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Report No.: SZEM170900979401
Page: 1 of 42

TEST REPORT

Application No.: SZEM1709009794CR
Applicant: SHANTOU HUI NA TOYS CO., LTD
Address of Applicant: NO.9 XIN XING FIVE ROAD, XIN NING, SHANTOU CITY, China
Manufacturer: SHANTOU HUI NA TOYS CO., LTD
Address of Manufacturer: NO.9 XIN XING FIVE ROAD, XIN NING, SHANTOU CITY, China
Factory: SHANTOU HUI NA TOYS CO., LTD
Address of Factory: NO.9 XIN XING FIVE ROAD, XIN NING, SHANTOU CITY, China
Equipment Under Test (EUT):
EUT Name: R/C TRUCK
Model No.: Please refer to section 2 ♣
♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
FCC ID: 2ANRLHN13556370399
Standard(s) : 47 CFR Part 15, Subpart C 15.249
Date of Receipt: 2017-09-13
Date of Test: 2017-09-18 to 2017-09-19
Date of Issue: 2017-09-28

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2017-09-28		Original

Authorized for issue by:			
		 Bill Chen /Project Engineer	
		 Eric Fu /Reviewer	

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
20dB Bandwidth	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Field Strength of the Fundamental Signal (15.249(a))	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass
Restricted Band Around Fundamental Frequency	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass

Remark:

Model No.: 1550, 1309-1, 1309-3, 1309-6, 1309-7, 1309-9, 1319-1, 1319-3, 1319-6, 1319-7, 1319-9 1329-1, 1329-3, 1329-6, 1329-7, 1329-9, 1339-1, 1339-3, 1339-6, 1339-7, 1339-9, 1349-1, 1349-3, 1349-6, 1349-7, 1349-9, 1359-1, 1359-3, 1359-6, 1359-7, 1359-9, 1369-1, 1369-3, 1369-6, 1369-7, 1369-9, 1379-1, 1379-3, 1379-6, 1379-7, 1379-9, 1389-1, 1389-3, 1389-6, 1389-7, 1389-9, 1399-1, 1399-3, 1399-6, 1399-7, 1399-9, 1910-1, 1911-1, 1912-1, 1913-1, 1914-1, 1915-1, 1916-1, 1917-1, 1918-1, 1919-1, 1920-1, 1921-1, 1910-3, 1911-3, 1912-3, 1913-3, 1914-3, 1915-3, 1916-3, 1917-3, 1918-3, 1919-3, 1920-3, 1921-3, 1910-5, 1911-5, 1912-5, 1913-5, 1914-5, 1915-5, 1916-5, 1917-5, 1918-5, 1919-5, 1920-5, 1921-5, 1310, 1320, 1330, 1340, 1350, 1360, 1370, 1380, 1390, 1510, 1520, 1530, 1540, 1550, 1560, 1570, 1580, 1590, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1581, 1582, 1583, 1584, 1585, 1586, 1587, 1588, 1589, 1591, 1592, 1593, 1594, 1595, 1596, 1597, 1598, 1599.

Only the model 1550 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on packing.

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4 General Information

4.1 Details of E.U.T.

Power supply:	TX:3.0V DC (1.5V x 2 "AA" Size Batteries)
Operation Frequency:	2405MHz~2475MHz
Number of Channel:	71
Sample Type:	portable production
Antenna Type:	Integral
Antenna Gain:	0dBi

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405MHz	19	2423MHz	37	2441MHz	55	2459MHz
2	2406MHz	20	2424MHz	38	2442MHz	56	2460MHz
3	2407MHz	21	2425MHz	39	2443MHz	57	2461MHz
4	2408MHz	22	2426MHz	40	2444MHz	58	2462MHz
5	2409MHz	23	2427MHz	41	2445MHz	59	2463MHz
6	2410MHz	24	2428MHz	42	2446MHz	60	2464MHz
7	2411MHz	25	2429MHz	43	2447MHz	61	2465MHz
8	2412MHz	26	2430MHz	44	2448MHz	62	2466MHz
9	2413MHz	27	2431MHz	45	2449MHz	63	2467MHz
10	2414MHz	28	2432MHz	46	2450MHz	64	2468MHz
11	2415MHz	29	2433MHz	47	2451MHz	65	2469MHz
12	2416MHz	30	2434MHz	48	2452MHz	66	2470MHz
13	2417MHz	31	2435MHz	49	2453MHz	67	2471MHz
14	2418MHz	32	2436MHz	50	2454MHz	68	2472MHz
15	2419MHz	33	2437MHz	51	2455MHz	69	2473MHz
16	2420MHz	34	2438MHz	52	2456MHz	70	2474MHz
17	2421MHz	35	2439MHz	53	2457MHz	71	2475MHz
18	2422MHz	36	2440MHz	54	2458MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 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(CH1)	2405MHz
The Middle channel(CH36)	2440MHz
The Highest channel(CH71)	2475MHz

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25×10^{-8}
2	Duty cycle	0.37%
3	Occupied Bandwidth	3%
4	RF conducted power	0.75dB
5	RF power density	2.84dB
6	Conducted Spurious emissions	0.75dB
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 test	1 °C
10	Humidity test	3%
11	Supply voltages	1.5%
12	Time	3%

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China.
518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

- CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services 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.

- A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- VCCI**

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.: G-823, R-4188, T-1153 and C-2383 respectively.

- FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2017-04-14	2018-04-13
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09

Field Strength of the Fundamental Signal (15.249(a))					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2017-05-02	2020-05-01
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2017-04-14	2018-04-13
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2017-03-05	2020-03-05
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-14	2017-06-16	2020-06-15
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2016-10-09	2017-10-09
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2016-10-09	2017-10-09
Pre-amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-10	2016-10-17	2017-10-17
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2017-04-14	2018-04-13
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21
Band filter	N/A	N/A	SEM023-01	N/A	N/A
Cable	SGS	CE	--	2016-10-09	2017-10-09

Restricted Band Around Fundamental Frequency					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2017-05-02	2020-05-01
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2017-04-14	2018-04-13
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2017-03-05	2020-03-05
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-14	2017-06-16	2020-06-15
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2016-10-09	2017-10-09
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2016-10-09	2017-10-09
Pre-amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-10	2016-10-17	2017-10-17
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2017-04-14	2018-04-13
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21
Band filter	N/A	N/A	SEM023-01	N/A	N/A
Cable	SGS	CE	--	2016-10-09	2017-10-09

RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
2	MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2016-10-09	2017-10-09
3	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-02	2017-03-05	2020-03-05
4	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2017-04-14	2018-04-13
5	Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

6	Cable	SGS	CE	--	2016-10-09	2017-10-09
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RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2017-05-10	2018-05-10
2	EXA Signal Analyzer (10Hz-26.5GHz)	Agilent Technologies Inc	N9010A	SEM004-09	2017-06-05	2018-06-04
3	BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2014-11-01	2017-11-01
4	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-13
5	Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2016-10-09	2017-10-09
6	Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2016-10-09	2017-10-09
7	Band filter	N/A	N/A	N/A	N/A	N/A
8	Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
9	Cable	SGS	CE	--	2016-10-09	2017-10-09

General used equipment						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2016-10-12	2017-10-12	
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2016-10-12	2017-10-12	
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2016-10-12	2017-10-12	
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2017-04-18	2018-04-18	

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

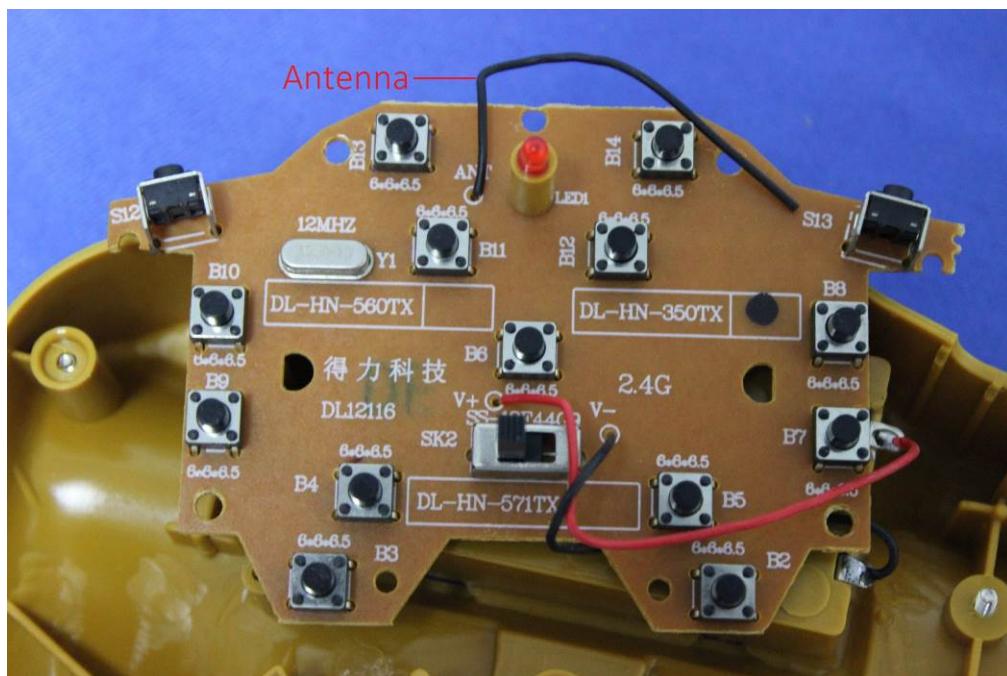
47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard Requirment:

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.

EUT Antenna:



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

7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

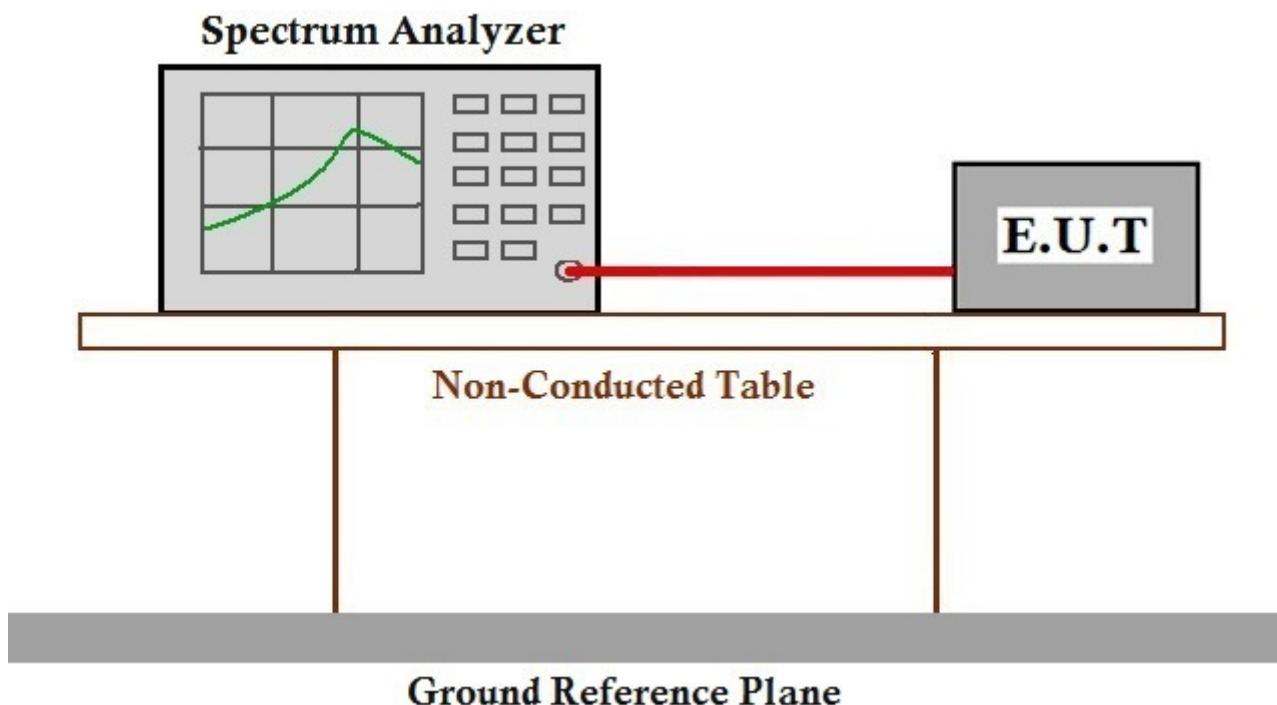
Test Requirement 47 CFR Part 15, Subpart C 15.215
Test Method: ANSI C63.10 (2013) Section 6.9
Limit: N/A

