TEST REPORT

For

Electronic thermometer

Model Number: RIT-P02-MED, RIT-P02-RR, RIT-P02-RS, RIT-P02-MM, RIT-P02-R1

FCC ID: 2ASVA-RIT-P02

Report Number : WT198001432

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection
Site Location	:	NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China
Tel	:	0086-755-86928965
Fax	:	0086-755-86009898-31396
Web	:	www.smq.com.cn
E-mail	:	emcrf@smq.com.cn

TEST REPORT DECLARATION

Applicant	:	Shenzhen Refresh Intelligent Technology Co., Ltd.
Address	:	83D302A,3rd FL, Tianjing BLDG, TianAn CheGongMiao In dustrial Pk, XiangMiHu, Futian DIST., Shenzhen, China
Manufacturer	:	Shenzhen Refresh Intelligent Technology Co., Ltd.
Address	:	83D302A,3rd FL, Tianjing BLDG, TianAn CheGongMiao In dustrial Pk, XiangMiHu, Futian DIST., Shenzhen, China
EUT Description	:	Electronic thermometer
Model No.	:	RIT-P02-MED, RIT-P02-RR, RIT-P02-RS, RIT-P02-MM, RIT-P02-R1
Trade mark	:	Ritsigns
Serial Number	:	/
FCC ID	:	2ASVA-RIT-P02

Test Standards:

FCC Part 15 15.209, 15.247(2018)

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Project Engineer:	(Chen Silin 陈司林)	Date:	Sep.18, 2019
Checked by:	(Lin Yixiang 林奕翔)	Date:	Sep.18, 2019
Approved by:	(Lin Bin 林斌)	Date:	Sep.18, 2019

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
6dB DTS bandwidth	15.247 (a) (2)	Pass
Maximum Peak Conducted Power	15.247 (b) (3)	Pass
Maximum Power Spectral Density Level	15.247 (3)	Pass
Conducted Bandedge and Spurious	15.247 (d)	Pass
Radiated Bandedge and Spurious	15.247 (d) 15.209 15.205	Pass
Antenna Requirement	15.203	Pass

Remark: “N/A” means “Not applicable.”

2. GENERAL INFORMATION

2.1. Report information

This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at NETC Building, No.4 Tongfa Rd., Xili, Nanshan, Shenzhen, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is Accredited Testing Laboratory of FCC with Designation number CN1165 and Site registration number 582918.

The Laboratory is registered to perform emission tests with Innovation, Science and Economic Development (ISED), and the registration number is 11177A.

2.3. Measurement Uncertainty

Radiated Emission
30MHz~1000MHz 4.5dB
1GHz~26.5GHz 4.6dB

3. PRODUCT DESCRIPTION

3.1. EUT Description

Description	:	Electronic thermometer
Manufacturer	:	Shenzhen Refresh Intelligent Technology Co., Ltd.
Model Number	:	RIT-P02-MED, RIT-P02-RR, RIT-P02-RS, RIT-P02-MM, RIT-P02-R1
Operate Frequency	:	2.402GHz~2.480GHz
Type(s) of Modulation:	:	GFSK
Antenna Designation	:	BT: Internal Antenna 0dBi
Operating voltage	:	2.0V (Low)/3.0V (Nominal)/ 3.6V (Max)
Software Version	:	V2.0
Hardware Version	:	V2.0

Remark: All of the model's circuit theory, electrical design and the Critical Components are identical only except the color and appearance. The differences do not affect the EMC performance .Unless otherwise specified; the model RIT-P02-MED was chose to perform all the tests.

Bluetooth Low Energy:

Table 2 Working Frequency List

Regulatory Range	RF Channels
2.400-2.4835 GHz	f=2402+k*2 MHz, k=0, … ,39

3.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **2ASVA-RIT-P02** filing to comply with Section15.209，15.247 of the FCC Part 15, Subpart C Rules.

3.3. Operating Condition of EUT

Worst-case mode and channel used for 30-1000 MHz radiated and power line conducted emissions was the mode and channel with the highest output power.
Worst-case data rates as provided by the client were:
Bluetooth low energy
Test mode is configured to be with duty cycle >98%

3.4. Directional Antenna Gain

Directional gain need NOT to be considered.

3.5. Support Equipment List

Table 3 Support Equipment List

Name	Model No	S/N	Manufacturer
Notebook	ThinkPad E460	--	Lenovo

3.6. Test Conditions

Date of test：Mar.28, 2019- Aug.23, 2019
Date of EUT Receive：Mar.18, 2019
Temperature: 22℃-25 ℃
Relative Humidity: 42%-56%

3.7. Special Accessories

Not available for this EUT intended for grant.

3.8. Equipment Modifications

Not available for this EUT intended for grant.

4. TEST EQUIPMENT USED

Table 4 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB12943	Test Receiver	R&S	ESR7	Dec.06,2018	1 Year
SB5472/02	Broadband Antenna	Schwarzbeck	VULB9163	May.31,2019	1 Year
SB8501/09	Test Receiver	R&S	ESU40	Mar.11,2019	1 Year
SB3435	Horn Antenna	R&S	HF906	Jan.01,2019	1 Year
SB9058/03	Pre-Amplifier	R&S	SCU 18	Feb.18,2019	1 Year
SB8501/10	Horn Antenna	R&S	3160-09	Mar.21,2017	3 Years
SB3345	Loop Antenna	Schwarzbeck	FMZB1516-113	Feb.20,2019	1 Year
SB8501/14	Pre-Amplifier	R&S	SCU-03	Feb.20,2019	1 Year
SB8501/16	Pre-Amplifier	R&S	SCU 26	Feb.18,2019	1 Year
SB8501/17	Pre-Amplifier	R&S	SCU-18	Feb.20,2019	1 Year
SB9060	Signal Analyzer	R&S	FSQ40	Feb.21, 2019	1 Year
--	Radiated Test Software	R&S	EMC 32 9.26.01	--	--

5. 6DB BANDWIDTH MEASUREMENT

5.1. LIMITS OF 6dB BANDWIDTH MEASUREMENT

CFR 47 (FCC) part 15.247 (a) (2), 558074 D01 DTS Meas Guidance v05r02

5.2. TEST PROCEDURE

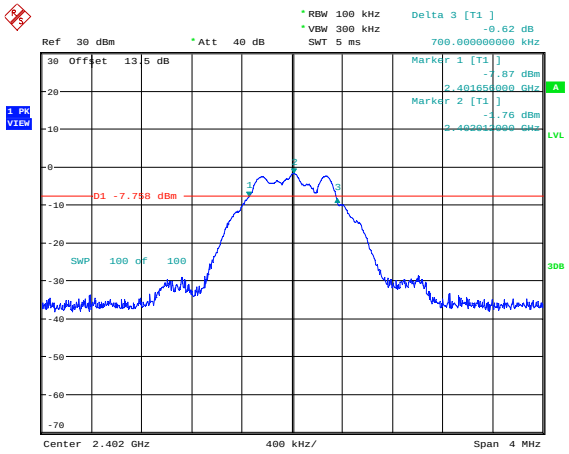
ANSI C63.10-2013 Clause 11.8
The transmitter output was connected to the spectrum analyzer.
a) Set RBW = 100 kHz.
b) Set the VBW ≥ [3 × RBW].
c)Detector = Peak.
d)Trace mode = max hold.
e)Sweep = auto couple.
f)Allow the trace to stabilize.
g)Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

5.3. TEST SETUP

5.4. Test Data

Table 5 6dB Bandwidth Test Data BLE

CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	results
2402	0.700	Pass
2440	0.692	Pass
2480	0.688	Pass



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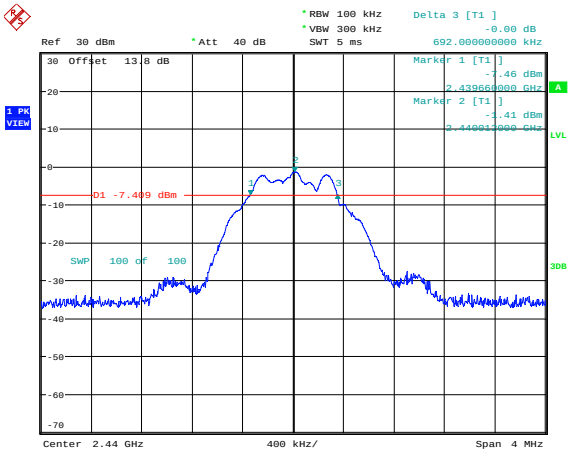

