

TEST REPORT

Application No.: SZEM2003001337CR
Applicant: RUNQIA TOYS FACTORY
Address of Applicant: CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA
Manufacturer: RUNQIA TOYS FACTORY
Address of Manufacturer: CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA

Equipment Under Test (EUT):

EUT Name: Remote control toy

Model No.: RQ2071, RQ2052, RQ2053, RQ2054, RQ2055, RQ2056, RQ2057, RQ2058, RQ2059, RQ2060, RQ2061, RQ2062, RQ2063, RQ2064, RQ2065, RQ2066, RQ2067, RQ2068, RQ2069, RQ2070, RQ2051, RQ2072, RQ2073, RQ2074, RQ2075, RQ2076, RQ2077, RQ2078, RQ2079, RQ2080, RQ2022, RQ2023, RQ2024, RQ2025, RQ2026, RQ2027, RQ2028, RQ2029, RQ2030, RQ2031, RQ2032, RQ2034, RQ2035, RQ2036, RQ2037, RQ2038, RQ2039, RQ2040, RQ2041, RQ2042, RQ2043, RQ2044, RQ2045, RQ2046, RQ2047, RQ2048, RQ2049, RQ2050, RQ2081, RQ2082, RQ2083, RQ2084, RQ2085, RQ2086, RQ2087, RQ2088, RQ2089, RQ2090, RQ2091, RQ2092, RQ2093, RQ2094, RQ2095, RQ2096, RQ2097, RQ2098, RQ2099, RQ2024A, RQ2020A, RQ2020B ♣

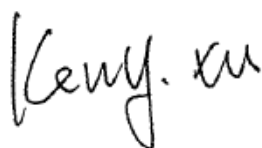
♣

Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.

FCC ID: 2AD4VRQ2071
Standard(s) : 47 CFR Part 15, Subpart C 15.249
Date of Receipt: 2020-03-10
Date of Test: 2020-03-11 to 2020-03-18
Date of Issue: 2020-03-19

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



Keny Xu
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-03-19		Original

Authorized for issue by:			
			
		Peter Geng /Project Engineer	
			
		Eric Fu /Reviewer	



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	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.: RQ2071, RQ2052, RQ2053, RQ2054, RQ2055, RQ2056, RQ2057, RQ2058, RQ2059, RQ2060, RQ2061, RQ2062, RQ2063, RQ2064, RQ2065, RQ2066, RQ2067, RQ2068, RQ2069, RQ2070, RQ2051, RQ2072, RQ2073, RQ2074, RQ2075, RQ2076, RQ2077, RQ2078, RQ2079, RQ2080, RQ2022, RQ2023, RQ2024, RQ2025, RQ2026, RQ2027, RQ2028, RQ2029, RQ2030, RQ2031, RQ2032, RQ2034, RQ2035, RQ2036, RQ2037, RQ2038, RQ2039, RQ2040, RQ2041, RQ2042, RQ2043, RQ2044, RQ2045, RQ2046, RQ2047, RQ2048, RQ2049, RQ2050, RQ2081, RQ2082, RQ2083, RQ2084, RQ2085, RQ2086, RQ2087, RQ2088, RQ2089, RQ2090, RQ2091, RQ2092, RQ2093, RQ2094, RQ2095, RQ2096, RQ2097, RQ2098, RQ2099, RQ2024A, RQ2020A, RQ2020B

Only the model RQ2071 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, only different on colour, appearance and packaging.

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4 General Information

4.1 Details of E.U.T.

Power Supply:	remote: DC 3.7V rechargeable battery which charged from USB port USB charger information,
Cable:	USB cable for remote: 47cm, unshielded
Antenna Gain:	0dBi
Antenna Type:	Integral antenna
Modulation Type:	GFSK
Number of Channels:	71
Operation Frequency:	2405MHz-2480MHz

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2405	27	2433	54	2460
1	2407	28	2434	55	2461
2	2408	29	2435	56	2462
3	2409	30	2436	57	2463
4	2410	31	2437	58	2464
5	2411	32	2438	59	2465
6	2412	33	2439	60	2466
7	2413	34	2440	61	2467
8	2414	35	2441	62	2468
9	2415	36	2442	63	2469
10	2416	37	2443	64	2470
11	2417	38	2444	65	2471
12	2418	39	2445	66	2472
13	2419	40	2446	67	2473
14	2420	41	2447	68	2474
15	2421	42	2448	69	2475
16	2422	43	2449	70	2480
17	2423	44	2450		
18	2424	45	2451		
19	2425	46	2452		
20	2426	47	2453		
21	2427	48	2454		
22	2428	49	2455		
23	2429	50	2456		
24	2430	51	2457		
25	2431	52	2458		
26	2432	53	2459		

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	$\pm 7.25 \times 10^{-8}$
2	Occupied Bandwidth	$\pm 3\%$
3	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
4	Temperature test	$\pm 1^\circ\text{C}$
5	Humidity test	$\pm 3\%$
6	Supply voltages	$\pm 1.5\%$
7	Time	$\pm 3\%$



4.4 Test Location

All tests were performed at:

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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:

- **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 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 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.

- **Innovation, Science and Economic Development Canada**

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

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2019-09-24	2020-09-23
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2019-04-01	2020-03-31
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27
Electric Field Probe	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019-07-11	2020-07-10
MXE EMI receiver (3Hz-3.6GHz)	KEYSIGHT	N9038A	SEM004-15	2019-12-16	2020-12-15
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31

Radiated Emissions (above 1GHz)

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
EXA Signal Analyzer (10Hz-44GHz)	Agilent Technologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2019-09-24	2020-09-23
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10

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

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
EXA Signal Analyzer (10Hz-44GHz)	Agilent Technologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2019-09-24	2020-09-23
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10



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Restricted Band Around Fundamental Frequency					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
EXA Signal Analyzer (10Hz-44GHz)	Agilent Technologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (800MHz-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2019-09-24	2020-09-23
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019-07-11	2020-07-10

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	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03



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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

Limit:

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.

6.1.2 Conclusion

EUT Antenna:

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

Antenna location: Refer to internal photos.



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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

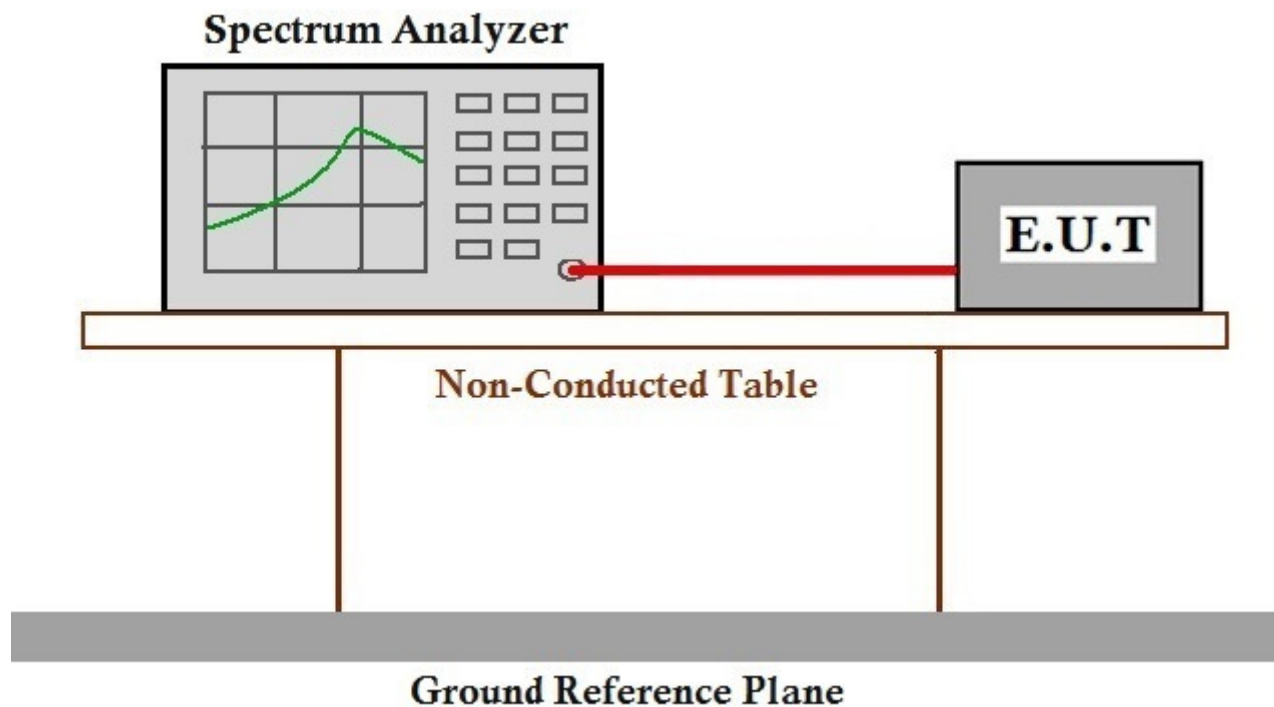
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1015 mbar

