

SZEMC-TRF-01 Rev. A/1 Report No.: SZCR240200052202

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TEST REPORT

Application No.: SZCR2402000522ET

Applicant: HAPE INTERNATIONAL (NINGBO) LTD

Address of Applicant: 9-27Nanhai Road, Dagang industrial City, Beilun, Ningbo, China

Equipment Under Test (EUT):

EUT Name: Sugarobot Eureka Model No.: 801001, 801002

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

actually tested and which were electrically identical.

Trade Mark: hape

FCC ID: 2APLM-801001TX

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

Date of Receipt: 2024-02-07

2024-02-20 to 2024-04-29 Date of Test:

2024-05-07 Date of Issue:

Test Result: Pass*

Ceny. Ku

Keny Xu **EMC Laboratory Manager**



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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		2024-05-07		Original			

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



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Test Summary 2

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

Radio Spectrum Matter Part						
Item	Standard	Method	Requirement	Result		
20dB Bandwidth		ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass		
Field Strength of the Fundamental Signal (15.249(a))		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		

Declaration of EUT Family Grouping:

Model No.: 801001, 801002

Only the model 801002 was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on model No. and colors.



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General Information

Details of E.U.T. 4.1

Power supply:	3V DC(1.5V x 2 "AAA" Size Batteries) for remote controller
Cable Loss (for RF conducted test):	-0.5dB
Operation Frequency:	2415MHz-2469MHz
Modulation Type:	GFSK
Number of Channels:	15
Antenna Type:	Integral Antenna
Antenna Gain:	0.17dBi

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	2415	6	2430	11	2456
2	2418	7	2436	12	2458
3	2422	8	2444	13	2463
4	2425	9	2446	14	2467
5	2428	10	2451	15	2469

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	± 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	2024-03-20			
IVIAA SIGITAL AHAIYZEL	KETSIGITI	N9020A SEM004-19		2024-03-14	2025-03-13			
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-	SEM021-09	2023-03-31	2024-03-30			
Alteridator	Huber+Suriner	1	3EIVIUZ 1-09	2024-03-27	2025-03-26			
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2023-03-21 2024-03-19	2024-03-20 2025-03-18			

Field 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 Analyzor	Rohde & Schwarz	FSV40	SEM008-04	2023-03-20	2024-03-19				
Signal Analyzer	Ronde & Schwarz	F3V40	3E1VI006-04	2024-03-15	2025-03-14				
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22				
Microwave system amplifier			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 Fundamental Frequency								
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			
Oignal / thaty201	Ronac a Conwarz	10040	OLIVIOUS 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			
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	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	I FIS-IINDGREN		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	3142C	SEM003-01	2023-09-16	2025-09-15			
Dro Amplifior	Agilant Tachnalagias	8447D	SEM005-01	2023-03-20	2024-03-19			
Pre-Amplifier	Agilent Technologies	8447D	SEIVI005-01	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			
Cianal Analyzar	Rohde & Schwarz	F6)/40	SEM009 04	2023-03-20	23-03-20 2024-03-19			
Signal Analyzer	Ronde & Schwarz	FSV40	SEM008-04	2024-03-14	2025-03-13			
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2023-07-23	2025-07-22			
Microwave system amplifier	- I ANIIANI I 83017		SEM005-25	2023-09-19	2024-09-18			
Measurement Software	AUDIX	e3 V8.2014-6- 27	-6- 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

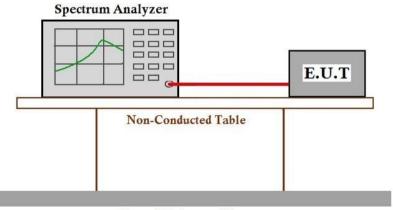
Operating Environment:

Temperature: 25.3 °C Humidity: 52.2 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT(remote) 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	3.783	Pass
Middle	4.681	Pass
Highest	4.870	Pass



