

SZEMC-TRF-01 Rev. A/1 Report No.: SZCR240100025202

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TEST REPORT

Application No.: SZCR2401000252ET (SGS HK NO.: T32420250017EM)

Applicant: Revell GmbH

Address of Applicant: Henschelstr.20-30 32257 Buende, Germany

Manufacturer/ Supplier: Coolerstuff

Buyer: Carrera Revell Europe GmbH

Equipment Under Test (EUT):

EUT Name: RC Construction Vehicle "Mini Digger"

Item No.: 24638 P.O. No.: Hxxxx **Country of Origin:** China **Country of Destination:** US Labeled Age Grading: 8+

FCC ID: 2A7EW246385010

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

2024-01-17 **Date of Receipt:**

Date of Test: 2024-01-21 to 2024-03-22

2024-03-27 Date of Issue:

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	Chapter	Date	Modifier	Remark	
01		2024-03-27		Original	

Authorized for issue by:		
	Mostin Tang	
	Martin Tang/Project Engineer	-
	Exic Fu	
	Eric Fu/Reviewer	-



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2 **Test Summary**

Radio Spectrum Technical Requirement					
Item Standard Method Requirement Resu					
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	N/A	47 CFR Part 15, Subpart C 15.203	Pass	

Radio Spectrum Matter Part					
Item	Standard	Method	Requirement	Result	
20dB Bandwidth		ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass	
Field Strength of the Fundamental Signal (15.249(a))		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 Below 1GHz		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass	
Radiated Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass	



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General Information

Details of E.U.T. 4.1

Power supply:	3V DC(1.5V x 2 "AA" Size Batteries) for remote controller
Cable Loss (for RF conducted test):	0.5dB
Operation Frequency:	2410MHz-2470MHz
Modulation Type:	GFSK
Number of Channels:	31
Antenna Type:	Wire Antenna
Antenna Gain:	0.21dBi

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

Channel List:

Channel	Frequency	Channel	Frequency	Channel	Frequency
	(MHz)		(MHz)		(MHz)
1	2410	12	2433	23	2454
2	2413	13	2434	24	2457
3	2414	14	2437	25	2458
4	2417	15	2438	26	2461
5	2418	16	2440	27	2462
6	2421	17	2442	28	2465
7	2422	18	2445	29	2466
8	2425	19	2446	30	2469
9	2426	20	2449	31	2470
10	2429	21	2450	/	/
11	2430	22	2453	/	/

4.2 Description of Support Units

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



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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	± 6.0dB (Below 1GHz);± 4.6dB (Above 1GHz)
Radiated Emissions Below 1GHz	± 6.0dB for 3m; ± 5.0dB for 10m
Radiated Emissions Above 1GHz	± 4.6dB (1GHz-18GHz);± 4.8dB (18MHz-40GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr/ETSI} (CISPR/ETSI 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, Nanshan District, 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 (Member No. 1937)

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. Shenzhen EMC laboratory 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: CN1336

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

Designation Number: CN1336. Test Firm Registration Number: 787754.

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	Chroma	62012P-80-60	SEM011-11	2023-10-19	2024-10-18
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-19	2023-03-21 2024-03-15	2024-03-20 2025-03-14
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-07	2024-07-06
Attenuator	Huber+Suhner	6620_SMA-50- 1	SEM021-09	2023-03-31	2024-03-30
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2023-03-21 2024-03-19	2024-03-20 2025-03-18

ield Strength of the Fundamental Signal (15.249(a))								
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date			
3m Fully-Anechoic Chamber	AUDIX	N/A	SEM001-02	2023-04-01	2026-03-31			
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2023-03-20	2024-03-19			
Signal Analyzei	Notice & Scriwarz	F3V40	3EIVI006-04	2024-03-15	2025-03-14			
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22			
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18			
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A			
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06			

