



FCC Test Report

Equipment : Label/Sign Printer
Brand Name : DuraLabel
Model No. : DLBRONCO
FCC ID : ZKKDLB01
Standard : 47 CFR FCC Part 15.225
Operating Band : 13.553 – 13.567 MHz
Applicant : **Graphic Products, Inc.**
PO BOX 4030 Beaverton, OREGON 97076 USA
Manufacturer : **Graphic Products, Inc.**
9825 SW Sunshine Ct., Beaverton, OR 97005

The product sample received on Dec. 25, 2017 and completely tested on Mar. 05, 2018. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

Phoenix Chen / Assistant Manager





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APPENDIX A. TEST PHOTOS

PHOTOGRAPHS OF EUT V01



Summary of Test Result

| Conformance Test Specifications | | | | | |
|---------------------------------|------------------|---|---|--|----------|
| Report Clause | Ref. Std. Clause | Description | Measured | Limit | Result |
| 1.1.2 | 15.203 | Antenna Requirement | Antenna connector mechanism complied | FCC 15.203 | Complied |
| 3.1 | 15.207 | AC Power-line Conducted Emissions | [dBuV]: 0.7047MHz 37.32(Margin 18.68dB) - QP 30.11(Margin 15.89dB) - AV | FCC 15.207 | Complied |
| 3.2 | 15.215(c) | Emission Bandwidth | 20dB Bandwidth 4.978 [kHz] F _L : 13.558698 MHz F _H : 13.563676 MHz | Fall in band F _L ≥ 13.553 MHz F _H ≤ 13.567 MHz | Complied |
| 3.3 | 15.225(a)~(d) | Field Strength of Fundamental Emissions and Spectrum Mask | Fundamental Emissions peak: 87.27 dBuV/m at 3m Device complies with spectrum mask – refer to test data | 124 dBuV/m at 3m | Complied |
| 3.4 | 15.225(d) | Transmitter Radiated Unwanted Emissions | [dBuV/m at 3m]: 39.7MHz 39.87 (Margin 0.13dB) - QP | FCC 15.209 | Complied |
| 3.5 | 15.225(e) | Frequency Stability | 65.63 ppm | ± 0.01% (100ppm) | Complied |



1 General Description

1.1 Information

1.1.1 RF General Information

| | | |
|----------|------------|--------------|
| NFC Chip | Brand Name | Model Name |
| | SUNION | RF-331 -GX-1 |

| RF General Information | | | | |
|--|--------------------|---------------------|----------------|-------------------------|
| Frequency Range | Modulation | Ch. Frequency (MHz) | Channel Number | Field Strength (dBuV/m) |
| 13.553 – 13.567 MHz | ISO 14443-3A (ASK) | 13.56 | 1 | 87.27 |
| Note 1: Field strength performed peak level at 3m. | | | | |

1.1.2 Antenna Information

| Antenna Category | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Integral antenna (antenna permanently attached) |
| <input type="checkbox"/> | Temporary RF connector provided |
| <input checked="" type="checkbox"/> | No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path. |
| <input type="checkbox"/> | External antenna (dedicated antennas) |

| Antenna General Information | | |
|-----------------------------|-----------|-----------|
| No. | Ant. Cat. | Ant. Type |
| 1 | Integral | Loop |

1.1.3 Type of EUT

| Identify EUT | |
|-------------------------------------|---|
| Presentation of Equipment | <input checked="" type="checkbox"/> Production ; <input type="checkbox"/> Pre-Production ; <input type="checkbox"/> Prototype |
| Type of EUT | |
| <input checked="" type="checkbox"/> | Stand-alone |
| <input type="checkbox"/> | Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: |
| <input type="checkbox"/> | Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: |
| <input type="checkbox"/> | Other: |



1.1.4 Test Signal Duty Cycle

| Duty Cycle Operation Restriction | | | |
|---|------------------------|-------------------------------------|-------------------------|
| The transmitter is used for | | The transmitter is operated | |
| <input checked="" type="checkbox"/> | Inductive applications | <input checked="" type="checkbox"/> | Automatically triggered |
| <input type="checkbox"/> | Duty cycle fixed mode | <input checked="" type="checkbox"/> | Duty cycle random mode |
| Duty cycle mode - NFC-A (ISO 14443-3A) | | | |
| Declare transmitter duty cycle / 1 hour = | | 100% | |
| Duty cycle Limit | | | |
| <input type="checkbox"/> | Class 1 - < 0.1 % | <input type="checkbox"/> | Class 2 - < 1.0 % |
| <input type="checkbox"/> | Class 3 - < 10 % | <input type="checkbox"/> | Class 4 - Up to 100 % |
| Duty cycle mode - NFC-B (ISO 14443-3B) | | | |
| Declare transmitter duty cycle / 1 hour = | | 100% | |
| Duty cycle Limit | | | |
| <input type="checkbox"/> | Class 1 - < 0.1 % | <input type="checkbox"/> | Class 2 - < 1.0 % |
| <input type="checkbox"/> | Class 3 - < 10 % | <input type="checkbox"/> | Class 4 - Up to 100 % |
| Duty cycle mode - NFC-F (ISO 18092) | | | |
| Declare transmitter duty cycle / 1 hour = | | 100% | |
| Duty cycle Limit | | | |
| <input type="checkbox"/> | Class 1 - < 0.1 % | <input type="checkbox"/> | Class 2 - < 1.0 % |
| <input type="checkbox"/> | Class 3 - < 10 % | <input type="checkbox"/> | Class 4 - Up to 100 % |
| Duty cycle mode - NFC-V (ISO 15693) | | | |
| Declare transmitter duty cycle / 1 hour = | | 100% | |
| Duty cycle Limit | | | |
| <input type="checkbox"/> | Class 1 - < 0.1 % | <input type="checkbox"/> | Class 2 - < 1.0 % |
| <input type="checkbox"/> | Class 3 - < 10 % | <input checked="" type="checkbox"/> | Class 4 - Up to 100 % |

1.1.5 EUT Operational Condition

| | | | |
|--------------------------|---|---|--|
| Supply Voltage | <input checked="" type="checkbox"/> AC mains | <input type="checkbox"/> DC | |
| Type of DC Source | <input type="checkbox"/> Internal DC supply | <input checked="" type="checkbox"/> External AC adapter | <input type="checkbox"/> Battery |
| Test Voltage | <input checked="" type="checkbox"/> Vnom (120V) | <input checked="" type="checkbox"/> Vmax (138V) | <input checked="" type="checkbox"/> Vmin (102V) |
| Test Climatic | <input checked="" type="checkbox"/> Tnom (20°C) | <input checked="" type="checkbox"/> Tmax (55°C) | <input checked="" type="checkbox"/> Tmin (-20°C) |

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ◆ 47 CFR FCC Part 15
- ◆ ANSI C63.10-2013
- ◆ KDB 174176 D01 v01r01

1.3 Testing Location Information

| Testing Location | | | | |
|-------------------------------------|---------------|---|----------------------|-------------|
| <input checked="" type="checkbox"/> | HWA YA | ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. | | |
| | | TEL : 886-3-327-3456 | FAX : 886-3-327-0973 | |
| Test Condition | Test Site No. | Test Engineer | Test Environment | Test Date |
| AC Conduction | CO04-HY | Eric | 24.2°C / 56% | 17/Jan/2018 |
| RF Conducted | TH01-HY | Tim | 23.5°C / 65% | 05/Mar/2018 |
| Radiated | 03CH03-HY | Jeff | 24.2°C / 56% | 12/Jan/2018 |

Test site Designation No. TW1190 with FCC.

