

Report No.: SZCR210402081401

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TEST REPORT

Application No.: SZCR2104020814ET

Applicant: Guanggdong songyang plastic toys co. ltd

Address of Applicant: HuaiNan a section 324 National Highway Lianxia Town Chenhai, Shantou,

China

Manufacturer: Guanggdong songyang plastic toys co. ltd

Address of Manufacturer: HuaiNan a section 324 National Highway Lianxia Town Chenhai, Shantou,

China

Factory: Guanggdong songyang plastic toys co. ltd

Address of Factory: HuaiNan a section 324 National Highway Lianxia Town Chenhai, Shantou,

China

Equipment Under Test (EUT):

EUT Name: R/C CAR

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: 2AEXV000003

Standard(s): 47 CFR Part 15, Subpart C 15.249

Date of Receipt: 2021-04-29

Date of Test: 2021-05-01 to 2021-05-17

Date of Issue: 2021-05-24

Test Result: Pass*

Keny Xu EMC Laboratory Manager

Ceny. xu



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^{*} In the configuration tested, the EUT complied with the standards specified above.



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	Revision Record						
Version	Version Chapter Date Modifier Remark						
01		2021-05-24		Original			

Authorized for issue by:		
	Gebin Sun	
	Gebin Sun/Project Engineer	-
	Exic Fu	
	Eric Fu/Reviewer	-



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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		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,	ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass		
Restricted Band Around Fundamental Frequency	Subpart C 15.249	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209	Pass		
Radiated Emissions		ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass		

Declaration of EUT Family Grouping:

Model No.: SY020-1, SY002, SY002-1, SY003, SY003-1, SY004, SY004-1, SY005, SY005-1, SY006, SY006-1, SY007, SY007-1, SY008, SY008-1, SY009, SY010, SY011, SY011-1, SY012, SY012-1, SY013, SY013-1, SY014, SY014-1, SY015, SY015-1, SY016, SY017, SY017-1, SY019, SY019A, SY019B, SY019-1, SY020, SY020A, SY020B, SY021A, SY021A-1, SY023A, SY023A-1, SY023B, SY024A, SY026A, SY026B, SY027, SY027-1, SY028A, SY028B, SY029, SY029A, SY029-1, SY030, SY030A, SY031, SY032, SY034, SY035, SY035-1, SY036, SY037A, SY037A-1, SY038A, SY038A-1, SY039, SY039A, SY039B, SY039C, SY039-1, SY040A, SY040B, SY040A-1, SY040B-1, SY041, SY041A, SY042, SY042A, SY042-1, SY043, SY044, SY044-1, SY045, SY045-1, SY046, SY047, SY047A, SY048, SY049, SY049-1, SY050, SY051, SY051B, SY052, SY052B, SY053, SY053B, SY054, SY054B, SY055, SY055A, SY055B, SY056A, SY056B, SY057, SY057A, SY057-1, SY058, SY058A, SY058-1, SY059, SY059B, SY060, SY060B, SY061, SY061B, SY062, SY062B, SY063, SY063B, SY064, SY064B, SY065, SY065B, SY066, SY066B, SY067, SY067B, SY068, SY068B, SY069B, SY069, SY070, SY070B, SY071, SY071B, SY072, SY072B, SY073, SY073B, SY074, SY074B, SY075, SY075B, SY076, SY076B, SY077, SY077B, SY078, SY078B, SY079, SY079B, SY080, SY080B

Only the model SY020 was tested. According to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models. with only difference on packaging.



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General Information

4.1 Details of E.U.T.

Power supply:	3V DC(1.5V x 2 "AA" Size Batteries) for TX
Operation Frequency:	2409MHz to 2473MHz
Modulation Type:	GFSK
Number of Channels:	65
Channel Spacing	1MHz
Sample Type:	Portable production
Antenna Type:	Integral
Antenna Gain:	0dBi

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.			
The EUT has been tested as an independent unit.						

