

TEST REPORT

For

Prolycht directional LED fixture

Model Number: Prolycht Orion 300

FCC ID: 2AXKOORION300-C4

Report Number : WT208001787

Test Laboratory : Shenzhen Academy of Metrology and Quality
Inspection
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TEST REPORT DECLARATION

Applicant : Shenzhen Chromatech Lighting CO.LTD

Address : 29 Gaoxin South Ring Road,#1 Room
901,Shenzhen,Guangdong,518000

Manufacturer : Shenzhen Chromatech Lighting CO.LTD

Address : 29 Gaoxin South Ring Road,#1 Room
901,Shenzhen,Guangdong,518000

EUT Description : Prolycht directional LED fixture

Model No. : Prolycht Orion 300

Trade mark : PROLYCHT

Serial Number : /

FCC ID : 2AXKOORION300-C4

Test Standards:

FCC Part 15 15.207, 15.209, 15.247 (2019)

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:	 (Huang Si 黄思)	Date:	Jan.27, 2021
Checked by:	 (Shi Changda 施昌达)	Date:	Jan.27, 2021
Approved by:	 (Lin Yixiang 林奕翔)	Date:	Jan.27, 2021

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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 (e)	Pass
Conducted Bandedge and Spurious	15.247 (d)	Pass
Radiated Bandedge and Spurious	15.247 (d) 15.209 15.205	Pass
Conducted Emission Test for AC Power Port	15.207	Pass
Antenna Requirements	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.

The lab will not be liable for any loss or damage resulting for false, inaccurate, inappropriate or incomplete product information provided by the applicant/manufacturer.

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.

The Laboratory is registered to perform emission tests with VCCI, and the registration number are C-20048, G20076, R-20077, R-20078 and T-20047.

The Laboratory is Accredited Testing Laboratory of American Association for Laboratory Accreditation (A2LA) and certificate number is 3292.01.

2.3.Measurement Uncertainty

Conducted Emission

9 kHz~150 kHz 3.7dB

150 kHz~30MHz 3.3dB

Radiated Emission

30MHz~1000MHz 4.3dB

1GHz~6GHz 4.6 dB

6GHz~18GHz 5.1dB

18GHz~26.5GHz 5.1dB

3. PRODUCT DESCRIPTION

NOTE: The extreme test conditions for temperature and antenna gain were declared by the manufacturer.

3.1.EUT Description

Description : Prolycht directional LED fixture
Manufacturer : Shenzhen Chromatech Lighting CO.LTD
Model Number : Prolycht Orion 300
Operate Frequency : 2.402GHz~2.480GHz
Antenna Designation : BT: PIFA ANTENNA
Operating voltage : AC100V (Low)/AC 120V (Nominal)/ AC 240V (Max)
Software Version : v1.0
Hardware Version : v1.0
Remark: --

Bluetooth Low Energy:

Table 2 Working Frequency List

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

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

This submittal(s) (test report) is intended for FCC ID: **2AXKOORION300-C4** filing to comply with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

3.3.Block Diagram of EUT Configuration

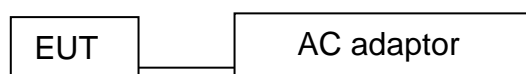


Figure 1 EUT setup

3.4.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%

3.5.Direction Antenna Gain

The EUT does NOT support a WIFI MIMO function.

Directional gain need NOT to be considered.

3.6.Support Equipment List

Table 3 Support Equipment List

Name	Model No	S/N	Manufacturer
--	--	--	--

3.7.Test Conditions

Date of test : Sep.9, 2020- Sep.15, 2020

Date of EUT Receive : Aug.7, 2020

Temperature: 23°C-25°C

Relative Humidity: 36%-51%

3.8.Special Accessories

Not available for this EUT intended for grant.

3.9.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
SB9058/05	Test Receiver	R&S	ESCI 3	Sep.25,2020	1 Year
SB4357	AMN	R&S	ENN216	Aug.26,2020	1 Year
SB13956	Test Receiver	R&S	ESR26	Feb.14,2020	1 Year
SB3955	Broadband Antenna	Schwarzbeck	VULB 9163	Jan.10,2020	1 Year
SB8501/09	Test Receiver	R&S	ESU40	Feb.14,2020	1 Year
SB3435	Horn Antenna	R&S	HF906	Dec.17,2019	1 Year
SB5472/02	Broadband Antenna	Schwarzbeck	VULB 9163	Jan.10,2020	1 Year
SB9058/03	Pre-Amplifier	R&S	SCU 18	Feb.14,2020	1 Year
SB8501/10	Horn Antenna	R&S	3160-09	Mar.10,2020	3 Years
SB8501/11	Horn Antenna	R&S	3160-09	Mar.09,2020	3 Years
SB8501/12	Horn Antenna	R&S	3160-10	Mar.17,2020	3 Years
SB8501/13	Horn Antenna	R&S	3160-10	Mar.10,2020	3 Years
SB3345	Loop Antenna	Schwarzbeck	FMZB1516-113	Feb.14,2020	1 Year
SB8501/14	Pre-Amplifier	R&S	SCU-03	Feb.14,2020	1 Year
SB8501/15	Pre-Amplifier	R&S	SCU-03	Feb.14,2020	1 Year
SB8501/16	Pre-Amplifier	R&S	SCU 26	Feb.14,2020	1 Year
SB8501/17	Pre-Amplifier	R&S	SCU-18	Feb.14,2020	1 Year
SB9060	Signal Analyzer	R&S	FSQ40	May.18, 2020	1 Year
SB13989	Wireless Wideband Communication Tester	R&S	CMW270	May.18, 2020	1 Year

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

The transmitter output was connected to the spectrum analyzer.

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ 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.

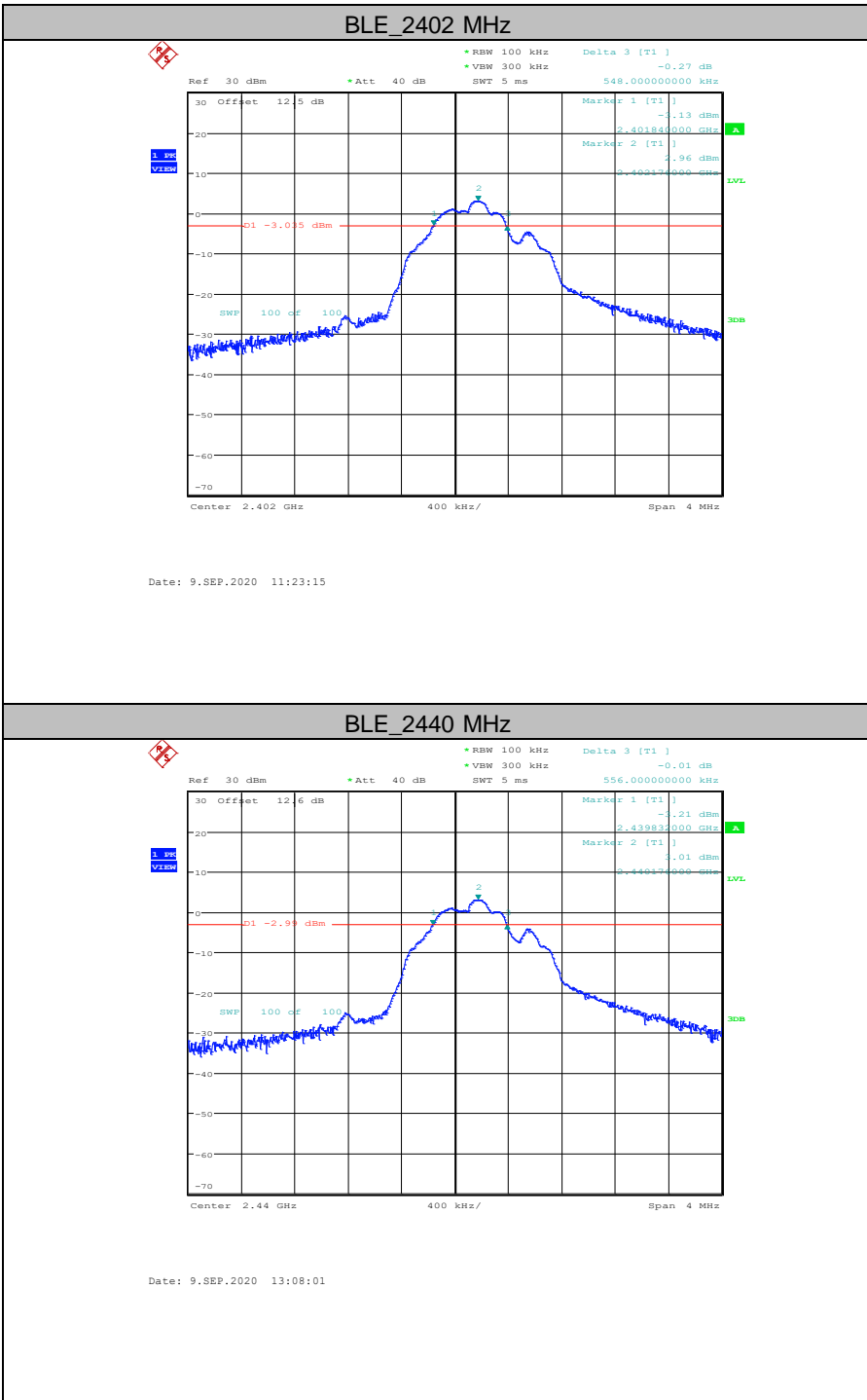
5.3.Test Setup



5.4.Test Data

Table 5 6dB Bandwidth Test Data BLE

Channel Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]	Result
2402	0.55	>=0.50	Pass
2440	0.56	>=0.50	Pass
2480	0.56	>=0.50	Pass



6. MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

6.1.Limits of Maximum Conducted Output Power Measurement

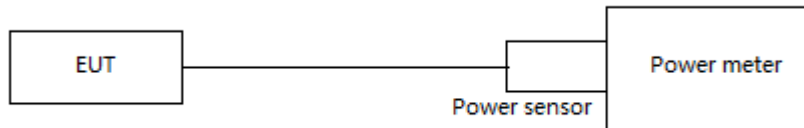
CFR 47 (FCC) part 15.247 (b) (3), 558074 D01 DTS Meas Guidance v05r02

6.2.Test Procedure

The transmitter output was connected to the spectrum analyzer.