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

| Test Items | Uncertainty | Remark |
|--------------------------------------|-------------|--------------------------|
| Conducted Emission (150kHz ~ 30MHz) | 3.6 dB | Confidence levels of 95% |
| Radiated Emission (9kHz ~ 30MHz) | 3.0 dB | Confidence levels of 95% |
| Radiated Emission (30MHz ~ 1,000MHz) | 4.3 dB | Confidence levels of 95% |
| Conducted Emission | 1.3 dB | Confidence levels of 95% |
| Temperature | 0.7 °C | Confidence levels of 95% |
| Humidity | 4 % | Confidence levels of 95% |



2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration

| Modulation Used for Conformance Testing | |
|---|--------------------------------|
| Modulation Mode | Field Strength (dBuV/m at 3 m) |
| NFC | 87.27 |




2.2 Test Channel Frequencies Configuration

| Modulation Mode | Test Channel Frequencies (MHz) |
|-----------------|--------------------------------|
| NFC | 13.56 |

2.3 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests | |
|---|---|
| Tests Item | AC power-line conducted emissions |
| Condition | AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz |
| Operating Mode | Adapter Mode |

| The Worst Case Mode for Following Conformance Tests | |
|---|---|
| Tests Item | Emission Bandwidth, Frequency Stability |
| Test Condition | Conducted measurement |

| The Worst Case Mode for Following Conformance Tests | | | |
|---|--|---|---|
| Tests Item | Field Strength of Fundamental Emissions Spectrum Mask, Transmitter Radiated Unwanted Emissions | | |
| Test Condition | Radiated measurement | | |
| User Position | <input type="checkbox"/> EUT will be placed in fixed position. | | |
| | <input type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. | | |
| | <input checked="" type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. | | |
| Pretest Mode | <input type="checkbox"/> 1. EUT Built in NFC A type | | |
| | <input type="checkbox"/> 2. EUT Built in NFC B type | | |
| | <input type="checkbox"/> 3. EUT Built in NFC F type | | |
| | <input checked="" type="checkbox"/> 4. EUT Built in NFC V type | | |
| | EUT only support mode 4 function. | | |
| Operating Mode < 1GHz | <input checked="" type="checkbox"/> 1. Adapter Mode | | |
| Modulation Mode | NFC | | |
| Orthogonal Planes of EUT | X Plane | Y Plane | Z Plane |
| |  |  |  |
| Worst Planes of EUT | | V | |



2.4 Accessories and Support Equipment

| Accessories Information | | | | |
|-------------------------|---------------------|---|-------------------|-----------|
| AC Adapter | Brand Name | Wearnes | Model Name | WDS060240 |
| | Power Rating | I/P: 100 - 240Vac, 1.6A, O/P: 24Vdc, 2.5A | | |
| | Power Cord | DC output : 1.14meter, Shielded cable, with ferrite core AC input : 1.8meter, Non-Shielded cable, w/o ferrite core | | |

Reminder: Regarding to more detail and other information, please refer to user manual.

| Support Equipment - AC Conduction | | | | |
|-----------------------------------|-----------|------------|------------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID |
| 1 | Tag | - | - | - |

Note: Support equipment No.1 was provided by customer.

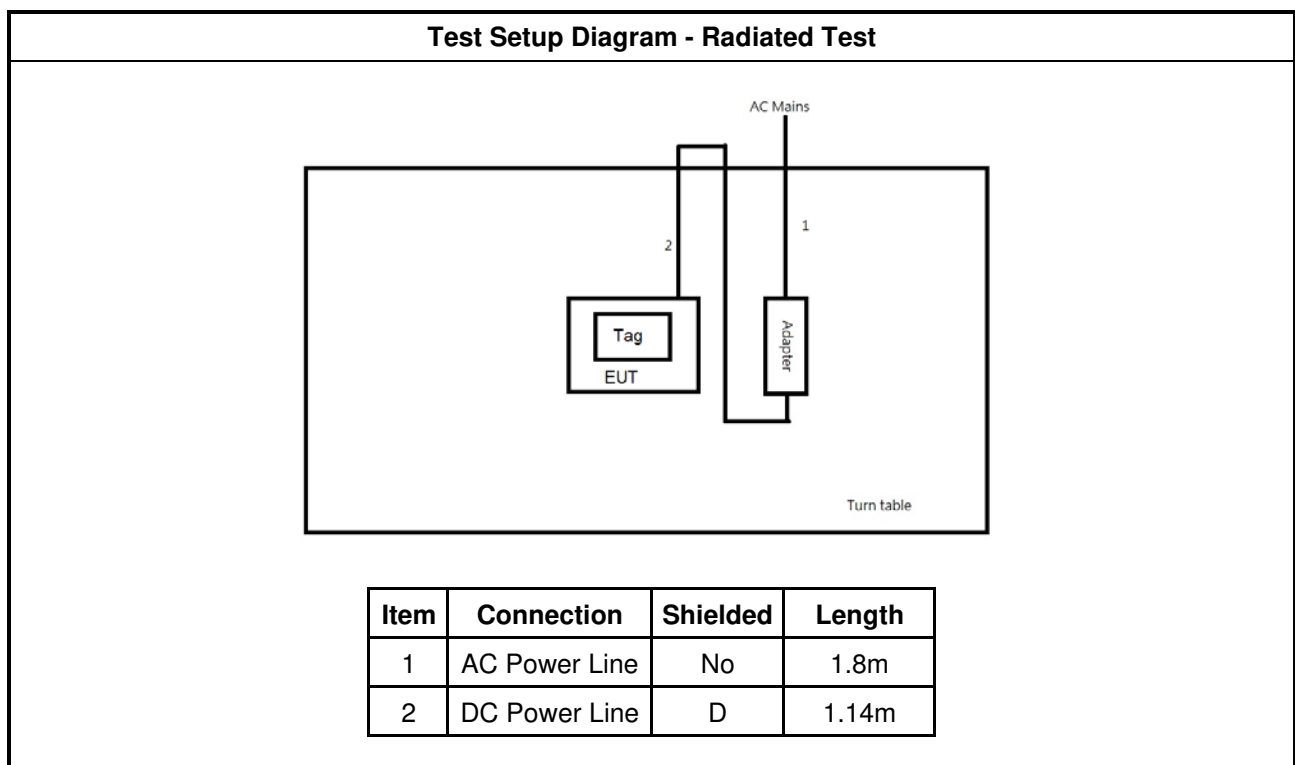
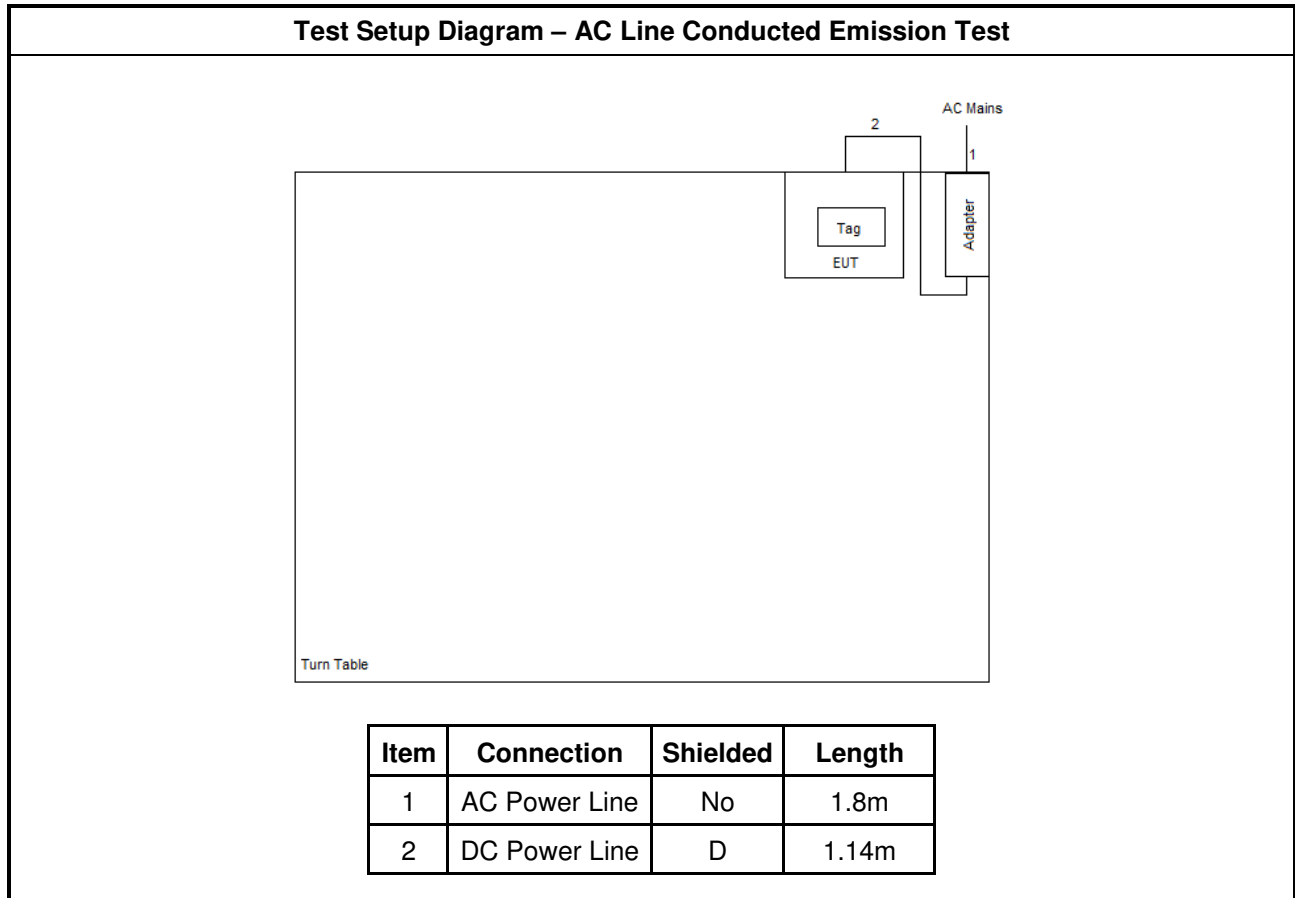
| Support Equipment - RF Conducted | | | | |
|----------------------------------|-----------|------------|------------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID |
| 1 | Tag | - | - | - |
| 2 | AC Source | GW | APS-9102 | - |

Note: Support equipment No.1 was provided by customer.

| Support Equipment - RF Radiated Emission | | | | |
|--|-----------|------------|------------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID |
| 1 | Tag | - | - | - |

Note: Support equipment No.1 was provided by customer.

