# FCC Radio Test Report

## FCC ID: 2AM8GCHAMELEON5R

### Original Grant

| | | |
|---|---|---|
| **Report No.** | : | TB-FCC178949 |
| **Applicant** | : | Guangzhou Lie Dun Electronics Technology CO.,Ltd |
| **Equipment Under Test (EUT)** | | |
| **EUT Name** | : | RUGGEDIZED HAND-HELD DEVICE |
| **Model No.** | : | CHAMELEON 5R SINGLE |
| **Series Model No.** | : | CHAMELEON 5R DUAL |
| **Brand Name** | : | CHAMELEON |
| **Sample ID** | : | 20190923-01-1#& 20190923-01-2# |
| **Receipt Date** | : | 2019-12-16 |
| **Test Date** | : | 2019-12-17 to 2021-02-27 |
| **Issue Date** | : | 2021-03-09 |
| **Standards** | : | FCC Part 15, Subpart C 15.225 |
| **Test Method** | : | ANSI C63.10: 2013 |
| **Conclusions** | : | **PASS** |

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

| | | |
|---|---|---|
| **Test/Witness Engineer** | : | Rebeca |
| **Engineer Supervisor** | : | Ivan Su |
| **Engineer Manager** | : | Ray Lai |

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.



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# Contents

# Revision History

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| TB-FCC178949 | Rev.01 | Initial issue of report | 2021-03-09 |
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# 1. General Information about EUT

## 1.1 Client Information

| | | |
|---|---|---|
| **Applicant** | : | Guangzhou Lie Dun Electronics Technology CO.,Ltd |
| **Address** | : | No.4 plant of No.43 South International Trade Avenue, Hualong Town, Panyu District, Guangzhou, Guangdong, China |
| **Manufacturer** | : | Guangzhou Lie Dun Electronics Technology CO.,Ltd |
| **Address** | : | No.4 plant of No.43 South International Trade Avenue, Hualong Town, Panyu District, Guangzhou, Guangdong, China |

## 1.2 General Description of EUT (Equipment Under Test)

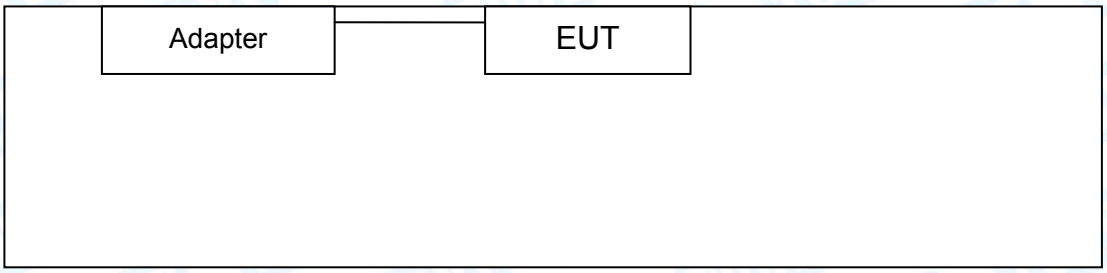
| | | | |
|---|---|---|---|
| **EUT Name** | : | RUGGEDIZED HAND-HELD DEVICE | |
| **Models No.** | : | CHAMELEON 5R SINGLE, CHAMELEON 5R DUAL | |
| **Model Difference** | : | All these models are identical in the same PCB, layout and electrical circuit, The only difference is size. | |
| **Product Description** | : | Operation Frequency: | NFC: 13.56MHz |
| | | Antenna: | 0dBi PIFA Antenna |
| **Power Rating** | : | DC 5V from Adapter(P12DUSB050200 US)<br>Input: 100-240V~, 50/60Hz, 0.3A<br>Output: DC 5V 2A<br>DC 3.85V 7100mAh/27Wh by rechargeable Li-ion battery. | |
| **Software Version** | : | CH501_V0.37_qfil_user_20201109 | |
| **Hardware Version** | : | 5FBD61_V1.03_PCB | |
| **Remark** | : | The antenna gain and adapter provided by the applicant, the verified for the RF conduction test provided by TOBY test lab. | |

**Note:**

(1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

## 1.3 Block Diagram Showing the Configuration of System Tested

**Charging + TX Mode**




## 1.4 Description of Support Units

The EUT has been test as an independent unit.

