

Report No.: GZCR240800096801 EMC-TRF-01 Rev 1.1

> 1 of 49 Page: FCC ID: 2ASIIR-SHS01

TEST REPORT

GZCR2408000968HS **Application No.:**

Applicant: Xiamen Renhe Sports Equipment Co., Ltd

Address of Applicant: 4/F., 1129, Jicheng Road, Industrial Concentration Zone, Tong'an, Xiamen,

Manufacturer: Xiamen Renhe Sports Equipment Co., Ltd

Address of Manufacturer: 4/F., 1129, Jicheng Road, Industrial Concentration Zone, Tong'an, Xiamen,

Fujian, China

Factory: Xiamen Renhe Sports Equipment Co., Ltd

Address of Factory: 4/F., 1129, Jicheng Road, Industrial Concentration Zone, Tong'an, Xiamen,

Fujian, China

Product Name: Smart Handle with a Safety Button

Model No.: **SHS-01**

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

2024-08-15 **Date of Receipt:**

2024-09-05 to 2024-12-03 **Date of Test:**

2024-12-24 Date of Issue:

Test Result: Pass*

adoy Liu Ricky Liu



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No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663 中国・广东・广州高新技术产业开发区科学城科珠路198号

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t (86-20) 82155555 t (86-20) 82155555

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



EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 2 of 49

	Revision Record				
Version Report No. Date Remark					
01	GZCR240800096801	2024-12-24	Original		

Authorized for issue by:			
	Damon. Guan		
	Damon Guan/Project Engineer	_	
	vius cui		
	Vico Cui/Reviewer	_	



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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

3 of 49 Page:

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				
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,	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	Subpart C 15.249	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**				
20dB Bandwidth		ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass				

^{**:} The EUT passed Field Strength of the Fundamental Signal (15.249(a)), Restricted Band Around Fundamental Frequency and Radiated Emissions Above 1GHz tests after modification.

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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EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 4 of 49

3 **Contents**

			Page
1	Cover	r Page	1
2	Test S	Summary	3
2		ents	
3			
4		ral Information	
		Details of E.U.T.	
		Description of Support Units	
		Measurement Uncertainty	
		Test Location	
		Test Facility	
		Deviation from Standards	
		Abnormalities from Standard Conditions	
5	Equip	ment List	8
6	Radio	Spectrum Technical Requirement	10
-		Antenna Requirement	
	6.1.1	Test Requirement:	
	6.1.2	Conclusion	
7	-	Spectrum Matter Test Results	
•		•	
	7.1 F 7.1.1	Field Strength of the Fundamental Signal (15.249(a))	
	7.1.1	Test Mode Description	
	7.1.2	Test Setup Diagram	
	7.1.4	Measurement Procedure and Data	
		Restricted Band Around Fundamental Frequency	
	7.2.1	E.U.T. Operation	
	7.2.2	Test Mode Description	
	7.2.3	Test Setup Diagram	
	7.2.4	Measurement Procedure and Data	
	7.3 F	Radiated Emissions Below 1GHz	33
		E.U.T. Operation	
	7.3.2	Test Mode Description	
	7.3.3	Test Setup Diagram	
	7.3.4	Measurement Procedure and Data	
		Radiated Emissions Above 1GHz	
	7.4.1	E.U.T. Operation	
	7.4.2	Test Mode Description	
	7.4.3	Test Setup Diagram	
	7.4.4	Measurement Procedure and Data	
		20dB Bandwidth	
	7.5.1 7.5.2	E.U.T. Operation Test Mode Description	
	7.5.2 7.5.3	Test Setup Diagram	
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EMC	-TRF-01	Rev 1.1	Report N	o.: GZCR240800096801	
			Page:	5 of 49	
	7.5.4	Measurement Procedure and Data			45
8	Test S	etup Photo			48
0	EUT C	enetwestianal Dataila (EUT Dhatas)			40



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EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 6 of 49

General Information

4.1 Details of E.U.T.

Power supply: DC 3.0V with CR2032 button cell

2410MHz (Low channel), 2426MHz (Middle channel), 2455MHz, 2473MHz Operation Frequency:

(High channel)

Test Voltage: DC 3.0V **GFSK** Modulation Type: Number of Channels:

Antenna Type: PCB Antenna

Antenna Number:

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Note Book Computer	LENOVO	ThinkPad T490	PF1D1MVJ

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty		
Field Strength of the Fundamental Signal (15.249(a))	±4.88dB (1GHz-6GHz);±5.06dB (6GHz- 18GHz); ±5.30dB (18GHz-40GHz)		
Restricted Band Around Fundamental Frequency	±4.88dB (1GHz-6GHz);±5.06dB (6GHz- 18GHz); ±5.30dB (18GHz-40GHz)		
Radiated Emissions Below 1GHz	±3.19dB (9kHz to 30MHz);±5.14dB (30MHz-1GHz):3m; ±4.90dB (30MHz- 1GHz):10m		
Radiated Emissions Above 1GHz	±4.88dB (1GHz-6GHz);±5.06dB (6GHz- 18GHz); ±5.30dB (18GHz-40GHz)		
20dB Bandwidth	± 0.274%		

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cispr} (CISPR Uncertainty) or U_{ETSI} (ETSI Uncertainty).

Emission decision rule:

- Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit, marked as Pass in the report.
- Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit, marked as Fail in the report.



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Report No.: GZCR240800096801 EMC-TRF-01 Rev 1.1

> Page: 7 of 49

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,

No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663

Tel: +86 20 82155555

No tests were sub-contracted.

