TEST REPORT

Application No.:	GZEM2002010593CR
Applicant:	Logistics and Supply Chain MultiTech R&D Centre Limited
Address of Applicant:	Units 1101-1105 and 1109, Level 11 Cyberport 2, 100 Cyberport Road, Hong Kong
Manufacturer:	The same as applicant
Address of Manufacturer:	The same as applicant
Factory:	Jetta (China) Industries Co., Ltd.
Address of Factory:	333 Cai Xin Lu, Lan He Zhen, Nan Sha Qu, Guangzhou, China
Equipment Under Test (EUT):	
EUT Name:	Sensing Monitoring
Model No.:	Coordinator
Trade Mark:	LSCM
Standard(s):	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2020-03-09
Date of Test:	2020-03-16 to 2020-04-02
Date of Issue:	2020-05-18
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		2020-05-18		Original

Authorized for issue by:				
Tested By		Kevin zhang **Kevin_Zhang/Project Engineer**		2020-03-16 to 2020-04-02 **Date**
Checked By		**Jerry_Chan /Reviewer**		2020-04-07 **Date**

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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(c)	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
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.13.3.2	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 11.11	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 15.209 & 15.247(d)	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 15.209 & 15.247(d)	Pass

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4 General Information

4.1 Details of E.U.T.

Power Supply:	DC5V (micro-USB port) or 24V (DC Jack Port)
Test Voltage:	AC 120V 60Hz powered by adapter (output: DC 5V) & DC power (output: DC 24 V) refer to section 4.2.
Port:	USB-A port for 5V power supply. micro-USB port for data transmission. DC Jack port for 24V power supply.
Antenna Gain	0dBi
Antenna Type	Dedicated Antenna
Channel Spacing	5MHz
Modulation Type	O-QPSK
Number of Channels	16
Operation Frequency	2405MHz to 2480MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	Apple	A1357 W010A051	REF. No.SEA0500
DC power	ZHAOXIN	RXN-305D	REF. No.SEA2700
Laptop	Lenovo	T430u	REF. No.SEA1800
Micro USB Cable	PHILIPS	SWR2101	REF. No.SEA0700

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 5.5 \times 10^{-8}$
2	Duty cycle	±0.57%
3	Occupied Bandwidth	±3%
4	RF Conducted power	±0.68dB
5	RF Power Density	±1.50dB
6	Conducted Spurious Emissions	±1.04dB
7	RF Radiated Power	±4.5dB (below 1GHz)
		±4.8dB (above 1GHz)
8	Radiated Spurious Emission Test	±4.5dB (30MHz-1GHz)
		±4.8dB (1GHz-18GHz)
9	Temperature	±0.4℃
10	Humidity	±1.3%
11	Supply Voltages	±1.5%
12	Time	±3%

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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.

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4.5 Test Facility

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

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

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

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

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian 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 17025:2005, 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**
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	N/A	N/A
Two-Line V-Netwok	Rohde & Schwarz	ENV216	EMC0118	2020-01-10	2021-01-09
LISN	Rohde & Schwarz	ENV216	EMC2135	2019-09-16	2020-09-15
EMI Test Receiver	Rohde & Schwarz	ESCS30	EMC0506	2019-11-18	2020-11-17
Coaxial Cable	HangTianXing	2m	EMC0107	2018-09-20	2020-09-19
Voltage Probe	SGS-EMC	N/A	EMC0106	2019-05-10	2021-05-09
Conical Metal Housing	SGS-EMC	N/A	EMC0167	2018-04-19	2020-04-18
Test Software E3c	Audix	Ver. 5.4.1221b	GZE100-62	N/A	N/A

Minimum 6dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2018-04-12	2020-04-12
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 Peak Output Power					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2018-04-12	2020-04-12
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

Power Spectrum Density					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2018-04-12	2020-04-12
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

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Conducted Band Edges Measurement					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
EXA Signal Analzer	AgilentTechnologies	N9010A	EMC2138	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2018-04-12	2020-04-12
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	2019-11-18	2020-11-17
6dB Attenuator	HP	8491A	EMC2062	2018-04-12	2020-04-12
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	2020-01-10	2021-01-09
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC0056	2020-01-10	2021-01-09
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	2017-05-04	2020-05-03
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	2020-01-10	2021-01-09
Amplifier	HP	8447F	EMC2065	2019-05-29	2020-05-28
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2019-11-18	2020-11-17
Active Loop Antenna	EMCO	6502	EMC0523	2018-03-05	2021-03-04
High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2020-01-10	2021-01-09
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2020-01-10	2021-01-09
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	2017-12-19	2020-12-18
MXE EMI Receiver	Keysight	N9038A	EMC2139	2019-11-18	2020-11-17
EXA Signal Analyzer	Keysight	N9010A	EMC2138	2019-11-18	2020-11-17

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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	2020-01-10	2021-01-09
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC0056	2020-01-10	2021-01-09
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	2017-05-04	2020-05-03
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	2020-01-10	2021-01-09
Amplifier	HP	8447F	EMC2065	2019-05-29	2020-05-28
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2019-11-18	2020-11-17
Active Loop Antenna	EMCO	6502	EMC0523	2018-03-05	2021-03-04
High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2020-01-10	2021-01-09
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2020-01-10	2021-01-09
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	2017-12-19	2020-12-18
MXE EMI Receiver	Keysight	N9038A	EMC2139	2019-11-18	2020-11-17
EXA Signal Analyzer	Keysight	N9010A	EMC2138	2019-11-18	2020-11-17
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

General used equipment

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2019-07-16	2020-07-15
DMM	Fluke	73	EMC0007	2019-07-16	2020-07-15

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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(c)

6.1.2 Conclusion

Standard Requirement:

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

15.247(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 dedicated antenna integrated on the main PCB and no consideration of replacement. The best-case gain of the antenna is 0dBi.

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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.		

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7.1.1 E.U.T. Operation

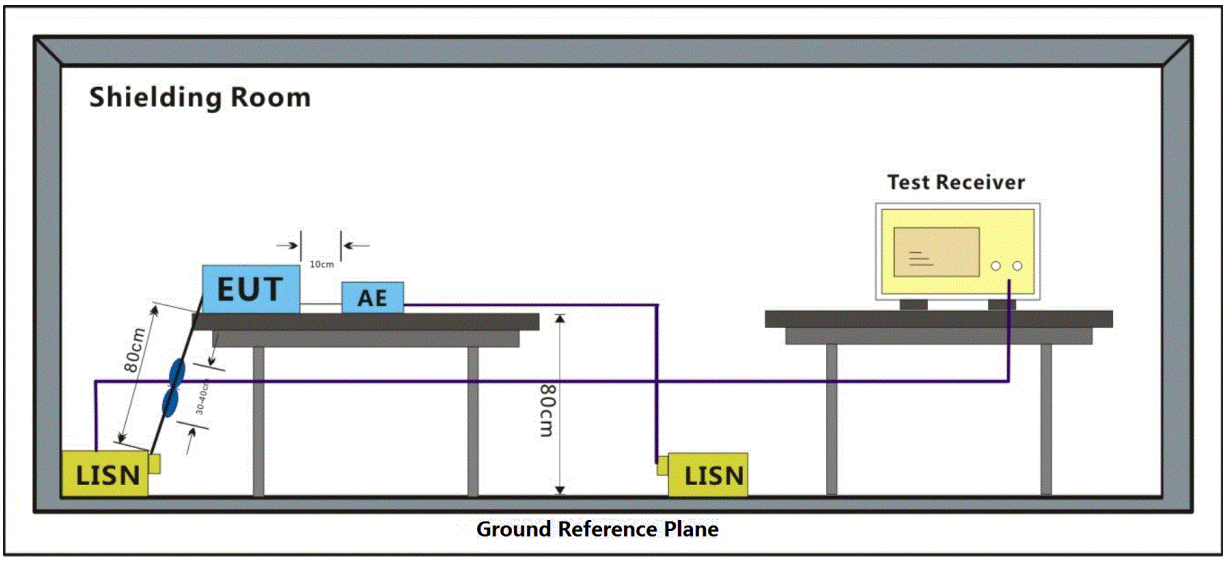
Operating Environment:

Temperature: 23 °C Humidity: 52 % RH Atmospheric Pressure: 1020 mbar

Test mode c2: TX mode Keep the EUT in continuously transmitting with O-QPSK modulation mode. power supply by DC5V (micro-USB port) and 24V (DC Jack Port) separately.

Only the data of worst-case power supply by USB port is recorded in the report.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

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

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

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

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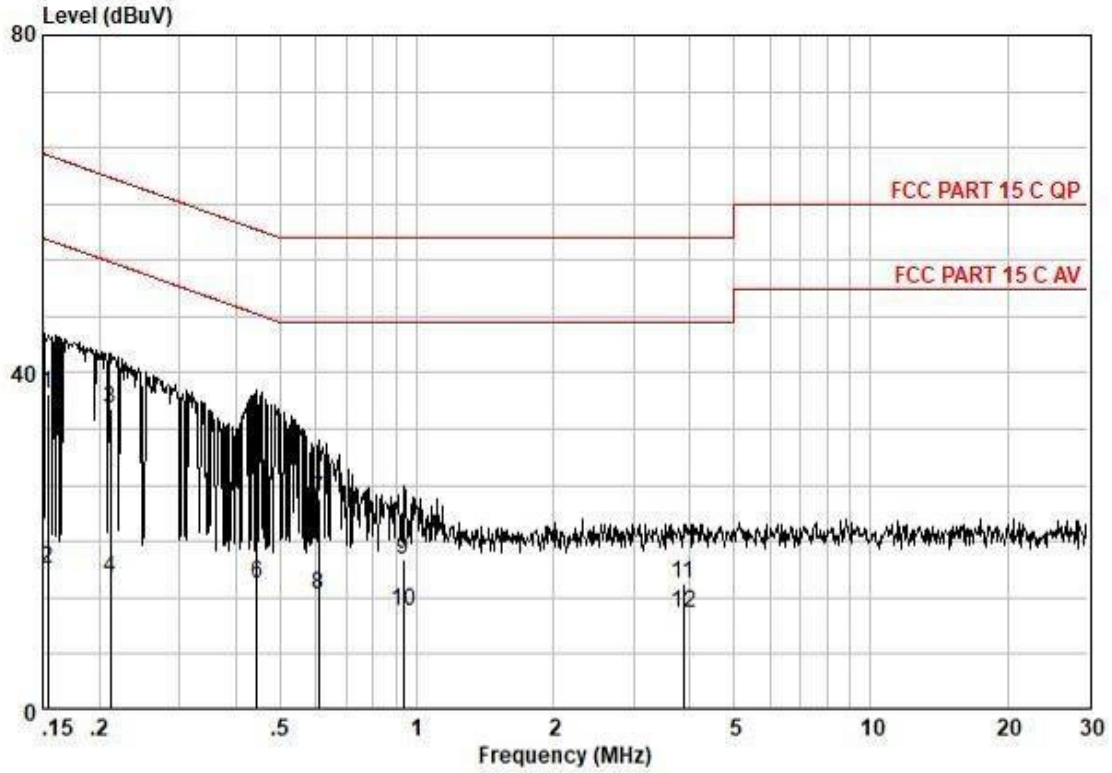
Mode:c2; Line:Live Line



Pol :LIVE
No :
Model :

Frequency MHz	read level dBuV	Cable Loss dB	LISN Factor dB	Measured level dBuV	Limit Line dBuV	Over limit dB	Remark
0.15	27.82	0.10	9.47	37.39	65.78	-28.39	QP
0.15	7.12	0.10	9.47	16.69	55.78	-39.09	AVERAGE
0.21	25.92	0.11	9.62	35.65	63.14	-27.49	QP
0.21	5.92	0.11	9.62	15.65	53.14	-37.49	AVERAGE
0.44	21.78	0.19	9.65	31.61	56.98	-25.36	QP
0.44	5.30	0.19	9.65	15.13	46.98	-31.84	AVERAGE
0.61	15.20	0.23	9.63	25.06	56.00	-30.94	QP
0.61	3.80	0.23	9.63	13.66	46.00	-32.34	AVERAGE
0.93	7.98	0.29	9.63	17.90	56.00	-38.10	QP
0.93	1.96	0.29	9.63	11.88	46.00	-34.12	AVERAGE
3.86	4.88	0.62	9.62	15.12	56.00	-40.88	QP
3.86	1.37	0.62	9.62	11.61	46.00	-34.39	AVERAGE

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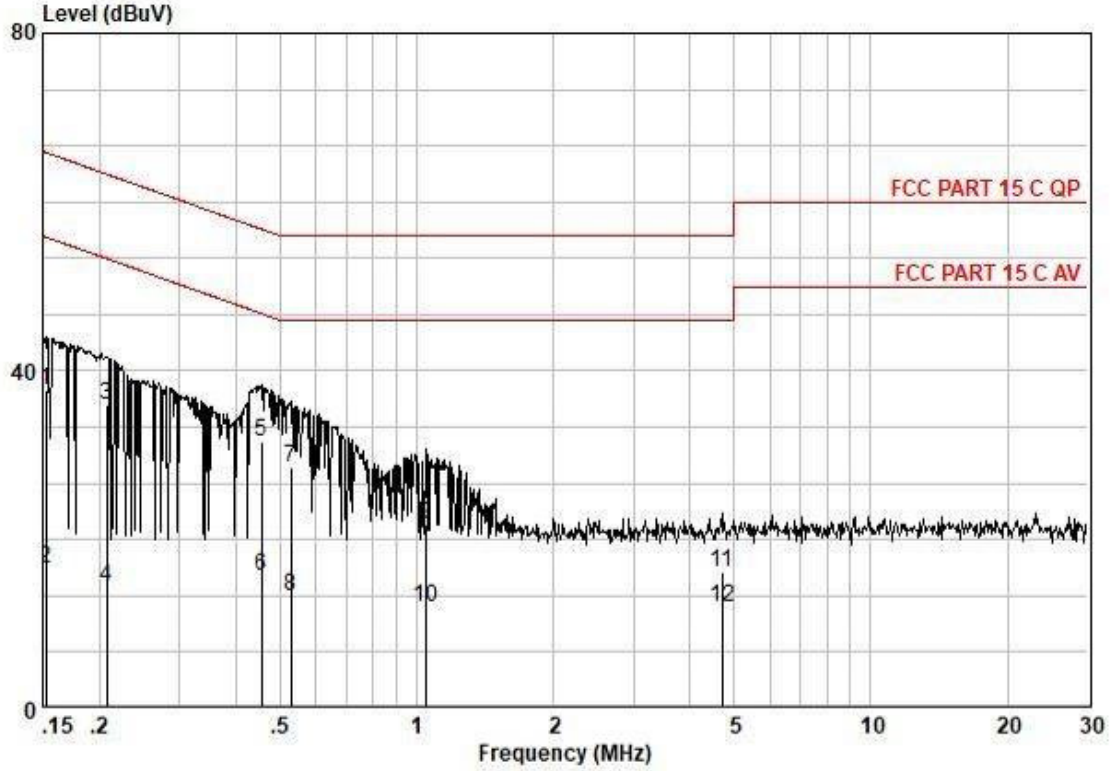
Mode:c2; Line: Neutral Line



Pol :NEUTRAL
No :
Model :

Frequency MHz	read level dBuV	Cable Loss dB	LISN Factor dB	Measured level dBuV	Limit Line dBuV	Over limit dB	Remark
0.15	28.32	0.10	9.39	37.81	65.87	-28.06	QP
0.15	6.98	0.10	9.39	16.47	55.87	-39.40	AVERAGE
0.21	26.34	0.10	9.59	36.03	63.32	-27.28	QP
0.21	4.67	0.10	9.59	14.36	53.32	-38.95	AVERAGE
0.45	21.80	0.19	9.55	31.54	56.80	-25.26	QP
0.45	5.85	0.19	9.55	15.59	46.80	-31.21	AVERAGE
0.53	18.88	0.21	9.56	28.64	56.00	-27.36	QP
0.53	3.57	0.21	9.56	13.33	46.00	-32.67	AVERAGE
1.04	12.00	0.30	9.59	21.89	56.00	-34.11	QP
1.04	2.02	0.30	9.59	11.91	46.00	-34.09	AVERAGE
4.70	5.88	0.68	9.60	16.16	56.00	-39.84	QP
4.70	1.70	0.68	9.60	11.98	46.00	-34.02	AVERAGE

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7.2 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

