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Report Template Version: V03
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Test Report

Report No. :	CQASZ20190100018E-01
Applicant:	Guangzhou Vensi Intelligent Technology Co., Ltd.
Address of Applicant:	No.19 Huangqi Shan Road, Yonghe Development Zone, Whampoa District, Guangzhou, China
Manufacturer:	Guangzhou Vensi Intelligent Technology Co., Ltd.
Address of Manufacturer:	No.19 Huangqi Shan Road, Yonghe Development Zone, Whampoa District, Guangzhou, China
Equipment Under Test (EUT):	
Product:	LMIOT-zigbee-module
Model No.:	LMZ-E321VX-SN
Brand Name:	Vensi 威士丹利 智能 Vensi Intelligent
FCC ID:	2AR6I-ZE321VX
Standards:	47 CFR Part 15, Subpart C
Date of Test:	2018-12-21 to 2019-01-04
Date of Issue:	2019-01-08
Test Result :	**PASS***

Tested By: Martin Lee

(Martin Lee)

Reviewed By: Aaron Ma

(Aaron Ma)

Approved By:

(Jack Ai)

SHENZHEN HUAXIA TESTING TECHNOLOGY CO.,LTD 华夏准测 APPROVED

.

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190100018E-01	Rev.01	Initial report	2019-01-08

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c),	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207,	ANSI C63.10 2013	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3),	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2),	ANSI C63.10 2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e),	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209,	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209,	ANSI C63.10 2013	PASS

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5 General Information

5.1 Client Information

Applicant:	Guangzhou Vensi Intelligent Technology Co., Ltd.
Address of Applicant:	No. 19 Huangqi Shan Road, Yonghe Development Zone, Whampoa District, Guangzhou, China
Manufacturer:	Guangzhou Vensi Intelligent Technology Co., Ltd.
Address of Manufacturer:	No. 19 Huangqi Shan Road, Yonghe Development Zone, Whampoa District, Guangzhou, China

5.2 General Description of EUT

Product Name:	LMIOT-zigbee-module
Model No.:	LMZ-E321VX-SN
Trade Mark:	Vensi 威士丹利 智能 Vensi Intelligent
Operation Frequency:	2405MHz～2480MHz
Channel Numbers:	16
Channel Separation:	5MHz
Type of Modulation:	O-QPSK(DSSS)
Antenna Type:	Ceramic antenna
Antenna Gain:	0dB
Power Supply:	DC 2.85V ～3.6V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405MHz	15	2425MHz	19	2445MHz	23	2465MHz
12	2410MHz	16	2430MHz	20	2450MHz	24	2470MHz
13	2415MHz	17	2435MHz	21	2455MHz	25	2475MHz
14	2420MHz	18	2440MHz	22	2460MHz	26	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 5 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The Lowest channel	2405MHz
The Middle channel	2440MHz
The Highest channel	2480MHz

Note:

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

5.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1008 mbar
Test mode:	
Transmitting mode:	Continuous traffic was generated using test commands. The device was programmed to transmit at 100% duty cycle at low, middle, and high channels

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
PC	Lenovo	ThinkPad E450c	Provide by lab	ID
AC/DC Adapter	Lenovo	ADLX65NLC3A	Provide by lab	DOC

5.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

5.6 Test Facility

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

- **CNAS (No. CNAS L5785)**

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **ISED Registration No.: 22984-1**

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

- **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

- **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen 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 No.:522263

5.7 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	±5.12dB	(1)
2	Radiated Emission (Above 1GHz)	±4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	±3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	time	0.6 %.	(1)
14	Frequency Error	5.5 Hz	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

5.8 Deviation from Standards

None.

5.9 Abnormalities from Standard Conditions

None.

5.10 Other Information Requested by the Customer

None.

5.11 Equipment List

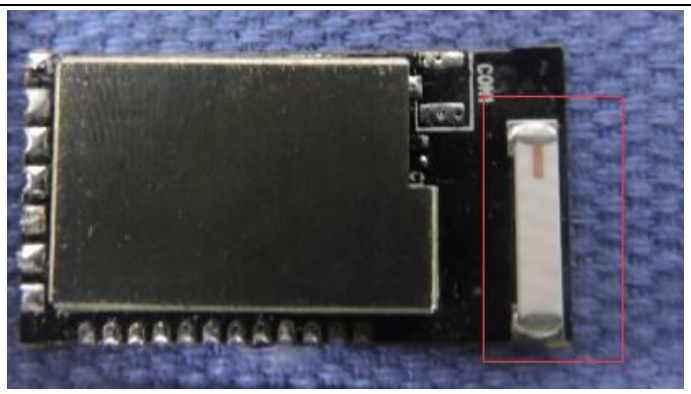
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2018/10/28	2020/10/27
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2018/9/26	2019/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSV30	CQA-102	2018/10/28	2019/10/27
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESPI3	CQA-013	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable	CQA	N/A	CQA-C009	2018/9/26	2019/9/25

Note:

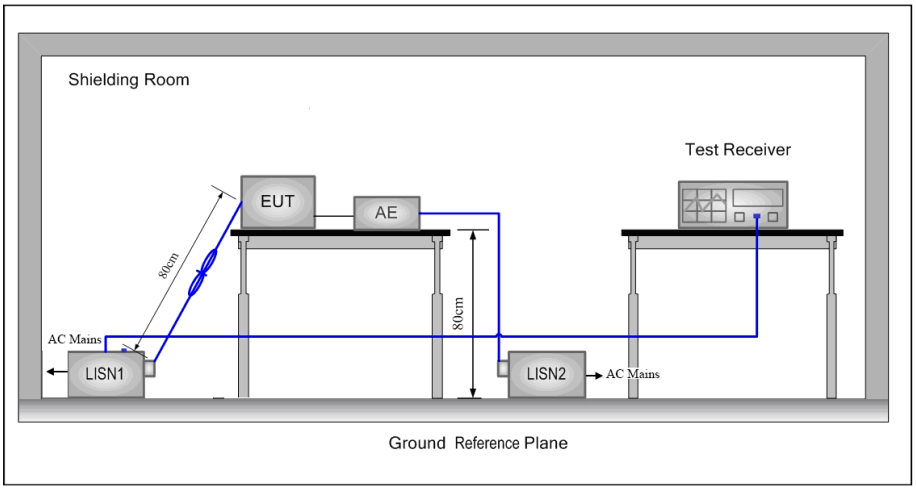
The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

6 Test results and Measurement Data

6.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c),
15.203 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 a Ceramic antenna. The best case gain of the antenna is 0dBi.	

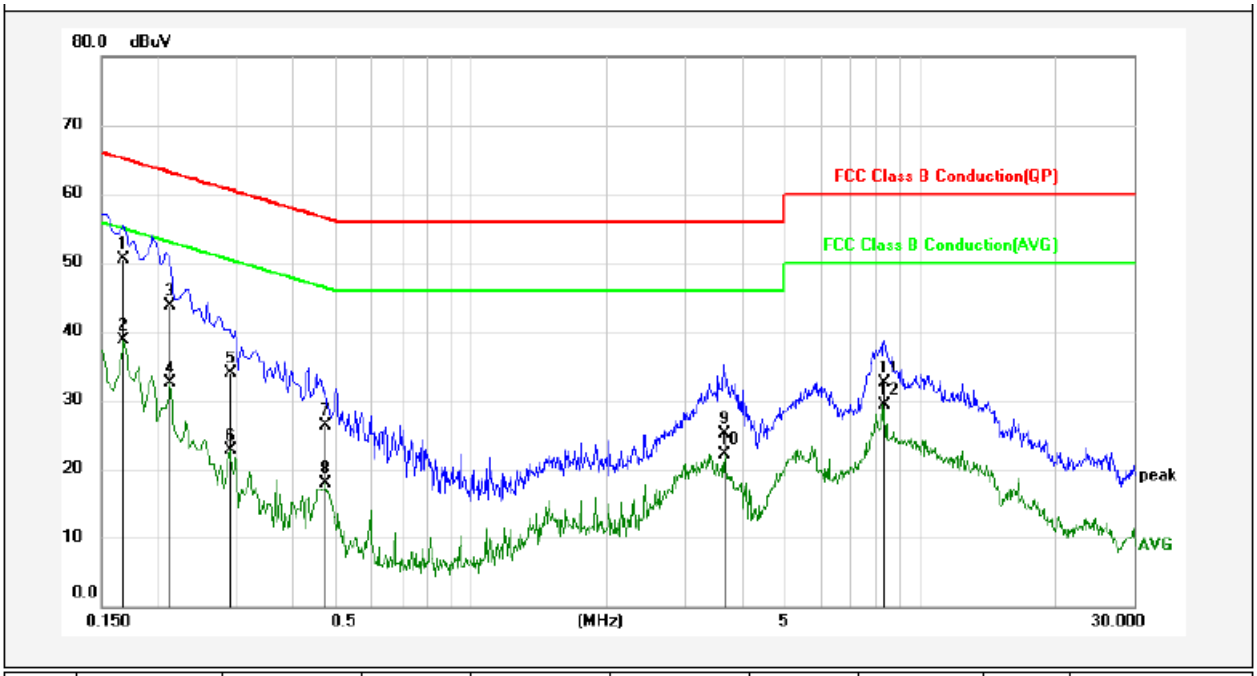
6.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207,
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	150kHz to 30MHz
Limit:	Frequency range (MHz) / Limit (dBuV): 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.
Test Procedure:	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 50Ω/50μH + 5Ω 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: 2013 on conducted measurement.
Test Setup:	
Exploratory Test Mode:	Transmitting with O-QPSK at lowest, middle and highest channel.