Restricted Band Around	estricted Band Around Fundamental Frequency							
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date			
3m Fully-Anechoic Chamber	AUDIX	UDIX N/A SEM001-02 20		2023-04-01	2026-03-31			
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2023-03-20 2024-03-15	2024-03-19 2025-03-14			
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22			
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18			
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A			
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06			
Broad-Band Horn Antenna	Schwarzbeck I Br		SEM003-15	2022-08-10	2024-08-09			
Pre-Amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2023-03-20 2024-03-15	2024-03-19 2025-03-14			



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Radiated Emissions Below 1GHz							
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date		
Loop Antenna	ETS-Lindgren	6502	SEM003-08	2023-11-20	2025-11-19		
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2023-06-19	2026-06-18		
MXE EMI Receiver	Agilent Technologies	N9038A	SEM004-15	2023-10-19	2024-10-18		
BiConiLog Antenna	ETS-LINDGREN 3	3142C	SEM003-01	2023-09-16	2025-09-15		
Dro Amplifiar	Asilant Tankanlarian 0447D	8447D	CEMOOF 04	2023-03-20	2024-03-19		
Pre-Amplifier	Agilent Technologies	0447D	SEM005-01	2024-03-14	2025-03-13		
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A		
Coaxial Cable	SGS	N/A	SEM025-01	2023-07-07	2024-07-06		

Radiated Emissions Above 1GHz						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
3m Fully-Anechoic Chamber	AUDIX	N/A	SEM001-02	2023-04-01	2026-03-31	
Ciamal Analyses	Dahala 0 Caharan	E0)/40	OFM000 04	2023-03-20	2024-03-19	
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2024-03-15	2025-03-14	
Horn Antenna	ntenna Rohde&Schwarz		SEM003-07	2023-07-23	2025-07-22	
Microwave system amplifier	Agilent	83017A	SEM005-25	2023-09-19	2024-09-18	
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A	
Coaxial Cable	SGS	N/A	SEM026-01	2023-07-07	2024-07-06	

General used equipment						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
Humidity/ Temperature Indicator	deli	8838	SEM002-32	2023-07-28	2024-07-27	
Humidity/ Temperature Indicator	deli	8838	SEM002-33	2023-07-28	2024-07-27	
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2023-03-23 2024-03-18	2024-03-22 2025-03-17	



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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

6.1.2 Conclusion

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.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna location: Refer to Internal photos



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Radio Spectrum Matter Test Results 7

7.1 20dB Bandwidth

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

7.1.1 E.U.T. Operation

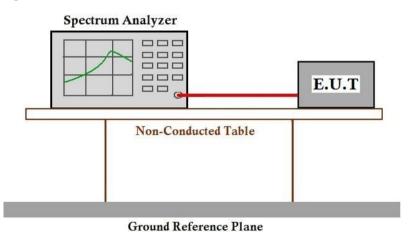
Operating Environment:

Temperature: 20.2 °C Humidity: 45.2 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Test channel	20dB bandwidth (MHz)	Results
Lowest	2.523	Pass
Middle	2.459	Pass
Highest	1.621	Pass



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

47 CFR Part 15, Subpart C 15.249(a) Test Requirement 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.

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.6 °C Humidity: 52.3 % RH Atmospheric Pressure: 1000 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.



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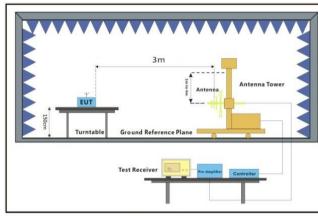


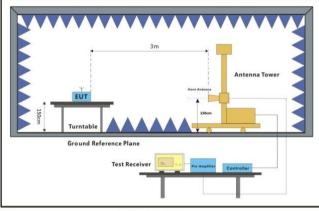
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7.2.3 Test Setup Diagram





