

Report No.: GZCR221200159901

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FCC ID: PIY-HLM49-23-A5T

TEST REPORT

Application No.: GZCR2212001599AT

Applicant: Mattel Asia Pacific Sourcing Ltd.

Address of Applicant: 11/F., South Tower, World Finance Centre, Harbour City, Tsimshatsui,

Kowloon 852 Hong Kong

Manufacturer: Mattel Asia Pacific Sourcing Ltd.

Address of Manufacturer: 11/F., South Tower, World Finance Centre, Harbour City, Tsimshatsui,

Kowloon 852 Hong Kong

Factory: Mattel Asia Pacific Sourcing Ltd.

Address of Factory: 11/F., South Tower, World Finance Centre, Harbour City, Tsimshatsui,

Kowloon 852 Hong Kong

Equipment Under Test (EUT):

EUT Name: Fisher-Price® Linkimals™ Learning Narwhal™

Model No.: HLM49, HVX60 ♣

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

actually tested and which were electrically identical.

Trade Mark: Fisher Price

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

Date of Receipt: 2022-12-06

Date of Test: 2022-12-07 to 2022-12-27

Date of Issue: 2022-12-27

Test Result: Pass*

Solay Liu Ricky Liu



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



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	Revision Record						
Version	Report No.	Date	Remark				
01		2022-12-27	Original				

Authorized for issue by		
	Cof Vlu	
	Curry Wu/Project Engineer	
	Ridge Liu	
	Ricky Liu/Reviewer	



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2 Test Summary

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

Radio Spectrum Matter Part						
Item	Standard	Method	Requirement	Result		
20dB Bandwidth		ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass		
Field Strength of the Fundamental Signal (15.249(a))		ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass		
Restricted Band Around Fundamental Frequency	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209	Pass		
Radiated Emissions (below 1GHz)		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass		
Radiated Emissions (above 1GHz)		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass		

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.

Declaration of EUT Family Grouping:

Model No.: HLM49, HVX60

Only the model HLM49 was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference on model name and IC language.



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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)

Operation Frequency: 2409MHz to 2471MHz

Modulation Type: GFSK Number of Channels: 3

Sample Type: Portable production

Antenna Type: Integral Antenna Gain: 3.42dBi

Channel List:

Channel	Frequency
	(MHz)
1	2409
2	2428
3	2471

4.2 Description of Support Units

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



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4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty		
20dB Bandwidth	± 3%		
Field Strength of the Fundamental Signal (15.249(a))	5.08dB (1GHz-6GHz); 5.14dB (above 6GHz)		
Restricted Band Around Fundamental Frequency	5.06dB (30MHz-1GHz;3m) 5.08dB (1GHz-6GHz); 5.14dB (above 6GHz)		
Radiated Emissions (below 1GHz)	5.06dB (30MHz-1GHz;3m)		
Radiated Emissions (above 1GHz)	5.08dB (1GHz-6GHz); 5.14dB (above 6GHz)		

Remark:

The Ulab (lab Uncertainty) is less than Ucispr (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance



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4.4 Test Location

All tests were performed at:

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

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Test Facility

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

• NVLAP (Lab Code: 200611-0)

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

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.



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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions



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Equipment List 5

20dB Bandwidth						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
EXA Signal Analzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2022-09-08	2023-09-07	
6dB Attenuator	HP	8491A	EMC2062	2022-03-29	2023-03-28	
MI CABLE	SGS-EMC	0.8M	EMC2136	2021-11-01	2023-11-01	
MI CABLE	SGS-EMC	0.8M	EMC2137	2021-11-01	2023-11-01	
Test Software	TST	V2.0	GZE100-78	N/A	N/A	

Field Strength of the Fundamental Signal (15.249(a))						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
EMI Test				2021-12-17	2022-12-16	
Receiver(20Hz- 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-	SCHWARZBECK	BBHA 9120D	EMC2026	2022-09-21	2025-09-20	
18GHz)	MESS-ELEKTRONIK	BBHA 9120D EIVIG2020	LIVIOZOZO	2022 00 21	2020 00 20	
1GHz-26.5 GHz	Agilopt	8449B	EMC0521	2021-12-17	2022-12-16	
Pre-Amplifier	Agilent	04490	EIVICU321	2022-12-16	2023-12-15	
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19	
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20	
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A	

Restricted Band Around Fundamental Frequency						
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date	
EMI Test				2021-12-17	2022-12-16	
Receiver(20Hz- 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-	SCHWARZBECK	BBHA 9120D	EMC2026	2022-09-21	2025-09-20	
18GHz)	MESS-ELEKTRONIK	BBHA 9120D	LIVICZUZU	2022-09-21	2025-09-20	
1GHz-26.5 GHz	Agilopt	8449B	EMC0521	2021-12-17	2022-12-16	
Pre-Amplifier	Agilent	04490	EMC0521	2022-12-16	2023-12-15	
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16	
2.4GHZ FIILEI	IVIICTO-TTOTIICS	DRIVI 30/02	EIVIC2009	2022-12-16	2023-12-15	
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19	
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20	