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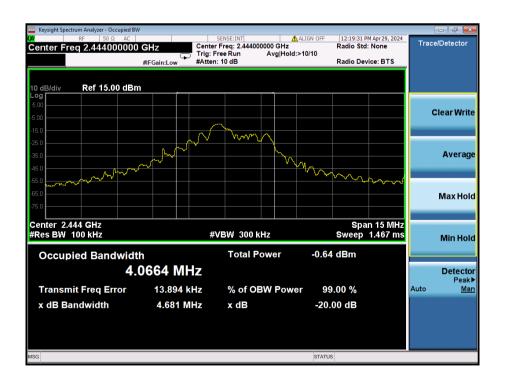


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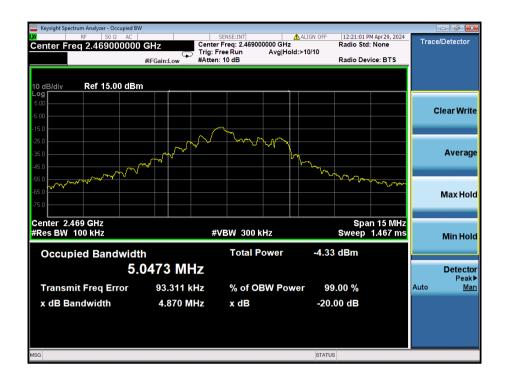
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7.2 Field Strength of the Fundamental Signal (15.249(a))

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

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	TX mode_Keep the EUT(remote) in transmitting with modulation mode.

Average value:

Calculate Formula:	Average value=Peak value + PDCF	
	PDCF=20 log(Duty cycle)	
	Duty cycle= T on time / T period	
	Ton time =1.2ms	
Toot doto	T period =23.65ms	
Test data:	Duty cycle=5.07%	
	PDCF value= -25.89dB	



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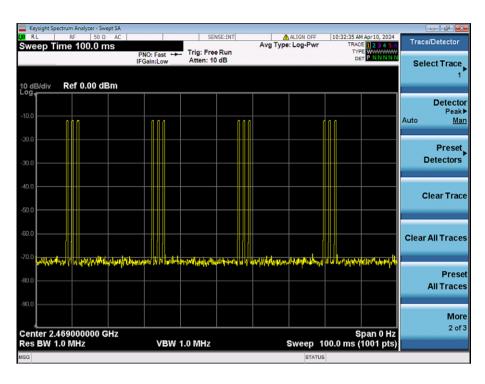
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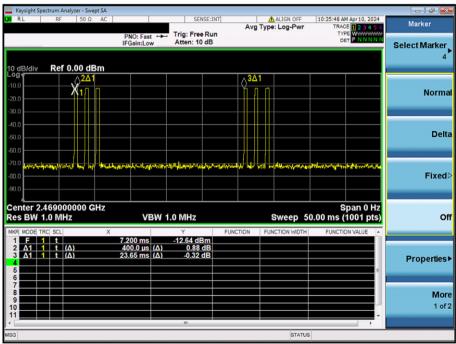


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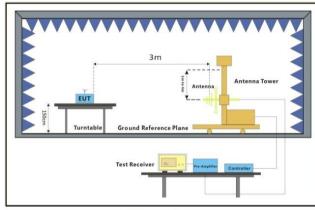


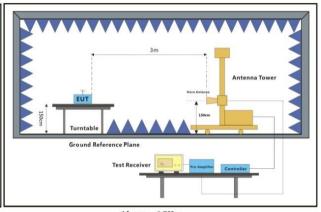
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7.2.3 Test Setup Diagram





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



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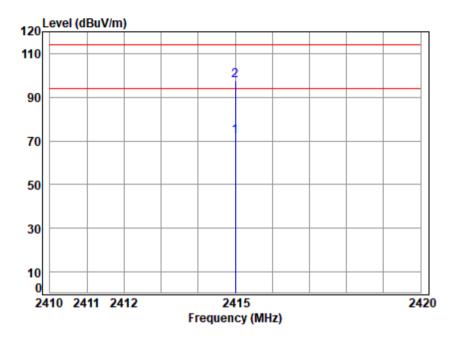