2.5 Test Setup Diagram



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

| AC Power-line Conducted Emissions Limit | | |
|---|------------|-----------|
| Frequency Emission (MHz) | Quasi-Peak | Average |
| 0.15-0.5 | 66 - 56 * | 56 - 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Note 1: * Decreases with the logarithm of the frequency.

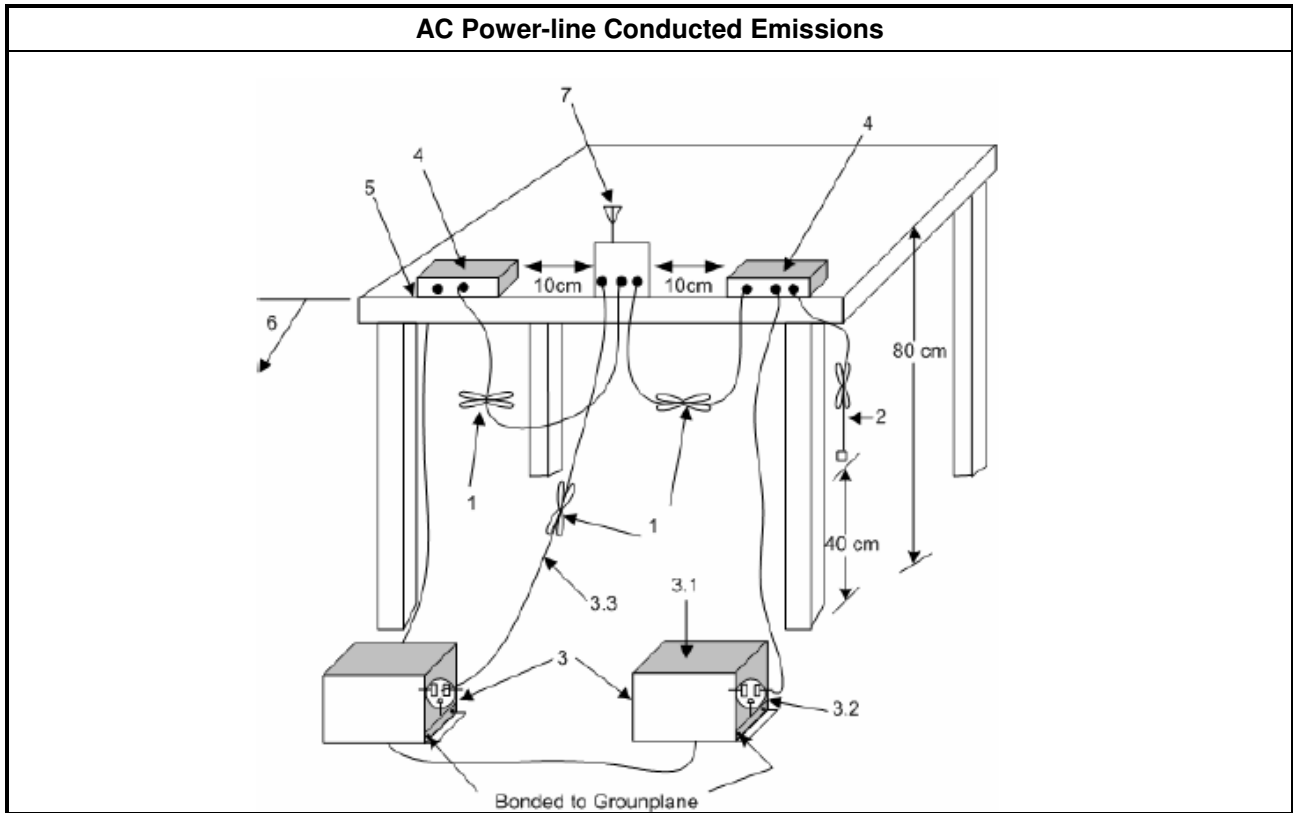
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

| Test Method | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions. |
| <input checked="" type="checkbox"/> | If AC conducted emissions fall in operating band, then following below test method confirm final result. |
| <input type="checkbox"/> | Accept measurements done with a suitable dummy load replacing the antenna under the following conditions: (1) Perform the AC line conducted tests with the antenna connected to determine compliance with FCC 15.207 limits outside the transmitter's fundamental emission band; (2) Retest with a dummy load to determine compliance with FCC 15.207 limits within the transmitter's fundamental emission band. |
| <input checked="" type="checkbox"/> | For a device with a permanent antenna operating at or below 30 MHz, accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) Perform the AC line conducted tests with the permanent antenna to determine compliance with the FCC 15.207 limits outside the transmitter's fundamental emission band; (2) Retest with a dummy load in lieu of the permanent antenna to determine compliance with the FCC 15.207 limits within the transmitter's fundamental emission band. |

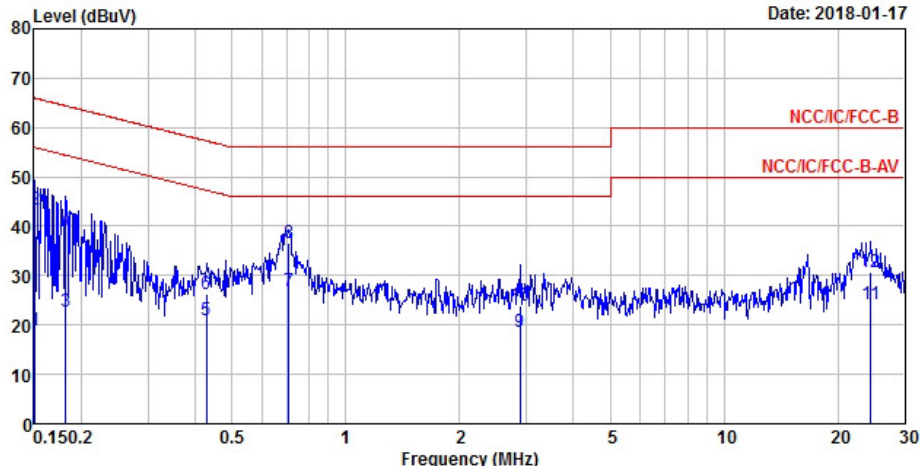
3.1.4 Test Setup





3.1.5 Test Result of AC Power-line Conducted Emissions

| AC Power-line Conducted Emissions Result | | | |
|--|--------------|-------------|---------|
| Operating Mode | 1 | Power Phase | Neutral |
| Operating Function | Adapter Mode | | |



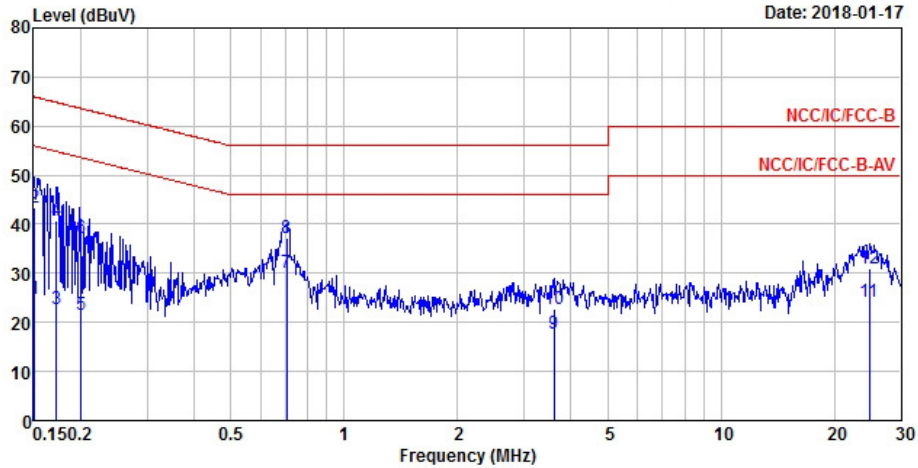
| | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|-------|---------|-------|------------|------------|------------|-------------|------------|---------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.1508 | 18.96 | -37.00 | 55.96 | 9.29 | 9.63 | 0.04 | Average |
| 2 | 0.1508 | 43.36 | -22.60 | 65.96 | 33.69 | 9.63 | 0.04 | QP |
| 3 | 0.1815 | 22.74 | -31.68 | 54.42 | 13.11 | 9.62 | 0.01 | Average |
| 4 | 0.1815 | 39.34 | -25.08 | 64.42 | 29.71 | 9.62 | 0.01 | QP |
| 5 | 0.4282 | 20.98 | -26.31 | 47.29 | 11.28 | 9.61 | 0.09 | Average |
| 6 | 0.4282 | 26.32 | -30.97 | 57.29 | 16.62 | 9.61 | 0.09 | QP |
| 7 MAX | 0.7084 | 26.99 | -19.01 | 46.00 | 17.33 | 9.62 | 0.04 | Average |
| 8 | 0.7084 | 36.55 | -19.45 | 56.00 | 26.89 | 9.62 | 0.04 | QP |
| 9 | 2.8845 | 18.47 | -27.53 | 46.00 | 8.78 | 9.64 | 0.05 | Average |
| 10 | 2.8845 | 23.86 | -32.14 | 56.00 | 14.17 | 9.64 | 0.05 | QP |
| 11 | 24.3995 | 24.24 | -25.76 | 50.00 | 14.52 | 9.70 | 0.02 | Average |
| 12 | 24.3995 | 30.78 | -29.22 | 60.00 | 21.06 | 9.70 | 0.02 | QP |

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)
 Note 3: When emissions are in operating band over limits, retest with a dummy load for final in-band results.



