



CTC Laboratories, Inc.

TEST REPORT

Report No. : **CTC2024240509**

FCC ID..... : **WNA-HPR3A-W5**

Applicant : **Shenzhen Skyworth Digital Technology Co.,LTD.**

Address..... : 14/F Unit A. Skyworth Building, Gaoxin Ave.1s., Nanshan District, Shenzhen, China

Manufacturer..... : Shenzhen Skyworth Digital Technology Co.,LTD.

Address..... : 14/F Unit A. Skyworth Building, Gaoxin Ave.1s., Nanshan District, Shenzhen, China

Product Name : **TBD, SET TOP BOX**

Trade Mark : SKYWORTH, STRONG, QVWI, Next

Model/Type reference..... : HPR3A

Listed Model(s) : HPR311

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

Test Report Form No : CTC-TR-058_A1

Master TRF : Dated 2024-09-20

Date of receipt of test sample..... : Oct. 18, 2024

Date of testing..... : Oct. 21, 2024 ~ Oct. 30, 2024

Date of issue..... : Dec. 06, 2024

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

Compiled by:

(Printed name+signature)

Lucy Lan

Supervised by:

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Eric Zhang

Approved by:

(Printed name+signature)

Totti Zhao

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CTC Laboratories, Inc.

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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

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

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

1.2. Report Version

Revised No.	Report No.	Date of issue	Description
01	CTC2024240509	Dec. 06, 2024	Original

1.3. Test Description

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

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

Laboratory accreditation

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

A2LA-Lab Cert. No.: 4340.01

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

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

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

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

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



1.5. Measurement Uncertainty

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

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

Test Items	Measurement Uncertainty	Notes
DTS Bandwidth	$\pm 0.0196\%$	(1)
Maximum Conducted Output Power	± 0.686 dB	(1)
Maximum Power Spectral Density Level	± 0.743 dB	(1)
Band-edge Compliance	± 1.328 dB	(1)
Unwanted Emissions In Non-restricted Freq Bands	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:	Shenzhen Skyworth Digital Technology Co.,LTD.
Address:	14/F Unit A. Skyworth Building, Gaoxin Ave.1s., Nanshan District, Shenzhen, China
Manufacturer:	Shenzhen Skyworth Digital Technology Co.,LTD.
Address:	14/F Unit A. Skyworth Building, Gaoxin Ave.1s., Nanshan District, Shenzhen, China
Factory:	Shenzhen Skyworth Digital Technology Co.,LTD. Baoan Factory
Address:	2-5F,Integration Multi-Storied Building, Skyworth Science and Technology Industrial Park, Tangtou Industrial Zone, Shiyan Street, Baoan District, Shenzhen city, China.

2.2. General Description of EUT

Product Name:	TBD, SET TOP BOX
Trade Mark:	SKYWORTH, STRONG, QVWI, Next
Model/Type reference:	HPR3A
Listed Model(s):	HPR311
Model Difference:	Only the models name is different
Sample ID:	CTC241012-002-S001
Power Supply:	DC12V 1A from AC/DC Adapter
Adapter Model 1	YS-SKY120100U00P ^{Note1} Input: 100-240V~ 50/60Hz 0.5A Output: 12Vdc/1A 12.0W
Adapter Model 2	RJ-SKY120100U60S ^{Note2} Input: 100-240V~ 50/60Hz 0.5A Output: 12Vdc/1A 12.0W
Adapter Model 3	BS12A-1201000US Input: 100-240V~ 50/60Hz 0.4A Output: 12Vdc/1A 12.0W
Hardware version:	/
Software version:	/

Note:

1. YS-SKY120100U0XP, (where X represents for marketing purpose with no safety impact, it can be 0-9)
2. RJ-SKY120100UXXS (XX=00-99, stands for customer code)

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Bluetooth 5.0 / BLE	
Modulation:	GFSK
Operation Frequency:	2402MHz~2480MHz
Channel Number:	40
Channel Separation:	2MHz
Data Rate:	1Mbps, 2Mbps
Antenna Type:	PCB Antenna
Antenna Gain:	1.87 dBi



2.3. Accessory Equipment Information

Equipment Information			
Name	Model	S/N	Manufacturer
Notebook	ThinkPad T460s	/	Lenovo
Cable Information			
Name	Shielded Type	Ferrite Core	Length
LAN Cable	Unshielded	NO	150cm
Test Software Information			
Name	Version	/	/
SecureCRT	/	/	/



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 BLE, 40 channels are provided to the EUT. Channels 00/19/39 were selected for testing.

Operation Frequency List:

Channel	Frequency (MHz)
00	2402
01	2404
:	:
18	2438
19	2440
20	2442
:	:
38	2478
39	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

RF Test System - SRD					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until
1	MXA Signal Analyzer	Keysight	N9020A	MY46471737	Dec. 12, 2024
2	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 12, 2024
3	PSG Analog Signal Generator	Agilent	E8257D	MY46521908	Dec. 12, 2024
4	USB Wideband Power Sensor	Keysight	U2021XA	MY55130004	Mar. 15, 2025
5	USB Wideband Power Sensor	Keysight	U2021XA	MY55130006	Mar. 15, 2025
6	High and low temperature test chamber	ESPEC	MT3035	/	Mar. 25, 2025
7	Test Software	Tonscend	JS1120-3	V2.6.88.0346	/

Radiated emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Until
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9163	01026	Dec. 18, 2024
2	Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-647	Sep. 25, 2025
3	Test Receiver	Keysight	N9038A	MY56400071	Dec. 12, 2024
4	Broadband Amplifier	SCHWARZBECK	BBV9743B	259	Dec. 12, 2024
5	Mirowave Broadband Amplifier	SCHWARZBECK	BBV9718C	111	Dec. 12, 2024
6	3m chamber 3	YIHENG	EE106	/	Aug. 28, 2026
7	Test Software	FARA	EZ-EMC	FA-03A2	/

Conducted emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Dec. 12, 2024
2	LISN	R&S	ENV216	101113	Dec. 12, 2024
3	EMI Test Receiver	R&S	ESCS30	100353	Dec. 12, 2024
4	ISN CAT6	Schwarzbeck	NTFM 8158	CAT6-8158-0046	Dec. 12, 2024
5	ISN CAT5	Schwarzbeck	NTFM 8158	CAT5-8158-0046	Dec. 12, 2024
6	Test Software	R&S	EMC32	6.10.10	/

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

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

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

3. TEST ITEM AND RESULTS

3.1. Conducted Emission

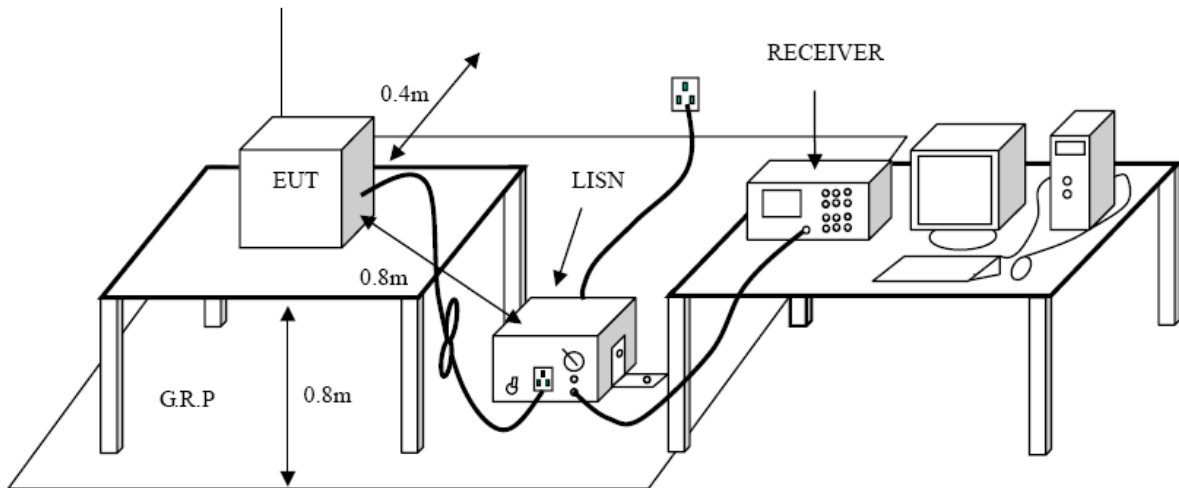
Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency (MHz)	Conducted Limit (dB μ V)	
	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 μ H coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

Test Mode

Please refer to the clause 2.4.

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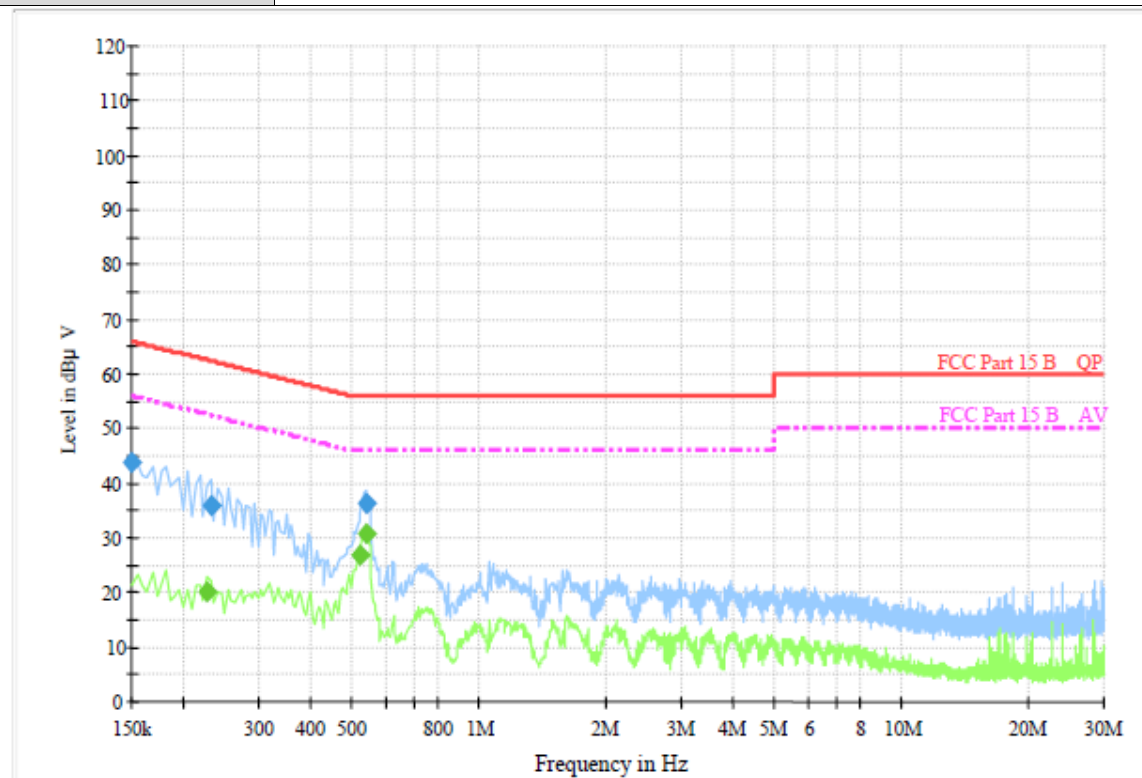
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**Test Result**

Test Voltage:	AC 120V/60Hz
Adapter Model	YS-SKY120100U00P
Terminal:	Line
Remark:	Only worse case is reported

**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBμ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμ V)	Comment
0.150000	43.9	1000.00	9.000	On	L1	9.5	22.1	66.0	
0.231000	35.9	1000.00	9.000	On	L1	9.5	26.5	62.4	
0.537000	36.4	1000.00	9.000	On	L1	9.5	19.6	56.0	

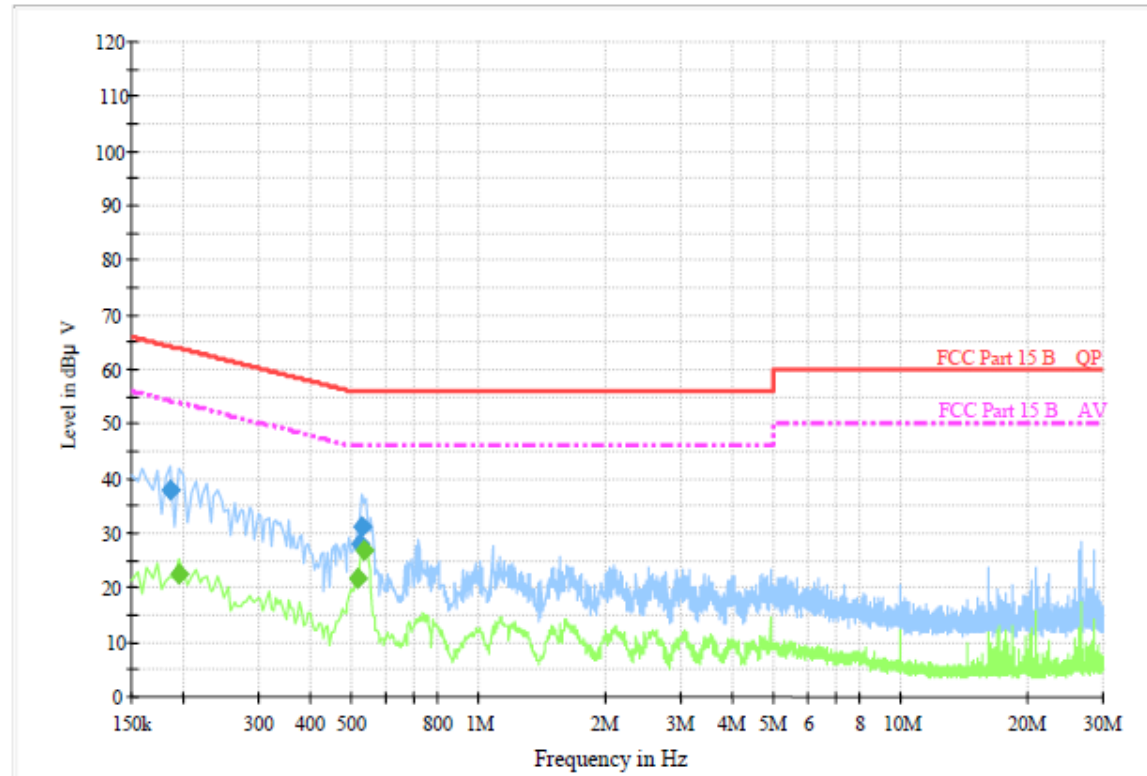
Final Measurement Detector 2

Frequency (MHz)	Average (dBμ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμ V)	Comment
0.226500	20.1	1000.00	9.000	On	L1	9.5	32.5	52.6	
0.519000	26.7	1000.00	9.000	On	L1	9.5	19.3	46.0	
0.537000	31.0	1000.00	9.000	On	L1	9.5	15.0	46.0	