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.
- a.lf the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h.Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i.The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i.Repeat above procedures until all frequencies measured was complete.
- Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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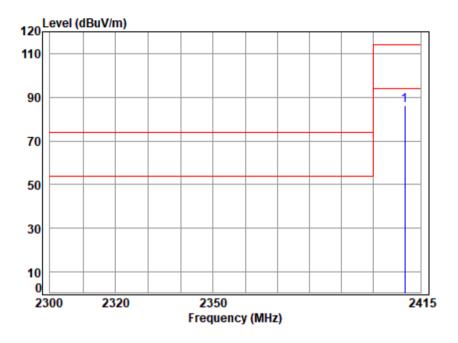


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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL : 00252ET/00253ET : 2410 Field Strengh Mode

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





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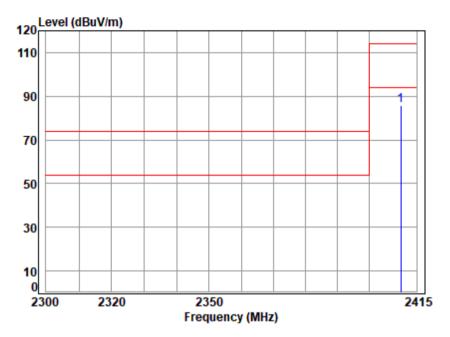


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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00252ET/00253ET : 2410 Field Strengh Mode

Cable Ant Preamp Read Limit 0ver Loss Factor Factor Line Limit Remark Freq Level Level MHz dB dB/m dB dBuV dBuV/m dBuV/m 2410.00 5.09 29.06 37.39 89.10 85.86 114.00 -28.14 Peak



1

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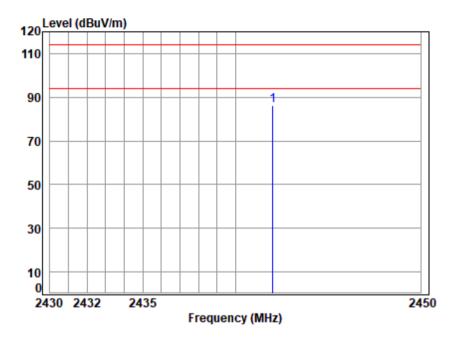


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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: middle



Site : chamber

Condition: 3m HORIZONTAL : 00252ET00253ET : 2442 Field Strengh Mode

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

1 2442.00 5.12 28.93 37.31 89.62 86.36 114.00 -27.64 Peak



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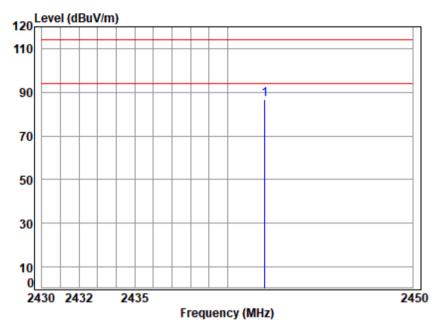


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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL : 00252ET00253ET

2442.00

: 2442 Field Strengh Mode

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

5.12 28.93 37.31 89.91 86.65 114.00 -27.35 Peak



1

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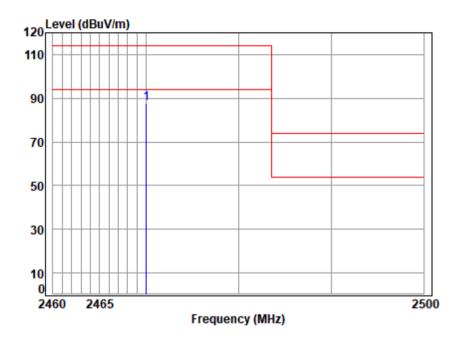


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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: High



Site : chamber

Condition: 3m HORIZONTAL : 00252ET/00253ET : 2470 Field Strengh Mode

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

1 2470.00 5.15 28.90 37.25 90.77 87.57 114.00 -26.43 Peak



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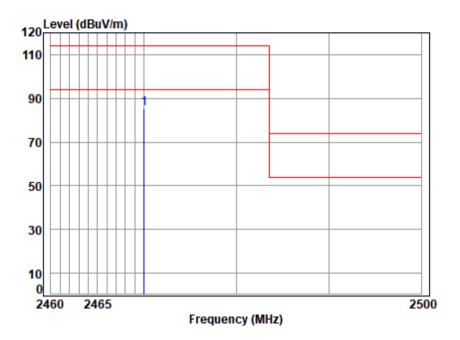


