



CTC Laboratories, Inc.

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TEST REPORT

Report No. **CTC20201127E02**
FCC ID..... **2AKIT-G2H**
IC..... **22635-G2H**
Applicant..... **Lumi United Technology Co., Ltd**
Address..... 8th Floor, JinQi Wisdom Valley, No.1 Tangling Road, Liuxian Ave,
Taoyuan Residential District, Nanshan District, Shenzhen, China
Manufacturer..... Lumi United Technology Co., Ltd
Address..... 8th Floor, JinQi Wisdom Valley, No.1 Tangling Road, Liuxian Ave,
Taoyuan Residential District, Nanshan District, Shenzhen, China
Product Name..... **Camera Hub G2, Camera Hub G2H**
Trade Mark..... Aqara
Model/Type reference..... CH-H01
Listed Model(s) CH-H01-H1, CH-H01-H2, CH-H01-H3, CH-H01-H4, CH-H01-H5,
ZNSXJ12LM, ZNSXJ12LM-G0
Standard..... **FCC CFR Title 47 Part 15 Subpart C Section 15.247**
RSS-247 Issue 2
RSS-Gen Issue 5
Date of receipt of test sample..... Apr. 23, 2019
Date of testing..... Apr. 25, 2019 to Aug. 18, 2020
Date of issue..... Aug. 24, 2020
Result..... **PASS**

Compiled by:
(Printed name+signature) **Jim Jiang** *Jim Jiang*

Supervised by:
(Printed name+signature) **Miller Ma** *Miller Ma*

Approved by:
(Printed name+signature) **Walter Chen** *Walter Chen*

Testing Laboratory Name: **CTC Laboratories, Inc.**
Address: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park,
Shenzhen, Guangdong, China

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.

[RSS 247 Issue 2](#): Standard Specifications for Frequency Hopping Systems (FHSs) and Digital Transmission Systems (DTSs) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz.

[RSS-Gen](#): General Requirements for Compliance of Radio Apparatus.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report Version

Revised No.	Date of issue	Description
01	Aug. 24, 2020	Original



1.3. Test Description

FCC Part 15 Subpart C(15.247)/ RSS-247 Issue 2/ RSS-Gen Issue 5				
Test Item	Standard Section		Result	Test Engineer
	FCC	IC		
Antenna Requirement	15.203	/	Pass	Lucy Lan
Conducted Emission	15.207(a)	RSS-GEN 8.8	Pass	Lucy Lan
Band-Edge & Unwanted Emissions into Restricted Frequency	15.205&15.247(d)	RSS-GEN 8.9	Pass	Lucy Lan
6dB Bandwidth	15.247(a)(2)	RSS 247 5.2 (1)	Pass	Lucy Lan
Conducted Max Output Power	15.247(b)(3)	RSS 247 5.4 (4)	Pass	Lucy Lan
Power Spectral Density	15.247(e)	RSS 247 5.2 (2)	Pass	Lucy Lan
Transmitter Radiated Spurious &Unwanted Emissions into Restricted Frequency	15.205, 15.209&15.247(d)	RSS 247 5.5	Pass	Lucy Lan

Note: "N/A" is not applicable.

The measurement uncertainty is not included in the test result.



1.4. Test Facility

Address of the report laboratory

CTC Laboratories, Inc.

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation. Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

FCC (Registration No.: 951311, Designation Number CN1208)

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 951311, Aug 26, 2017.

1.5. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the CTC Laboratories, Inc. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Below is the best measurement capability for CTC Laboratories, Inc.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	-----	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.6. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35 °C
Relative Humidity:	30~60 %
Air Pressure:	101.2 kPa



2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Lumi United Technology Co., Ltd
Address:	8th Floor, JinQi Wisdom Valley, No.1 Tangling Road, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen, China
Manufacturer:	Lumi United Technology Co., Ltd
Address:	8th Floor, JinQi Wisdom Valley, No.1 Tangling Road, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.2. General Description of EUT

Product Name:	Camera Hub G2, Camera Hub G2H
Marketing Name:	Aqara
Model/Type reference:	CH-H01
Listed Model(s):	CH-H01-H1, CH-H01-H2, CH-H01-H3, CH-H01-H4, CH-H01-H5, ZNSXJ12LM, ZNSXJ12LM-G0
Model Difference:	All these models are identical in the same PCB, layout and electrical circuit, only named differently for marketing purpose.
Power supply:	Adapter 1: RD0501000-USBA-180MG Input: 100-240AC, 50/60Hz 0.25A MAX Output: 5VDC, 1000mA Adapter 2: A18A-050100U-US2 Input: 100-240AC, 50/60Hz 0.2A Output: 5VDC, 1A
Hardware version:	V1.0.1
Software version:	V1.0.1

WIFI 802.11b/g/n(HT20)/n(HT40)

Modulation:	802.11b: DSSS(CCK, DQPSK, DBPSK) 802.11g/n: OFDM(BPSK, QPSK, 16QAM, 64QAM)
Operation frequency:	802.11b/g/n (HT20): 2412MHz~2462MHz 802.11n (HT20): 2422MHz~2452MHz
Max Peak Output Power:	802.11b: 16.27dBm 802.11g: 16.62dBm 802.11n (HT20): 15.03dBm 802.11n (HT40): 13.83dBm
Channel number:	802.11b/g/n (HT20): 11 Channels 802.11n (HT40): 7 Channels
Channel separation:	5MHz
Antenna type:	Monopole Antenna
Antenna gain:	2.30dBi



2.3. Accessory Equipment Information

Equipment Information			
Name	Model	S/N	Manufacturer
Aqara Motion Sensor	RTCGQ11LM	---	LUMI
Mobile Phone	A1660	---	APPLE
Router	R4CM	---	XIAOMI
Cable Information			
Name	Shielded Type	Ferrite Core	Length
USB Cable	Shielded	No	200cm

2.4. Operation State

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. WIFI11 channels are provided to the EUT. Channels 01/03/06/09/11 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
01	2412
02	2417
03	2422
04	2427
05	2432
06	2437
07	2442
08	2447
09	2452
10	2457
11	2462

Note: The display in grey were the channel selected for testing.

Test mode

For RF test items:
The software test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).
For AC power line conducted emissions:
The EUT was set to connect with the WIFI instrument under large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.



2.5. Measurement Instruments List

Tonscend JS0806-2 Test system						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated until
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 28, 2019	Dec. 27, 2020
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Dec. 28, 2019	Dec. 27, 2020
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 28, 2019	Dec. 27, 2020
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 28, 2019	Dec. 27, 2020
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 28, 2019	Dec. 27, 2020
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 28, 2019	Dec. 27, 2020
7	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Dec. 28, 2019	Dec. 27, 2020
8	Climate Chamber	TABA1	PR-4G	A8708055	Dec. 28, 2019	Dec. 27, 2020
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 28, 2019	Dec. 27, 2020
10	Climate Chamber	ESPEC	MT3065	/	Dec. 28, 2019	Dec. 27, 2020
11	300328 v2.1.1 test system	TONSCEND	v2.6	/	/	/

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 28, 2019	Dec. 27, 2020
2	LISN	R&S	ENV216	101113	Dec. 28, 2019	Dec. 27, 2020
3	EMI Test Receiver	R&S	ESCI	100920	Dec. 28, 2019	Dec. 27, 2020
4	ISN CAT6	Schwarzbeck	NTFM 8158	8158-0046	Dec. 28, 2019	Dec. 27, 2020



Radiated Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 28, 2019	Dec. 27, 2020
2	High pass filter	micro-tranics	HPM50111	142	Dec. 28, 2019	Dec. 27, 2020
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 28, 2019	Dec. 27, 2020
4	Ultra-Broadband Antenna	Schwarzbeck	BBHA9170	25841	Dec. 28, 2019	Dec. 27, 2020
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 28, 2019	Dec. 27, 2020
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 28, 2019	Dec. 27, 2020
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 28, 2019	Dec. 27, 2020
8	Pre-Amplifier	HP	8447D	1937A030 50	Dec. 28, 2019	Dec. 27, 2020
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 28, 2019	Dec. 27, 2020
10	Antenna Mast	UC	UC3000	N/A	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 28, 2019	Dec. 27, 2020
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX10 2	DA1580	Dec. 28, 2019	Dec. 27, 2020
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28, 2019	Dec. 27, 2020
15	RF Connection Cable	HUBER+SUHN ER	RE-7-FL	N/A	Dec. 28, 2019	Dec. 27, 2020
16	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 28, 2019	Dec. 27, 2020
17	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 28, 2019	Dec. 27, 2020
18	Attenuator	Chengdu E-Microwave	EMCAXX-10R NZ-3	---	Dec. 28, 2019	Dec. 27, 2020

Note: 1. The cable loss has calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

3.1. Conducted Emission

Limit

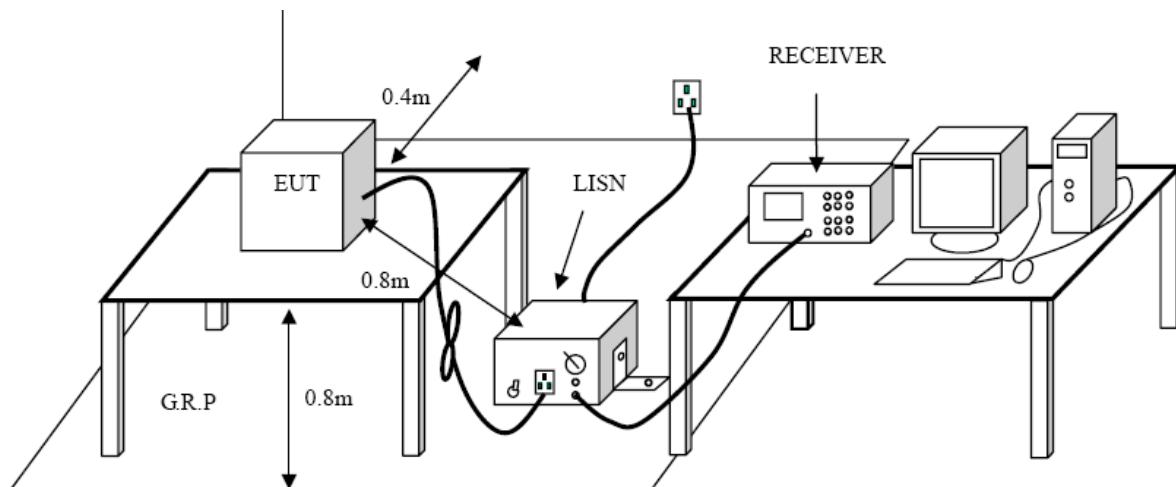
Conducted Emission Test Limit

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

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
7. During the above scans, the emissions were maximized by cable manipulation.

Test Mode

Please refer to the clause 2.3.

Test Results

Polarization	L																																																																																																																																						
Adapter	RD0501000-USBA-180MG																																																																																																																																						
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3.2. Radiated Emission

Limit

Radiated Emission Limits (9 kHz~1000 MHz)

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

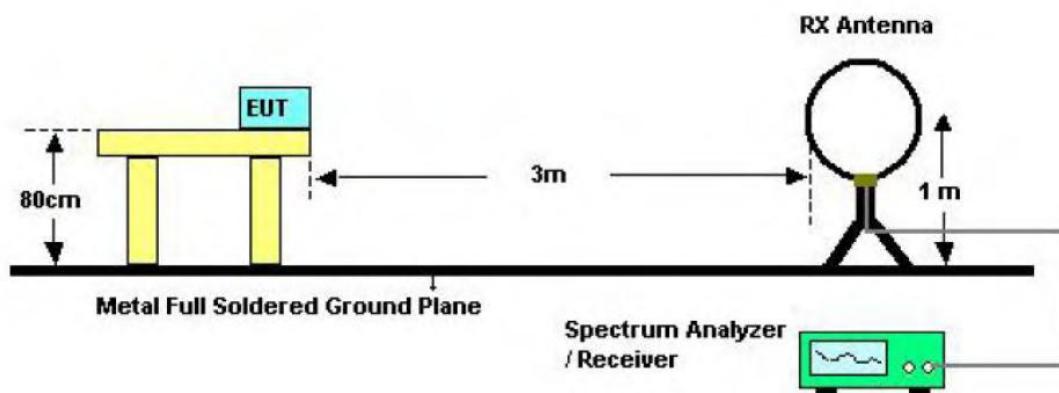
Radiated Emission Limit (Above 1000MHz)

Frequency (MHz)	Distance Meters(at 3m)	
	Peak	Average
Above 1000	74	54

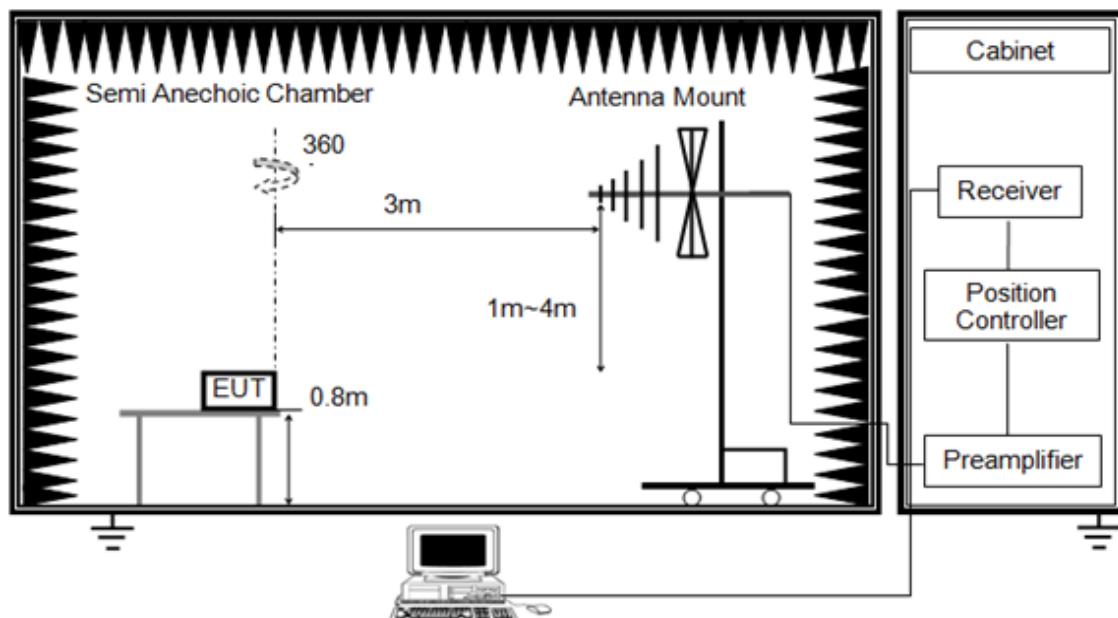
Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m).

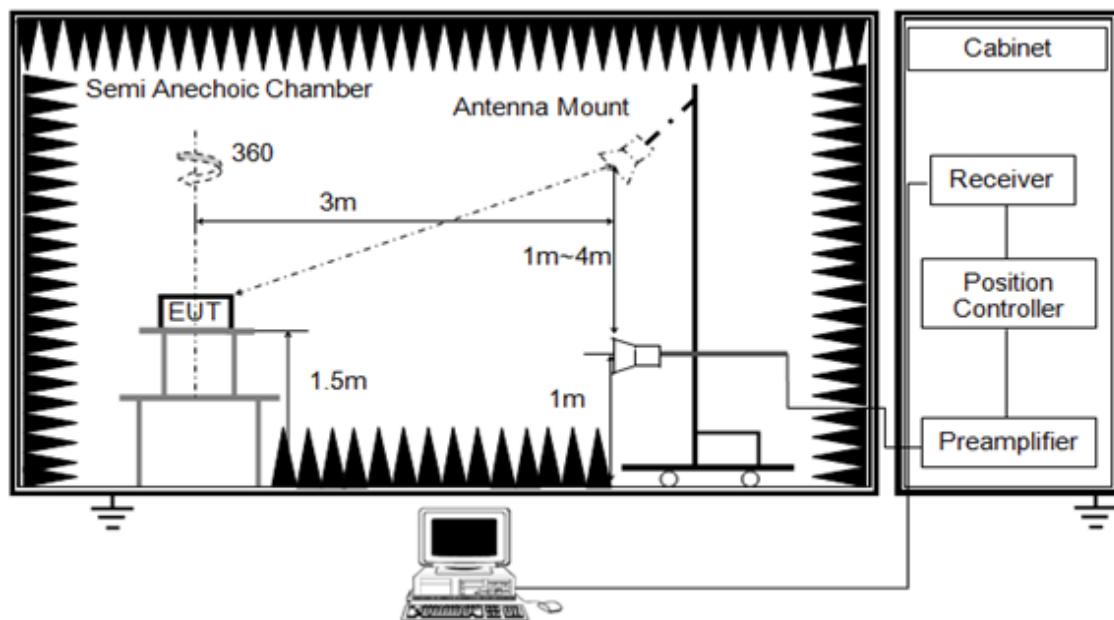
Test Configuration



Below 30MHz Test Setup



Below 1000MHz Test Setup



Above 1GHz Test Setup



Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, 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 to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
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.
 - (3) From 1 GHz to 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW=3MHz RMS detector for Average value.

Test Mode

Please refer to the clause 2.3.

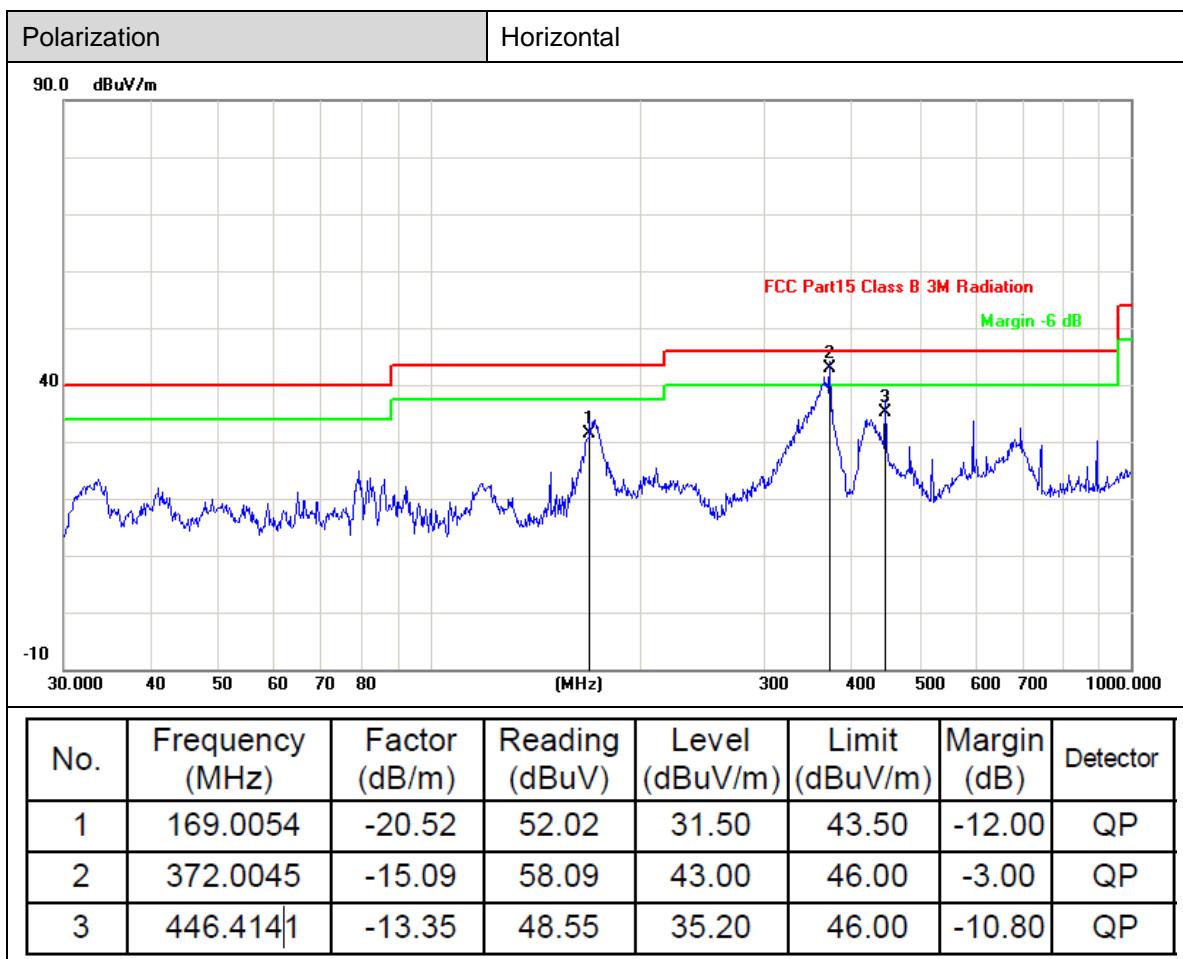
Test Result

9 KHz~30 MHz

From 9 KHz to 30 MHz: Conclusion: PASS

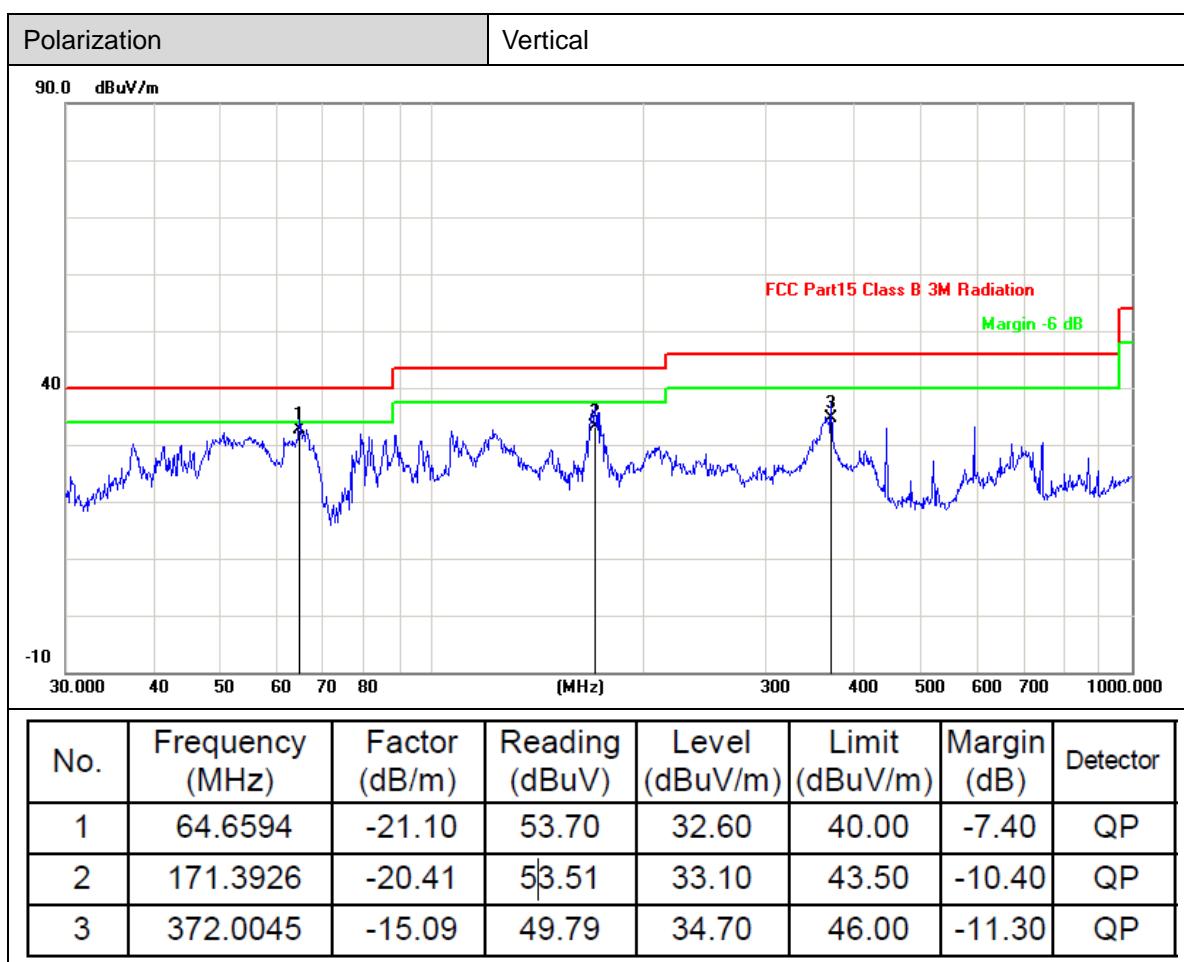
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Below 1GHz



Remark:

1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2. Margin value = Level -Limit value



