



CTC Laboratories, Inc.

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TEST REPORT

Report No.: **CTC20201578E06**
FCC ID.....: **2ATHM-CAW20A101**
Applicant.....: **AIR-U Co., Ltd**
Address.....: Yamaki 2nd BLDG, 8F, 3-4-2, Nishishinbashi, Minato-ku, Tokyo, Japan
Manufacturer.....: AIR-U Co., Ltd
Address.....: Yamaki 2nd BLDG, 8F, 3-4-2, Nishishinbashi, Minato-ku, Tokyo, Japan
Product Name.....: **4G Wireless Data Terminal**
Trade Mark.....: Cloud AIR-WIFI
Model/Type reference.....: CAW20A101
Listed Model(s): N/A
Standard.....: **FCC CFR Title 47 Part 15 Subpart C Section 15.247**
Date of receipt of test sample....: Oct. 16, 2020
Date of testing.....: Oct. 17, 2020 ~ Nov. 27, 2020
Date of issue.....: Nov. 28, 2020
Result.....: **PASS**

Compiled by:
(Printed name+signature) Terry Su 
Supervised by:
(Printed name+signature) Miller Ma 
Approved by:
(Printed name+signature) 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 (DTSSs) Operating in the Bands 902-928MHz, 2400-2483.5MHz and 5725-5850MHz.

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

1.2. Report version

Revised No.	Date of issue	Description
01	Nov. 28, 2020	Original



1.3. Test Description

FCC Part 15 Subpart C (15.247) / RSS 247 Issue 2				
Test Item	Standard Section		Result	Test Engineer
	FCC	IC		
Antenna Requirement	15.203	/	Pass	Rod Luo
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Jon Huang
Radiated Band Edge and Spurious Emissions	15.205&15.209&15.247(d)	RSS 247 5.5	Pass	Rod Luo
Conducted Band Edge and Spurious Emissions	15.247(d)	RSS 247 5.5	Pass	Rod Luo
6dB Bandwidth	15.247(a)(2)	RSS 247 5.2 (a)	Pass	Rod Luo
Conducted Max Output Power	15.247(b)(3)	RSS 247 5.4 (d)	Pass	Rod Luo
Power Spectral Density	15.247(e)	RSS 247 5.2 (b)	Pass	Rod Luo
Transmitter Radiated Spurious	15.209&15.247(d)	RSS 247 5.5&RSS-Gen 8.9	Pass	Rod Luo

Note: The measurement uncertainty is not included in the test result.



1.4. Test Facility

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/IEC 17025:2017 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	3.08 dB	(1)
Radiated Emissions 30~1000MHz	4.51 dB	(1)
Radiated Emissions 1~18GHz	5.84 dB	(1)
Radiated Emissions 18~40GHz	6.12 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:	21°C ~ 27°C
Relative Humidity:	40% ~ 60%
Air Pressure:	101kPa



2. GENERAL INFORMATION

2.1. Client Information

Applicant:	AIR-U Co., Ltd
Address:	Yamaki 2nd BLDG, 8F, 3-4-2, Nishishinbashi, Minato-ku, Tokyo, Japan
Manufacturer:	AIR-U Co., Ltd
Address:	Yamaki 2nd BLDG, 8F, 3-4-2, Nishishinbashi, Minato-ku, Tokyo, Japan
Factory:	Shenzhen uCloudlink Network Technology Co., Ltd.
Address:	3rd Floor, A part of Building 1, Shenzhen Software Industry Base, Nanshan District Xuefu Road, 518057 Shenzhen City, Guangdong, China



2.2. General Description of EUT

Product Name:	4G Wireless Data Terminal
Trade Mark:	Cloud AIR-WIFI
Model/Type reference:	CAW20A101
Listed Model(s):	N/A
Power supply:	5Vdc/2A from USB Cable 3.8Vdc from 3000mAh Li-ion Battery
Hardware version:	U3X_GPS_MB_VB
Software version:	K2_TSV0.0.000.000.200926_020601
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(HT40): 2422MHz~2452MHz
Channel number:	802.11b/g/n(HT20):11channels 802.11n(HT40):7channels
Channel separation:	5MHz
Antenna type:	PIFA Antenna
Antenna gain:	1.46dBi Max

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2.3. Accessory Equipment information

Equipment Information			
Name	Model	S/N	Manufacturer
Notebook	X220	R9-NCMYL 12/04	Lenovo
/	/	/	/
Cable Information			
Name	Shielded Type	Ferrite Core	Length
Type-C Cable	With	Without	0.3M
Test Software Information			
Name	/	/	/
QRCT V3.0.265.0	/	/	/



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.

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: CH 01~CH 11 for 802.11b/g/n(HT20), CH 03~CH 09 for 802.11n(HT40)

Data Rated

Preliminary tests were performed in different data rate, and found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	Data rate (worst mode)
802.11b	1Mbps
802.11g	6Mbps
802.11n(HT20)	HT-MCS0
802.11n(HT40)	HT-MCS0

Test mode

For RF test items:
The engineering test program was provided and enabled to make EUT continuous transmit.
For AC power line conducted emissions:
The EUT was set to connect with the WLAN AP 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 until
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 27, 2020
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 15, 2021
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 27, 2020
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 27, 2020
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 27, 2020
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 27, 2020
7	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Dec. 27, 2020
8	Climate Chamber	TABAI	PR-4G	A8708055	Dec. 27, 2020
9	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 27, 2020
10	Climate Chamber	ESPEC	MT3065	/	Dec. 27, 2020
11	300328 v2.2.2 test system	TONSCEND	v2.6	/	/

Radiated Emission and Transmitter spurious emissions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 27, 2020
2	High pass filter	micro-tranics	HPM50111	142	Dec. 27, 2020
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 27, 2020
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 27, 2020
5	Loop Antenna	LAPLAC	RF300	9138	Dec. 27, 2020
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 27, 2020
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 27, 2020
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 27, 2020
9	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 27, 2020
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 27, 2020
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX 102	DA1580	Dec. 27, 2020
14	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 27, 2020
15	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 27, 2020
16	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 27, 2020
17	High pass filter	Compliance	BSU-6	34202	Dec. 27, 2020

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		Direction systems			
18	Attenuator	Chengdu E-Microwave	EMCAXX-10 RNZ-3	---	Dec. 27, 2020
19	High and low temperature box	ESPEC	MT3065	12114019	Dec. 27, 2020

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 27, 2020
2	LISN	R&S	ENV216	101113	Dec. 27, 2020
3	EMI Test Receiver	R&S	ESCI	100658	Dec. 27, 2020

Note:1. The Cal. Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.

3. TEST ITEM AND RESULTS

3.1. Conducted Emission

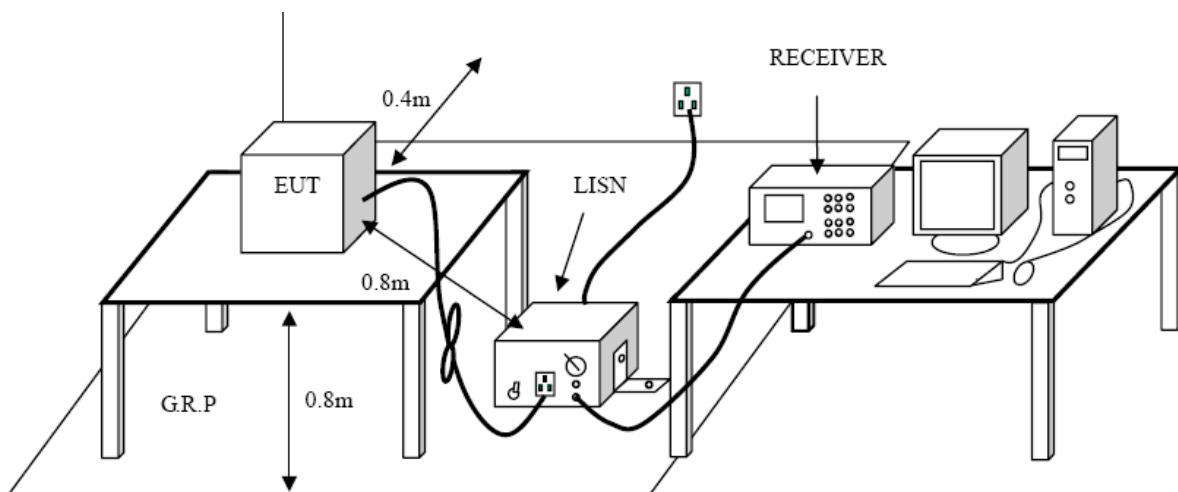
Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.207/ RSS - Gen 8.8:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test Configuration



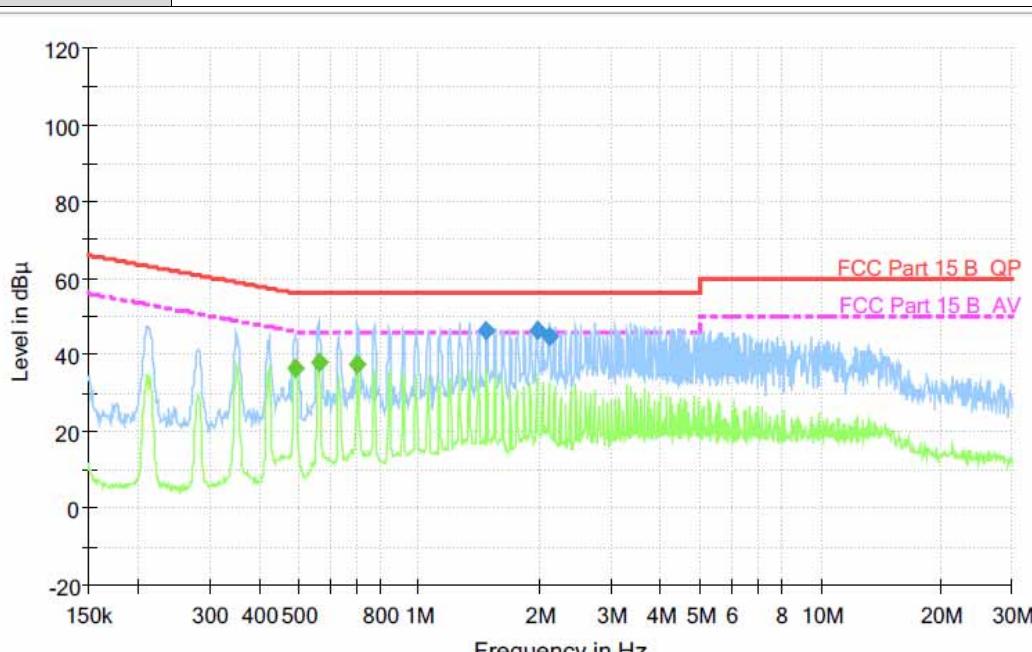
Test Procedure

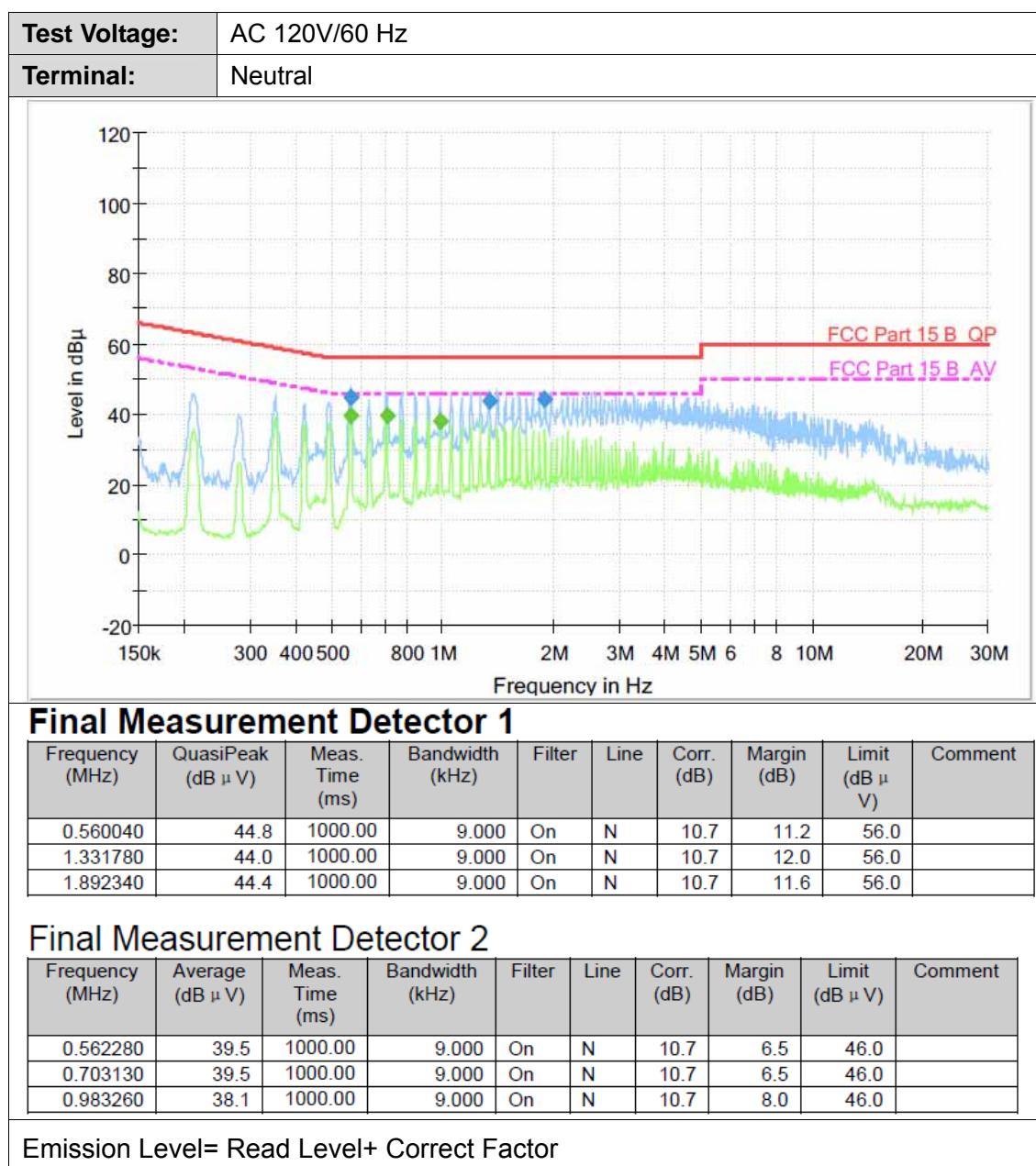
1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from 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 2.4.

Test Results

Test Voltage:	AC 120V/60 Hz																																																
Terminal:	Line																																																
																																																	
Final Measurement Detector 1																																																	
<table border="1"><thead><tr><th>Frequency (MHz)</th><th>QuasiPeak (dB μ V)</th><th>Meas. Time (ms)</th><th>Bandwidth (kHz)</th><th>Filter</th><th>Line</th><th>Corr. (dB)</th><th>Margin (dB)</th><th>Limit (dB μ V)</th><th>Comment</th></tr></thead><tbody><tr><td>1.471550</td><td>46.2</td><td>1000.00</td><td>9.000</td><td>On</td><td>L1</td><td>10.4</td><td>9.8</td><td>56.0</td><td></td></tr><tr><td>1.961560</td><td>46.5</td><td>1000.00</td><td>9.000</td><td>On</td><td>L1</td><td>10.4</td><td>9.5</td><td>56.0</td><td></td></tr><tr><td>2.099310</td><td>45.0</td><td>1000.00</td><td>9.000</td><td>On</td><td>L1</td><td>10.4</td><td>11.0</td><td>56.0</td><td></td></tr></tbody></table>										Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment	1.471550	46.2	1000.00	9.000	On	L1	10.4	9.8	56.0		1.961560	46.5	1000.00	9.000	On	L1	10.4	9.5	56.0		2.099310	45.0	1000.00	9.000	On	L1	10.4	11.0	56.0	
Frequency (MHz)	QuasiPeak (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment																																								
1.471550	46.2	1000.00	9.000	On	L1	10.4	9.8	56.0																																									
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Final Measurement Detector 2																																																	
<table border="1"><thead><tr><th>Frequency (MHz)</th><th>Average (dB μ V)</th><th>Meas. Time (ms)</th><th>Bandwidth (kHz)</th><th>Filter</th><th>Line</th><th>Corr. (dB)</th><th>Margin (dB)</th><th>Limit (dB μ V)</th><th>Comment</th></tr></thead><tbody><tr><td>0.490910</td><td>36.3</td><td>1000.00</td><td>9.000</td><td>On</td><td>L1</td><td>10.4</td><td>9.9</td><td>46.2</td><td></td></tr><tr><td>0.560040</td><td>37.9</td><td>1000.00</td><td>9.000</td><td>On</td><td>L1</td><td>10.4</td><td>8.1</td><td>46.0</td><td></td></tr><tr><td>0.700330</td><td>37.4</td><td>1000.00</td><td>9.000</td><td>On</td><td>L1</td><td>10.4</td><td>8.6</td><td>46.0</td><td></td></tr></tbody></table>										Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment	0.490910	36.3	1000.00	9.000	On	L1	10.4	9.9	46.2		0.560040	37.9	1000.00	9.000	On	L1	10.4	8.1	46.0		0.700330	37.4	1000.00	9.000	On	L1	10.4	8.6	46.0	
Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment																																								
0.490910	36.3	1000.00	9.000	On	L1	10.4	9.9	46.2																																									
0.560040	37.9	1000.00	9.000	On	L1	10.4	8.1	46.0																																									
0.700330	37.4	1000.00	9.000	On	L1	10.4	8.6	46.0																																									
Emission Level= Read Level+ Correct Factor																																																	



3.2. Radiated Emission

Limit

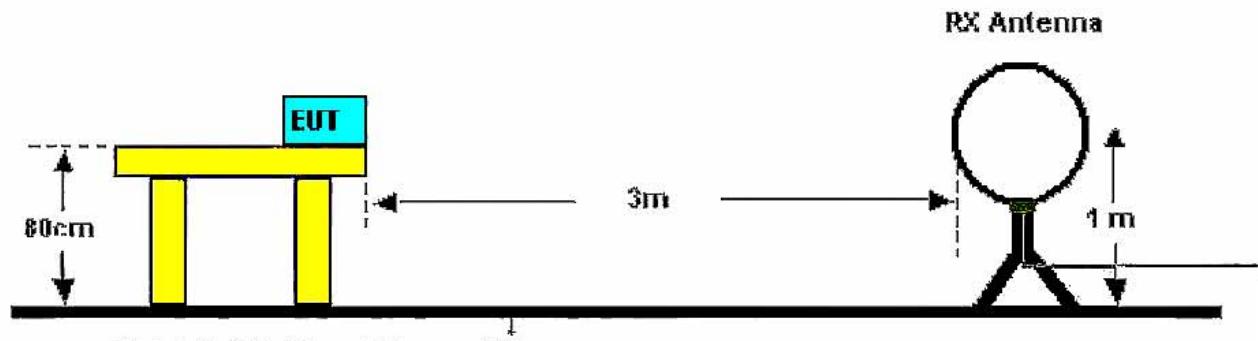
FCC CFR Title 47 Part 15 Subpart C Section 15.209/ RSS – Gen 8.9:

Frequency	Limit (dBuV/m @3m)	Value
30 MHz ~ 88 MHz	40.00	Quasi-peak
88 MHz ~ 216 MHz	43.50	Quasi-peak
216 MHz ~ 960 MHz	46.00	Quasi-peak
960 MHz ~ 1 GHz	54.00	Quasi-peak
Above 1 GHz	54.00	Average
	74.00	Peak

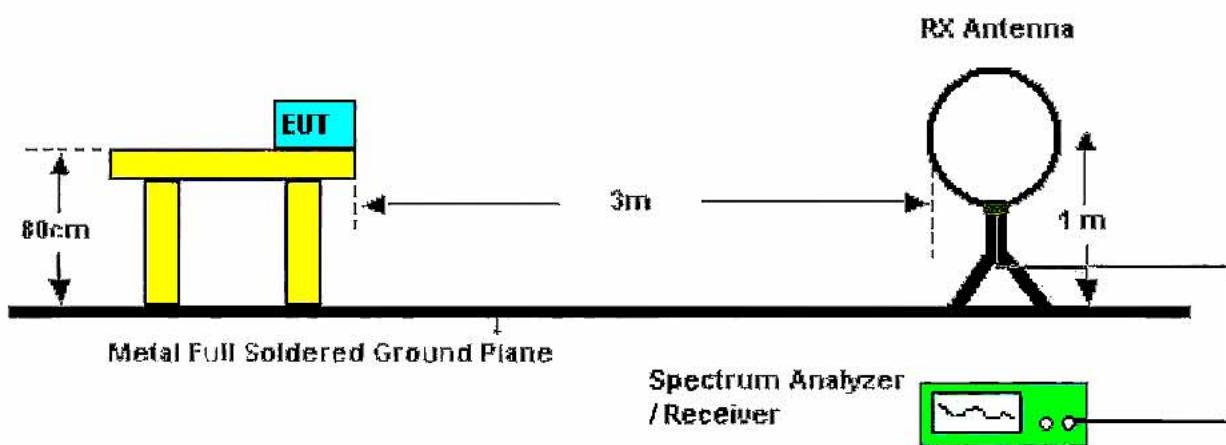
Note:

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

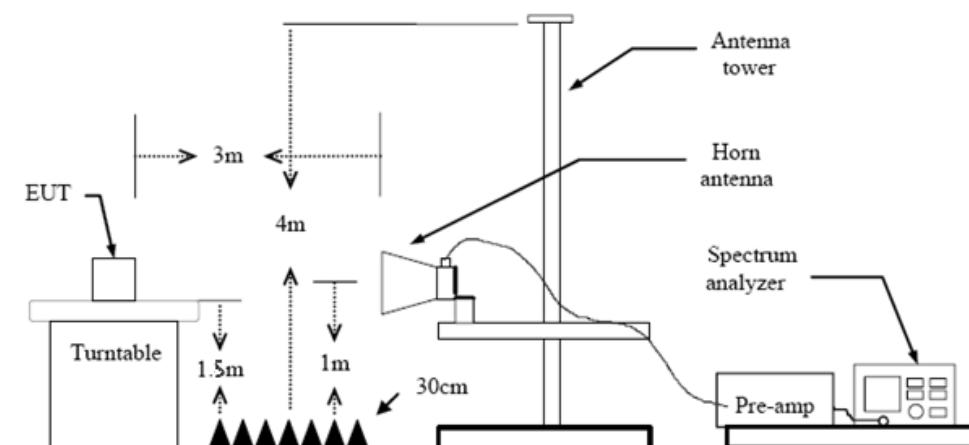
Test Configuration



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 2.4.