AC Power-line Conducted Emissions Result

| | | | |
|--------------------|--------------|-------------|------|
| Operating Mode | 1 | Power Phase | Line |
| Operating Function | Adapter Mode | | |



| | Freq | Level | Over | Limit | Read | LISN | Cable | Remark |
|--------------|---------------|--------------|---------------|--------------|--------------|-------------|-------------|----------------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.1508 | 24.71 | -31.25 | 55.96 | 15.05 | 9.62 | 0.04 | Average |
| 2 | 0.1508 | 43.37 | -22.59 | 65.96 | 33.71 | 9.62 | 0.04 | QP |
| 3 | 0.1722 | 22.76 | -32.10 | 54.86 | 13.12 | 9.62 | 0.02 | Average |
| 4 | 0.1722 | 40.60 | -24.26 | 64.86 | 30.96 | 9.62 | 0.02 | QP |
| 5 | 0.2007 | 21.49 | -32.09 | 53.58 | 11.87 | 9.62 | 0.00 | Average |
| 6 | 0.2007 | 37.30 | -26.28 | 63.58 | 27.68 | 9.62 | 0.00 | QP |
| 7 MAX | 0.7047 | 30.11 | -15.89 | 46.00 | 20.46 | 9.61 | 0.04 | Average |
| 8 | 0.7047 | 37.32 | -18.68 | 56.00 | 27.67 | 9.61 | 0.04 | QP |
| 9 | 3.6034 | 17.65 | -28.35 | 46.00 | 7.95 | 9.63 | 0.07 | Average |
| 10 | 3.6034 | 22.67 | -33.33 | 56.00 | 12.97 | 9.63 | 0.07 | QP |
| 11 | 24.7904 | 24.26 | -25.74 | 50.00 | 14.69 | 9.56 | 0.01 | Average |
| 12 | 24.7904 | 30.98 | -29.02 | 60.00 | 21.41 | 9.56 | 0.01 | QP |

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)
 Note 3: When emissions are in operating band over limits, retest with a dummy load for final in-band results.

3.2 Emission Bandwidth

3.2.1 Emission Bandwidth Limit

| 20dB Bandwidth Limit | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 – 13.567 MHz). |

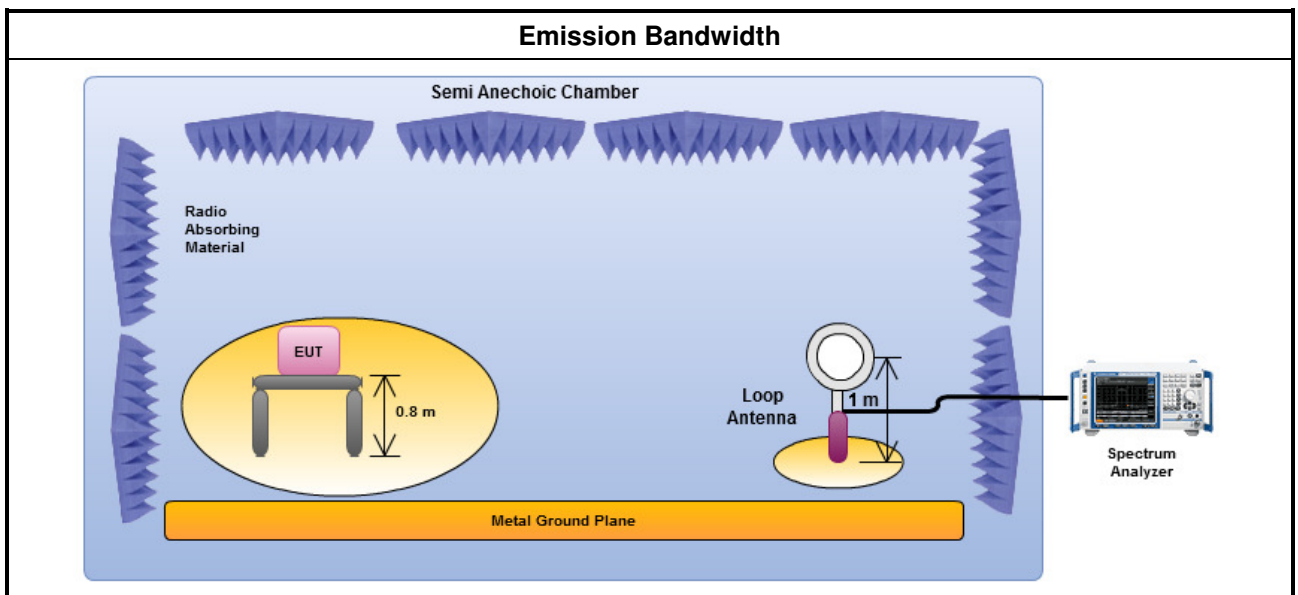
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

| Test Method | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | For the emission bandwidth refer ANSI C63.10, clause 6.9.1 for occupied bandwidth testing. |
| <input checked="" type="checkbox"/> | For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level. |

3.2.4 Test Setup



3.3 Field Strength of Fundamental Emissions and Spectrum Mask

3.3.1 Field Strength of Fundamental Emissions and Spectrum Mask Limit

| Field Strength of Fundamental Emissions For FCC | | | | | |
|---|------------|--------------|--------------|-------------|-------------|
| Emissions | (uV/m)@30m | (dBuV/m)@30m | (dBuV/m)@10m | (dBuV/m)@3m | (dBuV/m)@1m |
| fundamental | 15848 | 84.0 | 103.1 | 124.0 | 143.1 |
| Quasi peak measurement of the fundamental. | | | | | |

| Spectrum Mask For FCC | | | | | |
|-------------------------|------------|--------------|--------------|-------------|-------------|
| Freq. of Emission (MHz) | (uV/m)@30m | (dBuV/m)@30m | (dBuV/m)@10m | (dBuV/m)@3m | (dBuV/m)@1m |
| 1.705~13.110 | 30 | 29.5 | 48.6 | 69.5 | 88.6 |
| 13.110~13.410 | 106 | 40.5 | 59.6 | 80.5 | 99.6 |
| 13.410~13.553 | 334 | 50.5 | 69.6 | 90.5 | 109.6 |
| 13.553~13.567 | 15848 | 84.0 | 103.1 | 124.0 | 143.1 |
| 13.567~13.710 | 334 | 50.5 | 69.6 | 90.5 | 109.6 |
| 13.710~14.010 | 106 | 40.5 | 59.6 | 80.5 | 99.6 |
| 14.010~30.000 | 30 | 29.5 | 48.6 | 69.5 | 88.6 |

