



Report No.: SZEM190401278302

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TEST REPORT

Application No.: SZEM1904012783CR(SGS SZ No.:T51910230115EM)

Applicant: DOUBLEEAGLE INDUSTRY (CHINA) LIMITED

Address of Applicant: Xingda Industrial Park, Chenghai District, Shantou City, Guangdong

Province, China

Manufacturer / Supplier: DOUBLEEAGLE INDUSTRY (CHINA) LIMITED

Equipment Under Test (EUT):

EUT Name: Building Blocks

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.

Requested Age Grading: 3+
Country of Origin: China

FCC ID: 2AAFASY-C51027W-02

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

Date of Receipt: 2019-04-15

Date of Test: 2019-04-16 to 2019-04-22

Date of Issue: 2019-04-24

Test Result: Pass*

Keny Xu EMC Laboratory Manager

Ceny. Ku



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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 Rema						
01		2019-04-24		Original			

Authorized for issue by:		
	Gebin Sun	
	Gebin Sun /Project Engineer	_
	EvicFu	
	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	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 6.10.5	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.: C51001W, C51002W, C51003W, C51005W, C51006W, C51007W, C51008W, C51010W, C51011W, C51012W, C51013W, C51014W, C51015W, C51017W, C51018W, C51019W, C51020W, C51021W, C51022W, C51023W, C51024W, C51025W, C51026W, C51027W, C51028W, C51029W, C51030W, C51031W, C51032W, C51033W, C51034W, C51035W, C51036W, C51037W, C51038W, C51039W, C51040W, C51041W, C51042W, C51043W, C51044W, C51045W, C51046W, C51047W, C51048W, C51049W, C51050W, C51051W, C51052W, C51053W, C51054W, C51055W, C51056W, C51057W, C51058W, C51059W, C51060W, C51061W, C51062W, C51063W, C51064W, C51065W, C51067W, C51068W, C51069W, C51070W, C52001W, C52002W, C52003W, C52004W, C52005W, C52006W, C52007W, C52008W, C52009W, C52010W, C52011W, C52012W, C52013W, C52014W

Only the model C51027W was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on colour, decorations and model No..



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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
Operating Frequency:	2.4GHz(2405MHz-2475MHz)
Channel Spacing	1MHz
Channel number:	71
Modulation Type:	GFSK
Sample Type:	Portable production
Antenna Type:	Integral
Antenna Gain:	0dBi

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty		
1	Radio Frequency	± 7.25 x 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	DE Dodieted newer	± 4.5dB (below 1GHz)		
/	RF Radiated power	± 4.8dB (above 1GHz)		
0	Redicted Courieus amineian teat	± 4.5dB (Below 1GHz)		
8	Radiated Spurious emission test	± 4.8dB (Above 1GHz)		
9	Temperature test	± 1 ℃		
10	Humidity test	± 3%		
11	Supply voltages	± 1.5%		
12	Time	± 3%		



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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.

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

No tests were sub-contracted.

4.5 Test Facility

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

CNAS (No. CNAS L2929)

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

A2LA (Certificate No. 3816.01)

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

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
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
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	2018-07-12	2019-07-11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018-09-27	2019-09-26
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018-09-25	2019-09-24

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	2018-07-12	2019-07-11	
EXA Spectrum Analyzer	AgilentTechnologies 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 (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	2018-09-25	2019-09-24	
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2018-11-12	2019-11-11	
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31	
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31	
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-09-25	2019-09-24	
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21	



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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	2018-07-12	2019-07-11
EXA Spectrum Analyzer	AgilentTechnologies 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 (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	2018-09-25	2019-09-24
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2018-11-12	2019-11-11
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

Radiated Emissions(Ab	ove 1GHZ)				
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	2018-07-12	2019-07-11
EXA Spectrum Analyzer	AgilentTechnologies 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 (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



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Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2018-09-25	2019-09-24
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2018-11-12	2019-11-11
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

RE in Chamber(30MHz-1GHz)									
Test 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				
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2018-09-25	2019-09-24				
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26				
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	8447D SEM005-01		2020-03-31				
Measurement Software	AUDIX	e3 V8.2014-6- 27	· ·		N/A				
Coaxial Cable	SGS	N/A	SEM025-01	2018-07-12	2019-07-11				

