



TEST REPORT

Report No. : **CTC2025340802**
FCC ID..... : **XUJLAUNCHITPMS**
Applicant : **Launch Tech Co., Ltd.**
Address..... : No.4012, Launch Industrial Park, North Wuhe Rd, Bantian Street, Longgang District, Shenzhen, China
Manufacturer..... : Launch Tech Co., Ltd.
Address..... : No.4012, Launch Industrial Park, North Wuhe Rd, Bantian Street, Longgang District, Shenzhen, China
Product Name : **Modular activation programming tool**
Trade Mark : LAUNCH
Model/Type reference..... : LAUNCH i-TPMS
Listed Model(s)..... : /
Standard : **FCC CFR Title 47 Part 15 Subpart C Section 15.247**
Test Report Form No : CTC-TR-059_A2
Master TRF..... : Dated 2025-05-12
Date of receipt of test sample..... : May 27, 2025
Date of testing..... : May 27, 2025 ~ Jun. 20, 2025
Date of issue..... : Jun. 23, 2025
Result..... : **PASS**

Compiled by:

(Printed name+signature)

Jim Jiang

Jim Jiang

Supervised by:

(Printed name+signature)

Eric Zhang

Eric Zhang

Approved by:

(Printed name+signature)

Totti Zhao

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.

[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	CTC2025340802	Jun. 23, 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	ISED		
Antenna Requirement	15.203	RSS-Gen 6.8	Pass	Jim Jiang
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Jim Jiang
Restricted Bands	15.205	RSS-Gen 8.10	Pass	Jim Jiang
Hopping Channel Separation	15.247(a)(1)	RSS-247 5.1 (b)	Pass	Jim Jiang
Dwell Time	15.247(a)(iii)	RSS-247 5.1 (d)	Pass	Jim Jiang
Maximum Output Power	15.247(b)(1)	RSS-247 5.4 (b)	Pass	Jim Jiang
Number of Hopping Frequency	15.247(a)(iii)	RSS-247 5.1 (d)	Pass	Jim Jiang
Conducted Band Edge and Spurious Emissions	15.247(d)	RSS-247 5.5	Pass	Jim Jiang
Radiated Band Edge and Spurious Emissions	15.205&15.209&15.247(d)	RSS-247 5.5	Pass	Jim Jiang
Radiated Spurious Emission	15.247(d) &15.209	RSS-247 5.5&RSS-Gen 8.9	Pass	Jim Jiang
20dB Bandwidth	15.247(a)	RSS-247 5.1 (b)	Pass	Jim Jiang
Occupied Bandwidth	/	RSS-Gen 6.7	Pass	Jim Jiang

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
20dB Emission Bandwidth	$\pm 0.0196\%$	(1)
Carrier Frequency Separation	$\pm 1.9\%$	(1)
Number of Hopping Channel	$\pm 1.9\%$	(1)
Time of Occupancy	$\pm 0.028\%$	(1)
Max Peak Conducted Output Power	± 0.743 dB	(1)
Band-edge Spurious Emission	± 1.328 dB	(1)
Conducted RF Spurious Emission	9kHz-1GHz: ± 0.746 dB 1GHz-26GHz: ± 1.328 dB	(1)
Conducted Emissions 9kHz~30MHz	± 3.08 dB	(1)
Radiated Emissions 30~1000MHz	± 4.51 dB	(1)
Radiated Emissions 1~18GHz	± 5.84 dB	(1)
Radiated Emissions 18~40GHz	± 6.12 dB	(1)

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:	Launch Tech Co., Ltd.
Address:	No.4012, Launch Industrial Park, North Wuhe Rd, Bantian Street, Longgang District, Shenzhen, China
Manufacturer:	Launch Tech Co., Ltd.
Address:	No.4012, Launch Industrial Park, North Wuhe Rd, Bantian Street, Longgang District, Shenzhen, China

2.2. General Description of EUT

Product Name:	Modular activation programming tool
Trade Mark:	LAUNCH
Model/Type reference:	LAUNCH i-TPMS
Listed Model(s):	/
Model Difference:	/
Sample ID:	CTC250516-007-S002, CTC250516-007-S003
Power Supply:	USB Input: DC5V 1A 3.7V 2000mAh from lithium battery
Hardware Version:	V1.00.000
Software Version:	V1.18
Bluetooth 4.2 / BR+EDR	
Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Operation Frequency:	2402MHz~2480MHz
Channel Number:	79
Channel Separation:	1MHz
Antenna Type:	PCB Antenna
Antenna Gain:	-1.36dBi



2.3. Accessory Equipment Information

Equipment Information			
Name	Model	S/N	Manufacturer
Notebook	ThinkBook 14 G3 ACL	MP246QDR	Lenovo
Adapter	A2167	/	Apple
Cable Information			
Name	Shielded Type	Ferrite Core	Length
USB Cable	Unshielded	NO	100cm
Test Software Information			
Name	Version	/	/
RTLBTAPP	V2017.10.20	/	/



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. BT EDR, 79 channels are provided to the EUT. Channels 00/39/78 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
00	2402
01	2403
:	:
38	2440
39	2441
40	2442
:	:
77	2479
78	2480

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

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 charges through the adapter.
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	Cal. Until
1	MXA Signal Analyzer	Keysight	N9020A	MY52091402	Dec. 13, 2024	Dec. 12, 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 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	Mirowave 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
14	Low noise Amplifier	Tonscend	TAP180040048	AP24C8060348	Dec. 13, 2024	Dec. 12, 2025
Test Software						
Name		Manufacturer		Software Version		
EZ-EMC		FARA		FA-03A2		

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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
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

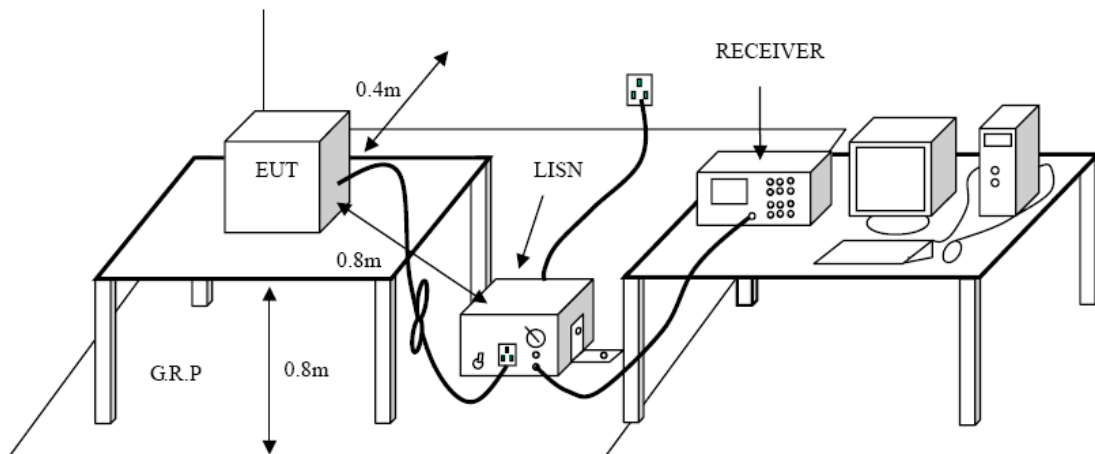
Limit

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

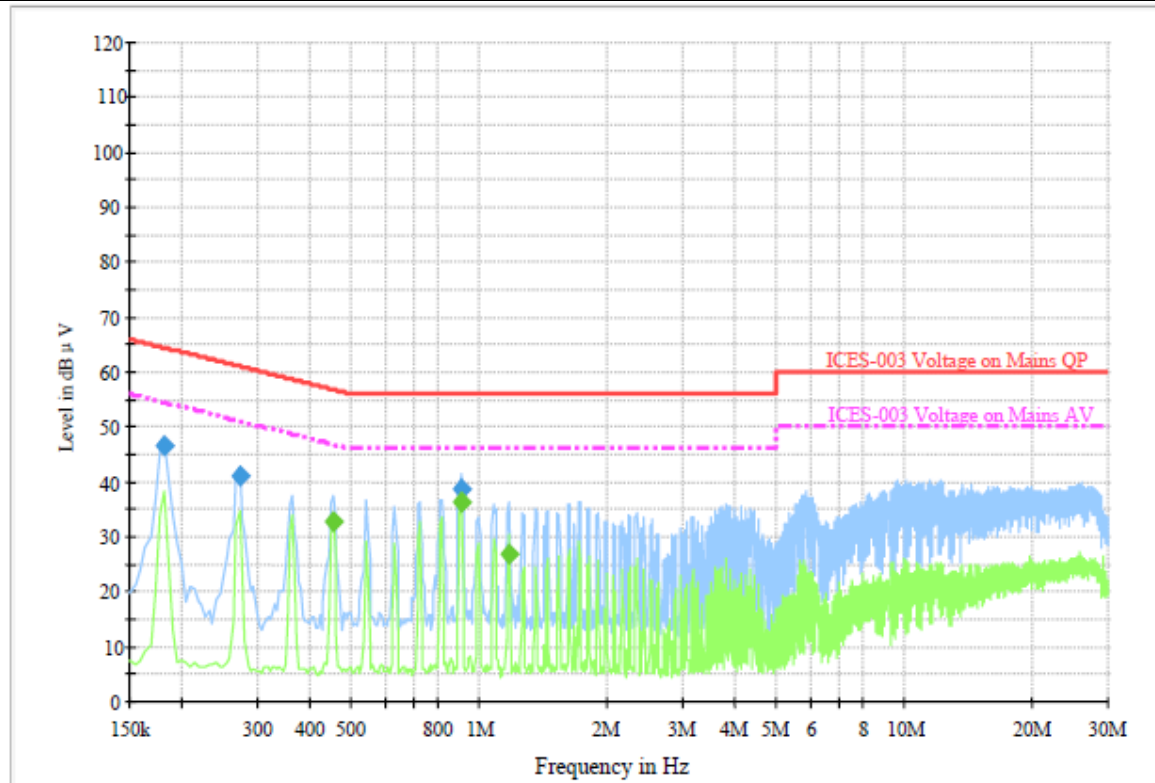
1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from 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 (dB μV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μV)	Comment
0.181500	46.5	1000.00	9.000	On	L1	9.5	17.9	64.4	
0.271500	41.0	1000.00	9.000	On	L1	9.5	20.1	61.1	
0.906000	38.9	1000.00	9.000	On	L1	9.5	17.1	56.0	

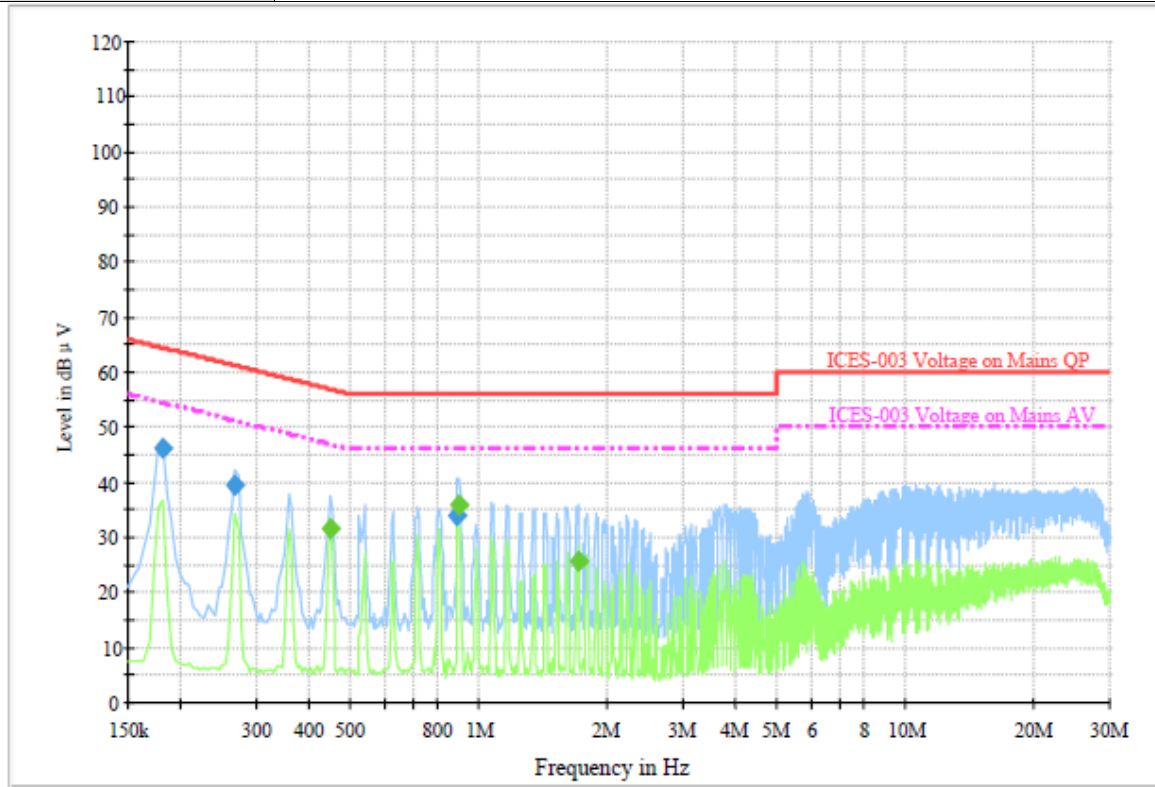
Final Measurement Detector 2

Frequency (MHz)	Average (dB μV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μV)	Comment
0.451500	32.6	1000.00	9.000	On	L1	9.5	14.2	46.8	
0.901500	36.4	1000.00	9.000	On	L1	9.5	9.6	46.0	
1.176000	26.9	1000.00	9.000	On	L1	9.6	19.1	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 (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.181500	46.2	1000.00	9.000	On	N	9.5	18.2	64.4	
0.267000	39.3	1000.00	9.000	On	N	9.4	21.9	61.2	
0.888000	34.1	1000.00	9.000	On	N	9.4	21.9	56.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dB μ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)	Comment
0.447000	31.7	1000.00	9.000	On	N	9.4	15.2	46.9	
0.897000	35.8	1000.00	9.000	On	N	9.4	10.2	46.0	
1.702500	25.6	1000.00	9.000	On	N	9.4	20.4	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