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
20dB Bandwidth	± 3%
Field Strength of the Fundamental Signal (15.249(a))	± 4.5dB (Below 1GHz);± 4.8dB (Above 1GHz)
Restricted Band Around Fundamental Frequency	± 4.5dB (Below 1GHz);± 4.8dB (Above 1GHz)
Radiated Emissions	± 4.5dB (Below 1GHz);± 4.8dB (Above 1GHz)
Temperature test	± 1 ℃
Humidity test	± 3%
Supply voltages	± 1.5%
Time	± 3%

Remark:

The Ulab (lab Uncertainty) is less than Ucispr (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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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.

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

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.

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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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	Rohde & Schwarz	NGSM 32/10	SEM011-04	2021-03-23	2022-03-22
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-17	2021-04-08	2022-04-07
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2021-04-08	2022-04-07

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	2021-03-26	2024-03-25	
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31	
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09	

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	2021-03-26	2024-03-25	
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31	
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09	



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Radiated Emissions Below 1GHz						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2020-07-19	2023-07-18	
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2020-11-02	2021-11-01	
BiConiLog Antenna	ETS-LINDGREN	3142C	SEM003-02	2019-05-24	2022-05-23	
Pre-Amplifier	Agilent Technologies	8447D	SEM005-01	2021-03-24	2022-03-23	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM025-01	2020-07-10	2021-07-09	

Radiated Emissions Above 1GHz								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25			
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31			
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13			
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2020-09-23	2021-09-22			
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A			
Coaxial Cable	SGS	N/A	SEM026-01	2020-07-10	2021-07-09			

General used equipment								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2020-09-15	2021-09-14			
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2020-09-15	2021-09-14			
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2021-03-30	2022-03-29			



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Radio Spectrum Technical Requirement 6

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

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

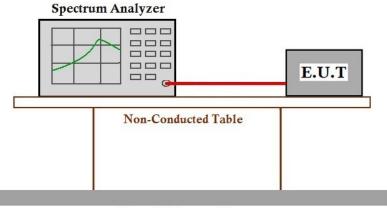
Operating Environment:

Temperature: 25.2 °C Humidity: 32.5 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in transmitting with modulation mode.

7.1.3 Test Setup Diagram



Ground Reference Plane

7.1.4 Measurement Procedure and Data

Test channel	20dB bandwidth (MHz)	Results		
Lowest	0.098	Pass		
Middle	0.145	Pass Pass		
Highest	0.073			



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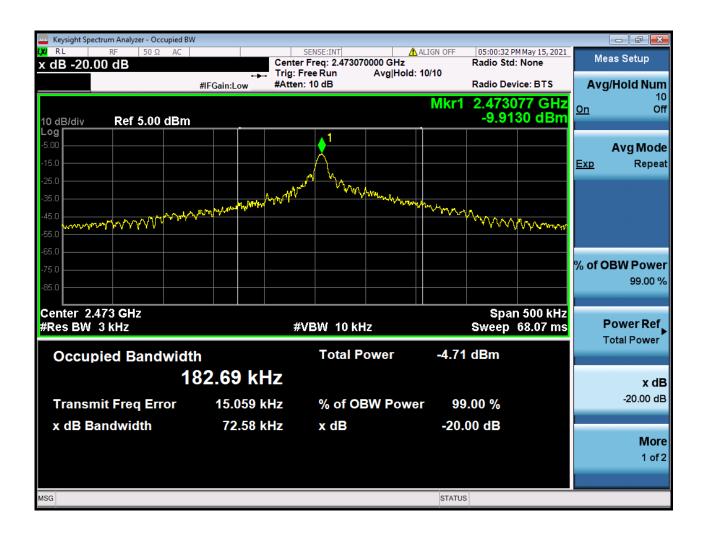
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7.2 Field Strength of the Fundamental Signal (15.249(a))

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.

