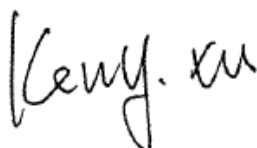


TEST REPORT

Application No.: SZCR2105021034ET(SGS SZ No.:T52110260074EM)
Applicant: HYPER TOY COMPANY
Address of Applicant: 177 Malaga Park Drive Malaga, NEW JERSEY 08328 USA, Malaga, New Jersey, United States
Buyer: WM/TARGET
Manufacturer: HYPER TOY COMPANY
Address of Manufacturer: 177 Malaga Park Drive Malaga, NEW JERSEY 08328 USA, Malaga, New Jersey, United States
Equipment Under Test (EUT):
EUT Name: 1:10 SCALE AMPHIBIOUS RC TRUCK
Model No.: HYP-SAM-0110
FCC ID: 2AMOVSAM0110
Country of Destination: USA
Standard(s) : 47 CFR Part 15, Subpart C 15.249
Date of Receipt: 2021-05-13
Date of Test: 2021-05-17 to 2021-06-02
Date of Issue: 2021-06-08

Test Result:	Pass*
---------------------	--------------

* In the configuration tested, the EUT complied with the standards specified above.



Keny Xu
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-06-08		Original

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

2 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))		ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass
Restricted Band Around Fundamental Frequency		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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4 General Information

4.1 Details of E.U.T.

Power supply:	4.5V DC(1.5V x 3 "AA" Size Batteries) for TX
Operation Frequency:	2410MHz-2473MHz
Modulation Type:	GFSK
Number of Channels:	32
Antenna Type:	Integral
Antenna Gain:	0dBi

Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2410	12	2430	23	2454
2	2414	13	2431	24	2456
3	2415	14	2433	25	2458
4	2416	15	2434	26	2462
5	2417	16	2439	27	2464
6	2418	17	2441	28	2465
7	2419	18	2442	29	2466
8	2421	19	2444	30	2467
9	2426	20	2446	31	2469
10	2428	21	2450	32	2473
11	2429	22	2452		

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

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	20dB Bandwidth	$\pm 3\%$
4	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
5	Temperature test	$\pm 1^\circ\text{C}$
6	Humidity test	$\pm 3\%$
7	Supply voltages	$\pm 1.5\%$
8	Time	$\pm 3\%$



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

Address 1: No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Address 2: Room 105, Building A, Xinlong Technology Industrial Park, No. 50 Fengtang Road, Xintian Community, Fuyong Street, Bao'an District, Shenzhen, China

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: 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 ISCED 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	2021-03-23	2022-03-22
Signal Analyzer	Rohde & Schwarz	FSV40	SEM008-04	2021-03-24	2022-03-23
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	2021-04-08	2022-04-07

Field Strength of the Fundamental Signal (15.249(a))					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2021-03-26	2024-03-25
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13
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	2021-03-26	2024-03-25
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13
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



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	2021-03-24	2022-03-23
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	2021-03-26	2024-03-25
EXA Signal Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2021-02-01	2022-01-31
Horn Antenna	Rohde&Schwarz	HF907	SEM003-07	2021-04-14	2024-04-13
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

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	2021-03-30	2022-03-29



6 Radio Spectrum Technical Requirement

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



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

7.1.1 E.U.T. Operation

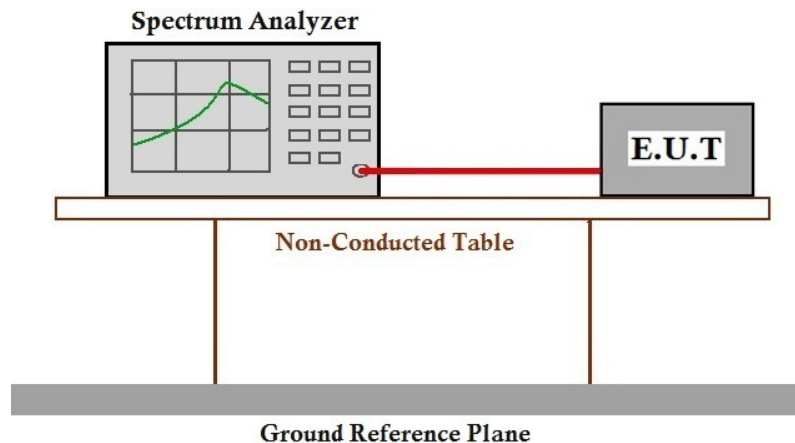
Operating Environment:

Temperature: 22.3 °C Humidity: 52.3 % RH Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	01	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	1.470	Pass
Middle	1.570	Pass
Highest	1.660	Pass





1 PK
VIEW





1 PK
VIEW



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:

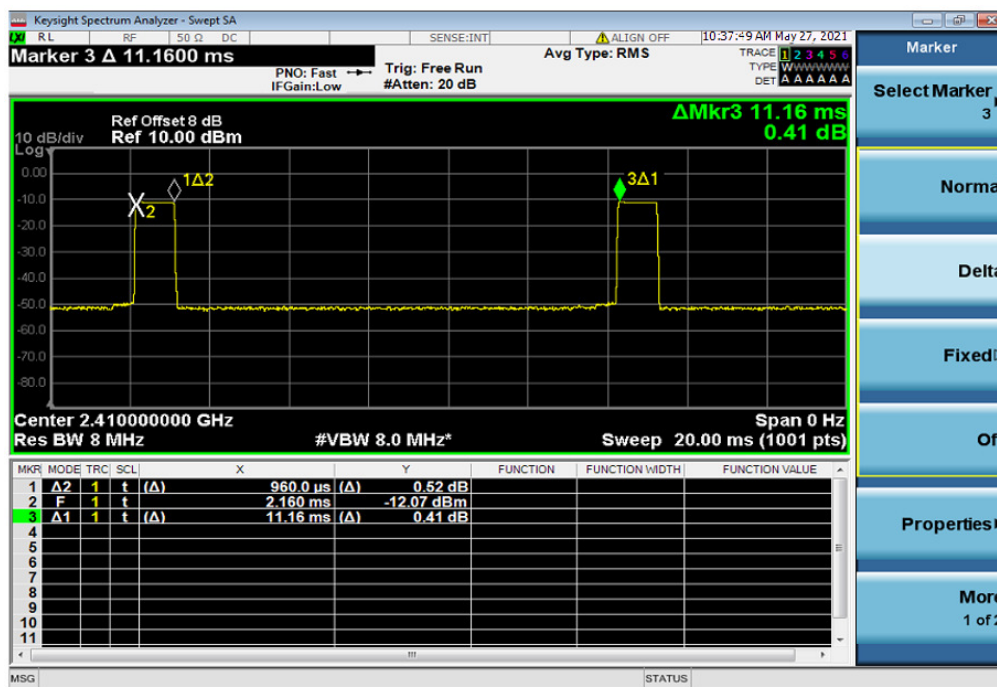
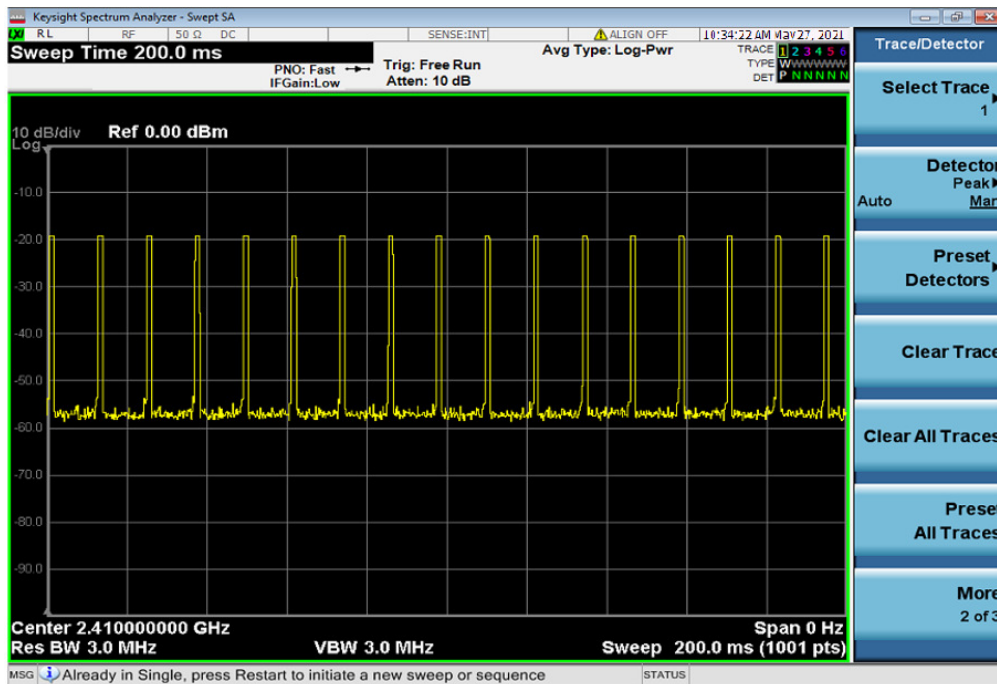
Fundamental frequency(MHz)	Field strength of fundamental(millivolts/meter)	Field strength of harmonics(microvolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

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:

Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =0.96ms
	T period =11.16ms
	Duty cycle=8.60%
	PDCF value= -21.31dB



7.2.1 E.U.T. Operation

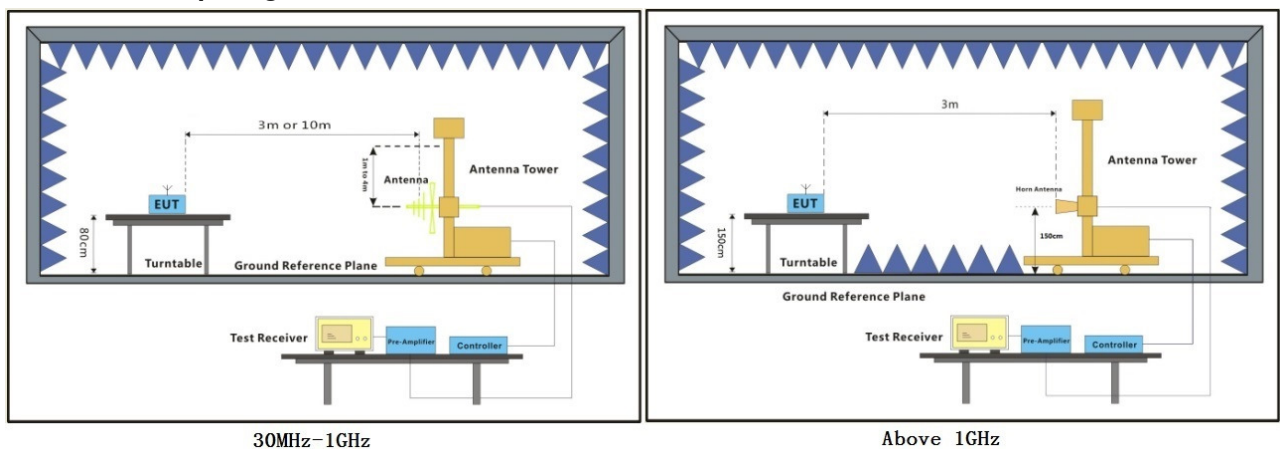
Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1010 mbar

7.2.1 Test Mode Description

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

7.2.2 Test Setup Diagram

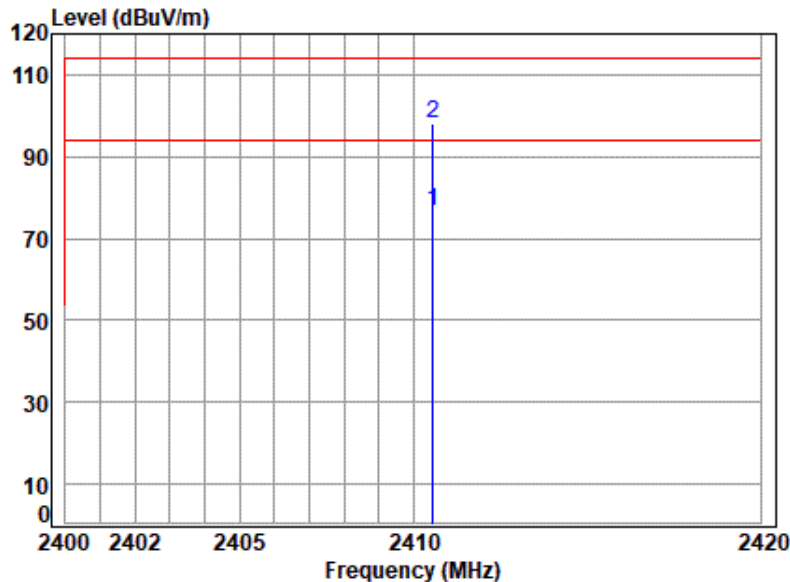


7.2.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
 - e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
 - f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
 - h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
 - i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
 - j. Repeat above procedures until all frequencies measured was complete.
- Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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