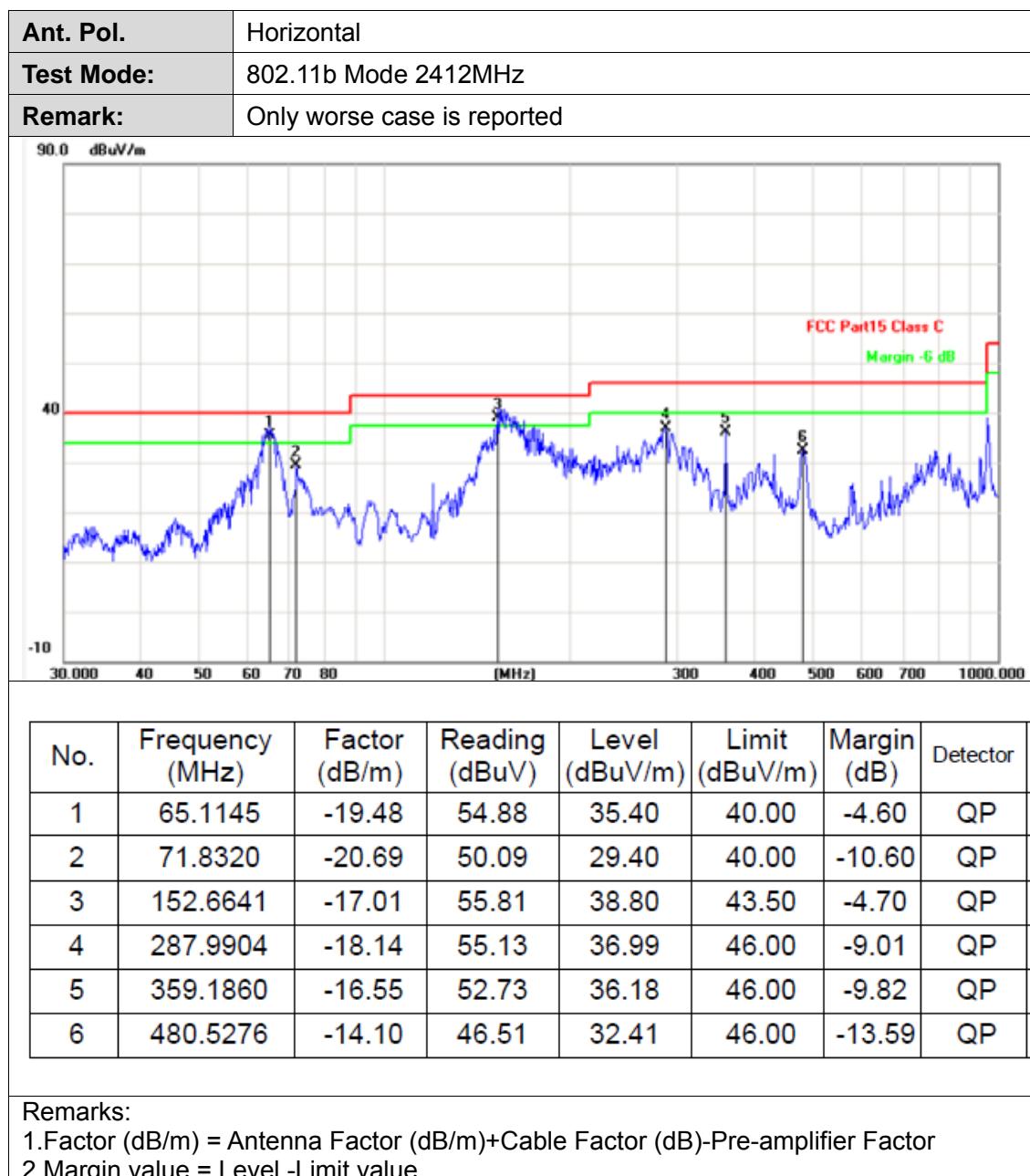
Test Result

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.

30MHz-1GHz

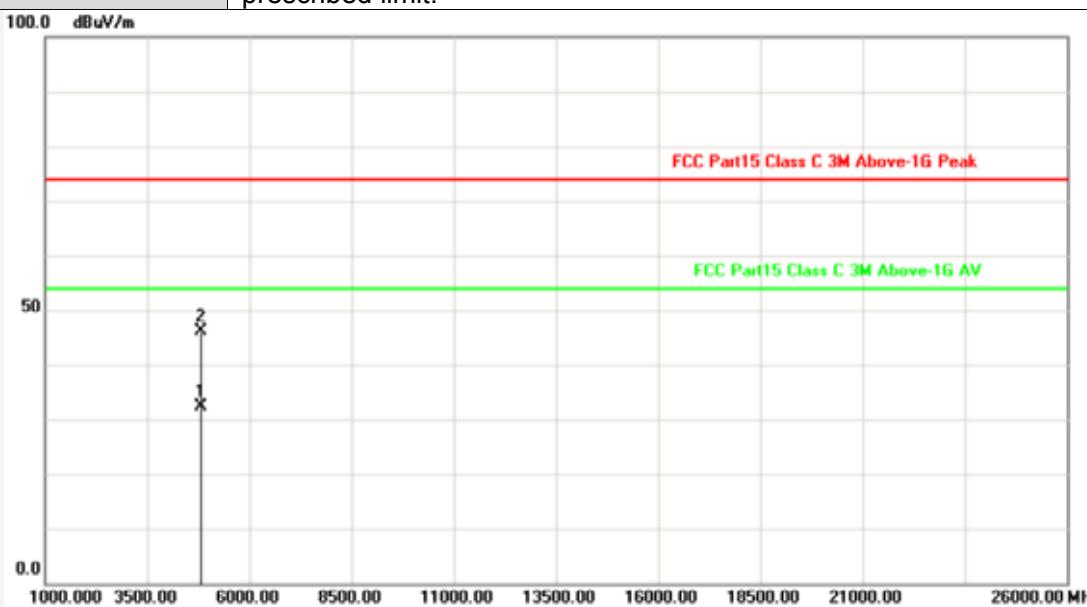


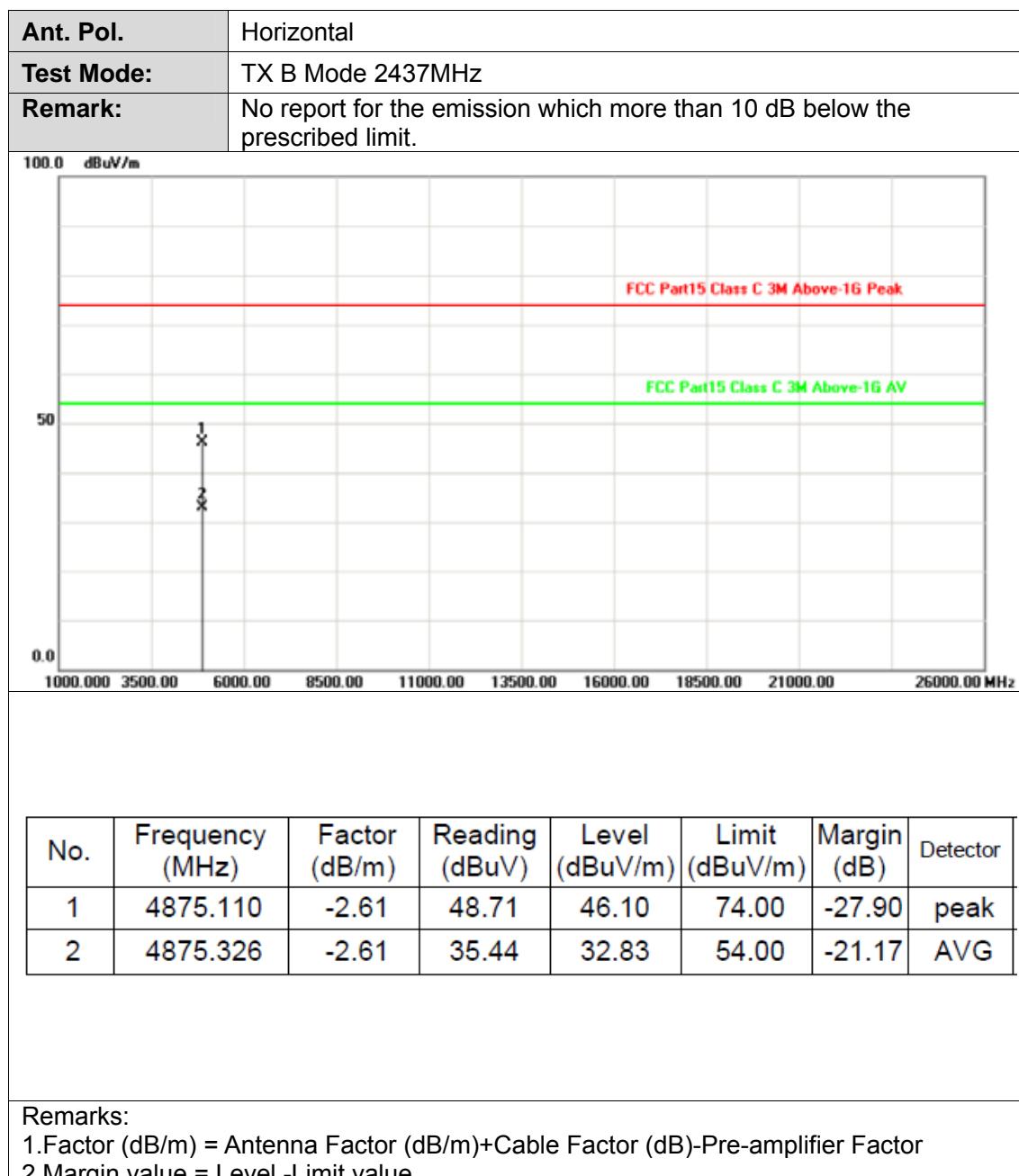
Ant. Pol.	Vertical																																																														
Test Mode:	802.11b Mode 2412MHz																																																														
Remark:	Only worse case is reported																																																														
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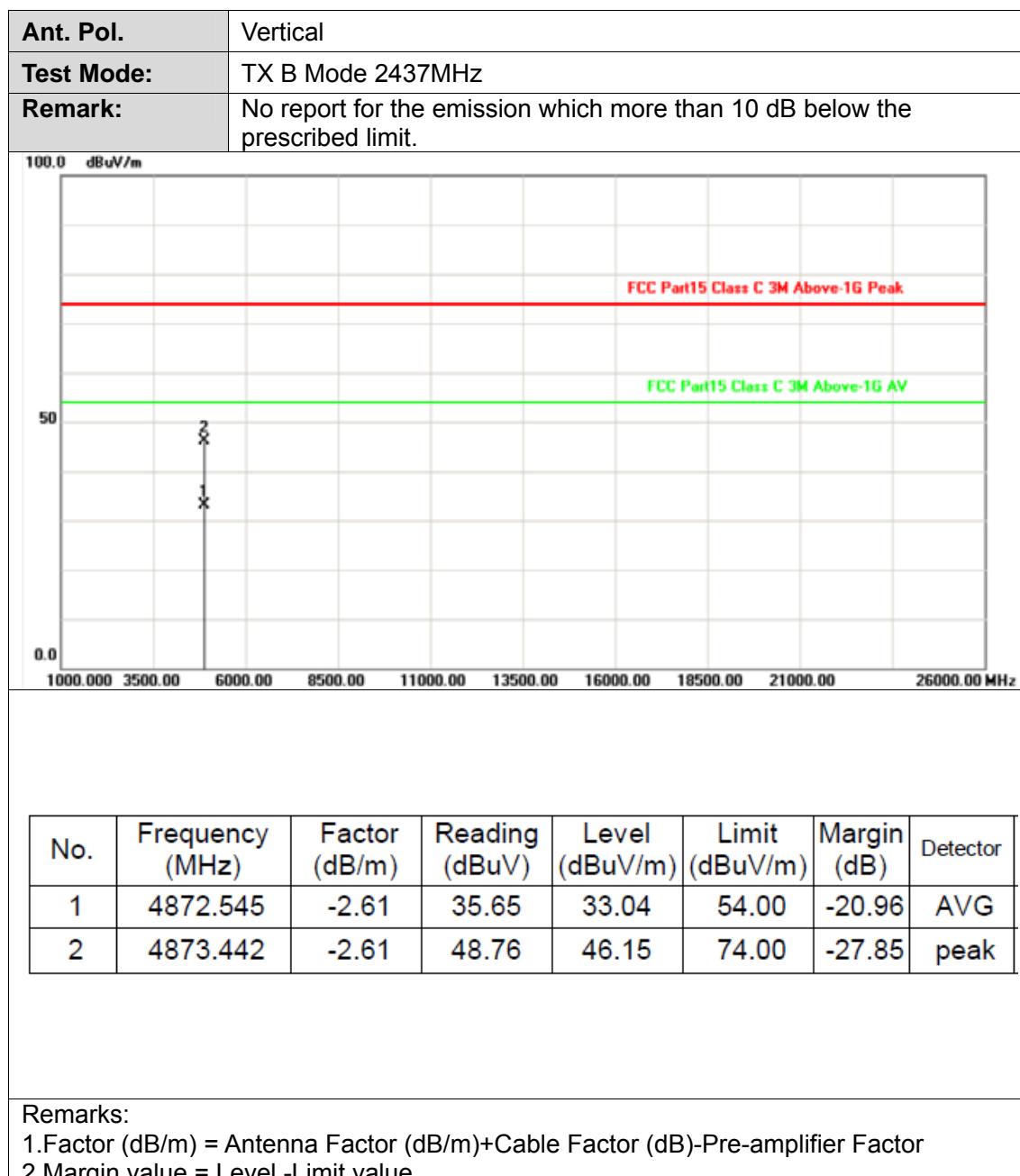


Adobe 1GHz

Ant. Pol.	Horizontal																													
Test Mode:	TX B Mode 2412MHz																													
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																													
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																							
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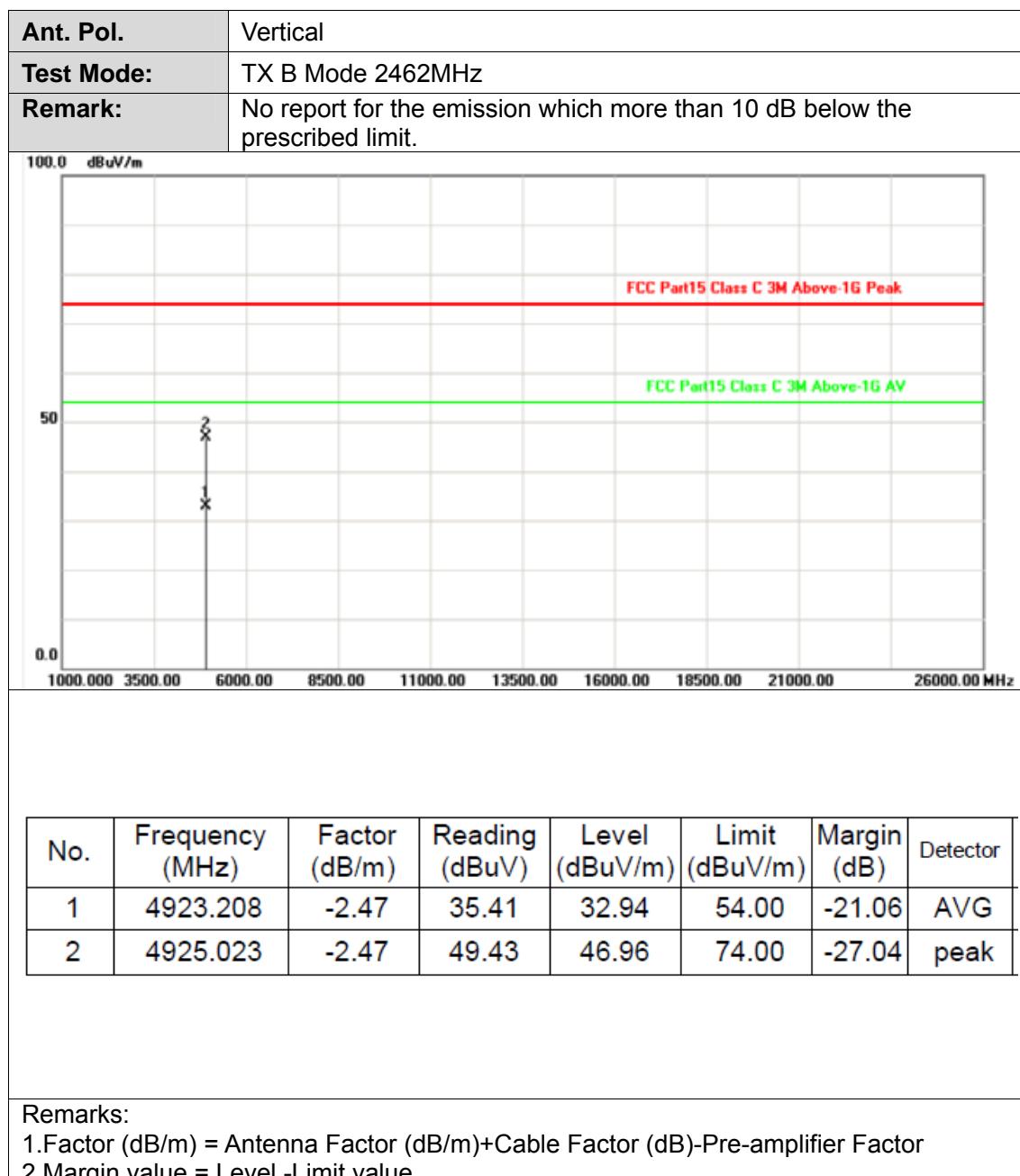
Ant. Pol.	Vertical																														
Test Mode:	TX B Mode 2412MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
 <p>The plot shows a graph of dBuV/m versus MHz. The Y-axis ranges from 0.0 to 100.0 dBuV/m with major grid lines every 50 dBuV/m. The X-axis ranges from 1000.000 to 26000.00 MHz with major grid lines every 3500.00 MHz. A red horizontal line at approximately 60 dBuV/m is labeled "FCC Part15 Class C 3M Above-1G Peak". A green horizontal line at approximately 54 dBuV/m is labeled "FCC Part15 Class C 3M Above-1G AV". Two vertical lines are plotted at approximately 4822.989 MHz and 4823.310 MHz, labeled '1' and '2' respectively. The reading at 4822.989 MHz is 35.09 dBuV, and at 4823.310 MHz is 48.96 dBuV. The level at 4822.989 MHz is 32.33 dBuV/m, and at 4823.310 MHz is 46.20 dBuV/m. The limit at 4822.989 MHz is 54.00 dBuV/m, and at 4823.310 MHz is 74.00 dBuV/m. The margin at 4822.989 MHz is -21.67 dB, and at 4823.310 MHz is -27.80 dB.</p>																															
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
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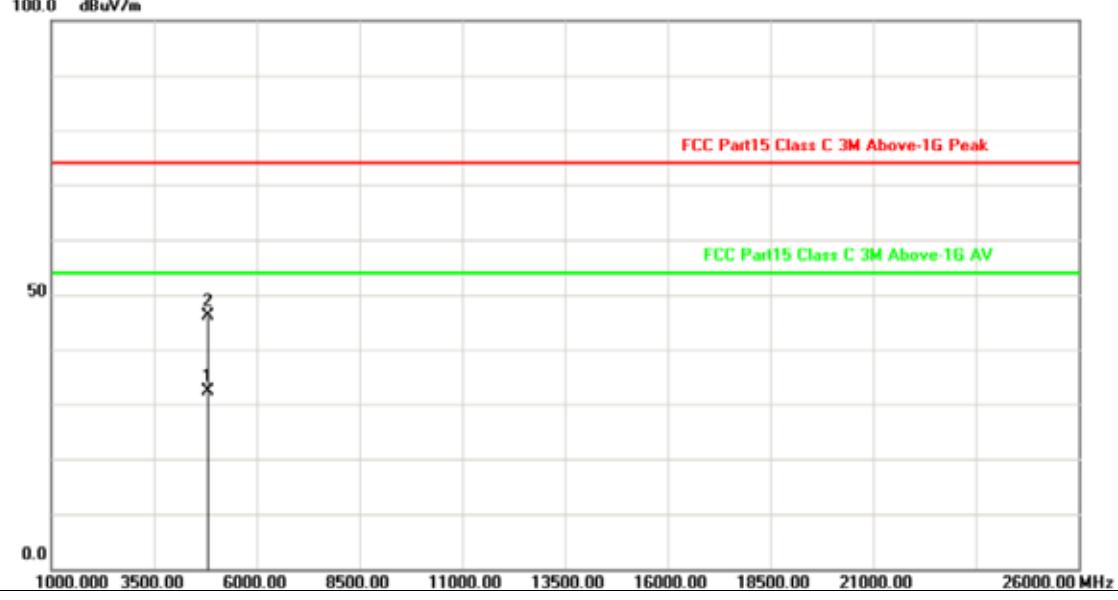