## 1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

| For Conducted Test | |
|---|---|
| **Final Test Mode** | **Description** |
| Mode 1 | Charging + TX Mode |
| **For Radiated Test** | |
| **Final Test Mode** | **Description** |
| Mode 2 | Charging + TX Mode |
| | |

**Note:**

(1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate.

According to ANSI C63.10 standards, the measurements are performed at the highest, middle, lowest available channels, and the worst case data rate as follows:

TX Mode: Transmitting mode.

(2) During the testing procedure, the continuously transmitting with the maximum power mode was programmed by the customer.

(3) The EUT is considered a portable unit; in normal use it was positioned on X-plane. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

## 1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of RF setting.

| Test Software Version | N/A |
|---|---|
| Frequency | 13.56 MHz |
| NFC | DEF |

## 1.7 Measurement Uncertainty

The reported uncertainty of measurement y ± U，where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2，providing a level of confidence of approximately 95 %.

| Test Item | Parameters | Expanded Uncertainty ($U_{Lab}$) |
|---|---|---|
| Conducted Emission | Level Accuracy:<br>9kHz~150kHz<br>150kHz to 30MHz | ±3.50 dB<br>±3.10 dB |
| Radiated Emission | Level Accuracy:<br>9kHz to 30 MHz | ±4.60 dB |
| Radiated Emission | Level Accuracy:<br>30MHz to 1000 MHz | ±4.50 dB |
| Radiated Emission | Level Accuracy:<br>Above 1000MHz | ±4.20 dB |

## 1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1/F.,Building 6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an District, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

**CNAS (L5813)**

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

**A2LA Certificate No.: 4750.01**

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025：2017 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01.FCC Accredited Test Site Number: 854351. Designation Number: CN1223.

**IC Registration No.: (11950A)**

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A.

# 2. Test Summary

| FCC Part 15 Subpart C(15.225) | | | | |
|---|---|---|---|---|
| **Standard Section** | **Test Item** | | **Judgment** | **Remark** |
| 15.207(a) | Conducted Emission | 20190923-01-1# | PASS | N/A |
| 15.209(a)&15.225 | Radiated emissions | 20190923-01-1# | PASS | N/A |
| 15.225(a) | Fundamental field strength limit | 20190923-01-1# | PASS | N/A |
| 15.225(e) | Fundamental frequency tolerance | 20190923-01-1# | PASS | N/A |
| 15.225 | Band edge compliance | 20190923-01-1# | PASS | N/A |
| 15.215(c) | Occupied bandwidth | 20190923-01-2# | PASS | N/A |
| **Note:** N/A is an abbreviation for Not Applicable. | | | | |

# 3. Test Software

| Test Item | Test Software | Manufacturer | Version No. |
|---|---|---|---|
| Conducted Emission | EZ-EMC | EZ | CDI-03A2 |
| Radiation Emission | EZ-EMC | EZ | FA-03A2RE |
| RF Conducted Measurement | MTS-8310 | MWRFtest | V2.0.0.0 |

