

Report No.: SZEM200300142802

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TEST REPORT

Application No.: SZEM2003001428CR (SGS SZ No.:T52010230056EM)

ZHENCHENG TOYS FACTORY Applicant:

Address of Applicant: CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE,

SHANTOU CITY, China

Manufacturer: ZHENCHENG TOYS FACTORY

CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, Address of Manufacturer:

SHANTOU CITY, 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.

Requested Age Grading: **Country of Origin:** China

FCC ID: 2AAGP19161B

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

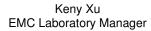
2020-03-12 **Date of Receipt:**

Date of Test: 2020-03-14 to 2020-03-30

Date of Issue: 2020-04-14

Test Result: Pass*

中国·深圳·科技园中区M-10栋一号厂房



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 Remai						
01		2020-04-14		Original			

Authorized for issue by:		
	Gebin Sun	
	Gebin Sun /Project Engineer	_
	EvicFu	
	Eric Fu /Reviewer	_



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Test Summary 2

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 Matt	er 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.: 333-19164B, 333-19161B, 333-19162B, 333-19163B, 333-19165B, 333-19161A, 333-19162A, 333-19163A, 333-19164A, 333-19165A, 333-19181B, 333-19182B, 333-19183B, 333-19184B, 333-19181A, 333-19182A,333-19183A, 333-19184A, 333-PY1901B, 333-PY1901A, 333-TJ1901B, 333-TJ1901A,333-DJ19161, 333-DJ19162, 333-DJ19163, 333-DJ19164, 333-DJ19165, 333-DJ19166, 333-GS19121,333-19101, 333-19102, 19SL02B, 19SL02A, 19SL01, 18SL02, 181401, 181402, 181403, 181001, 18GS04, 18GS06, 18GS09, 18MUD01, 18MUD02, 171605B, 171605A, 171803, 171804, 171603B, 171604B, 172801, 172802, 171801B, 171802B, 171801A, 171802A, 171601B, 171602B, 171601A, 171602A, 173201, 17SL01B, 17SL01A, 17MT01B, 17MT01A, 333-TK11, 333-TK11A, 17GS06A, 17GS09B, 333-P021, 333-P021A, 333-P023A, 333-P015, 333-P013, 333-P014, 333-P011, 17MUD01B, 17MUD01A, 17MUD02B, 17MUD02

Only the model 333-19164B was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on shell color and shape.



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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:	2420MHz to 2460MHz
Channel Spacing	1MHz
Modulation Type:	GFSK
Number of Channels:	41
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	Radiated Courieus amission test	± 4.5dB (Below 1GHz)
4	Radiated Spurious emission test	± 4.8dB (Above 1GHz)
5	Temperature test	± 1 ℃
6	Humidity test	± 3%
7	Supply voltages	± 1.5%
8	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:

• A2LA (Certificate No. 3816.01)

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

VCCI

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

• FCC –Designation Number: CN1178

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

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

· Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None





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Equipment List 5

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	2020-03-24	2021-03-23	
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23	
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10	
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A	
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23	
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23	
Electric and Magnetic Field Analyzer	Narda	EHP-50F	SEM022-05	2019-11-28	2020-11-27	
Electric Field Probe	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20	
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07	

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	2019-07-11	2020-07-10	
EVA Capatrum Anglyzor	AgilentTechnologies	NOO10A	CEM004 10	2019-04-12	2020-04-11	
EXA Spectrum Analyzer	Inc	N9010A	SEM004-12	2020-04-09	2021-04-08	
Horn Antenna	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12	
Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16	
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23	
Due emplifies	Dabda 9 Cabusara	01114 11050	CEMODE 17	2019-04-01	2020-03-31	
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2020-04-01	2021-03-31	
	Compliance			2019-04-01	2020-03-31	
Pre-amplifier	Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31	
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23	
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	2019-07-11	2020-07-10
EVA Connetwork Amelyana	AgilentTechnologies	NootoA	CEM004 10	2019-04-12	2020-04-11
EXA Spectrum Analyzer	Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
Dro amplifiar	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier	honde & Schwarz	GH14-H052	SEM005-17	2020-04-01	2021-03-31
	Compliance			2019-04-01	2020-03-31
Pre-amplifier	Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