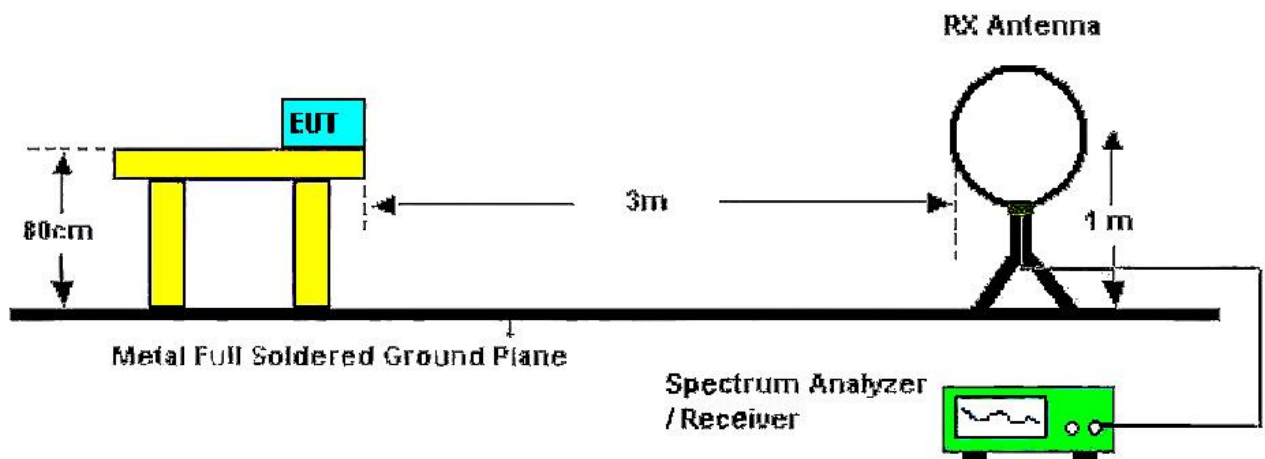
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

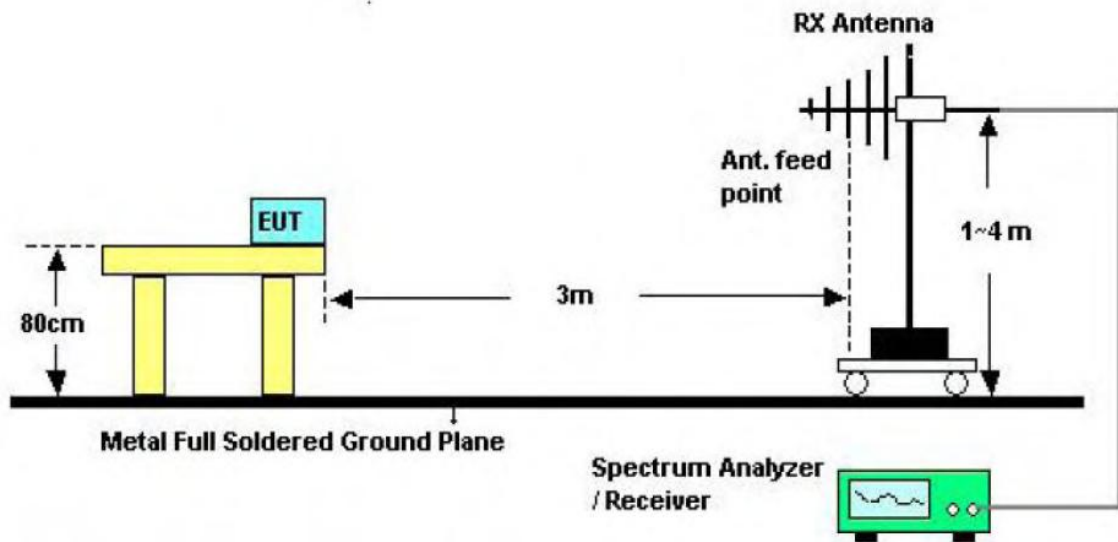
Frequency Range (MHz)	dBμV/m (at 3 meters)	
	Peak	Average
Above 1000	74	54

Note:

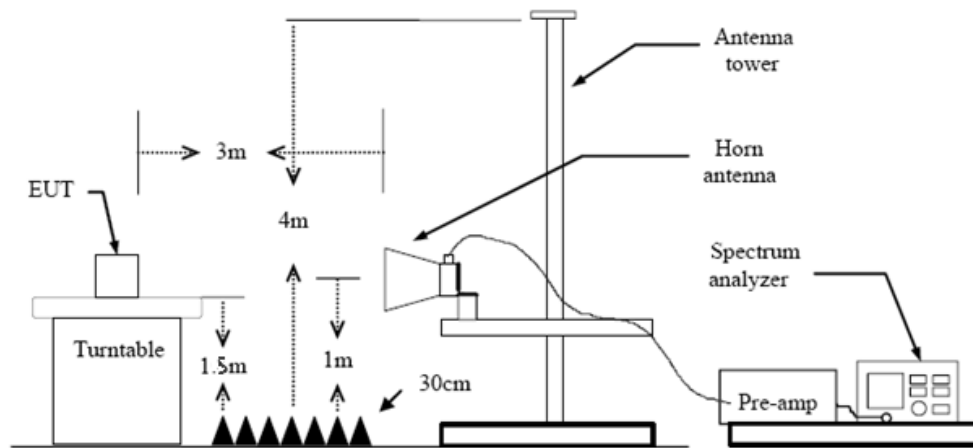
- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBμV/m)=20log Emission Level (μV/m).

Test Configuration





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

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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 10th 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 3.10 Duty Cycle.

Test Mode

Please refer to the clause 2.4.

Test Result

9 kHz~30 MHz

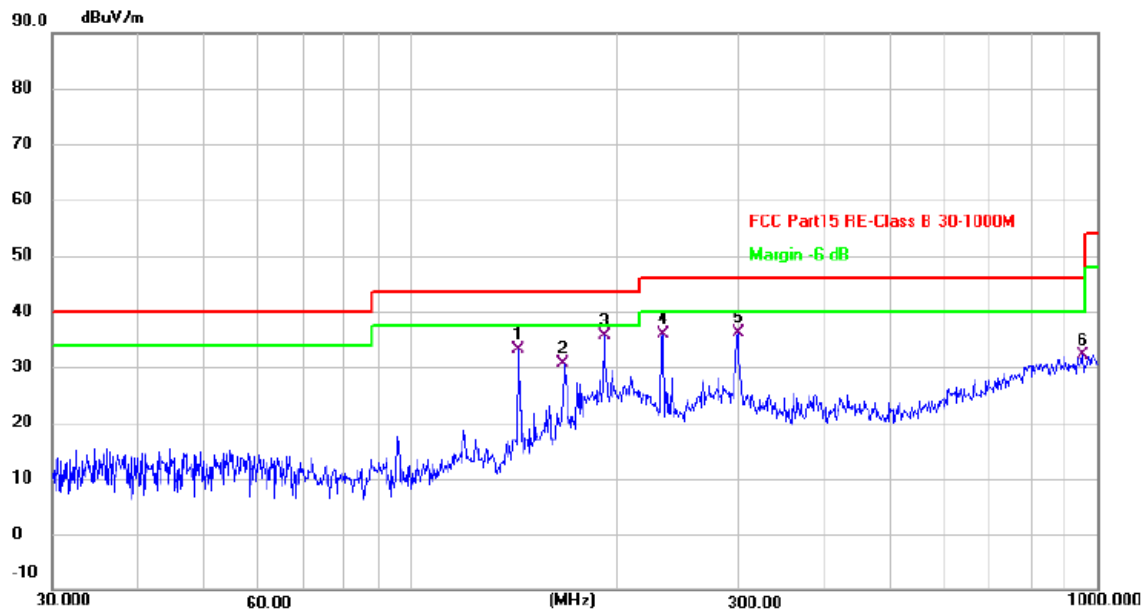
From 9 kHz to 30 MHz: The conclusion is PASS.

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 GFSK Mode 2402MHz
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	143.3257	49.89	-16.64	33.25	43.50	-10.25	QP
2	167.2366	47.03	-16.35	30.68	43.50	-12.82	QP
3 *	191.0738	54.44	-18.90	35.54	43.50	-7.96	QP
4	232.5318	54.03	-18.22	35.81	46.00	-10.19	QP
5	299.3158	51.84	-15.69	36.15	46.00	-9.85	QP
6	952.0937	33.72	-1.66	32.06	46.00	-13.94	QP

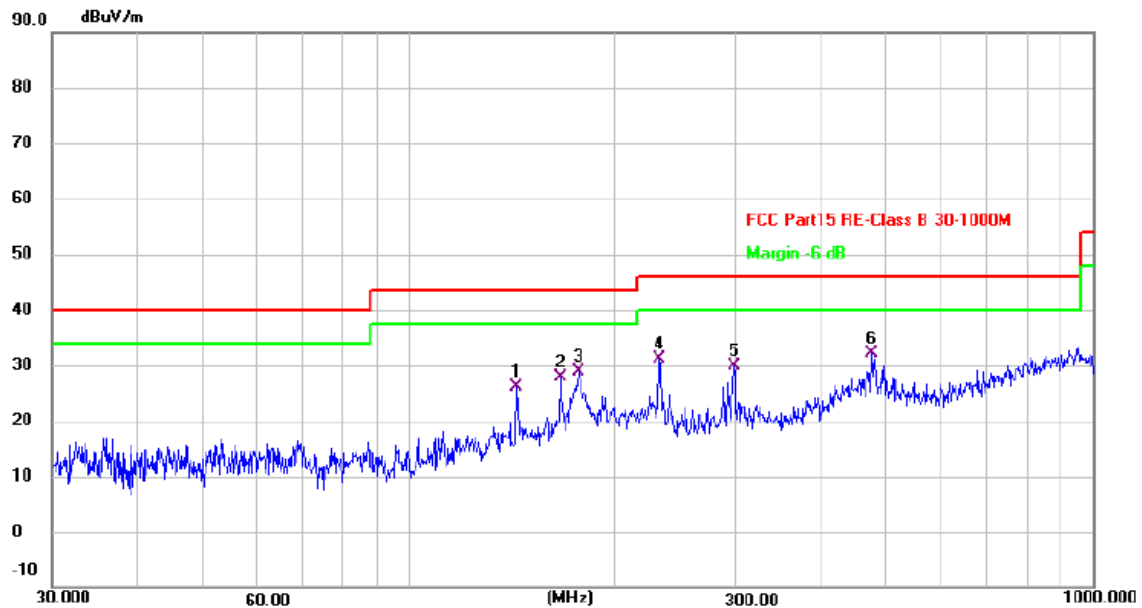
Remarks:

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 GFSK Mode 2402MHz
Remark:	Only worse case is reported.



