



FCC COMPLIANCE TEST REPORT

Technical Statement of Conformity
in accordance with FCC Part 15 Subpart C

The Product

Equipment Under Test	: SMART-PTT
Model Number	: SMART-PTT
Product Series	: N/A
Report Number	: HA235123-RA
Issue Date	: 04-Aug-2023

is produced by
Mobility Sound Technology LTD.
5F, No.100, Jian 1st Road, ZhongHe Dist., New Taipei City #23585, Taiwan



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BSMI Registration No. : SL2-IN-E-0023, SL2-A1-E-0023, **FCC Designation No.:** TW1071, TW1163, TW1136
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Caution :

This report sets forth our findings solely with respect to the test sample. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment. Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results. This test report shall not be reproduced without written approval of HongAn TECHNOLOGY EMC Laboratory. The relevant information of the content of this test report is provided by the customer. For the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error, which will affect the validity of the results of this test report, the laboratory will not be liable Related responsibilities.

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Release control Record

Report Version	Description	Issued Date
V00	Original release.	04-Aug-2023



Test Result Certification

Applicant	: Mobility Sound Technology LTD.
Address of Applicant	: 5F, No.100, Jian 1 st Road, ZhongHe Dist., New Taipei City #23585, Taiwan
Manufacturer	: Mobility Sound Technology LTD.
Address of Manufacturer	: 5F, No.100, Jian 1 st Road, ZhongHe Dist., New Taipei City #23585, Taiwan
Trade Name	: MobilitySound
Equipment Under Test	: SMART-PTT
Model Number	: SMART-PTT
Product Series	: N/A
FCC ID	: XTS-SMART-PTT
Filing Type	: Certification
Sample Received Date	: 04-Jul-2023
Test Standard	:

☒ FCC Part 15 Subpart C §15.249

Deviations from standard test methods & any other specifications : NONE

Remark:

1. This report details the results of the test carried out on one sample.
2. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in both ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.203, 15.207, 15.209, 15.249.
3. This report applies to the above sample only and shall not be reproduced in part without written approval of HongAn Technology Co., Ltd.
4. Test Location (HA2): HongAn Technology EMC Laboratory, No.15-1 Cweishuh Keng, Cweipin Village, Linkou Dist., New Taipei City, Taiwan, R.O.C. FCC Designation No.: TW1071, TW1163.
5. Test Location (HA5): HongAn Technology EMC Laboratory, 2F, No.146, Jian Yi Rd., Chung-Ho Dist., New Taipei City, Taiwan, R.O.C. FCC Designation No.: TW1136.

Tested by:

Tony Huang

Andrew Lin / ENG. Dept. Staff

2023-08-04

Approved by:

Eason Hsieh

Eason Hsieh / Section Manager

Date:

2022-08-04



Summary of Test Result

	Test Item	Applicable Standard	Test Result
1	Antenna Requirement	FCC part 15 subpart C §203	Compliance
2	Conducted Emission	FCC part 15 subpart C §207	N/A
3	Restricted Band of Operation	FCC part 15 subpart C §205	Compliance
4	Radiated Emission	FCC part 15 subpart C §209	Compliance
5	Field Strength	FCC part 15 subpart C §249(a)	Compliance
6	Out of Band Emission	FCC part 15 subpart C §249(d)	Compliance
7	20dB Bandwidth	FCC part 15 subpart C §215(c)	Compliance

1 General Description

1.1 Description of EUT

Equipment Under Test	:	SMART-PTT								
Model Number of EUT	:	SMART-PTT								
Product Series	:	N/A								
Power Supply	:	Input: DC 3V Coin Battery (CR2032)								
Frequency Range	:	2402~2480 MHz								
Number of Channels	:	BLE:40 Channels								
Carrier Frequency of Each Channel	:	00	2402	10	2422	20	2442	30	2462	
		01	2404	11	2424	21	2444	31	2464	
		02	2406	12	2426	22	2446	32	2466	
		03	2408	13	2428	23	2448	33	2468	
		04	2410	14	2430	24	2450	34	2470	
		05	2412	15	2432	25	2452	35	2472	
		06	2414	16	2434	26	2454	36	2474	
		07	2416	17	2436	27	2456	37	2476	
		08	2418	18	2438	28	2458	38	2478	
		09	2420	19	2440	29	2460	39	2480	
Antenna Specification	:	Printed Trace Antenna/ Gain: -0.8dBi								
Modulation Technique	:	FHSS								
		BLE : GFSK								
Transmit Data Rate	:	BLE : 1Mbps								
Specification	:	Dimensions : 3.9cm (L) X 3 cm (W) X 1.5 cm (H)								
		Weight : 15 g								
		Intended Function : The EUT is a smart PTT.								
		Product Variance : N/A.								



1.2 Test Instruments

☑HA2 (RE)					
Instrument Name	Manufacture	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
EMI Test Receiver	R&S	ESC17	100931	24-Mar-2023	23-Mar-2024
Spectrum Analyzer	R&S	FSV 40	101296	11-Apr-2023	10-Apr-2024
Preamplifier	SCHAFFNER	CPA 9231A	0405	15-Dec-2022	14-Dec-2023
Preamplifier(1~18GHz)	EMCI	EMC051845SE	980692	02-Dec-2022	01-Dec-2023
Preamplifier(18~40GHz)	EMCI	EMC184045SE	980699	12-May-2023	11-May-2024
Loop Antenna	EMCO	6502	9202-2717	31-Aug-2022	30-Aug-2023
Bilog Antenna(3m)	TESEQ	CBL6111D	58161	27-Dec-2022	26-Dec-2023
Bilog Antenna(10m)	TESEQ	CBL6111D	58161	27-Dec-2022	26-Dec-2023
Horn Antenna	EMCO	3115	9912-5992	24-Feb-2023	23-Feb-2024
Horn Antenna	Com-Power	AH-840	101042	15-May-2023	14-May-2024
Cable	HongAn	8D-FB	HA2-10MSite	19-Aug-2022	18-Aug-2023
RF Cable(1~18GHz)	EMCI	EMC104-SM-NM-1000	191104	30-Nov-2022	29-Nov-2023
RF Cable(1~18GHz)	EMCI	EMC104-SM-NM-8000	191103	30-Nov-2022	29-Nov-2023
RF Cable(18~40GHz)	EMCI	EMC102-KM-KM-1000	200301	12-May-2023	11-May-2024
RF Cable(18~40GHz)	WiSPEC	291LKA2292-8000	WSP-C-202205-001	12-May-2023	11-May-2024
Signal Generator	R&S	SMB100A	110549	23-Aug-2022	22-Aug-2023
Software	Audix	e3 (ver 6.101006a)	N/A	N/A	N/A

※ The test equipments used are calibrated and can be traced to National ITRI and International Standards.

1.3 Auxiliary Equipments

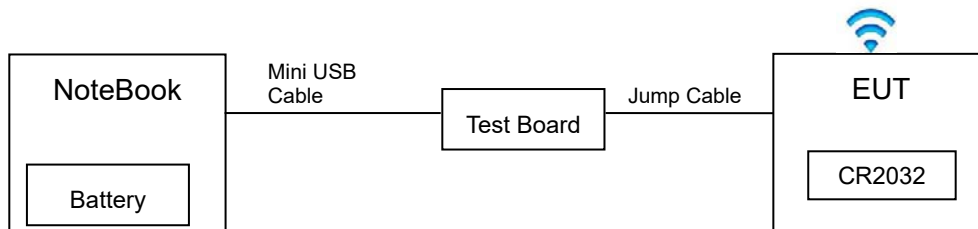
1.3.1. Provided by HongAn Technology Co., Ltd. for Test.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Power Cord
01	NoteBook	N61J	N61JV-021A520M	R31018	ASUS	Power Cord: Adapter to Notebook: Non-shielded Detachable, 1.8m, With Core AC to Adapter: Non-shielded Detachable, 1.8m, Without Core
02	Mini USB Cable	MNUC	N/A	N/A	Matrix	Shielded, Detachable, 1.2m, Without Core

1.3.2. Provided by the Manufacturer

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Specification
01	Test Board	N/A	N/A	N/A	N/A	N/A
02	Jump Cable	N/A	N/A	N/A	N/A	Non-Shielded, Detachable, 0.2m, w/o core
03	Coin Battery	CR2032	N/A	N/A	TOSHIBA	N/A

1.4 EUT SETUP



Note: Main Test Sample: SMART-PTT

1.5 Identifying the Final Test Mode

Mode 1: BLE(1Mbps) 2402 MHz TX

Mode 2: BLE(1Mbps) 2442 MHz TX

Mode 3: BLE(1Mbps) 2480 MHz TX

Note:

- After pre-test, we identified that the Test Mode 1 was most likely to produce the maximum transmitting power and cause maximum disturbance. Therefore, the Final Assessment was performed for the worst case.



