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Shenzhen Branch**

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Report No.: SZEM180400346402
Page: 1 of 42

TEST REPORT

Application No.: SZEM1804003464CR(SGS SZ No.:T51810220192EM)
Applicant: DOBLEEAGLE INDUSTRY (CHINA) LIMITED
Address of Applicant: XINGDA INDUSTRIAL PARK, CHENGHAI, SHANTOU CITY,
GUANGDONG PROVINCE, China
Manufacturer: DOBLEEAGLE INDUSTRY(CHINA) LIMITED
Buyer: DOBLEEAGLE INDUSTRY(CHINA) LIMITED
Equipment Under Test (EUT):
EUT Name: Radio Control Toys
Model No.: E511-003
Request Age Grading: 3+
Country of Origin: China
FCC ID: 2AAFASY- E511-003-01
Standard(s) : 47 CFR Part 15, Subpart C 15.249
Date of Receipt: 2018-05-10
Date of Test: 2018-05-16 to 2018-05-22
Date of Issue: 2018-05-24

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



Keny Xu
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		2018-05-24		Original

Authorized for issue by:				
				
		<hr/>		
		Moon Zhang /Project Engineer		
				
		<hr/>		
		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



3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION	5
4.1 DETAILS OF E.U.T.	5
4.2 CHANNEL LIST:	5
4.3 DESCRIPTION OF SUPPORT UNITS	6
4.4 MEASUREMENT UNCERTAINTY	6
4.5 TEST LOCATION.....	7
4.6 TEST FACILITY.....	7
4.7 DEVIATION FROM STANDARDS.....	7
4.8 ABNORMALITIES FROM STANDARD CONDITIONS	7
5 EQUIPMENT LIST.....	8
6 RADIO SPECTRUM TECHNICAL REQUIREMENT	11
6.1 ANTENNA REQUIREMENT	11
6.1.1 Test Requirement:	11
6.1.2 Conclusion	11
7 RADIO SPECTRUM MATTER TEST RESULTS.....	12
7.1 20dB BANDWIDTH	12
7.1.1 E.U.T. Operation	12
7.1.2 Test Setup Diagram	12
7.1.3 Measurement Procedure and Data.....	12
7.2 FIELD STRENGTH OF THE FUNDAMENTAL SIGNAL (15.249(A)).....	15
7.2.1 E.U.T. Operation	15
7.2.2 Test Setup Diagram	15
7.2.3 Measurement Procedure and Data.....	16
7.3 RESTRICTED BAND AROUND FUNDAMENTAL FREQUENCY	24
7.3.1 E.U.T. Operation	24
7.3.2 Test Setup Diagram	24
7.3.3 Measurement Procedure and Data.....	25
7.4 RADIATED EMISSIONS	30
7.4.1 E.U.T. Operation	30
7.4.2 Test Setup Diagram	31
7.4.3 Measurement Procedure and Data.....	31
8 PHOTOGRAPHS.....	41
8.1 RESTRICTED BAND AROUND FUNDAMENTAL FREQUENCY TEST SETUP	41
8.2 RADIATED EMISSIONS TEST SETUP	42
8.3 EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS).....	42



4 General Information

4.1 Details of E.U.T.

Power supply:	Remote: DC 3V by 2x1.5V "AA" batteries Car: DC 4.8V rechargeable battery which charged from USB port & DC 4.5V by 3x1.5V "AA" batteries
Cable:	USB charging line: 60cm, unshielded
Internal source:	12MHz
Operation Frequency	2402-2480MHz
Number of Channels	79
Modulation Type	GFSK
Channel Spacing	1MHz
Antenna Type	Wire antenna
Antenna Gain	2dBi

4.2 Channel list:

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	21	2422	41	2442	61	2462
2	2403	22	2423	42	2443	62	2463
3	2404	23	2424	43	2444	63	2464
4	2405	24	2425	44	2445	64	2465
5	2406	25	2426	45	2446	65	2466
6	2407	26	2427	46	2447	66	2467
7	2408	27	2428	47	2448	67	2468
8	2409	28	2429	48	2449	68	2469
9	2410	29	2430	49	2450	69	2470
10	2411	30	2431	50	2451	70	2471
11	2412	31	2432	51	2452	71	2472
12	2413	32	2433	52	2453	72	2473
13	2414	33	2434	53	2454	73	2474
14	2415	34	2435	54	2455	74	2475
15	2416	35	2436	55	2456	75	2476
16	2417	36	2437	56	2457	76	2477
17	2418	37	2438	57	2458	77	2478
18	2419	38	2439	58	2459	78	2479
19	2420	39	2440	59	2460	79	2480
20	2421	40	2441	60	2461	80	0

Selected Test Channel	
Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The highest channel	2480MHz

4.3 Description of Support Units

The EUT has been tested as an independent unit.

4.4 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 (Below 1GHz)
		4.8dB (Above 1GHz)
9	Temperature test	1 °C
10	Humidity test	3%
11	Supply voltages	1.5%
12	Time	3%



4.5 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.

4.6 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 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.

- **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.

4.7 Deviation from Standards

None

4.8 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	2017-09-27	2018-09-26
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2017-09-27	2018-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2017-07-13	2018-07-12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2017-09-27	2018-09-26
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2017-09-27	2018-09-26

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	2017-07-13	2018-07-12
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2017-09-27	2018-09-26
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	2018-04-02	2019-04-01

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	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2017-07-13	2018-07-12
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2018-04-02	2019-04-01
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2017-09-27	2018-09-26
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2017-09-27	2018-09-27



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

Report No.: SZEM180400346402

Page: 9 of 42

Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2018-04-02	2019-04-01
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2018-04-02	2019-04-01
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
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

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	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2017-07-13	2018-07-12
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2018-04-02	2019-04-01
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2017-09-27	2018-09-26
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2017-09-27	2018-09-27
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2018-04-02	2019-04-01
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2018-04-02	2019-04-01
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
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

Radiated Emissions

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2017-07-13	2018-07-12
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2018-04-02	2019-04-01
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26



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

Report No.: SZEM180400346402

Page: 10 of 42

Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2017-09-27	2018-09-26
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118- 352810	SEM005-05	2017-09-27	2018-09-27
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2018-04-02	2019-04-01
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2018-04-02	2019-04-01
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2017-09-27	2018-09-26
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

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	2017-09-29	2018-09-28
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2017-09-29	2018-09-28
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2017-09-29	2018-09-28
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2018-04-08	2019-04-07

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart 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.

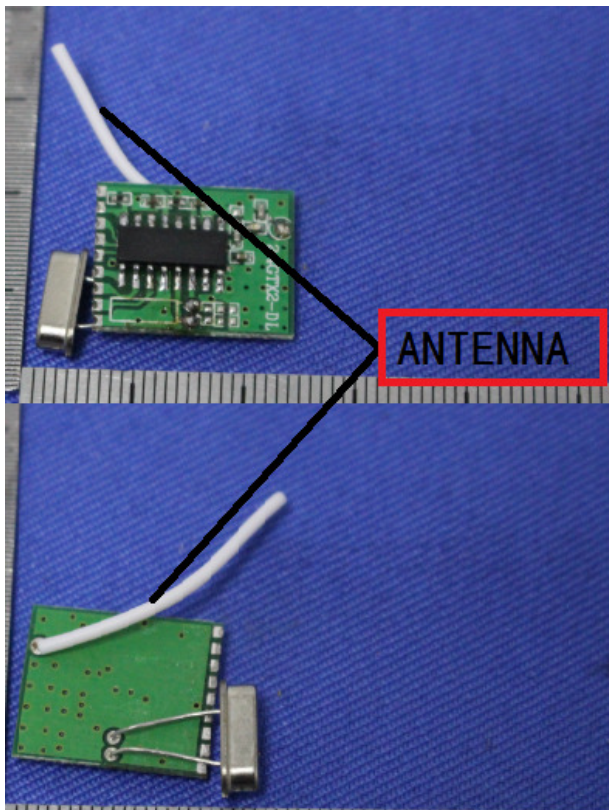
6.1.2 Conclusion

Standard Requirement:

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

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.



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

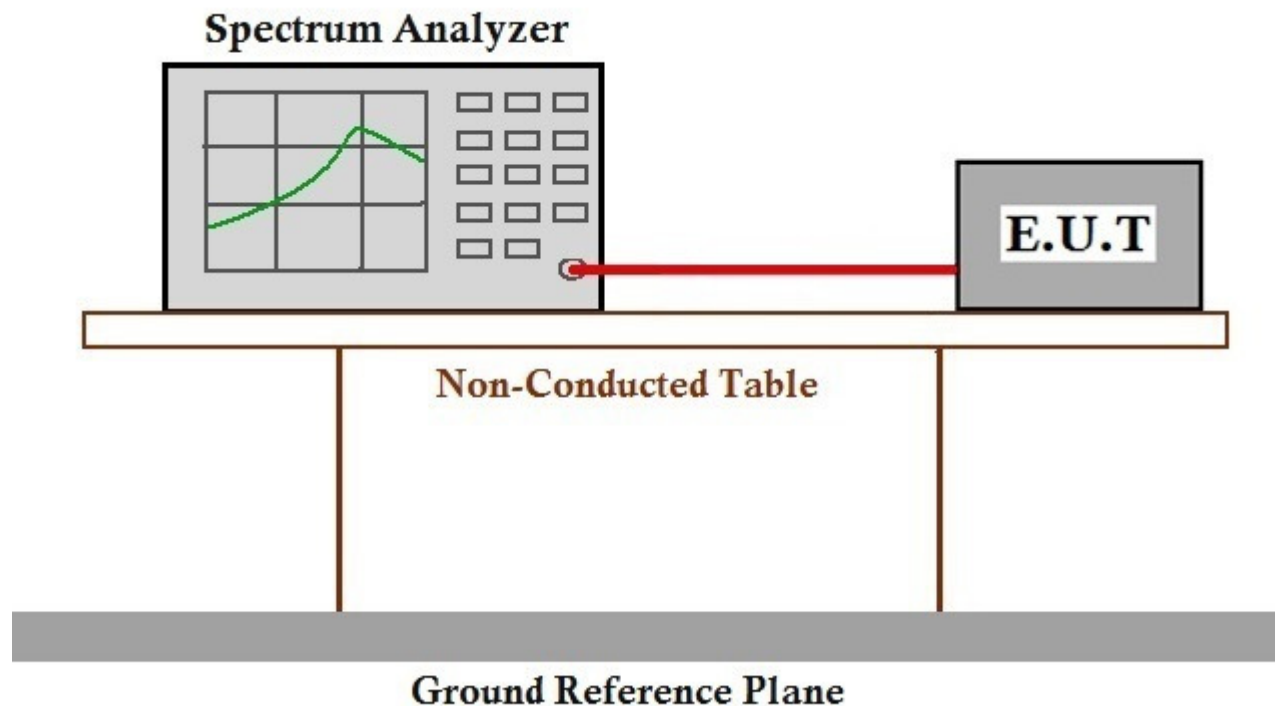
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.8 °C Humidity: 46.2 % RH Atmospheric Pressure: 1015 mbar

