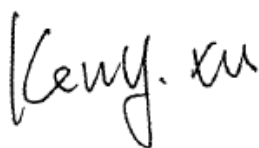


## TEST REPORT

**Application No.:** SZEM2012013243CR  
**Applicant:** Sony Mobile Communications Inc.  
**Address of Applicant:** 4-12-3 Higashi-shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan  
**Manufacturer:** Sony Mobile Communications Inc.  
**Address of Manufacturer:** 4-12-3 Higashi-shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan  
**Factory:** Dong Guan Huabel Electronic Technology Co., Ltd  
**Address of Factory:** No.9 Industrial Northern Road, National High-Tech Industrial Development Zone, SongShan Lake, Dong Guan City  
**Equipment Under Test (EUT):**  
**EUT Name:** GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, GPS and NFC  
**FCC ID:** PY7-13951F  
**Trade Mark:** Sony  
**Standard(s) :** 47 CFR Part 15, Subpart C 15.225  
**Date of Receipt:** 2020-12-22  
**Date of Test:** 2020-12-27 to 2021-01-14  
**Date of Issue:** 2021-04-06

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

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



Keny Xu  
EMC Laboratory Manager



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| Revision Record |         |            |          |                       |
|-----------------|---------|------------|----------|-----------------------|
| Version         | Chapter | Date       | Modifier | Remark                |
| 01              |         | 2021-01-14 |          | Original              |
| 02              |         | 2021-04-06 |          | Updated setup diagram |
|                 |         |            |          |                       |

|                          |  |                                                                                     |  |
|--------------------------|--|-------------------------------------------------------------------------------------|--|
| Authorized for issue by: |  |                                                                                     |  |
|                          |  |    |  |
|                          |  | <hr/> <b>Leo Lai/Project Engineer</b>                                               |  |
|                          |  |  |  |
|                          |  | <hr/> <b>Eric Fu/Reviewer</b>                                                       |  |

## 2 Test Summary

| Radio Spectrum Matter Part                          |                                  |                                    |                                              |        |
|-----------------------------------------------------|----------------------------------|------------------------------------|----------------------------------------------|--------|
| Item                                                | Standard                         | Method                             | Requirement                                  | Result |
| Conducted Emissions at AC Power Line (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                                      | 47 CFR Part 15, Subpart C 15.225 | ANSI C63.10 (2013) Section 6.9     | 47 CFR Part 15, Subpart C 15.215             | Pass   |
| Emission Mask                                       | 47 CFR Part 15, Subpart C 15.225 | ANSI C63.10 (2013) Section 6.4     | 47 CFR Part 15, Subpart C 15.225(a)&(b)&(C ) | Pass   |
| Frequency tolerance                                 | 47 CFR Part 15, Subpart C 15.225 | ANSI C63.10 (2013) Section 6.8     | 47 CFR Part 15, Subpart C 15.225(e)          | Pass   |
| Radiated Emissions (9kHz-30MHz)                     | 47 CFR Part 15, Subpart C 15.225 | ANSI C63.10 (2013) Section 6.4&6.5 | 47 CFR Part 15, Subpart C 15.225(d) & 15.209 | Pass   |
| Radiated Emissions (30MHz-1GHz)                     | 47 CFR Part 15, Subpart C 15.225 | ANSI C63.10 (2013) Section 6.4&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:         | DC 3.87V from internal rechargeable battery or from AC/DC adapter                                                                                          |
| Cable:                | USB cable: 80cm shielded                                                                                                                                   |
| Operation Frequency:  | 13.56MHz                                                                                                                                                   |
| Modulation Type:      | ASK                                                                                                                                                        |
| Antenna Type:         | Loop antenna                                                                                                                                               |
| S/N of tested sample: | HQ60CC6086                                                                                                                                                 |
| NFC Type:             | Type A, B, F and V                                                                                                                                         |
|                       | Remark: The EUT has been pre-scanned in NFC Type A, B, F and V. The worst type (Type A) was recorded in this report if no others remark in the test items. |

### 4.2 Description of Support Units

| Description      | Manufacturer | Model No. | Serial No. |
|------------------|--------------|-----------|------------|
| NFC testing card | Eastcore     | RF01      | --         |

### 4.3 Measurement Uncertainty

| No. | Item                            | Measurement Uncertainty              |
|-----|---------------------------------|--------------------------------------|
| 1   | Radio Frequency                 | $\pm 7.25 \times 10^{-8}$            |
| 2   | Duty cycle                      | $\pm 0.37\%$                         |
| 3   | Occupied Bandwidth              | $\pm 3\%$                            |
| 4   | Conduction emission             | $\pm 3.0\text{dB}$ (150kHz to 30MHz) |
| 5   | Radiated Spurious emission test | $\pm 4.5\text{dB}$ (Below 1GHz)      |
|     |                                 | $\pm 4.8\text{dB}$ (Above 1GHz)      |
| 6   | Temperature test                | $\pm 1^\circ\text{C}$                |
| 7   | Humidity test                   | $\pm 3\%$                            |
| 8   | Supply voltages                 | $\pm 1.5\%$                          |
| 9   | Time                            | $\pm 3\%$                            |

#### 4.4 Test Location

All tests were performed at:

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No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

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**

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. 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: CN1178**

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

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **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

| Radiated Emissions (9kHz-30MHz) |                      |                 |              |            |              |
|---------------------------------|----------------------|-----------------|--------------|------------|--------------|
| Equipment                       | Manufacturer         | Model No        | Inventory No | Cal Date   | Cal Due Date |
| 10m Semi-Anechoic Chamber       | SAEMC                | FSAC1018        | SEM001-03    | 2018-03-31 | 2021-03-30   |
| MXE EMI receiver                | KEYSIGHT             | N9038A          | SEM004-16    | 2020-11-02 | 2021-11-01   |
| Trilog-Broadband Antenna        | Schwarzbeck          | VULB9168        | SEM003-18    | 2019-08-08 | 2022-08-07   |
| Pre-amplifier                   | Sonoma Instrument Co | 310N            | SEM005-04    | 2020-04-09 | 2021-04-08   |
| Loop Antenna                    | ETS-Lindgren         | 6502            | SEM003-08    | 2020-08-14 | 2023-08-13   |
| Measurement Software            | AUDIX                | e3 V8.2014-6-27 | N/A          | N/A        | N/A          |
| Coaxial Cable                   | SGS                  | N/A             | SEM029-01    | 2020-07-10 | 2021-07-09   |

| Radiated Emissions (30MHz-1GHz) |                      |                 |              |            |              |
|---------------------------------|----------------------|-----------------|--------------|------------|--------------|
| Equipment                       | Manufacturer         | Model No        | Inventory No | Cal Date   | Cal Due Date |
| 3m Semi-Anechoic Chamber        | ETS-LINDGREN         | N/A             | SEM001-01    | 2020-07-19 | 2023-07-18   |
| MXE EMI Receiver                | Agilent Technologies | N9038A          | SEM004-15    | 2020-11-02 | 2021-11-01   |
| BiConiLog Antenna               | ETS-LINDGREN         | 3142C           | SEM003-02    | 2019-05-24 | 2022-05-23   |
| Pre-Amplifier                   | Agilent Technologies | 8447D           | SEM005-01    | 2020-04-01 | 2021-03-31   |
| Measurement Software            | AUDIX                | e3 V8.2014-6-27 | N/A          | N/A        | N/A          |
| Coaxial Cable                   | SGS                  | N/A             | SEM025-01    | 2020-07-10 | 2021-07-09   |

| Frequency tolerance                         |                              |                 |              |            |              |
|---------------------------------------------|------------------------------|-----------------|--------------|------------|--------------|
| Equipment                                   | Manufacturer                 | Model No        | Inventory No | Cal Date   | Cal Due Date |
| Shielding Room                              | SAEMC                        | MSR733          | SEM001-09    | 2019-06-13 | 2022-06-12   |
| DC Power Supply                             | Rohde & Schwarz              | NGSM 32/10      | SEM011-04    | 2020-03-24 | 2021-03-23   |
| Spectrum Analyzer                           | Rohde & Schwarz              | FSU43           | SEM004-08    | 2020-04-01 | 2021-03-31   |
| Signal Generator                            | KEYSIGHT                     | N5173B          | SEM006-05    | 2020-09-23 | 2021-09-22   |
| Measurement Software                        | TST                          | TST PASS V1.0.5 | N/A          | N/A        | N/A          |
| Coaxial Cable                               | SGS                          | N/A             | SEM031-02    | 2020-07-10 | 2021-07-09   |
| Attenuator                                  | Huber+Suhner                 | 6620_SMA-50-1   | SEM021-09    | 2020-05-21 | 2021-05-20   |
| Programmable Temperature & Humidity Chamber | Votsch Industrietechnik GmbH | VT 4002         | SEM002-15    | 2020-03-25 | 2021-03-24   |