Emission Level = Read Level + Correct Factor



Test Voltage:	AC 120V/60Hz
Adapter Model	YS-SKY120100U00P
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
0.186000	38.1	1000.00	9.000	On	N	9.5	26.1	64.2	
0.519000	28.1	1000.00	9.000	On	N	9.4	27.9	56.0	
0.528000	31.2	1000.00	9.000	On	N	9.4	24.8	56.0	

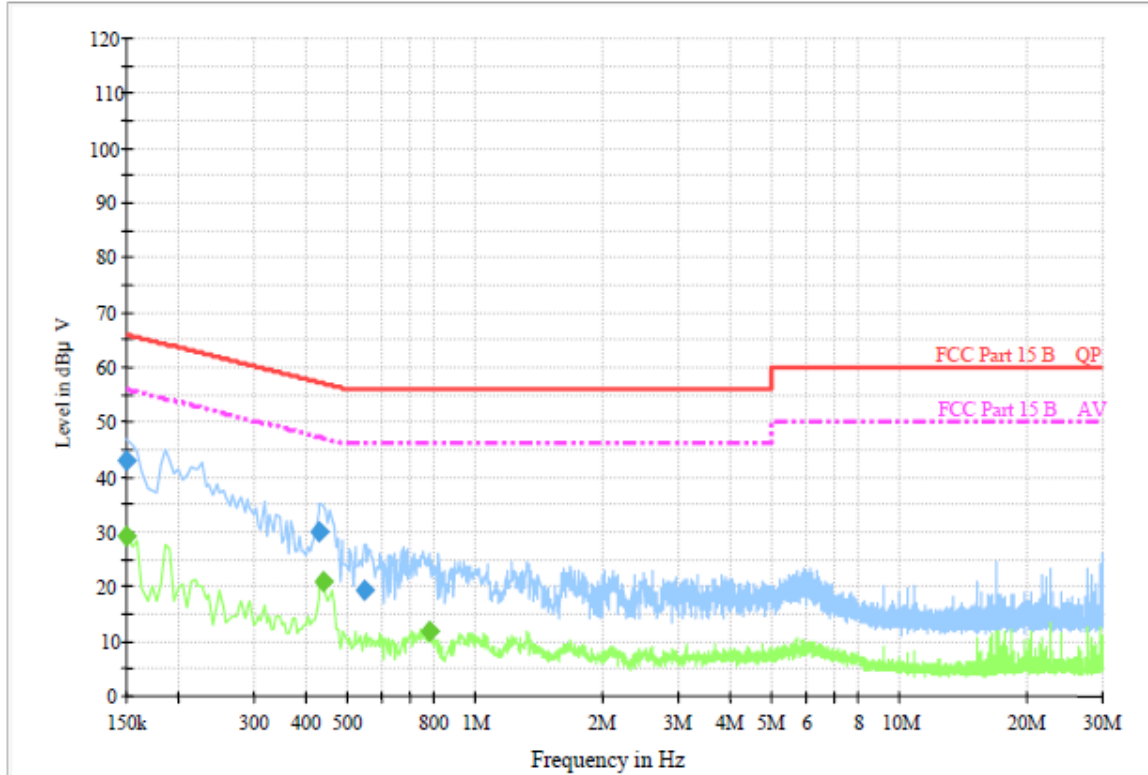
Final Measurement Detector 2

Frequency (MHz)	Average (dBμ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμ V)	Comment
0.195000	22.6	1000.00	9.000	On	N	9.4	31.2	53.8	
0.514500	21.8	1000.00	9.000	On	N	9.4	24.2	46.0	
0.532500	27.0	1000.00	9.000	On	N	9.4	19.0	46.0	

Emission Level = Read Level + Correct Factor



Test Voltage:	AC 120V/60Hz
Adapter Model	RJ-SKY120100U60S
Terminal:	Line
Remark:	Only worse case is reported



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμ V)	Comment
0.150000	42.9	1000.00	9.000	On	L1	9.5	23.1	66.0	
0.429000	29.8	1000.00	9.000	On	L1	9.5	27.5	57.3	
0.546000	19.5	1000.00	9.000	On	L1	9.5	36.5	56.0	

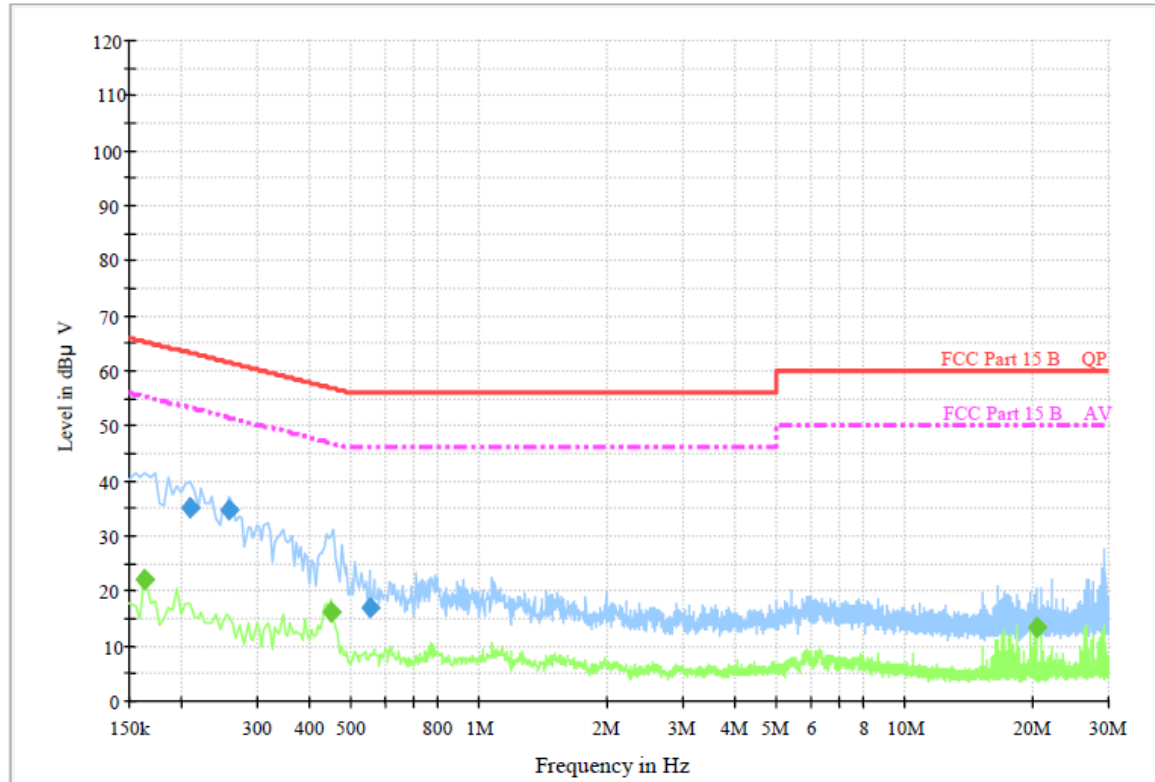
Final Measurement Detector 2

Frequency (MHz)	Average (dBμ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμ V)	Comment
0.150000	29.3	1000.00	9.000	On	L1	9.5	26.7	56.0	
0.438000	20.9	1000.00	9.000	On	L1	9.5	26.2	47.1	
0.775500	11.8	1000.00	9.000	On	L1	9.5	34.2	46.0	

Emission Level = Read Level + Correct Factor



Test Voltage:	AC 120V/60Hz
Adapter Model	RJ-SKY120100U60S
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
0.208500	35.1	1000.00	9.000	On	N	9.4	28.2	63.3	
0.258000	34.9	1000.00	9.000	On	N	9.4	26.6	61.5	
0.550500	16.9	1000.00	9.000	On	N	9.4	39.1	56.0	

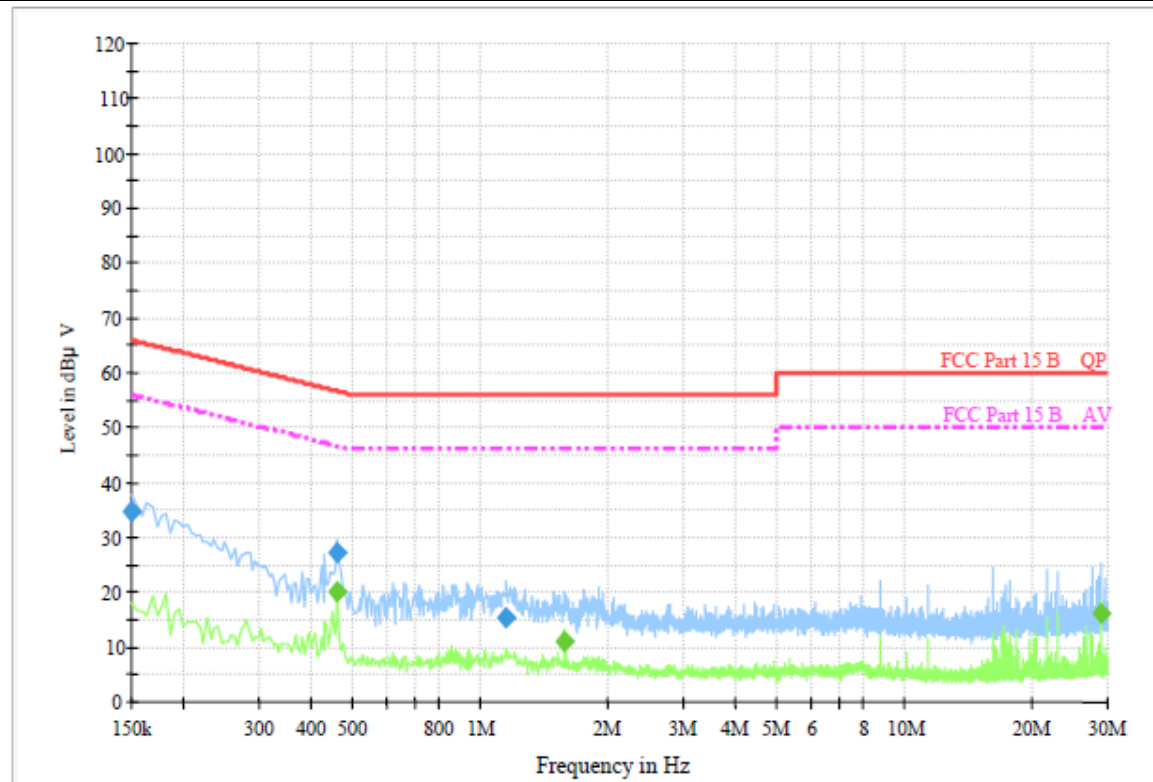
Final Measurement Detector 2

Frequency (MHz)	Average (dBμ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμ V)	Comment
0.163500	22.3	1000.00	9.000	On	N	9.5	33.0	55.3	
0.447000	16.1	1000.00	9.000	On	N	9.4	30.8	46.9	
20.260500	13.4	1000.00	9.000	On	N	9.5	36.6	50.0	

Emission Level = Read Level + Correct Factor



Test Voltage:	AC 120V/60Hz
Adapter Model	BS12A-1201000US
Terminal:	Line
Remark:	Only worse case is reported



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.150000	34.6	1000.00	9.000	On	L1	9.5	31.4	66.0	
0.460500	27.2	1000.00	9.000	On	L1	9.5	29.5	56.7	
1.149000	15.2	1000.00	9.000	On	L1	9.5	40.8	56.0	

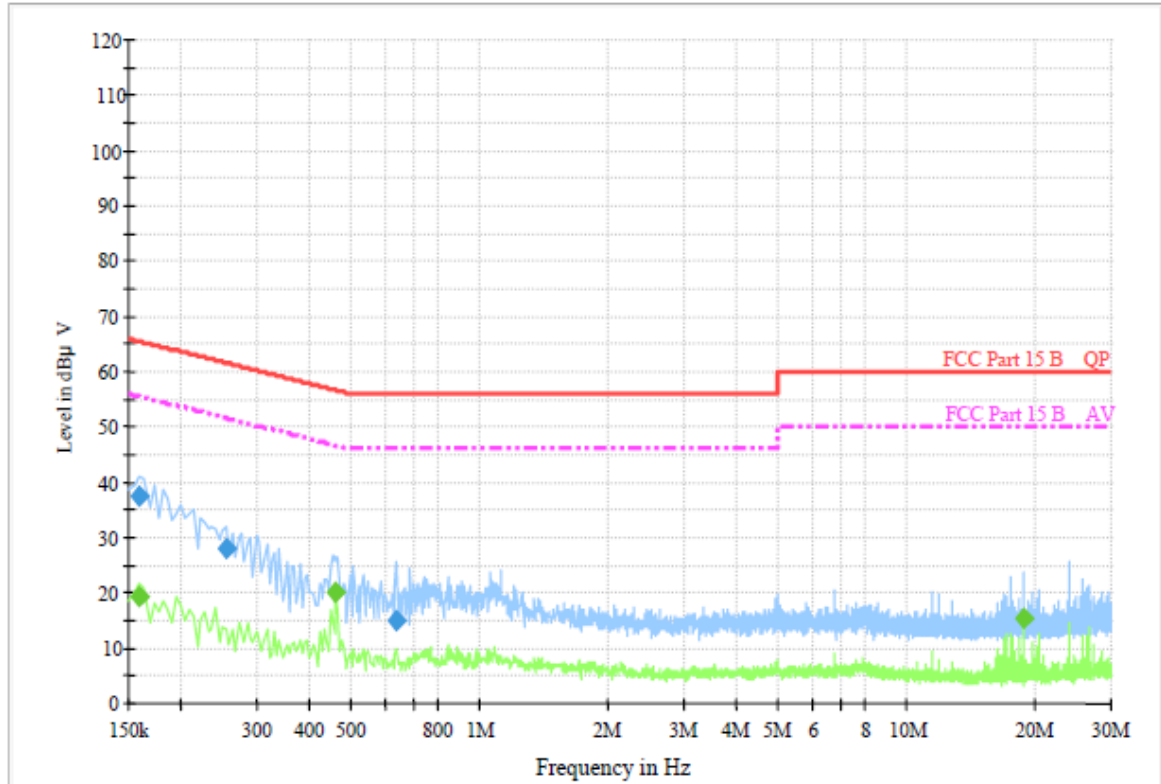
Final Measurement Detector 2

Frequency (MHz)	Average (dBµ V)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµ V)	Comment
0.460500	20.0	1000.00	9.000	On	L1	9.5	26.7	46.7	
1.581000	11.2	1000.00	9.000	On	L1	9.5	34.8	46.0	
29.049000	16.3	1000.00	9.000	On	L1	9.7	33.7	50.0	

