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TEST REPORT

Report No.: **CTC20221783E01**

FCC ID.....: **WNA-HP46E-R**

Applicant.....: **Shenzhen Skyworth Digital Technology Co.,LTD**
Address.....: 14/F,Block A,Skyworth Building,Gaoxin Ave.1.S.,Nanshan District,Shenzhen,China

Manufacturer.....: **Shenzhen Skyworth Digital Technology Co.,LTD**
Address.....: 14/F,Block A,Skyworth Building,Gaoxin Ave.1.S.,Nanshan District,Shenzhen,China

Product Name.....: **4K UHD Streaming TV Box**

Trade Mark.....: STRONG, SKYWORTH, MECOOL, THOMSON

Model/Type reference.....: Leap-S3

Listed Model(s): LEAP-S3, HP46E, HP4618, KM7 PLUS, THA 200, THA200

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

Date of receipt of test sample...: Oct. 11, 2022

Date of testing.....: Oct. 11, 2022 ~ Oct. 28, 2022

Date of issue.....: Nov. 30, 2022

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

Compiled by:

(Printed name+signature)

Lucy Lan

Supervised by:

(Printed name+signature)

Eric Zhang

Approved by:

(Printed name+signature)

Totti Zhao

Testing Laboratory Name.....: **CTC Laboratories, Inc.**

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

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

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

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

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

1.2. Report version

Revised No.	Date of issue	Description
01	Nov. 30, 2022	Original



1.3. Test Description

FCC Part 15 Subpart C (15.247)/ RSS 247 Issue 2				
Test Item	Standard Section		Result	Test Engineer
	FCC	IC		
Antenna Requirement	15.203	/	Pass	Alicia Liu
Conducted Emission	15.207	RSS-Gen 8.8	Pass	Eva Feng
Restricted Bands	15.205	RSS-Gen 8.10	Pass	Alicia Liu
Hopping Channel Separation	15.247(a)(1)	RSS 247 5.1 (b)	Pass	Alicia Liu
Dwell Time	15.247(a)(iii)	RSS 247 5.1 (d)	Pass	Alicia Liu
Peak Output Power	15.247(b)(1)	RSS 247 5.4 (b)	Pass	Alicia Liu
Number of Hopping Frequency	15.247(a)(iii)	RSS 247 5.1 (d)	Pass	Alicia Liu
Conducted Band Edge and Spurious Emissions	15.247(d)	RSS 247 5.5	Pass	Alicia Liu
Radiated Band Edge and Spurious Emissions	15.205&15.209&15.247(d)	RSS 247 5.5	Pass	Alicia Liu
Radiated Spurious Emission	15.247(d)&15.209	RSS 247 5.5&RSS-Gen 8.9	Pass	Alicia Liu
20dB Bandwidth	15.247(a)	RSS 247 5.1 (b)	Pass	Alicia Liu

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



1.4. Test Facility

CTC Laboratories, Inc.

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

Laboratory accreditation

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

A2LA-Lab Cert. No.: 4340.01

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

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

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

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

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

1.5. Measurement Uncertainty

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

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



Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.08 dB	(1)
Radiated Emissions 30~1000MHz	4.51 dB	(1)
Radiated Emissions 1~18GHz	5.84 dB	(1)
Radiated Emissions 18~40GHz	6.12 dB	(1)
Occupied Bandwidth	-----	(1)

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

1.6. Environmental conditions

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

Temperature:	21°C ~ 27°C
Relative Humidity:	40% ~ 60%
Air Pressure:	101kPa



2. GENERAL INFORMATION

2.1. Client Information

Applicant:	Shenzhen Skyworth Digital Technology Co.,LTD
Address:	14/F,Block A,Skyworth Building,Gaoxin Ave.1.S.,Nanshan District,Shenzhen,China
Manufacturer:	Shenzhen Skyworth Digital Technology Co.,LTD
Address:	14/F,Block A,Skyworth Building,Gaoxin Ave.1.S.,Nanshan District,Shenzhen,China

2.2. General Description of EUT

Product Name:	4K UHD Streaming TV Box
Trade Mark:	STRONG, SKYWORTH, MECOOL, THOMSON
Model/Type reference:	Leap-S3
Listed Model(s):	LEAP-S3, HP46E, HP4618, KM7 PLUS, THA 200, THA200
Model Difference:	All these models are identical in the same PCB, layout and electrical circuit, Different is trade mark and model number.
Power supply:	DC12V 1A from AC/DC Adapter
Adapter model 1:	RJ-SKY120100U60S ^{Note1} Input: 100-240V~ 50/60Hz 0.5A Output: 12Vdc/1A
Adapter model 2:	YS-SKY120100U00P ^{Note2} Input: 100-240V~ 50/60Hz 0.5A Output: 12Vdc/1A
Hardware version:	54024
Software version:	P2.0.3_20220929
Bluetooth 5.0/EDR	
Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	Onboard Antenna
Antenna gain:	1.2dBi

Note:

1. RJ-SKY120100AXXS, (A = E or B, stands for different plug, E means for Europe plug, B means for UK plug, M or U means for US plug. XX = 00-99. stands for customer code)
2. YS-SKY120100N0XP (N = E, B, 1 character indicate difference plug type: E denote EU plug, B denote UK plug, X = 0-9, 1 digit, only for marketing purpose, no impact on safety)



2.3. Accessory Equipment information

Equipment Information			
Name	Model	S/N	Manufacturer
Displayer	EW3270-T	EW3270U	BenQ
Notebook	ThinkBook 14G3 ACL	---	Lenovo
Cable Information			
Name	Shielded Type	Ferrite Core	Length
Lan Cable	Without	Without	1.5M
HDMI	Without	Without	1.5M
Test Software Information			
Name	/	/	/
adb.exe	/	/	/



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 was set to connect with the Bluetooth instrument under large package sizes transmission.
For Radiated spurious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.



2.5. Measurement Instruments List

Tonscend JS0806-2 Test system					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	KEYSIGHT	N9020A	100231	Dec. 23, 2022
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 15, 2023
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 23, 2022
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 23, 2022
5	Power Sensor	Agilent	U2021XA	MY5365004	Mar. 15, 2023
6	Power Sensor	Agilent	U2021XA	MY5365006	Mar. 15, 2023
7	High and low temperature box	ESPEC	MT3035	N/A	Mar. 15, 2023
8	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	102414	Dec. 23, 2022
9	300328 v2.2.2 test system	TONSCEND	v2.6	/	/

Radiated emission(3m chamber 2)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-1013	Jan. 12, 2023
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Dec. 23, 2022
3	Loop Antenna	LAPLAC	RF300	9138	Dec. 23, 2022
4	Spectrum Analyzer	R&S	FSU26	100105	Dec. 23, 2022
5	Spectrum Analyzer	R&S	FSV40-N	101331	Mar. 15, 2023
6	Pre-Amplifier	SONOMA	310	186194	Dec. 23, 2022
7	Low Noise Pre-Amplifier	EMCI	EMC051835	980075	Dec. 23, 2022
8	Test Receiver	R&S	ESC17	100967	Dec. 23, 2022
9	3m chamber 2	Frankonia	EE025	/	Oct. 23, 2024

Radiated emission(3m chamber 3)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-759	Mar. 30, 2023
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Dec. 23, 2022
3	Test Receiver	Keysight	N9038A	MY56400071	Dec. 23, 2022
4	Broadband Premplifier	SCHWARZBECK	BBV9743B	259	Dec. 23, 2022
5	Mirowave Broadband Amplifier	SCHWARZBECK	BBV9718C	111	Dec. 23, 2022
6	3m chamber 3	YIHENG	EE106	/	Sep. 09, 2023



Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 23, 2022
2	LISN	R&S	ENV216	101113	Dec. 23, 2022
3	EMI Test Receiver	R&S	ESCS30	100353	Dec. 23, 2022

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

2. The Cal. Interval was three year of the chamber

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

3. TEST ITEM AND RESULTS

3.1. Conducted Emission

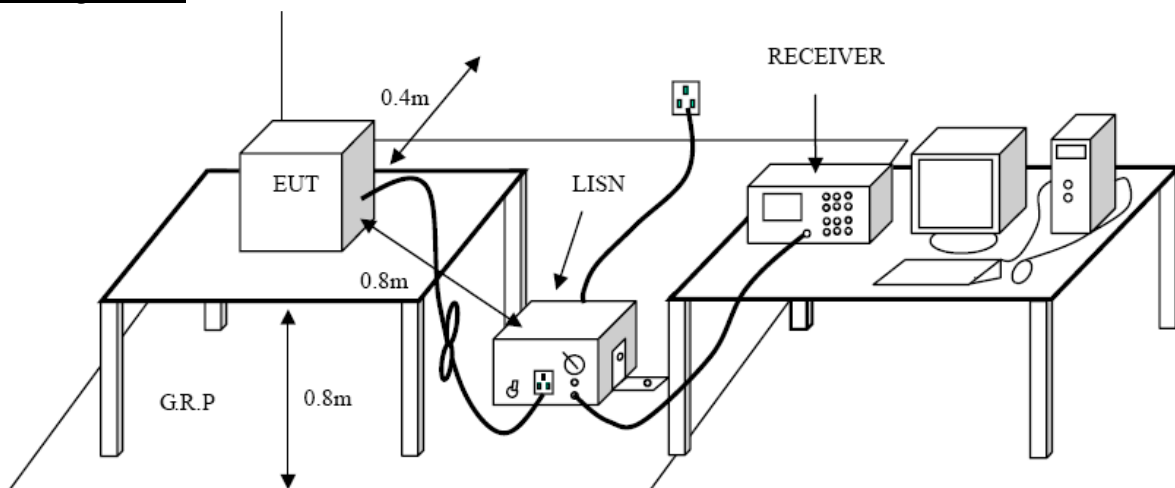
Limit

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

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

* Decreases with the logarithm of the frequency.

Test Configuration

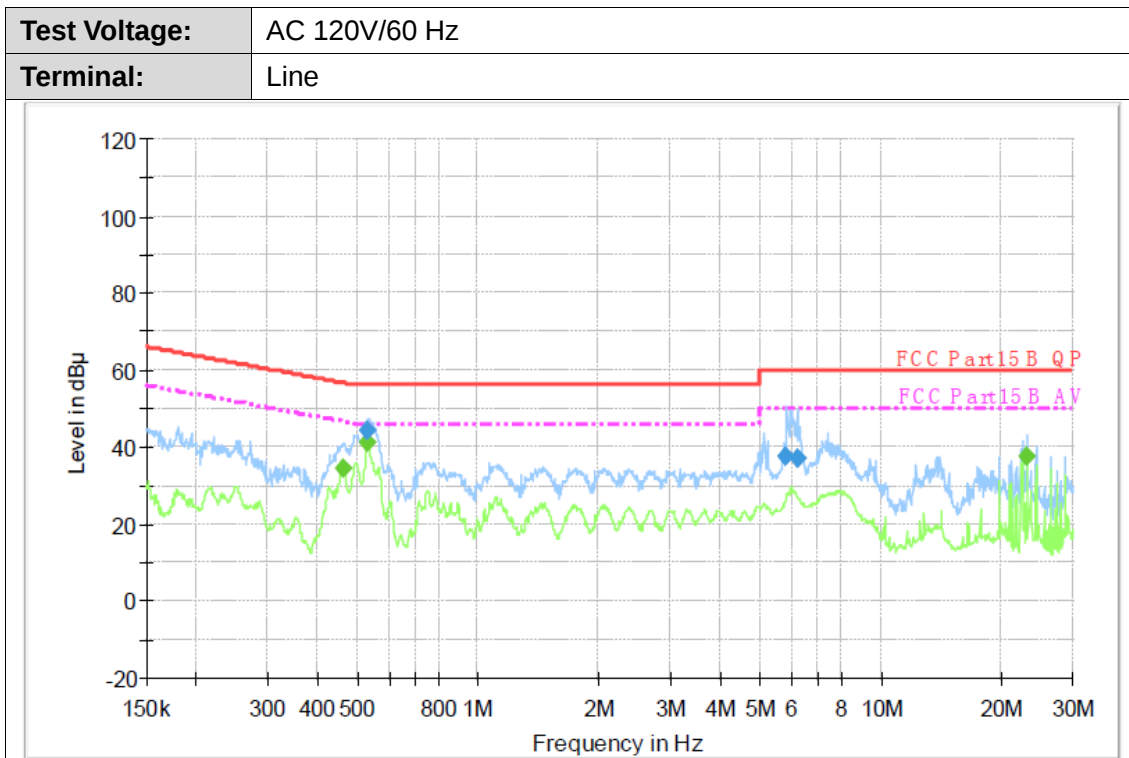


Test Procedure

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

Test Mode

Please refer to the clause 2.4.

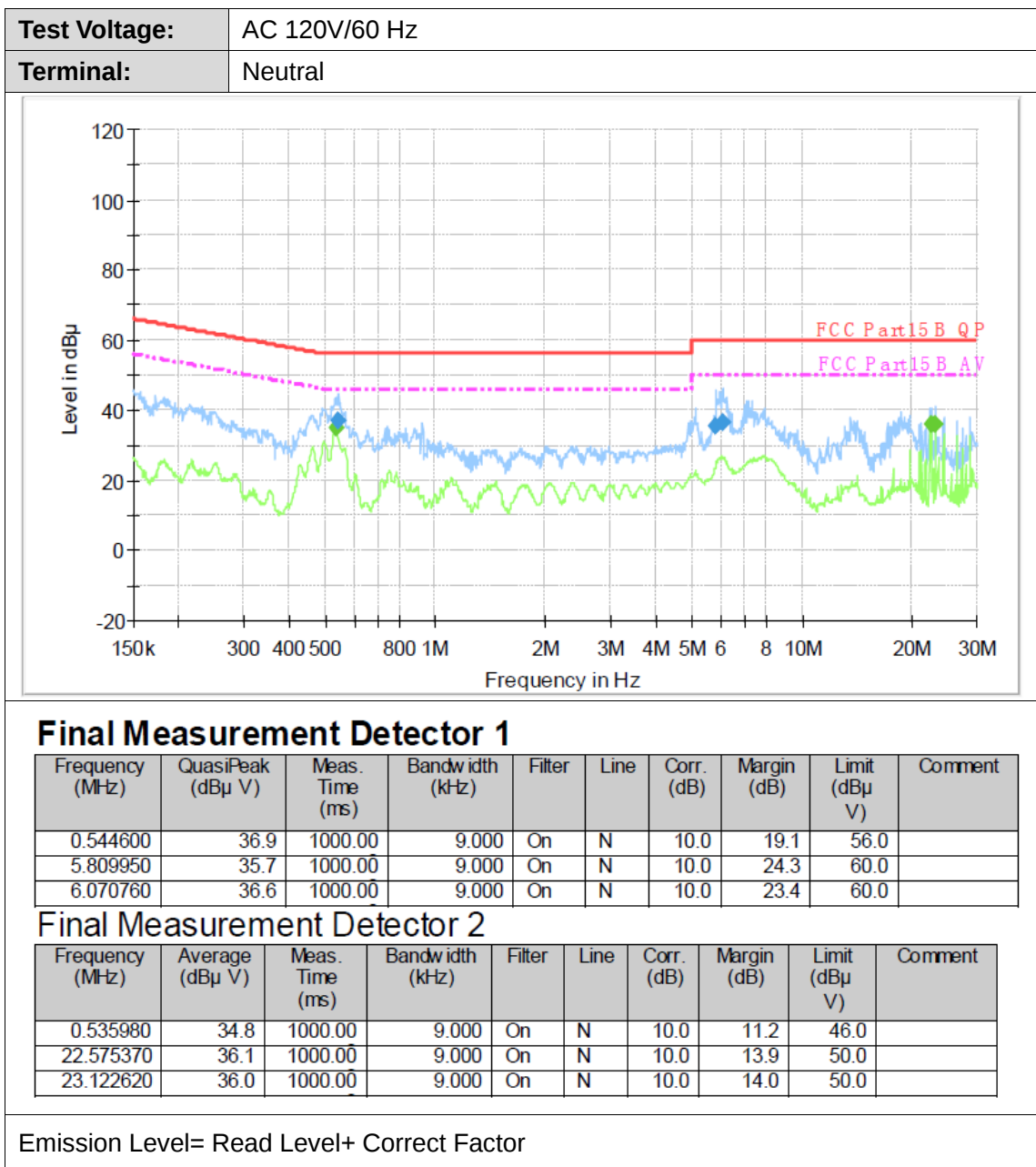
**Test Results****Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBu V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBu V)	Comment
0.531710	44.3	1000.00	9.000	On	L1	9.7	11.7	56.0	
5.833190	37.4	1000.00	9.000	On	L1	9.7	22.6	60.0	
6.193150	36.8	1000.00	9.000	On	L1	9.7	23.2	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBu V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBu V)	Comment
0.462380	34.3	1000.00	9.000	On	L1	9.7	12.3	46.6	
0.533840	40.9	1000.00	9.000	On	L1	9.7	5.1	46.0	
23.122620	37.5	1000.00	9.000	On	L1	10.1	12.5	50.0	

