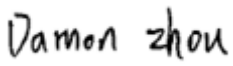
# TEST REPORT

| | |
|---|---|
| **Application No.:** | KSCR2407001236AT |
| **FCC ID:** | 2AH25K2A13 |
| **IC:** | 22621-K2A13 |
| **Applicant:** | Shanghai Sunmi Technology Co.,Ltd. |
| **Address of Applicant:** | Room 505, No.388 Song Hu Road, Yang Pu District, Shanghai, China |
| **Manufacturer:** | Shanghai Sunmi Technology Co.,Ltd. |
| **Address of Manufacturer:** | Room 505, No.388 Song Hu Road, Yang Pu District, Shanghai, China |
| **Equipment Under Test (EUT):** | |
| **EUT Name:** | Self-Checkout Kiosk |
| **Model No.:** | F4E02 |
| **HVIN:** | F4E02, F4E02(B) |
| **Trade Mark:** | SUNMI |
| **Standard(s) :** | 47 CFR Part 15, Subpart C 15.225<br>RSS-210 issue 10 Amendment 1<br>RSS-Gen Issue 5, April 2018, Amendment 2 |
| **Date of Receipt:** | 2024-07-03 |
| **Date of Test:** | 2024-08-12 |
| **Date of Issue:** | 2024-08-19 |
| **Test Result:** | **Pass*** |

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

| *Revision Record* | | | |
|---|---|---|---|
| ***Version*** | **Description** | ***Date*** | ***Remark*** |
| 00 | Original | 2024-08-19 | / |
| | | | |
| | | | |

| | | | | |
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| **Tested By** | |  | | |
| | | **Damon Zhou /Project Engineer** | | |
| **Approved By** | |  | | |
| | | **Terry Hou /Reviewer** | | |

# 2 Test Summary

| Radio Spectrum Technical Requirement | | | | |
|---|---|---|---|---|
| **Item** | **FCC Requirement** | **IC Requirement** | **Method** | **Result** |
| Antenna Requirement | 47 CFR Part 15, Subpart C 15.225 | N/A | RSS-210 Issue 10 Amendment (April 2020) | Customer Declaration |

| Radio Spectrum Matter Part | | | | |
|---|---|---|---|---|
| **Item** | **FCC Requirement** | **IC Requirement** | **Method** | **Result** |
| Conducted Emissions at AC Power Line (150kHz-30MHz) | 47 CFR Part 15, Subpart C 15.225 | RSS-210 Issue 10 Amendment (April 2020) | ANSI C63.10 (2013) Section 6.2 | Pass |
| 20dB Bandwidth | 47 CFR Part 15, Subpart C 15.225 | RSS-210 Issue 10 Amendment (April 2020) | ANSI C63.10 (2013) Section 6.9 | Pass |
| Emission Mask | 47 CFR Part 15, Subpart C 15.225 | RSS-210 Issue 10 Amendment (April 2020) | ANSI C63.10 (2013) Section 6.4 | Pass |
| Frequency tolerance | 47 CFR Part 15, Subpart C 15.225 | RSS-210 Issue 10 Amendment (April 2020) | ANSI C63.10 (2013) Section 6.8 | Pass |
| Radiated Emissions(9kHz-30MHz) | 47 CFR Part 15, Subpart C 15.225 | RSS-210 Issue 10 Amendment (April 2020) | ANSI C63.10 (2013) Section 6.4&6.5 | Pass |
| Radiated Emissions(30MHz-1GHz) | 47 CFR Part 15, Subpart C 15.225 | RSS-210 Issue 10 Amendment (April 2020) | ANSI C63.10 (2013) Section 6.4&6.5 | Pass |
| 99% Bandwidth | - | RSS-210 Issue 10 Amendment (April 2020) | RSS-Gen Section 6.7 | Pass |

Remark:
The product is divided into two different configurations (SKU1, SKU2).
SKU1: Large scan code window, the HVIN is F4E02(B)
SKU2: Small scan code window, the HVIN is F4E02
Except for the above differences, everything else is the same.
After Pre-scan test, only SKU2(HVIN: F4E02) was tested since their differences.

# 3 Contents

# 4 General Information

## 4.1 Details of E.U.T.

| | |
|---|---|
| Power supply: | AC 120V/60Hz |
| Test Voltage: | AC 120V/60Hz |
| Operation Frequency: | 13.56MHz |
| Modulation Type: | ASK |
| Antenna Type: | Loop Antenna |
| SN: | K288D45N00072 |
| Firmware Version: | V 2.0 |

## 4.2 Description of Support Units

| Description | Manufacturer | Model No. | Serial No. |
|---|---|---|---|
| Notebook | Lenovo | / | / |

## 4.3 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|---|---|---|
| 1 | Radio Frequency | $8.4 \times 10^{-8}$ |
| 2 | Timeout | 2s |
| 3 | Duty Cycle | 0.37% |
| 4 | Occupied Bandwidth | 3% |
| 5 | RF Conducted Power | 0.6dB |
| 6 | RF Power Density | 2.9dB |
| 7 | Conducted Spurious Emissions | 0.75dB |
| 8 | RF Radiated Power | 5.2dB (Below 1GHz) |
| | | 5.9dB (Above 1GHz) |
| 9 | Radiated Spurious Emission Test | 4.2dB (Below 30MHz) |
| | | 4.5dB (30MHz-1GHz) |
| | | 5.1dB (1GHz-18GHz) |
| | | 5.4dB (Above 18GHz) |
| 10 | Temperature Test | 1°C |
| 11 | Humidity Test | 3% |
| 12 | Supply Voltages | 1.5% |
| 13 | Time | 3% |
| Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2. | | |

## 4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).

2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).

