TEST REPORT

Application No.:	GZEM2012017560CR
Applicant:	The House of Marley. LLC
Address of Applicant:	3000 Pontiac Trail, Commerce Township, Michigan 48390 United States
Manufacturer:	The House of Marley. LLC
Address of Manufacturer:	3000 Pontiac Trail, Commerce Township, Michigan 48390 United States
Factory:	1. Dongguan Kailai Electronic Co., Ltd 2. YING TONG (VIETNAM) ELECTRONIC TECHNOLOGY COMPANY LIMITED
Address of Factory:	1. Second Building, No. 6, Changping baisha Road, Changping Town, Dongguan City, Guandong Province 2. Plot No. CN02-1-2, Lot No. CN02, Binh Xuyen II Industrial Park, Ba Hien Commune, Binh Xuyen District, Vinh Phuc Province, Vietnam
Equipment Under Test (EUT):	
EUT Name:	Champion
Model No.:	EM-JE131 EMJE131L for left earbuds EMJE131R for right earbuds
FCC ID:	PVB-EMJE131 (for left earbud)
FCC ID:	PVB-EMJE131R (for right earbud)
Trade Mark:	MARLEY
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2020-12-24
Date of Test:	2020-01-05 to 2021-01-22
Date of Issue:	2021-02-02
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		*2021-02-02*		*Original*

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

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass**
**: The EUT passed Conducted Radiated Spurious Emissions tests after modification.				

3 Contents

4 General Information

4.1 Details of E.U.T.

Rated voltage:	DC 5V&DC 3.6V
Test voltage:	DC 3.6V
Battery:	DC 3.6V rechargeable battery
Power supply:	DC 3.6V for working DC 5V charging by adaptor
Cable(s):	about 30cm unscreened USB cable
Antenna Gain	-3.79 dBi declared by applicant
Antenna Type:	Integra Antenna
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum (FHSS)
Channel Spacing:	1MHz
Number of Channels:	79
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Operation Frequency:	2402MHz to 2480MHz
Software version	V5.0
Hardware version	V3.0
Setting software:	BQB.exe
Power Setting:	3 dBm can not be changed by the user

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Peak Output Power	± 0.75dB
20dB Bandwidth	± 3%
Carrier Frequencies Separation	± 7.25 x 10^{-8}
Hopping Channel Number	± 7.25 x 10^{-8}
Dwell Time	± 0.37%
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	± 4.5dB (Below 1GHz);± 4.8dB (Above 1GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty), so the test results

– compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;

– non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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 C-Tick mark as a result of our NVLAP accreditation.

- **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 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

- **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, Jul 13, 2017.

- **Industry Canada (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-10449 and T-11179)**

The 10m Semi-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-10449 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

5 Equipment List

Conducted Peak Output Power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	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
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

20dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	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
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Carrier Frequencies Separation					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	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
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Hopping Channel Number					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	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
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Dwell Time					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	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
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Conducted Band Edges Measurement					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	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
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Conducted Spurious Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	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
MI CABLE	SGS-EMC	0.8M	EMC2137	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	Rohde & Schwarz	ESIB26	EMC0522	2021-01-08	2022-01-07
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC0056	2021-01-03	2022-01-02
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27
Trilog Broadband Antenna 25MHz-1GHz	SCHWARZBECKMESS-ELEKTRONIK	VULB 9168	EMC2174	2018-09-06	2021-09-05
Bi-log Type Antenna	Schaffner Chase	CBL6143	EMC0519	2020-06-08	2023-06-07
Horn Antenna	SCHWARZBECKMESS-ELEKTRONIK	BBHA 9120D	EMC2016	2019-09-25	2022-09-24
Horn Antenna 1GHz-18GHz	Rohde & Schwarz	HF906	EMC0518	2018-09-02	2021-09-01
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-01-08	2022-01-07

Amplifier	HP	8447F	EMC2065	2020-05-26	2021-05-25
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2020-11-13	2021-11-12
Active Loop Antenna	EMCO	6502	EMC0523	2020-05-19	2022-05-18
High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2021-01-08	2022-01-07
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-01-08	2022-01-07
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-19	2023-12-18
MXE EMI Receiver	Keysight	N9038A	EMC2139	2020-11-13	2021-11-12
EXA Signal Analyzer	Keysight	N9010A	EMC2138	2020-09-17	2021-09-16
Trilog Broadband Antenna 30MHz-1GHz	SCHWARZBECKMESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

Radiated Spurious Emissions

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB26	EMC0522	2021-01-08	2022-01-07
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC0056	2021-01-03	2022-01-02
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27
Trilog Broadband Antenna 25MHz-1GHz	SCHWARZBECKMESS-ELEKTRONIK	VULB 9168	EMC2174	2018-09-06	2021-09-05
Bi-log Type Antenna	Schaffner Chase	CBL6143	EMC0519	2020-06-08	2023-06-07
Horn Antenna	SCHWARZBECKMESS-ELEKTRONIK	BBHA 9120D	EMC2016	2019-09-25	2022-09-24
Horn Antenna 1GHz-18GHz	Rohde & Schwarz	HF906	EMC0518	2018-09-02	2021-09-01
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2021-01-08	2022-01-07
Amplifier	HP	8447F	EMC2065	2020-05-26	2021-05-25
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2020-11-13	2021-11-12
Active Loop Antenna	EMCO	6502	EMC0523	2020-05-19	2022-05-18
High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2021-01-08	2022-01-07
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-01-08	2022-01-07
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-19	2023-12-18
MXE EMI Receiver	Keysight	N9038A	EMC2139	2020-11-13	2021-11-12
EXA Signal Analyzer	Keysight	N9010A	EMC2138	2020-09-17	2021-09-16
Trilog Broadband Antenna 30MHz-1GHz	SCHWARZBECKMESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22

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Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

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

a

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)

Limit:

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(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 and no consideration of replacement. The best case gain of the antenna is -3.79dBi (declared by applicant).

Antenna location: Refer to Internal photos.

6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

> Number of shift register stages: 9

> Length of pseudo-random sequence: 29 -1 = 511 bits

> Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinated with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

7 Radio Spectrum Matter Test Results

7.1 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)
Test Method: ANSI C63.10 (2013) Section 7.8.5
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

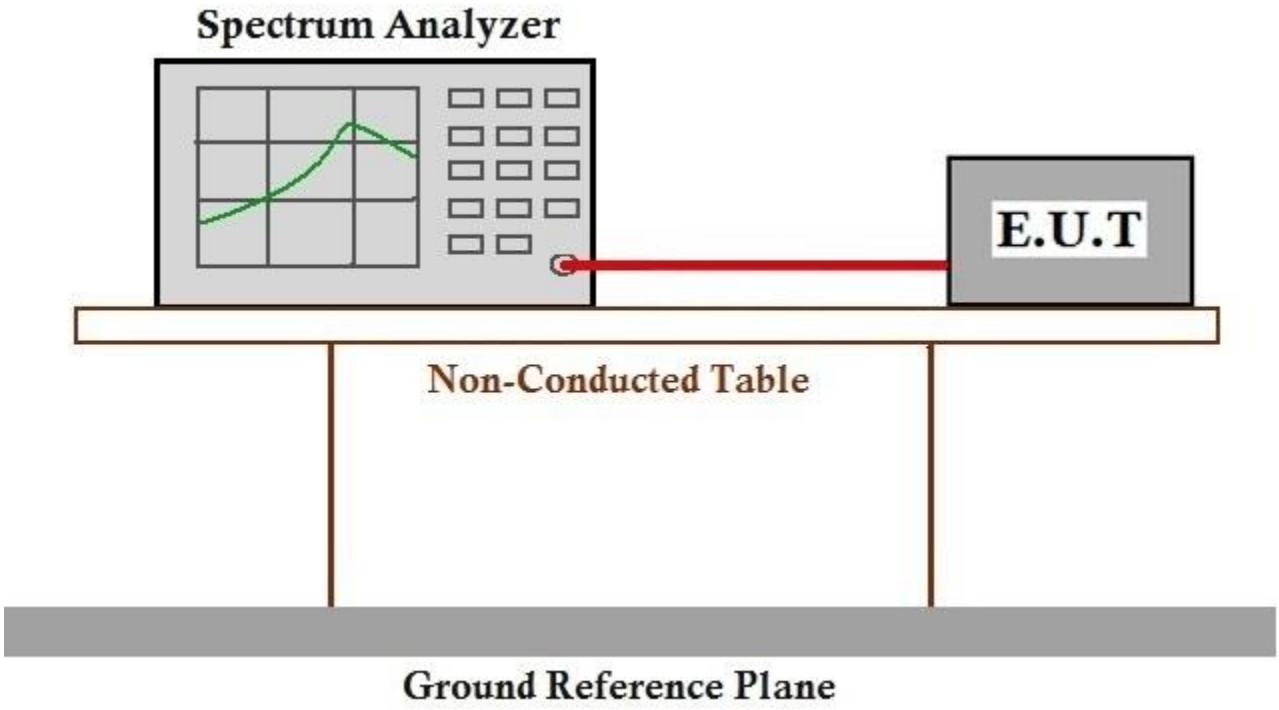
7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 20.0 °C Humidity: 36.9 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1)
Test Method: ANSI C63.10 (2013) Section 7.8.7

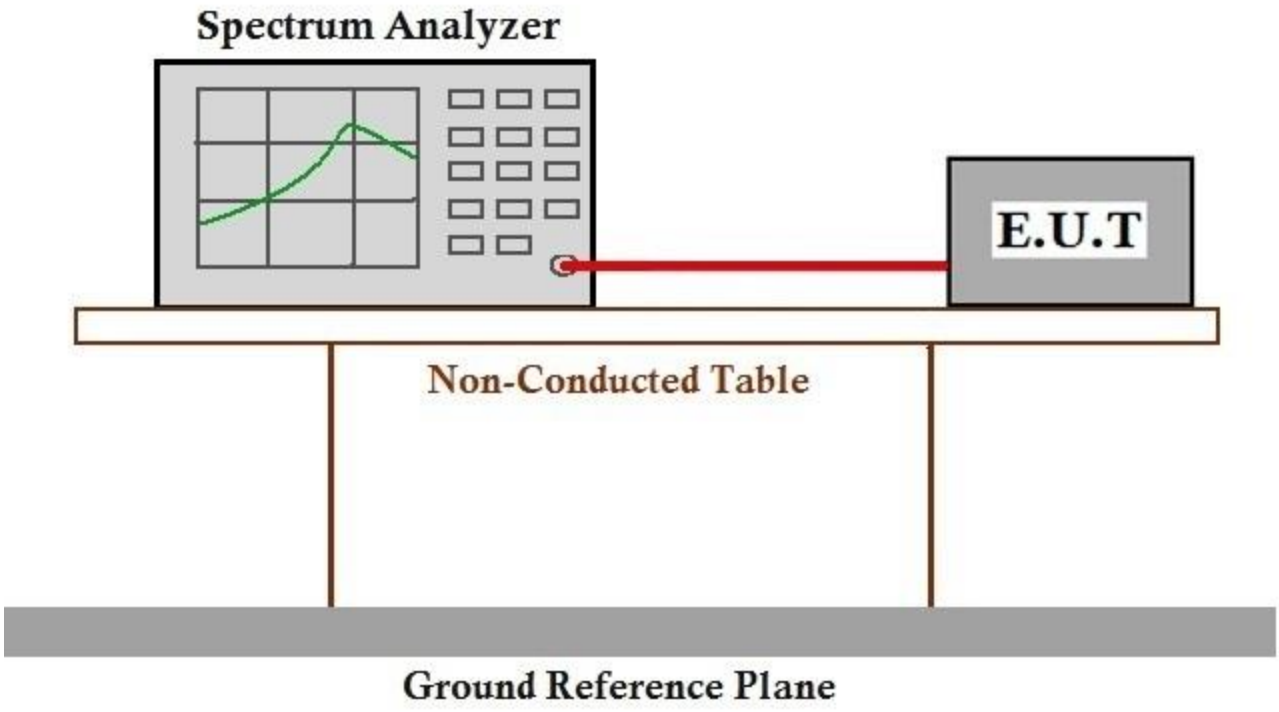
7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 20.1 °C Humidity: 36.9 % RH Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.3 Carrier Frequencies Separation

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)

Test Method: ANSI C63.10 (2013) Section 7.8.2

Limit: 2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W.

7.3.1 E.U.T. Operation

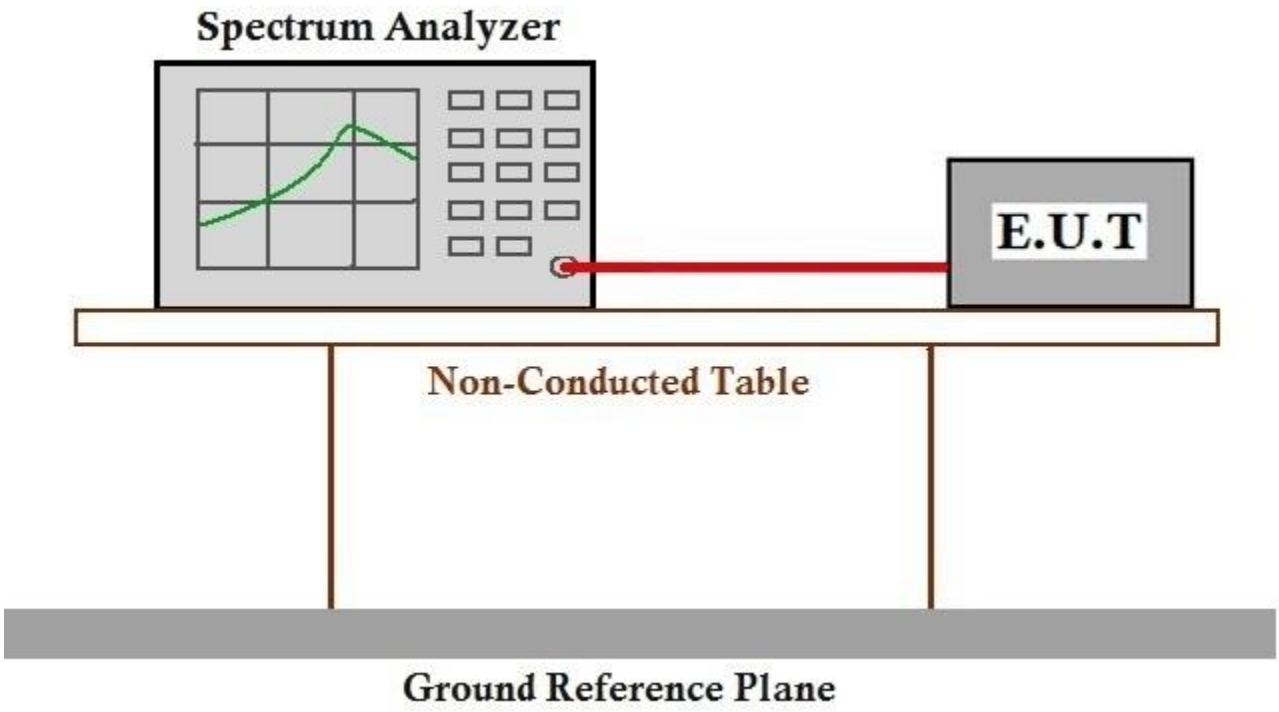
Operating Environment:

Temperature: 20.0 °C Humidity: 36.9 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.4 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)
Test Method: ANSI C63.10 (2013) Section 7.8.3
Limit:

Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

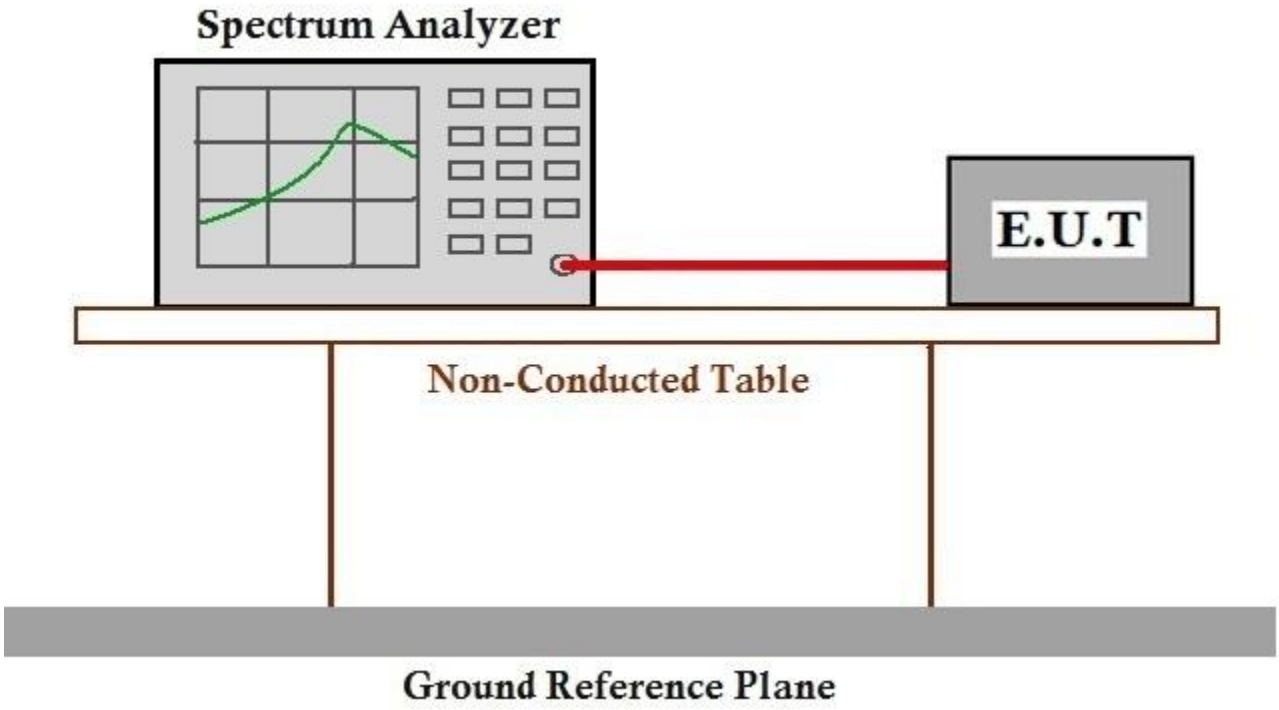
7.4.1 E.U.T. Operation

Operating Environment:
Temperature: 20.1 °C Humidity: 36.9 % RH Atmospheric Pressure: 1010 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.5 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)
Test Method: ANSI C63.10 (2013) Section 7.8.4
Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

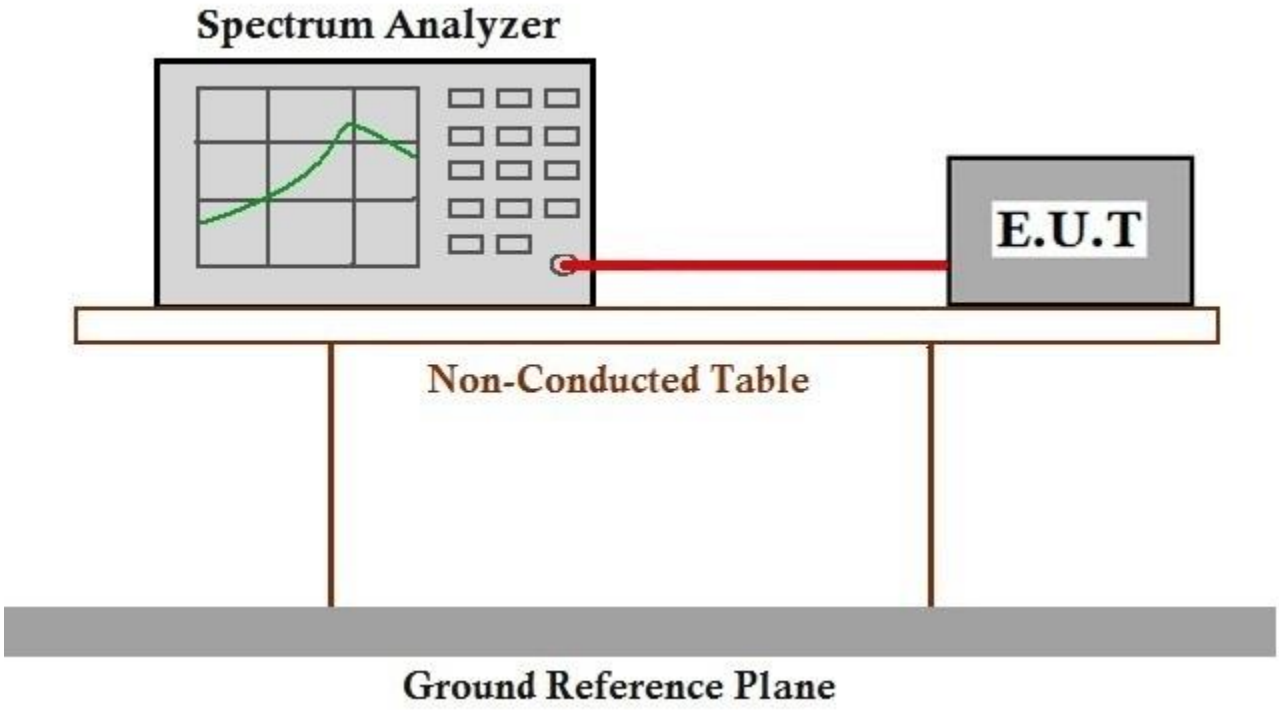
7.5.1 E.U.T. Operation

Operating Environment:
Temperature: 20.1 °C Humidity: 36.9 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.6 Conducted Band Edges Measurement

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

Test Method: ANSI C63.10 (2013) Section 7.8.6

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

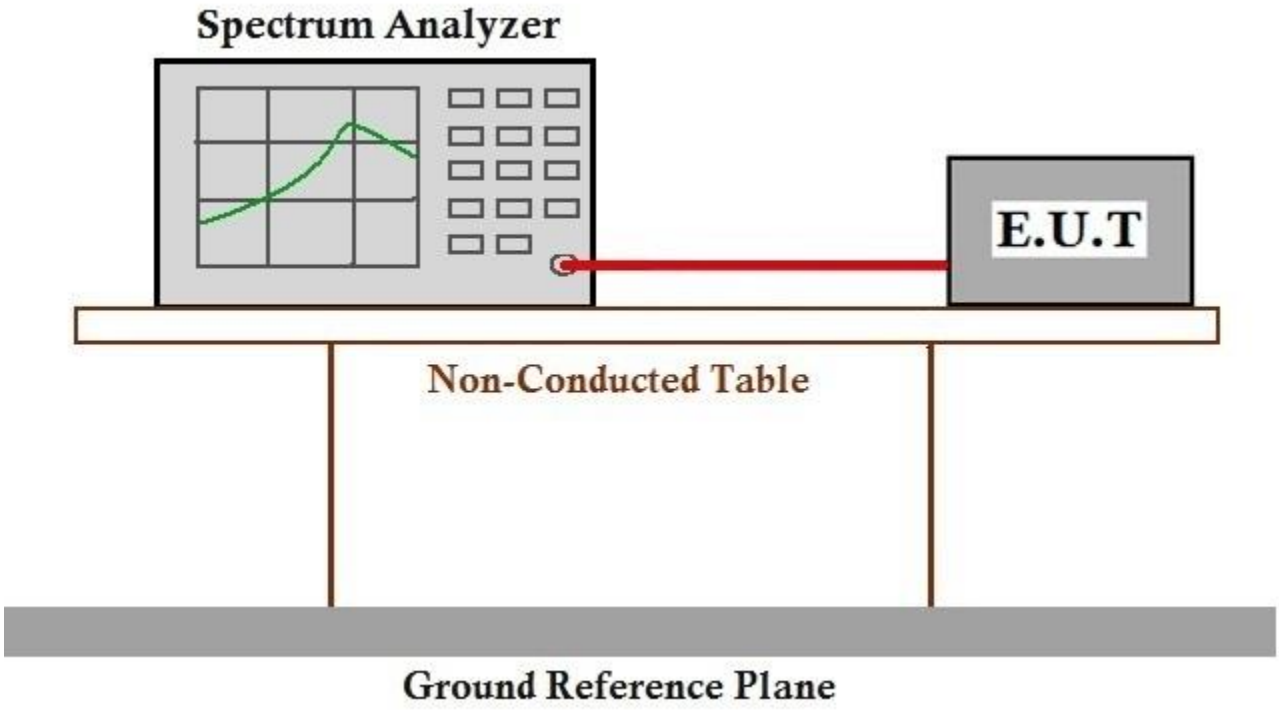
Operating Environment:

Temperature: 20.1 °C Humidity: 36.8 % RH Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	03	TX_Hop mode_Keep the EUT in frequency hopping mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.6.3 Test Setup Diagram



7.6.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.7 Conducted Spurious Emissions

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

Test Method: ANSI C63.10 (2013) Section 7.8.8

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).

7.7.1 E.U.T. Operation

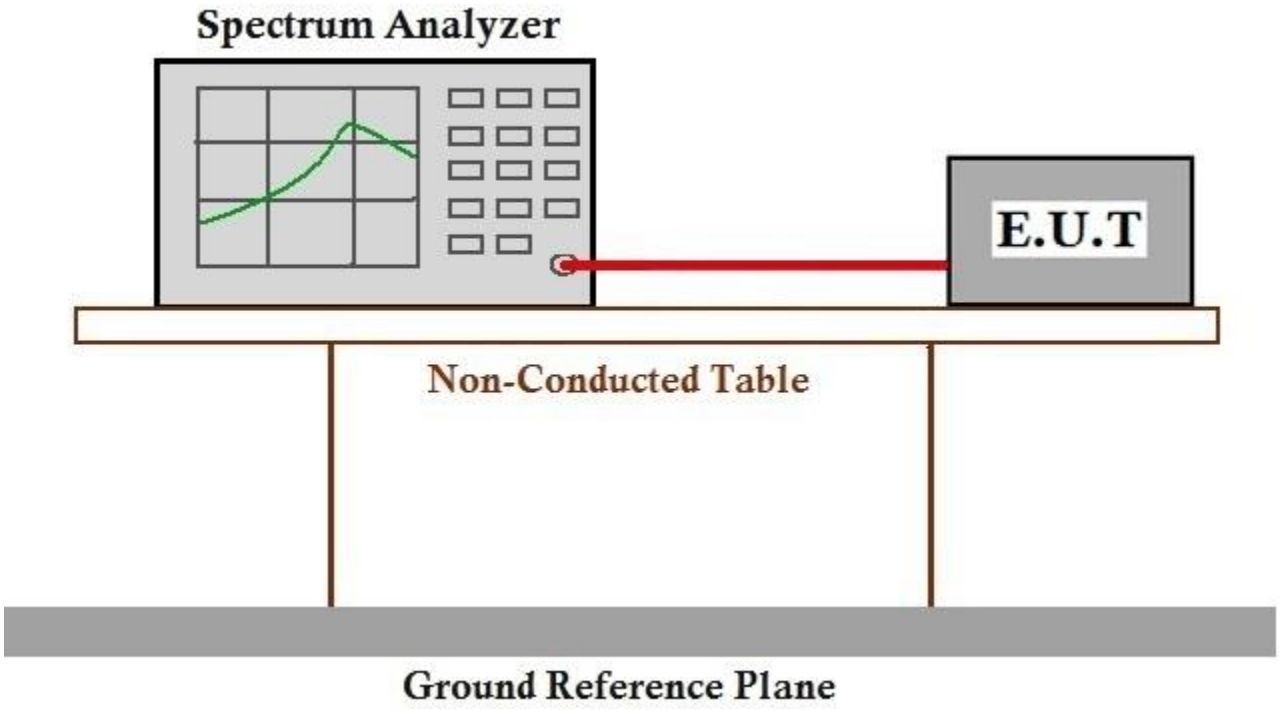
Operating Environment:

Temperature: 20.1 °C Humidity: 36.8 % RH Atmospheric Pressure: 1010 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.7.3 Test Setup Diagram



7.7.4 Measurement Procedure and Data

Please Refer To Appendix For Details

7.8 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.		

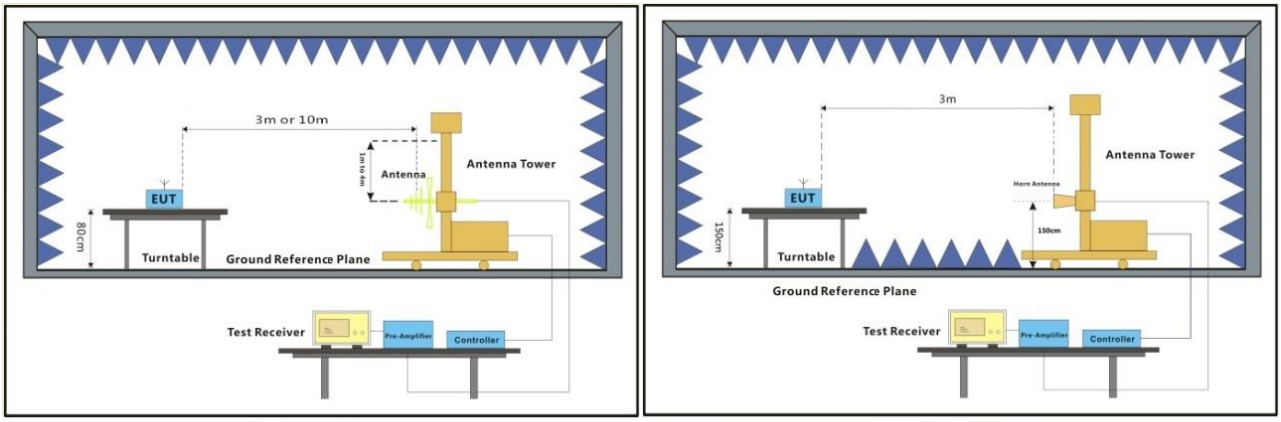
7.8.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 55 % RH Atmospheric Pressure: 1010 mbar

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.8.3 Test Setup Diagram



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.