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

7.1.2 Test Setup Diagram



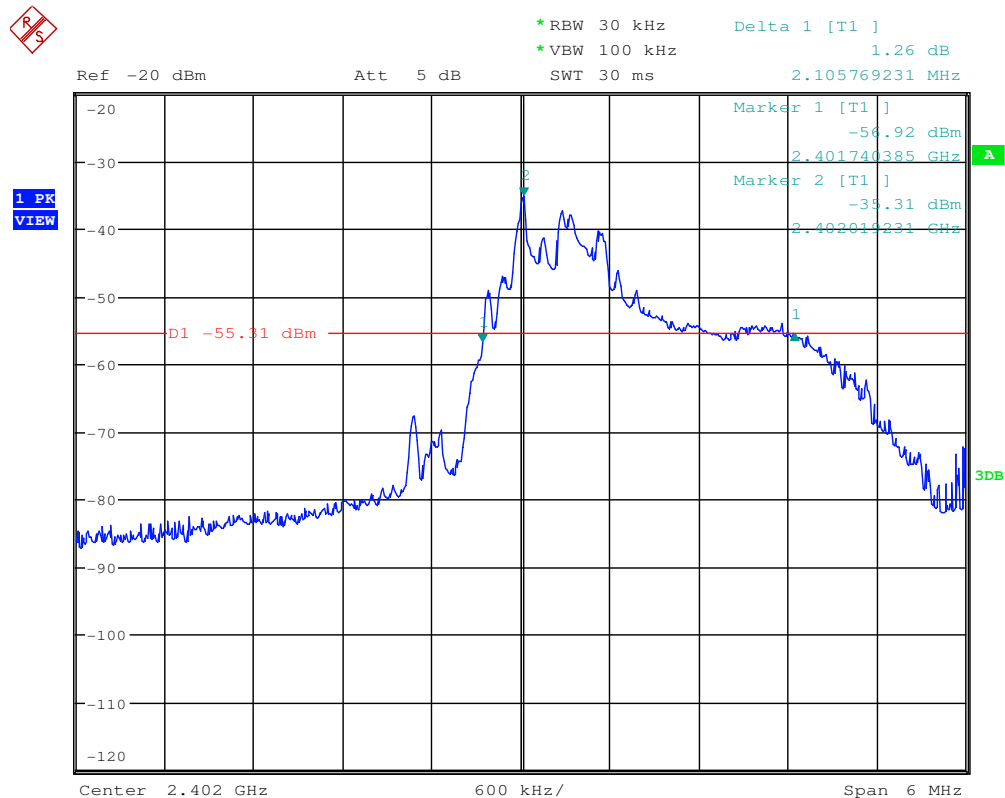
7.1.3 Measurement Procedure and Data

Test channel	20dB bandwidth (MHz)	Results
Lowest	2.11	Pass
Middle	1.86	Pass
Highest	2.18	Pass



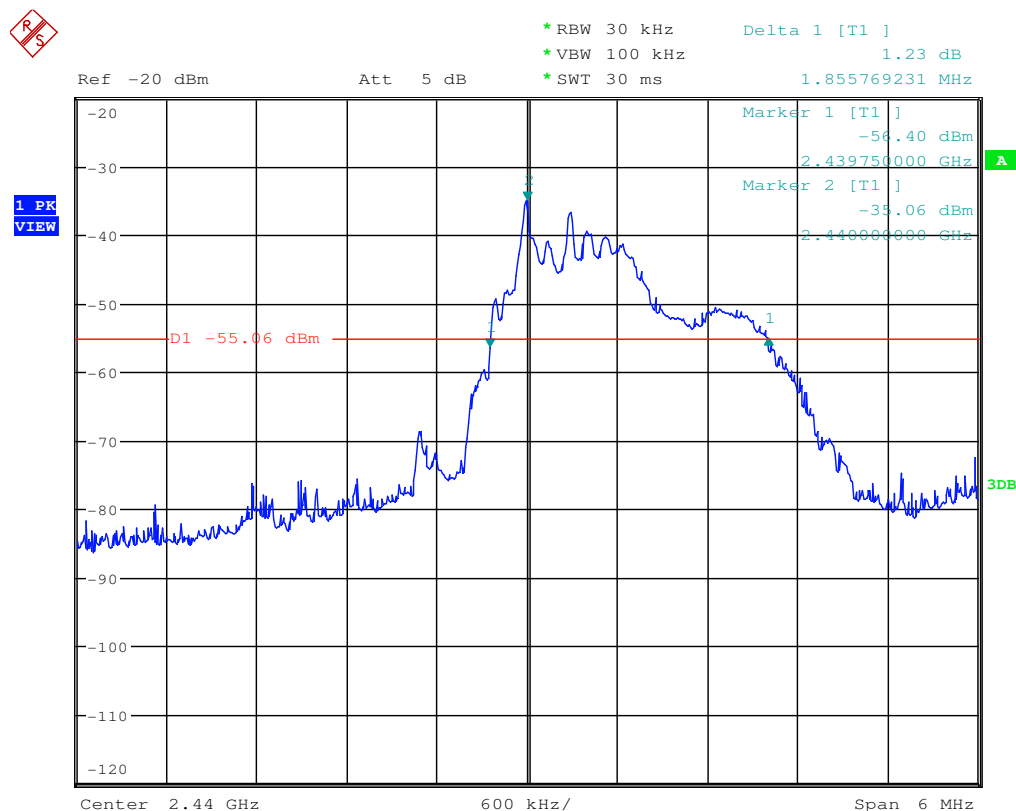
Test plot as follows:

Mode:a ; Channel:Low

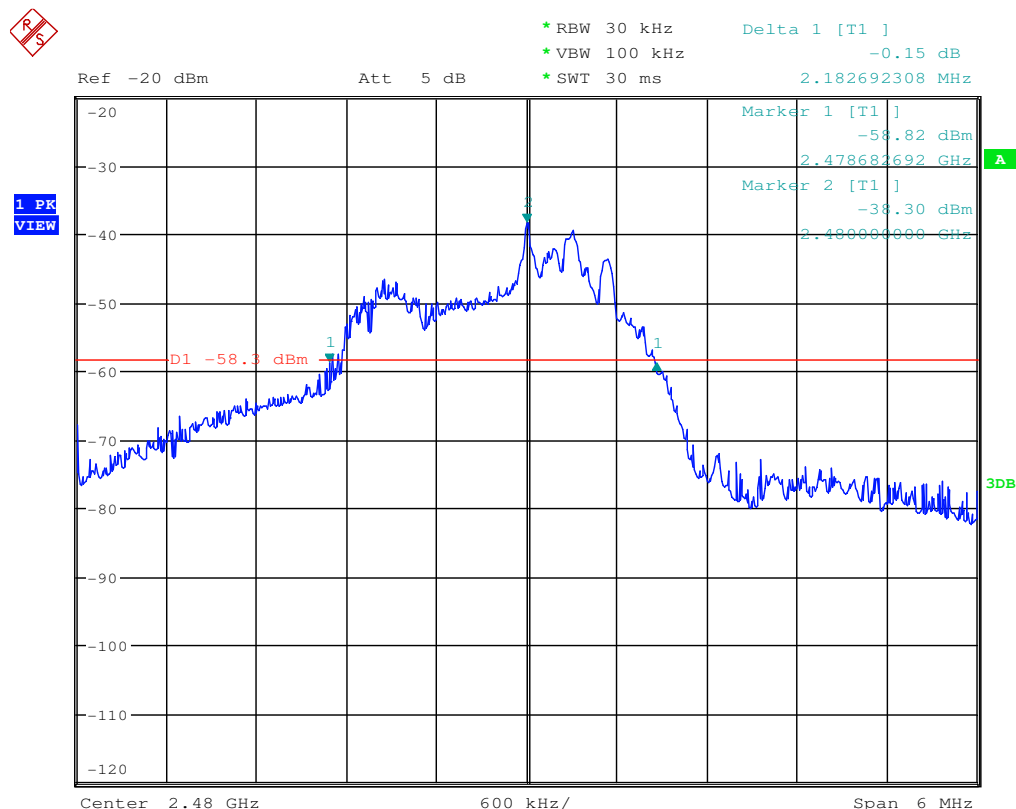




Mode:a ; Channel:middle



Mode: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

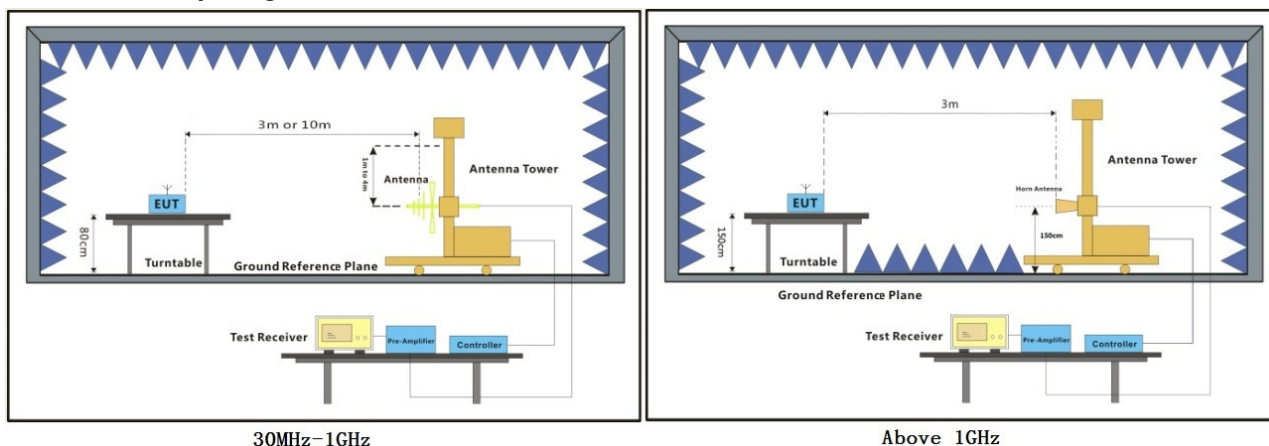
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 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.