3. Sample source: sent by customer.

## 4.5 Test Facility

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

**• A2LA**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

**• FCC**

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

**• ISED**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

**• VCCI**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

## 4.6 Deviation from Standards

None

## 4.7 Abnormalities from Standard Conditions

None

# 5 Equipment List

| Item | Equipment | Manufacturer | Model | Inventory No | Cal Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| **Conducted Emission at Mains Terminals** | | | | | | |
| 1 | EMI Test Receive | R&S | ESCI | KS301101 | 01/15/2024 | 01/14/2025 |
| 2 | LISN | R&S | ENV216 | KS301197 | 01/15/2024 | 01/14/2025 |
| 3 | LISN | Schwarzbeck | NNLK 8129 | KS301091 | 01/15/2024 | 01/14/2025 |
| 4 | Pulse Limiter | R&S | ESH3-Z2 | KUS1902E001 | 01/15/2024 | 01/14/2025 |
| 5 | CE test Cable | Thermax | / | CZ301102 | 01/15/2024 | 01/14/2025 |
| 6 | Test Software | Farad | EZ-EMC | / | N.C.R | N.C.R |
| **RF Radiated Test** | | | | | | |
| 1 | Spectrum Analyzer | R&S | FSV40 | KUS1806E003 | 08/24/2023 | 08/23/2024 |
| 2 | Universal Radio Communication Tester | R&S | CMW500 | KSEM009-1 | 03/19/2024 | 03/18/2025 |
| 3 | Signal Generator | Agilent | E8257C | KS301066 | 08/24/2023 | 08/23/2024 |
| 4 | Loop Antenna | COM-POWER | AL-130R | KUS1806E001 | 03/18/2023 | 03/17/2025 |
| 5 | Bilog Antenna | TESEQ | CBL 6112D | KUS1806E005 | 06/29/2023 | 06/28/2025 |
| 6 | Bilog Antenna | TESEQ | CBL 6112D | KUS1806E006 | 03/19/2024 | 03/18/2025 |
| 7 | Horn-antenna(1-18GHz) | Schwarzbeck | BBHA9120D | KS301079 | 08/24/2023 | 08/23/2024 |
| 8 | Horn-antenna(1-18GHz) | ETS-LINDGREN | 3117 | KS301186 | 04/07/2023 | 04/06/2025 |
| 9 | Horn Antenna(18-40GHz) | Schwarzbeck | BBHA9170 | CZ301058 | 01/07/2024 | 01/06/2026 |
| 10 | Amplifier(30MHz~18GHz) | PANSHAN TECHNOLOGY | LNA:1~18G | KSEM010-1 | 01/15/2024 | 01/14/2025 |
| 11 | Amplifier(18~40GHz) | PANSHAN TECHNOLOGY | LNA180400G40 | KSEM038 | 08/24/2023 | 08/23/2024 |
| 12 | RE Test Cable | REBES MICROWAVE | / | CZ301097 | 08/24/2023 | 08/23/2024 |
| 13 | Temperature & Humidity Recorder | Renke Control | RS-WS-N01-6J | KSEM024-4 | 03/19/2024 | 03/18/2025 |
| 14 | Software | Faratronic | EZ_EMC-v 3A1 | / | NCR | NCR |
| 15 | Software | ESE | E3_V 6.111221a | / | NCR | NCR |

# 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 Loop antenna and no consideration of replacement.

Antenna location: Refer to Internal photos

## 6.2 Antenna Requirement

### 6.2.1 Test Requirement:

RSS-Gen Section 6.8

### 6.2.2 Conclusion

Conclusion

Standard Requirement:

Measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level.When measurements at the antenna port are used to determine the RF output power, the effective gain of the device’s antenna shall be stated, based on a measurement or on data from the antenna’s manufacturer.

# 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.

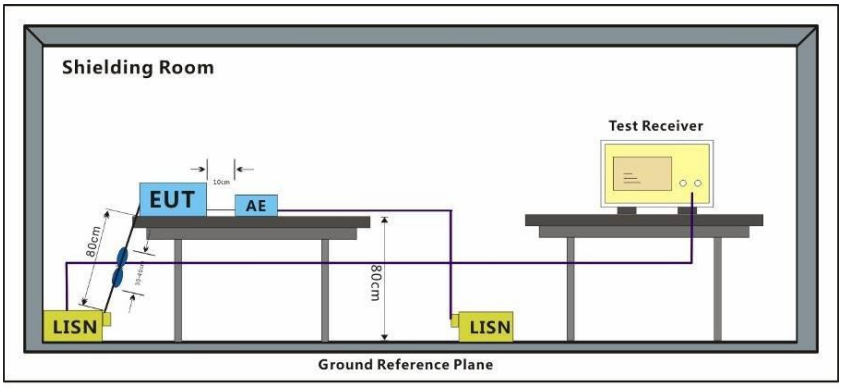
### 7.1.1 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 09 | TX mode with modulation |

### 7.1.2 E.U.T. Operation

Operating Environment:
Temperature: 24.7 °C Humidity: 47.9 % RH Atmospheric Pressure: 1010 mbar

### 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.

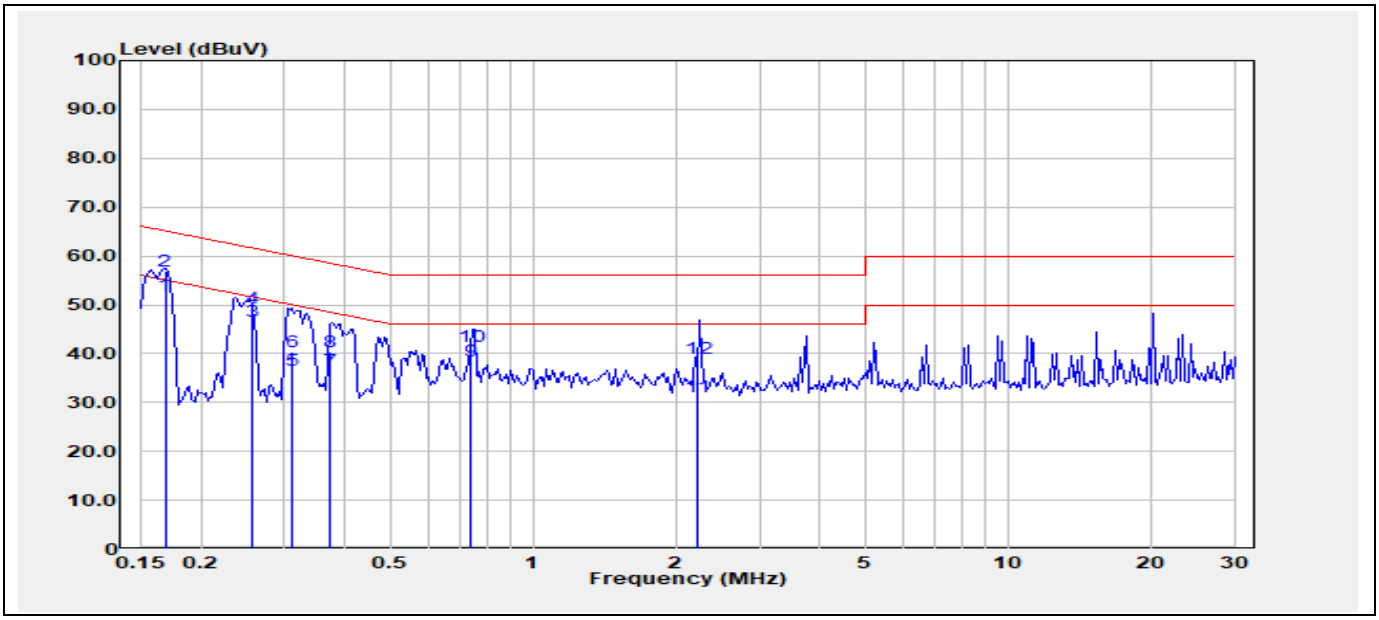
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

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.

