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Test Report

Report No. : CQAS20190700608E-03
Applicant: DongGuan Mae Tay Electronic Co.,Ltd
Address of Applicant: Beihuanlu Industrial Area, Changping Town Dongguan, Guangdong, China
Manufacturer: DongGuan Mae Tay Electronic Co.,Ltd
Address of Manufacturer: Beihuanlu Industrial Area, Changping Town Dongguan, Guangdong, China
Equipment Under Test (EUT):
Product: USB Dongle
Model No.: MM-008
FCC ID: 2AAIL-DG008
IC: 11188A-DG008
Brand Name: N/A
Standards: 47 CFR PART 15, Subpart B
ICES-003 Issue 6
Date of Test: 2019-07-18 to 2019-07-22
Date of Issue: 2019-07-22
Test Result : **PASS***

Tested By:

Tom Chen

(Tom Chen)

Reviewed By:

Aaron Ma

(Aaron Ma)

Approved By:

Jack Ai

(Jack Ai)



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

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

Revision History Of Report

| Report No. | Version | Description | Issue Date |
|---------------------|---------|----------------|------------|
| CQAS20190700608E-03 | Rev.01 | Initial report | 2019-07-22 |

2 Test Summary

| Test | Test Requirement | Test Method | Class / Severity | Result |
|---|--|-----------------|------------------|--------|
| Radiated Emission (30MHz to 25GHz) | 47 CFR PART 15, Subpart B ICES-003 Issue 6 | ANSI C63.4:2014 | Class B | PASS |
| Conducted Emission (150kHz to 30MHz) | 47 CFR PART 15, Subpart B ICES-003 Issue 6 | ANSI C63.4:2014 | Class B | PASS |

| Highest frequency generated or used in the device or on which the device operates or tunes (MHz) | Upper frequency of measurement Range (MHz) |
|--|--|
| Below 1.705 | 30 |
| 1.705 to 108 | 1000 |
| 108 to 500 | 2000 |
| 500 to 1000 | 5000 |
| Above 1000 | 5th harmonic of the highest frequency or 40GHz, whichever is lower |

Note:

The highest frequency of the internal sources of the EUT is 2474MHz

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 |
| 5 EQUIPMENT LIST | 7 |
| 6 TEST RESULTS | 8 |
| 6.1 CONDUCTED EMISSIONS MAINS TERMINALS, 150kHz TO 30MHz..... | 8 |
| 6.1.1 <i>E.U.T. Operation</i> | 9 |
| 6.1.2 <i>Measurement Data</i> | 9 |
| 6.2 RADIATED EMISSIONS, 30MHz TO 25GHz..... | 12 |
| 6.2.1 <i>E.U.T. Operation</i> | 13 |
| 6.2.2 <i>Measurement Data</i> | 14 |
| 7 PHOTOGRAPHS | 18 |
| 7.1 CONDUCTED EMISSION TEST SETUP..... | 18 |
| 7.2 RADIATED EMISSION TEST SETUP..... | 19 |
| 7.3 EUT CONSTRUCTIONAL DETAILS..... | 20 |

4 General Information

4.1 Details of E.U.T.

Power Supply: USB operated

4.2 Description of Support Units

The EUT has been tested with associated equipment below.

| Description | Manufacturer | Model No. | Remark | FCC certification |
|----------------|--------------|----------------|-------------------|-------------------|
| PC | Lenovo | ThinkPad E450c | Provide by lab | ID |
| AC/DC Adapter | Lenovo | ADLX65NLC3A | Provide by lab | DOC |
| Wireless Mouse | Mae | NS-PWME20 | Provide by client | / |

4.3 Measurement Uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for **CQA** laboratory is reported:

| Test | Range | Uncertainty | Notes |
|-----------------------|------------|-------------|-------|
| Radiated Emission | Below 1GHz | 5.12dB | (1) |
| Radiated Emission | Above 1GHz | 4.60dB | (1) |
| Conducted Disturbance | 0.15~30MHz | 3.34dB | (1) |

(1) This 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:

Shenzhen Huaxia Testing Technology Co., Ltd.,
1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District,
Shenzhen, China