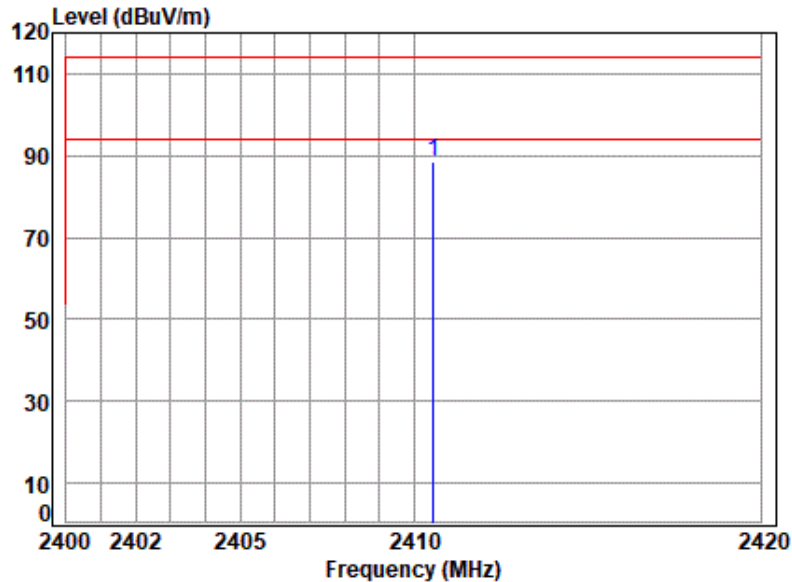
Site : chamber
Condition: 3m HORIZONTAL

Mode : 2410 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
Freq		Loss	Factor	Factor	Level	Line	Limit	Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2410.562	4.38	28.55	40.98	84.61	76.56	94.00	-17.44 Average
2	2410.562	4.38	28.55	40.98	105.92	97.87	114.00	-16.13 peak



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



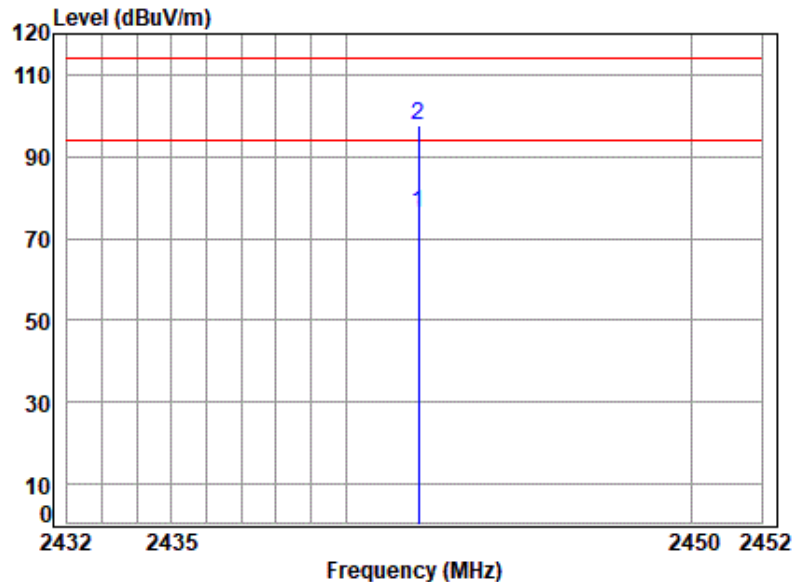
Site : chamber
Condition: 3m VERTICAL

Mode : 2410 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2410.562	4.38	28.55	40.98	96.52	88.47	114.00	-25.53 peak



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



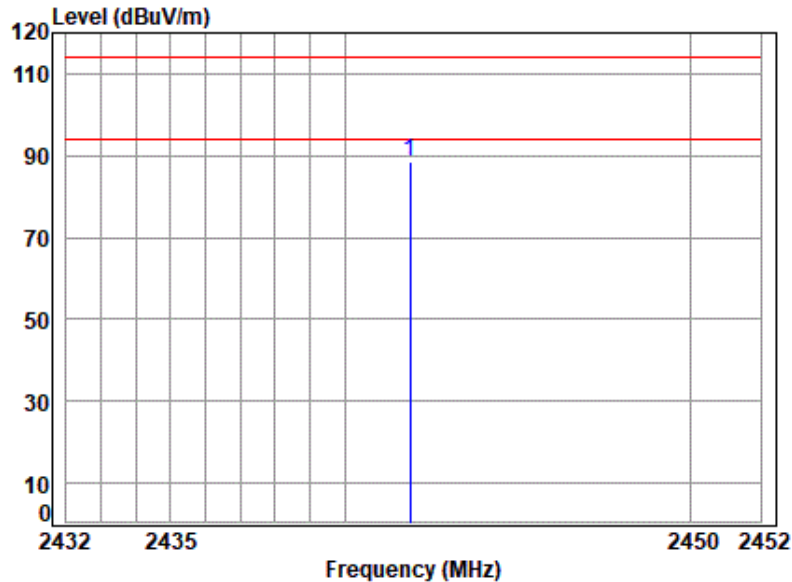
Site : chamber
Condition: 3m HORIZONTAL

Mode : 2442 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2442.100	4.43	28.61	40.99	84.14	76.19	94.00	-17.81 Average
2	2442.100	4.43	28.61	40.99	105.45	97.50	114.00	-16.50 Peak



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



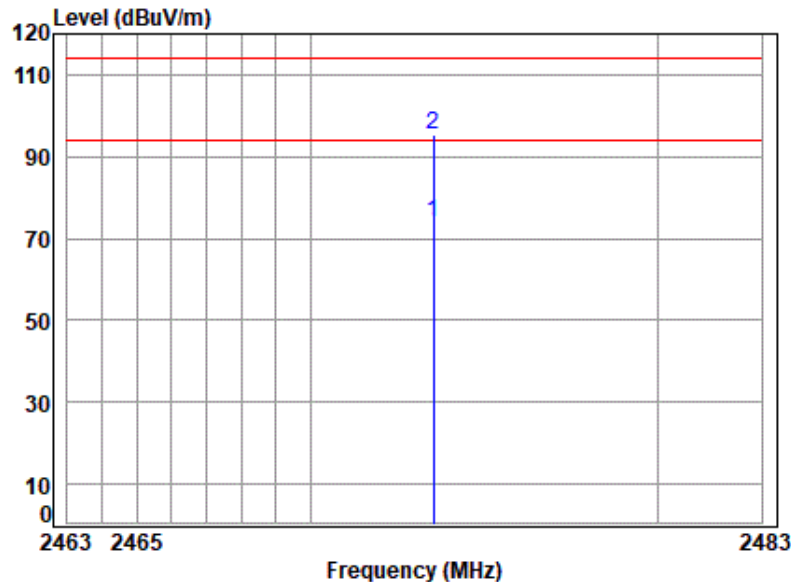
Site : chamber
Condition: 3m VERTICAL

Mode : 2442 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB		dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2441.880	4.43	28.61	40.99	96.40	88.45	114.00	-25.55 Peak