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| <b>Emission Mask</b>      |                      |                 |              |            |              |
|---------------------------|----------------------|-----------------|--------------|------------|--------------|
| Equipment                 | Manufacturer         | Model No        | Inventory No | Cal Date   | Cal Due Date |
| 10m Semi-Anechoic Chamber | SAEMC                | FSAC1018        | SEM001-03    | 2018-03-31 | 2021-03-30   |
| MXE EMI receiver          | KEYSIGHT             | N9038A          | SEM004-16    | 2020-11-02 | 2021-11-01   |
| Trilog-Broadband Antenna  | Schwarzbeck          | VULB9168        | SEM003-18    | 2019-08-08 | 2022-08-07   |
| Pre-amplifier             | Sonoma Instrument Co | 310N            | SEM005-04    | 2020-04-09 | 2021-04-08   |
| Loop Antenna              | ETS-Lindgren         | 6502            | SEM003-08    | 2020-08-14 | 2023-08-13   |
| Measurement Software      | AUDIX                | e3 V8.2014-6-27 | N/A          | N/A        | N/A          |
| Coaxial Cable             | SGS                  | N/A             | SEM029-01    | 2020-07-10 | 2021-07-09   |

| <b>Conducted Emissions at Mains Terminals (150kHz-30MHz)</b> |                  |                 |              |            |              |
|--------------------------------------------------------------|------------------|-----------------|--------------|------------|--------------|
| Equipment                                                    | Manufacturer     | Model No        | Inventory No | Cal Date   | Cal Due Date |
| Shielding Room                                               | ZhongYu Electron | GB-88           | SEM001-06    | 2019-06-13 | 2022-06-12   |
| EMI Test Receiver                                            | Rohde&Schwarz    | ESCI            | SEM004-02    | 2020-03-24 | 2021-03-23   |
| Measurement Software                                         | AUDIX            | e3 V8.2014-6-27 | N/A          | N/A        | N/A          |
| Coaxial Cable                                                | SGS              | N/A             | SEM024-01    | 2020-07-10 | 2021-07-09   |
| LISN                                                         | Rohde&Schwarz    | ENV216          | SEM007-01    | 2020-09-23 | 2021-09-22   |
| LISN                                                         | ETS-LINDGREN     | 3816/2          | SEM007-02    | 2020-04-01 | 2021-03-31   |

| <b>20dB Bandwidth</b>                       |                              |                 |              |            |              |
|---------------------------------------------|------------------------------|-----------------|--------------|------------|--------------|
| Equipment                                   | Manufacturer                 | Model No        | Inventory No | Cal Date   | Cal Due Date |
| Shielding Room                              | SAEMC                        | MSR733          | SEM001-09    | 2019-06-13 | 2022-06-12   |
| DC Power Supply                             | Rohde & Schwarz              | NGSM 32/10      | SEM011-04    | 2020-03-24 | 2021-03-23   |
| Spectrum Analyzer                           | Rohde & Schwarz              | FSU43           | SEM004-08    | 2020-04-01 | 2021-03-31   |
| Signal Generator                            | KEYSIGHT                     | N5173B          | SEM006-05    | 2020-09-23 | 2021-09-22   |
| Measurement Software                        | TST                          | TST PASS V1.0.5 | N/A          | N/A        | N/A          |
| Coaxial Cable                               | SGS                          | N/A             | SEM031-02    | 2020-07-10 | 2021-07-09   |
| Attenuator                                  | Huber+Suhner                 | 6620_SMA-50-1   | SEM021-09    | 2020-05-21 | 2021-05-20   |
| Programmable Temperature & Humidity Chamber | Votsch Industrietechnik GmbH | VT 4002         | SEM002-15    | 2020-03-25 | 2021-03-24   |



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| General used equipment          |                                           |          |              |            |              |
|---------------------------------|-------------------------------------------|----------|--------------|------------|--------------|
| Equipment                       | Manufacturer                              | Model No | Inventory No | Cal Date   | Cal Due Date |
| Humidity/ Temperature Indicator | Shanghai Meteorological Industry Factory  | ZJ1-2B   | SEM002-04    | 2020-09-15 | 2021-09-14   |
| Humidity/ Temperature Indicator | Mingle                                    | N/A      | SEM002-08    | 2020-09-15 | 2021-09-14   |
| Barometer                       | Changchun Meteorological Industry Factory | DYM3     | SEM002-01    | 2020-04-07 | 2021-04-06   |



## 6 Radio Spectrum Matter Test Results

### 6.1 Conducted Emissions at AC Power Line (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.



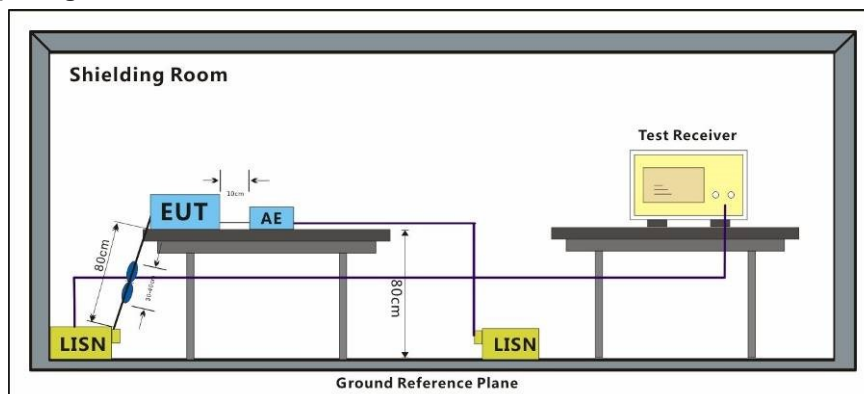
### 6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23.6 °C Humidity: 55.9 % RH Atmospheric Pressure: 1015 mbar

Test mode 00: Transmitting mode\_Keep the EUT in continue transmitting

### 6.1.2 Test Setup Diagram

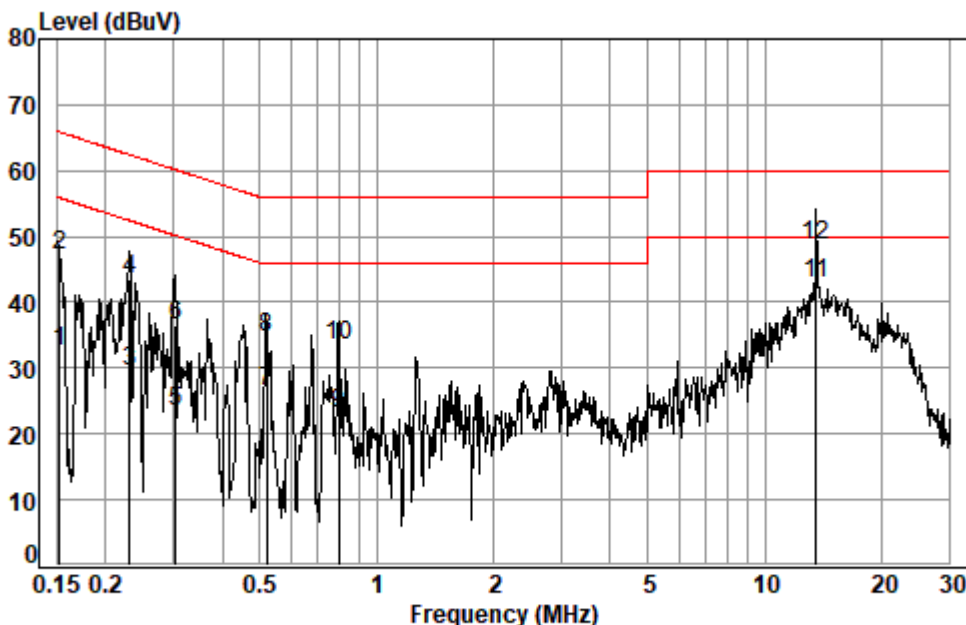


### 6.1.3 Measurement Procedure and Data

- 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: 1. LISN=Read Level+ Cable Loss+ LISN Factor;