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

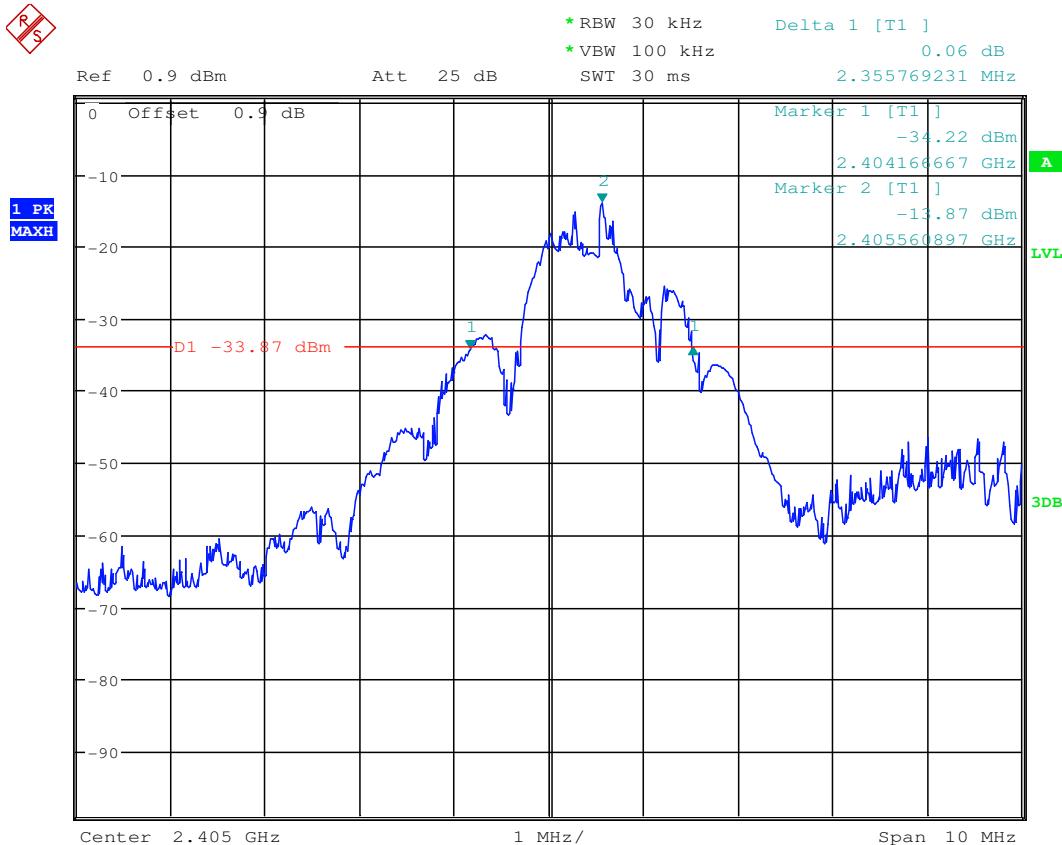
7.1.2 Test Setup Diagram



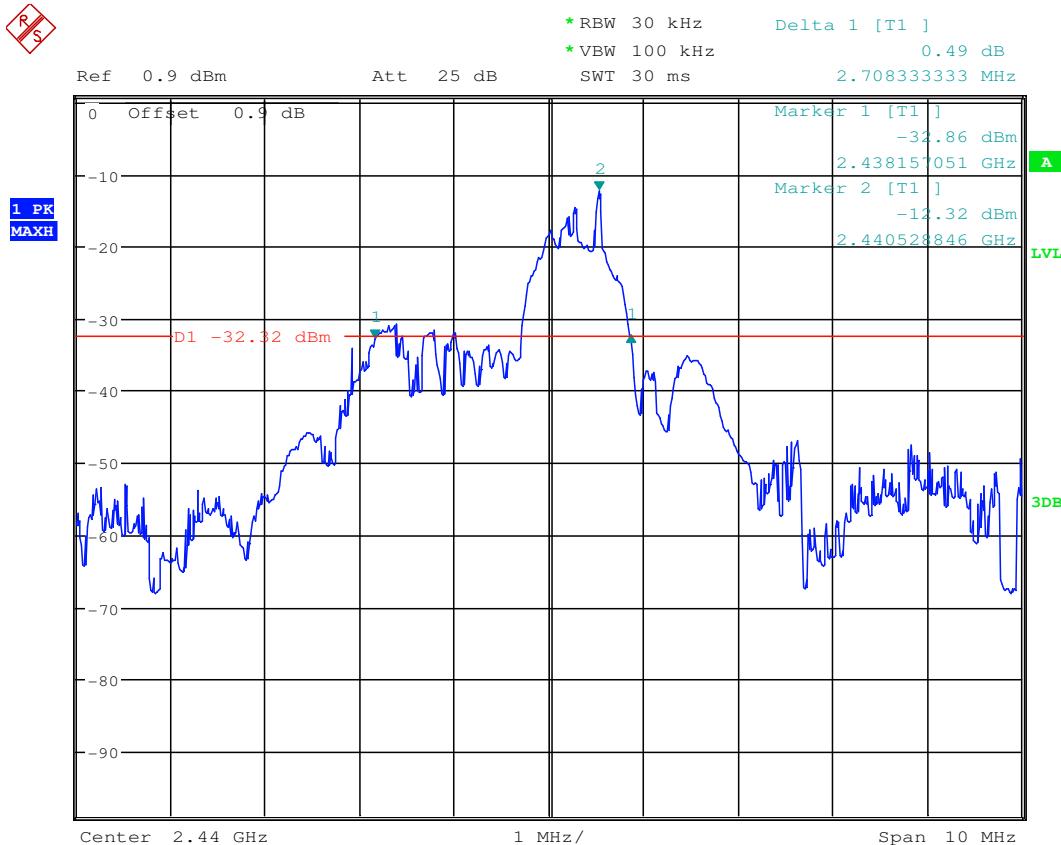
7.1.3 Measurement Procedure and Data

Test Channel	20dB bandwidth (MHz)	Results
Lowest	2.36	Pass
Middle	2.71	Pass
Highest	2.58	Pass

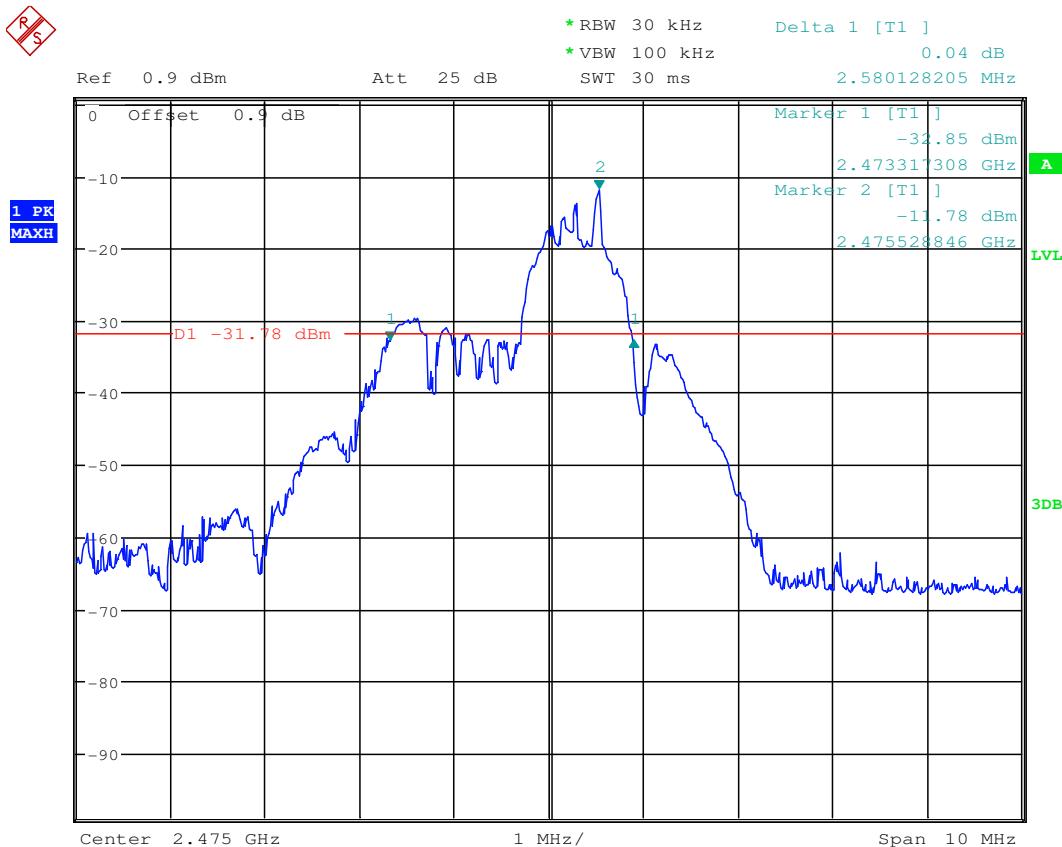
Mdoe a: Channel:Low



Mdoe a: Channel:middle



Mdoe a: Channel:High



7.2 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)

Test Method: ANSI C63.10 (2013) Section 6.5&6.6

Measurement Distance: 3m

Limit:

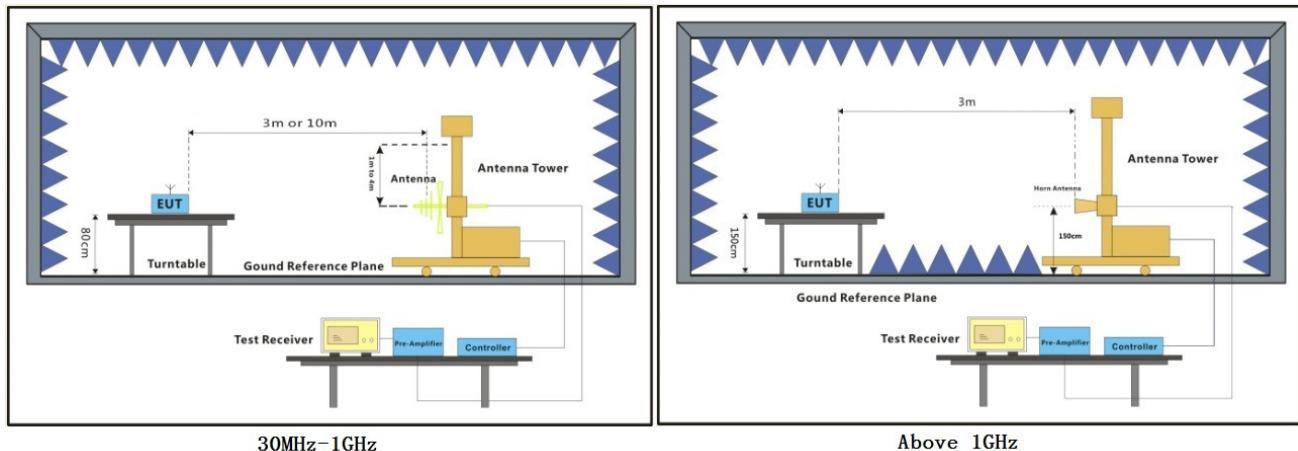
Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.0	Average Value
	114.0	Peak Value

