FCC COMPLIANCE TEST REPORT

Technical Statement of Conformity

in accordance with 47 CFR Part 15 Subpart C

The product

Equipment Under Test	: Bluetooth LE ID Badge
Model Number	: BT-BLE-ID-Badge
Product Series	: N/A
Report Number	: HA180096-RA
Issue Date	: 5-Feb-2018
Test Result	: Compliance

is produced by

ZONITH A/S

Gammel Kongevej 39E DK-1610 Copenhagen V Denmark

HongAn TECHNOLOGY CO., LTD.

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BSMI Registration No.: SL2-IN-E-0023, SL2-A1-E-0023, SL2-IS-E-0023, SL2-R1-E-0023, SL2-R2-E-0023, SL2-L1-E-0023

FCC Designation No.: TW1071, TW1163
TAF Accreditation No.: 1163
VCCI Registration No.: R-2156, C-2329, T-219

Contents

Test Result Certification

Applicant	: ZONITH A/S
Address of Applicant	: Gammel Kongevej 39E DK-1610 Copenhagen V Denmark
Manufacturer	: Mobility Sound Technology Ltd.
Address of Manufacturer	: 5F, No. 100, Jian 1st Road, ZhongHe Dist., New Taipei City #235, Taiwan
Trade Name	: **ZONITH A/S**
Equipment Under Test	: Bluetooth LE ID Badge
Model Number	: BT-BLE-ID-Badge
Product Series	: N/A
FCC ID	: 2AJ8P-BTBLE-IDBDG
Filing Type	: Certification
Sample Received Date	: 16-Jan-2018
Test Standard	:

☒ FCC Part 15 Subpart C §15.247

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, 15.247.
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: HongAn Technology Co., Ltd., No.15-1 Cweishuh Keng, Cweipin Village, Linkou Dist., New Taipei City, Taiwan, R.O.C. FCC Designation No.: TW1071, TW1163.

Documented by: Kay Wang 2018-2-05

Kay Wang/ ADM. Dept Staff

Tested by: Eason Hsieh 2018-1-23

Eason Hsieh / ENG. Dept. Staff

Approved by: Peter Chin **Date:** 2018-2-05

Peter Chin / Section Manager

Summary of Test Result

	Test Item	Applicable Standard	Test Result
1	Conducted limits	FCC part 15 subpart C §207	Compliance
2	Radiated emission limits	FCC part 15 subpart C §209	Compliance
3	6dB Bandwidth	FCC part 15 subpart C §247(a)(2)	Compliance
4	Maximum Conducted Output Power	FCC part 15 subpart C §247(b)(3)	Compliance
5	Out of Band Emission	FCC part 15 subpart C §247(d)	Compliance
6	Power Spectral Density	FCC part 15 subpart C §247(e)	Compliance
7	Antenna Requirement	FCC part 15 subpart C §203	Compliance

1 General Description

1.1 Description of EUT

Equipment Under Test	:	Bluetooth LE ID Badge
Model Number of EUT	:	BT-BLE-ID-Badge
Product Series	:	N/A
Power Supply	:	Li-ion Battery DC 3.7 V
Frequency Range	:	2402~2480 MHz
Number of Channels	:	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	:	Chip Antenna/ Gain: 1.3 dBi
Modulation Technique	:	GFSK
Transmit Data Rate	:	1 Mbps
Specification	:	**Dimensions :** 16 cm (L) X 6.5 cm (W) X 1.5 cm (H) **Weight :** 100 g **Intended Function :** The EUT is a Bluetooth ID badge, which will sent out SOS message for emergency status .

1.2 Test Instruments

Instrument Name	Manufacturer Mode	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
RF Amplifier	Schaffner	CPA9231A	0405	24-Aug-2017	23-Aug-2018
EMI Receiver	R&S	ESCI	100931	17-Aug-2017	16-Aug-2018
Spectrum Analyzer	R&S	FSV	101629	16-Jan-2018	15-Jan-2019
Preamplifier	HD	HD17187	004	22-May-2017	21-May-2018
Bilog Antenna	TESEQ	CBL6111D	38521	11-Oct-2017	10-Oct-2018
Double-Ridged Waveguide Horn	EMCO	3115	9912-5992	22-May-2017	21-May-2018
Horn Antenna (18-40GHz)	Com -Power	AH-840	101042	25-May-2017	24-May-2018
Microwave Preamplifier	Com -Power	PAM-840	461269	24-May-2017	23-May-2018
LISN	Rolf Heine Hochfrequenztechnik	NNB-4/32T	00001	08-Mar-2017	07-Mar-2018
Active Loop Antenna	EMCO	6502	9202-2717	21-Aug-2017	20-Aug-2018
Coaxial Cable	n/a	8D-FB	HA2-10MSITE-01	24-Aug-2017	23-Aug-2018
Microflex Cable	HUBER SUHNER	SUCOFLEX 104	MY3368/2	23-May-2017	22-May-2018
Microflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3367/2	24-May-2017	23-May-2018
Coaxial Cable	n/a	RG 223/U	HA2-CE-01	24-Aug-2017	23-Aug-2018

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

1.3 Auxiliary Equipments

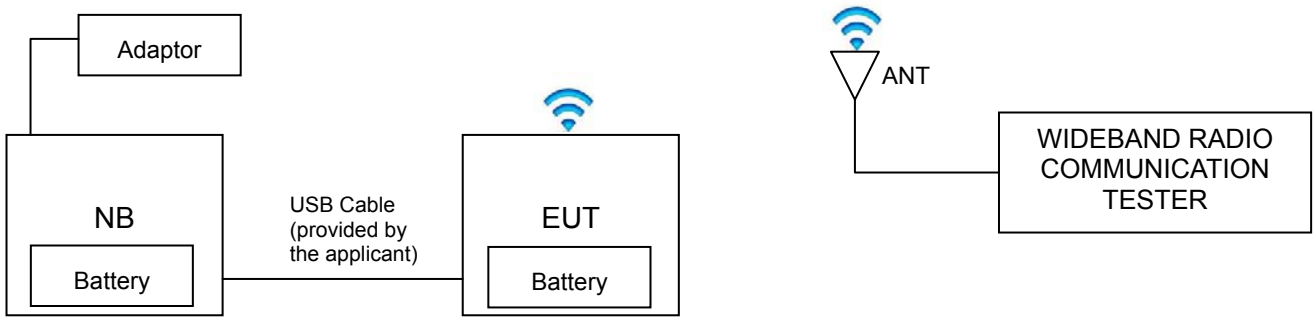
1.3.1. Provided by HongAn Technology Co., Ltd. for Test.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Power Cord
01	NoteBook	N61J	N61JV-021A520M	CE,FCC, C-TICK N13219, BSMI R31018	ASUS	N/A

1.3.2. Provided by the Manufacturer

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Specification
01	USB Cable	N/A	N/A	N/A	N/A	1.8m

1.4 EUT SETUP



Note: Main Test Sample: BT-BLE-ID-Badge

1.5 Identifying the Final Test Mode

1. Mode 1: TX mode CH 00.
2. Mode 2: TX mode CH 20.
3. Mode 3: TX mode CH 39.

Note:

1. After pre-test, we identified that the TX mode was most likely to cause maximum disturbance and most likely to be susceptible to 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. During the tests, there was no Test Software has been used.
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 15.247 under the FCC Rules Part 15 Subpart C.

1.6 Final Test Mode

Conducted Emission: Mode 1.
Radiated Emission (30~1000 MHz): Mode 1.
Radiated Emission (1~26.5GHz): All Mode.

1.7 Condition of Power Supply

Charging through USB port.

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 15.247.

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.

1.13 Qualification of Test Facility

Name of Test Facility	:	HongAn Technology
Address of Test Facility	:	No. 15-1, Cweishuh Keng, Cweipin Village, Linkou, New Taipei City, Taiwan, R.O.C
FCC Designation No.	:	TW1071, TW1163
TAF Accreditation No.	:	1163

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.

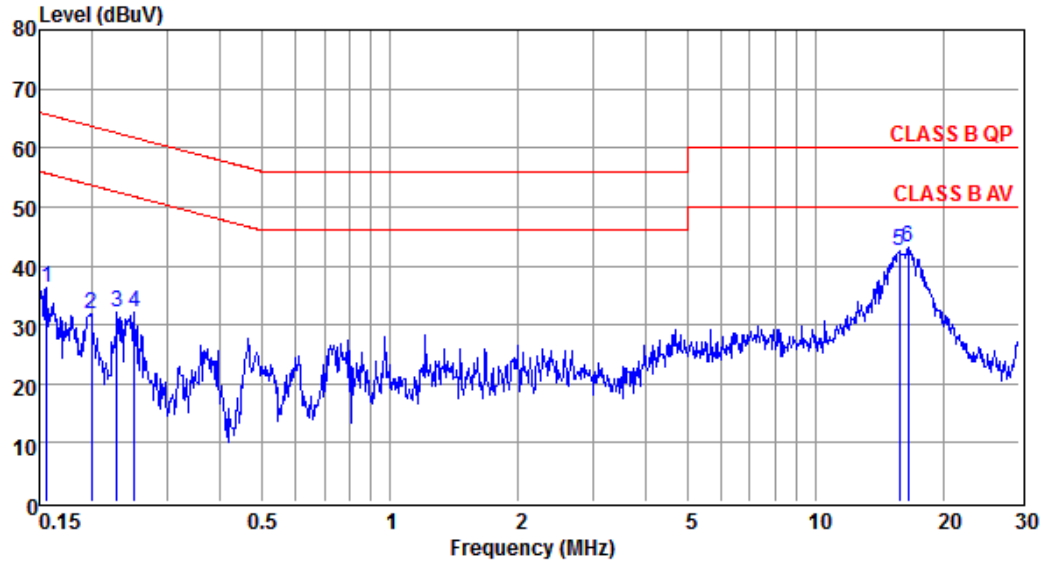
2.4 Test Result

Compliance

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

Power Line Conducted Emission Test Data

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Power Line	:	LINE	Mode	:	Mode 1



Freq	Read	C.F	Result	Limit	Margin	Remark	Phase
MHz	dBuV	dB	dBuV	dBuV	dB		
0.156	36.02	0.16	36.18	55.65	-19.47	Peak	LINE
0.199	31.84	0.12	31.96	53.67	-21.71	Peak	LINE
0.228	32.13	0.13	32.26	52.52	-20.26	Peak	LINE
0.251	31.89	0.13	32.02	51.73	-19.71	Peak	LINE
15.718	41.58	0.98	42.56	50.00	-7.44	Peak	LINE
16.486	42.16	1.01	43.17	50.00	-6.83	Peak	LINE

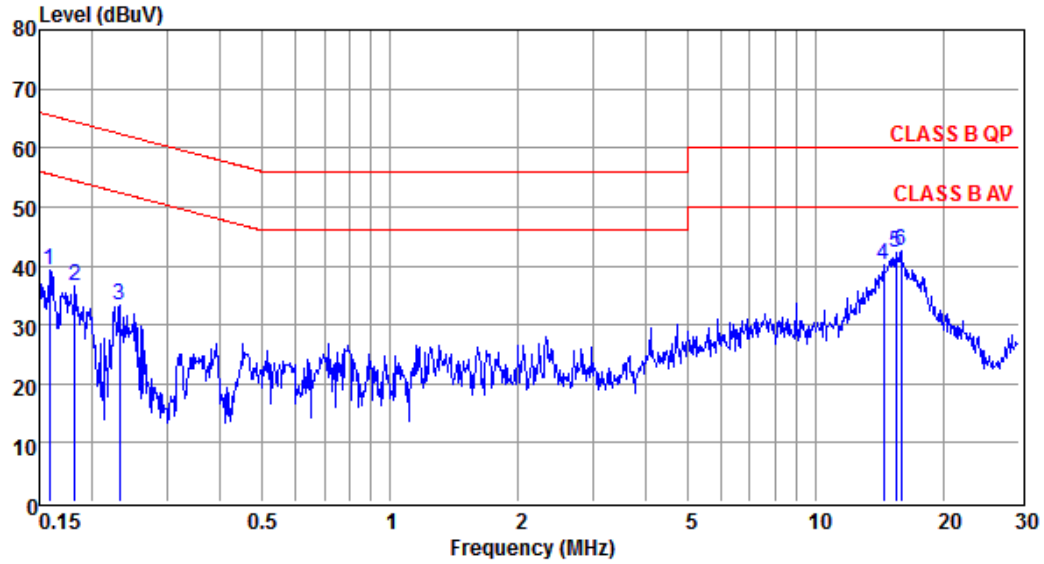
Note1: C.F (Correction Factor) = Insertion loss + Cable loss
Note2: Margin = Result - Limit

Remark：

1. Measuring frequencies from 0.15 MHz to 30 MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30 MHz were made with an instrument using quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15 MHz to 30 MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15 MHz to 30 MHz was 9kHz.