2. The NFC fundamental (13.56MHz) will be affected the test result and antenna was removed during the testing.



Site : Shielding Room  
Condition: Line  
Job No. : 13243CR  
Test mode: 00

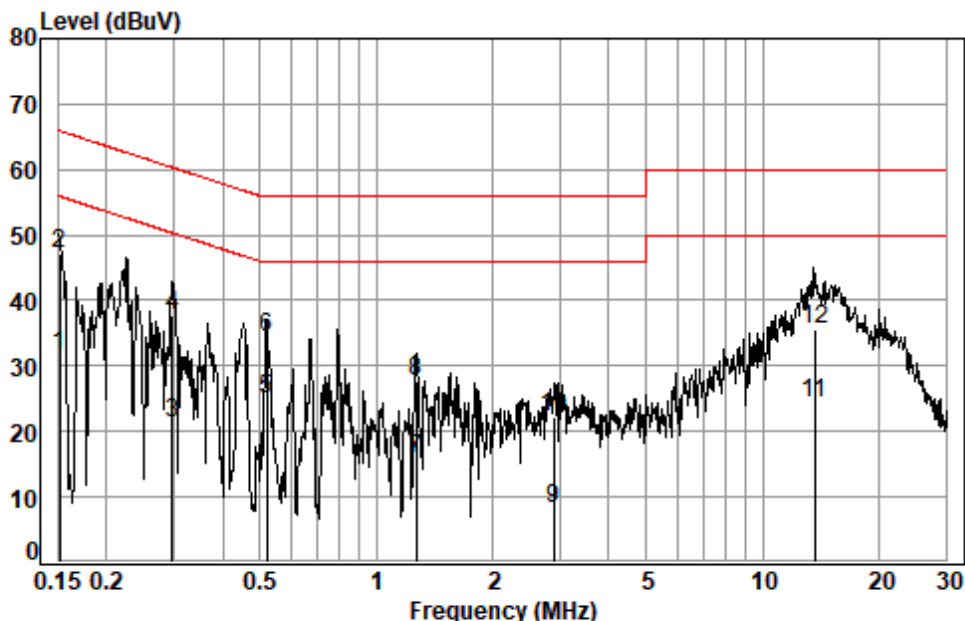
|    | Freq    | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark  |
|----|---------|------------|-------------|------------|-------|------------|------------|---------|
|    | MHz     | dB         | dB          | dBuV       | dBuV  | dBuV       | dB         |         |
| 1  | 0.1524  | 0.03       | 9.70        | 22.89      | 32.62 | 55.87      | -23.25     | Average |
| 2  | 0.1524  | 0.03       | 9.70        | 37.38      | 47.11 | 65.87      | -18.76     | QP      |
| 3  | 0.2304  | 0.04       | 9.73        | 19.74      | 29.51 | 52.44      | -22.93     | Average |
| 4  | 0.2304  | 0.04       | 9.73        | 33.60      | 43.37 | 62.44      | -19.07     | QP      |
| 5  | 0.3035  | 0.05       | 9.74        | 13.76      | 23.55 | 50.15      | -26.60     | Average |
| 6  | 0.3035  | 0.05       | 9.74        | 26.66      | 36.45 | 60.15      | -23.70     | QP      |
| 7  | 0.5210  | 0.07       | 9.77        | 16.51      | 26.35 | 46.00      | -19.65     | Average |
| 8  | 0.5210  | 0.07       | 9.77        | 24.76      | 34.60 | 56.00      | -21.40     | QP      |
| 9  | 0.8002  | 0.09       | 9.78        | 13.22      | 23.09 | 46.00      | -22.91     | Average |
| 10 | 0.8002  | 0.09       | 9.78        | 23.45      | 33.32 | 56.00      | -22.68     | QP      |
| 11 | 13.5600 | 0.16       | 10.44       | 32.36      | 42.96 | 50.00      | -7.04      | Average |
| 12 | 13.5600 | 0.16       | 10.44       | 38.04      | 48.64 | 60.00      | -11.36     | QP      |

Remark: Line conducted test plot with NFC antenna attached (L1)



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Mode: 00; Line: Live Line



Site : Shielding Room  
Condition: Line  
Job No. : 13243CR  
Test mode: 00

|    |         | Cable | LISN   | Read  |       | Limit | Over   |         |
|----|---------|-------|--------|-------|-------|-------|--------|---------|
|    | Freq    | Loss  | Factor | Level | Level | Line  | Limit  | Remark  |
|    | MHz     | dB    | dB     | dBuV  | dBuV  | dBuV  | dB     |         |
| 1  | 0.1516  | 0.03  | 9.70   | 22.06 | 31.79 | 55.91 | -24.12 | Average |
| 2  | 0.1516  | 0.03  | 9.70   | 37.48 | 47.21 | 65.91 | -18.70 | QP      |
| 3  | 0.2971  | 0.05  | 9.74   | 11.44 | 21.23 | 50.32 | -29.09 | Average |
| 4  | 0.2971  | 0.05  | 9.74   | 27.84 | 37.63 | 60.32 | -22.69 | QP      |
| 5  | 0.5210  | 0.07  | 9.77   | 15.18 | 25.02 | 46.00 | -20.98 | Average |
| 6  | 0.5210  | 0.07  | 9.77   | 24.40 | 34.24 | 56.00 | -21.76 | QP      |
| 7  | 1.2688  | 0.11  | 9.79   | 5.96  | 15.86 | 46.00 | -30.14 | Average |
| 8  | 1.2688  | 0.11  | 9.79   | 17.65 | 27.55 | 56.00 | -28.45 | QP      |
| 9  | 2.8845  | 0.14  | 9.84   | -1.75 | 8.23  | 46.00 | -37.77 | Average |
| 10 | 2.8845  | 0.14  | 9.84   | 12.23 | 22.21 | 56.00 | -33.79 | QP      |
| 11 | 13.6228 | 0.16  | 10.44  | 13.85 | 24.45 | 50.00 | -25.55 | Average |
| 12 | 13.6228 | 0.16  | 10.44  | 25.09 | 35.69 | 60.00 | -24.31 | QP      |

Remark: Line-conducted test plot with NFC antenna terminated 50ohm (L1)



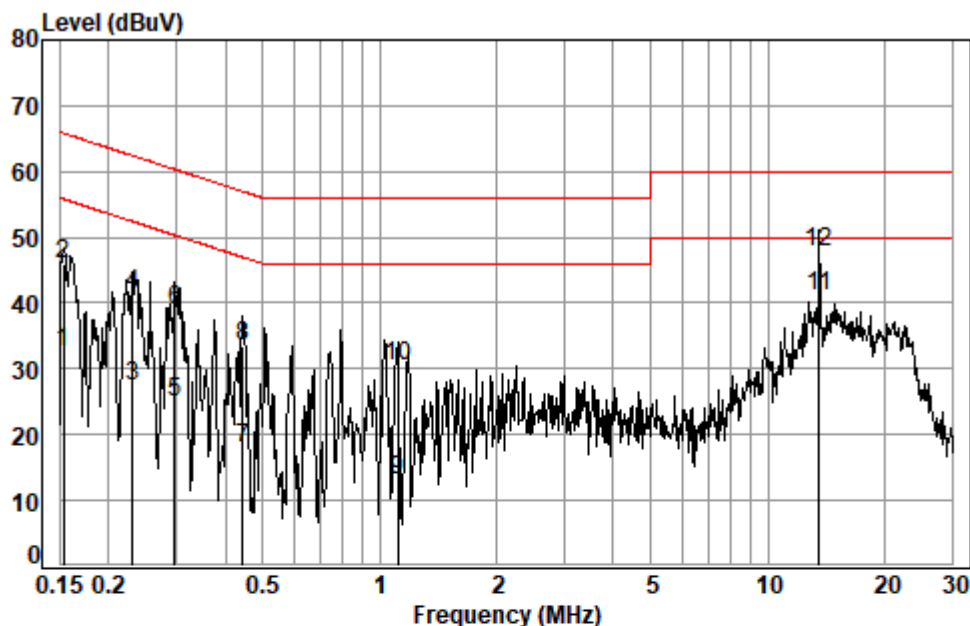
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Mode:00; Line:Neutral Line



Site : Shielding Room

Condition: Neutral

Job No. : 13243CR

Test mode: 00

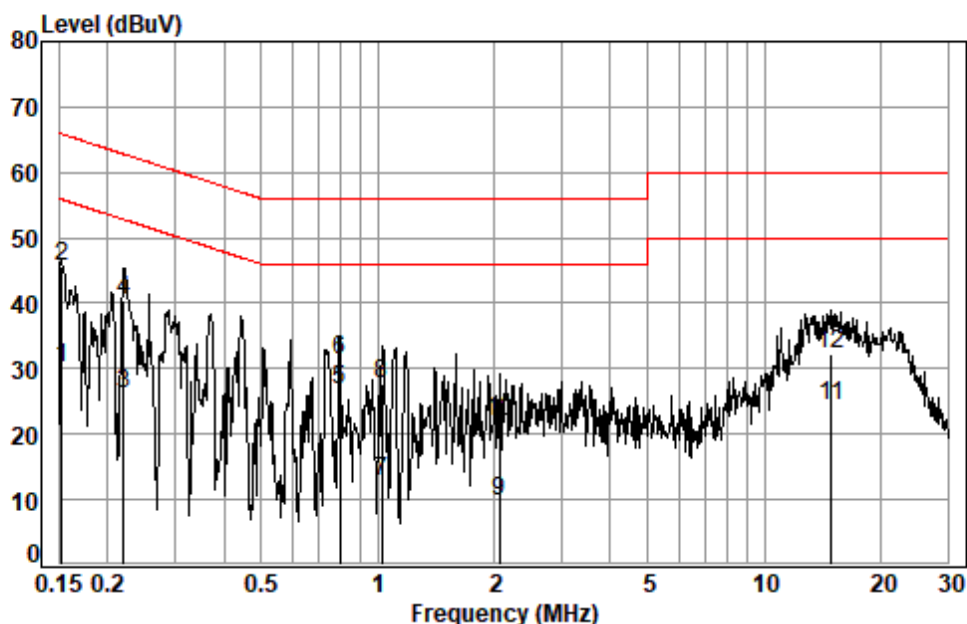
|    | Freq    | Cable Loss | LISN Factor | Read Level | Level | Limit Line | Over Limit | Remark  |
|----|---------|------------|-------------|------------|-------|------------|------------|---------|
|    | MHz     | dB         | dB          | dBuV       | dBuV  | dBuV       | dB         |         |
| 1  | 0.1532  | 0.03       | 9.71        | 22.91      | 32.65 | 55.82      | -23.17     | Average |
| 2  | 0.1532  | 0.03       | 9.71        | 36.33      | 46.07 | 65.82      | -19.75     | QP      |
| 3  | 0.2304  | 0.04       | 9.73        | 17.58      | 27.35 | 52.44      | -25.09     | Average |
| 4  | 0.2304  | 0.04       | 9.73        | 31.71      | 41.48 | 62.44      | -20.96     | QP      |
| 5  | 0.2955  | 0.05       | 9.74        | 15.27      | 25.06 | 50.37      | -25.31     | Average |
| 6  | 0.2955  | 0.05       | 9.74        | 29.12      | 38.91 | 60.37      | -21.46     | QP      |
| 7  | 0.4444  | 0.07       | 9.75        | 8.09       | 17.91 | 46.98      | -29.07     | Average |
| 8  | 0.4444  | 0.07       | 9.75        | 23.69      | 33.51 | 56.98      | -23.47     | QP      |
| 9  | 1.1114  | 0.10       | 9.79        | 3.25       | 13.14 | 46.00      | -32.86     | Average |
| 10 | 1.1114  | 0.10       | 9.79        | 20.38      | 30.27 | 56.00      | -25.73     | QP      |
| 11 | 13.5600 | 0.16       | 10.44       | 30.57      | 41.17 | 50.00      | -8.83      | Average |
| 12 | 13.5600 | 0.16       | 10.44       | 37.01      | 47.61 | 60.00      | -12.39     | QP      |