Test mode b:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram



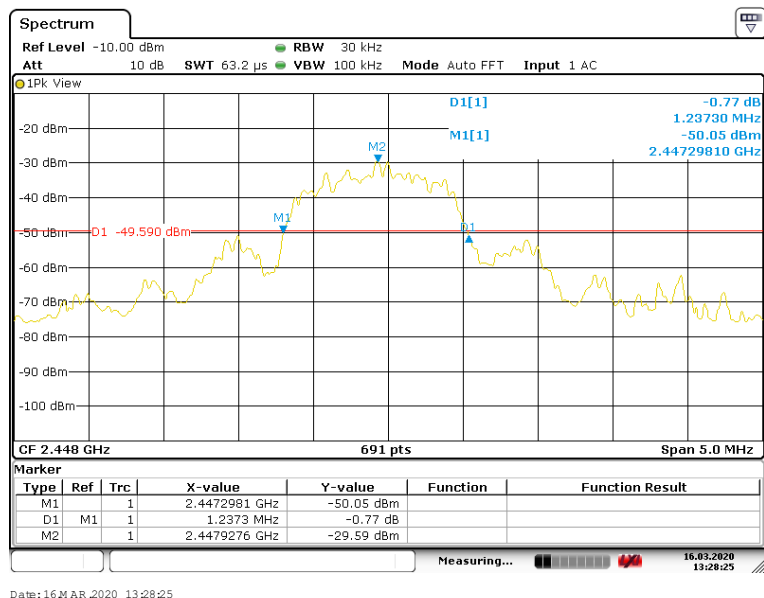
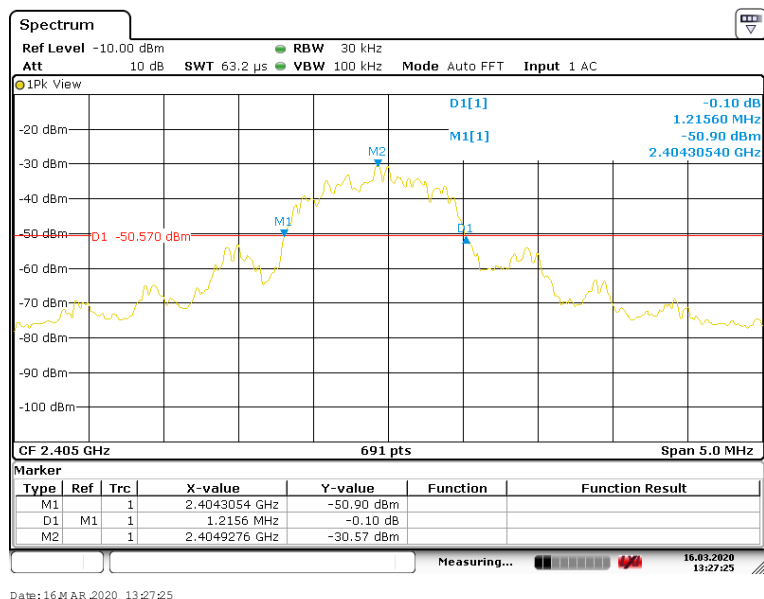
7.1.3 Measurement Procedure and Data



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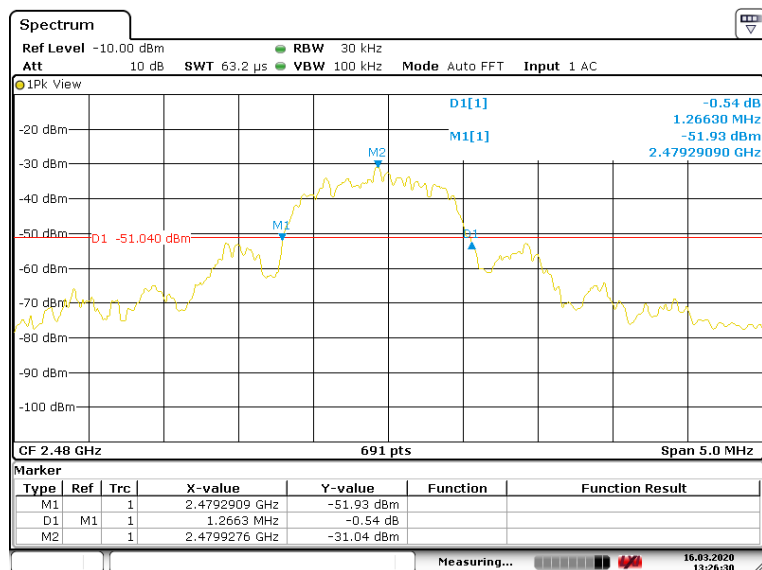


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Date: 16 MAR 2020 13:26:31



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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:

Fundamental frequency(MHz)	Field strength of fundamental(millivolts/meter)	Field strength of harmonics(microvolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

Remark: The frequencies above 1000MHz 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 fundamental frequency in "902-928MHz", the field strength of fundamental is based on Quasi-Peak.



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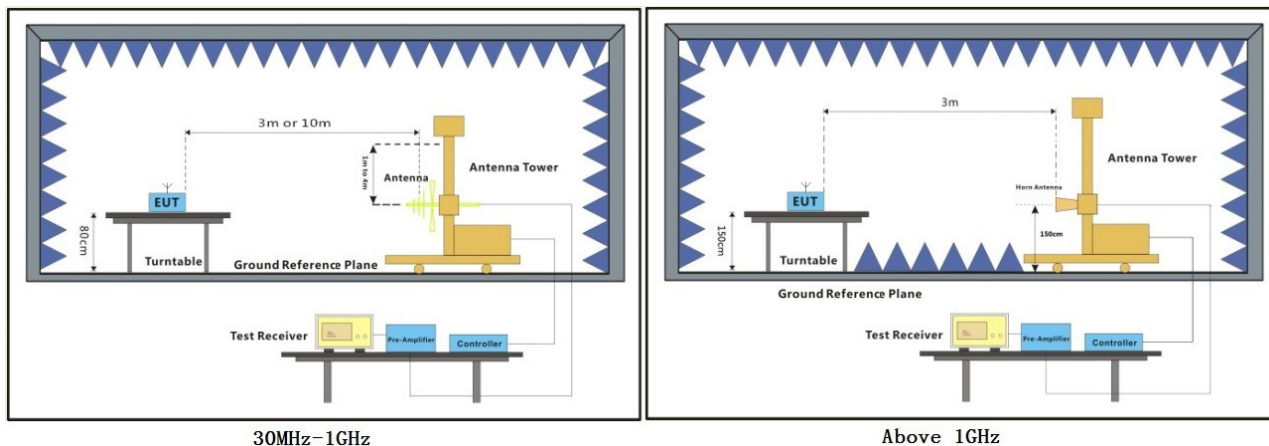
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 21 °C Humidity: 55 % RH Atmospheric Pressure: 1020 mbar

Test mode b: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

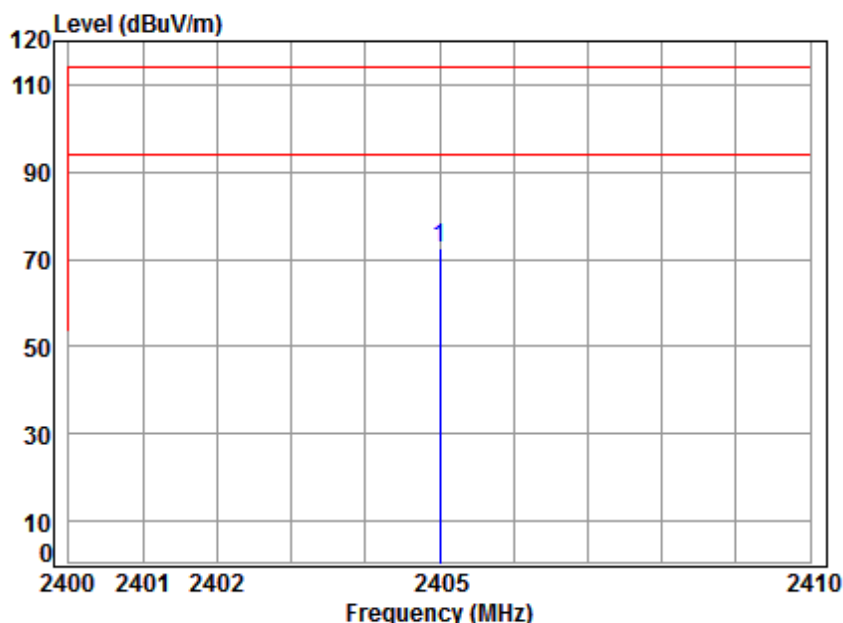


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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Condition: 3m HORIZONTAL