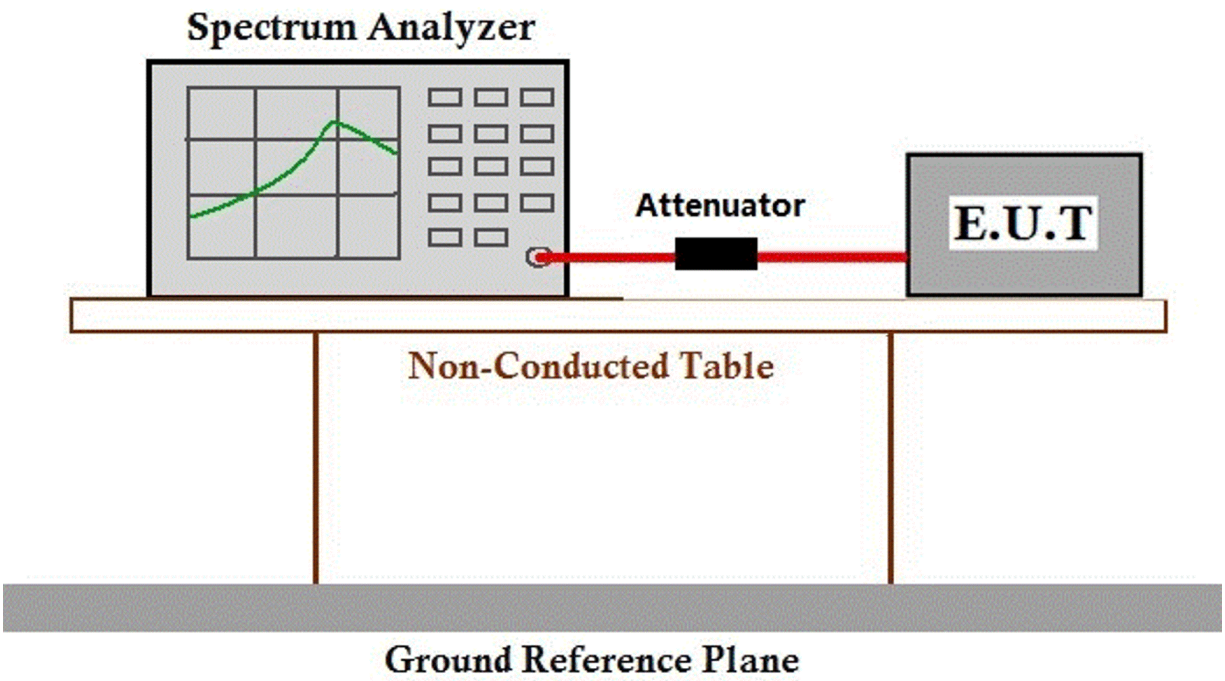
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 51.1 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in continuously transmitting with O-QPSK modulation mode.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.3 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

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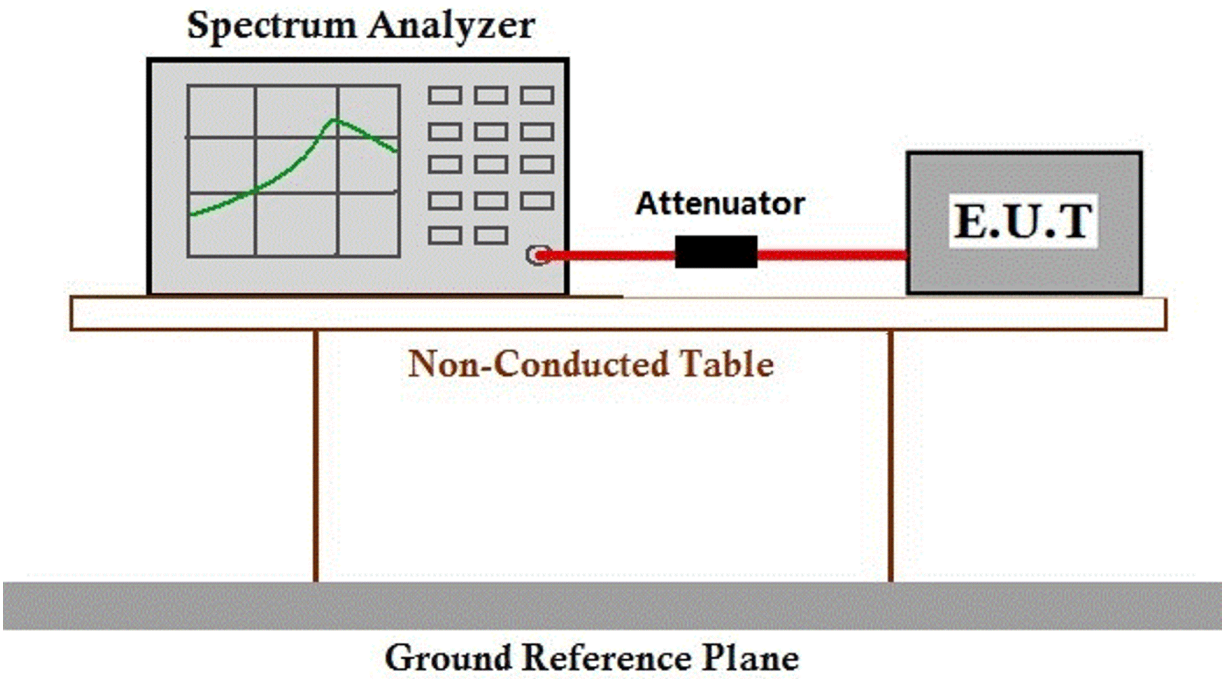
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 51.1 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in continuously transmitting with O-QPSK modulation mode.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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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

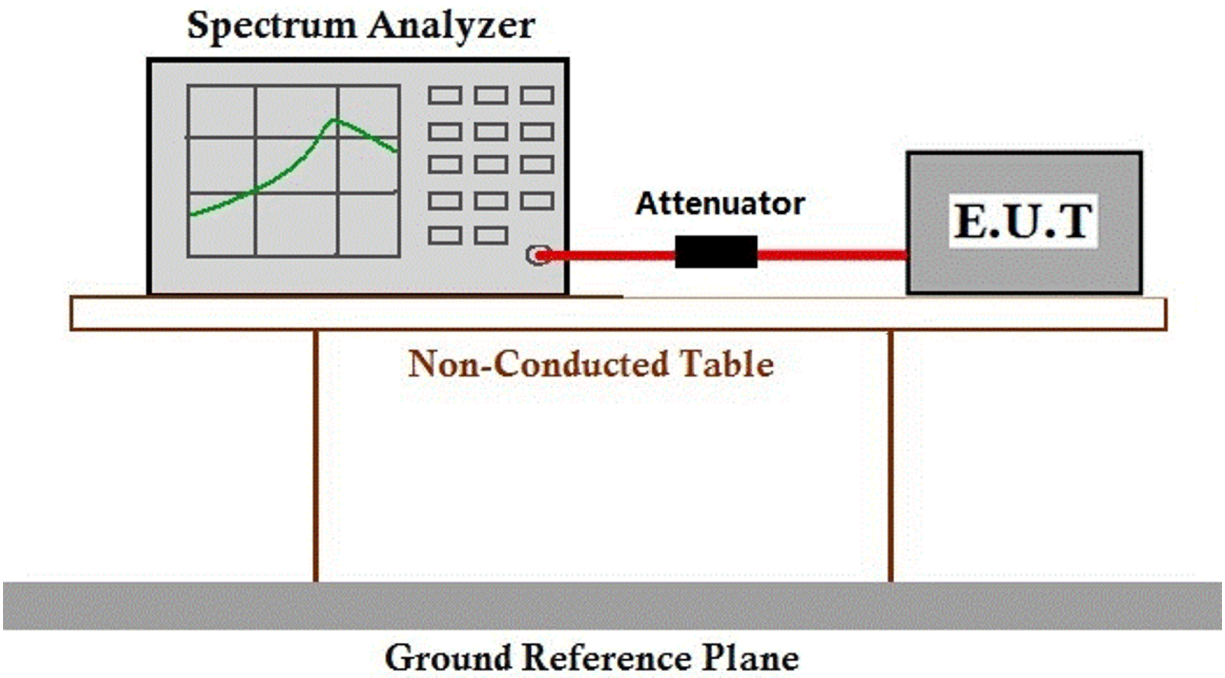
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 51 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in continuously transmitting with O-QPSK modulation mode.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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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)

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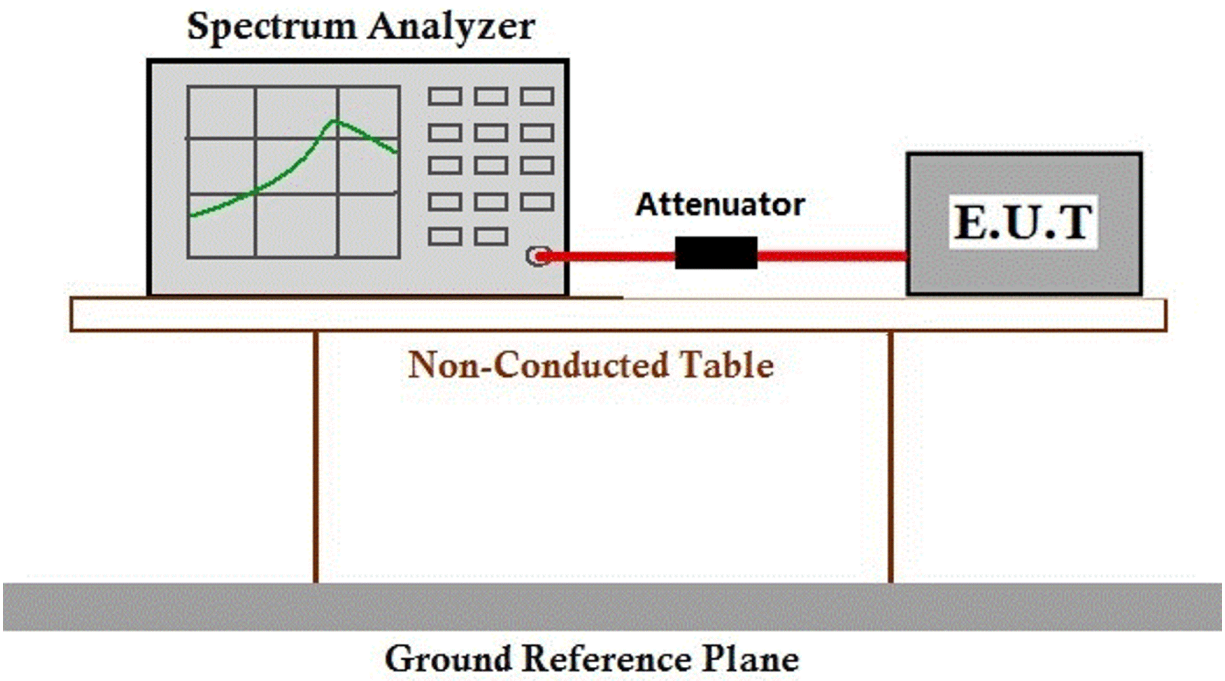
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 51 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in continuously transmitting with O-QPSK modulation mode.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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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)

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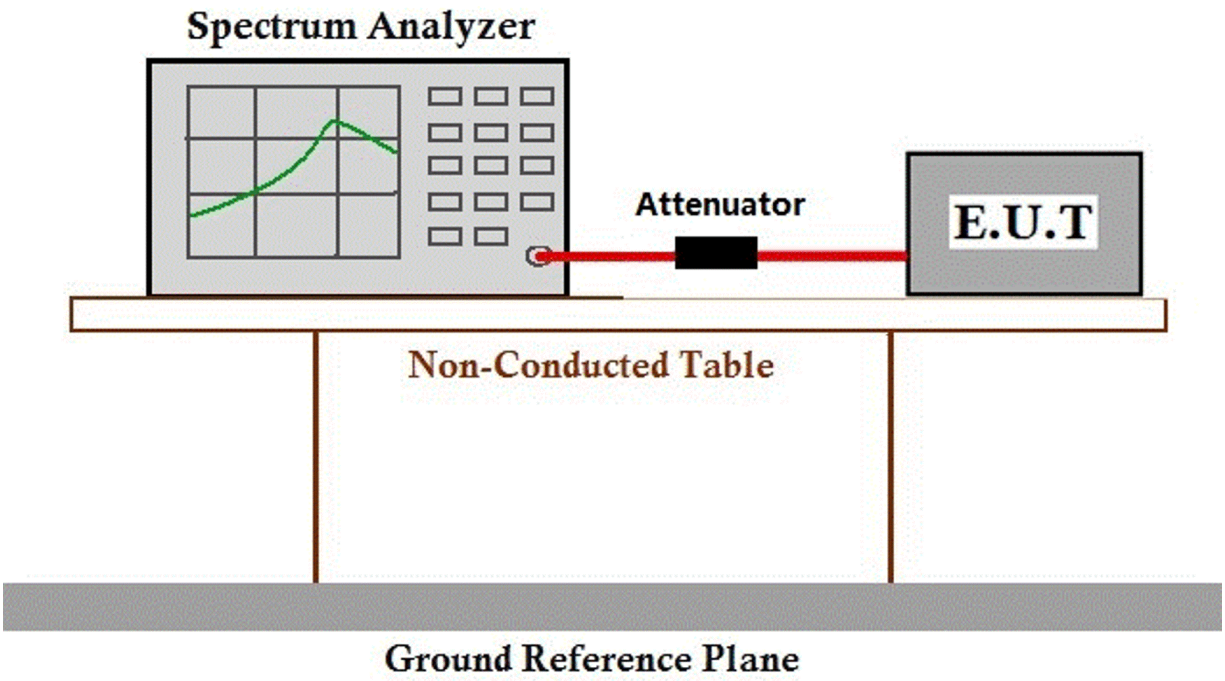
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 51 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in continuously transmitting with O-QPSK modulation mode.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247

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7.7 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)
Test Method: ANSI C63.10 (2013) Section 6.10.5
Measurement Distance: 3m
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.		

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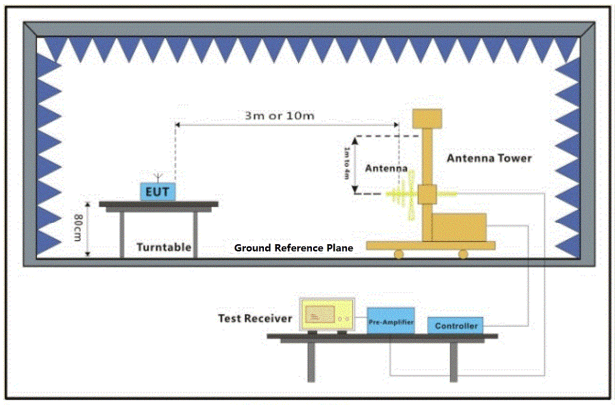
7.7.1 E.U.T. Operation

Operating Environment:

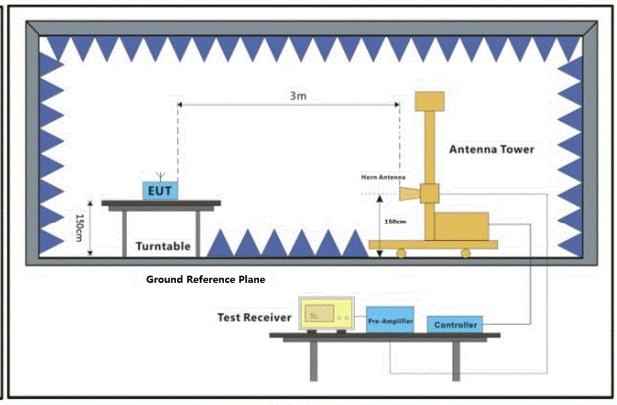
Temperature: 24.4 °C Humidity: 50.1 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in continuously transmitting with O-QPSK modulation mode.

7.7.2 Test Setup Diagram



30MHz-1GHz



Above 1GHz

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7.7.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

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

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

Remark 1: 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.

