

Report No.: SZCR210302002202

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## TEST REPORT

Application No.: SZCR2103020022ET(SGS SZ No:T52110240072EM)

Applicant: AMAX INDUSTRIAL GROUP CHINA CO., LTD

Address of Applicant: OFFICE NO.3 10/F WITTY COMMERCIAL BUILDING 1A-1L TUNG CHOI

STREET MONGKOK KOWLOON HONG KONG China

Manufacturer: AMAX INDUSTRIAL GROUP CHINA CO., LTD

Address of OFFICE NO.3 10/F WITTY COMMERCIAL BUILDING 1A-1L TUNG CHOI

STREET MONGKOK KOWLOON HONG KONG

**Equipment Under Test (EUT):** 

**EUT Name:** Ultra Micro Drone/Ultra Micro Helicopter

Model No.: VL-6232, VL-6233, VL-6234, ASC-6285, ASC-6214

Please refer to section 2 of this report which indicates which model was

actually tested and which were electrically identical.

Requested Age Grading: 8+

FCC ID: 2ASK3ASC-6285T

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

**Date of Receipt:** 2021-03-15

**Date of Test:** 2021-03-16 to 2021-03-17

**Date of Issue:** 2021-03-18

Test Result: Pass\*

Keny Xu EMC Laboratory Manager



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<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



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	Revision Record						
Version	Version Chapter Date Modifier Re						
01		2021-03-18		Original			

Authorized for issue by:		
	Gebin Sun	
	Gebin Sun/Project Engineer	
	Eric 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	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.: VL-6232, VL-6233. VL-6234, ASC-6285, ASC-6214

Only the model VL-6233 was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on color.



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9 EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS) ......41



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## **General Information**

### Details of E.U.T.

Power supply:	Rechargeable battery DC3.7V 60mAh for Remote ,Charged by DC5V
Operating Frequency:	2.4GHz(2402MHz-2479MHz)
Modulation Type:	GFSK
Channel Spacing	1MHz
Channel number:	78
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°C				
Humidity test	± 3%				
Supply voltages	± 1.5%				
Time	± 3%				

#### Remark:

The U<sub>lab</sub> (lab Uncertainty) is less than U<sub>cispr</sub> (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.

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

No tests were sub-contracted.

## 4.5 Test Facility

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

### A2LA (Certificate No. 3816.01)

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

#### VCCI

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

### • FCC –Designation Number: CN1178

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

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

### • Innovation, Science and Economic Development Canada

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

CAB identifier: CN0006.

IC#: 4620C.

### 4.6 Deviation from Standards

None

## 4.7 Abnormalities from Standard Conditions

None



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## 5 Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Rohde & Schwarz	NGSM 32/10	SEM011-04	2020-03-24	2021-03-23
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2020-04-01	2021-03-31
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2020-09-23	2021-09-22
Measurement Software	TST	TST PASS V1.0.5	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2020-07-10	2021-07-09
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2020-05-21	2021-05-20

Field Strength of the Fundamental Signal (15.249(a))						
Equipment	Manufacturer	Model No	<b>Inventory No</b>	Cal Date	Cal Due Date	
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12	
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08	
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12	
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	2018-03-13	2021-03-12
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2020-04-09	2021-04-08
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
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
Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2020-11-14	2023-11-13
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31



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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	2020-04-01	2021-03-31	
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	2018-03-13	2021-03-12				
EXA Signal Analyzer	Agilent Technologies Inc	N9010A SEM004-12		2020-04-09	2021-04-08				
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12				
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				
Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2020-11-14	2023-11-13				
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2020-04-01	2021-03-31				

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	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

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

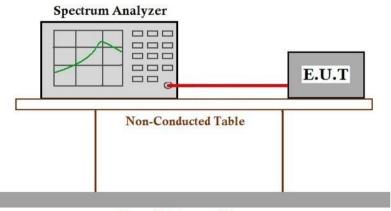
Operating Environment:

Temperature: 18.5 °C Humidity: 50.2 % 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	0.818	Pass	
Middle	0.734	Pass	
Highest	0.579	Pass	