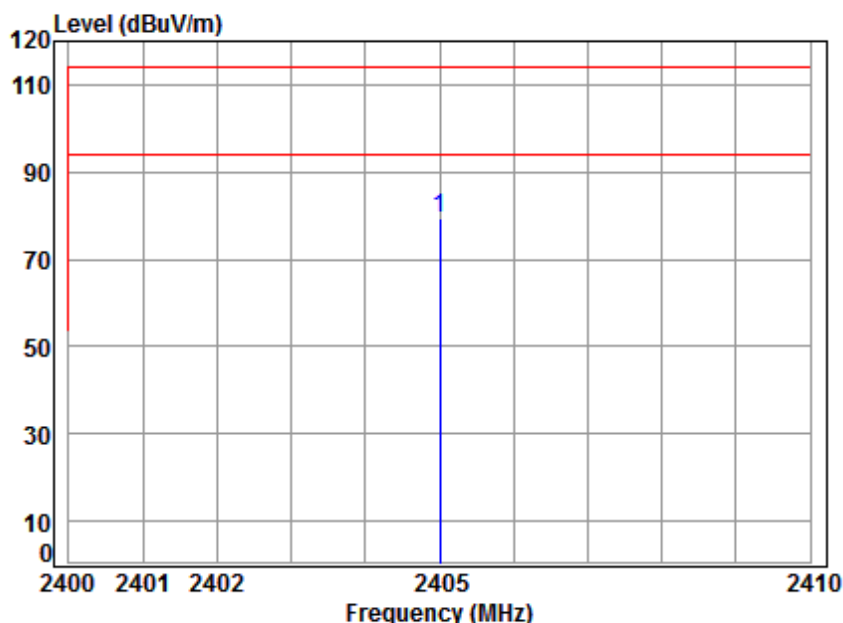
Job No : 01337CR

Mode : 2405 Field Strength

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp 2405.000	5.49	29.12	41.88	79.79	72.52	114.00	-41.48	peak



Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Condition: 3m VERTICAL

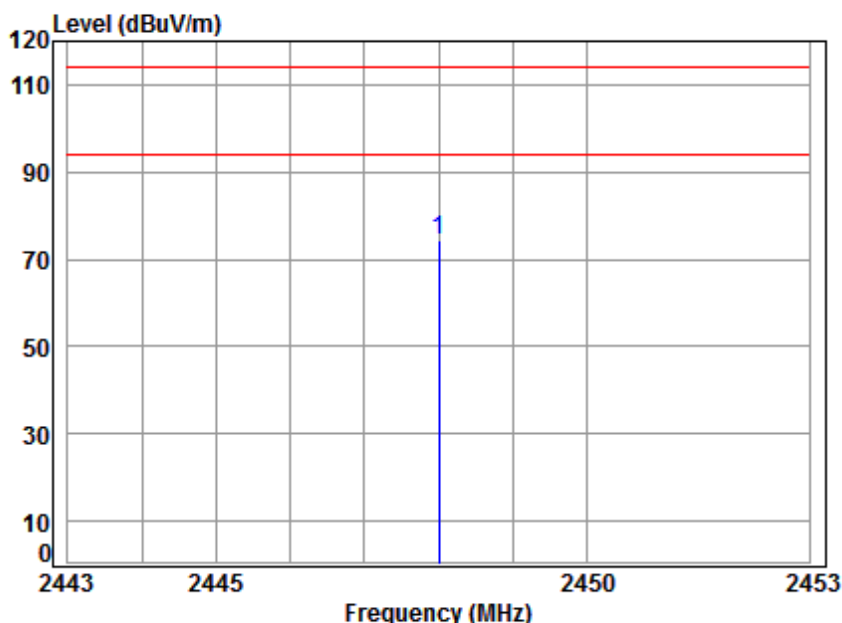
Job No : 01337CR

Mode : 2405 Field Strength

	Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp 2405.000	5.49	29.12	41.88	86.84	79.57	114.00	-34.43 peak



Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



Condition: 3m HORIZONTAL

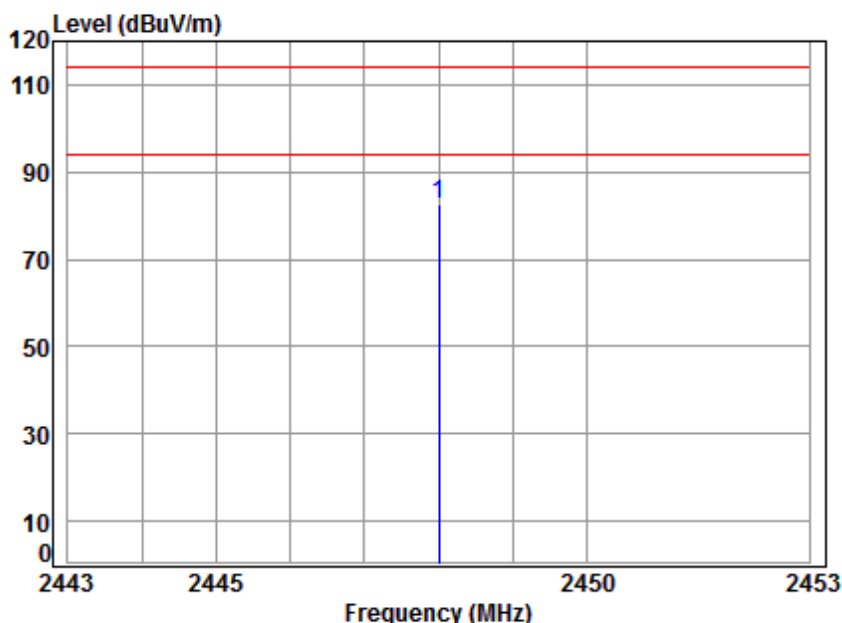
Job No : 01337CR

Mode : 2448 Field Strength

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp 2448.000	5.55	29.25	41.90	81.63	74.53	114.00	-39.47	Peak



Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



Condition: 3m VERTICAL

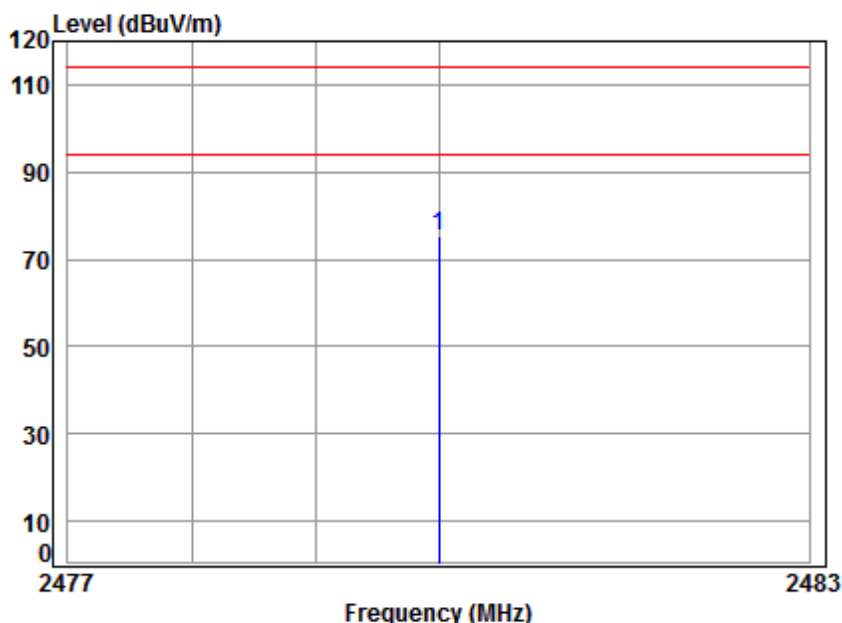
Job No : 01337CR

Mode : 2448 Field Strength

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp 2448.000	5.55	29.25	41.90	89.70	82.60	114.00	-31.40	Peak



Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Condition: 3m HORIZONTAL

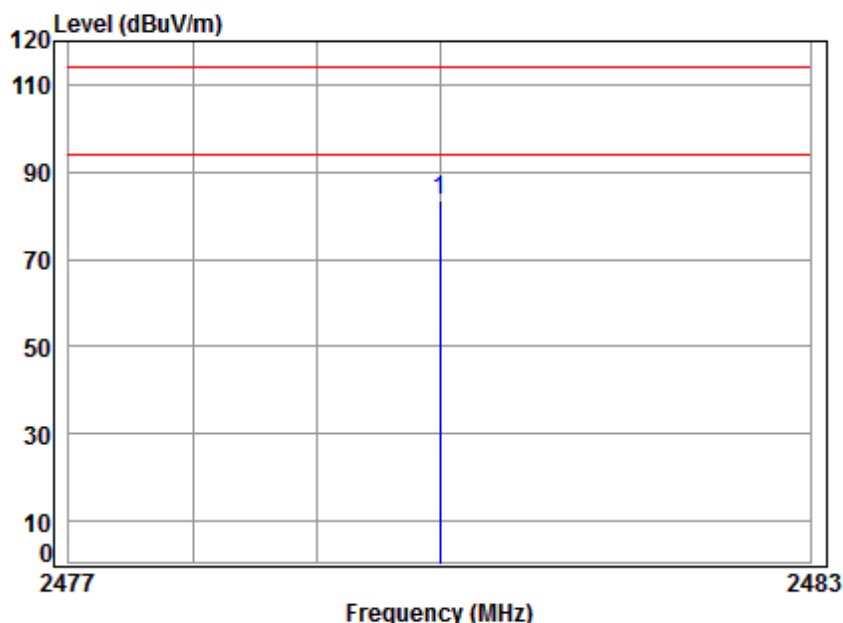
Job No : 01337CR

Mode : 2480 Field Strength

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp 2480.000	5.59	29.34	41.91	82.10	75.12	114.00	-38.88	peak



Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Condition: 3m VERTICAL

Job No : 01337CR

Mode : 2480 Field Strength

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp 2480.000	5.59	29.34	41.91	90.46	83.48	114.00	-30.52	peak



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

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.

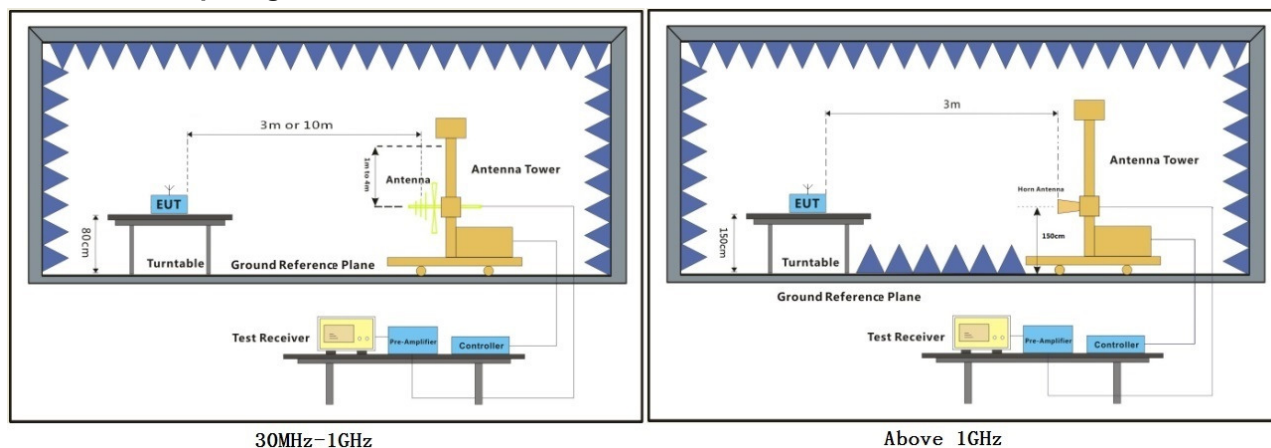
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1015 mbar

Test mode b:TX mode_Keep the EUT in transmitting with modulation mode.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

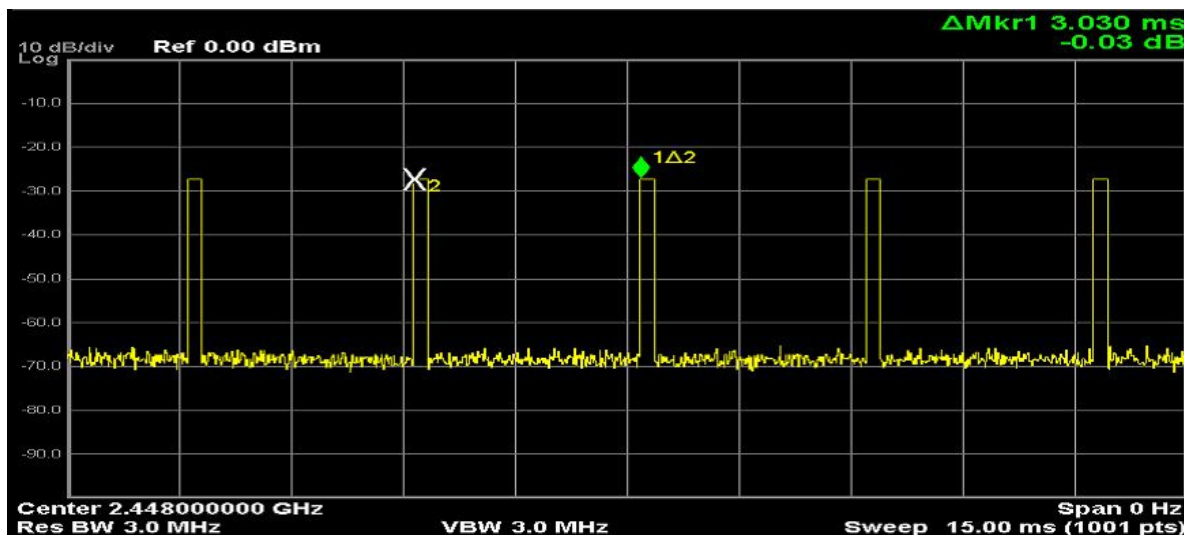
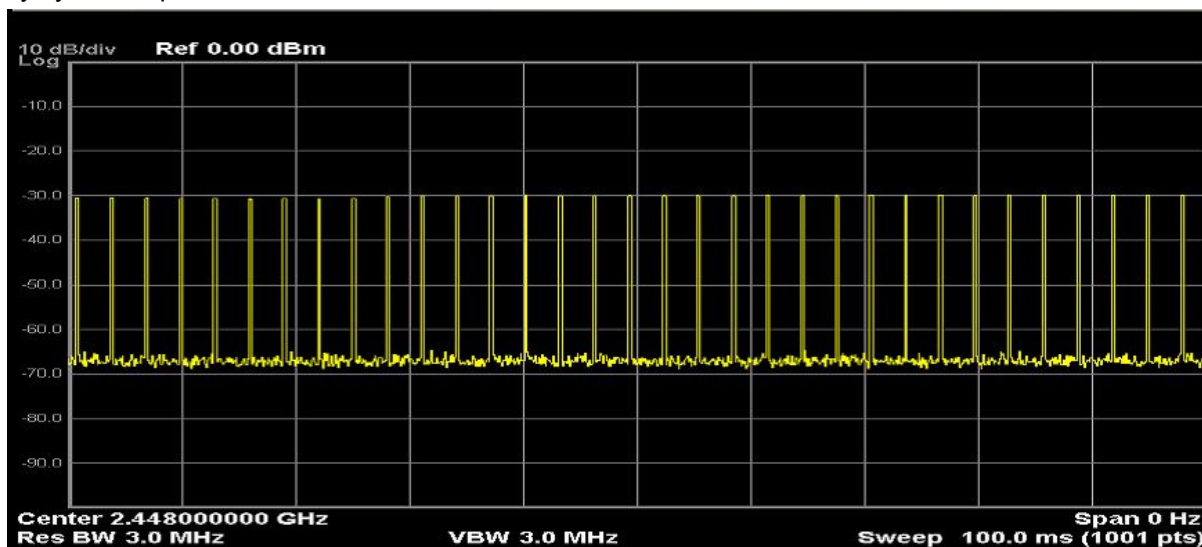
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- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or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