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 56 % RH Atmospheric Pressure: 1010 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.2.2 Test Setup Diagram

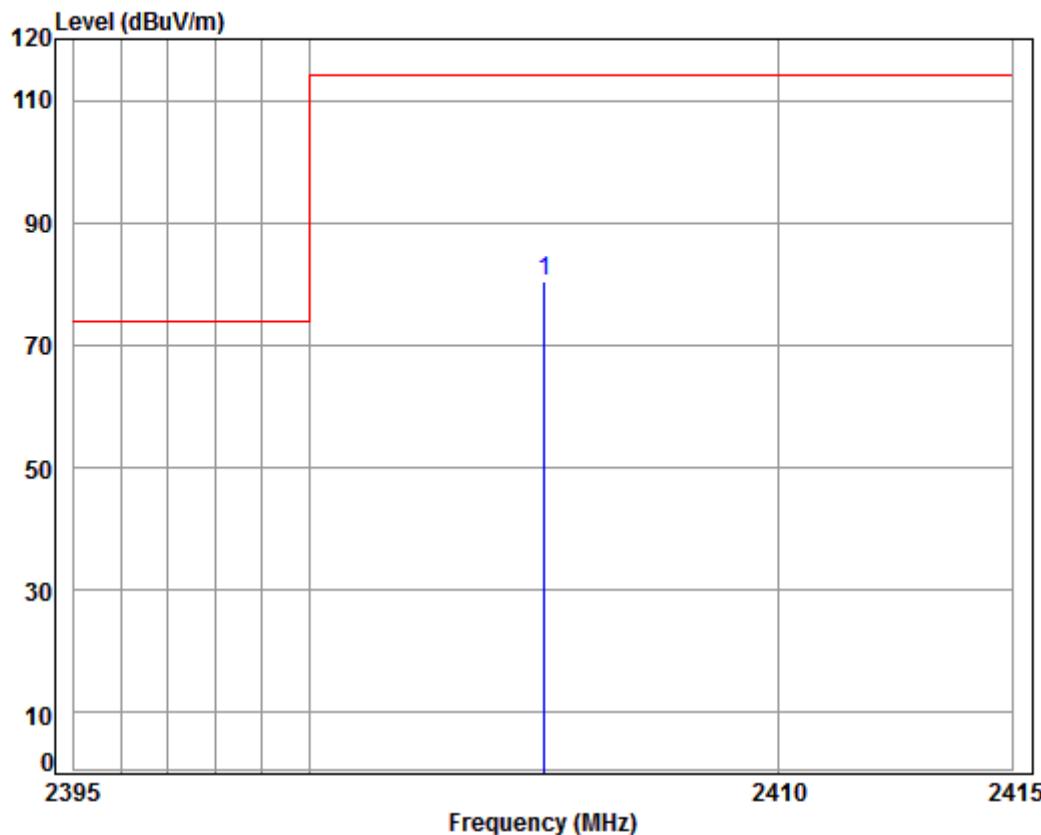


7.2.3 Measurement Procedure and Data

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

Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low



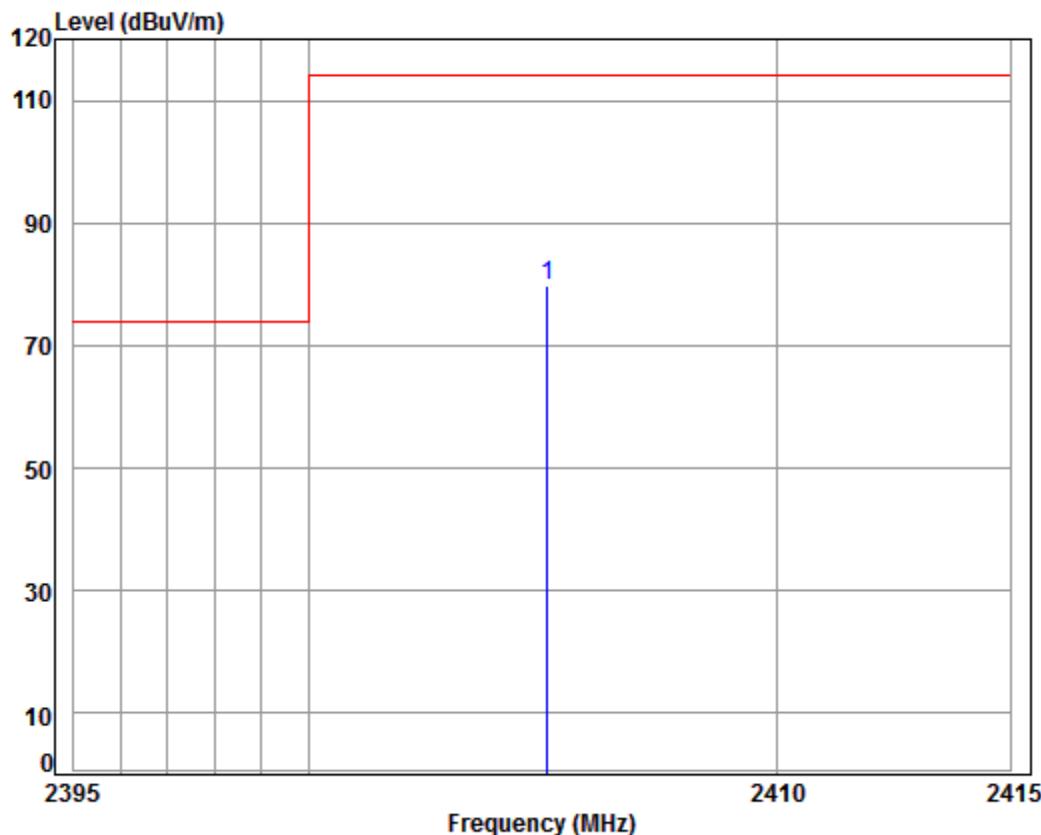
Condition: 3m HORIZONTAL

Job No : 09794CR

Mode : 2405 Filed Strength

		Cable Freq	Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Level	Over Limit	Remark
		MHz	dB	dB/m		dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	2405.001	5.49	29.12	37.95		83.91	80.57	114.00	-33.43	Peak

Mode:a; Polarization:Vertical; Modulation Type:GFSK; Channel:Low



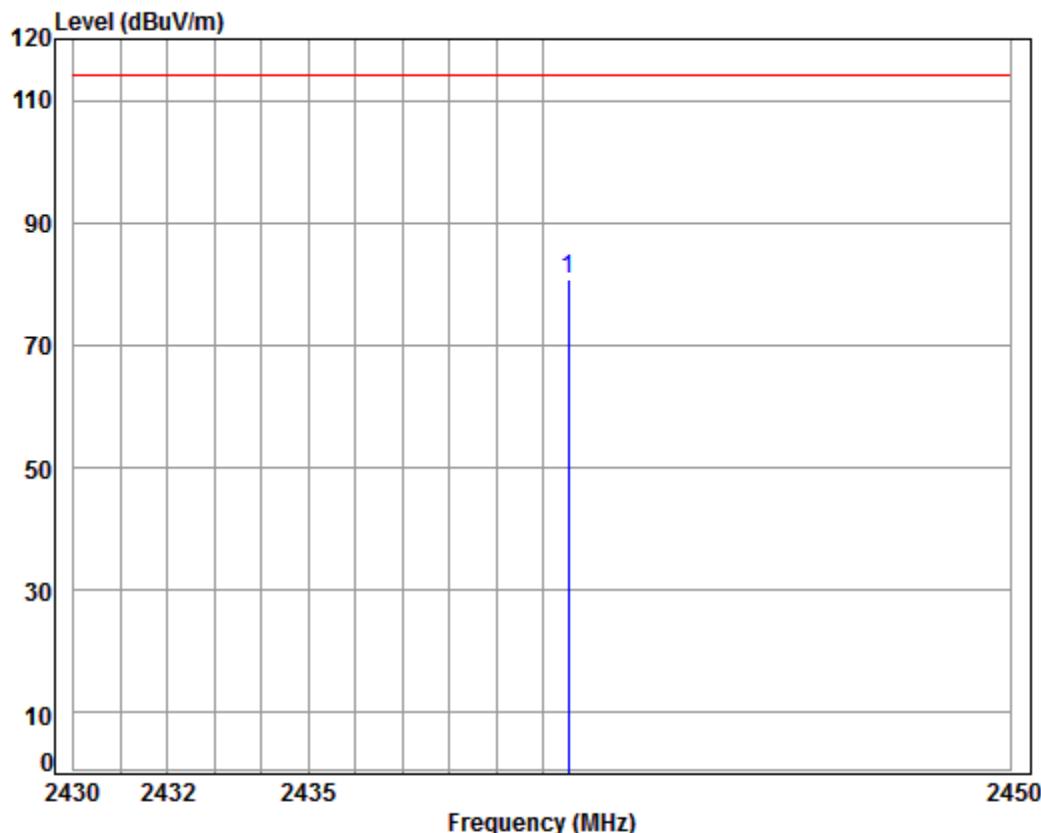
Condition: 3m VERTICAL

Job No : 09794CR

Mode : 2405 Filed Strength

	Cable Freq	Ant Loss	Preamp Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	2405.103	5.50	29.12	37.95	83.17	79.84	114.00	-34.16 Peak

Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel:middle



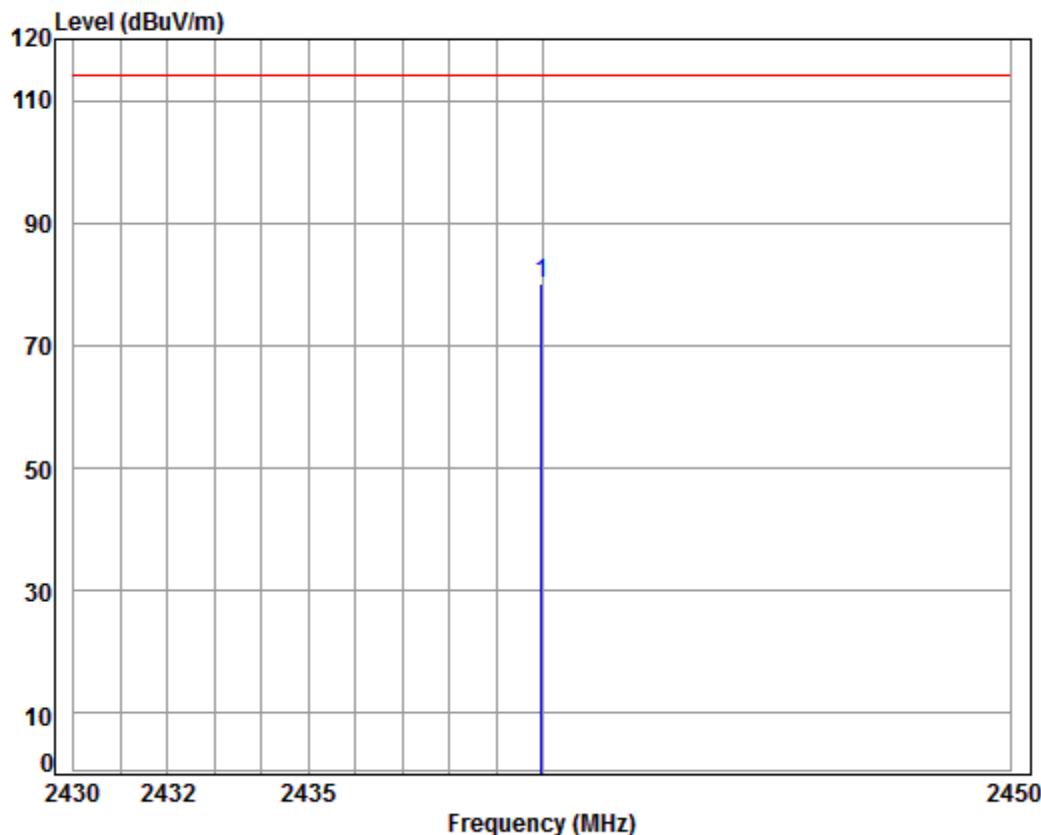
Condition: 3m HORIZONTAL

Job No : 09794CR

Mode : 2440 Filed Strength

		Cable Freq	Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Level	Over Limit	Remark
		MHz	dB	dB/m		dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	2440.540	5.54	29.23	37.95		83.95	80.77	114.00	-33.23	Peak