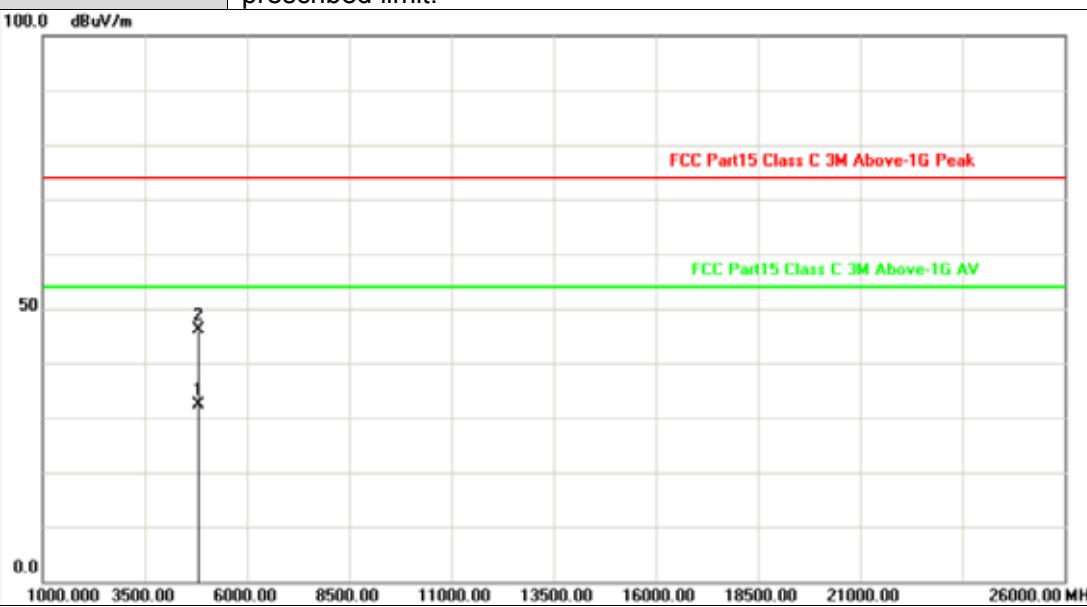


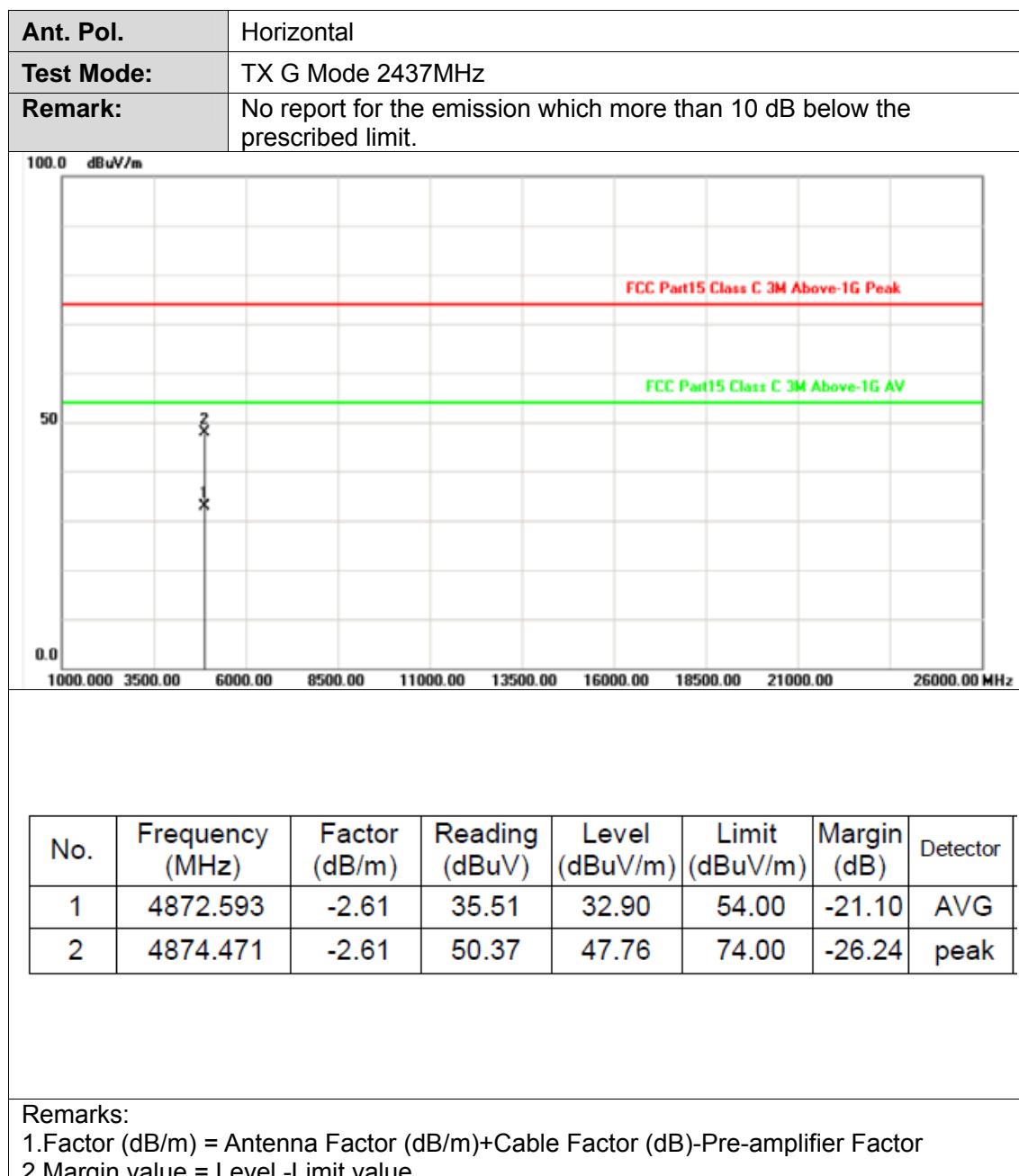


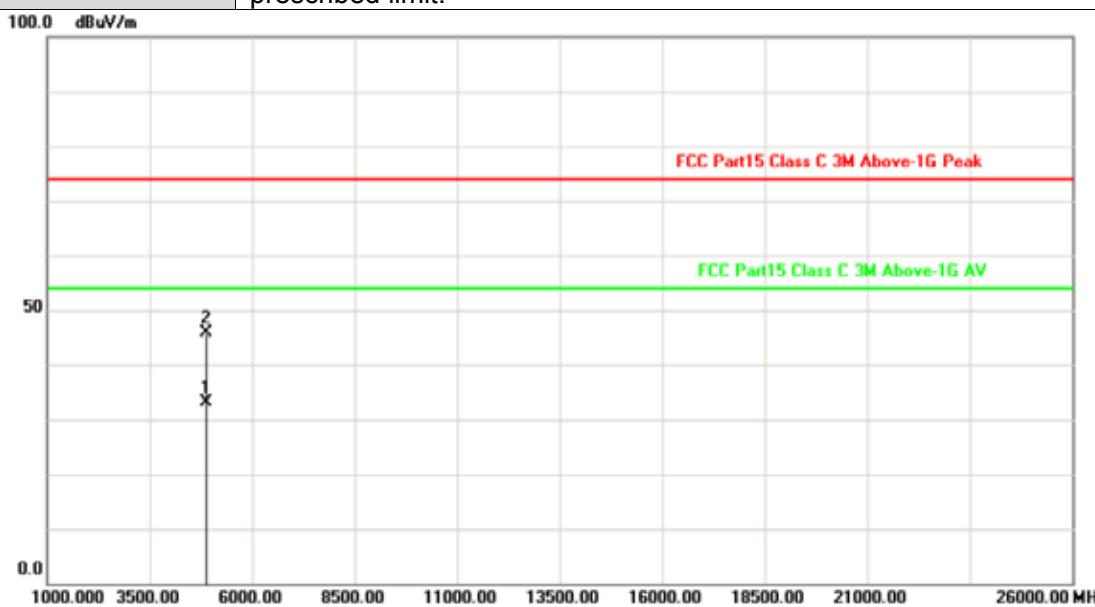
Ant. Pol.	Horizontal																														
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
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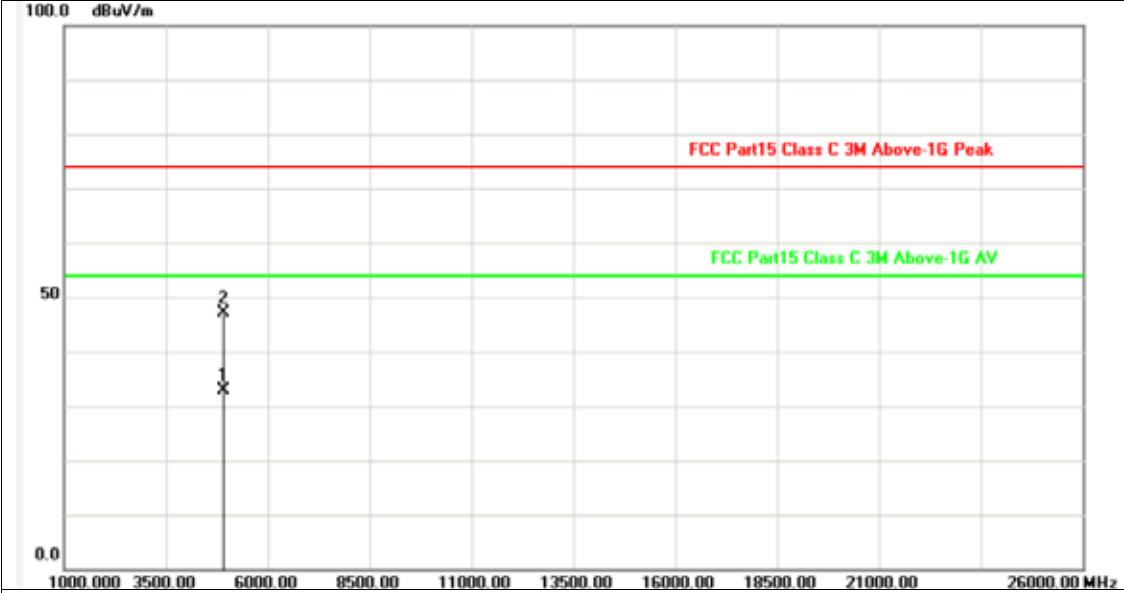
Ant. Pol.	Vertical																														
Test Mode:	TX G Mode 2412MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
 <p>The plot shows a vertical axis labeled 'dBuV/m' with major ticks at 0.0, 50, and 100.0. The horizontal axis is labeled 'MHz' with major ticks from 1000.000 to 26000.00 MHz. A red horizontal line represents the 'FCC Part15 Class C 3M Above-1G Peak' limit, starting at approximately 1000 MHz and extending to 26000 MHz. A green horizontal line represents the 'FCC Part15 Class C 3M Above-1G AV' limit, also starting at approximately 1000 MHz and extending to 26000 MHz. Two data points are plotted on the graph: point '1' at approximately 4822.800 MHz with a value of about 35.22 dBuV, and point '2' at approximately 4824.345 MHz with a value of about 48.89 dBuV. Both points fall well below the FCC limits.</p>																															
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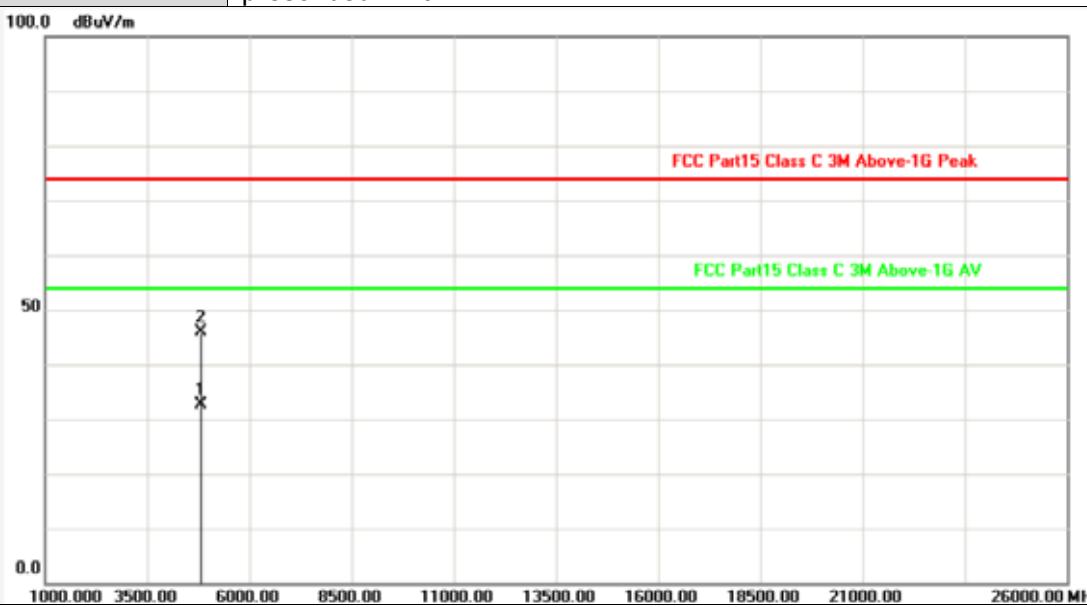


Ant. Pol.	Vertical																														
Test Mode:	TX G Mode 2437MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
 <p>The plot shows a graph of dBuV/m versus MHz. The Y-axis ranges from 0.0 to 100.0 dBuV/m with major grid lines every 10 units. The X-axis ranges from 1000.000 to 26000.00 MHz with major grid lines every 3500.00 MHz. A red horizontal line at approximately 54 dBuV/m is labeled "FCC Part15 Class C 3M Above-1G Peak". A green horizontal line at approximately 54.00 dBuV/m is labeled "FCC Part15 Class C 3M Above-1G AV". Two vertical lines represent measurements: one at 4872.680 MHz labeled '1' and another at 4875.185 MHz labeled '2'. The measurement values are 33.04 dBuV/m and 45.85 dBuV/m respectively, both falling well below the peak and average limits.</p>																															
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Ant. Pol.	Horizontal																														
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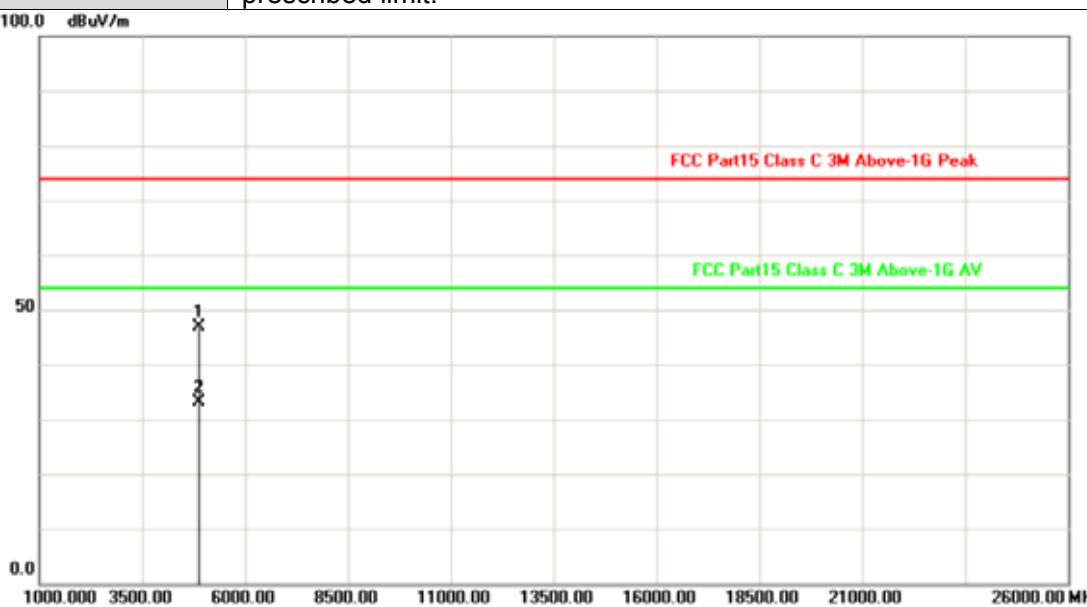
Ant. Pol.	Vertical																														
Test Mode:	TX G Mode 2462MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
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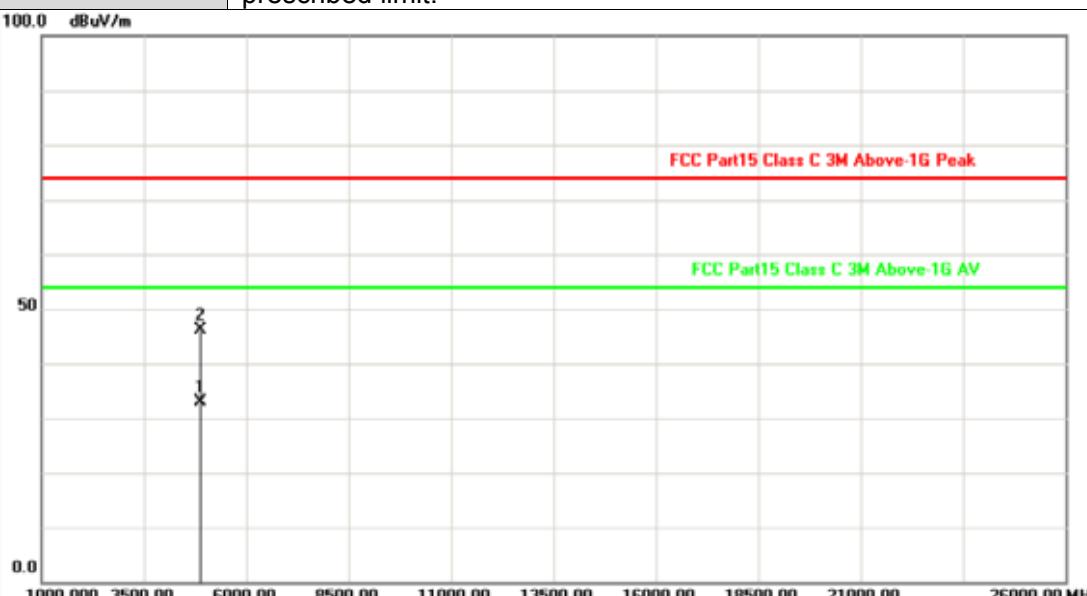
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Test Mode:	TX N20 Mode 2412MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
 <p>The plot shows a graph of dBuV/m versus MHz. The Y-axis ranges from 0.0 to 100.0 dBuV/m with major grid lines every 50 dBuV/m. The X-axis ranges from 1000.000 to 26000.00 MHz with major grid lines every 3500.00 MHz. A red horizontal line at approximately 65 dBuV/m is labeled "FCC Part15 Class C 3M Above-1G Peak". A green horizontal line at approximately 54 dBuV/m is labeled "FCC Part15 Class C 3M Above-1G AV". Two vertical lines are drawn at 4823.169 MHz and 4824.750 MHz, both labeled with 'x' and 'z' above them. The 'x' marks are at the bottom of the lines, and the 'z' marks are at the top.</p>																															
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4823.169	-2.76	35.36	32.60	54.00	-21.40	AVG																								
2	4824.750	-2.76	48.66	45.90	74.00	-28.10	peak																								
<p>Remarks:</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>																															