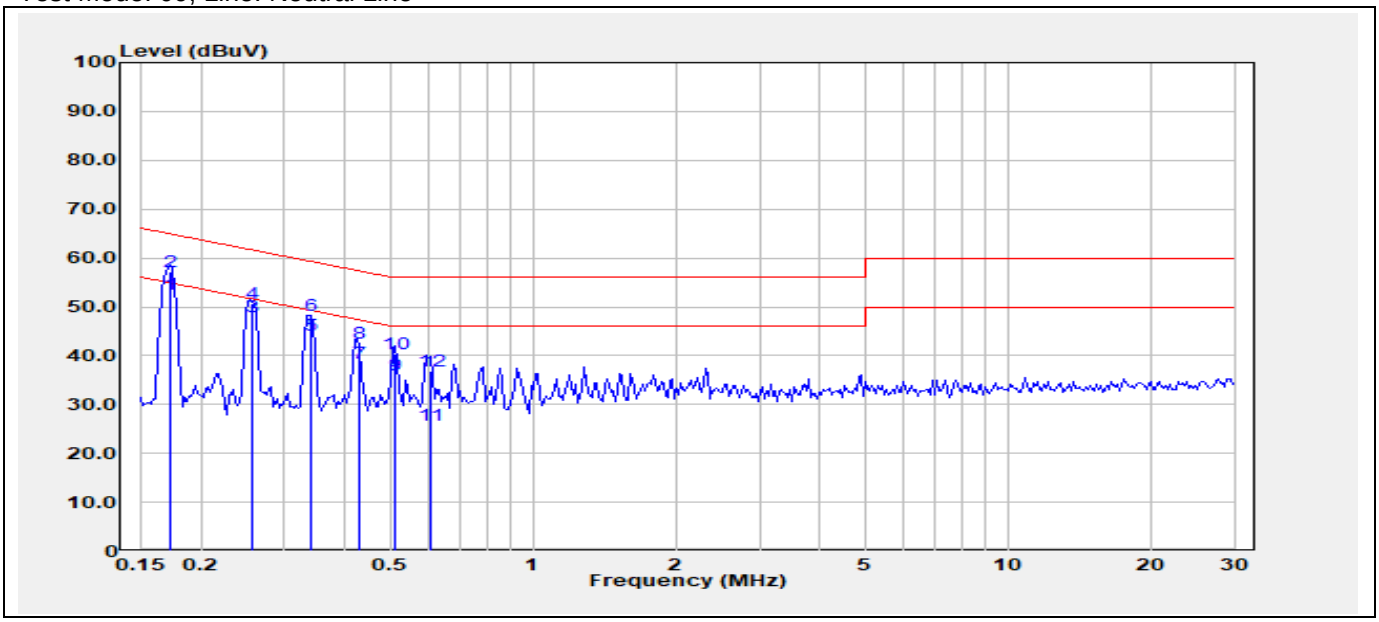
Remark: Level=Read Level+ Cable Loss+ LISN Factor

Test Mode: 09; Line: Live line




| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB) | Result (dBuV) | Limit (dBuV) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|
| 1 | 0.1680 | 31.81 | 20.18 | 51.99 | 55.06 | -3.07 | Average |
| 2 | 0.1680 | 36.81 | 20.18 | 56.99 | 65.06 | -8.07 | QP |
| 3 | 0.2560 | 26.47 | 20.07 | 46.54 | 51.56 | -5.02 | Average |
| 4 | 0.2560 | 29.38 | 20.07 | 49.45 | 61.56 | -12.11 | QP |
| 5 | 0.3097 | 16.47 | 20.08 | 36.54 | 49.98 | -13.43 | Average |
| 6 | 0.3097 | 20.36 | 20.08 | 40.43 | 59.98 | -19.54 | QP |
| 7 | 0.3743 | 16.47 | 20.07 | 36.54 | 48.41 | -11.87 | Average |
| 8 | 0.3743 | 20.44 | 20.07 | 40.51 | 58.41 | -17.90 | QP |
| 9 | 0.7395 | 18.72 | 19.77 | 38.50 | 46.00 | -7.50 | Average |
| 10 | 0.7395 | 21.69 | 19.77 | 41.47 | 56.00 | -14.53 | QP |
| 11 | 2.2220 | 11.26 | 20.02 | 31.27 | 46.00 | -14.73 | Average |
| 12 | 2.2220 | 19.12 | 20.02 | 39.14 | 56.00 | -16.86 | QP |

Test Mode: 09; Line: Neutral Line




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB) | (dBuV) | (dBuV) | (dB) | |
| 1 | 0.1723 | 32.31 | 20.15 | 52.46 | 54.85 | -2.39 | Average |
| 2 | 0.1723 | 37.11 | 20.15 | 57.26 | 64.85 | -7.59 | QP |
| 3 | 0.2559 | 28.01 | 20.09 | 48.10 | 51.56 | -3.46 | Average |
| 4 | 0.2559 | 30.70 | 20.09 | 50.79 | 61.56 | -10.77 | QP |
| 5 | 0.3419 | 24.03 | 20.10 | 44.13 | 49.16 | -5.03 | Average |
| 6 | 0.3419 | 28.13 | 20.10 | 48.23 | 59.16 | -10.93 | QP |
| 7 | 0.4310 | 18.48 | 20.05 | 38.53 | 47.23 | -8.70 | Average |
| 8 | 0.4310 | 22.62 | 20.05 | 42.67 | 57.23 | -14.56 | QP |
| 9 | 0.5130 | 16.05 | 19.92 | 35.97 | 46.00 | -10.03 | Average |
| 10 | 0.5130 | 20.53 | 19.92 | 40.45 | 56.00 | -15.55 | QP |
| 11 | 0.6067 | 5.79 | 19.87 | 25.66 | 46.00 | -20.34 | Average |
| 12 | 0.6067 | 17.04 | 19.87 | 36.91 | 56.00 | -19.09 | QP |

## 7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215
Test Method: ANSI C63.10 (2013) Section 6.9
Measurement Distance: 3m

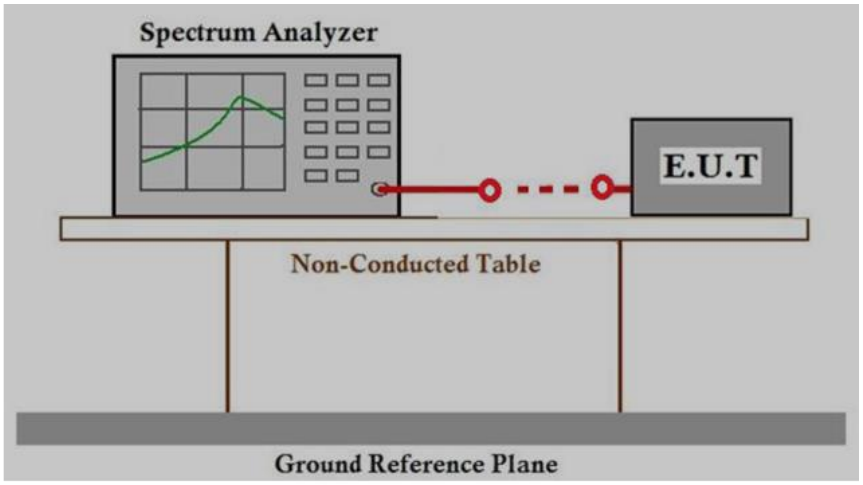
### 7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 23.3 °C Humidity: 50.1 % RH Atmospheric Pressure: 1010 mbar

### 7.2.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 09 | 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.