Level=Read Level + Antenna Factor + Cable Loss - Preamp Factor

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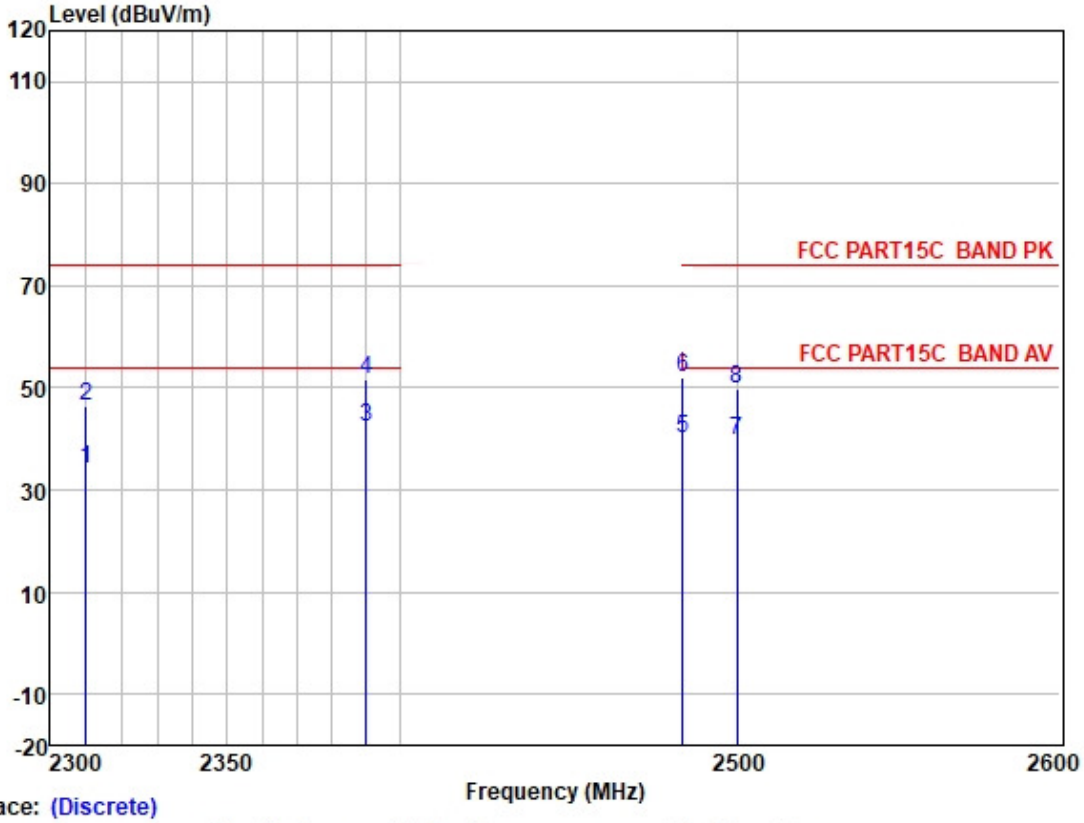
Mode:c; Polarization:Horizontal; Modulation:O-QPSK; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	40.73	27.15	3.32	36.94	34.26	54.00	-19.74	HORIZONTAL	Average
2	2310.000	52.87	27.15	3.32	36.94	46.40	74.00	-27.60	HORIZONTAL	Peak
3	2390.000	48.36	27.33	3.48	36.92	42.25	54.00	-11.75	HORIZONTAL	Average
4	2390.000	57.62	27.33	3.48	36.92	51.51	74.00	-22.49	HORIZONTAL	Peak
5	2483.500	46.16	27.48	3.53	36.90	40.27	54.00	-13.73	HORIZONTAL	Average
6	2483.500	57.91	27.48	3.53	36.90	52.02	74.00	-21.98	HORIZONTAL	Peak
7	2500.000	45.58	27.50	3.40	36.89	39.59	54.00	-14.41	HORIZONTAL	Average
8	2500.000	55.65	27.50	3.40	36.89	49.66	74.00	-24.34	HORIZONTAL	Peak

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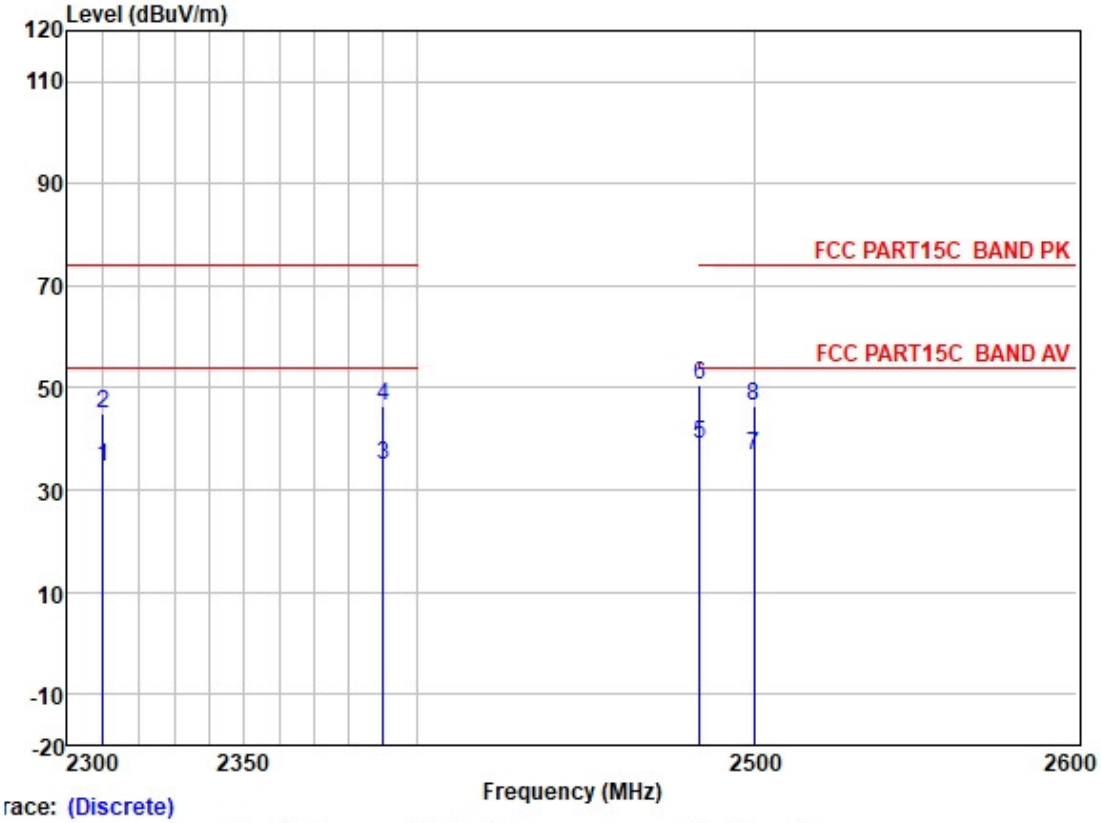
Mode:c; Polarization:Vertical; Modulation:O-QPSK; ; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	40.83	27.15	3.32	36.94	34.36	54.00	-19.64	VERTICAL	Average
2	2310.000	51.48	27.15	3.32	36.94	45.01	74.00	-28.99	VERTICAL	Peak
3	2390.000	41.13	27.33	3.48	36.92	35.02	54.00	-18.98	VERTICAL	Average
4	2390.000	52.70	27.33	3.48	36.92	46.59	74.00	-27.41	VERTICAL	Peak
5	2483.500	44.72	27.48	3.53	36.90	38.83	54.00	-15.17	VERTICAL	Average
6	2483.500	56.52	27.48	3.53	36.90	50.63	74.00	-23.37	VERTICAL	Peak
7	2500.000	42.79	27.50	3.40	36.89	36.80	54.00	-17.20	VERTICAL	Average
8	2500.000	52.29	27.50	3.40	36.89	46.30	74.00	-27.70	VERTICAL	Peak

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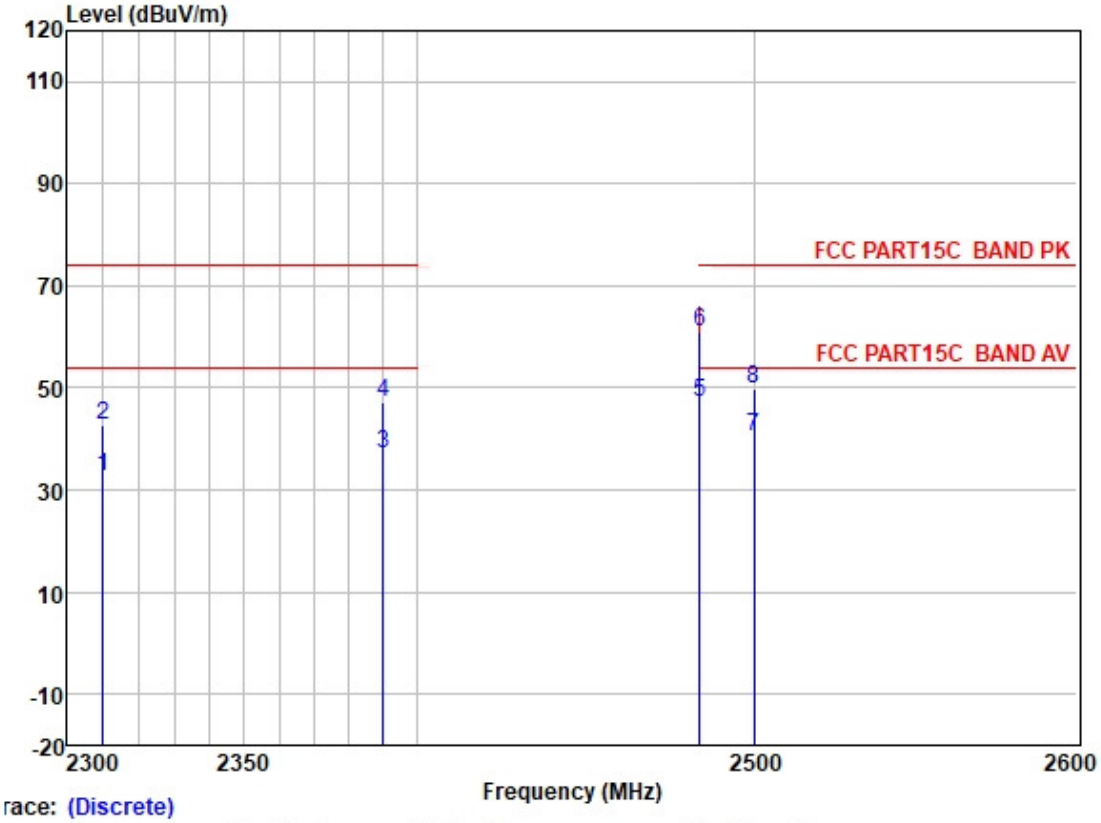
Mode:c; Polarization:Horizontal; Modulation:O-QPSK; ; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	39.22	27.15	3.32	36.94	32.75	54.00	-21.25	HORIZONTAL	Average
2	2310.000	49.13	27.15	3.32	36.94	42.66	74.00	-31.34	HORIZONTAL	Peak
3	2390.000	43.14	27.33	3.48	36.92	37.03	54.00	-16.97	HORIZONTAL	Average
4	2390.000	53.23	27.33	3.48	36.92	47.12	74.00	-26.88	HORIZONTAL	Peak
5	2483.500	53.00	27.48	3.53	36.90	47.11	54.00	-6.89	HORIZONTAL	Average
6	2483.500	66.84	27.48	3.53	36.90	60.95	74.00	-13.05	HORIZONTAL	Peak
7	2500.000	46.44	27.50	3.40	36.89	40.45	54.00	-13.55	HORIZONTAL	Average
8	2500.000	55.65	27.50	3.40	36.89	49.66	74.00	-24.34	HORIZONTAL	Peak

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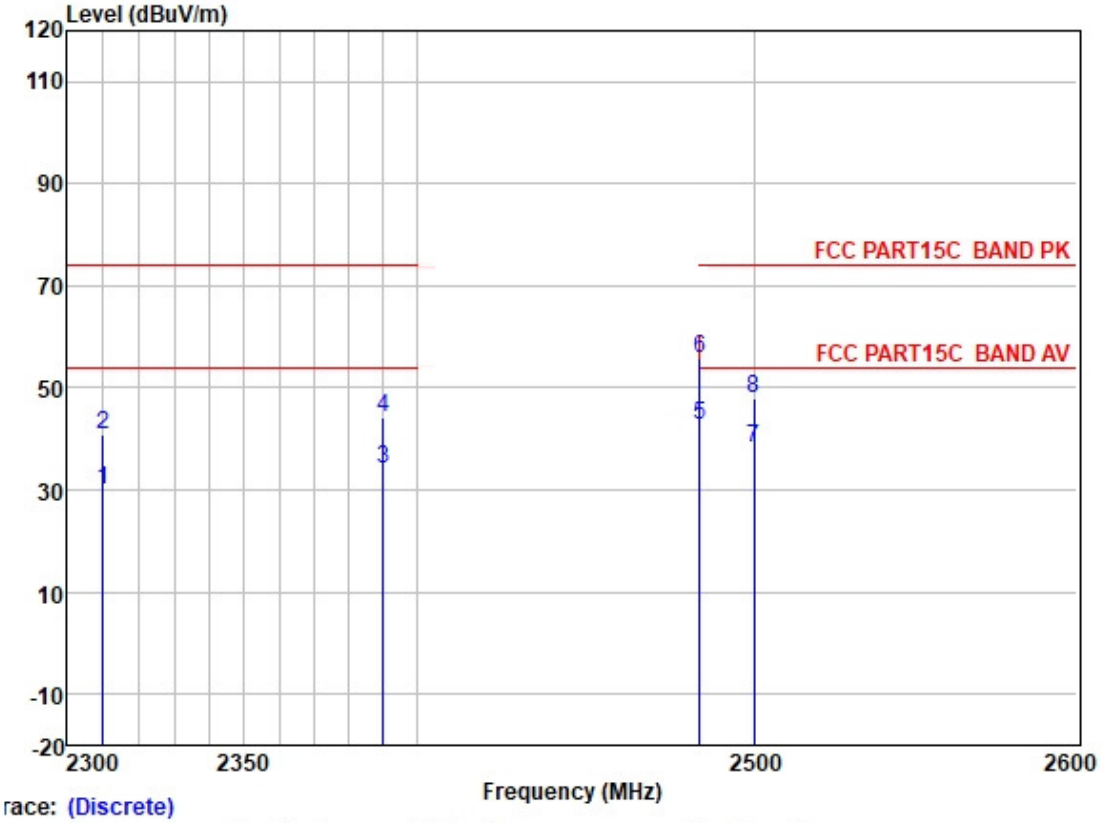
Mode:c; Polarization:Vertical; Modulation:O-QPSK; ; Channel:High



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2310.000	36.49	27.15	3.32	36.94	30.02	54.00	-23.98	VERTICAL	Average
2	2310.000	47.33	27.15	3.32	36.94	40.86	74.00	-33.14	VERTICAL	Peak
3	2390.000	40.09	27.33	3.48	36.92	33.98	54.00	-20.02	VERTICAL	Average
4	2390.000	50.30	27.33	3.48	36.92	44.19	74.00	-29.81	VERTICAL	Peak
5	2483.500	48.79	27.48	3.53	36.90	42.90	54.00	-11.10	VERTICAL	Average
6	2483.500	61.78	27.48	3.53	36.90	55.89	74.00	-18.11	VERTICAL	Peak
7	2500.000	44.35	27.50	3.40	36.89	38.36	54.00	-15.64	VERTICAL	Average
8	2500.000	53.96	27.50	3.40	36.89	47.97	74.00	-26.03	VERTICAL	Peak

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7.8 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)
Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
Measurement Distance: 3m
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.		

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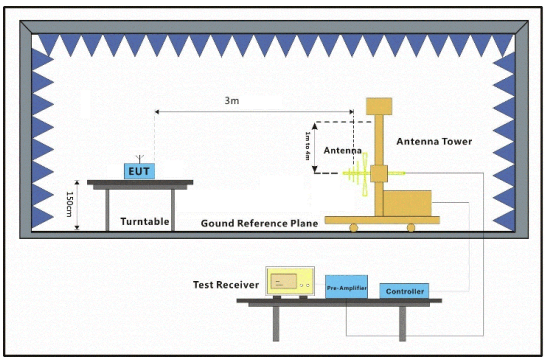
7.8.1 E.U.T. Operation

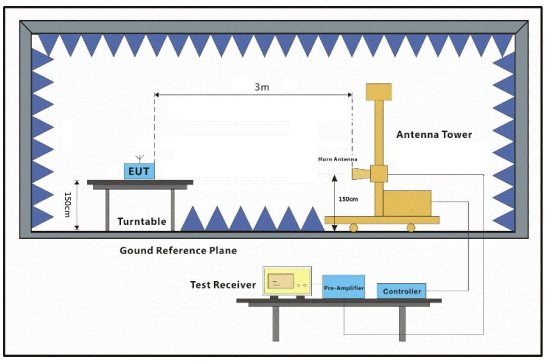
Operating Environment:

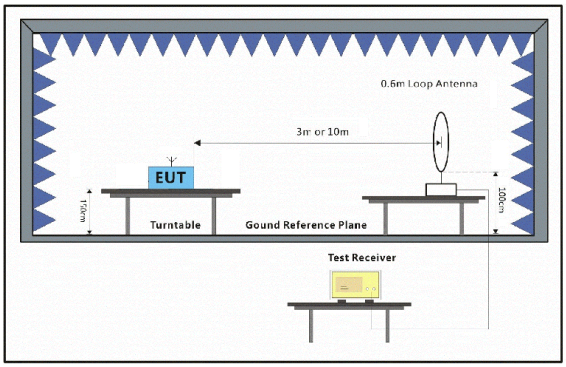
Temperature: 24.4 °C Humidity: 50.1 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in continuously transmitting with O-QPSK modulation mode.