Emission Level= Read Level+ Correct Factor





3.2. Radiated Emission

Limit

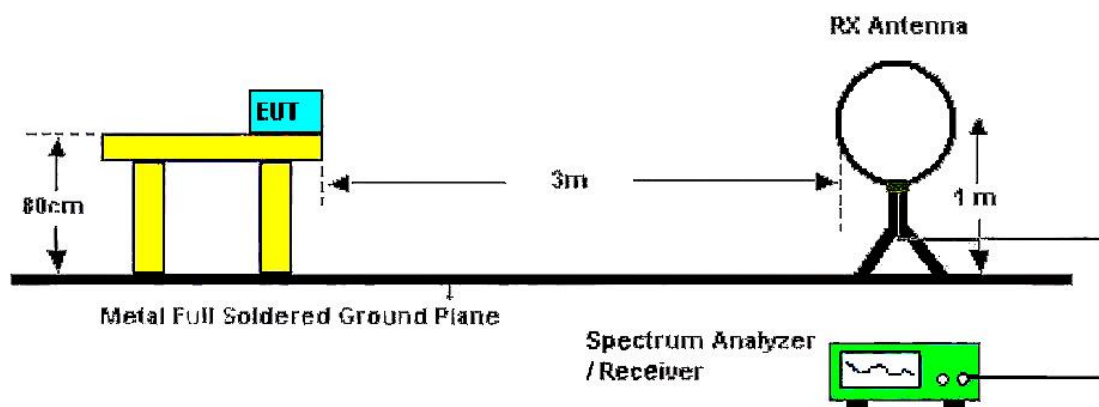
FCC CFR Title 47 Part 15 Subpart C Section 15.209/ RSS – Gen 8.9

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

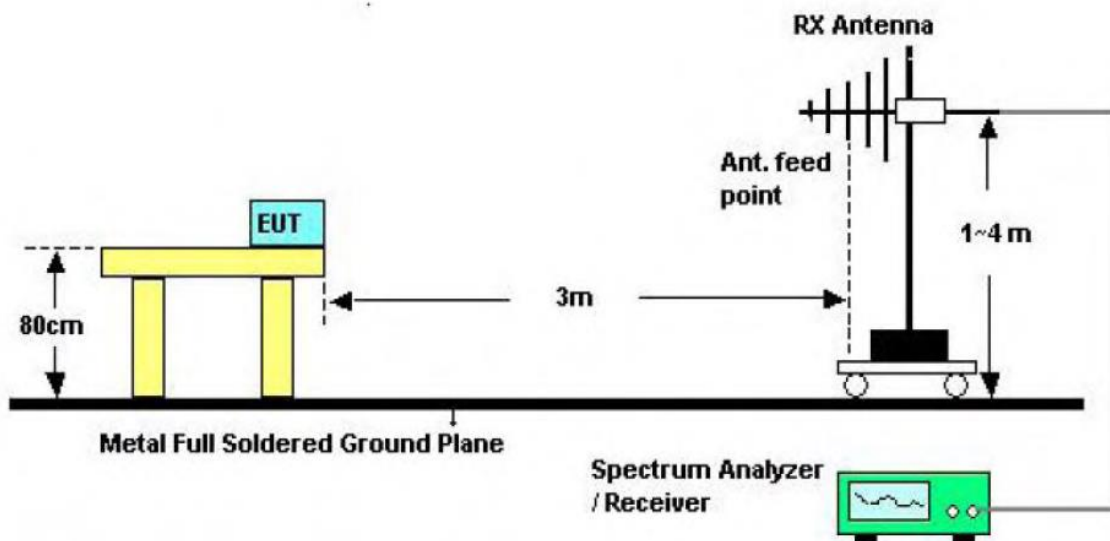
Note:

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

Test Configuration



Below 30MHz Test Setup



Below 1000MHz Test Setup

CTC Laboratories, Inc.

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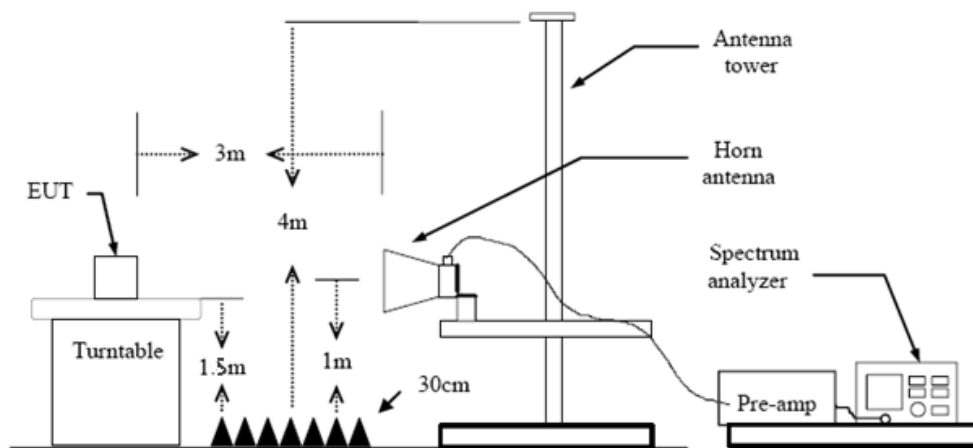
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Above 1GHz Test Setup

Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013
 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
 5. Set to the maximum power setting and enable the EUT transmit continuously.
 6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - (3) From 1 GHz to 10th harmonic:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW $\geq$ 1/T Peak detector for Average value.
- Note 1: For the 1/T& 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

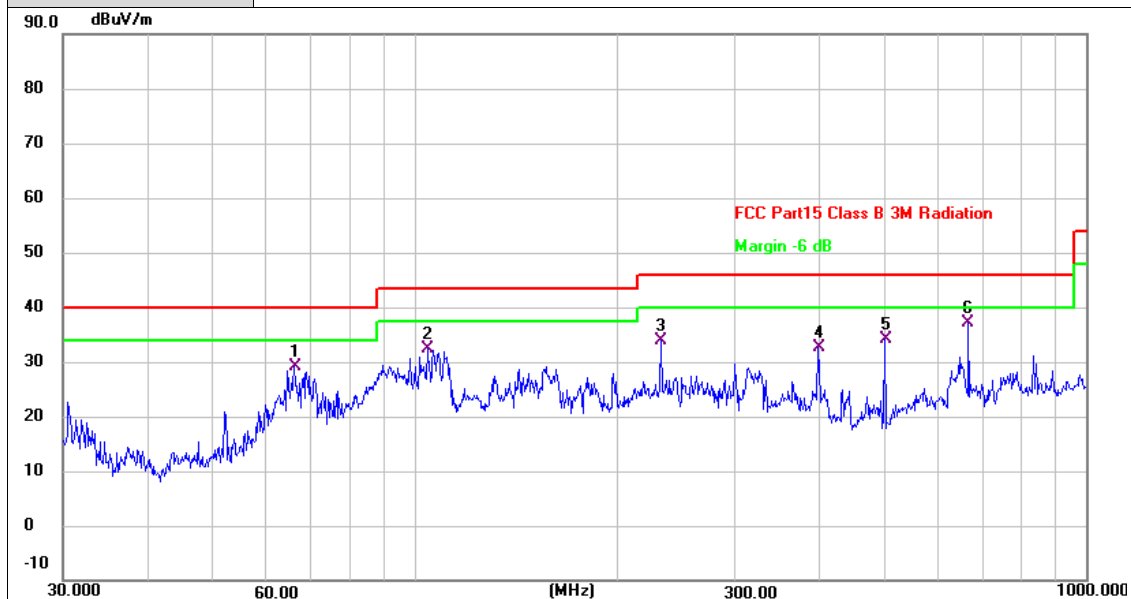
From 9 KHz to 30 MHz: Conclusion: PASS

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



30MHz-1GHz

Ant. Pol.	Horizontal
Test Mode:	TX GFSK Mode 2402MHz
Remark:	Only worse case is reported

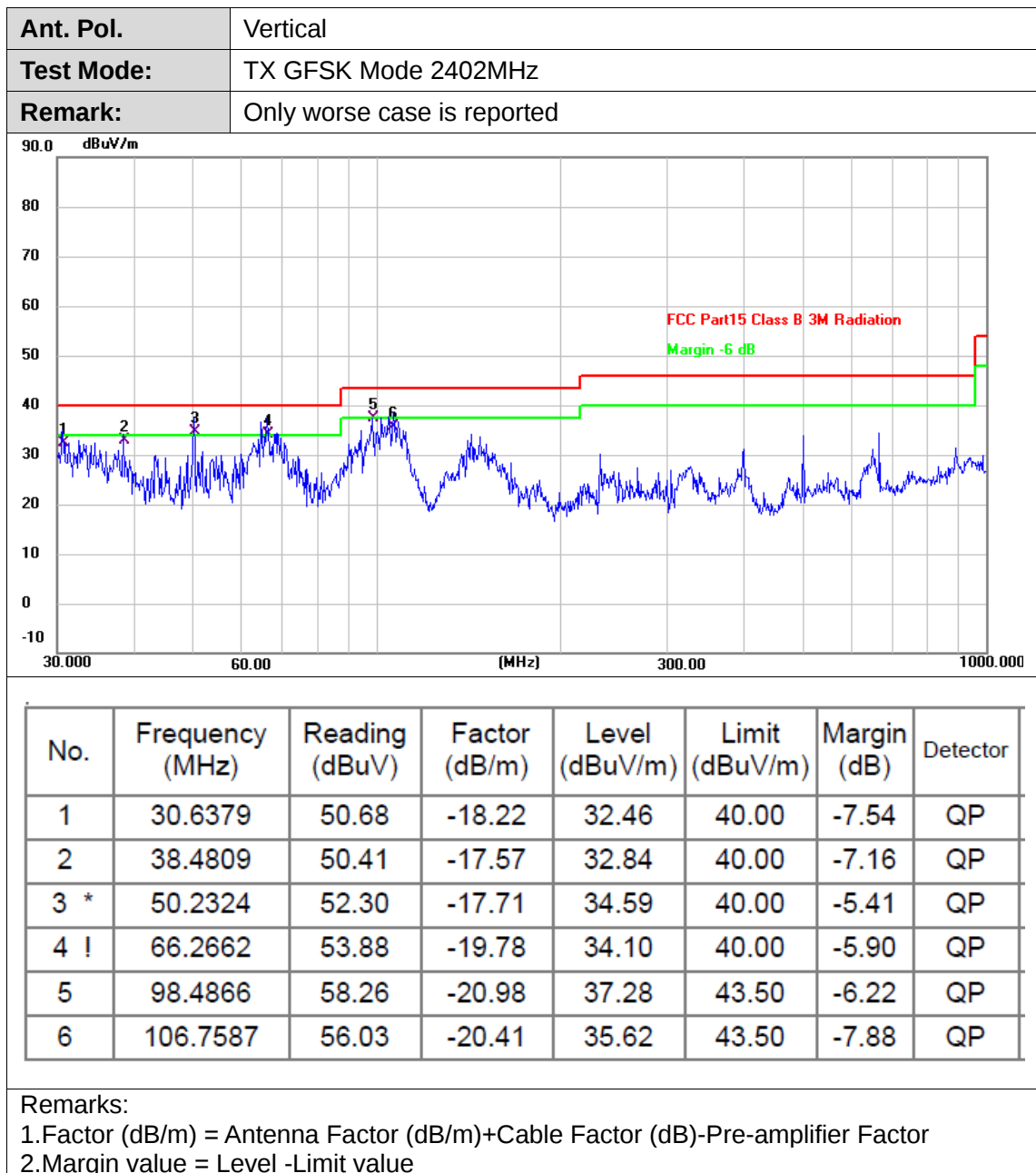


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	66.2661	48.93	-19.78	29.15	40.00	-10.85	QP
2	104.5360	52.82	-20.54	32.28	43.50	-11.22	QP
3	232.5318	53.02	-19.23	33.79	46.00	-12.21	QP
4	399.0302	47.53	-14.87	32.66	46.00	-13.34	QP
5	501.1790	46.66	-12.64	34.02	46.00	-11.98	QP
6 *	668.1422	46.73	-9.51	37.22	46.00	-8.78	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 10 dB below the pre-scribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2402MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1	4804.037	28.90	2.16	31.06	74.00	-42.94	QP
2 *	4804.273	42.19	2.16	44.35	74.00	-29.65	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 GFSK Mode 2441MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1 *	4882.078	35.61	2.31	37.92	54.00	-16.08	AVG
2	4882.363	44.09	2.31	46.40	74.00	-27.60	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 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4881.694	40.79	2.31	43.10	74.00	-30.90	peak
2 *	4882.001	26.39	2.31	28.70	54.00	-25.30	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 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1	4959.881	43.24	2.48	45.72	74.00	-28.28	peak
2 *	4959.883	34.56	2.48	37.04	54.00	-16.96	AVG
Remarks: 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value							

Ant. Pol.	Vertical						
Test Mode:	TX GFSK Mode 2480MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4959.225	39.98	2.48	42.46	74.00	-31.54	peak
2 *	4959.861	25.61	2.48	28.09	54.00	-25.91	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 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1	4804.005	44.03	2.16	46.19	74.00	-27.81	peak
2 *	4804.101	31.76	2.16	33.92	54.00	-20.08	AVG
Remarks: 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value							

Ant. Pol.	Vertical						
Test Mode:	TX $\pi/4$ -DQPSK Mode 2402MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1 *	4804.069	28.11	2.16	30.27	54.00	-23.73	AVG
2	4804.176	42.86	2.16	45.02	74.00	-28.98	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 $\pi/4$ -DQPSK Mode 2441MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4881.690	44.28	2.31	46.59	74.00	-27.41	peak
2 *	4881.944	33.67	2.31	35.98	54.00	-18.02	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 $\pi/4$ -DQPSK Mode 2441MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4882.210	26.10	2.31	28.41	54.00	-25.59	AVG
2	4882.320	40.49	2.31	42.80	74.00	-31.20	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 $\pi/4$ -DQPSK Mode 2480MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1 *	4959.934	32.30	2.48	34.78	54.00	-19.22	AVG
2	4960.058	43.11	2.48	45.59	74.00	-28.41	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 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1	4960.402	40.73	2.48	43.21	74.00	-30.79	peak
2 *	4960.475	25.22	2.48	27.70	54.00	-26.30	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 2402MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4803.956	31.72	2.16	33.88	54.00	-20.12	AVG
2	4804.188	43.63	2.16	45.79	74.00	-28.21	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 8-DPSK Mode 2402MHz
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4803.894	28.04	2.16	30.20	54.00	-23.80	AVG
2	4804.139	41.37	2.16	43.53	74.00	-30.47	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 2441MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBUV)	Factor (dB/m)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector
1 *	4881.879	33.61	2.31	35.92	54.00	-18.08	AVG
2	4882.157	44.45	2.31	46.76	74.00	-27.24	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 2441MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4881.769	26.36	2.31	28.67	54.00	-25.33	AVG
2	4882.678	40.99	2.32	43.31	74.00	-30.69	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 2480MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	4960.074	32.42	2.48	34.90	54.00	-19.10	AVG
2	4960.169	44.08	2.48	46.56	74.00	-27.44	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 2480MHz						
Remark:	No report for the emission which more than 10 dB below the pre-scribed limit.						
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	4959.789	40.72	2.48	43.20	74.00	-30.80	peak
2 *	4960.073	25.28	2.48	27.76	54.00	-26.24	AVG
Remarks: 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value							

