# MEASUREMENT REPORT

## FCC PART 15.225 / NFC 13.56MHz

| | |
|---|---|
| **FCC ID:** | HD5-EDA510 |
| **Applicant:** | Honeywell International Inc<br>Honeywell Safety and Productivity Solutions |
| **Application Type:** | Class II Permissive Change |
| **Product:** | Mobile Computer |
| **Model No.:** | EDA51-0 |
| **Brand Name:** | Honeywell |
| **FCC Classification:** | Part 15 Low Power Communication Device Transmitter (DXX) |
| **FCC Rule Part(s):** | Part 15 Subpart C (Section 15.225) |
| **Test Procedure(s):** | ANSI C63.10-2013 |
| **Test Date:** | August 12 ~ 13, 2020 |

Reviewed By: Jame Yuan
( Jame Yuan )

Approved By: Robin Wu
( Robin Wu )

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

# Revision History

| Report No. | Version | Description | Issue Date | Note |
|---|---|---|---|---|
| 2008RSU012-U1 | Rev. 01 | Initial Report | 08-13-2020 | Valid |
| | | | | |

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## General Information

| | |
|---|---|
| **Applicant:** | Honeywell International Inc<br>Honeywell Safety and Productivity Solutions |
| **Applicant Address:** | 9680 Old Bailes Rd, Fort Mill, SC 29707, USA |
| **Manufacturer:** | Honeywell International Inc<br>Honeywell Safety and Productivity Solutions |
| **Manufacturer Address:** | 9680 Old Bailes Rd, Fort Mill, SC 29707, USA |
| **Test Site:** | MRT Technology (Suzhou) Co., Ltd |
| **Test Site Address:** | D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China |

### Test Facility / Accreditations

**Measurements were performed at MRT Laboratory located in Tian'edang Rd.,Suzhou, China.**

- **MRT facility is an FCC registered (MRT Designation No. CN1166) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No.11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LACert. No.3628.01) in EMC, Telecommunications, Radio and SAR testing.**

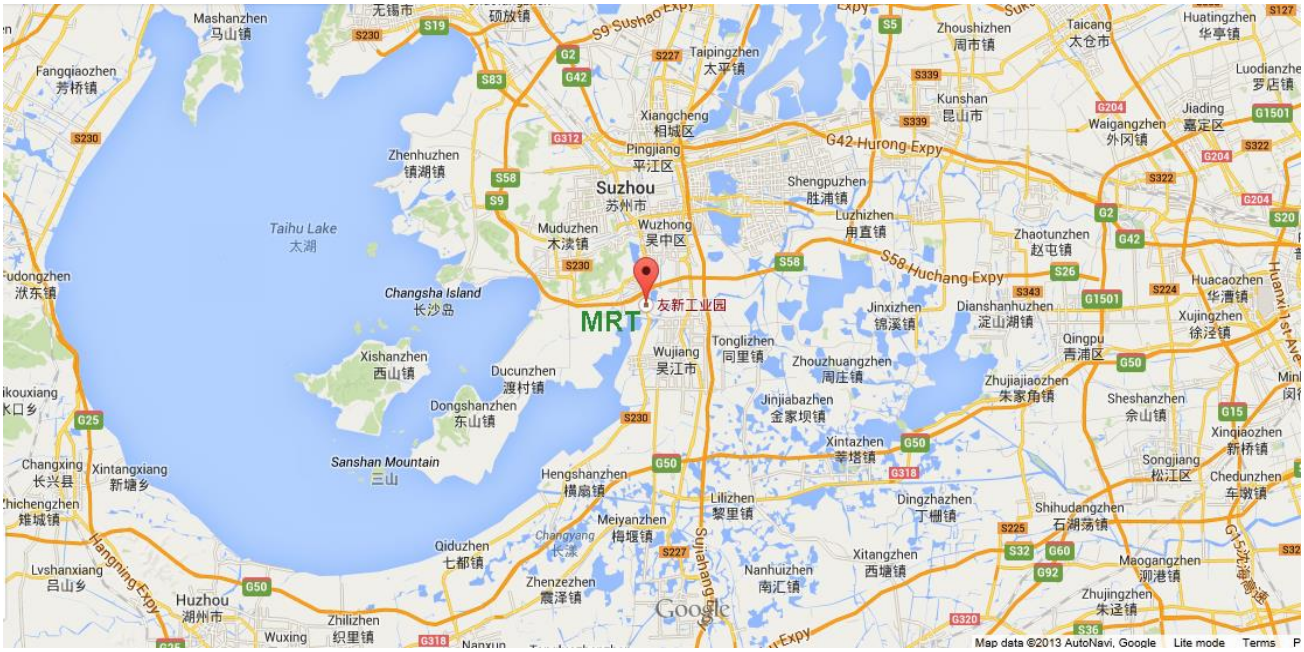
# 1. INTRODUCTION

## 1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.

## 1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The measurement facility compliant with the test site requirements specified in ANSI C63.4-2014.