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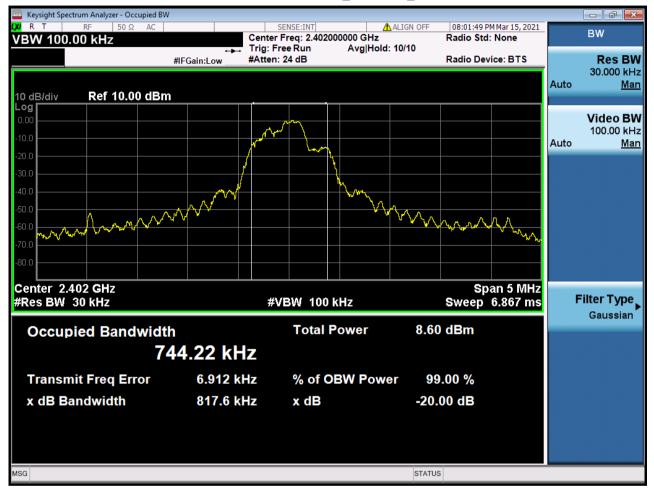
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Test Mode: OBW 2402MHz





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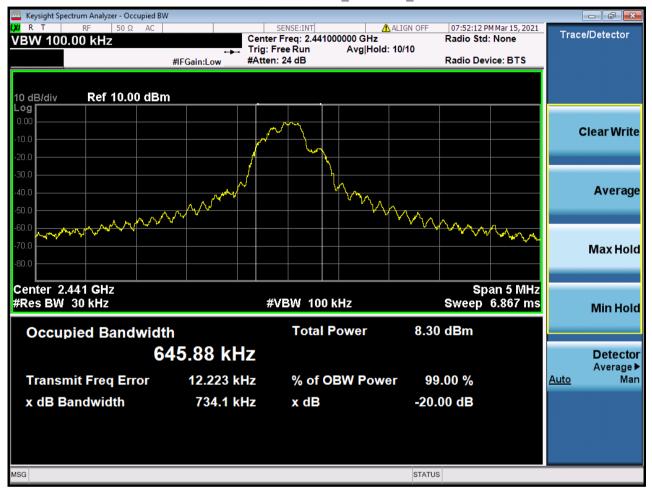
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Test Mode: OBW 2441MHz





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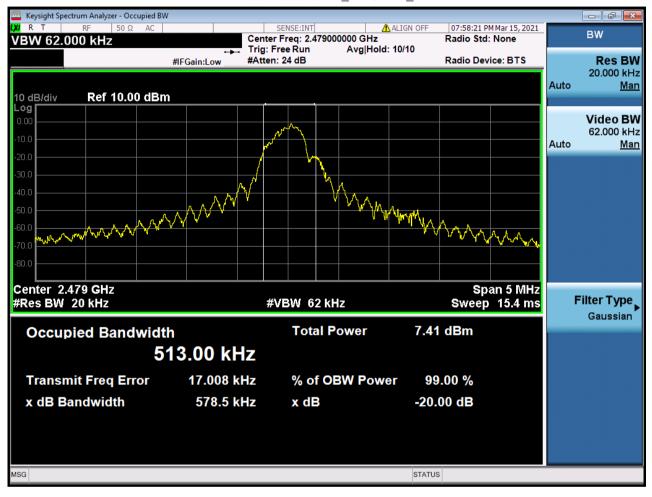
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Test Mode: OBW 2479MHz





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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 =3ms
Toot data	T period =37.95ms
Test data:	Duty cycle=7.91%
	PDCF value= -22.04dB





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### 7.2.1 E.U.T. Operation

Operating Environment:

53.8 % RH Temperature: Atmospheric Pressure: 1010 mbar 23.3 °C Humidity:

### 7.2.2 Test Mode Description

	- 1000 mode 2000 pmon							
Pre-scan / Mode Final test Code		Description						
Final test	02	TX mode_Keep the EUT in transmitting with modulation mode.						