Please Refer to Appendix for Details

## 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.

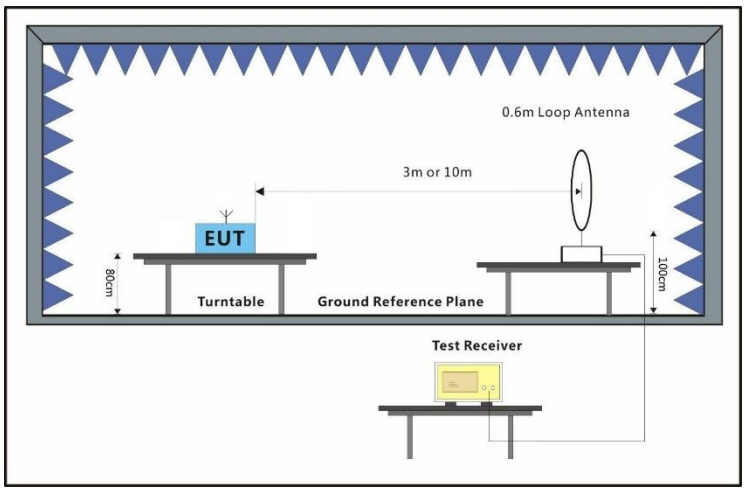
### 7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 23.3 °C Humidity: 50.2 % RH Atmospheric Pressure: 1010 mbar

### 7.3.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 09 | 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.

Please Refer to Appendix for Details

## 7.4 Frequency tolerance

Test Requirement 47 CFR Part 15, Subpart C 15.225(e)
Test Method: ANSI C63.10 (2013) Section 6.8
Measurement Distance: 3m

Limit: ±0.01

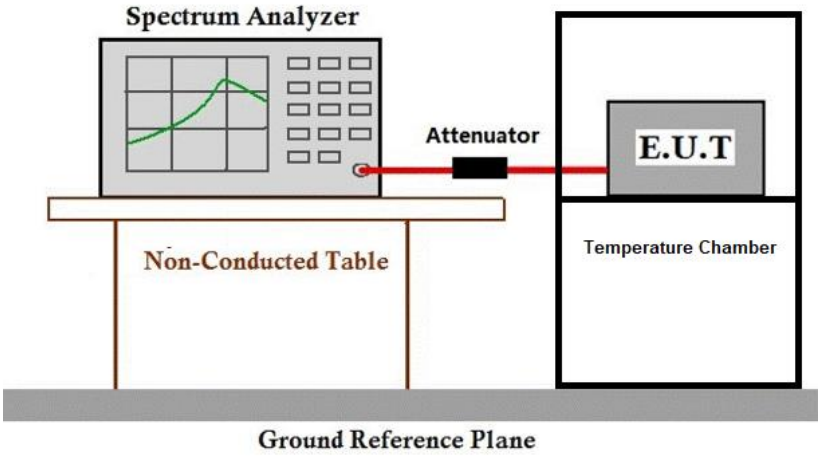
### 7.4.1 E.U.T. Operation

Operating Environment:
Temperature: 23.3 °C Humidity: 50.2 % RH Atmospheric Pressure: 1010 mbar

### 7.4.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 09 | 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.

Please Refer to Appendix for Details

## 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&6.5
Measurement Distance: 3m

Limit:

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

**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 λ/2π and the limit distance is greater than λ/2π, 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 λ/2π distance, and at a 20 dB/decade of distance rate beyond λ/2π. This shall be accomplished using Equation (2):

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

If the single point measured is at a distance greater than λ/2π, 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 λ/2π, 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:

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

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 |

### 7.5.1 E.U.T. Operation

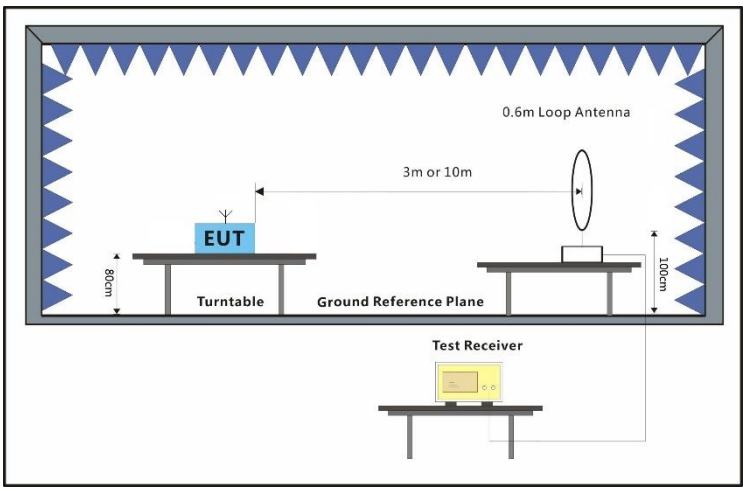
Operating Environment:

Temperature: 23.3 °C Humidity: 50.2 % RH Atmospheric Pressure: 1010 mbar

### 7.5.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 09 | 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.

Please Refer to Appendix for Details

## 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 6.4&6.5
Measurement Distance: 3m

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 (9-90kHz,110-490kHz and Above 1GHz) 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. | | |

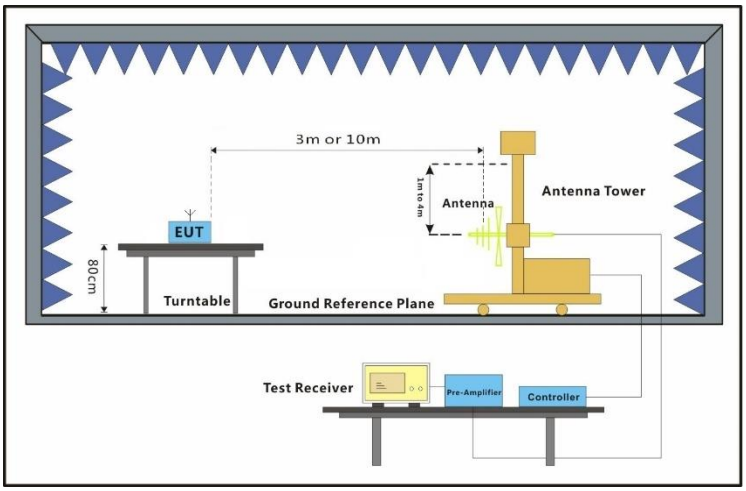
### 7.6.1 E.U.T. Operation

Operating Environment:
Temperature: 23.3 °C Humidity: 50.2 % RH Atmospheric Pressure: 1010 mbar

### 7.6.2 Test Mode Description

| Pre-scan / Final test | Mode Code | Description |
|---|---|---|
| Final test | 09 | TX mode with modulation |