- a)Set the RBW \geq DTS bandwidth.
- b)Set VBW \geq 3 x RBW.
- c)Set span \geq 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.

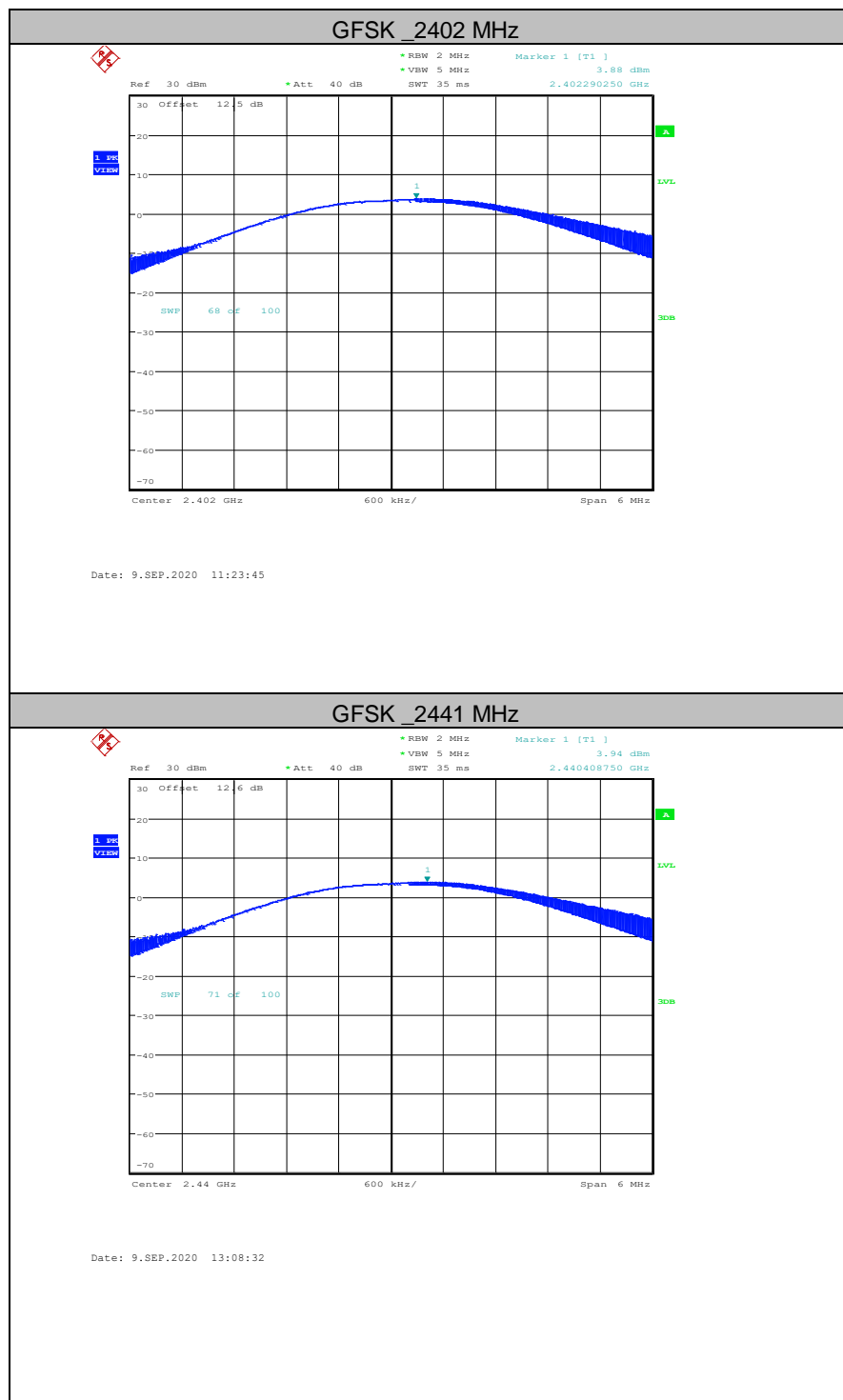
6.3.Test Setup



6.4.Test Data

Table 6 Maximum Conducted Output Power Test Data BLE

Center Freq. [MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
2402	3.88	<=30	Pass
2440	3.94	<=30	Pass
2480	3.45	<=30	Pass



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

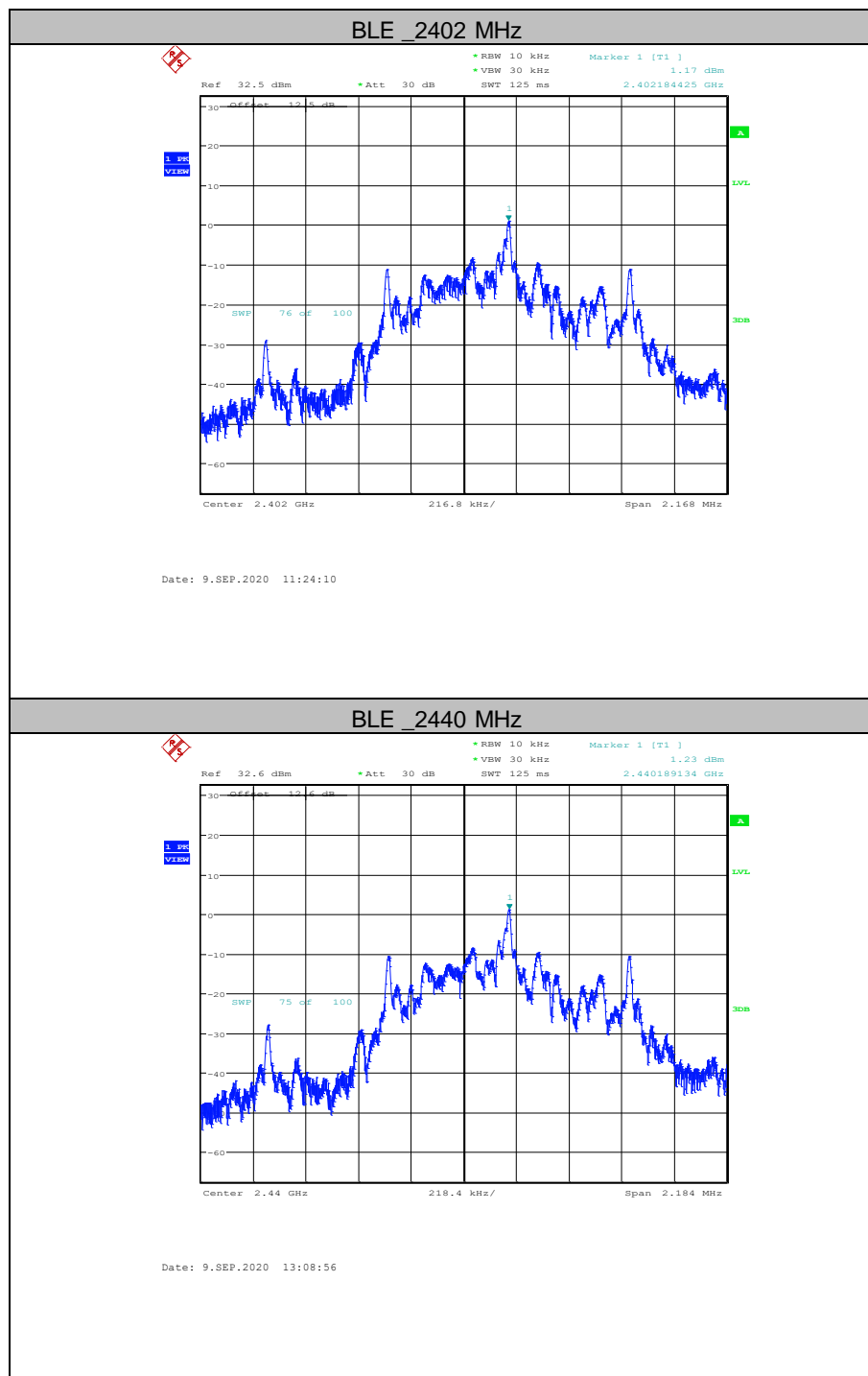
The transmitter output was connected to the spectrum analyzer.

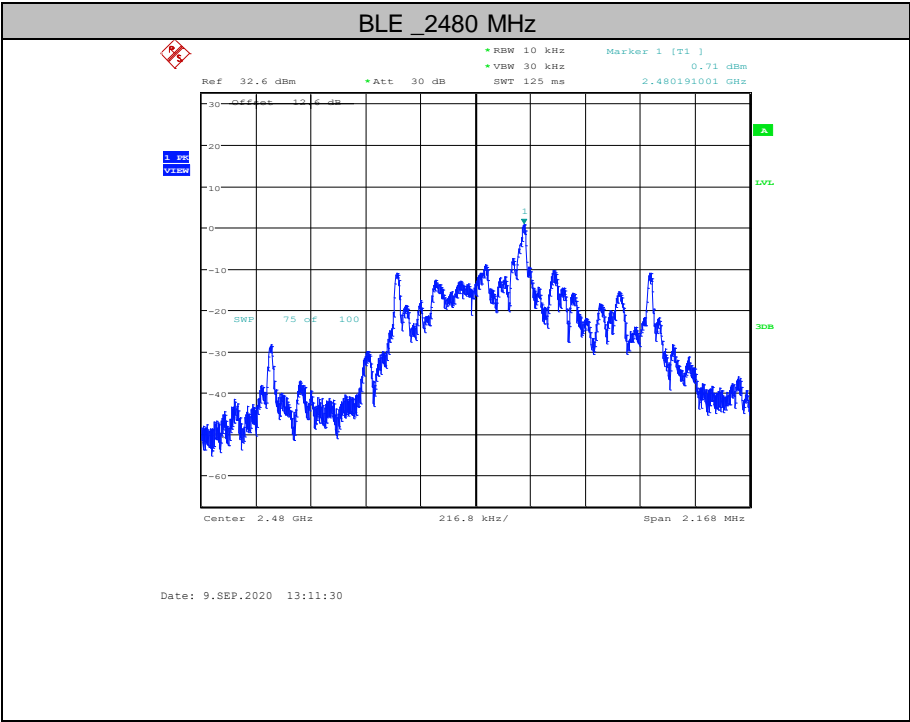
- a)Set analyzer center frequency to DTS channel center frequency.
- b) Set the span to 1.5 times the DTS bandwidth.
- c) Set RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
- d) Set VBW $\geq 3 \times \text{RBW}$.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max 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]	Limit [dBm]	Result
2402	1.17	<=8	Pass
2440	1.23	<=8	Pass
2480	0.71	<=8	Pass





8. CONDUCTED BANDEDGE AND SPURIOUS MEASUREMENT

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

The transmitter output was connected to the spectrum analyzer.