Mode:a; Polarization:Vertical; Modulation Type:GFSK; Channel:middle



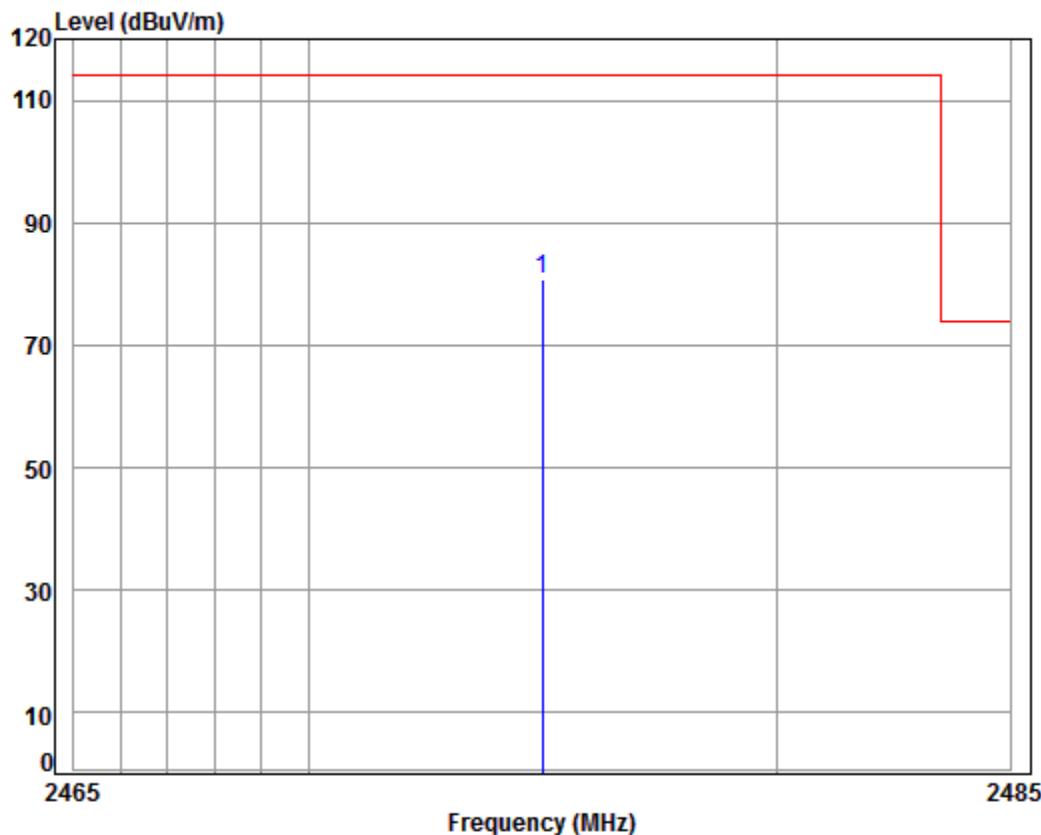
Condition: 3m VERTICAL

Job No : 09794CR

Mode : 2440 Filed Strength

	Cable Freq	Ant Loss	Preamp Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	2439.979	5.54	29.23	37.95	83.26	80.08	114.00	-33.92 Peak

Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel:High



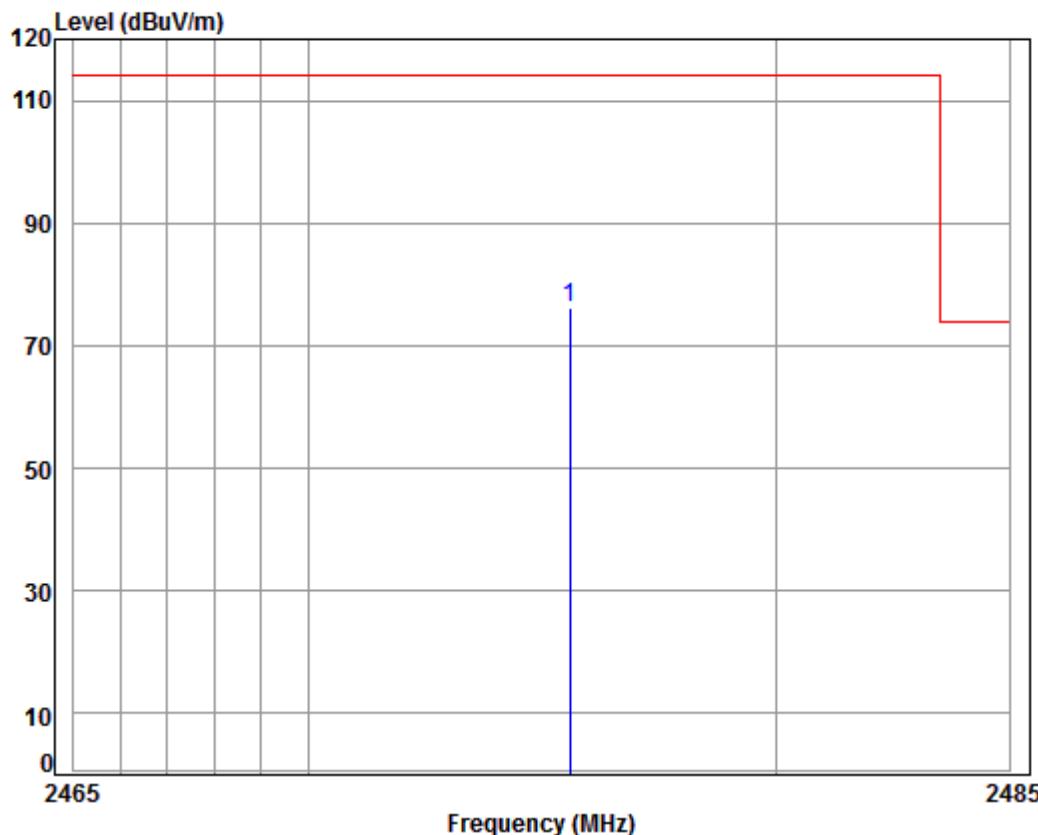
Condition: 3m HORIZONTAL

Job No : 09794CR

Mode : 2475 Filed Strength

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark
	MHz	dB	dB/m		dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	2474.985	5.59	29.33	37.95	83.81	80.78	114.00	-33.22	Peak

Mode:a; Polarization:Vertical; Modulation Type:GFSK; Channel:High



Condition: 3m VERTICAL

Job No : 09794CR

Mode : 2475 Filed Strength

	Cable Freq	Ant Loss	Preamp Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	2475.583	5.59	29.33	37.95	79.27	76.24	114.00	-37.76 Peak

Remark:

- 1) 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
- 2) 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. So, only the above measurement data were shown in the report.

7.3 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6

Measurement Distance: 3m

Limit:

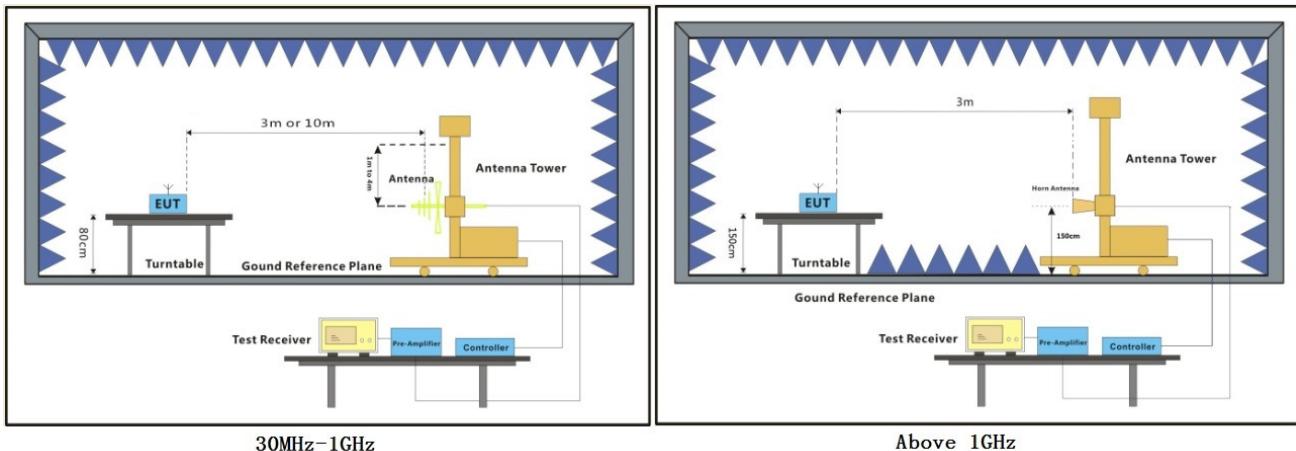
Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
Above 1GHz	74.0	Peak Value
Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.		

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 56 % RH Atmospheric Pressure: 1010 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.3.2 Test Setup Diagram

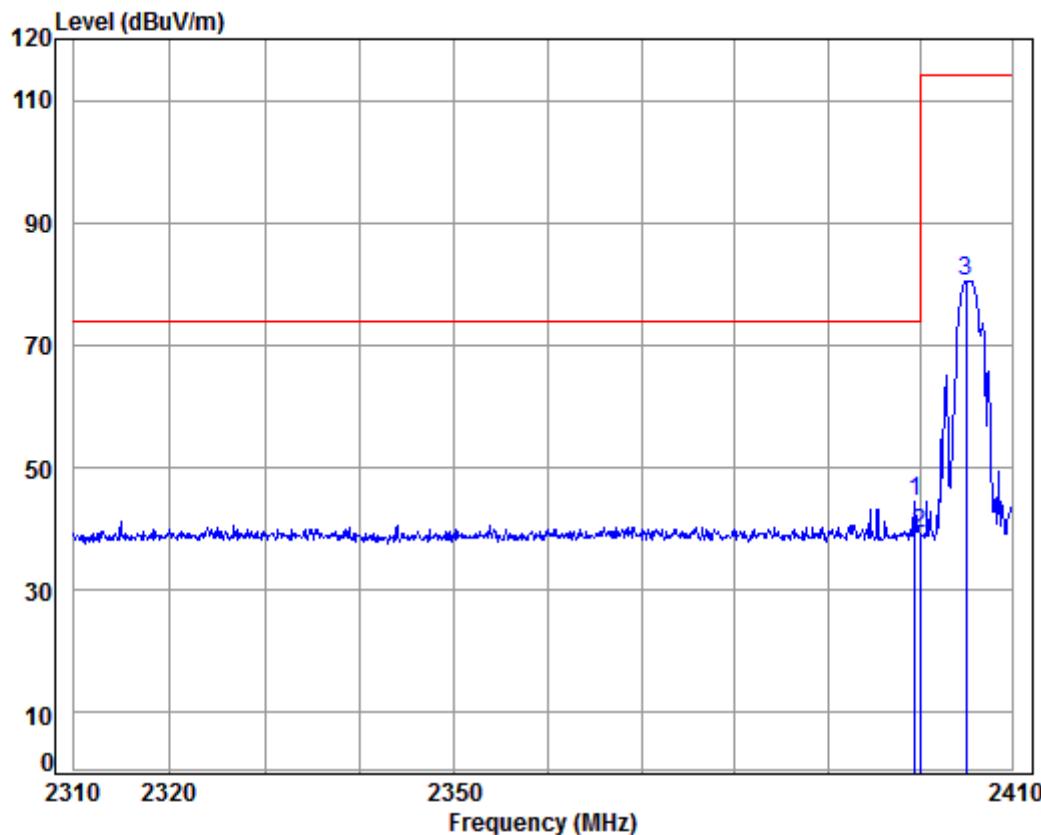


7.3.3 Measurement Procedure and Data

- 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.
- 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.
- 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.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- Test the EUT in the lowest channel, the middle channel, the highest channel.
- 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.
- Repeat above procedures until all frequencies measured was complete.