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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00252ET/00253ET Mode : 2470 Field Strengh

Cable Limit Ant Preamp Read 0ver Freq Loss Factor Factor Level Level Line Limit Remark MHz dB dB/m dB dBuV dBuV/m dBuV/m dB 37.25 88.74 85.54 114.00 -28.46 Peak 2470.00 5.15 28.90

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 20dB 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: 23.6 °C Humidity: 52.9 % RH Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.



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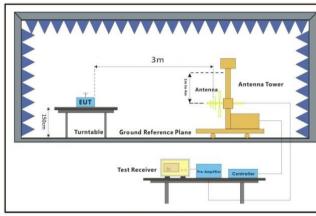


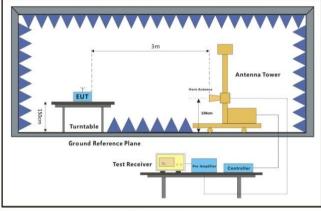
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7.3.3 Test Setup Diagram





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.
- a. 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: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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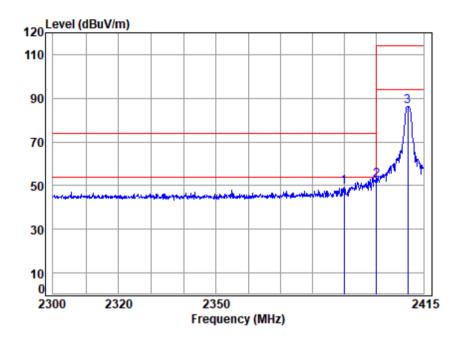


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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel:Low



Site : chamber

> 1 2

Condition: 3m HORIZONTAL : 00252ET/00253ET · 2/10 Randadga Mode

. 2410	Danuel	age .							
	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		
2389.80	5.08	29.10	37.44	52.36	49.10	74.00	-24.90	Peak	
2400.00	5.08	29.10	37.41	55.61	52.38	74.00	-21.62	Peak	
2410.00	5.09	29.06	37.39	89.55	86.31	114.00	-27.69	Peak	



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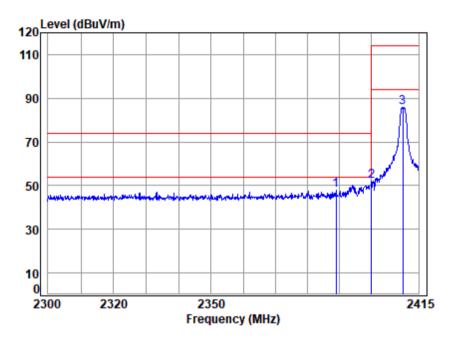


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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00252ET/00253ET Mode : 2410 Bandedge

Freq			Preamp Factor					Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2388.87								
2400.00	5.08	29.10	37.41	55.12	51.89	74.00	-22.11	Peak
2410.00	5.09	29.06	37.39	89.10	85.86	114.00	-28.14	Peak



1 2 3

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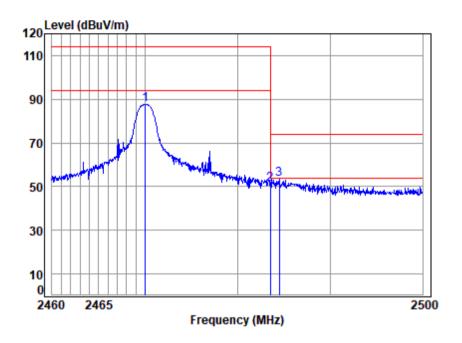


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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