4.5 Test Facility

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

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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EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 8 of 49

Equipment List 5

Field Strength of the Fundamental Signal (15.249(a))							
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date		
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13		
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01		
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18		
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22		
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18		
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19		
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		
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13		
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01		
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18		
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22		
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19		
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A		

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		
Coaxial cable	Mirco-COAX UTIFLEX	311A	EMC0540	2024-08-19	2026-08-18		
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2024-06-17	2025-06-16		
Active Loop Antenna- RED	ETS-Lindgren	6502	EMC2190	2024-04-08	2026-04-07		
EMI Test Receiver (9kHz-7GHz)	Rohde & Schwarz	ESR7	EMC2220	2024-05-13	2025-05-12		
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

Report No.: GZCR240800096801

Page: 9 of 49

Radiated Emissions Above 1GHz						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13	
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01	
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18	
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22	
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17	
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2024-10-14	2025-10-13	
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18	
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19	
Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	EMC2172	2024-08-19	2025-08-18	
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A	

RF Conducted Test								
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date			
MXA Signal Analyzer (10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2024-02-20	2025-02-19			
MI CABLE	SGS-EMC	M8.0	EMC2136	2023-11-02	2025-11-01			

General used equipment								
Equipment Manufacturer		Model No	Inventory No	Cal Date	Cal Due Date			
DMM	Fluke	73	EMC0006	2024-06-13	2025-06-12			



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Report No.: GZCR240800096801 EMC-TRF-01 Rev 1.1

> Page: 10 of 49

Radio Spectrum Technical Requirement 6

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna location: Refer to Internal photos



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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

11 of 49 Page:

Radio Spectrum Matter Test Results 7

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

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

Limit:

Test Distance: 3m

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

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

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

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21.9 °C Humidity: 51.4 % RH Atmospheric Pressure: 1017 mbar

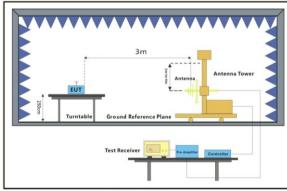
7.1.2 Test Mode Description

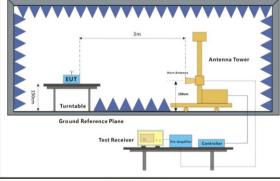
Pre-scan / Mode

Final test Code Description

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

7.1.3 Test Setup Diagram





Above 1GHz 30MHz-1GHz

检验检测专用章

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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

Page: 12 of 49

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



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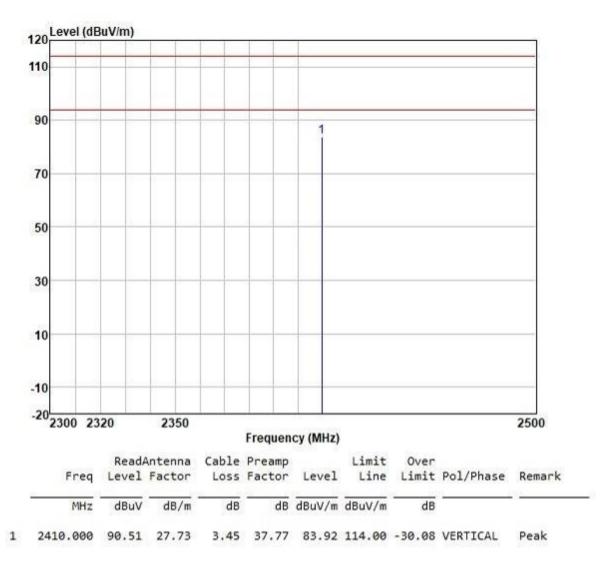


EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

13 of 49 Page:

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



Fundamental Frequency:

2410 MHz

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2410	83.92	None	114.00	-30.08	PK
2410	40.82	-43.10	94.00	-53.18	AV

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

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

Duty cycle= 0.007



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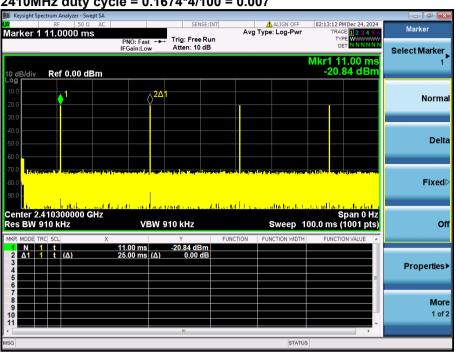


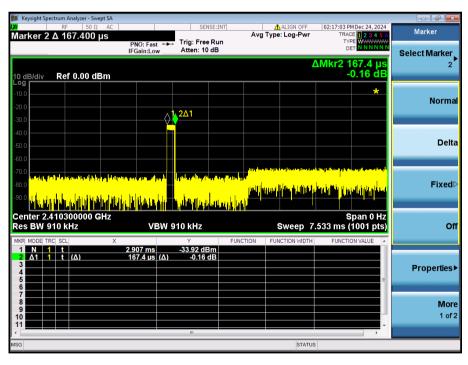
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Report No.: GZCR240800096801

Page: 14 of 49

2410MHz duty cycle = 0.1674*4/100 = 0.007







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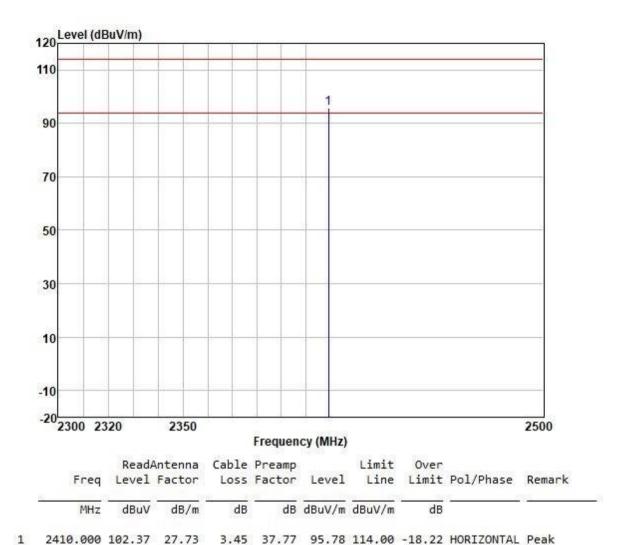


EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 15 of 49

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



Fundamental 2410 MHz Frequency:

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2410	95.78	None	114.00	-18.22	PK
2410	52.68	-43.10	94.00	-41.32	AV

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

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

Duty cycle= 0.007



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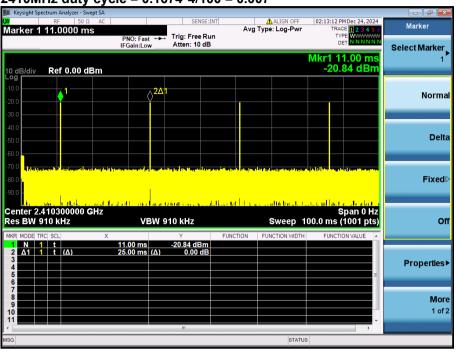