Average value:

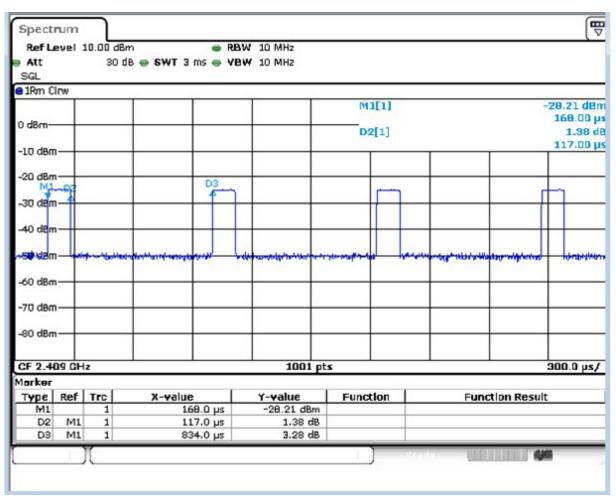
	Average value=Peak value + PDCF		
Calculate Formula:	PDCF=20 log(Duty cycle)		
	Duty cycle= T on time / T period		
	Ton time =0.117ms		
Took data:	T period =0.834ms		
Test data:	Duty cycle=14.03%		
	PDCF value= -17.06dB		





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7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.9 °C Atmospheric Pressure: 1010 mbar Humidity: 57.1 % RH

7.2.2 Test Mode Description

		501.pt.011
Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in transmitting with modulation mode.



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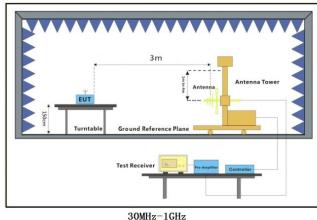
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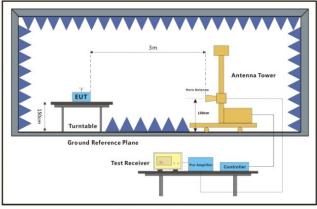


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7.2.3 Test Setup Diagram





Above 1GHz

7.2.4 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.lf 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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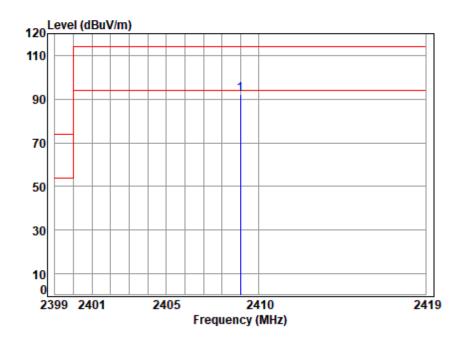
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20814ET

Mode : 2409 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 2409.000 4.38 28.92 40.43 99.50 92.37 114.00 -21.63 peak



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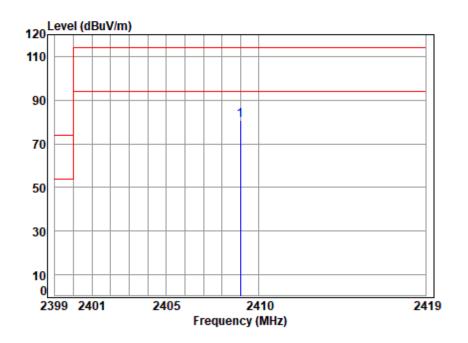
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m VERTICAL

Job No : 20814ET

Mode : 2409 Field strength

> Ant Preamp Cable Limit 0ver Read

Loss Factor Factor Limit Remark Freq Level Level Line

MHz dΒ dB/m dΒ dBuV dBuV/m dBuV/m dB

1 2409.000 4.38 28.92 40.43 88.05 80.92 114.00 -33.08 peak



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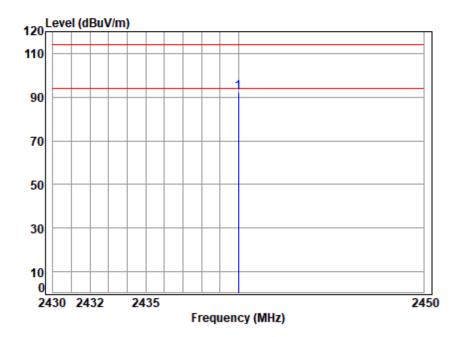
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20814ET