2. The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.
3. Channel Low (2402 MHz), Mid (2442 MHz) and High (2480 MHz) were chosen for full testing.
4. According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.
5. Test Software: Blue teraterm-4.74; RF parameter setting : BLE: Channel 00 , 19 , 39 / Data Rate : 1 Mbps / TX POWER : 0.

1.6 Final Test Mode

Radiated Emission (30~1000 MHz): Mode1.

Radiated Emission (1~26.5 GHz): All Modes.

1.7 Condition of Power Supply

DC 3V Coin Battery (CR2032)

1.8 EUT Configuration

1. Setup the EUT as shown in Sec.1.4 Block Diagram.
2. Turn on the power of all equipments.
3. Activate the selected Final Test Mode.

1.9 Test Methodology

The tests documented in this report were performed in accordance with ANSI C63.10 (2013) and FCC CFR 47 15.203, 15.207, 15.209 and 15.249.

1.10 General Test Procedures

Conducted Emissions

The EUT is set according to the requirements in Section 6.2 of ANSI C63.10 (2013).

Radiated Emissions

The EUT is set according to the requirements in Section 6.3 of ANSI C63.10 (2013).

1.11 Modification

N/A

1.12 FCC Part 15.205 restricted bands of operations

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37635-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

2 Power line Conducted Emission Measurement

2.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

2.2 Test Arrangement and Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

2.3 Limit (§ 15.207)

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency (MHz)	Limits (dBuV)	
	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.0	56	46
5.0 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

2.4 Test Result

N/A

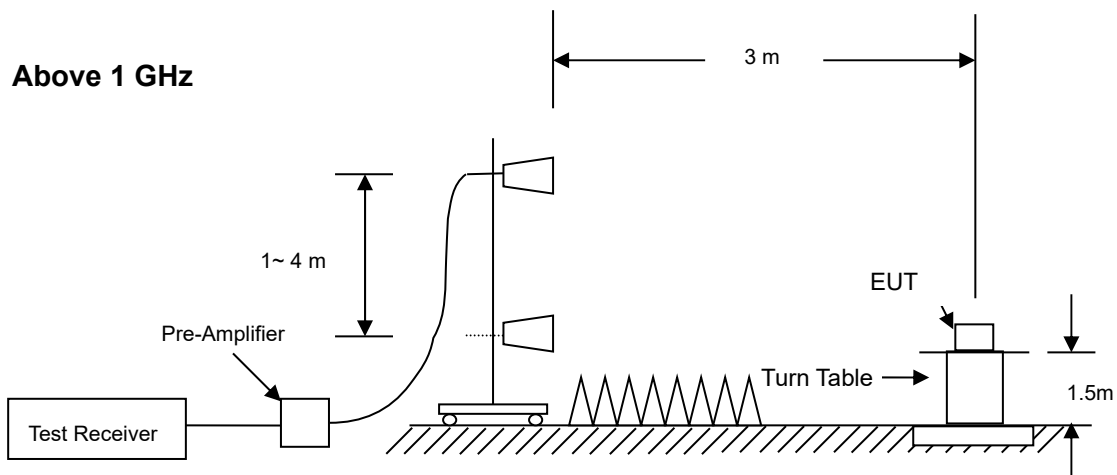
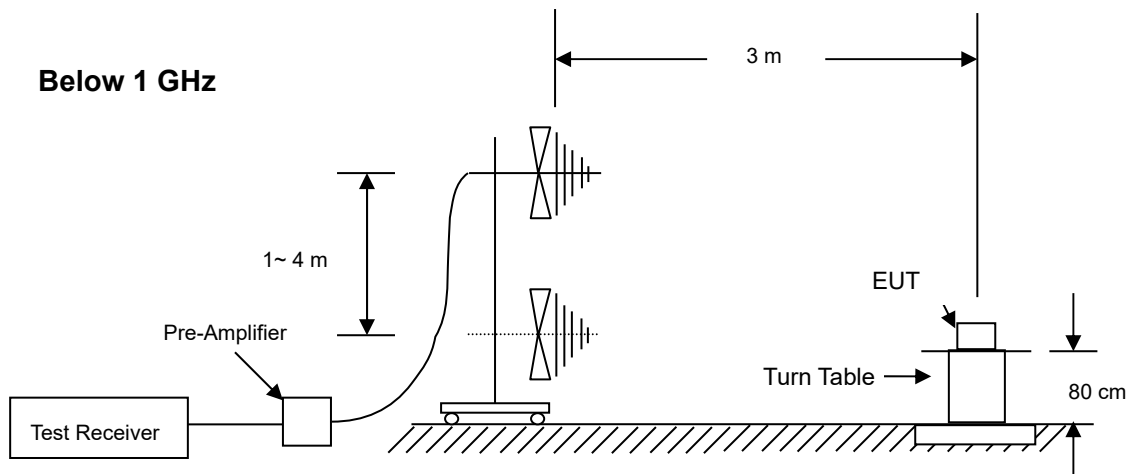
The EUT is powered by a Coin Battery (CR2032)

3 Radiated Emission Test

3.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

3.2 Test Arrangement and Procedure



1. The EUT is placed on a turntable, which is 0.8 m (below 1GHz) and 1.5m (above 1GHz) above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer. Refer to each test results for detail setting up.

7. Repeat above procedures until the measurements for all frequencies are complete.

3.3 Limit of Field Strength of Fundamental (§ 15.249)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

Note:

- Field strength limits are specified at a distance of 3 meters.
- For frequencies above 1000 MHz, the field strength limits in above table are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

3.4 Limit of Spurious Emission (§ 15.209)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is lesser attenuation.

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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

3.5 Test Result

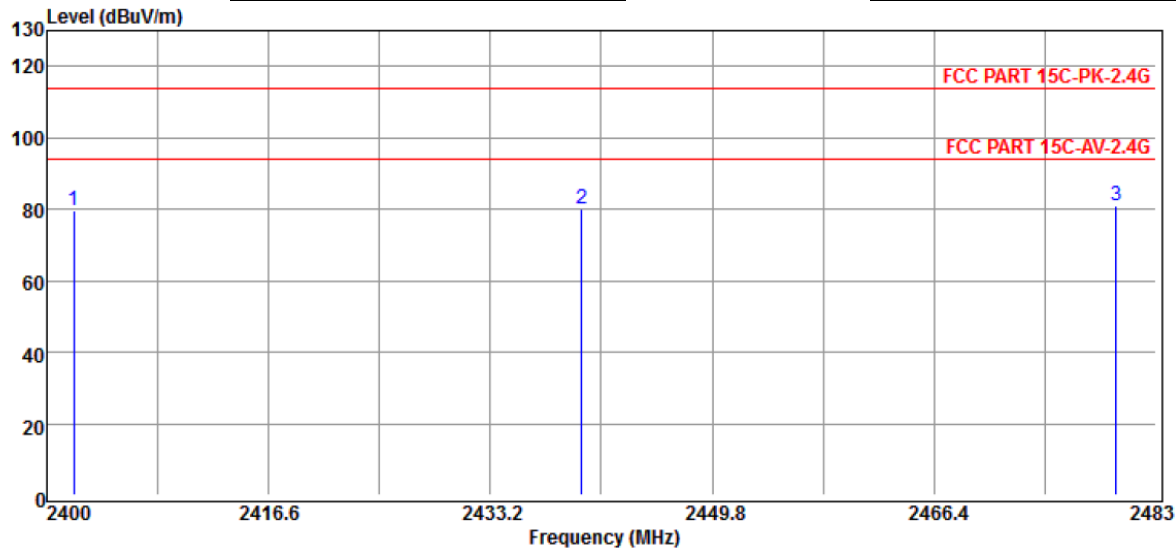
Compliance

The final test data are shown on the following page(s).

