



TEST REPORT

Application No.: GZCR2105020237AT
Applicant: Renesas Electronics America, Inc
Address of Applicant: 6024 Silver Creek Valley Road, San Jose, CA 95138
Manufacturer: Renesas Electronics America, Inc
Address of Manufacturer: 6024 Silver Creek Valley Road, San Jose, CA 95138
Factory: Podrain Electronics Pvt Ltd
Address of Factory: 92, 2nd Cross, Garavebhavipalya, Bangalore - 560068
Equipment Under Test (EUT):
EUT Name: Social Distancing Band
Model No.: SOCIAL DISTANCING BAND 1.0
Trade Mark: RENESAS
Standard(s) : 47 CFR Part 15, Subpart C 15.519
Date of Receipt: 2021-05-11
Date of Test: 2021-05-28 to 2021-06-10
Date of Issue: 2021-09-23

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

Kobe Jian
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-09-23		Original

Authorized for issue by:			
Tested By	 Lily Kuang/Project Engineer		
Reviewed By	 Ricky Liu/Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart F 15.519	N/A	47 CFR Part 15, Subpart C 15.203 & 15.519(a)(2)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart F 15.519	ANSI C63.10 (2013)	47 CFR Part 15, Subpart F 15.207	Pass
Dwell time	47 CFR Part 15, Subpart F 15.519	ANSI C63.10 (2013)	47 CFR Part 15, Subpart F 15.519(a)(1)	Pass
10dB Bandwidth	47 CFR Part 15, Subpart F 15.503	ANSI C63.10 (2013)	47 CFR Part 15, Subpart F 15.519(a) & (b)	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart F 15.519	ANSI C63.10 (2013)	47 CFR Part 15, Subpart F 15.205 & 15.209 & 15.519(c)(d)	Pass
Peak Power	47 CFR Part 15, Subpart F 15.519	ANSI C63.10 (2013)	47 CFR Part 15, Subpart F 15.519(e) & 15.521 (g)	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

3 Contents

	Page
1 Cover Page	1
2 Test Summary	3
3 Contents.....	4
4 General Information	5
4.1 Details of E.U.T.	5
4.2 Description of Support Units.....	5
4.3 Measurement Uncertainty	5
4.4 Test Location	5
4.5 Test Facility	6
4.6 Deviation from Standards.....	7
4.7 Abnormalities from Standard Conditions	7
5 Equipment List	8
6 Radio Spectrum Technical Requirement.....	10
6.1 Antenna Requirement.....	10
6.1.1 Test Requirement.....	10
6.1.2 Conclusion	10
7 Radio Spectrum Matter Test Results	11
7.1 Conducted Emissions at AC Power Line (150kHz-30MHz).....	11
7.1.1 E.U.T. Operation	11
7.1.2 Test Mode Description	11
7.1.3 Test Setup Diagram	11
7.1.4 Measurement Procedure and Data	12
7.2 10dB Bandwidth	15
7.2.1 E.U.T. Operation	15
7.2.2 Test Setup Diagram	15
7.2.3 Measurement Procedure and Data	15
7.3 Radiated Spurious Emissions.....	17
7.3.1 E.U.T. Operation	17
7.3.2 Test Setup Diagram	18
7.3.3 Measurement Procedure and Data	19
7.4 Peak Power	31
7.4.1 E.U.T. Operation	31
7.4.2 Test Setup Diagram	31
7.4.3 Measurement Procedure and Data	32
7.5 Dwell Time (15.519)	36
7.5.1 E.U.T. Operation	36
7.5.2 Test Setup Diagram	36
7.5.3 Measurement Procedure and Data	37
8 Test Setup Photo.....	38
9 EUT Constructional Details (EUT Photos).....	39



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4 General Information

4.1 Details of E.U.T.

Power supply:	Powered by built-in battery as below: Rated: DC 3.7V DC 5V for charging mode 2 wires about 1.5m unscreened mains cable
Test Voltage:	DC 3.7V
Antenna Gain	4.5 dBi declared by applicant
Antenna Type	Chip Antenna
Number of Channels	1
Operation Frequency	6469 MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Notebook	IBM	T30	S/N78-3VMLX 06/01

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	$\pm 3.12\text{dB}$
Peak Output Power	$\pm 0.75\text{dB}$
Dwell Time	$\pm 0.37\%$
Minimum 10dB Bandwidth	$\pm 3\%$
Radiated Spurious Emissions	$\pm 5.06\text{dB}$ (3m); $\pm 4.46\text{dB}$ (10m) (Below 1GHz); $\pm 5.08\text{dB}$ (1GHz-6GHz); $\pm 5.14\text{dB}$ (above 6GHz)

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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4.5 Test Facility

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

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver(9kHz-2.75GHz)	Rohde & Schwarz	ESCS30	EMC0506	2020-11-13	2021-11-12
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	N/A	N/A
Two-Line V-Network	Rohde & Schwarz	ENV216	EMC0118	2021-01-08	2022-01-06
Coaxial Cable	HangTianXing	2m	EMC0107	2020-09-09	2022-09-08
Test Software E3c	Audix	Ver. 5.4.1221b	GZE100-62	N/A	N/A

10dB Bandwidth & Dwell time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	JS Tonscend	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-02	2023-11-01
4X4 Power sensor Unit	TST	TSPS2023R	EMC2226	2021-08-30	2022-08-29
Test Software	TST	V2.0	GZE100-78	N/A	N/A
EXA Signal Analyzer	Agilent Technologies	N9010A	EMC2222	2021-06-21	2022-06-20

Radiated Emissions (below 1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Trilog Broadband Antenna(25MHz-1GHz)-Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2019-12-27	2021-12-26
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
EMI Test Receiver(1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2021-05-26	2022-05-25



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Radiated Emissions (above 1GHz) & Peak Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Chamber cable(1GHz-18GHz)	Scoflex	KMKM-8.0m	EMC0545	2020-09-09	2022-09-08
Chamber cable(Above 18GHz)	Huber Sunher	KMKM-8.0m	EMC0544	2020-09-09	2022-09-08
Horn Antenna(1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2019-09-25	2022-09-24
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-01-08	2022-01-07
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-01-08	2022-01-07
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2021-09-16	2022-09-15
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-08-30	2022-08-29

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2020-07-09	2021-07-08
DMM	Fluke	73	EMC0007	2020-07-09	2021-07-08



6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.519(a)(2)

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.

15.519(a) (2) requirement:

The use of antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole, or any fixed outdoors infrastructure is prohibited. Antennas may be mounted only on the hand held UWB device.

EUT Antenna:

The antenna is PCB antenna and no consideration of replacement. The best case gain of the antenna is 4.5 dBi.

Antenna location: Refer to Appendix (Internal Photos)

7 Radio Spectrum Matter Test Results

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

Test Requirement 47 CFR Part 15, Subpart C 15.207

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

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		
Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz		

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.2 °C

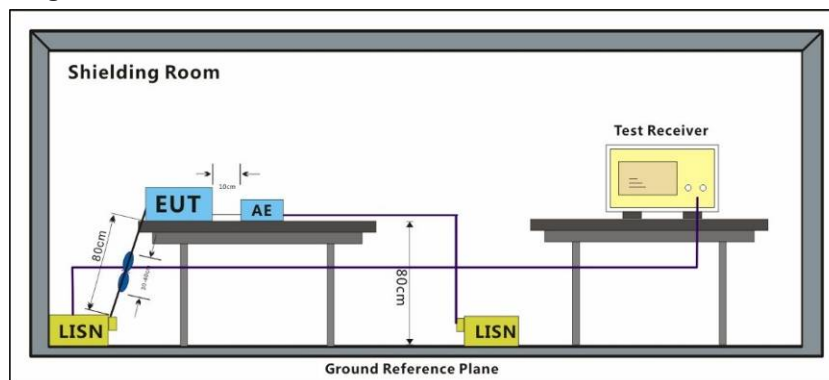
Humidity: 52 % RH

Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	Charge + TX mode_Keep the EUT in continuously transmitting mode in UWB frequency band.