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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL : 00522ET/00523ET : 2415 Field Strengh Mode

: Remote

	Freq				Read Level				Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2415.00	5.10	29.04	37.38	75.20	71.96	114.00	-42.04	Average



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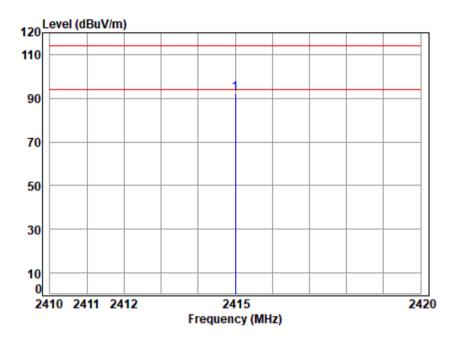


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00522ET/00523ET : 2415 Field Strengh Mode

: Remote

Cable Ant Preamp Limit 0ver Read Loss Factor Factor Limit Remark Freq Level Level Line dBuV dBuV/m dBuV/m MHz dB dB/m 2415.00 5.10 29.04 37.38 95.51 92.27 114.00 -21.73 peak



1

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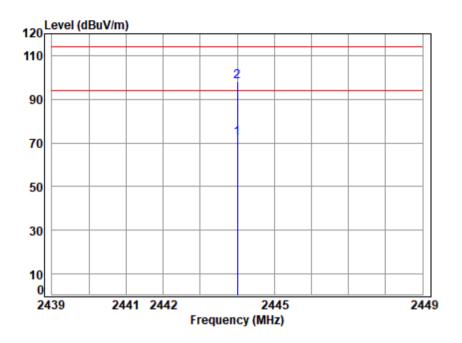


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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber

Condition: 3m HORIZONTAL : 00522ET/00523ET : 2444 Field Strengh Mode

: Remote

	Freq						Limit Line		Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		-
1	2444.00	5.13	28.92	37.31	75.42	72.16	114.00	-41.84	Average	
2	2444 00	5 13	28 92	37 31	101 31	98 05	114 00	_15 95	Poak	



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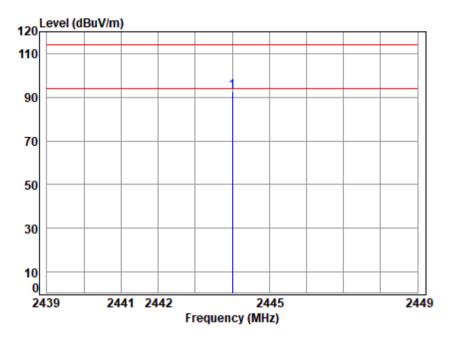


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Test Mode: 01; Polarity: Vertical; Modulation: GFSK; Channel: middle



Site : chamber Condition: 3m VERTICAL : 00522ET/00523ET Mode : 2444 Field Strengh

: Remote

2444.00

Cable Ant Preamp Limit 0ver Read Loss Factor Factor Limit Remark Freq Level Level Line dBuV dBuV/m dBuV/m MHz dB dB/m 5.13 28.92 37.31 95.72 92.46 114.00 -21.54 Peak



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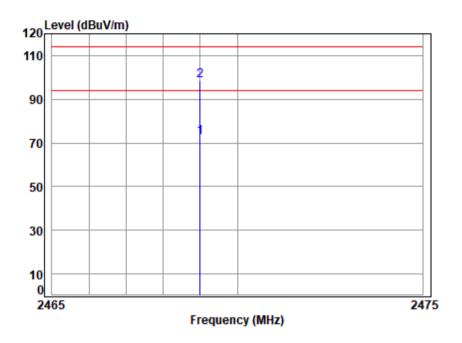