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



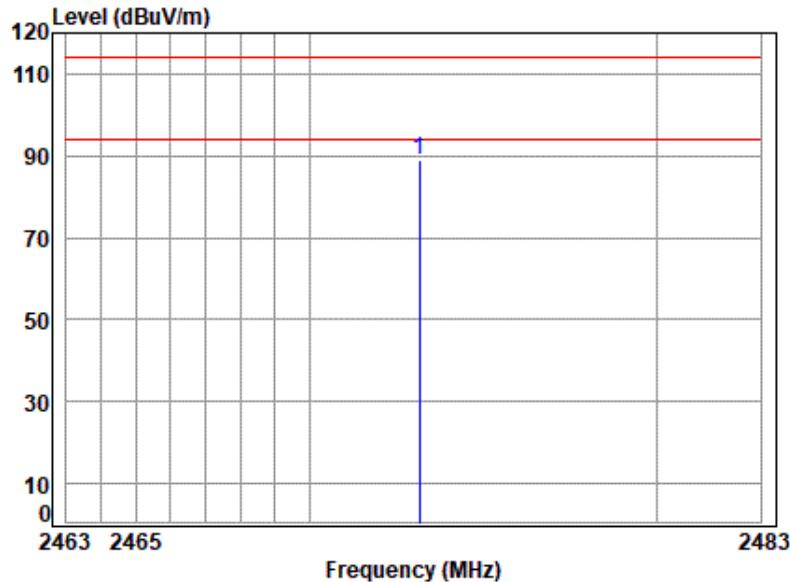
Site : chamber
Condition: 3m HORIZONTAL

Mode : 2473 Field strength

		Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2473.529	4.48	28.66	41.01	81.72	73.85	94.00	-20.15 Average
2	2473.529	4.48	28.66	41.01	103.03	95.16	114.00	-18.84 peak



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



Site : chamber
Condition: 3m VERTICAL

Mode : 2473 Field strength

	Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2473.146	4.48	28.66	41.01	96.96	89.09	114.00	-24.91 peak

Remark:

- The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the above measurement data were shown in the report



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:

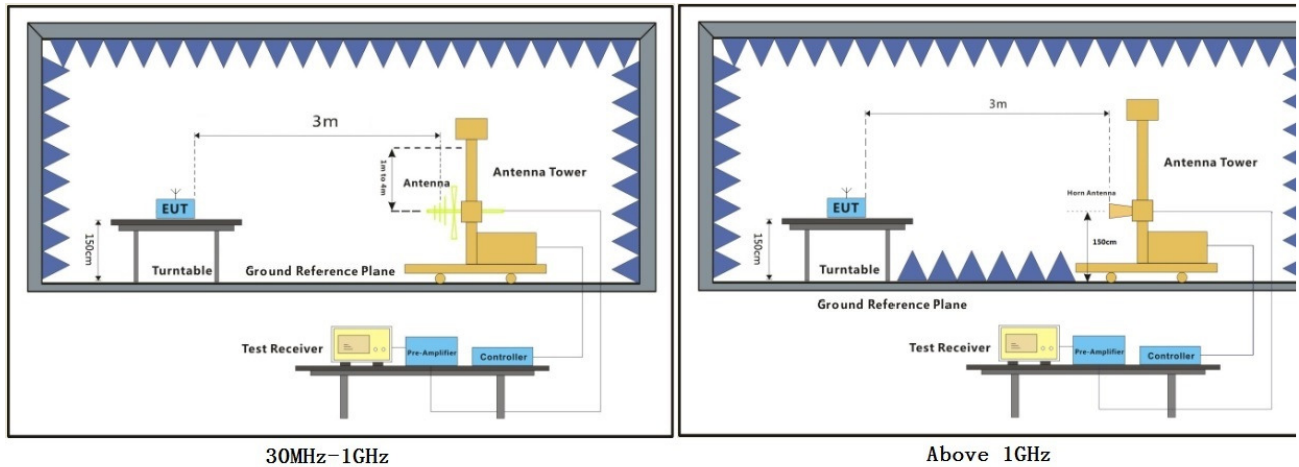
Temperature: 25 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

7.3.1 Test Mode Description

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



7.3.2 Test Setup Diagram

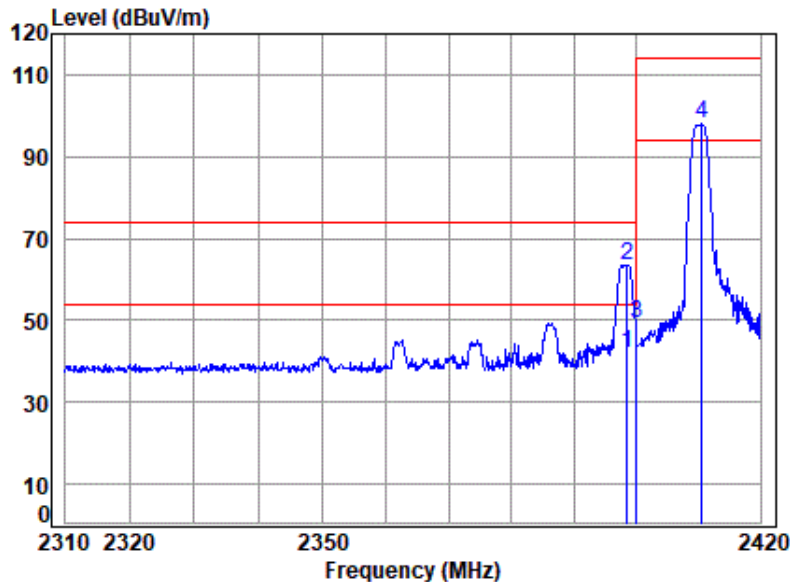


7.3.3 Measurement Procedure and Data

- 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.
- 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.
- 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.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- Test the EUT in the lowest channel, the middle channel, the Highest channel.
- 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.
- Repeat above procedures until all frequencies measured was complete.

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

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



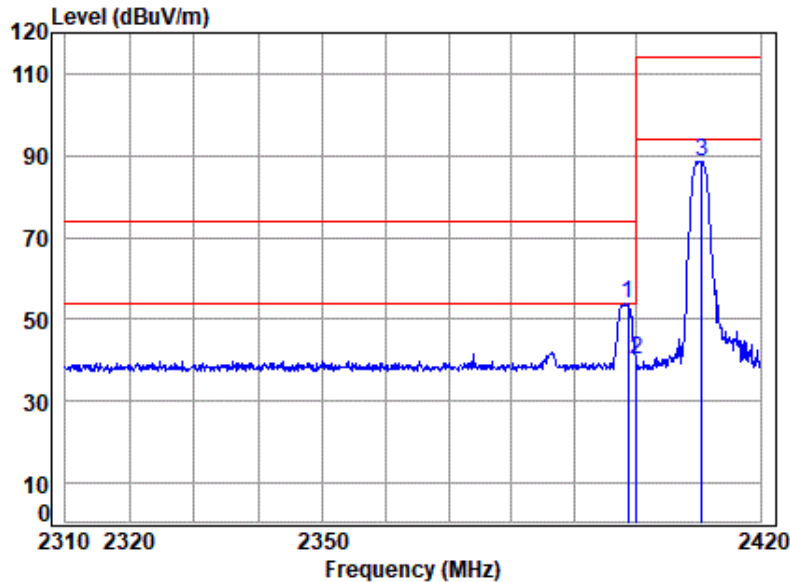
Site : chamber
Condition: 3m HORIZONTAL

Mode : 2410 Band edge

	Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2398.593	4.36	28.53	40.98	50.28	42.19	54.00	-11.81 Average
2 2398.593	4.36	28.53	40.98	71.59	63.50	74.00	-10.50 Peak
3 2400.000	4.36	28.53	40.98	57.59	49.50	74.00	-24.50 peak
4 2410.562	4.38	28.55	40.98	105.92	97.87	114.00	-16.13 peak



