

TEST REPORT

Application No.: SHEM2006004862CR
FCC ID: 2ADTD-K1102AEMK
Applicant: Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Applicant: No.555 Qianmo Road,Binjiang District Hangzhou 310052,China
Manufacturer: Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Manufacturer: No.555 Qianmo Road,Binjiang District Hangzhou 310052,China
Factory: 1.Hangzhou Hikvision Technology Co., Ltd.
 2.Hangzhou Hikvision Electronics Co.,Ltd.
 3.Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Factory: 1.No.700,Dongliu Road,Binjiang District,Hangzhou Ctiy,Zhejiang,310052,China
 2.No.299,Qiushi Road,Tonglu Economic Development Zone,Tonglu County,Hangzhou,Zhejiang,310052,China.
 3.No.555 Qianmo Road, Binjiang District Hangzhou 310052,China

Equipment Under Test (EUT):

EUT Name: card reader
Model No.: DS-K1102AEMK,DS-K1102AEM,DS-K1102AEMKUHK,DS-K1102AEMKCKV,DS-K1102AEMKUVS,DS-K1102AEMKKVO,DS-K1102AEMKHUN,DS-K1102AEMUHK,DS-K1102AEMCKV,DS-K1102AEMUVS,DS-K1102AEMKVO,DS-K1102AEMHUN
 □ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.

Trade mark: HIKVISION
Standard(s) : 47 CFR Part 15, Subpart C 15.225
Date of Receipt: 2020-06-29
Date of Test: 2020-06-28 to 2020-07-09
Date of Issue: 2020-07-13

| | |
|---------------------|--|
| Test Result: | |
|---------------------|--|

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

Parlam Zhan

Parlam Zhan
E&E Section Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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| Revision Record | | | |
|-----------------|-------------|------------|--------|
| Version | Description | Date | Remark |
| 00 | Original | 2020-07-13 | / |
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| Authorized for issue by: | | | |
| | |  | |
| | | <hr/> Micheal Niu / Project Engineer | |
| | |  | |
| | | <hr/> Parlam Zhan / Reviewer | |

2 Test Summary

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

| Radio Spectrum Matter Part | | | | |
|---|----------------------------------|------------------------------------|--|--------|
| Item | Standard | Method | Requirement | Result |
| Conducted Emissions at 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 |

Note: The test level of the fundamental signal is below the limit of general spurious emission, so the test item doesn't be performed.

Declaration of EUT Family Grouping:

Note 1: There are series models mentioned in this report, and they are the similar in electrical and electronic characters. Only the model DS-K1102AEMK was tested since their differences were the model number, trade name and appearance.

3 Contents

| | Page |
|--|------|
| 1 COVER PAGE..... | 1 |
| 2 TEST SUMMARY..... | 3 |
| 3 CONTENTS..... | 4 |
| 4 GENERAL INFORMATION | 5 |
| 4.1 DETAILS OF E.U.T..... | 5 |
| 4.2 DESCRIPTION OF SUPPORT UNITS..... | 5 |
| 4.3 MEASUREMENT UNCERTAINTY | 5 |
| 4.4 TEST LOCATION | 6 |
| 4.5 TEST FACILITY | 6 |
| 4.6 DEVIATION FROM STANDARDS | 6 |
| 4.7 ABNORMALITIES FROM STANDARD CONDITIONS | 6 |
| 5 EQUIPMENT LIST | 7 |
| 6 RADIO SPECTRUM TECHNICAL REQUIREMENT | 8 |
| 6.1 ANTENNA REQUIREMENT | 8 |
| 7 RADIO SPECTRUM MATTER TEST RESULTS | 9 |
| 7.1 CONDUCTED EMISSIONS AT AC POWER LINE (150kHz-30MHz)..... | 9 |
| 7.2 20DB BANDWIDTH..... | 13 |
| 7.3 EMISSION MASK..... | 15 |
| 7.4 FREQUENCY TOLERANCE | 16 |
| 7.5 RADIATED EMISSIONS(9kHz-30MHz)..... | 18 |
| 7.6 RADIATED EMISSIONS(30MHz-1GHz) | 21 |
| 8 TEST SETUP PHOTOGRAPHS | 25 |
| 9 EUT CONSTRUCTIONAL DETAILS..... | 25 |

4 General Information

4.1 Details of E.U.T.

Power supply: DC 12V by adapter
 Test voltage: AC 120V/60Hz
 Number of Channels: 1
 Antenna Type: Loop Antenna
 Modulation Type: ASK
 Operation Frequency: 13.56MHz

4.2 Description of Support Units

| Description | Manufacturer | Model No. | Serial No. |
|-------------|--------------|---------------|------------|
| AC Adapter | DVE | DSA-12G-12FEU | / |

4.3 Measurement Uncertainty

| No. | Item | Measurement Uncertainty |
|-----|---------------------------------|-------------------------|
| 1 | Radio Frequency | 8.4 x 10 ⁻⁸ |
| 2 | Timeout | 2s |
| 3 | Duty Cycle | 0.4% |
| 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 | 5.1dB (Below 1GHz) |
| | | 5.9dB (Above 1GHz) |
| 9 | Radiated Spurious Emission Test | 4.2dB (Below 30MHz) |
| | | 4.5dB (30MHz-1GHz) |
| | | 5.1dB (1GHz-6GHz) |
| | | 5.4dB (6GHz-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.

4.5 Test Facility

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

- **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 2541.01)**

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

- **FCC (Designation Number: CN1172)**

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

- **ISED (CAB identifier: CN0072)**

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

CAB Identifier: CN0072.

- **VCCI (Member No.: 1938)**

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-1600, C-1707, T-1499, G-10216 respectively.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