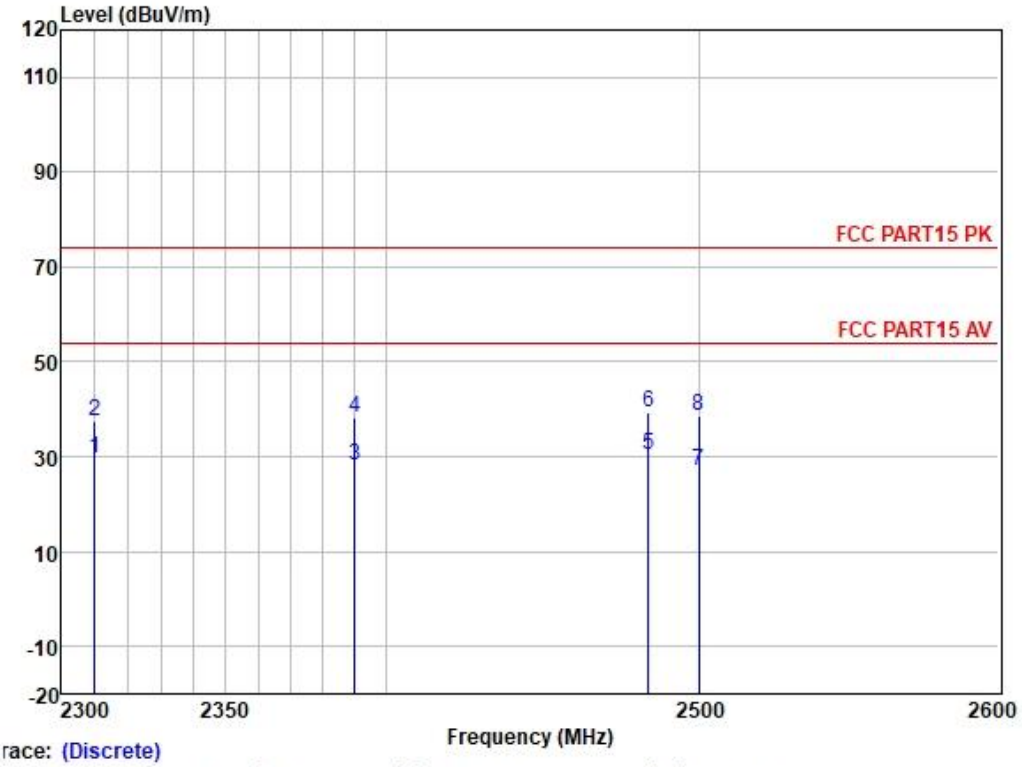
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

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

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

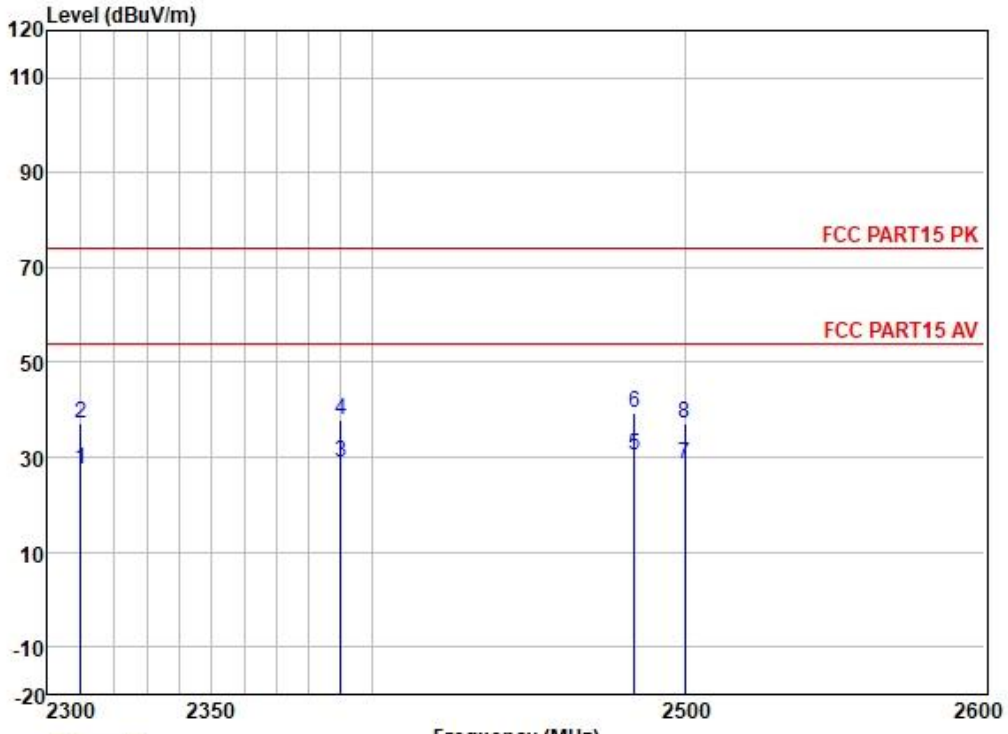
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level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

Left:



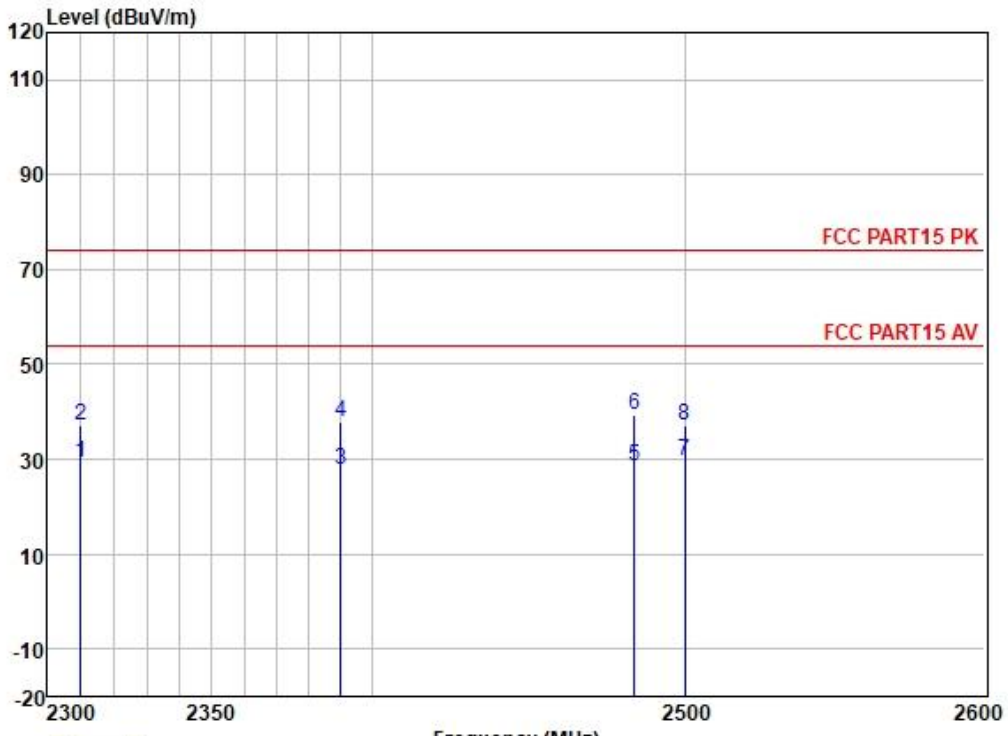
Trace: (Discrete)

	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	36.80	27.15	3.32	37.62	29.65	54.00	-24.35	HORIZONTAL	Average
2	2310.000	44.78	27.15	3.32	37.62	37.63	74.00	-36.37	HORIZONTAL	Peak
3	2390.000	34.82	27.33	3.48	37.59	28.04	54.00	-25.96	HORIZONTAL	Average
4	2390.000	44.90	27.33	3.48	37.59	38.12	74.00	-35.88	HORIZONTAL	Peak
5	2483.500	36.91	27.48	3.53	37.57	30.35	54.00	-23.65	HORIZONTAL	Average
6	2483.500	46.00	27.48	3.53	37.57	39.44	74.00	-34.56	HORIZONTAL	Peak
7	2500.000	33.87	27.50	3.40	37.56	27.21	54.00	-26.79	HORIZONTAL	Average
8	2500.000	45.20	27.50	3.40	37.56	38.54	74.00	-35.46	HORIZONTAL	Peak



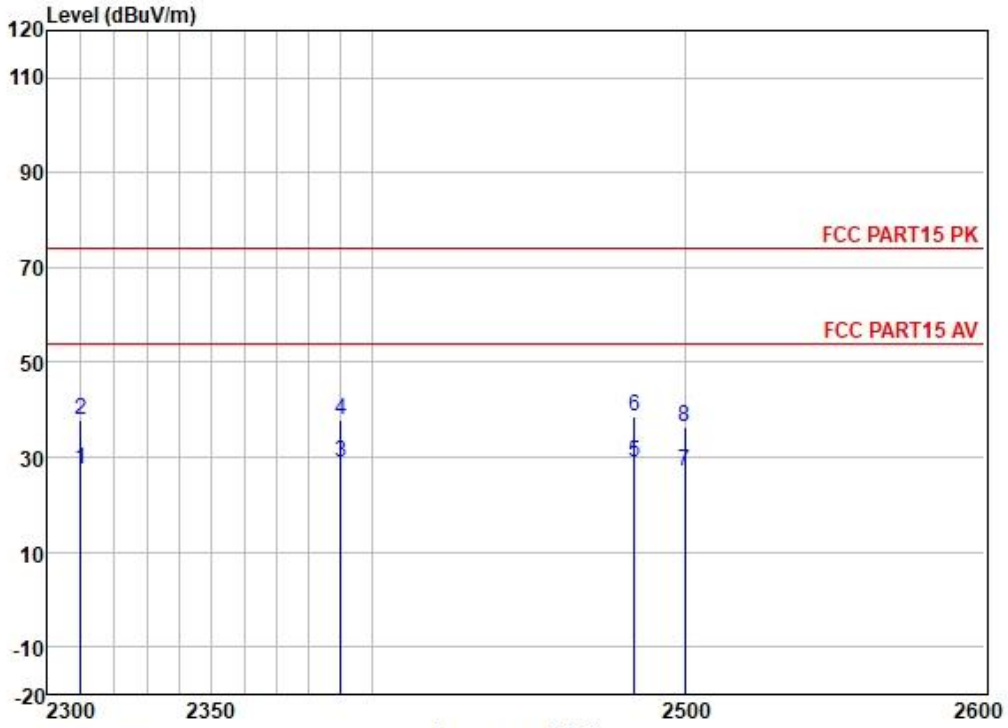
race: (Discrete)

	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	34.43	27.15	3.32	37.62	27.28	54.00	-26.72	VERTICAL	Average
2	2310.000	44.30	27.15	3.32	37.62	37.15	74.00	-36.85	VERTICAL	Peak
3	2390.000	35.63	27.33	3.48	37.59	28.85	54.00	-25.15	VERTICAL	Average
4	2390.000	44.73	27.33	3.48	37.59	37.95	74.00	-36.05	VERTICAL	Peak
5	2483.500	37.03	27.48	3.53	37.57	30.47	54.00	-23.53	VERTICAL	Average
6	2483.500	45.76	27.48	3.53	37.57	39.20	74.00	-34.80	VERTICAL	Peak
7	2500.000	35.03	27.50	3.40	37.56	28.37	54.00	-25.63	VERTICAL	Average
8	2500.000	43.67	27.50	3.40	37.56	37.01	74.00	-36.99	VERTICAL	Peak



race: (Discrete)

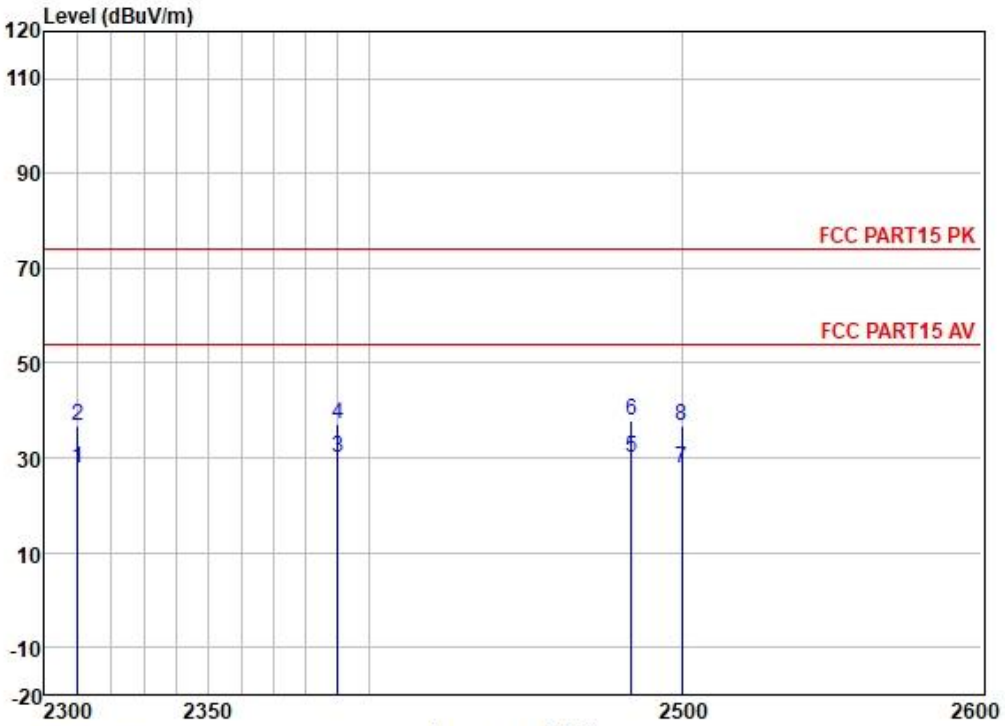
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	36.46	27.15	3.32	37.62	29.31	54.00	-24.69	HORIZONTAL	Average
2	2310.000	44.31	27.15	3.32	37.62	37.16	74.00	-36.84	HORIZONTAL	Peak
3	2390.000	34.44	27.33	3.48	37.59	27.66	54.00	-26.34	HORIZONTAL	Average
4	2390.000	44.48	27.33	3.48	37.59	37.70	74.00	-36.30	HORIZONTAL	Peak
5	2483.500	35.11	27.48	3.53	37.57	28.55	54.00	-25.45	HORIZONTAL	Average
6	2483.500	45.88	27.48	3.53	37.57	39.32	74.00	-34.68	HORIZONTAL	Peak
7	2500.000	36.42	27.50	3.40	37.56	29.76	54.00	-24.24	HORIZONTAL	Average
8	2500.000	43.73	27.50	3.40	37.56	37.07	74.00	-36.93	HORIZONTAL	Peak



race: (Discrete)

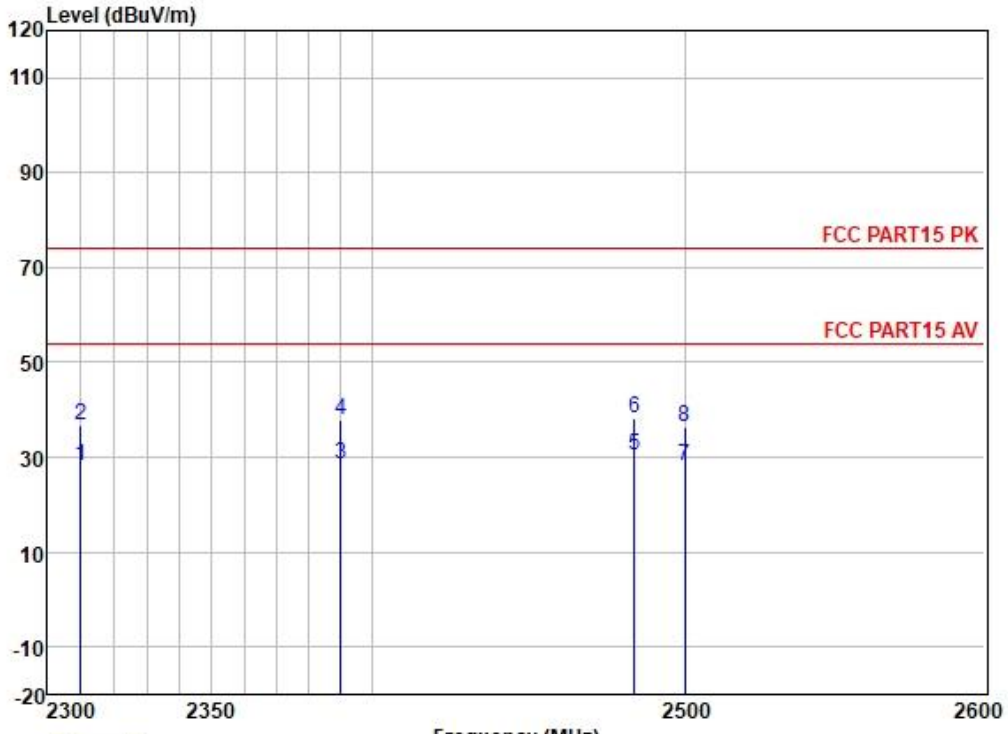
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	34.67	27.15	3.32	37.62	27.52	54.00	-26.48	VERTICAL	Average
2	2310.000	44.95	27.15	3.32	37.62	37.80	74.00	-36.20	VERTICAL	Peak
3	2390.000	35.64	27.33	3.48	37.59	28.86	54.00	-25.14	VERTICAL	Average
4	2390.000	44.76	27.33	3.48	37.59	37.98	74.00	-36.02	VERTICAL	Peak
5	2483.500	35.51	27.48	3.53	37.57	28.95	54.00	-25.05	VERTICAL	Average
6	2483.500	45.21	27.48	3.53	37.57	38.65	74.00	-35.35	VERTICAL	Peak
7	2500.000	33.53	27.50	3.40	37.56	26.87	54.00	-27.13	VERTICAL	Average
8	2500.000	43.15	27.50	3.40	37.56	36.49	74.00	-37.51	VERTICAL	Peak

Right:



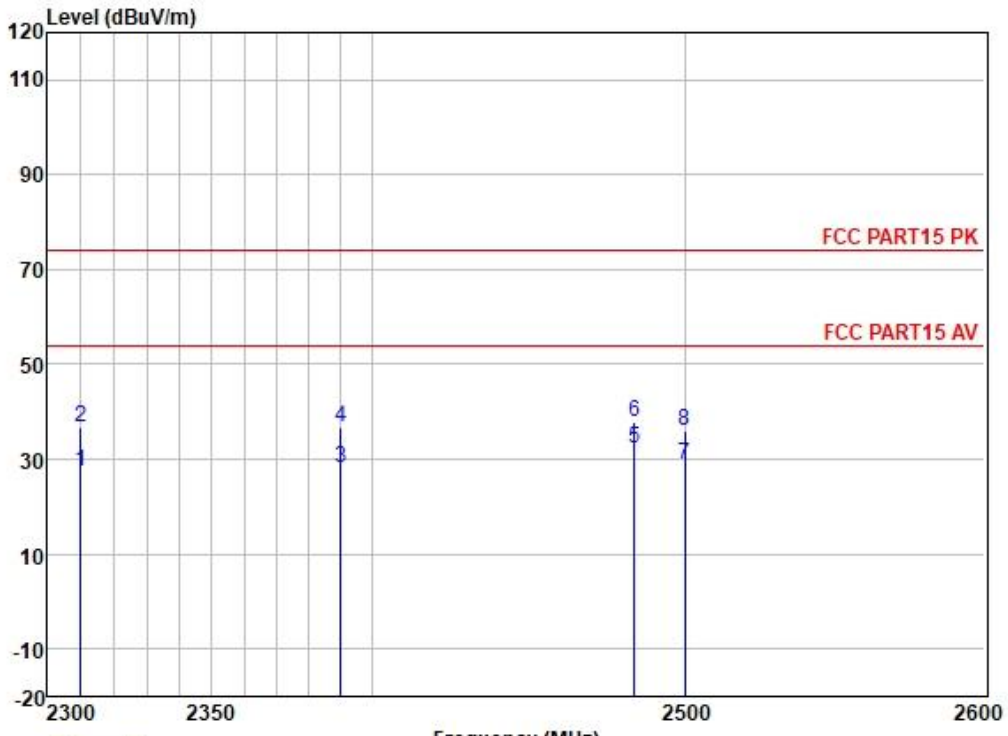
race: (Discrete)

	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	34.86	27.15	3.32	37.62	27.71	54.00	-26.29	HORIZONTAL	Average
2	2310.000	43.98	27.15	3.32	37.62	36.83	74.00	-37.17	HORIZONTAL	Peak
3	2390.000	36.63	27.33	3.48	37.59	29.85	54.00	-24.15	HORIZONTAL	Average
4	2390.000	44.02	27.33	3.48	37.59	37.24	74.00	-36.76	HORIZONTAL	Peak
5	2483.500	36.68	27.48	3.53	37.57	30.12	54.00	-23.88	HORIZONTAL	Average
6	2483.500	44.46	27.48	3.53	37.57	37.90	74.00	-36.10	HORIZONTAL	Peak
7	2500.000	34.44	27.50	3.40	37.56	27.78	54.00	-26.22	HORIZONTAL	Average
8	2500.000	43.50	27.50	3.40	37.56	36.84	74.00	-37.16	HORIZONTAL	Peak



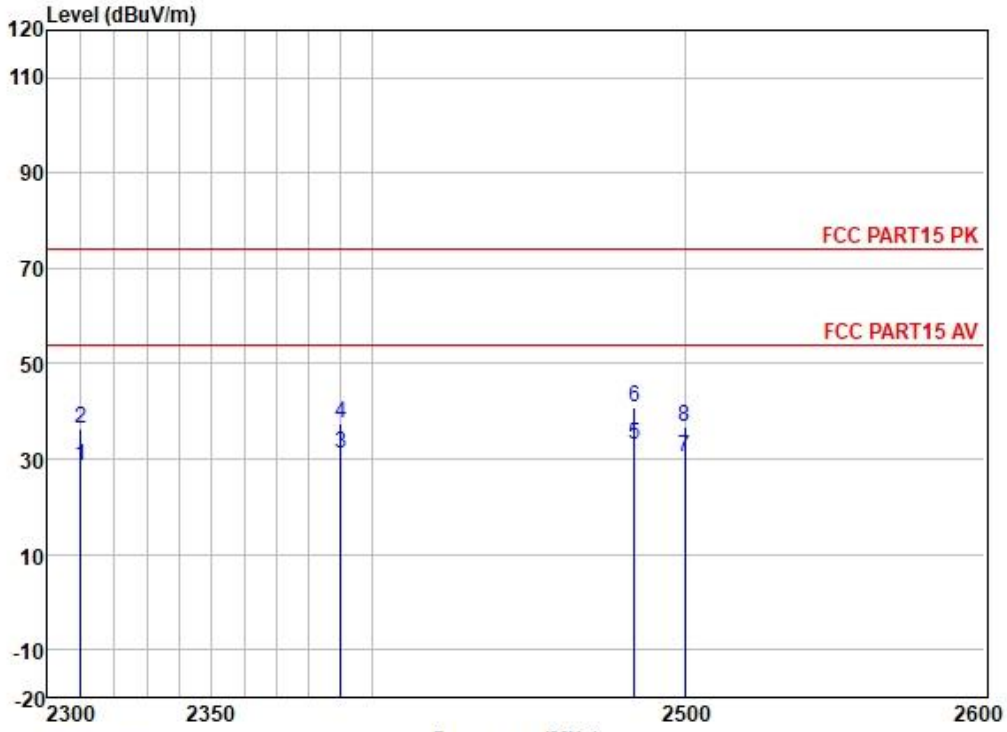
race: (Discrete)

	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	35.34	27.15	3.32	37.62	28.19	54.00	-25.81	VERTICAL	Average
2	2310.000	43.90	27.15	3.32	37.62	36.75	74.00	-37.25	VERTICAL	Peak
3	2390.000	35.14	27.33	3.48	37.59	28.36	54.00	-25.64	VERTICAL	Average
4	2390.000	44.64	27.33	3.48	37.59	37.86	74.00	-36.14	VERTICAL	Peak
5	2483.500	36.97	27.48	3.53	37.57	30.41	54.00	-23.59	VERTICAL	Average
6	2483.500	44.69	27.48	3.53	37.57	38.13	74.00	-35.87	VERTICAL	Peak
7	2500.000	34.92	27.50	3.40	37.56	28.26	54.00	-25.74	VERTICAL	Average
8	2500.000	42.98	27.50	3.40	37.56	36.32	74.00	-37.68	VERTICAL	Peak



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	34.40	27.15	3.32	37.62	27.25	54.00	-26.75	HORIZONTAL	Average
2	2310.000	43.79	27.15	3.32	37.62	36.64	74.00	-37.36	HORIZONTAL	Peak
3	2390.000	35.05	27.33	3.48	37.59	28.27	54.00	-25.73	HORIZONTAL	Average
4	2390.000	43.45	27.33	3.48	37.59	36.67	74.00	-37.33	HORIZONTAL	Peak
5	2483.500	38.87	27.48	3.53	37.57	32.31	54.00	-21.69	HORIZONTAL	Average
6	2483.500	44.35	27.48	3.53	37.57	37.79	74.00	-36.21	HORIZONTAL	Peak
7	2500.000	35.63	27.50	3.40	37.56	28.97	54.00	-25.03	HORIZONTAL	Average
8	2500.000	42.55	27.50	3.40	37.56	35.89	74.00	-38.11	HORIZONTAL	Peak



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	35.69	27.15	3.32	37.62	28.54	54.00	-25.46	VERTICAL	Average
2	2310.000	43.61	27.15	3.32	37.62	36.46	74.00	-37.54	VERTICAL	Peak
3	2390.000	37.97	27.33	3.48	37.59	31.19	54.00	-22.81	VERTICAL	Average
4	2390.000	44.18	27.33	3.48	37.59	37.40	74.00	-36.60	VERTICAL	Peak
5	2483.500	39.59	27.48	3.53	37.57	33.03	54.00	-20.97	VERTICAL	Average
6	2483.500	47.46	27.48	3.53	37.57	40.90	74.00	-33.10	VERTICAL	Peak
7	2500.000	37.01	27.50	3.40	37.56	30.35	54.00	-23.65	VERTICAL	Average
8	2500.000	43.33	27.50	3.40	37.56	36.67	74.00	-37.33	VERTICAL	Peak

7.9 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.		

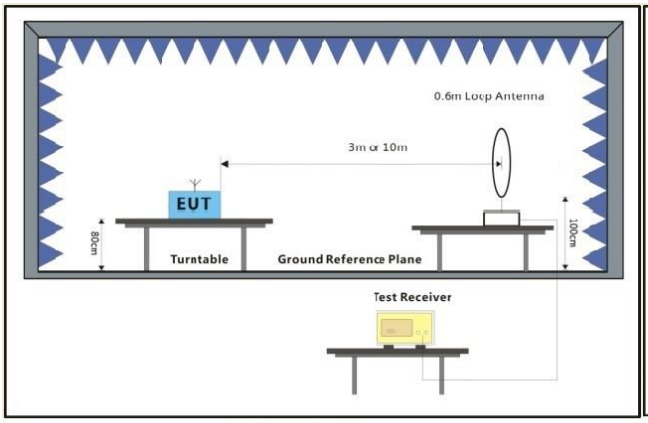
7.9.1 E.U.T. Operation

Operating Environment:
Temperature: 22.0 °C Humidity: 51.5 % RH Atmospheric Pressure: 1010 mbar

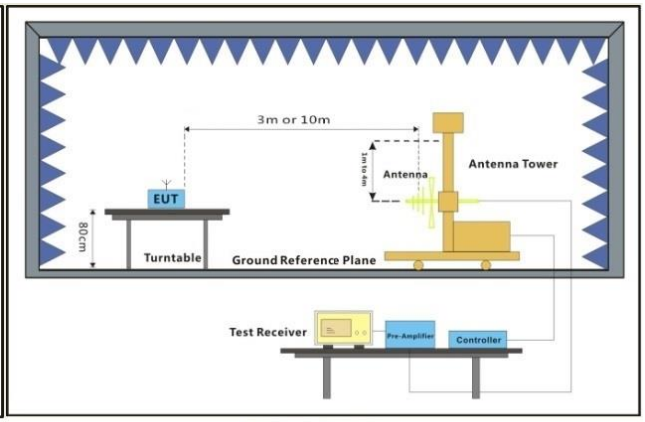
7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, π/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

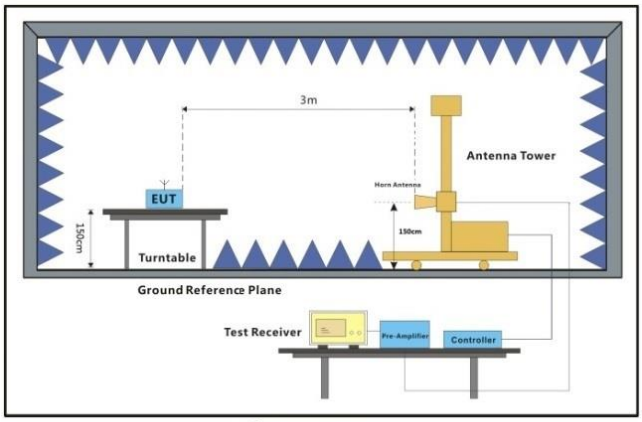
7.9.3 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

7.9.4 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.

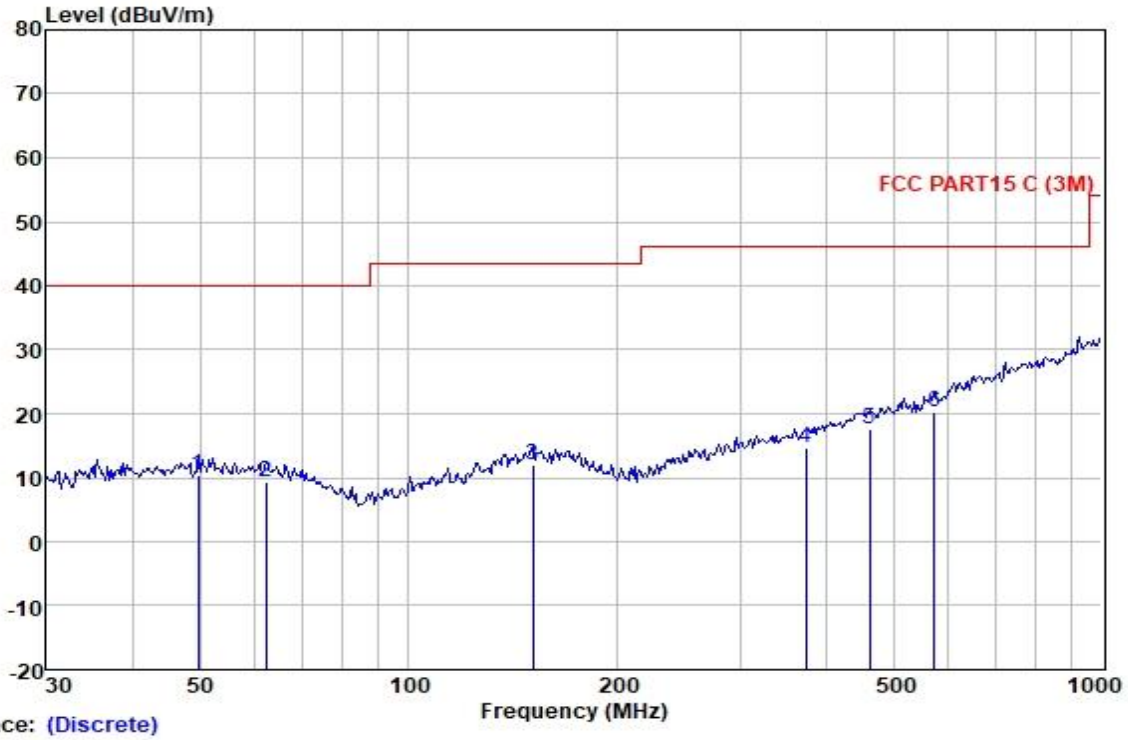
2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

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.