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EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07
Test Software E3	Audix	Ver.6.120110a	er.6.120110a GZE100-61		N/A
Horn Antenna(14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2020-06-28	2023-06-27
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2022-08-24	2023-08-23

Radiated Emissions (below 1GHz)										
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date					
Chamber cable	HangTianXing	N/A	EMC0542	2022-08-24	2023-08-23					
Trilog Broadband Antenna(25MHz-1GHz)- Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	EMC2174	2022-06-19	2025-06-18					
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2022-06-21	2023-06-20					
Active Loop Antenna- RED	ETS-Lindgren	6502	EMC2190	2022-04-06	2024-04-05					
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15					
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A					
EMI Test Receiver(1Hz- 8GHz)	Rohde & Schwarz	ESW8	EMC2220	2022-05-20	2023-05-19					

Radiated Emissions (above 1GHz)									
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date				
Chamber cable(Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23				
Horn Antenna(1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	I BRHA 9120D I FM		2022-09-21	2025-09-20				
1GHz-26.5 GHz	Agilont	0440D	EMC0521	2021-12-17	2022-12-16				
Pre-Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15				
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2021-12-17	2022-12-16				
2.4GHZ FIILEI	MICTO-TTOTICS	BNW 30702	EIVIC2009	2022-12-16	2023-12-15				
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19				
MXE EMI Receiver(10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20				
EXA Signal Analyzer(10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07				
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A				



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General used equipment										
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date					
DMM	Fluke	73	EMC0006	2022-06-24	2023-06-23					
DMM	Fluke	73	EMC0007	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

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 3.42dBi.

Antenna location: Refer to Internal photos



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Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

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

Limit: N/A

7.1.1 E.U.T. Operation

Operating Environment:

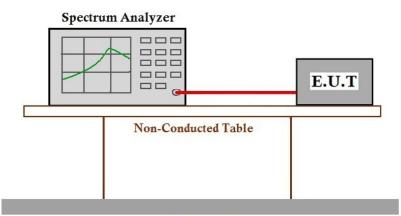
23.2 °C Temperature: Humidity: 46.8 % RH Atmospheric Pressure: 1015 mbar

7.1.2 Test Mode Description

Mode Pre-scan / **Description** Final test Code

Final test 00 TX mode Keep the EUT in transmitting with modulation mode.

7.1.3 Test Setup Diagram



Ground Reference Plane

7.1.4 Measurement Procedure and Data

Test channel	20dB bandwidth (MHz)	Results
Lowest	1.988	Pass
Middle	2.178	Pass
Highest	2.846	Pass



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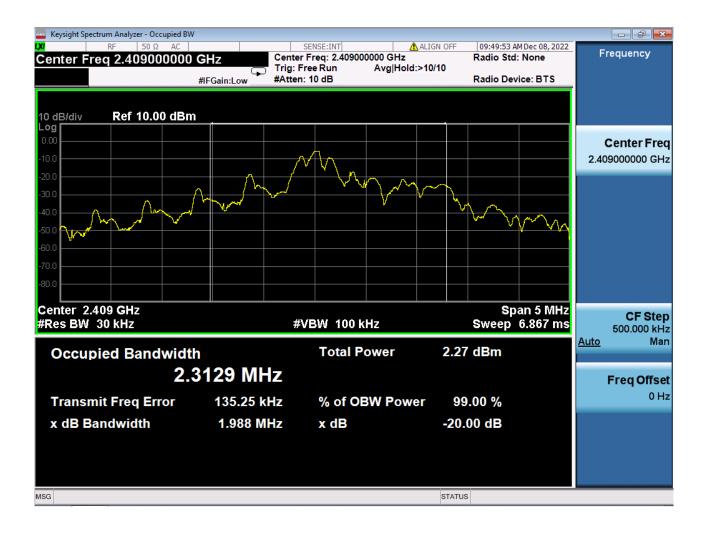
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7.2 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)
Test Method: ANSI C63.10 (2013) Section 6.5&6.6

Measurement Distance: 3m

Limit:

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

Remark: The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

For fundamental frequency in "902-928MHz", the field strength of fundamental is based on Quasi-Peak.