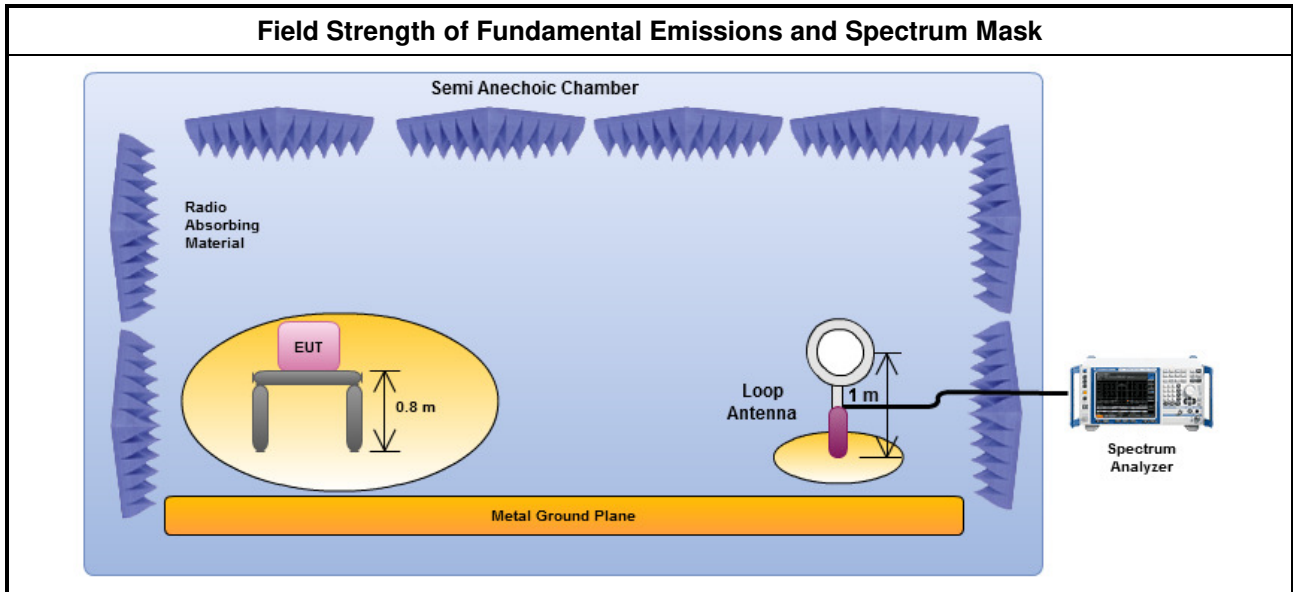
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

| Test Method | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz and test distance is 3m. |
| <input checked="" type="checkbox"/> | At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods. |
| <input type="checkbox"/> | The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor. |
| <input checked="" type="checkbox"/> | The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade). |
| <input checked="" type="checkbox"/> | For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level. |

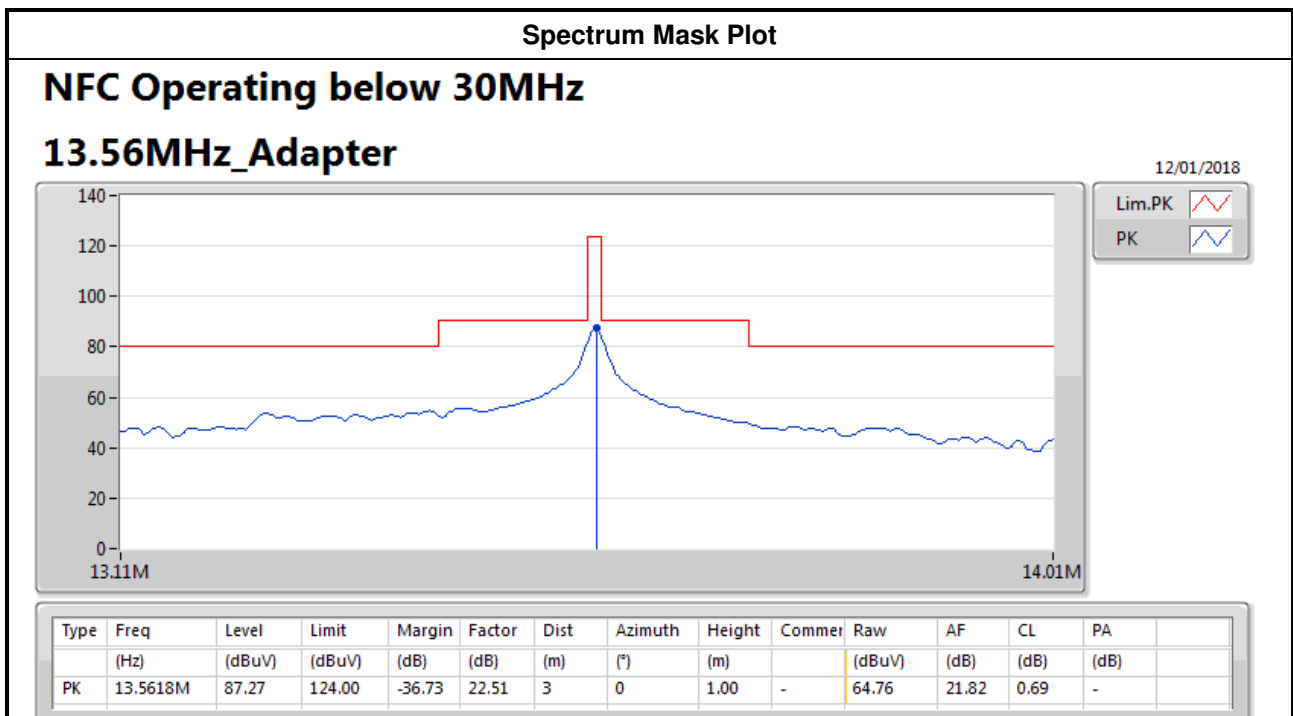
3.3.4 Test Setup



3.3.5 Test Result of Field Strength of Fundamental Emissions and Spectrum Mask

| Field Strength of Fundamental Emissions Result | | | | | |
|--|-----------------|-------------------------|--------------|-------------|-------------------|
| Modulation Mode | Frequency (MHz) | Fundamental (dBuV/m)@3m | Polarization | Margin (dB) | Limit (dBuV/m)@3m |
| NFC | 13.56 | 87.27 | H | 36.732 | 124.00 |
| Result | | Complied | | | |

Note 1: Measurement worst emissions of receive antenna polarization: H(Horizontal).



3.4 Transmitter Radiated Unwanted Emissions

3.4.1 Transmitter Radiated Unwanted Emissions Limit

| Transmitter Radiated Unwanted Emissions Limit | | | |
|---|-----------------------|-------------------------|----------------------|
| Frequency Range (MHz) | Field Strength (uV/m) | Field Strength (dBuV/m) | Measure Distance (m) |
| 0.009~0.490 | 2400/F(kHz) | 48.5 - 13.8 | 300 |
| 0.490~1.705 | 24000/F(kHz) | 33.8 - 23 | 30 |
| 1.705~30.0 | 30 | 29 | 30 |
| 30~88 | 100 | 40 | 3 |
| 88~216 | 150 | 43.5 | 3 |
| 216~960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