# 4. Test Equipment

| Conducted Emission Test | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Cal.** | **Cal. Due Date** |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 100321 | Jul. 13, 2019 | Jul. 12, 2020 |
| RF Switching Unit | Compliance Direction Systems Inc | RSU-A4 | 34403 | Jul. 13, 2019 | Jul. 12, 2020 |
| AMN | SCHWARZBECK | NNBL 8226-2 | 8226-2/164 | Jul. 13, 2019 | Jul. 12, 2020 |
| LISN | Rohde & Schwarz | ENV216 | 101131 | Jul. 13, 2019 | Jul. 12, 2020 |
| **Radiation Emission Test** | | | | | |
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Cal.** | **Cal. Due Date** |
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Jul. 13, 2019 | Jul. 12, 2020 |
| EMI Test Receiver | Rohde & Schwarz | ESPI | 100010/007 | Jul. 13, 2019 | Jul. 12, 2020 |
| Spectrum Analyzer | Rohde & Schwarz | FSV40-N | 102197 | Jul. 13, 2019 | Jul. 12, 2020 |
| Bilog Antenna | ETS-LINDGREN | 3142E | 00117537 | Mar.03, 2019 | Mar. 02, 2020 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00143207 | Mar.03, 2019 | Mar. 02, 2020 |
| Horn Antenna | ETS-LINDGREN | BBHA 9170 | BBHA9170582 | Mar.03, 2019 | Mar. 02, 2020 |
| Loop Antenna | SCHWARZBECK | FMZB 1519 B | 1519B-059 | Jul. 13, 2019 | Jul. 12, 2020 |
| Pre-amplifier | Sonoma | 310N | 185903 | Mar.03, 2019 | Mar. 02, 2020 |
| Pre-amplifier | HP | 8449B | 3008A00849 | Mar.03, 2019 | Mar. 02, 2020 |
| Pre-amplifier | SKET | LNPA_1840G-50 | SK201904032 | Mar.03, 2019 | Mar. 02, 2020 |
| Cable | HUBER+SUHNER | 100 | SUCOFLEX | Mar.03, 2019 | Mar. 02, 2020 |
| Positioning Controller | ETS-LINDGREN | 2090 | N/A | N/A | N/A |
| **Antenna Conducted Emission** | | | | | |
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Cal.** | **Cal. Due Date** |
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Jul. 13, 2019 | Jul. 12, 2020 |
| Spectrum Analyzer | Rohde & Schwarz | ESPI | 100010/007 | Jul. 13, 2019 | Jul. 12, 2020 |
| MXA Signal Analyzer | Agilent | N9020A | MY49100060 | Sep. 16, 2019 | Sep. 15, 2020 |
| Vector Signal Generator | Agilent | N5182A | MY50141294 | Sep. 16, 2019 | Sep. 15, 2020 |
| Analog Signal Generator | Agilent | N5181A | MY50141953 | Sep. 16, 2019 | Sep. 15, 2020 |
| RF Power Sensor | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO26 | Sep. 16, 2019 | Sep. 15, 2020 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO29 | Sep. 16, 2019 | Sep. 15, 2020 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO31 | Sep. 16, 2019 | Sep. 15, 2020 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO33 | Sep. 16, 2019 | Sep. 15, 2020 |
| **Note: The test equipments of the above project valid until 2020 year. Because of the EUT test time across 2020 and 2021 year, So the new calibrated equipment please see below test equipments.** | | | | | |

