

# TEST REPORT

**Application No.:** SZCR2312004019AT  
**Applicant:** KEYENCE CORPORATION  
**Address of Applicant:** 1-3-14, Higashinakajima, Higashiyodogawa-ku, Osaka, 533-8555 Japan  
**Manufacturer:** KEYENCE CORPORATION  
**Address of Manufacturer:** 1-3-14, Higashinakajima, Higashiyodogawa-ku, Osaka, 533-8555 Japan  
**Factory:** KEYENCE CORPORATION  
**Address of Factory:** 1-3-14, Higashinakajima, Higashiyodogawa-ku, Osaka, 533-8555 Japan  
**Equipment Under Test (EUT):**  
**EUT Name:** Handheld Terminal  
**Model No.:** BT-A600MGA  
**Trade Mark:** KEYENCE  
**FCC ID:** RF41761A  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.225  
**Date of Receipt:** 2023-12-08  
**Date of Test:** 2023-12-22 to 2024-08-12  
**Date of Issue:** 2024-08-23

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>Pass*</b> |
|---------------------|--------------|

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

*Keny Xu*

Keny Xu  
EMC Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch (EMC) EMC Laboratory

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| Revision Record |         |            |          |          |
|-----------------|---------|------------|----------|----------|
| Version         | Chapter | Date       | Modifier | Remark   |
| 01              |         | 2024-08-23 |          | Original |
|                 |         |            |          |          |
|                 |         |            |          |          |

|                          |  |                              |  |  |
|--------------------------|--|------------------------------|--|--|
| Authorized for issue by: |  |                              |  |  |
|                          |  | Calvin Weng                  |  |  |
|                          |  | Calvin Weng/Project Engineer |  |  |
|                          |  | Eric Fu                      |  |  |
|                          |  | Eric Fu/Reviewer             |  |  |



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## 2 Test Summary

| Radio Spectrum Technical Requirement |                                  |        |                                  |        |
|--------------------------------------|----------------------------------|--------|----------------------------------|--------|
| Item                                 | Standard                         | Method | Requirement                      | Result |
| Antenna Requirement                  | 47 CFR Part 15, Subpart C 15.225 | N/A    | 47 CFR Part 15, Subpart C 15.203 | Pass   |

| Radio Spectrum Matter Part                            |                                  |                                |                                              |        |
|-------------------------------------------------------|----------------------------------|--------------------------------|----------------------------------------------|--------|
| Item                                                  | Standard                         | Method                         | Requirement                                  | Result |
| Conducted Emissions at Mains Terminals (150kHz-30MHz) | 47 CFR Part 15, Subpart C 15.225 | ANSI C63.10 (2013) Section 6.2 | 47 CFR Part 15, Subpart C 15.207             | Pass   |
| 20dB Bandwidth                                        |                                  | ANSI C63.10 (2013) Section 6.9 | 47 CFR Part 15, Subpart C 15.215             | Pass   |
| Emission Mask                                         |                                  | ANSI C63.10 (2013) Section 6.4 | 47 CFR Part 15, Subpart C 15.225(a)&(b)&(C ) | Pass   |
| Frequency tolerance                                   |                                  | ANSI C63.10 (2013) Section 6.8 | 47 CFR Part 15, Subpart C 15.225(e)          | Pass   |
| Radiated Emissions (9kHz-30MHz)                       |                                  | ANSI C63.10 (2013) Section 6.4 | 47 CFR Part 15, Subpart C 15.225(d) & 15.209 | Pass   |
| Radiated Emissions (30MHz-1GHz)                       |                                  | ANSI C63.10 (2013) Section 6.5 | 47 CFR Part 15, Subpart C 15.225(d) & 15.209 | Pass   |



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## 4 General Information

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

|                      |                                                                                                                                                 |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply:        | DC3.6V by li-ion battery(6270mAh)<br>M/N:DX-BC6<br>Battery manufacturer:Getac Technology(Kunshan)Co.,Ltd.<br>Recharged by DC5V/2A power adapter |
| Operation Frequency: | 13.56MHz                                                                                                                                        |
| Modulation Type:     | ASK                                                                                                                                             |

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. |
|-------------|--------------|-----------|------------|
| --          | --           | --        | --         |

The EUT has been tested as an independent unit.

### 4.3 Measurement Uncertainty

| Test Item                                             | Measurement Uncertainty                               |
|-------------------------------------------------------|-------------------------------------------------------|
| Conducted Emissions at Mains Terminals (150kHz-30MHz) | $\pm 3.1\text{dB}$                                    |
| 20dB Bandwidth                                        | $\pm 3\%$                                             |
| Emission Mask                                         | $\pm 4.5\text{dB}$ (Below 1GHz)                       |
| Frequency tolerance                                   | $\pm 3\%$                                             |
| Radiated Emissions (9kHz-30MHz)                       | $\pm 3.6\text{dB}$                                    |
| Radiated Emissions (30MHz-1GHz)                       | $\pm 6.0\text{dB}$ for 3m; $\pm 5.0\text{dB}$ for 10m |

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### 4.4 Test Location

All tests were performed at:

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No tests were sub-contracted.

### 4.5 Test Facility

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

#### • A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

#### • VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

#### • FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

#### • Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

### 4.6 Deviation from Standards

None

### 4.7 Abnormalities from Standard Conditions

None



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## 5 Equipment List

| Conducted Emissions at AC Power Line (150kHz-30MHz) |                  |                  |               |                          |                          |
|-----------------------------------------------------|------------------|------------------|---------------|--------------------------|--------------------------|
| Equipment                                           | Manufacturer     | Model No.        | Inventory No. | Cal Date                 | Cal Due Date             |
| Shielding Room                                      | ZhongYu Electron | GB-88            | SEM001-06     | 2022-05-14               | 2025-05-13               |
| EMI Test Receiver                                   | Rohde&Schwarz    | ESCI             | SEM004-02     | 2023-03-15<br>2024-03-14 | 2024-03-14<br>2025-03-13 |
| Measurement Software                                | AUDIX            | e3 V8.2014-6-27a | N/A           | N/A                      | N/A                      |
| Coaxial Cable                                       | SGS              | N/A              | SEM024-01     | 2023-07-07<br>2024-07-06 | 2024-07-06<br>2025-07-05 |
| LISN                                                | Rohde&Schwarz    | ENV216           | SEM007-01     | 2023-08-15               | 2024-08-14               |
| LISN                                                | ETS-LINDGREN     | 3816/2           | SEM007-02     | 2023-03-15<br>2024-03-14 | 2024-03-14<br>2025-03-13 |