Average value:

	Average value=Peak value + PDCF		
Calculate Formula:	PDCF=20 log(Duty cycle)		
	Duty cycle= T on time / T period		
	Ton time =1.02ms		
Test data:	T period =12.06ms		
resi dala:	Duty cycle=8.46%		
	PDCF value= -21.45dB		



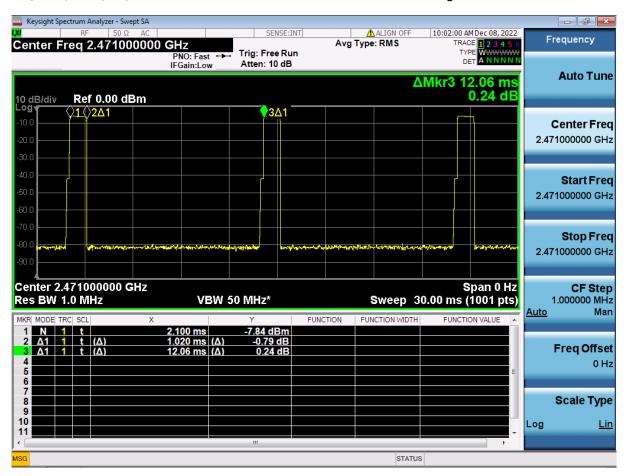
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7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 47.1 % RH Atmospheric Pressure: 1015 mbar

7.2.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode_Keep the EUT in transmitting with modulation mode.



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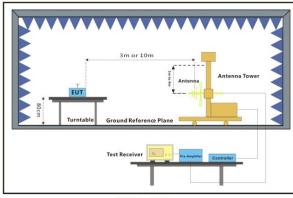
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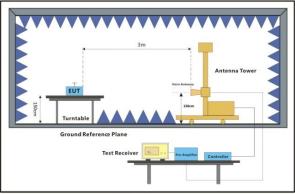


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7.2.3 Test Setup Diagram





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

Remark 2: Antenna: 3 denotes the type of antenna for above 1000MHz.



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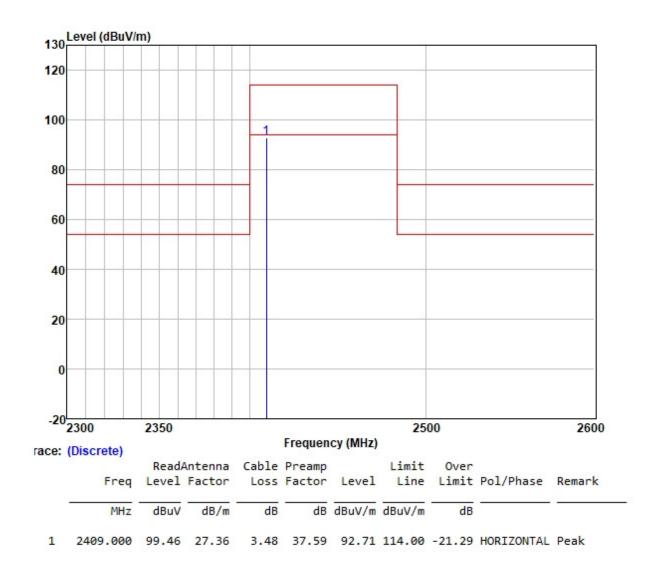
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low