| Item | Equipment | Manufacturer | Model | Serial Number | Cal Date | Cal. Due Date |
|---|--------------------------------------|---------------|-------------|---------------|------------|---------------|
| Conducted Emission at Mains Terminals (150kHz-30MHz) | | | | | | |
| 1 | EMI Test Receive | R&S | ESCI | 100781 | 02/24/2020 | 02/23/2021 |
| 2 | LISN | R&S | ENV216 | 101604 | 10/24/2019 | 10/23/2020 |
| 3 | LISN | Schwarzbeck | NNLK 8129 | 8129-143 | 10/24/2019 | 10/23/2020 |
| 4 | Pulse Limiter | R&S | ESH3-Z2 | 100609 | 02/24/2020 | 02/23/2021 |
| 5 | CE test Cable | Thermax | / | 14 | 02/24/2020 | 02/23/2021 |
| RF Conducted Test | | | | | | |
| 1 | Spectrum Analyzer | Agilent | E4446A | MY44020154 | 04/22/2020 | 04/21/2021 |
| 2 | Spectrum Analyzer | Keysight | N9020A | MY55370209 | 12/19/2019 | 12/18/2020 |
| 3 | Signal Generator | Agilent | E8257C | MY43321570 | 10/24/2019 | 10/23/2020 |
| 4 | Vector Signal Generator | R&S | SMU 200A | 102744 | 02/24/2020 | 02/23/2021 |
| 5 | Universal Radio Communication Tester | R&S | CMU200 | 109525 | 12/19/2019 | 12/18/2020 |
| 6 | Universal Radio Communication Tester | R&S | CMW500 | 159275 | 12/19/2019 | 12/18/2020 |
| 7 | Power Meter | Anritsu | ML2495A | 1445010 | 04/21/2020 | 04/20/2021 |
| 8 | Switcher | CCSRF | FY562 | KS301219 | 12/20/2019 | 12/19/2020 |
| 9 | AC Power Source | EXTECH | 6605 | 1570106 | N.C.R | N.C.R |
| 10 | DC Power Supply | Agilent | E3632A | MY50340053 | N.C.R | N.C.R |
| 11 | 6dB Attenuator | Mini-Circuits | NAT-6-2W | 15542-1 | N.C.R | N.C.R |
| 12 | Power Divider | AISI | IOWOPE2068 | PE2068 | N.C.R | N.C.R |
| 13 | Filter | MICRO-TRONICS | BRM50701 | 5 | N.C.R | N.C.R |
| 14 | Conducted test cable | / | RF01-RF04 | / | 04/21/2020 | 04/22/2021 |
| 15 | Temp. / Humidity Chamber | TERCHY | MHK-120AK | X30109 | 04/21/2020 | 04/20/2021 |
| RF Radiated Test | | | | | | |
| 1 | Spectrum Analyzer | R&S | FSV40 | 101493 | 01/08/2020 | 01/07/2021 |
| 2 | Signal Generator | Agilent | E8257C | MY43321570 | 10/24/2019 | 10/23/2020 |
| 3 | Loop Antenna | Schwarzbeck | HXYZ9170 | 9170-108 | 02/24/2020 | 02/23/2021 |
| 4 | Bilog Antenna | TESEQ | CBL 6112D | 35403 | 06/22/2019 | 06/21/2021 |
| 5 | Bilog Antenna | SCHWARZBECK | VULB9160 | 9160-3342 | 04/29/2019 | 04/28/2021 |
| 6 | Horn-antenna(1-18GHz) | Schwarzbeck | BBHA9120D | 267 | 11/04/2018 | 11/03/2020 |
| 7 | Horn-antenna(1-18GHz) | ETS-LINDGREN | 3117 | 00143290 | 02/25/2019 | 02/24/2021 |
| 8 | Horn Antenna(18-40GHz) | Schwarzbeck | BBHA9170 | BBHA9170171 | 02/27/2018 | 02/26/2021 |
| 9 | Pre-Amplifier(30MHz~18GHz) | CCSRF | AMP1277 | 1 | 12/19/2019 | 12/18/2020 |
| 10 | Pre-Amplifier(0.1~26.5GHz) | EMCI | EMC012645 | 980060 | 04/21/2020 | 04/20/2021 |
| 11 | Low Pass Filter | MICRO-TRONICS | VLFX-950 | RV142900829 | N.C.R | N.C.R |
| 12 | High Pass Filter | Mini-Circuits | VHF-1200 | 15542 | N.C.R | N.C.R |
| 13 | Filter (5450MHz~5770 MHz) | MICRO-TRONICS | BRC50704-01 | 2 | N.C.R | N.C.R |
| 14 | Filter (5690 MHz~5930 MHz) | MICRO-TRONICS | BRC50705-01 | 4 | N.C.R | N.C.R |
| 15 | Filter (5150 MHz~5350 MHz) | MICRO-TRONICS | BRC50703-01 | 2 | N.C.R | N.C.R |
| 16 | Filter (885 MHz~915 MHz) | MICRO-TRONICS | BRM14698 | 1 | N.C.R | N.C.R |
| 17 | Filter (815 MHz~860 MHz) | MICRO-TRONICS | BRM14697 | 1 | N.C.R | N.C.R |
| 18 | Filter (1745 MHz~1910 MHz) | MICRO-TRONICS | BRM14700 | 1 | N.C.R | N.C.R |
| 19 | Filter (1922 MHz~1977 MHz) | MICRO-TRONICS | BRM50715 | 1 | N.C.R | N.C.R |
| 20 | Filter (2550 MHz) | MICRO-TRONICS | HPM13362 | 5 | N.C.R | N.C.R |
| 21 | Filter (1532 MHz~1845 MHz) | MICRO-TRONICS | BRM50713 | 1 | N.C.R | N.C.R |
| 22 | Filter (2.4GHz) | MICRO-TRONICS | BRM50701 | 5 | N.C.R | N.C.R |
| 23 | RE test cable | / | RE01-RE04 | / | 04/21/2020 | 04/22/2021 |

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an 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 and no consideration of replacement.

Antenna location: Refer to Appendix(Internal Photos)

7 Radio Spectrum Matter Test Results

7.1 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.

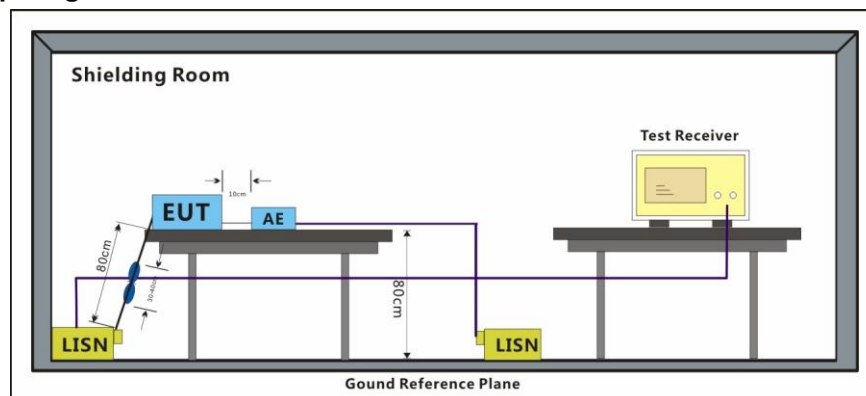
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram



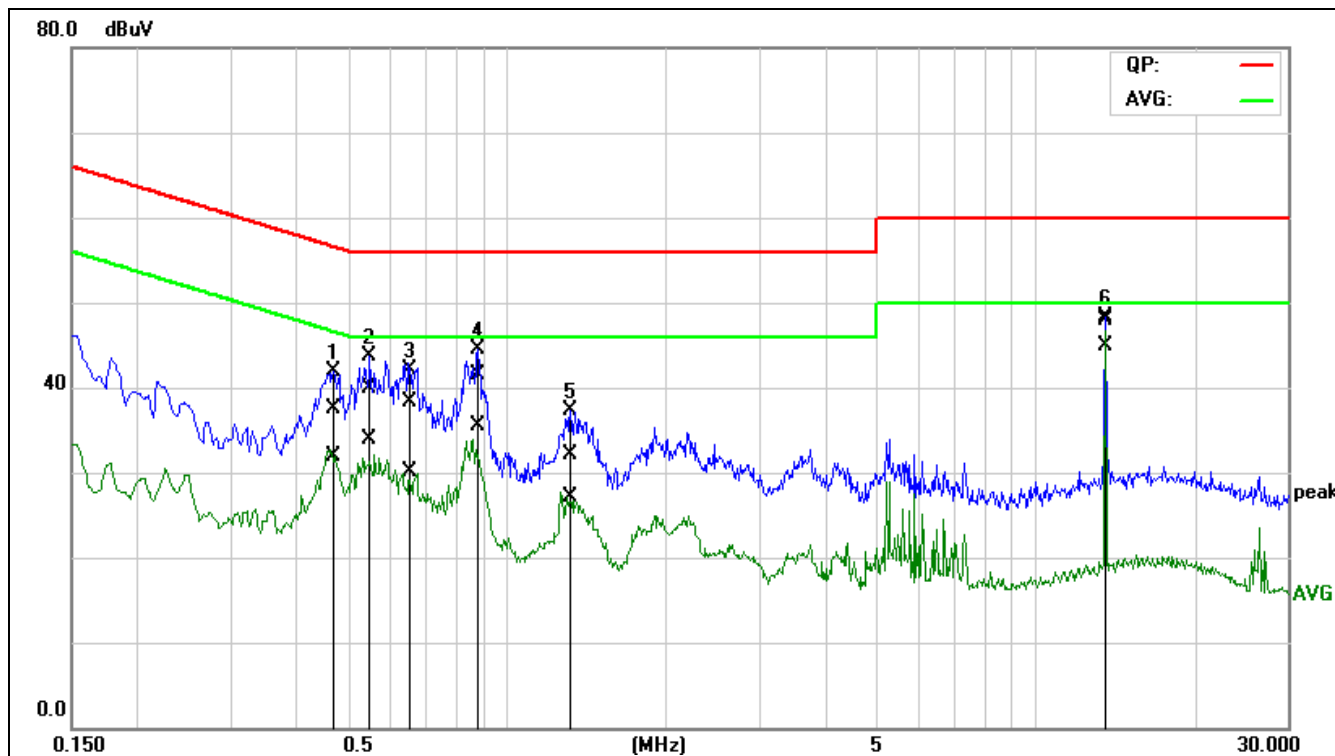
7.1.3 Measurement Procedure and Data

- 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:

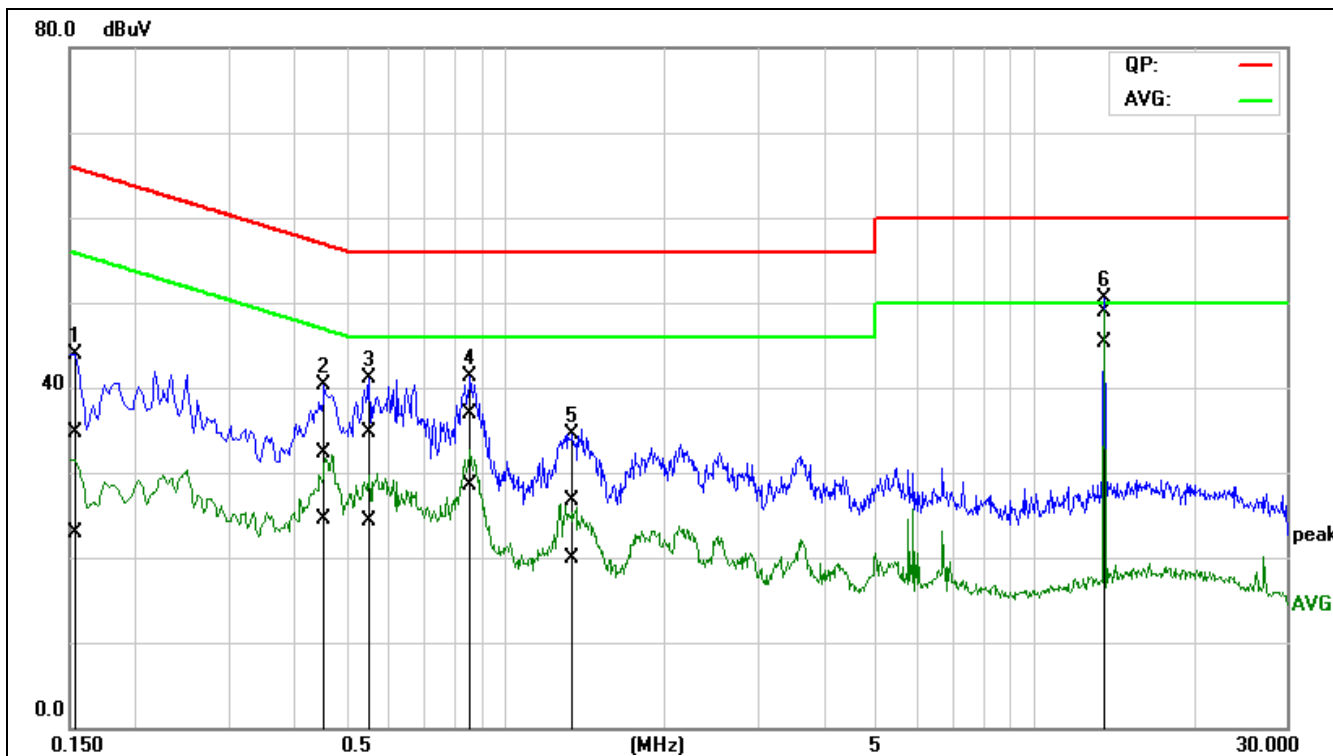
1.LISN=Read Level+ Cable Loss+ LISN Factor

Mode:a; Line: Live Line



| No. | Frequency (MHz) | QuasiPeak reading (dBuV) | Average reading (dBuV) | Correction factor (dB) | QuasiPeak result (dBuV) | Average result (dBuV) | QuasiPeak limit (dBuV) | Average limit (dBuV) | QuasiPeak margin (dB) | Average margin (dB) | Remark |
|-----|--------------------|--------------------------------|------------------------------|------------------------------|-------------------------------|-----------------------------|------------------------------|----------------------------|-----------------------------|---------------------------|--------|
| 1 | 0.4703 | 18.00 | 12.39 | 19.46 | 37.46 | 31.85 | 56.51 | 46.51 | -19.05 | -14.66 | Pass |
| 2 | 0.5519 | 20.35 | 14.37 | 19.47 | 39.82 | 33.84 | 56.00 | 46.00 | -16.18 | -12.16 | Pass |
| 3 | 0.6582 | 18.91 | 10.57 | 19.48 | 38.39 | 30.05 | 56.00 | 46.00 | -17.61 | -15.95 | Pass |
| 4 | 0.8731 | 22.05 | 16.05 | 19.54 | 41.59 | 35.59 | 56.00 | 46.00 | -14.41 | -10.41 | Pass |
| 5 | 1.3147 | 12.51 | 7.59 | 19.61 | 32.12 | 27.20 | 56.00 | 46.00 | -23.88 | -18.80 | Pass |
| 6* | 13.5591 | 27.79 | 24.89 | 20.09 | 47.88 | 44.98 | 60.00 | 50.00 | -12.12 | -5.02 | Pass |