The 9kHz-30MHz spurious emission is under limit 20dB more.

Radiated Emission Test Data (Field Strength of Fundamental)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 00, 19, 39	Frequency	: 2402, 2440, 2480 MHz
Test Mode	: 1, 2, 3(1Mbps)	Tested by	: Tony Huang
Polarization	: Horizontal	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	2402.000	95.63	-15.82	79.81	94.00	-14.19	HORIZONTAL	Peak
2	2440.000	95.85	-15.79	80.06	94.00	-13.94	HORIZONTAL	Peak
3	2480.000	96.30	-15.45	80.85	94.00	-13.15	HORIZONTAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

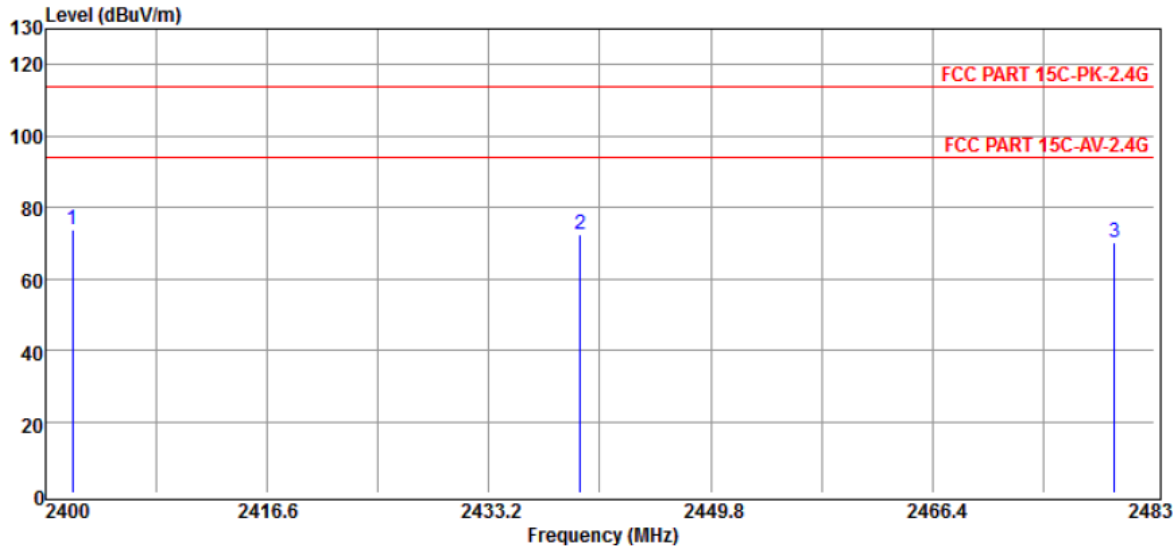
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:

Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 3MHz, VBW = 10MHz, Sweep = AUTO.

Note: Because the 20 dB Bandwidth is over 1MHz, the RBW setting of measuring Field strength of Fundamental should be 3MHz, and VBW should be at 10 MHz.

Radiated Emission Test Data (Field Strength of Fundamental)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 00, 19, 39	Frequency	: 2402, 2440, 2480 MHz
Test Mode	: 1, 2, 3(1Mbps)	Tested by	: Tony Huang
Polarization	: Vertical	EUT Position	: X axis



No.	Freq MHz	Reading dBuV	C.F dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Antenna Pol.	Remark
1	2402.000	89.41	-15.82	73.59	94.00	-20.41	VERTICAL	Peak
2	2440.000	88.00	-15.79	72.21	94.00	-21.79	VERTICAL	Peak
3	2480.000	85.65	-15.45	70.20	94.00	-23.80	VERTICAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

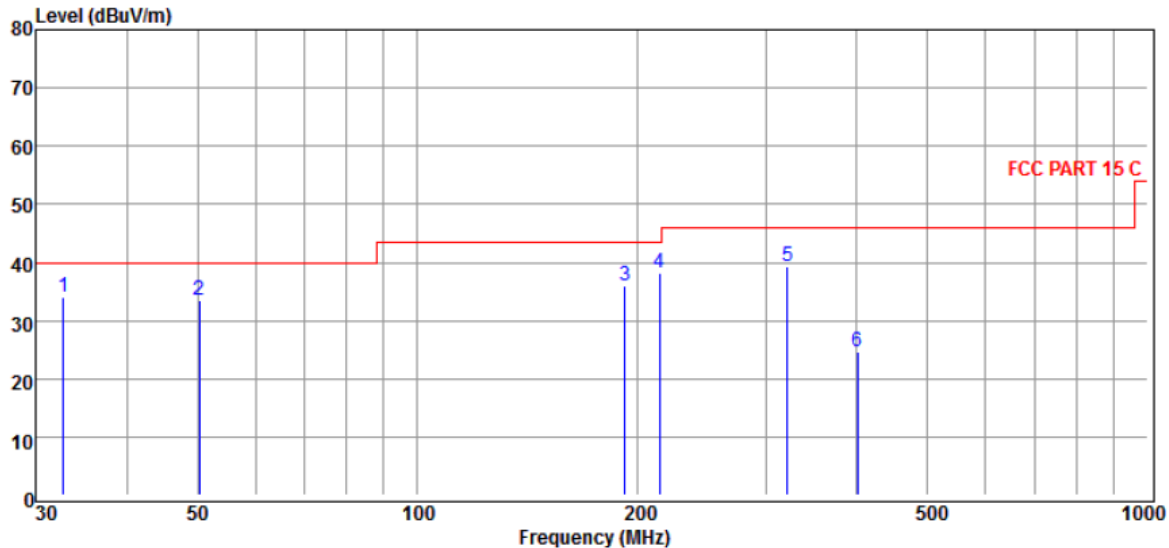
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 3MHz, VBW = 10MHz, Sweep = AUTO.
Note: Because the 20 dB Bandwidth is over 1MHz, the RBW setting of measuring Field strength of Fundamental should be 3MHz, and VBW should be at 10 MHz.

Radiated Emission Test Data (Below 1 GHz)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 39	Frequency	: 2480 MHz
Test Mode	: 3 (1Mbps)	Tested by	: Tony Huang
Polarization	: Horizontal	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	32.749	39.28	-5.22	34.06	40.00	-5.94	HORIZONTAL	Peak
2	50.232	48.15	-14.79	33.36	40.00	-6.64	HORIZONTAL	Peak
3	192.419	49.18	-13.08	36.10	43.50	-7.40	HORIZONTAL	Peak
4	214.514	50.85	-12.76	38.09	43.50	-5.41	HORIZONTAL	Peak
5	321.061	47.75	-8.58	39.17	46.00	-6.83	HORIZONTAL	Peak
6	400.432	30.72	-6.10	24.62	46.00	-21.38	HORIZONTAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

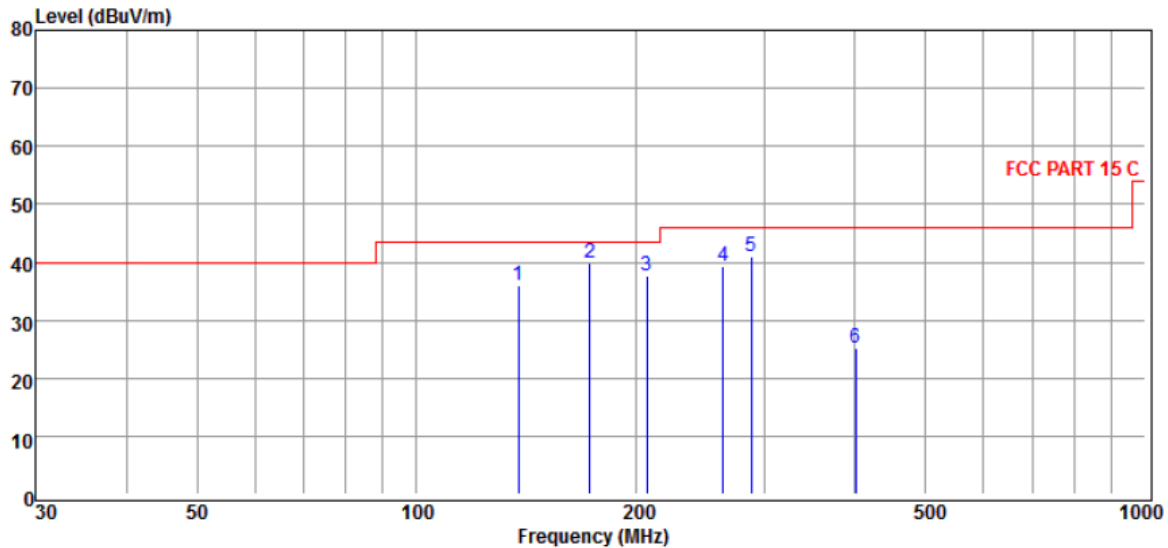
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

1. Measuring frequencies from 30 MHz to 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
4. All readings are Peak values. None of the peak value reading exceeds the Q.P. limit. Hence, Q.P. reading was not measured.
5. The IF bandwidth of SPA between 30 MHz to 1 GHz was 100 kHz.