| 20dB Bandwidth       |                 |               |               |                          |                          |
|----------------------|-----------------|---------------|---------------|--------------------------|--------------------------|
| Equipment            | Manufacturer    | Model No.     | Inventory No. | Cal Date                 | Cal Due Date             |
| DC Power Supply      | Zhao Xin        | PS-305D       | SEM011-13     | 2023-08-15               | 2024-08-14               |
| Spectrum Analyzer    | Rohde & Schwarz | FSP30         | SEM004-06     | 2023-09-19               | 2024-09-18               |
| Measurement Software | TST PASS        | TST PASS V2.0 | N/A           | N/A                      | N/A                      |
| Coaxial Cable        | SGS             | N/A           | SEM031-01     | 2023-07-07<br>2024-07-06 | 2024-07-06<br>2025-07-05 |
| Attenuator           | Huber+Suhner    | 6620_SMA-50-1 | SEM021-09     | 2023-03-28<br>2024-03-27 | 2024-03-27<br>2025-03-26 |

| Emission Mask             |                      |                 |               |                          |                          |
|---------------------------|----------------------|-----------------|---------------|--------------------------|--------------------------|
| Equipment                 | Manufacturer         | Model No.       | Inventory No. | Cal Date                 | Cal Due Date             |
| 10m Semi-Anechoic Chamber | SAEMC                | FSAC1018        | SEM001-03     | 2023-03-28<br>2024-03-27 | 2024-03-27<br>2025-03-26 |
| MXE EMI receiver          | KEYSIGHT             | N9038A          | SEM004-16     | 2023-08-15               | 2024-08-14               |
| Trilog-Broadband Antenna  | Schwarzbeck          | VULB9168        | SEM003-18     | 2023-09-23               | 2025-09-22               |
| Pre-amplifier             | Sonoma Instrument Co | 310N            | SEM005-04     | 2023-03-28<br>2024-03-27 | 2024-03-27<br>2025-03-26 |
| Loop Antenna              | ETS-Lindgren         | 6502            | SEM003-08     | 2023-11-20               | 2025-11-19               |
| Measurement Software      | AUDIX                | e3 V8.2014-6-27 | N/A           | N/A                      | N/A                      |
| Coaxial Cable             | SGS                  | N/A             | SEM029-01     | 2023-07-07<br>2024-07-06 | 2024-07-06<br>2025-07-05 |



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| Frequency tolerance                         |                              |               |               |                          |                          |
|---------------------------------------------|------------------------------|---------------|---------------|--------------------------|--------------------------|
| Equipment                                   | Manufacturer                 | Model No.     | Inventory No. | Cal Date                 | Cal Due Date             |
| DC Power Supply                             | Zhao Xin                     | PS-305D       | SEM011-13     | 2023-08-15               | 2024-08-14               |
| Spectrum Analyzer                           | Rohde & Schwarz              | FSP30         | SEM004-06     | 2023-09-19               | 2024-09-18               |
| Measurement Software                        | TST PASS                     | TST PASS V2.0 | N/A           | N/A                      | N/A                      |
| Coaxial Cable                               | SGS                          | N/A           | SEM031-01     | 2023-07-07<br>2024-07-06 | 2024-07-06<br>2025-07-05 |
| Attenuator                                  | Huber+Suhner                 | 6620_SMA-50-1 | SEM021-09     | 2023-03-28<br>2024-03-27 | 2024-03-27<br>2025-03-26 |
| Programmable Temperature & Humidity Chamber | Votsch Industrietechnik GmbH | VT 4002       | SEM002-15     | 2023-03-20<br>2024-03-19 | 2024-03-19<br>2025-03-18 |

| Radiated Emissions (9kHz-30MHz) |                      |                 |               |                          |                          |
|---------------------------------|----------------------|-----------------|---------------|--------------------------|--------------------------|
| Equipment                       | Manufacturer         | Model No.       | Inventory No. | Cal Date                 | Cal Due Date             |
| 10m Semi-Anechoic Chamber       | SAEMC                | FSAC1018        | SEM001-03     | 2023-03-28<br>2024-03-27 | 2024-03-27<br>2025-03-26 |
| MXE EMI receiver                | KEYSIGHT             | N9038A          | SEM004-16     | 2023-08-15               | 2024-08-14               |
| Trilog-Broadband Antenna        | Schwarzbeck          | VULB9168        | SEM003-18     | 2023-09-23               | 2025-09-22               |
| Pre-amplifier                   | Sonoma Instrument Co | 310N            | SEM005-04     | 2023-03-28<br>2024-03-27 | 2024-03-27<br>2025-03-26 |
| Loop Antenna                    | ETS-Lindgren         | 6502            | SEM003-08     | 2023-11-20               | 2025-11-19               |
| Measurement Software            | AUDIX                | e3 V8.2014-6-27 | N/A           | N/A                      | N/A                      |
| Coaxial Cable                   | SGS                  | N/A             | SEM029-01     | 2023-07-07<br>2024-07-06 | 2024-07-06<br>2025-07-05 |

| Radiated Emissions (30MHz-1GHz) |                      |                 |               |                          |                          |
|---------------------------------|----------------------|-----------------|---------------|--------------------------|--------------------------|
| Equipment                       | Manufacturer         | Model No.       | Inventory No. | Cal Date                 | Cal Due Date             |
| 10m Semi-Anechoic Chamber       | SAEMC                | FSAC1018        | SEM001-03     | 2023-03-28<br>2024-03-27 | 2024-03-27<br>2025-03-26 |
| MXE EMI receiver                | KEYSIGHT             | N9038A          | SEM004-16     | 2023-08-15               | 2024-08-14               |
| Trilog-Broadband Antenna        | Schwarzbeck          | VULB9168        | SEM003-18     | 2023-09-23               | 2025-09-22               |
| Pre-amplifier                   | Sonoma Instrument Co | 310N            | SEM005-04     | 2023-03-28<br>2024-03-27 | 2024-03-27<br>2025-03-26 |
| Loop Antenna                    | ETS-Lindgren         | 6502            | SEM003-08     | 2023-11-20               | 2025-11-19               |
| Measurement Software            | AUDIX                | e3 V8.2014-6-27 | N/A           | N/A                      | N/A                      |



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|               |     |     |           |                          |                          |
|---------------|-----|-----|-----------|--------------------------|--------------------------|
| Coaxial Cable | SGS | N/A | SEM029-01 | 2023-07-07<br>2024-07-06 | 2024-07-06<br>2025-07-05 |
|---------------|-----|-----|-----------|--------------------------|--------------------------|

| General used equipment          |                                           |           |               |                          |                          |
|---------------------------------|-------------------------------------------|-----------|---------------|--------------------------|--------------------------|
| Equipment                       | Manufacturer                              | Model No. | Inventory No. | Cal Date                 | Cal Due Date             |
| Humidity/ Temperature Indicator | deli                                      | 8838      | SEM002-32     | 2023-07-25<br>2024-07-24 | 2024-07-24<br>2025-07-23 |
| Humidity/ Temperature Indicator | deli                                      | 8838      | SEM002-33     | 2023-07-25<br>2024-07-24 | 2024-07-24<br>2025-07-23 |
| Barometer                       | Changchun Meteorological Industry Factory | DYM3      | SEM002-01     | 2023-03-19<br>2024-03-18 | 2024-03-18<br>2025-03-17 |



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## 6 Radio Spectrum Technical Requirement

### 6.1 Antenna Requirement

#### 6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

#### 6.1.2 Conclusion

15.203 requirement:

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

EUT Antenna:

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

Antenna location: Refer to Internal photos



## 7 Radio Spectrum Matter Test Results

### 7.1 Conducted Emissions at Mains Terminals (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

| Frequency range (MHz) | Limit (dBuV) |           |
|-----------------------|--------------|-----------|
|                       | Quasi-peak   | Average   |
| 0.15-0.5              | 66 to 56*    | 56 to 46* |
| 0.5-5                 | 56           | 46        |
| 5-30                  | 60           | 50        |

\* Decreases with the logarithm of the frequency.

