

 Report No.: GZCR230200019301

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 FCC ID: PIYHPK27-23A5T

## TEST REPORT

Application No.:	GZCR2302000193AT			
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			
Equipment Under Test (EUT	·):			
EUT Name:	HOT WHEELS® Monster Trucks HW Transforming Rhinomite RC™ Vehicle			
Model No.:	HPK27			
Trade Mark:	Mattel			
Standard(s) :	47 CFR Part 15, Subpart C 15.249			
Date of Receipt:	2023-02-10			
Date of Test:	2023-02-10 to 2023-03-02			
Date of Issue:	2023-03-03			
Test Result:	Pass*			
* Le dis est d'avant d'autorite de dis EUE est availle de la dis de la devide ser est d'autorite ser				

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

Ridey Lin

Ricky Liu Manager



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Revision Record						
Version Report No. Date Remark						
01		2023-03-03	Original			

Authorized for issue by		
	CJ-Vu	
	Curry Wu/Project Engineer	
	Ridey Liv	
	Ricky Liu/Reviewer	



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#### **Test Summary** 2

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		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.



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8	Test Setup Photo		46	
9	EUT Constructional Details (EUT Photos)			



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#### **General Information** 4

#### Details of E.U.T. 4.1

Power supply:	3V DC(1.5V x 2 "AA" Size Batteries)
Operation Frequency:	2420MHz to 2462MHz
Modulation Type:	GFSK
Number of Channels:	43
Channel spacing:	1MHz
Antenna Type:	Integral
Antenna Gain:	0.58dBi

### 4.2 Description of Support Units

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



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### 4.3 Measurement Uncertainty

Measurement Uncertainty
± 3%
5.08dB (1GHz-6GHz); 5.14dB
(above 6GHz)
5.06dB (30MHz-1GHz;3m) 5.08dB
(1GHz-6GHz); 5.14dB (above 6GHz)
5.06 dB (30 MHz-1 GHz; 3m)
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 limit.



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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 8215555 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 None



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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 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- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-21	2025-09-20
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	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 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- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D EMC2026		2022-09-21	2025-09-20			
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15			
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	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			



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Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
Notch Filter (5150-5880)	Mico-Tronics	BRM50716	EMC2168	2022-07-29	2023-07-28
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	Model No Inventory No		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			



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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	BBHA 9120D	EMC2026	2022-09-21	2025-09-20			
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15			
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	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			

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

#### 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. The best case gain of the antenna is 0.58dBi.

Antenna location: Refer to Internal photos



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#### **Radio Spectrum Matter Test Results** 7

#### 20dB Bandwidth 7.1

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 Enviro		
Temperature:	24.3 °C	Humidity:

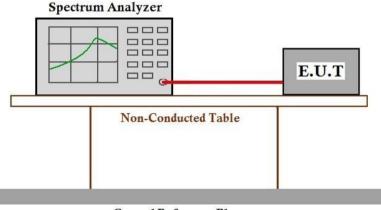
50.2 % RH

Atmospheric Pressure: 1003 mbar

#### 7.1.2 Test Mode Description

Pre-scan / Final test		Description
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	8.400	Pass
Middle	7.886	Pass
Highest	6.446	Pass



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Keysight Spectrum Ana	alyzer - Occ	upied BW									
<b>LXI</b> RF	50 Ω	AC			vse:INT eq: 2.42000		ALIGN OFF	03:57:51 P Radio Std	M Feb 15, 2023	Trac	e/Detector
				Trig: Free		Avg Hold	d:>10/10	Radio Stu	. None		
			#IFGain:Low	#Atten: 2	0 dB			Radio Dev	rice: BTS		
	ef 10.00	) dBm									
				~_	$\gamma$						
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-30.0	$\sim \sim \sim$						<b> </b> "	~~~~,	mma		Average
-40.0									* * ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Average
-50.0											
-60.0											
-70.0											Max Hold
-80.0											
Center 2.42 GH											
#Res BW 150 k				#VF	SW 470 k	Hz			n 20 MHz ep 1 ms		
	(TTE					115					Min Hold
Occupied	Band	widt	h		Total P	ower	13.3	dBm			
			3373 MI	7							Detector
		0.	5575 MI	12							Peak►
Transmit Fr	eq Err	or	-359.05	(Hz	% of OE	BW Pow	ver 99	.00 %		Auto	<u>Man</u>
x dB Bandw	vidth		8.400 N	IHz	x dB		-20	00 dB			
MSG							STATUS	,			
Mod							STATUS	,			



