

TEST REPORT

Application No.: GZCR2212001685LM
Applicant: Ting Shen Industrial Co., Ltd.
Address of Applicant: No.70 Lane 318 Chung Hsing Rd, Sec 2. San Chung Li, Chu Dong, HSINCHU 310, Taiwan
Manufacturer: Ting Shen Industrial Co., Ltd.
Address of Manufacturer: No.70 Lane 318 Chung Hsing Rd, Sec 2. San Chung Li, Chu Dong, HSINCHU 310, Taiwan
Factory: Guang Zhou Ting Shen Electric Co., Ltd.
Address of Factory: Lian Hua Port Industry, Sec.9D, 3rd F1. Lian Hua Bonded Processing District, Pan Yu Guang Zhou, Guangdong, China
Equipment Under Test (EUT):
EUT Name: Remote control (433M)
Model No.: TS-TXXXX ♣
♣ Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Trade Mark: TING SHEN
Standard(s) : 47 CFR Part 15, Subpart C 15.231
Date of Receipt: 2022-12-30
Date of Test: 2023-01-05 to 2023-01-12
Date of Issue: 2023-01-18

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Ricky Liu

Ricky Liu
Manager



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Revision Record			
Version	Report No.	Date	Remark
01	GZCR221200168501	2023-01-18	Original

Authorized for issue by:			
		Kevin Zhang	
		Kevin Zhang/Project Engineer	
		Vico Cui	
		Vico Cui/Reviewer	



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.231	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Dwell Time (15.231(a))	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 7.5	47 CFR Part 15, Subpart C 15.231(a)	Pass
Field Strength of the Fundamental Signal (15.231(b))		ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.231(b)	Pass
Radiated Emissions below 1GHz		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15C Section 15.231(b) and 15.209	Pass
Radiated Emissions above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15C Section 15.231(b) and 15.209	Pass
20dB Bandwidth		ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.231(c)	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

♣ Model No.: TS-TXXXX

The first and second "XX" represents 01~10 digit, means function type.

The third "X" represents A~Z letter, means function type.

The fourth "X" represents A~Z letter, means function type. Optional function: D: Dimmer, T: Timer, X: Dimmer &Timer, N: No

e.g., TS-T09AN, TS-T06AD

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference on the panel and key positions.

Therefore, only one model **TS-T09AN** was tested in this report.



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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3V (CR2025 lithium battery)
Cable(s):	N/A
Test Voltage:	DC 3 V
Operation Frequency	433.92 MHz
Channel Numbers:	1
Modulation Type:	ASK
Antenna Type:	PCB Antenna

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
Dwell Time (15.231(a))	±0.37%
Field Strength of the Fundamental Signal (15.231(b))	±5.00dB (30MHz-1GHz; 3m); ±4.38dB (30MHz-1GHz; 10m)
Radiated Emissions below 1GHz	±5.00dB (30MHz-1GHz; 3m); ±4.38dB (30MHz-1GHz; 10m)
Radiated Emissions above 1GHz	±5.12 dB (1GHz-6 GHz); ±5.38 dB (6GHz-18GHz); ±5.61(18GHz-40GHz)
20dB Bandwidth	±3%

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

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No tests were sub-contracted.



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4.5 Test Facility

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

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Dwell Time (15.231(a))					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
MXA Signal Analyzer (10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2022-03-03	2023-03-02

Field Strength of the Fundamental Signal (15.231(b))					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15
Chamber cable	HangTianXing	N/A	EMC0542	2022-08-24	2023-08-23
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2022-06-21	2023-06-20
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2022-05-20	2023-05-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	EMC2174	2022-06-19	2025-06-18

Radiated Emissions below 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15
Chamber cable	HangTianXing	N/A	EMC0542	2022-08-24	2023-08-23
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2022-06-21	2023-06-20
EMI Test Receiver (1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2022-05-20	2023-05-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Trilog Broadband Antenna (25MHz-1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	EMC2174	2022-06-19	2025-06-18

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EMC-TRF-01 Rev 1.1

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Radiated Emissions above 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23
Horn Antenna (1GHz-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-21	2025-09-20
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

20dB Bandwidth					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-02	2023-11-01
MXA Signal Analyzer (10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2022-03-03	2023-03-02

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2022-06-24	2023-06-23



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6 Radio Spectrum Technical Requirement

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

7 Radio Spectrum Matter Test Results

7.1 Dwell Time (15.231(a))

Test Requirement 47 CFR Part 15, Subpart C 15.231(a)

Test Method: ANSI C63.10 (2013) Section 7.5

Limit:

Device type	Limit
Manually operated transmitter	The switch automatically deactivate the transmitter within not more than 5 seconds of being released
Automatically activated transmitter	Cease transmission within 5 seconds after activation
Periodic transmissions to determine system integrity of transmitters used in security or safety applications	The total transmission time does not exceed 2 seconds per hour

