TEST REPORT

Application No.:	SHEM2012010786CR
FCC ID:	2AYKB-IRR301
IC:	27005-IRR301
Applicant:	Amsino International, Inc.
Address of Applicant:	708 Corporate Center Drive Pomona CA 91768 USA
Manufacturer:	Amsino Medical (Shanghai) Co., Ltd.
Address of Manufacturer:	Building #1-3, 16, Lane 355 Huazhe Rd., Songjiang Export Processing Zone, Shanghai China 201613
Factory:	Amsino Medical (Shanghai) Co., Ltd.
Address of Factory:	Building #1-3, 16, Lane 355 Huazhe Rd., Songjiang Export Processing Zone, Shanghai China 201613
Equipment Under Test (EUT):	
EUT Name:	Digital Surgical Suction System-Rover
Trade Name:	iReceptal
Model No.:	iRR301
Standard(s) :	47 CFR Part 15, Subpart C 15.249 RSS-210 Issue10, December 2019 RSS-Gen Issue 5 Amendment 2 (February 2021)
Date of Receipt:	2020-12-28
Date of Test:	2021-07-29 to 2021-08-03
Date of Issue:	2021-08-06
Test Result:	**PASS***

* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan
Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2021-08-06	/

Authorized for issue by:				
		Bill Wu		
		Bill Wu / Project Engineer		
		Parlam Zhan		
		Parlam Zhan / Reviewer		

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检验检测专用章 Inspection & Testing Services
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. Testing Center EMC Laboratory

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**FCC Requirement**	**IC Requirement**	**Method**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	RSS-Gen Clause 6.8	N/A	Pass

Radio Spectrum Matter Part				
Item	**FCC Requirement**	**IC Requirement**	**Method**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.249	RSS-210 Issue 10 December 2019	ANSI C63.10 (2013) Section 6.2	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.249	RSS-Gen Section 6.7	ANSI C63.10 (2013) Section 6.9	Pass
Field Strength of the Fundamental Signal (15.249(a))	47 CFR Part 15, Subpart C 15.249	RSS-210 Issue10 Annex B B.10	ANSI C63.10 (2013) Section 6.5&6.6	Pass
Restricted Band Around Fundamental Frequency	47 CFR Part 15, Subpart C 15.249	RSS-210 Issue10 Annex B B.10& RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.4&6.5&6.6	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.249	RSS-210 Issue10 Annex B B.10& RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.4&6.5&6.6	Pass
99% Bandwidth	-	RSS-Gen Section 6.7	ANSI C63.10 Section 6.9.3	Pass

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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 100~120V,50/60Hz
Test voltage:	AC 120V/60Hz
Modulation Type	GFSK
Number of Channels	40
Operation Frequency	2402MHz~2480MHz
Channel Spacing	2MHz
Antenna Type	PCB Antenna
Antenna Gain:	2dBi (Provided by the manufacturer)
S/N:	145818SJ001
Firmware version:	V2.0

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Docking Station	Amsino	iRD301	/

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4×10^{-8}
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Radiated Power	5.1dB (Below 1GHz)
		4.9dB (Above 1GHz)
6	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
7	Temperature Test	1°C
8	Humidity Test	3%
9	Supply Voltages	1.5%
10	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

4.5 Test Facility

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

- **CNAS (No. CNAS L0599)**

  CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 6332.01)**

  SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

- **FCC (Designation Number: CN1301)**

  SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized by Federal Communications Commission (FCC) as an accredited testing laboratory.

- **ISED (CAB Identifier: CN0020)**

  SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

  ISED#: 8617A.

- **VCCI (Member No.: 3061)**

  The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

- **GAC (No. ATL 0031)**

  SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the GCC Accreditation Center (GAC) in accordance with the recognised International standard ISO/IEC 17025: 2017.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Conducted Emission at Mains Terminals (150kHz-30MHz)					
EMI test receiver	R&S	ESR7	SHEM162-1	2020-12-20	2021-12-19
LISN	Schwarzbeck	NSLK8127	SHEM061-1	2020-12-20	2021-12-19
LISN	EMCO	3816/2	SHEM019-1	2020-12-20	2021-12-19
Pulse limiter	R&S	ESH3-Z2	SHEM029-1	2020-12-20	2021-12-19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2020-12-20	2021-12-19
CE test Cable	/	CE01	/	2020-12-20	2021-12-19
Test software	ESE	E3	Version: 6.111221a	/	/
RF Conducted Test					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2020-12-20	2021-12-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2020-08-13	2021-08-12
Signal Generator	R&S	SMR20	SHEM006-1	2020-08-13	2021-08-12
Signal Generator	Agilent	N5182A	SHEM182-1	2020-08-13	2021-08-12
Communication Tester	R&S	CMW270	SHEM183-1	2020-08-13	2021-08-12
Switcher	Tonscend	JS0806	SHEM184-1	2020-08-13	2021-08-12
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2020-08-13	2021-08-12
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2018-09-25	2021-09-24
AC Power Stabilizer	APC	KDF-31020T-V0-F0	SHEM216-1	2020-12-20	2021-12-19
DC Power Supply	MCH	MCH-303A	SHEM210-1	2020-12-20	2021-12-19
Conducted test Cable	/	RF01~RF04	/	2020-12-20	2021-12-19
Test software	Tonscend	JS Tonscend BT/WIFI System	Version: 2.6	/	/
RF Radiated Test					
EMI test Receiver	R&S	ESU40	SHEM051-1	2020-12-20	2021-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2020-12-20	2021-12-19
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2020-12-20	2021-12-19
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2019-10-14	2021-10-13
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM202-1	2020-04-30	2022-04-29
Horn Antenna (1-18GHz)	Schwarzbeck	HF906	SHEM009-1	2018-10-24	2021-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2019-10-14	2021-10-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2018-10-31	2021-10-30
Pre-amplifier (9KHz-2GHz)	CLAVIIO	BDLNA-0001	SHEM164-1	2020-08-13	2021-08-12
Pre-amplifier (1-18GHz)	CLAVIIO	BDLNA-0118	SHEM050-2	2020-08-13	2021-08-12
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2020-12-20	2021-12-19
Signal Generator	R&S	SMR40	SHEM058-1	2020-08-13	2021-08-12
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2020-05-25	2023-05-24
RE test Cable	/	RE01, RE02, RE06	/	2020-12-20	2021-12-19
Test software	ESE	E3	Version: 6.111221a	/	/

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

Limit:

15.203 requirement:

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

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently

attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is PCB antenna and no consideration of replacement. The best case gain of the antenna is 2dBi.

Antenna location: Refer to Appendix (Internal Photos)

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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.249

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

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.

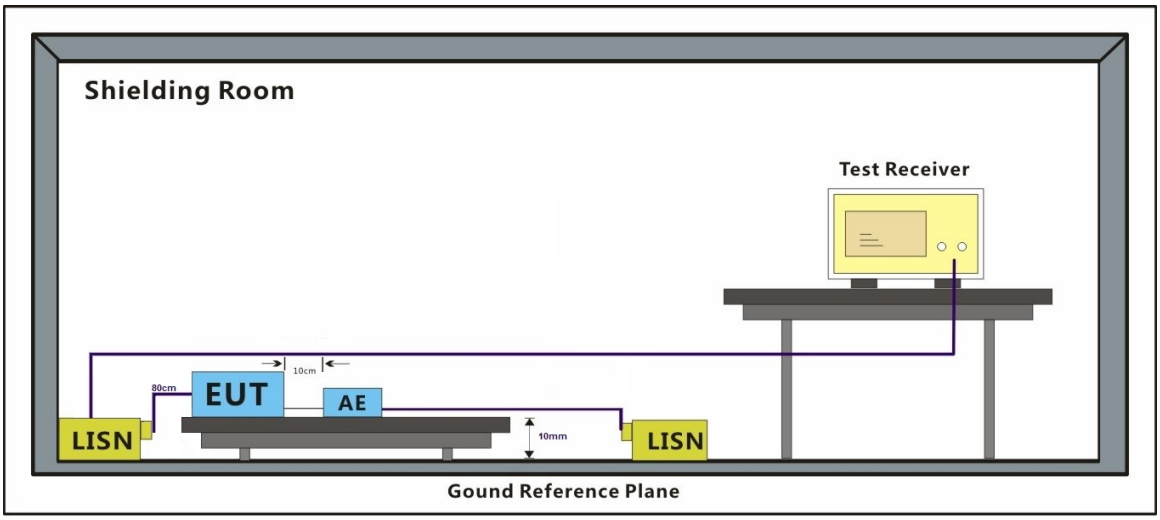
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram



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7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed directly on the horizontal ground reference plane or 10mm above the horizontal ground reference plane with insulating material.

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

1. LISN=Read Level+ Cable Loss+ LISN Factor

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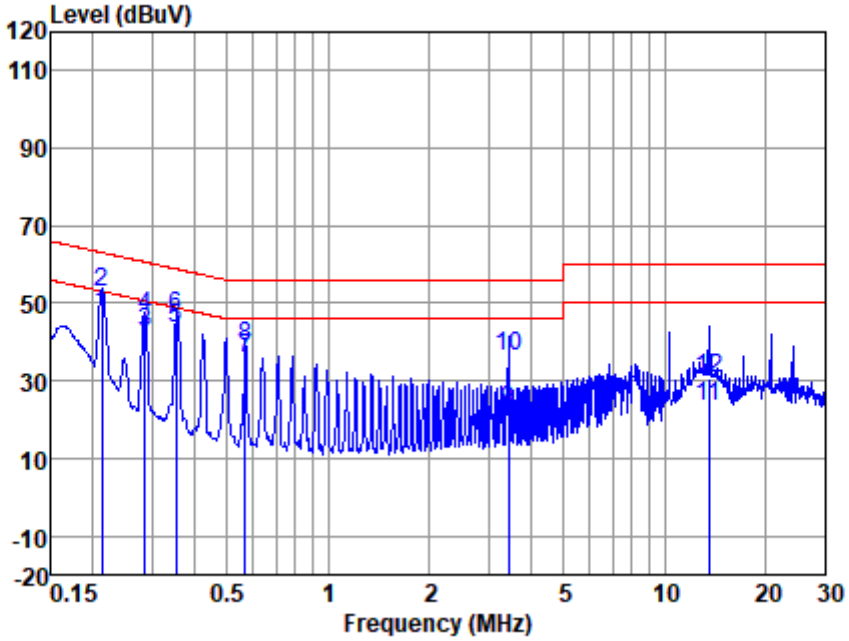
Mode:a; Line:Live Line