Establish a reference level by using the following procedure:

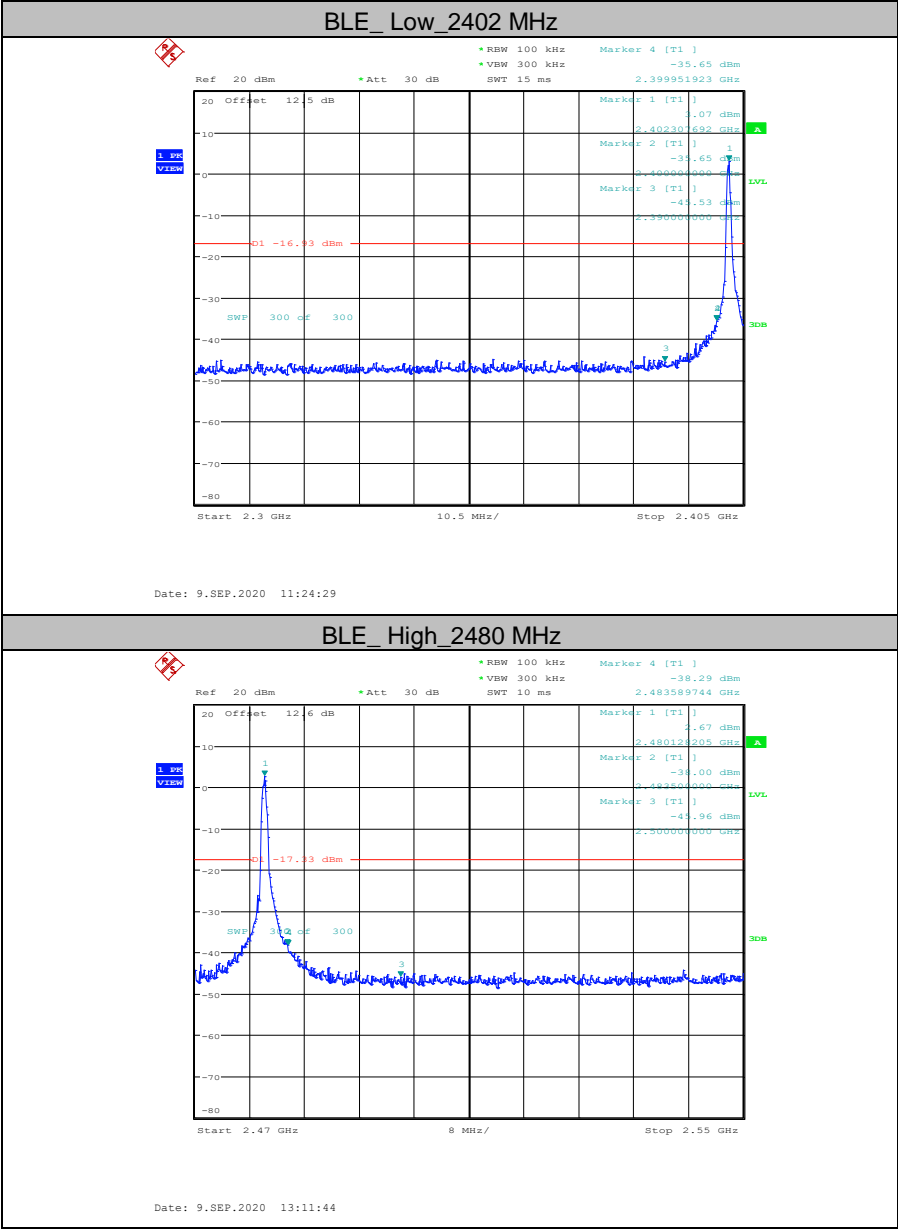
- a)Set instrument center frequency to DTS channel center frequency.
- b)Set the span to ≥ 1.5 times the DTS bandwidth.
- c)Set the RBW = 100 kHz.
- d)Set the VBW $\geq 3 \times$ RBW.
- e)Detector = peak.
- f)Sweep time = auto couple.
- g)Trace mode = max hold.
- h)Allow trace to fully stabilize.
- i)Use the peak marker function to determine the maximum PSD level.

Emission level measurement

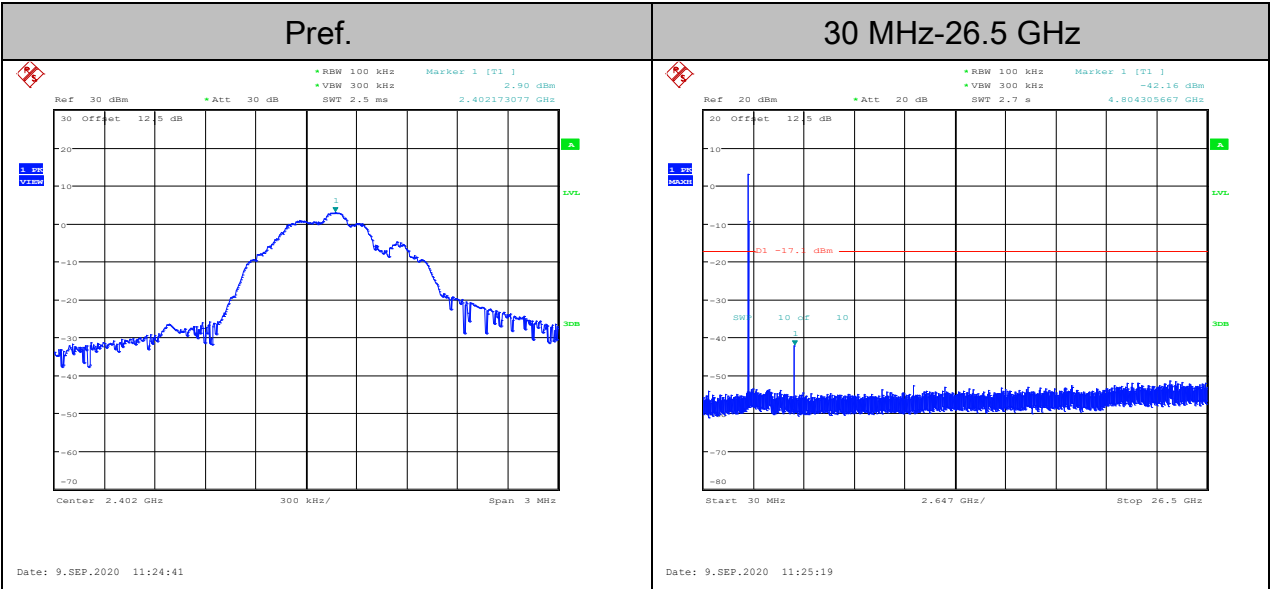
- a)Set the center frequency and span to encompass frequency range to be measured.
- b)Set the RBW = 100 kHz.
- c)Set the VBW $\geq 3 \times$ RBW.
- d)Detector = peak.
- e)Ensure that the number of measurement points $\geq \text{span/RBW}$
- f)Sweep time = auto couple.
- g)Trace mode = max hold.
- h)Allow trace to fully stabilize.
- i)Use the peak marker function to determine the maximum amplitude level.