> 1 2 3

Condition: 3m HORIZONTAL : 00252ET/00253ET Mode : 2470 Bandedge

5			Preamp					
Freq	LOSS	Factor	Factor	revel	revel	Line	Limit	Kemark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
2470.00	5.15	28.90	37.25	90.77	87.57	114.00	-26.43	Peak
2483.50	5.16	28.90	37.22	54.08	50.92	74.00	-23.08	Peak
2484.48	5.16	28.90	37.21	56.66	53.51	74.00	-20.49	Peak



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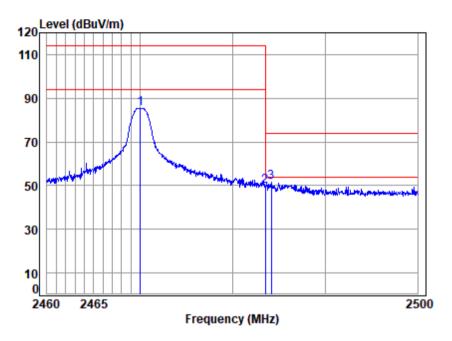


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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00252ET/00253ET Mode : 2470 Bandedge

			0						
		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	2470.00	5.15	28.90	37.25	88.74	85.54	114.00	-28.46	Peak
2	2483.50	5.16	28.90	37.22	52.91	49.75	74.00	-24.25	Peak
3	2484.16	5.16	28.90	37.21	54.68	51.53	74.00	-22.47	Peak



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7.4 Radiated Emissions Below 1GHz

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

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
960-1000	500	3

7.4.1 E.U.T. Operation

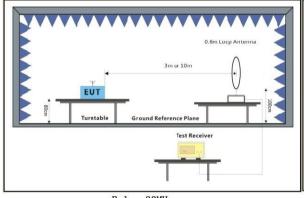
Operating Environment:

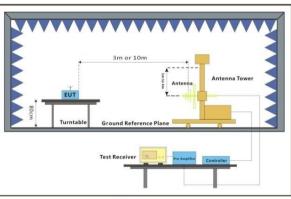
23.3 °C Temperature: Humidity: 52.6 % RH Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

	1 001 11	.040 00	on page
Pre-se Final		Mode Code	Description
Final t	test	00	TX mode_Keep the EUT in transmitting with modulation mode.

7.4.3 Test Setup Diagram





Below 30MHz 30MHz-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 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. 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.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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 quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. 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. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 9kHz to 30MHz, the disturbance 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.



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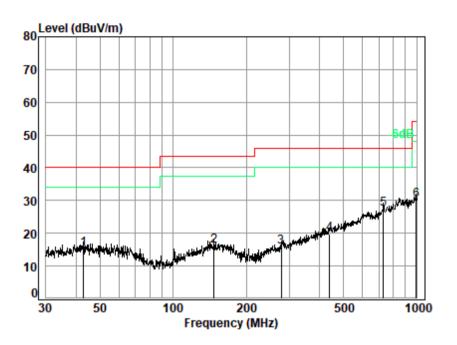


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Test Mode: 00; Polarity: Horizontal



Site : chamber

Condition: 3m HORIZONTAL

: 00252ET

Mode : 00

		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	
	42.00	0.24	47.00	25 07	22.00	45.33	40.00	24.60	OD.
1	42.90	0.21	17.99	25.87	22.99	15.32	40.00	-24.68	Q٢
2	147.40	0.92	17.29	25.59	23.39	16.01	43.50	-27.49	QP
3	278.07	0.96	17.06	25.24	22.99	15.77	46.00	-30.23	QP
4	440.20	1.53	20.91	25.97	23.18	19.65	46.00	-26.35	QP
5	731.92	1.91	25.85	26.46	25.93	27.23	46.00	-18.77	QP
6	996.50	2.79	28.35	25.51	24.39	30.02	54.00	-23.98	OP