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	143.3257	42.88	-16.64	26.24	43.50	-17.26	QP
2	166.0680	44.24	-16.28	27.96	43.50	-15.54	QP
3	176.8874	46.11	-17.33	28.78	43.50	-14.72	QP
4	231.7178	49.38	-18.26	31.12	46.00	-14.88	QP
5	298.2681	45.74	-15.75	29.99	46.00	-16.01	QP
6 *	473.8346	43.05	-11.01	32.04	46.00	-13.96	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 GFSK Mode 2402MHz						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2402MHz						
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	4803.909	42.29	1.84	44.13	74.00	-29.87	peak
2 *	4803.912	27.24	1.84	29.08	54.00	-24.92	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 GFSK Mode 2441MHz
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 *	4881.760	27.03	1.96	28.99	54.00	-25.01	AVG
2	4881.880	41.41	1.96	43.37	74.00	-30.63	peak

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 GFSK Mode 2441MHz
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	4881.859	42.46	1.96	44.42	74.00	-29.58	peak
2 *	4881.881	27.19	1.96	29.15	54.00	-24.85	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 GFSK Mode 2480MHz
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	4959.799	41.69	2.08	43.77	74.00	-30.23	peak
2 *	4960.239	27.25	2.08	29.33	54.00	-24.67	AVG

Remarks:

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

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX GFSK Mode 2480MHz
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	4959.924	41.56	2.08	43.64	74.00	-30.36	peak
2 *	4959.935	27.34	2.08	29.42	54.00	-24.58	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 $\pi/4$ -DQPSK Mode 2402MHz						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX $\pi/4$ -DQPSK Mode 2402MHz						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						



Ant. Pol.	Horizontal
Test Mode:	TX $\pi/4$ -DQPSK Mode 2441MHz
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 *	4881.713	27.36	1.96	29.32	54.00	-24.68	AVG
2	4881.867	41.83	1.96	43.79	74.00	-30.21	peak

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 $\pi/4$ -DQPSK Mode 2441MHz
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	4882.131	41.35	1.96	43.31	74.00	-30.69	peak
2 *	4882.199	26.89	1.96	28.85	54.00	-25.15	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 $\pi/4$ -DQPSK Mode 2480MHz
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 *	4959.911	26.92	2.08	29.00	54.00	-25.00	AVG
2	4960.234	41.75	2.08	43.83	74.00	-30.17	peak

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 $\pi/4$ -DQPSK Mode 2480MHz
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 *	4959.779	26.81	2.08	28.89	54.00	-25.11	AVG
2	4959.792	41.55	2.08	43.63	74.00	-30.37	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 8-DPSK Mode 2402MHz
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 *	4804.073	27.65	1.84	29.49	54.00	-24.51	AVG
2	4804.131	42.27	1.84	44.11	74.00	-29.89	peak

Remarks:

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

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 8-DPSK Mode 2402MHz
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	4803.896	42.10	1.84	43.94	74.00	-30.06	peak
2 *	4804.216	27.23	1.84	29.07	54.00	-24.93	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 8-DPSK Mode 2441MHz
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	4881.880	42.33	1.96	44.29	74.00	-29.71	peak
2 *	4882.126	27.65	1.96	29.61	54.00	-24.39	AVG

Remarks:

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

2.Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 8-DPSK Mode 2441MHz
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	4882.135	42.17	1.96	44.13	74.00	-29.87	peak
2 *	4882.190	27.98	1.96	29.94	54.00	-24.06	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 8-DPSK Mode 2480MHz
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	4959.861	41.40	2.08	43.48	74.00	-30.52	peak
2 *	4959.982	27.08	2.08	29.16	54.00	-24.84	AVG

Remarks:

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

2. Margin value = Level -Limit value

Ant. Pol.	Vertical
Test Mode:	TX 8-DPSK Mode 2480MHz
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	4959.918	41.28	2.08	43.36	74.00	-30.64	peak
2 *	4960.134	26.95	2.08	29.03	54.00	-24.97	AVG

Remarks:

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

2. Margin value = Level -Limit value

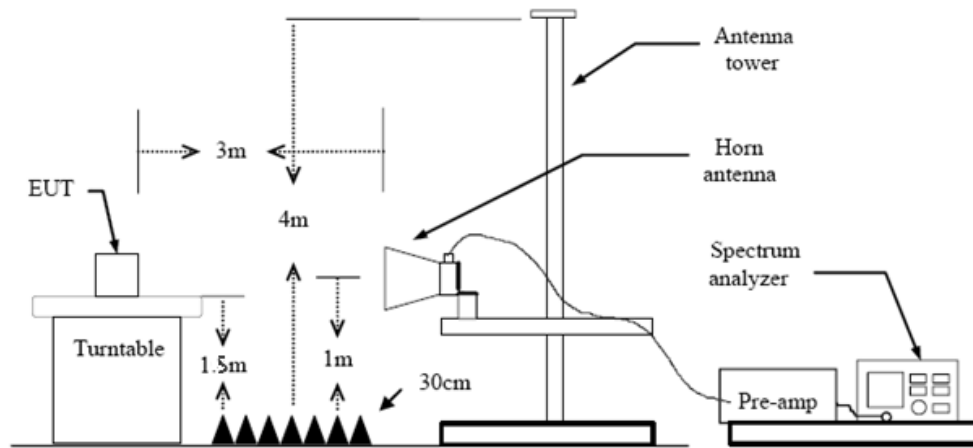
3.3. Band Edge Emissions (Radiated)

Limit

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

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

Test Configuration



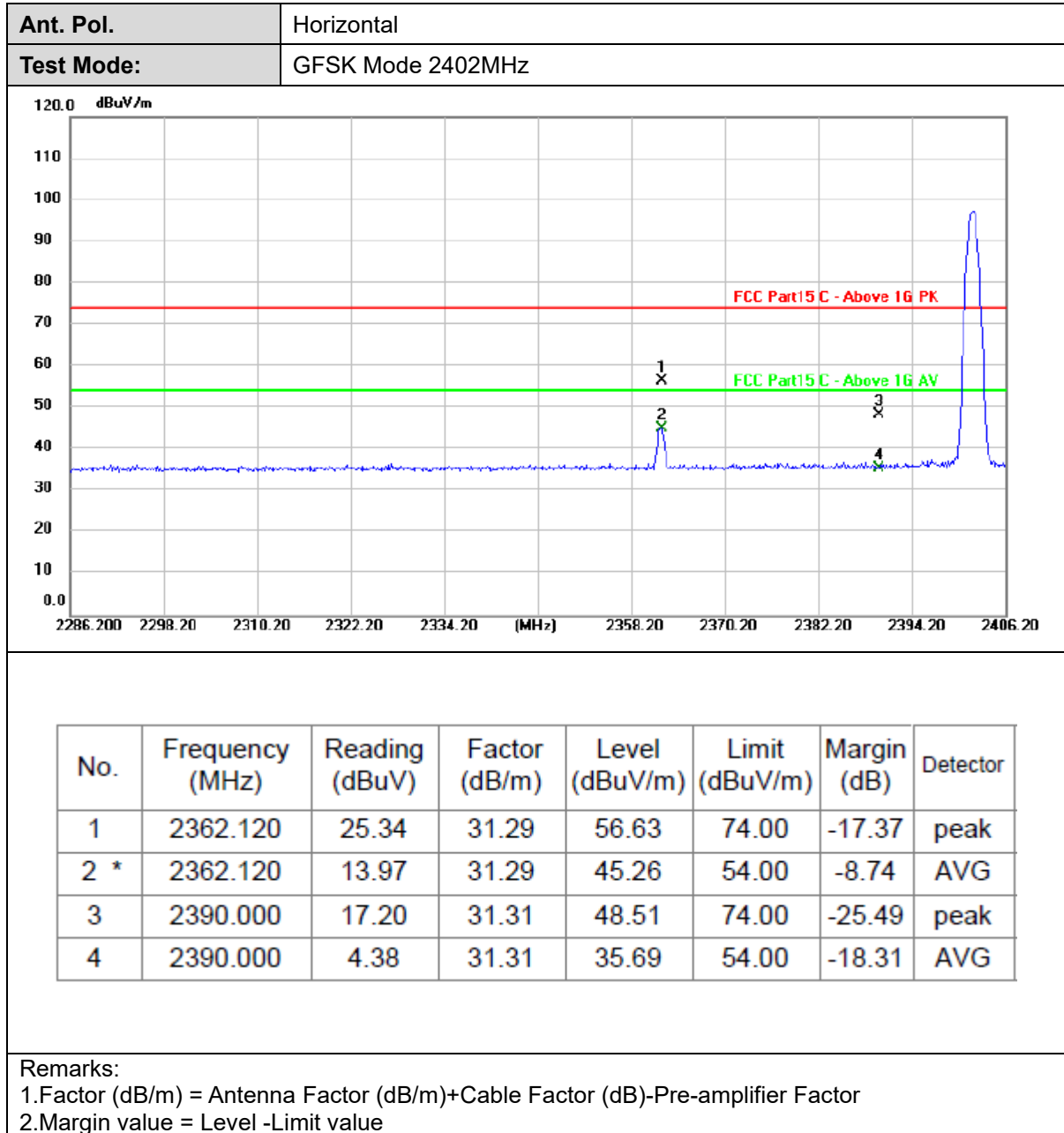
Test Procedure

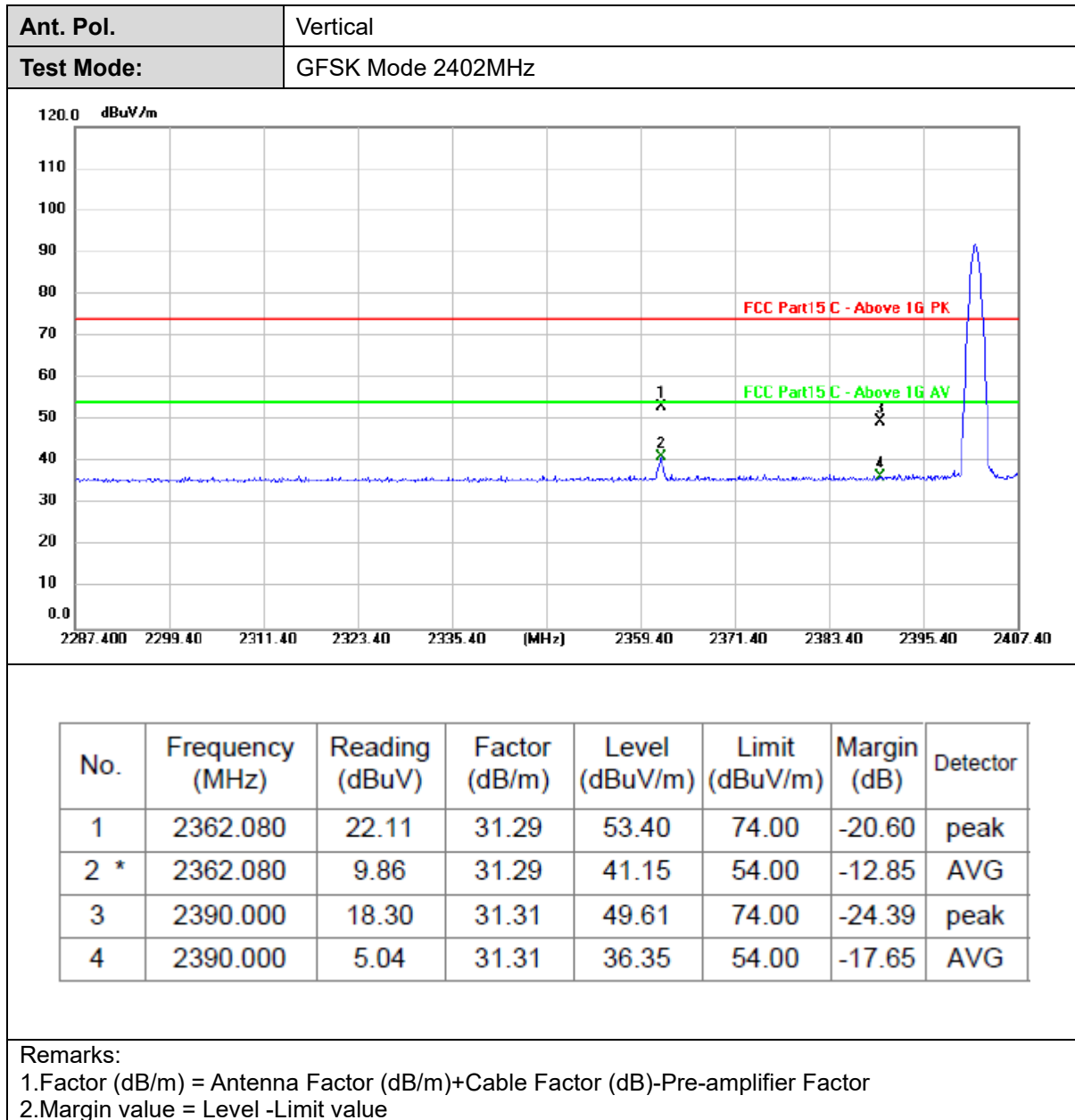
1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna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

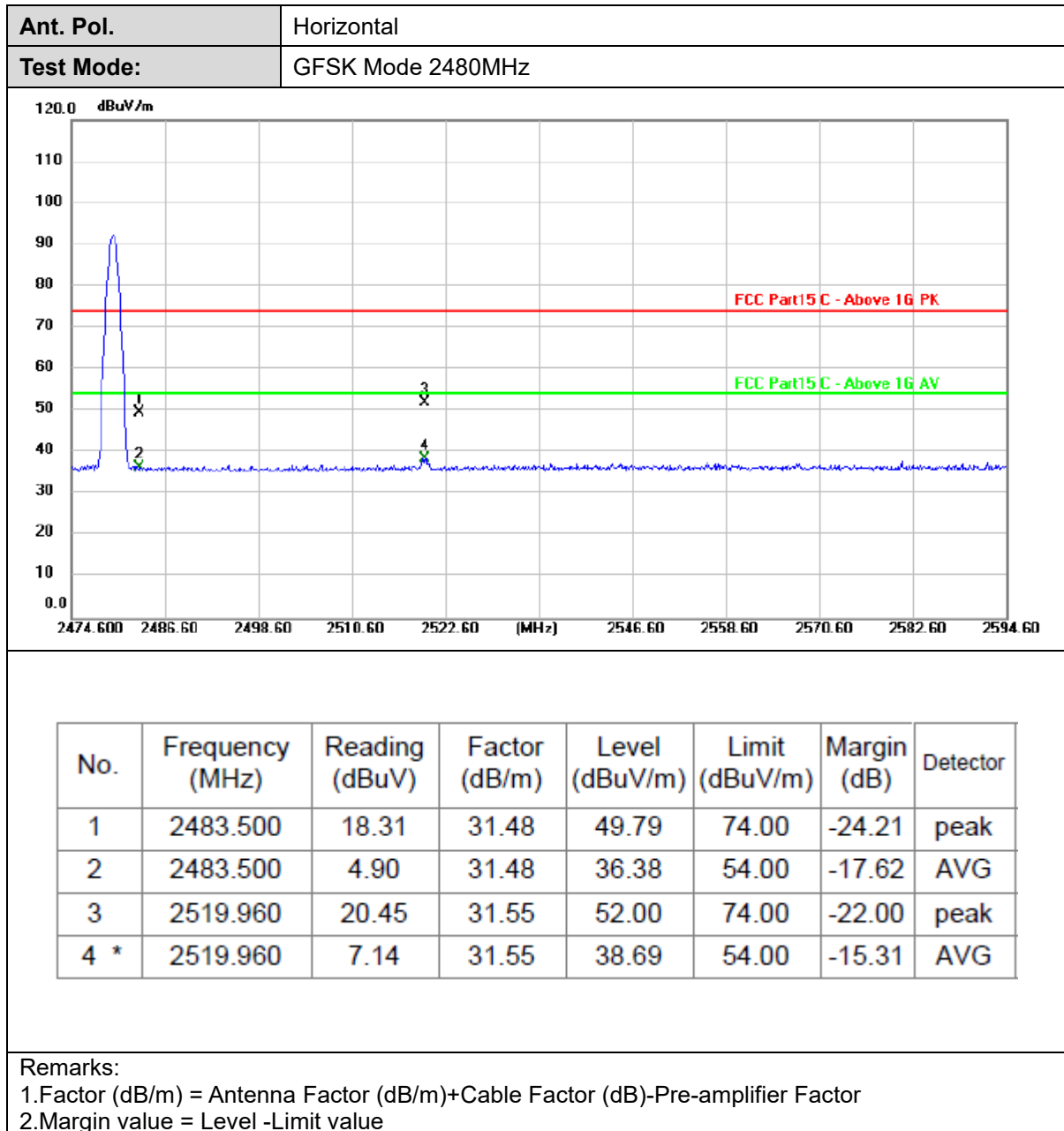
Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.10 Duty Cycle.