8.3.Test Data

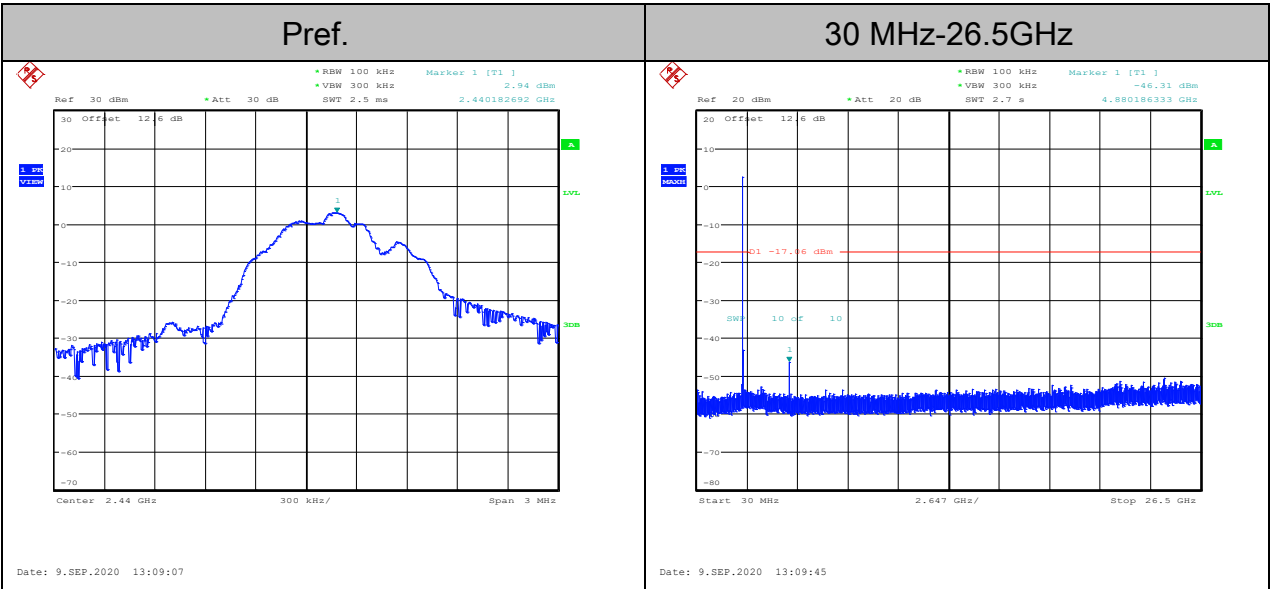
BLE
Band Edge



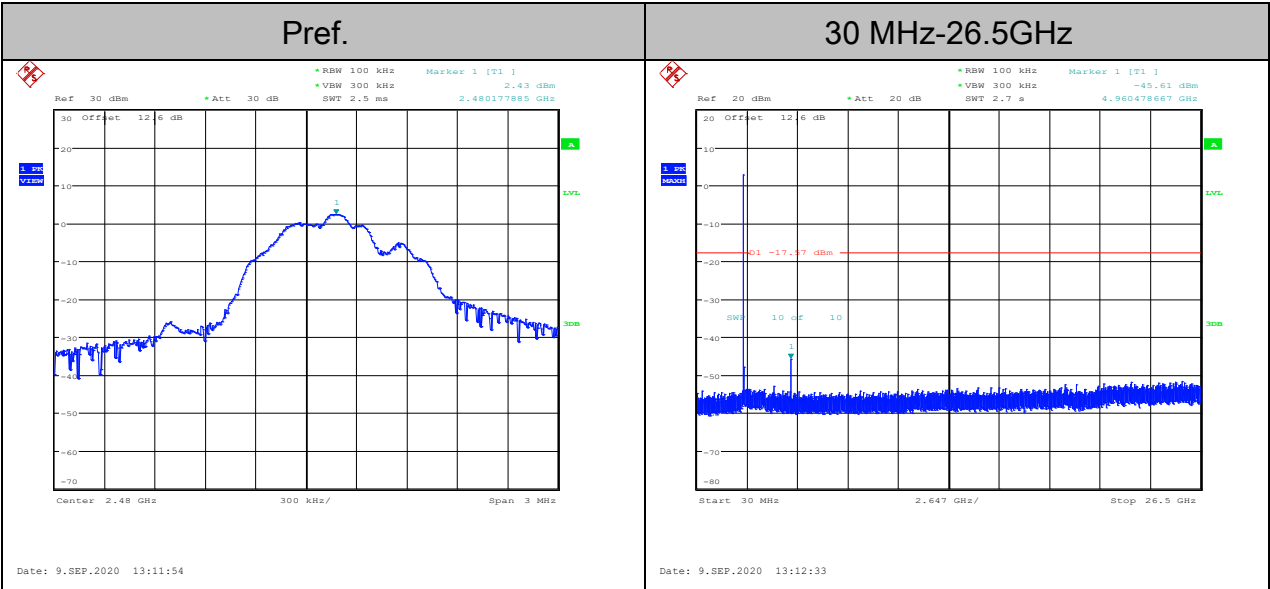
Conducted Spurious Emission
Low Channel



Conducted Spurious Emission
Mid. Channel



Conducted Spurious Emission
High Channel



9. RADIATED BANDEGE 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 \geq 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

9 kHz-30 MHz

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 +preamp (dB)	Antenna Factor (dB)	Reading (dBμV/m)	Level (dBμV/m)	Polarity (H/V)	Limit (dBμV/m)	Margin (dB)	Note
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

30 MHz-1 GHz

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

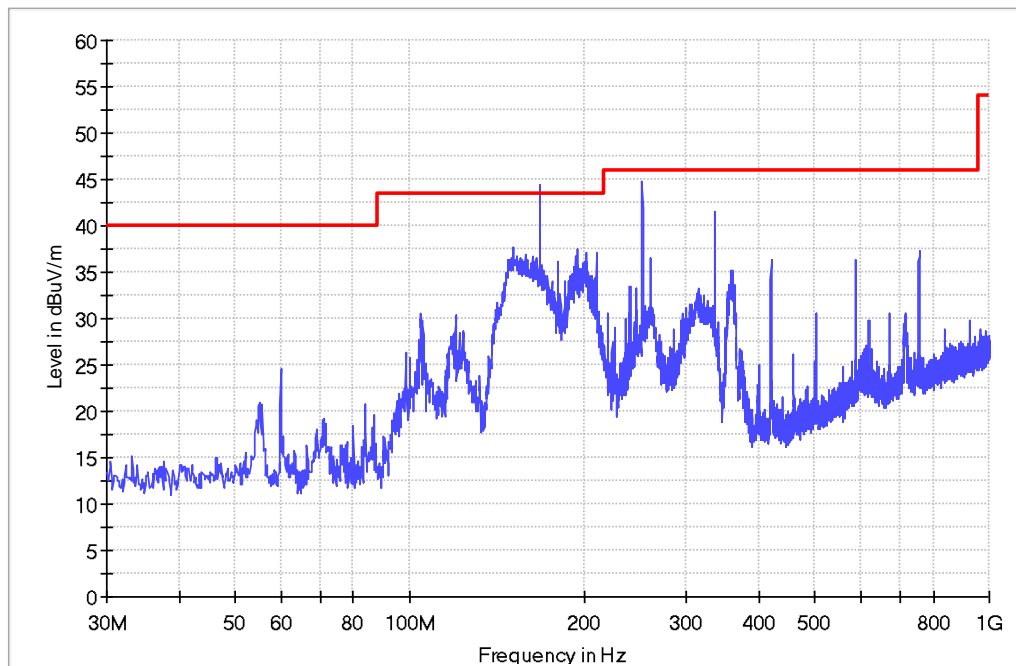
Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Reading (dBμV/m)	Level (dBμV/m)	Polarity (Horizontal/ Vertical)	Limit (dBμV/m)	Margin (dB)	Note
150.643	1.4	8.3	26.0	35.7	Horizontal	43.5	7.8	QP
167.982	1.5	8.7	33.1	43.3	Horizontal	43.5	0.2	QP
194.293	1.7	10.6	24.2	36.5	Horizontal	43.5	7.0	QP
252.008	1.9	12.1	30.1	44.1	Horizontal	46.0	1.9	QP
335.913	2.1	13.3	25.0	40.4	Horizontal	46.0	5.6	QP
756.045	3.4	18.8	15.1	37.3	Horizontal	46.0	8.7	QP
52.673	0.7	13.3	14.8	28.8	Vertical	40	11.2	QP
149.673	1.5	10.5	29.1	41.1	Vertical	43.5	2.4	QP
167.982	1.5	8.7	33.2	43.4	Vertical	43.5	0.1	QP
202.175	1.6	10.6	22.0	34.2	Vertical	43.5	9.3	QP
252.008	1.9	12.1	25.2	39.2	Vertical	46	6.8	QP
419.940	2.5	15.1	19.1	36.7	Vertical	46	9.3	QP

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

Radiated Emission

EUT Name: Orion 300
Operating Condition: Charging and Transmitting
Test Site: SMQ NETC EMC Lab.
Antenna Position: Vertical & Horizontal
Test Voltage: AC 120V/60Hz
Horizontal