Final Test Mode:	Through Pre-scan, find at lowest channel is the worst case. Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test Results:	Pass

Measurement Data

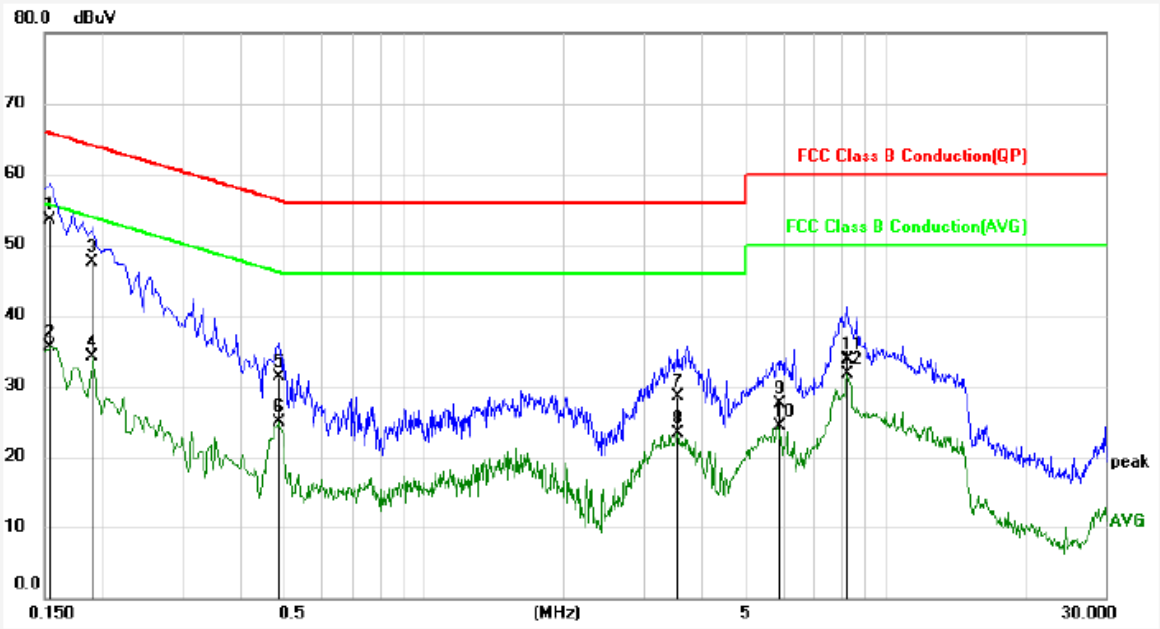
Live Line:



No.	Frequency (MHz)	Reading (dBuV)	Lisn/Isn (dB)	Cab_L (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1680	40.70	9.59	0.22	50.51	65.06	-14.55	QP	
2	0.1680	28.80	9.59	0.22	38.61	55.06	-16.45	AVG	
3	0.2130	33.90	9.56	0.23	43.69	63.09	-19.40	QP	
4	0.2130	22.76	9.56	0.23	32.55	53.09	-20.54	AVG	
5	0.2895	24.25	9.51	0.24	34.00	60.54	-26.54	QP	
6	0.2895	12.93	9.51	0.24	22.68	50.54	-27.86	AVG	
7	0.4740	16.61	9.52	0.24	26.37	56.44	-30.07	QP	
8	0.4740	8.13	9.52	0.24	17.89	46.44	-28.55	AVG	
9	3.6780	15.12	9.7	0.21	25.03	56.00	-30.97	QP	
10	3.6780	12.29	9.7	0.21	22.20	46.00	-23.80	AVG	
11	8.2815	22.67	9.7	0.22	32.59	60.00	-27.41	QP	
12	8.2815	19.32	9.7	0.22	29.24	50.00	-20.76	AVG	

Remarks: 1. Result=Reading+Lisn+Cab_L
2. If the average limit is met when using a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detctor is unnecessary.

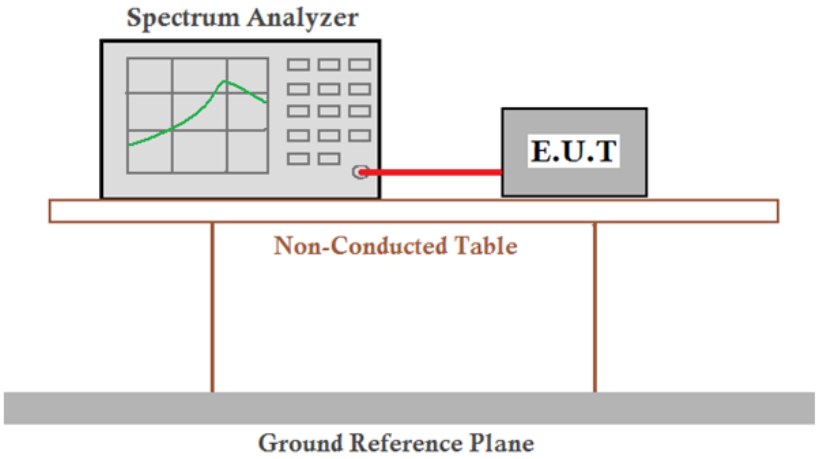
Neutral Line:



No.	Frequency (MHz)	Reading (dBuV)	Lisn/Isn (dB)	Cab_L (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1545	43.75	9.6	0.22	53.57	65.75	-12.18	QP	
2	0.1545	25.63	9.6	0.22	35.45	55.75	-20.30	AVG	
3	0.1905	37.74	9.6	0.23	47.57	64.01	-16.44	QP	
4	0.1905	24.35	9.6	0.23	34.18	54.01	-19.83	AVG	
5	0.4830	21.52	9.57	0.24	31.33	56.29	-24.96	QP	
6	0.4830	15.04	9.57	0.24	24.85	46.29	-21.44	AVG	
7	3.5475	18.49	9.75	0.21	28.45	56.00	-27.55	QP	
8	3.5475	13.28	9.75	0.21	23.24	46.00	-22.76	AVG	
9	5.8515	17.45	9.78	0.21	27.44	60.00	-32.56	QP	
10	5.8515	14.24	9.78	0.21	24.23	50.00	-25.77	AVG	
11	8.2995	23.81	9.73	0.22	33.76	60.00	-26.24	QP	
12	8.2995	21.80	9.73	0.22	31.75	50.00	-18.25	AVG	

Remarks: 1. Result=Reading+Lisn+Cab_L
2. If the average limit is met when using a quasi-peak detector.
the EUT shall be deemed to meet both limits and measurement
with average detctor is unnecessary.

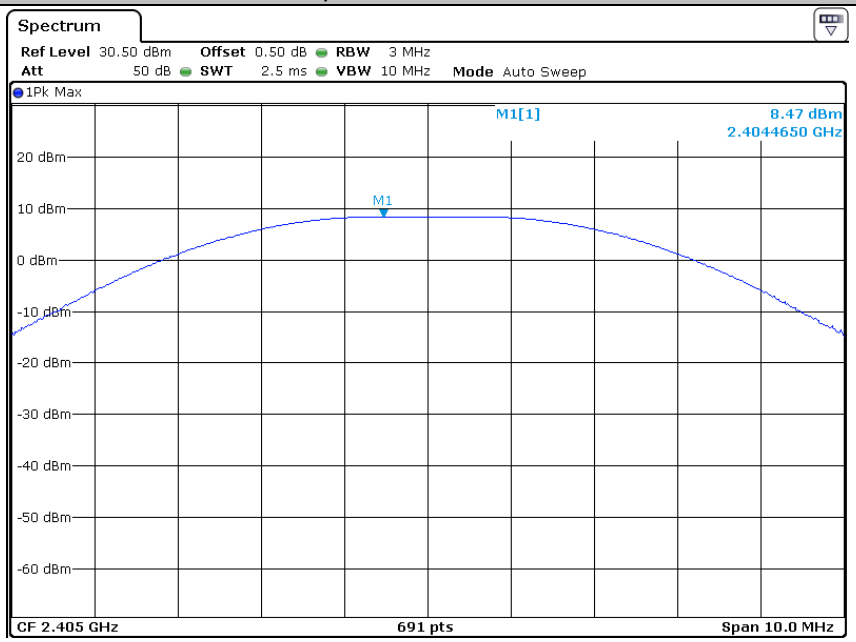
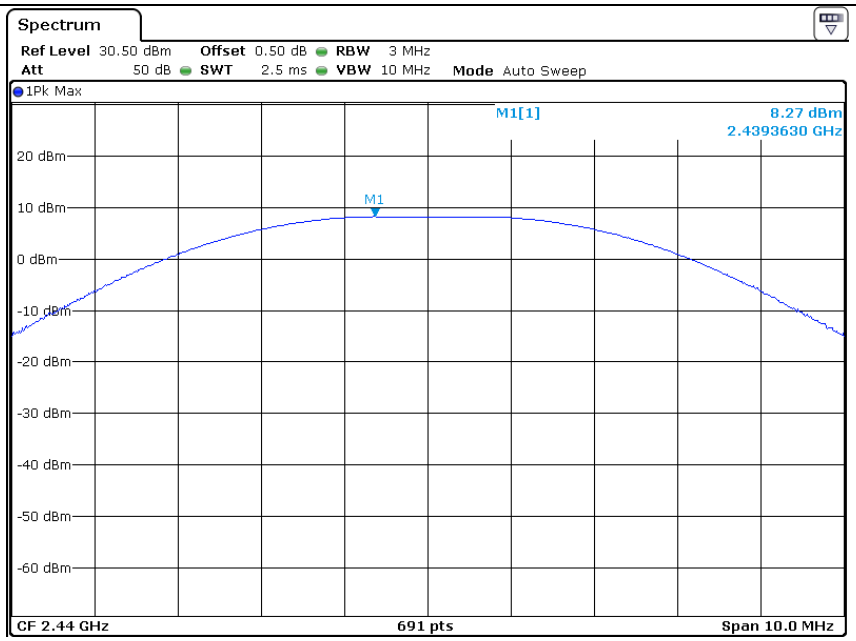
6.3 Conducted Peak Output Power

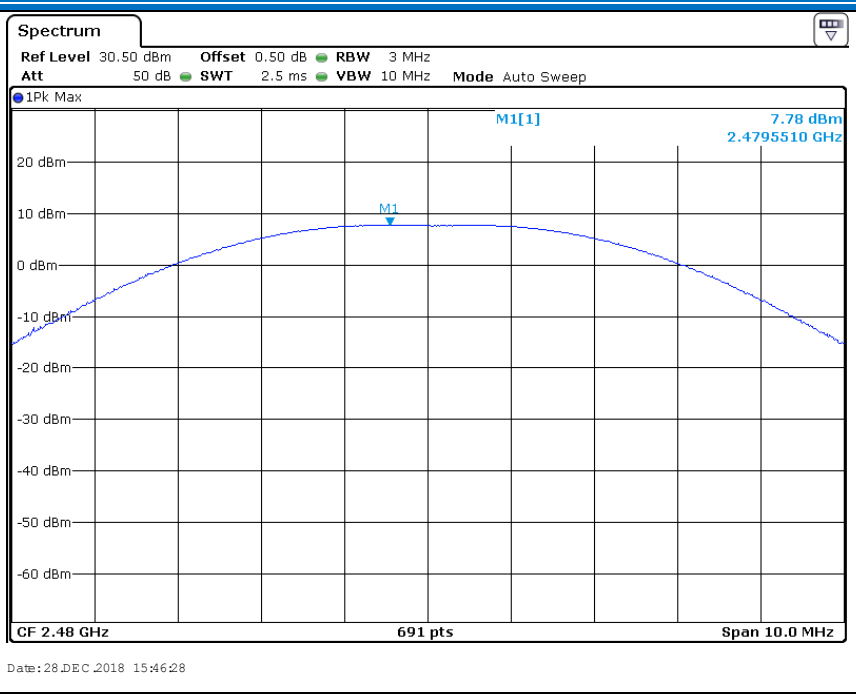
Test Requirement:	47 CFR Part 15C Section 15.247 (b)(3),
Test Method:	ANSI C63.10 2013
Test Setup:	 *Remark: Offset=Cable loss+ attenuation factor.*
Test Mode:	Transmitting with O-QPSK at lowest, middle and highest channel.
Limit:	30dBm
Test Results:	Pass