3.4.2 Measuring Instruments

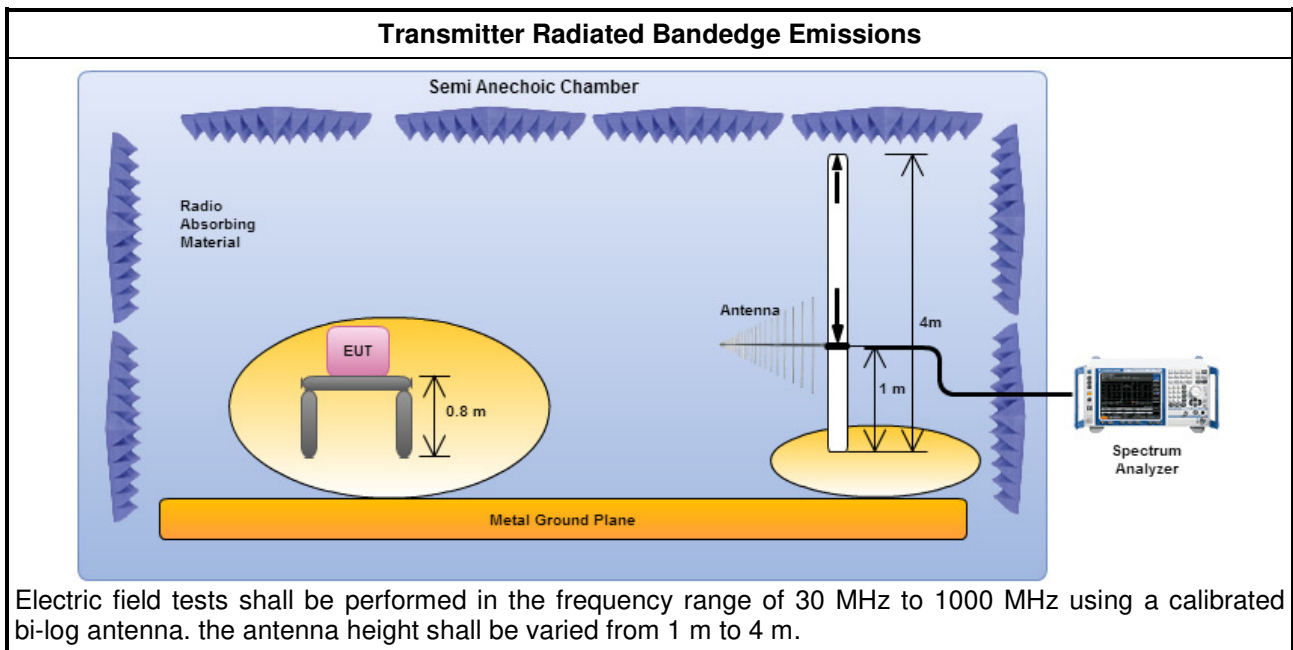
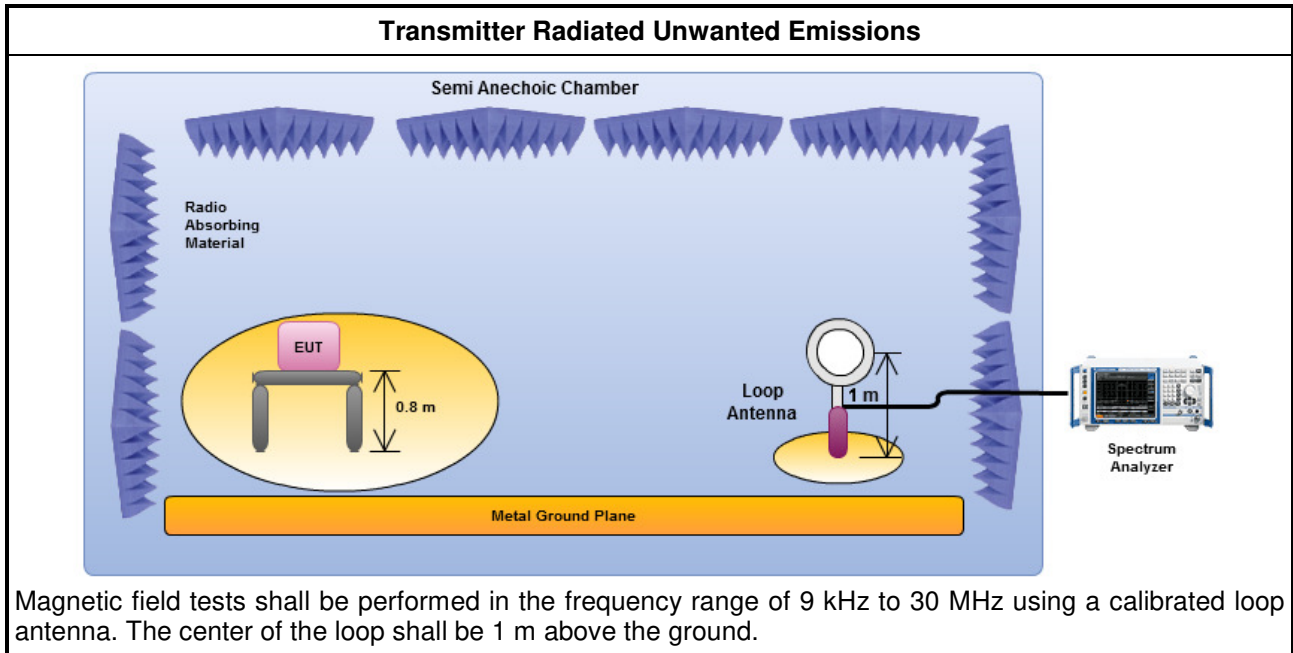
Refer a test equipment and calibration data table in this test report.



3.4.3 Test Procedures

| Test Method | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1 GHz and test distance is 3m. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz and test distance is 3m. |
| <input checked="" type="checkbox"/> | At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods. |
| <input type="checkbox"/> | The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor. |
| <input checked="" type="checkbox"/> | The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade). |
| <input checked="" type="checkbox"/> | For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level. |
| <input checked="" type="checkbox"/> | The any unwanted emissions level shall not exceed the fundamental emission level. |
| <input checked="" type="checkbox"/> | All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported. |

3.4.4 Test Setup





3.4.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

Summary

| Mode | Result | Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Dist (m) | Azimuth (°) | Height (m) | Comments |
|------------------|--------|------|-----------|--------------|--------------|-------------|-------------|----------|-------------|------------|----------|
| 13.553-13.567MHz | - | - | - | - | - | - | - | - | - | - | - |
| NFC | Pass | PK | 3.3738M | 46.03 | 69.50 | -23.47 | 20.84 | 3 | 0 | 1.00 | - |

Result

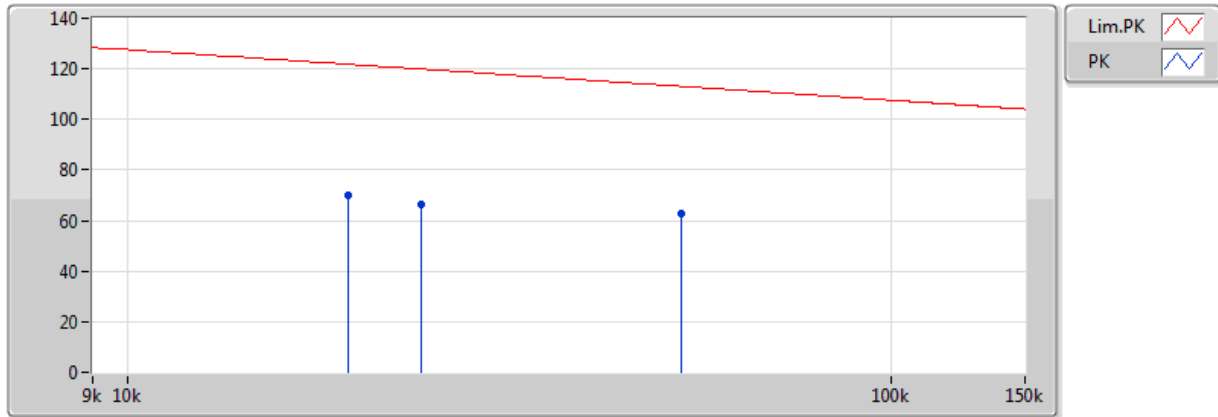
| Mode | Result | Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Dist (m) | Azimuth (°) | Height (m) | Comments |
|------------------|--------|------|-----------|--------------|--------------|-------------|-------------|----------|-------------|------------|----------|
| NFC | - | - | - | - | - | - | - | - | - | - | - |
| 13.56MHz_Adapter | Pass | PK | 19.434k | 70.17 | 121.80 | -51.63 | 21.96 | 3 | 360 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 24.228k | 66.08 | 119.90 | -53.82 | 22.01 | 3 | 360 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 53.274k | 62.91 | 113.05 | -50.14 | 21.14 | 3 | 360 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 2.3589M | 44.92 | 69.50 | -24.58 | 20.87 | 3 | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 3.3738M | 46.03 | 69.50 | -23.47 | 20.84 | 3 | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 4.3887M | 39.61 | 69.50 | -29.89 | 21.03 | 3 | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 13.5618M | 87.27 | 124.00 | -36.73 | 22.51 | 3 | 0 | 1.00 | - |



NFC Operating below 30MHz

13.56MHz_Adapter

12/01/2018

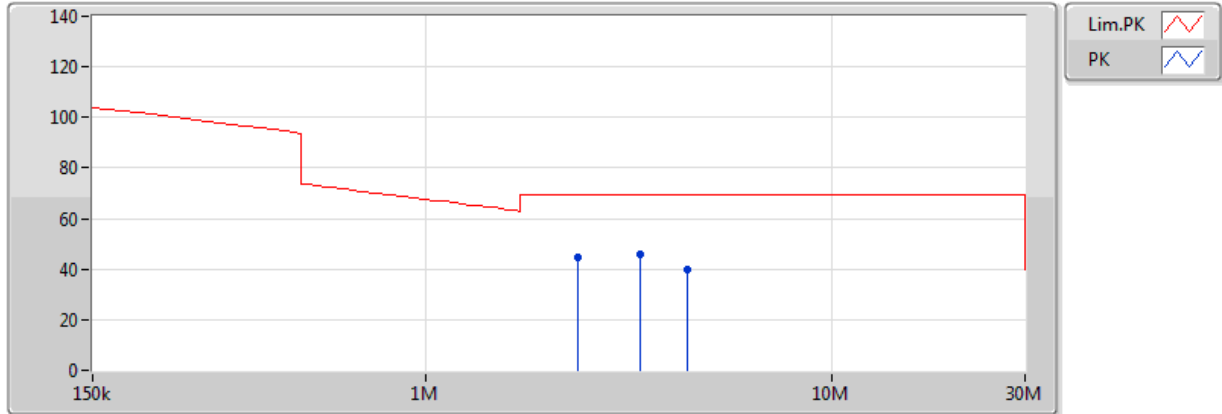


| Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Dist (m) | Azimuth (°) | Height (m) | Commer | Raw (dBuV) | AF (dB) | CL (dB) | PA (dB) |
|------|-----------|--------------|--------------|-------------|-------------|----------|-------------|------------|--------|------------|---------|---------|---------|
| PK | 53.274k | 62.91 | 113.05 | -50.14 | 21.14 | 3 | 360 | 1.00 | - | 41.77 | 21.07 | 0.07 | - |
| PK | 19.434k | 70.17 | 121.80 | -51.63 | 21.96 | 3 | 360 | 1.00 | - | 48.21 | 21.90 | 0.06 | - |
| PK | 24.228k | 66.08 | 119.90 | -53.82 | 22.01 | 3 | 360 | 1.00 | - | 44.07 | 21.95 | 0.06 | - |

