FCC TEST REPORT

For

Zigbee Plug-in Dimmer with load sensing

Model Number: ZB3102

FCC ID: U2ZZB3102

Report Number : WT168003885

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection National Digital Electronic Product Testing Center
Site Location	:	No.4 TongFa Road, Xili Town, Nanshan District, Shenzhen, China
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Test report declaration

Applicant	:	SHEENWAY ASIA LTD.
Address	:	Room1313, 13/F., AustinTower, 22-26AustinAvenu, TsimSha Tsui, Kowloon. Hong Kong. China
Manufacturer	:	SHEENWAY ASIA LTD.
Address	:	Room1313, 13/F., AustinTower, 22-26AustinAvenu, TsimSha Tsui, Kowloon. Hong Kong. China
EUT Description	:	Zigbee Plug-in Dimmer with load sensing
Model No	:	ZB3102
FCC ID	:	U2ZZB3102

Test Standards:

FCC Part 15 (October 1, 2015 Edition)

ANSI C63.10: 2013

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 data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules Part 15.207, 15.209 and 15.247.

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 Qichun)	Date:	Aug.08,2016
Checked by:	(Yang Dongping)	Date:	Aug.08,2016
Approved by:	(Lin Bin)	Date:	Aug.08,2016

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
6dB DTS bandwidth measurement	15.247 (a) (2)	Pass
Maximum peak conducted output power	15.247 (b)	Pass
Maximum Power Spectral Density Level	15.247 (e)	Pass
Conducted Band Edges and Spurious	15.247 (d)	Pass
Radiated Band Edges and Spurious	15.247 (d) 15.209 15.205	Pass
Conducted emission test for AC power port	15.207	Pass
Antenna Requirement	15.203 15.247 (b)	Pass

Remark: “ N/A” means “ Not applicable.”

2. GENERAL INFORMATION

2.1. Report information

2.1.1. 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.

2.1.2. 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.

2.1.3. 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 No.4 TongFa Road, Xili Town, Nanshan District, 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 listed in the United States of American Federal Communications Commission (FCC), and the registration number are 806614 (3m anechoic chamber), 446246 (10m anechoic chamber) and 994606 (10m anechoic chamber).

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is 11177A-1.

TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is UA 50303686-0003.

2.3. Measurement Uncertainty

Conducted Emission

9kHz~30MHz 3.5dB

Radiated Emission

30MHz~1000MHz 4.5dB

1GHz~25GHz 4.6dB

3. PRODUCT DESCRIPTION

3.1. EUT Description

Description	:	Zigbee Plug-in Dimmer with load sensing
Model Number	:	ZB3102
Rated Input	:	AC 120V/60Hz
Power supply	:	AC 120V/60Hz
Operate Frequency	:	2.405GHz~2.480GHz
Modulation	:	DSSS (O-QPSK)
Data Rate (Mbps)	:	250kbps
Antenna Designation	:	PCB antenna (Integrated)
Antenna Gain	:	2dBi

Table 2 Working Frequency List

Channel	Center Frequency(MHz)	Channel	Center Frequency(MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

3.2. Block Diagram of EUT Configuration

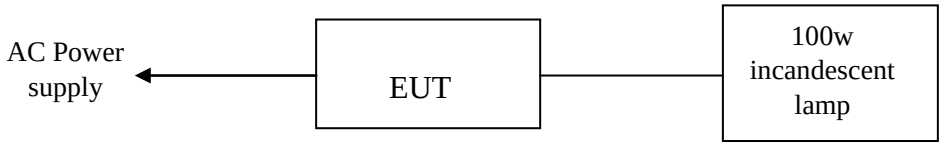

Figure 1 EUT setup

3.3. Operating Condition of EUT

Worst-case mode and channel used for power line conducted emissions was the mode and channel with the highest output power.

The fundamental of the EUT was investigated in three orthogonal orientations X, Y, Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Date Rate	Channel
Maximum Peak Conducted Power	TX	250 kbps	11, 18, 24, 25, 26
6dB DTS bandwidth Power Spectral Density	TX	250 kbps	11, 18, 24, 25, 26
Spurious Emission (blow 1GHz)	TX	250 kbps	Worst-case
Spurious Emission (above 1GHz)	TX	250 kbps	11, 18, 24, 25, 26
Band Edge	TX	250 kbps	11, 25, 26
Conducted emission test for AC power port	TX	250 kbps	Worst-case

3.4. Support Equipment List

Table 3 Support Equipment List

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

3.5. Test Conditions

Date of test：Jul.21, 2016-Jul.25, 2016

Date of EUT Receive：Jul.19, 2016

Temperature: 22-24℃

Relative Humidity: 41-48%

3.6. Special Accessories

Not available for this EUT intended for grant.

3.7. 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
SB3319	EMI Test Receiver	Rohde & Schwarz	ESCS30	Dec.10,2015	1 Year
SB4357	AMN	Rohde & Schwarz	ENV216	Sep.25,2015	1 Year
SB8501/09	EMI Test Receiver	Rohde & Schwarz	ESU40	Mar.23, 2016	1 Year
SB3345	Loop Antenna	SCHWARZBECK	FMZB1516	Jan.07, 2016	1 Year
SB9060	Spectrum analyzer	Rohde & Schwarz	FSQ40	Apr.25, 2016	1 Year
SB3955	Broadband antenna	SCHWARZBECK	VULB9163	Jan.07, 2016	1 Year
SB8501/01	Horn Antenna	Rohde & Schwarz	HF907	Mar.21, 2016	1 Year
SB8501/10	Horn Antenna	Rohde & Schwarz	3160-09	Mar.28, 2014	3 Years
SB8501/17	Preamplifier	Rohde & Schwarz	SCU-18	Mar.21, 2016	1 Year
SB8501/16	Preamplifier	Rohde & Schwarz	SCU-26	Mar.21, 2016	1 Year

5. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

5.1. LIMITS

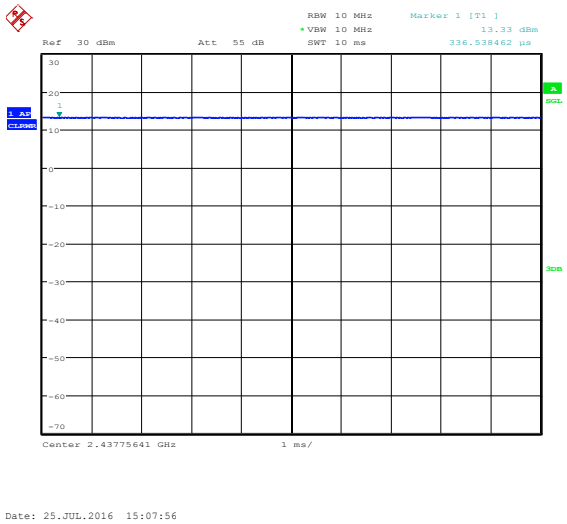
None; for reporting purposes only.

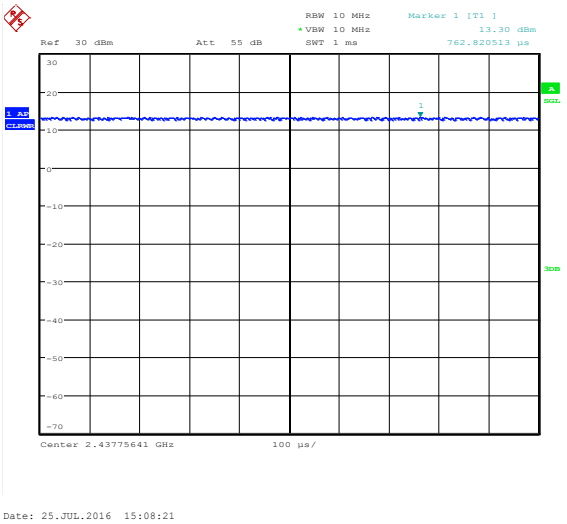
5.2. Test Procedure

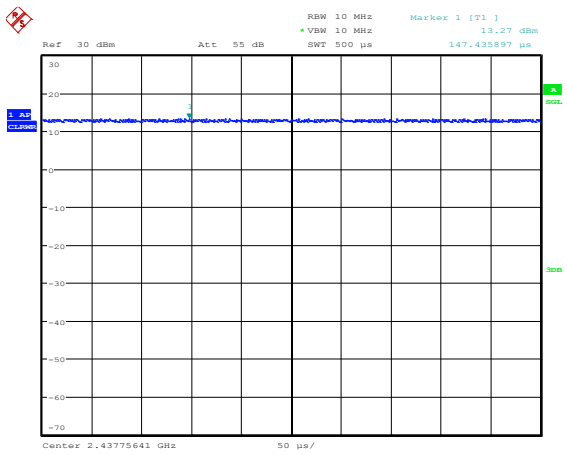
Reference to KDB558074 D01 DTS Meas Guidance v03r05, Zero-Span Spectrum Analyzer Method.

5.3. Test Data

Mode	ON Time (ms) T	Period (ms)	Duty Cycle %	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
Channel 18	--	--	100	0.0	0.010







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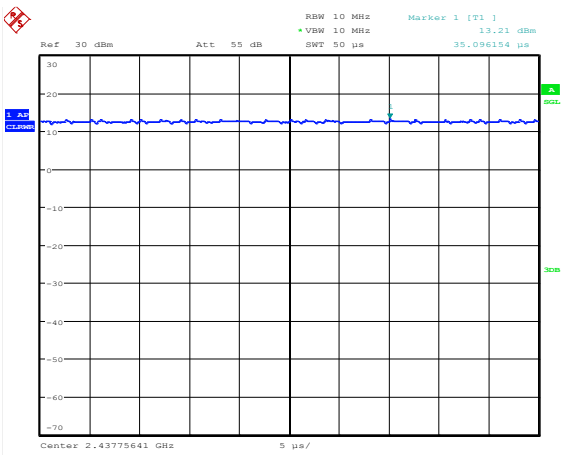

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6. 6DB BANDWIDTH MEASUREMENT

6.1. Limits of 6dB Bandwidth Measurement

CFR 47 (FCC) part 15.247 (a) (2)

6.2. Test Procedure

Reference to KDB558074 D01 DTS Meas Guidance v03r05,

The transmitter output was connected to the spectrum analyzer.

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 x RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

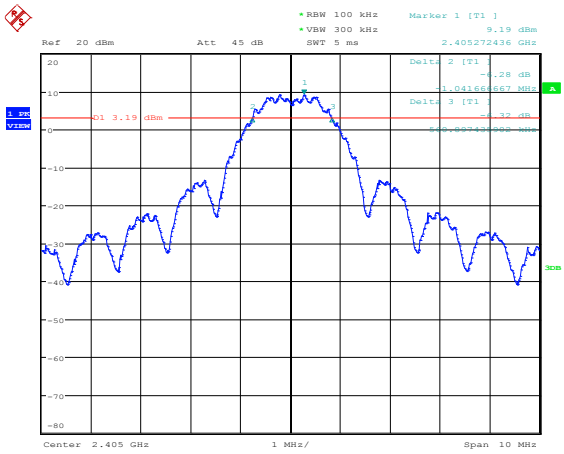
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3. Test Setup

6.4. Test Data

Table 5 6dB Bandwidth Test Data

CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	results
11 (2405MHz)	1.603	Pass
18 (2440MHz)	1.795	Pass
24 (2470MHz)	1.683	Pass
25 (2475MHz)	1.635	Pass
26 (2480MHz)	1.667	Pass



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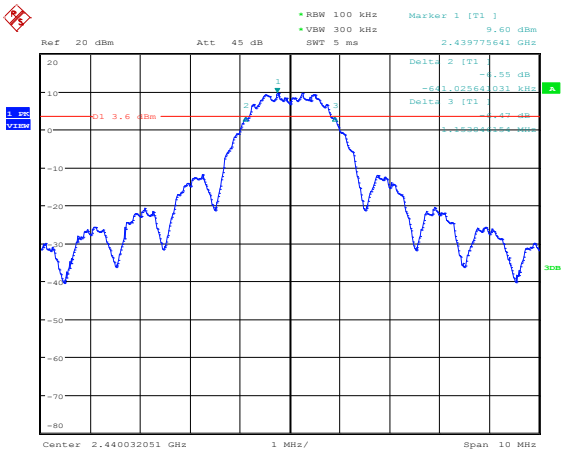

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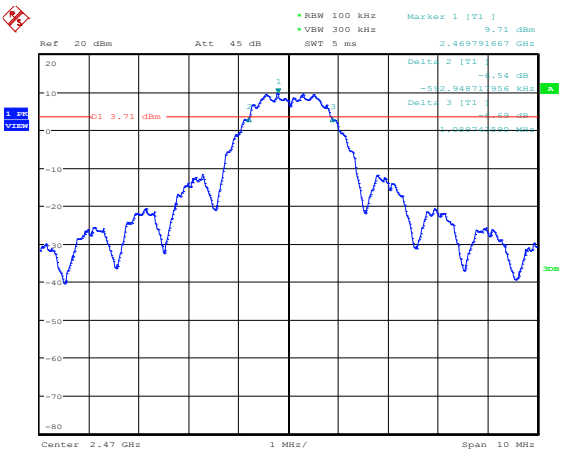

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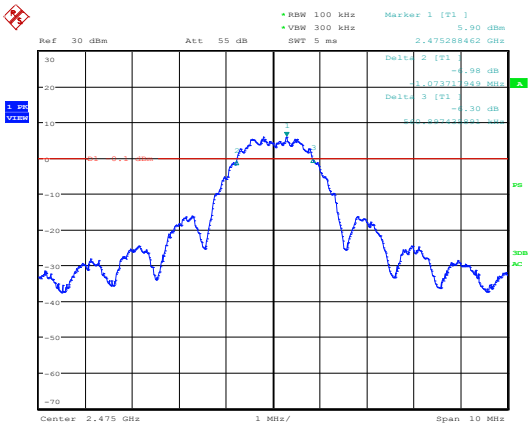

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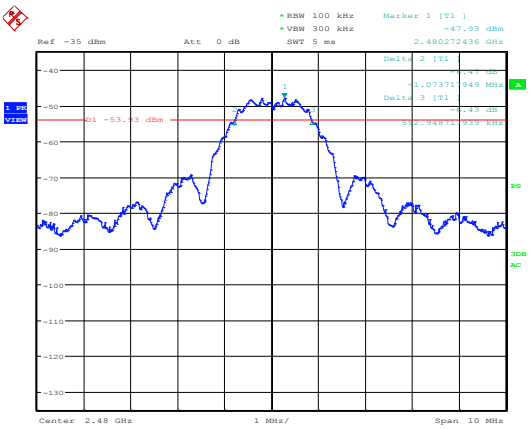

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7. MAXIMUM PEAK CONDUCTED OUTPUT POWER MEASUREMENT

7.1. Limits of Maximum Peak Conducted Output Power Measurement

CFR 47 (FCC) part 15.247 (b)

7.2. Test Procedure

Reference to KDB558074 D01 DTS Meas Guidance v03r05,

The transmitter output was connected to the spectrum analyzer.

a) Set the RBW ≥ DTS bandwidth.

b) Set VBW ≥ 3 x RBW.

c) Set span ≥ 3 x RBW

d) Sweep time = auto couple.

e) Detector = peak.

f) Trace mode = max hold.

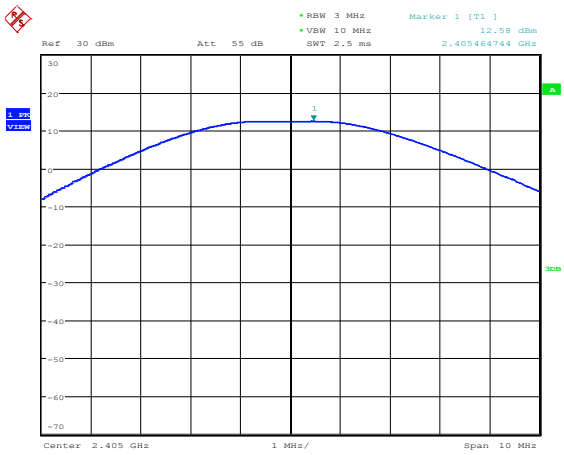
g) Allow trace to fully stabilize.

h) Use peak marker function to determine the peak amplitude level.