General used equipmen	t				
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological ZJ1-2B Industry Factory		SEM002-03	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2018-09-27	2019-09-26
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 Appendix(Internal photos)



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Radio Spectrum Matter Test Results

20dB Bandwidth

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

Limit: N/A

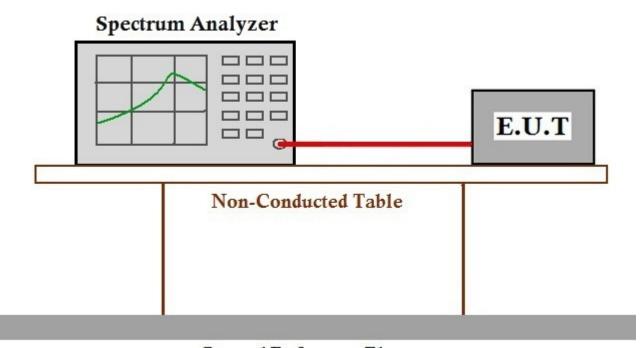
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: Humidity: 54.8 % RH Atmospheric Pressure: 1015 mbar 21.1 °C

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

7.1.2 Test Setup Diagram



Ground Reference Plane

7.1.3 Measurement Procedure and Data

Test channel	20dB bandwidth (MHz)	Results
Lowest	1.902	Pass
Middle	2.480	Pass
Highest	1.531	Pass



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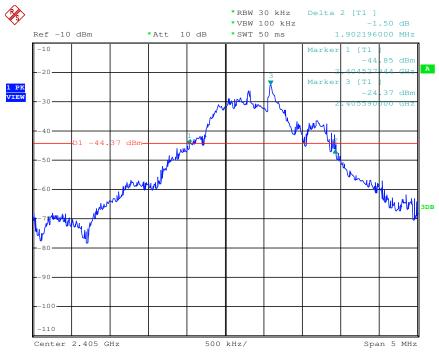
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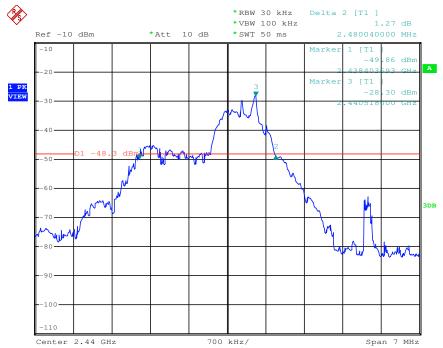
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Mode:b; Channel:Low



Mode:b; Channel:middle





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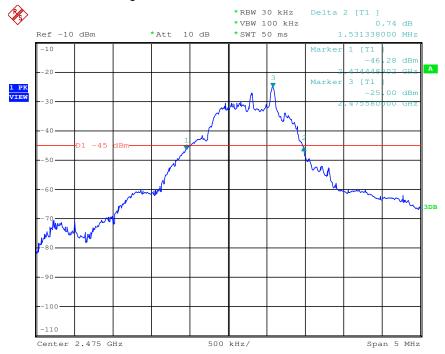
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Mode:b; Channel:High





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

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.

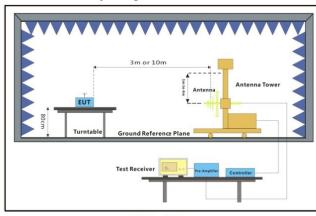
7.2.1 E.U.T. Operation

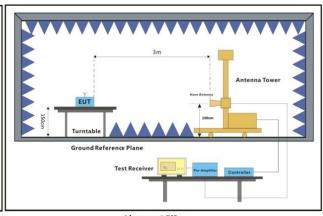
Operating Environment:

55 % RH Temperature: 21.9 °C Atmospheric Pressure: 1015 mbar Humidity:

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

7.2.2 Test Setup Diagram





Above 1GHz 30MHz-1GHz



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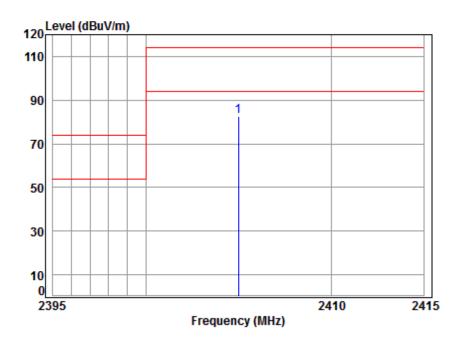
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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 12783CR