Measurement Data

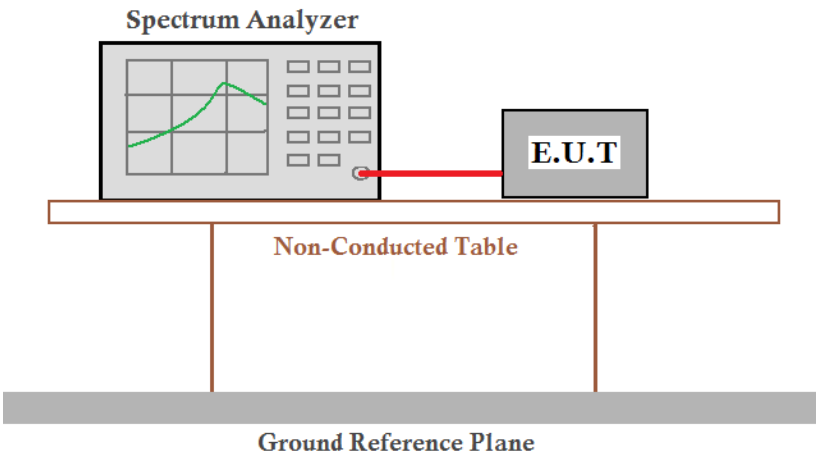
O-QPSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	8.47	30.00	Pass
Middle	8.27	30.00	Pass
Highest	7.78	30.00	Pass

Test plot as follows:

Graphs	
LCH	
MCH	

HCH	 Spectrum Ref Level 30.50 dBm Offset 0.50 dB RBW 3 MHz Att 50 dB SWT 2.5 ms VBW 10 MHz Mode Auto Sweep 1Pk Max M1[1] 7.78 dBm 2.4795510 GHz M1 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm CF 2.48 GHz 691 pts Span 10.0 MHz Date: 28.DEC.2018 15:46:28

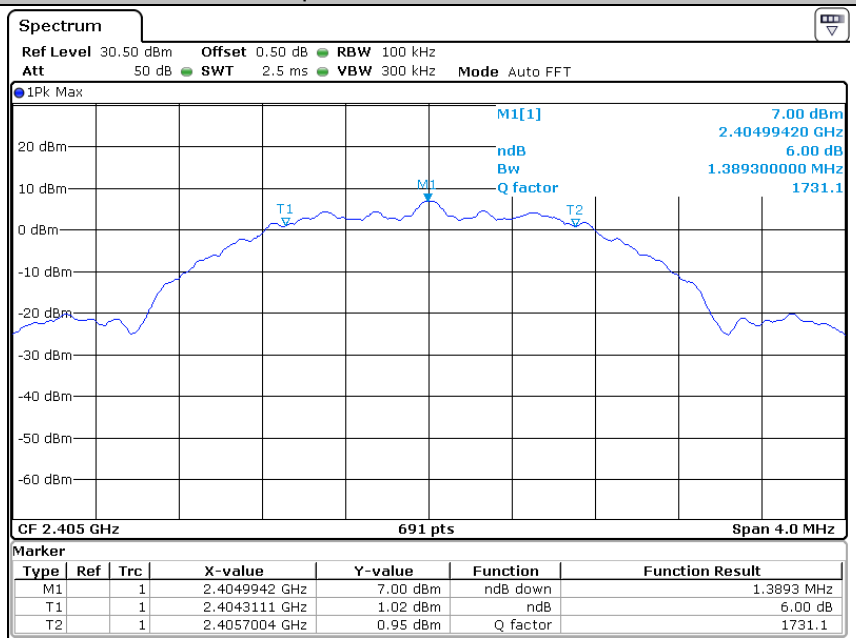
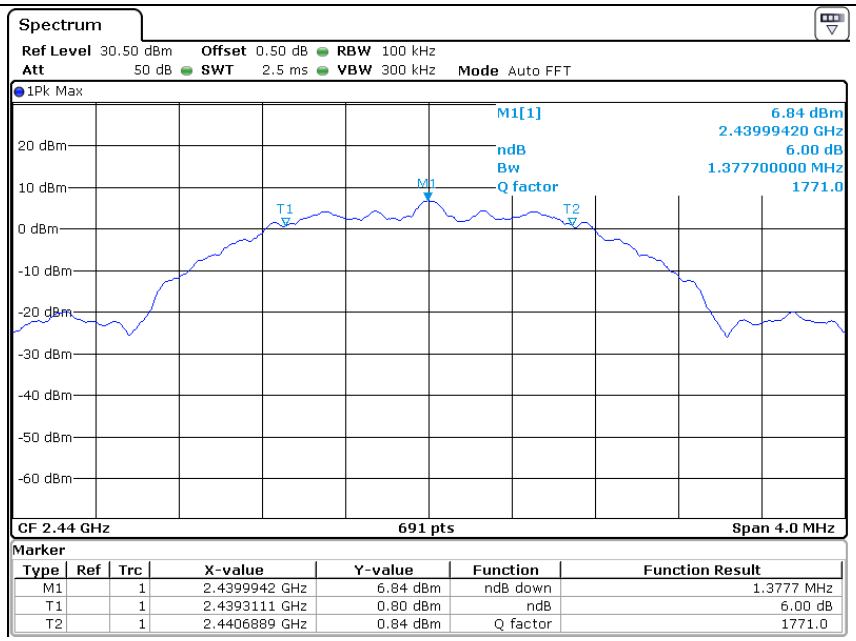
6.4 6dB Occupy Bandwidth

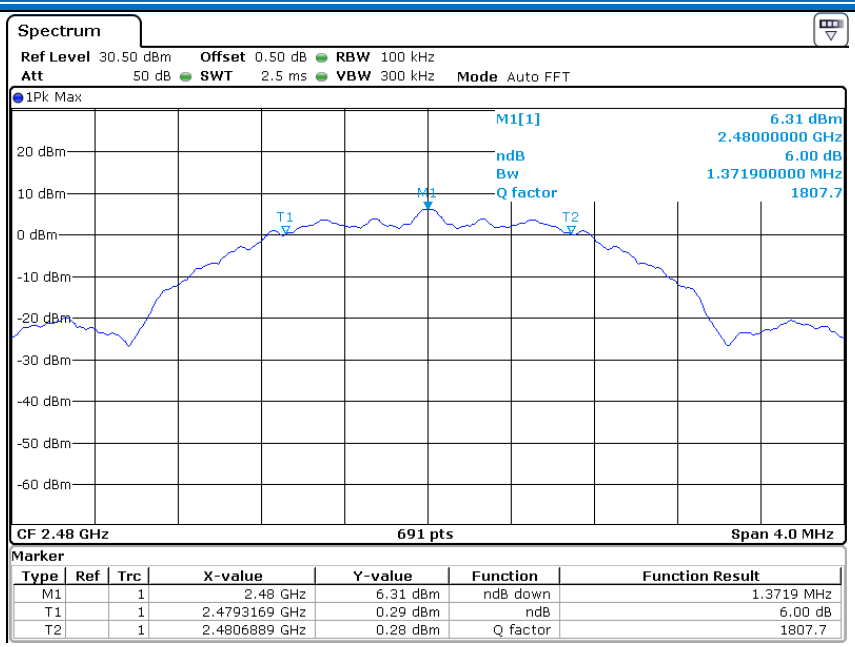
Test Requirement:	47 CFR Part 15C Section 15.247 (a)(2),
Test Method:	ANSI C63.10 2013
Test Setup:	 *Remark: Offset = cable loss + attenuation factor*
Test Mode:	Transmitting with O-QPSK at lowest, middle and highest channel.
Limit:	≥ 500 kHz
Test Results:	Pass

Measurement Data

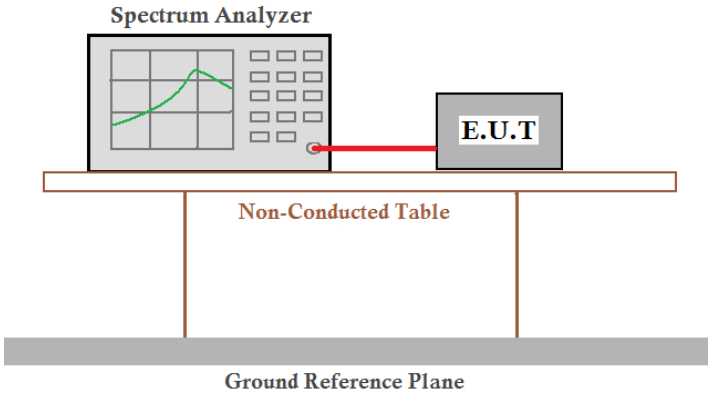
O-QPSK mode			
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	1.3893	≥500	Pass
Middle	1.3777	≥500	Pass
Highest	1.3719	≥500	Pass

Test plot as follows:

Graphs	
LCH	
MCH	

HCH	 Spectrum Ref Level 30.50 dBm Offset 0.50 dB RBW 100 kHz Att 50 dB SWT 2.5 ms VBW 300 kHz Mode Auto FFT 1Pk Max M1[1] 6.31 dBm 2.48000000 GHz ndB 6.00 dB Bw 1.371900000 MHz Q factor 1807.7 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm T1 M1 T2 CF 2.48 GHz 691 pts Span 4.0 MHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.48 GHz 6.31 dBm ndB down 1.3719 MHz T1 1 2.4793169 GHz 0.29 dBm ndB 6.00 dB T2 1 2.4806889 GHz 0.28 dBm Q factor 1807.7 Date: 28.DEC.2018 15:53:53

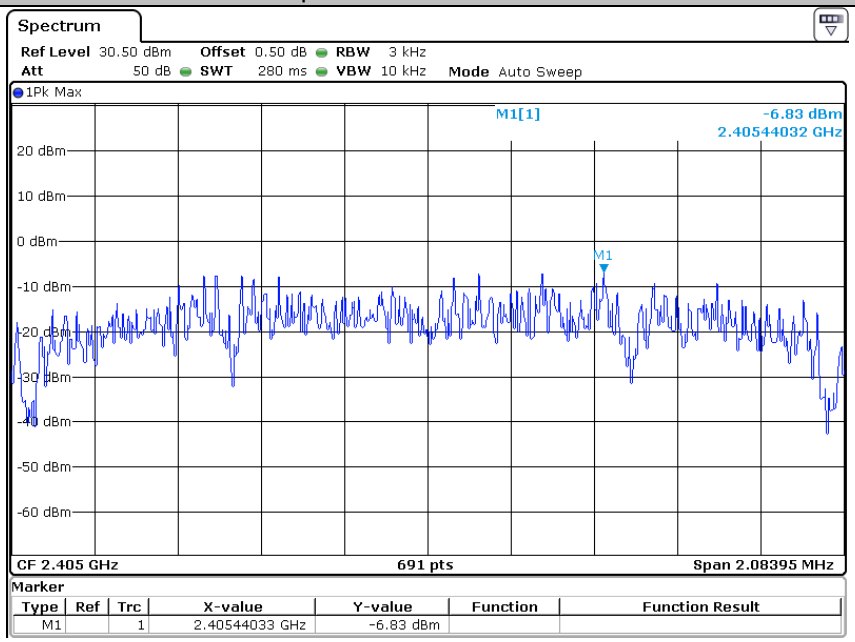
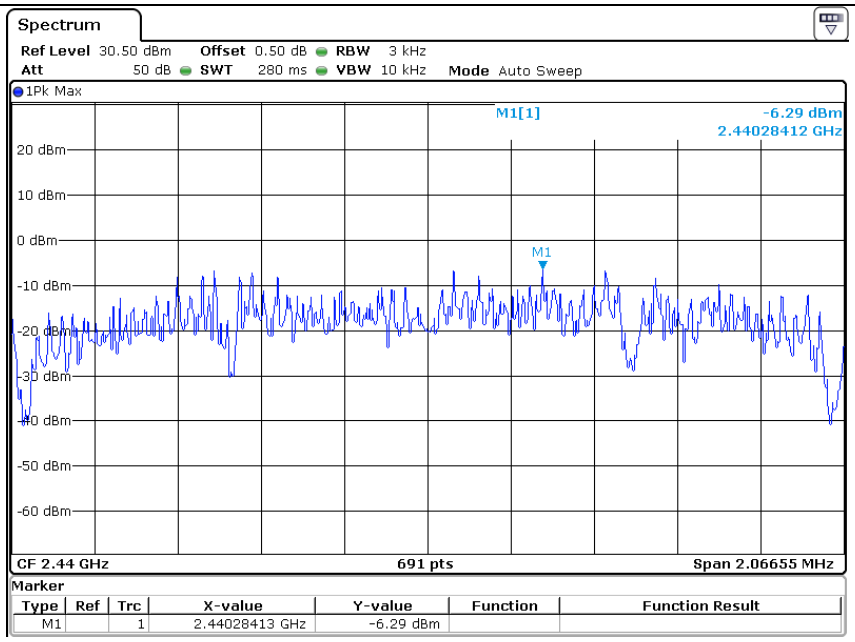
6.5 Power Spectral Density