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.2 °C

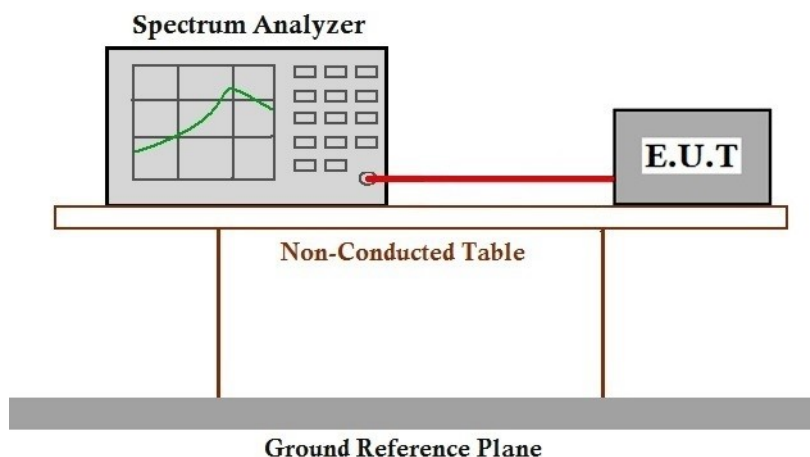
Humidity: 55.9 % RH

Atmospheric Pressure: 1010 mbar

7.1.2 Test Mode Description

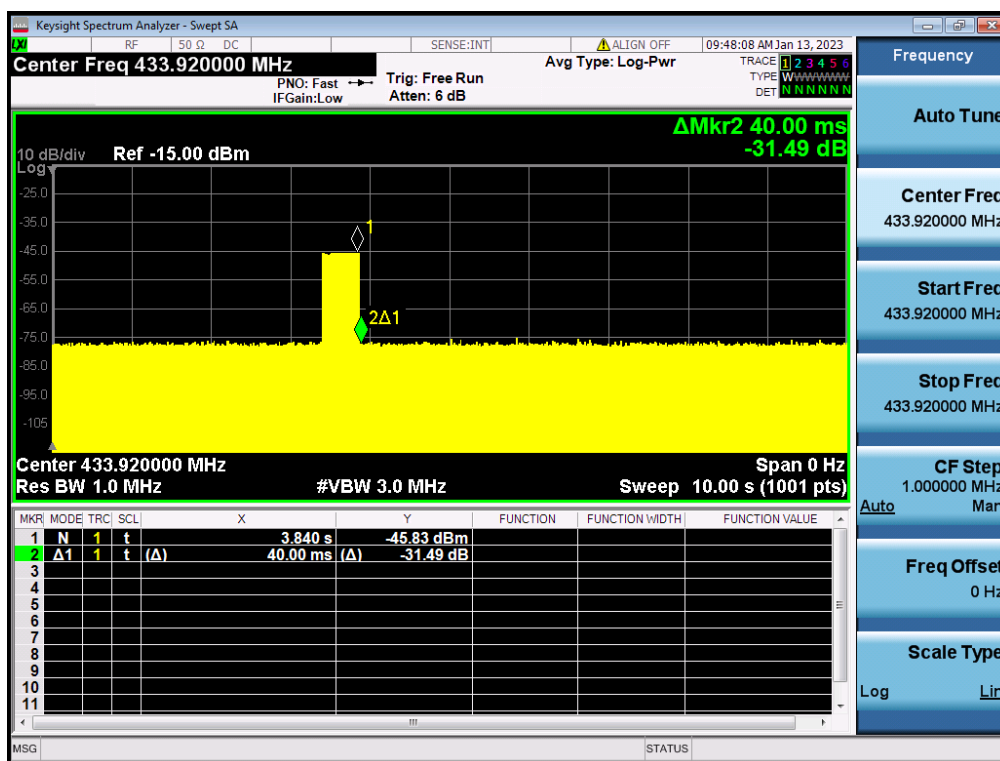
Pre-scan / Final test	Mode Code	Description
Final test	00	Tx mode

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Carrier Frequency	Shutdown Time	Limit
433.92MHz	40.00ms	≤5s



7.2 Field Strength of the Fundamental Signal (15.231(b))

Test Requirement 47 CFR Part 15, Subpart C 15.231(b)

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

Test Distance: 3 m

Limit:

Fundamental Frequency MHz	Field Strength of Fundamental ($\mu\text{V/m}$ @ 3 m)	Field Strength of Harmonics and Spurious Emissions ($\mu\text{V/m}$ @ 3 m)
40.66 to 40.70	2,250	225
70 to 130	1,250	125
130 to 174	**1,250 to 3,750	**125 to 375
174 to 260	3,750	375
260 to 470	**3,750 to 12,500	**375 to 1,250
Above 470	12,500	1,250
Detector:	Peak for pre-scan Peak for 30MHz to 1000 MHz: 100 kHz resolution bandwidth Peak for Above 1 GHz: 1 MHz resolution bandwidth	

** linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $56.81818(F) - 6136.3636$;

for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $41.6667(F) - 7083.3333$.]

Remark:

1. The fundamental frequency of the EUT is 433.92 MHz, so the limit for average or QP field strength dB $\mu\text{V/m}$ for the fundamental emission = 80.83 dB $\mu\text{V/m}$, and for peak field strength dB $\mu\text{V/m}$ for the fundamental emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

2. No fundamental is allowed in the restricted bands.

3. The fundamental correction factor is computed by analyzing the on time 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train. The average value of fundamental = Peak value + 20log (duty cycle), the duty cycle = $T_{\text{on_cum}} / 100\text{ms}$,

$$T_{\text{on_cum}} = 0.24\text{ms} \times 31 + 0.66\text{ms} \times 50 = 40.4\text{ms}$$