7.8.2 Test Setup Diagram







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7.8.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

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

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

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

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

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

3) Scan from 9kHz to 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

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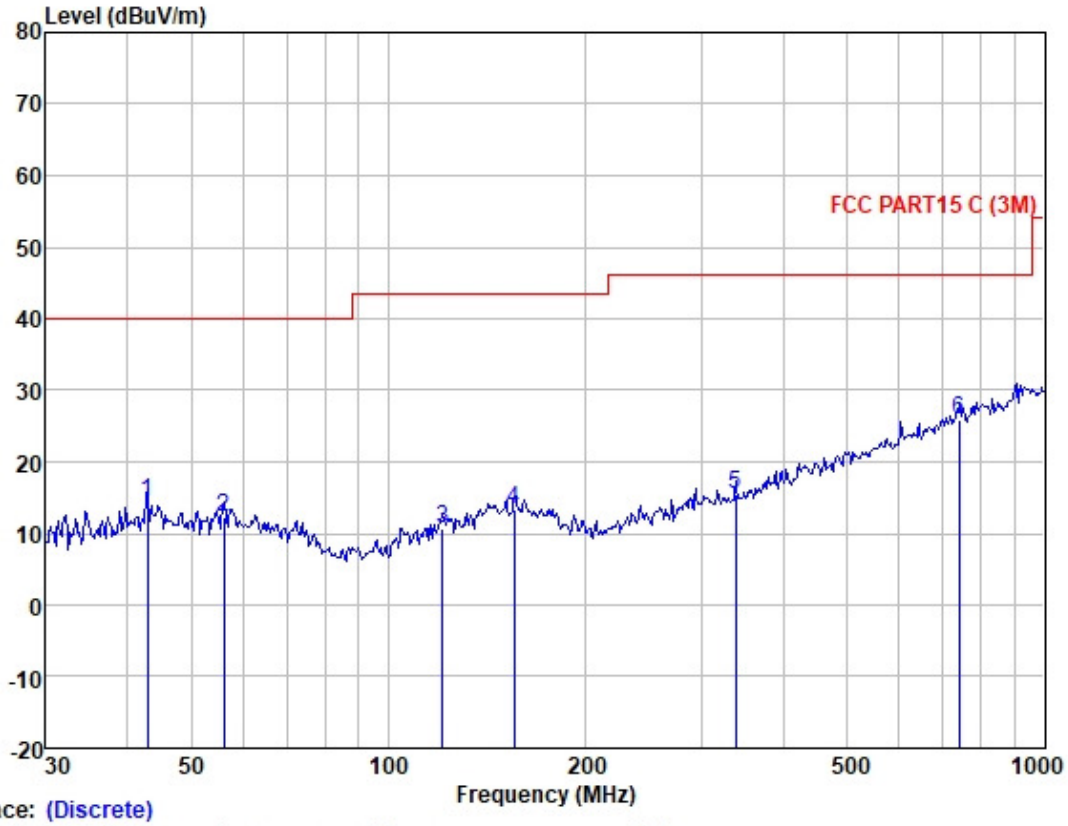

Trace: (Discrete)

	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	42.900	26.59	13.75	1.14	27.17	14.31	40.00	-25.69	HORIZONTAL	QP
2	56.001	24.48	13.70	1.28	27.16	12.30	40.00	-27.70	HORIZONTAL	QP
3	120.699	24.89	10.96	1.77	27.06	10.56	43.50	-32.94	HORIZONTAL	QP
4	155.364	24.35	13.72	2.10	26.86	13.31	43.50	-30.19	HORIZONTAL	QP
5	338.400	25.43	14.50	3.08	27.67	15.34	46.00	-30.66	HORIZONTAL	QP
6	739.661	26.84	22.00	5.24	28.11	25.97	46.00	-20.03	HORIZONTAL	QP

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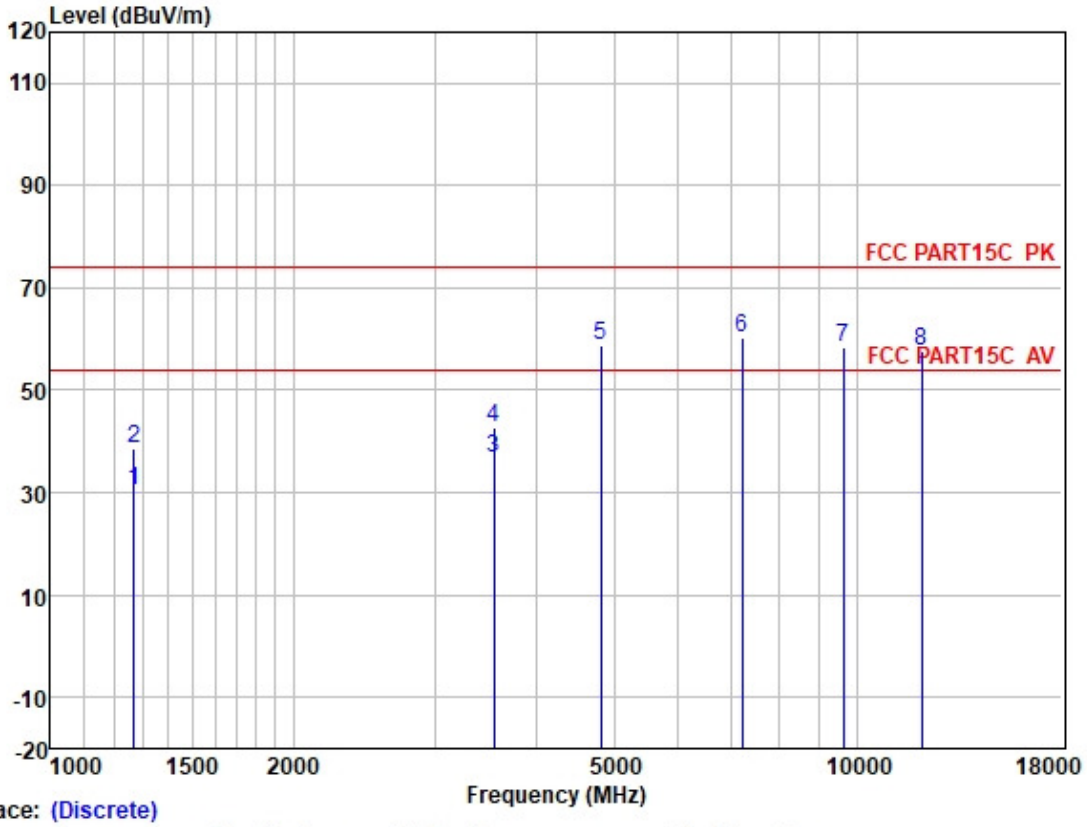
Mode:c; Polarization:Horizontal; Modulation:O-QPSK; ; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1268.150	40.25	25.10	2.44	37.32	30.47	54.00	-23.53	HORIZONTAL	Average
2	1268.150	48.28	25.10	2.44	37.32	38.50	74.00	-35.50	HORIZONTAL	Peak
3	3544.250	39.68	28.96	4.42	36.45	36.61	54.00	-17.39	HORIZONTAL	Average
4	3544.250	45.85	28.96	4.42	36.45	42.78	74.00	-31.22	HORIZONTAL	Peak
5	4810.054	58.42	31.42	5.40	36.48	58.76	74.00	-15.24	HORIZONTAL	Peak
6	7215.107	55.29	35.62	6.01	36.75	60.17	74.00	-13.83	HORIZONTAL	Peak
7	9620.120	49.38	38.37	7.07	36.35	58.47	74.00	-15.53	HORIZONTAL	Peak
8	12025.280	46.78	38.90	8.19	36.40	57.47	74.00	-16.53	HORIZONTAL	Peak

	Freq	Duty cycle correction factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol/Phase	Remark
5	4810.054	-38.27	20.49	54	-33.51	Horizontal	Average
6	7215.107	-38.27	21.9	54	-32.1	Horizontal	Average
7	9620.120	-38.27	20.2	54	-33.8	Horizontal	Average
8	12025.280	-38.27	19.2	54	-34.8	Horizontal	Average
Remark: Duty cycle correction factor = 20log (duty cycle), the detailed duty cycle test data see: Appendix 15.247							

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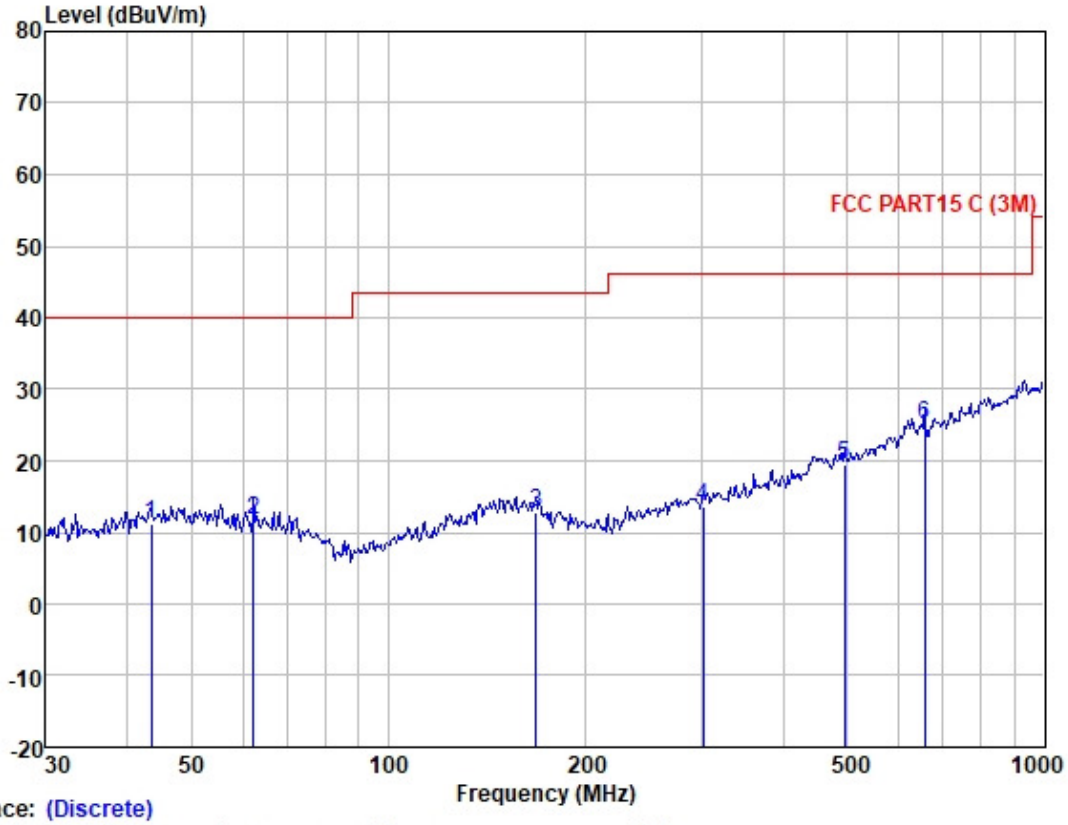

Trace: (Discrete)

	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	43.506	23.48	13.78	1.15	27.17	11.24	40.00	-28.76	VERTICAL	QP
2	62.213	24.56	13.08	1.31	27.16	11.79	40.00	-28.21	VERTICAL	QP
3	167.824	24.21	13.30	2.21	26.83	12.89	43.50	-30.61	VERTICAL	QP
4	301.422	24.15	13.62	2.98	27.21	13.54	46.00	-32.46	VERTICAL	QP
5	495.934	25.60	17.90	4.03	28.05	19.48	46.00	-26.52	VERTICAL	QP
6	656.530	27.78	20.55	4.91	28.10	25.14	46.00	-20.86	VERTICAL	QP

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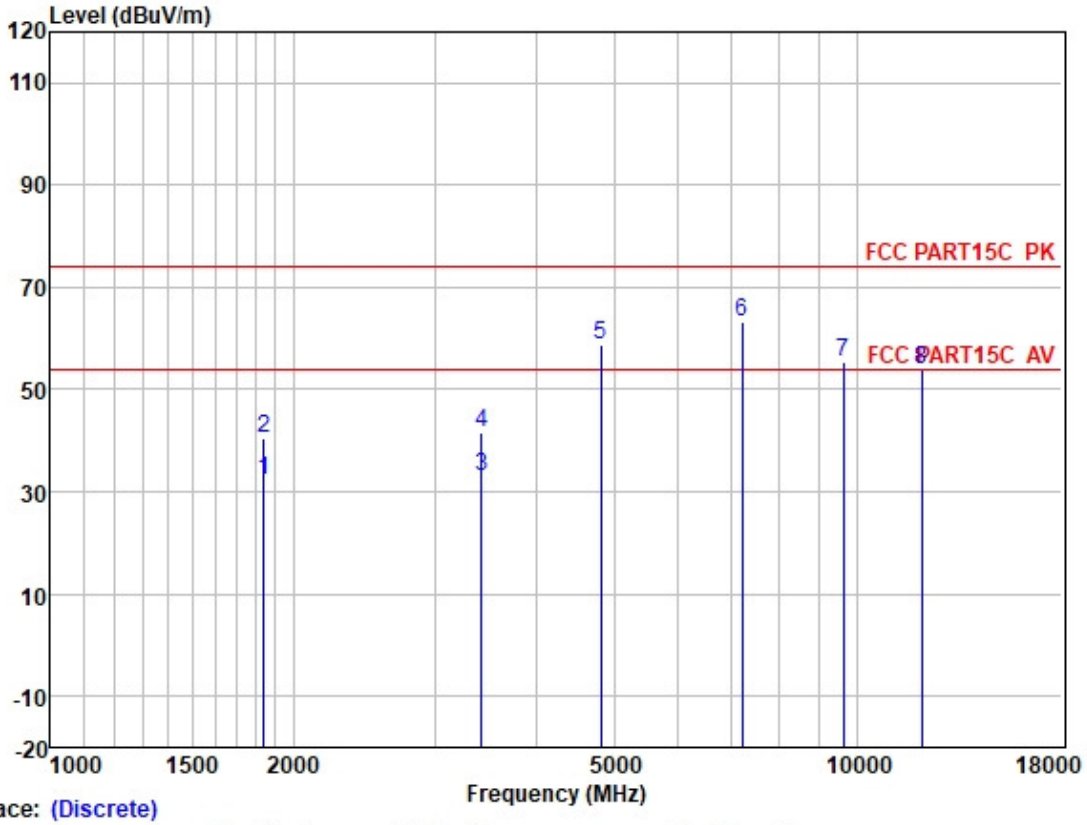
Mode:c; Polarization:Vertical; Modulation:O-QPSK; ; Channel:Low



race: (Discrete)

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1840.189	40.27	25.99	2.96	37.02	32.20	54.00	-21.80	VERTICAL	Average
2	1840.189	48.66	25.99	2.96	37.02	40.59	74.00	-33.41	VERTICAL	Peak
3	3425.675	36.45	28.86	4.15	36.46	33.00	54.00	-21.00	VERTICAL	Average
4	3425.675	45.13	28.86	4.15	36.46	41.68	74.00	-32.32	VERTICAL	Peak
5	4810.241	58.48	31.42	5.40	36.48	58.82	74.00	-15.18	VERTICAL	Peak
6	7215.852	58.45	35.62	6.01	36.75	63.33	74.00	-10.67	VERTICAL	Peak
7	9620.909	46.40	38.37	7.07	36.35	55.49	74.00	-18.51	VERTICAL	Peak
8	12025.610	43.10	38.90	8.19	36.40	53.79	74.00	-20.21	VERTICAL	Peak

	Freq	Duty cycle correction factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol/Phase	Remark
5	4810.241	-38.27	20.55	54.00	-33.45	Vertical	Average
6	7215.852	-38.27	25.06	54.00	-28.94	Vertical	Average
7	9620.909	-38.27	17.22	54.00	-36.78	Vertical	Average
8	12025.610	-38.27	15.52	54.00	-38.48	Vertical	Average
Remark: Duty cycle correction factor = 20log (duty cycle), the detailed duty cycle test data see: Appendix 15.247							

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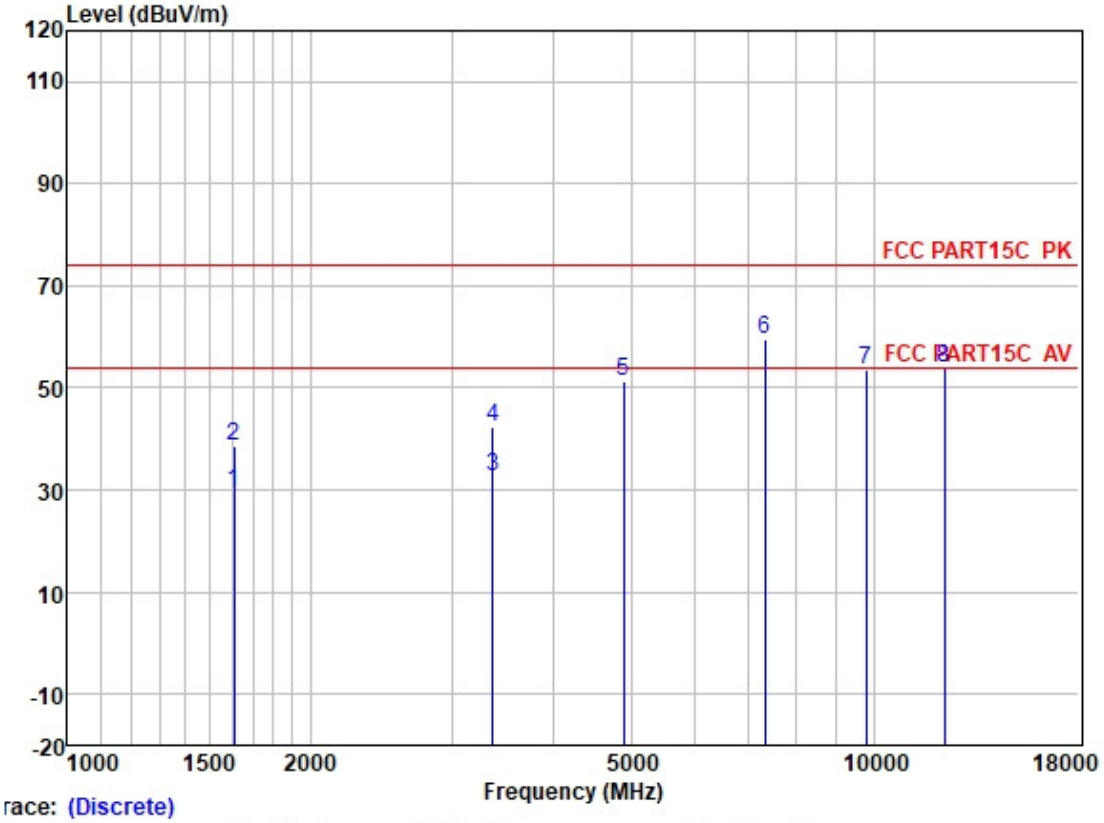
Mode:c; Polarization:Horizontal; Modulation:O-QPSK; ; Channel:middle



