

EMC-TRF-01 Rev 1.1

Report No.: GZCR220900127105 Page: 1 of 58 FCC ID: 2AAJGR2010

# **TEST REPORT**

Test Result:	Pass*
Date of Issue:	2023-07-14
Date of Test:	2023-07-05 to 2023-07-12
Date of Receipt:	2023-06-27
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Trade Mark:	Ørebustel
*	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
Model No.:	R2010-B-4L-A27NA, R2010-A-4L-A27NA, R2010-A-4L-A03AU 🛛 🐥
EUT Name:	Industrial Cellular Gateway
Equipment Under Test (EUT)	:
Address of Factory:	501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, Guangdong Province, China
Factory:	Guangzhou Robustel Co., Ltd.
Address of Manufacturer:	501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, Guangdong Province, China
Manufacturer:	Guangzhou Robustel Co., Ltd.
Address of Applicant:	501, Building #2, 63 Yongan Road, Huangpu District, Guangzhou, Guangdong Province, China
Applicant:	Guangzhou Robustel Co., Ltd.
Application No.:	GZCR2306000633AT

\* 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	GZCR220900127102	2023-03-06	Original		
02	GZCR220900127105	2023-07-14	Copy Report: added LTE and WIFI antennas		

Authorized for issue by		
	Jim Li	
	Jim Li/Project Engineer	
	vius cui	
	Vico Cui/Reviewer	



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# 2 Test Summary

Radio Spectrum Technical Requirement					
Item Standard Method Requirement Re					
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass	

Radio Spectrum Matter Part						
Item	Standard	Method	Requirement	Result		
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 11.12	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		
Radiated Spurious Emissions Below 1GHz	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass		
Radiated Spurious Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	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.

#### Remark for original report GZCR220900127102:

#### **A** Declaration of EUT Family Grouping:

Model No.: R2010-B-4L-A27NA, R2010-A-4L-A27NA, R2010-A-4L-A03AU

According to the declaration from the applicant, the electrical circuit design, layout, components used and internal wiring were identical for all models, with only difference as below:

Model No.:	Difference on:
R2010-A-4L-A27NA, R2010-B-4L-A27NA	Remove the POE function for model
	R2010-A-4L-A27NA
R2010-A-4L-A03AU, R2010-B-4L-A27NA	Remove the POE function and change the WWAN module for model R2010-A-4L-A03AU

Therefore, only one model R2010-B-4L-A27NA was tested in this report.

#### Remark for report GZCR220900127105

# This report GZCR220900127105 was based on original report GZCR220900127102, added LTE and WIFI antenas.

Reviewed the new WIFI antena, Radiated Emissions which fall in the restricted bands, Radiated Spurious Emissions Below 1GHz and Radiated Spurious Emissions Above 1GHz test ítems were performed on model **R2010-B-4L-A27NA** and recorded the new test results in this report GZCR220900127105.

All other test results please refer to original report GZCR220900127102 for details.



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# 4 General Information

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

Power supply:	DC 12V 1.5A supply by adaptor
	Adaptor information
	Model: GQ24-120150-AX
	Input: AC100-240V 50/60Hz 1A MAX
	Output: DC12V 1.5A 18W
Channel Spacing:	5MHz
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz;802.11n(HT40): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK);802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20):11;802.11n(HT40):7
Channel Spacing:	5MHz
Antenna Type:	RP-SMA Connector with dedicated antenna
Antenna Number:	2
Antonna Gain:	Option 1: ANT1:5 dBi; ANT2:5 dBi
Antenna Gain.	Option 2: ANT1:3 dBi; ANT2:3 dBi
Remark:	The switching adaptor is an optional part of EUT, all test in this report is performed with this adaptor.
	Two antennas can simultaneous transmission
Communication part:	Module ID XMR202008EC25AFXD for R2010-B-4L-A27NA, R2010-A-4L-A27NA
	Module ID XMR201805EC25AU for R2010-A-4L-A03AU

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Note Book Computer	LENOVO	ThinkPad T490	PF1D1MVJ
RJ45 Cable (1.2m length)	1	/	/

