



# TEST REPORT

**Report No.** ..... : **CTC2025420003**

**FCC ID** ..... : **2APN5-BASIC1GS**


**Applicant** ..... : **Shenzhen Sonoff Technologies Co.,Ltd.**

**Address** ..... : 3F & 6F, Bldg A, No. 663, Bulong Rd, Shenzhen, Guangdong, China

**Manufacturer** ..... : Shenzhen Sonoff Technologies Co.,Ltd.

**Address** ..... : 3F & 6F, Bldg A, No. 663, Bulong Rd, Shenzhen, Guangdong, China

**Product Name** ..... : **Matter Over WiFi Smart Switch**

**Trade Mark** ..... : , SONOFF

**Model/Type reference** ..... : BASIC-1GS

**Listed Model(s)** ..... : /

**Standard** ..... : **FCC CFR Title 47 Part 15 Subpart C Section 15.247**

**Test Report Form No** ..... : CTC-TR-057\_A2

**Master TRF** ..... : Dated 2025-05-12

**Date of receipt of test sample** ..... : Jul. 3, 2025

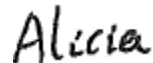
**Date of testing** ..... : Jul. 3, 2025 ~ Jul. 29, 2025

**Date of issue** ..... : Aug. 14, 2025

**Result** ..... : **PASS**

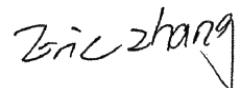
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(Printed name+signature) Eric Zhang



Approved by:

(Printed name+signature) Totti Zhao



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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 902–928MHz, 2400–2483.5MHz, and 5725–5850MHz.

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

## 1.2. Report Version

Revised No.	Report No.	Date of issue	Description
01	CTC2025420003	Aug. 14, 2025	Original

## 1.3. Test Description

FCC Part 15 Subpart C (15.247) / RSS-247 Issue 3			
Test Item	Standard Section	Result	Test Engineer
	FCC		
Antenna Requirement	15.203	Pass	Marrow
Conducted Emission	15.207	Pass	Marrow
Conducted Band Edge and Spurious Emissions	15.247(d)	Pass	Marrow
Radiated Band Edge and Spurious Emissions	15.205&15.209&15.247(d)	Pass	Marrow
6dB Bandwidth	15.247(a)(2)	Pass	Marrow
Occupied Bandwidth	/	Pass	Marrow
Conducted Max Output Power	15.247(b)(3)	Pass	Marrow
Power Spectral Density	15.247(e)	Pass	Marrow
Transmitter Radiated Spurious	15.209&15.247(d)	Pass	Marrow

Note:

1. The measurement uncertainty is not included in the test result.
2. N/A: means this test item is not applicable for this device according to the technology characteristic of device.



## 1.4. Test Facility

### Address of the report laboratory

#### CTC Laboratories, Inc.

Add: Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luh Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

### Laboratory accreditation

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

#### 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
DTS Bandwidth	$\pm 0.0196\%$	(1)
Maximum Conducted Output Power	$\pm 0.686$ dB	(1)
Maximum Power Spectral Density Level	$\pm 0.743$ dB	(1)
Band-edge Compliance	$\pm 1.328$ dB	(1)
Unwanted Emissions In Non-restricted Freq Bands	9kHz-1GHz: $\pm 0.746$ dB 1GHz-26GHz: $\pm 1.328$ dB	(1)
Conducted Emissions 9kHz~30MHz	$\pm 3.08$ dB	(1)
Radiated Emissions 30~1000MHz	$\pm 4.51$ dB	(1)
Radiated Emissions 1~18GHz	$\pm 5.84$ dB	(1)
Radiated Emissions 18~40GHz	$\pm 6.12$ dB	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## 1.6. Environmental Conditions

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

Temperature:	15 °C to 35 °C
Relative Humidity:	20 % to 75 %
Air Pressure:	101 kPa





## 2. GENERAL INFORMATION

### 2.1. Client Information

Applicant:	Shenzhen Sonoff Technologies Co.,Ltd.
Address:	3F & 6F, Bldg A, No. 663, Bulong Rd, Shenzhen, Guangdong, China
Manufacturer:	Shenzhen Sonoff Technologies Co.,Ltd.
Address:	3F & 6F, Bldg A, No. 663, Bulong Rd, Shenzhen, Guangdong, China

### 2.2. General Description of EUT

Product Name:	Matter Over WiFi Smart Switch
Trade Mark:	 SONOFF, SONOFF
Model/Type reference:	BASIC-1GS
Listed Model(s):	/
Model Difference:	/
Sample ID:	CTC250606-002-S008
Power Supply:	100-240V ~ 50/60Hz 10A MAX Resistive load  $\mu$
Hardware Version:	V1.0.0
Software Version:	V1.0.0
<b>2.4G Wi-Fi</b>	
Modulation:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/ n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Operation Frequency:	802.11b/ g/ n(HT20): 2412MHz~2462MHz
Channel Number:	802.11b/ g/ n(HT20): 11 channels
Channel Separation:	5MHz
Antenna 1 Type:	PCB Antenna
Antenna 1 Gain:	-1.04dBi



## 2.3. Accessory Equipment Information

Equipment Information			
Name	Model	S/N	Manufacturer
Notebook	ThinkPad T460s	MP246QDR	Lenovo
Serial port board	Foca v2.2	/	/
Cable Information			
Name	Shielded Type	Ferrite Core	Length
USB Cable	Unshielded	NO	100cm
Test Software Information			
Name	Version	/	/
Wifi_Test_Tool	1.7.9	/	/



## 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
12	2467
13	2472

Note: CH 01~CH 11 for 802.11b/g/n(HT20).

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 the worst case mode.

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

Test Mode:

For RF test items:
1. The engineering test program was provided and enabled to make EUT continuous transmit. 2. IEEE 802.11ax mode only supports full RU, so only the full RU is evaluated and measured inside report
For AC power line conducted emissions:
The engineering test program was provided and enabled to make EUT continuous transmit.
For Radiated spurious emissions test item:

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TRF No: CTC-TR-057\_A2





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

RF Test System - SRD						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Until
1	MXA Signal Analyzer	Keysight	N9020A	MY52091402	Aug. 22, 2024	Aug. 21, 2025
2	EXG Analog Signal Generator	Keysight	N5173B	MY59100842	Dec. 13, 2024	Dec. 12, 2025
3	MXG Vector Signal Generator	Keysight	N5182B	MY59100212	Dec. 13, 2024	Dec. 12, 2025
4	Wideband Radio Communication Tester	R&S	CMW500	102414	Dec. 13, 2024	Dec. 12, 2025
5	RF Control Unit	Tonscend	JS0806-2	/	Aug. 22, 2024	Aug. 21, 2025
6	High and low temperature test chamber	ESPEC	MT3035	/	Mar. 25, 2025	Mar. 24, 2026
7	RF Cable	HUBER+SUHNER	SUCOFLEX101PE	RF-09	Apr. 16, 2025	Apr. 15, 2026
Test Software						
Name		Manufacturer			Software Version	
JS1120-3		Tonscend			V3.3.38	

Radiated emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-1013	Dec. 18, 2024	Dec. 17, 2025
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-648	Dec. 12, 2024	Dec. 11, 2025
3	Pre-Amplifier	SONOMA	310	186194	Dec. 13, 2024	Dec. 12, 2025
4	Low Noise Pre-Amplifier	EMCI	EMC051835	980075	Dec. 13, 2024	Dec. 12, 2025
5	Spectrum Analyzer	R&S	FSV40N	101654	Dec. 13, 2024	Dec. 12, 2025
6	RE32L-001	HUBENR	/	009 (9kHz-1GHz)	Feb. 09, 2025	Feb. 08, 2026
7	RE32L-002	HUBENR	/	010 (9kHz-1GHz)	Feb. 09, 2025	Feb. 08, 2026
8	RE32L-003	HUBENR	/	011 (9kHz-1GHz)	Feb. 09, 2025	Feb. 08, 2026
9	RE32H-001	HUBENR	/	012 (1GHz-18GHz)	Feb. 09, 2025	Feb. 08, 2026
10	RE32H-002	HUBENR	/	013 (1GHz-18GHz)	Feb. 09, 2025	Feb. 08, 2026
11	3m chamber 2	Frankonia	EE025	/	Oct. 19, 2024	Oct. 18, 2027
Test Software						
Name		Manufacturer			Software Version	
EZ-EMC		FARA			FA-03A2	

Conducted emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Until
1	LISN	R&S	ENV216	101112	Dec. 13, 2024	Dec. 12, 2025
2	LISN	R&S	ENV216	101113	Dec. 13, 2024	Dec. 12, 2025

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3	EMI Test Receiver	R&S	ESCI	100524	Dec. 13, 2024	Dec. 12, 2025
4	ISN CAT6	Schwarzbeck	NTFM 8158	CAT6-8158-0046	Dec. 13, 2024	Dec. 12, 2025
5	ISN CAT5	Schwarzbeck	NTFM 8158	CAT5-8158-0046	Dec. 13, 2024	Dec. 12, 2025
6	CE-001	COMM	/	001	Feb. 09, 2025	Feb. 08, 2026
Test Software						
Name		Manufacturer		Software Version		
EMC32		R&S		6.10.10		

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

2. The Cal. Interval was three years of the antenna.

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

### 3. TEST ITEM AND RESULTS

#### 3.1. Conducted Emission

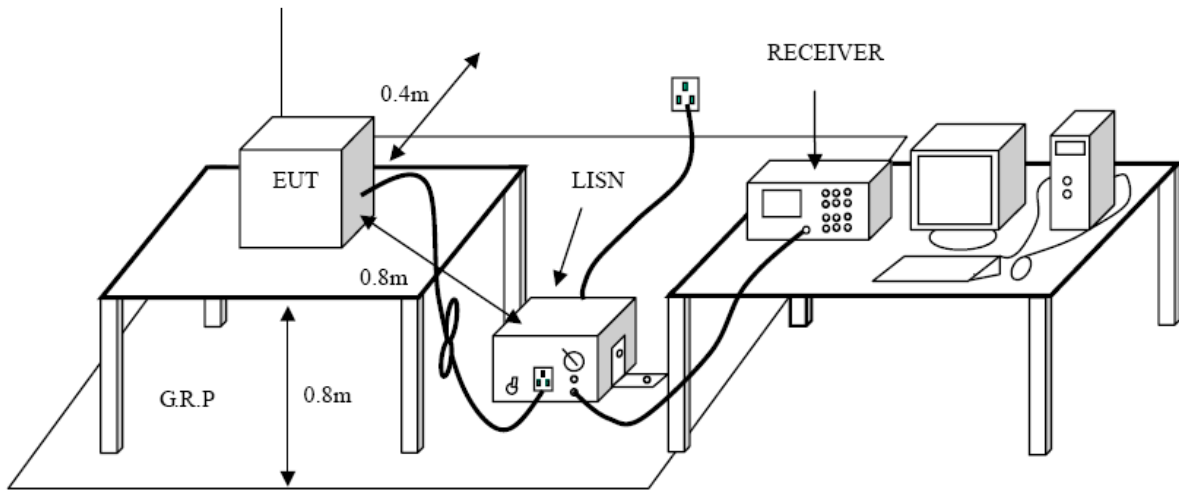
##### Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency (MHz)	Conducted Limit (dBμV)	
	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 impedance stabilization network (LISN). The LISN provides a 50 ohm / 50 μH coupling impedance for the measuring equipment.
4. 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)
5. 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.
6. 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.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

##### Test Mode

Please refer to the clause 2.4.

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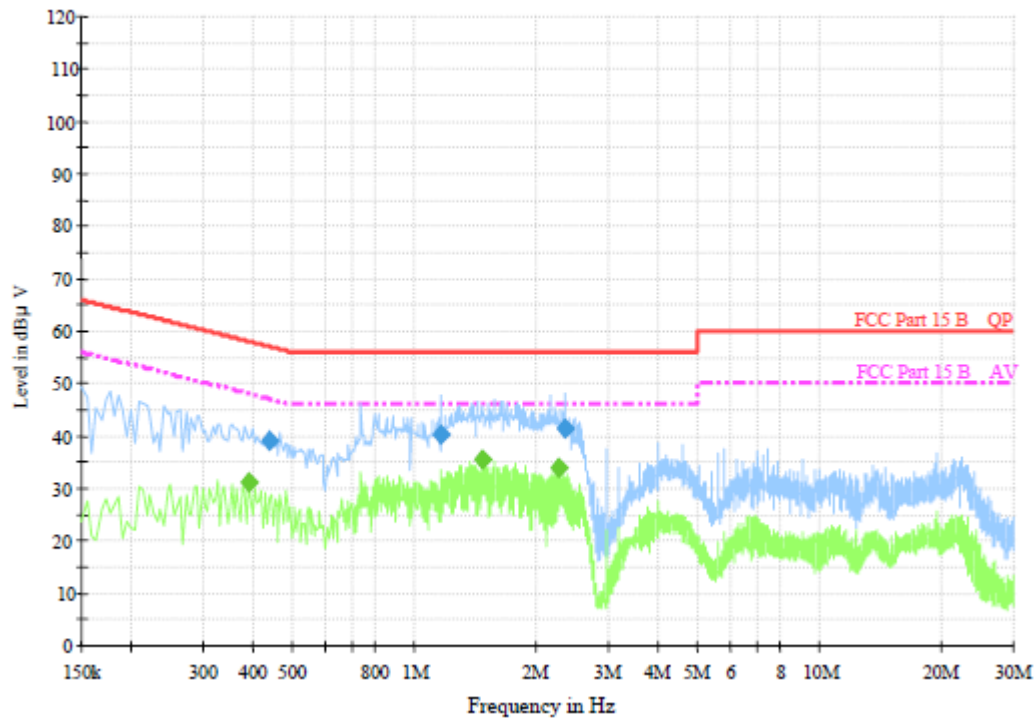
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TRF No: CTC-TR-057\_A2

**Test Result**

Test Voltage:	AC 120V/60Hz
Terminal:	Line
Remark:	Only worse case is reported.

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.438000	39.1	1000.00	9.000	On	L1	9.4	18.0	57.1	
1.158000	40.3	1000.00	9.000	On	L1	9.7	15.7	56.0	
2.350500	41.3	1000.00	9.000	On	L1	9.6	14.7	56.0	

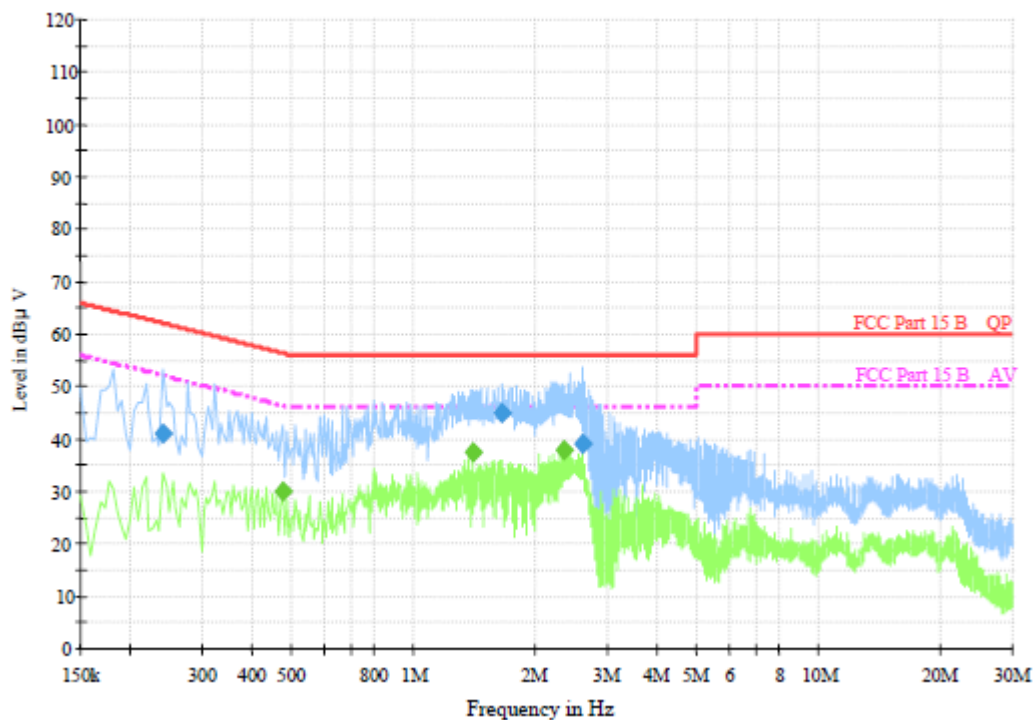
**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.388500	31.3	1000.00	9.000	On	L1	9.4	16.8	48.1	
1.473000	35.5	1000.00	9.000	On	L1	9.7	10.5	46.0	
2.251500	33.9	1000.00	9.000	On	L1	9.7	12.1	46.0	

Emission Level = Read Level + Correct Factor



Test Voltage:	AC 120V/60Hz
Terminal:	Neutral
Remark:	Only worse case is reported.



### Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.240000	41.1	1000.00	9.000	On	N	9.4	21.0	62.1	
1.657500	45.1	1000.00	9.000	On	N	9.5	10.9	56.0	
2.616000	39.2	1000.00	9.000	On	N	9.5	16.8	56.0	

### Final Measurement Detector 2

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.474000	30.1	1000.00	9.000	On	N	9.6	16.3	46.4	
1.396500	37.4	1000.00	9.000	On	N	9.5	8.6	46.0	
2.355000	37.7	1000.00	9.000	On	N	9.4	8.3	46.0	

Emission Level = Read Level + Correct Factor

## 3.2. Radiated Emission

### Limit

#### FCC CFR Title 47 Part 15 Subpart C Section 15.209

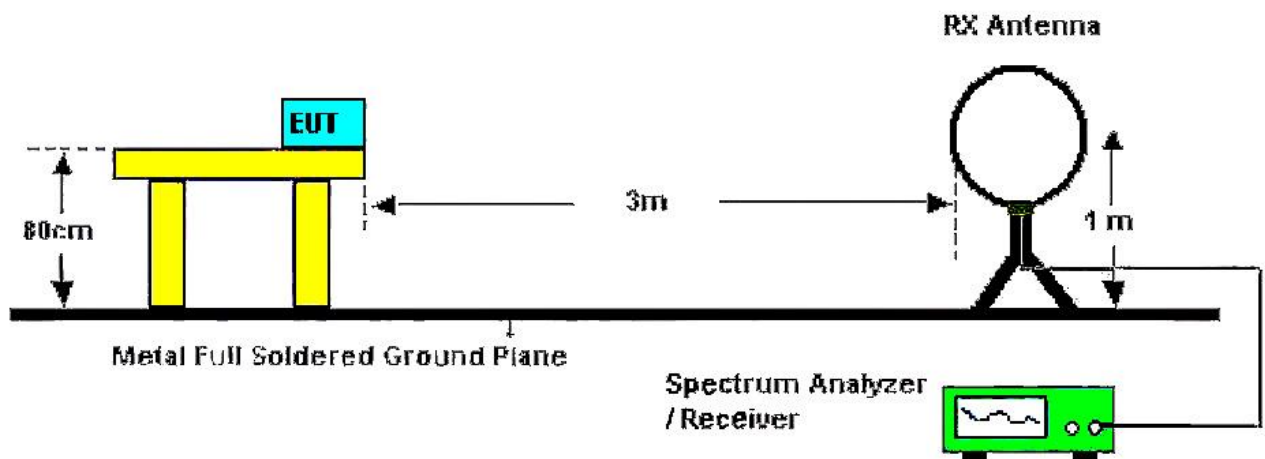
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Frequency Range (MHz)	dBμV/m (at 3 meters)	
	Peak	Average
Above 1000	74	54

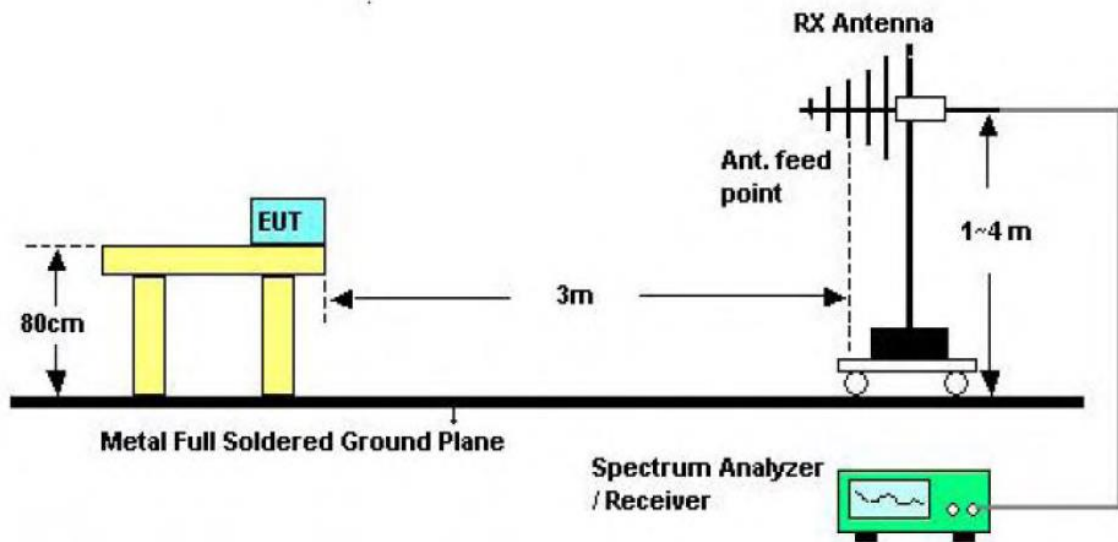
Note:

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

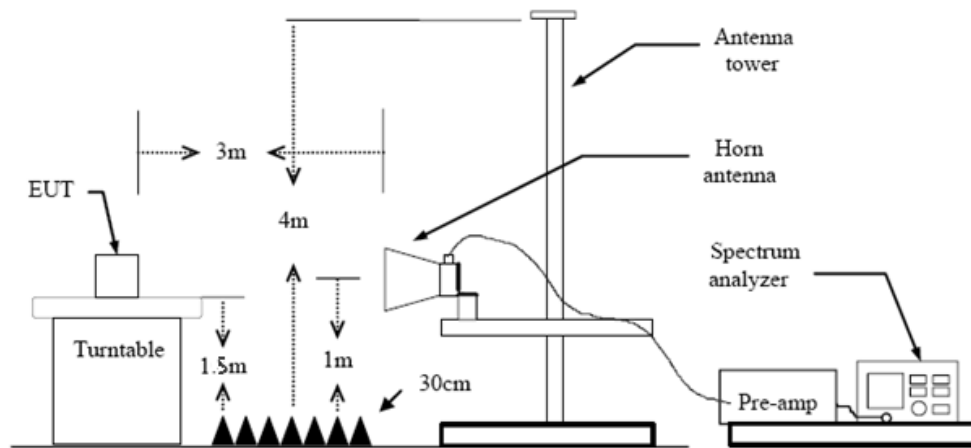
### Test Configuration



Below 30MHz Test Setup



30-1000MHz 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) 9k – 150kHz:  
RBW=300 Hz, VBW=1 kHz, Sweep=auto, Detector function=peak, Trace=max hold
  - (3) 0.15M – 30MHz:  
RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold
  - (4) 30M - 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.

(5) From 1 GHz to 10<sup>th</sup> harmonic:

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 3.8 Duty Cycle.

### **Test Mode**

Please refer to the clause 2.4.

### **Test Result**

#### **9 kHz~30 MHz**

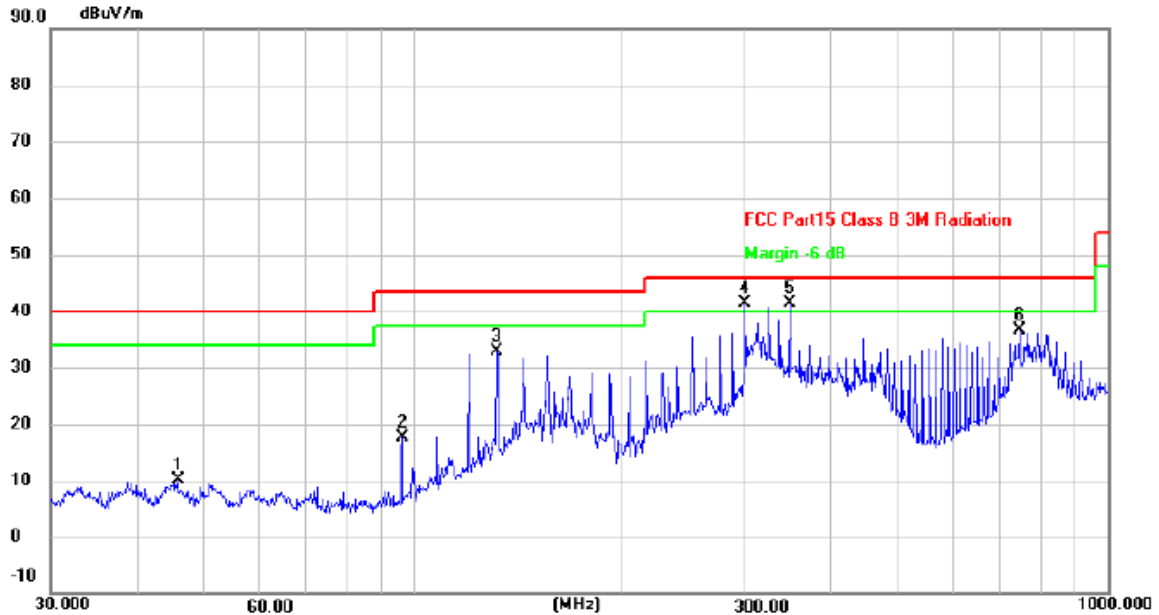
From 9 kHz to 30 MHz: The conclusion is PASS.

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. No.	Ant 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11b Mode 2412MHz
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	45.6948	28.29	-18.12	10.17	40.00	-29.83	QP
2	96.0986	39.48	-21.86	17.62	43.50	-25.88	QP
3	131.7577	51.91	-19.15	32.76	43.50	-10.74	QP
4 !	300.3672	58.32	-16.96	41.36	46.00	-4.64	QP
5 *	348.0274	57.47	-15.97	41.50	46.00	-4.50	QP
6	744.8661	43.94	-7.37	36.57	46.00	-9.43	QP

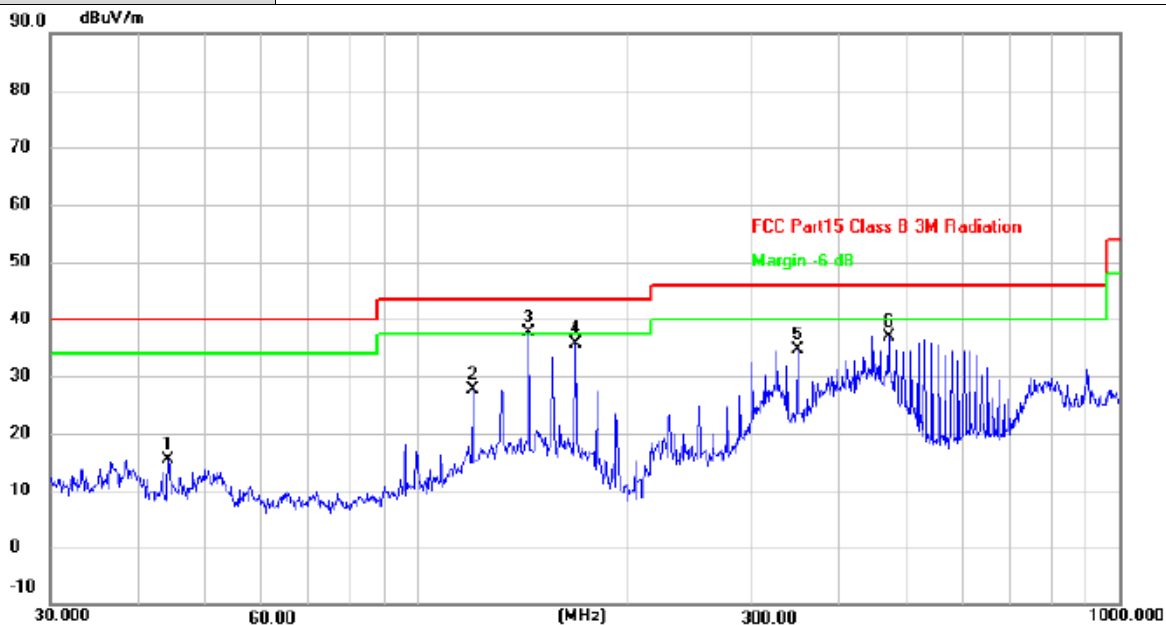
## Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



Ant. No.	Ant 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11b Mode 2412MHz
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	44.1202	33.42	-18.14	15.28	40.00	-24.72	QP
2	119.8556	47.63	-19.90	27.73	43.50	-15.77	QP
3 *	143.8295	55.74	-18.05	37.69	43.50	-5.81	QP
4	167.8242	53.88	-18.23	35.65	43.50	-7.85	QP
5	348.0274	50.71	-15.97	34.74	46.00	-11.26	QP
6	468.8762	49.29	-12.49	36.80	46.00	-9.20	QP

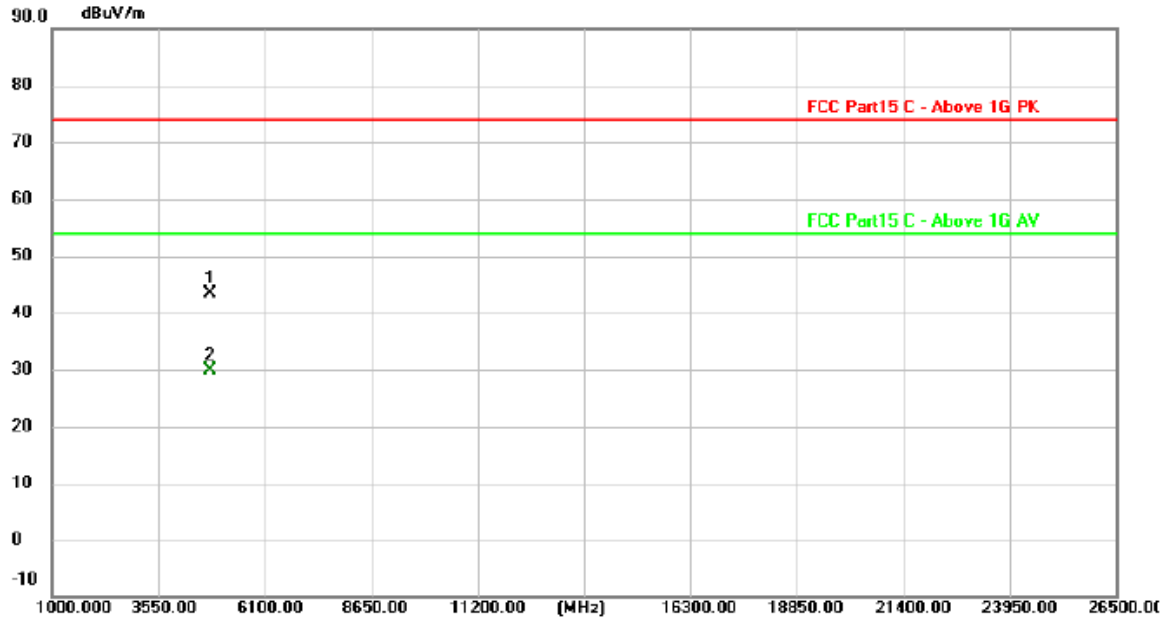
## Remarks:

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



## Above 1GHz

Ant. No.	Ant 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11b Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4823.876	46.75	-3.45	43.30	74.00	-30.70	peak
2 *	4823.884	33.28	-3.45	29.83	54.00	-24.17	AVG

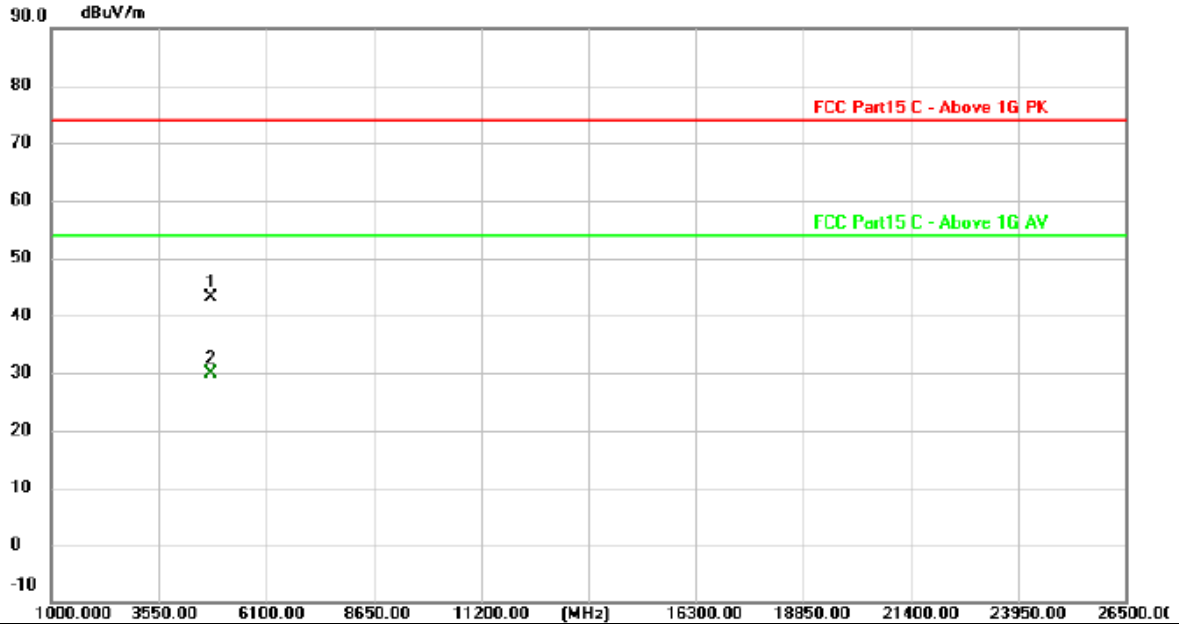
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	Ant 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11b Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4823.830	46.51	-3.45	43.06	74.00	-30.94	peak
2 *	4824.480	33.31	-3.45	29.86	54.00	-24.14	AVG

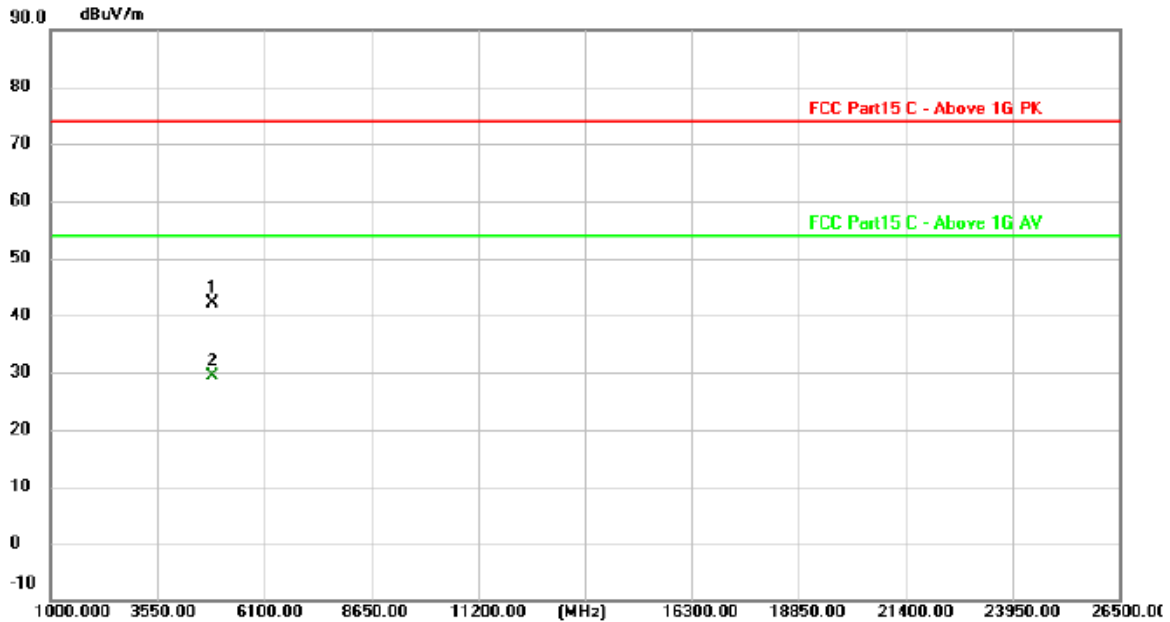
## Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



Ant. No.	Ant 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11b Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4874.014	45.57	-3.39	42.18	74.00	-31.82	peak
2 *	4874.400	32.80	-3.39	29.41	54.00	-24.59	AVG

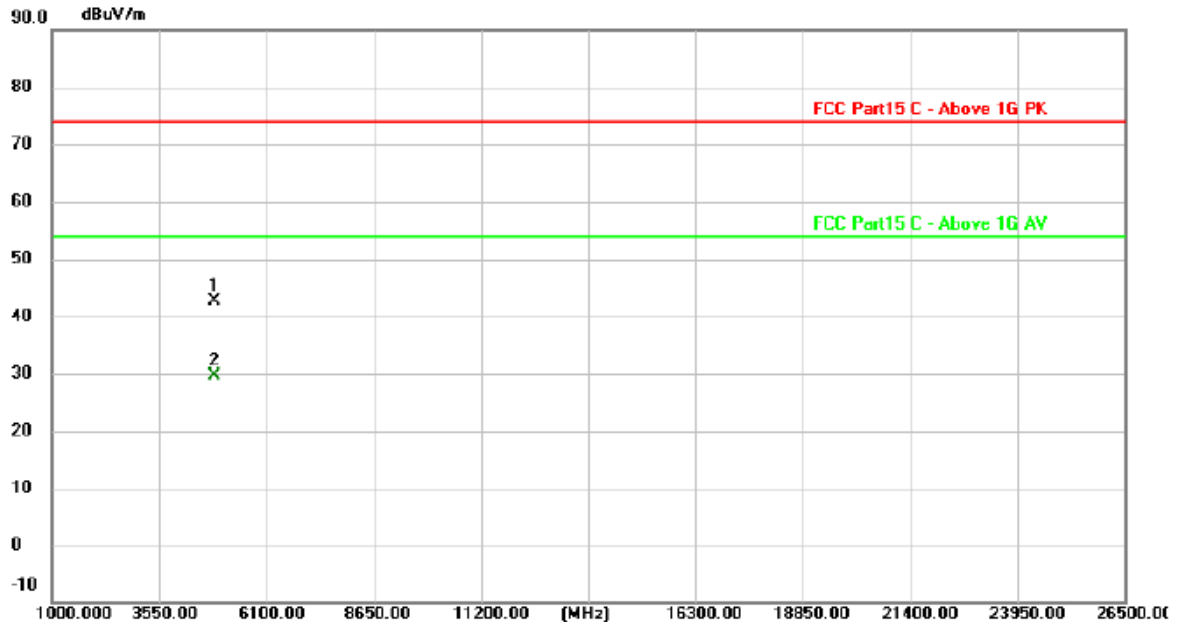
**Remarks:**

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	Ant 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11b Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4873.808	46.08	-3.39	42.69	74.00	-31.31	peak
2 *	4874.412	33.04	-3.39	29.65	54.00	-24.35	AVG