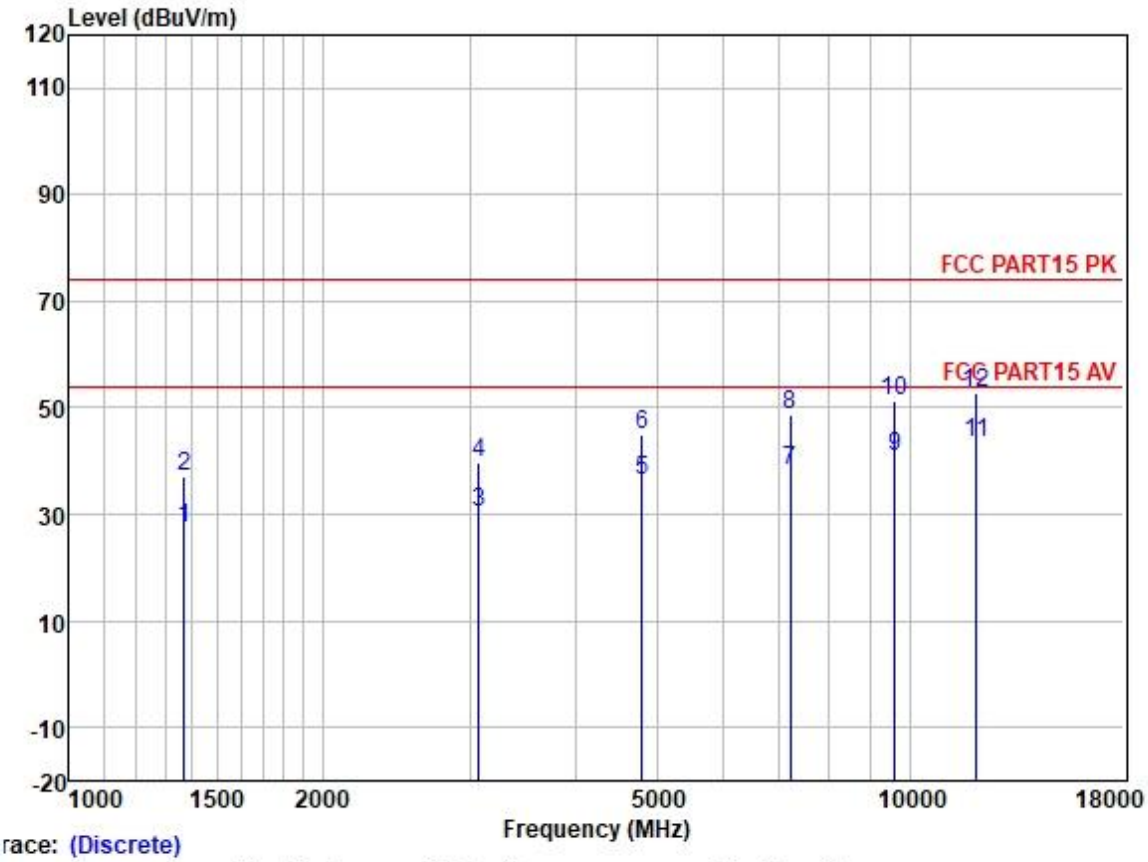
4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower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

Left: Low channel



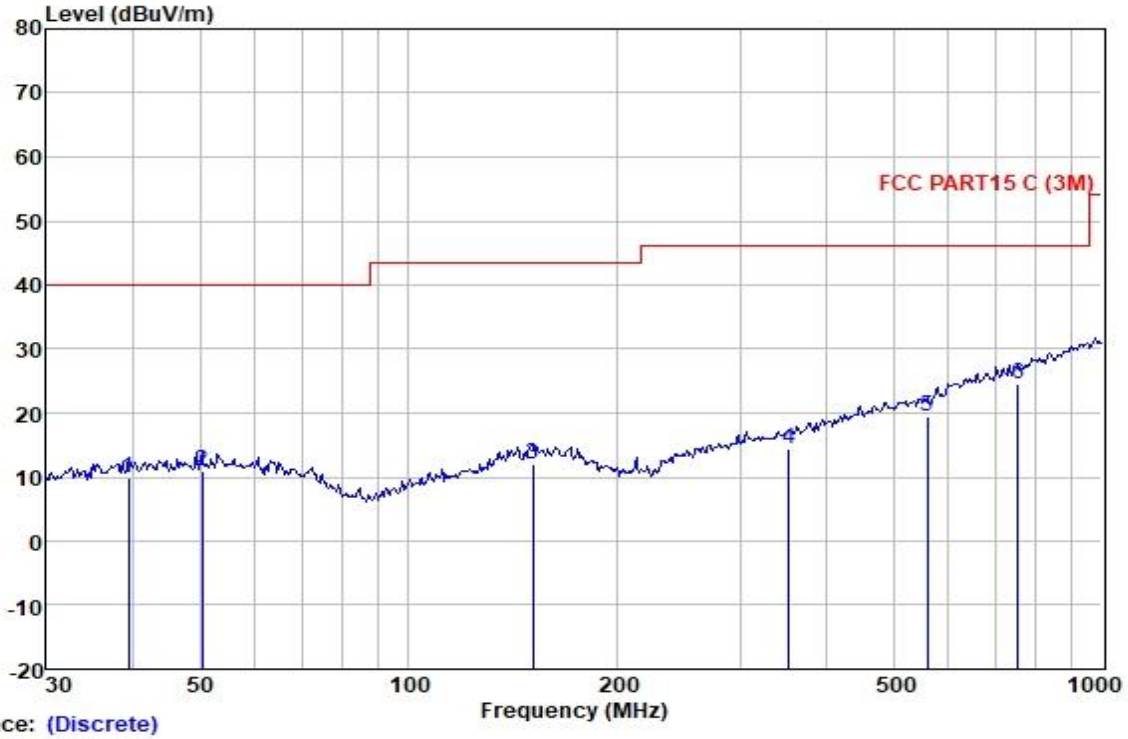
race: (Discrete)
Site : SGS
Condition: FCC PART15 C (3M) 3m HORIZONTAL
Job :
Model :
Power :
Test Mode: Left

	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	49.707	22.49	13.91	1.14	27.17	10.37	40.00	-29.63	HORIZONTAL	QP
2	62.213	22.19	13.08	1.30	27.15	9.42	40.00	-30.58	HORIZONTAL	QP
3	151.067	22.77	13.80	2.24	26.83	11.98	43.50	-31.52	HORIZONTAL	QP
4	373.311	22.71	15.35	3.79	27.21	14.64	46.00	-31.36	HORIZONTAL	QP
5	462.346	23.58	17.47	4.27	27.81	17.51	46.00	-28.49	HORIZONTAL	QP
6	572.614	24.36	18.97	4.98	28.17	20.14	46.00	-25.86	HORIZONTAL	QP



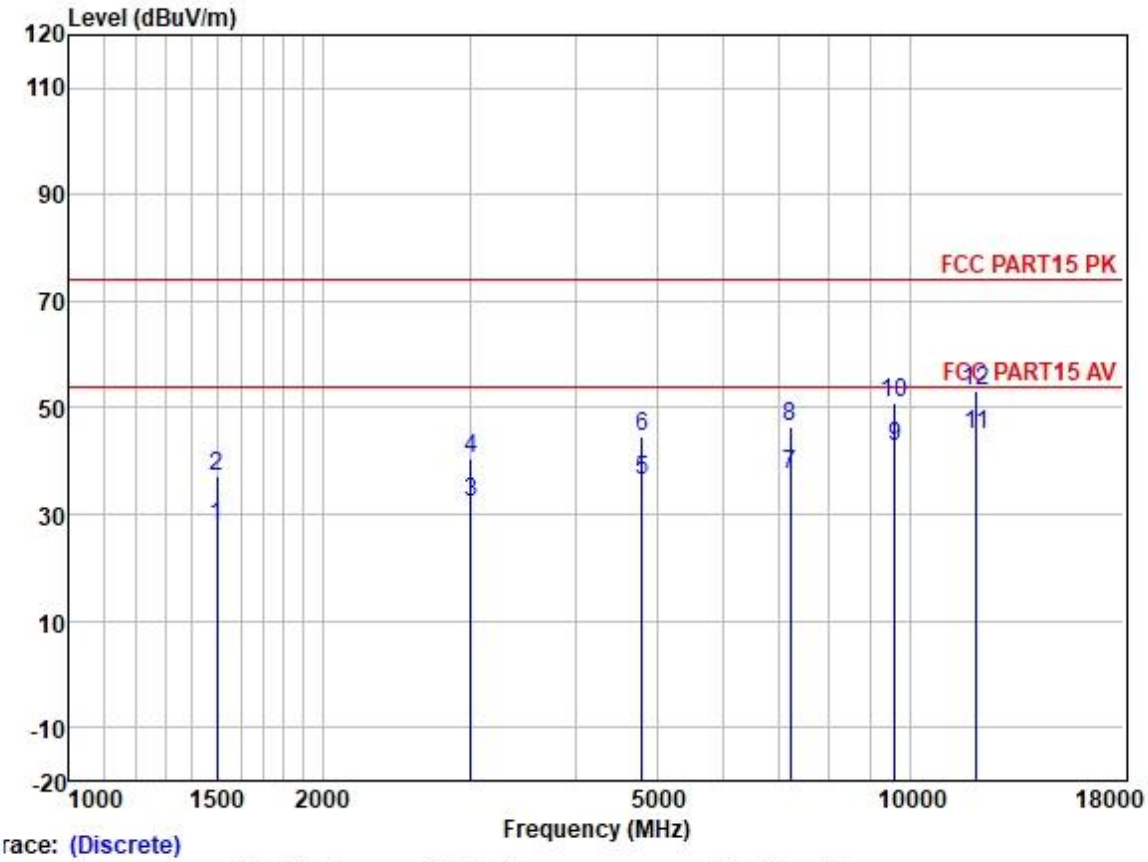
race: (Discrete)

	Freq	ReadAntenna Level	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	1370.328	37.83	25.35	2.60	38.25	27.53	54.00	-26.47	HORIZONTAL	Average
2	1370.328	47.44	25.35	2.60	38.25	37.14	74.00	-36.86	HORIZONTAL	Peak
3	3069.345	35.26	28.45	3.86	37.18	30.39	54.00	-23.61	HORIZONTAL	Average
4	3069.345	44.58	28.45	3.86	37.18	39.71	74.00	-34.29	HORIZONTAL	Peak
5	4804.991	36.20	31.42	5.40	36.83	36.19	54.00	-17.81	HORIZONTAL	Average
6	4804.991	45.06	31.42	5.40	36.83	45.05	74.00	-28.95	HORIZONTAL	Peak
7	7206.260	33.96	35.54	5.98	37.38	38.10	54.00	-15.90	HORIZONTAL	Average
8	7206.260	44.55	35.54	5.98	37.38	48.69	74.00	-25.31	HORIZONTAL	Peak
9	9608.240	32.95	38.37	7.07	37.42	40.97	54.00	-13.03	HORIZONTAL	Average
10	9608.240	43.37	38.37	7.07	37.42	51.39	74.00	-22.61	HORIZONTAL	Peak
11	12010.160	33.38	38.90	8.19	37.10	43.37	54.00	-10.63	HORIZONTAL	Average
12	12010.160	42.77	38.90	8.19	37.10	52.76	74.00	-21.24	HORIZONTAL	Peak



race: (Discrete)
Site : SGS
Condition: FCC PART15 C (3M) 3m HORIZONTAL
Job :
Model :
Power :
Test Mode: Right

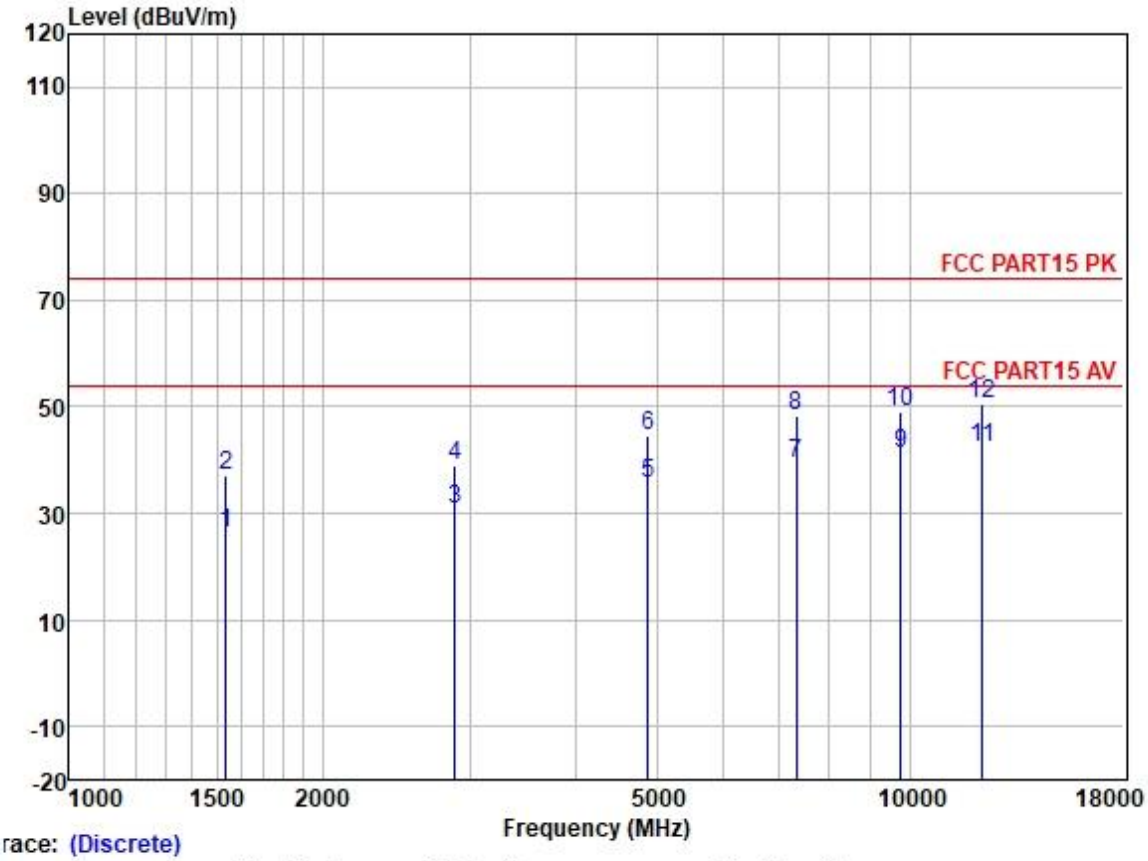
	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	39.437	22.52	13.46	1.10	27.18	9.90	40.00	-30.10	HORIZONTAL	QP
2	50.409	22.93	13.91	1.15	27.17	10.82	40.00	-29.18	HORIZONTAL	QP
3	151.067	22.83	13.80	2.24	26.83	12.04	43.50	-31.46	HORIZONTAL	QP
4	352.943	23.17	14.55	3.63	27.04	14.31	46.00	-31.69	HORIZONTAL	QP
5	558.730	23.97	18.78	4.88	28.13	19.50	46.00	-26.50	HORIZONTAL	QP
6	755.387	24.41	22.20	6.01	28.08	24.54	46.00	-21.46	HORIZONTAL	QP



race: (Discrete)

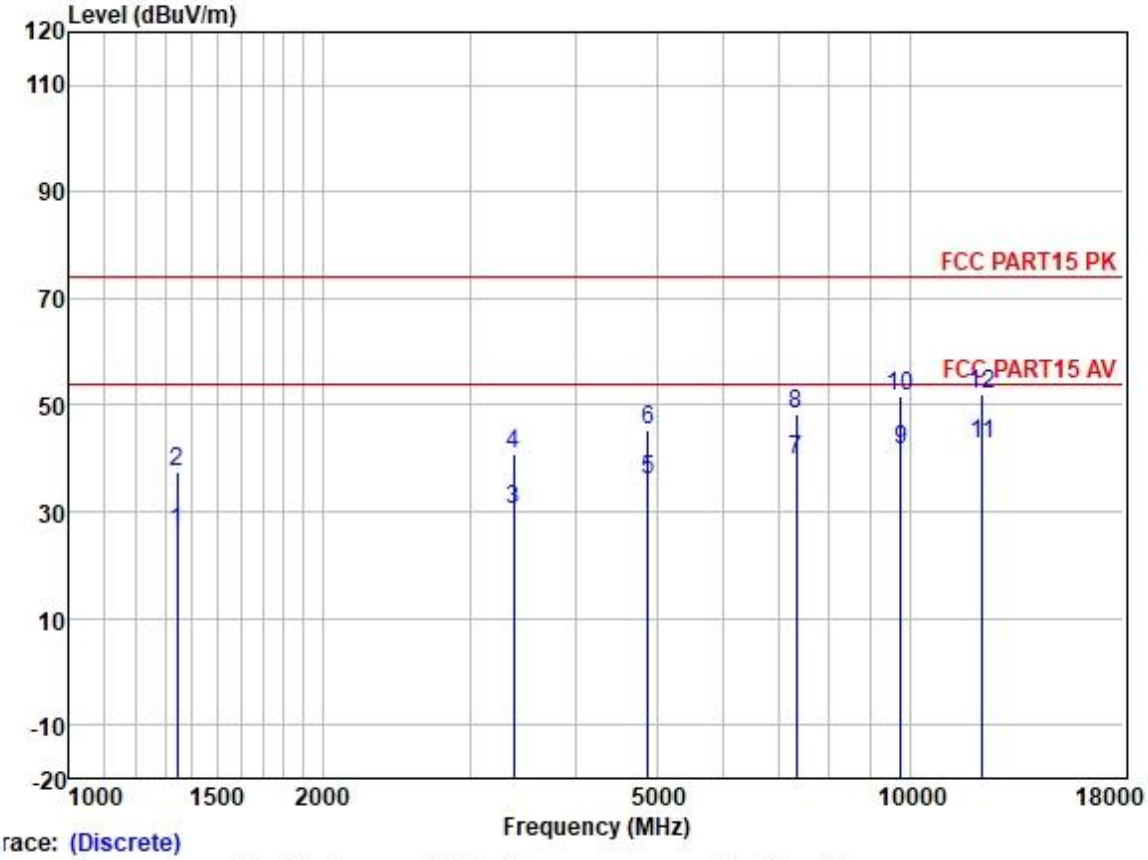
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1498.781	37.62	25.50	2.80	38.10	27.82	54.00	-26.18	VERTICAL	Average
2	1498.781	47.11	25.50	2.80	38.10	37.31	74.00	-36.69	VERTICAL	Peak
3	3007.868	37.38	28.41	3.81	37.25	32.35	54.00	-21.65	VERTICAL	Average
4	3007.868	45.68	28.41	3.81	37.25	40.65	74.00	-33.35	VERTICAL	Peak
5	4804.043	36.20	31.42	5.40	36.83	36.19	54.00	-17.81	VERTICAL	Average
6	4804.043	44.52	31.42	5.40	36.83	44.51	74.00	-29.49	VERTICAL	Peak
7	7206.551	33.38	35.54	5.98	37.38	37.52	54.00	-16.48	VERTICAL	Average
8	7206.551	42.42	35.54	5.98	37.38	46.56	74.00	-27.44	VERTICAL	Peak
9	9608.818	34.72	38.37	7.07	37.42	42.74	54.00	-11.26	VERTICAL	Average
10	9608.818	42.92	38.37	7.07	37.42	50.94	74.00	-23.06	VERTICAL	Peak
11	12010.710	35.01	38.90	8.19	37.10	45.00	54.00	-9.00	VERTICAL	Average
12	12010.710	43.25	38.90	8.19	37.10	53.24	74.00	-20.76	VERTICAL	Peak