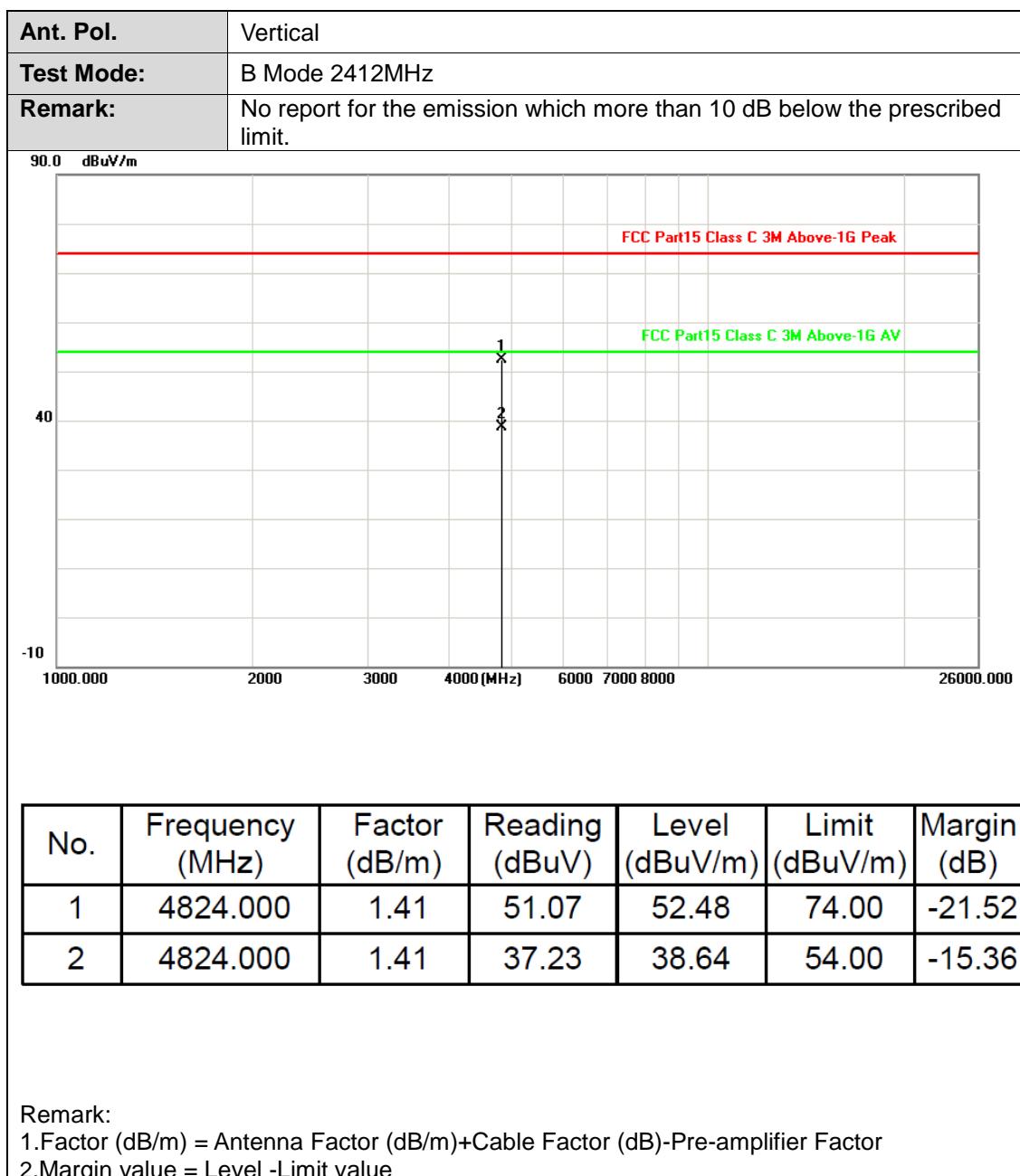
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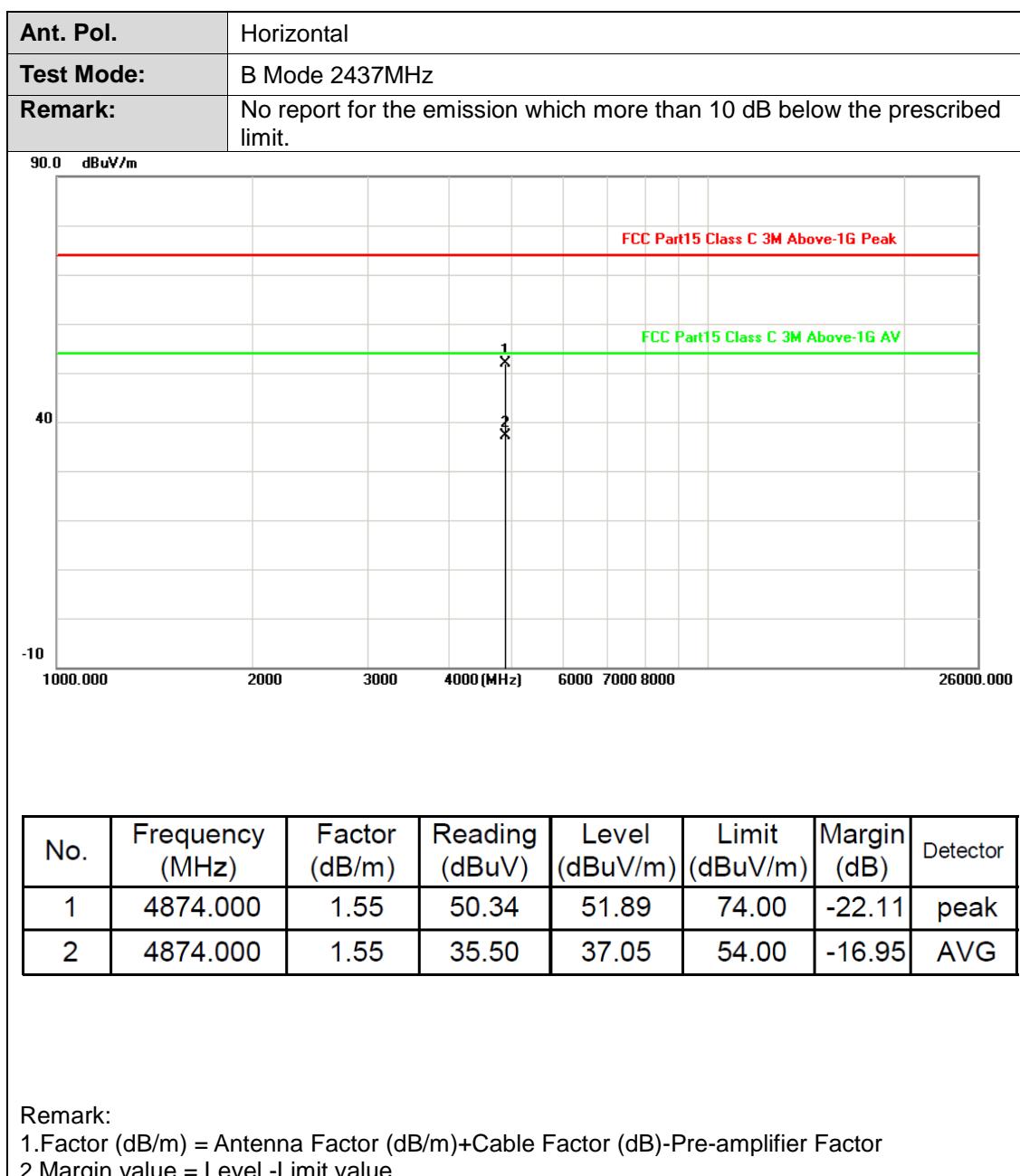
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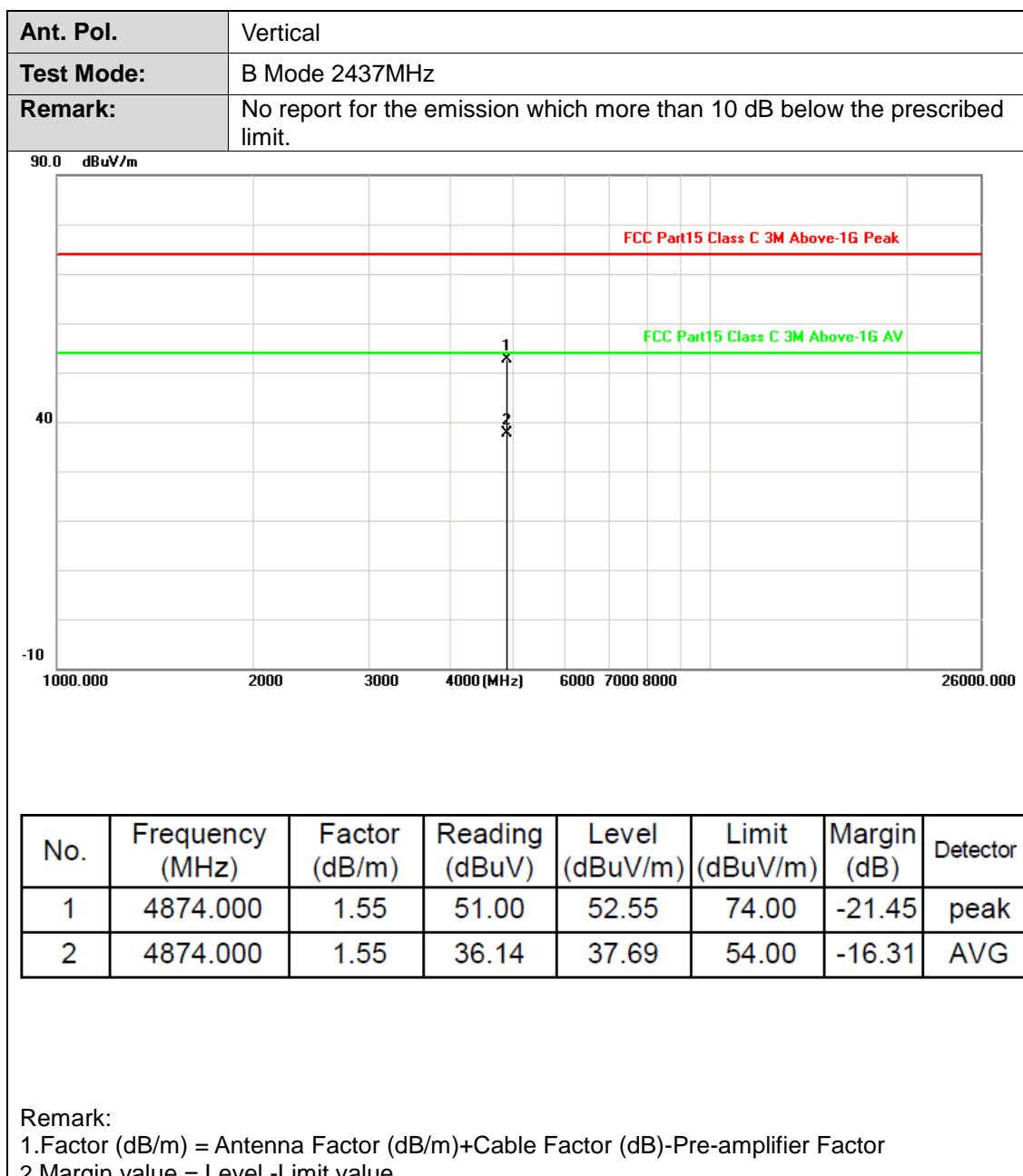


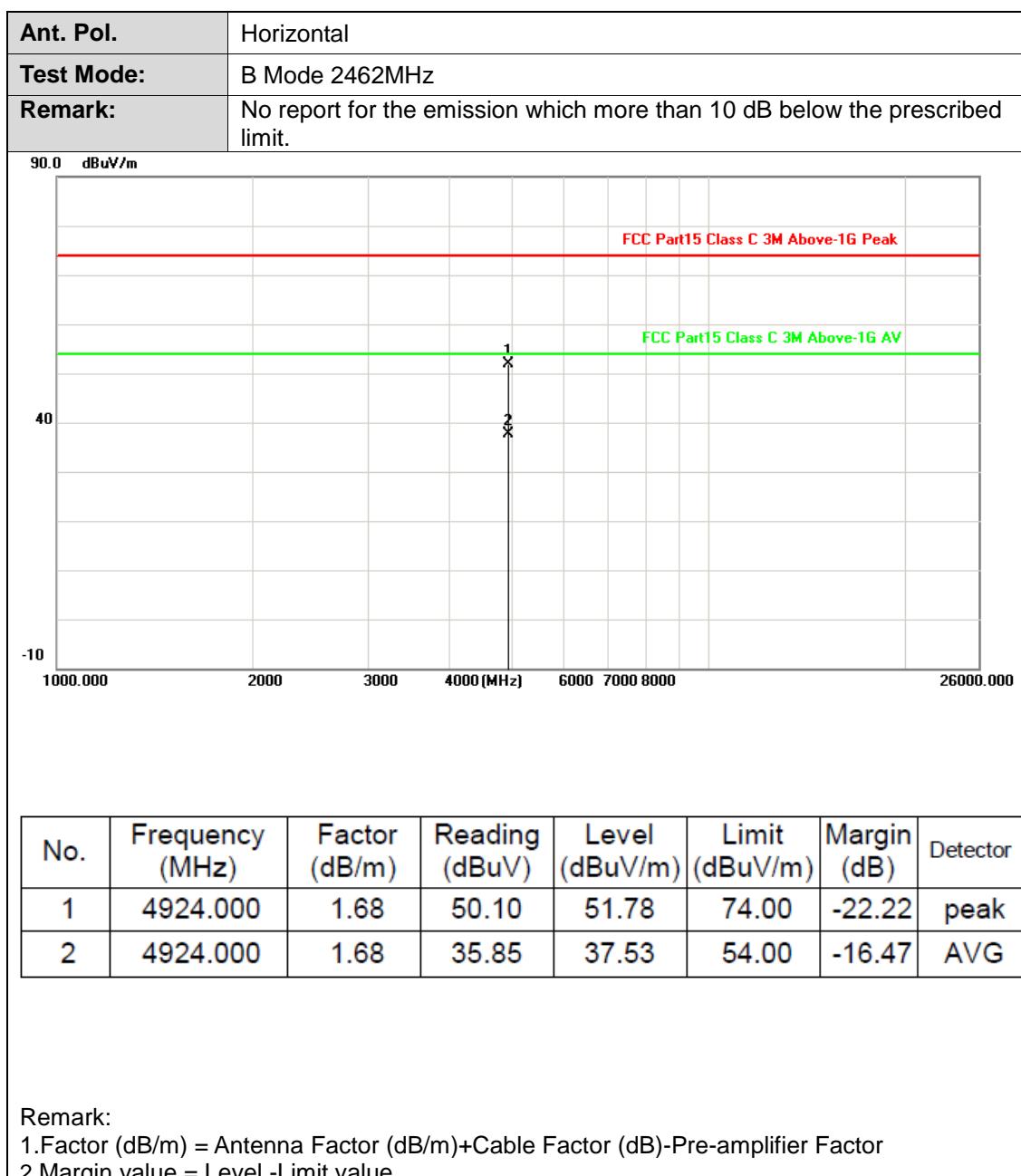
Above 1GHz

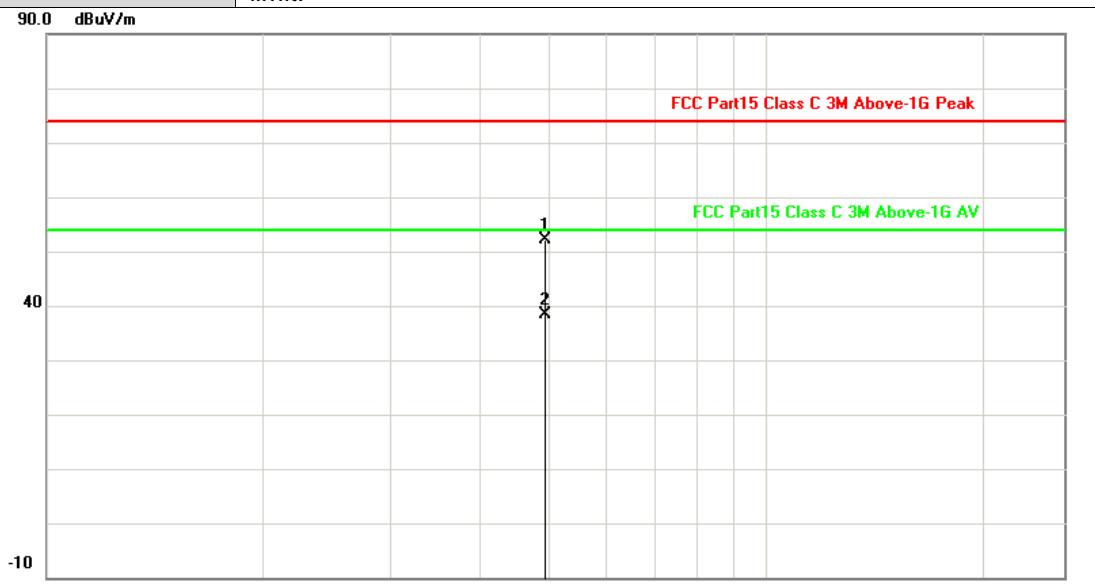
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Test Mode:	B Mode 2412MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
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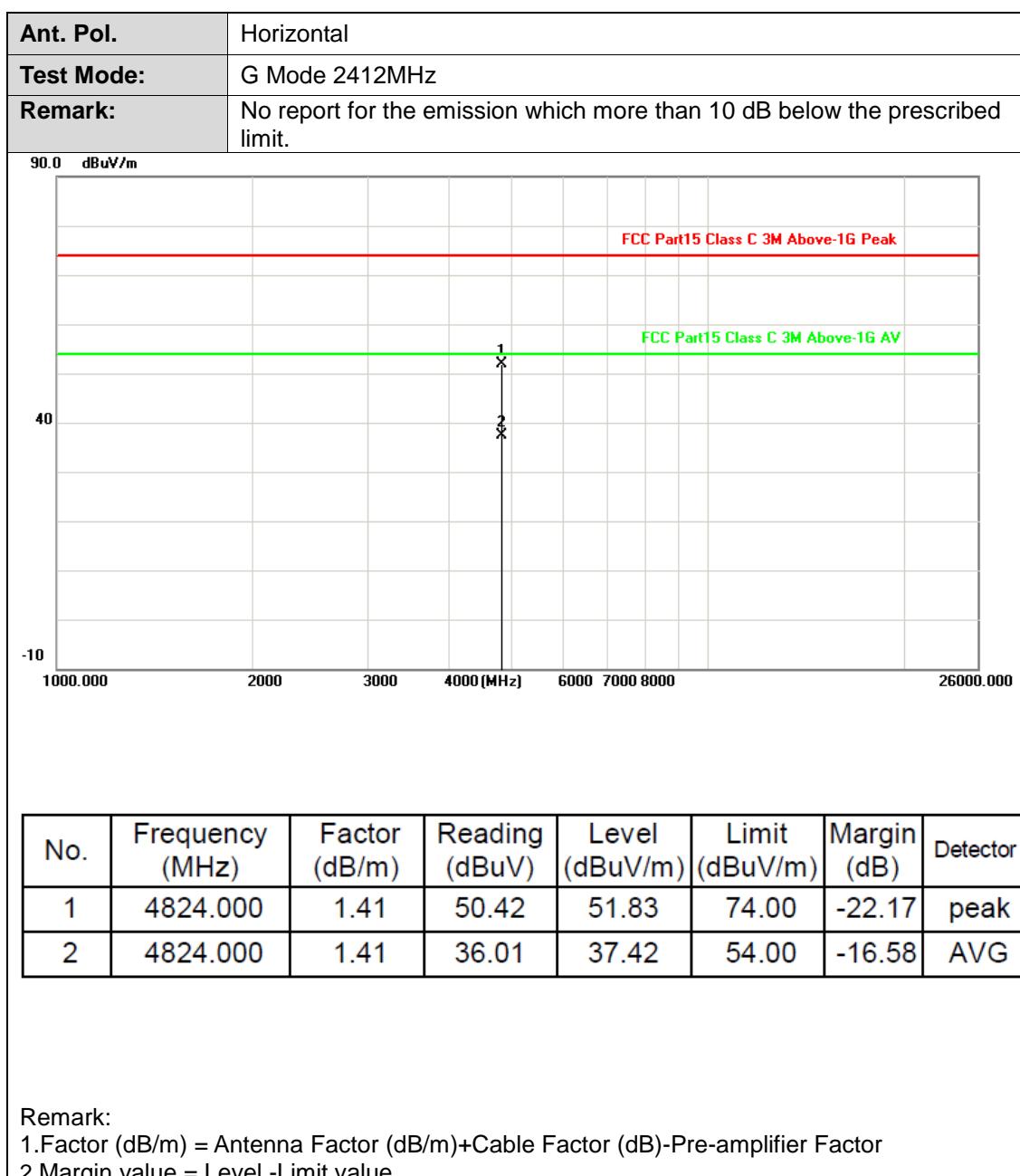