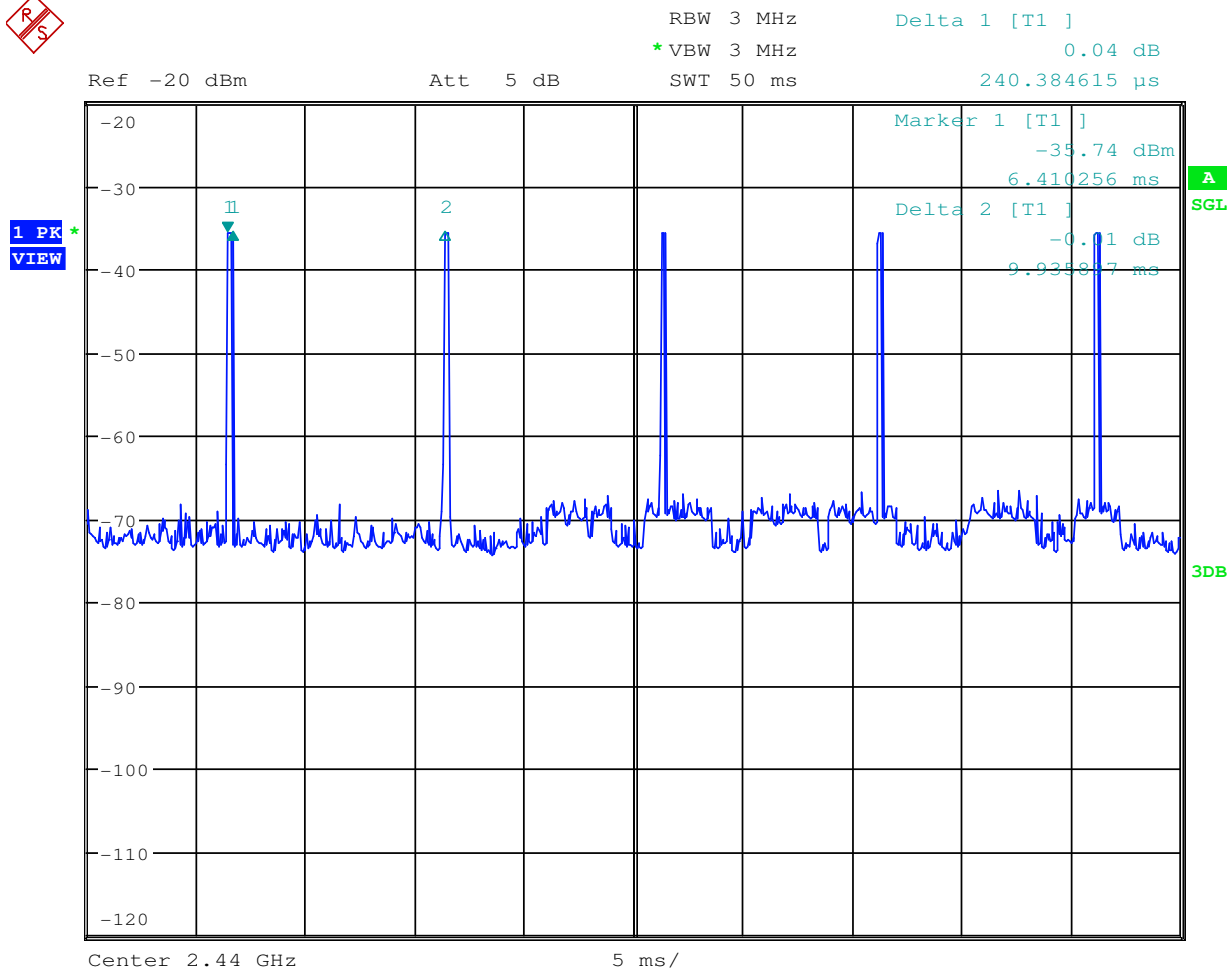
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

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 =0.24038ms
	T period =9.9358ms
	PDCF value= -32.38dB

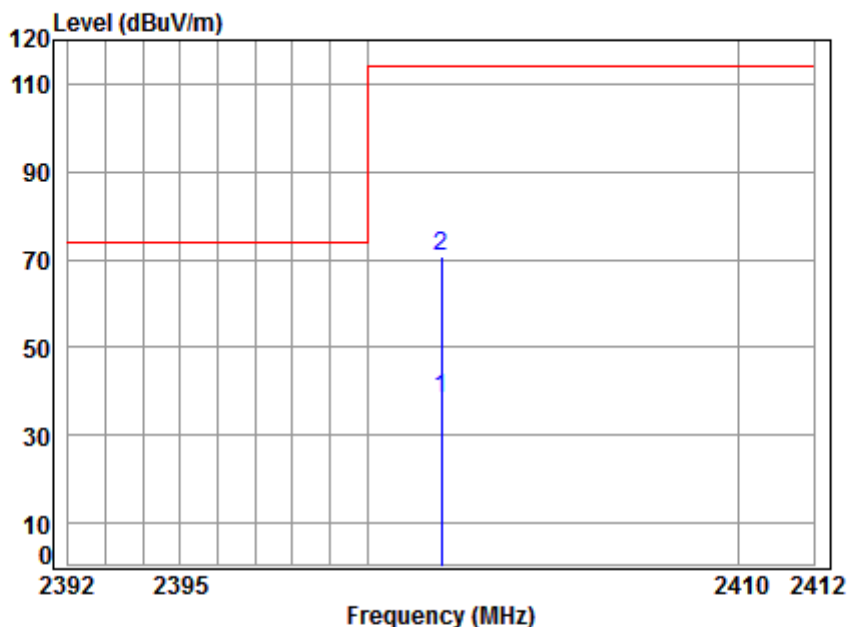


Duty cycle test plots:





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



Condition: 3m HORIZONTAL

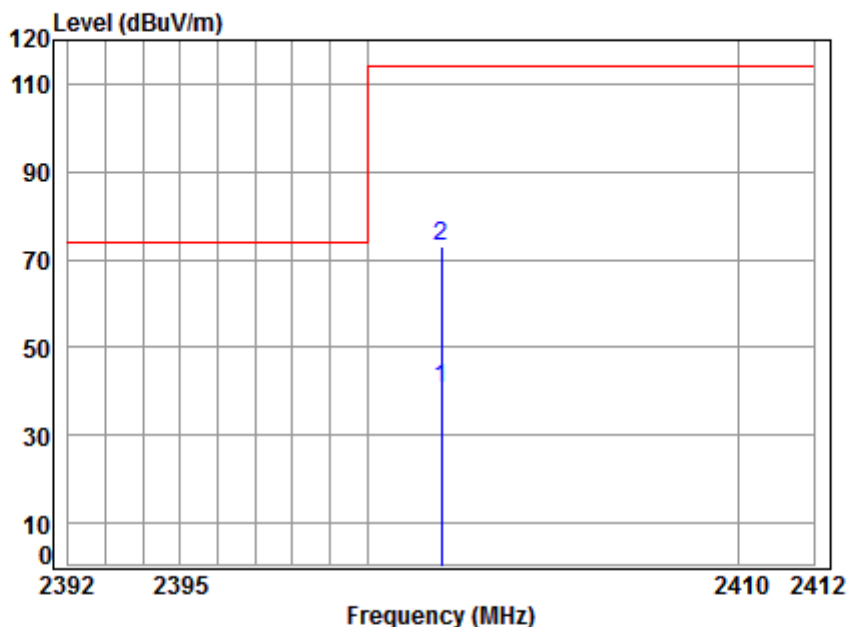
Job No : 03464CR

Mode : 2402 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	av 2402.000	5.49	29.11	37.65	41.29	38.24	94.00	-55.76 Average
2	pp 2402.000	5.49	29.11	37.65	73.67	70.62	114.00	-43.38 peak



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



Condition: 3m VERTICAL

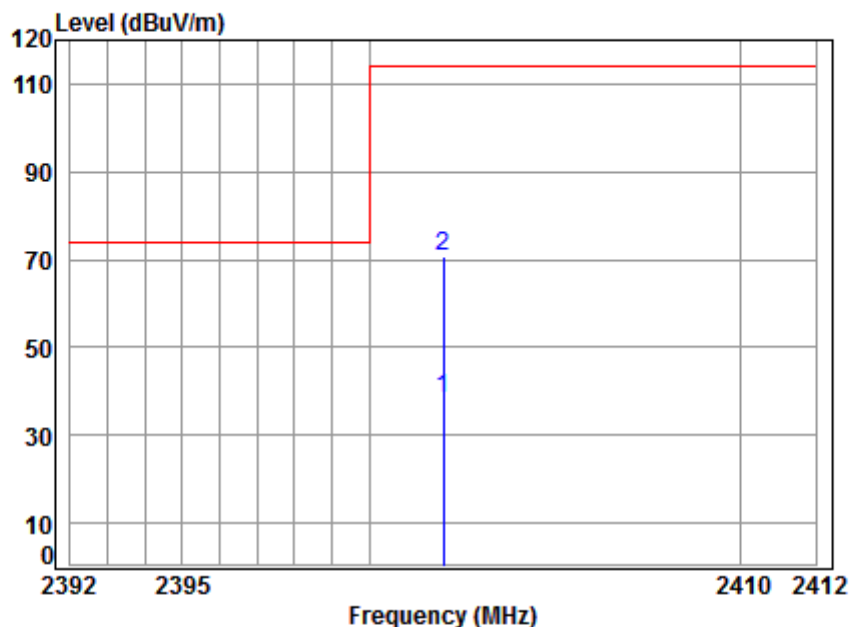
Job No : 03464CR

Mode : 2402 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	av 2402.000	5.49	29.11	37.65	43.70	40.65	94.00	-53.35 Average
2	pp 2402.000	5.49	29.11	37.65	76.08	73.03	114.00	-40.97 peak