7.1.3 Test Setup Diagram

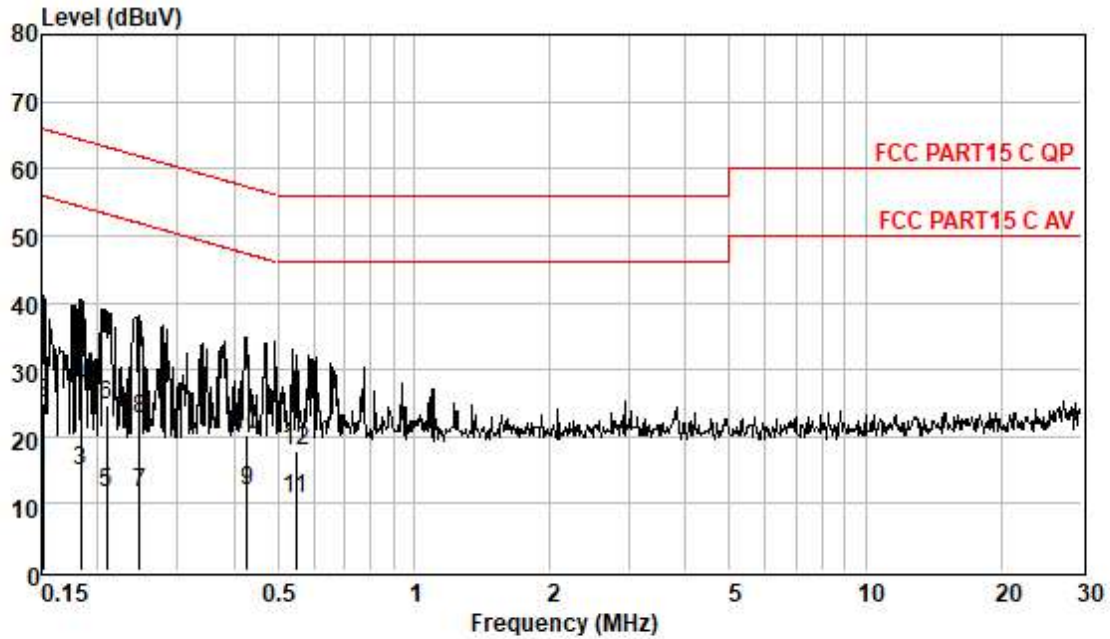


7.1.4 Measurement Procedure and Data

- 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 on the horizontal ground reference plane.
- 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.

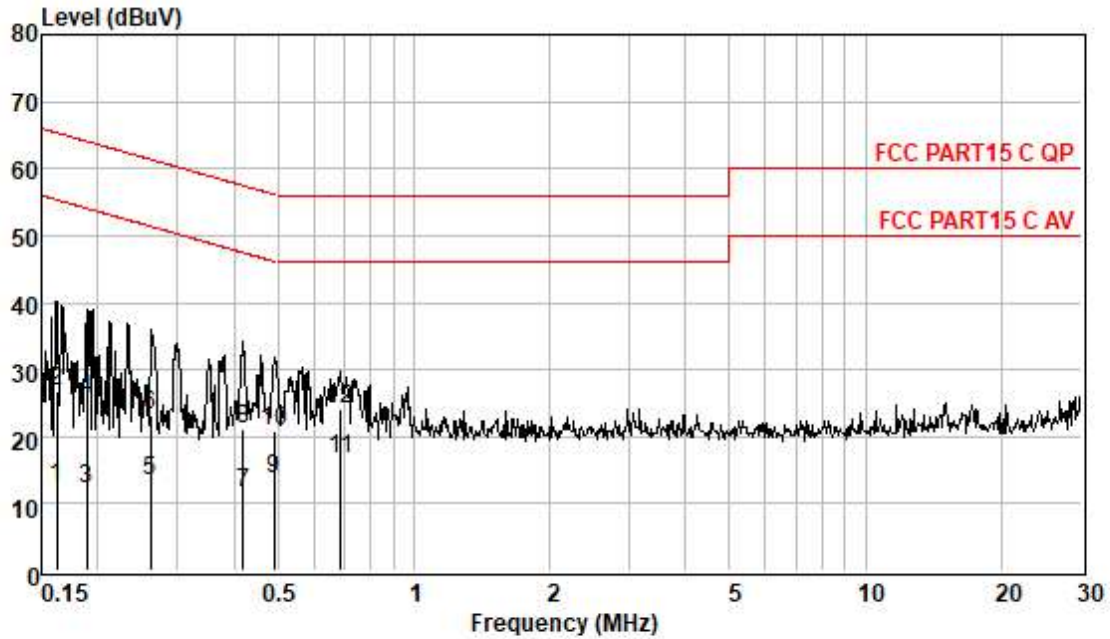
Remark: Level=Read Level+ Cable Loss+ LISN Factor

Test Mode: 01; Line: Live line

Pol : LINE
Mode :
Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.15	5.54	0.06	9.62	15.22	55.96	-40.74	Average
0.15	15.26	0.06	9.62	24.94	65.96	-41.02	QP
0.18	5.24	0.06	9.62	14.92	54.33	-39.41	Average
0.18	17.60	0.06	9.62	27.28	64.33	-37.05	QP
0.21	1.91	0.06	9.63	11.60	53.23	-41.63	Average
0.21	14.96	0.06	9.63	24.65	63.23	-38.58	QP
0.25	1.97	0.06	9.62	11.65	51.86	-40.21	Average
0.25	12.82	0.06	9.62	22.50	61.86	-39.36	QP
0.43	2.36	0.06	9.62	12.04	47.29	-35.25	Average
0.43	10.59	0.06	9.62	20.27	57.29	-37.02	QP
0.55	1.02	0.07	9.63	10.72	46.00	-35.28	Average
0.55	8.20	0.07	9.63	17.90	56.00	-38.10	QP

Test Mode: 01; Line: Neutral Line



Pol : NEUTRAL
Mode :
Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.16	2.77	0.06	9.55	12.38	55.34	-42.96	Average
0.16	17.24	0.06	9.55	26.85	65.34	-38.49	QP
0.19	2.72	0.06	9.54	12.32	54.06	-41.74	Average
0.19	15.96	0.06	9.54	25.56	64.06	-38.50	QP
0.26	3.78	0.06	9.55	13.39	51.38	-37.99	Average
0.26	13.48	0.06	9.55	23.09	61.38	-38.29	QP
0.42	1.91	0.06	9.56	11.53	47.46	-35.93	Average
0.42	11.50	0.06	9.56	21.12	57.46	-36.34	QP
0.49	3.96	0.07	9.55	13.58	46.14	-32.56	Average
0.49	11.24	0.07	9.55	20.86	56.14	-35.28	QP
0.69	7.10	0.07	9.55	16.72	46.00	-29.28	Average
0.69	14.46	0.07	9.55	24.08	56.00	-31.92	QP

7.2 10dB Bandwidth

Test Requirement 47 CFR Part 15F Section 15.503(a) & (d) & 15.519 (b)

Test Method: ANSI C63.10 (2013)