Power Line Conducted Emission Test Data

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Power Line	:	Neutral	Mode	:	Mode 1



Freq	Read	C.F	Result	Limit	Margin	Remark	Phase
MHz	dBuV	dB	dBuV	dBuV	dB		
0.158	39.05	0.12	39.17	55.56	-16.39	Peak	NEUTRAL
0.182	36.34	0.12	36.46	54.42	-17.96	Peak	NEUTRAL
0.232	33.09	0.13	33.22	52.39	-19.17	Peak	NEUTRAL
14.440	39.34	0.83	40.17	50.00	-9.83	Peak	NEUTRAL
15.388	41.46	0.86	42.32	50.00	-7.68	Peak	NEUTRAL
15.885	41.73	0.88	42.61	50.00	-7.39	Peak	NEUTRAL

Note1: C.F (Correction Factor) = Insertion loss + Cable loss
Note2: Margin = Result - Limit

Remark：

1. Measuring frequencies from 0.15 MHz to 30 MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30 MHz were made with an instrument using quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15 MHz to 30 MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15 MHz to 30 MHz was 9kHz.

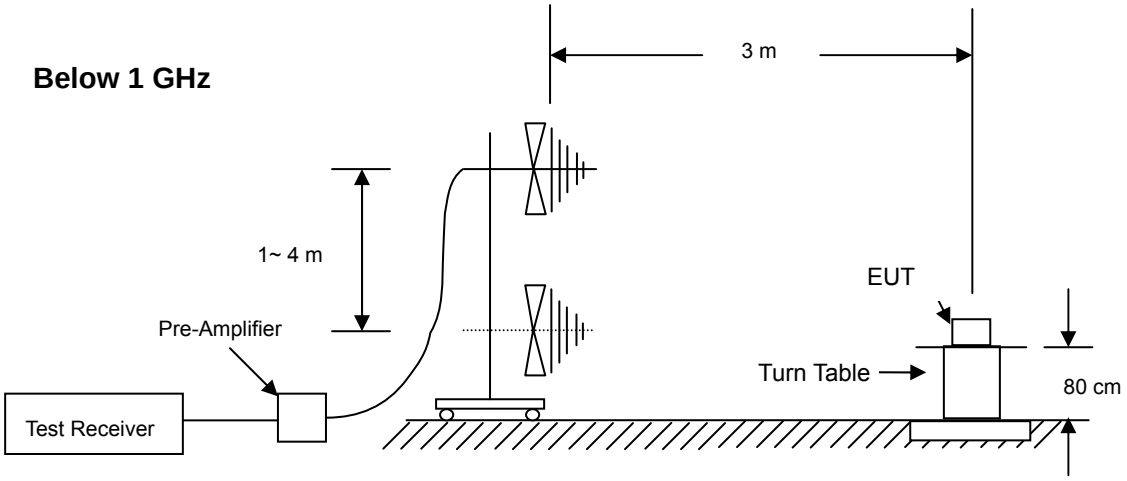
3 Radiated Emission Test

3.1 Test Instruments

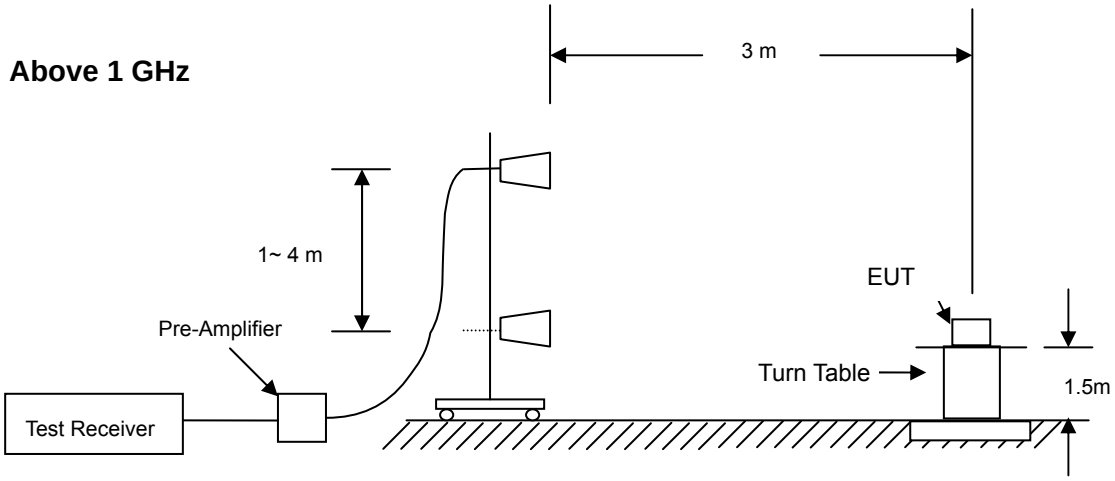
Refer to Sec. 1.2 Test Instruments.

3.2 Test Arrangement and Procedure

Below 1 GHz



Above 1 GHz



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. Maxium 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 meausreemnts for all frequencies are complete.

3.3 Limit (§ 15.205 & § 15.209)

3.3.1. Limit of Restricted Band of Operation (§ 15.205)

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

Frequency Band			
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
8.37625-8.38675	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	
13.36-13.41			

3.3.2. 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.

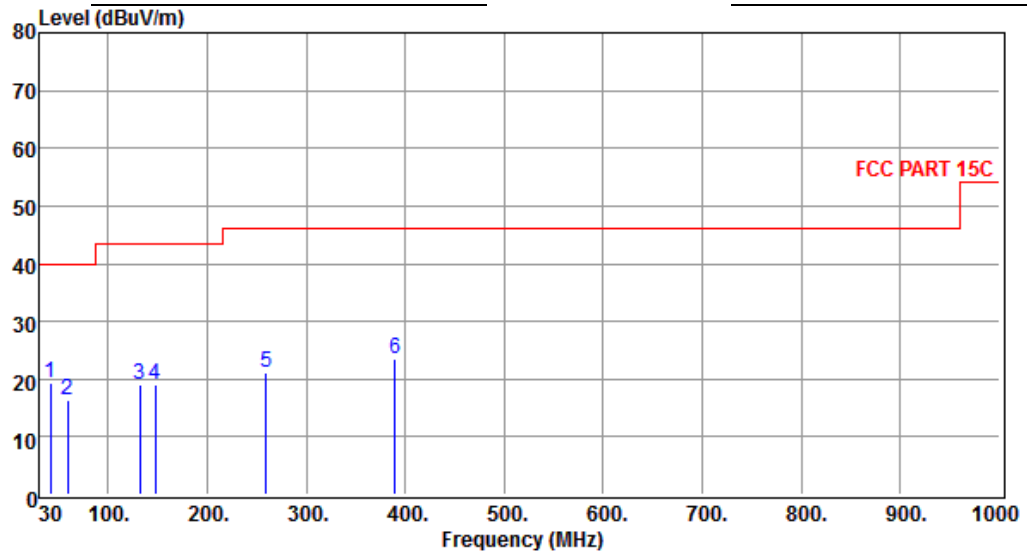
3.4 Test Result

Compliance

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

Radiated Emission Test Data (Below 1 GHz)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Polarization	:	Vertical	Channel	:	CH00
EUT Position	:	X axis			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
41.640	30.06	-10.64	19.42	40.00	-20.58			VERTICAL	Peak
59.100	33.10	-16.85	16.25	40.00	-23.75			VERTICAL	Peak
131.850	30.25	-11.26	18.99	43.50	-24.51			VERTICAL	Peak
147.370	30.68	-11.65	19.03	43.50	-24.47			VERTICAL	Peak
259.890	29.49	-8.25	21.24	46.00	-24.76			VERTICAL	Peak
389.870	29.95	-6.39	23.56	46.00	-22.44			VERTICAL	Peak

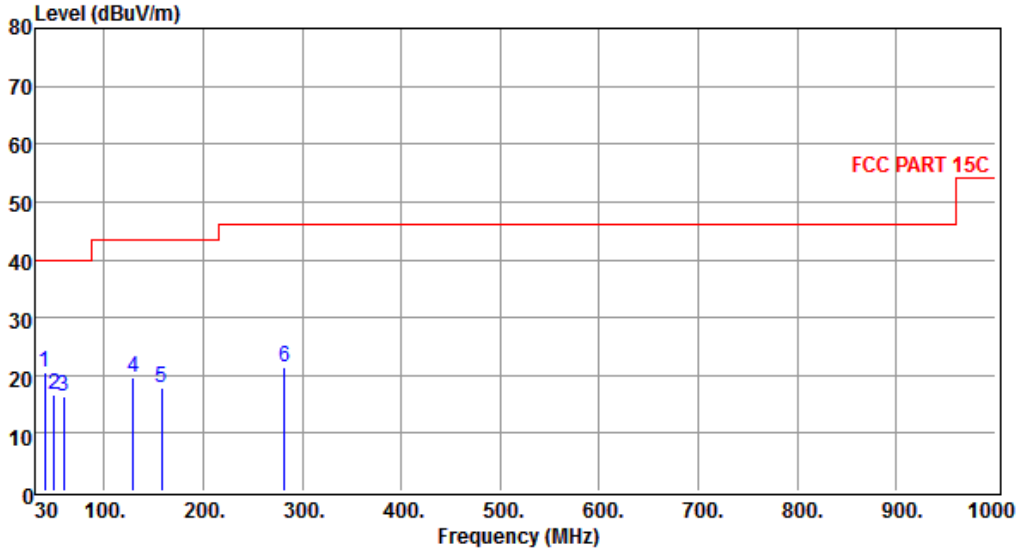
Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

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)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Polarization	:	Horizontal	Channel	:	CH00
EUT Position	:	X axis			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
39.700	29.92	-9.54	20.38	40.00	-19.62			HORIZONTAL	Peak
49.400	30.94	-14.34	16.60	40.00	-23.40			HORIZONTAL	Peak
59.100	33.20	-16.85	16.35	40.00	-23.65			HORIZONTAL	Peak
128.940	31.04	-11.27	19.77	43.50	-23.73			HORIZONTAL	Peak
158.040	29.90	-12.12	17.78	43.50	-25.72			HORIZONTAL	Peak
282.200	30.84	-9.42	21.42	46.00	-24.58			HORIZONTAL	Peak