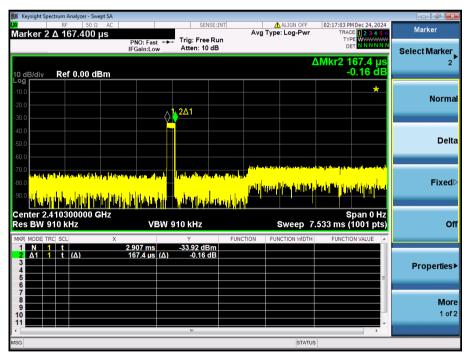
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Report No.: GZCR240800096801

Page: 16 of 49

2410MHz duty cycle = 0.1674*4/100 = 0.007







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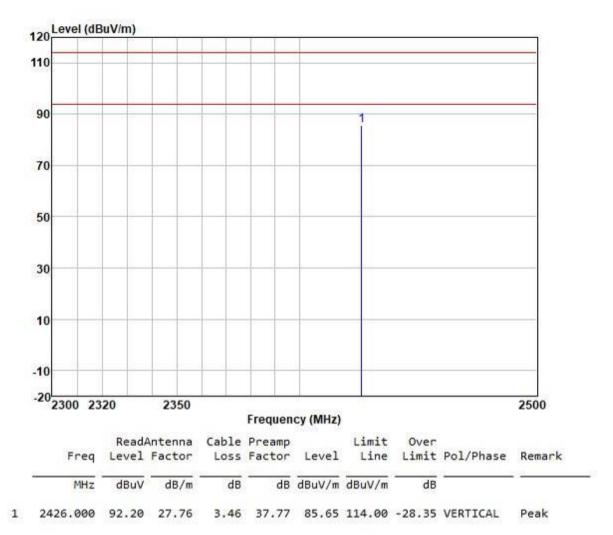


EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 17 of 49

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



Fundamental Frequency: 2426

MHz

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2426	85.65	None	114.00	-28.35	PK
2426	42.55	-43.10	94.00	-51.45	AV

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

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

Duty cycle= 0.007



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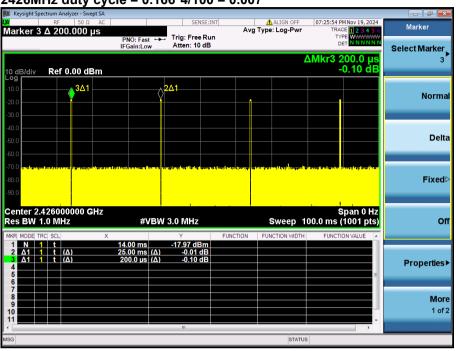


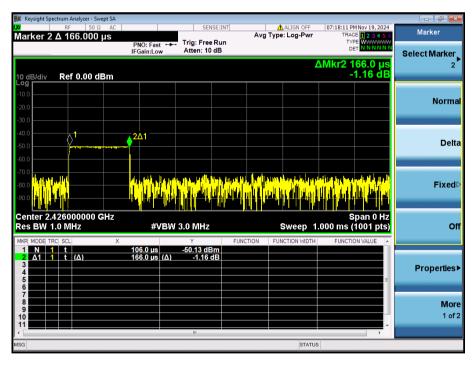
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Report No.: GZCR240800096801

Page: 18 of 49

2426MHz duty cycle = 0.166*4/100 = 0.007







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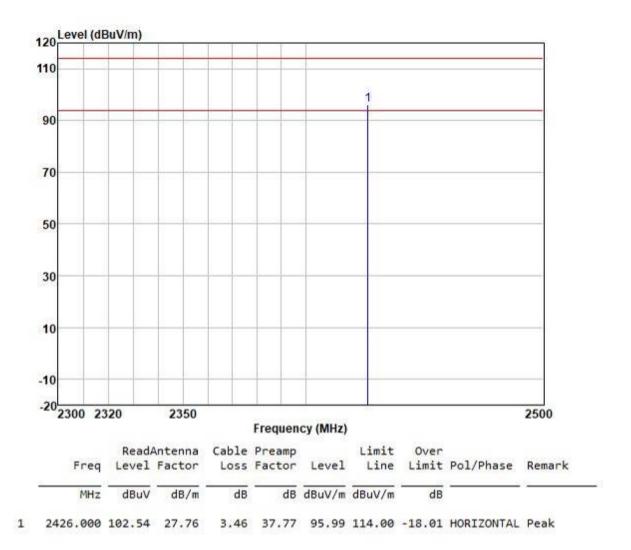


EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

19 of 49 Page:

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



Fundamental 2426 MHz Frequency:

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2426	95.99	None	114.00	-18.01	PK
2426	52.89	-43.10	94.00	-41.11	AV

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

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

Duty cycle= 0.007



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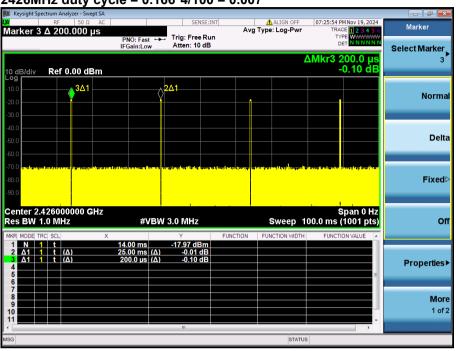


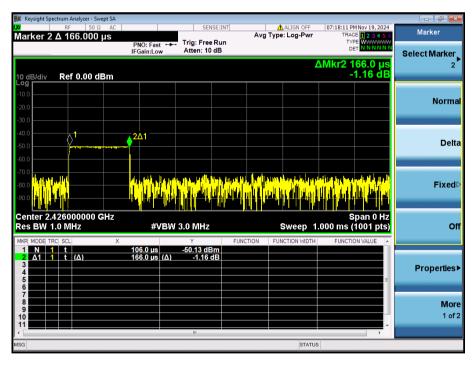
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Report No.: GZCR240800096801