Remark: Line-conducted test plot with NFC antenna attached (N)



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Mode:00; Line:Neutral Line



Site : Shielding Room  
Condition: Neutral  
Job No. : 13243CR  
Test mode: 00

|    | Freq    | Cable Loss | LISN Factor | Read Level | Limit Level | Limit Line | Over Limit | Remark  |
|----|---------|------------|-------------|------------|-------------|------------|------------|---------|
|    | MHz     | dB         | dB          | dBuV       | dBuV        | dBuV       | dB         |         |
| 1  | 0.1524  | 0.03       | 9.71        | 20.51      | 30.25       | 55.87      | -25.62     | Average |
| 2  | 0.1524  | 0.03       | 9.71        | 35.85      | 45.59       | 65.87      | -20.28     | QP      |
| 3  | 0.2208  | 0.04       | 9.72        | 16.26      | 26.02       | 52.79      | -26.77     | Average |
| 4  | 0.2208  | 0.04       | 9.72        | 30.79      | 40.55       | 62.79      | -22.24     | QP      |
| 5  | 0.8002  | 0.09       | 9.77        | 16.96      | 26.82       | 46.00      | -19.18     | Average |
| 6  | 0.8002  | 0.09       | 9.77        | 21.41      | 31.27       | 56.00      | -24.73     | QP      |
| 7  | 1.0265  | 0.10       | 9.78        | 2.84       | 12.72       | 46.00      | -33.28     | Average |
| 8  | 1.0265  | 0.10       | 9.78        | 17.93      | 27.81       | 56.00      | -28.19     | QP      |
| 9  | 2.0659  | 0.13       | 9.81        | -0.13      | 9.81        | 46.00      | -36.19     | Average |
| 10 | 2.0659  | 0.13       | 9.81        | 11.93      | 21.87       | 56.00      | -34.13     | QP      |
| 11 | 14.9068 | 0.16       | 10.52       | 13.74      | 24.42       | 50.00      | -25.58     | Average |
| 12 | 14.9068 | 0.16       | 10.52       | 21.56      | 32.24       | 60.00      | -27.76     | QP      |

Remark: Line-conducted test plot with NFC antenna terminated 50ohm (N)



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## 6.2 20dB Bandwidth

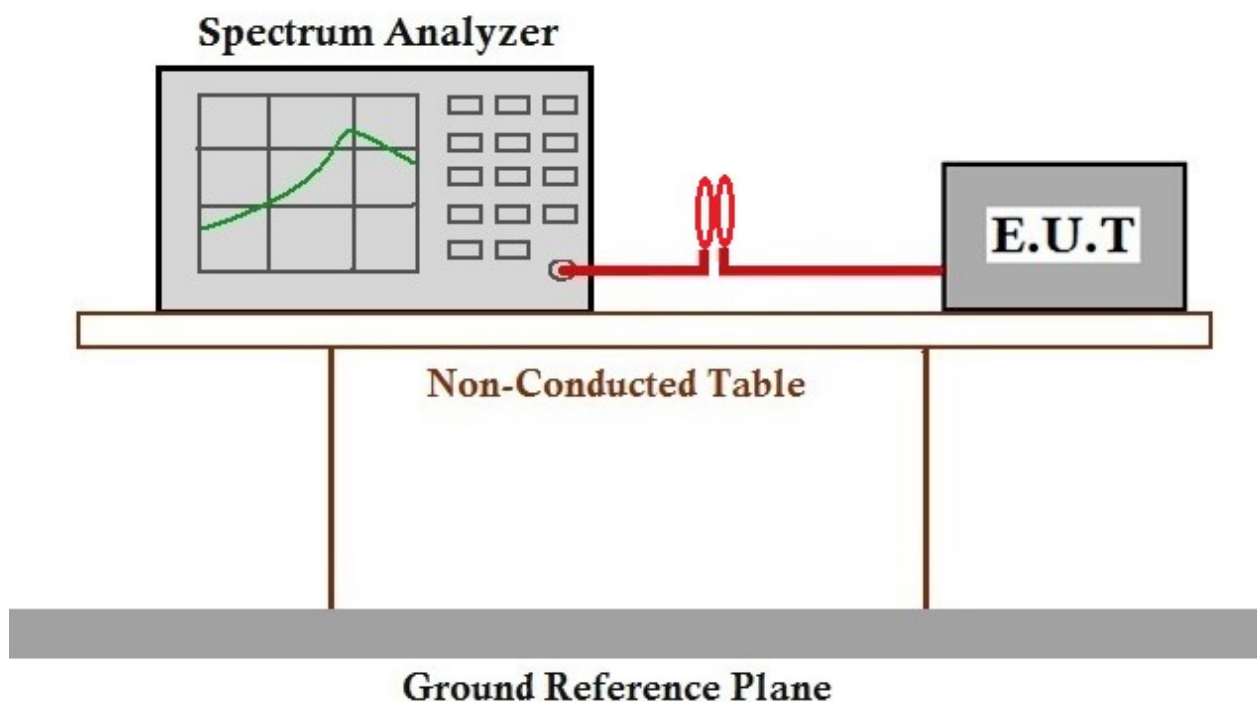
Test Requirement 47 CFR Part 15, Subpart C 15.215  
Test Method: ANSI C63.10 (2013) Section 6.9  
Limit: N/A

### 6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 54 % RH Atmospheric Pressure: 1015 mbar  
Test mode 00: Transmitting mode\_Keep the EUT in continue transmitting