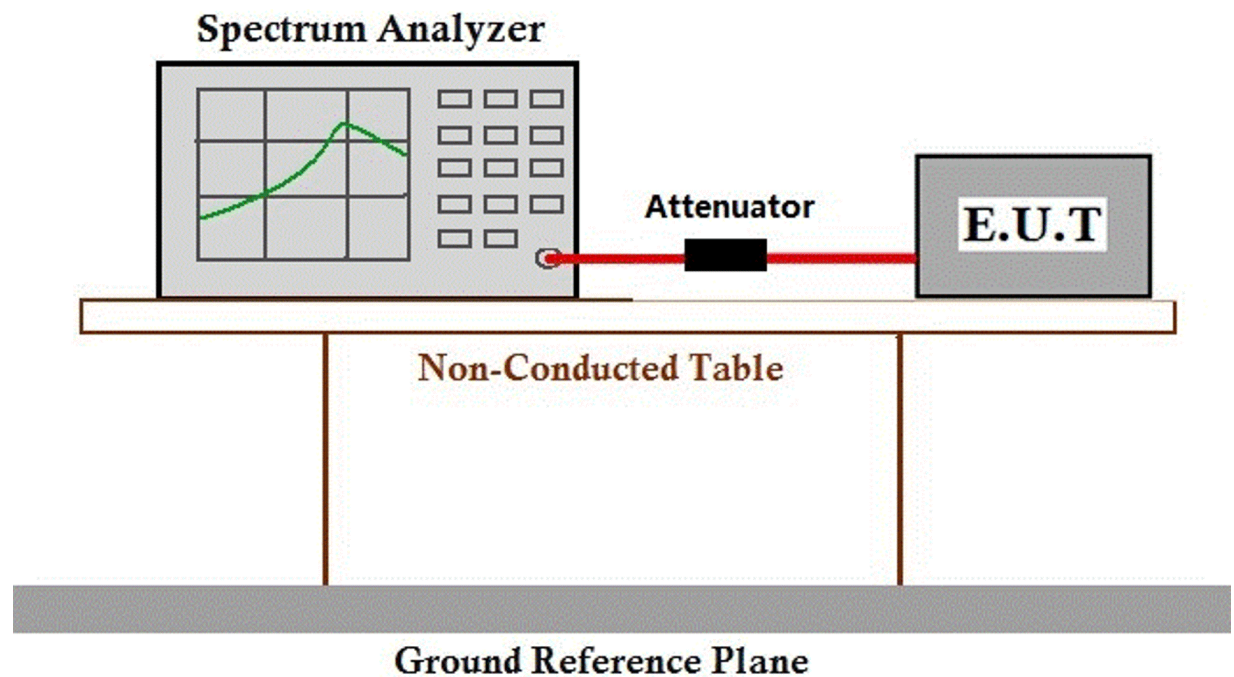
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 51.1 % RH Atmospheric Pressure: 1020 mbar

Test mode 04: TX mode_Keep the EUT in continuously transmitting mode in UWB frequency band.

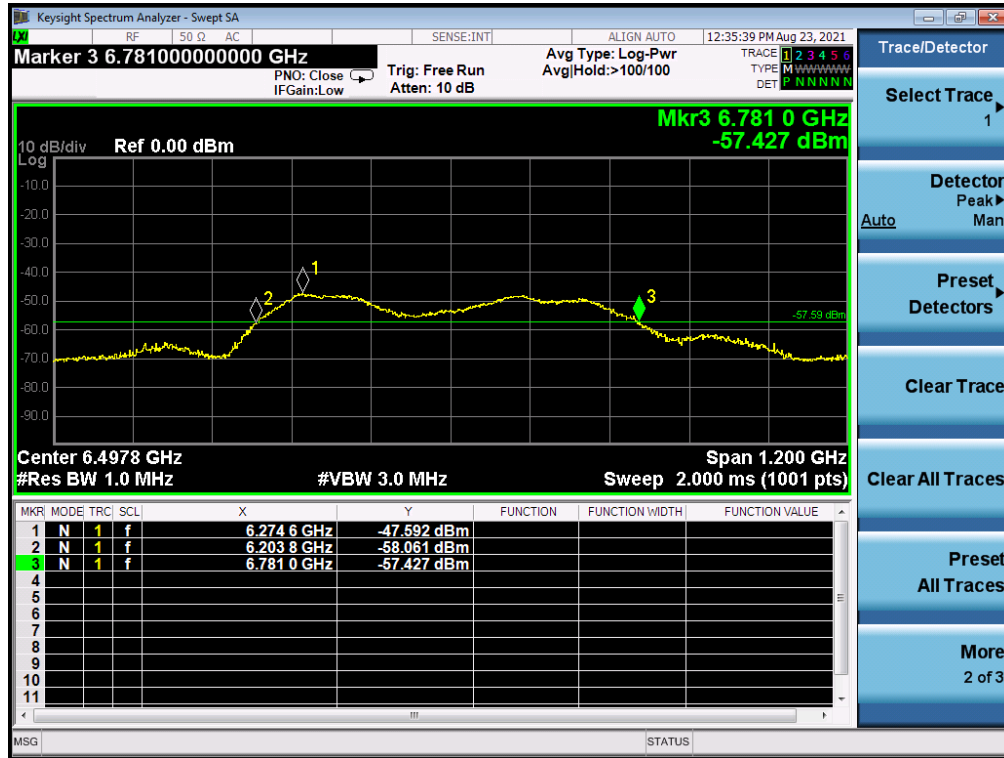
7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

Test Frequency (MHz)	F _L (MHz)	F _H (MHz)	Limit (MHz)	10dB bandwidth (MHz)	Limit (MHz)	Results
6469	6203.8	6781.0	Within 3100-10600	577.2	≥500MHz	Pass

Test plot as follows:



7.3 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart F 15.519 (c) & (d) & 15.209

Test Method: ANSI C63.10 (2013)

Measurement Distance: 3m above 30MHz, 10m below 30MHz

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1610MHz	-75.3 dBm (EIRP, RBW=1MHz)		RMS	-
1610MHz-1990MHz	-63.3 dBm (EIRP, RBW=1MHz)		RMS	-
1990MHz-3100MHz	-61.3 dBm (EIRP, RBW=1MHz)		RMS	-
3100MHz -10600MHz	-41.3 dBm (EIRP, RBW=1MHz)		RMS	-
Above 10600MHz	-61.3 dBm (EIRP, RBW=1MHz)		RMS	-
1164MHz-1240MHz	-85.3 dBm (EIRP, RBW=1kHz)		RMS	-
1559MHz-1610MHz	-85.3 dBm (EIRP, RBW=1kHz)		RMS	-

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 74.1 % RH Atmospheric Pressure: 1020 mbar

Test mode 04: TX mode_Keep the EUT in continuously transmitting mode in UWB frequency band



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7.3.2 Test Setup Diagram

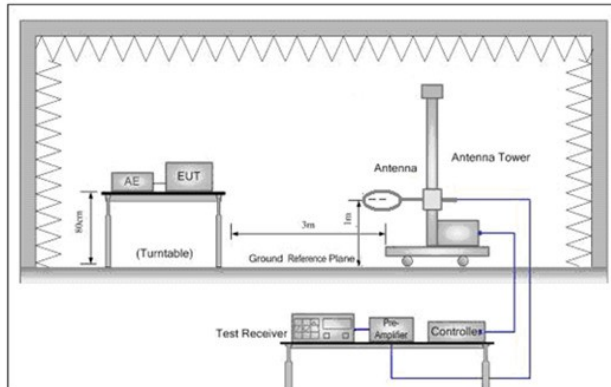


Figure 1. Below 30MHz

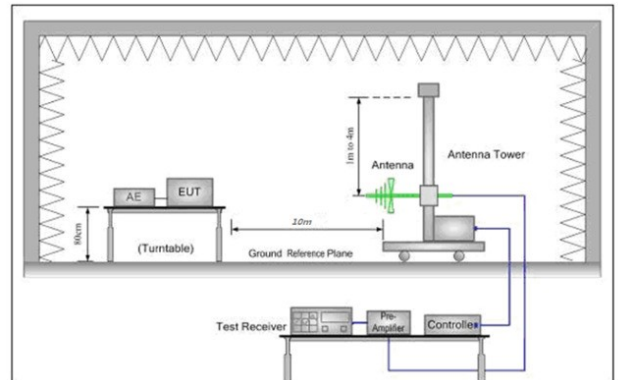


Figure 2. 30MHz to 1GHz

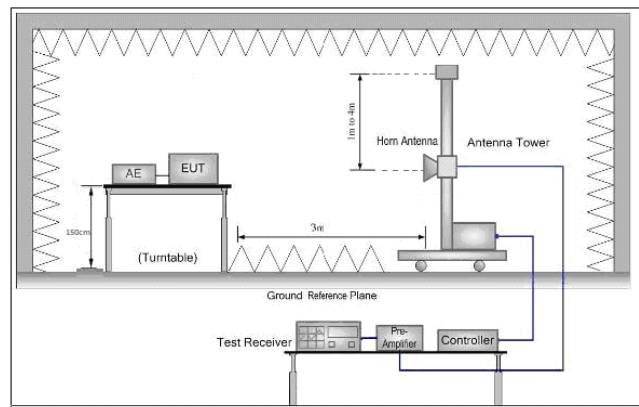


Figure 3. Above 1 GHz

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) 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 10 times of the fundamental or 40GHz, which is less, 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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According to ANSI 63.10 Clause 10.3.9, the EIRP to field strength at a specified measurement distance of 3 m is below:

$$E \text{ (dBuV/m)} = \text{EIRP(dBm)} + 95.3$$

Thus, the field strength limit for the test above 960 MHz is below:

Frequency	Limit		Detector	Measurement Distance
	EIRP (dBm)	Field Strength (dBuV/m)		
960MHz-1610MHz	-75.3 (RBW=1MHz)	20.00	RMS	3
1610MHz-1990MHz	-63.3 (RBW=1MHz)	32.00	RMS	3
1990MHz-3100MHz	-61.3 (RBW=1MHz)	34.00	RMS	3
3100MHz-10600MHz	-41.3 (RBW=1MHz)	54.00	RMS	3
Above 10600MHz	-61.3 (RBW=1MHz)	34.00	RMS	3
1164MHz-1240MHz	-85.3 (RBW=1kHz)	10.00	RMS	3
1559MHz-1610MHz	-85.3 (RBW=1kHz)	10.00	RMS	3

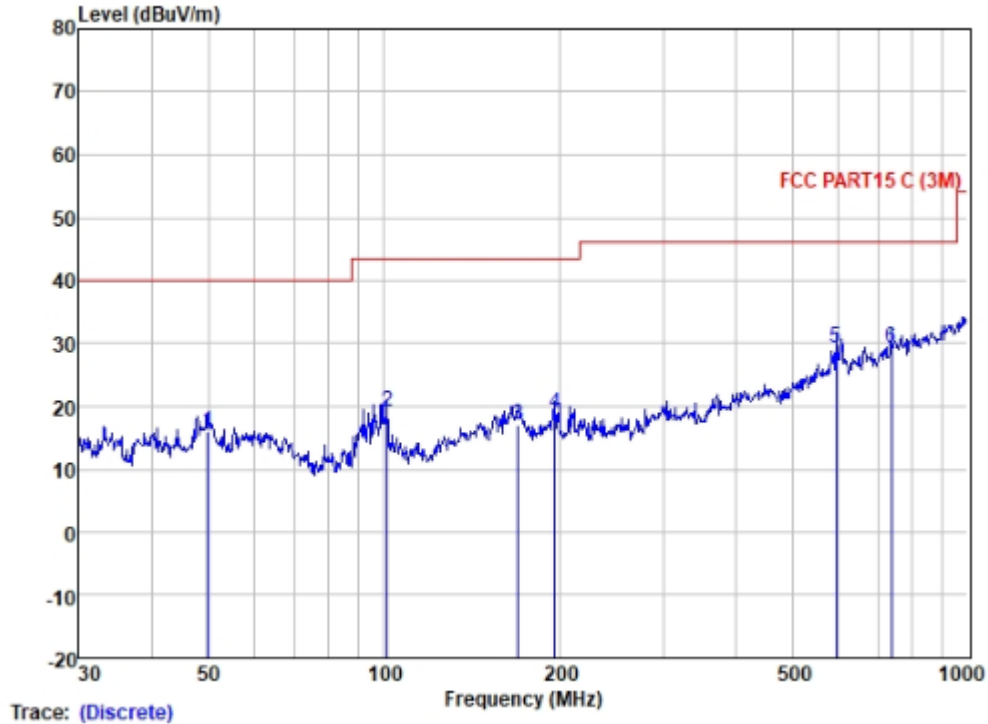


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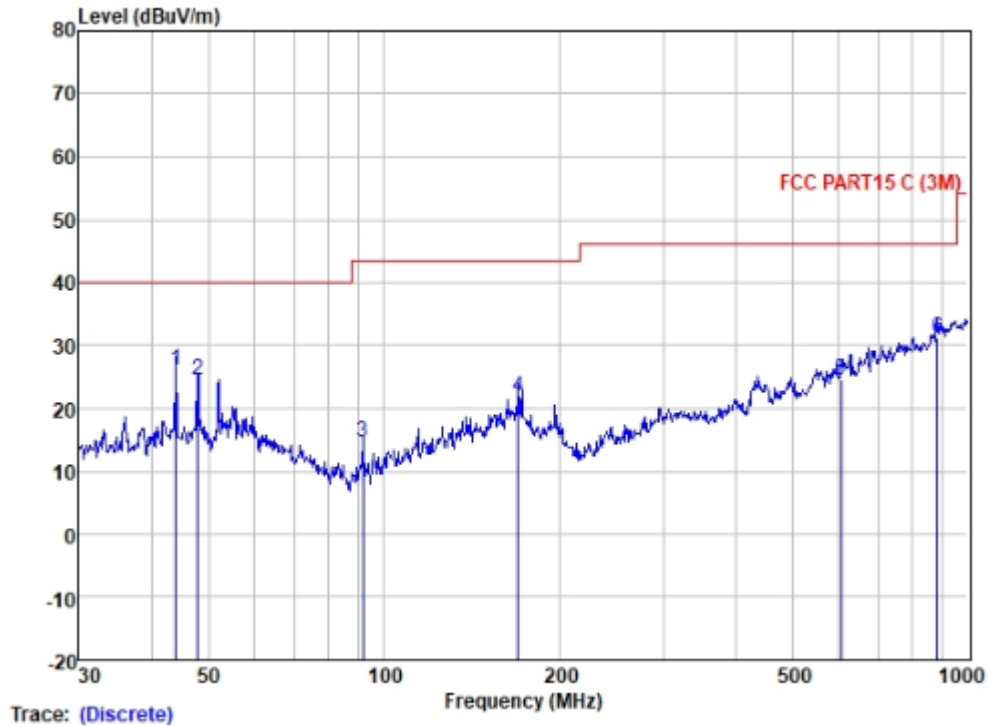
Below 960MHz:

Test Mode: 04; Polarity: Horizontal



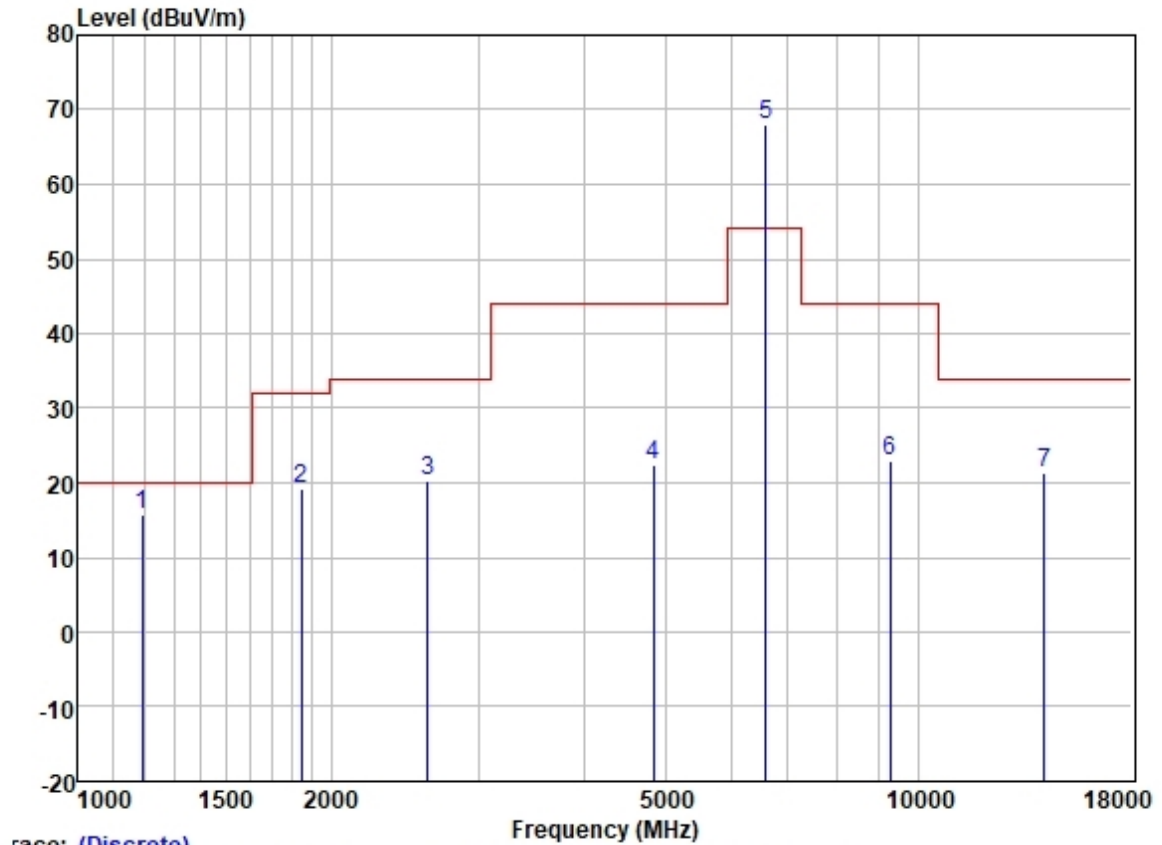
	Freq	Read	Antenna	Cable	Preamp	Measured	Limit	Over	Pol/	
	MHz	Level	Factor	Loss	Factor	Level	Line	Limit	Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	49.88	28.12	13.91	1.14	27.17	16.00	40.00	-24.00	HORIZONTAL	QP
2	101.29	35.22	9.30	1.74	27.08	19.18	43.50	-24.32	HORIZONTAL	QP
3	169.60	28.19	13.15	2.39	26.77	16.96	43.50	-26.54	HORIZONTAL	QP
4	195.82	32.45	10.60	2.51	26.73	18.83	43.50	-24.67	HORIZONTAL	QP
5	593.05	32.85	19.60	5.10	28.20	29.35	46.00	-16.65	HORIZONTAL	QP
6	739.66	29.42	22.00	5.93	28.11	29.24	46.00	-16.76	HORIZONTAL	QP

Test Mode: 04; Polarity: Vertical



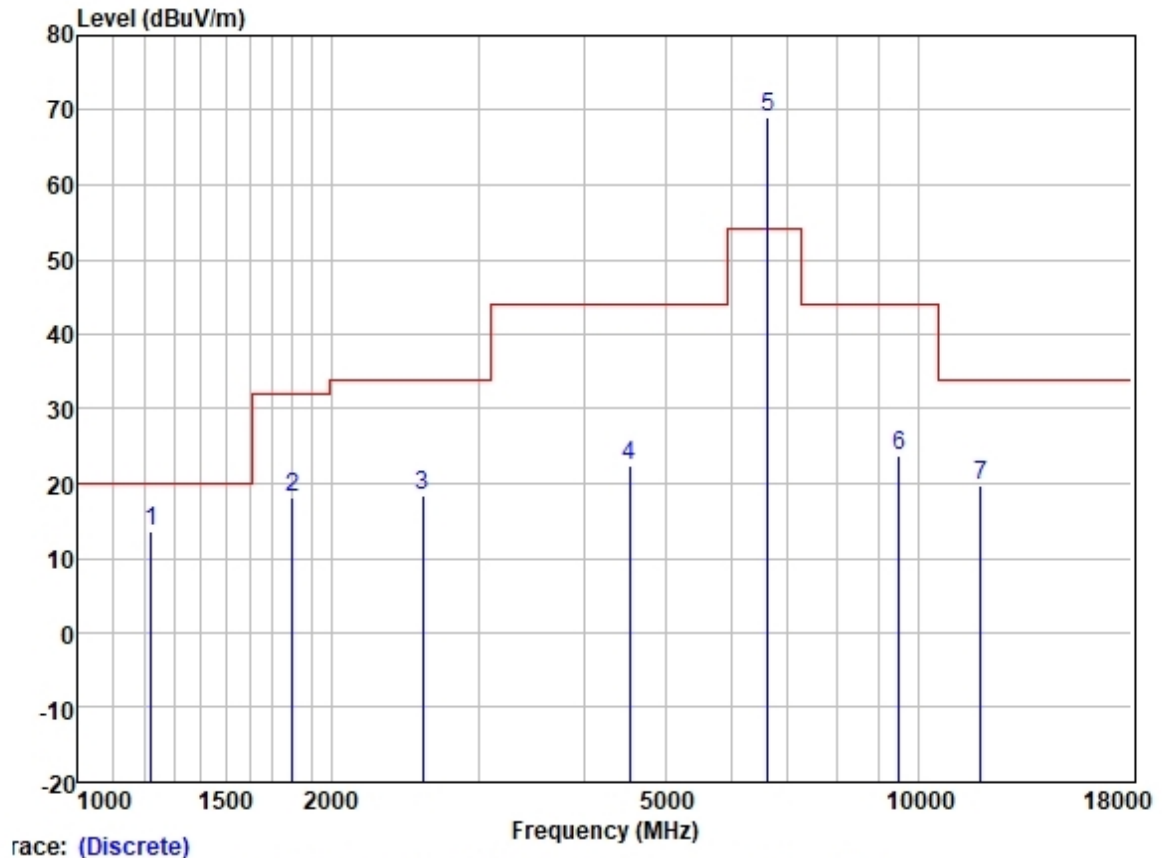
	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	43.97	38.44	13.80	1.12	27.17	26.19	40.00	-13.81	VERTICAL	QP
2	47.83	36.65	13.99	1.13	27.17	24.60	40.00	-15.40	VERTICAL	QP
3	91.82	31.96	8.07	1.64	27.08	14.59	43.50	-28.91	VERTICAL	QP
4	169.60	33.15	13.15	2.39	26.77	21.92	43.50	-21.58	VERTICAL	QP
5	605.66	27.31	20.17	5.18	28.21	24.45	46.00	-21.55	VERTICAL	QP
6	887.61	29.21	23.07	6.86	27.86	31.28	46.00	-14.72	VERTICAL	QP

Above 960MHz:



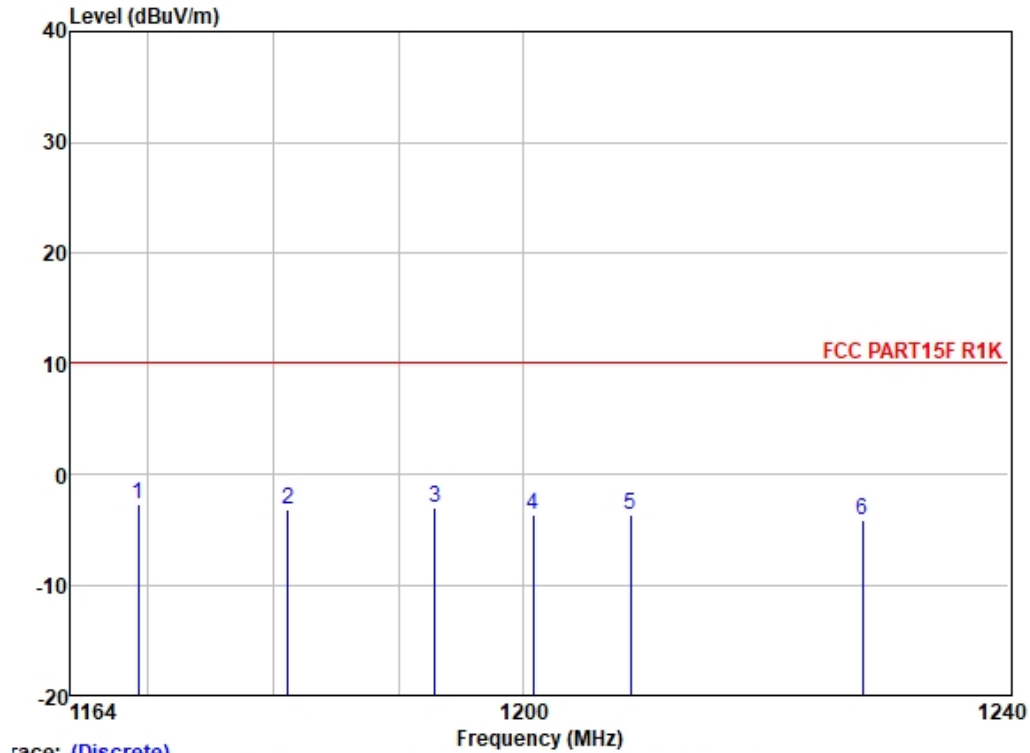
		ReadAntenna		Cable	Preamp		Limit	Over		
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1192.811	27.13	24.65	2.36	38.39	15.75	20.00	-4.25	VERTICAL	Average
2	1845.516	28.00	25.99	2.95	37.78	19.16	32.00	-12.84	VERTICAL	Average
3	2610.661	26.73	27.65	3.51	37.52	20.37	34.00	-13.63	VERTICAL	Average
4	4845.948	22.25	31.50	5.45	36.84	22.36	44.00	-21.64	VERTICAL	Average
5 *	6593.733	64.25	34.16	6.57	37.04	67.94	54.00	13.94	VERTICAL	Peak
6	9258.909	15.18	37.85	7.33	37.46	22.90	44.00	-21.10	VERTICAL	Average
7	14160.710	7.51	40.81	8.31	35.30	21.33	34.00	-12.67	VERTICAL	Average