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Test Mode: 01; Polarity: Horizontal; Modulation: GFSK; Channel: High



Site : chamber

Condition: 3m HORIZONTAL : 00522ET/00523ET : 2469 Field Strengh Mode

: Remote

	Freq				Read Level				Remark	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		_
1	2469.00	5.15	28.90	37.25	75.88	72.68	114.00	-41.32	Average	
2	2469.00	5.15	28.90	37.25	101.77	98.57	114.00	-15.43	Peak	



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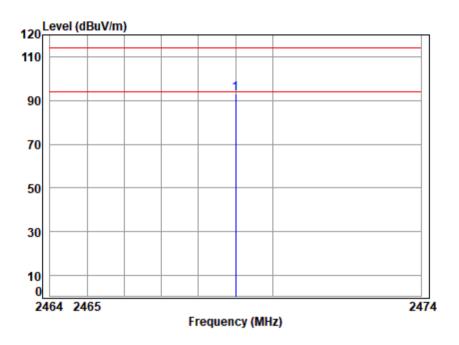


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00522ET/00523ET Mode : 2469 Field Strengh

: Remote

Cable Ant Preamp Limit 0ver Read Loss Factor Factor Line Limit Remark Frea Level Level MHz dB dB/m dBuV dBuV/m dBuV/m 2469.00 5.15 28.90 37.25 96.21 93.01 114.00 -20.99 Peak

Remark:

1

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: 23.1 °C Humidity: 52.6 % RH Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

7.5.2 TC3t W	3.2 Test mode bescription								
Pre-scan / Final test	Mode Code	Description							
Final test	01	TX mode Keep the EUT(remote) in transmitting with modulation mode.							



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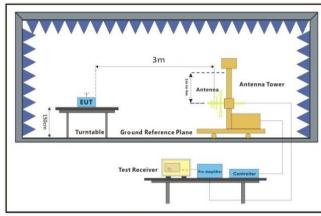


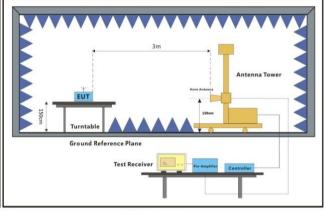
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7.3.3 Test Setup Diagram





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, guasi-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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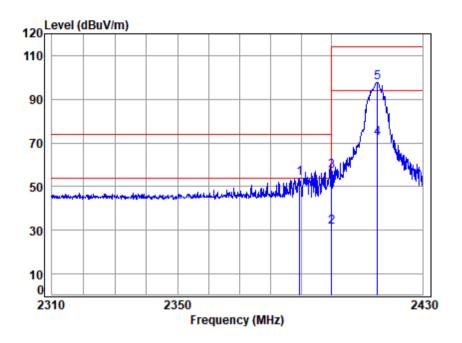


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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL : 00522ET/00523ET : 2415 Band edge Mode

: Remote

	Freq				Read Level				Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2389.61	5.08	29.10	37.44	56.97	53.71	74.00	-20.29	peak
2	2400.00	5.08	29.10	37.41	34.49	31.26	74.00	-42.74	Average
3	2400.00	5.08	29.10	37.41	60.38	57.15	74.00	-16.85	Peak
4	2415.00	5.10	29.04	37.38	75.20	71.96	114.00	-42.04	Average
5	2415.00	5.10	29.04	37.38	101.09	97.85	114.00	-16.15	peak



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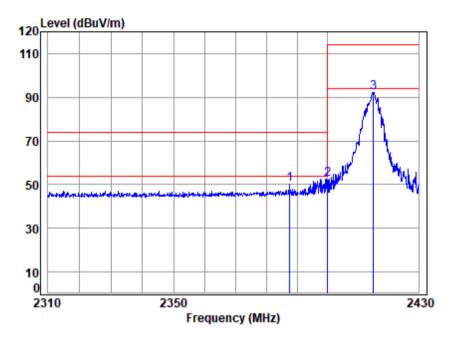