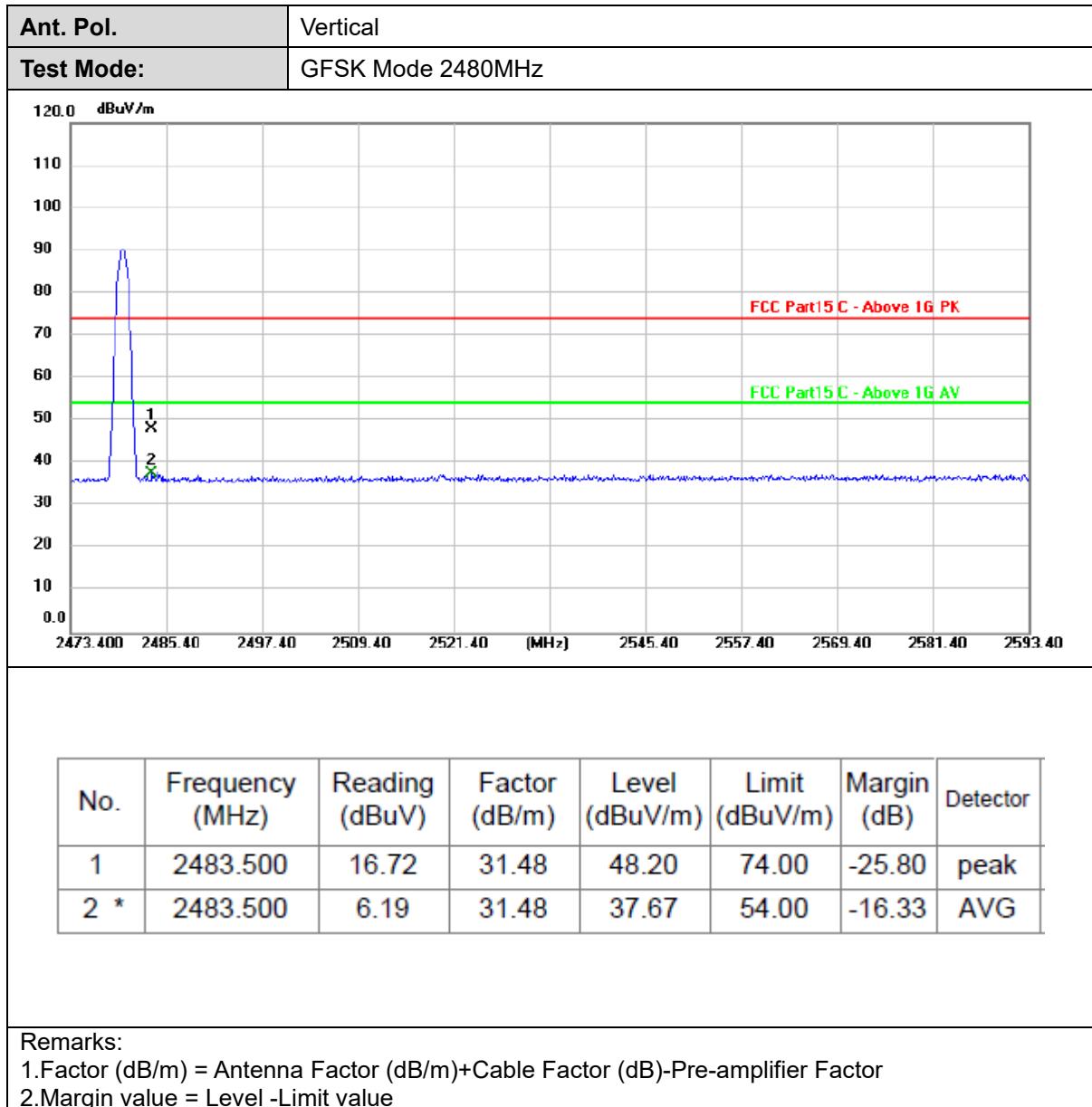
Test Mode

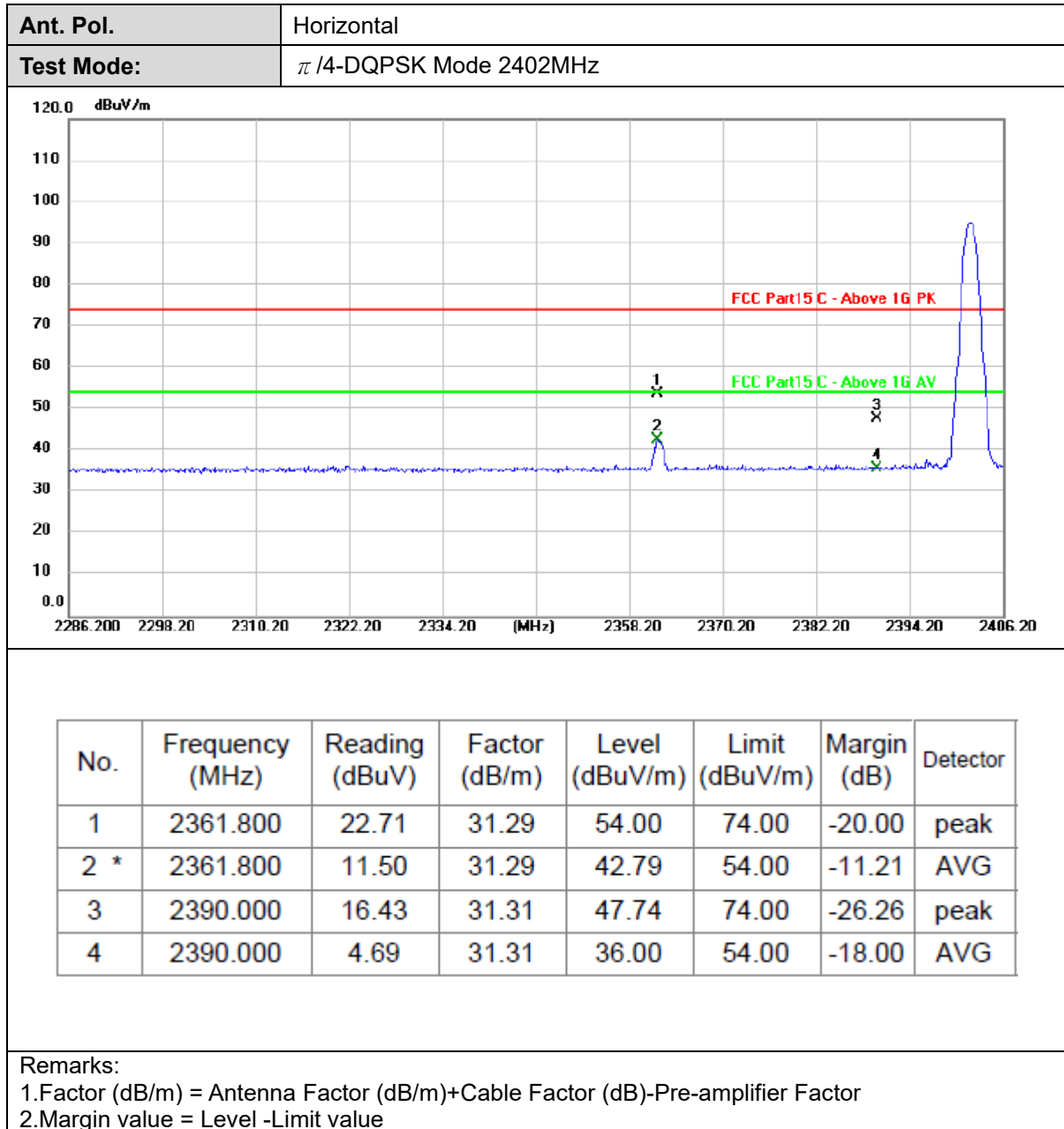
Please refer to the clause 2.4.

