TEST REPORT

Application No.:	GZCR2111021423AT
Applicant:	Shenzhen Sunway Communication CO.,LTD
Address of Applicant:	1013 Xihuan Road, Shajing Street, Bao'an District, Shenzhen, China
Manufacturer:	Shenzhen Sunway Communication CO.,LTD
Address of Manufacturer:	1013 Xihuan Road, Shajing Street, Bao'an District, Shenzhen, China
Factory:	Shenzhen Sunway Communication CO.,LTD
Address of Factory:	1013 Xihuan Road, Shajing Street, Bao'an District, Shenzhen, China
Equipment Under Test (EUT):	
EUT Name:	Sunway UWB Module
Model No.:	SWM1000SR150
FCC ID:	2A2WQ-SR150
Trade Mark:	Sunway
Standard(s) :	47 CFR Part 15, Subpart F
Date of Receipt:	2021-10-18
Date of Test:	2021-10-20 to 2021-11-29
Date of Issue:	2021-12-01
Test Result:	**Pass***

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

Kobe Jian
EMC Laboratory Manager

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2021-12-01*		*Original*

Authorized for issue by				
		 **Curry Wu/Project Engineer**		
		 **Ricky Liu/Reviewer**		

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart F Section 15.203	N/A	PASS
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart F 15.521(j)/15.207	ANSI C63.10 (2013) Section 6.2	PASS
UWB Bandwidth	47 CFR Part 15, Subpart F Section 15.503 (a) (d)	ANSI C63.10 (2013) Section10.1	PASS
Shutdown Timing Requirements	47 CFR Part 15, Subpart F Section 15.519 (a)(1)	ANSI C63.10 (2013) Section7.8.4	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart F Section 15.519 (c)(d)/15.209	ANSI C63.10 (2013) Section10.2&10.3	PASS
Peak Power and Maximum Average Emissions	47 CFR Part 15, Subpart F Section 15.519 (c) (e)	ANSI C63.10 (2013) Section10.3	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.

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中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	For RF module: DC1.8V from the mainboard which with DC 5V input from USB port
Frequency Range:	6.24GHz~8.24GHz
Modulation Type:	BPM – BPSK (BPRF & HPRF)
Number of Channels:	2
Sample Type:	Portable production
Antenna Type:	Circular polarization patch
Antenna Gain:	CH5:5.3dBi; CH9: 5.8dBi

4.2 Description of Support Units

Description	Manufacturer	Model No.	Remark
Adapter	Apple	A1357	Provided by lab
Mainboard	NXP	K32L3A6	Provided by lab

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	±3.12dB
Conducted Peak Output Power	± 0.75dB
UWB Bandwidth	± 3%
Radiated Spurious Emissions	±5.14dB
Peak Power and Maximum Average Emissions	±5.14dB
Radiated Spurious Emissions (Below 1GHz)	±5.06dB (3m); ±4.46dB (10m)
Radiated Spurious Emissions (Above 1GHz)	±5.08dB (1GHz-6GHz);±5.14dB(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, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663

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

No tests were sub-contracted.

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.

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**
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
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2021-09-24	2022-09-23
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
EMI Test Receiver(9kHz-3.6GHz)	Rohde & Schwarz	ESR4	EMC2221	2021-06-01	2022-05-31

UWB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2021-09-16	2022-09-15
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
				2021-11-01	2023-11-01
Test Software	TST	V2.0	GZE100-78	N/A	N/A

Radiated Emissions which fall in the restricted bands					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver(20Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-01-08	2022-01-07
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	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
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2021-07-29	2022-07-28
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-09-08	2022-09-07

Radiated Spurious 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

Radiated Spurious Emissions (Above 1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver(20Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2021-01-08	2022-01-07
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	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
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2021-07-29	2022-07-28
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2021-09-08	2022-09-07

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2021-07-05	2022-07-05

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15F Section 15.203

6.1.2 Conclusion

§ 15.203 Antenna 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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

EUT Antenna:	Please refer to interior photos of EUT
The antenna under test is a Circular polarization patch antenna. The best case gain of the antenna is CH5:5.3dBi; CH9: 5.8dBi.	

7 Radio Spectrum Matter Test Results

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

Test Requirement 47 CFR Part 15, Subpart F 15.521(j)/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

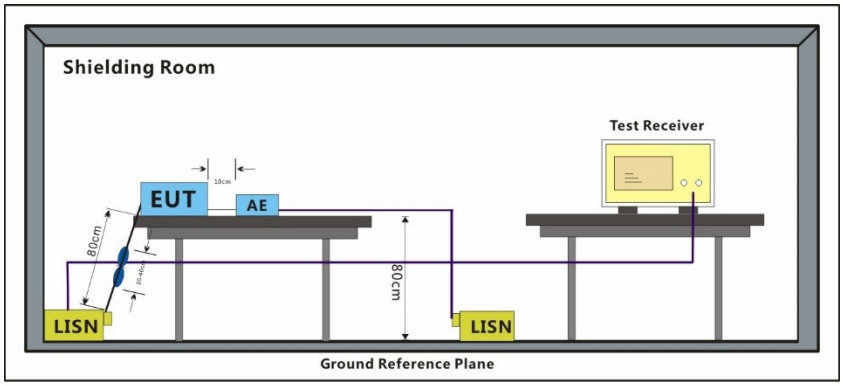
Operating Environment:

Temperature: 24.6 °C Humidity: 49.1 % RH Atmospheric Pressure: 1003 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

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.

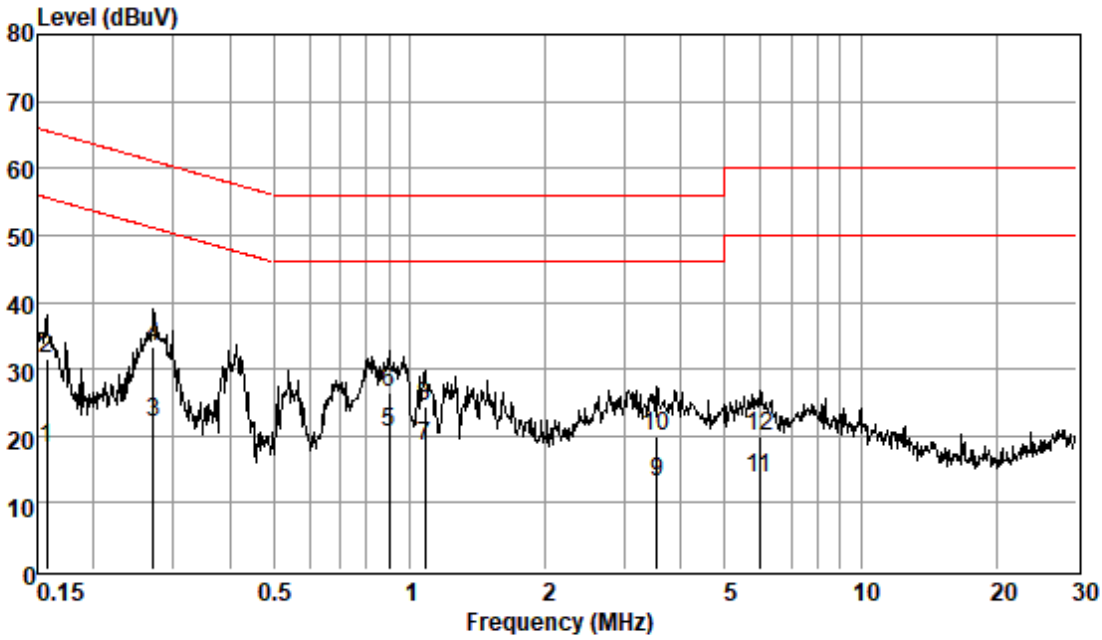
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.

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: LISN=Read Level+ Cable Loss+ LISN Factor

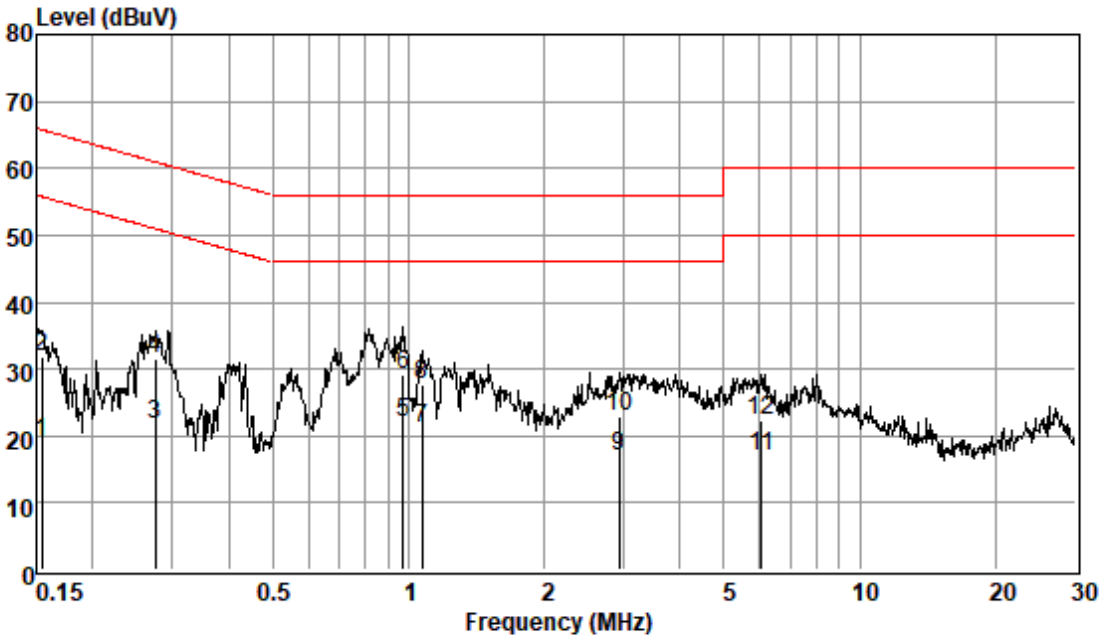
Test Mode: 00; Line: Live line; CH5_BPRF:



Pol :LINE
Mode :
Model :

Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.16	8.50	0.06	9.62	18.18	55.60	-37.42	Average
0.16	21.93	0.06	9.62	31.61	65.60	-33.99	QP
0.27	12.20	0.06	9.62	21.88	51.07	-29.19	Average
0.27	23.54	0.06	9.62	33.22	61.07	-27.85	QP
0.90	10.78	0.07	9.62	20.47	46.00	-25.53	Average
0.90	16.81	0.07	9.62	26.50	56.00	-29.50	QP
1.08	8.86	0.08	9.62	18.56	46.00	-27.44	Average
1.08	14.61	0.08	9.62	24.31	56.00	-31.69	QP
3.53	3.27	0.16	9.62	13.05	46.00	-32.95	Average
3.53	10.00	0.16	9.62	19.78	56.00	-36.22	QP
5.96	3.96	0.19	9.67	13.82	50.00	-36.18	Average
5.96	9.97	0.19	9.67	19.83	60.00	-40.17	QP