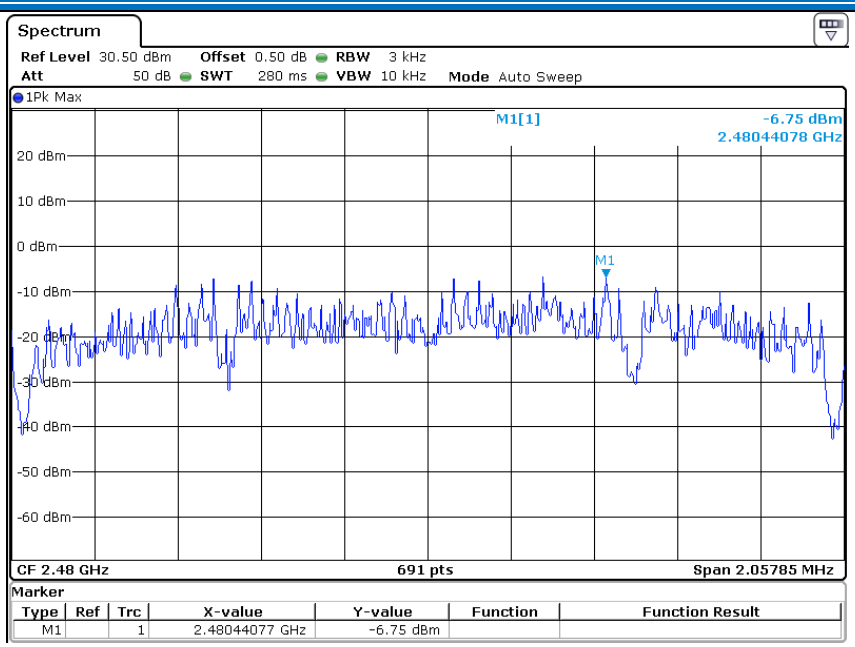
Test Requirement:	47 CFR Part 15C Section 15.247 (e),
Test Method:	ANSI C63.10 2013
Test Setup:	 *Remark: Offset = cable loss + attenuation factor*
Test Mode:	Transmitting with O-QPSK at lowest, middle and highest channel.
Limit:	≤8.00dBm/3kHz
Test Results:	Pass

Measurement Data

O-QPSK mode			
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Lowest	-6.83	≤8.00	Pass
Middle	-6.29	≤8.00	Pass
Highest	-6.75	≤8.00	Pass

Test plot as follows:

Graphs	
LCH	
MCH	

HCH	 Spectrum Ref Level 30.50 dBm Offset 0.50 dB RBW 3 kHz Att 50 dB SWT 280 ms VBW 10 kHz Mode Auto Sweep 1Pk Max M1[1] -6.75 dBm 2.48044078 GHz 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm M1 CF 2.48 GHz 691 pts Span 2.05785 MHz Marker Type Ref Trc X-value Y-value Function Function Result M1 1 2.48044077 GHz -6.75 dBm Date: 28.DEC.2018 16:10:54

6.6 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205, RSS-Gen Issue 5
Test Method:	ANSI C63.10 2013
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

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

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Test Setup:	

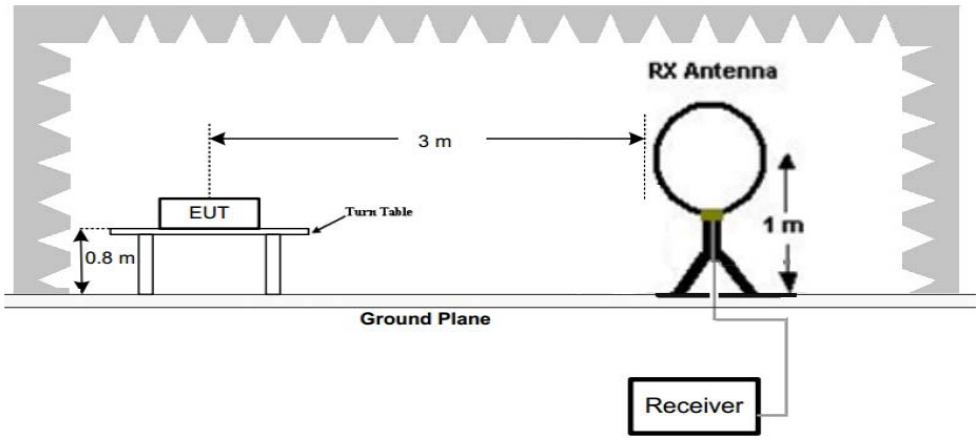


Figure 1. Below 30MHz

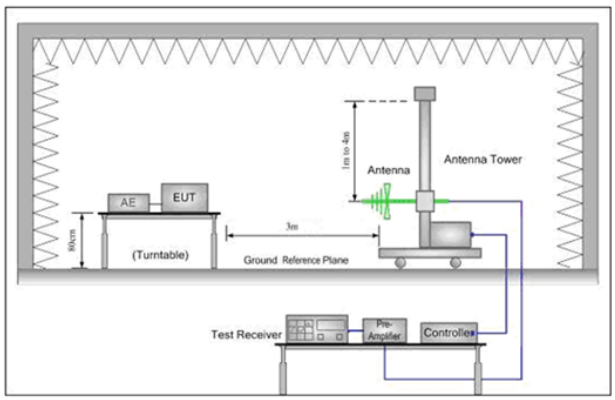


Figure 2. 30MHz to 1GHz

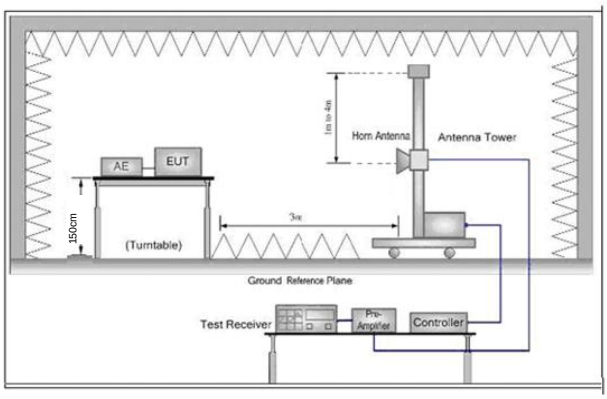


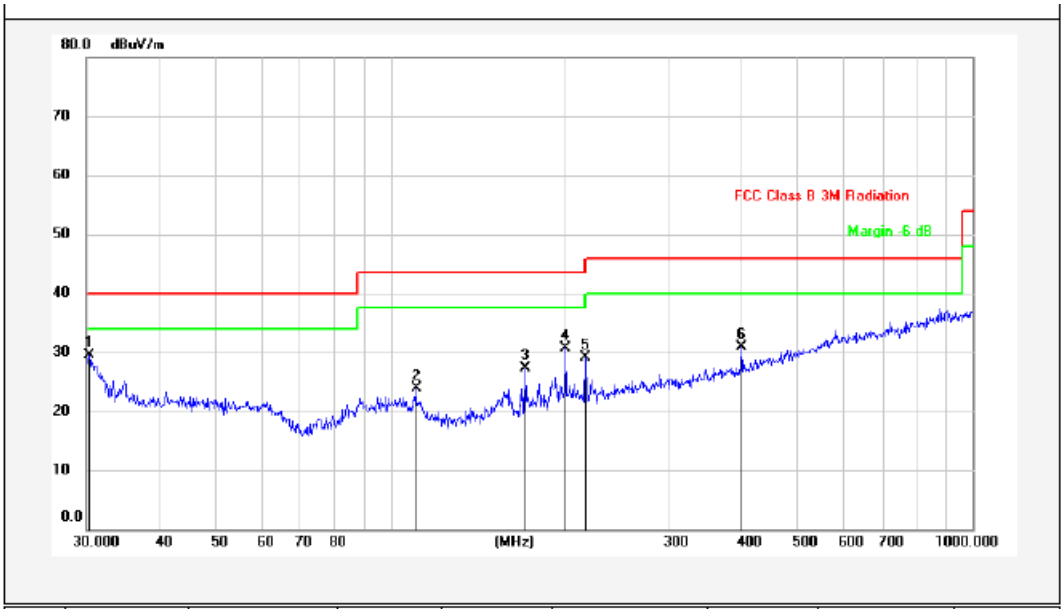
Figure 3. Above 1 GHz

Test Procedure:	a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. 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. d. 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. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. 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. g. Test the EUT in the lowest channel ,the middle channel ,the Highest channel h. Repeat above procedures until all frequencies measured was complete.
Test Mode:	Transmitting with O-QPSK at lowest, middle and highest channel.
Final Test Mode:	For below 1GHz, through Pre-scan, find at lowest channel is the worst case. Only the worst case is recorded in the report.
Test Results:	Pass