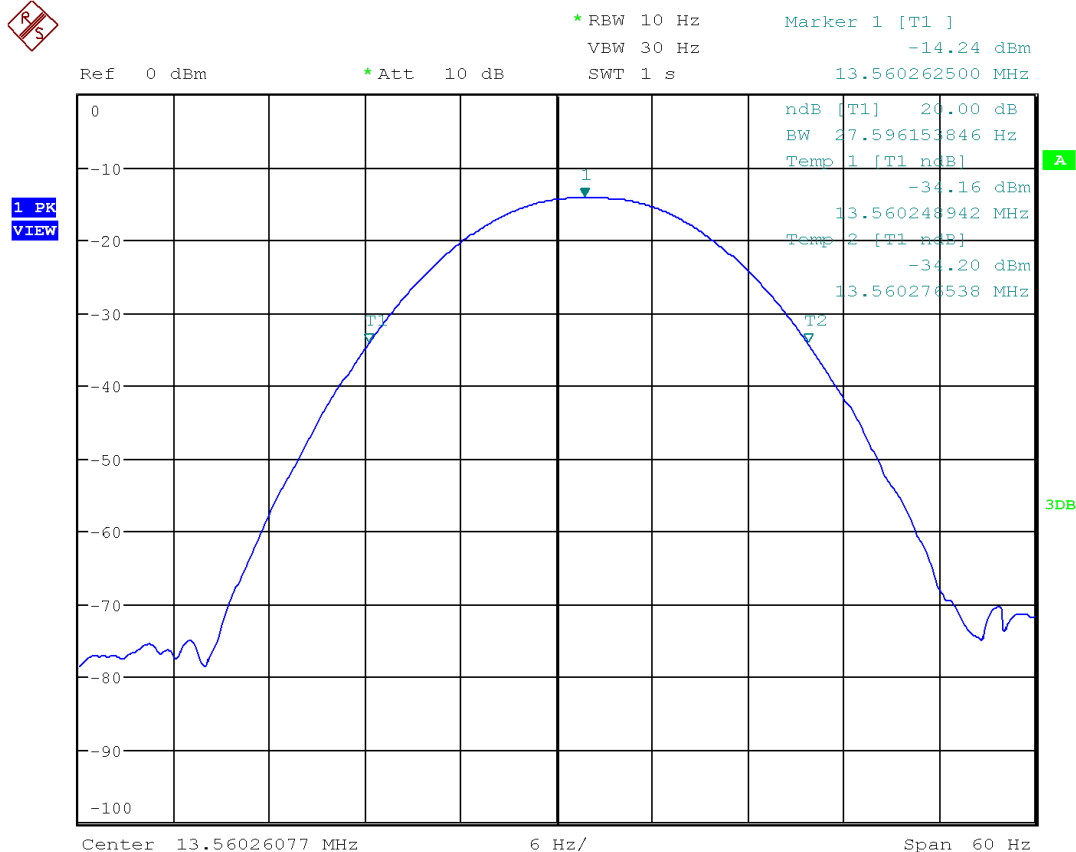
### 6.2.2 Test Setup Diagram



### 6.2.3 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.

Remark: Because the signal is CW-like, it is not practical to use an RBW setting of 1-5% of the emission bandwidth since the emission bandwidth will be proportional to the RBW.



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### 6.3 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.

(e) According to KDB 414788, we have a site validation between OATS and Semi Chamber for radiated emission measurements below 30 MHz, and the result of 3m Chamber measured is worst case result.

#### 6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode 00: Transmitting mode\_Keep the EUT in continue transmitting

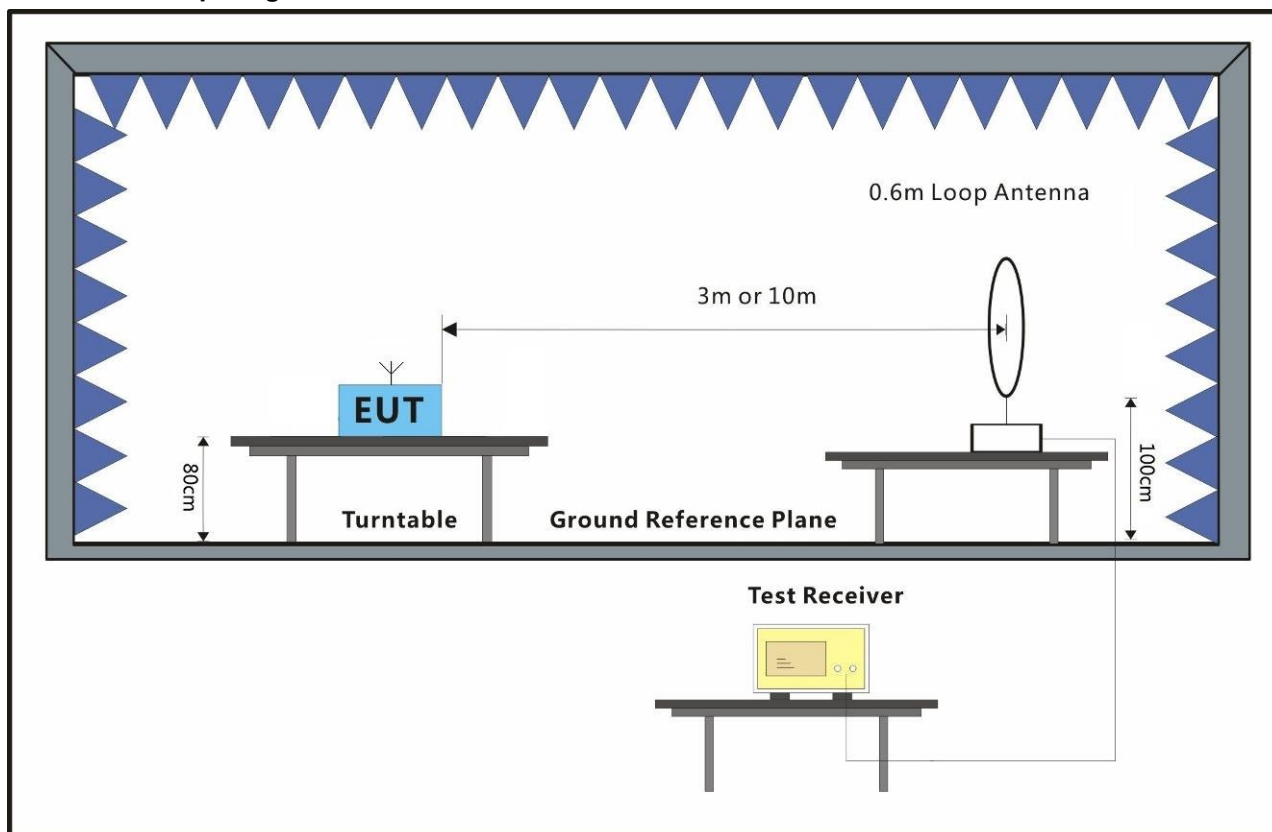


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## 6.3.2 Test Setup Diagram



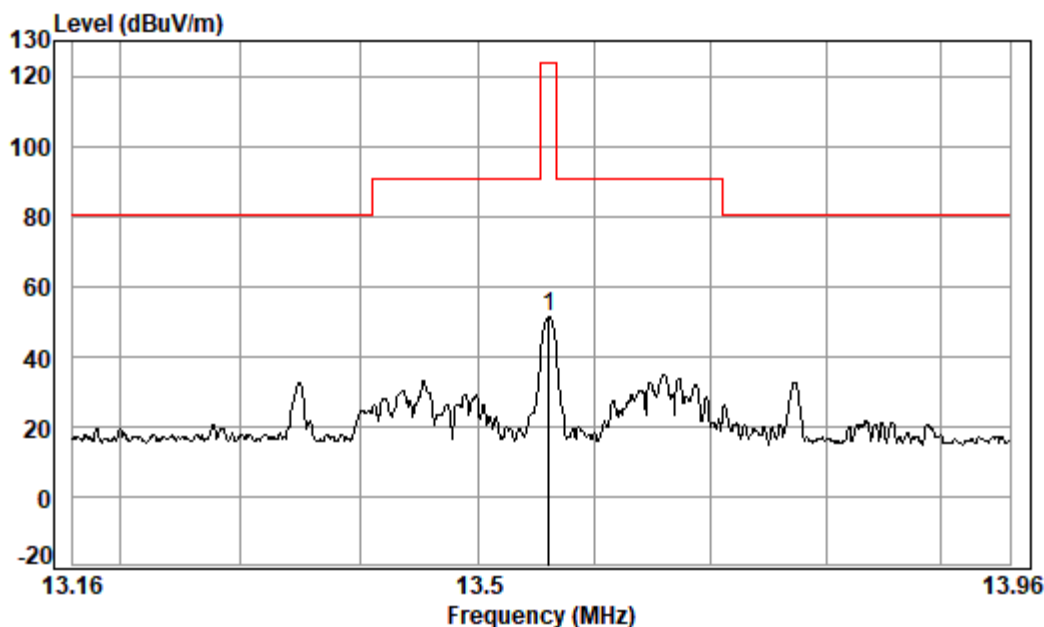
## 6.3.3 Measurement Procedure and Data

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.

The RBW setting of the spectrum is 200Hz from 9KHz to 150KHz, 9KHz from 150KHz to 30MHz, 120KHz from 30MHz to 1GHz.



Mode:00 (Detector: QP)



Condition: 3m

Job No. : 13243CR

Test Mode: 00

| Frequency (MHz) | Cable loss (dB) | ANT Factor (dB) | Preamp Factor (dB) | Read Level @ 3m (dBuV) | Level @ 3m (dBuV/m) | Level @ 30m (dBuV/m) | Limit @ 30m (dBuV/m) | Margin (dB) |
|-----------------|-----------------|-----------------|--------------------|------------------------|---------------------|----------------------|----------------------|-------------|
| 13.561          | 0.62            | 8.88            | 32.5               | 74.25                  | 51.25               | 11.25                | 84.00                | -72.75      |

### Below 30MHz

The test was performed at a 3m test site.