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

Operating Environment:

Temperature: 23.2 °C

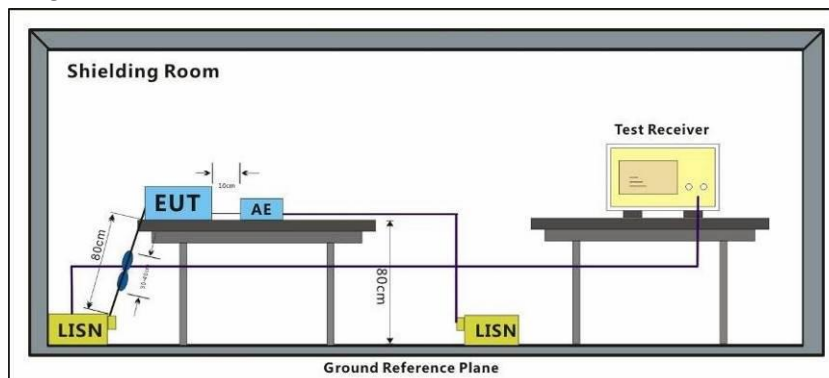
Humidity: 50.5 % RH

Atmospheric Pressure: 1000 mbar

#### 7.1.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description             |
|-----------------------|-----------|-------------------------|
| Final test            | 29        | TX mode with modulation |

#### 7.1.3 Test Setup Diagram



## 7.1.4 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: Level=Read Level+ Cable Loss+ LISN Factor



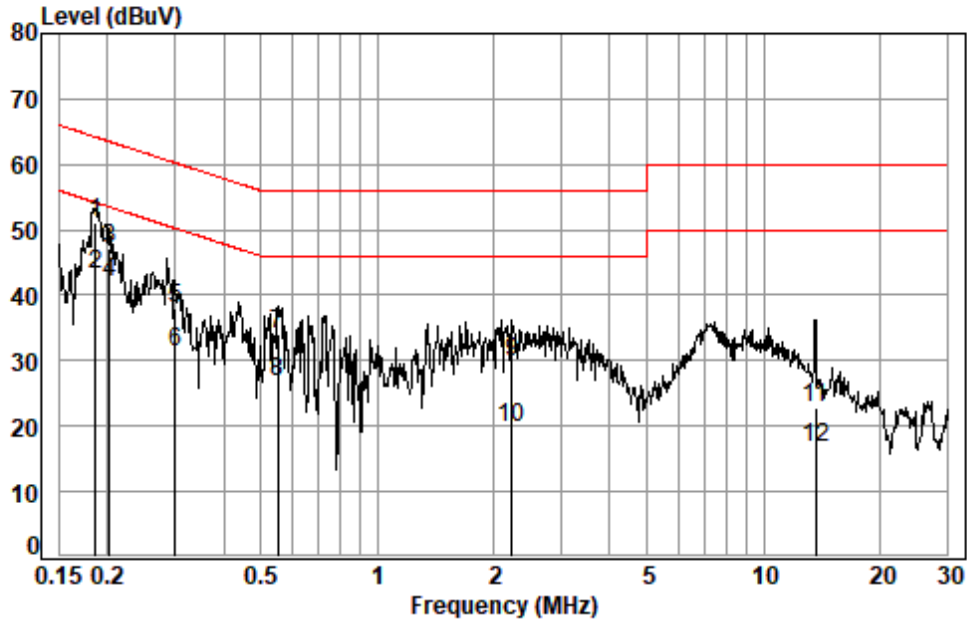
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Test Mode: 29; Line: Live line



Site : Shielding Room  
Condition: Line  
Job No. : 04019AT  
Test mode: 29

|     |         | Cable | LISN   | Read  | Limit | Over  |                |
|-----|---------|-------|--------|-------|-------|-------|----------------|
|     | Freq    | Loss  | Factor | Level | Level | Line  | Limit Remark   |
|     | MHz     | dB    | dB     | dBuV  | dBuV  | dBuV  | dB             |
| 1 * | 0.1864  | 0.02  | 10.28  | 40.70 | 51.00 | 64.20 | -13.20 QP      |
| 2 * | 0.1864  | 0.02  | 10.28  | 32.76 | 43.06 | 54.20 | -11.14 Average |
| 3   | 0.2029  | 0.02  | 10.28  | 36.99 | 47.29 | 63.49 | -16.20 QP      |
| 4   | 0.2029  | 0.02  | 10.28  | 31.62 | 41.92 | 53.49 | -11.57 Average |
| 5   | 0.3003  | 0.03  | 10.31  | 27.60 | 37.94 | 60.24 | -22.30 QP      |
| 6   | 0.3003  | 0.03  | 10.31  | 20.87 | 31.21 | 50.24 | -19.03 Average |
| 7   | 0.5523  | 0.04  | 10.34  | 23.79 | 34.17 | 56.00 | -21.83 QP      |
| 8   | 0.5523  | 0.04  | 10.34  | 16.39 | 26.77 | 46.00 | -19.23 Average |
| 9   | 2.2367  | 0.07  | 10.45  | 19.44 | 29.96 | 56.00 | -26.04 QP      |
| 10  | 2.2367  | 0.07  | 10.45  | 9.22  | 19.74 | 46.00 | -26.26 Average |
| 11  | 13.6228 | 0.21  | 10.81  | 11.74 | 22.76 | 60.00 | -37.24 QP      |
| 12  | 13.6228 | 0.21  | 10.81  | 5.81  | 16.83 | 50.00 | -33.17 Average |