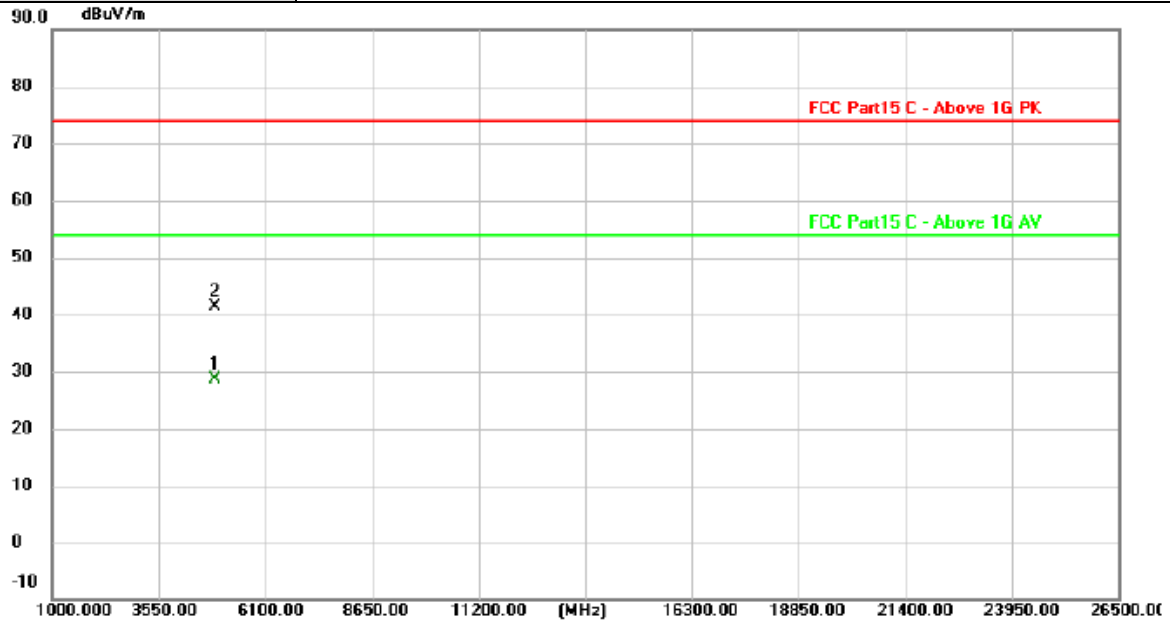
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	Ant 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11b Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4924.285	31.91	-3.28	28.63	54.00	-25.37	AVG
2	4924.371	44.61	-3.28	41.33	74.00	-32.67	peak

## Remarks:

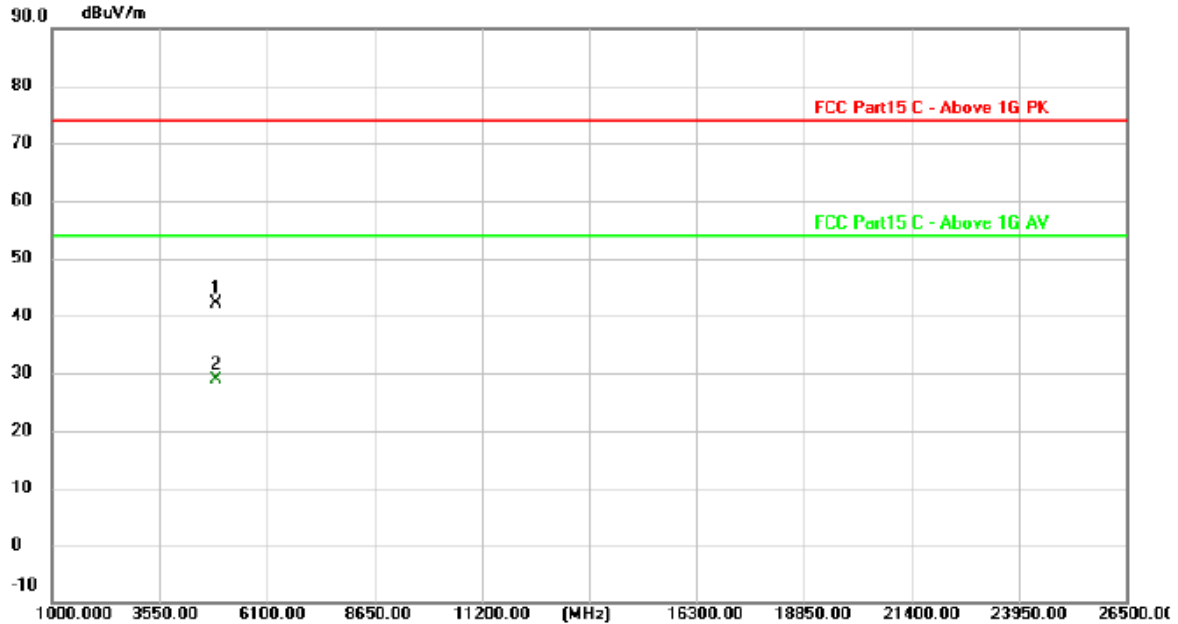
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value





Ant. No.	Ant 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11b Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4924.058	45.29	-3.28	42.01	74.00	-31.99	peak
2 *	4924.374	32.08	-3.28	28.80	54.00	-25.20	AVG

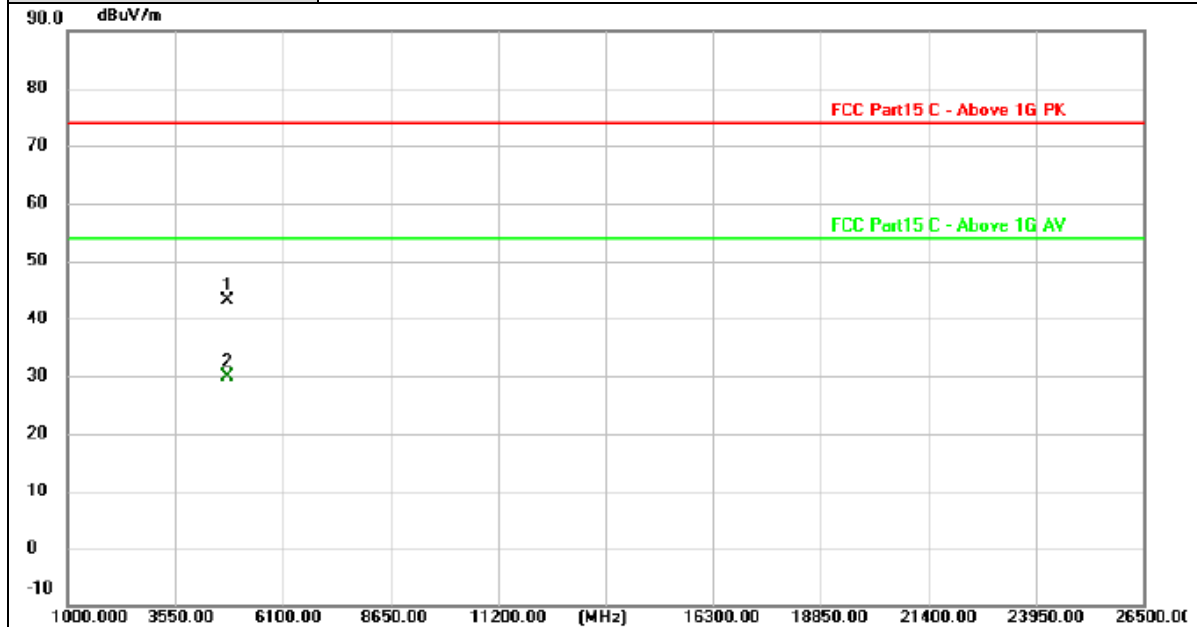
## Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



Ant. No.	Ant 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11g Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4824.083	46.55	-3.45	43.10	74.00	-30.90	peak
2 *	4824.413	33.27	-3.45	29.82	54.00	-24.18	AVG

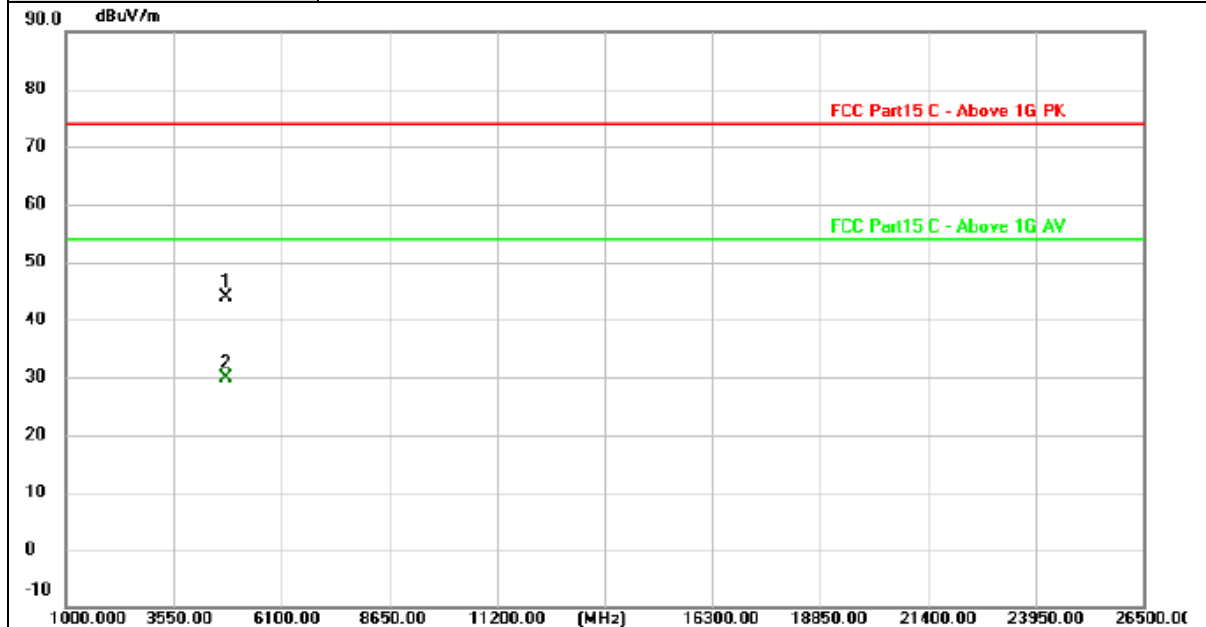
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	Ant 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11g Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4823.856	47.43	-3.45	43.98	74.00	-30.02	peak
2 *	4824.066	33.29	-3.45	29.84	54.00	-24.16	AVG

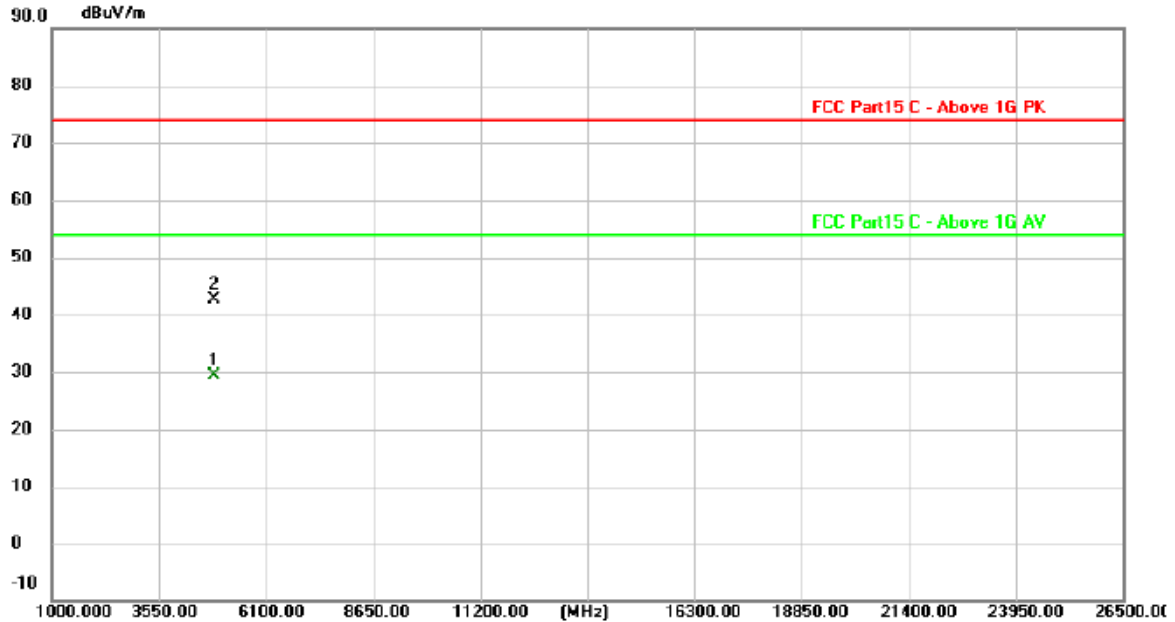
## Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



Ant. No.	Ant 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11g Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4873.615	32.87	-3.39	29.48	54.00	-24.52	AVG
2	4874.219	46.00	-3.39	42.61	74.00	-31.39	peak

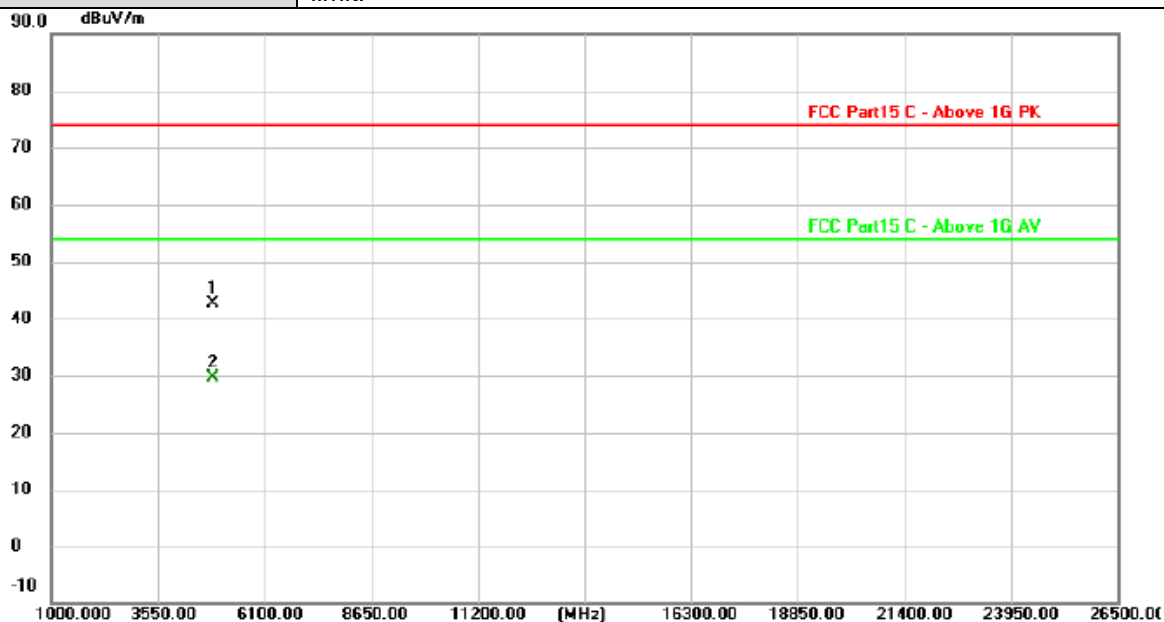
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	Ant 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11g Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



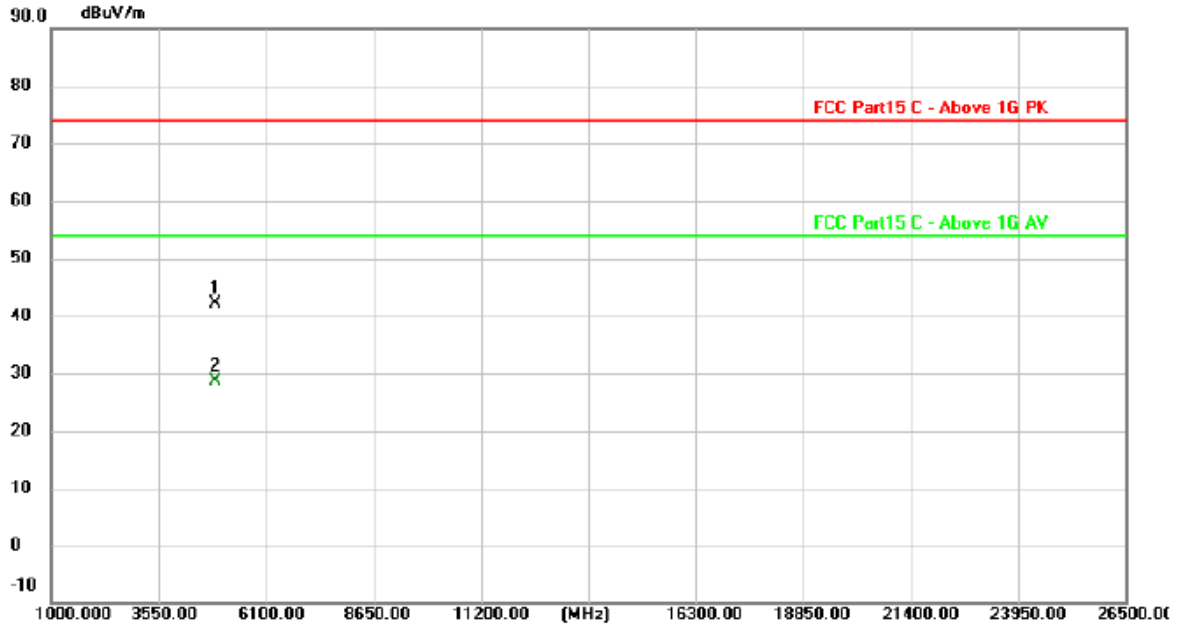
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4873.808	46.08	-3.39	42.69	74.00	-31.31	peak
2 *	4874.412	33.04	-3.39	29.65	54.00	-24.35	AVG

## Remarks:

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



Ant. No.	Ant 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11g Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4923.836	45.37	-3.28	42.09	74.00	-31.91	peak
2 *	4924.242	31.92	-3.28	28.64	54.00	-25.36	AVG