7.3. Test Data

Table 6 Maximum Peak Output Power Test Data

CHANNEL FREQUENCY (MHz)	Maximum Peak Output Power (dBm)	Limit (dBm)	Result
11 (2405MHz)	12.6	30	Pass
18 (2440MHz)	13.3	30	Pass
24 (2470MHz)	13.5	30	Pass
25 (2475MHz)	9.6	30	Pass
26 (2480MHz)	-43.7	30	Pass



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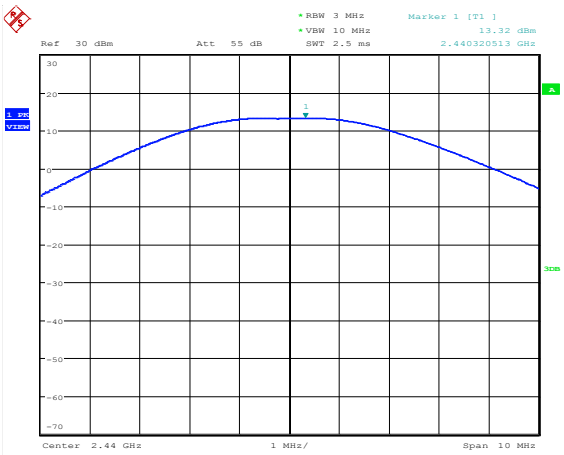

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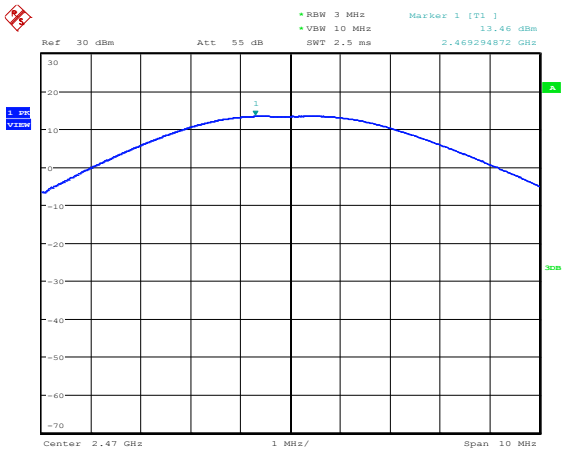

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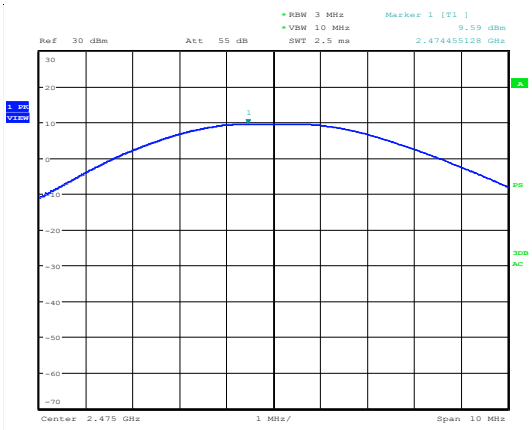

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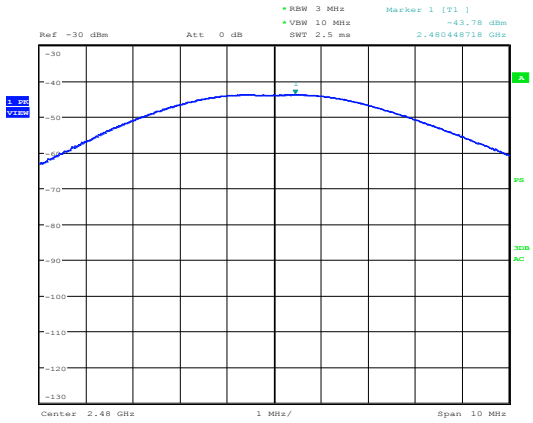

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8. MAXIMUM POWER SPECTRAL DENSITY LEVEL MEASUREMENT

8.1. Limits of Maximum Power Spectral Density Level Measurement

CFR 47 (FCC) part 15.247 (e)

8.2. Test Procedure

Reference to KDB558074 D01 DTS Meas Guidance v03r05,

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 the RBW to: RBW = 3 kHz.

d) Set the VBW = 10 kHz.

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

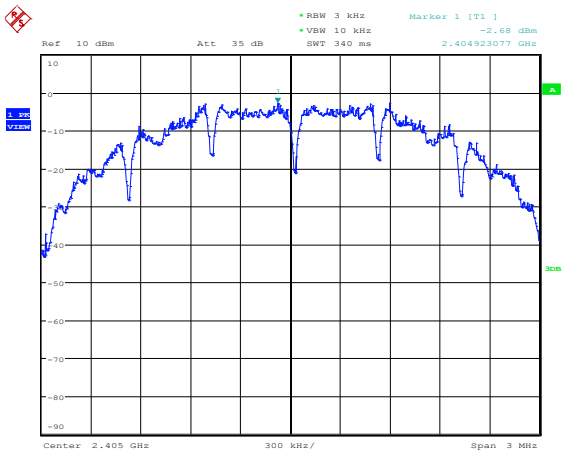
i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

8.3. Test Data

Table 7 Maximum Power Spectral Density Level Test Data

CHANNEL FREQUENCY (MHz)	PSD [dBm]	Limit [dBm]	Result
11 (2405MHz)	-2.6	8	Pass
18 (2440MHz)	-2.1	8	Pass
24 (2470MHz)	-1.0	8	Pass
25 (2475MHz)	-5.9	8	Pass
26 (2480MHz)	-58.0	8	Pass



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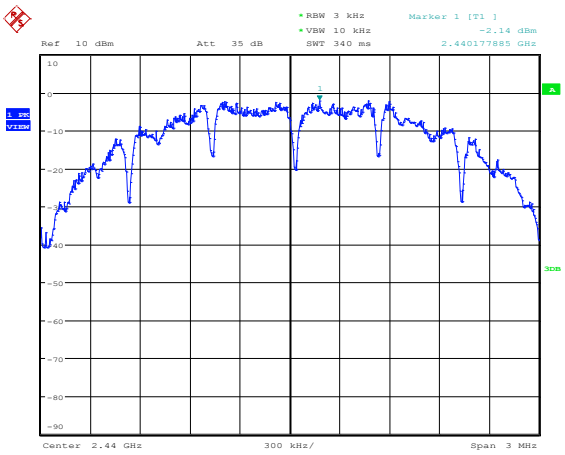

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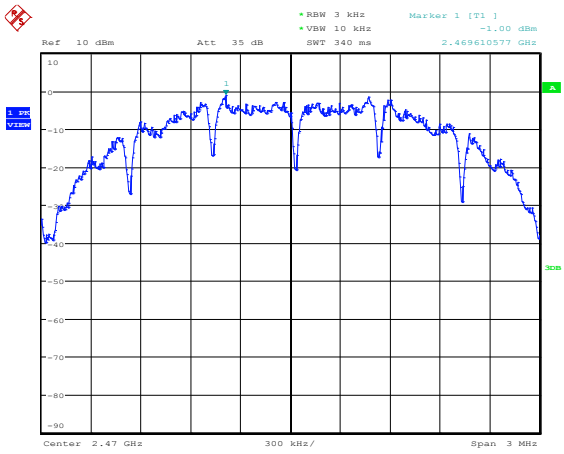

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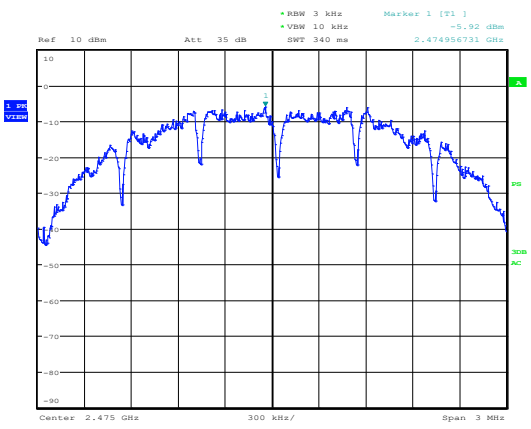

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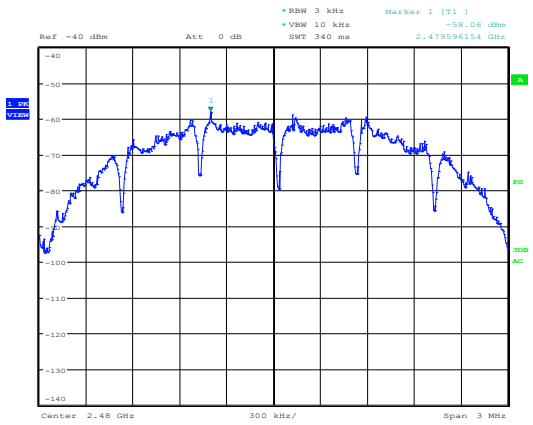

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9. CONDUCTED BANDEDGE AND SPURIOUS MEASURMENT

9.1. Limits of Conducted Band Edge and Spurious Measurement

CFR 47 (FCC) part 15.247 (d)

9.2. Test Procedure

Reference to KDB558074 D01 DTS Meas Guidance v03r05,

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) Ensure that the number of measurement points ≥ span/RBW

f) Sweep time = auto couple.

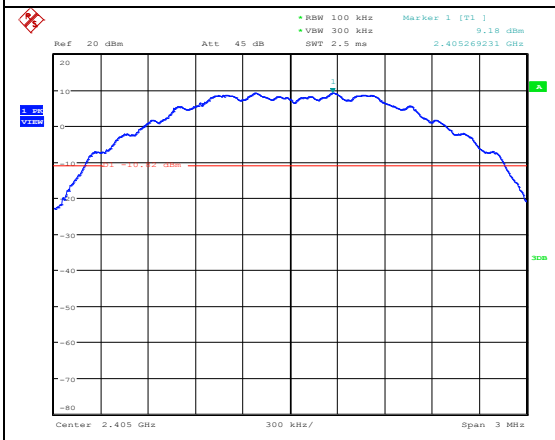
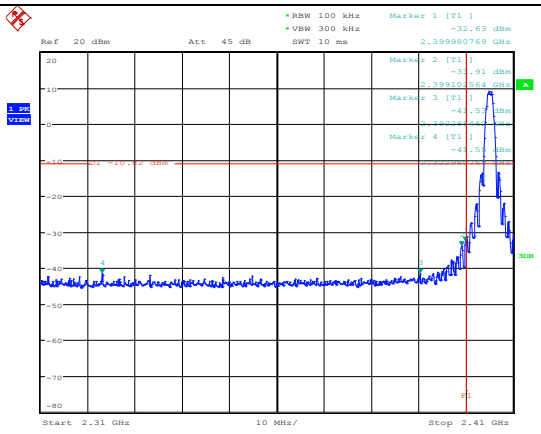
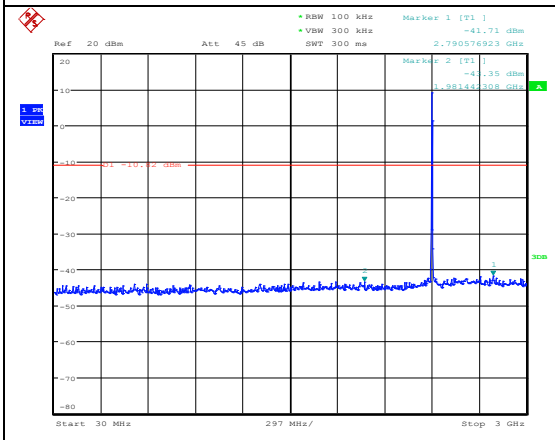
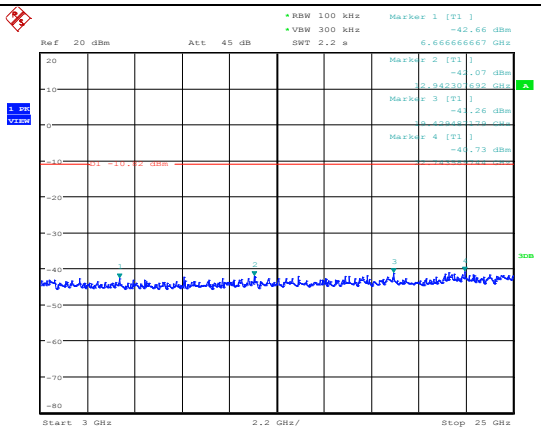
g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level.

9.3. Test Data

Channel 11

Pref	Lower Edge
	
30MHz-3GHz	3GHz-25GHz
	

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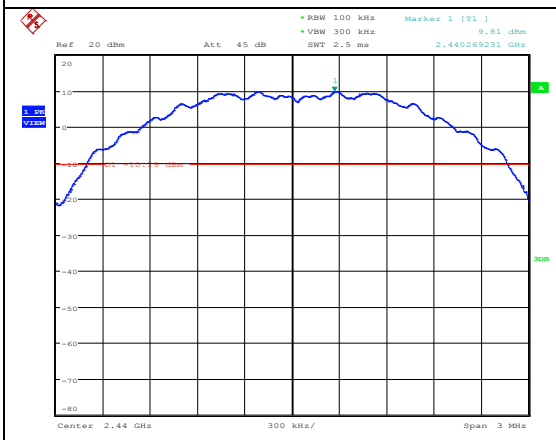
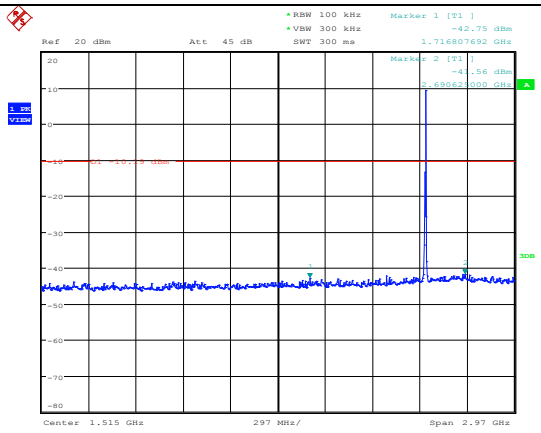
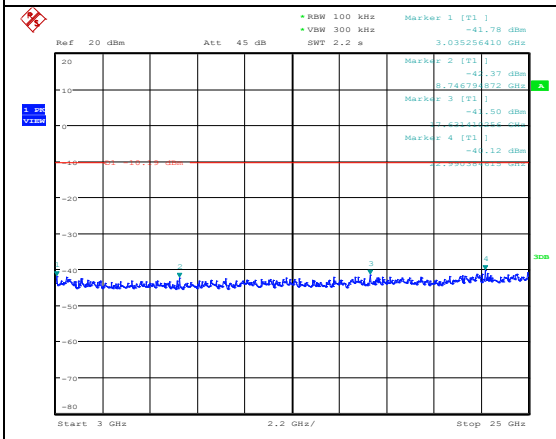
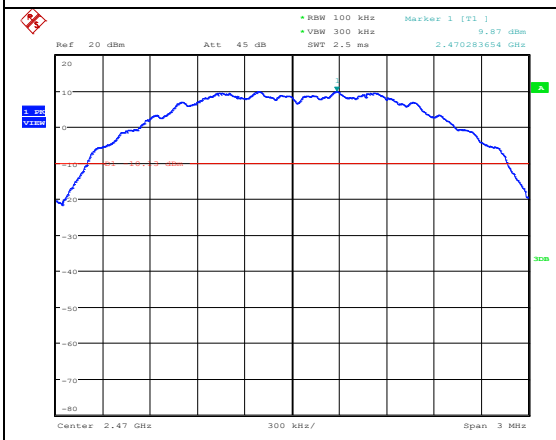
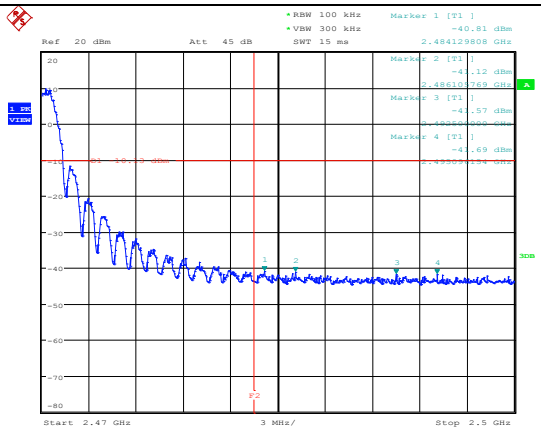
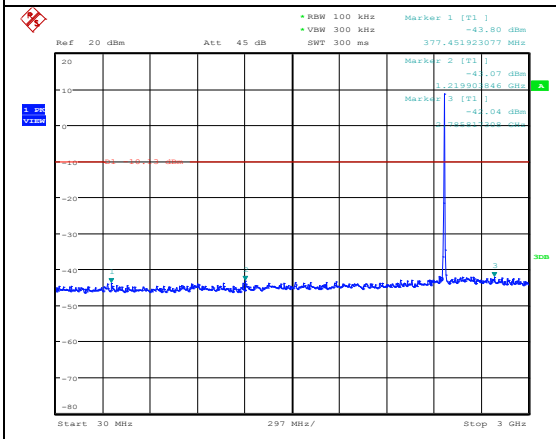
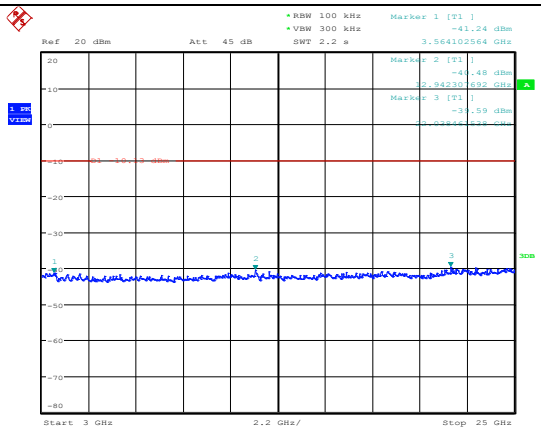
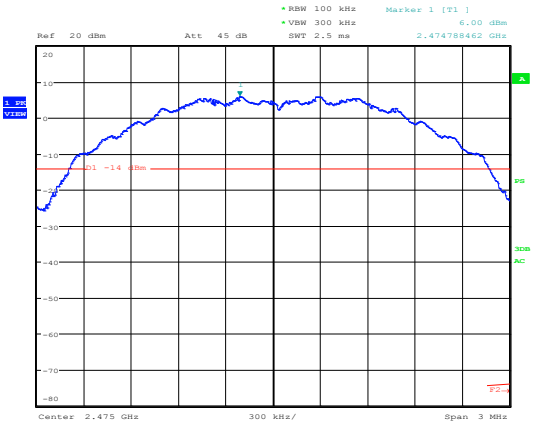
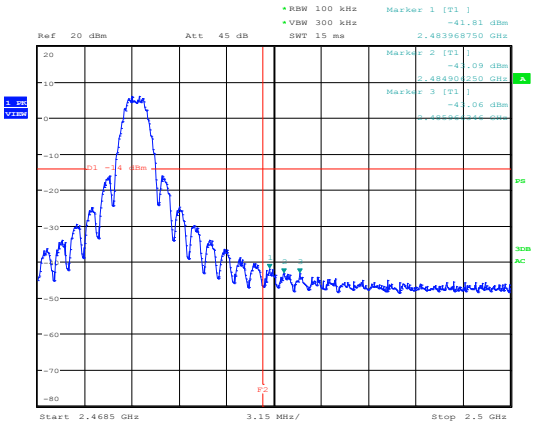
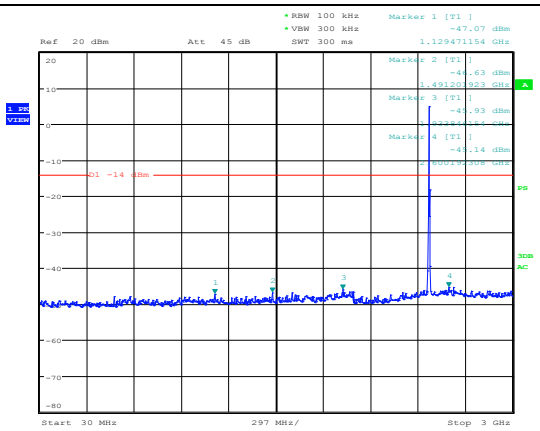
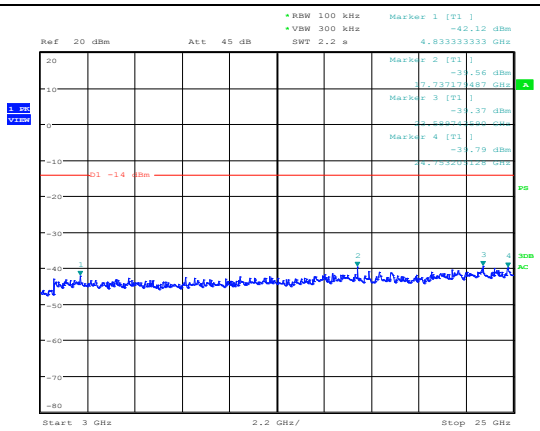
Pref	30MHz-3GHz
 Date: 25.JUL.2016 15:48:34	 Date: 25.JUL.2016 15:50:45
3GHz-25GHz	
 Date: 25.JUL.2016 15:53:34	

