

TEST REPORT

Application No.: SHEM2106006331CR
FCC ID: 2AK23MC232
IC: 22406-MC232
Applicant: Keeson Technology Corporation Limited
Address of Applicant: No. 195, Yuanfeng East Road, Wangjiangjing, Xiuzhou District, Jiaxing City, 31400 China
Manufacturer: DewertOkin Technology Group Co., Ltd.
Address of Manufacturer: No.465, Xinnanyang Road, Wangjiangjing Development Zone, Xiuzhou District, Jiaxing City, Zhejiang Province
Factory: DewertOkin Technology Group Co., Ltd.
Address of Factory: No.465, Xinnanyang Road, Wangjiangjing Development Zone, Xiuzhou District, Jiaxing City, Zhejiang Province

Equipment Under Test (EUT):
EUT Name: CONTROL BOX
Model No.: MC232
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: 2021-06-18
Date of Test: 2021-06-24 to 2021-07-23
Date of Issue: 2021-08-09

Test Result:	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

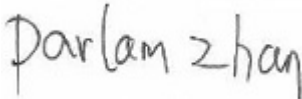
Parlam Zhan
Laboratory Manager

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	2021-08-09	/

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



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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
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:	DC 29V
Test voltage:	DC 29V
Modulation Type	GFSK
Number of Channels	40
Operation Frequency	2402MHz~2480MHz
Channel Spacing	2MHz
Antenna Type	PCB Antenna
Antenna Gain:	1dBi (Provided by the manufacturer)
S/N:	6800273015X181110001
Firmware version:	V1.0

4.2 Description of Support Units

The EUT has been tested independently.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4 x 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



5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
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 1dBi.

Antenna location: Refer to Appendix (Internal Photos)



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7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215

Test Method: ANSI C63.10 (2013) Section 6.9

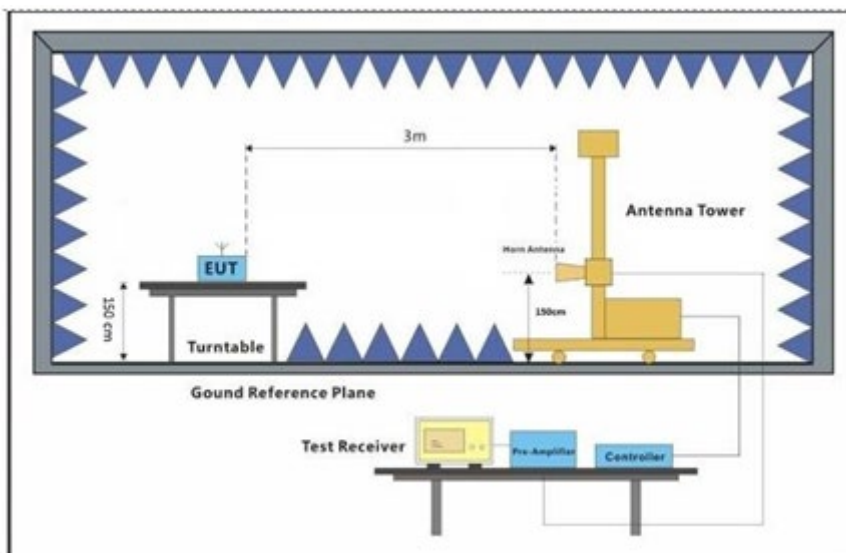
7.1.1 E.U.T. Operation

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.

7.1.2 Test Setup Diagram



7.1.3 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.



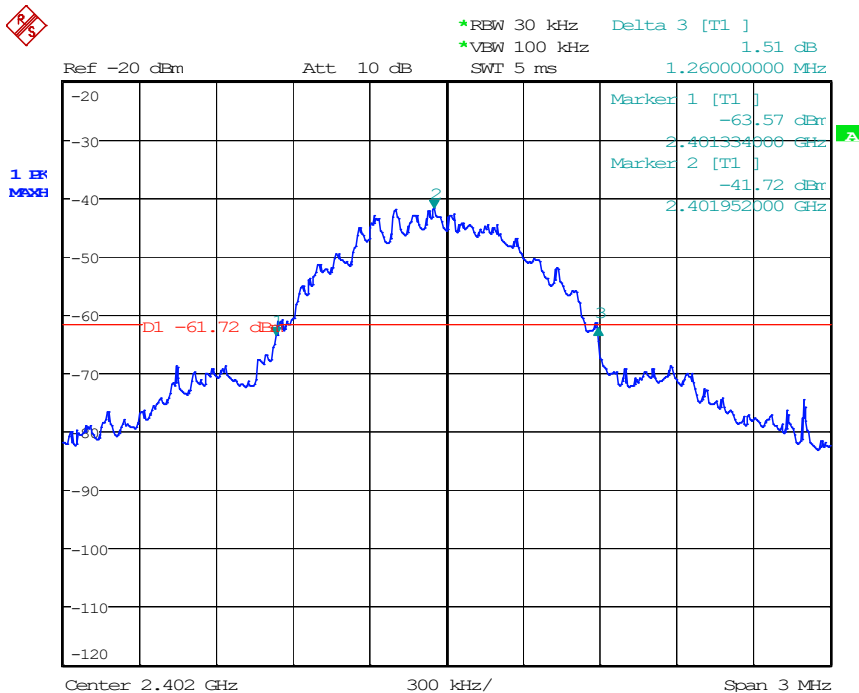
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Frequency (MHz)	Bandwidth (MHz)	Result
2402	1.26	PASS
2440	1.14	PASS
2480	1.13	PASS

Test plot as follows:

Channel: 2402MHz



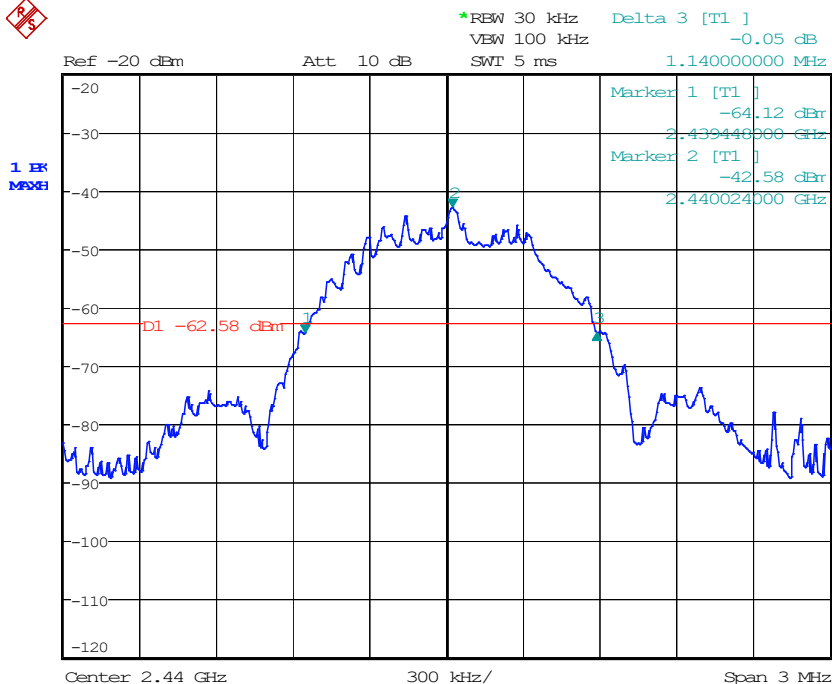
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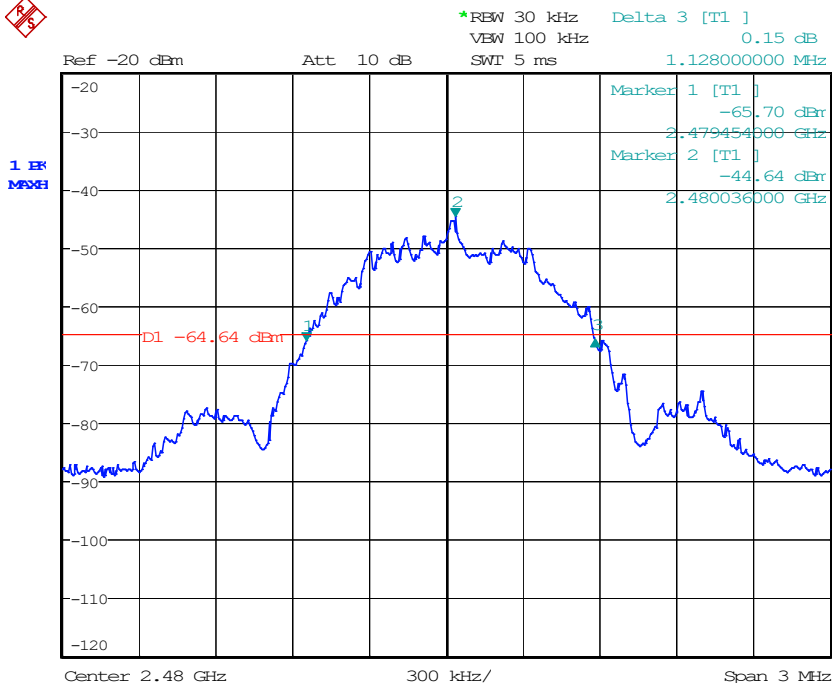
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Channel: 2440MHz



Date: 20.JUL.2021 18:29:59

Channel: 2480MHz



Date: 20.JUL.2021 18:28:41



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7.2 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
	Average	1MHz	10Hz	Average

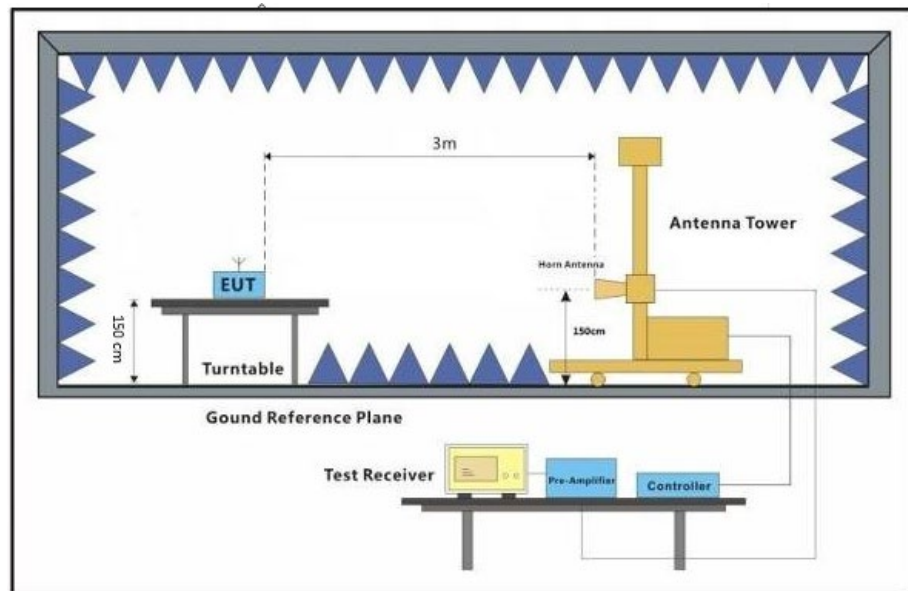
Limit:

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

E.U.T. Operation:

Operating Environment:
Temperature: 20°C Humidity: 50% RH Atmospheric Pressure: 1002 mbar
Test Mode: a:TX:mode Keep the EUT in transmitting with modulation mode

Test Setup:



Test Procedure:

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- For each suspected emission, the EUT was arranged to its worst case and

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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 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

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
2402	92.87	-3.39	89.48	94	-4.52	Peak	Horizontal
	86.17	-3.39	82.78	94	-11.22	Peak	Vertical

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
2440	90.12	-3.34	86.78	94	-7.22	Peak	Horizontal
	86.52	-3.34	83.18	94	-10.82	Peak	Vertical

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
2480	90.65	-3.27	87.38	114	-26.62	Peak	Horizontal
	90.48	-3.27	87.21	94	-6.79	Average	Horizontal
	84.35	-3.27	81.08	94	-12.92	Peak	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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7.3 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.

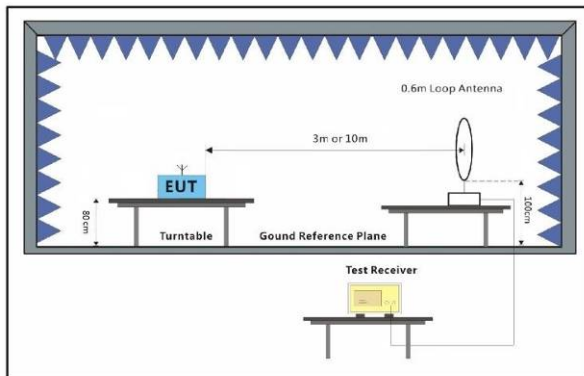
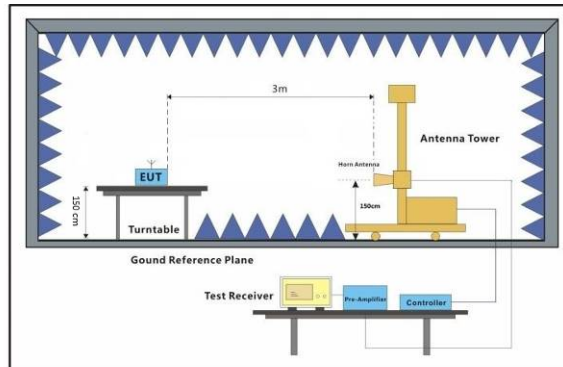
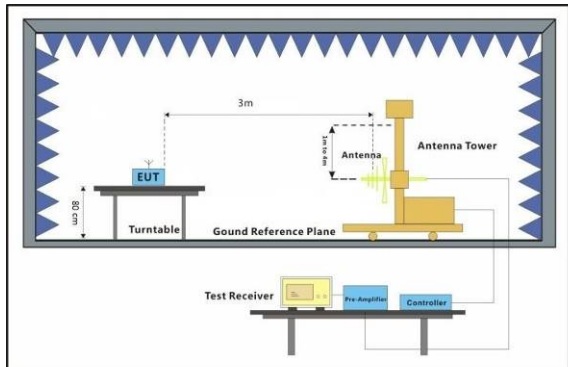
7.3.1 E.U.T. Operation

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.