Test Mode: 00; Line: Neutral Line; CH5_BPRF:



Pol :NEUTRAL
Mode :
Model :

Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.15	9.36	0.06	9.55	18.97	55.78	-36.81	Average
0.15	22.21	0.06	9.55	31.82	65.78	-33.96	QP
0.27	12.04	0.06	9.55	21.65	50.98	-29.33	Average
0.27	21.91	0.06	9.55	31.52	60.98	-29.46	QP
0.97	12.35	0.07	9.55	21.97	46.00	-24.03	Average
0.97	19.66	0.07	9.55	29.28	56.00	-26.72	QP
1.07	11.41	0.08	9.55	21.04	46.00	-24.96	Average
1.07	17.98	0.08	9.55	27.61	56.00	-28.39	QP
2.93	7.20	0.15	9.56	16.91	46.00	-29.09	Average
2.93	13.29	0.15	9.56	23.00	56.00	-33.00	QP
6.06	7.15	0.20	9.57	16.92	50.00	-33.08	Average
6.06	12.60	0.20	9.57	22.37	60.00	-37.63	QP

Remark:

1) All modes of CH5, CH9, BPRF and HPRF have been a fully pretest and listed the worst one data in the report.

7.2 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15, Subpart F Section 15.519 (c)(d)/15.209
Test Method:	ANSI C63.10: 2013 section 10.2 & 10.3
Test Site:	Measurement Distance: 0.5m & 3m (Semi & Fully-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-960MHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
Above 960MHz	RMS	1MHz	3MHz	RMS

Limit:
(Spurious Emissions)

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	3
1610MHz-1990MHz	-63.3 dBm (EIRP, RBW=1MHz)		RMS	3
1990MHz-3100MHz	-61.3 dBm (EIRP, RBW=1MHz)		RMS	3
3100MHz-10600MHz	-41.3 dBm (EIRP, RBW=1MHz)		RMS	3
Above 10600MHz	-61.3 dBm (EIRP, RBW=1MHz)		RMS	3
1164MHz-1240MHz	-85.3 dBm (EIRP, RBW=1kHz)		RMS	3
1559MHz-1610MHz	-85.3 dBm (EIRP, RBW=1kHz)		RMS	3

Test Setup:	

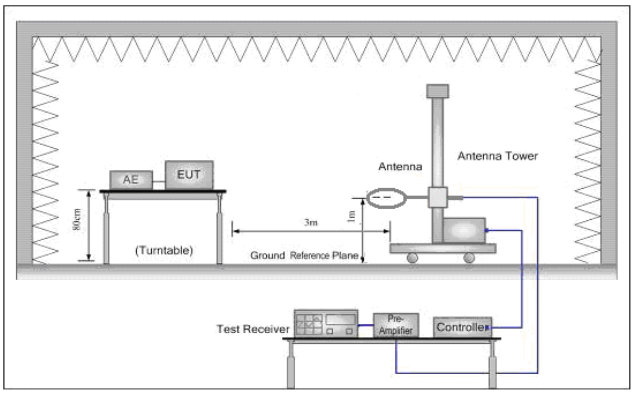


Figure 1. Below 30MHz

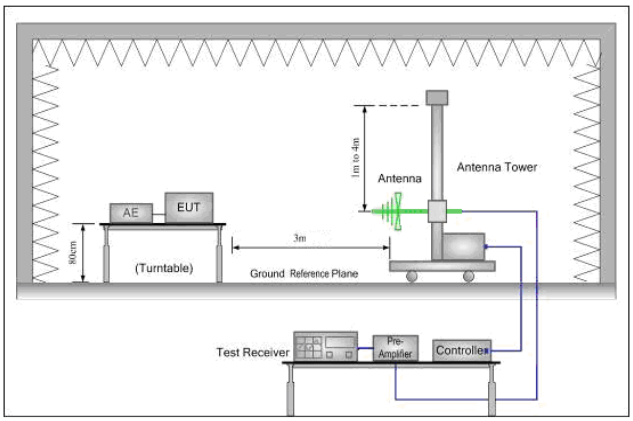


Figure 2. 30MHz to 1GHz

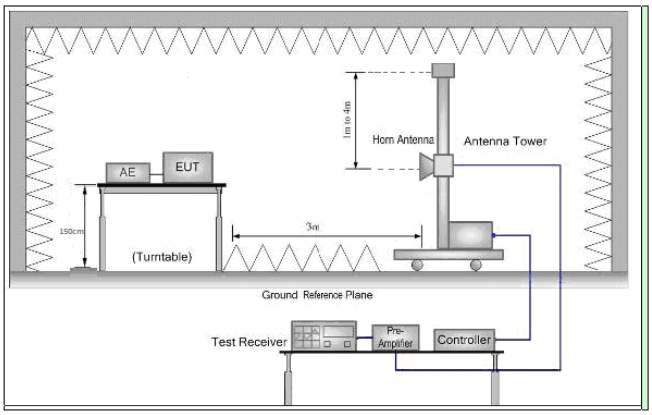


Figure 3. Above 1 GHz

Test Procedure:	1) For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 3) The EUT was set 0.5 meter or 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 4) 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. 5) 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. 6) The test-receiver system was set to Peak Detect Function and Specified

	Bandwidth with Maximum Hold Mode. 7) 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. 8) Test the EUT in the lowest channel, the Highest channel 9) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode and found the X axis positioning which it is worse case. 10) Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	00:TX mode_Keep the EUT in transmitting with modulation mode.
Instruments Used:	Refer to section 5 for details
Test Results:	Pass

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

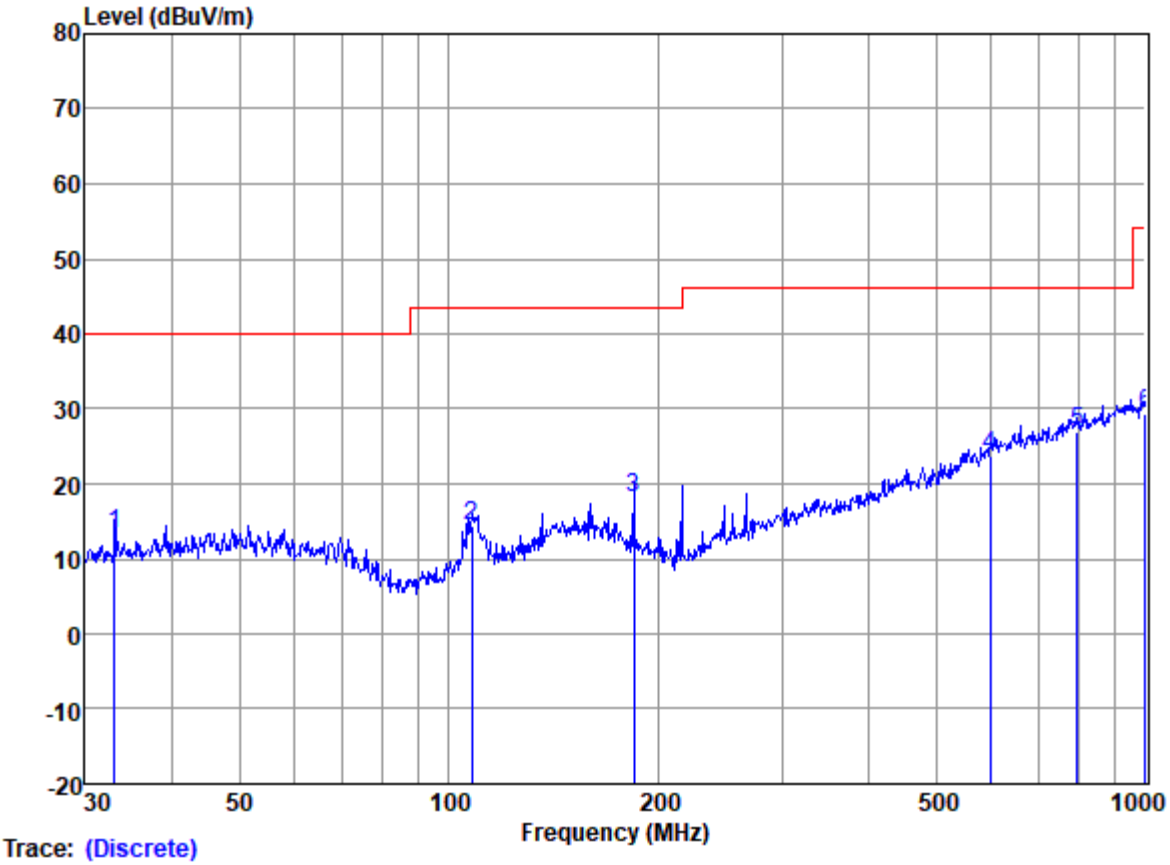
E (dBuV/m) = EIRP(dBm) + 95.3

Frequency	Limit		Detector	Measurement Distance
	EIRP (dBm)	Field Strength (dBuV/m)		
960MHz-1610MHz	-75.3 (RBW=1MHz)	20.00	RMS	0.5
1610MHz-1990MHz	-63.3 (RBW=1MHz)	32.00	RMS	0.5
1990MHz-3100MHz	-61.3 (RBW=1MHz)	34.00	RMS	0.5
3100MHz-10600MHz	-41.3 (RBW=1MHz)	54.00	RMS	3
Above 10600MHz	-61.3 (RBW=1MHz)	34.00	RMS	0.5
1164MHz-1240MHz	-85.3 (RBW=1kHz)	10.00	RMS	0.5
1559MHz-1610MHz	-85.3 (RBW=1kHz)	10.00	RMS	0.5

Distance factor = 20*log(0.5/3) = -15.56dB

Measurement Data

30MHz~1GHz, Horizontal, CH5_BPRF:

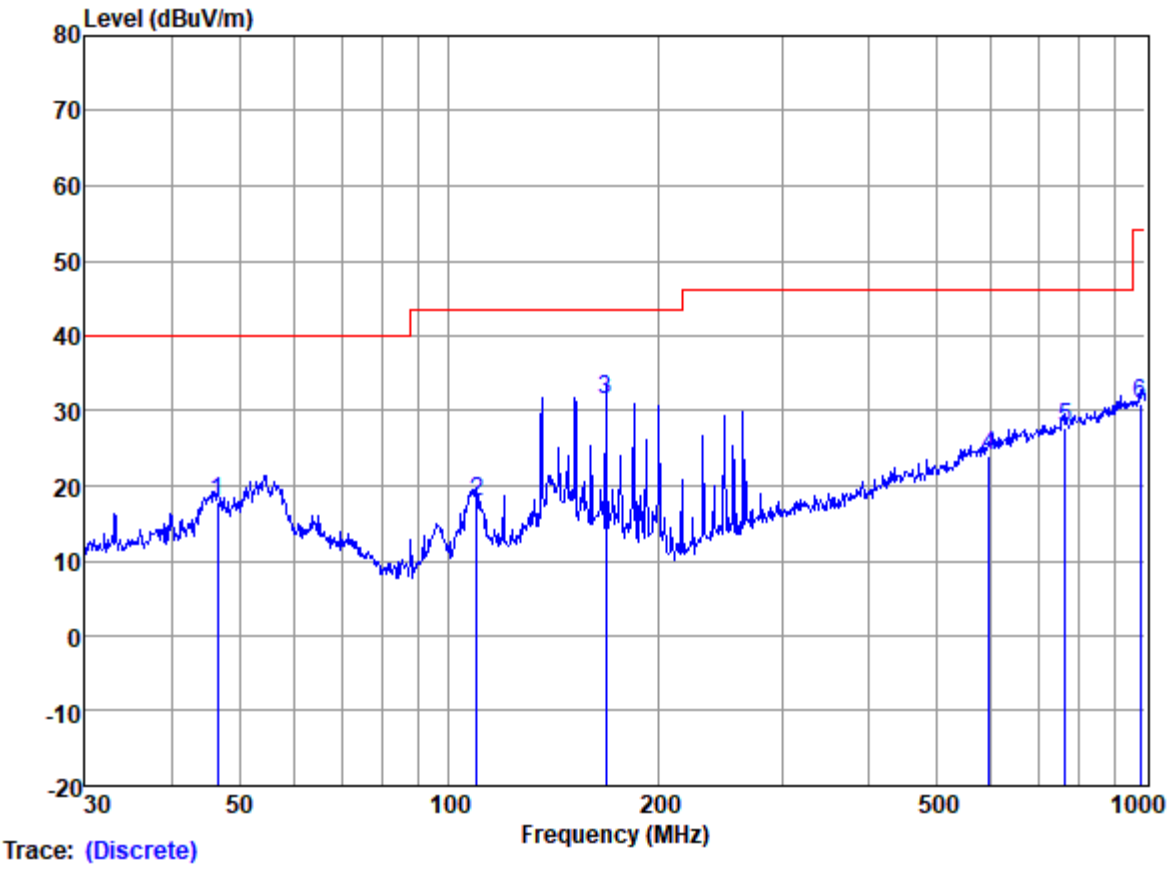


Trace: (Discrete)

Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	33.09	26.63	12.76	1.05	27.19	13.25	40.00	-26.75	HORIZONTAL	QP
2	107.89	29.27	10.30	1.78	27.06	14.29	43.50	-29.21	HORIZONTAL	QP
3	183.84	31.00	11.50	2.46	26.75	18.21	43.50	-25.29	HORIZONTAL	QP
4	597.22	27.10	19.80	5.14	28.21	23.83	46.00	-22.17	HORIZONTAL	QP
5	796.18	26.36	22.57	6.14	28.03	27.04	46.00	-18.96	HORIZONTAL	QP
6	1000.00	25.34	24.30	7.43	27.66	29.41	54.00	-24.59	HORIZONTAL	QP

30MHz~1GHz, Vertical, CH5_BPRF:



Trace: (Discrete)

Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	46.50	29.91	13.92	1.13	27.17	17.79	40.00	-22.21	VERTICAL	QP
2	109.41	32.80	10.37	1.79	27.06	17.90	43.50	-25.60	VERTICAL	QP
3	167.82	42.57	13.30	2.38	26.78	31.47	43.50	-12.03	VERTICAL	QP
4	595.13	27.33	19.70	5.10	28.20	23.93	46.00	-22.07	VERTICAL	QP
5	766.06	27.55	22.20	6.05	28.06	27.74	46.00	-18.26	VERTICAL	QP
6	982.62	27.23	24.13	7.31	27.68	30.99	54.00	-23.01	VERTICAL	QP

Transmitting with modulation Mode at CH5_BPRF									
Test Data: Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Distance factor	Read_ Level (dBm)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1096.904	24.85	2.57	39.68	-15.56	40.11	12.29	20.0	-7.71	Horizontal
1507.470	25.74	3.27	39.96	-15.56	40.15	13.64	20.0	-6.36	Horizontal
3060.486	30.57	4.95	40.75	-15.56	48.33	27.54	34.0	-6.46	Horizontal
4039.212	32.63	6.32	41.44	0	41.43	38.94	54.0	-15.06	Horizontal
5408.529	34.16	8.03	42.34	0	39.99	39.84	54.0	-14.16	Horizontal
9366.577	37.22	10.70	38.19	0	31.26	40.99	54.0	-13.01	Horizontal
10791.690	37.69	10.79	37.52	-15.56	32.69	28.09	34.0	-5.91	Horizontal
13917.240	39.99	12.57	39.54	-15.56	33.7	31.16	34.0	-2.84	Horizontal
17386.380	42.79	14.05	40.25	-15.56	31.78	32.81	34.0	-1.19	Horizontal
1109.660	24.88	2.59	39.69	-15.56	40.19	12.41	20.0	-7.59	Vertical
1556.169	25.99	3.31	39.98	-15.56	39.62	13.38	20.0	-6.62	Vertical
3051.653	30.54	4.93	40.74	-15.56	47.85	27.02	34.0	-6.98	Vertical
3546.577	31.79	5.60	41.11	0	42.27	38.55	54.0	-15.45	Vertical
5797.032	34.44	8.23	42.38	0	39.69	39.98	54.0	-14.02	Vertical
9753.371	37.40	10.76	37.51	0	29.94	40.59	54.0	-13.41	Vertical
11803.280	38.04	12.00	38.01	-15.56	34.14	30.61	34.0	-3.39	Vertical
14916.940	40.77	12.89	40.08	-15.56	33.45	31.47	34.0	-2.53	Vertical
17386.380	42.79	14.05	40.25	-15.56	31.95	32.98	34.0	-1.02	Vertical

Transmitting with modulation Mode at CH5_BPRF									
Test Data: Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Distance factor	Read_ Level (dBm)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1132.340	24.94	2.64	39.71	-15.56	40.63	12.94	20.0	-7.06	Horizontal
1792.937	27.13	3.50	40.11	-15.56	50.85	25.81	32.0	-6.19	Horizontal
3034.063	30.50	4.91	40.73	-15.56	47.93	27.05	34.0	-6.95	Horizontal
3768.513	32.20	5.94	41.25	0	41.34	38.23	54.0	-15.77	Horizontal
5932.638	34.55	8.25	42.39	0	39.51	39.92	54.0	-14.08	Horizontal
10215.020	37.46	10.62	37.22	0	29.7	40.56	54.0	-13.44	Horizontal
12009.760	38.00	12.26	38.11	-15.56	32.69	29.28	34.0	-4.72	Horizontal
15134.080	40.70	13.24	40.18	-15.56	33.45	31.65	34.0	-2.35	Horizontal
17087.460	42.49	14.14	40.32	-15.56	31.64	32.39	34.0	-1.61	Horizontal
1072.303	25.03	2.71	39.74	-15.56	39.64	12.08	20.0	-7.92	Vertical
1741.856	26.90	3.46	40.08	-15.56	50.21	24.93	32.0	-7.07	Vertical
3060.486	30.57	4.95	40.75	-15.56	48.63	27.84	34.0	-6.16	Vertical
3505.809	31.71	5.53	41.08	0	42.79	38.95	54.0	-15.05	Vertical
5847.517	34.48	8.24	42.39	0	38.86	39.19	54.0	-14.81	Vertical
10244.580	37.45	10.61	37.23	0	30.58	41.41	54.0	-12.59	Vertical
12114.350	38.02	12.44	38.19	-15.56	34.14	30.85	34.0	-3.15	Vertical
15310.070	40.70	13.59	40.27	-15.56	33.45	31.91	34.0	-2.09	Vertical
17186.530	42.59	14.11	40.30	-15.56	40.63	32.71	34.0	-1.29	Vertical

Remark:

1) Scan from 9kHz to 40GHz, the disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
2) All modes of CH5, CH9, BPRF and HPRF have been a fully pretest and listed the worst one data in the report.
3) Final Test Level =Receiver Reading + Antenna Factor + Distance Factor + Cable Loss - Preamplifier Factor

7.3 PEAK POWER AND MAXIMUM AVERAGE EMISSIONS

Test Requirement:	47 CFR Part 15, Subpart F Section 15.519 (c) (e)
Test Method:	ANSI C63.10: 2013 section 10.3
Test Site:	Measurement Distance: 3m (Fully-Anechoic Chamber)
Limit: (Spurious Emissions)	FCC §15.519 (c) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
3100-10600	-41.3

(e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M. That limit is 0 dBm EIRP.