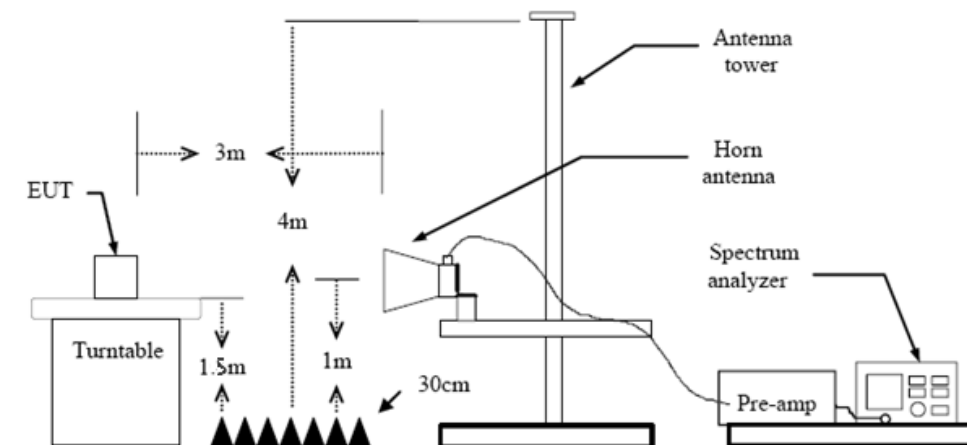
3.3. Band Edge Emissions (Radiated)

Limit

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

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

Test Configuration



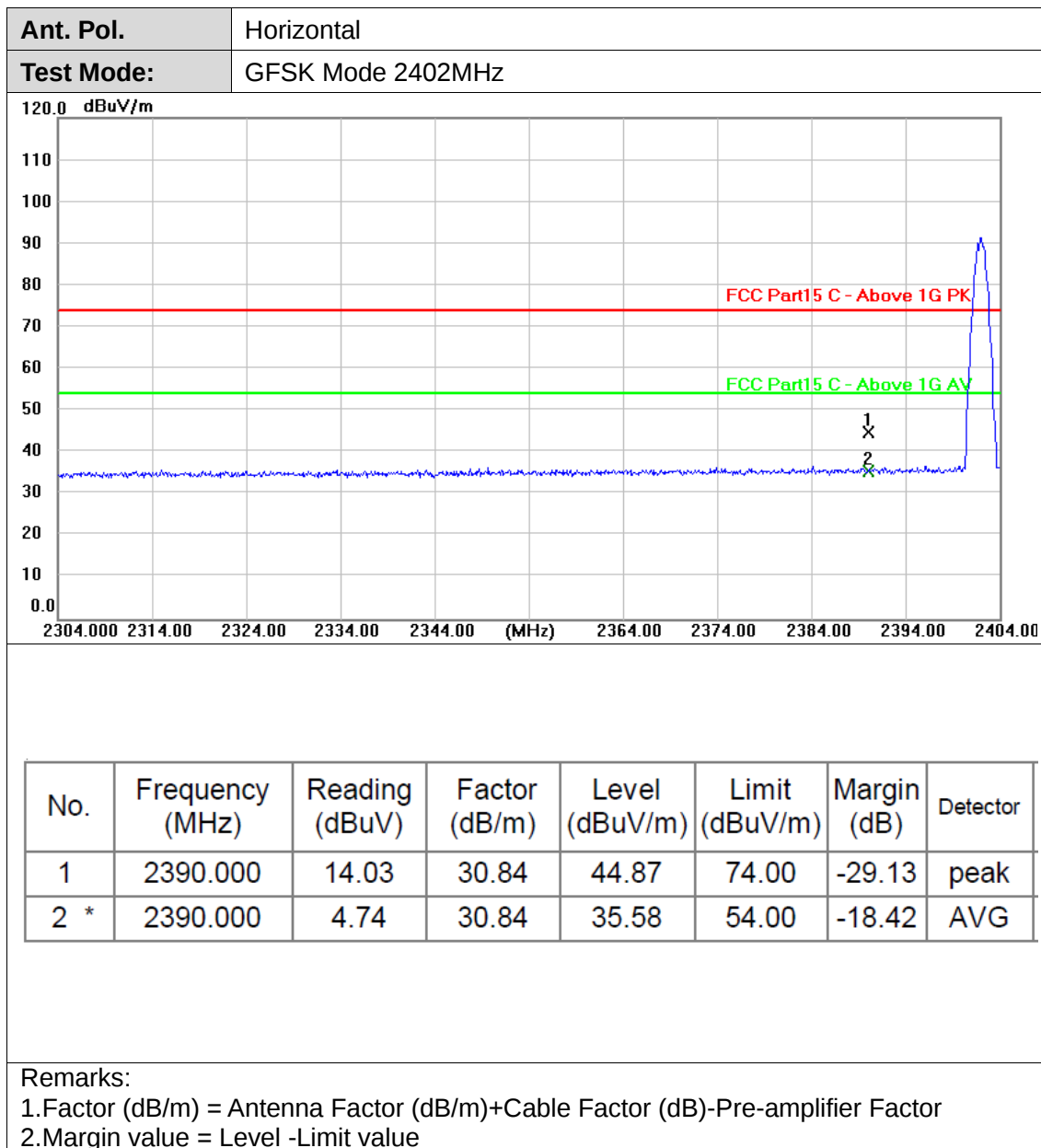
Test Procedure

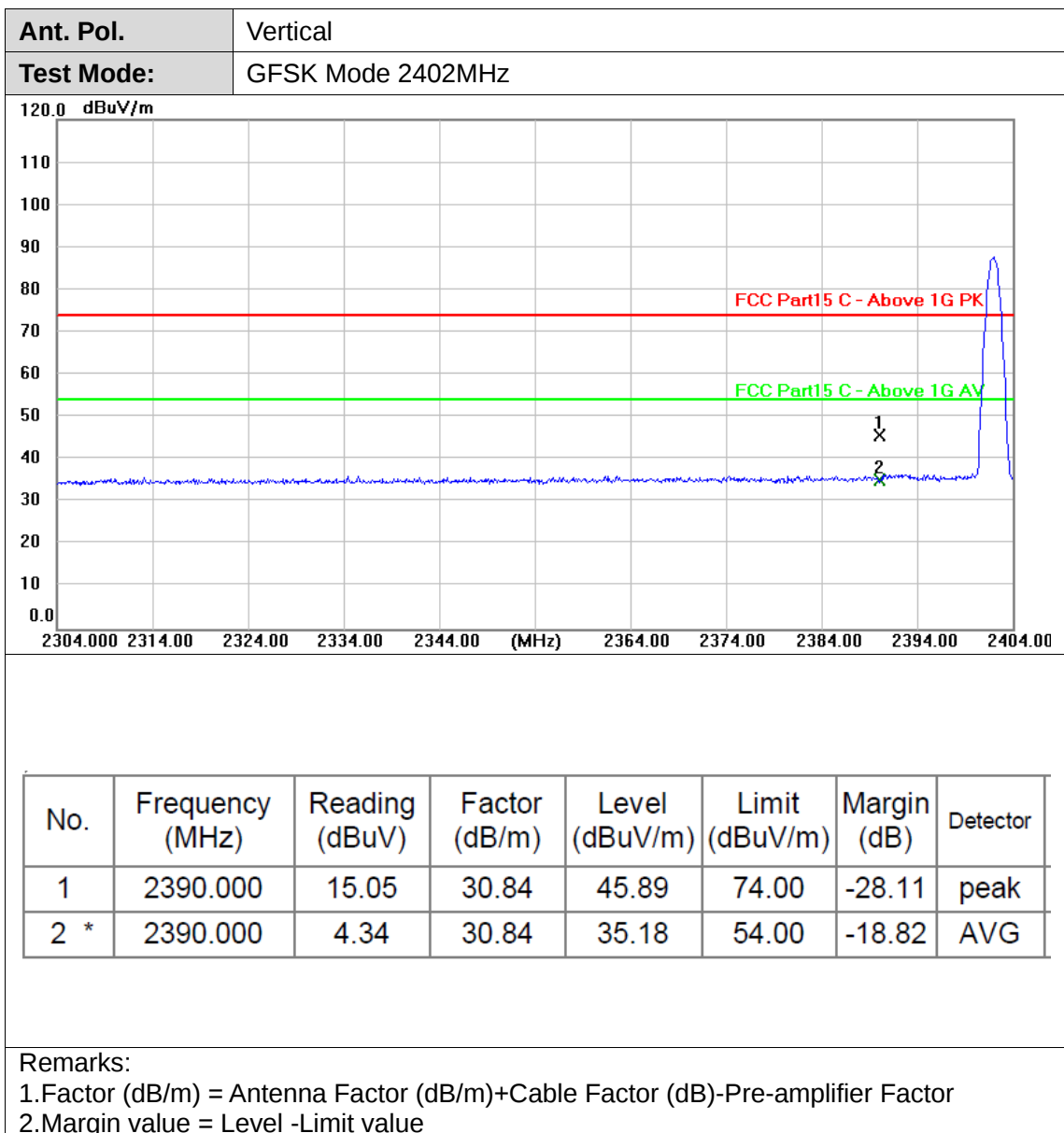
1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna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

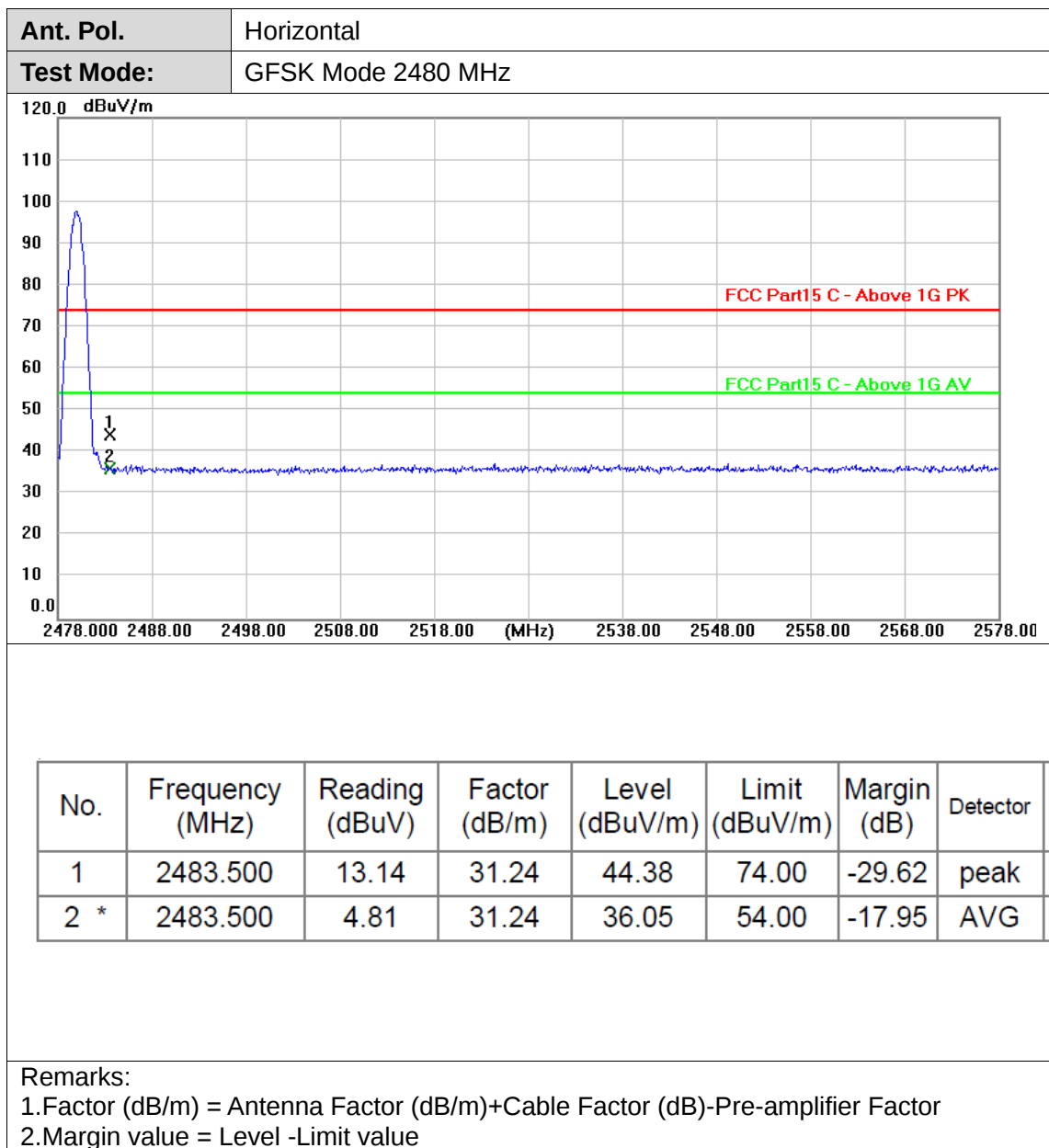
Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.10 Duty Cycle.