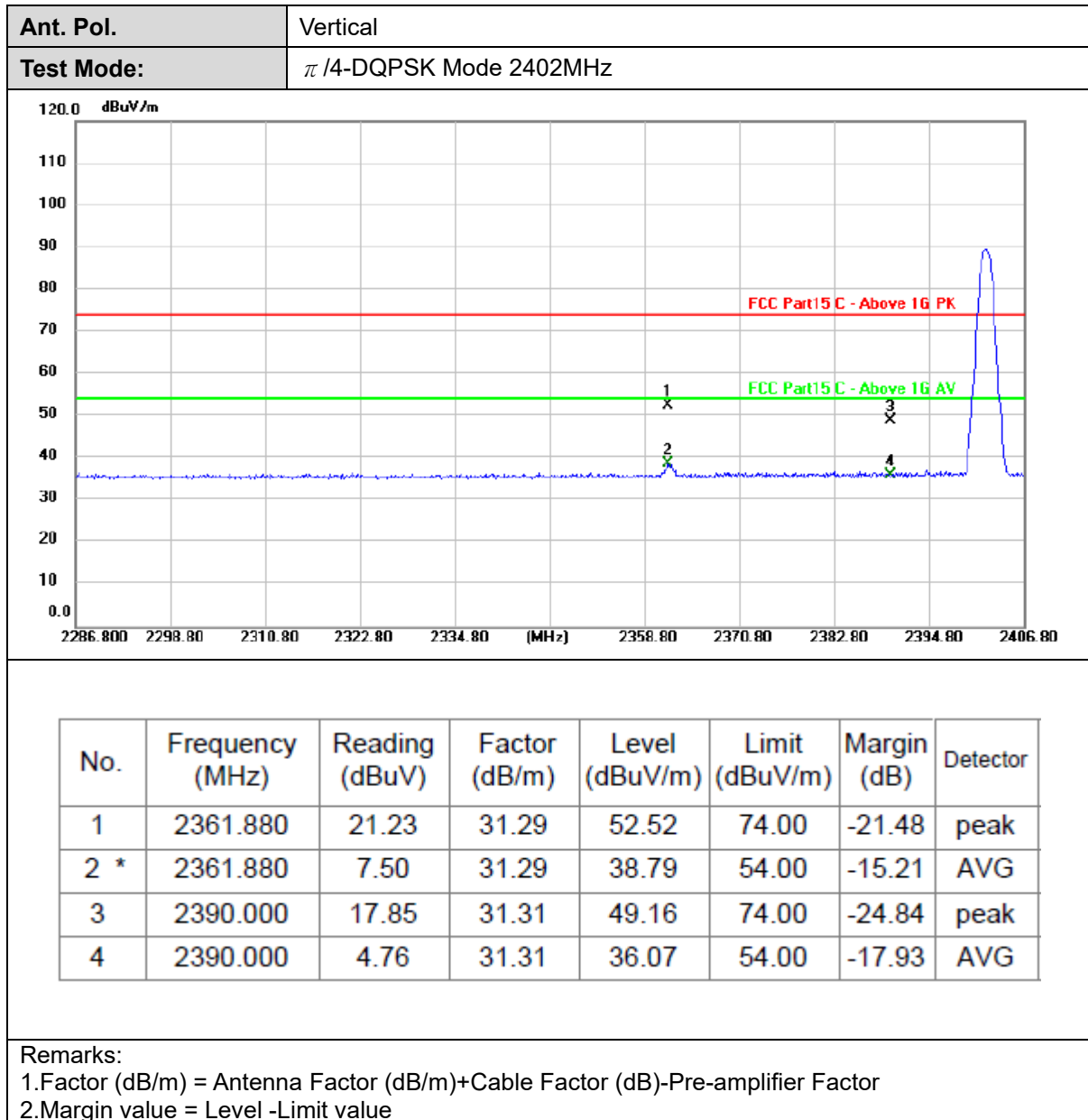
**Test Result**

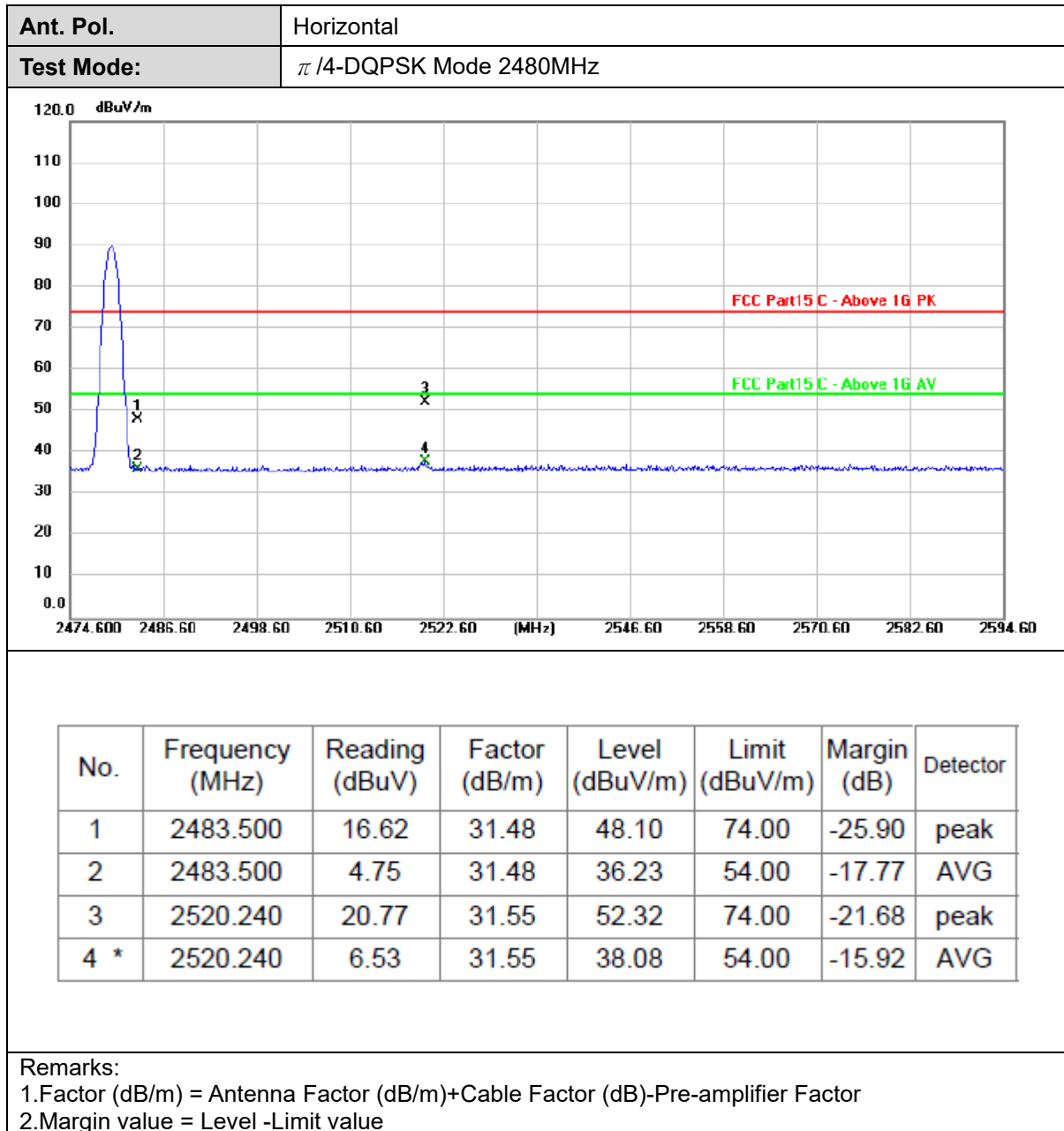


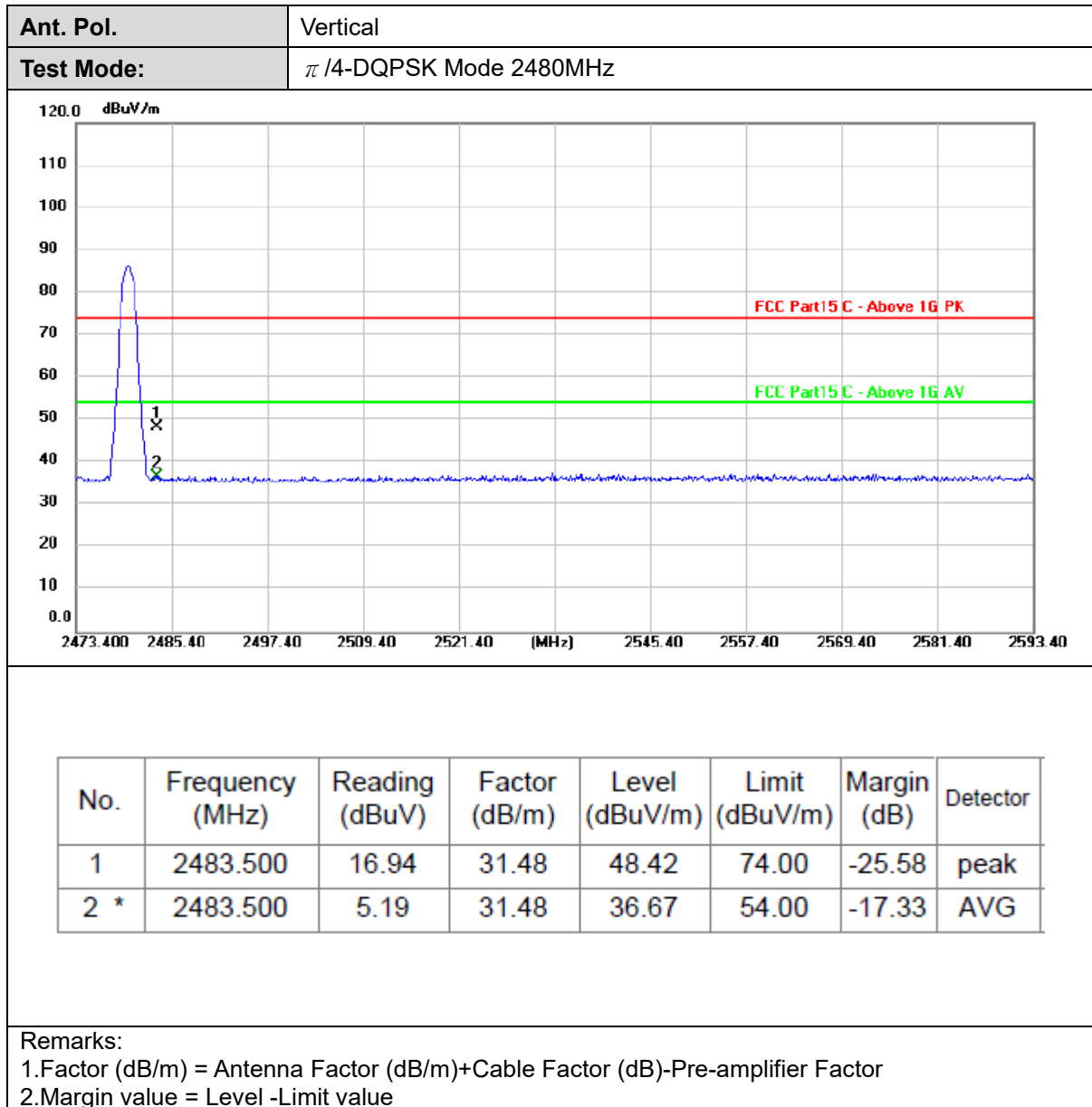


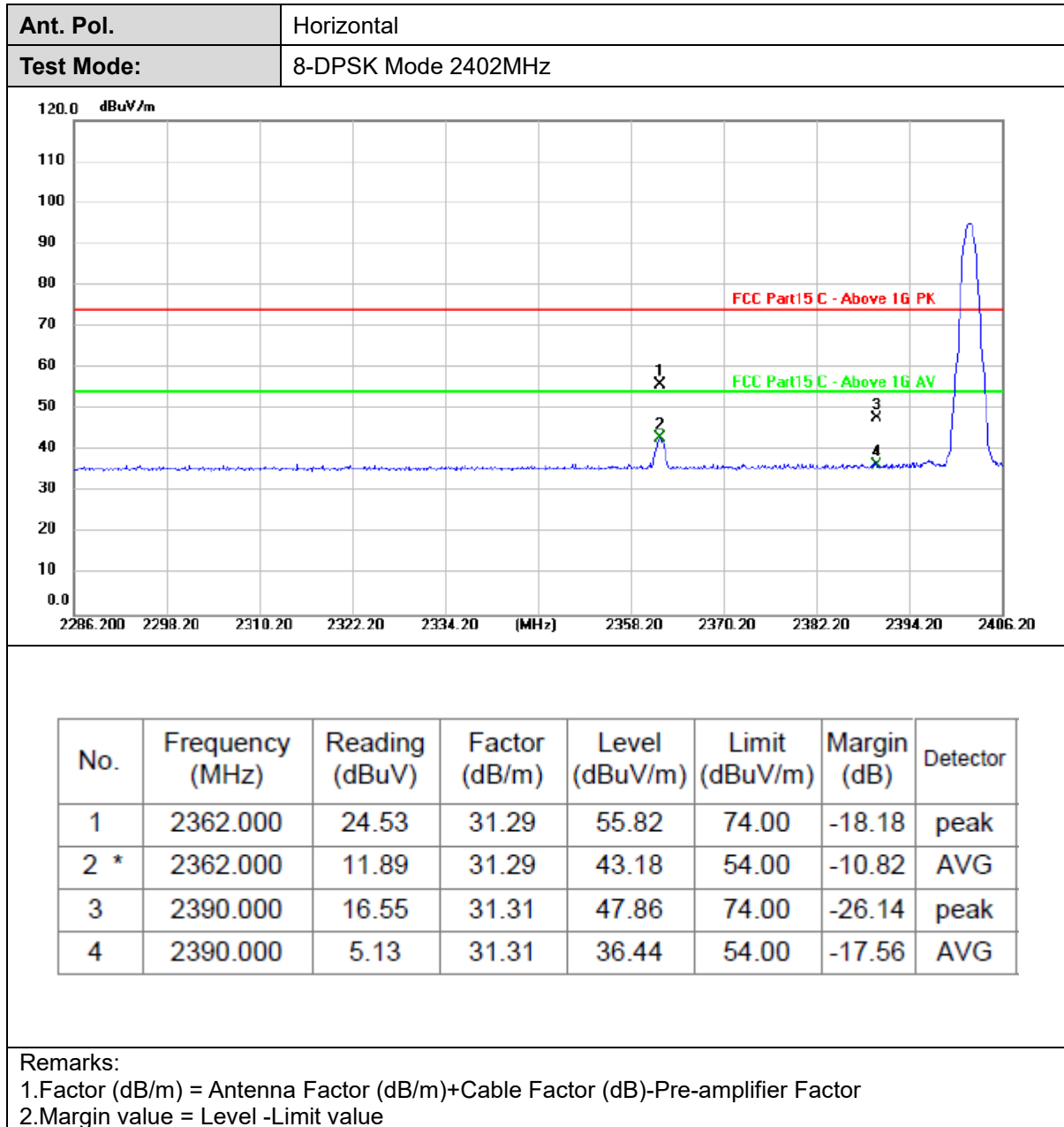


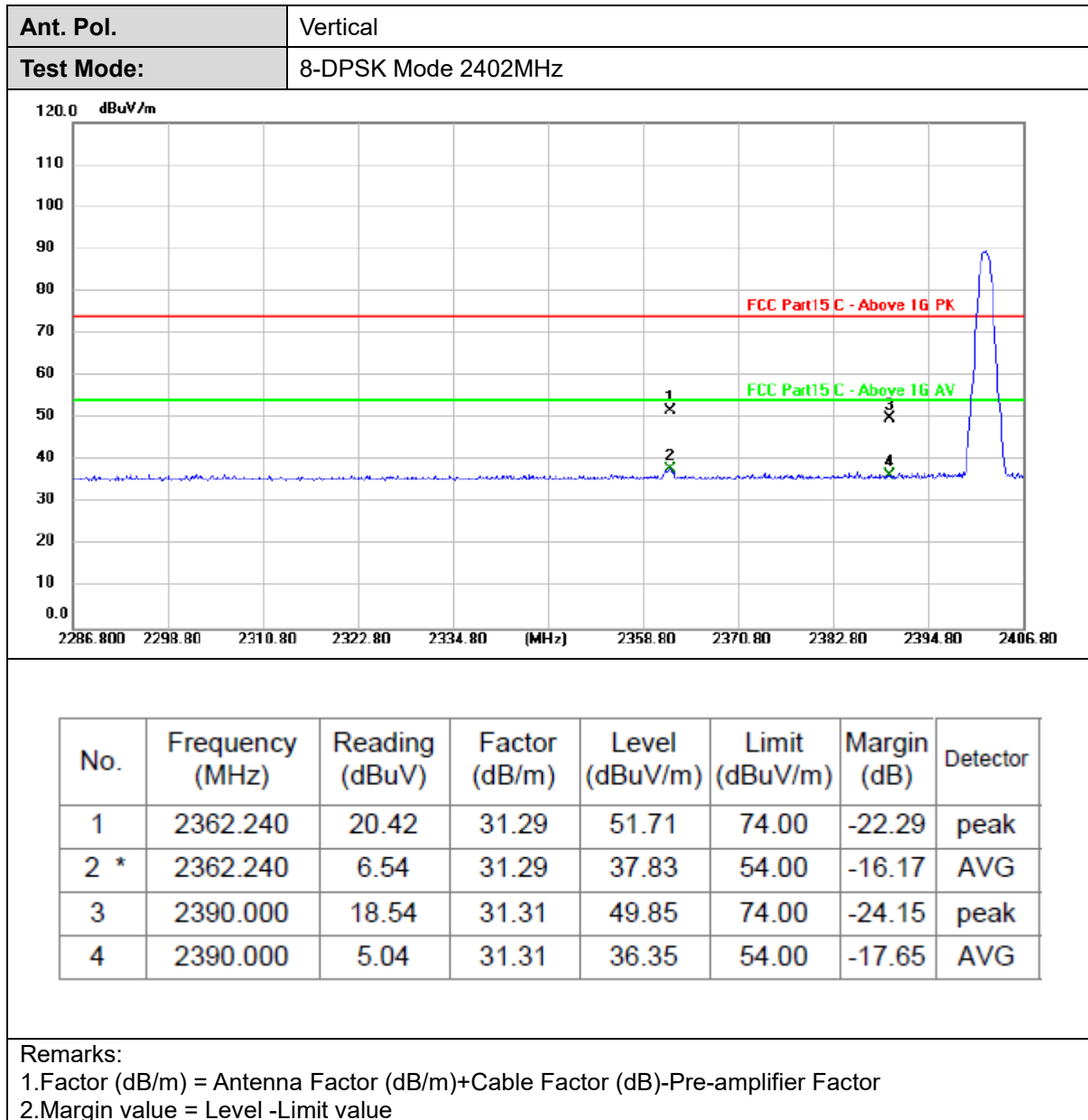


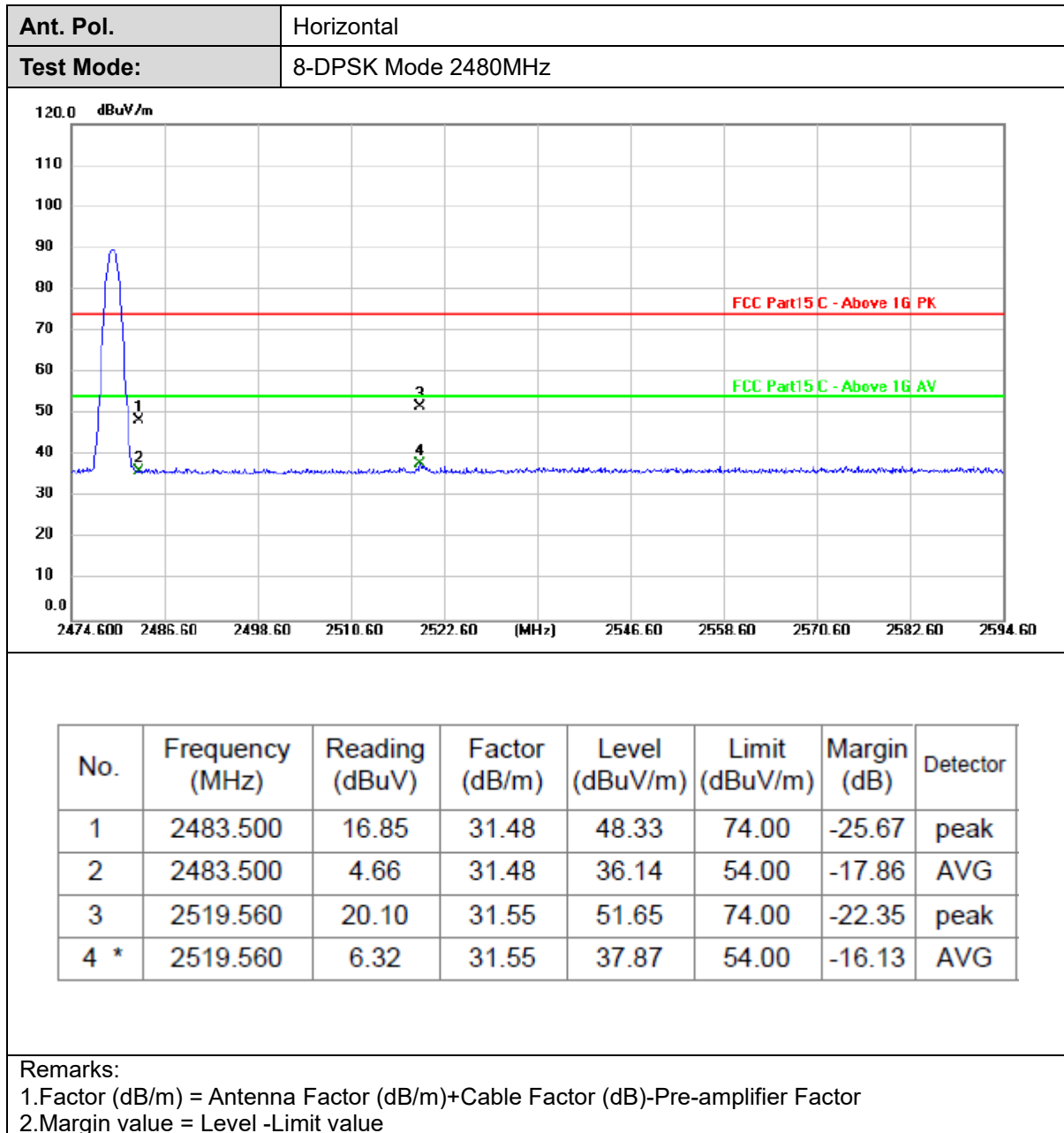


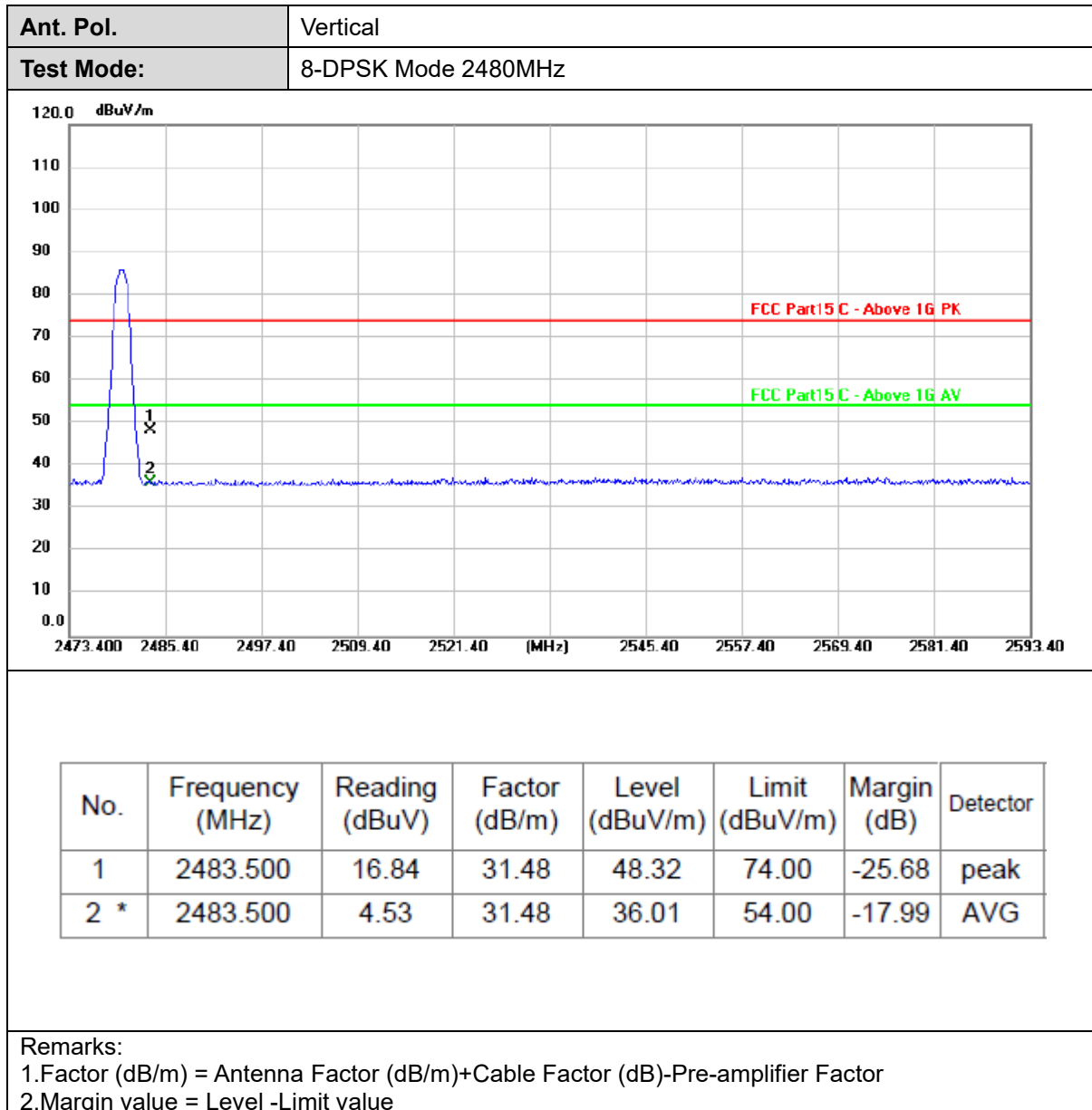














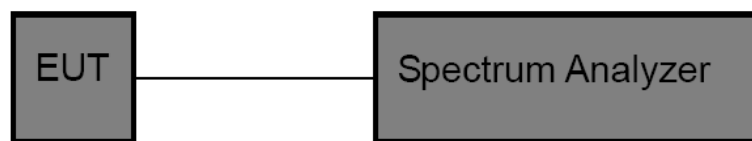
3.4. Band Edge and Spurious Emissions (Conducted)

Limit

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

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 ≥ RBW, scan up through 10th 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

Band edge measurements