Mode : 2405 Field strength

> Cable Ant Preamp Limit 0ver Read

Freq Loss Factor Factor Level Level Line Limit Remark

dBuV dBuV/m dBuV/m MHz dB dB/m dΒ dB

2405.000 5.49 28.54 41.18 89.60 82.45 114.00 -31.55 Peak



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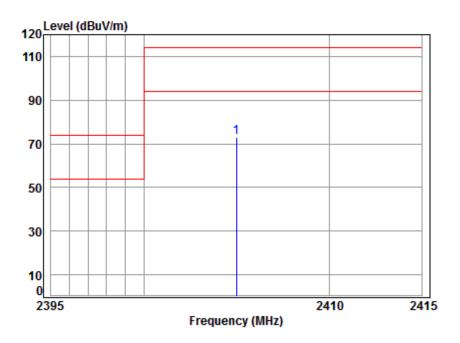
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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 12783CR

Mode : 2405 Field strength

> Cable Ant Preamp Limit 0ver Read

Freq Loss Factor Factor Level Level Line Limit Remark

dBuV dBuV/m dBuV/m MHz dB dB/m dΒ dB

2405.000 5.49 28.54 41.18 79.96 72.81 114.00 -41.19 Peak



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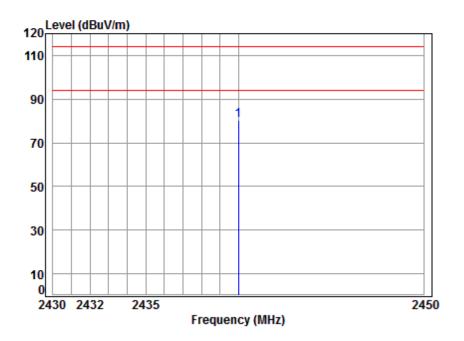
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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



: chamber Site

Condition: 3m HORIZONTAL

Job No : 12783CR

: 2440 Field strength Mode

> Cable Ant Preamp Limit 0ver Read

Freq Loss Factor Factor Level Level Line Limit Remark

dBuV dBuV/m dBuV/m MHz dB dB/m dΒ dB

2440.000 5.54 28.60 41.19 87.18 80.13 114.00 -33.87 Peak



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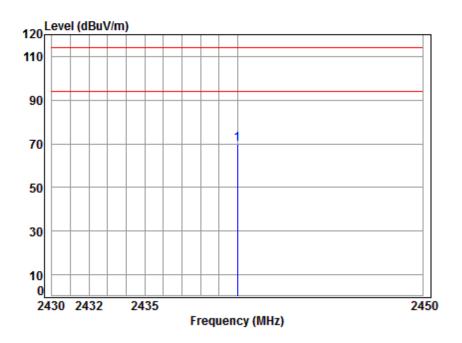
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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



: chamber Site Condition: 3m VERTICAL Job No : 12783CR

: 2440 Field strength Mode

> Cable Ant Preamp Limit 0ver Read

Freq Loss Factor Factor Level Level Line Limit Remark

dBuV dBuV/m dBuV/m MHz dB dB/m dΒ dB

2440.000 5.54 28.60 41.19 76.69 69.64 114.00 -44.36 Peak



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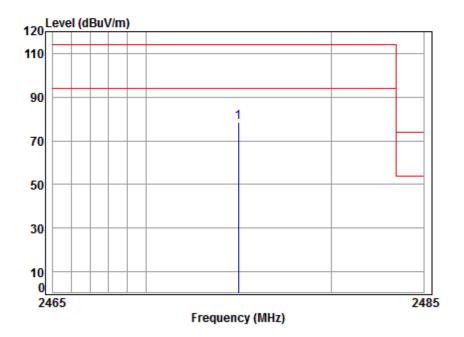
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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