Mode : 2440 Field strength

> Ant Preamp Cable Limit 0ver Read Loss Factor Factor Level Level Limit Remark Freq Line MHz dΒ dB/m dΒ dBuV dBuV/m dBuV/m dB

1 2440.000 4.43 28.98 40.45 99.09 92.05 114.00 -21.95 peak



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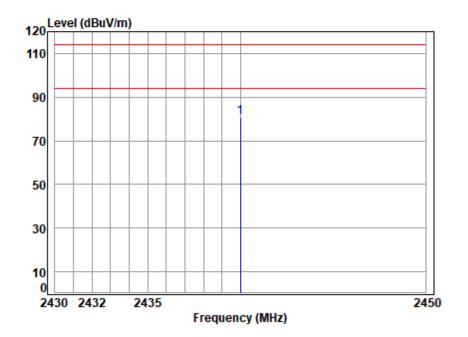
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber

Job No

Condition: 3m VERTICAL

Mode : 2440 Field strength

: 20814ET

Ant Preamp Cable Limit 0ver Read

Loss Factor Factor Limit Remark Freq Level Level Line

MHz dΒ dB/m dΒ dBuV dBuV/m dBuV/m dB

1 2440.000 4.43 28.98 40.45 87.83 80.79 114.00 -33.21 peak



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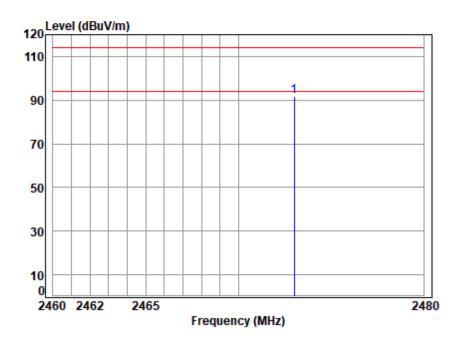
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20814ET

Mode : 2473 Field strength

Cable Ant Preamp Read Limit Over
Freq Loss Factor Factor Level Line Limit Remark

MHz dB dB/m dB dBuV/m dBuV/m dB

1 2473.000 4.48 29.05 40.46 98.72 91.79 114.00 -22.21 peak



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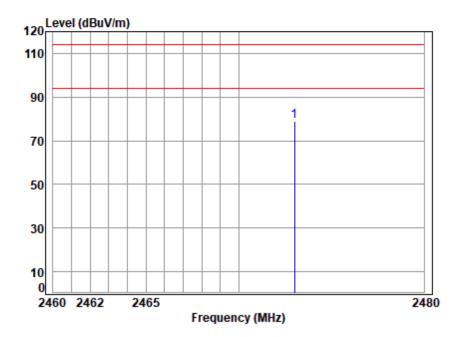
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m VERTICAL

Job No : 20814ET

: 2473 Field strength Mode

> Cable Ant Preamp Limit 0ver Read Loss Factor Factor Level Level Line Limit Remark Freq MHz dB dB/m dB dBuV dBuV/m dBuV/m dB

1 2473.000 4.48 29.05 40.46 85.91 78.98 114.00 -35.02 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



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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 6.10.5

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

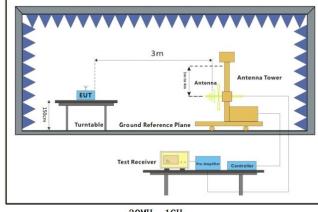
Operating Environment:

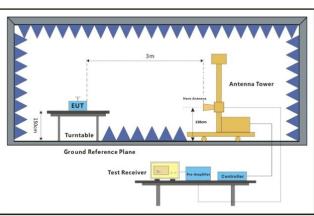
Temperature: 23.5 °C Humidity: 56.3 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

7.0.2 .000		501.pt.01.
Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in transmitting with modulation mode.