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00522ET/00523ET : 2415 Band edge Mode

: Remote

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2387.55	5.07	29.10	37.44	53.25	49.98	74.00	-24.02	peak
2	2400.00	5.08	29.10	37.41	55.85	52.62	74.00	-21.38	Peak
3	2415.00	5.10	29.04	37.38	95.51	92.27	114.00	-21.73	peak



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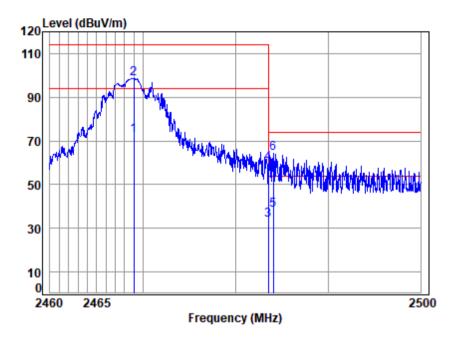


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Test Mode: 01; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber

Condition: 3m HORIZONTAL : 00522ET/00523ET Mode : 2469 Band edge

: Remote

		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	2469.00	5 15	28 00	37 25	75 99	72 68	11/ 00	/11 33	Average
1	2409.00								_
2	2469.00	5.15	28.90	37.25	101.77	98.57	114.00	-15.43	Peak
3	2483.50	5.16	28.90	37.22	36.99	33.83	74.00	-40.17	Average
4	2483.50	5.16	28.90	37.22	62.88	59.72	74.00	-14.28	Peak
5	2484.04	5.16	28.90	37.22	41.38	38.22	74.00	-35.78	Average
6	2484.04	5.16	28.90	37.22	67.27	64.11	74.00	-9.89	Peak



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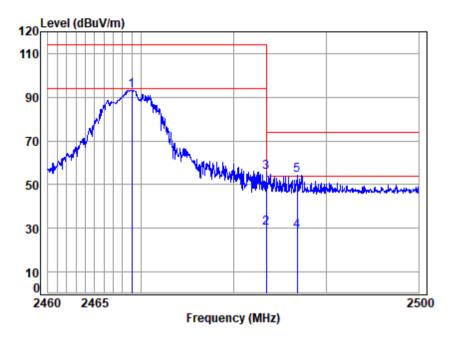


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00522ET/00523ET Mode : 2469 Band edge

: Remote

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2469.00	5.15	28.90	37.25	96.21	93.01	114.00	-20.99	Peak
2	2483.50	5.16	28.90	37.22	33.15	29.99	74.00	-44.01	Average
3	2483.50	5.16	28.90	37.22	59.04	55.88	74.00	-18.12	Peak
4	2486.81	5.16	28.90	37.21	31.76	28.61	74.00	-45.39	Average
5	2486.81	5.16	28.90	37.21	57.65	54.50	74.00	-19.50	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

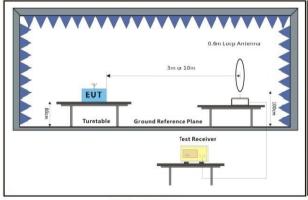
Operating Environment:

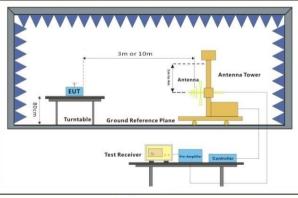
23.2 °C Temperature: Humidity: 52.6 % RH Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

7.7.2 10001	12 Tool Mode Becomption									
Pre-scan / Final test	Mode Code	Description								
Final test	01	TX mode_Keep the EUT(remote) in transmitting with modulation mode.								