7.3.2 Test Setup Diagram



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7.3.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground 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 above the ground at a 3 meter fully-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

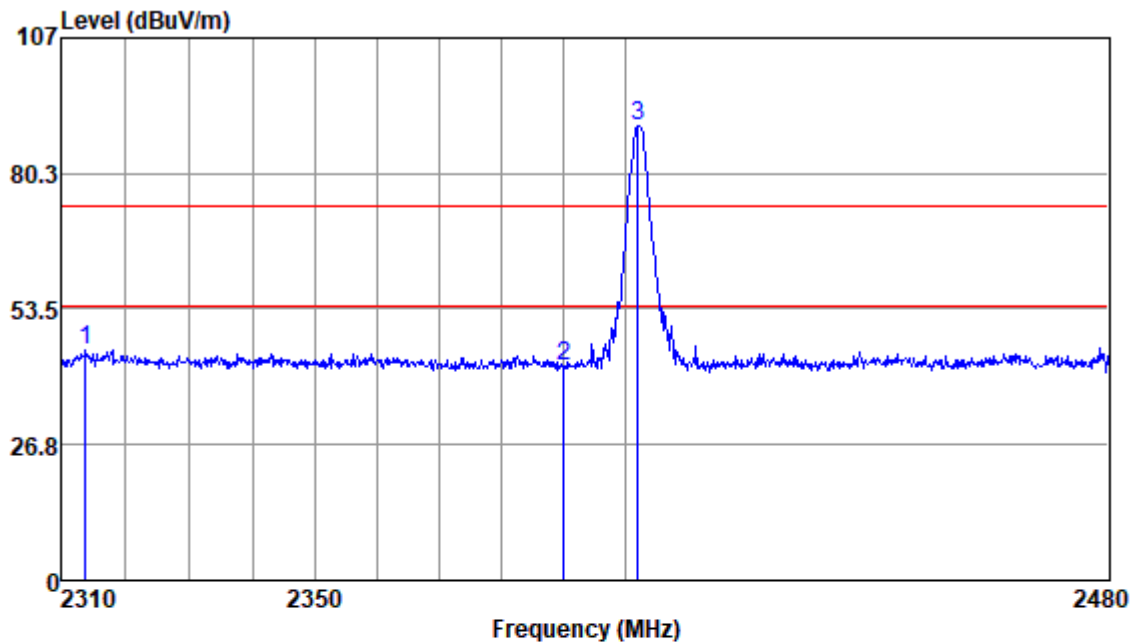
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level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



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2402MHz:



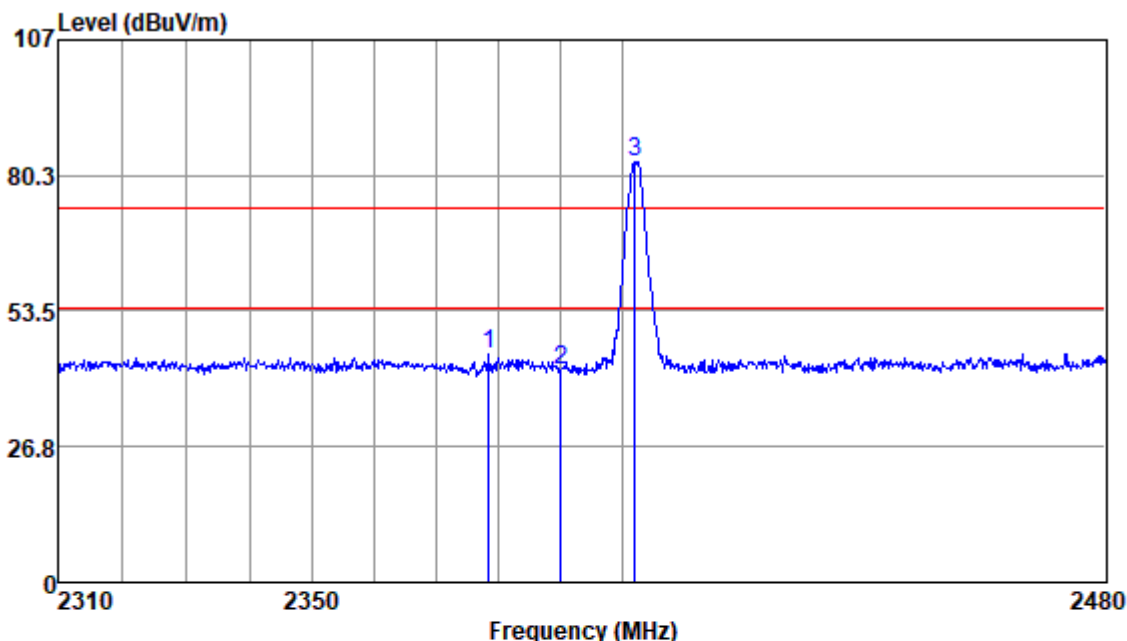
Antenna Polarity :HORIZONTAL

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	
2313.61	49.27	28.75	2.68	35.12	45.58	74.00	-28.42	Peak
2390.00	45.57	28.97	2.77	35.18	42.13	74.00	-31.87	Peak
2402.00	92.87	29.01	2.79	35.19	89.48	74.00	15.48	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	
2378.41	48.86	28.40	2.76	35.17	44.85	74.00	-29.15	Peak
2390.00	45.48	28.97	2.77	35.18	42.04	74.00	-31.96	Peak
2402.00	86.17	29.01	2.79	35.19	82.78	74.00	8.78	Peak

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

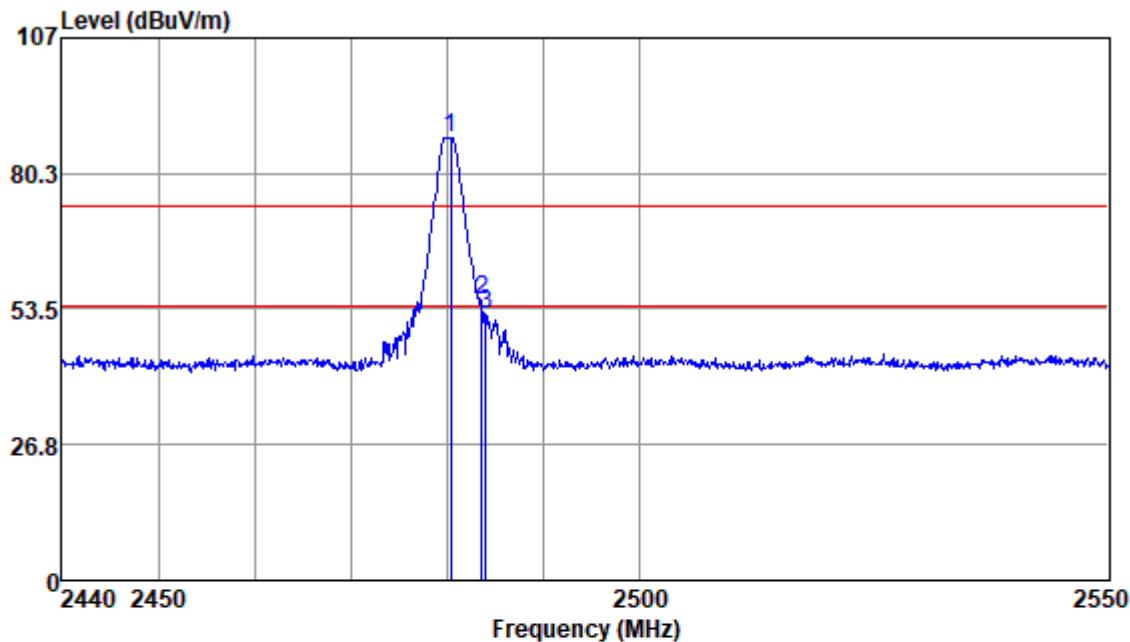


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2480MHz:



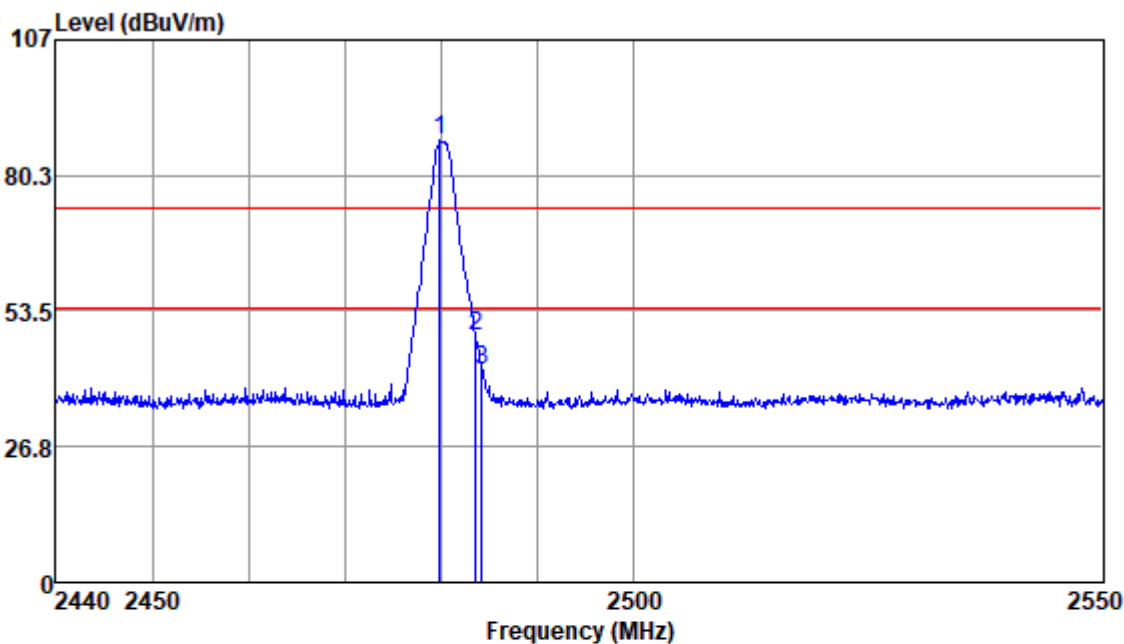
Antenna Polarity :HORIZONTAL

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	
2480.25	90.65	29.10	2.88	35.25	87.38	74.00	13.38	Peak
2483.50	58.65	29.11	2.88	35.26	55.38	74.00	-18.62	Peak
2483.97	55.85	29.11	2.88	35.26	52.58	74.00	-21.42	Peak

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



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Antenna Polarity :HORIZONTAL

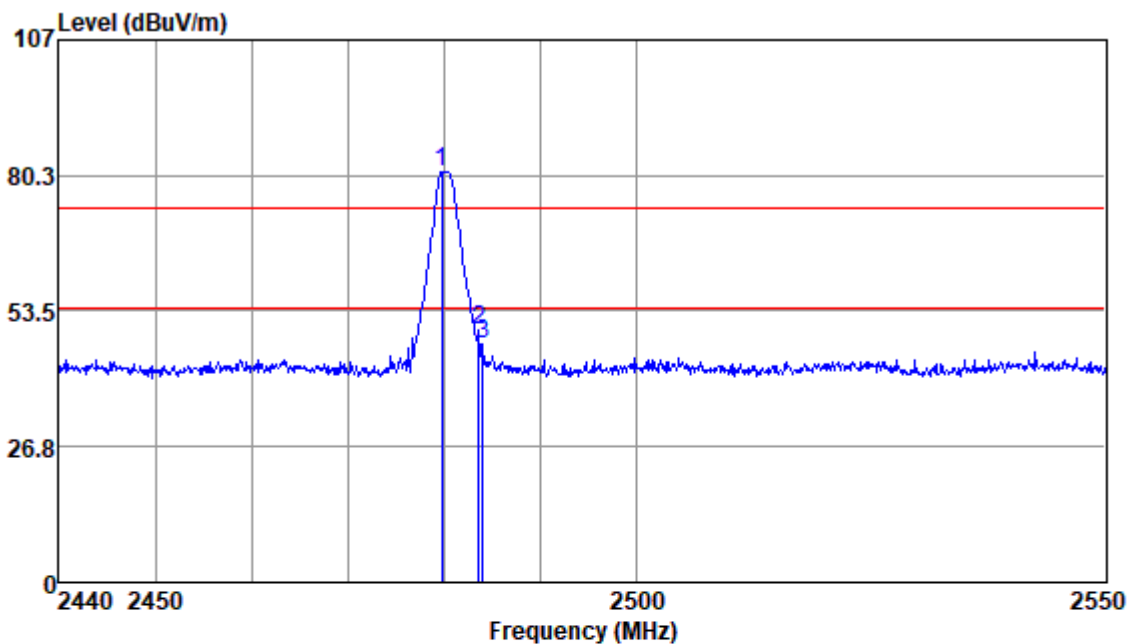
Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
2479.81	90.48	29.10	2.88	35.25	87.21	54.00	33.21	Average
2483.50	51.64	29.11	2.88	35.26	48.37	54.00	-5.63	Average
2484.19	45.31	29.11	2.88	35.26	42.04	54.00	-11.96	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	
2479.70	84.35	29.10	2.88	35.25	81.08	74.00	7.08	Peak
2483.50	52.84	29.11	2.88	35.26	49.57	74.00	-24.43	Peak
2483.97	50.17	29.11	2.88	35.26	46.90	74.00	-27.10	Peak

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



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7.4 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:

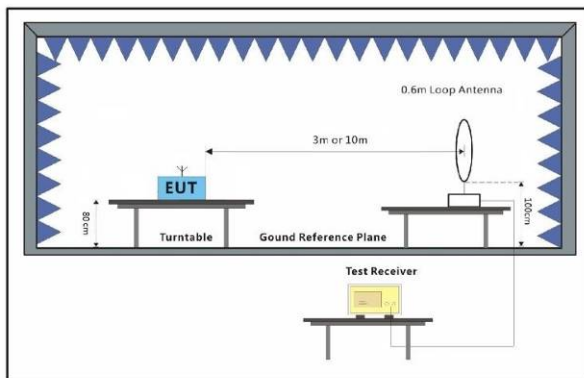
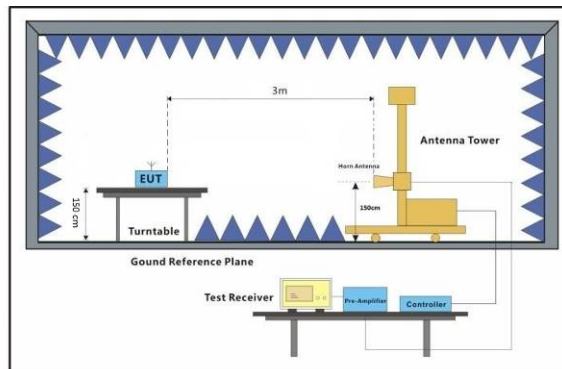
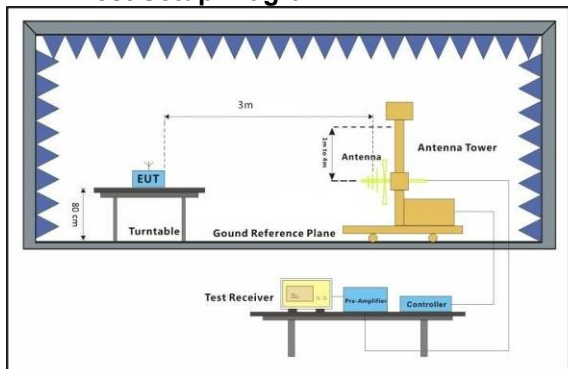
Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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.