6.6.1 Radiated emission below 1GHz

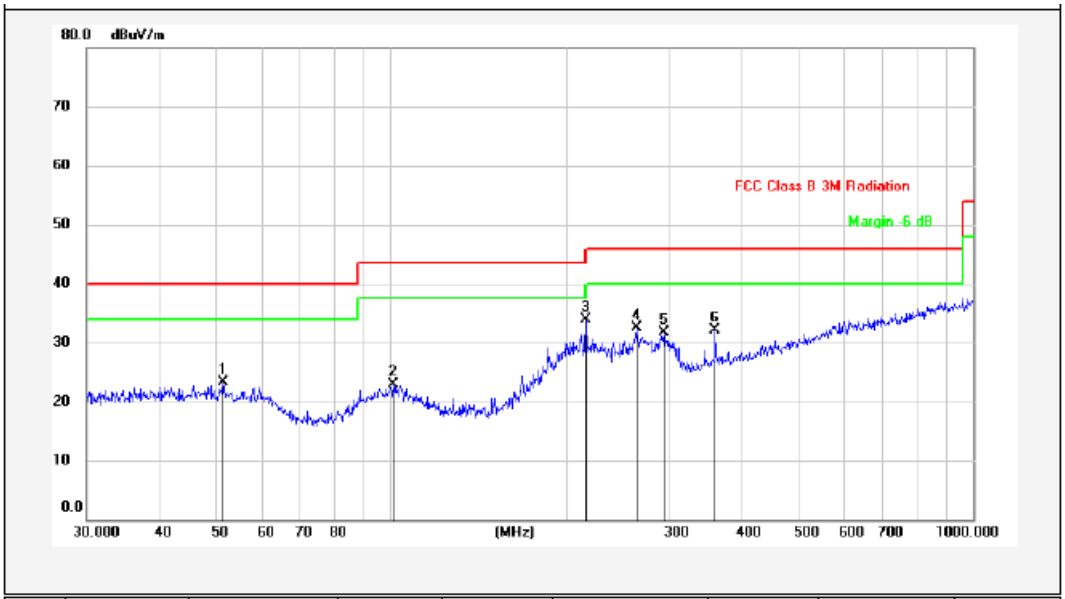
30MHz~1GHz_the worst case (lowest channel)		
Test mode:	Transmitting	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna (dB/m)	Cable (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.3171	17.45	11.19	0.89	29.53	40.00	-10.47	QP
2	110.5687	11.15	11.19	1.58	23.92	43.50	-19.58	QP
3	170.1947	17.00	8.51	1.84	27.35	43.50	-16.15	QP
4	199.9856	18.54	10.3	1.96	30.80	43.50	-12.70	QP
5	216.0240	16.17	10.81	2.08	29.06	46.00	-16.94	QP
6	400.4318	12.66	15.51	2.75	30.92	46.00	-15.08	QP

Remarks: 1. Result=Reading+Antenna+Cable
2. If Peak Result complies with QP Limit, QP Result is deemed to comply with QP Limit.

Test mode:	Transmitting	Horizontal

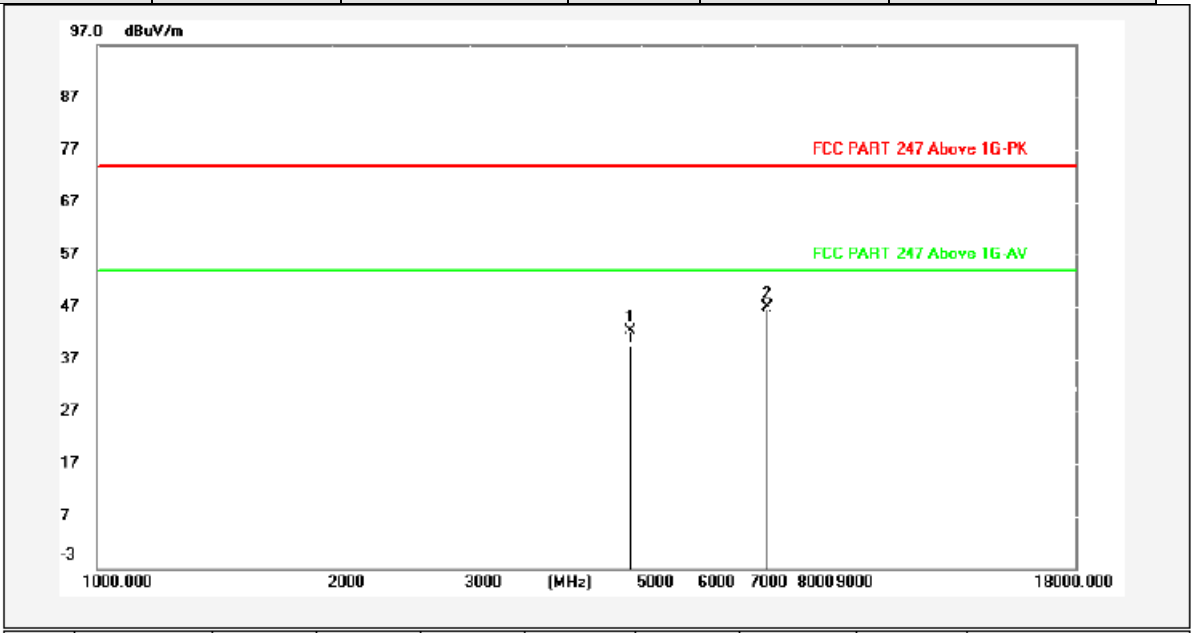


No.	Frequency (MHz)	Reading (dBuV/m)	Antenna (dB/m)	Cable (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	51.4806	9.96	12.17	1.12	23.25	40.00	-16.75	QP
2	100.9339	9.42	12.03	1.53	22.98	43.50	-20.52	QP
3	216.0240	20.94	10.81	2.08	33.83	46.00	-12.17	QP
4	263.8190	17.88	12.34	2.31	32.53	46.00	-13.47	QP
5	294.1136	15.94	13.31	2.43	31.68	46.00	-14.32	QP
6	360.4476	14.73	14.71	2.64	32.08	46.00	-13.92	QP

Remarks: 1. Result=Reading+Antenna+Cable
2. If Peak Result complies with QP Limit, QP Result is deemed to comply with QP Limit.

6.6.2 Transmitter emission above 1GHz

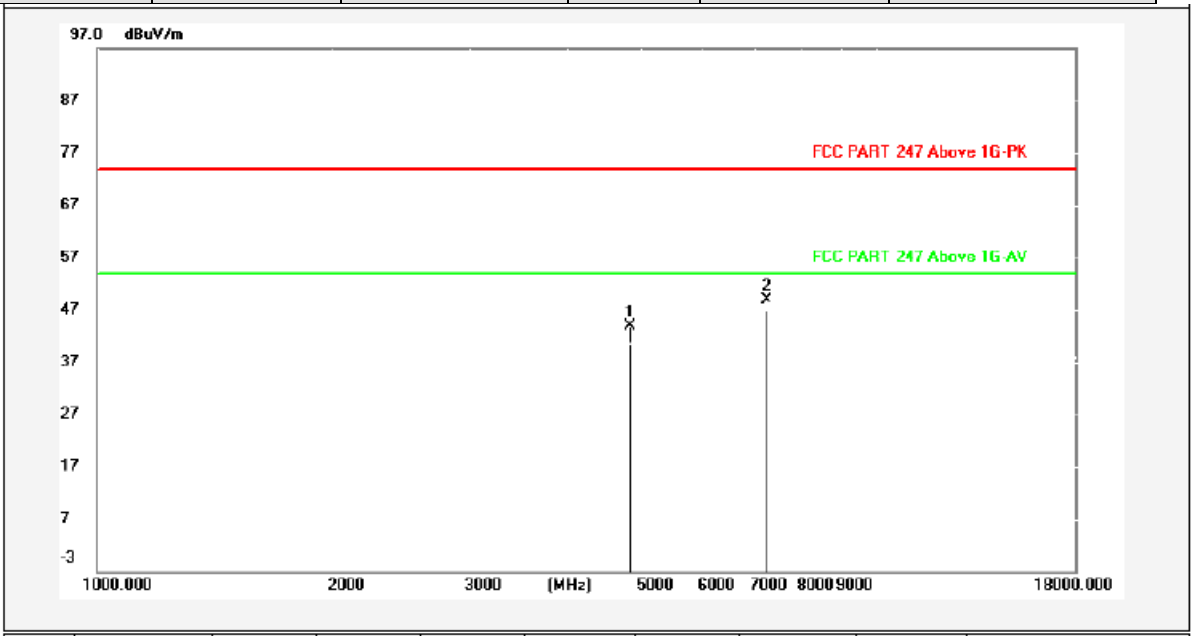
Test mode:	Transmitting	Test channel:	Lowest	Polarization:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	4810.000	41.17	31.18	-29.88	42.47	74.00	-31.53	peak	
2	7215.000	37.21	35.91	-26.29	46.83	74.00	-27.17	peak	

Remarks:1. Result=Reading+Antenna+Cable

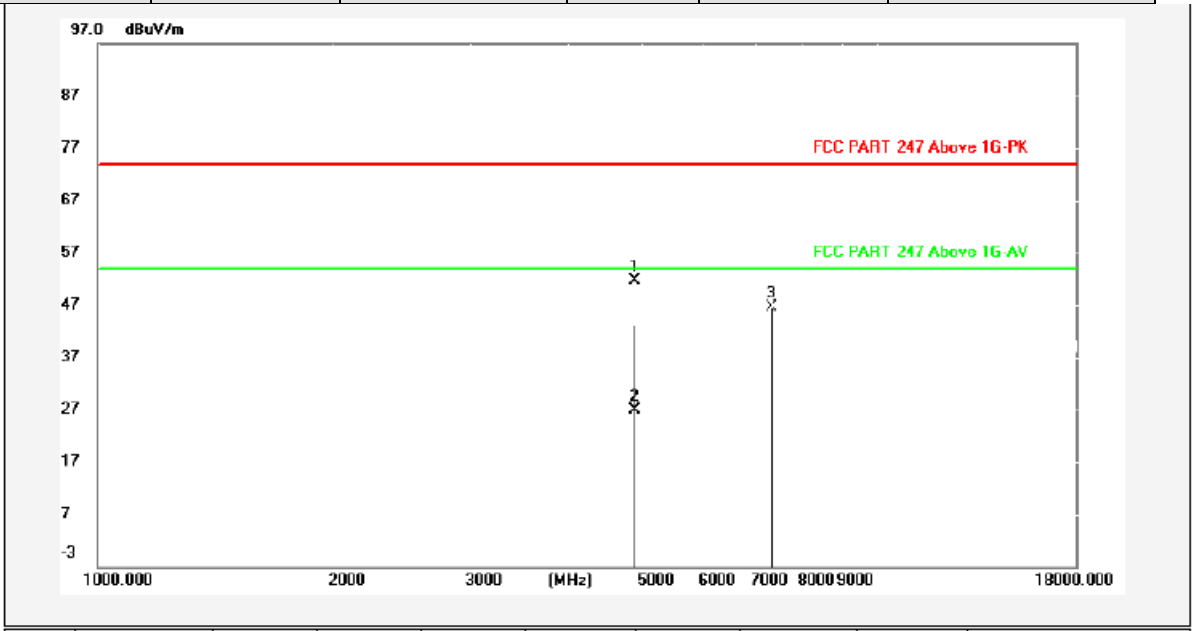
Test mode:	Transmitting	Test channel:	Lowest	Polarization:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	4810.000	42.48	31.18	-29.88	43.78	74.00	-30.22	peak	
2	7215.000	39.30	35.91	-26.29	48.92	74.00	-25.08	peak	

