TEST REPORT

Application No.:	GZCR2105020331HS
Applicant:	HYPERICE, INC.
Address of Applicant:	525 Technology Drive, Suite 100 Irvine, California 92618 USA
Manufacturer:	HYPERICE, INC.
Address of Manufacturer:	525 Technology Drive, Suite 100 Irvine, California 92618 USA
Factory:	Guangdong ESINO Technology Group Co., Ltd
Address of Factory:	No.5 Xifu Street, Lincun, Tangxia Town, Dongguan City, Guangdong Province, China
Equipment Under Test (EUT):	
EUT Name:	Hypervolt 2
Model No.:	53200 038-00
Trade Mark:	HYPERICE
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2021-05-27
Date of Test:	2021-06-07 to 2021-06-23
Date of Issue:	2021-08-13
Test Result:	**Pass***

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

Kobe Jian
EMC Laboratory Manager

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		*2021-08-13*		*Original*

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

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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.

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检验检测专用章
Inspection & Testing Services
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 14.4V supply by internal rechargeable battery AC charging by adaptor: Model：MX24Z2-1801000 Input:AC100-240V 50/60Hz 0.7A Output: DC18V 1A 18W
Cable(s):	about 1.8m x2 wires DC mains cable
Operation Frequency:	2402MHz to 2480MHz
Modulation Type:	GFSK
Number of Channels:	40
Channel Spacing:	2MHz
Antenna type:	PCB antenna
Antenna gain:	0dBi
Hardware version:	Encoder_LITE_V2.2
Software version:	Realxroll Test App v0.1.15
Setup software:	Putty.exe
Power setting:	default
Function:	Hypervolt 2 with BLE function

4.2 Description of Support Units

The EUT has been tested as an independent unit.

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	Below 1GHz:±5.06dB (3m); ±4.46dB (10m) Above 1GHz: ±5.08dB (1GHz-6GHz) ±5.14dB (above 6GHz)
Radiated Spurious Emissions	Below 1GHz:±5.06dB (3m); ±4.46dB (10m) Above 1GHz: ±5.08dB (1GHz-6GHz) ±5.14dB (above 6GHz)

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4.4 Test Location

All tests were performed at:

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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.

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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

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

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

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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**
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

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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	2020-07-09	2021-07-08
DMM	Fluke	73	EMC0007	2020-07-09	2021-07-08

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 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 0 dBi.

Please refer to internal photos.

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7 Radio Spectrum Matter Test Results

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

Test Requirement 47 CFR Part 15, Subpart C 15.207

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

Limit:

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

7.1.1 E.U.T. Operation

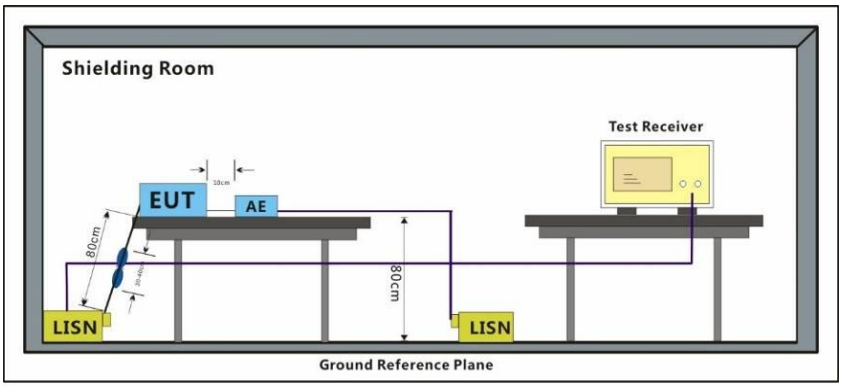
Operating Environment:

Temperature: 23 °C Humidity: 55.2 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

7.1.3 Test Setup Diagram



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

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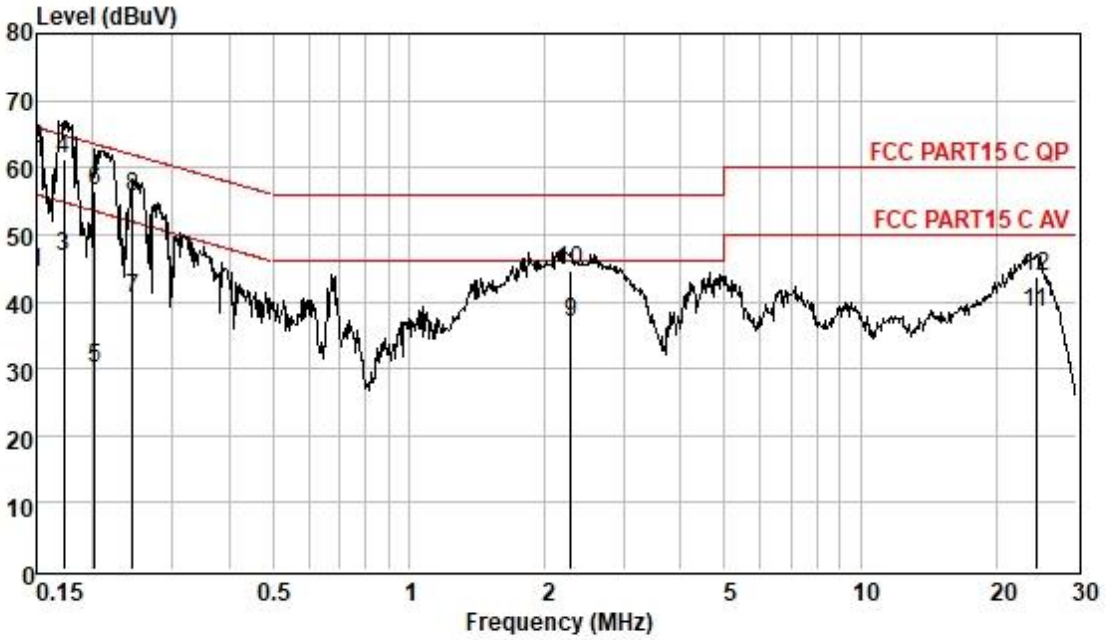
Test Mode: 03; Line: Live line



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
0.15	34.62	0.06	9.62	44.30	56.00	-11.70	Average
0.15	53.09	0.06	9.62	62.77	66.00	-3.23	QP
0.17	37.10	0.06	9.62	46.78	54.86	-8.08	Average
0.17	51.69	0.06	9.62	61.37	64.86	-3.49	QP
0.20	20.38	0.06	9.63	30.07	53.54	-23.47	Average
0.20	46.86	0.06	9.63	56.55	63.54	-6.99	QP
0.24	30.82	0.06	9.62	40.50	51.95	-11.45	Average
0.24	46.06	0.06	9.62	55.74	61.95	-6.21	QP
2.28	26.99	0.13	9.62	36.74	46.00	-9.26	Average
2.28	34.84	0.13	9.62	44.59	56.00	-11.41	QP
24.40	28.10	0.40	9.88	38.38	50.00	-11.62	Average
24.40	33.35	0.40	9.88	43.63	60.00	-16.37	QP

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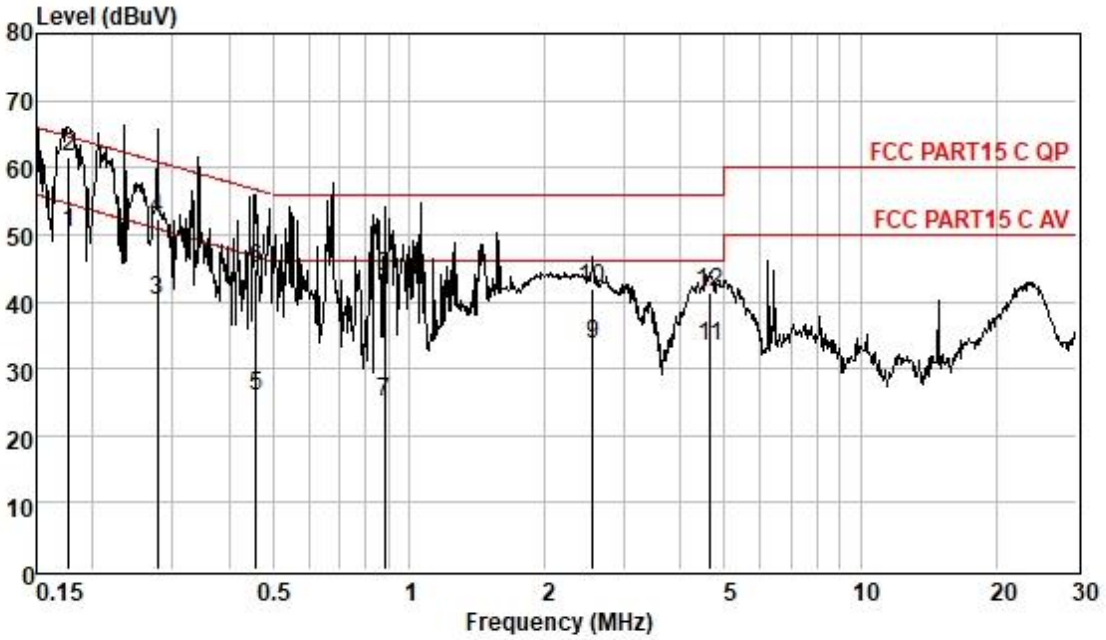
Test Mode: 03; Line: Neutral Line



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
0.18	40.65	0.06	9.55	50.26	54.64	-4.38	Average
0.18	51.89	0.06	9.55	61.50	64.64	-3.14	QP
0.28	30.47	0.06	9.54	40.07	50.90	-10.83	Average
0.28	42.80	0.06	9.54	52.40	60.90	-8.50	QP
0.46	16.17	0.07	9.55	25.79	46.71	-20.92	Average
0.46	35.24	0.07	9.55	44.86	56.71	-11.85	QP
0.88	15.50	0.07	9.55	25.12	46.00	-20.88	Average
0.88	34.19	0.07	9.55	43.81	56.00	-12.19	QP
2.55	24.00	0.14	9.54	33.68	46.00	-12.32	Average
2.55	32.15	0.14	9.54	41.83	56.00	-14.17	QP
4.65	23.61	0.18	9.56	33.35	46.00	-12.65	Average
4.65	31.68	0.18	9.56	41.42	56.00	-14.58	QP

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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

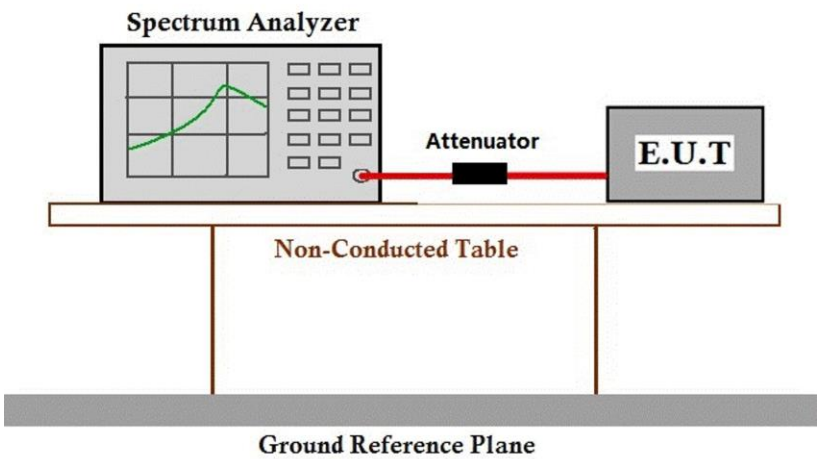
Operating Environment:

Temperature: 26.7 °C Humidity: 55.3 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	Charge + TX mode_Keep the EUT in charging and 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

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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

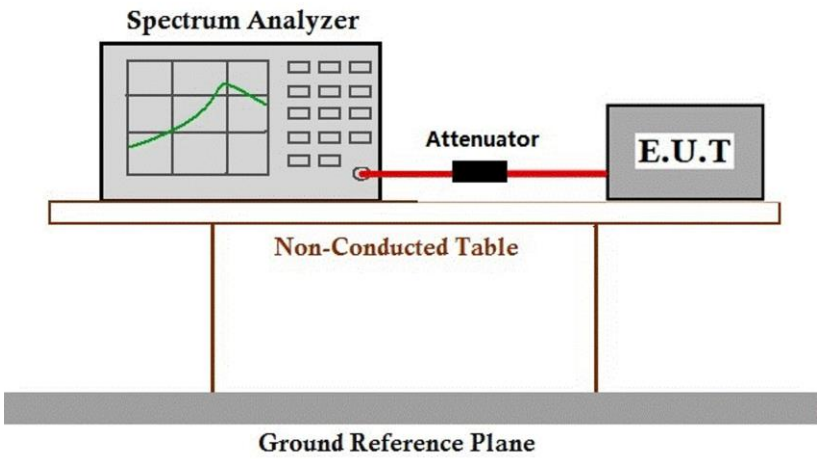
Operating Environment:

Temperature: 26.7 °C Humidity: 55.3 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	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

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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