Copy of Field strength 30M-1GHz



Vertical

Copy of Field strength 30M-1GHz

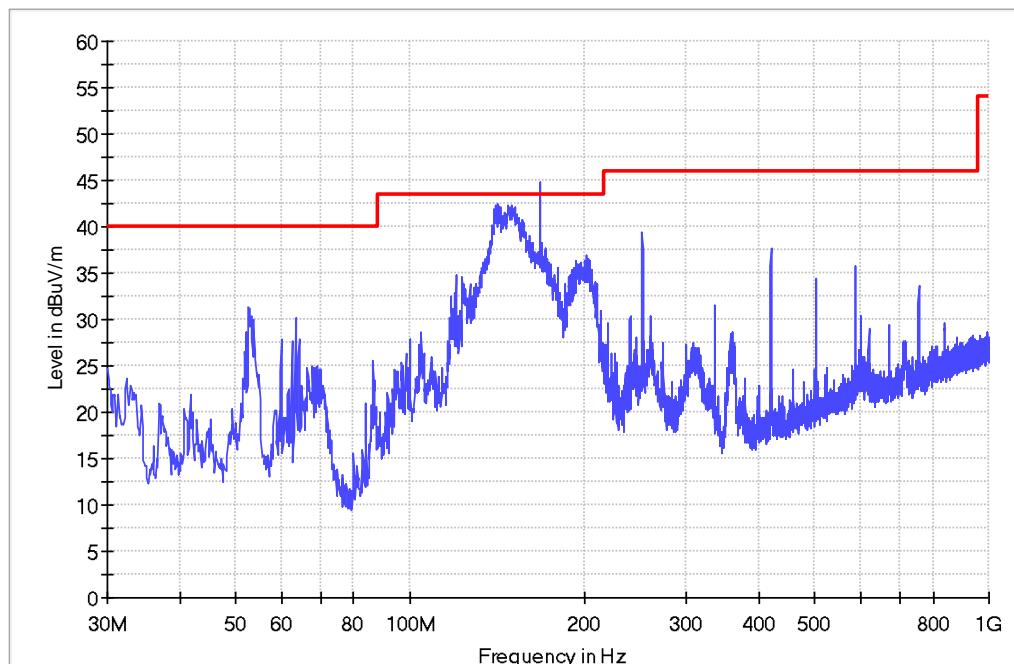


Table 10 Radiated Emission Test Data 1GHz -18GHz

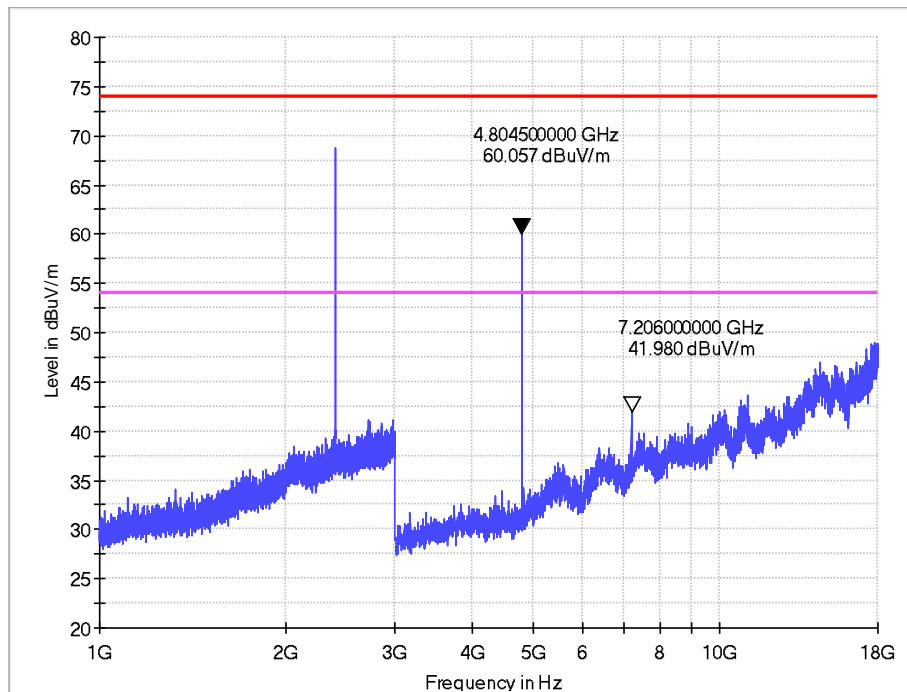
Channel	Frequency (MHz)	Cable Loss +preamp (dB)	Antenna Factor (dB)	Reading (dBμV/m)	Level (dBμV/m)	Polarity (Horizontal/ Vertical)	Limit (dBμV/m)	Margin (dB)	Note
CH0	4803.836	-39.4	33.4	70.4	64.4	Horizontal	74	9.6	PK
CH0	4803.836	-39.4	33.4	56.3	50.3	Horizontal	54	3.7	AV
CH0	7206.467	-38.3	35.6	57.4	54.7	Horizontal	74	19.3	PK
CH0	7206.467	-38.3	35.6	43.5	40.8	Horizontal	54	13.2	AV
CH0	4803.851	-39.4	33.4	64.2	58.2	Vertical	74	15.8	PK
CH0	4803.851	-39.4	33.4	50.4	44.4	Vertical	54	9.6	AV
CH0	7206.132	-38.3	35.6	57.2	54.5	Vertical	74	19.5	PK
CH0	7206.132	-38.3	35.6	44.0	41.3	Vertical	54	12.7	AV
CH19	4880.325	-39.4	33.4	67.0	61.0	Horizontal	74	13.0	PK
CH19	4880.325	-39.4	33.4	55.0	49.0	Horizontal	54	5.0	AV
CH19	4880.313	-39.4	33.4	63.2	57.2	Vertical	74	16.8	PK
CH19	4880.313	-39.4	33.4	51.2	45.2	Vertical	54	8.8	AV
CH39	7440.457	-37.7	35.6	59.7	57.6	Horizontal	74	16.4	PK
CH39	7440.457	-37.7	35.6	45.5	43.4	Horizontal	54	10.6	AV