: chamber Site

Condition: 3m HORIZONTAL

Job No : 12783CR

Mode : 2475 Field strength

> Cable Ant Preamp Limit 0ver Read

Freq Loss Factor Factor Level Level Line Limit Remark

dBuV dBuV/m dBuV/m MHz dB dB/m dΒ dB

2475.000 5.59 28.66 41.21 85.41 78.45 114.00 -35.55 Peak



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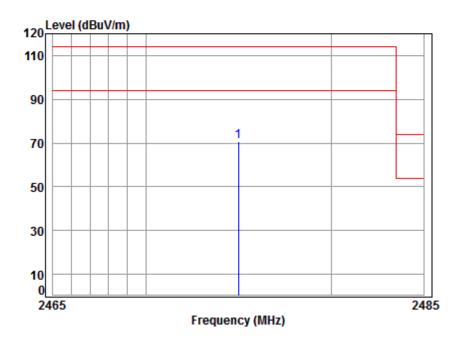
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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Site : chamber Condition: 3m VERTICAL

Job No : 12783CR

Mode : 2475 Field strength

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

1 2475.000 5.59 28.66 41.21 77.53 70.57 114.00 -43.43 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

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

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

ANSI C63.10 (2013) Section 6.10.5 Test Method:

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.

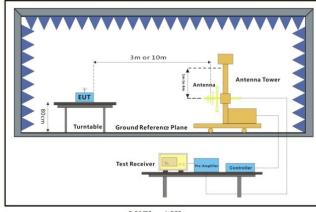
7.3.1 E.U.T. Operation

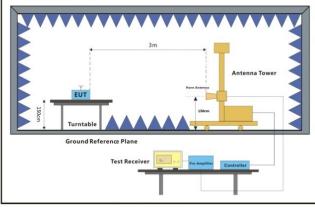
Operating Environment:

Temperature: 20.3 °C Humidity: 51.3 % RH Atmospheric Pressure: 1015 mbar

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

7.3.2 Test Setup Diagram





Above 1GHz 30MHz-1GHz



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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
- 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

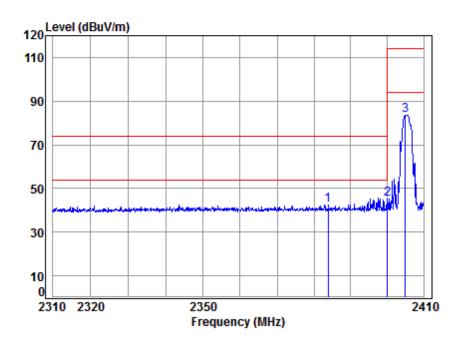




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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 12783CR

1 2 3

Mode : 2405 Band edge

	Cable	Ant	Preamp	Read		Limit	0ver	
Frea			Factor					
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
		,			,	,		
2383.894	5.47	28.51	41.17	49.79	42.60	74.00	-31.40	peak
2400.000								•
2405 000								•



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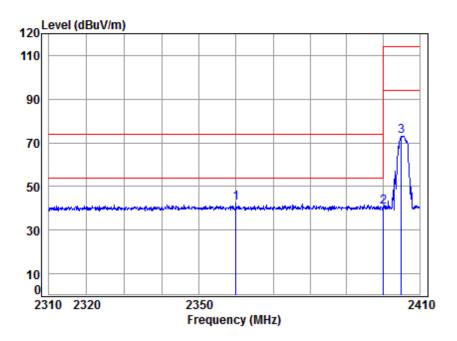
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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 12783CR

: 2405 Band edge Mode

			Preamp					
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2359.970	5.43	28.47	41.16	49.73	42.47	74.00	-31.53	peak
2400.000	5.49	28.54	41.18	47.92	40.77	74.00	-33.23	peak
2/05 000	5 /19	28 5/	<i>I</i> 11 18	80 16	73 01	11/1 00	-40 99	neak



1 2 3

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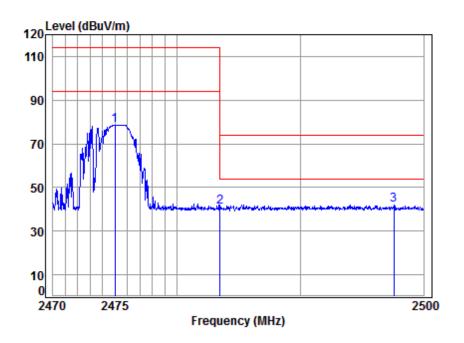
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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 12783CR