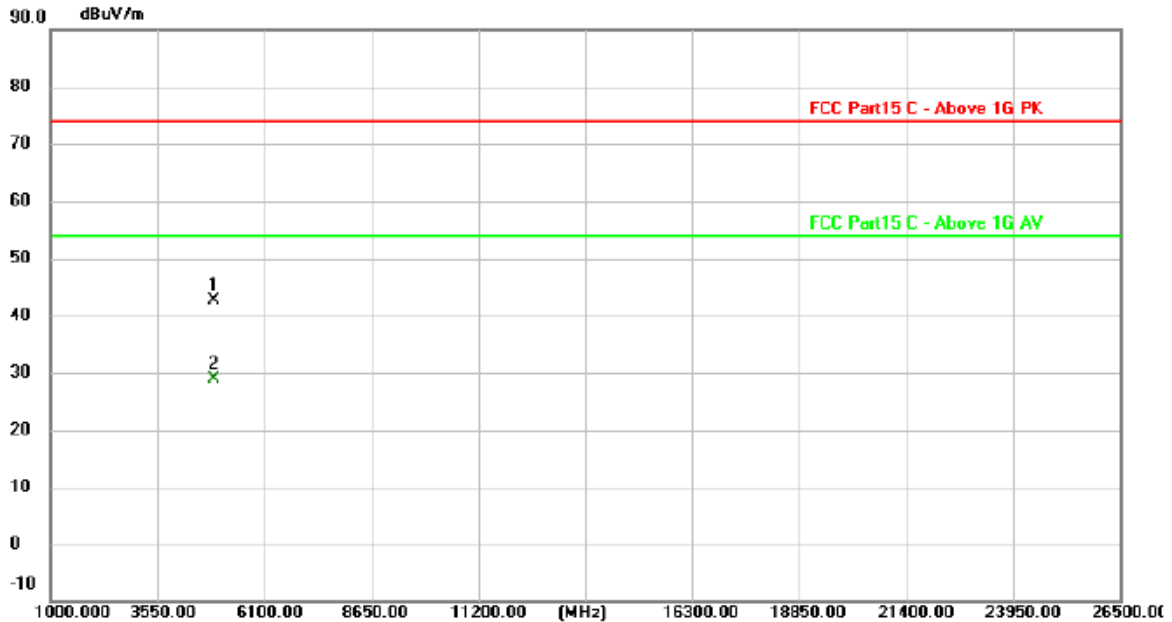
## Remarks:

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



Ant. No.	Ant 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11g Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4923.650	45.87	-3.28	42.59	74.00	-31.41	peak
2 *	4924.352	32.16	-3.28	28.88	54.00	-25.12	AVG

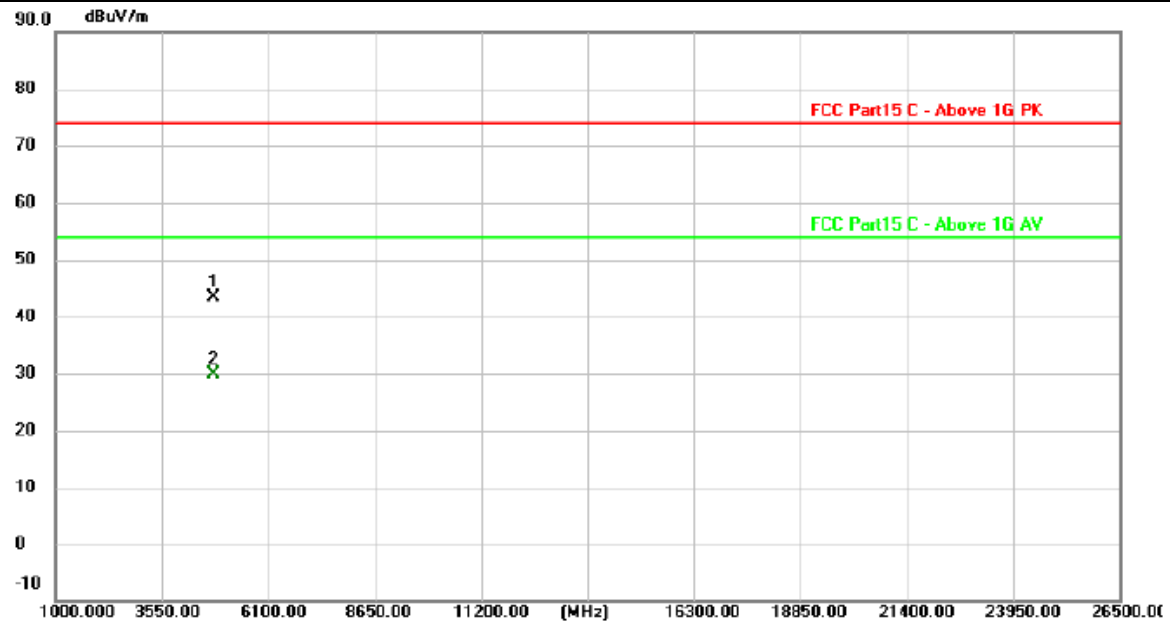
**Remarks:**

1. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor

2. Margin value = Level - Limit value



Ant. No.	ANT 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11n(HT20) Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4823.814	46.81	-3.45	43.36	74.00	-30.64	peak
2 *	4824.212	33.36	-3.45	29.91	54.00	-24.09	AVG

## Remarks:

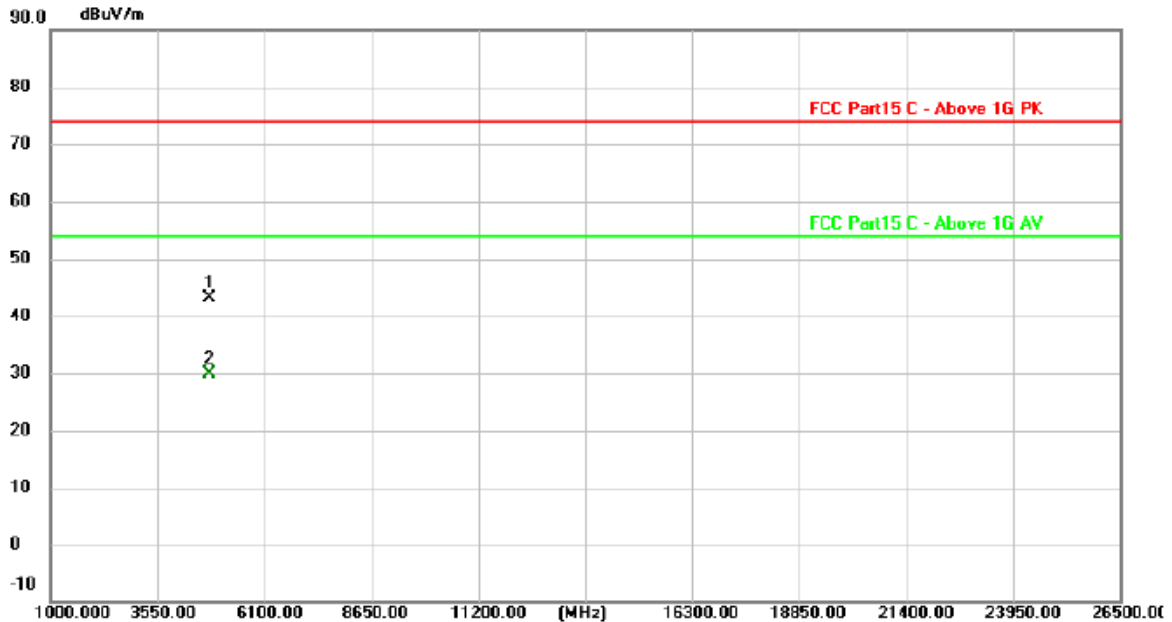
1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value





Ant. No.	ANT 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 2412MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4823.758	46.67	-3.45	43.22	74.00	-30.78	peak
2 *	4824.158	33.43	-3.45	29.98	54.00	-24.02	AVG

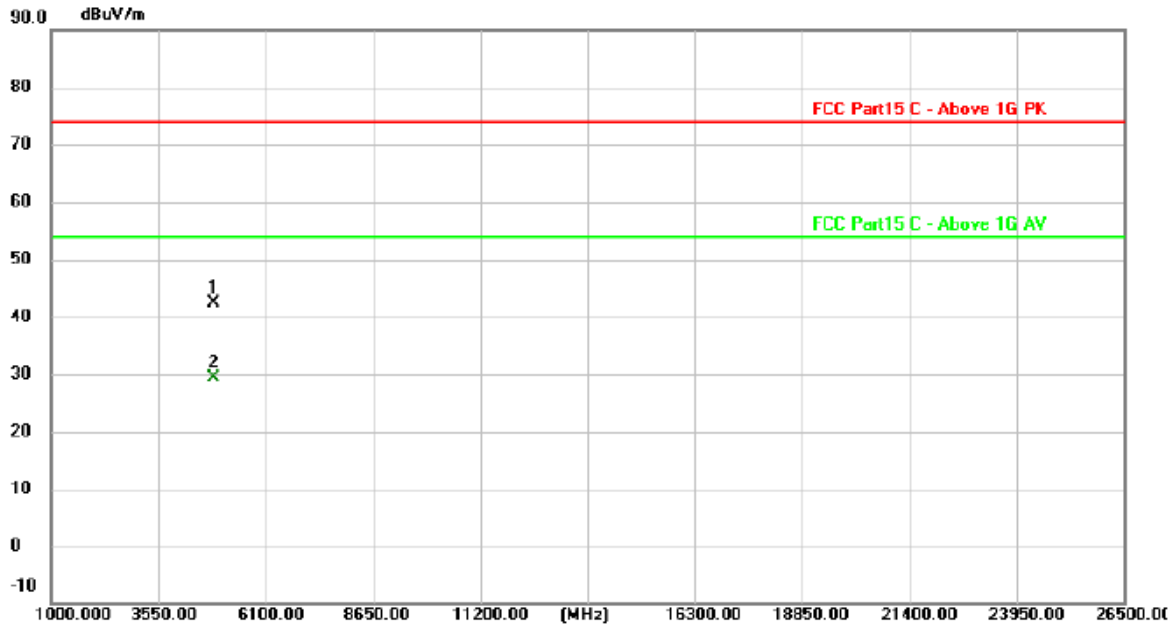
**Remarks:**

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	ANT 1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11n(HT20) Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4873.992	45.84	-3.39	42.45	74.00	-31.55	peak
2 *	4874.270	32.83	-3.39	29.44	54.00	-24.56	AVG

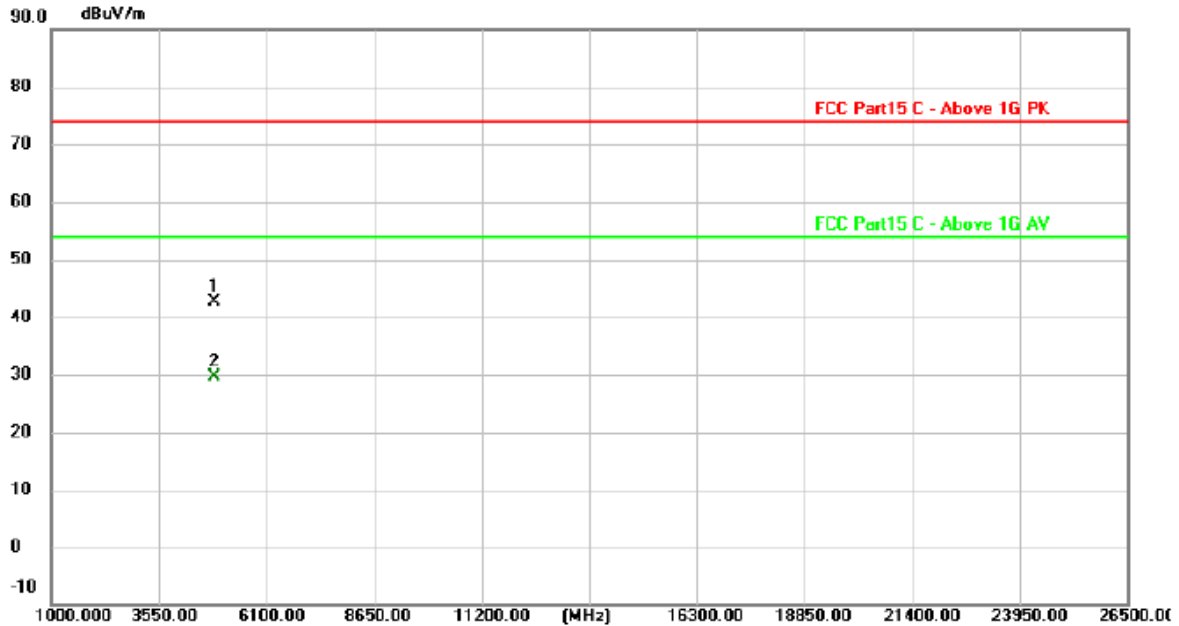
**Remarks:**

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	ANT1
Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 2437MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4873.833	46.12	-3.39	42.73	74.00	-31.27	peak
2 *	4874.285	32.95	-3.39	29.56	54.00	-24.44	AVG

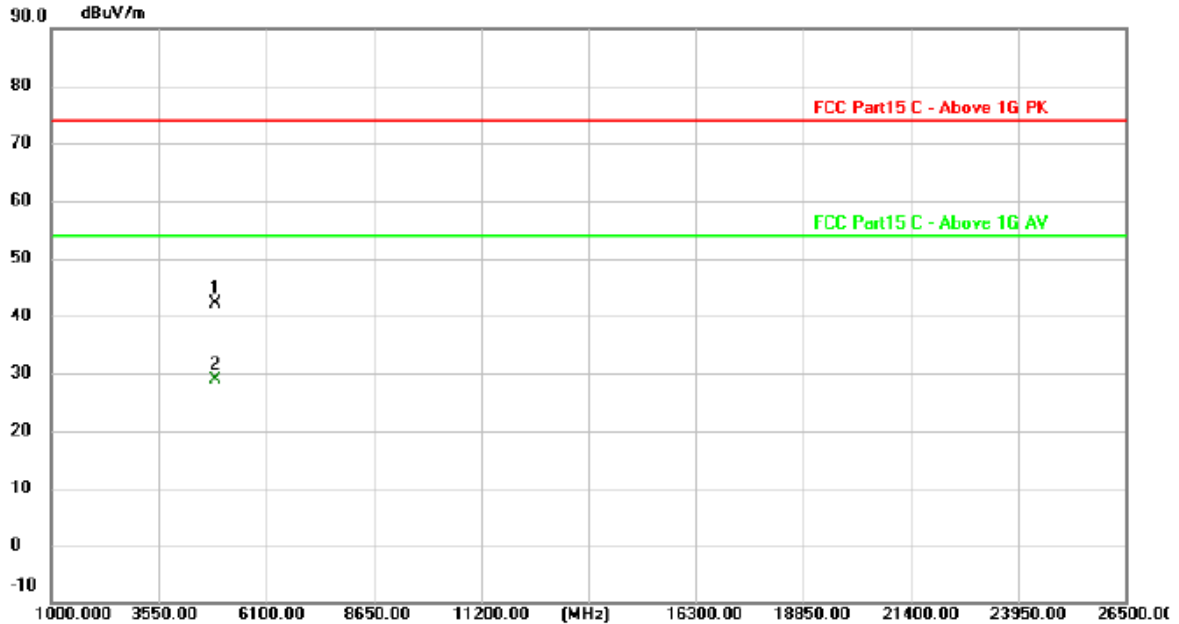
**Remarks:**

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	ANT1
Ant. Pol.	Horizontal
Test Mode:	TX 802.11n(HT20) Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4923.870	45.44	-3.28	42.16	74.00	-31.84	peak
2 *	4924.372	32.10	-3.28	28.82	54.00	-25.18	AVG

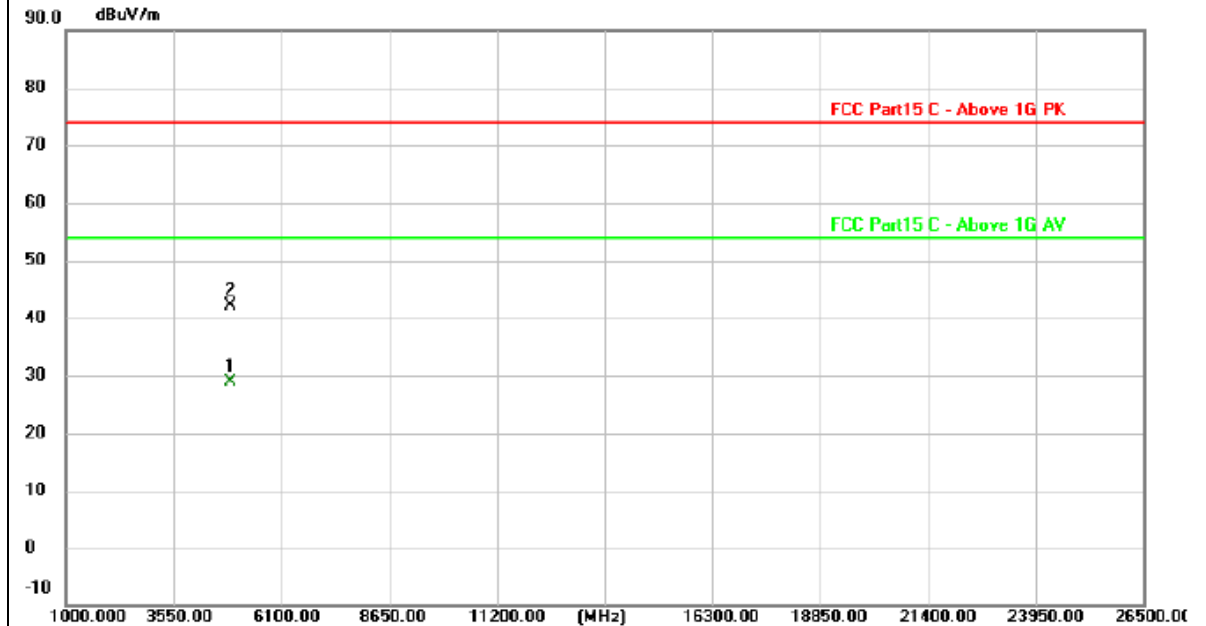
## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value



Ant. No.	ANT1
Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 2462MHz
Remark:	No report for the emission which more than 20 dB below the prescribed limit.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4924.277	32.23	-3.28	28.95	54.00	-25.05	AVG
2	4924.290	45.47	-3.28	42.19	74.00	-31.81	peak

## Remarks:

1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

2.Margin value = Level -Limit value

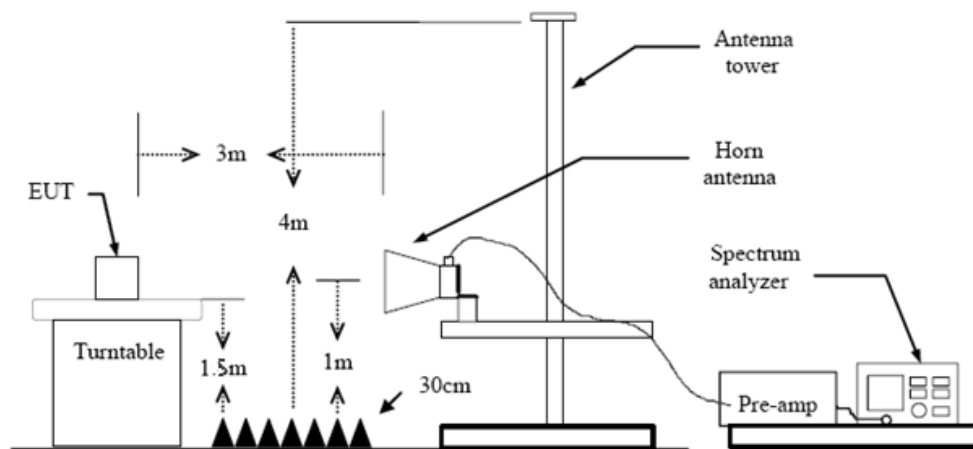
### 3.3. Band Edge Emissions (Radiated)