Left:Middle channel



race: (Discrete)

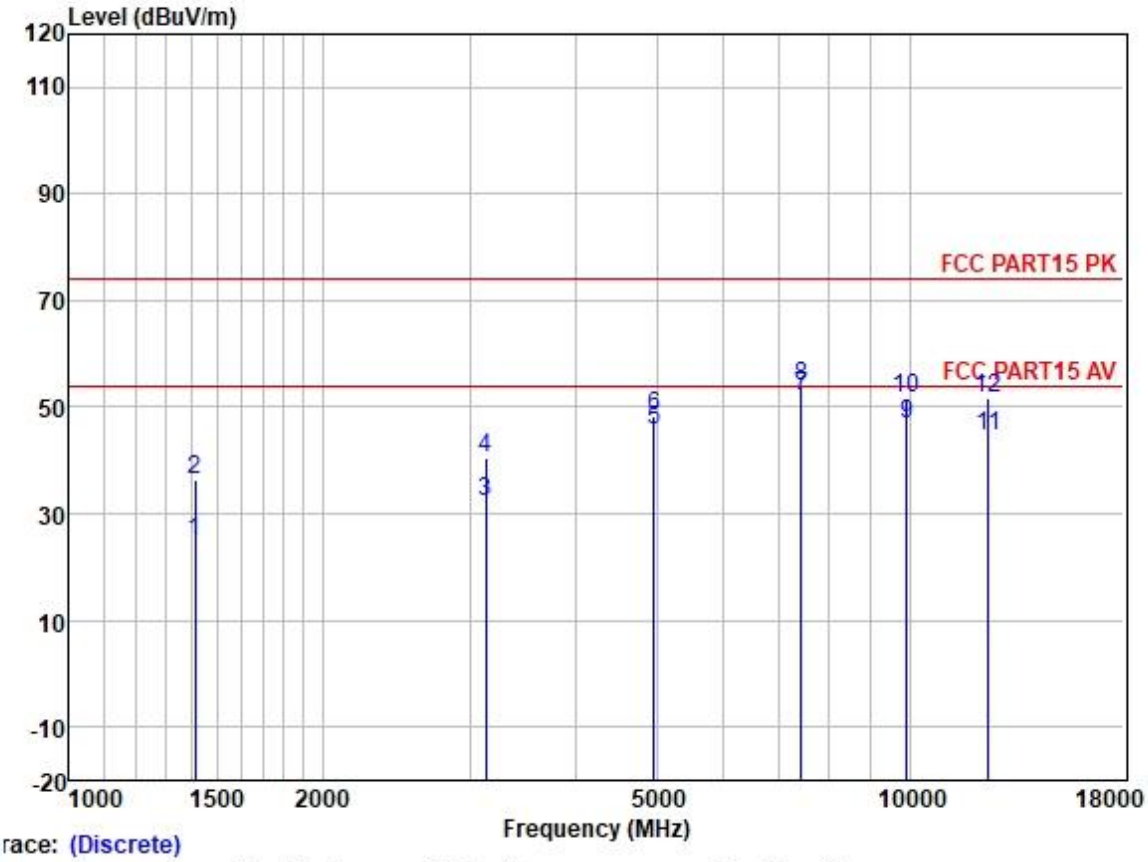
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1538.281	36.06	25.53	2.80	38.03	26.36	54.00	-27.64	HORIZONTAL	Average
2	1538.281	46.80	25.53	2.80	38.03	37.10	74.00	-36.90	HORIZONTAL	Peak
3	2880.247	36.15	28.27	3.70	37.36	30.76	54.00	-23.24	HORIZONTAL	Average
4	2880.247	44.56	28.27	3.70	37.36	39.17	74.00	-34.83	HORIZONTAL	Peak
5	4882.110	35.33	31.56	5.52	36.84	35.57	54.00	-18.43	HORIZONTAL	Average
6	4882.110	44.30	31.56	5.52	36.84	44.54	74.00	-29.46	HORIZONTAL	Peak
7	7323.353	34.71	36.00	6.13	37.43	39.41	54.00	-14.59	HORIZONTAL	Average
8	7323.353	43.62	36.00	6.13	37.43	48.32	74.00	-25.68	HORIZONTAL	Peak
9	9764.880	33.17	38.50	7.02	37.41	41.28	54.00	-12.72	HORIZONTAL	Average
10	9764.880	40.90	38.50	7.02	37.41	49.01	74.00	-24.99	HORIZONTAL	Peak
11	12205.530	32.46	38.74	8.08	37.00	42.28	54.00	-11.72	HORIZONTAL	Average
12	12205.530	40.79	38.74	8.08	37.00	50.61	74.00	-23.39	HORIZONTAL	Peak



race: (Discrete)

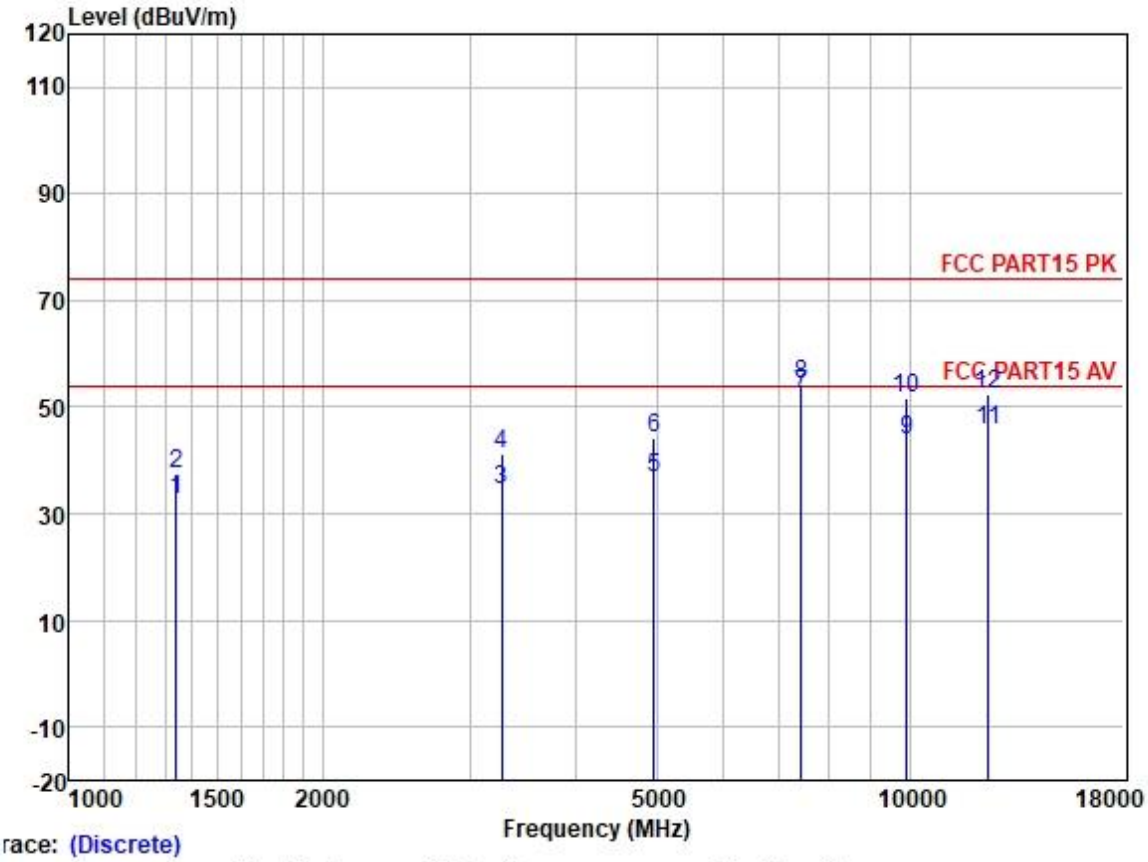
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1342.882	36.70	25.30	2.60	38.27	26.33	54.00	-27.67	VERTICAL	Average
2	1342.882	48.00	25.30	2.60	38.27	37.63	74.00	-36.37	VERTICAL	Peak
3	3376.523	34.52	28.83	4.09	36.99	30.45	54.00	-23.55	VERTICAL	Average
4	3376.523	44.91	28.83	4.09	36.99	40.84	74.00	-33.16	VERTICAL	Peak
5	4882.732	35.66	31.56	5.52	36.84	35.90	54.00	-18.10	VERTICAL	Average
6	4882.732	45.16	31.56	5.52	36.84	45.40	74.00	-28.60	VERTICAL	Peak
7	7323.838	34.86	36.00	6.13	37.43	39.56	54.00	-14.44	VERTICAL	Average
8	7323.838	43.78	36.00	6.13	37.43	48.48	74.00	-25.52	VERTICAL	Peak
9	9764.588	33.55	38.50	7.02	37.41	41.66	54.00	-12.34	VERTICAL	Average
10	9764.588	43.51	38.50	7.02	37.41	51.62	74.00	-22.38	VERTICAL	Peak
11	12205.980	33.07	38.74	8.08	37.00	42.89	54.00	-11.11	VERTICAL	Average
12	12205.980	42.13	38.74	8.08	37.00	51.95	74.00	-22.05	VERTICAL	Peak

Left:High channel



race: (Discrete)

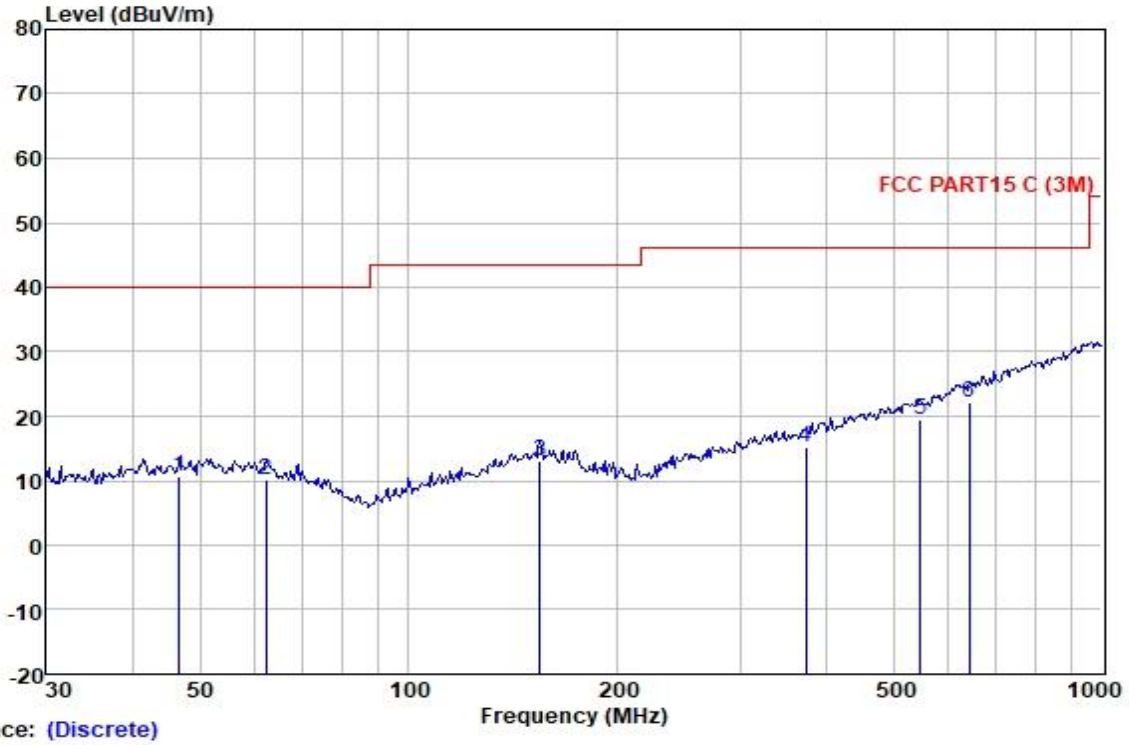
	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1410.514	35.16	25.40	2.62	38.22	24.96	54.00	-29.04	HORIZONTAL	Average
2	1410.514	46.71	25.40	2.62	38.22	36.51	74.00	-37.49	HORIZONTAL	Peak
3	3132.079	36.77	28.51	3.95	37.14	32.09	54.00	-21.91	HORIZONTAL	Average
4	3132.079	44.98	28.51	3.95	37.14	40.30	74.00	-33.70	HORIZONTAL	Peak
5	4960.276	45.39	31.65	5.65	36.84	45.85	54.00	-8.15	HORIZONTAL	Average
6	4960.276	47.95	31.65	5.65	36.84	48.41	74.00	-25.59	HORIZONTAL	Peak
7	7440.010	47.03	36.27	6.22	37.47	52.05	54.00	-1.95	HORIZONTAL	Average
8	7440.010	48.75	36.27	6.22	37.47	53.77	74.00	-20.23	HORIZONTAL	Peak
9	9920.123	38.59	38.65	6.96	37.40	46.80	54.00	-7.20	HORIZONTAL	Average
10	9920.123	43.29	38.65	6.96	37.40	51.50	74.00	-22.50	HORIZONTAL	Peak
11	12400.010	34.77	38.57	7.97	36.88	44.43	54.00	-9.57	HORIZONTAL	Average
12	12400.010	42.04	38.57	7.97	36.88	51.70	74.00	-22.30	HORIZONTAL	Peak



race: (Discrete)

