

Report No.: GZCR210802087101

Page: 1 of 24 FCC ID: 2AYOTME-USI150

TEST REPORT

Application No.: GZCR2108020871AT

Applicant: Shenzhen gianfenyi intelligent technology co., LTD.

Address of Applicant: 3002, Chuangxingda Commercial Center Baoan District, Shenzhen, 518000

China

Manufacturer: Shenzhen gianfenyi intelligent technology co., LTD.

Address of Manufacturer: 302, Floor 3 Chuangxingda Commercial Center Building, Bao'an District,

Shenzhen, PRC

Factory: Shenzhen qianfenyi intelligent technology co., LTD.

Address of Factory: 4F, Building E, Baoshi Technology Park, Baoshi Road, Tangtou Community,

Shiyan Street, Bao'an District, Shenzhen, PRC

Equipment Under Test (EUT):

EUT Name: ME-USI150 **Model No.:** ME-USI150

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

Date of Receipt: 2021-08-22

Date of Test: 2021-08-22 to 2021-08-28

Date of Issue: 2021-08-29

Test Result: Pass*

Kobe Jian EMC Laboratory Manager



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



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| | Revision Record | | | | | | |
|---------|--------------------------------------|------------|--|----------|--|--|--|
| Version | Version Chapter Date Modifier Remark | | | | | | |
| 01 | | 2021-08-29 | | Original | | | |
| | | | | | | | |
| | | | | | | | |

| Authorized for issue by | | |
|-------------------------|------------------------------|---|
| | Kevin Zhang | |
| | Kevin Zhang/Project Engineer | - |
| | Riday Liu | |
| | Ricky Liu/Reviewer | - |



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2 Test Summary

| Radio Spectrum Technical Requirement | | | | | | |
|---------------------------------------|------------------------------|-----|-------------------------------------|------|--|--|
| Item Standard Method Requirement Resu | | | | | | |
| Antenna Requirement | 47 CFR Part 15, Subpart C | 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 6.9.2 | 47 CFR Part 15, Subpart C 15.215 | Pass | | | |
| Radiated Emissions (30MHz-1GHz) | 47 CFR Part 15, | ANSI C63.10 (2013) Section 6.5 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass | | | |
| Radiated Emissions (9kHz-30MHz) | Subpart C | ANSI C63.10 (2013) Section 6.4 | 47 CFR Part 15, Subpart C 15.205 & 15.209 | Pass | | | |
| Restricted band | | ANSI C63.10 (2013) Section 6.10.5 | 47 CFR Part 15, Subpart C 15.205 | 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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General Information 4

Details of E.U.T.

Power supply: 1.5V DC (1.5Vx1"AAAA" Size Batteries)

Operation Frequency: 111kHz-489kHz

Modulation Type: **D-BPSK**

Antenna Type: Loop Antenna

4.2 Description of Support Units

| Description Manufacturer | | Model No. | Serial No. |
|--------------------------|------|-----------|---------------|
| Chromebook | ASUS | C436 | client supply |

4.3 Measurement Uncertainty

| Test Item | Measurement Uncertainty | |
|---------------------------------|-----------------------------|--|
| 20dB Bandwidth | +/-3% | |
| Radiated Emissions (30MHz-1GHz) | 5.06dB (3m) 4.46dB (10m) | |
| Radiated Emissions (9kHz-30MHz) | ± 4.5dB | |
| Restricted band | ± 3% | |

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 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Test Facility

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

• NVLAP (Lab Code: 200611-0)

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

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

ACMA

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

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

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

CNAS (Lab Code: L0167)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

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

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

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

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

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

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

• CBTL (Lab Code: TL129)

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



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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions



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5 Equipment List

| 20dB Bandwidth | | | | | |
|-----------------------------------|-------------------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| EXA Signal Analzer(10Hz-44GHz) | Agilent Technologies | N9010A | EMC2138 | 2020-09-17 | 2021-09-16 |
| 6dB Attenuator | HP | 8491A | EMC2062 | 2020-04-15 | 2022-04-14 |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2019-11-02 | 2021-11-01 |

| Radiated Emissions (30MHz-1GHz) | | | | | | |
|---|--------------------------------|---------------|--------------|------------|--------------|--|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date | |
| Chamber cable | HangTianXing | N/A | EMC0542 | 2020-09-09 | 2022-09-08 | |
| Trilog Broadband Antenna(25MHz-1GHz)- Lab | SCHWARZBECK MESS-ELEKTRONIK | VULB 9168 | SEM003-18 | 2019-02-22 | 2022-02-22 | |
| Amplifier(9kHz-1.3GHz) | HP | 8447F | EMC2065 | 2021-05-19 | 2022-05-18 | |
| 10m Semi-Anechoic Chamber | ETS | N/A | EMC0530 | 2019-10-20 | 2022-10-19 | |
| Test Software E3 | Audix | Ver.6.120110a | GZE100-61 | N/A | N/A | |
| EMI Test Receiver(1Hz- 8GHz) | Rohde & Schwarz | ESW8 | EMC2220 | 2021-05-26 | 2022-05-25 | |

| Radiated Emissions (9kHz-30MHz) | | | | | | |
|---------------------------------|-----------------|---------------|--------------|------------|--------------|--|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date | |
| Chamber cable | HangTianXing | N/A | EMC0542 | 2020-09-09 | 2022-09-08 | |
| Amplifier(9kHz-1.3GHz) | HP | 8447F | EMC2065 | 2021-05-19 | 2022-05-18 | |
| Active Loop Antenna- RED | ETS-Lindgren | 6502 | EMC2190 | 2019-12-27 | 2021-12-26 | |
| 10m Semi-Anechoic Chamber | ETS | N/A | EMC0530 | 2019-10-20 | 2022-10-19 | |
| Test Software E3 | Audix | Ver.6.120110a | GZE100-61 | N/A | N/A | |
| EMI Test Receiver(1Hz- 8GHz) | Rohde & Schwarz | ESW8 | EMC2220 | 2021-05-26 | 2022-05-25 | |

| Restricted band | | | | | |
|------------------------------------|-----------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| Signal Analyzer (20Hz- 26.5GHz) | Rohde & Schwarz | FISQ 26 | EMC0069 | 2020-11-13 | 2021-11-12 |
| 6dB Attenuator | HP | 8491A | EMC2062 | 2020-04-15 | 2022-04-14 |
| MI CABLE | SGS-EMC | 0.8M | EMC2136 | 2019-11-02 | 2021-11-01 |



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| General used equipmer | nt | | | | |
|-----------------------|--------------|----------|--------------|------------|--------------|
| Equipment | Manufacturer | Model No | Inventory No | Cal Date | Cal Due Date |
| DMM | Fluke | 73 | EMC0006 | 2021-07-05 | 2022-07-05 |
| DMM | Fluke | 73 | EMC0007 | 2021-07-05 | 2022-07-05 |

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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

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 use an unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

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.

This requirement does not apply to carrier current devices or to devices operated under the provisions of §§ 15.211, 15.213, 15.217, 15.219, 15.221, or § 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site.

However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

EUT Antenna:

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

Please refer to internal photos.



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Radio Spectrum Matter Test Results

20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215 Test Method: ANSI C63.10 (2013) Section 6.9.2

For report reference only Limit:

7.1.1 E.U.T. Operation

Operating Environment:

23.3 °C Temperature: Humidity: 51.3 % RH Atmospheric Pressure: 995 mbar

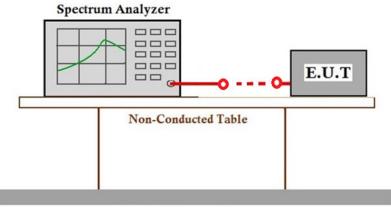
7.1.2 Test Mode Description

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

TX mode Keep the EUT in continuously transmitting mode with D-BPSK Final test 00

modulation.