# 2. PRODUCT INFORMATION

## 2.1. Equipment Description

| | |
|---|---|
| Product Name | Mobile Computer |
| Model No. | EDA51-0 |
| Serial No. | 20213B21CD |
| Wi-Fi Specification | 802.11a/b/g/n/ac |
| Bluetooth Version | V4.2 dual mode |
| NFC | 13.56MHz |
| **Accessories** | |
| USB Adapter | Model No.: ADS-12B-06 05010E<br>Input Power: 100 - 240V ~ 50/60Hz, Max. 0.3A<br>Output Power: 5VDC 2.0A |
| Battery | Model No.: BAT-EDA50US<br>Capacitance: 15.2Wh, 4000mAh<br>Rated Voltage: 3.8V |

## 2.2. Product Specification Subjective to this Report

| | |
|---|---|
| Frequency Range | 13.56MHz |
| Channel Number | 1 |
| Modulation | ASK |
| Antenna Type | Loop Antenna |

Note: For other features of this EUT, test report will be issued separately.

## 2.3. Test Mode

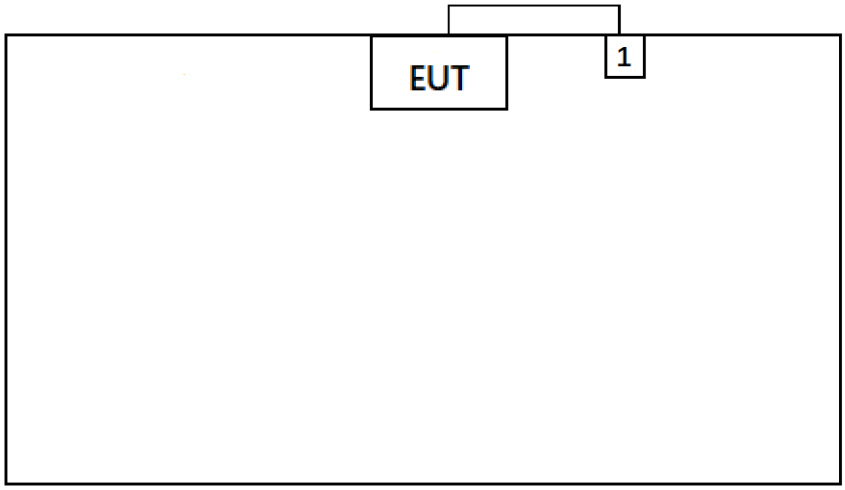
| Test Mode |
|---|
| Mode 1: Transmit by NFC |

## 2.4. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

## 2.5. Description of Test Configuration and Software

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.




| Product | | Manufacturer | Model No. |
|---|---|---|---|
| 1 | Adapter | Shenzhen Honor Electronic Co., Ltd | ADS-12B-06 05010E |

## 2.6. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

## 2.7. Test Environment Condition

| | |
|---|---|
| Ambient Temperature | 15°C~35°C |
| Relative Humidity | 20%RH ~75%RH |

# 3. DESCRIPTION OF TEST

## 3.1. Evaluation Procedure

The measurement procedure described in the document titled “American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices” (ANSI C63.10-2013) was used in the measurement.

## 3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.
The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.
Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.
An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013 at Clause 4.3.

### 3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 0.8 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

# 4. ANTENNA REQUIREMENTS

**Excerpt from §15.203 of the FCC Rules/Regulations:**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the **Mobile Computer** is **permanently attached.**
- There are no provisions for connection to an external antenna.

**Conclusion:**

The unit complies with the requirement of §15.203.

# 5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions - SR2

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESR3 | MRTSUE06185 | 1 year | 2021/01/18 |
| Two-Line V-Network | R&S | ENV 216 | MRTSUE06002 | 1 year | 2021/06/11 |
| Two-Line V-Network | R&S | ENV 216 | MRTSUE06003 | 1 year | 2021/06/11 |
| Thermohygrometer | Testo | 608-H1 | MRTSUE06404 | 1 year | 2021/07/26 |
| Shielding Room | MIX-BEP | Chamber-SR2 | MRTSUE06215 | N/A | N/A |

Radiated Emissions - AC1

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESR7 | MRTSUE06001 | 1 year | 2021/01/18 |
| PXA Signal Analyzer | Keysight | 9030B | MRTSUE06395 | 1 year | 2020/09/03 |
| Loop Antenna | Schwarzbeck | FMZB 1519 | MRTSUE06025 | 1 year | 2020/11/13 |
| Bilog Period Antenna | Schwarzbeck | VULB 9168 | MRTSUE06172 | 1 year | 2021/04/03 |
| Broad Band Horn Antenna | Schwarzbeck | BBHA 9120D | MRTSUE06023 | 1 year | 2020/10/13 |
| Broad Band Horn Antenna | Schwarzbeck | BBHA 9170 | MRTSUE06024 | 1 year | 2020/12/29 |
| Microwave System Amplifier | Agilent | 83017A | MRTSUE06076 | 1 year | 2020/11/15 |
| Preamplifier | Schwarzbeck | BBV 9721 | MRTSUE06121 | 1 year | 2021/06/11 |
| Thermohygrometer | Testo | 608-H1 | MRTSUE06403 | 1 year | 2021/07/26 |
| Anechoic Chamber | TDK | Chamber-AC1 | MRTSUE06212 | 1 year | 2021/04/30 |