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🔤 Keysight Spectrum Analyzer - Occupied B	W				
<b>LX</b> RF 50 Ω AC		SENSE:INT	ALIGN OFF	04:02:49 PM Feb 15, 2023	Trace/Detector
x dB -20.00 dB		Center Freq: 2.441000 Trig: Free Run	000 GHz Avg Hold:>10/10	Radio Std: None	The of Botto to to
		#Atten: 20 dB	Anglitera. Provide	Radio Device: BTS	
					Ĩ
10 dB/div Ref 10.00 dB	m				
		<u>~~</u>			
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-20.0					
-30.0			· ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and and a second	
-40.0				- And Martin	Average
-50.0					
-60.0					
-70.0					Max Hold
-80.0					
Center 2.441 GHz				Span 20 MHz	
#Res BW 150 kHz		#VBW 470 kH	Z	Sweep 1 ms	Min Hold
		T-4-LD-			
Occupied Bandwid	th	Total Po	wer 13.0	6 dBm	
7	.7510 MHz	7			Detector
					Peak▶
Transmit Freq Error	-307.28 kH	z % of OB	W Power 99	0.00 %	Auto <u>Man</u>
x dB Bandwidth	7.886 MH	z xdB	20	00 dB	
	1.000 MIH		-20.	UU UB	
MSG			STATUS	5	
			STATU		



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	1				
XI         RF         50 Ω         AC	Canta	SENSE:INT	ALIGN OFF	04:05:15 PM Feb 15, 2023 Radio Std: None	Trace/Detector
x dB -20.00 dB	Trig: F	Free Run Avg Ho	old:>10/10	Radio Sta. None	
	#IFGain:Low #Atter	n: 20 dB		Radio Device: BTS	_
10 dB/div Ref 10.00 dBn	ı				
Log 0.00		~~~			
-10.0	( And				Clear Write
-20.0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
-30.0	$\sim$		MA.		
-30.0 -40.0 -50.0			- white	MARA.	Average
					Average
-60.0					
-70.0					Max Hold
-80.0					
Center 2.462 GHz				Span 20 MHz	
#Res BW 150 kHz	#	VBW 470 kHz		Sweep 1 ms	
		T-4-1 D	40.0	-ID	
Occupied Bandwidt		Total Power	13.6	dBm	
6.3	2644 MHz				Detector
Transmit Freq Error	-228.66 kHz	% of OBW Pov		00 %	Peak► Auto Man
x dB Bandwidth	6.446 MHz	x dB	-20.0	0 dB	
MSG			STATUS		



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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) ANSI C63.10 (2013) Section 6.5&6.6 Test Method: Measurement Distance: 3m Limit:

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

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			
	Ton time =0.40ms			
Toot data:	T period =3.52ms			
Test data:	Duty cycle=11.36%			
	PDCF value= -18.89dB			



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- - - - - X-Keysight Spectrum Analyzer - Swept SA ALIGN OFF #Avg Type: RMS 04:35:37 PM Feb 24, 2023 SENSE:INT Frequency TRACE 1 2 3 4 5 6 TYPE WWWWW DET P P P P P P Center Freq 2.420000000 GHz Trig: Free Run PNO: Fast IFGain:Low #Atten: 36 dB Auto Tune ΔMkr3 3.520 ms 3.17 dB 10 dB/div Log**√** Ref 25.00 dBm ¢<sup>1</sup> (<sup>2Δ1</sup> **Center Freq** 3∆1 2.42000000 GHz Start Freq 2.420000000 GHz Water Arte water balance and provide and weiner and the second second hadraderate and the production of the second Stop Freq 2.420000000 GHz Center 2.420000000 GHz Span 0 Hz **CF** Step Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.00 ms (1001 pts) 1.000000 MHz <u>Auto</u> Man FUNCTION EUNCTION WIDTH FUNCTION VALU 
 N
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 Δ1
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 (Δ)

 Δ1
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 t
 (Δ)
 5.570 ms 400.0 μs (Δ) 3.520 ms (Δ) -0.93 dBm 1 4.24 dB 3.17 dB 2 **Freq Offset** 4 0 Hz 5 6 7 Scale Type 8 C 10 Log Lin 11 MSG STATUS

#### 7.2.1 E.U.T. Operation

Operating Enviror	nment:					
Temperature:	24.5 °C	Humidity:	50.5 % RH	Atmospheric Pressure:	1003	mbar