### 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

Please Refer to Appendix for Details

# 8 Test Setup Photo

Refer to Appendix - Test Setup Photo for KSCR2407001236AT

# 9 EUT Constructional Details (EUT Photos)

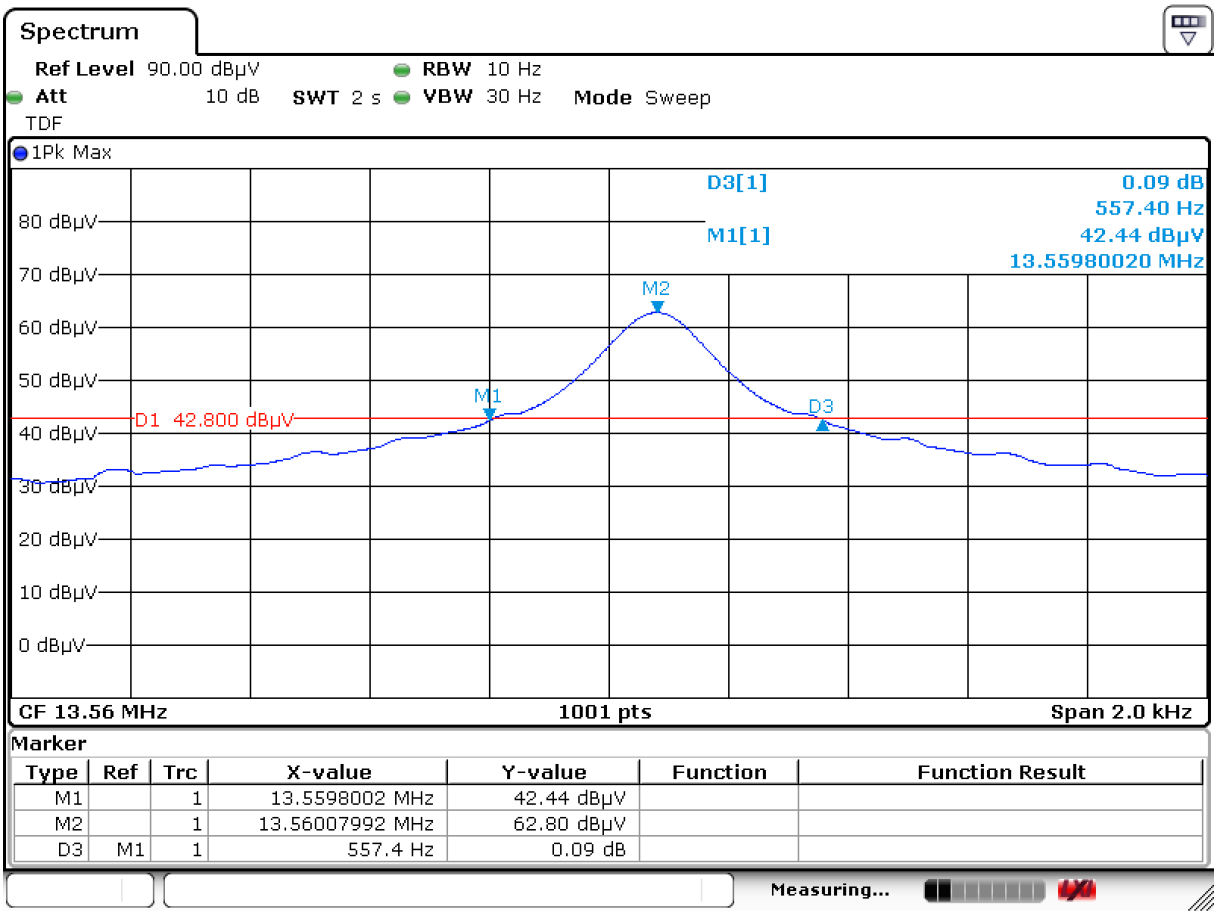
Refer to Appendix - Photographs of EUT Constructional Details for KSCR2407001236AT

# 10 Appendix

**20dB Bandwidth**

| 20dB bandwidth (kHz) | $F_L$ (MHz) | $F_H$ (MHz) | Limit(MHz) | Result |
|---|---|---|---|---|
| 0.5574 | 13.5598 | 13.5604 | 13.110 – 14.010 | Pass |

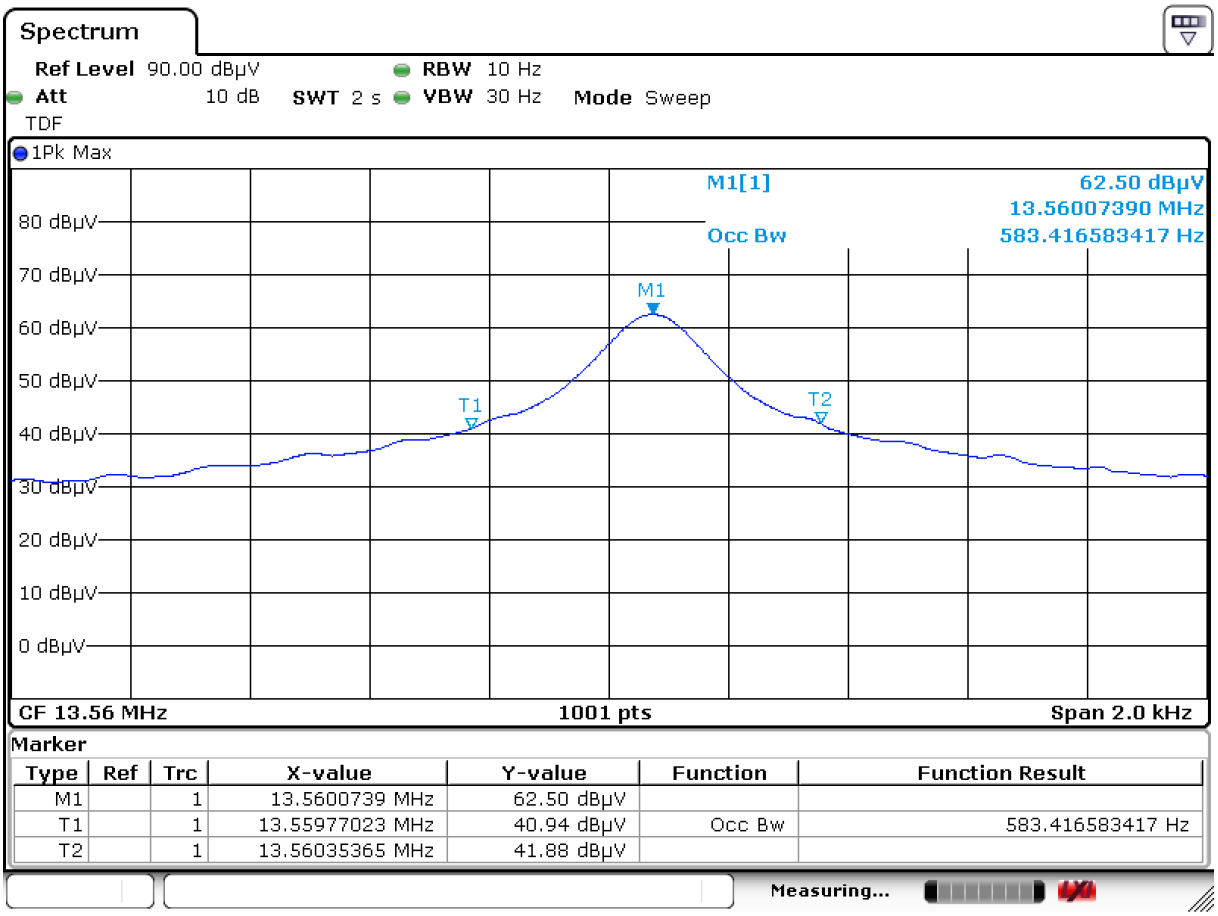
**Test plot as follows:**



**99% Bandwidth**

| 99% bandwidth (kHz) | $F_L$ (MHz) | $F_H$ (MHz) | Limit(MHz) | Result |
|---|---|---|---|---|
| 0.5834 | 13.5598 | 13.5604 | 13.110 – 14.010 | Pass |