4.5 Test Facility

- **ISED No.: 22984**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements

- **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

- **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

5 Equipment List

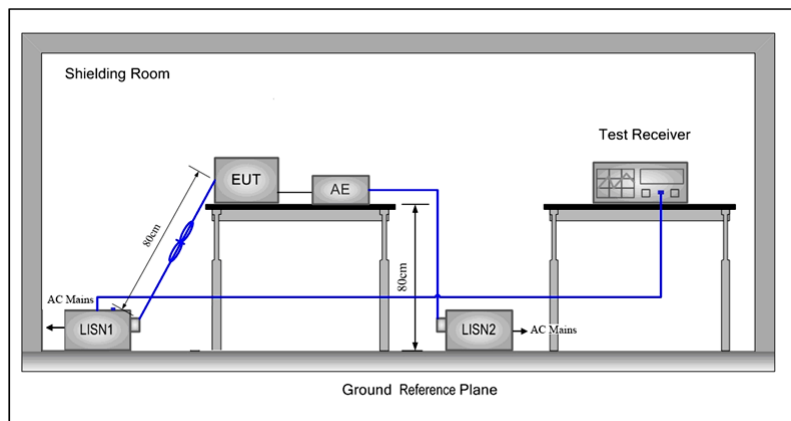
| Radiated Emission | | | | | |
|----------------------------|--------------|------------------------|----------------|------------------|----------------------|
| Test Equipment | Manufacturer | Model No. | Instrument No. | Calibration Date | Calibration Due Date |
| Horn Antenna | R&S | HF906 | CQA-012 | 2018/9/26 | 2020/9/25 |
| Bilog Antenna | R&S | HL562 | CQA-011 | 2018/9/26 | 2020/9/25 |
| Horn Antenna | Schwarzbeck | BBHA 9170 | CQA-060 | 2018/9/26 | 2020/9/25 |
| EMI Test Receiver | R&S | ESR7 | CQA-005 | 2018/9/26 | 2019/9/25 |
| Spectrum analyzer | R&S | FSU26 | CQA-038 | 2018/10/28 | 2019/10/27 |
| Preamplifier | MITEQ | AFS4-00010300-18-10P-4 | CQA-035 | 2018/9/26 | 2019/9/25 |
| Preamplifier | MITEQ | AMF-6D-02001800-29-20P | CQA-036 | 2018/11/2 | 2019/11/1 |
| Coaxial cable (1GHz~40GHz) | CQA | N/A | C019 | 2018/9/26 | 2019/9/25 |
| Coaxial cable (9KHz~1GHz) | CQA | N/A | C020 | 2018/9/26 | 2019/9/25 |

| Conducted Emission | | | | | |
|-----------------------------|----------------|--------------|-----------|----------------|-----------|
| Item | Test Equipment | Manufacturer | Model No. | Instrument No. | Due Date |
| EMI Test Receiver | R&S | ESPI3 | CQA-005 | 2018/9/26 | 2019/9/25 |
| LISN | R&S | ENV216 | CQA-003 | 2018/11/5 | 2019/11/4 |
| Coaxial cable (9KHz~300MHz) | CQA | N/A | C009 | 2018/9/26 | 2019/9/25 |

6 Test Results

6.1 Conducted Emissions Mains Terminals, 150kHz to 30MHz

| | |
|-------------------|---|
| Test Requirement: | 47 CFR PART 15, Subpart B ICES-003 Issue 6 |
| Test Method: | ANSI C63.4 |
| Frequency Range: | 150kHz to 30MHz |
| Class / Severity: | Class B |
| Limit: | |
| 0.15M-0.5MHz | 66dB(dB μ V)-56dB(dB μ V) quasi-peak, 56dB(dB μ V)-46dB(dB μ V) average |
| 0.5M-5MHz | 56dB(dB μ V) quasi-peak, 46dB(dB μ V) average |
| 5M-30MHz | 60dB(dB μ V) quasi-peak, 50dB(dB μ V) average |
| Test Setup: | |



Test Procedure:

- 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 50 Ω /50 μ H + 5 Ω 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.

Detector:

Peak for pre-scan (9kHz Resolution Bandwidth)
Quasi-Peak if maximised peak within 6dB of Quasi-Peak limit

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.0 °C Humidity: 55 % RH Atmospheric Pressure: 1015 mbar