Mode:a; Line:Neutral Line



| No. | Frequency (MHz) | QuasiPeak reading (dBuV) | Average reading (dBuV) | Correction factor (dB) | QuasiPeak result (dBuV) | Average result (dBuV) | QuasiPeak limit (dBuV) | Average limit (dBuV) | QuasiPeak margin (dB) | Average margin (dB) | Remark |
|-----|-----------------|--------------------------|------------------------|------------------------|-------------------------|-----------------------|------------------------|----------------------|-----------------------|---------------------|--------|
| 1 | 0.1540 | 15.34 | 3.48 | 19.40 | 34.74 | 22.88 | 65.78 | 55.78 | -31.04 | -32.90 | Pass |
| 2 | 0.4540 | 12.88 | 5.19 | 19.39 | 32.27 | 24.58 | 56.80 | 46.80 | -24.53 | -22.22 | Pass |
| 3 | 0.5540 | 15.22 | 4.91 | 19.41 | 34.63 | 24.32 | 56.00 | 46.00 | -21.37 | -21.68 | Pass |
| 4 | 0.8580 | 17.45 | 9.03 | 19.51 | 36.96 | 28.54 | 56.00 | 46.00 | -19.04 | -17.46 | Pass |
| 5 | 1.3420 | 7.07 | 0.30 | 19.59 | 26.66 | 19.89 | 56.00 | 46.00 | -29.34 | -26.11 | Pass |
| 6* | 13.5580 | 28.92 | 25.29 | 20.04 | 48.96 | 45.33 | 60.00 | 50.00 | -11.04 | -4.67 | Pass |

7.2 20dB Bandwidth

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

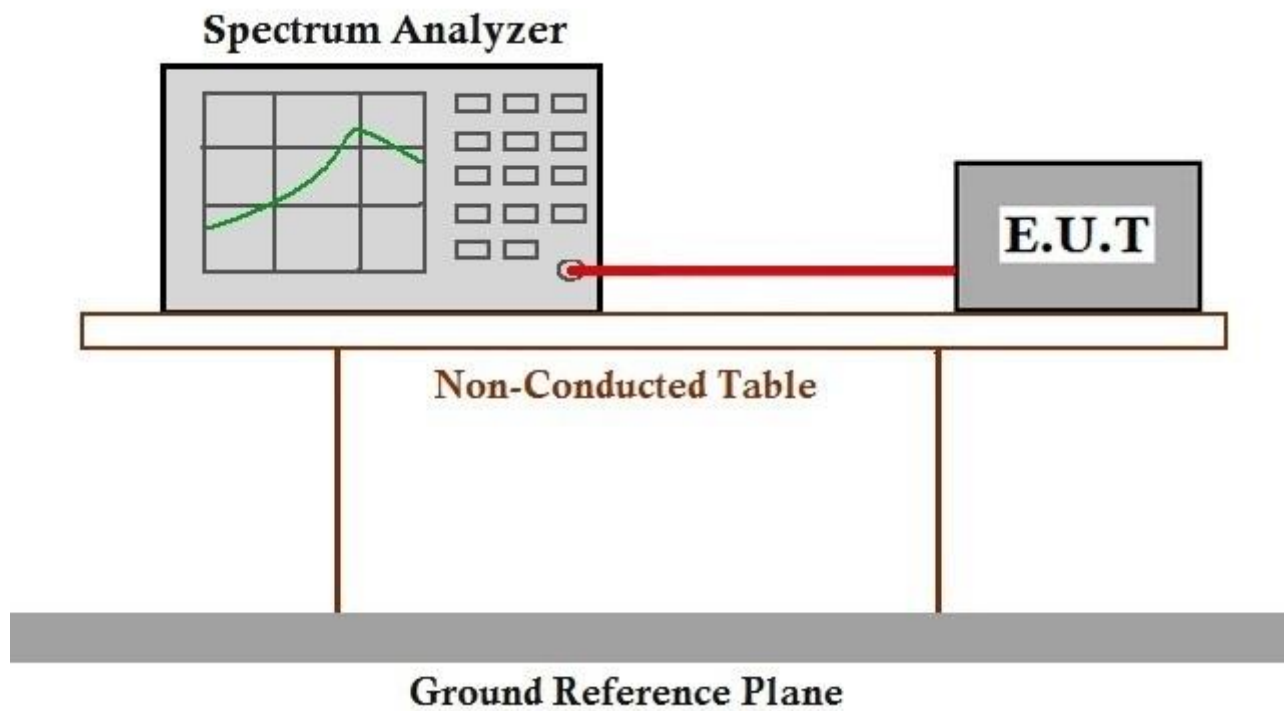
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

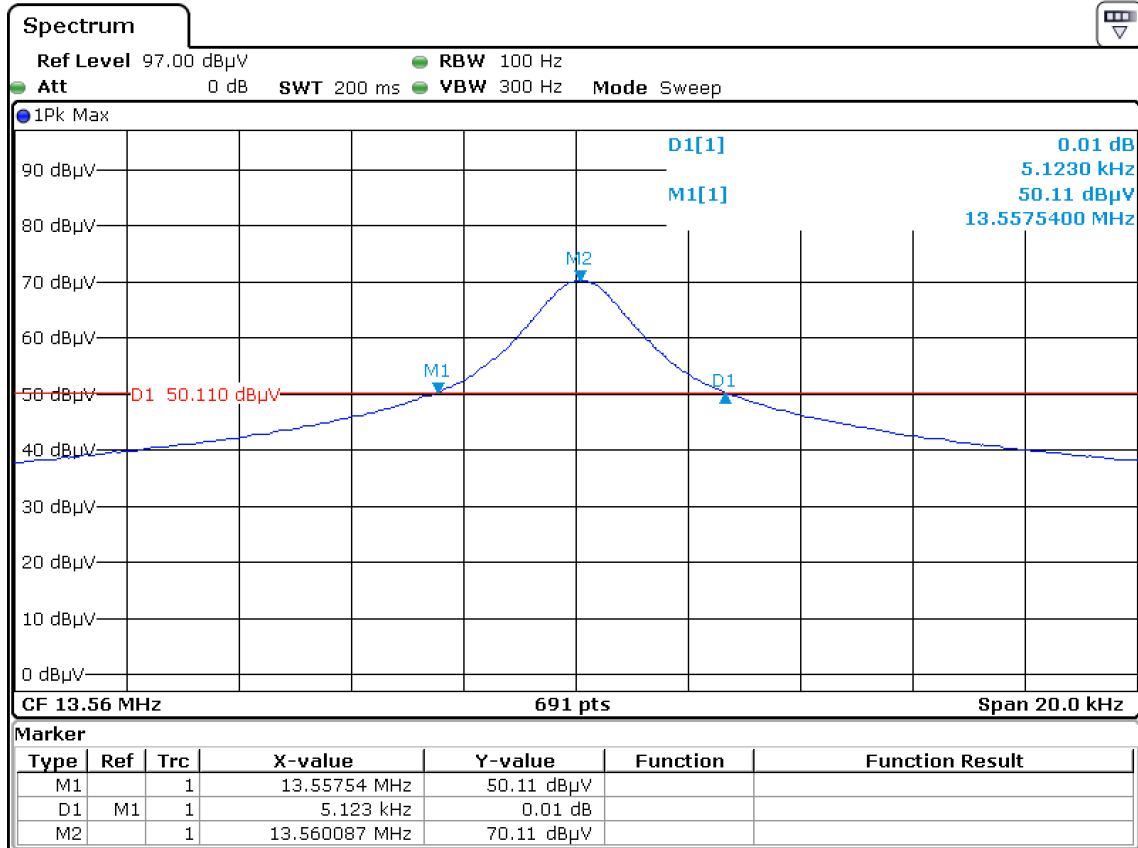
7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

| 20dB bandwidth (kHz) | F _L (MHz) | F _H (MHz) | Limit(MHz) | Result |
|----------------------|----------------------|----------------------|-----------------|--------|
| 5.123 | 13.5575 | 13.5627 | 13.110 – 14.010 | Pass |

Test plot as follows:



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
 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.