$$\text{duty cycle} = 40.4\text{ms} / 100\text{ms} = 0.404$$

$$\text{average value} = \text{peak value} - 7.87$$

4. Please refer to below test plots for more details for duty cycle test.



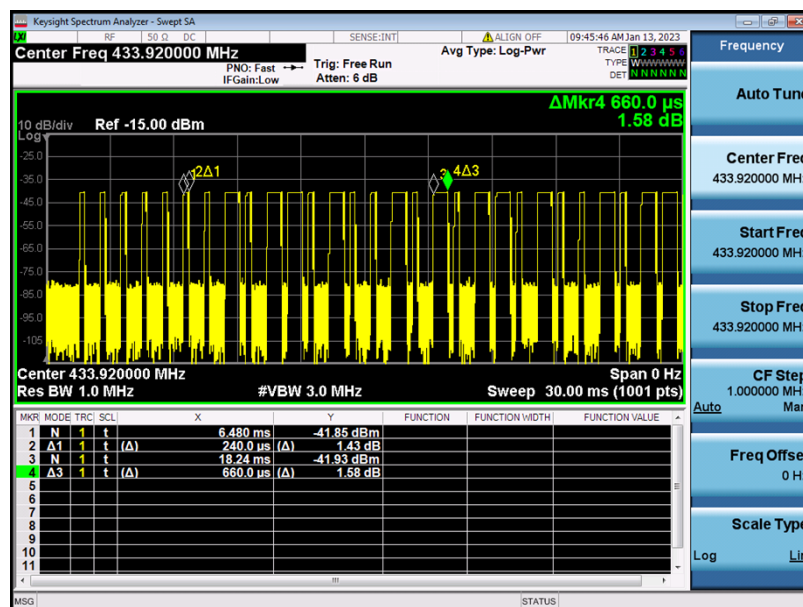
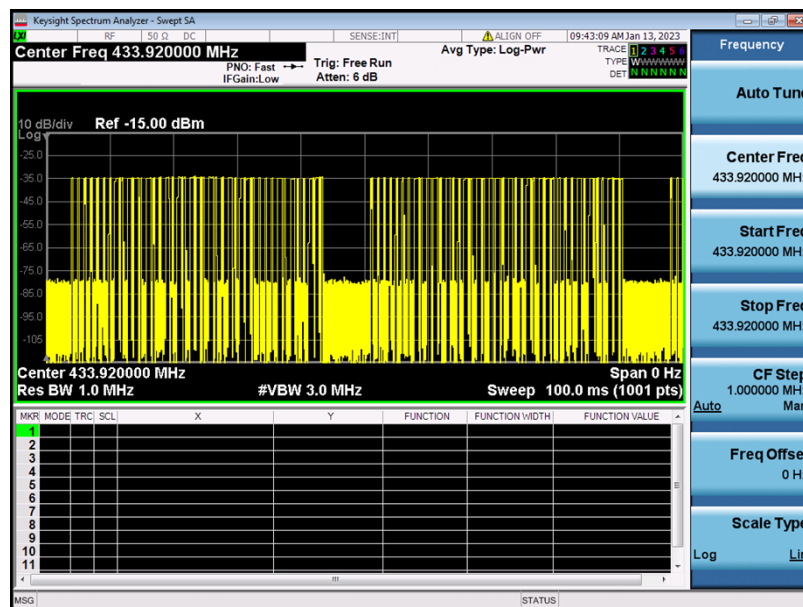
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5. Test plots:



7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.4 °C

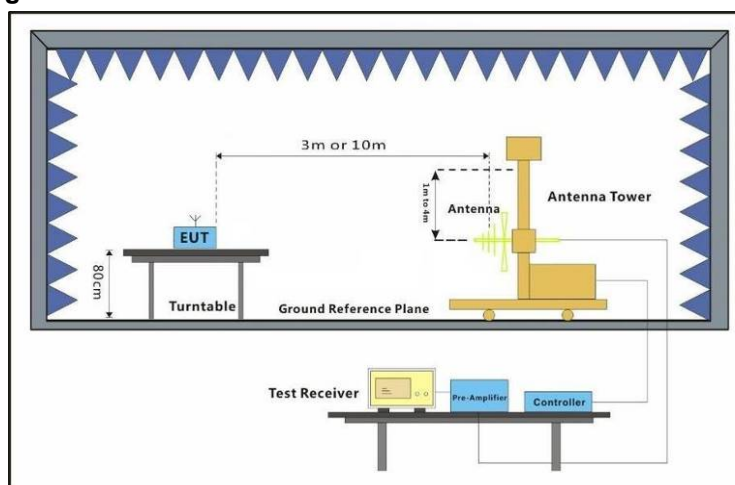
Humidity: 59.0 % RH

Atmospheric Pressure: 1013 mbar

7.2.2 Test Mode Description

Pre-scan /	Mode	Description
Final test	Code	
Final test	00	Tx mode

7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

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

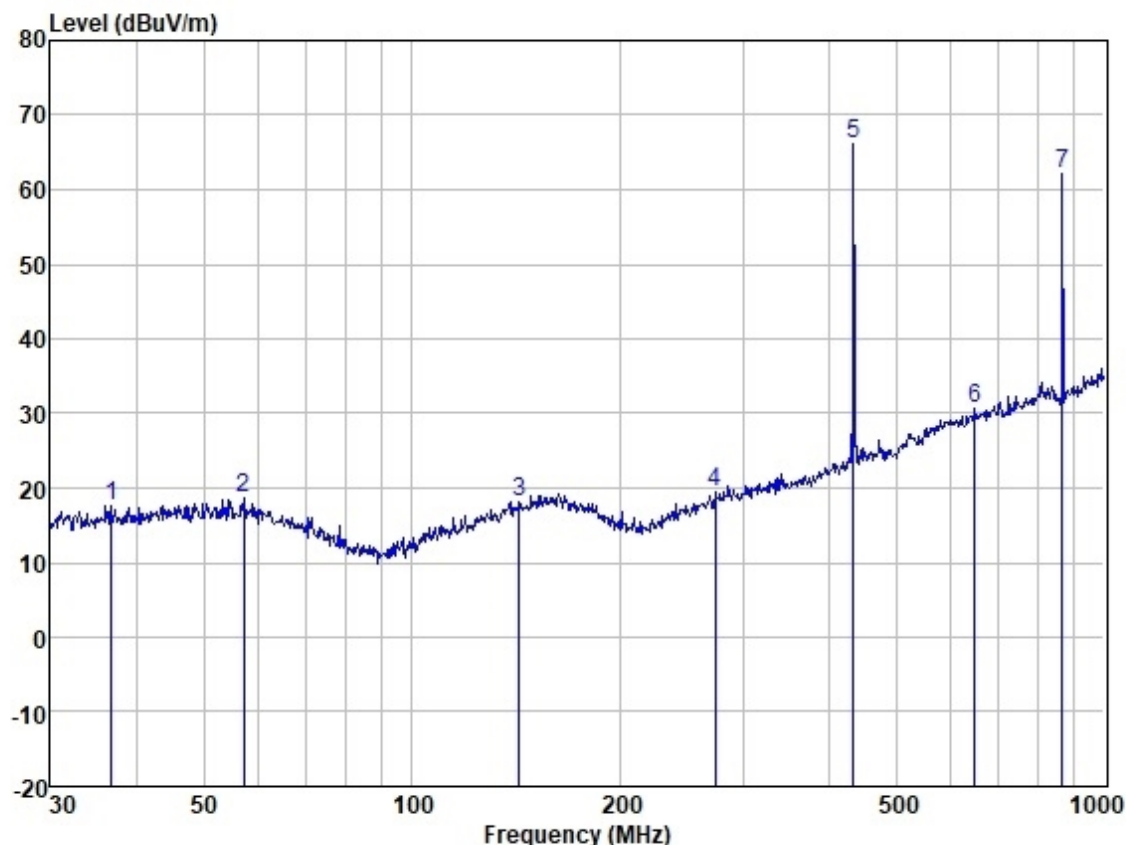
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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Test Mode: 00; Polarity: Horizontal