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



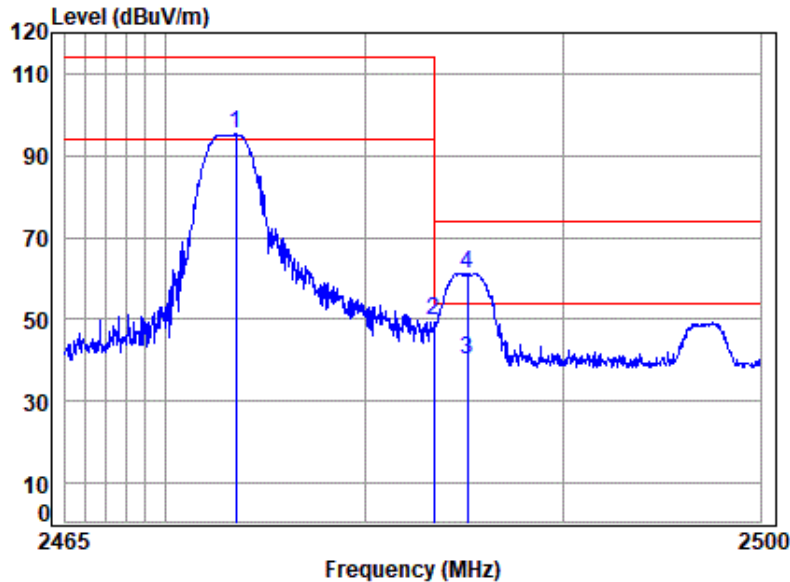
Site : chamber
Condition: 3m VERTICAL

Mode : 2410 Band edge

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2398.704	4.36	28.53	40.98	62.02	53.93	74.00	-20.07	Peak
2	2400.000	4.36	28.53	40.98	48.02	39.93	74.00	-34.07	peak
3	2410.562	4.38	28.55	40.98	96.52	88.47	114.00	-25.53	peak



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



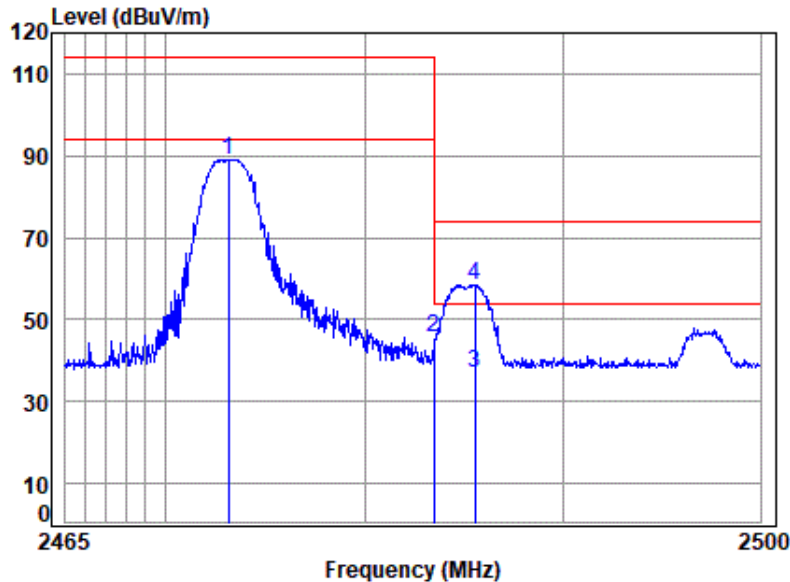
Site : chamber
Condition: 3m HORIZONTAL

Mode : 2473 Band edge

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2473.529	4.48	28.66	41.01	103.03	95.16	114.00	-18.84	peak
2	2483.500	4.49	28.67	41.01	57.41	49.56	74.00	-24.44	peak
3	2485.170	4.50	28.68	41.01	47.84	40.01	54.00	-13.99	Average
4	2485.170	4.50	28.68	41.01	69.15	61.32	74.00	-12.68	Peak



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



Site : chamber
Condition: 3m VERTICAL

Mode : 2473 Band edge

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	
1	2473.146	4.48	28.66	41.01	96.96	89.09	114.00	-24.91 peak
2	2483.500	4.49	28.67	41.01	53.32	45.47	74.00	-28.53 peak
3	2485.590	4.50	28.68	41.01	44.93	37.10	54.00	-16.90 Average
4	2485.590	4.50	28.68	41.01	66.24	58.41	74.00	-15.59 Peak

Remark:

- The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the above measurement data were shown in the report.



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:

Temperature: 22.3 °C

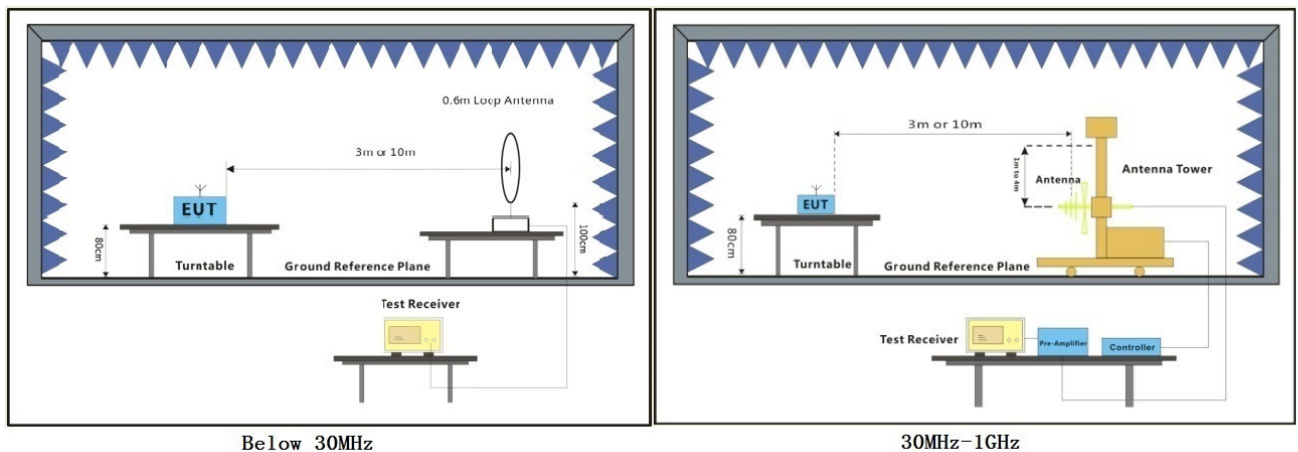
Humidity: 52.5 % RH

Atmospheric Pressure: 1010 mbar

7.4.1 Test Mode Description

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

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 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.