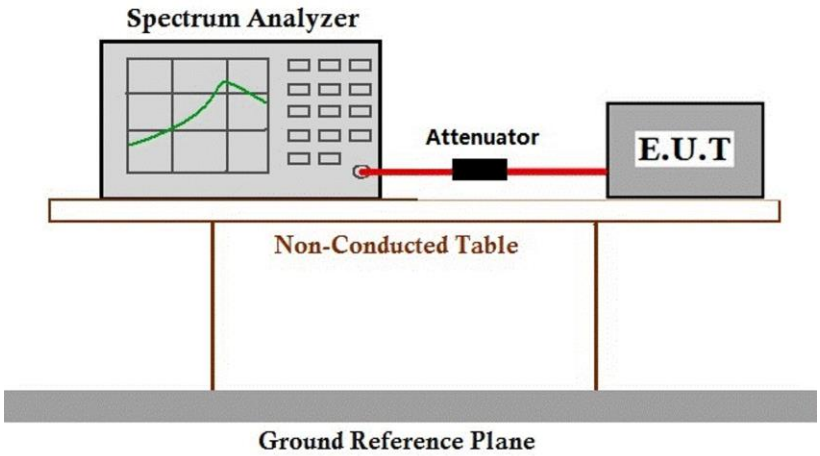
Operating Environment:

Temperature: 26.7 °C Humidity: 55.3 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	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

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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

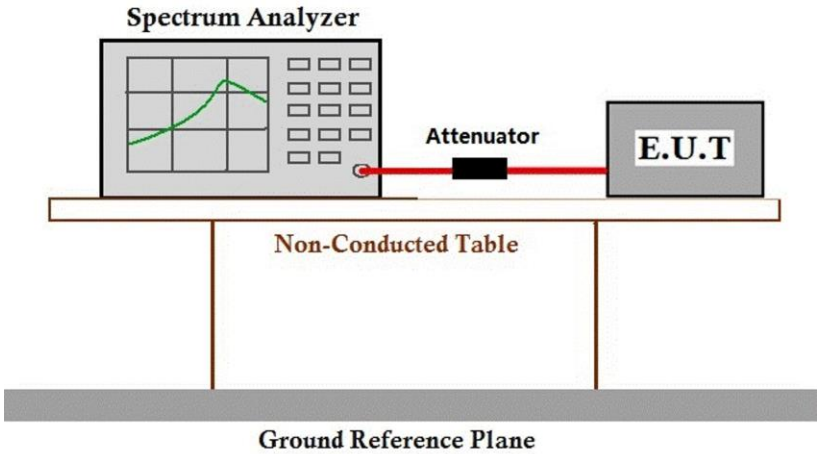
Operating Environment:

Temperature: 26.7 °C Humidity: 55.3 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	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

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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

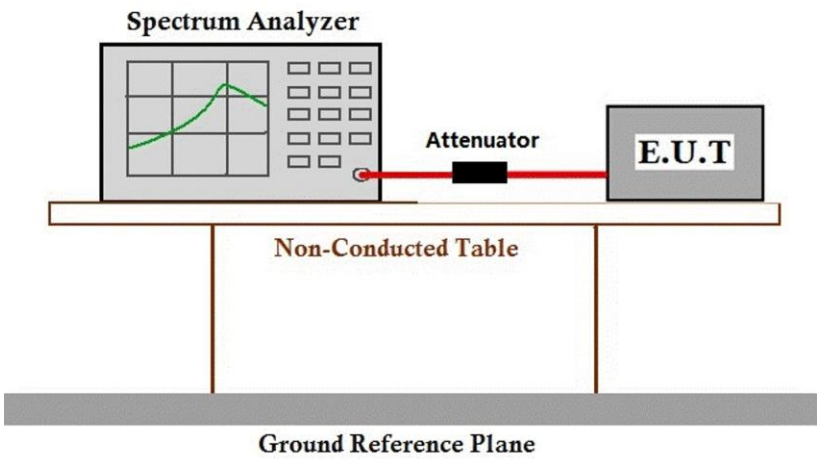
Operating Environment:

Temperature: 26.7 °C Humidity: 55.3 % RH Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	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

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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

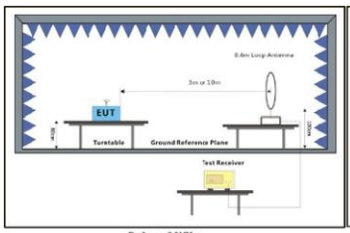
Operating Environment:

Temperature: 25.9 °C Humidity: 57.5 % RH Atmospheric Pressure: 1010 mbar

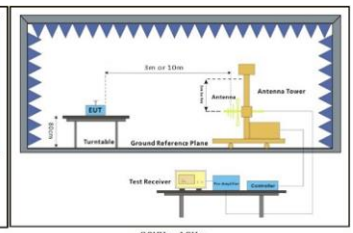
7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

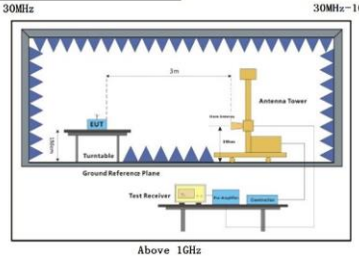
7.7.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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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.

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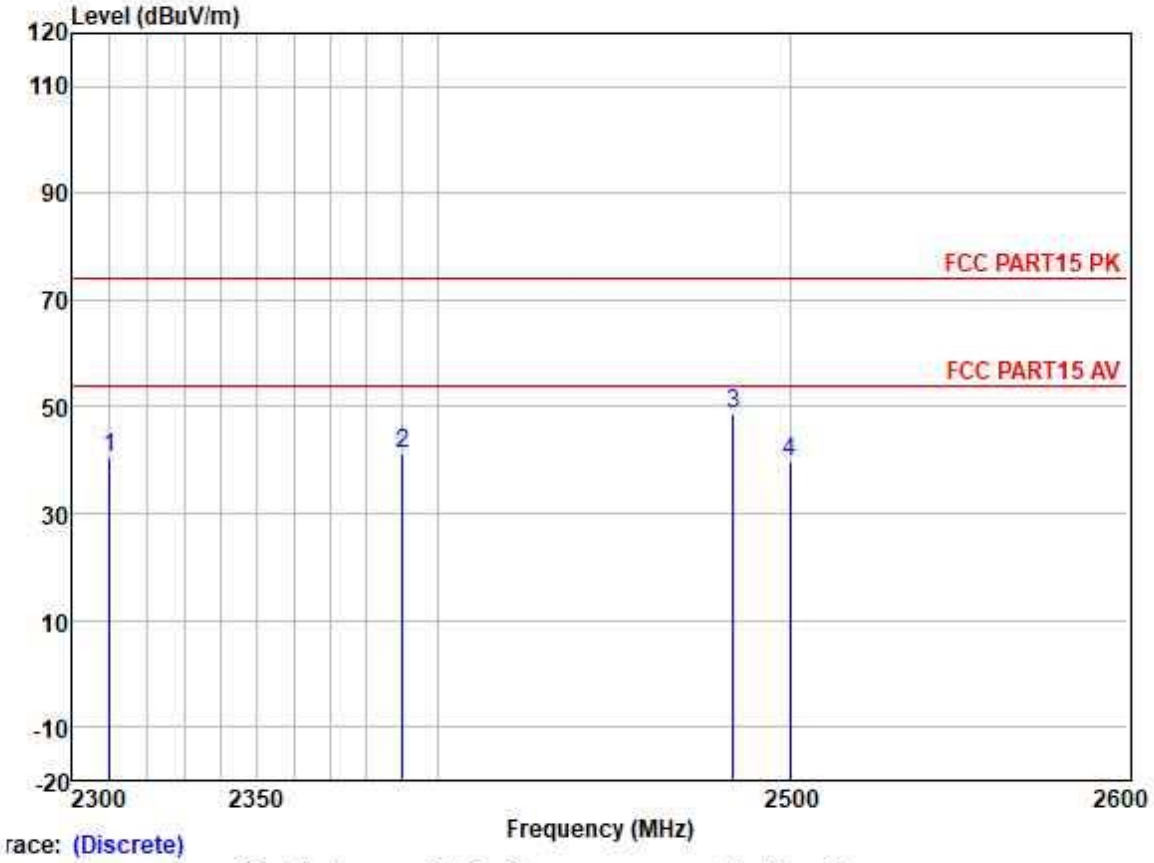
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:High; Antenna: 3



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	47.70	27.15	3.32	37.62	40.55	74.00	-33.45	HORIZONTAL	Peak
2	2390.000	47.98	27.33	3.48	37.59	41.20	74.00	-32.80	HORIZONTAL	Peak
3	2483.500	55.16	27.48	3.53	37.57	48.60	74.00	-25.40	HORIZONTAL	Peak
4	2500.000	46.56	27.50	3.40	37.56	39.90	74.00	-34.10	HORIZONTAL	Peak

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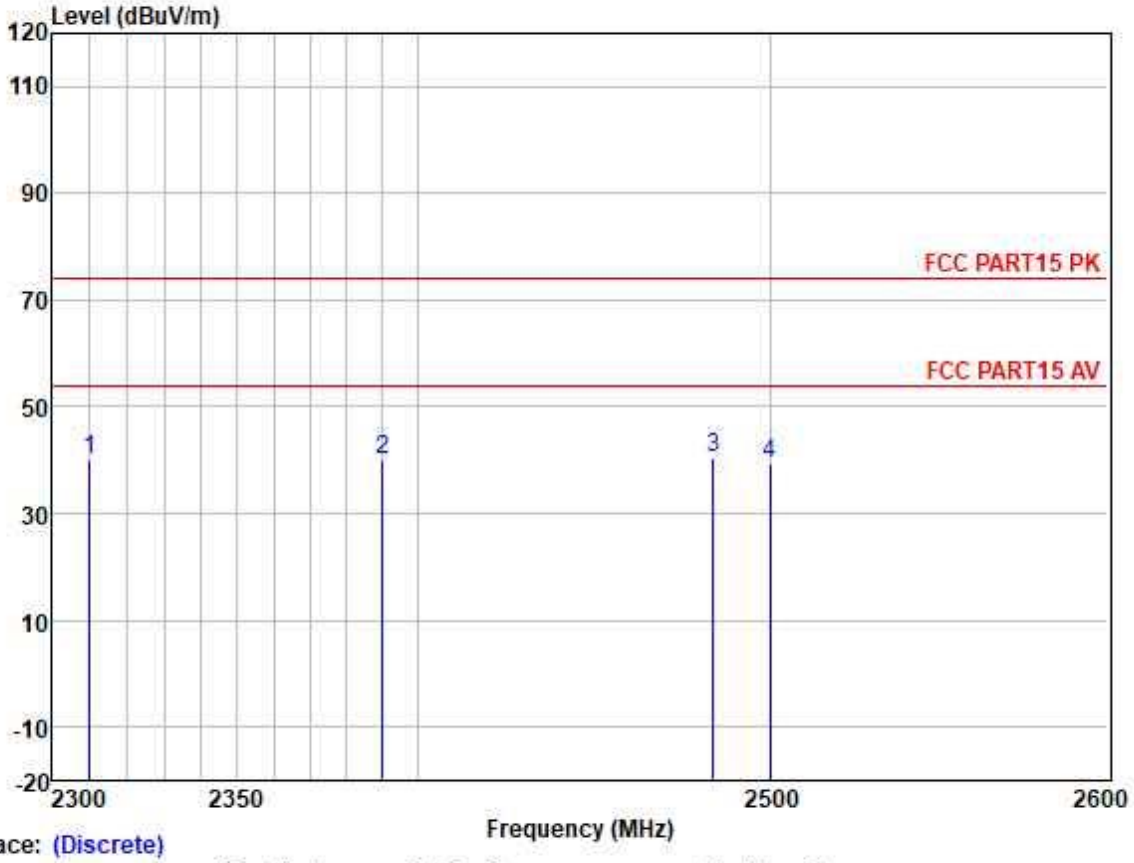
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low; Antenna: 3



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	47.28	27.15	3.32	37.62	40.13	74.00	-33.87	HORIZONTAL	Peak
2	2390.000	46.90	27.33	3.48	37.59	40.12	74.00	-33.88	HORIZONTAL	Peak
3	2483.500	46.98	27.48	3.53	37.57	40.42	74.00	-33.58	HORIZONTAL	Peak
4	2500.000	46.10	27.50	3.40	37.56	39.44	74.00	-34.56	HORIZONTAL	Peak