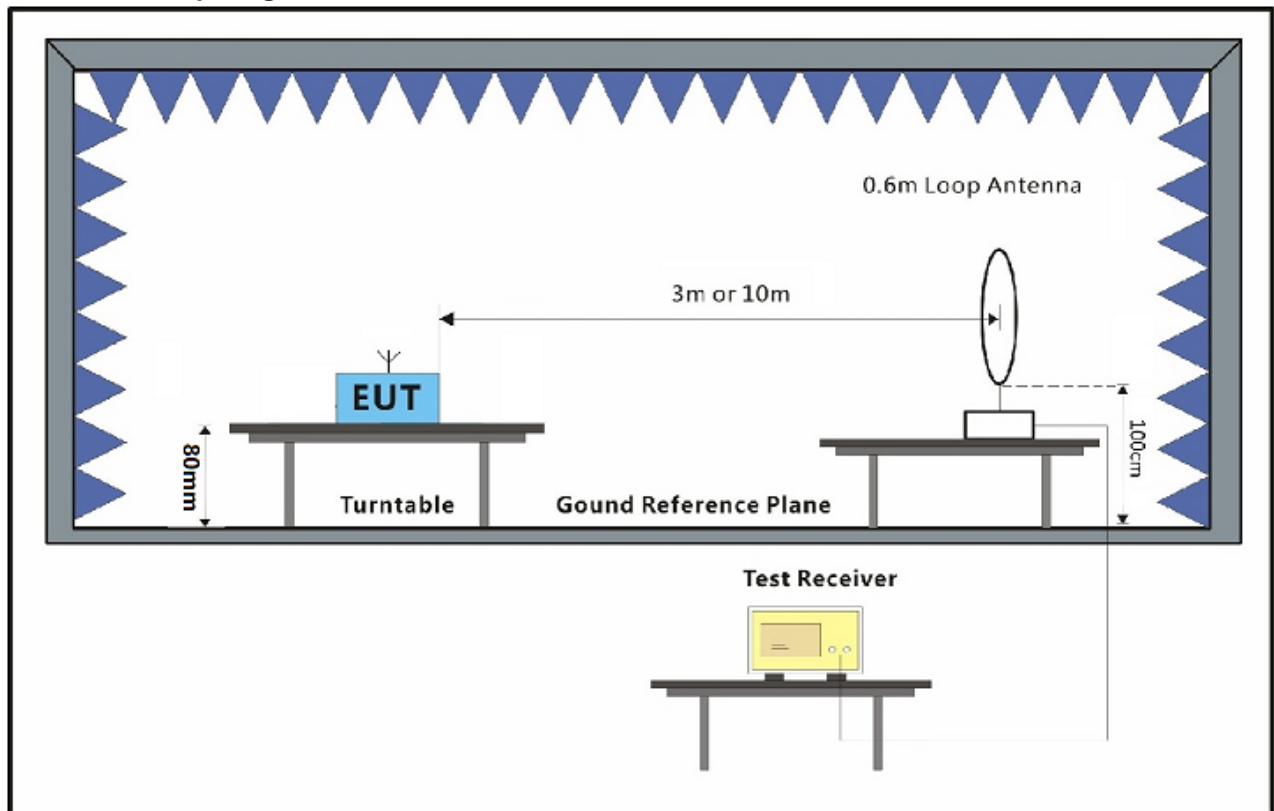
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.3.2 Test Setup Diagram



7.3.3 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.

Note :The test level of the fundamental signal is below the limit of general spurious emission, so the test item doesn't be performed.

7.4 Frequency tolerance

Test Requirement 47 CFR Part 15, Subpart C 15.225(e)
 Test Method: ANSI C63.10 (2013) Section 6.8
 Limit: 1.356kHz

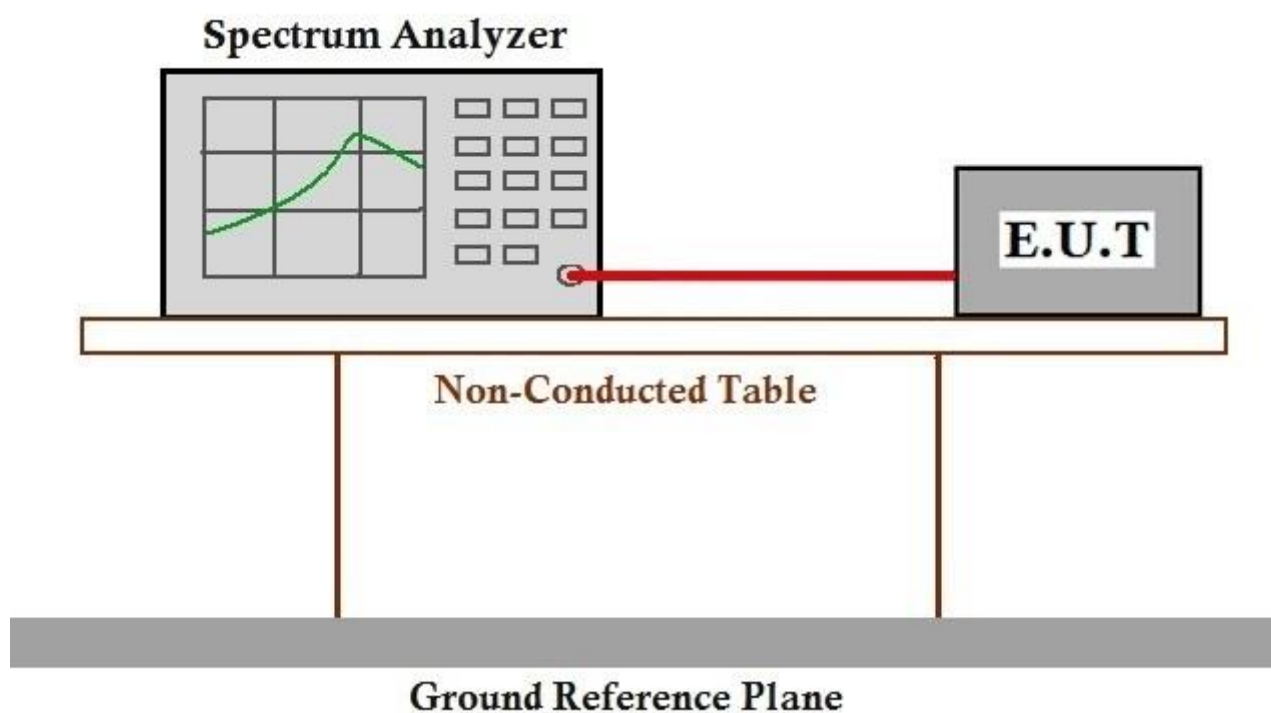
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