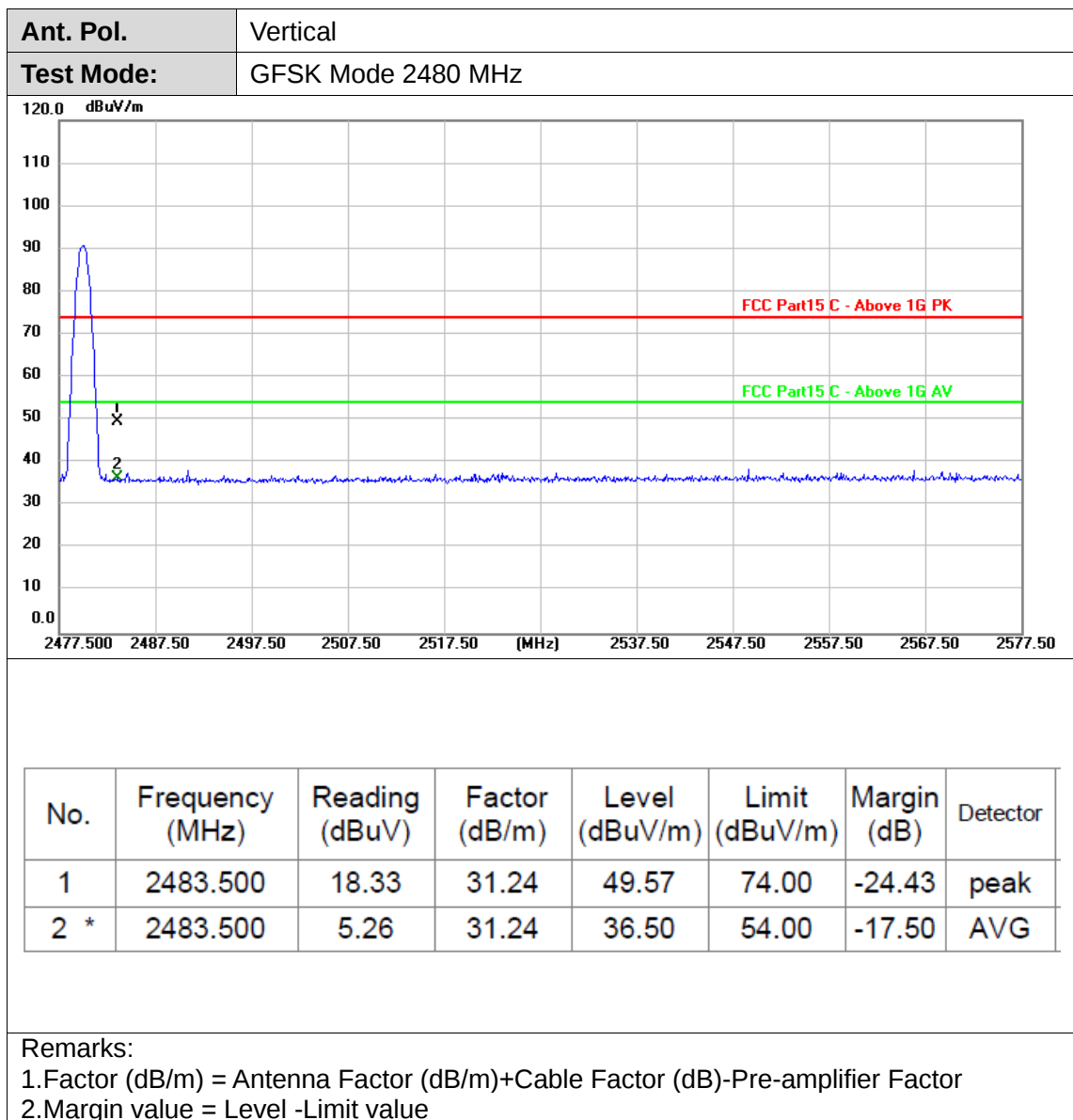
Test Mode

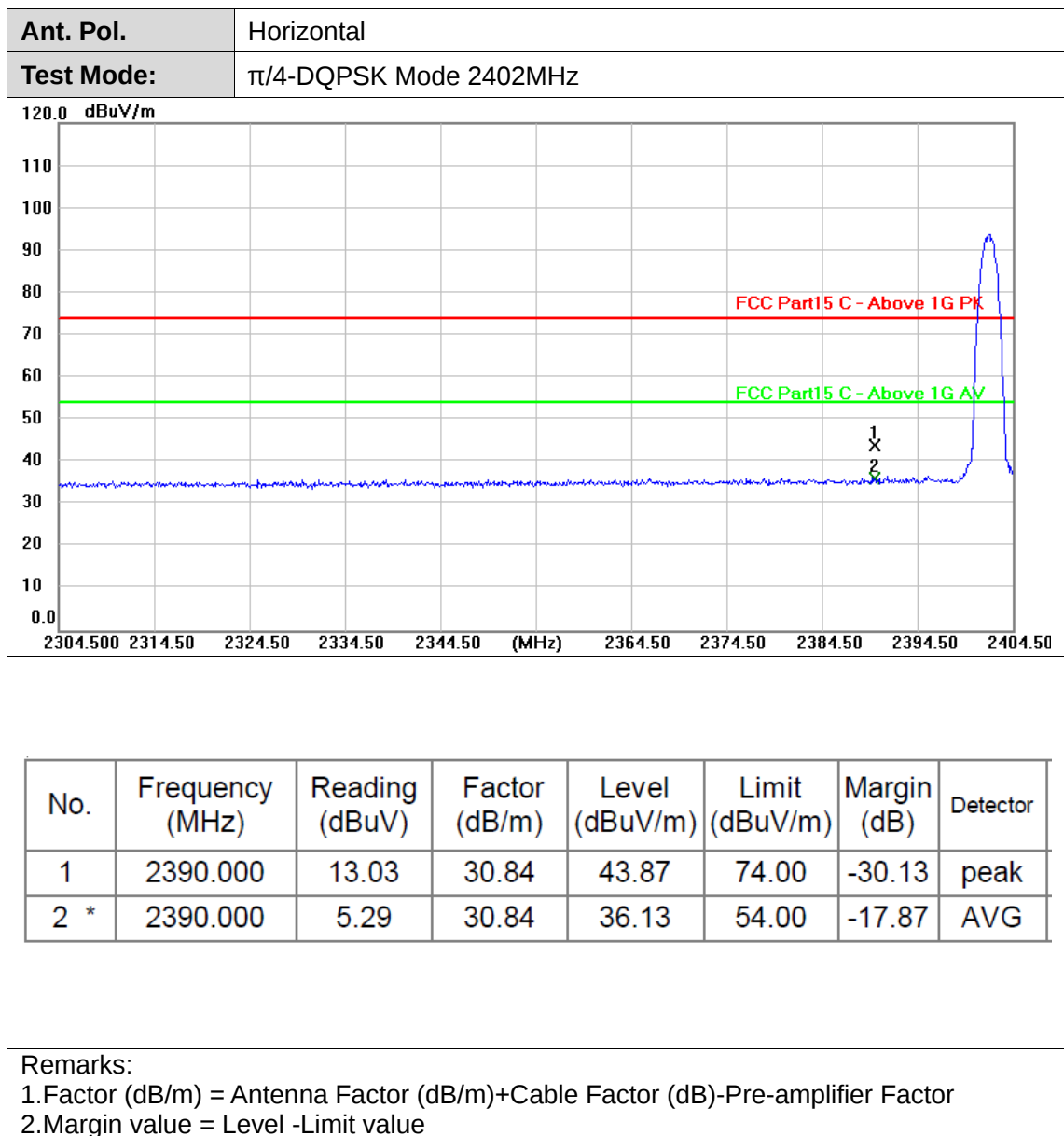
Please refer to the clause 2.4.