Site : SGS
Job :
Model :
Power :
Test Mode :

Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
5 434.065	73.63	16.60	4.07	28.18	66.12			HORIZONTAL	

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
434.065	66.12	None	100.83	-34.71	PK
434.065	58.25	-7.87	80.83	-22.58	AV

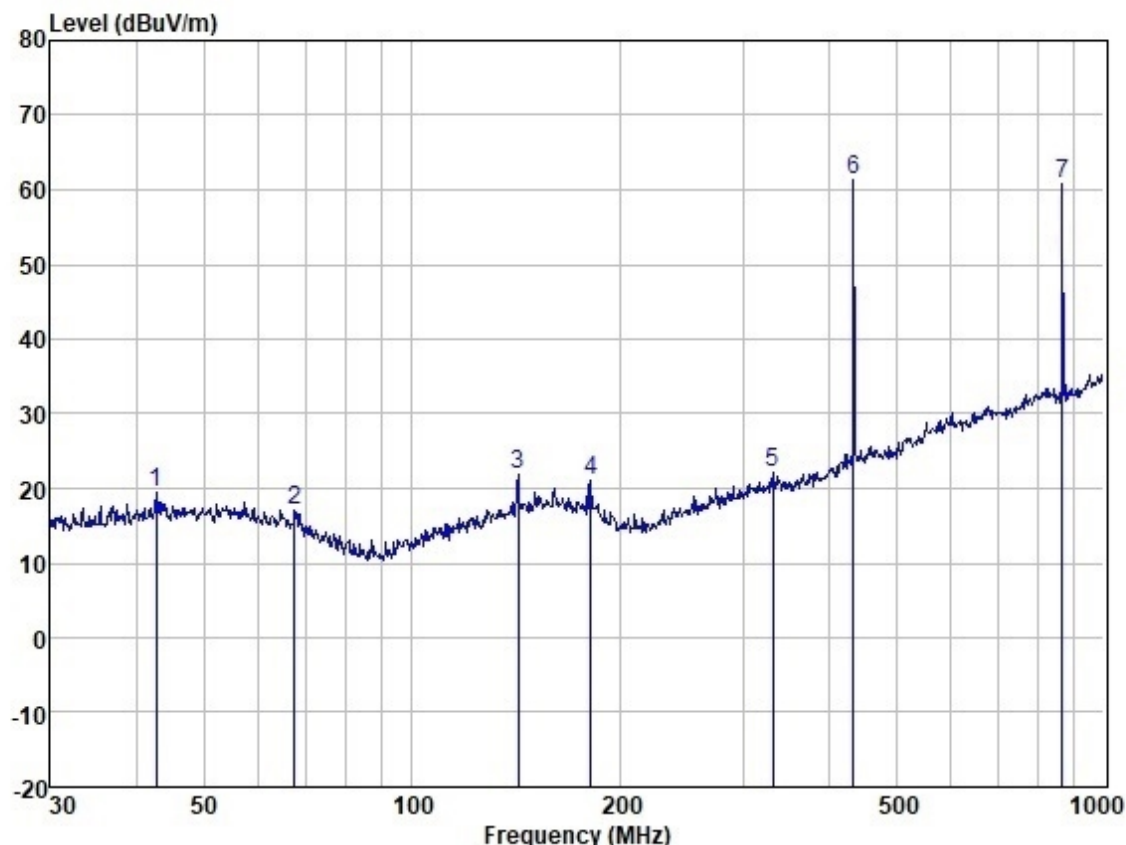
Remark: AV level=PK level+Factor (dB)

Factor (dB)=20*log(Duty cycle)

Duty cycle= 0.404



Test Mode: 00; Polarity: Vertical



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
6	434.065	68.94	16.60	4.07	28.18	61.43			VERTICAL	

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
434.065	61.43	None	100.83	-39.40	PK
434.065	53.56	-7.87	80.83	-27.27	AV

Remark: AV level=PK level+Factor (dB)

Factor (dB)=20*log(Duty cycle)

Duty cycle= 0.404



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7.3 Radiated Emissions below 1GHz

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

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

Test Distance: 3 m

Limit:

General requirements in Section 15.209

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
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.

Requirements in Section 15.231(b)

Fundamental Frequency (MHz)	Field Strength of Fundamental (μV/m @ 3 m)	Field Strength of Harmonics and Spurious Emissions (μV/m @ 3 m)
40.66 to 40.70	2,250	225
70 to 130	1,250	125
130 to 174	**1,250 to 3,750	**125 to 375
174 to 260	3,750	375
260 to 470	**3,750 to 12,500	**375 to 1,250
Above 470	12,500	1,250
Detector:	Peak for pre-scan Peak for 30MHz to 1000 MHz: 100 kHz resolution bandwidth Peak for Above 1 GHz: 1 MHz resolution bandwidth	

** linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:

for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F) - 6136.3636;

for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F) - 7083.3333.