7.4.1 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.

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 0.8 meters above the ground 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 above the ground at a 3 meter fully-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

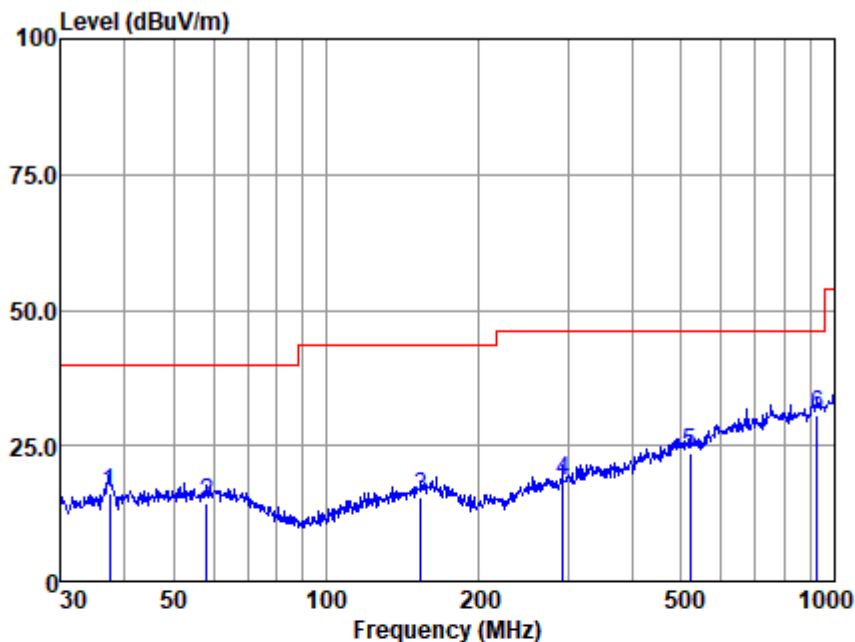


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30MHz-1GHz:

Mode:a; Polarization:Horizontal



Antenna Polarity :HORIZONTAL

EUT/Project :6331CR

Test mode :a

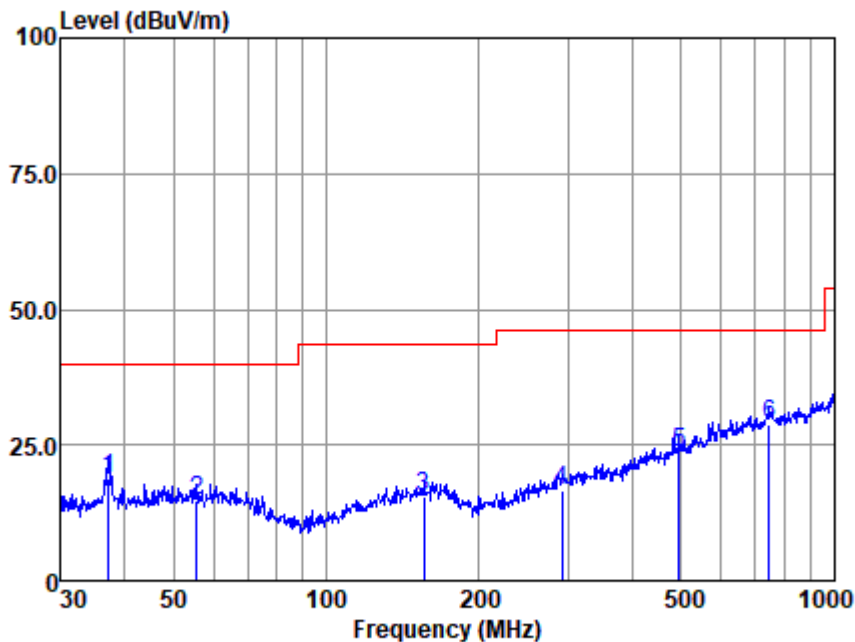
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	37.416	34.59	12.80	0.84	31.93	16.30	40.00	-23.70 QP
2	58.203	31.94	13.20	1.10	31.69	14.55	40.00	-25.45 QP
3	153.739	31.77	13.02	1.89	31.32	15.36	43.50	-28.14 QP
4	292.058	33.62	13.11	2.79	31.24	18.28	46.00	-27.72 QP
5	520.888	32.57	17.96	3.63	30.68	23.48	46.00	-22.52 QP
6	925.756	33.82	23.72	4.85	31.92	30.47	46.00	-15.53 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 :6331CR
 Test mode :a

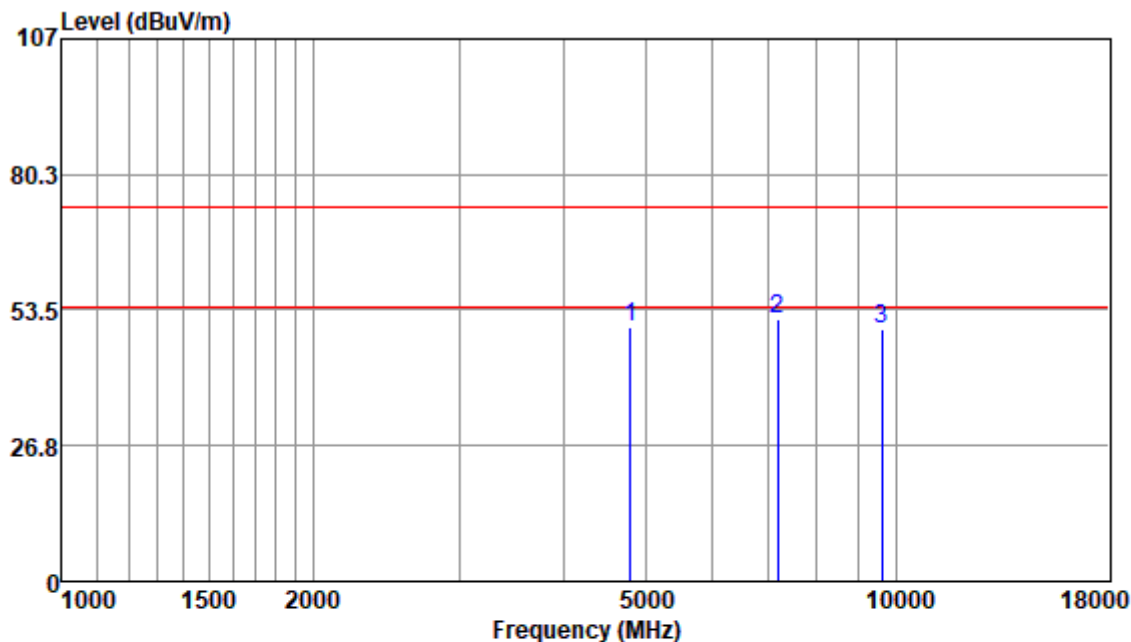
	Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	37.285	12.78	0.84	31.93	18.80	40.00	-21.20	QP
2	55.609	13.35	1.07	31.82	14.76	40.00	-25.24	QP
3	155.910	13.08	1.90	31.27	15.61	43.50	-27.89	QP
4	291.036	13.08	2.79	31.26	16.72	46.00	-29.28	QP
5	495.934	17.63	3.51	30.56	23.69	46.00	-22.31	QP
6	744.866	21.97	4.34	31.13	28.72	46.00	-17.28	QP