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

Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low



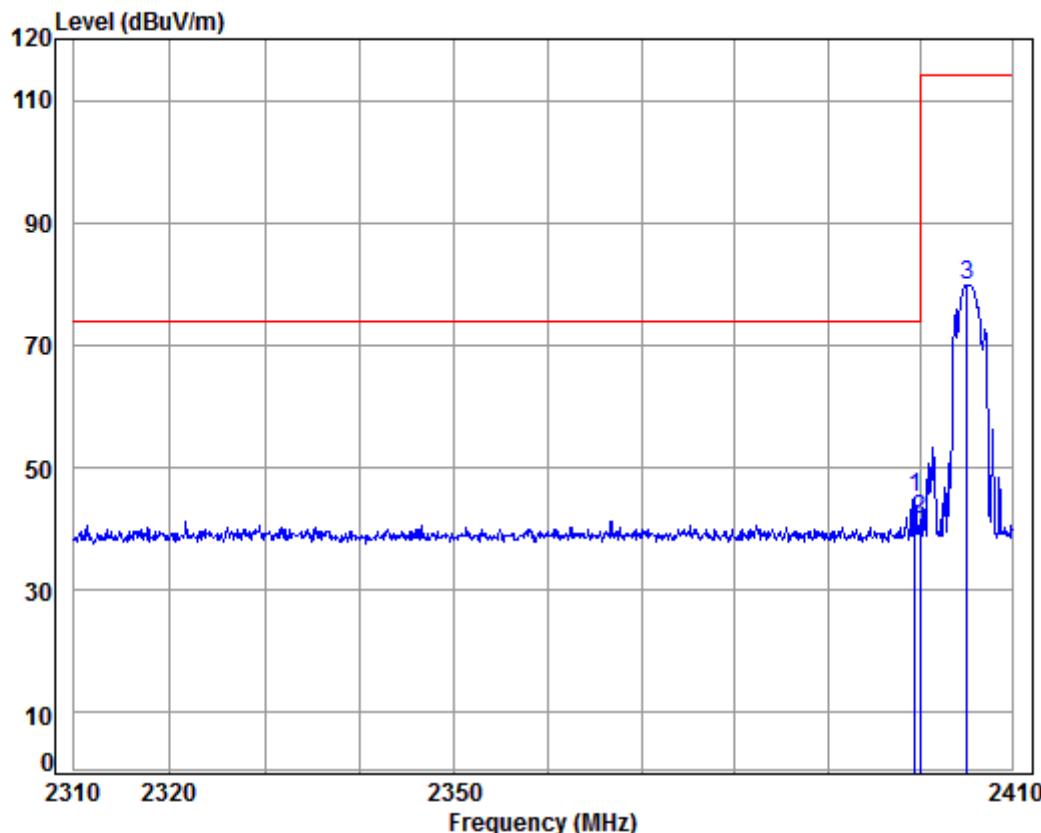
Condition: 3m HORIZONTAL

Job No : 09794CR

Mode : 2405 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2399.503	5.49	29.11	37.96	47.95	44.59	74.00	-29.41	Peak
2	2400.000	5.49	29.11	37.96	42.50	39.14	74.00	-34.86	Peak
3	2405.001	5.49	29.12	37.95	83.91	80.57	114.00	-33.43	Peak

Mode:a; Polarization:Vertical; Modulation Type:GFSK; Channel:Low



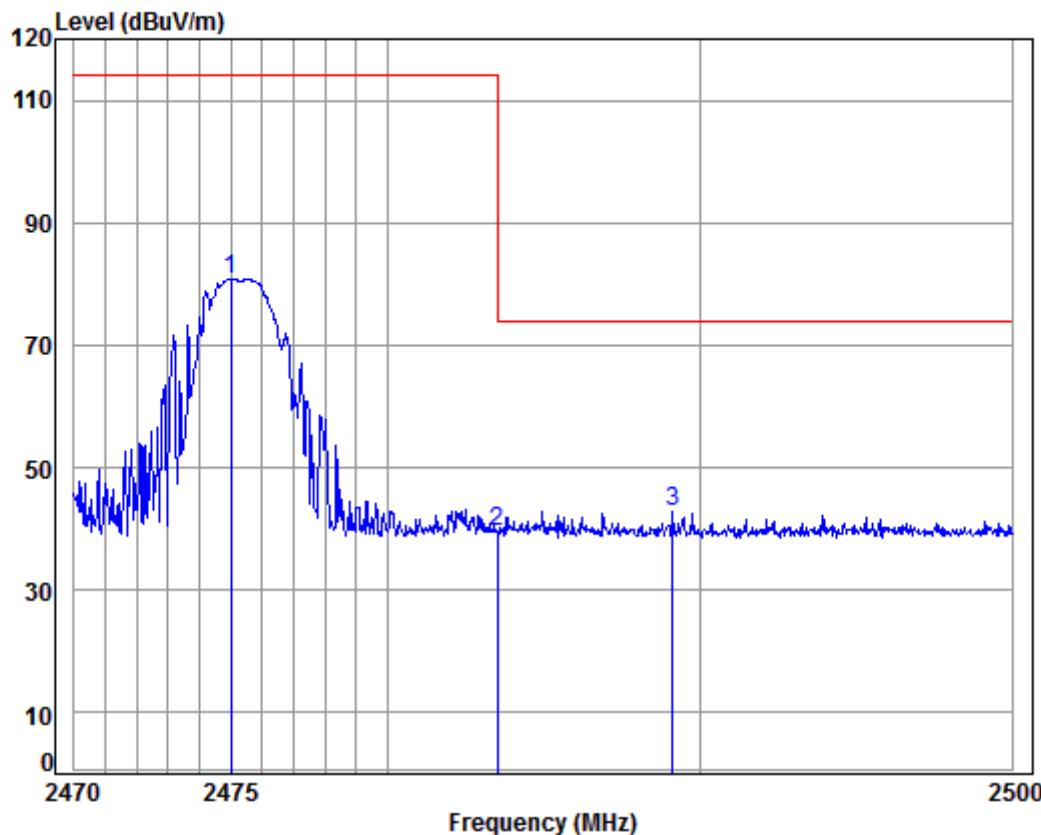
Condition: 3m VERTICAL

Job No : 09794CR

Mode : 2405 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	2399.503	5.49	29.11	37.96	48.34	44.98	74.00	-29.02	Peak
2	2400.000	5.49	29.11	37.96	44.73	41.37	74.00	-32.63	Peak
3	2405.103	5.50	29.12	37.95	83.17	79.84	114.00	-34.16	Peak

Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel:High



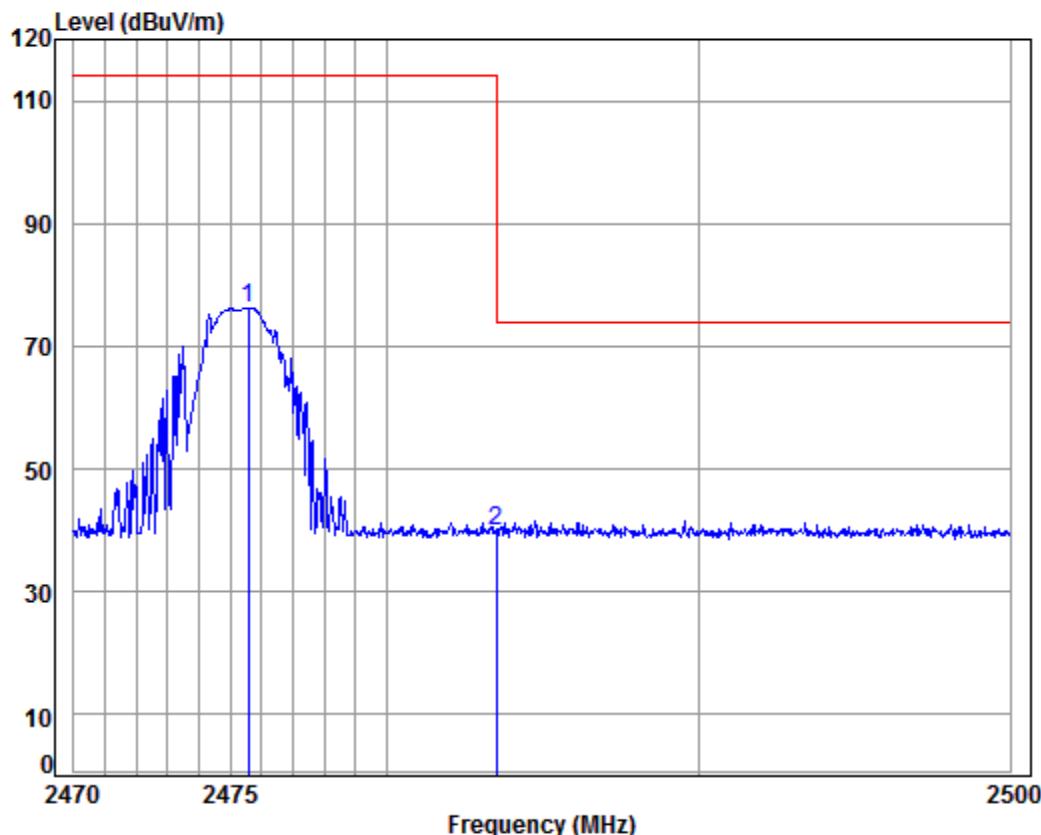
Condition: 3m HORIZONTAL

Job No : 09794CR

Mode : 2475 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark
	MHz	dB	dB/m		dBuV	dBuV/m	dBuV/m	dB	
1	2474.985	5.59	29.33	37.95	83.81	80.78	114.00	-33.22	Peak
2	2483.500	5.60	29.35	37.95	42.64	39.64	74.00	-34.36	Peak
3 pp	2489.098	5.61	29.37	37.95	45.82	42.85	74.00	-31.15	Peak

Mode:a; Polarization:Vertical; Modulation Type:GFSK; Channel:High



Condition: 3m VERTICAL

Job No : 09794CR

Mode : 2475 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m		dB	dBuV	dBuV/m	dBuV/m	
1	2475.583	5.59	29.33	37.95	79.27	76.24	114.00	-37.76	Peak
2	pp 2483.500	5.60	29.35	37.95	43.05	40.05	74.00	-33.95	Peak

Remark:

1) 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

2) 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. So, only the above measurement data were shown in the report.