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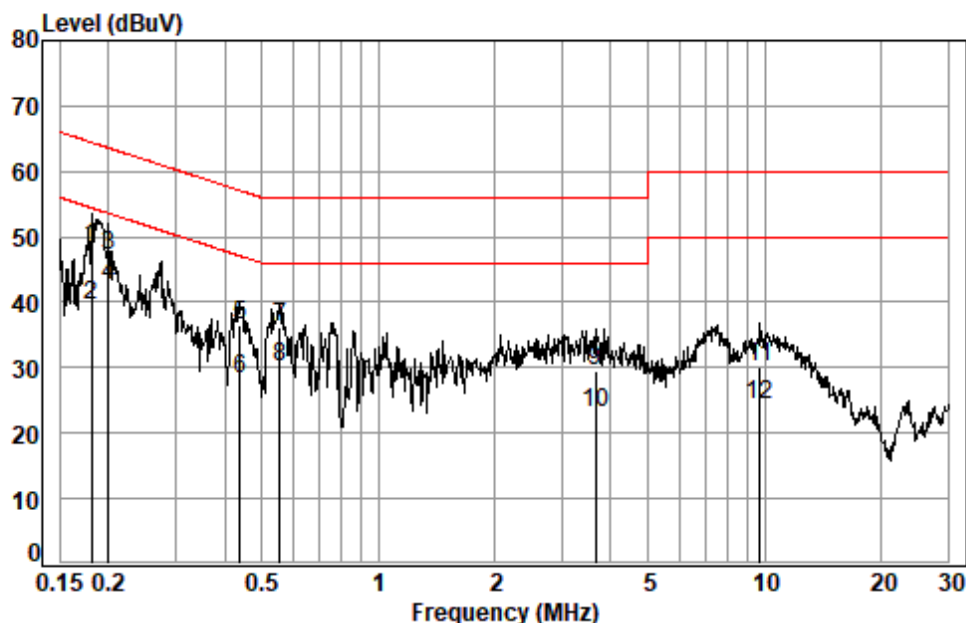
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Test Mode: 29; Line: Neutral Line



Site : Shielding Room

Condition: Neutral

Job No. : 04019AT

Test mode: 29

|     |        | Cable | LISN   | Read  | Limit | Over  |                |
|-----|--------|-------|--------|-------|-------|-------|----------------|
|     | Freq   | Loss  | Factor | Level | Level | Line  | Limit Remark   |
|     | MHz    | dB    | dB     | dBuV  | dBuV  | dBuV  | dB             |
| 1 * | 0.1815 | 0.02  | 10.25  | 37.95 | 48.22 | 64.42 | -16.20 QP      |
| 2   | 0.1815 | 0.02  | 10.25  | 29.36 | 39.63 | 54.42 | -14.79 Average |
| 3   | 0.2007 | 0.02  | 10.25  | 36.86 | 47.13 | 63.58 | -16.45 QP      |
| 4 * | 0.2007 | 0.02  | 10.25  | 32.23 | 42.50 | 53.58 | -11.08 Average |
| 5   | 0.4374 | 0.03  | 10.28  | 26.08 | 36.39 | 57.11 | -20.72 QP      |
| 6   | 0.4374 | 0.03  | 10.28  | 18.08 | 28.39 | 47.11 | -18.72 Average |
| 7   | 0.5552 | 0.04  | 10.31  | 25.70 | 36.05 | 56.00 | -19.95 QP      |
| 8   | 0.5552 | 0.04  | 10.31  | 19.91 | 30.26 | 46.00 | -15.74 Average |
| 9   | 3.6418 | 0.08  | 10.67  | 18.80 | 29.55 | 56.00 | -26.45 QP      |
| 10  | 3.6418 | 0.08  | 10.67  | 12.28 | 23.03 | 46.00 | -22.97 Average |
| 11  | 9.7567 | 0.17  | 11.05  | 18.81 | 30.03 | 60.00 | -29.97 QP      |
| 12  | 9.7567 | 0.17  | 11.05  | 12.98 | 24.20 | 50.00 | -25.80 Average |



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### 7.2 20dB Bandwidth

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

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

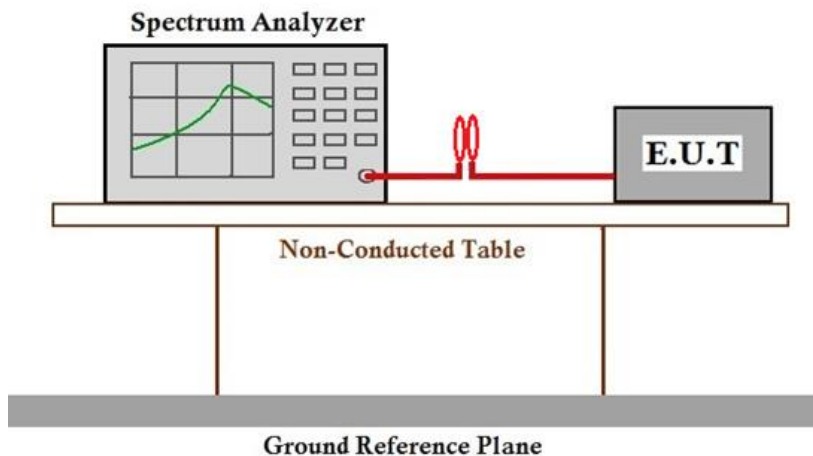
Operating Environment:

Temperature: 23.2 °C Humidity: 45 % RH Atmospheric Pressure: 1000 mbar

#### 7.2.2 Test Mode Description

| Pre-scan /<br>Final test | Mode<br>Code | Description             |
|--------------------------|--------------|-------------------------|
| Final test               | 29           | TX mode with modulation |

#### 7.2.3 Test Setup Diagram



#### 7.2.4 Measurement Procedure and Data

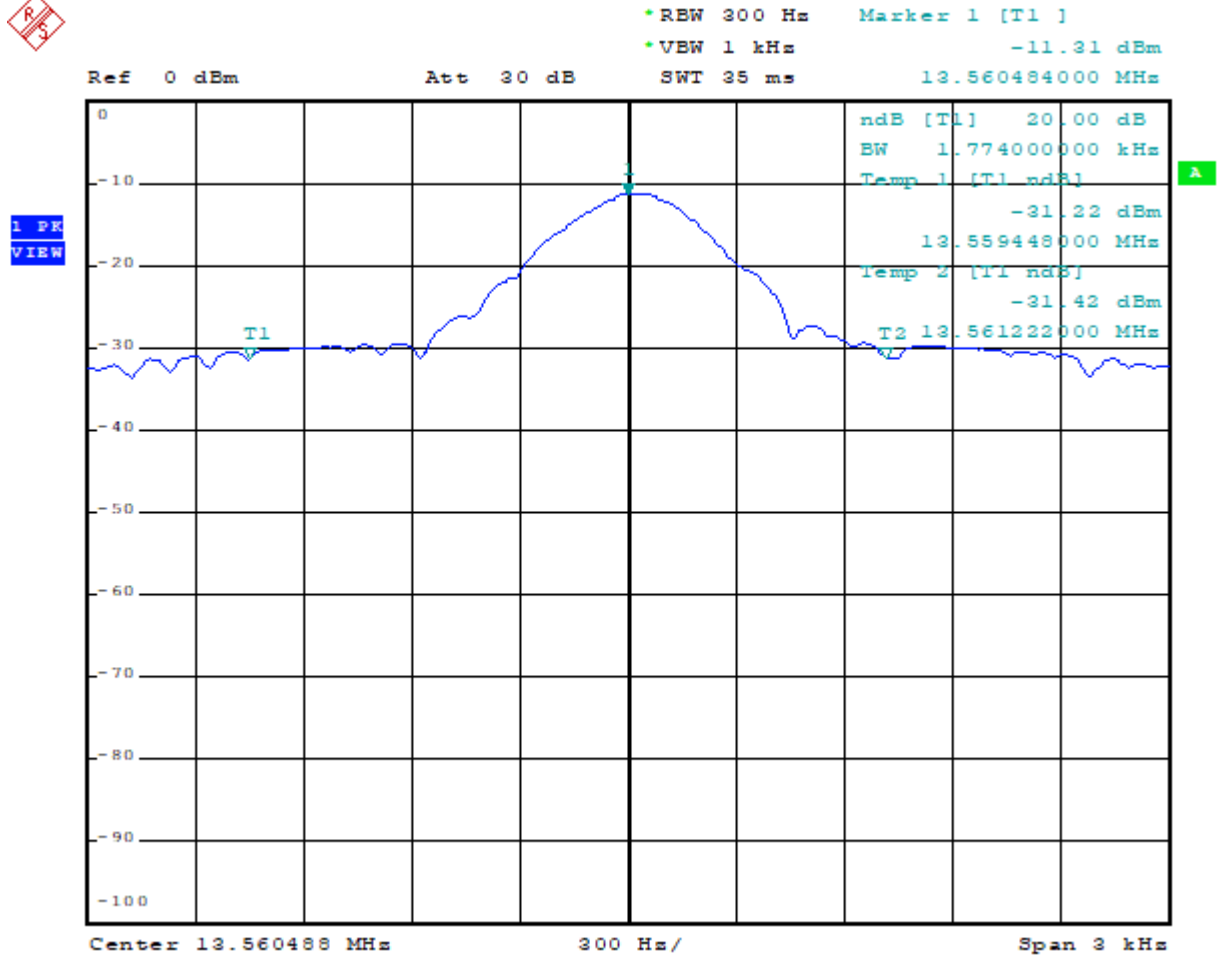
The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