Radiated Emission - AC2

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| Spectrum Analyzer | Keysight | N9038A | MRTSUE06125 | 1 year | 2021/07/02 |
| Loop Antenna | Schwarzbeck | FMZB 1519 | MRTSUE06025 | 1 year | 2020/11/13 |
| Bilog Period Antenna | Schwarzbeck | VULB 9162 | MRTSUE06022 | 1 year | 2020/10/13 |
| Horn Antenna | Schwarzbeck | BBHA9120D | MRTSUE06171 | 1 year | 2020/10/27 |
| Broad Band Horn Antenna | Schwarzbeck | BBHA 9170 | MRTSUE06024 | 1 year | 2020/12/29 |
| Broadband Coaxial Preamplifier | Schwarzbeck | BBV 9718 | MRTSUE06176 | 1 year | 2020/11/15 |
| Preamplifier | Schwarzbeck | BBV 9721 | MRTSUE06121 | 1 year | 2021/06/11 |
| Temperature/Humidity Meter | Minggao | ETH529 | MRTSUE06170 | 1 year | 2020/12/15 |
| Anechoic Chamber | RIKEN | Chamber-AC2 | MRTSUE06213 | 1 year | 2021/04/30 |

Conducted Test Equipment - TR3

| Instrument | Manufacturer | Type No. | Asset No. | Cali. Interval | Cali. Due Date |
|---|---|---|---|---|---|
| EXA Signal Analyzer | Agilent | N9020A | MRTSUE06106 | 1 year | 2021/04/14 |
| EXA Signal Analyzer | Keysight | N9010B | MRTSUE06453 | 1 year | 2021/07/02 |
| Signal Analyzer | R&S | FSV40 | MRTSUE06218 | 1 year | 2021/04/14 |
| Power Meter | Agilent | U2021XA | MRTSUE06030 | 1 year | 2020/11/17 |
| USB wideband power sensor | Keysight | U2021XA | MRTSUE06446 | 1 year | 2021/06/11 |
| USB wideband power sensor | Keysight | U2021XA | MRTSUE06447 | 1 year | 2021/06/11 |
| Bluetooth Test Set | Anritsu | MT8852B-042 | MRTSUE06389 | 1 year | 2021/06/11 |
| Audio Analyzer | Agilent | U8903B | MRTSUE06143 | 1 year | 2021/06/11 |
| Modulation Analyzer | HP | 8901A | MRTSUE06098 | 1 year | 2020/10/10 |
| Wideband Radio Communication Tester | R&S | CMW 500 | MRTSUE06243 | 1 year | 2020/11/07 |
| DC Power Supply | GWINSTEK | DPS-3303C | MRTSUE06064 | N/A | N/A |
| Attenuator | MVE | 6dB | MRTSUE06534 | 1 year | 2020/12/12 |
| Attenuator | MVE | 10dB | MRTSUE06543 | 1 year | 2020/12/12 |
| Temperature & Humidity Chamber | BAOYT | BYH-150CL | MRTSUE06051 | 1 year | 2020/11/07 |
| Thermohygrometer | testo | 608-H1 | MRTSUE06401 | 1 year | 2021/07/26 |

| **Software** | **Version** | **Function** |
|---|---|---|
| EMI Software | V3 | EMI Test Software |

# 6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

| |
|---|
| AC Conducted Emission Measurement |
| Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>9kHz~150kHz: 3.74dB<br>150kHz~30MHz: 3.44dB |
| Radiated Disturbance |
| Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>Horizontal: 30MHz~300MHz: 5.04dB<br>300MHz~1GHz: 4.95dB<br>1GHz~40GHz: 6.40dB<br>Vertical: 30MHz~300MHz: 5.24dB<br>300MHz~1GHz: 6.03dB<br>1GHz~40GHz: 6.40dB |
| Spurious Emissions, Conducted |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>0.78dB |
| Output Power |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>1.13dB |
| Occupied Bandwidth |
| Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):<br>0.28% |

# 7. TEST RESULT

## 7.1. Summary

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| 15.225 (a), (b), (c) | In-Band Emission | 15,848uV/m @ 30m<br>13.553 ~ 13.567 MHz<br>334uV/m @ 30m<br>13.410 ~ 13.553 MHz<br>13.567 ~ 13.710 MHz<br>106uV/m @ 30m<br>13.110 ~ 13.410 MHz<br>13.710 ~ 14.010 MHz | Radiated | Pass | Section 7.2 |
| 15.225(d) | Out-Band Emission | Emissions outside of the specified band (13.110~14.010 MHz) must meet the radiated limits detailed in 15.209 | | Pass | Section 7.3 |
| 15.225(e) | Frequency Stability Tolerance | ±0.01% of operating frequency | | Pass | Section 7.4 |
| 15.207 | AC Conducted Emissions 150kHz - 30MHz | < FCC 15.207 limits | Line Conducted | Pass | Section 7.5 |

**Notes:**

1) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.