Emission Level = Read Level + Correct Factor



Test Voltage:	AC 120V/60Hz
Adapter Model	BS12A-1201000US
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
0.159000	37.4	1000.00	9.000	On	N	9.5	28.1	65.5	
0.253500	28.2	1000.00	9.000	On	N	9.4	33.4	61.6	
0.636000	15.0	1000.00	9.000	On	N	9.4	41.0	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	19.4	1000.00	9.000	On	N	9.5	36.1	55.5	
0.460500	20.2	1000.00	9.000	On	N	9.4	26.5	46.7	
18.807000	15.3	1000.00	9.000	On	N	9.5	34.7	50.0	

Emission Level = Read Level + Correct Factor

3.2. Radiated Emission

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.209

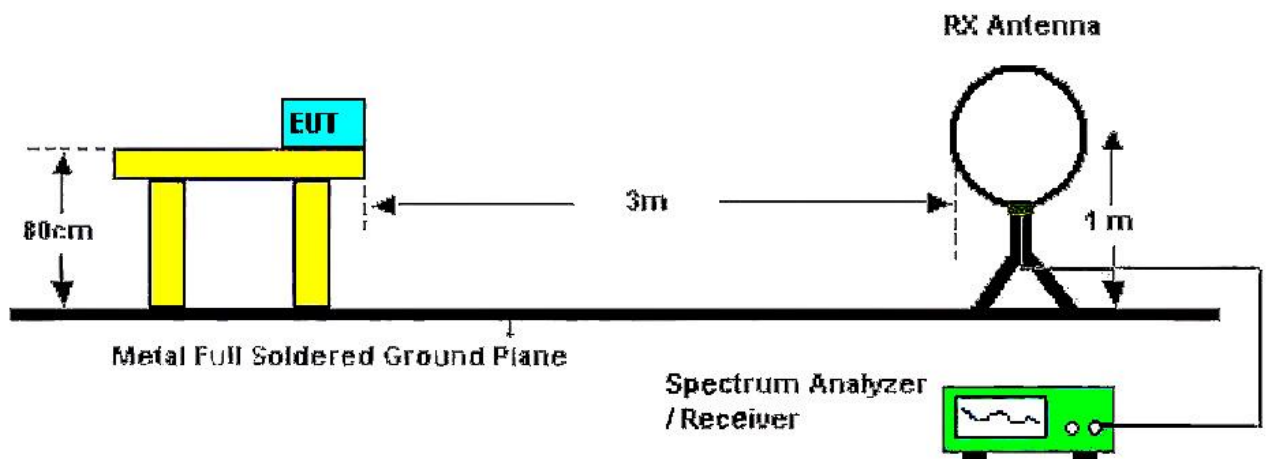
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

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

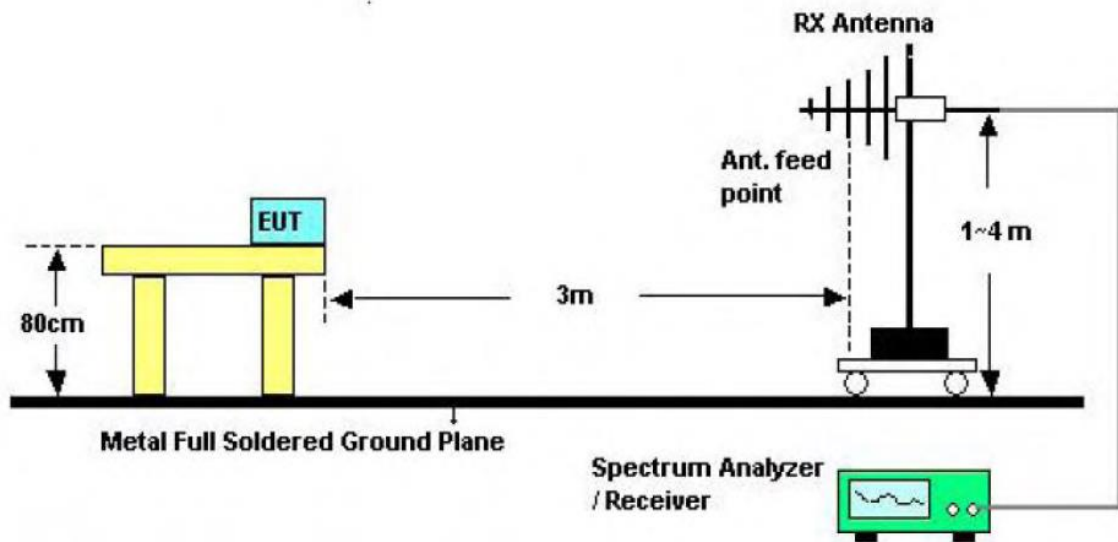
Note:

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

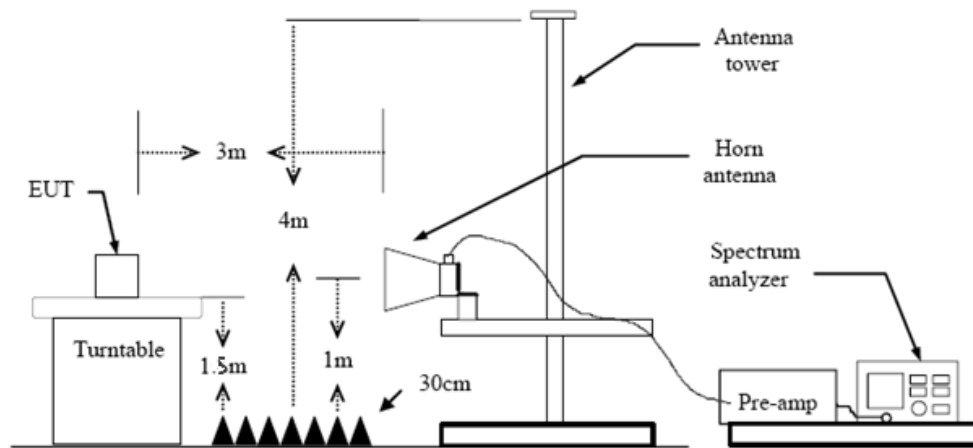
Test Configuration



Below 30MHz Test Setup



30-1000MHz Test Setup



Above 1GHz Test Setup

Test Procedure

1. The EUT was setup and tested according to ANSI C63.10:2013.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) 9k – 150kHz:
RBW=300 Hz, VBW=1 kHz, Sweep=auto, Detector function=peak, Trace=max hold
 - (3) 0.15M – 30MHz:
RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold
 - (4) 30M - 1 GHz:
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold



If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

(5) From 1 GHz to 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 3.8 Duty Cycle.

Test Mode

Please refer to the clause 2.4.

Test Result

9 kHz~30 MHz

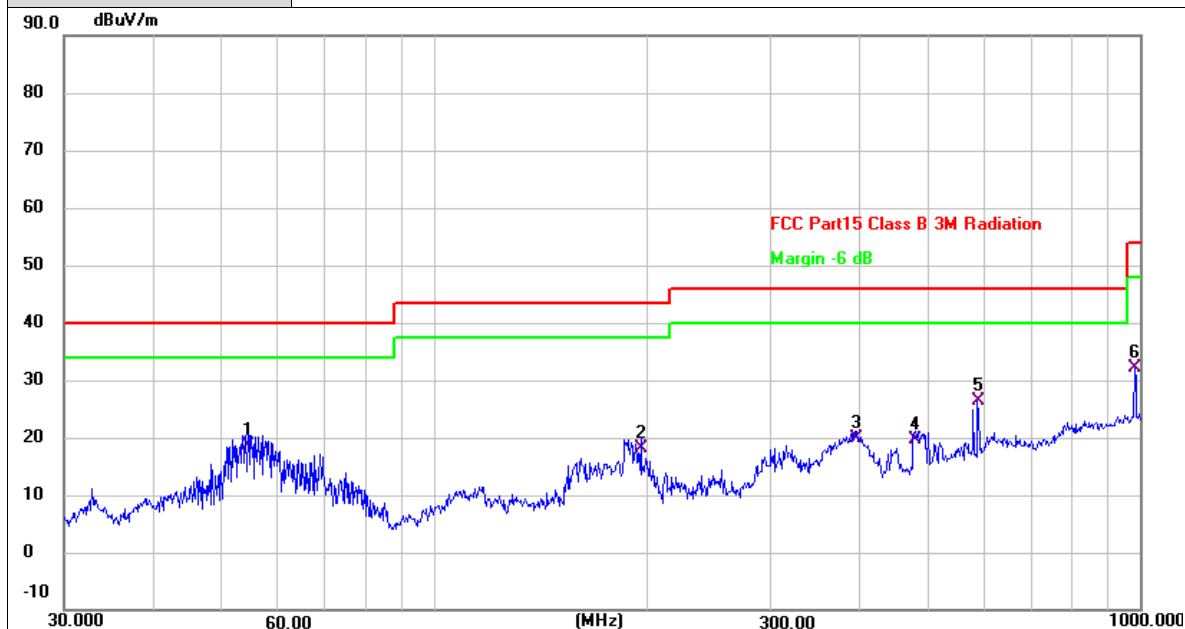
From 9 kHz to 30 MHz: The conclusion is PASS.

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



30MHz-1GHz

Ant. Pol.	Horizontal
Adapter Model	YS-SKY120100U00P
Test Mode:	TX BLE 1M 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	54.6428	37.02	-18.37	18.65	40.00	-21.35	QP
2	196.5098	39.19	-20.99	18.20	43.50	-25.30	QP
3	394.8545	35.19	-15.19	20.00	46.00	-26.00	QP
4	480.5276	32.23	-12.58	19.65	46.00	-26.35	QP
5 *	588.9050	36.04	-9.76	26.28	46.00	-19.72	QP
6	982.6200	35.48	-3.38	32.10	54.00	-21.90	QP

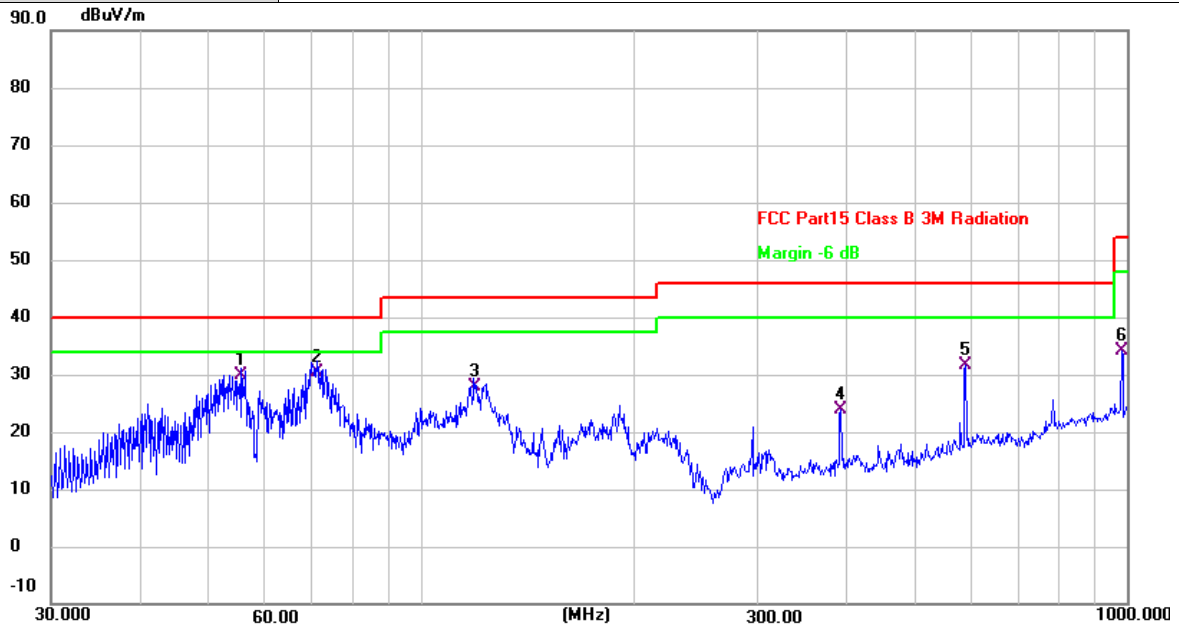
Remarks:

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

2. Margin value = Level - Limit value



Ant. Pol.	Vertical
Adapter Model	YS-SKY120100U00P
Test Mode:	TX BLE 1M 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	55.6094	48.48	-18.48	30.00	40.00	-10.00	QP
2 *	71.3300	51.11	-20.63	30.48	40.00	-9.52	QP
3	119.0180	48.54	-20.69	27.85	43.50	-15.65	QP
4	393.4723	39.04	-15.23	23.81	46.00	-22.19	QP
5	590.9737	41.32	-9.69	31.63	46.00	-14.37	QP
6	982.6200	37.46	-3.38	34.08	54.00	-19.92	QP

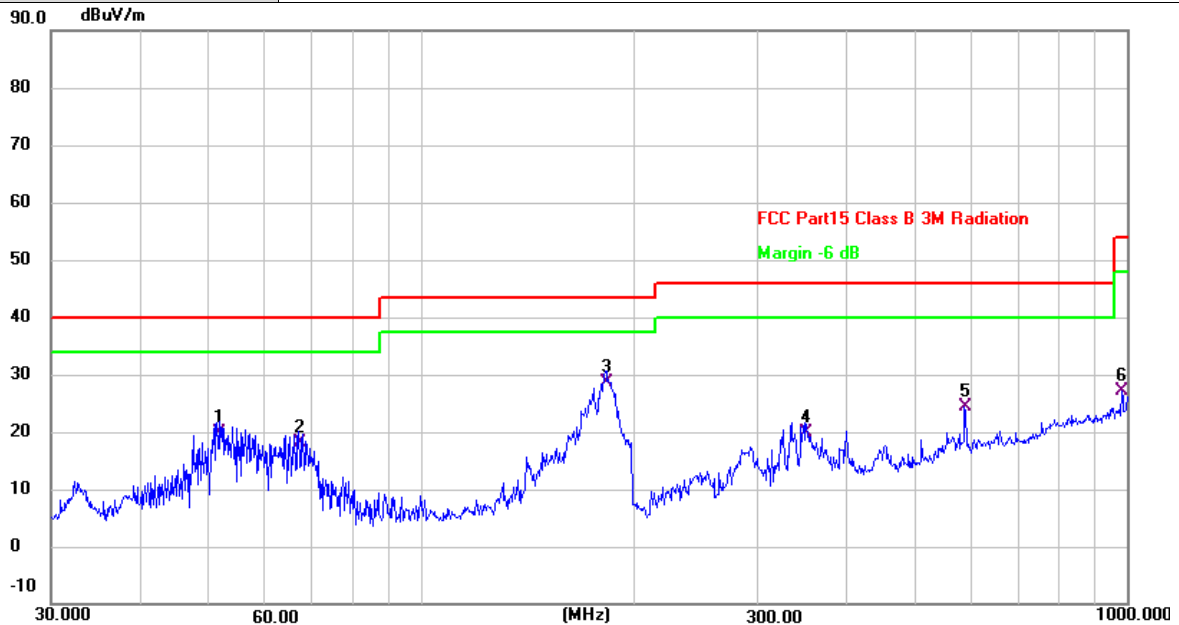
Remarks:

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

2. Margin value = Level - Limit value



Ant. Pol.	Horizontal
Adapter Model	RJ-SKY120100U60S
Test Mode:	TX BLE 1M 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	51.8430	38.10	-18.10	20.00	40.00	-20.00	QP
2	67.2022	37.99	-19.93	18.06	40.00	-21.94	QP
3 *	183.2005	48.72	-20.13	28.59	43.50	-14.91	QP
4	350.4768	36.23	-16.23	20.00	46.00	-26.00	QP
5	588.9051	34.10	-9.76	24.34	46.00	-21.66	QP
6	982.6200	30.41	-3.38	27.03	54.00	-26.97	QP

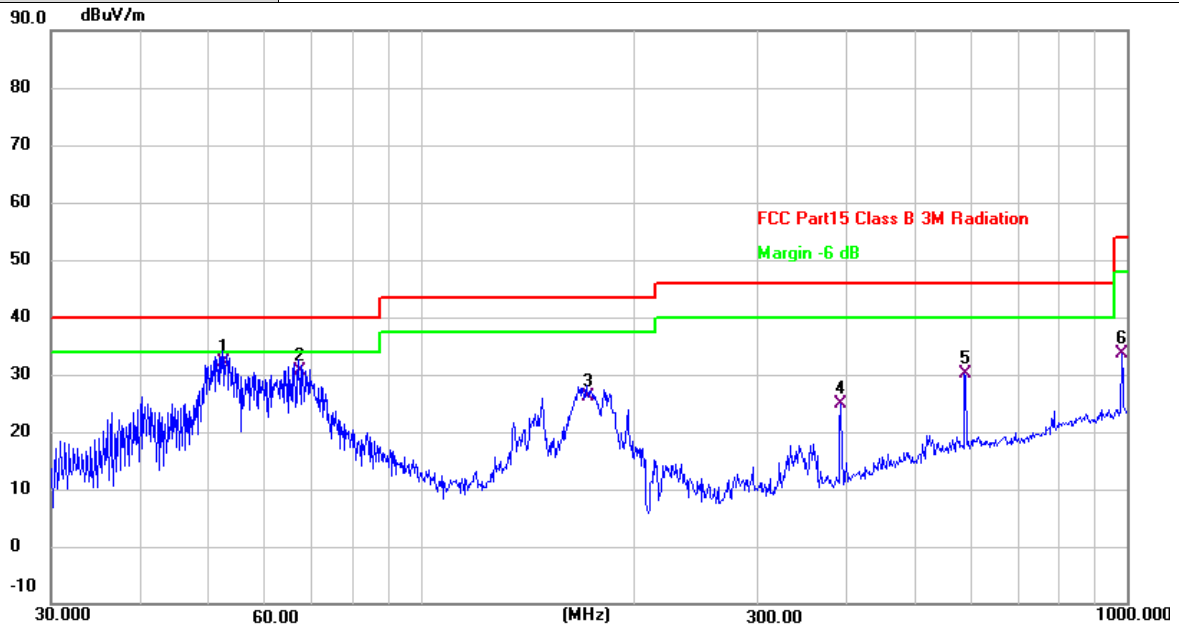
Remarks:

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

2. Margin value = Level - Limit value



Ant. Pol.	Vertical
Adapter Model	RJ-SKY120100U60S
Test Mode:	TX BLE 1M 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 *	52.3912	50.39	-18.15	32.24	40.00	-7.76	QP
2	67.2022	50.46	-19.93	30.53	40.00	-9.47	QP
3	171.9946	45.52	-19.42	26.10	43.50	-17.40	QP
4	393.4723	40.04	-15.23	24.81	46.00	-21.19	QP
5	588.9051	39.98	-9.76	30.22	46.00	-15.78	QP
6	982.6200	36.95	-3.38	33.57	54.00	-20.43	QP

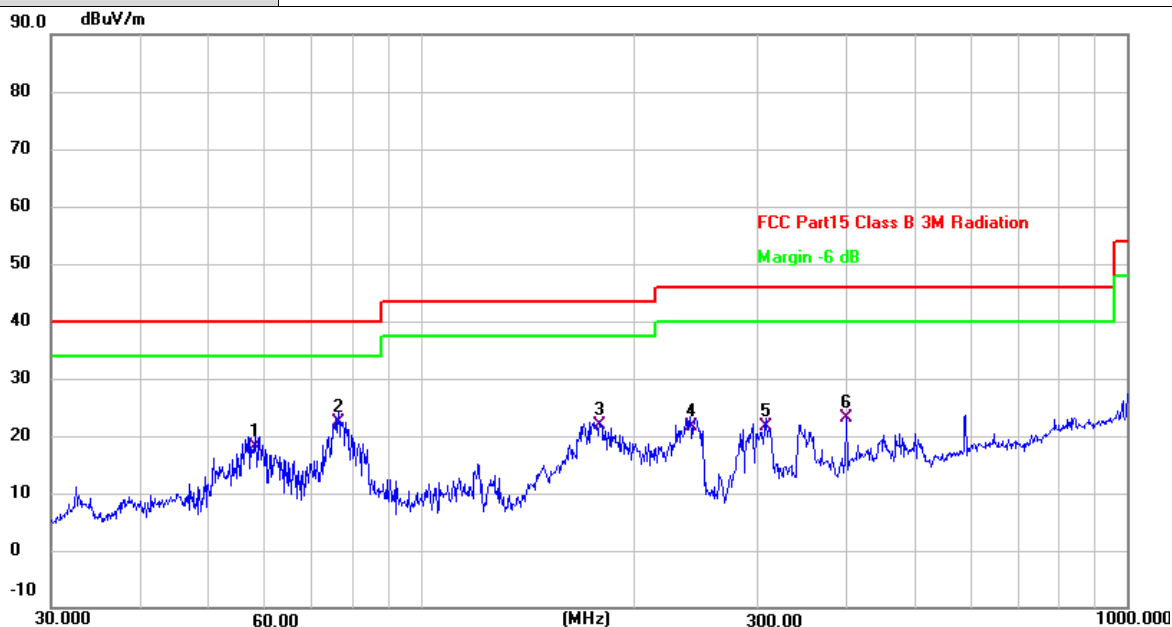
Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Horizontal
Adapter Model	BS12A-1201000US
Test Mode:	TX BLE 1M 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	58.4074	36.80	-18.68	18.12	40.00	-21.88	QP
2 *	76.5119	43.90	-21.58	22.32	40.00	-17.68	QP
3	179.3863	41.69	-19.89	21.80	43.50	-21.70	QP
4	240.8303	41.32	-19.76	21.56	46.00	-24.44	QP
5	307.8312	38.93	-17.28	21.65	46.00	-24.35	QP
6	400.4318	38.16	-15.07	23.09	46.00	-22.91	QP

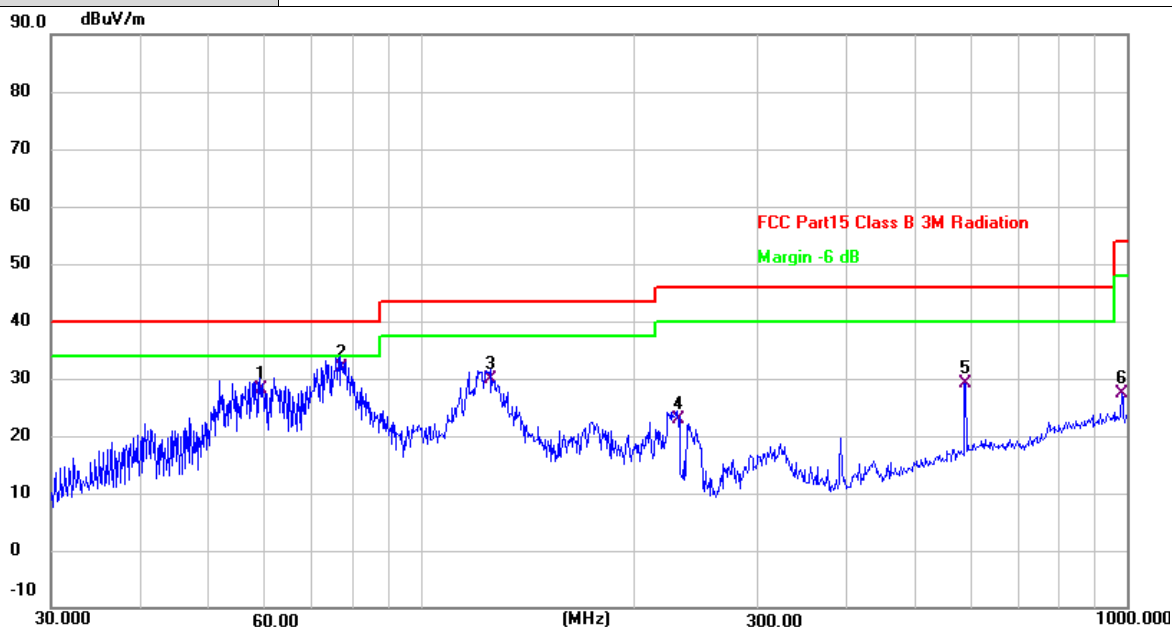
Remarks:

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

2.Margin value = Level -Limit value



Ant. Pol.	Vertical
Adapter Model	BS12A-1201000US
Test Mode:	TX BLE 1M 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	59.2325	46.87	-18.75	28.12	40.00	-11.88	QP
2 *	77.0505	53.54	-21.67	31.87	40.00	-8.13	QP
3	125.4457	50.24	-20.24	30.00	43.50	-13.50	QP
4	230.9068	42.97	-20.12	22.85	46.00	-23.15	QP
5	588.9051	38.93	-9.76	29.17	46.00	-16.83	QP
6	982.6200	30.78	-3.38	27.40	54.00	-26.60	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 BLE 1M 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 *	4804.376	27.47	2.00	29.47	54.00	-24.53	AVG
2	4804.504	42.16	2.00	44.16	74.00	-29.84	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 BLE 1M 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 *	4803.385	27.06	2.00	29.06	54.00	-24.94	AVG
2	4804.369	41.17	2.00	43.17	74.00	-30.83	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 BLE 1M Mode 2440MHz						
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 *	4879.225	26.59	2.09	28.68	54.00	-25.32	AVG
2	4880.857	41.36	2.09	43.45	74.00	-30.55	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 BLE 1M Mode 2440MHz						
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 *	4880.105	26.67	2.09	28.76	54.00	-25.24	AVG
2	4880.126	40.81	2.09	42.90	74.00	-31.10	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 BLE 1M Mode 2480MHz						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX BLE 1M 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	4959.713	41.37	2.21	43.58	74.00	-30.42	peak
2 *	4960.709	26.58	2.21	28.79	54.00	-25.21	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 BLE 2M 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 *	4803.075	27.21	1.99	29.20	54.00	-24.80	AVG
2	4803.977	41.59	2.00	43.59	74.00	-30.41	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 BLE 2M 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 *	4803.879	27.43	2.00	29.43	54.00	-24.57	AVG
2	4804.103	42.00	2.00	44.00	74.00	-30.00	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 BLE 2M Mode 2440MHz						
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	4879.625	40.63	2.09	42.72	74.00	-31.28	peak
2 *	4879.845	26.54	2.09	28.63	54.00	-25.37	AVG
Remarks: 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value							

Ant. Pol.	Vertical						
Test Mode:	TX BLE 2M Mode 2440MHz						
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 *	4879.594	26.80	2.09	28.89	54.00	-25.11	AVG
2	4880.261	41.77	2.09	43.86	74.00	-30.14	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 BLE 2M Mode 2480MHz						
Remark:	No report for the emission which more than 20 dB below the prescribed limit.						