LISN : LINE
EUT/Project No : 0786CR
Test Mode :

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.21	37.02	0.20	9.93	47.15	53.10	-5.95	Average
2	0.21	42.53	0.20	9.93	52.66	63.10	-10.44	QP
3	0.28	32.26	0.20	9.94	42.40	50.68	-8.28	Average
4	0.28	36.52	0.20	9.94	46.66	60.68	-14.02	QP
5	0.35	33.46	0.20	9.93	43.59	48.87	-5.28	Average
6	0.35	36.64	0.20	9.93	46.77	58.87	-12.10	QP
7	0.57	25.73	0.20	9.92	35.85	46.00	-10.15	Average
8	0.57	28.56	0.20	9.92	38.68	56.00	-17.32	QP
9	3.44	12.00	0.20	9.99	22.19	46.00	-23.81	Average
10	3.44	26.32	0.20	9.99	36.51	56.00	-19.49	QP
11	13.55	12.87	0.45	10.12	23.44	50.00	-26.56	Average
12	13.55	20.17	0.45	10.12	30.74	60.00	-29.26	QP

Notes: Emission Level = Read Level +LISN Factor + Cable loss

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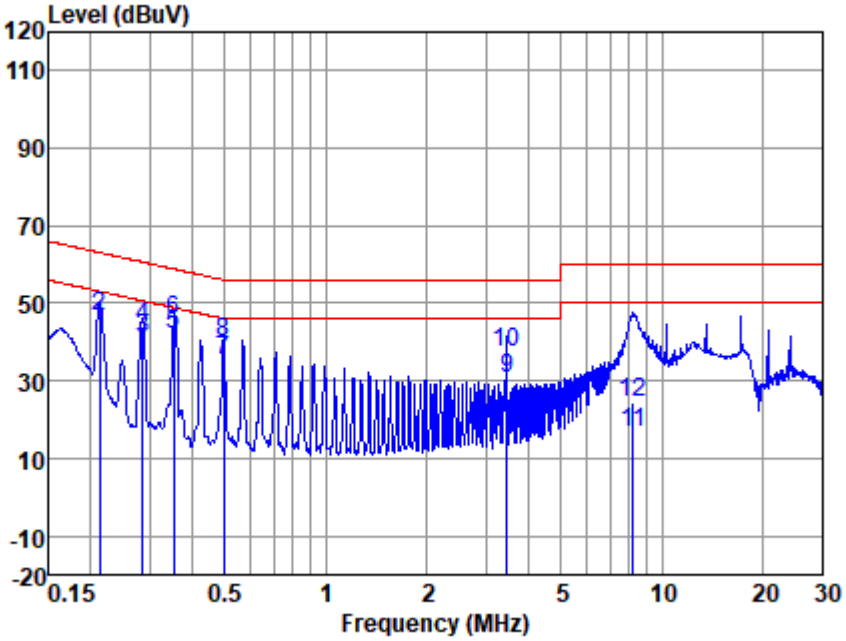
Mode:a; Line:Neutral Line



LISN : NEUTRAL
EUT/Project No : 0786CR
Test Mode :

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.21	33.42	0.20	9.93	43.55	53.10	-9.55	Average
2	0.21	36.36	0.20	9.93	46.49	63.10	-16.61	QP
3	0.28	30.80	0.20	9.94	40.94	50.68	-9.74	Average
4	0.28	33.81	0.20	9.94	43.95	60.68	-16.73	QP
5	0.35	31.93	0.20	9.93	42.06	48.87	-6.81	Average
6	0.35	35.43	0.20	9.93	45.56	58.87	-13.31	QP
7	0.50	24.95	0.20	9.93	35.08	46.05	-10.97	Average
8	0.50	29.96	0.20	9.93	40.09	56.05	-15.96	QP
9	3.45	20.35	0.20	9.99	30.54	46.00	-15.46	Average
10	3.45	27.40	0.20	9.99	37.59	56.00	-18.41	QP
11	8.24	6.24	0.25	10.05	16.54	50.00	-33.46	Average
12	8.24	13.97	0.25	10.05	24.27	60.00	-35.73	QP

Notes: Emission Level = Read Level +LISN Factor + Cable loss

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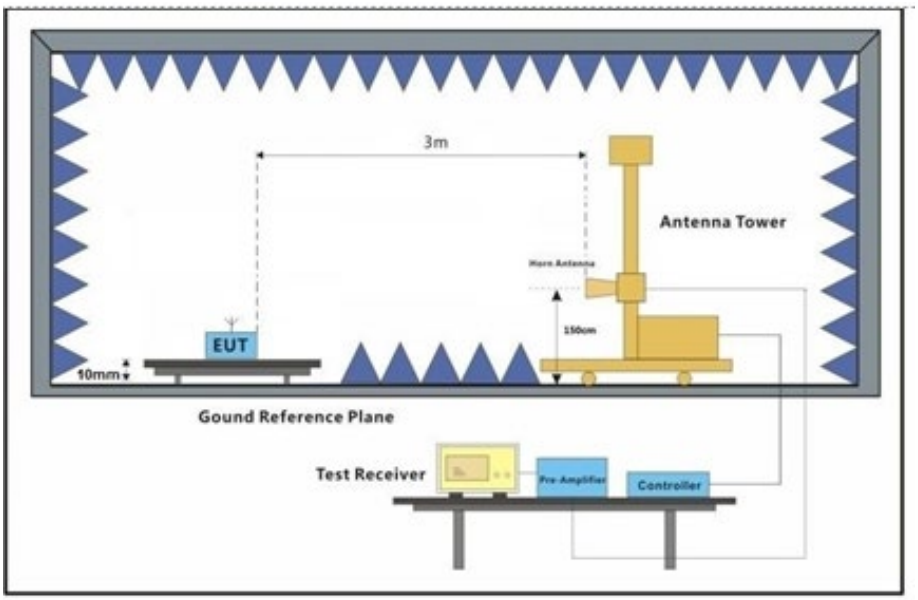
7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215
Test Method: ANSI C63.10 (2013) Section 6.9

7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

1. Place the EUT on the table and set it in Engineering mode.
2. Set the spectrum analyzer as RBW = approximately 1 % to 5 % of the OBW (set 30 kHz), VBW =3* RBW, Span=3MHz, Sweep=auto
3. Mark the peak frequency and –20dB (upper and lower) frequency.
4. Repeat above procedures until all frequency measured was complete.

Frequency (MHz)	Bandwidth (MHz)	Result
2402	0.720	PASS
2440	0.664	PASS
2480	0.668	PASS

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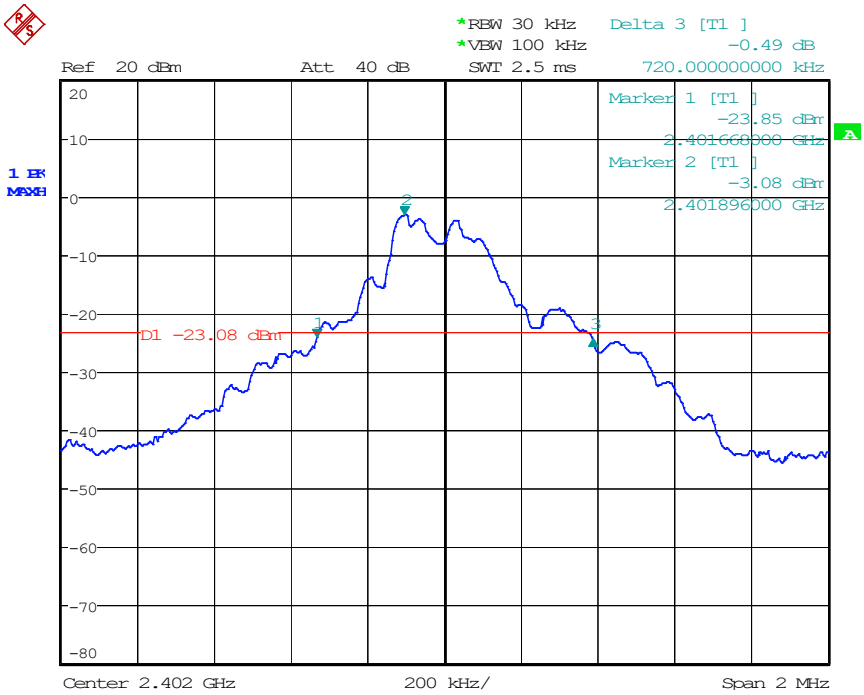
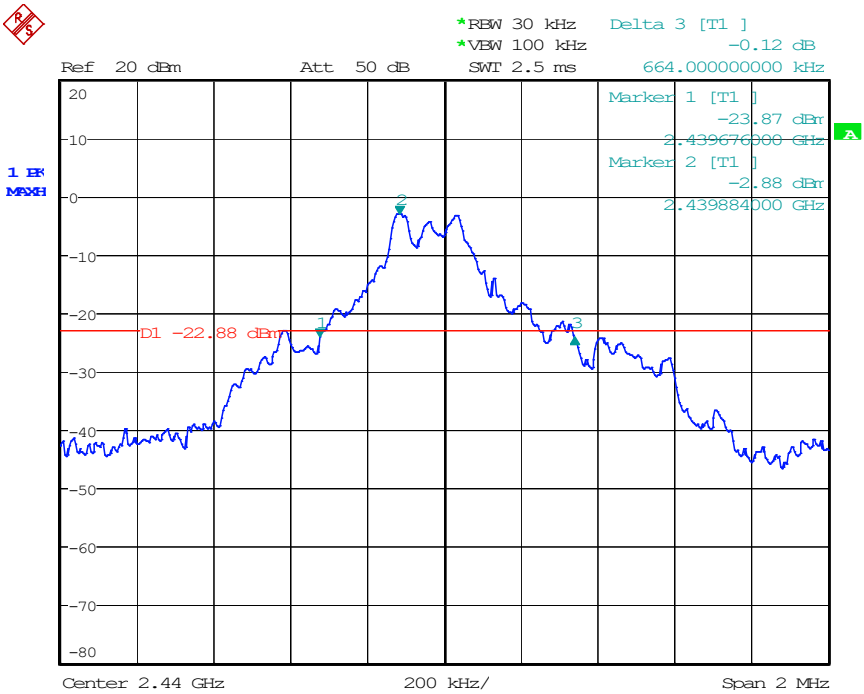
Test plot as follows:

Channel: 2402MHz



Date: 18.JUN.2021 16:07:33

Channel: 2440MHz



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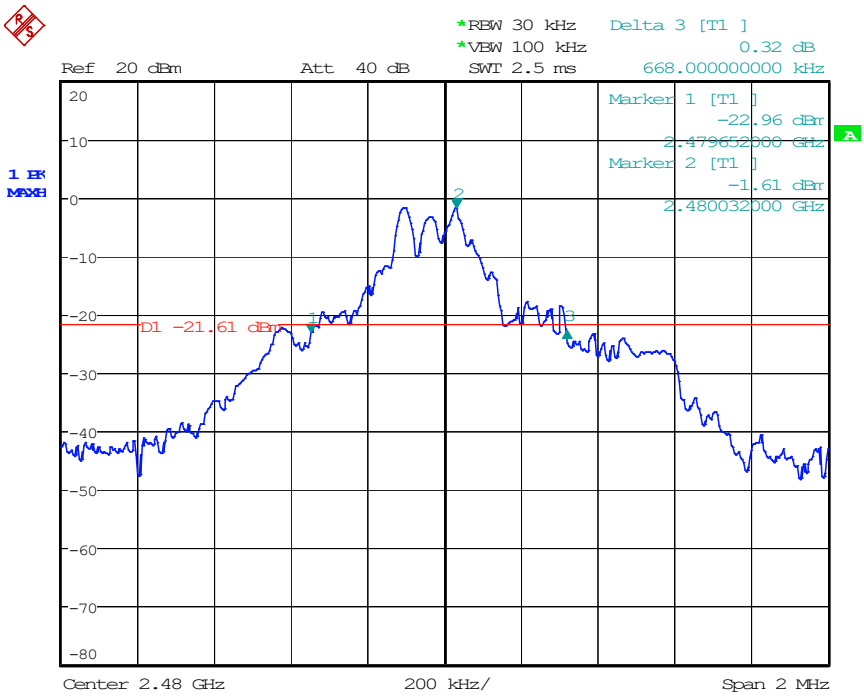
Channel: 2480MHz



Date: 18.JUN.2021 15:08:20

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7.3 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)
Test Method: ANSI C63.10 (2013) Section 6.5&6.6

Test Site: **Measurement Distance: 3m**

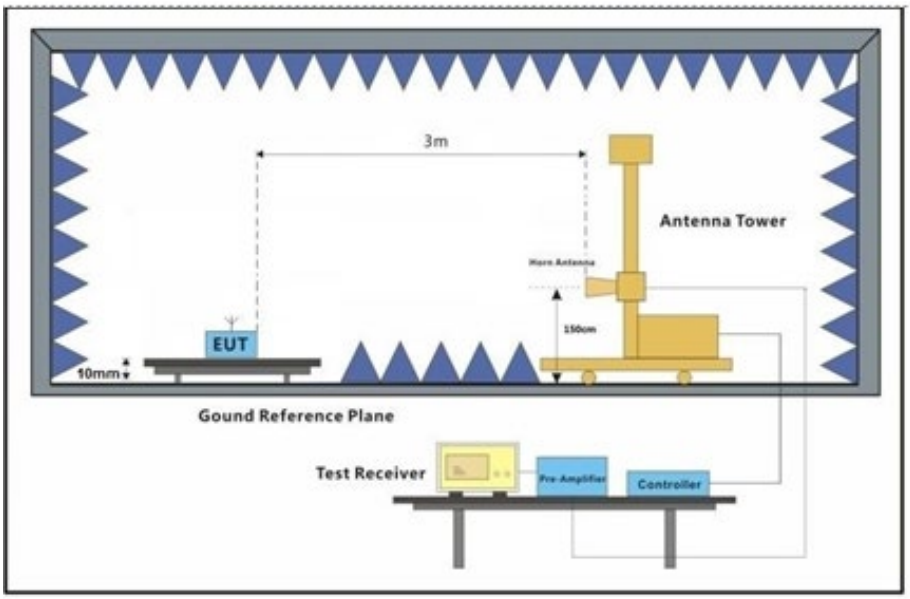
Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

Frequency	Limit (dBuV/m)	Remark
2400~2483.5 MHz	114	Peak
	94	Average

Test Setup:



Test Procedure:

a. The EUT was placed on the 10mm above the horizontal ground reference plane at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit

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specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Test Results: Pass

Measurement Data

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
2402	100.99	-5.60	95.39	114	-18.61	Peak	Horizontal
	97.62	-5.60	92.02	94	-1.98	Avg	Horizontal
	104.80	-5.60	99.20	114	-14.80	Peak	Vertical
	98.48	-5.60	92.88	94	-1.12	Avg	Vertical

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
2440	102.11	-5.60	96.51	114	-17.49	Peak	Horizontal
	96.26	-5.60	90.66	94	-3.34	Avg	Horizontal
	105.52	-5.60	99.92	114	-14.08	Peak	Vertical
	97.22	-5.60	91.62	94	-2.38	Avg	Vertical

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
2480	102.11	-5.59	96.52	114	-17.48	Peak	Horizontal
	97.69	-5.59	92.10	94	-1.90	Avg	Horizontal
	107.42	-5.59	101.83	114	-12.17	Peak	Vertical
	98.14	-5.59	92.55	94	-1.45	Avg	Vertical

Remark:

1) The basic equation with a sample calculation is as follows: Level = Read Level + Factor.

(The Factor is calculated by adding the Antenna Factor, Cable Loss and Preamp Factor)

2) If the Peak value below the Average Limit, the Average test doesn't perform for this submission.

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7.4 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6

Limit:

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
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

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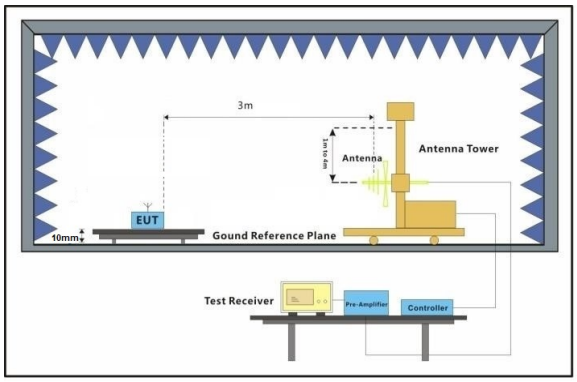
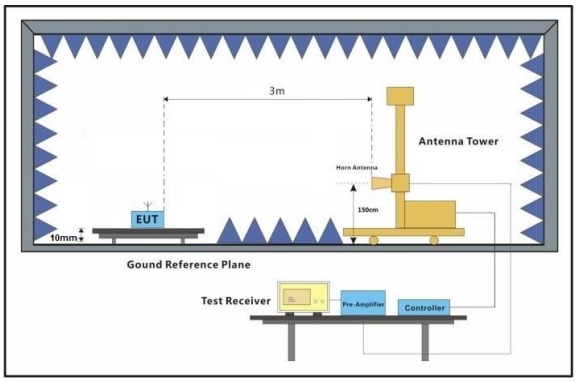
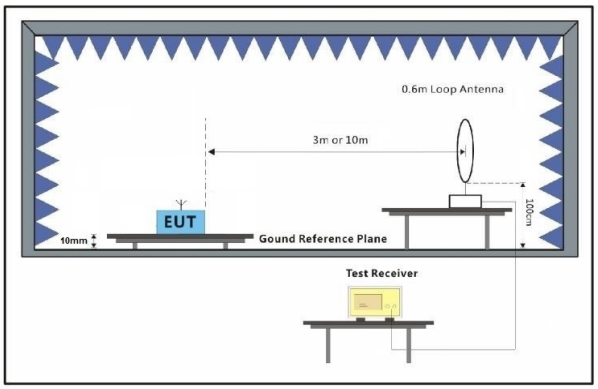
7.4.2 Test Setup Diagram







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7.4.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8m for table-top equipment, and the EUT was placed directly on the horizontal ground reference plane or 10mm above the horizontal ground reference plane with insulating material for floor-standing equipment at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters for table-top equipment, and the EUT was placed directly on the horizontal ground reference plane or 10mm above the horizontal ground reference plane with insulating material for floor-standing equipment at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

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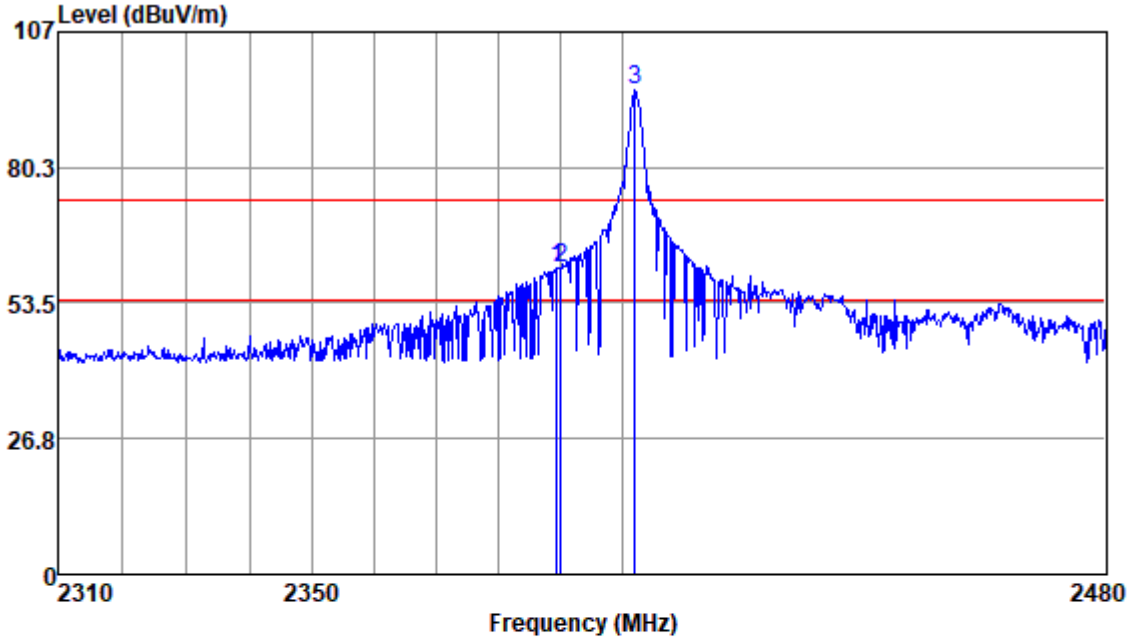
2402MHz:



Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2389.42	66.07	28.97	2.77	37.40	60.41	74.00	-13.59	Peak
2390.00	65.97	28.97	2.77	37.40	60.31	74.00	-13.69	Peak
2402.00	100.99	29.01	2.79	37.40	95.39	74.00	21.39	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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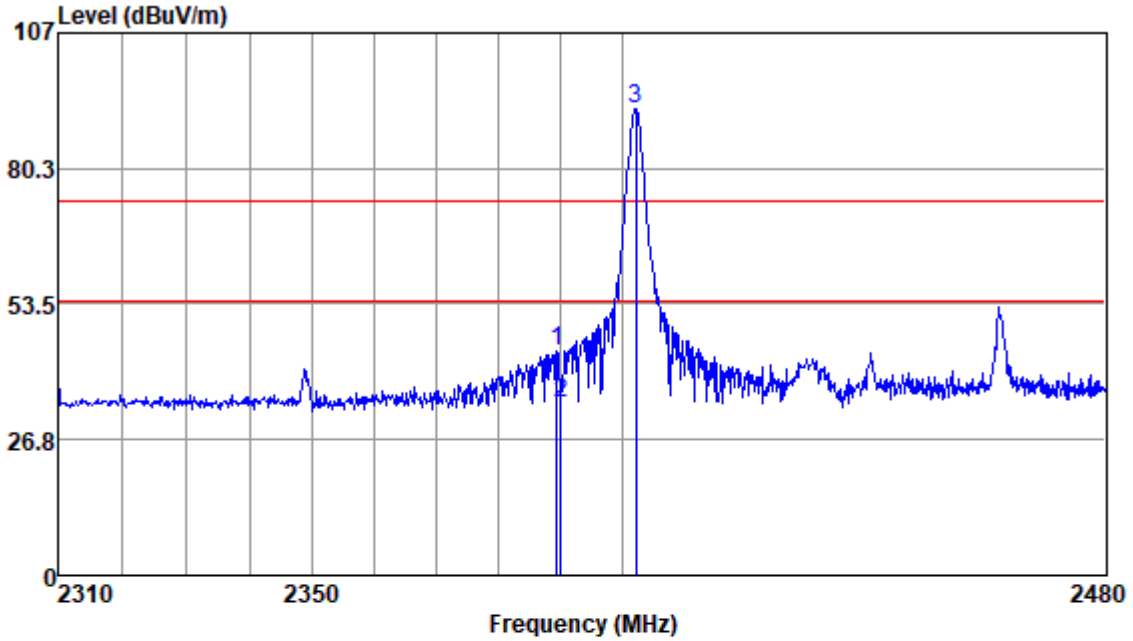

Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2389.42	49.95	28.97	2.77	37.40	44.29	54.00	-9.71	Average
2390.00	39.51	28.97	2.77	37.40	33.85	54.00	-20.15	Average
2402.18	97.62	29.01	2.79	37.40	92.02	54.00	38.02	Average

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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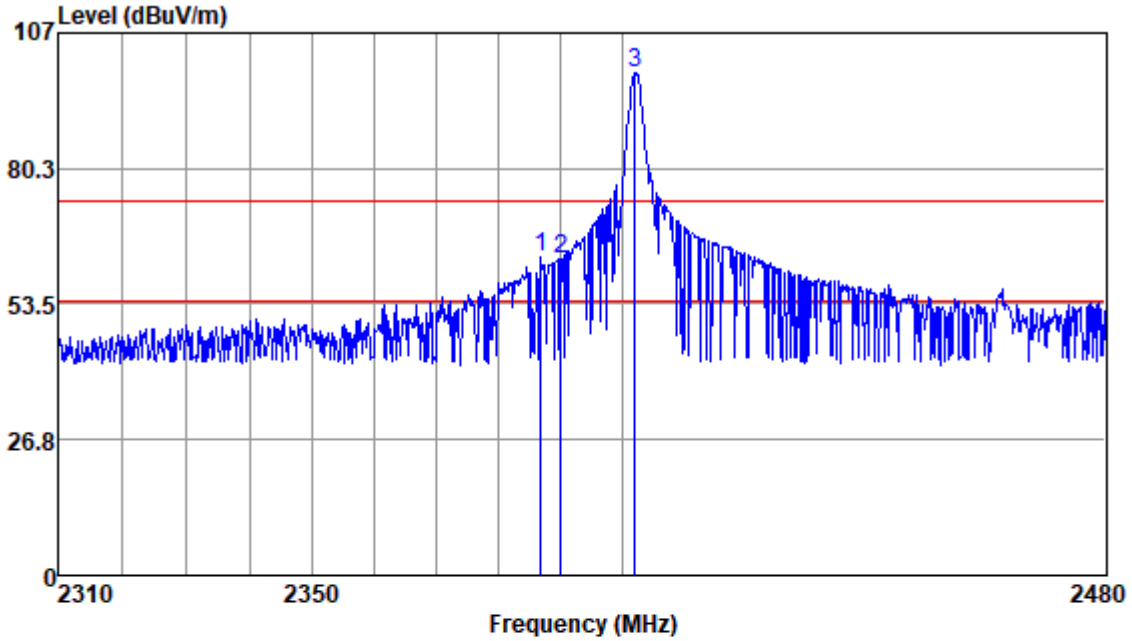

Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2386.70	68.62	28.97	2.77	37.40	62.96	74.00	-11.04	Peak
2390.00	68.06	28.97	2.77	37.40	62.40	74.00	-11.60	Peak
2402.00	104.80	29.01	2.79	37.40	99.20	74.00	25.20	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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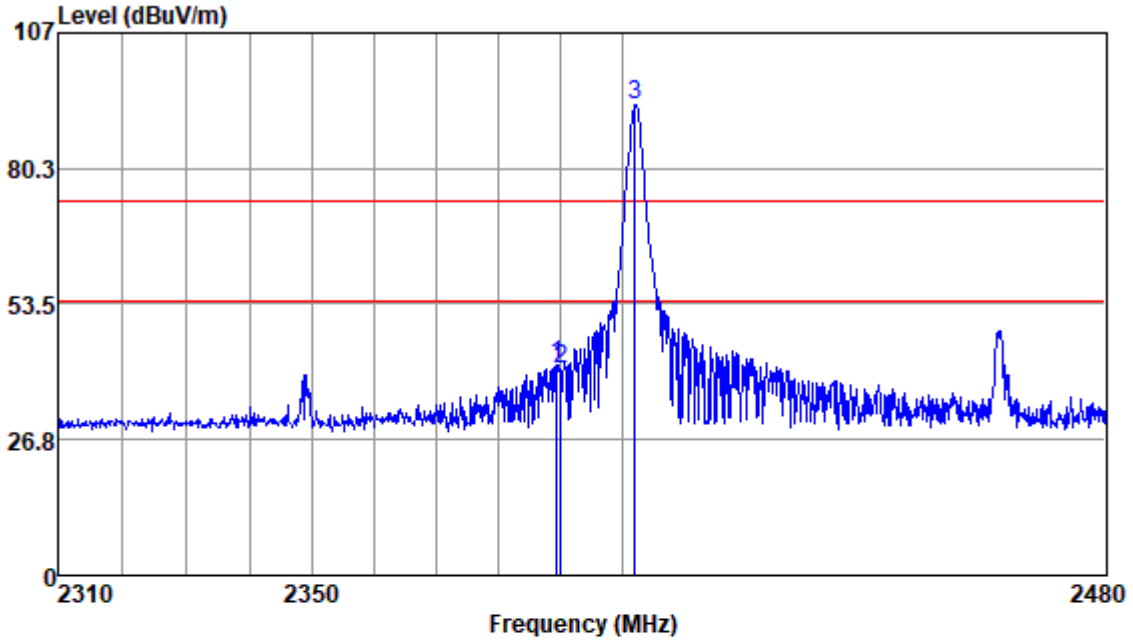

Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2389.42	47.29	28.97	2.77	37.40	41.63	54.00	-12.37	Average
2390.00	46.18	28.97	2.77	37.40	40.52	54.00	-13.48	Average
2402.00	98.48	29.01	2.79	37.40	92.88	54.00	38.88	Average

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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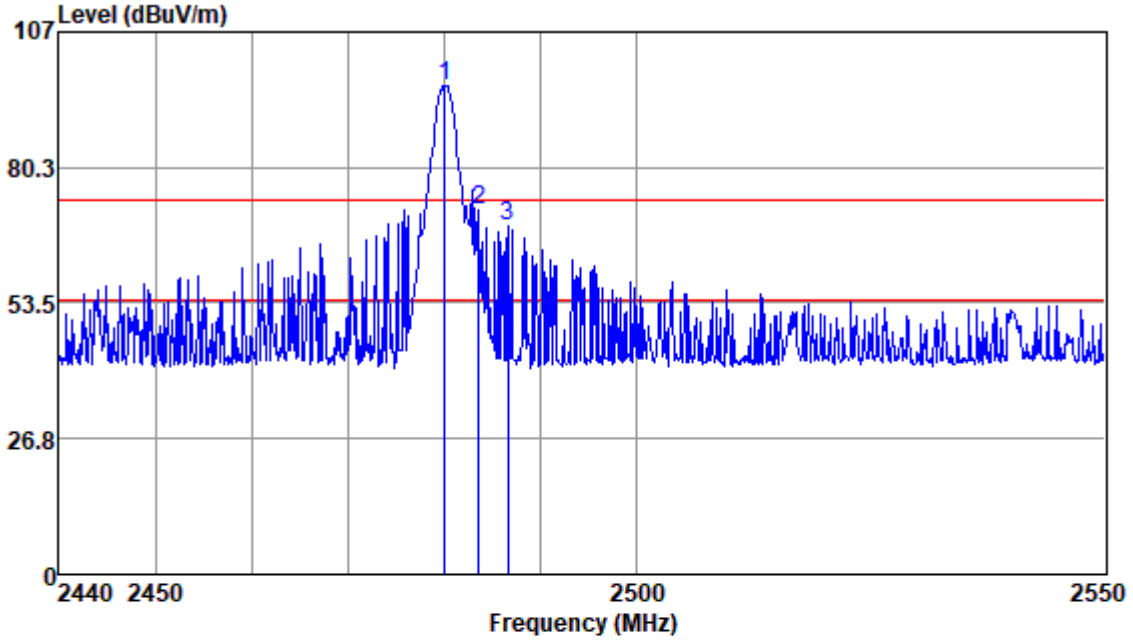
2480MHz:



Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2480.03	102.11	29.10	2.88	37.57	96.52	74.00	22.52	Peak
2483.50	77.30	29.11	2.88	37.57	71.72	74.00	-2.28	Peak
2486.60	74.42	29.11	2.88	37.57	68.84	74.00	-5.16	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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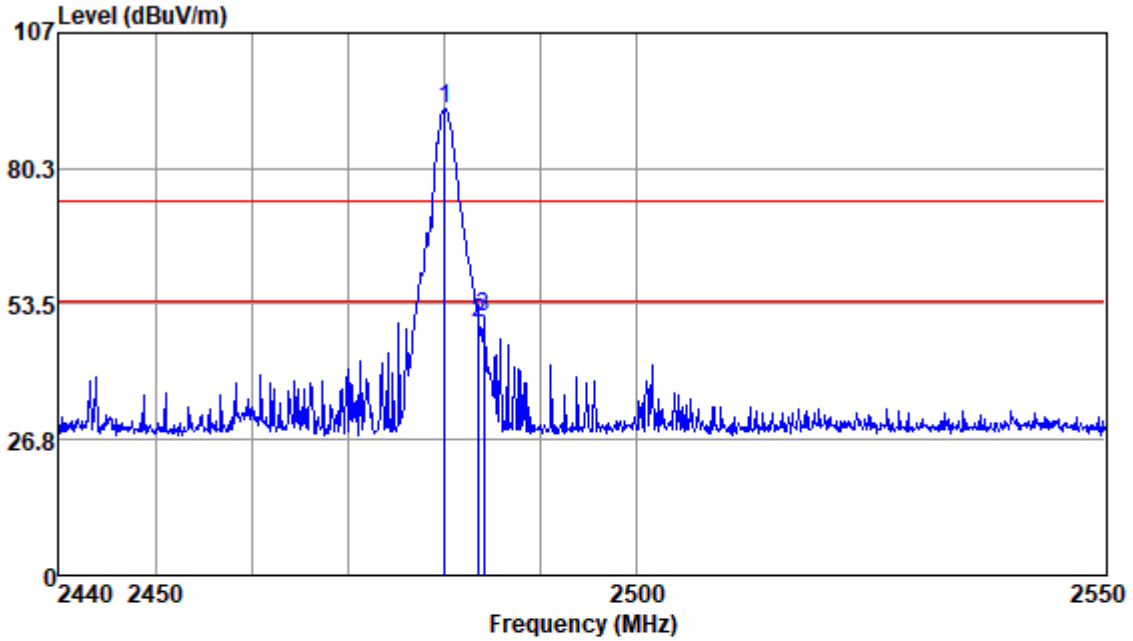

Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2480.03	97.69	29.10	2.88	37.57	92.10	54.00	38.10	Average
2483.50	55.29	29.11	2.88	37.57	49.71	54.00	-4.29	Average
2484.08	56.38	29.11	2.88	37.57	50.80	54.00	-3.20	Average

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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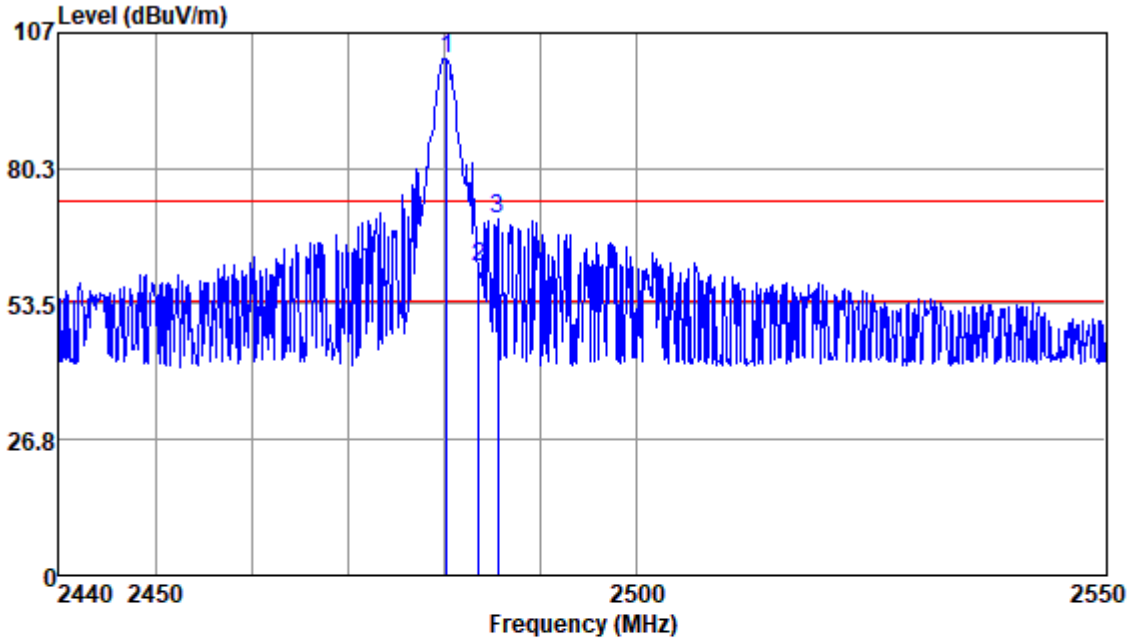

Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2480.14	107.42	29.10	2.88	37.57	101.83	74.00	27.83	Peak
2483.50	66.20	29.11	2.88	37.57	60.62	74.00	-13.38	Peak
2485.50	75.94	29.11	2.88	37.57	70.36	74.00	-3.64	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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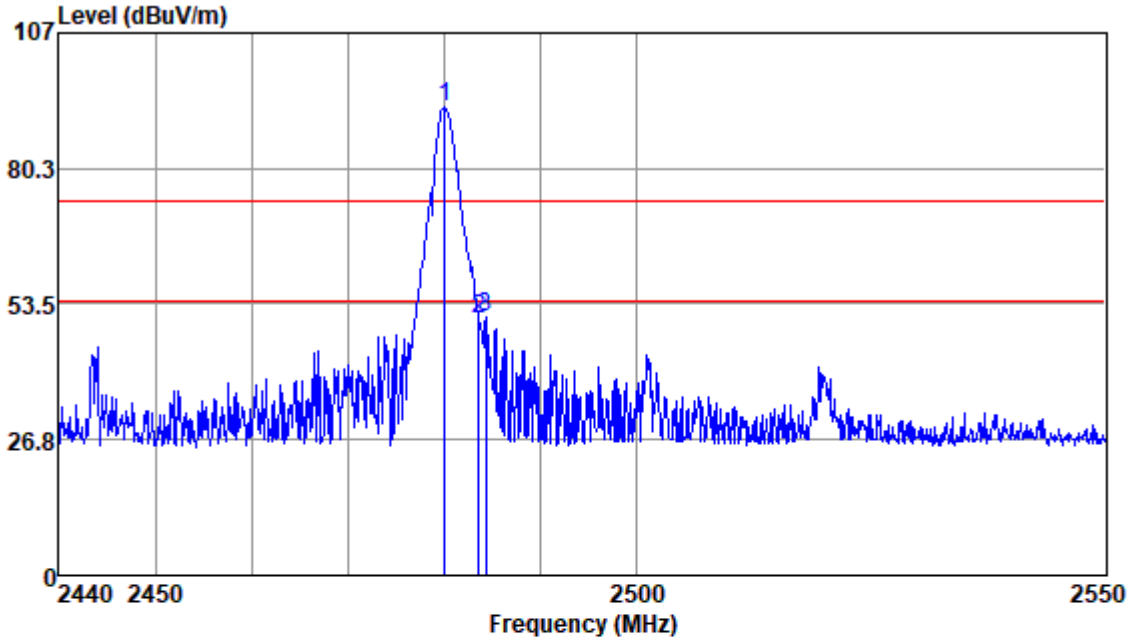

Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2480.03	98.14	29.10	2.88	37.57	92.55	54.00	38.55	Average
2483.50	56.12	29.11	2.88	37.57	50.54	54.00	-3.46	Average
2484.30	56.37	29.11	2.88	37.57	50.79	54.00	-3.21	Average

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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7.5 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)

Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6

Limit:

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
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