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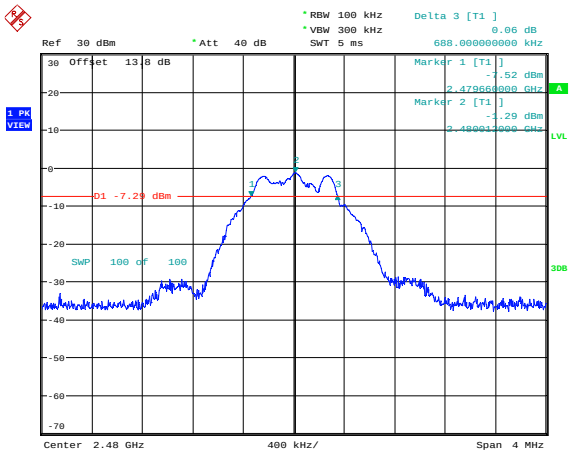

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6. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

6.1. LIMITS OF Maximum Conducted Output Power Measurement

CFR 47 (FCC) part 15.247 (b) (3), 558074 D01 DTS Meas Guidance v05r02

6.2. TEST PROCEDURE

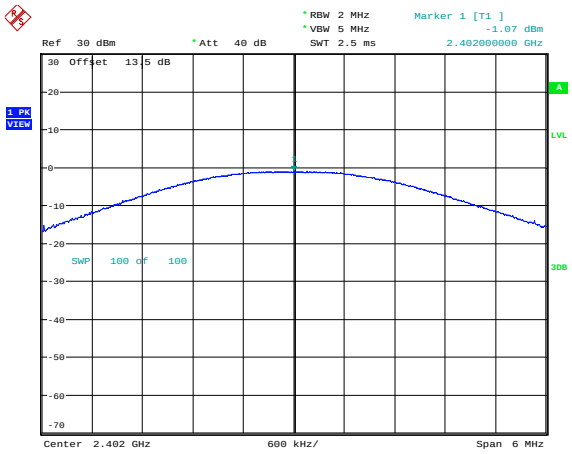
The transmitter output was connected to the spectrum analyzer.
a)Set the RBW ⩾ DTS bandwidth.
b)Set VBW ⩾ RBW.
c)Set span ⩾ 3 x RBW
d)Sweep time = auto couple.
e)Detector = peak.
f)Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

6.3. TEST SETUP

6.4. TEST DATA

Table 6 Maximum Conducted Output Power Test Data BLE

Center Freq.[MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
2402	-1.07	< 30	Pass
2440	-0.65	< 30	Pass
2480	-0.63	< 30	Pass



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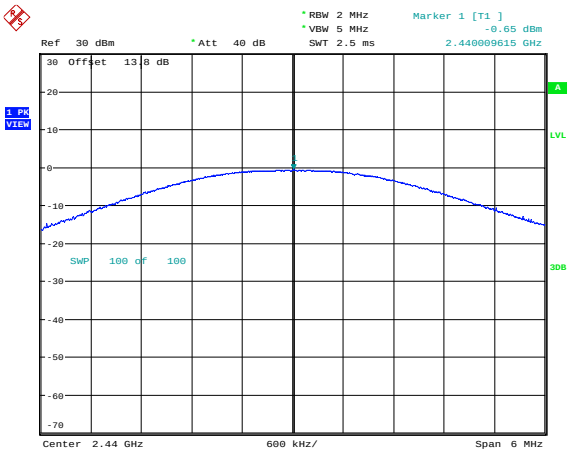

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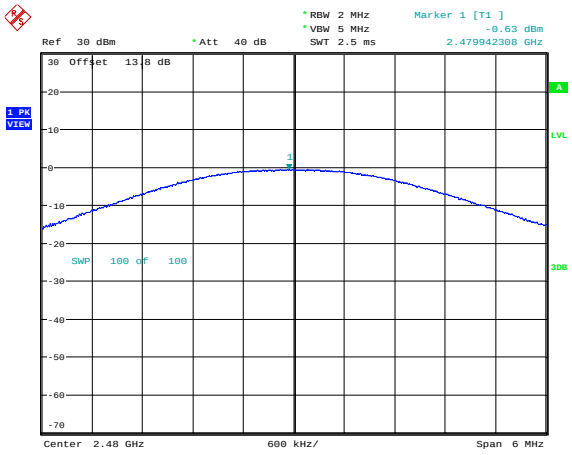

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7. MAXIMUM POWER SPECTRAL DENSITY LEVEL MEASUREMENT

7.1. LIMITS OF Maximum Power Spectral Density Level Measurement

CFR 47 (FCC) part 15.247 (e) , 558074 D01 DTS Meas Guidance v05r02

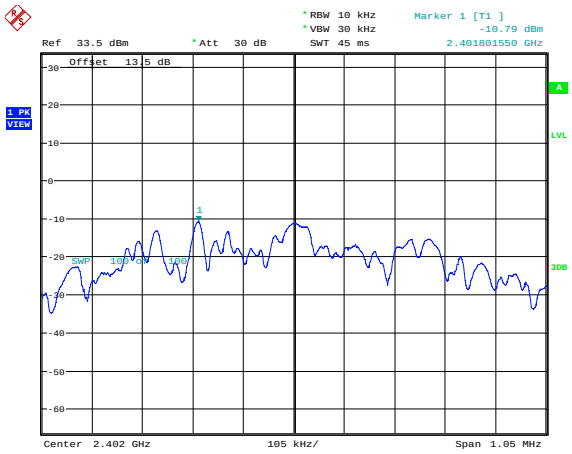
7.2. TEST PROCEDURE

ANSI C63.10-2013 Clause 11.10
The transmitter output was connected to the spectrum analyzer.
a)Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set RBW to：3kHz≤RBW≤100 kHz.
d) Set VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h)Allow trace to fully stabilize.
i)Use the peak marker function to determine the maximum amplitude level within the RBW.
j)If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.3. TEST DATA

Table 7 Maximum Power Spectral Density Level Test Data BLE

Freq.[MHz]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Result
2402	-10.79	8	Pass
2440	-10.41	8	Pass
2480	-10.47	8	Pass



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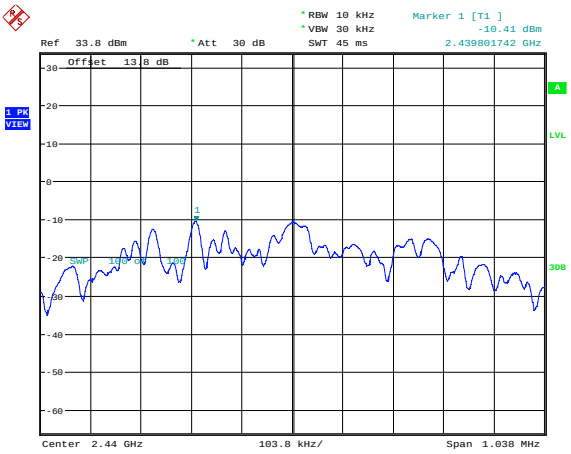

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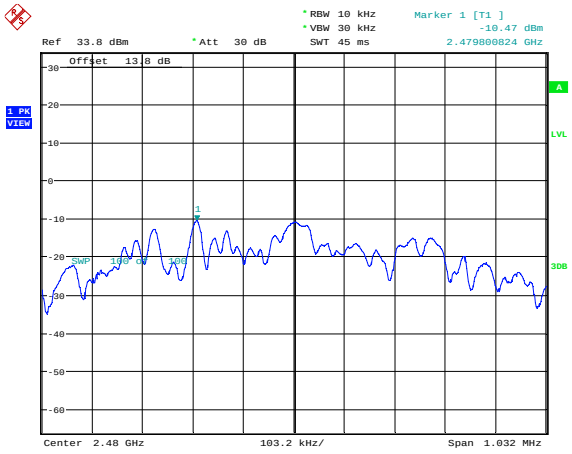