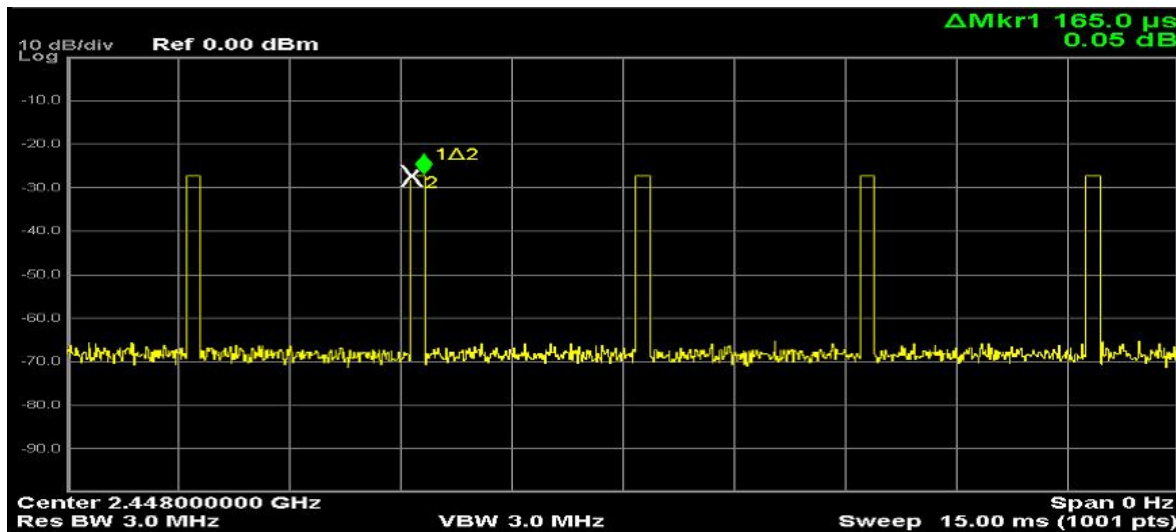
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Average value:

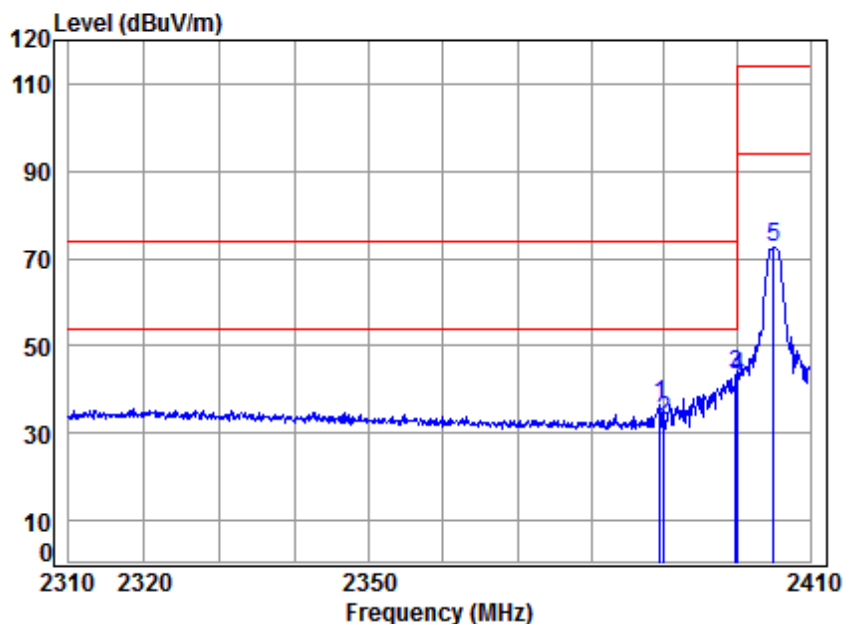
Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =0.165ms
	T period =3.03ms
	PDCF value= -25.28dB

Duty cycle test plots:





Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Condition: 3m HORIZONTAL

Job No : 01337CR

Mode : 2405 Band edge

		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2389.356	5.47	29.08	41.87	43.97	36.65	74.00	-37.35	peak
2	2390.000	5.47	29.08	41.87	40.25	32.93	74.00	-41.07	peak
3 pp	2399.808	5.49	29.11	41.88	50.74	43.46	74.00	-30.54	peak
4	2400.000	5.49	29.11	41.88	50.21	42.93	74.00	-31.07	peak
5	2405.000	5.49	29.12	41.88	79.79	72.52	114.00	-41.48	peak

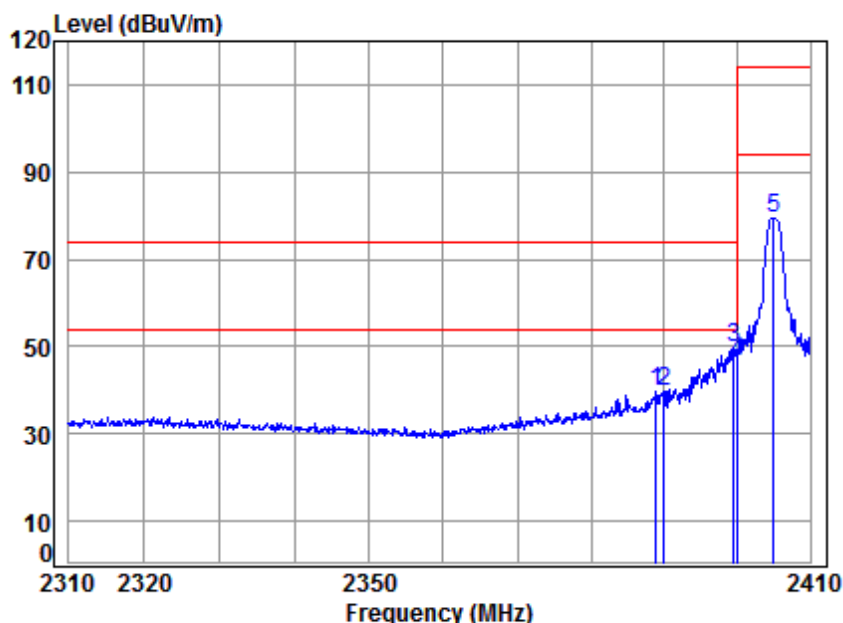


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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Condition: 3m VERTICAL

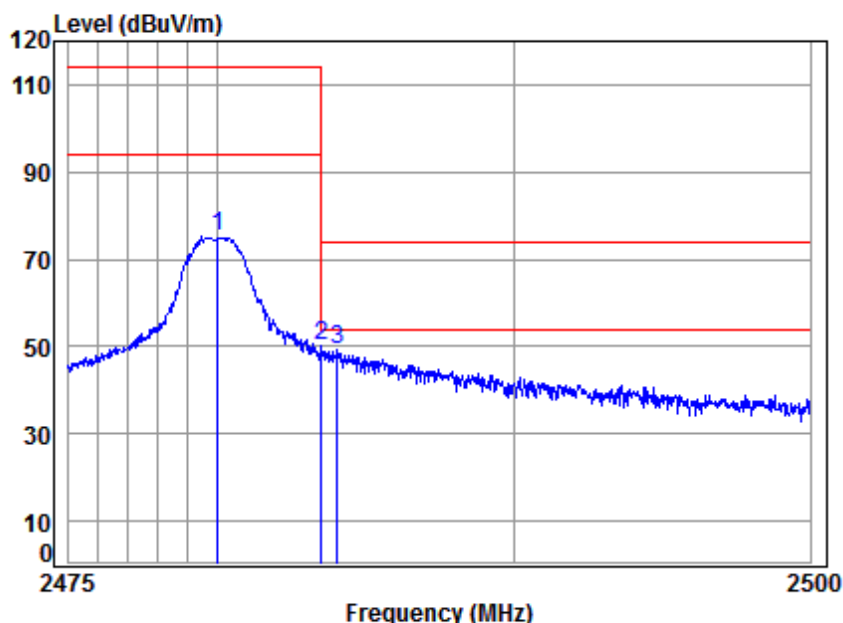
Job No : 01337CR

Mode : 2405 Band edge

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2388.850	5.47	29.07	41.87	46.87	39.54	74.00	-34.46 peak
2	2390.000	5.47	29.08	41.87	46.84	39.52	74.00	-34.48 peak
3	pp 2399.503	5.49	29.11	41.88	57.07	49.79	74.00	-24.21 peak
4	2400.000	5.49	29.11	41.88	53.60	46.32	74.00	-27.68 peak
5	2405.000	5.49	29.12	41.88	86.84	79.57	114.00	-34.43 peak



Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Condition: 3m HORIZONTAL

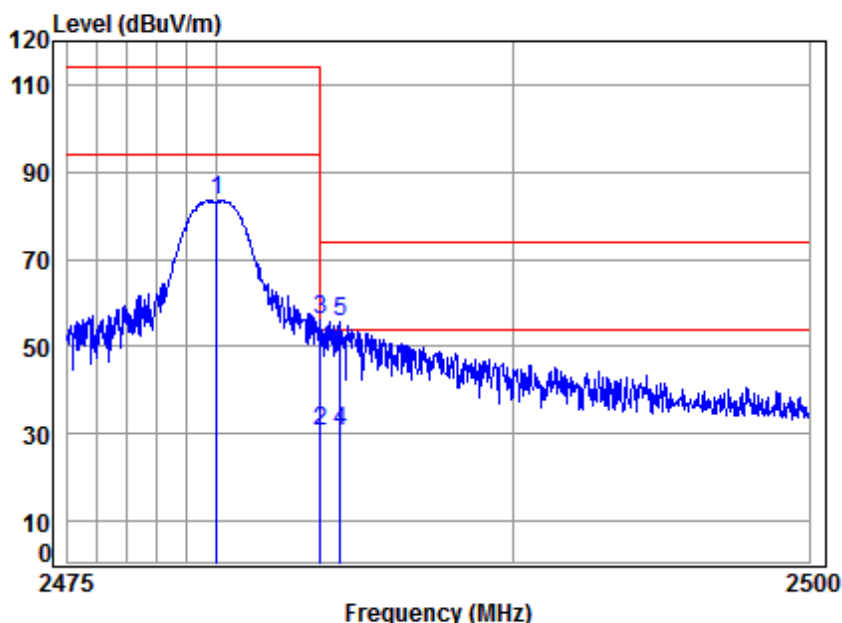
Job No : 01337CR

Mode : 2480 Band edge

		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2480.000	5.59	29.34	41.91	82.10	75.12	114.00	-38.88	peak
2	pp 2483.500	5.60	29.35	41.91	56.97	50.01	74.00	-23.99	peak
3	2484.021	5.60	29.35	41.91	56.09	49.13	74.00	-24.87	peak



Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Condition: 3m VERTICAL

Job No : 01337CR

Mode : 2480 Band edge

		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2480.000	5.59	29.34	41.91	90.46	83.48	114.00	-30.52	peak
2	av 2483.500	5.60	29.35	41.91	37.68	30.72	54.00	-23.28	Average
3	pp 2483.500	5.60	29.35	41.91	62.96	56.00	74.00	-18.00	peak
4	2484.146	5.60	29.35	41.91	37.41	30.45	54.00	-23.55	Average
5	2484.146	5.60	29.35	41.91	62.69	55.73	74.00	-18.27	peak



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

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



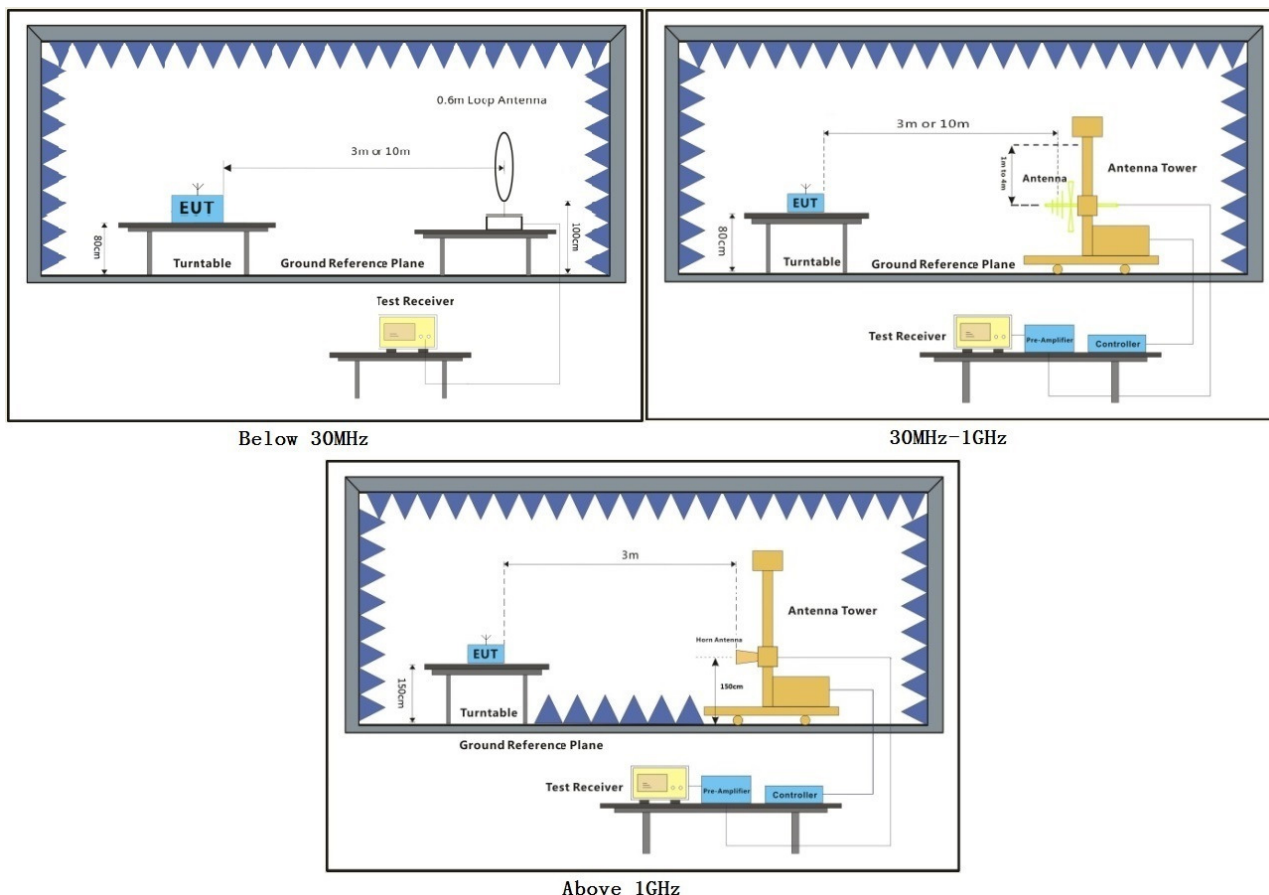
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.8 °C Humidity: 56.1 % RH Atmospheric Pressure: 1020 mbar

Test mode b:TX mode_Keep the EUT in transmitting with modulation mode.

7.4.2 Test Setup Diagram

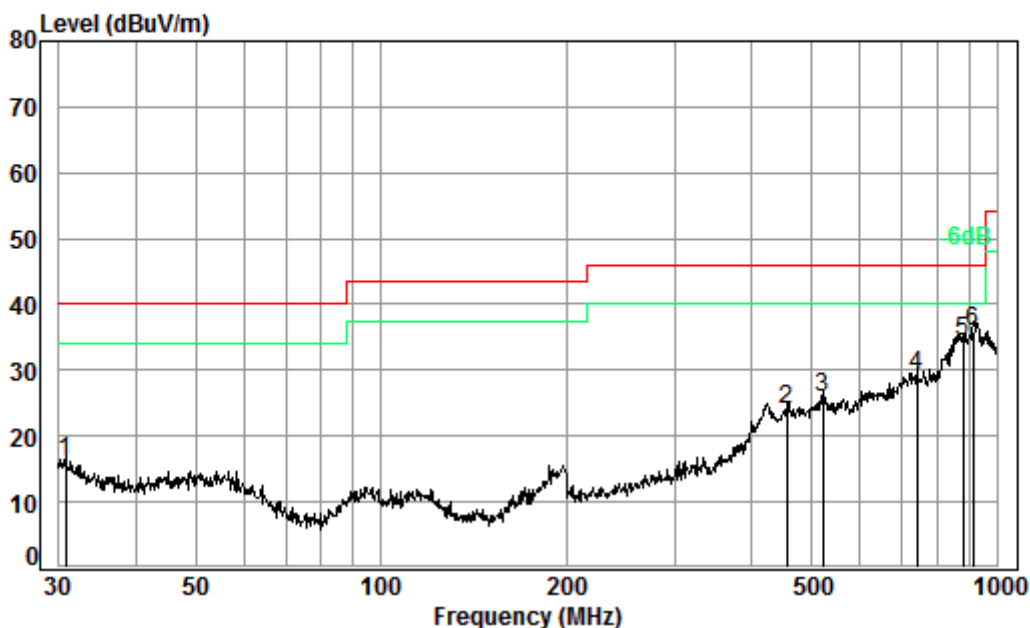


7.4.3 Measurement Procedure and Data

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.