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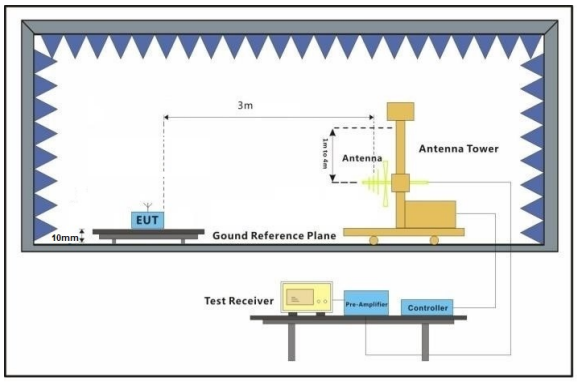
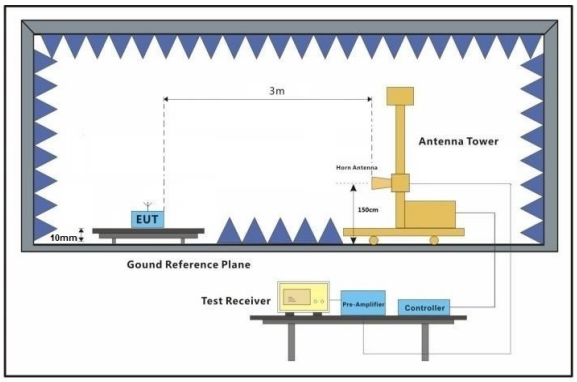
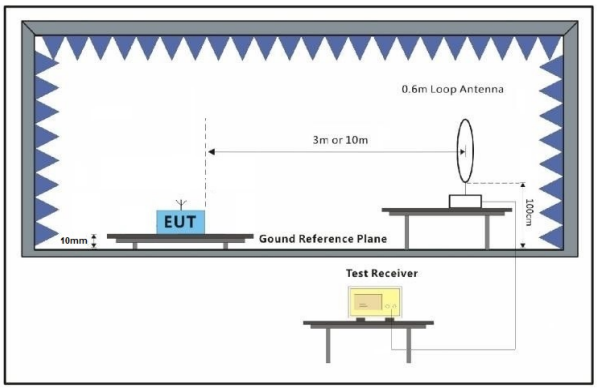
7.5.2 Test Setup Diagram







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SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. Testing Center EMC Laboratory

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7.5.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8m for table-top equipment, and the EUT was placed directly on the horizontal ground reference plane or 10mm above the horizontal ground reference plane with insulating material for floor-standing equipment at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters for table-top equipment, and the EUT was placed directly on the horizontal ground reference plane or 10mm above the horizontal ground reference plane with insulating material for floor-standing equipment at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown

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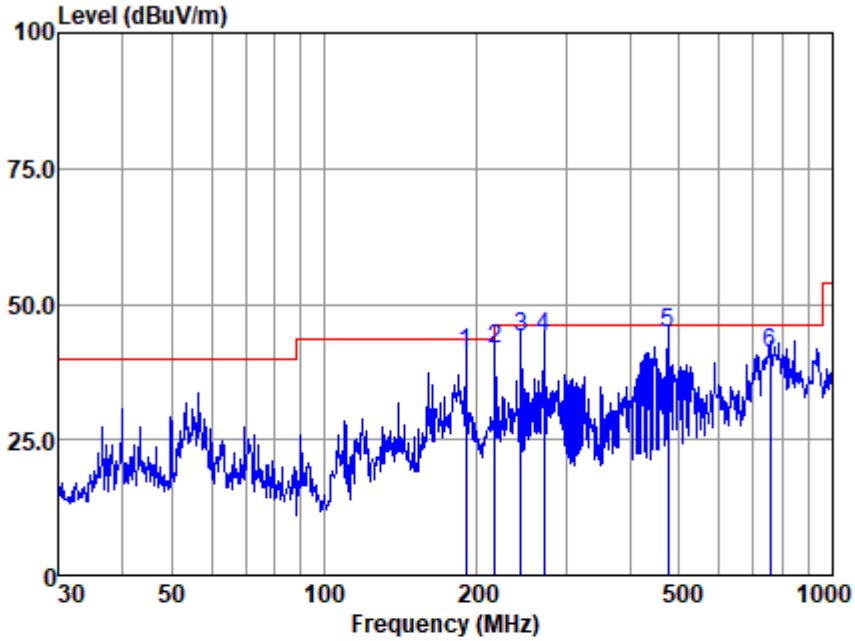
30MHz-1GHz:
Mode:a; Polarization:Horizontal



Antenna Polarity :HORIZONTAL
EUT/Project :10786CR
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	189.739	60.00	10.50	2.15	31.74	40.91	43.50	-2.59	QP
2	216.783	60.80	9.70	2.36	31.19	41.67	46.00	-4.33	QP
3	244.232	61.23	11.21	2.56	31.09	43.91	46.00	-2.09	QP
4	271.325	59.90	12.55	2.72	31.29	43.88	46.00	-2.12	QP
5	475.499	54.69	17.20	3.46	30.73	44.62	46.00	-1.38	QP
6	755.387	45.51	22.12	4.37	30.89	41.11	46.00	-4.89	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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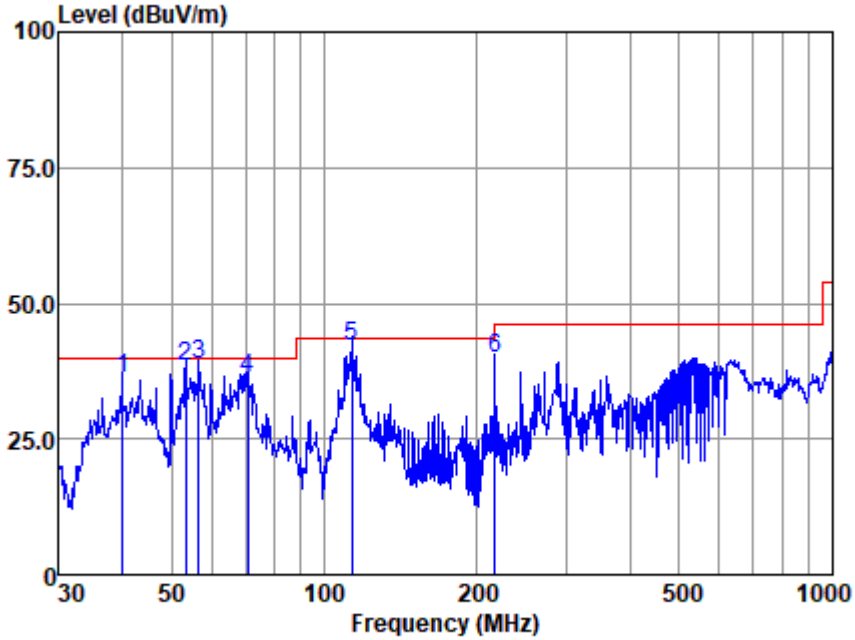
Mode:a; Polarization:Vertical



Antenna Polarity :VERTICAL
EUT/Project :10786CR
Test mode :a

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	39.994	54.20	13.20	0.88	32.02	36.26	40.00	-3.74	QP
2	53.318	55.77	13.49	1.04	31.90	38.40	40.00	-1.60	QP
3	56.593	56.03	13.30	1.08	31.80	38.61	40.00	-1.39	QP
4	70.584	54.73	11.57	1.22	31.23	36.29	40.00	-3.71	QP
5	113.316	61.67	10.40	1.60	31.59	42.08	43.50	-1.42	QP
6	216.783	58.90	9.70	2.36	31.19	39.77	46.00	-6.23	QP

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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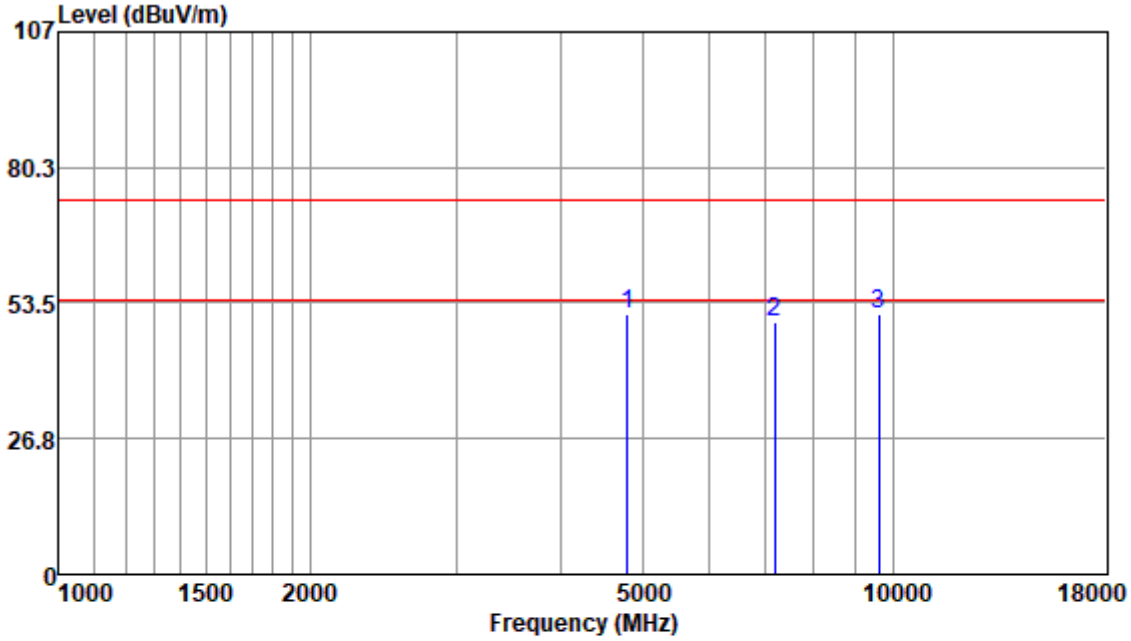
Above 1GHz:
2402MHz:



Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4804.00	51.82	33.72	4.46	38.71	51.29	74.00	-22.71	Peak
7206.00	44.93	36.28	5.72	37.18	49.75	74.00	-24.25	Peak
9608.00	41.13	37.70	6.53	34.18	51.18	74.00	-22.82	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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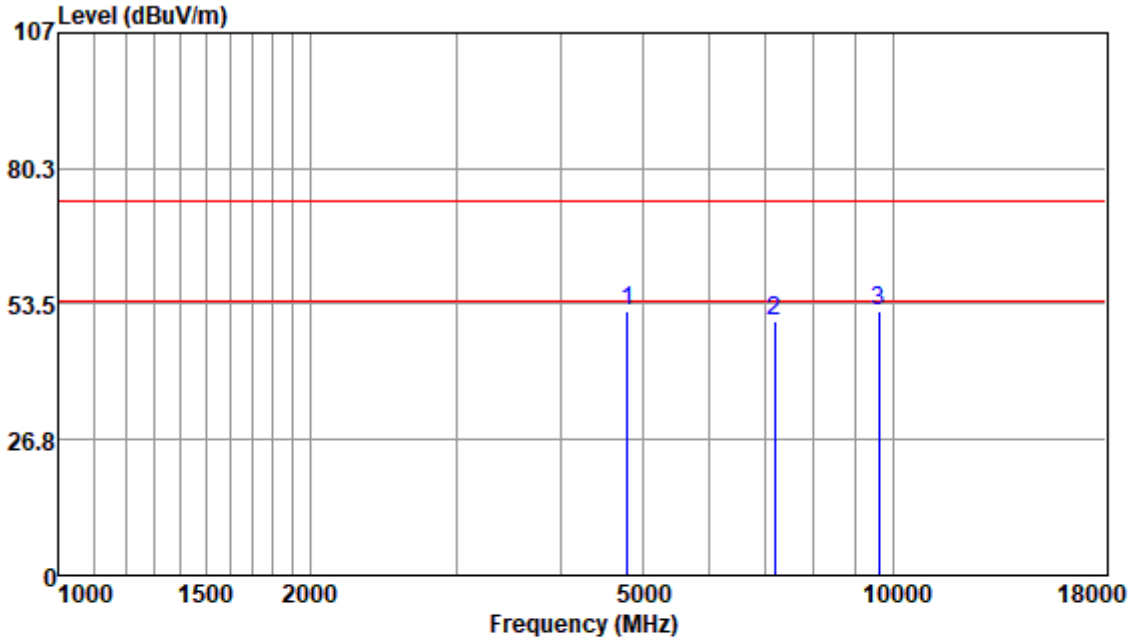

Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4804.00	52.57	33.72	4.46	38.71	52.04	74.00	-21.96	Peak
7206.00	45.18	36.28	5.72	37.18	50.00	74.00	-24.00	Peak
9608.00	42.14	37.70	6.53	34.18	52.19	74.00	-21.81	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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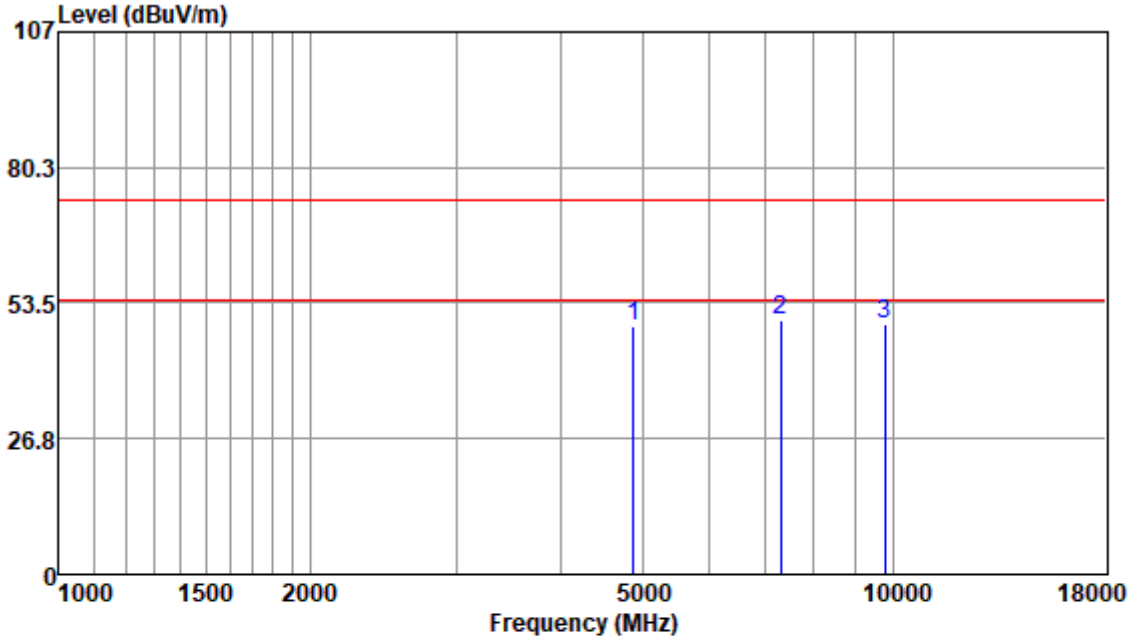
2440MHz:



Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4880.00	49.23	33.93	4.47	38.78	48.85	74.00	-25.15	Peak
7320.00	44.76	36.47	5.85	37.10	49.98	74.00	-24.02	Peak
9760.00	39.18	37.68	6.50	34.15	49.21	74.00	-24.79	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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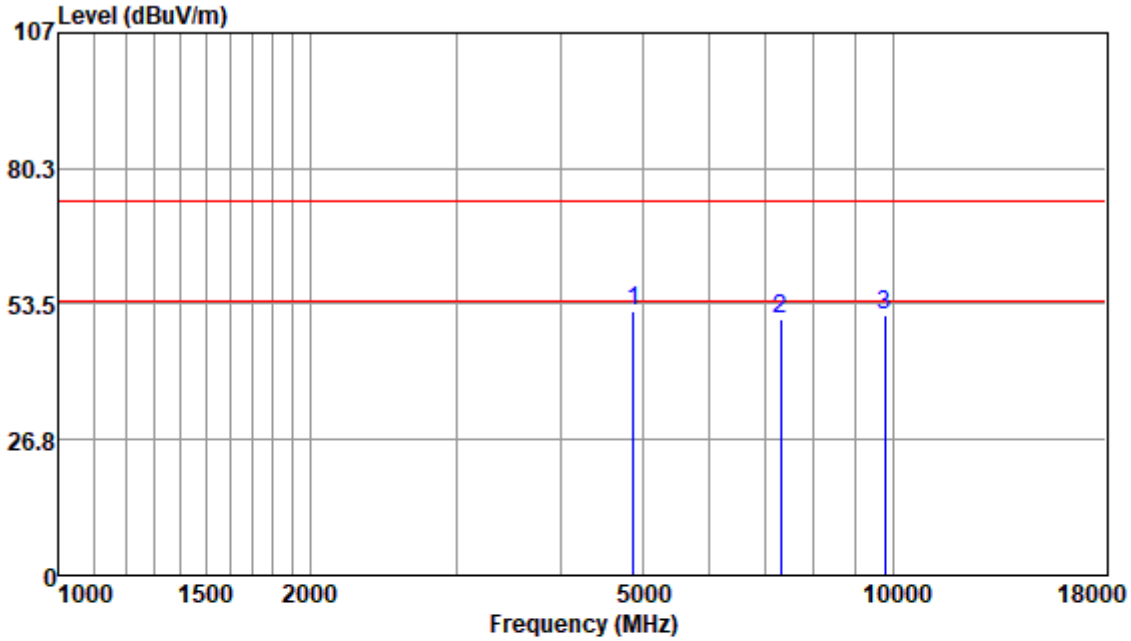

Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4880.00	52.67	33.93	4.47	38.78	52.29	74.00	-21.71	Peak
7320.00	45.40	36.47	5.85	37.10	50.62	74.00	-23.38	Peak
9760.00	41.14	37.68	6.50	34.15	51.17	74.00	-22.83	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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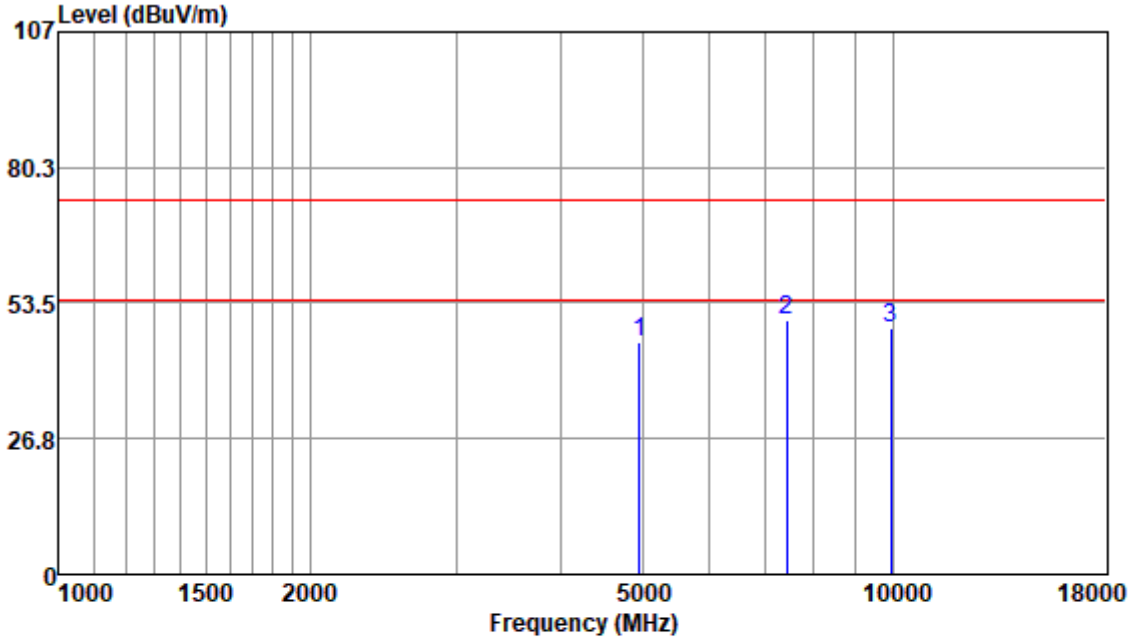
2480MHz:



Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4960.00	46.25	33.98	4.48	38.87	45.84	74.00	-28.16	Peak
7440.00	44.85	36.40	5.97	37.03	50.19	74.00	-23.81	Peak
9920.00	38.56	37.81	6.47	34.11	48.73	74.00	-25.27	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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检验检测专用章 Inspection & Testing Services
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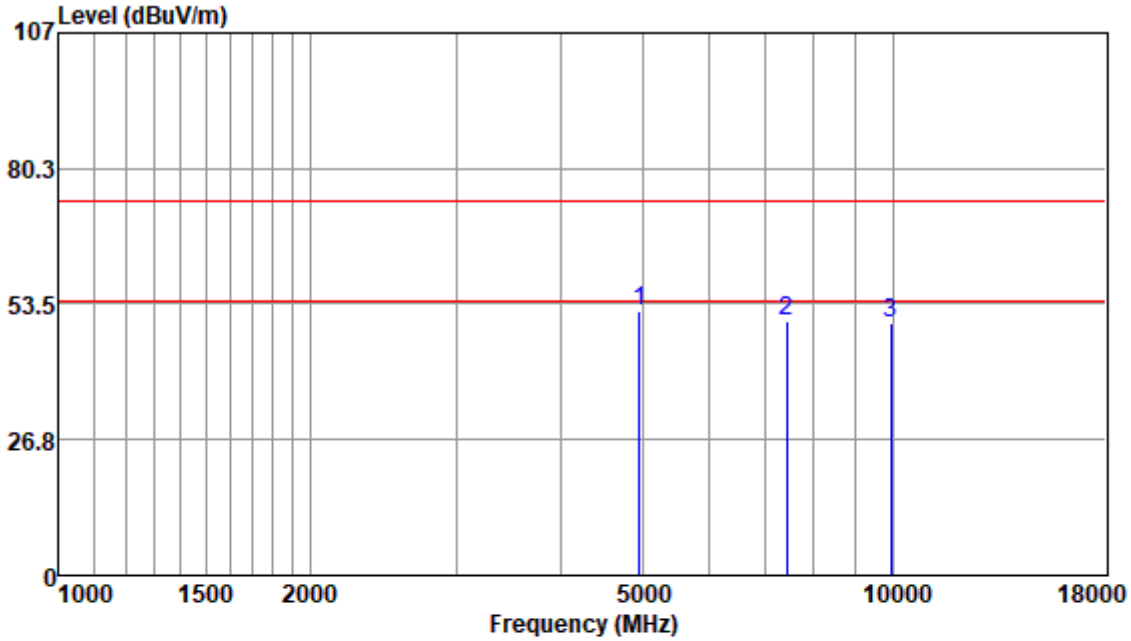

Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4960.00	52.51	33.98	4.48	38.87	52.10	74.00	-21.90	Peak
7440.00	44.81	36.40	5.97	37.03	50.15	74.00	-23.85	Peak
9920.00	39.48	37.81	6.47	34.11	49.65	74.00	-24.35	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

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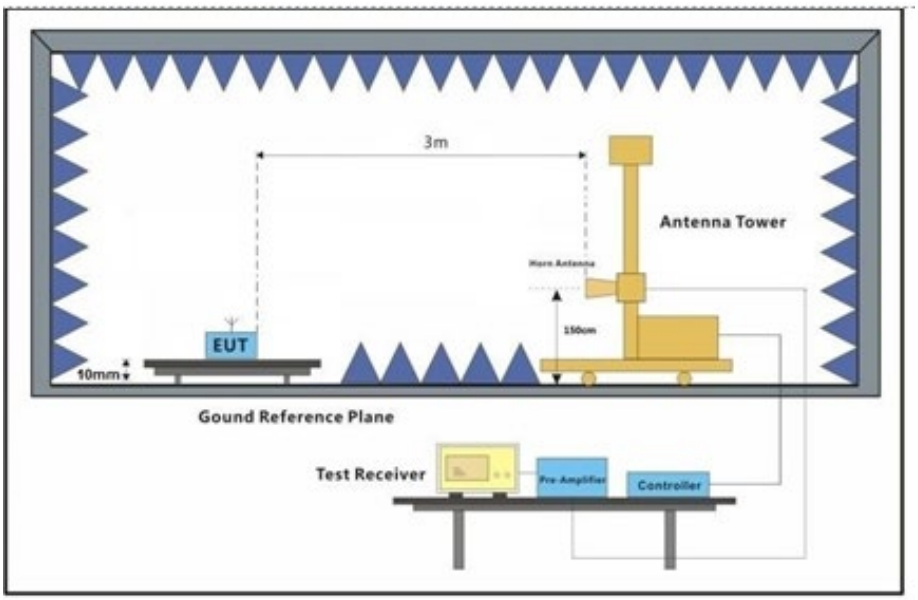
7.6 99% Bandwidth

Test Requirement RSS-Gen Section 6.7
Test Method: RSS-Gen Section 6.7

7.6.1 E.U.T. Operation

Operating Environment:
Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

1. Place the EUT on the table and set it in Engineering mode.
2.Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centred on the hopping channel;
3.Set the spectrum analyzer: RBW = 1% of the span (set 30kHz). VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4.Mark the peak frequency and using the 99% OBW function measure the bandwidth.

Frequency (MHz)	Bandwidth (MHz)	Result
2402	0.740	PASS
2440	0.772	PASS
2480	0.820	PASS

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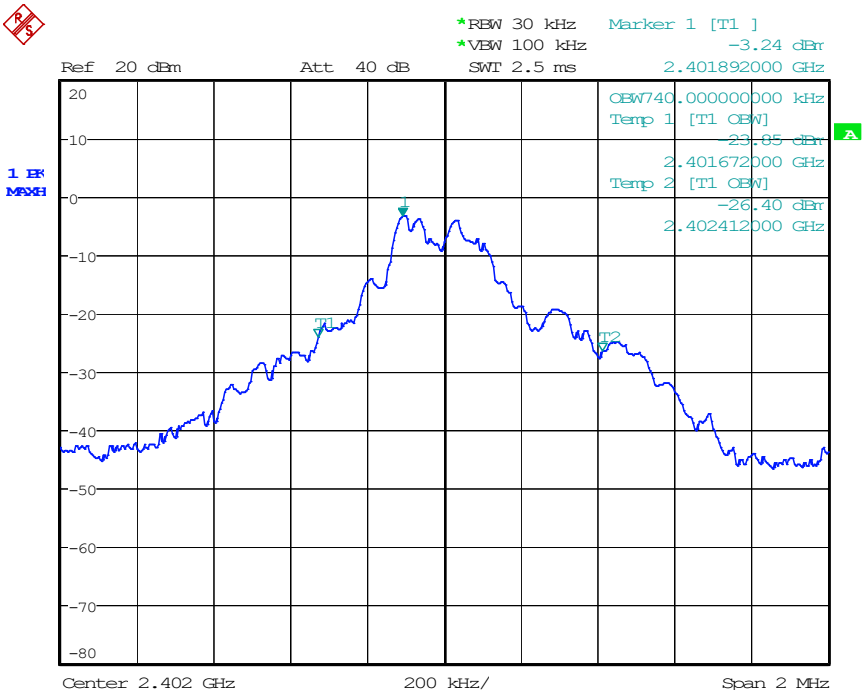
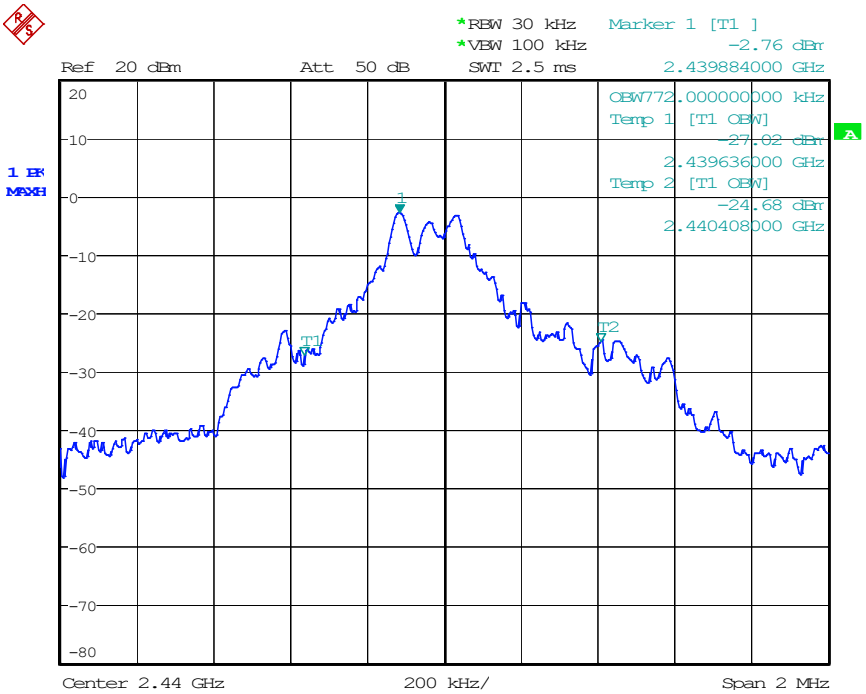
Test plot as follows:

Channel: 2402MHz



Date: 18.JUN.2021 15:52:54

Channel: 2440MHz



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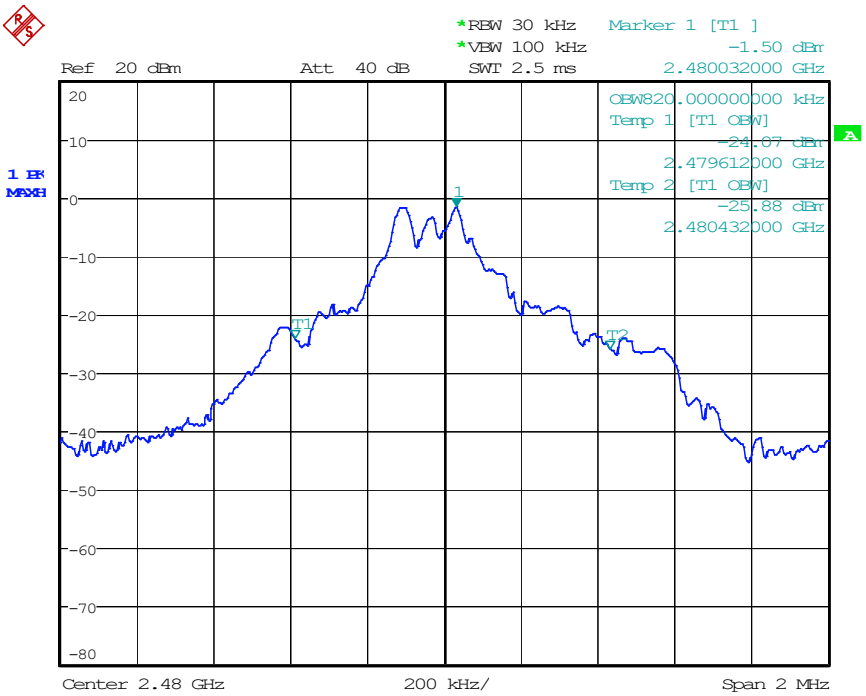
Channel: 2480MHz



Date: 18.JUN.2021 15:05:52

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8 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

- End of the Report -

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