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8. CONDUCTED BANDEDGE AND SPURIOUS MEASURMENT

8.1. LIMITS OF Conducted Bandedge and Spurious Measurement

CFR 47 (FCC) part 15.247 (d) and 558074 D01 DTS Meas Guidance v05r02

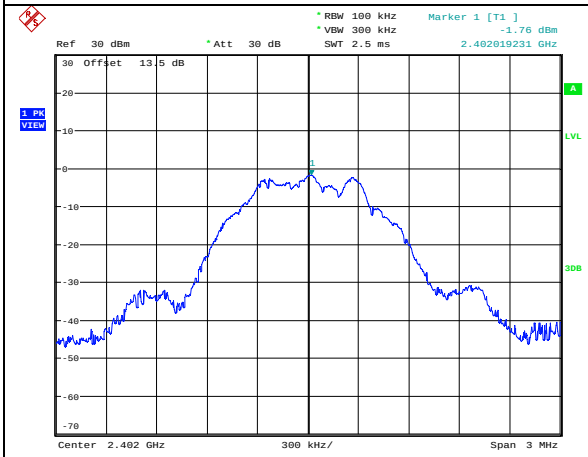
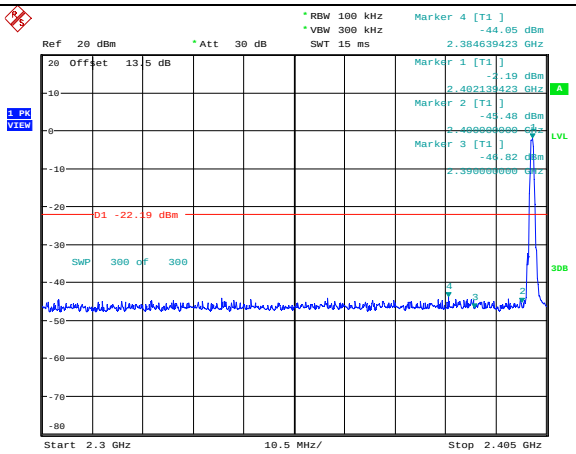
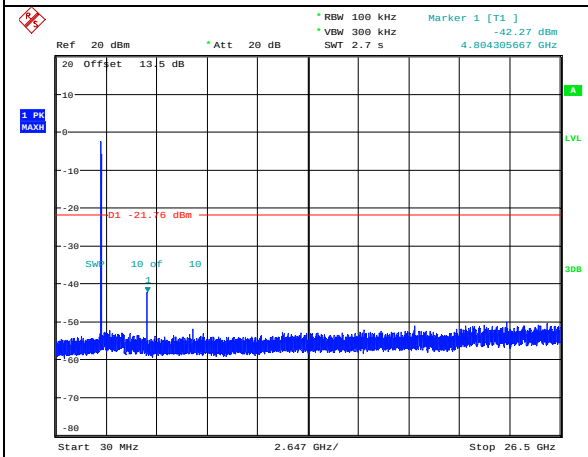
8.2. TEST PROCEDURE

ANSI C63.10-2013 Clause 11.11
The transmitter output was connected to the spectrum analyzer.
Establish a reference level by using the following procedure:
a)Set instrument center frequency to DTS channel center frequency.
b)Set the span to ≥ 1.5 times the DTS bandwidth.
c)Set the RBW = 100 kHz.
d)Set the VBW ≥ 3 x RBW.
e)Detector = peak.
f)Sweep time = auto couple.
g)Trace mode = max hold.
h)Allow trace to fully stabilize.
i)Use the peak marker function to determine the maximum PSD level.
Emission level measurement
a)Set the center frequency and span to encompass frequency range to be measured.
b)Set the RBW = 100 kHz.
c)Set the VBW ≥ 3 x RBW.
d)Detector = peak.
e)Sweep time = auto couple.
f)Trace mode = max hold.
g)Allow trace to fully stabilize.
h)Use the peak marker function to determine the maximum amplitude level.

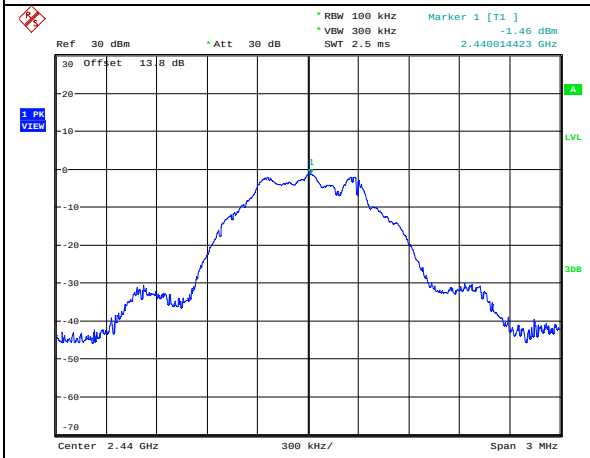
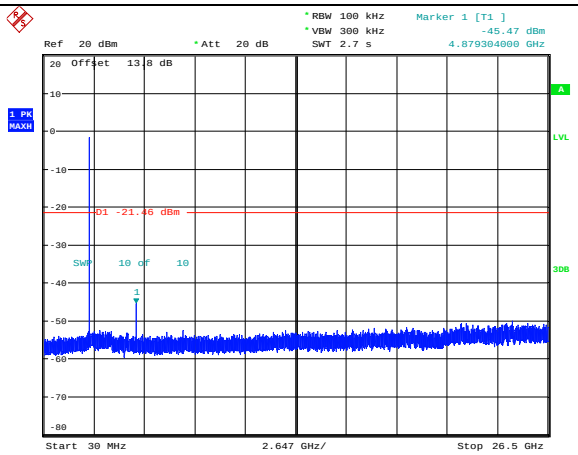
Test Result ： ALL emission outside of 2400-2483.5 are lower at least 20dB than fundamental frequency.

8.3. TEST DATA

BLE CH0

Pref	Lower Edge
 Date: 20.MAR.2019 10:34:54	 Date: 20.MAR.2019 10:32:21
30MHz-25GHz	---
 Date: 20.MAR.2019 10:36:01	---

BLE CH19

Pref	30MHz-25GHz
	
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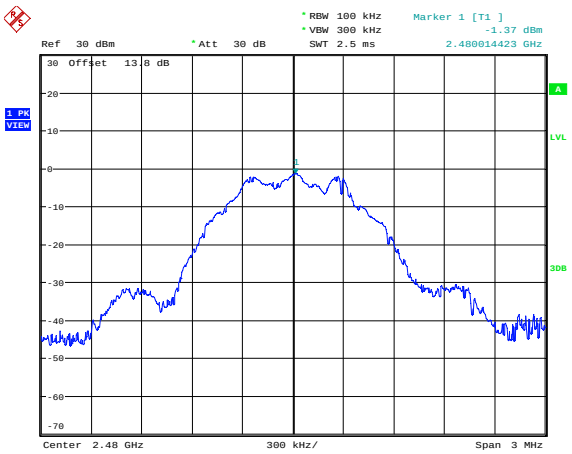
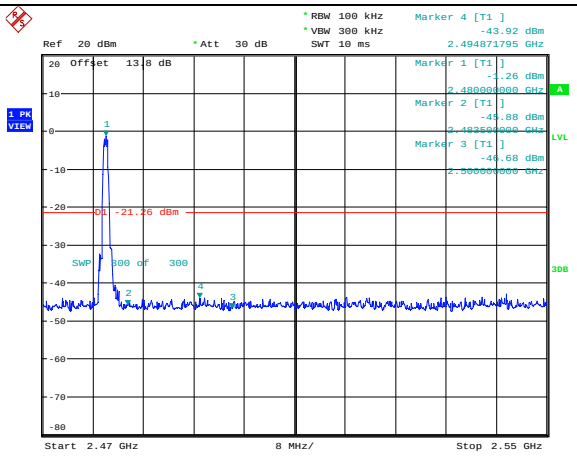
BLE CH39

Pref	Upper Edge
 Date: 20.MAR.2019 10:48:25	 Date: 20.MAR.2019 10:47:18
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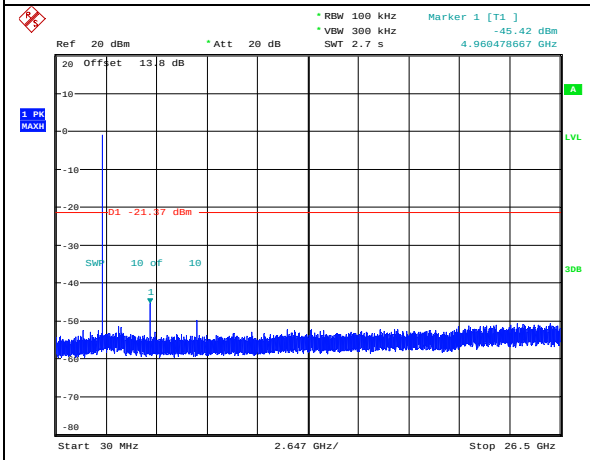 Date: 20.MAR.2019 10:49:09	---

9. RADIATED BANDEDGE AND SPURIOUS MEASUREMENT

9.1. LIMITS OF Radiated Bandedge and Spurious Measurement

CFR 47 (FCC) part 15.247 (d) and 558074 D01 DTS Meas Guidance v05r02

9.2. TEST PROCEDURE

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. For measurement below 1GHz, the EUT was placed on a turntable with 0.8meter, above ground. For measurement above 1 GHz, test at FAR, the EUT is placed on a non-conductive table, which is 1.5 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
(1) Span shall wide enough to fully capture the emission being measured;
(2) Set RBW=100 kHz for f < 1 GHz; VBW >= RBW; Sweep = auto; Detector function = peak; Trace = max hold;
(3) Set RBW = 1 MHz, VBW= 3MHz for f > 1 GHz for peak measurement.
Set RBW = 1 MHz, and 1/T (on time) for average measurement.