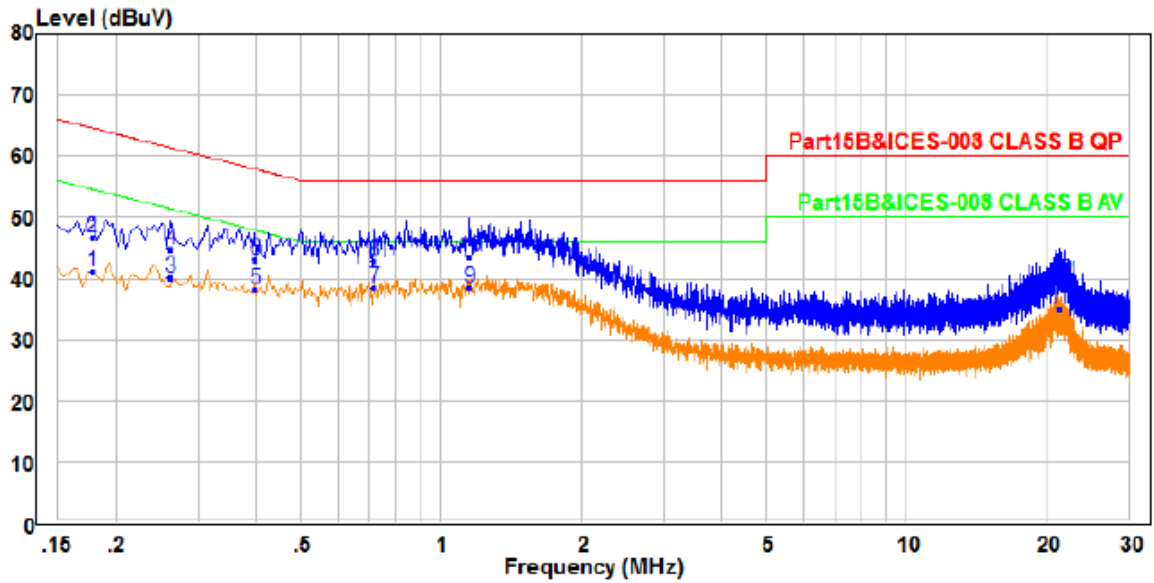
EUT Operation: Mode a: Data exchange

Test Status: Pretest the EUT at different test mode and found the Mode a which is worst case, the test worst case mode is recorded in the report.