## 7.2. In-band Emission

### 7.2.1.Test Limit

| FCC Part 15 Subpart C Paragraph 15.225 | | |
|---|---|---|
| Frequency (MHz) | Distance (m) | Level (uV/m) |
| 13.553 ~13.567 | 30 | 15,848 |
| 13.410 ~13.553<br>13.567 ~13.710 | 30 | 334 |
| 13.110 ~13.410<br>13.710 ~14.010 | 30 | 106 |
| Note 1: The lower limit shall apply at the transition frequency.<br>Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.<br>Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m) | | |

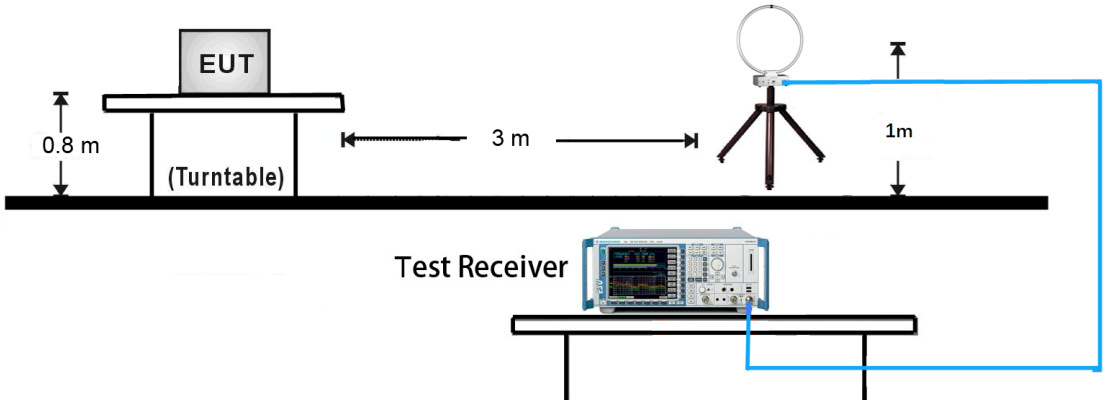
### 7.2.2.Test Procedure Used

ANSI C63.10-2013 - Section 6.4.7

### 7.2.3.Test Setting

1. RBW = 9kHz
2. VBW = 3 * RBW
3. Detector = Peak
4. Trace mode = Max hold
5. Sweep = Auto couple
6. Allow the trace to stabilize

### 7.2.4.Test Setup



### 7.2.5.Test Result

| Test Engineer | Antony Yang | Test Date | 2020/08/12 |
|---|---|---|---|
| Test Mode | Mode1 | Test Site | AC1 |

| Frequency | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (@3m) (dBuV/m) | Margin [dB] |
|---|---|---|---|---|---|
| Face On | | | | | |
| 13.41 | 8.18 | 20.58 | 28.76 | 80.51 | -51.75 |
| 13.50 | 7.44 | 20.62 | 28.06 | 90.47 | -62.41 |
| 13.56 | 31.13 | 20.63 | 51.76 | 123.99 | -72.23 |
| 13.70 | 8.68 | 20.67 | 29.35 | 90.47 | -61.12 |
| 14.00 | 7.02 | 20.73 | 27.75 | 80.51 | -52.76 |
| Face Off | | | | | |
| 13.31 | 7.61 | 20.55 | 28.16 | 80.51 | -52.35 |
| 13.50 | 6.79 | 20.62 | 27.41 | 90.47 | -63.06 |
| 13.56 | 28.65 | 20.63 | 49.28 | 123.99 | -74.71 |
| 13.61 | 6.92 | 20.64 | 27.56 | 90.47 | -62.91 |
| 13.98 | 7.54 | 20.72 | 28.26 | 80.51 | -52.25 |

Note 1: All measurements were performed using a loop antenna. The antenna was positioned in two orthogonal (face on and face off) and the position with the highest emission level was recorded.

Note 2: Measurements were tested at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear extrapolation factor (40 dB/decade) as specified in &15.31(f)(2).

Extrapolation Factor = $20*\text{Log}(30/3)^2$ = 40 dB

Note 3: All measurements were recorded using an EMI test receiver employing a peak detector.

## 7.3. Out-band Emission

### 7.3.1.Test Limit

| FCC Part 15 Subpart C Paragraph 15.209 | | |
|---|---|---|
| Frequency (MHz) | Distance (m) | Level (uV/m) |
| 0.009 - 0.490 | 300 | 2400/F (kHz) |
| 0.490 - 1.705 | 30 | 2400/F (kHz) |
| 1.705 - 30 | 30 | 30 |
| 30 - 88 | 3 | 100 |
| 88 - 216 | 3 | 150 |
| 216 - 960 | 3 | 200 |
| Above 960 | 3 | 500 |
| Note 1: The lower limit shall apply at the transition frequency.<br>Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.<br>Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m) | | |