The level at 30m test distance is below:

The factor calculated by the following equation:

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

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



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## 6.4 Frequency tolerance

Test Requirement 47 CFR Part 15, Subpart C 15.225(e)  
Test Method: ANSI C63.10 (2013) Section 6.8  
Limit:  $\pm 1.356\text{kHz}(\pm 0.01\%)$

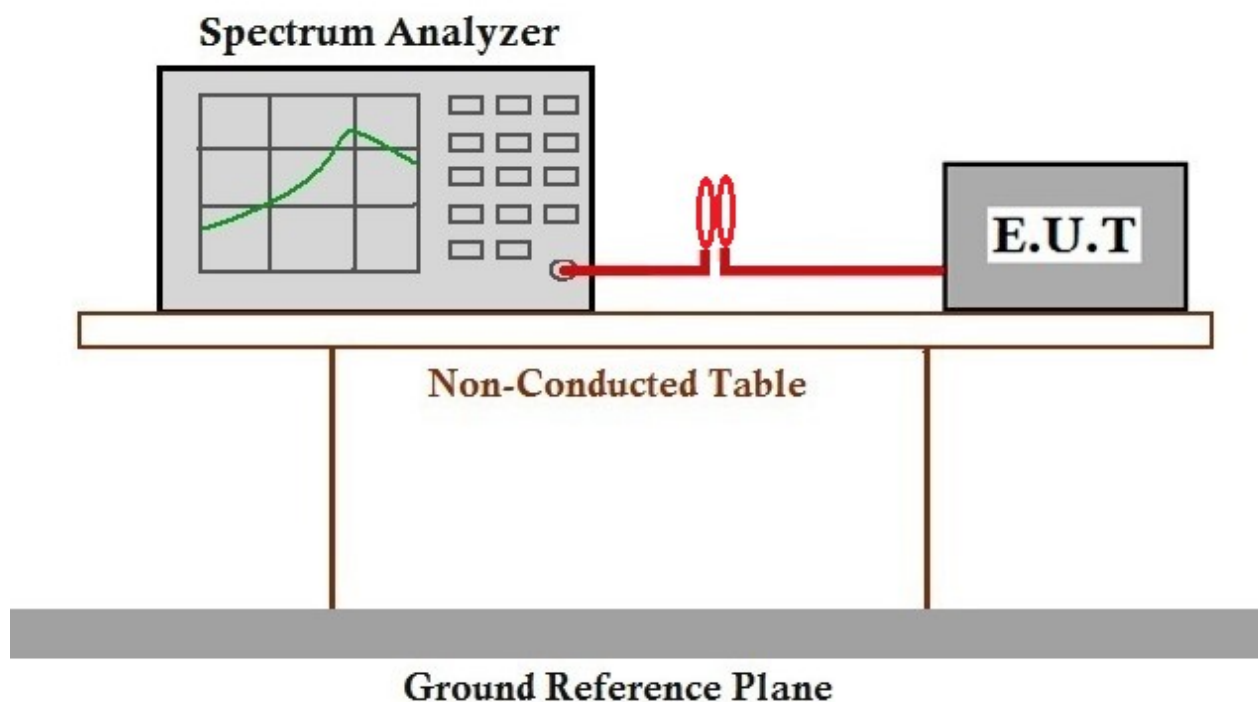
### 6.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode 00: Transmitting mode\_Keep the EUT in continue transmitting

### 6.4.2 Test Setup Diagram



### 6.4.3 Measurement Procedure and Data

During the test, maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized.

|                          |          |                       |
|--------------------------|----------|-----------------------|
| Declared Frequency (MHz) | 13.56MHz | Test start at startup |
|--------------------------|----------|-----------------------|

| Temperature (°C) | Voltage(VDC) | Measurement Frequency(MHz) | Frequency Tolerance (%) | Limit (%) | Result |
|------------------|--------------|----------------------------|-------------------------|-----------|--------|
| 50               | 3.87         | 13.560341                  | 0.00251                 | ±0.01     | Pass   |
| 40               |              | 13.560300                  | 0.00222                 |           | Pass   |
| 30               |              | 13.560276                  | 0.00204                 |           | Pass   |
| 20               |              | 13.560247                  | 0.00182                 |           | Pass   |
| 10               |              | 13.560298                  | 0.00220                 |           | Pass   |
| 0                |              | 13.560309                  | 0.00228                 |           | Pass   |
| -10              |              | 13.560333                  | 0.00245                 |           | Pass   |
| -20              |              | 13.560402                  | 0.00296                 |           | Pass   |
| 20               | 4.45         | 13.560255                  | 0.00188                 |           | Pass   |
|                  | 3.29         | 13.560285                  | 0.00210                 |           | Pass   |

|                          |          |                         |
|--------------------------|----------|-------------------------|
| Declared Frequency (MHz) | 13.56MHz | Test start at 2 minutes |
|--------------------------|----------|-------------------------|

| Temperature (°C) | Voltage(VDC) | Measurement Frequency(MHz) | Frequency Tolerance (%) | Limit (%) | Result |
|------------------|--------------|----------------------------|-------------------------|-----------|--------|
| 50               | 3.87         | 13.560346                  | 0.00255                 | ±0.01     | Pass   |
| 40               |              | 13.560300                  | 0.00221                 |           | Pass   |
| 30               |              | 13.560274                  | 0.00202                 |           | Pass   |
| 20               |              | 13.560248                  | 0.00183                 |           | Pass   |
| 10               |              | 13.560297                  | 0.00219                 |           | Pass   |
| 0                |              | 13.560307                  | 0.00226                 |           | Pass   |
| -10              |              | 13.560333                  | 0.00245                 |           | Pass   |
| -20              |              | 13.560403                  | 0.00297                 |           | Pass   |
| 20               | 4.45         | 13.560255                  | 0.00188                 |           | Pass   |
|                  | 3.29         | 13.560292                  | 0.00215                 |           | Pass   |



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|                          |          |                         |
|--------------------------|----------|-------------------------|
| Declared Frequency (MHz) | 13.56MHz | Test start at 5 minutes |
|--------------------------|----------|-------------------------|

| Temperature (°C) | Voltage(VDC) | Measurement Frequency(MHz) | Frequency Tolerance (%) | Limit (%) | Result |
|------------------|--------------|----------------------------|-------------------------|-----------|--------|
| 50               | 3.87         | 13.560345                  | 0.00254                 | ±0.01     | Pass   |
| 40               |              | 13.560307                  | 0.00227                 |           | Pass   |
| 30               |              | 13.560280                  | 0.00207                 |           | Pass   |
| 20               |              | 13.560251                  | 0.00185                 |           | Pass   |
| 10               |              | 13.560297                  | 0.00219                 |           | Pass   |
| 0                |              | 13.560307                  | 0.00227                 |           | Pass   |
| -10              |              | 13.560340                  | 0.00251                 |           | Pass   |
| -20              |              | 13.560402                  | 0.00296                 |           | Pass   |
| 20               | 4.45         | 13.560255                  | 0.00188                 |           | Pass   |
|                  | 3.29         | 13.560290                  | 0.00214                 |           | Pass   |

|                          |          |                          |
|--------------------------|----------|--------------------------|
| Declared Frequency (MHz) | 13.56MHz | Test start at 10 minutes |
|--------------------------|----------|--------------------------|

| Temperature (°C) | Voltage(VDC) | Measurement Frequency(MHz) | Frequency Tolerance (%) | Limit (%) | Result |
|------------------|--------------|----------------------------|-------------------------|-----------|--------|
| 50               | 3.87         | 13.560349                  | 0.00258                 | ±0.01     | Pass   |
| 40               |              | 13.560305                  | 0.00225                 |           | Pass   |
| 30               |              | 13.560278                  | 0.00205                 |           | Pass   |
| 20               |              | 13.560257                  | 0.00190                 |           | Pass   |
| 10               |              | 13.560297                  | 0.00219                 |           | Pass   |
| 0                |              | 13.560306                  | 0.00225                 |           | Pass   |
| -10              |              | 13.560335                  | 0.00247                 |           | Pass   |
| -20              |              | 13.560401                  | 0.00296                 |           | Pass   |
| 20               | 4.45         | 13.560264                  | 0.00194                 |           | Pass   |
|                  | 3.29         | 13.560294                  | 0.00217                 |           | Pass   |

## 6.5 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<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                               |
| 30-88          | 100                                  | 40.0              | QP       | 3                                |
| 88-216         | 150                                  | 43.5              | QP       | 3                                |
| 216-960        | 200                                  | 46.0              | QP       | 3                                |
| 960-1000       | 500                                  | 54.0              | QP       | 3                                |
| Above 1000     | 500                                  | 54.0              | AV       | 3                                |