Test voltage: 120V/60Hz

6.1.2 Measurement Data

Mode a:
Live line

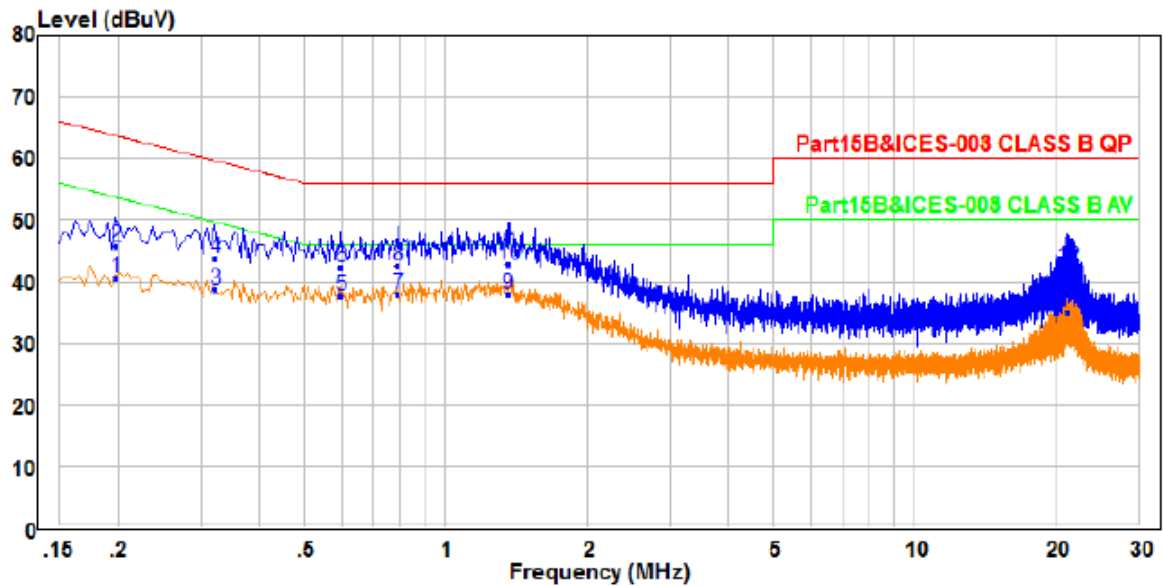


| | Read Freq | Level | Factor | Level | Limit Line | Over Limit | Remark | Pol/Phase |
|-------|-----------|-------|--------|-------|------------|------------|---------|-----------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | | |
| 1 | 0.178 | 31.58 | 9.49 | 41.07 | 54.58 | -13.51 | Average | Line |
| 2 | 0.178 | 37.23 | 9.49 | 46.72 | 64.58 | -17.86 | QP | Line |
| 3 | 0.262 | 30.53 | 9.49 | 40.02 | 51.37 | -11.35 | Average | Line |
| 4 | 0.262 | 35.21 | 9.49 | 44.70 | 61.37 | -16.67 | QP | Line |
| 5 | 0.398 | 28.67 | 9.51 | 38.18 | 47.90 | -9.72 | Average | Line |
| 6 | 0.398 | 33.60 | 9.51 | 43.11 | 57.90 | -14.79 | QP | Line |
| 7 | 0.718 | 28.65 | 9.85 | 38.50 | 46.00 | -7.50 | Average | Line |
| 8 | 0.718 | 32.85 | 9.85 | 42.70 | 56.00 | -13.30 | QP | Line |
| 9 PP | 1.150 | 29.00 | 9.53 | 38.53 | 46.00 | -7.47 | Average | Line |
| 10 QP | 1.150 | 34.01 | 9.53 | 43.54 | 56.00 | -12.46 | QP | Line |
| 11 | 21.221 | 24.97 | 10.08 | 35.05 | 50.00 | -14.95 | Average | Line |
| 12 | 21.221 | 29.62 | 10.08 | 39.70 | 60.00 | -20.30 | QP | Line |

Remark:

1. The following Peak, Quasi-Peak and Average measurements were performed on the EUT:
2. Correct Factor= LISN Factor + Cable Loss
3. Final Test Level =Receiver Reading + Correct Factor.
4. Over Limit= Final Test Level - Limit

Mode a:
Neutral line



| | Read Freq | Level | Factor | Level | Limit | Over | Remark | Pol/Phase |
|-------|-----------|-------|--------|-------|-------|--------|---------|-----------|
| | MHz | dBuV | dB | dBuV | dBuV | dB | | |
| 1 | 0.198 | 31.10 | 9.48 | 40.58 | 53.69 | -13.11 | Average | Neutral |
| 2 | 0.198 | 36.21 | 9.48 | 45.69 | 63.69 | -18.00 | QP | Neutral |
| 3 | 0.322 | 29.25 | 9.50 | 38.75 | 49.66 | -10.91 | Average | Neutral |
| 4 | 0.322 | 34.17 | 9.50 | 43.67 | 59.66 | -15.99 | QP | Neutral |
| 5 | 0.598 | 27.88 | 9.71 | 37.59 | 46.00 | -8.41 | Average | Neutral |
| 6 | 0.598 | 32.72 | 9.71 | 42.43 | 56.00 | -13.57 | QP | Neutral |
| 7 | 0.790 | 28.08 | 9.80 | 37.88 | 46.00 | -8.12 | Average | Neutral |
| 8 | 0.790 | 32.74 | 9.80 | 42.54 | 56.00 | -13.46 | QP | Neutral |
| 9 PP | 1.354 | 28.17 | 9.72 | 37.89 | 46.00 | -8.11 | Average | Neutral |
| 10 QP | 1.354 | 33.11 | 9.72 | 42.83 | 56.00 | -13.17 | QP | Neutral |
| 11 | 21.093 | 24.84 | 10.06 | 34.90 | 50.00 | -15.10 | Average | Neutral |
| 12 | 21.093 | 32.38 | 10.06 | 42.44 | 60.00 | -17.56 | QP | Neutral |

Remark:

1. The following Peak, Quasi-Peak and Average measurements were performed on the EUT:
2. Correct Factor= LISN Factor + Cable Loss
3. Final Test Level =Receiver Reading + Correct Factor.
4. Over Limit= Final Test Level - Limit

6.2 Radiated Emissions, 30MHz to 25GHz

| | |
|------------------------|---|
| Test Requirement: | 47 CFR PART 15, Subpart B ICES-003 Issue 6 |
| Test Method: | ANSI C63.4 |
| Frequency Range: | 30MHz to 25GHz |
| Measurement Distance: | 3m |
| Class: | Class B |
| Limit: | 40.0 dB μ V/m between 30MHz & 88MHz 43.5 dB μ V/m between 88MHz & 216MHz 46.0 dB μ V/m between 216MHz & 960MHz / 54.0 dB μ V/m above 960MHz |
| The highest frequency: | 74 dB μ V/m above 960MHz for peak 54 dB μ V/m above 960MHz for average |

Test Setup:

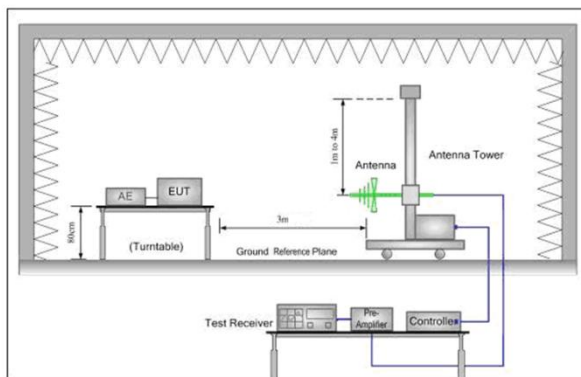


Figure 1. 30MHz to 1GHz

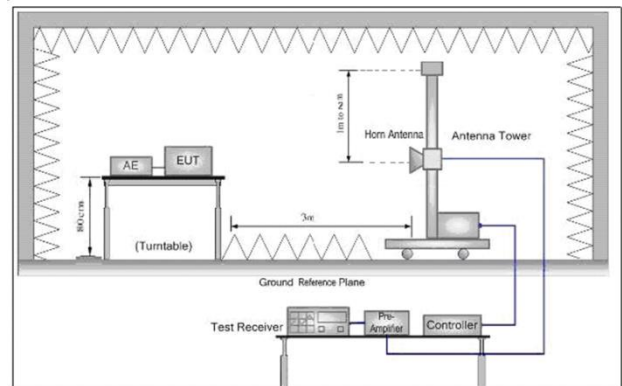


Figure 2. Above 1 GHz

Test Procedure:

- 1) The radiated emissions were tested in a semi-anechoic chamber.
 - 2) The EUT is placed on a turntable, which is 0.8m above ground plane.
 - 3) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
 - 4) EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
 - 5) Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
 - 6) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
 - 7) Repeat above procedures until the measurements for all frequencies are complete.
2. Above 1GHz test procedure as below:
- 1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and receiving antenna is moved from 1m to 4m.

Detector:

Peak for pre-scan (120kHz resolution bandwidth)
Quasi-Peak if maximised peak within 6dB of limit

6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.0 °C Humidity: 54 % RH Atmospheric Pressure: 1015 mbar

EUT Operation: Mode a: Data exchange

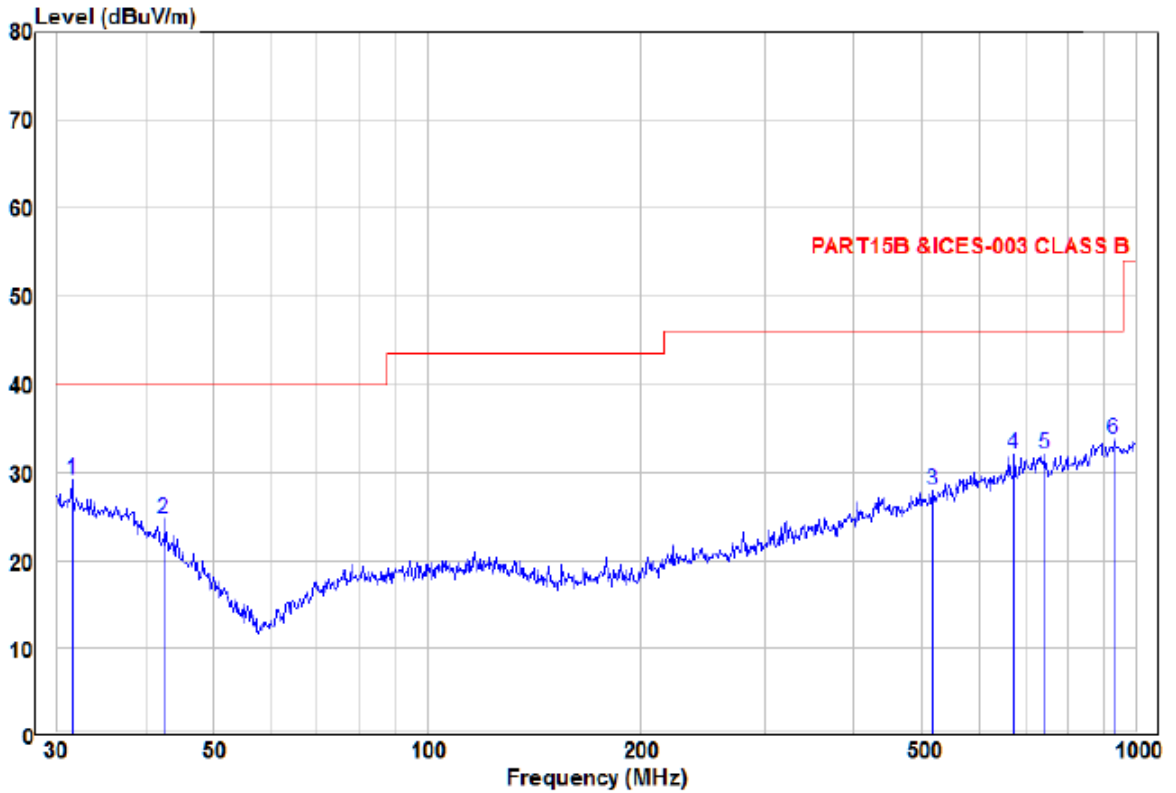
Test Status: Pretest the EUT at different test mode and found the Mode a which is worst case, the test worst case mode is recorded in the report.