NFC Operating below 30MHz

13.56MHz_Adapter

12/01/2018



| Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Dist (m) | Azimuth (°) | Height (m) | Commer | Raw (dBuV) | AF (dB) | CL (dB) | PA (dB) |
|------|-----------|--------------|--------------|-------------|-------------|----------|-------------|------------|--------|------------|---------|---------|---------|
| PK | 3.3738M | 46.03 | 69.50 | -23.47 | 20.84 | 3 | 0 | 1.00 | - | 25.19 | 20.45 | 0.39 | - |
| PK | 2.3589M | 44.92 | 69.50 | -24.58 | 20.87 | 3 | 0 | 1.00 | - | 24.05 | 20.50 | 0.37 | - |
| PK | 4.3887M | 39.61 | 69.50 | -29.89 | 21.03 | 3 | 0 | 1.00 | - | 18.58 | 20.61 | 0.42 | - |



3.4.6 Transmitter Radiated Unwanted Emissions (Above 30MHz)

Summary

| Mode | Result | Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments |
|------------------|--------|------|-----------|--------------|--------------|-------------|-------------|----------|-----------|-------------|------------|----------|
| 13.553-13.567MHz | - | - | - | - | - | - | - | - | - | - | - | - |
| NFC | Pass | QP | 39.7M | 39.87 | 40.00 | -0.13 | -7.84 | 3 | Vertical | 56 | 1.00 | - |

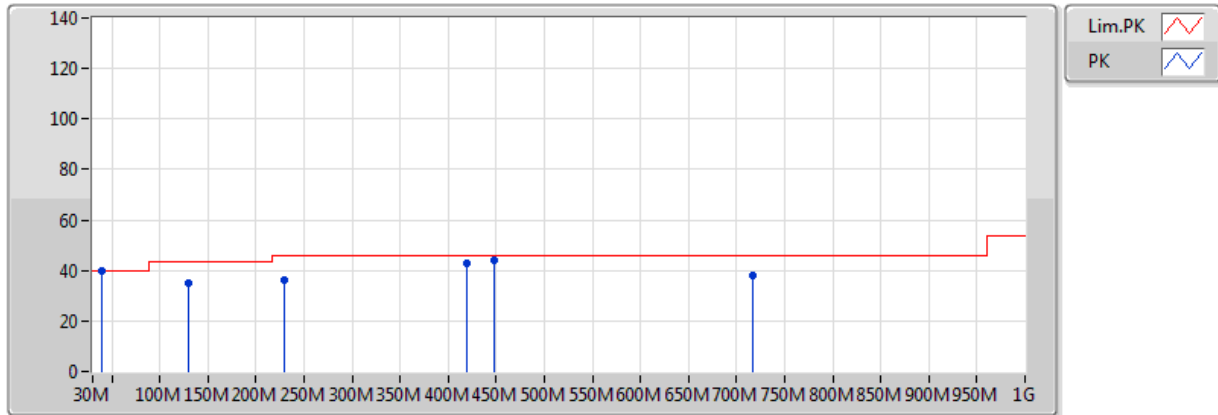
Result

| Mode | Result | Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments |
|------------------|--------|------|-----------|--------------|--------------|-------------|-------------|----------|------------|-------------|------------|----------|
| NFC | - | - | - | - | - | - | - | - | - | - | - | - |
| 13.56MHz_Adapter | Pass | PK | 130.88M | 37.52 | 43.50 | -5.98 | -7.80 | 3 | Horizontal | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 229.82M | 39.34 | 46.00 | -6.66 | -9.04 | 3 | Horizontal | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 406.36M | 42.62 | 46.00 | -3.38 | -3.10 | 3 | Horizontal | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 447.1M | 42.17 | 46.00 | -3.83 | -2.47 | 3 | Horizontal | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | QP | 175.5M | 39.77 | 43.50 | -3.73 | -10.12 | 3 | Horizontal | 96 | 1.48 | - |
| 13.56MHz_Adapter | Pass | QP | 720.64M | 36.33 | 46.00 | -9.67 | 0.77 | 3 | Horizontal | 124 | 1.30 | - |
| 13.56MHz_Adapter | Pass | PK | 128.94M | 35.24 | 43.50 | -8.26 | -7.73 | 3 | Vertical | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 229.82M | 36.39 | 46.00 | -9.61 | -9.04 | 3 | Vertical | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | PK | 419.94M | 42.79 | 46.00 | -3.21 | -2.77 | 3 | Vertical | 0 | 1.00 | - |
| 13.56MHz_Adapter | Pass | QP | 39.7M | 39.87 | 40.00 | -0.13 | -7.84 | 3 | Vertical | 56 | 1.00 | - |
| 13.56MHz_Adapter | Pass | QP | 447.1M | 44.00 | 46.00 | -2.00 | -2.47 | 3 | Vertical | 115 | 1.03 | - |
| 13.56MHz_Adapter | Pass | QP | 716.76M | 38.31 | 46.00 | -7.69 | 0.64 | 3 | Vertical | 278 | 1.02 | - |

NFC Operating above 30MHz

13.56MHz_Adapter

12/01/2018

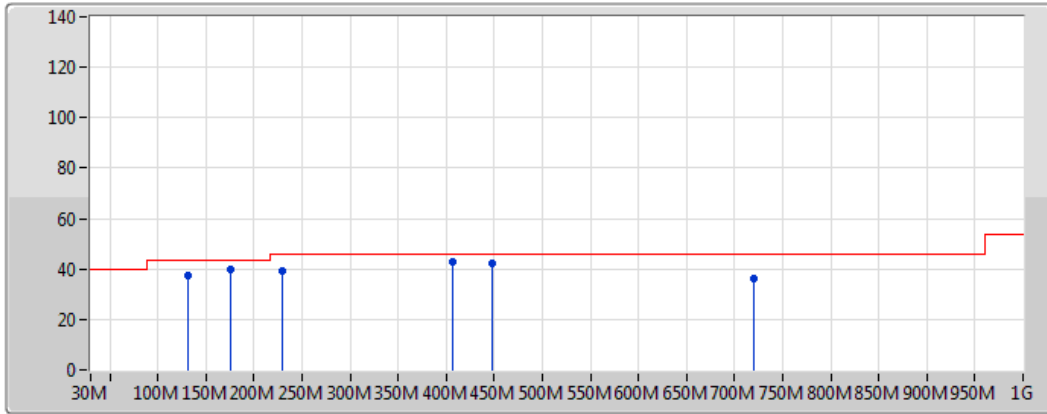


| Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments | Raw (dBuV) | AF (dB) | CL (dB) | PA (dB) |
|------|-----------|--------------|--------------|-------------|-------------|----------|-----------|-------------|------------|----------|------------|---------|---------|---------|
| PK | 128.94M | 35.24 | 43.50 | -8.26 | -7.73 | 3 | Vertical | 0 | 1.00 | - | 42.97 | 17.14 | 2.37 | 27.24 |
| PK | 229.82M | 36.39 | 46.00 | -9.61 | -9.04 | 3 | Vertical | 0 | 1.00 | - | 45.43 | 15.29 | 2.51 | 26.84 |
| PK | 419.94M | 42.79 | 46.00 | -3.21 | -2.77 | 3 | Vertical | 0 | 1.00 | - | 45.56 | 21.42 | 3.21 | 27.40 |
| QP | 39.7M | 39.87 | 40.00 | -0.13 | -7.84 | 3 | Vertical | 56 | 1.00 | - | 47.71 | 17.86 | 1.86 | 27.56 |
| QP | 447.1M | 44.00 | 46.00 | -2.00 | -2.47 | 3 | Vertical | 115 | 1.03 | - | 46.47 | 21.67 | 3.41 | 27.55 |
| QP | 716.76M | 38.31 | 46.00 | -7.69 | 0.64 | 3 | Vertical | 278 | 1.02 | - | 37.67 | 24.35 | 4.20 | 27.92 |