The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Remark:

1. The fundamental frequency of the EUT is 433.92 MHz.
2. The limit for average field strength dBuV/m for the spurious emission=60.83 dBuV/m. Spurious in the restricted bands must be less than 60.83 dBuV/m or 15.209, whichever limit permits a higher field strength, and for peak field strength dBuV/m for the spurious emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.
3. The spurious emissions correction factor is computed by analyzing the on time 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train. The average value of spurious emissions = Peak value +20log (duty cycle), please refer to section 7.2 for details for duty cycle test.

7.3.1 E.U.T. Operation

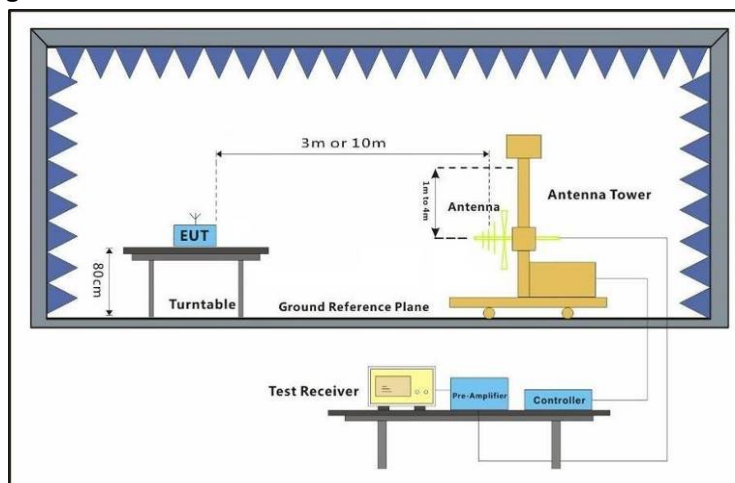
Operating Environment:

Temperature: 24.5 °C Humidity: 59.5 % RH Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Tx mode

7.3.3 Test Setup Diagram



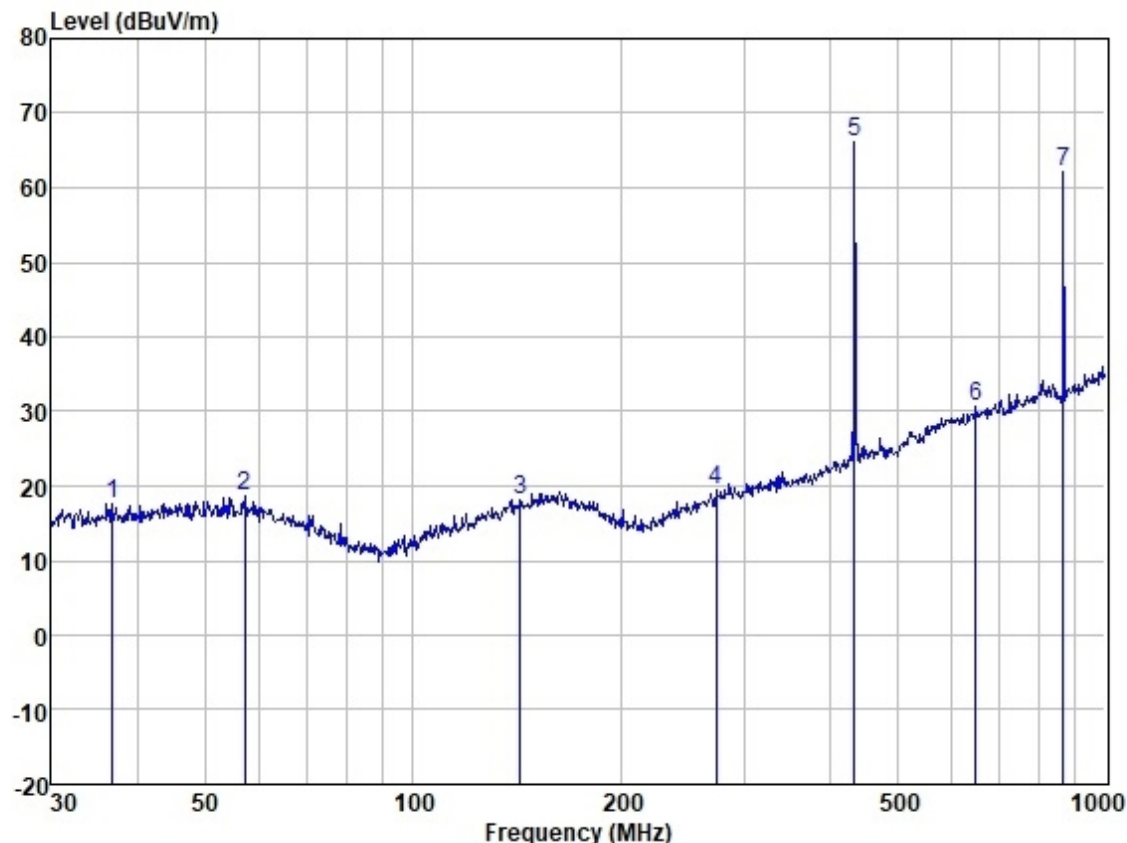
7.3.4 Measurement Procedure and Data

- 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. 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 peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- 2) Scan from 9kHz to 1GHz, 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.