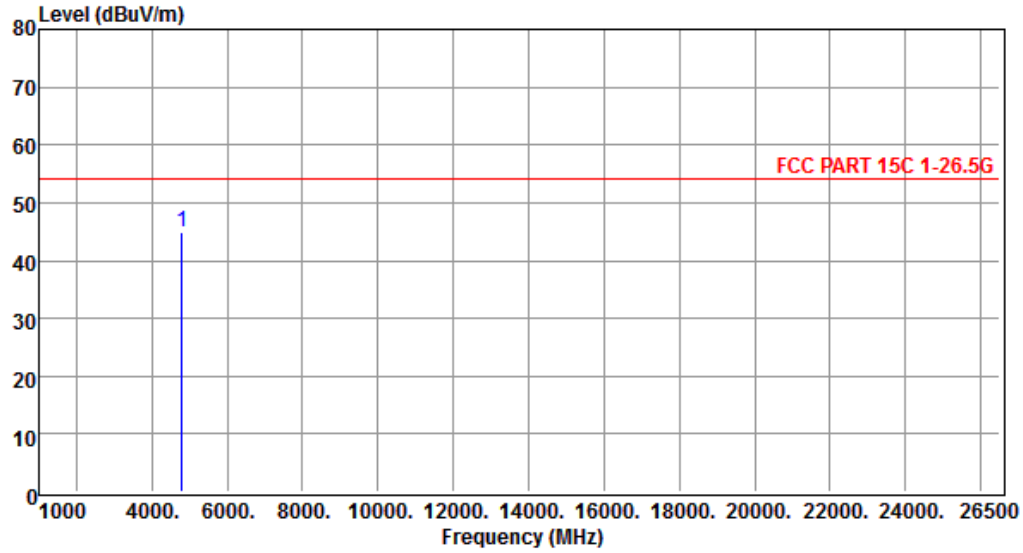
Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

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)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Polarization	:	Vertical	Channel	:	CH00
EUT Position	:	X axis			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
4804.000	42.26	2.77	45.03	54.00	-8.97			VERTICAL	Peak

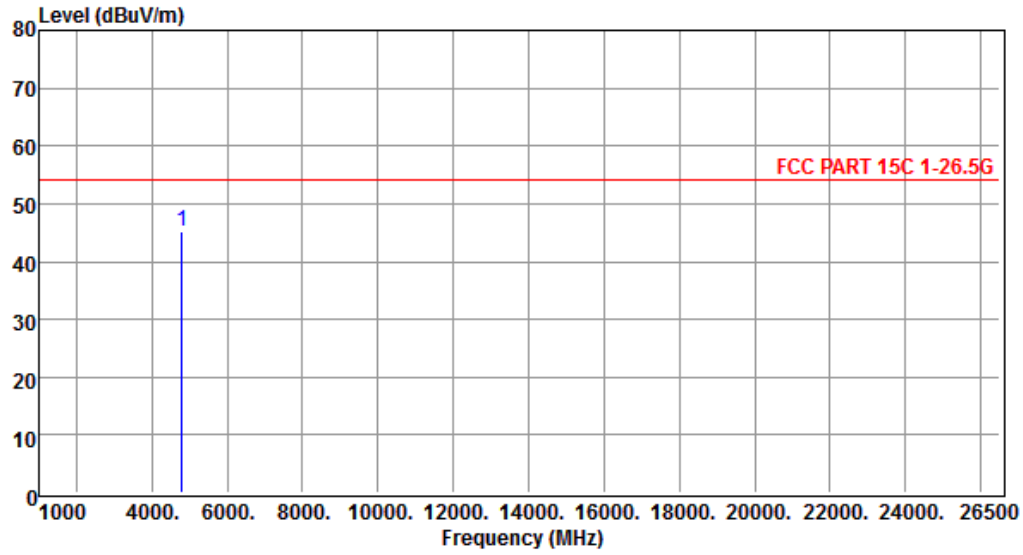
Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

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)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Polarization	:	Horizontal	Channel	:	CH00
EUT Position	:	X axis			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
4804.000	42.42	2.77	45.19	54.00	-8.81			HORIZONTAL	Peak

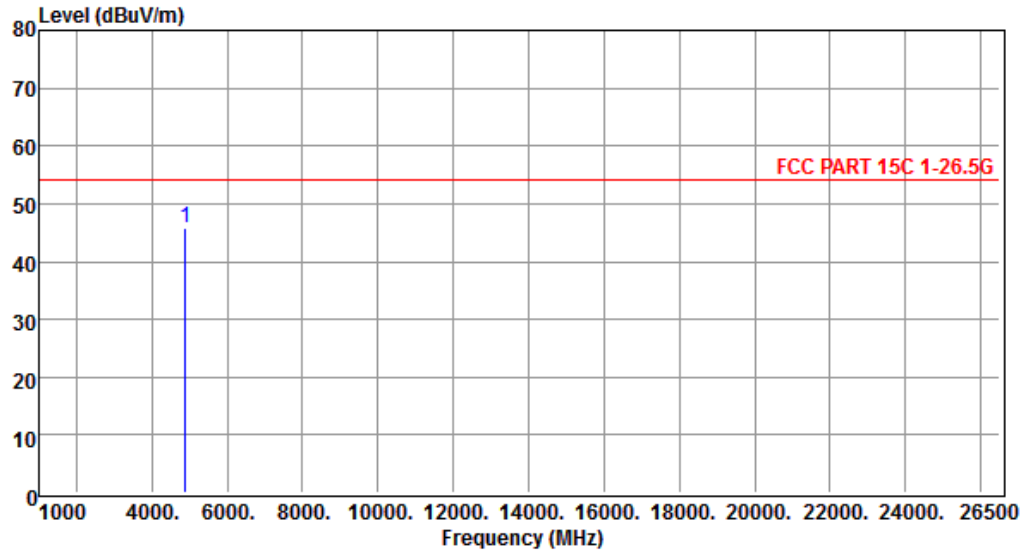
Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

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)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Polarization	:	Vertical	Channel	:	CH20
EUT Position	:	X axis			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
4884.000	42.88	2.94	45.82	54.00	-8.18			VERTICAL	Peak

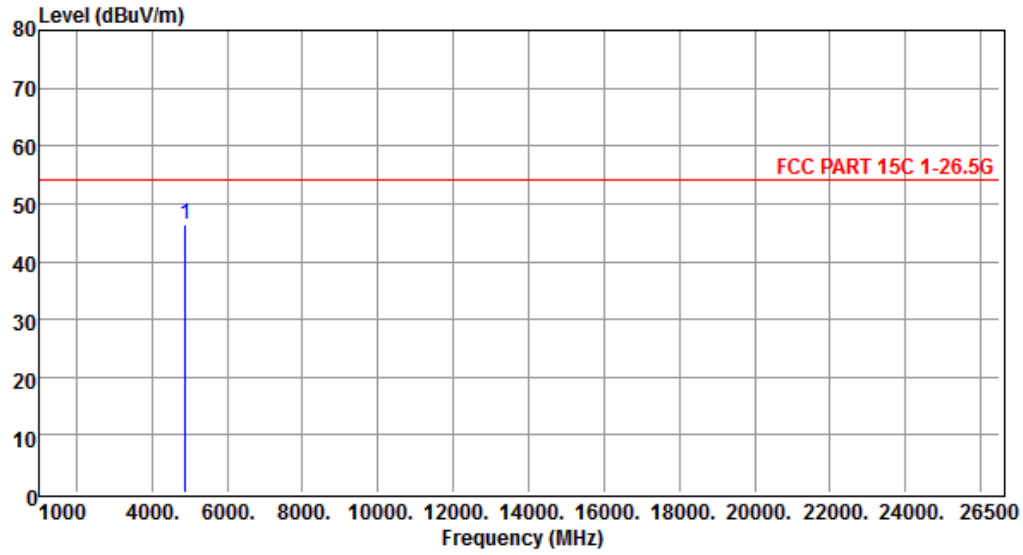
Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

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)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Polarization	:	Horizontal	Channel	:	CH20
EUT Position	:	X axis			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
4884.000	43.36	2.94	46.30	54.00	-7.70			HORIZONTAL	Peak

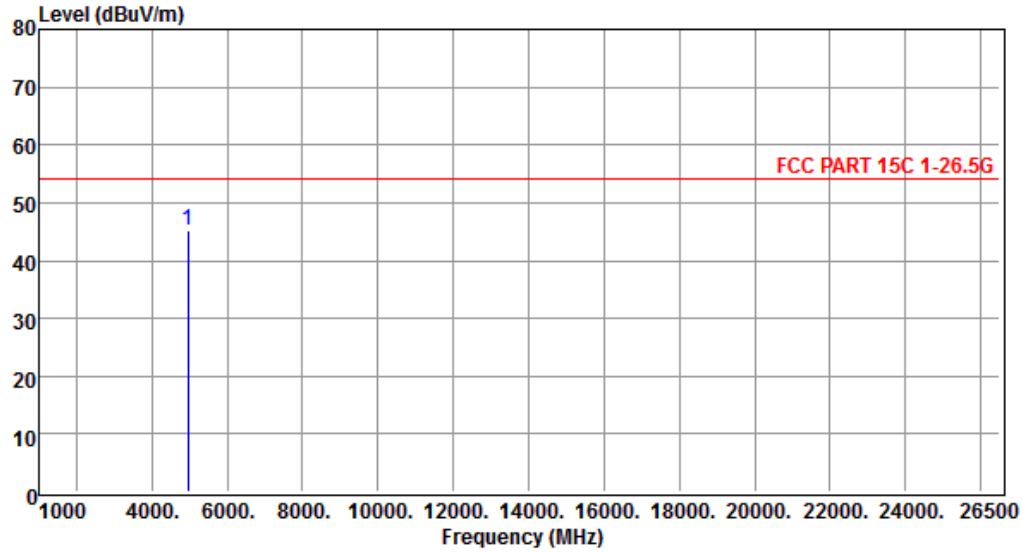
Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

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)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Polarization	:	Vertical	Channel	:	CH39
EUT Position	:	X axis			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
4960.000	41.97	3.15	45.12	54.00	-8.88			VERTICAL	Peak

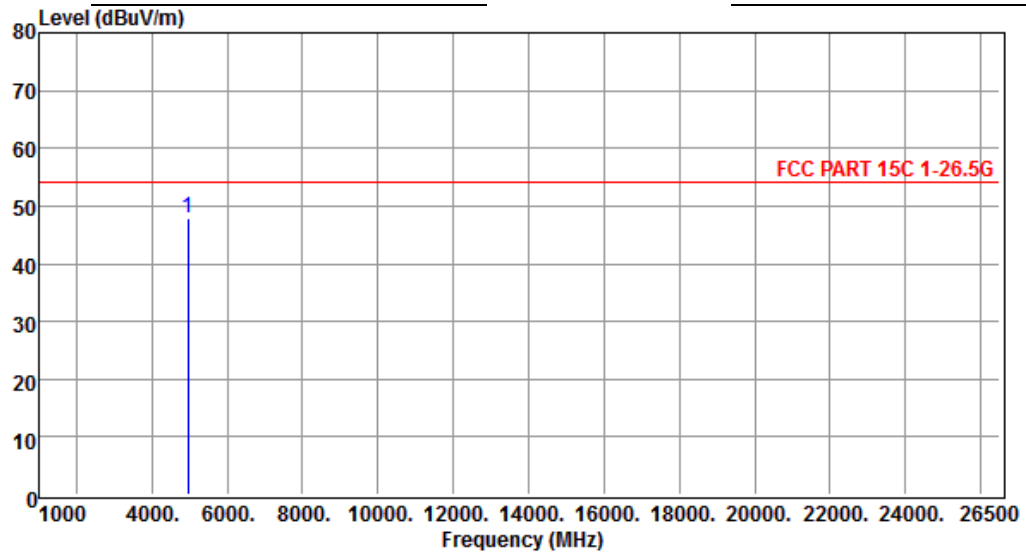
Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

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)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Polarization	:	Horizontal	Channel	:	CH39
EUT Position	:	X axis			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
4960.000	44.71	3.15	47.86	54.00	-6.14			HORIZONTAL	Peak

Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

Remark：

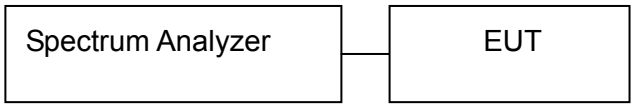
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already 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 6 dB Bandwidth of the Emission

4.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

4.2 Test Arrangement



4.3 Test Procedure

1. Connect the EUT to spectrum analyzer through appropriate attenuator.
2. Spectrum setting; RMB = 100 kHz; VBW ≥ 300 kHz. Detector = Peak. Sweep = Auto.
3. Trace = Max Hold.