Radiated Emissions(Above 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	2019-07-11	2020-07-10		
EVA Consistence Analysis	AgilentTechnologies	NOOTOA	CEM004 10	2019-04-12	2020-04-11		
EXA Spectrum Analyzer	Inc	N9010A	SEM004-12	2020-04-09	2021-04-08		
Horn Antenna	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12		
Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16		
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23		
Due emplifies	Dabda 9 Cabusara	OU14 4 11050	OEMO05 17	2019-04-01	2020-03-31		
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2020-04-01	2021-03-31		
	Compliance			2019-04-01	2020-03-31		
Pre-amplifier	Directions Systems Inc.	PAP-2640-50	PAP-2640-50	PAP-2640-50 S	SEM005-08	2020-04-01	2021-03-31
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23		



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Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21
---------------------	--------------	------	-----------	------------	------------

RE in Chamber					
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 (3Hz-3.6GHz)	KEYSIGHT	N9038A	SEM004-15	2019-12-16	2020-12-15
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier	Agilent	8447D	SEM005-01	2019-04-01	2020-03-31
(0.1-1300MHz)	Technologies	0447 D	3E10003-01	2020-04-01	2021-03-31
Measurement Software	Measurement Software AUDIX		N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019-07-11	2020-07-10

General used equipment								
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date			
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25			
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25			
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25			
	Changchun			2019-04-04	2020-04-03			
Barometer	Meteorological Industry Factory	DYM3	SEM002-01	2020-04-07	2021-04-06			



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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 Limit:

15.203 requirement:

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

6.1.2 Conclusion

EUT Antenna:

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

Antenna location: Refer to Internal photos.





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Radio Spectrum Matter Test Results 7

20dB Bandwidth

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

Limit: N/A

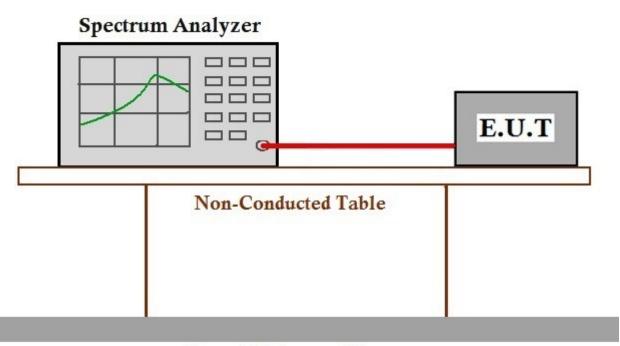
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 26 Atmospheric Pressure: 1015 mbar Humidity: 49.7 % RH

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	5.216 Pass			
Middle	4.551	Pass		
Highest	4.279	Pass		



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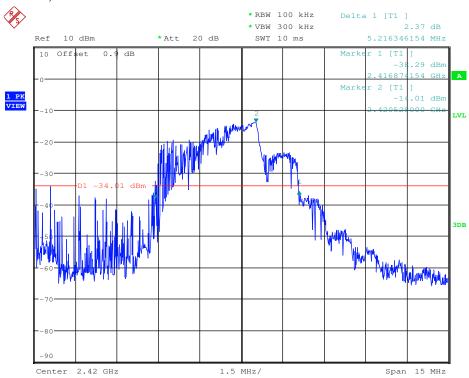
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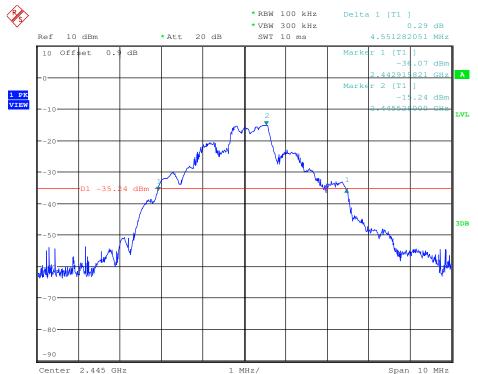
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Mode:b; Channel:Low