Test Mode: 00; Polarity: Horizontal



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	36.766	30.87	13.20	1.07	27.62	17.52			HORIZONTAL	
2	56.991	31.44	13.64	1.20	27.60	18.68			HORIZONTAL	
3	142.824	30.30	13.16	2.11	27.43	18.14			HORIZONTAL	
4	274.194	30.71	12.77	3.12	27.21	19.39			HORIZONTAL	
6	649.660	33.66	20.42	5.28	28.75	30.61			HORIZONTAL	
7	869.130	61.90	22.26	6.31	28.30	62.17			HORIZONTAL	



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Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
36.77	17.52	None	80.83	-63.31	PK
36.77	9.65	-7.87	60.83	-51.18	AV
56.99	18.68	None	80.83	-62.15	PK
56.99	10.81	-7.87	60.83	-50.02	AV
142.82	18.14	None	80.83	-62.69	PK
142.82	10.27	-7.87	60.83	-50.56	AV
274.19	19.39	None	66.02	-46.63	PK
274.19	11.52	-7.87	46.02	-34.50	AV
649.66	30.61	None	80.83	-50.22	PK
649.66	22.74	-7.87	60.83	-38.09	AV
869.13	62.17	None	80.83	-18.66	PK
869.13	54.30	-7.87	60.83	-6.53	AV

Remark: AV level=PK level+Factor (dB)

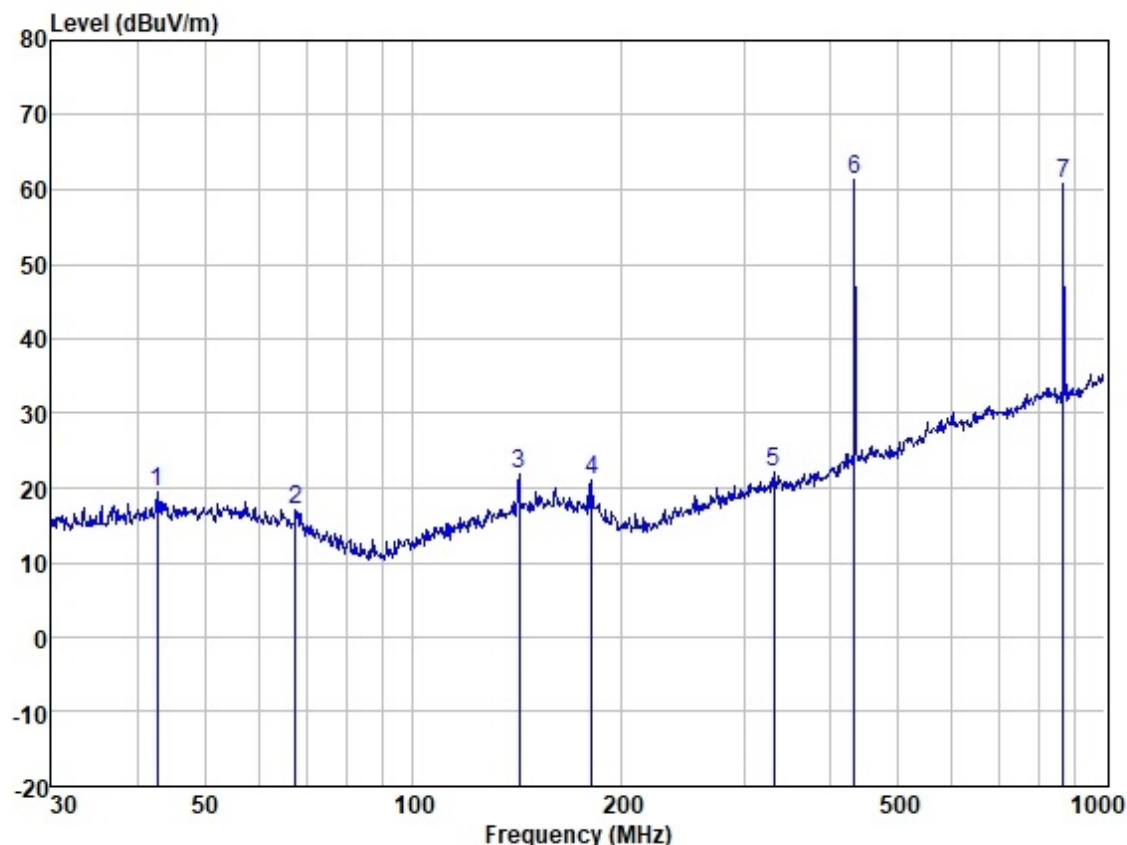
Factor (dB)=20*log(Duty cycle)

Duty cycle= 0.404

Remark:

Point 5 is the fundamental frequency of the EUT, please refer to section 7.2.4 for details

Test Mode: 00; Polarity: Vertical



Site : SGS
Job :
Model :
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	42.600	32.23	13.75	1.10	27.61	19.47			VERTICAL	
2	67.675	31.15	12.06	1.38	27.60	16.99			VERTICAL	
3	142.324	34.01	13.16	2.11	27.44	21.84			VERTICAL	
4	181.283	33.76	12.28	2.45	27.32	21.17			VERTICAL	
5	331.355	31.79	14.26	3.44	27.41	22.08			VERTICAL	
7	869.130	60.56	22.26	6.31	28.30	60.83			VERTICAL	



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Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
42.60	19.47	None	80.83	-61.36	PK
42.60	11.60	-7.87	60.83	-49.23	AV
67.68	16.99	None	80.83	-63.84	PK
67.68	9.12	-7.87	60.83	-51.71	AV
142.32	21.84	None	80.83	-58.99	PK
142.32	13.97	-7.87	60.83	-46.86	AV
181.28	21.17	None	80.83	-59.66	PK
181.28	13.30	-7.87	60.83	-47.53	AV
331.36	22.08	None	66.02	-43.94	PK
331.36	14.21	-7.87	46.02	-31.81	AV
869.13	60.83	None	80.83	-20.00	PK
869.13	52.96	-7.87	60.83	-7.87	AV

Remark: AV level=PK level+Factor (dB)

Factor (dB)=20*log(Duty cycle)

Duty cycle= 0.404

Remark:

Point 6 is the fundamental frequency of the EUT, please refer to section 7.2.4 for details



7.4 Radiated Emissions above 1GHz

Test Requirement 47 CFR Part 15C Section 15.231(b) and 15.209

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

Test Distance: 3 m

Limit:

General requirements in Section 15.209

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.		