*Remark: The point 5 is the fundamental frequency and please refer to section 7.4 for details



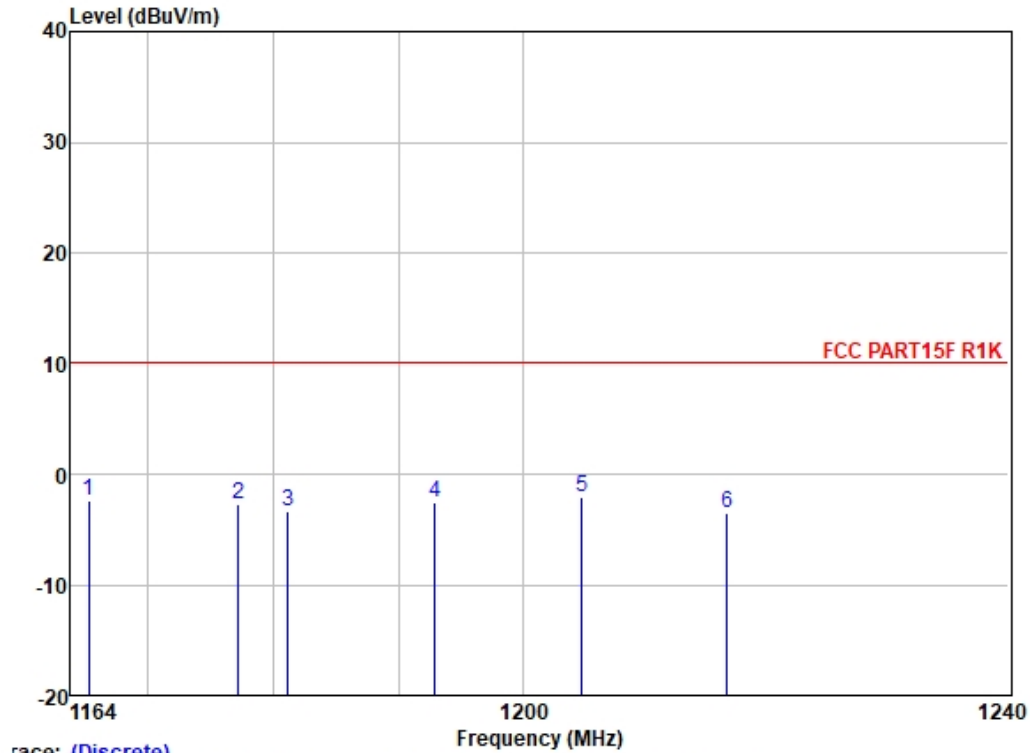
	Freq	Read	Antenna	Cable	Preamp	Limit	Over		
	MHz	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1220.714	24.73	24.82	2.32	38.37	13.50	20.00	-6.50	HORIZONTAL Average
2	1798.127	26.96	25.94	3.00	37.81	18.09	32.00	-13.91	HORIZONTAL Average
3	2573.203	24.97	27.59	3.47	37.53	18.50	34.00	-15.50	HORIZONTAL Average
4	4534.271	23.28	30.85	5.21	36.82	22.52	44.00	-21.48	HORIZONTAL Average
5 *	6627.604	65.20	34.20	6.58	37.05	68.93	54.00	14.93	HORIZONTAL Peak
6	9502.925	15.86	38.30	7.10	37.43	23.83	44.00	-20.17	HORIZONTAL Average
7	11871.710	9.53	39.11	8.24	37.11	19.77	34.00	-14.23	HORIZONTAL Average

*Remark: The point 5 is the fundamental frequency and please refer to section 7.4 for details

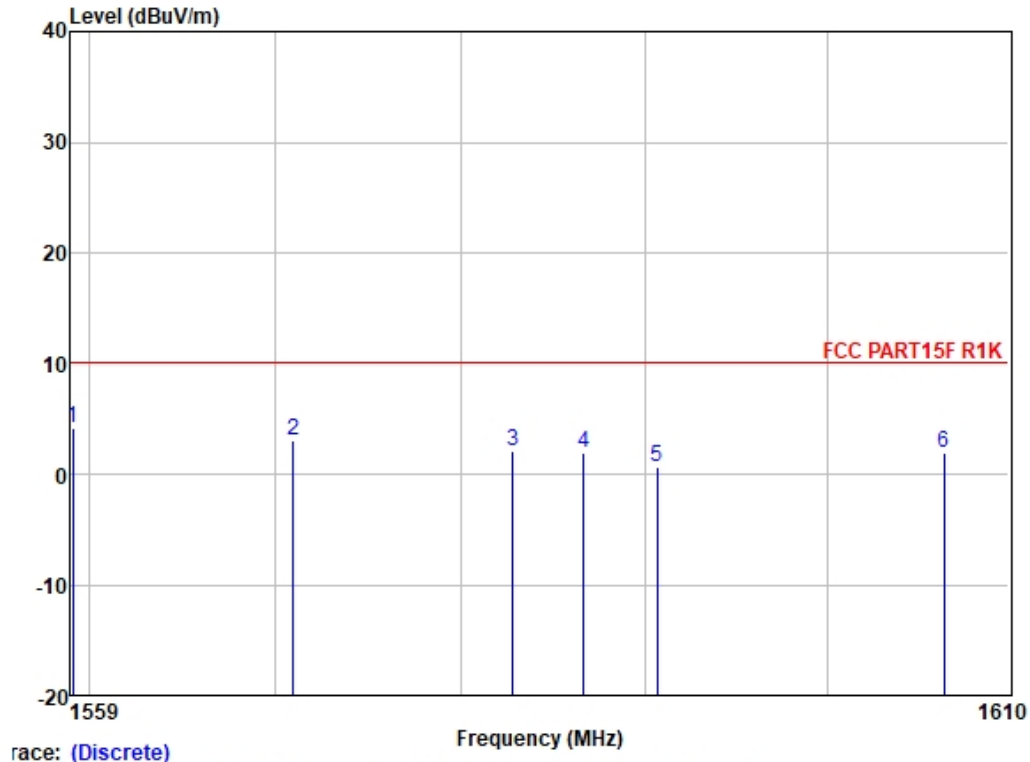


Trace: (Discrete)

