EMC-TRF-01 Rev 1.0

Report No.: GZCR210502032702
Page: 1 of 69
FCC ID: 2AWD4-ECHTES156

TEST REPORT

Application No.:	GZCR2105020327AT
Applicant:	Echelon Fitness Multimedia, LLC
Address of Applicant:	605 Chestnut Street, Suite 700, Chattanooga, TN 37450 USA
Manufacturer:	Echelon Fitness Multimedia, LLC
Address of Manufacturer:	605 Chestnut Street, Suite 700, Chattanooga, TN 37450 USA
Factory:	TES Touch Embedded Solutions (Xiamen) CO., LTD.
Factory of Manufacturer:	No. 60, Xinglin South Rd., Jimei District, Xiamen, Fujian 361022, China
Equipment Under Test (EUT):	
EUT Name:	Echelon Touch Screen
Model No.:	ECHTES-156, ECHTES-215, ECHTES-238 ♣
♣	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2021-05-26
Date of Test:	2021-06-08 to 2021-07-12
Date of Issue:	2021-07-16
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		*2021-07-16*		*Original*

Authorized for issue by				
Tested By		Jim Li **Jim Li/Project Engineer**		
Reviewed By		Ricky Liu **Ricky Liu/Reviewer**		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power		ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions		ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	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.

♣ **Declaration of EUT Family Grouping:**

Model No.: ECHTES-156, ECHTES-215, ECHTES-238

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference on the LCD panel size.

Therefore, only the model ECHTES-156 was tested.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	DC 12 V powered by SWITCHING ADAPTER as below: MODEL: SOY-1200500-327 INPUT:100-240VAC~, 50/60Hz, 1.7A Max OUTPUT:12.0V, 5.0A, 60.0W
Cable(s):	AC mains for adapter:3 wires, 1.8m, unshielded DC input for main unit:1.8m, with ferrite bead DC IN Port USB Port USB/OTG Port TF Card Slot HDMI Port LAN Port LINE OUT Port DC OUT Port 3.5mm Headphone Jack
Test Voltage:	AC 120 V, 60 Hz
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	PCB Antenna
Antenna Gain (Max):	2dBi declared by applicant.
Firmware Version:	MTB-818 V1-2 C002B002-20210610
Hardware Version:	rk3288_mtb818
Testing Software:	WLAN Test
Sample NO.:	119C105921
Power Setting:	5dBm can not be changed by user.
Function:	Media PAD with 2.4G BT BLE function.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Mobile Phone	SAMSUNG	SM-G9810	RFCN309Q9QF
Note Book PC	LENOVO	Lenovo Xiaoxinchao 5000	PF0TLJX7

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	±3.12dB
Conducted Peak Output Power	± 0.75dB
Minimum 6dB Bandwidth	± 3%
Power Spectrum Density	± 2.84dB
Conducted Band Edges Measurement	± 0.75dB
Conducted Spurious Emissions	± 0.75dB
Radiated Emissions which fall in the restricted bands	± 4.5dB (Below 1GHz); ± 4.8dB (Above 1GHz)
Radiated Spurious Emissions	±5.06dB (3m); ±4.46dB (10m)

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

4.8 Duty cycle of the EUT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percent.

Formula:

Duty Cycle = Ton/(Ton+Toff)

Measurement Procedure:

1. Set span = Zero
2. RBW=8MHz
3. VBW=8MHz
4. Detector=Peak

Mode	Channel(MHz)	Duty Cycle(%)	Correction Factor(dB)*
BLE_1M	2402	63.00	2.00
	2440	63.00	2.00
	2480	62.90	2.01
BLE_2M	2402	33.20	4.79
	2440	33.30	4.77
	2480	33.20	4.79

*Correction Factor(dB) =10log(1/Duty Cycle)

Please refer to appendix for details.

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	2020-09-25	2021-09-24
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	2021/6/1	2022/5/31

Conducted Peak Output Power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Minimum 6dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Power Spectrum Density					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Conducted Band Edges Measurement					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Conducted Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

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	2020/9/9	2022/9/8
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
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2020-11-13	2021-11-12
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2020-09-17	2021-09-16
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2020-07-29	2021-07-28
Horn Antenna(14-40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2020-09-09	2021-09-08

Radiated Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2020/9/9	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
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2020-11-13	2021-11-12
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2020-09-17	2021-09-16
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2020-07-29	2021-07-28
Signal Analyzer (20Hz-26.5GHz)	Rohde & Schwarz	FISQ 26	EMC0069	2020/11/13	2021-11-12

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 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

15.247(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

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

Please refer to 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

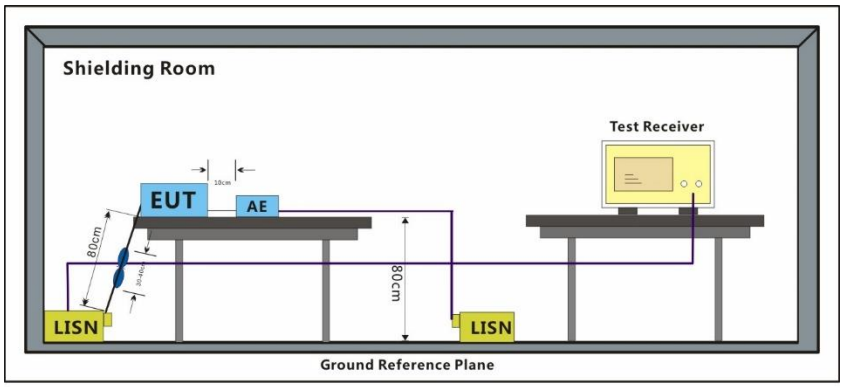
Operating Environment:

Temperature: 22.8 °C Humidity: 52 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

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.

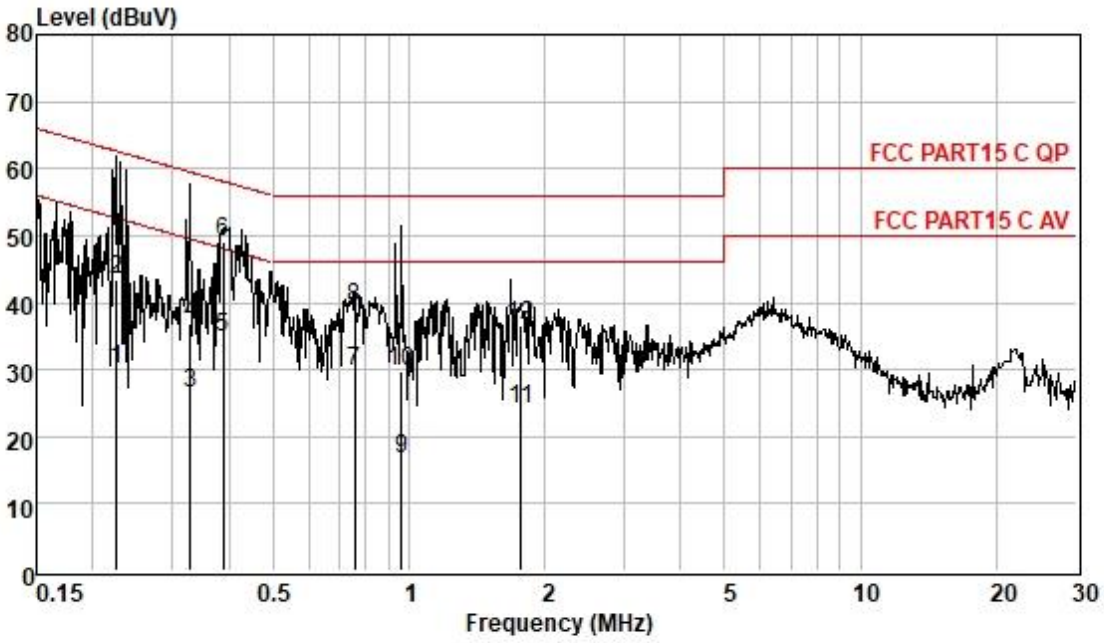
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane.

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

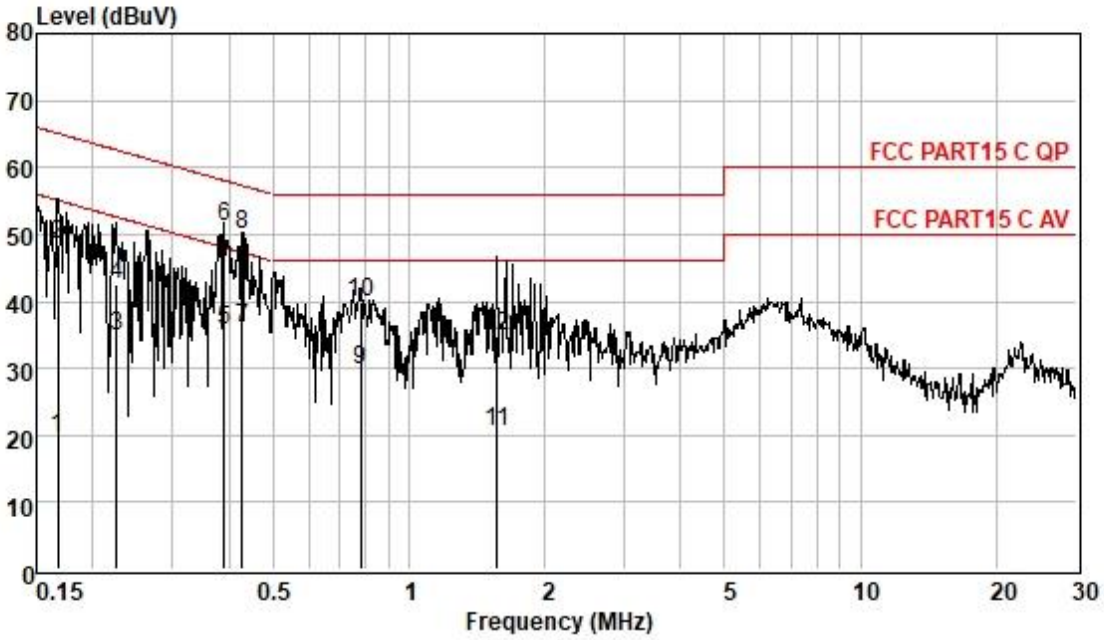
Test Mode: 04; Line: Live line



Pol :LINE
Mode :
Model :156

Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.23	20.37	0.06	9.62	30.05	52.61	-22.56	Average
0.23	33.85	0.06	9.62	43.53	62.61	-19.08	QP
0.33	16.73	0.06	9.63	26.42	49.49	-23.07	Average
0.33	27.08	0.06	9.63	36.77	59.49	-22.72	QP
0.39	24.98	0.06	9.62	34.66	48.08	-13.42	Average
0.39	39.49	0.06	9.62	49.17	58.08	-8.91	QP
0.76	20.03	0.07	9.63	29.73	46.00	-16.27	Average
0.76	29.60	0.07	9.63	39.30	56.00	-16.70	QP
0.96	6.85	0.07	9.62	16.54	46.00	-29.46	Average
0.96	19.96	0.07	9.62	29.65	56.00	-26.35	QP
1.77	14.34	0.11	9.62	24.07	46.00	-21.93	Average
1.77	26.78	0.11	9.62	36.51	56.00	-19.49	QP

Test Mode: 04; Line: Neutral Line



Pol :NEUTRAL
Mode :
Model :156

Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.17	9.89	0.06	9.55	19.50	55.08	-35.58	Average
0.17	38.98	0.06	9.55	48.59	65.08	-16.49	QP
0.23	25.22	0.06	9.55	34.83	52.61	-17.78	Average
0.23	33.06	0.06	9.55	42.67	62.61	-19.94	QP
0.39	26.05	0.06	9.56	35.67	48.03	-12.36	Average
0.39	41.42	0.06	9.56	51.04	58.03	-6.99	QP
0.43	26.43	0.06	9.56	36.05	47.29	-11.24	Average
0.43	40.32	0.06	9.56	49.94	57.29	-7.35	QP
0.78	20.08	0.07	9.55	29.70	46.00	-16.30	Average
0.78	30.22	0.07	9.55	39.84	56.00	-16.16	QP
1.57	10.95	0.10	9.55	20.60	46.00	-25.40	Average
1.57	25.26	0.10	9.55	34.91	56.00	-21.09	QP

7.2 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.2.1 E.U.T. Operation

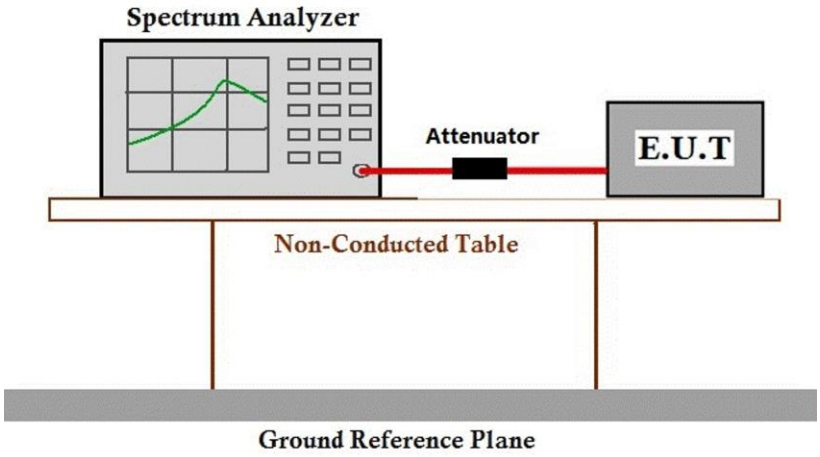
Operating Environment:

Temperature: 29.6 °C Humidity: 53.3 % RH Atmospheric Pressure: 1005 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.3 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)
Test Method: ANSI C63.10 (2013) Section 11.8.1
Limit: ≥500 kHz

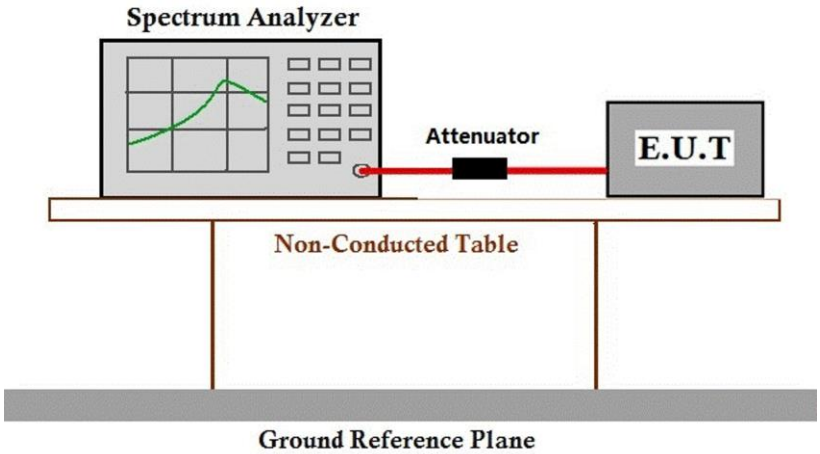
7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 29.6 °C Humidity: 53.3 % RH Atmospheric Pressure: 1005 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.4 Power Spectrum Density

Test Requirement	47 CFR Part 15, Subpart C 15.247(e)
Test Method:	ANSI C63.10 (2013) Section 11.10.2
Limit:	≤8dBm in any 3 kHz band during any time interval of continuous transmission

7.4.1 E.U.T. Operation

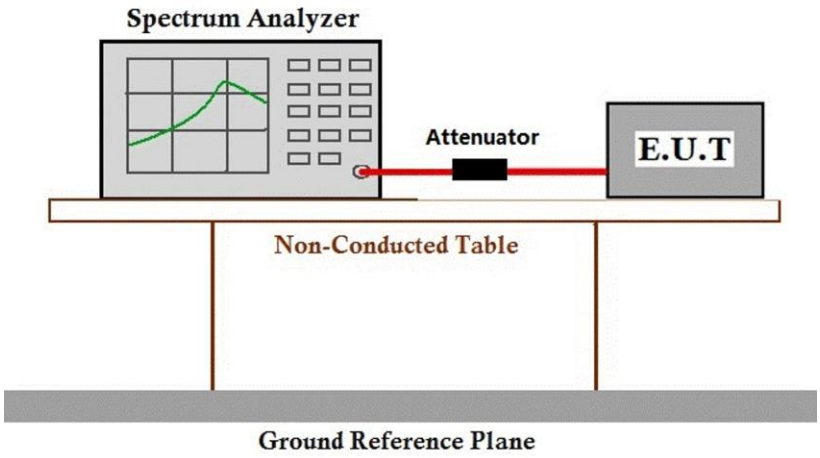
Operating Environment:

Temperature: 29.6 °C Humidity: 53.3 % RH Atmospheric Pressure: 1005 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.5 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.13.3.2

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

7.5.1 E.U.T. Operation

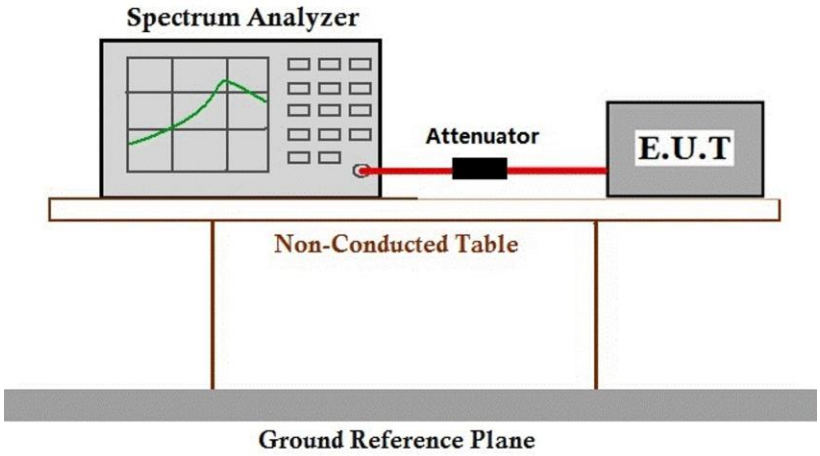
Operating Environment:

Temperature: 29.6 °C Humidity: 53.3 % RH Atmospheric Pressure: 1005 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.6 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)

Test Method: ANSI C63.10 (2013) Section 11.11

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

7.6.1 E.U.T. Operation

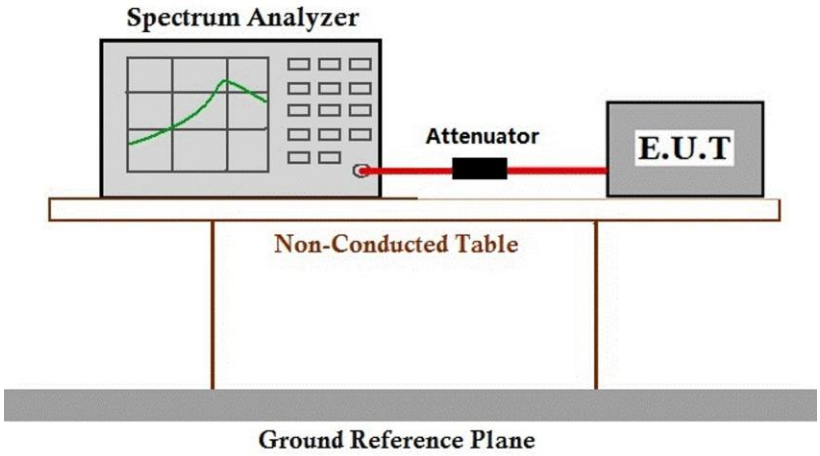
Operating Environment:

Temperature: 29.6 °C Humidity: 53.3 % RH Atmospheric Pressure: 1005 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.6.3 Test Setup Diagram



7.6.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.7 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

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.		

7.7.1 E.U.T. Operation

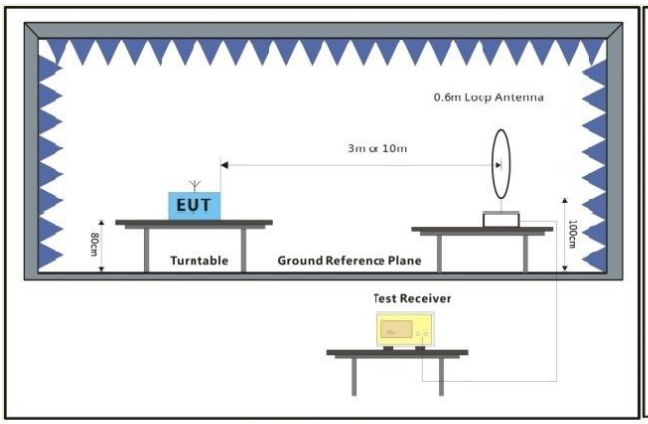
Operating Environment:

Temperature: 26.2 °C Humidity: 62.5 % RH Atmospheric Pressure: 1010 mbar

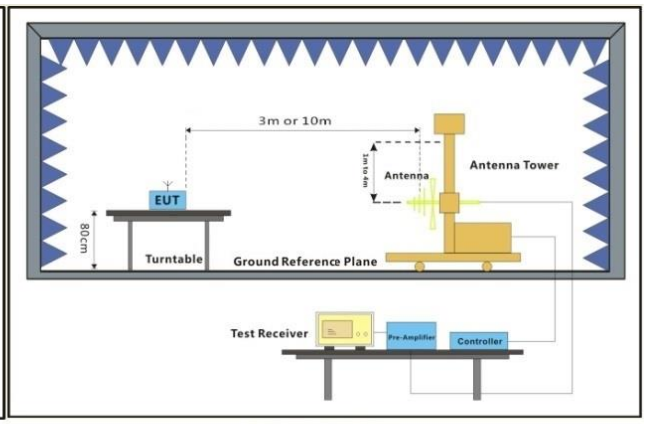
7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

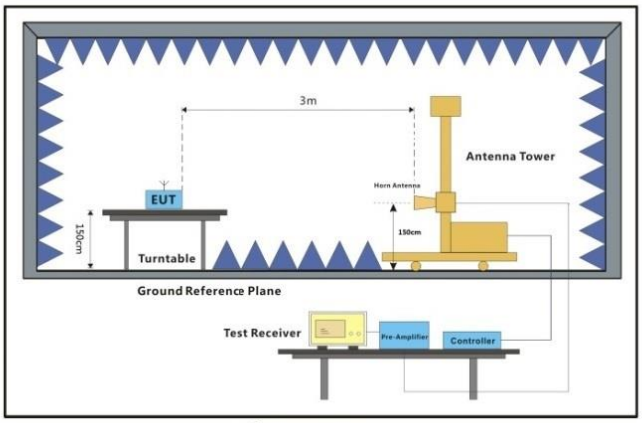
7.7.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

7.7.4 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 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.

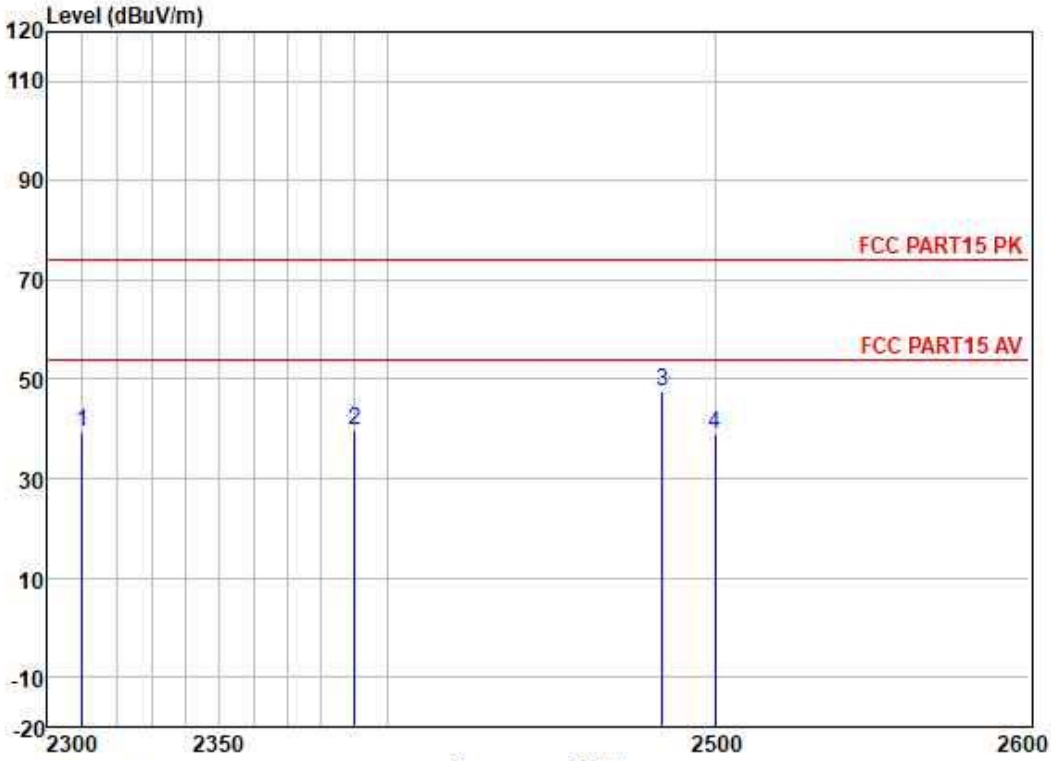
j. Repeat above procedures until all frequencies measured was complete.

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.

Remark 3: Antenna: 3 denotes the type of antenna for above 1000MHz.

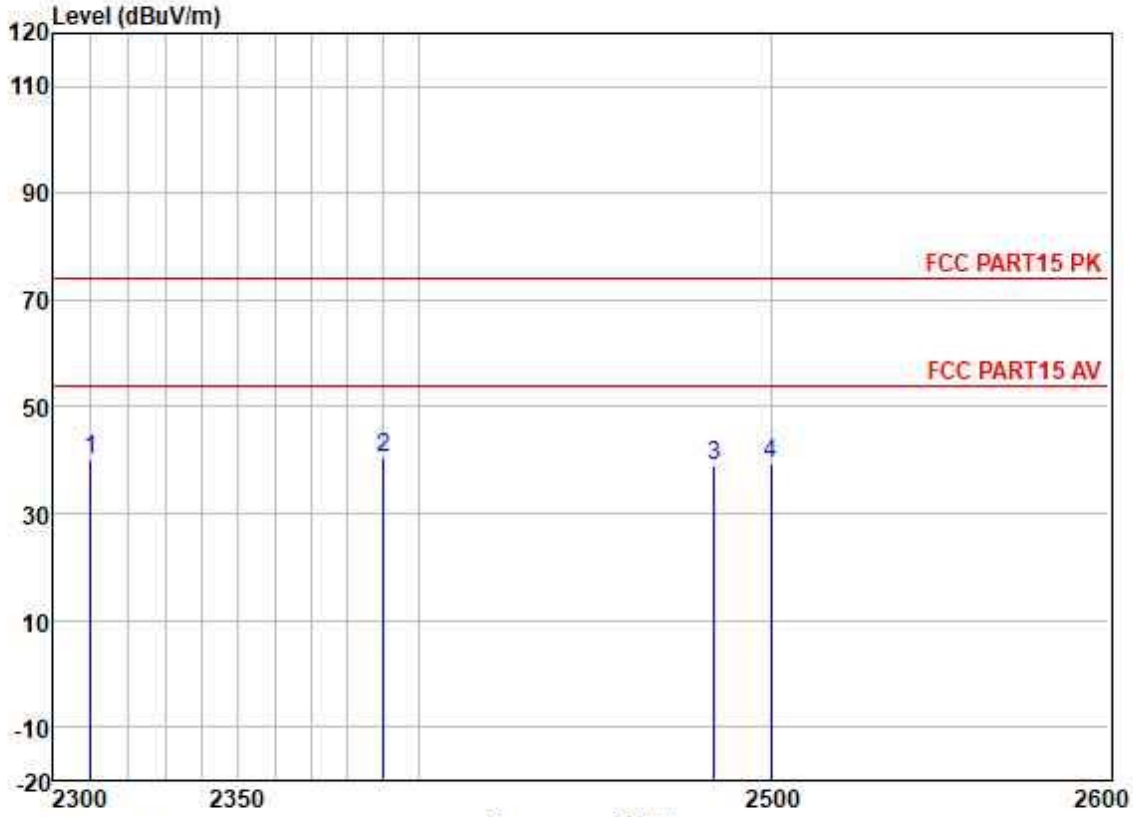
Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; ; Channel:High; Antenna: 3



race: (Discrete)

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	46.35	27.15	3.32	37.62	39.20	74.00	-34.80	HORIZONTAL	Peak
2	2390.000	46.64	27.33	3.48	37.59	39.86	74.00	-34.14	HORIZONTAL	Peak
3	2483.500	54.04	27.48	3.53	37.57	47.48	74.00	-26.52	HORIZONTAL	Peak
4	2500.000	45.66	27.50	3.40	37.56	39.00	74.00	-35.00	HORIZONTAL	Peak

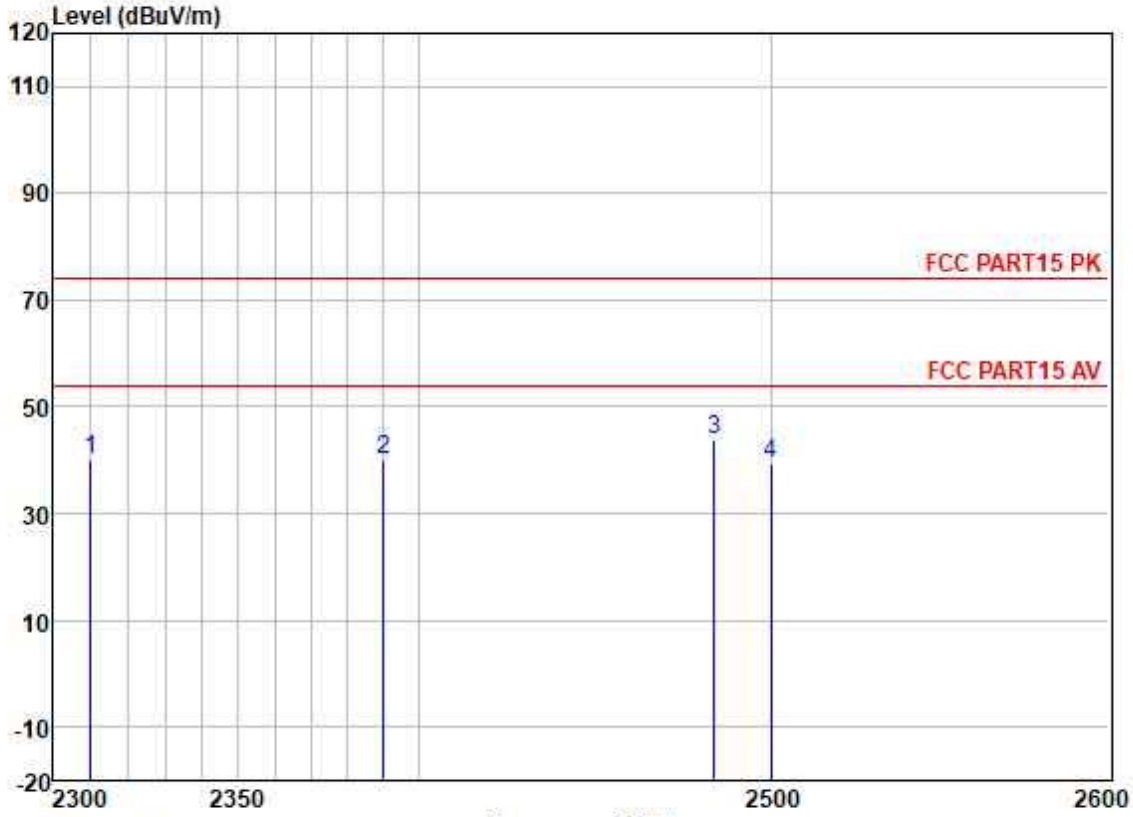
Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low; Antenna: 3



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	47.17	27.15	3.32	37.62	40.02	74.00	-33.98	HORIZONTAL	Peak
2	2390.000	47.35	27.33	3.48	37.59	40.57	74.00	-33.43	HORIZONTAL	Peak
3	2483.500	45.40	27.48	3.53	37.57	38.84	74.00	-35.16	HORIZONTAL	Peak
4	2500.000	45.92	27.50	3.40	37.56	39.26	74.00	-34.74	HORIZONTAL	Peak