Requirements in Section 15.231(b)

Fundamental Frequency (MHz)	Field Strength of Fundamental ($\mu\text{V/m}$ @ 3 m)	Field Strength of Harmonics and Spurious Emissions ($\mu\text{V/m}$ @ 3 m)
Above 470	12,500	1,250
Detector:	Peak for pre-scan Peak for Above 1 GHz: 1 MHz resolution bandwidth	

7.4.1 E.U.T. Operation

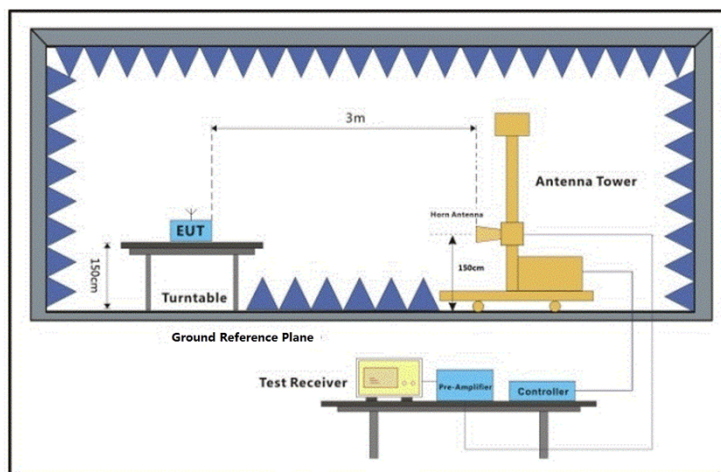
Operating Environment:

Temperature: 25.1 °C Humidity: 53.7 % RH Atmospheric Pressure: 1015 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	Tx mode

7.4.3 Test Setup Diagram



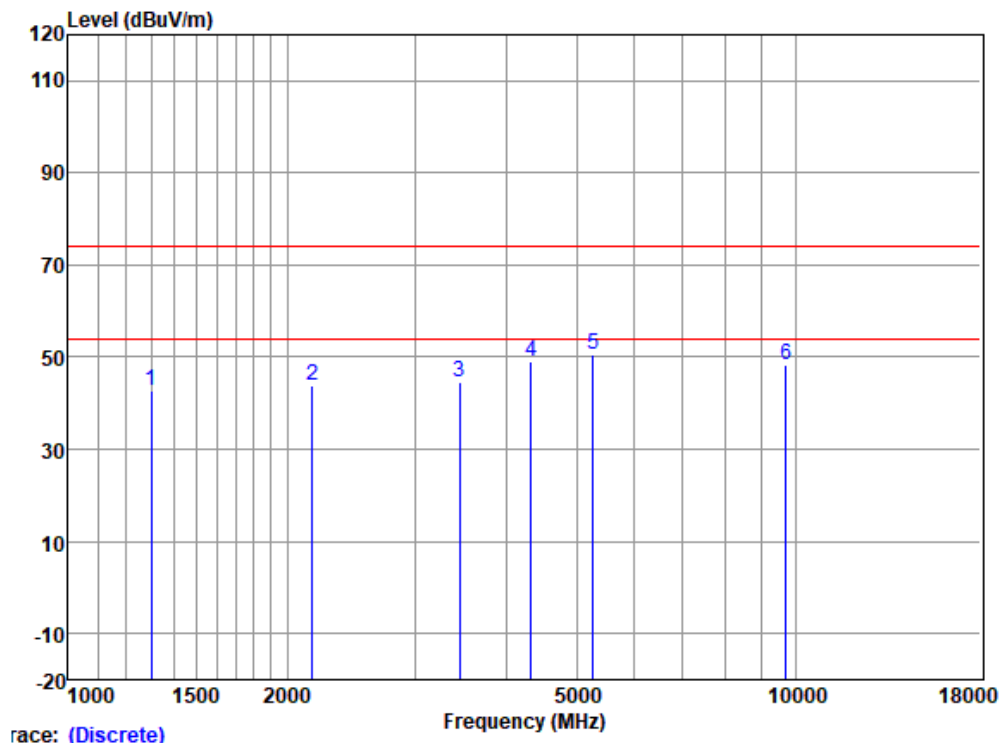
7.4.4 Measurement Procedure and Data

- 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 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 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.
- The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark:

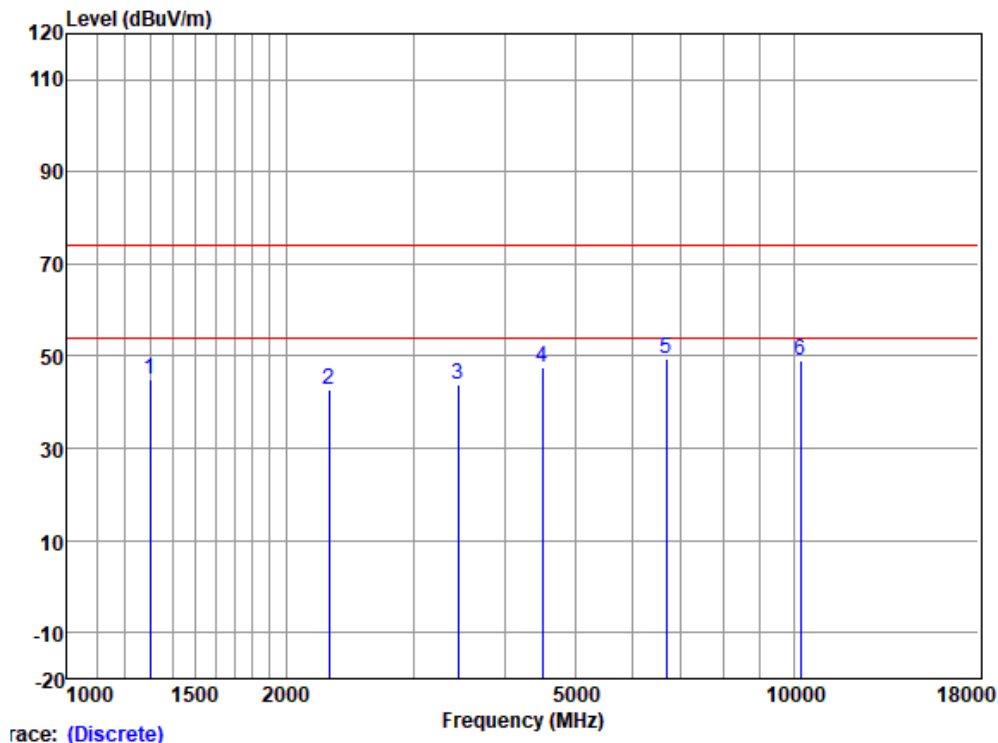
- The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows: Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor
- For frequencies above 1GHz, the field strength limits are 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.