Ant. Pol.	Vertical						
Test Mode:	TX BLE 2M 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 *	4960.479	27.00	2.21	29.21	54.00	-24.79	AVG
2	4960.810	39.94	2.21	42.15	74.00	-31.85	peak
Remarks: 1.Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 2.Margin value = Level -Limit value							

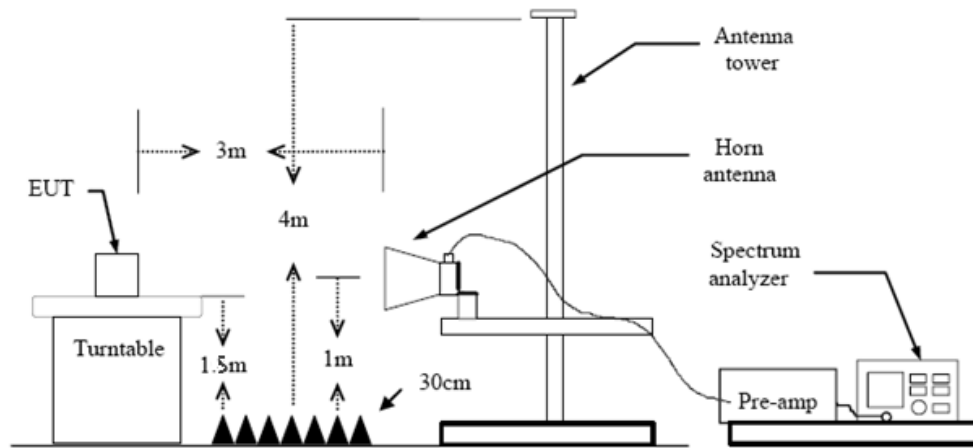
3.3. Band Edge Emissions (Radiated)

Limit

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

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

Test Configuration



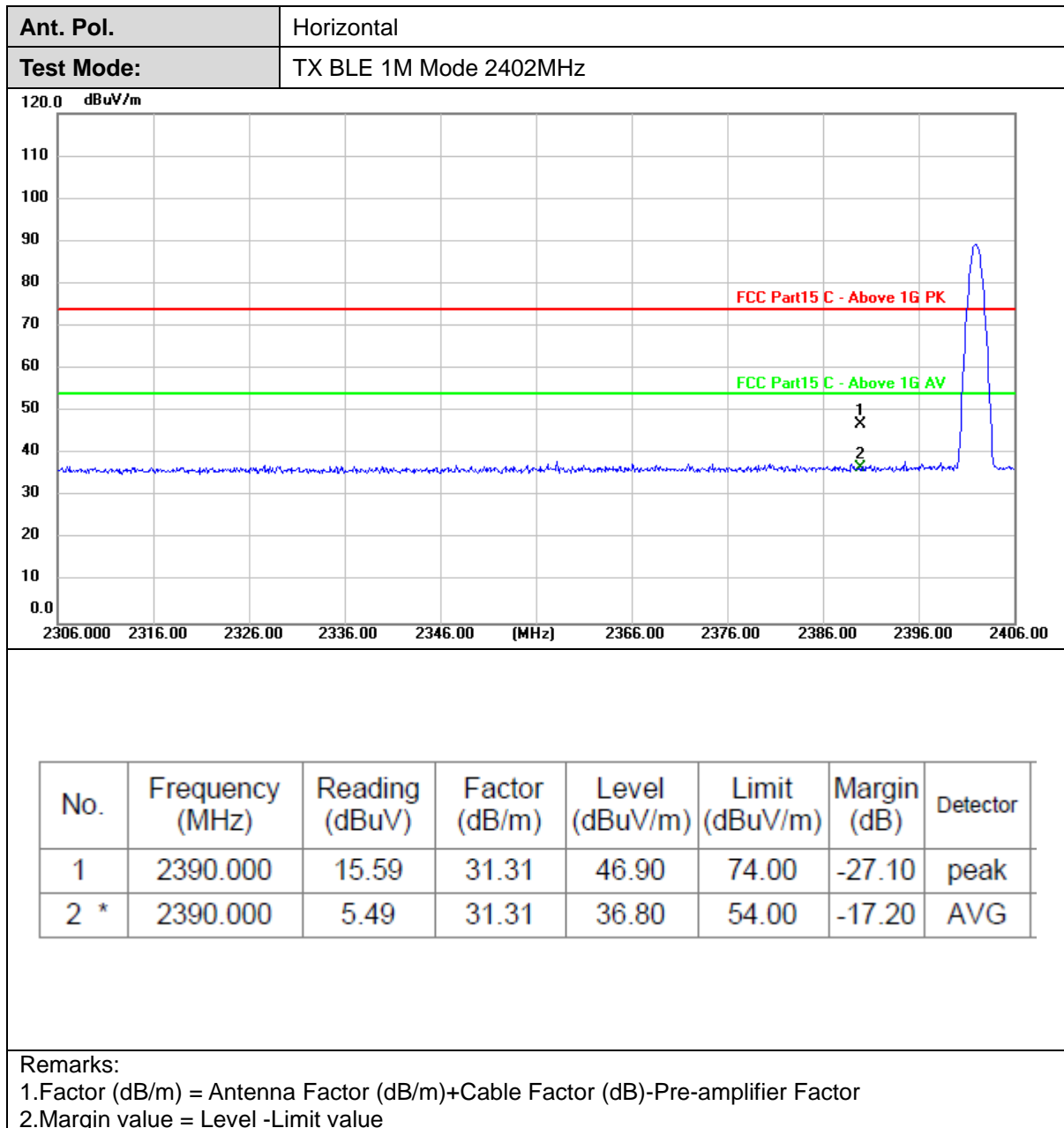
Test Procedure

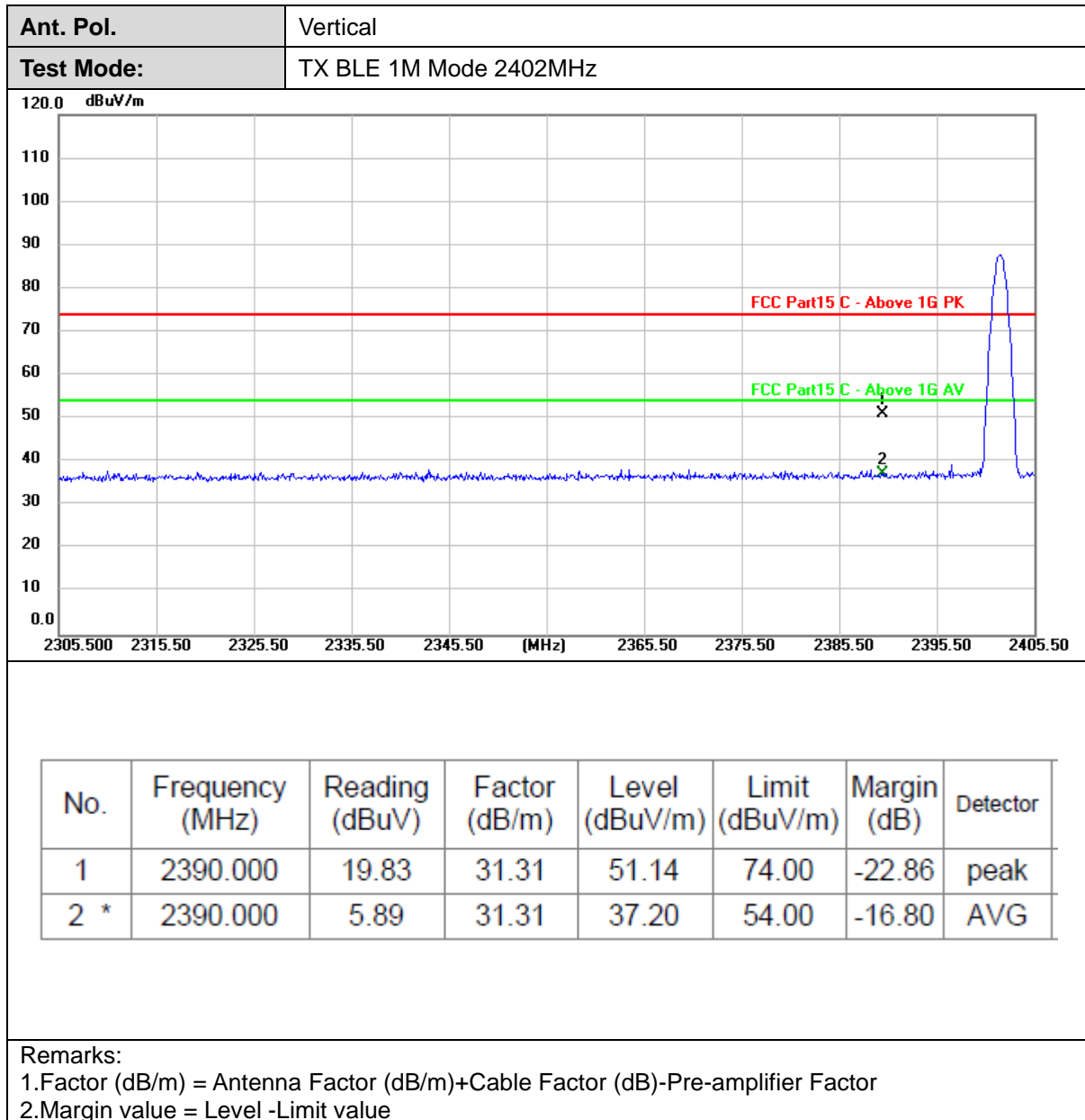
1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
RBW=1MHz, VBW=3MHz Peak detector for Peak value.
RBW=1MHz, VBW see note 1 with Peak Detector for Average Value.

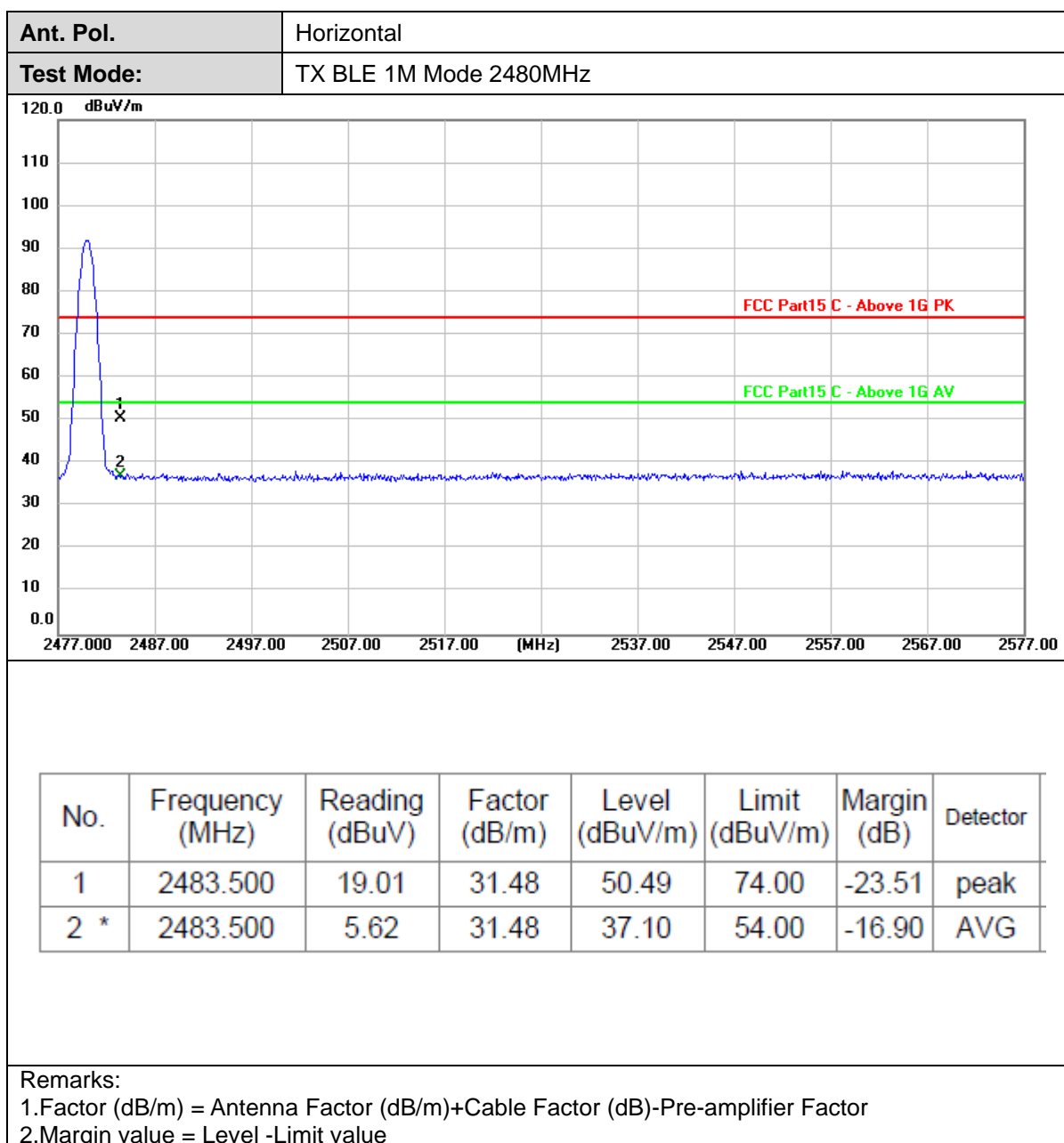
Note 1: For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 3.8 Duty Cycle.