**Test plot as follows:**



**Frequency tolerance**

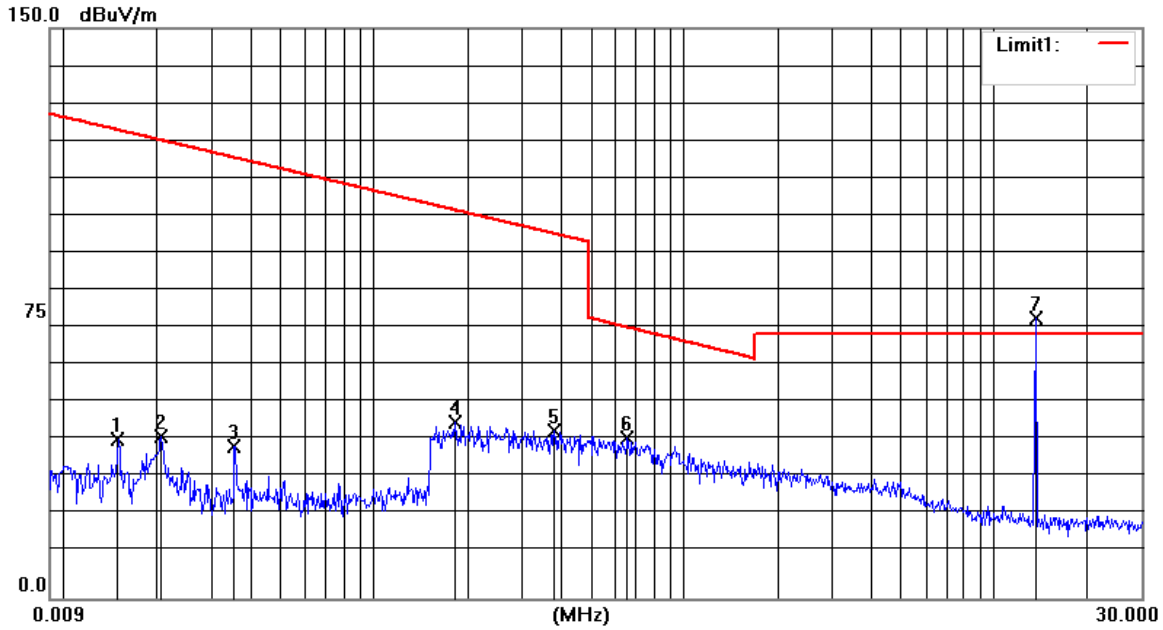
Nominal Operation Frequency: 13.56MHz

| Test Conditions | | Test Result (MHz) | Deviation (kHz) | Limit (kHz) | Result |
|---|---|---|---|---|---|
| Temp (℃) | Volt (V AC) | | | | |
| $T_{nom}$ (-20) | $V_{nom}$ (120) | 13.55982 | -0.18 | ±0.01% (1.3560kHz) | Pass |
| $T_{nom}$ (-10) | $V_{nom}$ (120) | 13.55989 | -0.11 | | Pass |
| $T_{nom}$ (0) | $V_{nom}$ (120) | 13.55995 | -0.05 | | Pass |
| $T_{nom}$ (10) | $V_{nom}$ (120) | 13.56001 | 0.01 | | Pass |
| $T_{nom}$ (20) | $V_{nom}$ (120) | 13.56008 | 0.08 | | Pass |
| $T_{nom}$ (30) | $V_{nom}$ (120) | 13.56013 | 0.13 | | Pass |
| $T_{nom}$ (40) | $V_{nom}$ (120) | 13.56019 | 0.19 | | Pass |
| $T_{nom}$ (50) | $V_{nom}$ (120) | 13.56024 | 0.24 | | Pass |
| $T_{nom}$ (20) | $V_{min}$ (102) | 13.56004 | 0.04 | | Pass |
| | $V_{max}$ (138) | 13.56011 | 0.11 | | Pass |

Note: Deviation (kHz) = (Test Result-13.56MHz)*1000

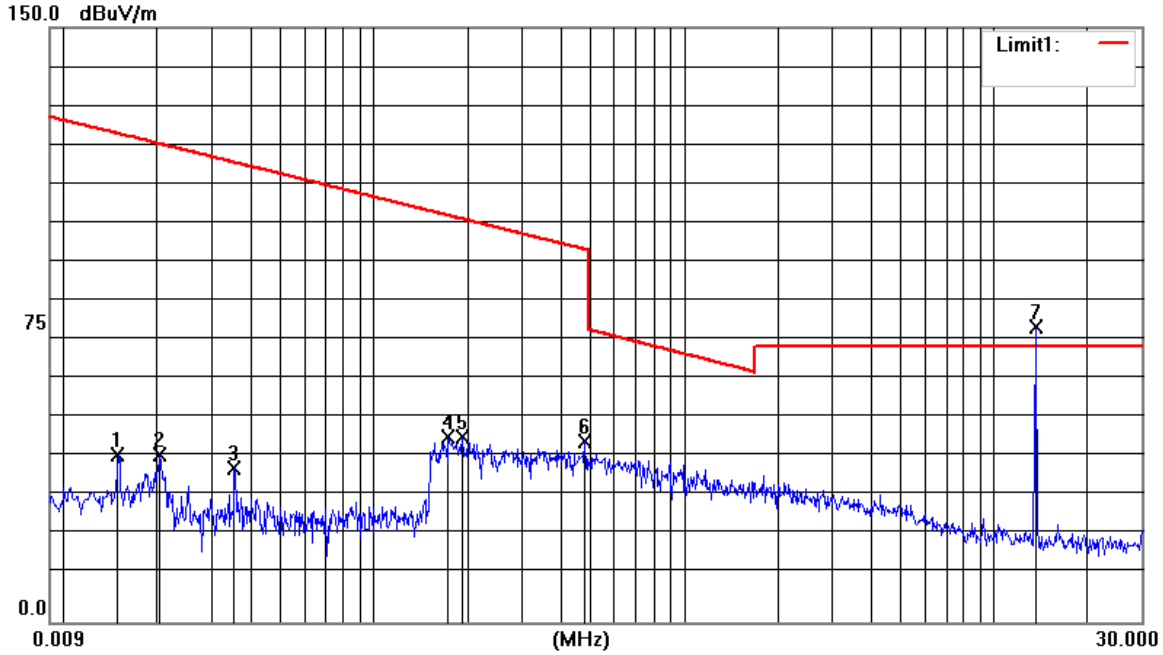
**Radiated Emissions(9kHz-30MHz)**

**Horizontal**




| Item | Freq. | Read Level | Correct Factor | Result Level@3m | Result Level@SPEC | Limit Line@SPEC | Over Limit | Detector |
|---|---|---|---|---|---|---|---|---|
| (Mark) | (MHz) | (dBµV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 0.0150 | 25.80 | 15.94 | 41.74 | -38.26 | 43.20 | -81.46 | QP |
| 2 | 0.0205 | 26.53 | 15.88 | 42.41 | -37.59 | 40.57 | -78.16 | QP |
| 3 | 0.0354 | 24.19 | 15.72 | 39.91 | -40.09 | 35.96 | -76.05 | QP |
| 4 | 0.1824 | 31.76 | 14.45 | 46.21 | -33.79 | 22.13 | -55.92 | QP |
| 5 | 0.3810 | 29.64 | 14.43 | 44.07 | -35.93 | 15.92 | -51.85 | QP |
| 6 | 0.6542 | 27.82 | 14.40 | 42.22 | 2.22 | 31.30 | -29.08 | QP |
| 7 | 13.5600 | 60.66 | 13.00 | 73.66 | 33.66 | 84.00 | -50.34 | Peak |