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### 7.3 Emission Mask

Test Requirement 47 CFR Part 15, Subpart C 15.225(a)&(b)&(C )  
 Test Method: ANSI C63.10 (2013) Section 6.4  
 Measurement Distance: 3m

Limit:

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

#### Below 30MHz

The limit at 30m test distance is below:

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left( \frac{d_{\text{limit}}}{d_{\text{measure}}} \right)$$

where

$FS_{\text{limit}}$  is the calculation of field strength at the limit distance, expressed in dBμV/m  
 $FS_{\text{max}}$  is the measured field strength, expressed in dBμV/m  
 $d_{\text{measure}}$  is the distance of the measurement point from the EUT  
 $d_{\text{limit}}$  is the reference distance or the distance of the  $\lambda/2\pi$  point

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 84dBuV/m at 30 meters.

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

Operating Environment:

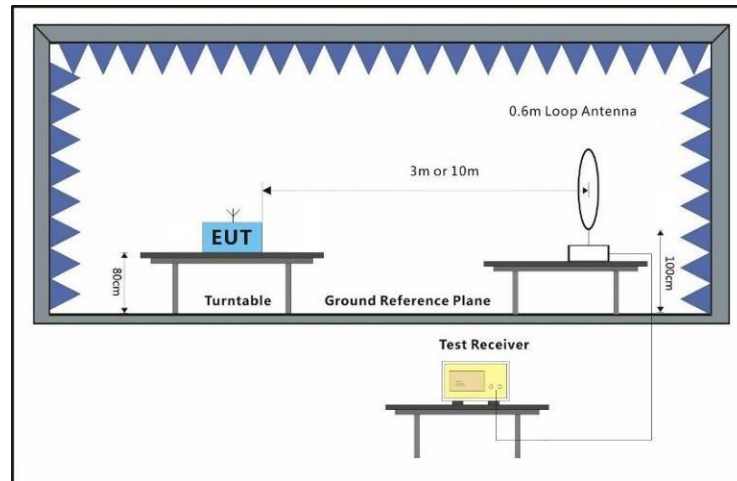
Temperature: 24 °C Humidity: 50 % RH Atmospheric Pressure: 1000 mbar



### 7.3.2 Test Mode Description

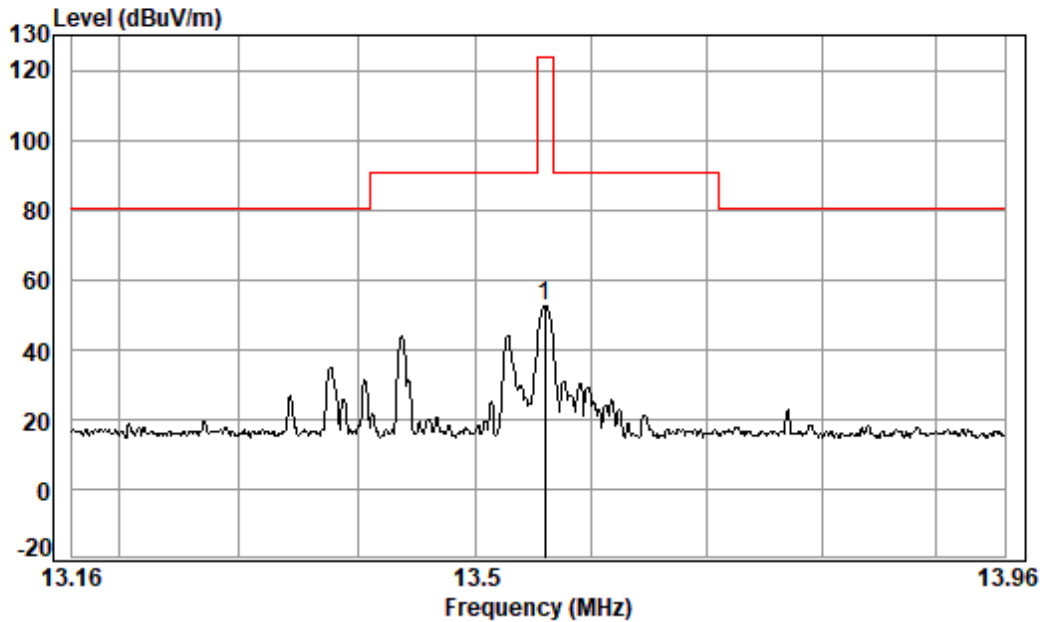
| Pre-scan / Final test | Mode Code | Description             |
|-----------------------|-----------|-------------------------|
| Final test            | 29        | TX mode with modulation |

### 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. Only the worst position of vertical was shown in the report.



Condition: 3m

Job No. : 04019AT

Test Mode: 29

|   |      | Read   | Ant    | Cable | Preamp |        | Limit  | Over   |           |
|---|------|--------|--------|-------|--------|--------|--------|--------|-----------|
|   | Freq | Level  | Factor | Loss  | Factor | Level  | Line   | Limit  | Remark    |
|   | MHz  | dBuV   | dB/m   | dB    | dB     | dBuV/m | dBuV/m | dB     |           |
| 1 | pp   | 13.560 | 75.23  | 8.65  | 1.13   | 32.50  | 52.51  | 124.00 | -71.49 QP |



### 7.4 Frequency tolerance

Test Requirement 47 CFR Part 15, Subpart C 15.225(e)

Test Method: ANSI C63.10 (2013) Section 6.8

Limit:

$\pm 0.01\%$

#### 7.4.1 E.U.T. Operation

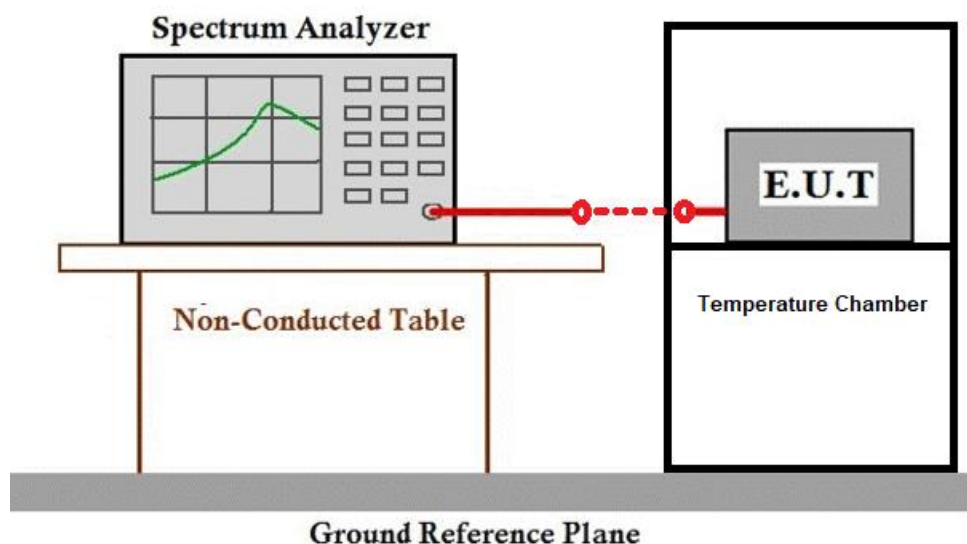
Operating Environment:

Temperature: 23.2 °C Humidity: 45 % RH Atmospheric Pressure: 1000 mbar

#### 7.4.2 Test Mode Description

| Pre-scan /<br>Final test | Mode<br>Code | Description             |
|--------------------------|--------------|-------------------------|
| Final test               | 29           | TX mode with modulation |

#### 7.4.3 Test Setup Diagram



#### 7.4.4 Measurement Procedure and Data

The EUT was placed in an environmental test chamber and powered such that control element received normal voltage and the transmitter provided maximum RF output.



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|                          |          |             |
|--------------------------|----------|-------------|
| Declared Frequency (MHz) | 13.56MHz | @10 minutes |
|--------------------------|----------|-------------|

| Temperature (°C) | Voltage(Vdc) | Measurement Frequency(MHz) | Frequency Tolerance (%) | Limit (%) | Result |
|------------------|--------------|----------------------------|-------------------------|-----------|--------|
| 50               | 3.6          | 13.559800                  | -0.001475               | ±0.01     | Pass   |
| 40               |              | 13.559805                  | -0.001438               |           | Pass   |
| 30               |              | 13.559804                  | -0.001445               |           | Pass   |
| 20               |              | 13.559805                  | -0.001438               |           | Pass   |
| 10               |              | 13.559809                  | -0.001409               |           | Pass   |
| 0                |              | 13.559807                  | -0.001423               |           | Pass   |
| -10              |              | 13.559809                  | -0.001409               |           | Pass   |
| -20              |              | 13.559803                  | -0.001453               |           | Pass   |
| 20               | 3.4          | 13.559808                  | -0.001416               |           | Pass   |
|                  | 4.2          | 13.559808                  | -0.001416               |           | Pass   |



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## 7.5 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209

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

Measurement Distance: 10m

Limit:

| Frequency(MHz) | Field strength<br>(microvolts/meter) | Limit<br>(dBuV/m) | Detector | Measurement Distance<br>(meters) |
|----------------|--------------------------------------|-------------------|----------|----------------------------------|
| 0.009-0.490    | 2400/F(kHz)                          | -                 | -        | 300                              |
| 0.490-1.705    | 24000/F(kHz)                         | -                 | -        | 30                               |
| 1.705-30       | 30                                   | -                 | -        | 30                               |

### Below 30MHz

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):

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

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):

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

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):

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

Remark:

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

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

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

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

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left( \frac{d_{\text{limit}}}{d_{\text{measure}}} \right)$$

where

$FS_{\text{limit}}$  is the calculation of field strength at the limit distance, expressed in dBμV/m  
 $FS_{\text{max}}$  is the measured field strength, expressed in dBμV/m  
 $d_{\text{measure}}$  is the distance of the measurement point from the EUT  
 $d_{\text{limit}}$  is the reference distance or the distance of the  $\lambda/2\pi$  point

r

### 7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C

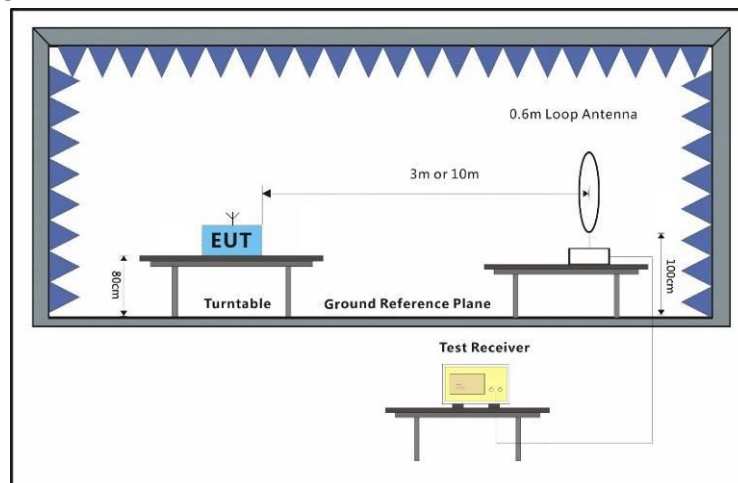
Humidity: 50 % RH

Atmospheric Pressure: 1000 mbar

### 7.5.2 Test Mode Description

| Pre-scan /<br>Final test | Mode<br>Code | Description             |
|--------------------------|--------------|-------------------------|
| Final test               | 29           | TX mode with modulation |