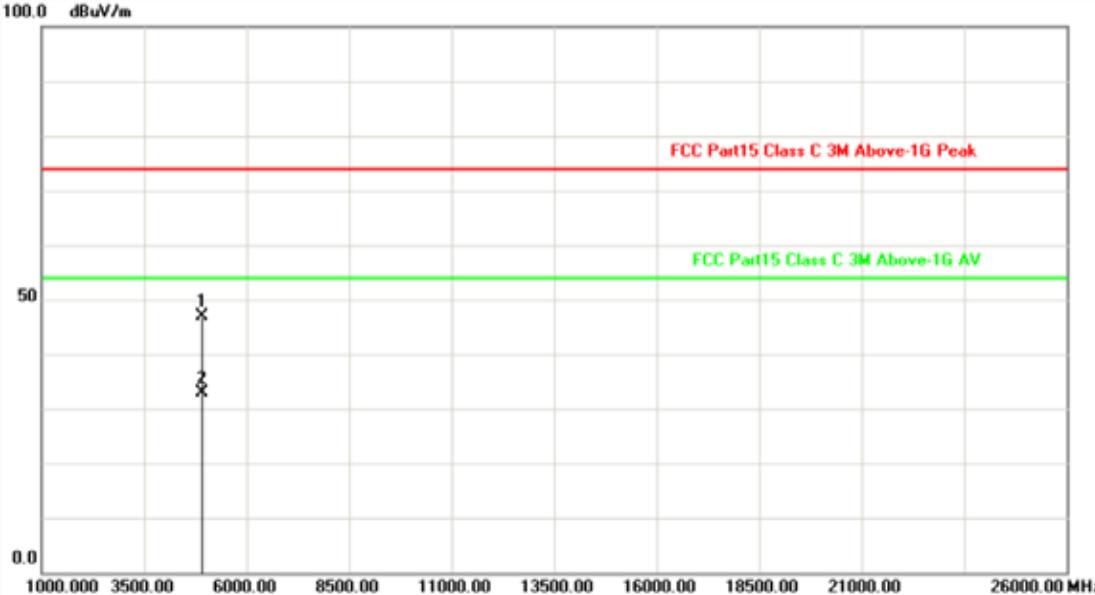


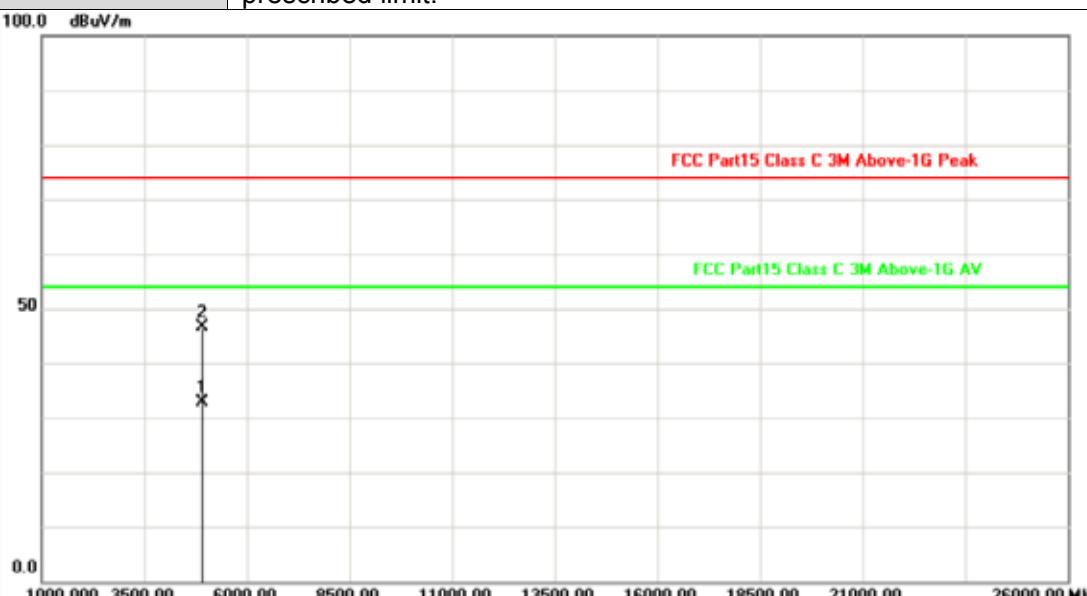
Ant. Pol.	Vertical																															
Test Mode:	TX N20 Mode 2412MHz																															
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																															
<p>100.0 dBuV/m</p> <p>FCC Part15 Class C 3M Above-1G Peak</p> <p>FCC Part15 Class C 3M Above-1G AV</p> <p>50</p> <p>0.0</p> <p>1000.00 3500.00 6000.00 8500.00 11000.00 13500.00 16000.00 18500.00 21000.00 26000.00 MHz</p>																																
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																									
1	4823.169	-2.76	34.97	32.21	54.00	-21.79	AVG																									
2	4825.356	-2.76	48.29	45.53	74.00	-28.47	peak																									
<p>Remarks:</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>																																

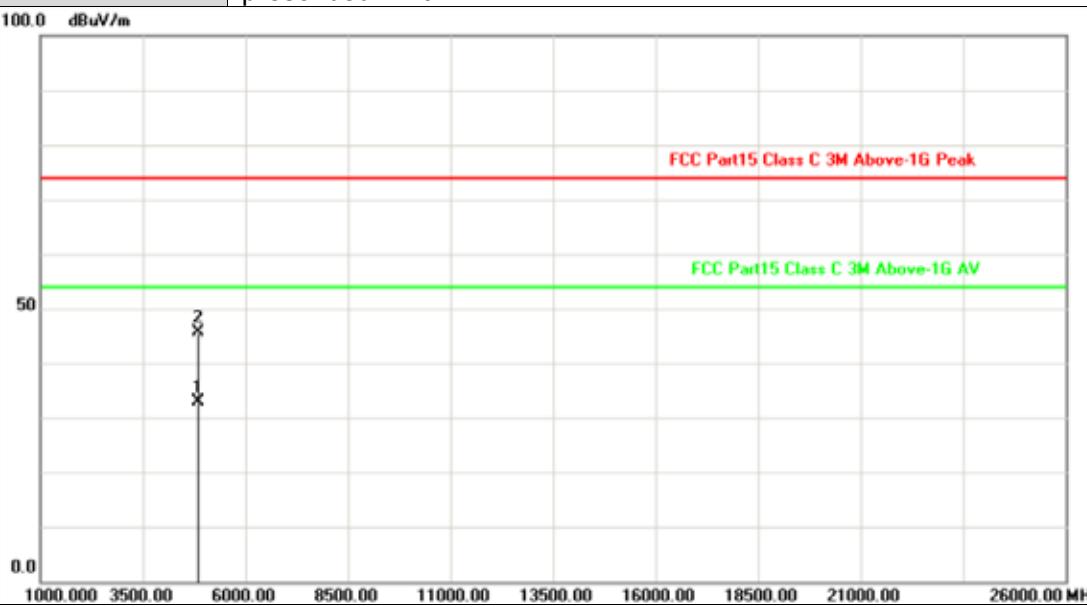


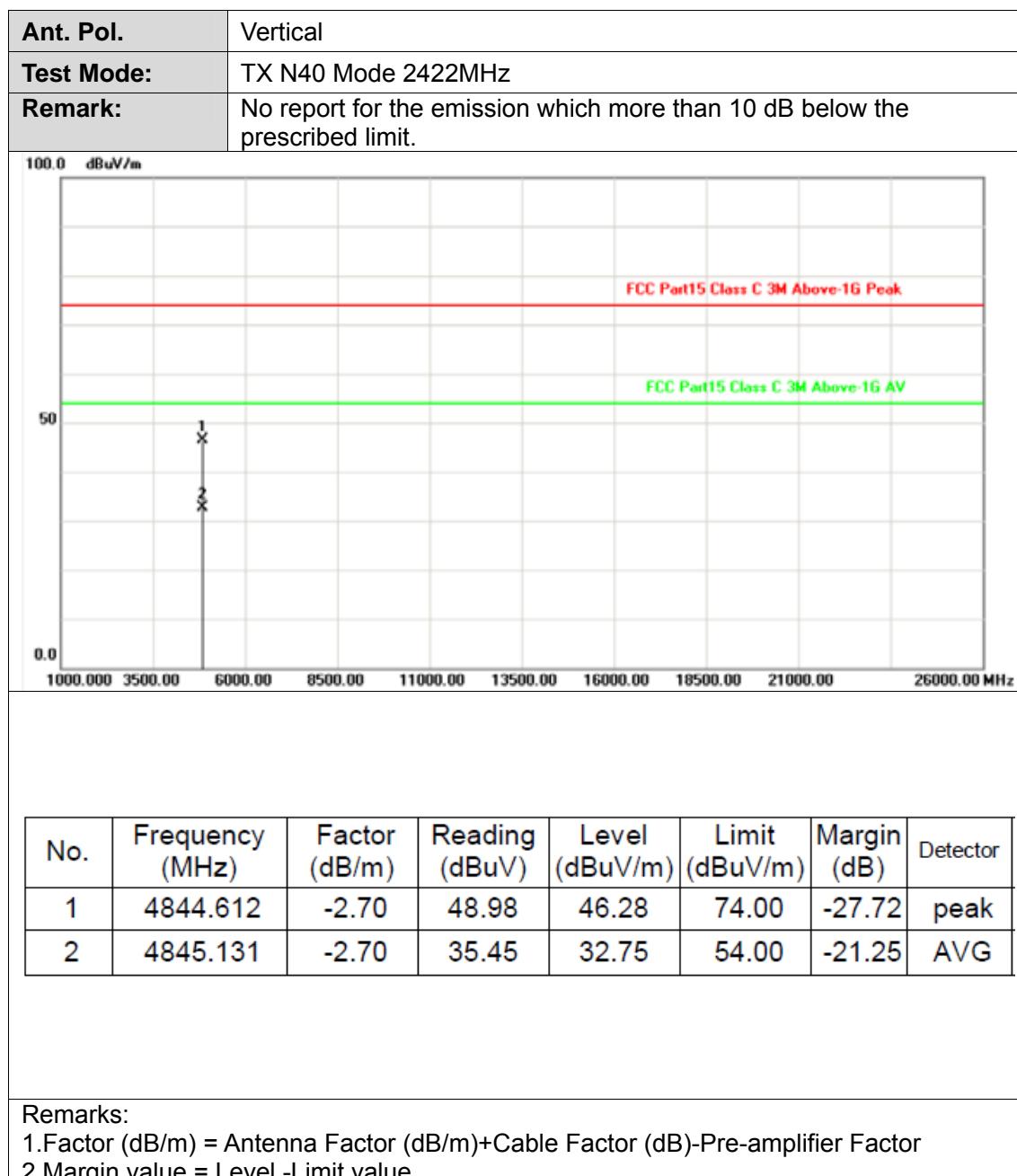
Ant. Pol.	Horizontal																														
Test Mode:	TX N20 Mode 2437MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
																															
<table border="1"><thead><tr><th>No.</th><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>4872.755</td><td>-2.61</td><td>49.48</td><td>46.87</td><td>74.00</td><td>-27.13</td><td>peak</td></tr><tr><td>2</td><td>4874.702</td><td>-2.61</td><td>35.62</td><td>33.01</td><td>54.00</td><td>-20.99</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	4872.755	-2.61	49.48	46.87	74.00	-27.13	peak	2	4874.702	-2.61	35.62	33.01	54.00	-20.99	AVG
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
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<p>Remarks:</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.	Vertical																														
Test Mode:	TX N20 Mode 2437MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
																															
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4872.830	-2.61	35.55	32.94	54.00	-21.06	AVG																								
2	4873.502	-2.61	48.70	46.09	74.00	-27.91	peak																								
<p>Remarks:</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:	TX N20 Mode 2462MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
																															
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No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4924.309	-2.47	49.45	46.98	74.00	-27.02	peak																								
2	4925.206	-2.47	35.40	32.93	54.00	-21.07	AVG																								
<p>Remarks:</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.	Vertical																														
Test Mode:	TX N20 Mode 2462MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
 <p>The plot shows a graph of dBuV/m versus MHz. The Y-axis ranges from 0.0 to 100.0 dBuV/m with major grid lines every 50 units. The X-axis ranges from 1000.000 to 26000.00 MHz with major grid lines every 3500.00 MHz. A red horizontal line at approximately 60 dBuV/m is labeled "FCC Part15 Class C 3M Above-1G Peak". A green horizontal line at approximately 54 dBuV/m is labeled "FCC Part15 Class C 3M Above-1G AV". Two vertical lines are drawn at 4922.500 MHz and 4923.859 MHz. The first vertical line is labeled '1' and the second is labeled '2'. Arrows point from these labels to their respective frequency values on the X-axis.</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>4922.500</td><td>-2.47</td><td>35.46</td><td>32.99</td><td>54.00</td><td>-21.01</td><td>AVG</td></tr><tr><td>2</td><td>4923.859</td><td>-2.47</td><td>49.06</td><td>46.59</td><td>74.00</td><td>-27.41</td><td>peak</td></tr></tbody></table>								No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	1	4922.500	-2.47	35.46	32.99	54.00	-21.01	AVG	2	4923.859	-2.47	49.06	46.59	74.00	-27.41	peak
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4922.500	-2.47	35.46	32.99	54.00	-21.01	AVG																								
2	4923.859	-2.47	49.06	46.59	74.00	-27.41	peak																								
<p>Remarks:</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:	TX 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>4843.433</td><td>-2.70</td><td>35.47</td><td>32.77</td><td>54.00</td><td>-21.23</td><td>AVG</td></tr><tr><td>2</td><td>4844.414</td><td>-2.70</td><td>48.36</td><td>45.66</td><td>74.00</td><td>-28.34</td><td>peak</td></tr></tbody></table>								No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	1	4843.433	-2.70	35.47	32.77	54.00	-21.23	AVG	2	4844.414	-2.70	48.36	45.66	74.00	-28.34	peak
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4843.433	-2.70	35.47	32.77	54.00	-21.23	AVG																								
2	4844.414	-2.70	48.36	45.66	74.00	-28.34	peak																								
<p>Remarks:</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>																															