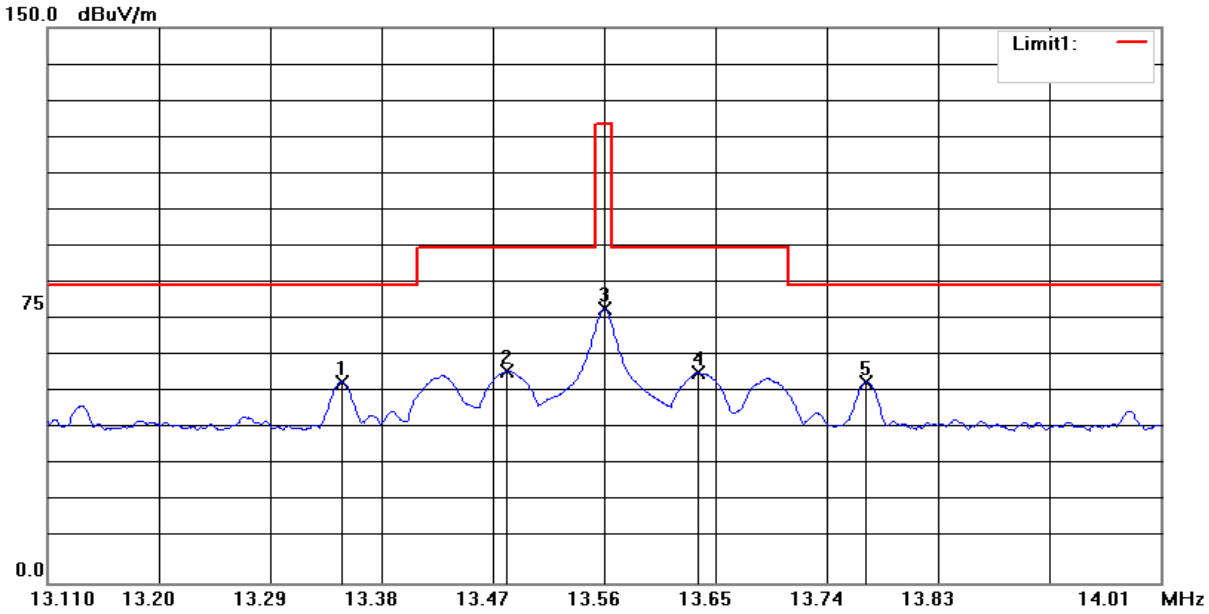
**Vertical**




| Item | Freq. | Read Level | Correct Factor | Result Level@3m | Result Level@SPEC | Limit Line@SPEC | Over Limit | Detector |
|---|---|---|---|---|---|---|---|---|
| (Mark) | (MHz) | (dBμV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 0.0150 | 26.18 | 15.94 | 42.12 | -37.88 | 43.20 | -81.08 | QP |
| 2 | 0.0204 | 26.35 | 15.88 | 42.23 | -37.77 | 40.61 | -78.38 | QP |
| 3 | 0.0354 | 23.24 | 15.72 | 38.96 | -41.04 | 35.96 | -77.00 | QP |
| 4 | 0.1731 | 32.32 | 14.45 | 46.77 | -33.23 | 22.57 | -55.80 | QP |
| 5 | 0.1922 | 32.37 | 14.45 | 46.82 | -33.18 | 21.69 | -54.87 | QP |
| 6 | 0.4786 | 31.06 | 14.41 | 45.47 | -34.53 | 14.00 | -48.53 | QP |
| 7 | 13.5600 | 61.35 | 13.00 | 74.35 | 34.35 | 84.00 | -49.65 | Peak |

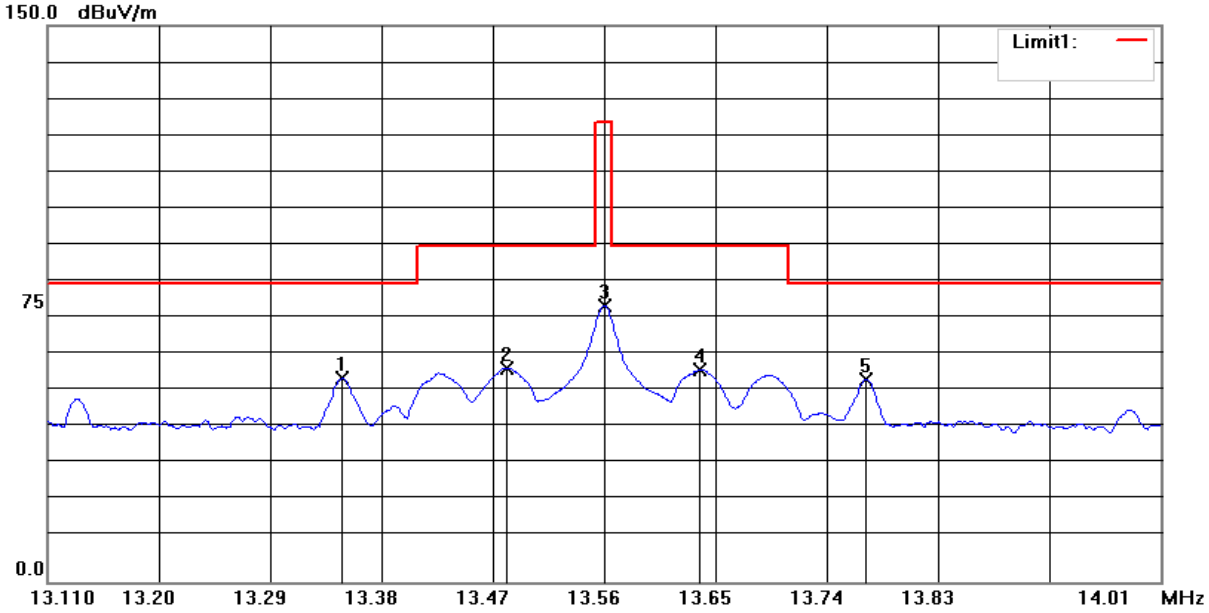
**Emission Mask**

**Horizontal**




| Item | Freq. | Read Level | Correct Factor | Result Level@3m | Limit Line@3m | Over Limit | Detector |
|---|---|---|---|---|---|---|---|
| (Mark) | (MHz) | (dBµV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 13.3476 | 41.18 | 13.02 | 54.20 | 80.50 | -26.30 | QP |
| 2 | 13.4808 | 44.11 | 13.01 | 57.12 | 90.50 | -33.38 | QP |
| 3 | 13.5600 | 61.04 | 13.00 | 74.04 | 124.00 | -49.96 | Peak |
| 4 | 13.6356 | 43.84 | 12.99 | 56.83 | 90.50 | -33.67 | QP |
| 5 | 13.7724 | 41.21 | 12.98 | 54.19 | 80.50 | -26.31 | QP |