7.1.3 Test Setup Diagram



Ground Reference Plane



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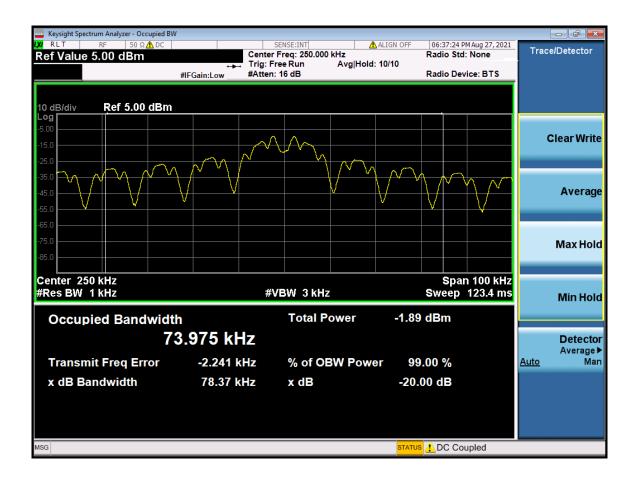
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7.1.4 Measurement Procedure and Data





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7.2 Radiated Emissions (30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

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

Measurement Distance:

Limit:

| Frequency(MHz) | Field strength(microvolts/meter) | Measurement distance(meters) | | |
|----------------|----------------------------------|------------------------------|--|--|
| 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 guasi-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.

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C Humidity: 56.8 % RH Atmospheric Pressure: 995 mbar

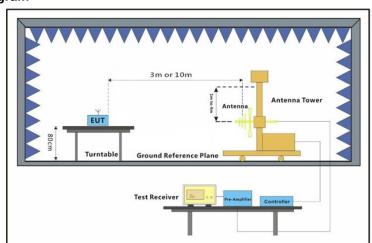
7.2.2 Test Mode Description

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

TX mode Keep the EUT in continuously transmitting mode with D-BPSK Final test 00

modulation.

7.2.3 Test Setup Diagram





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7.2.4 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 meter semianechoic 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, 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.
- j. Repeat above procedures until all frequencies measured was complete.

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



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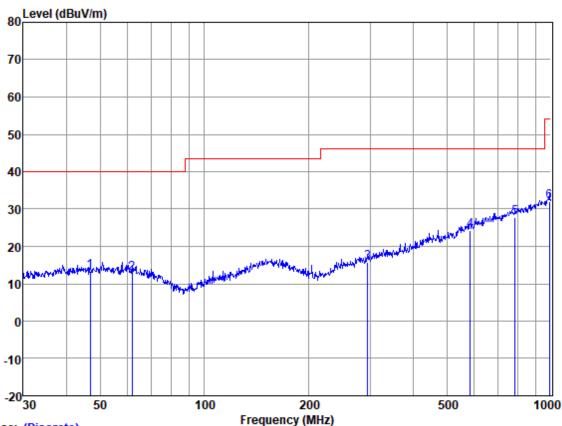
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Test Mode: 00; Polarity: Horizontal



Trace: (Discrete)

Site : SGS

Condition : FCC PART15 C (3M)

Job :
Model :
Power :
Test Mode :

| | Freq | | | | | Measured Level | | | Pol/ Phase | Remark |
|---|--------|-------|-------|------|-------|-------------------|--------|--------|---------------|--------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dBuV | | |
| 1 | 46.83 | 25.46 | 13.94 | 1.13 | 27.17 | 13.36 | 40.00 | -26.64 | HORIZONTAL | QP |
| 2 | 61.78 | 25.64 | 13.13 | 1.28 | 27.15 | 12.90 | 40.00 | -27.10 | HORIZONTAL | QP |
| 3 | 295.15 | 25.64 | 13.50 | 3.15 | 26.55 | 15.74 | 46.00 | -30.26 | HORIZONTAL | QP |
| 4 | 584.79 | 27.99 | 19.30 | 5.06 | 28.19 | 24.16 | 46.00 | -21.84 | HORIZONTAL | QP |
| 5 | 787.85 | 27.27 | 22.45 | 6.11 | 28.04 | 27.79 | 46.00 | -18.21 | HORIZONTAL | QP |
| 6 | 989.54 | 28.22 | 24.20 | 7.37 | 27.67 | 32.12 | 54.00 | -21.88 | HORIZONTAL | QP |