1 2 3

Mode : 2475 Band edge

	Cable	Ant	Preamp	Read		Limit	0ver	
Freq			Factor					
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2475.000	5.59	28.66	41.21	85.52	78.56	114.00	-35.44	peak
2483.500	5.60	28.67	41.21	47.83	40.89	74.00	-33.11	peak
2497.587	5.62	28.70	41.22	49.03	42.13	74.00	-31.87	peak



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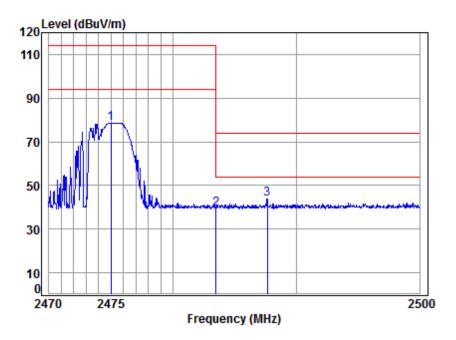
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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Site : chamber Condition: 3m VERTICAL Job No : 12783CR

Mode : 2475 Band edge

Freq			Preamp Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2475.000 2483.500	5.60	28.67	41.21	46.40	39.46	74.00	-34.54	peak
2487.626	5.60	28.68	41.21	50.55	43.62	74.00	-30.38	peak

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:

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



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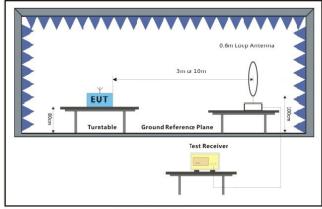
7.4.1 E.U.T. Operation

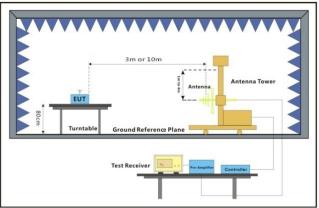
Operating Environment:

21.9 °C Atmospheric Pressure: 1015 mbar Temperature: Humidity: 55 % RH

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

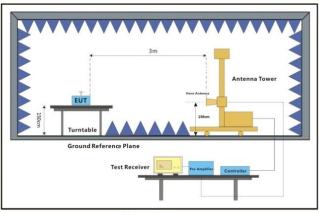
7.4.2 Test Setup Diagram





Below 30MHz

30MHz-1GHz



Above 1GHz



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7.4.3 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:

- 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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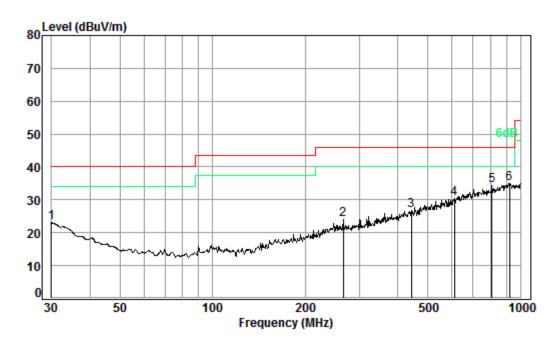
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30MHz~1GHz

QP value:

Mode: b; Polarization: Horizontal;



Condition: 3m Horizontal

Job No. : 12783CR

Test Mode: b

	Freq			Preamp Factor				Over Limit
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.00	0.60	22.50	27.73	27.65	23.02	40.00	-16.98
2	265.68	1.75	19.01	26.97	30.15	23.94	46.00	-22.06
3	441.74	2.38	23.38	27.60	28.70	26.86	46.00	-19.14
4	609.92	2.72	26.74	28.14	29.21	30.53	46.00	-15.47
5	807.43	3.24	28.60	27.69	30.32	34.47	46.00	-11.53
6 pp	922.52	3.62	29.92	27.20	28.57	34.91	46.00	-11.09



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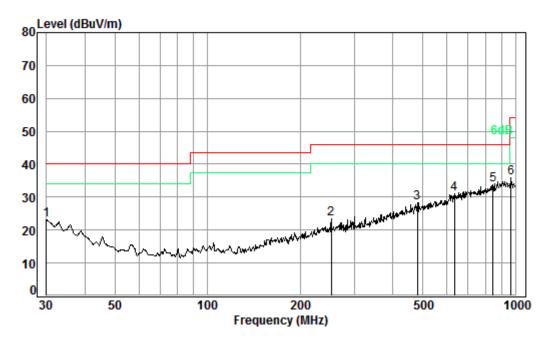
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Mode :b; Polarization: Vertical