| Conducted Emission Test | | | | | |
|---|---|---|---|---|---|
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Cal.** | **Cal. Due Date** |
| EMI Test Receiver | Rohde & Schwarz | ESCI | 100321 | Jul. 06, 2020 | Jul. 05, 2021 |
| RF Switching Unit | Compliance Direction Systems Inc | RSU-A4 | 34403 | Jul. 06, 2020 | Jul. 05, 2021 |
| AMN | SCHWARZBECK | NNBL 8226-2 | 8226-2/164 | Jul. 06, 2020 | Jul. 05, 2021 |
| LISN | Rohde & Schwarz | ENV216 | 101131 | Jul. 06, 2020 | Jul. 05, 2021 |
| **Radiation Emission Test** | | | | | |
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Cal.** | **Cal. Due Date** |
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Jul. 06, 2020 | Jul. 05, 2021 |
| EMI Test Receiver | Rohde & Schwarz | ESPI | 100010/007 | Jul. 06, 2020 | Jul. 05, 2021 |
| Spectrum Analyzer | Rohde & Schwarz | FSV40-N | 102197 | Jul. 06, 2020 | Jul. 05, 2021 |
| Bilog Antenna | ETS-LINDGREN | 3142E | 00117537 | Mar.01, 2020 | Feb. 28, 2022 |
| Horn Antenna | ETS-LINDGREN | 3117 | 00143207 | Mar.01, 2020 | Feb. 28, 2022 |
| Horn Antenna | ETS-LINDGREN | BBHA 9170 | BBHA9170582 | Mar.01, 2020 | Feb. 28, 2022 |
| Loop Antenna | SCHWARZBECK | FMZB 1519 B | 1519B-059 | Jul. 07, 2020 | Jul. 06, 2021 |
| Pre-amplifier | Sonoma | 310N | 185903 | Mar.01, 2020 | Feb. 28, 2021 |
| Pre-amplifier | HP | 8449B | 3008A00849 | Mar.01, 2020 | Feb. 28, 2021 |
| Pre-amplifier | SKET | LNPA_1840G-50 | SK201904032 | Mar.01, 2020 | Feb. 28, 2021 |
| Cable | HUBER+SUHNER | 100 | SUCOFLEX | Mar.01, 2020 | Feb. 28, 2021 |
| Positioning Controller | ETS-LINDGREN | 2090 | N/A | N/A | N/A |
| **Antenna Conducted Emission** | | | | | |
| **Equipment** | **Manufacturer** | **Model No.** | **Serial No.** | **Last Cal.** | **Cal. Due Date** |
| Spectrum Analyzer | Agilent | E4407B | MY45106456 | Jul. 06, 2020 | Jul. 05, 2021 |
| Spectrum Analyzer | Rohde & Schwarz | ESPI | 100010/007 | Jul. 06, 2020 | Jul. 05, 2021 |
| MXA Signal Analyzer | Agilent | N9020A | MY49100060 | Sep. 11, 2020 | Sep. 10, 2021 |
| Vector Signal Generator | Agilent | N5182A | MY50141294 | Sep. 11, 2020 | Sep. 10, 2021 |
| Analog Signal Generator | Agilent | N5181A | MY50141953 | Sep. 11, 2020 | Sep. 10, 2021 |
| RF Power Sensor | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO26 | Sep. 11, 2020 | Sep. 10, 2021 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO29 | Sep. 11, 2020 | Sep. 10, 2021 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO31 | Sep. 11, 2020 | Sep. 10, 2021 |
| | DARE!! Instruments | RadiPowerRPR3006W | 17I00015SNO33 | Sep. 11, 2020 | Sep. 10, 2021 |

# 5. Conducted Emission Test

## 5.1 Test Standard and Limit

### 5.1.1Test Standard

FCC Part 15.207

### 5.1.2 Test Limit

**Conducted Emission Test Limit**

| Frequency | Maximum RF Line Voltage (dBμV) | |
|---|---|---|
| | Quasi-peak Level | Average Level |
| 150kHz~500kHz | 66 ~ 56 * | 56 ~ 46 * |
| 500kHz~5MHz | 56 | 46 |
| 5MHz~30MHz | 60 | 50 |