Test Setup:

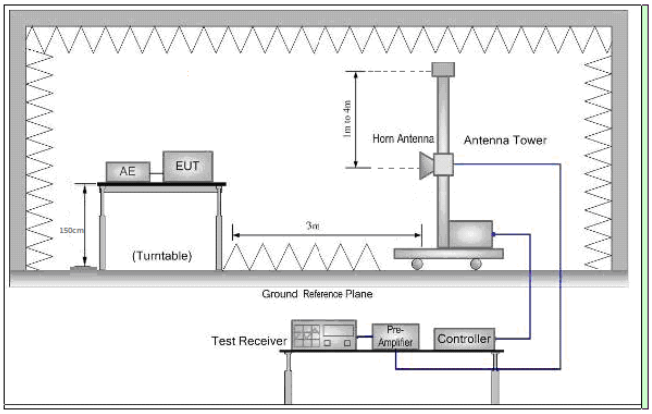


Figure 1. Above 1 GHz

Test Procedure:

1) For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3) 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.
4) 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

	6) 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. 7) Test the EUT in the lowest channel, the Highest channel 8) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode and found the X axis positioning which it is worse case. 9) Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	00:TX mode_Keep the EUT in transmitting with modulation mode.
Instruments Used:	Refer to section 5 for details
Test Results:	Pass

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 (dBuV/m) = EIRP(dBm) + 95.3

For peak power test, the spectrum anylyzer was set to RBW=10MHz, VBW=10MHz, and add a conversion factor of 20*log(50MHz/10MHz)=13.98

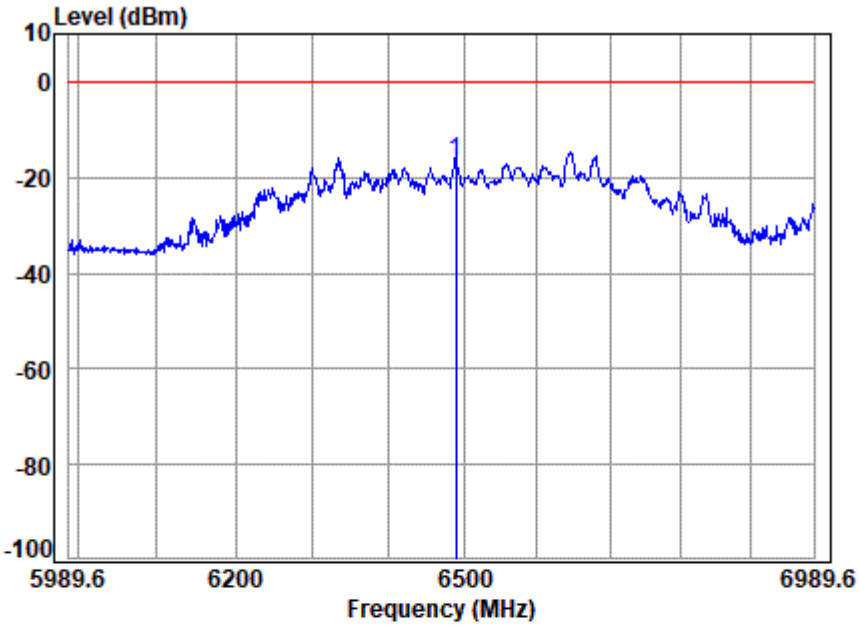
Measurement Data

7.3.1 Peak Power

Peak Power							
Channel	PRF Mode	Level (dBm) @ RBW=10MHz	Factor	Level (dBm) @ RBW=50MHz	Limit (dBm)	Margin	Polarization
CH 5	BPRF	-16.68	13.98	-2.7	0	2.7	Horizontal
		-17.47	13.98	-3.49	0	3.49	Vertical
	HPRF	-25.32	13.98	-11.34	0	11.34	Horizontal
		-26.22	13.98	-12.24	0	12.24	Vertical

Peak Power							
Channel	PRF Mode	Level (dBm) @ RBW=10MHz	Factor	Level (dBm) @ RBW=50MHz	Limit (dBm)	Margin	Polarization
CH 9	BPRF	-14.83	13.98	-0.85	0	0.85	Horizontal
		-24.99	13.98	-11.01	0	11.01	Vertical
	HPRF	-23.08	13.98	-9.1	0	9.1	Horizontal
		-29.69	13.98	-15.71	0	15.71	Vertical

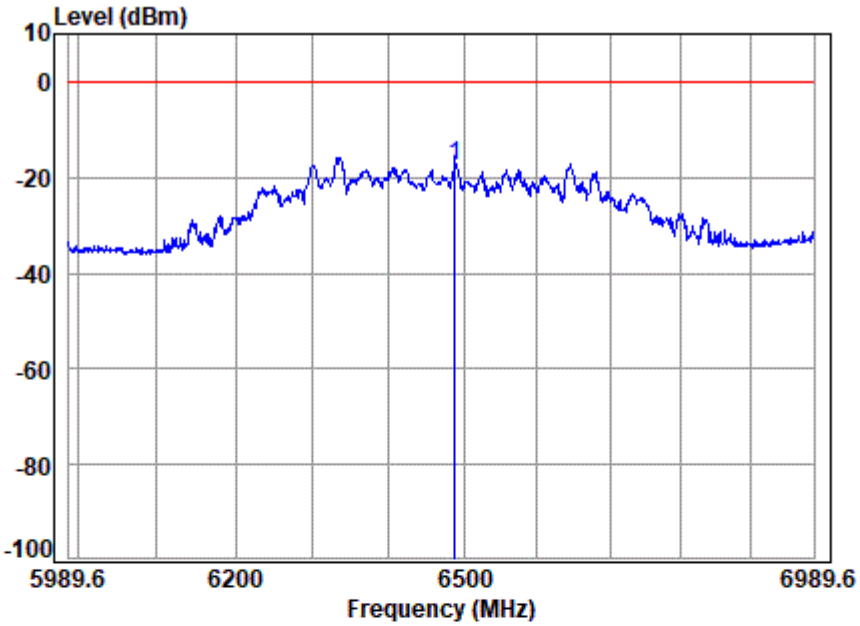
CH 5 BPRF; Horizontal:



Condition: 3m HORIZONTAL
Test mode: CH5
Note: BPRF PK

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	6489.32	-16.68	0.00	-16.68

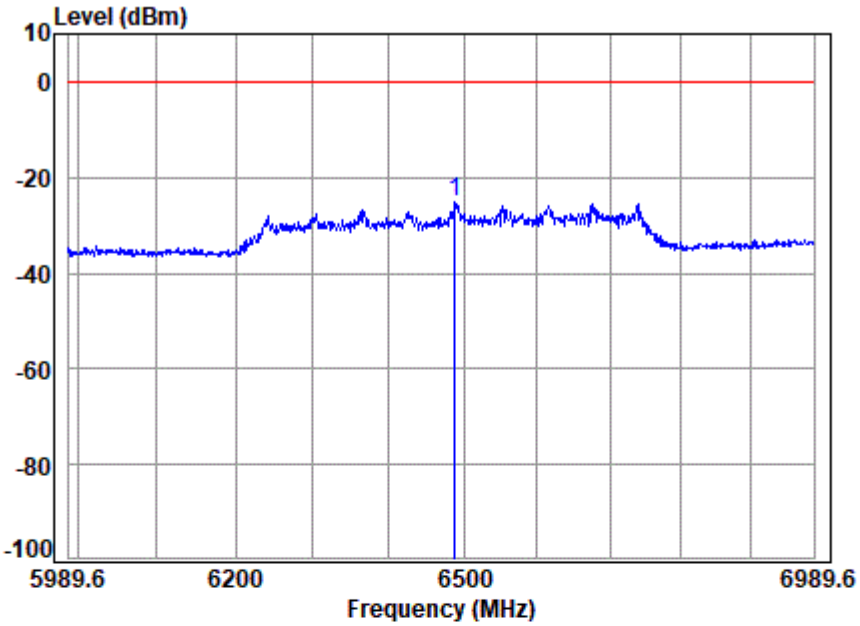
CH 5 BPRF; Vertical:



Condition: 3m VERTICAL
Test mode: CH5
Note: BPRF PK

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	6488.32	-17.47	0.00	-17.47

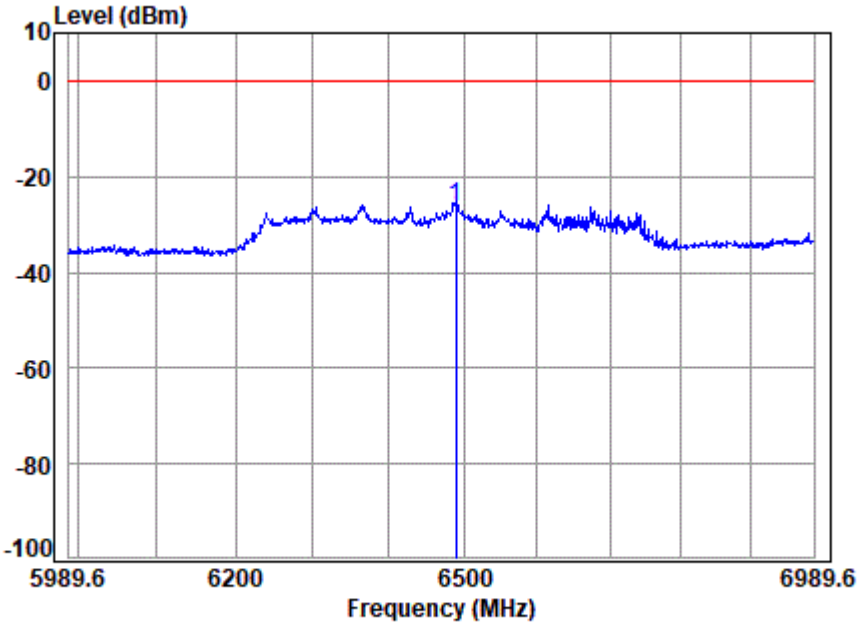
CH 5 HPRF; Horizontal:



Condition: 3m HORIZONTAL
Test mode: CH5
Note: HPRF PK

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	6488.32	-25.32	0.00	-25.32

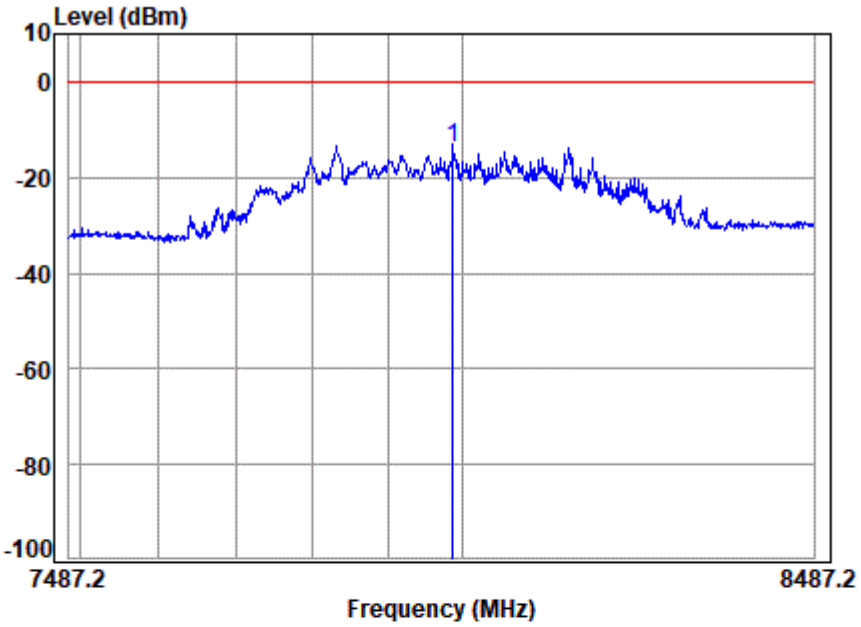
CH 5 HPRF; Vertical:



Condition: 3m VERTICAL
Test mode: CH5
Note: HPRF PK

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	6489.32	-26.22	0.00	-26.22

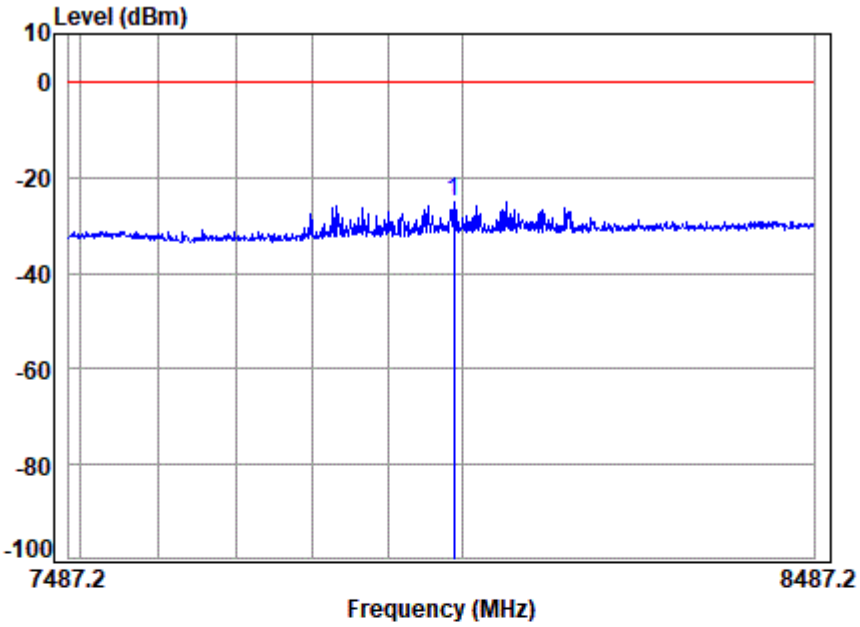
CH 9 BPRF; Horizontal:



Condition: 3m HORIZONTAL
Test mode: CH9
Note: BPRF PK

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	7987.54	-14.83	0.00	-13.83

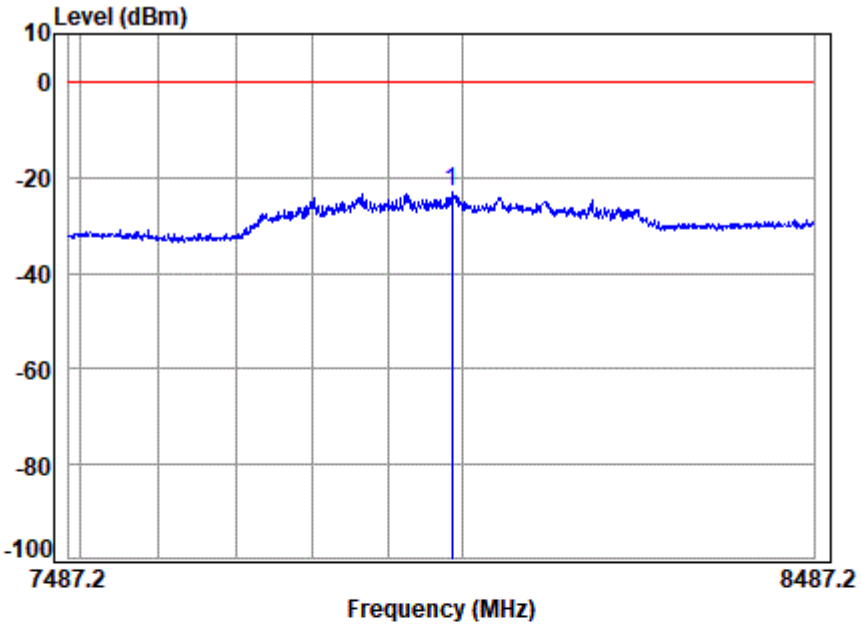
CH 9 BPRF; Vertical:



Condition: 3m VERTICAL
Test mode: CH9
Note: BPRF PK

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	7988.54	-24.99	0.00	-24.99

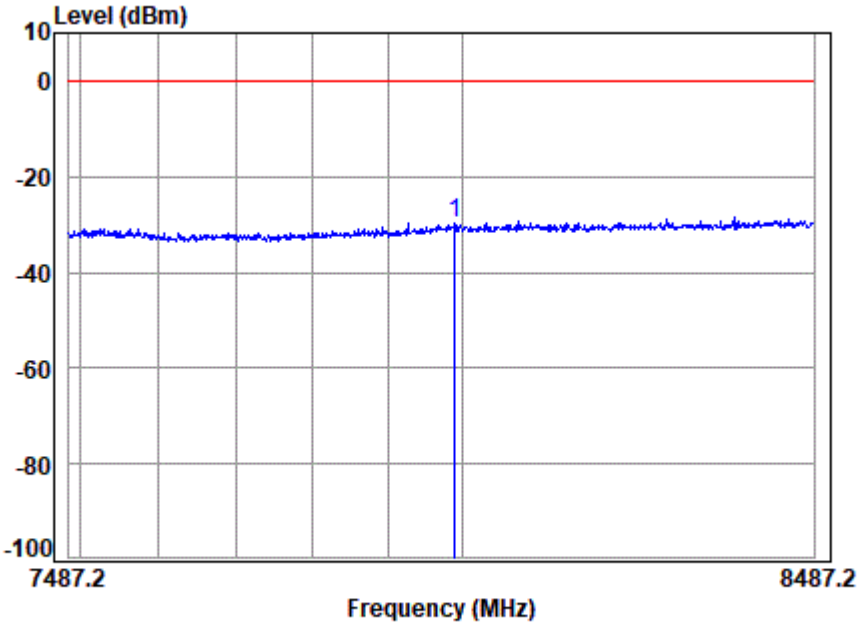
CH 9 HPRF; Horizontal:



Condition: 3m HORIZONTAL
Test mode: CH9
Note: HPRF PK

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	7985.54	-23.08	0.00	-23.08

CH 9 HPRF; Vertical:



Condition: 3m VERTICAL
Test mode: CH9
Note: HPRF PK

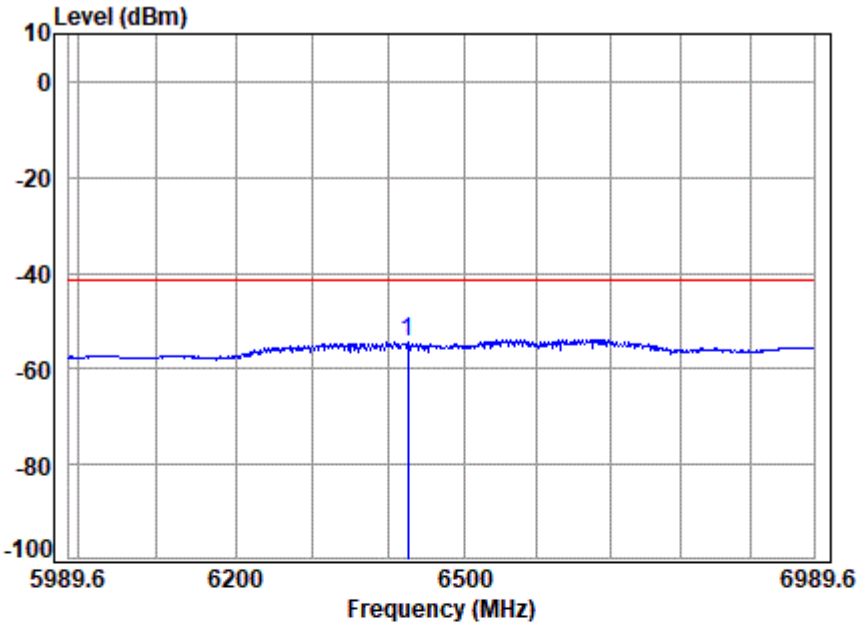
Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	7989.54	-29.69	0.00	-29.69

7.3.2 Average Power

Average Power					
Channel	**PRF Mode**	**Level (dBm) @ RBW=1MHz**	**Limit (dBm)**	**Margin**	**Polarization**
CH 5	BPRF	-54.60	-41.3	13.30	Horizontal
		-54.90	-41.3	13.60	Vertical
	HPRF	-55.54	-41.3	14.24	Horizontal
		-55.61	-41.3	14.31	Vertical

Average Power					
Channel	**PRF Mode**	**Level (dBm) @ RBW=1MHz**	**Limit (dBm)**	**Margin**	**Polarization**
CH 9	BPRF	-51.48	-41.3	10.18	Horizontal
		-53.11	-41.3	11.81	Vertical
	HPRF	-50.83	-41.3	9.53	Horizontal
		-52.70	-41.3	11.40	Vertical

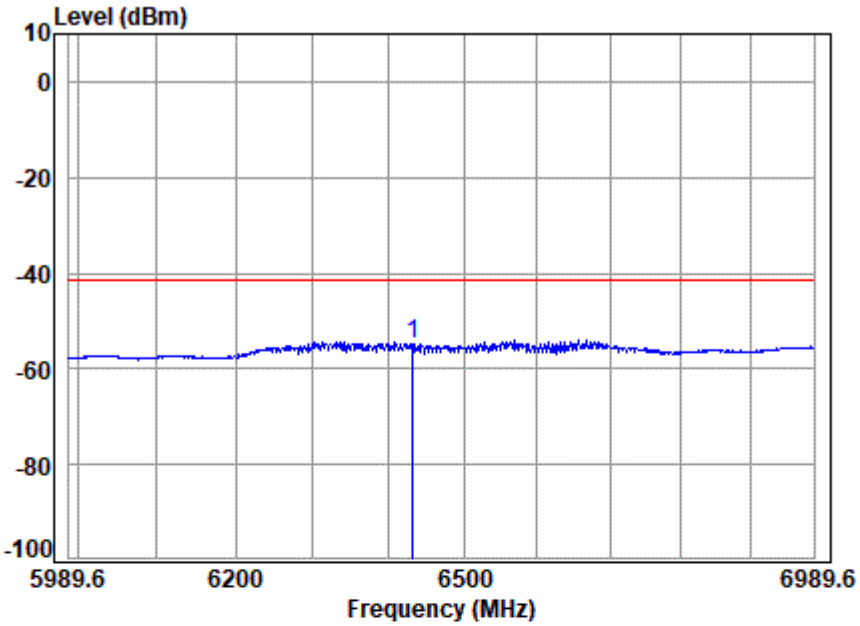
CH 5 BPRF; Horizontal:



Condition: 3m HORIZONTAL
Test mode: CH5
Note: BPRF AV

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	6425.51	-54.60	-41.30	-13.30