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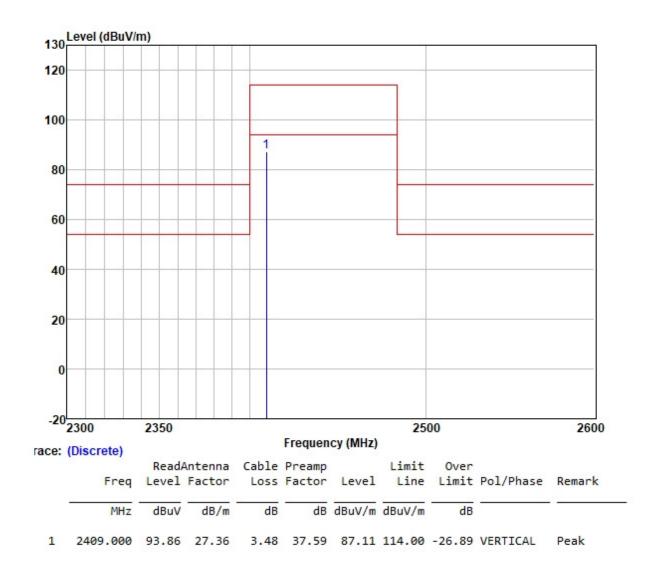
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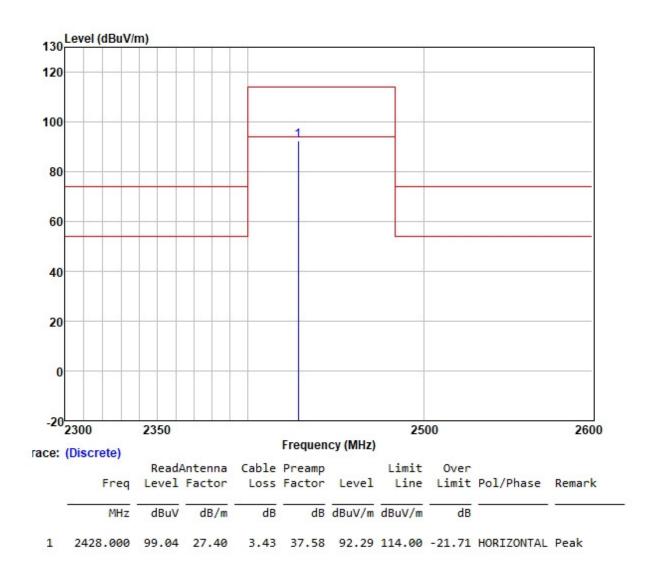
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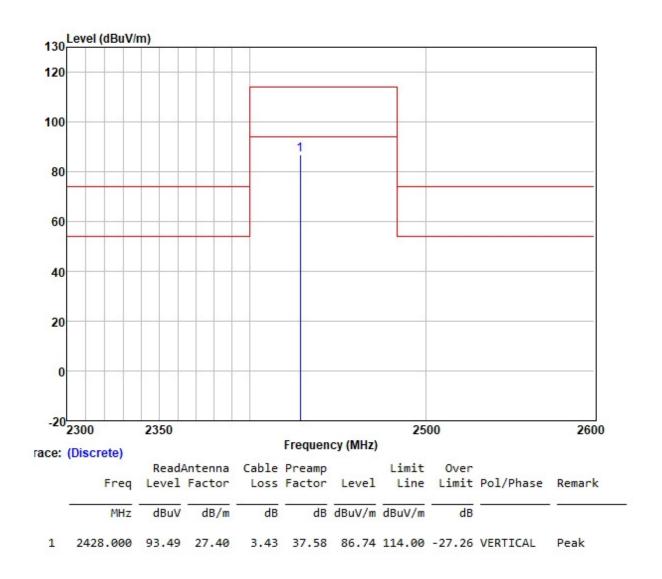
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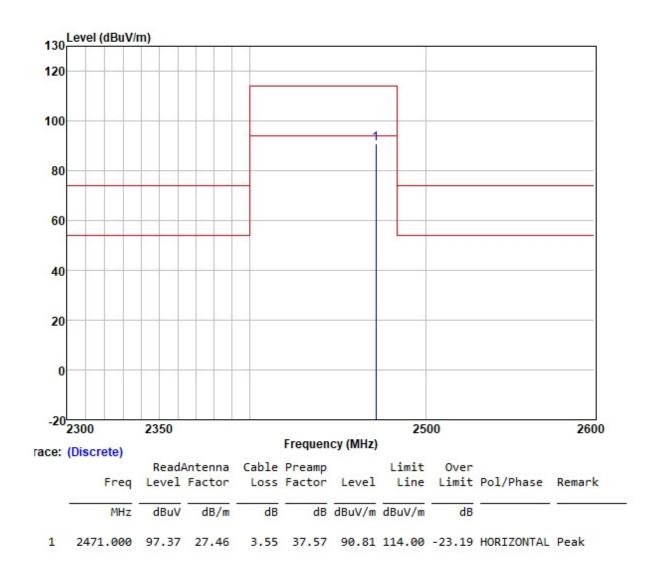
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:High





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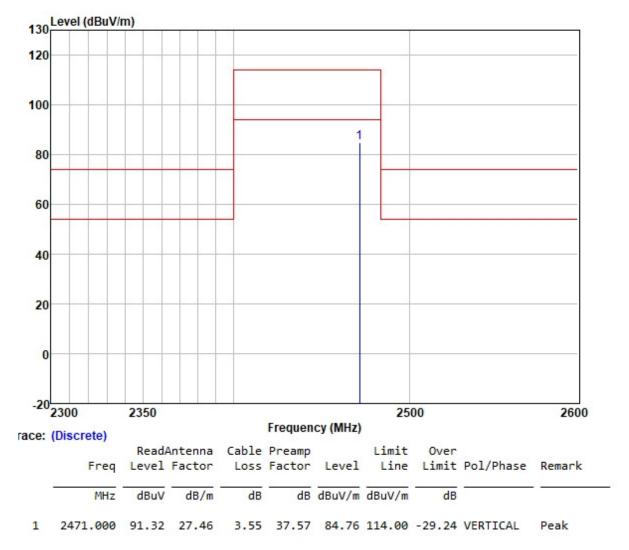
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Remark:

- 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
- 2) The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the above measurement data were shown in the report



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7.3 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
Above 1GHz	74.0	Peak Value

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

7.3.1 E.U.T. Operation

Operating Environment:

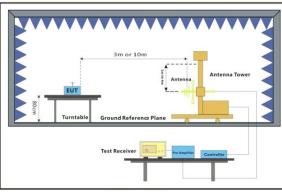
Temperature: 23.5 °C Humidity: 47.1 % RH Atmospheric Pressure: 1015 mbar

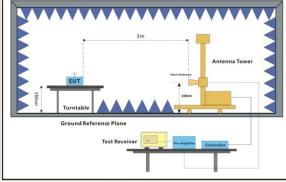
7.3.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode Keep the EUT in transmitting with modulation mode.

7.3.3 Test Setup Diagram





30MHz-1GHz Above 1GHz

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7.3.4 Measurement Procedure and Data

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

Remark 2: Antenna: 3 denotes the type of antenna for above 1000MHz.