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



Condition: 3m HORIZONTAL

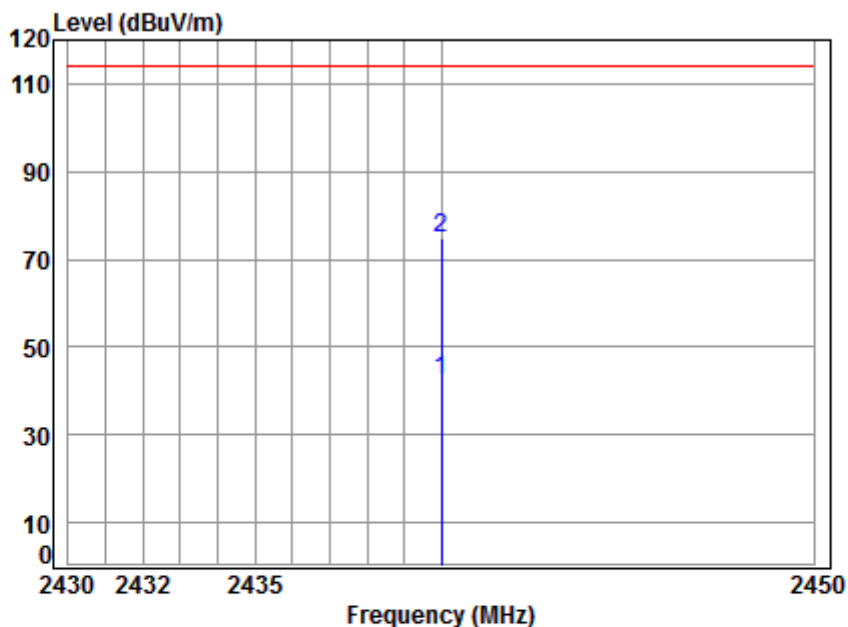
Job No : 03464CR

Mode : 2402 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	av 2402.000	5.49	29.11	37.65	41.29	38.24	94.00	-55.76 Average
2	pp 2402.000	5.49	29.11	37.65	73.67	70.62	114.00	-43.38 peak



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



Condition: 3m VERTICAL

Job No : 03464CR

Mode : 2440 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 av	2440.000	5.54	29.23	37.65	45.12	42.24	94.00	-51.76 Average
2 pp	2440.000	5.54	29.23	37.65	77.50	74.62	114.00	-39.38 peak

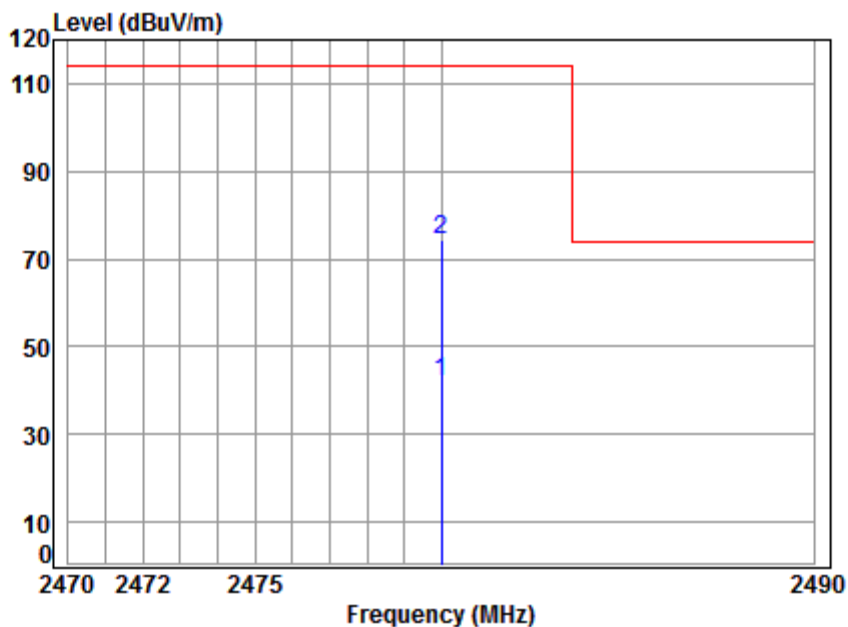


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Shenzhen Branch

Report No.: SZEM180400346402

Page: 22 of 42

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



Condition: 3m HORIZONTAL

Job No : 03464CR

Mode : 2480 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 av	2480.000	5.59	29.34	37.65	44.61	41.89	94.00	-52.11 Average
2 pp	2480.000	5.59	29.34	37.65	76.98	74.26	114.00	-39.74 peak

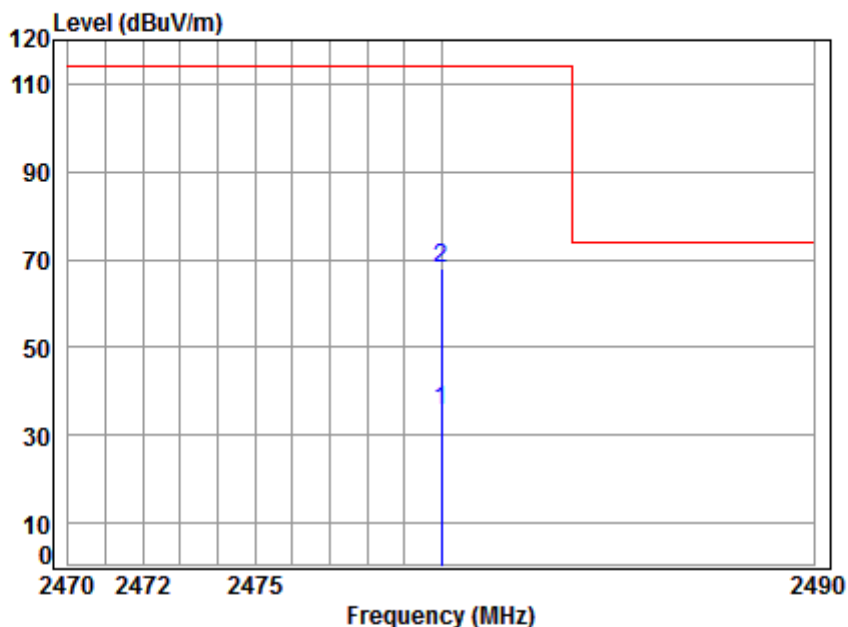


SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

Report No.: SZEM180400346402

Page: 23 of 42

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



Condition: 3m VERTICAL

Job No : 03464CR

Mode : 2480 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 av	2480.000	5.59	29.34	37.65	38.14	35.42	94.00	-58.58 Average
2 pp	2480.000	5.59	29.34	37.65	70.51	67.79	114.00	-46.21 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
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.

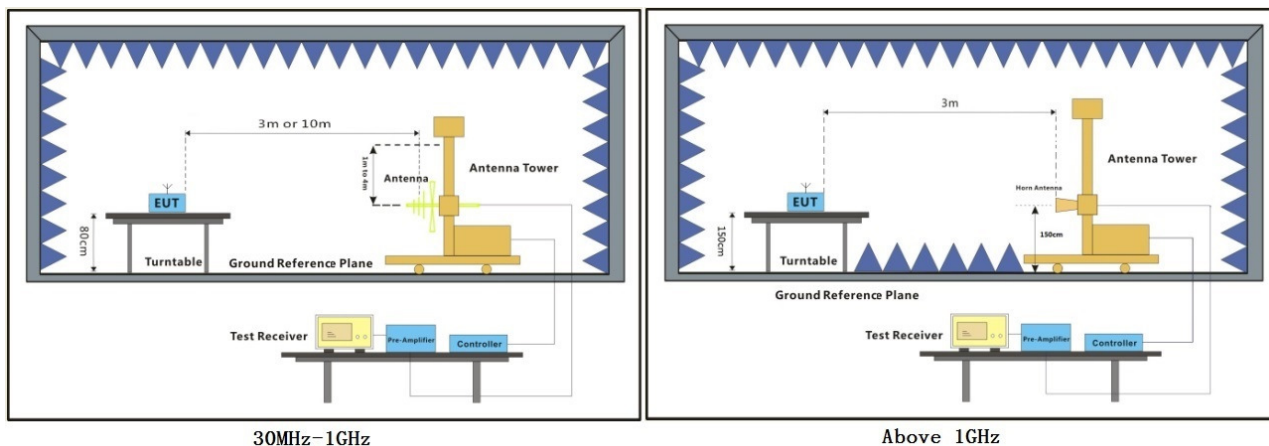
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 53.6 % RH Atmospheric Pressure: 1015 mbar