#### Limit

#### FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d)

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

#### Test Configuration



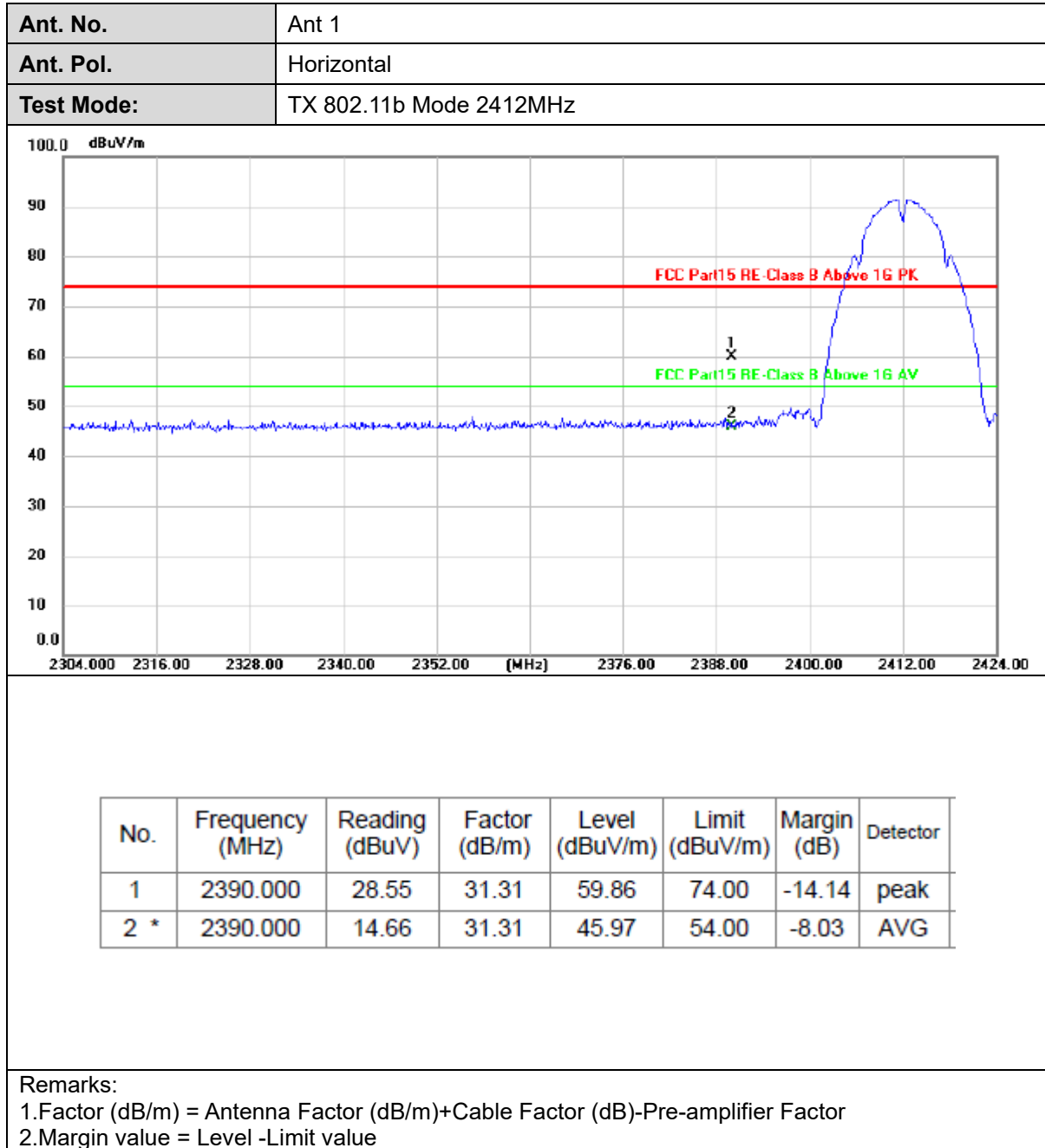
#### Test Procedure

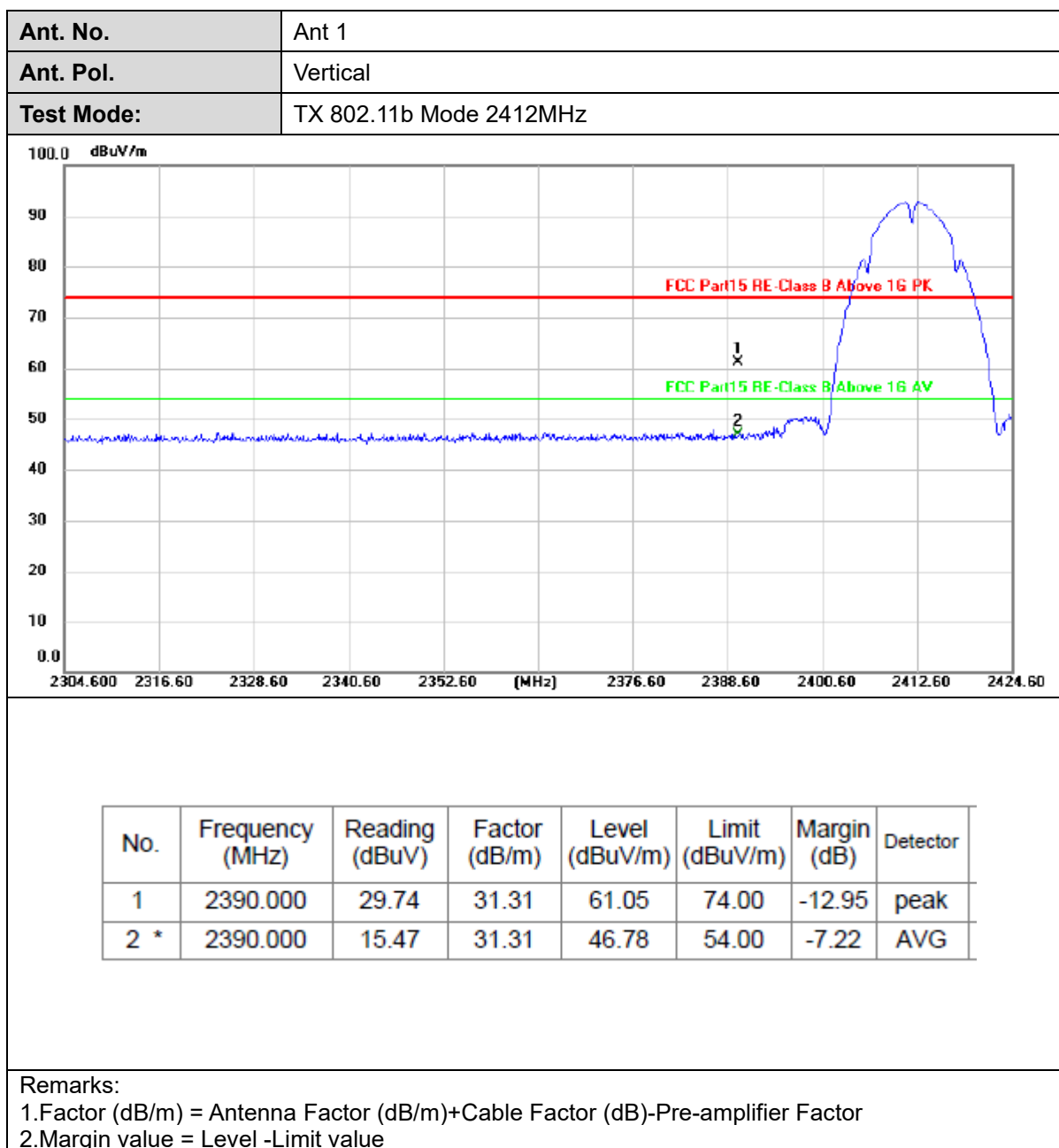
1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna 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 3.8 Duty Cycle.

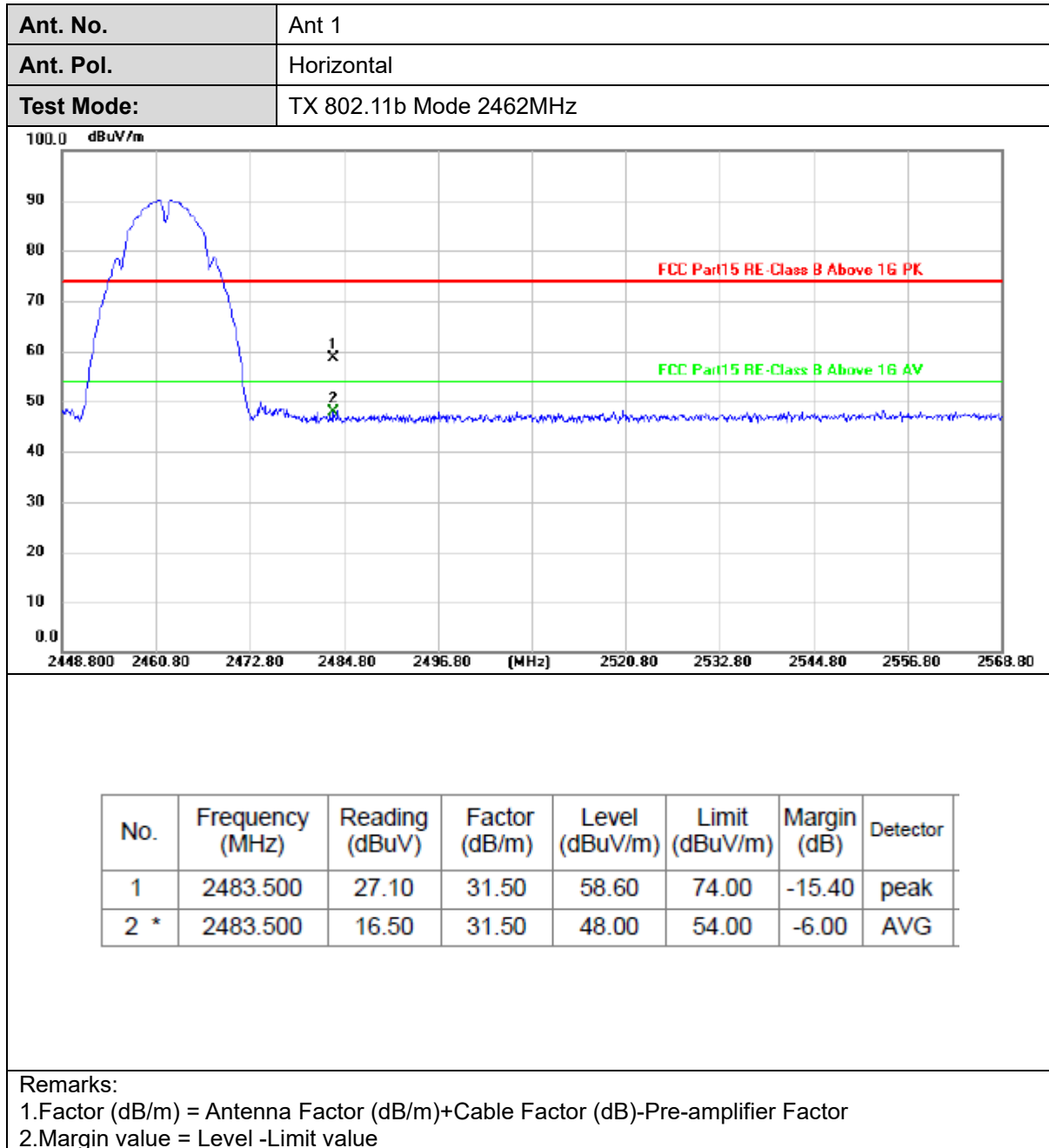
#### Test Mode

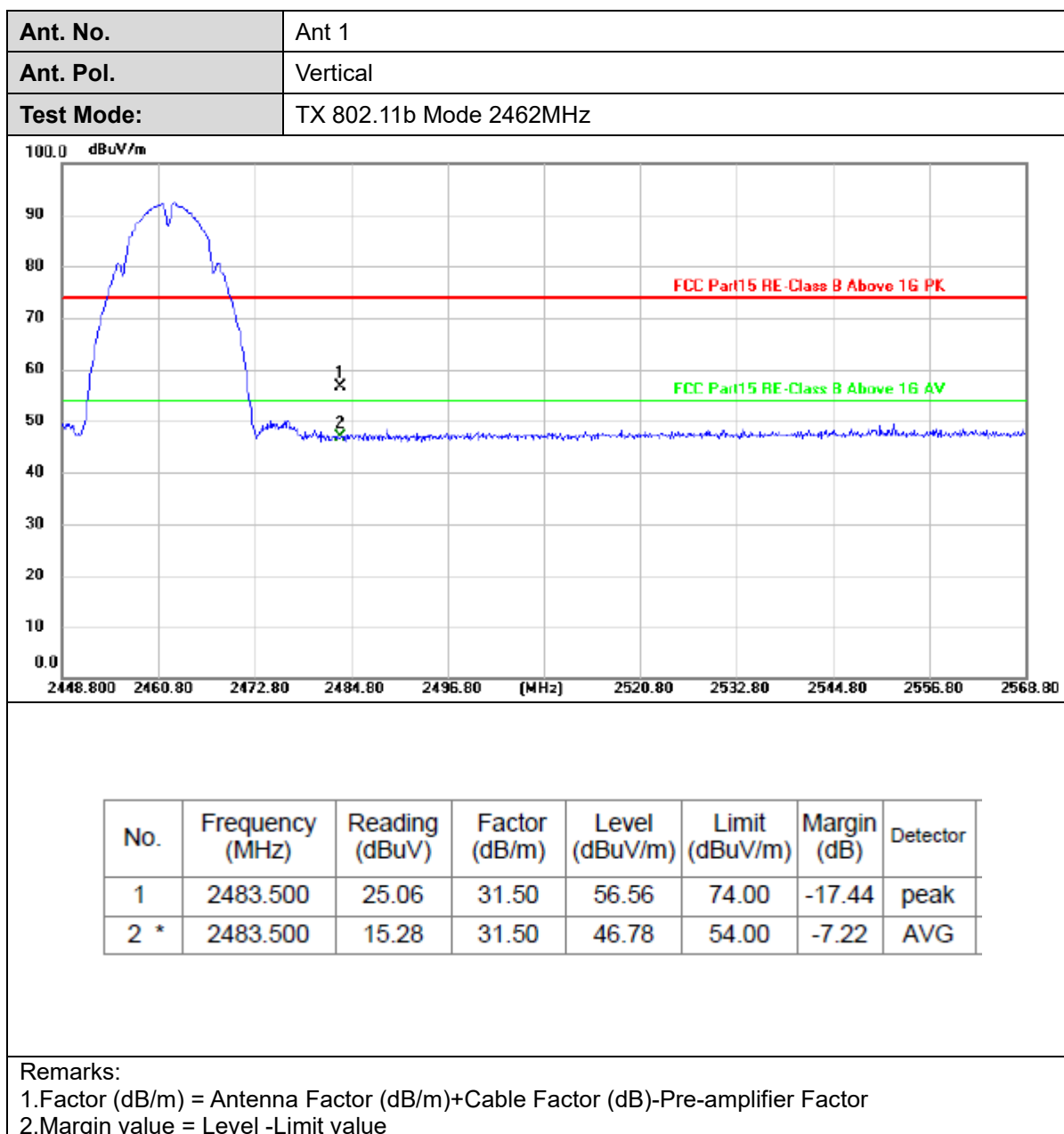
Please refer to the clause 2.4.