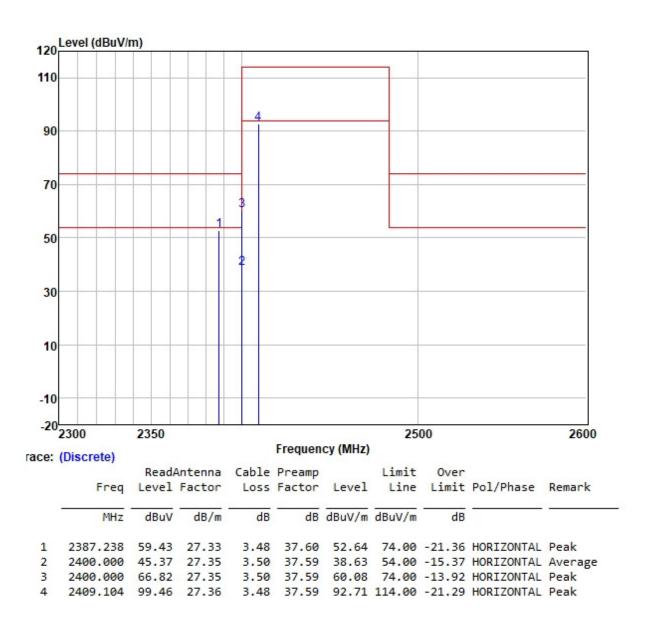




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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low





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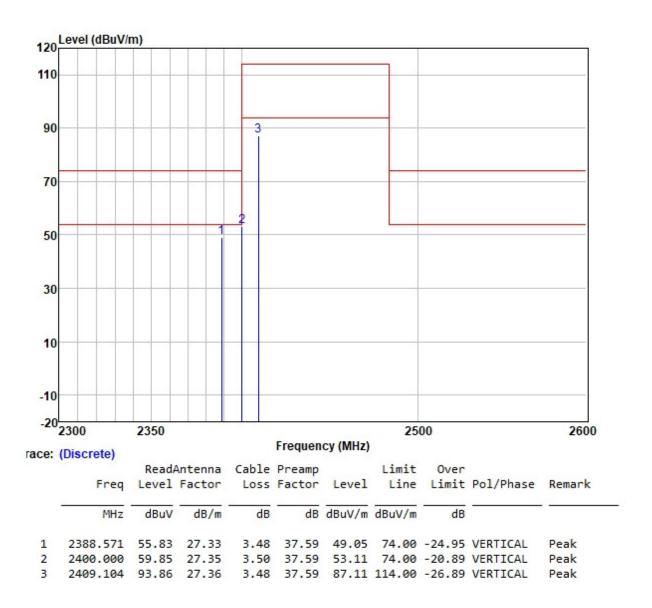
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:Low





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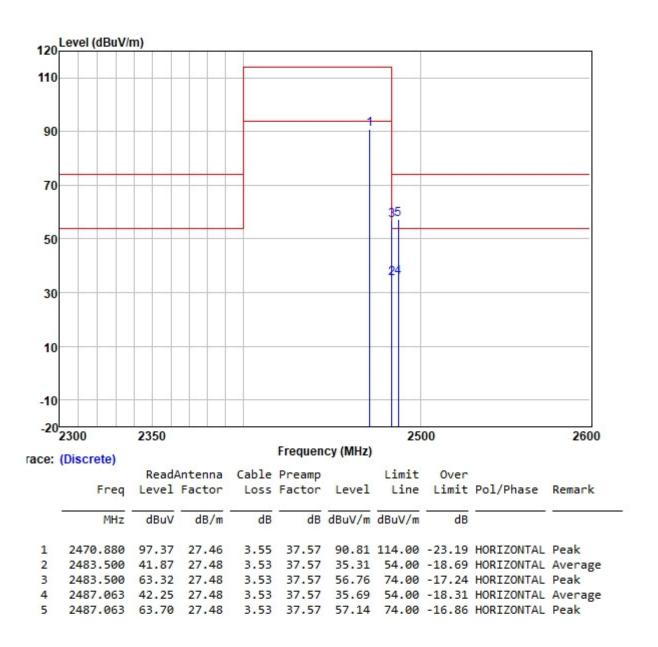
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:High





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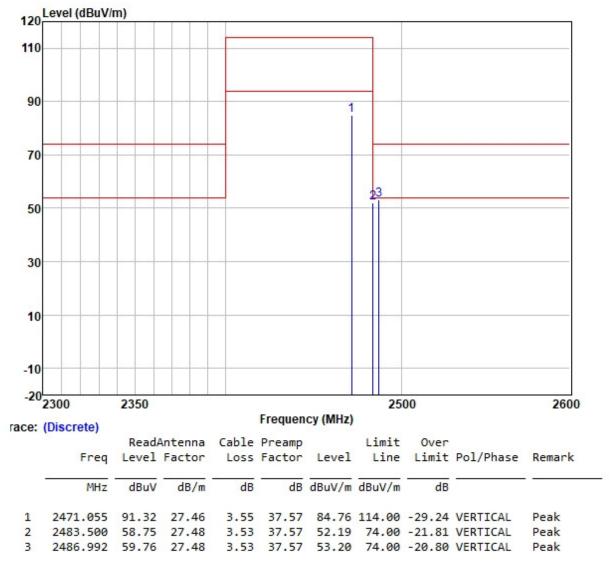
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:High