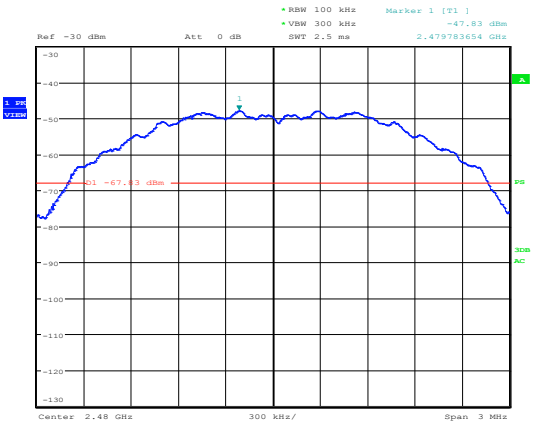
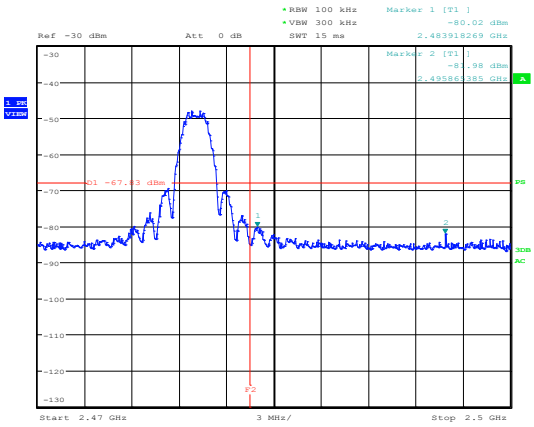
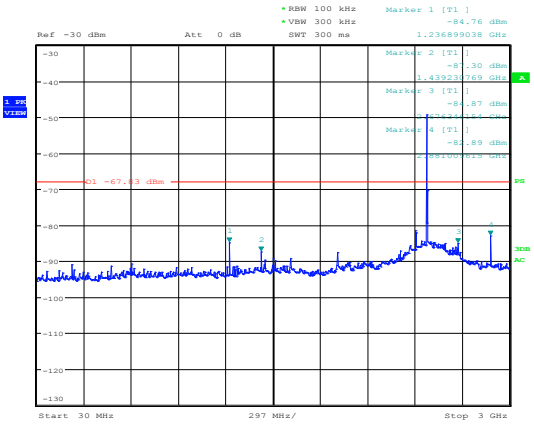
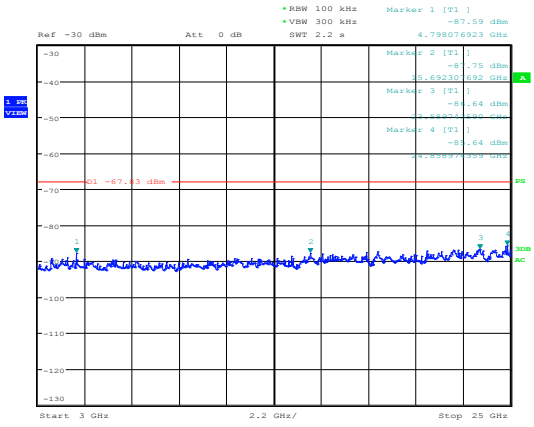
Channel 24

Pref	Upper Edge
	
30MHz-3GHz	3GHz-25GHz
	

Channel 25

Pref	Upper Edge
 OCB-V Date: 22.JUL.2016 10:22:16	 OCB-V Date: 22.JUL.2016 10:23:40
30MHz-3GHz	**3GHz-25GHz**
 OCB-V Date: 22.JUL.2016 10:25:13	 OCB-V Date: 22.JUL.2016 10:26:33

Channel 26

Pref	Upper Edge
 OCB-V Date: 22.JUL.2016 10:29:26	 OCB-V Date: 22.JUL.2016 10:30:38
30MHz-3GHz	3GHz-25GHz
 OCB-V Date: 22.JUL.2016 10:32:20	 OCB-V Date: 22.JUL.2016 10:33:46

10. RADIATED BAND EDGE AND SPURIOUS MEASUREMENT

10.1. Limits of Radiated Band Edge And Spurious Measurement

CFR 47 (FCC) part 15.247 (d) and 558074 D01 DTS Meas Guidance v03r05

10.2. TEST PROCEDURE

1. The testing follows the guidelines in ANSI C63.10: 2013 and Reference to KDB558074 D01 DTS Meas Guidance v03r05.

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 0.8 meter 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. 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.

6. 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.

10.3. Test Data

Table 8 Radiated Emission Test Data (9kHz-30MHz)

Model No.: 999.11000611

Test mode: TX, Worst-case

Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dBμV)	Emission Level dB (μV/m)	Limits dB (μV/m)	EUT axes	Note
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For radiated emission from 9kHz to 30MHz, the pre-scan result was lower than limit greater than 20dB, no emission reported.

Table 9 Radiated Emission Test Data (30MHz-1GHz)

Model No.: ZB3102

Test mode: TX, Worst-case

Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dBμV)	Emission Level dB (μV/m)	Limits dB (μV/m)	EUT axes	Note
31.377	Vertical	0.6	12.3	10.8	23.7	40.0	X	QP
38.267	Vertical	0.7	12.3	16.6	29.6	40.0	X	QP
44.037	Vertical	0.7	13.6	3.5	17.8	40.0	X	QP
54.343	Vertical	0.8	13.3	1.3	15.4	40.0	X	QP
117.646	Vertical	1.3	12.3	3.1	16.7	43.5	X	QP
168.005	Vertical	1.5	8.7	12.9	23.1	43.5	X	QP
31.778	Horizontal	0.6	12.3	-0.9	12.0	40.0	X	QP
45.702	Horizontal	0.8	13.6	-2.7	11.7	40.0	X	QP
60.504	Horizontal	1.0	12.7	-2.5	11.2	40.0	X	QP
101.686	Horizontal	1.1	13.2	-0.8	13.5	43.5	X	QP
116.664	Horizontal	1.2	12.3	2.7	16.2	43.5	X	QP
168.005	Horizontal	1.5	8.7	9.7	19.9	43.5	X	QP

Table 10 Radiated Emission Test Data (1GHz-18GHz)

Model No.: ZB3102

Test mode: TX, Channel 11

Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dBμV)	Emission Level dB (μV/m)	Limits dB (μV/m)	EUT axes	Note
4811.035	Vertical	-39.4	34.0	53.7	48.3	74	X	Harmonics PK
4811.035	Vertical	-39.4	34.0	43.9	38.5	54	X	Harmonics AV
7216.583	Vertical	-38.3	35.6	54.6	51.9	74	X	Harmonics PK
7216.583	Vertical	-38.3	35.6	43.8	41.1	54	X	Harmonics AV
9618.065	Vertical	-36.3	37.1	53.1	53.9	74	X	Harmonics PK
9618.065	Vertical	-36.3	37.1	43.3	44.1	54	X	Harmonics AV
4811.029	Horizontal	-39.4	34.0	55.0	49.6	74	X	Harmonics PK
4811.029	Horizontal	-39.4	34.0	46.5	41.1	54	X	Harmonics AV
7216.577	Horizontal	-38.3	35.6	54.2	51.5	74	X	Harmonics PK
7216.577	Horizontal	-38.3	35.6	44.2	41.5	54	X	Harmonics AV
9618.076	Horizontal	-36.3	37.1	51.5	52.3	74	X	Harmonics PK
9618.076	Horizontal	-36.3	37.1	40.6	41.4	54	X	Harmonics AV

Table 11 Radiated Emission Test Data (1GHz-18GHz)

Model No.: ZB3102

Test mode: TX, Channel 18

Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dBμV)	Emission Level dB (μV/m)	Limits dB (μV/m)	EUT axes	Note
4881.049	Horizontal	-39.4	34.0	55.0	49.6	74	X	Harmonics PK
4881.049	Horizontal	-39.4	34.0	46.7	41.3	54	X	Harmonics AV
7321.535	Horizontal	-38.1	35.6	56.3	53.8	74	X	Harmonics PK
7321.535	Horizontal	-38.1	35.6	46.4	43.9	54	X	Harmonics AV
9762.076	Horizontal	-35.6	37.1	52.2	53.7	74	X	Harmonics PK
9762.076	Horizontal	-35.6	37.1	40.7	42.2	54	X	Harmonics AV
4881.041	Vertical	-39.4	34.0	53.6	48.2	74	X	Harmonics PK
4881.041	Vertical	-39.4	34.0	44.3	38.9	54	X	Harmonics AV
7321.527	Vertical	-38.1	35.6	56.8	54.3	74	X	Harmonics PK
7321.527	Vertical	-38.1	35.6	46.5	44.0	54	X	Harmonics AV
9762.081	Vertical	-35.6	37.1	53.1	54.6	74	X	Harmonics PK
9762.081	Vertical	-35.6	37.1	42.9	44.4	54	X	Harmonics AV

Table 12 Radiated Emission Test Data (1GHz-18GHz)

Model No.: ZB3102

Test mode: TX, Channel 24

Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dBμV)	Emission Level dB (μV/m)	Limits dB (μV/m)	EUT axes	Note
4941.063	Vertical	-39.5	34.0	54.4	48.9	74	X	Harmonics PK
4941.063	Vertical	-39.5	34.0	45.1	39.6	54	X	Harmonics AV
7411.499	Vertical	-37.6	35.6	57.2	55.2	74	X	Harmonics PK
7411.499	Vertical	-37.6	35.6	48.4	46.4	54	X	Harmonics AV
9882.087	Vertical	-35.0	37.0	50.3	52.3	74	X	Harmonics PK
9882.087	Vertical	-35.0	37.0	40.0	42.0	54	X	Harmonics AV
4941.072	Horizontal	-39.5	34.0	54.1	48.6	74	X	Harmonics PK
4941.072	Horizontal	-39.5	34.0	45.3	39.8	54	X	Harmonics AV
7411.493	Horizontal	-37.6	35.6	56.9	54.9	74	X	Harmonics PK
7411.493	Horizontal	-37.6	35.6	48.3	46.3	54	X	Harmonics AV
9882.091	Horizontal	-35.0	37.0	52.5	54.5	74	X	Harmonics PK
9882.091	Horizontal	-35.0	37.0	43.0	45.0	54	X	Harmonics AV

Table 13 Radiated Emission Test Data (1GHz-18GHz)

Model No.: ZB3102

Test mode: TX, Channel 25

Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dBμV)	Emission Level dB (μV/m)	Limits dB (μV/m)	EUT axes	Note
4951.068	Vertical	-39.5	34.0	51.8	46.3	74	X	Harmonics PK
4951.068	Vertical	-39.5	34.0	42.6	37.1	54	X	Harmonics AV
7426.491	Vertical	-37.7	35.6	54.1	52.0	74	X	Harmonics PK
7426.491	Vertical	-37.7	35.6	43.4	41.3	54	X	Harmonics AV
9900.031	Vertical	-34.9	37.0	49.1	51.2	74	X	Harmonics PK
9900.031	Vertical	-34.9	37.0	36.9	39.0	54	X	Harmonics AV
4951.071	Horizontal	-39.5	34.0	54.3	48.8	74	X	Harmonics PK
4951.071	Horizontal	-39.5	34.0	44.5	39.0	54	X	Harmonics AV
7426.497	Horizontal	-37.7	35.6	53.7	51.6	74	X	Harmonics PK
7426.497	Horizontal	-37.7	35.6	43.0	40.9	54	X	Harmonics AV
9900.027	Horizontal	-34.9	37.0	48.2	50.3	74	X	Harmonics PK
9900.027	Horizontal	-34.9	37.0	36.5	38.6	54	X	Harmonics AV

Table 14 Radiated Emission Test Data (1GHz-18GHz)

Model No.: ZB3102

Test mode: TX, Channel 26

Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dBμV)	Emission Level dB (μV/m)	Limits dB (μV/m)	EUT axes	Note
4960.001	Vertical	-39.4	34.0	50.9	45.5	74	X	Harmonics PK
4960.001	Vertical	-39.4	34.0	38.4	33.0	54	X	Harmonics AV
7440.000	Vertical	-37.7	35.6	52.1	50.0	74	X	Harmonics PK
7440.000	Vertical	-37.7	35.6	40.2	38.1	54	X	Harmonics AV
9920.001	Vertical	-35.0	37.0	49.8	51.8	74	X	Harmonics PK
9920.001	Vertical	-35.0	37.0	36.4	38.4	54	X	Harmonics AV
4960.000	Horizontal	-39.4	34.0	52.1	46.7	74	X	Harmonics PK
4960.000	Horizontal	-39.4	34.0	39.3	33.9	54	X	Harmonics AV
7440.001	Horizontal	-37.7	35.6	53.2	51.1	74	X	Harmonics PK
7440.001	Horizontal	-37.7	35.6	41.2	39.1	54	X	Harmonics AV
9920.000	Horizontal	-35.0	37.0	49.9	51.9	74	X	Harmonics PK
9920.000	Horizontal	-35.0	37.0	37.7	39.7	54	X	Harmonics AV

Note: 1. Emission level(dBuV/m)=Reading Value(dBuV) + Correction Factor(dB)+Antenna Factor (dB/m)

2. Correction Factor(dB) = Cable Factor (dB)+Amplifier Factor(dB)

3. No other spurious and harmonic emissions were reported greater than listed emissions above table.

Table 15 Radiated Emission Test Data (18GHz-25GHz)