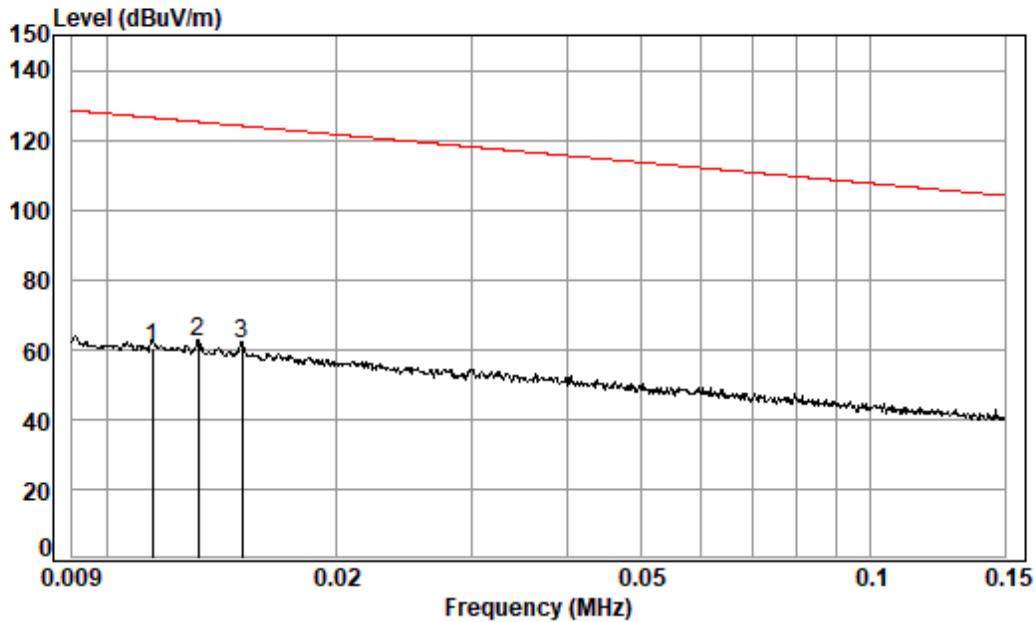
### 7.5.3 Test Setup Diagram



## 7.5.4 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. Only the worst position of vertical was shown in the report.





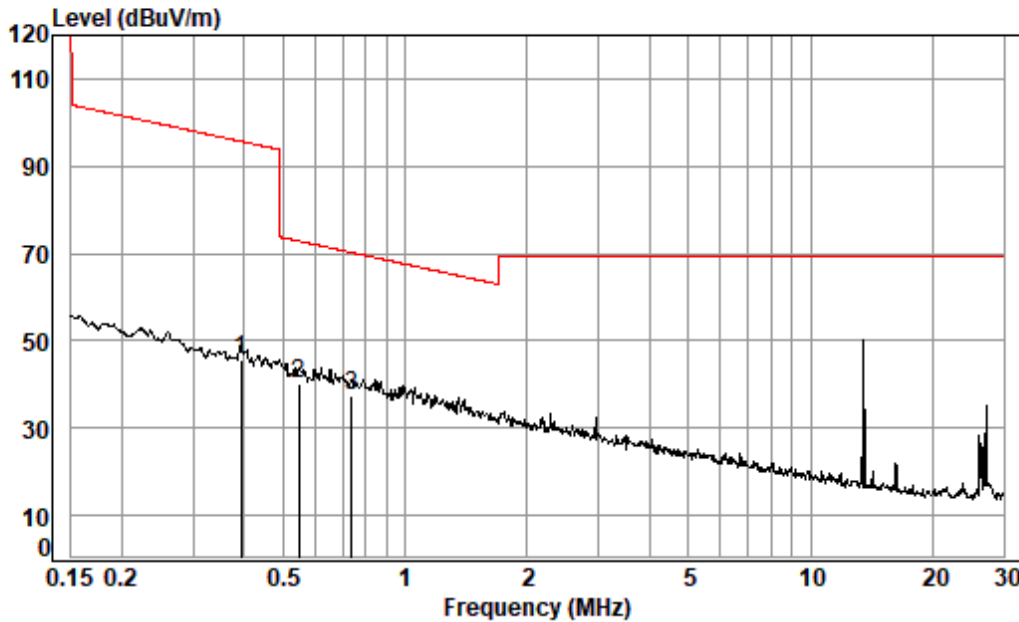
Condition: 3m

Job No. : 04190AT

Test Mode: 29

|      | Freq  | Read Level | Ant Factor | Cable Loss | Preamp Factor | Level  | Limit  | Over Limit | Remark  |
|------|-------|------------|------------|------------|---------------|--------|--------|------------|---------|
|      | MHz   | dBuV       | dB/m       | dB         | dB            | dBuV/m | dBuV/m | dB         |         |
| 1    | 0.011 | 74.27      | 17.59      | 0.31       | 31.47         | 60.70  | 126.40 | -65.70     | Average |
| 2    | 0.013 | 76.41      | 16.81      | 0.31       | 31.59         | 61.94  | 125.20 | -63.26     | Average |
| 3 pp | 0.015 | 77.18      | 15.95      | 0.31       | 31.71         | 61.73  | 124.05 | -62.32     | Average |





Condition: 3m

Job No. : 04019AT

Test Mode: 29

|   |      | Read  | Ant    | Cable | Preamp |        | Limit  | Over  |                |
|---|------|-------|--------|-------|--------|--------|--------|-------|----------------|
|   | Freq | Level | Factor | Loss  | Factor | Level  | Line   | Limit | Remark         |
|   | MHz  | dBuV  | dB/m   | dB    | dB     | dBuV/m | dBuV/m | dB    |                |
| 1 | av   | 0.393 | 67.35  | 10.31 | 0.33   | 32.50  | 45.49  | 95.71 | -50.22 Average |
| 2 |      | 0.546 | 61.94  | 10.30 | 0.35   | 32.50  | 40.09  | 72.85 | -32.76 QP      |
| 3 | pp   | 0.739 | 59.38  | 10.29 | 0.38   | 32.50  | 37.55  | 70.21 | -32.66 QP      |



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## 7.6 Radiated Emissions (30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209

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

Measurement Distance: 10m

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 quasi-peak detector except for the frequency bands 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.

### 7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C

Humidity: 50 % RH

Atmospheric Pressure: 1000 mbar

### 7.6.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description             |
|-----------------------|-----------|-------------------------|
| Final test            | 29        | TX mode with modulation |



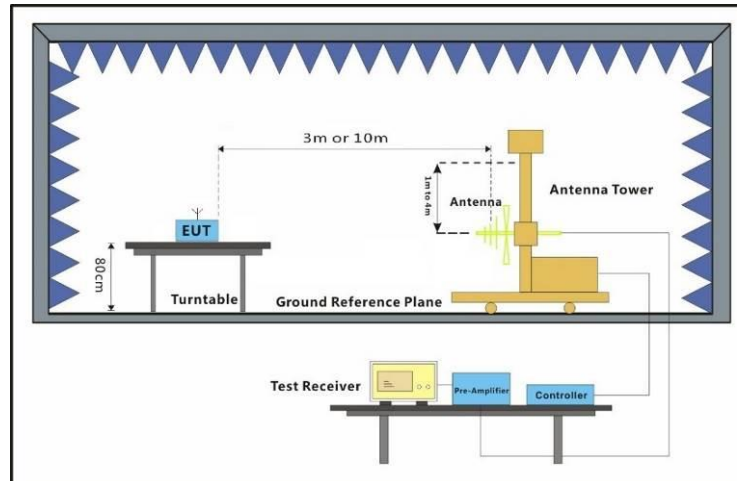
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### 7.6.3 Test Setup Diagram



### 7.6.4 Measurement Procedure and Data

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz 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 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. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report. Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