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	1611.091	38.21	25.59	2.80	37.07	29.53	54.00	-24.47	HORIZONTAL	Average
2	1611.091	47.19	25.59	2.80	37.07	38.51	74.00	-35.49	HORIZONTAL	Peak
3	3366.778	36.17	28.82	4.09	36.47	32.61	54.00	-21.39	HORIZONTAL	Average
4	3366.778	45.73	28.82	4.09	36.47	42.17	74.00	-31.83	HORIZONTAL	Peak
5	4890.499	50.66	31.56	5.52	36.50	51.24	74.00	-22.76	HORIZONTAL	Peak
6	7335.349	54.28	36.00	6.13	36.76	59.65	74.00	-14.35	HORIZONTAL	Peak
7	9780.789	44.30	38.53	7.01	36.33	53.51	74.00	-20.49	HORIZONTAL	Peak
8	12225.220	43.51	38.74	8.08	36.30	54.03	74.00	-19.97	HORIZONTAL	Peak

	Freq	Duty cycle correction factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol/Phase	Remark
5	4890.499	-38.42	12.82	54.00	-41.18	Horizontal	Average
6	7335.349	-38.42	21.23	54.00	-32.77	Horizontal	Average
7	9780.789	-38.42	15.09	54.00	-38.91	Horizontal	Average
8	12225.220	-38.42	15.61	54.00	-38.39	Horizontal	Average

Remark:
Duty cycle correction factor = 20log (duty cycle), the detailed duty cycle test data see: Appendix 15.247

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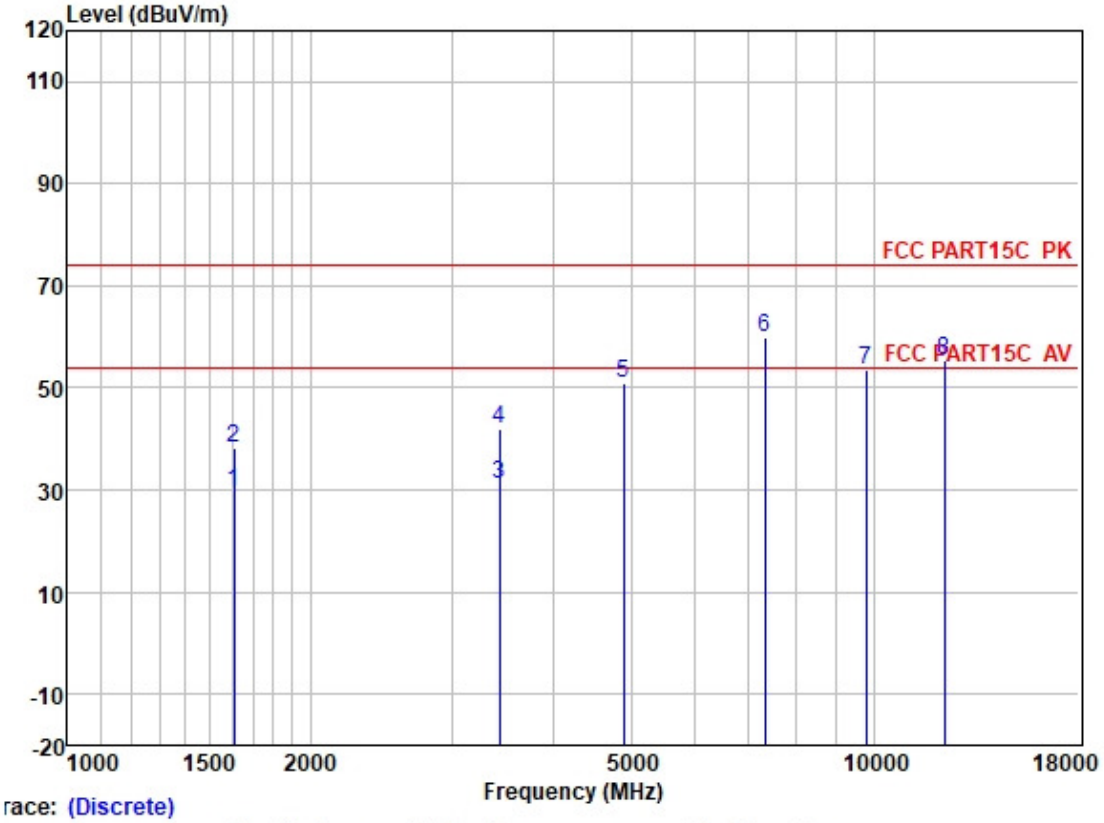
Mode:c; Polarization:Vertical; Modulation:O-QPSK; ; Channel:middle



	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	1611.091	38.29	25.59	2.80	37.07	29.61	54.00	-24.39	VERTICAL	Average
2	1611.091	47.05	25.59	2.80	37.07	38.37	74.00	-35.63	VERTICAL	Peak
3	3435.590	34.71	28.87	4.16	36.46	31.28	54.00	-22.72	VERTICAL	Average
4	3435.590	45.59	28.87	4.16	36.46	42.16	74.00	-31.84	VERTICAL	Peak
5	4890.153	50.32	31.56	5.52	36.50	50.90	74.00	-23.10	VERTICAL	Peak
6	7335.646	54.60	36.00	6.13	36.76	59.97	74.00	-14.03	VERTICAL	Peak
7	9780.240	44.28	38.53	7.01	36.33	53.49	74.00	-20.51	VERTICAL	Peak
8	12225.130	44.88	38.74	8.08	36.30	55.40	74.00	-18.60	VERTICAL	Peak

	Freq	Duty cycle correction factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol/Phase	Remark
5	4890.153	-38.42	12.48	54.00	-41.52	Vertical	Average
6	7335.646	-38.42	21.55	54.00	-32.45	Vertical	Average
7	9780.240	-38.42	15.07	54.00	-38.93	Vertical	Average
8	12225.130	-38.42	16.98	54.00	-37.02	Vertical	Average

Remark:
Duty cycle correction factor = 20log (duty cycle), the detailed duty cycle test data see: Appendix 15.247

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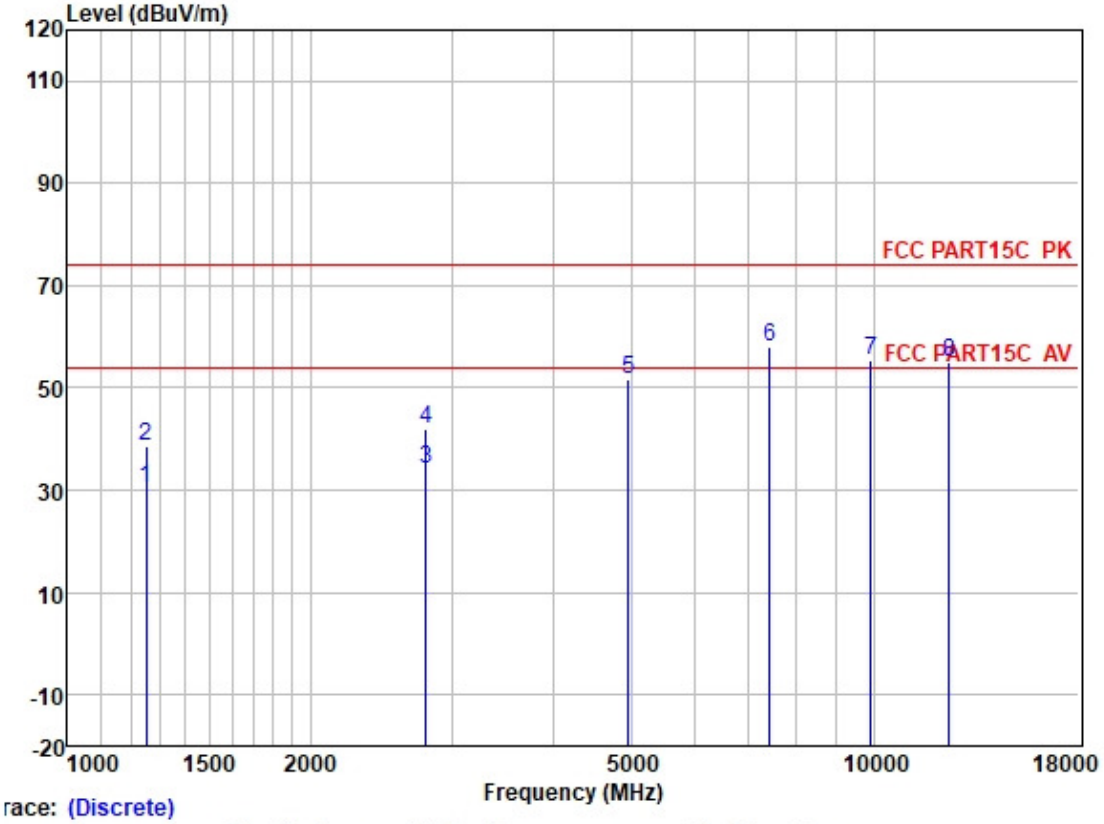
Mode:c; Polarization:Horizontal; Modulation:O-QPSK; ; Channel:High



	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	1252.885	40.40	25.03	2.36	37.33	30.46	54.00	-23.54	HORIZONTAL	Average
2	1252.885	48.42	25.03	2.36	37.33	38.48	74.00	-35.52	HORIZONTAL	Peak
3	2782.060	38.93	28.10	3.69	36.75	33.97	54.00	-20.03	HORIZONTAL	Average
4	2782.060	46.79	28.10	3.69	36.75	41.83	74.00	-32.17	HORIZONTAL	Peak
5	4960.016	50.95	31.65	5.65	36.52	51.73	74.00	-22.27	HORIZONTAL	Peak
6	7440.020	52.33	36.27	6.22	36.77	58.05	74.00	-15.95	HORIZONTAL	Peak
7	9920.580	46.26	38.65	6.96	36.31	55.56	74.00	-18.44	HORIZONTAL	Peak
8	12400.620	44.65	38.57	7.97	36.17	55.02	74.00	-18.98	HORIZONTAL	Peak

	Freq	Duty cycle correction factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol/Phase	Remark
5	4960.016	-38.42	13.31	54.00	-40.69	Horizontal	Average
6	7440.020	-38.42	19.63	54.00	-34.37	Horizontal	Average
7	9920.580	-38.42	17.14	54.00	-36.86	Horizontal	Average
8	12400.620	-38.42	16.6	54.00	-37.4	Horizontal	Average
Remark: Duty cycle correction factor = 20log (duty cycle), the detailed duty cycle test data see: Appendix 15.247							

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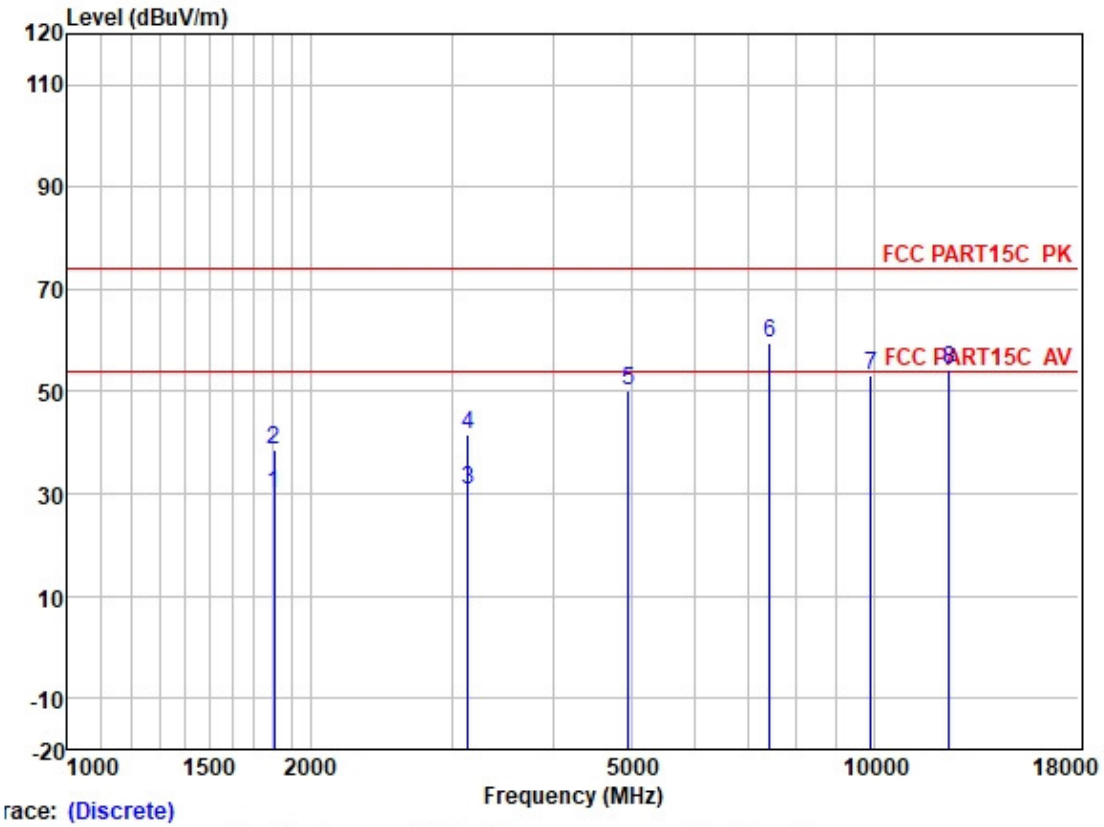

Trace: (Discrete)

	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	1803.332	38.29	25.95	3.00	37.03	30.21	54.00	-23.79	VERTICAL	Average
2	1803.332	46.81	25.95	3.00	37.03	38.73	74.00	-35.27	VERTICAL	Peak
3	3141.145	34.77	28.51	3.95	36.52	30.71	54.00	-23.29	VERTICAL	Average
4	3141.145	45.63	28.51	3.95	36.52	41.57	74.00	-32.43	VERTICAL	Peak
5	4960.517	49.33	31.65	5.65	36.52	50.11	74.00	-23.89	VERTICAL	Peak
6	7440.527	53.79	36.27	6.22	36.77	59.51	74.00	-14.49	VERTICAL	Peak
7	9920.525	43.82	38.65	6.96	36.31	53.12	74.00	-20.88	VERTICAL	Peak
8	12400.900	43.85	38.57	7.97	36.17	54.22	74.00	-19.78	VERTICAL	Peak

	Freq	Duty cycle correction factor	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Pol/Phase	Remark
5	4960.517	-38.42	11.69	54.00	-42.31	Vertical	Average
6	7440.527	-38.42	21.09	54.00	-32.91	Vertical	Average
7	9920.525	-38.42	14.7	54.00	-39.3	Vertical	Average
8	12400.900	-38.42	15.8	54.00	-38.2	Vertical	Average
Remark: Duty cycle correction factor = 20log (duty cycle), the detailed duty cycle test data see: Appendix 15.247							

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8 Appendix

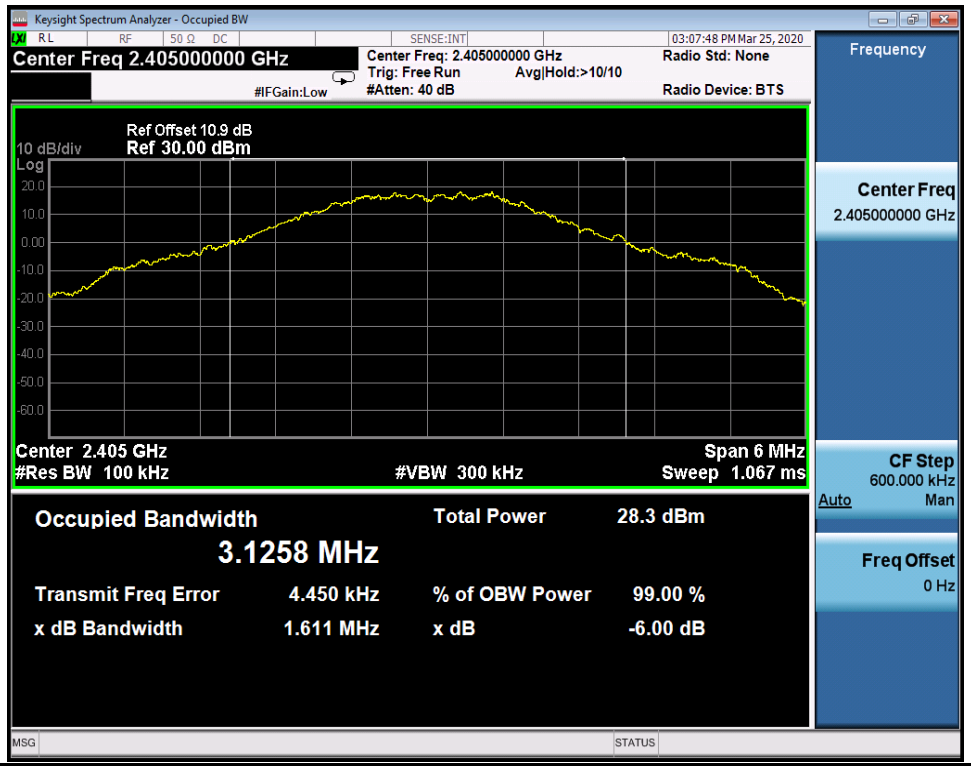
8.1 Appendix 15.247

1.6dB Bandwidth

Test Mode	Test Channel	Ant	OBW[MHz]	EBW[MHz]	Limit	Verdict
ZIGBEE	2405	Ant1	3.1239	1.611	0.5	PASS
ZIGBEE	2445	Ant1	2.9063	1.599	0.5	PASS
ZIGBEE	2480	Ant1	2.7343	1.599	0.5	PASS