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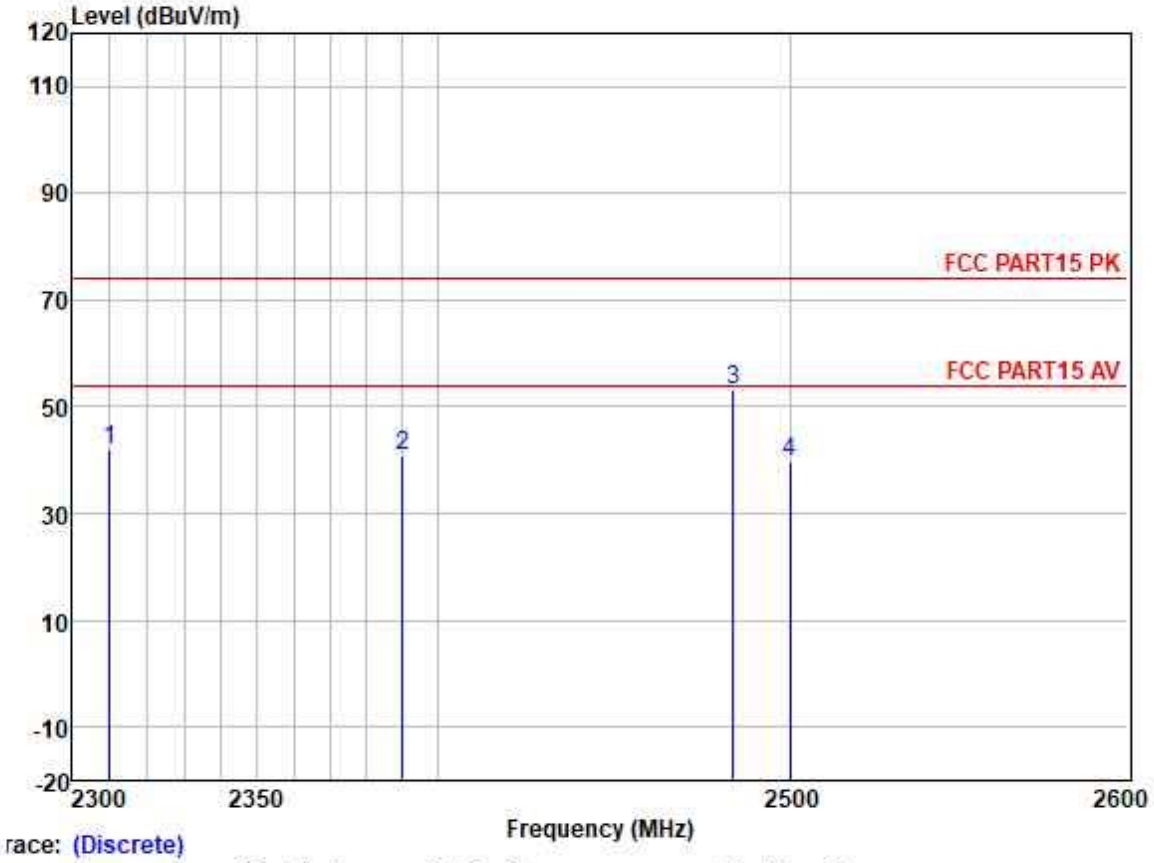
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:High; Antenna: 3



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	49.29	27.15	3.32	37.62	42.14	74.00	-31.86	VERTICAL	Peak
2	2390.000	47.68	27.33	3.48	37.59	40.90	74.00	-33.10	VERTICAL	Peak
3	2483.500	59.60	27.48	3.53	37.57	53.04	74.00	-20.96	VERTICAL	Peak
4	2500.000	46.42	27.50	3.40	37.56	39.76	74.00	-34.24	VERTICAL	Peak

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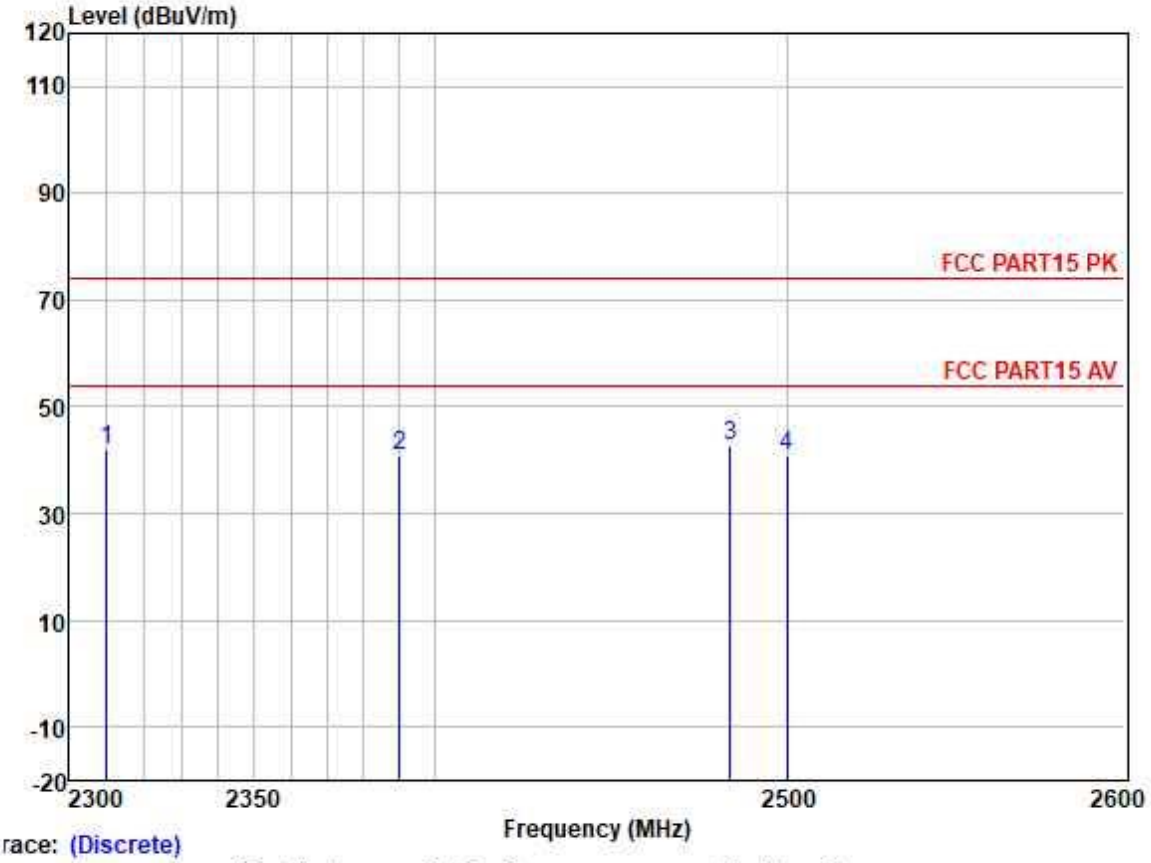
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:Low; Antenna: 3



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	48.96	27.15	3.32	37.62	41.81	74.00	-32.19	VERTICAL	Peak
2	2390.000	47.51	27.33	3.48	37.59	40.73	74.00	-33.27	VERTICAL	Peak
3	2483.500	49.21	27.48	3.53	37.57	42.65	74.00	-31.35	VERTICAL	Peak
4	2500.000	47.43	27.50	3.40	37.56	40.77	74.00	-33.23	VERTICAL	Peak

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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

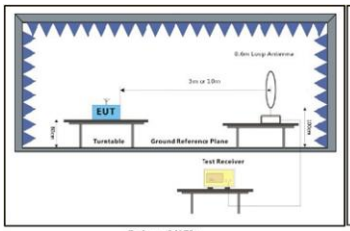
Operating Environment:

Temperature: 25.8 °C Humidity: 57.8 % RH Atmospheric Pressure: 1010 mbar

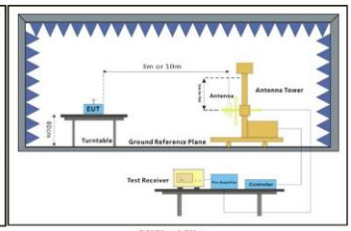
7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	02	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.
Final test	03	Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation.

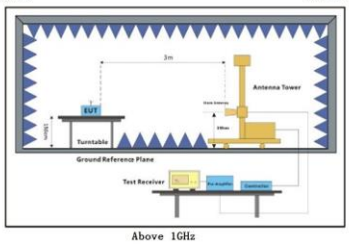
7.8.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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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, 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) Antenna: 2 denotes the type of antenna for 30-1000MHz; Antenna: 3 denotes the type of antenna for above 1000MHz.

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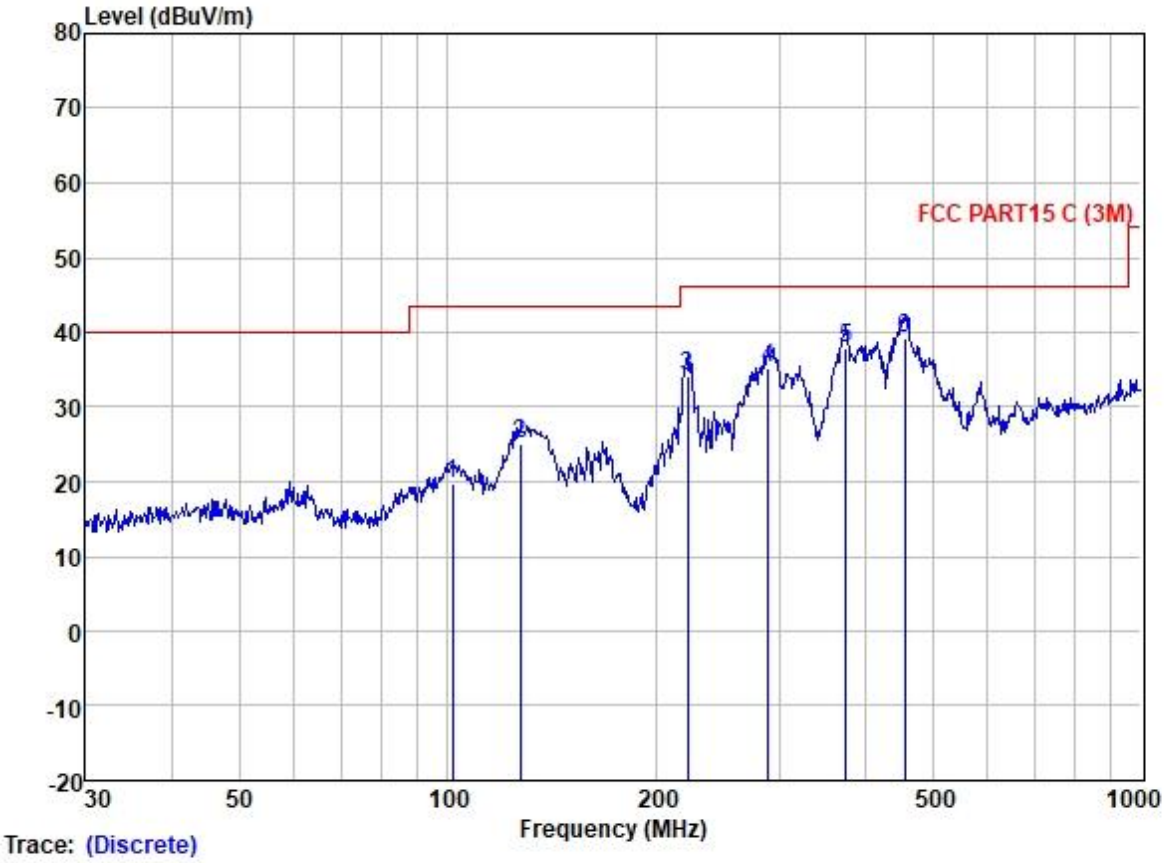
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low; Antenna: 2



Site : SGS
Condition : FCC PART15 C (3M) HORIZONTAL
Job :
Model :
Power : AC
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	101.64	35.69	9.35	1.74	27.08	19.70	43.50	-23.80	HORIZONTAL	QP
2	127.22	38.39	11.70	1.94	27.00	25.03	43.50	-18.47	HORIZONTAL	QP
3	221.39	48.31	9.82	2.65	26.70	34.08	46.00	-11.92	HORIZONTAL	QP
4	290.02	45.18	13.40	3.12	26.56	35.14	46.00	-10.86	HORIZONTAL	QP
5	374.62	45.97	15.40	3.79	27.22	37.94	46.00	-8.06	HORIZONTAL	QP
6	455.91	45.35	17.42	4.22	27.75	39.24	46.00	-6.76	HORIZONTAL	QP