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

7.3.2 Test Setup Diagram





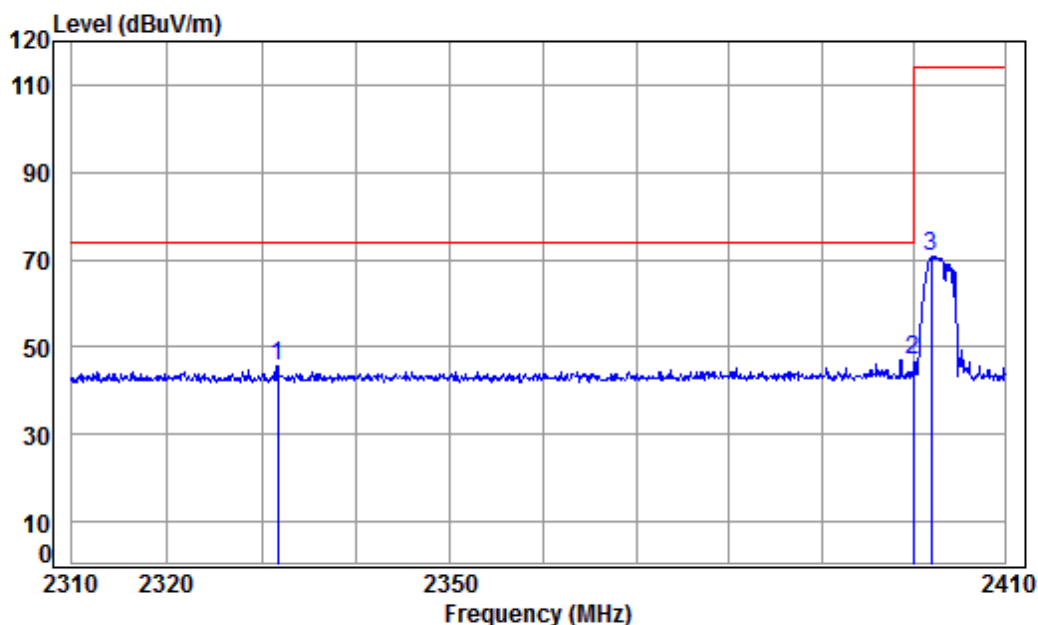
7.3.3 Measurement Procedure and Data

- 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:GFSK; Channel:Low



Condition: 3m HORIZONTAL

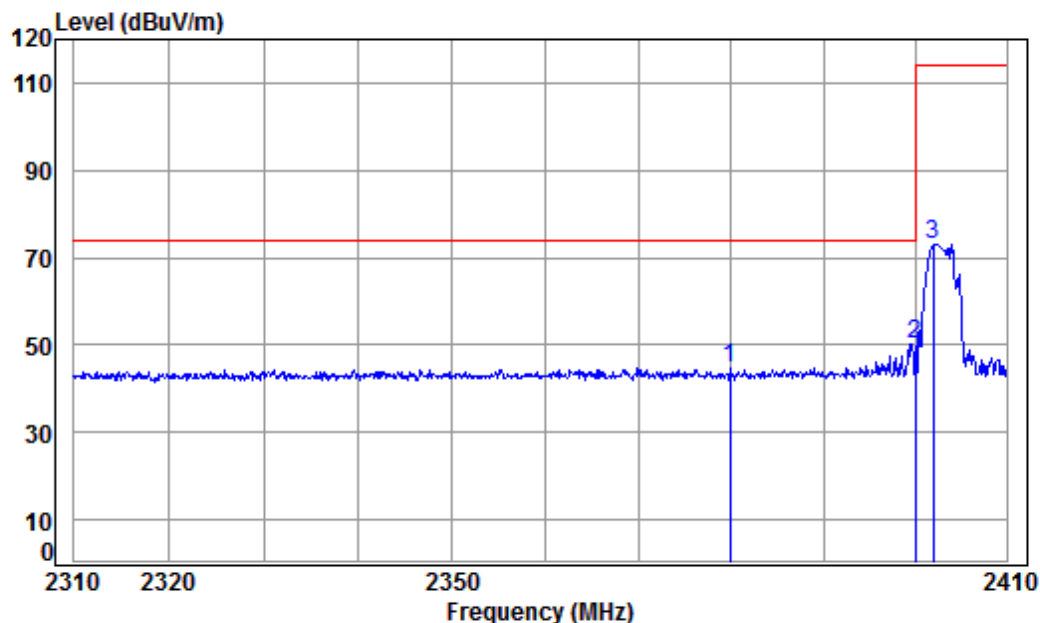
Job No : 03464CR

Mode : 2402 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2331.737	5.40	28.90	37.66	49.05	45.69	74.00	-28.31 Peak
2 pp	2400.000	5.49	29.10	37.66	50.04	46.97	74.00	-27.03 peak
3	2402.000	5.49	29.11	37.65	73.67	70.62	114.00	-43.38 peak



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



Condition: 3m VERTICAL

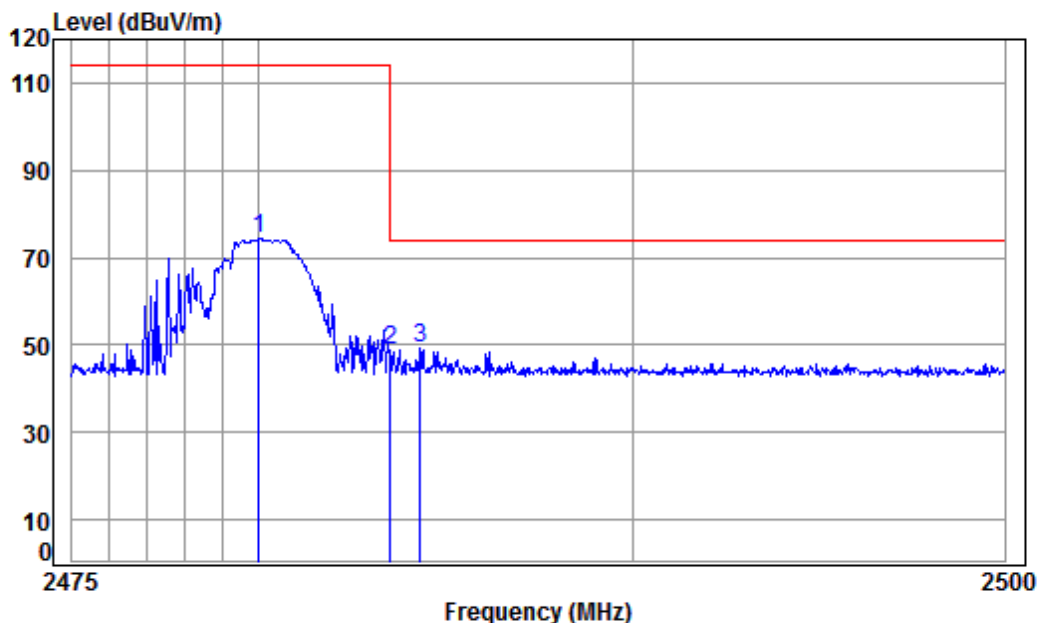
Job No : 03464CR

Mode : 2402 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2379.856	5.46	29.05	37.66	48.02	44.87	74.00	-29.13	Peak
2 pp	2400.000	5.49	29.11	37.66	53.24	50.18	74.00	-23.82	peak
3	2402.000	5.49	29.11	37.65	76.08	73.03	114.00	-40.97	peak



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



Condition: 3m HORIZONTAL

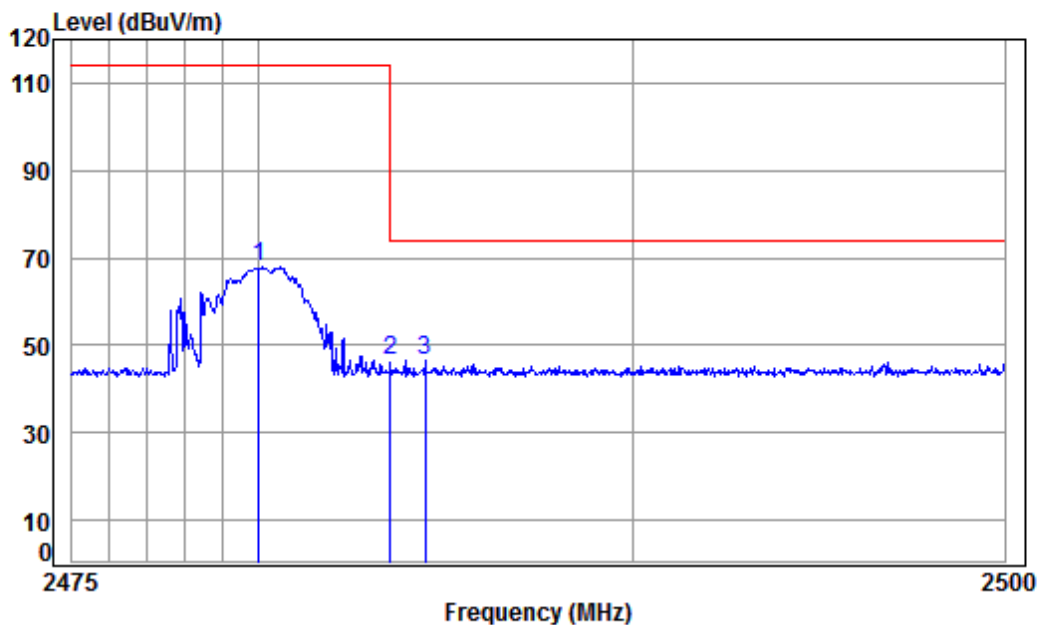
Job No : 03464CR

Mode : 2480 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2480.000	5.59	29.34	37.65	76.98	74.26	114.00	-39.74	peak
2	2483.500	5.60	29.35	37.65	51.63	48.93	74.00	-25.07	peak
3 pp	2484.321	5.60	29.35	37.65	51.79	49.09	74.00	-24.91	Peak



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



Condition: 3m VERTICAL

Job No : 03464CR

Mode : 2480 Band edge

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2480.000	5.59	29.34	37.65	70.51	67.79	114.00	-46.21 peak
2 pp	2483.500	5.60	29.35	37.65	49.24	46.54	74.00	-27.46 peak
3	2484.446	5.60	29.36	37.65	49.17	46.48	74.00	-27.52 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

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

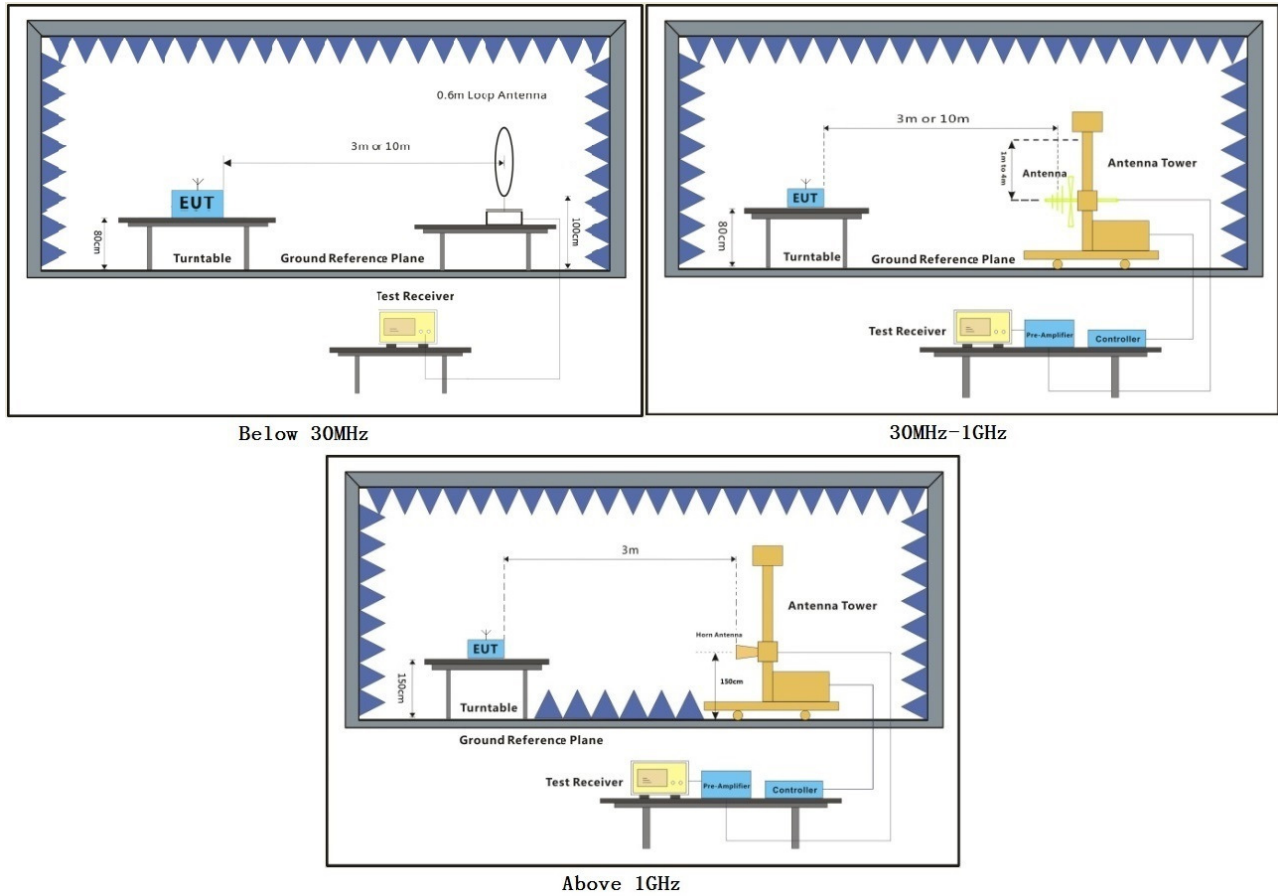
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 53.5 % RH Atmospheric Pressure: 1015 mbar