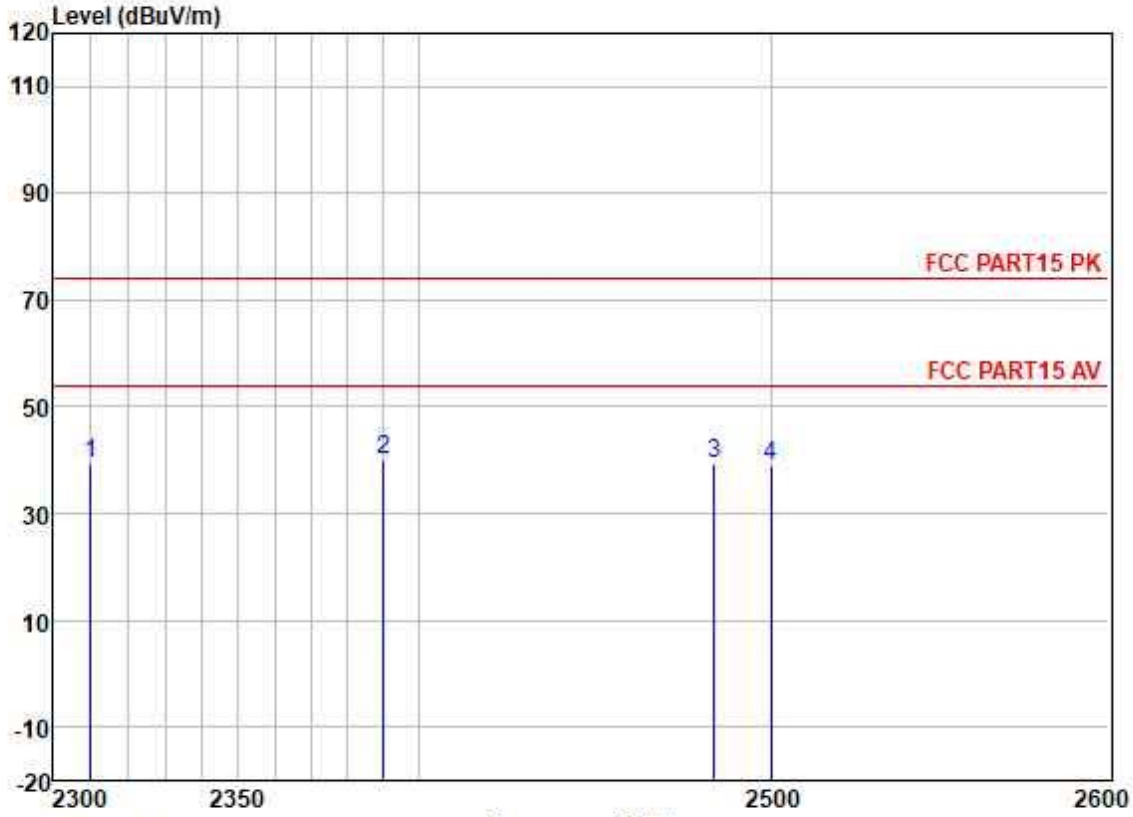
Test Mode: 04; Polarity: Vertical; Modulation:GFSK; ; Channel:High; Antenna: 3



race: (Discrete)

	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	47.24	27.15	3.32	37.62	40.09	74.00	-33.91	VERTICAL	Peak
2	2390.000	46.96	27.33	3.48	37.59	40.18	74.00	-33.82	VERTICAL	Peak
3	2483.500	50.56	27.48	3.53	37.57	44.00	74.00	-30.00	VERTICAL	Peak
4	2500.000	46.08	27.50	3.40	37.56	39.42	74.00	-34.58	VERTICAL	Peak

Test Mode: 04; Polarity: Vertical; Modulation:GFSK; ; Channel:Low; Antenna: 3



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	46.36	27.15	3.32	37.62	39.21	74.00	-34.79	VERTICAL	Peak
2	2390.000	46.74	27.33	3.48	37.59	39.96	74.00	-34.04	VERTICAL	Peak
3	2483.500	46.10	27.48	3.53	37.57	39.54	74.00	-34.46	VERTICAL	Peak
4	2500.000	45.73	27.50	3.40	37.56	39.07	74.00	-34.93	VERTICAL	Peak

7.8 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 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.		

7.8.1 E.U.T. Operation

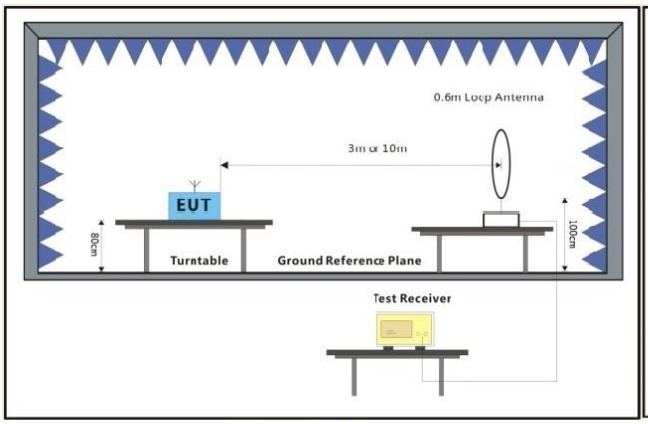
Operating Environment:

Temperature: 25.5 °C Humidity: 65.8 % RH Atmospheric Pressure: 1005 mbar

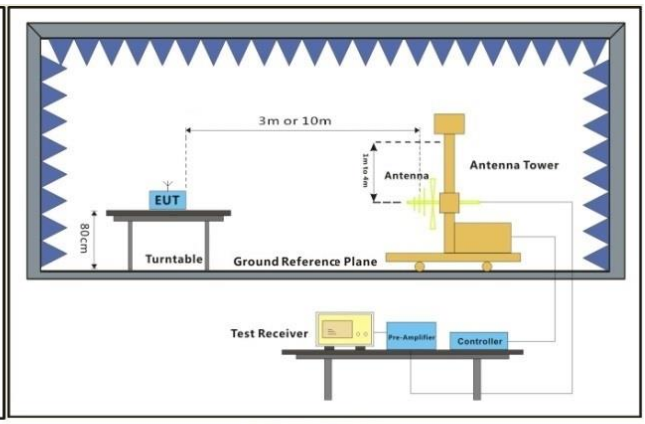
7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	04	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

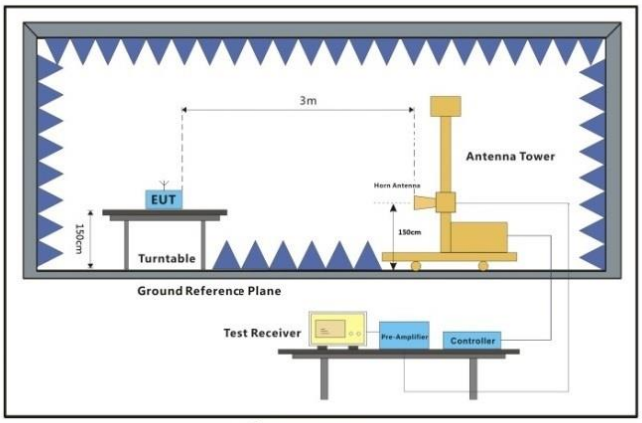
7.8.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

7.8.4 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:

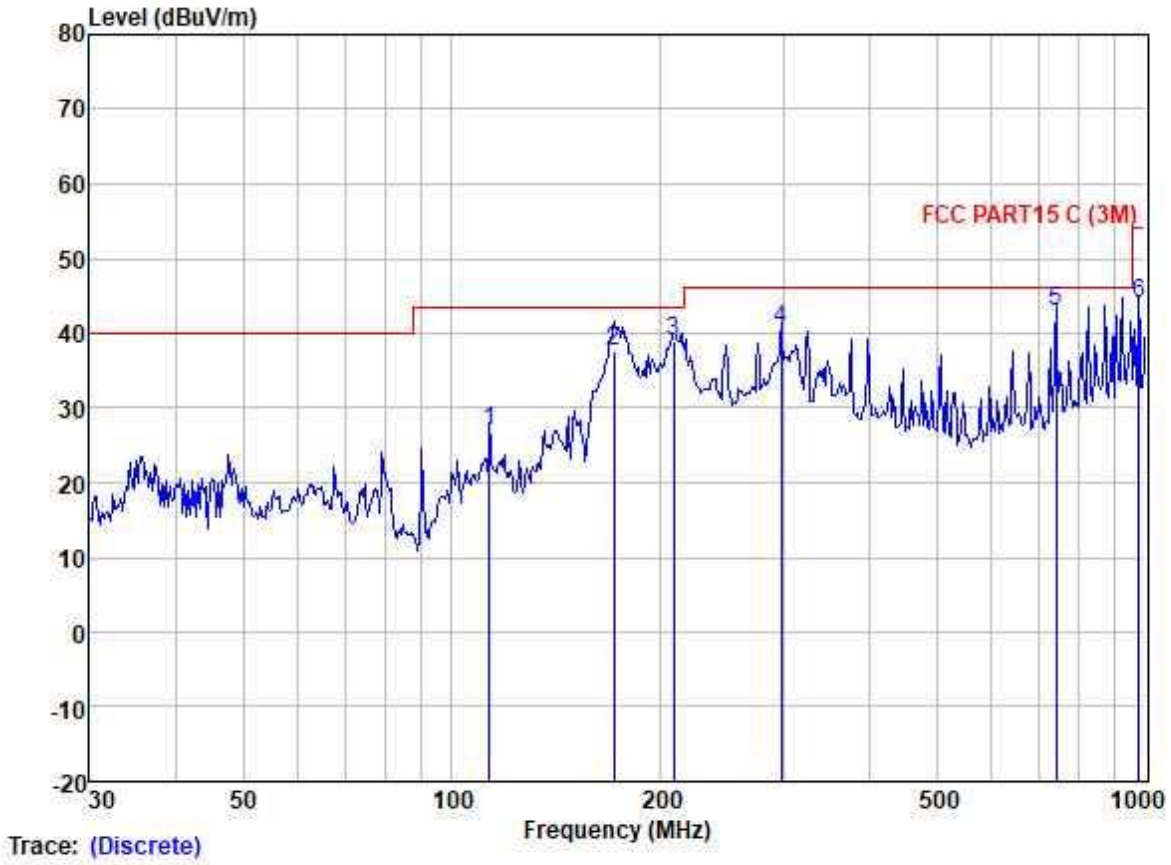
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

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, if 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.

5) The average emission data was not adding the duty cycle correction factor as the peak emission is below the average emission limit in this report.