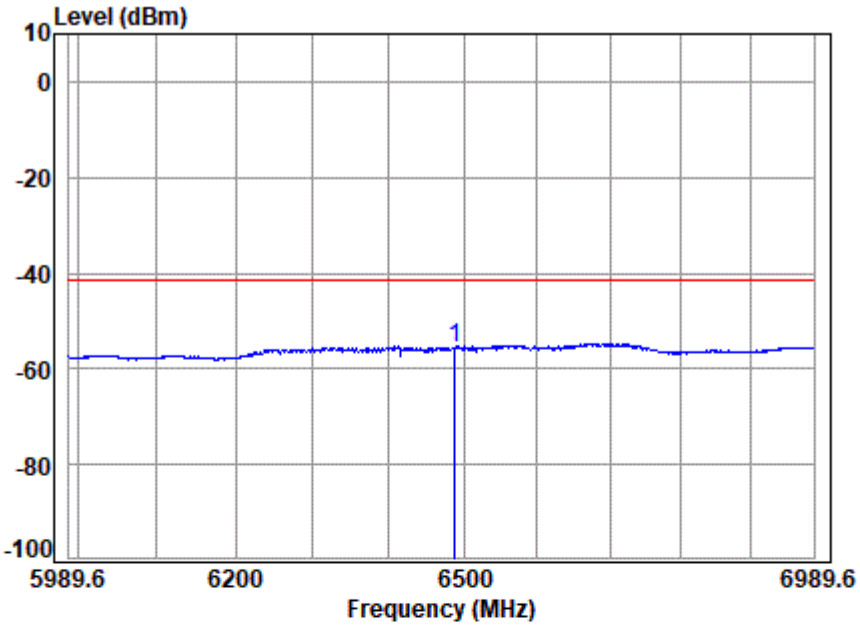
CH 5 BPRF; Vertical:



Condition: 3m VERTICAL
Test mode: CH5
Note: BPRF AV

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	6432.46	-54.90	-41.30	-13.60

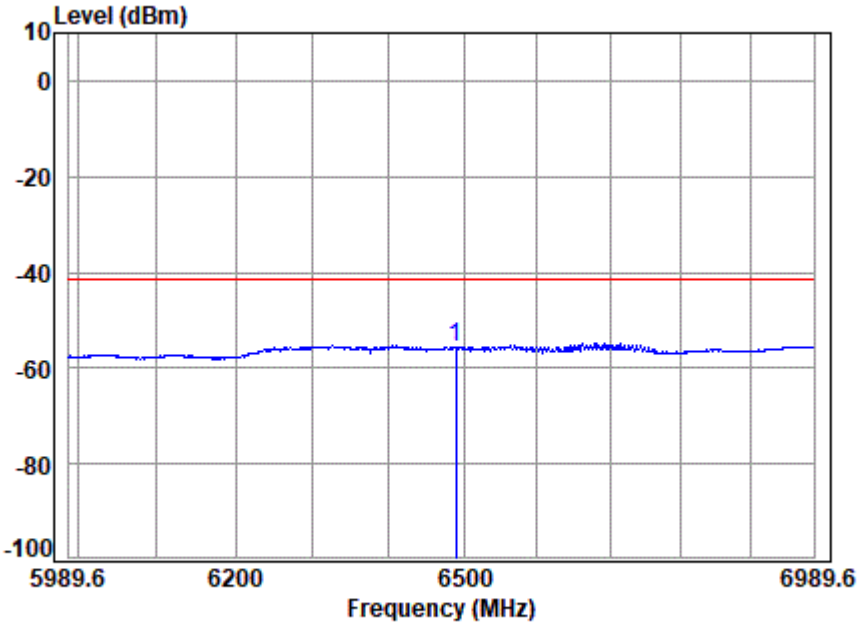
CH 5 HPRF; Horizontal:



Condition: 3m HORIZONTAL
Test mode: CH5
Note: HPRF AV

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	6488.32	-55.54	-41.30	-14.24

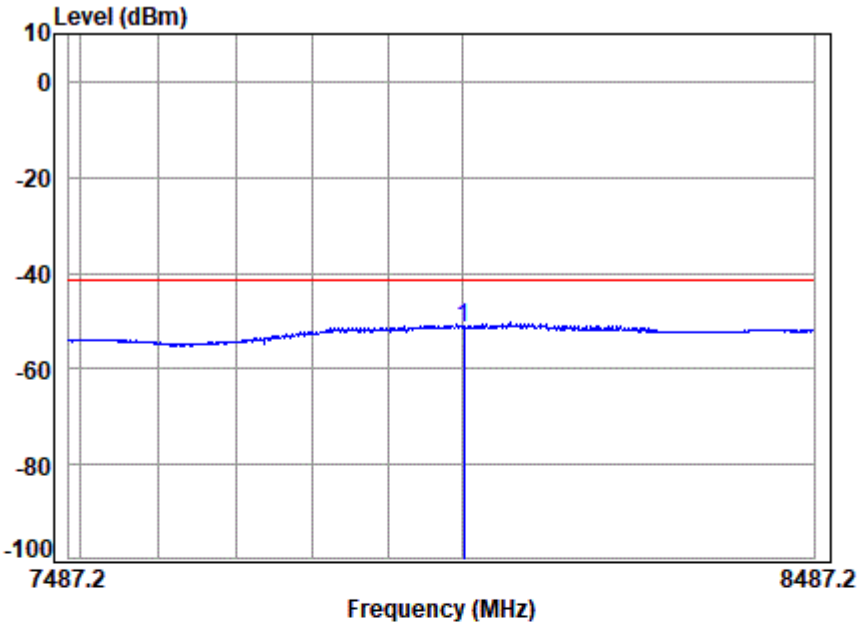
CH 5 HPRF; Vertical:



Condition: 3m VERTICAL
Test mode: CH5
Note: HPRF AV

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	6490.32	-55.61	-41.30	-14.31

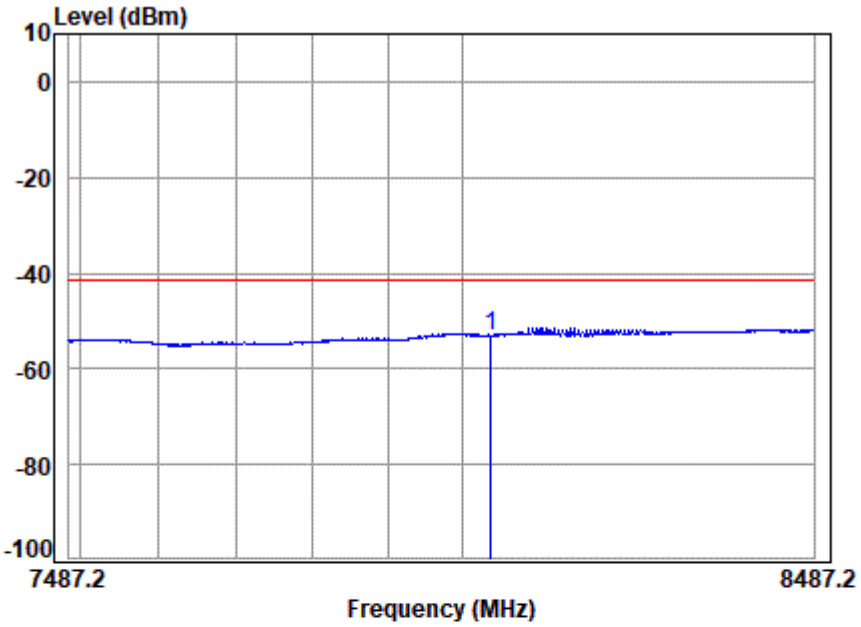
CH 9 BPRF; Horizontal:



Condition: 3m HORIZONTAL
Test mode: CH9
Note: BPRF AV

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	8001.57	-51.48	-41.30	-10.18

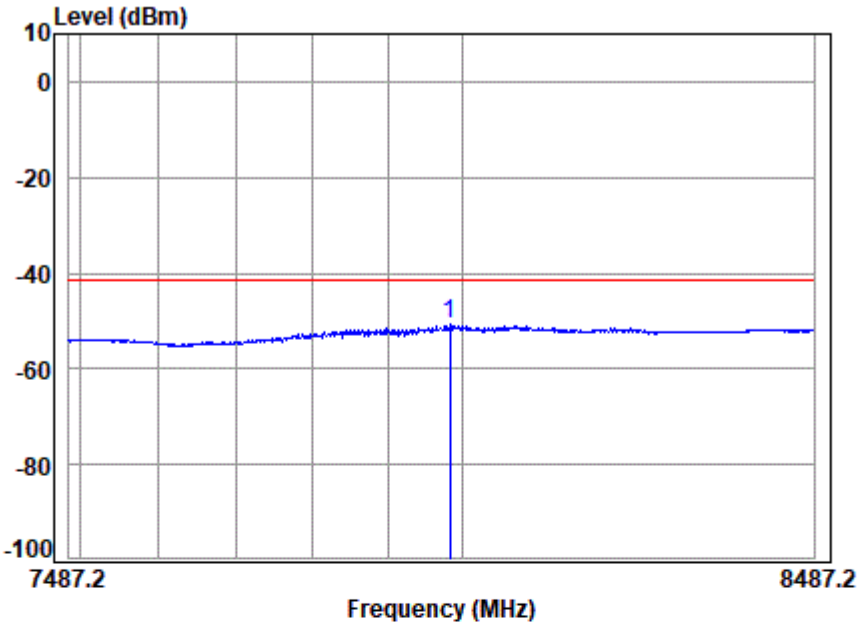
CH 9 BPRF; Vertical:



Condition: 3m VERTICAL
Test mode: CH9
Note: BPRF AV

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	8037.77	-53.11	-41.30	-11.81

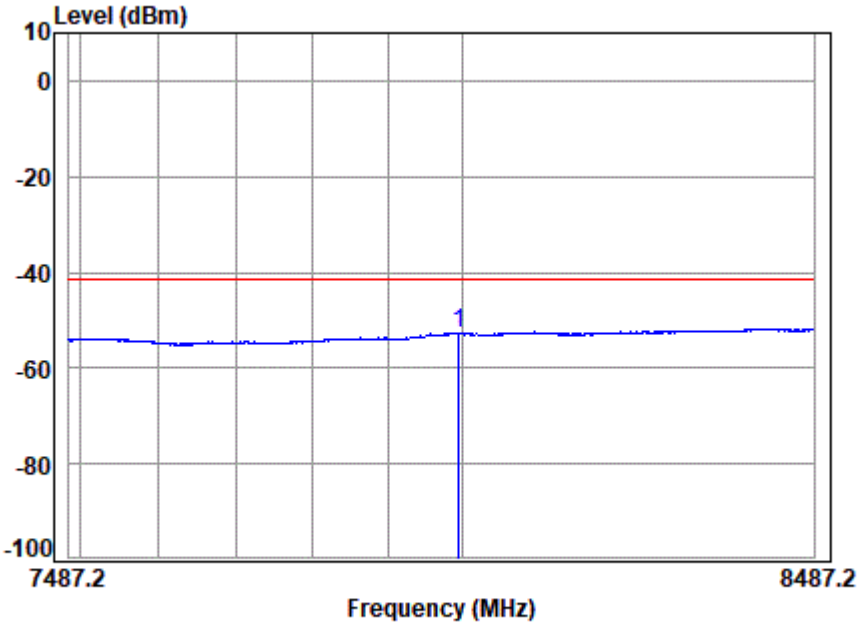
CH 9 HPRF; Horizontal:



Condition: 3m HORIZONTAL
Test mode: CH9
Note: HPRF AV

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	7982.54	-50.81	-41.30	-9.51

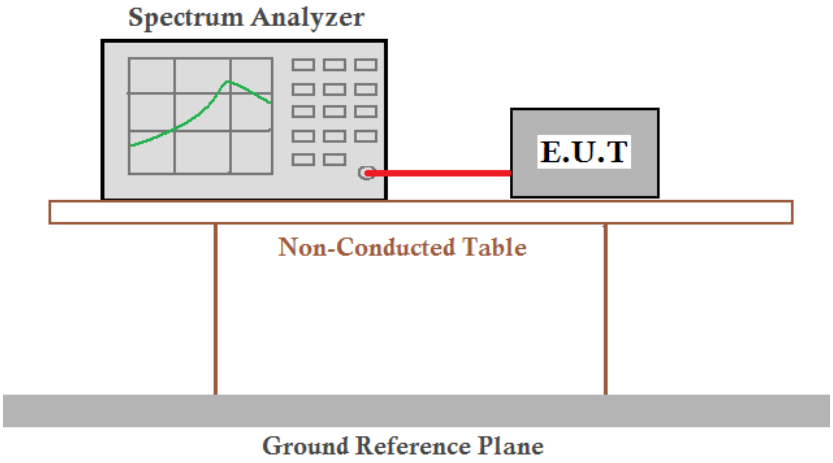
CH 9 HPRF; Vertical:



Condition: 3m VERTICAL
Test mode: CH9
Note: HPRF AV

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	7995.56	-52.70	-41.30	-11.40

7.4 UWB Bandwidth (10dB Bandwidth)

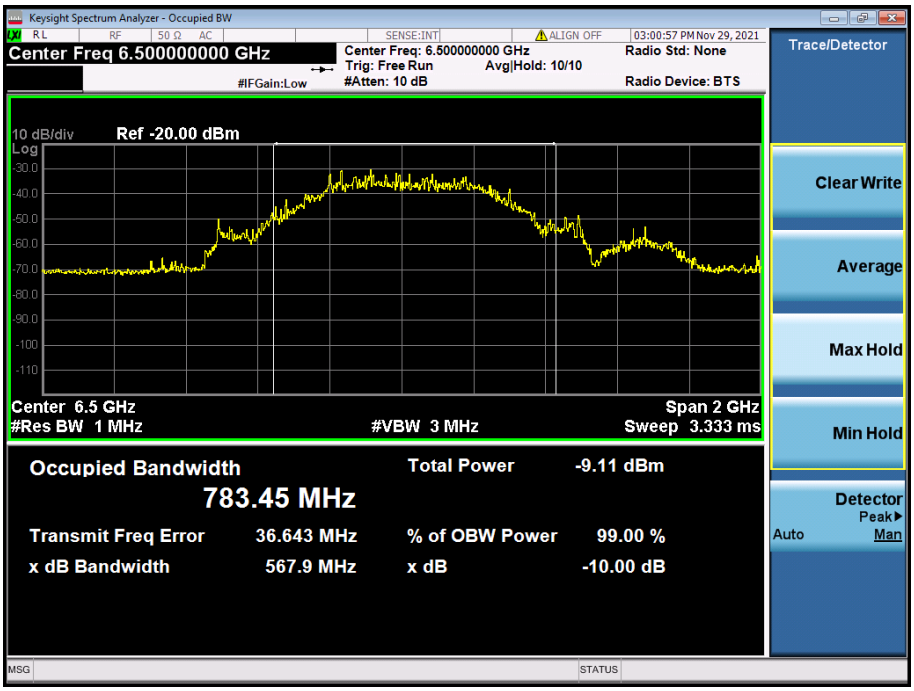
Test Requirement:	47 CFR Part 15F Section 15.503(a) (d)
Test Method:	ANSI C63.10:2013 section 10.1
Test Setup:	
Limit:	≥500MHz
Exploratory Test Mode:	00:TX mode_Keep the EUT in transmitting with modulation mode.
Instruments Used:	Refer to section 5 for details
Test Results:	Pass

Measurement Data

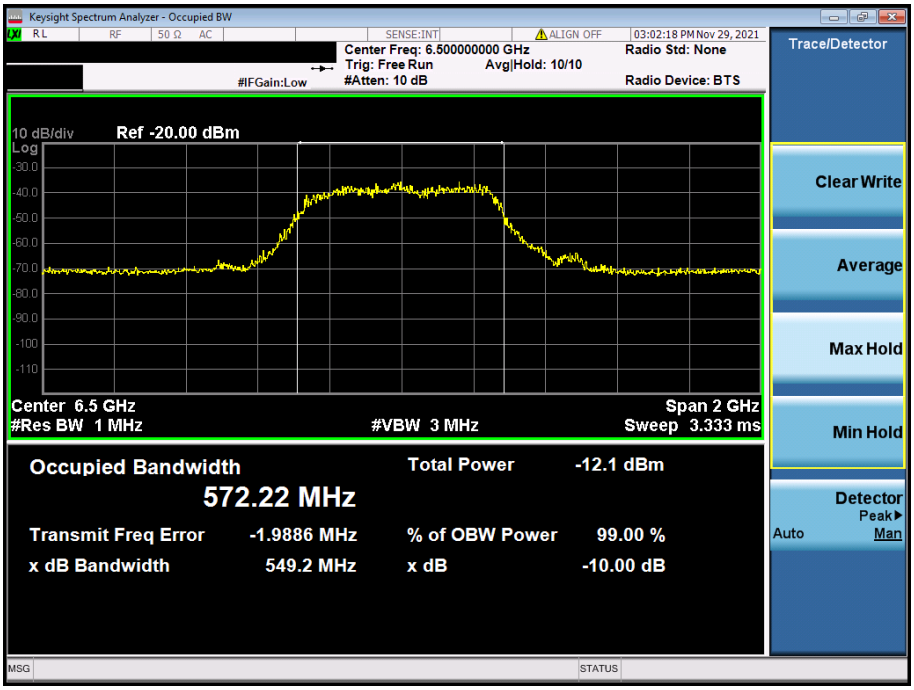
Test Frequency (MHz)	Modulation	10dB bandwidth (MHz)	Limit (MHz)	Results
CH 5	BPRF	567.9	≥500	Pass
CH 5	HPRF	549.2	≥500	Pass
CH 9	BPRF	574.1	≥500	Pass
CH 9	HPRF	554.8	≥500	Pass

Test plot as follows:

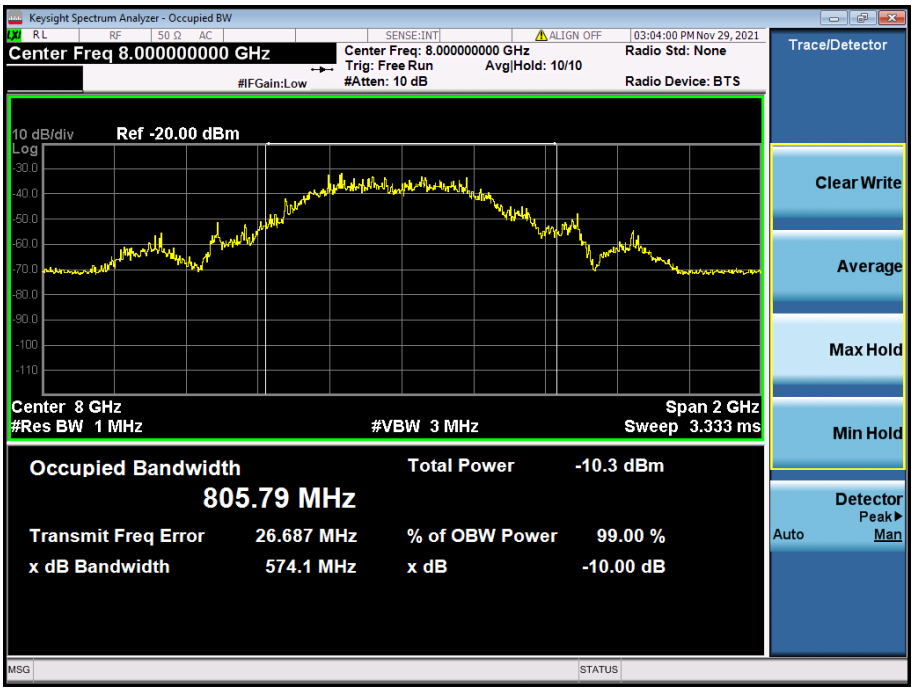
Test channel:	CH 5 BRPF



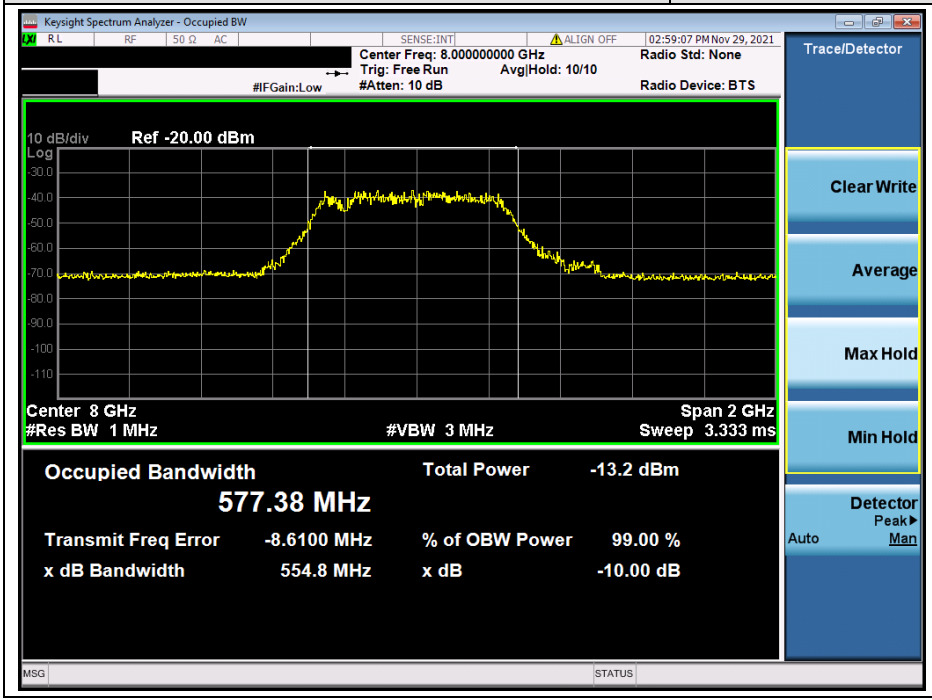
Test channel:	CH 5 HRPF



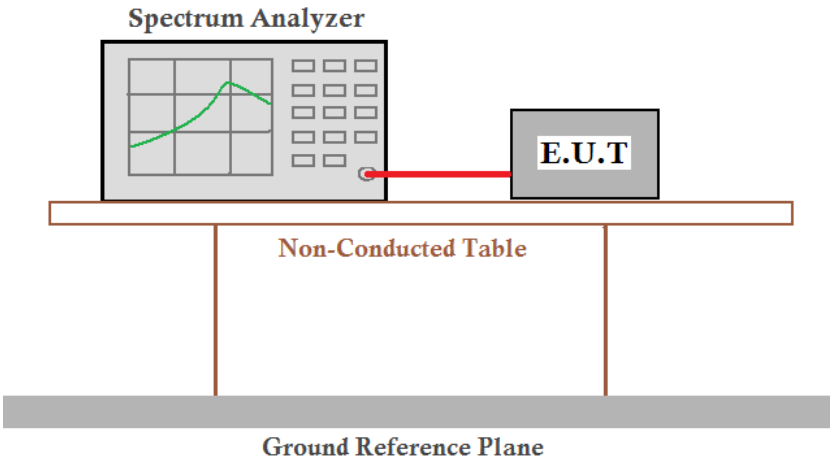
Test channel:	CH 9 BRPF



Test channel:	CH 9 HRPF

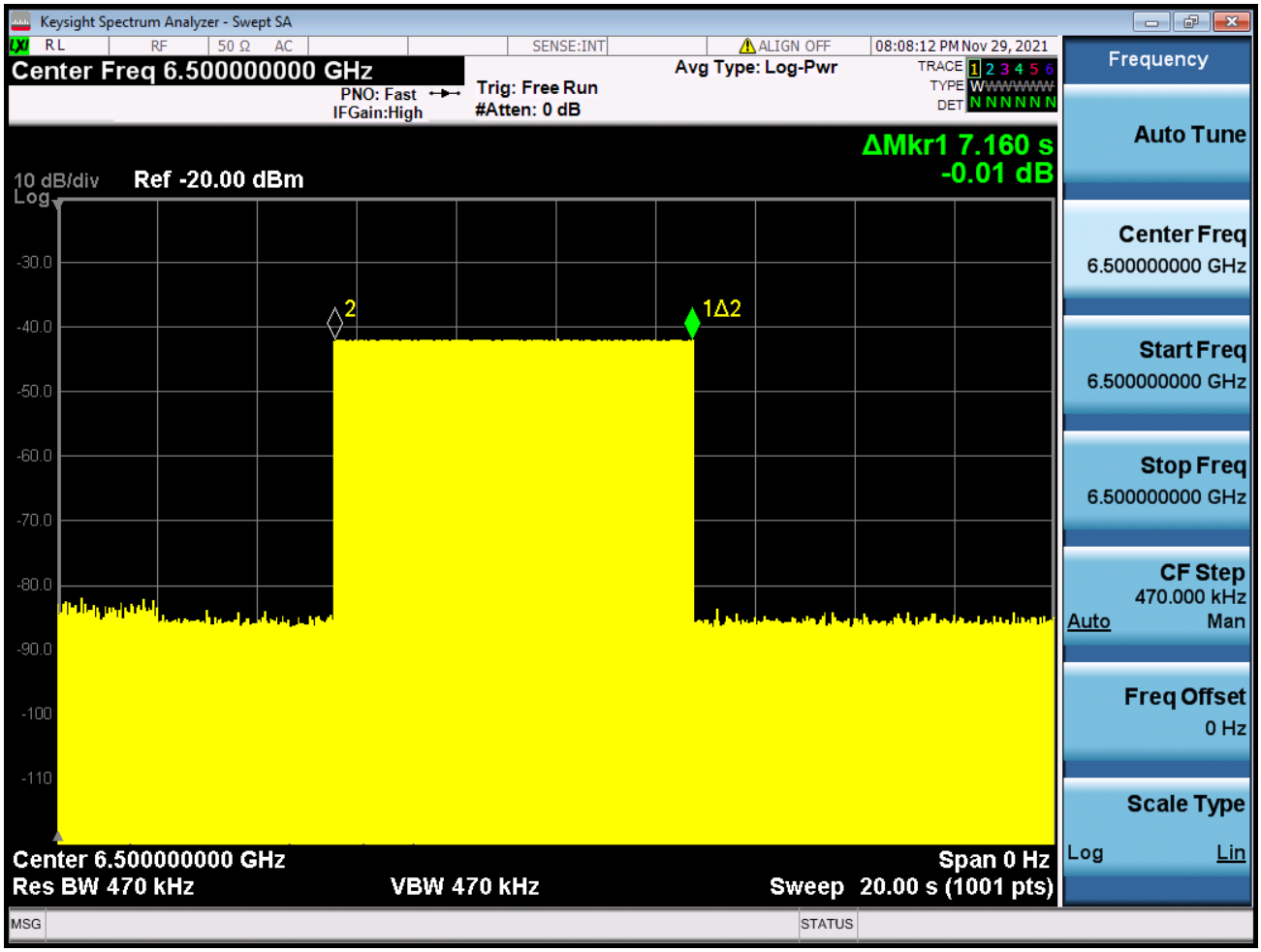


7.5 Shutdown Timing Requirements

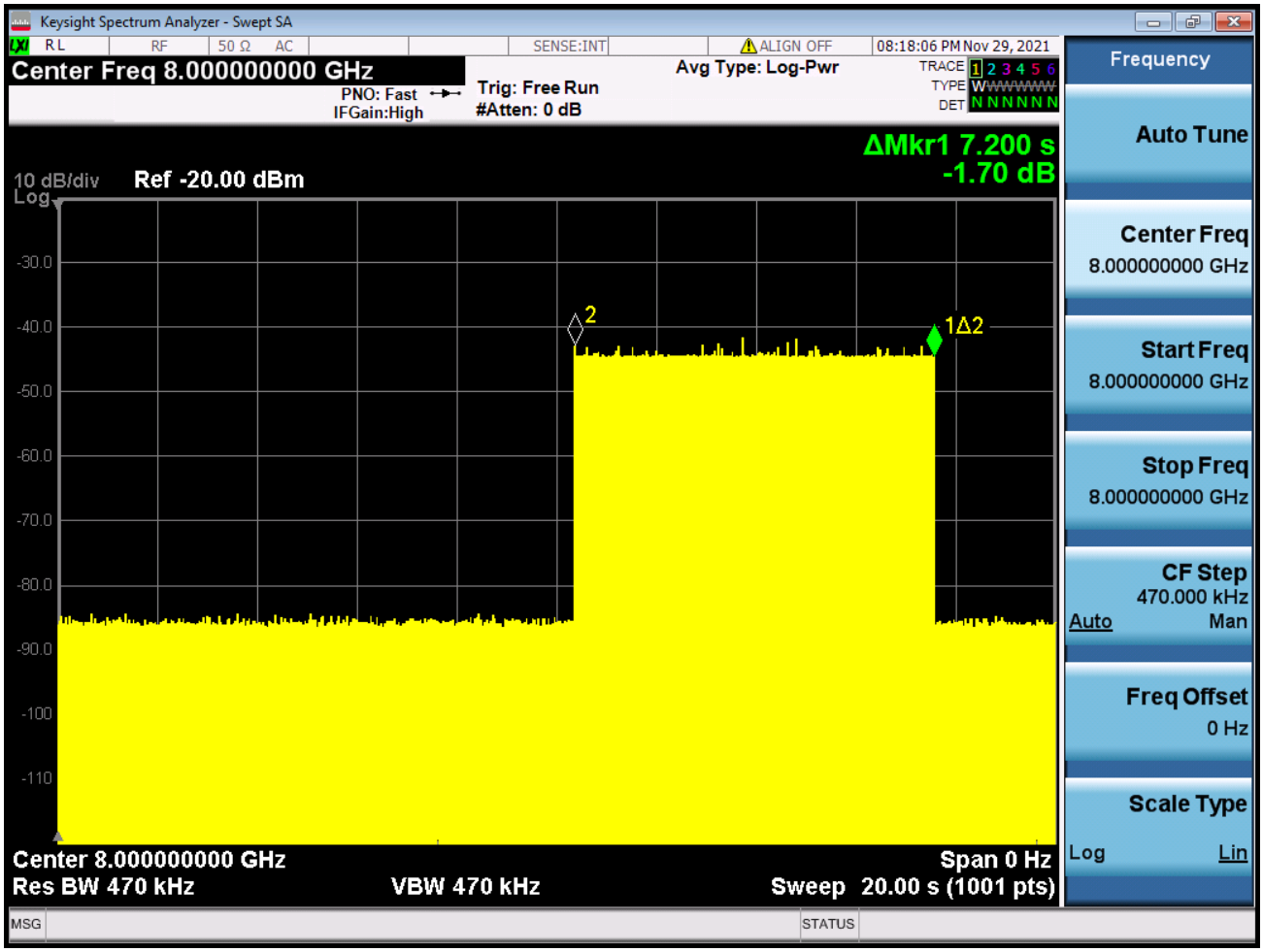
Test Requirement:	47 CFR Part 15F Section 15.519(a)(1)
Test Method:	ANSI C63.10:2013 section 7.8.4
Test Setup:	
Limit:	The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received
Exploratory Test Mode:	01.Normal operation mode
Instruments Used:	Refer to section 5 for details
Test Results:	Pass

Measurement Data

CH 5



CH 9



8 Test Setup Photo

Refer to Appendix - Test Setup Photos for GZCR2111021423AT.

9 EUT Constructional Details (EUT Photos)

Refer to Appendix – External and Internal Photos for GZCR2111021423AT.

- End of the Report -

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