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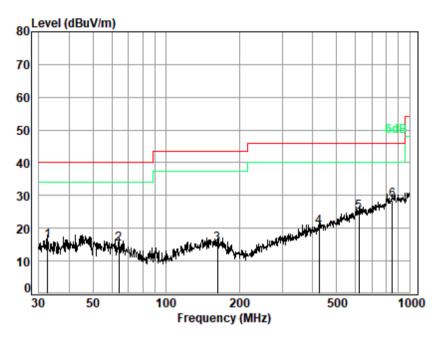


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Test Mode: 00; Polarity: Vertical



Site : chamber Condition: 3m VERTICAL : 00252ET Mode : 00

Cable Ant Preamp Read Limit 0ver Loss Factor Factor Line Limit Remark Freq Level Level MHz dB dB/m dB dBuV dBuV/m dBuV/m 1 32.52 0.21 16.97 25.90 24.79 16.07 40.00 -23.93 QP 24.02 15.12 40.00 -24.88 OP 2 63.98 0.22 16.72 25.84 3 162.61 0.83 17.32 25.53 22.47 15.09 43.50 -28.41 QP 4 425.03 1.57 20.38 25.90 24.46 20.51 46.00 -25.49 OP 5 620.71 2.23 24.41 26.58 24.77 24.83 46.00 -21.17 QP 6 848.06 2.97 27.36 26.16 24.37 28.54 46.00 -17.46 OP



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7.5 Radiated Emissions Above 1GHz

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

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

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

7.5.1 E.U.T. Operation

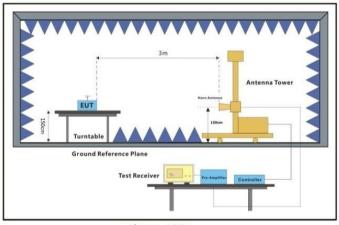
Operating Environment:

Temperature: 23.2 °C Humidity: 52.6 % RH Atmospheric Pressure: 1020 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in transmitting with modulation mode.

7.5.3 Test Setup Diagram



Above 1GHz



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7.5.4 Measurement Procedure and Data

- a. 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.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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 or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. 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. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz 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.
- 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. 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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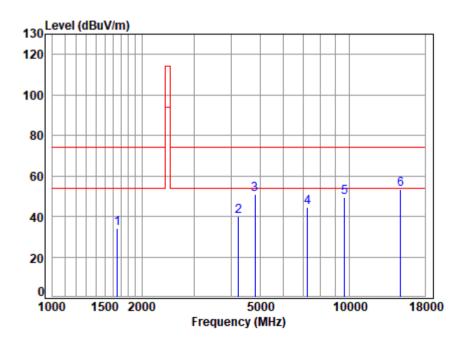


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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL Job No : 00252ET/00253ET Mode : 2410 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	1653.55	4.27	26.29	38.41	41.90	34.05	74.00	-39.95	peak
2	4230.40	6.94	33.80	35.92	35.04	39.86	74.00	-34.14	peak
3	4820.00	7.32	34.38	35.51	44.83	51.02	74.00	-22.98	peak
4	7230.00	9.21	35.70	35.81	35.39	44.49	74.00	-29.51	peak
5	9640.00	12.38	37.48	37.45	36.85	49.26	74.00	-24.74	peak
6	14916.94	14.03	40.78	37.03	35.56	53.34	74.00	-20.66	peak



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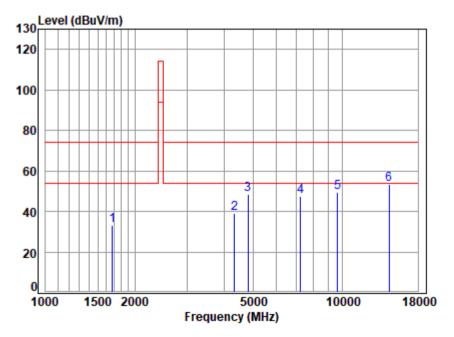