#### 7.2.2 Test Mode Description

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



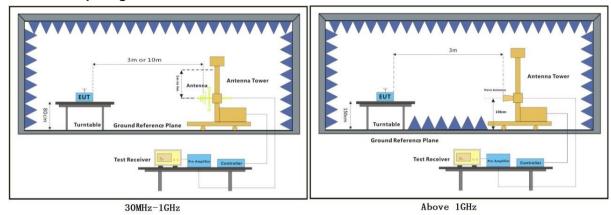
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#### 7.2.3 Test Setup Diagram



#### 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.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.

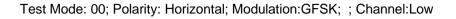


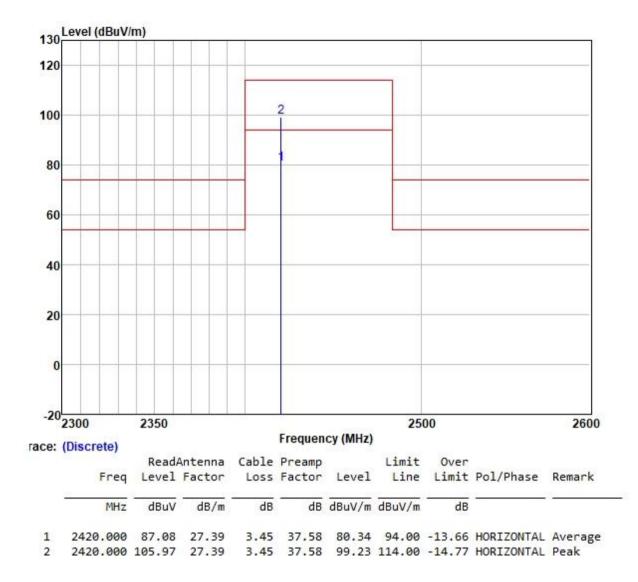
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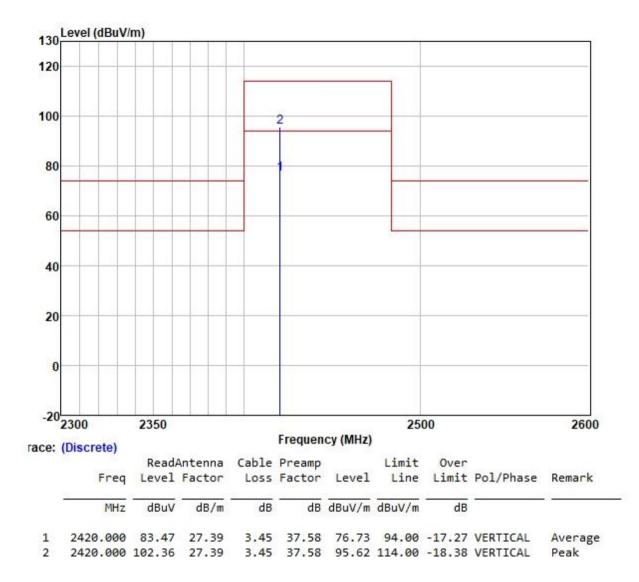
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; ; Channel:Low





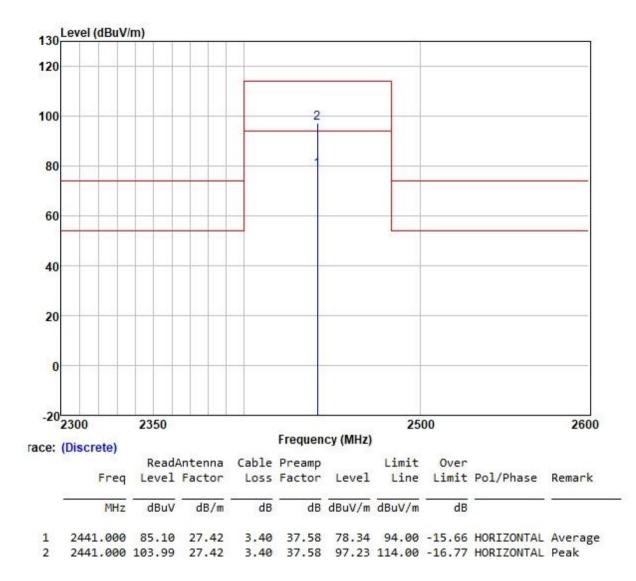
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; ; Channel:middle