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

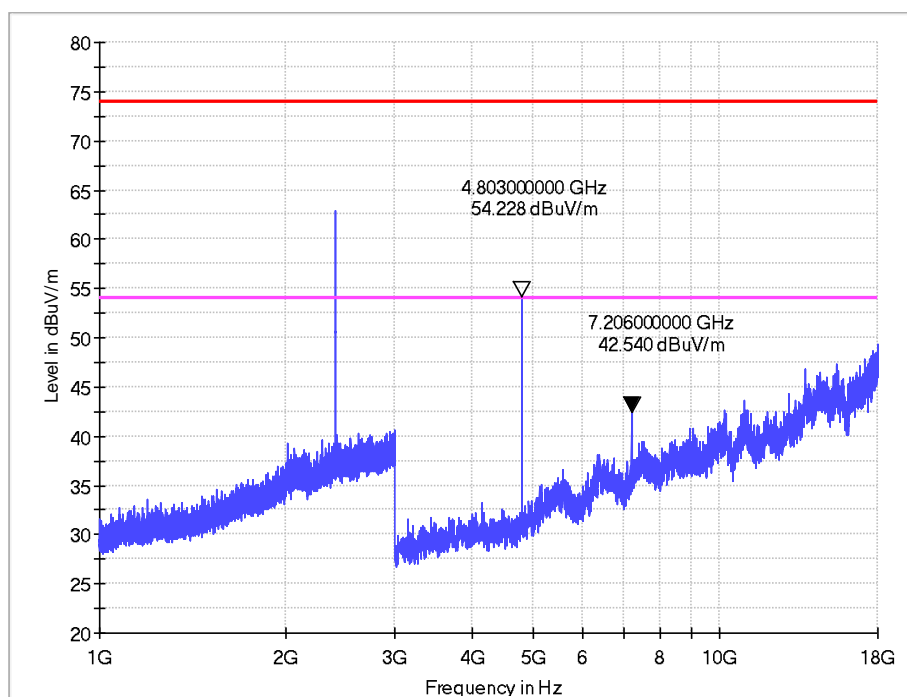
1-18 GHz

BLE CH0

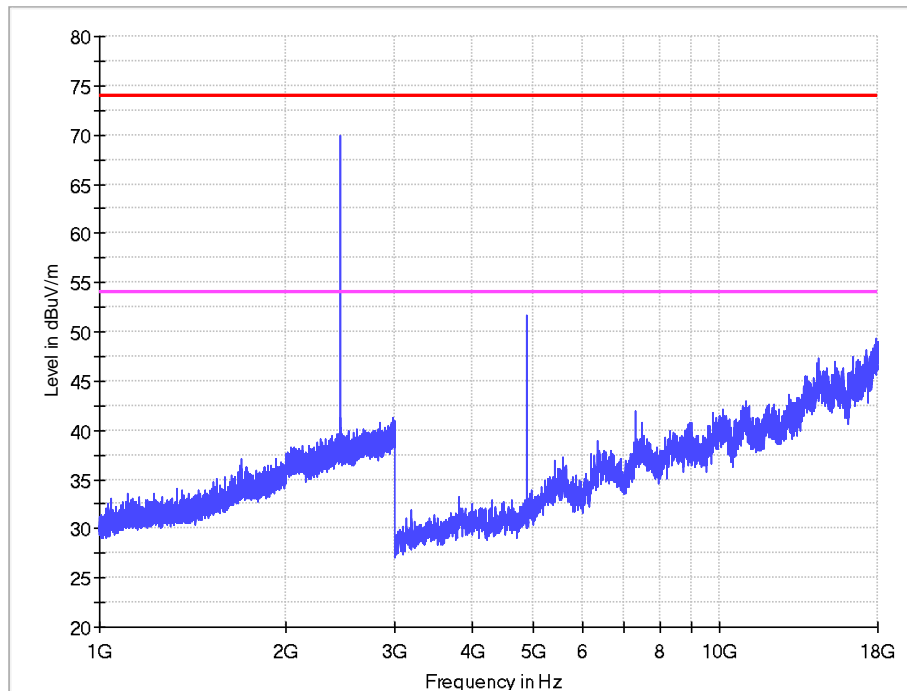
Horizontal



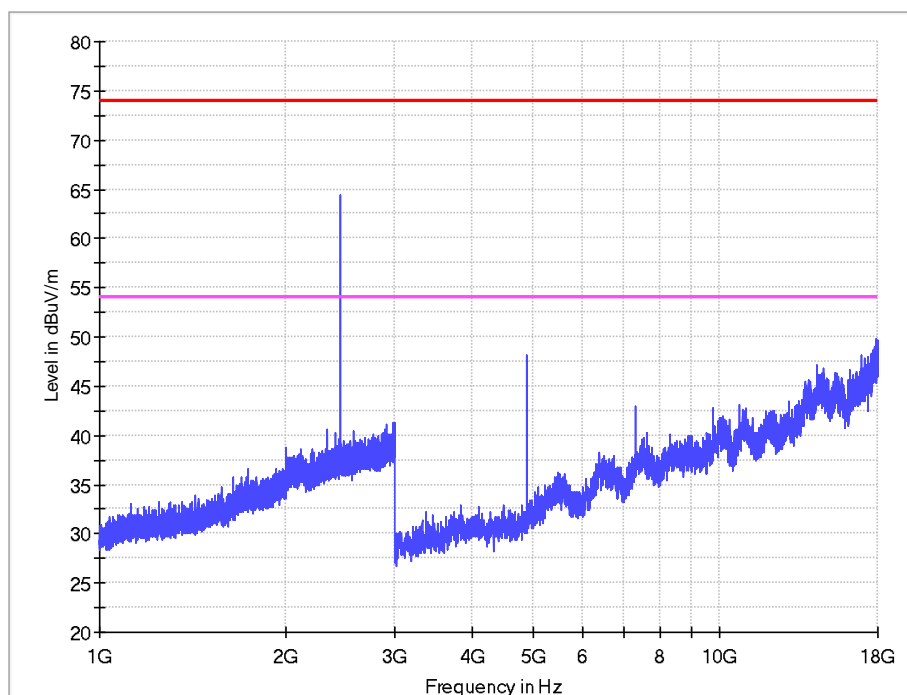
Vertical



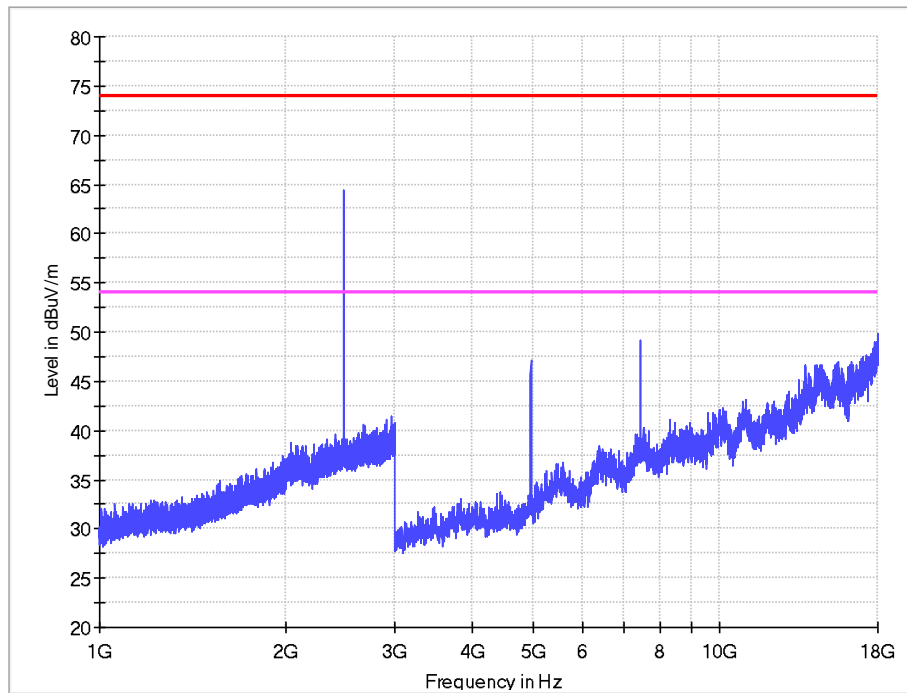
1-18 GHz
BLE CH19
Horizontal



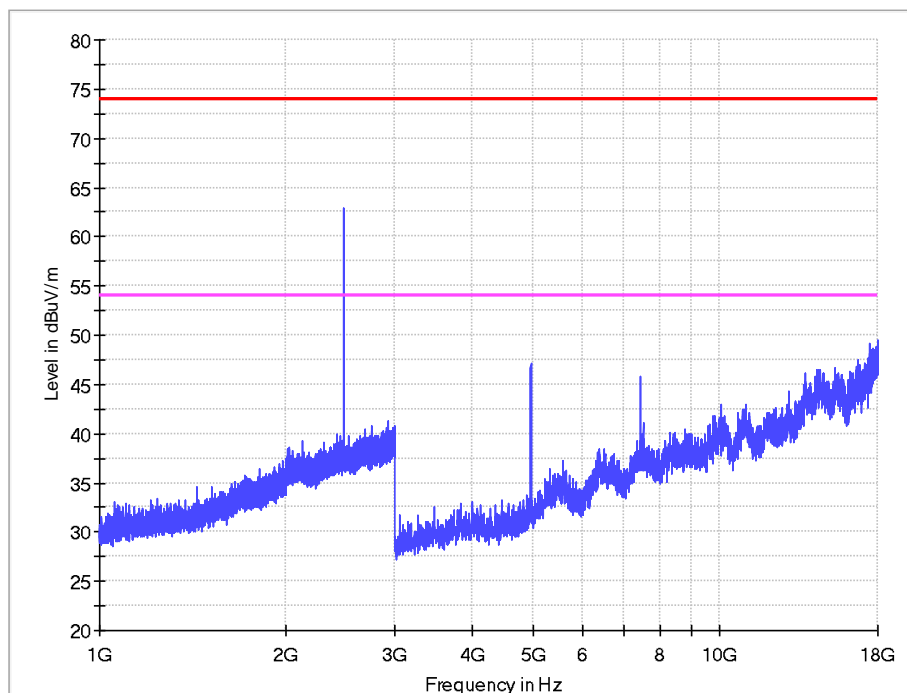
Vertical



1-18 GHz
BLE CH39
Horizontal



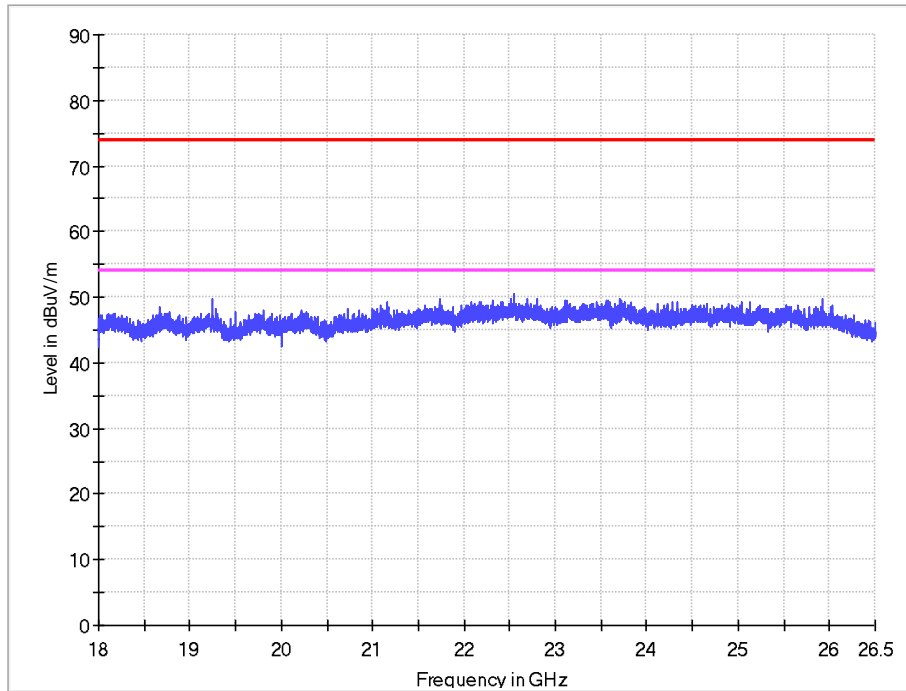
Vertical



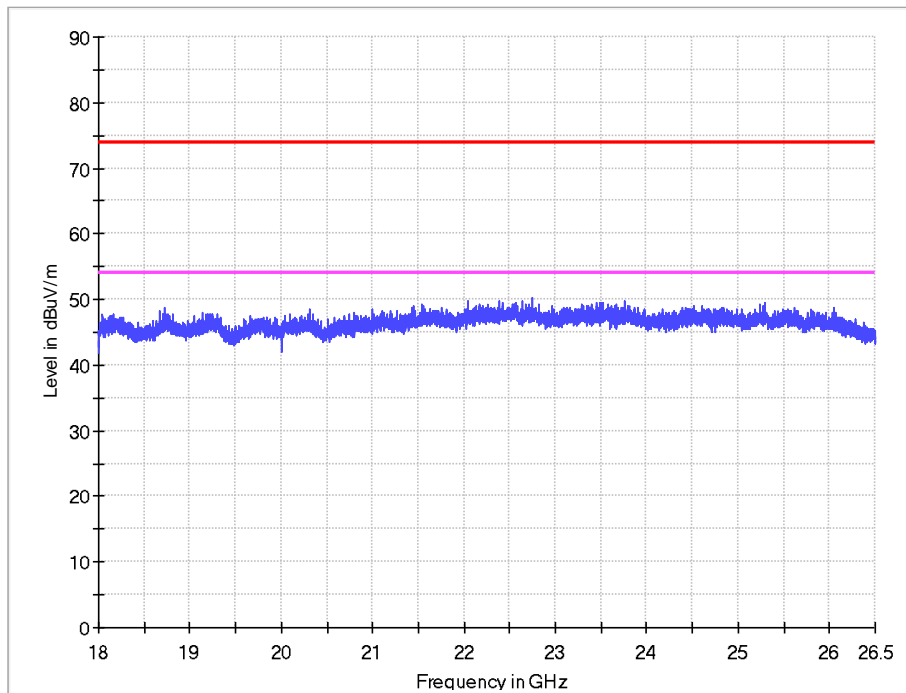
18-26.5 GHz

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

Horizontal



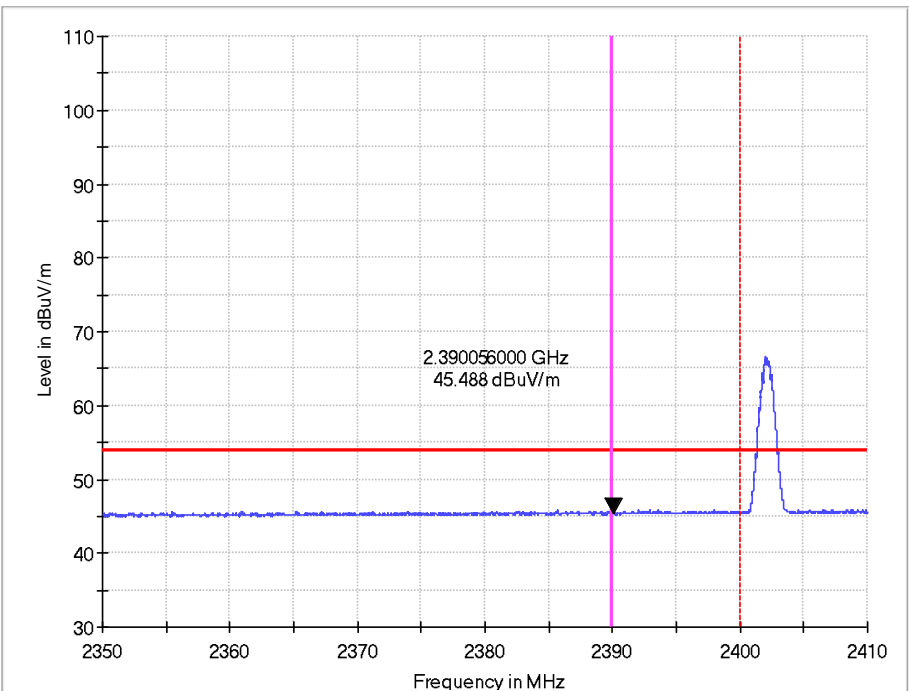
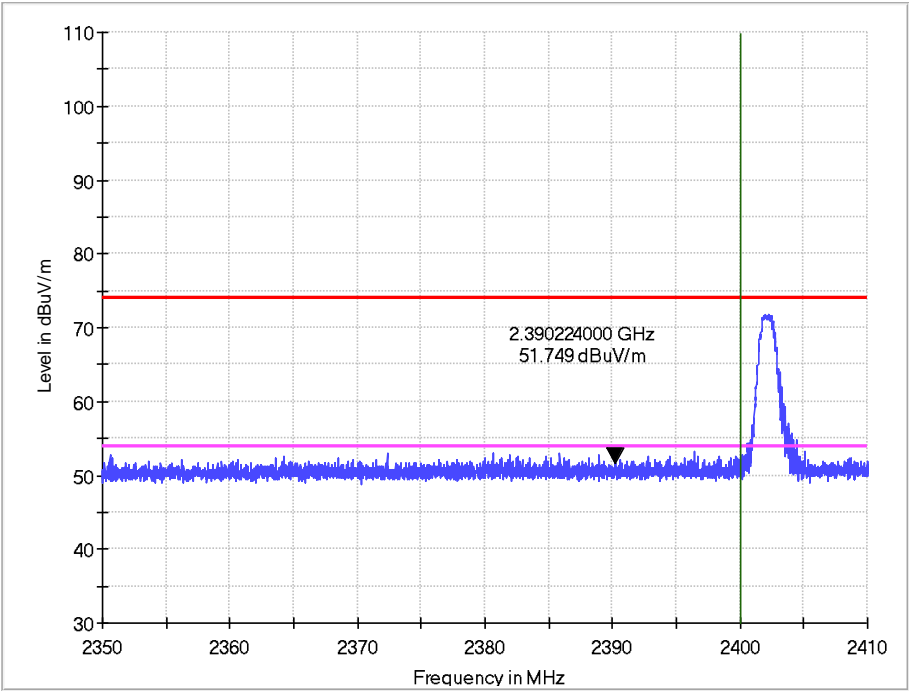
Vertical