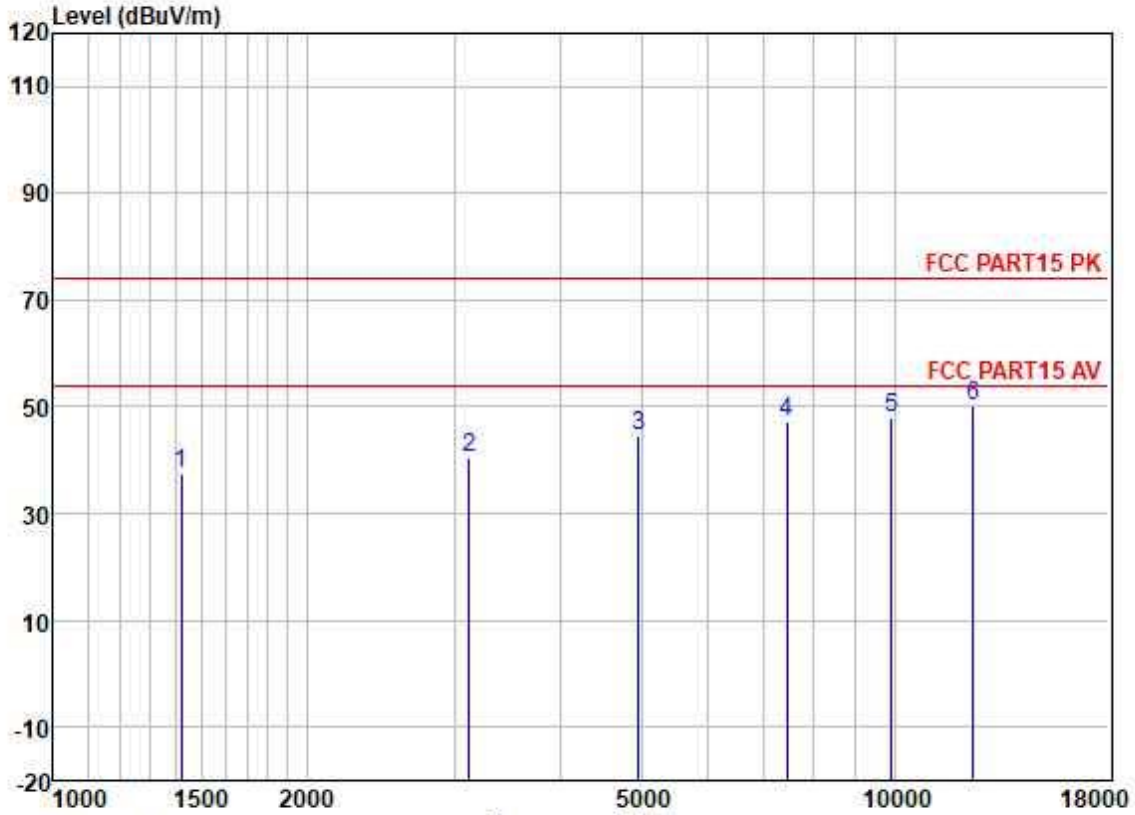
Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low;




```
Site        : SGS
Condition   : FCC PART15 C (3M)                                  HORIZONTAL
Job         :
Model       : 156
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	113.32	41.73	10.57	1.82	27.05	27.07	43.50	-16.43	HORIZONTAL	QP
2	171.39	49.05	13.03	2.40	26.77	37.71	43.50	-5.79	HORIZONTAL	QP
3	208.58	53.37	9.80	2.57	26.72	39.02	43.50	-4.48	HORIZONTAL	QP
4	298.27	50.28	13.57	3.16	26.55	40.46	46.00	-5.54	HORIZONTAL	QP
5	744.87	42.88	22.10	5.97	28.10	42.85	46.00	-3.15	HORIZONTAL	QP
6	979.18	40.40	24.10	7.31	27.69	44.12	54.00	-9.88	HORIZONTAL	QP

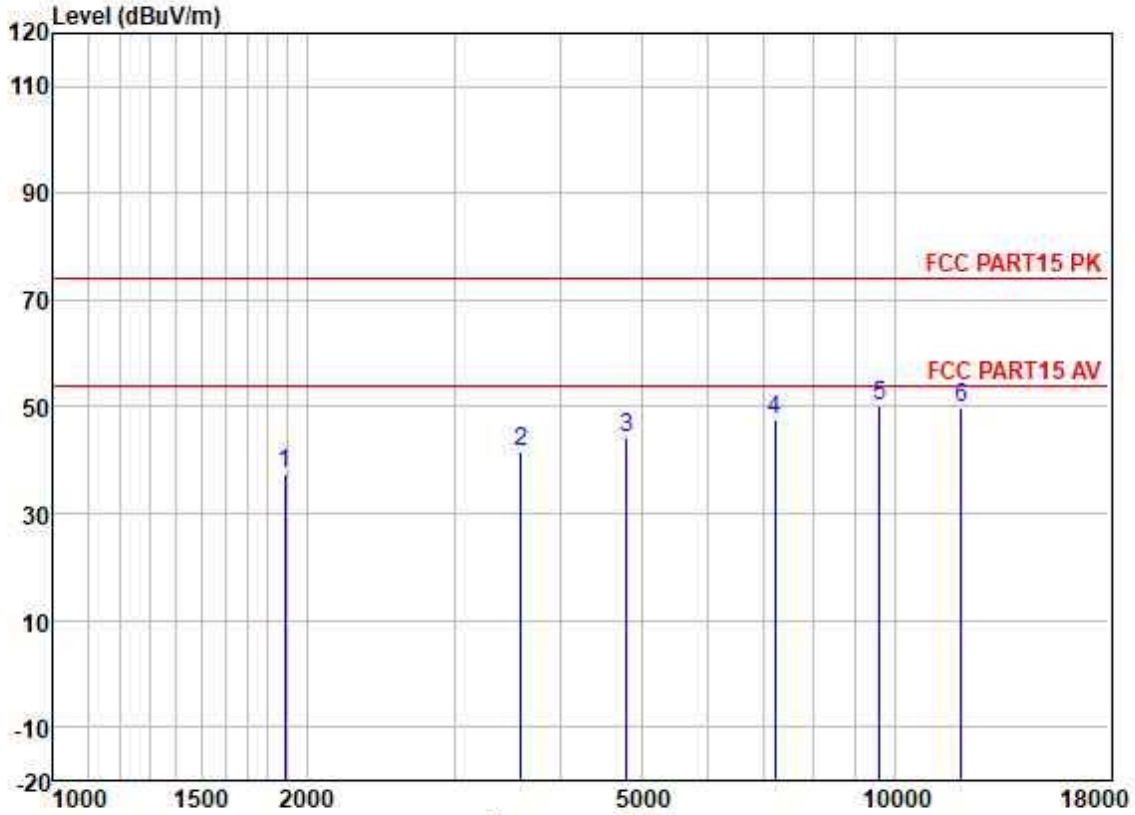
Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; ; Channel:High;



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1418.692	47.48	25.42	2.63	38.20	37.33	74.00	-36.67	HORIZONTAL	Peak
2	3123.039	45.28	28.50	3.94	37.14	40.58	74.00	-33.42	HORIZONTAL	Peak
3	4960.110	44.13	31.65	5.65	36.84	44.59	74.00	-29.41	HORIZONTAL	Peak
4	7440.732	42.31	36.27	6.22	37.47	47.33	74.00	-26.67	HORIZONTAL	Peak
5	9920.221	39.79	38.65	6.96	37.40	48.00	74.00	-26.00	HORIZONTAL	Peak
6	12400.920	40.49	38.57	7.97	36.88	50.15	74.00	-23.85	HORIZONTAL	Peak

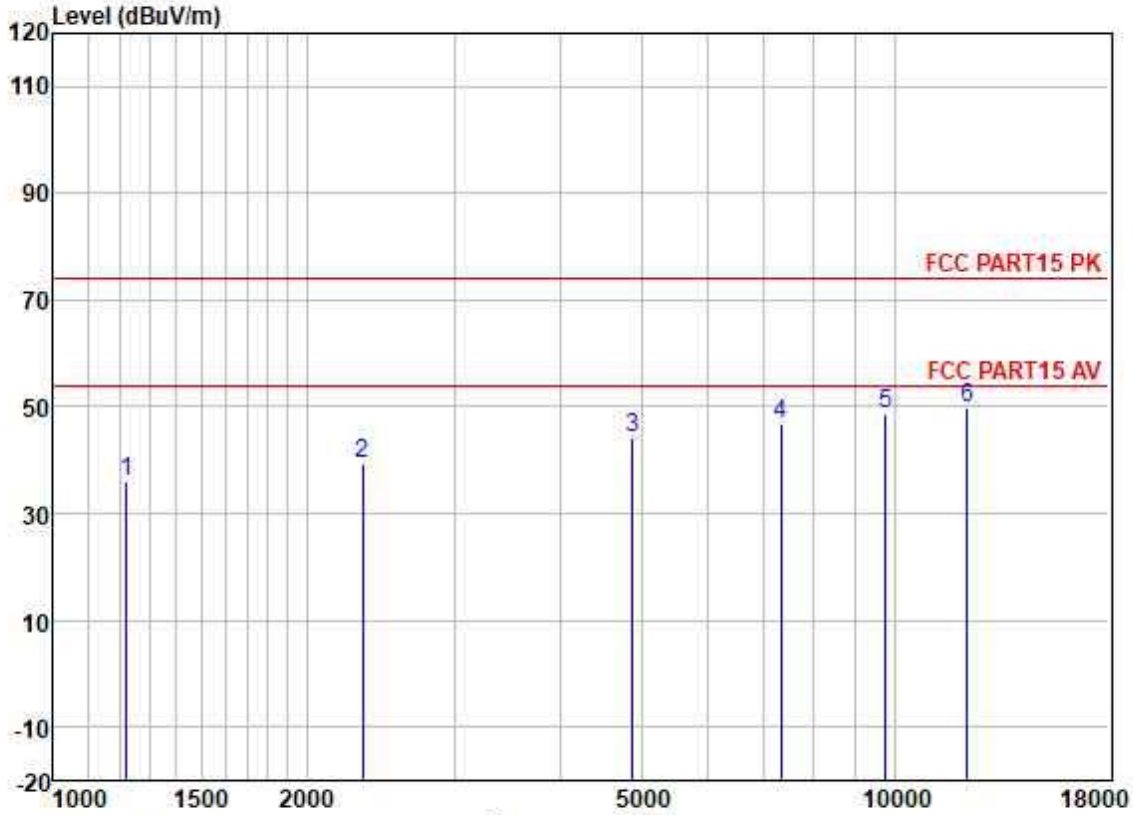
Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low;



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1883.236	46.16	26.03	2.91	37.77	37.33	74.00	-36.67	HORIZONTAL	Peak
2	3598.203	44.86	29.04	4.50	36.91	41.49	74.00	-32.51	HORIZONTAL	Peak
3	4804.274	44.07	31.42	5.40	36.83	44.06	74.00	-29.94	HORIZONTAL	Peak
4	7206.551	43.58	35.54	5.98	37.38	47.72	74.00	-26.28	HORIZONTAL	Peak
5	9608.540	42.23	38.37	7.07	37.42	50.25	74.00	-23.75	HORIZONTAL	Peak
6	12010.510	39.93	38.90	8.19	37.10	49.92	74.00	-24.08	HORIZONTAL	Peak

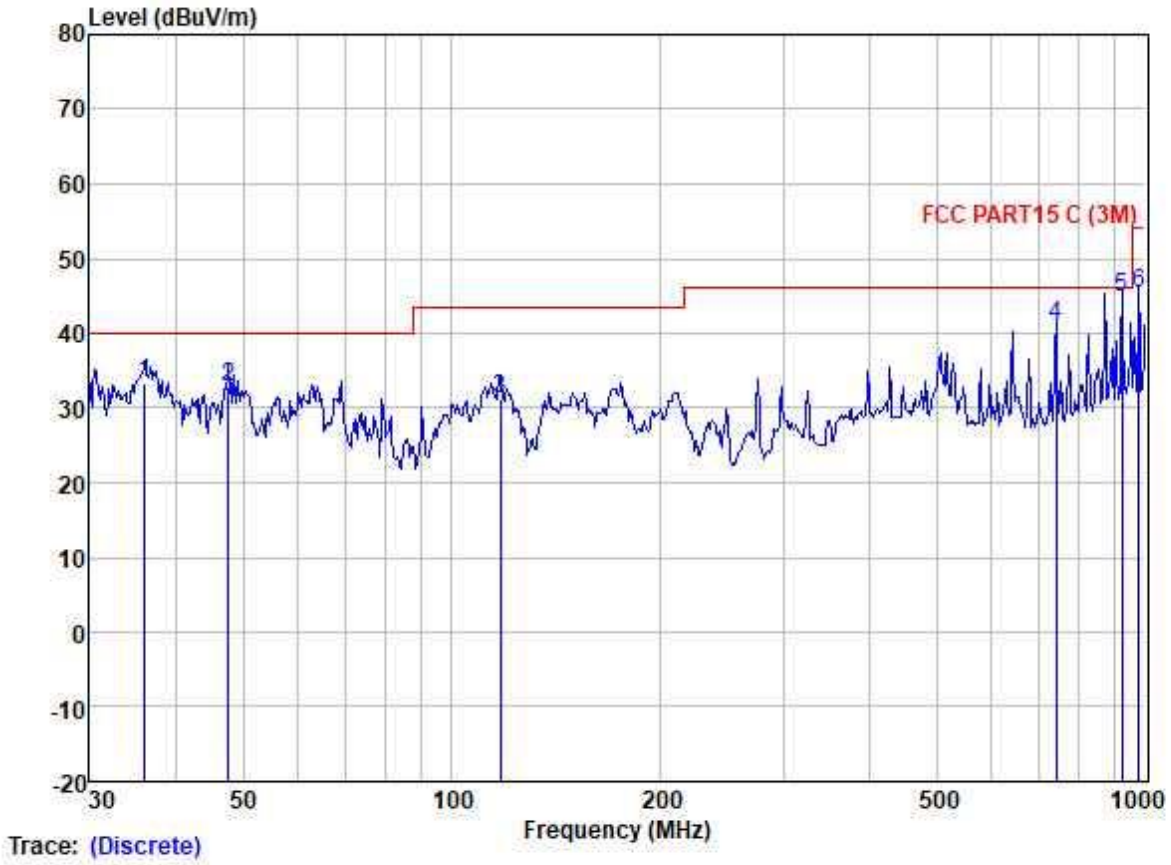
Test Mode: 04; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle;



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1220.714	47.30	24.82	2.32	38.37	36.07	74.00	-37.93	HORIZONTAL	Peak
2	2332.356	46.40	27.20	3.36	37.62	39.34	74.00	-34.66	HORIZONTAL	Peak
3	4884.185	44.07	31.56	5.52	36.84	44.31	74.00	-29.69	HORIZONTAL	Peak
4	7326.894	42.21	36.00	6.13	37.43	46.91	74.00	-27.09	HORIZONTAL	Peak
5	9768.390	40.59	38.53	7.01	37.41	48.72	74.00	-25.28	HORIZONTAL	Peak
6	12210.670	40.07	38.74	8.08	37.00	49.89	74.00	-24.11	HORIZONTAL	Peak

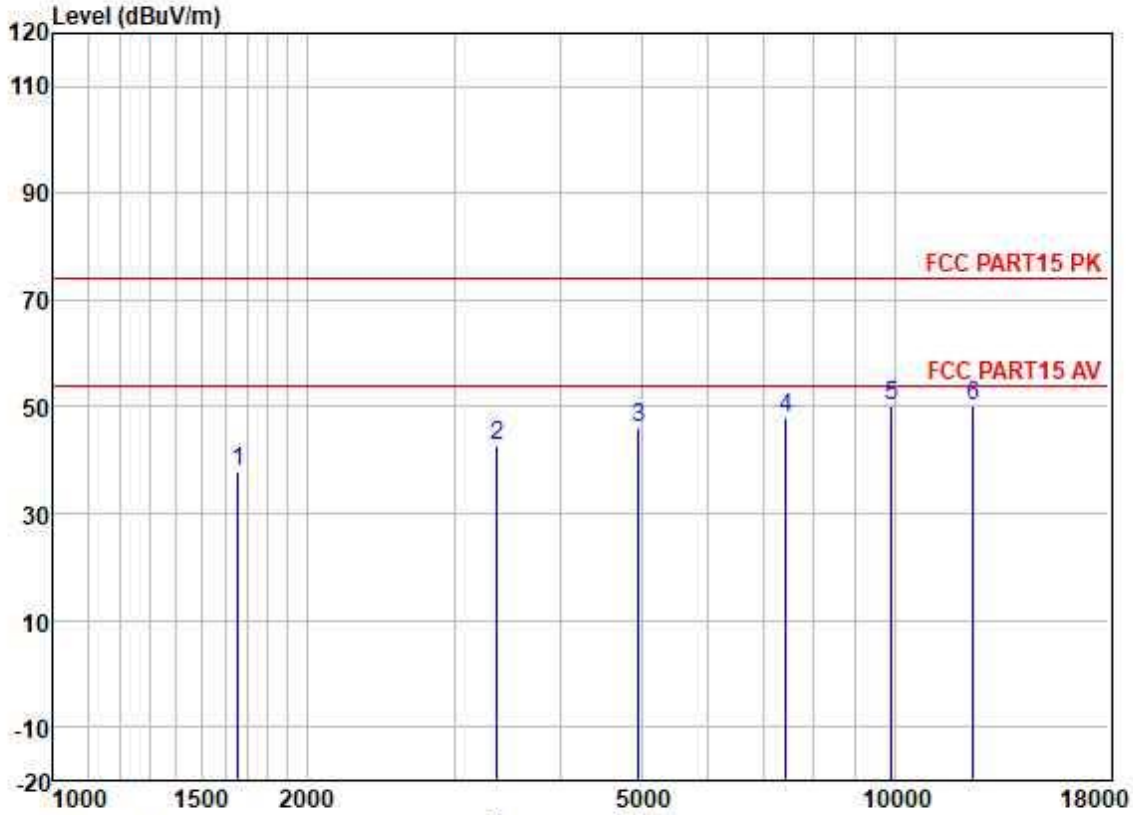
Test Mode: 04; Polarity: Vertical; Modulation:GFSK; ; Channel:Low;




```
Site        : SGS
Condition   : FCC PART15 C (3M)                                  VERTICAL
Job         :
Model       : 156
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	36.00	46.33	13.00	1.07	27.18	33.22	40.00	-6.78	VERTICAL	QP
2	47.66	44.77	13.99	1.13	27.17	32.72	40.00	-7.28	VERTICAL	QP
3	117.36	45.81	10.70	1.85	27.04	31.32	43.50	-12.18	VERTICAL	QP
4	744.87	41.01	22.10	5.97	28.10	40.98	46.00	-5.02	VERTICAL	QP
5	925.76	41.76	23.73	7.01	27.81	44.69	46.00	-1.31	VERTICAL	QP
6	979.18	41.74	24.10	7.31	27.69	45.46	54.00	-8.54	VERTICAL	QP

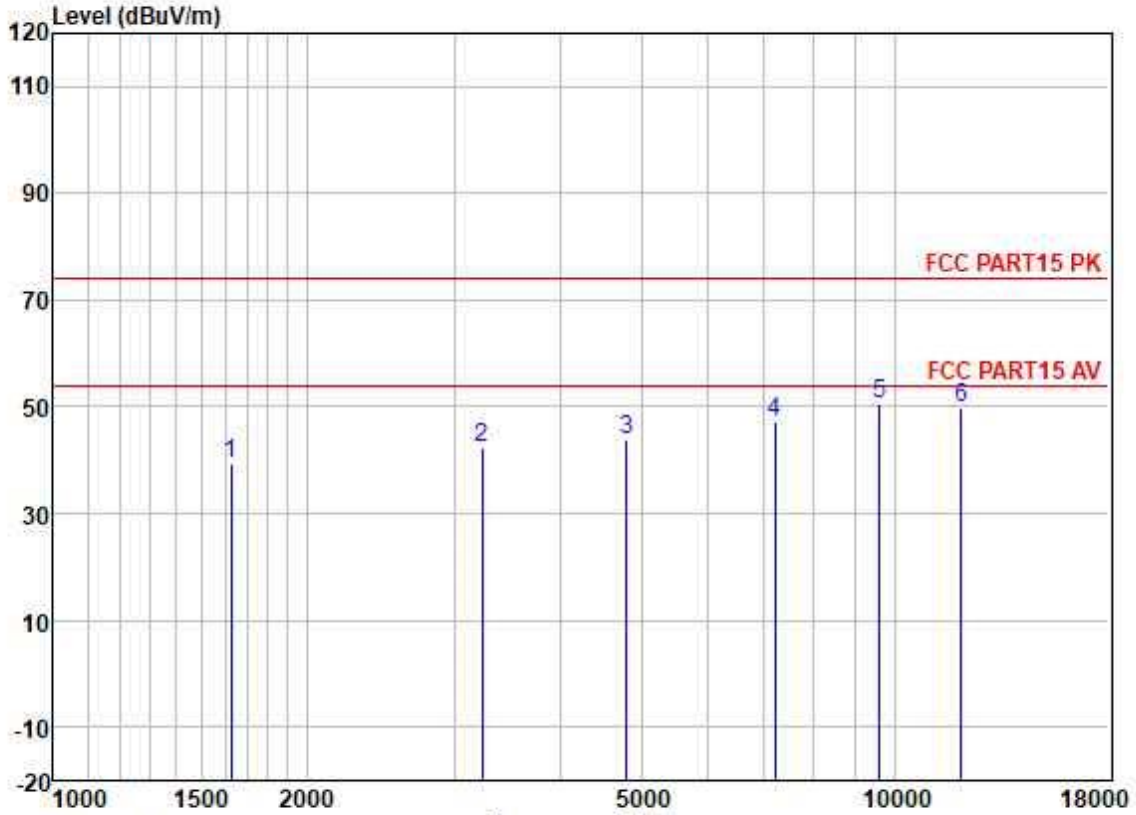
Test Mode: 04; Polarity: Vertical; Modulation:GFSK; ; Channel:High;



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1658.337	47.50	25.65	2.80	37.93	38.02	74.00	-35.98	VERTICAL	Peak
2	3366.778	46.88	28.82	4.09	36.99	42.80	74.00	-31.20	VERTICAL	Peak
3	4960.418	45.65	31.65	5.65	36.84	46.11	74.00	-27.89	VERTICAL	Peak
4	7440.026	42.79	36.27	6.22	37.47	47.81	74.00	-26.19	VERTICAL	Peak
5	9920.020	42.09	38.65	6.96	37.40	50.30	74.00	-23.70	VERTICAL	Peak
6	12400.150	40.47	38.57	7.97	36.88	50.13	74.00	-23.87	VERTICAL	Peak