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



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Above 1GHz:
2402MHz:



Antenna Polarity :HORIZONTAL

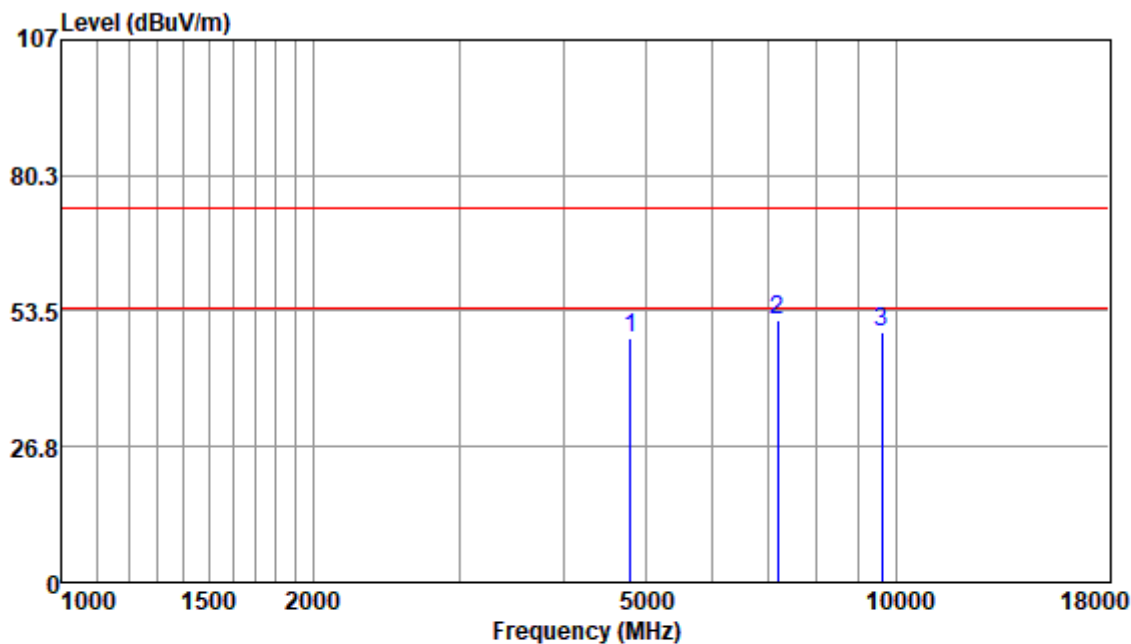
Read Freq	Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
4804.00	48.86	33.72	4.46	36.79	50.25	74.00	-23.75	Peak
7206.00	45.33	36.28	5.72	35.53	51.80	74.00	-22.20	Peak
9608.00	39.16	37.70	6.53	33.58	49.81	74.00	-24.19	Peak

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	46.80	33.72	4.46	36.79	48.19	74.00	-25.81	Peak
7206.00	45.16	36.28	5.72	35.53	51.63	74.00	-22.37	Peak
9608.00	38.84	37.70	6.53	33.58	49.49	74.00	-24.51	Peak

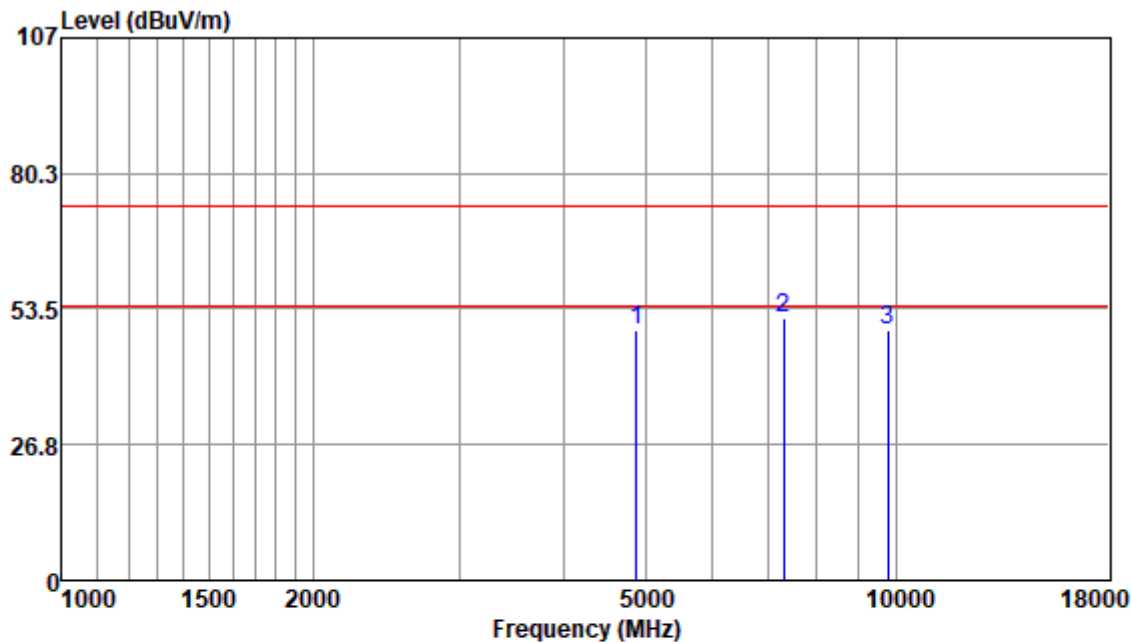
Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor



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2440MHz:



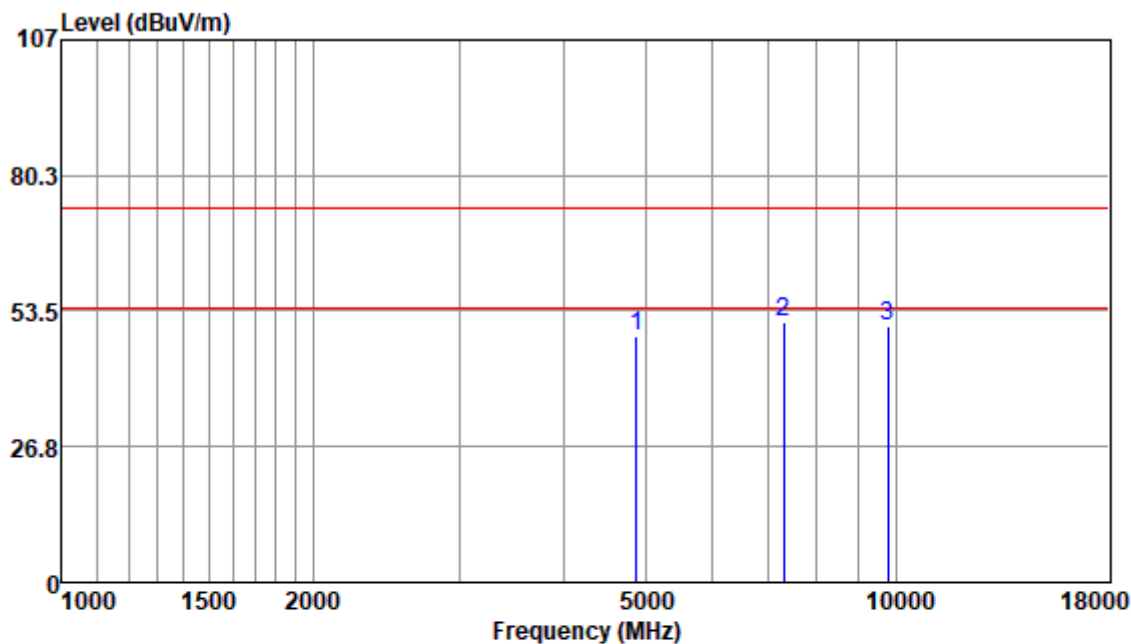
Antenna Polarity :HORIZONTAL

Read Freq	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	47.79	33.93	4.47	36.81	49.38	74.00	-24.62	Peak
7320.00	44.63	36.47	5.85	35.42	51.53	74.00	-22.47	Peak
9760.00	38.79	37.68	6.50	33.50	49.47	74.00	-24.53	Peak