Radiated Emission Test Data (Below 1 GHz)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 39	Frequency	: 2480 MHz
Test Mode	: 3 (1Mbps)	Tested by	: Tony Huang
Polarization	: Vertical	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	137.903	47.13	-11.10	36.03	43.50	-7.47	VERTICAL	Peak
2	173.205	53.13	-13.14	39.99	43.50	-3.51	VERTICAL	Peak
3	207.123	50.17	-12.64	37.53	43.50	-5.97	VERTICAL	Peak
4	263.819	48.00	-8.57	39.43	46.00	-6.57	VERTICAL	Peak
5	287.990	49.95	-9.06	40.89	46.00	-5.11	VERTICAL	Peak
6	400.432	31.23	-6.10	25.13	46.00	-20.87	VERTICAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

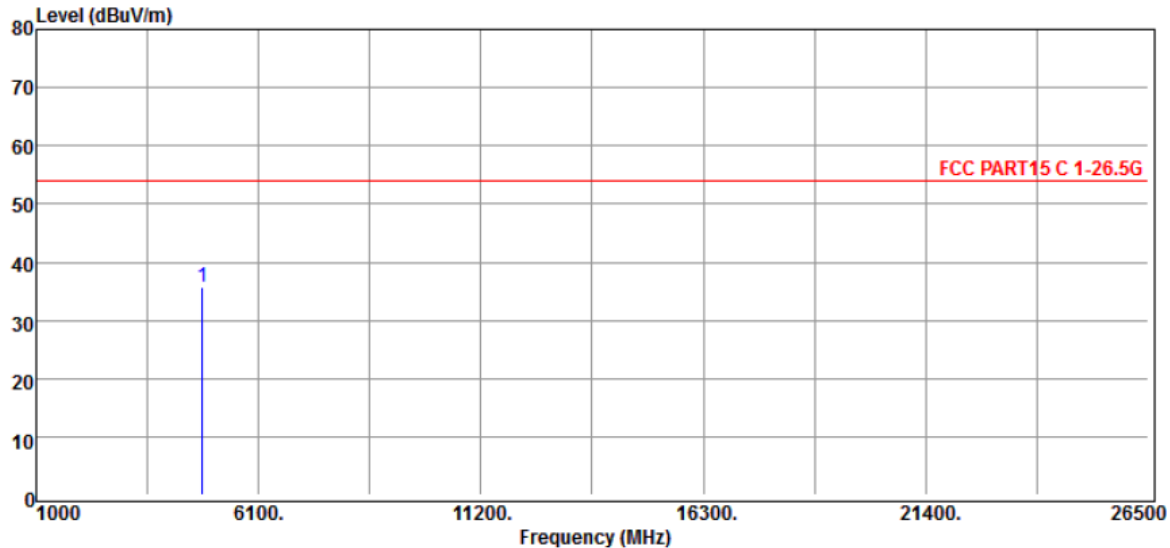
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

1. Measuring frequencies from 30 MHz to 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
4. All readings are Peak values. None of the peak value reading exceeds the Q.P. limit. Hence, Q.P. reading was not measured.
5. The IF bandwidth of SPA between 30 MHz to 1 GHz was 100 kHz.

Radiated Emission Test Data (Above and Field Strength to 10th Harmonic)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 00	Frequency	: 2402 MHz
Test Mode	: 1 (1Mbps)	Tested by	: Tony Huang
Polarization	: Horizontal	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	4804.000	45.91	-10.16	35.75	54.00	-18.25	HORIZONTAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

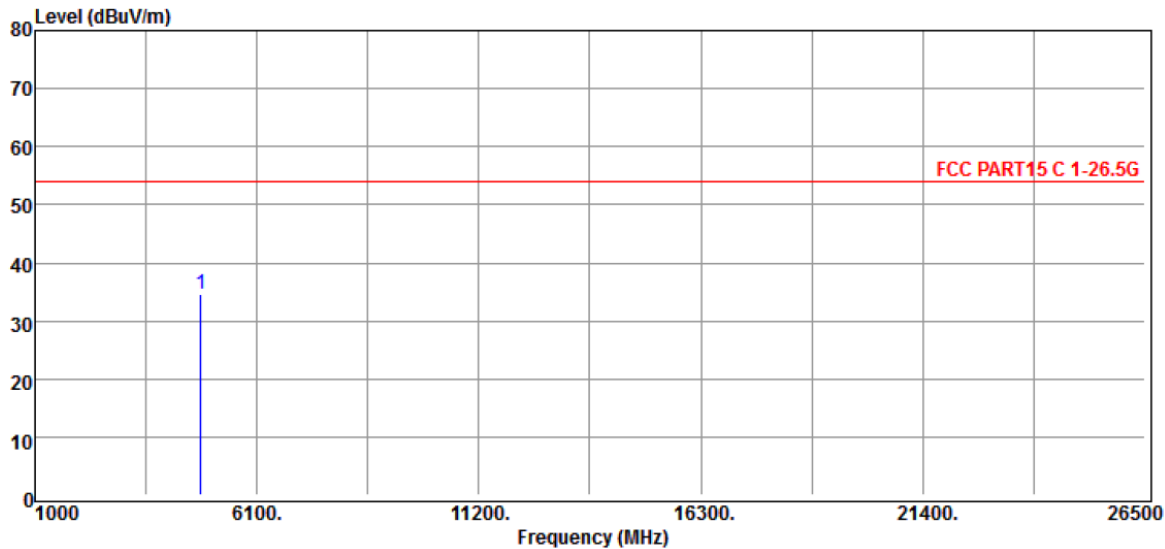
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
- Spectrum setting:
 - Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Radiated Emission Test Data (Above and Field Strength to 10th Harmonic)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 00	Frequency	: 2402 MHz
Test Mode	: 1 (1Mbps)	Tested by	: Tony Huang
Polarization	: Vertical	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	4804.000	44.69	-10.16	34.53	54.00	-19.47	VERTICAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

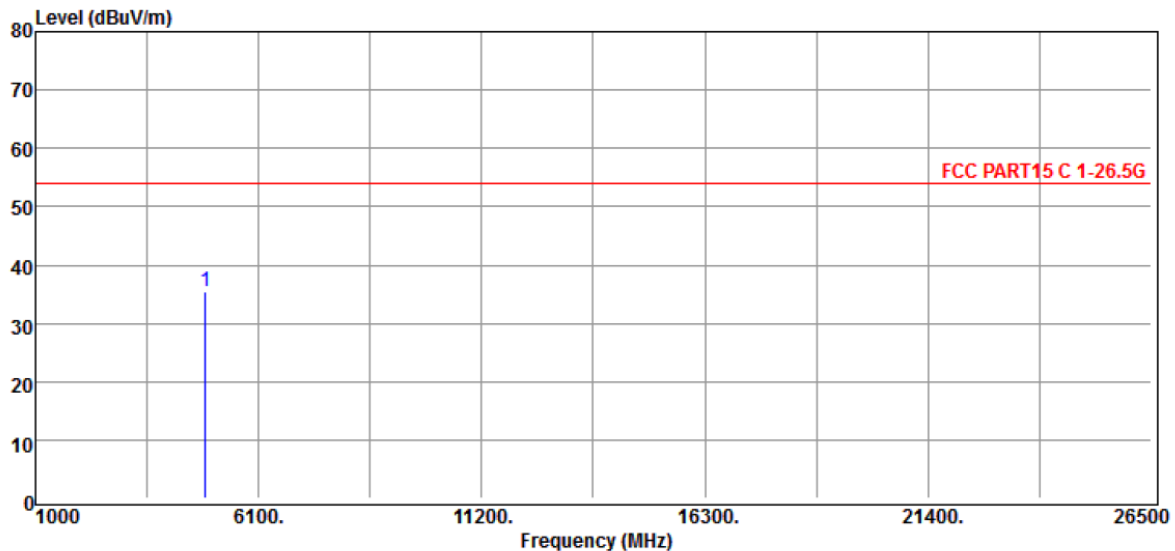
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
- Spectrum setting:
 - Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Radiated Emission Test Data (Above and Field Strength to 10th Harmonic)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 19	Frequency	: 2440 MHz
Test Mode	: 2 (1Mbps)	Tested by	: Tony Huang
Polarization	: Horizontal	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	4880.000	45.16	-9.81	35.35	54.00	-18.65	HORIZONTAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