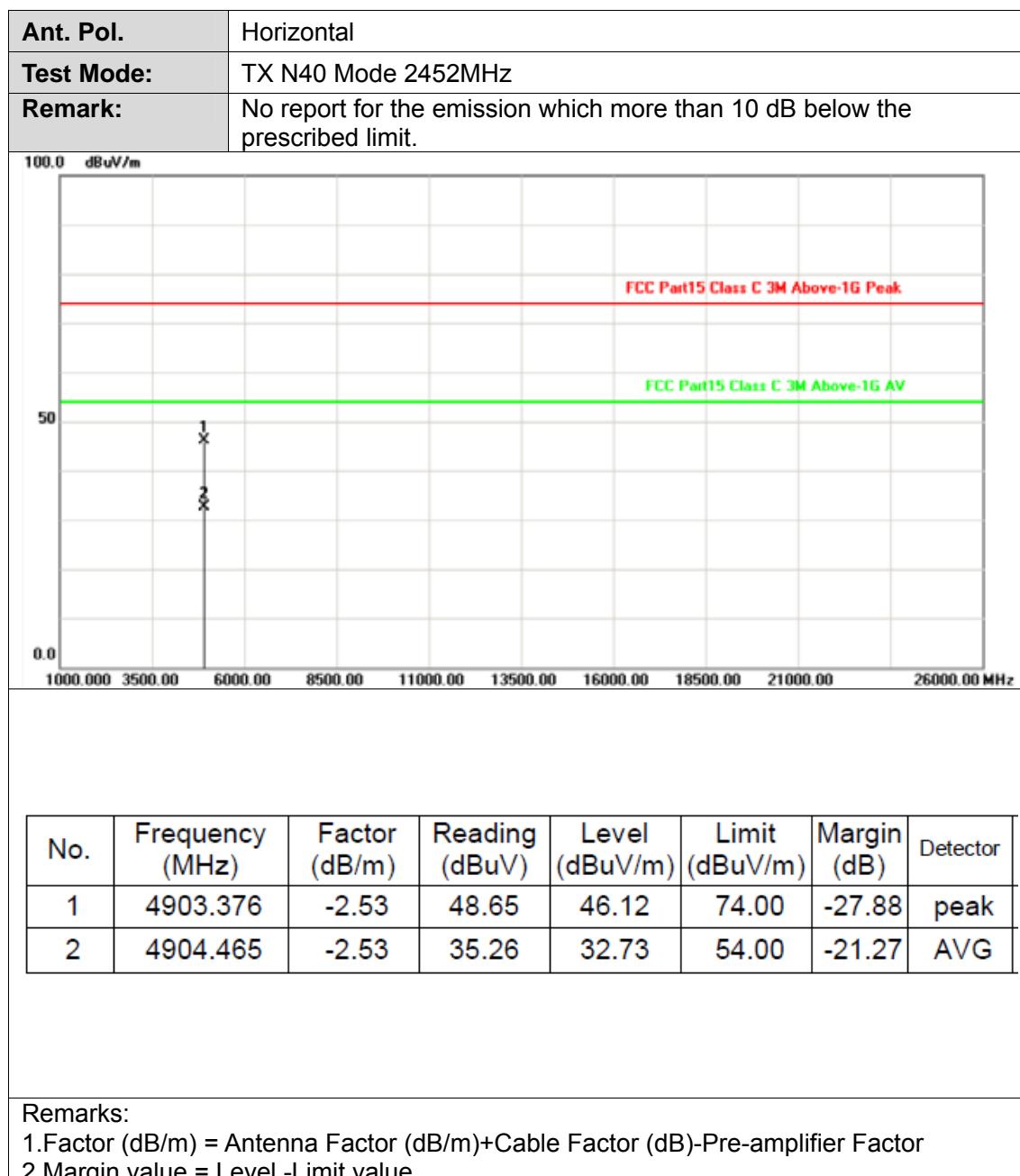


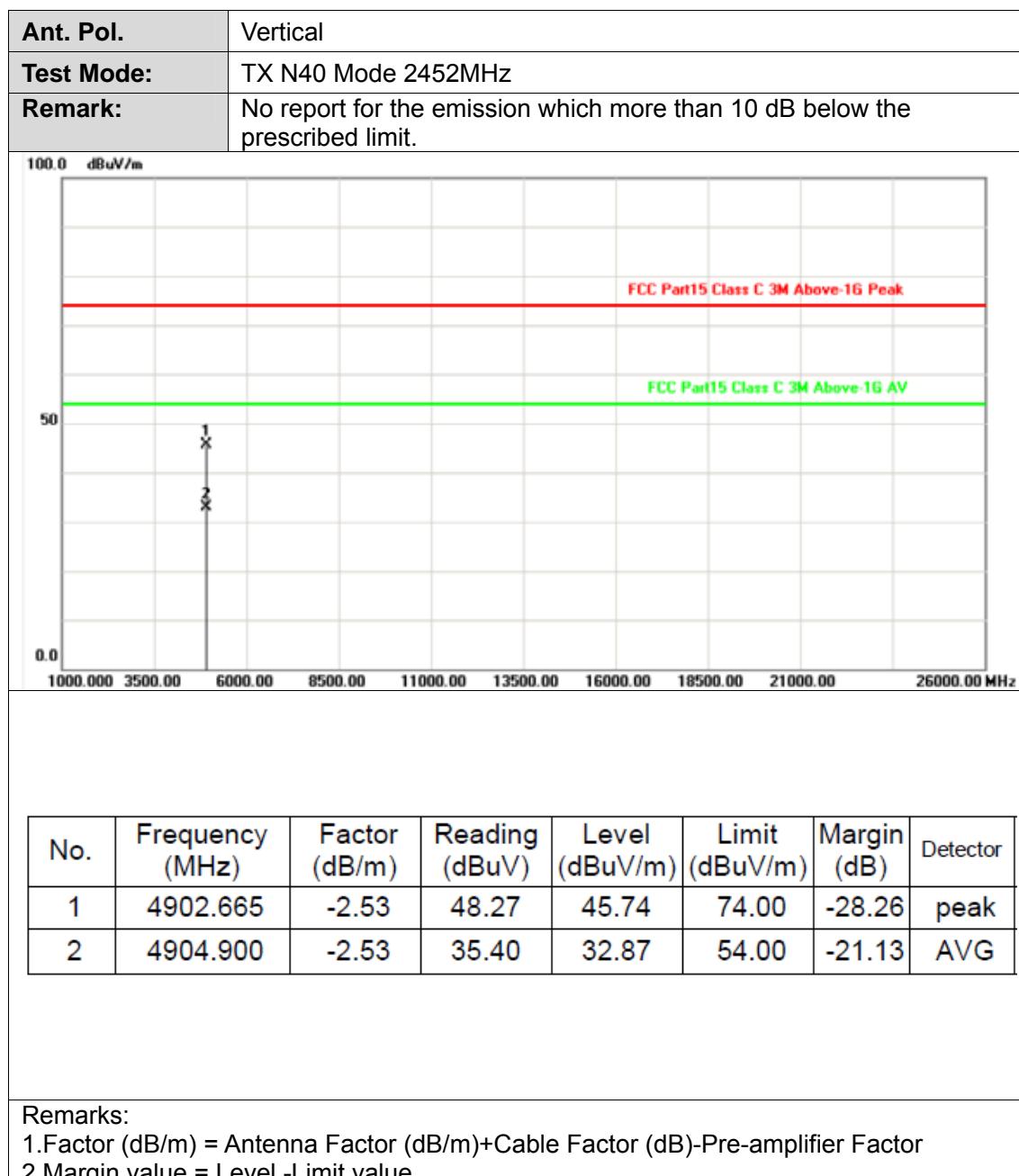


Ant. Pol.	Horizontal																														
Test Mode:	TX N40 Mode 2437MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
<p>100.0 dBuV/m</p> <p>50</p> <p>0.0</p> <p>FCC Part15 Class C 3M Above-1G Peak</p> <p>FCC Part15 Class C 3M Above-1G AV</p> <p>1000.000 3500.00 6000.00 8500.00 11000.00 13500.00 16000.00 18500.00 21000.00 26000.00 MHz</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>4872.740</td><td>-2.61</td><td>35.60</td><td>32.99</td><td>54.00</td><td>-21.01</td><td>AVG</td></tr><tr><td>2</td><td>4875.389</td><td>-2.61</td><td>48.85</td><td>46.24</td><td>74.00</td><td>-27.76</td><td>peak</td></tr></tbody></table>								No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	1	4872.740	-2.61	35.60	32.99	54.00	-21.01	AVG	2	4875.389	-2.61	48.85	46.24	74.00	-27.76	peak
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4872.740	-2.61	35.60	32.99	54.00	-21.01	AVG																								
2	4875.389	-2.61	48.85	46.24	74.00	-27.76	peak																								
<p>Remarks:</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.	Vertical																														
Test Mode:	TX N40 Mode 2437MHz																														
Remark:	No report for the emission which more than 10 dB below the prescribed limit.																														
<p>100.0 dBuV/m</p> <p>FCC Part15 Class C 3M Above-1G Peak</p> <p>50</p> <p>FCC Part15 Class C 3M Above-1G AV</p> <p>0.0</p> <p>1000.000 3500.00 6000.00 8500.00 11000.00 13500.00 16000.00 18500.00 21000.00 26000.00 MHz</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>4873.499</td><td>-2.61</td><td>49.22</td><td>46.61</td><td>74.00</td><td>-27.39</td><td>peak</td></tr><tr><td>2</td><td>4875.395</td><td>-2.61</td><td>36.14</td><td>33.53</td><td>54.00</td><td>-20.47</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	4873.499	-2.61	49.22	46.61	74.00	-27.39	peak	2	4875.395	-2.61	36.14	33.53	54.00	-20.47	Avg
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector																								
1	4873.499	-2.61	49.22	46.61	74.00	-27.39	peak																								
2	4875.395	-2.61	36.14	33.53	54.00	-20.47	Avg																								
<p>Remarks:</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

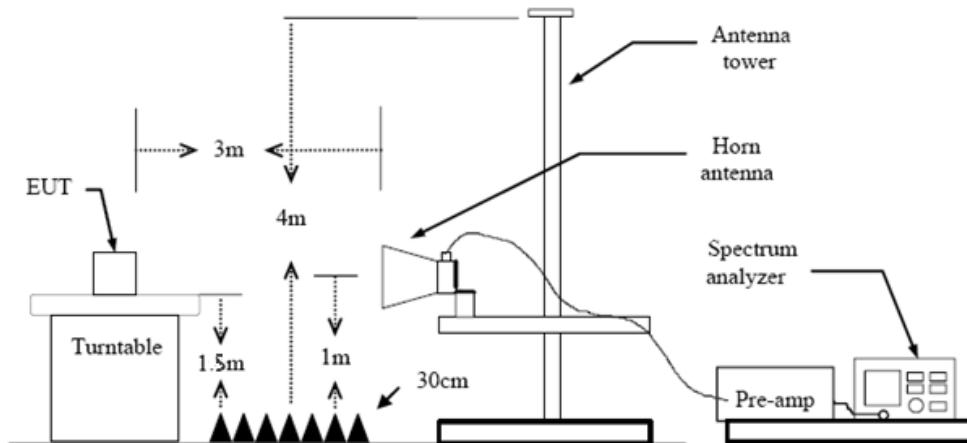
Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d)/ RSS 247 5.5:

Restricted Frequency Band (MHz)	(dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

Conducted band edge and Conducted Spurious Emissions limit: The highest point of the operating frequency waveform down 20dB

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 see note 1 with Peak Detector for Average Value.

Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.7 Duty Cycle.

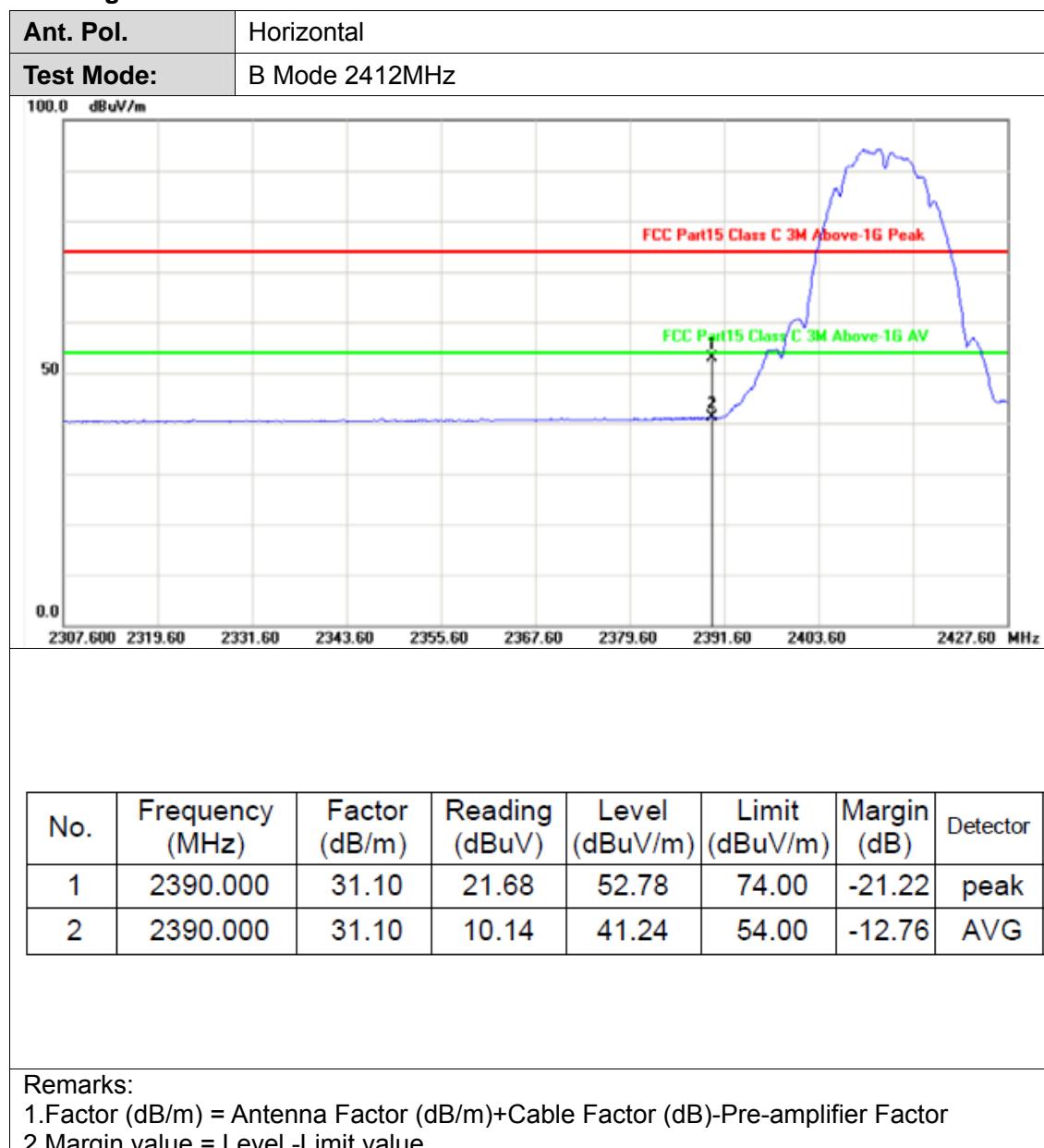
2: Duty Cycle > 98%, VBW=10Hz.

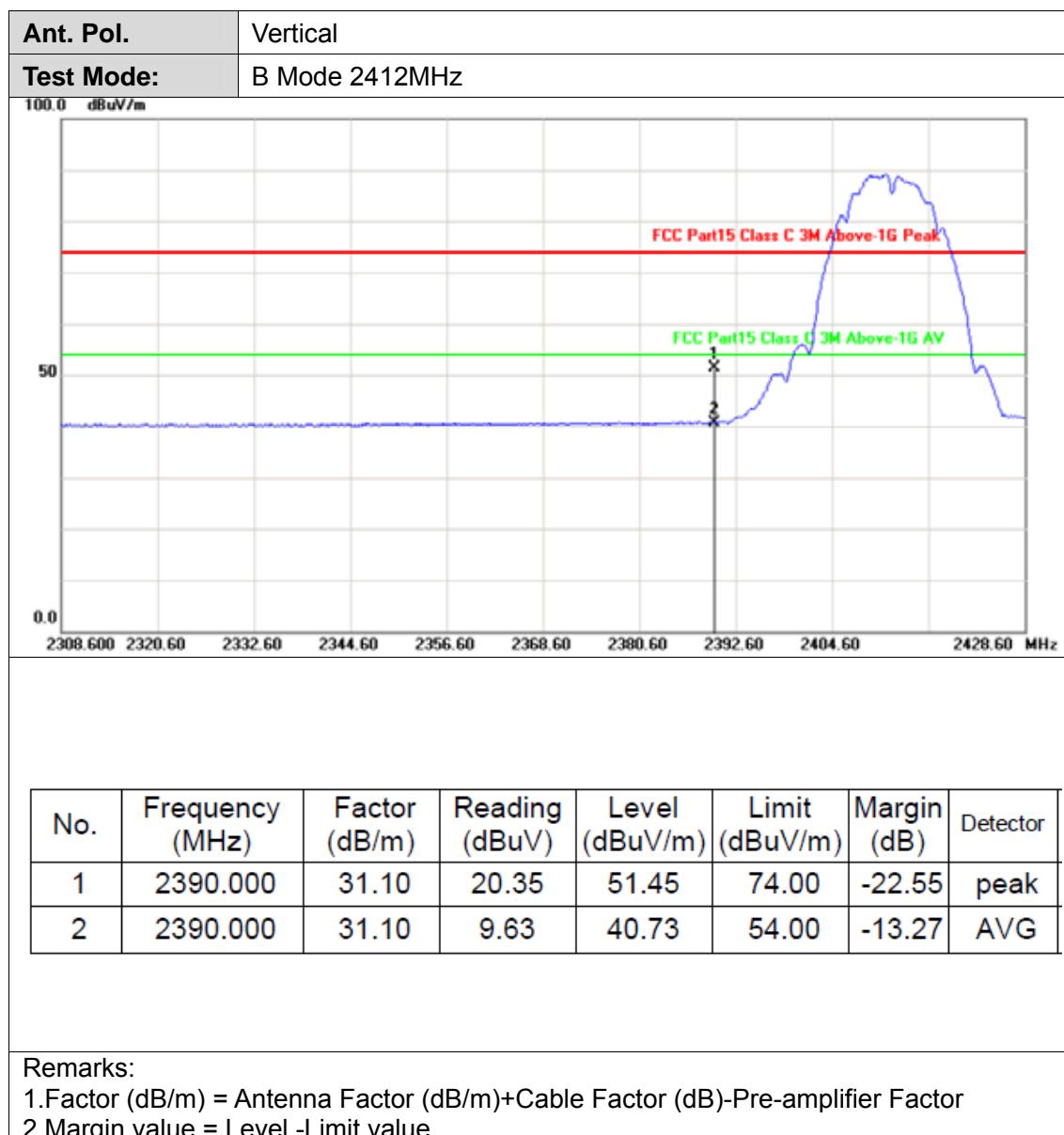
Test Mode

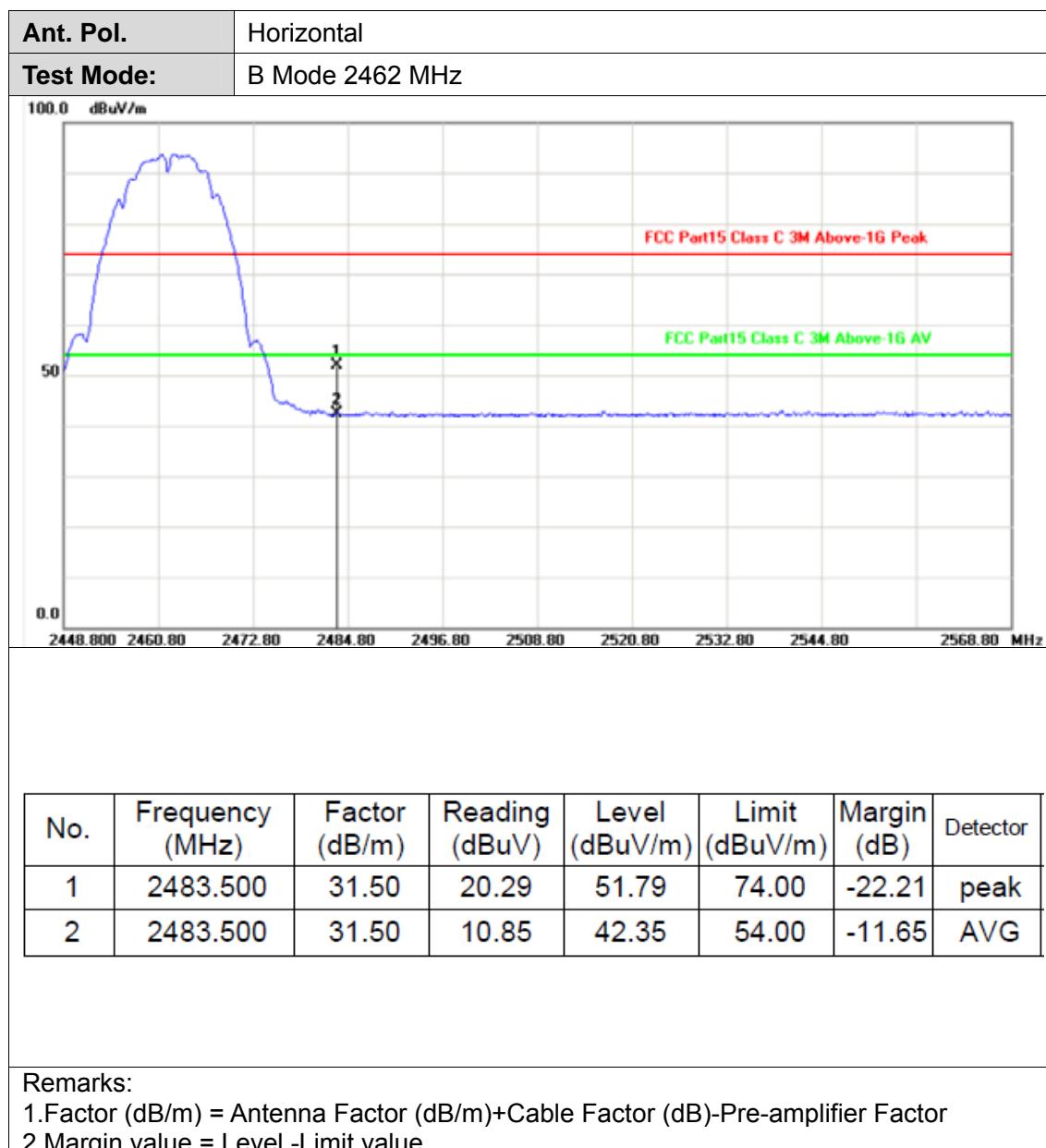
Please refer to the clause 2.4.