7.4 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)

Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6

Measurement Distance: 3m

Limit:

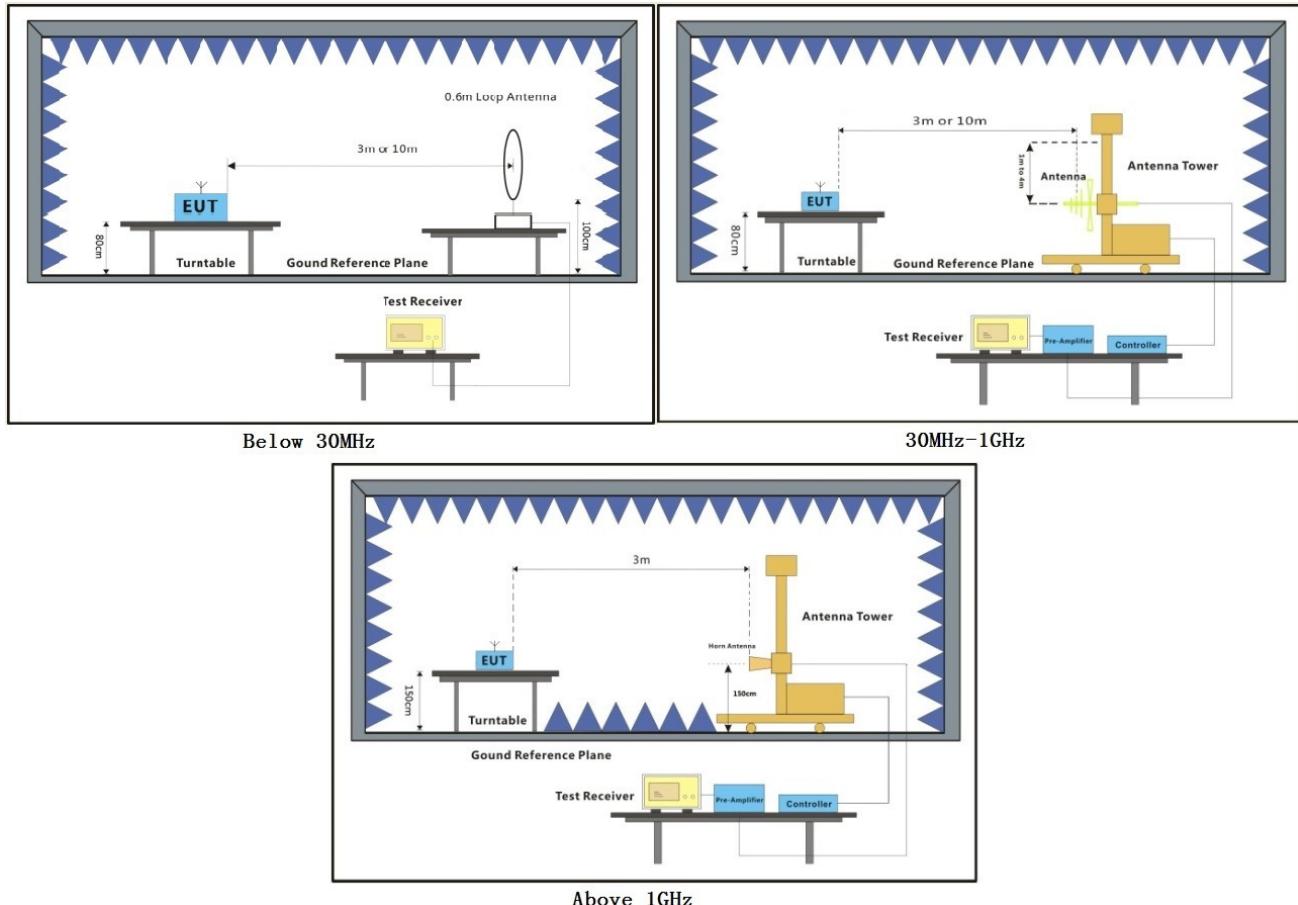
Frequency(MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 56 % RH Atmospheric Pressure: 1010 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.4.2 Test Setup Diagram



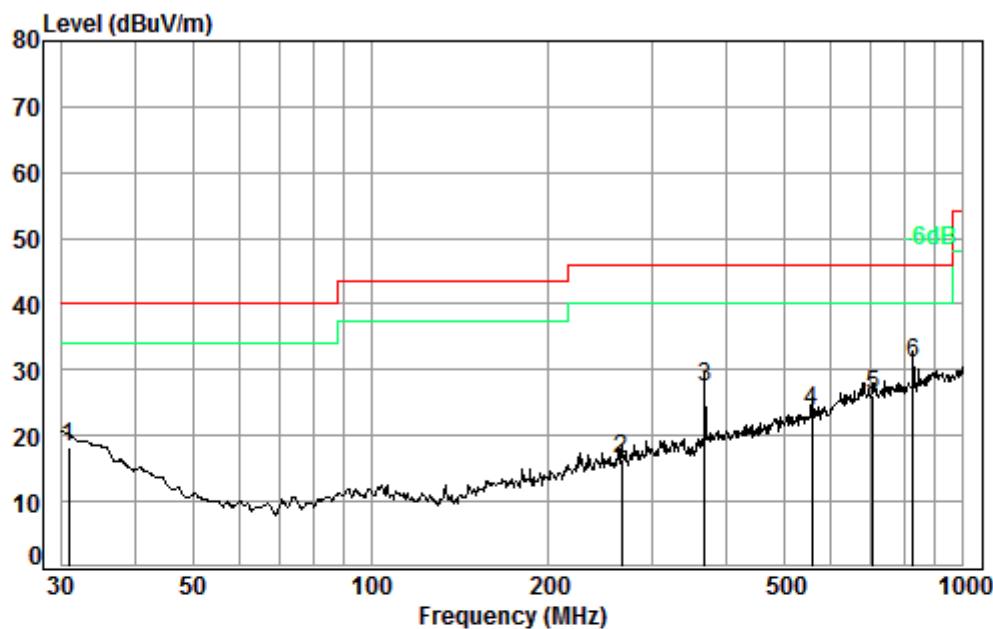
7.4.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

Radiated emission below 1GHz

QP value:

Mode:a; Polarization:Horizontal



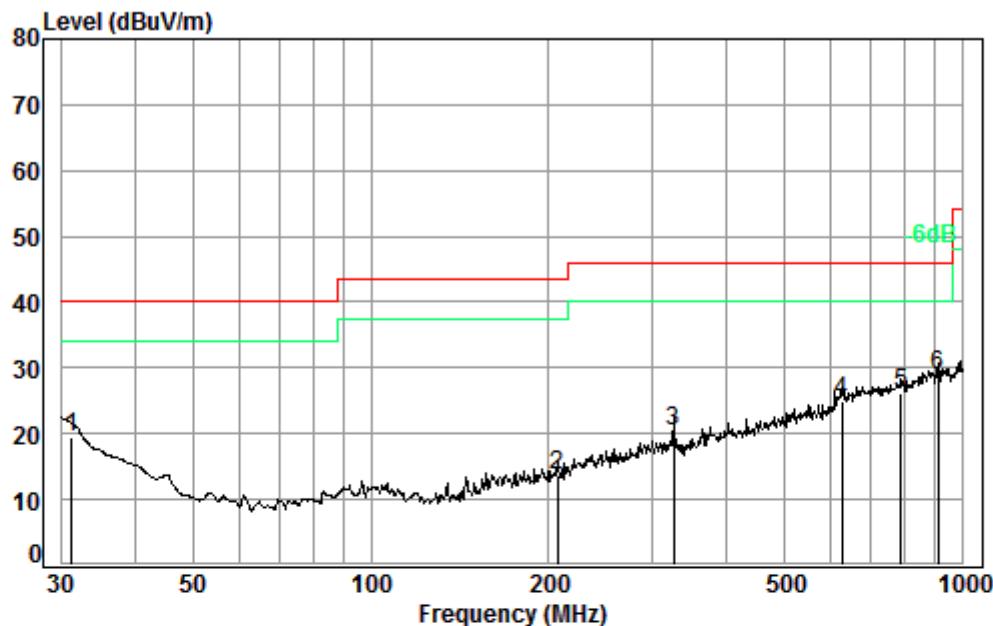
Condition: 3m HORIZONTAL

Job No. : 09794CR

Test mode: a

Freq	Cable	Ant	Preamp	Read	Limit	Over	dB
	Loss	Factor	Factor	Level	Level	Line	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	
1	30.85	0.60	18.22	27.35	26.77	18.24	40.00
2	265.68	1.75	12.61	26.49	28.62	16.49	46.00
3	366.82	2.11	15.31	26.91	36.87	27.38	46.00
4	556.77	2.66	18.95	27.61	29.72	23.72	46.00
5	704.23	2.92	21.60	27.41	28.98	26.09	46.00
6 pp	824.60	3.31	22.40	27.16	32.42	30.97	46.00
							-15.03

Mode:a; Polarization:Vertical



Condition: 3m VERTICAL

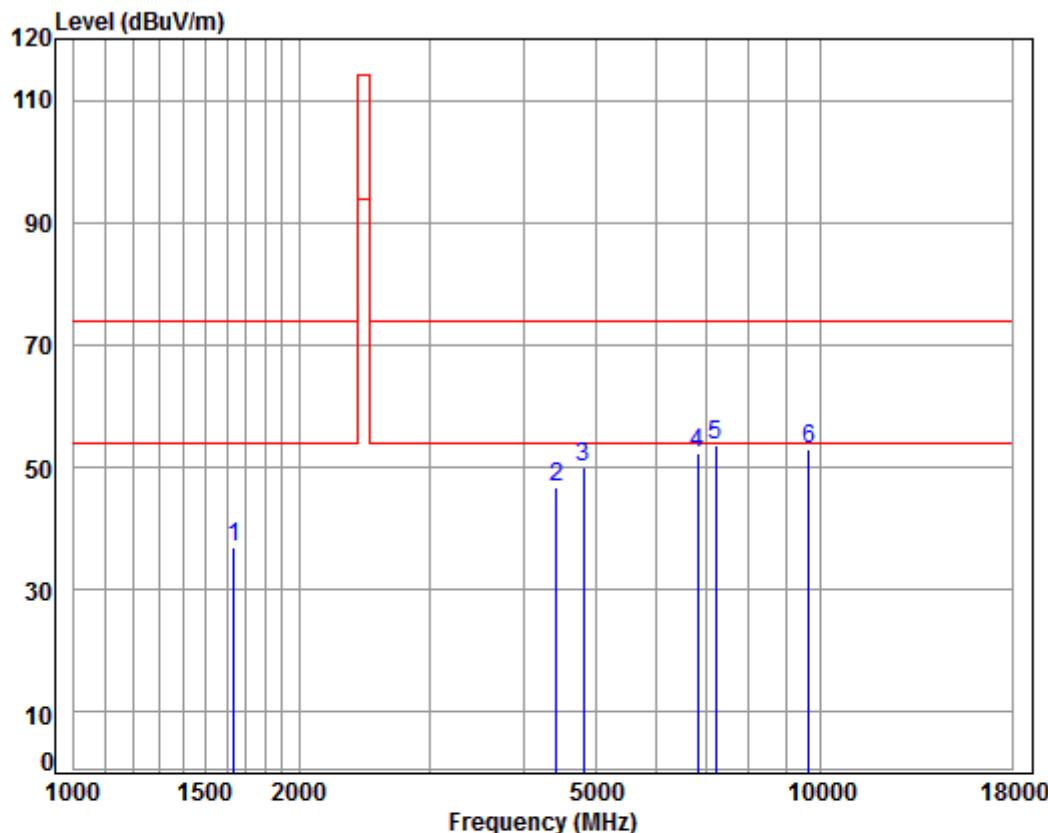
Job No. : 09794CR

Test mode: a

Freq	Cable	Ant	Preamp	Read	Limit	Over		
	Loss	Factor	Factor	Level			Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	31.29	0.60	17.98	27.35	28.32	19.55	40.00	-20.45
2	206.40	1.44	10.53	26.67	28.54	13.84	43.50	-29.66
3	324.46	1.98	14.78	26.58	30.30	20.48	46.00	-25.52
4	625.08	2.75	20.50	27.51	29.22	24.96	46.00	-21.04
5	787.85	3.17	22.05	27.31	28.34	26.25	46.00	-19.75
6 pp	909.67	3.61	23.24	26.71	28.69	28.83	46.00	-17.17