### 7.2.3 Test Setup Diagram



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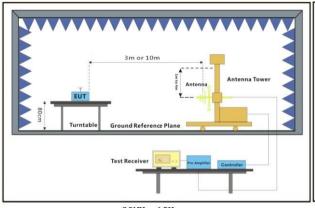
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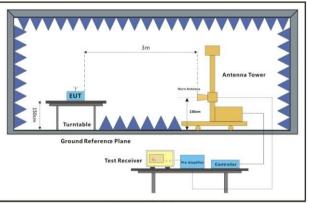
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30MHz-1GHz

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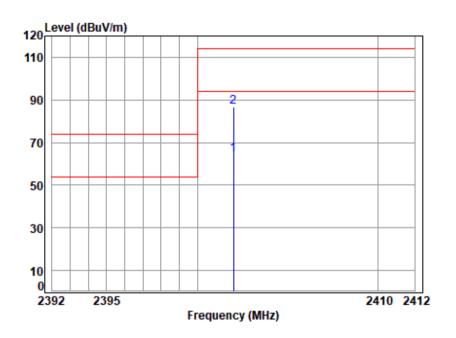
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20022ET

Mode : 2402 Field strength

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

1 2402.000 4.36 28.54 40.43 72.01 64.48 94.00 -29.52 Average 2 2402.000 4.36 28.54 40.43 94.05 86.52 114.00 -27.48 peak



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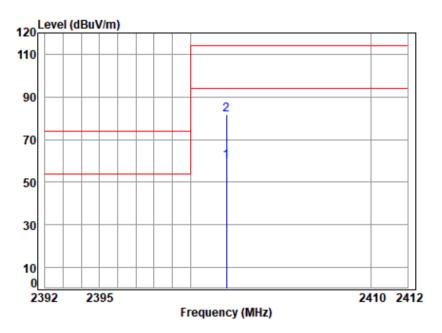
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL

Job No : 20022ET

2402,000

1

Mode : 2402 Field strength

Ant Preamp Cable Limit 0ver Read Loss Factor Factor Level Line Limit Remark Frea Level dBuV dBuV/m dBuV/m MHz dB dB/m dB dB 2402.000 4.36 28.54 40.43 67.30 59.77 94.00 -34.23 Average

4.36 28.54 40.43 89.34 81.81 114.00 -32.19 peak



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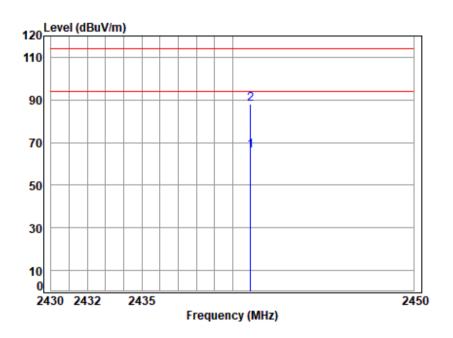
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20022ET

Mode : 2441 Field strength

> Ant Preamp Cable Limit 0ver Read Loss Factor Factor Level Line Limit Remark Frea Level

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

2441.000 4.43 28.60 40.45 73.41 65.99 94.00 -28.01 Average 1 2441.000 4.43 28.60 40.45 95.45 88.03 114.00 -25.97 peak



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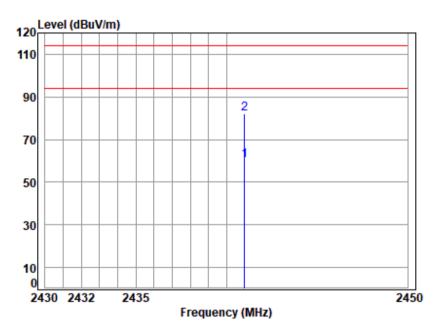
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL Job No : 20022ET

2441.000

Mode : 2441 Field strength

> Ant Preamp Cable Limit 0ver Read Loss Factor Factor Level Line Limit Remark Frea Level dBuV dBuV/m dBuV/m MHz dB dB/m dB dB 2441.000 4.43 28.60 40.45 67.65 60.23 94.00 -33.77 Average

> > 4.43 28.60 40.45 89.69 82.27 114.00 -31.73 peak



1

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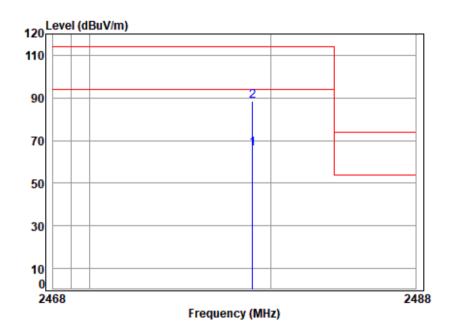
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20022ET