9.3. TEST DATA

9kHz-30MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

Table 8 Radiated Emission Test Data 9k Hz-30MHz

Frequency MHz	Cable Loss(dB)	Antenna Factor(dB)	Readings(dBμV/m)	Level(dBμV/m)	Polarity(H/V)	Turntable Angle(deg)	Antenna Height(m)	Limits(dBμV/m)	Margin(dB)
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
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30MHz-1GHz

Worst case is shown below for 30MHz-1GHz only.

The emissions don't show in following result tables are more than 20dB below the limits.

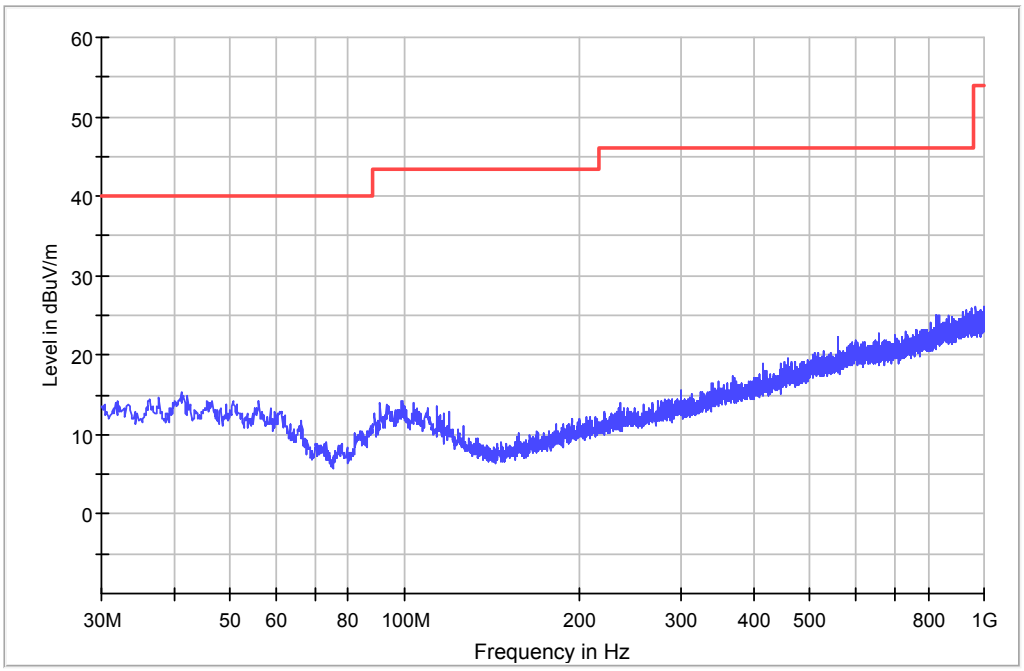
Table 9 Radiated Emission Test Data 30MHz-1GHz

Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Readings (dBμV/m)	Level (dBμV/m)	Polarity (H/V)	Limits (dBμV/m)	Margin (dB)	Note
34.274	0.6	12.3	-3.8	9.1	V	40.0	30.9	QP
40.667	0.7	13.6	-5.6	8.7	V	40.0	31.3	QP
46.875	0.8	13.6	-5.5	8.9	V	40.0	31.1	QP
89.625	1.1	10.3	-2.0	9.4	V	43.5	34.1	QP
104.96	1.2	13.2	-5.5	8.9	V	43.5	34.6	QP
781.125	3.5	18.8	-9.7	12.6	V	46.0	33.4	QP
36.245	0.6	12.3	-2.8	10.1	H	40	29.9	QP
41.515	0.7	13.6	-3.9	10.4	H	40	29.6	QP
55.754	0.9	13.0	-4.3	9.6	H	40	30.4	QP
90.467	1.2	11.9	-4.6	8.5	H	43.5	35.0	QP
98.877	1.1	12.8	-5.2	8.7	H	43.5	34.8	QP
827.461	3.6	20.1	-6.4	17.3	H	46	28.7	QP

Remark: Emission level (dBuV)=Read Value(dBuV/m) + Antenna Factor(dB)+ Cable Loss +preamp(dB)

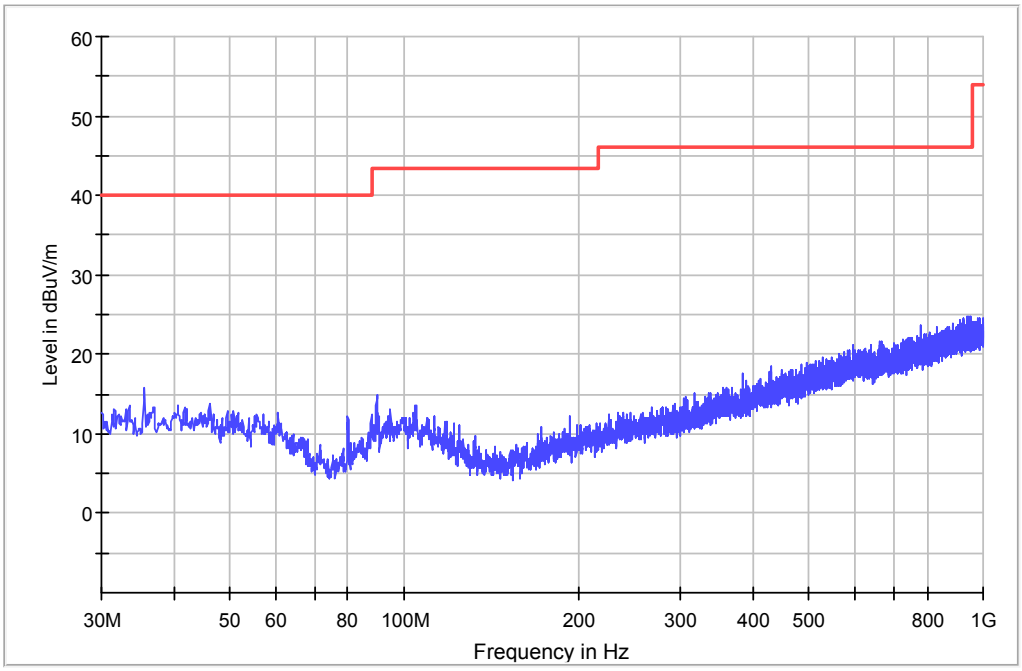
30MHz~1GHz:

Field strength 30M-1GHz



(Horizontal)

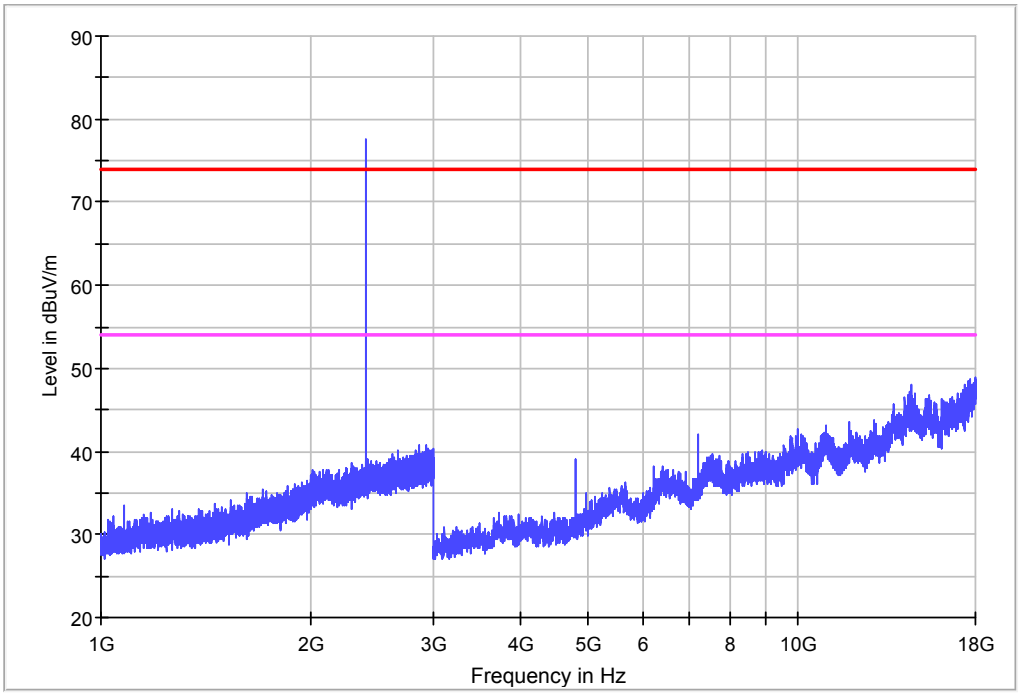
Field strength 30M-1GHz



(Vertical)