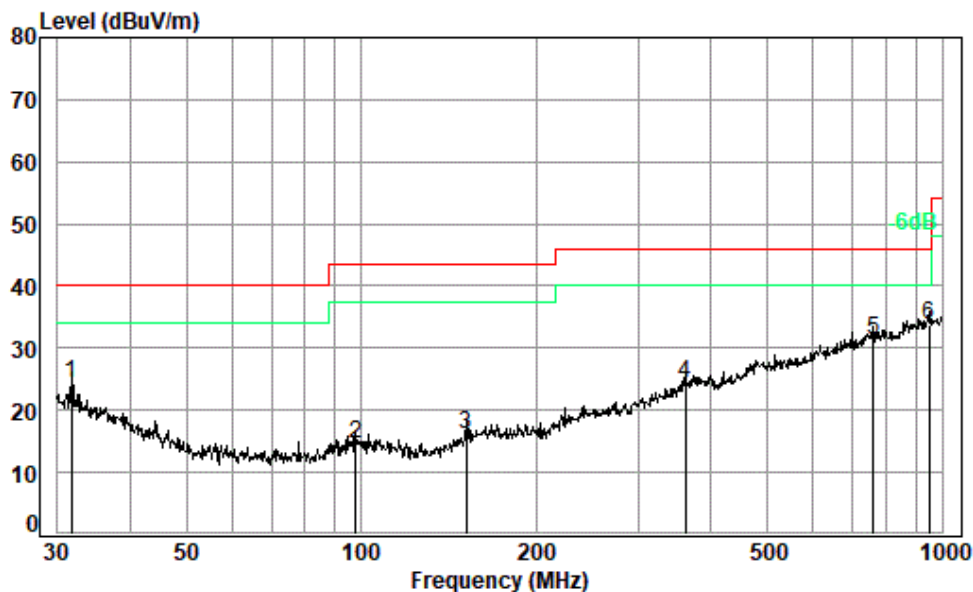
Remark:

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.



30MHz~1GHz

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



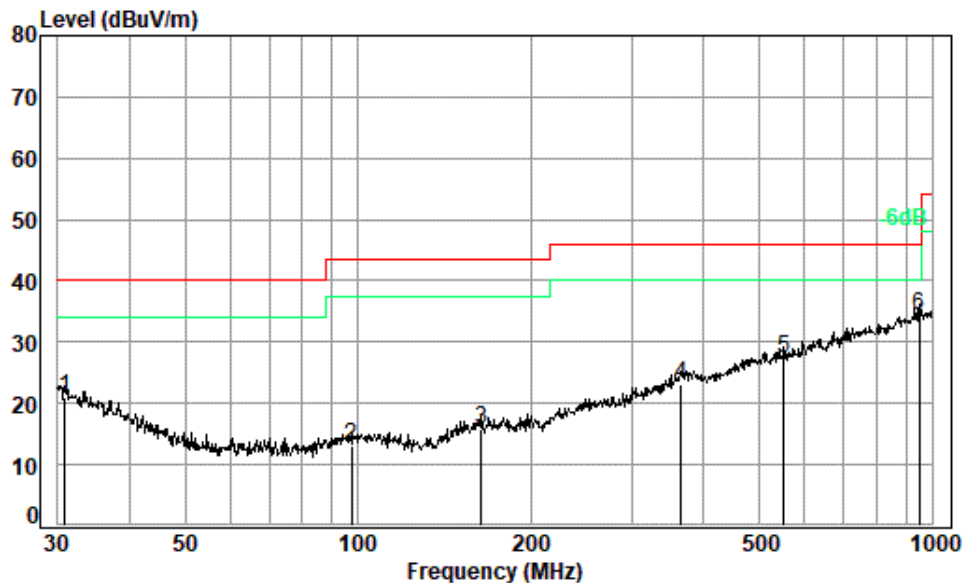
Condition: 3m HORIZONTAL

Test Mode: 01

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB		dB/m	dB	dBuV/m	dBuV/m	dB	
1	31.73	0.62	21.70	27.73	29.61	24.20	40.00	-15.80	QP
2	97.80	1.14	13.80	27.61	27.22	14.55	43.50	-28.95	QP
3	151.60	1.16	14.81	27.33	27.55	16.19	43.50	-27.31	QP
4	361.71	2.20	21.79	27.21	27.42	24.20	46.00	-21.80	QP
5	760.70	3.15	27.91	27.80	28.16	31.42	46.00	-14.58	QP
6 pp	948.76	3.55	29.33	26.91	27.79	33.76	46.00	-12.24	QP



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



Condition: 3m VERTICAL

Test Mode: 01

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	30.85	0.61	22.35	27.73	25.73	20.96	40.00	-19.04	QP
2	97.46	1.15	13.80	27.61	25.79	13.13	43.50	-30.37	QP
3	164.33	1.17	15.49	27.28	26.42	15.80	43.50	-27.70	QP
4	365.54	2.21	21.98	27.23	26.31	23.27	46.00	-22.73	QP
5	550.95	2.61	25.09	27.97	27.50	27.23	46.00	-18.77	QP
6 pp	948.76	3.55	29.33	26.91	28.27	34.24	46.00	-11.76	QP



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

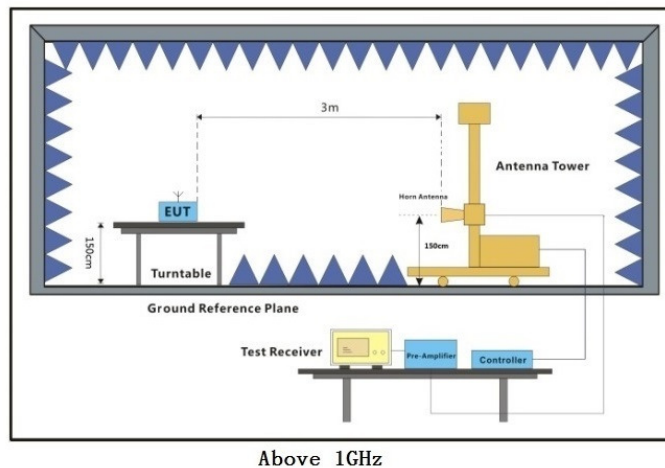
Operating Environment:

Temperature: 25.5 °C Humidity: 56.5 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

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

7.5.3 Test Setup Diagram



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.