2479.000

1 2

Mode : 2479 Field strength

> Ant Preamp Cable Limit 0ver Read Loss Factor Factor Level Line Limit Remark Frea Level dBuV dBuV/m dBuV/m MHz dB dB/m dB dB 2479.000 4.49 28.67 40.46 73.59 66.29 94.00 -27.71 Average

> > 4.49 28.67 40.46 95.63 88.33 114.00 -25.67 peak



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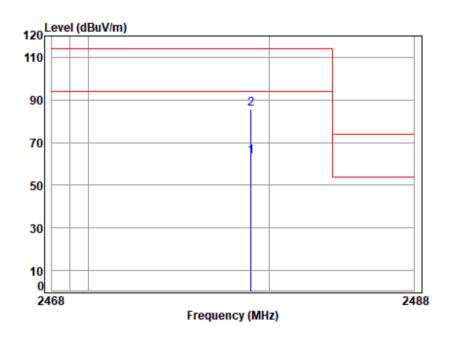
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL

Job No : 20022ET

Mode : 2479 Field strength

Freq			Preamp Factor					Remark	
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
2479.000 2479.000			40.46 40.46					Average peak	

### Remark:

1 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

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: 23.3 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar

### 7.3.2 Test Mode Description

7.0.2 Test mode besorption							
	Pre-scan / Final test	Mode Code	Description				
	Final test	02	TX mode Keep the EUT in transmitting with modulation mode.				



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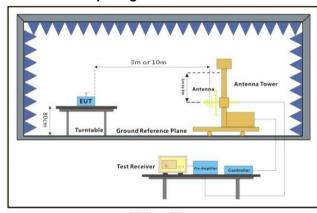
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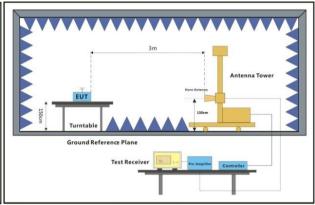


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### 7.3.3 Test Setup Diagram





30MHz-1GHz

Above 1GHz

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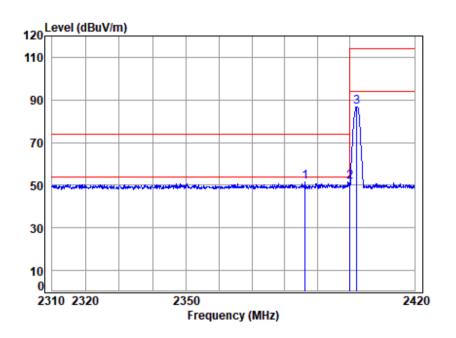
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Test Mode: 02; Polarity: Horizontal; Modulation: GFSK; Channel: Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20022ET

Mode 2402 Band edge

ouc	. 27	oz Dani	u cugc							
		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	2386.239	4.34	28.51	40.42	59.15	51.58	74.00	-22.42	Peak	
2	2400.000	4.36	28.53	40.42	59.20	51.67	74.00	-22.33	peak	
3	2402.166	4.36	28.54	40.43	94.32	86.79	114.00	-27.21	peak	



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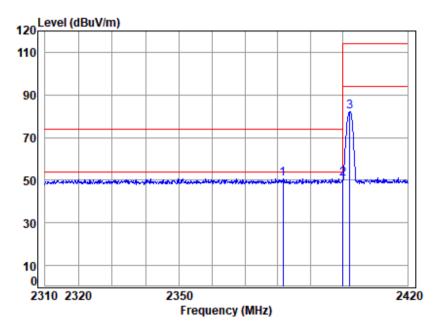
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 20022ET

Mode : 2402 Band edge

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2381.692	4.33	28.50	40.42	58.41	50.82	74.00	-23.18	Peak
2	2400.000	4.36	28.53	40.42	58.04	50.51	74.00	-23.49	peak
3	2402.166	4.36	28.54	40.43	89.55	82.02	114.00	-31.98	peak



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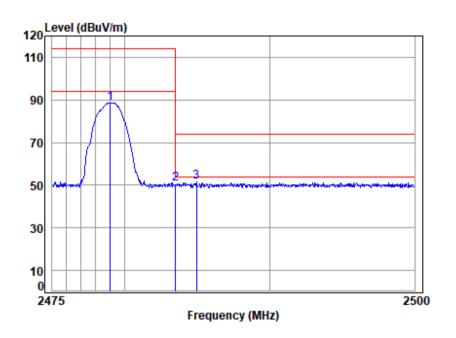
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20022ET