7.3.3 Test Setup Diagram





30MHz-1GHz Above 1GHz



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7.3.4 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
- 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

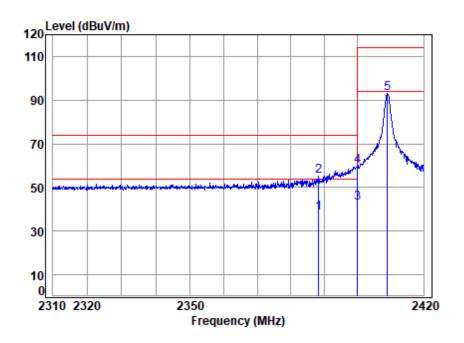




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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20814ET

Mode : 2409 Band edge

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2388.349	4.34	28.87	40.42	45.53	38.32	54.00	-15.68	Average
2	2388.349	4.34	28.87	40.42	62.59	55.38	74.00	-18.62	Peak
3	2400.000	4.36	28.90	40.42	49.93	42.77	54.00	-11.23	Average
4	2400.000	4.36	28.90	40.42	66.99	59.83	74.00	-14.17	peak
5	2409.104	4.38	28.92	40.43	100.03	92.90	114.00	-21.10	peak



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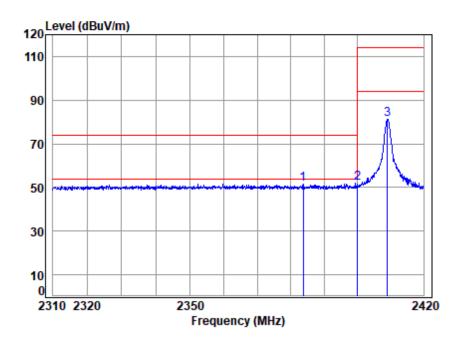
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Job No

1

2

Condition: 3m VERTICAL

Mode : 2409 Band edge

: 20814ET

Cable Ant Preamp Limit 0ver Read Loss Factor Factor Limit Remark Freq Level Level Line MHz dΒ dB/m dΒ dBuV dBuV/m dBuV/m dB 2383.687 4.33 28.87 40.42 58.74 51.52 74.00 -22.48 Peak 4.36 28.90 40.42 59.18 52.02 74.00 -21.98 peak 2400.000 4.38 2408.992 28.92 40.43 88.28 81.15 114.00 -32.85 peak



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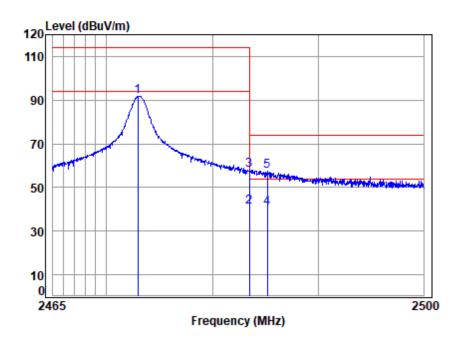
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20814ET

Mode : 2473 Band edge

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2473.000	4.48	29.05	40.46	98.69	91.76	114.00	-22.24	peak
2	2483.500	4.49	29.07	40.47	47.95	41.04	54.00	-12.96	Average
3	2483.500	4.49	29.07	40.47	65.01	58.10	74.00	-15.90	peak
4	2485.205	4.50	29.07	40.47	47.50	40.60	54.00	-13.40	Average
5	2485.205	4.50	29.07	40.47	64.56	57.66	74.00	-16.34	Peak



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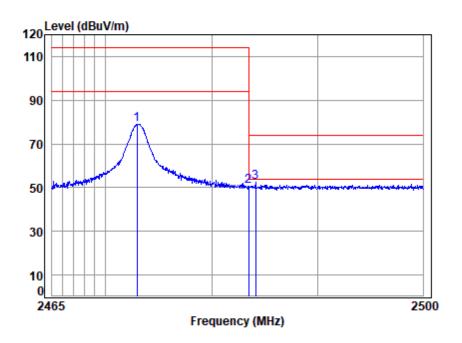
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m VERTICAL