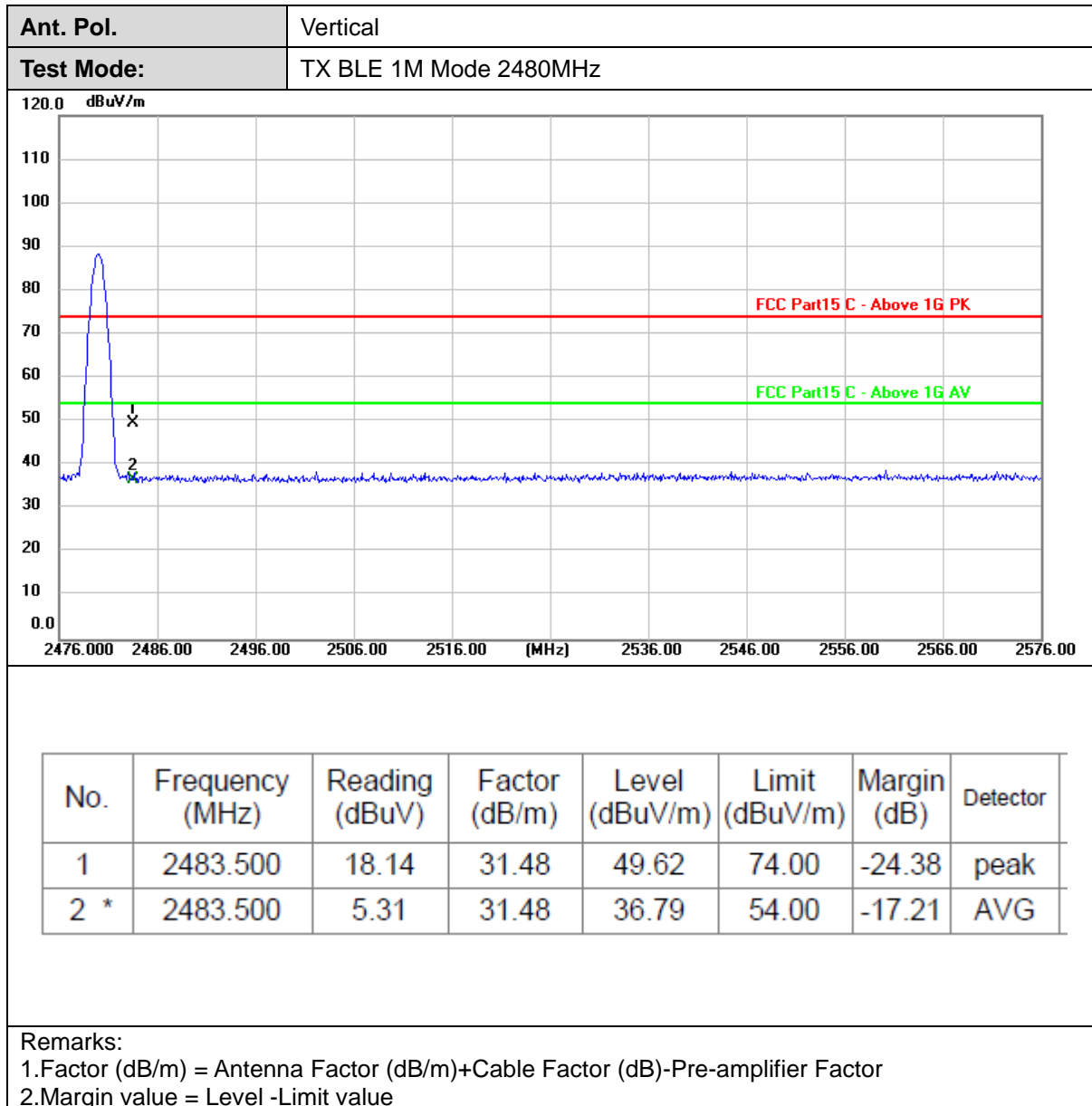
Test Mode

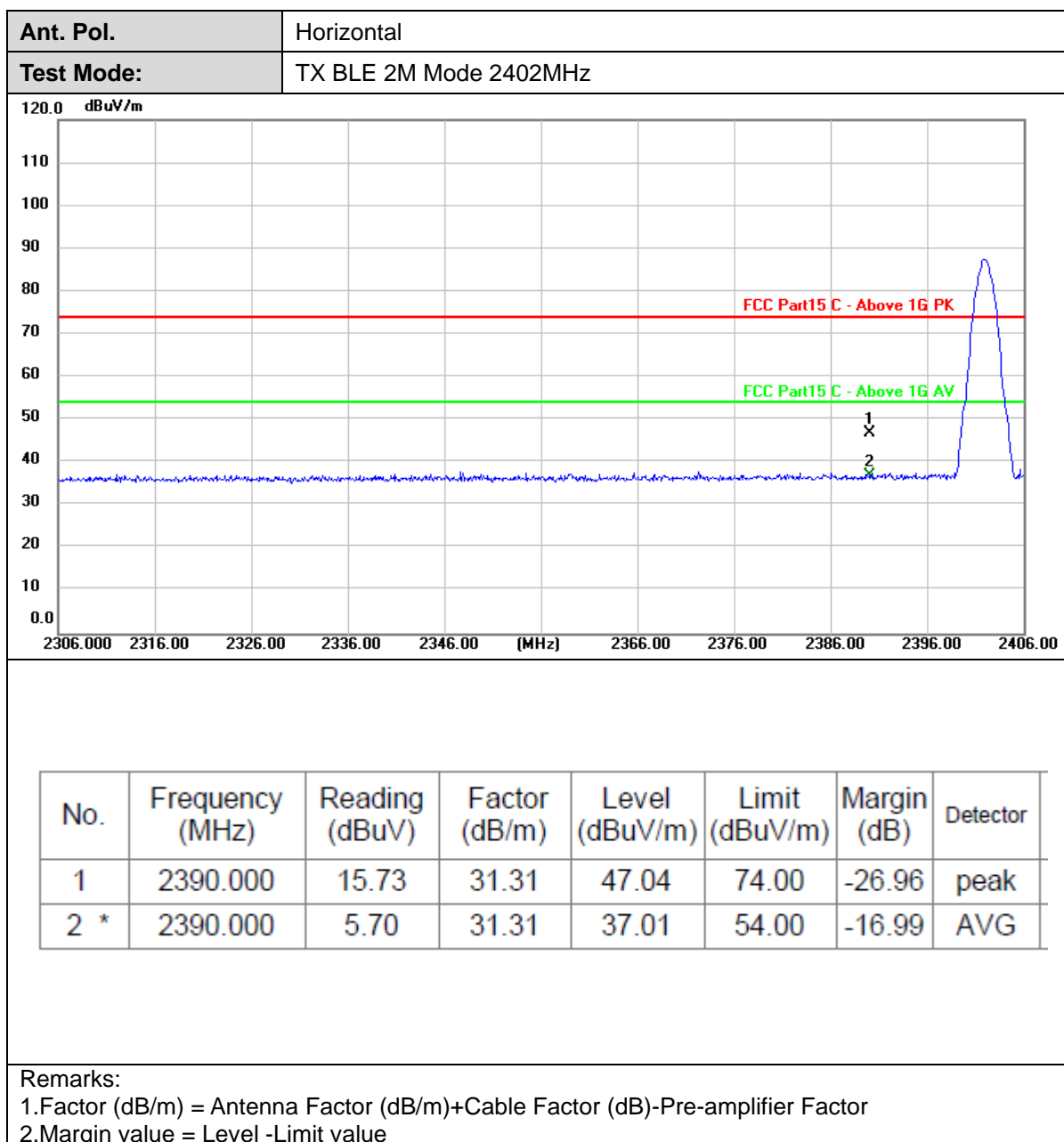
Please refer to the clause 2.4.

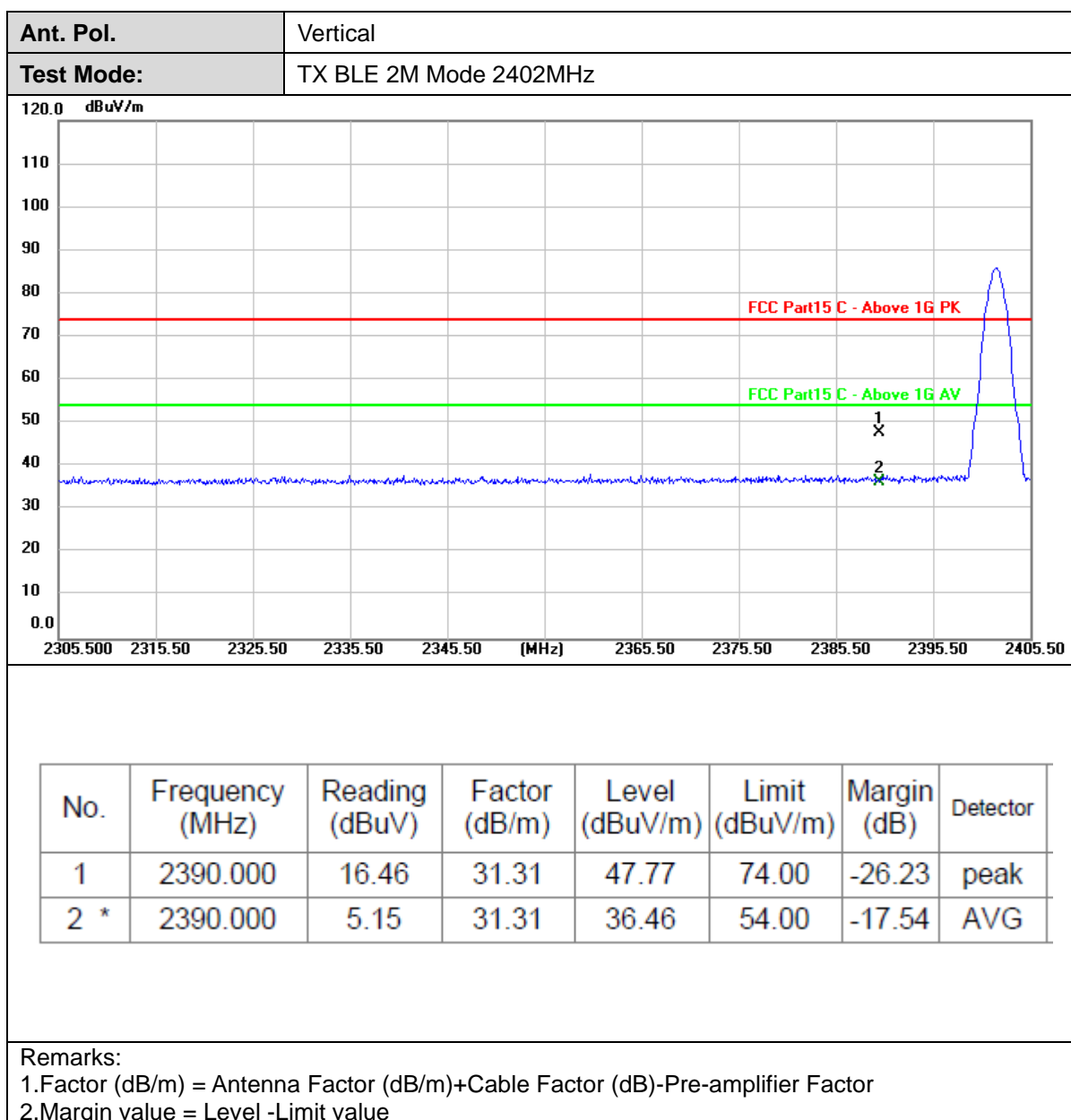
**Test Result**

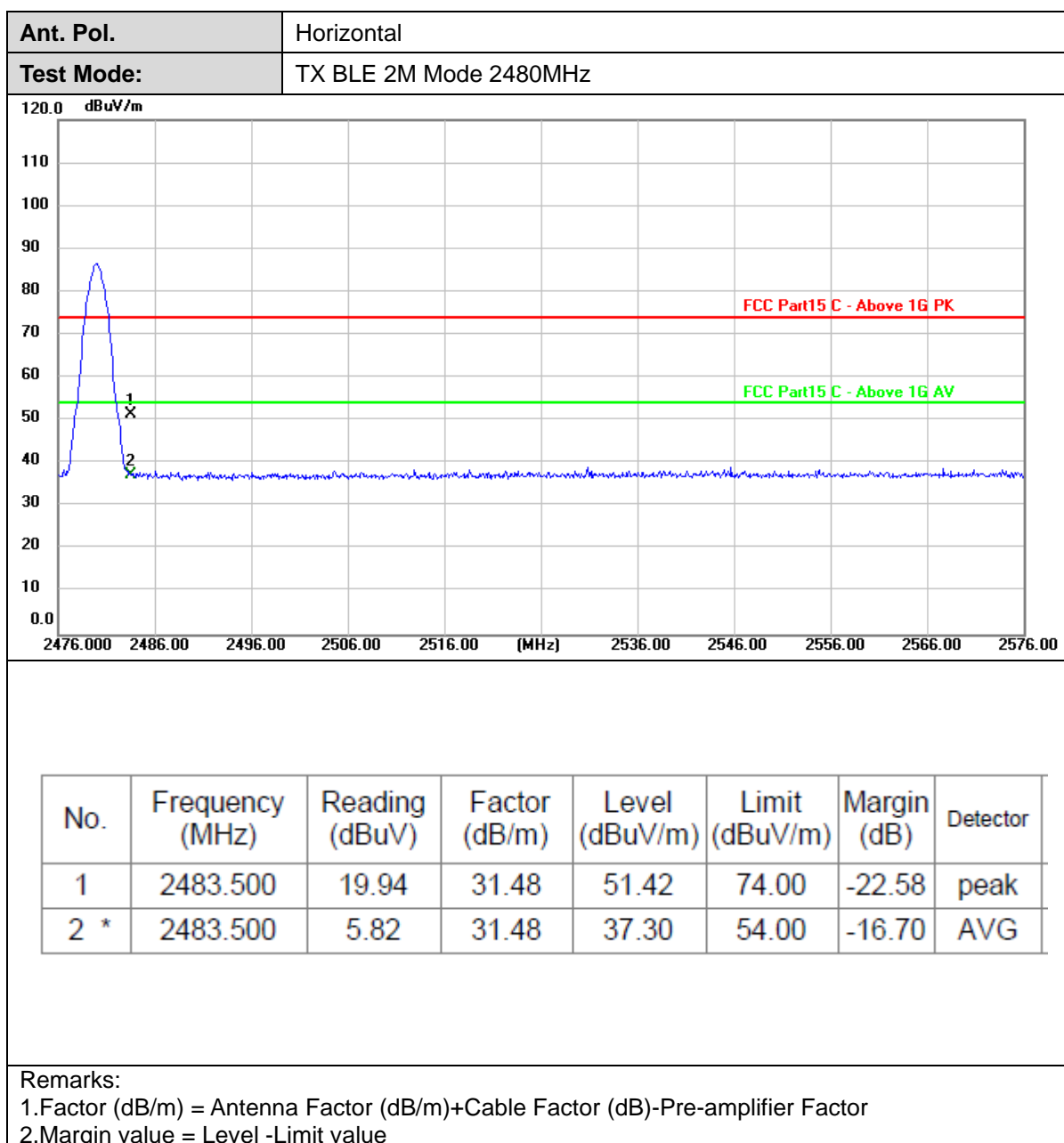


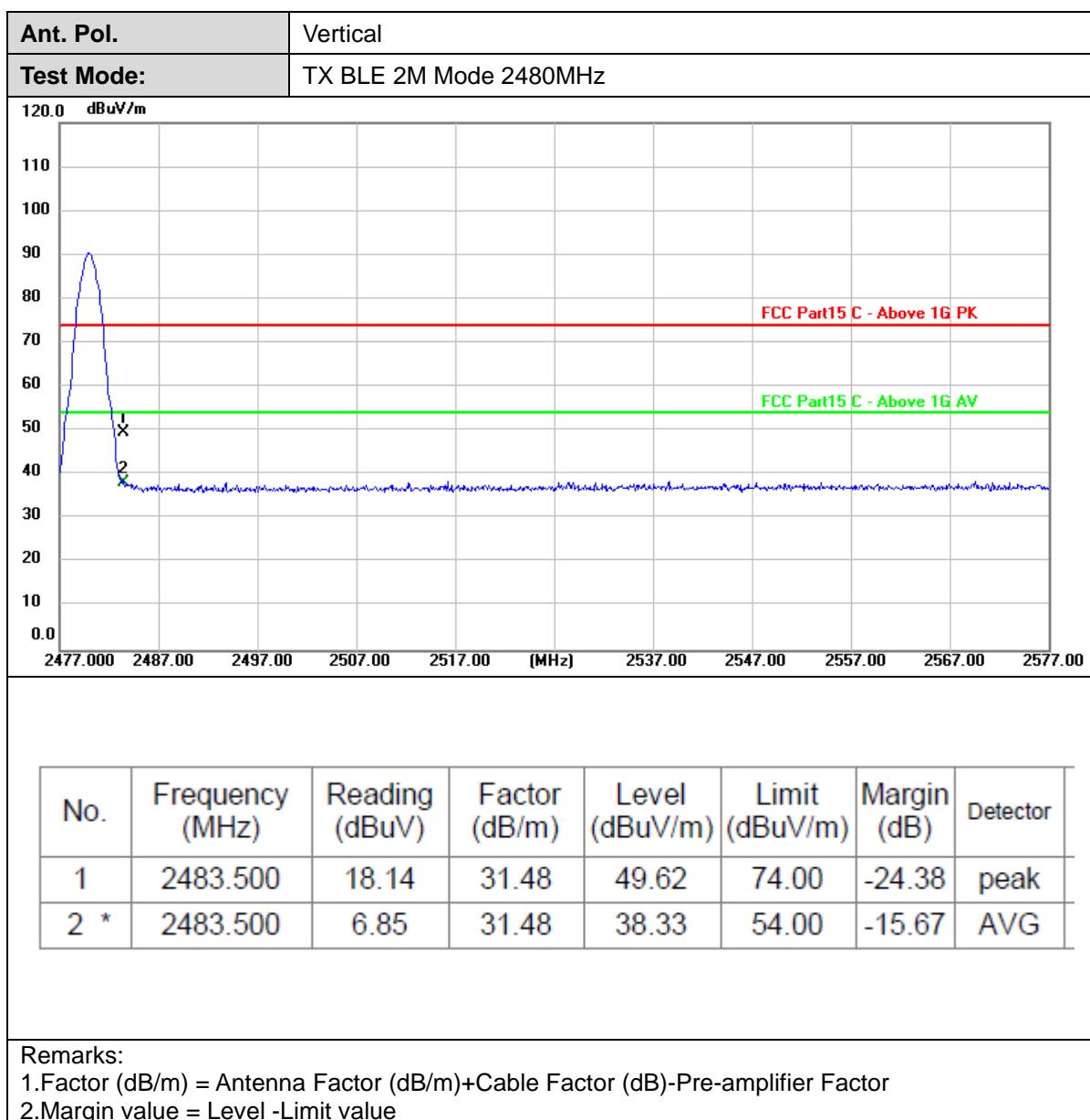














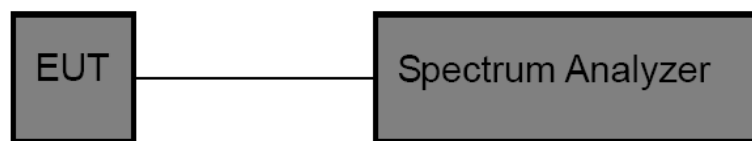
3.4. Band Edge and Spurious Emissions (Conducted)