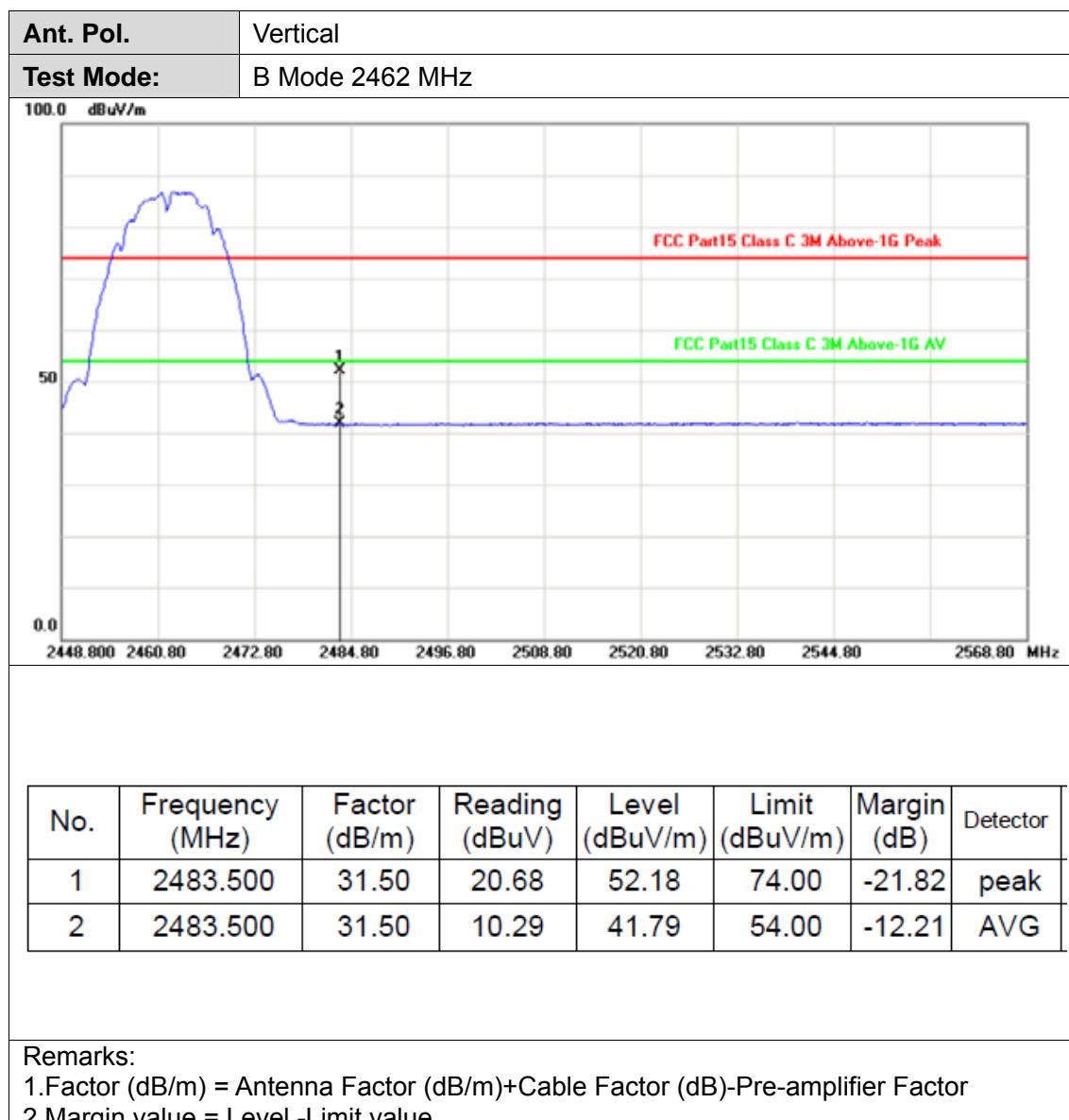
Test Results

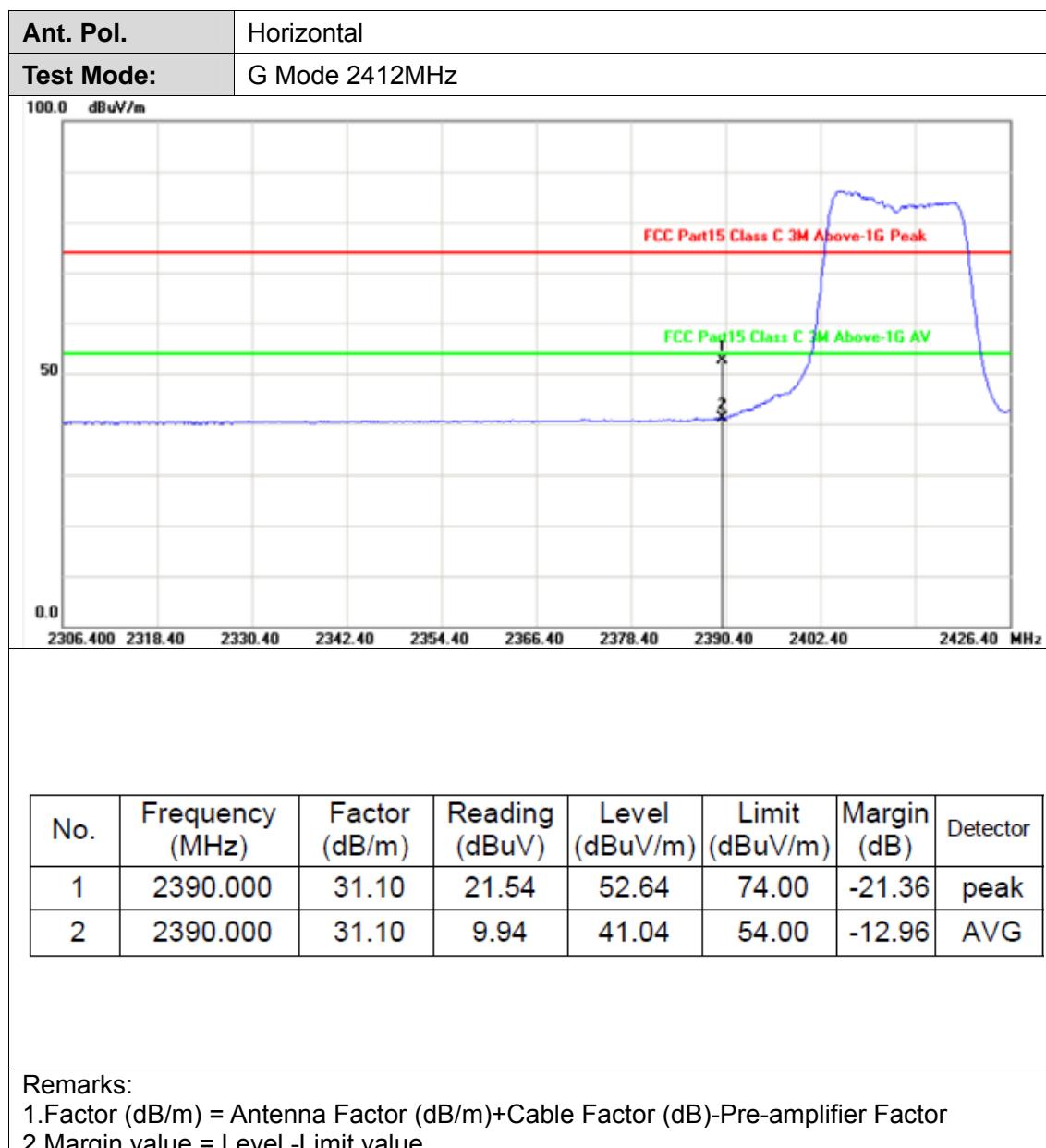
(1) Band edge Radiation Test





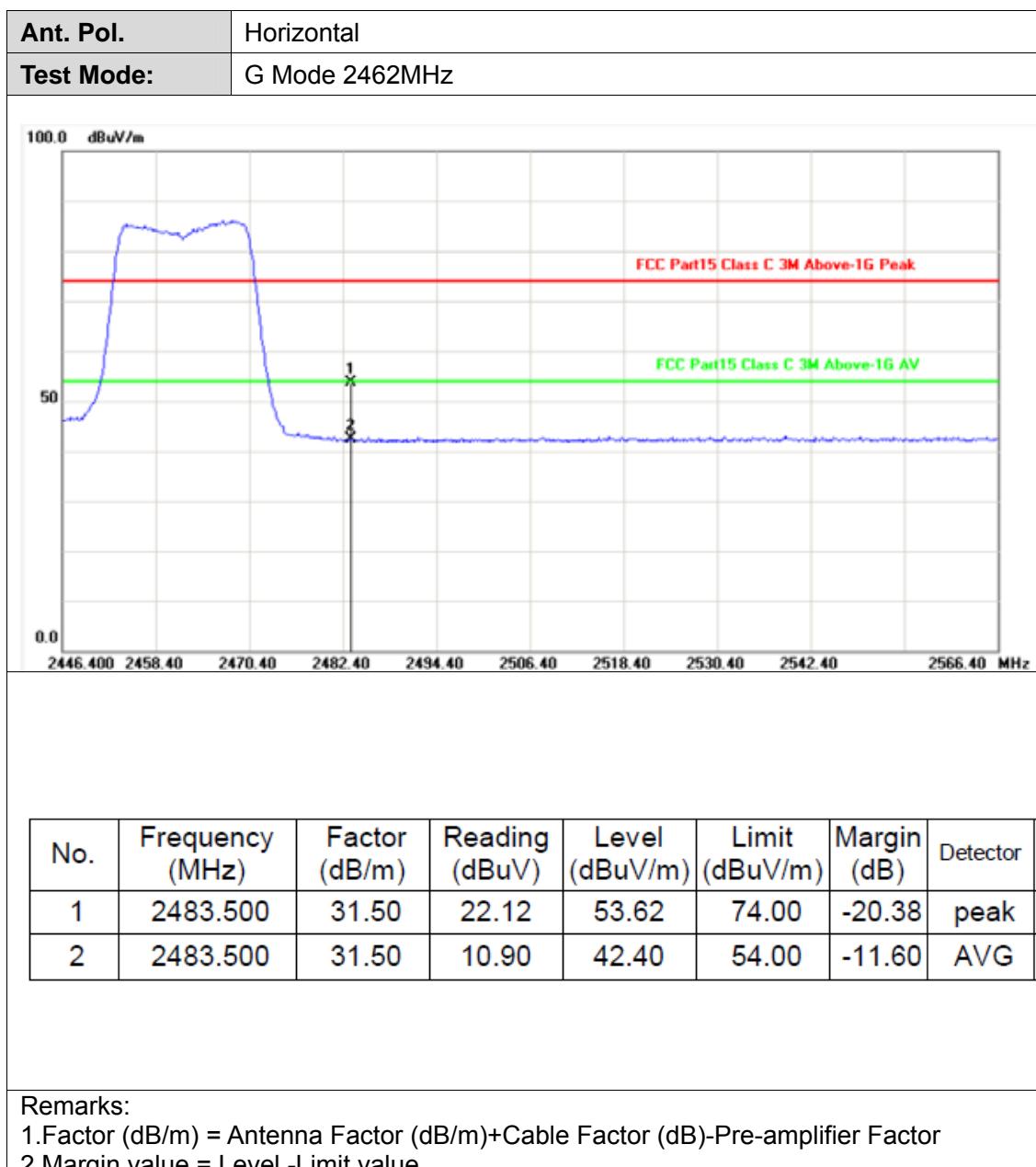


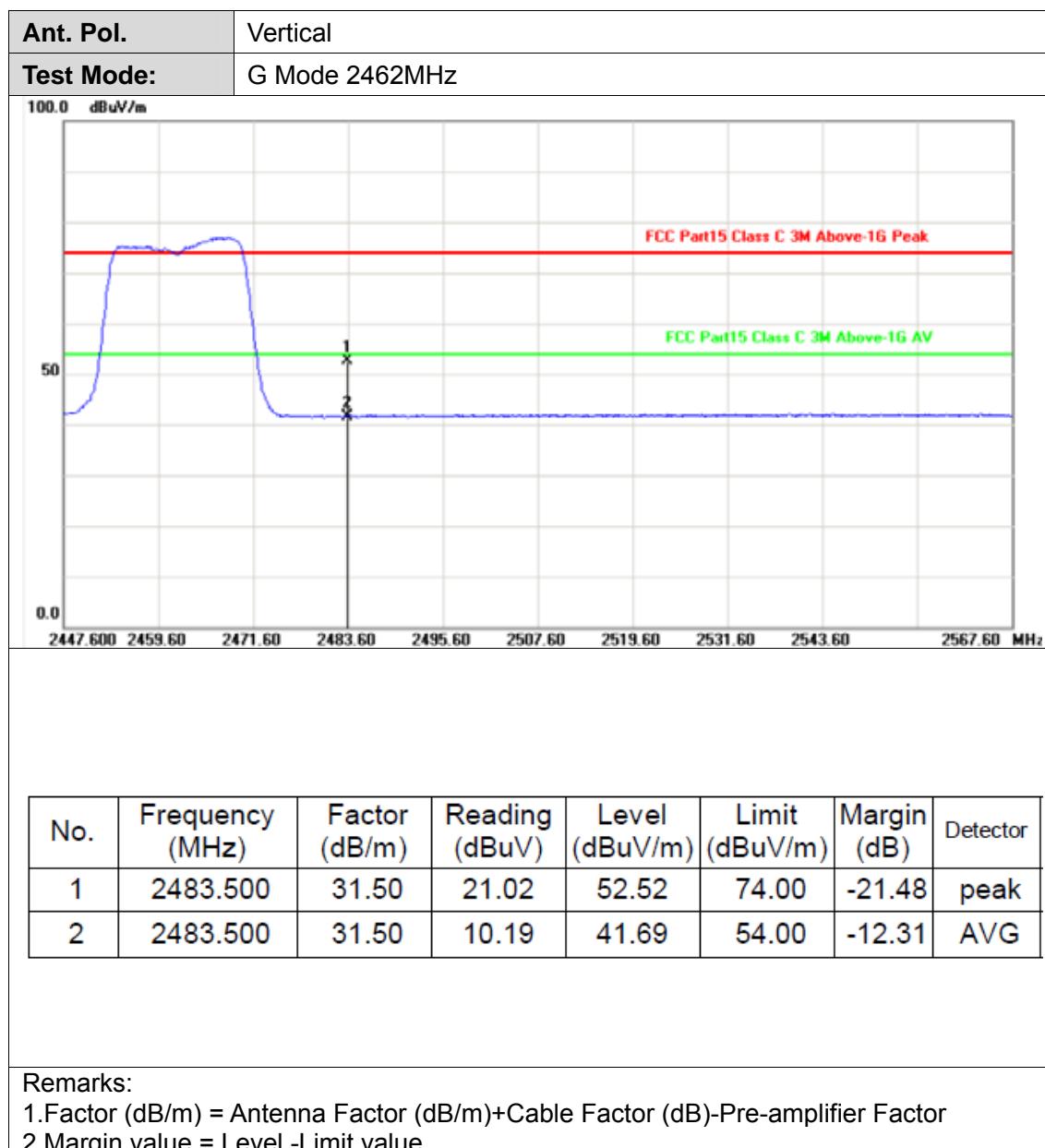


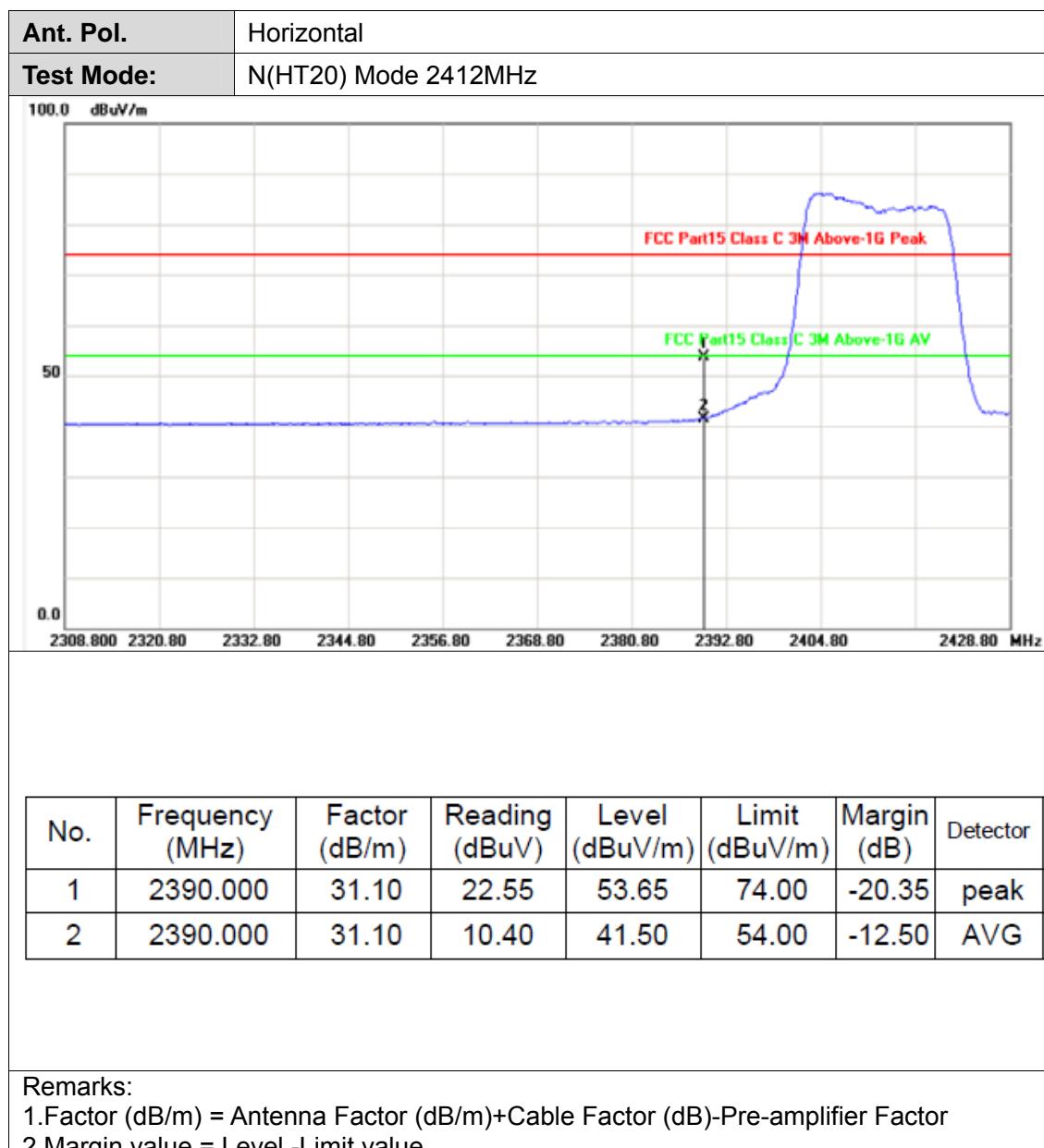


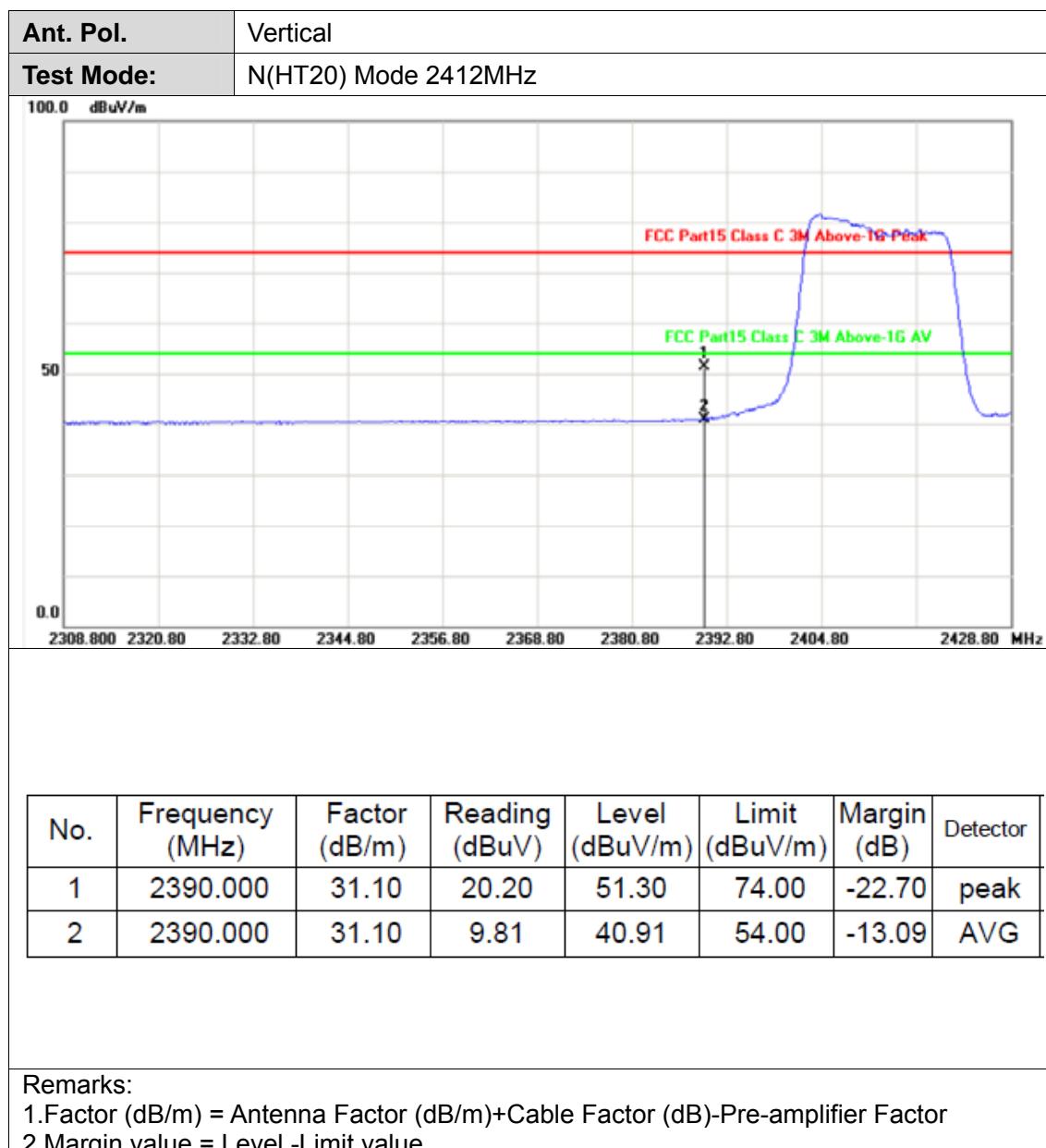


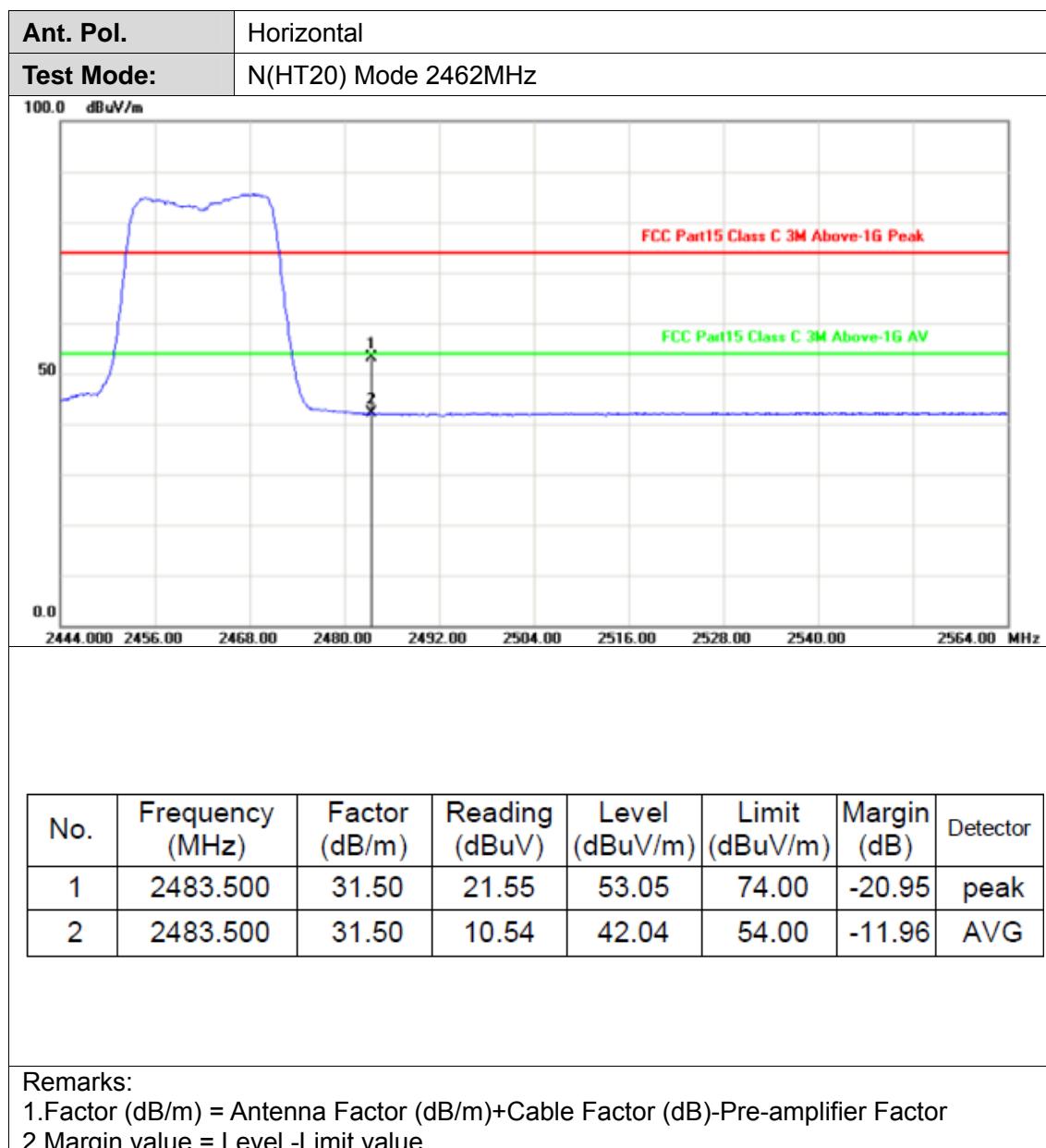
Ant. Pol.	Vertical													
Test Mode:	G Mode 2412MHz													
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector							
1	2390.000	31.10	20.55	51.65	74.00	-22.35	peak							
2	2390.000	31.10	9.82	40.92	54.00	-13.08	AVG							
Remarks: 1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2. Margin value = Level - Limit value														