Page: 20 of 49

2426MHz duty cycle = 0.166*4/100 = 0.007







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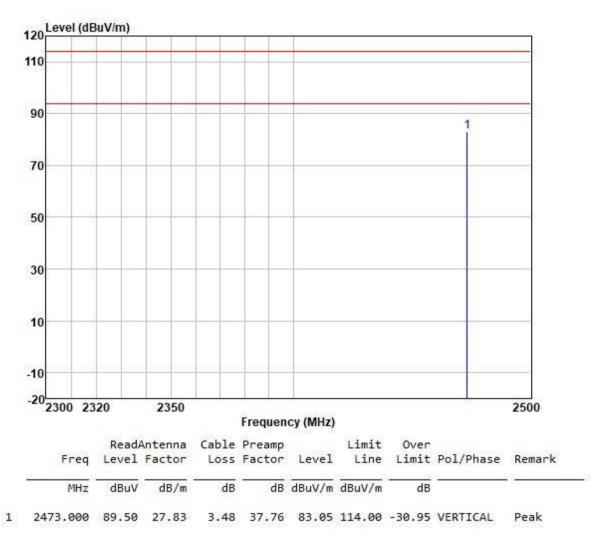
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

21 of 49 Page:

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



Fundamental 2473 MHz Frequency:

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2473	83.05	None	114.00	-30.95	PK
2473	39.95	-43.10	94.00	-54.05	AV

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

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

Duty cycle=



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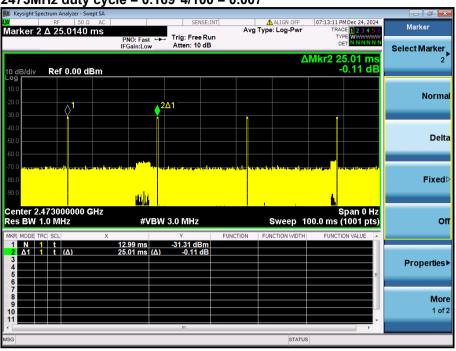


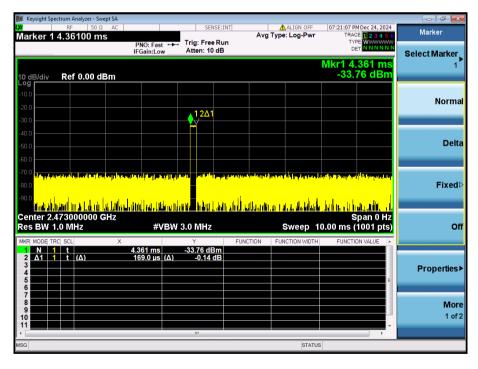
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Report No.: GZCR240800096801

Page: 22 of 49

2473MHz duty cycle = 0.169*4/100 = 0.007







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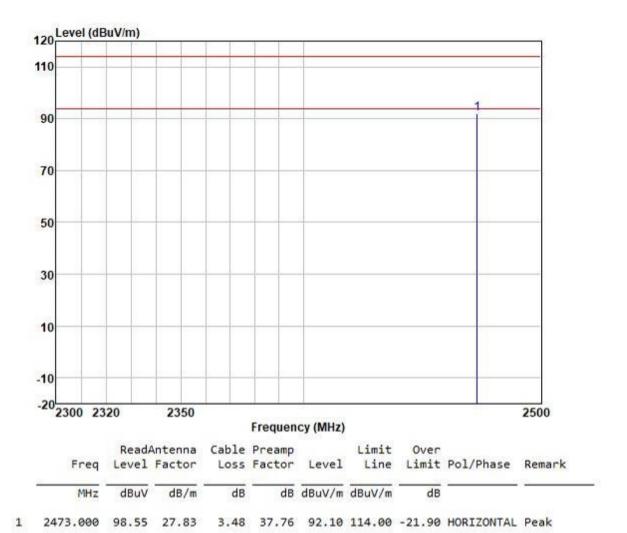


EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 23 of 49

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



Fundamental 2473 MHz Frequency:

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2473	92.10	None	114.00	-21.90	PK
2473	49.00	-43.10	94.00	-45.00	AV

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

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

Duty cycle= 0.007



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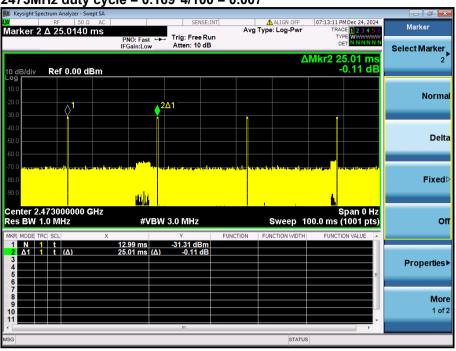


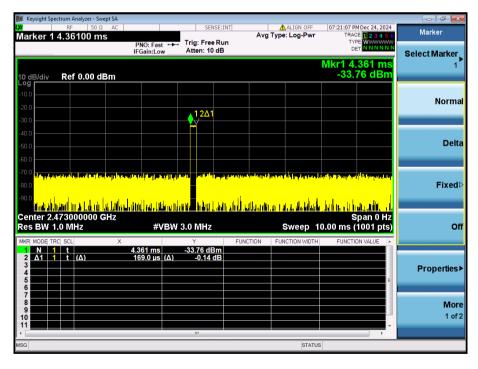
EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 24 of 49

2473MHz duty cycle = 0.169*4/100 = 0.007







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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

Page: 25 of 49

7.2 Restricted Band Around Fundamental Frequency

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

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

Test 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.