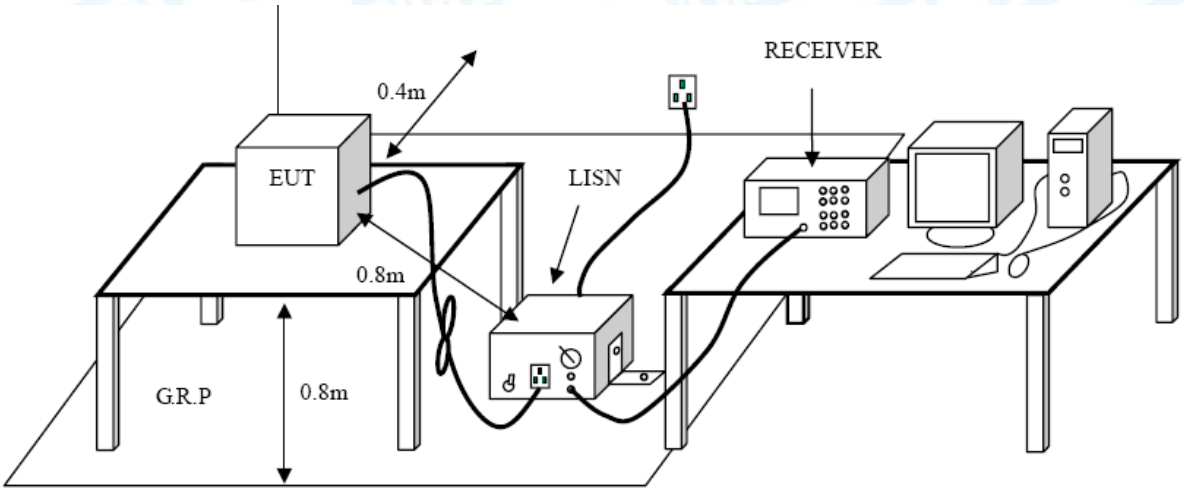
Notes:

(1) *Decreasing linearly with logarithm of the frequency.

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

(3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

## 5.2 Test Setup



## 5.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9 kHz, and the test frequency band is from 0.15MHz to 30MHz.

## 5.4 Deviation From Test Standard

No deviation

## 5.5 EUT Operating Mode

Please refer to the description of test mode.

## 5.6 Test Data

Please refer to the Attachment A.