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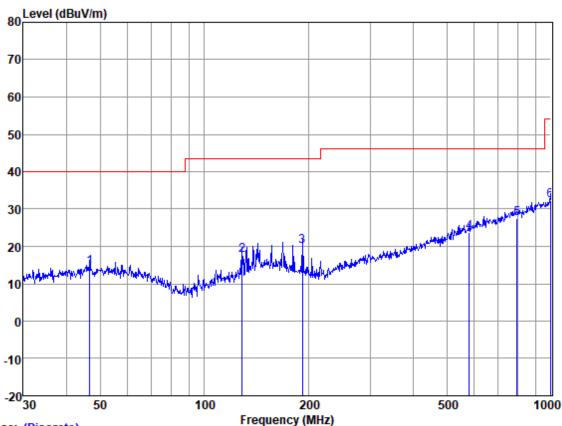
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Test Mode: 00; Polarity: Vertical



Trace: (Discrete)

Site : SGS

Condition : FCC PART15 C (3M)

Job :
Model :
Power :
Test Mode :

| | Freq | | | | | Measured Level | | | Pol/ Phase | Remark |
|---|--------|-------|-------|------|-------|-------------------|--------|--------|---------------|--------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dBuV | | |
| 1 | 46.67 | 26.51 | 13.93 | 1.13 | 27.17 | 14.40 | 40.00 | -25.60 | VERTICAL | QP |
| 2 | 128.56 | 30.86 | 11.87 | 1.94 | 27.00 | 17.67 | 43.50 | -25.83 | VERTICAL | QP |
| 3 | 191.75 | 33.36 | 10.90 | 2.50 | 26.74 | 20.02 | 43.50 | -23.48 | VERTICAL | QP |
| 4 | 580.70 | 27.77 | 19.20 | 5.02 | 28.18 | 23.81 | 46.00 | -22.19 | VERTICAL | QP |
| 5 | 796.18 | 26.80 | 22.57 | 6.14 | 28.03 | 27.48 | 46.00 | -18.52 | VERTICAL | QP |
| 6 | 996.50 | 28.21 | 24.27 | 7.43 | 27.66 | 32.25 | 54.00 | -21.75 | VERTICAL | QP |



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7.3 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209

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

Measurement Distance: 3m

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 |

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. 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.

If field strength is measured at only a single point, then that point shall be at the radial from the EUT that produces the maximum emission at the frequency being measured, as described in 5.4. If that point is closer to the EUT than $\lambda/2\pi$ and the limit distance is greater than $\lambda/2\pi$, the measurement shall be extrapolated to the limit distance by conservatively presuming that the field strength decreases at a 40 dB/decade of distance rate to the $\lambda/2\pi$ distance, and at a 20 dB/decade of distance rate beyond $\lambda/2\pi$. This shall be accomplished using Equation (2):

$$FS_{(10m)} = FS_{(30/300m)} + 40log\{d_{(near field)}/d_{(10m)}\} + 20log\{d_{(30/300m)}/d_{(near field)}\}$$
(2)

If the single point measured is at a distance greater than $\lambda/2\pi$, then extrapolation to the limit distance shall be calculated using Equation (3):

$$FS_{(10m)} = FS_{(30/300m)} + 20log\{d_{(30/300m)}/d_{(10m)}\}$$
(3)

If both the single point and the limit distance are equal to or closer to the EUT than $\lambda/2\pi$, then extrapolation to the limit distance shall be calculated using Equation (4):

$$FS_{(10m)} = FS_{(30/300m)} + 40log\{d_{(30/300m)}/d_{(10m)}\}$$
(4)

Remark:

 $d_{near field} = 47.77 / f_{MHz}$

where f_{MHz} is the frequency of the emission being measured in MHz.