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.0 °C Humidity: 51.4 % RH Atmospheric Pressure: 1017 mbar

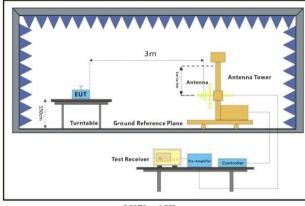
7.2.2 Test Mode Description

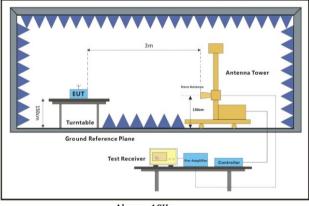
Mode Pre-scan /

Final test Code Description

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

7.2.3 Test Setup Diagram





Above 1GHz 30MHz-1GHz

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Report No.: GZCR240800096801 EMC-TRF-01 Rev 1.1

> Page: 26 of 49

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



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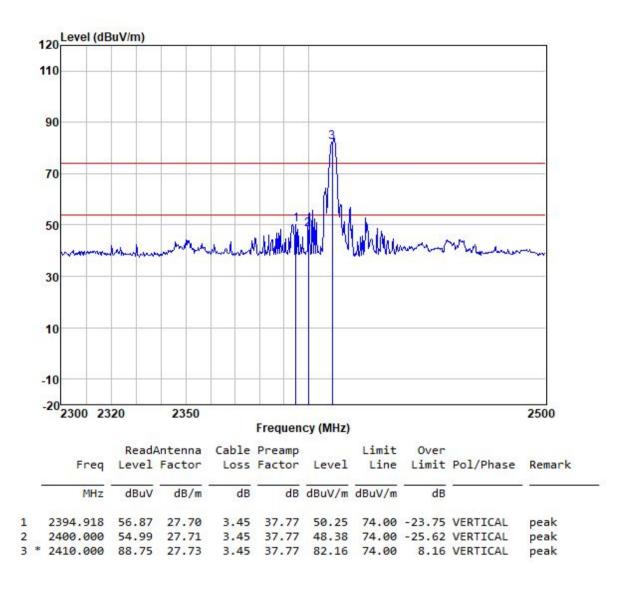
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

27 of 49 Page:

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





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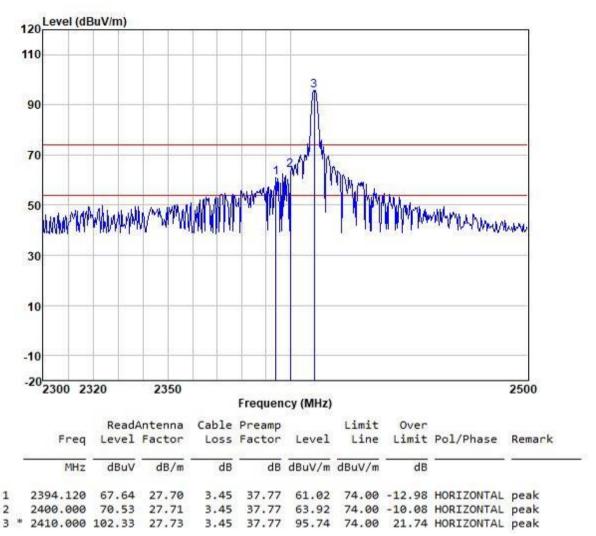
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Page: 28 of 49

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



Fundamental 2410 MHz Frequency:

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2394.120	61.02	None	74.00	-12.98	PK
2394.120	17.92	-43.10	54.00	-36.08	AV
2400.000	63.92	None	74.00	-10.08	PK
2400.000	20.82	-43.10	54.00	-33.18	AV

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

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

Duty cycle= 0.007



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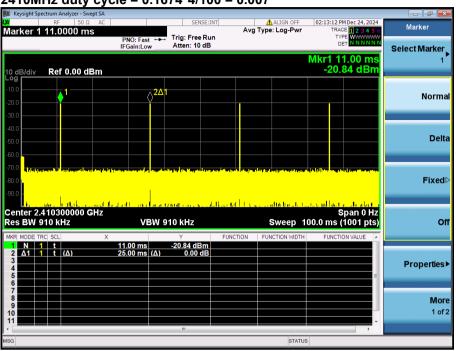


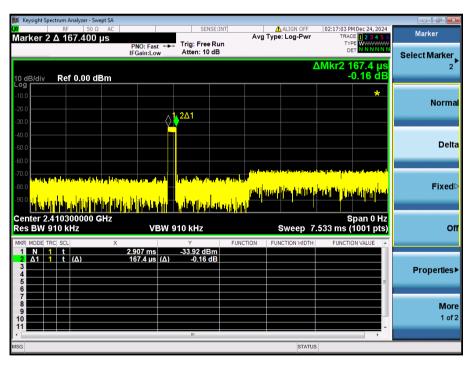
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Page: 29 of 49

2410MHz duty cycle = 0.1674*4/100 = 0.007







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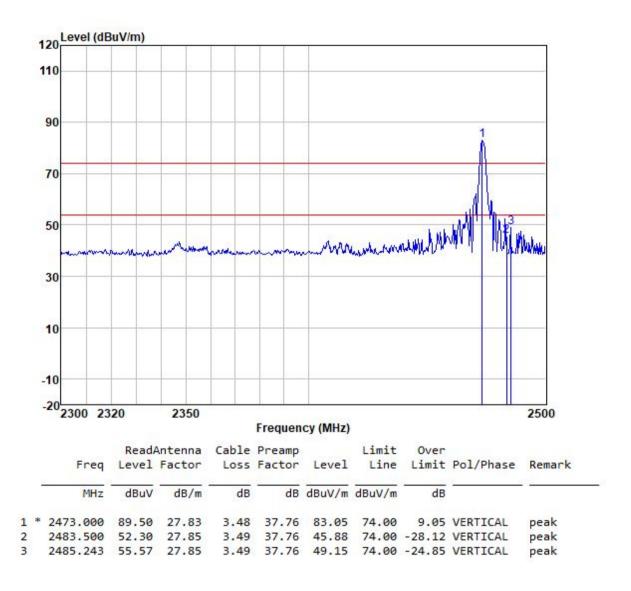
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

30 of 49 Page:

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





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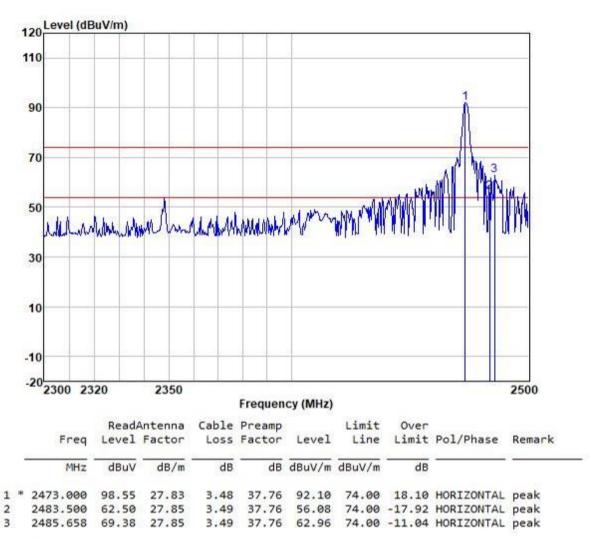
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Page: 31 of 49