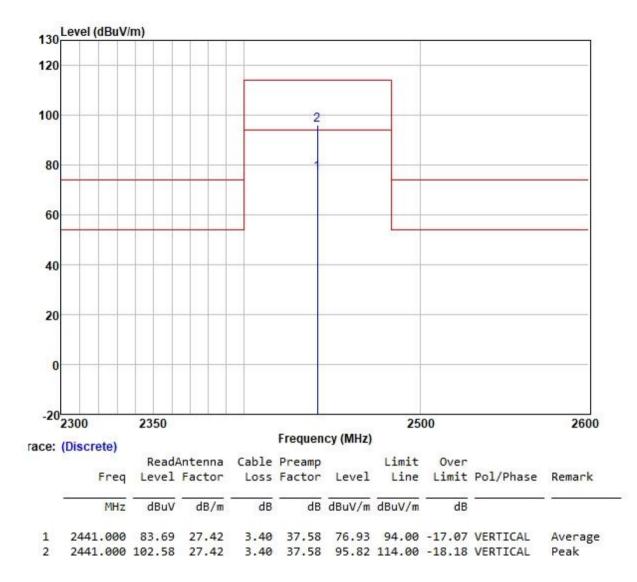
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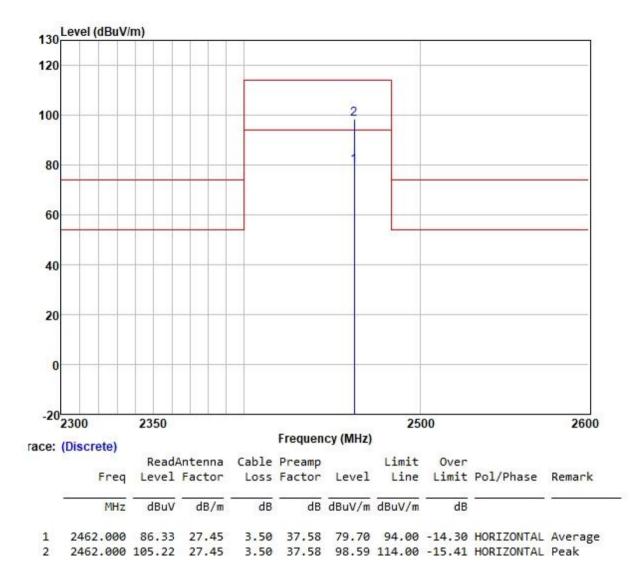
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Report No.: GZCR230200019301 Page: 25 of 46

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



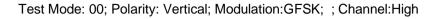


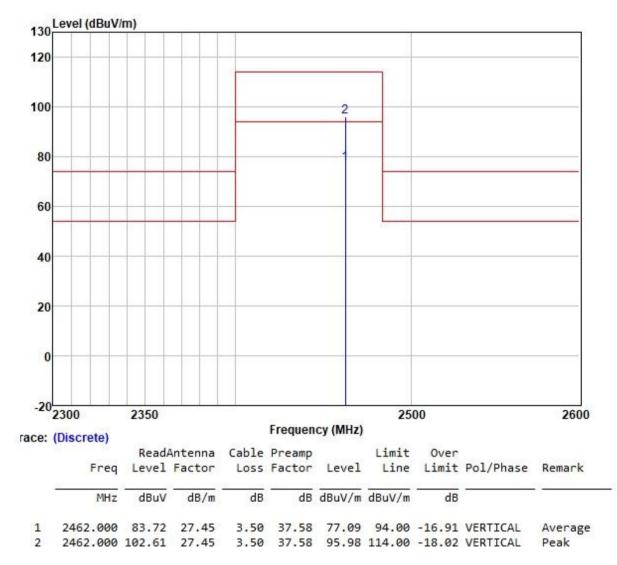
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Remark:

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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### 7.3 Restricted Band Around Fundamental Frequency

Test Requirement47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209Test Method:ANSI C63.10 (2013) Section 6.10.5Measurement Distance:3mLimit:Image: Content of the section of the secti

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:	24.5 °C	Humidity:	50.5 % RH		Atmospheric Pressure:	1003	mbar

#### 7.3.2 Test Mode Description

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



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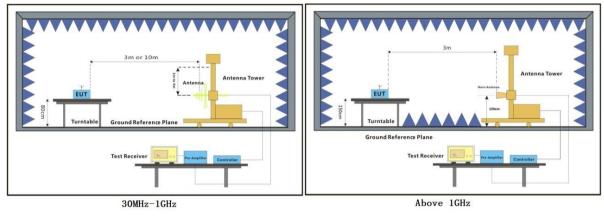
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#### 7.3.3 Test Setup Diagram