4.4 Limit (§ 15.247(a)(2))

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

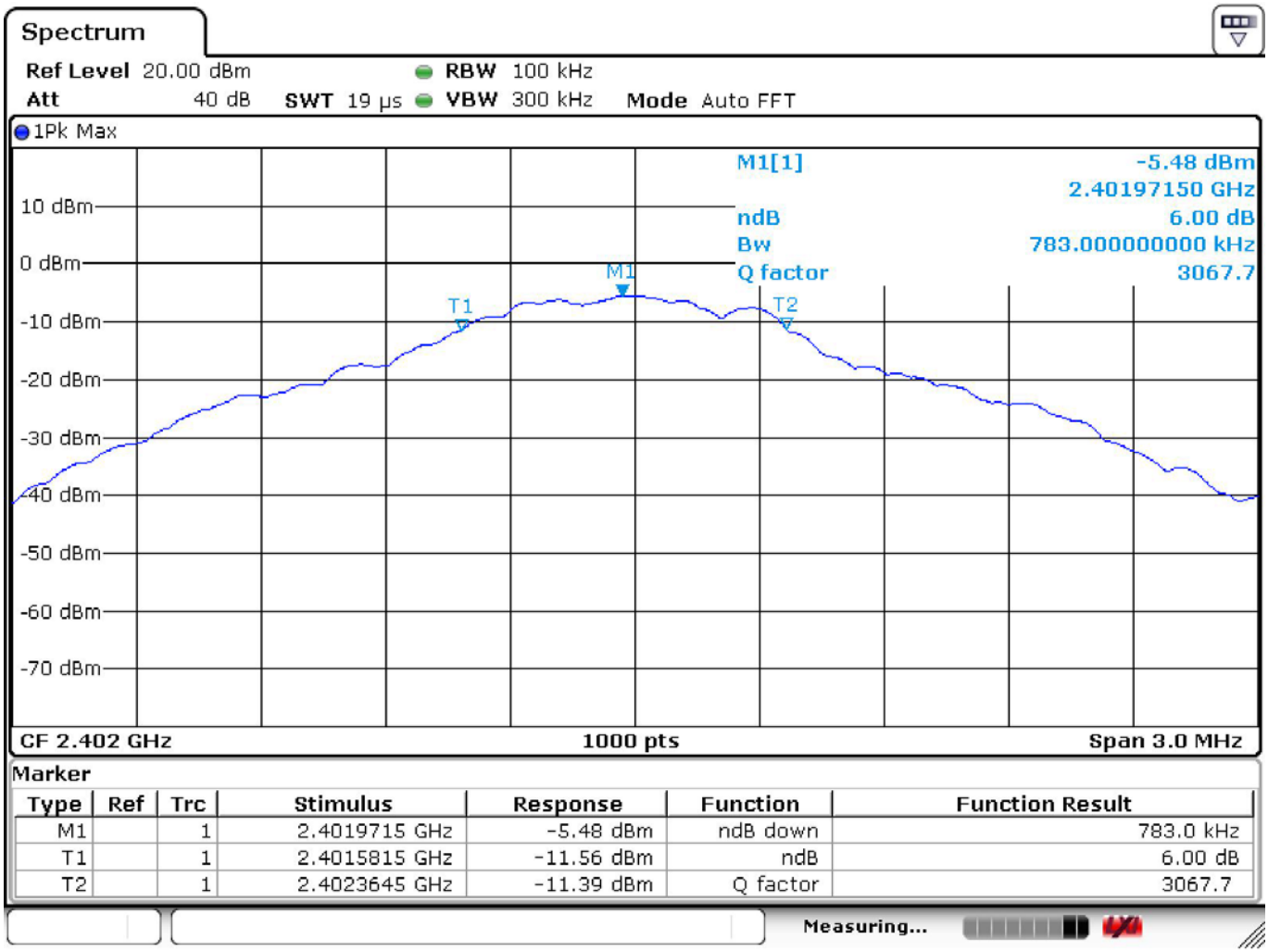
4.5 Test Result

Compliance

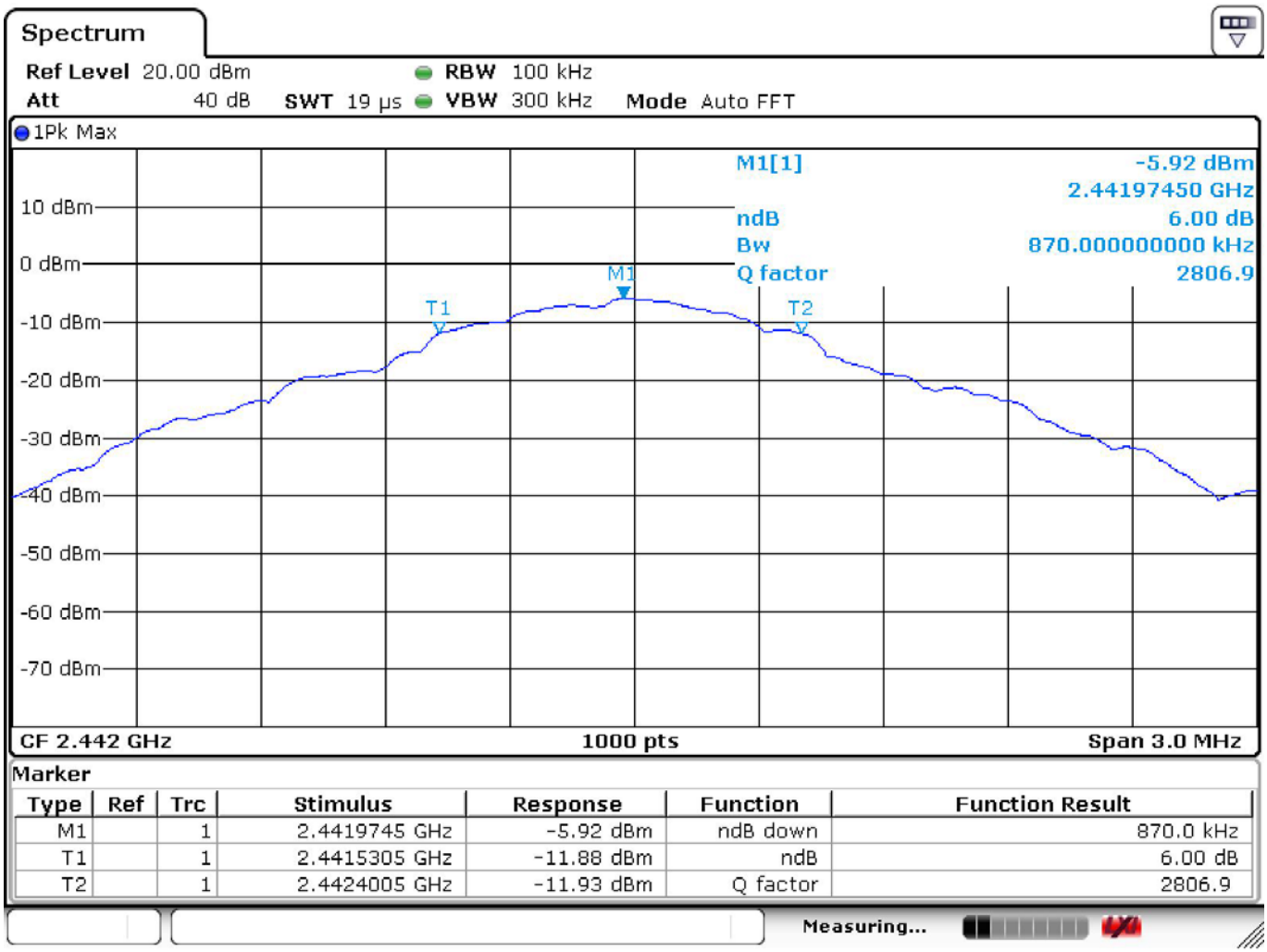
The final test data are shown on the following page(s).

Bluetooth			
Channel	**Frequency (MHz)**	**6dB Bandwidth (kHz)**	**Limit (kHz)**
00	2402	783	≧500
20	2442	870	≧500
39	2480	726	≧500