Nominal Operation Frequency: 13.56MHz

| Test Conditions | | Test Result (MHz) | Deviation (kHz) | Limit (kHz) | Result |
|------------------------|-------------------------|----------------------|--------------------|-----------------------|--------|
| Temp (°C) | Volt (V DC) | | | | |
| T _{nom} (-20) | V _{nom} (12) | 13.56009 | 0.09 | ±0.01% (1.3560kHz) | Pass |
| T _{nom} (-10) | V _{nom} (12) | 13.56008 | 0.08 | | Pass |
| T _{nom} (0) | V _{nom} (12) | 13.56008 | 0.08 | | Pass |
| T _{nom} (10) | V _{nom} (12) | 13.56008 | 0.08 | | Pass |
| T _{nom} (20) | V _{nom} (12) | 13.56008 | 0.08 | | Pass |
| T _{nom} (30) | V _{nom} (12) | 13.56008 | 0.08 | | Pass |
| T _{nom} (40) | V _{nom} (12) | 13.56008 | 0.08 | | Pass |
| T _{nom} (50) | V _{nom} (12) | 13.56006 | 0.06 | | Pass |
| T _{nom} (60) | V _{nom} (12) | 13.56006 | 0.06 | | Pass |
| T _{nom} (20) | V _{min} (10.2) | 13.56007 | 0.07 | | Pass |
| | V _{max} (13.8) | 13.56008 | 0.08 | | Pass |

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

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

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 |
| 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 |

NOTE:

(1) For test distance other than what is specified, but fulfilling the requirements of section 15.31(f) (2) the field strength is calculated by adding additionally an extrapolation factor of 40dB/decade (inverse linear distance for field strength measurements).

So the Distance Extrapolation Factor in dB is $40 \cdot \log(D_{TEST} / D_{SPEC})$ where D_{TEST} = Test Distance and D_{SPEC} = Specified Distance.

Field strength limit (dBuV/m)@test distance= Field strength limit (dBuV/m)@specified distance +Distance Extrapolation Factor

(2) The lower limit shall apply at the transition frequencies.

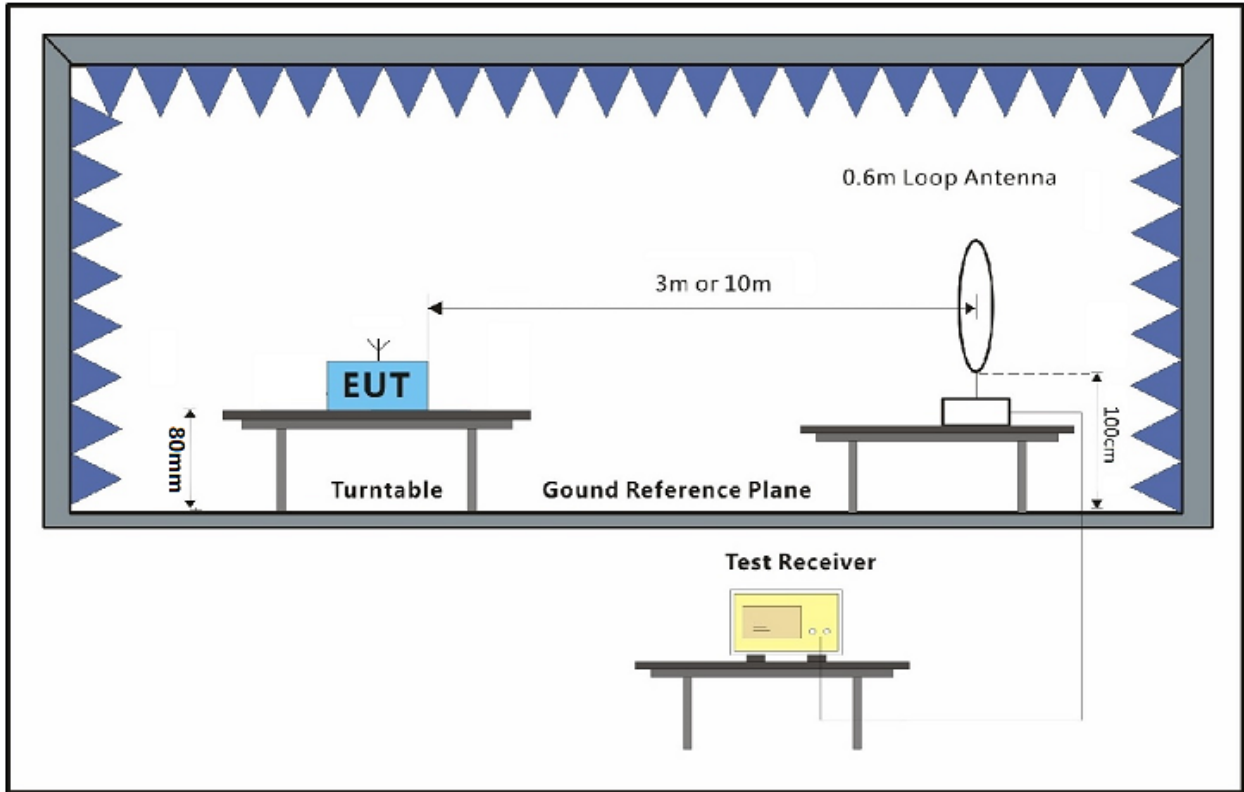
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

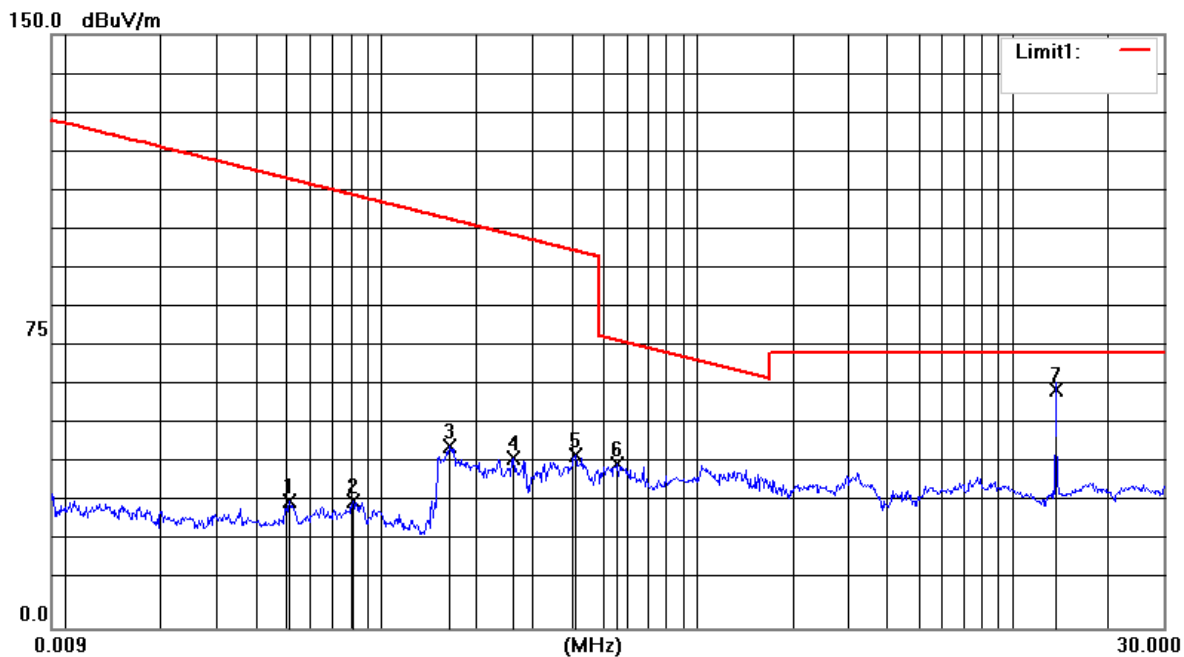
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.5.2 Test Setup Diagram