#### 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.

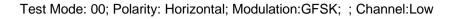


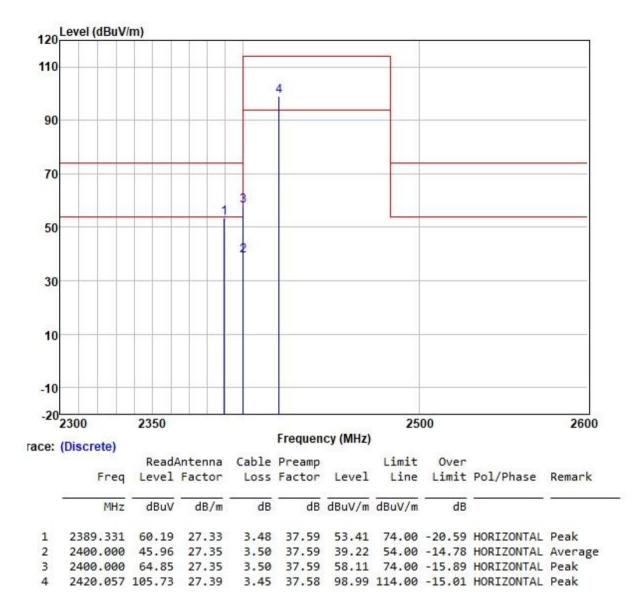
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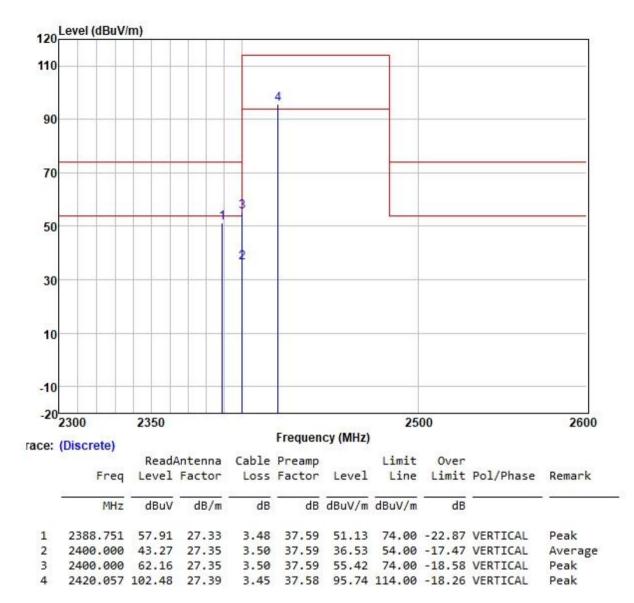
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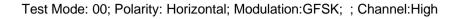
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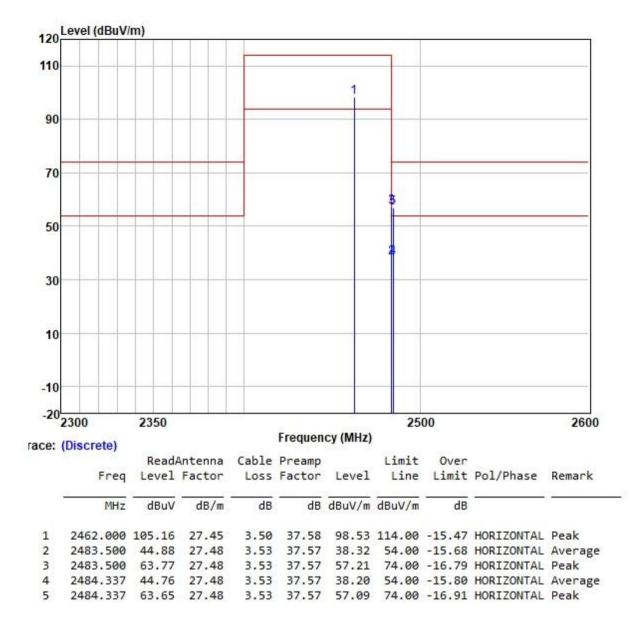
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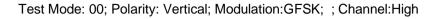
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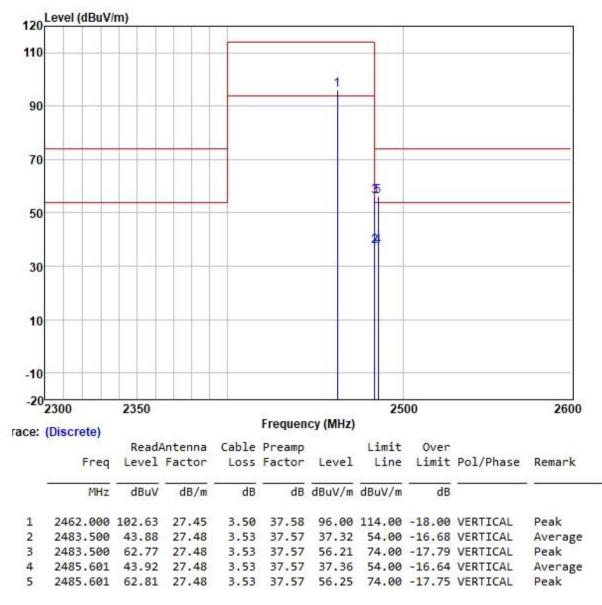
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Remark:

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 Enviror	nment:					
Temperature:	24.7 °C	Humidity:	50.8 % RH	Atmospheric Pressure:	1003	mbar

#### 7.4.2 Test Mode Description

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



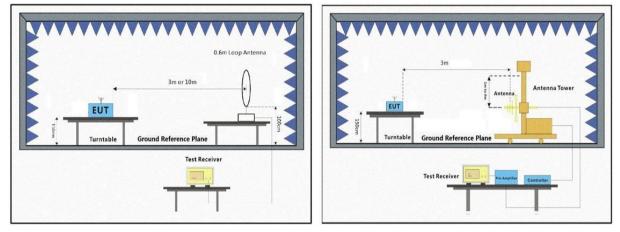
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#### 7.4.3 Test Setup Diagram



#### 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

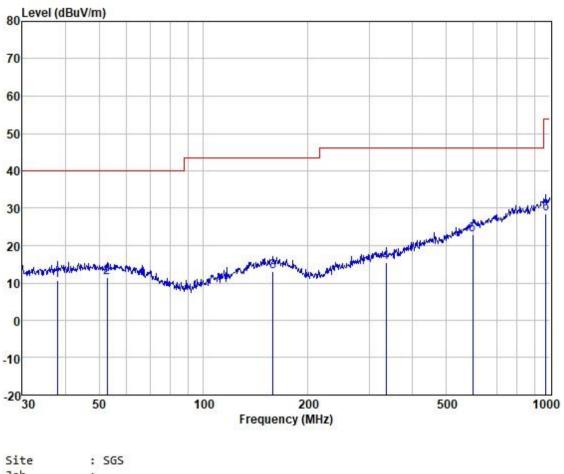
3) Scan from 9kHz to 1 GHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit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

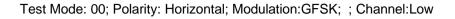


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Site	:	SG
Job	:	
Model	:	
Power	:	
Test Mode	:	

	Freq				Contraction of the second s	Measured Level			Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	37.812	23.86	13.31	1.07	27.62	10.62	40.00	-29.38	HORIZONTAL	QP
2	52.760	23.94	13.93	1.16	27.60	11.43	40.00	-28.57	HORIZONTAL	QP
3	158.668	24.46	13.67	2.32	27.36	13.09	43.52	-30.43	HORIZONTAL	QP
4	336.035	25.12	14.31	3.47	27.45	15.45	46.02	-30.57	HORIZONTAL	QP
5	597.223	26.65	20.11	4.98	28.80	22.94	46.02	-23.08	HORIZONTAL	QP
6	972.337	25.37	24.30	7.00	28.04	28.63	53.98	-25.35	HORIZONTAL	QP



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80 Level (dBuV/m) 70 60 50 40 30 20 المجرمار Materia Martin Autor . 10 0 -10 -20<u>–</u>30 1000 50 100 200 500 Frequency (MHz) s

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

Site	:	SG
Job	:	
Model	:	
Power	:	
Test Mode	:	

	Freq					Measured Level			Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	34.639	24.44	12.97		27.63		40.00	-29.17	VERTICAL	QP
2	53.318	24.61	13.90	1.17	27.60	12.08	40.00	-27.92	VERTICAL	QP
3	159.784	24.85	13.69	2.32	27.36	13.50	43.52	-30.02	VERTICAL	QP
4	355.427	25.02	14.52	3.65	27.74	15.45	46.02	-30.57	VERTICAL	QP
5	599.321	27.24	20.17	4.98	28.80	23.59	46.02	-22.43	VERTICAL	QP
6	982.620	26.27	24.22	7.00	28.02	29.47	53.98	-24.51	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

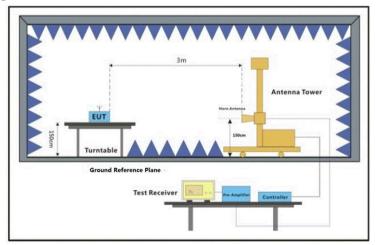
#### 7.5.1 E.U.T. Operation

Operating Enviro	nment:				
Temperature:	24.5 °C	Humidity:	50.5 % RH	Atmospheric Pressure: 1003	mbar