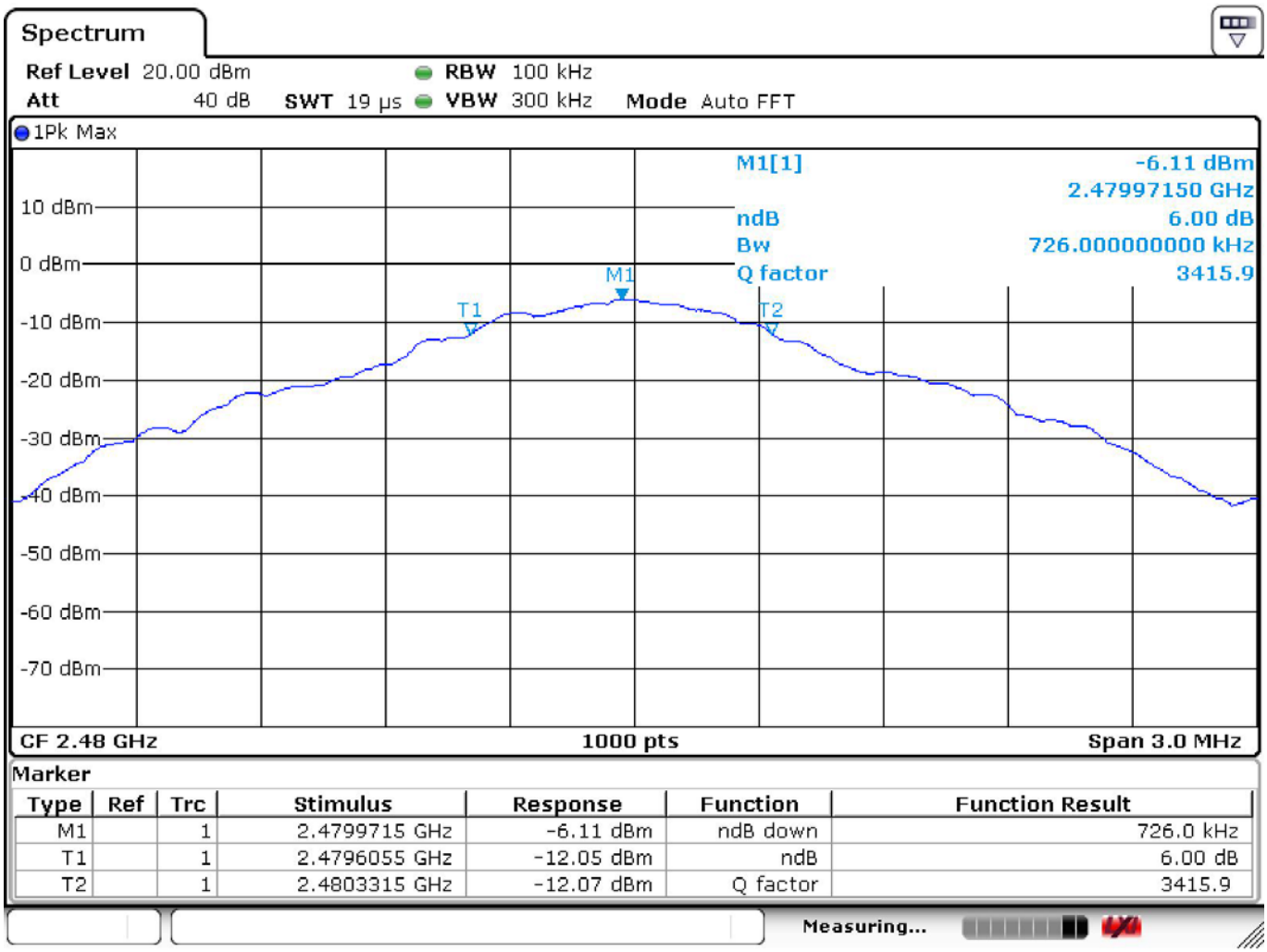
Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	BT BLE	Channel	:	00



Test Mode : BT BLE Channel : 20



Test Mode : BT BLE Channel : 39

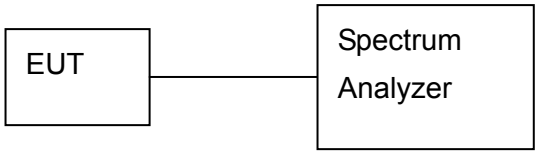


5 Maximum Conducted Output Power

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 RBW is set to 3MHz and VBW is set to 10MHz. Span set to 5MHz.
3. Max Hold..

5.3 Limit (§ 15.247(b))

15.247(b) - The maximum peak conducted output power of the intentional radiator shall not exceed the following:

15.247(b)(3) - For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt (30 dBm).

The maximum antenna gain is 1.3 dBi.

5.4 Test Result

Compliance.

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

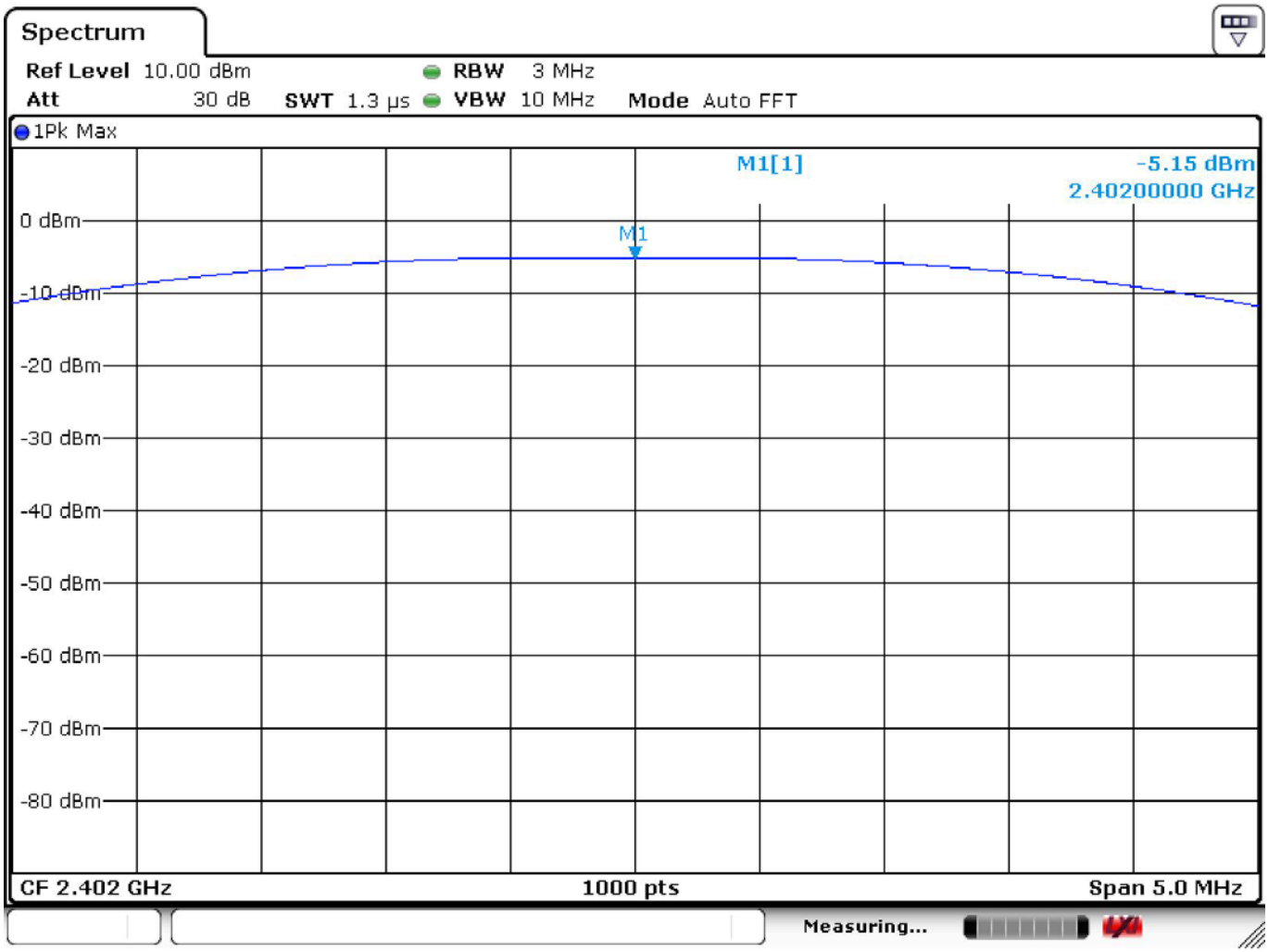
Result of Peak Conducted output power

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	BLE			

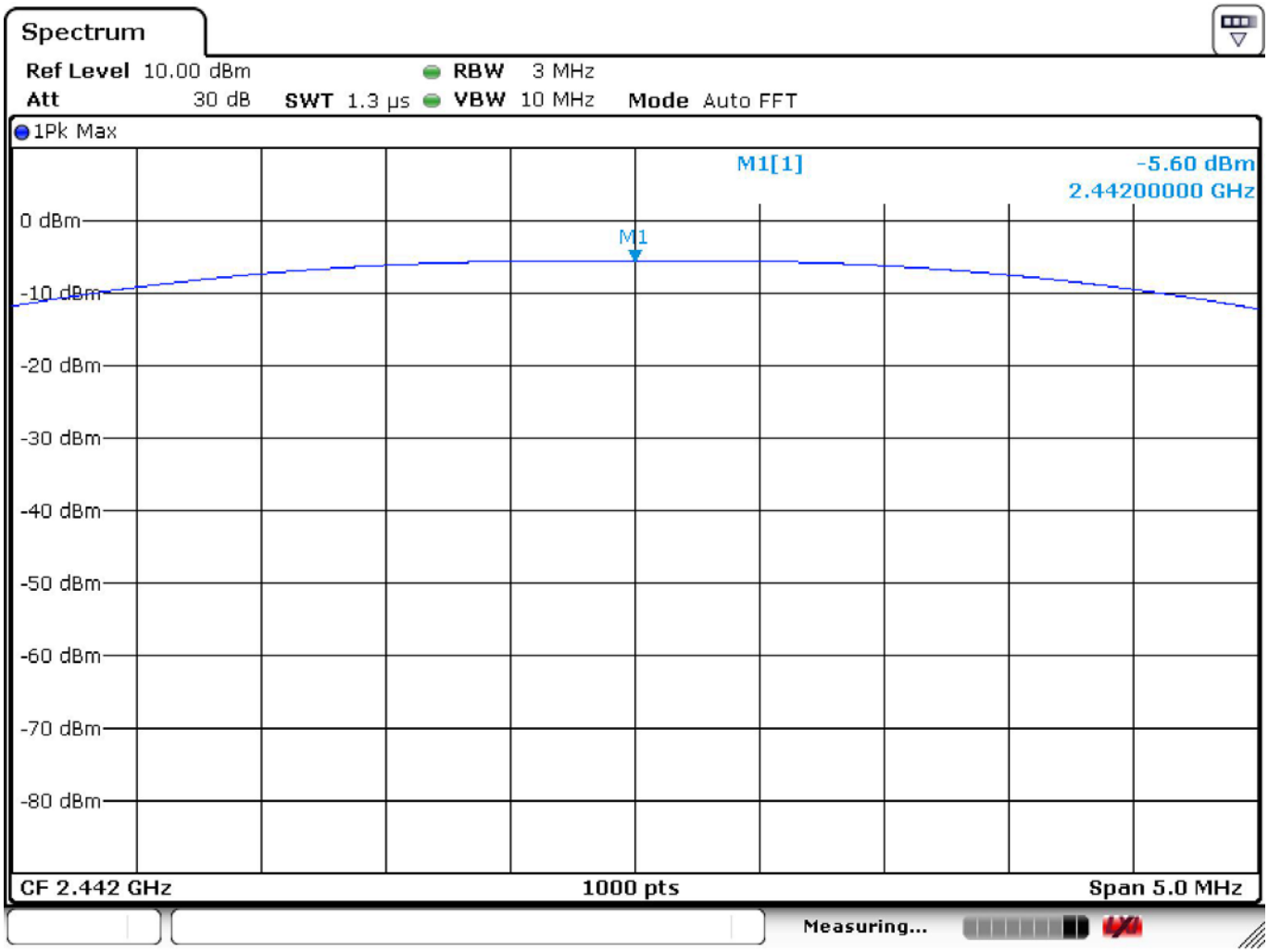
Test Channel	Frequency (MHz)	Test Result		Limit	
		(dBm)	(W)	(dBm)	(W)
00	2402	-5.15	0.0003054921113	30	1
20	2442	-5.60	0.0002754228703	30	1
39	2480	-5.66	0.0002716439269	30	1