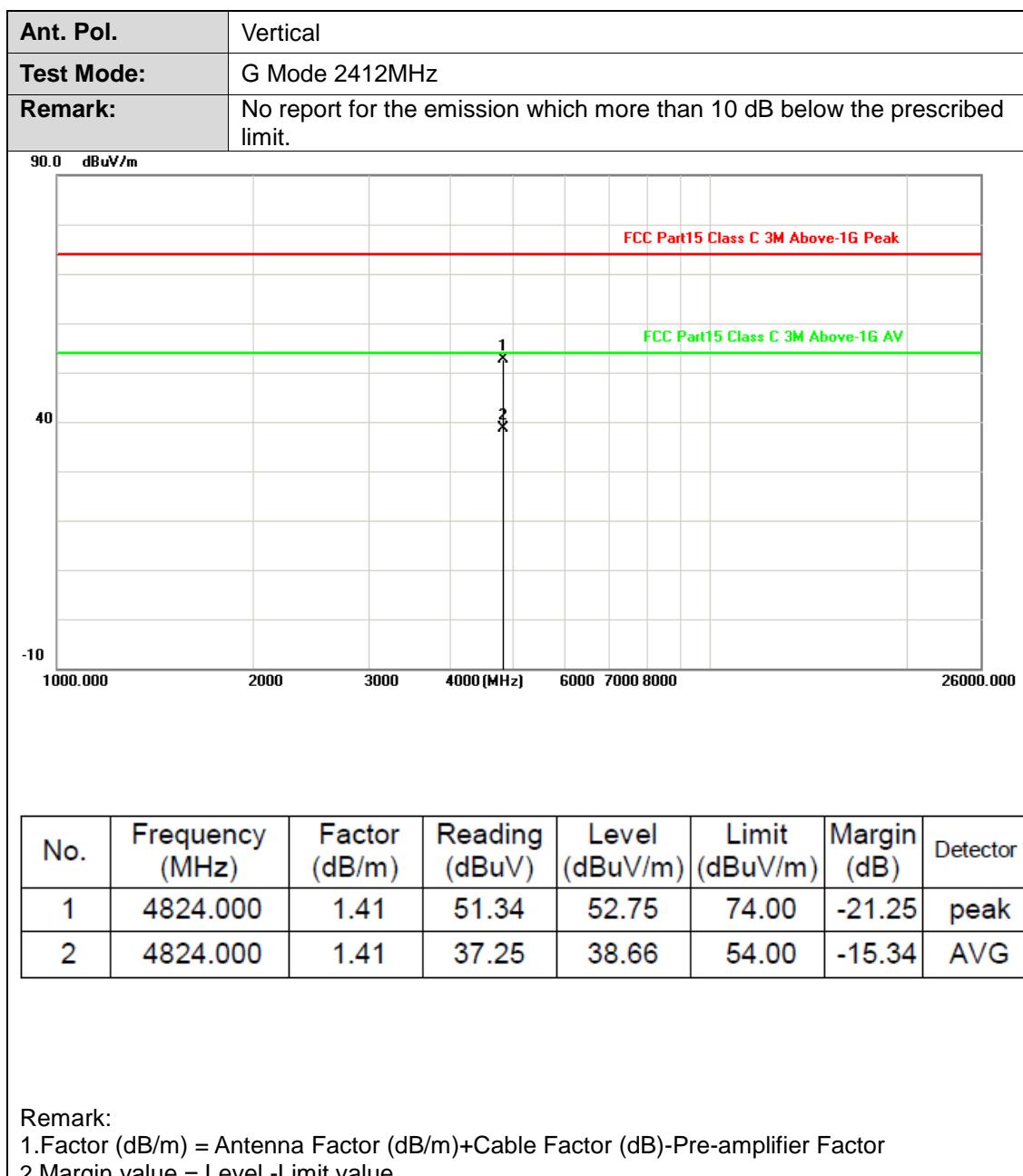


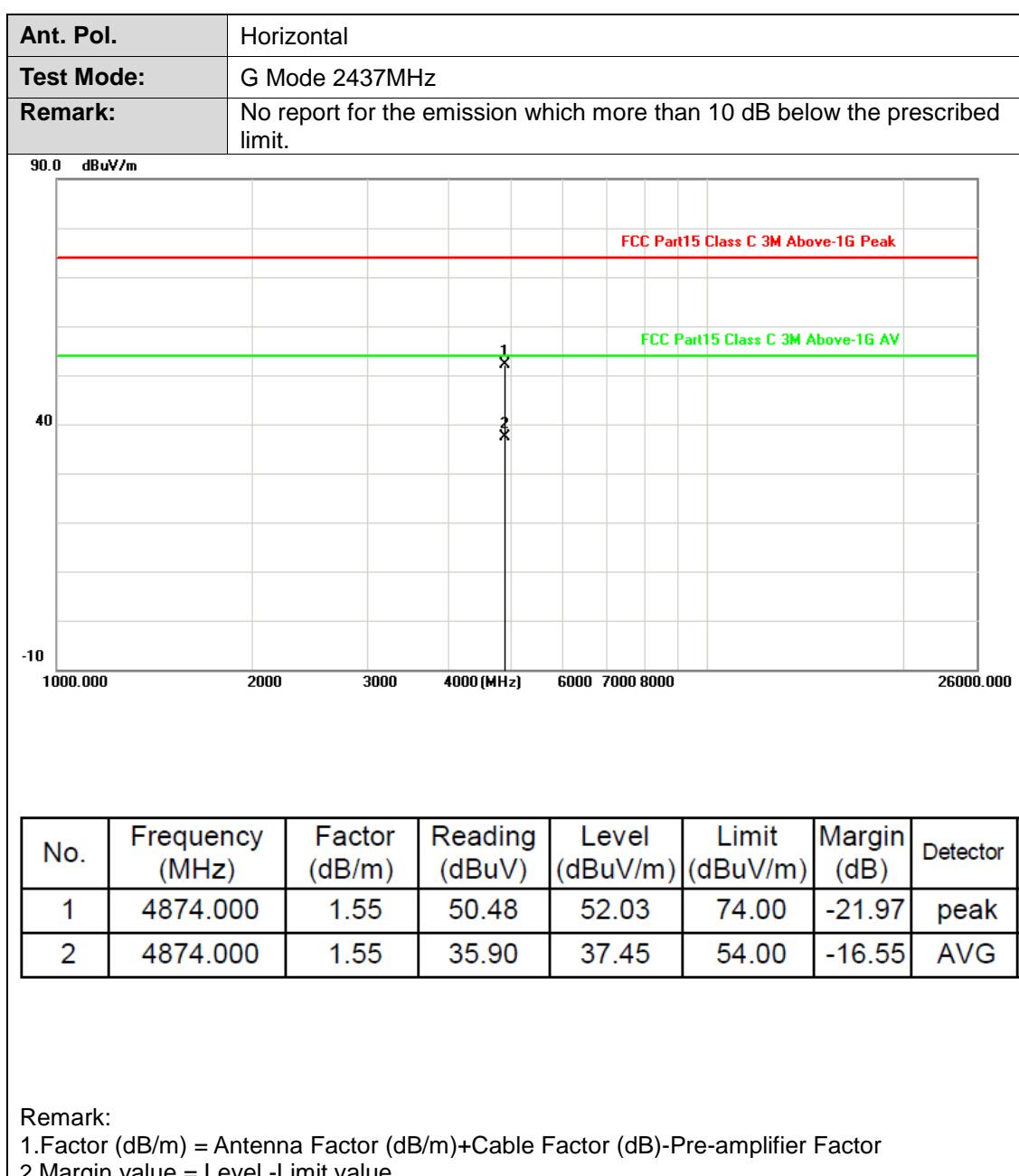


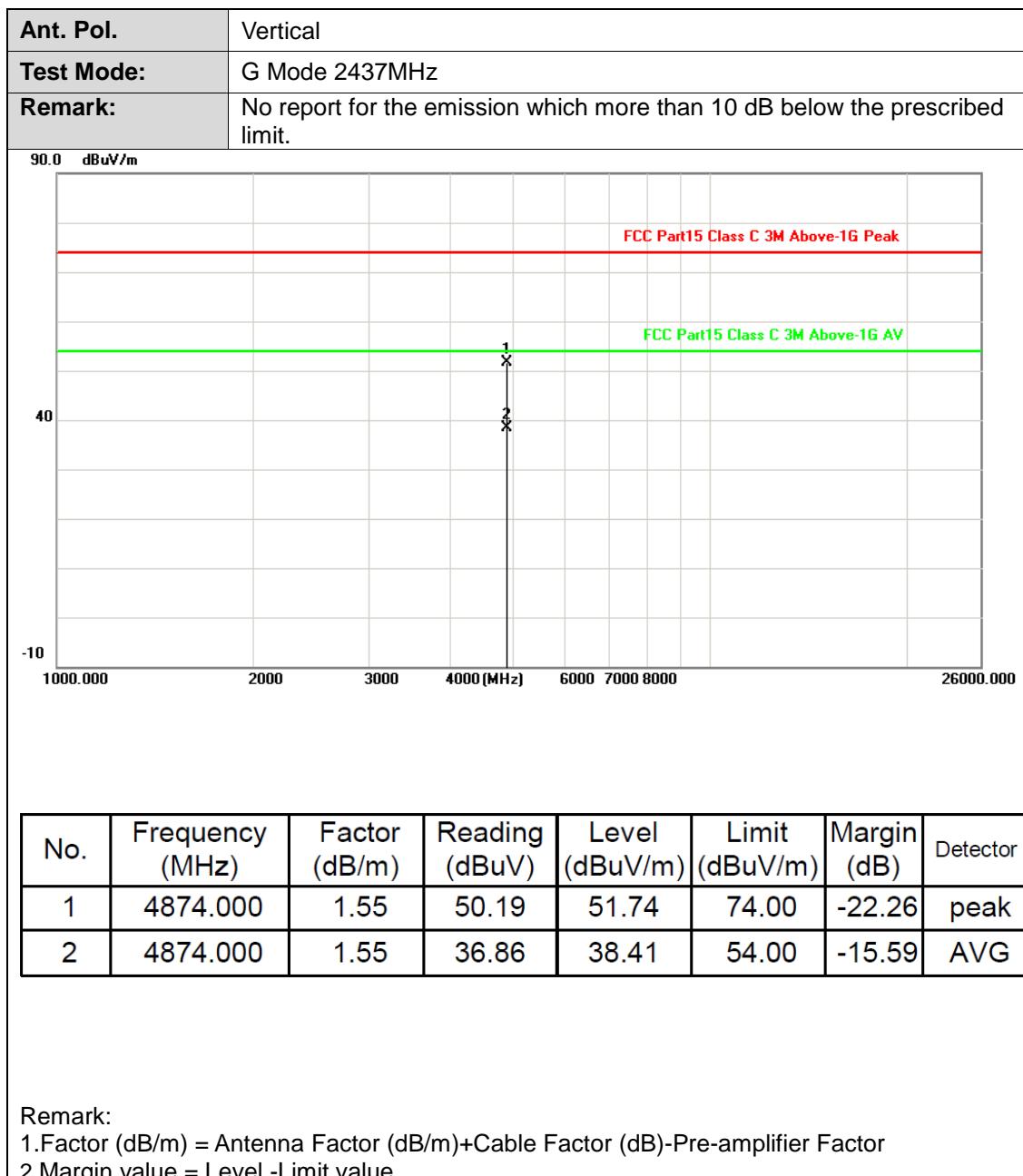


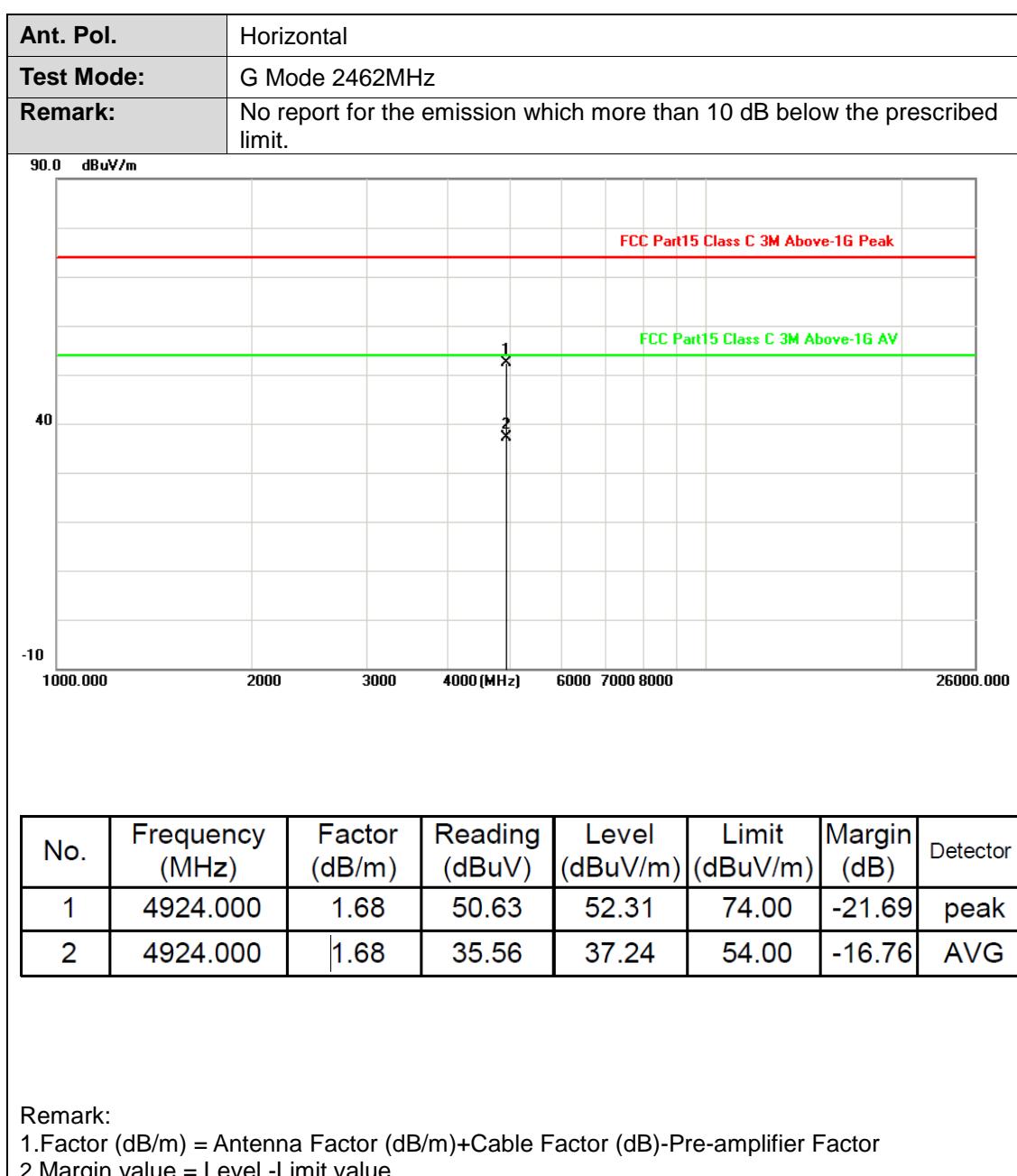
Ant. Pol.	Vertical																														
Test Mode:	B Mode 2462MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
 <p>The figure is a spectral emission mask plot showing dBuV/m on the y-axis (ranging from -10 to 90.0) versus MHz on the x-axis (ranging from 1000.000 to 26000.000). A red horizontal line represents the 'FCC Part15 Class C 3M Above-1G Peak' limit at approximately 74.00 dBuV/m. A green horizontal line represents the 'FCC Part15 Class C 3M Above-1G AV' limit at approximately 54.00 dBuV/m. A vertical line with markers '1' and '2' is drawn at 4924.000 MHz. The reading at this frequency is 50.46 dBuV, which is 52.14 dBuV/m (the level) minus 74.00 dBuV/m (the limit), resulting in a margin of -21.86 dB. The detector used is 'peak'.</p>																															
<table border="1"><thead><tr><th>No.</th><th>Frequency (MHz)</th><th>Factor (dB/m)</th><th>Reading (dBuV)</th><th>Level (dBuV/m)</th><th>Limit (dBuV/m)</th><th>Margin (dB)</th><th>Detector</th></tr></thead><tbody><tr><td>1</td><td>4924.000</td><td>1.68</td><td>50.46</td><td>52.14</td><td>74.00</td><td>-21.86</td><td>peak</td></tr><tr><td>2</td><td>4924.000</td><td>1.68</td><td>36.76</td><td>38.44</td><td>54.00</td><td>-15.56</td><td>AVG</td></tr></tbody></table>								No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	1	4924.000	1.68	50.46	52.14	74.00	-21.86	peak	2	4924.000	1.68	36.76	38.44	54.00	-15.56	AVG
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4924.000	1.68	50.46	52.14	74.00	-21.86	peak																								
2	4924.000	1.68	36.76	38.44	54.00	-15.56	AVG																								
<p>Remark:</p> <p>1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor 2. Margin value = Level - Limit value</p>																															

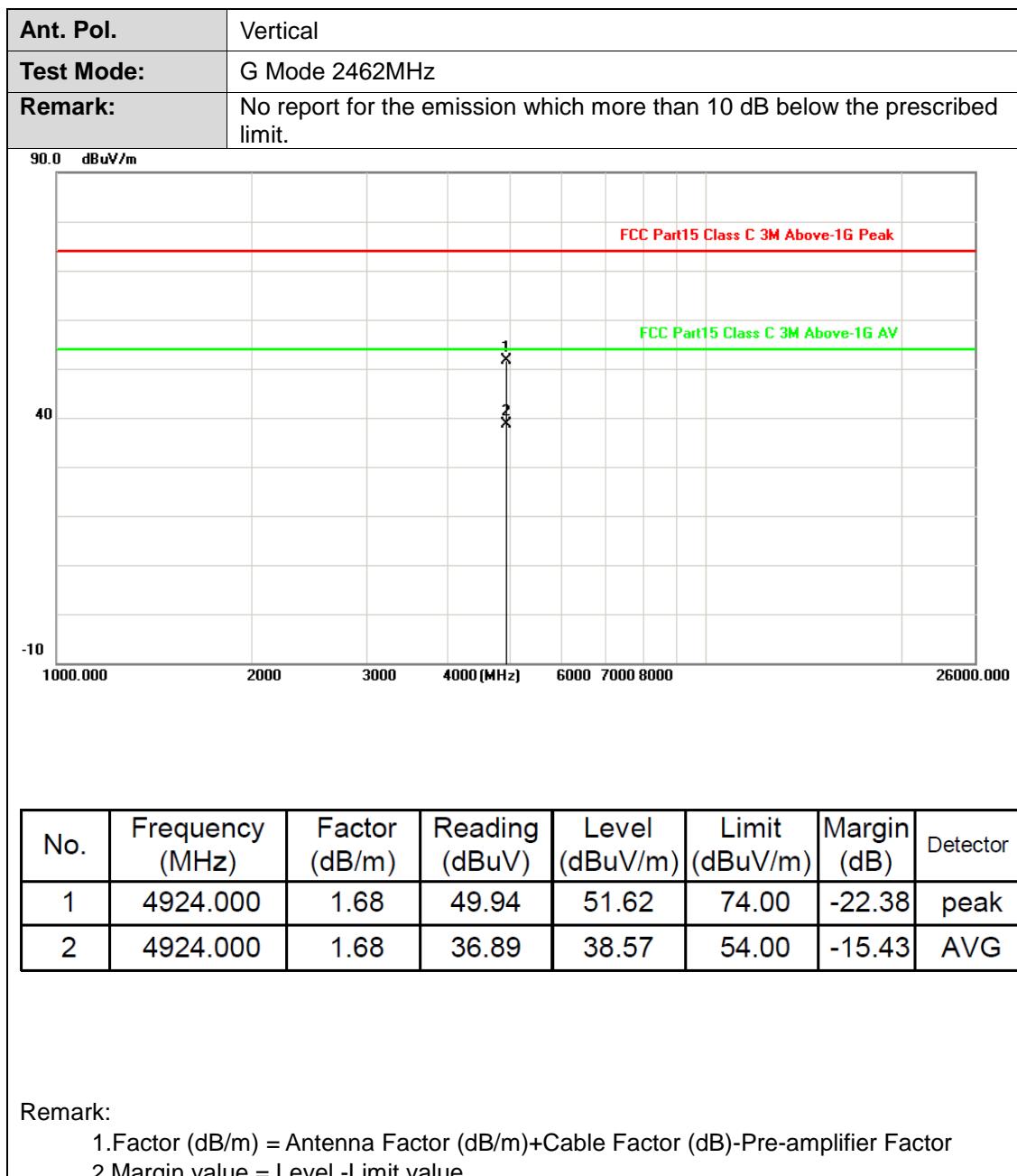




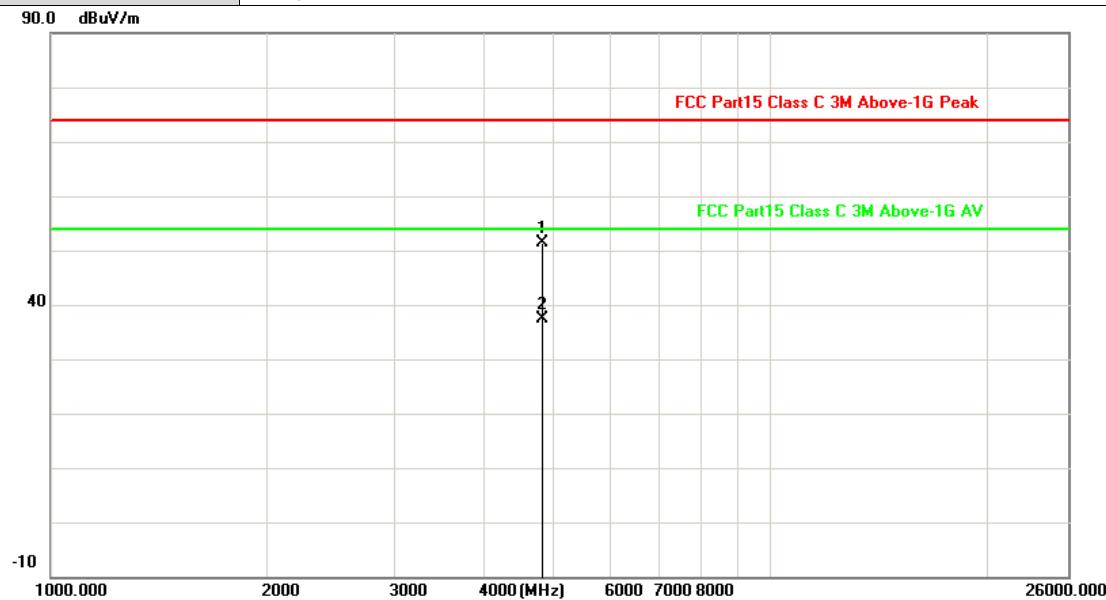








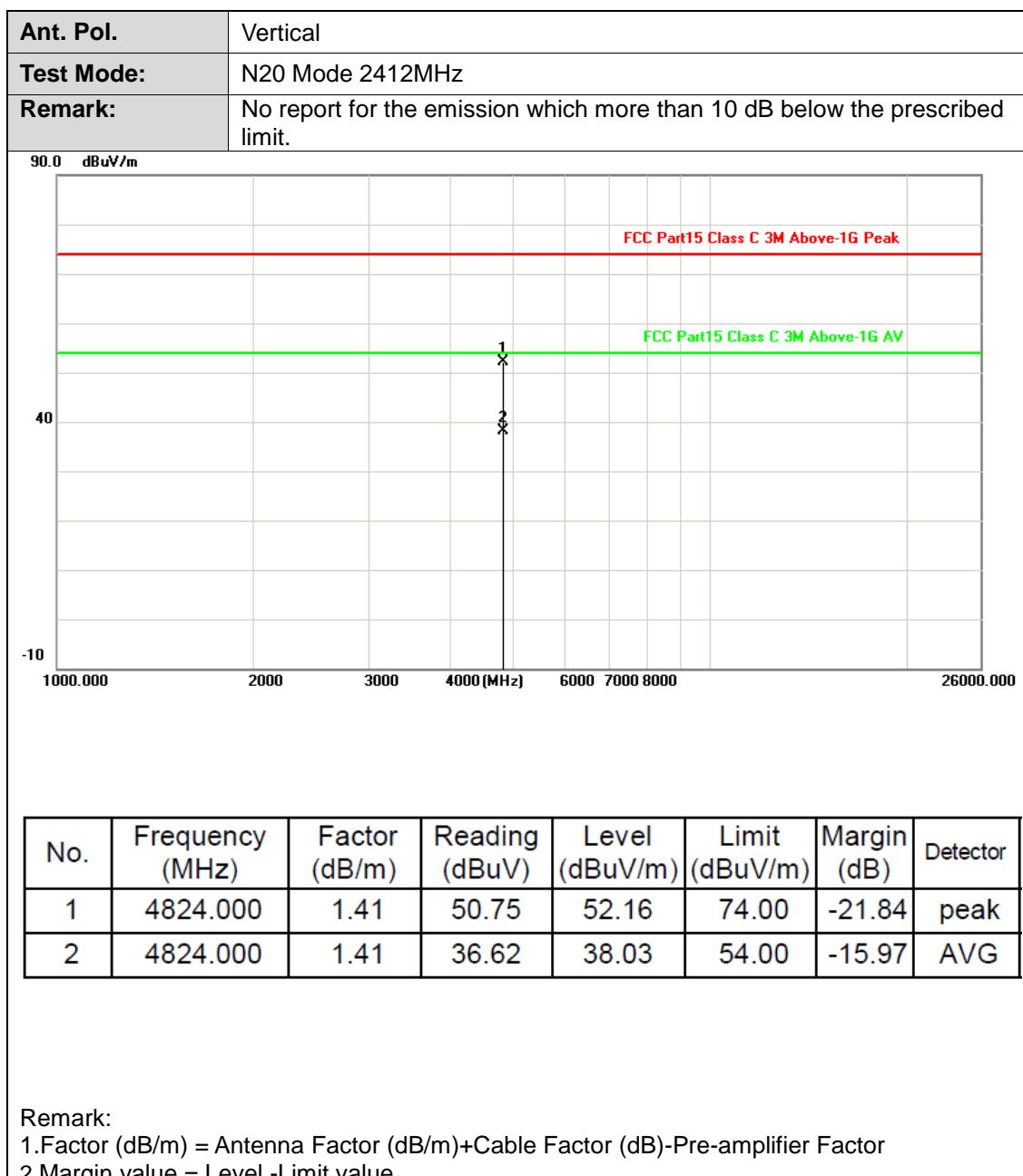
Ant. Pol.	Horizontal
Test Mode:	N20 Mode 2412MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.

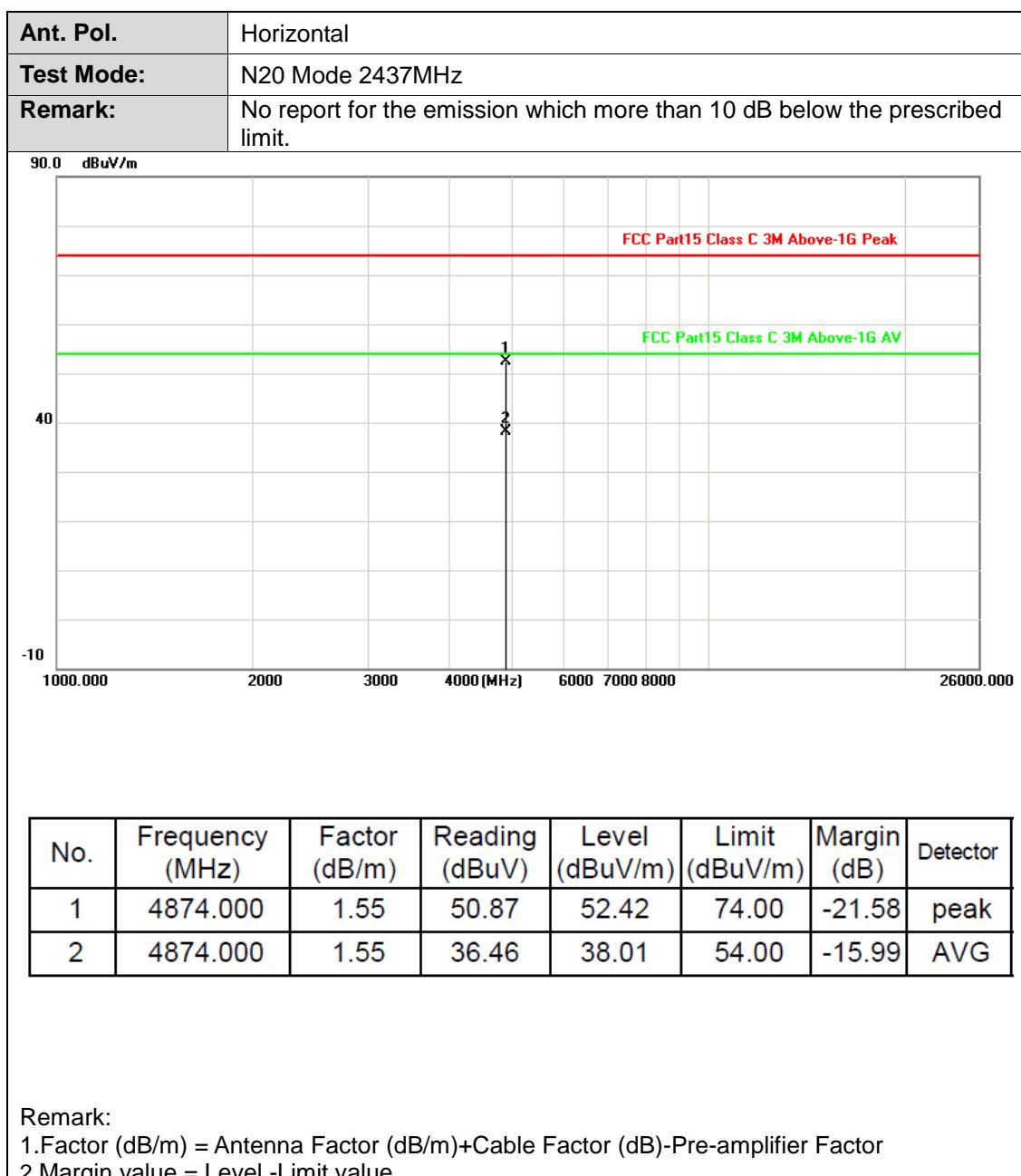


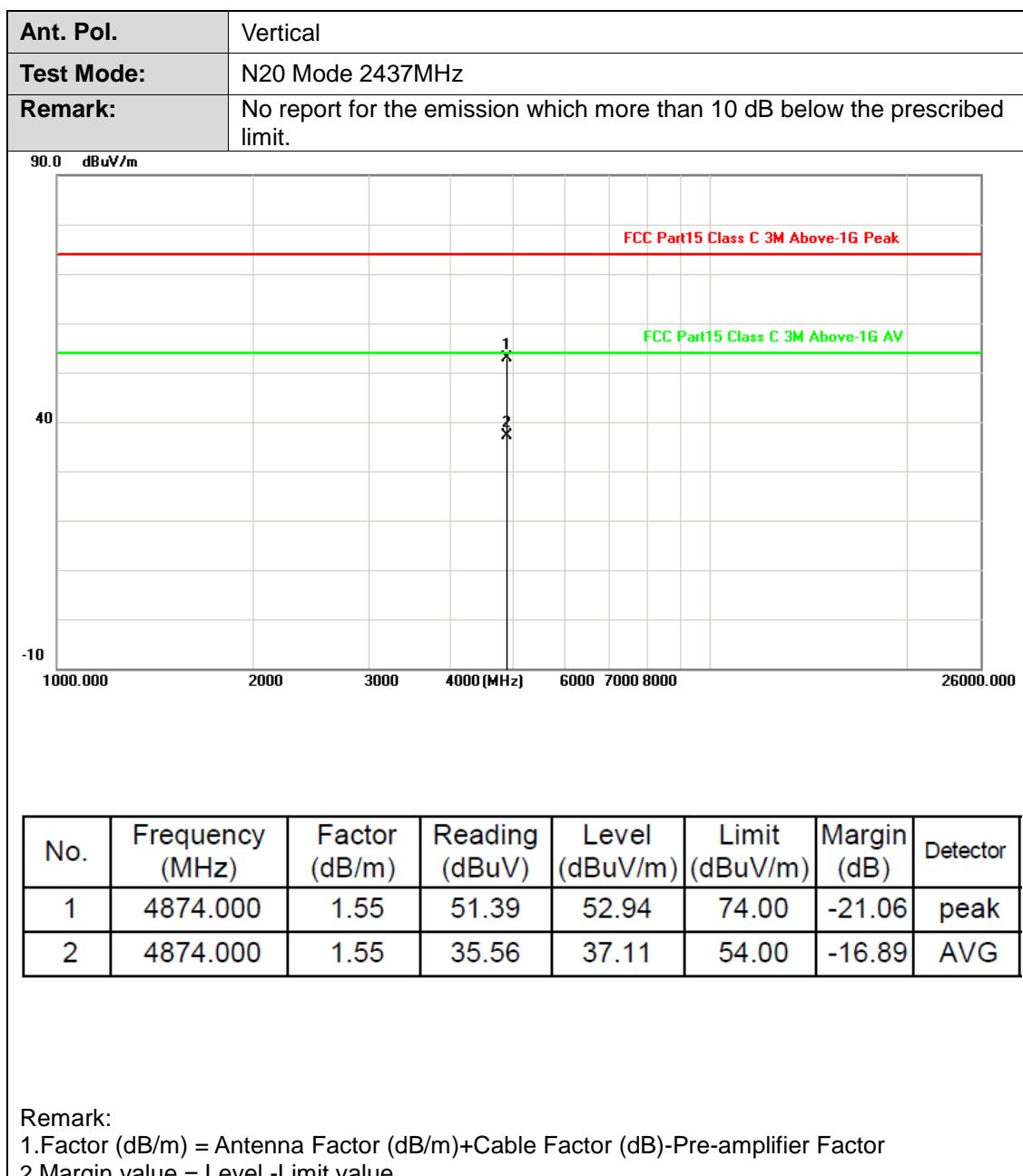
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4824.000	1.41	49.95	51.36	74.00	-22.64	peak
2	4824.000	1.41	36.07	37.48	54.00	-16.52	AVG

Remark:

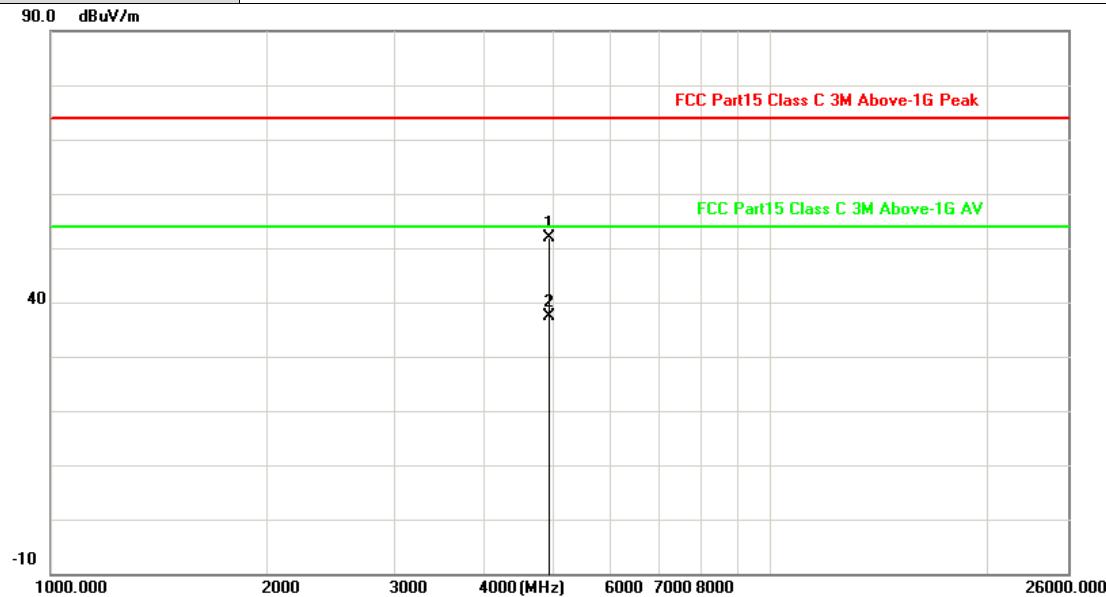
1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2. Margin value = Level -Limit value







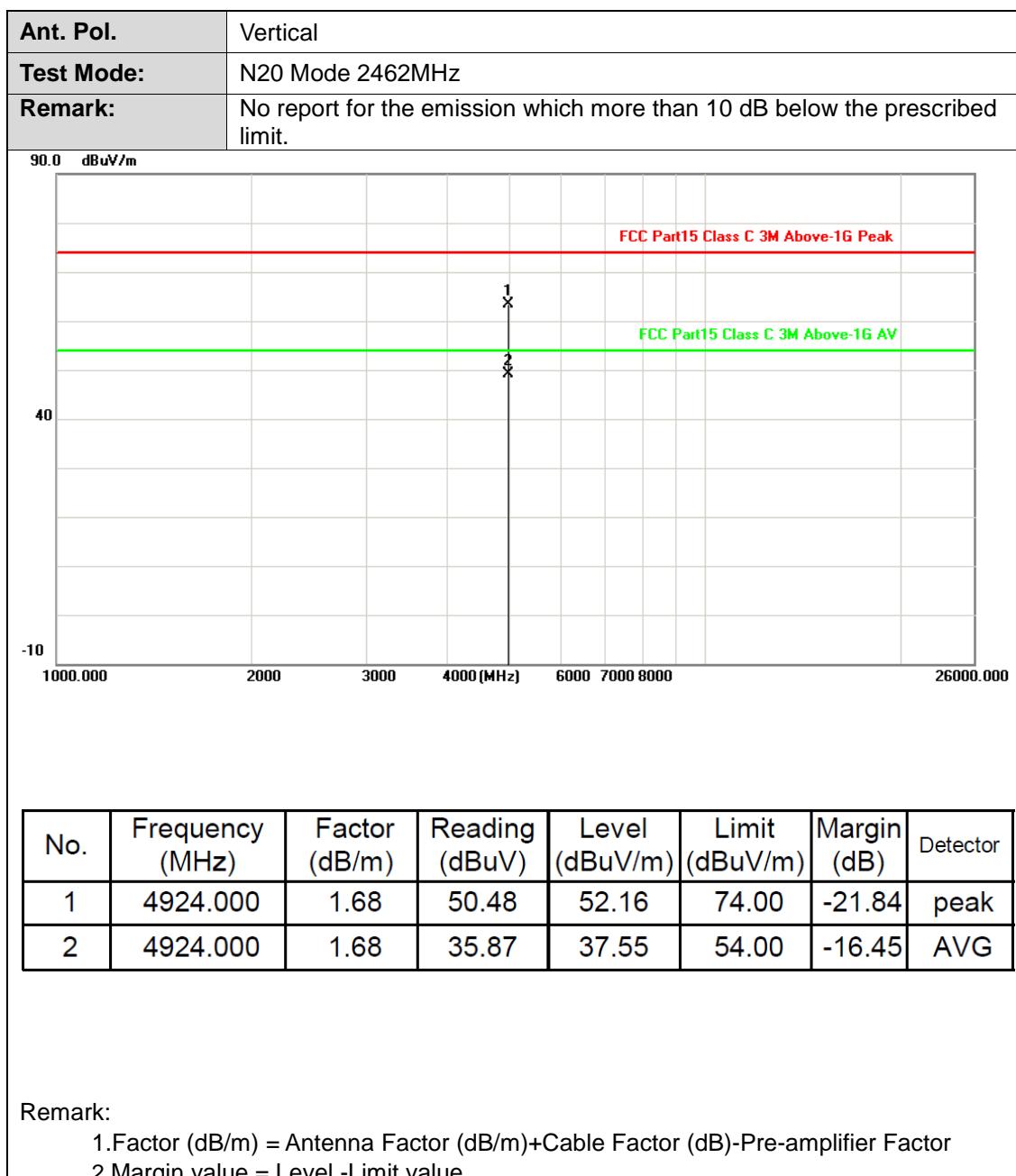
Ant. Pol.	Horizontal
Test Mode:	N20 Mode 2462MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.