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



Fundamental 2483 MHz Frequency:

Frequency (MHz)	Level (dBuV/m)	Factor (dB)	Limit Line (dBuV/m)	Over limit (dB)	Remark
2483.500	56.08	None	74.00	-17.92	PK
2483.500	12.98	-43.10	54.00	-41.02	AV
2485.658	62.96	None	74.00	-11.04	PK
2485.658	19.86	-43.10	54.00	-34.14	AV

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

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

Duty cycle= 0.007



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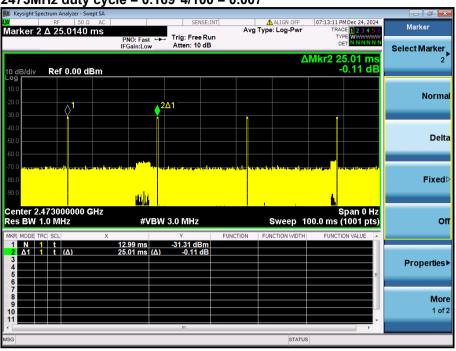


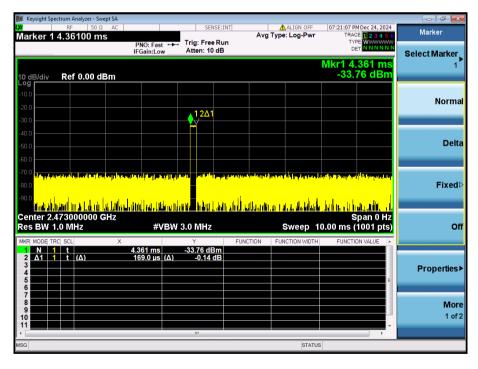
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Report No.: GZCR240800096801

Page: 32 of 49

2473MHz duty cycle = 0.169*4/100 = 0.007







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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

33 of 49 Page:

7.3 Radiated Emissions Below 1GHz

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

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

Test Distance: 10 m for 30 MHz to 1GHz; 3 m for 9kHz to 30 MHz.

Limit:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
960-1000	500	3

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.0 °C Humidity: 59.0 % RH Atmospheric Pressure: 1005 mbar

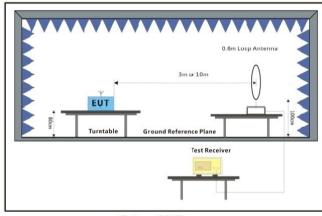
7.3.2 Test Mode Description

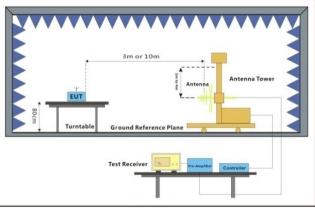
Mode Pre-scan /

Final test Code Description

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

7.3.3 Test Setup Diagram





Below 30MHz

30MHz-1GHz



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Page: 34 of 49

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 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete. Remark:
- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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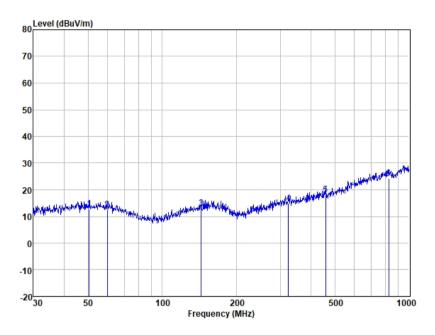
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

35 of 49 Page:

Test Mode: 00; Polarity: Horizontal



Site : SGS Job Model Power Test Mode

	Freq					Measured Level				Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	50.586	26.16	13.97	0.75	27.96	12.92			HORIZONTAL	QP
2	59.859	26.32	13.33	0.78	27.93	12.50			HORIZONTAL	QP
3	143.830	26.63	13.20	0.97	27.74	13.06			HORIZONTAL	QP
4	324.456	26.22	14.14	1.73	27.27	14.82			HORIZONTAL	QP
5	459.114	27.46	17.10	1.87	28.37	18.06			HORIZONTAL	QP
6	827.493	26.83	23.25	2.57	28.26	24.39			HORIZONTAL	OP

Frequency (MHz)	Level @10m (dBuV/m)	Convert Factor* (dB)	Level @ 3m (dBuV/m)	Limit @3m (dBuV/m)	Over limit (dB)	Remark
50.586	12.92	10.46	23.38	40.00	-16.62	QP
59.859	12.50	10.46	22.96	40.00	-17.04	QP
143.830	13.06	10.46	23.52	43.52	-20.00	QP
324.456	14.82	10.46	25.28	46.02	-20.74	QP
459.114	18.06	10.46	28.52	46.02	-17.50	QP
827.493	24.39	10.46	34.85	46.02	-11.17	QP

^{*}Remark:

Level (dBuV/m) @3m = Level (dBuV/m) @10m + Convert Factor (dB)

Convert Factor (dB) = 20*log(Measurement Distance/Specified Distance) = 20*log(10/3) = 10.46 dB according to 15.31 (f) (1)



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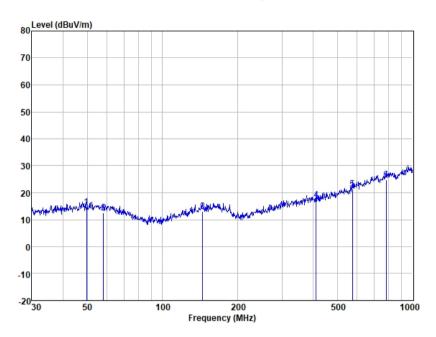
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

36 of 49 Page:

Test Mode: 00; Polarity: Vertical



Site : SGS Job Mode1 Power Test Mode

	Freq					Measured Level				Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	49.707	27.86	13.98	0.74	27.96	14.62			VERTICAL	QP
2	57.999	26.01	13.56	0.77	27.93	12.41			VERTICAL	QP
3	144.842	26.51	13.24	0.97	27.74	12.98			VERTICAL	QP
4	411.824	27.72	15.79	1.83	28.06	17.28			VERTICAL	QP
5	574.626	28.76	19.09	2.00	28.48	21.37			VERTICAL	QP
6	785.093	28.22	22.46	2.50	28.30	24.88			VERTICAL	OP

Frequency (MHz)	Level @10m (dBuV/m)	Convert Factor* (dB)	Level @ 3m (dBuV/m)	Limit @3m (dBuV/m)	Over limit (dB)	Remark
49.707	14.62	10.46	25.08	40.00	-14.92	QP
57.999	12.41	10.46	22.87	40.00	-17.13	QP
144.842	12.98	10.46	23.44	43.52	-20.08	QP
411.824	17.28	10.46	27.74	46.02	-18.28	QP
574.626	21.37	10.46	31.83	46.02	-14.19	QP
785.093	24.88	10.46	35.34	46.02	-10.68	QP

^{*}Remark:

Level (dBuV/m) @3m = Level (dBuV/m) @10m + Convert Factor (dB)

Convert Factor (dB) = 20*log(Measurement Distance/Specified Distance) = 20*log(10/3) = 10.46 dB according to 15.31 (f) (1)



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37 of 49 Page:

7.4 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

Limit:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
Above 1000	500	3

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 21.9 °C Humidity: 51.4 % RH Atmospheric Pressure: 1017 mbar

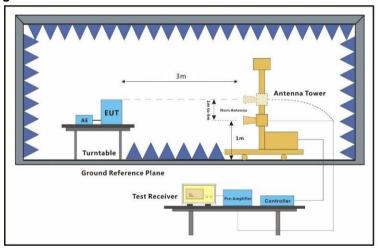
7.4.2 Test Mode Description

Mode Pre-scan /

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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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

Page: 38 of 49

7.4.4 Measurement Procedure and Data

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

Remark:

- 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
- 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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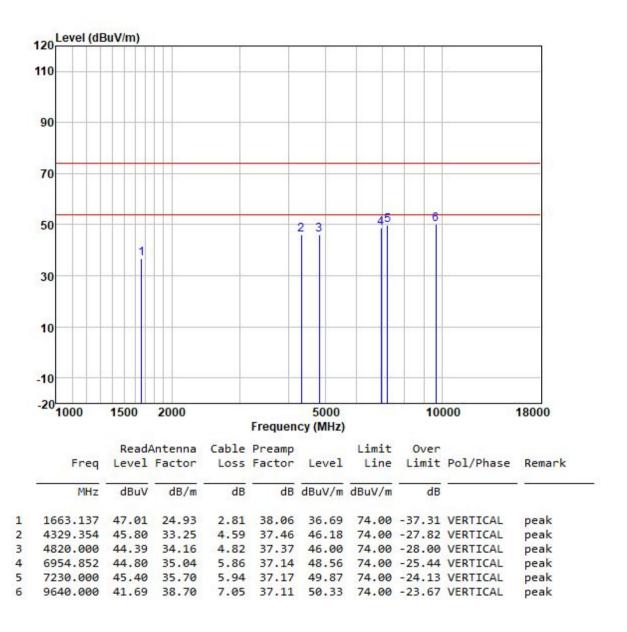
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

Page: 39 of 49

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





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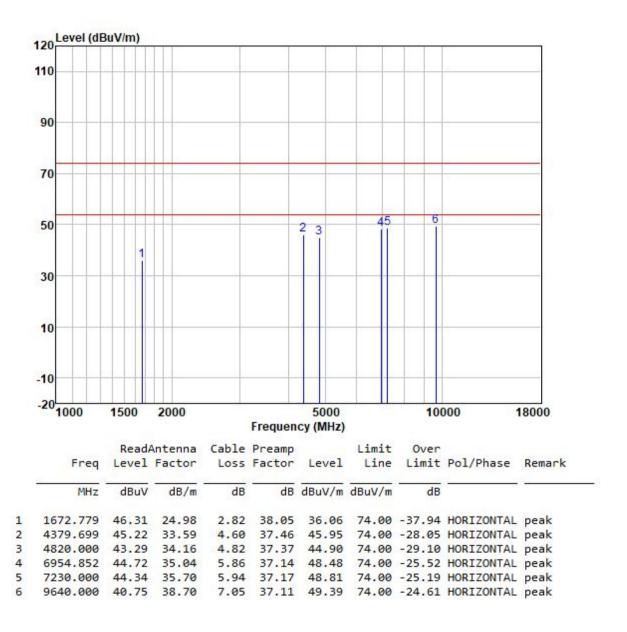
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

Page: 40 of 49

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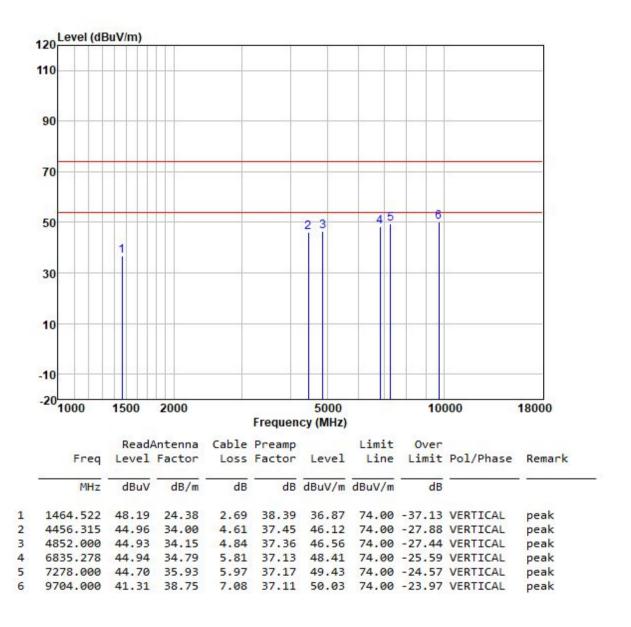
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