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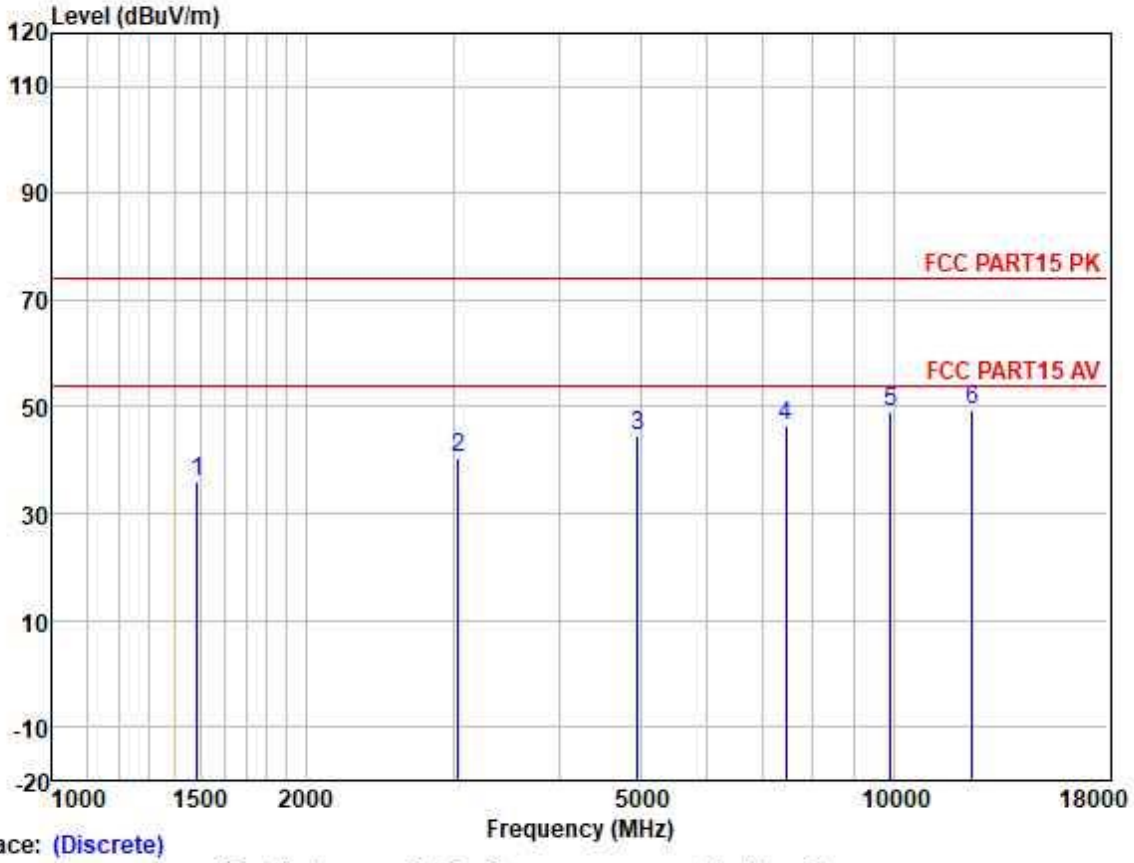
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:High; Antenna: 3



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	1485.841	46.04	25.49	2.78	38.13	36.18	74.00	-37.82	HORIZONTAL	Peak
2	3034.063	45.51	28.42	3.83	37.22	40.54	74.00	-33.46	HORIZONTAL	Peak
3	4960.668	44.16	31.65	5.65	36.84	44.62	74.00	-29.38	HORIZONTAL	Peak
4	7440.732	41.55	36.27	6.22	37.47	46.57	74.00	-27.43	HORIZONTAL	Peak
5	9920.717	40.79	38.65	6.96	37.40	49.00	74.00	-25.00	HORIZONTAL	Peak
6	12400.540	39.78	38.57	7.97	36.88	49.44	74.00	-24.56	HORIZONTAL	Peak

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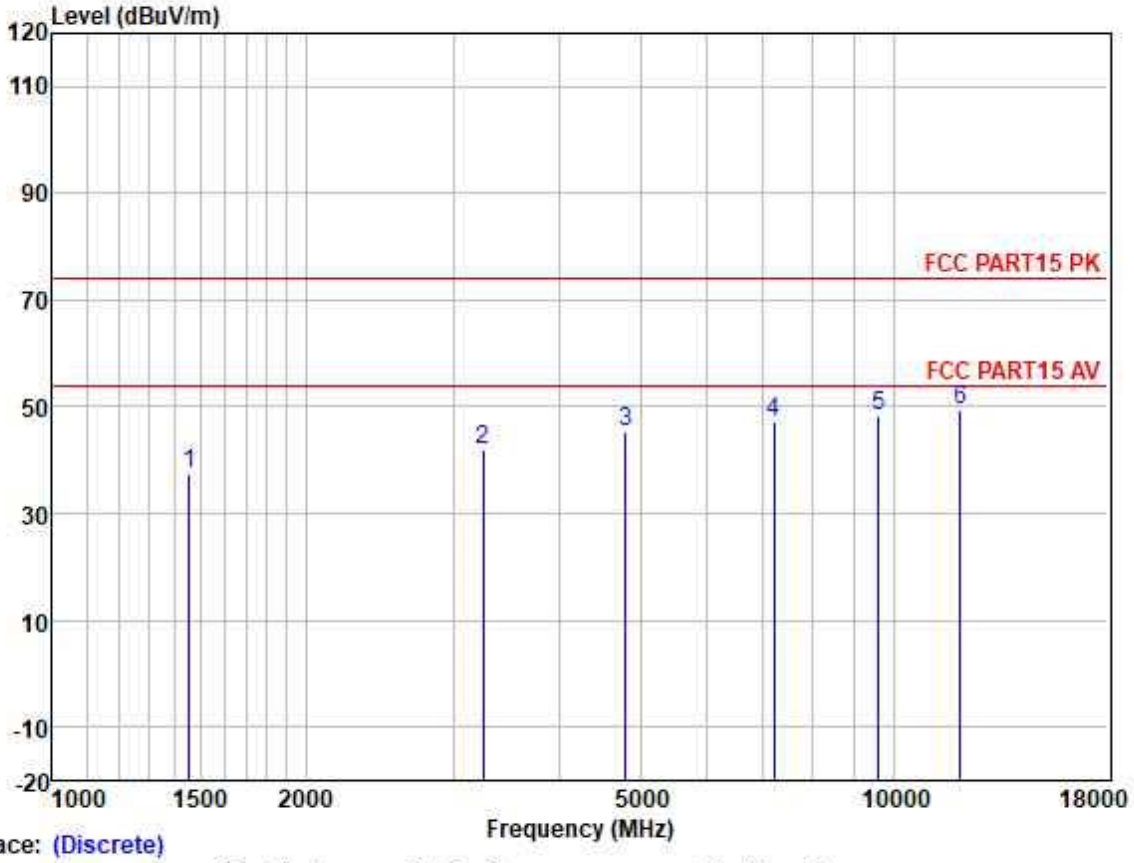
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low; Antenna: 3



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	1456.081	47.51	25.46	2.72	38.17	37.52	74.00	-36.48	HORIZONTAL	Peak
2	3252.005	46.23	28.68	4.03	37.06	41.88	74.00	-32.12	HORIZONTAL	Peak
3	4804.274	45.50	31.42	5.40	36.83	45.49	74.00	-28.51	HORIZONTAL	Peak
4	7206.209	43.10	35.54	5.98	37.38	47.24	74.00	-26.76	HORIZONTAL	Peak
5	9608.450	40.48	38.37	7.07	37.42	48.50	74.00	-25.50	HORIZONTAL	Peak
6	12010.900	39.61	38.90	8.19	37.10	49.60	74.00	-24.40	HORIZONTAL	Peak

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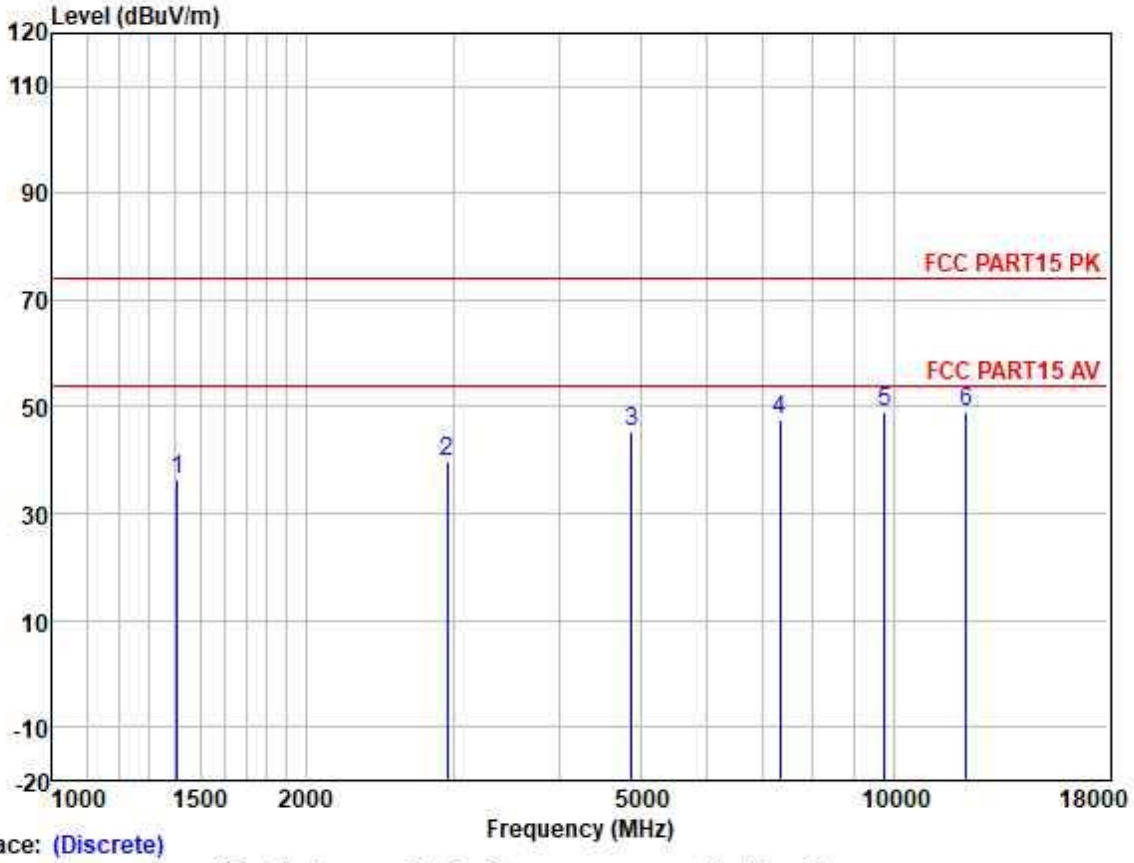
Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle; Antenna: 3



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	1406.443	46.47	25.40	2.61	38.22	36.26	74.00	-37.74	HORIZONTAL	Peak
2	2947.623	45.02	28.35	3.75	37.30	39.82	74.00	-34.18	HORIZONTAL	Peak
3	4884.993	45.07	31.56	5.52	36.84	45.31	74.00	-28.69	HORIZONTAL	Peak
4	7326.265	42.94	36.00	6.13	37.43	47.64	74.00	-26.36	HORIZONTAL	Peak
5	9768.450	40.85	38.53	7.01	37.41	48.98	74.00	-25.02	HORIZONTAL	Peak
6	12210.250	39.39	38.74	8.08	37.00	49.21	74.00	-24.79	HORIZONTAL	Peak