Mode 2479 Rand edge

jue	. 24	/ 5 Dan	u euge							
		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	2479.000	4.49	28.67	40.46	95.91	88.61	114.00	-25.39	peak	
2	2483.500	4.49	28.67	40.47	57.94	50.63	74.00	-23.37	peak	
3	2484.925	4.50	28.68	40.47	59.06	51.77	74.00	-22.23	Peak	



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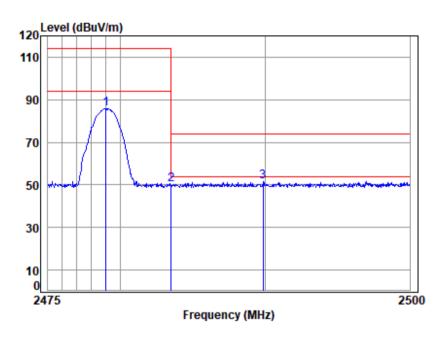
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL Job No : 20022ET

Mode : 2479 Band edge

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2479.000	4.49	28.67	40.46	92.94	85.64	114.00	-28.36	peak
2	2483.500	4.49	28.67	40.47	57.66	50.35	74.00	-23.65	peak
3	2489.834	4.50	28.68	40.47	58.88	51.59	74.00	-22.41	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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## 7.4 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

## 7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar

## 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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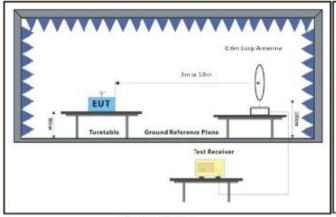
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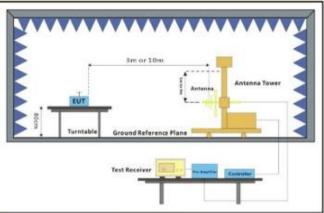


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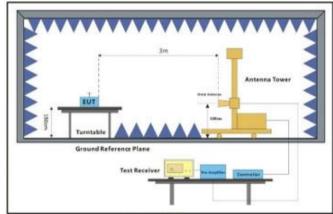
### 7.4.3 Test Setup Diagram





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.
- i. 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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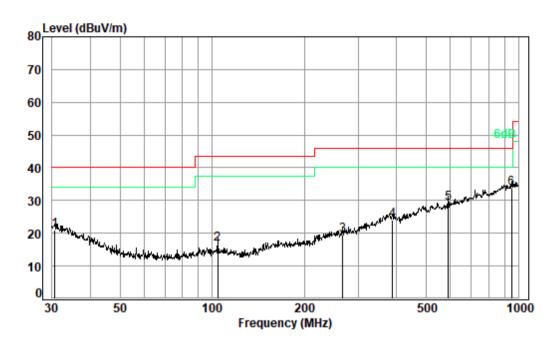


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### **Below 1GHz**

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



Condition: 3m HORIZONTAL

Job No. : 20022ET

Test Mode: 02

	ouc. 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	30.64	0.61	22.51	27.73	25.52	20.91	40.00	-19.09	QP
2	104.17	1.11	13.87	27.58	29.29	16.69	43.50	-26.81	QP
3	266.61	1.77	18.43	26.95	26.28	19.53	46.00	-26.47	QP
4	387.99	2.27	22.28	27.34	26.71	23.92	46.00	-22.08	QP
5	590.97	2.68	25.62	28.10	29.04	29.24	46.00	-16.76	QP
6 pp	948.76	3.55	29.33	26.91	27.91	33.88	46.00	-12.12	QP



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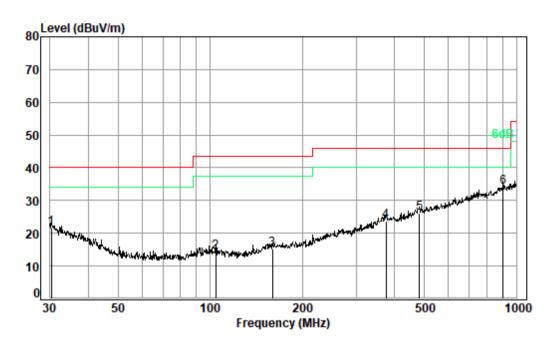
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Condition: 3m VERTICAL Job No. : 20022ET