7.5.3 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.



| Item | Freq. | Read Level | Correct Factor | Result Level@3m | Result Level@SP EC | Limit Line@SPE C | Over Limit | Detector |
|--------|---------|------------|----------------|-----------------|--------------------|------------------|------------|----------|
| (Mark) | (MHz) | (dBμV) | (dB/m) | (dBuV/m) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 0.0510 | 17.22 | 14.67 | 31.89 | -48.11 | 33.44 | -81.55 | QP |
| 2 | 0.0810 | 16.86 | 15.13 | 31.99 | -48.01 | 29.43 | -77.44 | QP |
| 3 | 0.1642 | 30.74 | 15.10 | 45.84 | -34.16 | 23.29 | -57.45 | QP |
| 4 | 0.2605 | 27.64 | 15.19 | 42.83 | -37.17 | 19.28 | -56.45 | QP |
| 5 | 0.4107 | 28.41 | 15.24 | 43.65 | -36.35 | 15.33 | -51.68 | QP |
| 6 | 0.5590 | 26.16 | 15.18 | 41.34 | 1.34 | 32.66 | -31.32 | QP |
| 7 | 13.5860 | 44.64 | 15.49 | 60.13 | 20.13 | 29.50 | -9.37 | Peak |

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
 Limit:

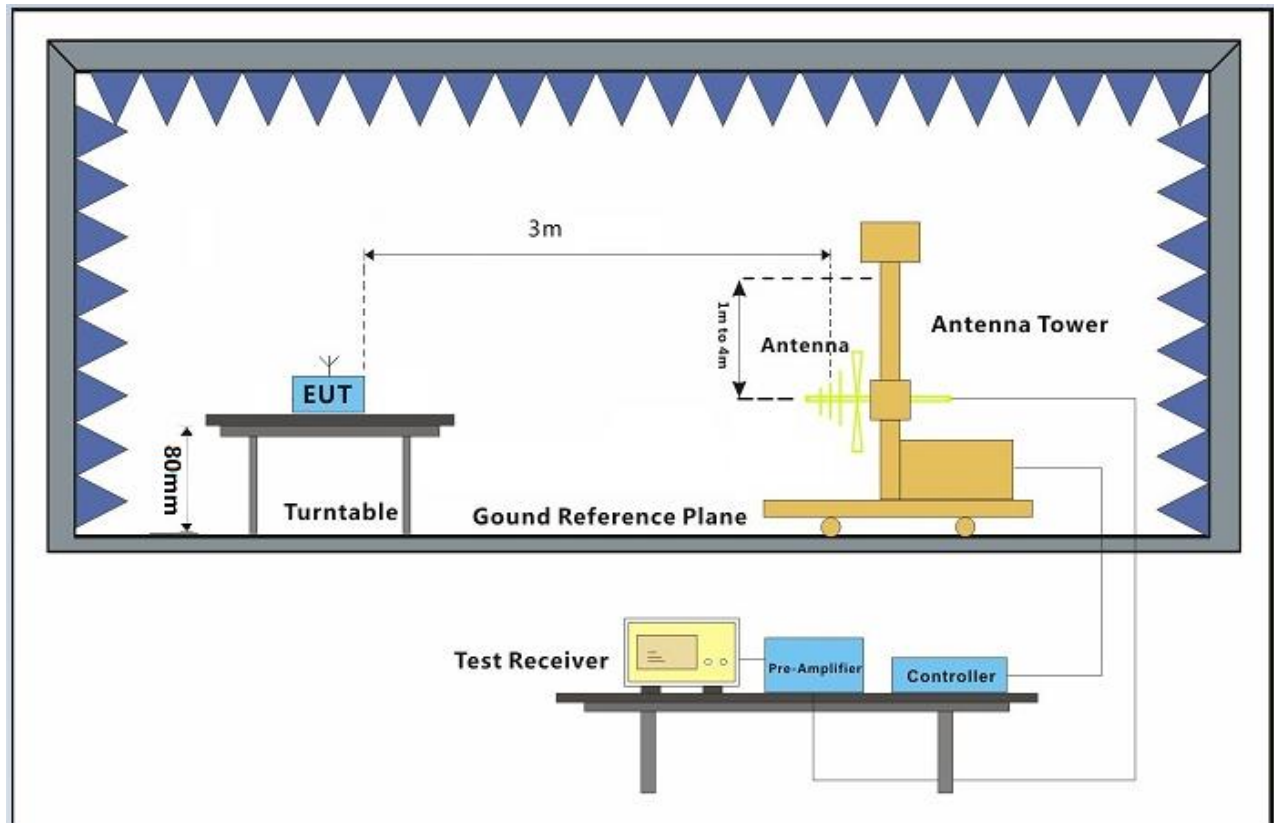
| Frequency | Field strength (microvolt/meter) | Limit (dBuV/m) | Remark | Measurement distance (m) |
|---------------|----------------------------------|----------------|------------|--------------------------|
| 30MHz-88MHz | 100 | 40.0 | Quasi-peak | 3 |
| 88MHz-216MHz | 150 | 43.5 | Quasi-peak |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

7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar
 Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.6.2 Test Setup Diagram