Remark:

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



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7.4 Radiated Emissions (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)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24.5 °C Humidity: 47.3 % RH Atmospheric Pressure: 1015 mbar

7.4.2 Test Mode Description

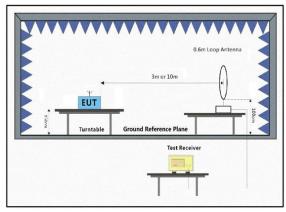
Pre-scan / Mode

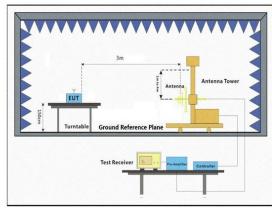
Final test Code

Description

Final test 00 TX mode_Keep the EUT in transmitting with modulation mode.

7.4.3 Test Setup Diagram







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7.4.4 Measurement Procedure and Data

- a. 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. 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) Through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

3) Scan from 9kHz to 1 GHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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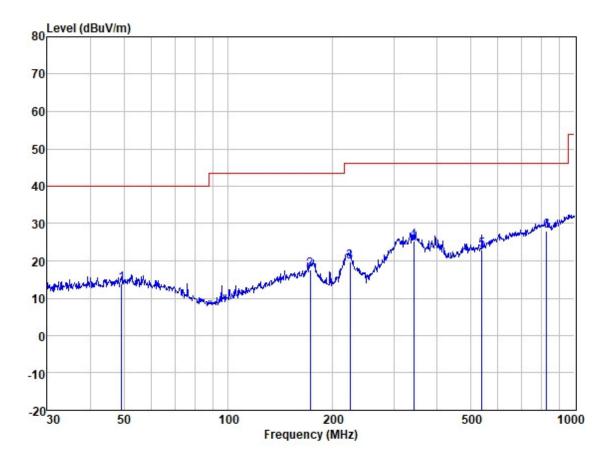
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:Low



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

	Freq					Measured Level			Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	49.187	26.22	13.98	1.13	27.60	13.73	40.00	-26.27	HORIZONTAL	QP
2	172.599	29.52	13.05	2.41	27.33	17.65	43.52	-25.87	HORIZONTAL	QP
3	224.519	34.01	10.32	2.68	27.28	19.73	46.02	-26.29	HORIZONTAL	QP
4	343.180	35.04	14.35	3.55	27.55	25.39	46.02	-20.63	HORIZONTAL	QP
5	539.478	28.89	18.17	4.65	28.67	23.04	46.02	-22.98	HORIZONTAL	QP
6	830.400	27.27	23.19	6.14	28.50	28.10	46.02	-17.92	HORIZONTAL	QP



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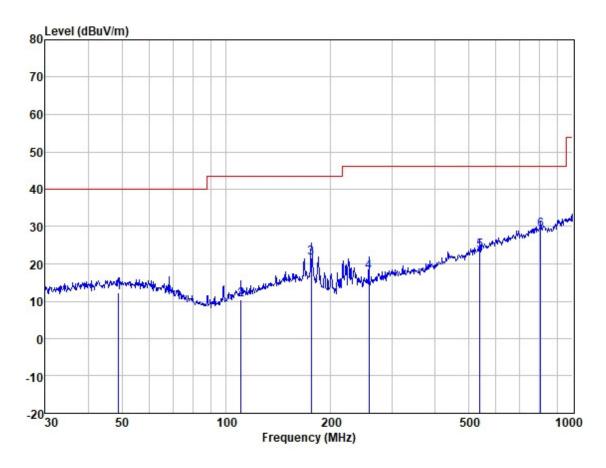
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:Low



Site : SGS Job Model Power Test Mode

	Freq					Measured Level				Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	48.843	24.88	13.97	1.13	27.60	12.38	40.00	-27.62	VERTICAL	QP
2	110.182	25.80	10.45	1.76	27.58	10.43	43.52	-33.09	VERTICAL	QP
3	175.652	33.53	12.91	2.42	27.33	21.53	43.52	-21.99	VERTICAL	QP
4	258.326	29.92	12.04	3.01	27.23	17.74	46.02	-28.28	VERTICAL	QP
5	539.478	29.45	18.17	4.65	28.67	23.60	46.02	-22.42	VERTICAL	QP
6	807.429	28.60	23.10	6.07	28.58	29.19	46.02	-16.83	VERTICAL	QP



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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)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 47.1 % RH Atmospheric Pressure: 1015 mbar

7.5.2 Test Mode Description

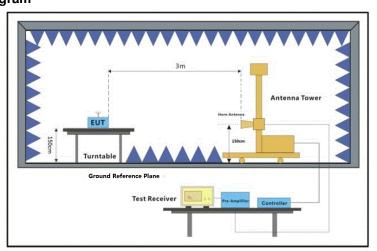
Pre-scan / Mode

Final test Code

Description

Final test 00 TX mode_Keep the EUT in transmitting with modulation mode.