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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL Job No : 00252ET/00253ET Mode : 2410 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	
	4600 40	4.74	06.00	20.44		22.07	74.00	40.73	
1	1682.48	4.31	26.23	38.41	41.14	33.2/	74.00	-40./3	peak
2	4329.35	7.01	34.24	35.85	33.85	39.25	74.00	-34.75	peak
3	4820.00	7.32	34.38	35.51	42.39	48.58	74.00	-25.42	peak
4	7230.00	9.21	35.70	35.81	38.46	47.56	74.00	-26.44	peak
5	9640.00	12.38	37.48	37.45	36.90	49.31	74.00	-24.69	peak
6	14408.43	13.90	40.40	37.13	36.09	53.26	74.00	-20.74	peak



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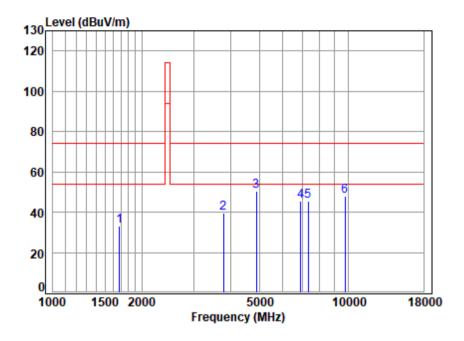


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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: middle



Site : chamber

Condition: 3m HORIZONTAL : 00252ET/00253ET Mode : 2442 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	
1682.48	4.31	26.23	38.41	41.15	33.28	74.00	-40.72	peak
3790.36	6.56	32.50	36.11	36.38	39.33	74.00	-34.67	peak
4884.00	7.36	34.64	35.46	44.06	50.60	74.00	-23.40	peak
6914.76	8.86	35.66	35.52	36.59	45.59	74.00	-28.41	peak
7326.00	9.32	35.70	35.91	36.19	45.30	74.00	-28.70	peak
9768.00	12.47	37.36	37.42	35.70	48.11	74.00	-25.89	peak
	MHz 1682.48 3790.36 4884.00 6914.76 7326.00	MHz dB 1682.48 4.31 3790.36 6.56 4884.00 7.36 6914.76 8.86 7326.00 9.32	MHz dB dB/m 1682.48 4.31 26.23 3790.36 6.56 32.50 4884.00 7.36 34.64 6914.76 8.86 35.66 7326.00 9.32 35.70	Freq Loss Factor Factor MHz dB dB/m dB 1682.48 4.31 26.23 38.41 3790.36 6.56 32.50 36.11 4884.00 7.36 34.64 35.46 6914.76 8.86 35.66 35.52 7326.00 9.32 35.70 35.91	Freq Loss Factor Factor Level MHz dB dB/m dB dBuV 1682.48 4.31 26.23 38.41 41.15 3790.36 6.56 32.50 36.11 36.38 4884.00 7.36 34.64 35.46 44.06 6914.76 8.86 35.66 35.52 36.59 7326.00 9.32 35.70 35.91 36.19	Freq Loss Factor Factor Level Level MHz dB dB/m dB dBuV dBuV/m 1682.48 4.31 26.23 38.41 41.15 33.28 3790.36 6.56 32.50 36.11 36.38 39.33 4884.00 7.36 34.64 35.46 44.06 50.60 6914.76 8.86 35.66 35.52 36.59 45.59 7326.00 9.32 35.70 35.91 36.19 45.30	Freq Loss Factor Factor Level Level Line MHz dB dB/m dB dBuV dBuV/m dBuV/m 1682.48 4.31 26.23 38.41 41.15 33.28 74.00 3790.36 6.56 32.50 36.11 36.38 39.33 74.00 4884.00 7.36 34.64 35.46 44.06 50.60 74.00 6914.76 8.86 35.66 35.52 36.59 45.59 74.00 7326.00 9.32 35.70 35.91 36.19 45.30 74.00	Freq Loss Factor Factor Level Level Line Limit MHz dB dB/m dB dBuV dBuV/m dBuV/m dB