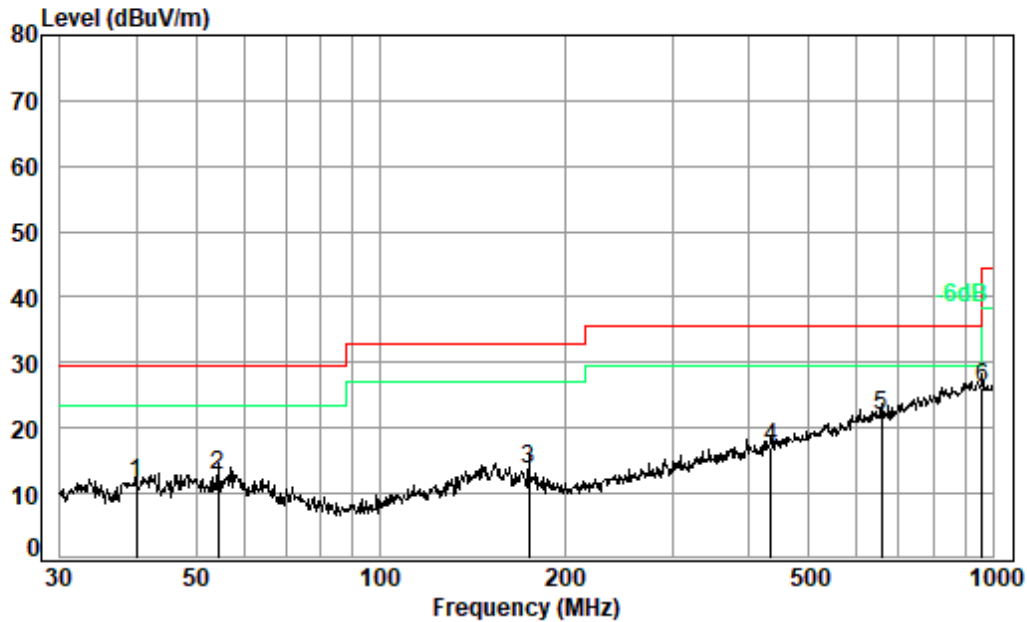
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Test Mode: 29; Polarity: Horizontal



Condition: 10m HORIZONTAL

Job No. : 04019AT

Test Mode: 29

|      | Freq    | Read Level | Ant Factor | Cable Loss | Preamp Factor | Level  | Limit Line | Over Limit | Remark |
|------|---------|------------|------------|------------|---------------|--------|------------|------------|--------|
|      | MHz     | dBuV       | dB/m       | dB         | dB            | dBuV/m | dBuV/m     | dB         |        |
| 1    | 39.994  | 26.59      | 17.09      | 0.45       | 32.50         | 11.63  | 29.50      | -17.87     | QP     |
| 2    | 54.261  | 27.34      | 17.28      | 0.53       | 32.49         | 12.66  | 29.50      | -16.84     | QP     |
| 3    | 175.037 | 28.93      | 16.16      | 1.02       | 32.40         | 13.71  | 33.00      | -19.29     | QP     |
| 4    | 434.065 | 26.86      | 20.74      | 1.69       | 32.30         | 16.99  | 35.60      | -18.61     | QP     |
| 5    | 658.836 | 27.34      | 24.67      | 2.17       | 32.34         | 21.84  | 35.60      | -13.76     | QP     |
| 6 pp | 958.794 | 26.54      | 28.34      | 2.63       | 31.28         | 26.23  | 35.60      | -9.37      | QP     |



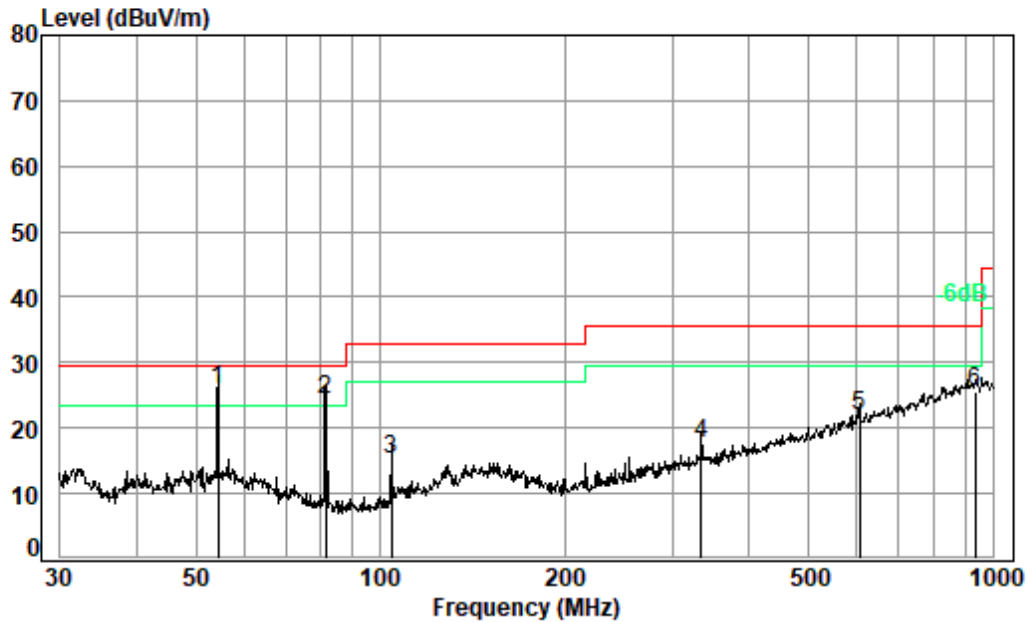
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Test Mode: 29; Polarity: Vertical



Condition: 10m VERTICAL

Job No. : 04019AT

Test Mode: 29

|   |      | Read    | Ant    | Cable | Preamp |        | Limit  | Over  |           |
|---|------|---------|--------|-------|--------|--------|--------|-------|-----------|
|   | Freq | Level   | Factor | Loss  | Factor | Level  | Line   | Limit | Remark    |
|   | MHz  | dBuV    | dB/m   | dB    | dB     | dBuV/m | dBuV/m | dB    |           |
| 1 | pp   | 54.261  | 40.51  | 17.28 | 0.53   | 32.49  | 25.83  | 29.50 | -3.67 QP  |
| 2 |      | 81.497  | 43.24  | 13.04 | 0.65   | 32.44  | 24.49  | 29.50 | -5.01 QP  |
| 3 |      | 104.170 | 32.93  | 13.91 | 0.74   | 32.40  | 15.18  | 33.00 | -17.82 QP |
| 4 |      | 333.687 | 29.86  | 18.54 | 1.48   | 32.30  | 17.58  | 35.60 | -18.02 QP |
| 5 |      | 605.659 | 28.04  | 24.02 | 2.10   | 32.39  | 21.77  | 35.60 | -13.83 QP |
| 6 |      | 935.546 | 25.90  | 28.28 | 2.61   | 31.33  | 25.46  | 35.60 | -10.14 QP |



## 8 Test Setup Photo

Refer to Appendix - Test Setup Photo for SZCR2312004019AT

## 9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for SZCR2312004019AT

- End of the Report -