7.5.3 Test Setup Diagram





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7.5.4 Measurement Procedure and Data

- a. 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 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 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. 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) 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 1GHz to 25GHz, 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) 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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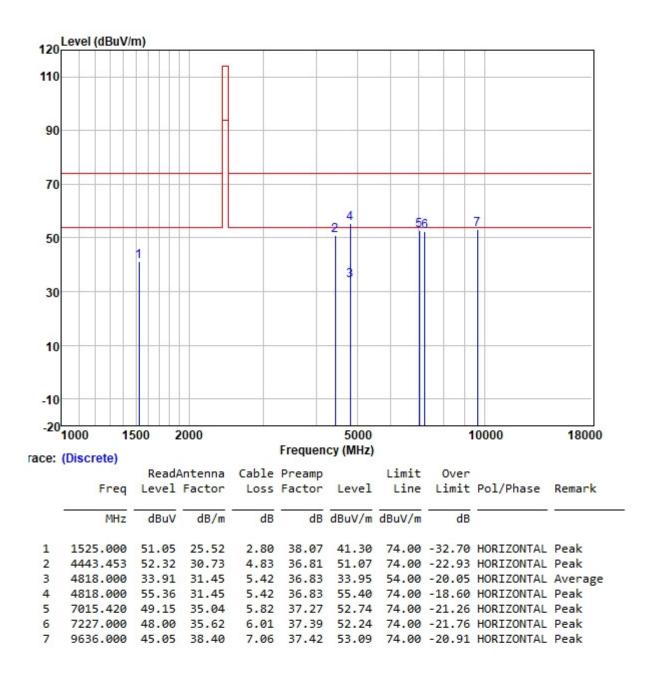
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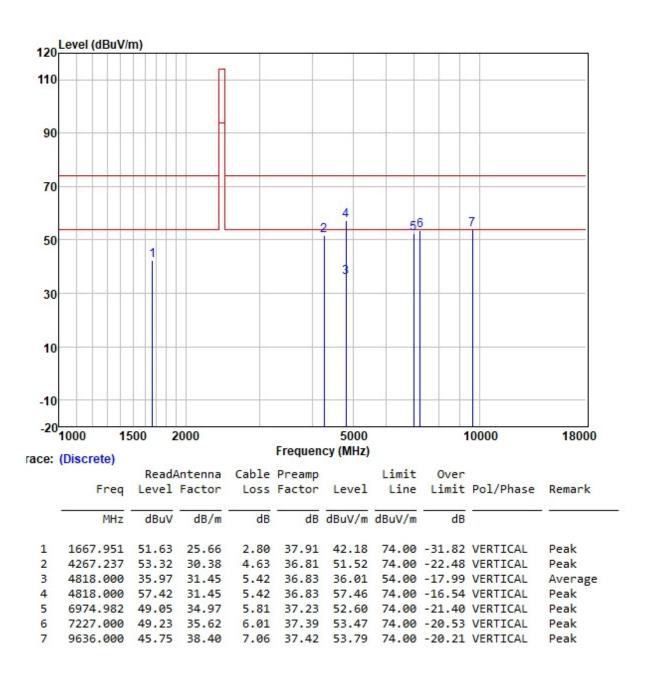