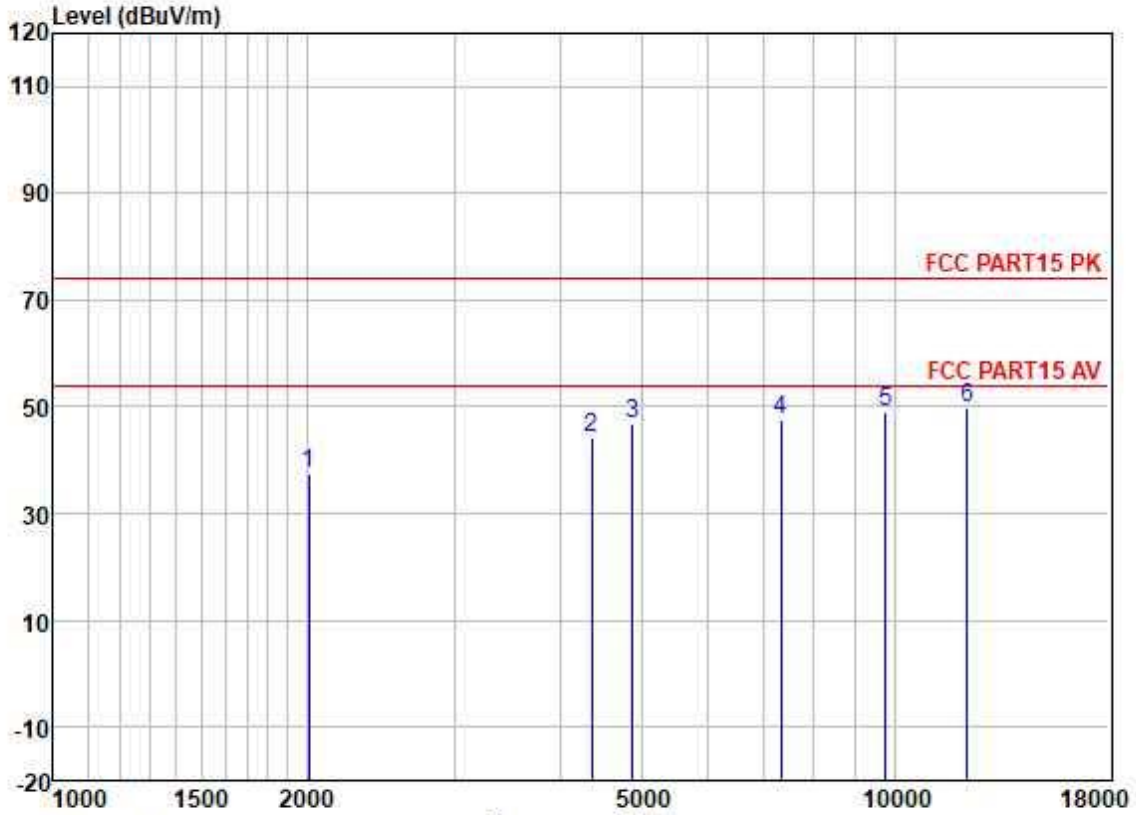
Test Mode: 04; Polarity: Vertical; Modulation:GFSK; ; Channel:Low;



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1625.121	49.04	25.61	2.80	37.95	39.50	74.00	-34.50	VERTICAL	Peak
2	3233.260	46.74	28.65	4.02	37.07	42.34	74.00	-31.66	VERTICAL	Peak
3	4804.315	43.79	31.42	5.40	36.83	43.78	74.00	-30.22	VERTICAL	Peak
4	7206.026	43.21	35.54	5.98	37.38	47.35	74.00	-26.65	VERTICAL	Peak
5	9608.530	42.50	38.37	7.07	37.42	50.52	74.00	-23.48	VERTICAL	Peak
6	12010.860	39.91	38.90	8.19	37.10	49.90	74.00	-24.10	VERTICAL	Peak

Test Mode: 04; Polarity: Vertical; Modulation:GFSK; ; Channel:middle;



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2012.686	45.98	26.12	3.10	37.69	37.51	74.00	-36.49	VERTICAL	Peak
2	4367.058	45.74	30.62	4.68	36.81	44.23	74.00	-29.77	VERTICAL	Peak
3	4884.695	46.76	31.56	5.52	36.84	47.00	74.00	-27.00	VERTICAL	Peak
4	7326.265	42.92	36.00	6.13	37.43	47.62	74.00	-26.38	VERTICAL	Peak
5	9768.240	40.85	38.53	7.01	37.41	48.98	74.00	-25.02	VERTICAL	Peak
6	12210.100	39.92	38.74	8.08	37.00	49.74	74.00	-24.26	VERTICAL	Peak

8 Appendix

(Cable Loss=0.9 dB)

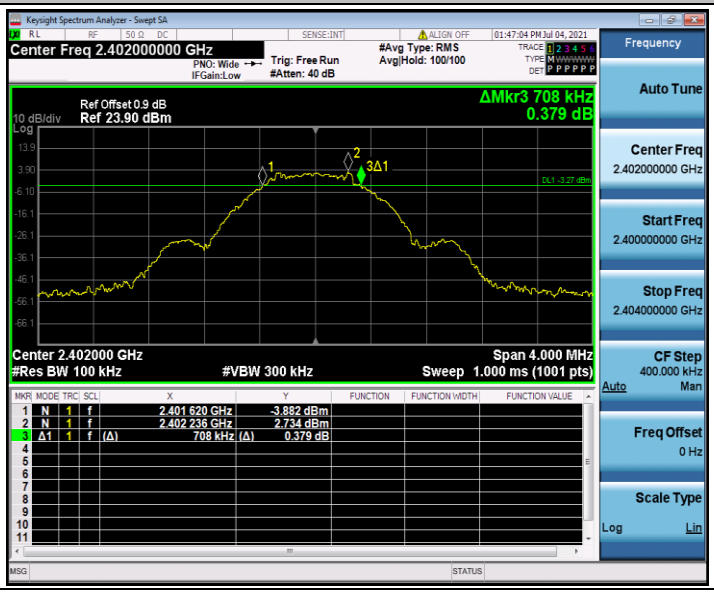
8.1 Appendix A: DTS Bandwidth

8.1.1 Test Result

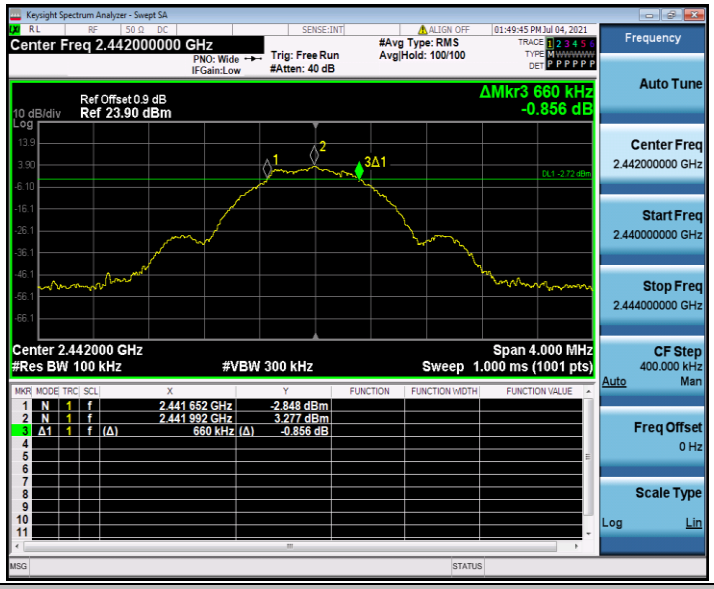
TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.708	2401.620	2402.328	>=0.5	PASS
		2442	0.660	2441.652	2442.312	>=0.5	PASS
		2480	0.664	2479.652	2480.316	>=0.5	PASS
BLE_2M	Ant1	2402	1.092	2401.424	2402.516	>=0.5	PASS
		2442	1.104	2441.416	2442.520	>=0.5	PASS
		2480	1.068	2479.484	2480.552	>=0.5	PASS

8.1.2 Test Graphs

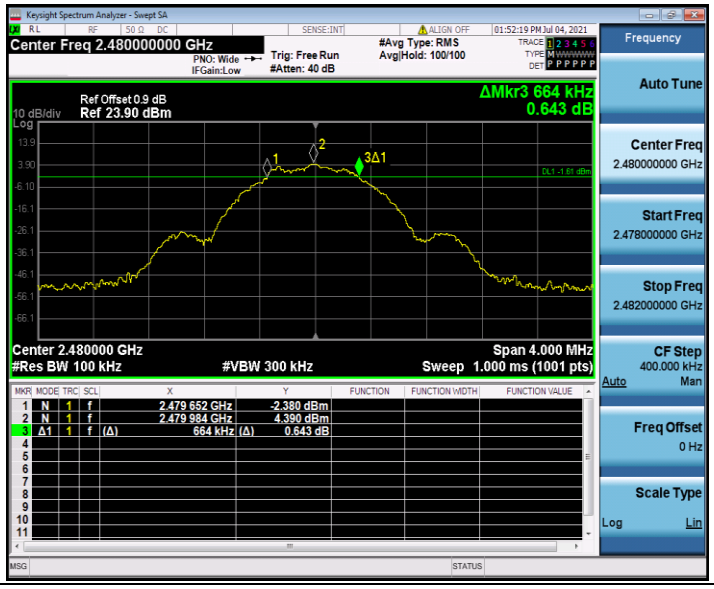
BLE_1M_Ant1_2402



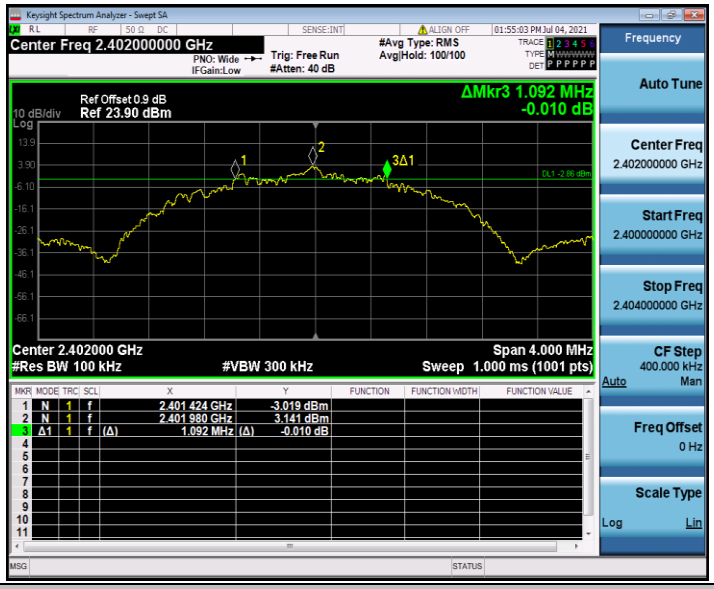
BLE_1M_Ant1_2442



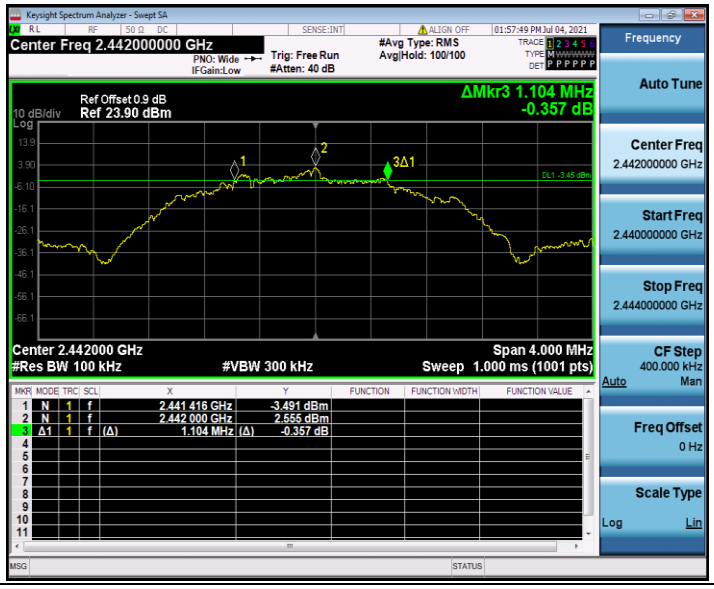
BLE_1M_Ant1_2480



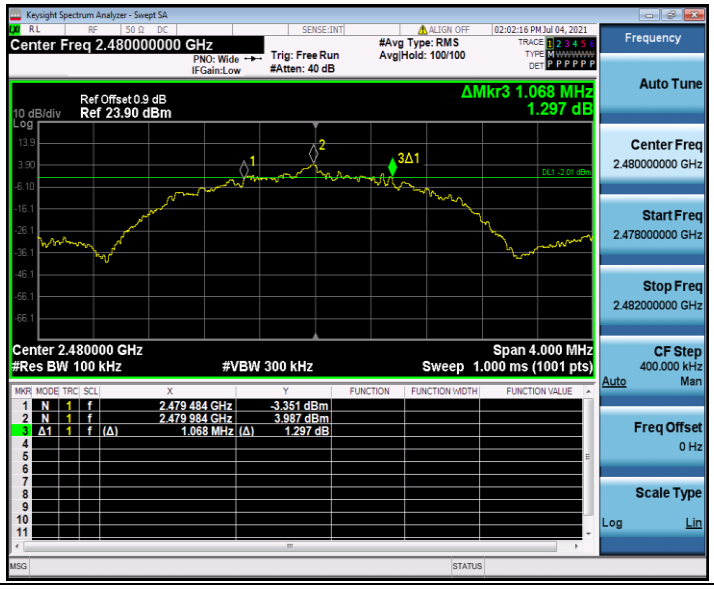
BLE_2M_Ant1_2402



BLE_2M_Ant1_2442



BLE_2M_Ant1_2480



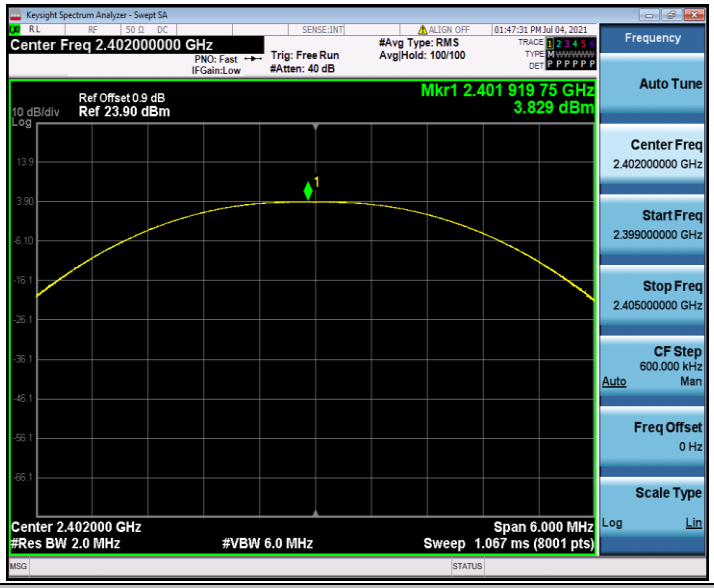
8.2 Appendix B: Maximum conducted output power

8.2.1 Test Result

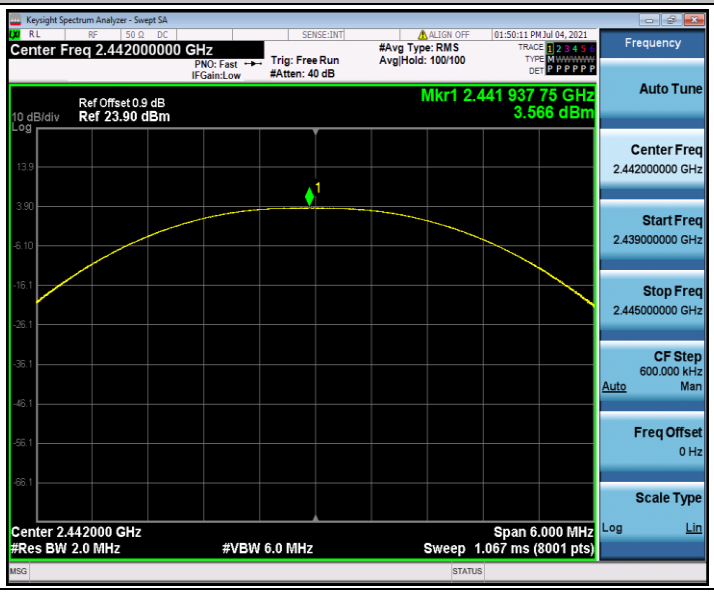
TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	3.83	<=30	PASS
		2442	3.57	<=30	PASS
		2480	4.5	<=30	PASS
BLE_2M	Ant1	2402	3.51	<=30	PASS
		2442	3.12	<=30	PASS
		2480	4.29	<=30	PASS