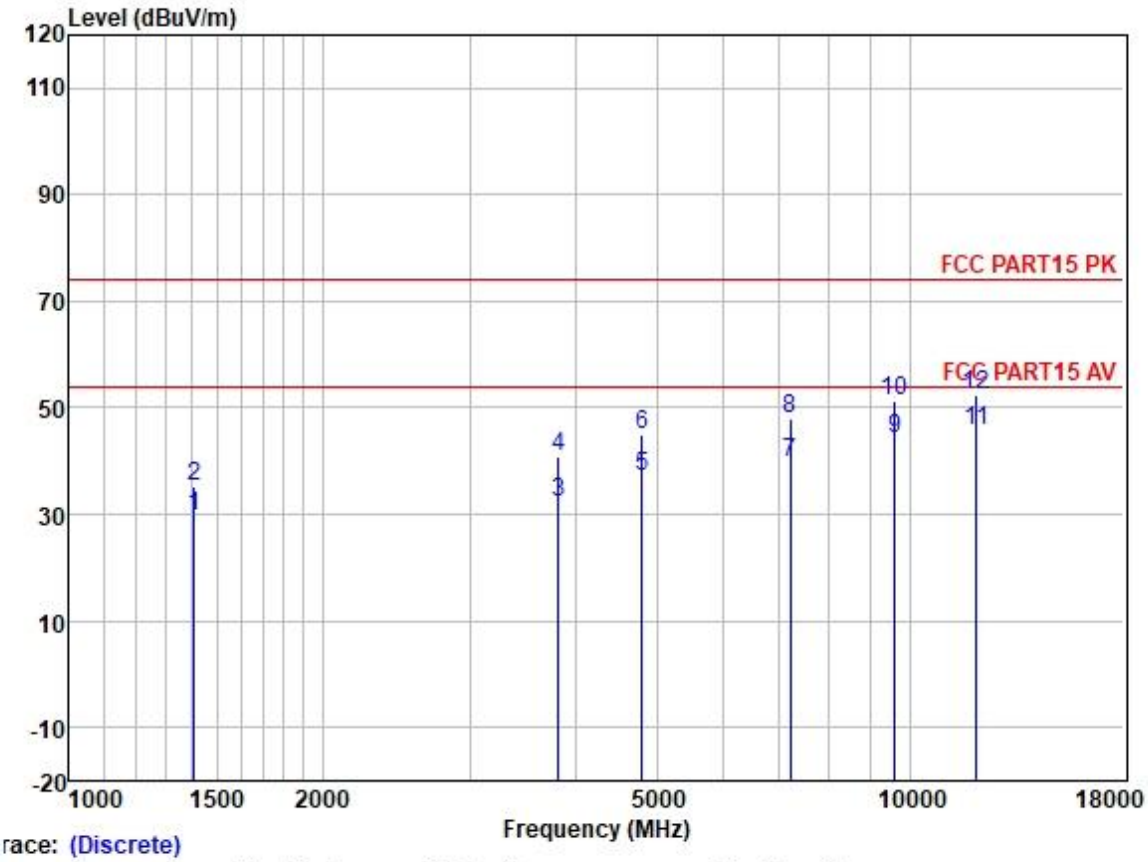
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1339.006	42.94	25.29	2.60	38.27	32.56	54.00	-21.44	VERTICAL	Average
2	1339.006	48.03	25.29	2.60	38.27	37.65	74.00	-36.35	VERTICAL	Peak
3	3270.858	38.87	28.71	4.04	37.04	34.58	54.00	-19.42	VERTICAL	Average
4	3270.858	45.62	28.71	4.04	37.04	41.33	74.00	-32.67	VERTICAL	Peak
5	4960.153	36.42	31.65	5.65	36.84	36.88	54.00	-17.12	VERTICAL	Average
6	4960.153	43.72	31.65	5.65	36.84	44.18	74.00	-29.82	VERTICAL	Peak
7	7440.010	47.56	36.27	6.22	37.47	52.58	54.00	-1.42	VERTICAL	Average
8	7440.010	49.26	36.27	6.22	37.47	54.28	74.00	-19.72	VERTICAL	Peak
9	9920.588	35.57	38.65	6.96	37.40	43.78	54.00	-10.22	VERTICAL	Average
10	9920.588	43.57	38.65	6.96	37.40	51.78	74.00	-22.22	VERTICAL	Peak
11	12400.540	36.05	38.57	7.97	36.88	45.71	54.00	-8.29	VERTICAL	Average
12	12400.540	42.66	38.57	7.97	36.88	52.32	74.00	-21.68	VERTICAL	Peak

Right:Low channel



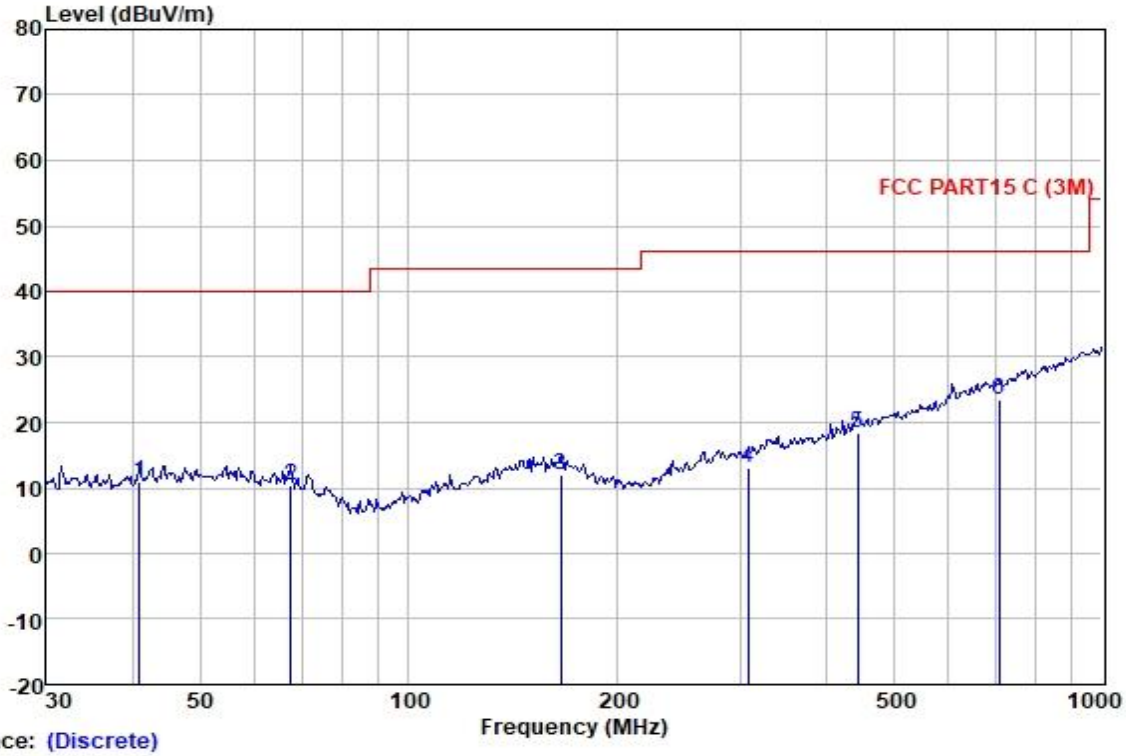
race: (Discrete)
Site : SGS
Condition: FCC PART15 C (3M) 3m VERTICAL
Job :
Model :
Power :
Test Mode: Left

	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	46.666	22.74	13.93	1.13	27.17	10.63	40.00	-29.37	VERTICAL	QP
2	62.213	22.93	13.08	1.30	27.15	10.16	40.00	-29.84	VERTICAL	QP
3	154.279	23.81	13.78	2.28	26.82	13.05	43.50	-30.45	VERTICAL	QP
4	373.311	23.16	15.35	3.79	27.21	15.09	46.00	-30.91	VERTICAL	QP
5	547.098	24.27	18.60	4.76	28.09	19.54	46.00	-26.46	VERTICAL	QP
6	642.861	24.43	20.42	5.45	28.19	22.11	46.00	-23.89	VERTICAL	QP



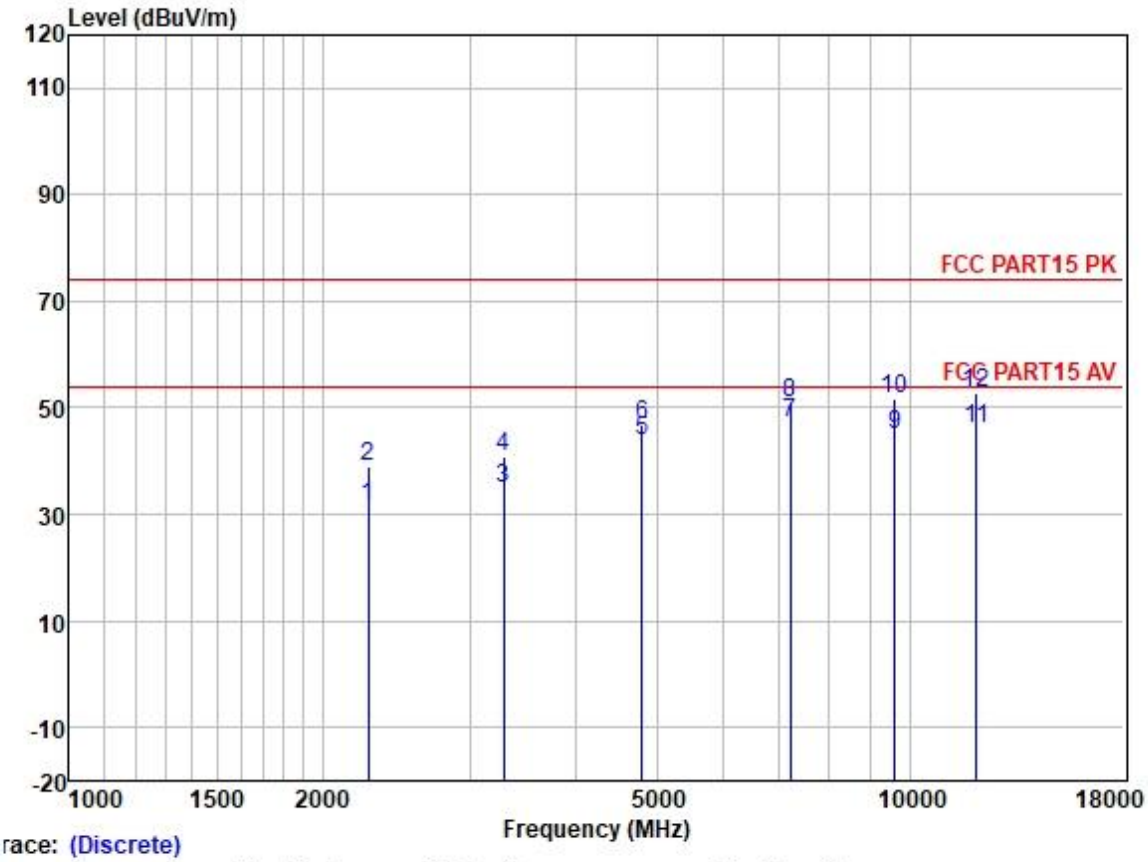
race: (Discrete)

	Freq	ReadAntenna Level	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	39.70	25.40	2.61	38.22	29.49	54.00	-24.51	HORIZONTAL	Average
2	1406.443	45.51	25.40	2.61	38.22	35.30	74.00	-38.70	HORIZONTAL	Peak
3	3823.371	34.86	29.57	4.60	36.84	32.19	54.00	-21.81	HORIZONTAL	Average
4	3823.371	43.40	29.57	4.60	36.84	40.73	74.00	-33.27	HORIZONTAL	Peak
5	4804.617	37.14	31.42	5.40	36.83	37.13	54.00	-16.87	HORIZONTAL	Average
6	4804.617	44.96	31.42	5.40	36.83	44.95	74.00	-29.05	HORIZONTAL	Peak
7	7206.838	35.62	35.54	5.98	37.38	39.76	54.00	-14.24	HORIZONTAL	Average
8	7206.838	43.87	35.54	5.98	37.38	48.01	74.00	-25.99	HORIZONTAL	Peak
9	9608.312	36.29	38.37	7.07	37.42	44.31	54.00	-9.69	HORIZONTAL	Average
10	9608.312	43.11	38.37	7.07	37.42	51.13	74.00	-22.87	HORIZONTAL	Peak
11	12010.560	35.62	38.90	8.19	37.10	45.61	54.00	-8.39	HORIZONTAL	Average
12	12010.560	42.46	38.90	8.19	37.10	52.45	74.00	-21.55	HORIZONTAL	Peak



race: (Discrete)
Site : SGS
Condition: FCC PART15 C (3M) 3m VERTICAL
Job :
Model :
Power :
Test Mode: Right

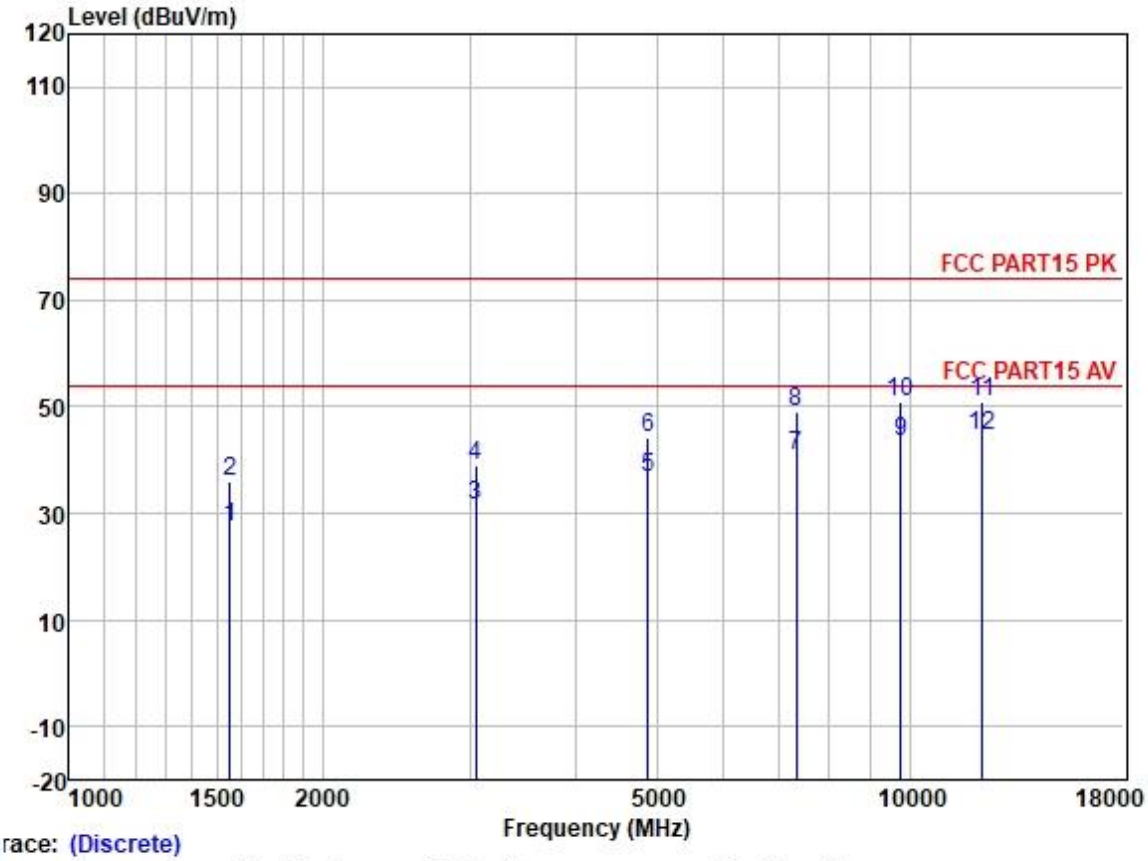
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	40.845	23.37	13.58	1.10	27.18	10.87	40.00	-29.13	VERTICAL	QP
2	67.675	23.98	12.24	1.38	27.14	10.46	40.00	-29.54	VERTICAL	QP
3	165.487	22.99	13.42	2.37	26.78	12.00	43.50	-31.50	VERTICAL	QP
4	308.913	22.68	13.85	3.23	26.60	13.16	46.00	-32.84	VERTICAL	QP
5	443.294	24.77	17.13	4.16	27.61	18.45	46.00	-27.55	VERTICAL	QP
6	709.182	24.65	21.20	5.80	28.15	23.50	46.00	-22.50	VERTICAL	QP



race: (Discrete)