NFC Operating above 30MHz

13.56MHz_Adapter

12/01/2018



| Type | Freq (Hz) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Factor (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments | Raw (dBuV) | AF (dB) | CL (dB) | PA (dB) |
|------|-----------|--------------|--------------|-------------|-------------|----------|------------|-------------|------------|----------|------------|---------|---------|---------|
| PK | 130.88M | 37.52 | 43.50 | -5.98 | -7.80 | 3 | Horizontal | 0 | 1.00 | - | 45.32 | 17.04 | 2.38 | 27.23 |
| PK | 229.82M | 39.34 | 46.00 | -6.66 | -9.04 | 3 | Horizontal | 0 | 1.00 | - | 48.38 | 15.29 | 2.51 | 26.84 |
| PK | 406.36M | 42.62 | 46.00 | -3.38 | -3.10 | 3 | Horizontal | 0 | 1.00 | - | 45.72 | 21.11 | 3.10 | 27.32 |
| PK | 447.1M | 42.17 | 46.00 | -3.83 | -2.47 | 3 | Horizontal | 0 | 1.00 | - | 44.64 | 21.67 | 3.41 | 27.55 |
| QP | 175.5M | 39.77 | 43.50 | -3.73 | -10.12 | 3 | Horizontal | 96 | 1.48 | - | 49.89 | 14.52 | 2.38 | 27.02 |
| QP | 720.64M | 36.33 | 46.00 | -9.67 | 0.77 | 3 | Horizontal | 124 | 1.30 | - | 35.56 | 24.46 | 4.22 | 27.91 |

3.5 Frequency Stability

3.5.1 Frequency Stability Limit

| Frequency Stability Limit | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm). |

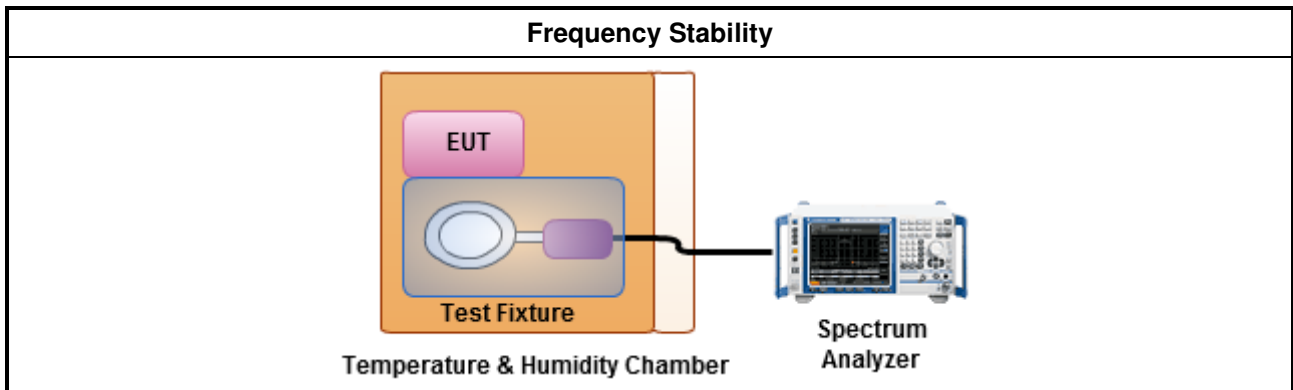
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

| Test Method | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.8 for frequency stability tests |
| <input checked="" type="checkbox"/> | Frequency stability with respect to ambient temperature |
| <input checked="" type="checkbox"/> | Frequency stability when varying supply voltage |
| <input type="checkbox"/> | For conducted measurement. |
| <input checked="" type="checkbox"/> | For radiated measurement. The equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted power level. |

3.5.4 Test Setup





3.5.5 Test Result of Frequency Stability

| Frequency Stability Result | | | | | | | | | |
|---|-----------------|---------------------------|----------|----------|----------|---------------------------|-------|-------|--------|
| Condition | Ch. Freq. (MHz) | Frequency Stability (ppm) | | | | | | | |
| | | Test Frequency (MHz) | | | | Frequency Stability (ppm) | | | |
| | | 0 min | 2 min | 5 min | 10 min | 0 min | 2 min | 5 min | 10 min |
| T _{20°C} Vmax | 13.56 | 13.56085 | 13.56086 | 13.56088 | 13.56088 | 62.68 | 63.42 | 64.90 | 64.90 |
| T _{20°C} Vmin | 13.56 | 13.56081 | 13.56081 | 13.56082 | 13.56084 | 59.73 | 59.73 | 60.47 | 61.95 |
| T _{55°C} Vnom | 13.56 | 13.56086 | 13.56087 | 13.56087 | 13.56086 | 63.42 | 64.16 | 64.16 | 63.42 |
| T _{50°C} Vnom | 13.56 | 13.56087 | 13.56087 | 13.56087 | 13.56086 | 64.16 | 64.16 | 64.16 | 63.42 |
| T _{40°C} Vnom | 13.56 | 13.56086 | 13.56086 | 13.56087 | 13.56088 | 63.42 | 63.42 | 64.16 | 64.90 |
| T _{30°C} Vnom | 13.56 | 13.56085 | 13.56086 | 13.56088 | 13.56088 | 62.68 | 63.42 | 64.90 | 64.90 |
| T _{20°C} Vnom | 13.56 | 13.56083 | 13.56088 | 13.56086 | 13.56086 | 61.21 | 64.90 | 63.42 | 63.42 |
| T _{10°C} Vnom | 13.56 | 13.56086 | 13.56086 | 13.56088 | 13.56088 | 63.42 | 63.42 | 64.90 | 64.90 |
| T _{0°C} Vnom | 13.56 | 13.56088 | 13.56088 | 13.56088 | 13.56089 | 64.90 | 64.90 | 64.90 | 65.63 |
| T _{-10°C} Vnom | 13.56 | 13.56089 | 13.56089 | 13.56089 | 13.56090 | 65.63 | 65.63 | 65.63 | 66.37 |
| T _{-20°C} Vnom | 13.56 | 13.56088 | 13.56088 | 13.56086 | 13.56086 | 64.90 | 64.90 | 63.42 | 63.42 |
| Limit (ppm) | 100 | | | | | | | | |
| Result | Complied | | | | | | | | |
| Note 1: Measure at 85 % [Vmin] and 115 % [Vmax] of the nominal voltage [Vnom]. The nominal voltage refer test report clause 1.1.5 for EUT operational condition. Note 2: Measure maximum deviation frequency at operating frequency at startup and two, five, and ten min. | | | | | | | | | |



4 Test Equipment and Calibration Data

Instrument for AC Conduction

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date |
|--------------------------------|--------------|-------------|----------------|---------------------|------------------|----------------------|
| EMC Receiver | R&S | ESR3 | 102052 | 9KHz ~ 3.6GHz | 29/Apr/2017 | 28/Apr/2018 |
| RF Cable-CON | HUBER+SUHNER | RG213/U | 07611832020001 | 9kHz ~ 30MHz | 06/Oct/2017 | 05/Oct/2018 |
| AC POWER | APC | AFC-11005G | F310050055 | 47Hz~63Hz 5~300V | NCR | NCR |
| Impuls Begrenzer Pulse Limiter | SCHWARZBECK | VTSD 9561-F | 9561-F041 | 9 kHz ~ 30 MHz | 12/Oct/2017 | 11/Oct/2018 |
| LISN | R&S | ENV216 | 101295 | 9kHz ~ 30MHz | 17/Nov/2017 | 16/Nov/2018 |

NCR: No Calibration Require.

Instrument for Conducted Test

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date |
|----------------------------|--------------|------------------|-------------|-----------------|------------------|----------------------|
| Spectrum Analyzer | R&S | FSV 40 | 101515 | 9kHz~40GHz | 08/Dec/2017 | 07/Dec/2018 |
| Loop Antenna | TESEQ | HLA 6120 | 24155 | 9 kHz~30 MHz | 16/Mar/2016 | 15/Mar/2018 |
| Temp. and Humidity Chamber | Giant Force | GTH-225-40-CP-AR | MAA1611-005 | -40 ~ 100°C | 21/Nov/2016 | 20/Nov/2018 |

Instrument for Radiated Test

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date |
|--------------------------|----------------|-----------|------------|--------------------|------------------|----------------------|
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 30MHz ~ 1GHz 3m | 31/Oct/2017 | 30/Oct/2018 |
| Amplifier | HP | 8447D | 2944A08033 | 10kHz ~ 1.3GHz | 19/Apr/2017 | 18/Apr/2018 |
| Spectrum | R&S | FSV40 | 101500 | 9kHz ~ 40GHz | 28/Jun/2017 | 27/Jun/2018 |
| Receiver | R&S | ESR3 | 102052 | 9KHz ~ 3.6GHz | 29/Apr/2017 | 28/Apr/2018 |
| RF Cable-R03m | Jye Bao | RG142 | CB021 | 9kHz ~ 1GHz | 26/Jan/2017 | 25/Jan/2018 |
| Bilog Antenna | SCHAFFNER | CBL 6112B | 22237 | 30MHz ~ 1GHz | 08/Jul/2017 | 07/Jul/2018 |
| Loop Antenna | TESEQ | HLA 6120 | 31244 | 9 kHz~30 MHz | 02/Mar/2017 | 01/Mar/2018 |