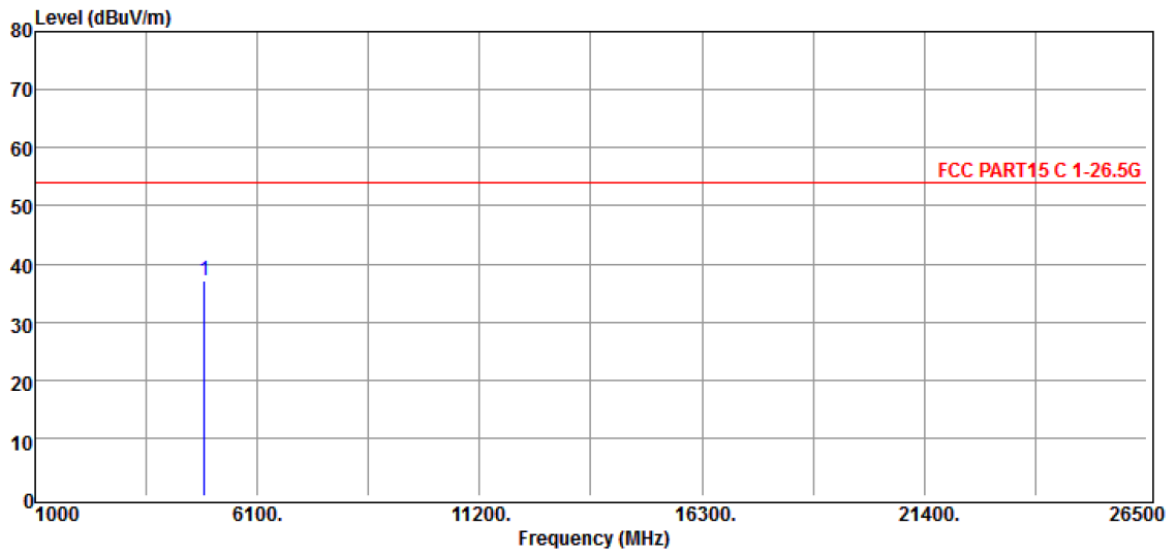
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
- Spectrum setting:
 - Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Radiated Emission Test Data (Above and Field Strength to 10th Harmonic)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 19	Frequency	: 2440 MHz
Test Mode	: 2 (1Mbps)	Tested by	: Tony Huang
Polarization	: Vertical	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	4880.000	46.83	-9.81	37.02	54.00	-16.98	VERTICAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

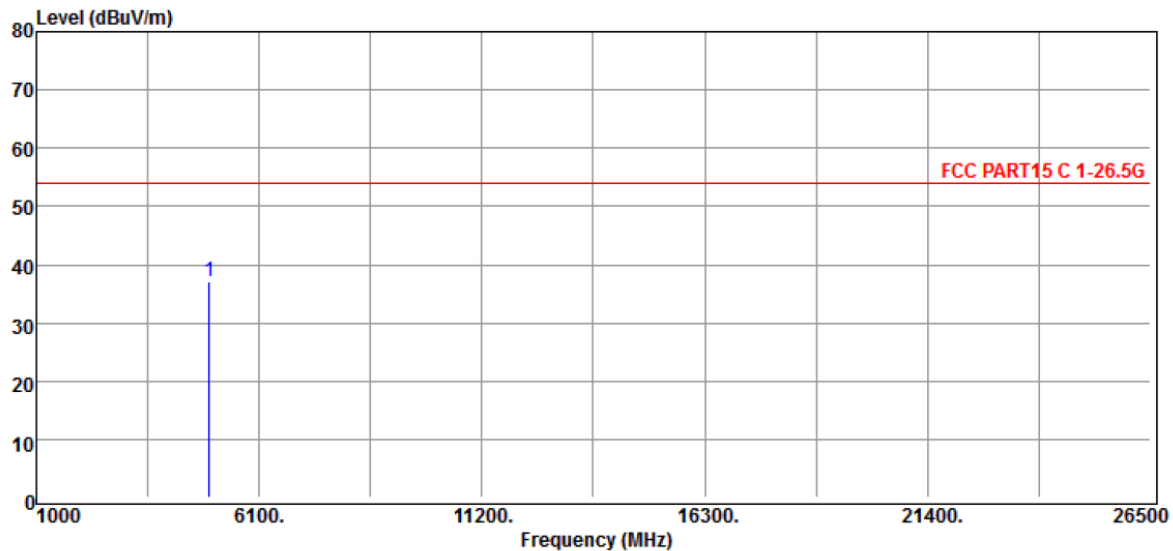
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
- Spectrum setting:
 - Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Radiated Emission Test Data (Above and Field Strength to 10th Harmonic)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 39	Frequency	: 2480 MHz
Test Mode	: 3 (1Mbps)	Tested by	: Tony Huang
Polarization	: Horizontal	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	4960.000	46.85	-9.73	37.12	54.00	-16.88	HORIZONTAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

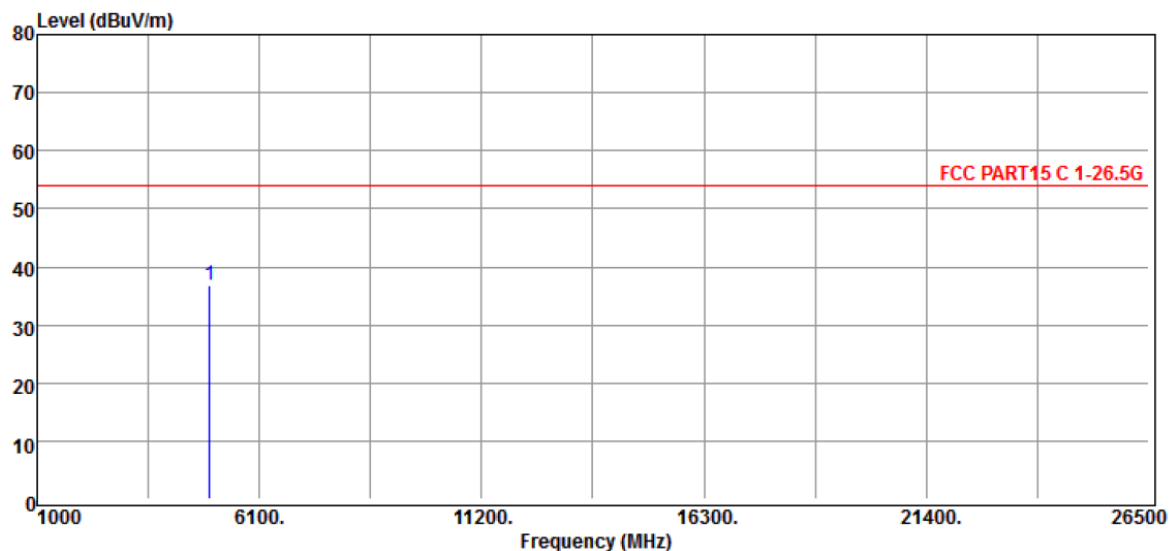
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
 - (a) Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

**Radiated Emission Test Data (Above and Field Strength to 10th Harmonic)**

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 39	Frequency	: 2480 MHz
Test Mode	: 3 (1Mbps)	Tested by	: Tony Huang
Polarization	: Vertical	EUT Position	: X axis



No.	Freq MHz	Reading dBuV	C.F dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Antenna Pol.	Remark
1	4960.000	46.55	-9.73	36.82	54.00	-17.18	VERTICAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
 - (a) Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.