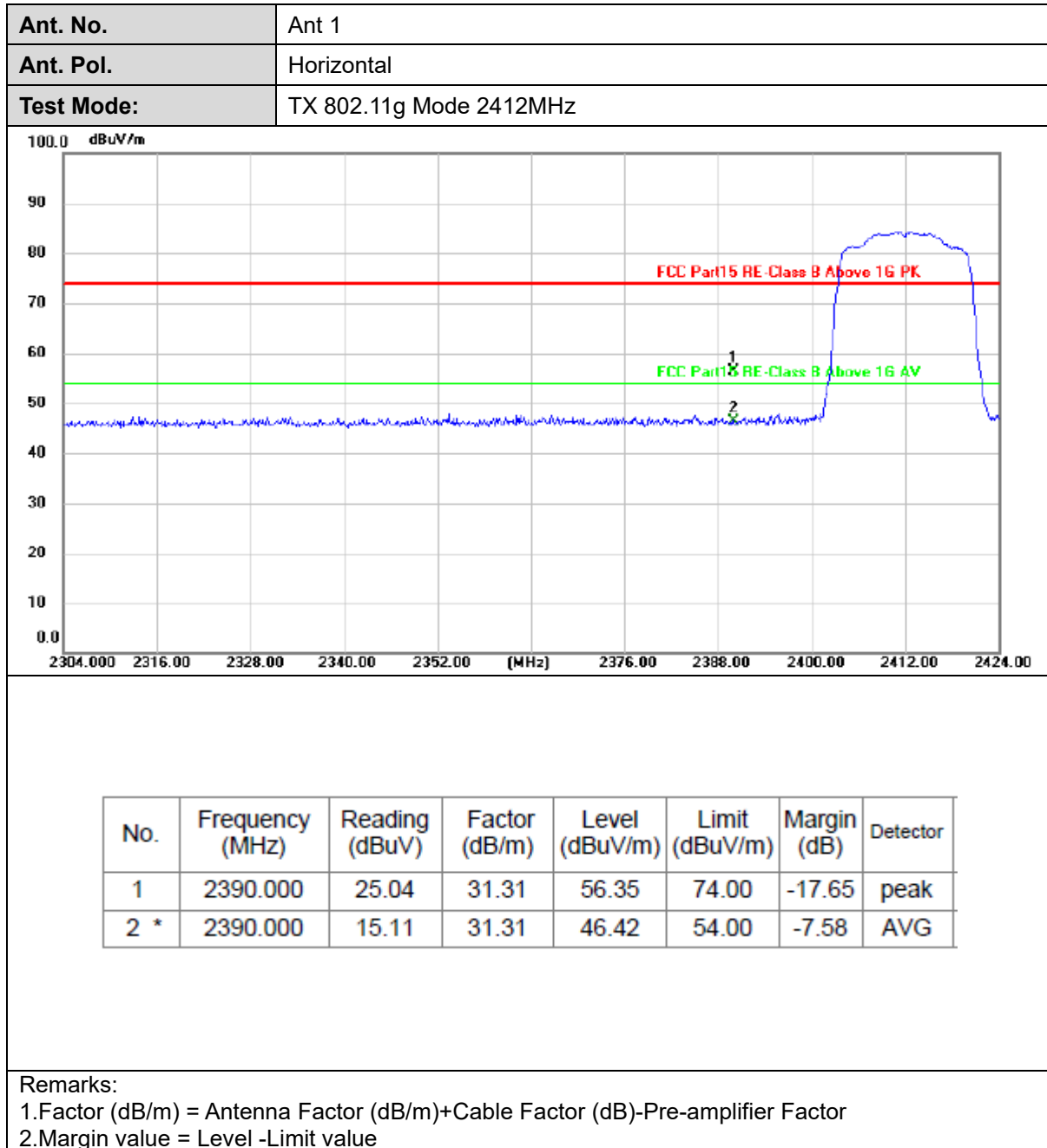
**Test Result**

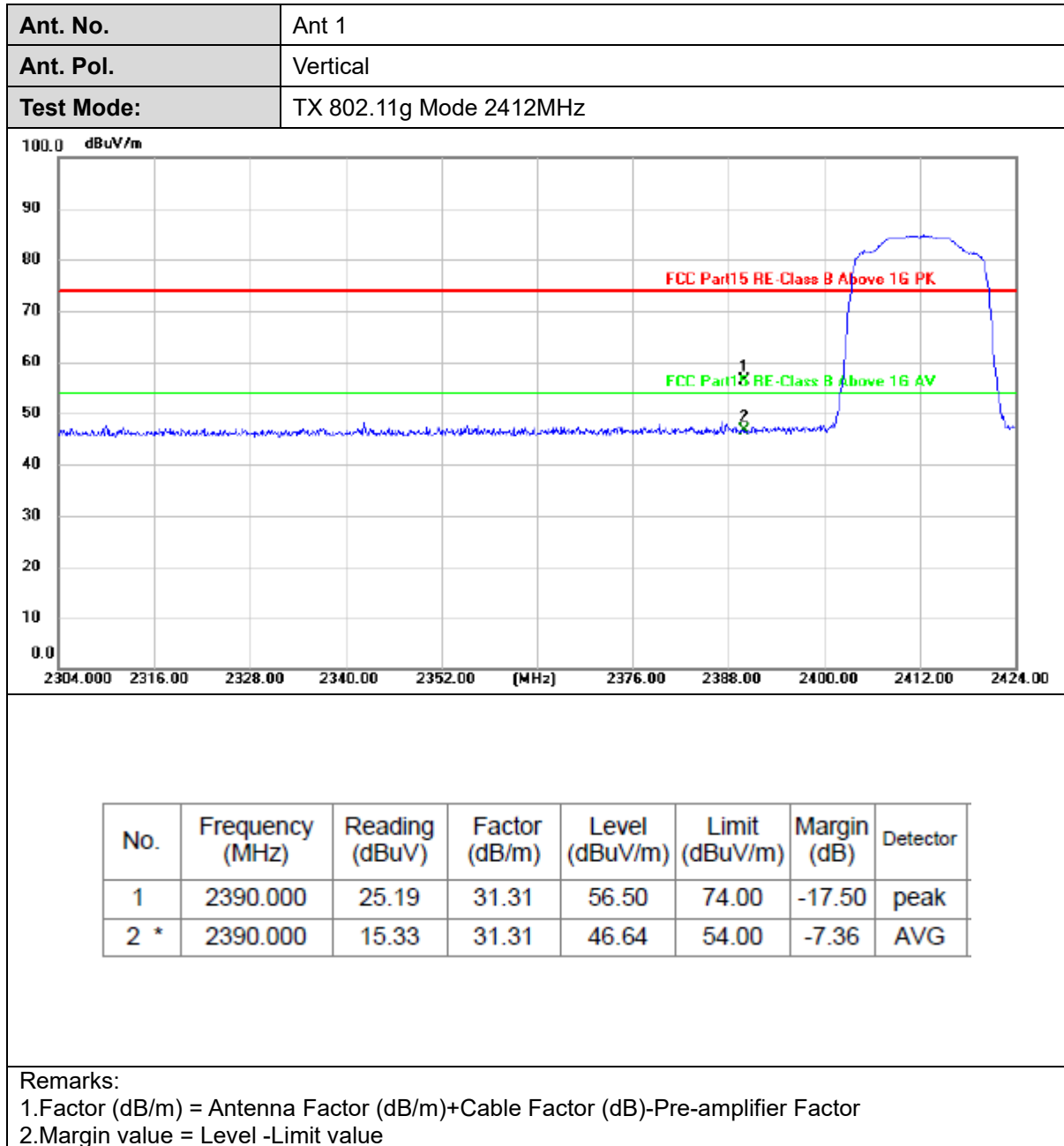


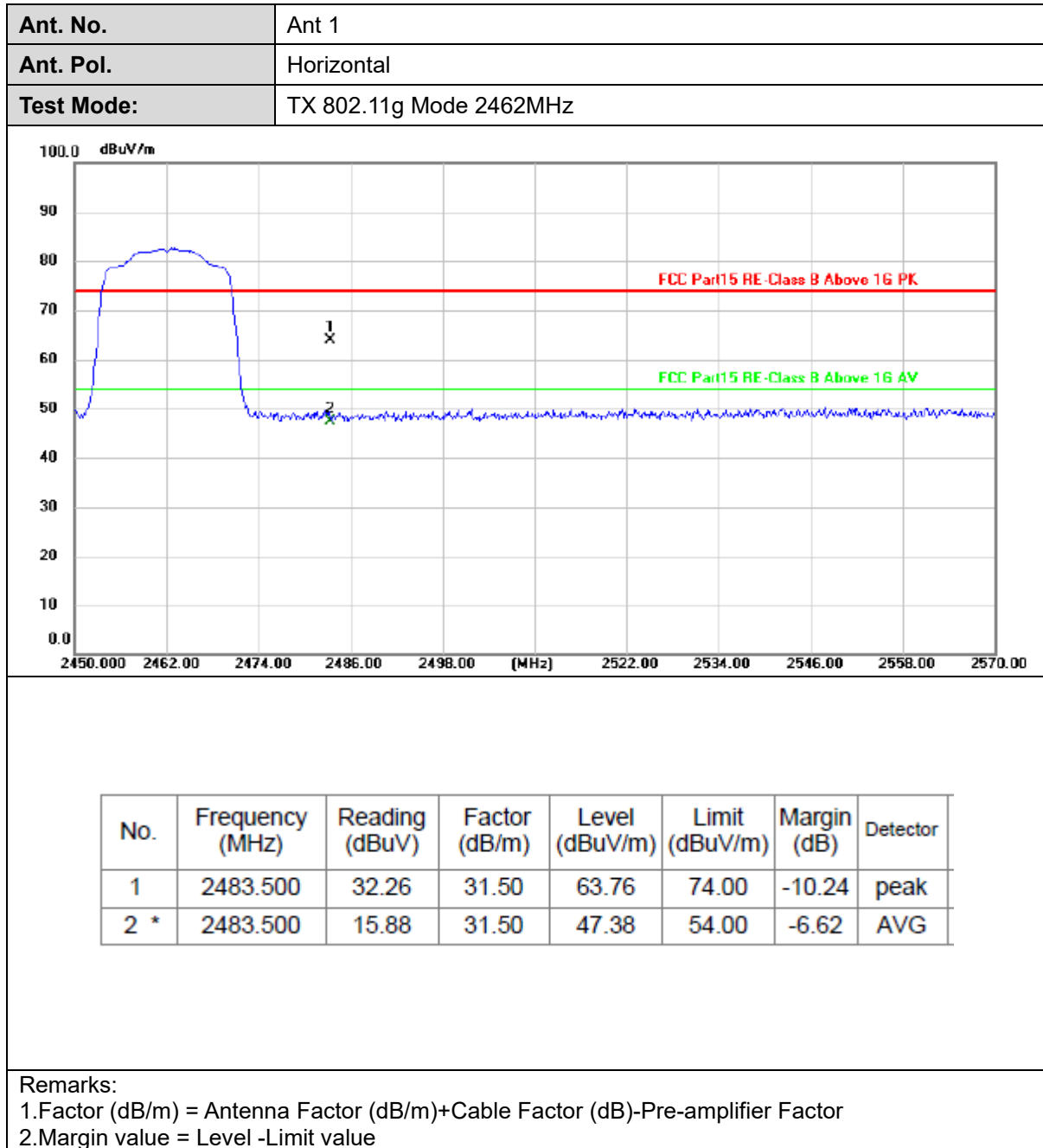


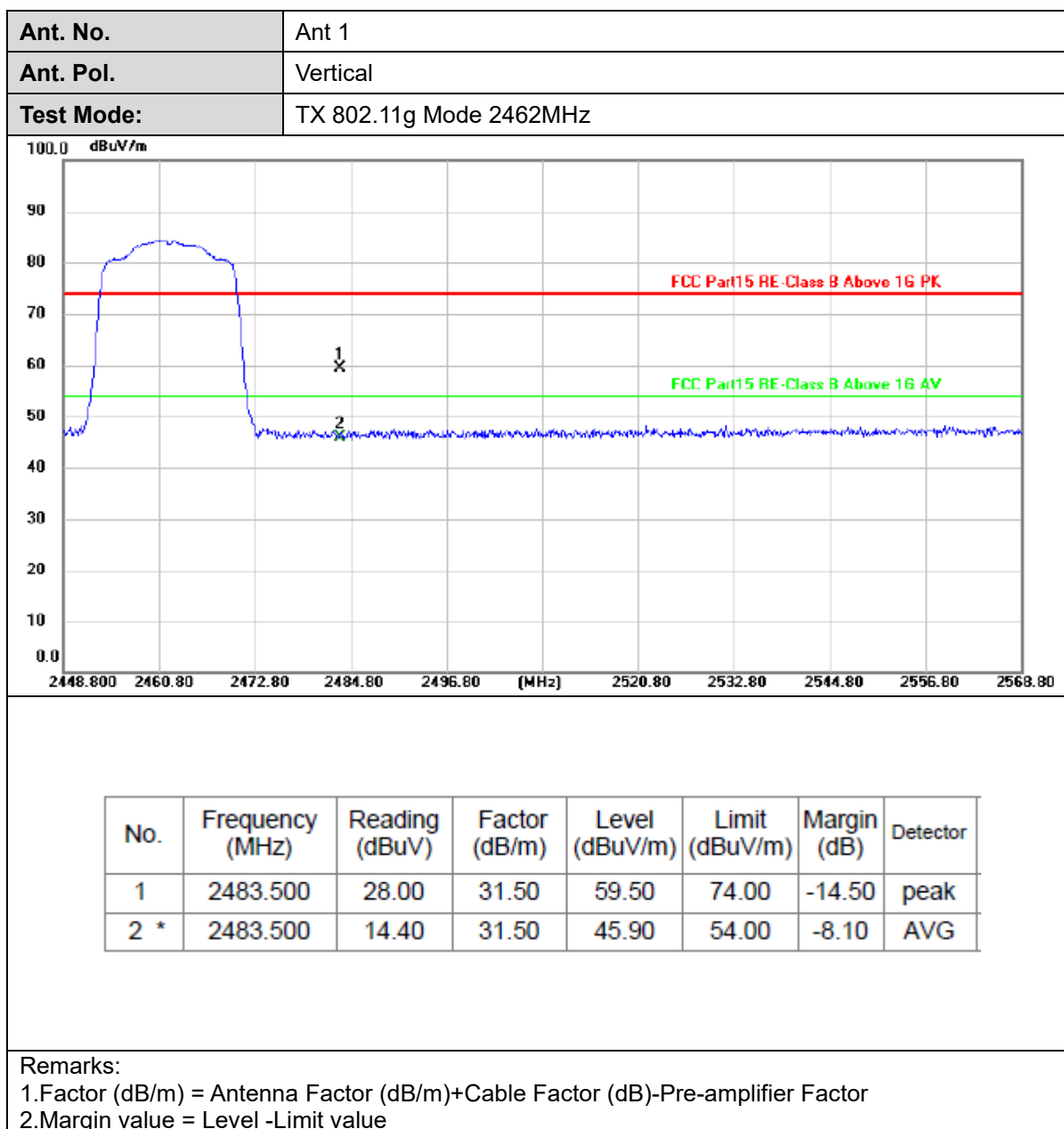


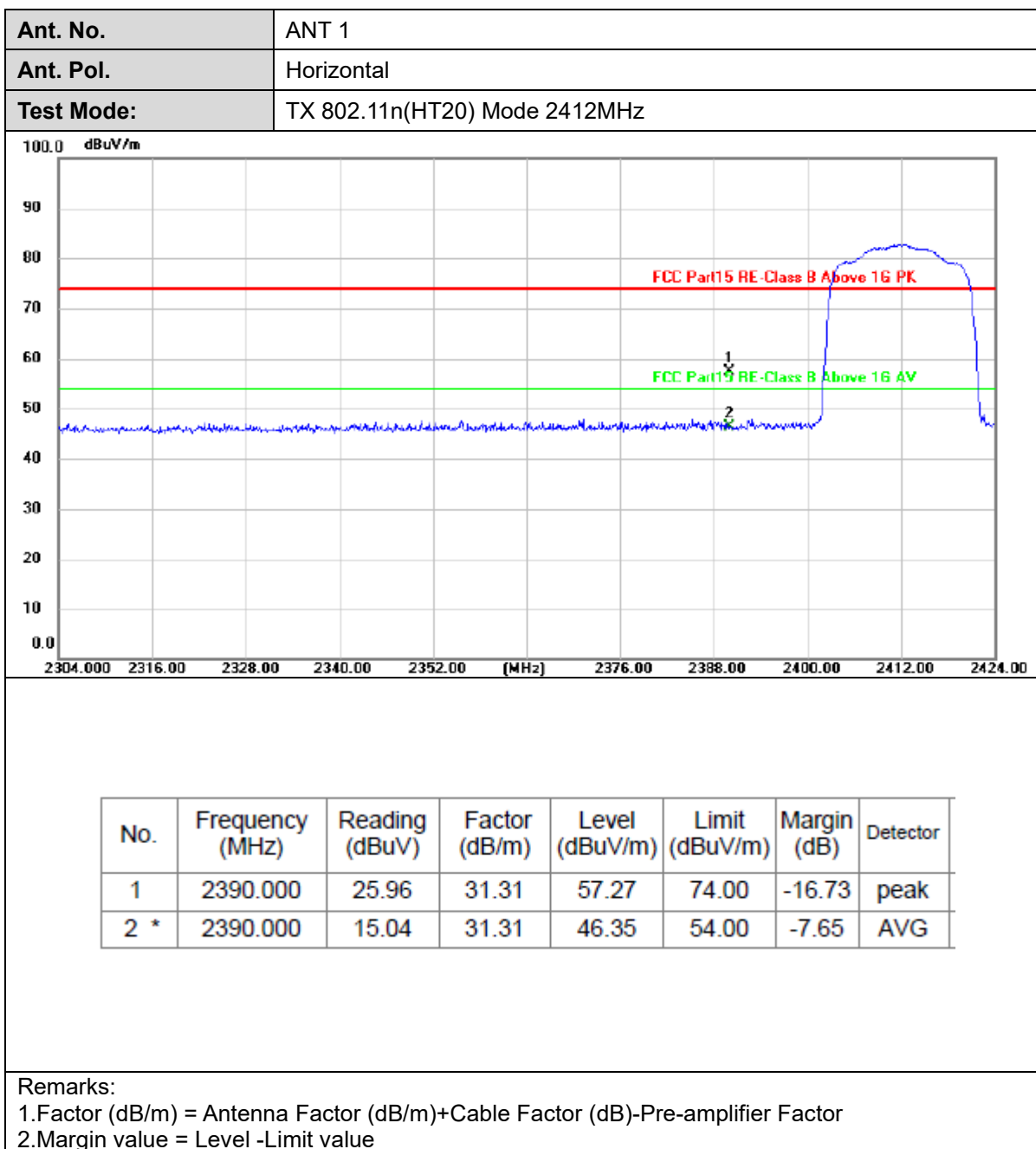






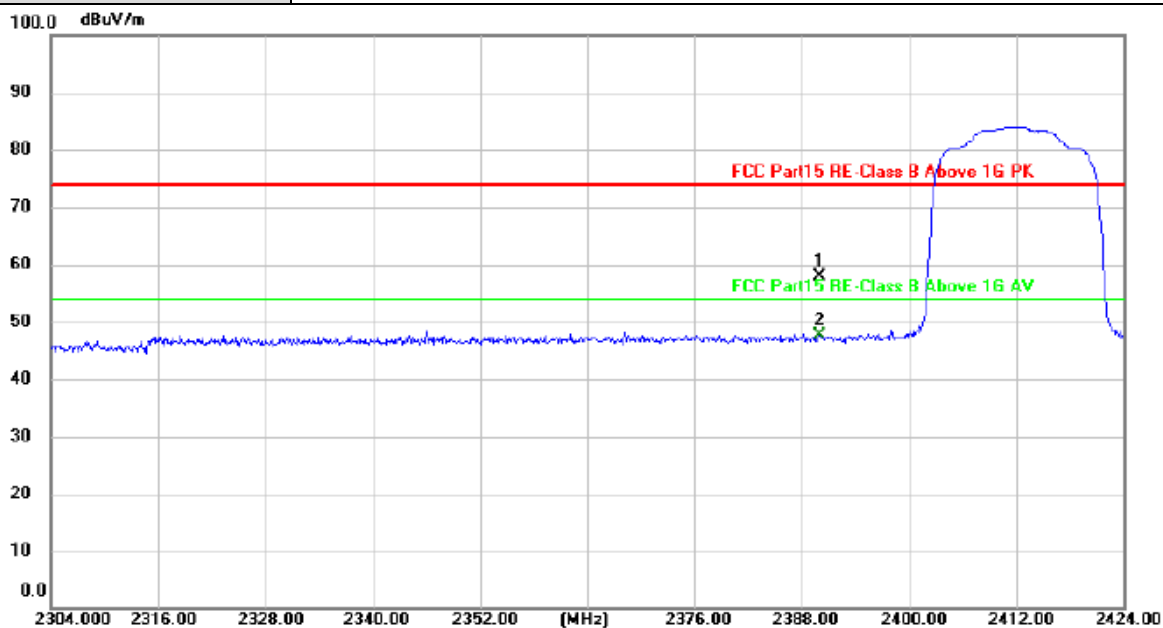








Ant. No.	ANT 1
Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 2412MHz

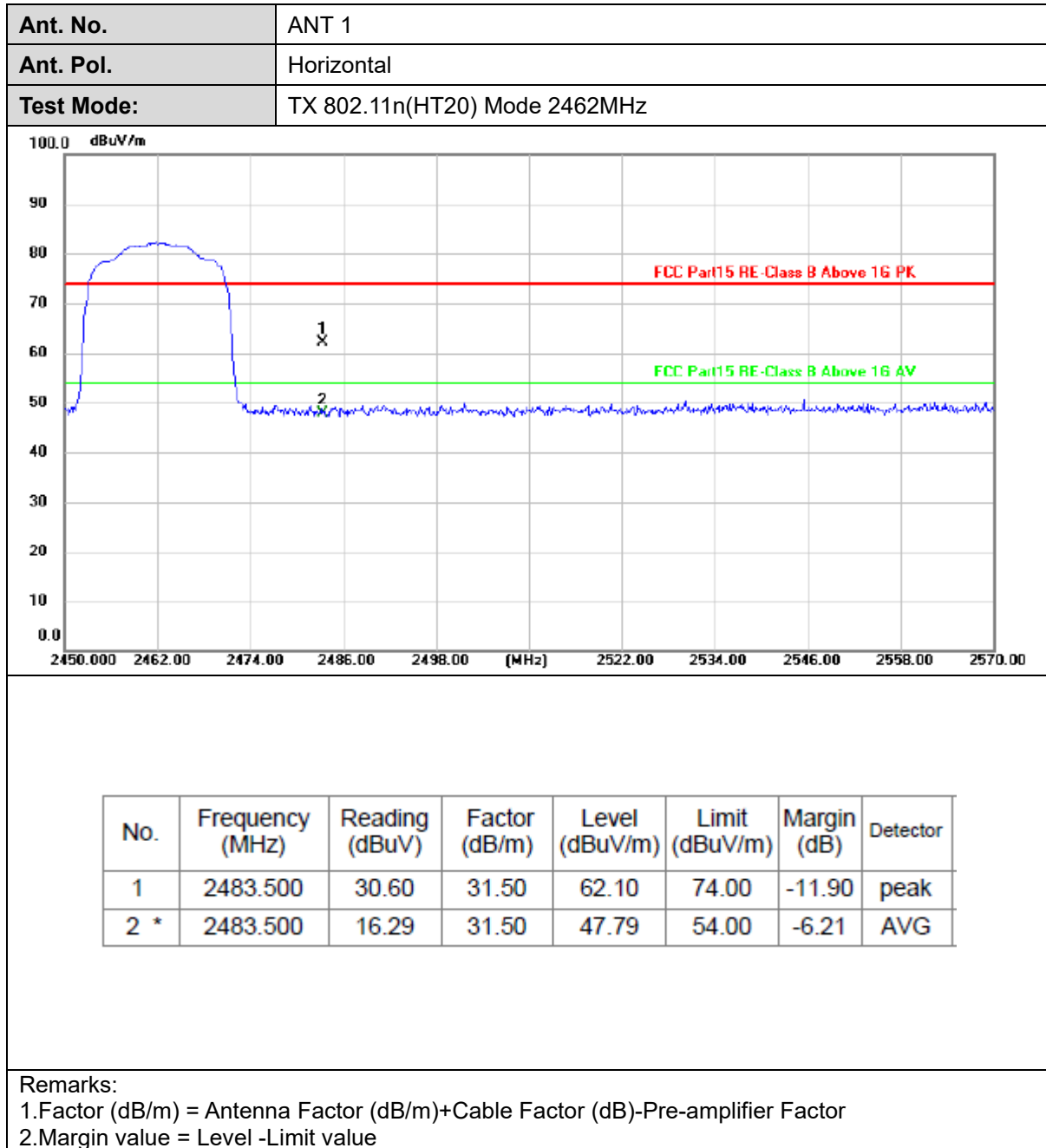


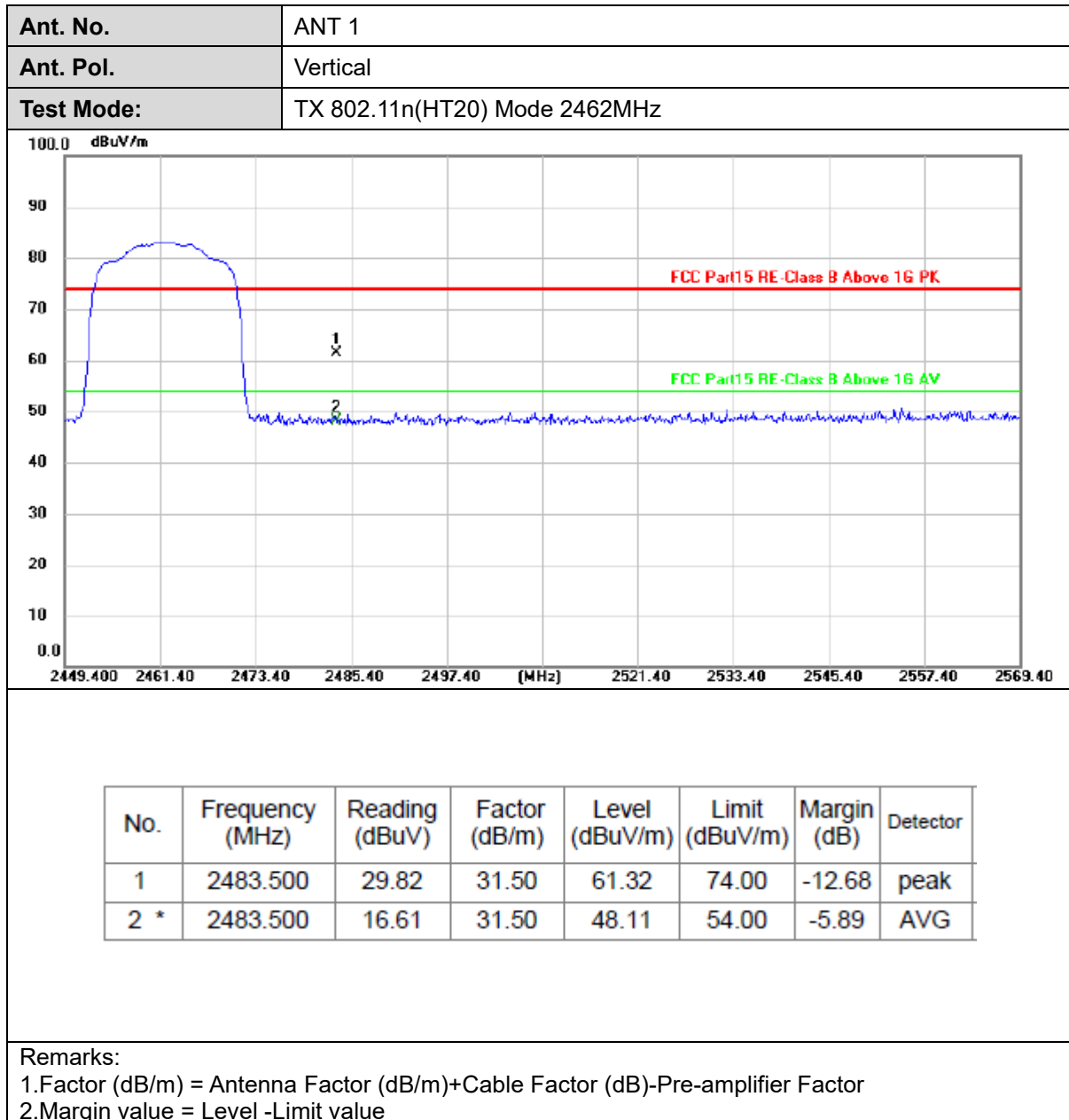
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	26.45	31.31	57.76	74.00	-16.24	peak
2 *	2390.000	16.31	31.31	47.62	54.00	-6.38	AVG

## Remarks:

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









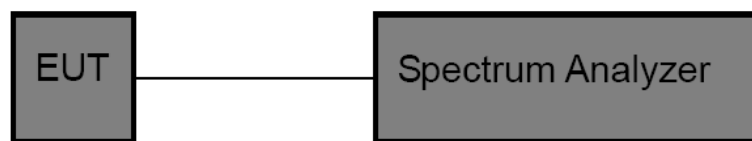
### 3.4. Band Edge and Spurious Emissions (Conducted)

#### Limit

##### **FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d)**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

#### Test Configuration



#### Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:  
RBW = 100 kHz, VBW  $\geq$  RBW, scan up through 10<sup>th</sup> harmonic.  
Sweep = auto, Detector function = peak, Trace = max hold.