#### 7.5.2 Test Mode Description

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

#### 7.5.3 Test Setup Diagram





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#### EMC-TRF-01 Rev 1.0

#### 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 fullyanechoic 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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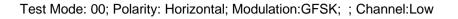
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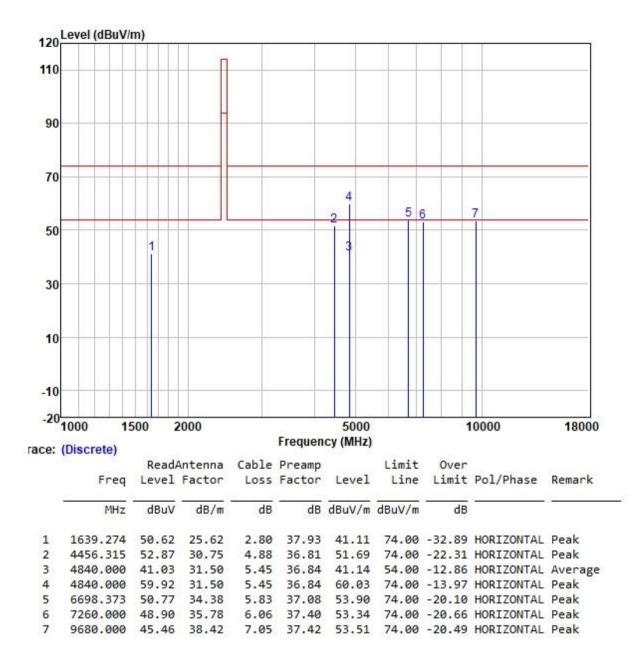
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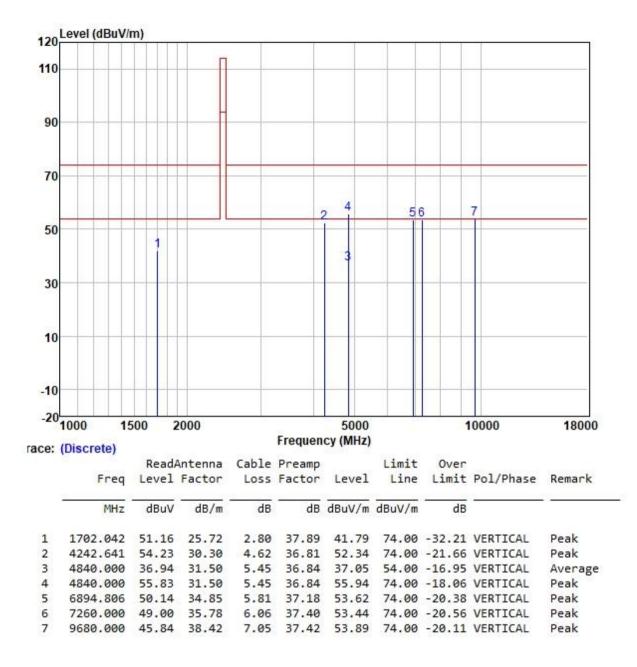
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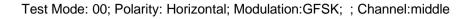