Peak Conducted output power Test Data

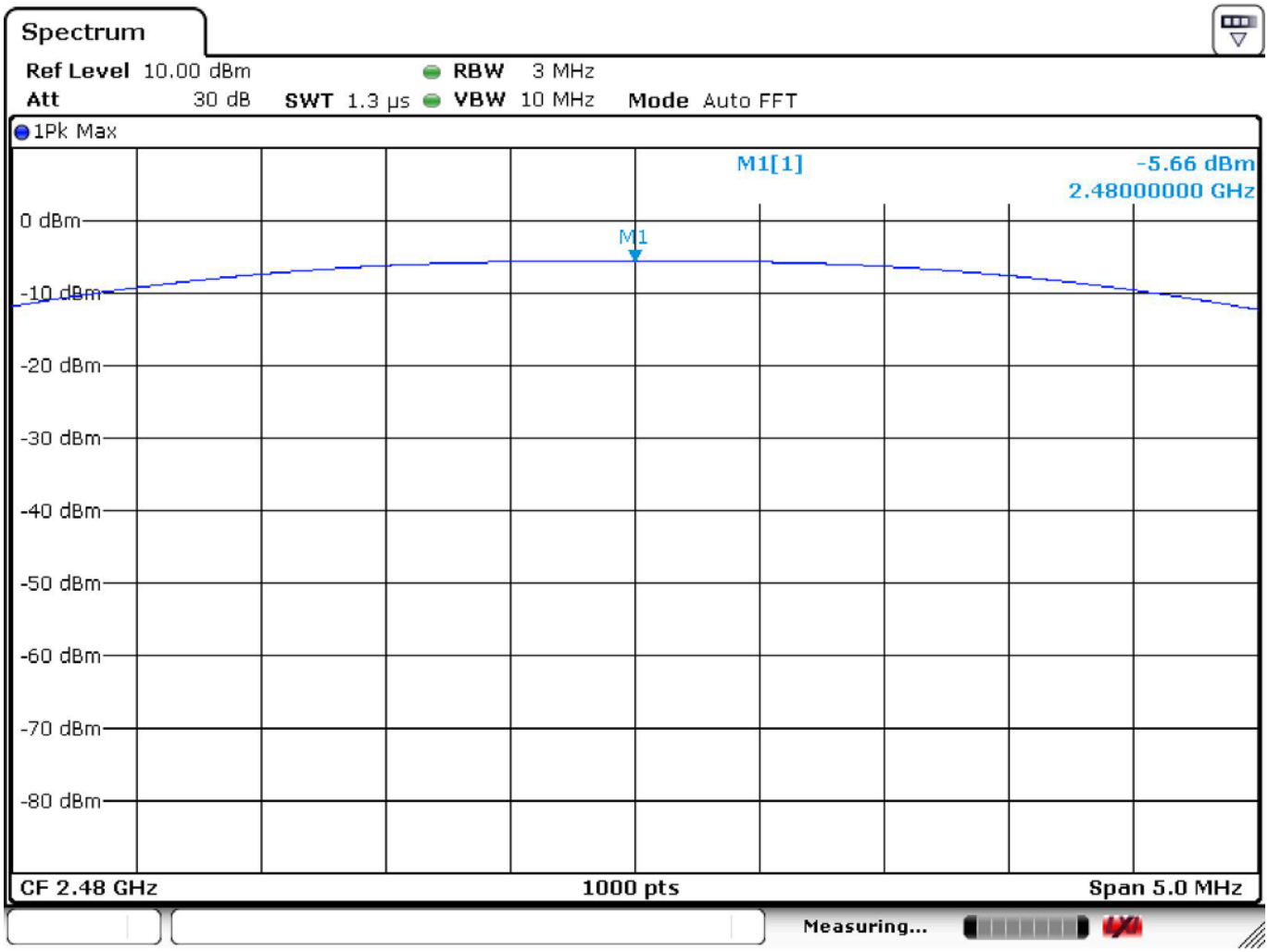
Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	BT BLE	Channel	:	00



Test Mode : BT BLE Channel : 20



Test Mode : BT BLE Channel : 39

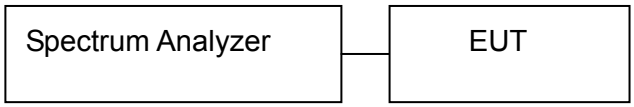


6 Out of Band Emission Test

6.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

6.2 Test Arrangement



6.3 Test Procedure

1. Connect the EUT to spectrum analyzer through appropriate attenuator.
2. Spectrum setting; RMB = 100 kHz; VBW = 300 kHz.
3. Span ≥ 1.5 time DTS BW.
4. Detector = Peak.
5. Trace = Max Hold.

6.4 Limit (§ 15.247(d))

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 conducted power limits. If the transmitter complies with the conducted 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 § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

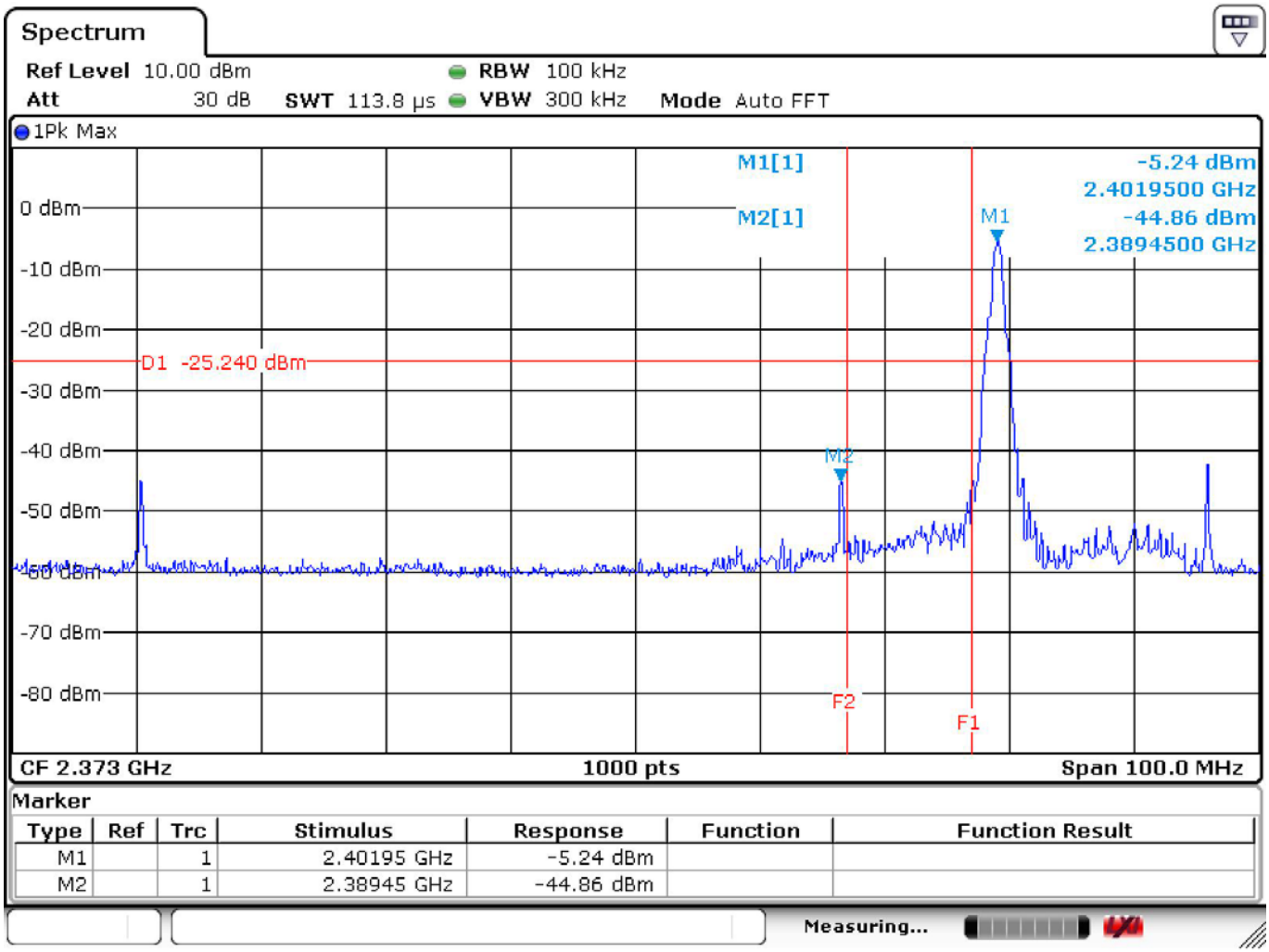
6.5 Test Result

Compliance

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

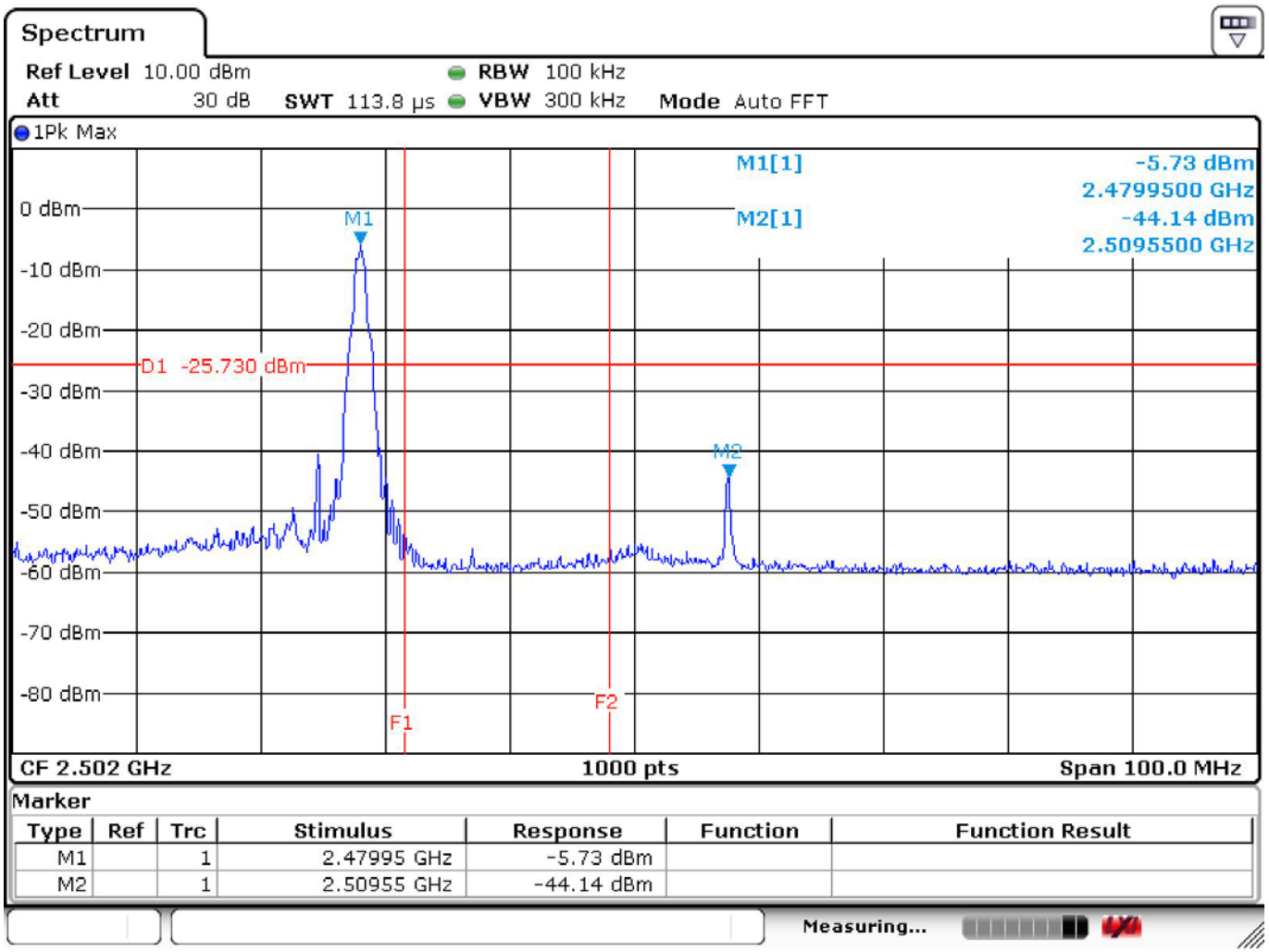
Band-Edge Test Data (Lower Edge)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	Mode 1	Channel	:	CH00 (2402 MHz)