1-18G

BLE CH0



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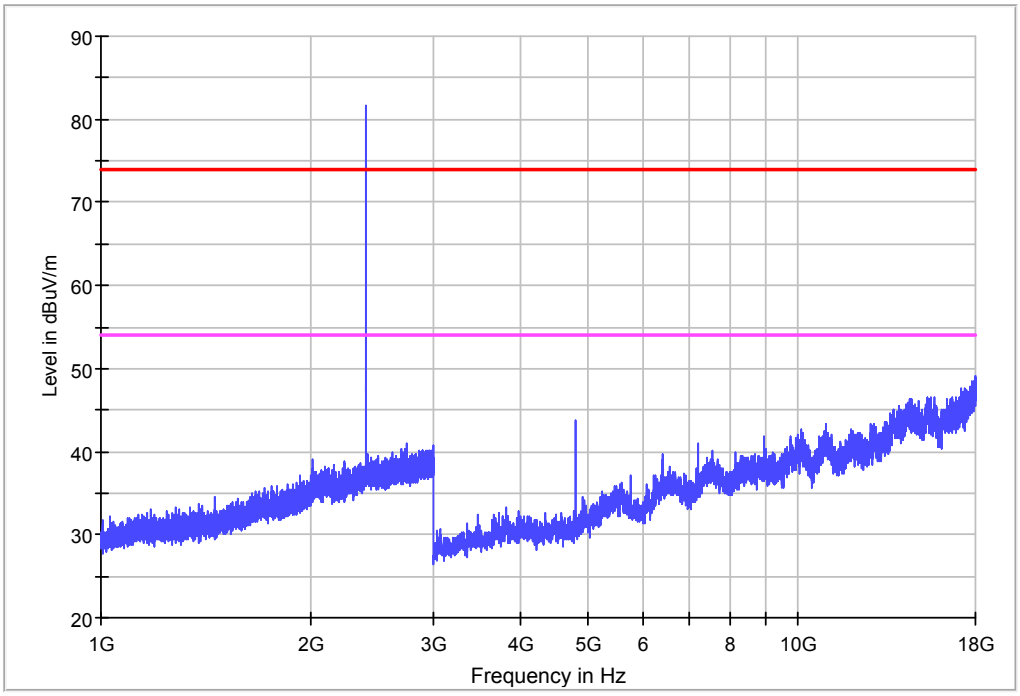
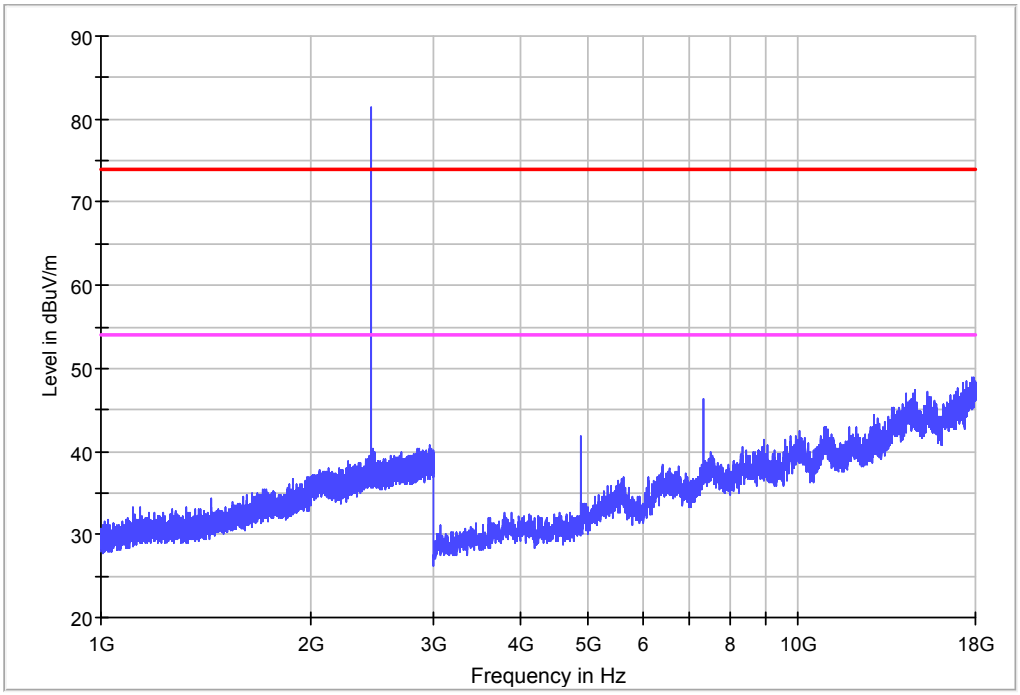