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.1 °C Humidity: 56.9 % RH Atmospheric Pressure: 995 mbar



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7.3.2 Test Mode Description

Pre-scan / Mode Final test Code

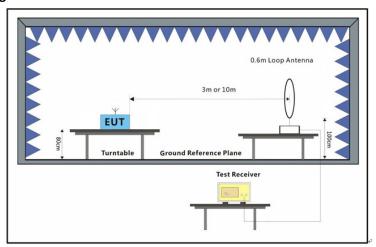
Description

Final test 00

TX mode_Keep the EUT in continuously transmitting mode with D-BPSK

modulation.

7.3.3 Test Setup Diagram



7.3.4 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.



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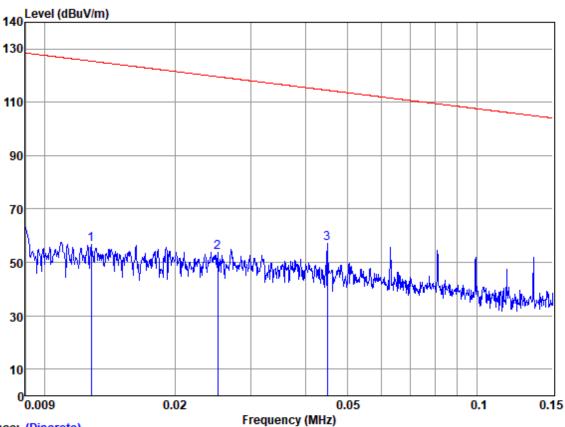
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Test Mode: 00; Polarity: Coplanar



Trace: (Discrete)

Site : SGS

Condition : FCC LOOP 9K -30M 3

Job :
Model :
Power :
Test Mode :

| | Freq | | | | | Measured Level | | | | Remark |
|---|------|-------|-------|------|-------|-------------------|--------|--------|------------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dBuV | | |
| 1 | 0.01 | 69.71 | 15.10 | 0.05 | 28.23 | 56.63 | 125.47 | -68.84 | HORIZONTAL | Average |
| 2 | 0.03 | 69.30 | 12.83 | 0.05 | 28.54 | 53.64 | 119.60 | -65.96 | HORIZONTAL | Average |
| 3 | 0.04 | 74.33 | 11.96 | 0.05 | 29.24 | 57.10 | 114.54 | -57.44 | HORIZONTAL | Average |



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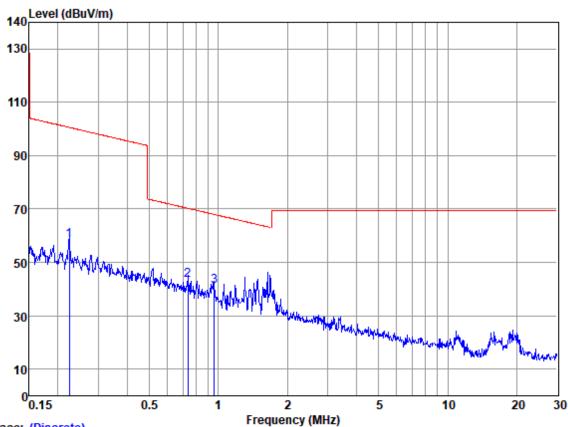
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Test Mode: 00; Polarity: Coplanar



Trace: (Discrete)

Site : SGS

Condition : FCC LOOP 9K -30M 3

Job :
Model :
Power :
Test Mode :

| | Freq | | | | | Measured Level | | | | Remark |
|---|------|-------|-------|------|-------|-------------------|--------|--------|------------|---------|
| | MHz | dBuV | dB/m | dB | dB | dBuV/m | dBuV/m | dBuV | | |
| 1 | 0.22 | 77.02 | 10.79 | 0.05 | 29.45 | 58.41 | 100.58 | -42.17 | HORIZONTAL | Average |
| 2 | 0.74 | 61.90 | 10.51 | 0.12 | 29.41 | 43.12 | 70.28 | -27.16 | HORIZONTAL | QP |
| 3 | 0.96 | 59.77 | 10.41 | 0.13 | 29.41 | 40.90 | 67.98 | -27.08 | HORIZONTAL | QP |

Remark: All tests were conducted in two different polarizations and the worst case (coplanar) is reported only.