#### 4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Radiated Emissions which fall in the restricted bands	±5.00dB (30MHz-1GHz; 3m);±4.38dB (30MHz-1GHz; 10m);± 5.12dB (1GHz- 6GHz); ±5.38dB (6GHz-18GHz); ±5.61dB(18GHz-40GHz)
Radiated Spurious Emissions Below 1GHz	±5.00dB (3m); ±4.38dB (10m)
Radiated Spurious Emissions Above 1GHz	±5.12dB (1GHz-6GHz); ±5.38dB (6GHz- 18GHz); ±5.61dB(18GHz-40GHz)



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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:

#### • ACMA

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

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

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

#### • FCC Recognized Accredited Test Firm(Registration No.: 486818)

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

#### • ISED (Registration No.: 4620B, CAB identifier: CN0052)

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

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

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

#### • CBTL (Lab Code: TL129)

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

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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#### 5 **Equipment List**

Radiated Emissions which fall in the restricted bands						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15	
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15	
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2022-08-24	2024-08-23	
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22	
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17	
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07	
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20	
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19	
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A	

Radiated Spurious Emissions Below 1GHz						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2022-10-16	2025-10-15	
Chamber cable	HangTianXing	N/A	EMC0542	2022-08-24	2023-08-23	
Amplifier (9kHz-1.3GHz)	HP	8447F	EMC2065	2023-06-14	2024-06-13	
Active Loop Antenna- RED	ETS-Lindgren	6502	EMC2190	2022-04-06	2024-04-05	
EMI Test Receiver (1Hz- 8GHz)	Rohde & Schwarz	ESW8	EMC2220	2023-05-19	2024-05-18	
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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Radiated Spurious Emissions Above 1GHz							
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date		
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2022-12-16	2023-12-15		
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2022-12-16	2023-12-15		
Chamber cable (Above 1GHz)	amber cable (Above 1GHz) Scoflex		EMC0545	2022-08-24	2024-08-23		
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	2022-12-16	2023-12-15		
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2022-09-08	2023-09-07		
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2022-10-21	2023-10-20		
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-20	2023-12-19		
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A		

General used equipmen	t				
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2023-06-11	2024-06-10



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#### **Radio Spectrum Technical Requirement** 6

#### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

#### 6.1.2 Conclusion

Standard 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 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

Both of two antenna are dedicated and no consideration of replacement. The best case gain of this two antenna is 3 dBi. The directional gain is 6.01dBi.

Antenna location: Refer to internal photo.



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

3 m

#### Radiated Emissions which fall in the restricted bands 7.1

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 11.12

Limit:

Test Distance:

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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### 7.1.1 E.U.T. Operation

**Operating Environment:** 

Temperature:	24.2 °C	Humidity:	52.2 % RH	Atmospheric Pressure:	1006	mbar
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#### 7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



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#### 7.1.3 Test Setup Diagram



#### 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 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: 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.

Remark3:For WLAN radiated test, according to the conducted power and verify test the SISO & MIMO mode, the worst-case is SISO mode for 802.11b/g, MIMO mode for 802.11n, therefore, all final test are performed in SISO & MIMO mode and reported.



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Test Mode: 00; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:Low



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Test Mode: 00; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:Low





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Test Mode: 00; Polarity: Vertical; Modulation:802.11b; Bandwidth:20MHz; Channel:High



1 *	2462.000	92.77	27.82	3.64	37.74	86.49	74.00	12.49	VERTICAL	Peak
2	2483.500	46.74	27.85	3.42	37.73	40.28	74.00	-33.72	VERTICAL	Peak
3	2493.594	49.73	27.86	3.33	37.72	43.20	74.00	-30.80	VERTICAL	Peak



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Test Mode: 00; Polarity: Horizontal; Modulation:802.11b; Bandwidth:20MHz; Channel:High



3.42 37.73 40.42 74.00 -33.58 HORIZONTAL Peak 2 2483.500 46.88 27.85 2490.875 49.59 27.86 3.33 37.73 43.05 74.00 -30.95 HORIZONTAL Peak 3



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Test Mode: 00; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:Low





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Test Mode: 00; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:High



