



# TEST REPORT

Report No. ....: CTC2025326702  
FCC ID.....: 2BM6KC3  
Applicant .....: Shenzhen Ningxin Juli Technical Service Co., Ltd.  
Address.....: Floor 3, Building C, Shenli Industrial Park, Huaqing Avenue,  
Tsinghua Community, Longhua Street, Longhua District,  
Shenzhen China  
Manufacturer.....: Shenzhen Aoni Electronics Co., LTD  
Address.....: Building 5, Honghui Industrial Park, Liuxian Second Road, Xin  
'an Street, Bao 'an District, Shenzhen China  
Product Name .....: DASHCAM  
Trade Mark .....: sarmert  
Model/Type reference.....: C3  
Listed Model(s).....: /  
Standard .....: FCC CFR Title 47 Part 15 Subpart E Section 15.407  
Test Report Form No .....: CTC-TR-062\_A2  
Master TRF.....: Dated 2025-05-12  
Date of receipt of test sample.....: May 19, 2025  
Date of testing.....: May 19, 2025 ~ Jun. 10, 2025  
Date of issue.....: Aug. 18, 2025  
Result.....: PASS

Compiled by:

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*Jim Jiang*

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*Eric Zhang*

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(Printed name+signature)

Totti Zhao

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**Table of Contents****Page**

<b>1. TEST SUMMARY .....</b>	<b>3</b>
1.1. TEST STANDARDS.....	3
1.2. REPORT VERSION .....	3
1.3. TEST DESCRIPTION.....	4
1.4. TEST FACILITY .....	5
1.5. MEASUREMENT UNCERTAINTY .....	6
1.6. ENVIRONMENTAL CONDITIONS.....	6
<b>2. GENERAL INFORMATION .....</b>	<b>7</b>
2.1. CLIENT INFORMATION .....	7
2.2. GENERAL DESCRIPTION OF EUT .....	7
2.3. ACCESSORY EQUIPMENT INFORMATION .....	8
2.4. OPERATION STATE .....	9
2.5. MEASUREMENT INSTRUMENTS LIST .....	11
<b>3. TEST ITEM AND RESULTS .....</b>	<b>13</b>
3.1. CONDUCTED EMISSION.....	13
3.2. RADIATED EMISSION.....	16
3.3. BAND EDGE EMISSIONS.....	37
3.4. BANDWIDTH.....	63
3.5. PEAK OUTPUT POWER .....	82
3.6. POWER SPECTRAL DENSITY .....	85
3.7. FREQUENCY STABILITY .....	94
3.8. ANTENNA REQUIREMENT.....	98
3.9. DYNAMIC FREQUENCY SELECTION.....	99



# 1. TEST SUMMARY

## 1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15.407](#): for 802.11a/n/ac/ax, the test procedure follows the FCC KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

[RSS-247 Issue 3](#): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

[RSS-Gen Issue 5](#): General Requirements for Compliance of Radio Apparatus.

[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	CTC2025326702	Aug. 18, 2025	Original



### 1.3. Test Description

FCC Part 15 Subpart E (15.407) / RSS-247 Issue 3				
Test Item	Standard Section		Result	Test Engineer
	FCC	ISED		
Antenna Requirement	15.203	RSS-Gen 6.8	Pass	Jim Jiang
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Jim Jiang
Band Edge Emissions	15.407(b)	RSS-247 6.2	Pass	Jim Jiang
26dB Bandwidth & 99% Bandwidth	15.407(a)	RSS-247 6.2.1.2	Pass	Jim Jiang
6dB Bandwidth (only for UNII-3)	15.407(e)	RSS-247 6.2.4.1	Pass	Jim Jiang
Peak Output Power	15.407(a)	RSS-247 6.2	Pass	Jim Jiang
Power Spectral Density	15.407(a)	RSS-247 6.2	Pass	Jim Jiang
Transmitter Radiated Spurious Emission	15.407(b) & 15.209	RSS-Gen 8.9 RSS-247 6.2	Pass	Jim Jiang
Frequency Stability	15.407(g)	RSS-Gen 6.11	Pass	Jim Jiang
Dynamic Frequency Selection (DFS)	15.407(h)	RSS-247 6.3	N/A	N/A
Automatically Discontinue Transmission	15.407(c)	RSS-247 6.4(a)	Pass	Note 3

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.
3. During no any information transmission, the EUT can automatically discontinue transmission and become standby mode for power saving. the EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



## 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.

#### Innovation, Science and Economic Development 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
Emission Bandwidth	$\pm 0.0196\%$	(1)
Maximum Conduct Output Power	$\pm 0.766\text{dB}$	(1)
Power Spectral Density	$\pm 1.22\text{dB}$	(1)
Band Edge Measurements	$\pm 1.328\text{dB}$	(1)
Unwanted Emissions Measurement	9kHz-1GHz: $\pm 0.746\text{dB}$ 1GHz-26GHz: $\pm 1.328\text{dB}$	(1)
Frequency Stability	$\pm 2.76\%$	(1)
Conducted Emissions 9kHz~30MHz	$\pm 3.08\text{ dB}$	(1)
Radiated Emissions 30~1000MHz	$\pm 4.51\text{ dB}$	(1)
Radiated Emissions 1~18GHz	$\pm 5.84\text{ dB}$	(1)
Radiated Emissions 18~40GHz	$\pm 6.12\text{ dB}$	(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

<b>Normal Condition</b>	Temperature	15 °C to 35 °C
	Relative Humidity	20 % to 75 %
	Air Pressure	101 kPa
	Voltage	The normal test voltage for the equipment shall be the nominal voltage for which the equipment was designed.
<b>Extreme Condition</b>	Temperature	Measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.
	Voltage	Measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.

<b>Normal Condition</b>	$T_N$ =Normal Temperature	25 °C
<b>Extreme Condition</b>	$T_L$ =Lower Temperature	-20 °C
	$T_H$ =Higher Temperature	70 °C

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TRF No: CTC-TR-062\_A2



## 2. GENERAL INFORMATION

### 2.1. Client Information

Applicant:	Shenzhen Ningxin Juli Technical Service Co., Ltd.
Address:	Floor 3, Building C, Shenli Industrial Park, Huaqing Avenue, Tsinghua Community, Longhua Street, Longhua District, Shenzhen China
Manufacturer/ Factory:	Shenzhen Aoni Electronics Co., LTD
Address:	Building 5, Honghui Industrial Park, Liuxian Second Road, Xin 'an Street, Bao 'an District, Shenzhen China

### 2.2. General Description of EUT

Product Name:	DASHCAM
Trade Mark:	sarmert
Model/Type reference:	C3
Listed Model(s):	/
Model Difference:	/
Sample ID:	CTC250519-003-S002, CTC250519-003-S003
Power Supply:	Type-C Input: DC5V 2.5A
Hardware Version:	/
Software Version:	/

5G Wi-Fi					
Operation Band:	<input checked="" type="checkbox"/> U-NII-1	<input type="checkbox"/> U-NII-2A	<input type="checkbox"/> U-NII-2C	<input checked="" type="checkbox"/> U-NII-3	
Operation Frequency:	U-NII-1	5180MHz~5240MHz			
	U-NII-3	5745MHz~5825MHz			
Support Bandwidth:	802.11a	<input checked="" type="checkbox"/> 20MHz			
	802.11n	<input checked="" type="checkbox"/> 20MHz	<input checked="" type="checkbox"/> 40MHz		
	802.11ac	<input type="checkbox"/> 20MHz	<input type="checkbox"/> 40MHz	<input type="checkbox"/> 80MHz	<input type="checkbox"/> 160MHz
Modulation:	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)				
Antenna Type:	Chip Antenna				
Antenna Gain:	U-NII-1: 2.3dBi, U-NII-3: 2.6dBi				

Note: The product does not support TPC.



## 2.3. Accessory Equipment Information

Equipment Information			
Name	Model	S/N	Manufacturer
Notebook	ThinkPad T460s	MP246QDR	Lenovo
Adapter	A2244	/	Apple
Cable Information			
Name	Shielded Type	Ferrite Core	Length
USB Cable	Unshielded	NO	100cm
Test Software Information			
Name	Version	/	/
SecureCRTPortable	7.1.1	/	/





## 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.

Operation Frequency List:

Operating Band	20MHz Bandwidth		40MHz Bandwidth	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)
U-NII-1	36	5180	38	5190
	40	5200		
	44	5220	46	5230
	48	5240		
U-NII-3	149	5745	151	5755
	153	5765		
	157	5785	159	5795
	161	5805		
	165	5825		

Test channel is below:

Operating Band	Test Channel	20MHz Bandwidth		40MHz Bandwidth	
		Channel	Frequency (MHz)	Channel	Frequency (MHz)
U-NII-1	CH <sub>L</sub>	36	5180	38	5190
	CH <sub>M</sub>	40	5200	/	/
	CH <sub>H</sub>	48	5240	46	5230
U-NII-3	CH <sub>L</sub>	149	5745	151	5755
	CH <sub>M</sub>	157	5785	/	/
	CH <sub>H</sub>	165	5825	159	5795

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.

Test Mode	Data Rate (worst mode)
802.11a	6Mbps
802.11n(HT20)/ 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 is powered by an adapter, and the phone is connected to the EUT using the RoadRec app.
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

RF Test System – SRD						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSV40-N	101331	Mar. 23, 2025	Mar. 24, 2026
2	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 13, 2024	Dec. 12, 2025
3	PSG Analog Signal Generator	Agilent	E8257D	MY46521908	Dec. 13, 2024	Dec. 12, 2025
4	USB Wideband Power Sensor	Keysight	U2021XA	MY55130004	Mar. 25, 2025	Mar. 24, 2026
5	USB Wideband Power Sensor	Keysight	U2021XA	MY55130006	Mar. 25, 2025	Mar. 24, 2026
6	Wideband Radio Communication Tester	R&S	CMW500	102257	May 25, 2024	May 24, 2025
7	RF Control Unit	Tonscend	JS0806-2	/	Aug. 22, 2024	Aug. 21, 2025
8	High and low temperature test chamber	ESPEC	MT3035	/	Mar. 25, 2025	Mar. 24, 2026
9	RF Cable	HUBER+SUHNER	SUCOFLEX101PE	RF-08	Apr. 15, 2025	Apr. 16, 2026
Test Software						
Name		Manufacturer			Software Version	
JS1120-3		Tonscend			V2.6.88.0346	

Radiated emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Calibrated Until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9163	01026	Dec. 25, 2024	Dec. 24, 2025
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Sep. 26, 2024	Sep. 25, 2025
3	Test Receiver	Keysight	N9038A	MY56400071	Dec. 13, 2024	Dec. 12, 2025
4	Broadband Amplifier	Schwarzbeck	BBV9743B	259	Dec. 13, 2024	Dec. 12, 2025
5	Microwave Broadband Amplifier	Schwarzbeck	BBV9718C	111	Dec. 13, 2024	Dec. 12, 2025
6	RE33L-001	COMM	/	014 (9kHz-1GHz)	Feb. 09, 2025	Feb. 08, 2026
7	RE33L-002	COMM	/	015 (9kHz-1GHz)	Feb. 09, 2025	Feb. 08, 2026
8	RE33H-001	SUHB SUCOFLEX	/	016 (1GHz-18GHz)	Feb. 09, 2025	Feb. 08, 2026
9	RE33H-002	HUBENR	/	017 (1GHz-18GHz)	Feb. 09, 2025	Feb. 08, 2026
10	RE33H-003	HUBENR	/	018 (1GHz-18GHz)	Feb. 09, 2025	Feb. 08, 2026
11	RE33H-003	HUBENR	/	019 (18GHz-40GHz)	Feb. 09, 2025	Feb. 08, 2026
12	3m chamber 3	YIHENG	EE106	/	Aug. 29, 2023	Aug. 28, 2026
13	SHF-EHF Horn Antenna	Schwarzbeck	BBHA 9170	013551	Dec. 13, 2024	Dec. 12, 2025

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TRF No: CTC-TR-062\_A2



14	Low noise Amplifier	Tonscend	TAP180040048	AP24C8060348	Dec. 13, 2024	Dec. 12, 2025
Test Software						
Name		Manufacturer		Software Version		
EZ-EMC		FARA		FA-03A2		

Conducted emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Calibrated 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
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

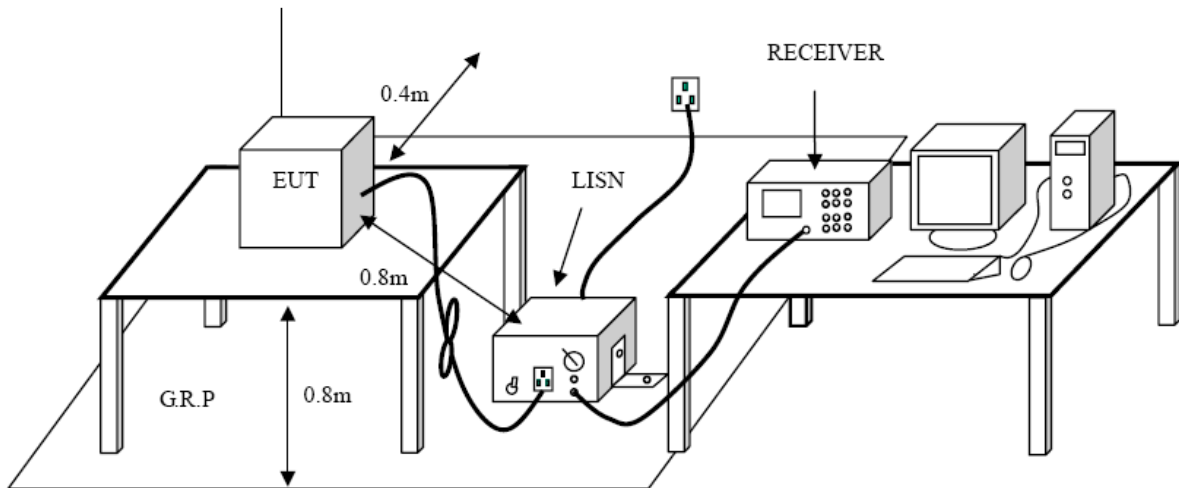
##### Limit

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

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

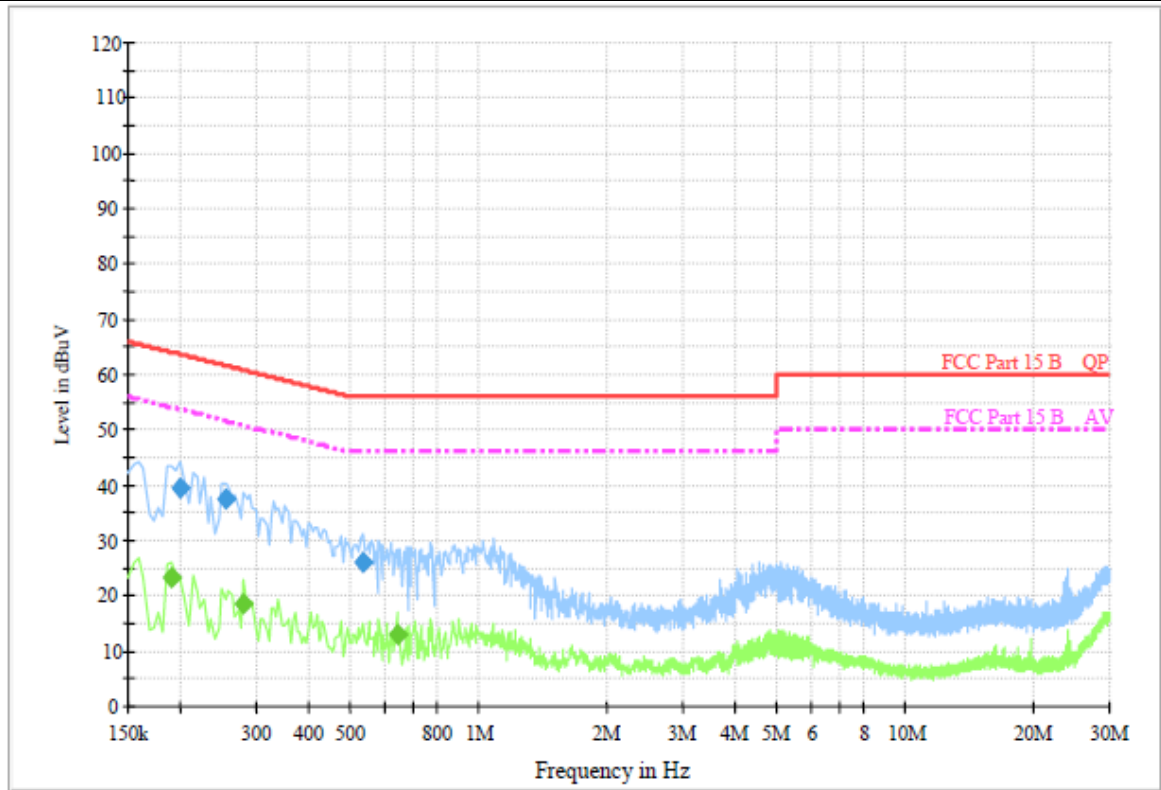
1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from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

**Test Result**

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

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBu V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBu V)	Comment
0.199500	39.4	1000.00	9.000	On	L1	9.5	24.2	63.6	
0.253500	37.6	1000.00	9.000	On	L1	9.5	24.0	61.6	
0.532500	26.1	1000.00	9.000	On	L1	9.4	29.9	56.0	

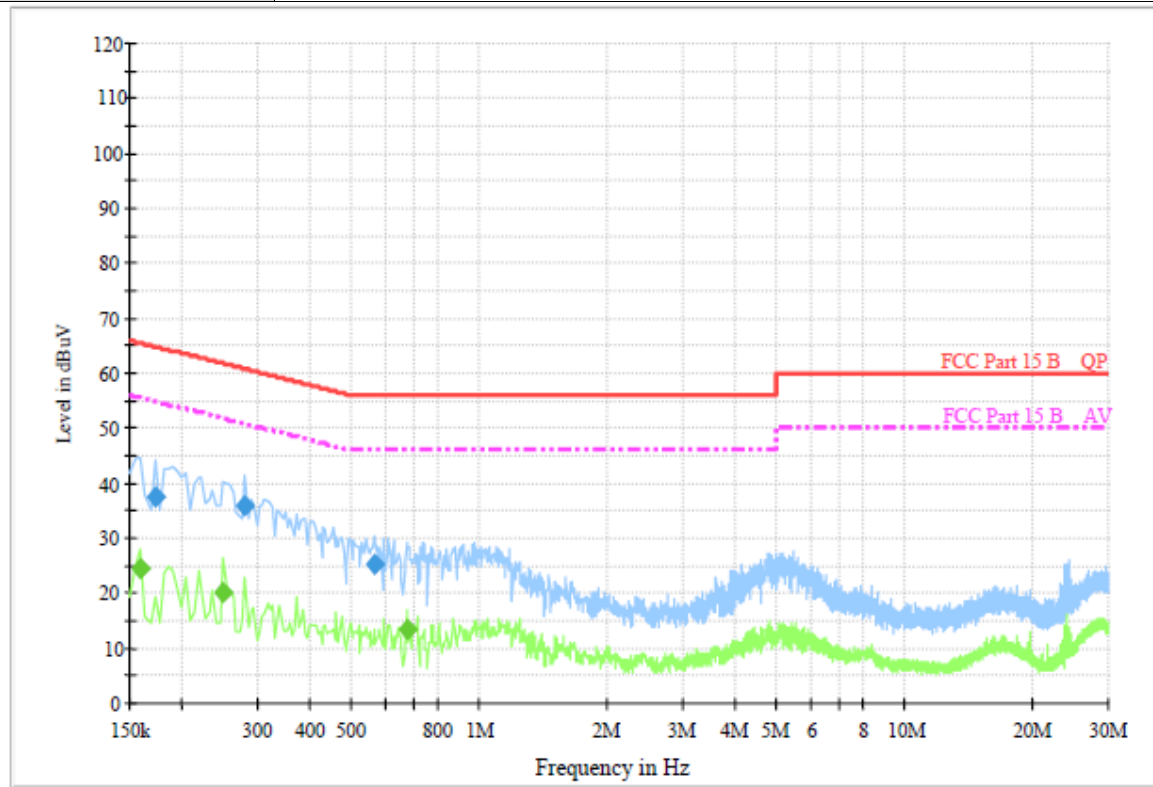
**Final Measurement Detector 2**

Frequency (MHz)	Average (dBu V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBu V)	Comment
0.190500	23.2	1000.00	9.000	On	L1	9.5	30.8	54.0	
0.280500	18.7	1000.00	9.000	On	L1	9.5	32.1	50.8	
0.640500	13.2	1000.00	9.000	On	L1	9.5	32.8	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
0.172500	37.5	1000.00	9.000	On	N	9.4	27.3	64.8	
0.280500	35.8	1000.00	9.000	On	N	9.4	25.0	60.8	
0.564000	25.3	1000.00	9.000	On	N	9.5	30.7	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
0.159000	24.3	1000.00	9.000	On	N	9.4	31.2	55.5	
0.249000	20.0	1000.00	9.000	On	N	9.4	31.8	51.8	
0.672000	13.5	1000.00	9.000	On	N	9.3	32.5	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 (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).

#### Limits of unwanted emission out of the restricted bands

#### FCC CFR Title 47 Part 15 Subpart E Section 15. 407(b) / RSS-247 6.2

Frequency (MHz)	EIRP Limits (dBm)	Equivalent Field Strength at 3m (dBμV/m)
5150~5250	-27	68.2
5250~5350	-27	68.2
5470~5725	-27	68.2
5725~5825	-27 (Note 2)	68.2
	10 (Note 2)	105.2
	15.6 (Note 2)	110.8
	27 (Note 2)	122.2

Note:

1. The following formula is used to convert the equipment isotropic radiated power (eirp) to field

strength:  $E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m}$ , where P is the eirp (Watts).

2. According to FCC 16-24, all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

#### Test Configuration

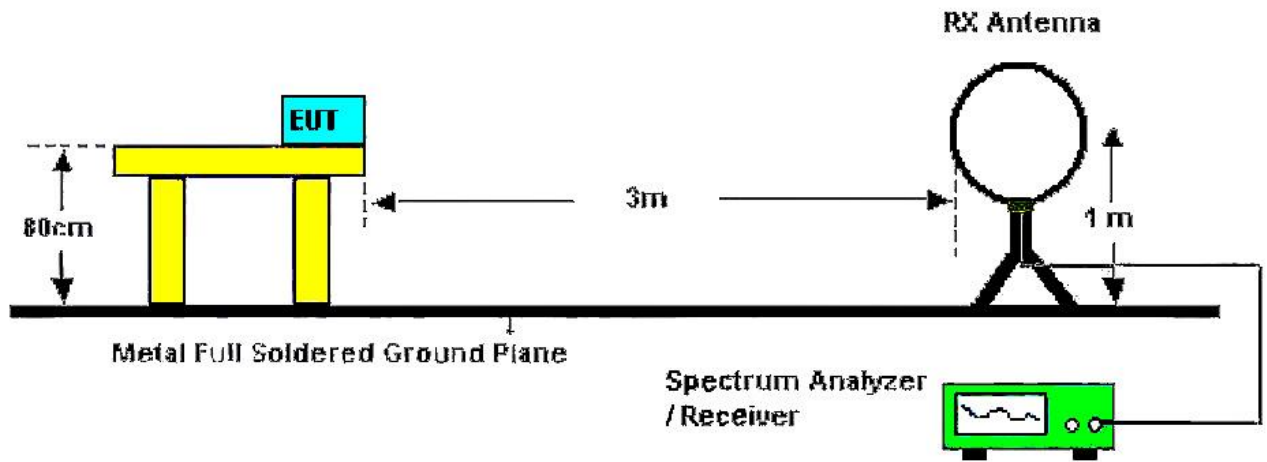
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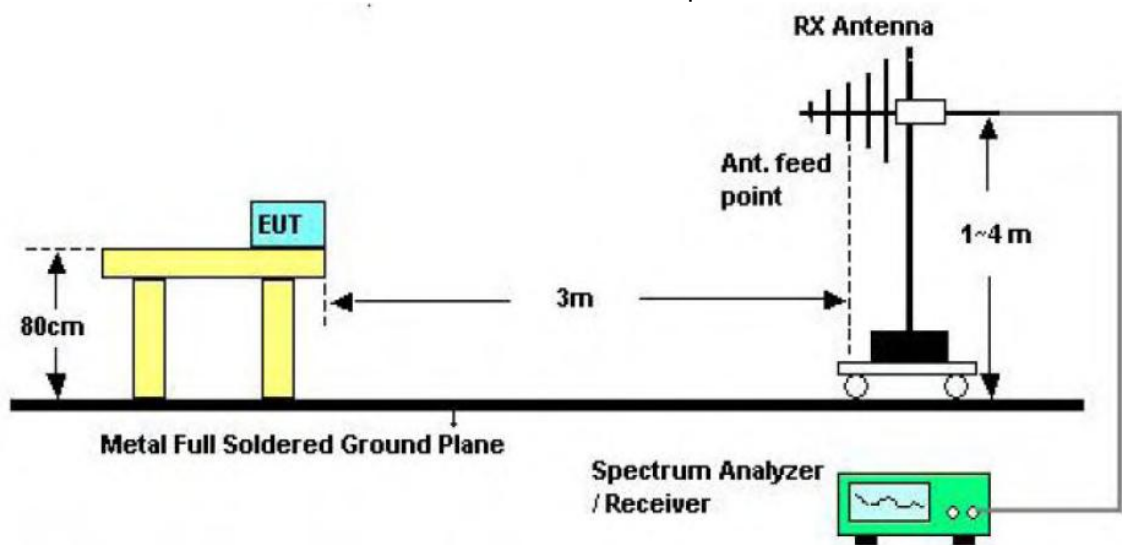
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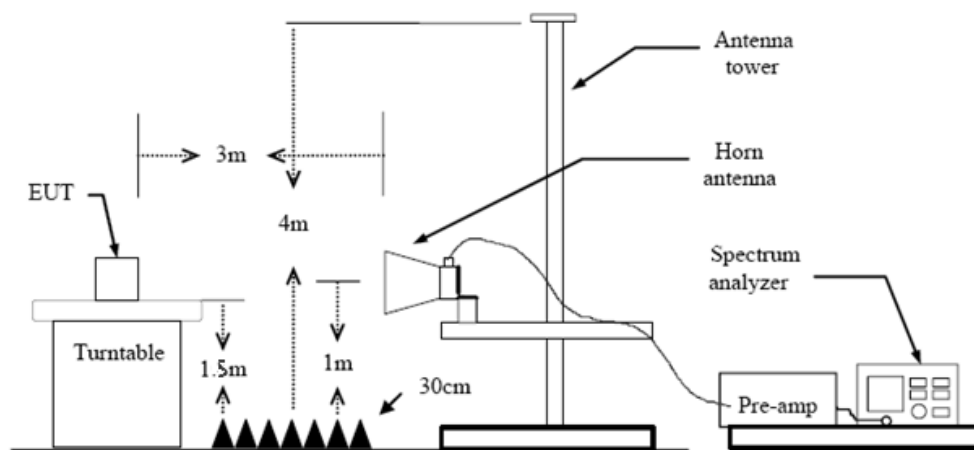




Below 30MHz Test Setup



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 holdIf 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 40 GHz:  
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 Duty Cycle.

## **Test Mode**

Please refer to the clause 2.4.

## **Test Result**

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

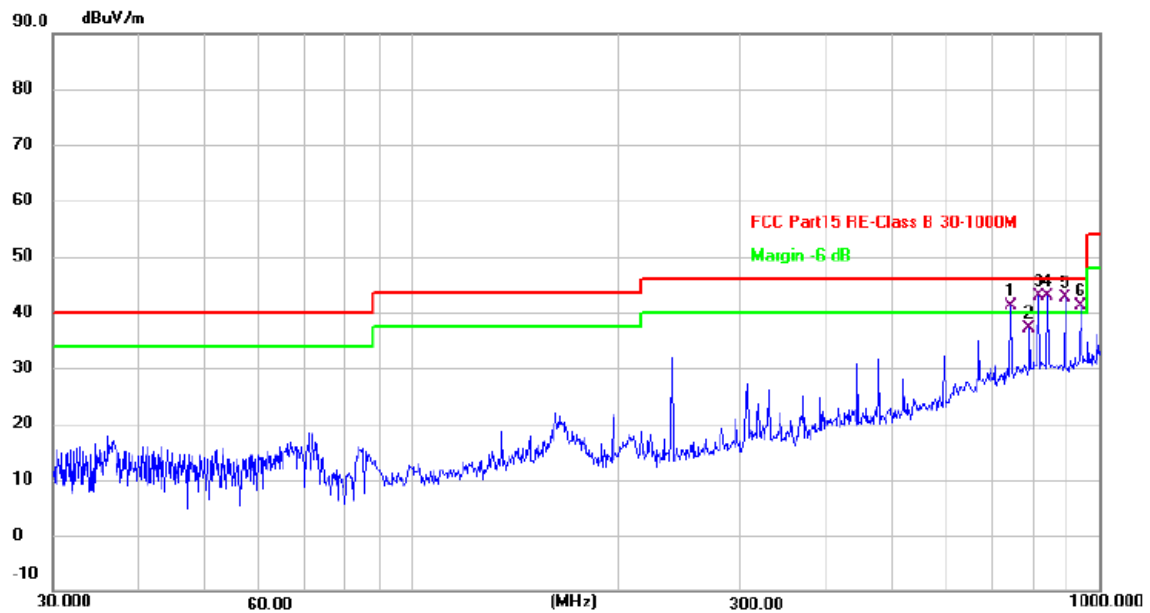
From 9 kHz to 30 MHz: The conclusion is PASS.