4 Out of Band Emission Test

4.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

4.2 Test Arrangement and Procedure

Refer to Sec. 3.2.

4.3 Limit of Field Strength of Fundamental (§ 15.249(d))

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

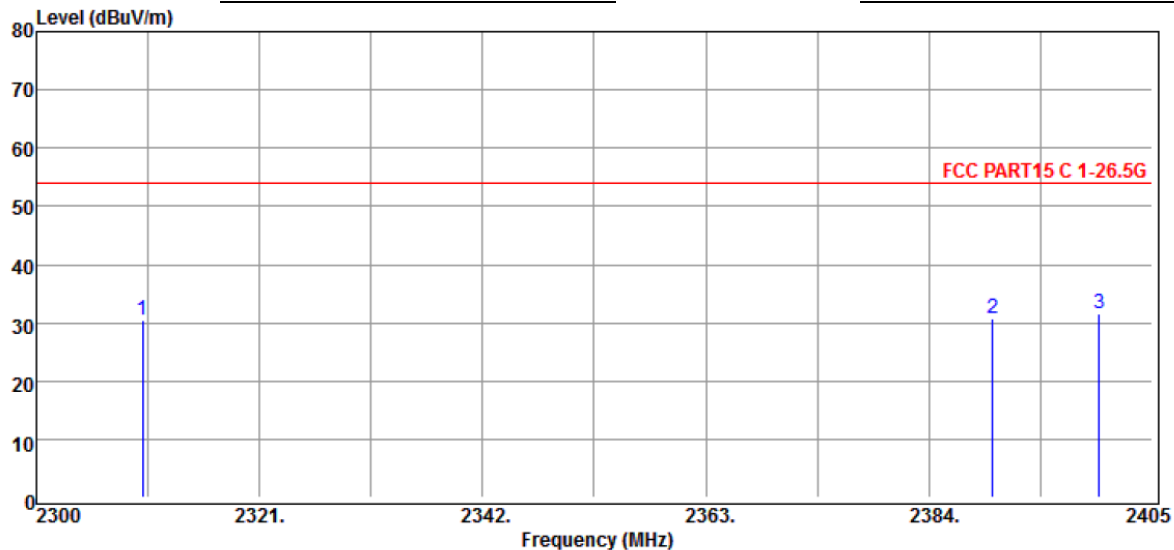
4.4 Test Result

Compliance

The final test data are shown on the following page(s).

Band-Edge Test Data (Lower Edge)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 00	Frequency	: 2402 MHz
Test Mode	: 1 (1Mbps)	Tested by	: Tony Huang
Polarization	: Horizontal	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	2310.000	46.48	-16.10	30.38	54.00	-23.62	HORIZONTAL	Peak
2	2390.000	46.44	-15.83	30.61	54.00	-23.39	HORIZONTAL	Peak
3	2400.000	47.34	-15.82	31.52	54.00	-22.48	HORIZONTAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

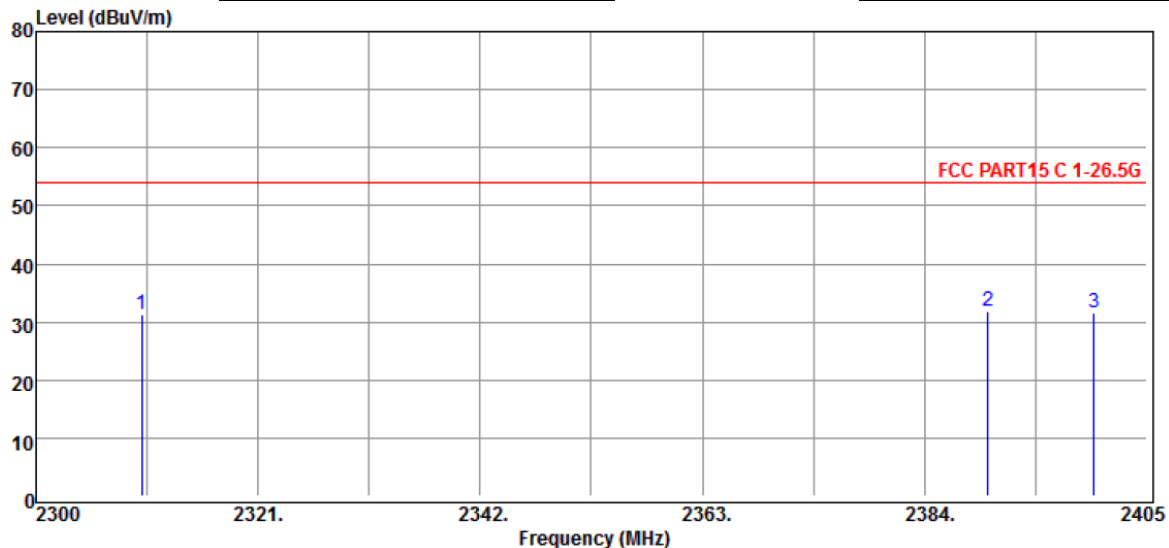
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
 - (a) Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Band-Edge Test Data (Lower Edge)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 00	Frequency	: 2402 MHz
Test Mode	: 1 (1Mbps)	Tested by	: Tony Huang
Polarization	: Vertical	EUT Position	: X axis



No.	Freq MHz	Reading dBuV	C.F dB/m	Result dBuV/m	Limit dBuV/m	Margin dB	Antenna Pol.	Remark
1	2310.000	47.38	-16.10	31.28	54.00	-22.72	VERTICAL	Peak
2	2390.000	47.75	-15.83	31.92	54.00	-22.08	VERTICAL	Peak
3	2400.000	47.31	-15.82	31.49	54.00	-22.51	VERTICAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

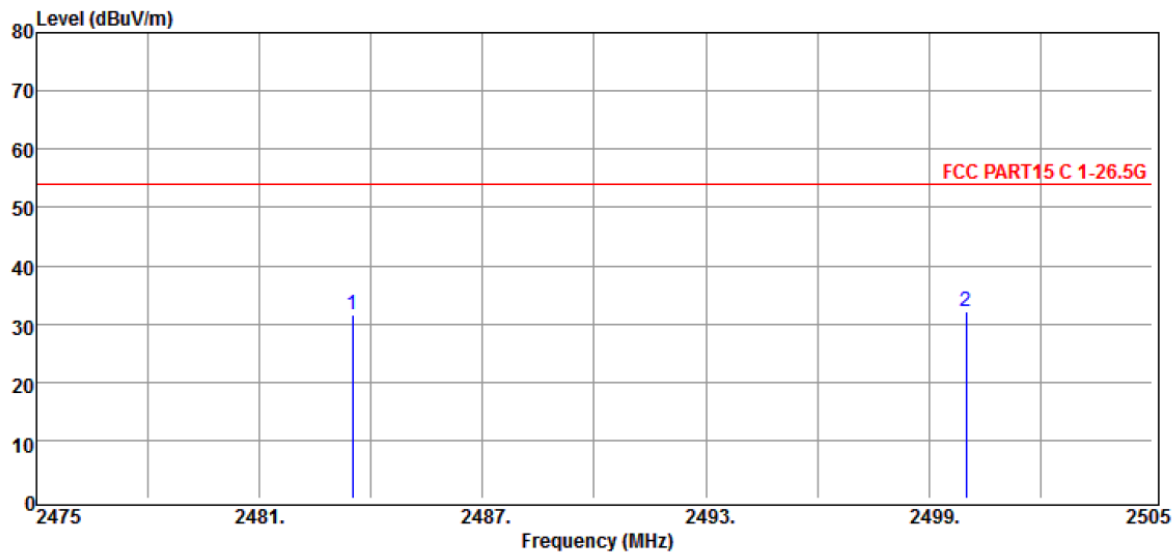
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
- Spectrum setting:
 - Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Band-Edge Test Data (Upper Edge)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 39	Frequency	: 2480 MHz
Test Mode	: 3 (1Mbps)	Tested by	: Tony Huang
Polarization	: Horizontal	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	2483.500	47.13	-15.45	31.68	54.00	-22.32	HORIZONTAL	Peak
2	2500.000	47.56	-15.34	32.22	54.00	-21.78	HORIZONTAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