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7.4 Restricted band

Test Requirement 47 CFR Part 15, Subpart C 15.205 Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

The fundamental wave could not fall in the restricted band 90KHz-110KHz and 495-505KHz

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.3 °C Humidity: 56.4 % RH Atmospheric Pressure: 995 mbar

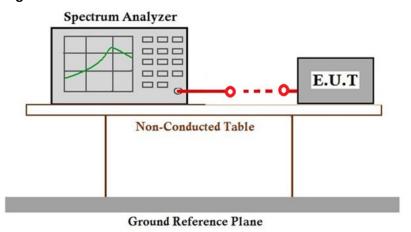
7.4.2 Test Mode Description

Pre-scan / Mode Final test Code Description

Final test 00 TX mode_Keep the EUT in continuously transmitting mode with D-BPSK

modulation.

7.4.3 Test Setup Diagram



7.4.4 Measurement Procedure and Data



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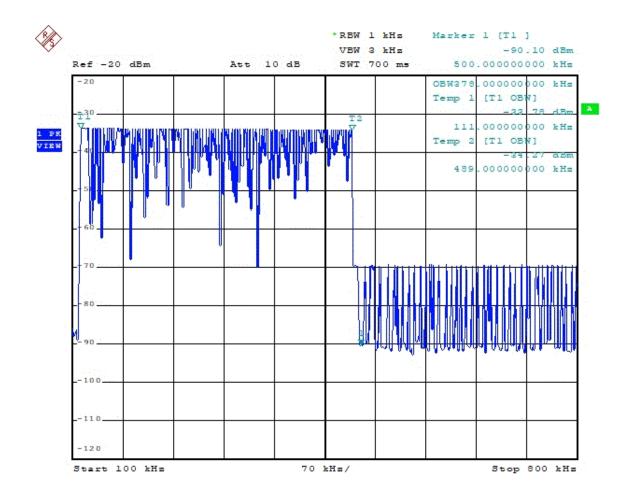
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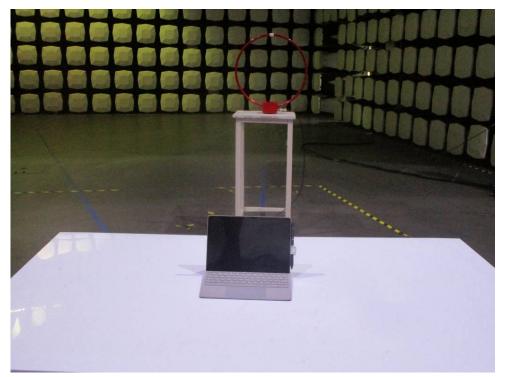


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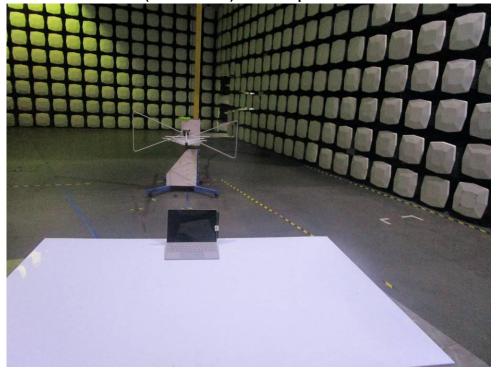
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Test Setup Photo 8

Radiated Emissions (9kHz-30MHz) Test Setup



Radiated Emissions (30MHz-1GHz) Test Setup





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EUT Constructional Details (EUT Photos) 9

Refer to Appendix - External and Internal Photos for GZCR2108020871AT.

- End of the Report -



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