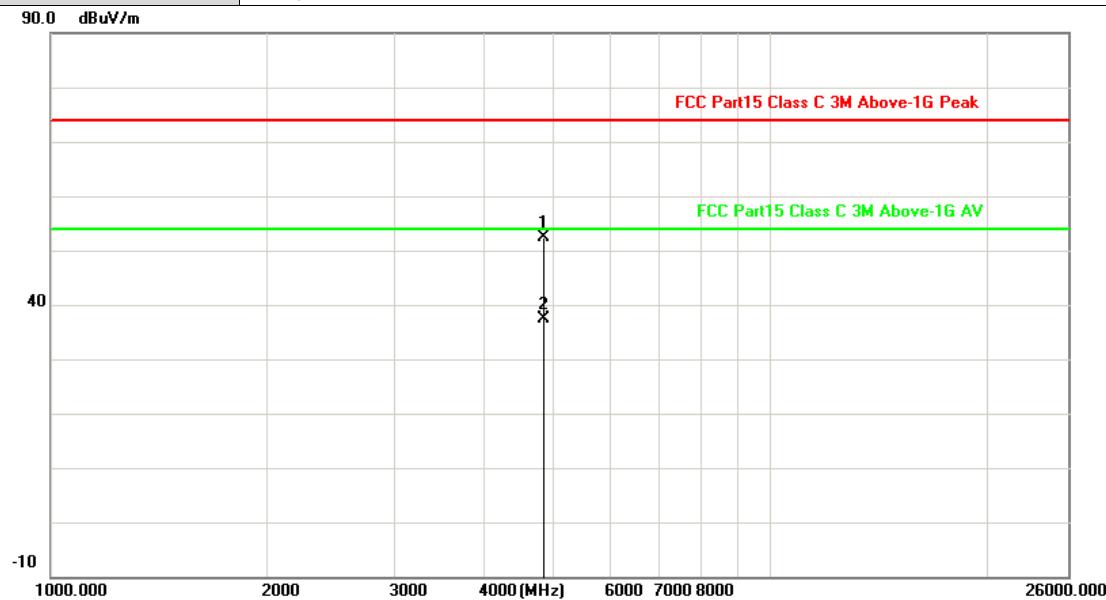
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	4924.000	1.68	50.10	51.78	74.00	-22.22
2	4924.000	1.68	35.81	37.49	54.00	-16.51

Remark:

1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2. Margin value = Level -Limit value



Ant. Pol.	Horizontal
Test Mode:	N40 Mode 2422MHz
Remark:	No report for the emission which more than 10 dB below the prescribed limit.

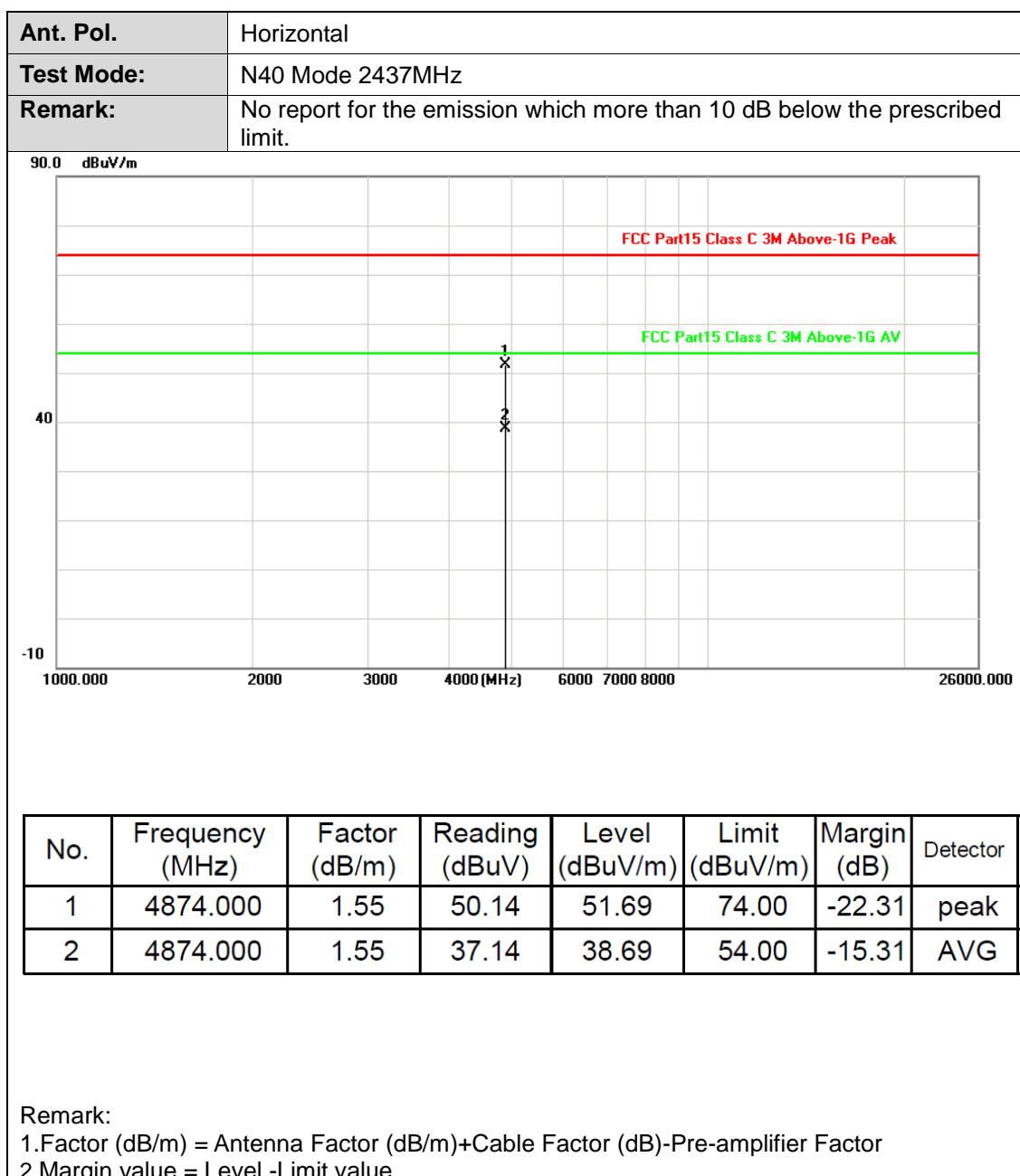


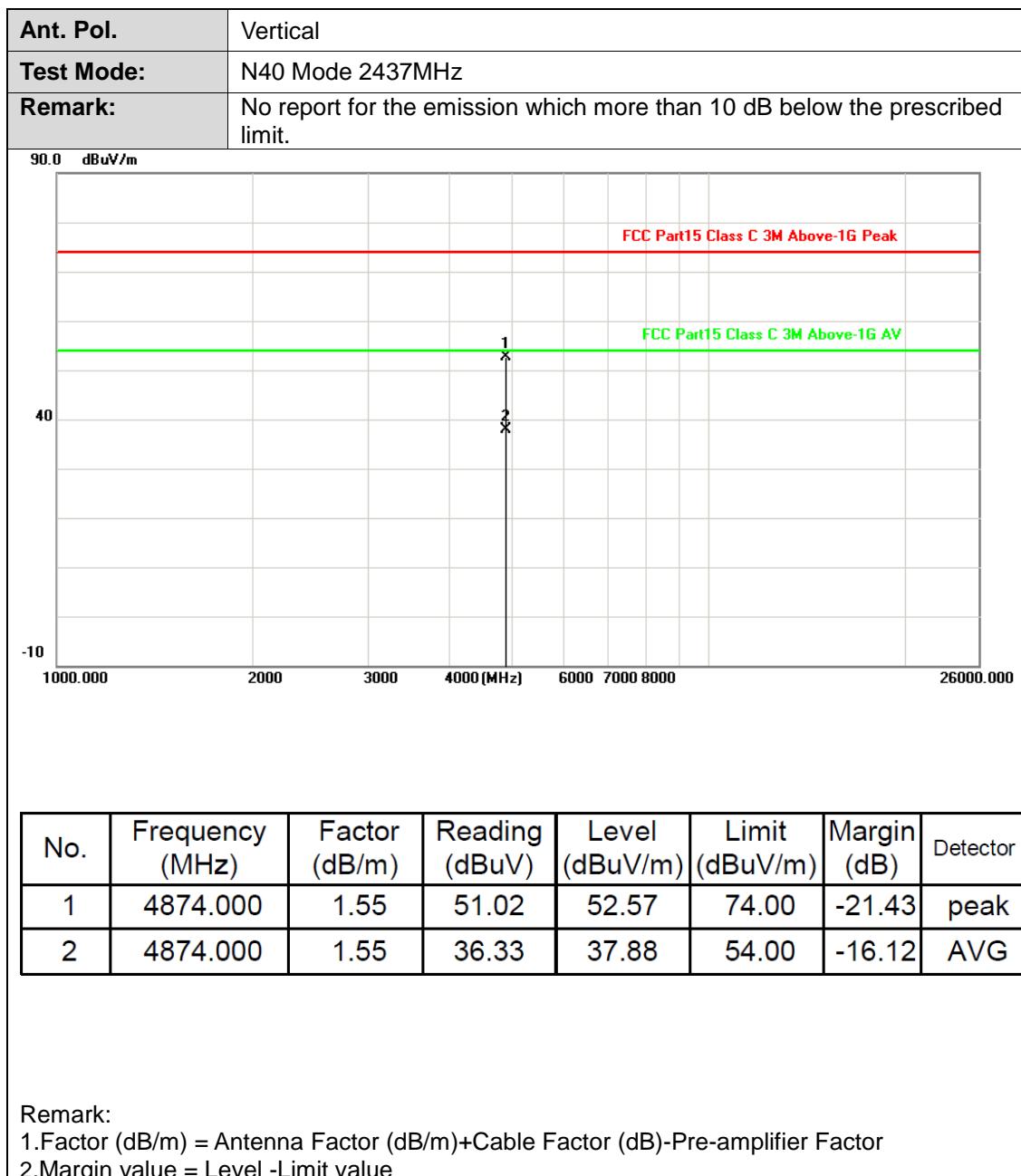
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4844.000	1.47	51.00	52.47	74.00	-21.53	peak
2	4844.000	1.47	35.79	37.26	54.00	-16.74	AVG

Remark:

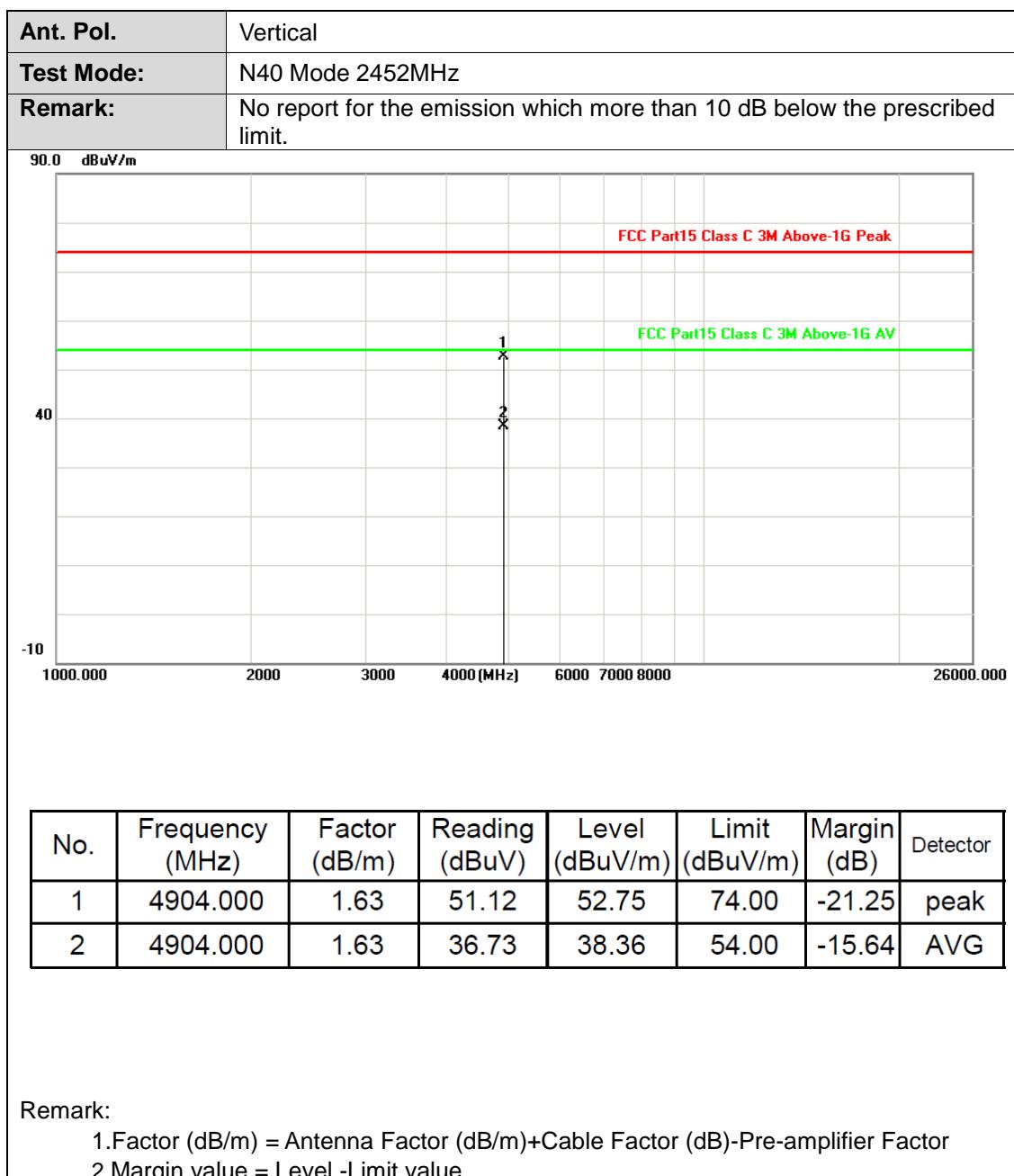
1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
2. Margin value = Level -Limit value

Ant. Pol.	Vertical																														
Test Mode:	N40 Mode 2422MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
<table border="1"> <thead> <tr> <th>No.</th><th>Frequency (MHz)</th><th>Factor (dB/m)</th><th>Reading (dBuV)</th><th>Level (dBuV/m)</th><th>Limit (dBuV/m)</th><th>Margin (dB)</th><th>Detector</th></tr> </thead> <tbody> <tr> <td>1</td><td>4844.000</td><td>1.47</td><td>50.28</td><td>51.75</td><td>74.00</td><td>-22.25</td><td>peak</td></tr> <tr> <td>2</td><td>4844.000</td><td>1.47</td><td>36.76</td><td>38.23</td><td>54.00</td><td>-15.77</td><td>AVG</td></tr> </tbody> </table>								No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	1	4844.000	1.47	50.28	51.75	74.00	-22.25	peak	2	4844.000	1.47	36.76	38.23	54.00	-15.77	AVG
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4844.000	1.47	50.28	51.75	74.00	-22.25	peak																								
2	4844.000	1.47	36.76	38.23	54.00	-15.77	AVG																								
<p>Remark:</p> <p>1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor</p> <p>2. Margin value = Level - Limit value</p>																															





Ant. Pol.	Horizontal																														
Test Mode:	N40 Mode 2452MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
<table border="1"> <thead> <tr> <th>No.</th><th>Frequency (MHz)</th><th>Factor (dB/m)</th><th>Reading (dBuV)</th><th>Level (dBuV/m)</th><th>Limit (dBuV/m)</th><th>Margin (dB)</th><th>Detector</th></tr> </thead> <tbody> <tr> <td>1</td><td>4904.000</td><td>1.63</td><td>49.75</td><td>51.38</td><td>74.00</td><td>-22.62</td><td>peak</td></tr> <tr> <td>2</td><td>4904.000</td><td>1.63</td><td>35.96</td><td>37.59</td><td>54.00</td><td>-16.41</td><td>AVG</td></tr> </tbody> </table>								No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	1	4904.000	1.63	49.75	51.38	74.00	-22.62	peak	2	4904.000	1.63	35.96	37.59	54.00	-16.41	AVG
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4904.000	1.63	49.75	51.38	74.00	-22.62	peak																								
2	4904.000	1.63	35.96	37.59	54.00	-16.41	AVG																								
<p>Remark:</p> <p>1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor</p> <p>2. Margin value = Level -Limit value</p>																															

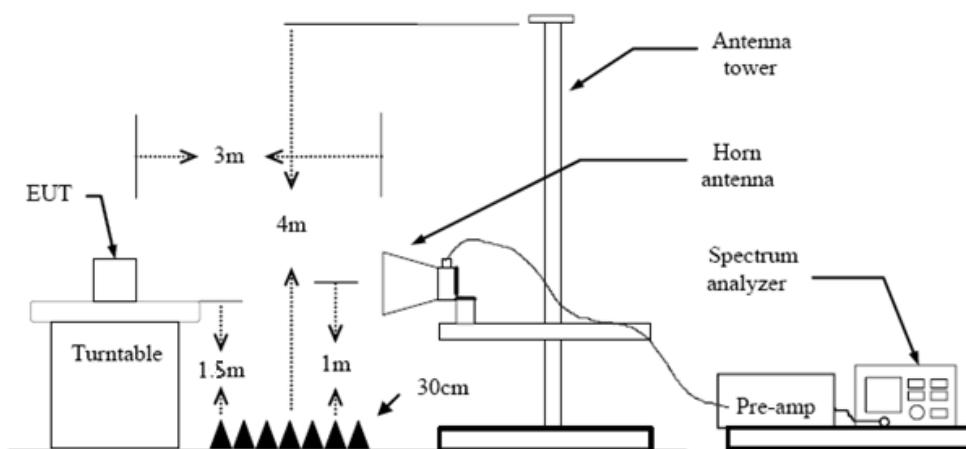


3.3. Band Edge Emissions

Limit

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54
Note: All restriction bands have been tested, only the worst case is reported.		

Test Configuration



Test Procedure

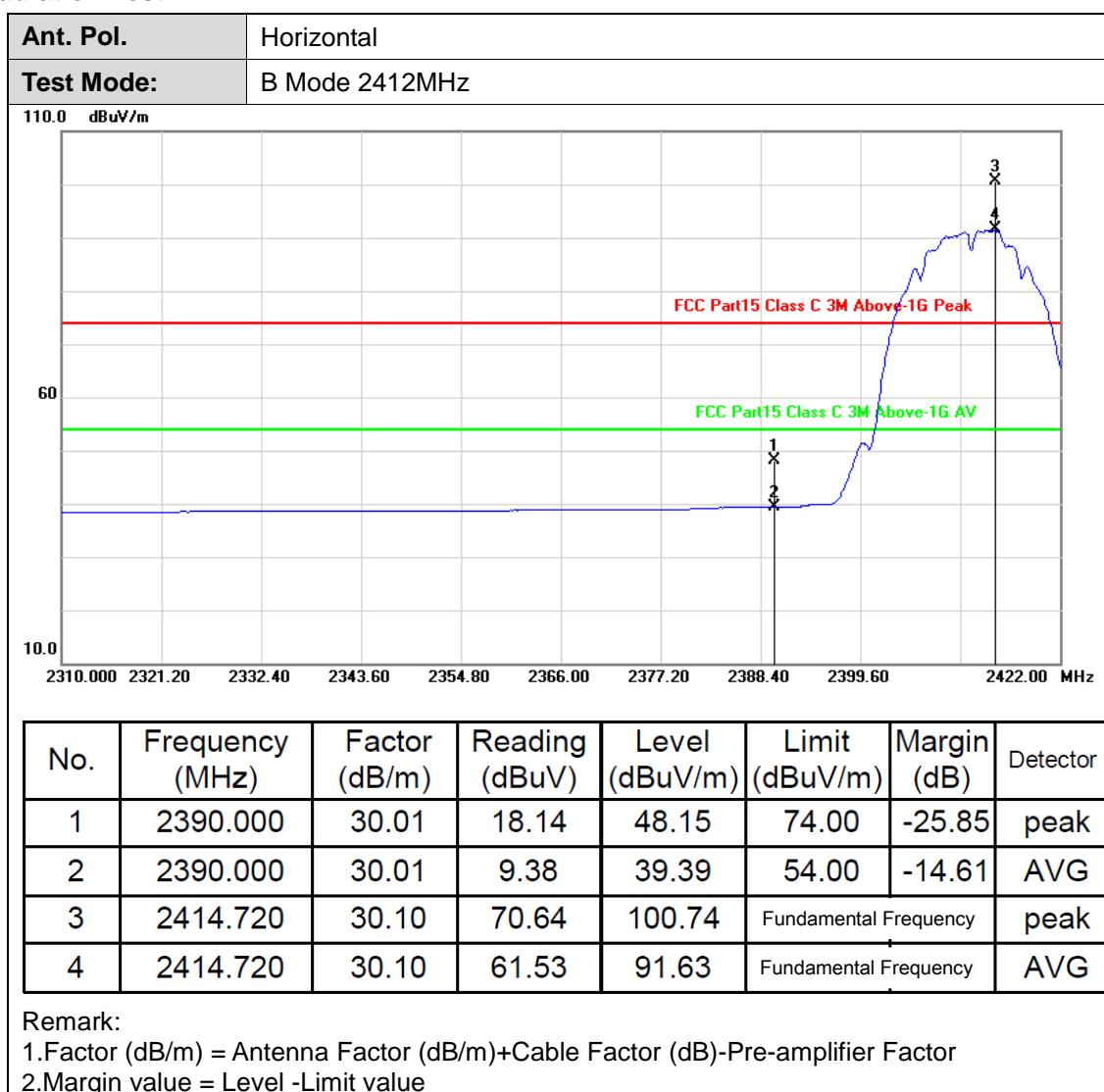
1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
RBW=1MHz, VBW=10Hz with PEAK Detector for Average Value.