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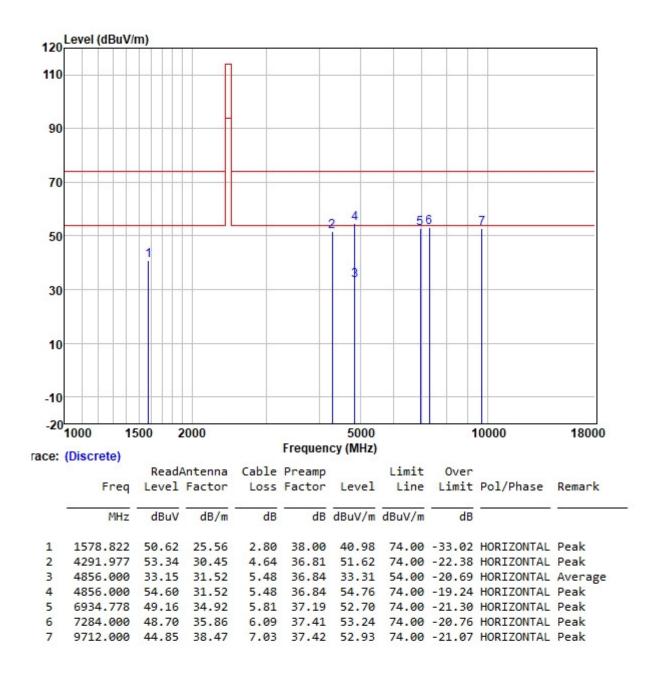
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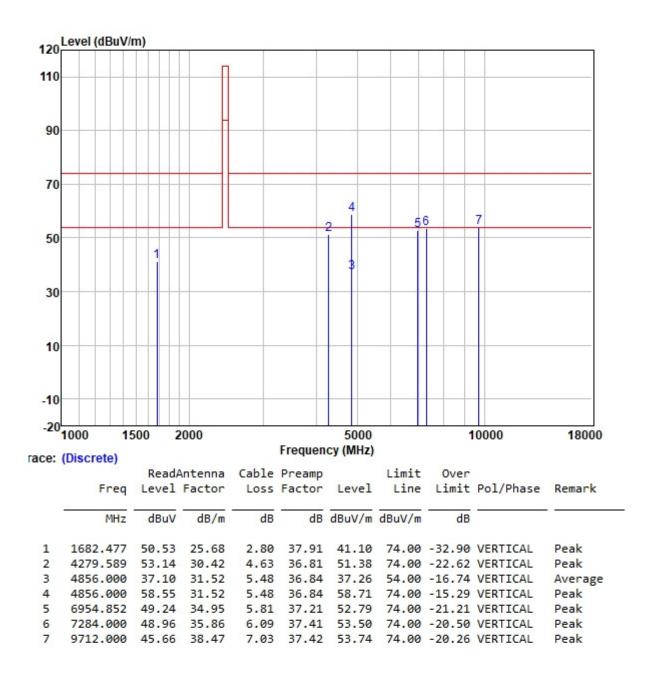
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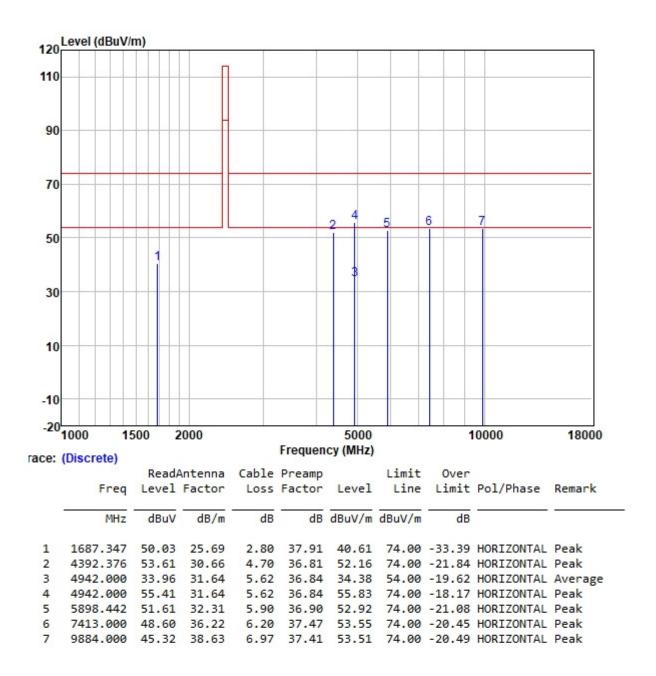
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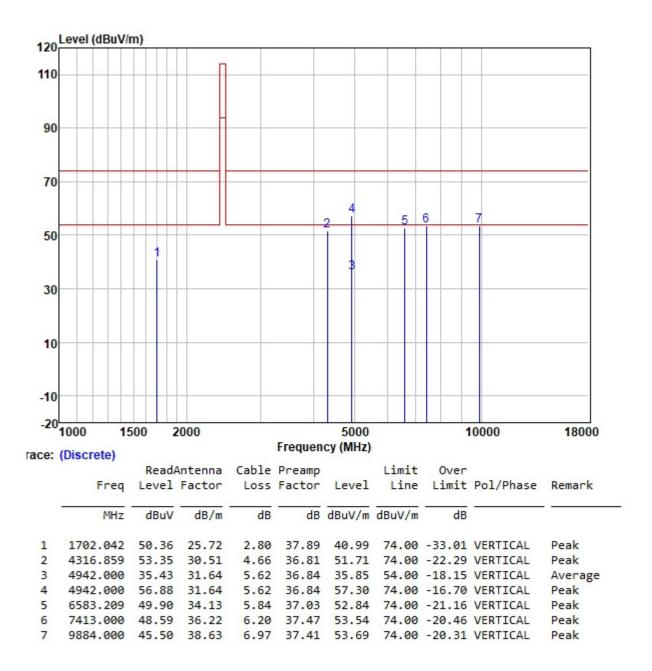
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8 **Test Setup Photo**

Refer to Appendix - Test Setup Photo for GZCR2212001599AT

EUT Constructional Details (EUT Photos) 9

Refer to Appendix - External and Internal Photos for GZCR2212001599AT

- End of the Report -



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