# 6. Radiated Emission Test

## 6.1 Test Standard and Limit

### 6.1.1 Test Standard

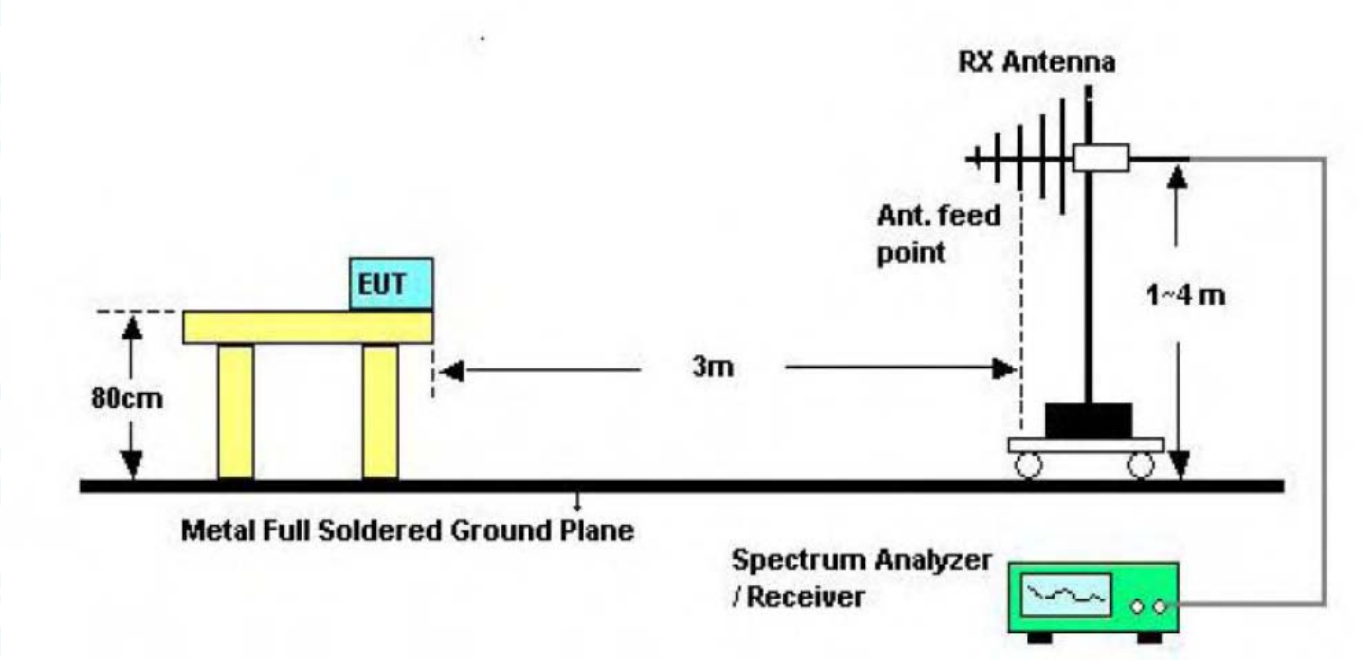
FCC Part 15.209(a)&15.225

### 6.1.2 Test Limit

**Radiated Emission Limits (30MHz~1000MHz)**

| Frequency Range (MHz) | E-field Strength Limit @ 3m (mV/m) | E-field Strength Limit @ 3m (dBμV/m) | E-field Strength Limit @ 10m (dBμV/m) |
|---|---|---|---|
| 30-88 | 100 | 40 | 30 |
| 88-216 | 150 | 43.5 | 33.5 |
| 216-960 | 200 | 46 | 36 |
| 960-1000 | 500 | 54 | 44 |

## 5.2 Test Setup




Below 1000MHz Test Setup

## 6.3 Test Procedure

(1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1 GHz. The EUT was placed on a rotating 0.8m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation.
(2) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
(3) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
(4) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
(5) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
(6) For the actual test configuration, please see the test setup photo.

## 6.4 Deviation From Test Standard

No deviation

## 6.5 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

## 6.6 Test Data

Please refer to the Attachment B.

# 7. Electric Field Strength of Fundamental and Outside the Allocated bands

## 7.1 Test Standard and Limit

### 7.1.1 Test Standard

FCC Part 15.225(a)
FCC Part 15.225

### 7.1.2 Test Limit

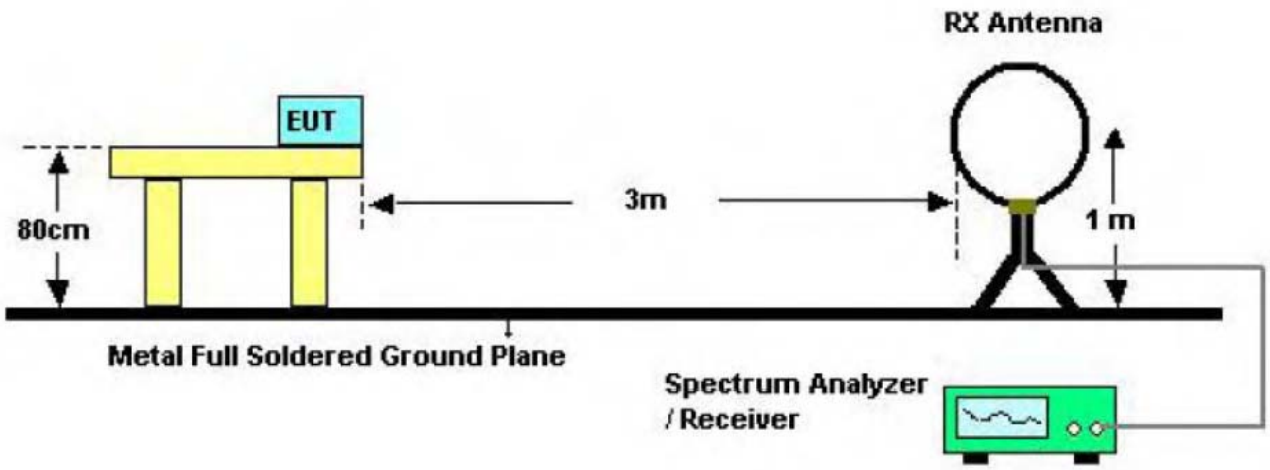
**Electric Field Strength of Fundamental**