Limit

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

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

Test Configuration



Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
RBW = 100 kHz, VBW ≥ 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 Conducted Test

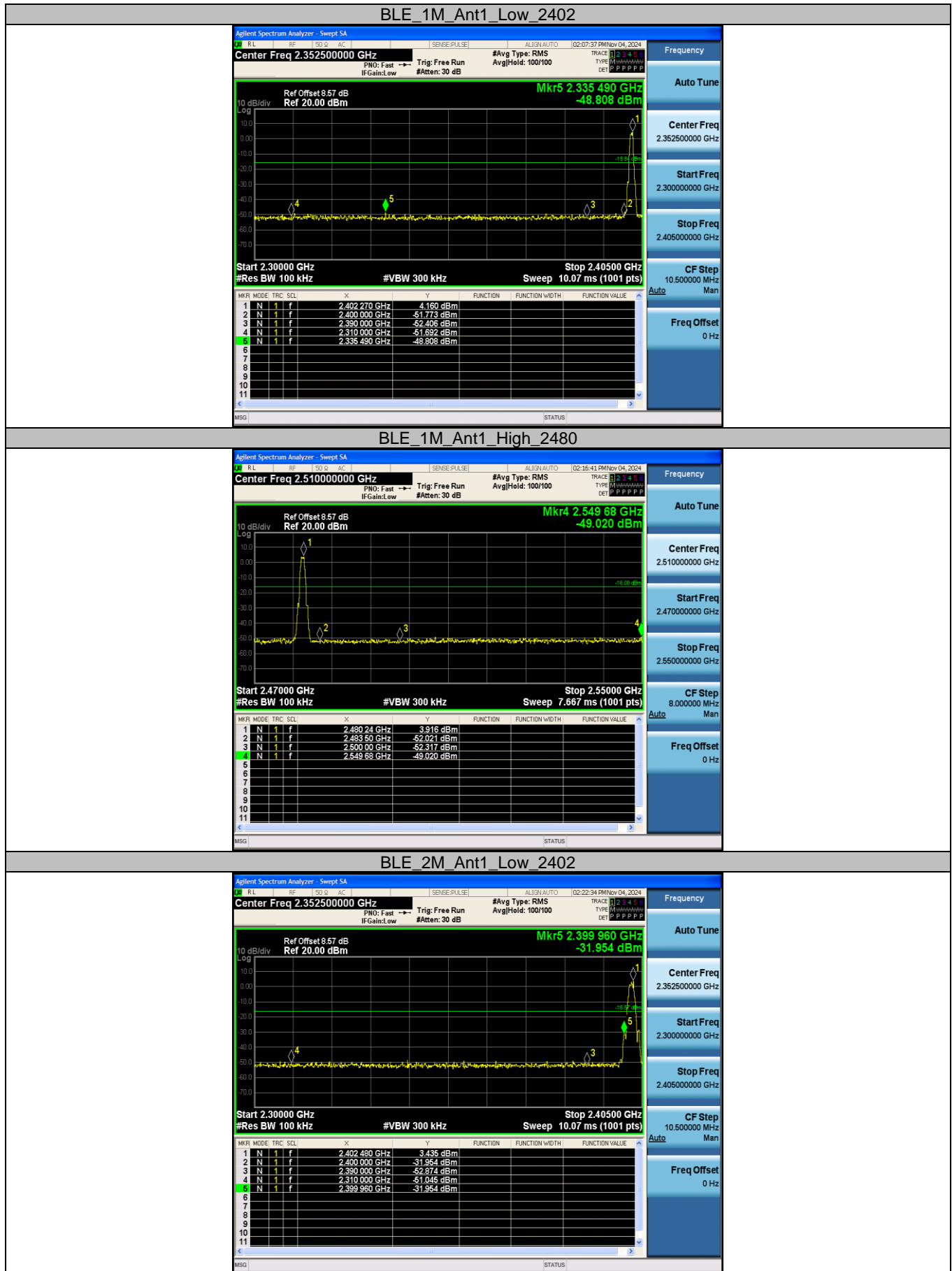
TestMode	Antenna	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	4.16	-48.81	≤-15.84	PASS
		High	2480	3.92	-49.02	≤-16.08	PASS
BLE_2M	Ant1	Low	2402	3.44	-31.95	≤-16.57	PASS
		High	2480	3.96	-47.63	≤-16.04	PASS

**Conducted Spurious Emissions Test**

TestMode	Antenna	Freq(MHz)	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	2.89	2.89	---	PASS
			30~1000	2.89	-55.08	≤-17.11	PASS
			1000~26500	2.89	-41.06	≤-17.11	PASS
		2440	Reference	2.17	2.17	---	PASS
			30~1000	2.17	-53.74	≤-17.83	PASS
			1000~26500	2.17	-40.99	≤-17.83	PASS
		2480	Reference	3.07	3.07	---	PASS
			30~1000	3.07	-55.18	≤-16.93	PASS
			1000~26500	3.07	-41.37	≤-16.93	PASS
BLE_2M	Ant1	2402	Reference	0.96	0.96	---	PASS
			30~1000	0.96	-54.1	≤-19.04	PASS
			1000~26500	0.96	-41.45	≤-19.04	PASS
		2440	Reference	4.15	4.15	---	PASS
			30~1000	4.15	-55.2	≤-15.85	PASS
			1000~26500	4.15	-41.87	≤-15.85	PASS
		2480	Reference	0.87	0.87	---	PASS
			30~1000	0.87	-55.03	≤-19.13	PASS
			1000~26500	0.87	-41.96	≤-19.13	PASS



Band Edge Conducted Test plot as follows:

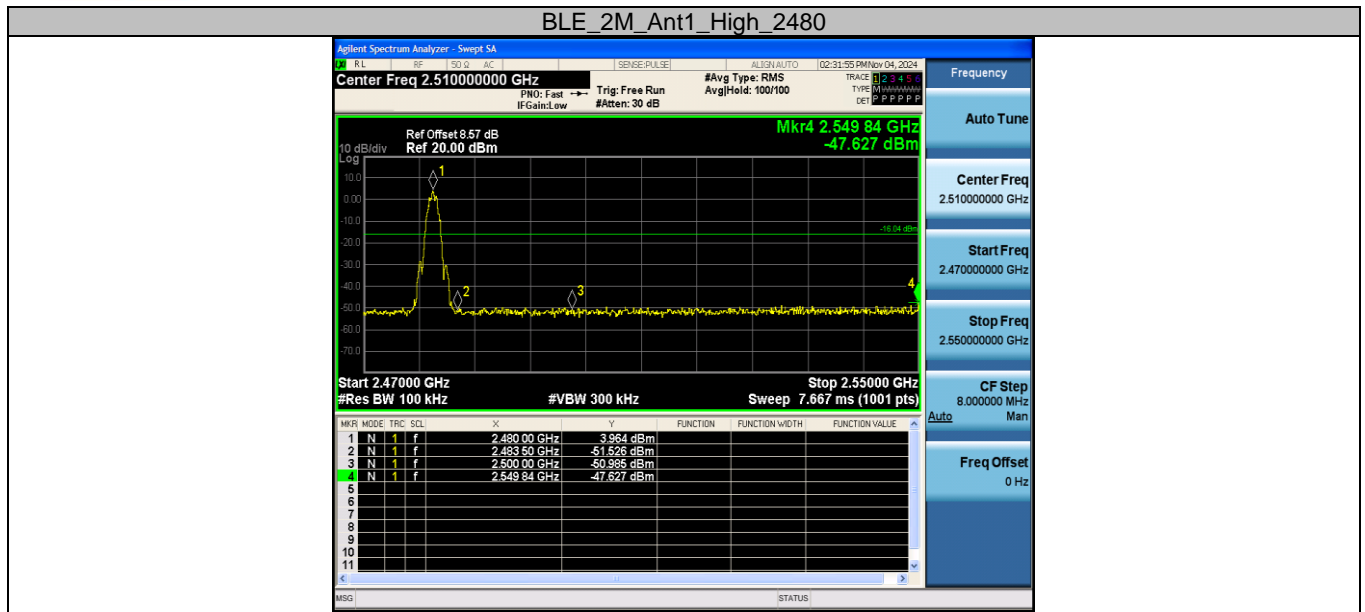


CTC Laboratories, Inc.

Room 101 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-058_A1

For anti-fake verification, please visit the official website of China Inspection And Testing Society : yz.cnca.cn



CTC Laboratories, Inc.

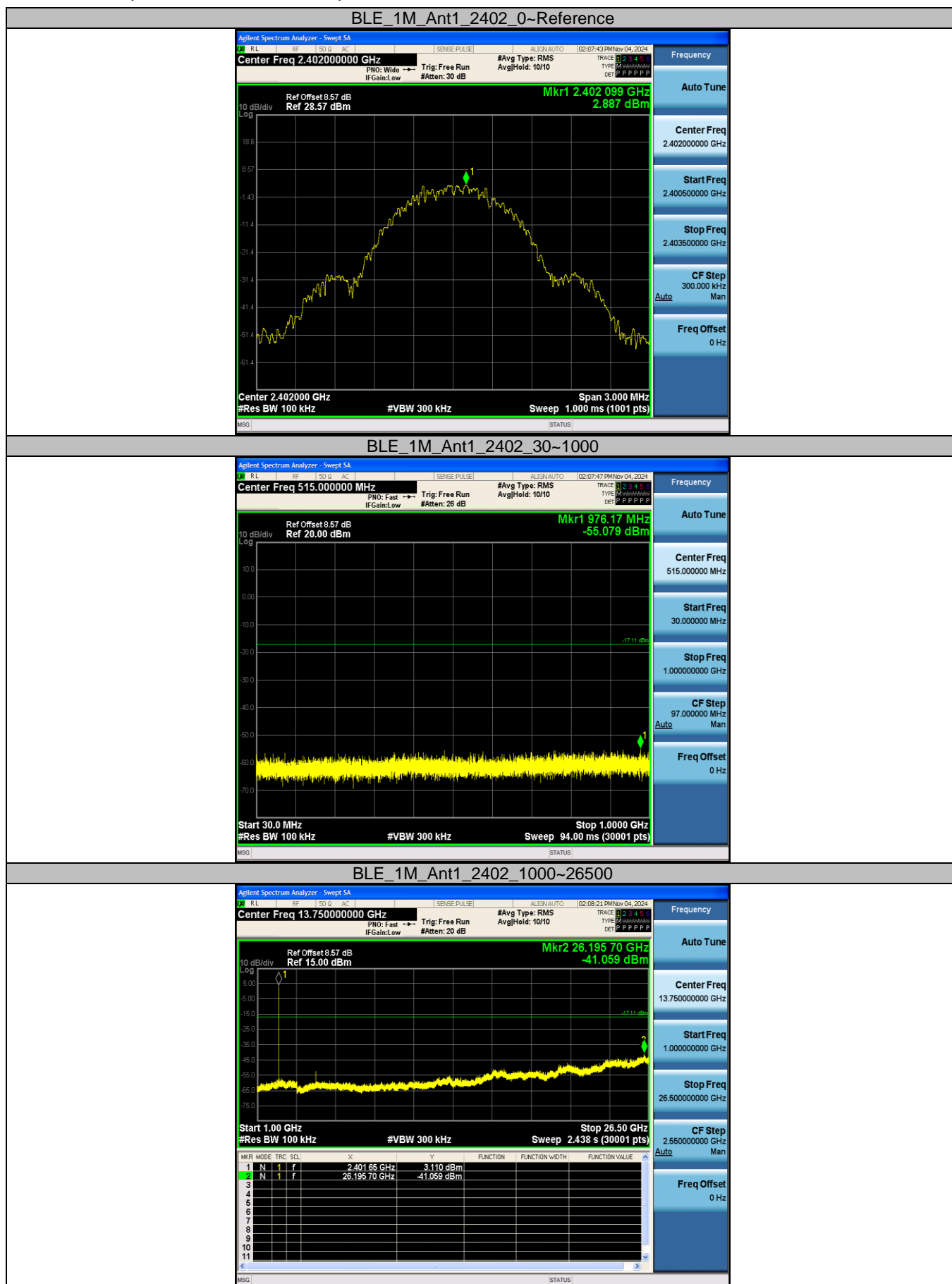
Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China
Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-058_A1

For anti-fake verification, please visit the official website of China Inspection And Testing Society : yz.cnca.cn



Conducted Spurious Emissions Test plot as follows:



CTC Laboratories, Inc.