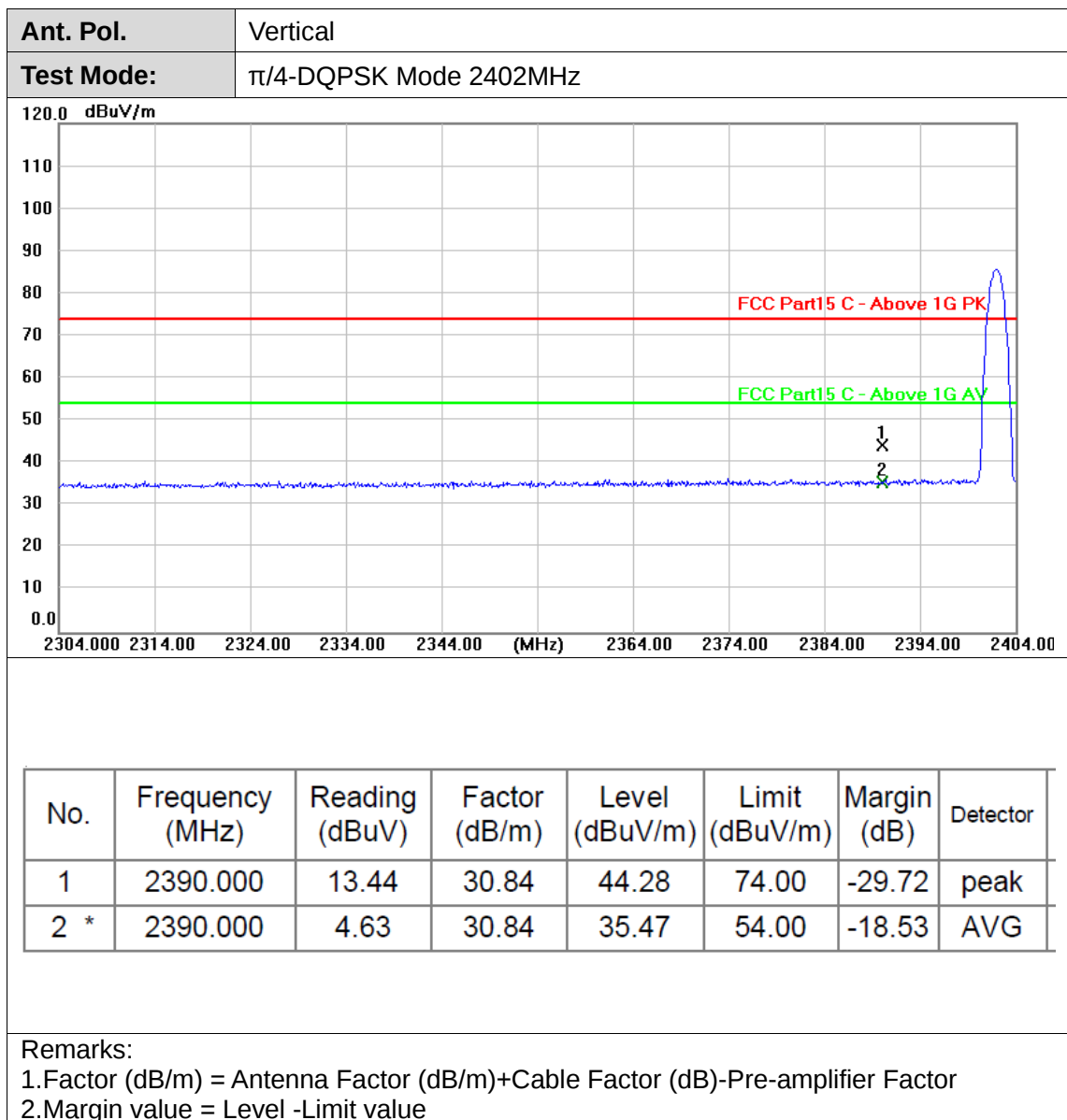
**Test Results**

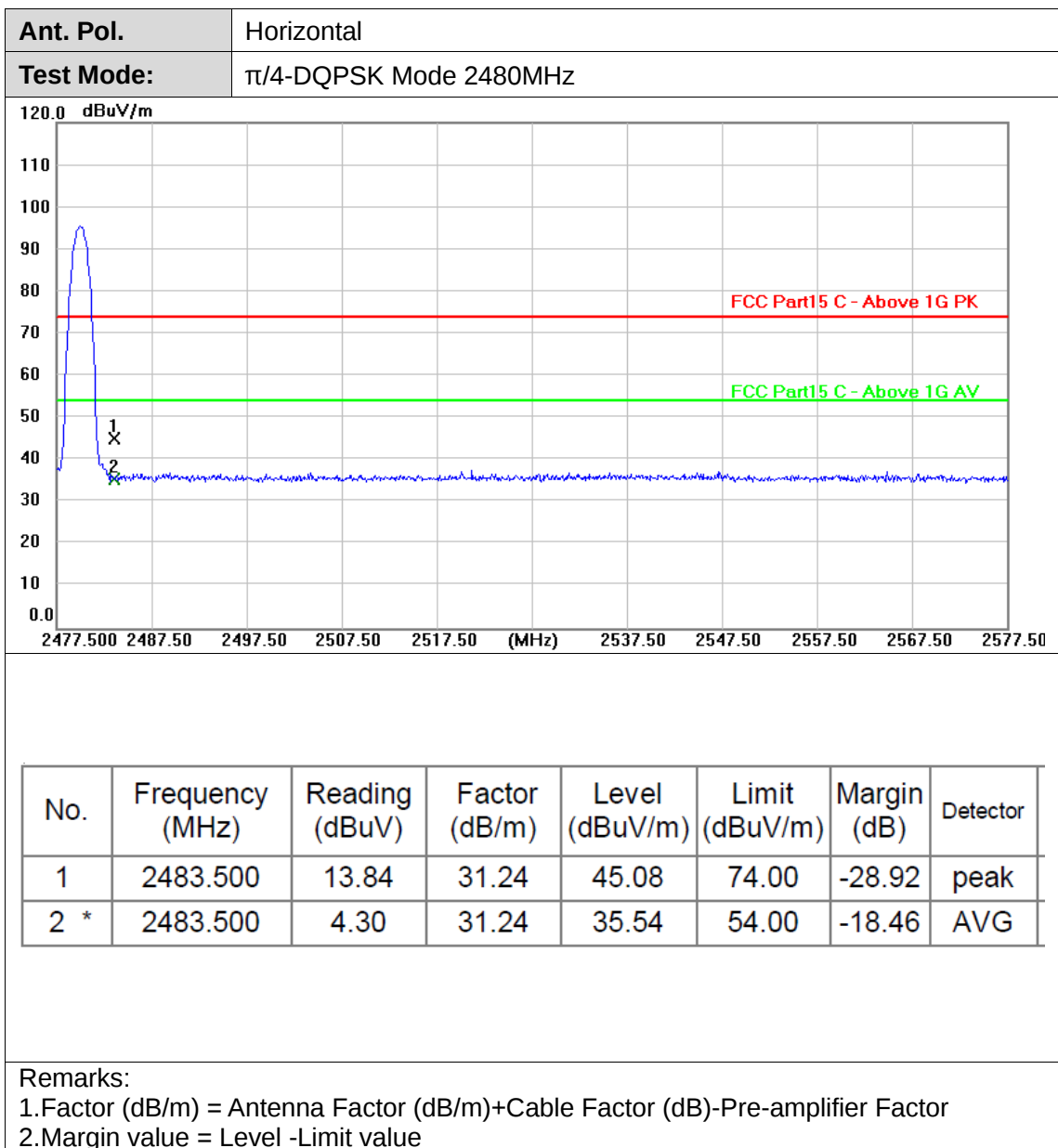


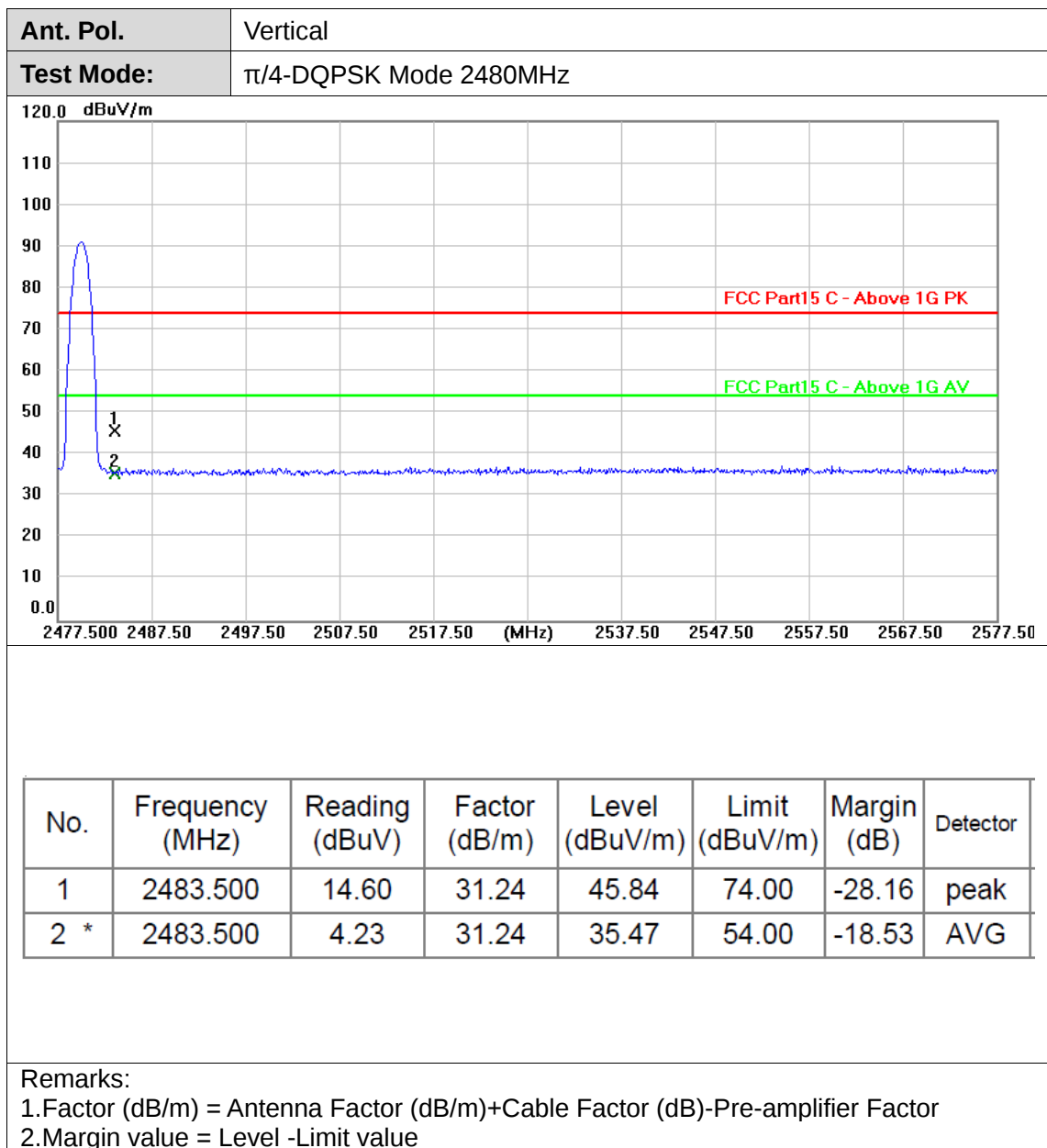


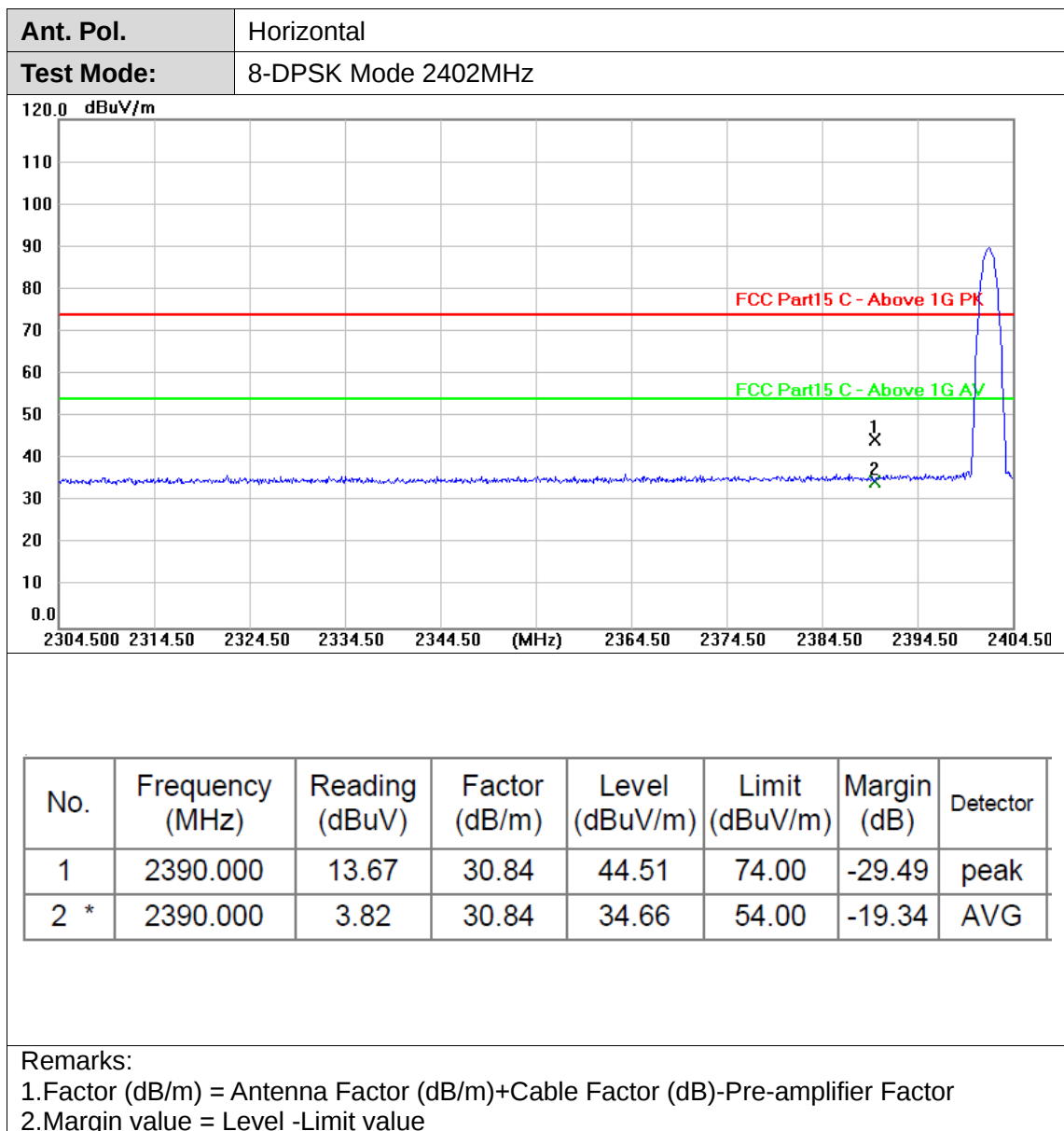


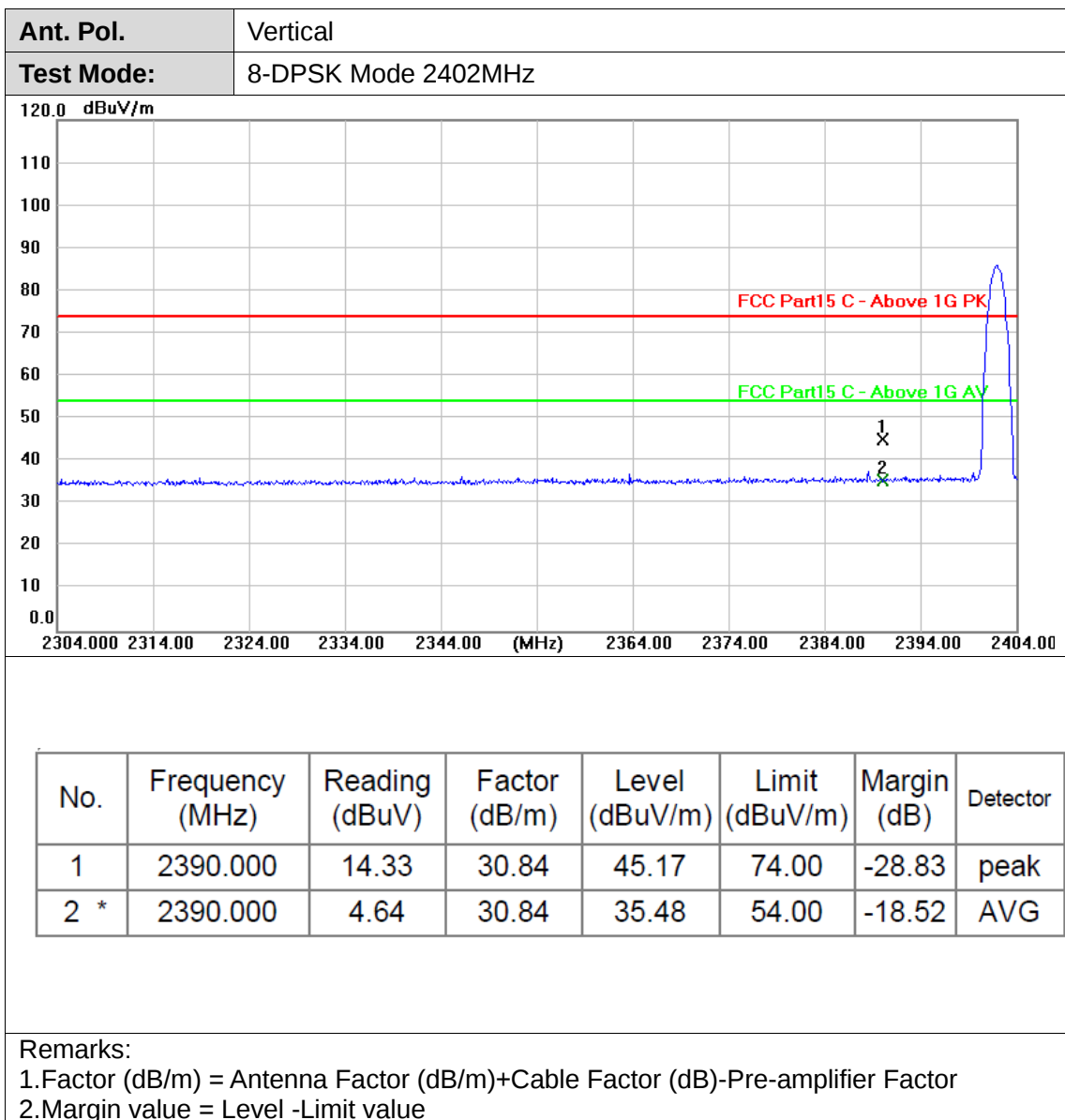


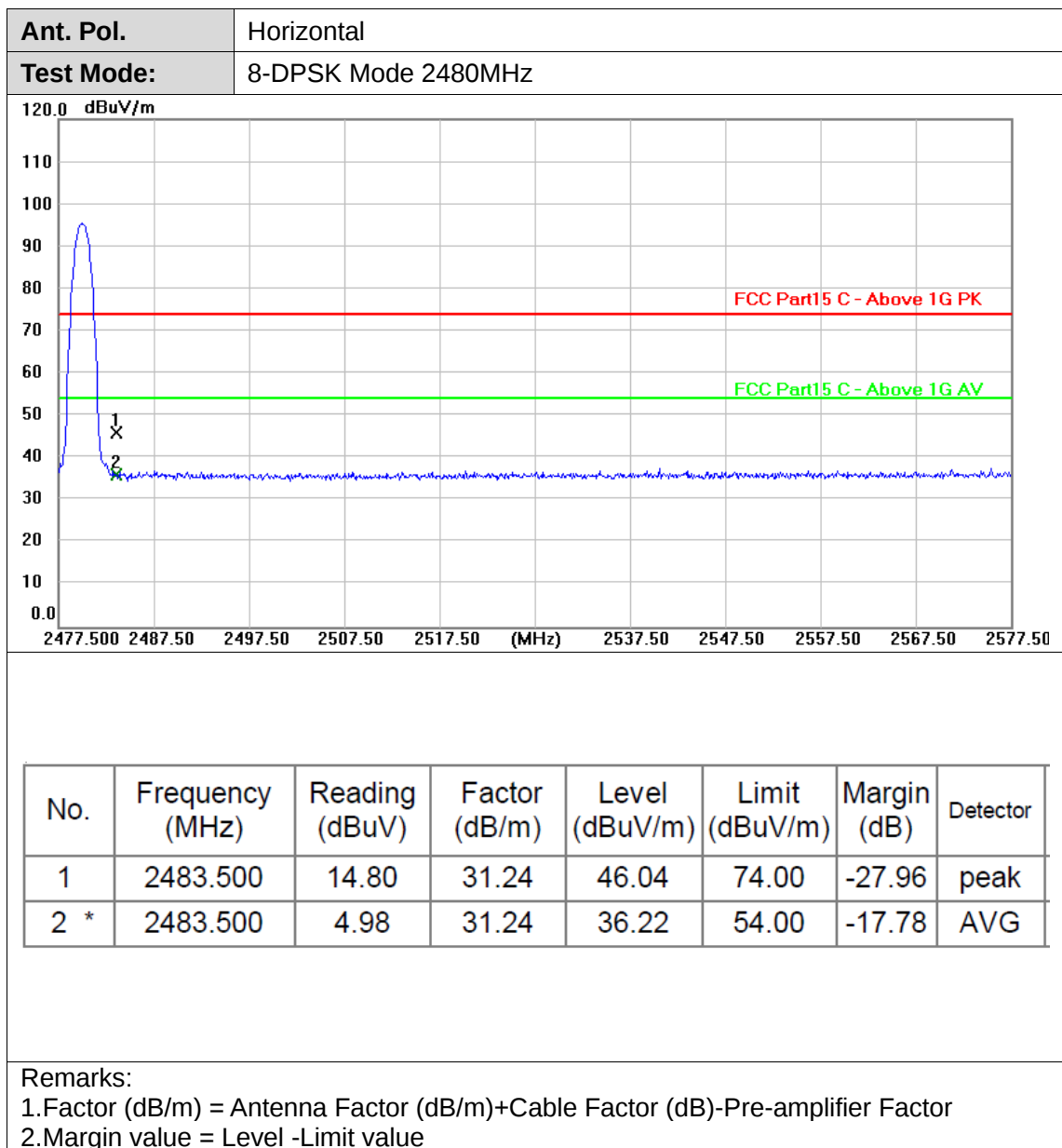


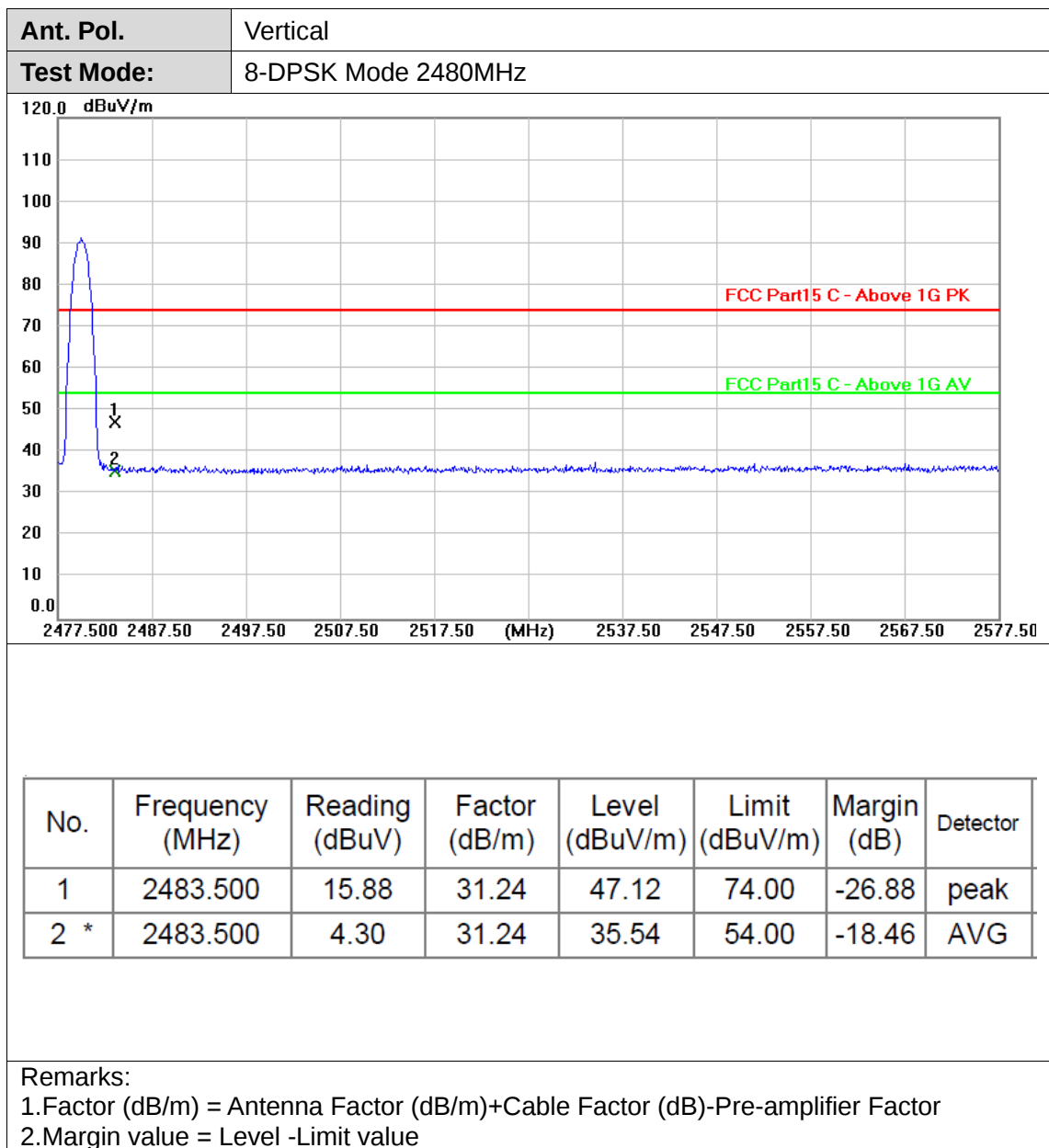












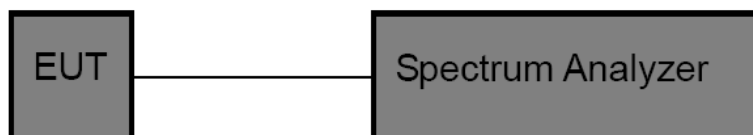


3.4. Band edge and Spurious Emissions (Conducted)

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

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.