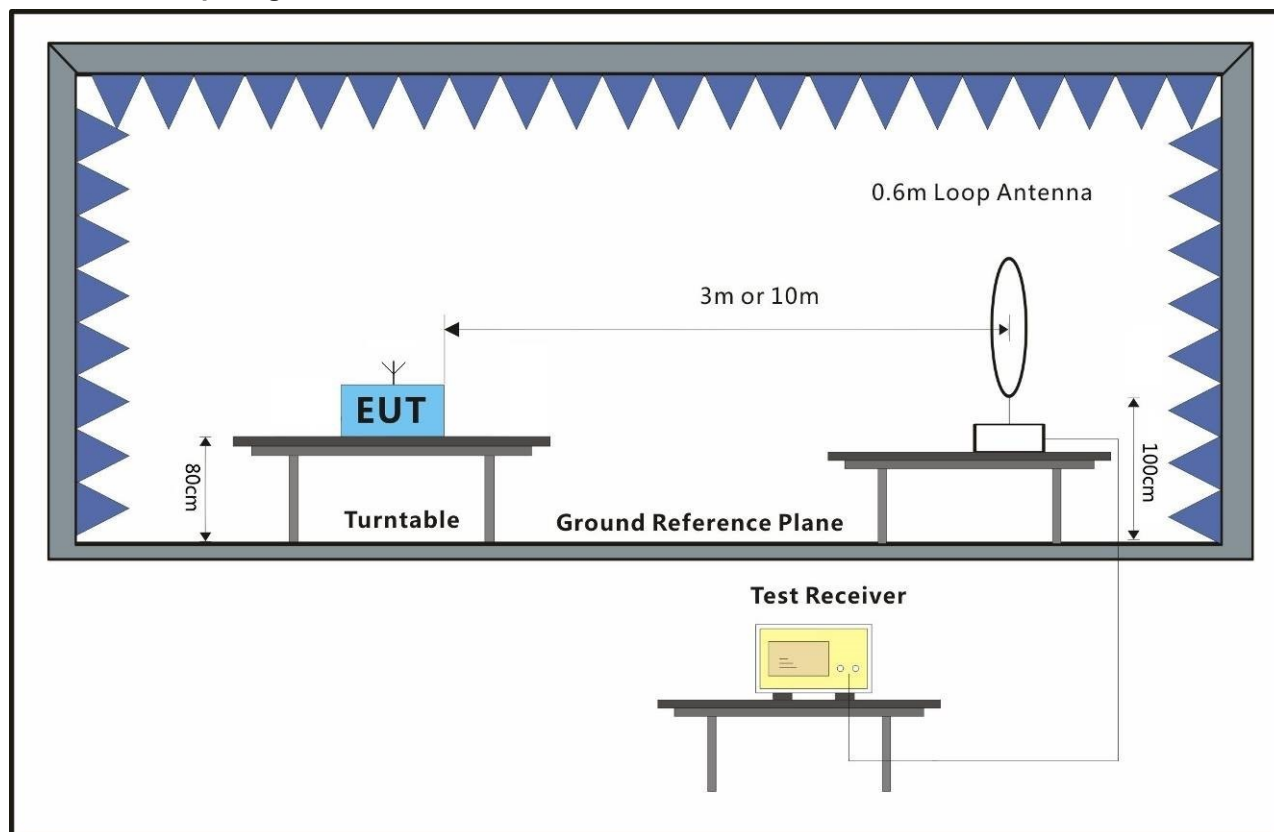
## 6.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

Test mode 00: Transmitting mode\_Keep the EUT in continue transmitting

## 6.5.2 Test Setup Diagram

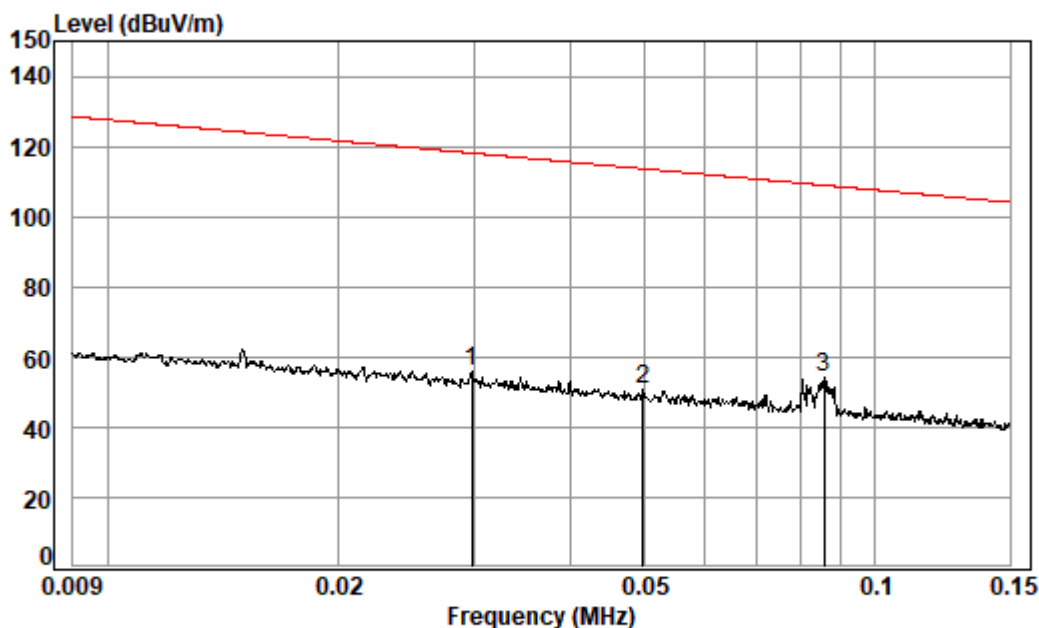


## 6.5.3 Measurement Procedure and Data

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.

According to KDB 414788, we have a site validation between OATS and Semi Chamber for radiated emission measurements below 30 MHz, and the result of 3m Chamber measured is worst case result.

The RBW setting of the spectrum is 200Hz from 9KHz to 150KHz, 9KHz from 150KHz to 30MHz, 120KHz from 30MHz to 1GHz.



Condition: 3m

Job No. : 13243CR

Test Mode: 00

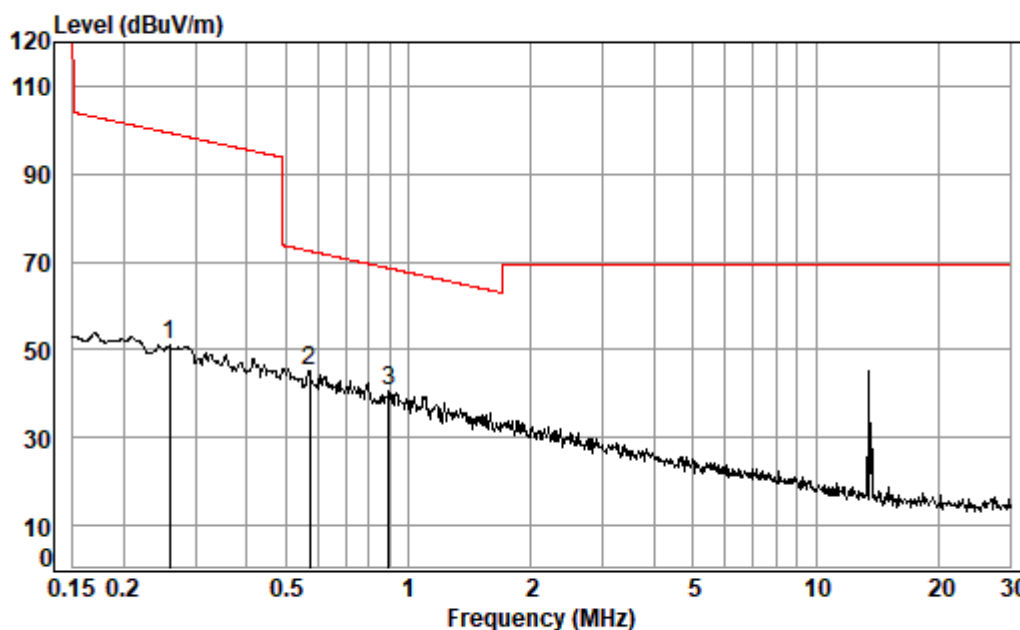


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Condition: 3m

Job No. : 13243CR

Test Mode: 00

| Frequency (MHz) | Level @3m (dBuV/m) | Limit @ 300m (dBuV/m) | Limit @ 30m (dBuV/m) | Factor (dB) | Level @ 300m (dBuV/m) | Level @ 30m (dBuV/m) | Margin (dB) |
|-----------------|--------------------|-----------------------|----------------------|-------------|-----------------------|----------------------|-------------|
| 0.0298          | 56.02              | 38.11                 | -                    | 80.00       | -23.98                | -                    | -62.09      |
| 0.0498          | 50.98              | 33.66                 | -                    | 80.00       | -29.02                | -                    | -62.68      |
| 0.0859          | 54.31              | 28.92                 | -                    | 80.00       | -25.69                | -                    | -54.61      |
| 0.2589          | 50.93              | 19.34                 | -                    | 80.00       | -29.07                | -                    | -48.41      |
| 0.5731          | 45.33              | -                     | 32.44                | 40.00       |                       | 5.33                 | -27.11      |
| 0.8944          | 40.68              | -                     | 28.57                | 40.00       |                       | 0.68                 | -27.89      |

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



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## 6.6 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     | Field strength<br>(microvolt/meter) | Limit (dBuV/m) | Remark     | Measurement<br>distance (m) |
|---------------|-------------------------------------|----------------|------------|-----------------------------|
| 30MHz-88MHz   | 100                                 | 40.0           | Quasi-peak | 3                           |
| 88MHz-216MHz  | 150                                 | 43.5           | Quasi-peak | 3                           |
| 216MHz-960MHz | 200                                 | 46.0           | Quasi-peak | 3                           |
| 960MHz-1GHz   | 500                                 | 54.0           | Quasi-peak | 3                           |



### 6.6.1 E.U.T. Operation

Operating Environment:

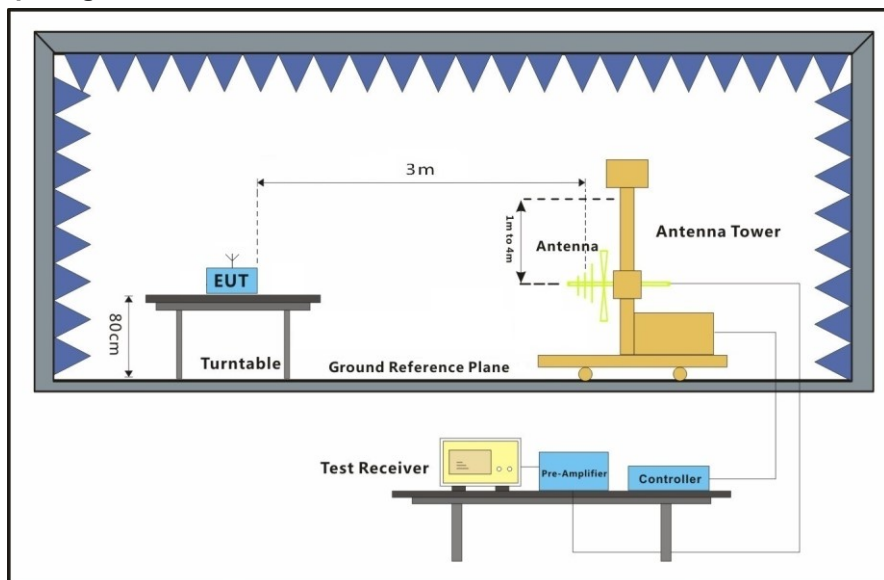
Temperature: 25 °C

Humidity: 51 % RH

Atmospheric Pressure: 1015 mbar

Test mode 00: Transmitting mode\_Keep the EUT in continue transmitting

### 6.6.2 Test Setup Diagram



### 6.6.3 Measurement Procedure and Data

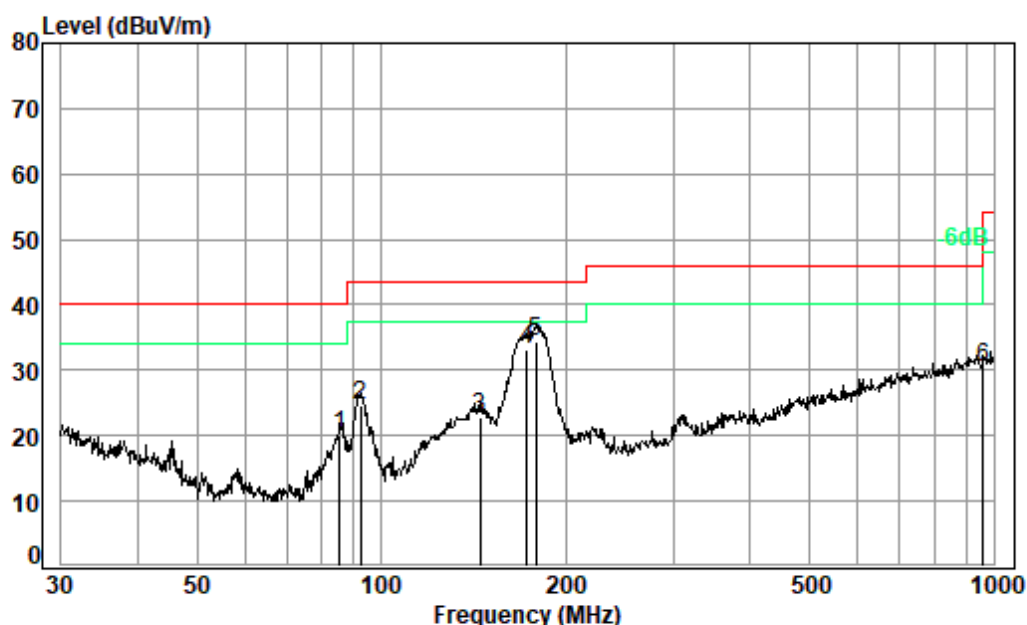
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground for below 1GHz at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which 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.
- h. The RBW setting of the spectrum is 200Hz from 9KHz to 150KHz, 9KHz from 150KHz to 30MHz, 120KHz from 30MHz to 1GHz.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



Mode:00; Polarization:Horizontal



Condition: 3m HORIZONTAL

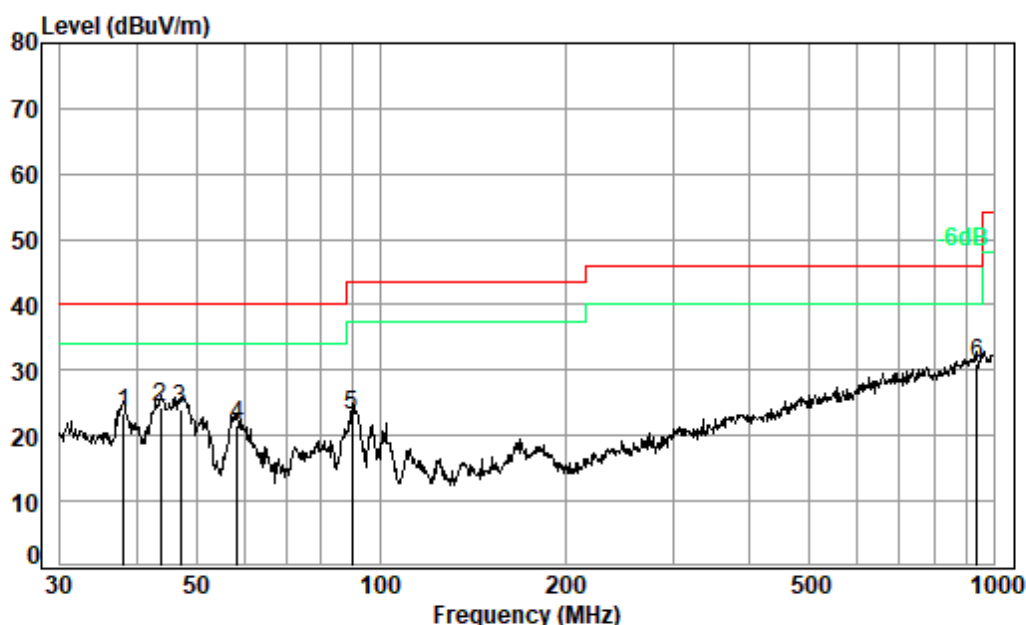
Job No. : 13243CR

Test Mode: 00

|      | Freq   | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level  | Limit Line | Over Limit | Remark |
|------|--------|------------|------------|---------------|------------|--------|------------|------------|--------|
|      | MHz    | dB         | dB/m       | dB            | dBuV       | dBuV/m | dBuV/m     | dB         |        |
| 1    | 85.60  | 1.26       | 12.46      | 27.63         | 33.84      | 19.93  | 40.00      | -20.07     | QP     |
| 2    | 92.46  | 1.25       | 13.50      | 27.62         | 37.48      | 24.61  | 43.50      | -18.89     | QP     |
| 3    | 144.84 | 1.15       | 14.04      | 27.36         | 35.05      | 22.88  | 43.50      | -20.62     | QP     |
| 4    | 173.21 | 1.18       | 15.53      | 27.24         | 43.72      | 33.19  | 43.50      | -10.31     | QP     |
| 5 pp | 178.76 | 1.18       | 15.42      | 27.22         | 45.08      | 34.46  | 43.50      | -9.04      | QP     |
| 6    | 958.79 | 3.56       | 29.48      | 26.86         | 24.21      | 30.39  | 46.00      | -15.61     | QP     |



Mode:00; Polarization:Vertical



Condition: 3m VERTICAL

Job No. : 13243CR

Test Mode: 00

|      | Freq   | Cable Loss | Ant Factor | Preamp Factor | Read Level | Level  | Limit Line | Over Limit | Remark |
|------|--------|------------|------------|---------------|------------|--------|------------|------------|--------|
|      | MHz    | dB         | dB/m       | dB            | dBuV       | dBuV/m | dBuV/m     | dB         |        |
| 1    | 38.08  | 0.68       | 19.15      | 27.71         | 31.24      | 23.36  | 40.00      | -16.64     | QP     |
| 2    | 43.81  | 0.70       | 16.31      | 27.70         | 34.98      | 24.29  | 40.00      | -15.71     | QP     |
| 3    | 47.16  | 0.70       | 15.01      | 27.69         | 35.98      | 24.00  | 40.00      | -16.00     | QP     |
| 4    | 58.41  | 0.79       | 13.12      | 27.67         | 35.26      | 21.50  | 40.00      | -18.50     | QP     |
| 5    | 89.90  | 1.30       | 13.09      | 27.62         | 36.32      | 23.09  | 43.50      | -20.41     | QP     |
| 6 pp | 938.83 | 3.54       | 29.20      | 26.96         | 25.15      | 30.93  | 46.00      | -15.07     | QP     |



## 7 Photographs

### 7.1 Test Setup

Refer to setup photos.

### 7.2 EUT Constructional Details (EUT Photos)

Refer to external and internal photos.

- End of the Report -