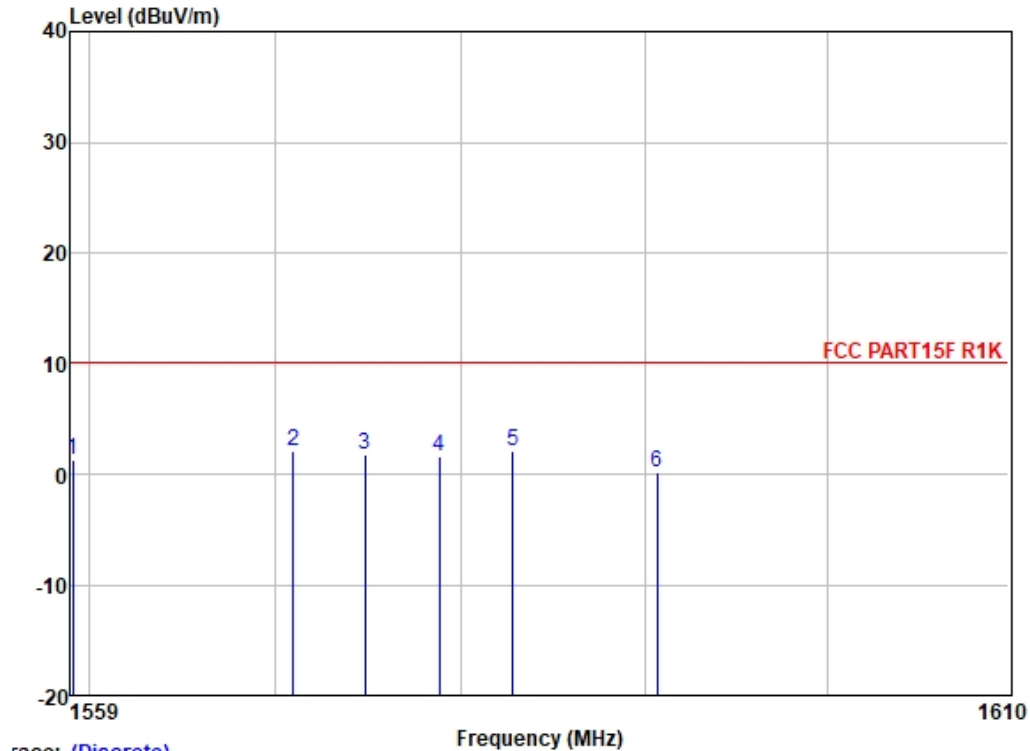
	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
		Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1169.313	8.67	24.55	2.39	38.40	-2.79	10.00	-12.79	VERTICAL	Average
2	1181.206	8.26	24.60	2.37	38.40	-3.17	10.00	-13.17	VERTICAL	Average
3	1192.919	8.42	24.65	2.36	38.39	-2.96	10.00	-12.96	VERTICAL	Average
4	1200.867	7.72	24.68	2.34	38.39	-3.65	10.00	-13.65	VERTICAL	Average
5	1208.793	7.59	24.74	2.33	38.39	-3.73	10.00	-13.73	VERTICAL	Average
6	1227.825	7.05	24.88	2.31	38.37	-4.13	10.00	-14.13	VERTICAL	Average



		ReadAntenna	Cable	Preamp		Limit	Over			
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1165.400	9.12	24.54	2.39	38.40	-2.35	10.00	-12.35	HORIZONTAL	Average
2	1177.253	8.64	24.58	2.38	38.40	-2.80	10.00	-12.80	HORIZONTAL	Average
3	1181.206	8.01	24.60	2.37	38.40	-3.42	10.00	-13.42	HORIZONTAL	Average
4	1192.919	8.78	24.65	2.36	38.39	-2.60	10.00	-12.60	HORIZONTAL	Average
5	1204.823	9.25	24.70	2.34	38.39	-2.10	10.00	-12.10	HORIZONTAL	Average
6	1216.693	7.79	24.79	2.32	38.37	-3.47	10.00	-13.47	HORIZONTAL	Average



	Freq	ReadAntenna	Cable	Preamp		Limit	Over			
		Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1559.100	13.85	25.54	2.80	38.03	4.16	10.00	-5.84	VERTICAL	Average
2	1570.939	12.71	25.55	2.80	38.00	3.06	10.00	-6.94	VERTICAL	Average
3	1582.817	11.79	25.56	2.80	38.00	2.15	10.00	-7.85	VERTICAL	Average
4	1586.693	11.54	25.57	2.80	38.00	1.91	10.00	-8.09	VERTICAL	Average
5	1590.682	10.25	25.57	2.80	37.98	0.64	10.00	-9.36	VERTICAL	Average
6	1606.428	11.49	25.59	2.80	37.98	1.90	10.00	-8.10	VERTICAL	Average



		ReadAntenna		Cable	Preamp		Limit	Over		
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1559.100	10.94	25.54	2.80	38.03	1.25	10.00	-8.75	HORIZONTAL	Average
2	1570.939	11.67	25.55	2.80	38.00	2.02	10.00	-7.98	HORIZONTAL	Average
3	1574.838	11.39	25.56	2.80	38.00	1.75	10.00	-8.25	HORIZONTAL	Average
4	1578.847	11.18	25.56	2.80	38.00	1.54	10.00	-8.46	HORIZONTAL	Average
5	1582.817	11.65	25.56	2.80	38.00	2.01	10.00	-7.99	HORIZONTAL	Average
6	1590.682	9.75	25.57	2.80	37.98	0.14	10.00	-9.86	HORIZONTAL	Average

7.4 Peak Power

Test Requirement 47 CFR Part 15, Subpart F 15.519 (e) & 15.521 (g)
 Test Method: ANSI C63.10 (2013)
 Measurement Distance: 3m
 Limit: 20log (RBW/50) dBm where RBW is the resolution bandwidth in MHz

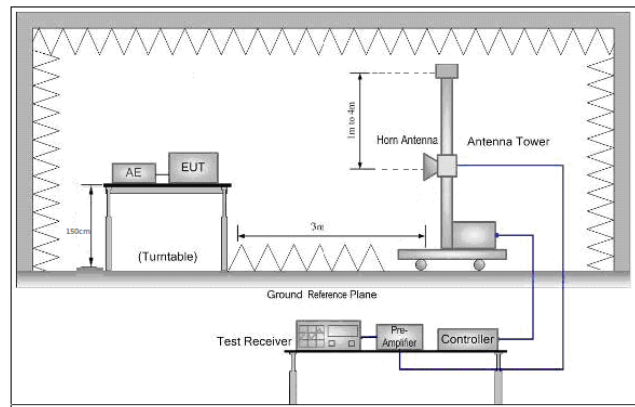
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24.1 °C Humidity: 74.1 % RH Atmospheric Pressure: 1020 mbar

Test mode 04: TX mode_Keep the EUT in continuously transmitting mode in UWB frequency band

7.4.2 Test Setup Diagram



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:

Set the Rx/SA frequency to carrier, fine tuning to get highest level. 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

The red line show in graphic is the limit in standard used in this section.



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Measurement Data

Field Strength for fundamental @ RBW=10MHz						
Frequency (f _M MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Polarization
6593.733	34.16	5.84	37.04	71.43	74.39	Vertical
6627.604	34.20	5.83	37.05	73.51	76.49	Horizontal

Caculated Field Strength of fundamental @ RBW=10MHz					
Frequency (f _M MHz)	Measured Field Strength of fundamental (FS _M) (dBuV/m)	Limit (dBm)	Limit (dBuV/m)	Margin	Polarization
6593.733	74.39	-13.98	81.32*	-6.93	Vertical
6627.604	76.49	-13.98	81.32*	-4.83	Horizontal