Transmitter emission above 1GHz

Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel:Low



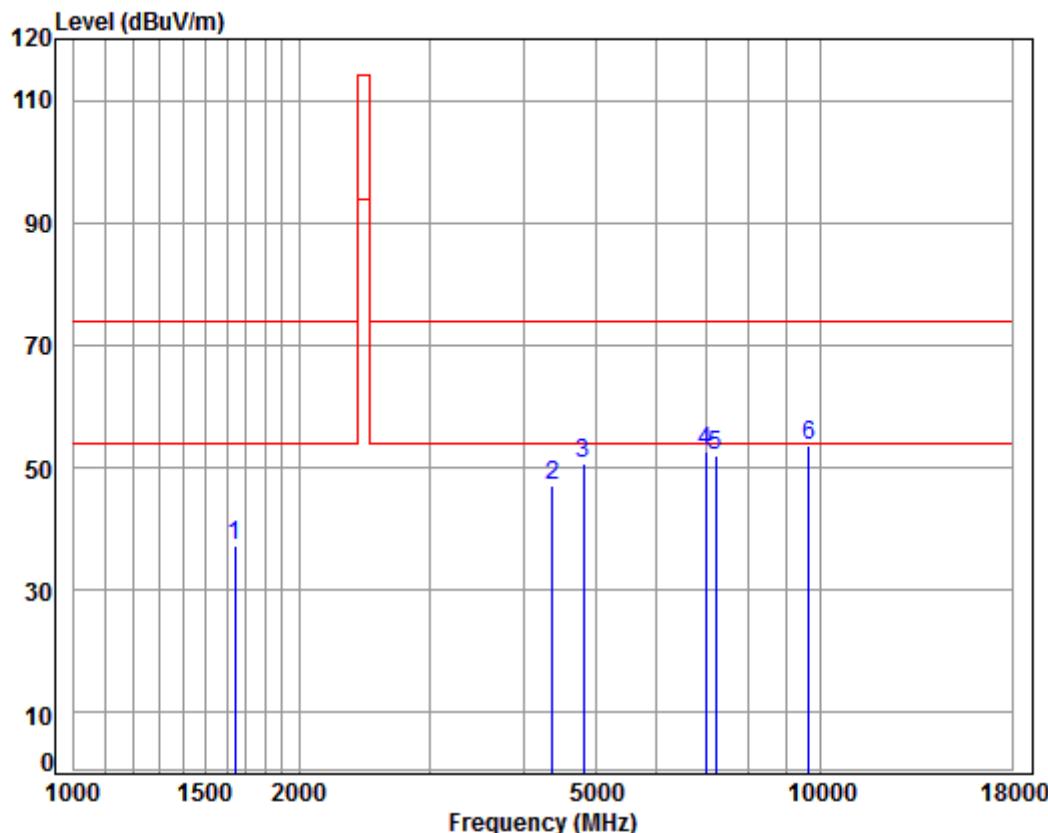
Condition: 3m HORIZONTAL

Job No : 09794CR

Mode : 2405 TX RSE

	Freq	Cable	Ant	Preamp	Read	Limit	Over	Remark
		Loss	Factor	Factor	Level	Level	Line	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	1639.274	5.30	26.42	38.03	43.13	36.82	74.00	-37.18 peak
2	4417.841	7.47	33.60	38.22	44.05	46.90	74.00	-27.10 peak
3	4810.000	7.90	34.17	38.41	46.35	50.01	74.00	-23.99 peak
4	6835.278	10.58	36.05	37.45	43.17	52.35	74.00	-21.65 peak
5 pp	7215.000	10.07	36.41	37.10	44.32	53.70	74.00	-20.30 peak
6	9620.000	10.75	37.52	35.08	39.75	52.94	74.00	-21.06 peak

Mode:a; Polarization:Vertical; Modulation Type:GFSK; Channel:Low



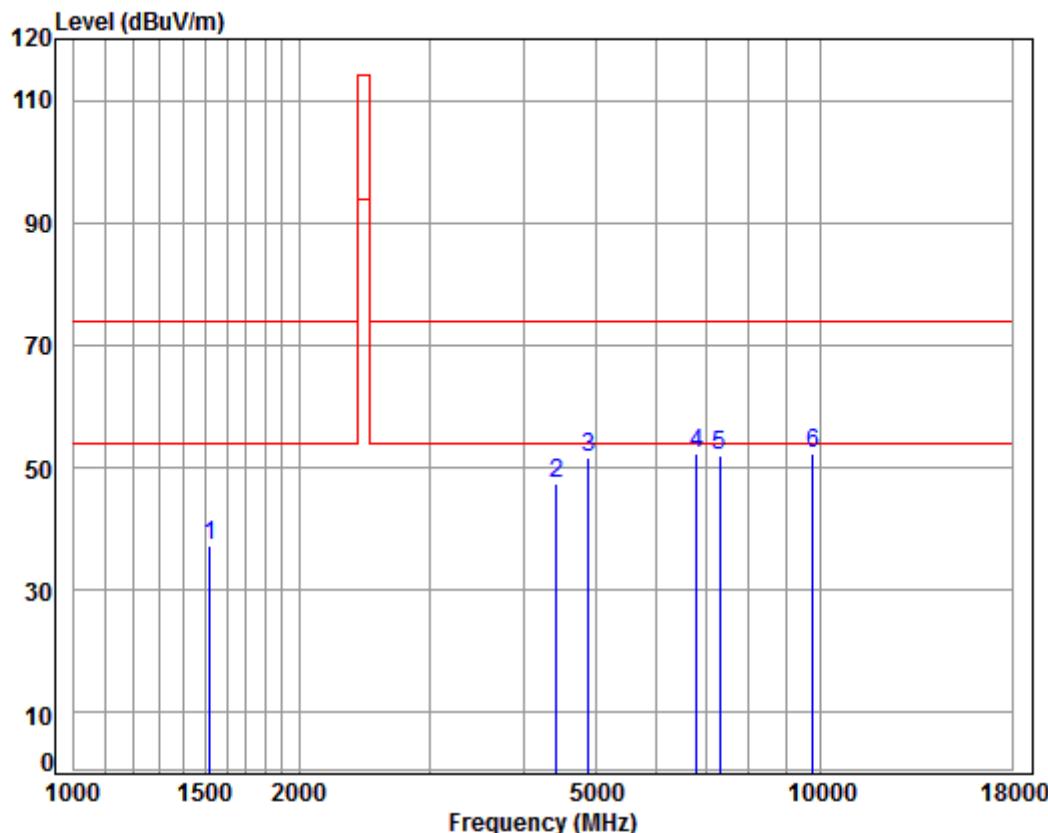
Condition: 3m VERTICAL

Job No : 09794CR

Mode : 2405 TX RSE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit		Over Limit	Remark
					Level	Line		
1 1644.019	5.30	26.44	38.03	43.59	37.30	74.00	-36.70	peak
2 4367.058	7.41	33.60	38.20	44.34	47.15	74.00	-26.85	peak
3 4810.000	7.90	34.17	38.41	47.11	50.77	74.00	-23.23	peak
4 6995.172	10.14	36.49	37.30	43.26	52.59	74.00	-21.41	peak
5 7215.000	10.07	36.41	37.10	42.56	51.94	74.00	-22.06	peak
6 pp 9620.000	10.75	37.52	35.08	40.29	53.48	74.00	-20.52	peak

Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel:middle



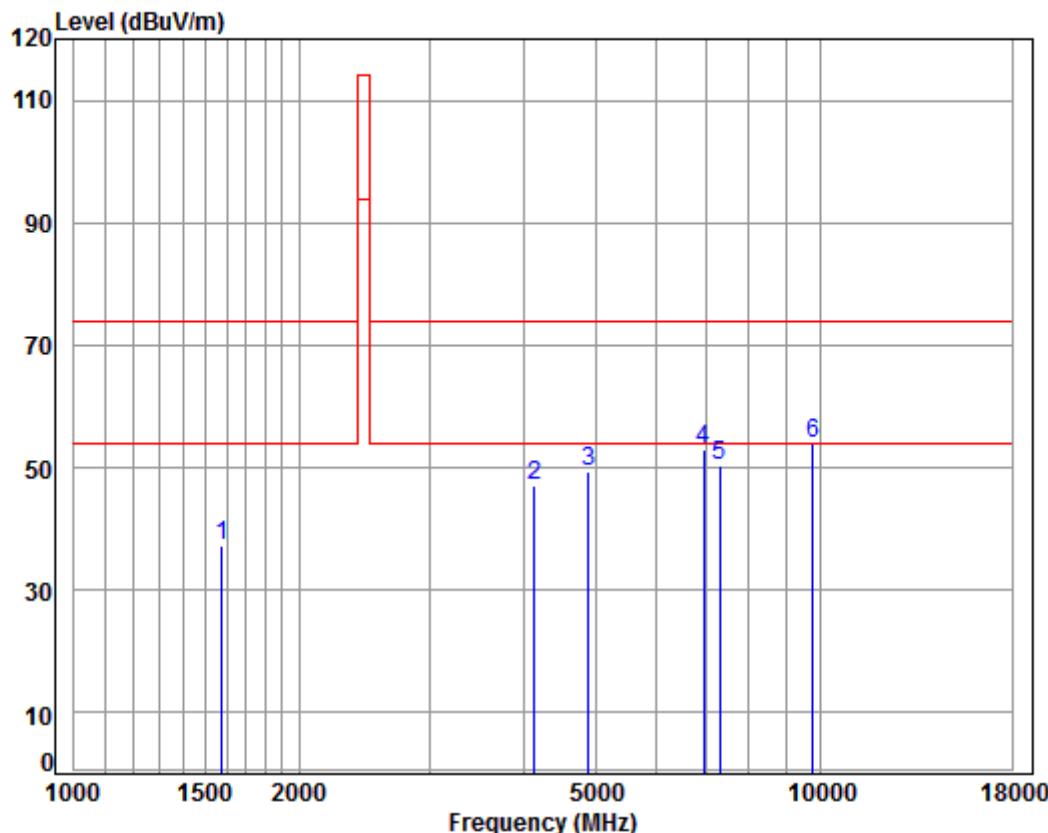
Condition: 3m HORIZONTAL

Job No : 09794CR

Mode : 2440 TX RSE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit		Over Line	Over Limit	Remark
					dB	dBuV			
1 1520.598	5.45	25.89	38.04	43.85	37.15	74.00	-36.85	peak	
2 4417.841	7.47	33.60	38.22	44.55	47.40	74.00	-26.60	peak	
3 4880.000	7.97	34.29	38.45	47.90	51.71	74.00	-22.29	peak	
4 6815.551	10.64	36.00	37.47	43.24	52.41	74.00	-21.59	peak	
5 7320.000	10.05	36.37	37.00	42.62	52.04	74.00	-21.96	peak	
6 pp 9760.000	10.82	37.55	35.02	39.09	52.44	74.00	-21.56	peak	