Test Mode: 02

	Enoa			Preamp Factor					Romank
_	Freq								Kelliark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	30.32	0.60	22.76	27.73	25.93	21.56	40.00	-18.44	QP
2	104.17	1.11	13.87	27.58	26.99	14.39	43.50	-29.11	QP
3	159.78	1.17	15.39	27.29	25.89	15.16	43.50	-28.34	QP
4	375.94	2.24	22.20	27.28	26.67	23.83	46.00	-22.17	QP
5	482.22	2.47	24.30	27.73	27.02	26.06	46.00	-19.94	QP
6 pp	903.31	3.50	28.95	27.15	28.66	33.96	46.00	-12.04	OP



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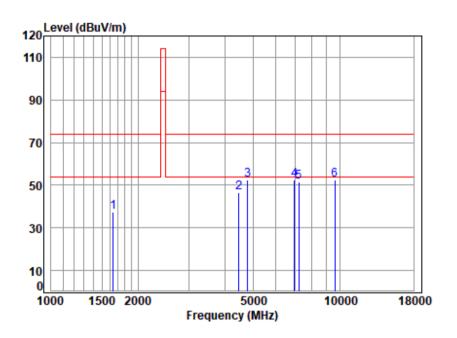


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#### **Above 1GHz**

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



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20022ET

Mode : 2402 TX RSE

				Preamp					
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB		dB	-dBuV	dBul//m	dBul//m	——dB	
	PINZ	ub	ub/III	ub	abuv	ubuv/III	ubuv/III	ub	
1	1639.274	3.38	26.42	40.03	47.67	37.44	74.00	-36.56	peak
2	4469.214	6.73	33.55	41.85	48.30	46.73	74.00	-27.27	peak
3	4804.000	7.10	33.97	42.14	53.45	52.38	74.00	-21.62	peak
4	6954.852	8.52	35.87	41.73	49.82	52.48	74.00	-21.52	peak
5	7206.000	8.74	36.07	41.50	48.36	51.67	74.00	-22.33	peak
6	9608.000	10.81	37.67	37.76	41.77	52.49	74.00	-21.51	peak



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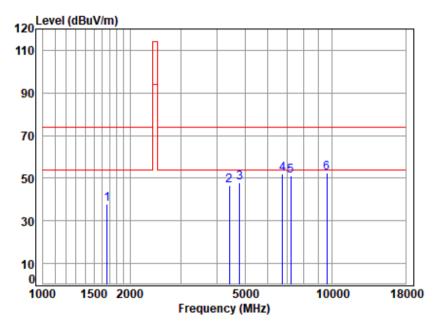
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 20022ET Mode 2402 TX RSF

Jue	. 240	72 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	1667.951	3.40	26.54	40.04	47.75	37.65	74.00	-36.35	peak
2	4417.841	6.68	33.46	41.80	48.33	46.67	74.00	-27.33	peak
3	4804.000	7.10	33.97	42.14	49.02	47.95	74.00	-26.05	peak
4	6756.708	8.42	35.76	41.86	49.78	52.10	74.00	-21.90	peak
5	7206.000	8.74	36.07	41.50	47.75	51.06	74.00	-22.94	peak
6	9608.000	10.81	37.67	37.76	41.92	52.64	74.00	-21.36	peak



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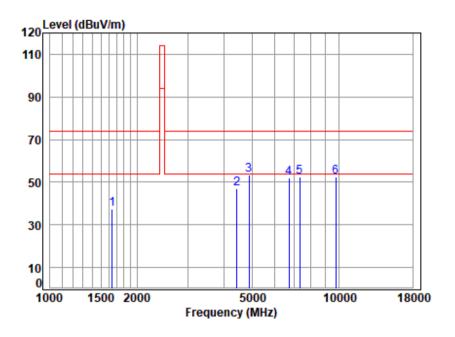
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Test Mode: 02; Polarity: Horizontal; Modulation: GFSK; Channel: middle