8.2.2 Test Graphs

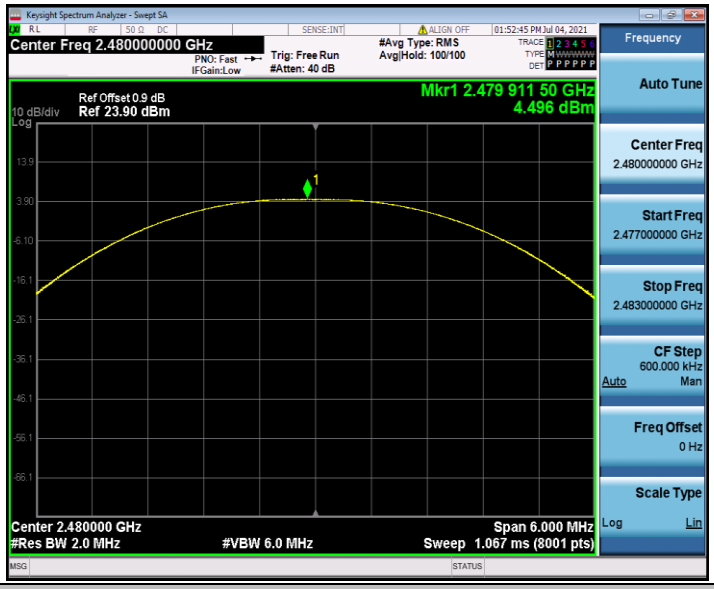
BLE_1M_Ant1_2402



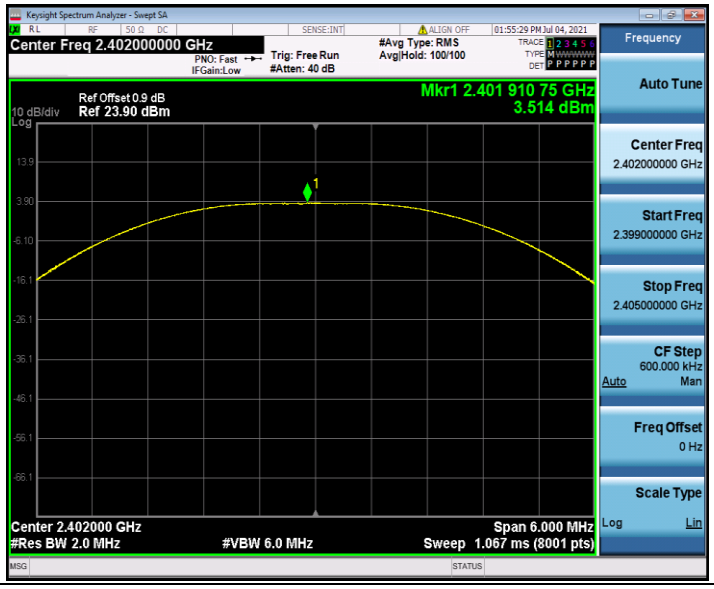
BLE_1M_Ant1_2442



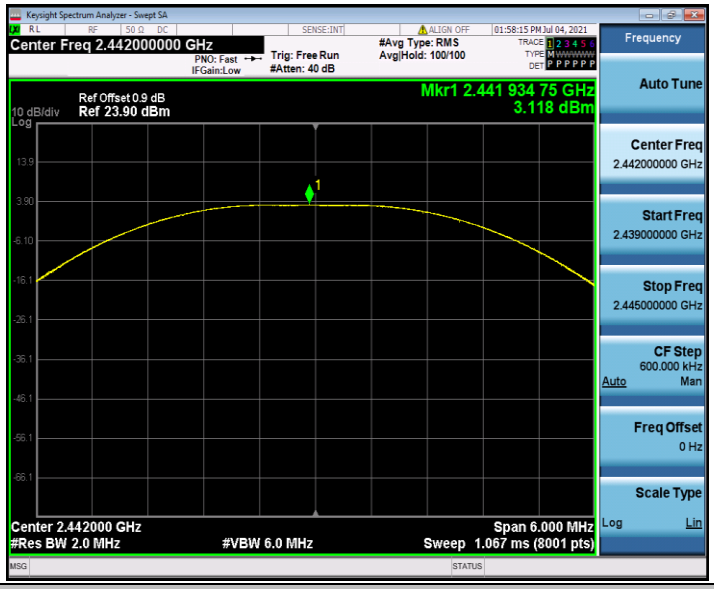
BLE_1M_Ant1_2480



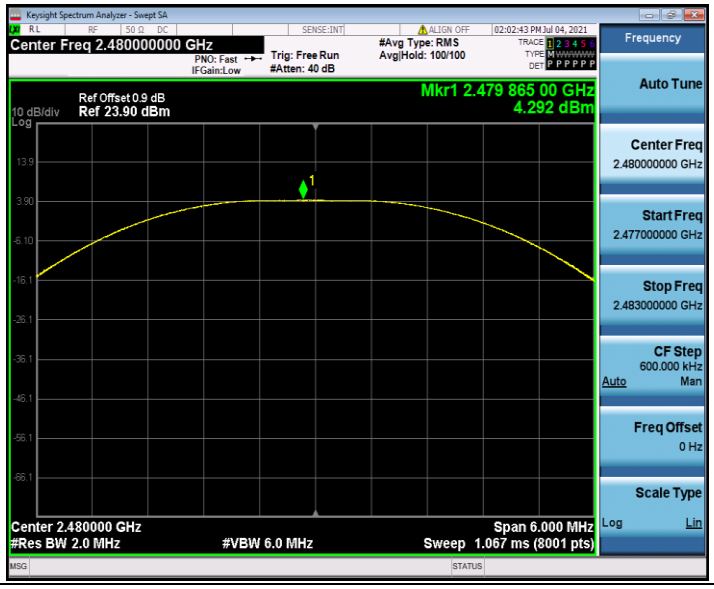
BLE_2M_Ant1_2402



BLE_2M_Ant1_2442



BLE_2M_Ant1_2480



8.3 Appendix C: Maximum power spectral density

8.3.1 Test Result

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-6.02	<=8	PASS
		2442	-6.3	<=8	PASS
		2480	-5.22	<=8	PASS
BLE_2M	Ant1	2402	-7.18	<=8	PASS
		2442	-7.1	<=8	PASS
		2480	-7.03	<=8	PASS

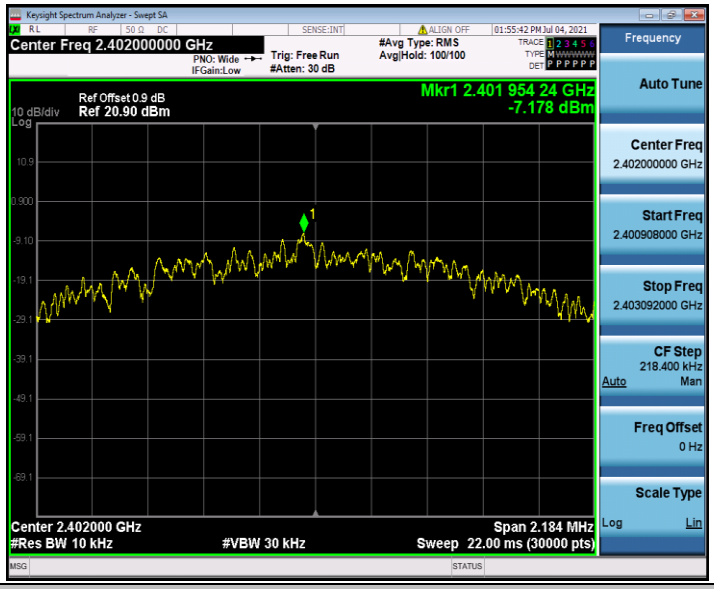
8.3.2 Test Graphs

BLE_1M_Ant1_2402

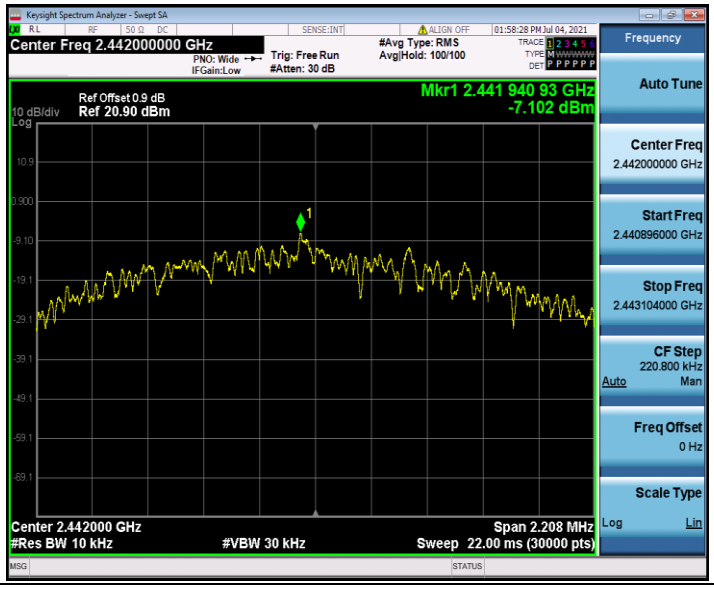
BLE_1M_Ant1_2442

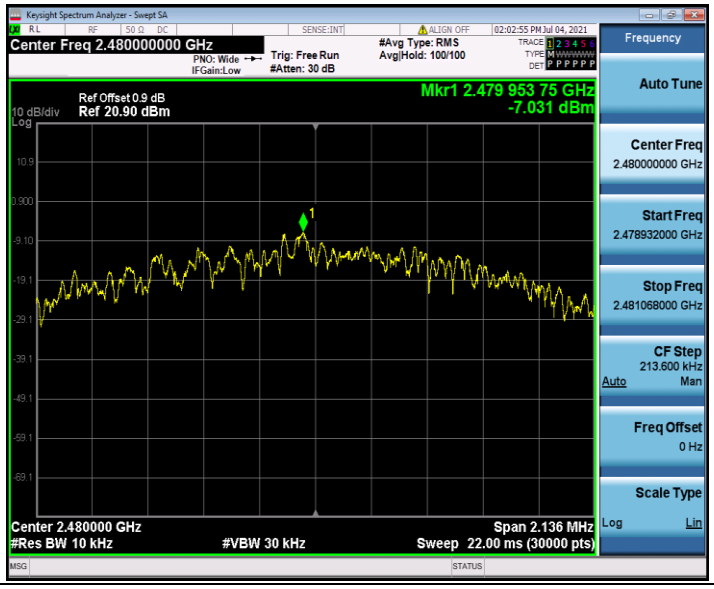
BLE_1M_Ant1_2480

BLE_2M_Ant1_2402



BLE_2M_Ant1_2442



BLE_2M_Ant1_2480


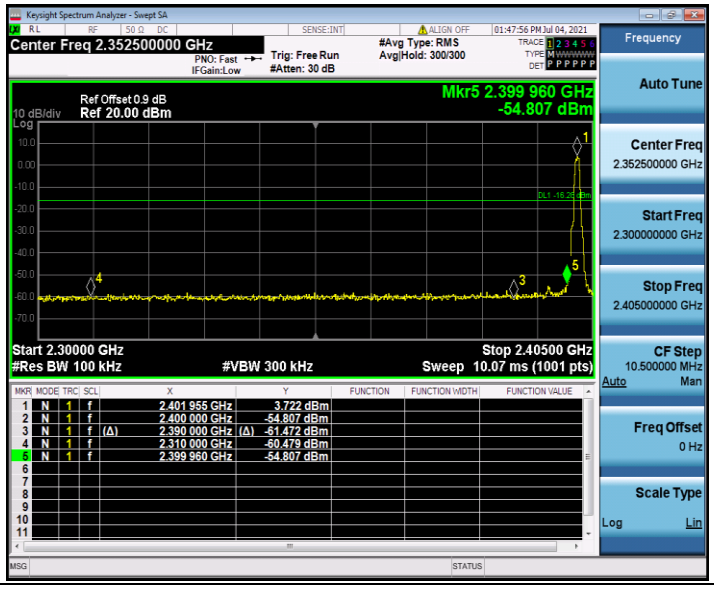
8.4 Appendix D: Band edge measurements

8.4.1 Test Result

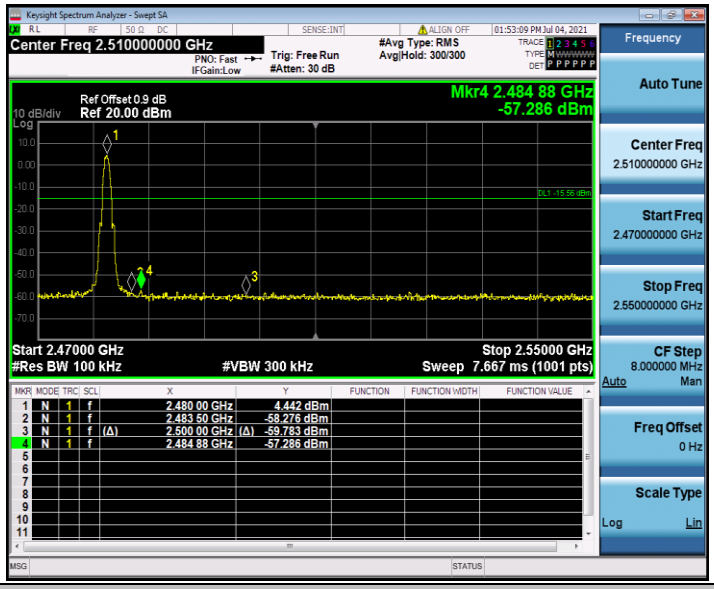
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	3.72	-54.81	<=-16.28	PASS
		High	2480	4.44	-57.29	<=-15.56	PASS
BLE_2M	Ant1	Low	2402	3.30	-28.9	<=-16.7	PASS
		High	2480	3.18	-57.23	<=-16.82	PASS

