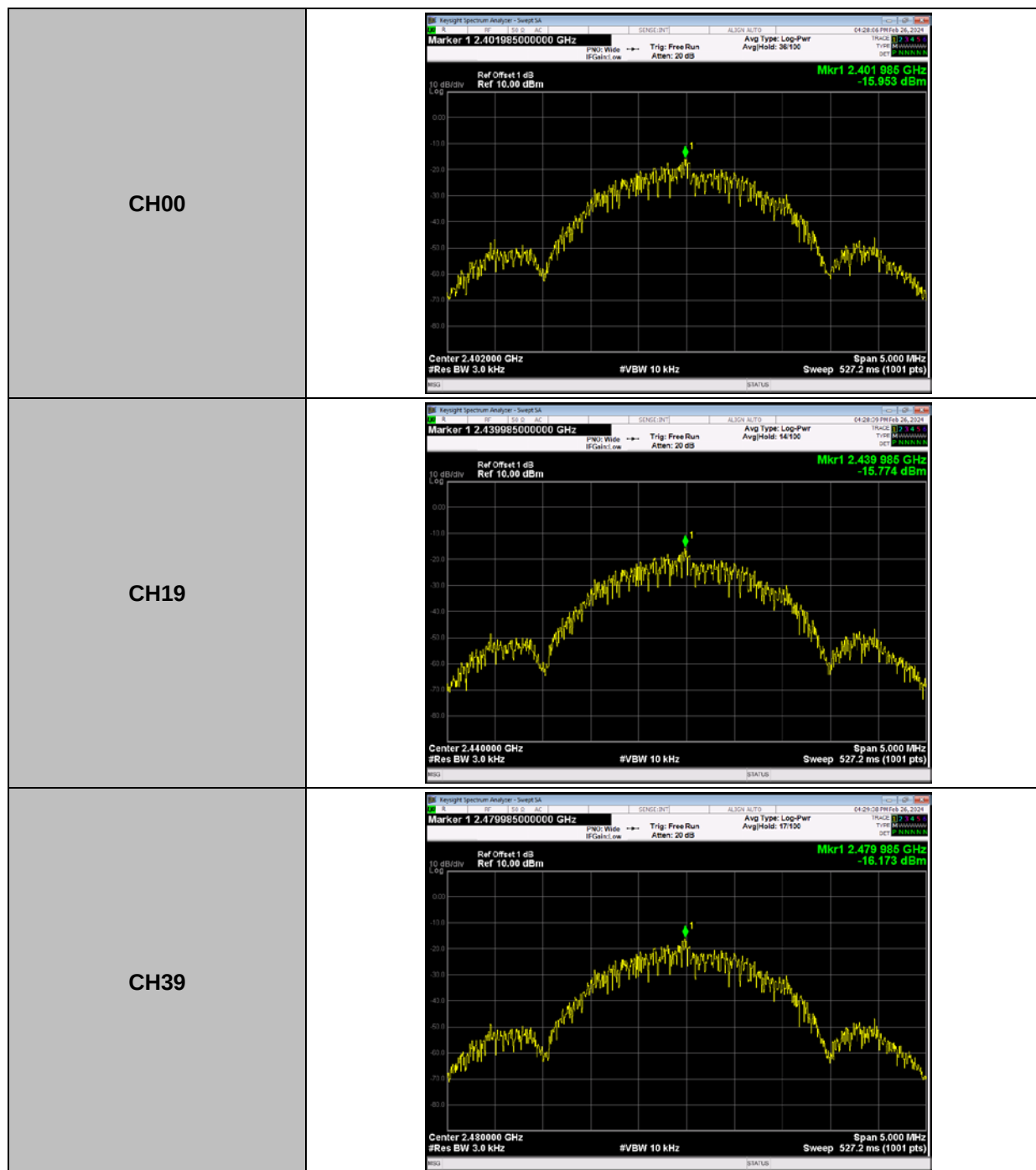
The EUT tested system was configured as the statements of 4.5 unless otherwise a special operating condition is specified in the follows during the testing.

8.6 TEST RESULTS

TX Mode_1Mbps				
Channel	Frequency (MHz)	Power SpectralDensity (dBm/3 kHz)	Limit: <dBm/3KHz	Result
CH00	2402	-16.075	8	PASS
CH19	2440	-13.124	8	PASS
CH39	2480	-13.297	8	PASS



TX Mode 2Mbps				
Channel	Frequency (MHz)	Power SpectralDensity (dBm/3 kHz)	Limit: <dBm/3KHz	Result
CH00	2402	-15.953	8	PASS
CH19	2440	-15.774	8	PASS
CH39	2480	-16.173	8	PASS



9 FREQUENCY STABILITY MEASUREMENT

9.1 LIMIT

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

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:

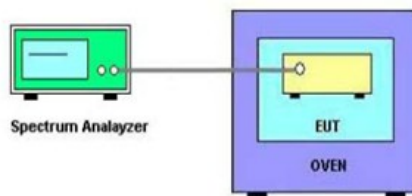
Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RBW	3 kHz
VBW	10kHz
Sweep Time	Auto

c. Frequency Error=[(Measured Frequency - Nominal Frequency)/ Nominal Frequency]*10⁶.

9.3 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum analyzer	KEYSIGHT	N9010A	MY55150427	2024/05/23
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°C	GJ1000-10D001	N/A
5	DC Power Supply	G.KE	IPR-10010D	010931954	N/A

9.4 TEST SETUP



9.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

9.6 TEST RESULTS

	Temperature vs. Frequency Stability	
Voltage	Temperature	Measurement Frequency (MHz)
3V	(°C)	2480
	-20	2479.99689
	25	2479.99689
	50	2479.99685
2.1V	25	2479.99683
Max. Deviation (MHz)		-0.00317
Max. Deviation (ppm)		-1.28

Note: 2.1V is the end point voltage, and products below 2.1V will cease working.

END OF TEST REPORT