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

7.4.2 Test Setup Diagram



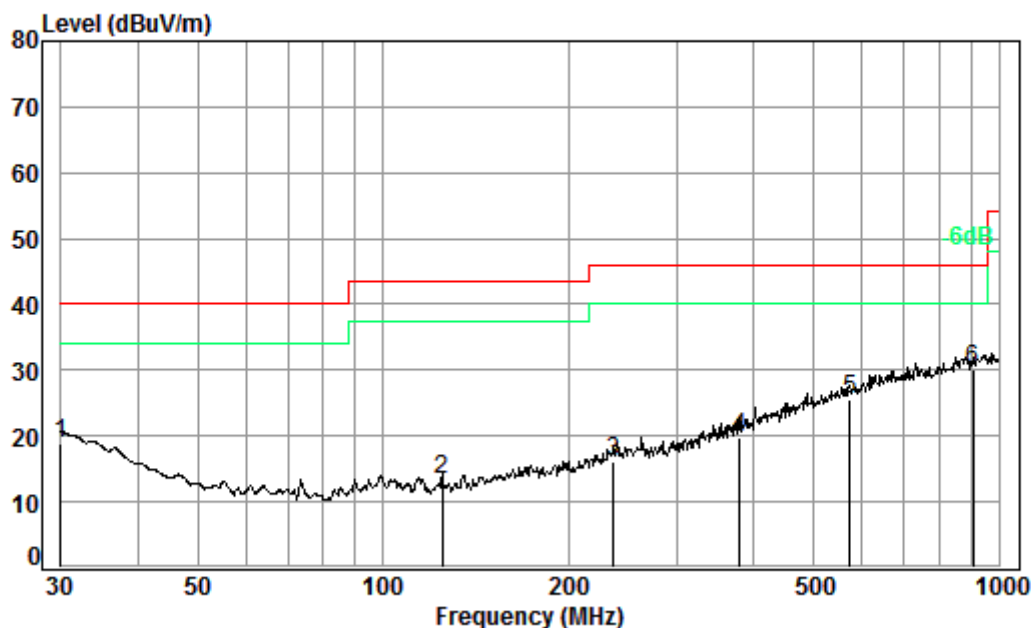
7.4.3 Measurement Procedure and Data

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

30MHz~1GHz (QP)

Mode:a; Polarization:Horizontal



Condition: 3m HORIZONTAL

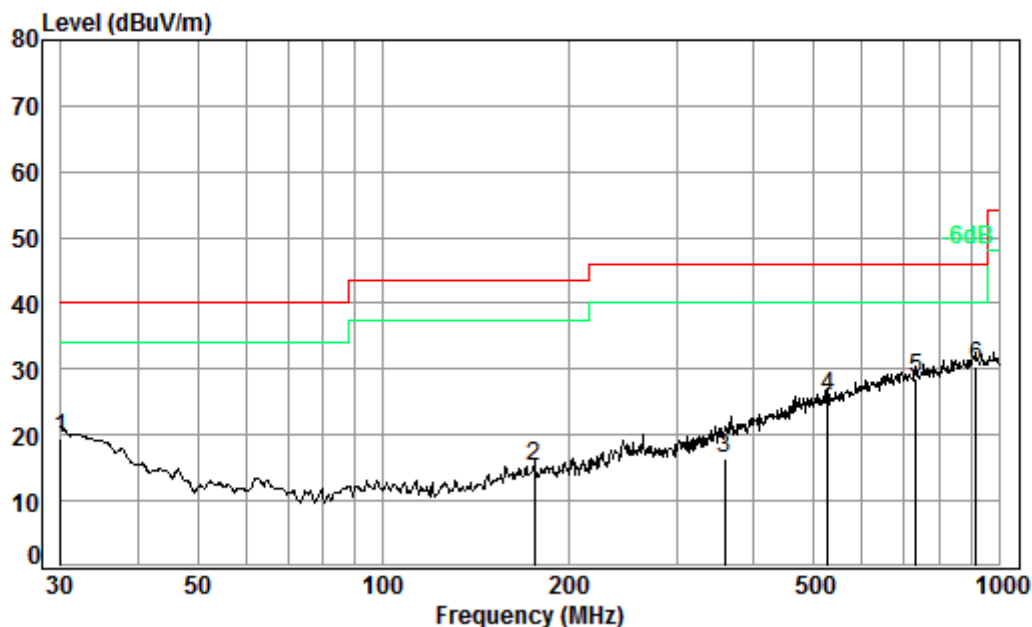
Job No. : 03464CR

: a

	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	30.00	0.60	22.50	27.67	23.32	18.75	40.00	-21.25
2	125.01	1.26	13.26	27.52	26.37	13.37	43.50	-30.13
3	236.64	1.61	18.54	27.53	23.65	16.27	46.00	-29.73
4	379.91	2.15	21.90	27.70	23.56	19.91	46.00	-26.09
5	572.61	2.67	26.09	27.75	24.59	25.60	46.00	-20.40
6 pp	906.48	3.61	29.83	27.06	23.65	30.03	46.00	-15.97



Mode:a; Polarization:Vertical



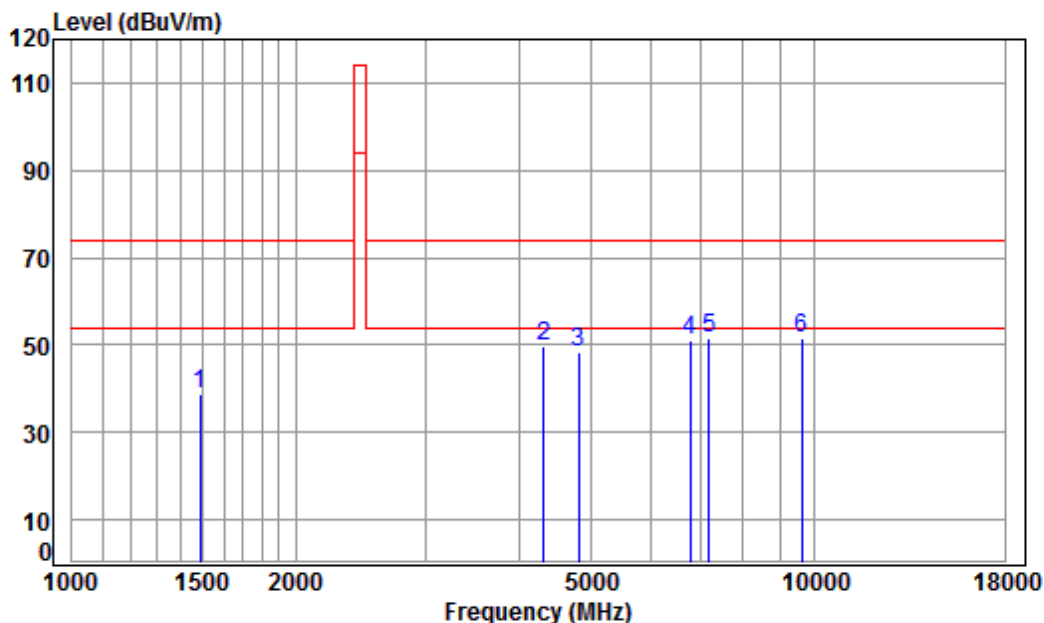
Condition: 3m VERTICAL
Job No. : 03464CR
: a

	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	30.00	0.60	22.50	27.67	23.89	19.32	40.00
2	176.27	1.36	15.83	27.53	25.47	15.13	43.50
3	359.19	2.09	21.35	27.66	20.53	16.31	46.00
4	528.25	2.63	25.20	27.83	25.98	25.98	46.00
5	734.49	3.01	28.12	27.50	24.83	28.46	46.00
6 pp	919.29	3.62	29.90	27.02	23.98	30.48	46.00