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. Pol.	Horizontal
Test Mode:	TX 802.11a Mode 5180MHz (U-NII-1)
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 !	742.2586	46.05	-4.81	41.24	46.00	-4.76	QP
2	790.6186	40.67	-3.45	37.22	46.00	-8.78	QP
3 *	815.9678	46.15	-3.15	43.00	46.00	-3.00	QP
4 !	839.1817	45.95	-3.04	42.91	46.00	-3.09	QP
5 !	890.7277	45.20	-2.55	42.65	46.00	-3.35	QP
6 !	938.8325	42.74	-1.57	41.17	46.00	-4.83	QP

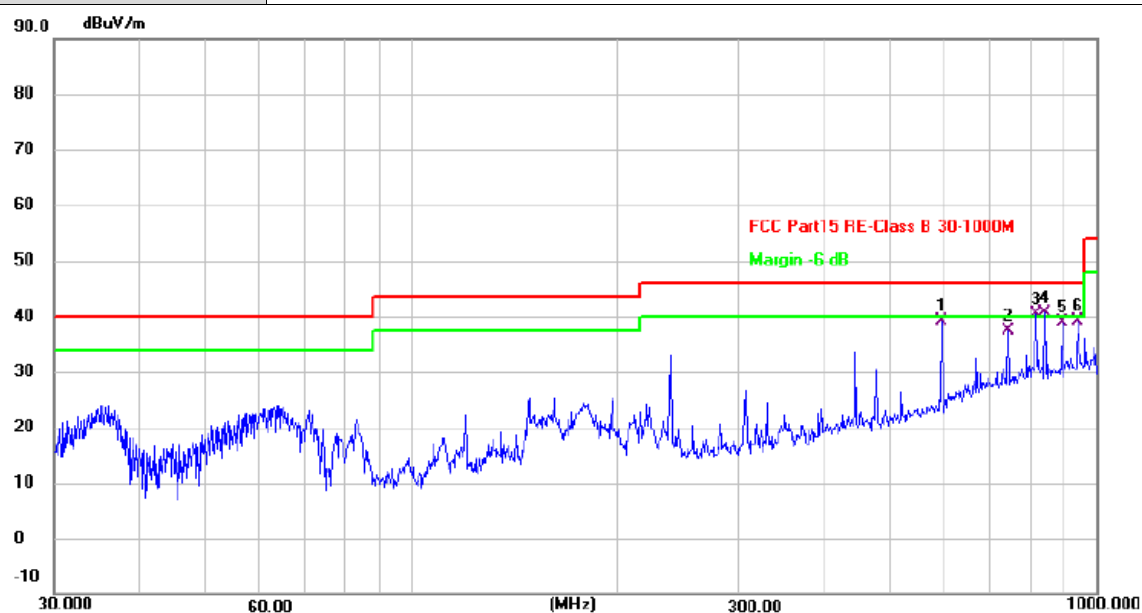
## Remarks:

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:	TX 802.11a Mode 5180MHz (U-NII-1)
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	593.0496	47.09	-8.05	39.04	46.00	-6.96	QP
2	742.2587	42.12	-4.82	37.30	46.00	-8.70	QP
3 !	815.9678	43.47	-3.15	40.32	46.00	-5.68	QP
4 *	839.1816	43.62	-3.04	40.58	46.00	-5.42	QP
5	890.7277	41.48	-2.55	38.93	46.00	-7.07	QP
6	938.8326	40.81	-1.57	39.24	46.00	-6.76	QP

## Remarks:

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

2. Margin value = Level - Limit value



## Above 1GHz

Ant. Pol.	Horizontal						
Test Mode:	TX 802.11a Mode 5180MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11a Mode 5180MHz (U-NII-1)
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	10359.916	39.05	13.75	52.80	74.00	-21.20	peak
2 *	10360.243	25.88	13.75	39.63	54.00	-14.37	AVG

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11a Mode 5200MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11a Mode 5200MHz (U-NII-1)
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	10399.961	39.71	13.79	53.50	74.00	-20.50	peak
2 *	10400.321	25.25	13.79	39.04	54.00	-14.96	AVG

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11a Mode 5240MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11a Mode 5240MHz (U-NII-1)
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 *	10480.139	26.15	13.87	40.02	54.00	-13.98	AVG
2	10480.242	39.74	13.87	53.61	74.00	-20.39	peak

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT20) Mode 5180MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX 802.11n(HT20) Mode 5180MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						





Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT20) Mode 5200MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

<b>Ant. Pol.</b>	Vertical
<b>Test Mode:</b>	TX 802.11n(HT20) Mode 5200MHz (U-NII-1)
<b>Remark:</b>	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	10400.311	40.04	13.79	53.83	74.00	-20.17	peak
2 *	10400.317	26.42	13.79	40.21	54.00	-13.79	AVG

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT20) Mode 5240MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX 802.11n(HT20) Mode 5240MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT40) Mode 5190MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX 802.11n(HT40) Mode 5190MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT40) Mode 5230MHz (U-NII-1)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT40) Mode 5230MHz (U-NII-1)
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	10459.964	39.56	13.85	53.41	74.00	-20.59	peak
2 *	10460.215	25.91	13.85	39.76	54.00	-14.24	AVG

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11a Mode 5745MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						
</							

Ant. Pol.	Vertical
Test Mode:	TX 802.11a Mode 5745MHz (U-NII-3)
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 *	11489.830	24.68	14.94	39.62	54.00	-14.38	AVG
2	11490.437	39.30	14.95	54.25	74.00	-19.75	peak

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11a Mode 5785MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11a Mode 5785MHz (U-NII-3)
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	11569.695	39.02	15.00	54.02	74.00	-19.98	peak
2 *	11570.032	23.45	15.01	38.46	54.00	-15.54	AVG

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11a Mode 5825MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11a Mode 5825MHz (U-NII-3)
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 *	11649.871	23.89	15.01	38.90	54.00	-15.10	AVG
2	11650.232	39.08	15.03	54.11	74.00	-19.89	peak

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT20) Mode 5745MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 5745MHz (U-NII-3)
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	11489.775	39.55	14.94	54.49	74.00	-19.51	peak
2 *	11489.979	24.48	14.94	39.42	54.00	-14.58	AVG

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





Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT20) Mode 5785MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 5785MHz (U-NII-3)
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	11570.412	39.41	15.01	54.42	74.00	-19.58	peak
2 *	11570.425	24.85	15.01	39.86	54.00	-14.14	AVG

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT20) Mode 5825MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT20) Mode 5825MHz (U-NII-3)
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 *	11649.870	23.73	15.01	38.74	54.00	-15.26	AVG
2	11650.350	39.19	15.03	54.22	74.00	-19.78	peak

Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT40) Mode 5755MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX 802.11n(HT40) Mode 5755MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						



Ant. Pol.	Horizontal						
Test Mode:	TX 802.11n(HT40) Mode 5795MHz (U-NII-3)						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical
Test Mode:	TX 802.11n(HT40) Mode 5795MHz (U-NII-3)
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 *	11589.792	24.17	15.02	39.19	54.00	-14.81	AVG
2	11590.352	39.43	15.03	54.46	74.00	-19.54	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

#### Limit

Limits of unwanted emission out of the restricted bands

FCC CFR Title 47 Part 15 Subpart E Section 15. 407(b) / RSS-247 6.2

Frequency (MHz)	EIRP Limits (dBm)	Equivalent Field Strength at 3m (dBμV/m)
5150~5250	-27	68.2
5250~5350	-27	68.2
5470~5725	-27	68.2
5725~5825	-27 (Note 2)	68.2
	10 (Note 2)	105.2
	15.6 (Note 2)	110.8
	27 (Note 2)	122.2

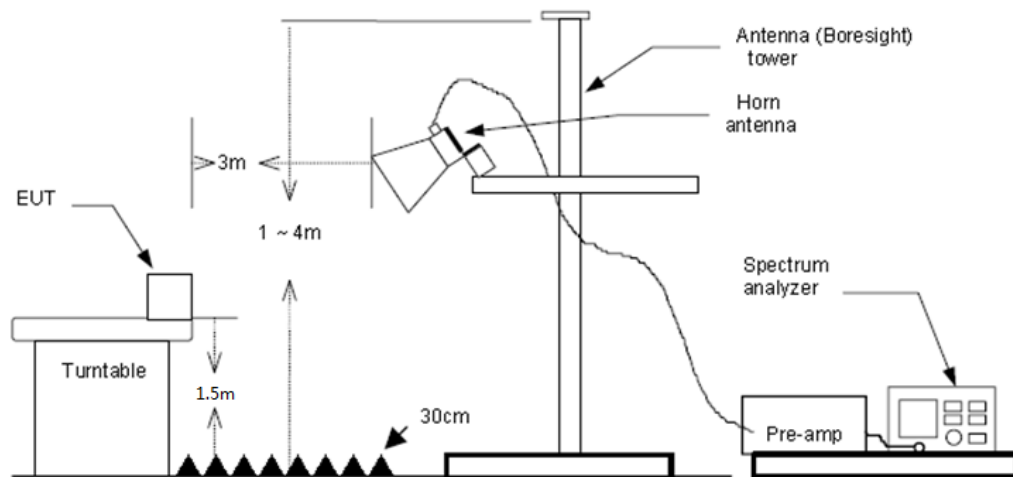
Note:

1. The following formula is used to convert the equipment isotropic radiated power (eirp) to field

strength:  $E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m}$ , where P is the eirp (Watts).

2. According to FCC 16-24, all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

#### 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.

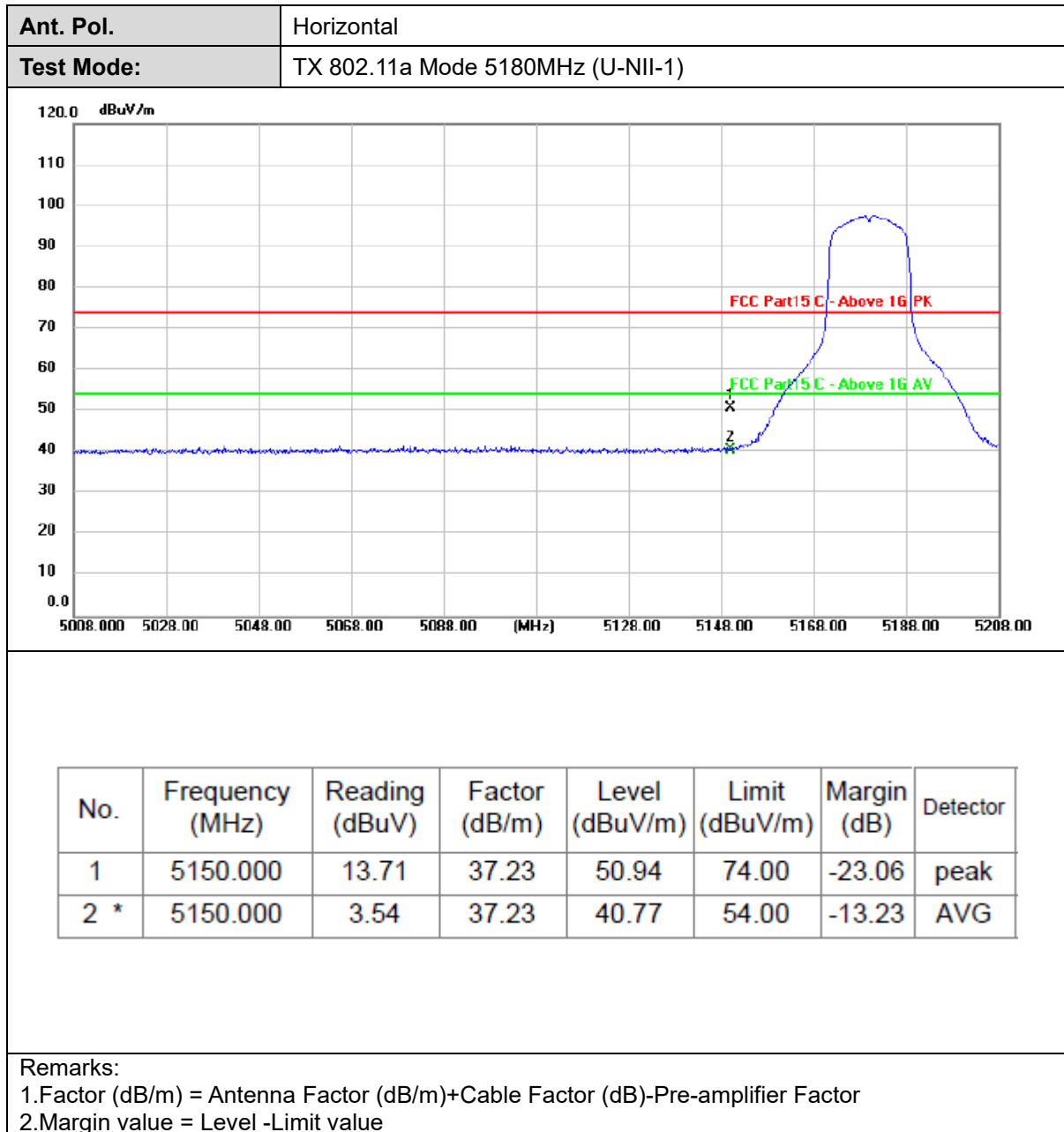
Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause Duty Cycle.

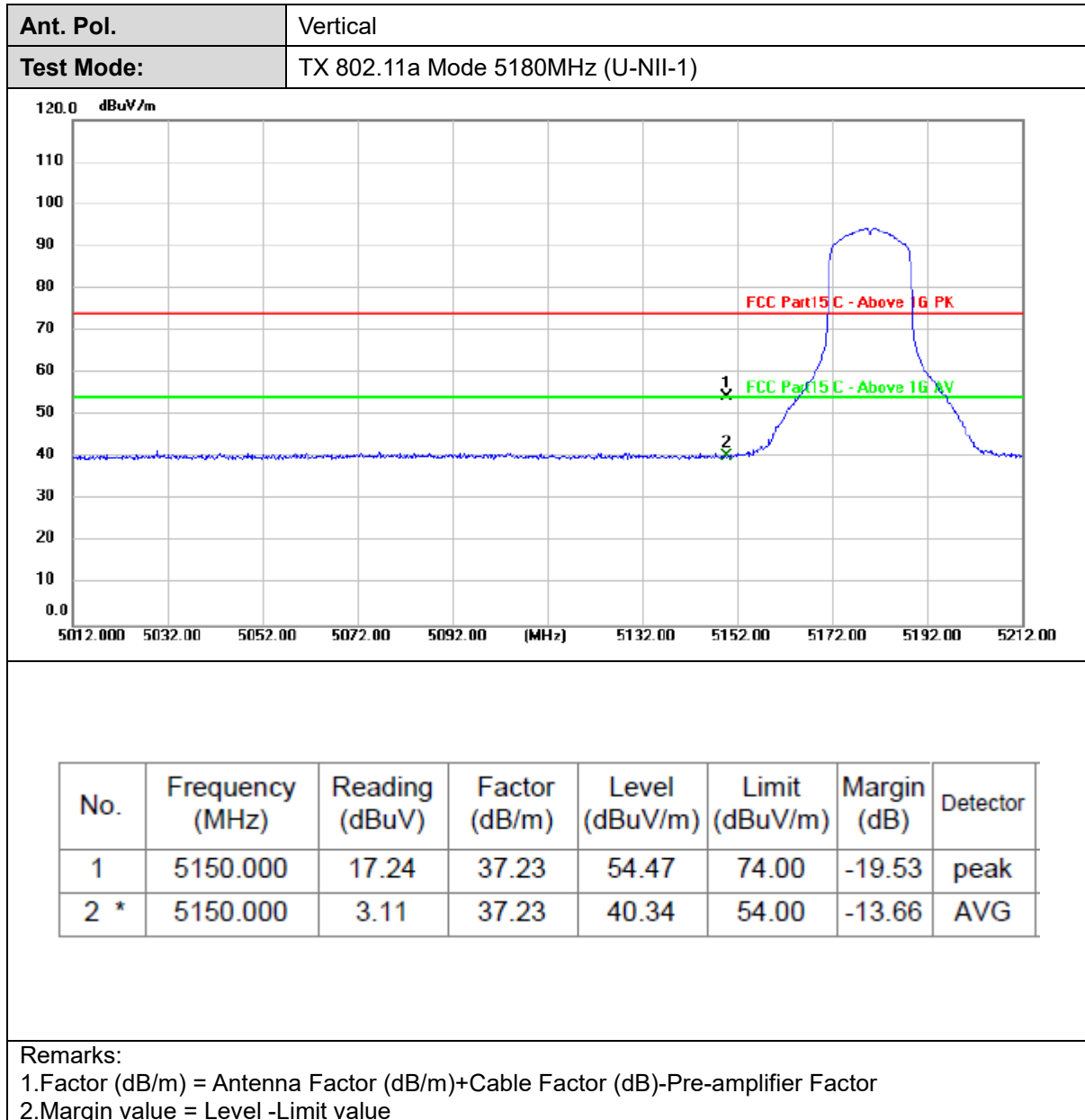
### **Test Mode**

Please refer to the clause 2.4.

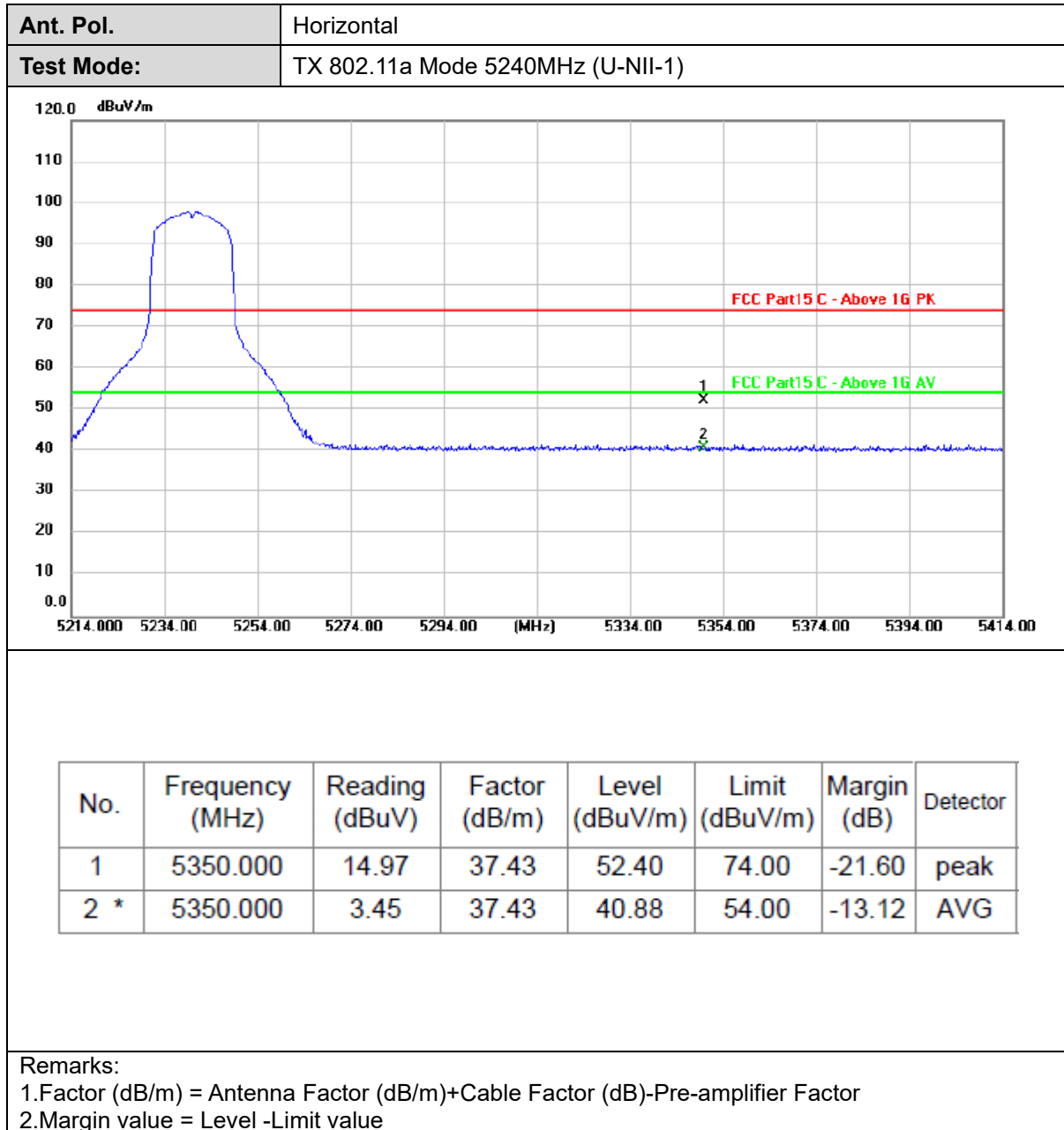
### **Test Result**

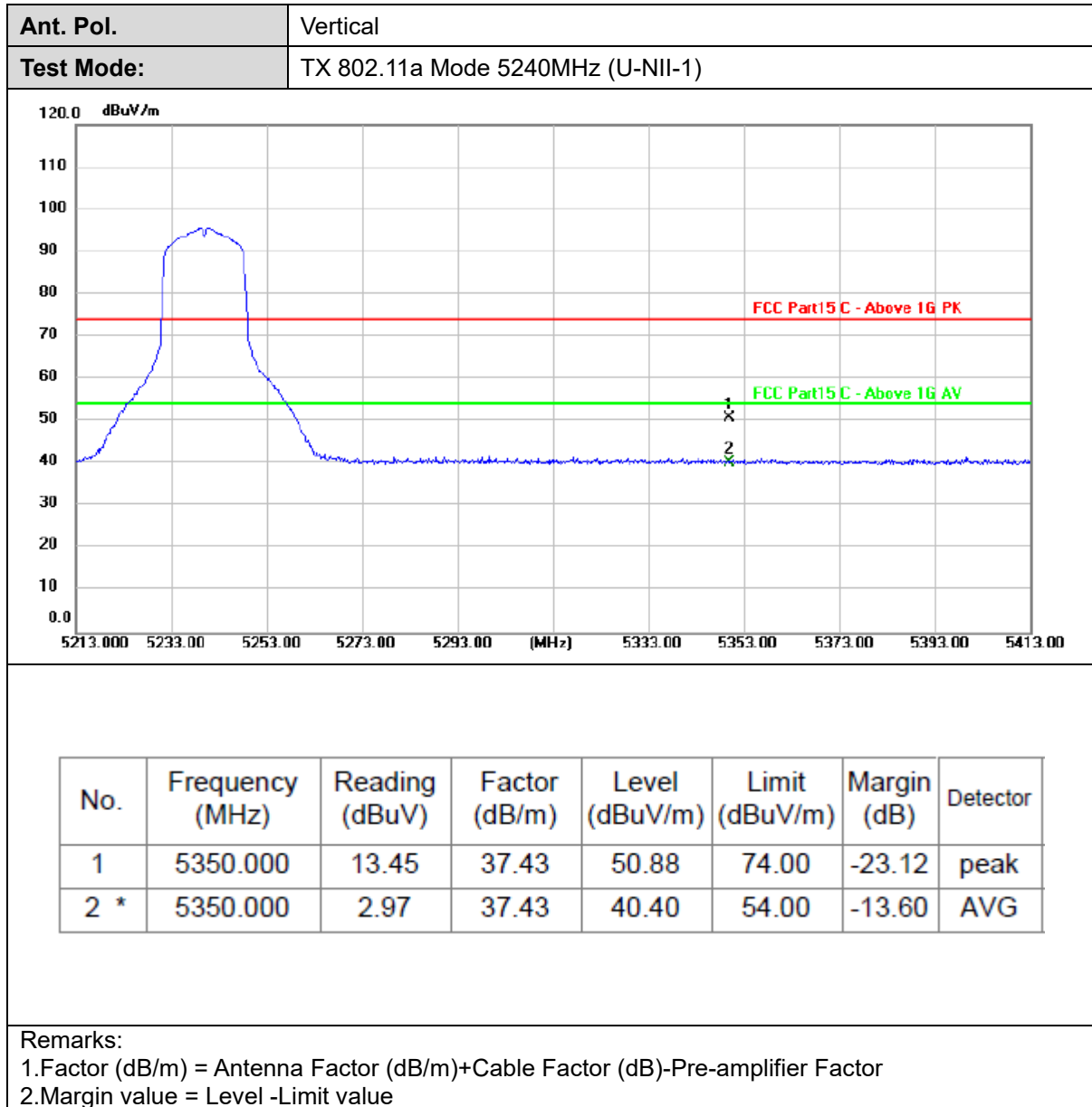
*Note: Pre-scan both 4500-5150MHz, 5350-5460MHz were investigated, report only shows the test data for worst case.*