6.2.2 Measurement Data

Below 1GHz:

Mode a

Vertical



| | Read | Limit | Over | | | | | |
|---|------|--------|--------|--------|--------|-------|-------------|-----------|
| | Freq | Level | Factor | Level | Line | Limit | Remark | Pol/Phase |
| | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | pp | 31.51 | 11.51 | 17.66 | 29.17 | 40.00 | -10.83 Peak | VERTICAL |
| 2 | | 42.60 | 10.64 | 14.10 | 24.74 | 40.00 | -15.26 Peak | VERTICAL |
| 3 | | 517.25 | 9.71 | 18.19 | 27.90 | 46.00 | -18.10 Peak | VERTICAL |
| 4 | | 672.84 | 11.74 | 20.26 | 32.00 | 46.00 | -14.00 Peak | VERTICAL |
| 5 | | 744.87 | 10.48 | 21.53 | 32.01 | 46.00 | -13.99 Peak | VERTICAL |
| 6 | | 932.27 | 10.02 | 23.83 | 33.85 | 46.00 | -12.15 Peak | VERTICAL |

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Pre-amplifier. The basic

equation with a sample calculation is as follows:

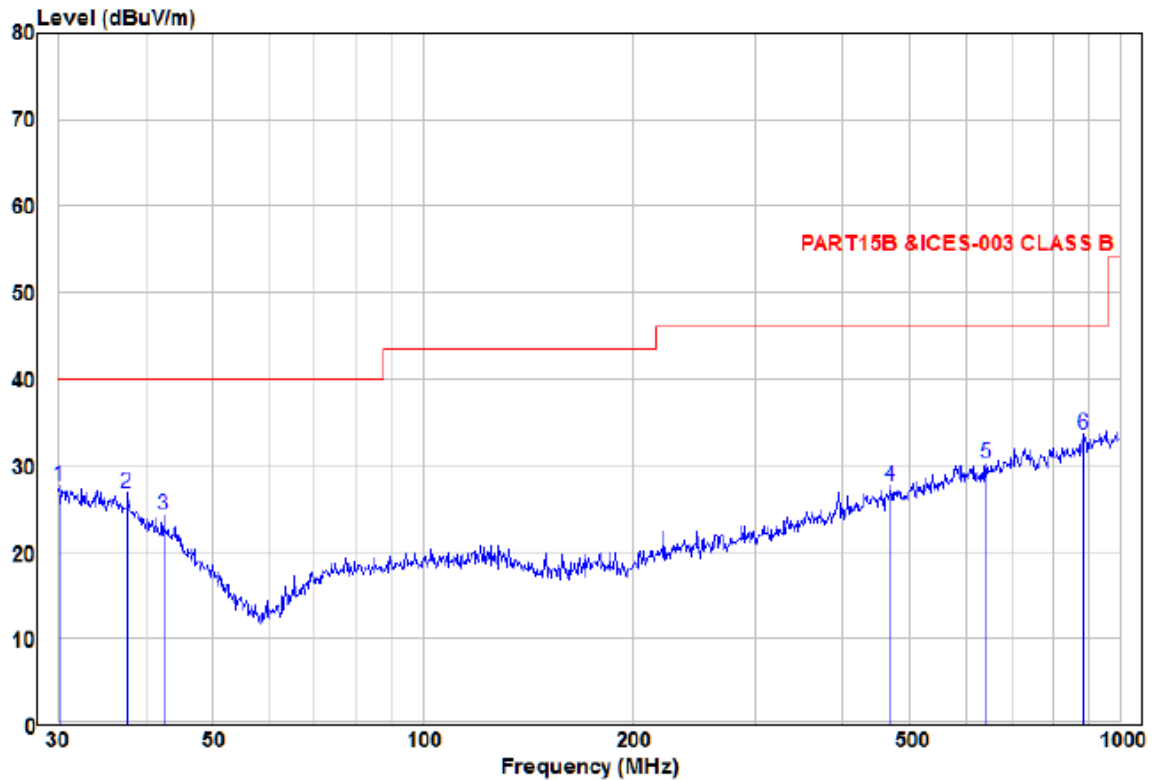
Factor= Antenna Factor + Cable Factor – Pre-amplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