Mode:b; Channel:middle





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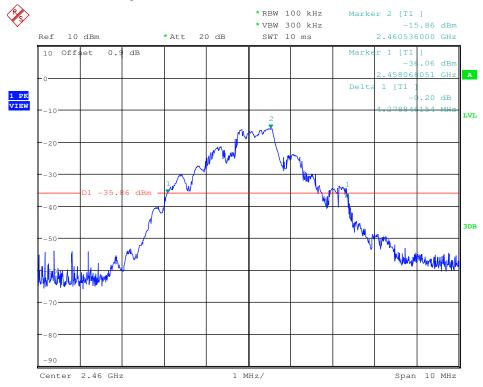
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Mode:b; Channel:High





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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)
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:

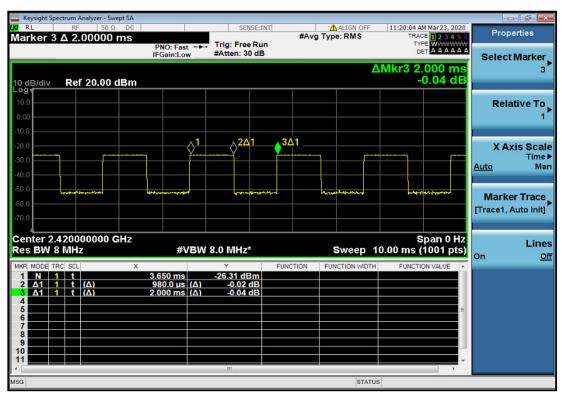
	Average value=Peak value + PDCF
Calculate Formula:	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
	Ton time =0.98ms
Took data:	T period =2ms
Test data:	Duty cycle=49.0%
	PDCF value= -6.2dB





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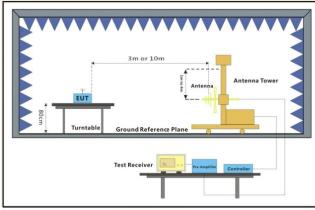
7.2.1 E.U.T. Operation

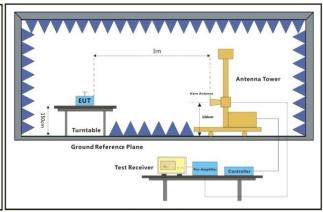
Operating Environment:

Temperature: Humidity: 51 % RH Atmospheric Pressure: 1020 mbar

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

7.2.2 Test Setup Diagram





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

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

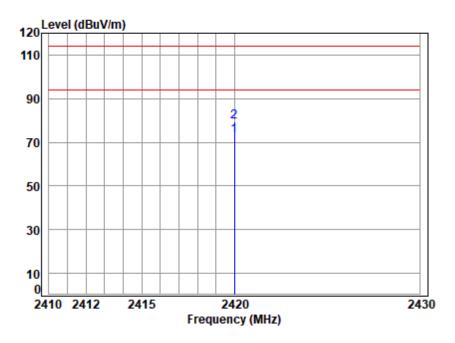




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Mode:b; Polarization:Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 01428CR

Mode : 2420 Field strength

Freq			Preamp Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2420.000 2420.000								_



1

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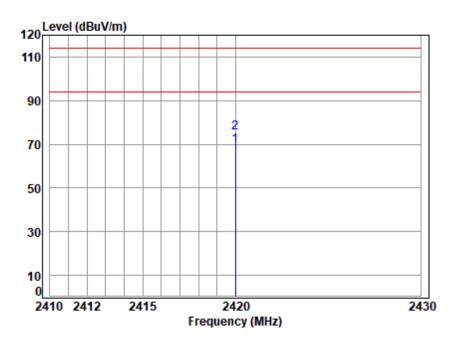
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Mode:b; Polarization:Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 01428CR

Mode : 2420 Field strength

> Ant Preamp Cable Read Limit 0ver Loss Factor Factor Level Level Line Limit Remark Freq dBuV dBuV/m dBuV/m MHz dB dB/m 3.71 28.57 40.98 77.98 69.28 94.00 -24.72 Average 2420.000 3.71 28.57 40.98 84.18 75.48 114.00 -38.52 peak 2420.000