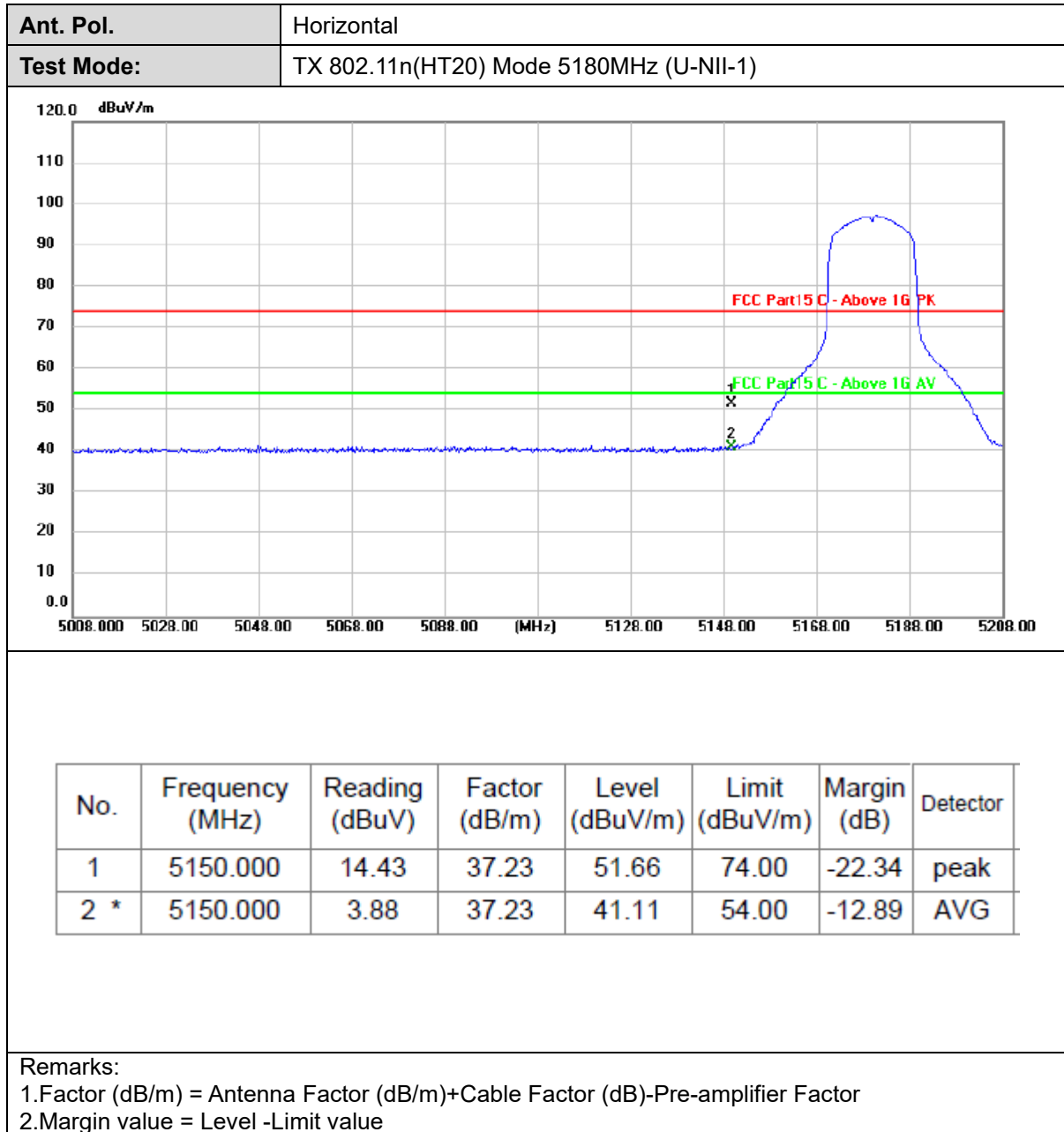


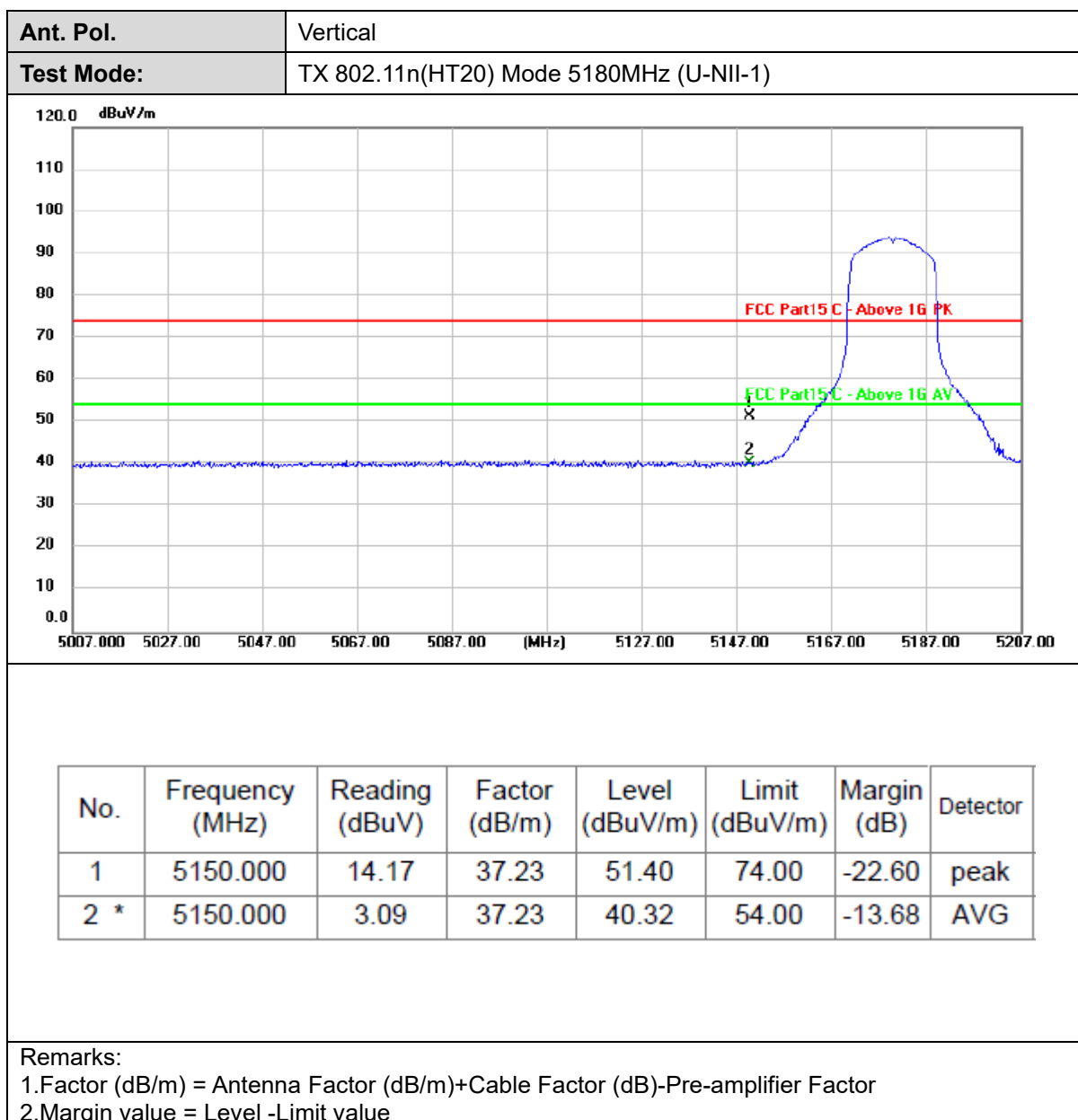


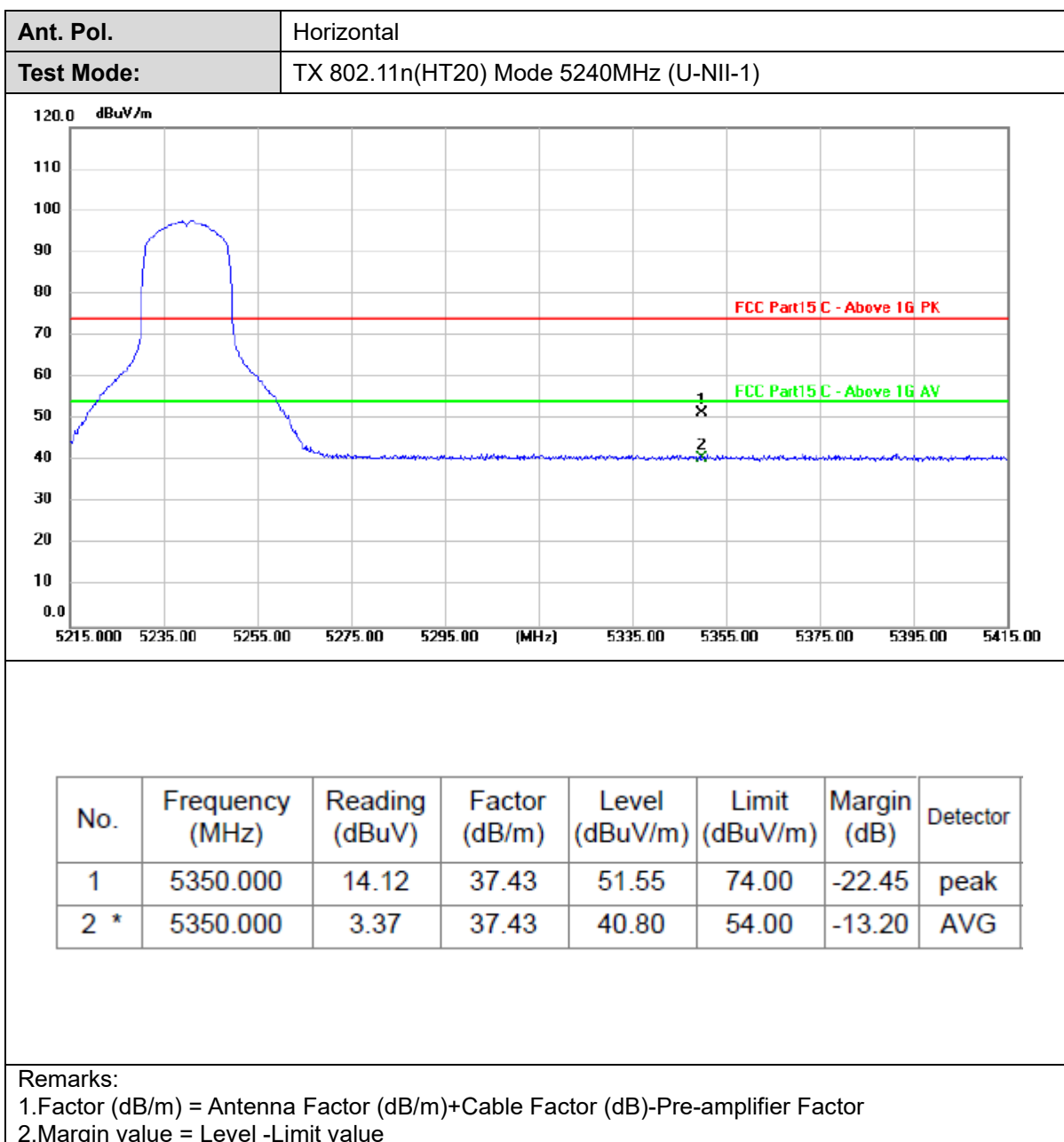


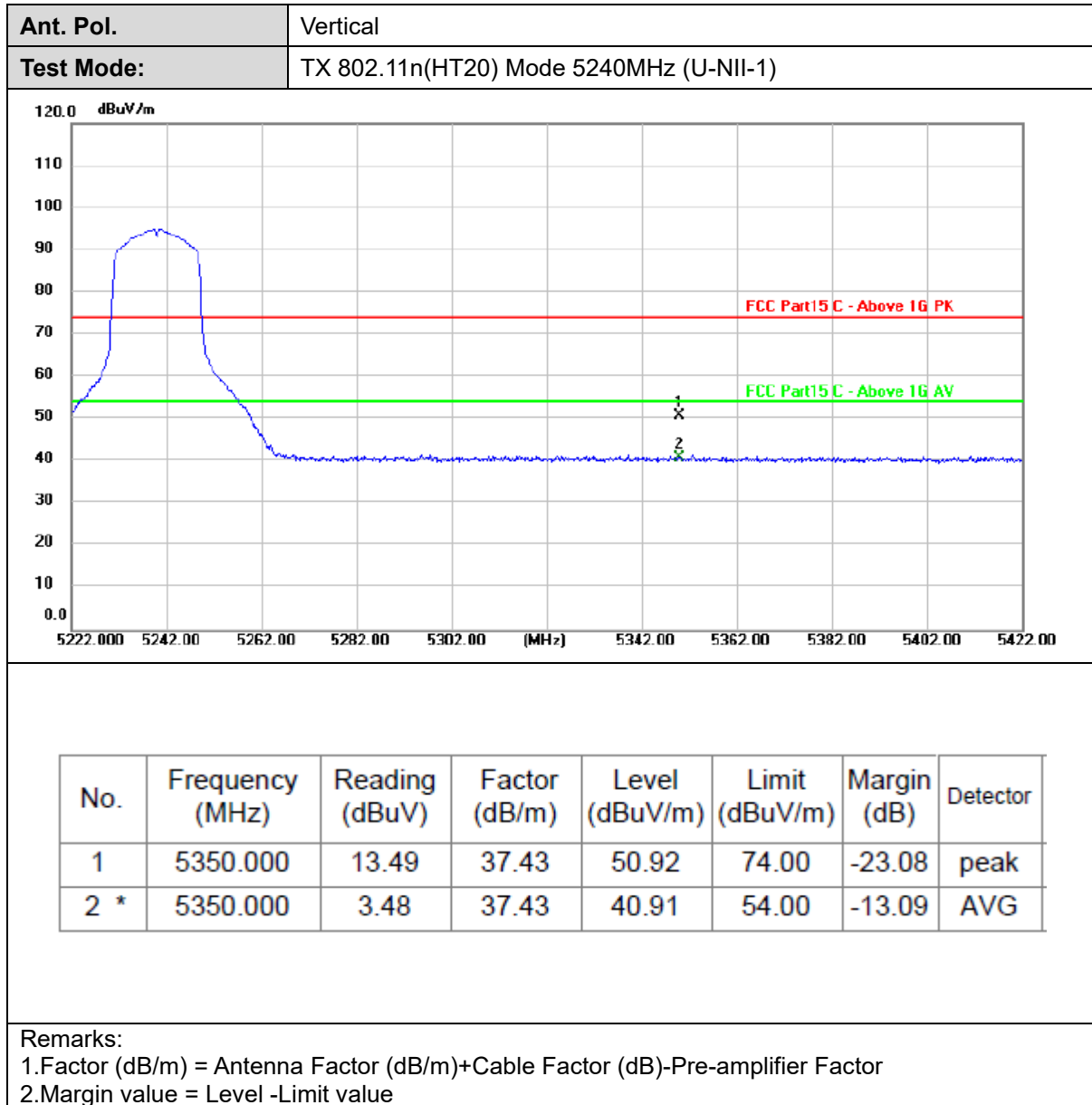


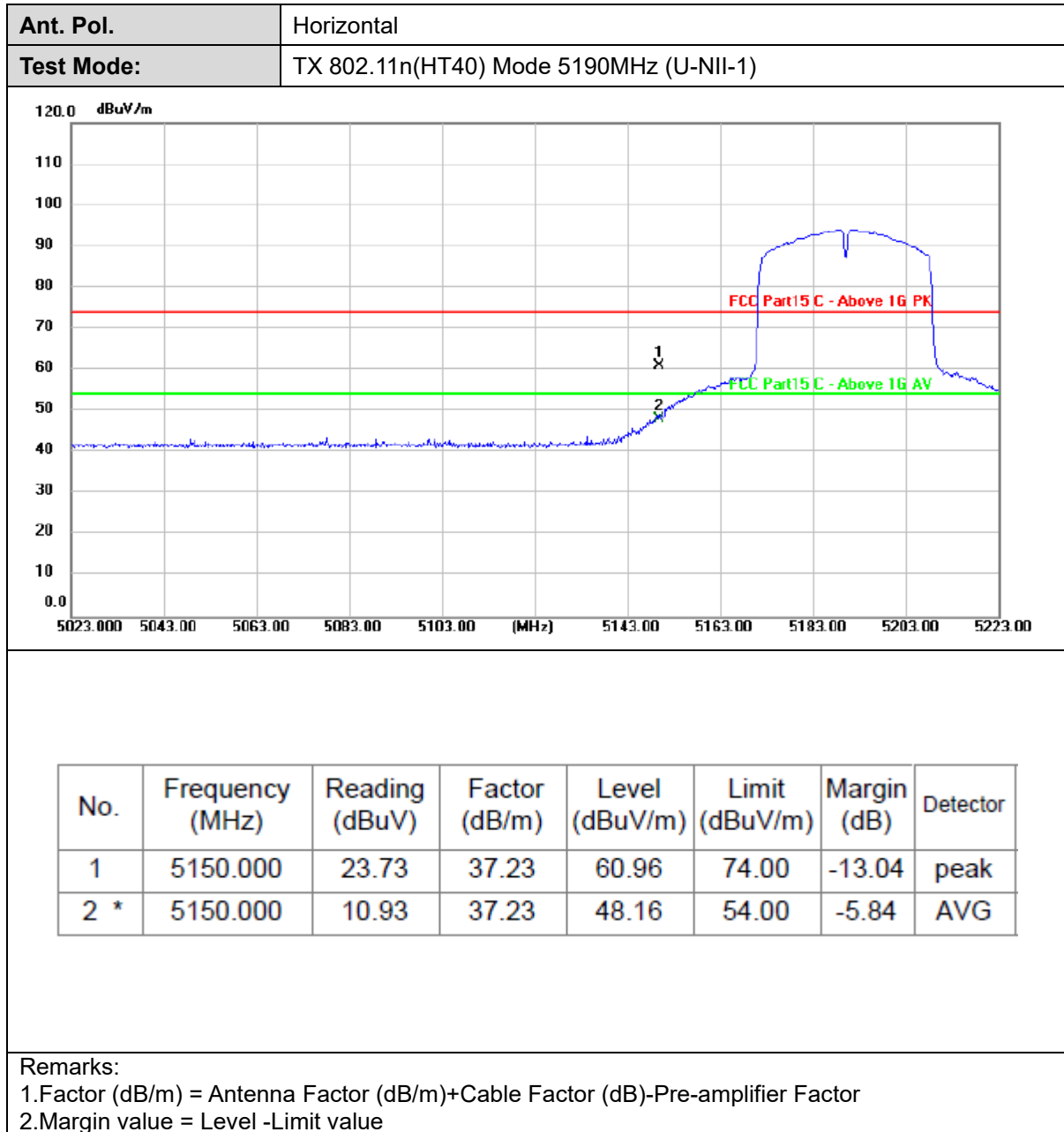


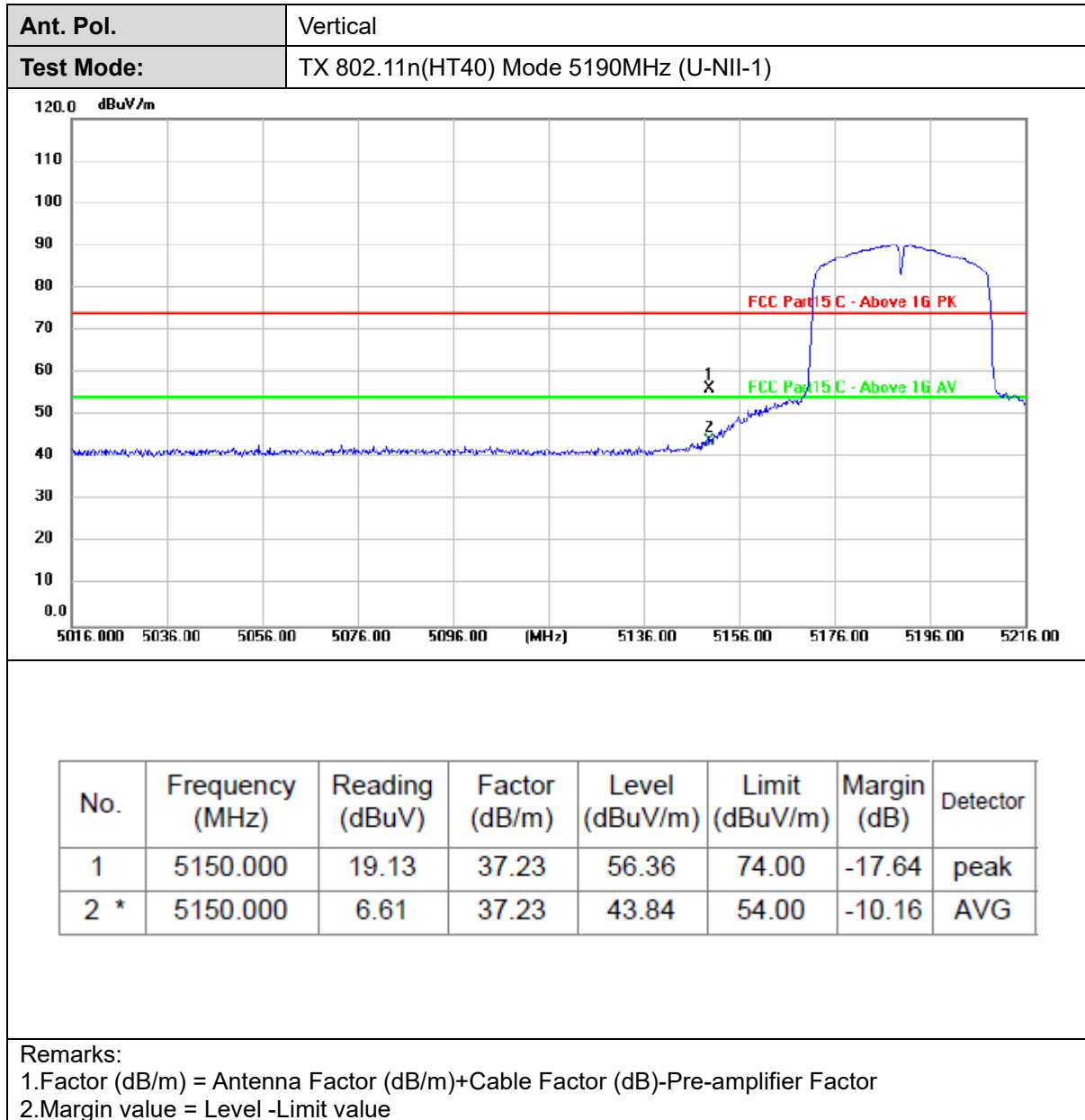




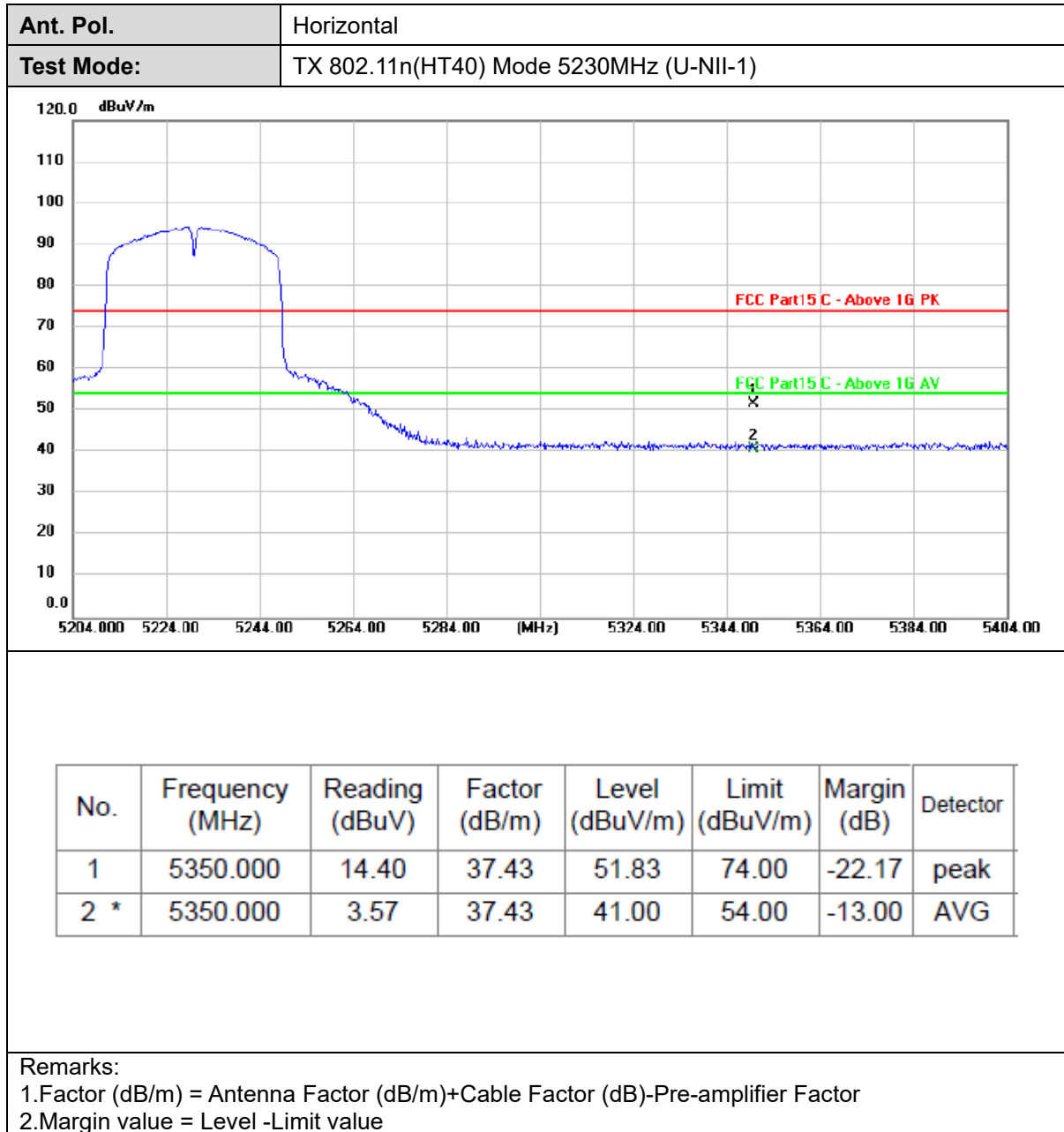


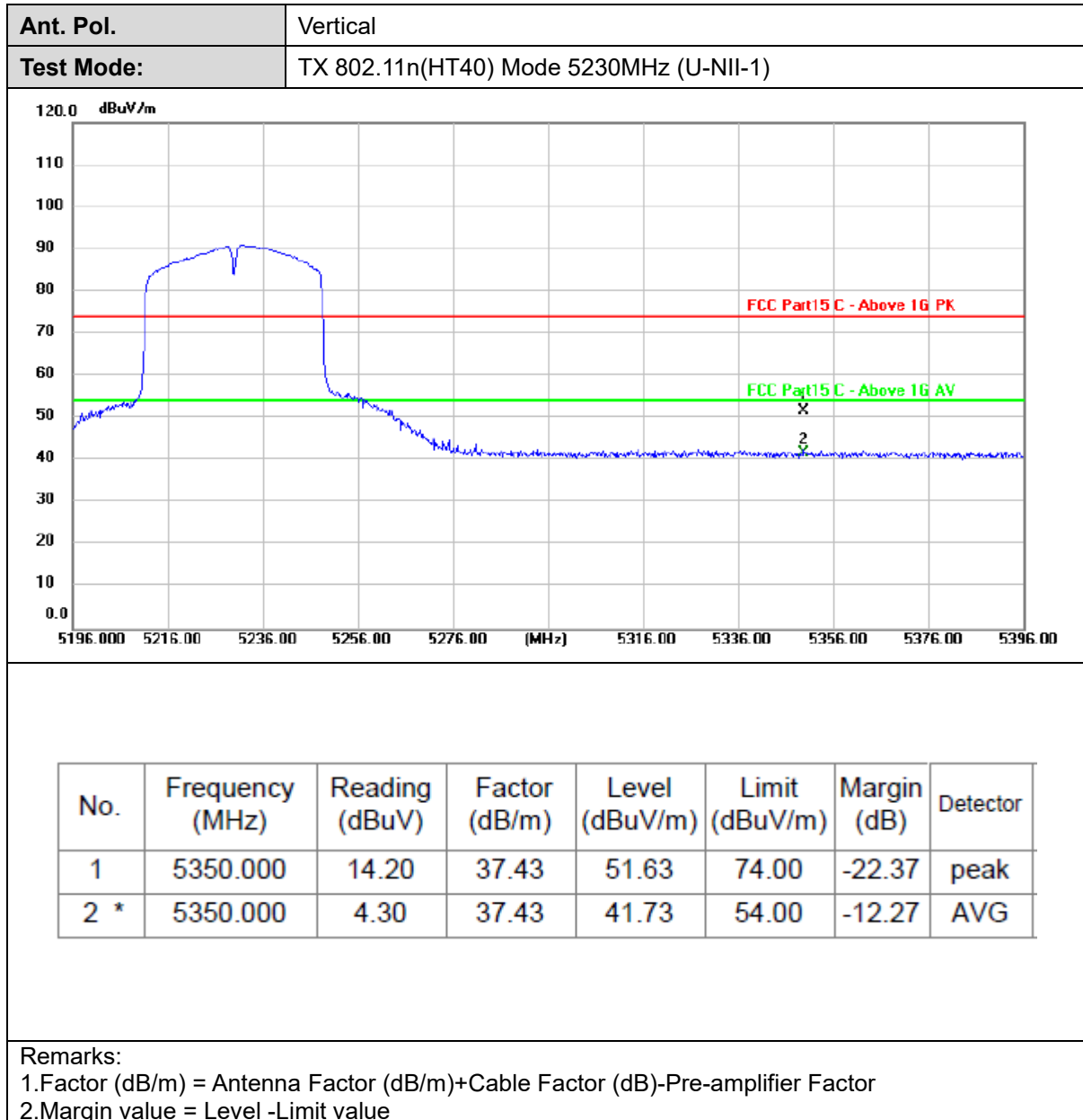


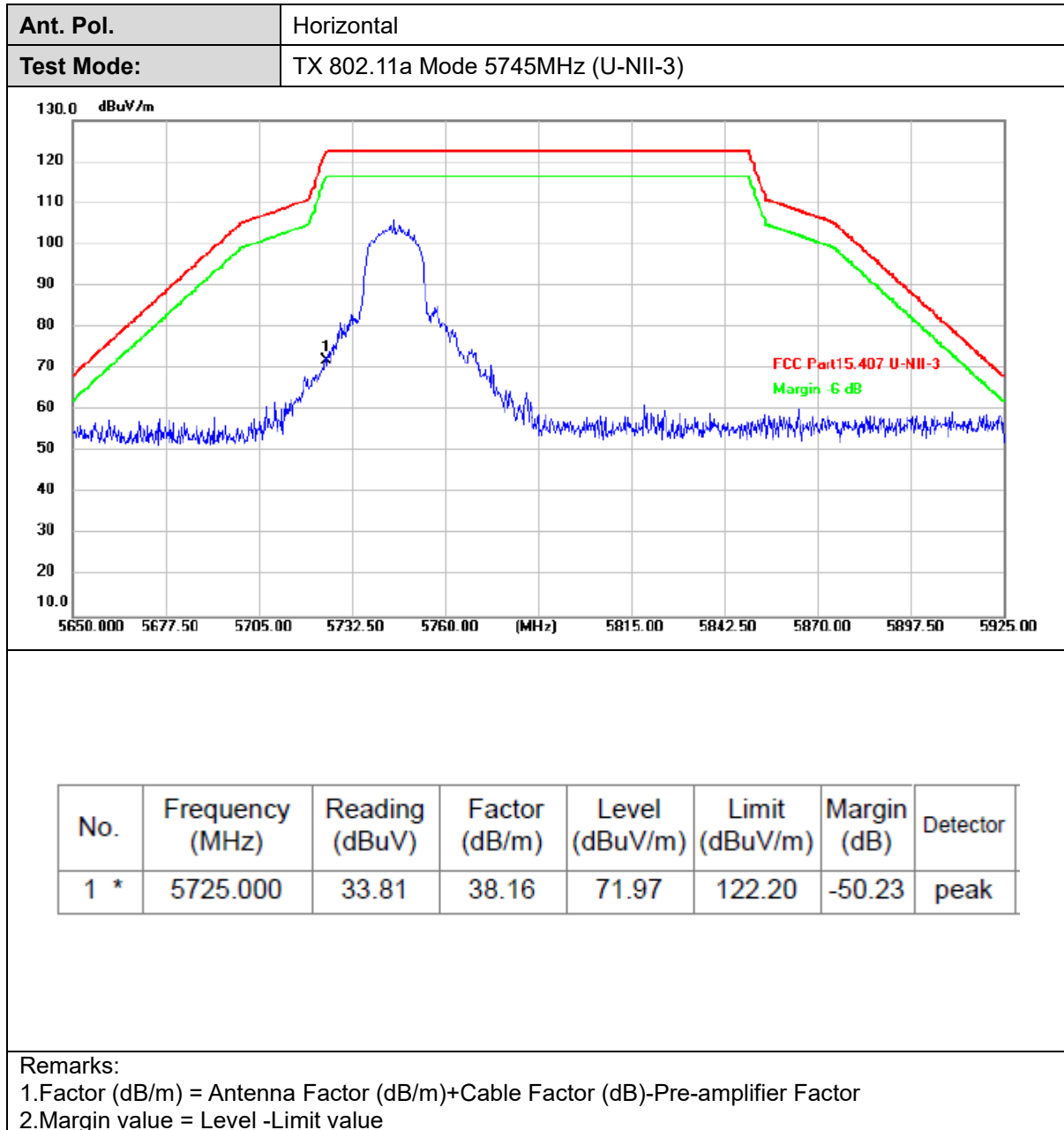


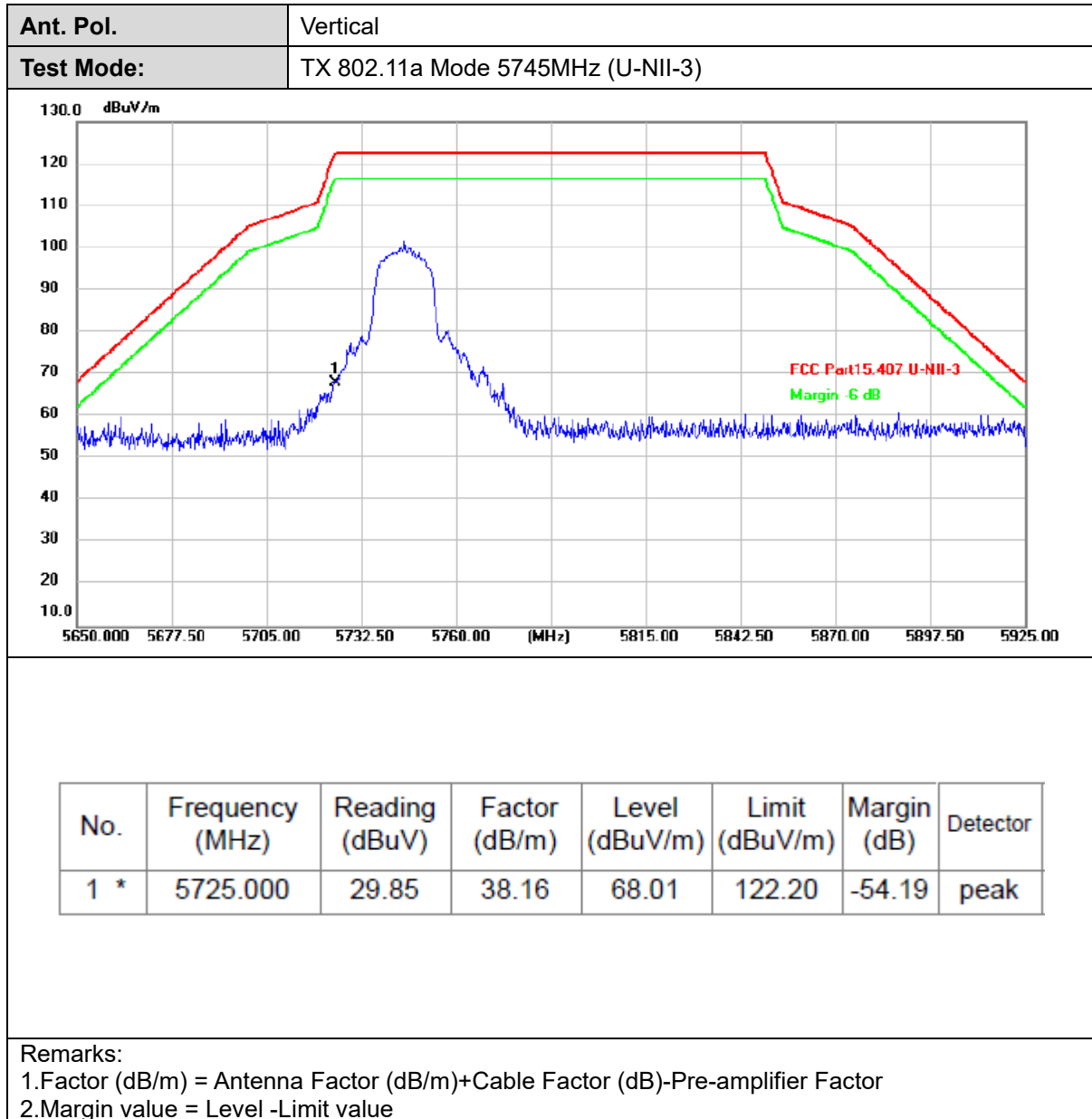


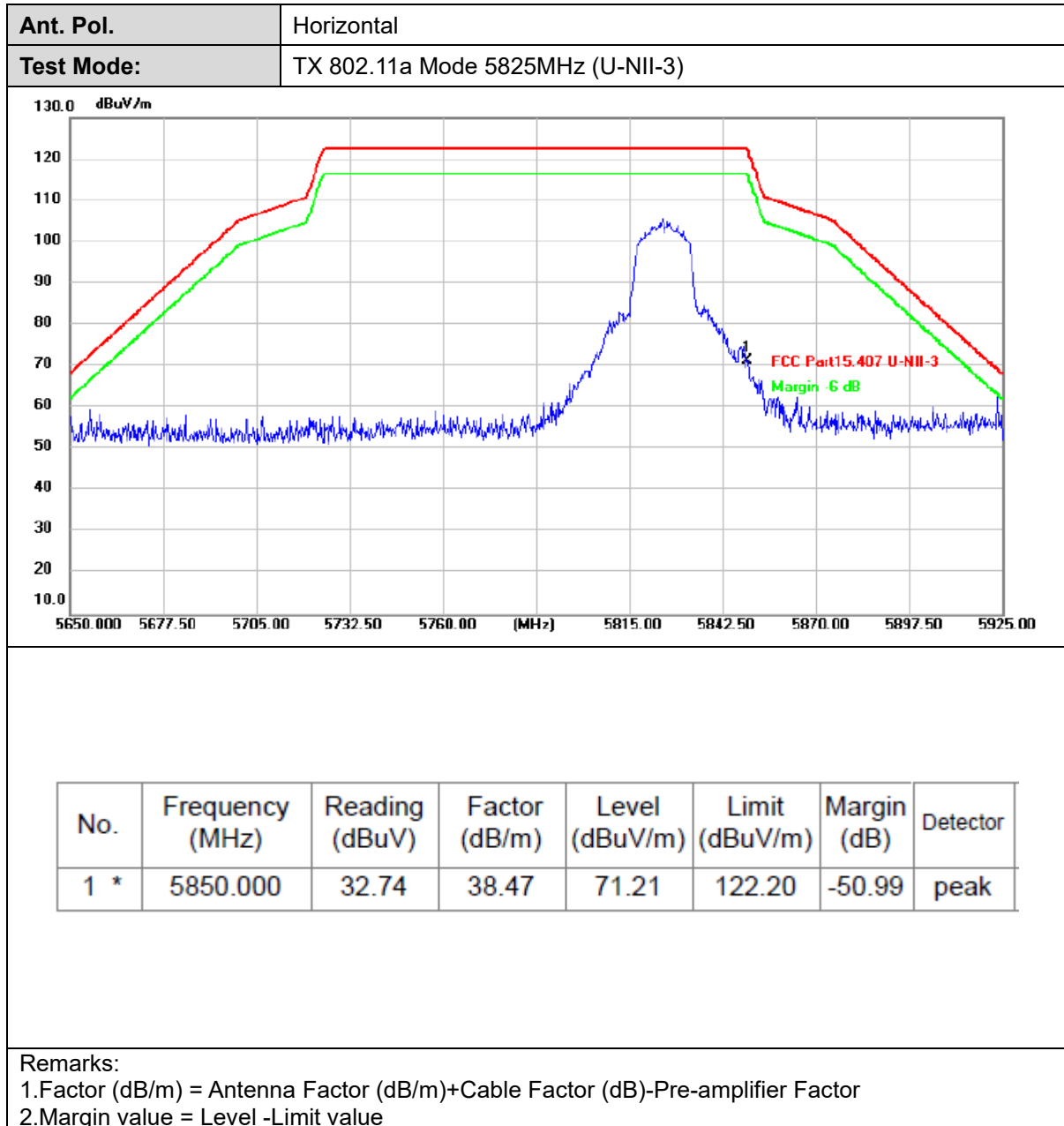


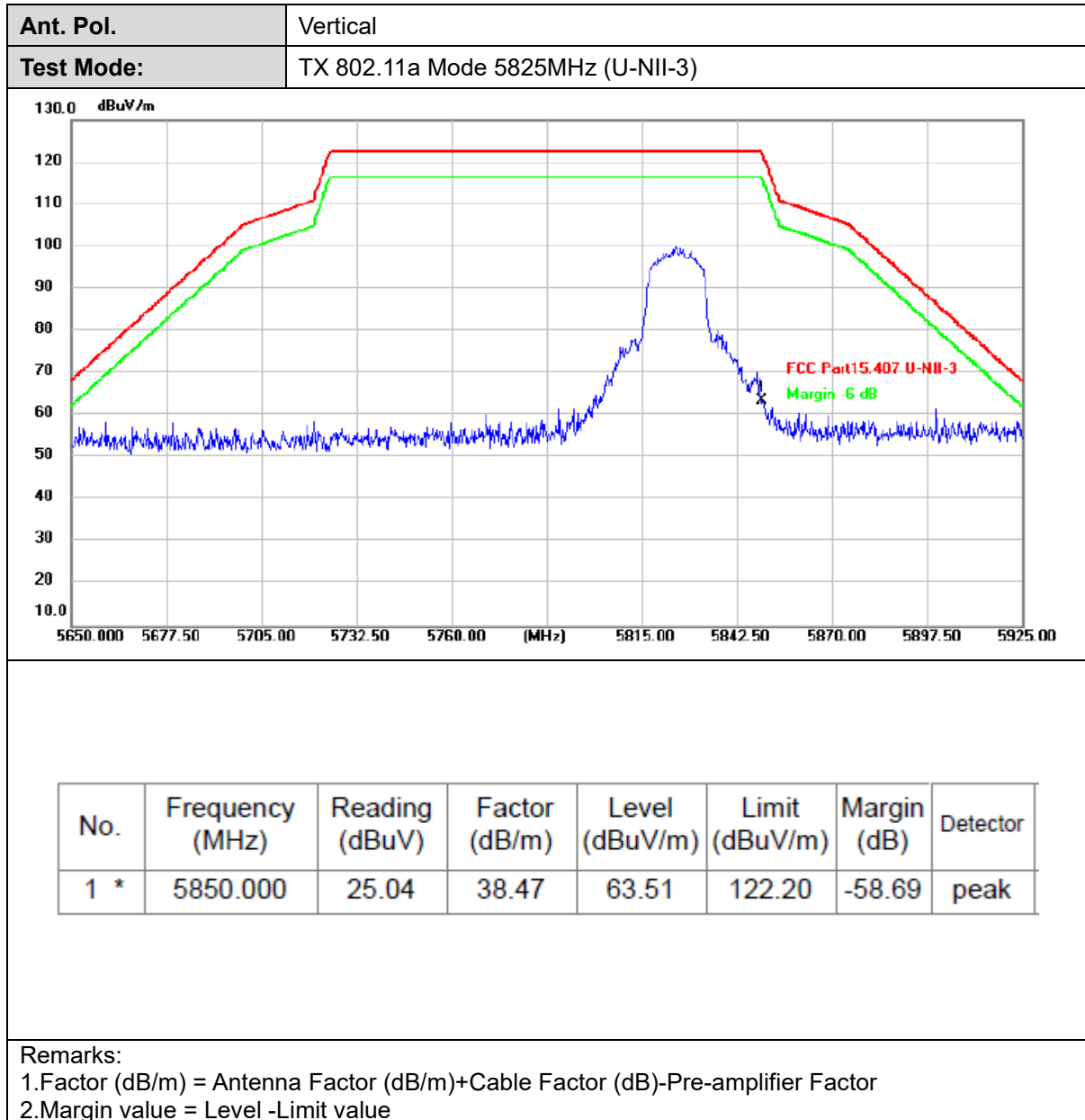


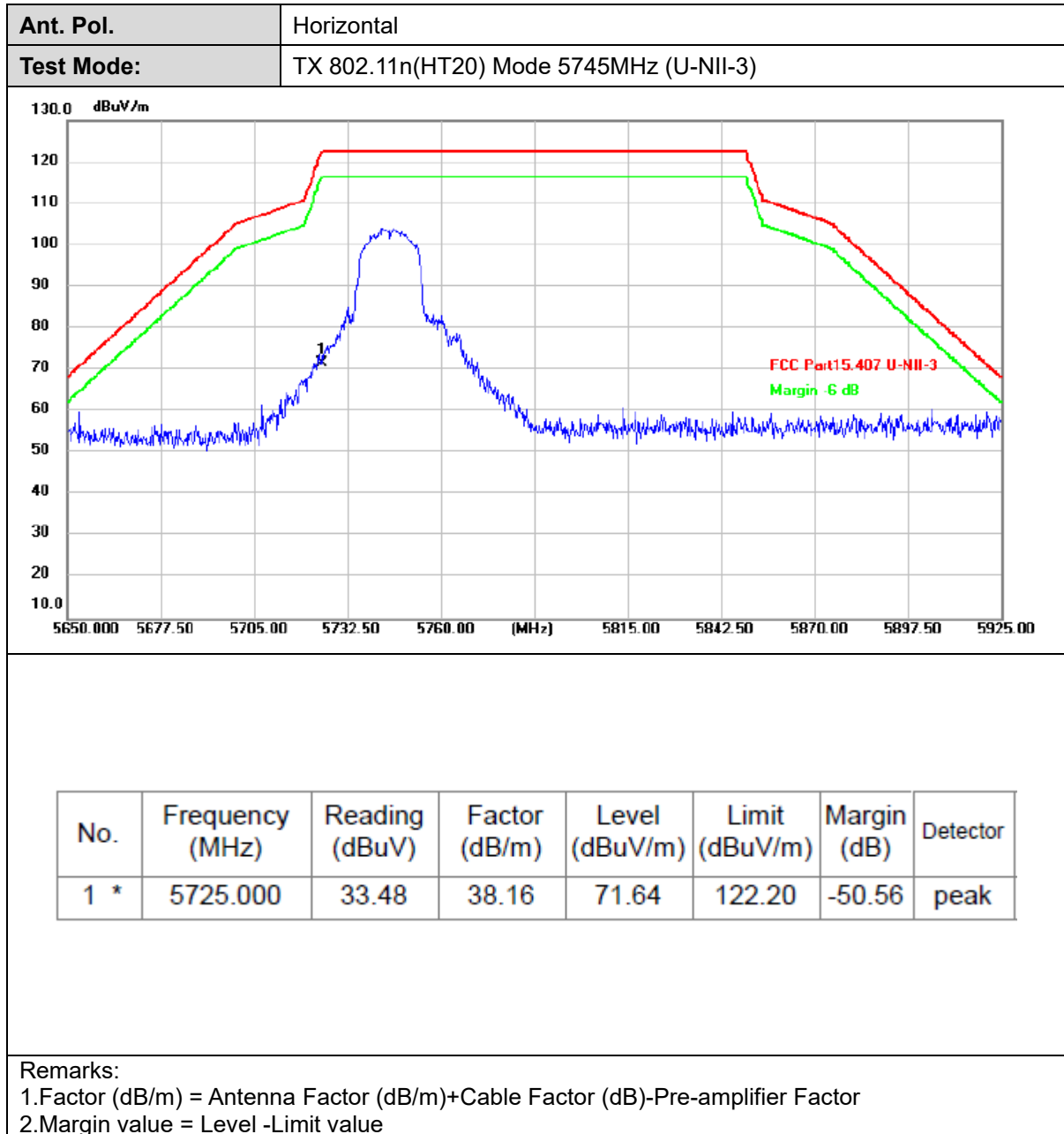


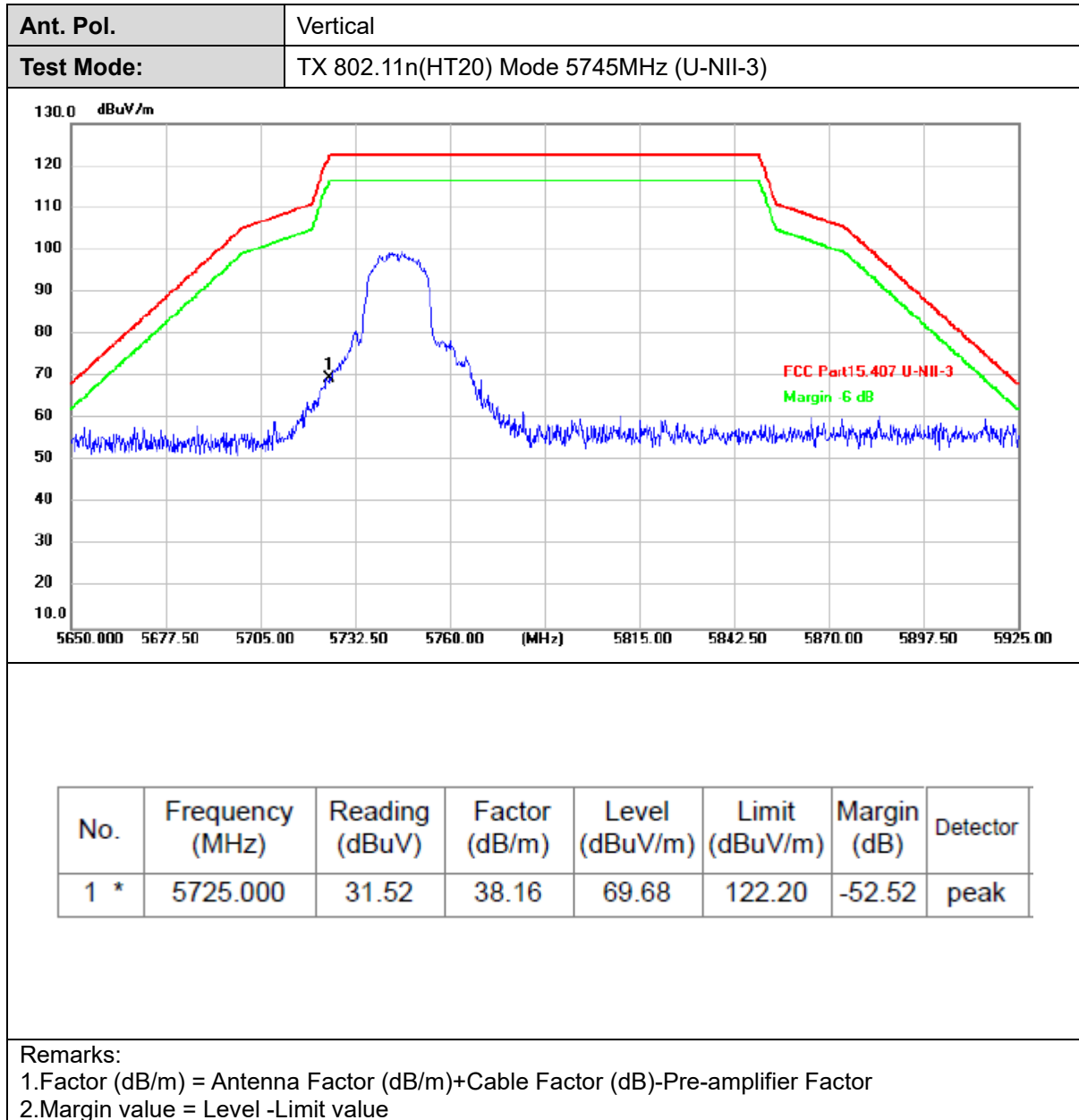




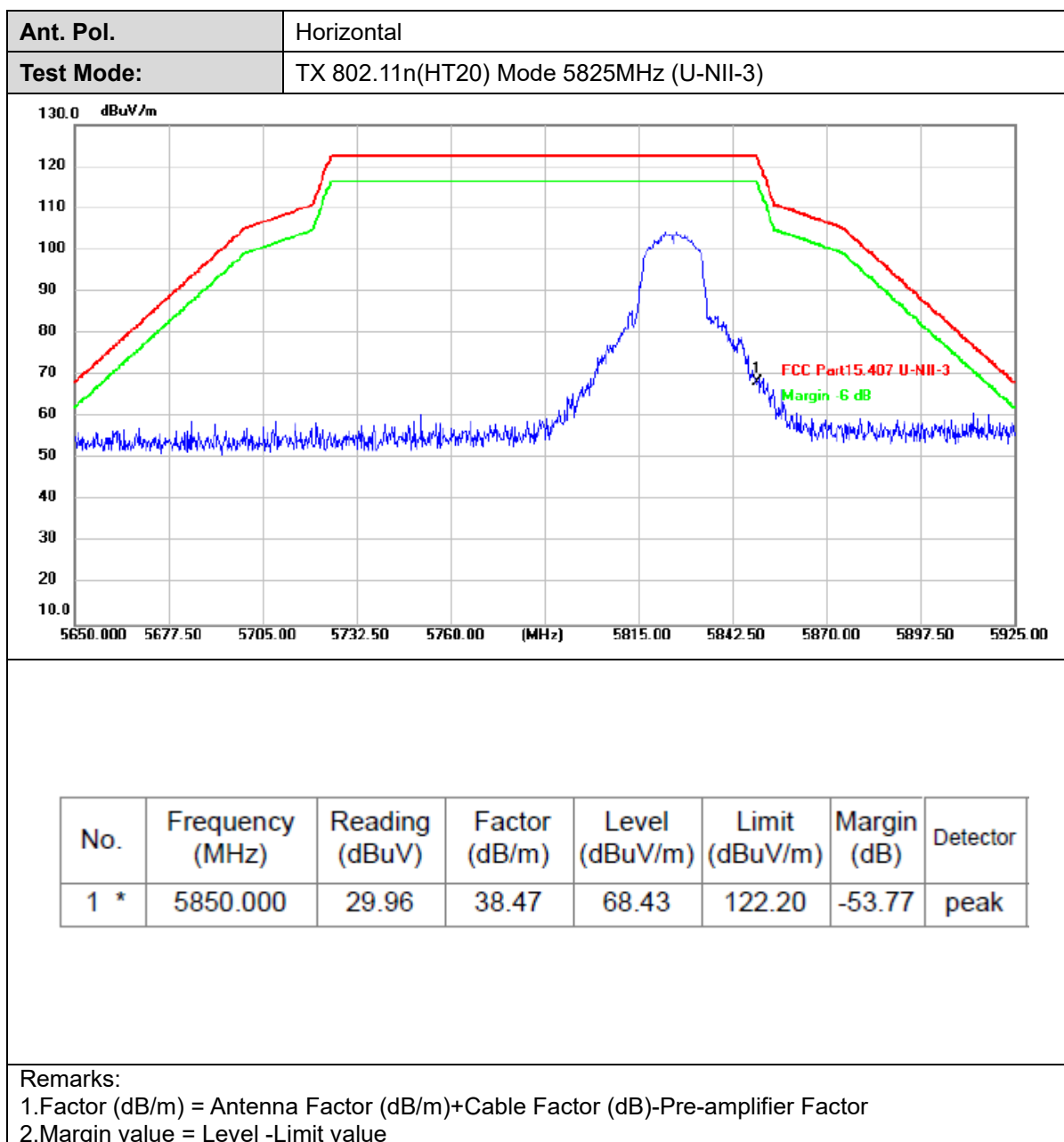


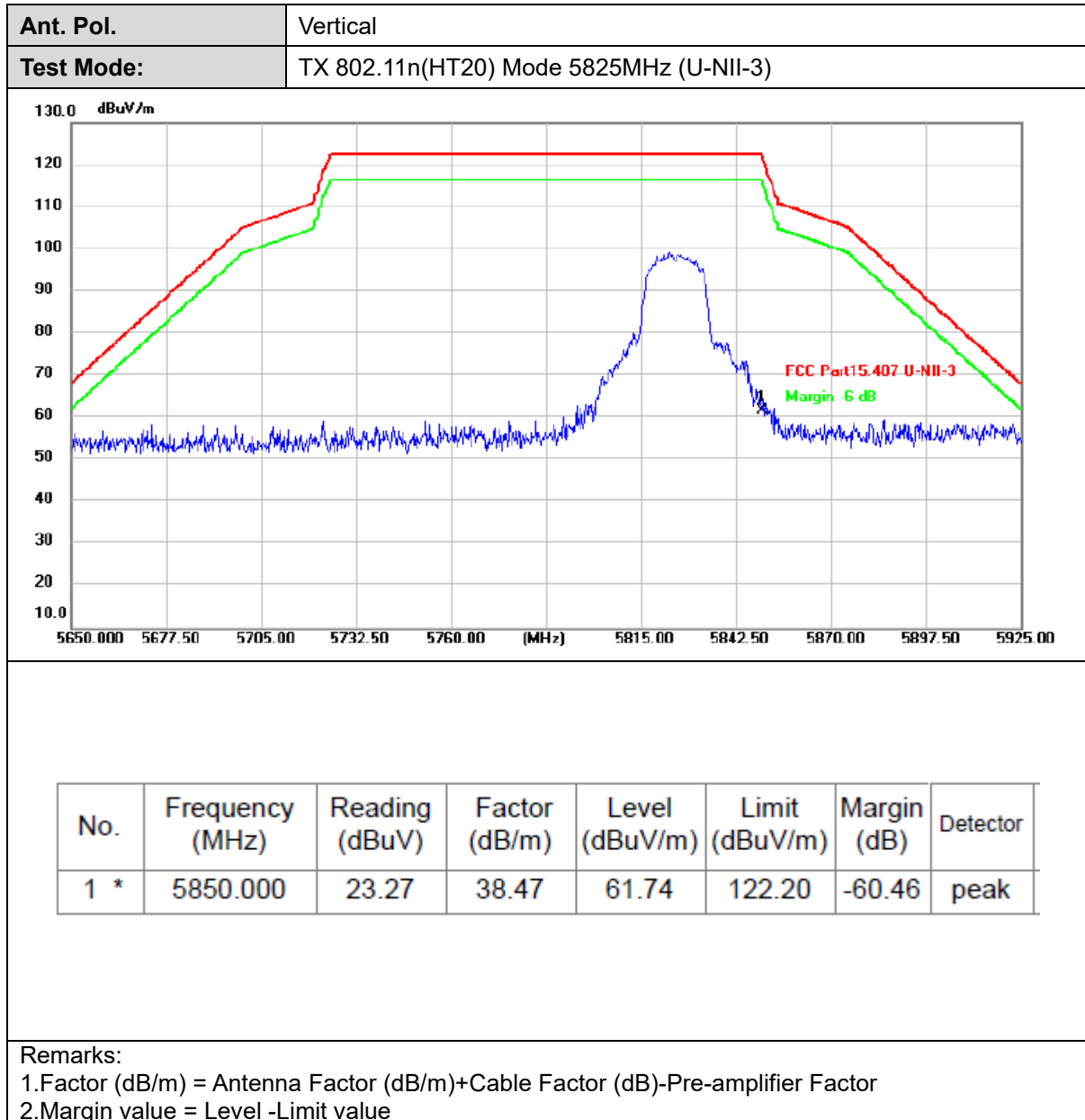


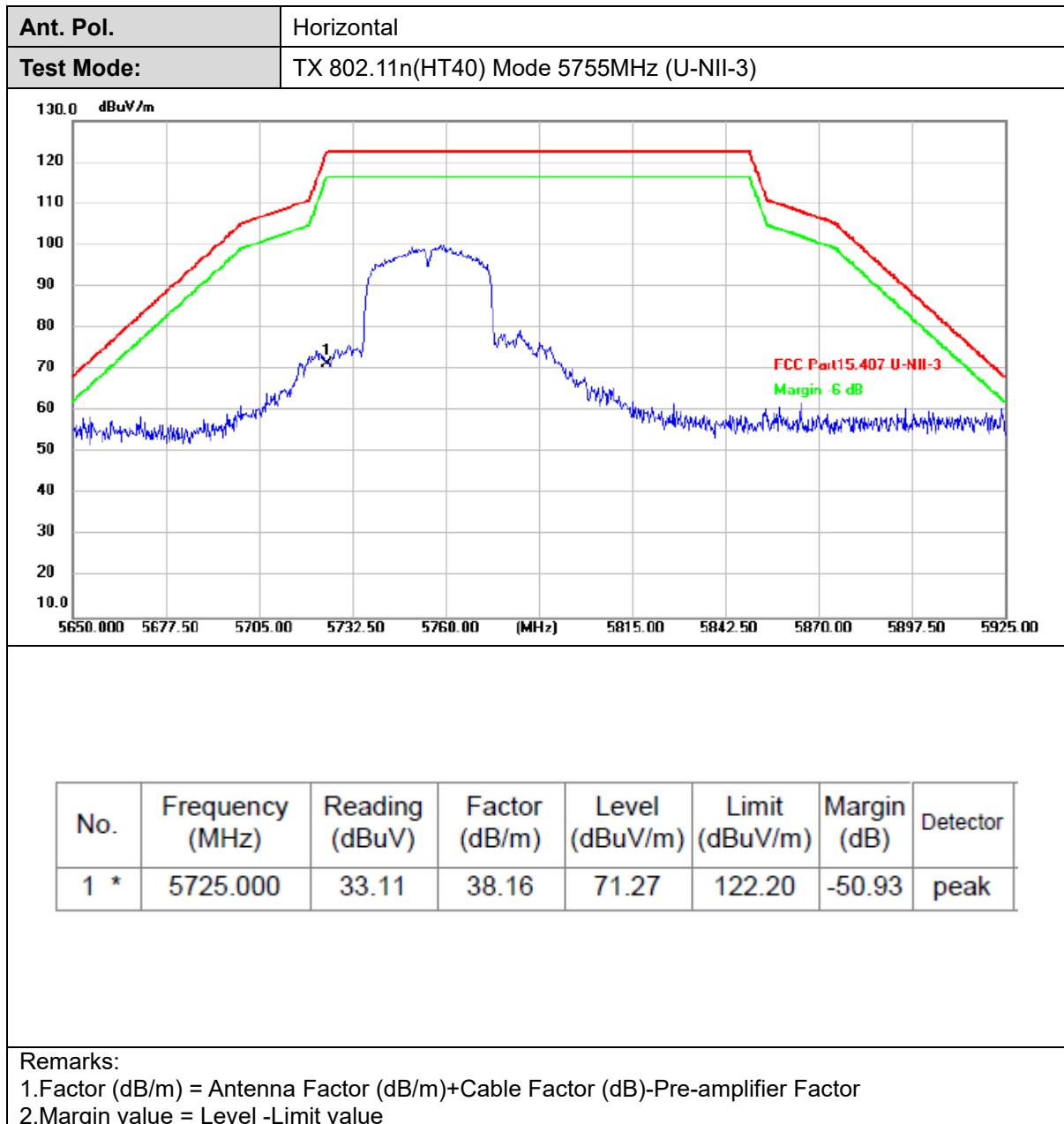


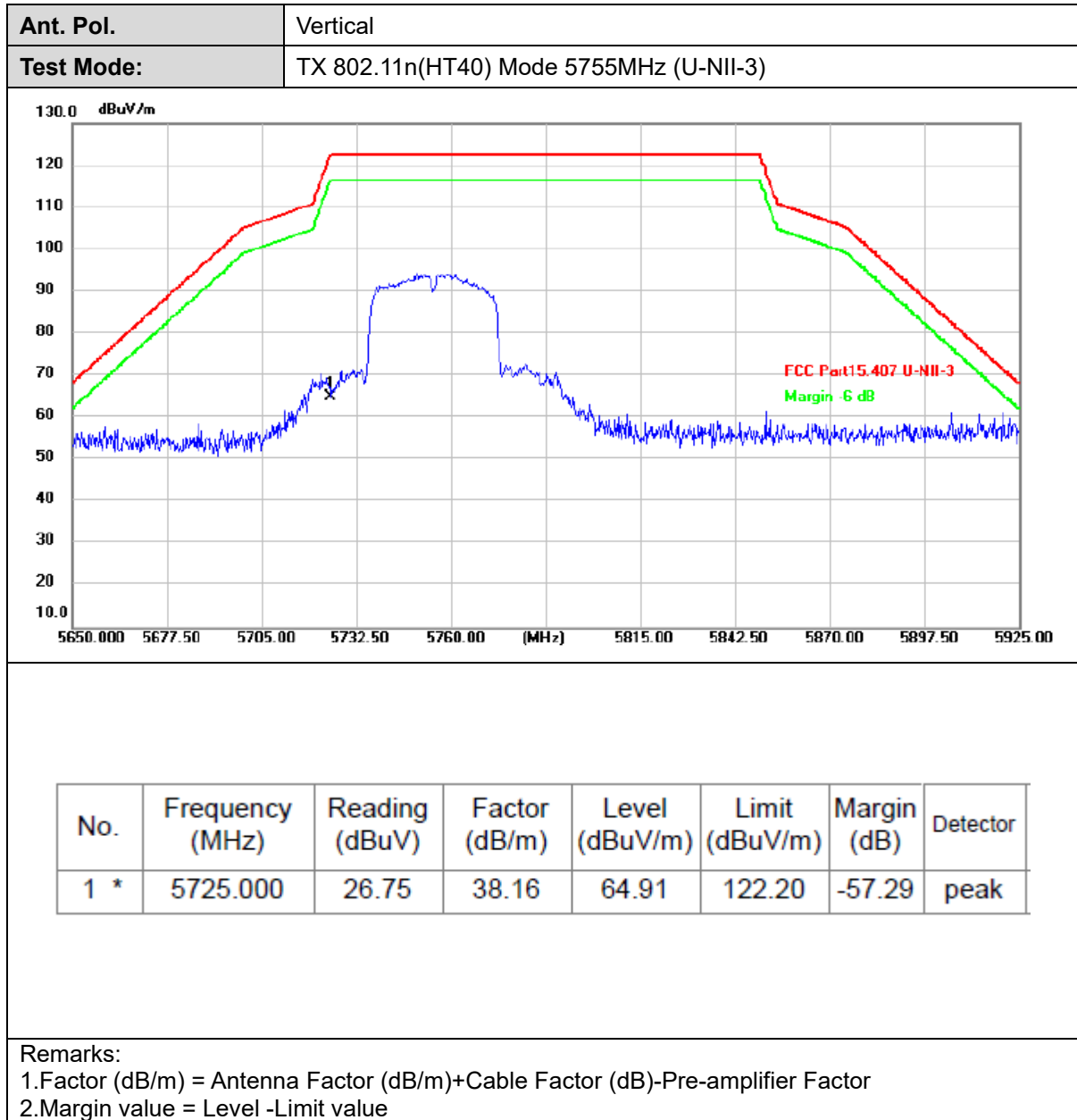


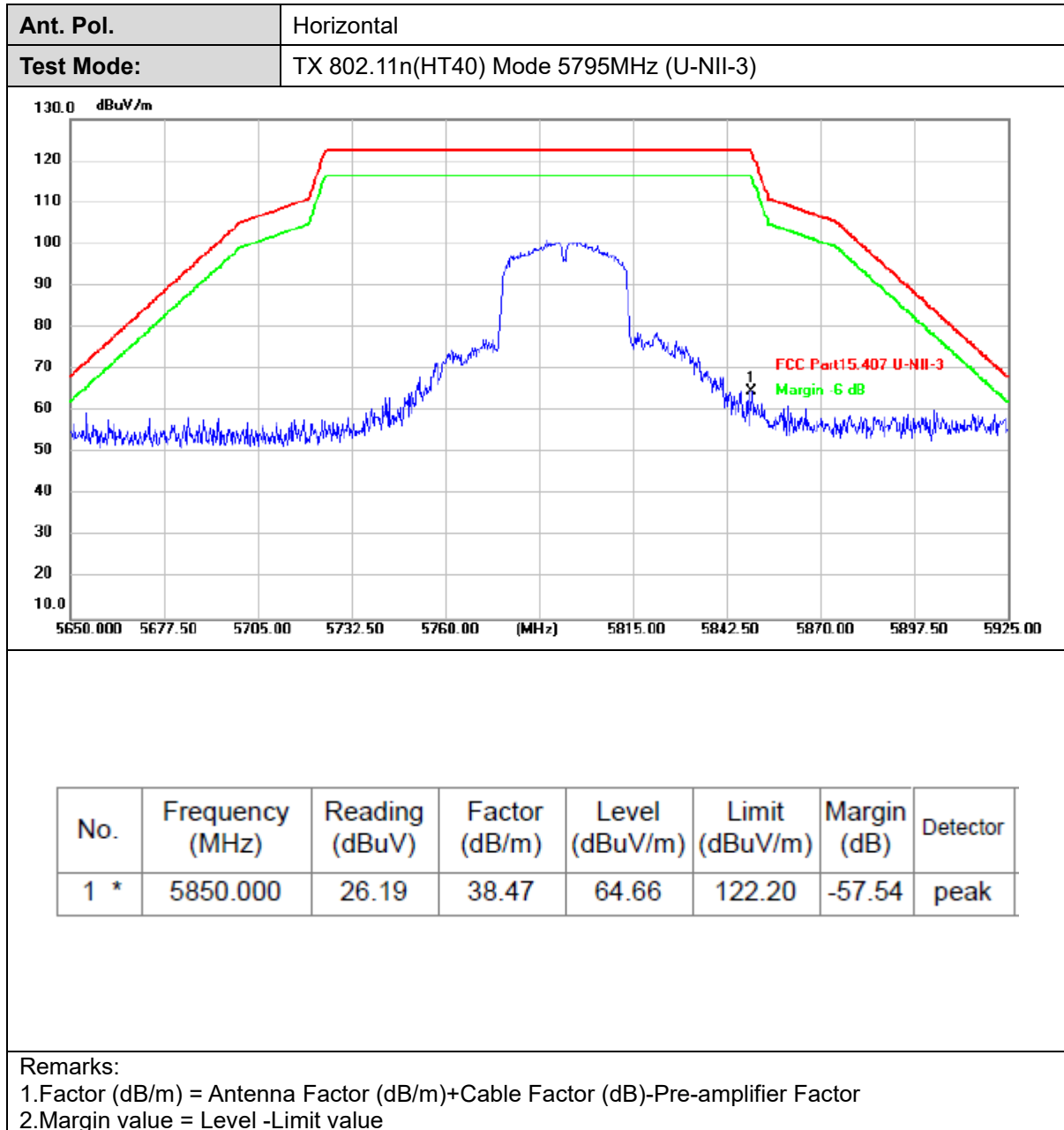


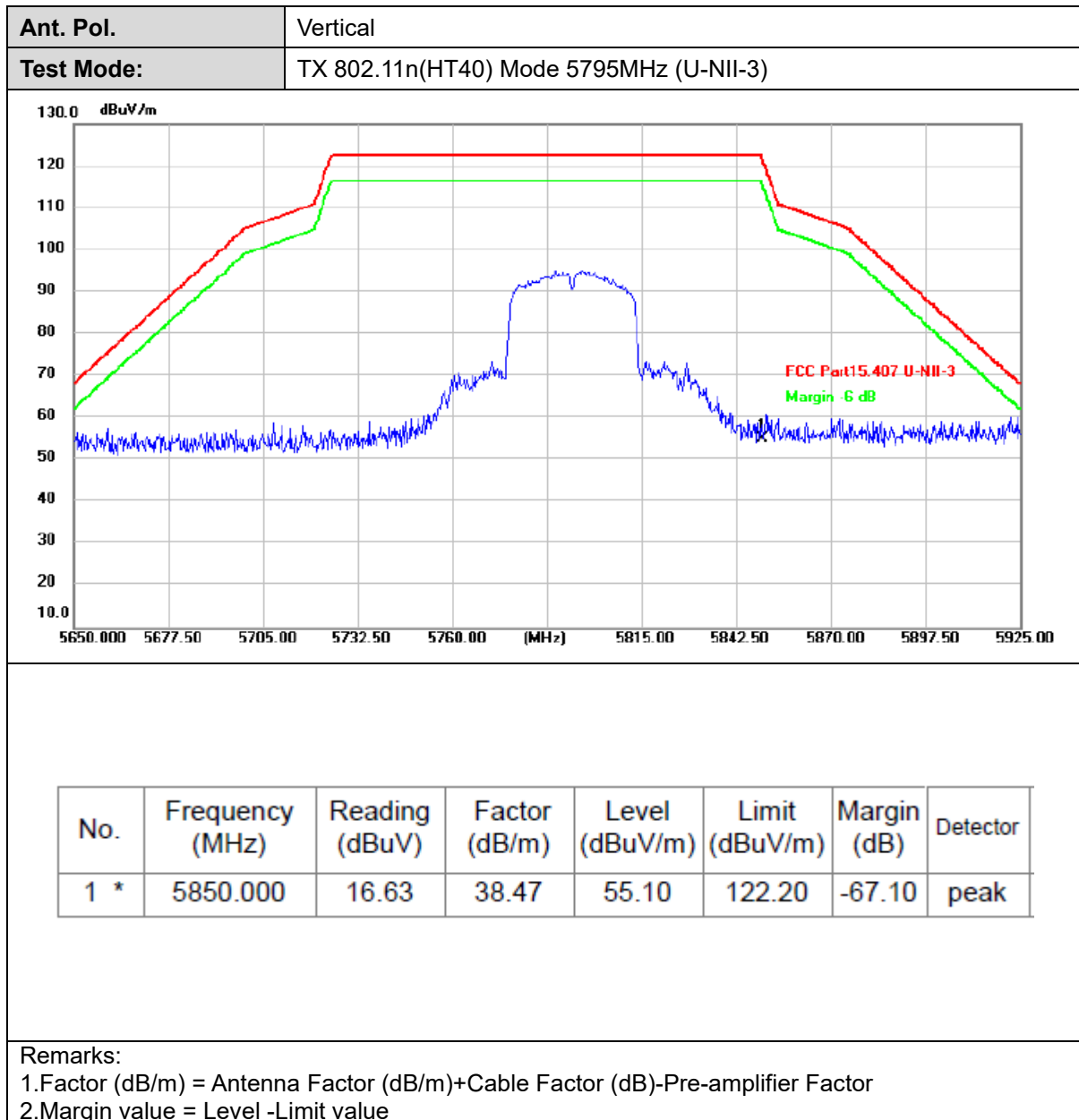














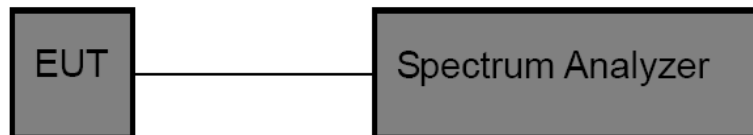
### 3.4. Bandwidth

#### Limit

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a) & (e) / RSS-247 6.2.1.2 & 6.2.4.1

Test Item	Limit	Frequency Range (MHz)
26dB Bandwidth& 99% Bandwidth	N/A	5150~5250
		5250~5350
		5500~5700
6 dB Bandwidth	≥500 kHz	5725~5850

#### Test Configuration



#### Test Procedure

Please refer to KDB789033 D02 for the measurement methods.

#### The setting of the spectrum analyzer as below:

26dB Bandwidth Test	
Spectrum Parameters	Setting
Attenuation	Auto
Span	>26 dB Bandwidth