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20022ET

Mode : 2441 TX RSE

oue	. 24	T IV	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	1639.274	3.38	26.42	40.03	47.55	37.32	74.00	-36.68	peak	
2	4430.628	6.70	33.48	41.81	48.81	47.18	74.00	-26.82	peak	
3	4882.000	7.18	34.06	42.20	54.19	53.23	74.00	-20.77	peak	
4	6717.762	8.40	35.73	41.89	49.72	51.96	74.00	-22.04	peak	
5	7323.000	8.85	36.16	41.40	48.87	52.48	74.00	-21.52	peak	
6	9764,000	10.76	37.76	37.50	41.24	52.26	74.00	-21.74	peak	



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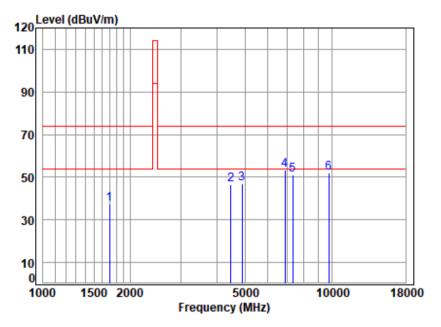
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL Job No : 20022ETE Mode

ioae	: 24	41 IX	KSE						
		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	3.43	26.68	40.06	47.28	37.33	74.00	-36.67	peak
2	4469.214	6.73	33.55	41.85	48.19	46.62	74.00	-27.38	peak
3	4882.000	7.18	34.06	42.20	47.98	47.02	74.00	-26.98	peak
4	6874.906	8.48	35.83	41.78	50.95	53.48	74.00	-20.52	peak
5	7323.000	8.85	36.16	41.40	47.54	51.15	74.00	-22.85	peak
6	9764.000	10.76	37.76	37.50	41.19	52.21	74.00	-21.79	peak



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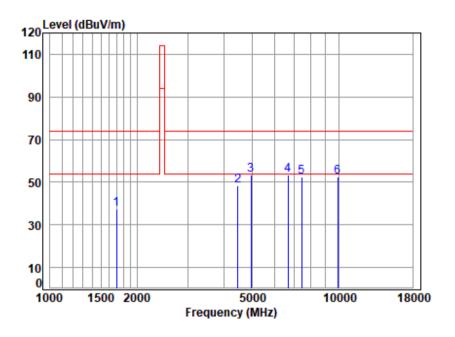
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Test Mode: 02; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 20022ET

Mode : 2479 TX RSE

louc	. 27	/ / / /	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	1697.129	3.43	26.66	40.06	47.54	37.57	74.00	-36.43	peak	
2	4469.214	6.73	33.55	41.85	50.14	48.57	74.00	-25.43	peak	
3	4958.000	7.26	34.15	42.27	54.10	53.24	74.00	-20.76	peak	
4	6659.763	8.37	35.70	41.93	51.17	53.31	74.00	-20.69	peak	
5	7437.000	8.95	36.25	41.29	48.55	52.46	74.00	-21.54	peak	
6	9916,000	10.71	37.85	37.24	41.30	52.62	74.00	-21.38	peak	



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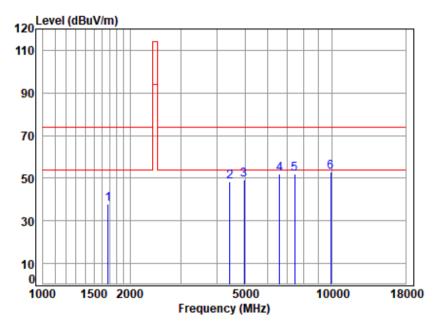
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Test Mode: 02; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL Job No : 20022ET Mode : 2479 TX RSE

_	. 24	/ J I/	IVDE							
		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		
	1682.477	3.42	26.60	40.05	47.85	37.82	74.00	-36.18	peak	
	4430.628	6.70	33.48	41.81	49.78	48.15	74.00	-25.85	peak	
	4958.000	7.26	34.15	42.27	50.30	49.44	74.00	-24.56	peak	
	6602.265	8.33	35.66	41.97	50.09	52.11	74.00	-21.89	peak	
	7437.000	8.95	36.25	41.29	48.30	52.21	74.00	-21.79	peak	
	9916.000	10.71	37.85	37.24	41.61	52.93	74.00	-21.07	neak	



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## 8 Test Setup Photo

Please Refer to external and internal photos for details.

## 9 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.

- End of the Report -



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