Model No.: ZB3102

Test mode: TX, Worst-case

Frequency (MHz)	Polarization	Correction Factor (dB)	Antenna Factor (dB/m)	Reading Value (dBμV)	Emission Level dB (μV/m)	Limits dB (μV/m)	EUT axes	Note
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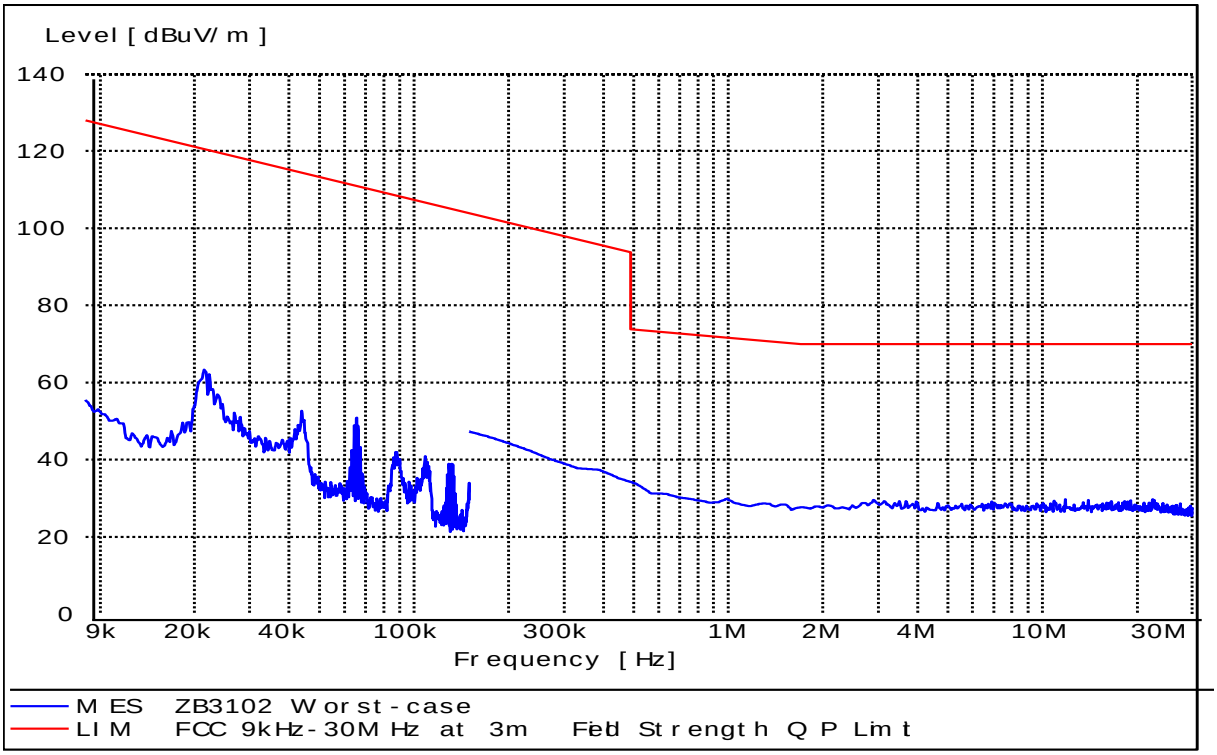
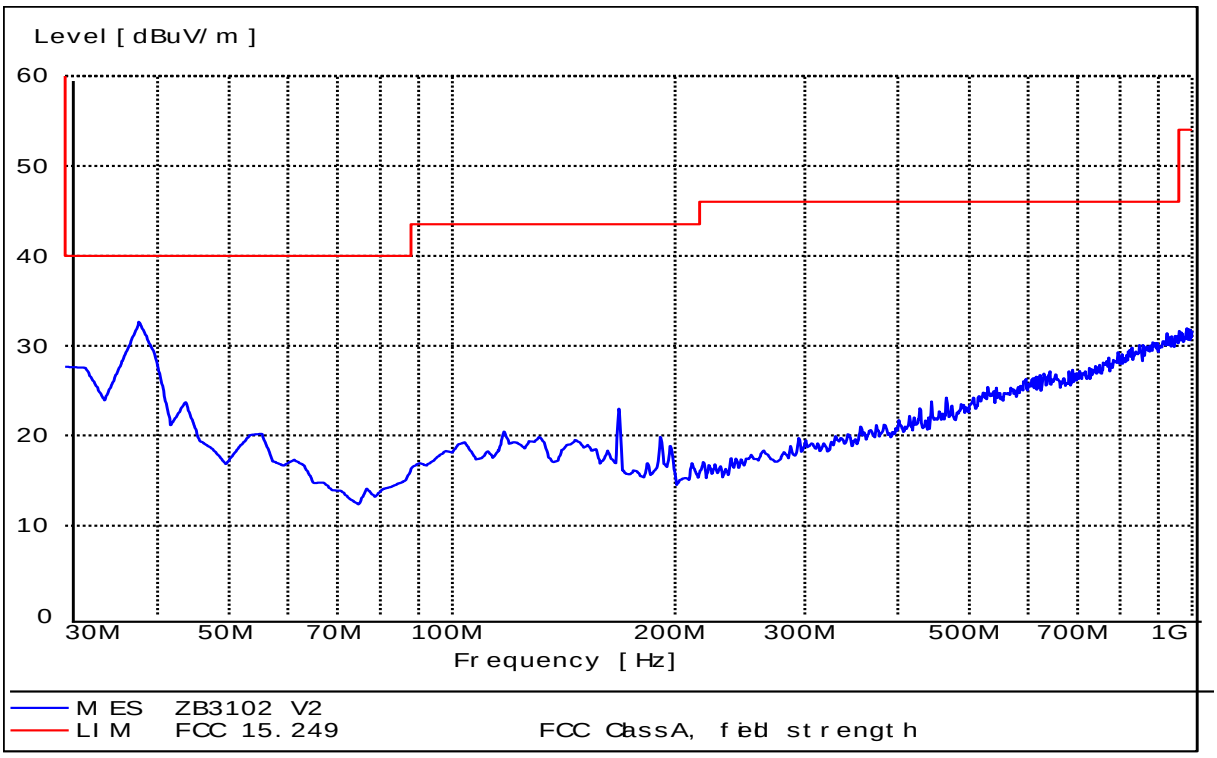
No spurious and harmonic emissions were found at 18-25GHz.