Test Mode: 00; Polarity: Horizontal



	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1301.103	53.94	23.97	2.68	38.04	42.55	74.00	-31.45	HORIZONTAL Peak
2	2163.504	47.89	26.77	6.34	37.18	43.82	74.00	-30.18	HORIZONTAL Peak
3	3455.508	47.97	29.01	4.27	36.79	44.46	74.00	-29.54	HORIZONTAL Peak
4	4329.354	47.08	33.25	5.31	36.64	49.00	74.00	-25.00	HORIZONTAL Peak
5	5269.649	48.18	33.30	5.42	36.26	50.64	74.00	-23.36	HORIZONTAL Peak
6	9697.151	38.75	38.75	7.68	36.84	48.34	74.00	-25.66	HORIZONTAL Peak

Test Mode: 00; Polarity: Vertical



	ReadAntenna	Cable	Preamp		Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1301.103	56.35	23.97	2.68	38.04	44.96	74.00	-29.04	VERTICAL Peak
2	2292.257	47.15	27.43	5.40	37.16	42.82	74.00	-31.18	VERTICAL Peak
3	3455.508	47.44	29.01	4.27	36.79	43.93	74.00	-30.07	VERTICAL Peak
4	4508.136	44.65	34.17	5.32	36.60	47.54	74.00	-26.46	VERTICAL Peak
5	6679.040	45.42	34.28	6.27	36.39	49.58	74.00	-24.42	VERTICAL Peak
6	10215.020	40.10	39.32	6.44	36.78	49.08	74.00	-24.92	VERTICAL Peak

7.5 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.231(c)

Test Method: ANSI C63.10 (2013) Section 6.9

Limit:

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

7.5.1 E.U.T. Operation

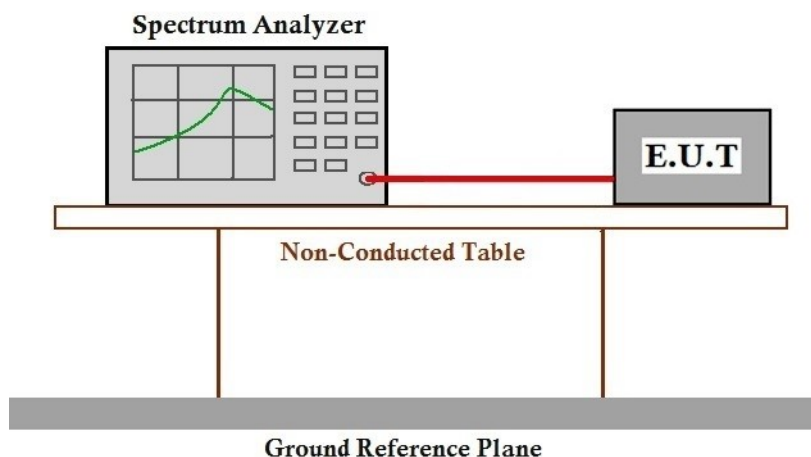
Operating Environment:

Temperature: 25.2 °C Humidity: 55.9 % RH Atmospheric Pressure: 1010 mbar

7.5.2 Test Mode Description

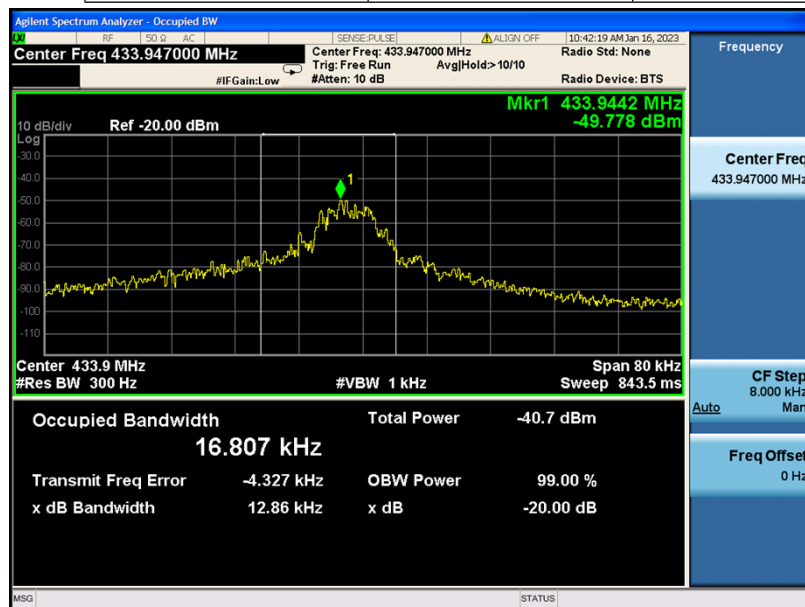
Pre-scan / Mode	Description
Final test Code	
Final test 00	Tx mode

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

Test Channel (MHz)	Bandwidth (MHz)	Max Limit (MHz)	Verdict
433.92	0.01286	1.08	Pass



8 Test Setup Photo

Refer to Appendix - Test Setup Photos for GZCR221200168501



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9 EUT Constructional Details (EUT Photos)

Refer to Appendix - External and Internal Photos for GZCR2212001685LM

- End of the Report -