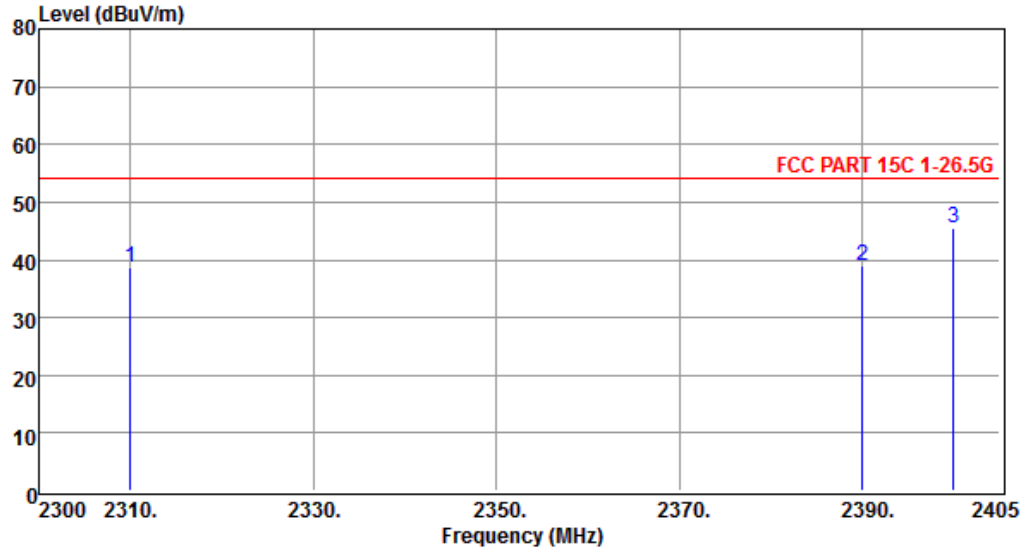
Band-Edge Test Data (Upper Edge)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	Mode 3	Channel	:	CH39 (2480 MHz)



Radiated Emission in the Restricted Band Test Data (Lower Edge)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	Mode 1	Channel	:	CH00 (2402 MHz)
Polarization	:	Vertical			

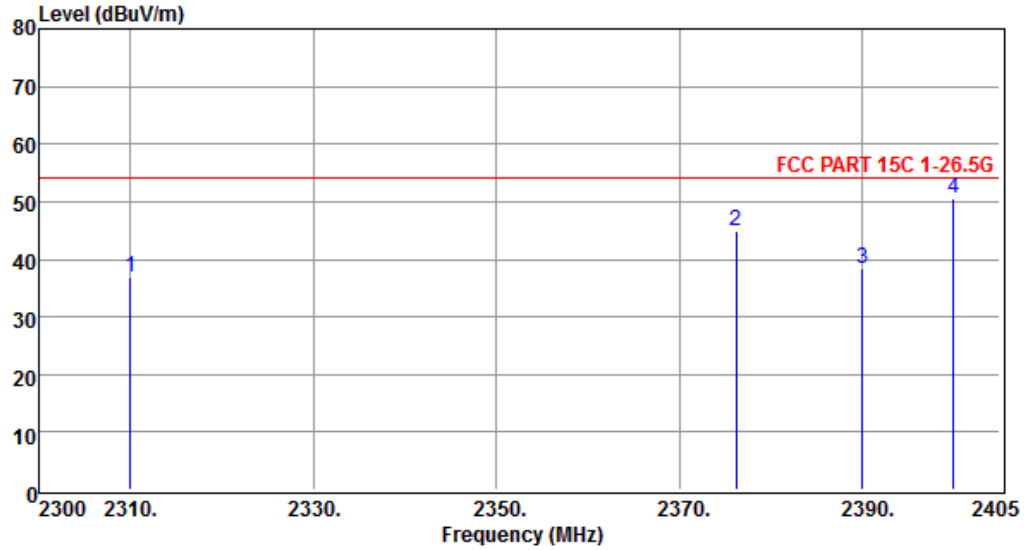


Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
2310.000	44.90	-6.13	38.77	54.00	-15.23			VERTICAL	Peak
2390.000	44.86	-5.85	39.01	54.00	-14.99			VERTICAL	Peak
2400.000	51.29	-5.85	45.44	54.00	-8.56			VERTICAL	Peak

Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

Radiated Emission in the Restricted Band Test Data (Lower Edge)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	Mode 1	Channel	:	CH00 (2402 MHz)
Polarization	:	Horizontal			

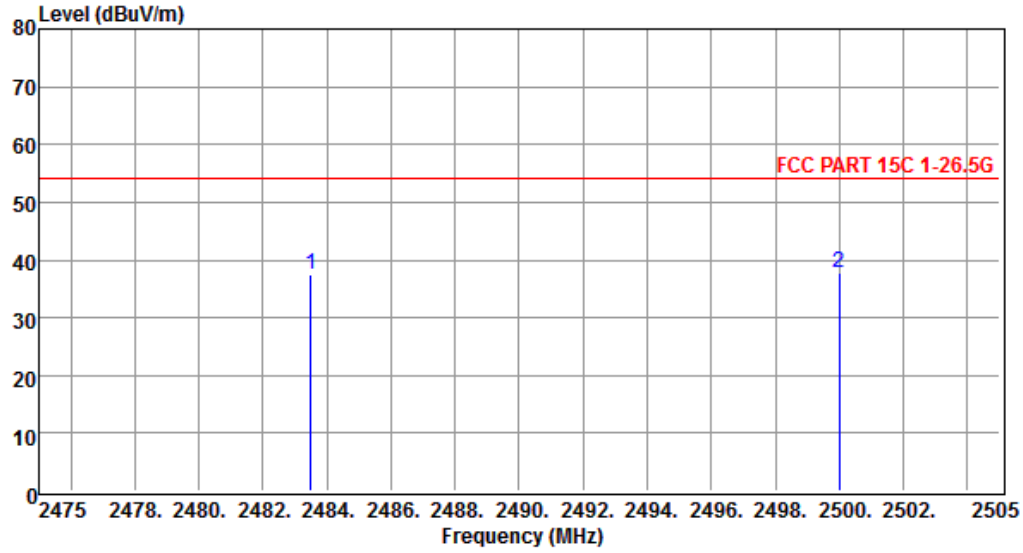


Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
2310.000	43.10	-6.13	36.97	54.00	-17.03			HORIZONTAL	Peak
2376.230	50.89	-5.91	44.98	54.00	-9.02			HORIZONTAL	Peak
2390.000	44.15	-5.85	38.30	54.00	-15.70			HORIZONTAL	Peak
2400.000	56.36	-5.85	50.51	54.00	-3.49			HORIZONTAL	Peak

Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

Radiated Emission in the Restricted Band Test Data (Upper Edge)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	Mode 3	Channel	:	CH39 (2480 MHz)
Polarization	:	Vertical			

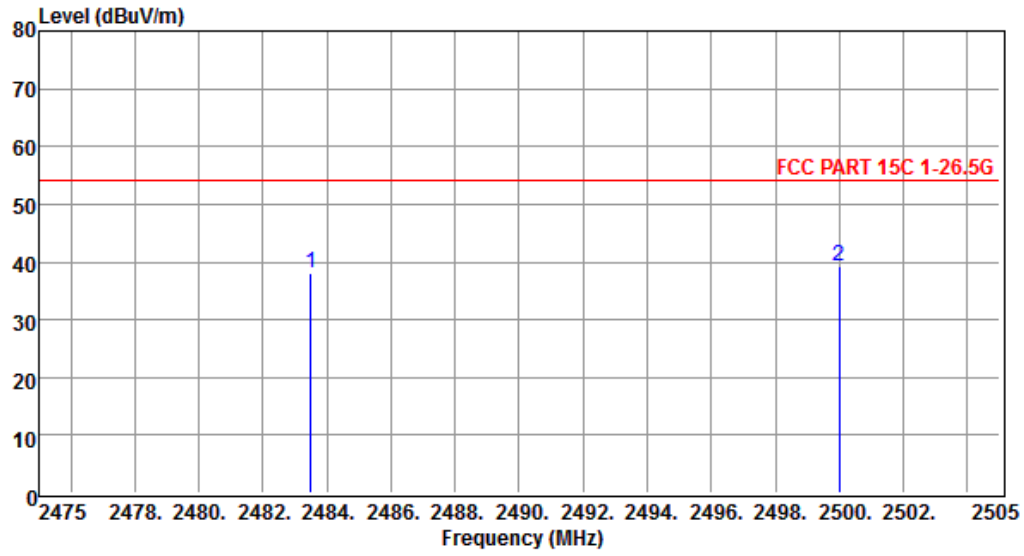


Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
2483.500	42.93	-5.58	37.35	54.00	-16.65			VERTICAL	Peak
2499.990	43.26	-5.53	37.73	54.00	-16.27			VERTICAL	Peak

Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

Radiated Emission in the Restricted Band Test Data (Upper Edge)

Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	Mode 3	Channel	:	CH39 (2480 MHz)
Polarization	:	Horizontal			



Freq	Reading	C.F	Result	Limit	Margin	A/H	T/P	Polarity	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg		
2483.500	43.60	-5.58	38.02	54.00	-15.98			HORIZONTAL	Peak
2500.000	44.89	-5.53	39.36	54.00	-14.64			HORIZONTAL	Peak

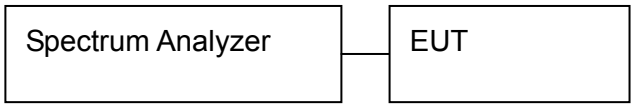
Note1: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
Note2: Margin = Result - Limit

7 Power Spectral Density

7.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

7.2 Test Arrangement



7.3 Test Procedure

1. Connect the EUT to spectrum analyzer through appropriate attenuator.
2. Spectrum setting; RMB = 3 kHz; VBW = 10 kHz; Span = 1.5 times DTS bandwidth; Sweep Time = 2.5 mSec.
3. Trace = Max Hold.
4. Test method in Section 11.10.2 of ANSI C63.10 (2013) was used to measure the power spectral density.