Room 101 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-058_A1

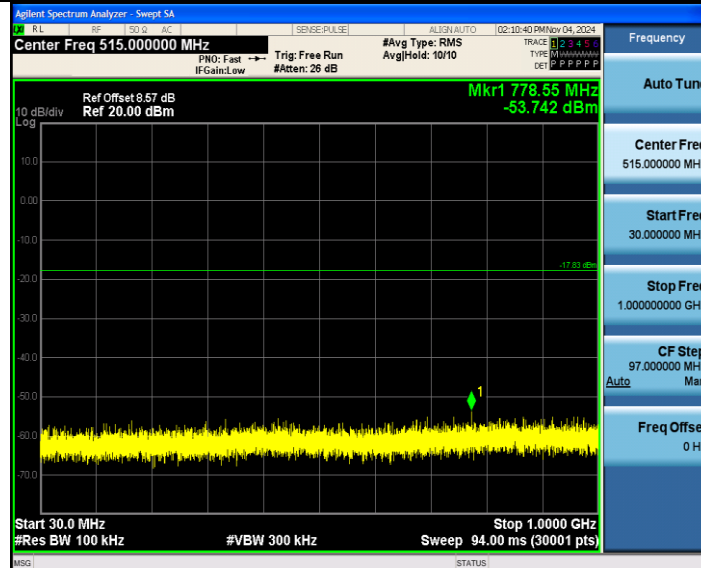
For anti-fake verification, please visit the official website of China Inspection And Testing Society : yz.cnca.cn



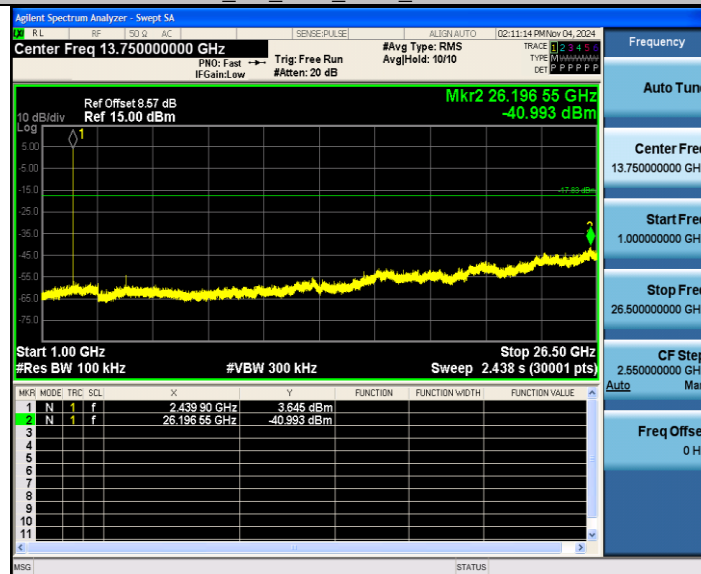
BLE_1M_Ant1_2440_0~Reference



BLE_1M_Ant1_2440_30~1000



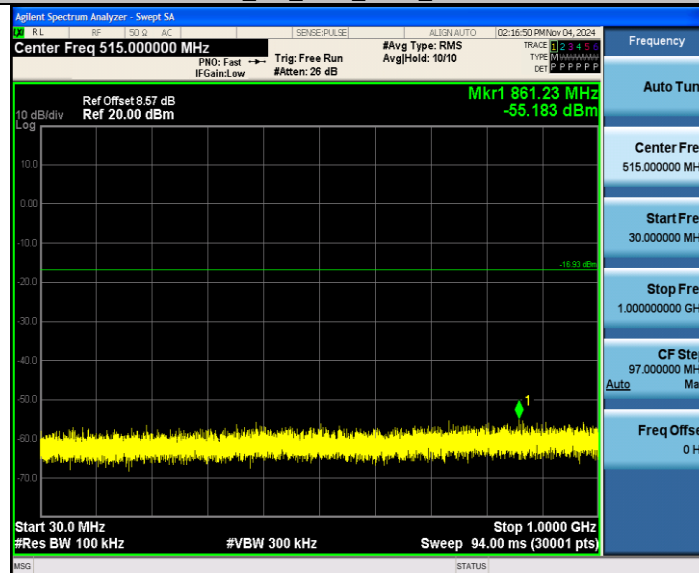
BLE_1M_Ant1_2440_1000~26500



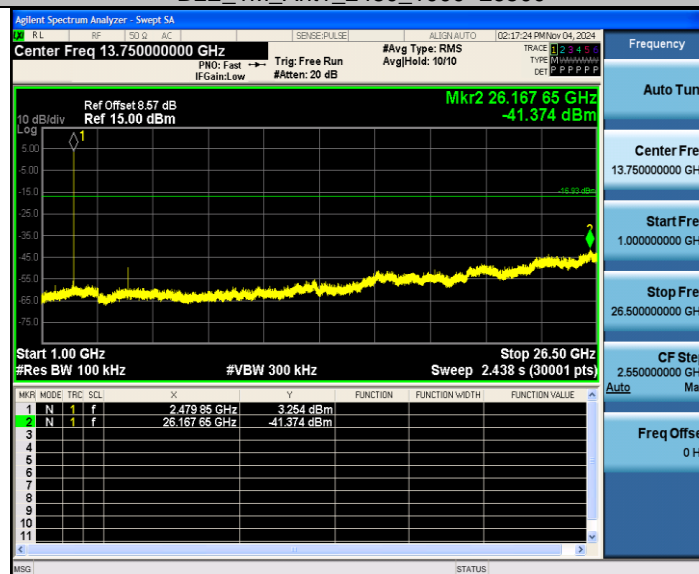
BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000



BLE_1M_Ant1_2480_1000~26500



BLE_2M_Ant1_2402_0~Reference

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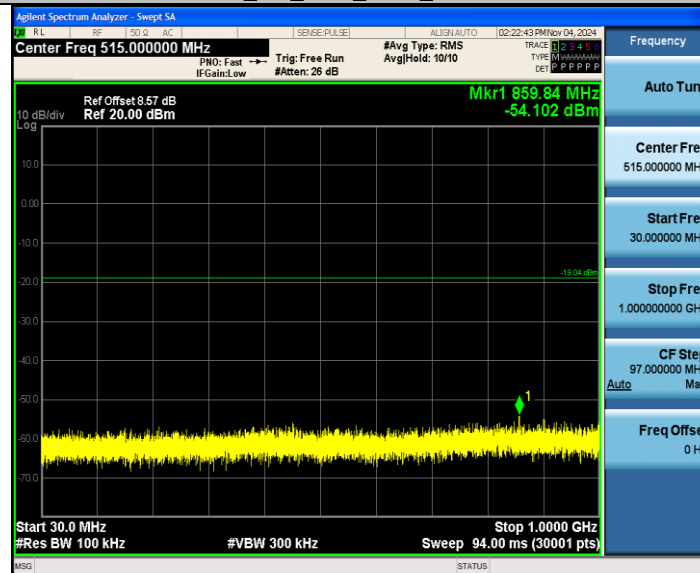
Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China
Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-058_A1

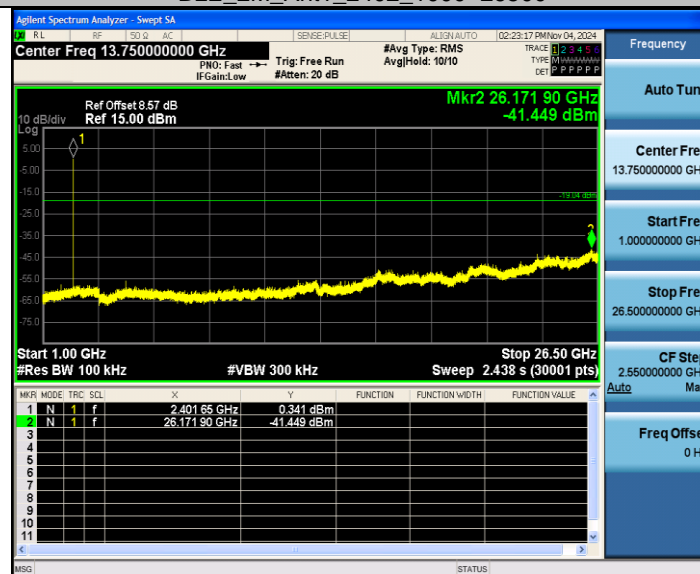
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BLE_2M_Ant1_2402_30~1000



BLE_2M_Ant1_2402_1000~26500



BLE_2M_Ant1_2440_0~Reference

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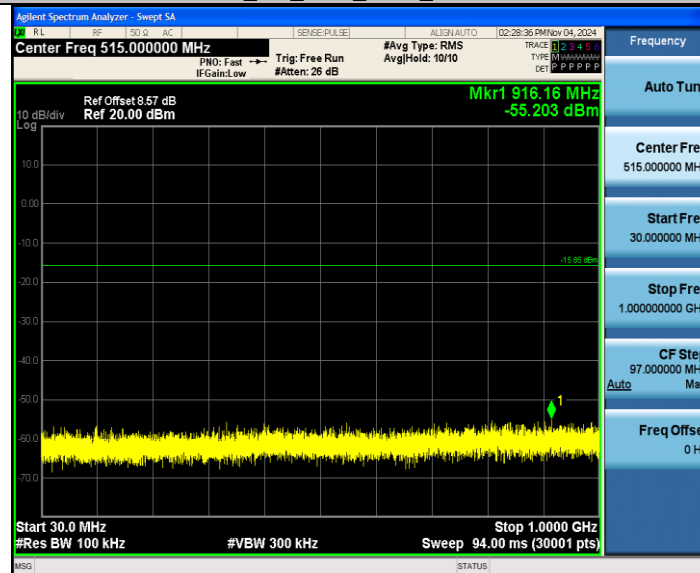
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BLE_2M_Ant1_2440_30~1000



BLE_2M_Ant1_2440_1000~26500



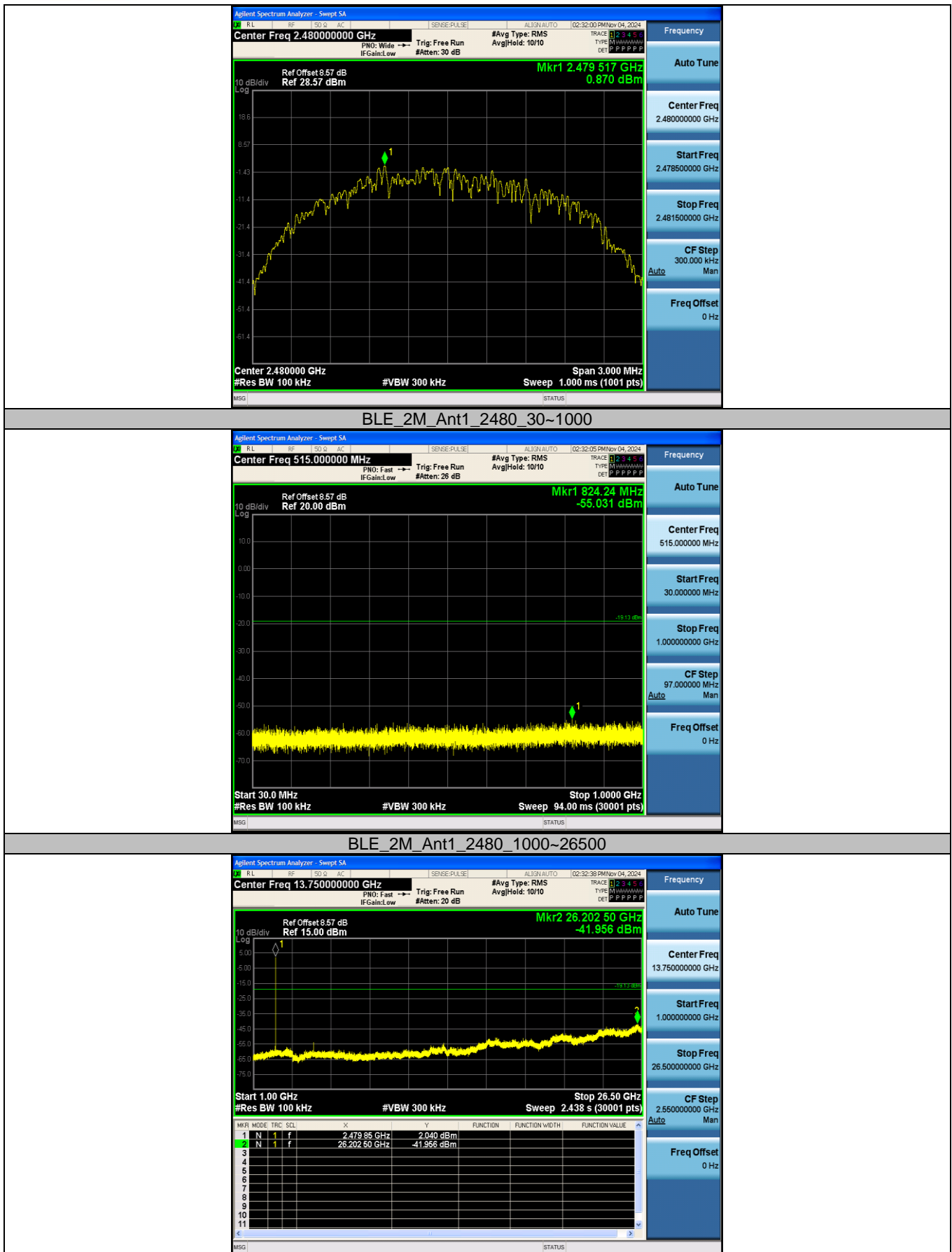
BLE_2M_Ant1_2480_0~Reference

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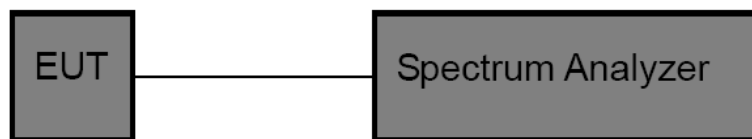
3.5. DTS Bandwidth

Limit

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2)

Test Item	Limit	Frequency Range (MHz)
DTS Bandwidth	≥ 500 kHz (6dB bandwidth)	2400~2483.5

Test Configuration



Test Procedure

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
2. DTS Spectrum Setting:
 - (1) Set RBW = 100 kHz.
 - (2) Set the video bandwidth (VBW) ≥ 3 RBW.
 - (3) Detector = Peak.
 - (4) Trace mode = Max hold.
 - (5) Sweep = Auto couple.OCB 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 Result**

TestMode	Antenna	Freq(MHz)	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.644	2401.692	2402.336	0.5	PASS
		2440	0.696	2439.664	2440.360	0.5	PASS
		2480	0.672	2479.676	2480.348	0.5	PASS
BLE_2M	Ant1	2402	1.116	2401.460	2402.576	0.5	PASS
		2440	1.116	2439.464	2440.580	0.5	PASS
		2480	1.336	2479.344	2480.680	0.5	PASS



99% Bandwidth:



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BLE_2M_Ant1_2402



BLE_2M_Ant1_2440



BLE_2M_Ant1_2480



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DTS Bandwidth:



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