TEST PLOT

6dB Bandwidth_ZIGBEE_2405_Ant1



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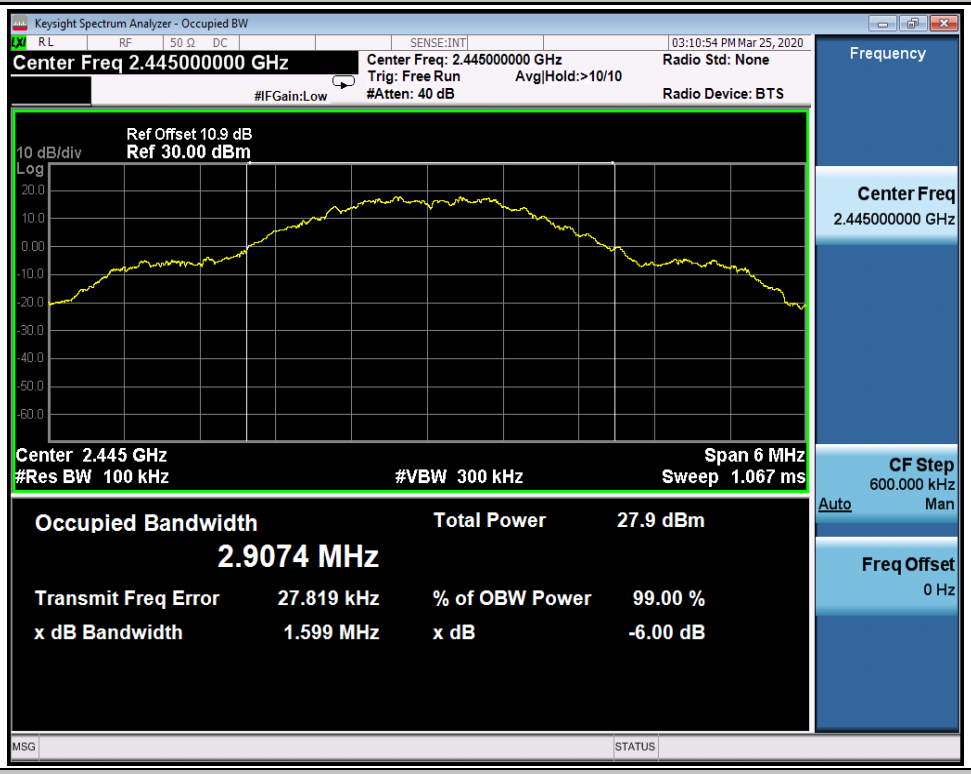
6dB Bandwidth_ ZIGBEE _2445_Ant1



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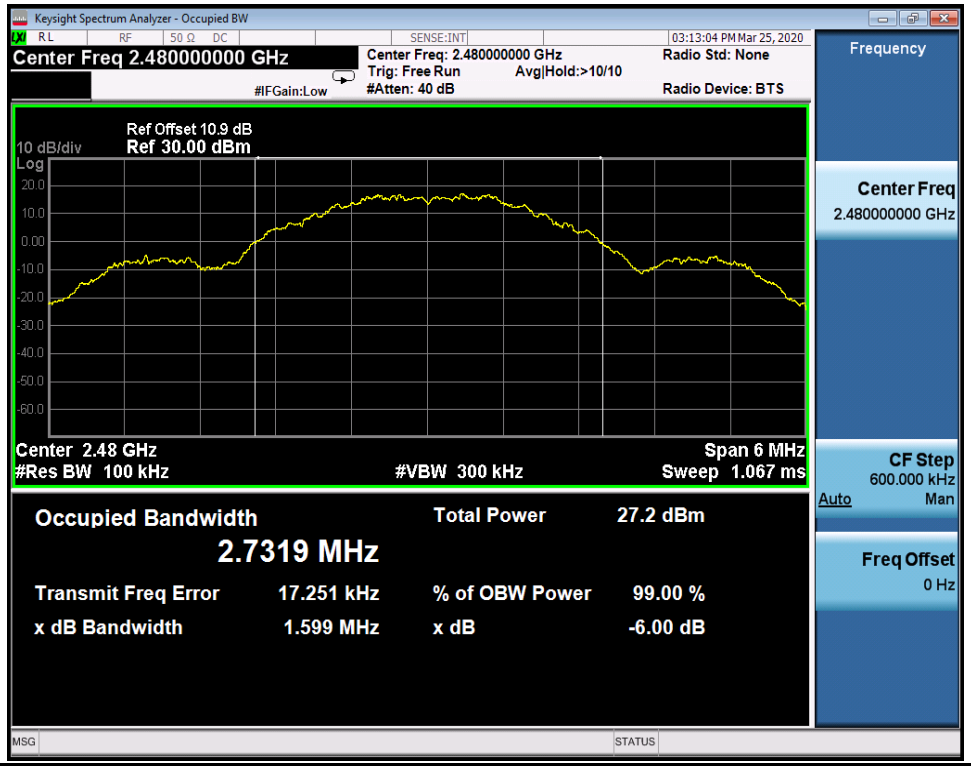

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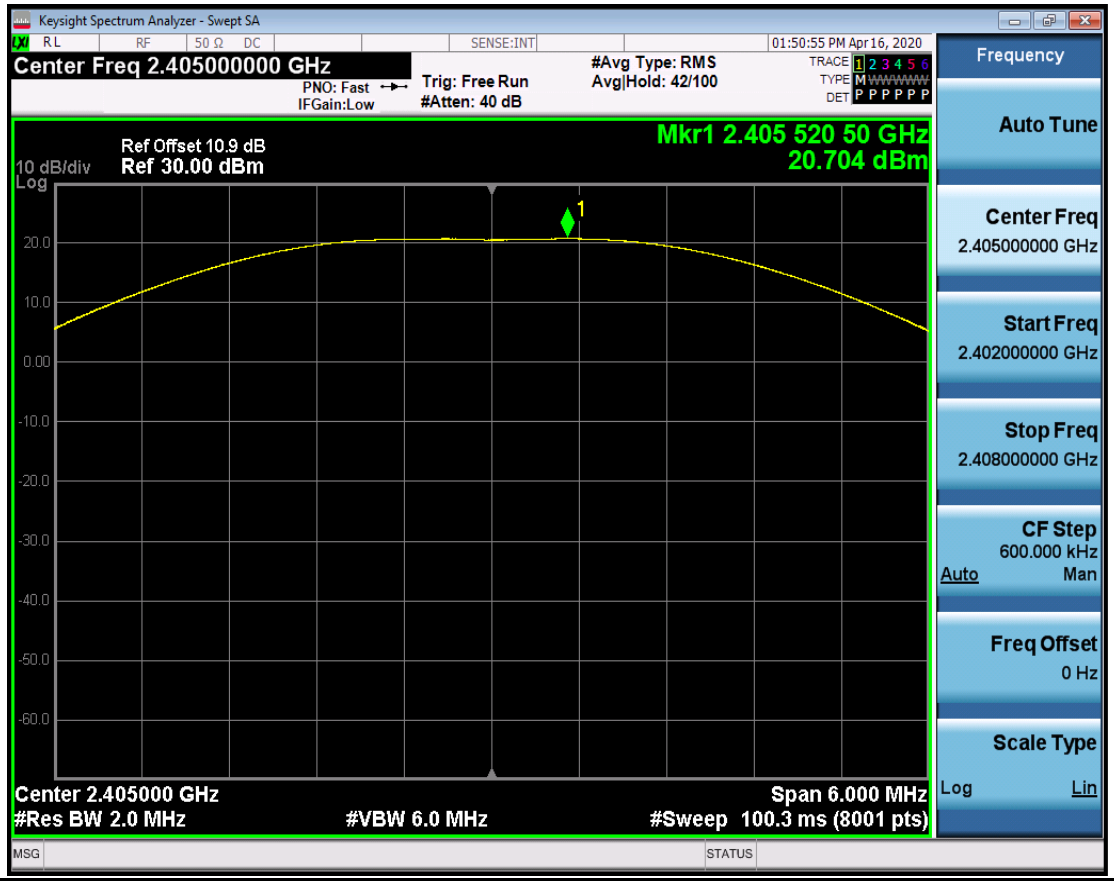
2.Maximum peak conducted output power

Test Mode	Test Channel	Ant	Power[dBm]	Limit[dBm]	Verdict
ZIGBEE	2405	Ant1	20.704	30	PASS
ZIGBEE	2445	Ant1	20.052	30	PASS
ZIGBEE	2480	Ant1	19.404	30	PASS

TEST PLOT
Maximum peak conducted output power_ZIGBEE_2405_Ant1



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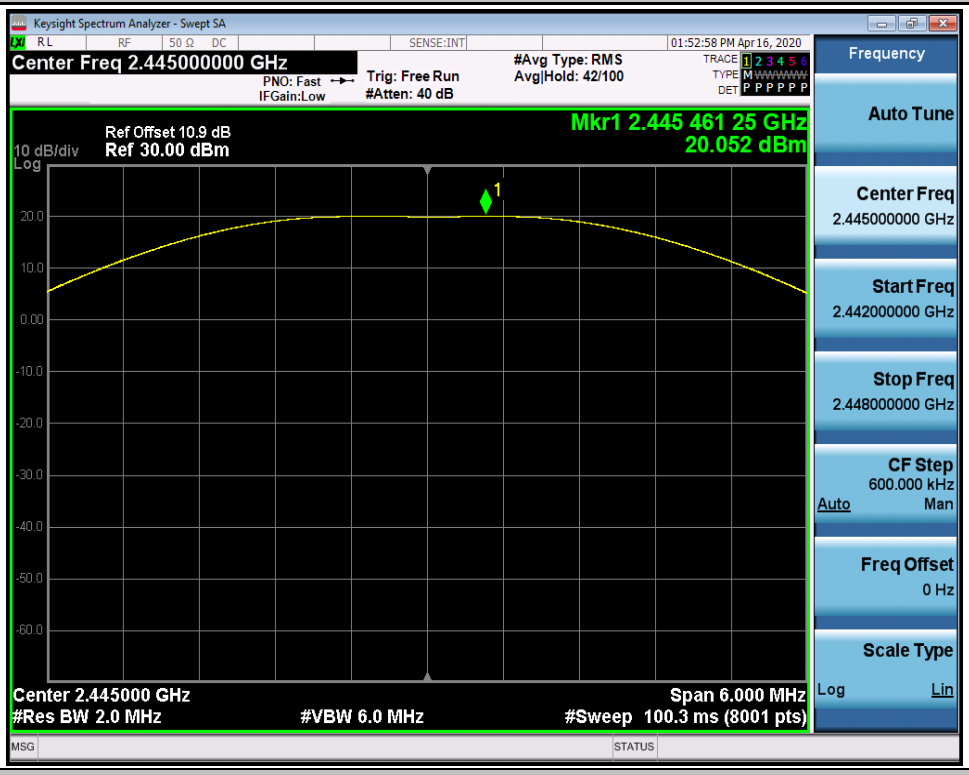
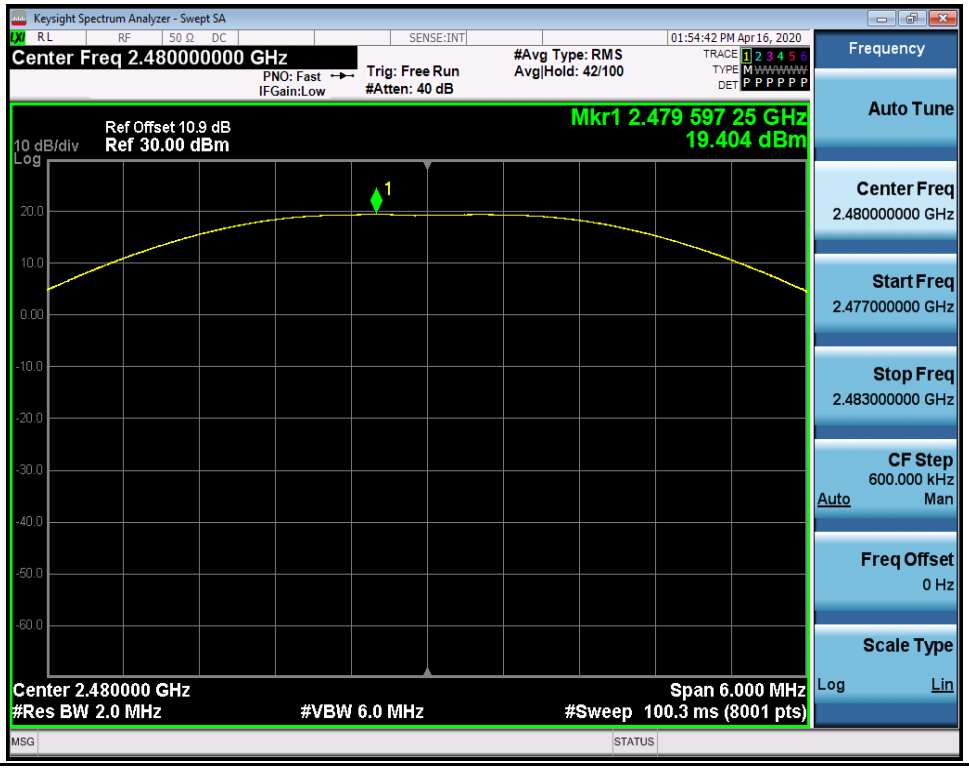
Maximum peak conducted output power_ZIGBEE_2445_Ant1



Maximum peak conducted output power_ZIGBEE_2480_Ant1



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3.Maximum Peak power spectral density

Test Mode	Test Channel	Ant	Result	Limit[dBm/3kHz]	Verdict
ZIGBEE	2405	Ant1	4.707	8.00	PASS
ZIGBEE	2445	Ant1	4.806	8.00	PASS
ZIGBEE	2480	Ant1	2.937	8.00	PASS

TEST PLOT
Maximum Peak power spectral density_ZIGBEE_2405_Ant1

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Maximum Peak power spectral density_ZIGBEE_2445_Ant1

Maximum Peak power spectral density_ZIGBEE_2480_Ant1

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4.Band-edge for RF Conducted Emissions

Test Mode	Test Channel	Ant	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
ZIGBEE	2405	Ant1	17.715	-38.912	-2.29	PASS
ZIGBEE	2480	Ant1	17.059	-29.313	-2.94	PASS