Mode:a; Polarization:Vertical; Modulation Type:GFSK; Channel:middle



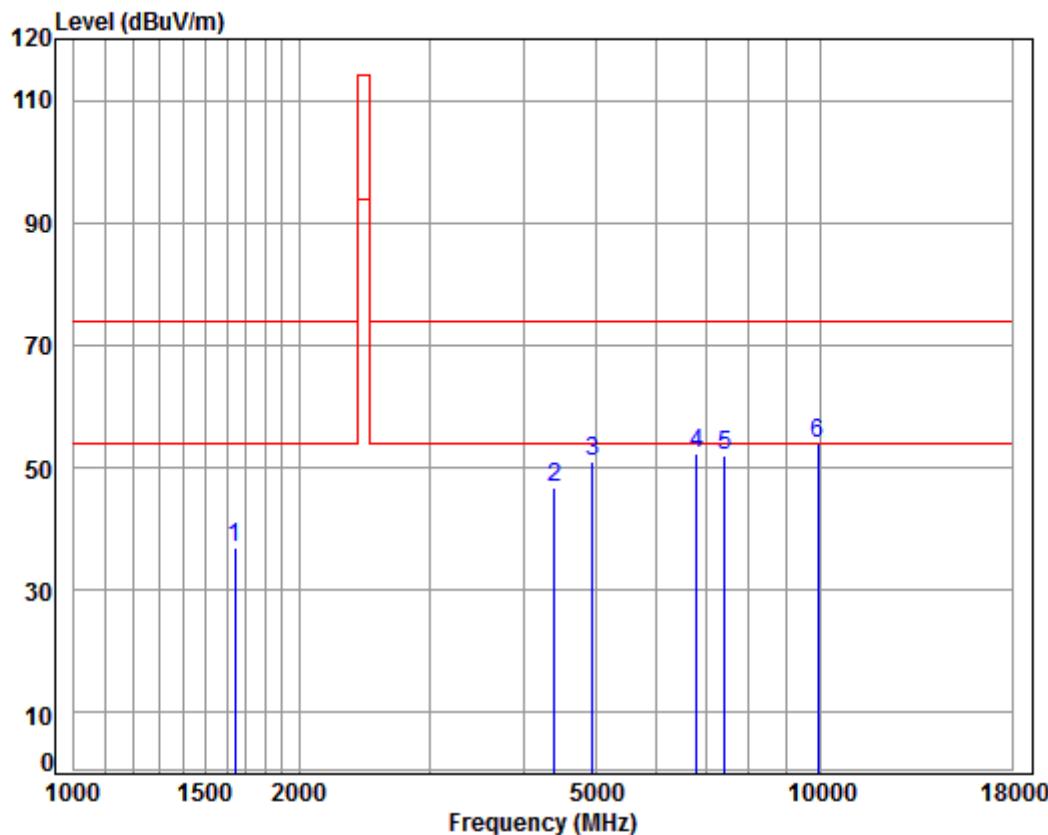
Condition: 3m VERTICAL

Job No : 09794CR

Mode : 2440 TX RSE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit		Over Limit	Remark
					dB	dBuV	dBuV/m	dBuV/m
1 1578.822	5.38	26.16	38.03	43.81	37.32	74.00	-36.68	peak
2 4133.699	7.14	33.60	38.07	44.50	47.17	74.00	-26.83	peak
3 4880.000	7.97	34.29	38.45	45.69	49.50	74.00	-24.50	peak
4 6954.852	10.25	36.38	37.34	43.73	53.02	74.00	-20.98	peak
5 7320.000	10.05	36.37	37.00	40.79	50.21	74.00	-23.79	peak
6 pp 9760.000	10.82	37.55	35.02	40.54	53.89	74.00	-20.11	peak

Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel:High



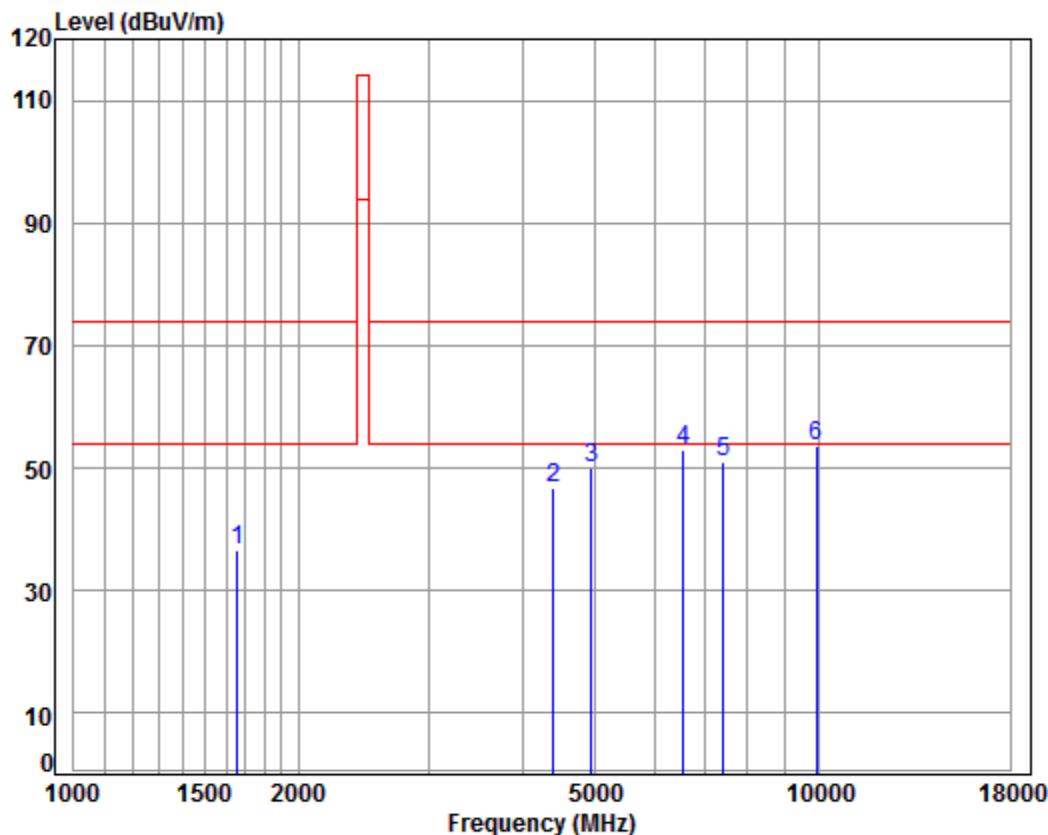
Condition: 3m HORIZONTAL

Job No : 09794CR

Mode : 2475 TX RSE

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit		Over Line	Over Limit	Remark
					dB	dB/m			
	MHz								
1	1644.019	5.30	26.44	38.03	43.21	36.92	74.00	-37.08	peak
2	4392.376	7.44	33.60	38.21	43.89	46.72	74.00	-27.28	peak
3	4950.000	8.04	34.41	38.48	47.11	51.08	74.00	-22.92	peak
4	6815.551	10.64	36.00	37.47	43.20	52.37	74.00	-21.63	peak
5	7425.000	10.02	36.33	36.90	42.40	51.85	74.00	-22.15	peak
6 pp	9900.000	10.89	37.58	34.95	40.31	53.83	74.00	-20.17	peak

Mode:a; Polarization:Vertical; Modulation Type:GFSK; Channel:High



Condition: 3m VERTICAL

Job No : 09794CR

Mode : 2475 TX RSE

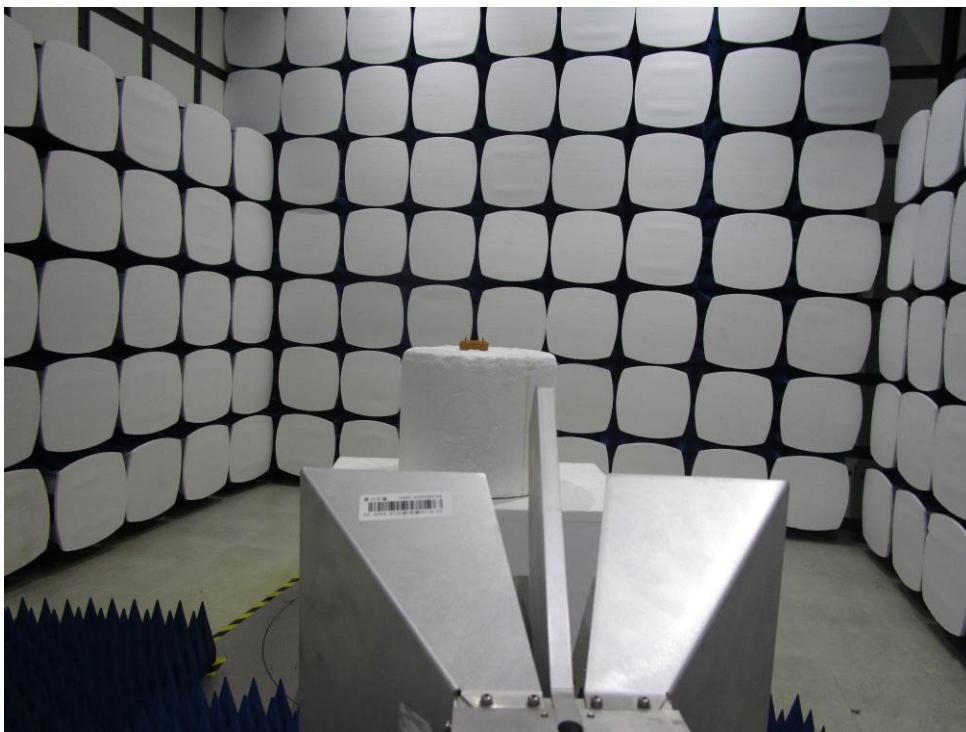
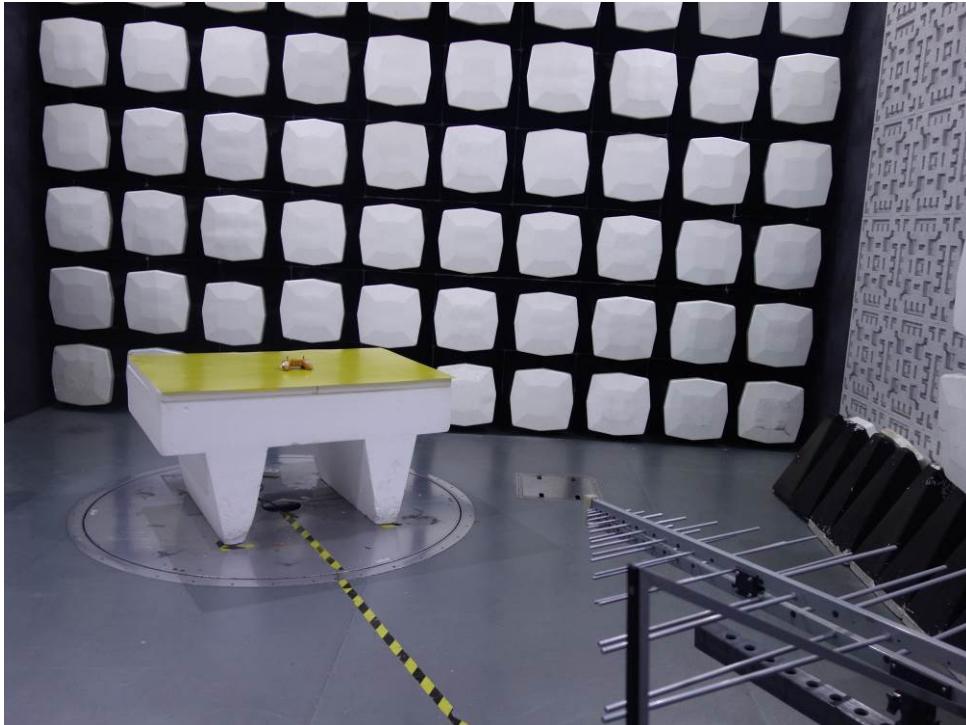
Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit		Over Limit	Remark
					dB	dB/m		
	MHz							
1	1658.337	5.28	26.50	38.03	42.93	36.68	74.00	-37.32 peak
2	4392.376	7.44	33.60	38.21	44.02	46.85	74.00	-27.15 peak
3	4950.000	8.04	34.41	38.48	45.92	49.89	74.00	-24.11 peak
4	6564.209	11.35	35.29	37.72	44.03	52.95	74.00	-21.05 peak
5	7425.000	10.02	36.33	36.90	41.66	51.11	74.00	-22.89 peak
6	pp 9900.000	10.89	37.58	34.95	40.17	53.69	74.00	-20.31 peak

Remark:

- 1) 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
- 2) Scan from 9kHz to 25GHz, the disturbance above 13GHz 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.
- 3) As shown in this section, 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. So, only the peak measurements were shown in the report.

8 Photographs

8.1 Radiated Emissions Test Setup



8.2 EUT Constructional Details

Refer to EUT external and internal photos.