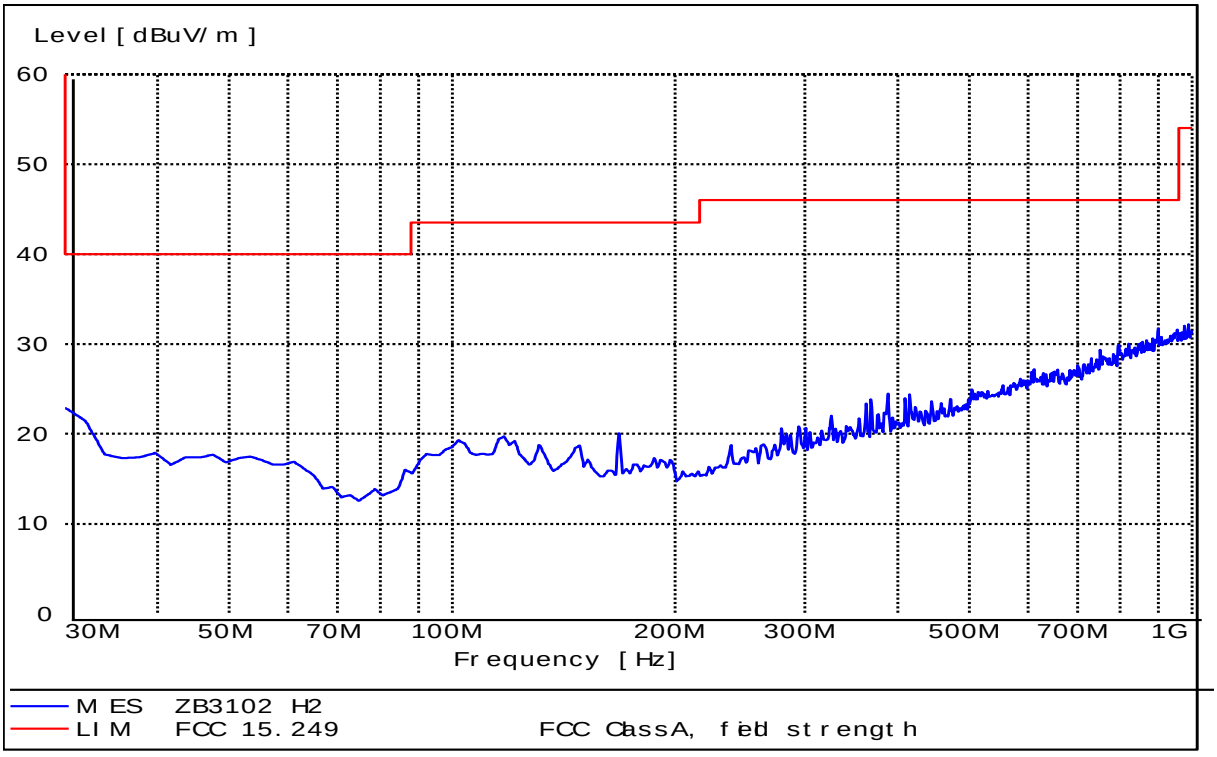
9kHz-30MHz



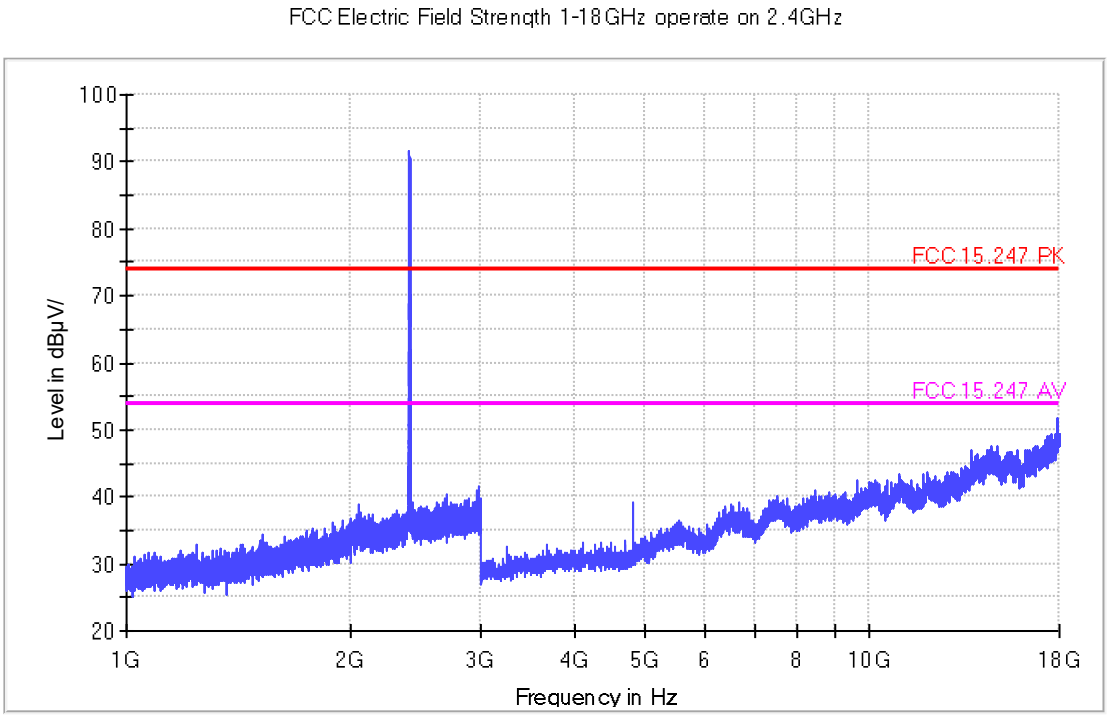
Below 1GHz, Vertical



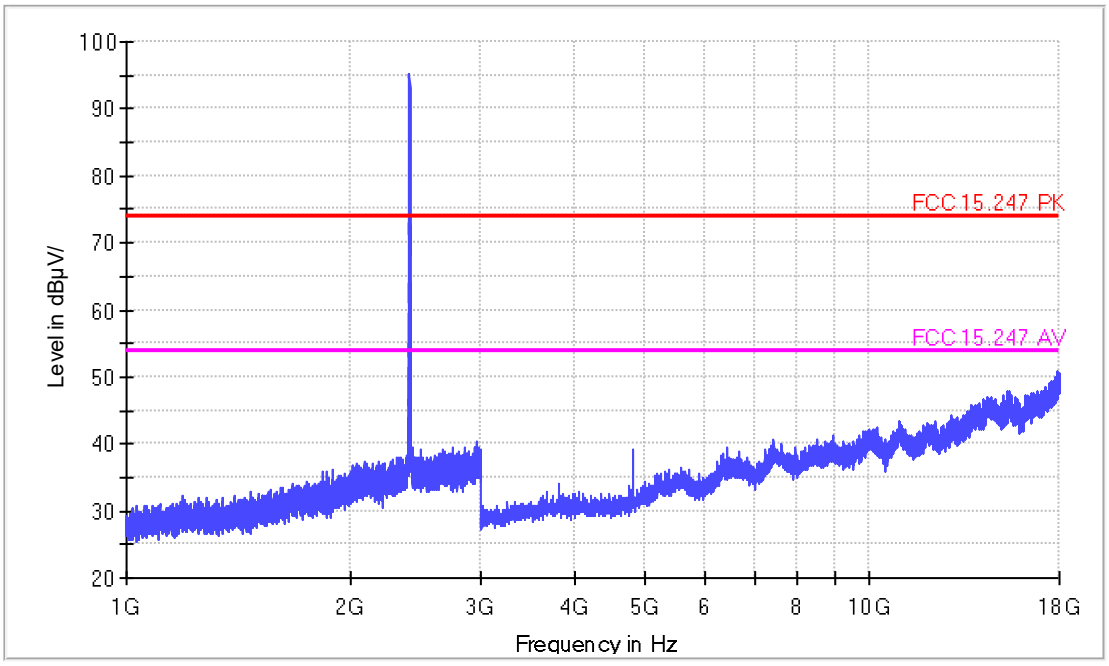
Below 1GHz, Horizontal



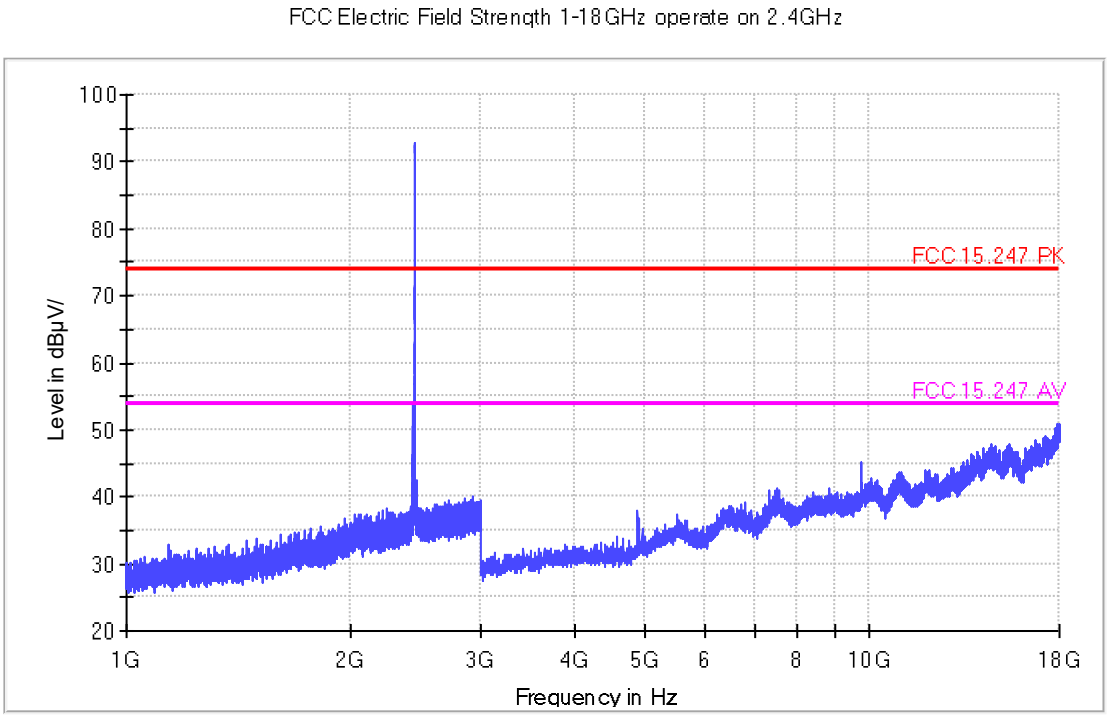
1G-18GHz, Vertical, Channel 11



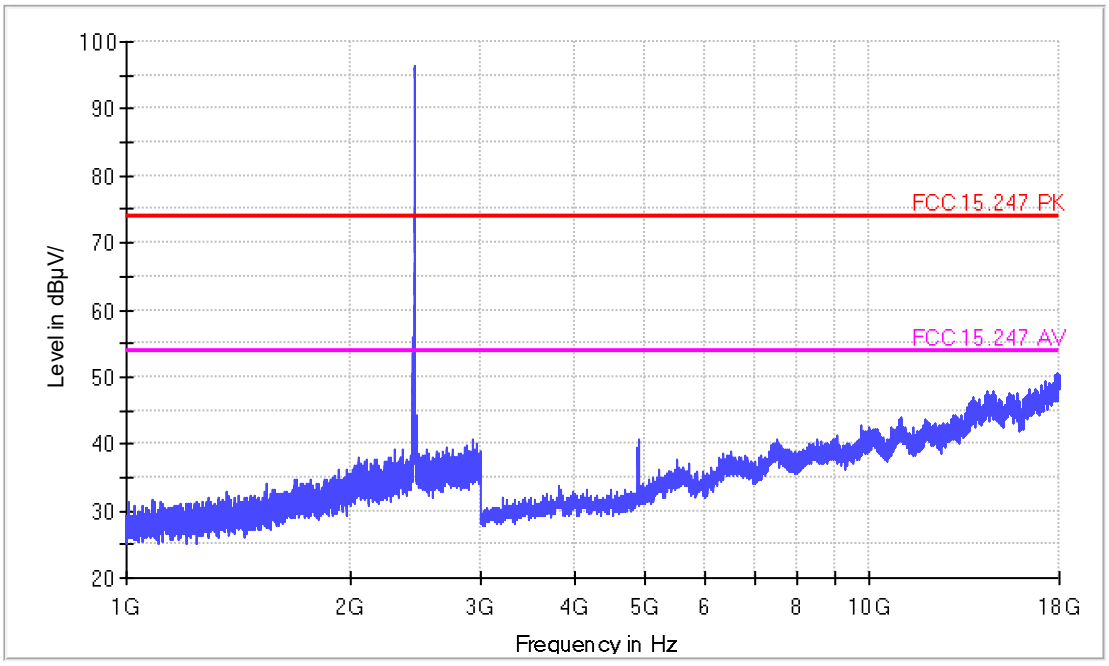
1G-18GHz, Horizontal, Channel 11



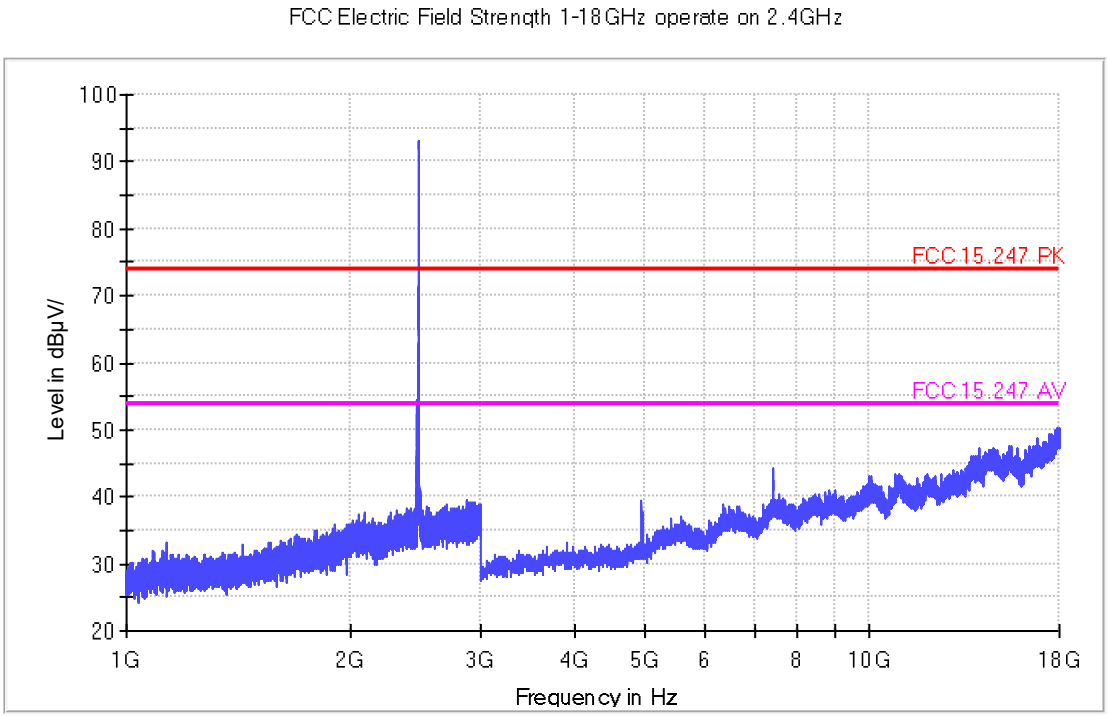
1G-18GHz, Vertical, Channel 18



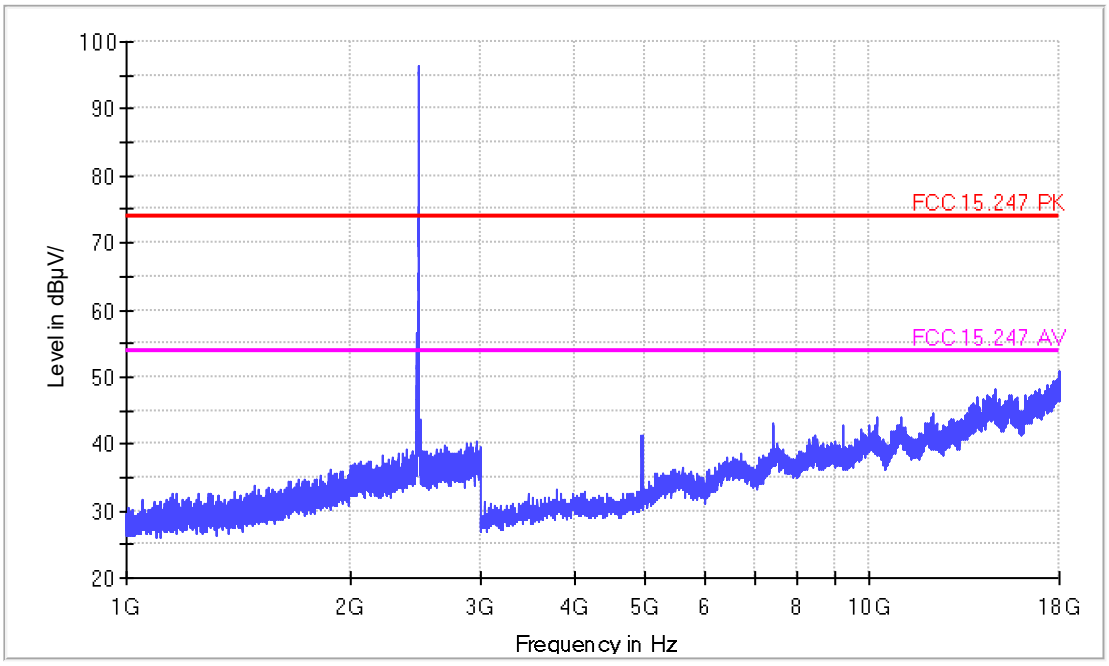
1G-18GHz, Horizontal, Channel 18



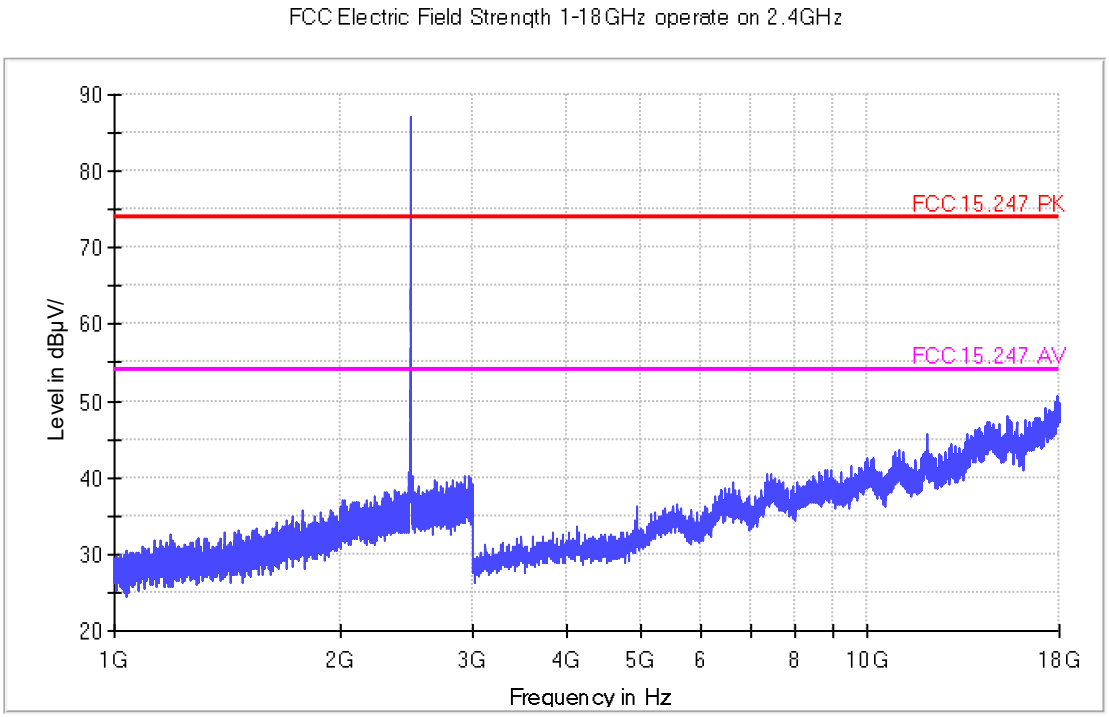
1G-18GHz, Vertical, Channel 24



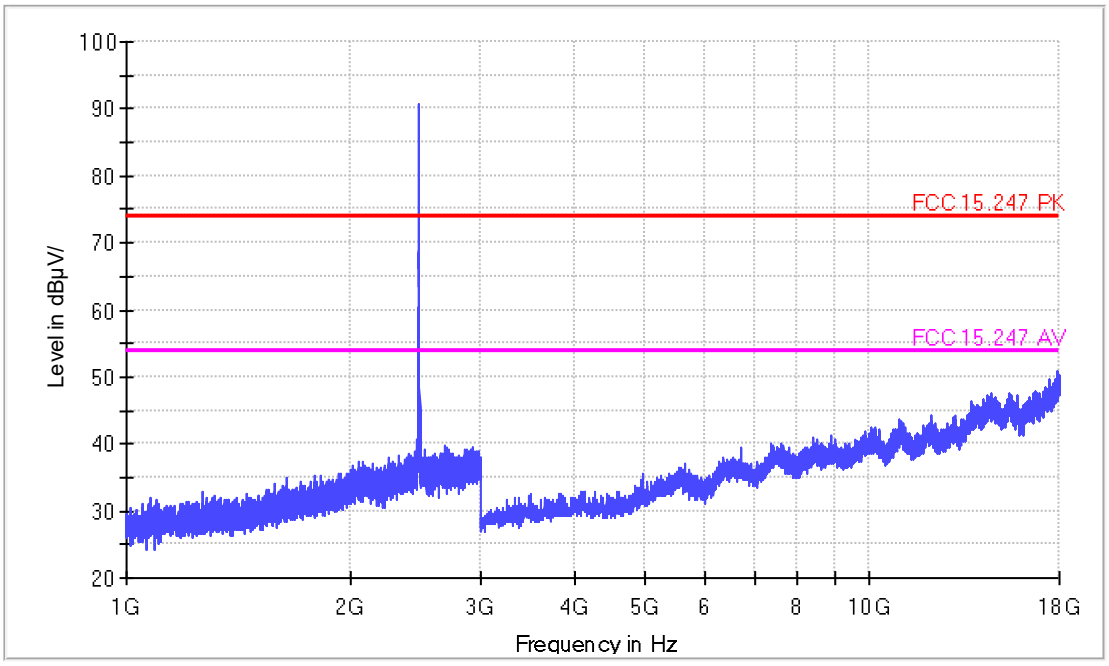
1G-18GHz, Horizontal, Channel 24



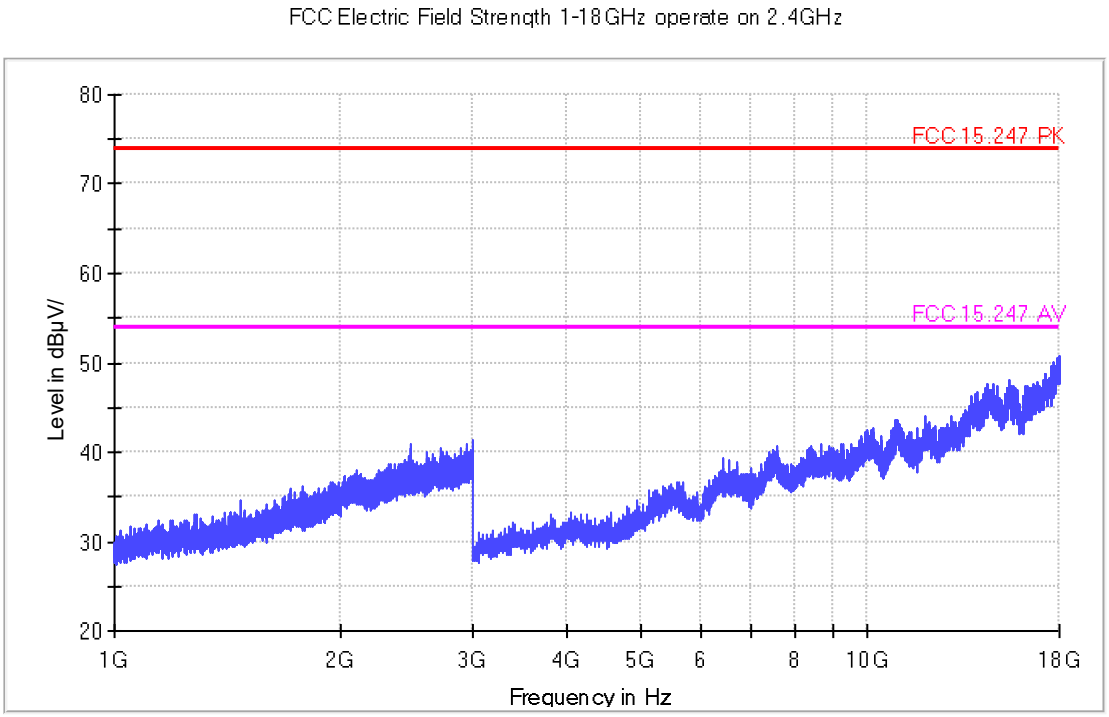