Remarks:1. Result=Reading+Antenna+Cable

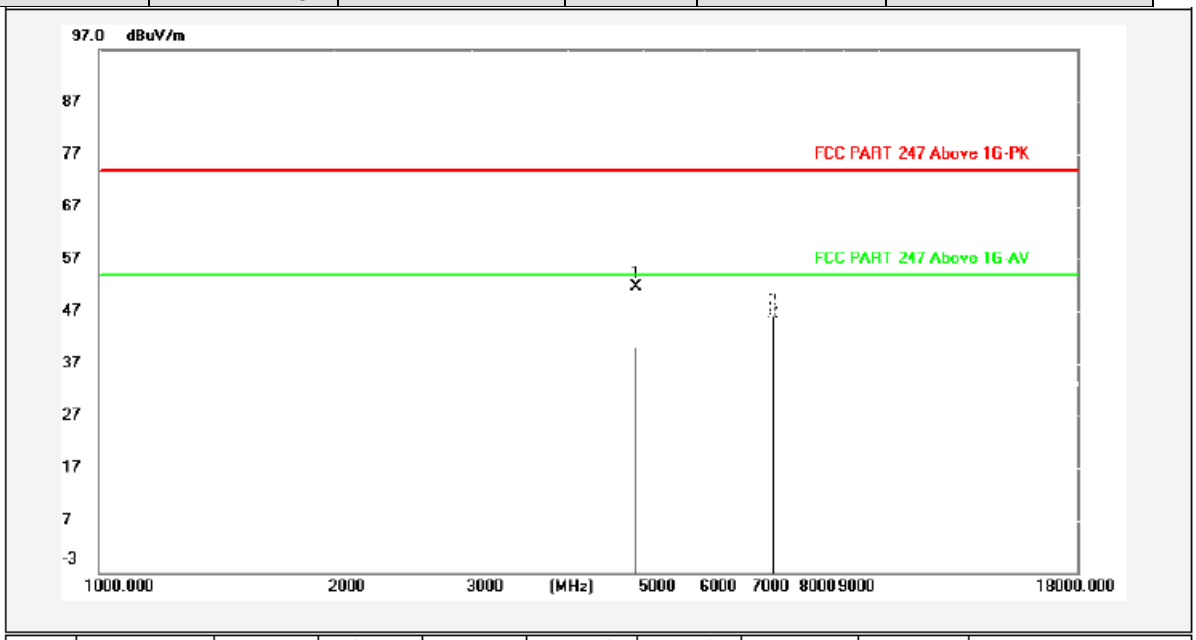
Test mode:	Transmitting	Test channel:	Middle	Polarization:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	4880.000	50.31	31.34	-29.91	51.74	74.00	-22.26	peak	
2	4880.000	25.35	31.34	-29.91	26.78	54.00	-27.22	AVG	
3	7320.000	36.72	36.11	-26.31	46.52	74.00	-27.48	peak	

Remarks:1. Result=Reading+Antenna+Cable

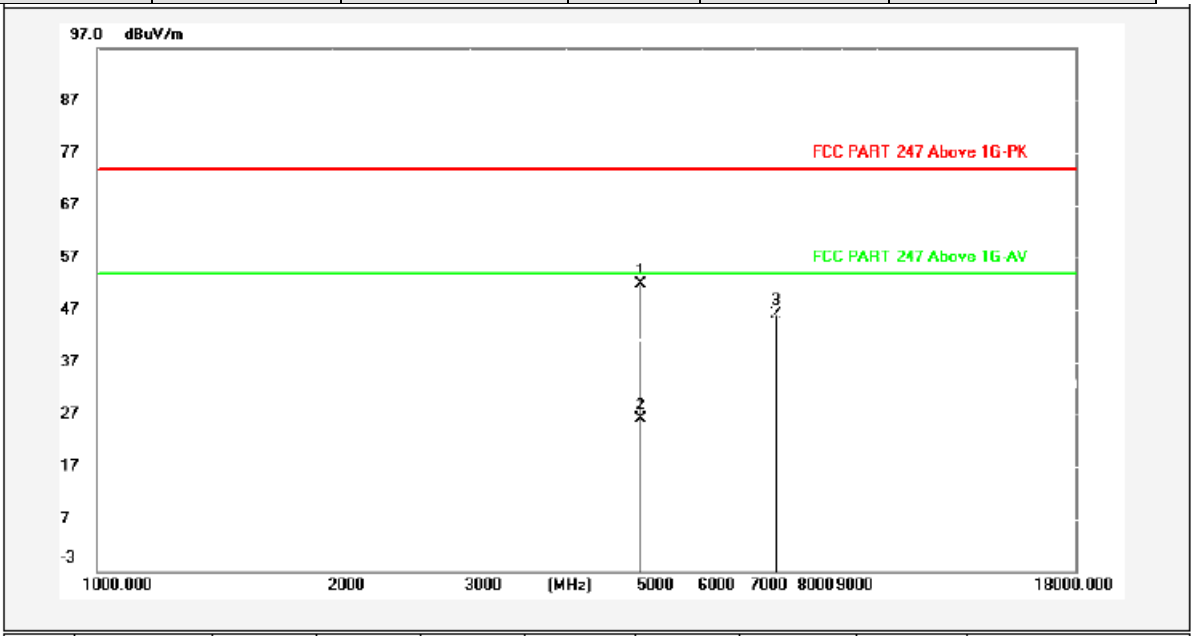
Test mode:	Transmitting	Test channel:	Middle	Polarization:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	4880.000	50.10	31.34	-29.91	51.53	74.00	-22.47	peak	
2	7320.000	36.51	36.11	-26.31	46.31	74.00	-27.69	peak	

Remarks:1. Result=Reading+Antenna+Cable

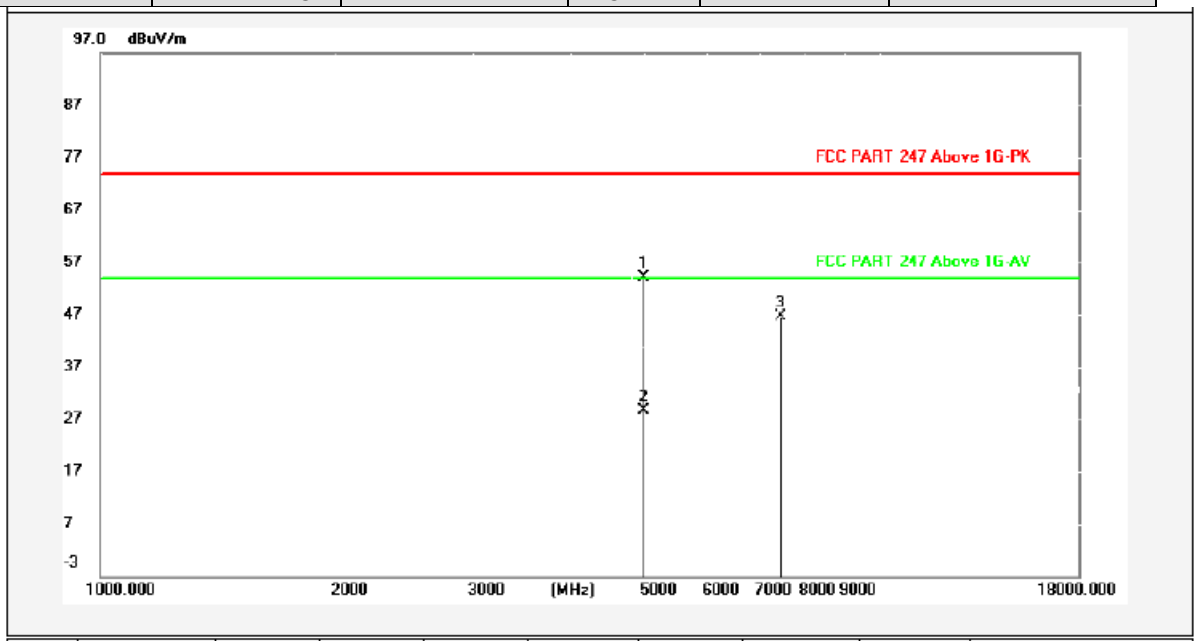
Test mode:	Transmitting	Test channel:	Highest	Polarization:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	4960.000	50.06	31.51	-29.69	51.88	74.00	-22.12	peak	
2	4960.000	24.24	31.51	-29.69	26.06	54.00	-27.94	AVG	
3	7440.000	35.32	36.34	-25.65	46.01	74.00	-27.99	peak	

Remarks:1. Result=Reading+Antenna+Cable

Test mode:	Transmitting	Test channel:	Highest	Polarization:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	4960.000	52.39	31.51	-29.69	54.21	74.00	-19.79	peak	
2	4960.000	26.74	31.51	-29.69	28.56	54.00	-25.44	AVG	
3	7440.000	35.95	36.34	-25.65	46.64	74.00	-27.36	peak	

Remarks:1. Result=Reading+Antenna+Cable

Remark:

1) Scan from 9kHz to 25GHz,The disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

6.7 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205,
Test Method:	ANSI C63.10 2013
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test Setup:

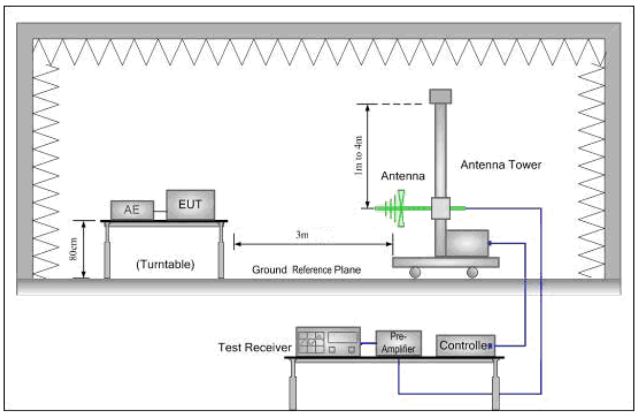


Figure 1. 30MHz to 1GHz

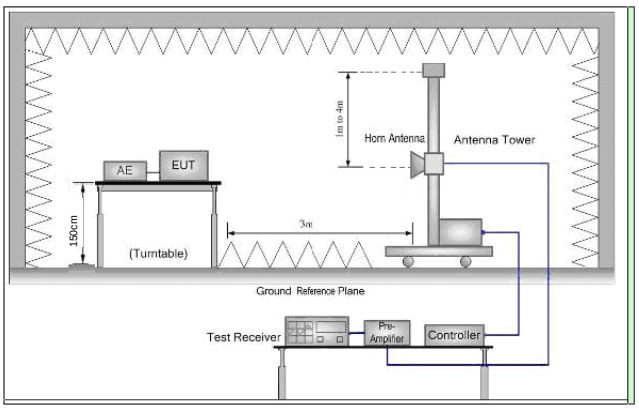


Figure 2. Above 1 GHz

Test Procedure:

a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
Note: For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