8.4.2 Test Graphs

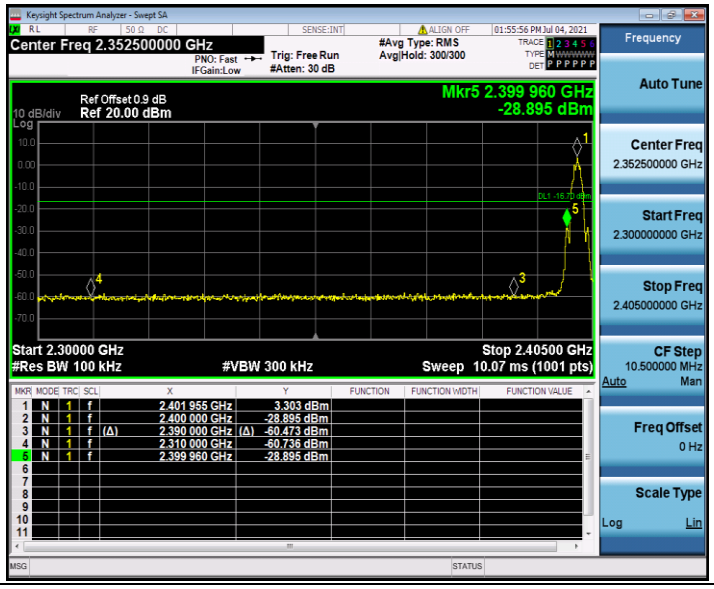
BLE_1M_Ant1_Low_2402

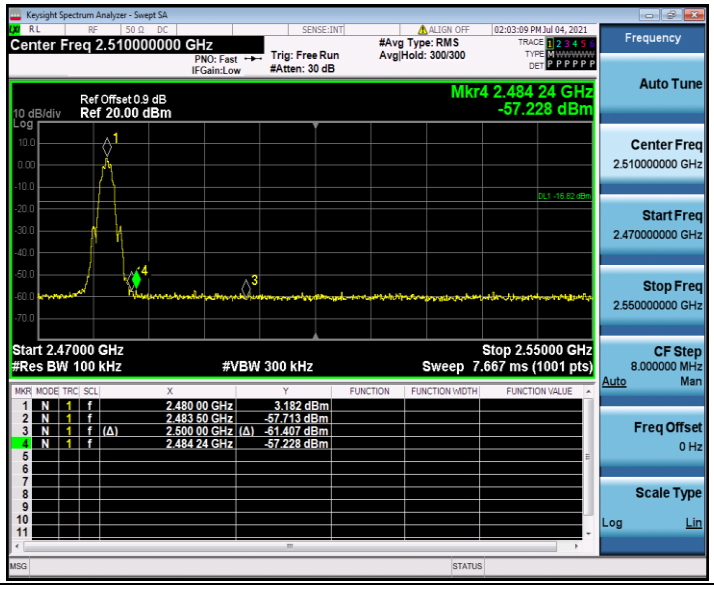


BLE_1M_Ant1_High_2480



BLE_2M_Ant1_Low_2402



BLE_2M_Ant1_High_2480


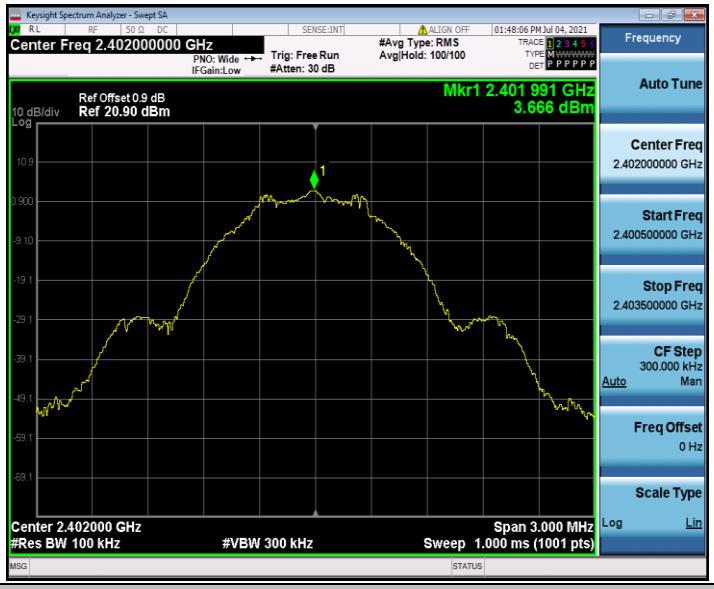
8.5 Appendix E: Conducted Spurious Emission

8.5.1 Test Result

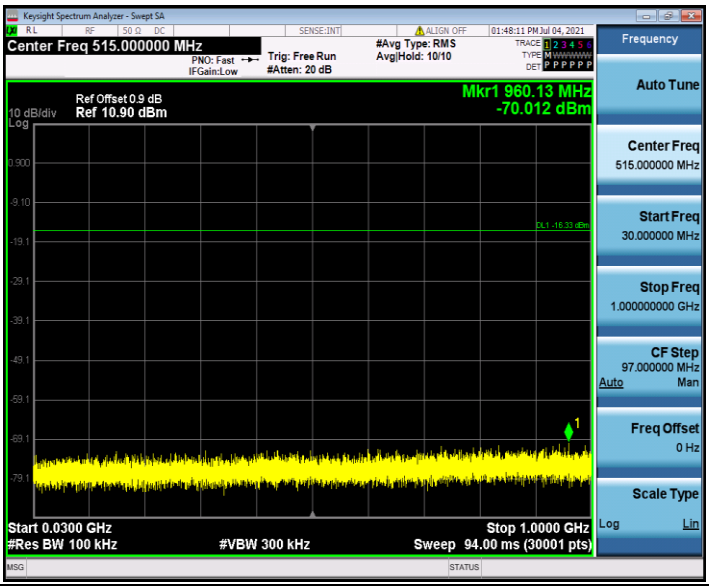
TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	3.67	3.67	---	PASS
			30~1000	30~1000	-70.012	<=-16.334	PASS
			1000~26500	1000~26500	-38.125	<=-16.334	PASS
		2442	Reference	3.38	3.38	---	PASS
			30~1000	30~1000	-70.091	<=-16.62	PASS
			1000~26500	1000~26500	-38.748	<=-16.62	PASS
		2480	Reference	3.90	3.90	---	PASS
			30~1000	30~1000	-69.091	<=-16.099	PASS
			1000~26500	1000~26500	-39.715	<=-16.099	PASS
BLE_2M	Ant1	2402	Reference	3.20	3.20	---	PASS
			30~1000	30~1000	-70.087	<=-16.8	PASS
			1000~26500	1000~26500	-36.403	<=-16.8	PASS
		2442	Reference	2.82	2.82	---	PASS
			30~1000	30~1000	-69.135	<=-17.177	PASS
			1000~26500	1000~26500	-41.559	<=-17.177	PASS
		2480	Reference	3.98	3.98	---	PASS
			30~1000	30~1000	-69.998	<=-16.018	PASS
			1000~26500	1000~26500	-41.972	<=-16.018	PASS

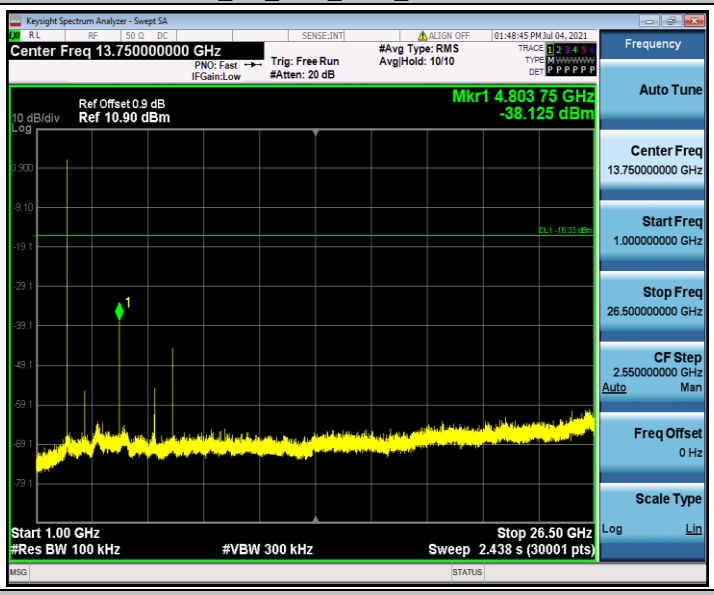
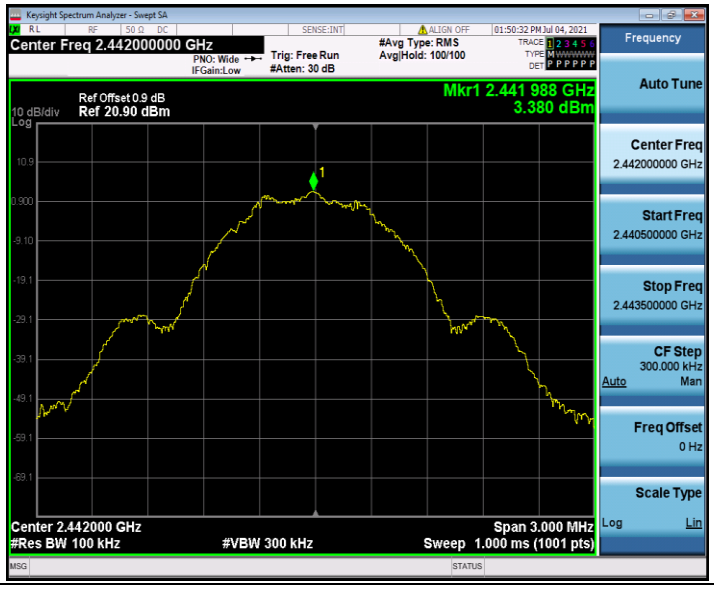
8.5.2 Test Graphs

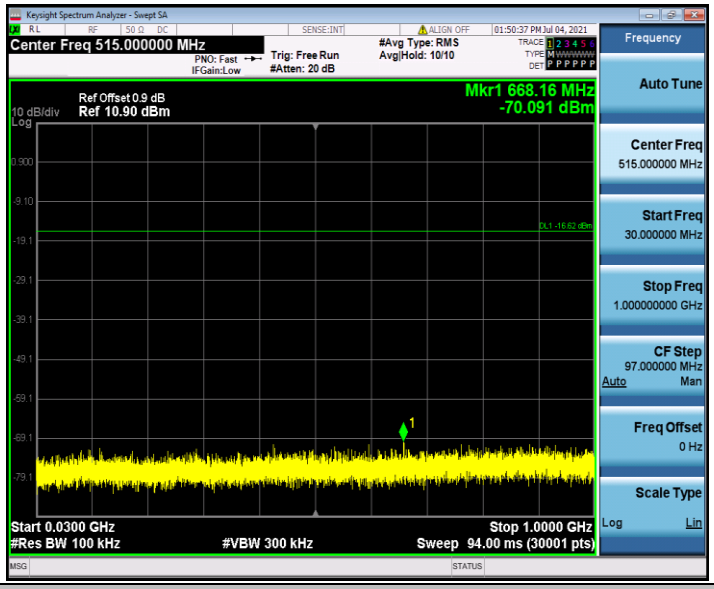
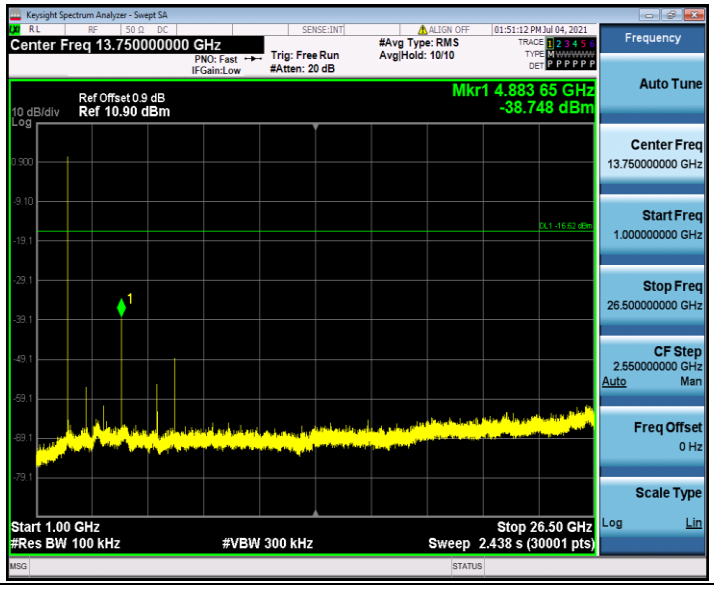
BLE_1M_Ant1_2402_0~Reference



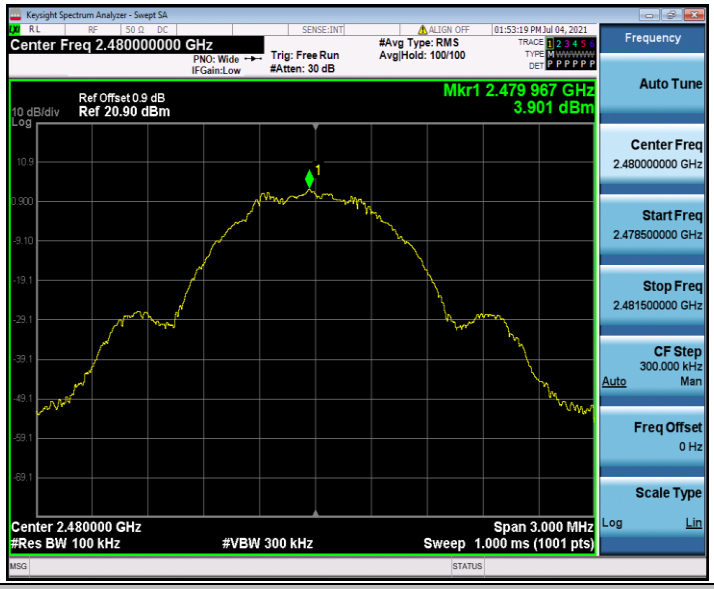
BLE_1M_Ant1_2402_30~1000



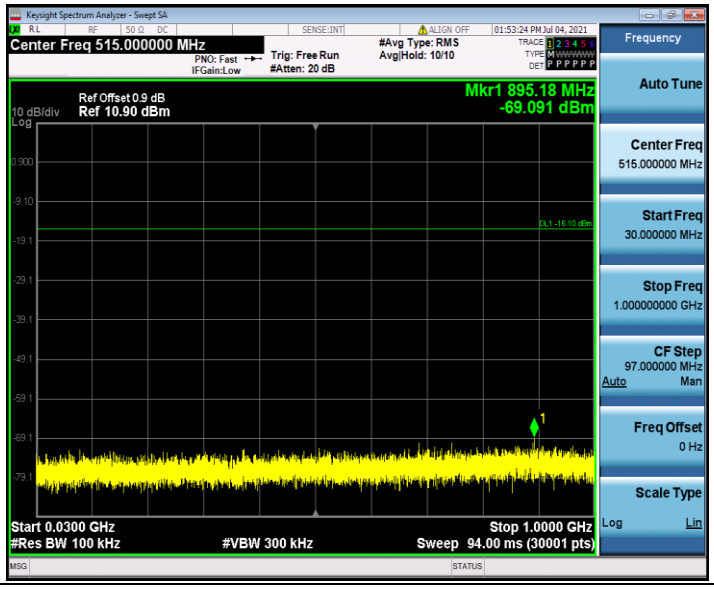
BLE_1M_Ant1_2402_1000~26500

BLE_1M_Ant1_2442_0~Reference


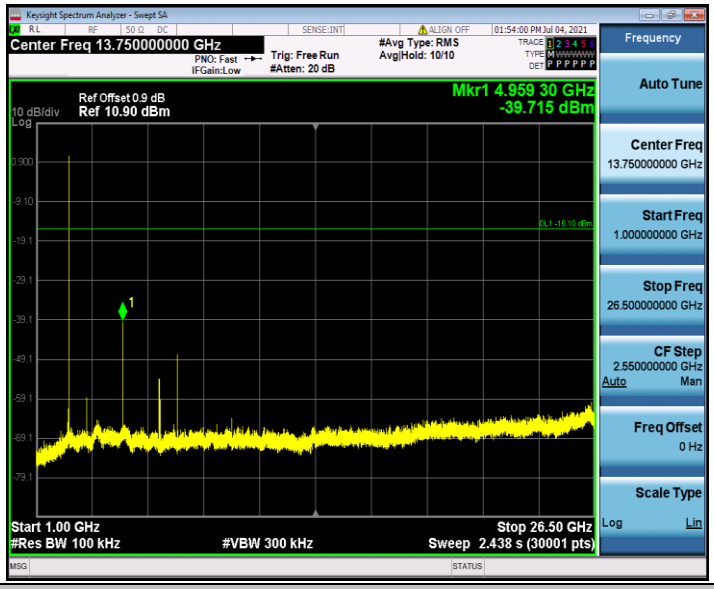
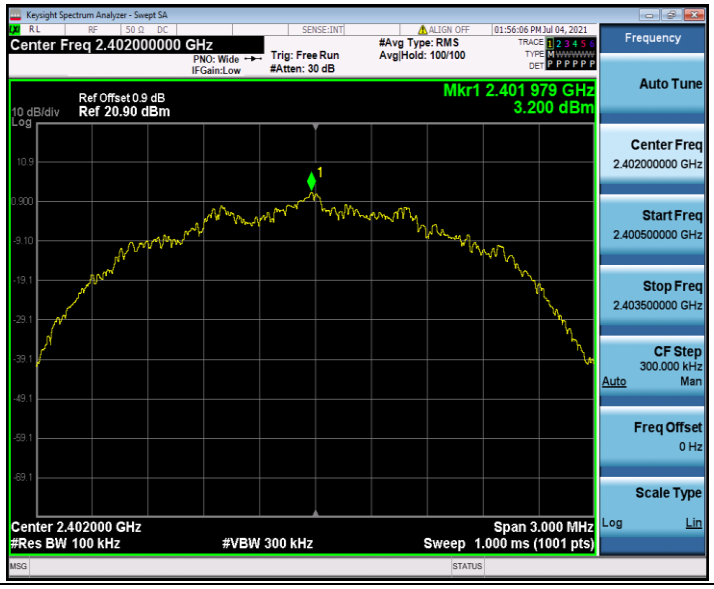
BLE_1M_Ant1_2442_30~1000