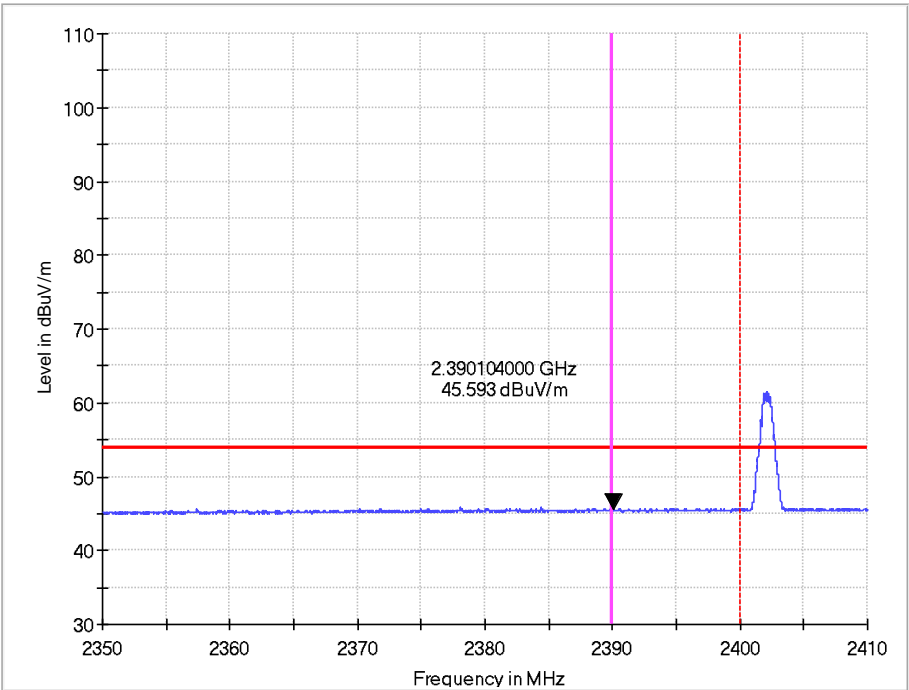
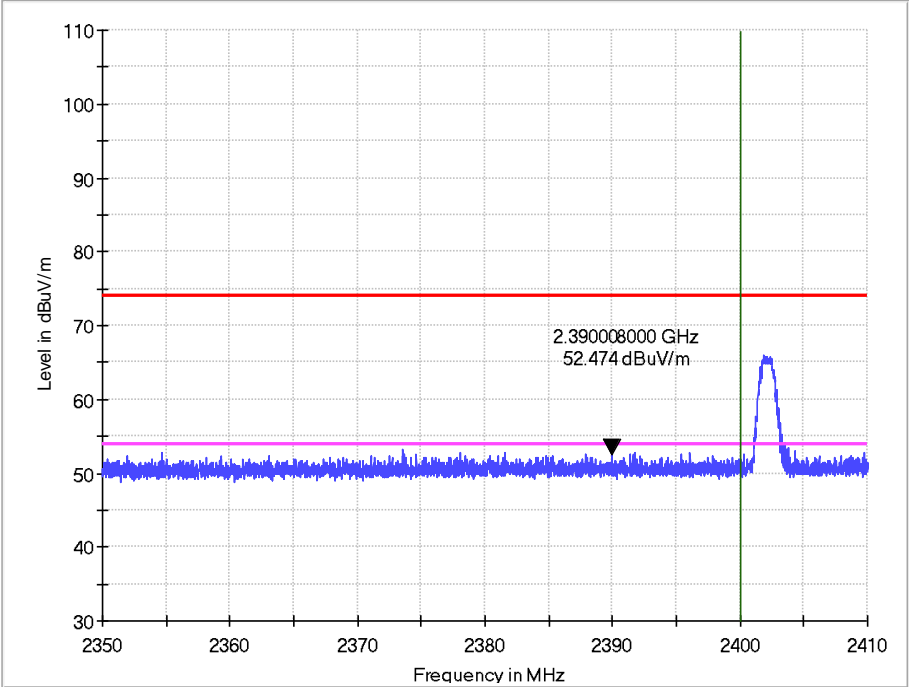
Band Edge

BLE CH0

Horizontal



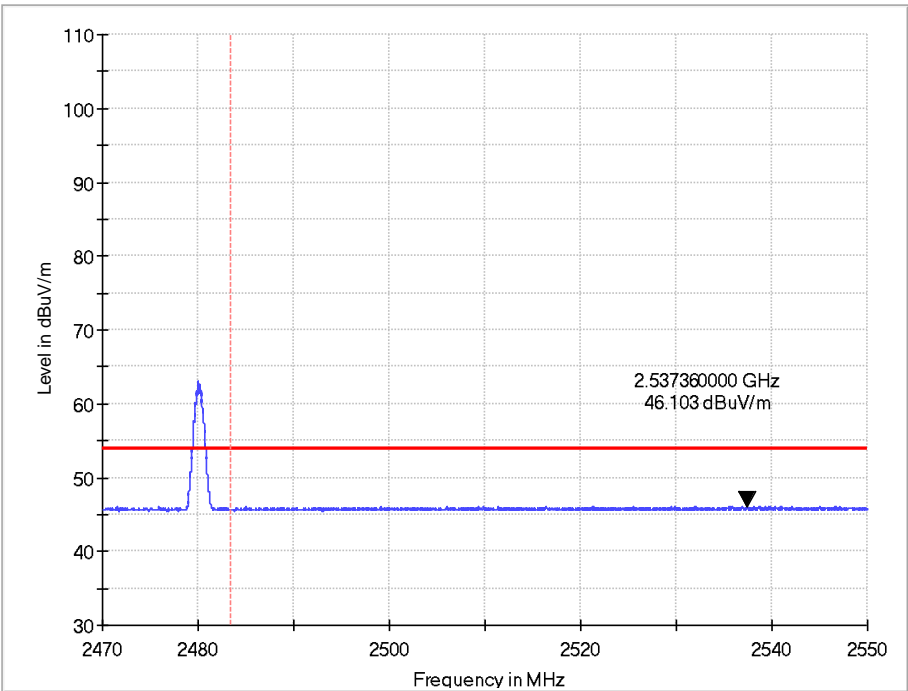
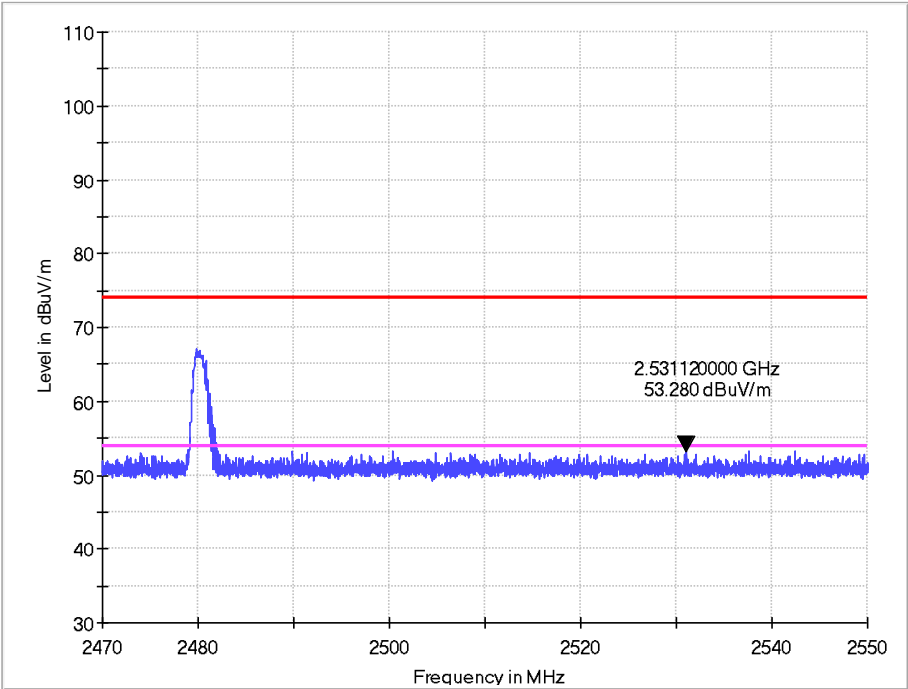
Vertical