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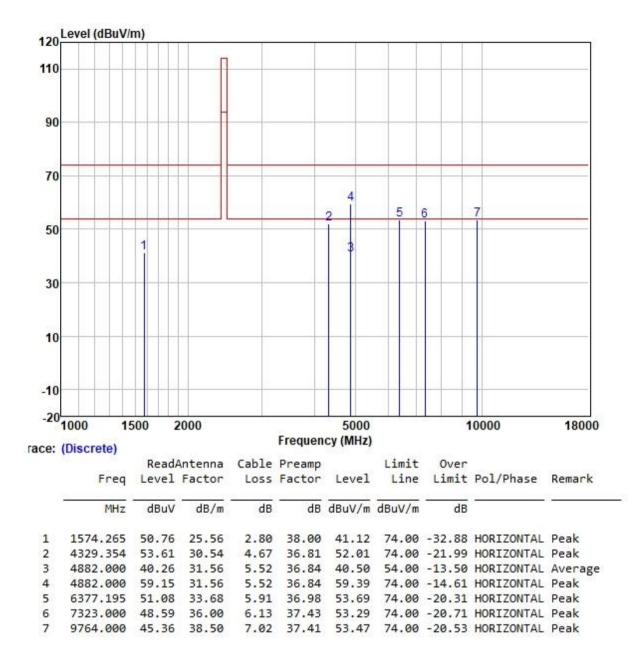
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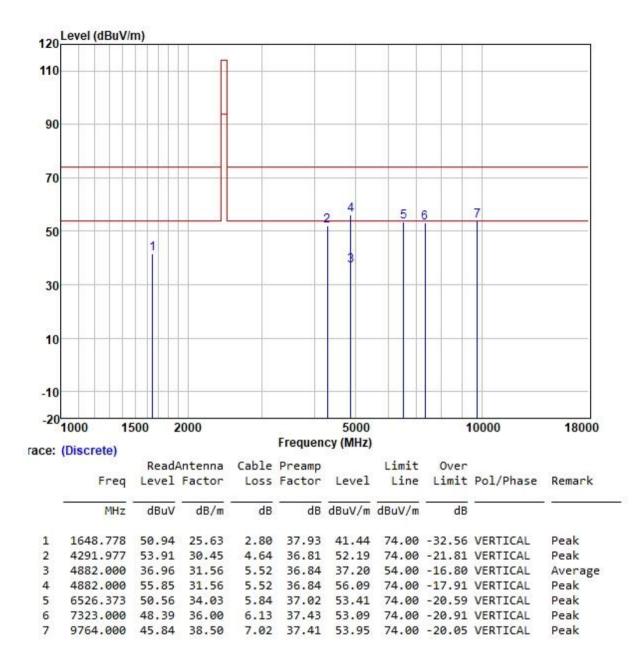
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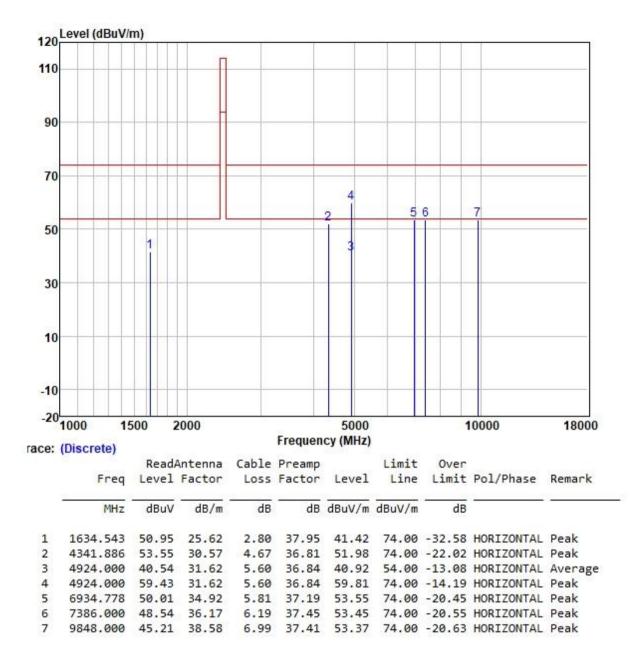
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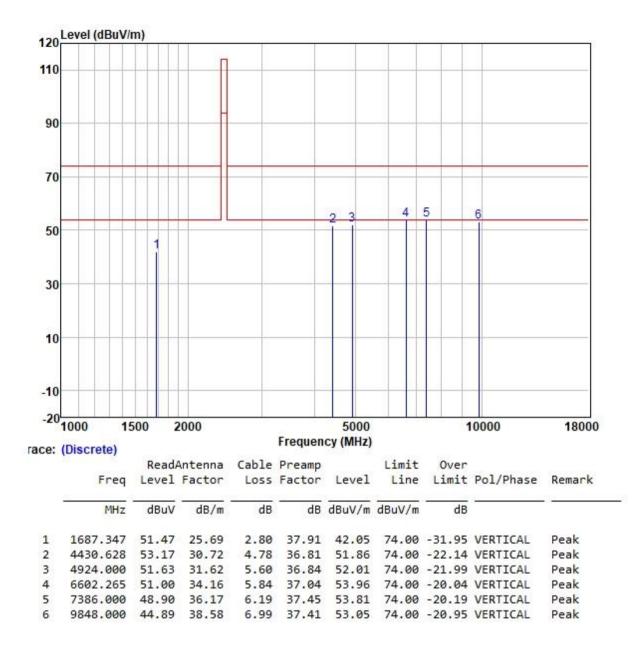
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#### **Test Setup Photo** 8

Refer to Appendix - Test Setup Photo for GZCR2302000193AT

#### **EUT Constructional Details (EUT Photos)** 9

Refer to Appendix – External and Internal Photos for GZCR2302000193AT

- End of the Report -



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