7.4.3 Test Setup Diagram





30MHz-1GHz Below 30MHz



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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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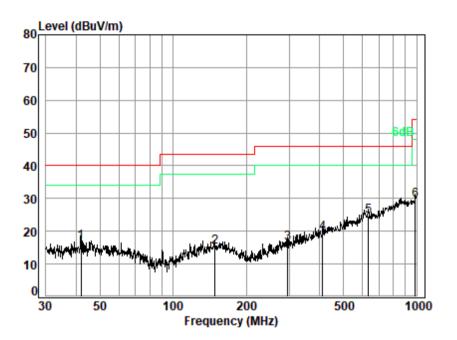


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Test Mode: 01; Polarity: Horizontal



Site : chamber

Condition: 3m HORIZONTAL

: 00522ET Mode : 01

> 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 41.86 0.21 17.96 25.88 24.54 16.83 40.00 -23.17 QP 148.96 0.91 17.39 25.58 22.39 15.11 43.50 -28.39 OP 2 3 296.18 1.02 17.42 25.21 23.09 16.32 46.00 -29.68 QP 411.82 1.61 19.93 25.84 23.76 19.46 46.00 -26.54 OP 5 633.91 2.20 24.51 26.56 24.54 24.69 46.00 -21.31 QP 6 986.07 2.65 28.25 25.56 24.03 29.37 54.00 -24.63 OP



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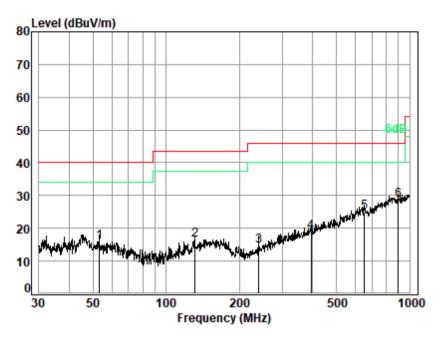


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Test Mode: 01; Polarity: Vertical



Site : chamber Condition: 3m VERTICAL : 00522ET Mode : 01

		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	53.13	0.17	17.44	25.85	24.16	15.92	40.00	-24.08	QP
2	131.30	0.98	16.12	25.65	24.91	16.36	43.50	-27.14	QP
3	239.99	0.83	15.60	25.32	23.45	14.56	46.00	-31.44	QP
4	394.85	1.63	19.64	25.75	23.47	18.99	46.00	-27.01	QP
5	651.94	2.14	24.43	26.54	25.00	25.03	46.00	-20.97	QP
6	897.00	2.39	27.49	25.94	24.62	28.56	46.00	-17.44	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

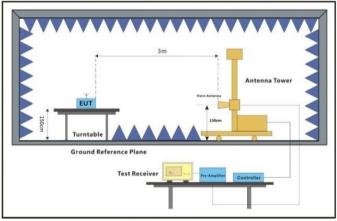
Operating Environment:

Temperature: 23.2 °C Humidity: 52.9 % RH Atmospheric Pressure: 1020 mbar

7.5.2 Test Mode Description

	Pre-scan / Final test	Mode Code	Description						
	Final test	01	TX mode_Keep the EUT(remote) 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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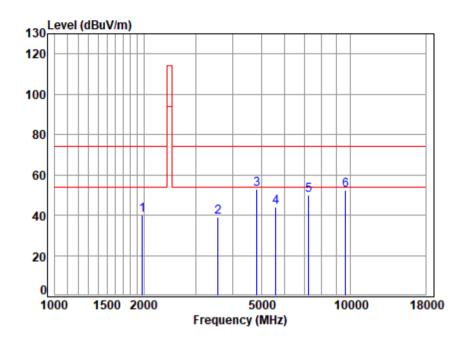


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Test Mode: 01; Polarity: Horizontal; Modulation: GFSK; Channel:Low