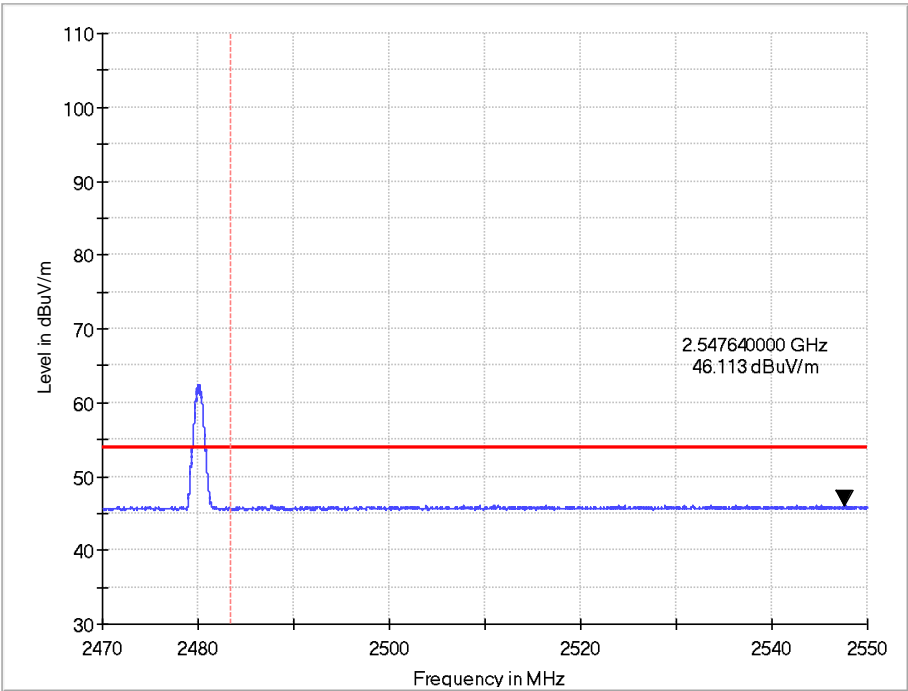
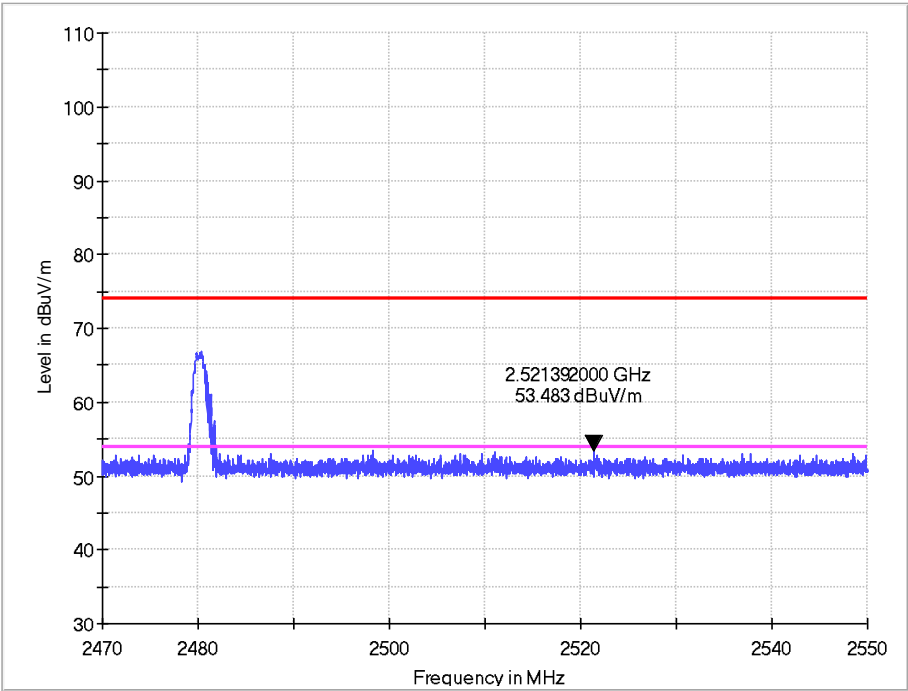
Band Edge

BLE CH39

Horizontal



Vertical



10. CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT

10.1. Test Standard and Limit

10.1.1. Test Standard

FCC Part 15.207

10.1.2. Test Limit

Table 11 Conducted Emission Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency

* The lower limit shall apply at the transition frequency.

10.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions form both sides of AC line. According to the requirements of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

The bandwidth of EMI test receiver is set at 9kHz.

10.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

10.4. Test Data

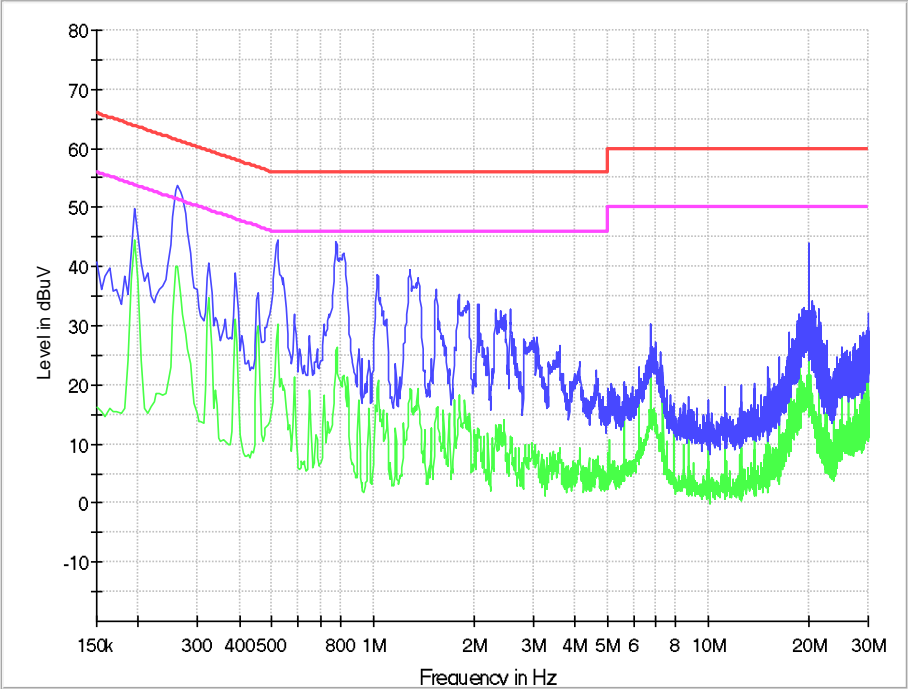
The emissions don't show in below are too low against the limits. Refer to the test curves.

Table 12 Conducted Emission Test Data

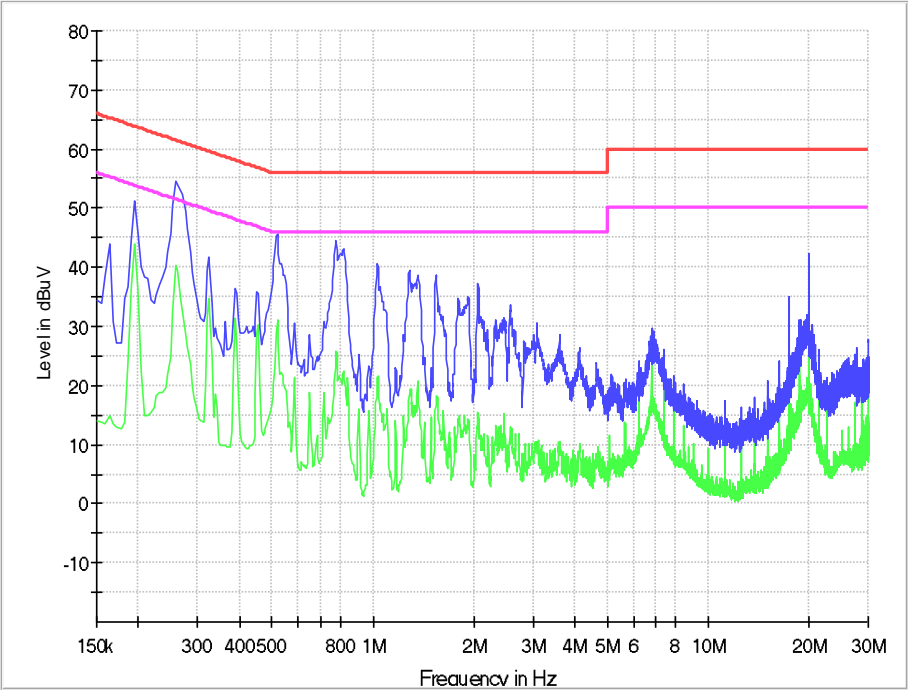
Test mode: Charging and Transmitting								
	Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
			Reading (dB μ V)	Emission Level (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Emission Level (dB μ V)	Limit (dB μ V)
Line	0.195	9.7	38.4	48.1	63.8	34.6	44.3	53.8
	0.262	9.7	40.6	50.3	61.4	29.4	39.1	51.4
	0.519	9.8	30.8	40.6	56	20.7	30.5	46
	0.780	9.8	29.8	39.6	56	15.5	25.3	46
	1.288	9.8	26.5	36.3	56	8.9	18.7	46
	19.999	9.9	33.2	43.1	60	33.0	42.9	50
Neutral	0.195	9.7	39.2	48.9	63.8	33.6	43.3	53.8
	0.258	9.7	41.0	50.7	61.5	30.4	40.1	51.5
	0.519	9.8	32.1	41.9	56	21.2	31	46
	0.775	9.8	31.1	40.9	56	16.0	25.8	46
	1.032	9.8	27.9	37.7	56	11.1	20.9	46
	19.999	9.9	30.9	40.8	60	30.7	40.6	50

REMARKS: 1. Emission level (dB μ V) = Read Value (dB μ V) + Correction Factor (dB)
 2. Correction Factor (dB) = LISN Factor (dB) + Cable Factor (dB) + Limiter Factor (dB)
 3. The other emission levels were very low against the limit.

Line



Neutral



11.ANTENNA REQUIREMENTS

11.1.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.

11.2.Antenna Connector

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

11.3.Antenna Gain

The antenna gain of EUT is less than 6 dBi.

-----End of Report-----