4. Measure and record the results in the test report.

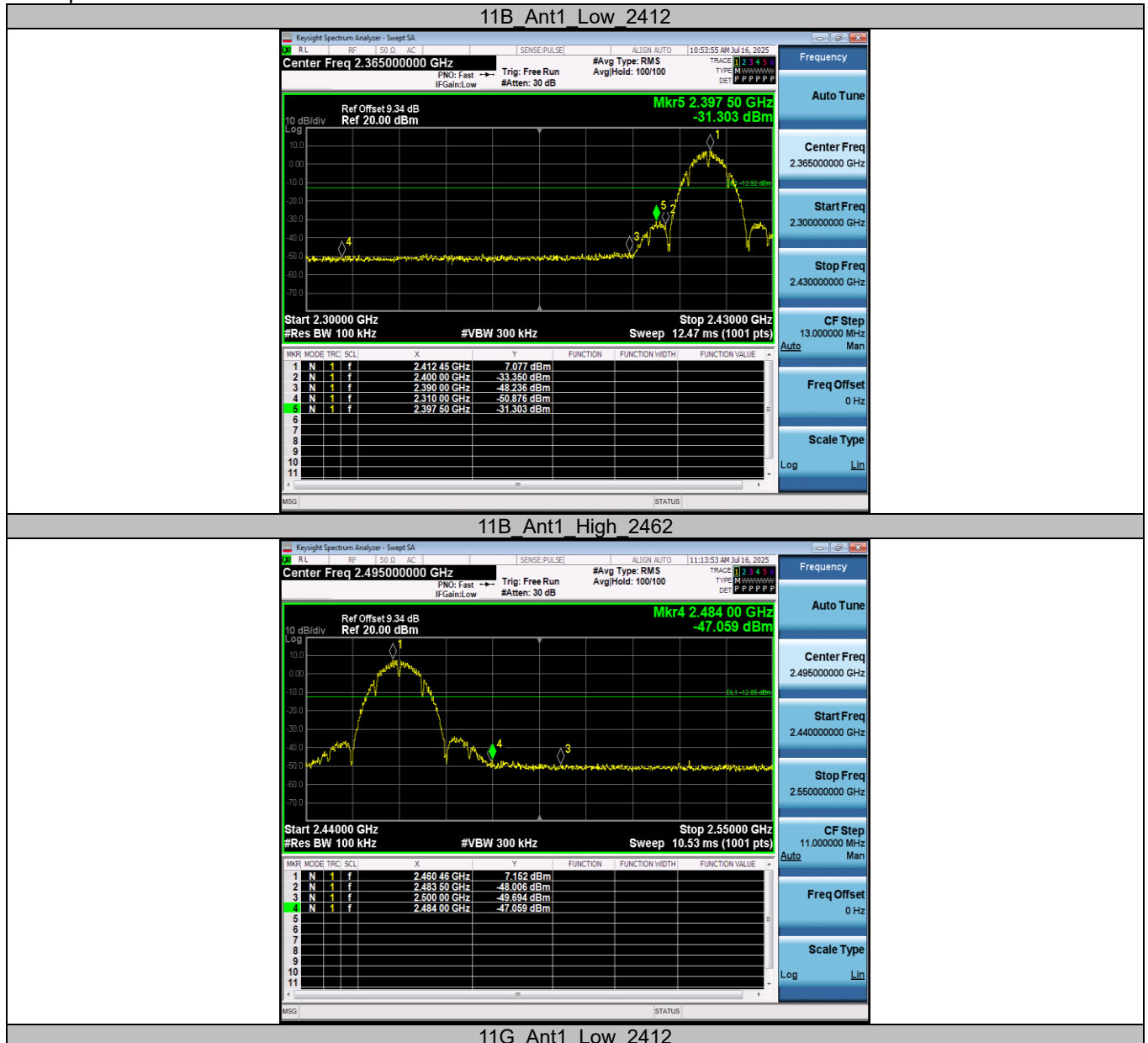
#### Test Mode

Please refer to the clause 2.4.

**Test Result****(1) Band Edge Conducted Test**

TestMode	Antenna	ChName	Frequency[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
11B	Ant1	Low	2412	7.08	-31.3	≤-12.92	PASS
		High	2462	7.15	-47.06	≤-12.85	PASS
11G	Ant1	Low	2412	2.08	-36.36	≤-17.92	PASS
		High	2462	-0.31	-47.82	≤-20.31	PASS
11N20SISO	Ant1	Low	2412	2.25	-42.96	≤-17.75	PASS
		High	2462	4.38	-48.29	≤-15.62	PASS

Test plot as follows:

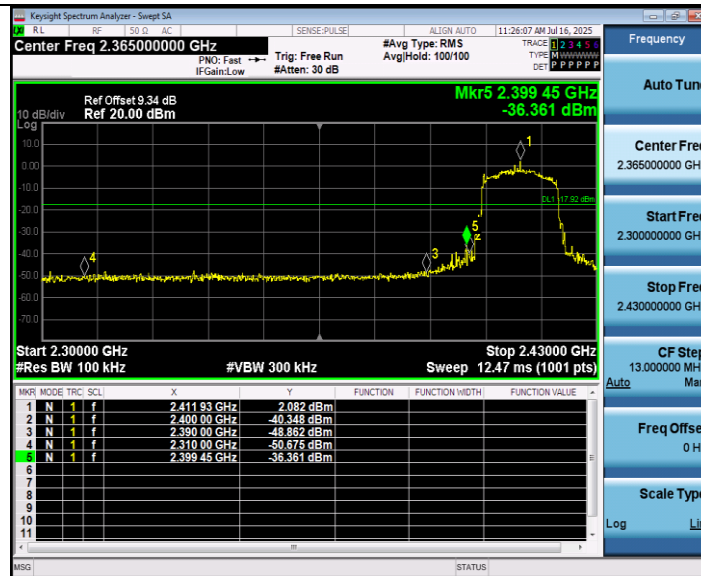


CTC Laboratories, Inc.

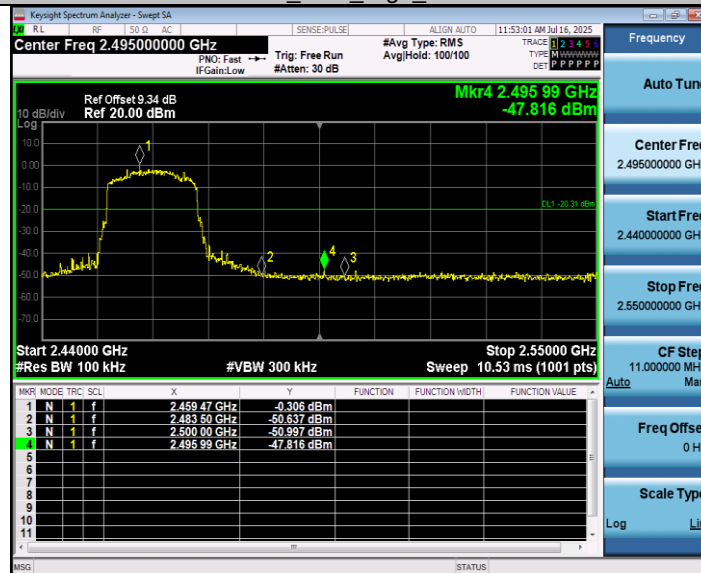
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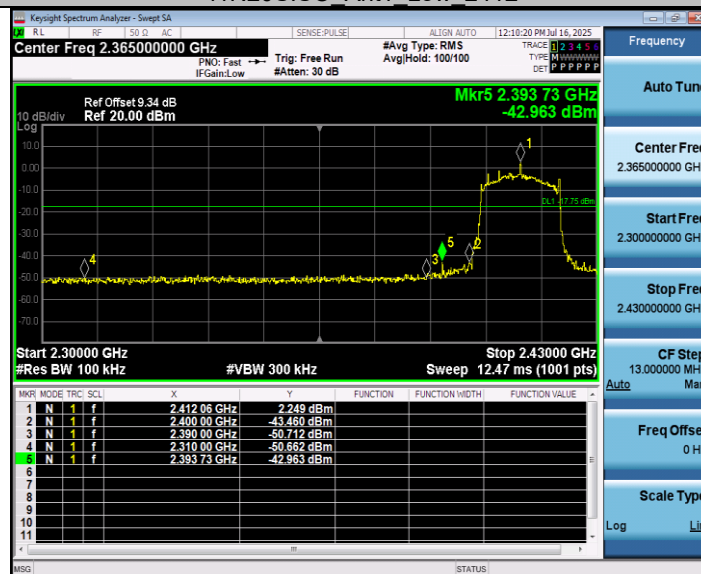
TRF No: CTC-TR-057\_A2



11G\_Ant1\_High\_2462



11N20SISO Ant1 Low 2412



11N20SISO Ant1 High 2462

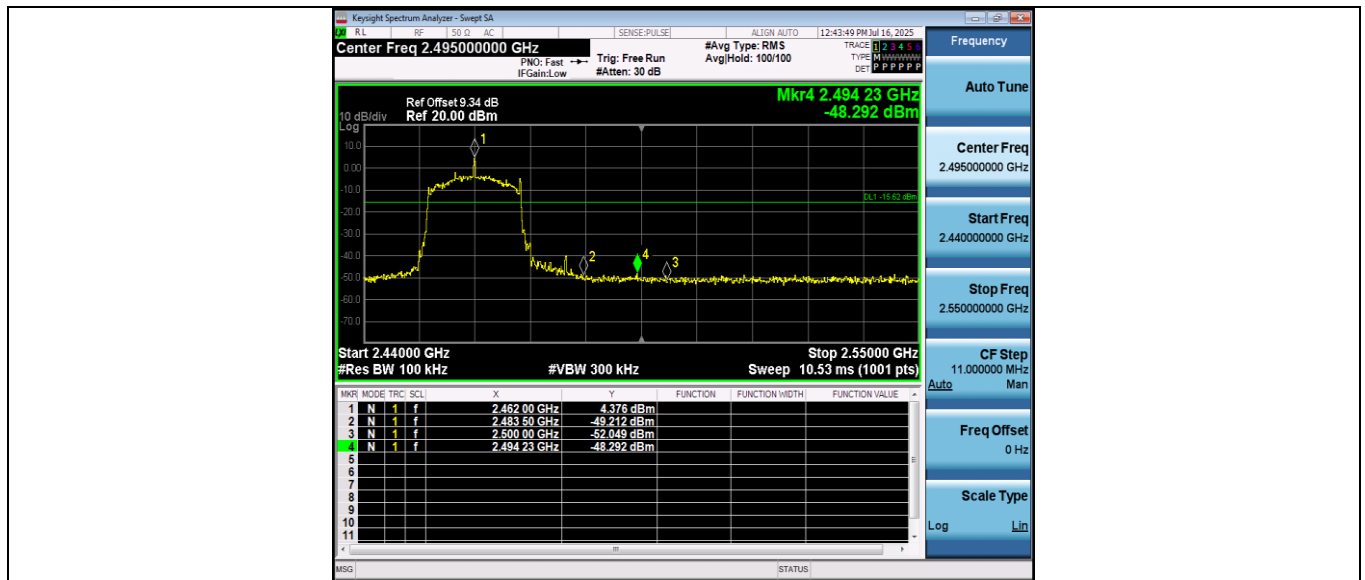
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Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

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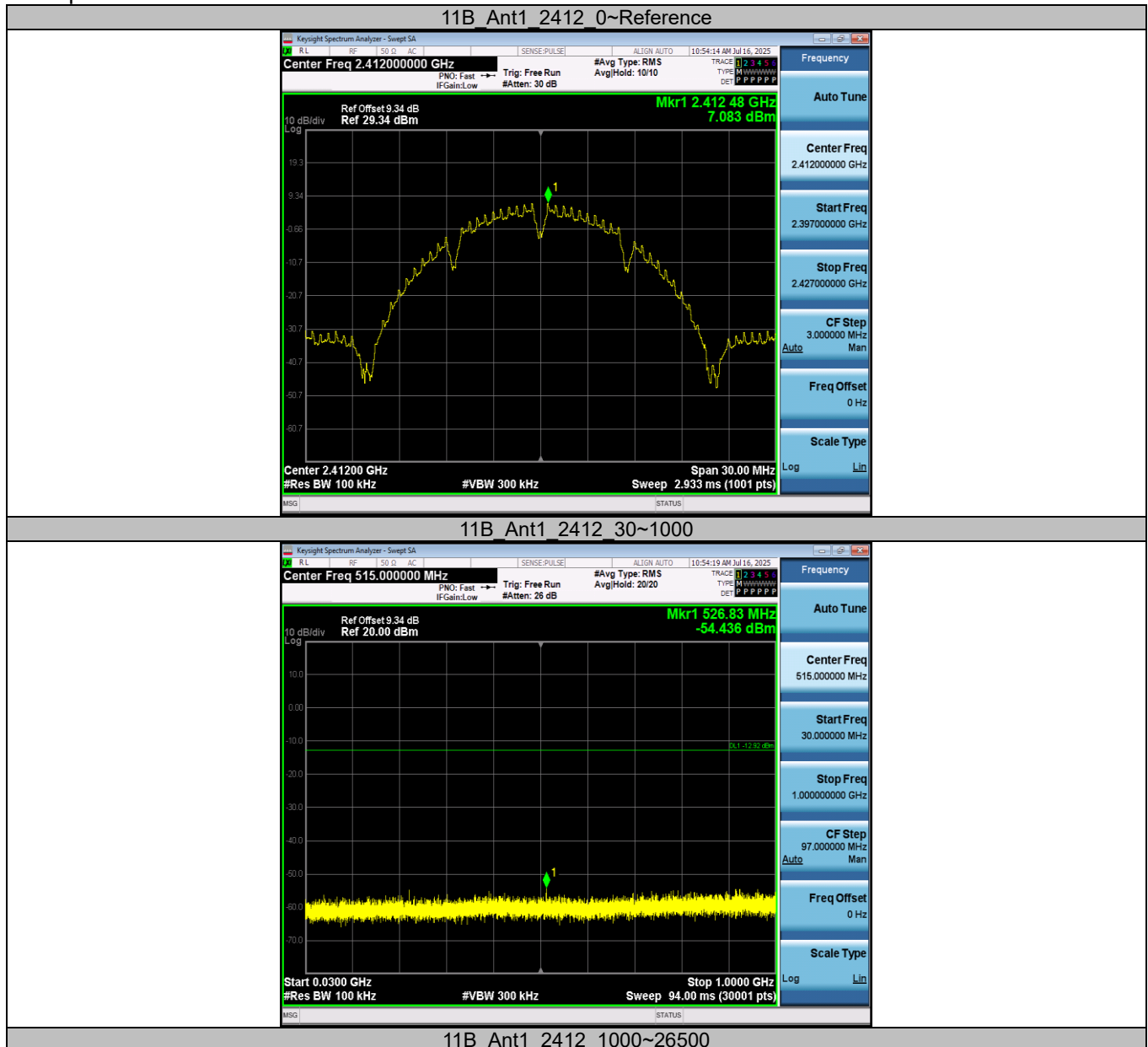
TRF No: CTC-TR-057\_A2