Mode a:

Horizontal



| | Read | Limit | Over | | | | |
|------|--------|--------|--------|--------|-------|-------------|------------|
| Freq | Level | Factor | Level | Line | Limit | Remark | |
| MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Pol/Phase | |
| 1 pp | 30.11 | 9.91 | 17.80 | 27.71 | 40.00 | -12.29 Peak | HORIZONTAL |
| 2 | 37.68 | 9.82 | 16.93 | 26.75 | 40.00 | -13.25 Peak | HORIZONTAL |
| 3 | 42.45 | 9.97 | 14.17 | 24.14 | 40.00 | -15.86 Peak | HORIZONTAL |
| 4 | 468.88 | 10.32 | 17.34 | 27.66 | 46.00 | -18.34 Peak | HORIZONTAL |
| 5 | 642.86 | 10.34 | 19.84 | 30.18 | 46.00 | -15.82 Peak | HORIZONTAL |
| 6 | 887.61 | 10.59 | 23.02 | 33.61 | 46.00 | -12.39 Peak | HORIZONTAL |

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic

equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

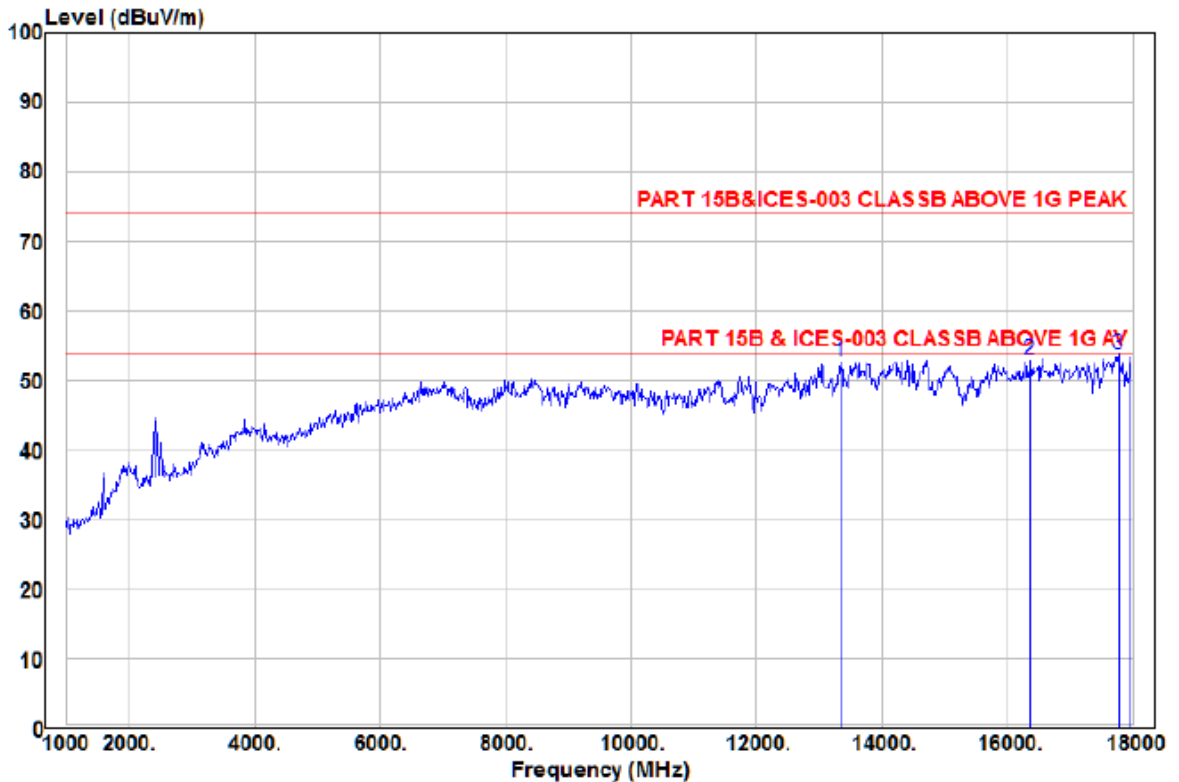
Level = Read Level + Factor,

Over Limit=Level-Limit Line.