### 7.3.2.Test Procedure Used

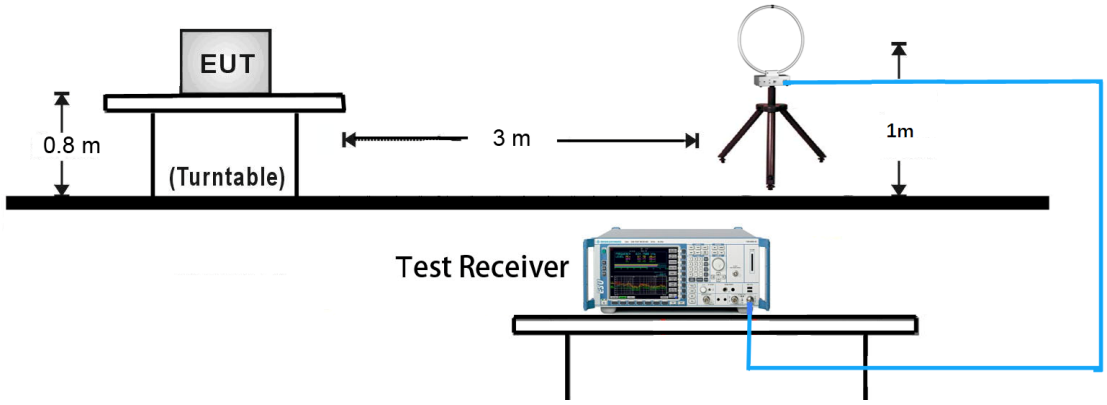
ANSI C63.10-2013 - Section 6.5.4

### 7.3.3.Test Setting

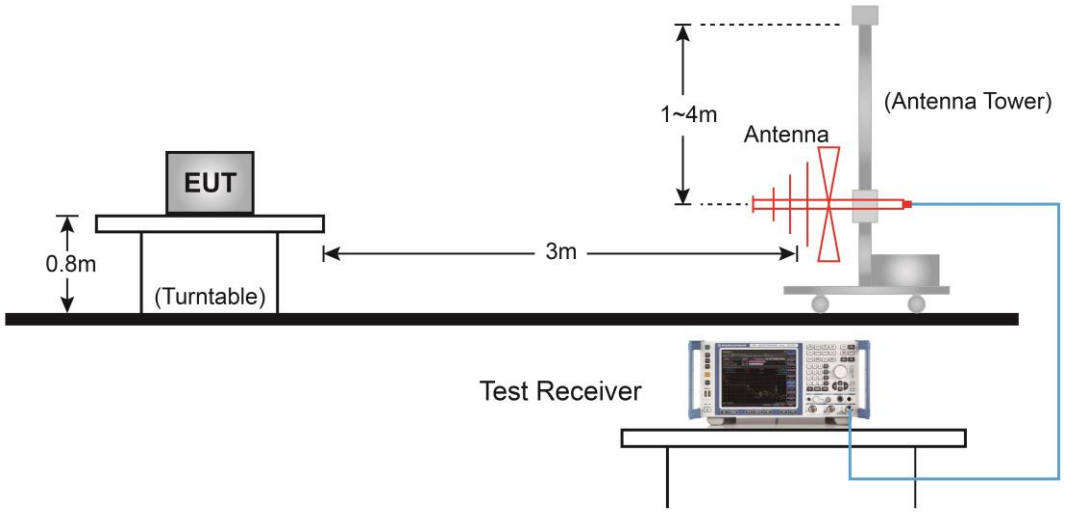
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 9kHz for emission below 30MHz and 100kHz for emission between 30MHz and 1GHz
3. VBW = 3 * RBW
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace to stabilize

### 7.3.4.Test Setup

9kHz ~ 30MHz Test Setup:




30MHz ~ 1GHz Test Setup:



### 7.3.5.Test Result

| Test Engineer | Antony Yang | Test Date | 2020/08/12 |
|---|---|---|---|
| Test Mode | Mode 1 | Test Site | AC1 |

| Out-Band Emission Below 30MHz | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (MHz) | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
| Face On | | | | | | |
| 27.90 | 8.00 | 20.35 | 28.35 | 69.54 | -41.19 | QP |
| Face Off | | | | | | |
| 22.90 | 8.02 | 20.44 | 28.44 | 69.54 | -41.08 | QP |

| Out-Band Emission Above 30MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| Polarization | Frequency (MHz) | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
| H | 47.0 | 4.1 | 20.3 | 24.4 | 40.0 | -15.6 | QP |
| H | 97.4 | 14.3 | 17.9 | 32.2 | 43.5 | -11.3 | QP |
| H | 148.3 | 18.5 | 14.7 | 33.2 | 43.5 | -10.3 | QP |
| H | 389.4 | 5.4 | 22.4 | 27.8 | 46.0 | -18.2 | QP |
| H | 525.7 | 3.3 | 24.4 | 27.7 | 46.0 | -18.3 | QP |
| H | 729.4 | 3.2 | 27.6 | 30.8 | 46.0 | -15.2 | QP |
| V | 47.9 | 13.2 | 20.4 | 33.6 | 40.0 | -6.4 | QP |
| V | 77.0 | 15.2 | 14.1 | 29.3 | 40.0 | -10.7 | QP |
| V | 158.5 | 21.4 | 15.2 | 36.6 | 43.5 | -6.9 | QP |
| V | 345.7 | 2.3 | 21.9 | 24.2 | 46.0 | -21.8 | QP |
| V | 600.8 | 1.4 | 26.3 | 27.7 | 46.0 | -18.3 | QP |
| V | 834.1 | 2.5 | 29.1 | 31.6 | 46.0 | -14.4 | QP |

Note1: Below 30MHz measurement was performed using a loop antenna. The antenna was positioned in two orthogonal (face on and face off) and the position with the highest emission level was recorded.

Note2: Measurements were tested at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear extrapolation factor (40 dB/decade) as specified in &15.31(f)(2).

Extrapolation Factor = $40*\mathrm{Log}^{(30/3)}$ = 40 dB

Note3: All measurements were recorded using an EMI test receiver employing a peak detector.