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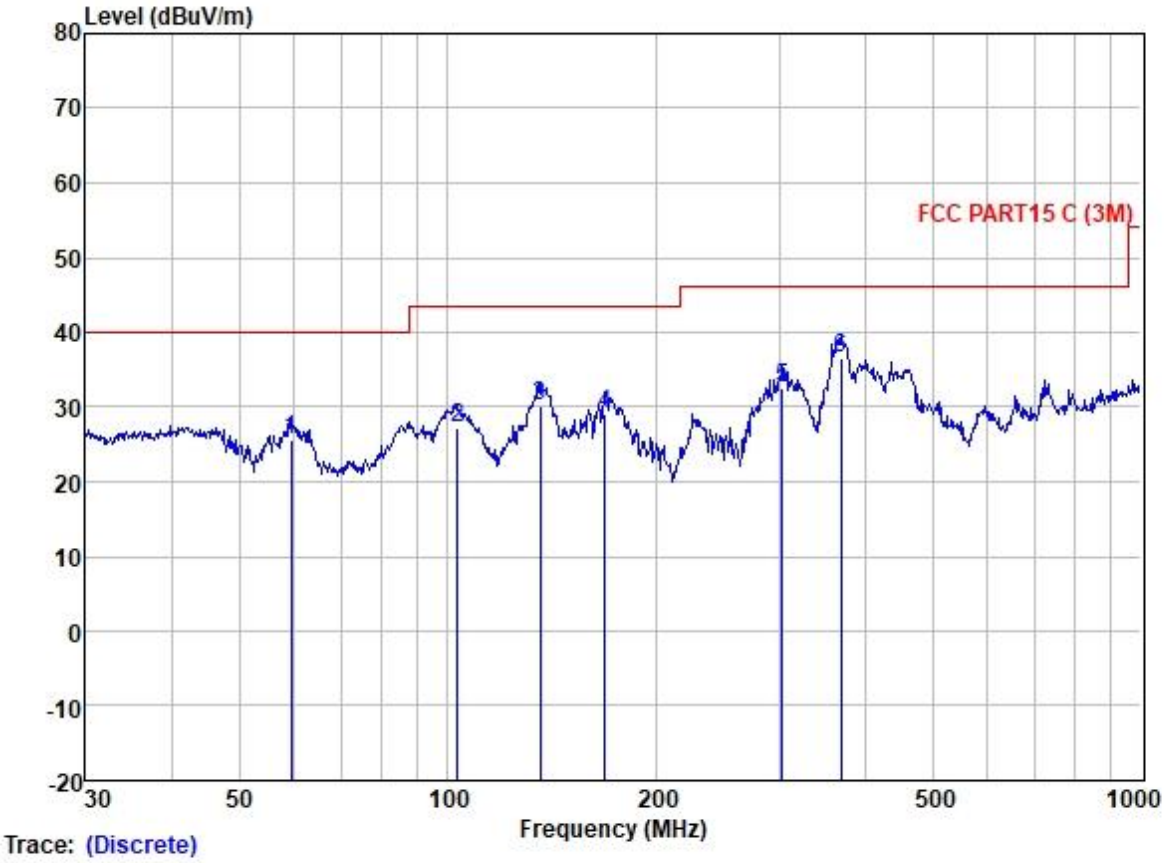
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:Low; Antenna: 2




```
Site        : SGS
Condition   : FCC PART15 C (3M)                                  VERTICAL
Job         :
Model       :
Power       : AC
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	59.44	37.99	13.46	1.25	27.16	25.54	40.00	-14.46	VERTICAL	QP
2	103.08	42.85	9.60	1.74	27.07	27.12	43.50	-16.38	VERTICAL	QP
3	135.98	42.20	12.80	2.03	26.96	30.07	43.50	-13.43	VERTICAL	QP
4	168.41	40.11	13.25	2.39	26.77	28.98	43.50	-14.52	VERTICAL	QP
5	303.54	42.34	13.68	3.18	26.57	32.63	46.00	-13.37	VERTICAL	QP
6	369.40	44.70	15.20	3.76	27.18	36.48	46.00	-9.52	VERTICAL	QP

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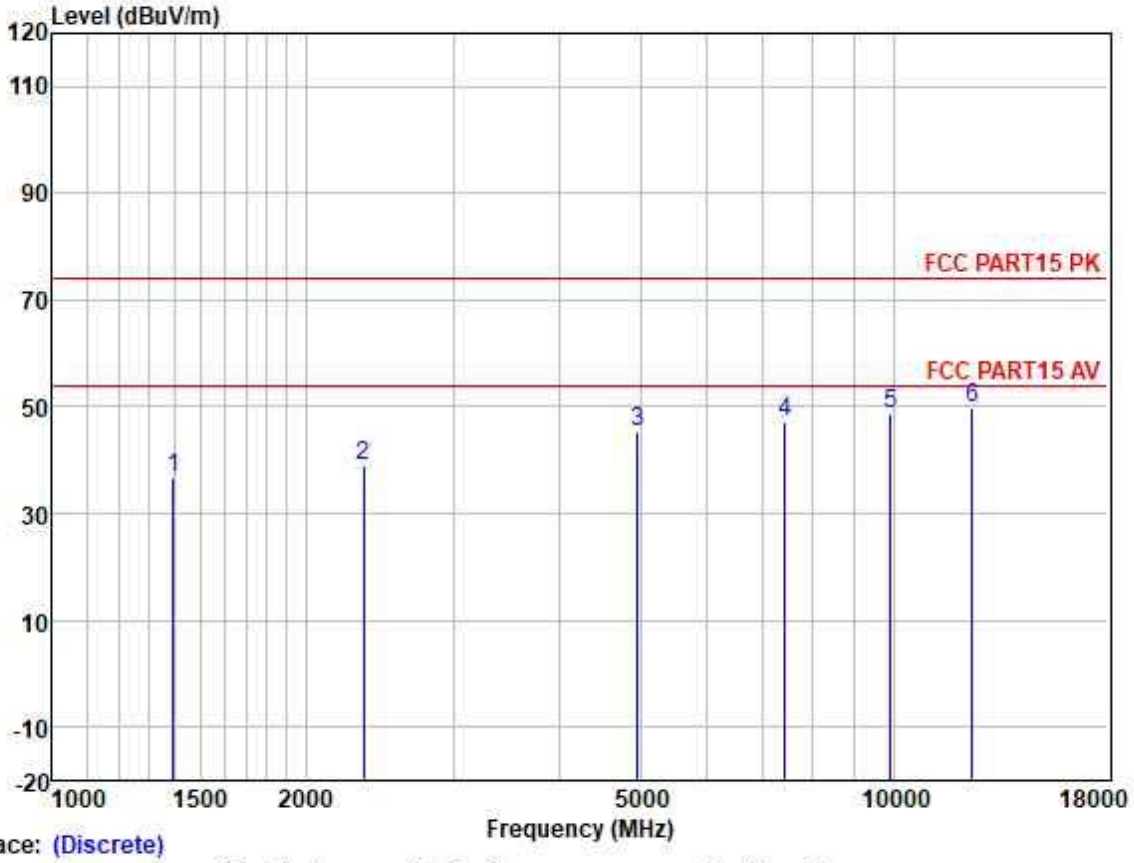
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:High; Antenna: 3



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	1394.300	47.11	25.38	2.60	38.22	36.87	74.00	-37.13	VERTICAL	Peak
2	2345.878	45.93	27.24	3.38	37.61	38.94	74.00	-35.06	VERTICAL	Peak
3	4960.999	45.03	31.65	5.65	36.84	45.49	74.00	-28.51	VERTICAL	Peak
4	7440.375	42.18	36.27	6.22	37.47	47.20	74.00	-26.80	VERTICAL	Peak
5	9920.349	40.33	38.65	6.96	37.40	48.54	74.00	-25.46	VERTICAL	Peak
6	12400.470	40.15	38.57	7.97	36.88	49.81	74.00	-24.19	VERTICAL	Peak

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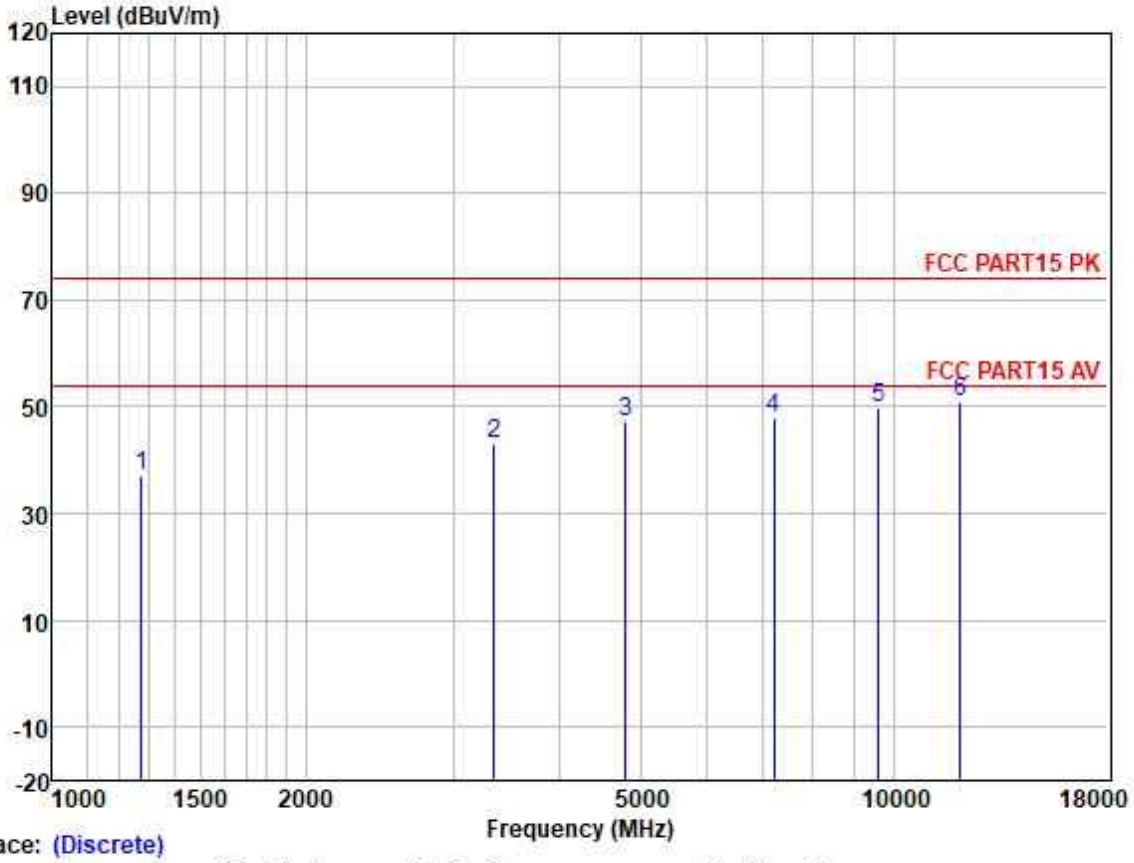
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:Low; Antenna: 3



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	1274.802	47.78	25.12	2.48	38.33	37.05	74.00	-36.95	VERTICAL	Peak
2	3347.371	47.16	28.80	4.08	37.01	43.03	74.00	-30.97	VERTICAL	Peak
3	4804.982	47.33	31.42	5.40	36.83	47.32	74.00	-26.68	VERTICAL	Peak
4	7206.527	43.85	35.54	5.98	37.38	47.99	74.00	-26.01	VERTICAL	Peak
5	9608.530	41.74	38.37	7.07	37.42	49.76	74.00	-24.24	VERTICAL	Peak
6	12010.670	40.87	38.90	8.19	37.10	50.86	74.00	-23.14	VERTICAL	Peak

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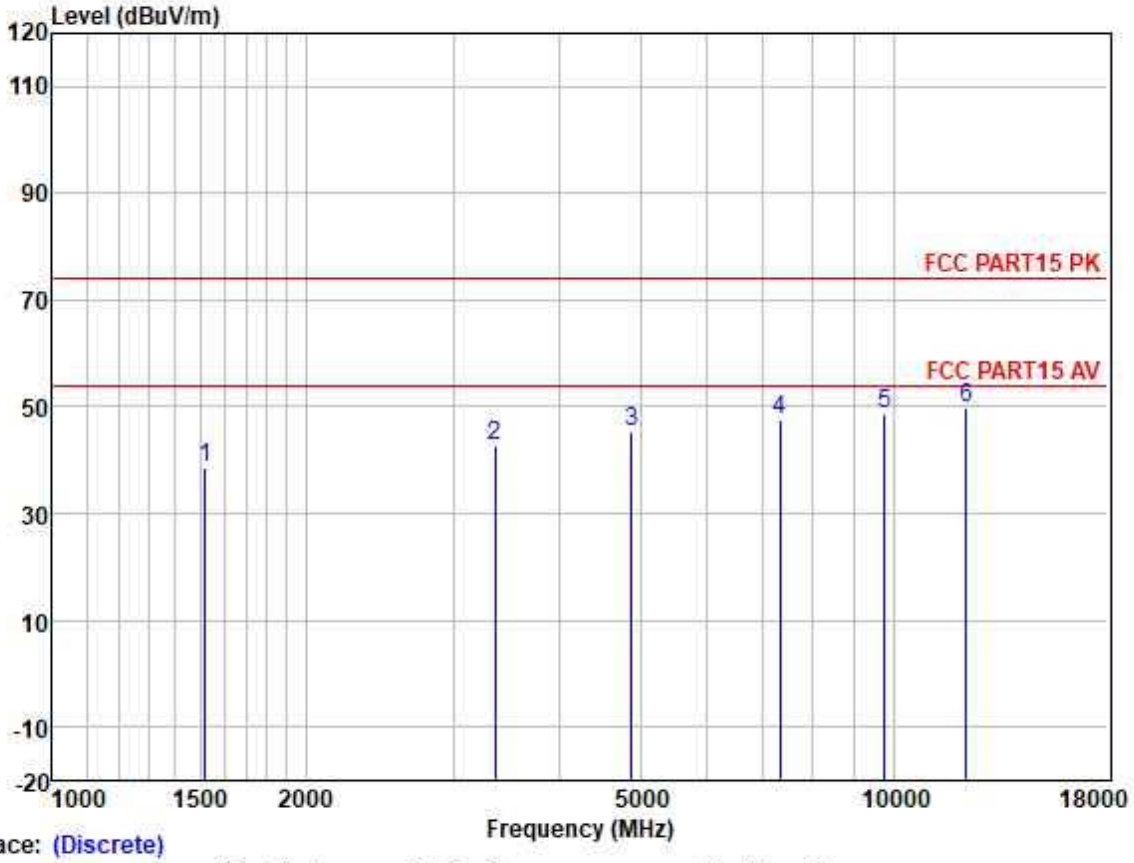