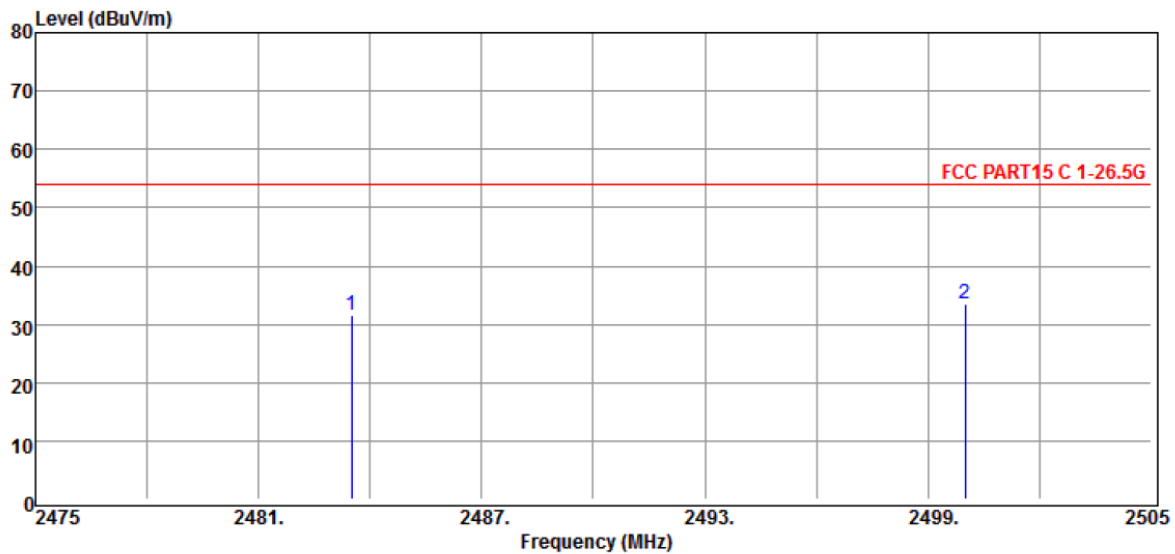
Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
 - (a) Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Band-Edge Test Data (Upper Edge)

Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 39	Frequency	: 2480 MHz
Test Mode	: 3 (1Mbps)	Tested by	: Tony Huang
Polarization	: Vertical	EUT Position	: X axis



No.	Freq MHz	Reading dBμV	C.F dB/m	Result dBμV/m	Limit dBμV/m	Margin dB	Antenna Pol.	Remark
1	2483.500	47.09	-15.45	31.64	54.00	-22.36	VERTICAL	Peak
2	2500.000	48.76	-15.34	33.42	54.00	-20.58	VERTICAL	Peak

Note 1. C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain.

Note 2. Margin = Result - Limit ; Result = Reading + C.F.

Remark :

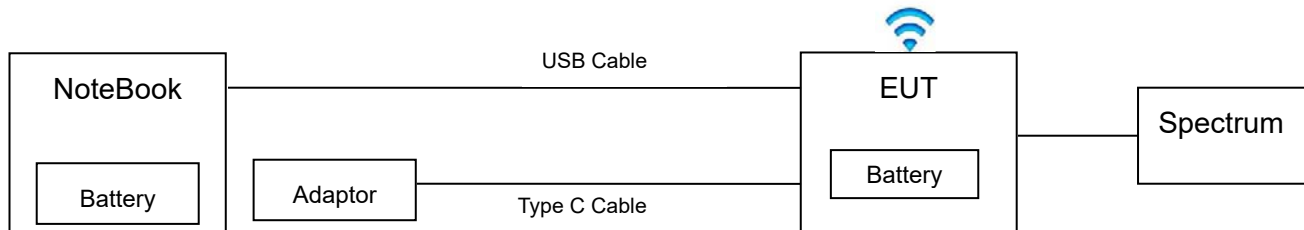
- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
- All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
- Spectrum setting:
 - Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

5 20 dB Bandwidth

5.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

5.2 Test Arrangement and Procedure



1. The transmitter output was connected to a spectrum analyzer (through an attenuator, if it's necessary).
2. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. Measured the -20 dB bandwidth and plotted the graph.

5.3 Limit

None; For report purpose only.

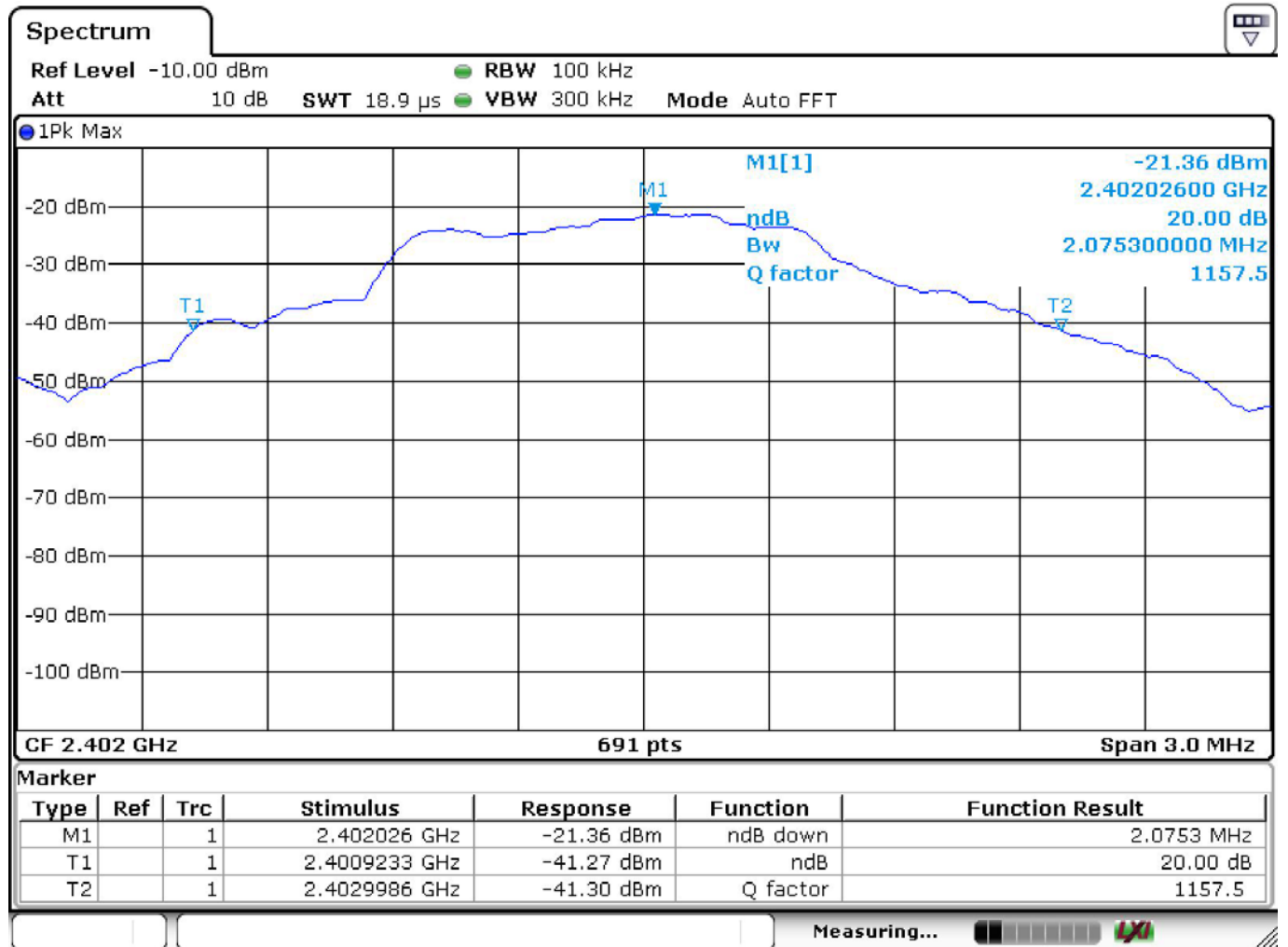
5.4 Test Result

No non-compliance noted.

The final test data are shown on the following page(s).