below 1GHz

Mode:b; Polarization:Horizontal; Detector: QP



Condition: 3m HORIZONTAL

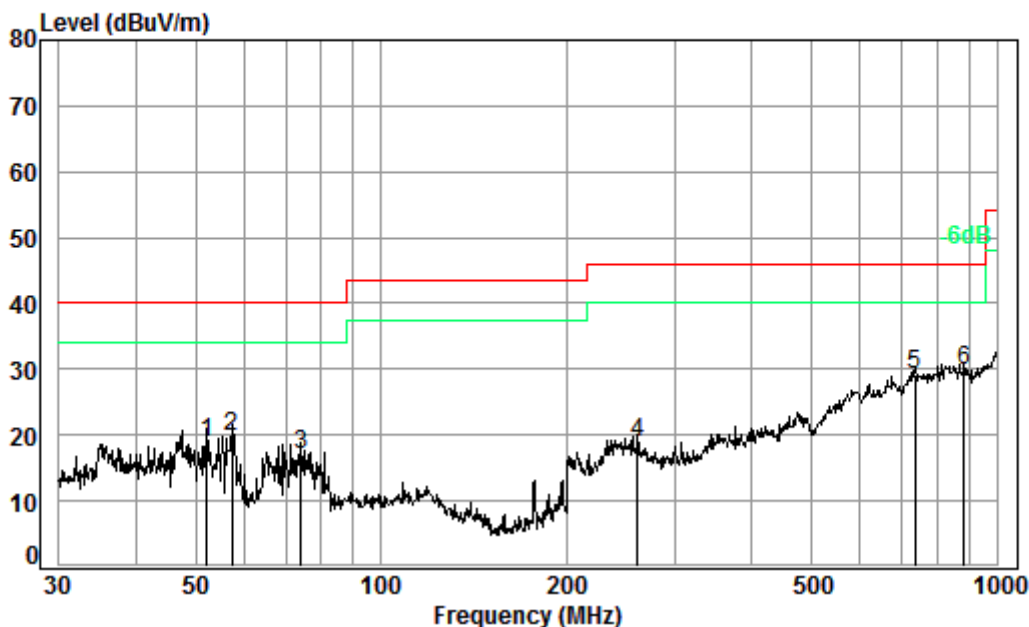
Job No. : 01337CR

Test Mode: b

	Freq	Cable	Ant	Preamp	Read	Limit	Over
	MHz	Loss	Factor	Factor	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m
1	30.75	0.60	22.07	27.67	21.01	16.01	40.00
2	455.91	2.43	23.69	27.82	25.84	24.14	46.00
3	520.89	2.62	25.05	27.84	26.07	25.90	46.00
4	742.26	3.03	28.16	27.49	25.65	29.35	46.00
5	881.41	3.53	29.57	27.14	28.37	34.33	46.00
6 pp	916.07	3.62	29.88	27.03	29.30	35.77	46.00



Mode:b; Polarization:Vertical; Detector: QP



Condition: 3m VERTICAL

Job No. : 01337CR

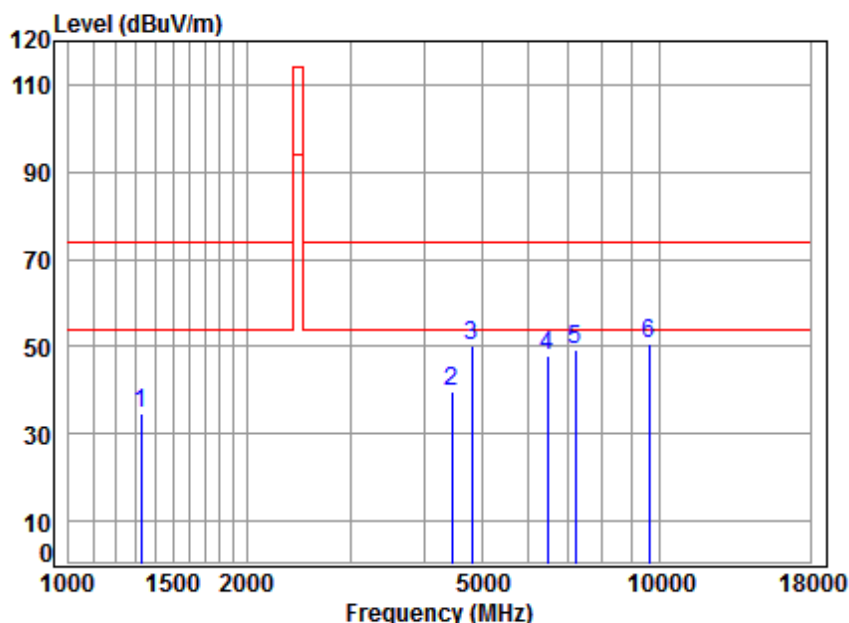
Test Mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	52.21	0.80	13.96	27.59	31.79	18.96	40.00	-21.04
2	57.19	0.80	13.46	27.57	32.98	19.67	40.00	-20.33
3	74.14	0.93	12.46	27.52	31.02	16.89	40.00	-23.11
4	261.06	1.73	19.08	27.54	25.68	18.95	46.00	-27.05
5	737.07	3.02	28.13	27.50	25.66	29.31	46.00	-16.69
6 pp	884.50	3.54	29.61	27.13	23.94	29.96	46.00	-16.04



above 1GHz

Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Condition: 3m HORIZONTAL

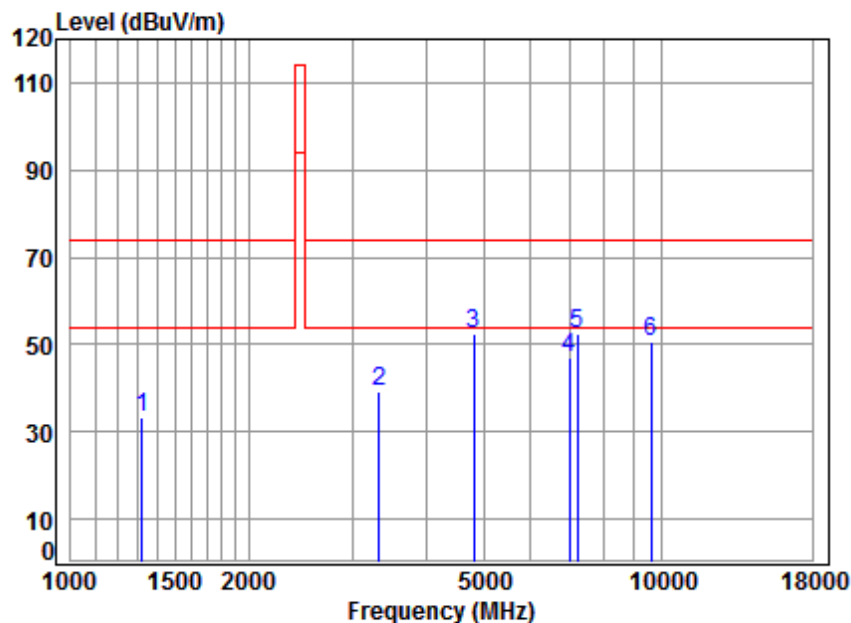
Job No : 01337CR

Mode : 2405 TX SE

	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	dB	
1	1323.614	4.88	25.06	41.28	45.96	34.62	74.00	-39.38	peak
2	4456.315	7.51	33.60	42.41	41.19	39.89	74.00	-34.11	peak
3	4810.000	7.90	34.17	42.47	50.72	50.32	74.00	-23.68	peak
4	6470.026	11.48	35.08	41.24	42.71	48.03	74.00	-25.97	peak
5	7215.000	10.07	36.41	40.71	43.49	49.26	74.00	-24.74	peak
6 pp	9620.000	10.75	37.52	37.72	40.26	50.81	74.00	-23.19	peak



Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Condition: 3m VERTICAL

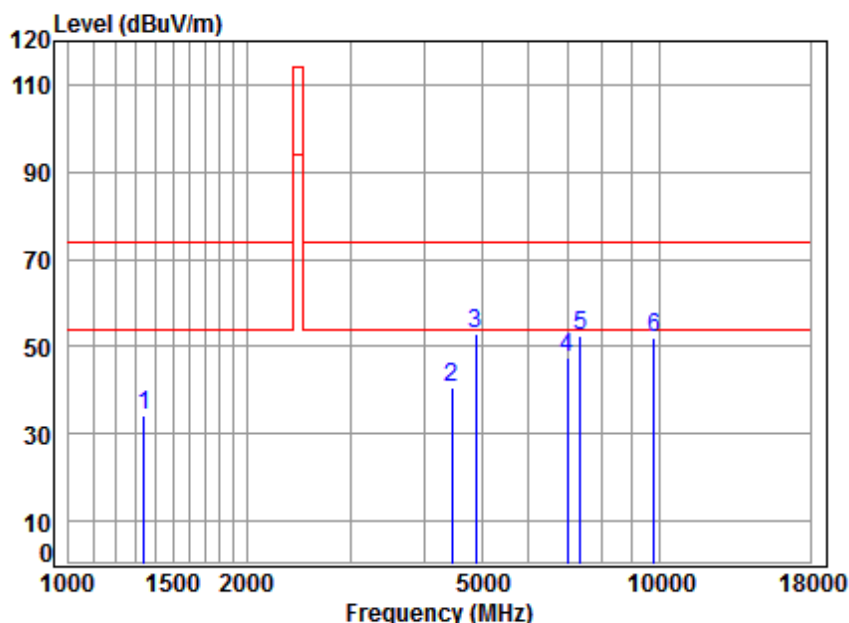
Job No : 01337CR

Mode : 2405 TX SE

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1319.794	4.87	25.04	41.28	44.84	33.47	74.00	-40.53 peak
2	3328.077	6.30	31.91	42.18	43.32	39.35	74.00	-34.65 peak
3	pp 4810.000	7.90	34.17	42.47	52.80	52.40	74.00	-21.60 peak
4	6995.172	10.14	36.49	40.86	41.02	46.79	74.00	-27.21 peak
5	7215.000	10.07	36.41	40.71	46.50	52.27	74.00	-21.73 peak
6	9620.000	10.75	37.52	37.72	39.98	50.53	74.00	-23.47 peak



Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



Condition: 3m HORIZONTAL

Job No : 01337CR

Mode : 2448 TX SE

	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	dB	
1	1339.006	4.94	25.13	41.29	45.31	34.09	74.00	-39.91	peak
2	4456.315	7.51	33.60	42.41	42.03	40.73	74.00	-33.27	peak
3 pp	4896.000	7.98	34.32	42.48	52.89	52.71	74.00	-21.29	peak
4	6974.982	10.20	36.43	40.87	41.67	47.43	74.00	-26.57	peak
5	7344.000	10.04	36.36	40.62	46.65	52.43	74.00	-21.57	peak
6	9792.000	10.84	37.56	37.48	40.88	51.80	74.00	-22.20	peak

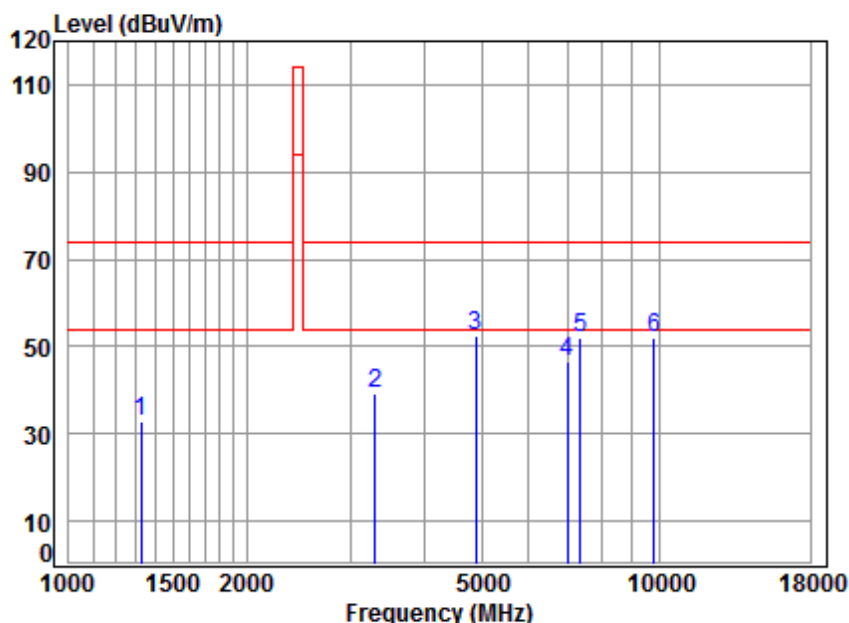


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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



Condition: 3m VERTICAL

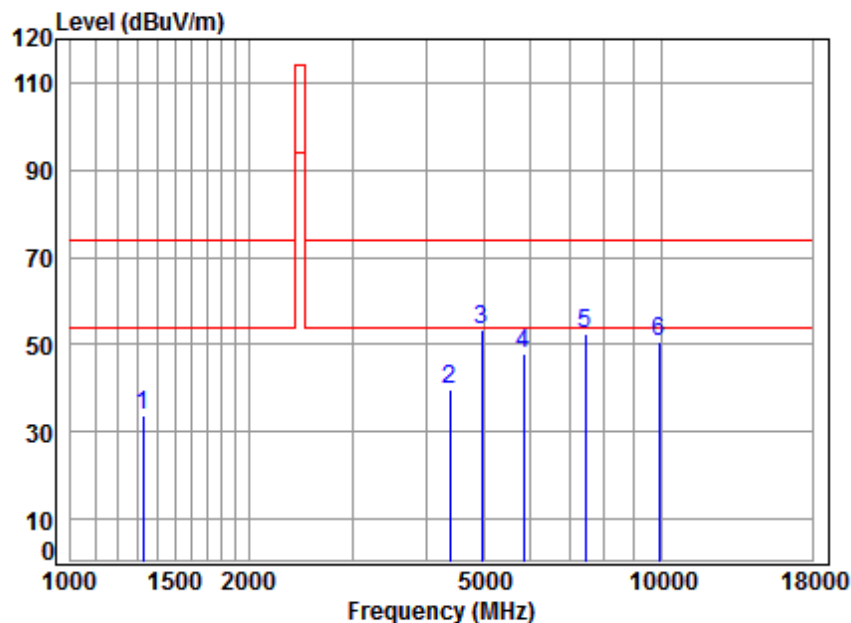
Job No : 01337CR

Mode : 2448 TX SE

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1323.614	4.88	25.06	41.28	44.39	33.05	74.00	-40.95 peak
2	3308.894	6.29	31.87	42.18	43.11	39.09	74.00	-34.91 peak
3	4896.000	7.98	34.32	42.48	52.59	52.41	74.00	-21.59 peak
4	6995.172	10.14	36.49	40.86	40.73	46.50	74.00	-27.50 peak
5	7344.000	10.04	36.36	40.62	46.35	52.13	74.00	-21.87 peak
6	9792.000	10.84	37.56	37.48	40.93	51.85	74.00	-22.15 peak



Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Condition: 3m HORIZONTAL

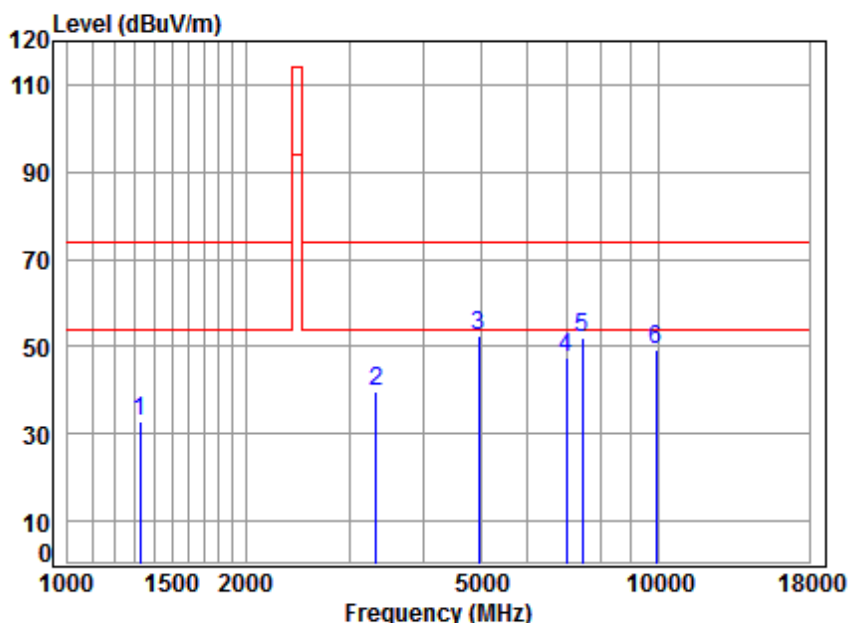
Job No : 01337CR

Mode : 2480 TX SE

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1323.614	4.88	25.06	41.28	45.31	33.97	74.00	-40.03 peak
2	4379.699	7.43	33.60	42.40	41.28	39.91	74.00	-34.09 peak
3	4960.000	8.05	34.43	42.49	53.46	53.45	74.00	-20.55 peak
4	5847.517	10.06	34.61	41.73	45.03	47.97	74.00	-26.03 peak
5	7440.000	10.02	36.32	40.56	46.88	52.66	74.00	-21.34 peak
6	9920.000	10.90	37.58	37.31	39.43	50.60	74.00	-23.40 peak



Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Condition: 3m VERTICAL

Job No : 01337CR

Mode : 2480 TX SE

	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	dB	
1	1323.614	4.88	25.06	41.28	44.11	32.77	74.00	-41.23	peak
2	3328.077	6.30	31.91	42.18	43.72	39.75	74.00	-34.25	peak
3 pp	4960.000	8.05	34.43	42.49	52.70	52.69	74.00	-21.31	peak
4	6995.172	10.14	36.49	40.86	41.68	47.45	74.00	-26.55	peak
5	7440.000	10.02	36.32	40.56	46.23	52.01	74.00	-21.99	peak
6	9920.000	10.90	37.58	37.31	38.27	49.44	74.00	-24.56	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 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.
- 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 above measurement data were shown in the report.



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8 Photographs

8.1 EUT Test Setup

Please refer to setup photos.

8.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos.

- End of the Report -