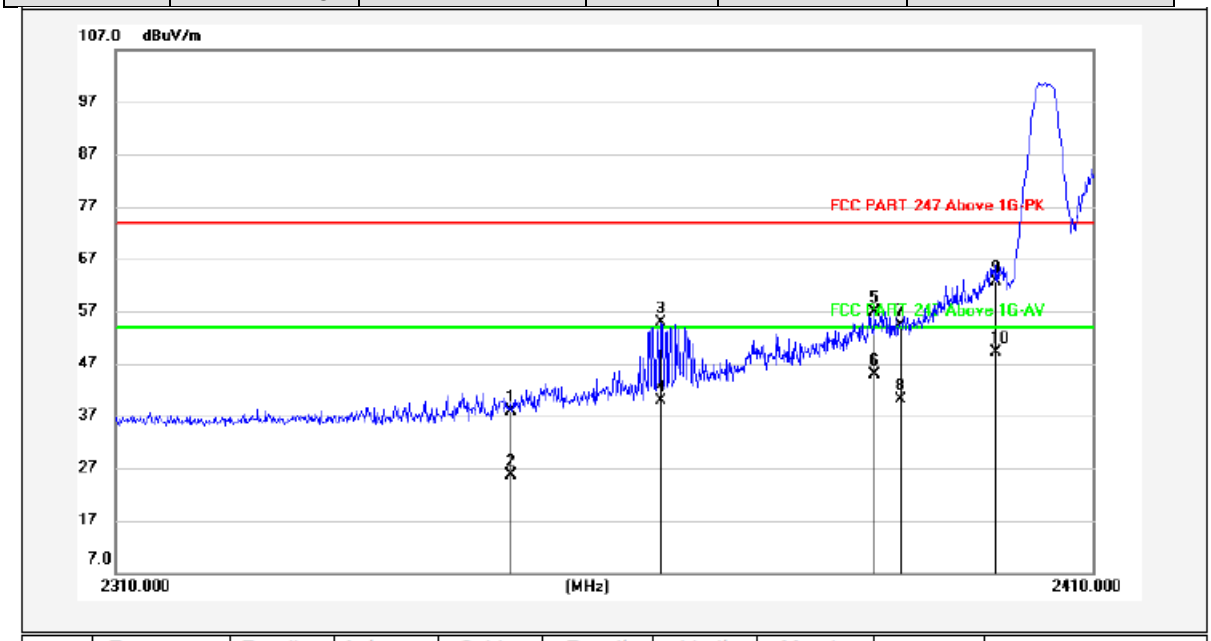
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. 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.

	d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel g. Test the EUT in the lowest channel , the Highest channel h. Repeat above procedures until all frequencies measured was complete.
Test Mode:	Transmitting with O-QPSK at lowest, middle and highest channel.
Test Results:	Pass

Test data:

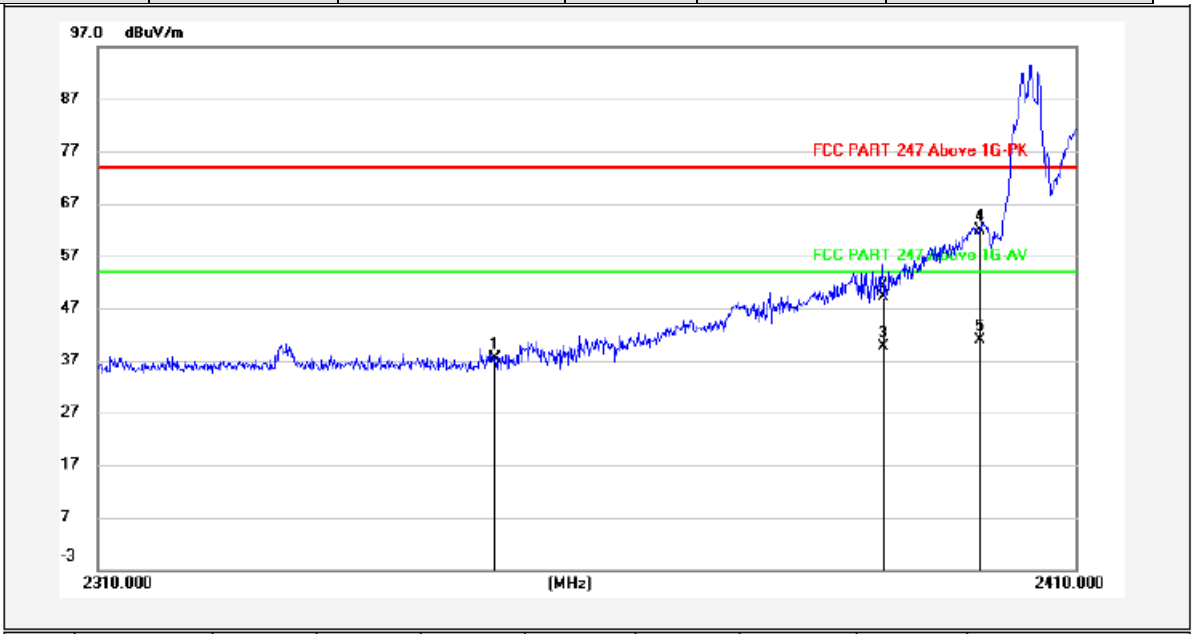
Test mode:	Transmitting	Test channel:	Lowest	Polarization:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2350.000	43.28	27.1	-32.61	37.77	74.00	-36.23	peak	
2	2350.000	31.17	27.1	-32.61	25.66	54.00	-28.34	AVG	
3	2365.277	60.23	27.13	-32.57	54.79	74.00	-19.21	peak	
4	2365.277	45.23	27.13	-32.57	39.79	54.00	-14.21	AVG	
5	2387.331	62.31	27.17	-32.53	56.95	74.00	-17.05	peak	
6	2387.331	50.36	27.17	-32.53	45.00	54.00	-9.00	AVG	
7	2390.000	59.84	27.18	-32.52	54.50	74.00	-19.50	peak	
8	2390.000	45.35	27.18	-32.52	40.01	54.00	-13.99	AVG	
9	2400.000	68.04	27.2	-32.5	62.74	74.00	-11.26	peak	
10	2400.000	54.33	27.2	-32.5	49.03	54.00	-4.97	AVG	

Remarks:1. Result=Reading+Antenna+Cable

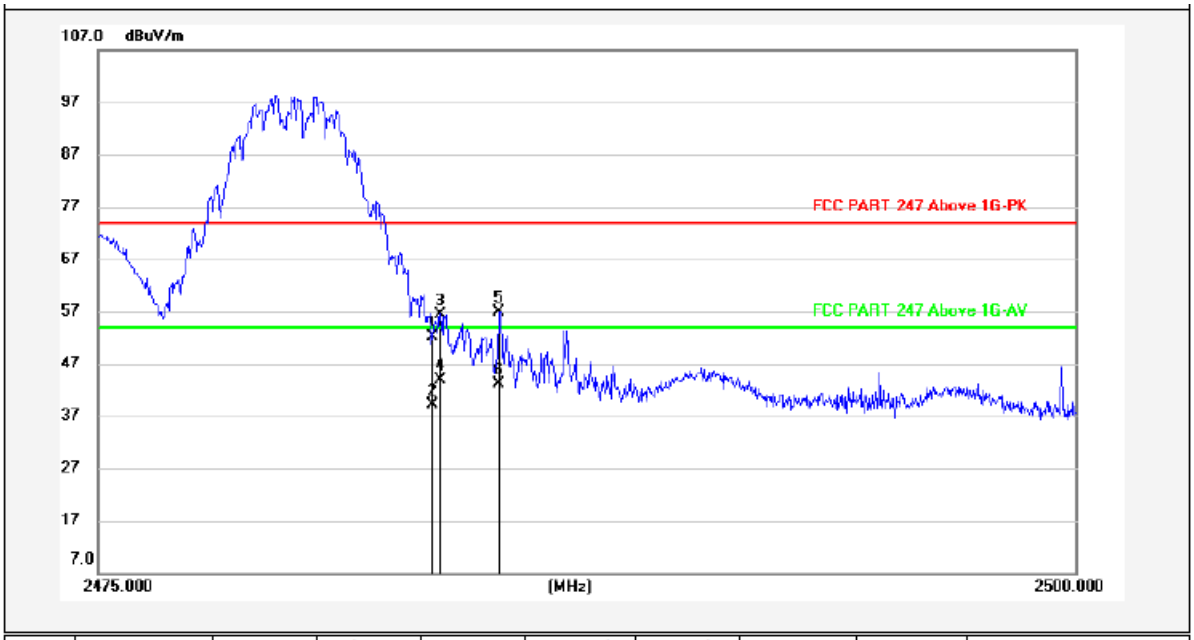
Test mode:	Transmitting	Test channel:	Lowest	Polarization:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2350.000	42.88	27.1	-32.61	37.37	74.00	-36.63	peak	
2	2390.000	54.46	27.18	-32.52	49.12	74.00	-24.88	peak	
3	2390.000	45.00	27.18	-32.52	39.66	54.00	-14.34	AVG	
4	2400.000	67.22	27.2	-32.5	61.92	74.00	-12.08	peak	
5	2400.000	46.30	27.2	-32.5	41.00	54.00	-13.00	AVG	

Remarks:1. Result=Reading+Antenna+Cable

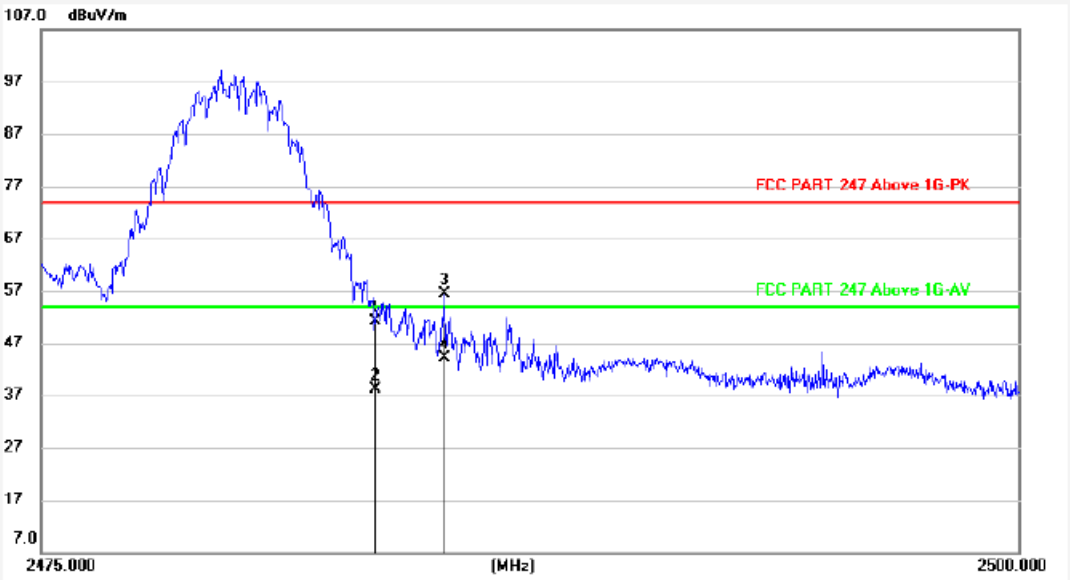
Test mode:	Transmitting	Test channel:	Highest	Polarization:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	57.34	27.37	-32.58	52.13	74.00	-21.87	peak	
2	2483.500	44.29	27.37	-32.58	39.08	54.00	-14.92	AVG	
3	2483.721	61.71	27.37	-32.58	56.50	74.00	-17.50	peak	
4	2483.721	49.21	27.37	-32.58	44.00	54.00	-10.00	AVG	
5	2485.220	62.13	27.37	-32.58	56.92	74.00	-17.08	peak	
6	2485.220	48.33	27.37	-32.58	43.12	54.00	-10.88	AVG	