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



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Antenna Polarity :VERTICAL

Read 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	47.04	33.93	4.47	36.81	48.63	74.00	-25.37	Peak
7320.00	44.44	36.47	5.85	35.42	51.34	74.00	-22.66	Peak
9760.00	39.77	37.68	6.50	33.50	50.45	74.00	-23.55	Peak

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

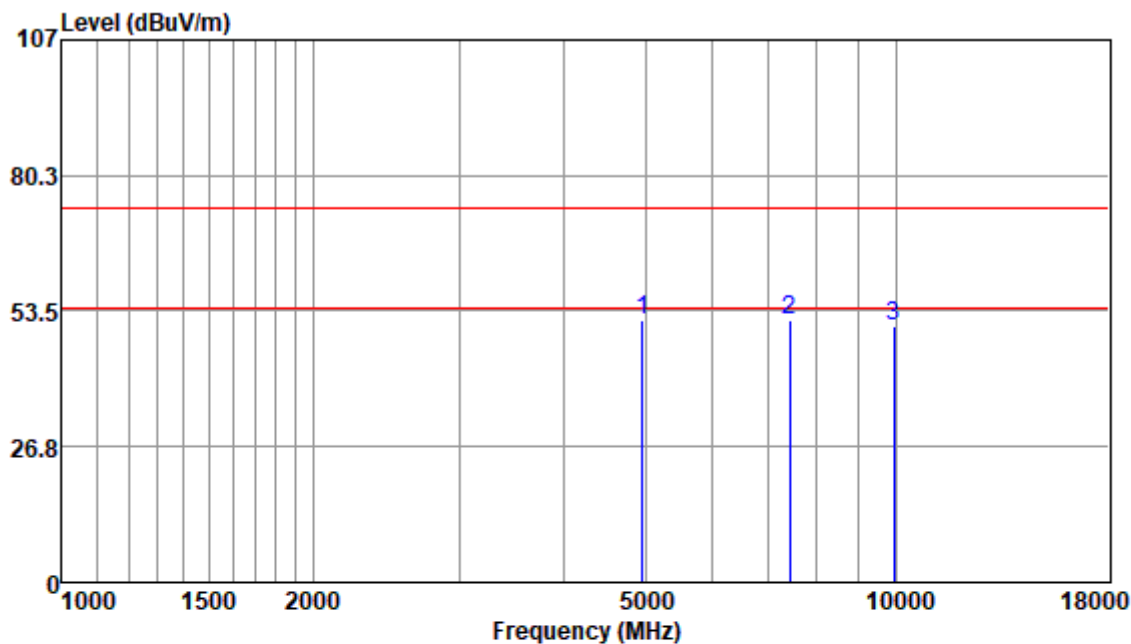


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 t(86-21) 61915666 f(86-21)61915678 e.sgs.china@sgs.com

2480MHz:



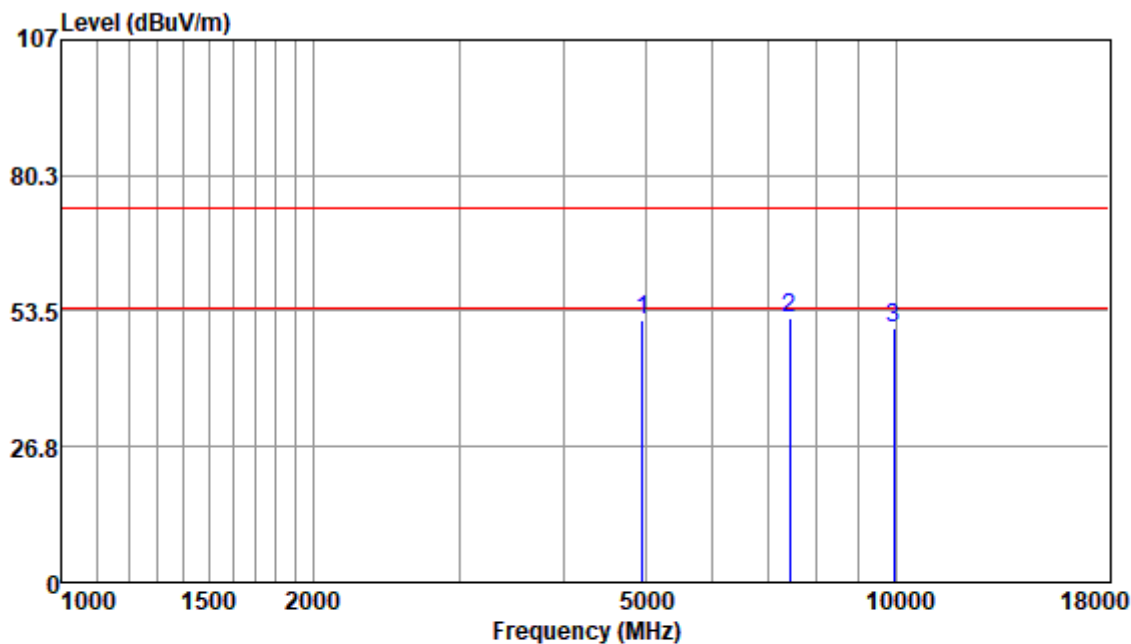
Antenna Polarity :HORIZONTAL

Read	Antenna	Cable	Preamp	Emission	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB
4960.00	50.22	33.98	4.48	36.83	51.85	74.00	-22.15
7440.00	44.80	36.40	5.97	35.34	51.83	74.00	-22.17
9920.00	39.52	37.81	6.47	33.41	50.39	74.00	-23.61

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	
4960.00	50.22	33.98	4.48	36.83	51.85	74.00	-22.15	Peak
7440.00	45.14	36.40	5.97	35.34	52.17	74.00	-21.83	Peak
9920.00	39.34	37.81	6.47	33.41	50.21	74.00	-23.79	Peak