Test Mode	Antenna	ChName	Freq(MHz)	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	1.42	-47.90	≤-18.58	PASS
		High	2480	2.17	-47.18	≤-17.83	PASS
		Low	Hop_2402	2.42	-45.15	≤-17.58	PASS
		High	Hop_2480	4.03	-43.50	≤-15.97	PASS
2DH5	Ant1	Low	2402	1.51	-49.11	≤-18.49	PASS
		High	2480	0.31	-48.09	≤-19.69	PASS
		Low	Hop_2402	2.33	-44.85	≤-17.67	PASS
		High	Hop_2480	3.05	-43.62	≤-16.95	PASS
3DH5	Ant1	Low	2402	0.87	-49.46	≤-19.13	PASS
		High	2480	2.28	-46.77	≤-17.72	PASS
		Low	Hop_2402	2.87	-45.04	≤-17.13	PASS
		High	Hop_2480	3.99	-44.12	≤-16.01	PASS



Test Graphs



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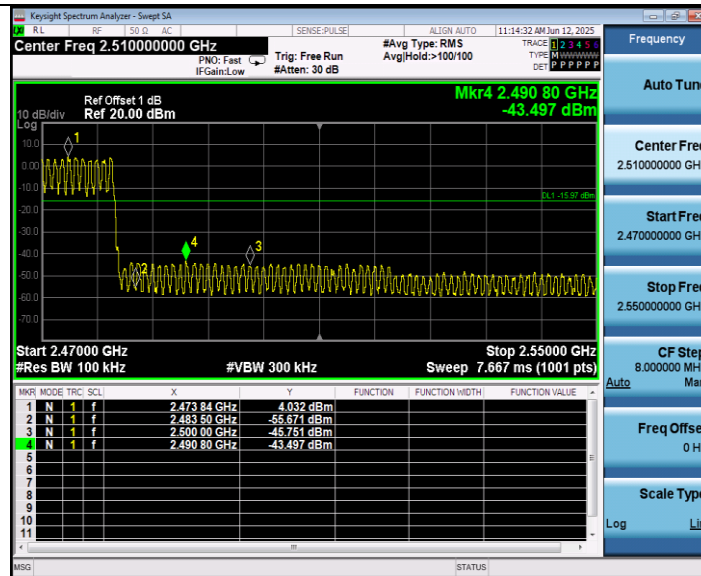
Tel.: (86)755-27521059