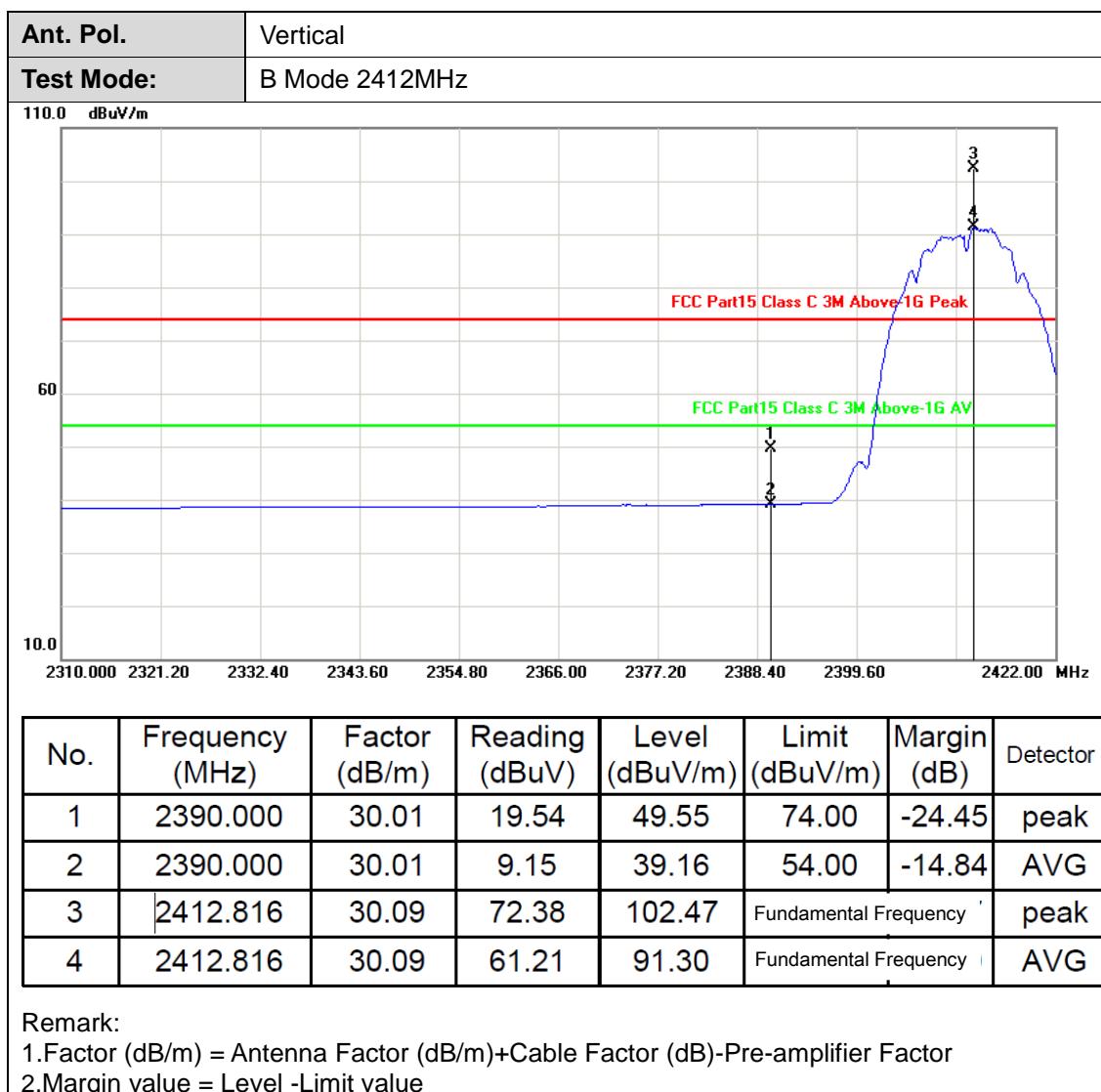
Test Mode

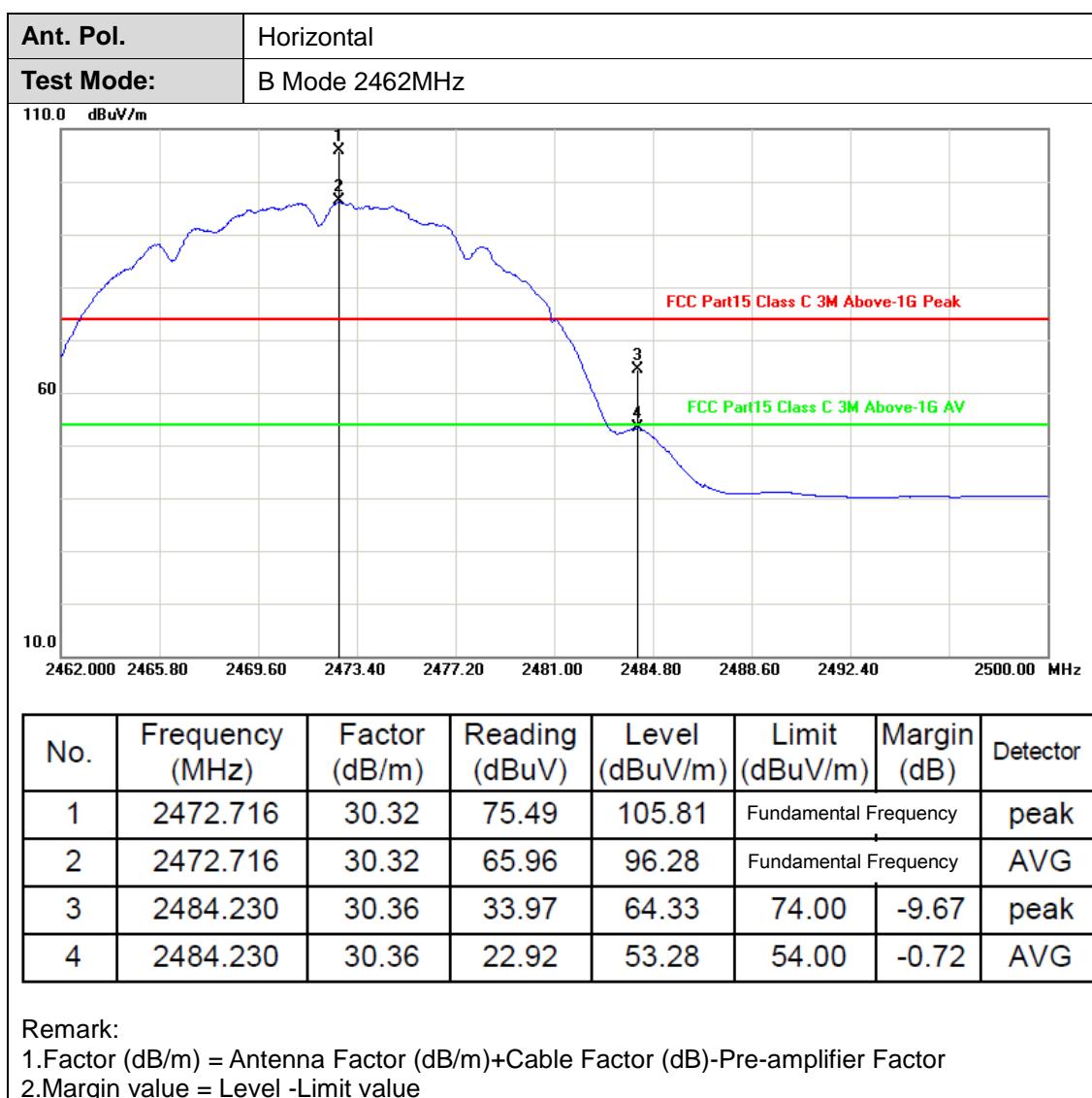
Please refer to the clause 2.3.