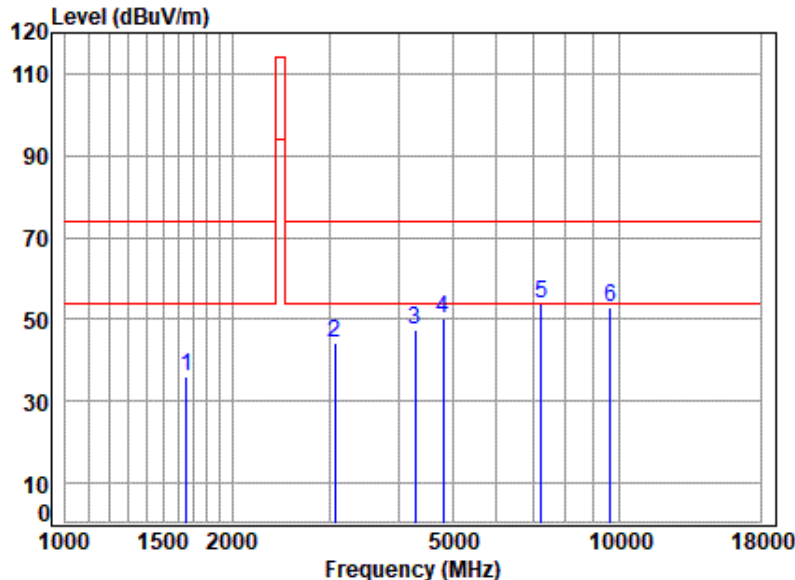
Remark:

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.
4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



Above 1GHz

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



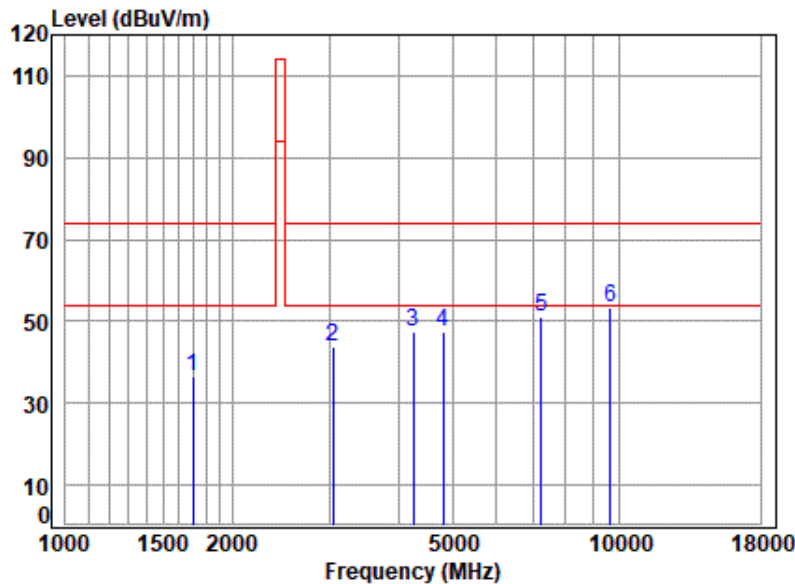
Site : chamber
Condition: 3m HORIZONTAL

Mode : 2410 TX RSE

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1653.550	3.39	26.48	40.60	46.90	36.17	74.00	-37.83	peak
2	3069.345	4.96	31.43	41.28	49.22	44.33	74.00	-29.67	Peak
3	4291.977	6.57	33.60	42.39	49.66	47.44	74.00	-26.56	peak
4	4820.000	7.11	34.19	42.78	51.59	50.11	74.00	-23.89	peak
5	7230.000	8.76	36.41	41.57	50.16	53.76	74.00	-20.24	peak
6	9640.000	10.80	37.53	38.53	43.34	53.14	74.00	-20.86	peak



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



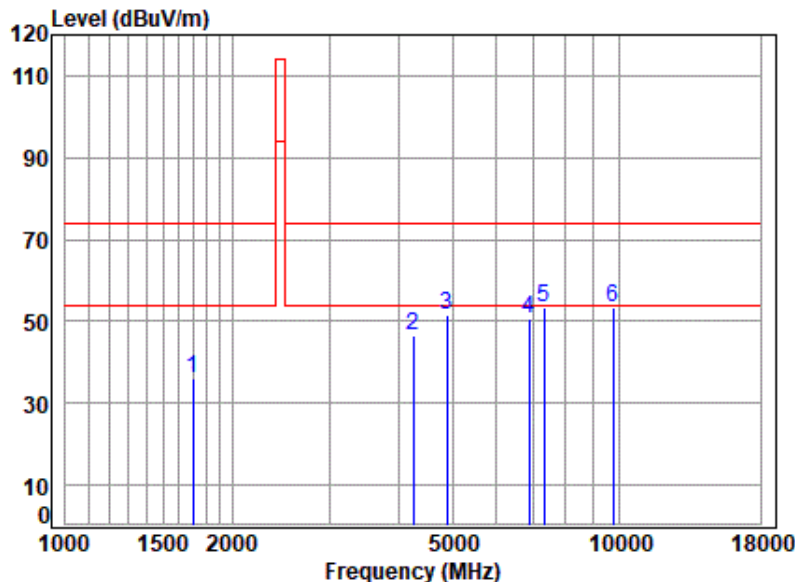
Site : chamber
Condition: 3m VERTICAL

Mode : 2410 TX RSE

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	
1	1697.129	3.43	26.66	40.63	47.23	36.69	74.00 -37.31	peak
2	3042.846	4.92	31.38	41.25	48.88	43.93	74.00 -30.07	Peak
3	4254.921	6.53	33.60	42.36	49.64	47.41	74.00 -26.59	peak
4	4820.000	7.11	34.19	42.78	49.09	47.61	74.00 -26.39	peak
5	7230.000	8.76	36.41	41.57	47.52	51.12	74.00 -22.88	peak
6	9640.000	10.80	37.53	38.53	43.71	53.51	74.00 -20.49	peak