Transmitter emission above 1GHz

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



Condition: 3m HORIZONTAL

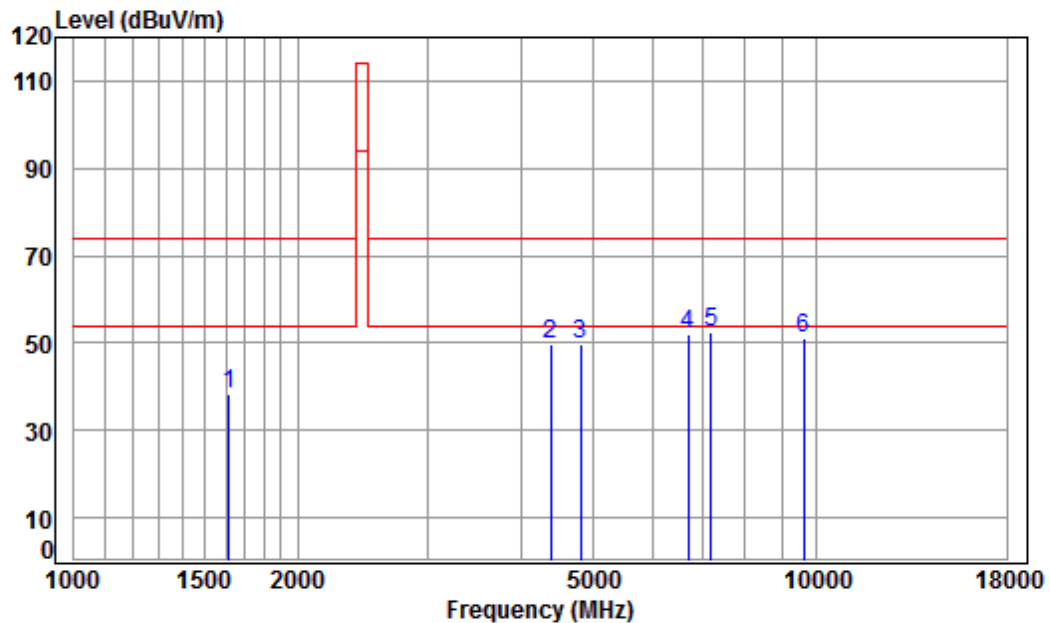
Job No : 03464CR

Mode : 2402 TX RSE

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1490.142	5.45	25.76	38.04	45.41	38.58	74.00	-35.42	peak
2	4316.859	7.36	33.60	38.17	46.85	49.64	74.00	-24.36	peak
3	4804.000	7.89	34.16	38.41	44.80	48.44	74.00	-25.56	peak
4	6795.879	10.69	35.94	37.49	42.08	51.22	74.00	-22.78	peak
5 pp	7206.000	10.08	36.42	37.10	42.08	51.48	74.00	-22.52	peak
6	9608.000	10.75	37.52	35.09	38.24	51.42	74.00	-22.58	peak



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



Condition: 3m VERTICAL

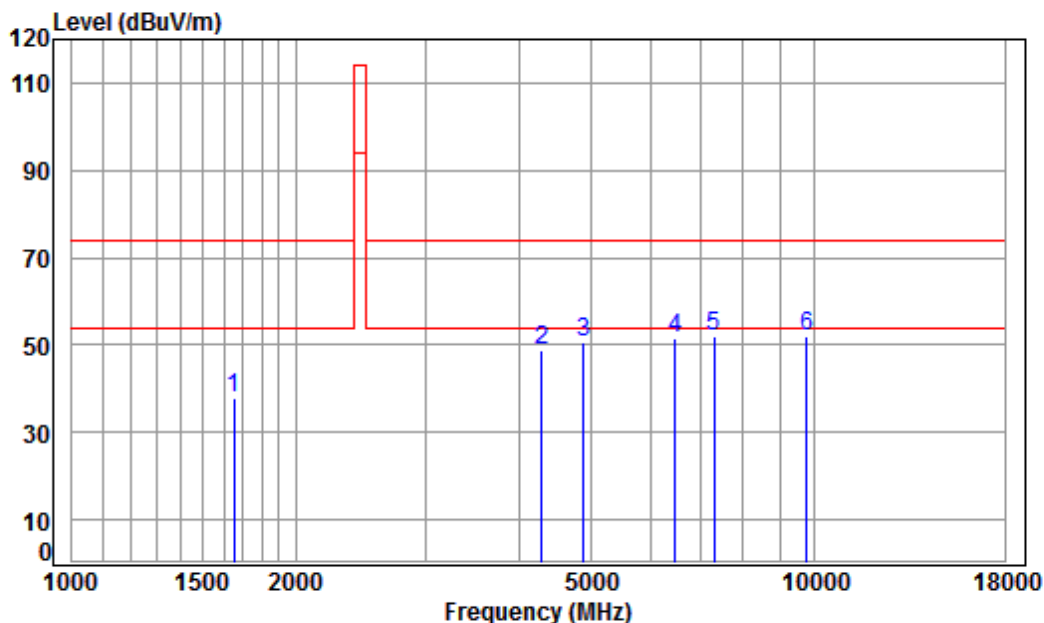
Job No : 03464CR

Mode : 2402 TX RSE

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1615.754	5.33	26.32	38.03	44.54	38.16	74.00	-35.84	peak
2	4379.699	7.43	33.60	38.20	46.69	49.52	74.00	-24.48	peak
3	4804.000	7.89	34.16	38.41	46.18	49.82	74.00	-24.18	peak
4	6717.762	10.91	35.72	37.57	43.05	52.11	74.00	-21.89	peak
5 pp	7206.000	10.08	36.42	37.10	42.91	52.31	74.00	-21.69	peak
6	9608.000	10.75	37.52	35.09	38.06	51.24	74.00	-22.76	peak



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



Condition: 3m HORIZONTAL

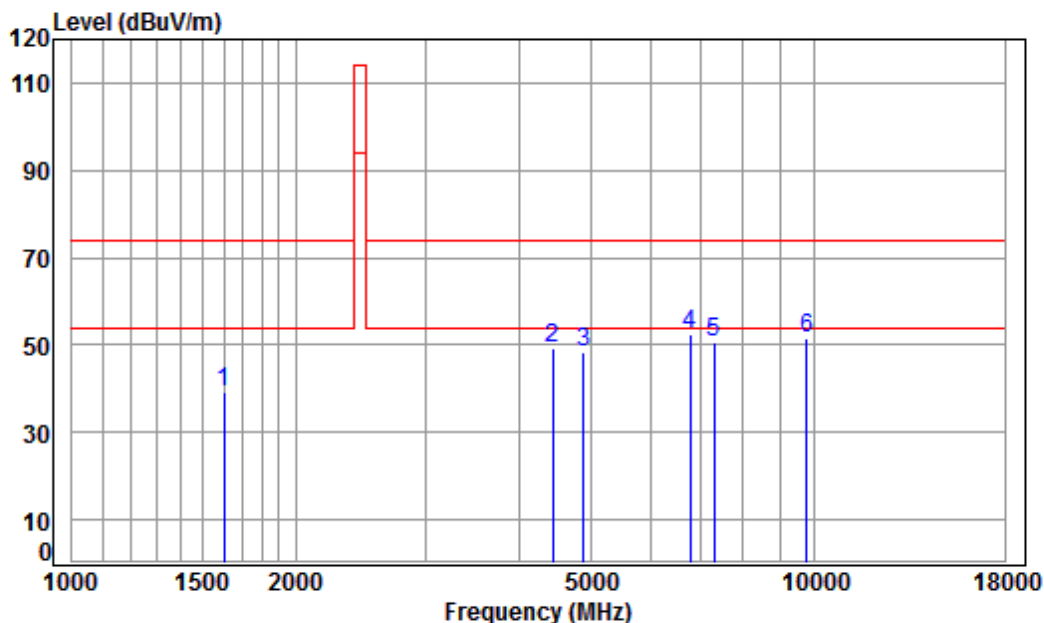
Job No : 03464CR

Mode : 2440 TX RSE

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1653.550	5.28	26.48	38.03	44.35	38.08	74.00	-35.92	peak
2	4291.977	7.33	33.60	38.16	46.21	48.98	74.00	-25.02	peak
3	4880.000	7.97	34.29	38.45	46.63	50.44	74.00	-23.56	peak
4	6488.754	11.52	35.09	37.79	42.95	51.77	74.00	-22.23	peak
5	7320.000	10.05	36.37	37.00	42.37	51.79	74.00	-22.21	peak
6 pp	9760.000	10.82	37.55	35.02	38.47	51.82	74.00	-22.18	peak



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



Condition: 3m VERTICAL

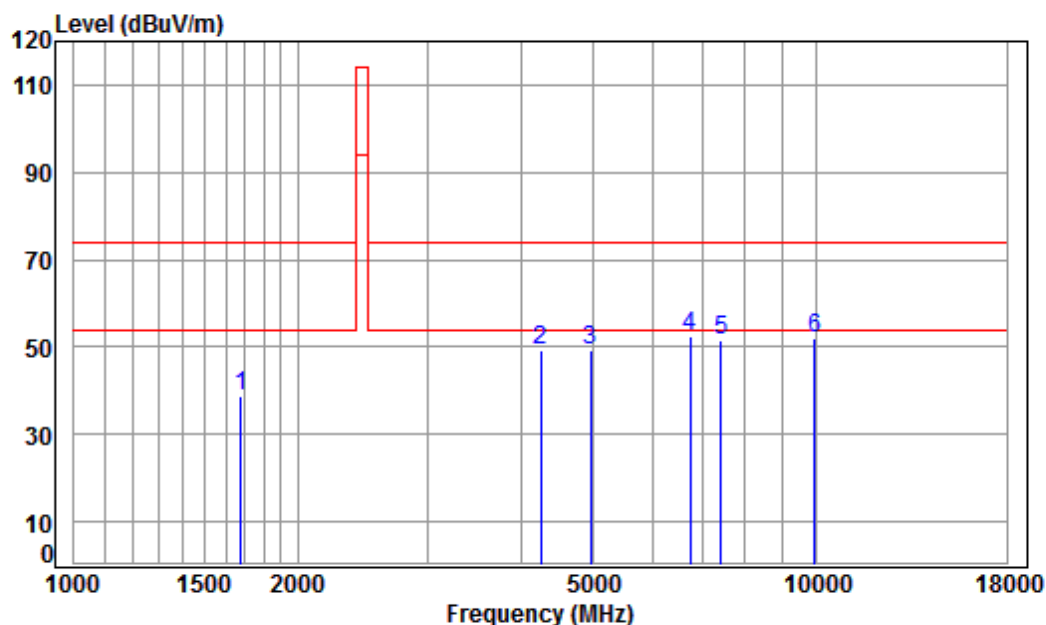
Job No : 03464CR

Mode : 2440 TX RSE

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1601.804	5.35	26.26	38.03	45.63	39.21	74.00	-34.79	peak
2	4443.453	7.50	33.60	38.24	46.20	49.06	74.00	-24.94	peak
3	4880.000	7.97	34.29	38.45	44.43	48.24	74.00	-25.76	peak
4 pp	6795.879	10.69	35.94	37.49	43.35	52.49	74.00	-21.51	peak
5	7320.000	10.05	36.37	37.00	41.39	50.81	74.00	-23.19	peak
6	9760.000	10.82	37.55	35.02	38.28	51.63	74.00	-22.37	peak