7.4 Limit (§ 15.247(e))

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

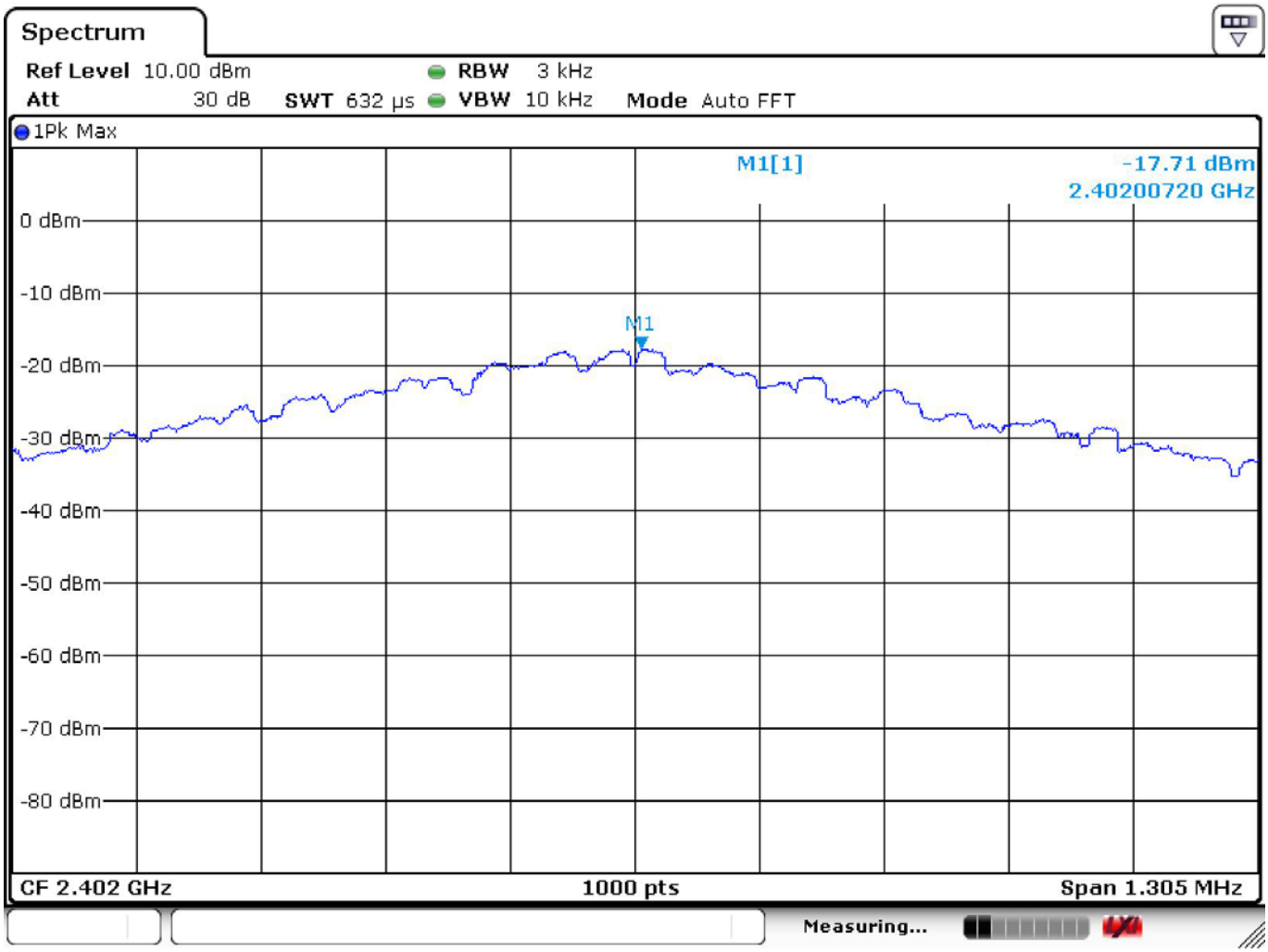
7.5 Test Result

Compliance

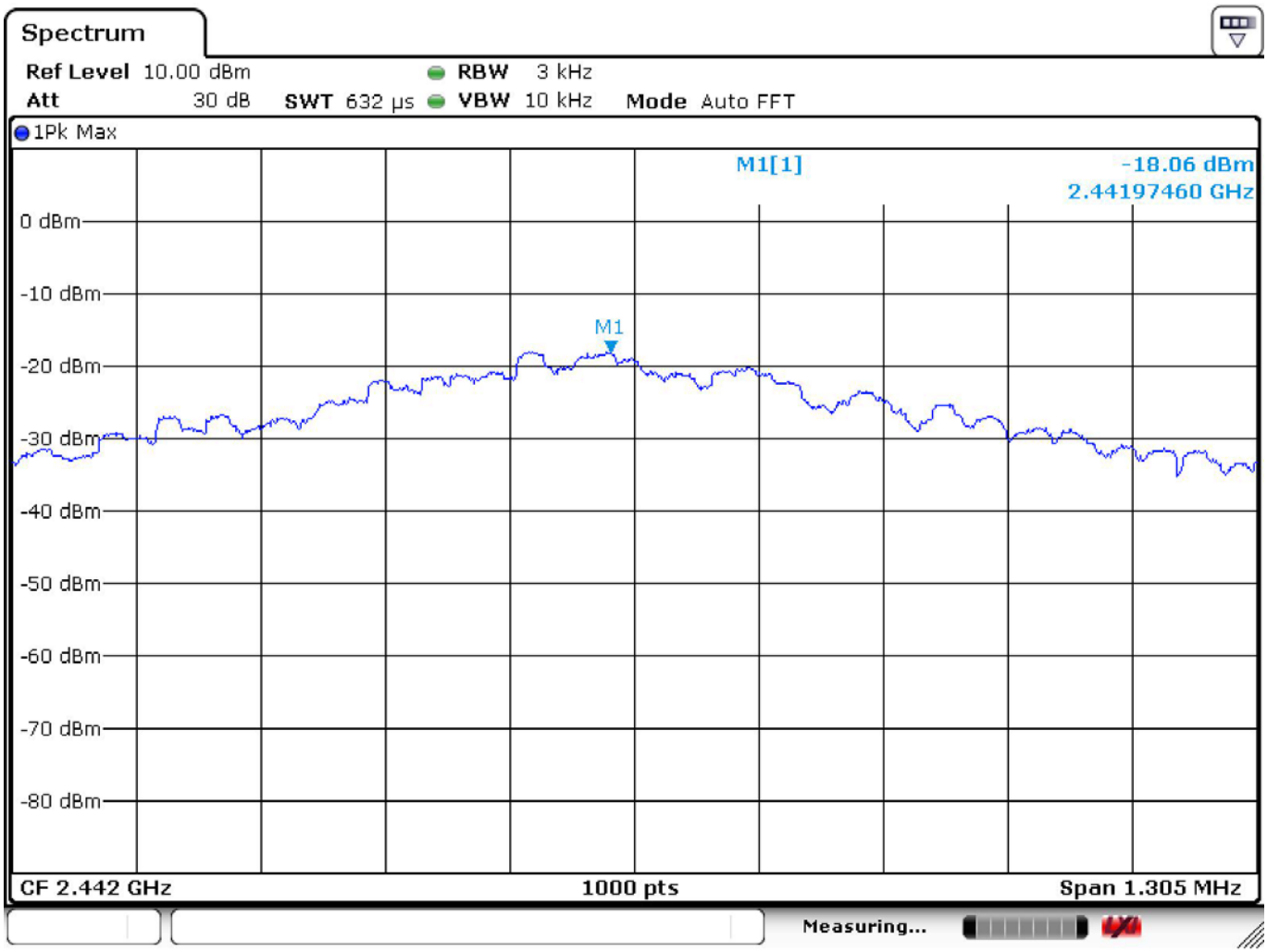
The final test data are shown on the following page(s).

Bluetooth			
Channel	**Frequency (MHz)**	**Result (dBm)**	**Limit (dBm/ 3kHz)**
00	2402	-17.71	8
20	2442	-18.06	8
39	2480	-18.56	8

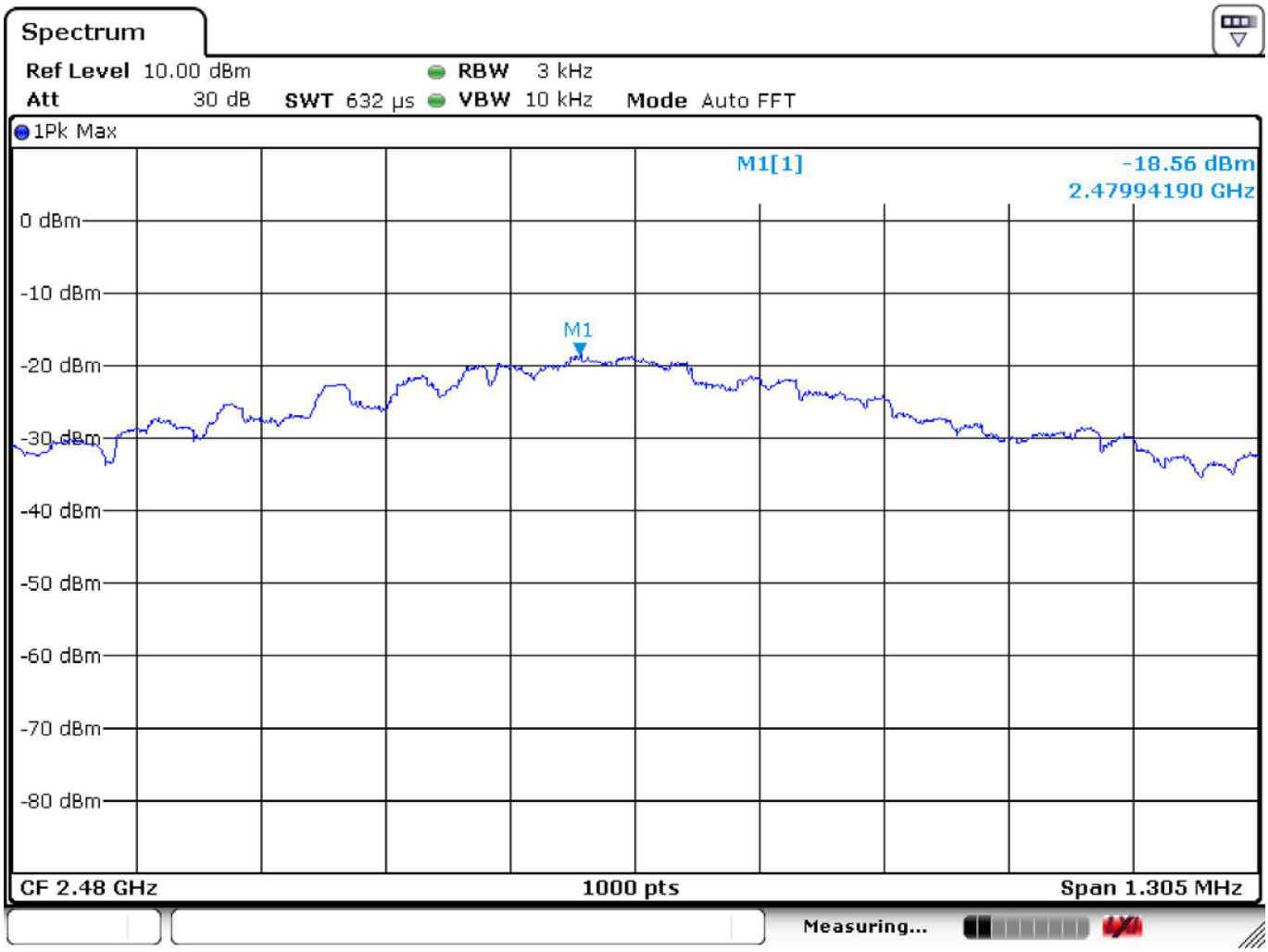
Temperature	:	20.3℃	Humidity	:	46%
Test Date	:	23-JAN-2018	Tested by	:	Eason Hsieh
Test Mode	:	BT BLE	Channel	:	00



Test Mode : BT BLE Channel : 20



Test Mode : BT BLE Channel : 39



8 Antenna requirement

8.1 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.

8.2 Test Result

Compliance.

The EUT applies a Chip Ceramic antenna.

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