Job No : 20814ET

Mode : 2473 Band edge

		~ ~~8~						
	Cable	Ant	Preamp	Read		Limit	0ver	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2473.000	4.48	29.05	40.46	85.99	79.06	114.00	-34.94	peak
2483.500	4.49	29.07	40.47	57.66	50.75	74.00	-23.25	peak
2484.154	4.50	29.07	40.47	59.43	52.53	74.00	-21.47	Peak

Remark:

1 2 3

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



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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:

Fraguenov/MUz)	Field strength	Limit	Detector	Measurement Distance
Frequency(MHz)	(microvolts/meter)	(dBuV/m)	Detector	(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: 23.5 °C Atmospheric Pressure: 1010 mbar Humidity: 56.3 % RH

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode_Keep the EUT in transmitting with modulation mode.



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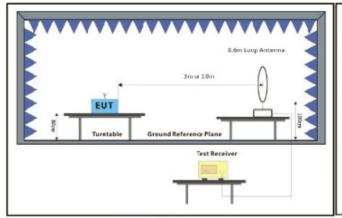
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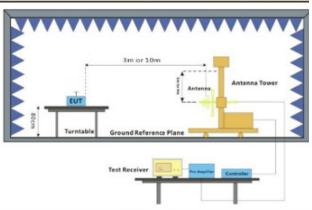


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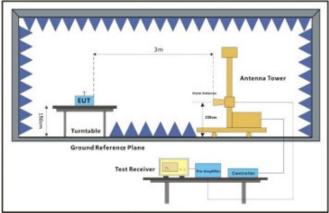
7.4.3 Test Setup Diagram





Below 30MHz

30MHz-1GHz



Above 1GHz



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7.4.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete. Remark:
- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

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

- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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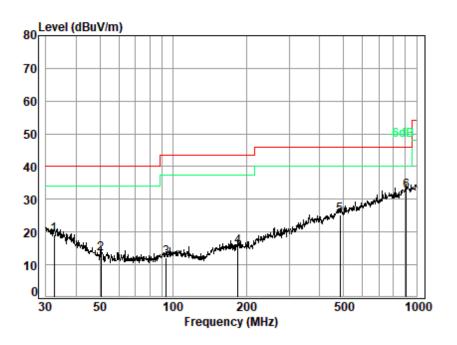


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Below 1GHz

Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No. : 20814ET

Test Mode: 02

	louc. oz								
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
_									
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	32.41	0.63	21.38	27.73	24.84	19.12	40.00	-20.88	QP
2	50.41	0.70	13.98	27.68	26.27	13.27	40.00	-26.73	QP
3	93.77	1.22	13.50	27.62	24.98	12.08	43.50	-31.42	QP
4	184.49	1.19	15.45	27.20	26.07	15.51	43.50	-27.99	QP
5	485.61	2.47	24.30	27.75	26.26	25.28	46.00	-20.72	QP
6 q	906.48	3.51	29.00	27.13	27.27	32.65	46.00	-13.35	OP



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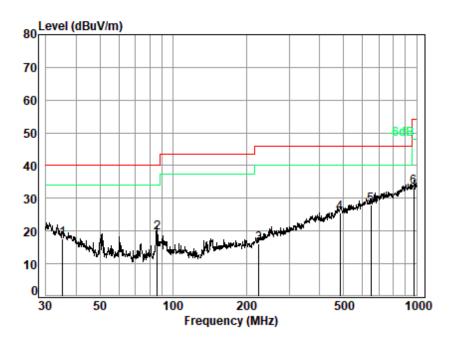
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m VERTICAL

Job No. : 20814ET

Test Mode: 02

	Freq			Preamp Factor					
_	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	35.13	0.65	20.21	27.72	24.55	17.69	40.00	-22.31	QP
2	86.20	1.26	12.54	27.63	33.40	19.57	40.00	-20.43	QP
3	225.31	1.44	17.07	27.06	24.60	16.05	46.00	-29.95	QP
4	485.61	2.47	24.30	27.75	26.50	25.52	46.00	-20.48	QP
5 q	649.66	2.80	26.30	28.02	26.87	27.95	46.00	-18.05	QP
6	975.75	3.58	29.50	26.78	27.29	33.59	54.00	-20.41	OP