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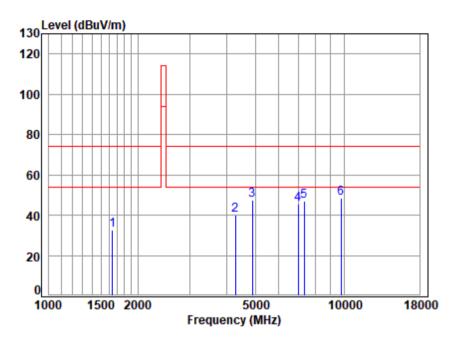


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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL : 00252ET/00253ET : 2442 TX RSE Mode

ouc	. 2442	IN NO	_						
		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	1639.27	4.25	26.41	38.41	40.58	32.83	74.00	-41.17	peak
2	4279.59	6.98	33.92	35.89	34.83	39.84	74.00	-34.16	peak
3	4884.00	7.36	34.64	35.46	40.76	47.30	74.00	-26.70	peak
4	6974.98	8.90	35.75	35.55	36.54	45.64	74.00	-28.36	peak
5	7326.00	9.32	35.70	35.91	37.65	46.76	74.00	-27.24	peak
6	9768.00	12.47	37.36	37.42	36.20	48.61	74.00	-25.39	peak
									•



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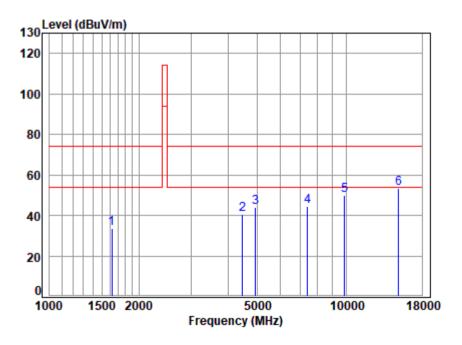


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Test Mode: 00; Polarity: Horizontal; Modulation: GFSK; Channel: High



Site : chamber

Condition: 3m HORIZONTAL Job No : 00252ET/00253ET Mode : 2470 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	1625.12	4.23	26.55	38.41	41.03	33.40	74.00	-40.60	peak
2	4469.21	7.10	33.97	35.75	35.08	40.40	74.00	-33.60	peak
3	4940.00	7.39	34.62	35.43	37.58	44.16	74.00	-29.84	peak
4	7410.00	9.42	35.84	35.99	35.37	44.64	74.00	-29.36	peak
5	9880.00	12.55	37.26	37.40	37.75	50.16	74.00	-23.84	peak
6	15003.42	14.05	40.70	37.01	35.82	53.56	74.00	-20.44	peak



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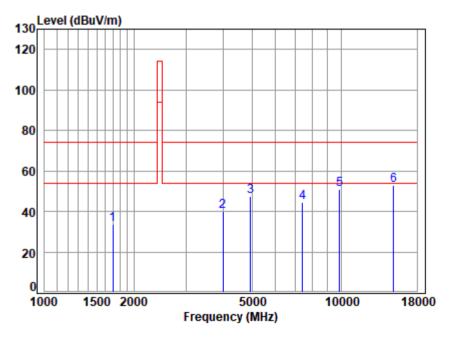


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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL Job No : 00252ET/00253ET Mode : 2470 TX RSE

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1702.04	4.33	26.22	38.42	41.28	33.41	74.00	-40.59	peak
2	3992.78	6.77	33.07	36.10	36.15	39.89	74.00	-34.11	peak
3	4940.00	7.39	34.62	35.43	40.92	47.50	74.00	-26.50	peak
4	7410.00	9.42	35.84	35.99	35.33	44.60	74.00	-29.40	peak
5	9880.00	12.55	37.26	37.40	38.66	51.07	74.00	-22.93	peak
6	15003.42	14.05	40.70	37.01	35.39	53.13	74.00	-20.87	peak



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Test Setup Photo 8

Refer to Appendix - Test Setup Photo for SZCR2401000252ET

EUT Constructional Details (EUT Photos) 9

Refer to Appendix - external and internal photos for SZCR2401000252ET

- End of the Report -



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