Site : chamber

Condition: 3m HORIZONTAL : 00522ET/00523ET Mode : 2415 TX RSE

: Remote

	Freq	Cable Loss		Preamp Factor			Limit Line		Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1978.08	4.66	28.41	38.45	45.21	39.83	74.00	-34.17	Peak
2	3567.14	6.30	31.77	36.12	37.09	39.04	74.00	-34.96	Peak
3	4830.00	7.33	34.42	35.50	46.59	52.84	74.00	-21.16	Peak
4	5599.41	7.89	34.70	35.09	36.28	43.78	74.00	-30.22	Peak
5	7245.00	9.22	35.70	35.83	40.75	49.84	74.00	-24.16	Peak
6	9660.00	12.40	37.50	37.45	39.80	52.25	74.00	-21.75	Peak



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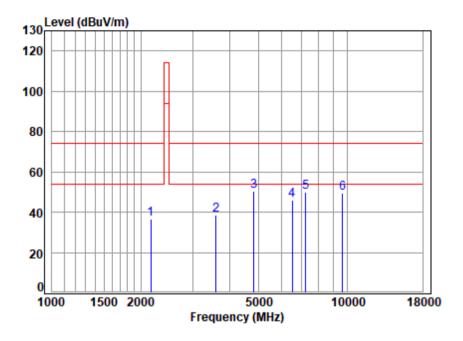


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber Condition: 3m VERTICAL : 00522ET/00523ET Mode : 2415 TX RSE

: Remote

		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	2163.50	4.85	28.09	38.00	41.66	36.60	74.00	-37.40	Peak
2	3598.20	6.34	32.08	36.11	36.44	38.75	74.00	-35.25	Peak
3	4830.00	7.33	34.42	35.50	44.40	50.65	74.00	-23.35	Peak
4	6507.54	8.57	35.58	35.25	36.87	45.77	74.00	-28.23	Peak
5	7245.00	9.22	35.70	35.83	41.06	50.15	74.00	-23.85	Peak
6	9660.00	12.40	37.50	37.45	36.98	49.43	74.00	-24.57	Peak



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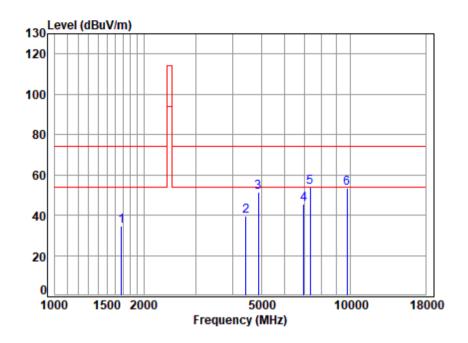


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Test Mode: 01; Polarity: Horizontal; Modulation: GFSK; Channel: middle



Site : chamber

Condition: 3m HORIZONTAL : 00522ET/00523ET Mode : 2444 TX RSE

: Remote

		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	1677.62	4.30	26.24	38.41	42.71	34.84	74.00	-39.16	peak
2	4430.63								•
3	4888.00	7.36	34.65	35.46	44.72	51.27	74.00	-22.73	peak
4	6954.85	8.89	35.79	35.54	36.56	45.70	74.00	-28.30	peak
5	7332.00	9.33	35.70	35.91	44.51	53.63	74.00	-20.37	peak
6	9776.00	12.48	37.35	37.42	40.84	53.25	74.00	-20.75	peak



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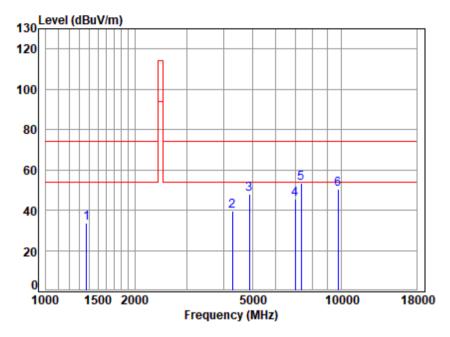


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber Condition: 3m VERTICAL : 00522ET/00523ET Mode : 2444 TX RSE