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



Condition: 3m HORIZONTAL

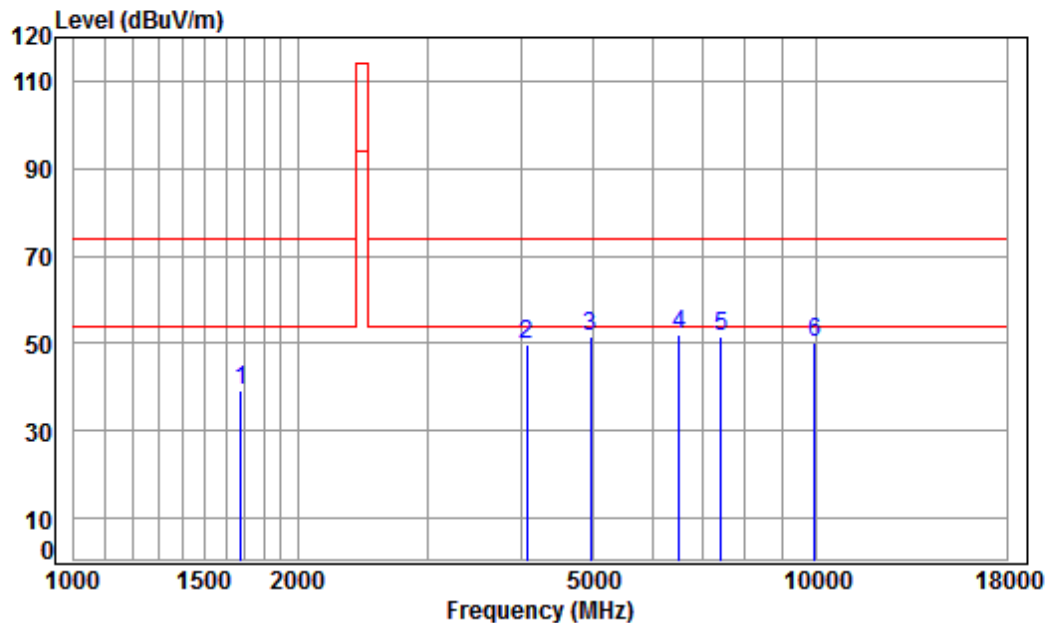
Job No : 03464CR

Mode : 2480 TX RSE

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1677.621	5.25	26.58	38.03	44.98	38.78	74.00	-35.22	peak
2	4254.921	7.28	33.60	38.14	46.75	49.49	74.00	-24.51	peak
3	4960.000	8.05	34.43	38.48	45.48	49.48	74.00	-24.52	peak
4 pp	6756.708	10.80	35.83	37.53	43.29	52.39	74.00	-21.61	peak
5	7440.000	10.02	36.32	36.89	42.33	51.78	74.00	-22.22	peak
6	9920.000	10.90	37.58	34.94	38.62	52.16	74.00	-21.84	peak



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



Condition: 3m VERTICAL

Job No : 03464CR

Mode : 2480 TX RSE

	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	1677.621	5.25	26.58	38.03	45.22	39.02	74.00	-34.98	peak
2	4074.388	7.07	33.60	38.04	46.89	49.52	74.00	-24.48	peak
3	4960.000	8.05	34.43	38.48	47.47	51.47	74.00	-22.53	peak
4 pp	6526.373	11.46	35.18	37.75	43.21	52.10	74.00	-21.90	peak
5	7440.000	10.02	36.32	36.89	42.04	51.49	74.00	-22.51	peak
6	9920.000	10.90	37.58	34.94	36.76	50.30	74.00	-23.70	peak

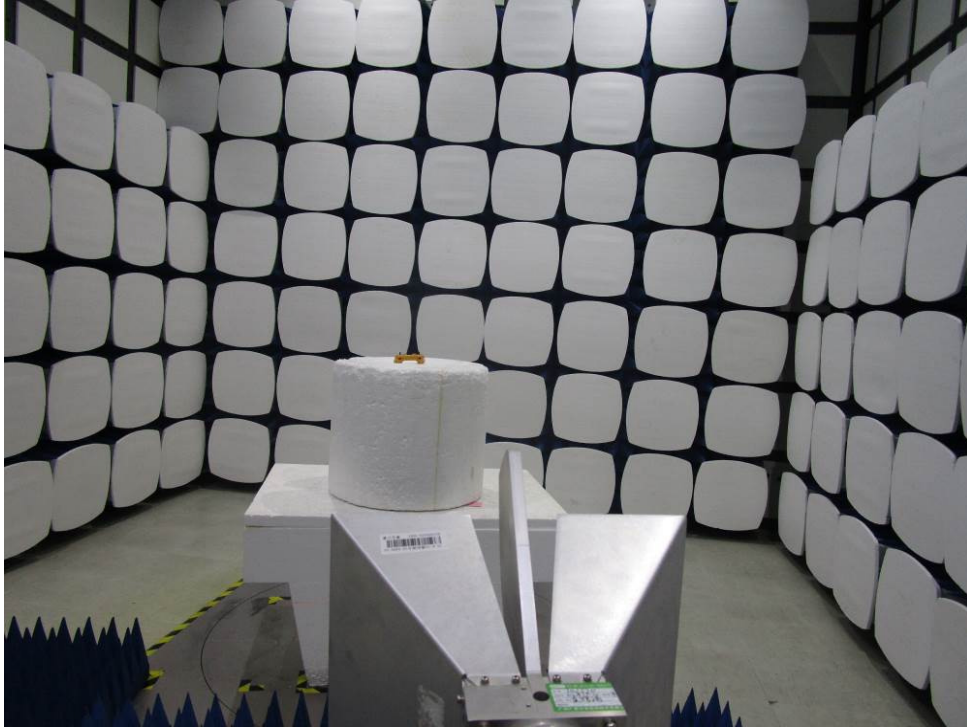


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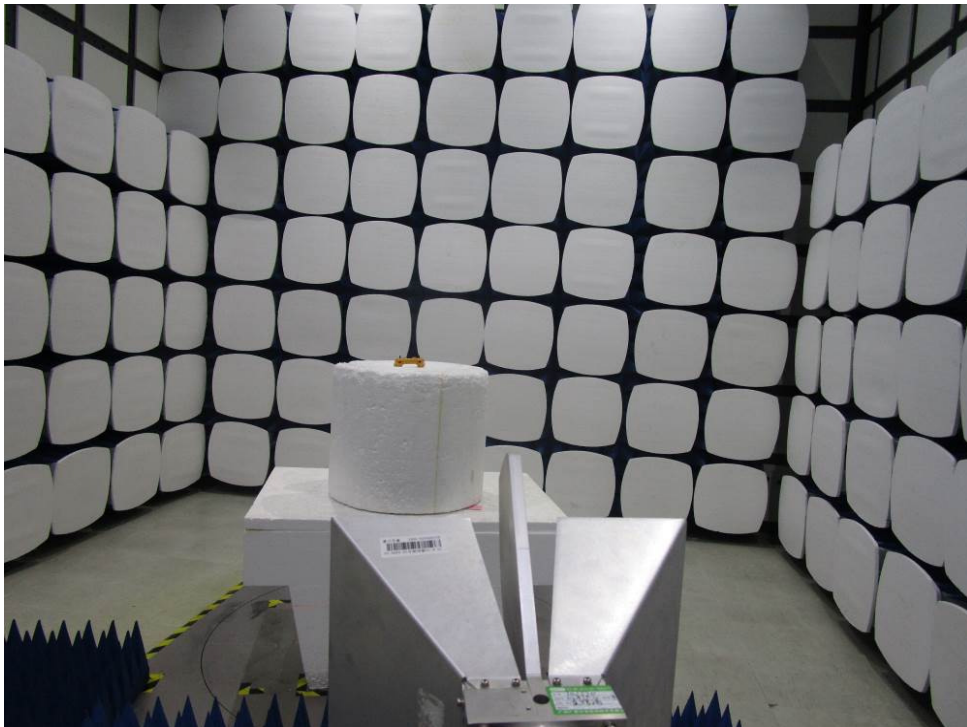
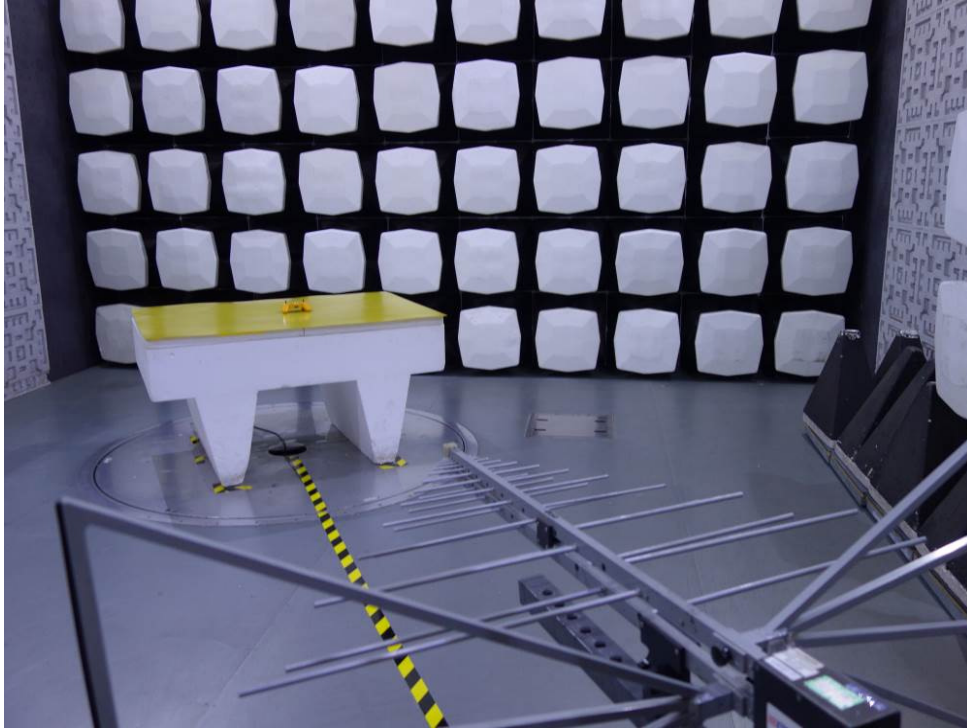
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, the disturbance above 18GHz 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.

8 Photographs

8.1 Restricted Band Around Fundamental Frequency Test Setup



8.2 Radiated Emissions Test Setup



8.3 EUT Constructional Details (EUT Photos)

Refer to EUT external and internal photos.

- End of the Report -