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



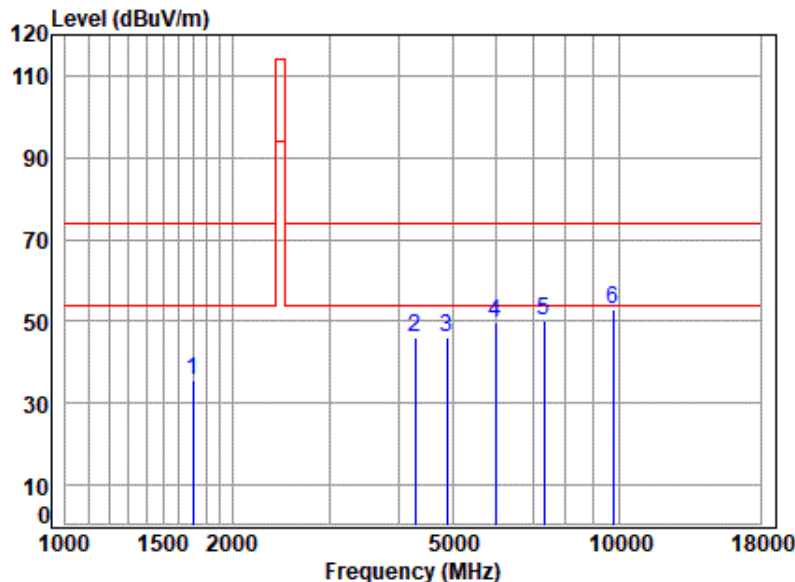
Site : chamber
Condition: 3m HORIZONTAL

Mode : 2442 TX RSE

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1697.129	3.43	26.66	40.63	46.52	35.98	74.00	-38.02	peak
2	4242.641	6.52	33.60	42.35	48.59	46.36	74.00	-27.64	peak
3	4884.000	7.18	34.30	42.82	52.83	51.49	74.00	-22.51	peak
4	6874.906	8.48	36.16	41.75	47.96	50.85	74.00	-23.15	peak
5	7326.000	8.85	36.37	41.52	49.88	53.58	74.00	-20.42	peak
6	9768.000	10.76	37.55	38.34	43.47	53.44	74.00	-20.56	peak



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



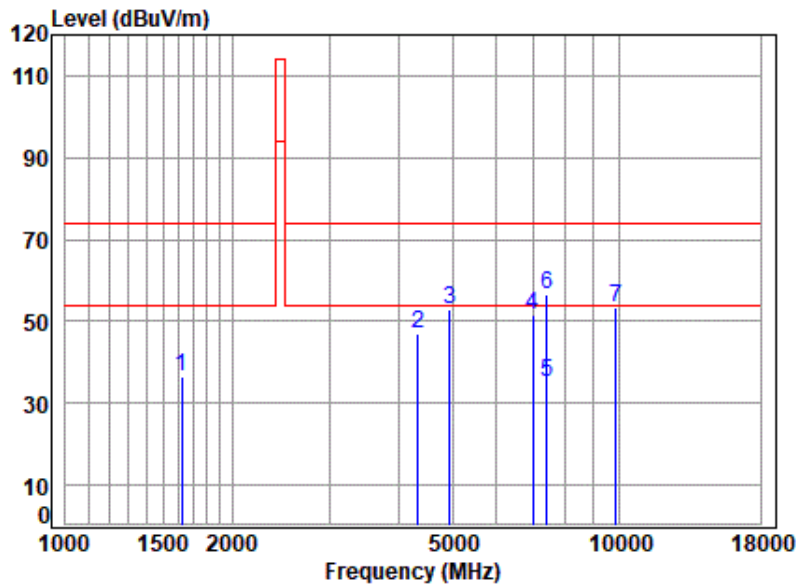
Site : chamber
Condition: 3m VERTICAL

Mode : 2442 TX RSE

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1697.129	3.43	26.66	40.63	45.93	35.39	74.00	-38.61	peak
2	4291.977	6.57	33.60	42.39	48.43	46.21	74.00	-27.79	peak
3	4884.000	7.18	34.30	42.82	47.54	46.20	74.00	-27.80	peak
4	5984.305	8.26	34.69	42.25	48.98	49.68	74.00	-24.32	peak
5	7326.000	8.85	36.37	41.52	46.55	50.25	74.00	-23.75	peak
6	9768.000	10.76	37.55	38.34	43.11	53.08	74.00	-20.92	peak



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



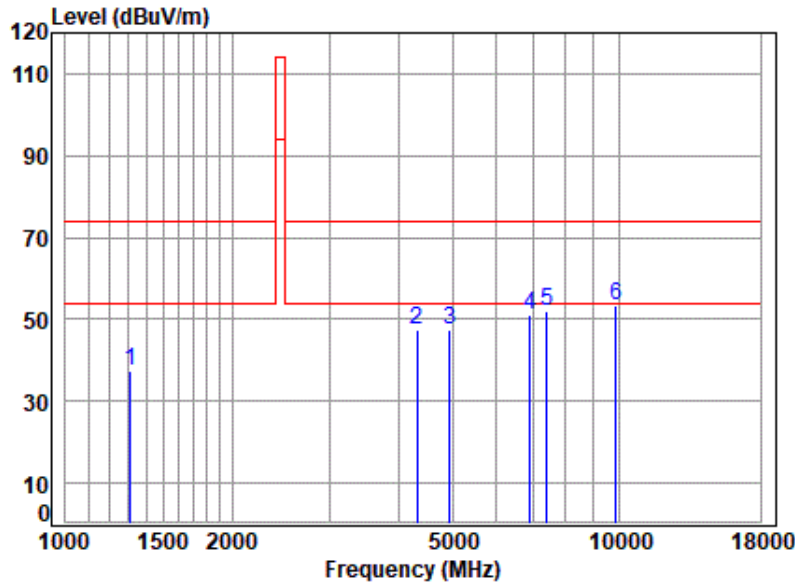
Site : chamber
Condition: 3m HORIZONTAL

Mode : 2473 TX RSE

	Freq	Cable Loss	Ant Factor	Preampl Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1620.431	3.36	26.34	40.58	47.30	36.42	74.00	-37.58	peak
2	4341.886	6.61	33.60	42.43	49.14	46.92	74.00	-27.08	peak
3	4946.000	7.24	34.41	42.86	54.16	52.95	74.00	-21.05	peak
4	6995.172	8.54	36.49	41.69	48.23	51.57	74.00	-22.43	peak
5	7419.000	8.94	36.33	41.47	31.27	35.07	54.00	-18.93	Average
6	7419.000	8.94	36.33	41.47	52.58	56.38	74.00	-17.62	peak
7	9892.000	10.72	37.58	38.16	43.04	53.18	74.00	-20.82	peak



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



Site : chamber
Condition: 3m VERTICAL

Mode : 2473 TX RSE

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1308.399	2.96	24.99	40.37	50.01	37.59	74.00	-36.41	peak
2	4316.859	6.59	33.60	42.41	49.72	47.50	74.00	-26.50	peak
3	4946.000	7.24	34.41	42.86	48.88	47.67	74.00	-26.33	peak
4	6894.806	8.49	36.21	41.74	48.37	51.33	74.00	-22.67	peak
5	7419.000	8.94	36.33	41.47	48.16	51.96	74.00	-22.04	peak
6	9892.000	10.72	37.58	38.16	43.38	53.52	74.00	-20.48	peak



8 Test Setup Photo

Refer to test setup Photos for SZCR2105021034ET

9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for SZCR2105021034ET

- End of the Report -