Fax: (86)755-27521011

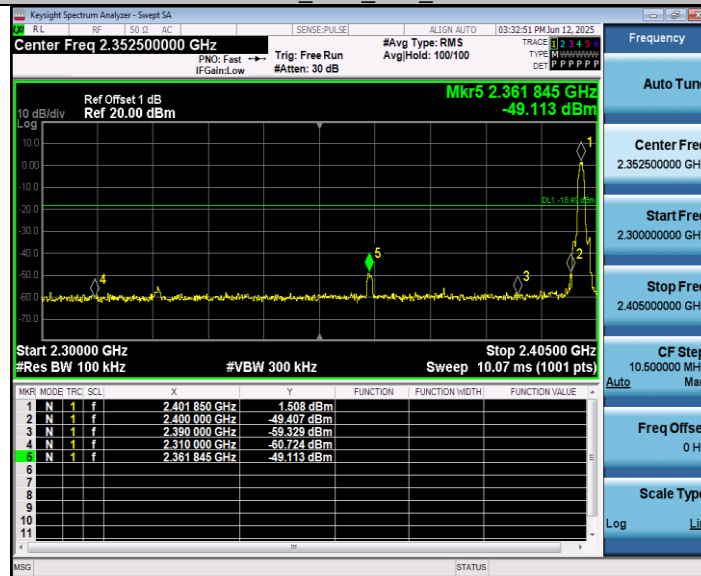
Http://www.sz-ctc.org.cn

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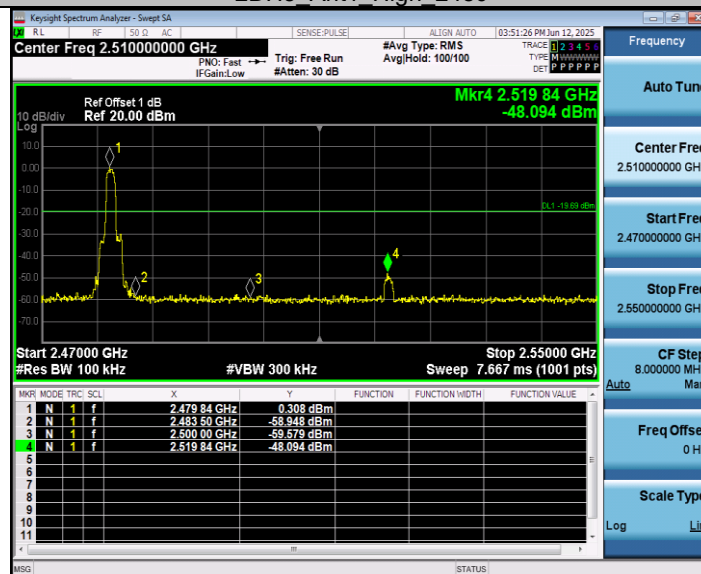
TRF No: CTC-TR-059_A2



2DH5_Ant1_Low_2402



2DH5_Ant1_High_2480



2DH5_Ant1_Low_Hop_2402

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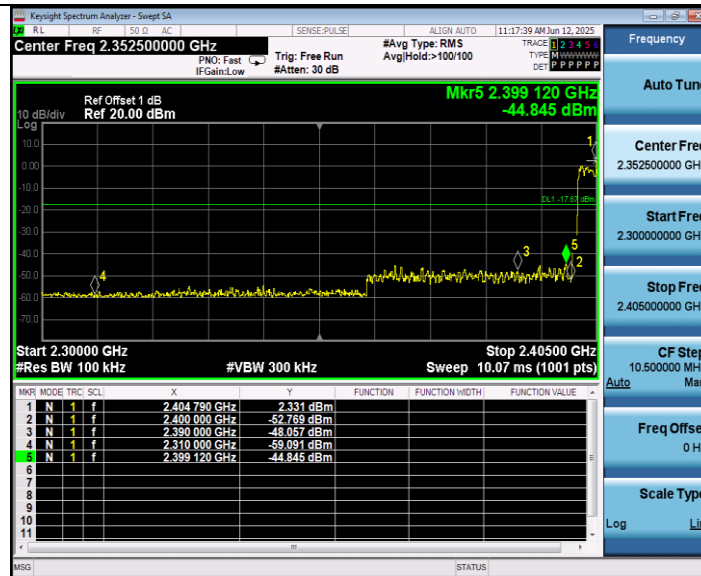
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Fax: (86)755-27521011

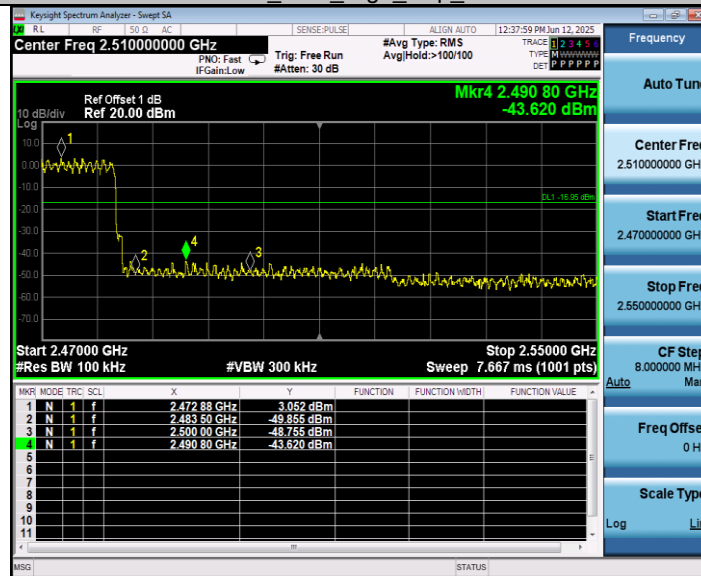
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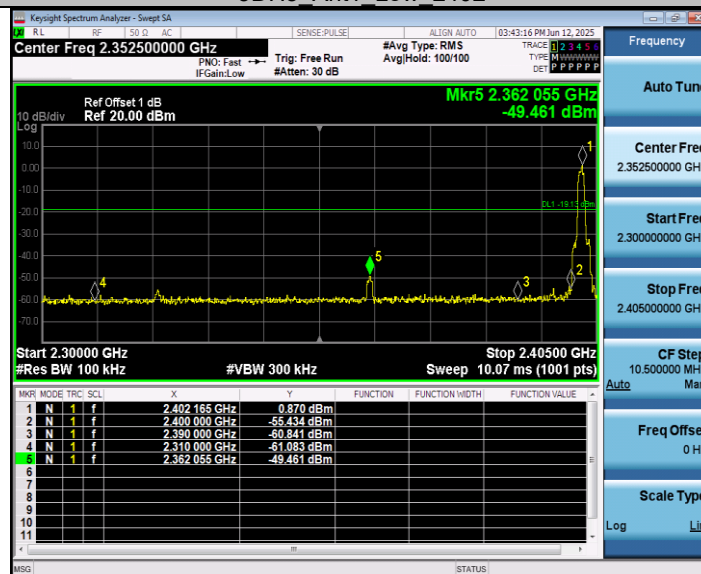
TRF No: CTC-TR-059_A2



2DH5_Ant1_High_Hop_2480



3DH5_Ant1_Low_2402



3DH5_Ant1_High_2480

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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

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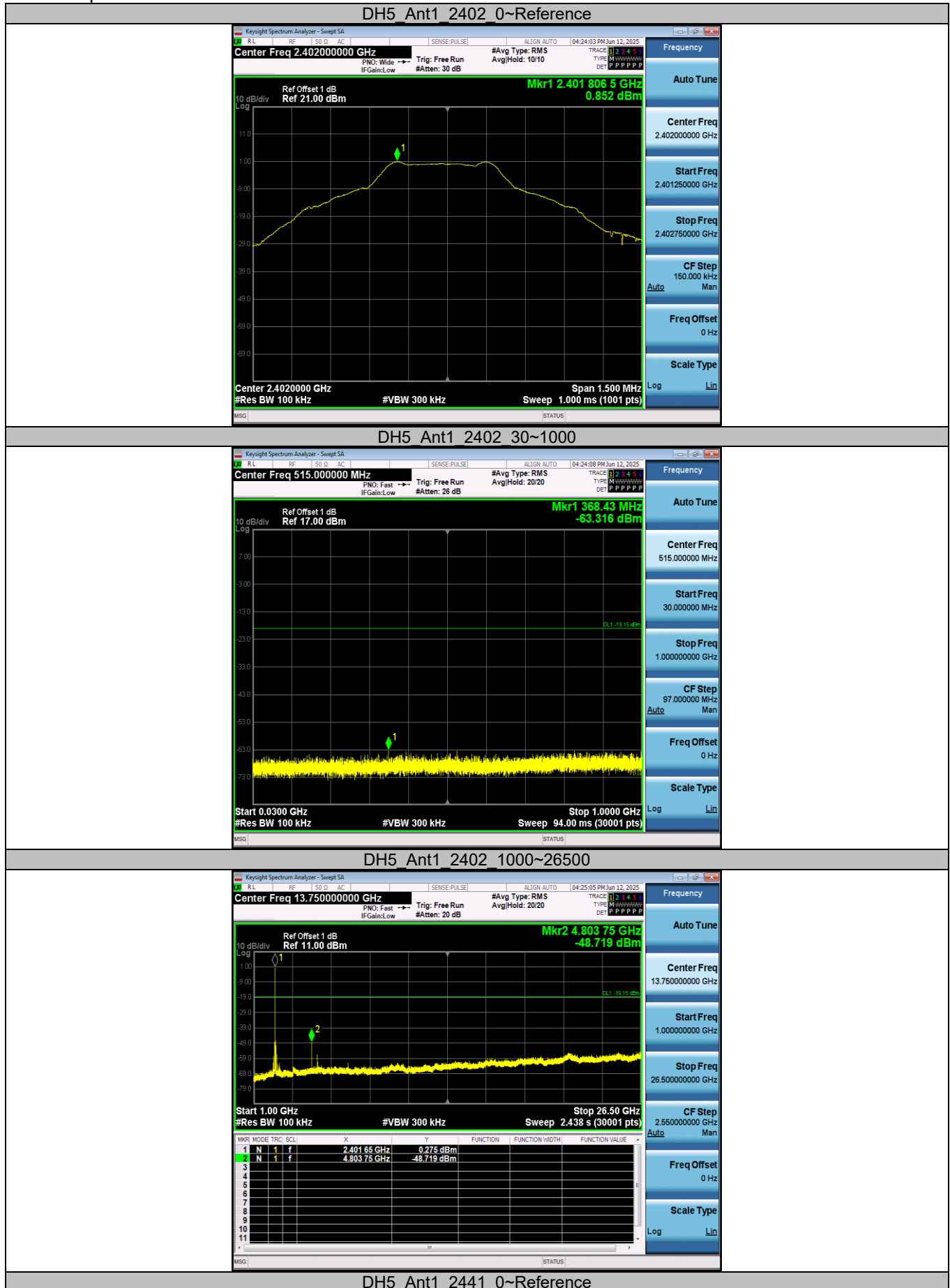
TRF No: CTC-TR-059_A2

**Conducted Spurious Emission**

Test Mode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	0.85	0.85	---	PASS
			30~1000	0.85	-63.32	≤-19.15	PASS
			1000~26500	0.85	-48.72	≤-19.15	PASS
		2441	Reference	1.19	1.19	---	PASS
			30~1000	1.19	-63.67	≤-18.81	PASS
			1000~26500	1.19	-49.74	≤-18.81	PASS
		2480	Reference	1.64	1.64	---	PASS
			30~1000	1.64	-63.19	≤-18.36	PASS
			1000~26500	1.64	-53.80	≤-18.36	PASS
2DH5	Ant1	2402	Reference	1.52	1.52	---	PASS
			30~1000	1.52	-62.55	≤-18.48	PASS
			1000~26500	1.52	-50.49	≤-18.48	PASS
		2441	Reference	1.90	1.90	---	PASS
			30~1000	1.90	-62.02	≤-18.10	PASS
			1000~26500	1.90	-52.44	≤-18.10	PASS
		2480	Reference	1.56	1.56	---	PASS
			30~1000	1.56	-62.63	≤-18.44	PASS
			1000~26500	1.56	-54.75	≤-18.44	PASS
3DH5	Ant1	2402	Reference	1.52	1.52	---	PASS
			30~1000	1.52	-62.56	≤-18.48	PASS
			1000~26500	1.52	-51.36	≤-18.48	PASS
		2441	Reference	1.64	1.64	---	PASS
			30~1000	1.64	-62.86	≤-18.36	PASS
			1000~26500	1.64	-49.89	≤-18.36	PASS
		2480	Reference	3.19	3.19	---	PASS
			30~1000	3.19	-61.96	≤-16.81	PASS
			1000~26500	3.19	-48.60	≤-16.81	PASS



Test Graphs



CTC Laboratories, Inc.