3.64 37.74 90.55 74.00 16.55 VERTICAL 1 \* 2462.000 96.83 27.82 Peak 47.01 27.85 3.42 37.73 40.55 74.00 -33.45 VERTICAL Peak 2 2483.500 2495.207 50.34 27.86 3.33 37.72 43.81 74.00 -30.19 VERTICAL 3 Peak



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Test Mode: 00; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:High



3.24 37.72 45.98 74.00 -28.02 HORIZONTAL Peak 2498.082 52.59 27.87



3

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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:Low





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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:20MHz; Channel:High



47.74 27.85 3.42 37.73 41.28 74.00 -32.72 VERTICAL Peak 2483.500 3.24 37.72 43.53 74.00 -30.47 VERTICAL Peak 2498.990 50.14 27.87



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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:20MHz; Channel:High



3.24 37.72 45.70 74.00 -28.30 HORIZONTAL Peak 2499.596 52.31 27.87



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Test Mode: 00; Polarity: Vertical; Modulation:802.11n; Bandwidth:40MHz; Channel:Low



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Test Mode: 00; Polarity: Horizontal; Modulation:802.11n; Bandwidth:40MHz; Channel:Low





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#### 7.2 Radiated Spurious Emissions Below 1GHz

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.4,6.5
Limit:	
Test Distance:	3 m

Test Distance:

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

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

Operating Enviro	nment:					
Temperature:	23.6 °C	Humidity:	56.3 % RH	Atmospheric Pressure:	1006	mbar

#### 7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.

#### 7.2.3 Test Setup Diagram





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#### 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. 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.

3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



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Test Mode: 00; Polarity: Horizontal

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

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Guanoz

aboratory.

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	50.942	37.01	13.97	0.48	28.10	23.36	40.00	-16.64	HORIZONTAL	QP
2	59.441	29.66	13.45	0.52	28.10	15.53	40.00	-24.47	HORIZONTAL	QP
3	111.738	45.96	10.49	0.70	28.07	29.08	43.50	-14.42	HORIZONTAL	QP
4	164.330	40.11	13.48	0.86	27.73	26.72	43.50	-16.78	HORIZONTAL	QP
5	233.349	44.69	11.22	1.03	27.55	29.39	46.00	-16.61	HORIZONTAL	QP
6	801.786	33.47	22.88	1.93	28.50	29.78	46.00	-16.22	HORIZONTAL	QP



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Test Mode: 00; Polarity: Vertical

: SGS
:
:
:
:

	Freq	Read Level	Anterna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	37.416	36.07	13.31	0.41	28.14	21.65	40.00	-18.35	VERTICAL	QP
2	70.584	34.72	11.46	0.56	28.10	18.64	40.00	-21.36	VERTICAL	QP
3	108.647	39.58	10.27	0.70	28.08	22.47	43.50	-21.03	VERTICAL	QP
4	166.651	37.85	13.38	0.87	27.71	24.39	43.50	-19.11	VERTICAL	QP
5	226.894	39.18	10.47	1.01	27.57	23.09	46.00	-22.91	VERTICAL	QP
6	434.065	36.14	16.60	1.41	28.24	25.91	46.00	-20.09	VERTICAL	QP



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#### 7.3 Radiated Spurious Emissions Above 1GHz

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.6
Limit:	

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

#### 7.3.1 E.U.T. Operation

Operating Environ	iment:					
Temperature:	24.2 °C	Humidity:	52.2 % RH	Atmospheric Pressure:	1006	mbar

#### 7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40), final test modes are considering the modulation and worse data rates. Only the data of worst case is recorded in the report.



#### 7.3.3 Test Setup Diagram



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#### 7.3.4 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 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. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

4. For WLAN radiated test, according to the conducted power and verify test the SISO & MIMO mode, the worst-case is SISO mode for 802.11b/g, MIMO mode for 802.11n, therefore, all final test are performed in SISO & MIMO mode and reported.



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Test Mode: 00; Polarity: Vertical; Modulation:802.11g; Bandwidth:20MHz; Channel:Low





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Test Mode: 00; Polarity: Horizontal; Modulation:802.11g; Bandwidth:20MHz; Channel:middle



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

Refer to Appendix - Test Setup Photo for GZCR230600063305

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

Refer to Appendix - External and Internal Photos for GZCR2306000633AT

- End of the Report -



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