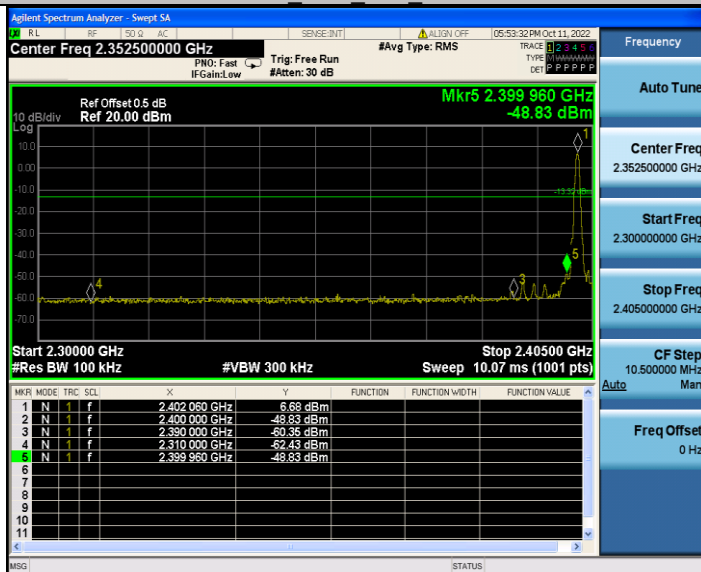
Test Results

(1) Band edge Conducted Test

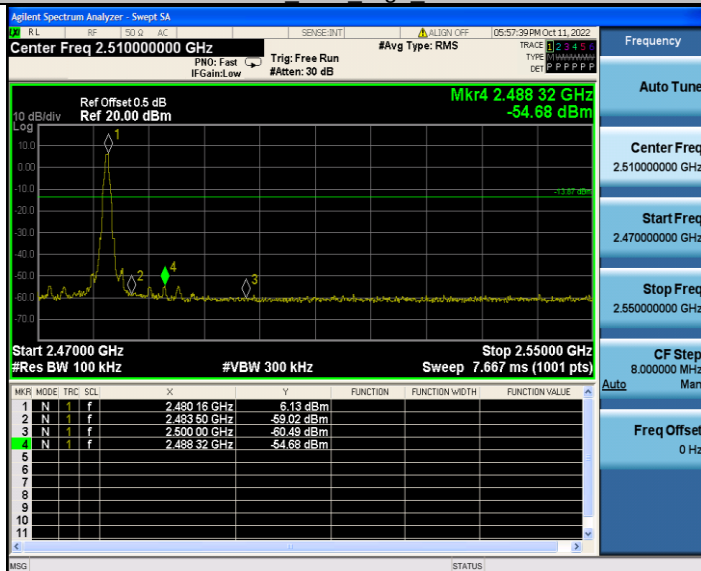
TestMode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	6.68	-48.83	≤-13.32	PASS
		High	2480	6.14	-54.68	≤-13.87	PASS
		Low	Hop 2402	7.90	-58.73	≤-12.1	PASS
		High	Hop 2480	7.63	-58.93	≤-12.37	PASS
2DH5	Ant1	Low	2402	6.85	-49.14	≤-13.16	PASS
		High	2480	6.33	-55.18	≤-13.67	PASS
		Low	Hop 2402	5.47	-58.21	≤-14.53	PASS
		High	Hop 2480	7.58	-57.4	≤-12.42	PASS
3DH5	Ant1	Low	2402	7.00	-48.59	≤-13	PASS
		High	2480	6.09	-54.54	≤-13.91	PASS
		Low	Hop 2402	5.67	-58.05	≤-14.33	PASS
		High	Hop 2480	7.68	-58.33	≤-12.33	PASS



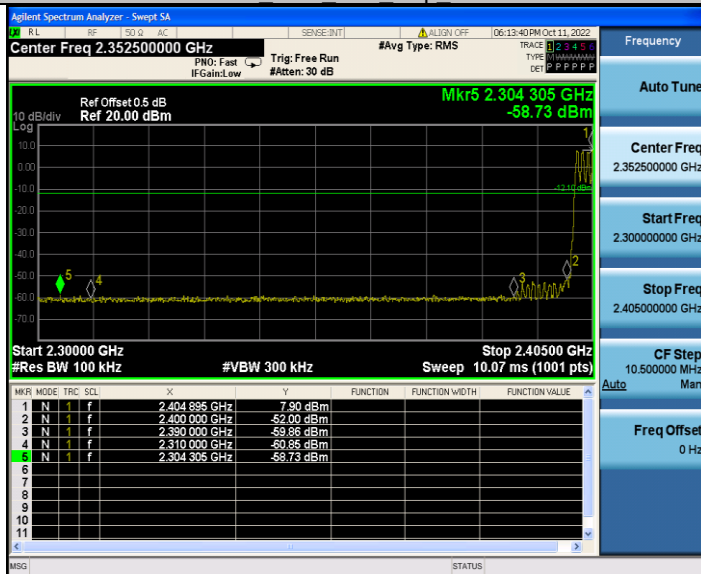
DH5 Ant1 Low 2402



DH5 Ant1 High 2480



DH5 Ant1 Low Hop 2402



DH5 Ant1 High Hop 2480

CTC Laboratories, Inc.

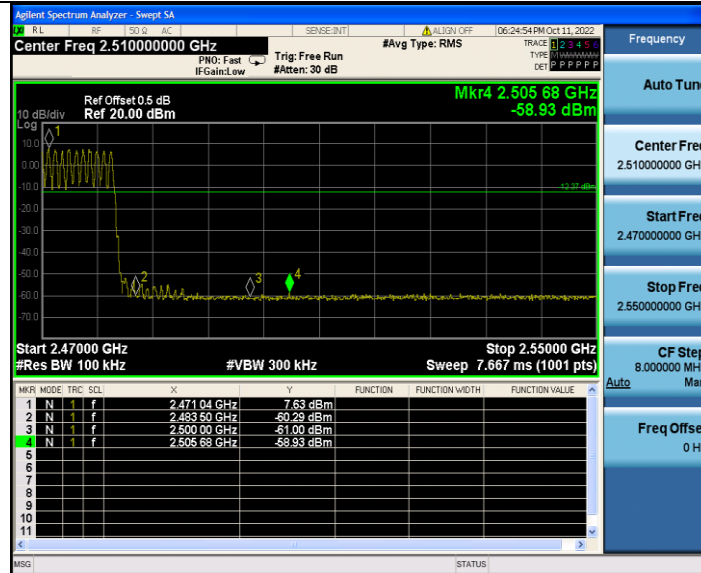
1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

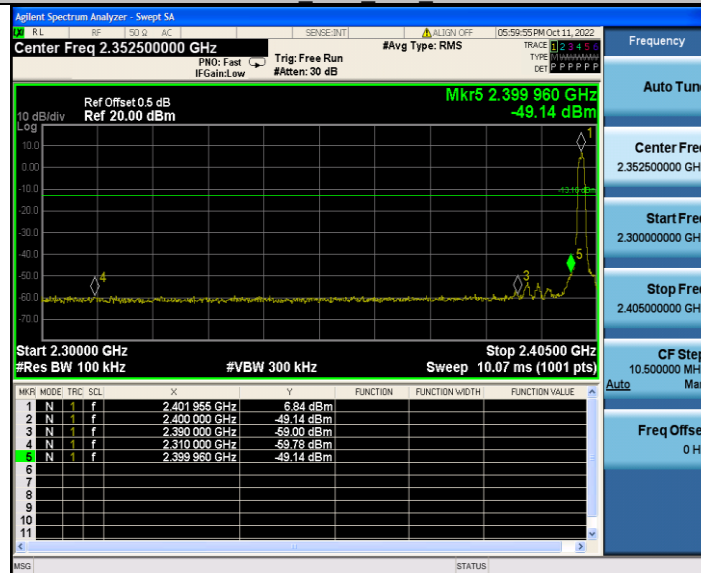
Fax: (86)755-27521011

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

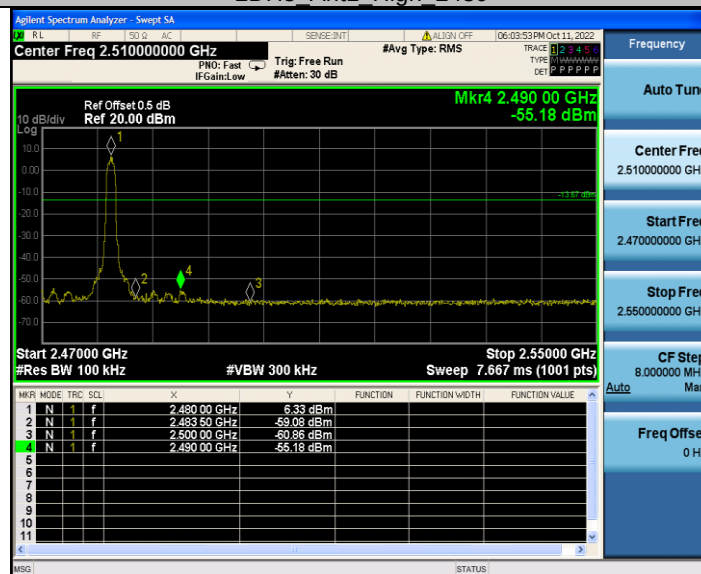
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn



2DH5 Ant1 Low 2402



2DH5 Ant1 High 2480



2DH5 Ant1 Low Hop 2402

CTC Laboratories, Inc.

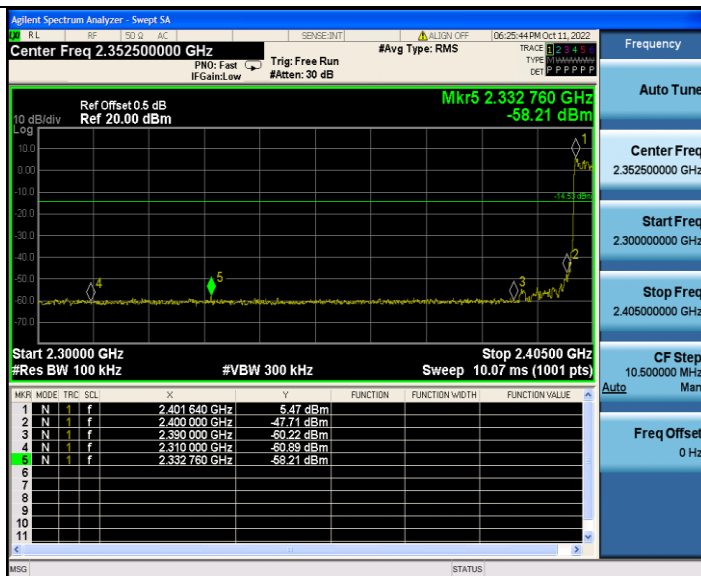
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Tel.: (86)755-27521059

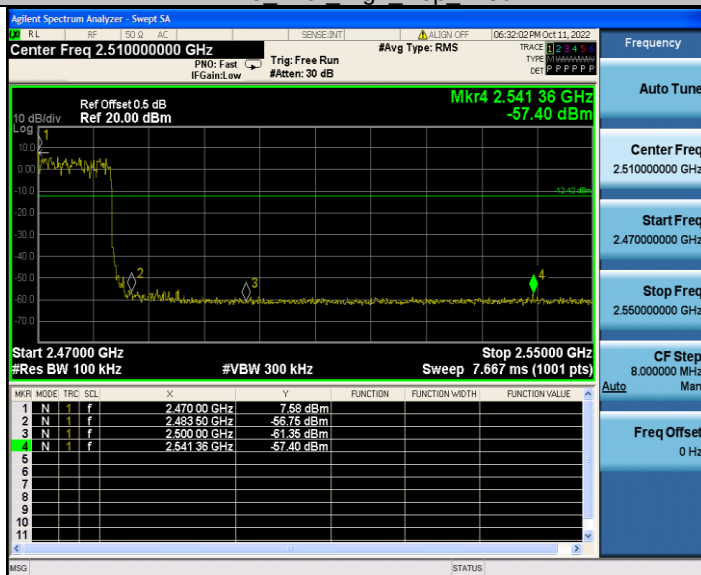
Fax: (86)755-27521011

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

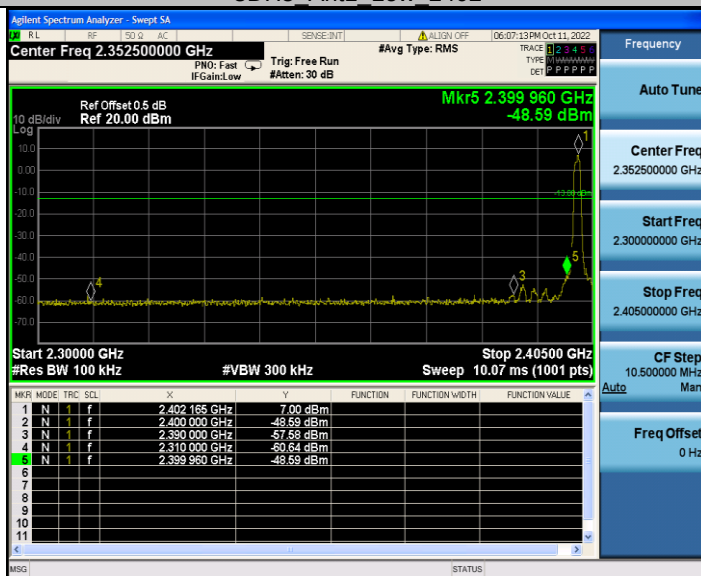
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn



2DH5 Ant1 High Hop 2480



3DH5 Ant1 Low 2402



3DH5 Ant1 High 2480

CTC Laboratories, Inc.

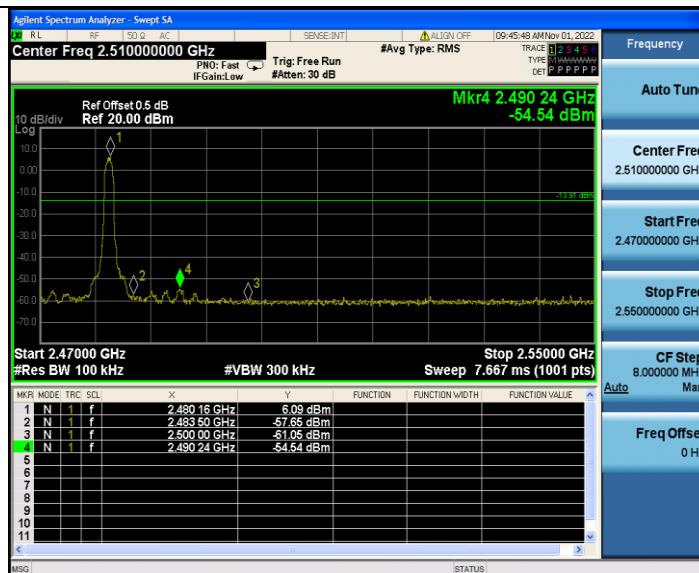
1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

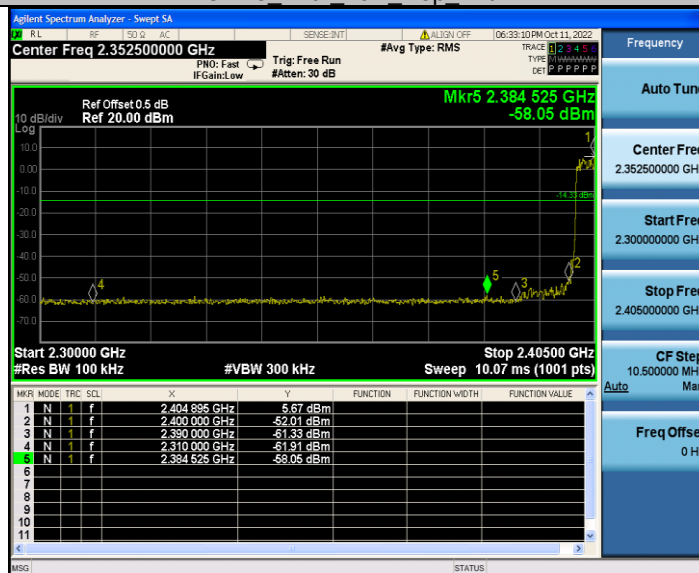
Fax: (86)755-27521011

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

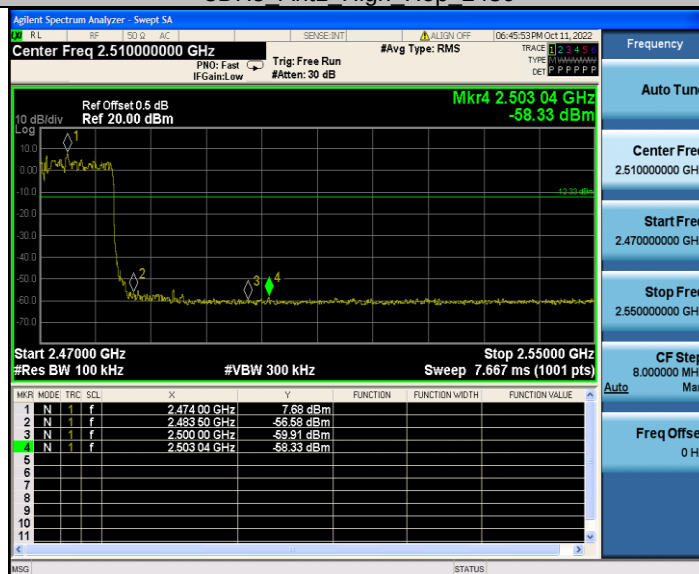
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn



3DH5 Ant1 Low Hop 2402



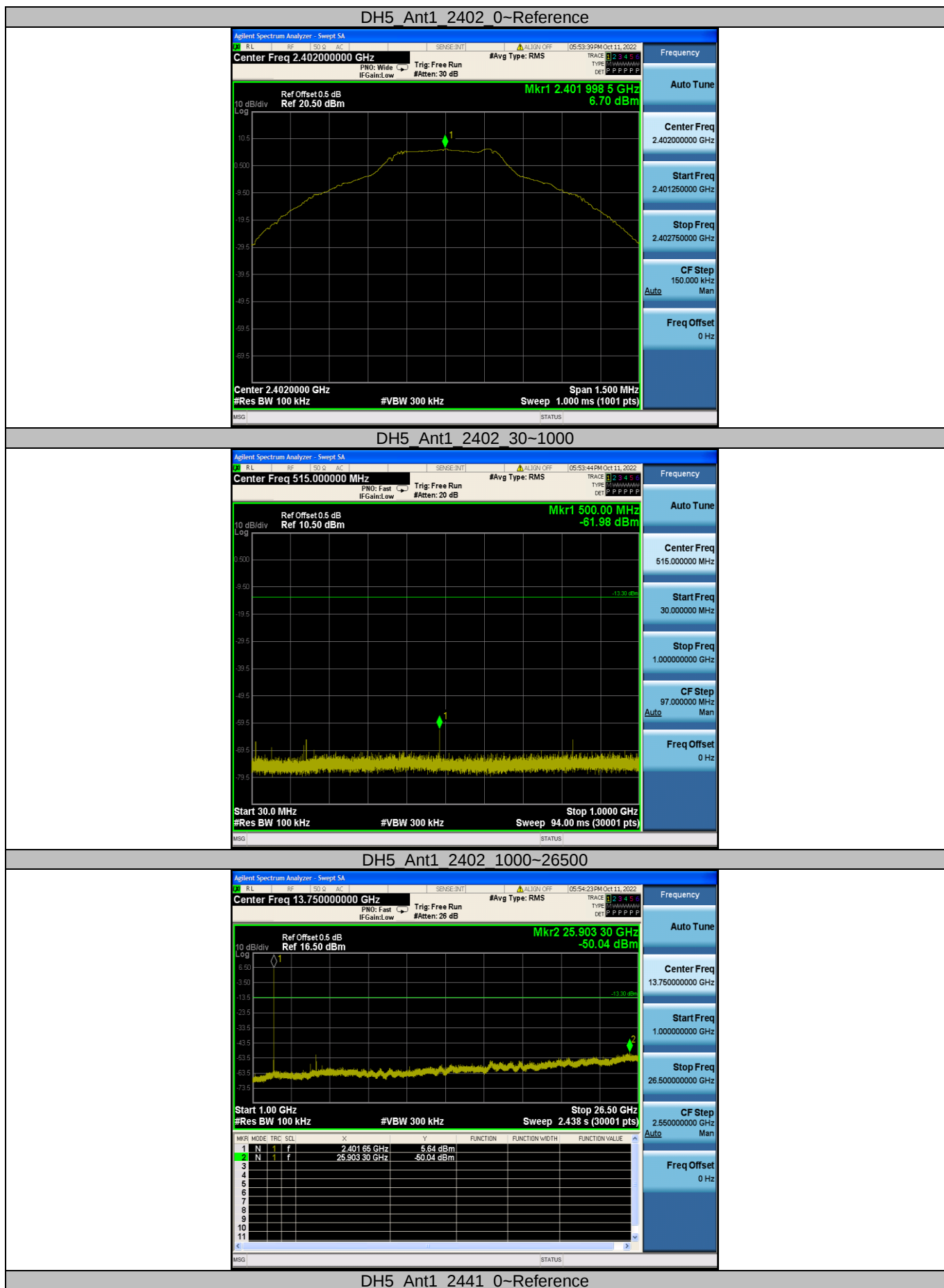
3DH5 Ant1 High Hop 2480





(2) Conducted Spurious Emissions Test

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	6.70	6.70	---	PASS
			30~1000	6.70	-61.98	≤ -13.3	PASS
			1000~26500	6.70	-50.04	≤ -13.3	PASS
		2441	Reference	6.77	6.77	---	PASS
			30~1000	6.77	-61.92	≤ -13.23	PASS
			1000~26500	6.77	-49.73	≤ -13.23	PASS
		2480	Reference	6.12	6.12	---	PASS
			30~1000	6.12	-61.32	≤ -13.88	PASS
			1000~26500	6.12	-49.41	≤ -13.88	PASS
2DH5	Ant1	2402	Reference	6.97	6.97	---	PASS
			30~1000	6.97	-61.55	≤ -13.03	PASS
			1000~26500	6.97	-50.13	≤ -13.03	PASS
		2441	Reference	6.90	6.90	---	PASS
			30~1000	6.90	-62.24	≤ -13.1	PASS
			1000~26500	6.90	-50.54	≤ -13.1	PASS
		2480	Reference	6.37	6.37	---	PASS
			30~1000	6.37	-61.05	≤ -13.63	PASS
			1000~26500	6.37	-49.96	≤ -13.63	PASS
3DH5	Ant1	2402	Reference	6.96	6.96	---	PASS
			30~1000	6.96	-61.39	≤ -13.04	PASS
			1000~26500	6.96	-50.42	≤ -13.04	PASS
		2441	Reference	7.05	7.05	---	PASS
			30~1000	7.05	-62.22	≤ -12.95	PASS
			1000~26500	7.05	-50.57	≤ -12.95	PASS
		2480	Reference	6.04	6.04	---	PASS
			30~1000	6.04	-62.07	≤ -13.96	PASS
			1000~26500	6.04	-47.03	≤ -13.96	PASS



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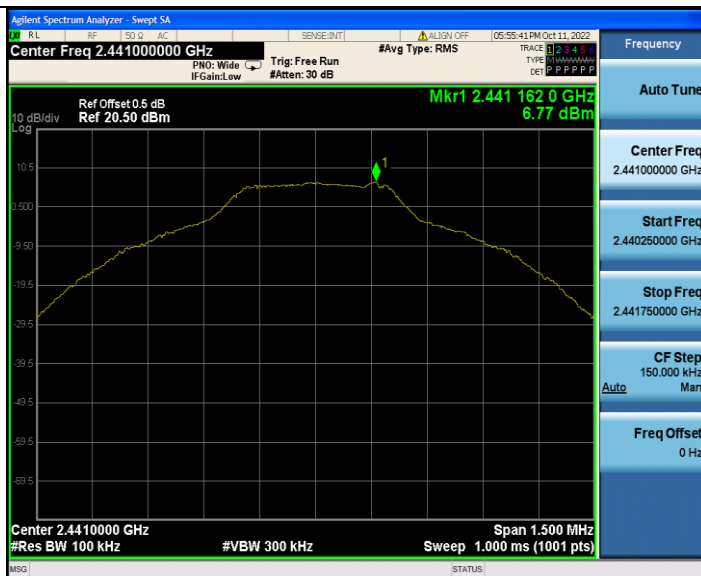
1-2/F, Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel.: (86)755-27521059

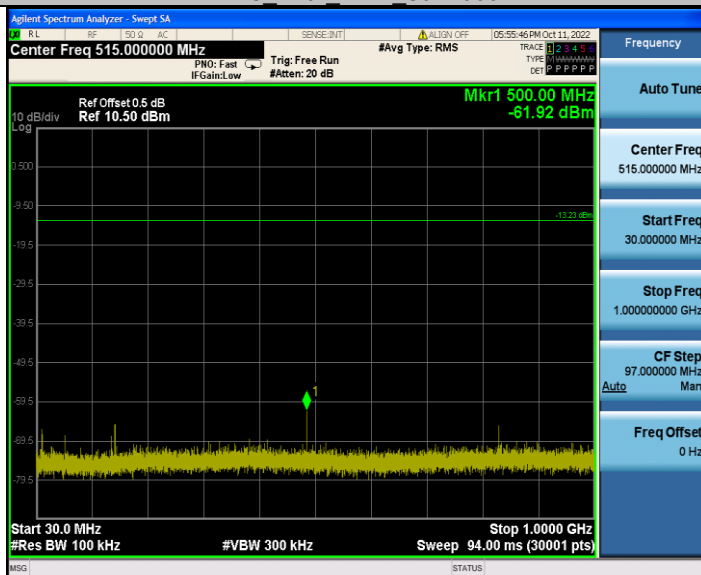
Fax: (86)755-27521011

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

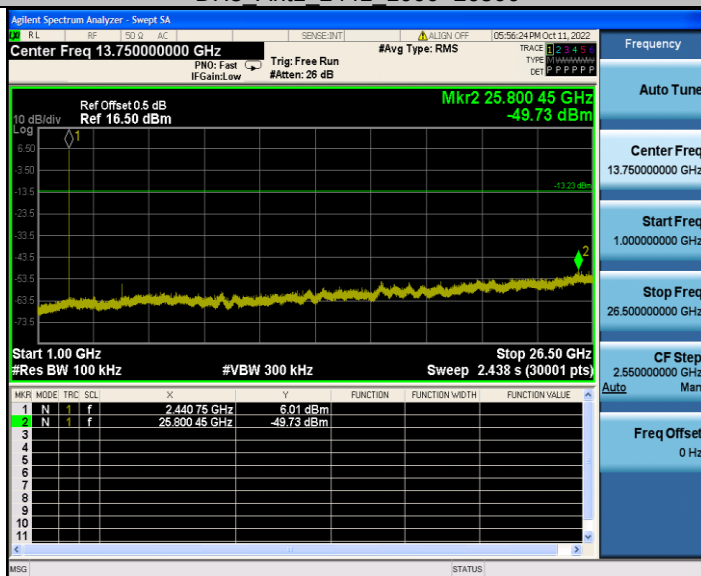
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn



DH5 Ant1 2441 30~1000



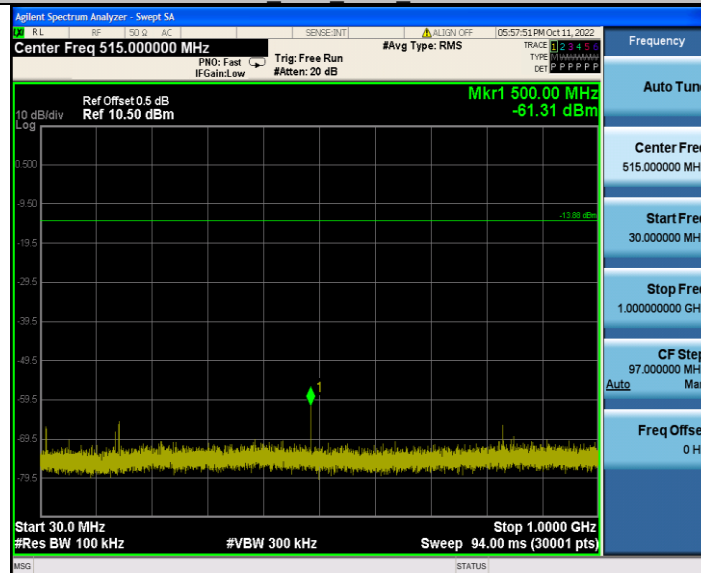
DH5 Ant1 2441 1000~26500



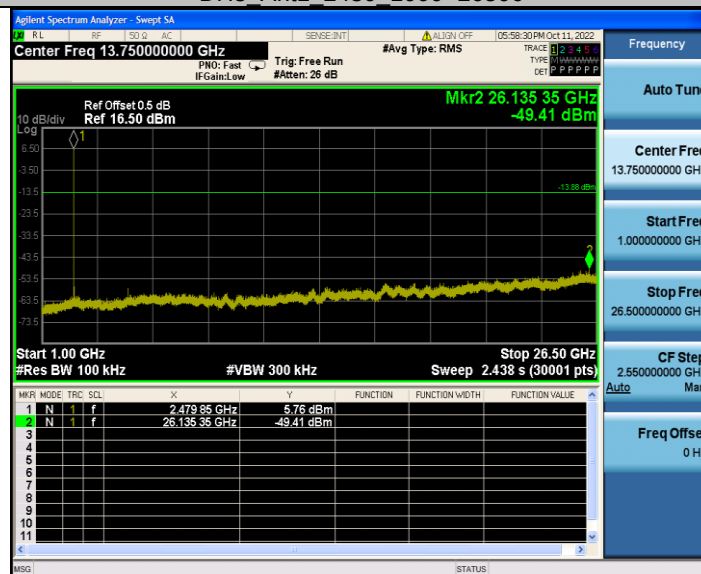
DH5 Ant1 2480 0~Reference



DH5 Ant1 2480 30~1000



DH5 Ant1 2480 1000~26500



2DH5 Ant1 2402 0~Reference

CTC Laboratories, Inc.