**(2) Conducted Spurious Emissions Test**

TestMode	Antenna	Frequency[MHz]	FreqRange [Mhz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	7.08	7.08	---	PASS
			30~1000	7.08	-54.44	≤-12.92	PASS
			1000~26500	7.08	-45.93	≤-12.92	PASS
		2437	Reference	7.94	7.94	---	PASS
			30~1000	7.94	-54.54	≤-12.06	PASS
			1000~26500	7.94	-45.63	≤-12.06	PASS
		2462	Reference	7.46	7.46	---	PASS
			30~1000	7.46	-54.52	≤-12.54	PASS
			1000~26500	7.46	-46.15	≤-12.54	PASS
11G	Ant1	2412	Reference	2.19	2.19	---	PASS
			30~1000	2.19	-54.17	≤-17.81	PASS
			1000~26500	2.19	-45.83	≤-17.81	PASS
		2437	Reference	1.23	1.23	---	PASS
			30~1000	1.23	-53.79	≤-18.77	PASS
			1000~26500	1.23	-45.05	≤-18.77	PASS
		2462	Reference	1.73	1.73	---	PASS
			30~1000	1.73	-54.29	≤-18.27	PASS
			1000~26500	1.73	-45.75	≤-18.27	PASS
11N20SISO	Ant1	2412	Reference	4.76	4.76	---	PASS
			30~1000	4.76	-53.67	≤-15.24	PASS
			1000~26500	4.76	-45.78	≤-15.24	PASS
		2437	Reference	3.93	3.93	---	PASS
			30~1000	3.93	-54.44	≤-16.07	PASS
			1000~26500	3.93	-46.35	≤-16.07	PASS
		2462	Reference	3.04	3.04	---	PASS
			30~1000	3.04	-54.23	≤-16.96	PASS
			1000~26500	3.04	-45.93	≤-16.96	PASS
			30~1000	7.08	7.08	---	PASS
			1000~26500	7.08	-54.44	≤-12.92	PASS



Test plot as follows:



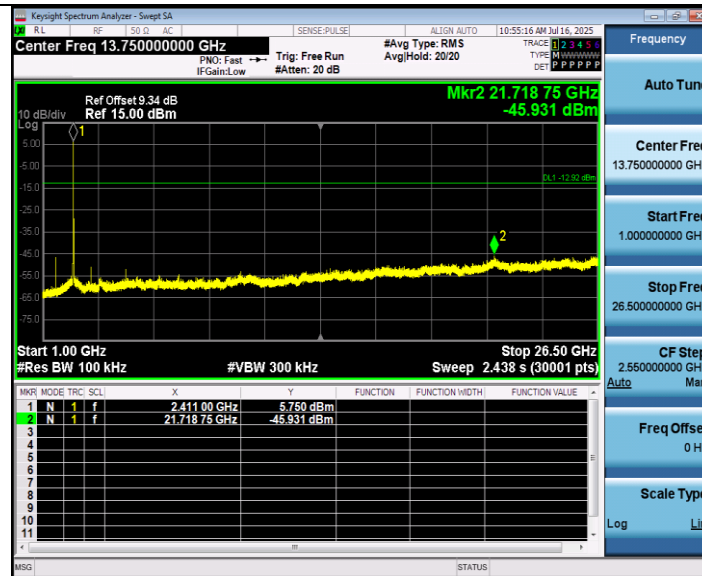
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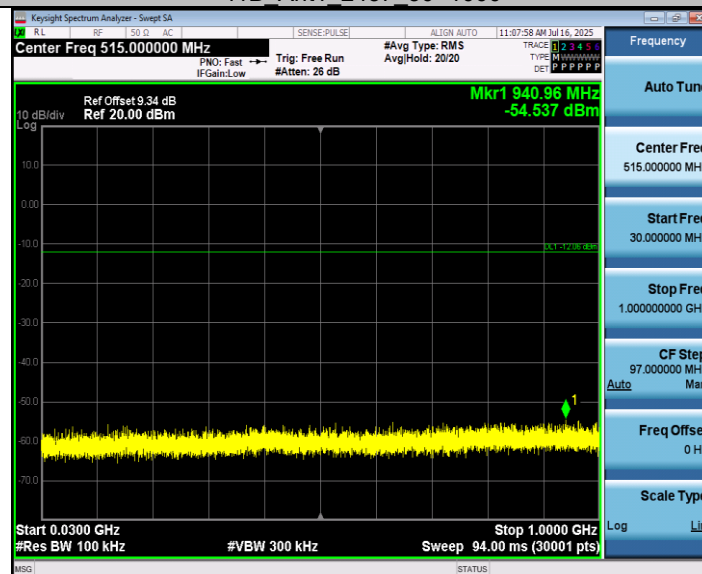




11B\_Ant1\_2437\_0~Reference



11B\_Ant1 2437 30~1000



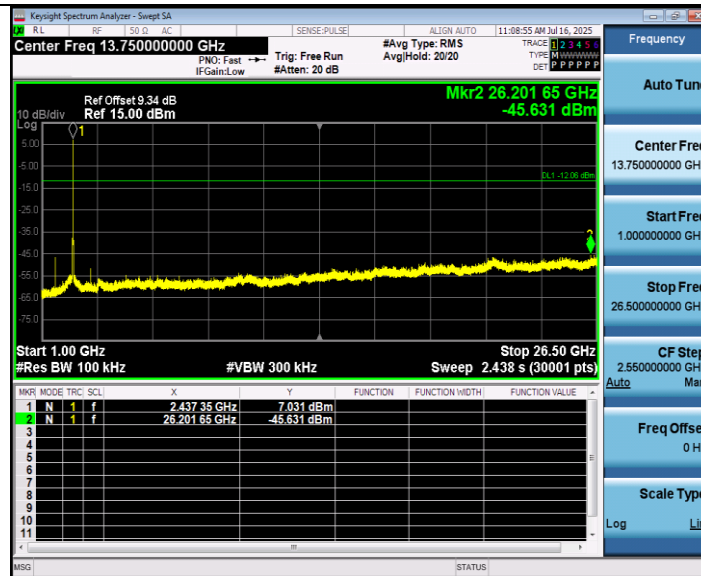
11B\_Ant1 2437 1000~26500

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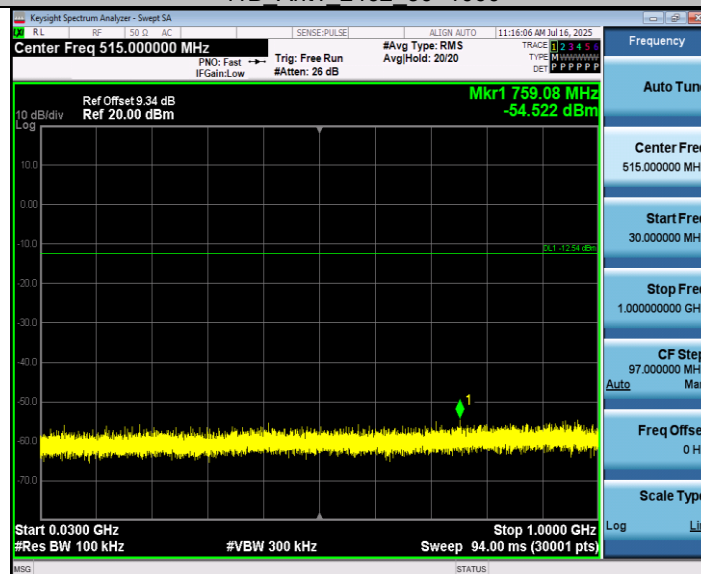
TRF No: CTC-TR-057\_A2



11B\_Ant1\_2462\_0~Reference



11B\_Ant1\_2462\_30~1000



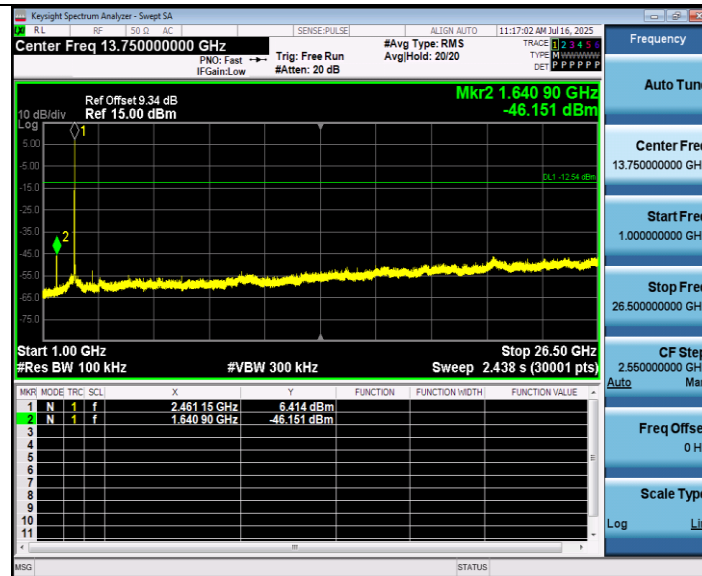
11B\_Ant1\_2462\_1000~26500

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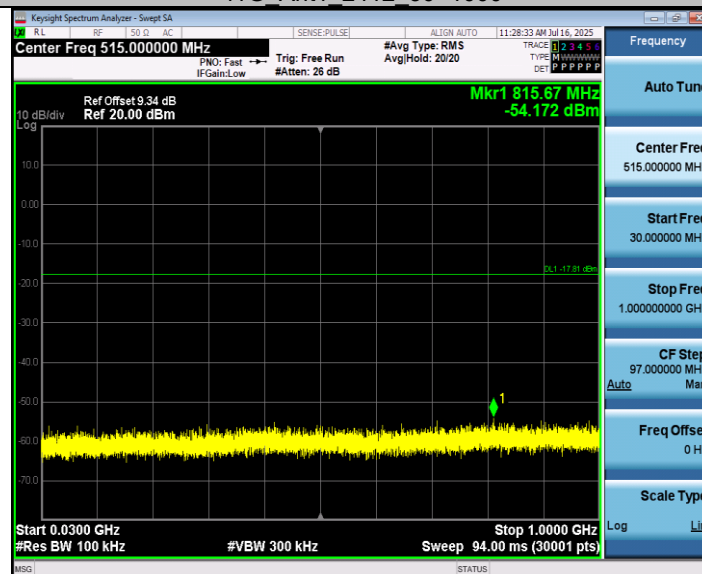
TRF No: CTC-TR-057\_A2



11G\_Ant1\_2412\_0~Reference



11G\_Ant1\_2412\_30~1000



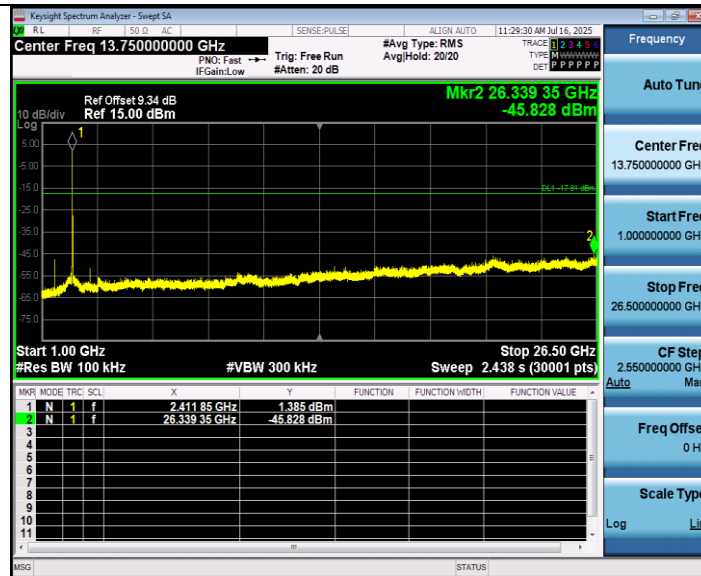
11G\_Ant1\_2412\_1000~26500

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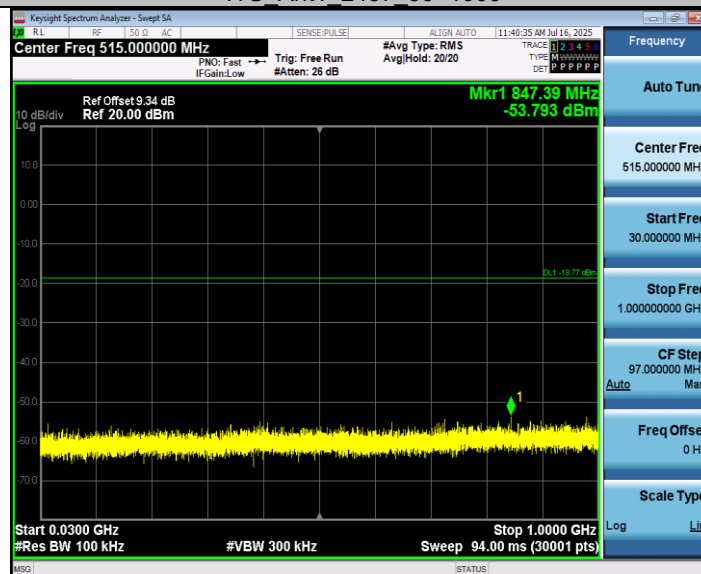
TRF No: CTC-TR-057\_A2



11G\_Ant1\_2437\_0~Reference



11G\_Ant1\_2437\_30~1000



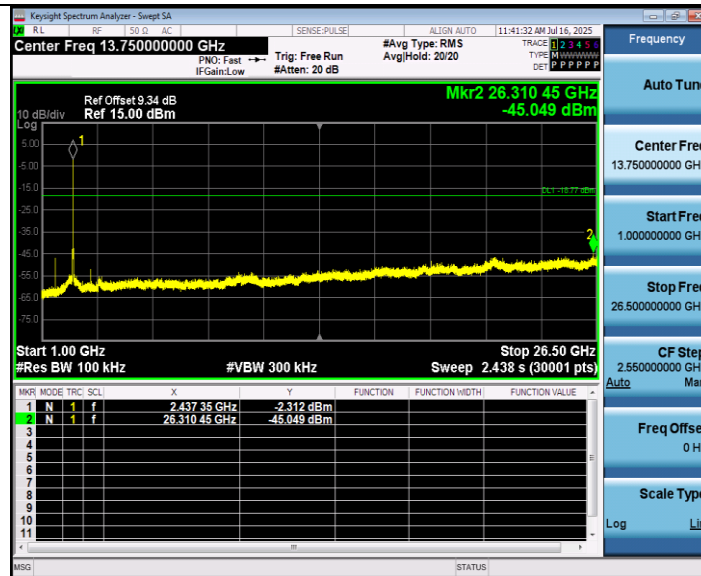
11G\_Ant1\_2437\_1000~26500

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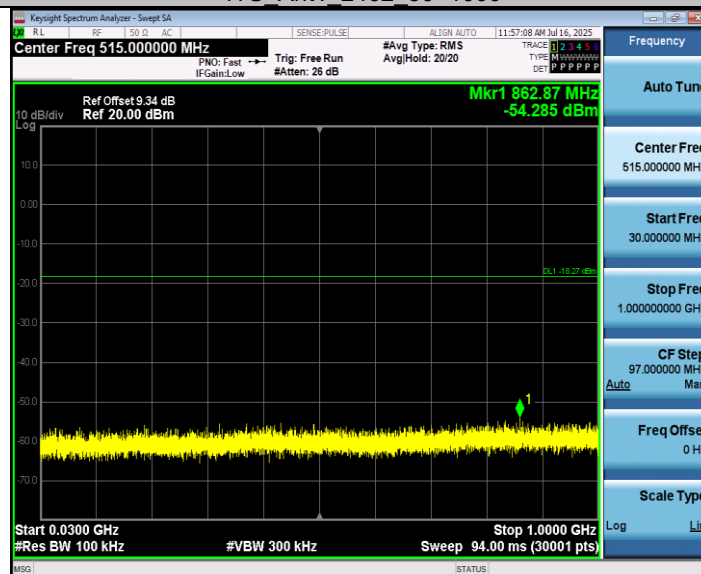
TRF No: CTC-TR-057\_A2



11G\_Ant1\_2462\_0~Reference



11G\_Ant1\_2462\_30~1000



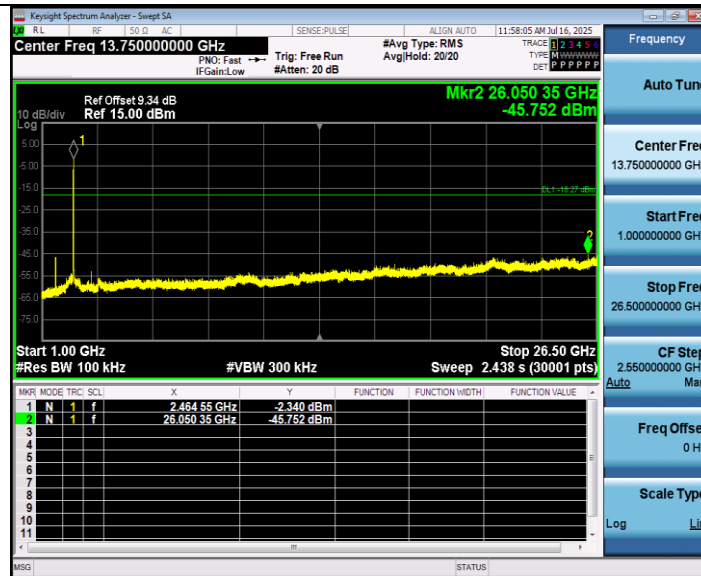
11G\_Ant1\_2462\_1000~26500

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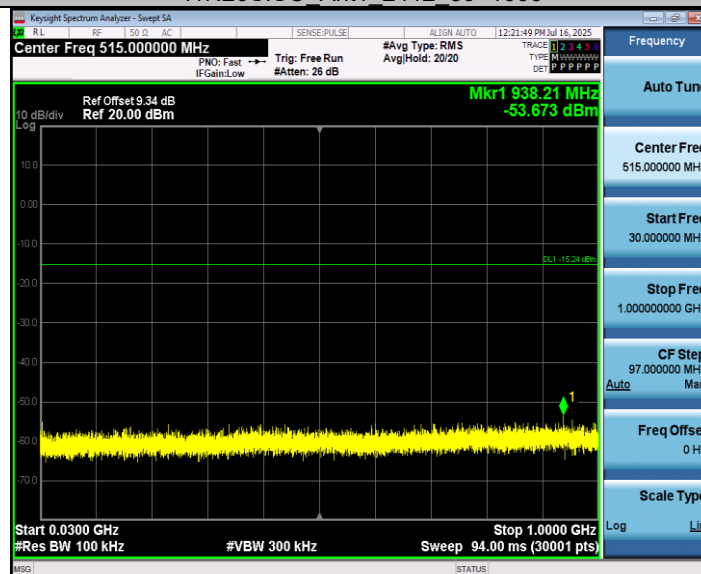
TRF No: CTC-TR-057\_A2



11N20SISO\_Ant1\_2412\_0~Reference



11N20SISO\_Ant1\_2412\_30~1000



11N20SISO\_Ant1\_2412\_1000~26500

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