RBW	Approximately 1% of the emission bandwidth
VBW	>RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto



6dB Bandwidth Test	
Spectrum Parameters	Setting
Attenuation	Auto
Span	>6 dB Bandwidth
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto
99% Occupied Bandwidth Test	
Spectrum Parameters	Setting
Attenuation	Auto
RBW	1% to 5% of the OBW
VBW	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold

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

#### **Test Mode**

Please refer to the clause 2.4.



**Test Result****99% Bandwidth**

Test Mode	Freq(MHz)	OCB [MHz]	Limit[MHz]	Verdict
IEEE 802.11a	5180	17.463	---	---
	5200	17.502	---	---
	5240	17.263	---	---
	5745	17.143	---	---
	5785	17.143	---	---
	5825	17.103	---	---
IEEE 802.11n_20	5180	18.462	---	---
	5200	18.382	---	---
	5240	17.982	---	---
	5745	18.581	---	---
	5785	18.062	---	---
	5825	18.422	---	---
IEEE 802.11n_40	5190	35.964	---	---
	5230	35.804	---	---
	5755	35.804	---	---
	5795	35.724	---	---

**26dB Bandwidth**

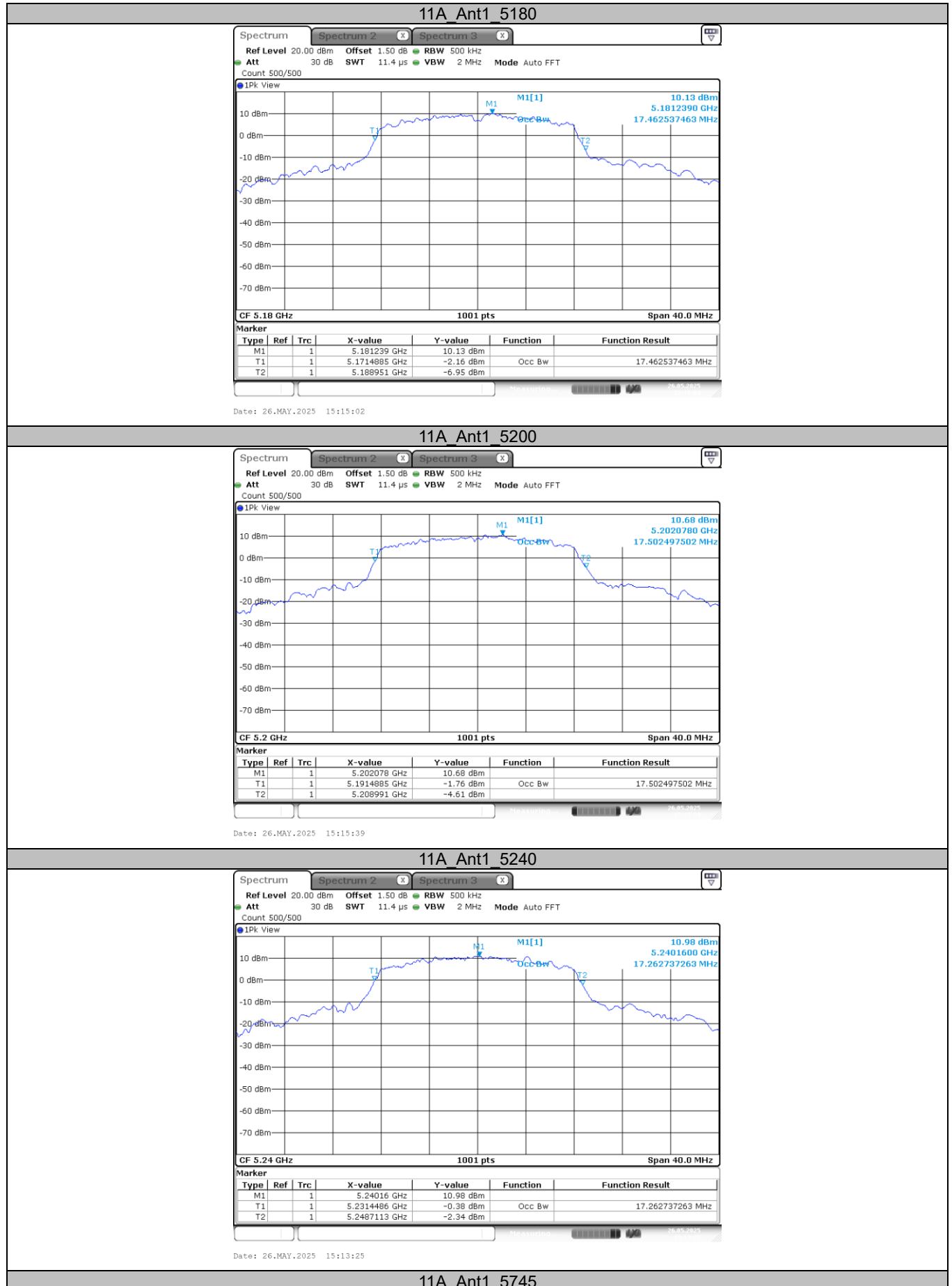
Test Mode	Freq(MHz)	26dB EBW [MHz]	Limit[MHz]	Verdict
IEEE 802.11a	5180	25.28	---	---
	5200	26.12	---	---
	5240	26.56	---	---
	5745	26.72	---	---
	5785	24.16	---	---
	5825	26.64	---	---
IEEE 802.11n_20	5180	26.48	---	---
	5200	28.12	---	---
	5240	21.16	---	---
	5745	28.08	---	---
	5785	24.76	---	---
	5825	23.84	---	---
IEEE 802.11n_40	5190	55.44	---	---
	5230	38.88	---	---