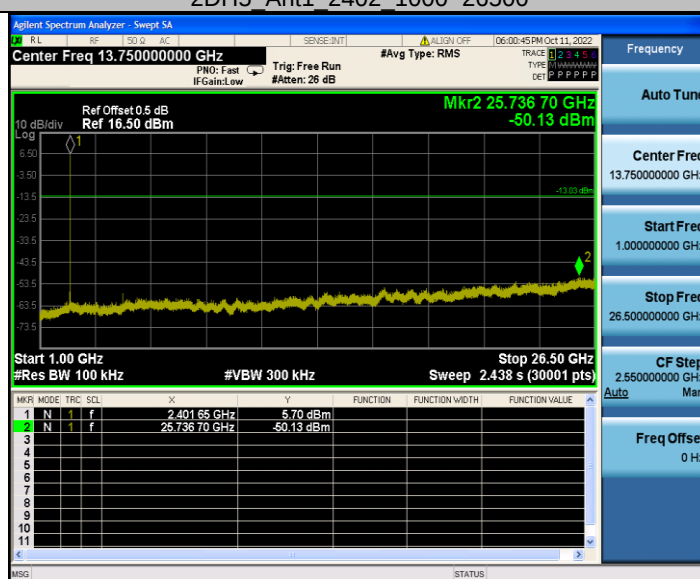
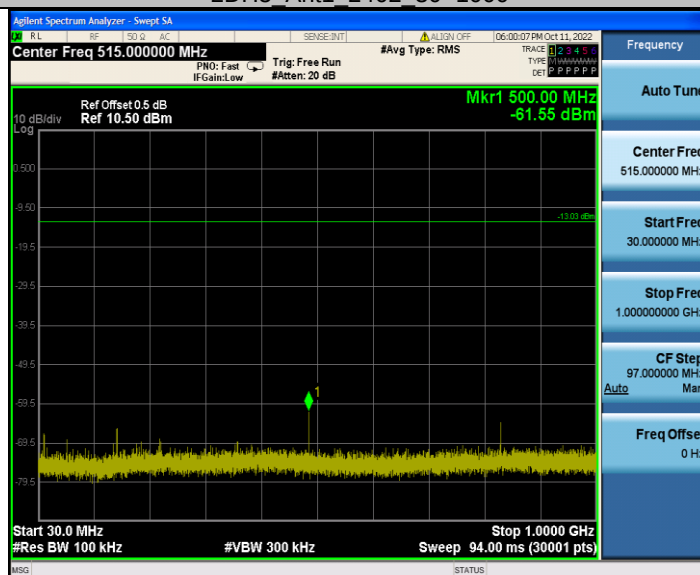
1-2/F, Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

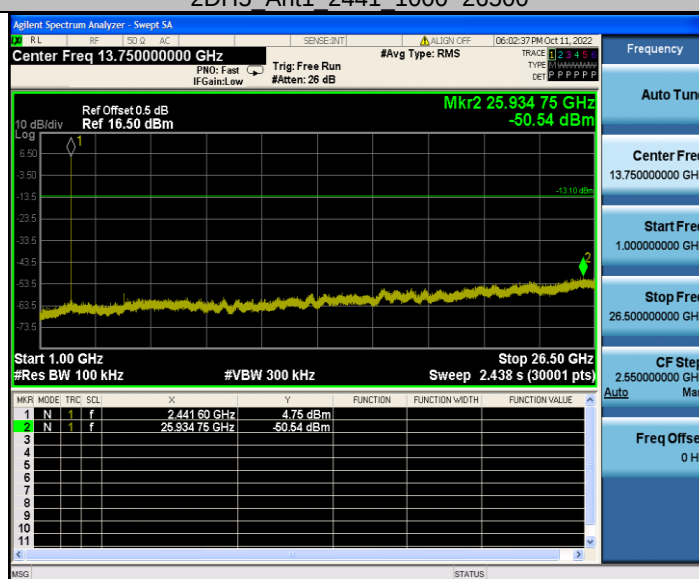
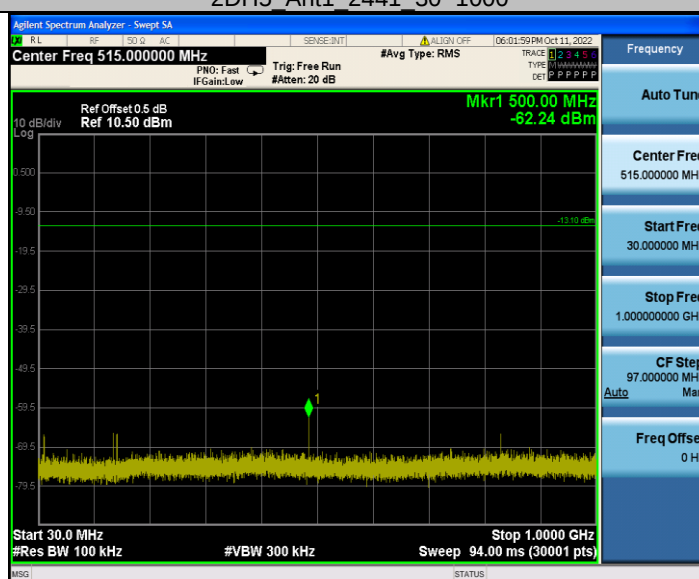
Tel.: (86)755-27521059

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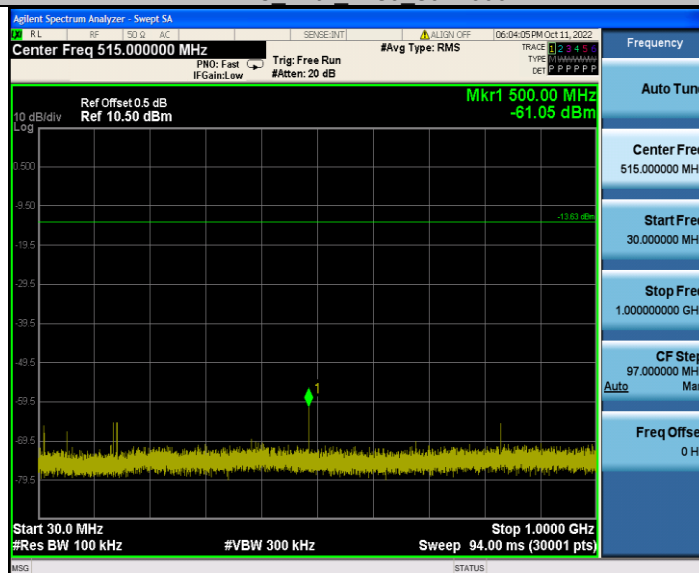
For anti-fake verification, please visit the official website of Certification and Accreditation Administration of the People's Republic of China : yz.cnca.cn



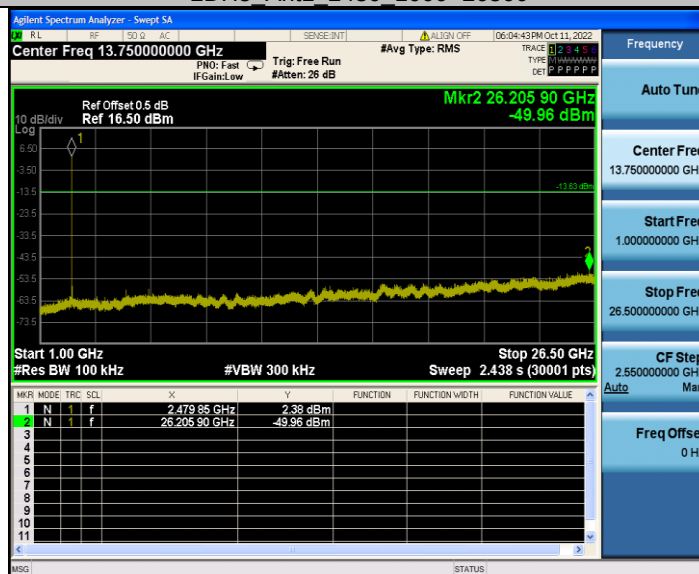




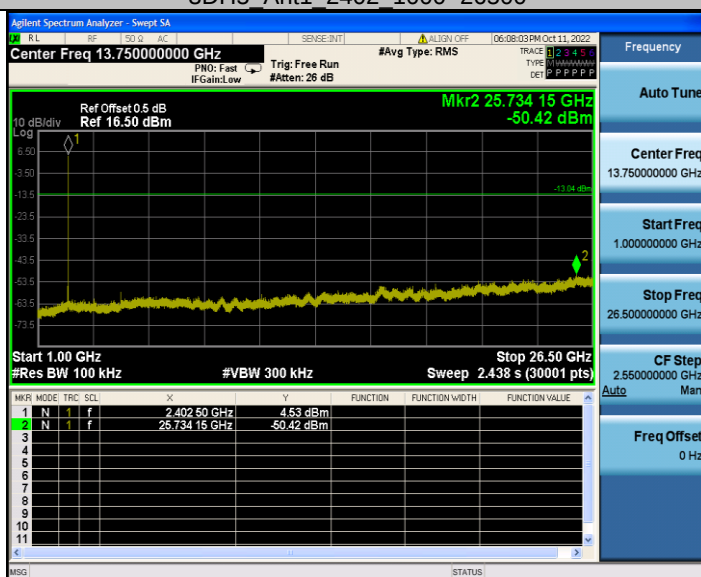
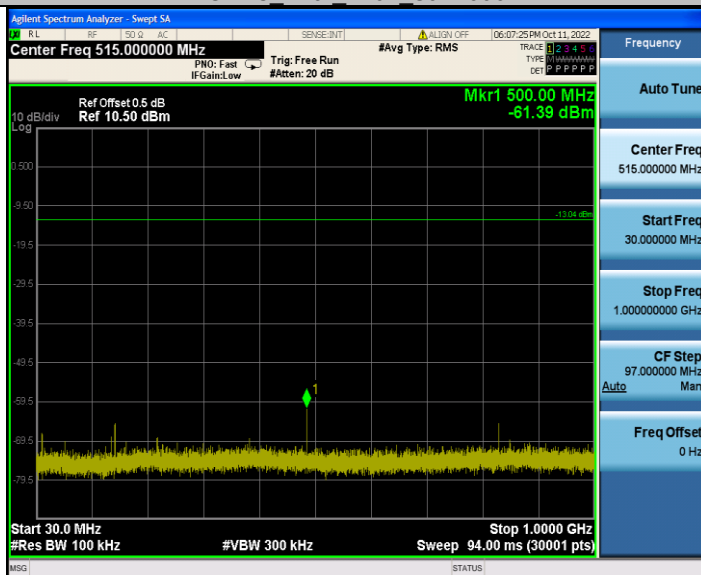
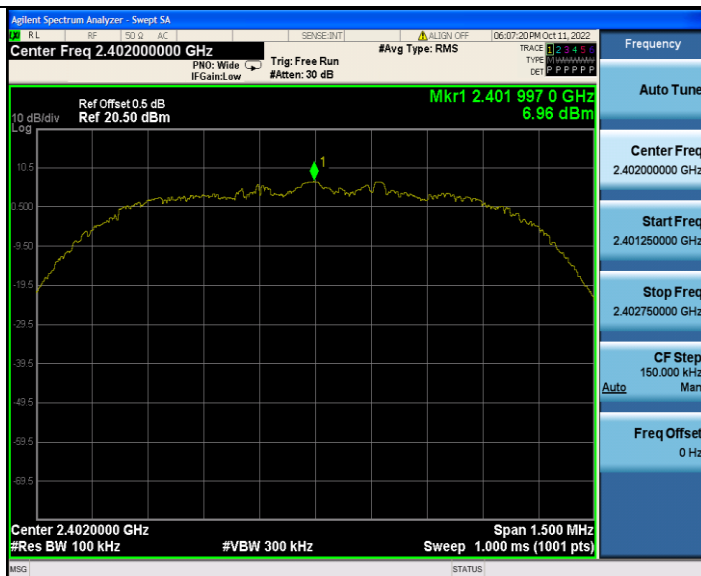
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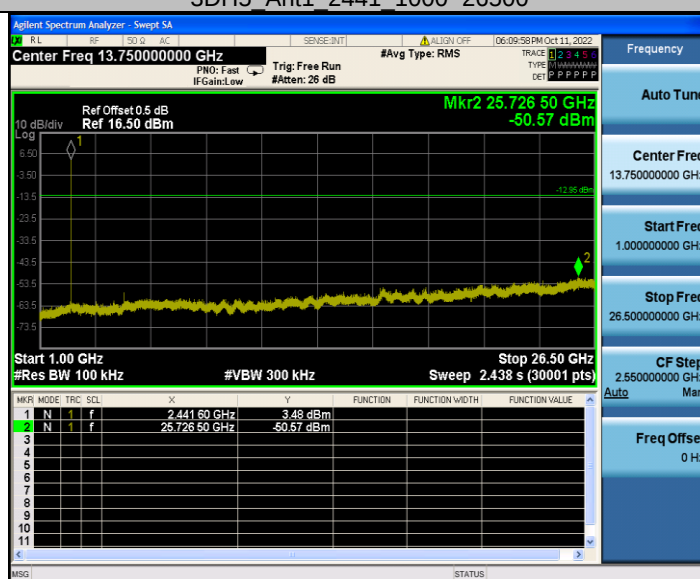
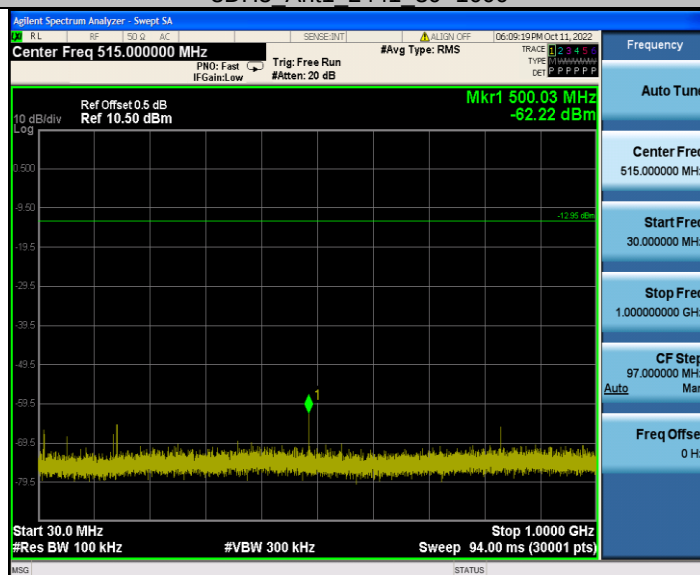


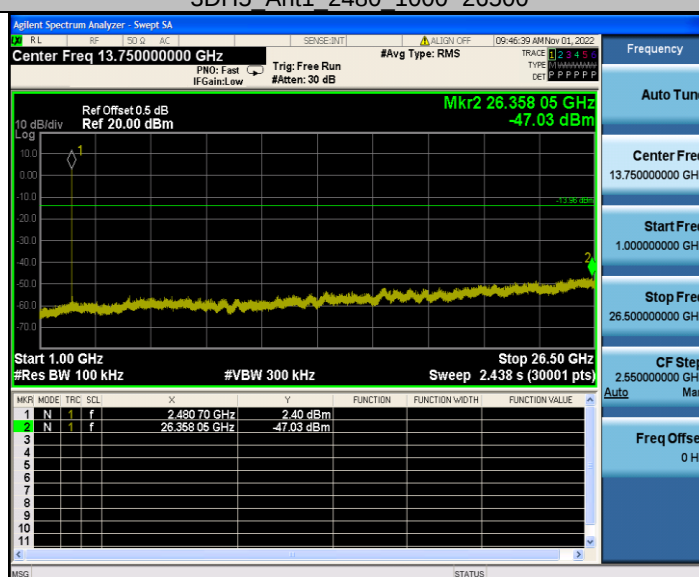
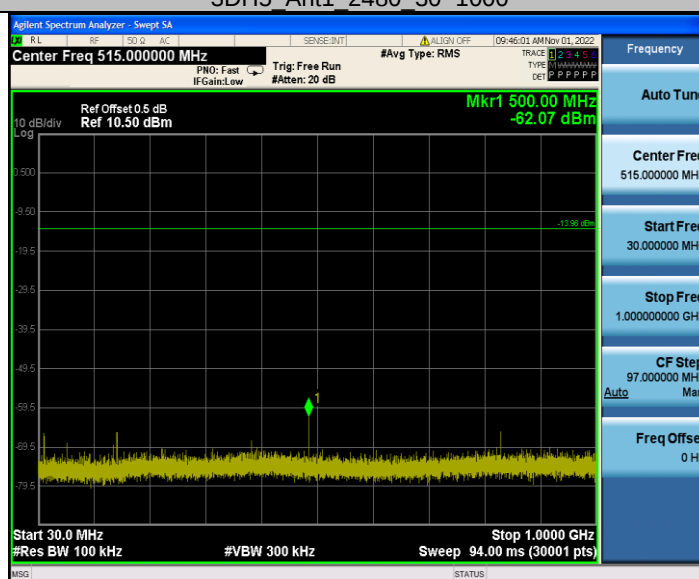
2DH5_Ant1_2480_1000~26500



3DH5_Ant1_2402_0~Reference







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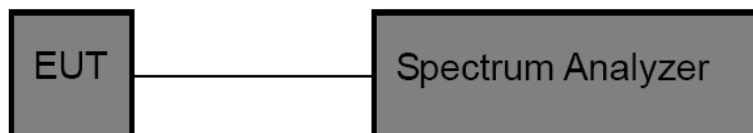


3.5. Bandwidth

Limit

N/A

Test Configuration



Test Procedure

5. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
6. OCB and 20dB Spectrum Setting:
 - (1) Set RBW = 1% ~ 5% occupied bandwidth.
 - (2) Set the video bandwidth (VBW) ≥ 3 RBW.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.

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

Test Mode

Please refer to the clause 2.4.

Test Results

Modulation type	Channel	Occupied Bandwidth (MHz)	20dB Bandwidth (MHz)	20dB Bandwidth *2/3 (MHz)
GFSK	00	0.905	0.993	0.662
	39	0.882	0.993	0.662
	78	0.876	0.993	0.662
$\pi/4$ -DQPSK	00	1.177	1.302	0.868
	39	1.176	1.299	0.866
	78	1.166	1.287	0.858
8-DPSK	00	1.175	1.290	0.860
	39	1.172	1.296	0.864
	78	1.174	1.299	0.866