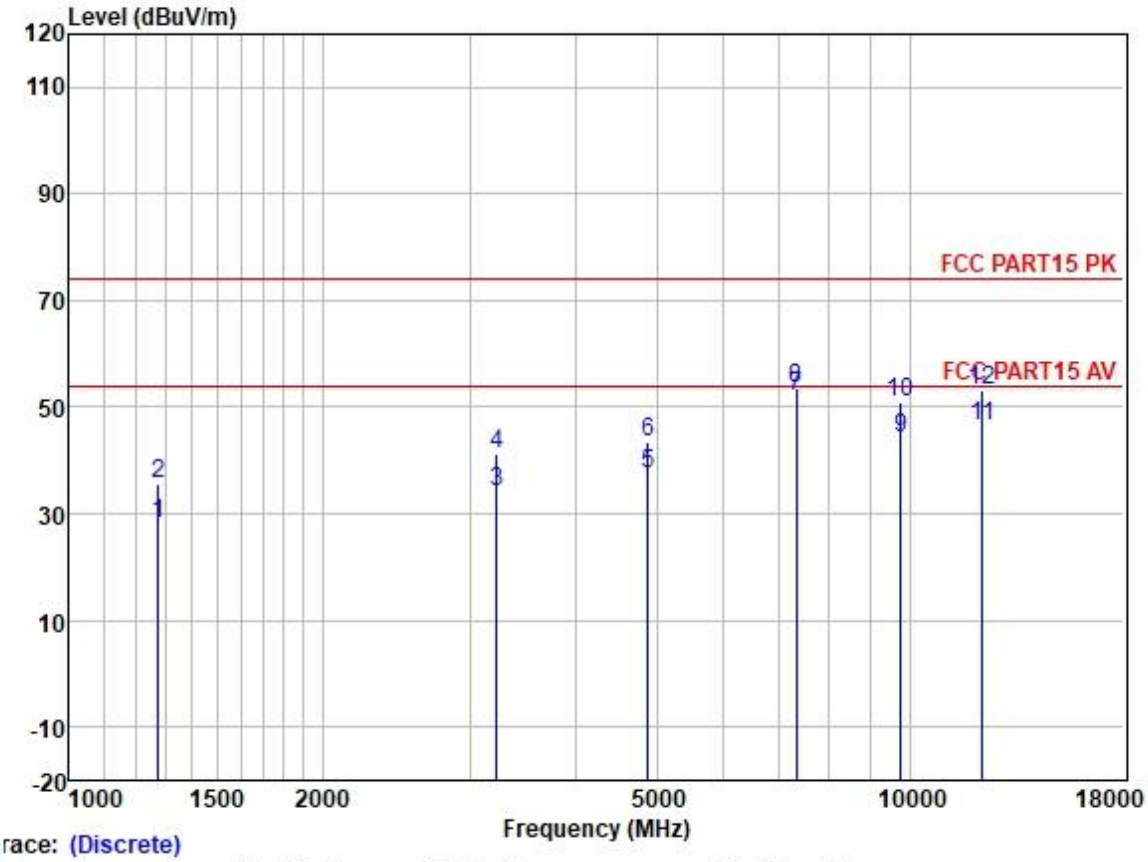
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2265.907	38.74	26.98	3.27	37.63	31.36	54.00	-22.64	VERTICAL	Average
2	2265.907	46.30	26.98	3.27	37.63	38.92	74.00	-35.08	VERTICAL	Peak
3	3289.821	38.99	28.74	4.05	37.03	34.75	54.00	-19.25	VERTICAL	Average
4	3289.821	45.20	28.74	4.05	37.03	40.96	74.00	-33.04	VERTICAL	Peak
5	4804.778	43.82	31.42	5.40	36.83	43.81	54.00	-10.19	VERTICAL	Average
6	4804.778	46.96	31.42	5.40	36.83	46.95	74.00	-27.05	VERTICAL	Peak
7	7206.911	43.15	35.54	5.98	37.38	47.29	54.00	-6.71	VERTICAL	Average
8	7206.911	46.91	35.54	5.98	37.38	51.05	74.00	-22.95	VERTICAL	Peak
9	9608.450	37.09	38.37	7.07	37.42	45.11	54.00	-8.89	VERTICAL	Average
10	9608.450	43.49	38.37	7.07	37.42	51.51	74.00	-22.49	VERTICAL	Peak
11	12010.000	36.05	38.90	8.19	37.10	46.04	54.00	-7.96	VERTICAL	Average
12	12010.000	42.72	38.90	8.19	37.10	52.71	74.00	-21.29	VERTICAL	Peak

Right: Middle channel



race: (Discrete)

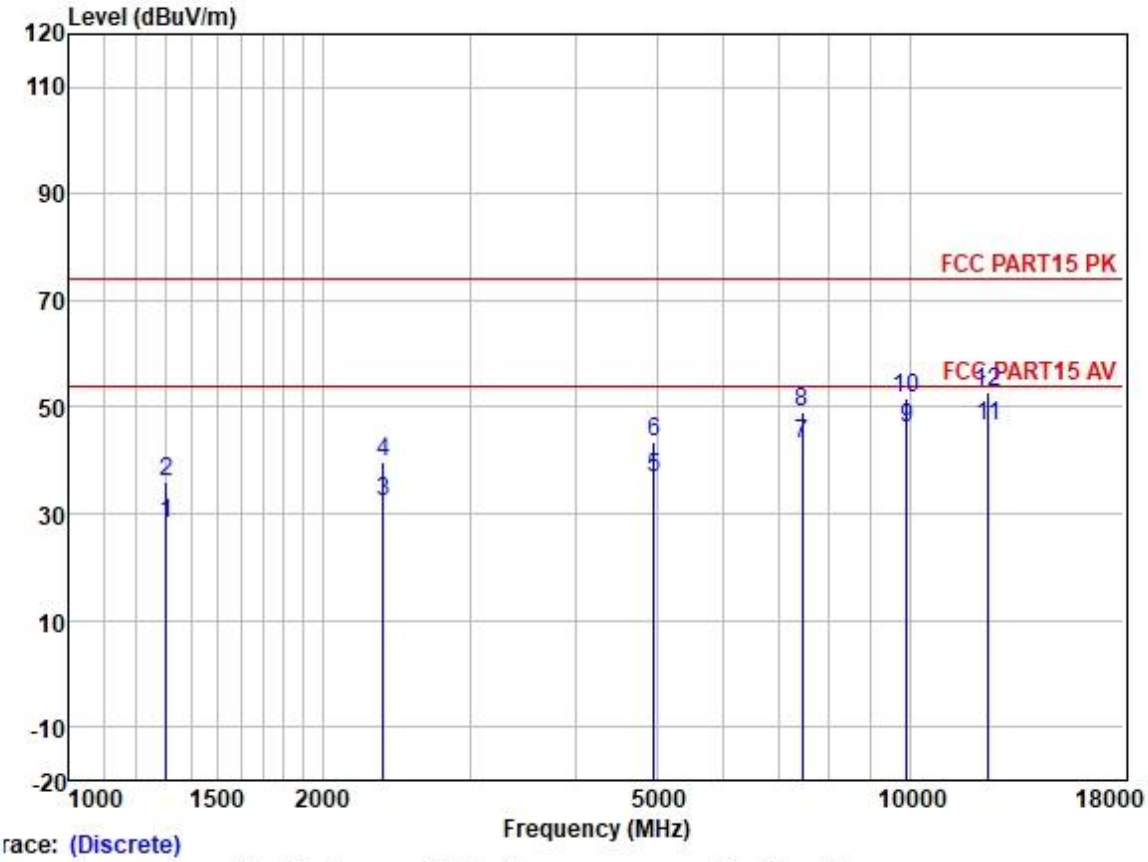
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1551.677	37.04	25.54	2.80	38.03	27.35	54.00	-26.65	HORIZONTAL	Average
2	1551.677	45.74	25.54	2.80	38.03	36.05	74.00	-37.95	HORIZONTAL	Peak
3	3042.846	36.45	28.43	3.84	37.20	31.52	54.00	-22.48	HORIZONTAL	Average
4	3042.846	44.00	28.43	3.84	37.20	39.07	74.00	-34.93	HORIZONTAL	Peak
5	4882.043	36.52	31.56	5.52	36.84	36.76	54.00	-17.24	HORIZONTAL	Average
6	4882.043	43.91	31.56	5.52	36.84	44.15	74.00	-29.85	HORIZONTAL	Peak
7	7323.806	36.15	36.00	6.13	37.43	40.85	54.00	-13.15	HORIZONTAL	Average
8	7323.806	44.38	36.00	6.13	37.43	49.08	74.00	-24.92	HORIZONTAL	Peak
9	9764.823	35.27	38.50	7.02	37.41	43.38	54.00	-10.62	HORIZONTAL	Average
10	9764.823	42.86	38.50	7.02	37.41	50.97	74.00	-23.03	HORIZONTAL	Peak
11	12205.920	41.00	38.74	8.08	37.00	50.82	74.00	-23.18	HORIZONTAL	Peak
12	12205.920	34.71	38.74	8.08	37.00	44.53	54.00	-9.47	HORIZONTAL	Average



race: (Discrete)

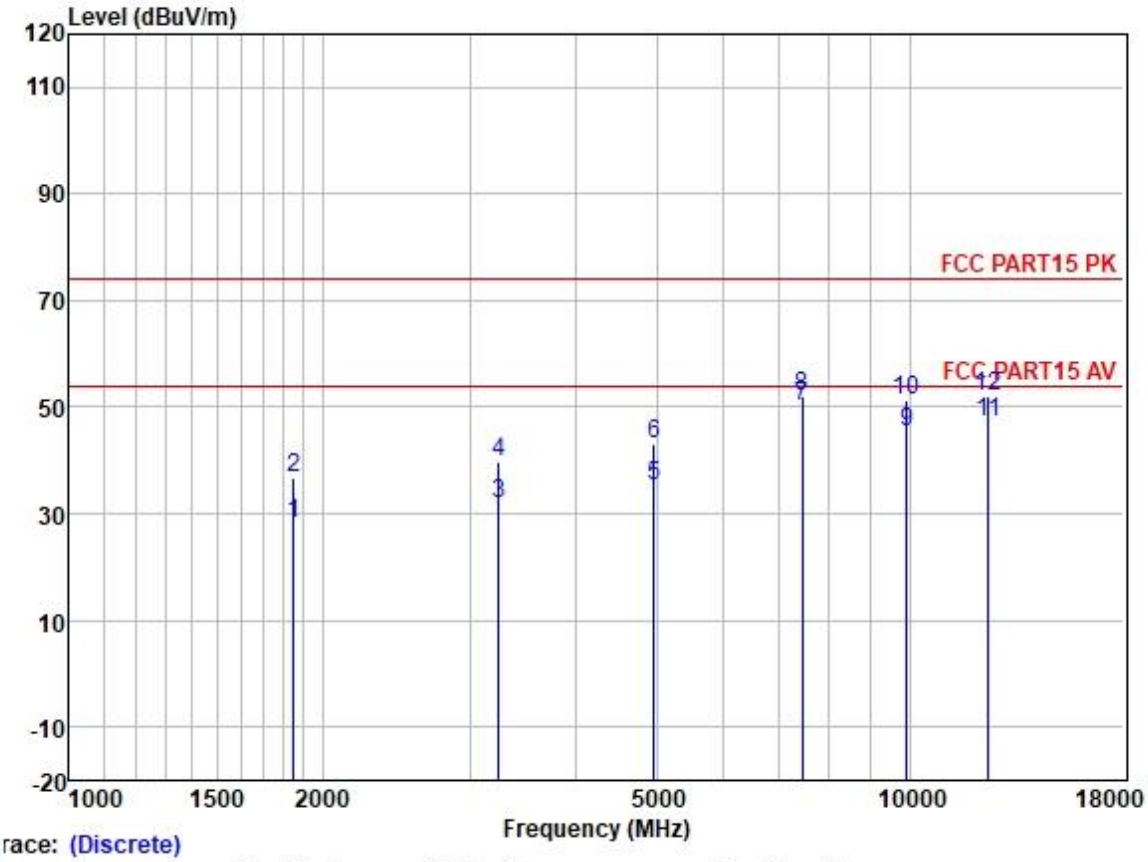
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1274.802	38.90	25.12	2.48	38.33	28.17	54.00	-25.83	VERTICAL	Average
2	1274.802	46.53	25.12	2.48	38.33	35.80	74.00	-38.20	VERTICAL	Peak
3	3223.928	38.65	28.63	4.01	37.07	34.22	54.00	-19.78	VERTICAL	Average
4	3223.928	45.74	28.63	4.01	37.07	41.31	74.00	-32.69	VERTICAL	Peak
5	4882.049	37.41	31.56	5.52	36.84	37.65	54.00	-16.35	VERTICAL	Average
6	4882.049	43.28	31.56	5.52	36.84	43.52	74.00	-30.48	VERTICAL	Peak
7	7322.974	47.47	36.00	6.13	37.43	52.17	54.00	-1.83	VERTICAL	Average
8	7322.974	48.99	36.00	6.13	37.43	53.69	74.00	-20.31	VERTICAL	Peak
9	9764.063	36.19	38.50	7.02	37.41	44.30	54.00	-9.70	VERTICAL	Average
10	9764.063	42.84	38.50	7.02	37.41	50.95	74.00	-23.05	VERTICAL	Peak
11	12205.310	36.50	38.74	8.08	37.00	46.32	54.00	-7.68	VERTICAL	Average
12	12205.310	43.23	38.74	8.08	37.00	53.05	74.00	-20.95	VERTICAL	Peak

Right: High channel



race: (Discrete)

	Freq	ReadAntenna Level	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	1304.623	38.59	25.21	2.60	38.31	28.09	54.00	-25.91	HORIZONTAL	Average
2	1304.623	46.65	25.21	2.60	38.31	36.15	74.00	-37.85	HORIZONTAL	Peak
3	2366.308	39.29	27.28	3.43	37.60	32.40	54.00	-21.60	HORIZONTAL	Average
4	2366.308	46.63	27.28	3.43	37.60	39.74	74.00	-34.26	HORIZONTAL	Peak
5	4960.245	36.29	31.65	5.65	36.84	36.75	54.00	-17.25	HORIZONTAL	Average
6	4960.245	43.06	31.65	5.65	36.84	43.52	74.00	-30.48	HORIZONTAL	Peak
7	7440.879	38.00	36.27	6.22	37.47	43.02	54.00	-10.98	HORIZONTAL	Average
8	7440.879	44.01	36.27	6.22	37.47	49.03	74.00	-24.97	HORIZONTAL	Peak
9	9920.725	37.99	38.65	6.96	37.40	46.20	54.00	-7.80	HORIZONTAL	Average
10	9920.725	43.45	38.65	6.96	37.40	51.66	74.00	-22.34	HORIZONTAL	Peak
11	12400.250	36.80	38.57	7.97	36.88	46.46	54.00	-7.54	HORIZONTAL	Average
12	12400.250	43.32	38.57	7.97	36.88	52.98	74.00	-21.02	HORIZONTAL	Peak



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	1850.858	37.01	26.00	2.94	37.78	28.17	54.00	-25.83	VERTICAL	Average
2	1850.858	45.43	26.00	2.94	37.78	36.59	74.00	-37.41	VERTICAL	Peak
3	3242.619	36.29	28.67	4.02	37.06	31.92	54.00	-22.08	VERTICAL	Average
4	3242.619	44.18	28.67	4.02	37.06	39.81	74.00	-34.19	VERTICAL	Peak
5	4960.982	34.96	31.65	5.65	36.84	35.42	54.00	-18.58	VERTICAL	Average
6	4960.982	42.80	31.65	5.65	36.84	43.26	74.00	-30.74	VERTICAL	Peak
7	7440.914	45.02	36.27	6.22	37.47	50.04	54.00	-3.96	VERTICAL	Average
8	7440.914	47.00	36.27	6.22	37.47	52.02	74.00	-21.98	VERTICAL	Peak
9	9920.710	37.25	38.65	6.96	37.40	45.46	54.00	-8.54	VERTICAL	Average
10	9920.710	43.18	38.65	6.96	37.40	51.39	74.00	-22.61	VERTICAL	Peak
11	12400.210	37.37	38.57	7.97	36.88	47.03	54.00	-6.97	VERTICAL	Average
12	12400.210	42.36	38.57	7.97	36.88	52.02	74.00	-21.98	VERTICAL	Peak

8 EUT Constructional Details (EUT Photos)

Refer to Appendix - Photographs of EUT Constructional Details for GZEM2012017560CR

9 Appendix

(cable loss=0.9dB)
Below test data is for right earbud.

Please refer to Appendix BT Classic Test result of Right Earbud for GZEM2012017560CR.

Below test data is for Left earbud.

Please refer to Appendix BT Classic Test result of Left Earbud for GZEM2012017560CR.

- End of the Report -