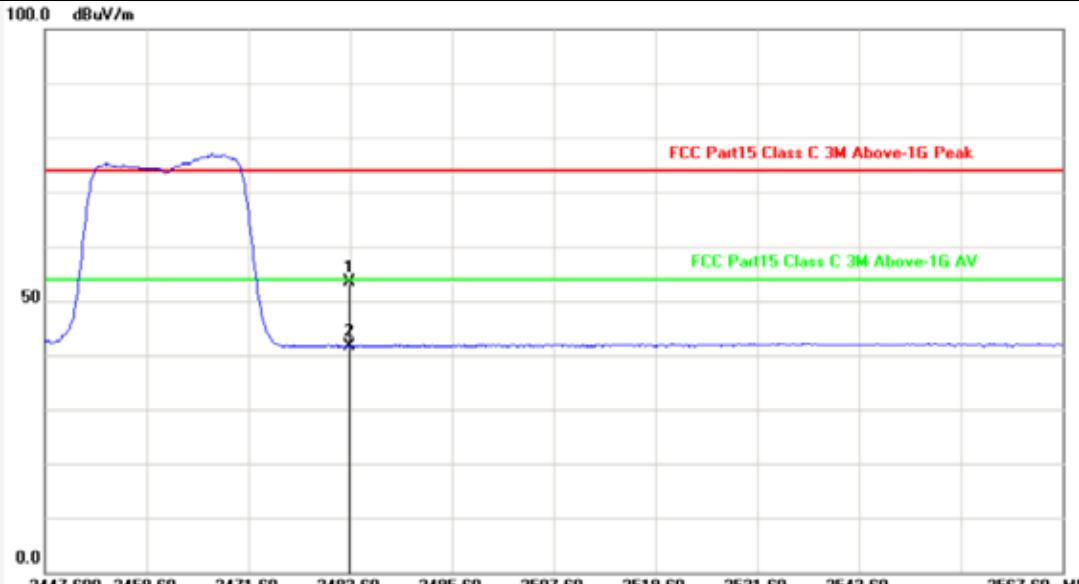


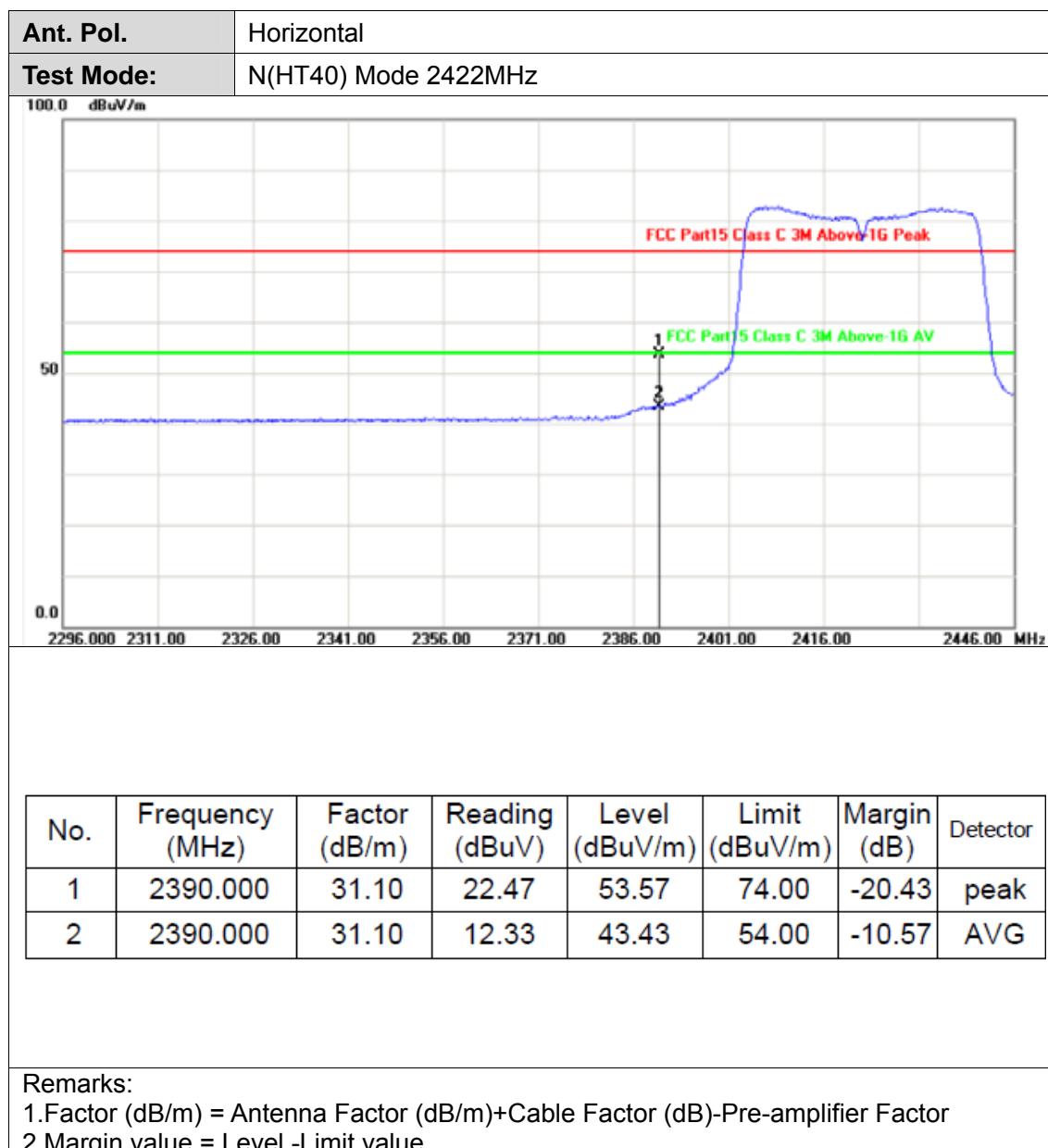


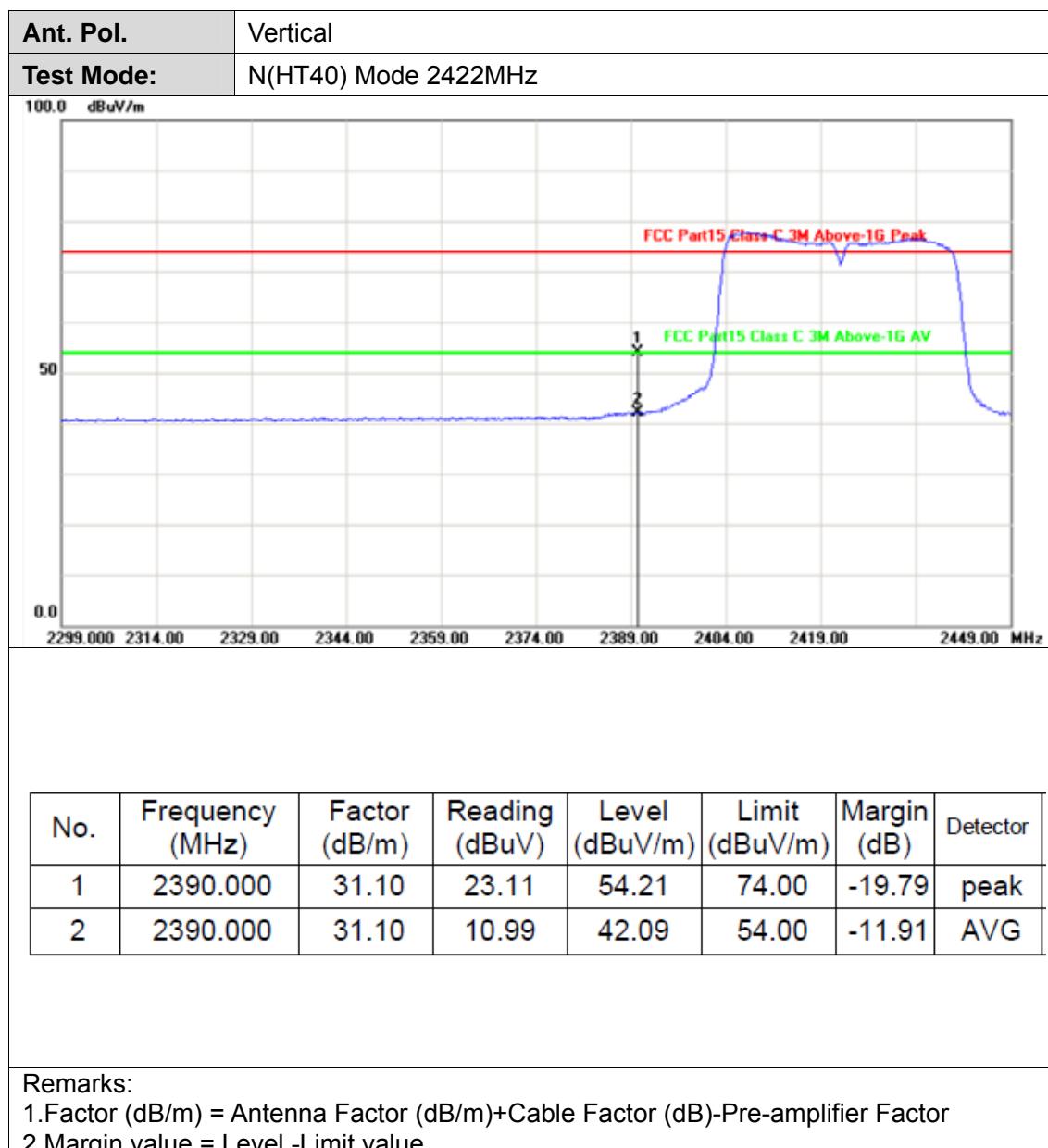


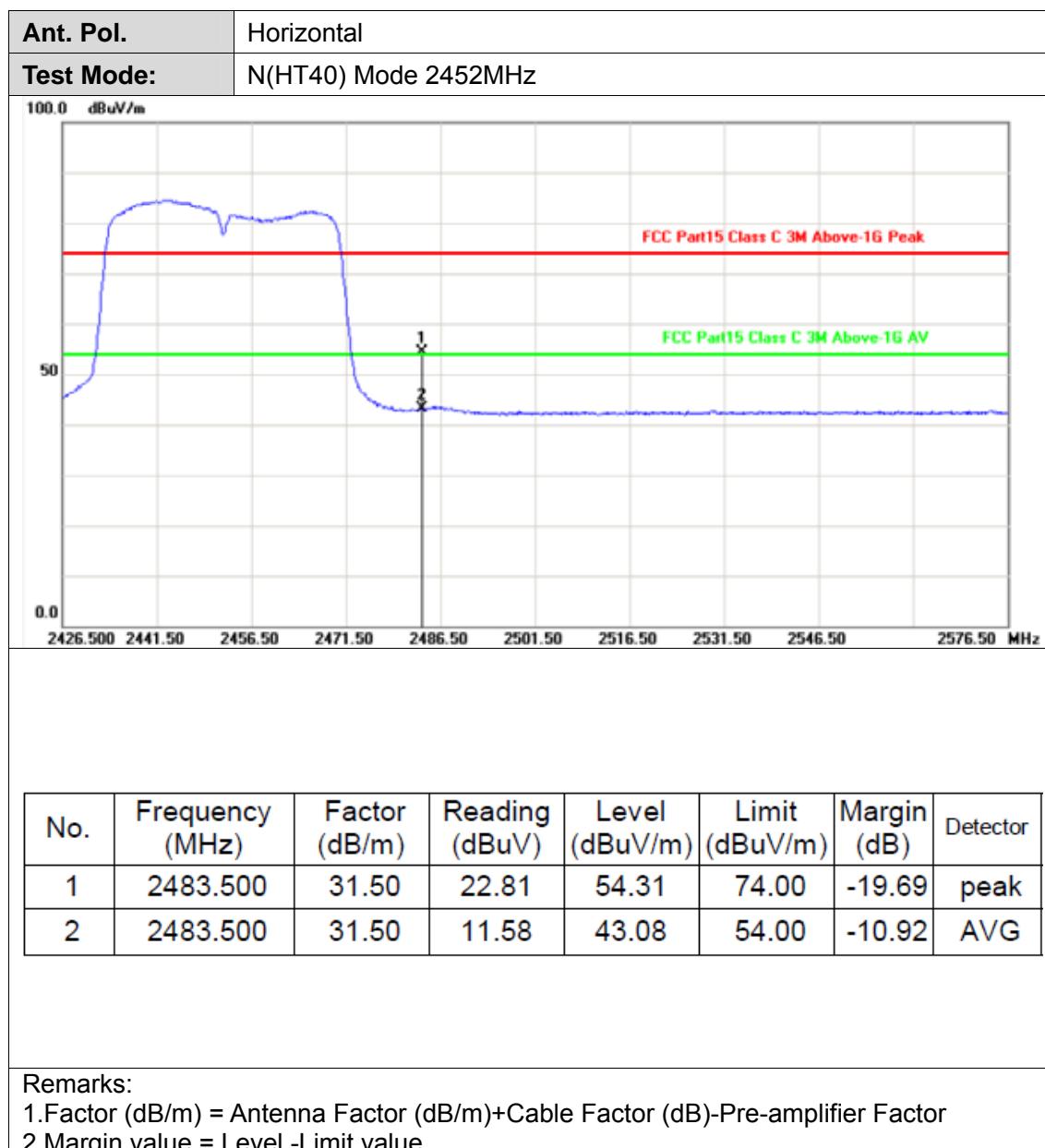


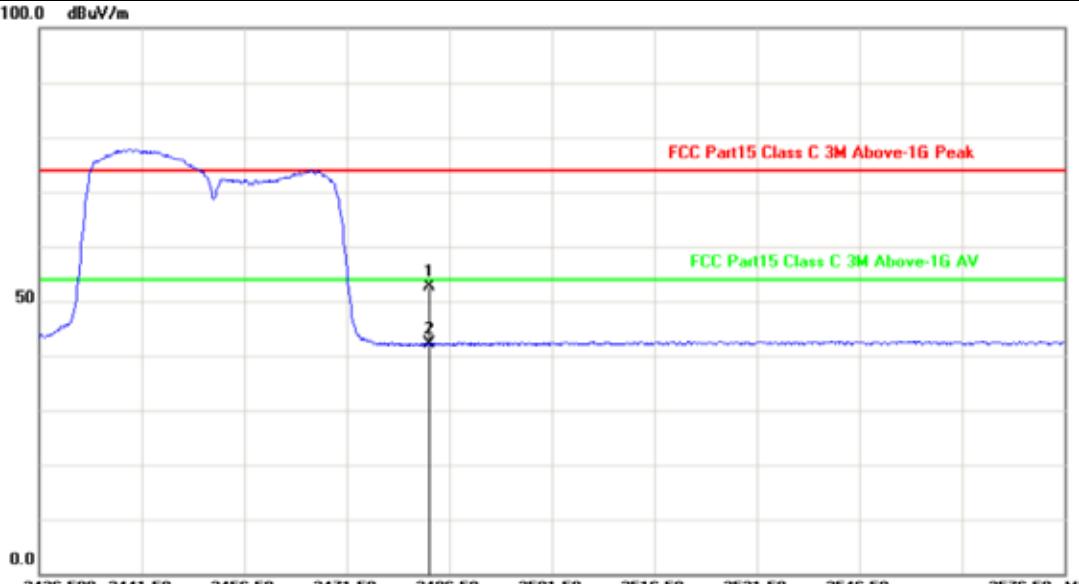


Ant. Pol.	Vertical													
Test Mode:	N(HT20) Mode 2462MHz													
														
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector							
1	2483.500	31.50	21.83	53.33	74.00	-20.67	peak							
2	2483.500	31.50	10.06	41.56	54.00	-12.44	AVG							
<p>Remarks:</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.	Vertical													
Test Mode:	N(HT40) Mode 2452MHz													
														
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector							
1	2483.500	31.50	21.12	52.62	74.00	-21.38	peak							
2	2483.500	31.50	10.55	42.05	54.00	-11.95	AVG							
Remarks: 1. Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2. Margin value = Level -Limit value														

(2) Band edge Conducted Test

Type:	802.11 b		
CH01			
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	Result
2400.000	-34.57	-15.46	Pass
2390.000	-54.35		
2399.792	-36.78		

Type:	802.11 b		
CH11			
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	Result
2483.500	-53.88	-15.41	Pass
2500.000	-53.00		
2508.926	-52.53		

Type:	802.11 g		
CH01	<p>D1 -21.04 dBm</p>	<p>* RBW 100 kHz Marker 4 [T1] -40.26 dBm * VBW 300 kHz 2.399791667 GHz SWT 15 ms</p> <p>Ref 20 dBm Att 30 dB</p> <p>Marker 1 [T1] -1.04 dBm 2.404791667 GHz</p> <p>Marker 2 [T1] -37.54 dBm 2.400000000 GHz</p> <p>Marker 3 [T1] -51.83 dBm 2.399000000 GHz</p>	LVL
Date: 18.NOV.2020 10:13:42			
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	Result
2400.000	-37.57	-21.04	Pass
2390.000	-51.83		
2399.855	-40.26		

Type:	802.11 g		
CH11	<p>D1 -22.79 dBm</p>	<p>* RBW 100 kHz Marker 4 [T1] -52.62 dBm * VBW 300 kHz 2.484246795 GHz SWT 15 ms</p> <p>Ref 20 dBm Att 30 dB</p> <p>Marker 1 [T1] -2.79 dBm 2.469613385 GHz</p> <p>Marker 2 [T1] -53.23 dBm 2.483500000 GHz</p> <p>Marker 3 [T1] -56.26 dBm 2.500000000 GHz</p>	LVL
Date: 18.NOV.2020 10:48:30			
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	Result
2483.500	-53.23	-22.79	Pass
2500.000	-56.26		
2484.247	-52.62		