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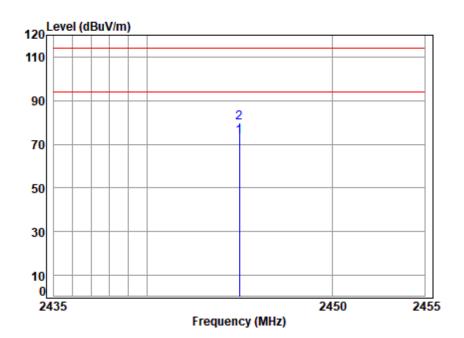
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Mode:b; Polarization:Horizontal; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 01428CR

Mode : 2445 Field strength

Freq			Preamp Factor					
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2445.000 2445.000								_



1 2

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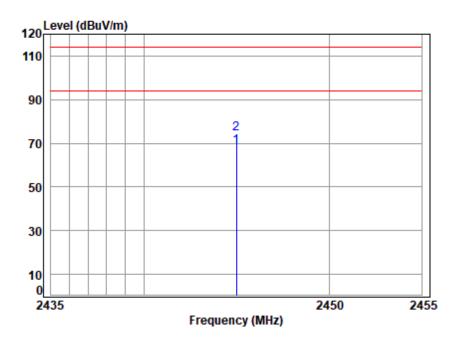
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Mode:b; Polarization:Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL Job No : 01428CR

Mode : 2445 Field strength

Ant Preamp Cable Read Limit 0ver Loss Factor Factor Level Level Line Limit Remark Freq dBuV dBuV/m dBuV/m MHz dB dB/m 2445.000 3.83 28.61 41.00 76.85 68.29 94.00 -25.71 Average 3.83 28.61 41.00 83.05 74.49 114.00 -39.51 peak 2445.000



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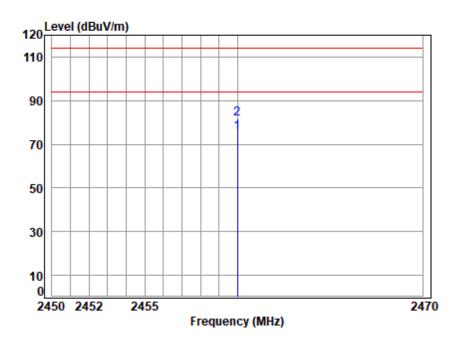
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Mode:b; Polarization:Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 01428CR

Mode : 2460 Field strength

> Ant Preamp Cable Read Limit 0ver Loss Factor Factor Level Level Line Limit Remark Freq dBuV dBuV/m dBuV/m MHz dB dB/m 2460.000 3.90 28.63 41.00 83.90 75.43 94.00 -18.57 Average 2460.000 3.90 28.63 41.00 90.10 81.63 114.00 -32.37 peak



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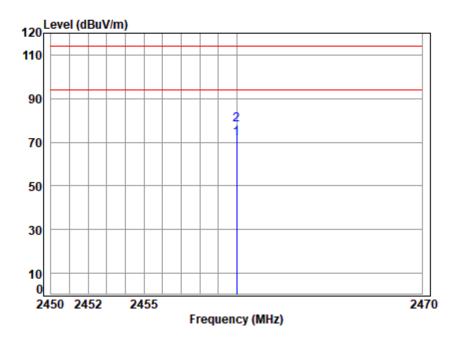
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Mode:b; Polarization:Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL

Job No : 01428CR

Mode : 2460 Field strength

	Freq			Preamp Factor					Remark
_	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
	460.000 460.000								_

Remark:

1 2

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.

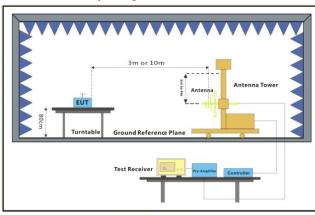
7.3.1 E.U.T. Operation

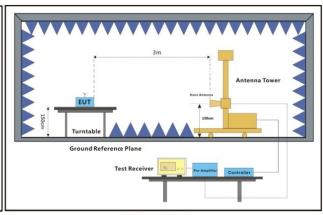
Operating Environment:

Temperature: 56.3 % RH Atmospheric Pressure: 1015 mbar 23.5 °C Humidity:

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

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



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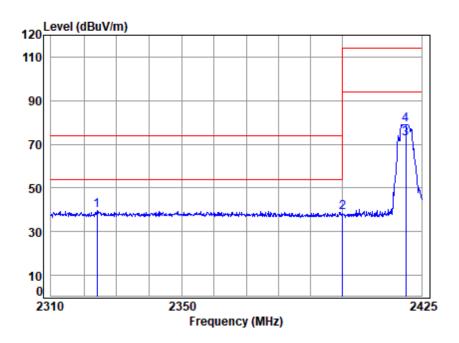
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Mode:b; Polarization:Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 01428CR

· 2420 Rand edge Mode

-	. 244	LO Dan	u cuge						
		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	
	2323.958	4.13	28.41	40.94	48.03	39.63	74.00	-34.37	Peak
	2400.000	3.63	28.53	40.98	47.83	39.01	74.00	-34.99	peak
	2420.000	3.71	28.57	40.98	81.47	72.77	94.00	-21.23	Average
	2420 000	3 71	28 57	40 98	87 67	78 97	114 00	-35 A3	neak



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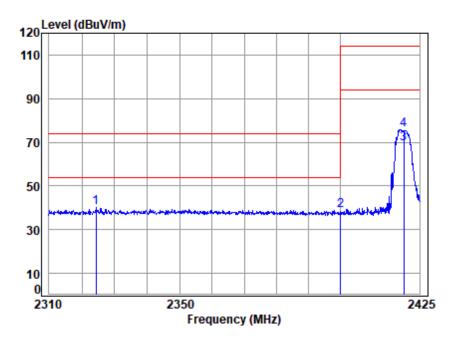
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Mode:b; Polarization:Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 01428CR

Mode : 2420 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	
	45	ub/	40	aba.	abar,	aba*/	u.	
2324.297	4 12	20 /1	40.04	10 16	40 OE	74 00	22 05	Doole
2524.297	4.12	20.41	40.94	40.40	40.05	74.00	-33.93	reak
2400.000	3.63	28.53	40.98	47.76	38.94	74.00	-35.06	peak
2420.000	3.71	28.57	40.98	78.08	69.38	94.00	-24.62	Average
								_
2420.000	3./1	28.5/	40.98	84.28	/5.58	114.00	-38.42	peak



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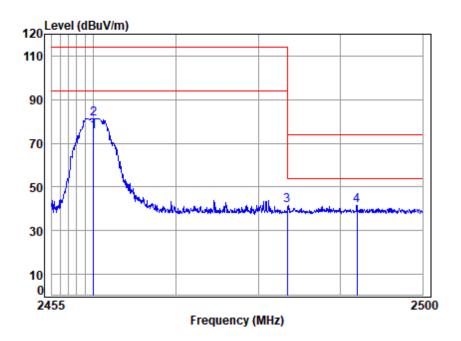
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Mode:b; Polarization:Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 01428CR

Mode : 2460 Band edge

. 2-1	oo ban	u cubc						
	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	
2460.000	3.90	28.63	41.00	83.61	75.14	94.00	-18.86	Average
2460.000	3.90	28.63	41.00	89.81	81.34	114.00	-32.66	Peak
2483.500	4.01	28.67	41.01	49.70	41.37	74.00	-32.63	Peak
2491.975	4.04	28.69	41.01	49.89	41.61	74.00	-32.39	Peak



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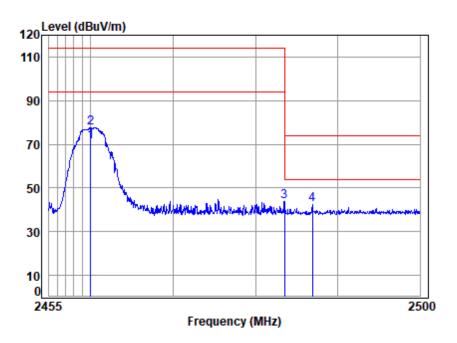
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Mode:b; Polarization:Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL Job No : 01428CR