Test Mode: 03; Polarity: Vertical; Modulation:GFSK; ; Channel:middle; Antenna: 3



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	1520.598	48.31	25.51	2.80	38.07	38.55	74.00	-35.45	VERTICAL	Peak
2	3357.061	46.69	28.81	4.09	37.01	42.58	74.00	-31.42	VERTICAL	Peak
3	4884.902	45.16	31.56	5.52	36.84	45.40	74.00	-28.60	VERTICAL	Peak
4	7326.551	42.81	36.00	6.13	37.43	47.51	74.00	-26.49	VERTICAL	Peak
5	9768.980	40.65	38.53	7.01	37.41	48.78	74.00	-25.22	VERTICAL	Peak
6	12210.250	40.04	38.74	8.08	37.00	49.86	74.00	-24.14	VERTICAL	Peak

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8 Test Setup Photo

Refer to Appendix _Test Setup Photo for GZCR210502033102

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9 EUT Constructional Details (EUT Photos)

Refer to Appendix _ External and Internal Photos for GZCR2105020331HS.

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10 Appendix(Cable loss =0.9dB)

10.1 Appendix A: DTS Bandwidth

10.1.1 Test Result

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	0.716	2401.640	2402.356	>=0.5	PASS
		2442	0.728	2441.640	2442.368	>=0.5	PASS
		2480	0.740	2479.628	2480.368	>=0.5	PASS
BLE_2M	Ant1	2402	1.044	2401.484	2402.528	>=0.5	PASS
		2442	1.422	2441.280	2442.702	>=0.5	PASS
		2480	1.128	2479.418	2480.546	>=0.5	PASS

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10.1.2 Test Graphs

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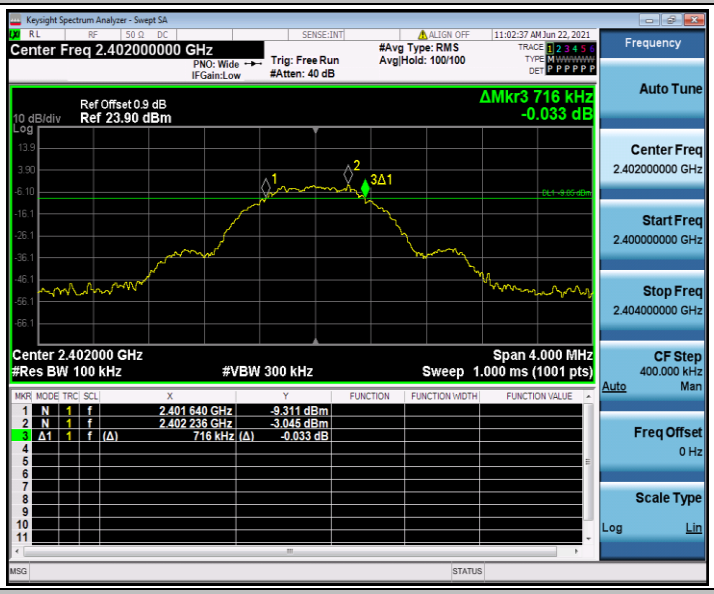
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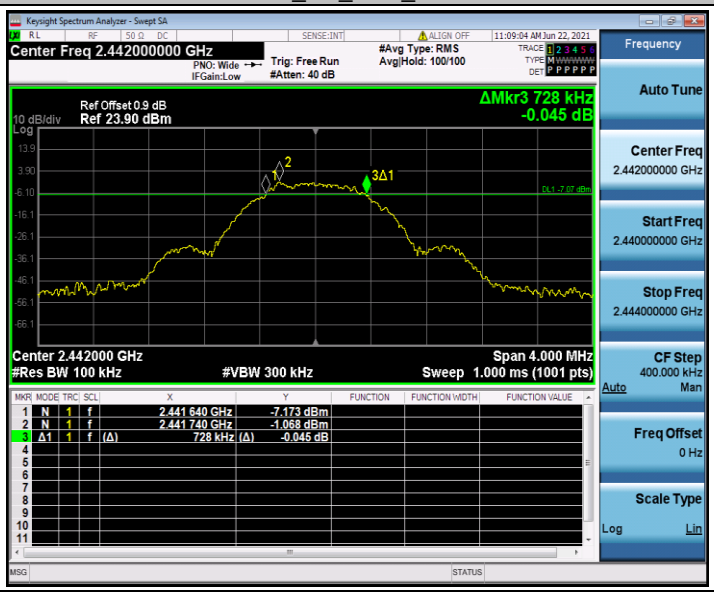

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BLE_1M_Ant1_2480

BLE_2M_Ant1_2402

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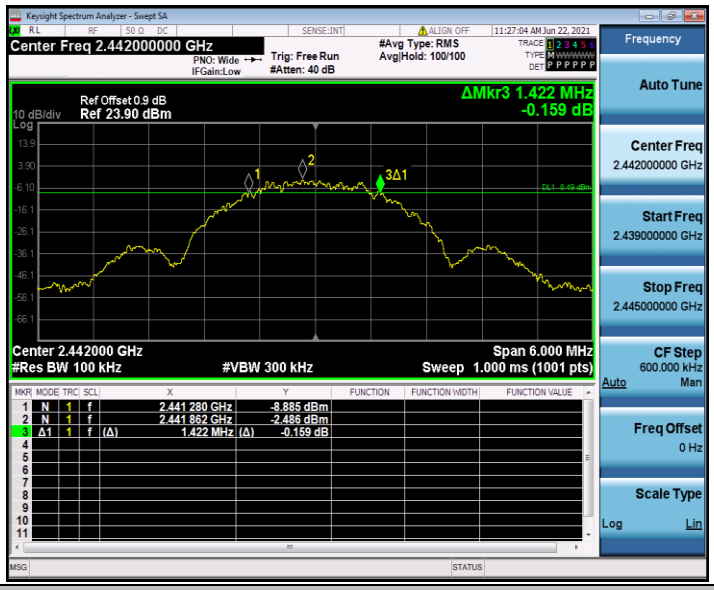
BLE_2M_Ant1_2442



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10.2 Appendix B: Maximum conducted output power

10.2.1 Test Result

TestMode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	-1.93	<=30	PASS
		2442	-0.04	<=30	PASS
		2480	1.2	<=30	PASS
BLE_2M	Ant1	2402	-2	<=30	PASS
		2442	-0.11	<=30	PASS
		2480	1.22	<=30	PASS