1G-18GHz, Vertical, Channel 25



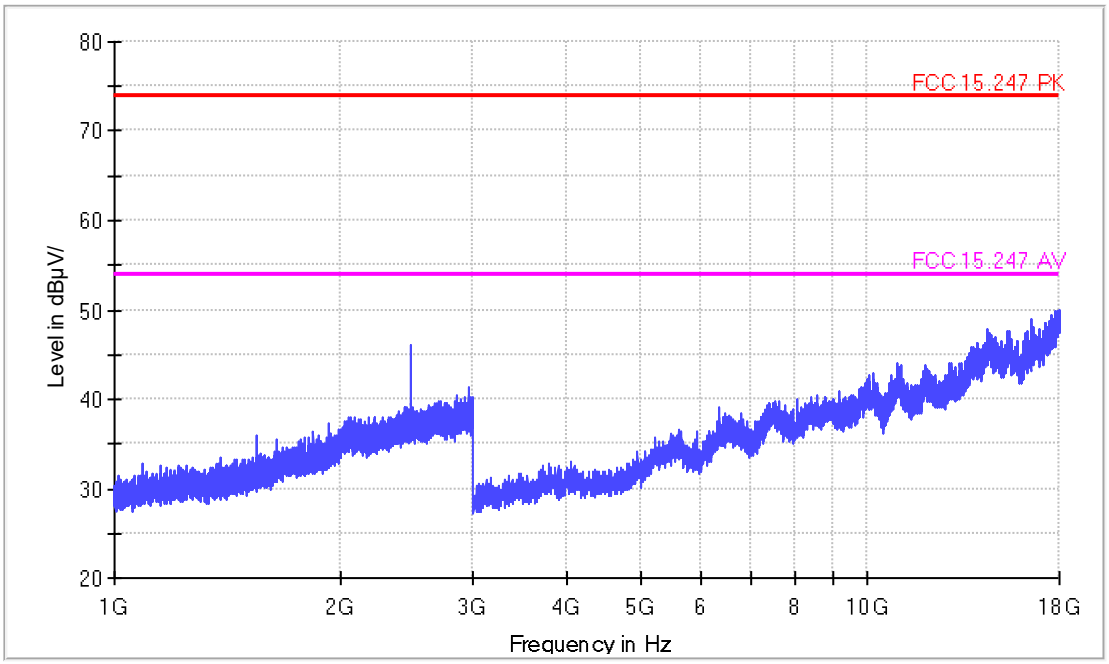
1G-18GHz, Horizontal, Channel 25



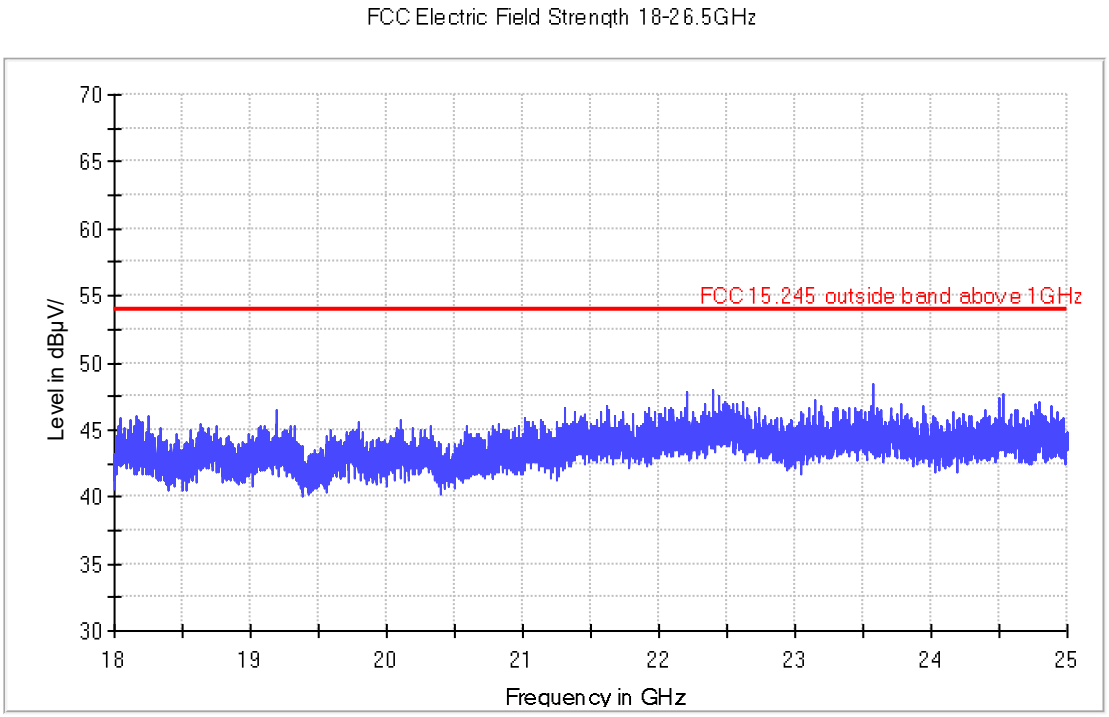
1G-18GHz, Vertical, Channel 26



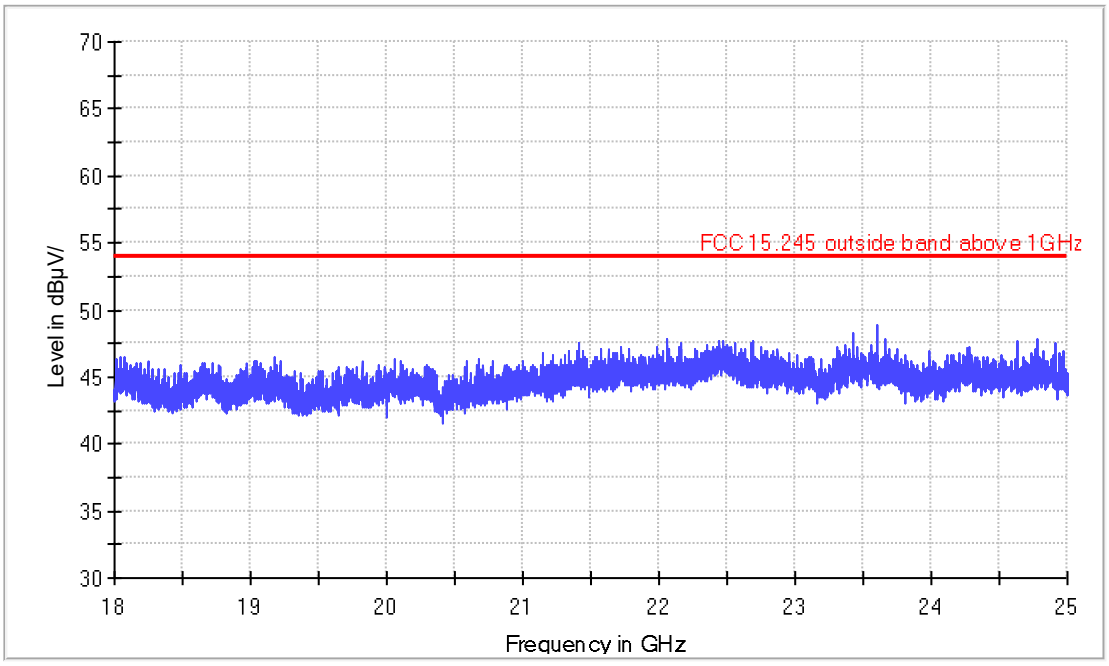
1G-18GHz, Horizontal, Channel 26



18G-25GHz, Vertical

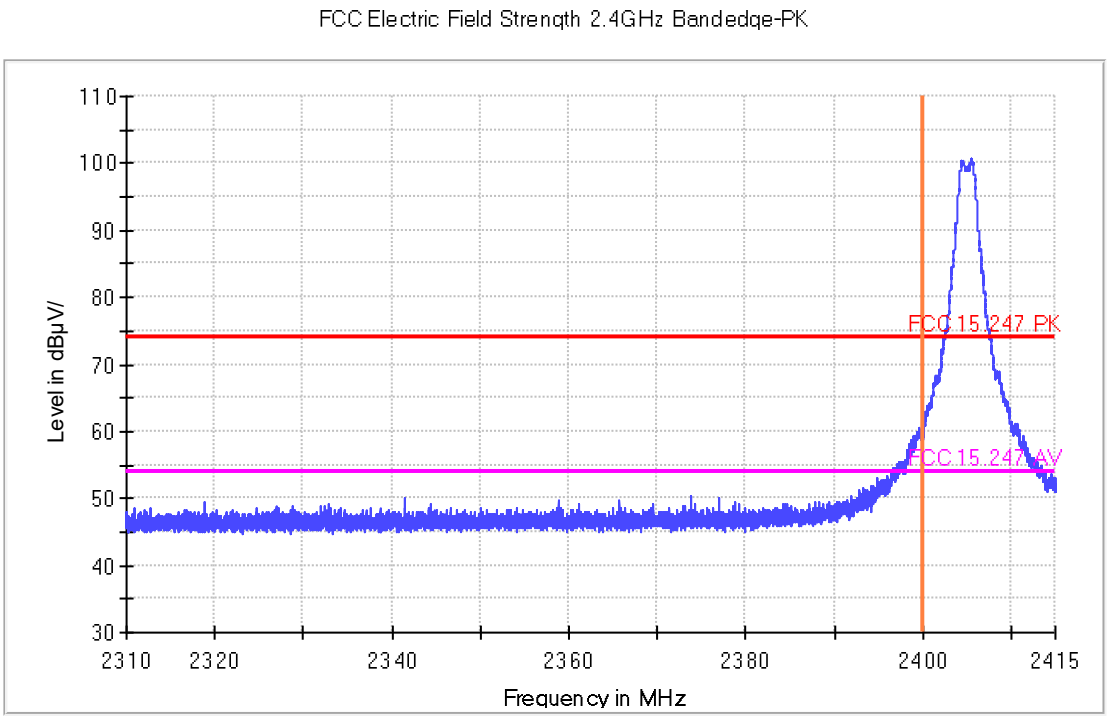


18G-25GHz, Horizontal

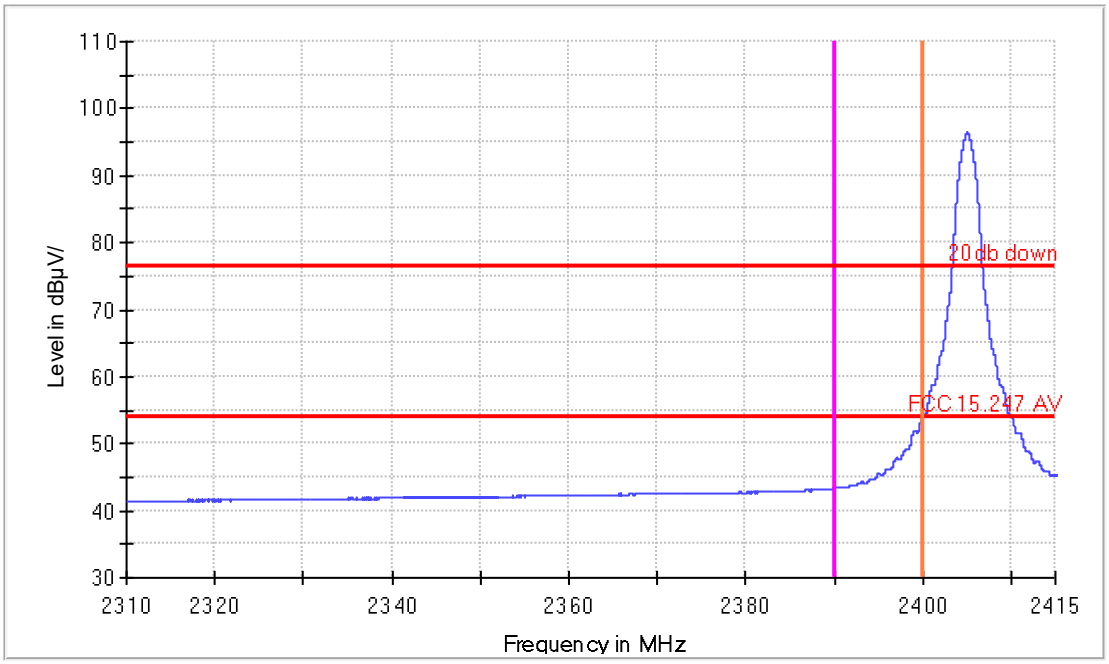


Band Edge

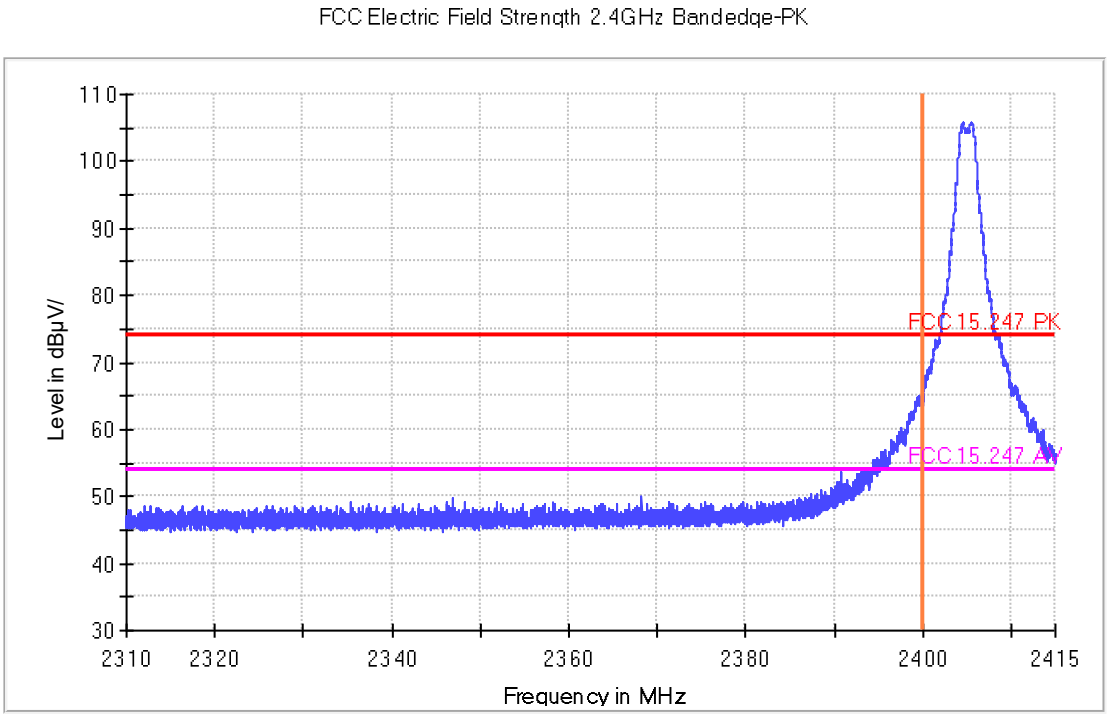
Vertical, Channel 11, PK



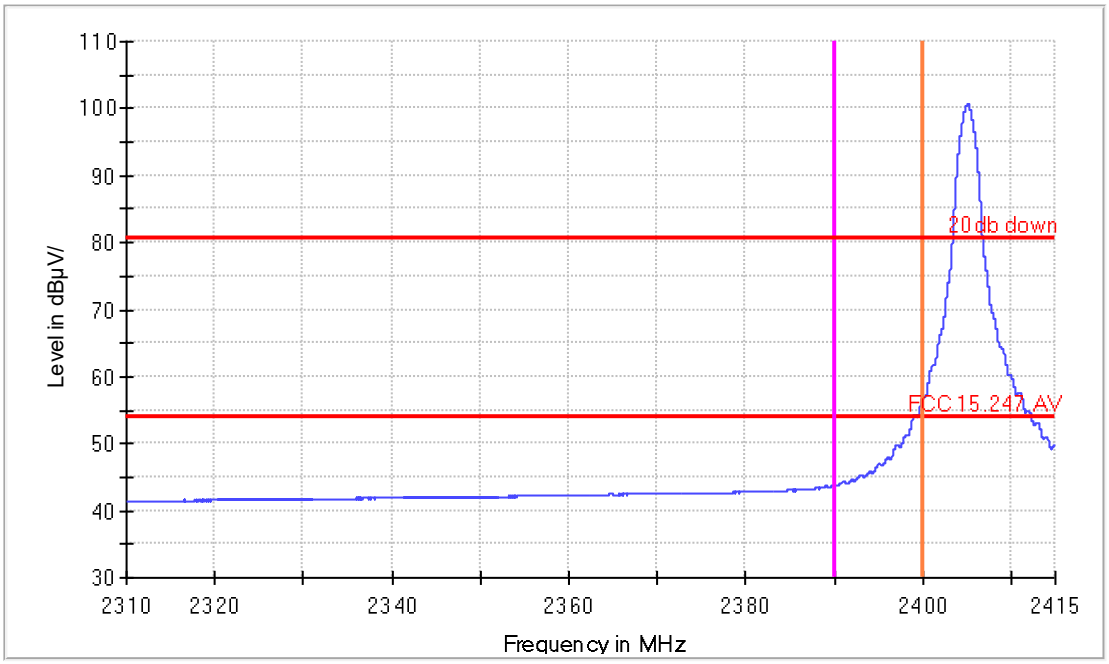
Vertical, Channel 11, AV



Horizontal, Channel 11, PK



Horizontal, Channel 11, AV



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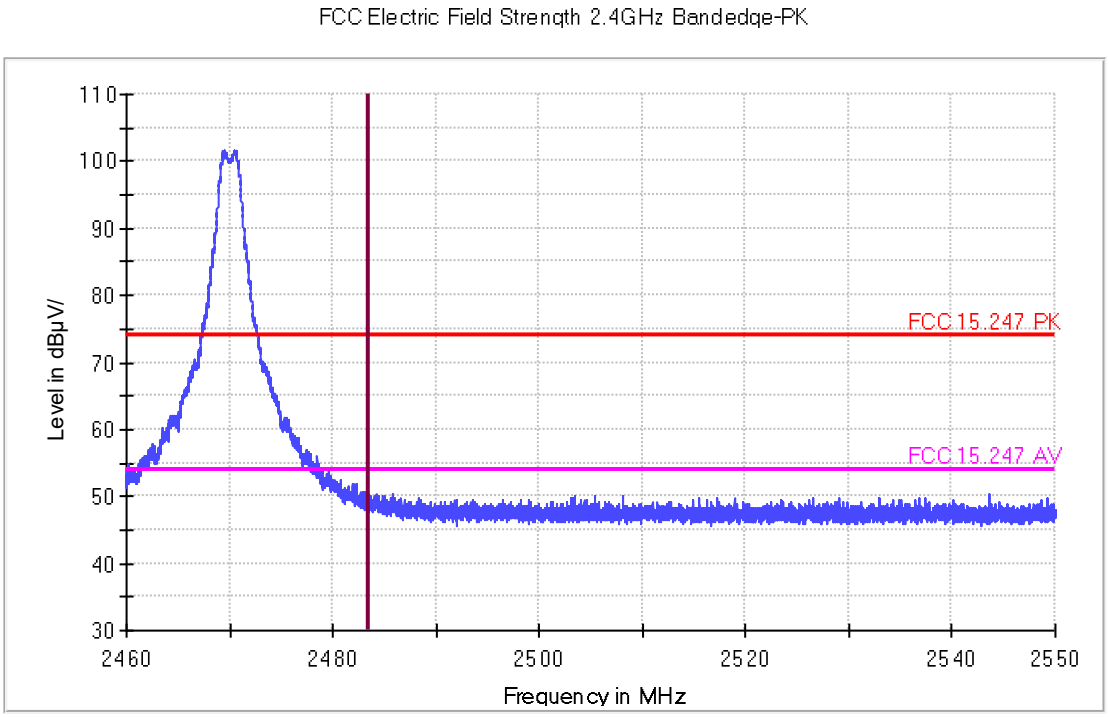