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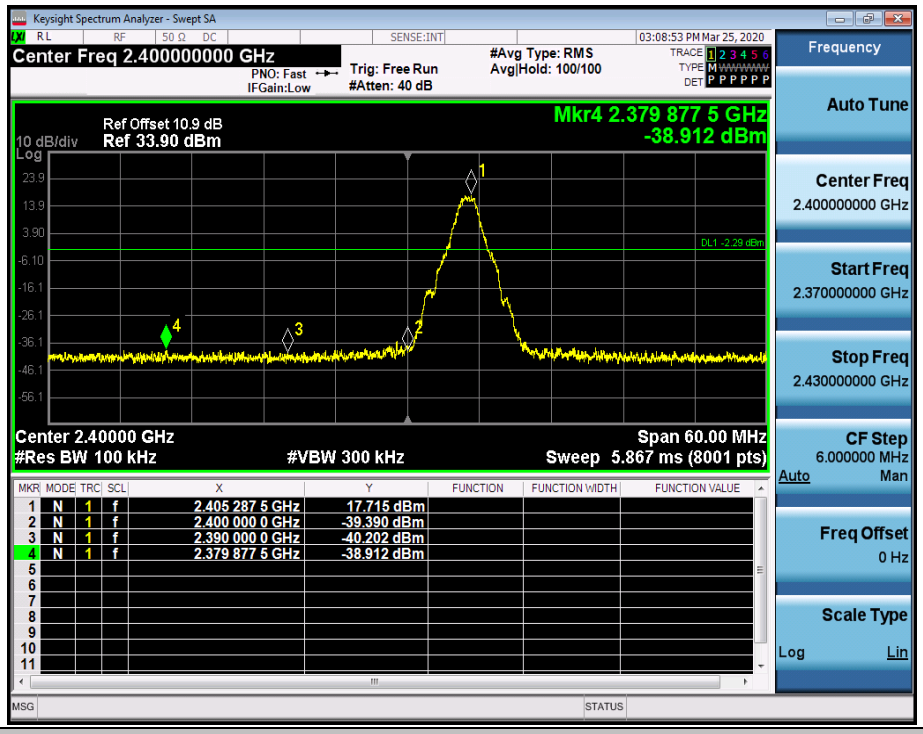
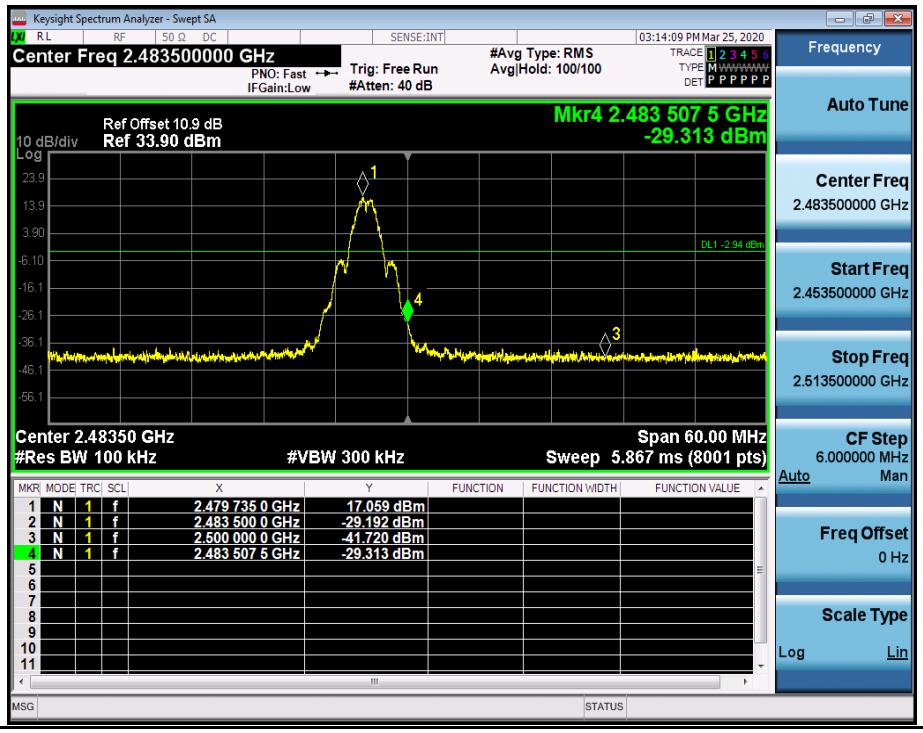
TEST PLOT

Band-edge for RF Conducted Emissions_ZIGBEE_2405_Ant1



Band-edge for RF Conducted Emissions_ZIGBEE_2480_Ant1



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5.RF Conducted Spurious Emissions

Test Mode	Test Channel	Ant	StartFre [MHz]	StopFre [MHz]	RBW [kHz]	VBW [kHz]	Pref[dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
ZIGBEE	2405	Ant1	30	10000	100	300	18.001	-43.397	<-1.999	PASS
ZIGBEE	2405	Ant1	10000	26000	100	300	18.001	-41.650	<-1.999	PASS
ZIGBEE	2445	Ant1	30	10000	100	300	17.563	-44.940	<-2.437	PASS
ZIGBEE	2445	Ant1	10000	26000	100	300	17.563	-41.075	<-2.437	PASS
ZIGBEE	2480	Ant1	30	10000	100	300	17.067	-42.192	<-2.933	PASS
ZIGBEE	2480	Ant1	10000	26000	100	300	17.067	-41.870	<-2.933	PASS

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TEST PLOT	
RF Conducted Spurious Emissions_ZIGBEE_2405_Ant1	
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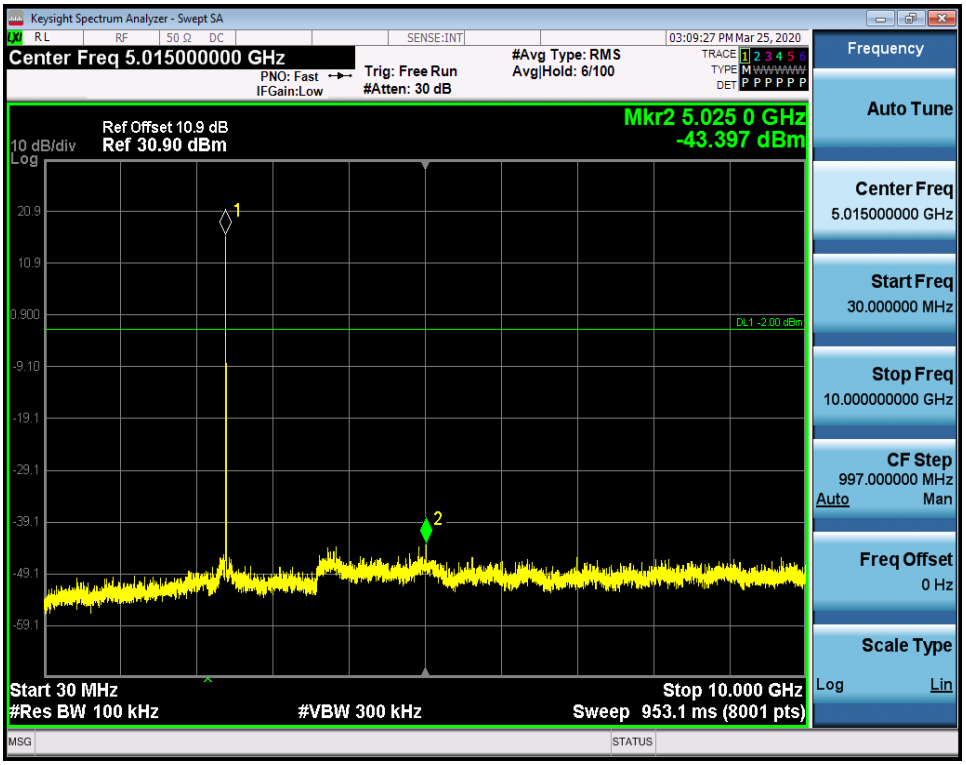
CSE_1	

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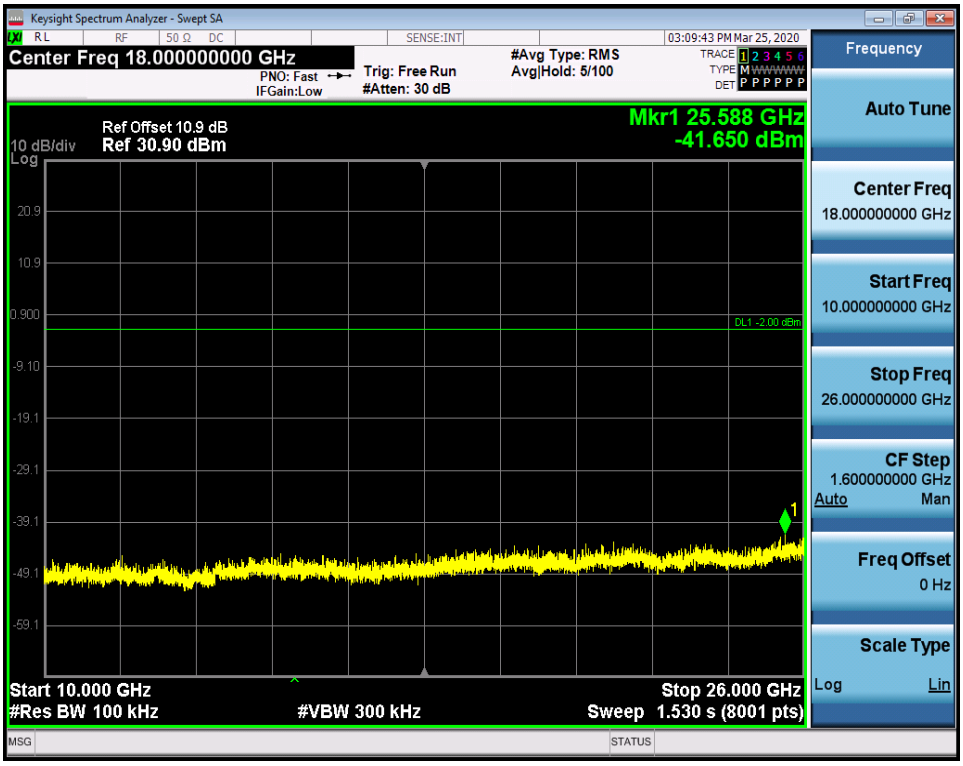
CSE_2	
RF Conducted Spurious Emissions_ZIGBEE_2445_Ant1	
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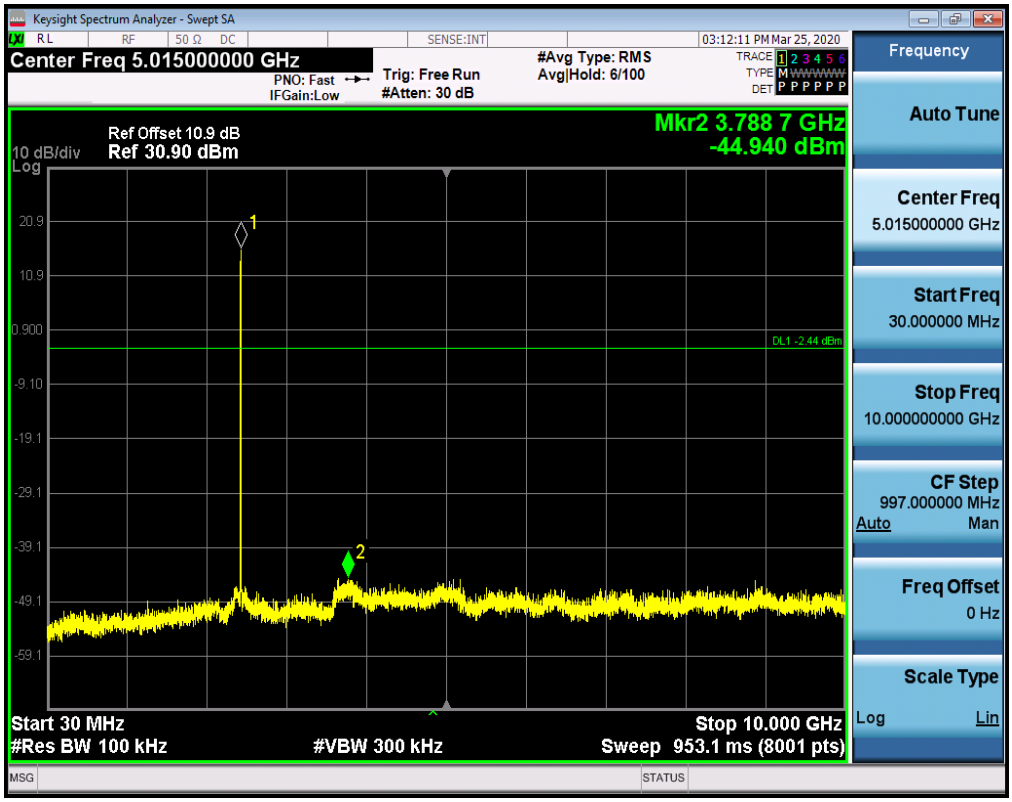
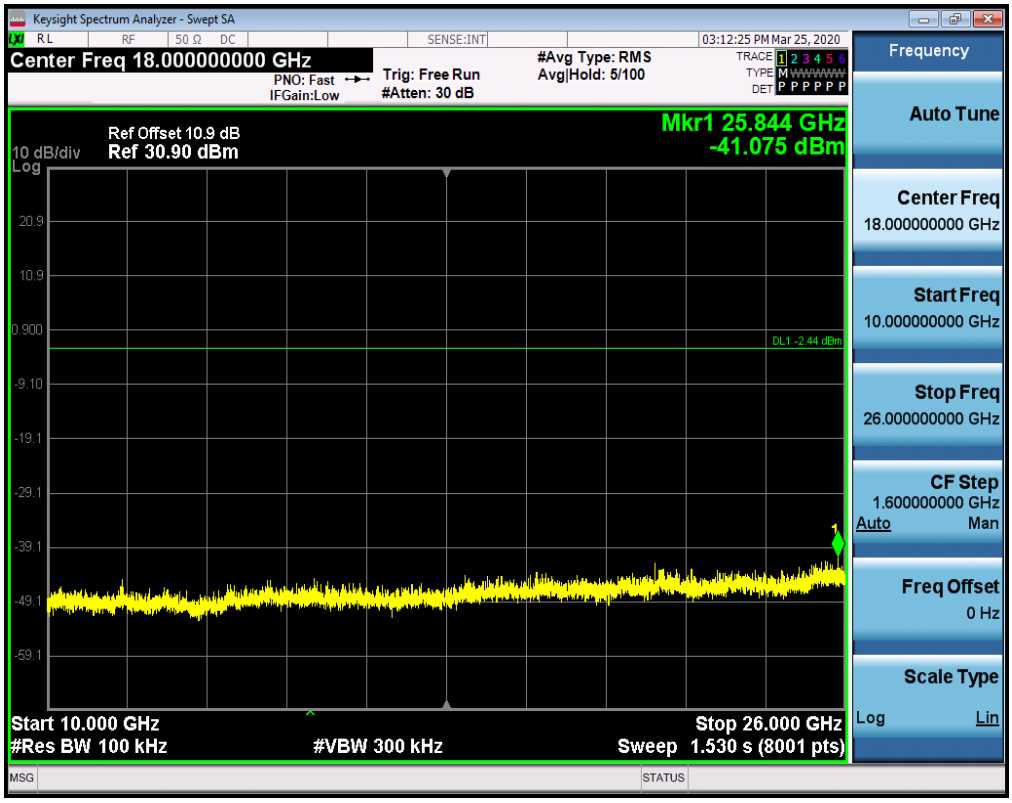
CSE_1	
CSE_2	

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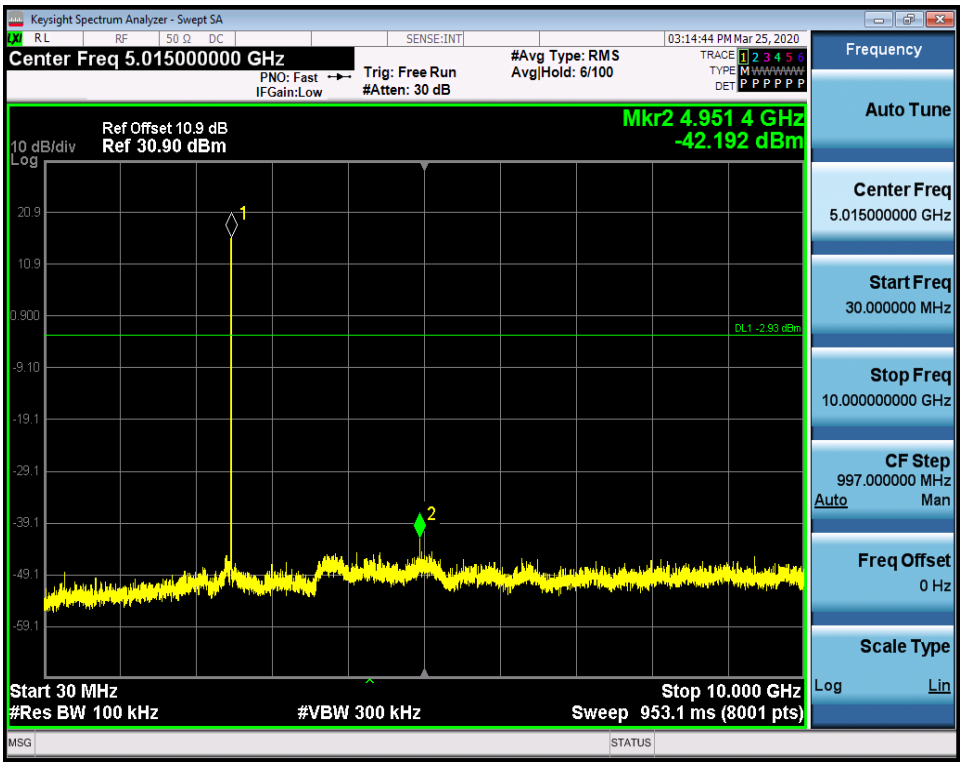
RF Conducted Spurious Emissions_ZIGBEE_2480_Ant1	
Pref	
CSE_1	