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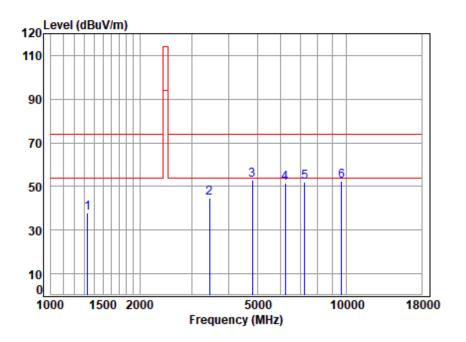


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Above 1GHz

Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20814ET

Mode : 2409 TX RSE

Ouc	. 27	00 17	NJL.							
		Cable	Ant	Preamp	Read		Limit	0ver		
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	1331.288	3.00	25.38	39.85	49.17	37.70	74.00	-36.30	Peak	
2	3445.535	5.45	31.57	41.04	48.91	44.89	74.00	-29.11	Peak	
3	4818.000	7.11	33.65	42.15	54.24	52.85	74.00	-21.15	Peak	
4	6213.441	8.27	34.60	42.24	50.97	51.60	74.00	-22.40	Peak	
5	7227.000	8.76	35.69	41.48	49.20	52.17	74.00	-21.83	Peak	
6	9636 000	10 80	37 36	37 71	41 83	52 28	74 99	-21 72	Peak	



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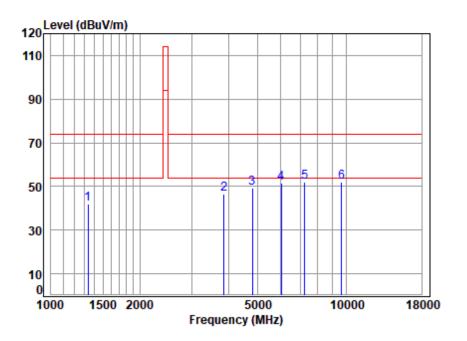
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m VERTICAL

Job No : 20814ET Mode : 2409 TX RSE

IOUC		05 17	1132						
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1335.141	3.00	25.38	39.85	53.45	41.98	74.00	-32.02	Peak
2	3856.668	6.07	32.35	41.31	49.53	46.64	74.00	-27.36	Peak
3	4818.000	7.11	33.65	42.15	50.57	49.18	74.00	-24.82	Peak
4	6018.999	8.26	34.60	42.39	50.97	51.44	74.00	-22.56	Peak
5	7227.000	8.76	35.69	41.48	48.86	51.83	74.00	-22.17	Peak
6	9636.000	10.80	37.36	37.71	41.79	52.24	74.00	-21.76	Peak



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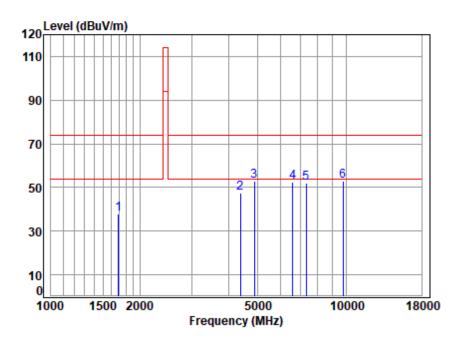
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20814ET

Mode : 2440 TX RSE

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1692.231	3.42	26.66	40.06	47.88	37.90	74.00	-36.10	peak
2	4392.376	6.66	32.92	41.78	49.58	47.38	74.00	-26.62	peak
3	4880.000	7.18	33.77	42.20	54.23	52.98	74.00	-21.02	peak
4	6602.265	8.33	34.79	41.97	51.36	52.51	74.00	-21.49	peak
5	7320.000	8.84	35.76	41.40	48.94	52.14	74.00	-21.86	peak
	9760.000	10.76	37.41	37.50	42.13	52.80	74.00	-21.20	peak