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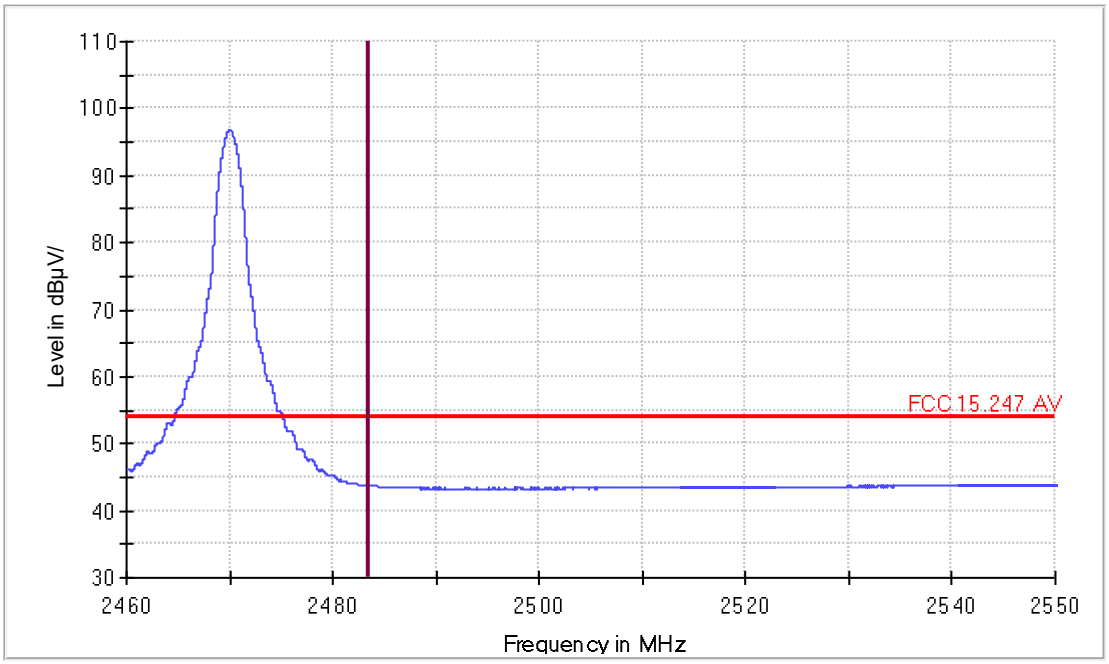

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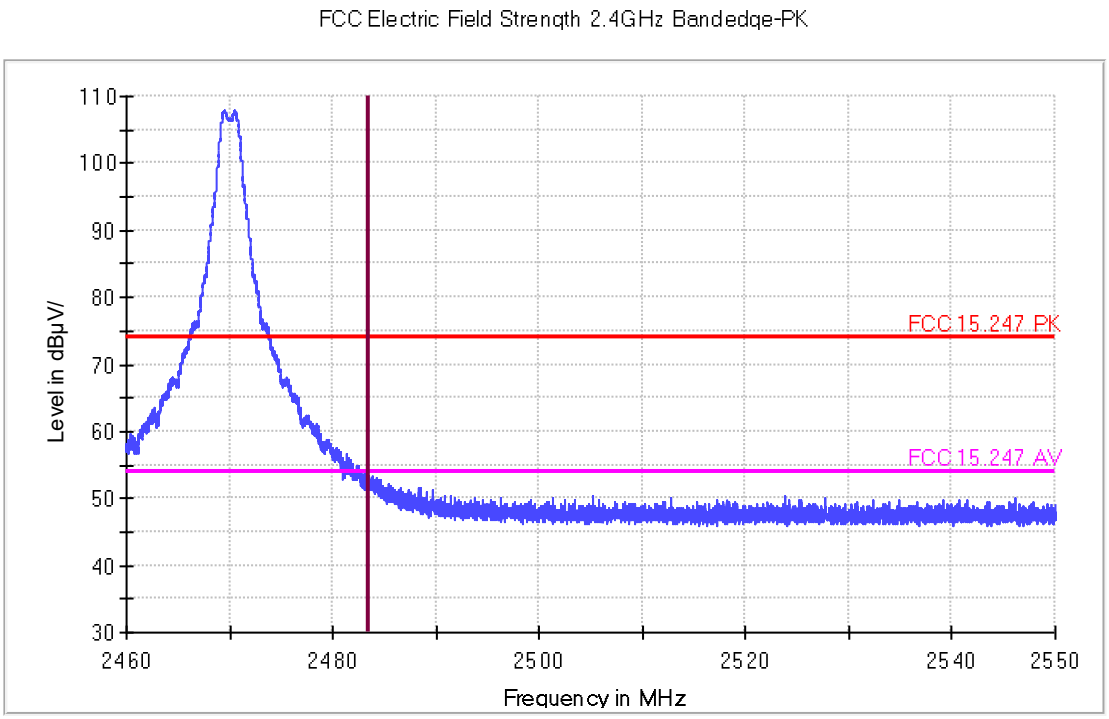

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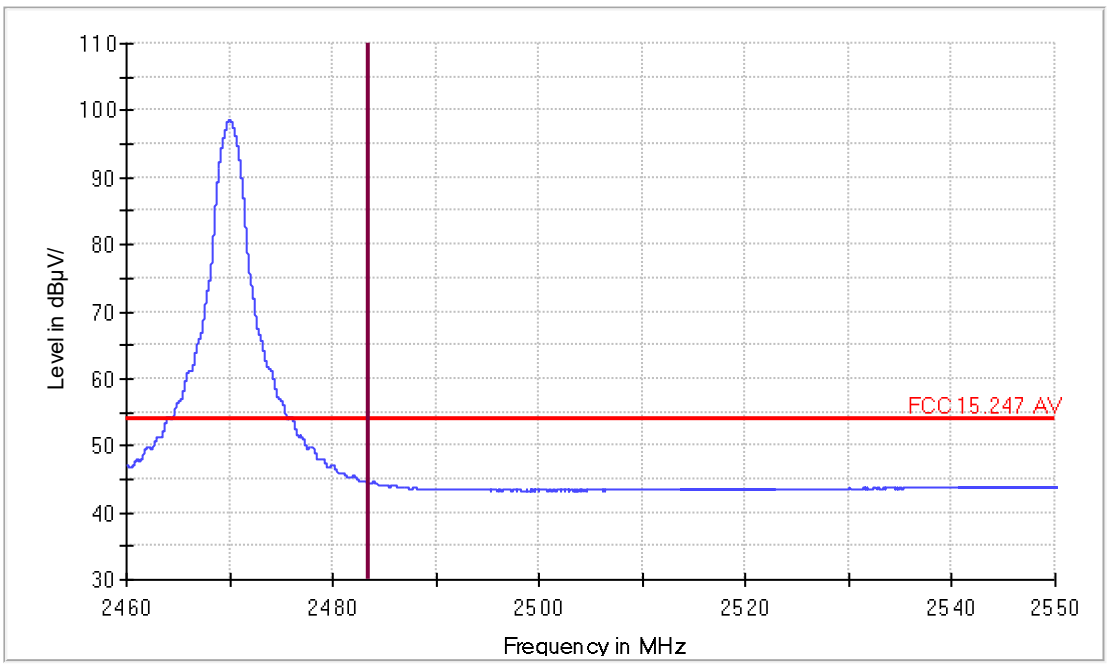

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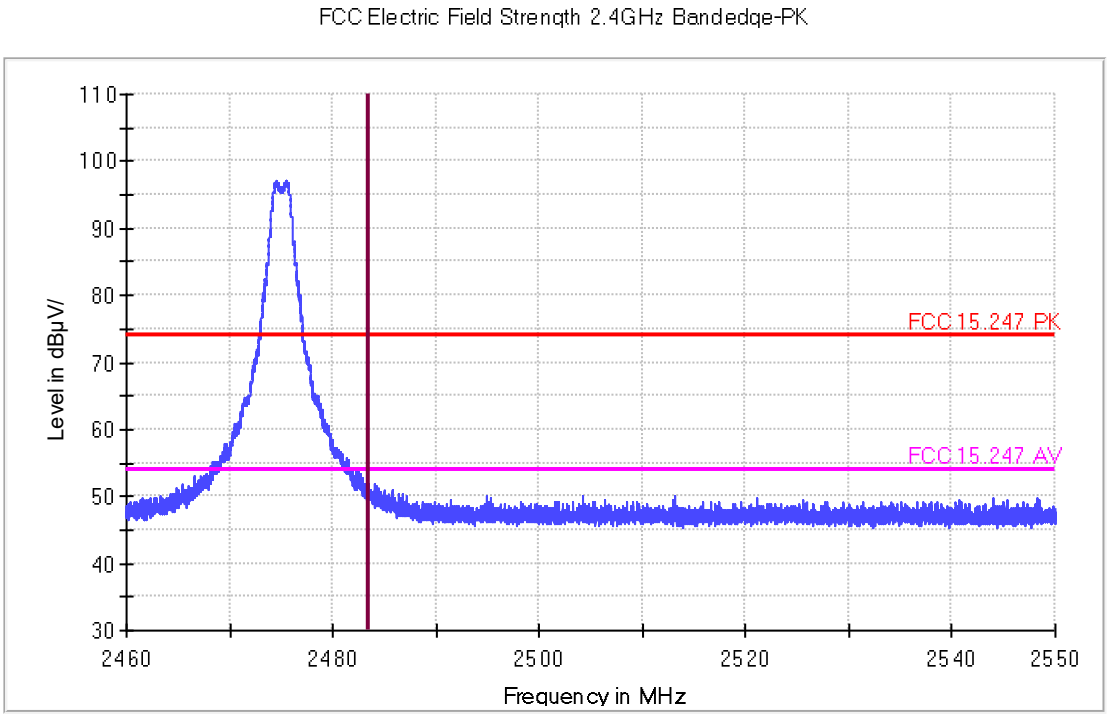

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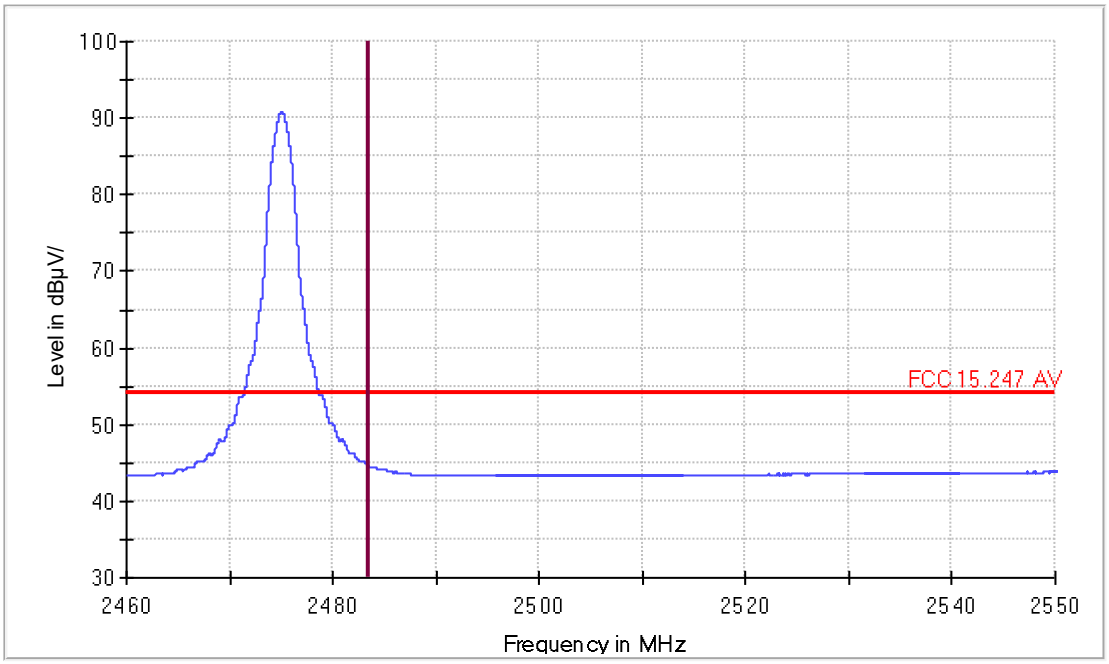

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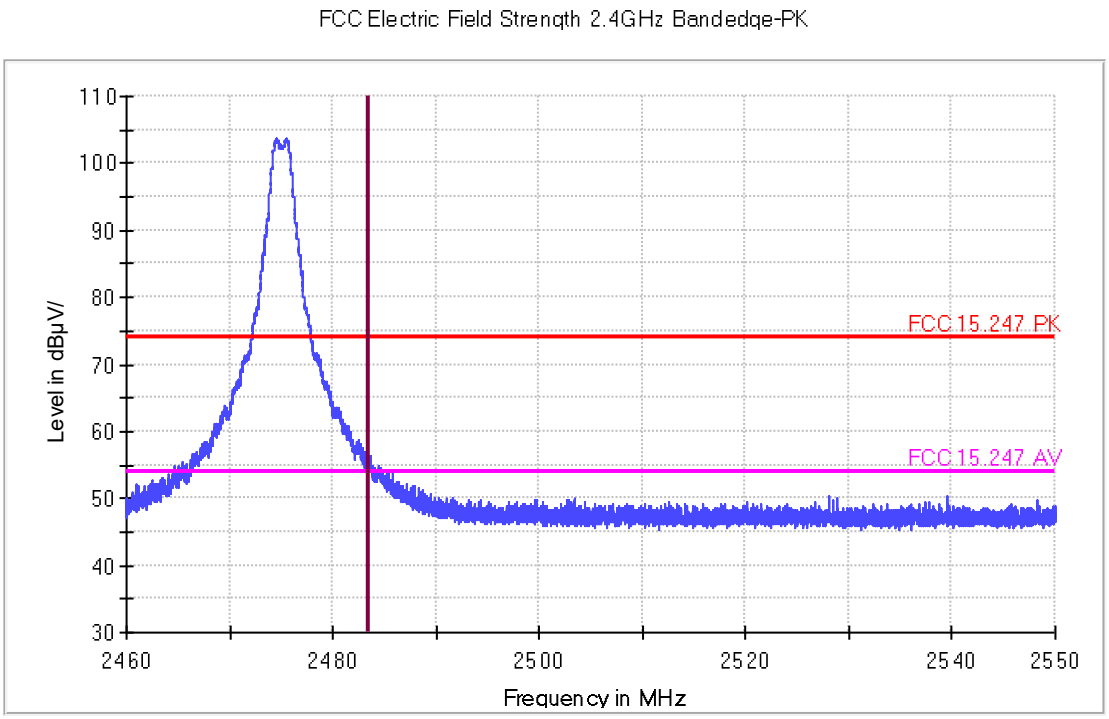

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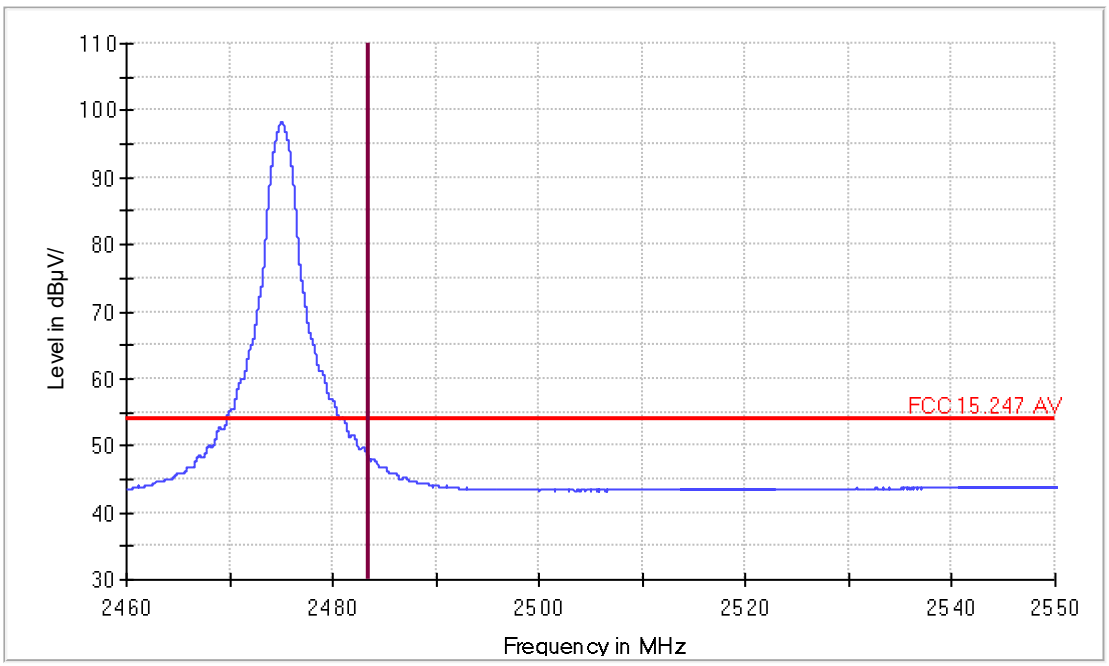