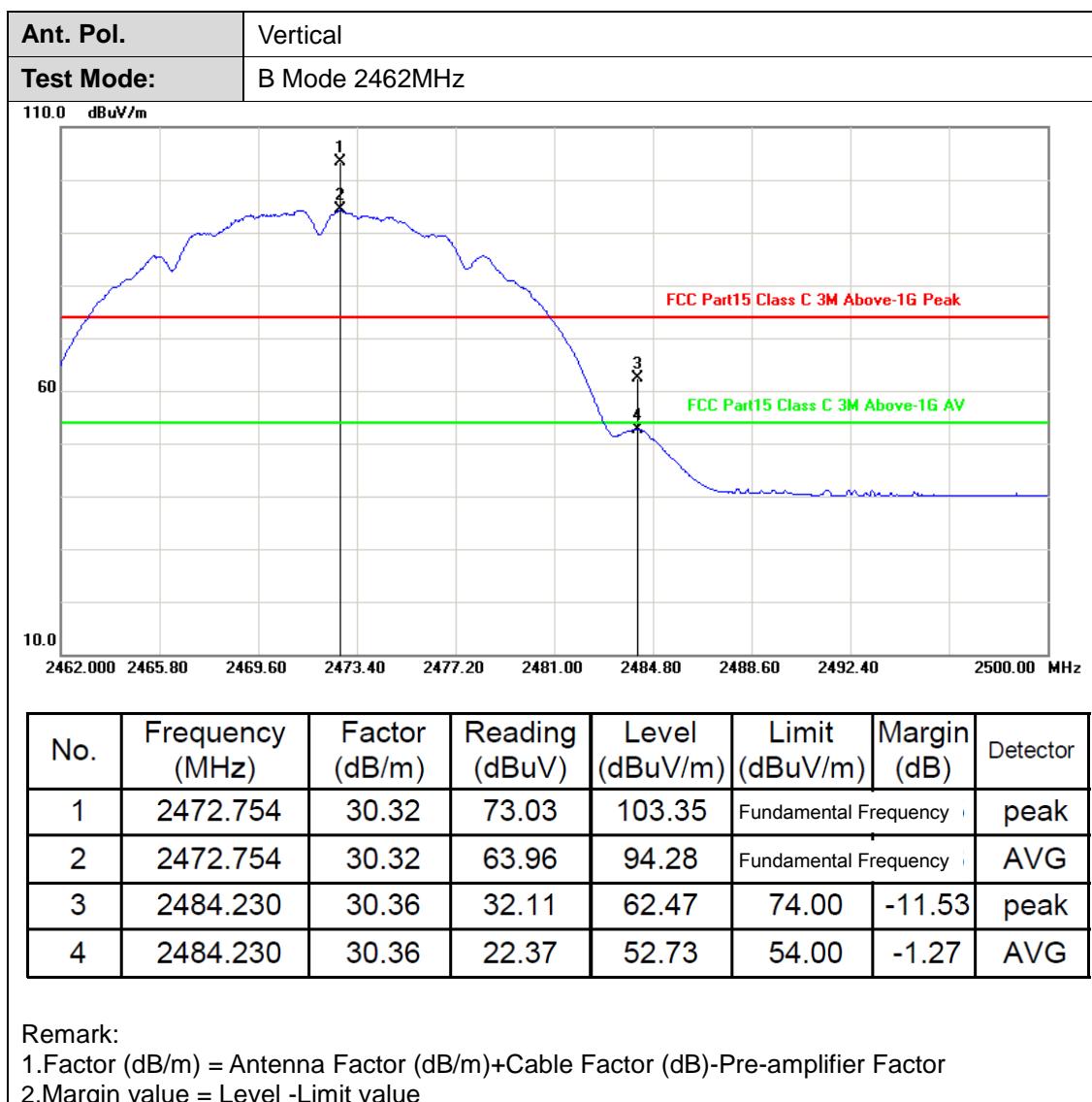
Test Results

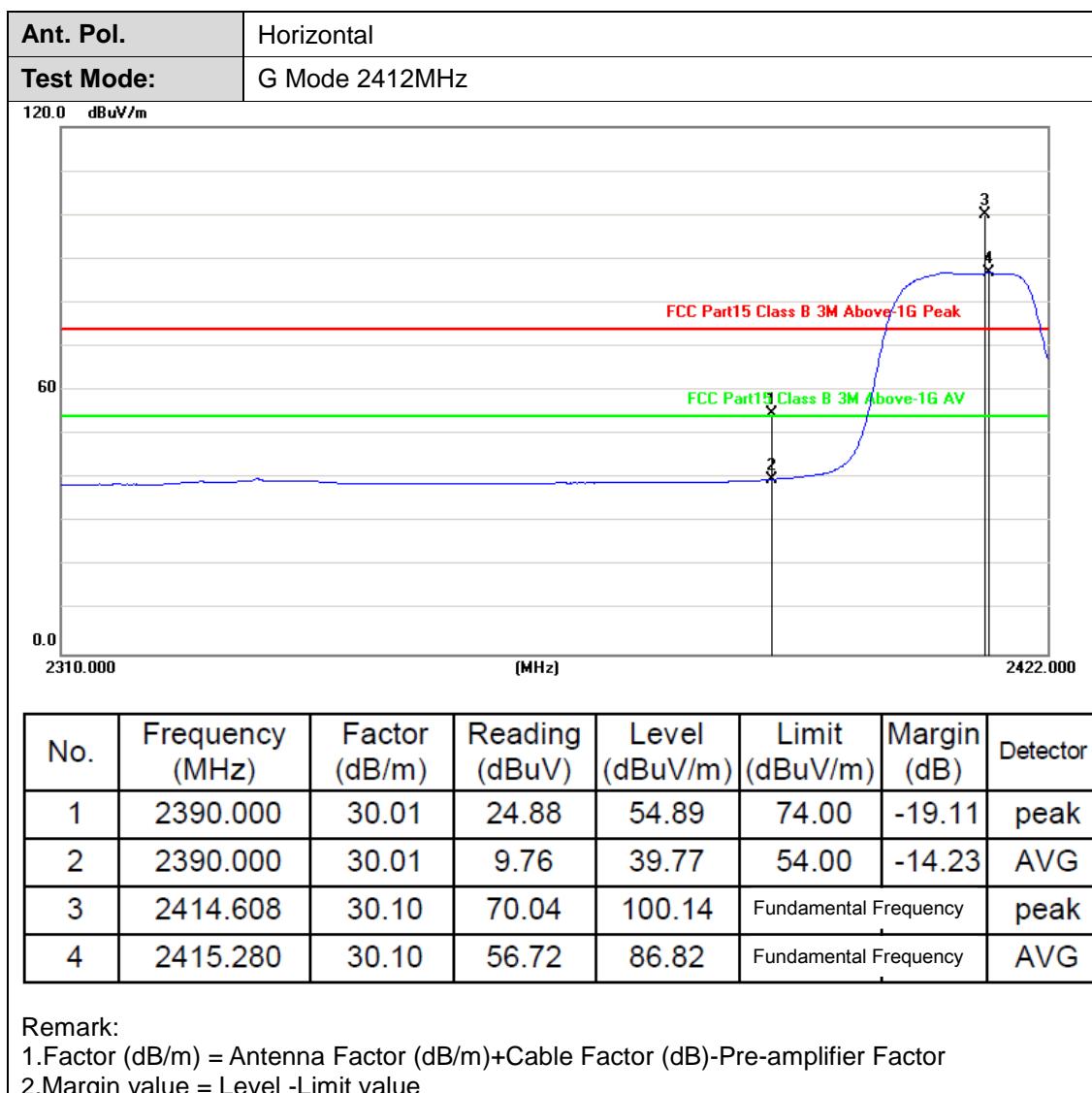
(1) Radiation Test

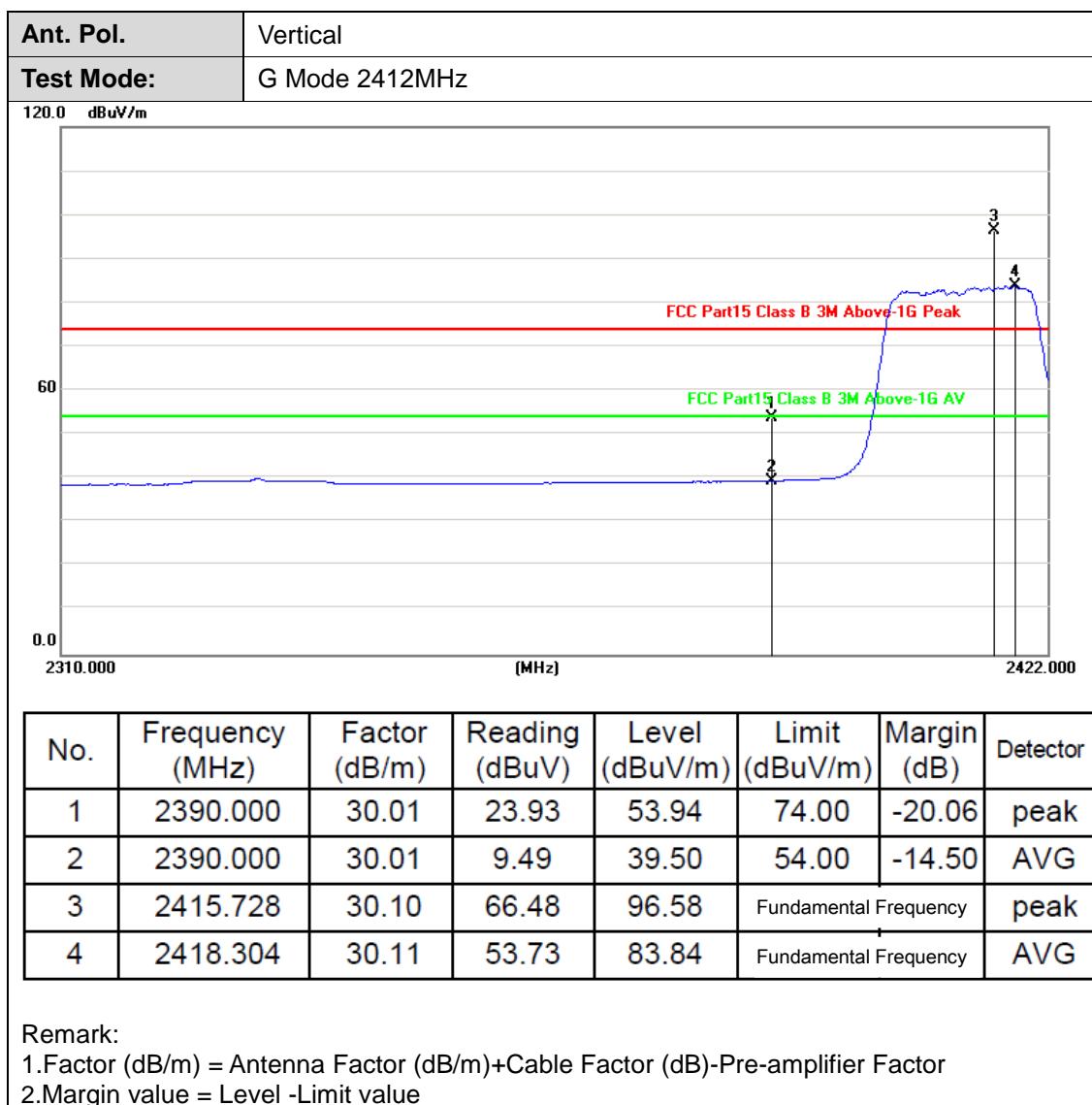


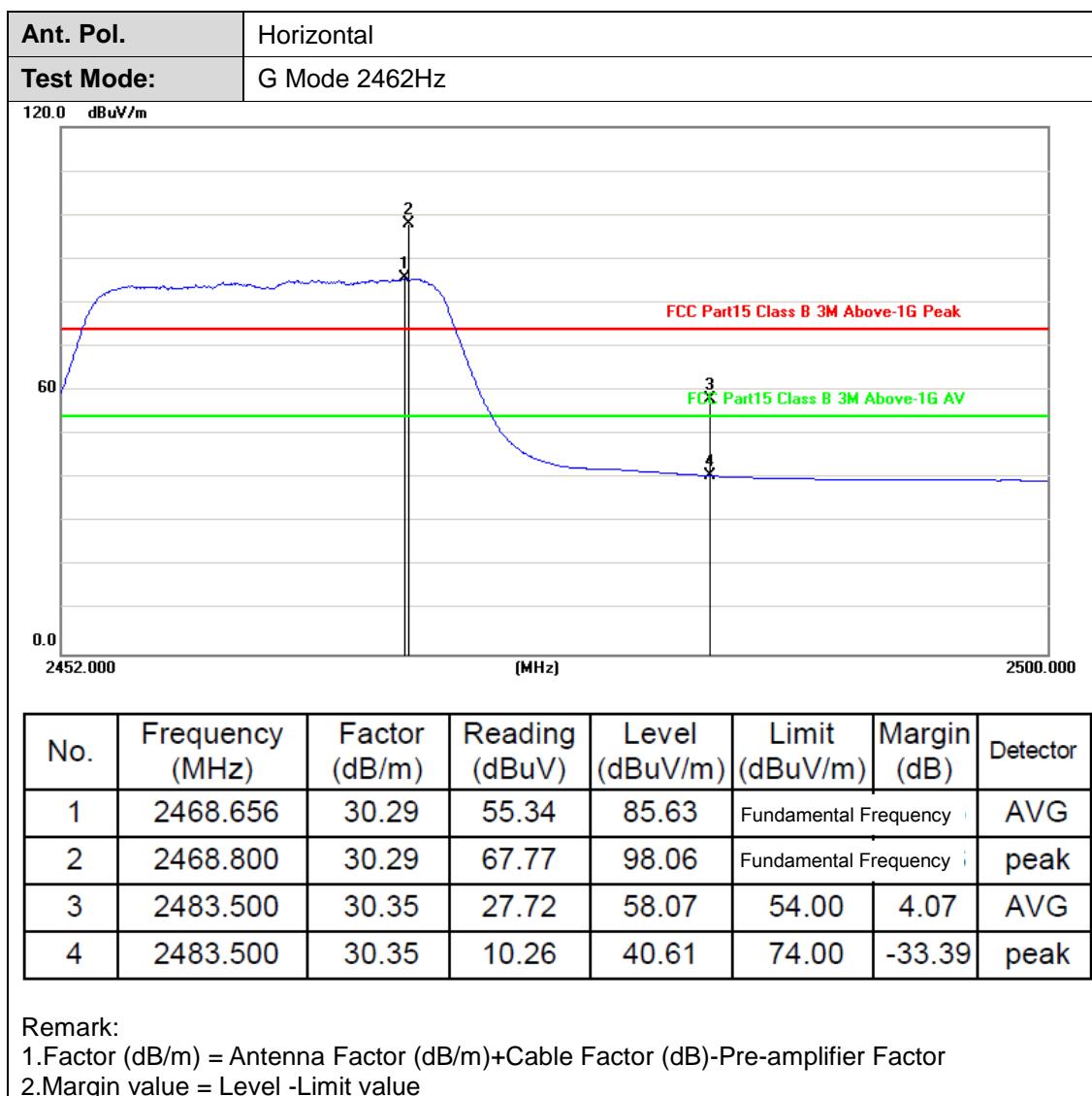


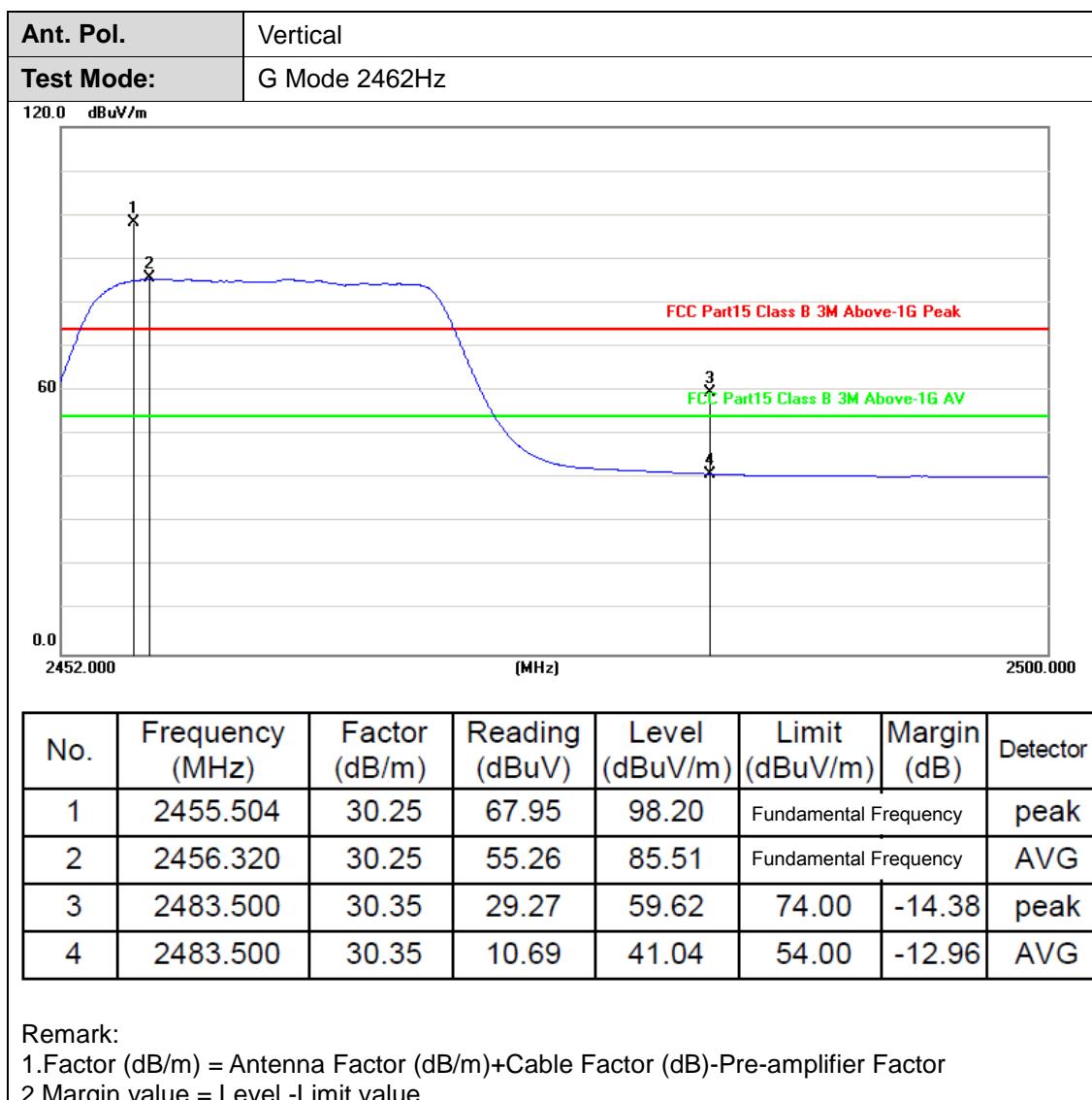


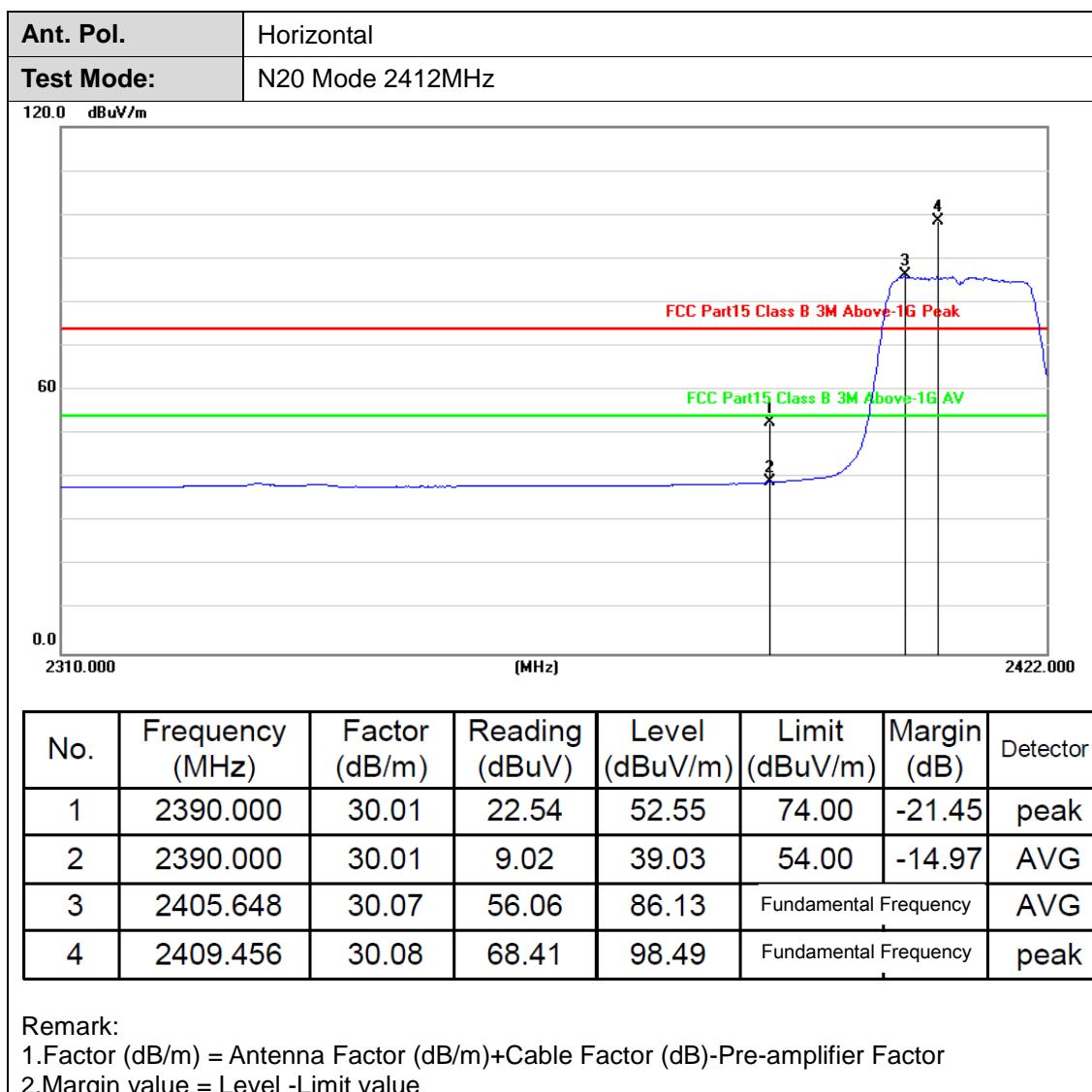


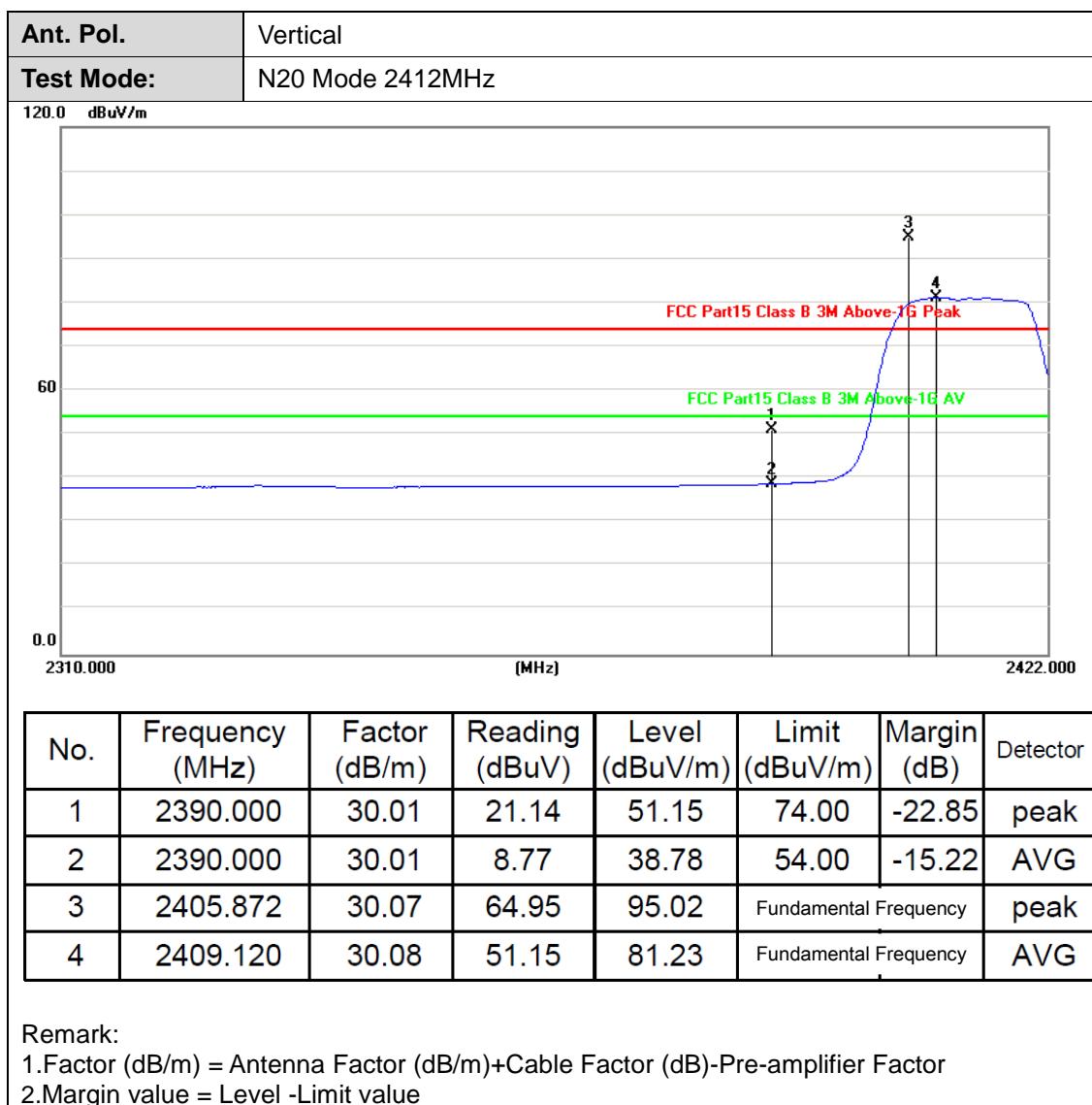


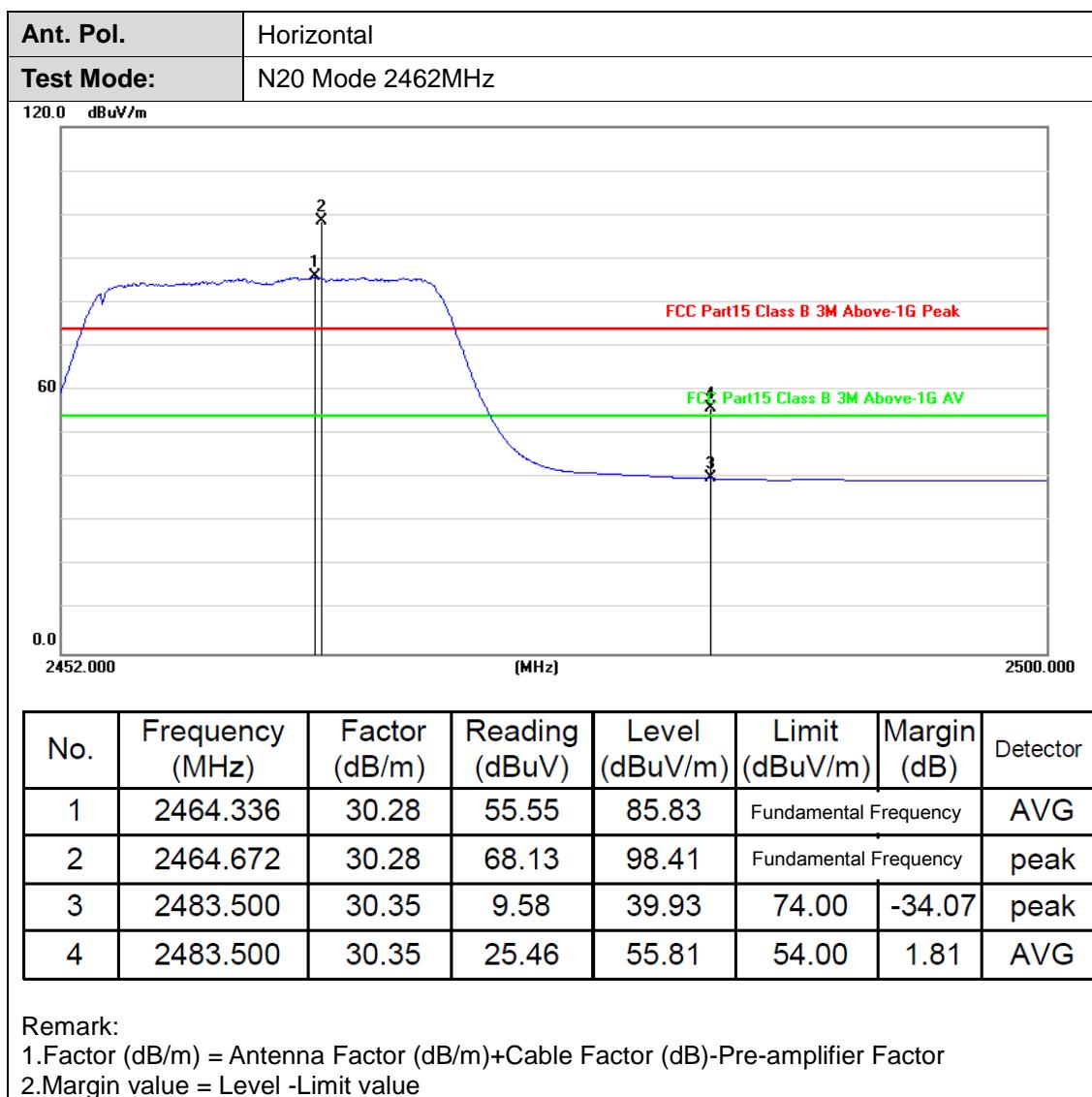


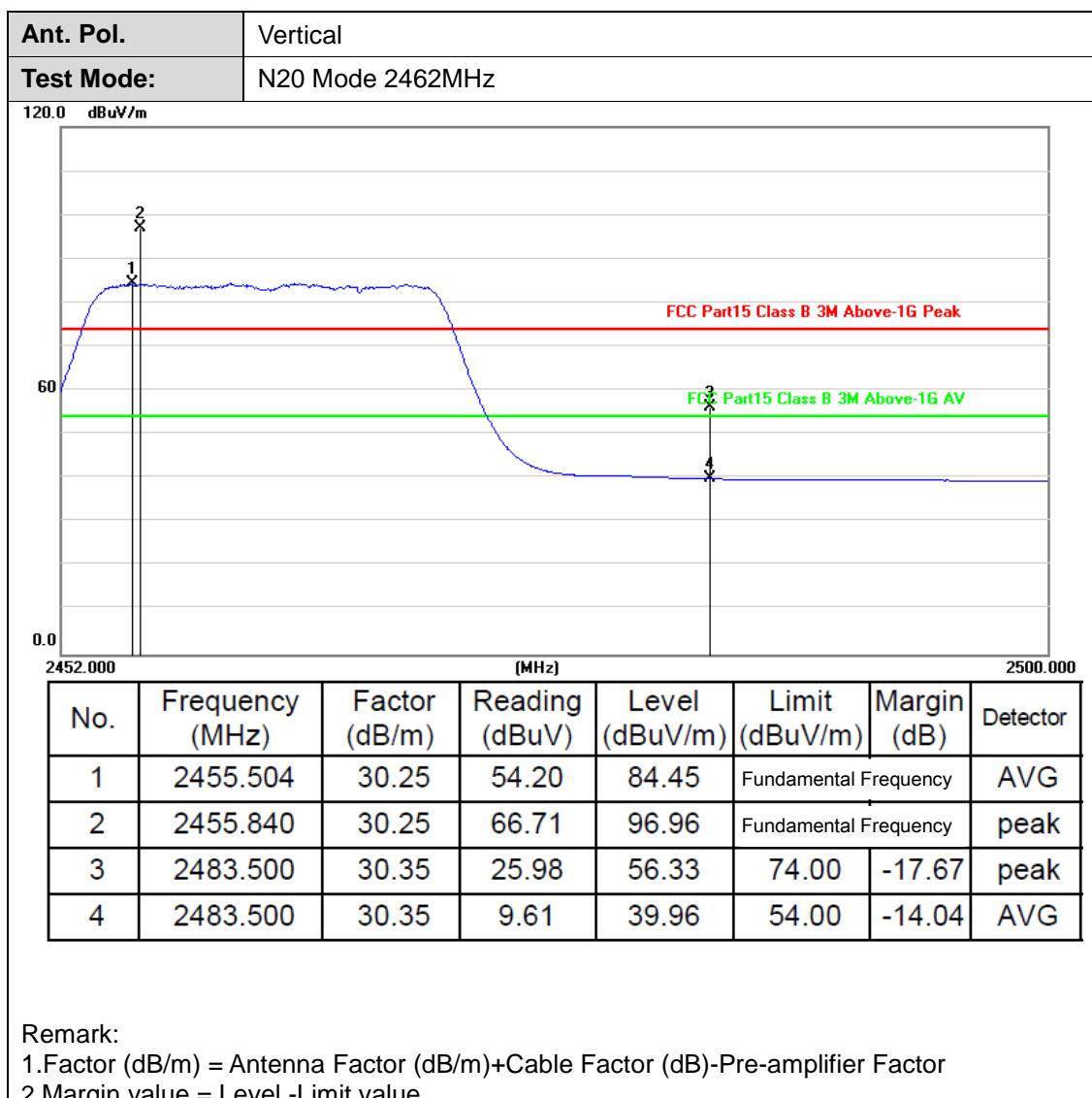


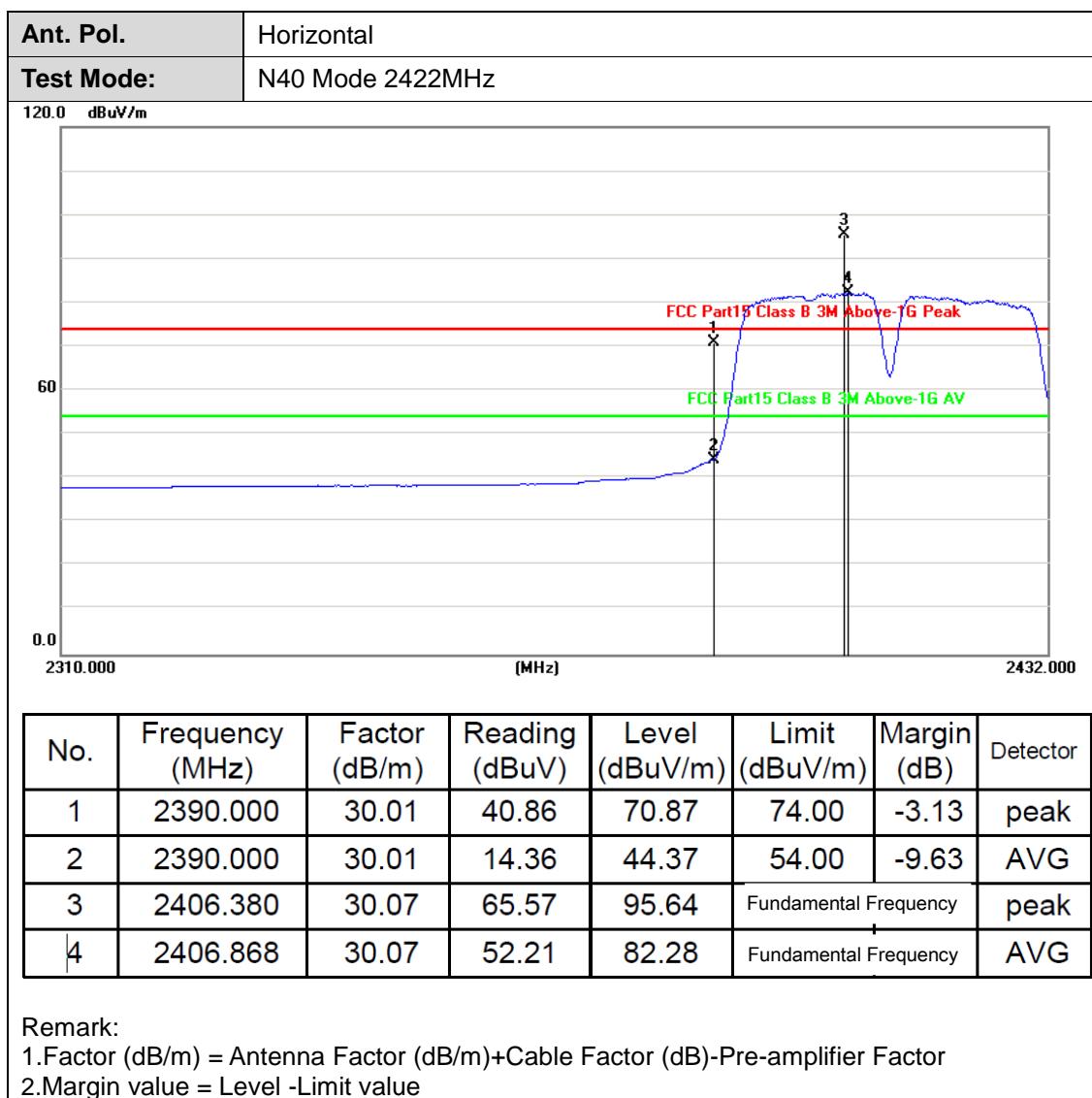


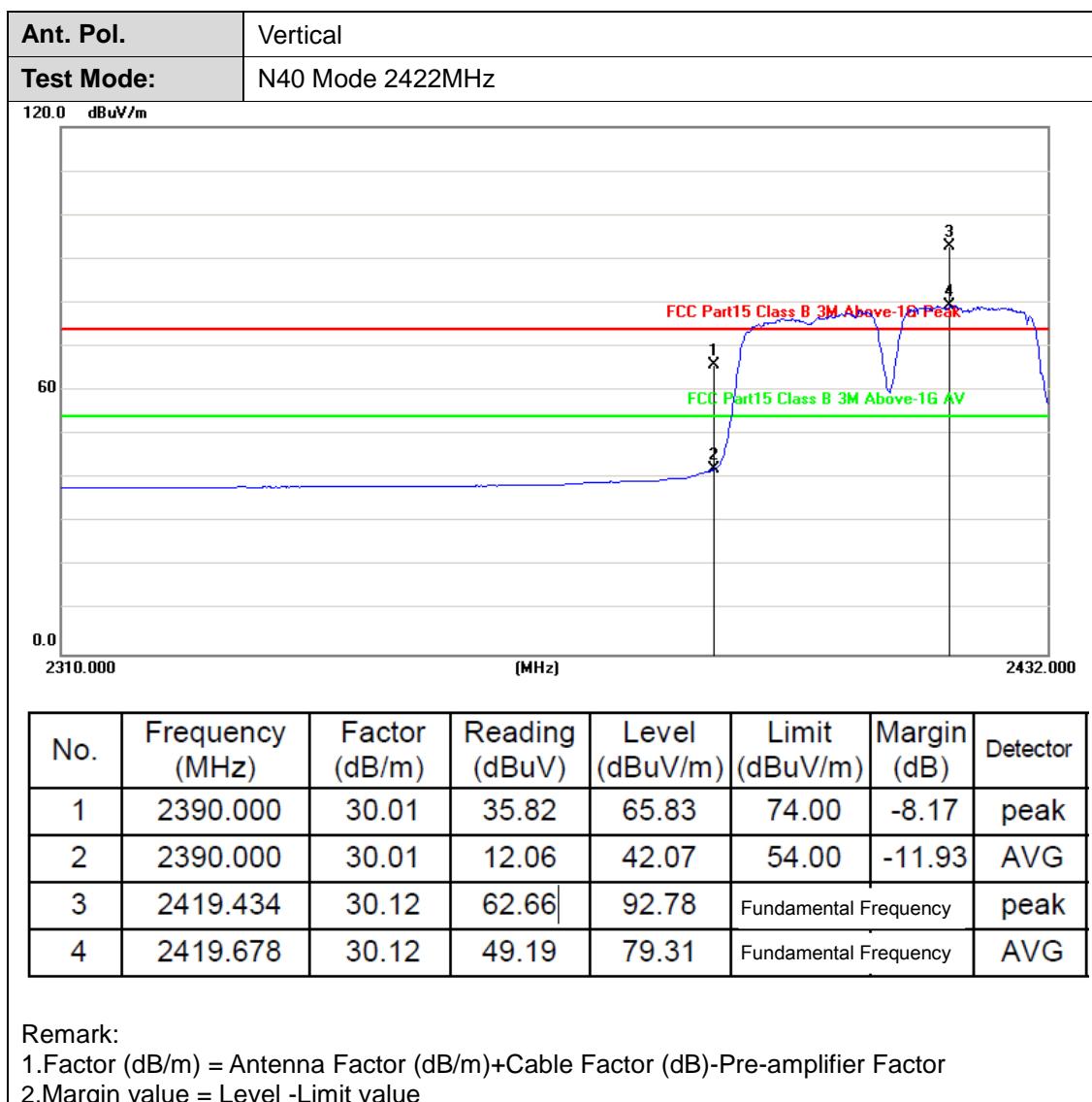


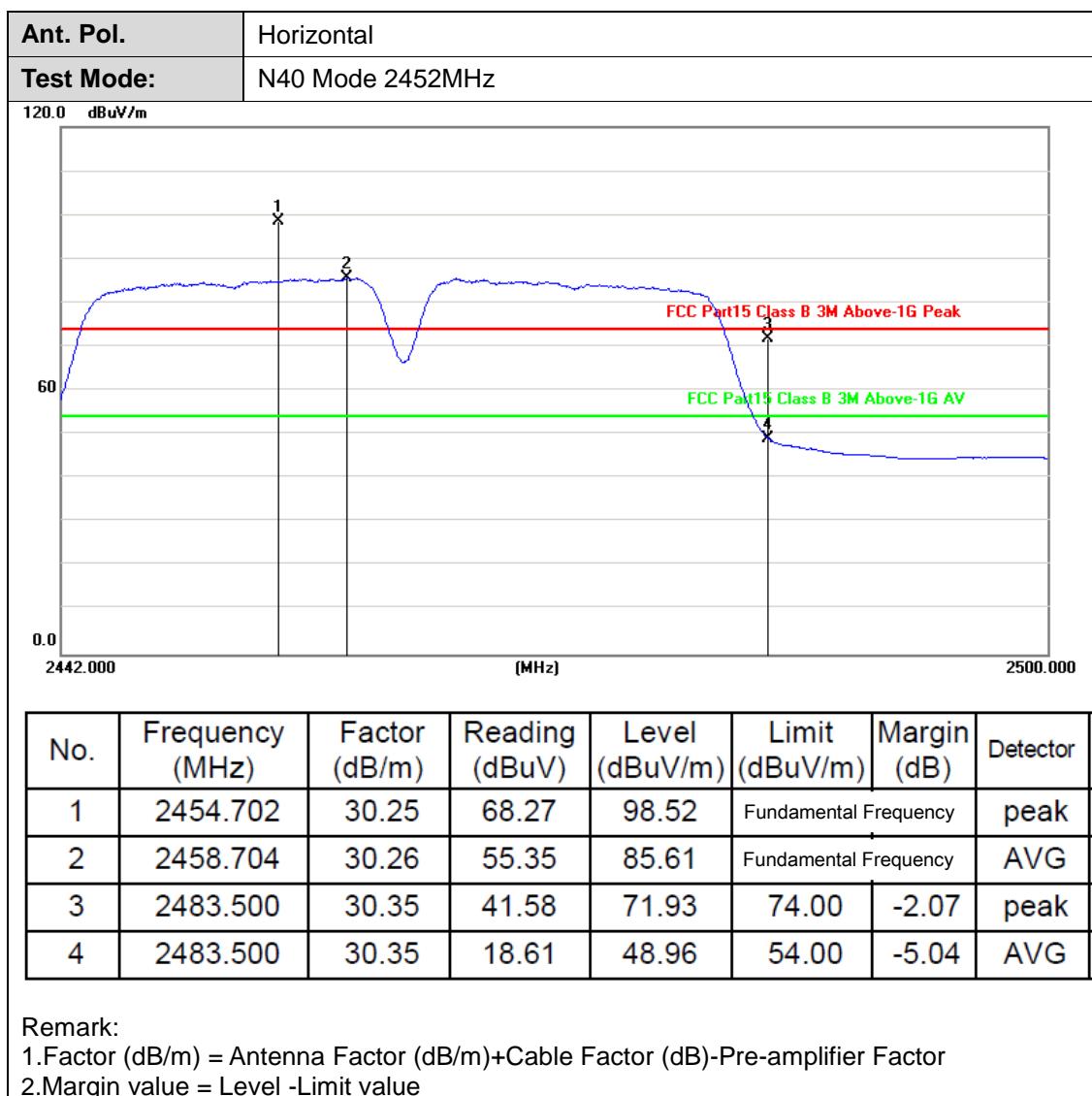


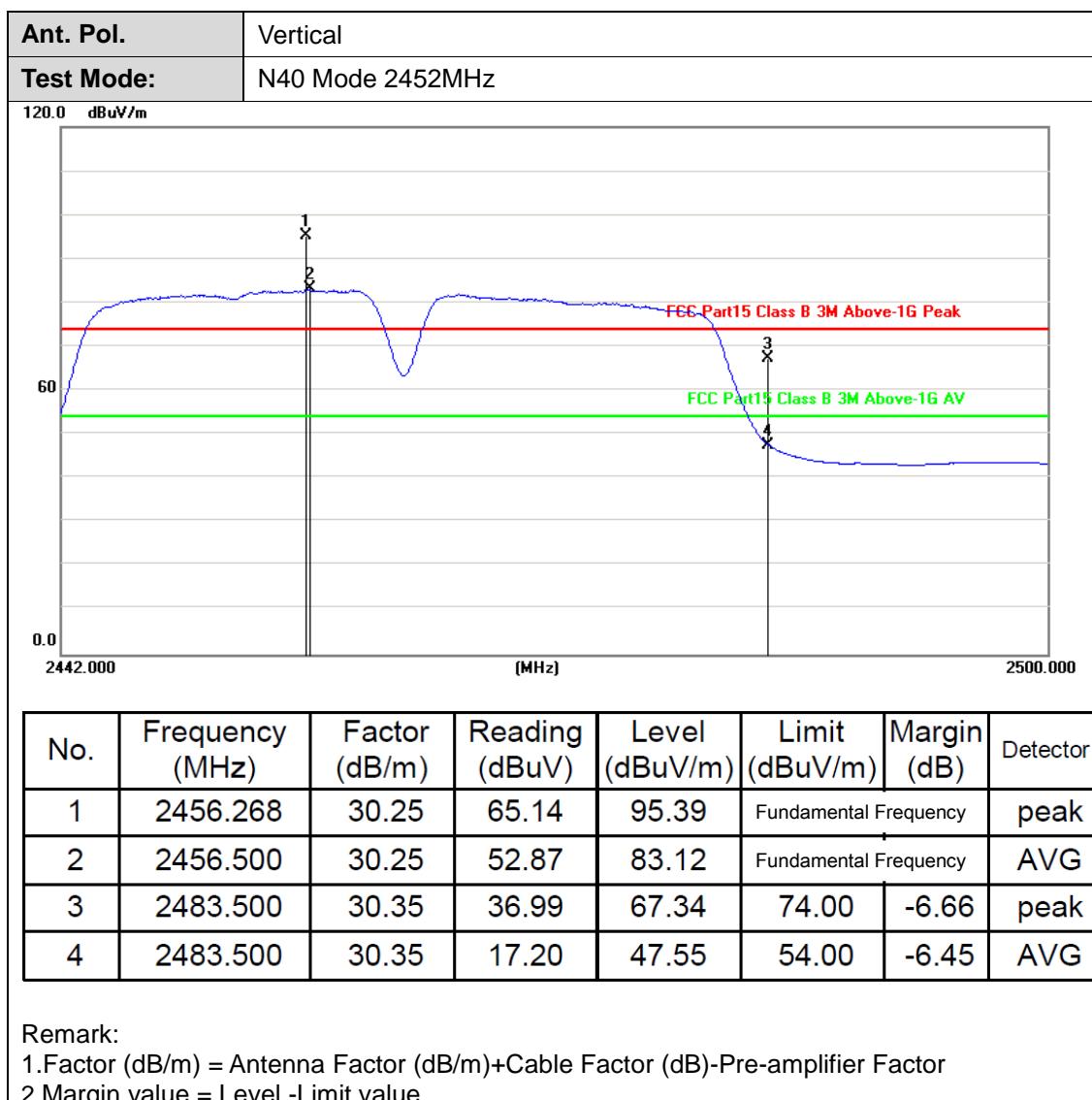




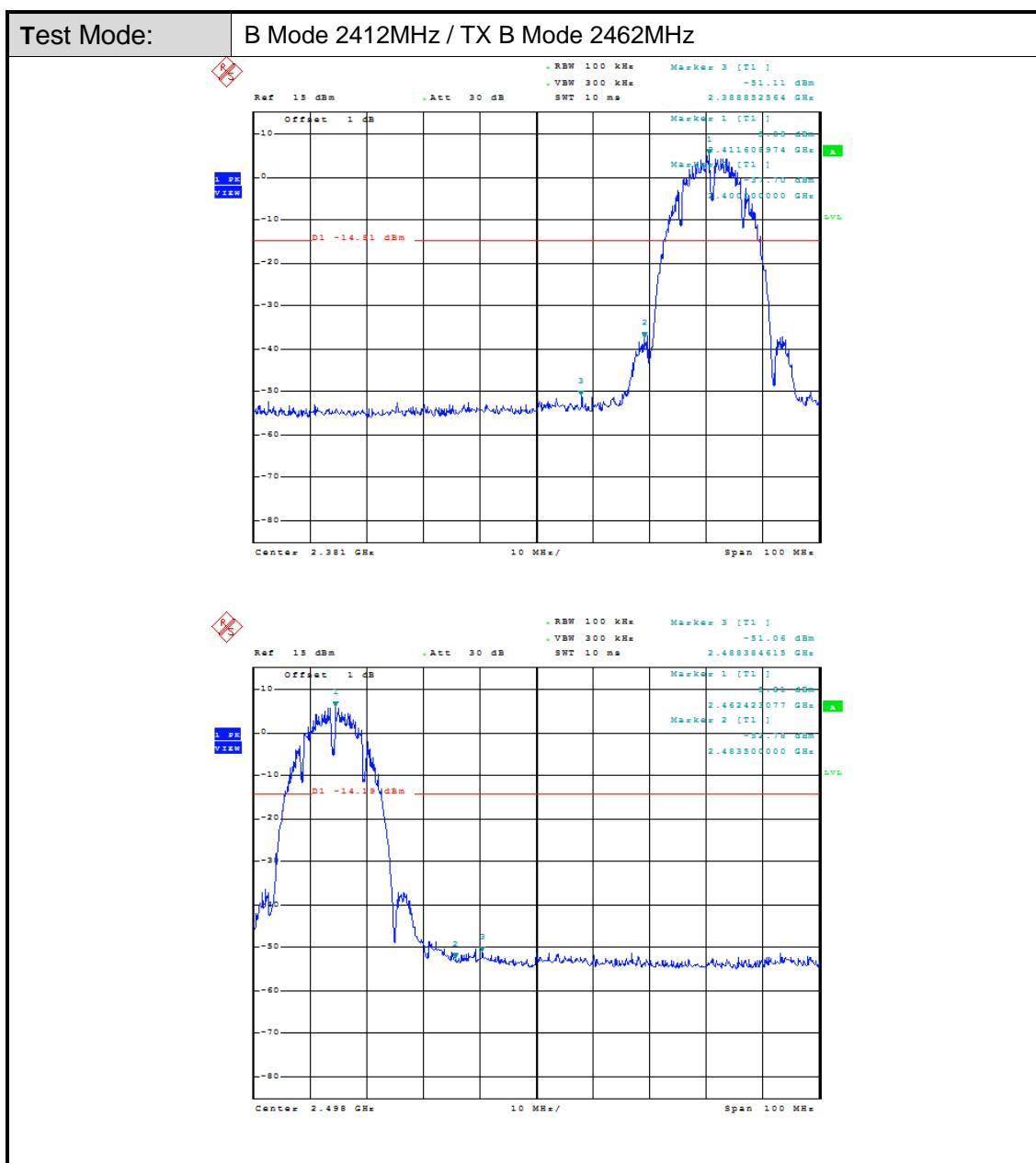


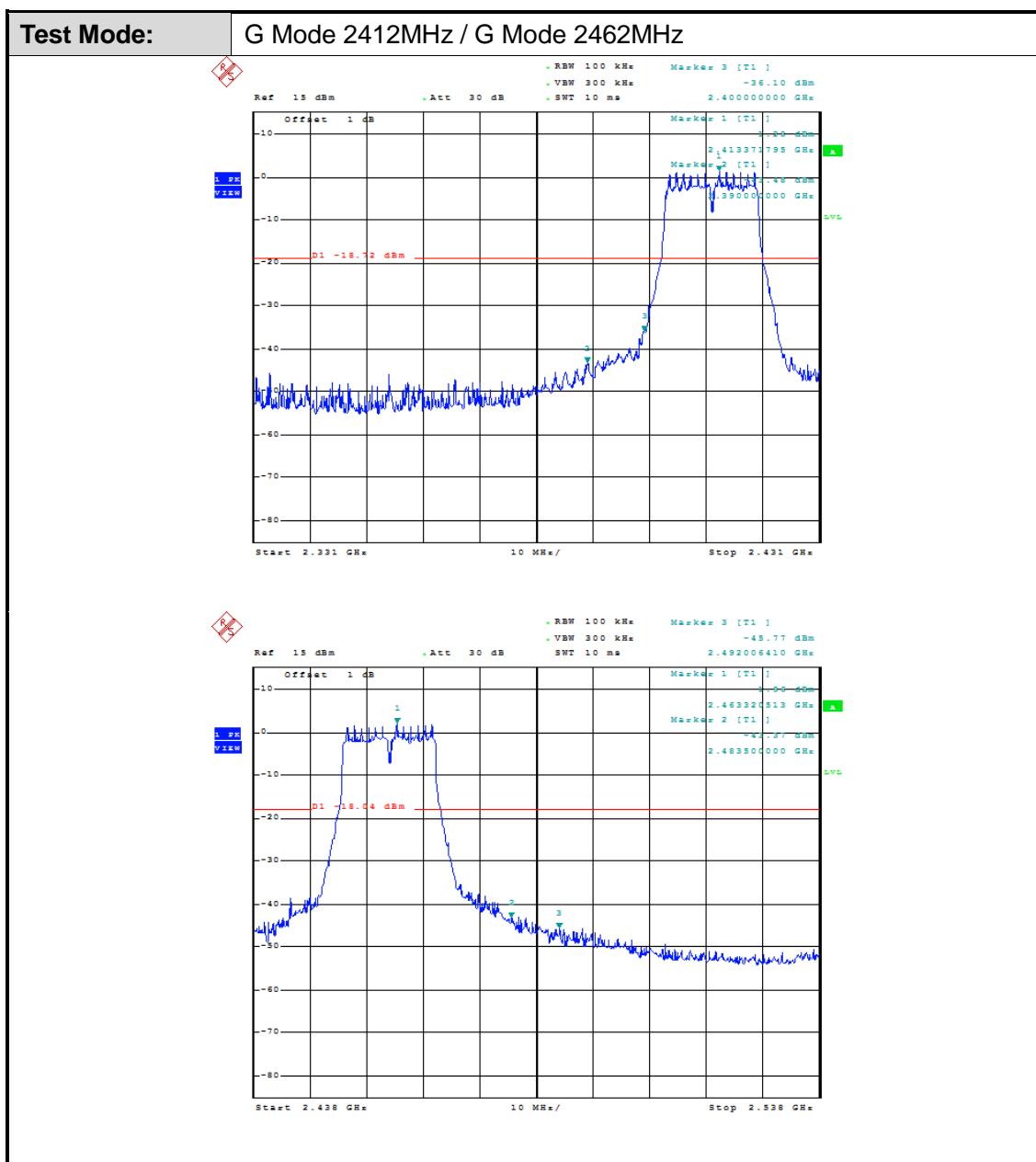


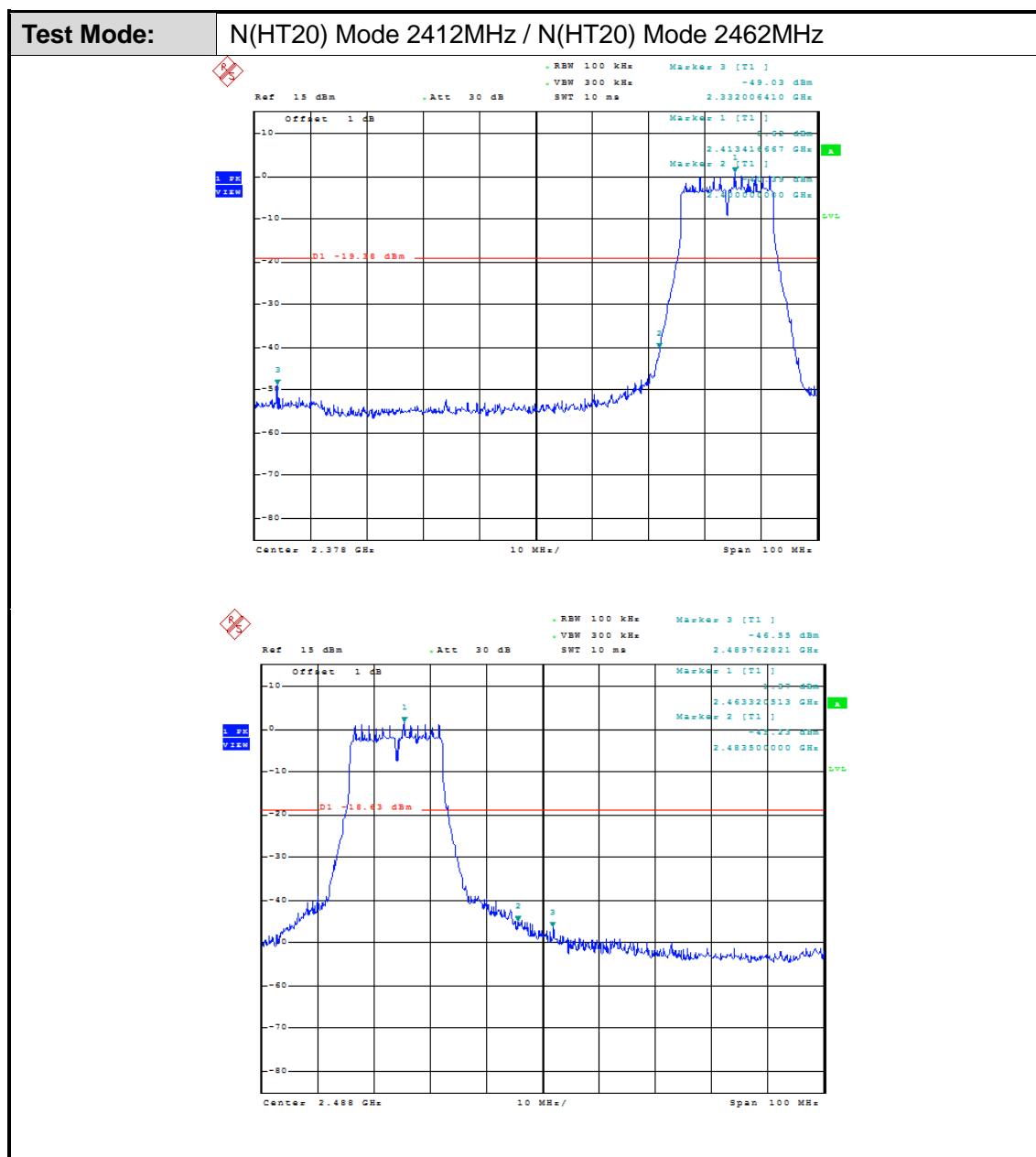


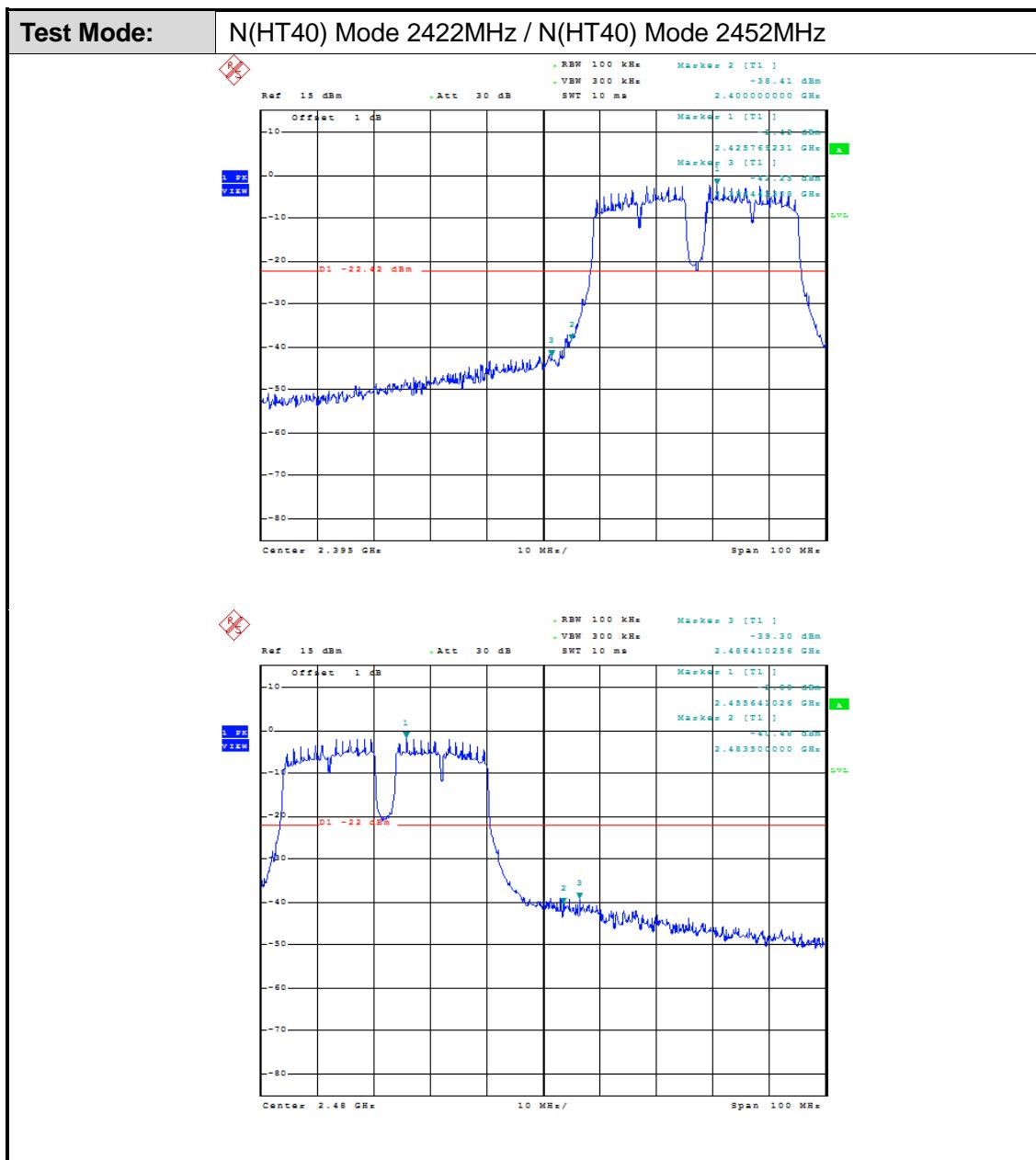


(2) Conducted Test







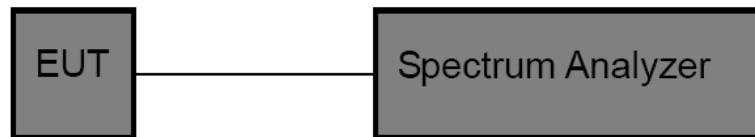


3.4. Bandwidth

Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	>=500 KHz (6dB bandwidth)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. Spectrum Setting:

For 6dB Occupied Bandwidth Set RBW = 100 kHz.

For 99% Occupied Bandwidth Set RBW =1% to 5% of the occupied bandwidth

Set the video bandwidth (VBW) \geq 3 RBW.

Detector = Peak.

Trace mode = Max hold.

Sweep = Auto couple.

NOTE: The EUT was set to continuously transmitting in each mode and low, Middle and high channel for the test.

Test Mode

Please refer to the clause 2.3.

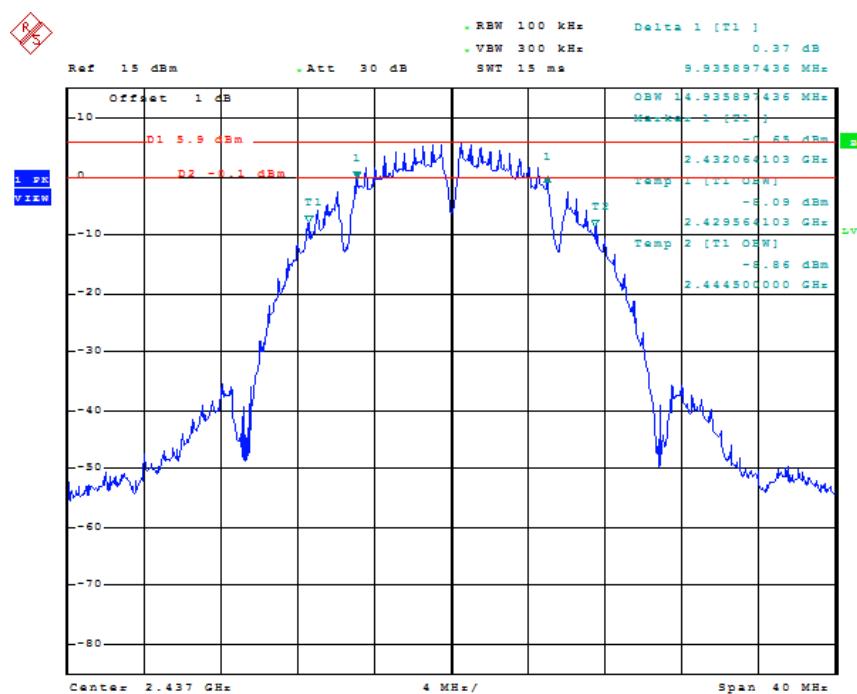
Test Results

Test Mode:	802.11B Mode			
Channel frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	
2412	10.00	15.00	>=0.5	
2437	9.93	14.93		
2462	10.06	14.93		
802.11B Mode				
2412 MHz				
Date: 17.MAY.2019 12:08:05				



802.11B Mode