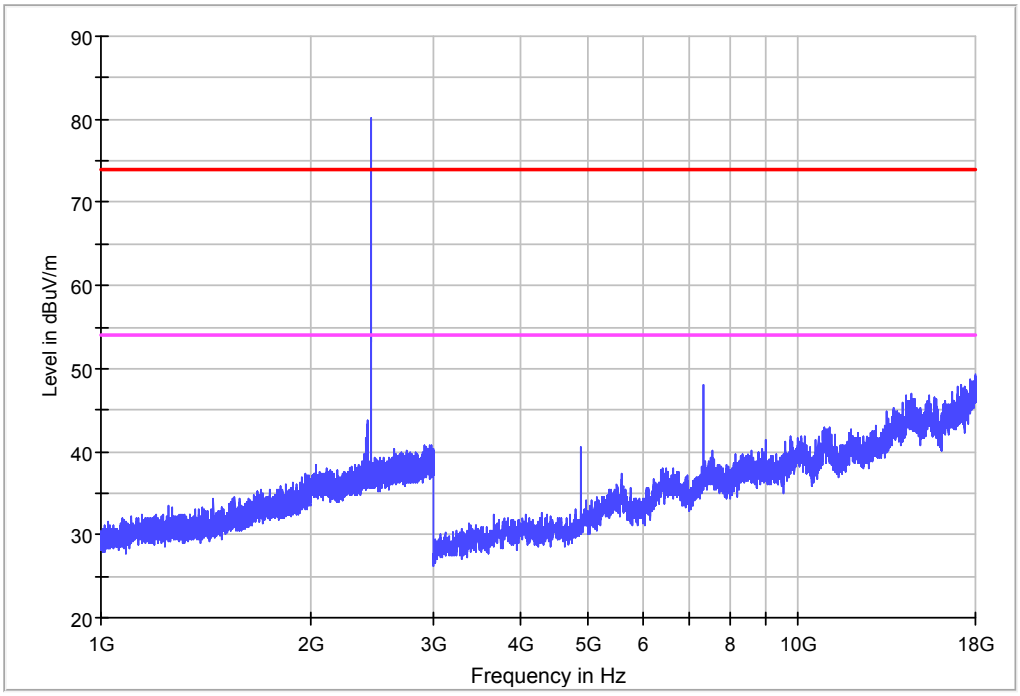
Vertical

1-18G

BLE CH19



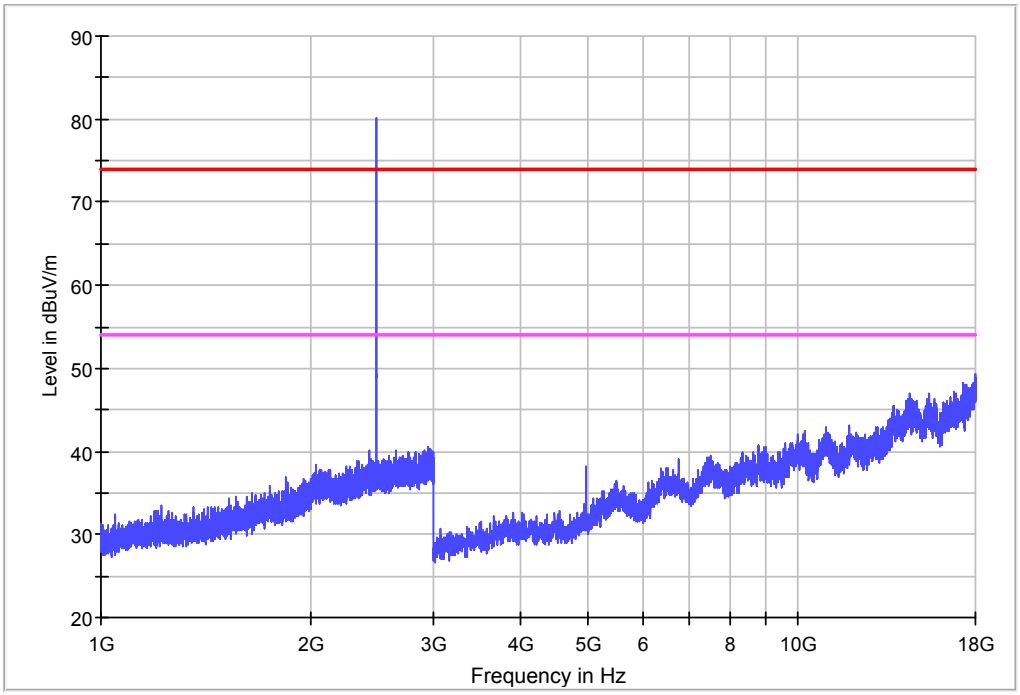
Horizontal



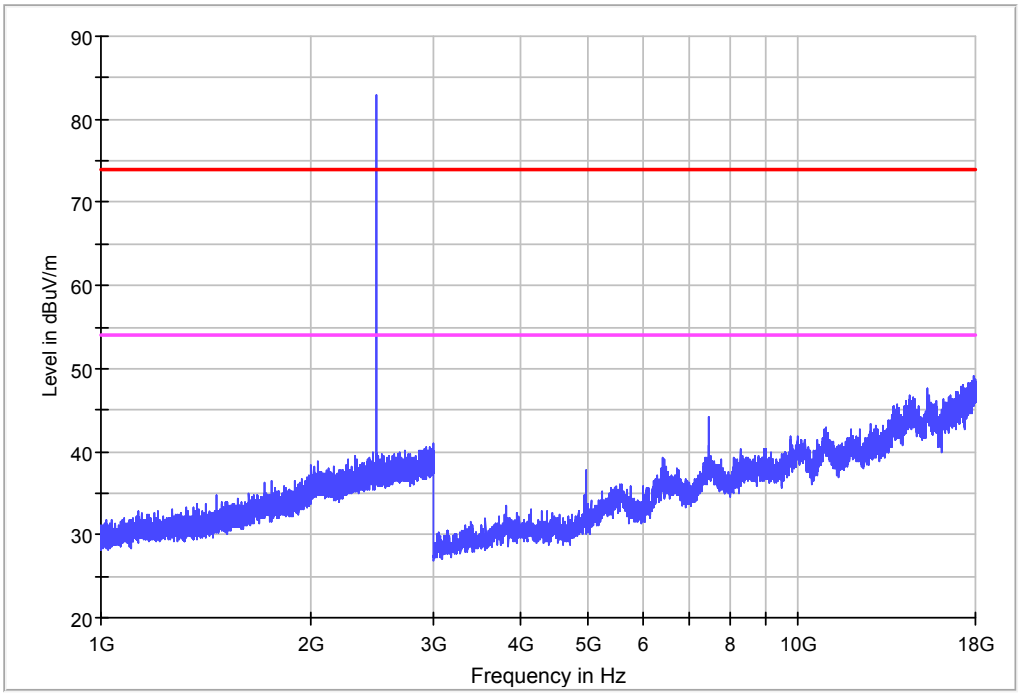
Vertical

1-18G

BLE CH39



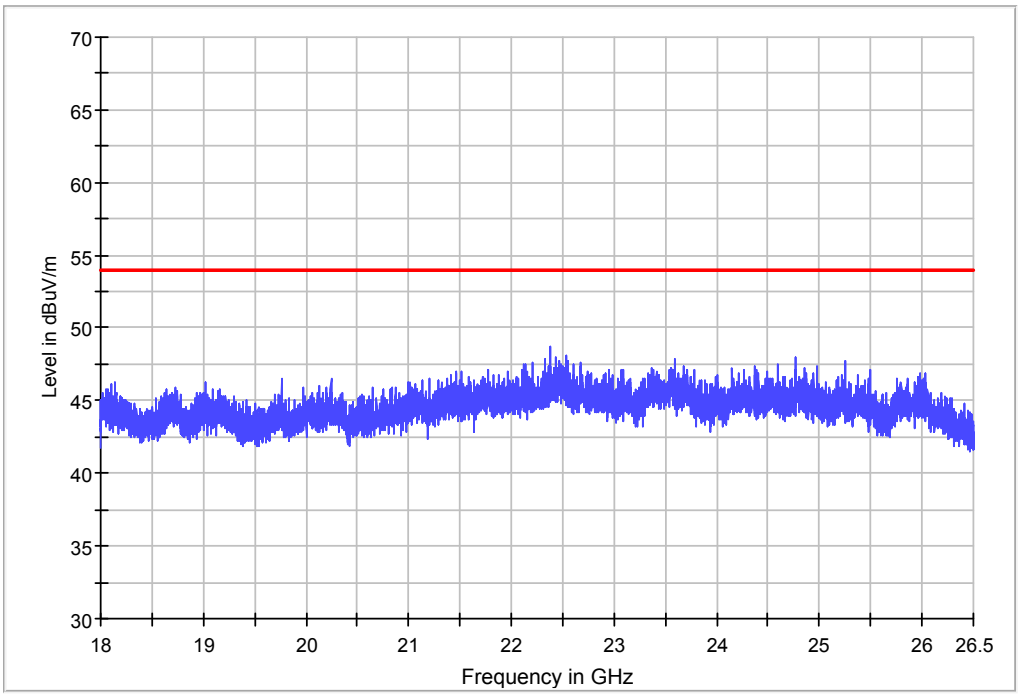
Horizontal



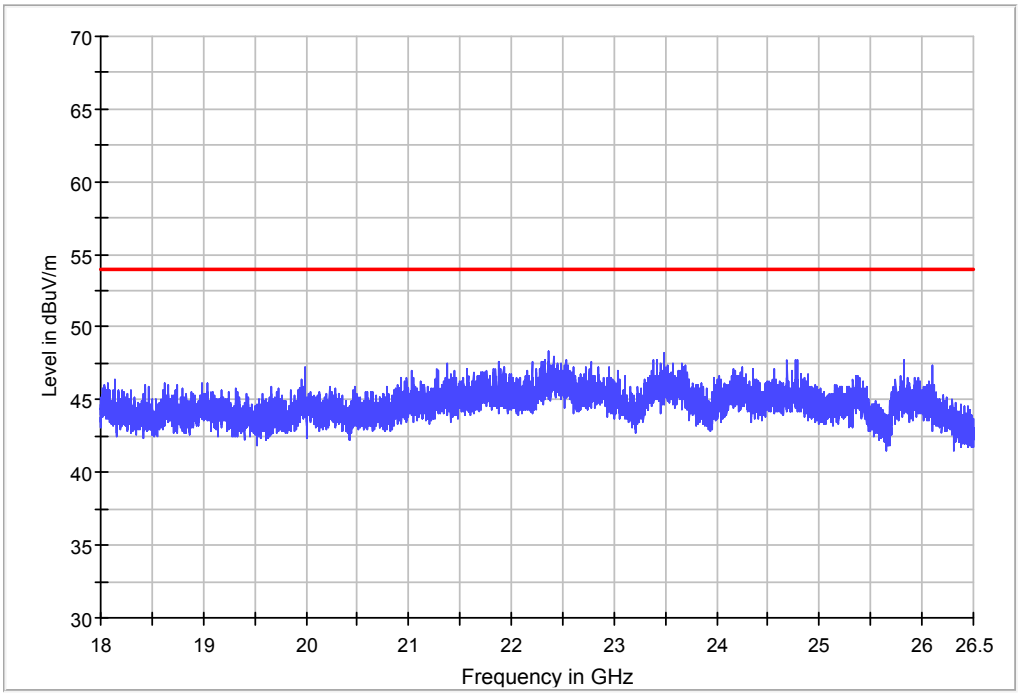
Vertical

18-26.5GHz

No Peak found in pre-scan, only worst case result is listed in this report.