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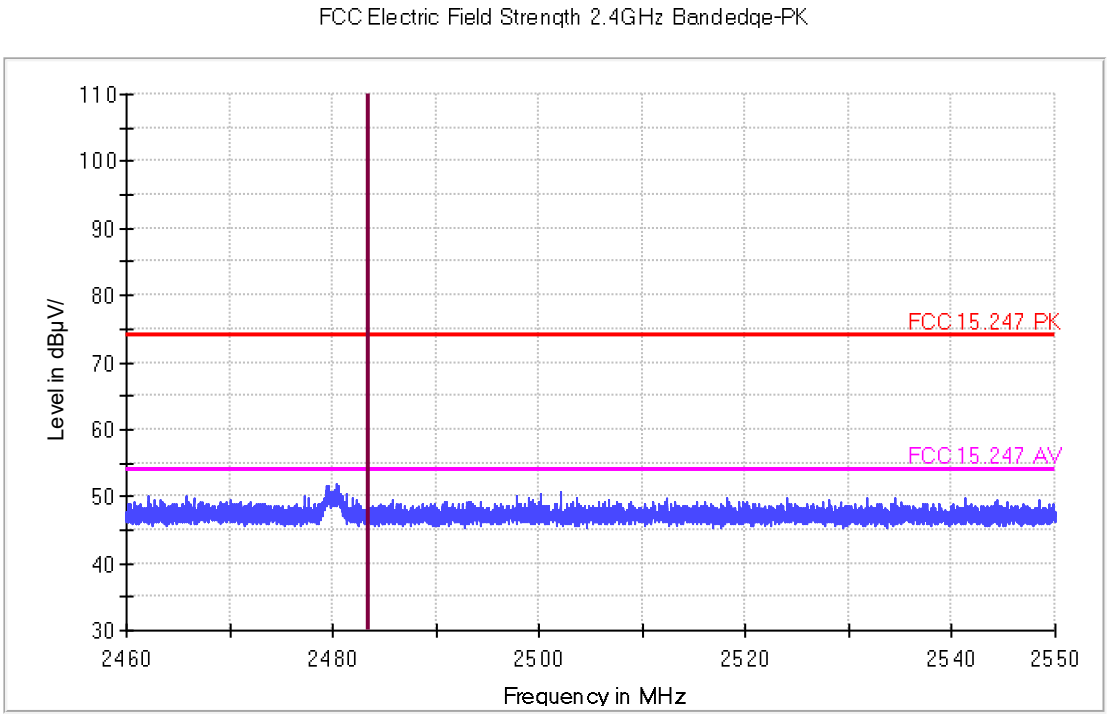

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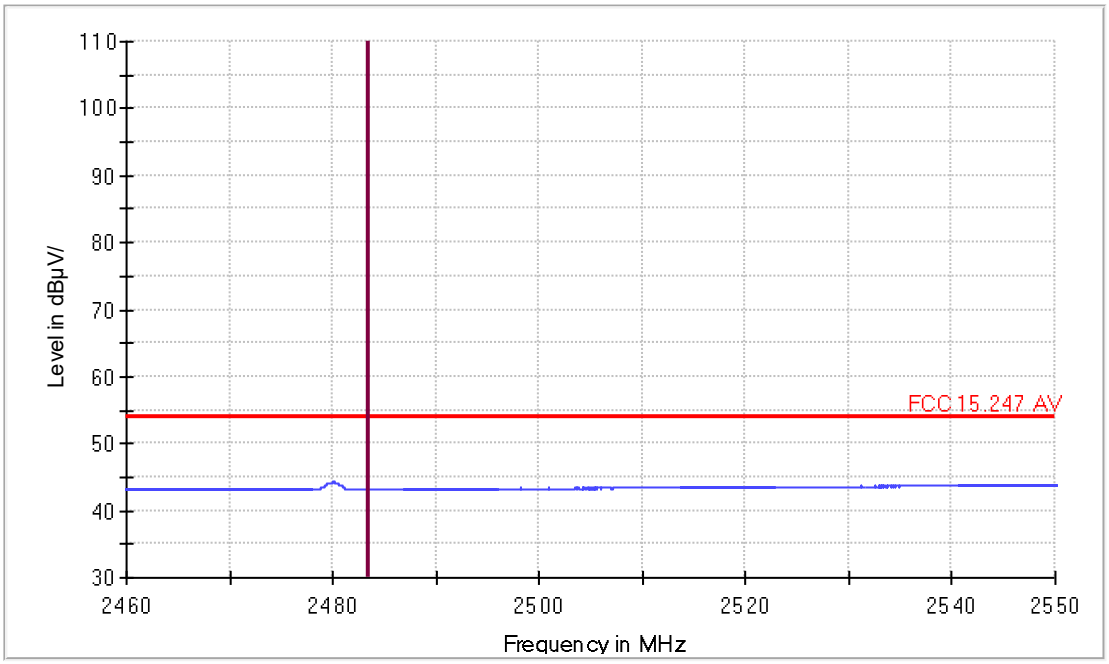

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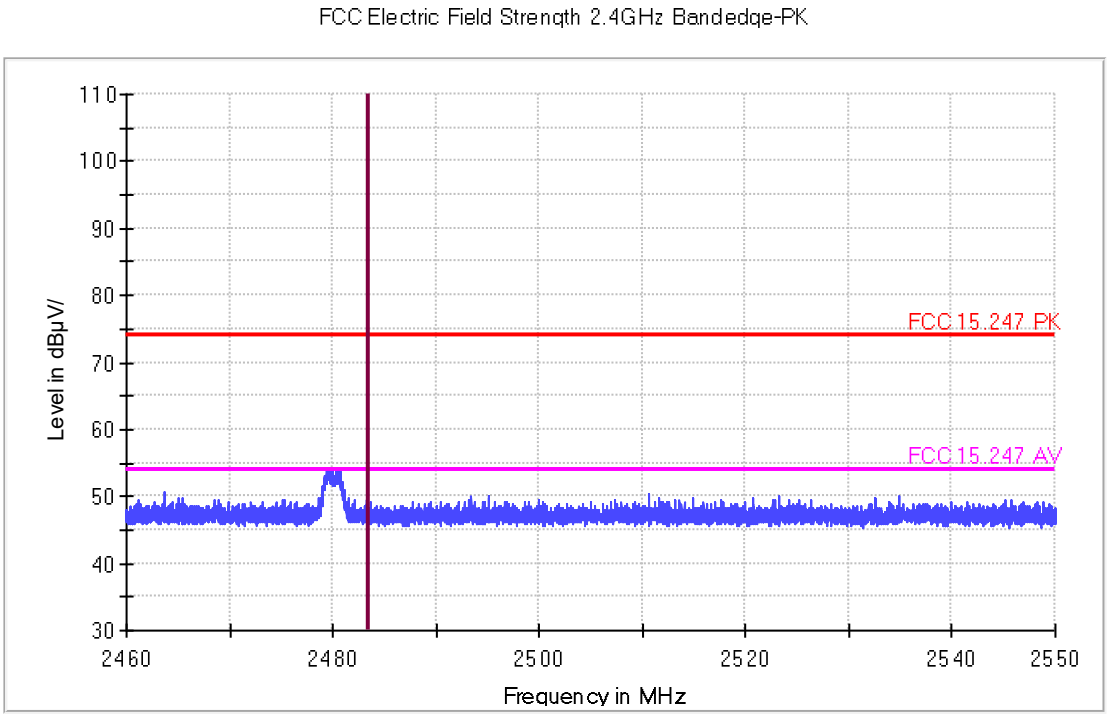

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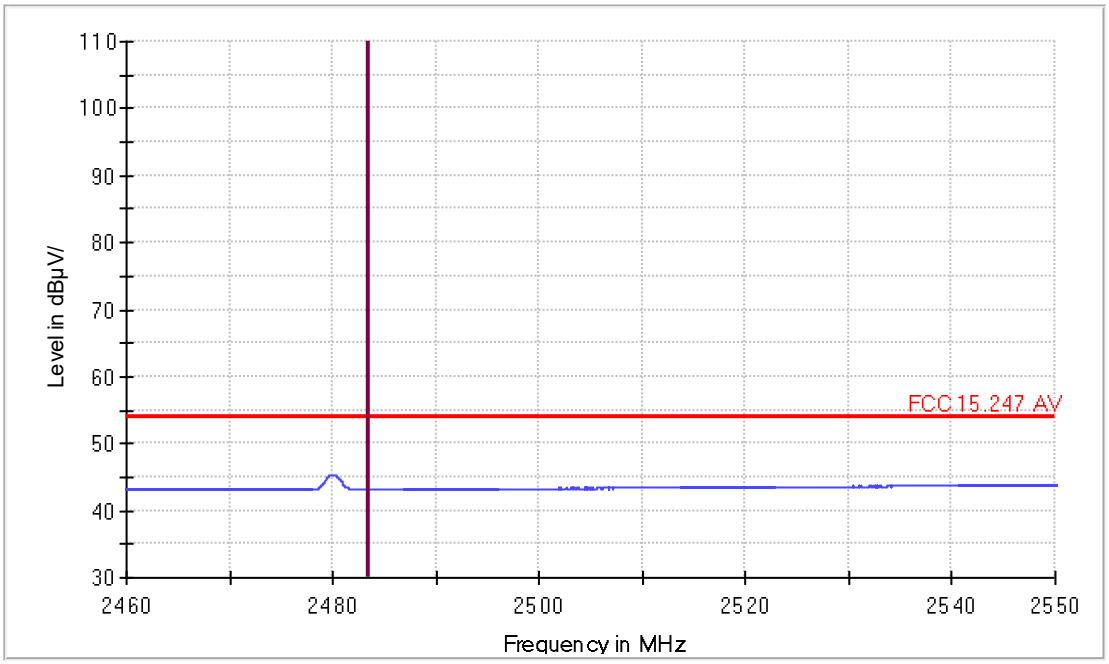


11. CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT

11.1. Test Standard and Limit

11.1.1. Test Standard

FCC Part 15 15.207

11.1.2. Test Limit

Table 16 Conducted Disturbance Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	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.

11.2. 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 an Artificial Mains Network (A.M.N.). An EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions from both sides of AC line. 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.

11.3. 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.

11.4.Test Data

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

Table 17 Conducted Disturbance Test Data

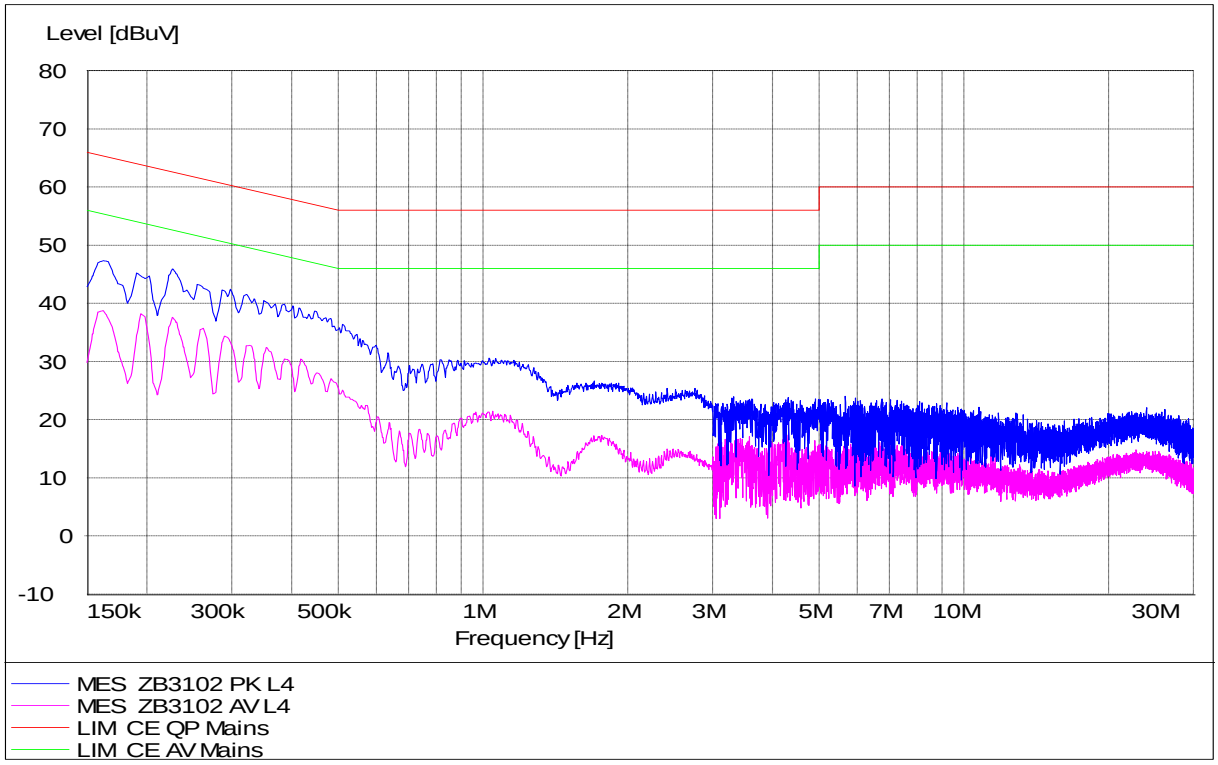
Model No.: Test mode: TX, Worst-case							
Line							
Frequency MHz	QP		AV		QP	AV	Factor (dB)
	Level (dBuV)	Limit (dBuV)	Level (dBuV)	Limit (dBuV)	Reading (dBuV)	Reading (dBuV)	
0.162	42.4	65.4	38.3	55.4	32.7	28.6	9.7
0.194	41.4	63.9	38.2	53.9	31.7	28.5	9.7
0.226	41.1	62.6	37.3	52.6	31.4	27.6	9.7
0.262	39.3	61.4	35.6	51.4	29.6	25.9	9.7
0.290	37.7	60.5	34.2	50.5	28.0	24.5	9.7
0.326	37.8	59.6	32.7	49.6	28.1	23.0	9.7
Neutral							
Frequency MHz	QP		AV		QP	AV	Factor (dB)
	Level (dBuV)	Limit (dBuV)	Level (dBuV)	Limit (dBuV)	Reading (dBuV)	Reading (dBuV)	
0.162	41.9	65.4	37.8	55.4	32.2	28.1	9.7
0.198	40.7	63.7	36.8	53.7	31.0	27.1	9.7
0.226	40.4	62.6	36.7	52.6	30.7	27.0	9.7
0.262	38.7	61.4	35.0	51.4	29.0	25.3	9.7
0.290	37.1	60.5	33.6	50.5	27.4	23.9	9.7
0.326	37.2	59.6	32.1	49.6	27.5	22.4	9.7

REMARKS: 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)

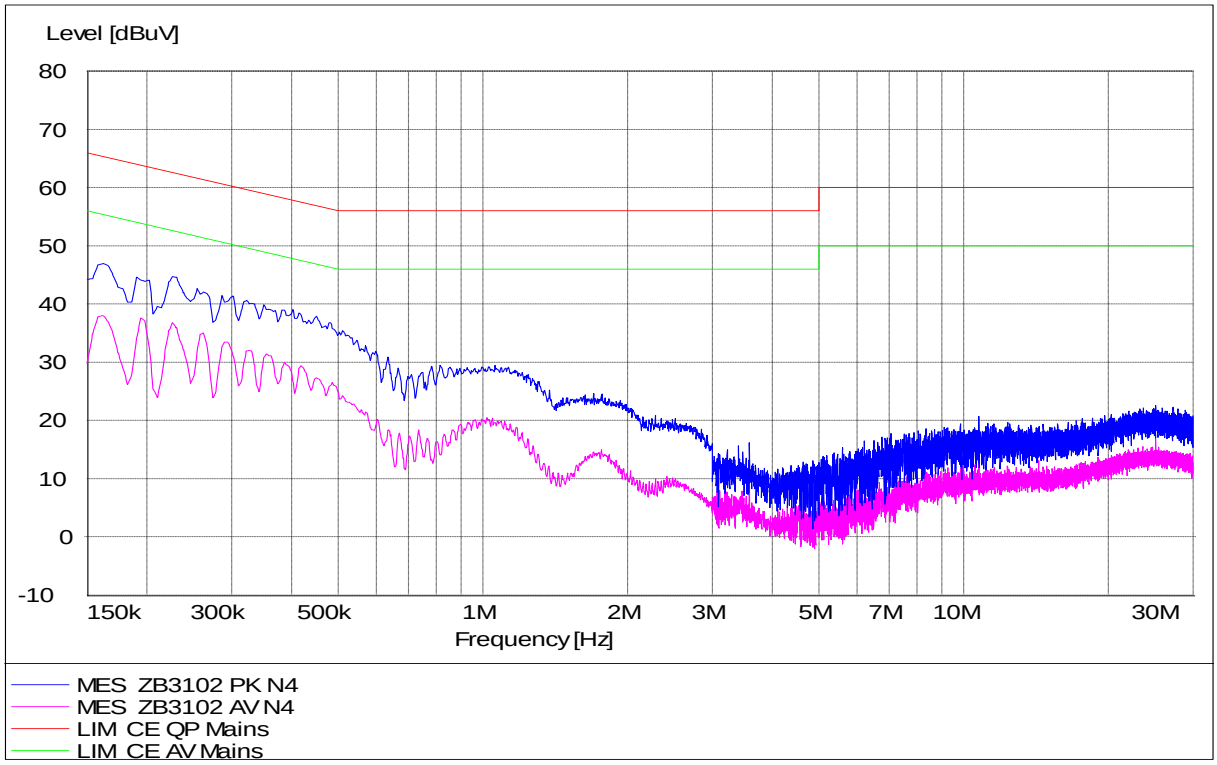
2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)

3. The other emission levels were very low against the limit.

Line



Neutral



12. ANTENNA REQUIREMENTS

12.1. 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.

12.2. Antenna Connector

The EUT has not external antenna connector and built in monopole antenna which is integrated inside the enclosure.

12.3. Antenna Gain

The antenna gain of EUT is less than 6 dBi.