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



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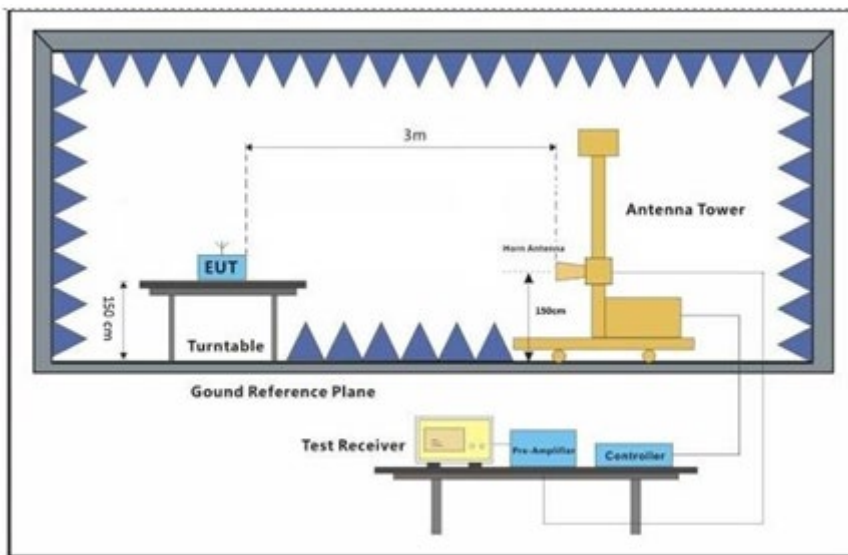
7.5 99% Bandwidth

Test Requirement RSS-Gen Section 6.7
 Test Method: ANSI C63.10 Section 6.9.3

7.5.1 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.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

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

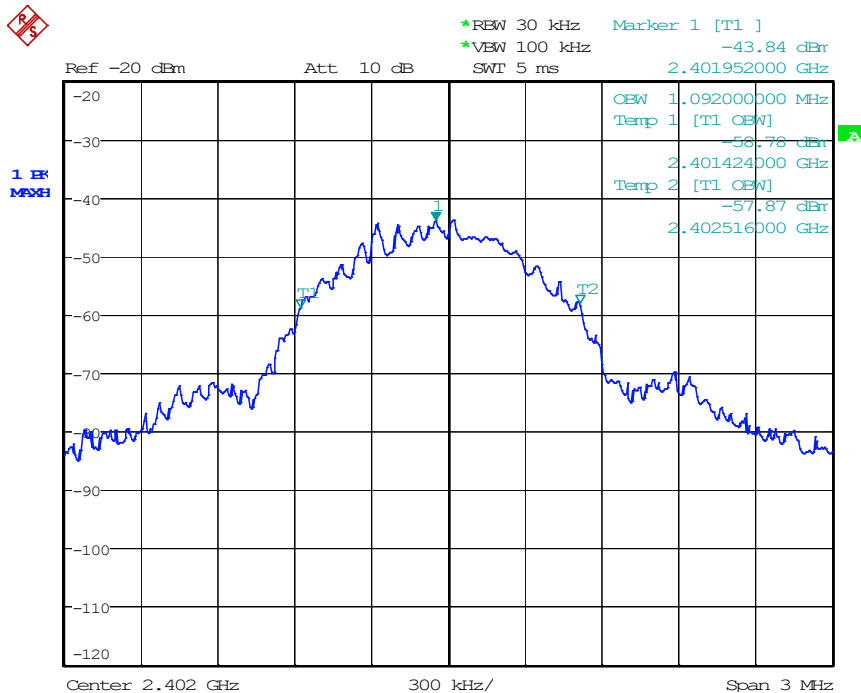


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Frequency (MHz)	Bandwidth (MHz)	Result
2402	1.092	PASS
2440	1.050	PASS
2480	1.050	PASS

Test plot as follows:

Channel: 2402MHz



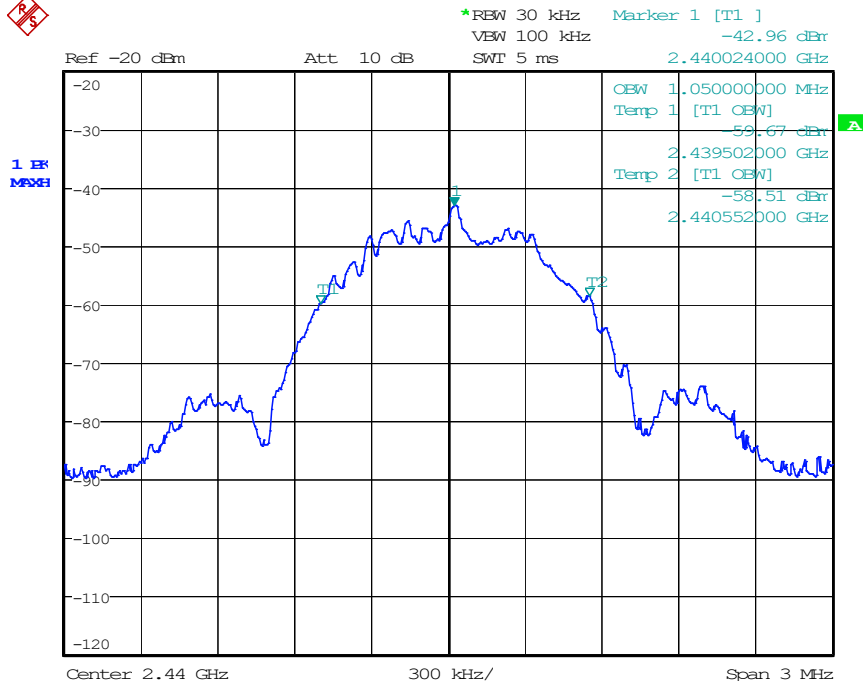
Date: 23.JUL.2021 15:01:30



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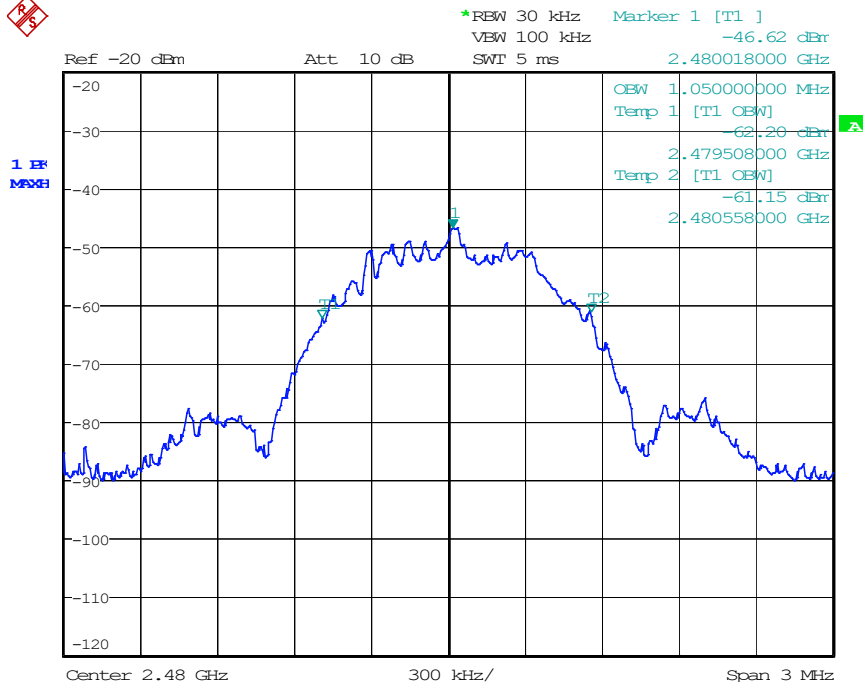
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Channel: 2440MHz



Date: 20.JUL.2021 18:26:39

Channel: 2480MHz



Date: 20.JUL.2021 18:27:03



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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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