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10.2.2 Test Graphs

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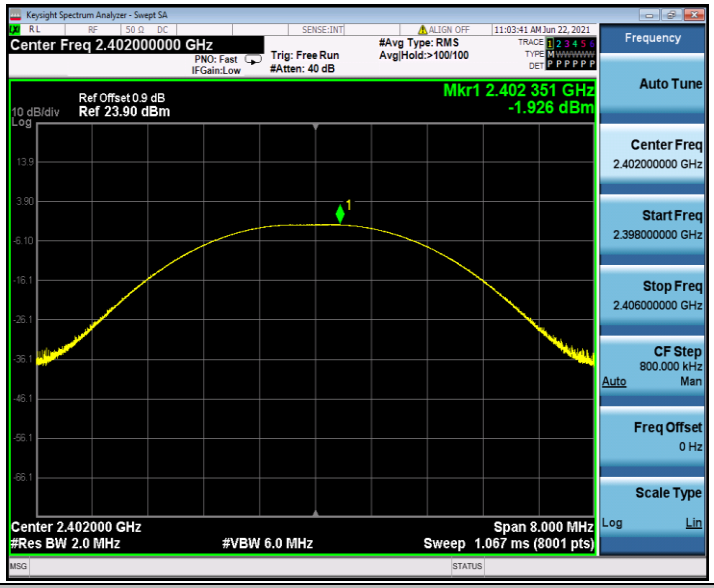

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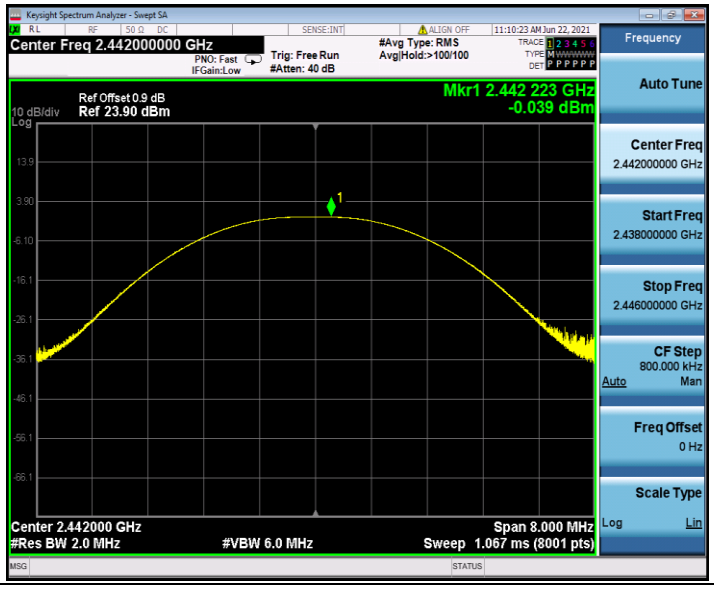

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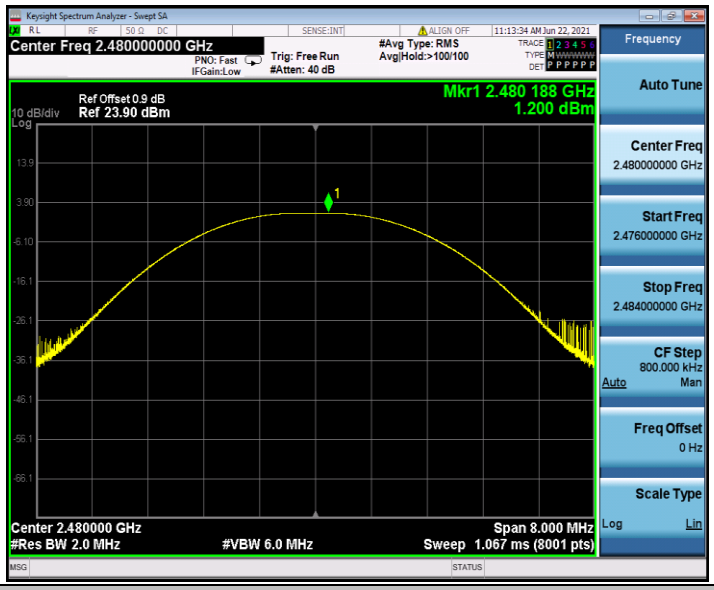
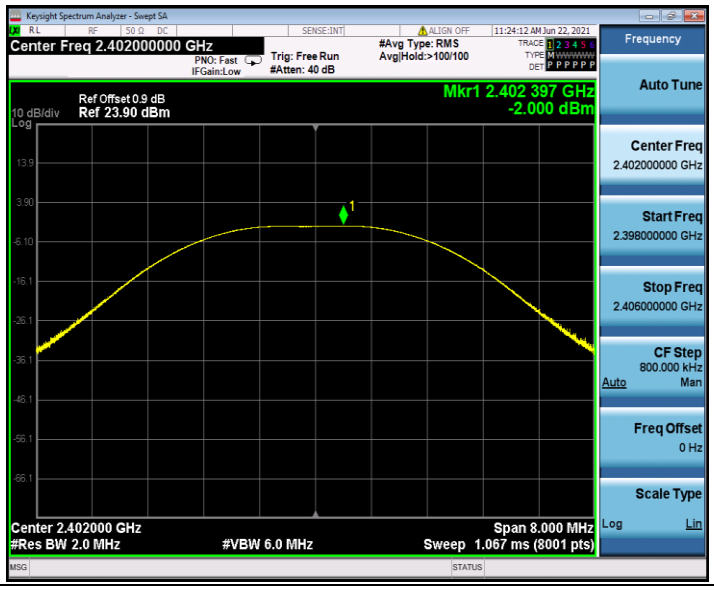
BLE_1M_Ant1_2480



BLE_2M_Ant1_2402



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BLE_2M_Ant1_2442

BLE_2M_Ant1_2480

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10.3 Appendix C: Maximum power spectral density

10.3.1 Test Result

TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3kHz]	Verdict
BLE_1M	Ant1	2402	-9.66	<=8	PASS
		2442	-7.7	<=8	PASS
		2480	-6.01	<=8	PASS
BLE_2M	Ant1	2402	-11.41	<=8	PASS
		2442	-9.29	<=8	PASS
		2480	-9.08	<=8	PASS

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10.3.2 Test Graphs

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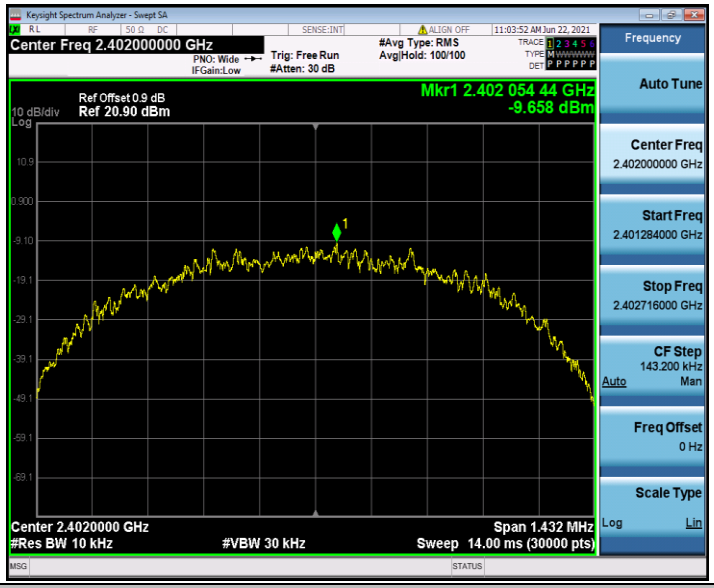

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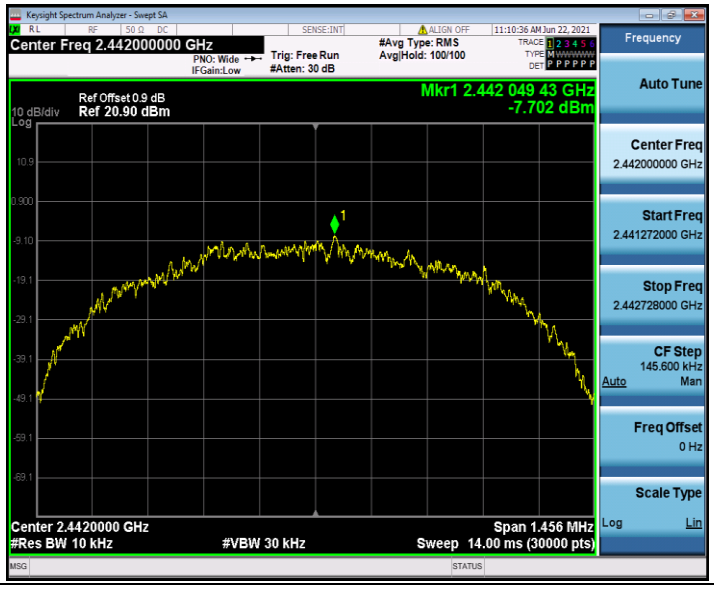

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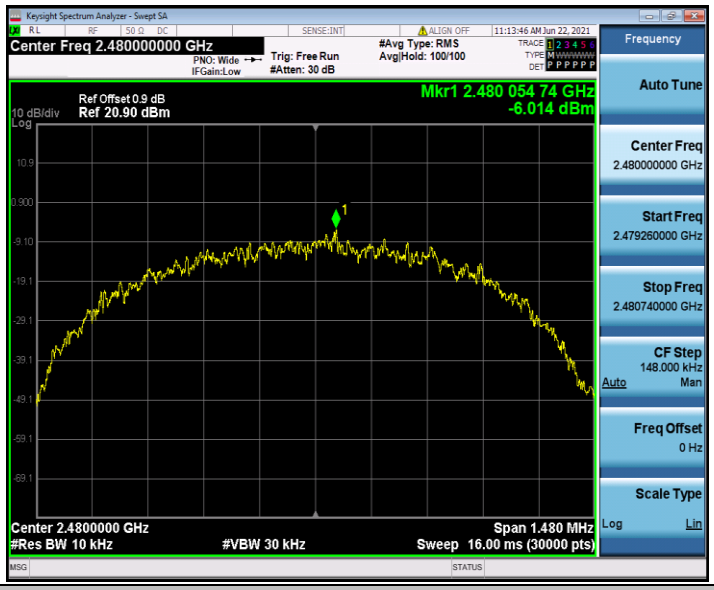
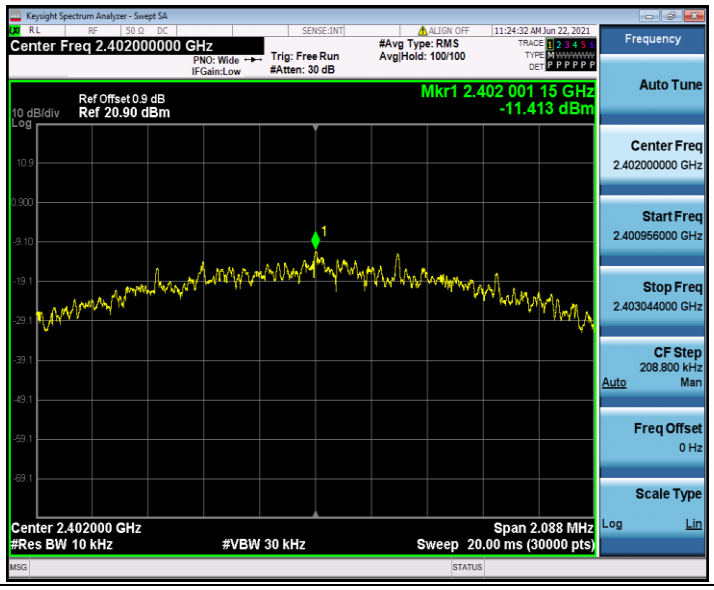
BLE_1M_Ant1_2480



BLE_2M_Ant1_2402



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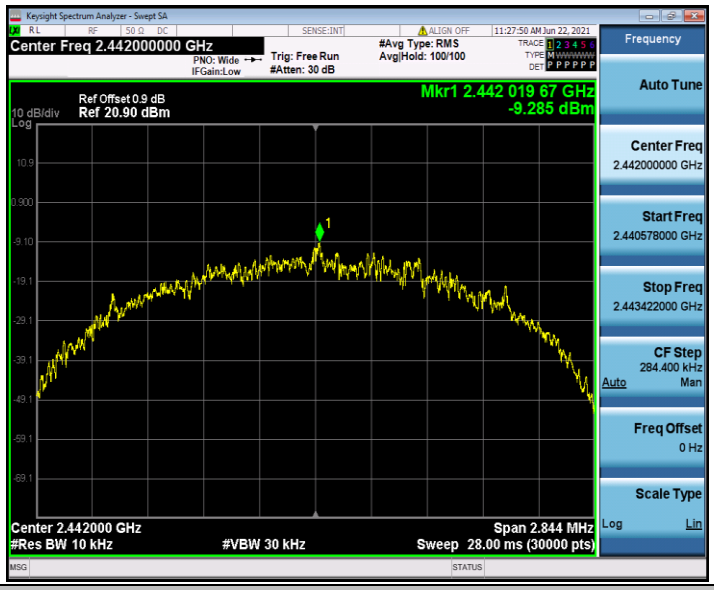
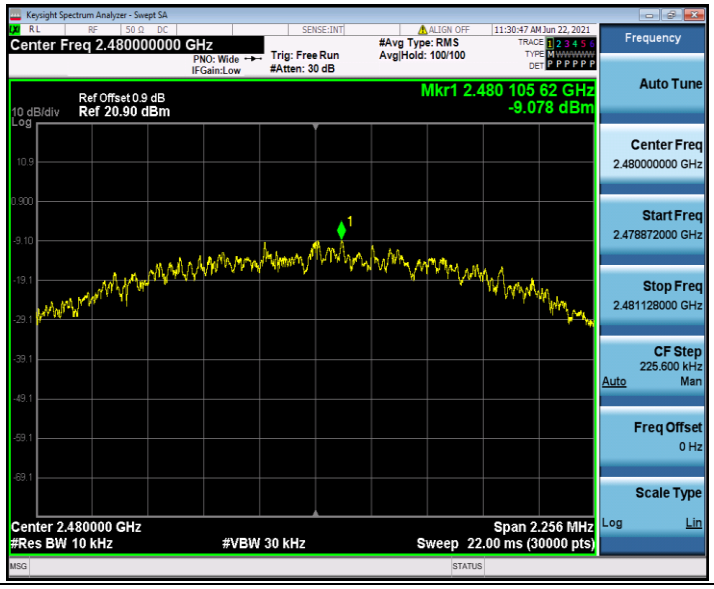


BLE_2M_Ant1_2480



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10.4 Appendix D: Band edge measurements

10.4.1 Test Result

TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	Low	2402	-2.04	-54.65	<=-22.04	PASS
		High	2480	1.19	-52.27	<=-18.81	PASS
BLE_2M	Ant1	Low	2402	-2.40	-33.86	<=-22.41	PASS
		High	2480	0.99	-51.86	<=-19.01	PASS

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10.4.2 Test Graphs

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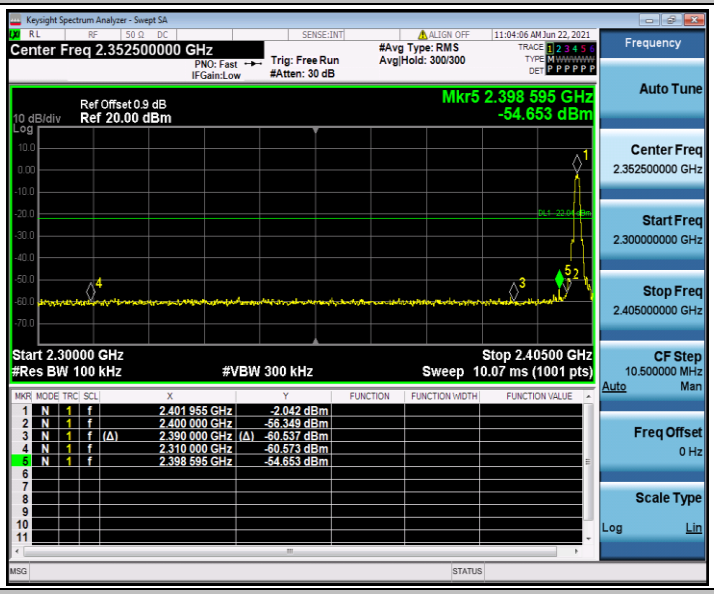
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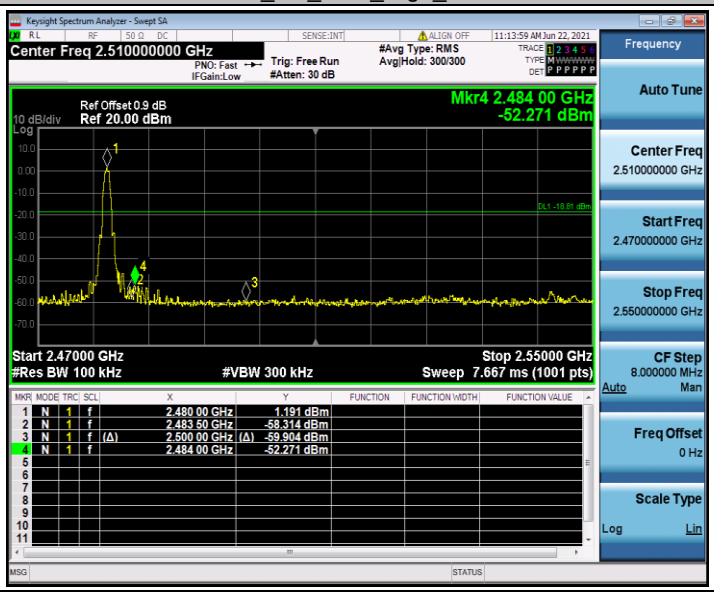