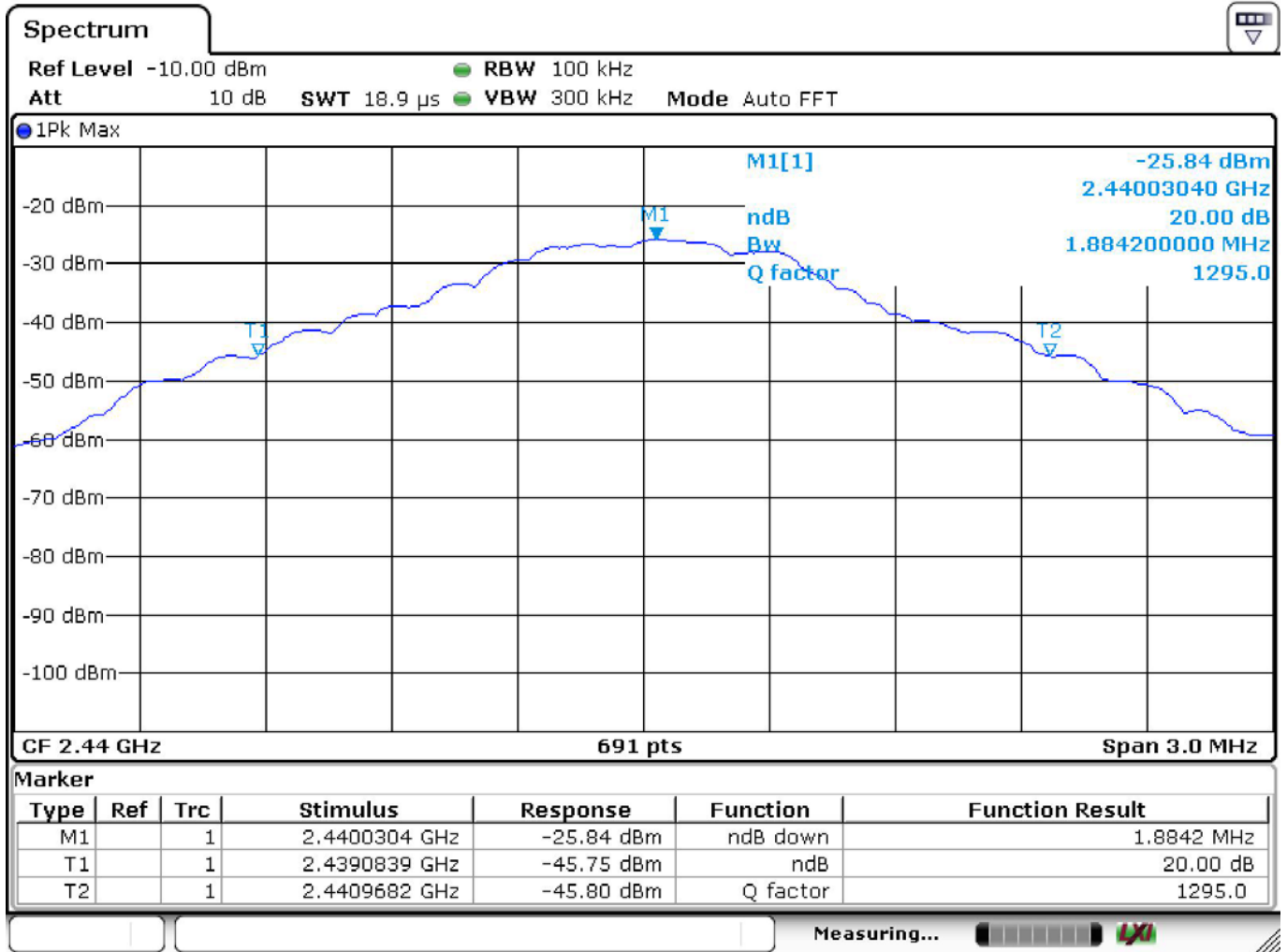
Test Site	: HA2	Test Date	: 2023-07-27
Temperature	: 25°C	Humidity	: 59%
Channel	: 00	Frequency	: 2402 MHz
Test Mode	: 1 (1Mbps)	Tested by	: Tony Huang





Test Mode : 2

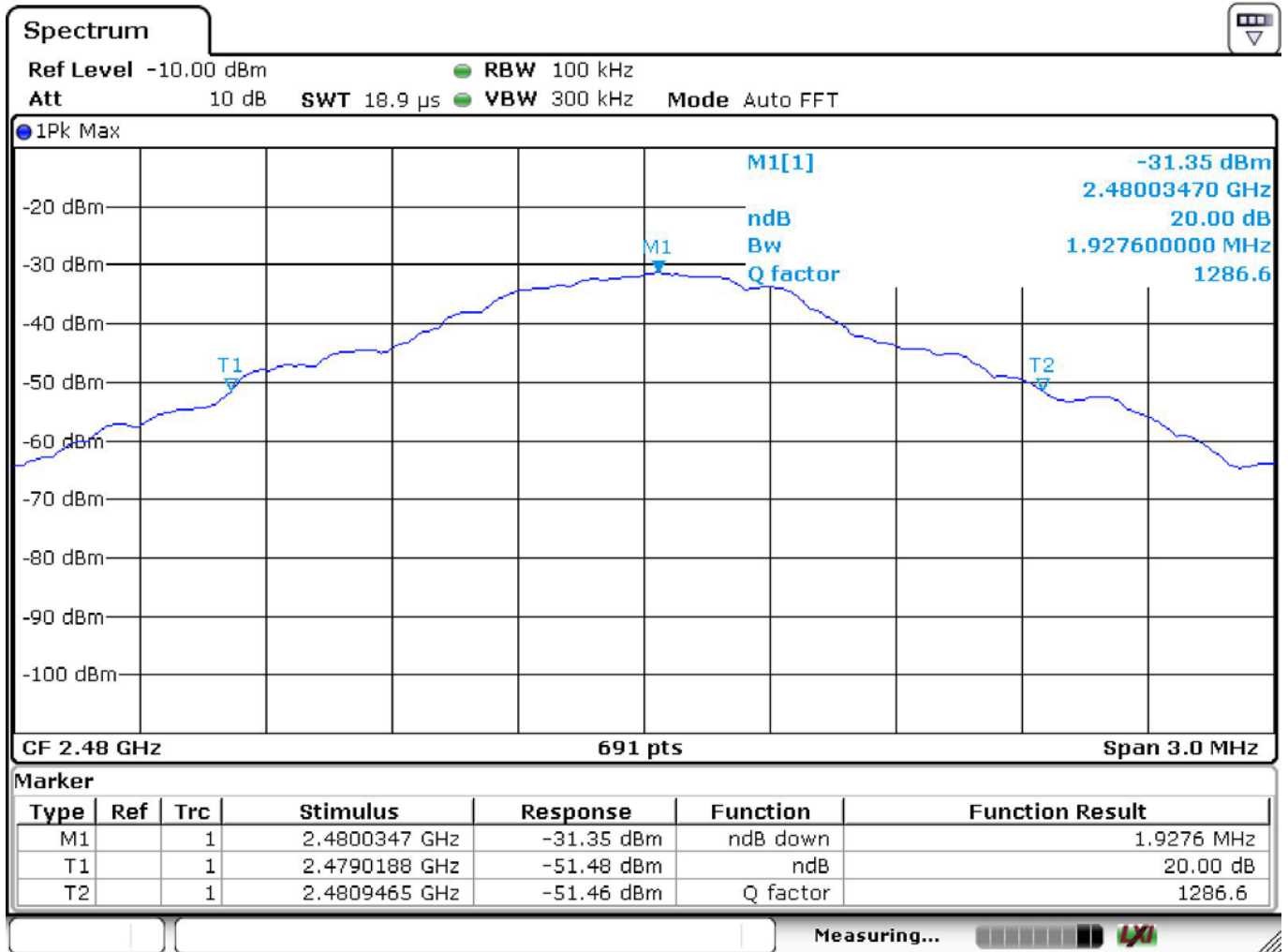
Channel : 19





Test Mode : 3

Channel : 39





6 Antenna requirement

6.1 Limit (§ 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a uniue coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

6.2 Test Result

Compliance.

The EUT applies a Printed Trace antenna.

-----End Of Test Report-----