: Remote

		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	
	4270 22	2.07	24.54	20.27	42.62	22.67	74.00	40. 33	
1	1370.33	3.8/	24.54	38.37	43.63	33.6/	74.00	-40.33	peak
2	4291.98	6.99	33.97	35.88	34.56	39.64	74.00	-34.36	peak
3	4888.00	7.36	34.65	35.46	41.17	47.72	74.00	-26.28	peak
4	6974.98	8.90	35.75	35.55	36.41	45.51	74.00	-28.49	peak
5	7332.00	9.33	35.70	35.91	44.50	53.62	74.00	-20.38	peak
6	9776.00	12.48	37.35	37.42	37.77	50.18	74.00	-23.82	peak



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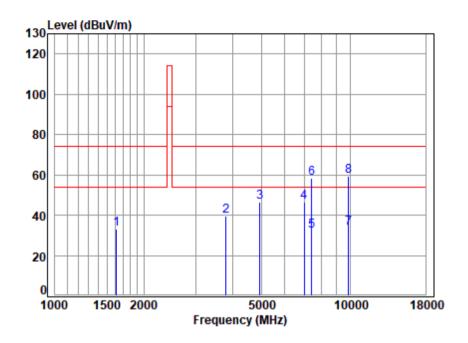


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Test Mode: 01; Polarity: Horizontal; Modulation: GFSK; Channel: High



Site : chamber

Condition: 3m HORIZONTAL : 00522ET/00523ET Mode : 2469 TX RSE

: Remote

	Freq	Cable		Preamp Factor		Level			Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1615.75	4.22	26.64	38.40	40.90	33.36	74.00	-40.64	peak
2	3801.33	6.57	32.42	36.11	36.72	39.60	74.00	-34.40	peak
3	4938.00	7.39	34.62	35.43	39.74	46.32	74.00	-27.68	peak
4	6974.98	8.90	35.75	35.55	37.22	46.32	74.00	-27.68	peak
5	7407.00	9.42	35.83	35.99	23.06	32.32	54.00	-21.68	Average
6	7407.00	9.42	35.83	35.99	48.95	58.21	74.00	-15.79	peak
7	9876.00	12.55	37.25	37.40	21.04	33.44	54.00	-20.56	Average
8	9876.00	12.55	37.25	37.40	46.93	59.33	74.00	-14.67	peak



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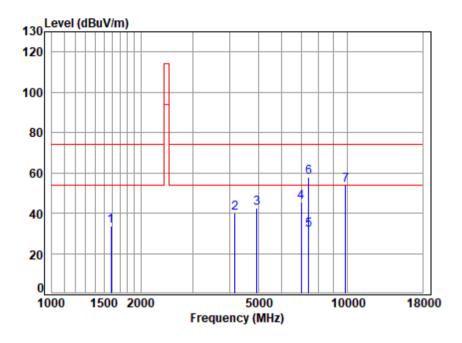


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Test Mode: 01; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber Condition: 3m VERTICAL : 00522ET/00523ET Mode : 2469 TX RSE

: Remote

	Freq			Preamp Factor					Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1587.98	4.18	26.85	38.40	40.89	33.52	74.00	-40.48	peak
2	4169.70	6.90	33.80	35.97	35.34	40.07	74.00	-33.93	peak
3	4938.00	7.39	34.62	35.43	35.89	42.47	74.00	-31.53	peak
4	6974.98	8.90	35.75	35.55	36.41	45.51	74.00	-28.49	peak
5	7407.00	9.42	35.83	35.99	22.61	31.87	54.00	-22.13	Average
6	7407.00	9.42	35.83	35.99	48.50	57.76	74.00	-16.24	peak
7	9876.00	12.55	37.25	37.40	41.27	53.67	74.00	-20.33	peak



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Test Setup Photo 8

Refer to Appendix - Test Setup Photo_remote controller for SZCR2402000522ET

EUT Constructional Details (EUT Photos) 9

Refer to Appendix - External and Internal photos_remote controller for SZCR2402000522ET

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