Condition: 3m Vertical

Job No. : 12783CR

Test Mode: b

	Freq			Preamp Factor				
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.00	0.60	22.50	27.73	27.79	23.16	40.00	-16.84
2	252.06	1.68	18.98	27.01	29.80	23.45	46.00	-22.55
3	480.53	2.53	24.21	27.76	29.29	28.27	46.00	-17.73
4	633.91	2.77	27.06	28.08	29.13	30.88	46.00	-15.12
5 pp	845.09	3.39	29.11	27.52	28.84	33.82	46.00	-12.18
6	968.93	3.67	30.15	27.02	29.20	36.00	54.00	-18.00



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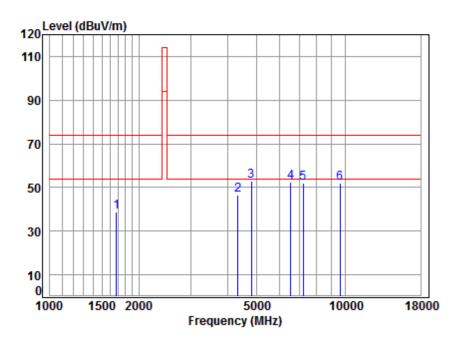


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Above 1GHz

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



Site : chamber

Condition: 3m HORIZONTAL

Job No : 12783CR Mode : 2405 TX RSE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1677.621	5.25	26.58	40.82	47.86	38.87	74.00	-35.13	peak
2	4329.354	7.37	33.30	43.12	49.02	46.57	74.00	-27.43	peak
3	4810.000	7.90	33.98	43.62	54.69	52.95	74.00	-21.05	peak
4	6545.263	11.41	35.63	42.37	47.67	52.34	74.00	-21.66	peak
5	7215.000	10.07	36.08	41.85	47.59	51.89	74.00	-22.11	peak
6	9620,000	10.75	37.67	38.41	42.18	52.19	74.00	-21.81	neak



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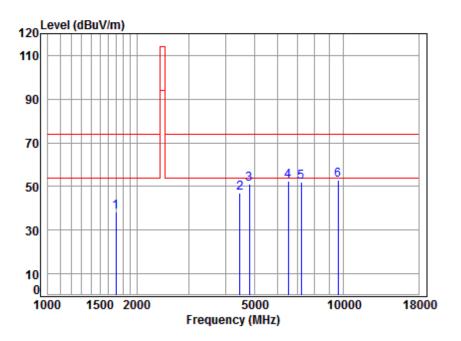
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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 12783CR Mode : 2405 TX RSE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1697.129	5.23	26.66	40.83	47.25	38.31	74.00	-35.69	peak
2	4469.214	7.53	33.55	43.27	49.14	46.95	74.00	-27.05	peak
3	4810.000	7.90	33.98	43.62	52.65	50.91	74.00	-23.09	peak
4	6507.536	11.52	35.60	42.40	47.74	52.46	74.00	-21.54	peak
	7215.000								•
6	9620.000	10.75	37.67	38.41	42.93	52.94	74.00	-21.06	peak



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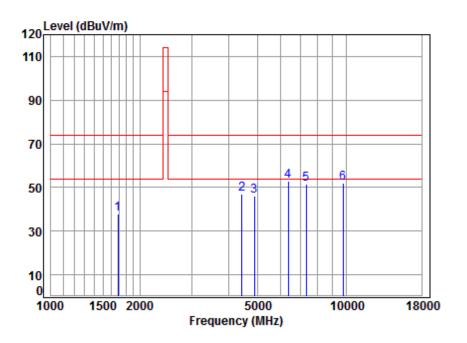
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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 12783CR Mode : 2440 TX RSE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
	1687.347	5.24	26.62	40.82	46.74	37.78	74.00	-36.22	peak
2	4443.453	7.50	33.50	43.25	49.18	46.93	74.00	-27.07	peak
}	4880.000	7.97	34.06	43.69	47.78	46.12	74.00	-27.88	peak
ļ	6377.195	11.31	35.48	42.51	48.59	52.87	74.00	-21.13	peak
,	7320.000	10.05	36.16	41.77	47.06	51.50	74.00	-22.50	peak
	9760 000	10 82	37 76	38 18	41 75	52 15	74 99	-21 85	neak