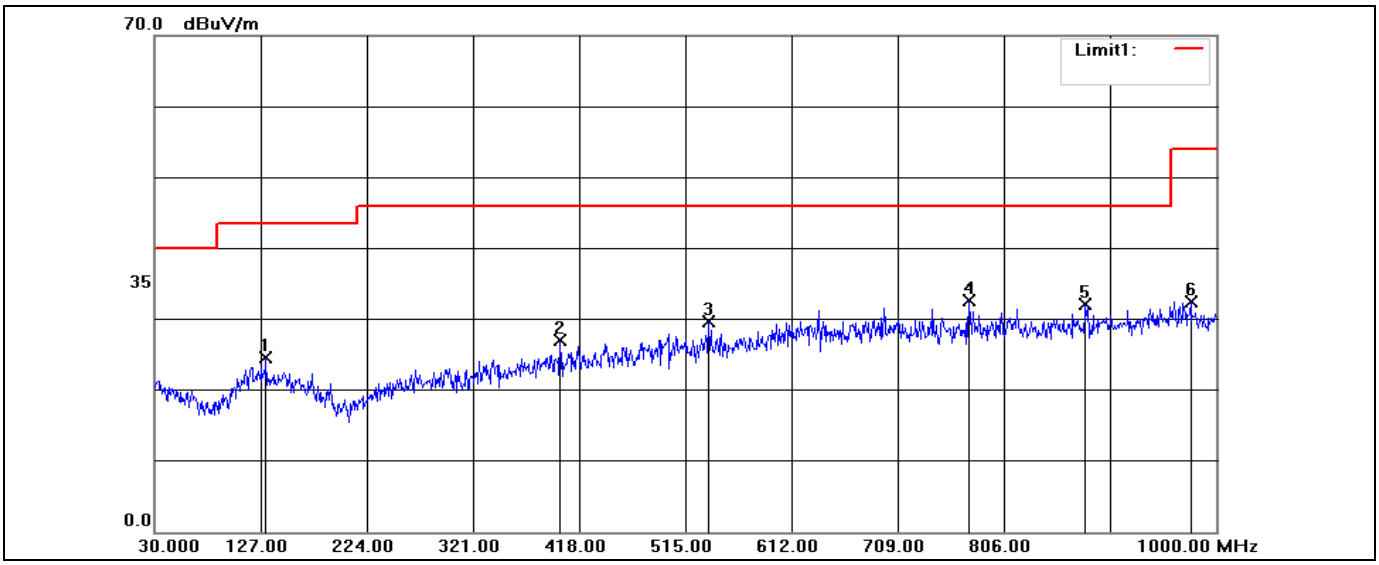
**Vertical**




| Item | Freq. | Read Level | Correct Factor | Result Level@3m | Limit Line@3m | Over Limit | Detector |
|---|---|---|---|---|---|---|---|
| (Mark) | (MHz) | (dBµV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 13.3485 | 41.84 | 13.02 | 54.86 | 80.50 | -25.64 | QP |
| 2 | 13.4808 | 44.72 | 13.01 | 57.73 | 90.50 | -32.77 | QP |
| 3 | 13.5600 | 61.60 | 13.00 | 74.60 | 124.00 | -49.40 | Peak |
| 4 | 13.6374 | 44.30 | 12.99 | 57.29 | 90.50 | -33.21 | QP |
| 5 | 13.7715 | 41.65 | 12.98 | 54.63 | 80.50 | -25.87 | QP |

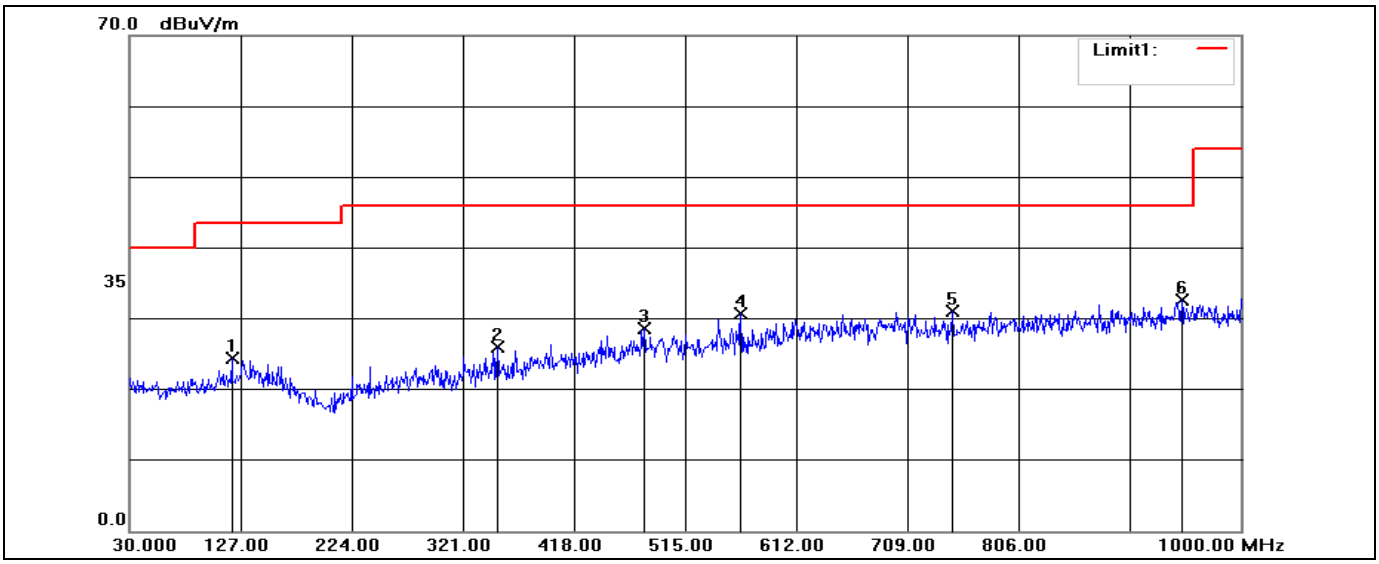
**Below 1GHz**

**Horizontal**




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 131.8500 | 4.99 | 19.55 | 24.54 | 43.50 | -18.96 | QP |
| 2 | 400.5400 | 3.41 | 23.59 | 27.00 | 46.00 | -19.00 | QP |
| 3 | 536.3400 | 3.92 | 25.67 | 29.59 | 46.00 | -16.41 | QP |
| 4 | 773.9900 | 4.92 | 27.65 | 32.57 | 46.00 | -13.43 | QP |
| 5 | 880.6900 | 3.66 | 28.44 | 32.10 | 46.00 | -13.90 | QP |
| 6 | 976.7200 | 3.29 | 29.25 | 32.54 | 54.00 | -21.46 | QP |

**Vertical**




| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|---|---|---|---|---|---|---|---|
| | (MHz) | (dBuV) | Factor(dB/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 119.2400 | 5.21 | 19.14 | 24.35 | 43.50 | -19.15 | QP |
| 2 | 351.0700 | 3.65 | 22.41 | 26.06 | 46.00 | -19.94 | QP |
| 3 | 479.1100 | 3.72 | 24.85 | 28.57 | 46.00 | -17.43 | QP |
| 4 | 563.5000 | 4.66 | 26.01 | 30.67 | 46.00 | -15.33 | QP |
| 5 | 748.7700 | 3.60 | 27.48 | 31.08 | 46.00 | -14.92 | QP |
| 6 | 948.5900 | 3.32 | 29.28 | 32.60 | 46.00 | -13.40 | QP |

- End of the Report -