	5755	47.68	---	---
	5795	42.08	---	---

**6dB Bandwidth**

Test Mode	Freq(MHz)	6db EBW [MHz]	Limit[MHz]	Verdict
IEEE 802.11a	5745	13.84	≥0.5	PASS
	5785	16.04	≥0.5	PASS
	5825	16.28	≥0.5	PASS
IEEE 802.11n_20	5745	17.04	≥0.5	PASS
	5785	13.84	≥0.5	PASS
	5825	13.88	≥0.5	PASS
IEEE 802.11n_40	5755	35.04	≥0.5	PASS
	5795	34.72	≥0.5	PASS



99% Bandwidth:



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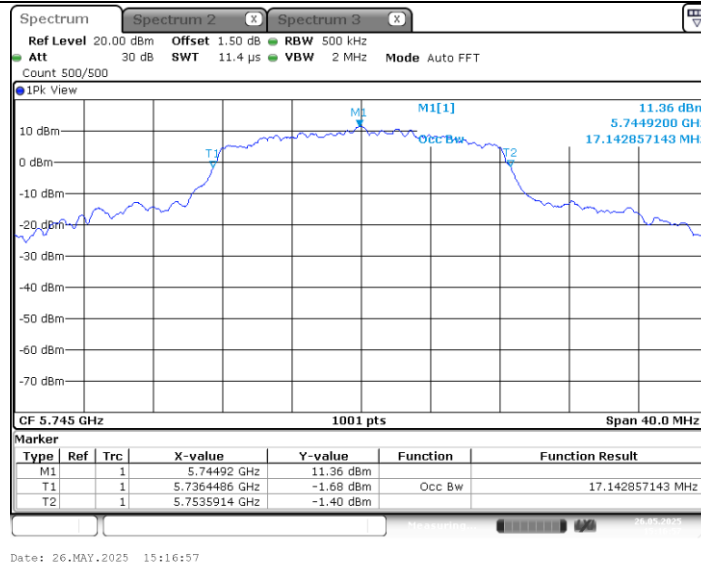
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

Tel.: (86)755-27521059 Fax: (86)755-27521011

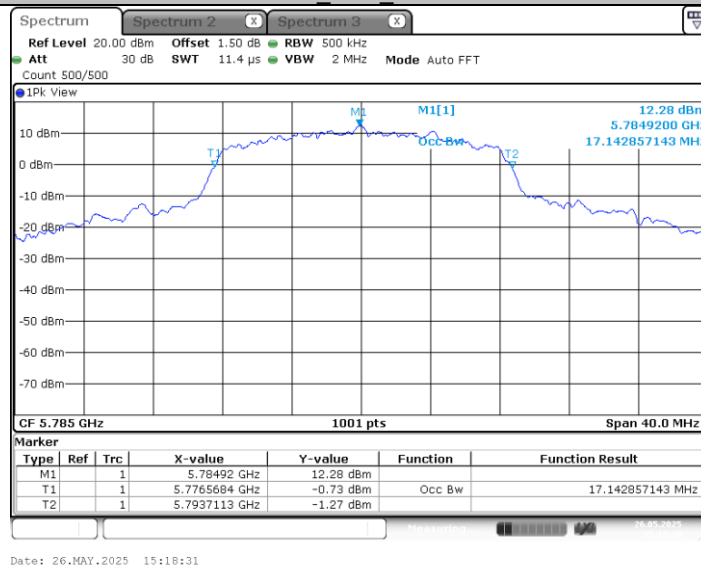
Http://www.sz-ctc.org.cn

For anti-fake verification, please visit the official website of China Inspection And Testing Society : [yz.cncqa.com](http://www.yz.cncqa.com)

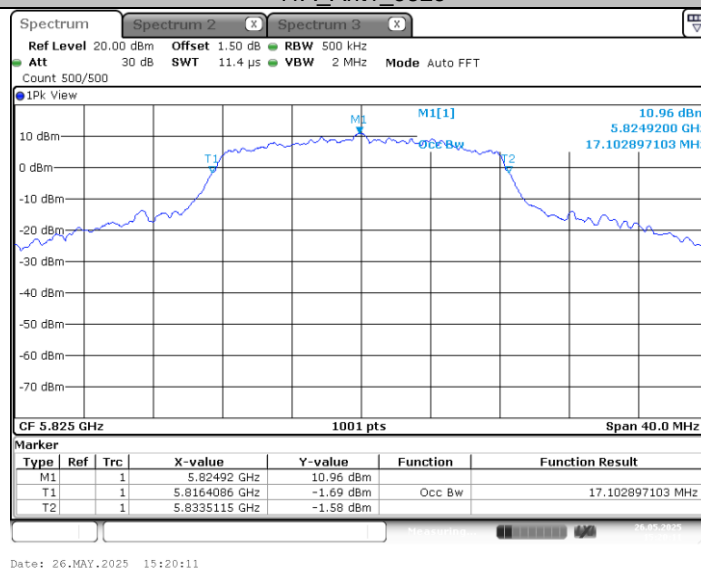
TRF No: CTC-TR-062\_A2



## 11A Ant1 5785



## 11A Ant1 5825



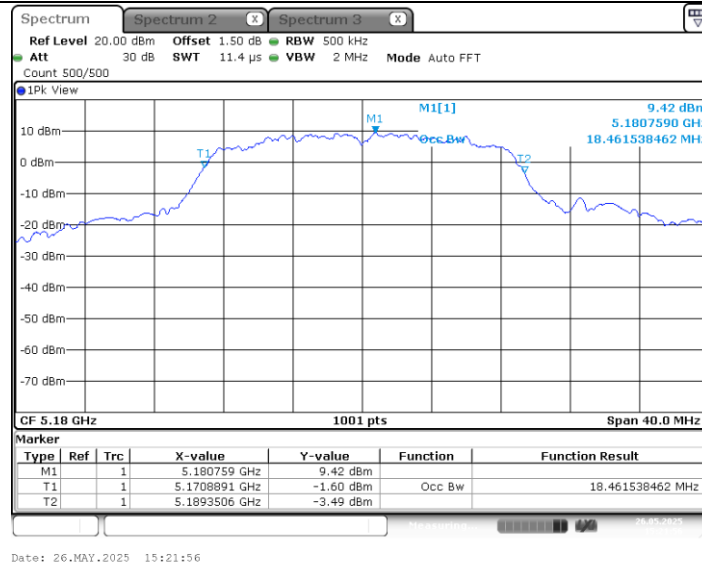
## 11N20SISO Ant1 5180

CTC Laboratories, Inc.

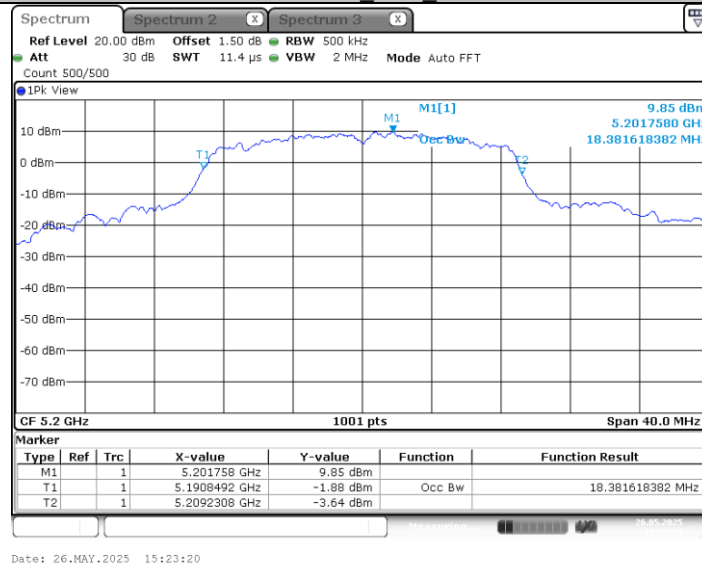
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict,  
Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-062\_A2

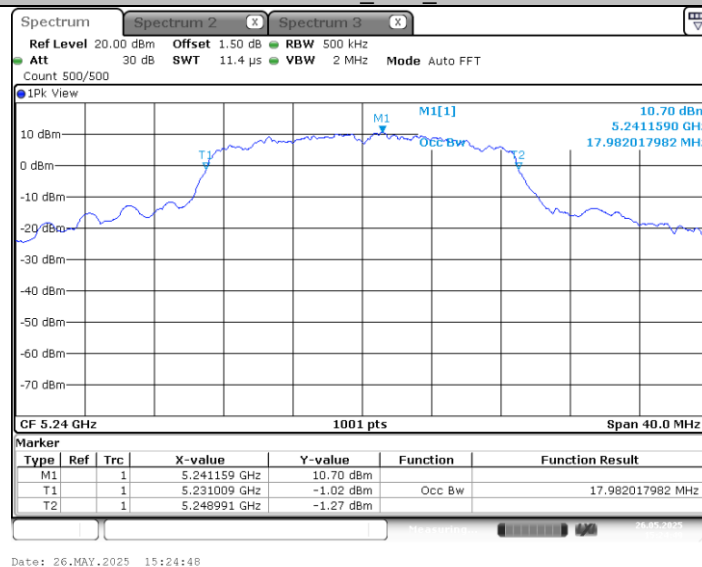
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Society : [yz.cncqa.com](http://yz.cncqa.com)



## 11N20SISO\_Ant1\_5200



## 11N20SISO\_Ant1\_5240



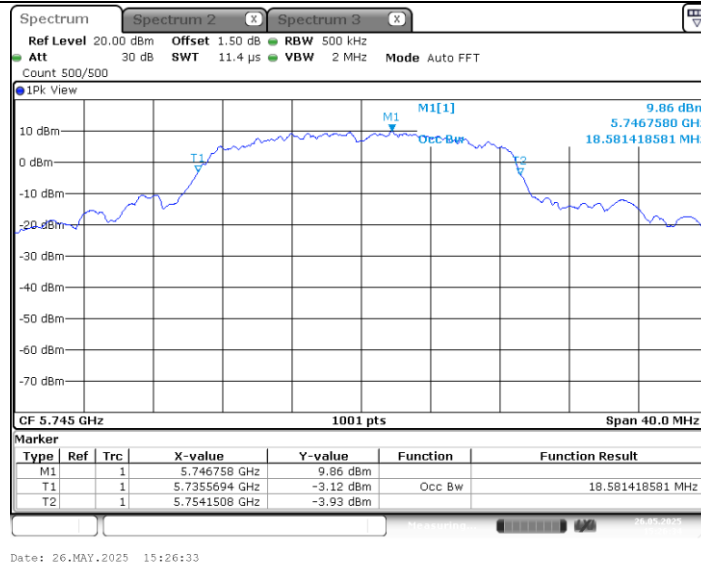
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CTC Laboratories, Inc.