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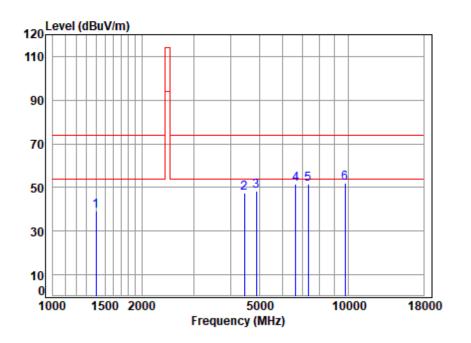
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m VERTICAL

Job No : 20814ET Mode : 2440 TX RSE

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1398.336	3.10	25.51	39.89	50.62	39.34	74.00	-34.66	peak
2	4456.315	6.72	32.97	41.84	49.50	47.35	74.00	-26.65	peak
3	4880.000	7.18	33.77	42.20	49.46	48.21	74.00	-25.79	peak
4	6640.542	8.36	34.86	41.94	50.26	51.54	74.00	-22.46	peak
5	7320.000	8.84	35.76	41.40	48.26	51.46	74.00	-22.54	peak
6	9760.000	10.76	37.41	37.50	41.53	52.20	74.00	-21.80	peak



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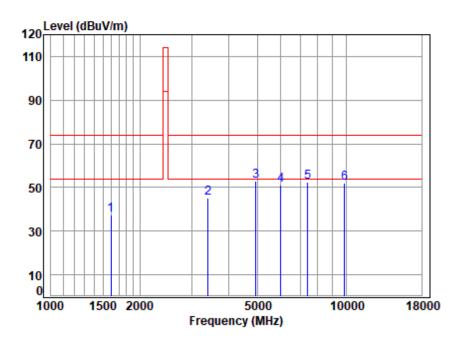
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20814ET

Mode : 2473 TX RSE

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1597.181	3.35	26.20	40.01	47.65	37.19	74.00	-36.81	Peak
2	3405.929	5.40	31.47	41.01	49.13	44.99	74.00	-29.01	Peak
3	4946.000	7.24	33.90	42.26	54.19	53.07	74.00	-20.93	Peak
4	6001.626	8.26	34.60	42.40	50.53	50.99	74.00	-23.01	Peak
5	7419.000	8.94	35.84	41.31	48.79	52.26	74.00	-21.74	Peak
6	9892,000	10.72	37.46	37.28	41.33	52.23	74.00	-21.77	Peak



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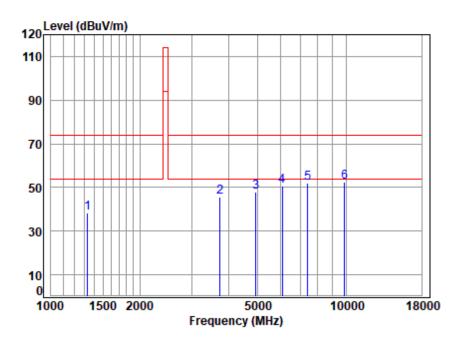
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber

1 2 3

5 6

Condition: 3m VERTICAL

Job No : 20814ET Mode : 2473 TX RSE

Freq			Preamp Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1331.288	3.00	25.38	39.85	49.67	38.20	74.00	-35.80	Peak
3735.978	5.89	32.14	41.23	48.99	45.79	74.00	-28.21	Peak
4946.000	7.24	33.90	42.26	49.09	47.97	74.00	-26.03	Peak
6071.417	8.26	34.60	42.35	50.08	50.59	74.00	-23.41	Peak
7419.000	8.94	35.84	41.31	48.70	52.17	74.00	-21.83	Peak
9892 000	10 72	37 46	37 28	41 56	52 46	74 00	-21 54	Peak



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8 Test Setup Photo

Refer to Setup Photos

9 EUT Constructional Details (EUT Photos)

Refer to EUT external and internal photos

- End of the Report -



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