Horizontal

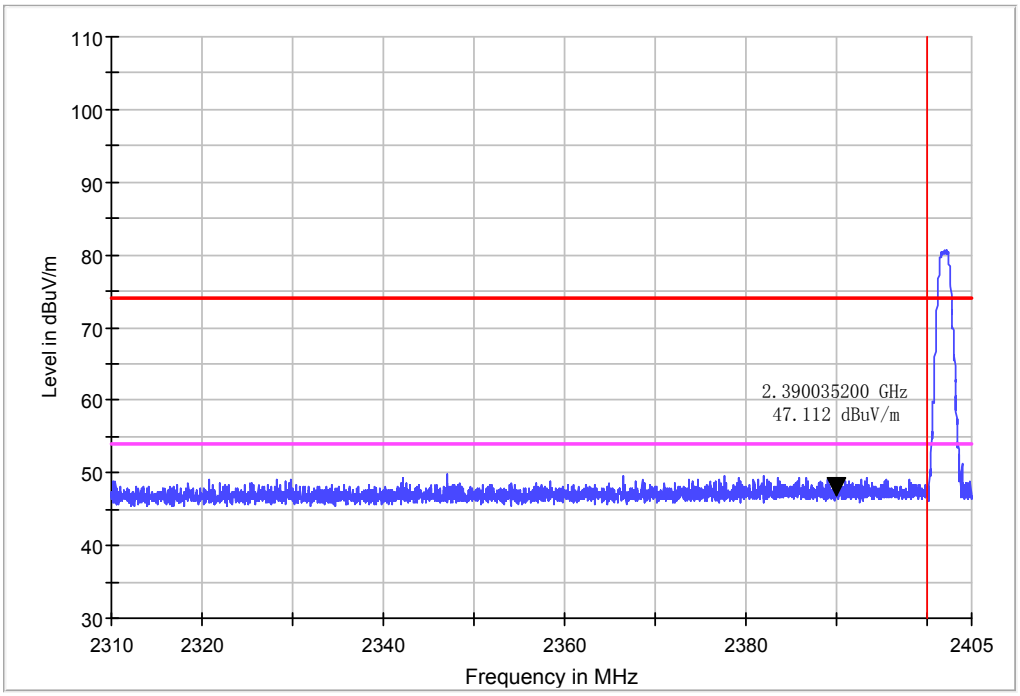


Vertical

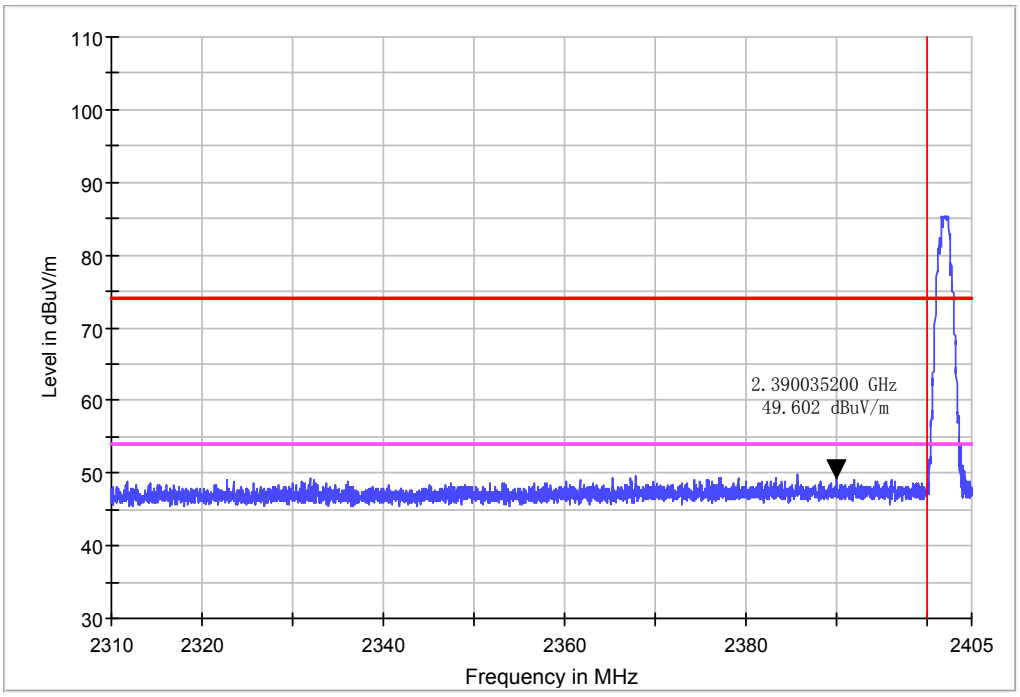
Band edge

BLE CH0

PK



Horizontal

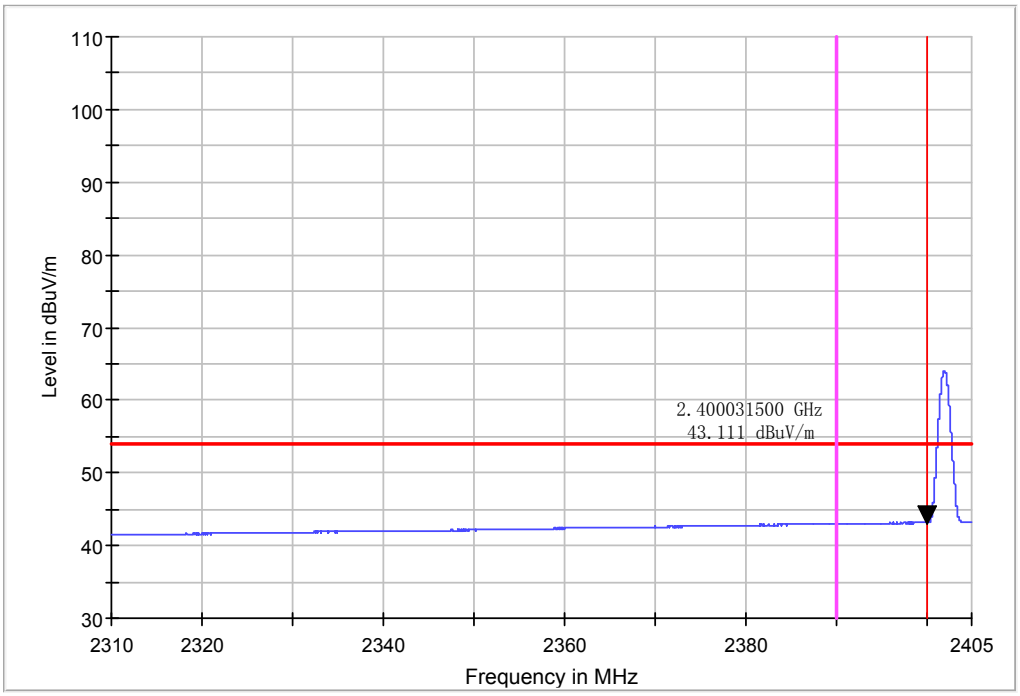


Vertical

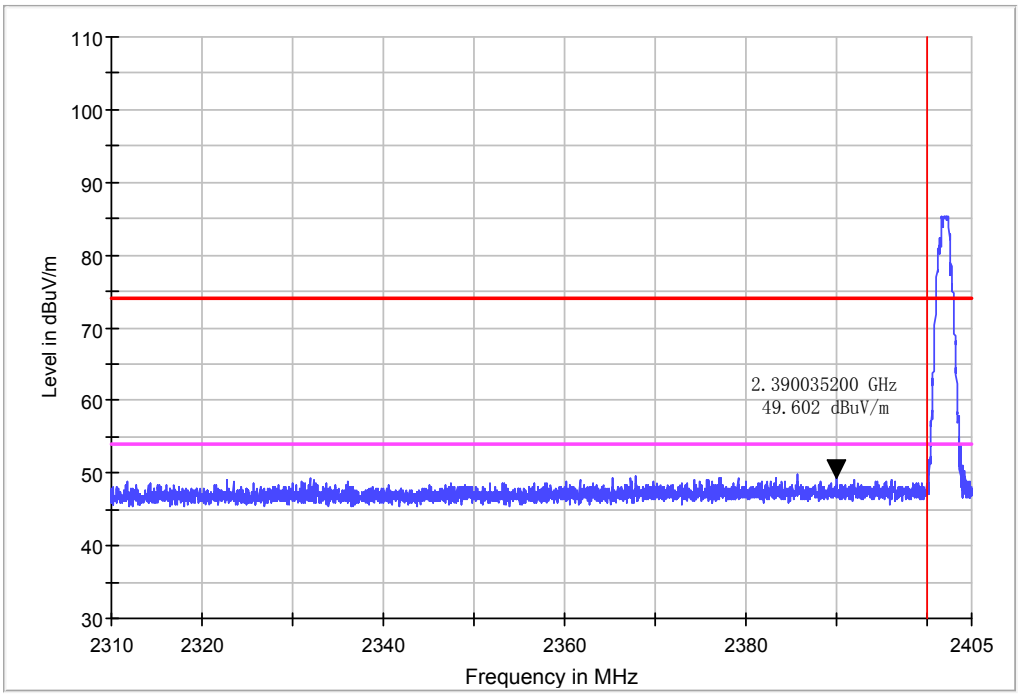
Band edge

BLE CH0

AV



Horizontal

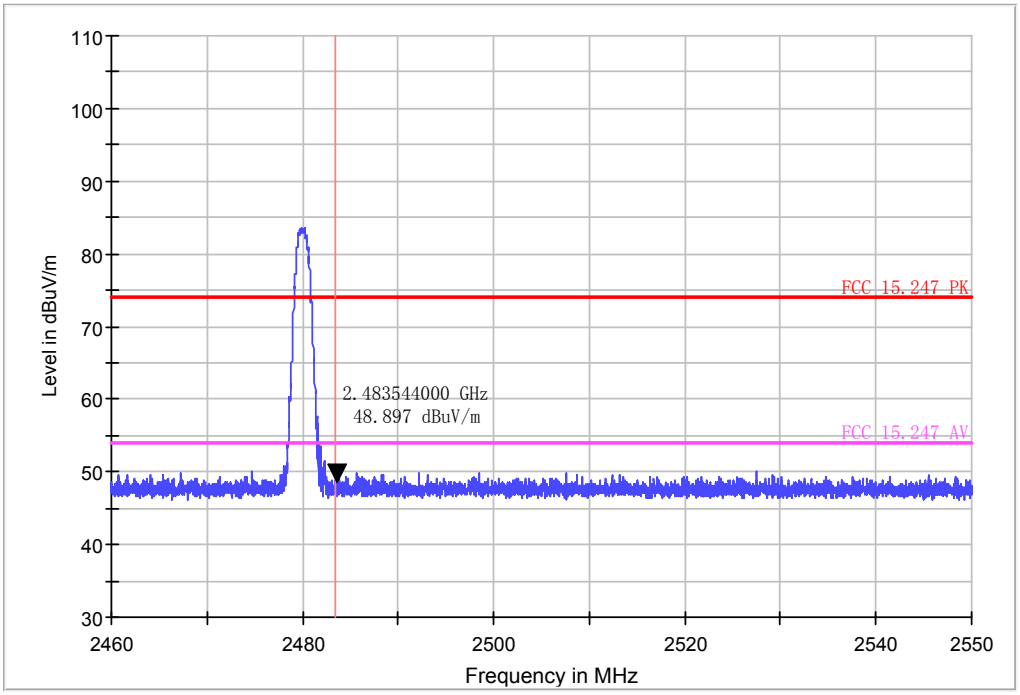


Vertical

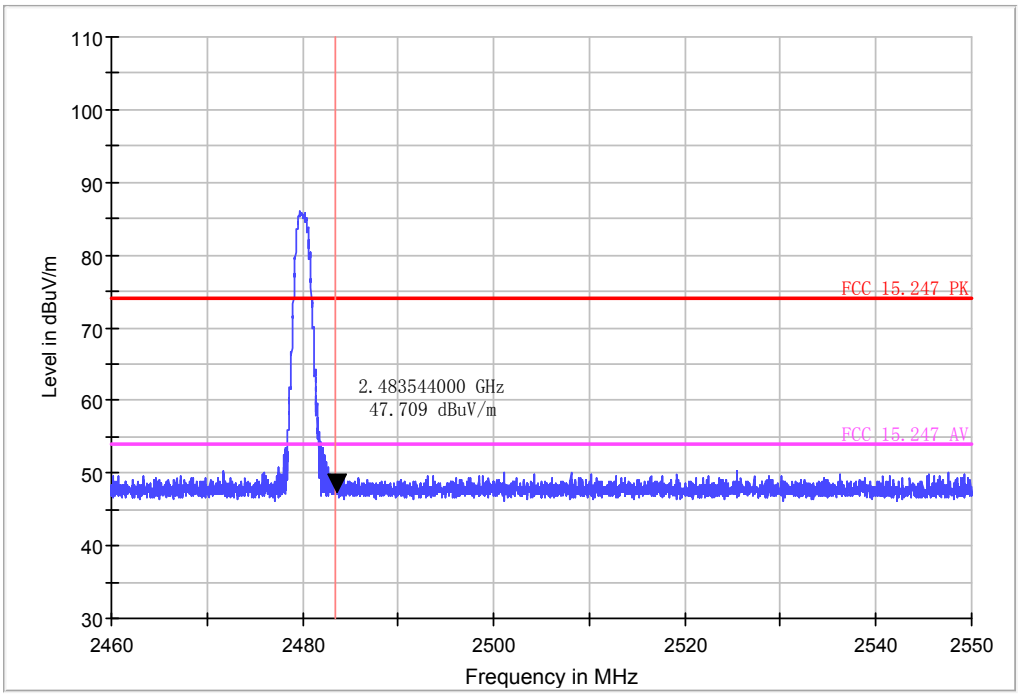
Band edge

BLE CH39

PK



Horizontal