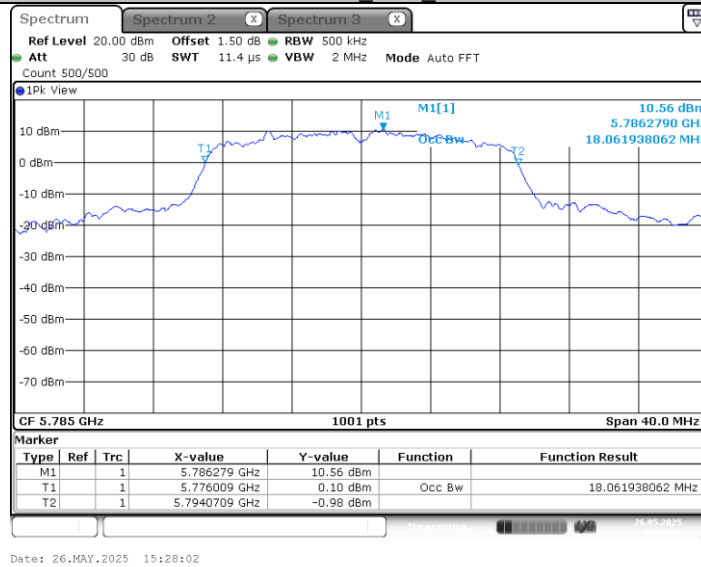
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict,  
Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-062\_A2

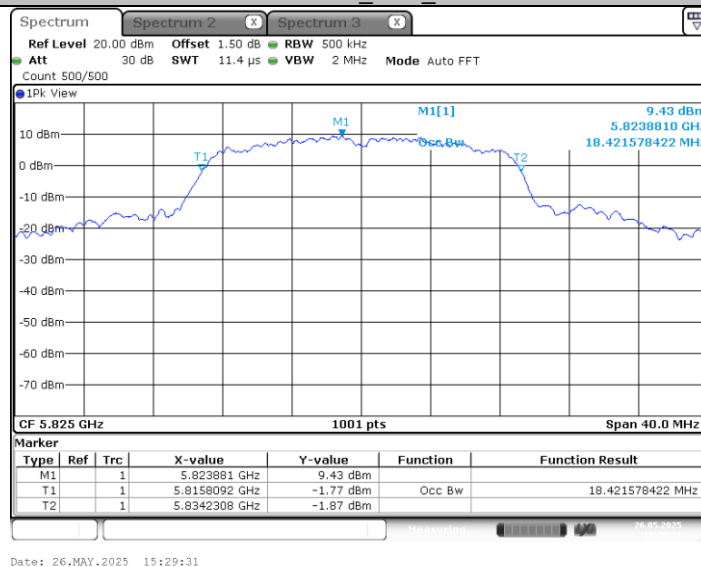
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Society : [yz.cncaq.com](http://yz.cncaq.com)



## 11N20SISO\_Ant1\_5785



## 11N20SISO\_Ant1\_5825



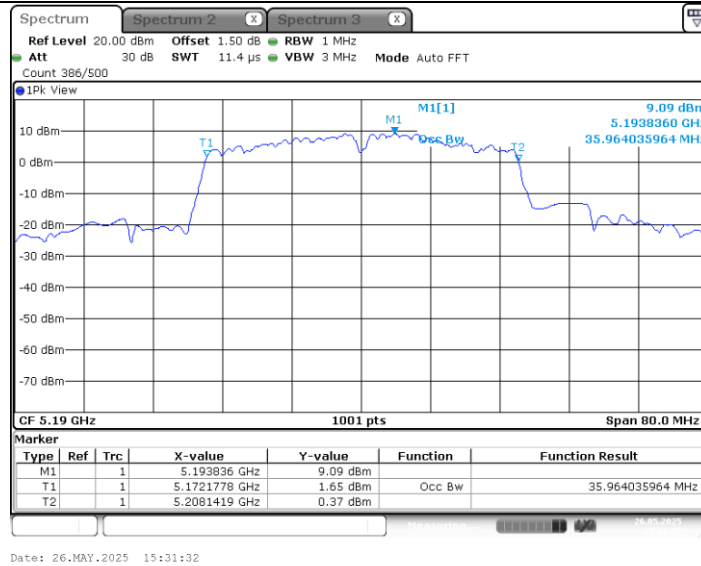
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CTC Laboratories, Inc.

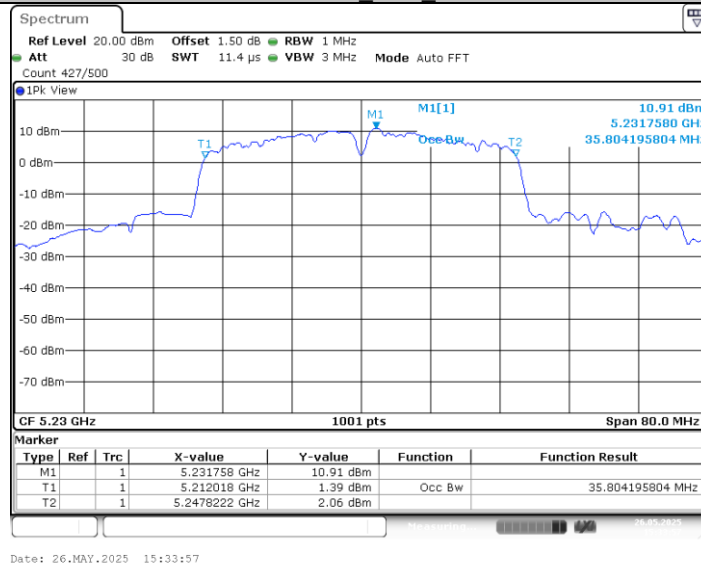
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict,  
Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-062\_A2

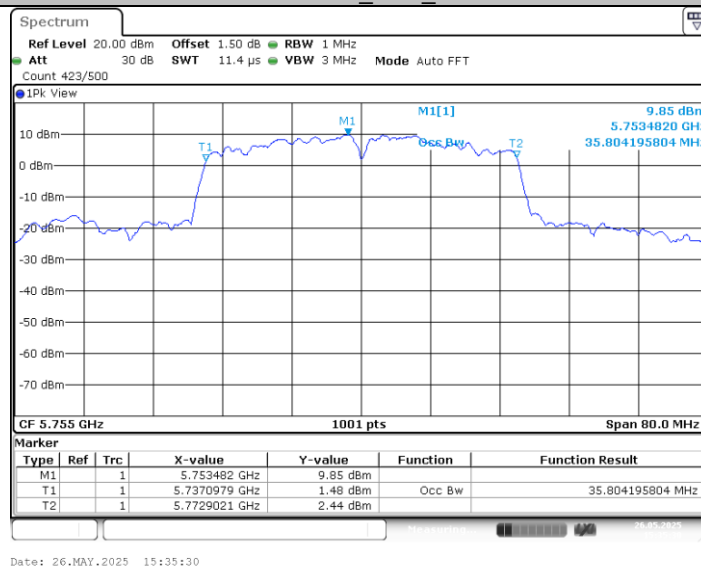
For anti-fake verification, please visit the official website of China Inspection And Testing  
Society : [yz.cncaq.com](http://yz.cncaq.com)



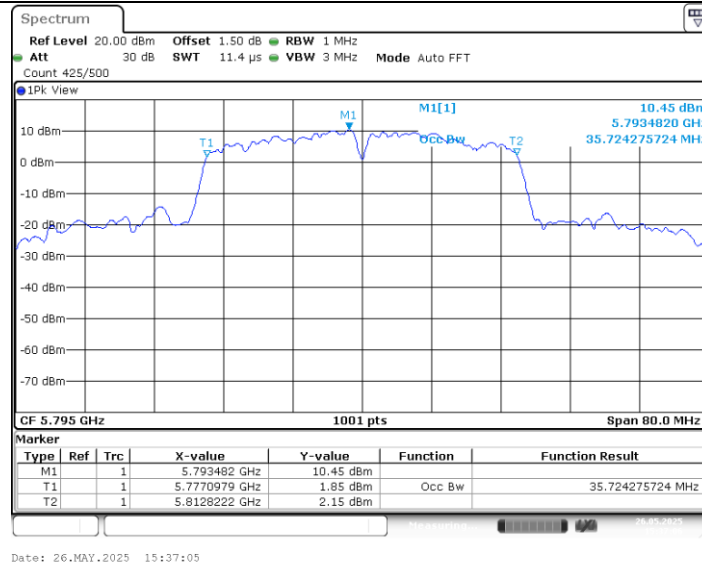
## 11N40SISO\_Ant1\_5230



## 11N40SISO\_Ant1\_5755



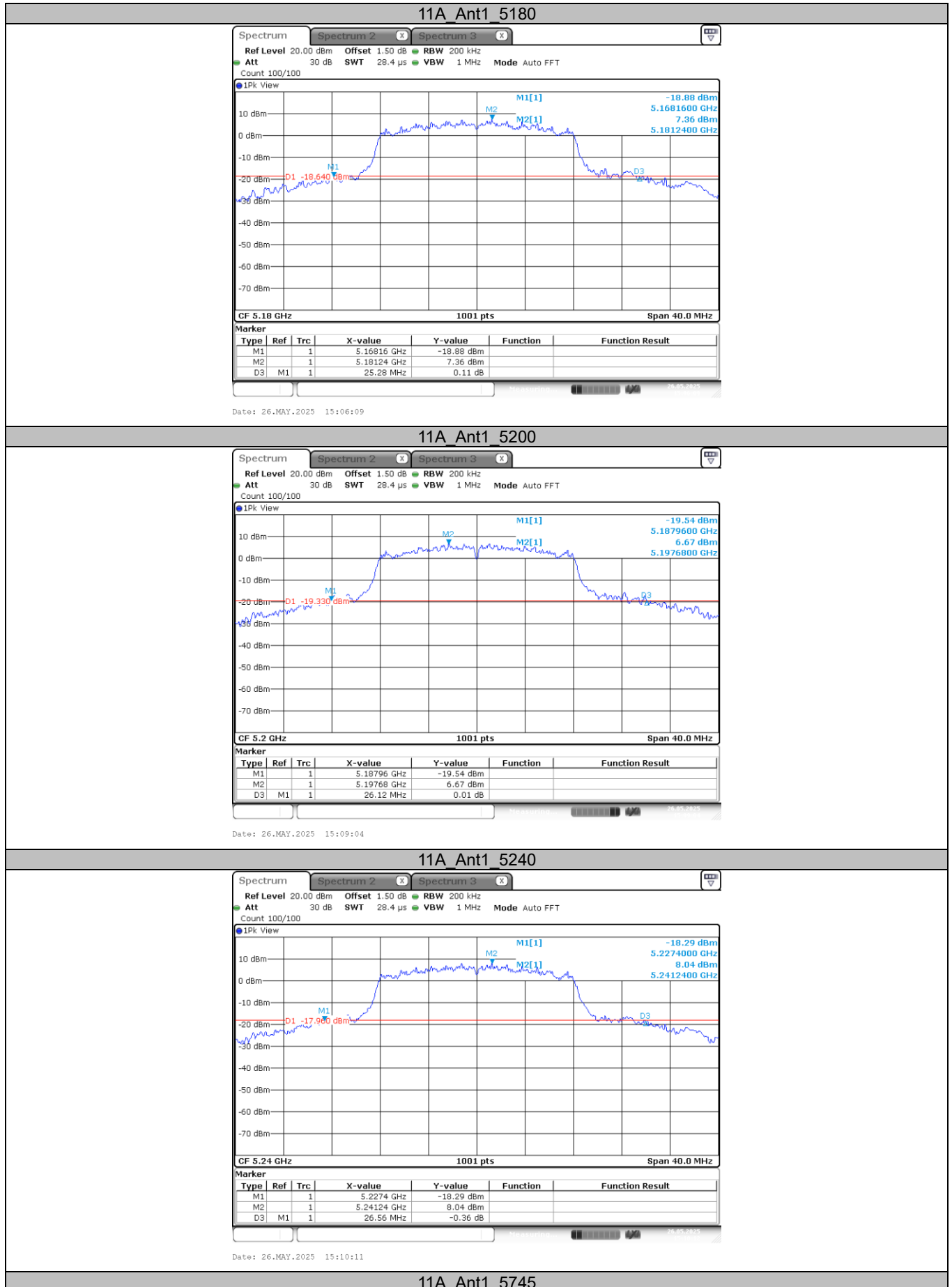
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26dB Bandwidth:



CTC Laboratories, Inc.

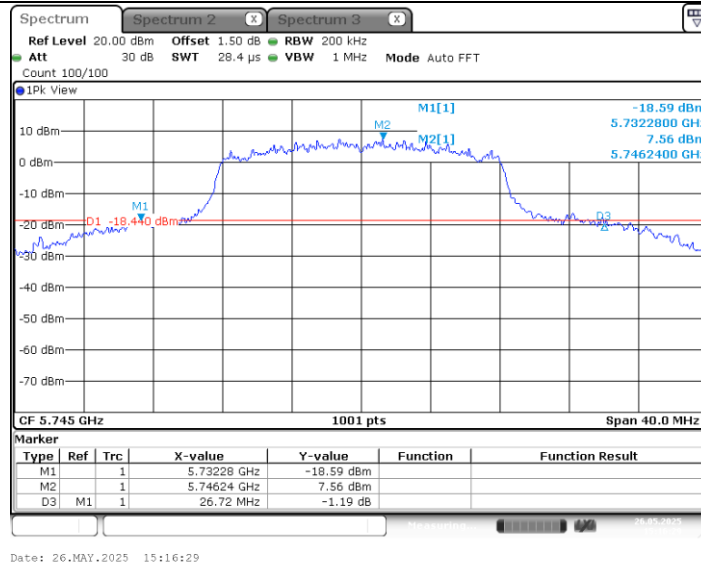
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

Tel.: (86)755-27521059 Fax: (86)755-27521011

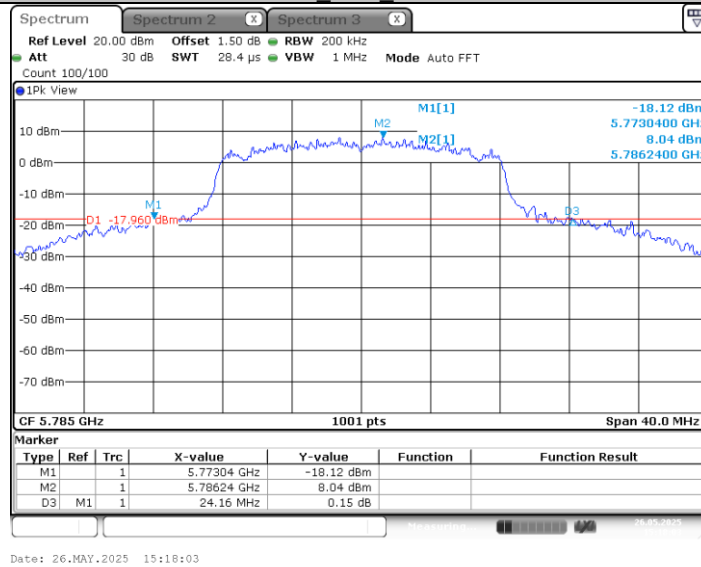
Http://www.sz-ctc.org.cn

TRF No: CTC-TR-062\_A2

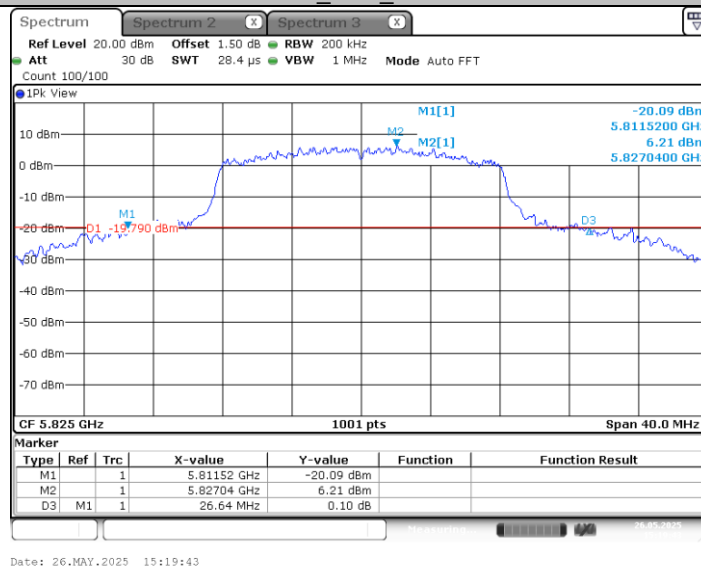
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## 11A Ant1 5785



## 11A Ant1 5825



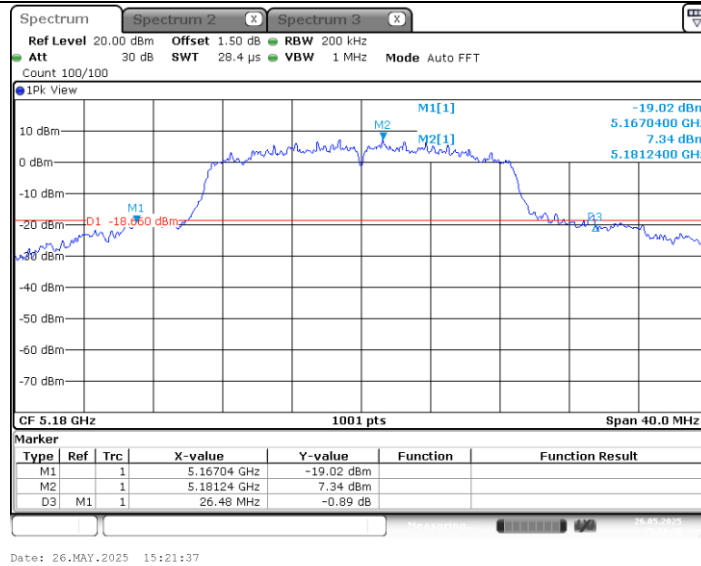
## 11N20SISO Ant1 5180

CTC Laboratories, Inc.

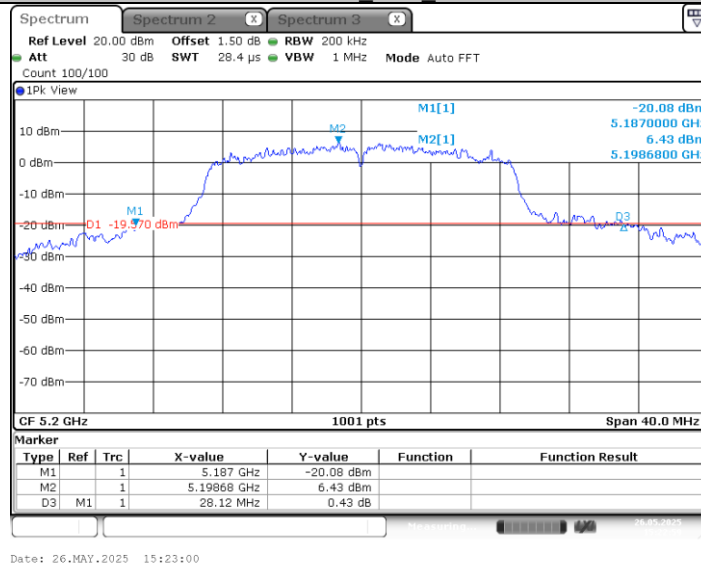
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict,  
Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-062\_A2

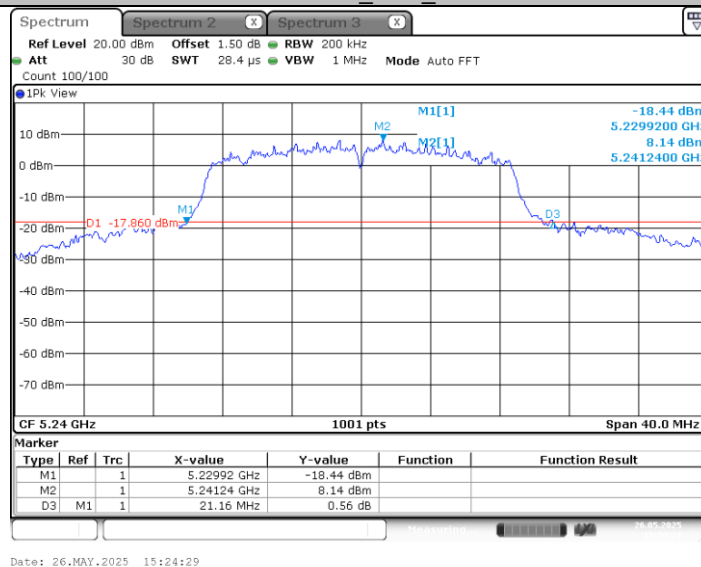
For anti-fake verification, please visit the official website of China Inspection And Testing  
Society : [yz.cncaq.com](http://yz.cncaq.com)



## 11N20SISO\_Ant1\_5200



## 11N20SISO\_Ant1\_5240



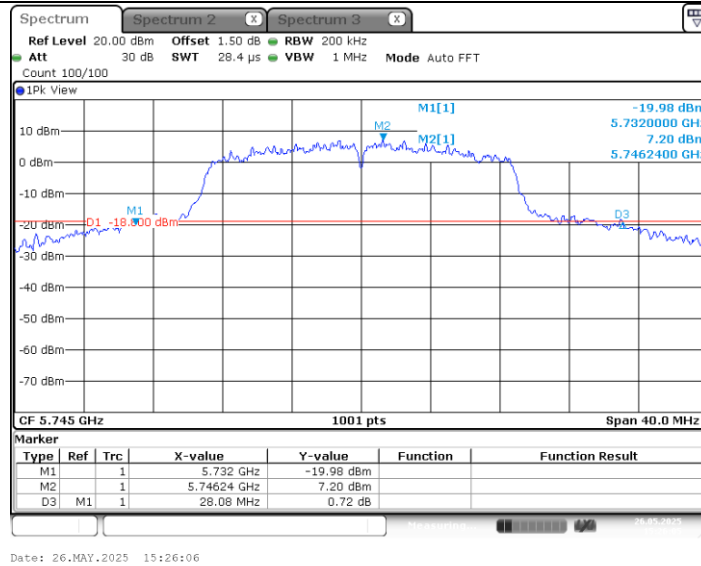
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CTC Laboratories, Inc.

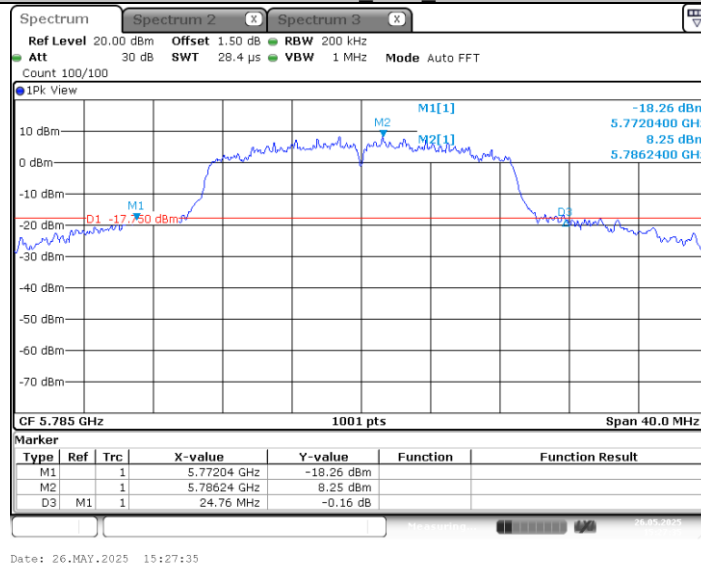
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict,  
Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-062\_A2

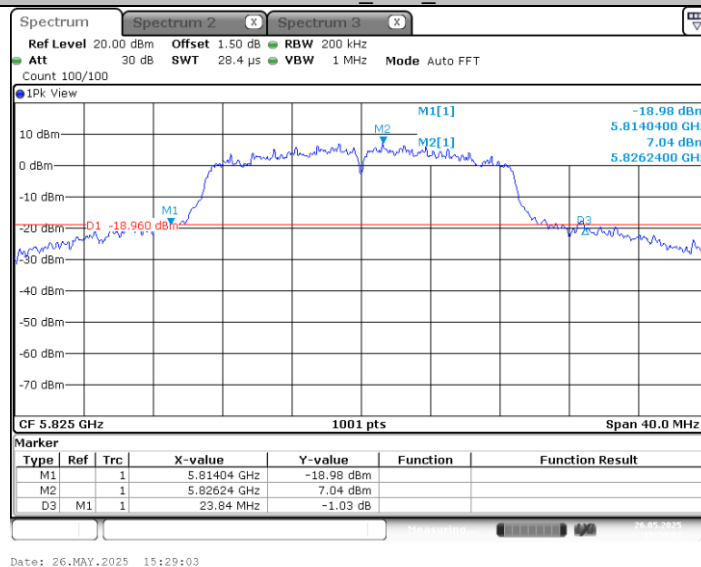
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Society : [yz.cncaq.com](http://yz.cncaq.com)



## 11N20SISO\_Ant1\_5785



## 11N20SISO\_Ant1\_5825



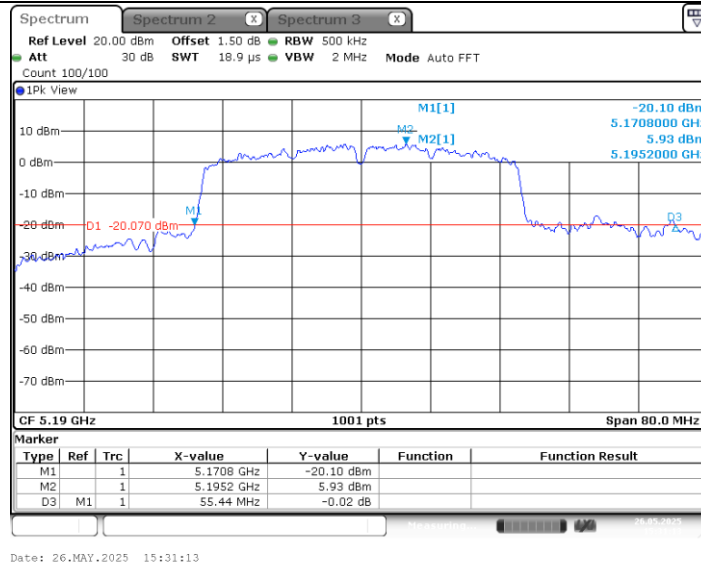
## 11N40SISO\_Ant1\_5190

CTC Laboratories, Inc.