## 7.4. Frequency Tolerence

### 7.4.1.Test Limit

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

### 7.4.2.Test Procedure Used

ANSI C63.10-2013 - Section 6.8

### 7.4.3.Test Setting

**Frequency Stability Under Temperature Variations:**

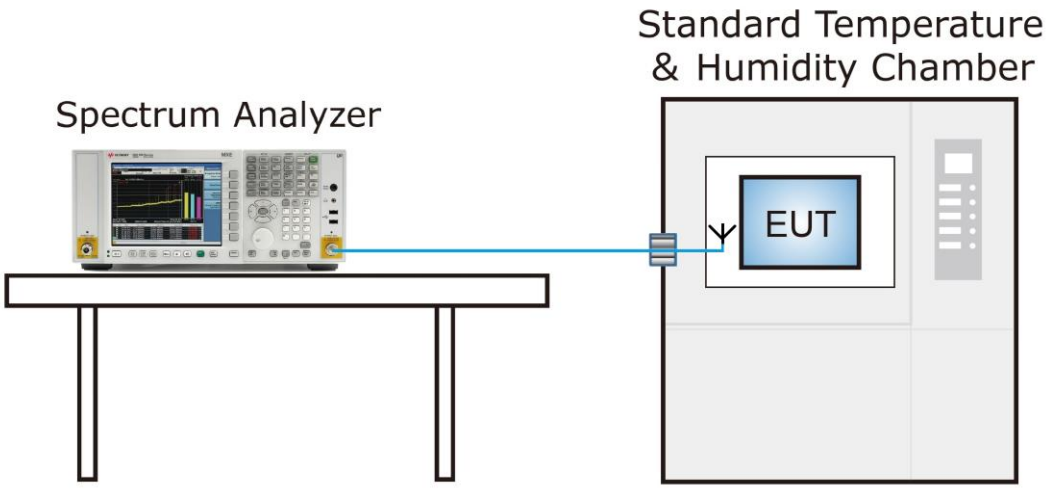
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ decreased per stage until the lowest temperature reached.

**Frequency Stability Under Voltage Variations:**

Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

### 7.4.4.Test Setup



### 7.4.5.Test Result

| Test Engineer | Antony Yang | Test Date | 2020/08/13 |
|---|---|---|---|
| Test Mode | Mode1 | Test Site | AC1 |

| Operating Frequency: 13.56MHz | | | | | |
|---|---|---|---|---|---|
| Reference Voltage: 3.85Vdc | | | | | |
| Deviation Limit: +/- 0.01% = 1356Hz | | | | | |
| Voltage (%) | Power Battery | Temp (°C) | Freq. (Hz) | Freq. Dev. (Hz) | Deviation (%) |
| 100% | 3.8 | -20 | 13,559,904 | -96 | -0.000708 |
| | | -10 | 13,560,061 | 61 | 0.000450 |
| | | 0 | 13,559,909 | -91 | -0.000671 |
| | | +10 | 13,559,995 | -5 | -0.000037 |
| | | +20 (Ref) | 13,560,058 | 58 | 0.000428 |
| | | +30 | 13,559,990 | -10 | -0.000074 |
| | | +40 | 13,560,073 | 73 | 0.000538 |
| | | +50 | 13,560,069 | 69 | 0.000509 |
| Battery Upper | 4.35 | + 20 | 13,559,935 | -65 | -0.000479 |
| Battery Endpoint | 3.45 | + 20 | 13,560,034 | 34 | 0.000251 |

Note 1: Frequency Tolerance (ppm) = {[Measured Frequency (MHz) - Declared Frequency (MHz)] / Declared Frequency (MHz)} $*10^6$.

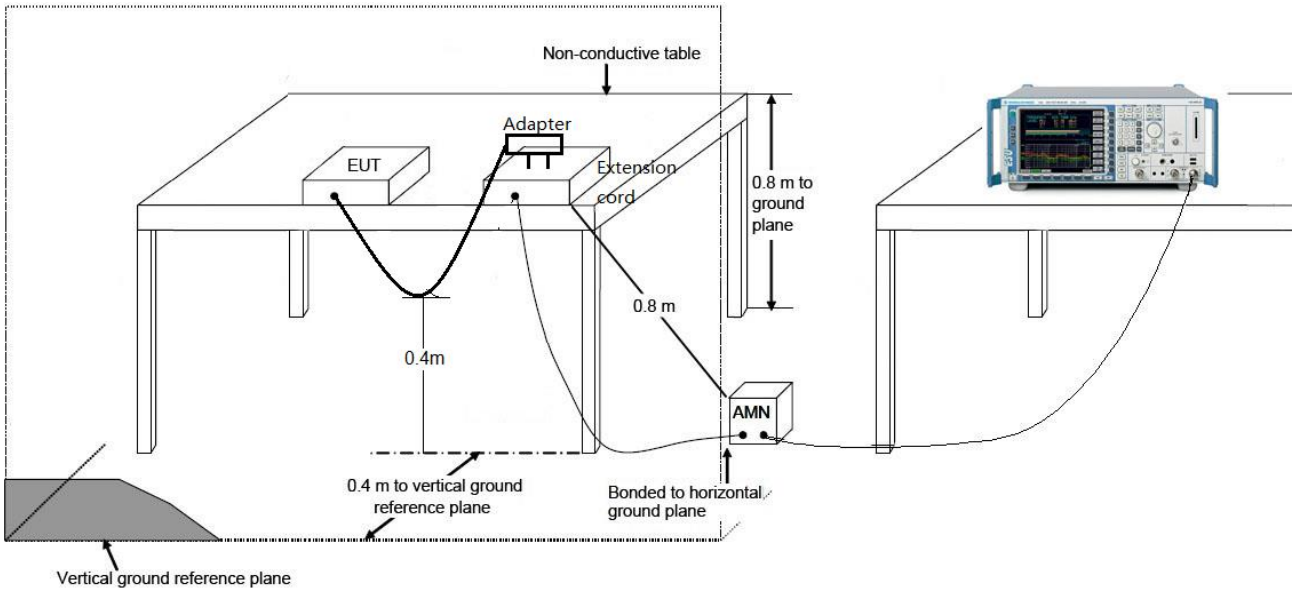
Note 2: Battery upper voltage is 4.35Vdc, battery endpoint voltage is 3.45Vdc, which are declared by the manufacturer.