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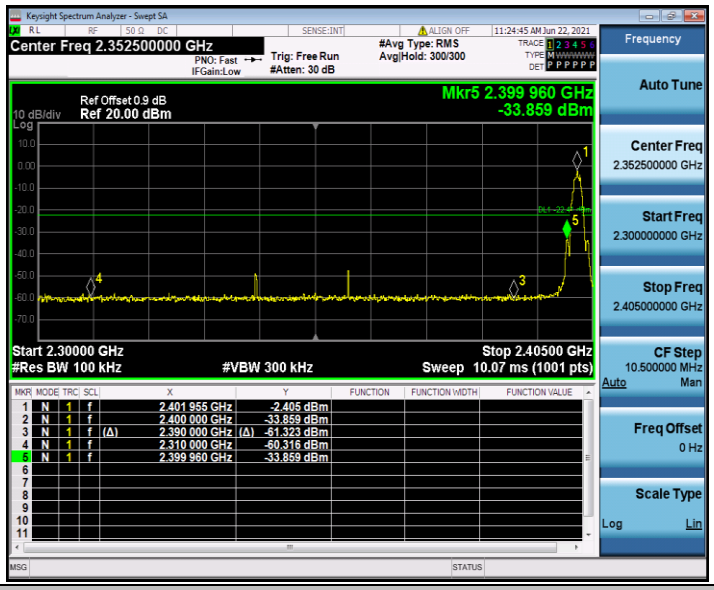

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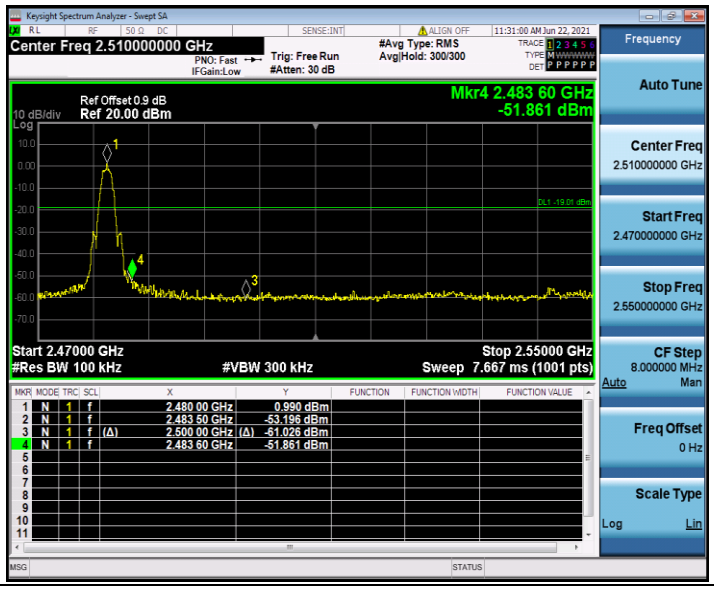

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10.5 Appendix E: Conducted Spurious Emission

10.5.1 Test Result

TestMode	Antenna	Channel	FreqRange [MHz]	RefLevel [dBm]	Result[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	Reference	-2.70	-2.70	---	PASS
			30~1000	30~1000	-70.032	<=-22.7	PASS
			1000~26500	1000~26500	-49.723	<=-22.7	PASS
		2442	Reference	-0.54	-0.54	---	PASS
			30~1000	30~1000	-70.22	<=-20.54	PASS
			1000~26500	1000~26500	-50.531	<=-20.54	PASS
		2480	Reference	0.73	0.73	---	PASS
			30~1000	30~1000	-70.356	<=-19.268	PASS
			1000~26500	1000~26500	-49.038	<=-19.268	PASS
BLE_2M	Ant1	2402	Reference	-2.36	-2.36	---	PASS
			30~1000	30~1000	-69.721	<=-22.362	PASS
			1000~26500	1000~26500	-50.098	<=-22.362	PASS
		2442	Reference	-0.23	-0.23	---	PASS
			30~1000	30~1000	-69.594	<=-20.229	PASS
			1000~26500	1000~26500	-52.634	<=-20.229	PASS
		2480	Reference	-0.80	-0.80	---	PASS
			30~1000	30~1000	-69.84	<=-20.797	PASS
			1000~26500	1000~26500	-50.508	<=-20.797	PASS

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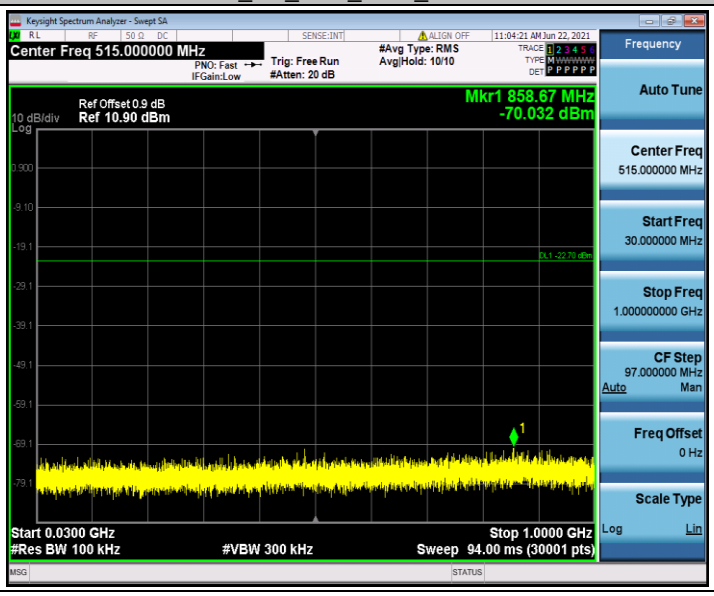
10.5.2 Test Graphs

BLE_1M_Ant1_2402_0~Reference

BLE_1M_Ant1_2402_30~1000



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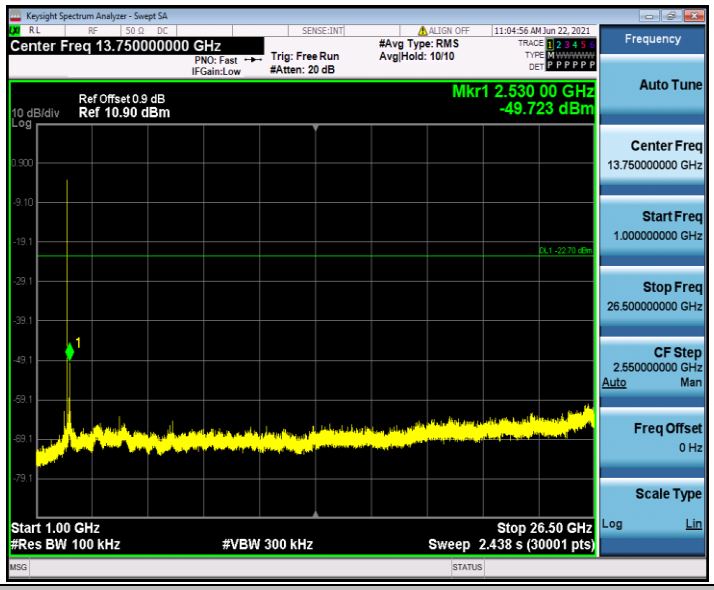

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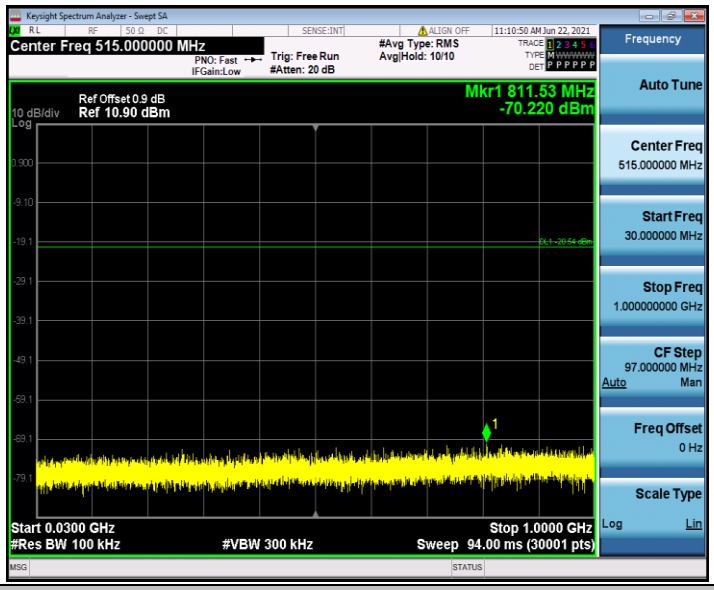

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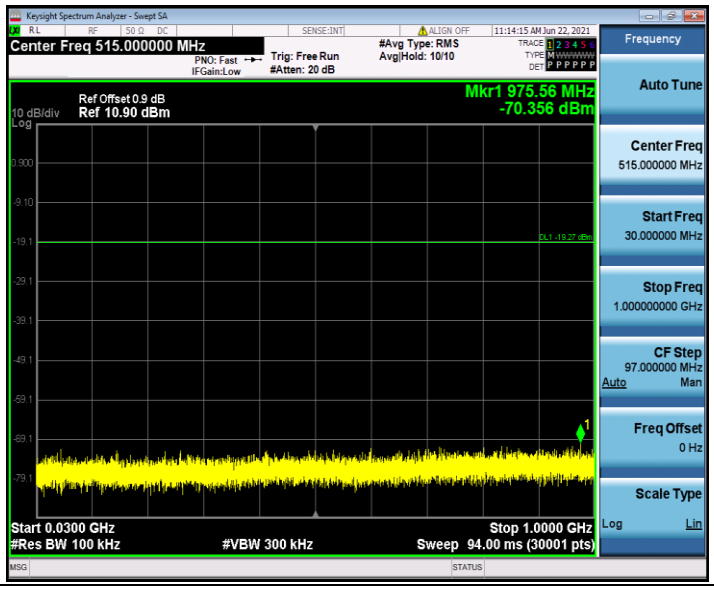

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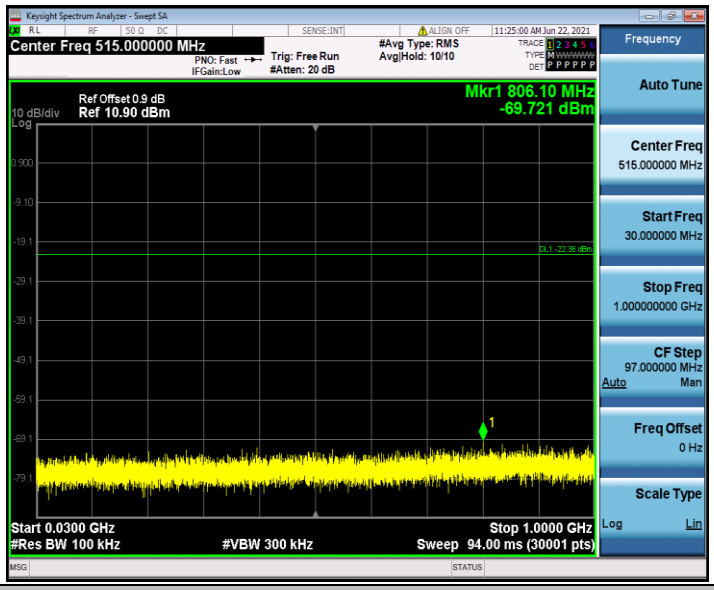

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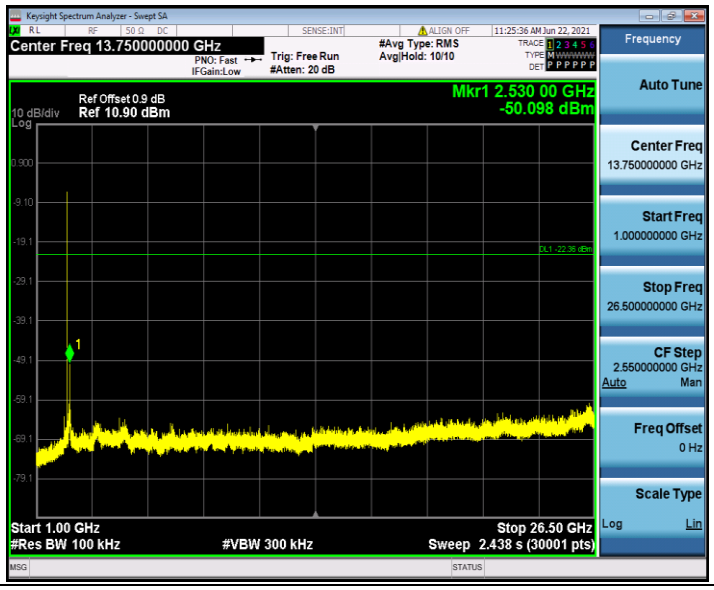

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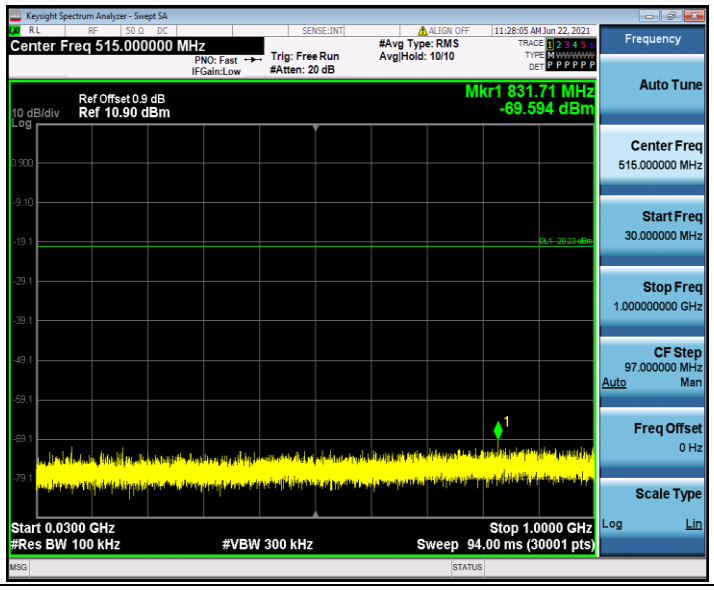

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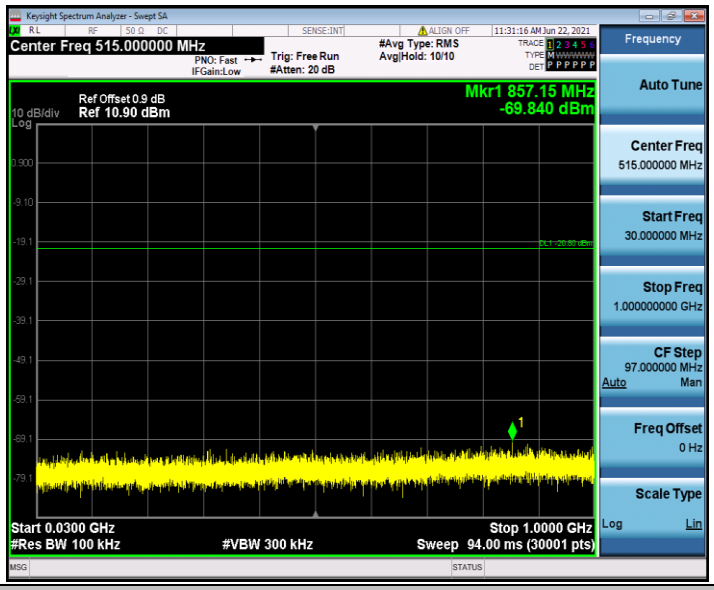

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