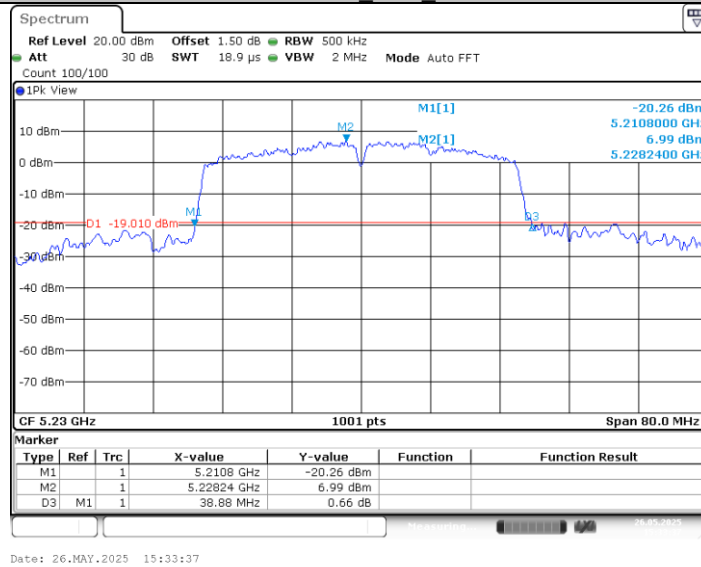
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict,  
Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-062\_A2

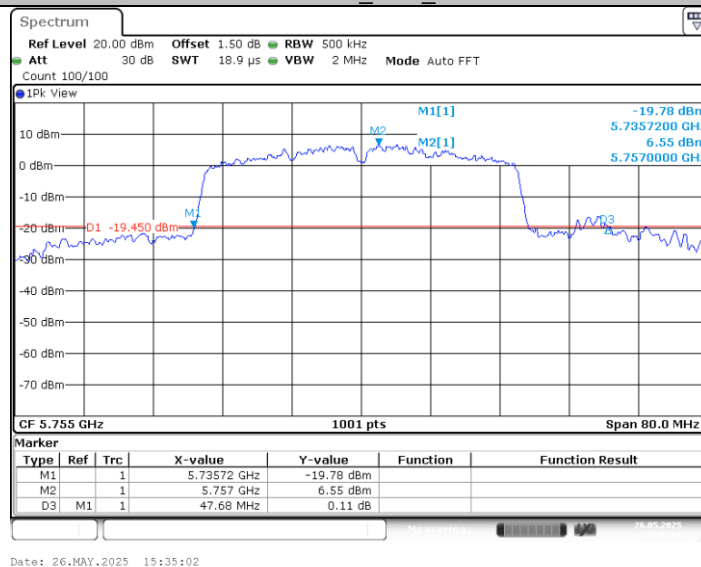
For anti-fake verification, please visit the official website of China Inspection And Testing  
Society : [yz.cncaq.com](http://yz.cncaq.com)



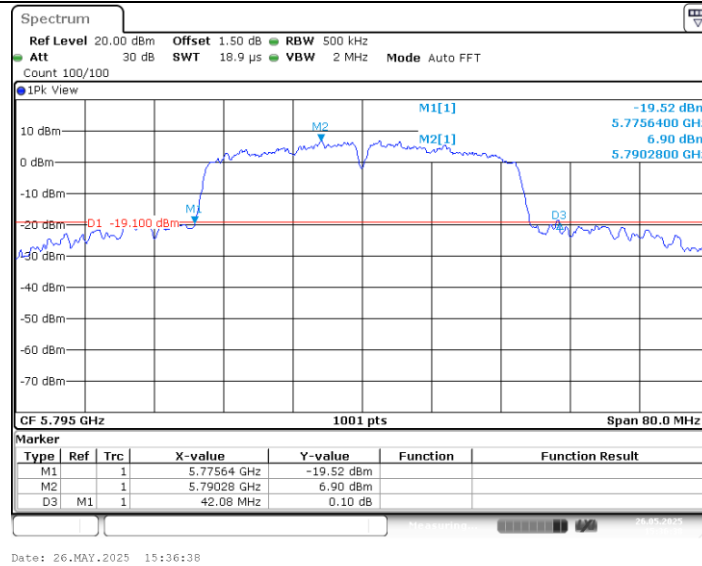
## 11N40SISO\_Ant1\_5230



## 11N40SISO\_Ant1\_5755



## 11N40SISO\_Ant1\_5795



CTC Laboratories, Inc.

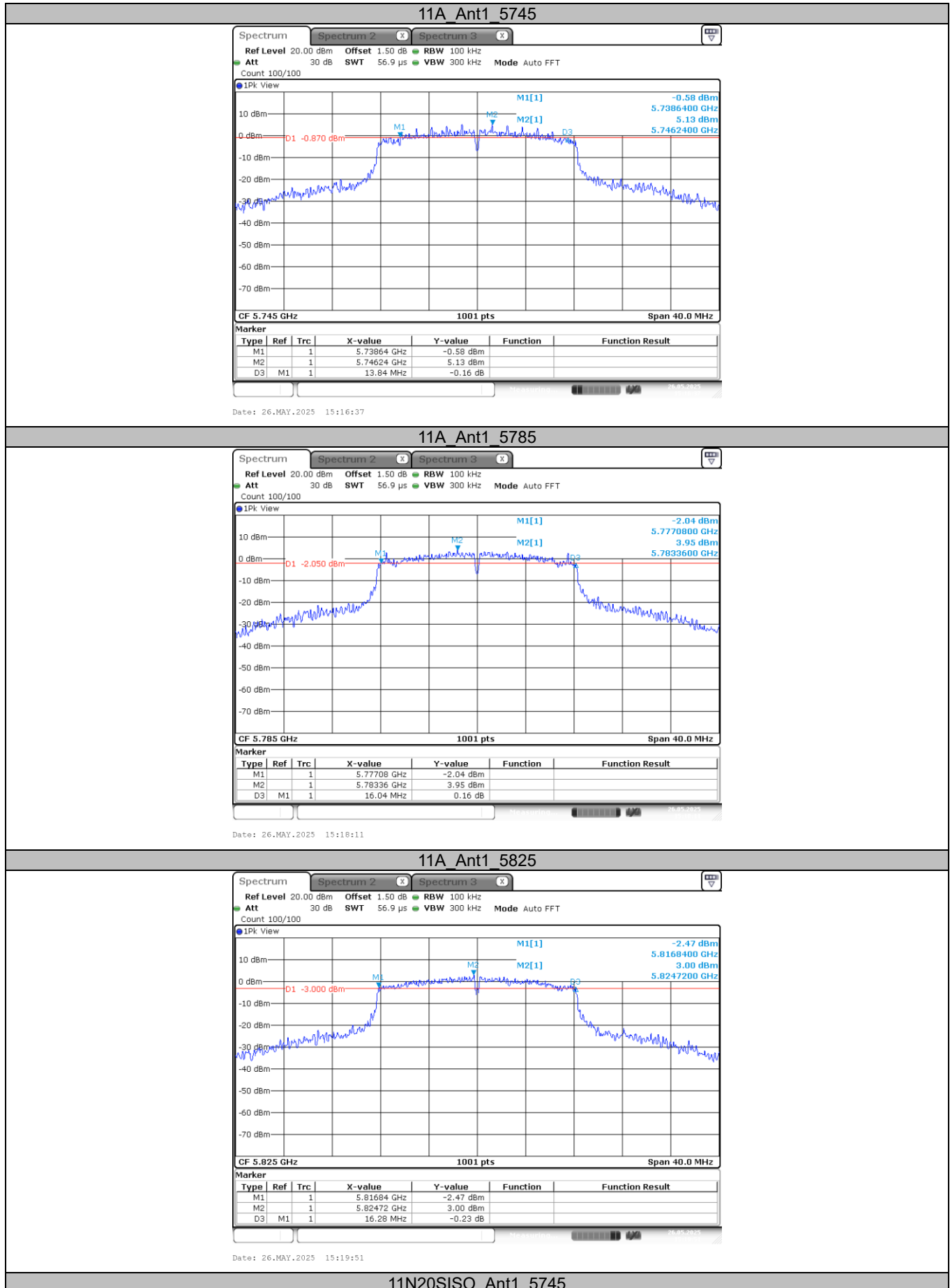
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict,  
Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

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Society : [yz.cncaq.com](http://yz.cncaq.com)



6dB Bandwidth:



CTC Laboratories, Inc.

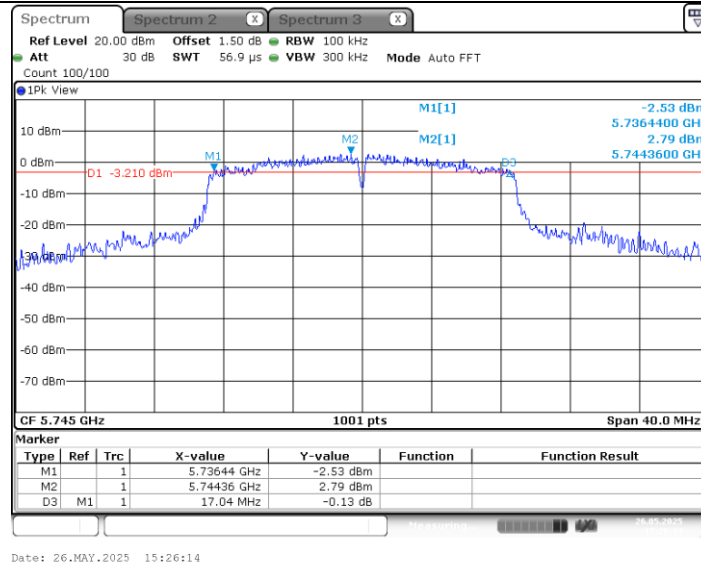
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

Tel.: (86)755-27521059 Fax: (86)755-27521011

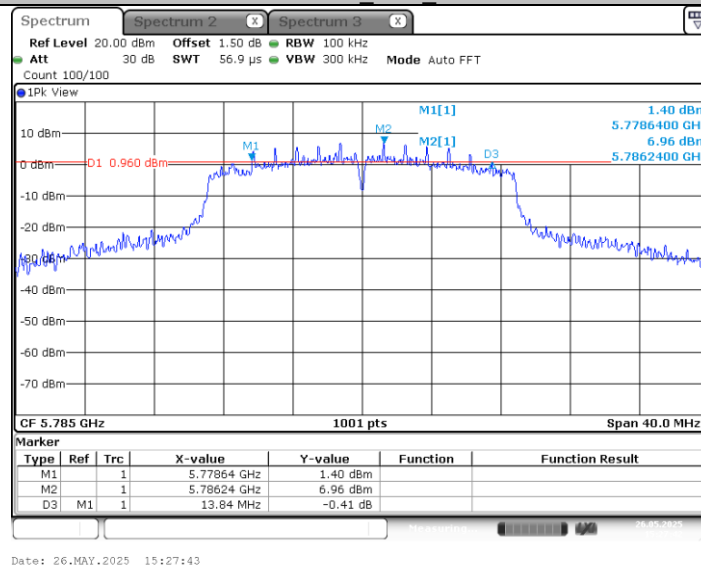
Http://www.sz-ctc.org.cn

For anti-fake verification, please visit the official website of China Inspection And Testing Society : [yz.cncaq.com](http://www.yz.cncaq.com)

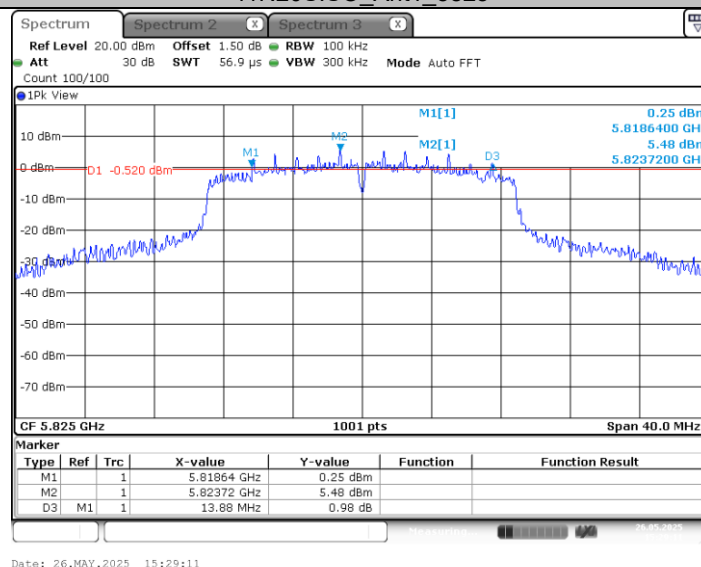
TRF No: CTC-TR-062\_A2



## 11N20SISO\_Ant1\_5785



## 11N20SISO\_Ant1\_5825



## 11N40SISO\_Ant1\_5755

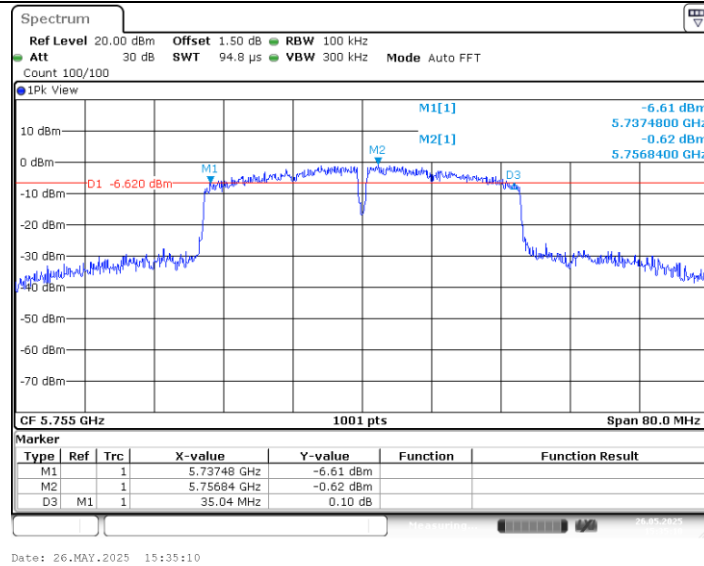
CTC Laboratories, Inc.

Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict,  
Longhua District, Shenzhen, Guangdong, China Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

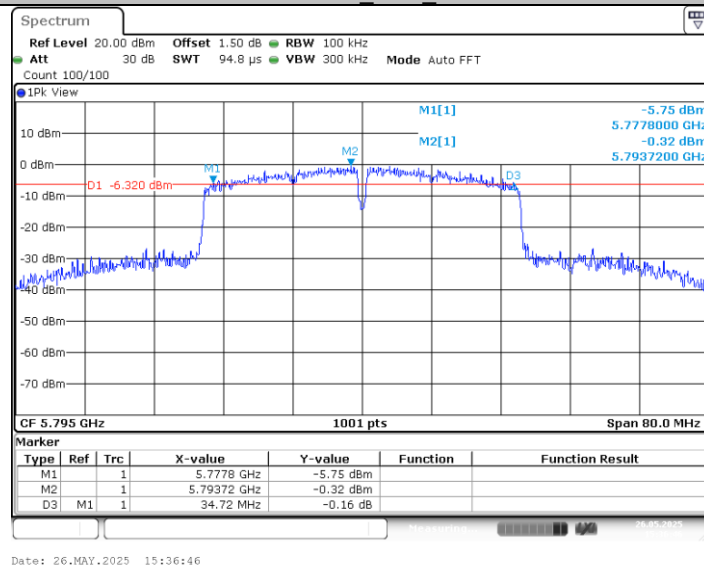
For anti-fake verification, please visit the official website of China Inspection And Testing  
Society : [yz.cncqa.com](http://yz.cncqa.com)

TRF No: CTC-TR-062\_A2





## 11N40SISO\_Ant1\_5795



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### 3.5. Peak Output Power

#### Limit

#### FCC CFR Title 47 Part 15 Subpart E Section 15.407(a)

Test Item	Limit	Frequency Range (MHz)
Conducted Output Power	Fixed: 1 Watt (30dBm) Mobile and Portable: 250mW (24dBm)	5150~5250
	250mW (24dBm)	5250~5350
	250mW (24dBm)	5500~5700
	1 Watt (30dBm)	5725~5850

#### RSS-247 6.2

IC Power@PSD Limit					
Frequency	Type of devices	Maximum Conducted Output Power	EIRP Output Power	Conducted Power Spectral Density	EIRP Power Spectral Density
5150MHz-5250MHz	in vehicles		30mW or $1.76 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices		200mW or $10 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		10dBm/MHz
5250MHz-5350MHz	in vehicles		30mW or $1.76 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices	250mW or $11 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	1W or $17 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	11dBm/MHz	
5470MHz-5600MHz 5650MHz-5725MHz	ALL Devices	250mW or $11 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	1W or $17 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	11dBm/MHz	
5725MHz-5850MHz	ALL Devices	1W		30dBm/500KHz	

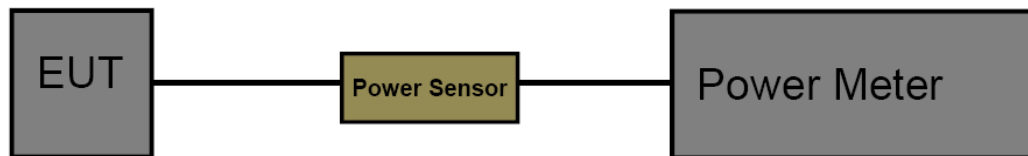
#### Test Configuration

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TRF No: CTC-TR-062\_A2

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### **Test Procedure**

The measurement is according to section 3 of KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

### **Test Mode**

Please refer to the clause 2.4.

**Test Result**

Test Mode	Freq(MHz)	Conducted Output Power [dBm]	Limit [dBm]	Verdict
IEEE 802.11a	5180	16.37	≤24	PASS
	5200	16.65	≤24	PASS
	5240	<b>17.17</b>	≤24	PASS
	5745	16.69	≤30	PASS
	5785	17.11	≤30	PASS
	5825	16.22	≤30	PASS
IEEE 802.11n_20	5180	16.21	≤24	PASS
	5200	16.54	≤24	PASS
	5240	16.99	≤24	PASS
	5745	16.49	≤30	PASS
	5785	16.96	≤30	PASS
	5825	16.14	≤30	PASS
IEEE 802.11n_40	5190	15.60	≤24	PASS
	5230	16.27	≤24	PASS
	5755	15.86	≤30	PASS
	5795	16.14	≤30	PASS



### 3.6. Power Spectral Density

#### Limit

#### FCC CFR Title 47 Part 15 Subpart E Section 15.407(a)

For the 5.15~5.25GHz band:

- Outdoor AP  
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.  
If  $G_{TX} > 6\text{dBi}$ , then  $\text{PSD} = 17 - (G_{TX} - 6)$ .
- Indoor AP  
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.  
If  $G_{TX} > 6\text{dBi}$ , then  $\text{PSD} = 17 - (G_{TX} - 6)$ .
- Point-to-point AP  
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.  
If  $G_{TX} > 23\text{dBi}$ , then  $\text{PSD} = 17 - (G_{TX} - 23)$ .
- Client devices  
The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.  
If  $G_{TX} > 6\text{dBi}$ , then  $\text{PSD} = 11 - (G_{TX} - 6)$ .

For the 5.25~5.35GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.  
If  $G_{TX} > 6\text{dBi}$ , then  $\text{PSD} = 11 - (G_{TX} - 6)$ .

For the 5.47~5.725GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.  
If  $G_{TX} > 6\text{dBi}$ , then  $\text{PSD} = 11 - (G_{TX} - 6)$ .

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)  
The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.  
If  $G_{TX} > 6\text{dBi}$ , then  $\text{PSD} = 30 - (G_{TX} - 6)$ .
- Point-to-point systems (P2P)  
The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.

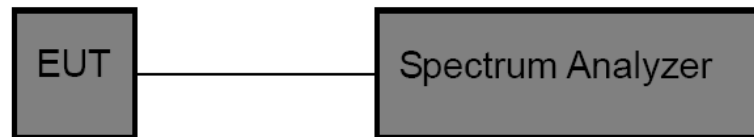
Note:  $G_{TX}$ : EUT Antenna gain.

#### RSS-247 6.2



IC Power&PSD Limit					
Frequency	Type of devices	Maximum Conducted Output Power	EIRP Output Power	Conducted Power Spectral Density	EIRP Power Spectral Density
5150MHz-5250MHz	in vehicles		30mW or $1.76 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices		200mW or $10 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		10dBm/MHz
5250MHz-5350MHz	in vehicles		30mW or $1.76 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices	250mW or $11 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	1W or $17 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	11dBm/MHz	
5470MHz-5600MHz 5650MHz-5725MHz	ALL Devices	250mW or $11 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	1W or $17 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	11dBm/MHz	
5725MHz-5850MHz	ALL Devices	1W		30dBm/500KHz	

### Test Configuration



### Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyzer center frequency to transmitting frequency.
- (3) Set the span to encompass the entire emissions bandwidth (EBW) (alternatively, the entire 99% OBW) of the signal.
- (4) RBW=1MHz for devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz  
RBW=500kHz for devices operating in the band 5.725-5.85 GHz.
- (5) Set the VBW to:  $\geq 3$  RBW
- (6) Detector: AVG
- (7) Trace: Max Hold and View
- (7) Sweep time: auto
- (8) Trace average at least 100 traces in power averaging.
- (9) User the peak marker function to determine the maximum amplitude level within the RBW. Apply correction to the result if different RBW is used.

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

### Test Mode

Please refer to the clause 2.4.

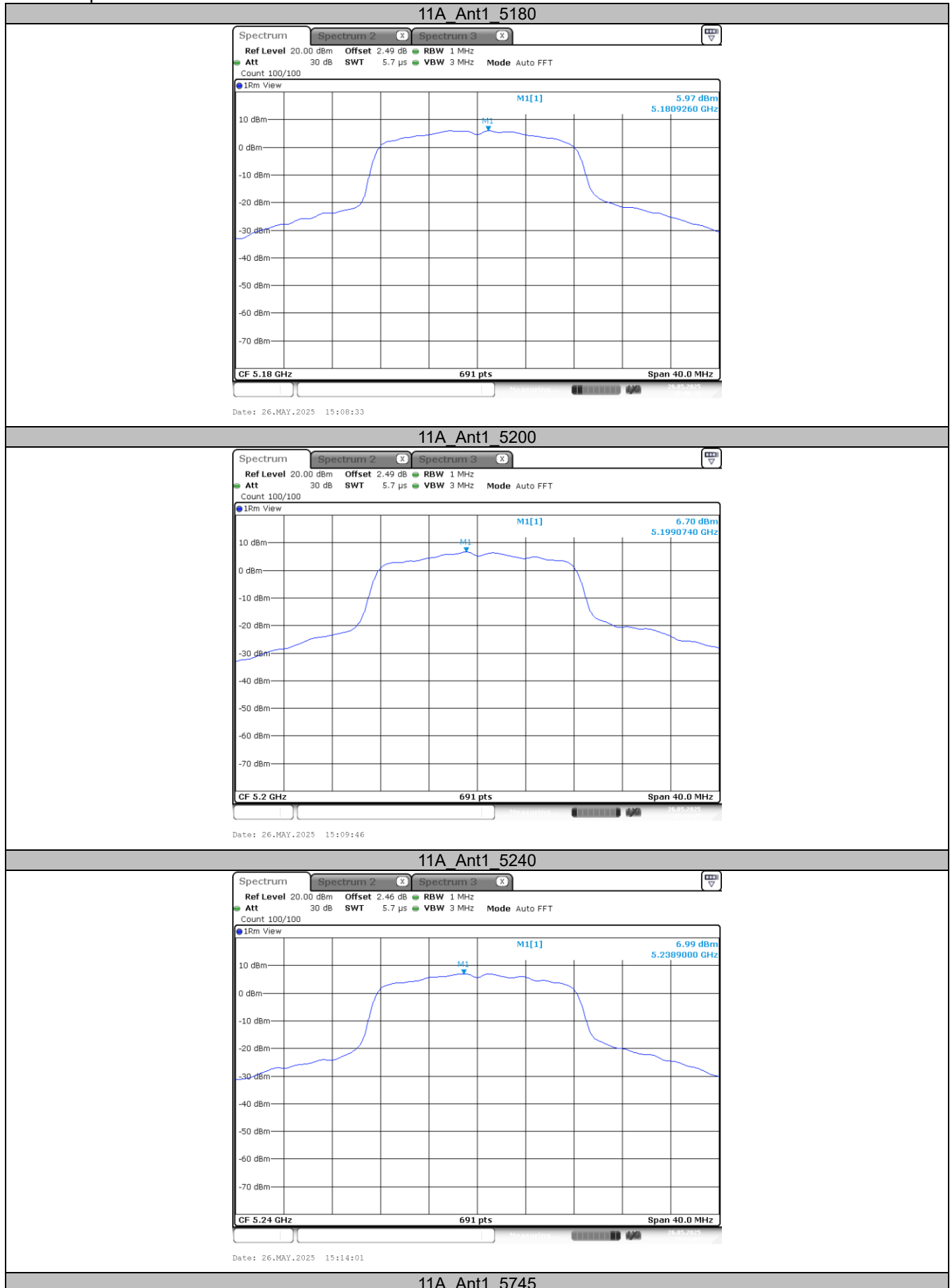
**Test Result**

Test Mode	Freq(MHz)	Conducted PSD [dBm/MHz]	Conducted PSD Limit [dBm/MHz]	Conducted PSD Limit [dBm/500kHz]	Verdict
IEEE 802.11a	5180	5.97	≤17	/	PASS
	5200	6.70	≤17	/	PASS
	5240	6.99	≤17	/	PASS
	5745	3.57	/	≤30	PASS
	5785	4.06	/	≤30	PASS
	5825	2.96	/	≤30	PASS
IEEE 802.11n_20	5180	5.97	≤17	/	PASS
	5200	6.25	≤17	/	PASS
	5240	6.37	≤17	/	PASS
	5745	3.08	/	≤30	PASS
	5785	4.02	/	≤30	PASS
	5825	2.99	/	≤30	PASS
IEEE 802.11n_40	5190	3.14	≤17	/	PASS
	5230	3.38	≤17	/	PASS
	5755	0.60	/	≤30	PASS
	5795	0.71	/	≤30	PASS

Note: 1.The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.  
2.The Duty Cycle Factor and RBW Factor is compensated in the graph.



## Test Graphs



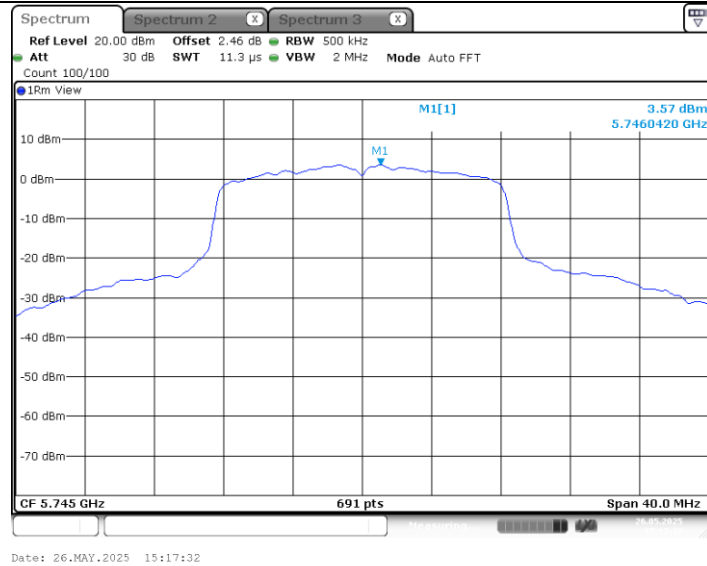
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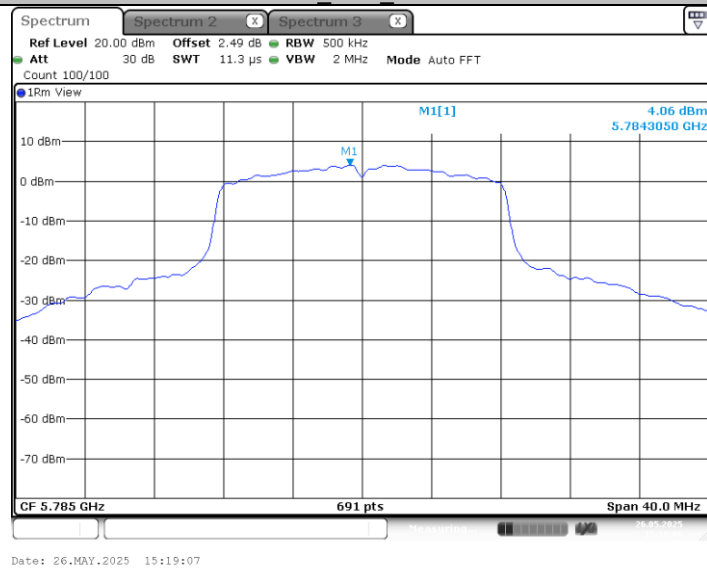
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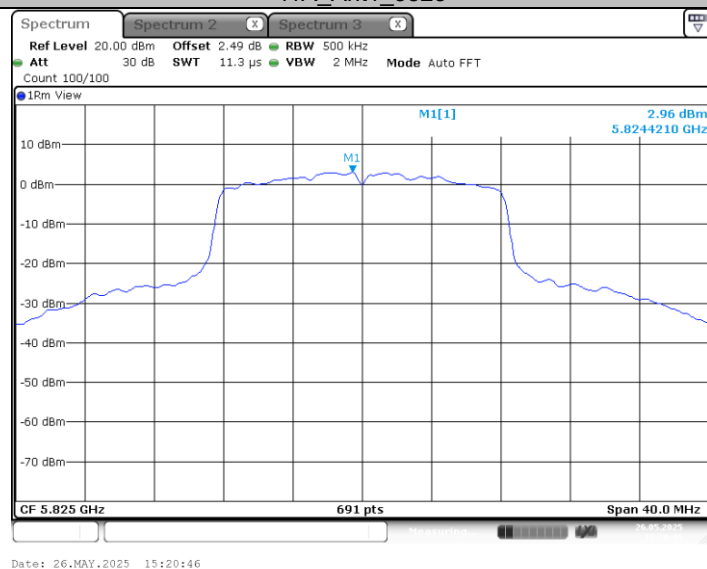