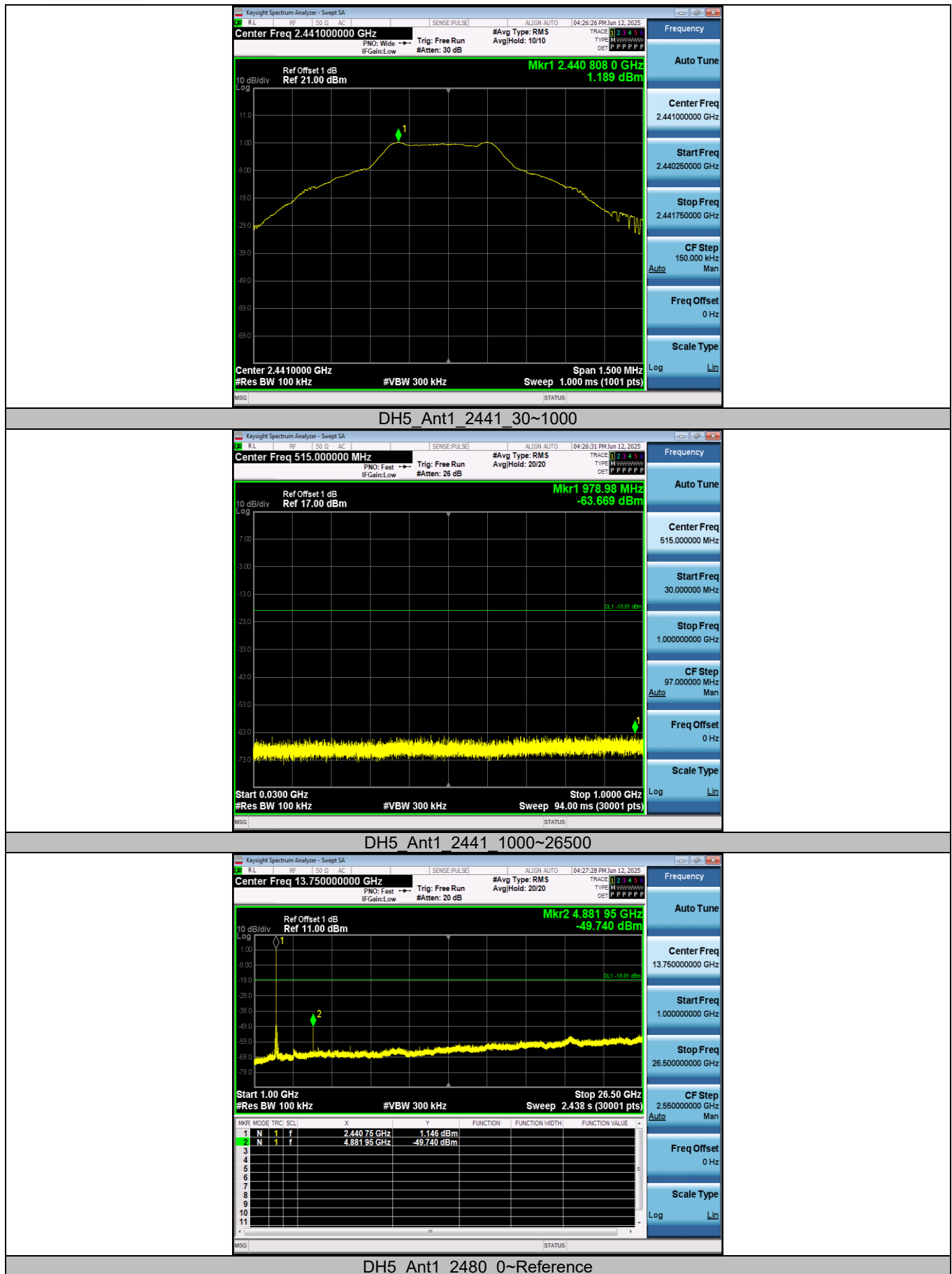
Room 107, 108, 207, 208, 303 of Building A, Room 101 of Building B, No.7, Lanqing 1st Road, Luhua Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China

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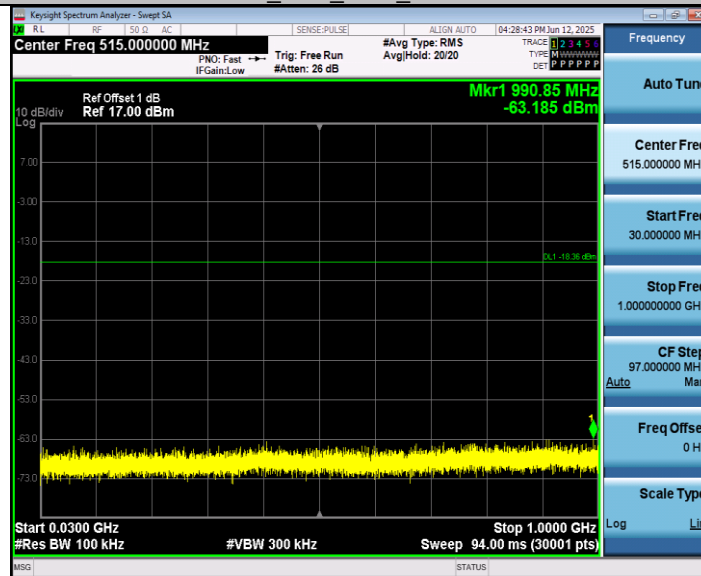
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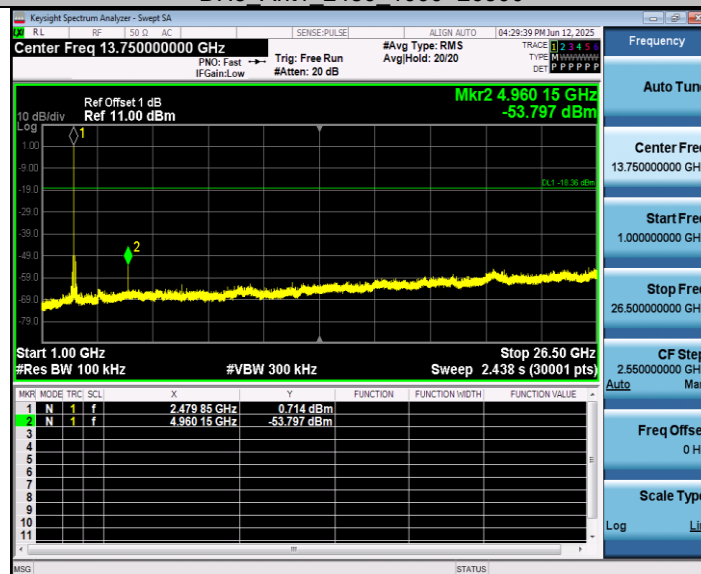
TRF No: CTC-TR-059_A2



DH5_Ant1_2480_30~1000



DH5_Ant1_2480_1000~26500



2DH5_Ant1_2402_0~Reference

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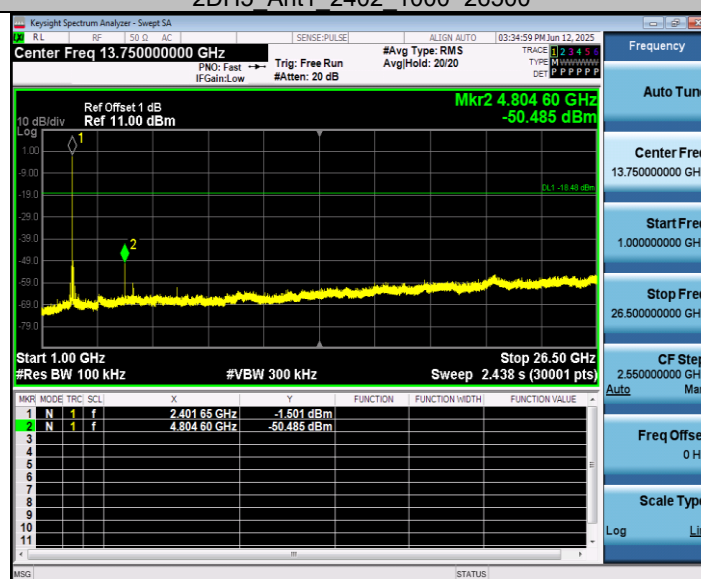
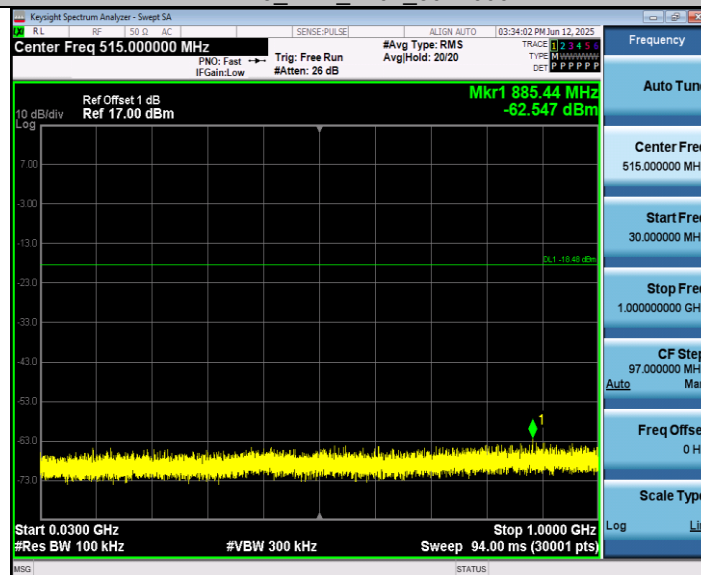
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Tel.: (86)755-27521059 Fax: (86)755-27521011

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Tel.: (86)755-27521059

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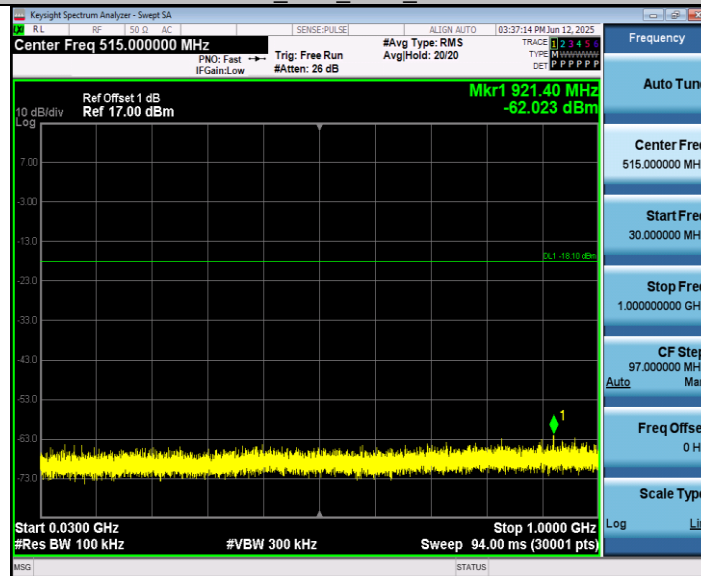
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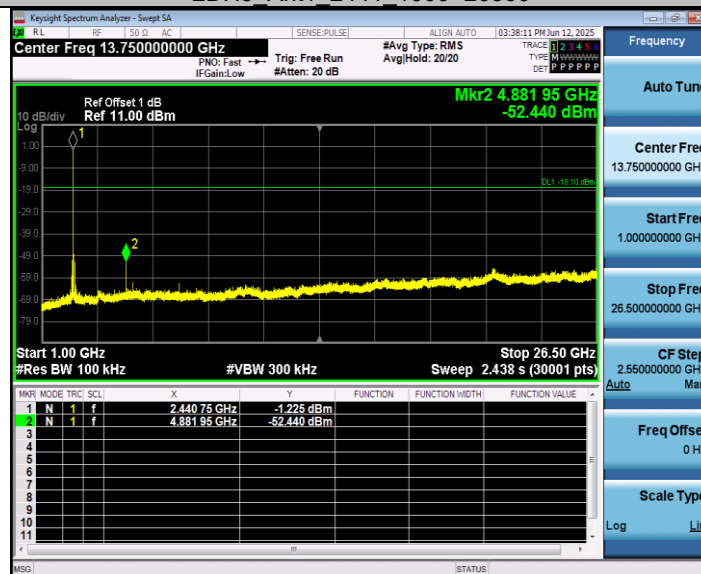
TRF No: CTC-TR-059_A2



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2DH5_Ant1_2441_1000~26500



2DH5_Ant1_2480_0~Reference

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Tel.: (86)755-27521059

Fax: (86)755-27521011

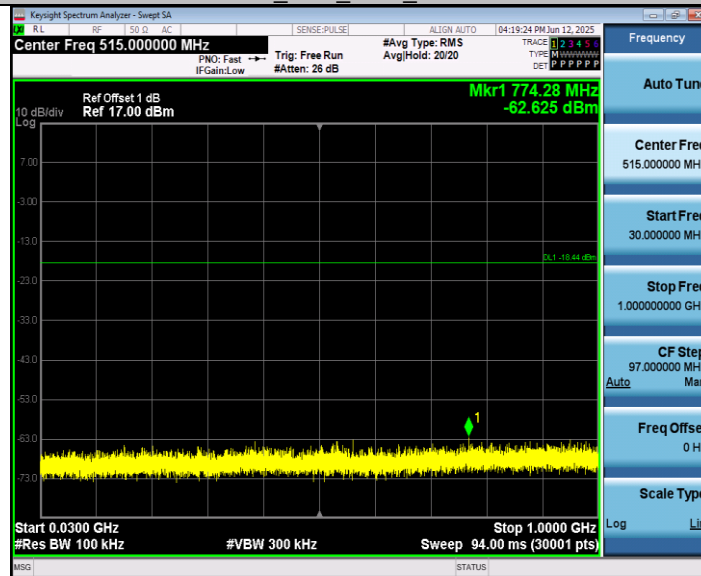
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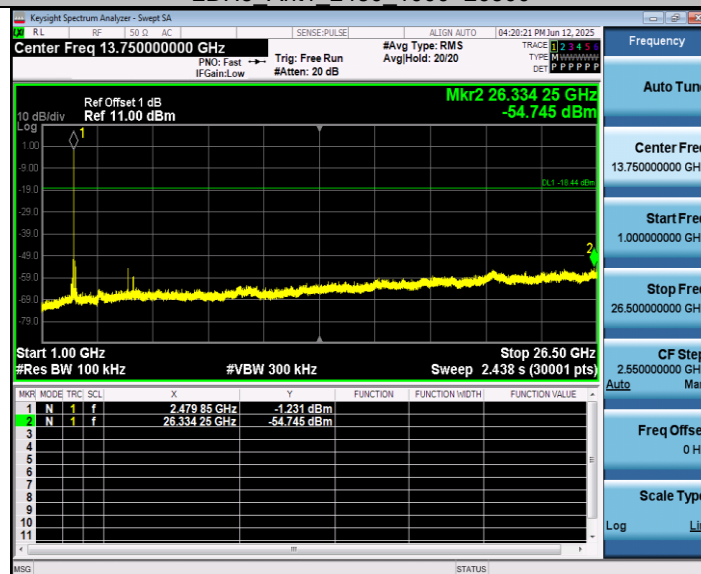
TRF No: CTC-TR-059_A2



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3DH5_Ant1_2402_0~Reference

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

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