Above 1GHz

Mode a:

Horizontal



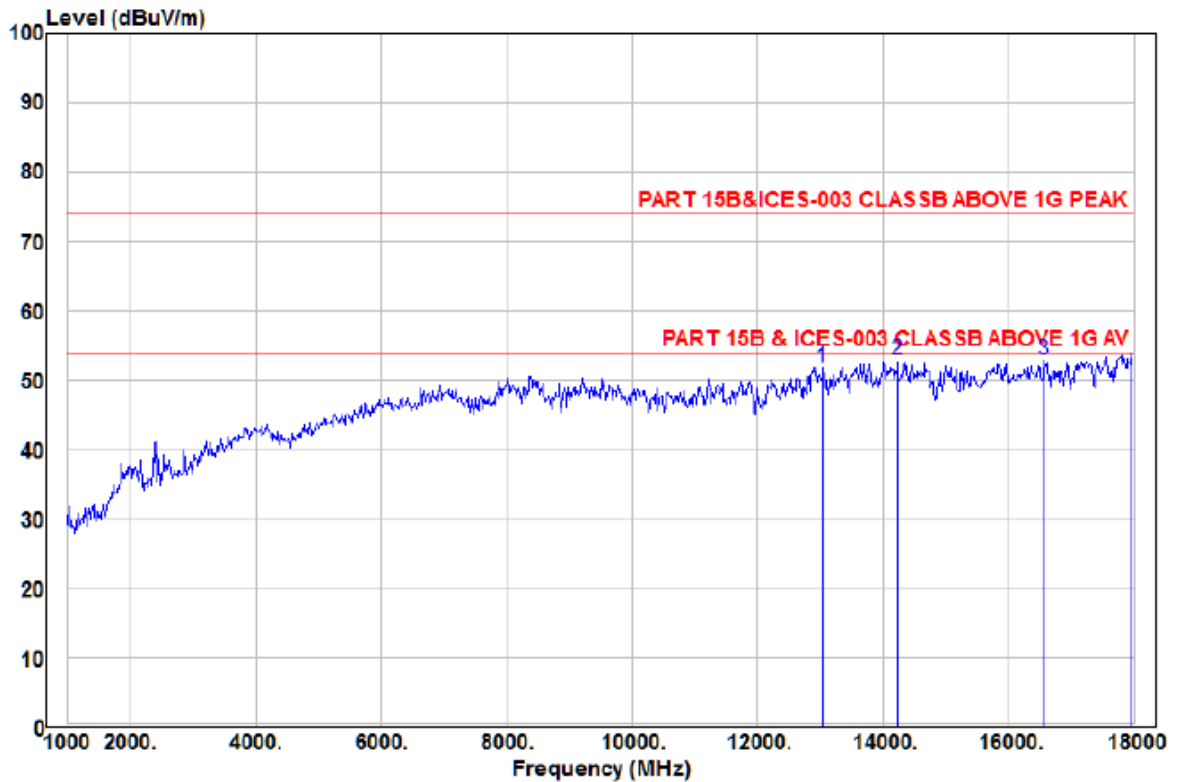
| | Read Freq | Read Level | Factor | Level | Limit | Over | Remark | Pol/Phase |
|------|-----------|------------|--------|--------|--------|--------|--------|------------|
| | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | 13342.00 | 44.36 | 8.28 | 52.64 | 74.00 | -21.36 | Peak | HORIZONTAL |
| 2 | 16368.00 | 37.96 | 15.00 | 52.96 | 74.00 | -21.04 | Peak | HORIZONTAL |
| 3 pp | 17762.00 | 38.36 | 15.43 | 53.79 | 74.00 | -20.21 | Peak | HORIZONTAL |

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
- 2) Scan from 30M to 25GHz, the disturbance above 18GHz was very low. As shown in this section, 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. So, only the peak measurements were shown in the report.
- 3) 2408~2474MHz was the fundamental frequency range

Mode a:

Vertical



| | Read Freq | Read Level | Factor | Level | Limit | Over | Remark | Pol/Phase |
|---|-------------|------------|--------|--------|--------|--------|--------|-----------|
| | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | | |
| 1 | 13036.00 | 42.83 | 9.01 | 51.84 | 74.00 | -22.16 | Peak | VERTICAL |
| 2 | 14226.00 | 42.46 | 10.40 | 52.86 | 74.00 | -21.14 | Peak | VERTICAL |
| 3 | pp 16572.00 | 39.40 | 13.54 | 52.94 | 74.00 | -21.06 | Peak | VERTICAL |

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
- 2) Scan from 30M to 25GHz, the disturbance above 10GHz was very low. As shown in this section, 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. So, only the peak measurements were shown in the report.
- 3) 2402~2480MHz was the fundamental frequency range

7.3 EUT Constructional Details

END OF THE REPORT