11A Ant1\_5785



11A Ant1\_5825



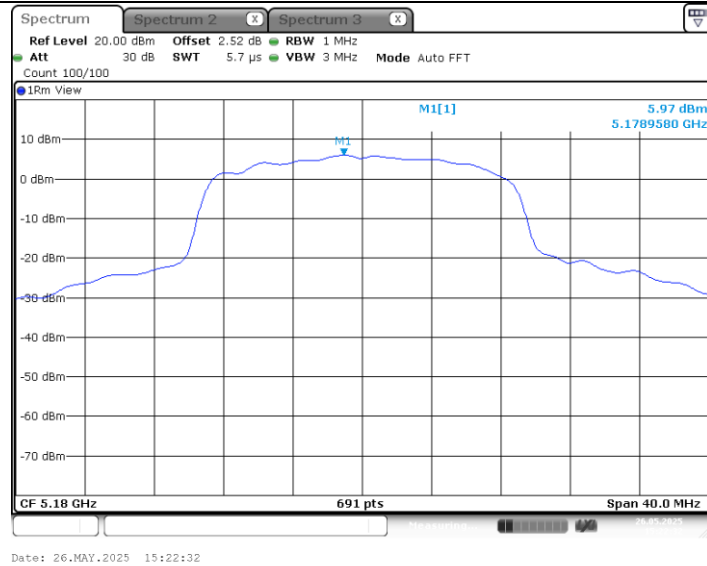
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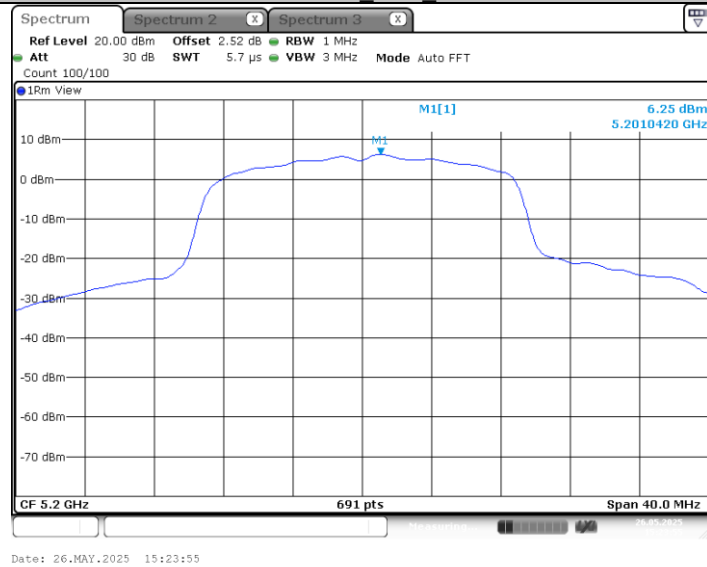
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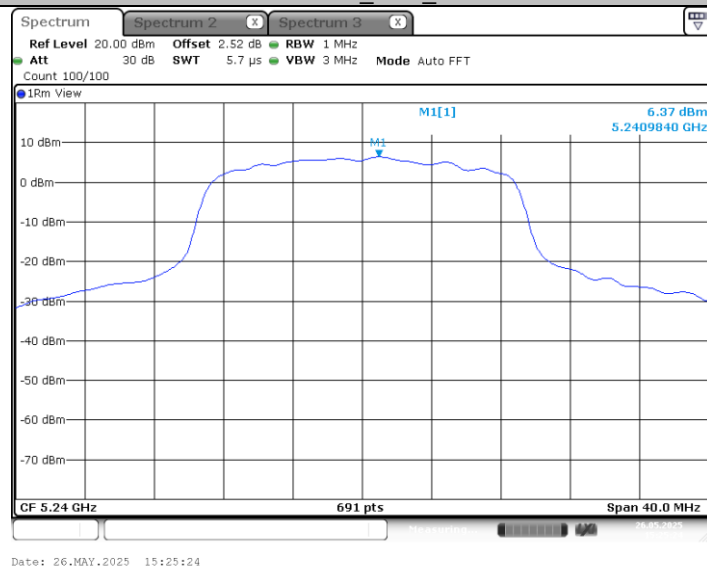
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11N20SISO\_Ant1\_5200



11N20SISO\_Ant1\_5240



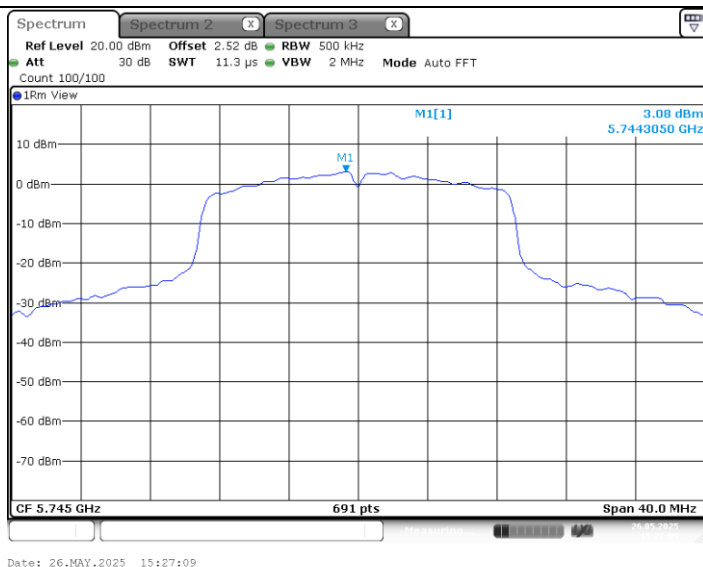
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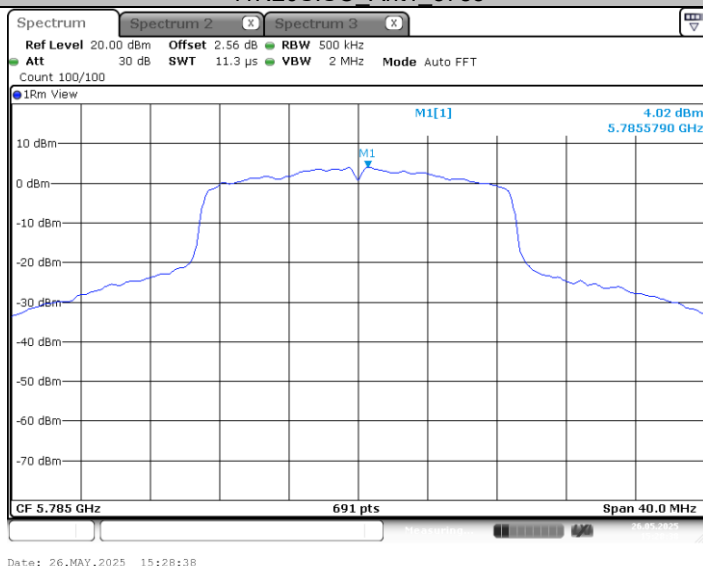
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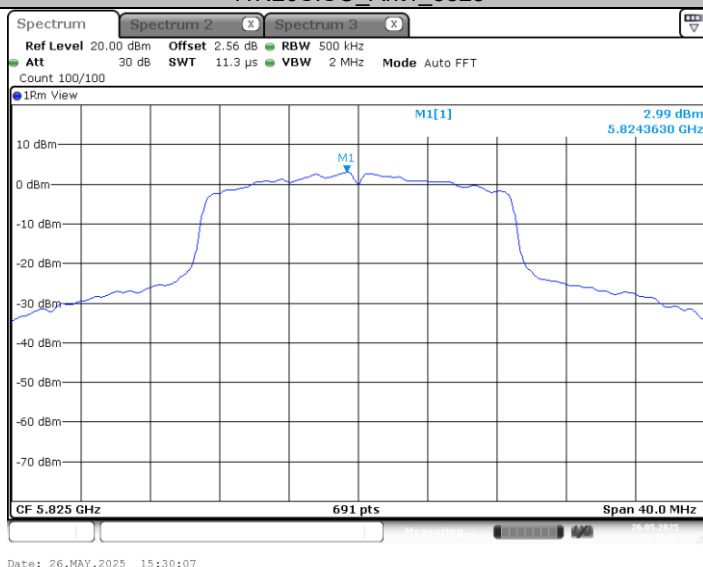
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11N20SISO\_Ant1\_5785



11N20SISO\_Ant1\_5825



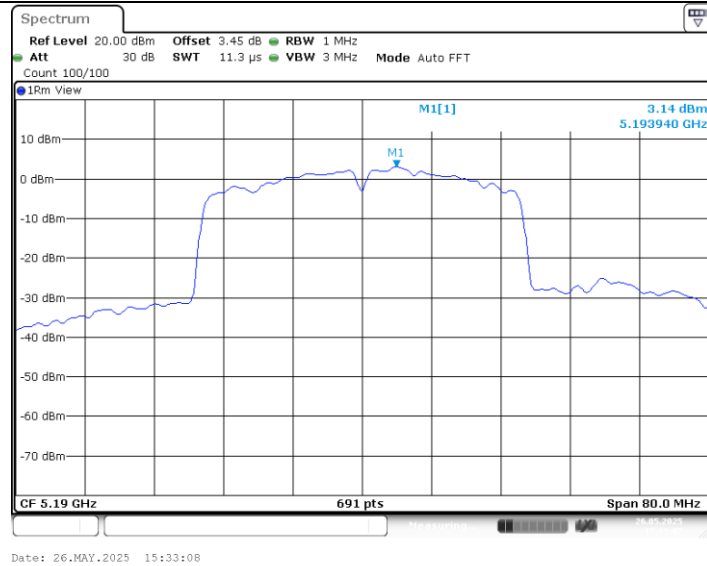
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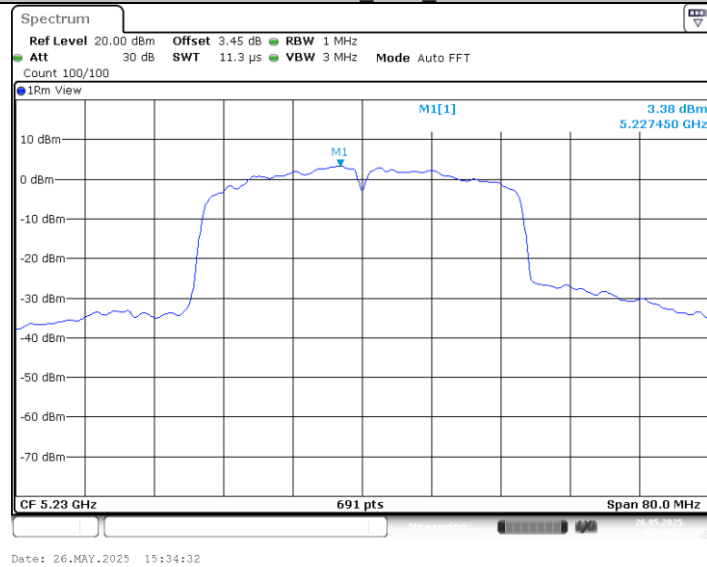
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TRF No: CTC-TR-062\_A2

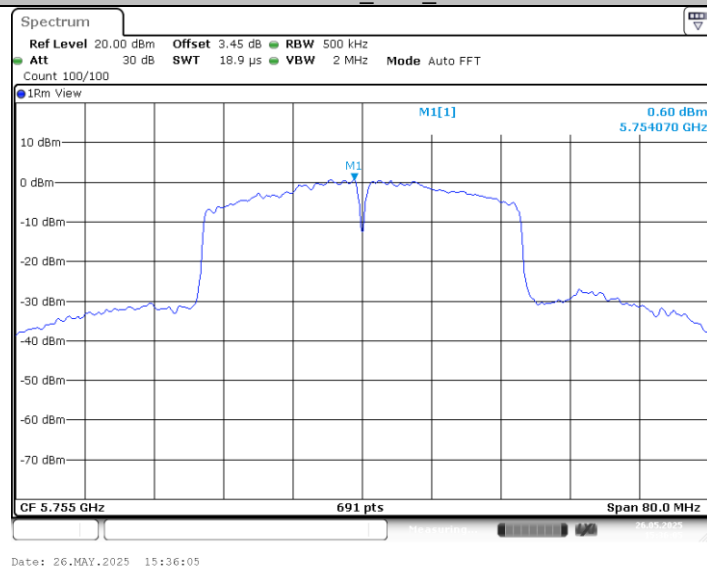
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Society : [yz.cncaq.com](http://yz.cncaq.com)



11N40SISO\_Ant1\_5230



11N40SISO\_Ant1\_5755



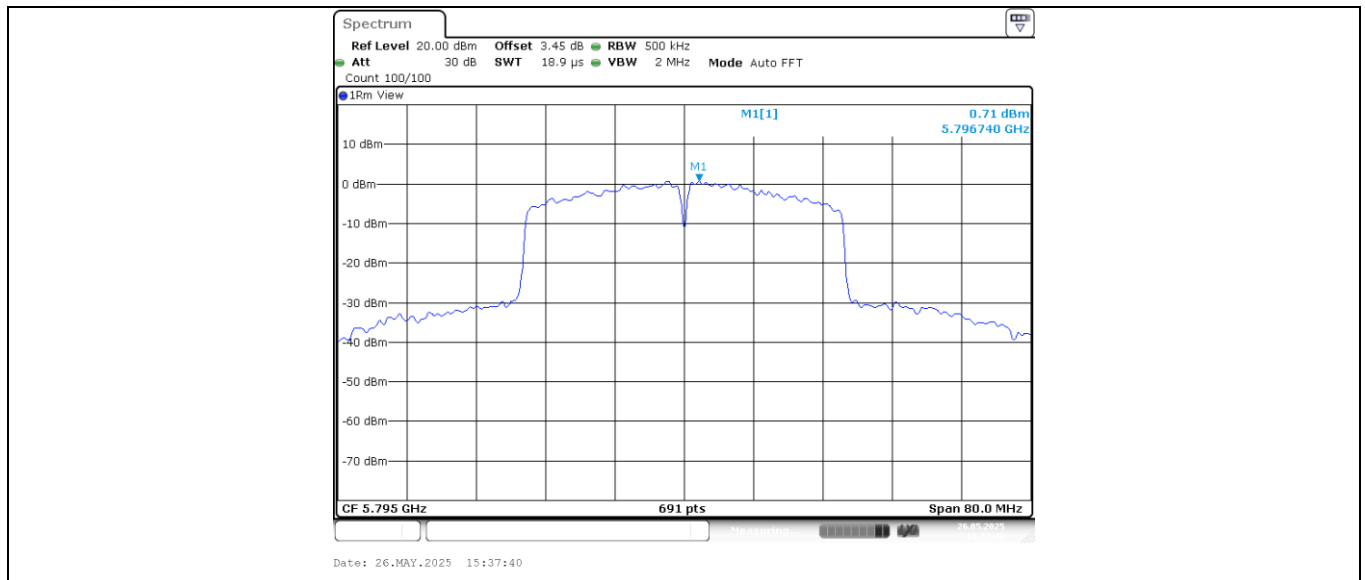
11N40SISO\_Ant1\_5795

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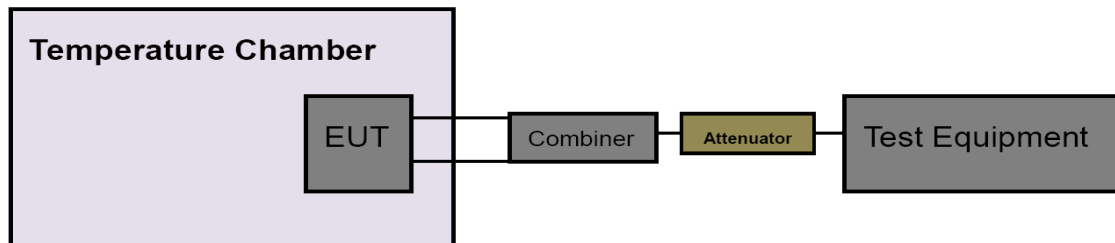
### 3.7. Frequency Stability

#### Limit

#### FCC CFR Title 47 Part 15 Subpart E Section 15.407(g) / RSS-Gen 6.11

Test Item	Limit	Frequency Range (MHz)
Frequency Stability	Specified in the user's manual, the transmitter center frequency tolerance shall be $\pm 20$ ppm maximum for the 5 GHz band (IEEE 802.11n specification)	5150~5250
		5250~5350
		5500~5700
		5725~5850

#### Test Configuration



#### Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyzer center frequency to transmitting frequency.
- (3) Set the span to encompass the entire emissions bandwidth (EBW) of the signal.
- (4) Set the RBW to: 8MHz, VBW=8MHz with peak detector and max hold settings.
- (5) The test extreme voltage is to change the primary supply voltage from 5Vdc percent of the nominal value.
- (6) Extreme temperature is -20°C~70°C

NOTE: The EUT was set to continuously transmitting in continuously un-modulation transmitting mode. NT is Normal Temperature, LT is Lower Temperature, HT is Higher Temperature, NV is Normal Voltage

#### Test Mode

Please refer to the clause 2.4.

**Test Result**

Voltage								
Test Mode	Antenna	Freq(MHz)	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Bandwidth 20MHz	Ant1	5180	NV	NT	-21480.00	-4.146718	20	PASS
			LV	NT	-21980.00	-4.243243	20	PASS
			HV	NT	-22480.00	-4.339768	20	PASS
		5200	NV	NT	-22980.00	-4.419231	20	PASS
			LV	NT	-23480.00	-4.515385	20	PASS
			HV	NT	-23480.00	-4.515385	20	PASS
		5240	NV	NT	-23480.00	-4.480916	20	PASS
			LV	NT	-23980.00	-4.576336	20	PASS
			HV	NT	-23980.00	-4.576336	20	PASS
		5745	NV	NT	-26470.00	-4.607485	20	PASS
			LV	NT	-26470.00	-4.607485	20	PASS
			HV	NT	-26470.00	-4.607485	20	PASS
		5785	NV	NT	-26970.00	-4.662057	20	PASS
			LV	NT	-26470.00	-4.575627	20	PASS
			HV	NT	-26970.00	-4.662057	20	PASS
Bandwidth 40MHz	Ant1	5190	NV	NT	-23980.00	-4.620424	20	PASS
			LV	NT	-23980.00	-4.620424	20	PASS
			HV	NT	-23980.00	-4.620424	20	PASS
		5230	NV	NT	-23980.00	-4.585086	20	PASS
			LV	NT	-23980.00	-4.585086	20	PASS
			HV	NT	-23980.00	-4.585086	20	PASS
		5755	NV	NT	-26470.00	-4.599479	20	PASS
			LV	NT	-26470.00	-4.599479	20	PASS
			HV	NT	-26470.00	-4.599479	20	PASS
		5795	NV	NT	-26970.00	-4.654012	20	PASS
			LV	NT	-26970.00	-4.654012	20	PASS
			HV	NT	-27470.00	-4.740293	20	PASS



Temperature								
Test Mode	Antenna	Freq(MHz)	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Bandwidth 20MHz	Ant1	5180	NV	-20	-22480.00	-4.339768	20	PASS
			NV	-10	-22480.00	-4.339768	20	PASS
			NV	0	-22480.00	-4.339768	20	PASS
			NV	10	-22480.00	-4.339768	20	PASS
			NV	20	-22480.00	-4.339768	20	PASS
			NV	30	-22980.00	-4.436293	20	PASS
			NV	40	-22480.00	-4.339768	20	PASS
			NV	50	-22980.00	-4.436293	20	PASS
			NV	60	-22980.00	-4.436293	20	PASS
			NV	70	-22980.00	-4.436293	20	PASS
		5200	NV	-20	-23480.00	-4.515385	20	PASS
			NV	-10	-22980.00	-4.419231	20	PASS
			NV	0	-22980.00	-4.419231	20	PASS
			NV	10	-22980.00	-4.419231	20	PASS
			NV	20	-22980.00	-4.419231	20	PASS
			NV	30	-23480.00	-4.515385	20	PASS
			NV	40	-23480.00	-4.515385	20	PASS
			NV	50	-23480.00	-4.515385	20	PASS
			NV	60	-23480.00	-4.515385	20	PASS
			NV	70	-23480.00	-4.515385	20	PASS
		5240	NV	-20	-23980.00	-4.576336	20	PASS
			NV	-10	-23480.00	-4.480916	20	PASS
			NV	0	-22980.00	-4.419231	20	PASS
			NV	10	-23480.00	-4.480916	20	PASS
			NV	20	-23480.00	-4.480916	20	PASS
			NV	30	-23480.00	-4.480916	20	PASS
			NV	40	-23980.00	-4.576336	20	PASS
			NV	50	-23980.00	-4.576336	20	PASS
			NV	60	-23980.00	-4.576336	20	PASS
			NV	70	-23980.00	-4.576336	20	PASS
		5745	NV	-20	-26470.00	-4.607485	20	PASS
			NV	-10	-26470.00	-4.607485	20	PASS
			NV	0	-26470.00	-4.607485	20	PASS
			NV	10	-26470.00	-4.607485	20	PASS
			NV	20	-26470.00	-4.607485	20	PASS
			NV	30	-26470.00	-4.607485	20	PASS
			NV	40	-26470.00	-4.607485	20	PASS
			NV	50	-26470.00	-4.607485	20	PASS
			NV	60	-26470.00	-4.607485	20	PASS
			NV	70	-26470.00	-4.607485	20	PASS
		5785	NV	-20	-26970.00	-4.662057	20	PASS
			NV	-10	-26970.00	-4.662057	20	PASS
			NV	0	-26970.00	-4.662057	20	PASS
			NV	10	-26970.00	-4.662057	20	PASS
			NV	20	-26470.00	-4.575627	20	PASS
			NV	30	-26970.00	-4.662057	20	PASS
			NV	40	-26970.00	-4.662057	20	PASS
			NV	50	-26970.00	-4.662057	20	PASS
			NV	60	-26970.00	-4.662057	20	PASS
			NV	70	-26970.00	-4.662057	20	PASS
		5825	NV	-20	-26970.00	-4.630043	20	PASS
			NV	-10	-26970.00	-4.630043	20	PASS
			NV	0	-26970.00	-4.630043	20	PASS
			NV	10	-26970.00	-4.630043	20	PASS
			NV	20	-26970.00	-4.630043	20	PASS
			NV	30	-26970.00	-4.630043	20	PASS
			NV	40	-27470.00	-4.715880	20	PASS
			NV	50	-26970.00	-4.630043	20	PASS
			NV	60	-26970.00	-4.630043	20	PASS
			NV	70	-26970.00	-4.630043	20	PASS
Bandwidth	Ant1	5190	NV	-20	-23980.00	-4.620424	20	PASS

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40MHz			NV	-10	-23980.00	-4.620424	20	PASS
			NV	0	-23980.00	-4.620424	20	PASS
			NV	10	-23980.00	-4.620424	20	PASS
			NV	20	-23980.00	-4.620424	20	PASS
			NV	30	-23980.00	-4.620424	20	PASS
			NV	40	-23480.00	-4.524085	20	PASS
			NV	50	-23480.00	-4.524085	20	PASS
			NV	60	-23480.00	-4.524085	20	PASS
			NV	70	-23480.00	-4.524085	20	PASS
		5230	NV	-20	-23480.00	-4.489484	20	PASS
			NV	-10	-23980.00	-4.585086	20	PASS
			NV	0	-23980.00	-4.585086	20	PASS
			NV	10	-23480.00	-4.489484	20	PASS
			NV	20	-23480.00	-4.489484	20	PASS
			NV	30	-23980.00	-4.585086	20	PASS
			NV	40	-23980.00	-4.585086	20	PASS
			NV	50	-23480.00	-4.489484	20	PASS
			NV	60	-23980.00	-4.585086	20	PASS
			NV	70	-23980.00	-4.585086	20	PASS
		5755	NV	-20	-26970.00	-4.686360	20	PASS
			NV	-10	-26970.00	-4.686360	20	PASS
			NV	0	-26970.00	-4.686360	20	PASS
			NV	10	-26970.00	-4.686360	20	PASS
			NV	20	-26970.00	-4.686360	20	PASS
			NV	30	-26970.00	-4.686360	20	PASS
			NV	40	-26970.00	-4.686360	20	PASS
			NV	50	-26970.00	-4.686360	20	PASS
			NV	60	-26970.00	-4.686360	20	PASS
			NV	70	-26970.00	-4.686360	20	PASS
		5795	NV	-20	-26970.00	-4.654012	20	PASS
			NV	-10	-26970.00	-4.654012	20	PASS
			NV	0	-26970.00	-4.654012	20	PASS
			NV	10	-26970.00	-4.654012	20	PASS
			NV	20	-26970.00	-4.654012	20	PASS
			NV	30	-26970.00	-4.654012	20	PASS
			NV	40	-26970.00	-4.654012	20	PASS
			NV	50	-26970.00	-4.654012	20	PASS
			NV	60	-26970.00	-4.654012	20	PASS
			NV	70	-26970.00	-4.654012	20	PASS



### 3.8. Antenna Requirement

#### Requirement

##### **FCC CFR Title 47 Part 15 Subpart C Section 15.203**

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

#### Test Result

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



### 3.9. Dynamic Frequency Selection

#### Requirement

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

**Limit****1. DFS Detection Thresholds**

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0dBi receive antenna.  
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.  
Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

**2. DFS Response Requirements**

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.  
Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.  
Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

**Radar Test Waveforms**

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.



Table 5 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup} \left\{ \left( \frac{1}{360} \right) \cdot \left( \frac{19 \cdot 10^6}{\text{PRI}_{\mu\text{sec}}} \right) \right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 μsec is selected, the number of pulses

$$\left\{ \left( \frac{1}{360} \right) \cdot \left( \frac{19 \cdot 10^6}{3066} \right) \right\}$$

would be Round up  $\left\{ \left( \frac{1}{360} \right) \cdot \left( \frac{19 \cdot 10^6}{3066} \right) \right\} = \text{Round up } \{17.2\} = 18$ .

Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658

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Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveform are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type waveforms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

For the Frequency Hopping Radar Type, the same Burst parameters are used for each wave form. The hopping sequence is different for each wave form and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

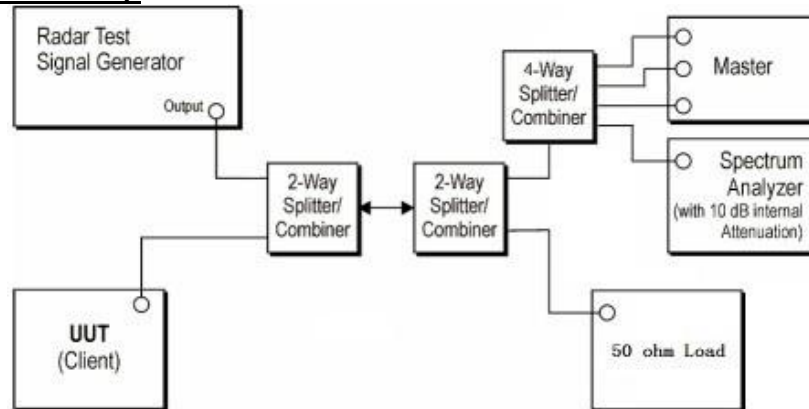
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250–5724MHz. Next, the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

## Calibration of Radar Waveform

### Radar Waveform Calibration Procedure

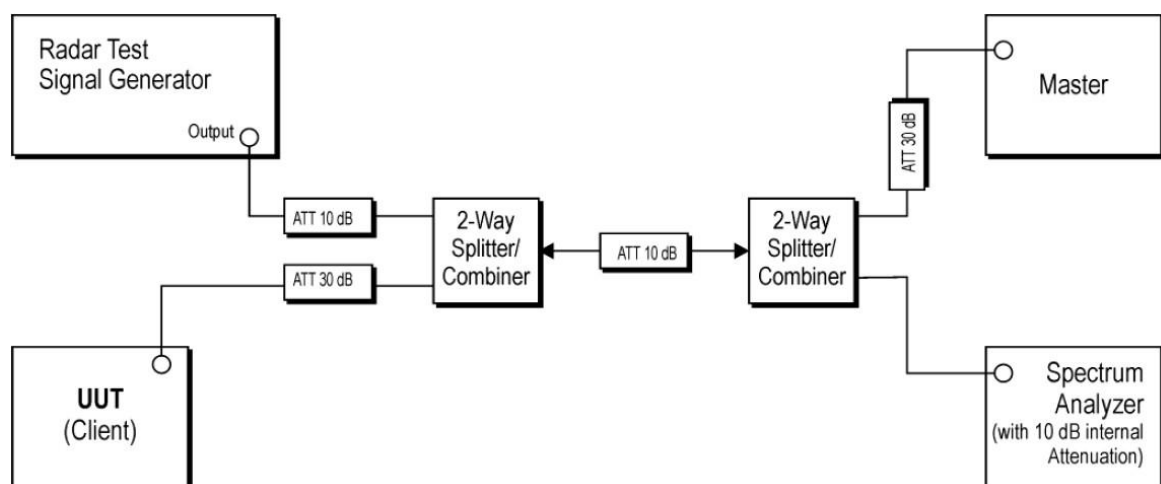
- 1) A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master.
- 2) The interference Radar Detection Threshold Level is  $-62\text{dBm} - 4.64\text{dBi} + 1\text{dB} = -65.64\text{dBm}$  that had been taken into account the output power range and antenna gain.
- 3) The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz. The spectrum analyzer had offset -1.0dB to compensate RF cable loss 1.0dB.
- 4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was  $-62\text{dBm} - 4.64\text{dBi} + 1\text{dB} = -65.64\text{dBm}$ . Capture the spectrum analyzer plots on short pulse radar waveform.

### Conducted Calibration Setup



### Test Configuration

#### Setup for Client with injection at the Master





## **Radar Waveform Calibration Result**

Not Applicable.

## **Test Procedure**

1. The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device
3. A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
4. EUT will associate with the master at channel. The file "iperf.exe" specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
5. When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
6. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type
7. Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by:  $Dwell (0.3ms) = S (12000ms) / B (4000)$ ; where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by:  $C (ms) = N \times Dwell (0.3ms)$ ; where C is the Closing Time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.
8. Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

## **Test Mode**

Please refer to the clause 2.4.

## **Test Result**

Not Applicable.

\*\*\*\*\*THE END OF REPORT\*\*\*\*\*