## 7.5. AC Conducted Emissions Measurement

### 7.5.1.Test Limit

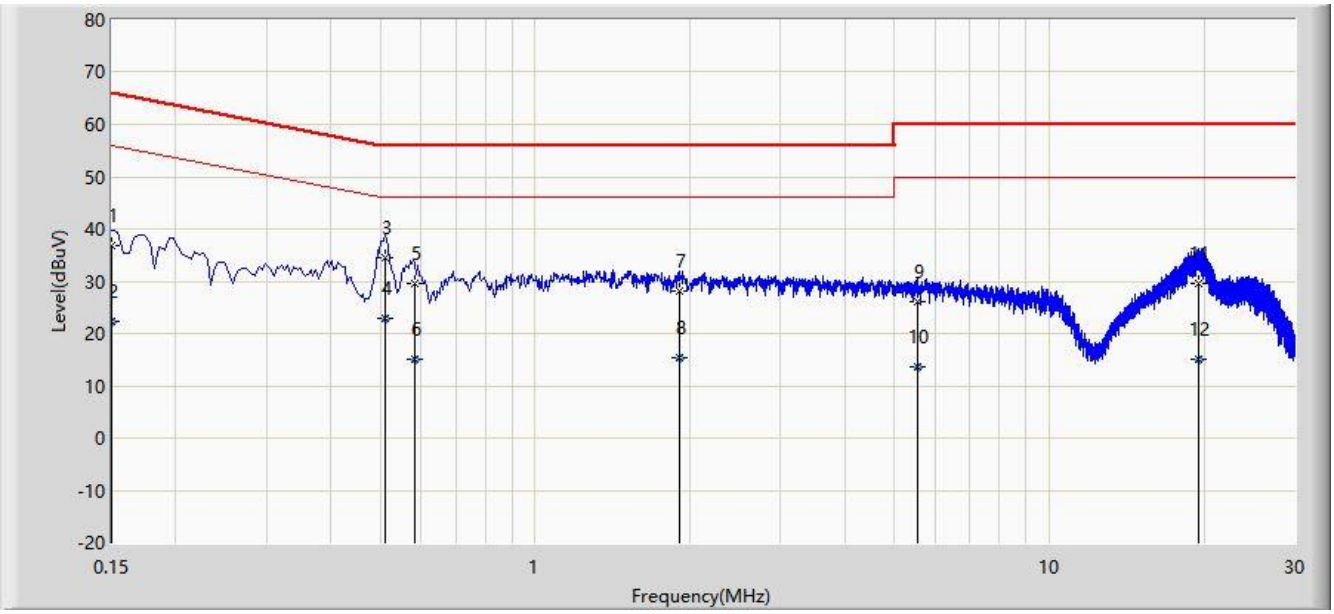
| FCC Part 15 Subpart C Paragraph 15.207 | | |
|---|---|---|
| Frequency (MHz) | QP (dBuV) | AV (dBuV) |
| 0.15 - 0.50 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30 | 60 | 50 |
| Note 1: The lower limit shall apply at the transition frequencies.<br>Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz. | | |

### 7.5.2.Test Setup



### 7.5.3.Test Result

| | |
|---|---|
| Site: SR2 | Time: 2020/08/13 - 15:25 |
| Limit: FCC_Part15.207_CE_AC Power | Engineer: Antony Yang |
| Probe: ENV216_101683_Filter On | Polarity: Line |
| EUT: Mobile Computer | Power: AC 120V/60Hz |
| Test Mode 1 | |