Mode : 2460 Band edge

> Ant Preamp Cable Limit 0ver Read Loss Factor Factor Limit Remark Freq Level Level Line MHz dB dB/m dBuV dBuV/m dBuV/m 2460.000 3.90 28.63 41.00 79.73 71.26 94.00 -22.74 Average 2460.000 3.90 28.63 41.00 85.93 77.46 114.00 -36.54 Peak 2483,500 4.01 28.67 52.11 43.78 74.00 -30.22 Peak 41.01 42.42 2486.866 4.02 28.68 41.01 50.73 74.00 -31.58 Peak

Remark:

1

2

3

4

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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7.4 Radiated Emissions

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

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

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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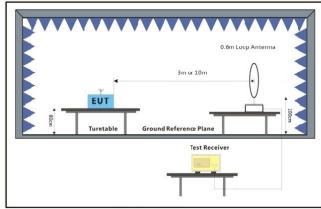
7.4.1 E.U.T. Operation

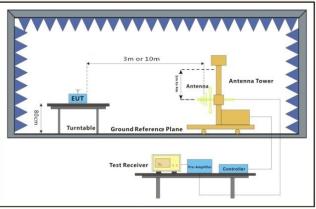
Operating Environment:

25 Atmospheric Pressure: 1020 mbar Temperature: °C Humidity: 51 % RH

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

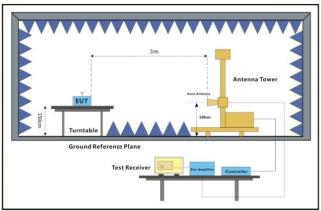
7.4.2 Test Setup Diagram





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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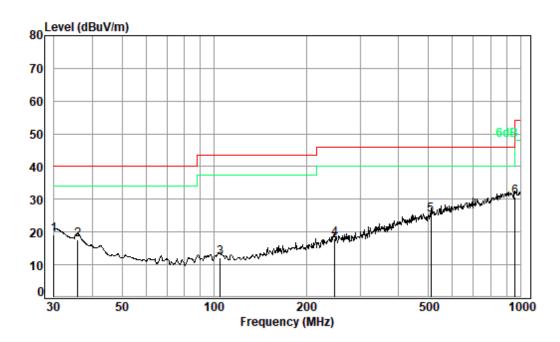


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Radiated emission below 1GHz

Mode:b: Polarization:Horizontal



Condition: 3m HORIZONTAL

Job No. : 01428CR

Test mode: b

	_			Preamp					_
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	30.00	0.60	22.50	27.73	23.70	19.07	40.00	-20.93	QP
2	35.87	0.60	19.39	27.72	25.51	17.78	40.00	-22.22	QP
3	104.54	1.21	13.78	27.61	24.75	12.13	43.50	-31.37	QP
4	247.68	1.66	18.92	27.02	24.28	17.84	46.00	-28.16	QP
5 pp	510.04	2.61	24.82	27.87	25.83	25.39	46.00	-20.61	QP
6	962.16	3.66	30.12	27.05	23.84	30.57	54.00	-23.43	OP



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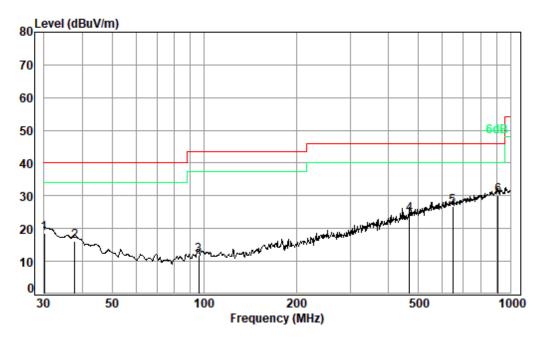
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Mode:b; Polarization:Vertical



Condition: 3m VERTICAL Job No. : 01428CR

Test mode: b

	mouci b									
		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	30.11	0.60	22.44	27.73	23.12	18.43	40.00	-21.57	QP	
2	37.81	0.60	18.48	27.71	24.84	16.21	40.00	-23.79	QP	
3	96.10	1.16	13.66	27.64	24.59	11.77	43.50	-31.73	QP	
4	468.88	2.49	23.97	27.71	25.69	24.44	46.00	-21.56	QP	
5	647.39	2.80	27.24	28.05	24.82	26.81	46.00	-19.19	QP	
6 n	n 912.86	3 61	29 87	27 24	23 91	30 15	46 00	-15 85	OP	