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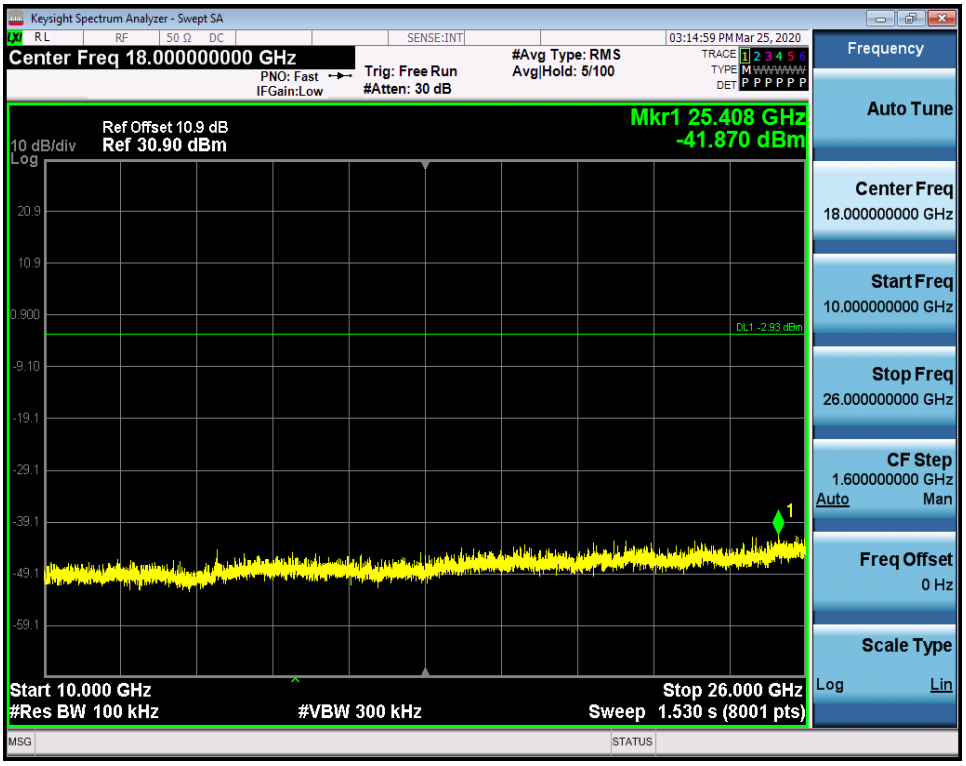
CSE_2	

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6.Duty cycle

Test mode	Test channel	Ant	T_{on}	$T_{observation}$	Duty cycle
ZIGBEE	2405	Ant1	1.22ms	100ms	1.22%
ZIGBEE	2445	Ant1	1.20ms	100ms	1.20%
ZIGBEE	2480	Ant1	1.20ms	100ms	1.20%

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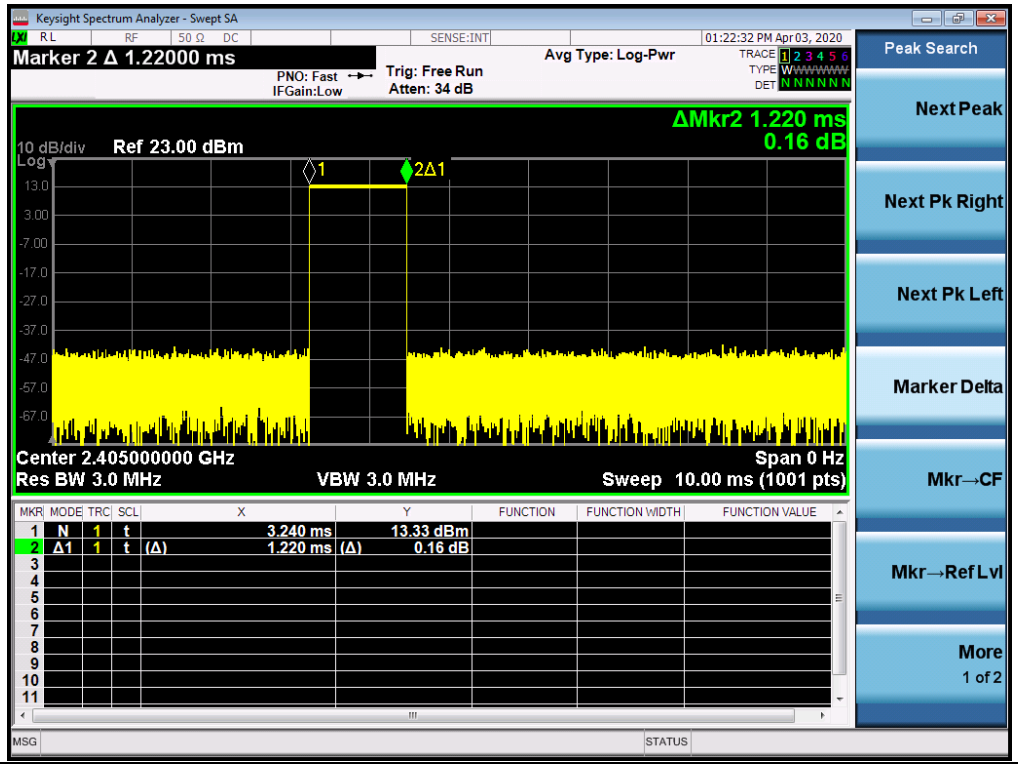
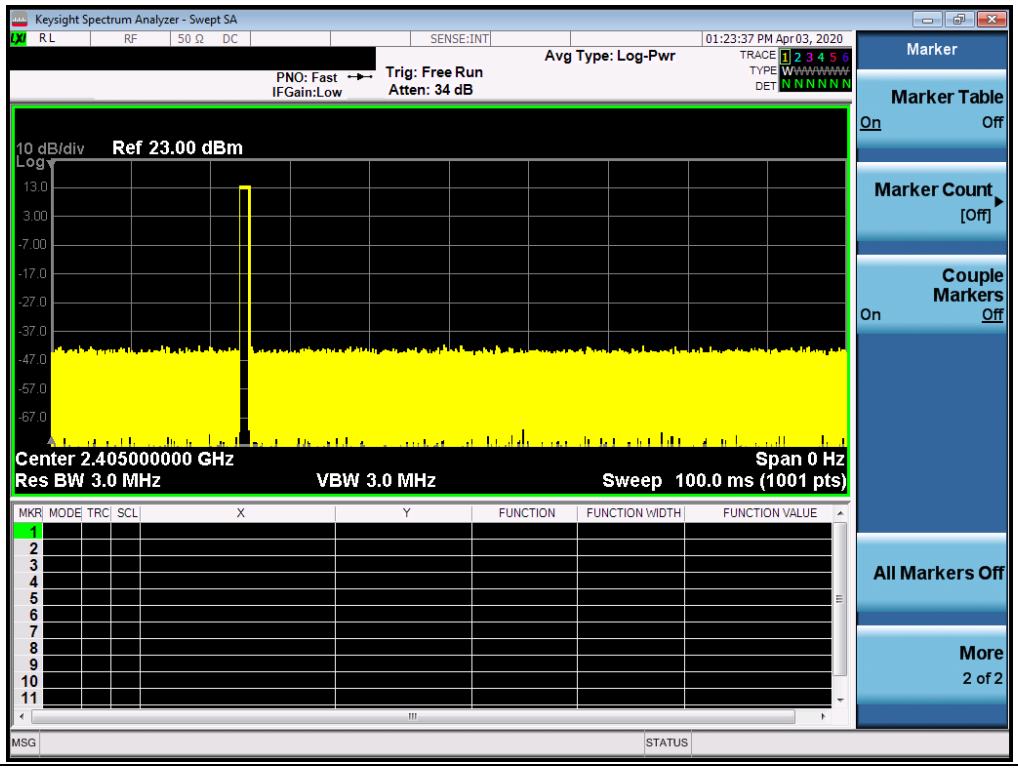
TEST PLOT
Duty Cycle_ZIGBEE_2405_Ant1





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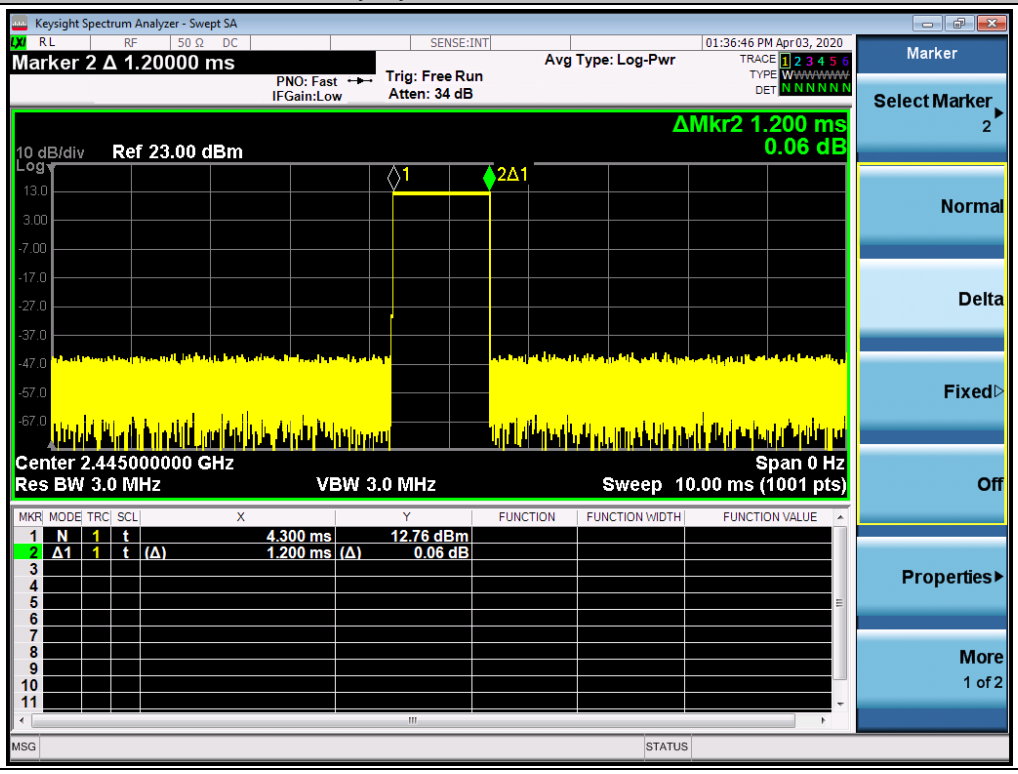
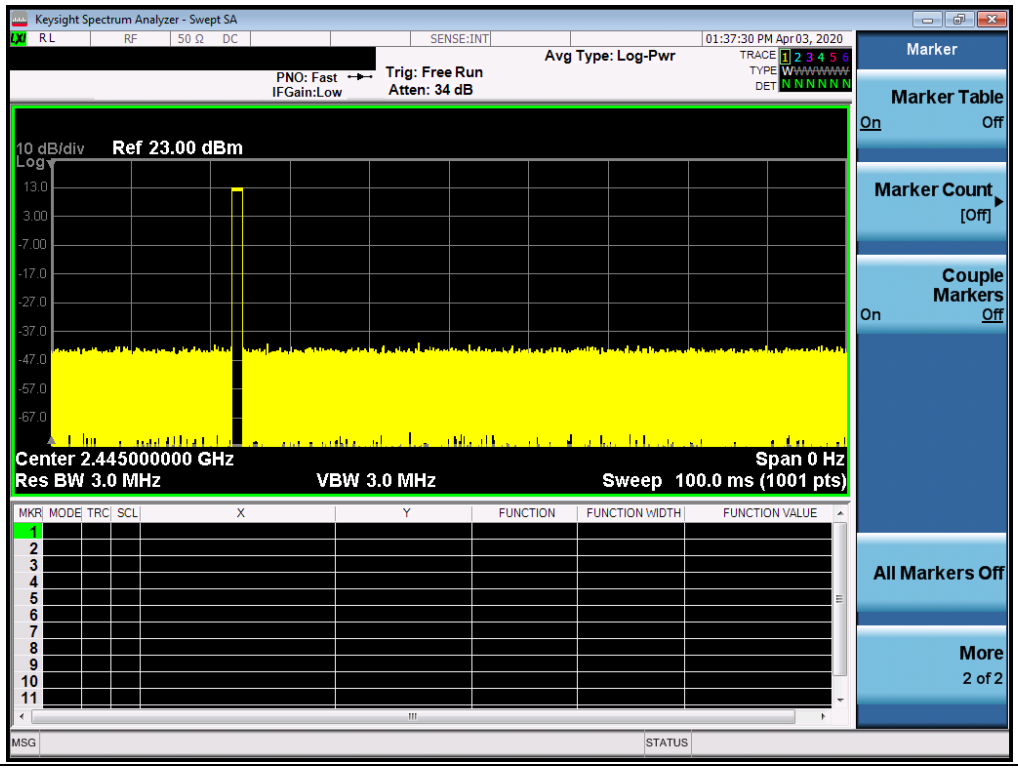
Duty Cycle_ZIGBEE_2445_Ant1





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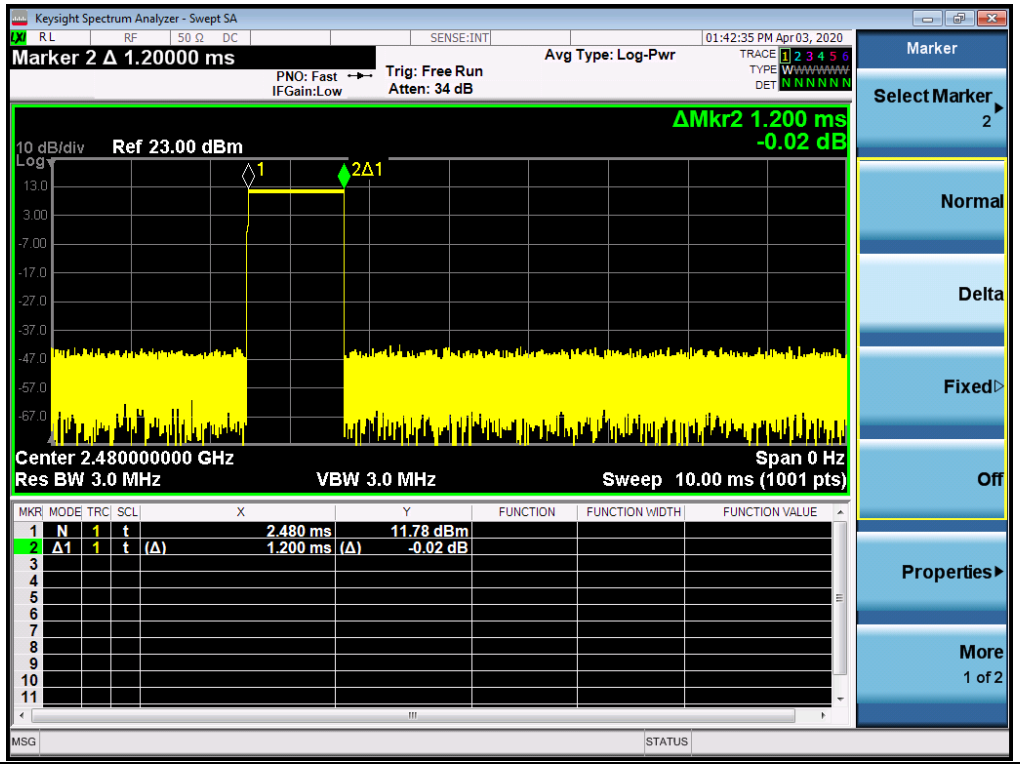
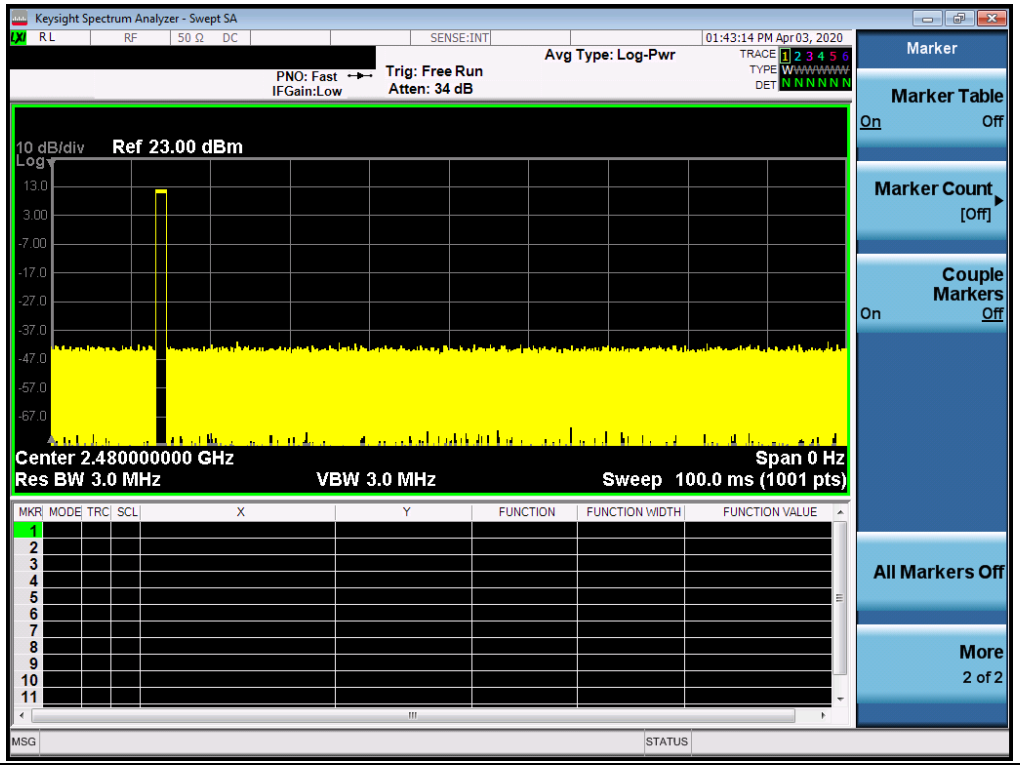
Duty Cycle_ZIGBEE_2480_Ant1





--End of Report--

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