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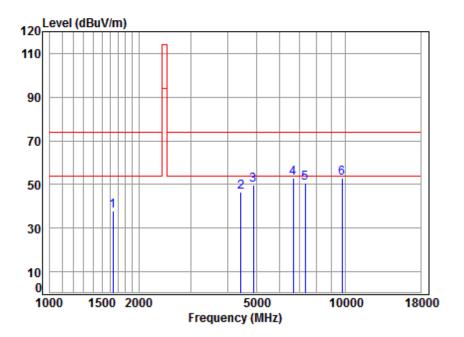
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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



Site : chamber Condition: 3m VERTICAL Job No : 12783CR Mode : 2440 TX RSE

ouc	. 24	TO IA	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	1634.543	5.31	26.40	40.79	47.05	37.97	74.00	-36.03	peak	
2	4443.453	7.50	33.50	43.25	48.66	46.41	74.00	-27.59	peak	
3	4880.000	7.97	34.06	43.69	51.38	49.72	74.00	-24.28	peak	
4	6659.763	11.08	35.70	42.28	48.50	53.00	74.00	-21.00	peak	
5	7320.000	10.05	36.16	41.77	46.42	50.86	74.00	-23.14	peak	
6	9760.000	10.82	37.76	38.18	42.56	52.96	74.00	-21.04	peak	



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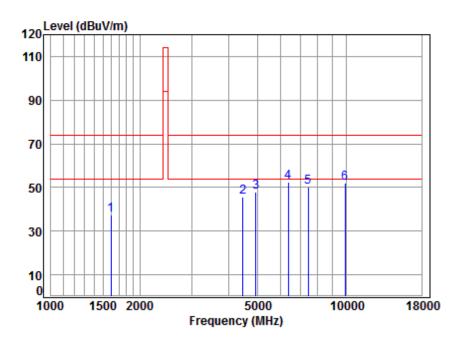
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Mode:b; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 12783CR Mode : 2475 TX RSE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1597.181	5.35	26.24	40.77	46.70	37.52	74.00	-36.48	peak
2	4469.214	7.53	33.55	43.27	47.92	45.73	74.00	-28.27	peak
3	4950.000	8.04	34.14	43.75	49.67	48.10	74.00	-25.90	peak
4	6377.195	11.31	35.48	42.51	48.26	52.54	74.00	-21.46	peak
5	7425.000	10.02	36.24	41.70	45.56	50.12	74.00	-23.88	peak
6	9900.000	10.89	37.84	37.96	41.26	52.03	74.00	-21.97	neak



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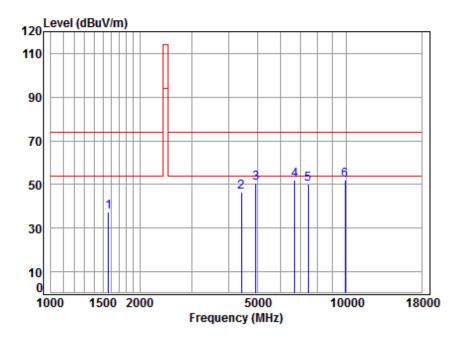
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Mode:b; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Site : chamber Condition: 3m VERTICAL Job No : 12783CR Mode : 2475 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	1565.191	5.39	26.10	40.75	46.63	37.37	74.00	-36.63	peak
2	4417.841	7.47	33.46	43.22	48.72	46.43	74.00	-27.57	peak
3	4950.000	8.04	34.14	43.75	52.36	50.79	74.00	-23.21	peak
4	6698.373	10.97	35.72	42.24	47.63	52.08	74.00	-21.92	peak
5	7425.000	10.02	36.24	41.70	45.84	50.40	74.00	-23.60	peak
6	9900.000	10.89	37.84	37.96	41.29	52.06	74.00	-21.94	peak



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Photographs 8

8.1 Test Setup

Please refer to setup photos.

8.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.

- End of the Report -



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