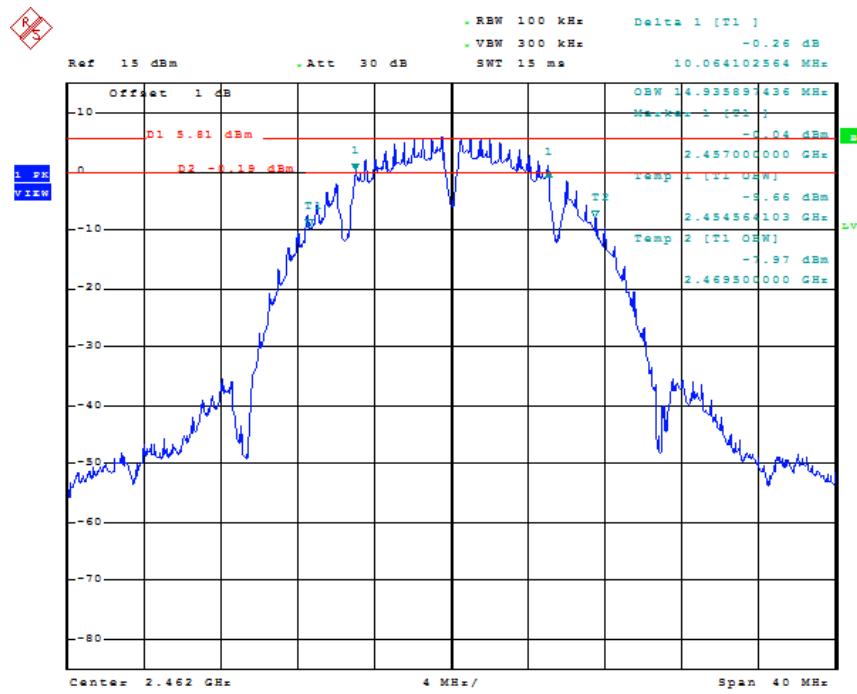
2437 MHz



Date: 17.MAY.2019 12:09:16

802.11B Mode

2462 MHz



Date: 17.MAY.2019 12:12:41

CTC Laboratories, Inc.

1-2/F, Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China
Tel: (86)755-27521059 Fax: (86)755-27521011 [Http://www.sz-ctc.org.cn](http://www.sz-ctc.org.cn)

Fax: (86)-33-27321011 [Http://www.s2c-cic.org.cn](http://www.s2c-cic.org.cn)
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cncaic.cn

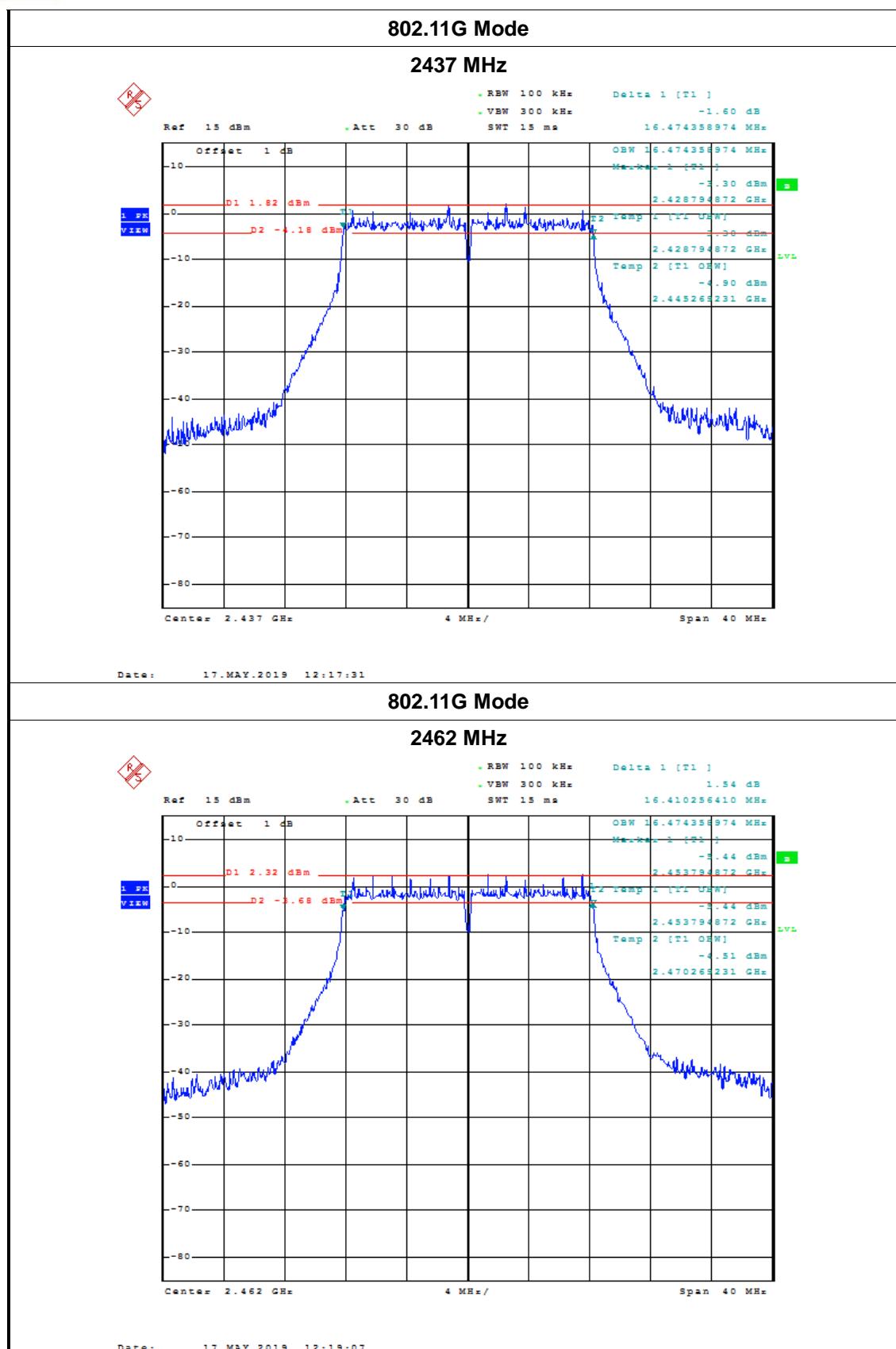


802.11G Mode			
Channel frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
2412	16.41	16.53	>=0.5
2437	16.47	16.53	
2462	16.41	16.47	

802.11G Mode

2412 MHz

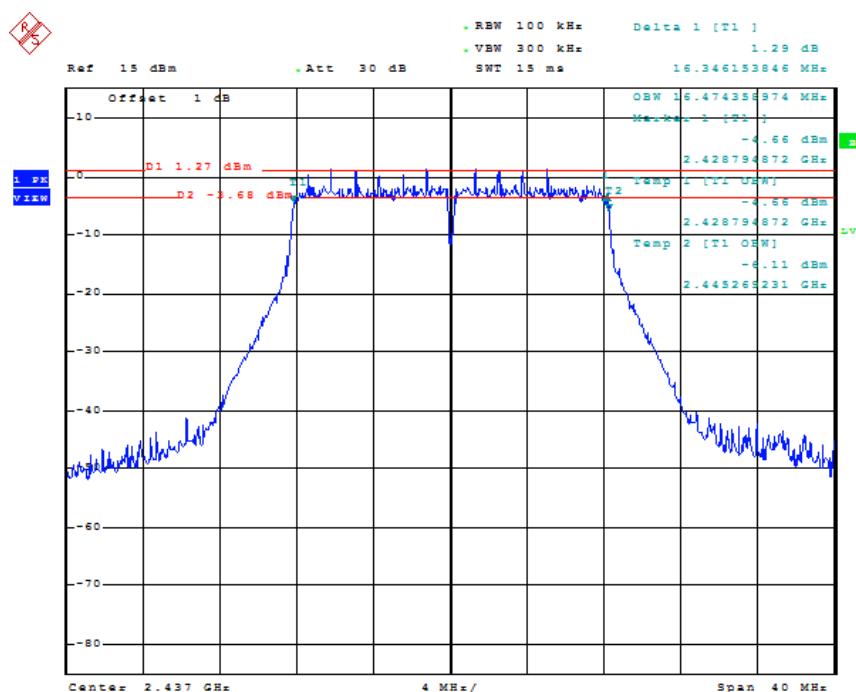
Date: 17.MAY.2019 12:14:44



Test Mode: 802.11N(HT20) Mode				
Channel frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	
2412	16.41	16.47	>=0.5	
2437	16.34	16.47		
2462	16.28	16.47		
802.11N(HT20) Mode				
2412 MHz				
<p>RBW 100 kHz, VBW 300 kHz, SWT 15 ms, 16.410256410 MHz</p> <p>Ref 15 dBm, Att 30 dB</p> <p>OBW 16.474358974 MHz, Max. 2 [T2] -5.53 dBm, 2.403794872 GHz</p> <p>Temp 1 [T1] 0.83 dBm, 2.403794872 GHz</p> <p>Temp 2 [T1] -5.17 dBm, 2.403794872 GHz</p> <p>Delta 1 [T1] 1.04 dB, 2.420265231 GHz</p> <p>Delta 2 [T2] -4.09 dBm, 2.420265231 GHz</p> <p>Span 40 MHz, Center 2.412 GHz, 4 MHz/</p> <p>Date: 17.MAY.2019 12:32:47</p>				

802.11N(HT20) Mode

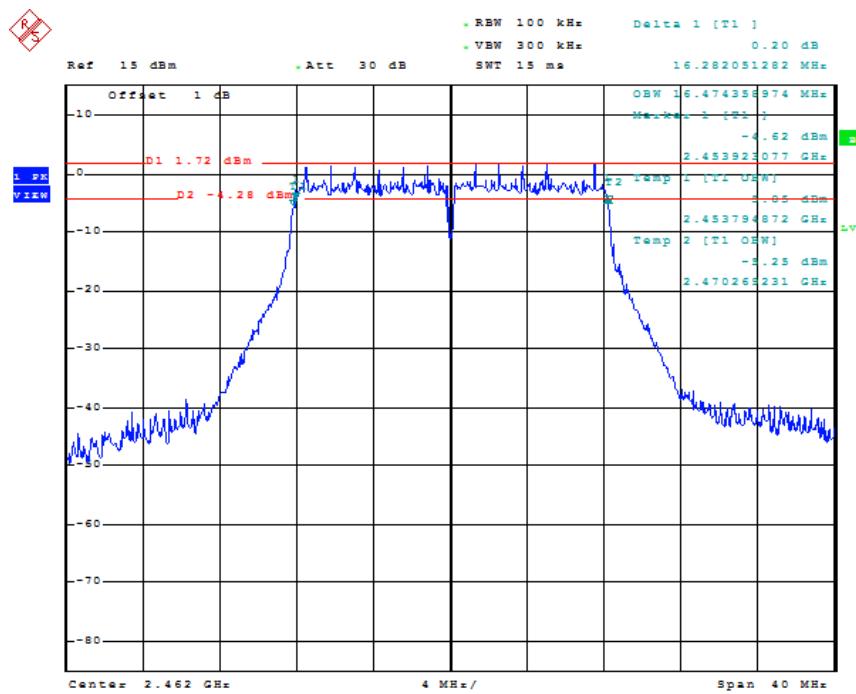
2437 MHz



Date: 17.MAY.2019 12:25:48

802.11N(HT20) Mode

2462 MHz



Date: 17.MAY.2019 12:30:17

CTC Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China
Tel.: (86)755-27521059 Fax: (86)755-27521011 [Http://www.sz-ctc.org.cn](http://www.sz-ctc.org.cn)