Page: 41 of 49

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





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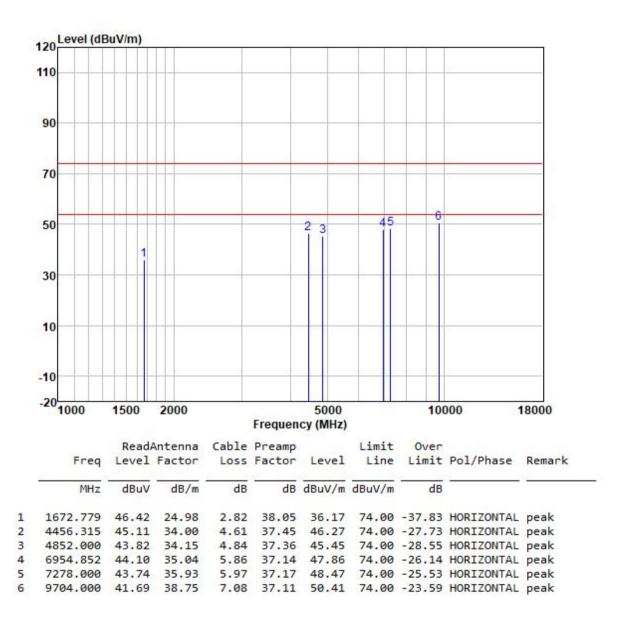
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

Page: 42 of 49

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





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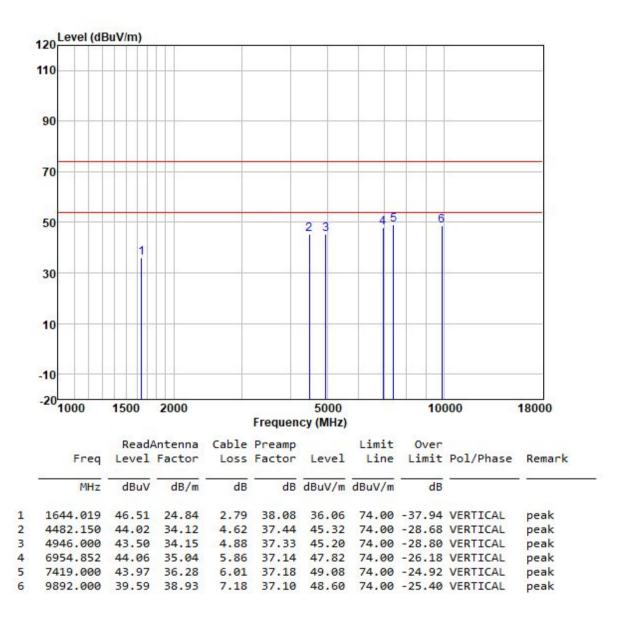
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

Page: 43 of 49

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





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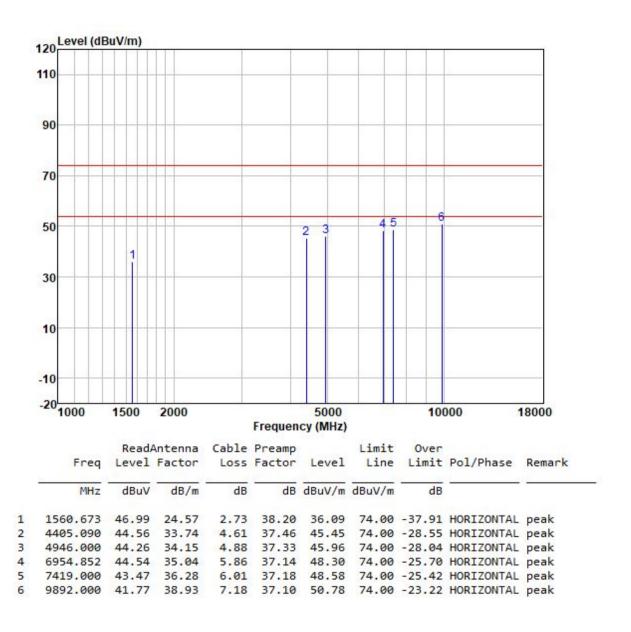
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Page: 44 of 49

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Report No.: GZCR240800096801 EMC-TRF-01 Rev 1.1

> 45 of 49 Page:

7.5 20dB Bandwidth

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

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 61.8 % RH Atmospheric Pressure: 1005 mbar

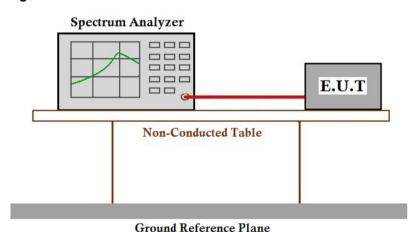
7.5.2 Test Mode Description

Mode Pre-scan /

Final test Code Description

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

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data



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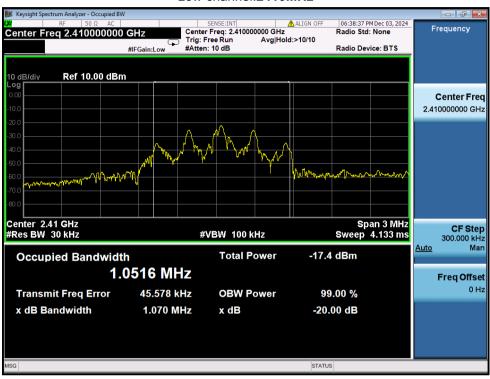
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EMC-TRF-01 Rev 1.1 Report No.: GZCR240800096801

46 of 49 Page:

Test Mode: 00 Low channel.2410MHz



Middle channel.2426MHz



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Page: 47 of 49

High channel.2473MHz





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Rev 1.1 EMC-TRF-01

Report No.: GZCR240800096801

Page: 48 of 49

Test Setup Photo 8

Refer to Appendix - Test Setup Photo for GZCR240800096801



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EMC-TRF-01 Rev 1.1

Report No.: GZCR240800096801

Page: 49 of 49

EUT Constructional Details (EUT Photos) 9

Refer to Appendix - External and Internal Photos for GZCR2408000968HS

- End of the Report -



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