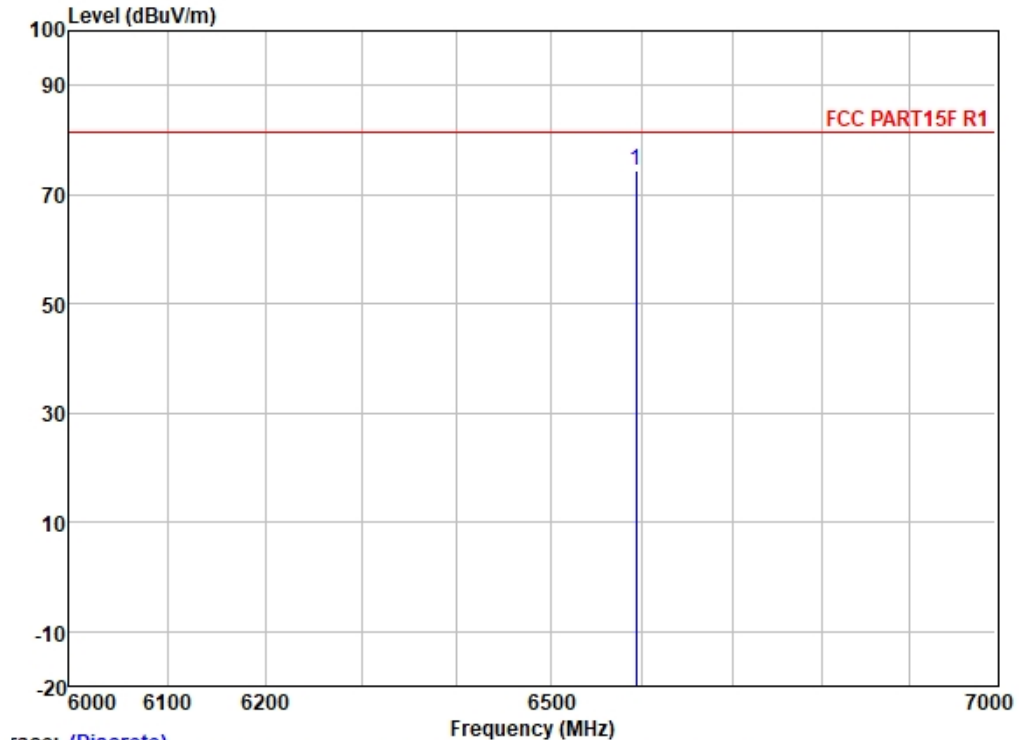
Note: EIRP limit = 20log (10MHz/50MHz) = -13.98 (dBm)

*Remark: According to ANSI 63.10 Clause 10.3.9, the EIRP to field strength at a specified measurement distance of 3 m is below:

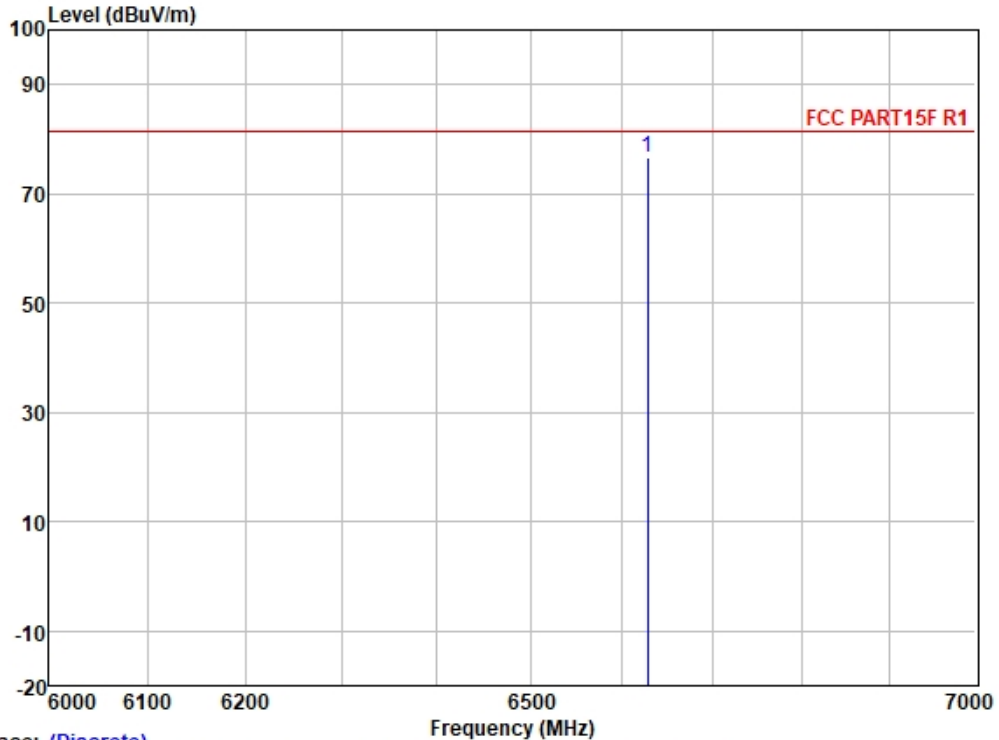
$E \text{ (dBuV/m)} = \text{EIRP(dBm)} + 95.3$



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	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	6593.733	71.43	34.16	5.84	37.04	74.39	81.32	-6.93	VERTICAL Peak



Trace: (Discrete)

	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	6627.604	73.51	34.20	5.83	37.05	76.49	81.32	-4.83 HORIZONTAL Peak



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7.5 Dwell Time (15.519)

Test Requirement 47 CFR Part 15F Section 15.519(a)(1)

Test Method: ANSI C63.10 (2013)

Limit: A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgement of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

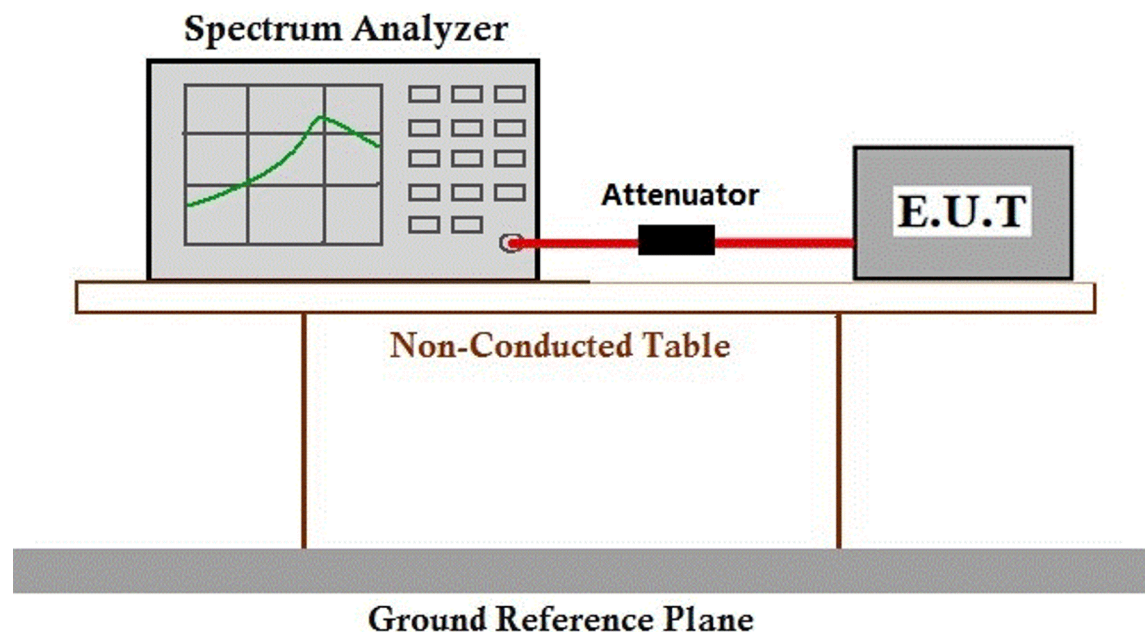
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 24.9 °C Humidity: 63.7 % RH Atmospheric Pressure: 1020 mbar

Test Mode: 04: TX mode_Keep the EUT in continuously transmitting mode in UWB frequency band

7.5.2 Test Setup Diagram



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7.5.3 Measurement Procedure and Data

Carrier Frequency	Shutdown Time	Limit	result
6496GHz	8.14s	≤10s	pass



8 Test Setup Photo

Refer to Test Setup Photo for GZCR210502023702 & GZCR210502023704

9 EUT Constructional Details (EUT Photos)

Refer to external and internal photos for GZCR2105020237AT

- End of the Report -