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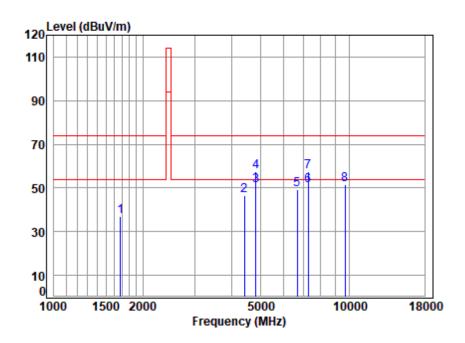


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Above 1GHz

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



Site : chamber

Condition: 3m HORIZONTAL

Job No : 01428CR Mode : 2420 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	1682.477	3.25	26.60	40.62	47.57	36.80	74.00	-37.20	peak
2	4417.841	6.63	33.46	42.49	48.88	46.48	74.00	-27.52	peak
3	4840.000	6.91	34.01	42.79	53.08	51.21	54.00	-2.79	Average
4	4840.000	6.91	34.01	42.79	59.28	57.41	74.00	-16.59	peak
5	6679.040	8.27	35.71	41.85	47.24	49.37	74.00	-24.63	peak
6	7260.000	8.42	36.11	41.55	48.12	51.10	54.00	-2.90	Average
7	7260.000	8.42	36.11	41.55	54.32	57.30	74.00	-16.70	peak
8	9680.000			38.47					



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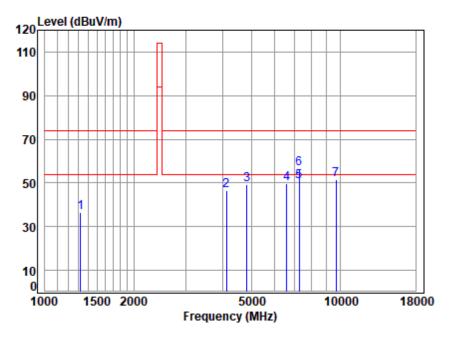
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Mode:b; Polarization:Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 01428CR Mode : 2420 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	1319.794	2.79	25.11	40.38	48.88	36.40	74.00	-37.60	peak
2	4121.768	6.02	32.93	42.26	49.73	46.42	74.00	-27.58	peak
3	4840.000	6.91	34.01	42.79	51.16	49.29	74.00	-24.71	peak
4	6583.209	7.90	35.65	41.91	47.91	49.55	74.00	-24.45	peak
5	7260.000	8.42	36.11	41.55	47.62	50.60	54.00	-3.40	Average
6	7260.000	8.42	36.11	41.55	53.82	56.80	74.00	-17.20	peak
7	9680.000	9.61	37.71	38.47	42.77	51.62	74.00	-22.38	peak



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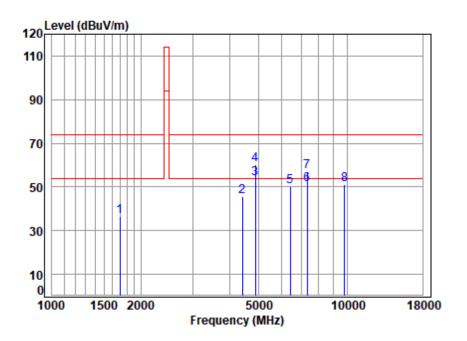
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Mode:b; Polarization:Horizontal; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 01428CR Mode : 2445 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	1702.042	3.30	26.68	40.63	46.96	36.31	74.00	-37.69	peak
2	4417.841	6.63	33.46	42.49	48.16	45.76	74.00	-28.24	peak
3	4890.000	7.05	34.07	42.83	55.65	53.94	54.00	-0.06	Average
4	4890.000	7.05	34.07	42.83	61.85	60.14	74.00	-13.86	peak
5	6414.167	7.63	35.52	42.00	48.92	50.07	74.00	-23.93	peak
6	7335.000	8.33	36.17	41.51	47.89	50.88	54.00	-3.12	Average
7	7335.000	8.33	36.17	41.51	54.09	57.08	74.00	-16.92	peak
8	9780.000	9.19	37.77	38.32	42.47	51.11	74.00	-22.89	peak