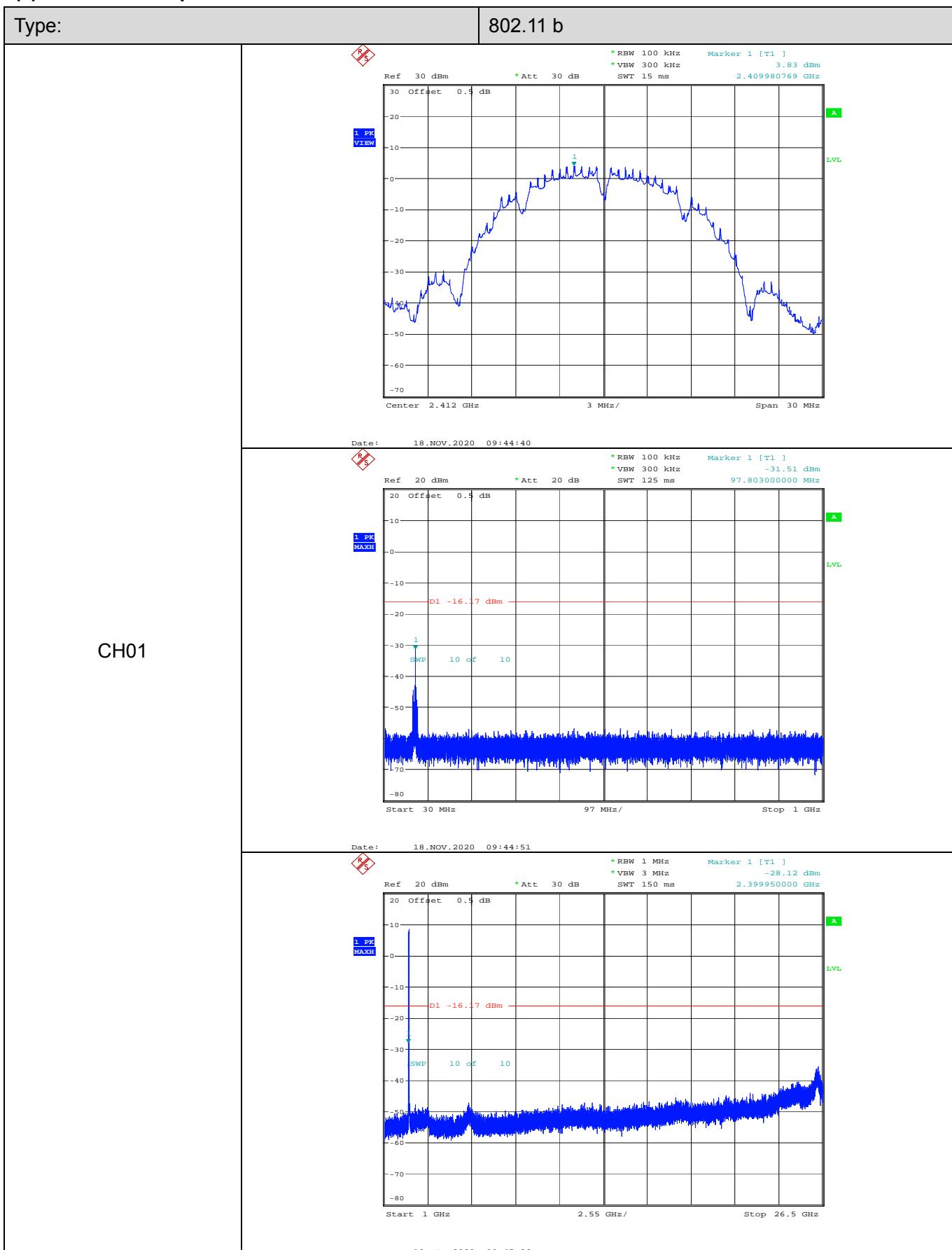
Type:	802.11 n(HT20)		
CH01			
Date: 18.NOV.2020 11:02:05			
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	Result
2400.000	-35.49	-21.13	Pass
2390.000	-49.72		
2399.792	-40.30		

Type:	802.11 n(HT20)		
CH11			
Date: 18.NOV.2020 11:14:31			
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	Result
2483.500	-53.98	-22.75	Pass
2500.000	-54.17		
2484.952	-51.76		

Type:	802.11 n(HT40)		
CH03	<p>Detailed description: This is a spectrum analysis plot for channel CH03. The x-axis represents frequency from 2.3 GHz to 2.45 GHz, with a major scale of 15 MHz. The y-axis represents power in dBm from -80 to 0. A blue line shows the measured signal power, which is relatively flat around -45 dBm until approximately 2.4 GHz, where it rises sharply to about -24.81 dBm. Several markers are placed on the plot: Marker 1 at 2.40721538 GHz (-4.81 dBm), Marker 2 at 2.400000000 GHz (-37.85 dBm), Marker 3 at 2.399519231 GHz (-45.42 dBm), and Marker 4 at 2.400000000 GHz (-37.69 dBm). A horizontal red line at -24.81 dBm indicates the compliance limit.</p>		
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	
2400.000	-37.85	-24.81	Pass
2390.000	-45.42		
2399.519	-37.69		

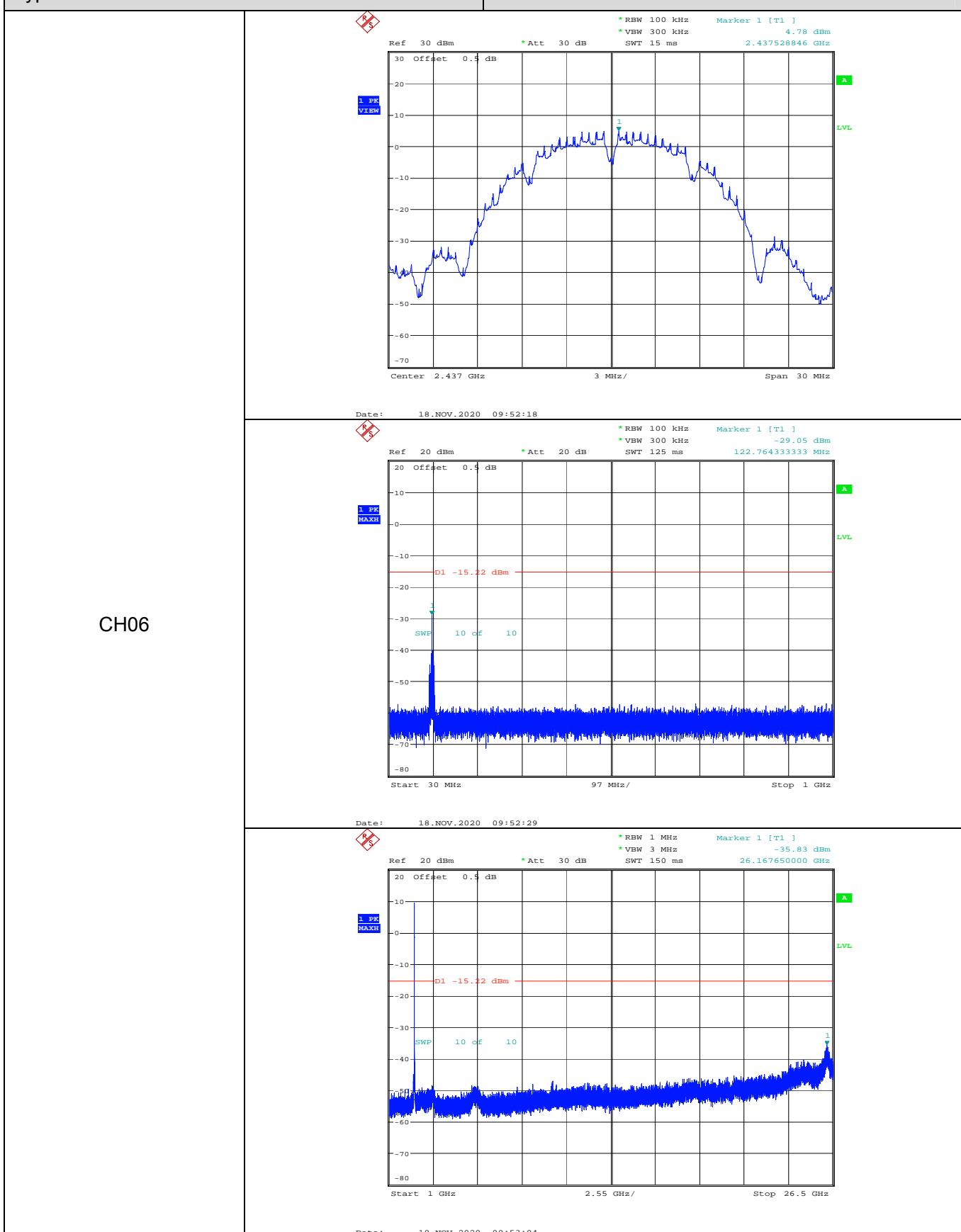
Type:	802.11 n(HT40)		
CH09	<p>Detailed description: This is a spectrum analysis plot for channel CH09. The x-axis represents frequency from 2.42 GHz to 2.55 GHz, with a major scale of 13 MHz. The y-axis represents power in dBm from -80 to 0. A blue line shows the measured signal power, which is relatively flat around -47 dBm until approximately 2.45 GHz, where it rises sharply to about -25.44 dBm. Several markers are placed on the plot: Marker 1 at 2.443333333 GHz (-8.44 dBm), Marker 2 at 2.483504000 GHz (-50.02 dBm), and Marker 3 at 2.500004000 GHz (-55.72 dBm). A horizontal red line at -25.44 dBm indicates the compliance limit.</p>		
Mark frequency(MHz)	Value (dBm)	Limit (dBm)	
2483.500	-50.02	-25.44	Pass
2500.000	-55.72		
2484.583	-47.28		

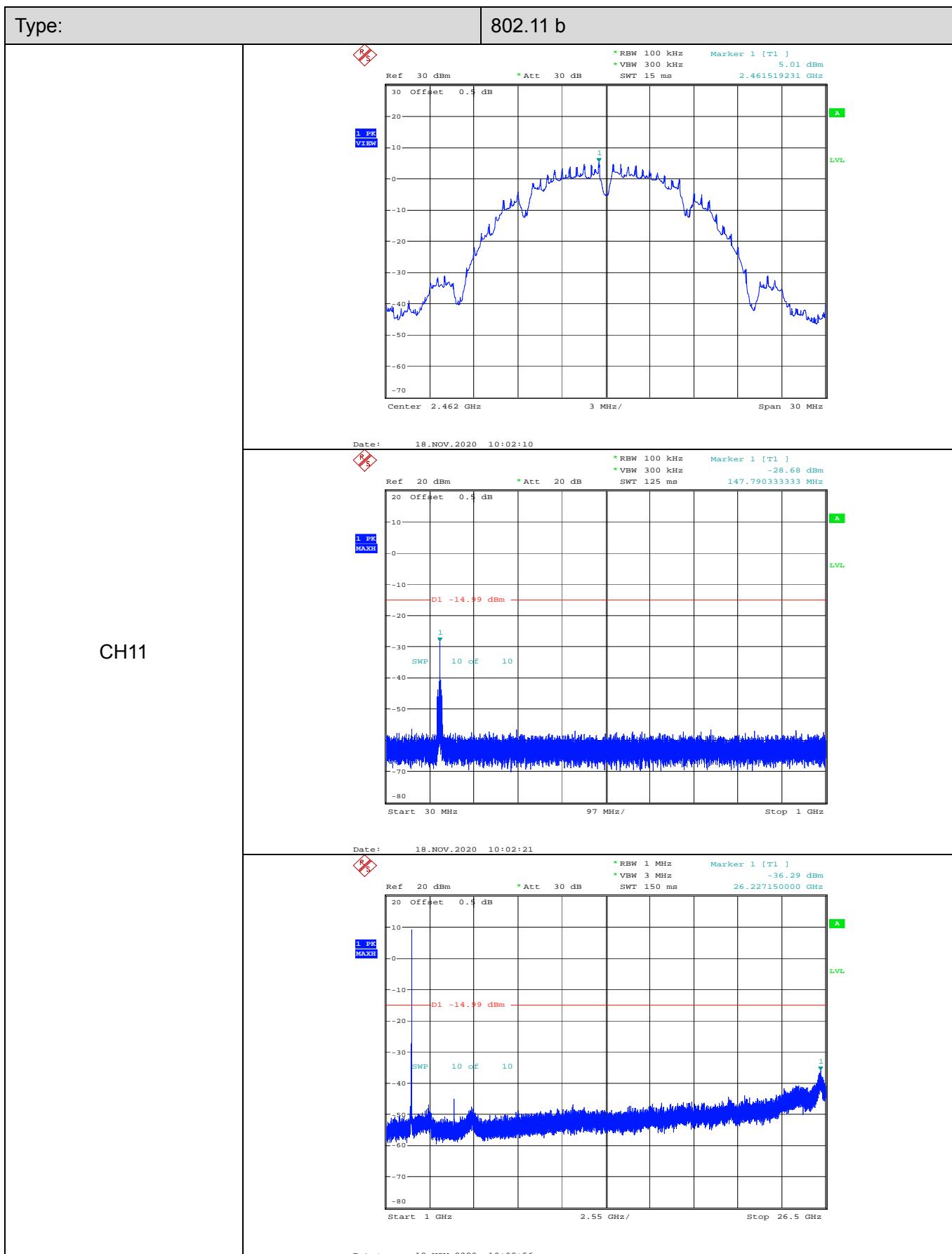
(3) Conducted Spurious Emissions Test

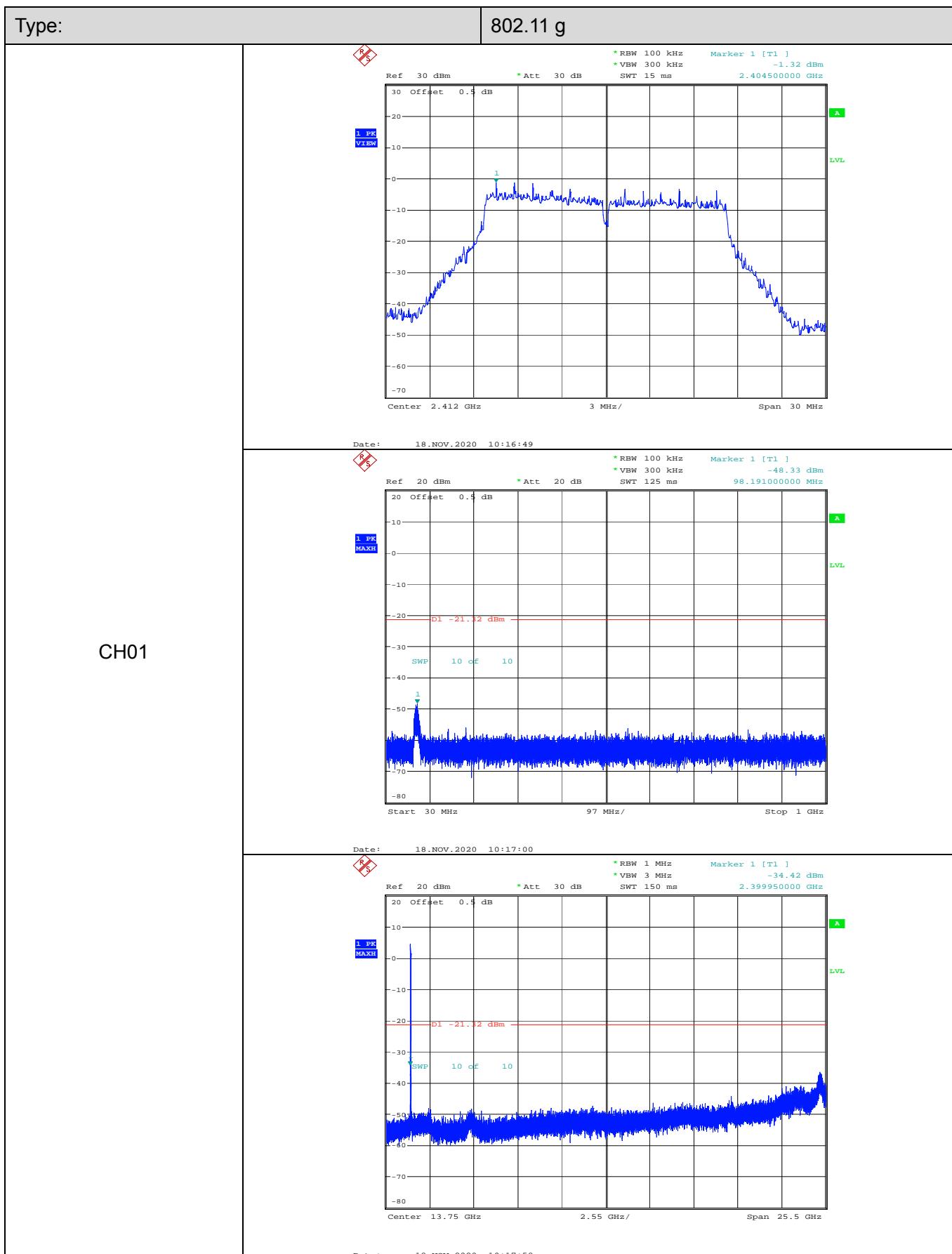


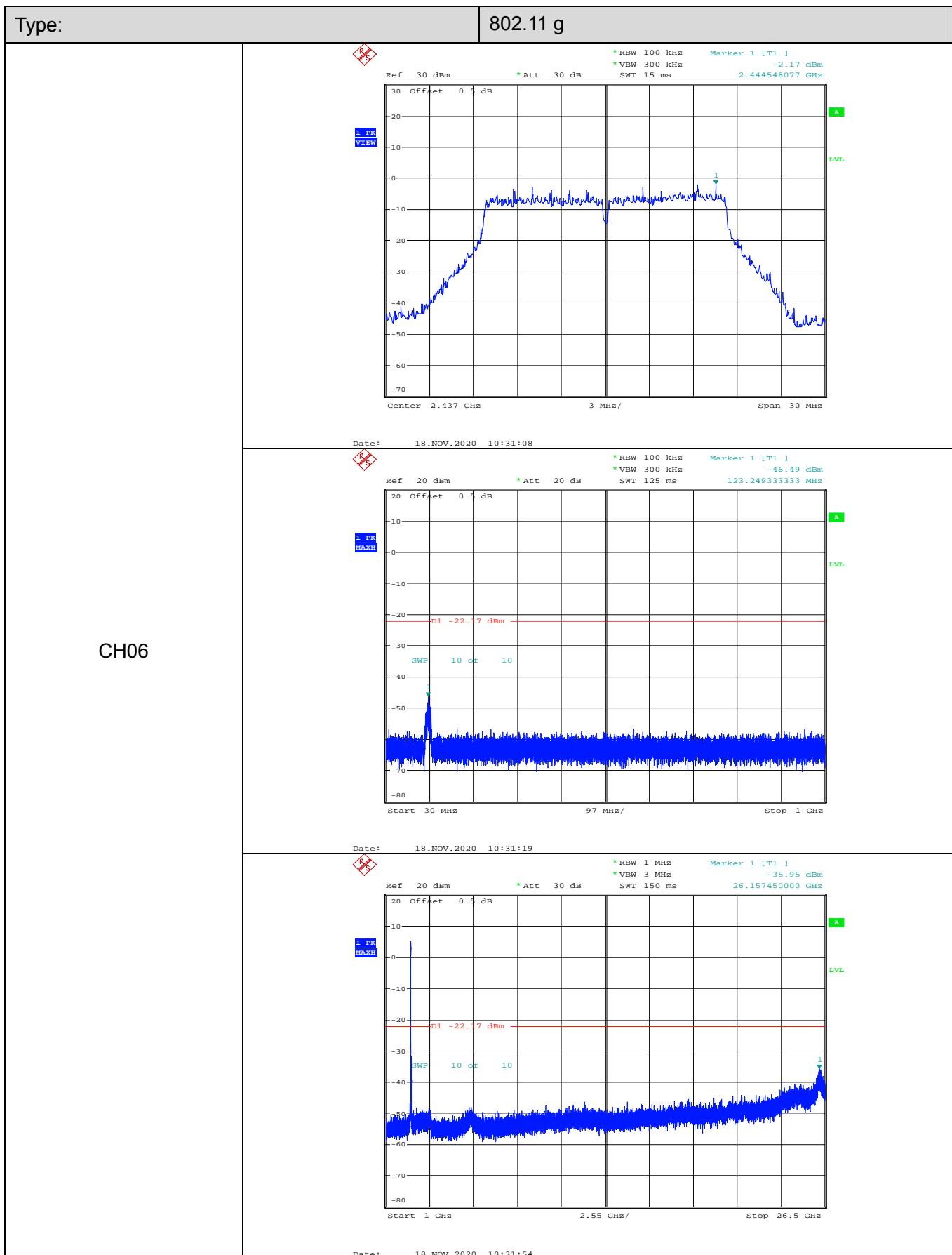
Type:

802.11 b









Date: 18.NOV.2020 10:31:54

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