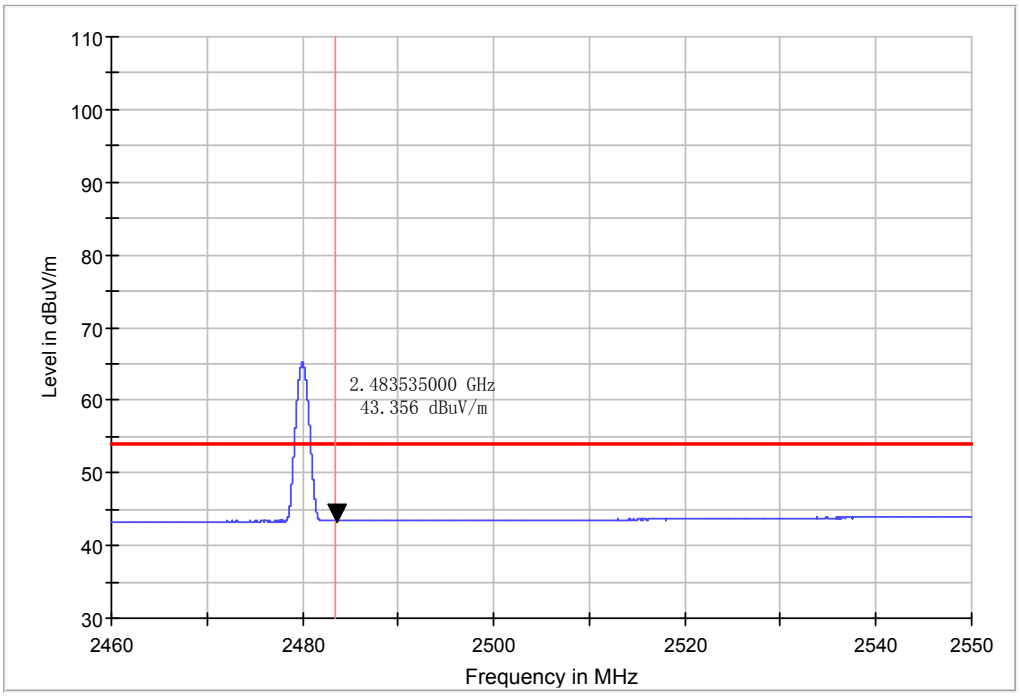


Vertical

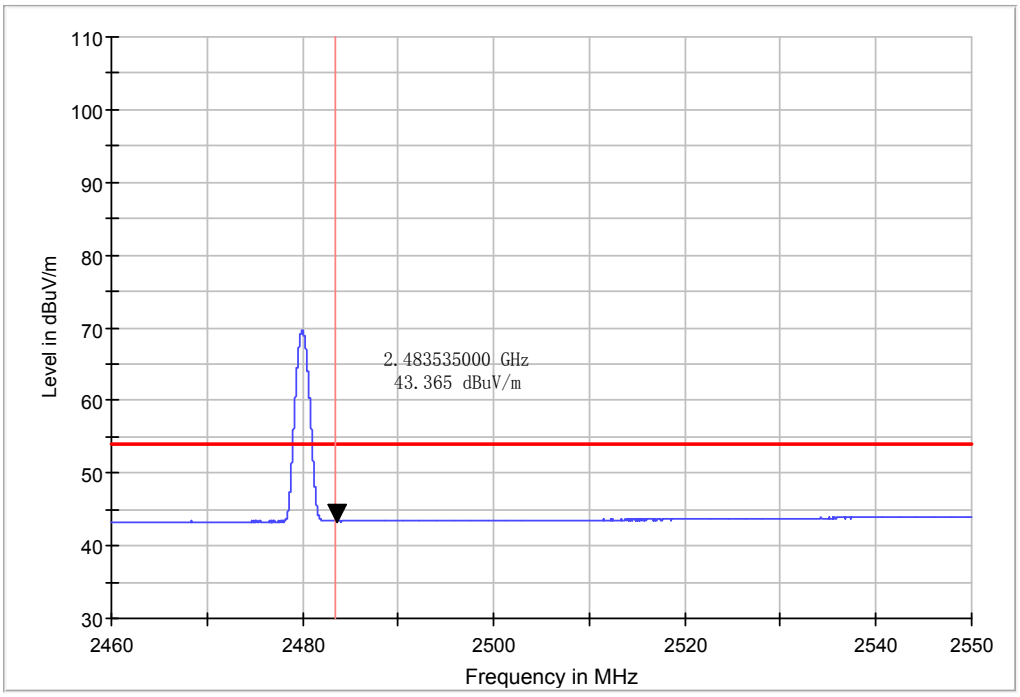
Band edge

BLE CH39

AV



Horizontal



Vertical

10. ANTENNA REQUIREMENTS

10.1. Applicable requirements

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

10.2. Antenna Connector

Antenna Connector is on the PCB within enclosure and not accessible to user.

10.3. Antenna Gain

The antenna gain of EUT is less than 6 dBi.

END OF REPORT