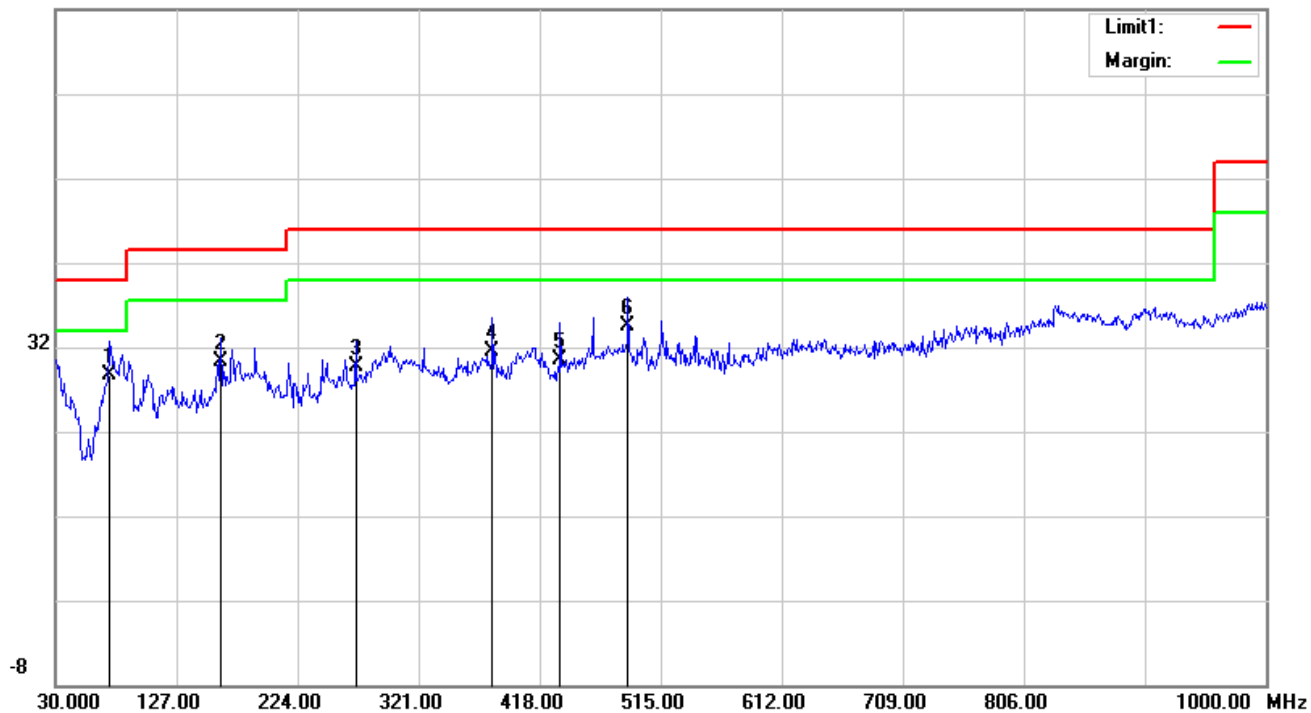
7.6.3 Measurement Procedure and Data

- 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.

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

Horizontal:

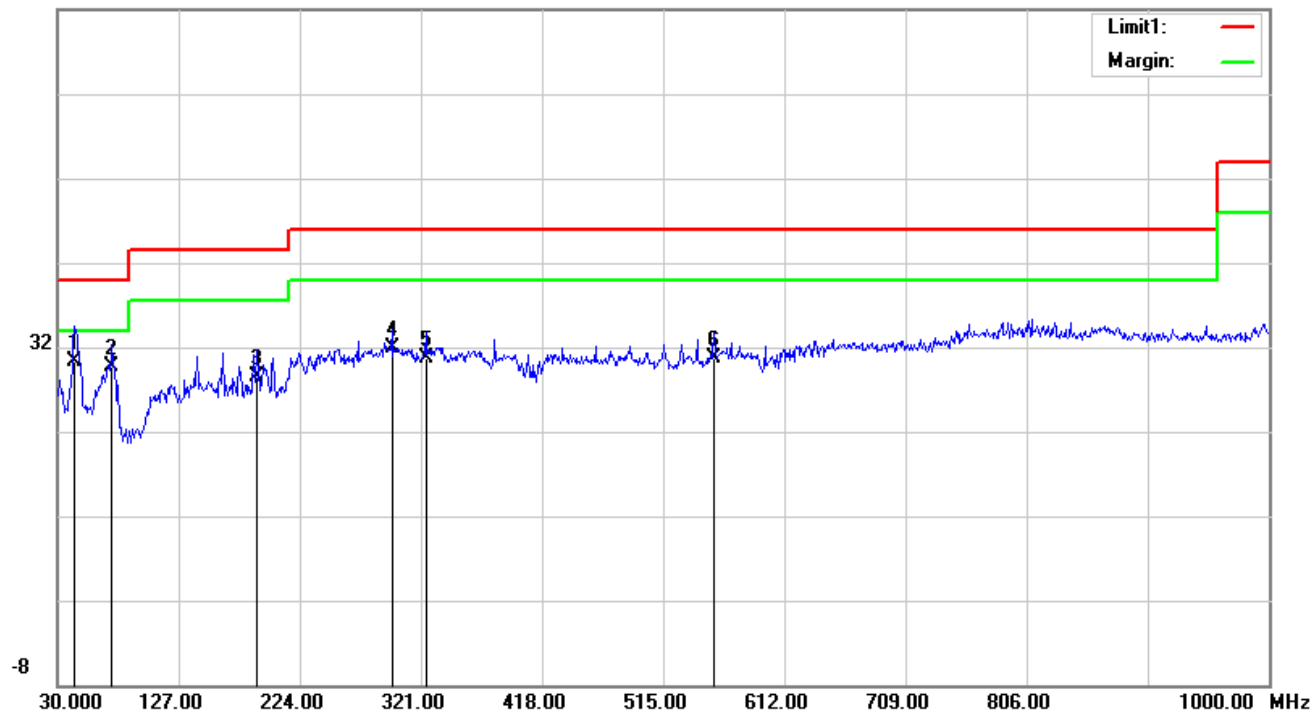
72.0 dBuV/m



| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (deg.) | Remark |
|-----|-----------------|----------------|----------------------|-----------------|----------------|-------------|-------------|---------------|--------|
| 1 | 73.6500 | 14.41 | 14.23 | 28.64 | 40.00 | -11.36 | 100 | 58 | QP |
| 2 | 161.9200 | 10.97 | 19.28 | 30.25 | 43.50 | -13.25 | 100 | 124 | QP |
| 3 | 270.5600 | 9.74 | 19.94 | 29.68 | 46.00 | -16.32 | 200 | 136 | QP |
| 4 | 380.1700 | 8.00 | 23.41 | 31.41 | 46.00 | -14.59 | 200 | 205 | QP |
| 5 | 434.4900 | 6.24 | 24.30 | 30.54 | 46.00 | -15.46 | 300 | 258 | QP |
| 6 | 488.8100 | 9.53 | 25.05 | 34.58 | 46.00 | -11.42 | 400 | 301 | QP |

Vertical:

72.0 dBuV/m



| No. | Frequency (MHz) | Reading (dBuV) | Correct Factor(dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Height (cm) | Degree (deg.) | Remark |
|-----|-----------------|----------------|----------------------|-----------------|----------------|-------------|-------------|---------------|--------|
| 1 | 43.5800 | 12.09 | 18.16 | 30.25 | 40.00 | -9.75 | 200 | 145 | QP |
| 2 | 73.6500 | 15.45 | 14.23 | 29.68 | 40.00 | -10.32 | 200 | 241 | QP |
| 3 | 189.0800 | 11.21 | 17.20 | 28.41 | 43.50 | -15.09 | 100 | 152 | QP |
| 4 | 297.7200 | 11.29 | 20.60 | 31.89 | 46.00 | -14.11 | 100 | 32 | QP |
| 5 | 324.8800 | 9.07 | 21.71 | 30.78 | 46.00 | -15.22 | 300 | 58 | QP |
| 6 | 555.7400 | 4.75 | 25.99 | 30.74 | 46.00 | -15.26 | 400 | 118 | QP |



8 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

- End of the Report -