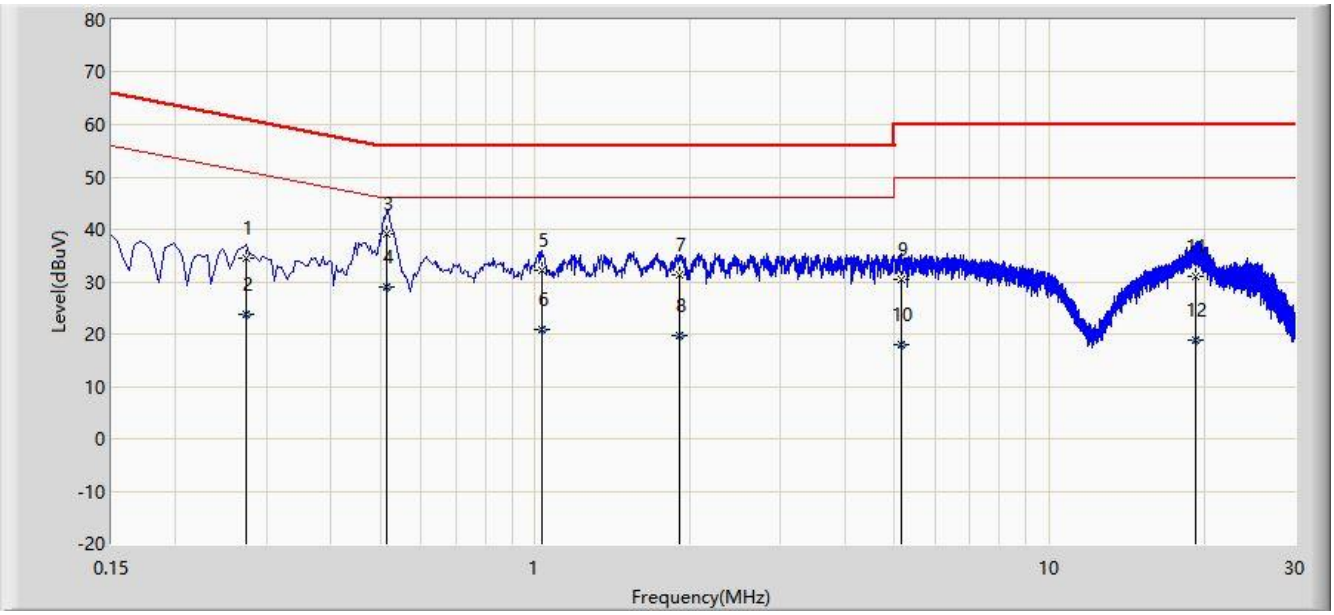



| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 0.150 | 36.836 | 27.222 | -29.164 | 66.000 | 9.613 | QP |
| 2 | | | 0.150 | 22.240 | 12.627 | -33.760 | 56.000 | 9.613 | AV |
| 3 | | * | 0.510 | 34.601 | 24.903 | -21.399 | 56.000 | 9.697 | QP |
| 4 | | | 0.510 | 22.990 | 13.293 | -23.010 | 46.000 | 9.697 | AV |
| 5 | | | 0.582 | 29.614 | 19.906 | -26.386 | 56.000 | 9.708 | QP |
| 6 | | | 0.582 | 14.976 | 5.268 | -31.024 | 46.000 | 9.708 | AV |
| 7 | | | 1.910 | 28.065 | 18.304 | -27.935 | 56.000 | 9.760 | QP |
| 8 | | | 1.910 | 15.295 | 5.535 | -30.705 | 46.000 | 9.760 | AV |
| 9 | | | 5.526 | 25.950 | 16.062 | -34.050 | 60.000 | 9.888 | QP |
| 10 | | | 5.526 | 13.526 | 3.638 | -36.474 | 50.000 | 9.888 | AV |
| 11 | | | 19.454 | 29.439 | 19.082 | -30.561 | 60.000 | 10.358 | QP |
| 12 | | | 19.454 | 15.178 | 4.820 | -34.822 | 50.000 | 10.358 | AV |

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

| | |
|---|---|
| Site: SR2 | Time: 2020/08/13 - 15:29 |
| Limit: FCC_Part15.207_CE_AC Power | Engineer: Antony Yang |
| Probe: ENV216_101683_Filter On | Polarity: Neutral |
| EUT: Mobile Computer | Power: AC 120V/60Hz |
| Test Mode 1 | |




| No | Flag | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 0.274 | 34.530 | 24.886 | -26.466 | 60.996 | 9.644 | QP |
| 2 | | | 0.274 | 23.851 | 14.208 | -27.144 | 50.996 | 9.644 | AV |
| 3 | | * | 0.514 | 39.192 | 29.504 | -16.808 | 56.000 | 9.688 | QP |
| 4 | | | 0.514 | 28.965 | 19.277 | -17.035 | 46.000 | 9.688 | AV |
| 5 | | | 1.030 | 32.201 | 22.460 | -23.799 | 56.000 | 9.741 | QP |
| 6 | | | 1.030 | 20.797 | 11.056 | -25.203 | 46.000 | 9.741 | AV |
| 7 | | | 1.906 | 31.309 | 21.550 | -24.691 | 56.000 | 9.759 | QP |
| 8 | | | 1.906 | 19.646 | 9.887 | -26.354 | 46.000 | 9.759 | AV |
| 9 | | | 5.154 | 30.504 | 20.644 | -29.496 | 60.000 | 9.861 | QP |
| 10 | | | 5.154 | 17.913 | 8.053 | -32.087 | 50.000 | 9.861 | AV |
| 11 | | | 19.262 | 31.157 | 20.891 | -28.843 | 60.000 | 10.266 | QP |
| 12 | | | 19.262 | 18.837 | 8.571 | -31.163 | 50.000 | 10.266 | AV |

Note: Measure Level (dBμV) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB).

# 8. CONCLUSION

The data collected relate only the item(s) tested and show that the device is in compliance with Part 15C of the FCC Rules.

The End

# Appendix A - Test Setup Photograph

Refer to “2008RSU012-UT” file.

# Appendix B - EUT Photograph

Refer to “2008RSU012-UE” file.