BLE_1M_Ant1_2442_1000~26500


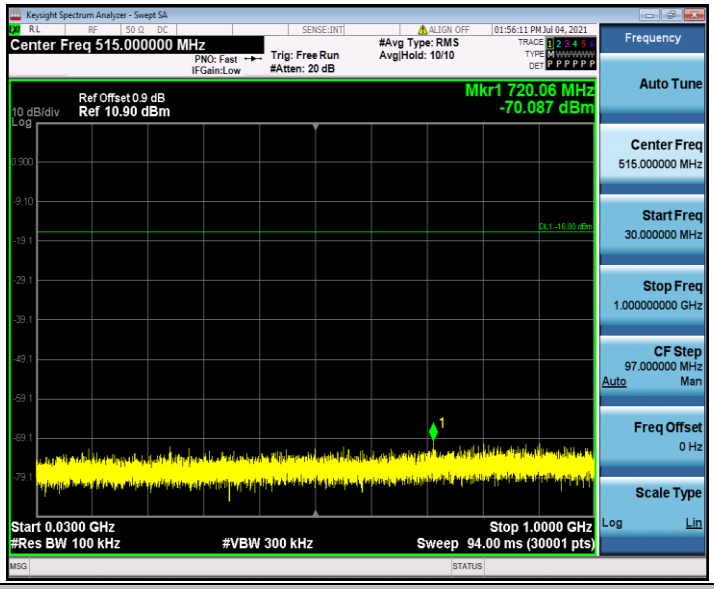
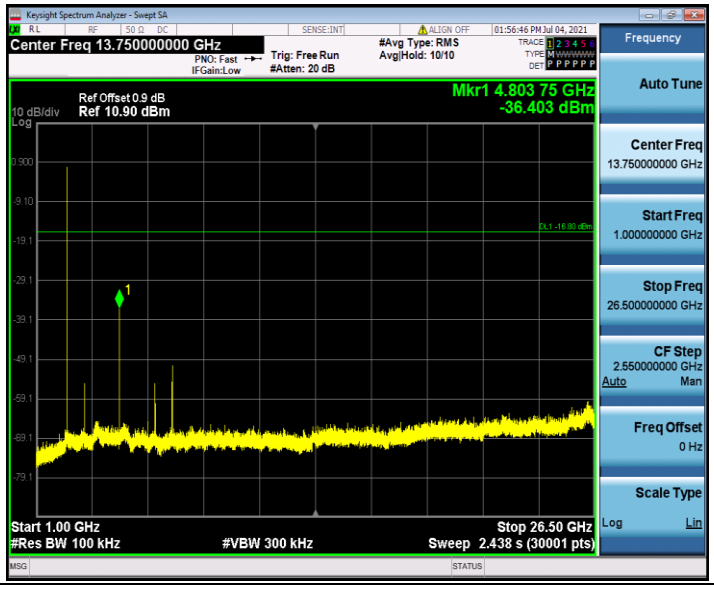
BLE_1M_Ant1_2480_0~Reference



BLE_1M_Ant1_2480_30~1000

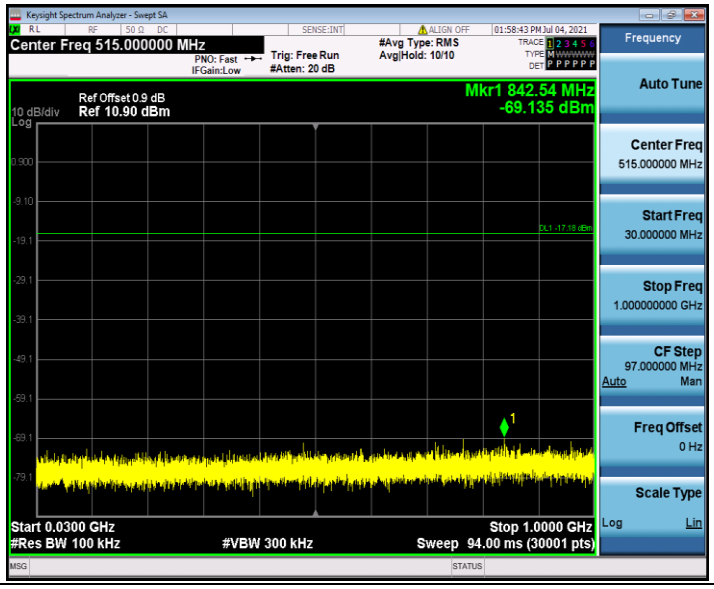


BLE_1M_Ant1_2480_1000~26500

BLE_2M_Ant1_2402_0~Reference


BLE_2M_Ant1_2402_30~1000

BLE_2M_Ant1_2402_1000~26500


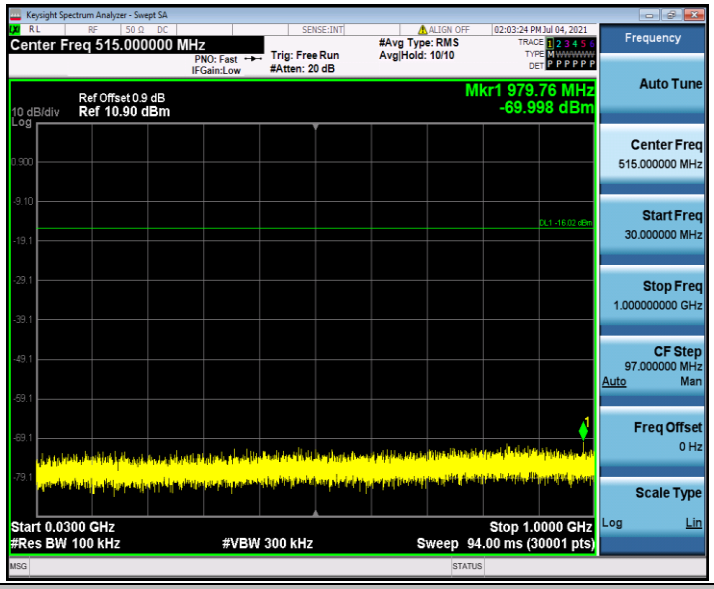
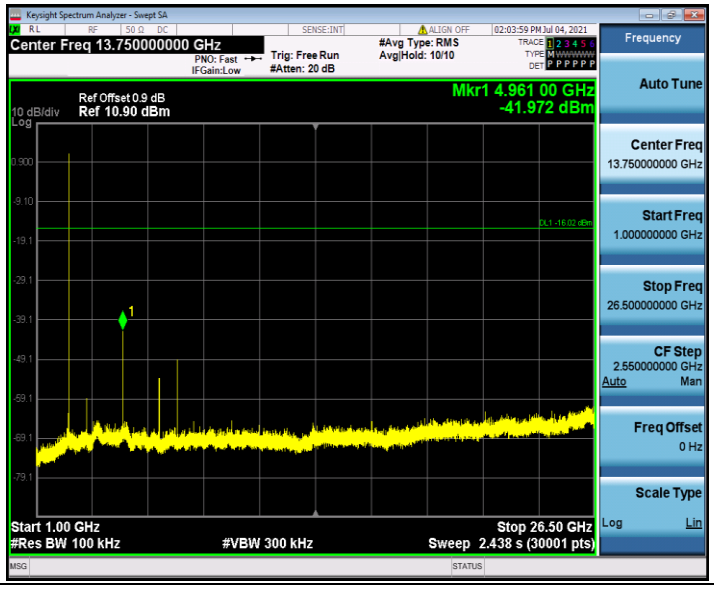
BLE_2M_Ant1_2442_0~Reference

BLE_2M_Ant1_2442_30~1000



BLE_2M_Ant1_2442_1000~26500

BLE_2M_Ant1_2480_0~Reference

BLE_2M_Ant1_2480_30~1000

BLE_2M_Ant1_2480_1000~26500


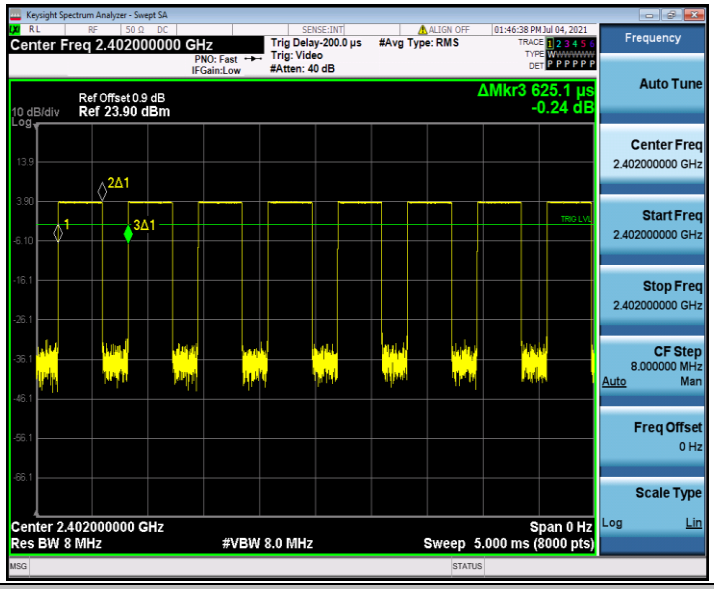
8.6 Appendix F: Duty Cycle

8.6.1 Test Result

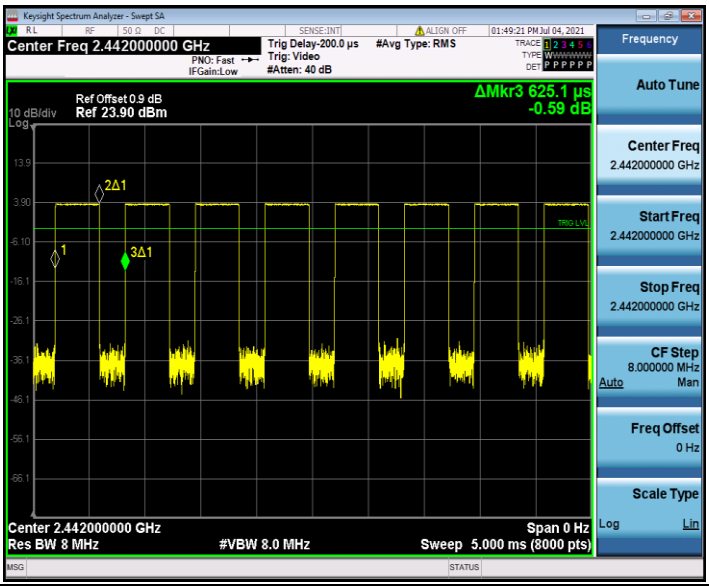
TestMode	Antenna	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
BLE_1M	Ant1	2402	0.39	0.63	63.00
		2442	0.39	0.63	63.00
		2480	0.39	0.63	62.90
BLE_2M	Ant1	2402	0.21	0.63	33.20
		2442	0.21	0.63	33.30
		2480	0.21	0.63	33.20

8.6.2 Test Graphs

BLE_1M_Ant1_2402



BLE_1M_Ant1_2442



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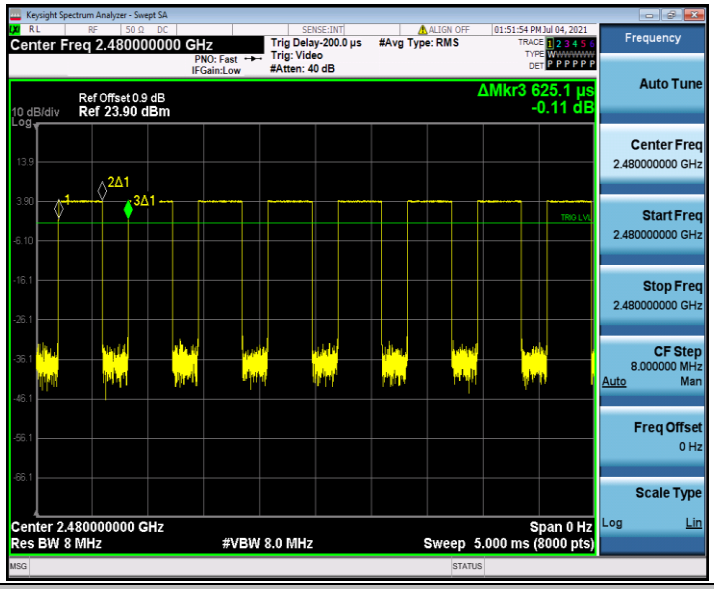

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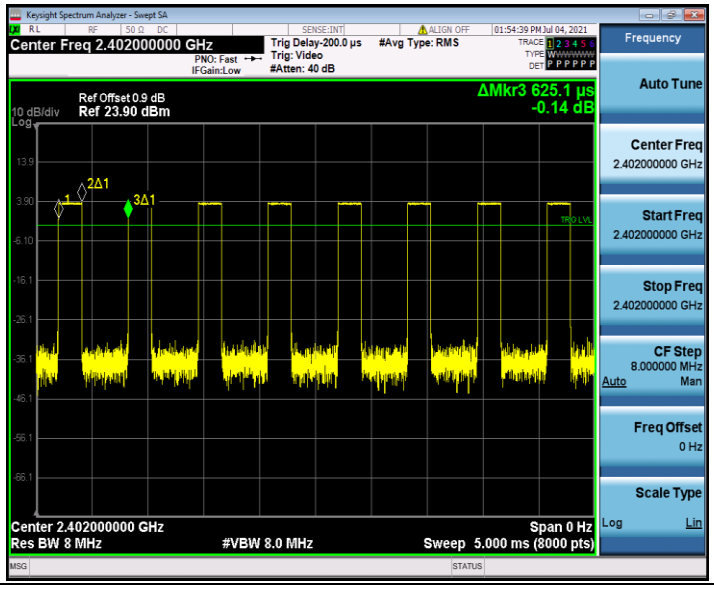

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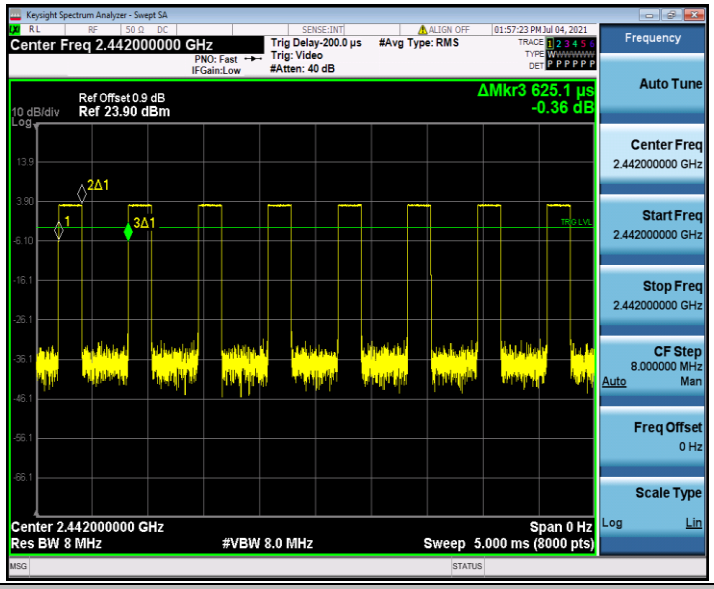

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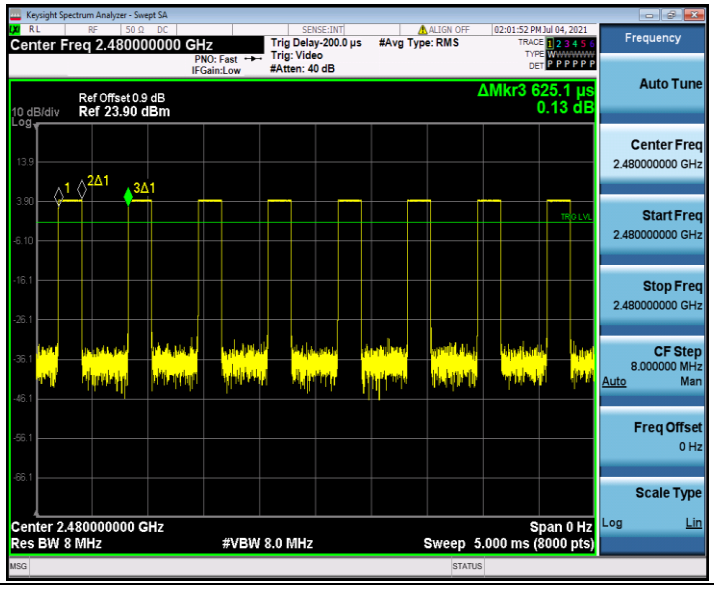

- End of the Report -