Remarks:1. Result=Reading+Antenna+Cable

Test mode:	Transmitting	Test channel:	Highest	Polarization:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Antenna. (dB/m)	Cable. (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2483.500	56.30	27.37	-32.58	51.09	74.00	-22.91	peak	
2	2483.500	43.22	27.37	-32.58	38.01	54.00	-15.99	AVG	
3	2485.270	61.63	27.37	-32.58	56.42	74.00	-17.58	peak	
4	2485.270	49.22	27.37	-32.58	44.01	54.00	-9.99	AVG	

Remarks:1. Result=Reading+Antenna+Cable

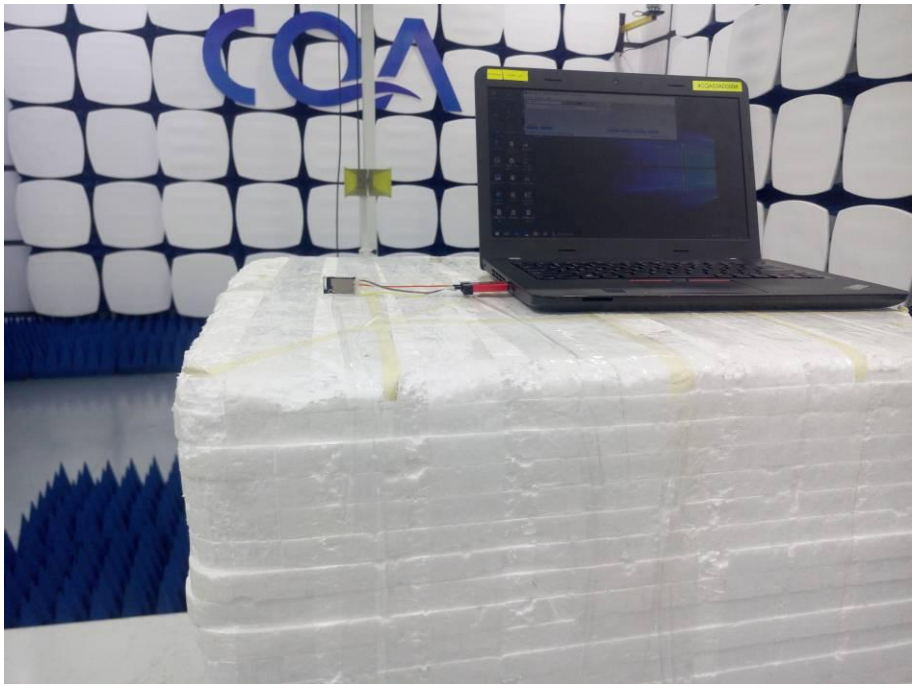
7 Photographs - EUT Test Setup

7.1 Radiated Spurious Emission

9KHz~30MHz:

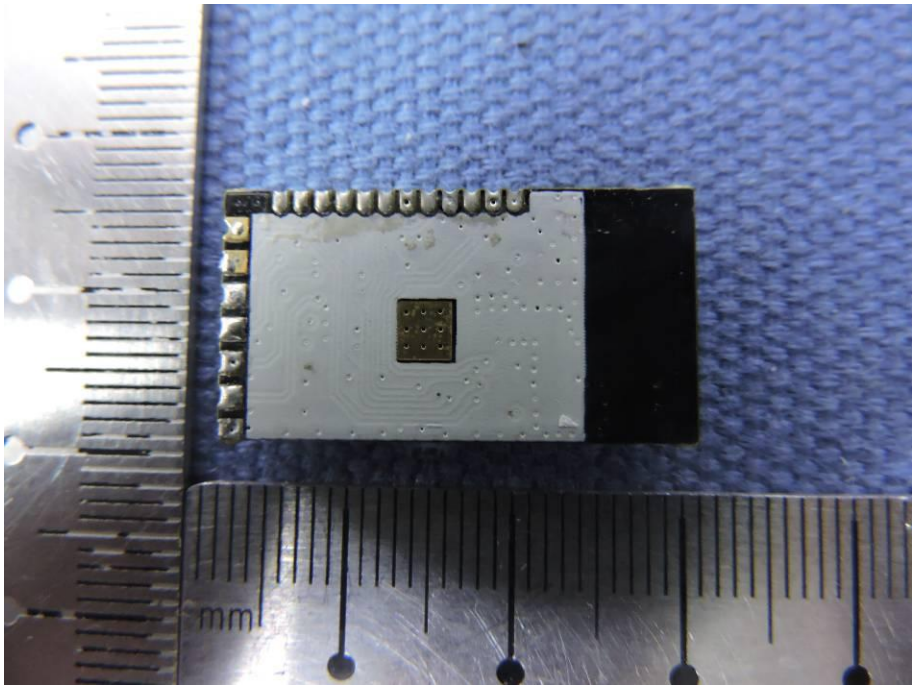
30MHz-1GHz:

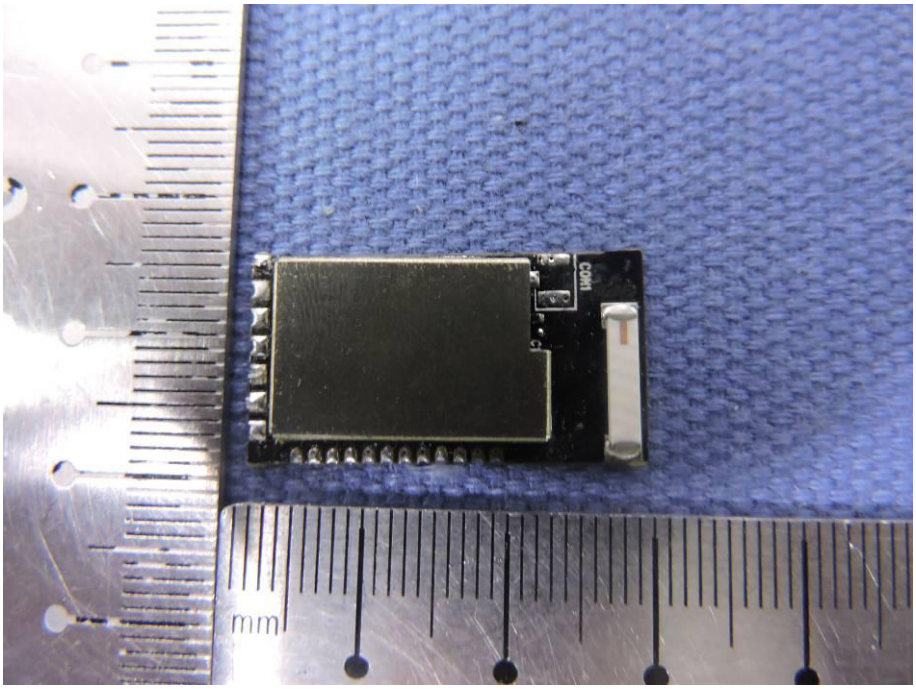
Above 1GHz:

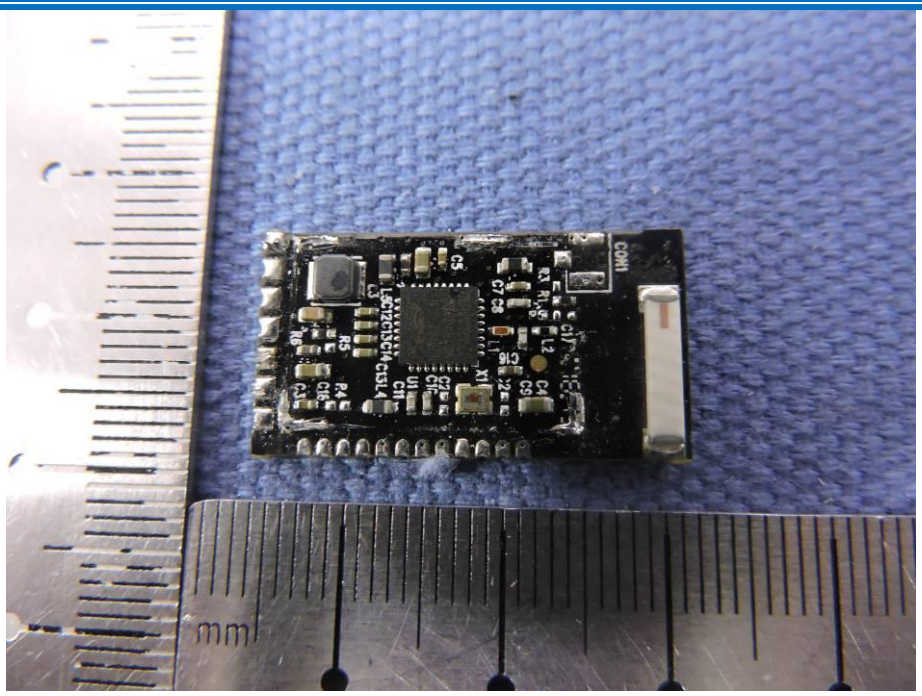


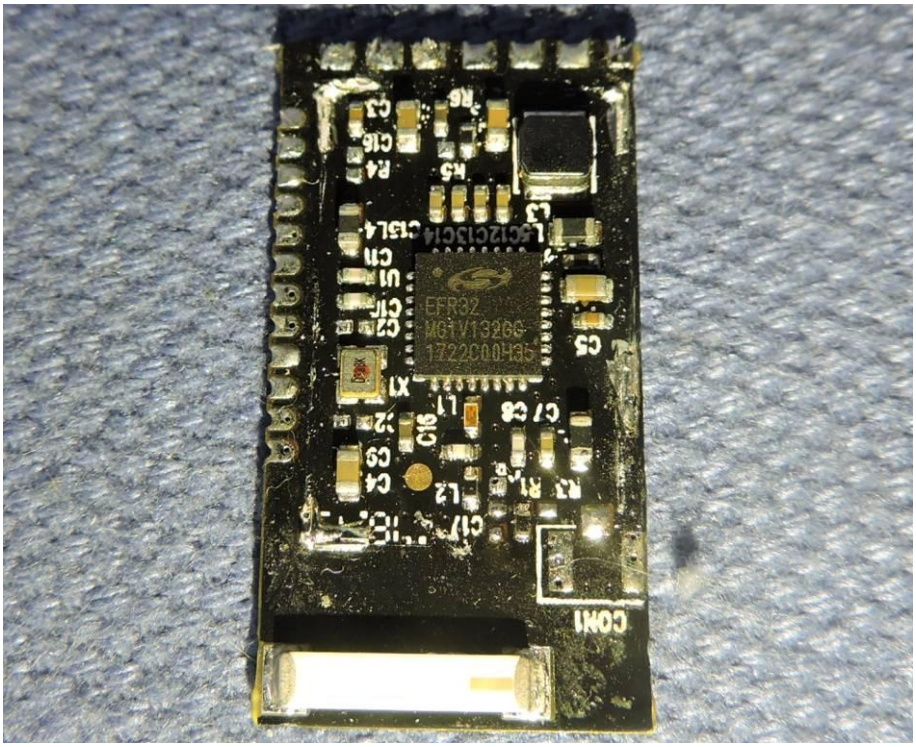
7.2 Conducted Emission

8 Photographs - EUT Constructional Details









THE END