Test Mode:	802.11N(HT40) Mode		
Channel frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
2422	35.51	36.02	>=0.5
2437	35.25	35.95	
2452	35.12	35.99	

802.11N(HT40) Mode

2422 MHz

RF

Ref 15 dBm Att 30 dB SWT 10 ms 35.512820513 MHz

Offset 1 dB

RBW 100 kHz Delta 1 [T1]

VBW 300 kHz -0.63 dB

OBW 36.025643026 MHz

Mea-Kew 1 [T1] -1.69 dBm

2.404433887 GHz

Temp 1 [T1 OEW] -8.26 dBm

2.404051383 GHz

Mea-Kew 2 [T1] -8.89 dBm

2.440074923 GHz

Temp 2 [T1 OEW] -8.89 dBm

2.440074923 GHz

1 FSK

VIEW

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D1 -1.97 dBm

D2 -1.97 dBm

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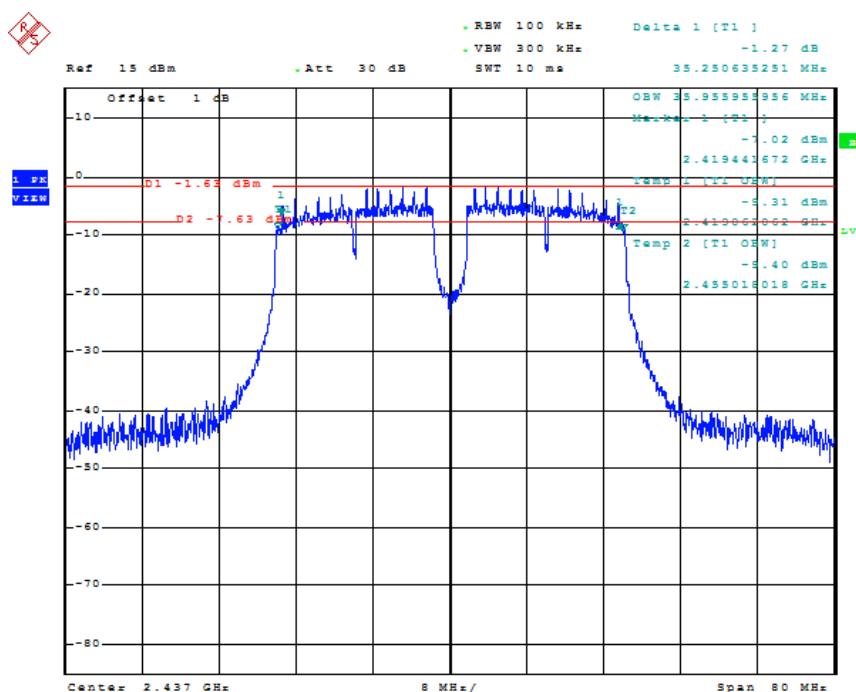
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1000



802.11N(HT40) Mode

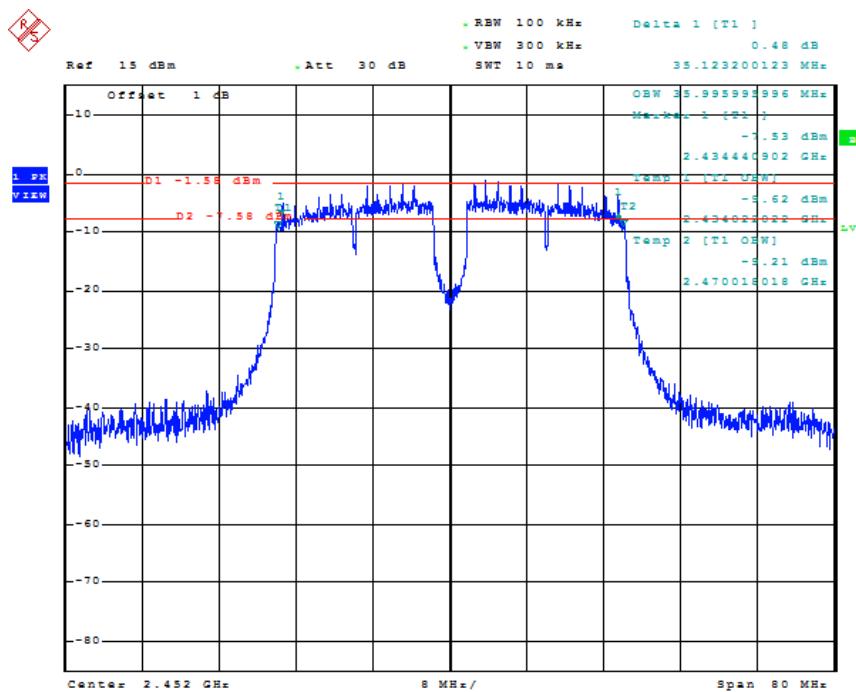
2437 MHz



Date: 17.MAY.2019 12:43:22

802.11N(HT40) Mode

2452 MHz



Date: 17.MAY.2019 12:46:29

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Fax: (86)-33-27321011 [Http://www.s2c-cic.org.cn](http://www.s2c-cic.org.cn)
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cncaic.cn

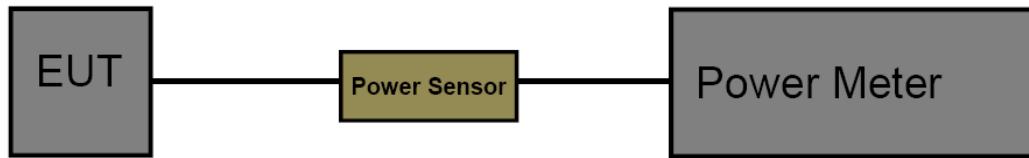


3.5. Maximum conducted output power

Limit

Standard	Test Item	Limit	Frequency Range(MHz)
CFR 47 FCC 15.247(b)(3) ISED RSS-247 5.4	Maximum conducted output power	1 Watt or 30dBm	2400~2483.5
ISED RSS-247 5.4	EIRP	4 Watt or 36dBm	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the Power sensor and antenna output port as show in the block diagram above.
2. The measurement is according to section 9.1.2 of KDB 558074 D01 DTS Meas Guidance
3. The power sensor video bandwidth is greater than or equal to the DTS bandwidth of the equipment.

Test Mode

Please refer to the clause 2.2

Test Result

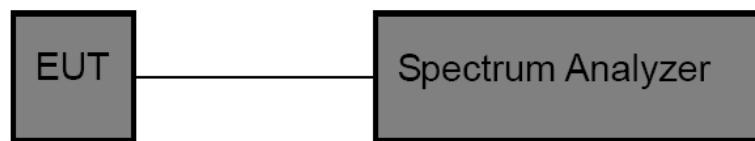
Mode	Channel frequency (MHz)	Maximum conducted output power (dBm)	EIRP
802.11b	2412	18.00	20.30
	2437	18.22	20.52
	2462	18.63	20.93
802.11g	2412	21.76	24.06
	2437	21.96	24.26
	2462	22.44	24.74
802.11n (HT20)	2412	20.66	22.96
	2437	21.19	23.49
	2462	21.76	24.06
802.11n (HT40)	2422	20.47	22.77
	2437	20.66	22.96
	2452	21.11	23.41
Result :	PASS		

3.6. Power Spectral Density

Limit

FCC Part 15 Subpart C(15.247)		
Test Item	Limit	Frequency Range(MHz)
Power Spectral Density	8dBm(in any 3 kHz)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement according to section 10.2 of KDB 558074 D01 DTS Meas Guidance
3. Spectrum Setting:
 - Set analyser center frequency to DTS channel center frequency.
 - Set the span to 1.5 times the DTS bandwidth.
 - Set the RBW to: 3 kHz
 - Set the VBW to: 10 kHz
 - Detector: peak
 - Sweep time: autoAllow trace to fully stabilize. Then use the peak marker function to determine the maximum amplitude level.

Test Mode

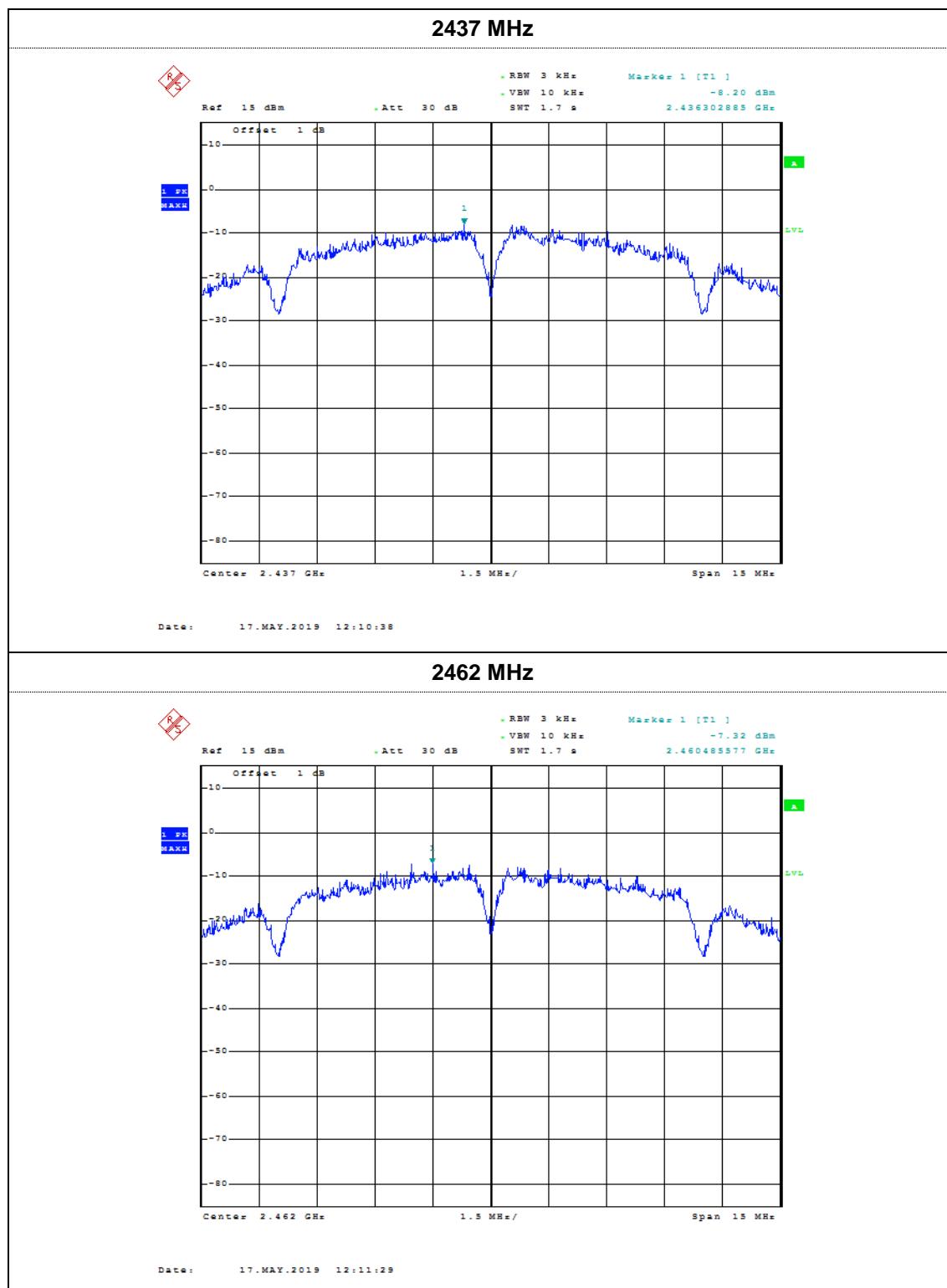
Please refer to the clause 2.2

Test Result

Test Mode:		802.11b Mode		
Channel Frequency (MHz)		Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412		-8.58	8	PASS
2437		-8.20		
2462		-7.32		

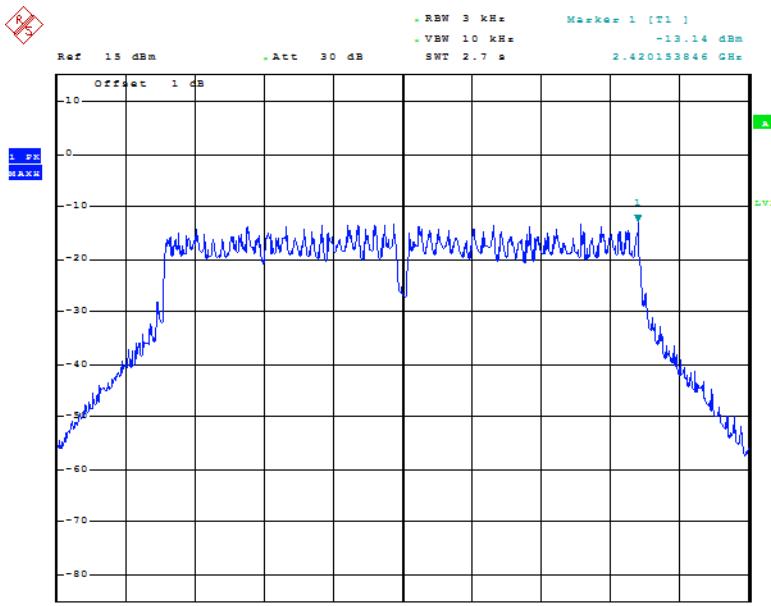
2412 MHz

Date: 17.MAY.2019 12:04:58



Test Mode:	802.11G Mode		
Channel Frequency (MHz)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412	-13.14	8	PASS
2437	-12.43		
2462	-11.77		

2412 MHz



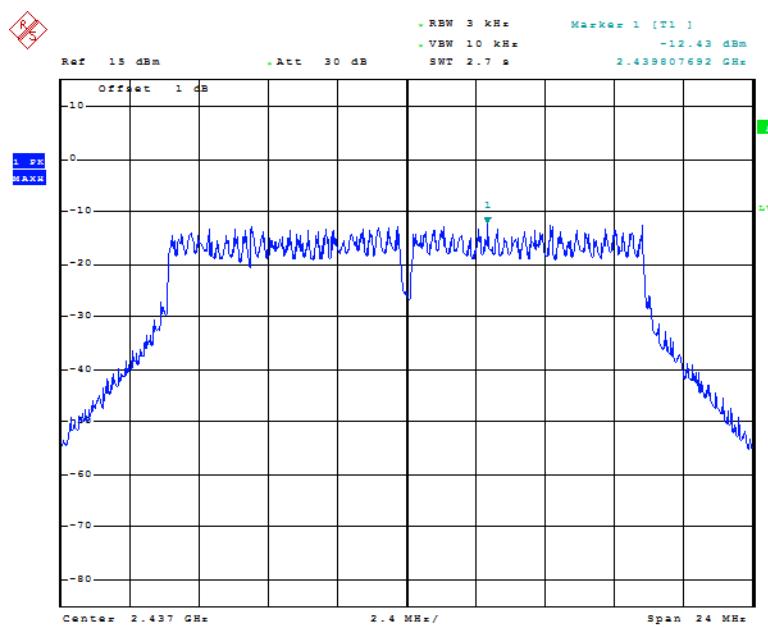
RBW 3 kHz Marker 1 (T1) -13.14 dBm
VBW 10 kHz SWR 2.7 a 2.420153846 GHz
Ref 15 dBm Att 30 dB

Offset 1 dB

Span 24 MHz

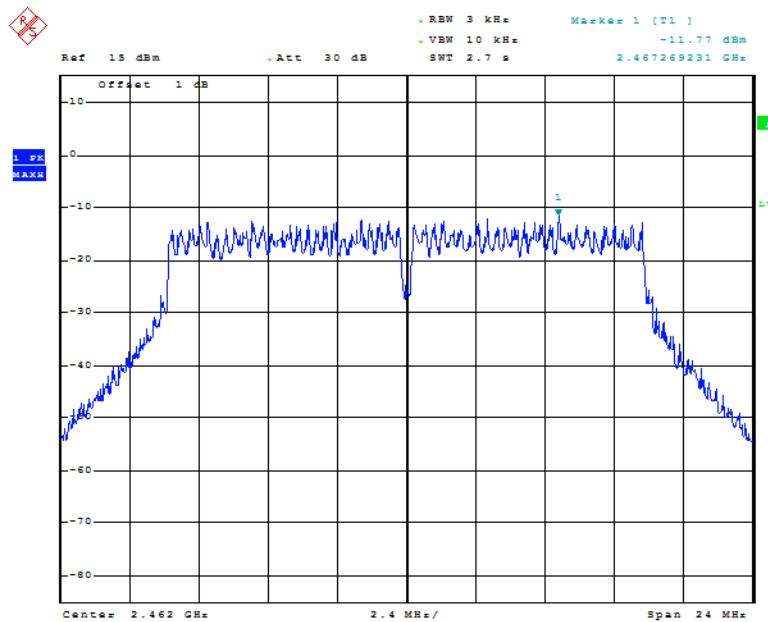
Date: 17.MAY.2019 12:15:12

2437 MHz



Date: 17.MAY.2019 12:15:57

2462 MHz



Date: 17.MAY.2019 12:19:37

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Test Mode:	802.11N (HT20) Mode		
Channel Frequency (MHz)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412	-13.78	8	PASS
2437	-12.40		
2462	-12.45		

2412 MHz

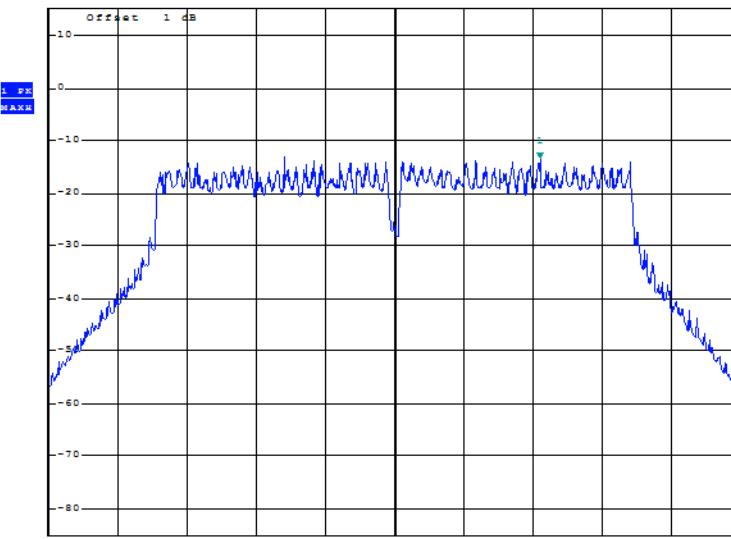
Ref 15 dBm Att 30 dB SWR 2.7 a

RBW 3 kHz Marker 1 [T1] -13.78 dBm

VBW 10 kHz 2.417038462 GHz

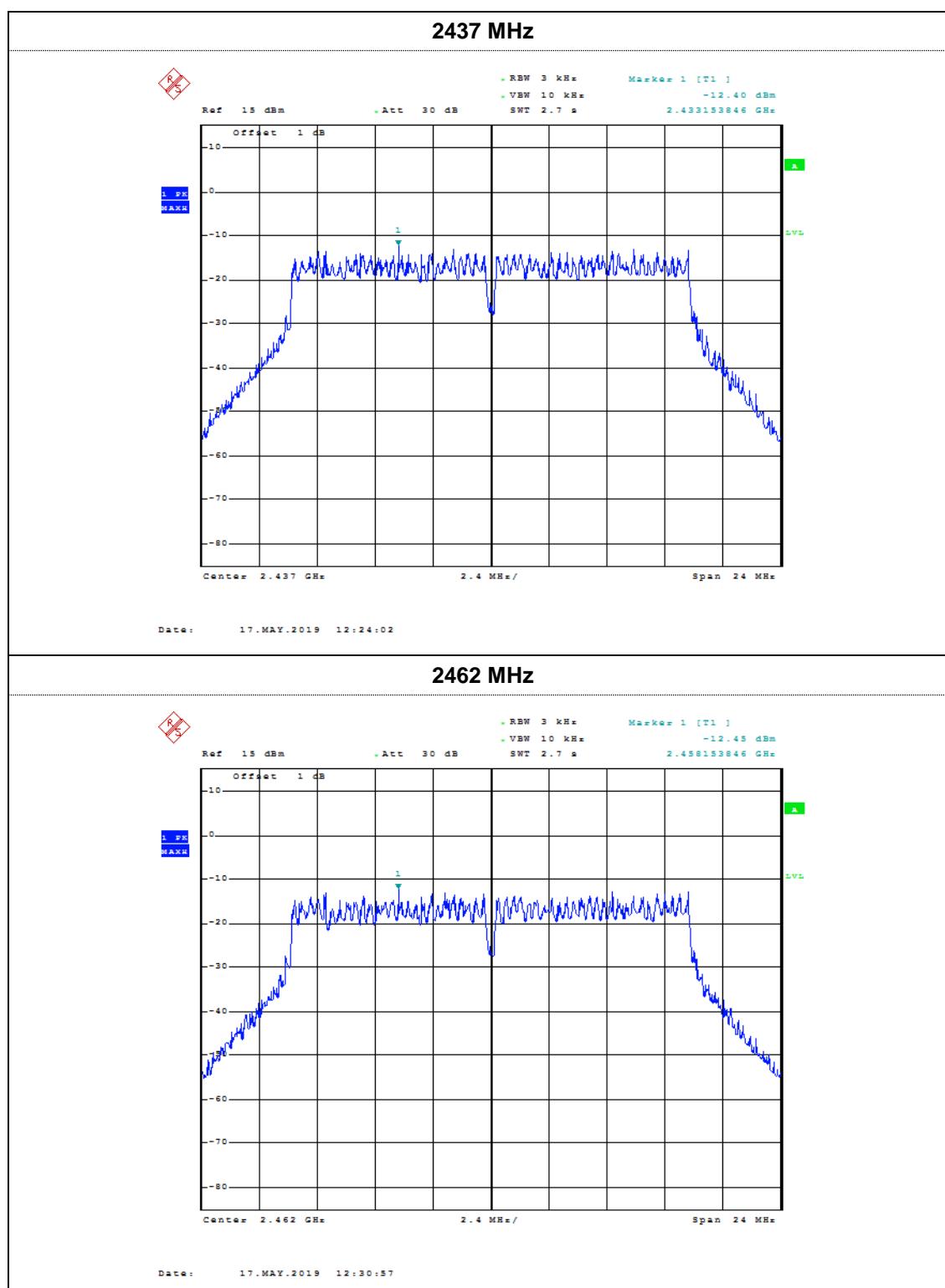
Offset 1 dB LVL

Center 2.412 GHz 2.4 MHz/ Span 24 MHz

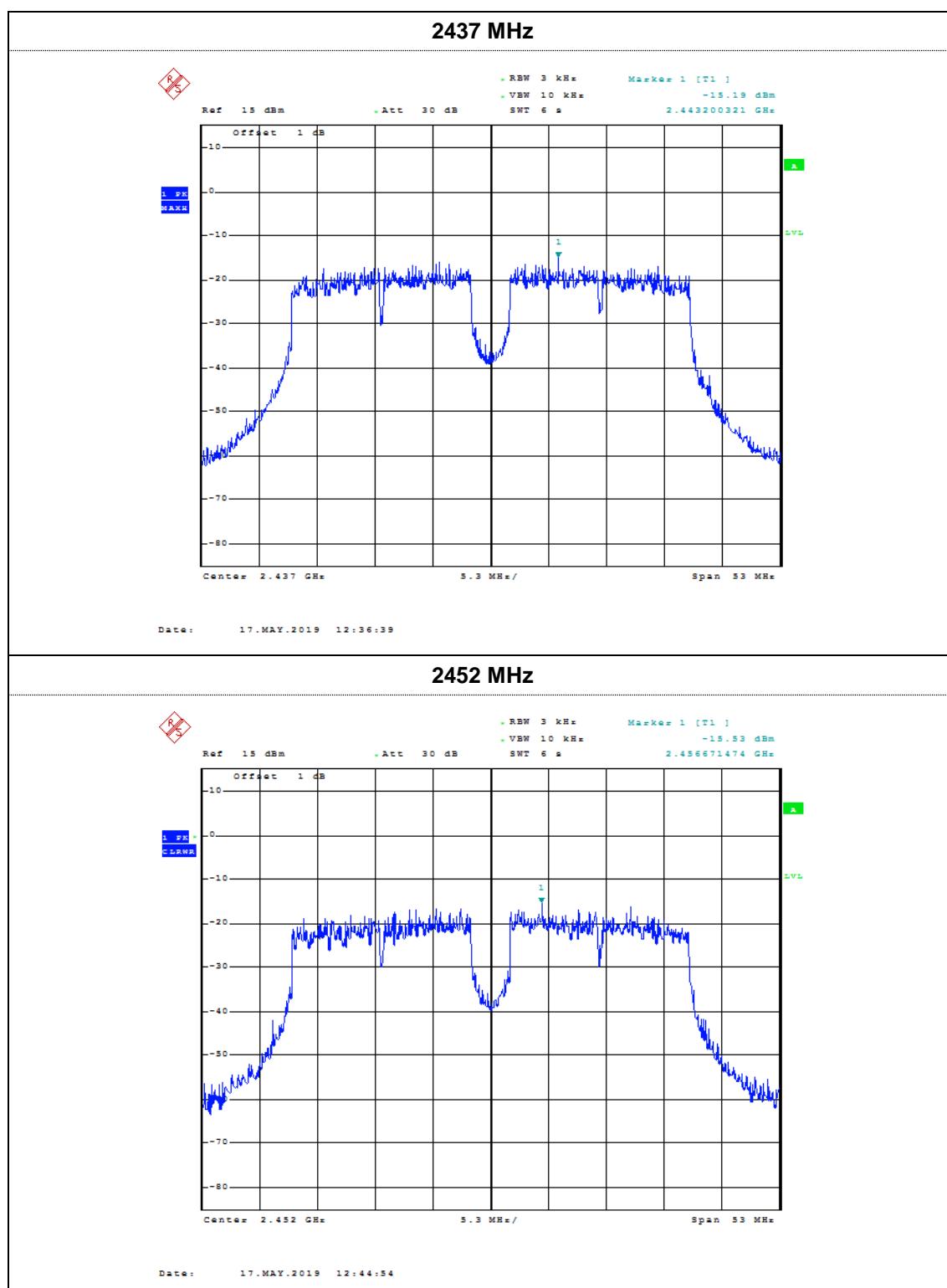


1 dB
MAX

Date: 17.MAY.2019 12:20:41



Test Mode:		802.11N (HT40) Mode				
Channel Frequency (MHz)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result			
2422	-16.38	8	PASS			
2437	-15.19					
2452	-15.53					
2422 MHz						
<p>Date: 17.MAY.2019 12:35:26</p>						





3.7. Antenna Requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1)(i):

(i) Systems operating in the 2400~2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Test Result

Complies

Note : The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

*****THE END*****