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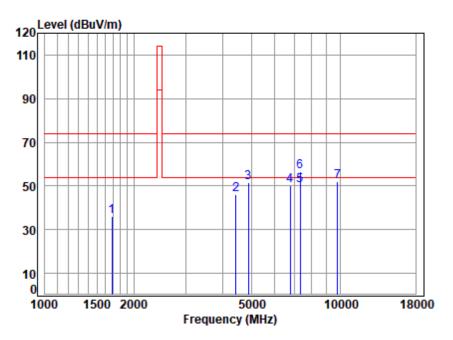
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Mode:b; Polarization:Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL Job No : 01428CR Mode : 2445 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	1687.347	3.27	26.62	40.62	46.68	35.95	74.00	-38.05	peak
2	4443.453	6.55	33.50	42.51	48.46	46.00	74.00	-28.00	peak
3	4890.000	7.05	34.07	42.83	53.17	51.46	74.00	-22.54	peak
4	6776.265	8.07	35.77	41.80	48.18	50.22	74.00	-23.78	peak
5	7335.000	8.33	36.17	41.51	47.23	50.22	54.00	-3.78	Average
6	7335.000	8.33	36.17	41.51	53.43	56.42	74.00	-17.58	peak
7	9780.000	9.19	37.77	38.32	43.18	51.82	74.00	-22.18	peak



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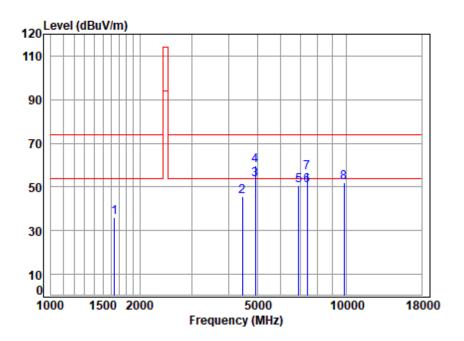
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Mode:b; Polarization:Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 01428CR Mode : 2460 TX RSE

	Freq	Cable Loss		Preamp Factor				Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1644.019	3.11	26.44	40.60	47.27	36.22	74.00	-37.78	peak
2	4456.315			42.52					•
3	4920.000	7.06	34.11	42.85	55.16	53.48	54.00	-0.52	Average
4	4920.000	7.06	34.11	42.85	61.36	59.68	74.00	-14.32	peak
5	6914.763	7.83	35.85	41.73	48.65	50.60	74.00	-23.40	peak
6	7380.000	8.23	36.21	41.49	47.51	50.46	54.00	-3.54	Average
7	7380.000	8.23	36.21	41.49	53.71	56.66	74.00	-17.34	peak
8	9840.000	9.03	37.81	38.23	43.48	52.09	74.00	-21.91	peak



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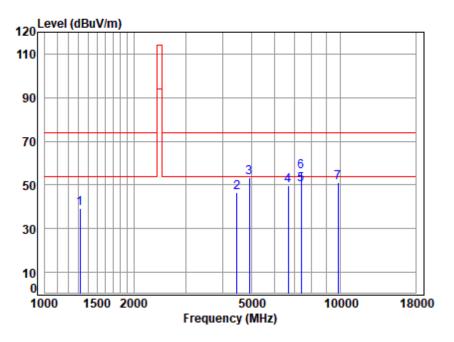
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Mode:b; Polarization:Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL Job No : 01428CR Mode : 2460 TX RSE

ouc	. 240	JO 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	1315.985	2.81	25.09	40.37	51.51	39.04	74.00	-34.96	peak
2	4469.214	6.47	33.55	42.53	48.84	46.33	74.00	-27.67	peak
3	4920.000	7.06	34.11	42.85	54.88	53.20	74.00	-20.80	peak
4	6659.763	8.21	35.70	41.86	47.84	49.89	74.00	-24.11	peak
5	7380.000	8.23	36.21	41.49	47.13	50.08	54.00	-3.92	Average
6	7380.000	8.23	36.21	41.49	53.33	56.28	74.00	-17.72	peak
7	9840.000	9.03	37.81	38.23	42.45	51.06	74.00	-22.94	peak



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8 **Photographs**

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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