| Frequency Range (MHz) | E-field Strength Limit @ 30m (μV/m) | E-field Strength Limit @ 3m (dBμV/m) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 129-94 |
| 0.490-1.705 | 24000/F(kHz) | 74-63 |
| 1.705-30 | 30 | 70 |
| Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula: $Extrapolation(dB) = 40\log_{10}(Measurement\ \ Distance/Specification\ \ Distance)$ | | |

**Outside the Allocated bands**

| Frequency Range (MHz) | E-field Strength Limit @ 30 m (μV/m) | E-field Strength Limit @ 3 m (dBμV/m) |
|---|---|---|
| 13.560 ± 0.007 | +15,848 | 124 |
| 13.410 to 13.553<br>13.567 to 13.710 | +334 | 90 |
| 13.110 to 13.410<br>13.710 to 14.010 | +106 | 81 |
| Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula: $Extrapolation(dB) = 40\log_{10}(Measurement\ \ Distance/Specification\ \ Distance)$ | | |

## 7.2 Test Setup




## 7.3 Test Procedure

The transmitter carrier output levels (E-Field) from the EUT are measured in a semi-anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.0 meter above the ground. The E-field is measured with a shielded loop antenna connected to a measurement receiver. Detected E-field was maximized by rotating the EUT through 360° and adjusting the receiving antenna polarizations. The maximization processes were repeated with the EUT positioned respectively in its three orthogonal axes. The measurements were performed with the peak detector and if required, the quasi-peak detector.

## 7.4 Deviation From Test Standard

No deviation

## 7.5 EUT Operating Condition

The measurement of EUT is carried out under the transmit state of NFC.

## 7.6 Test Data

Please refer to the Attachment C.

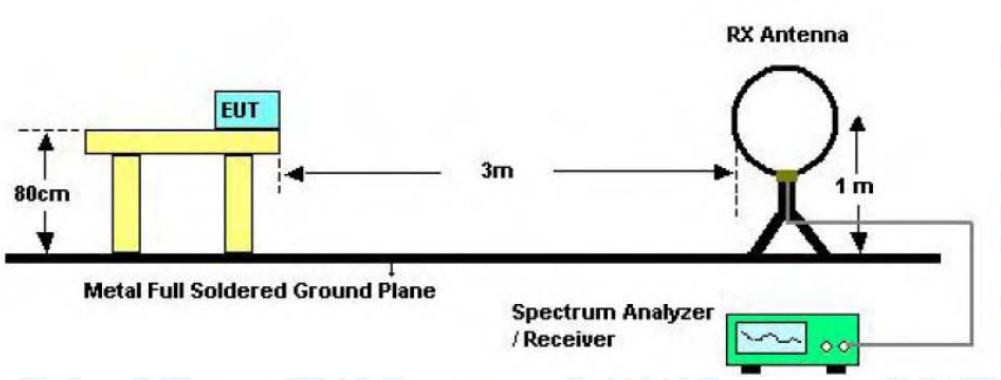
# 8. Occupied Bandwidth Test

## 8.1 Test Standard and Limit

### 8.1.1 Test Standard

FCC Part 15.215 (c)

## 8.2 Test Setup




## 8.3 Test Procedure

The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

1. RBW used in the range of 1% to 5% of the anticipated emission bandwidth
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = Max Hold.
5. Sweep = Auto couple.
6. Allow the trace to stabilize.
7. OBW 99% function of spectrum analyzer used

## 8.4 Deviation From Test Standard

No deviation

## 8.5 EUT Operating Condition

The measurement of EUT is carried out under the transmit state of NFC.

## 8.6 Test Data

Please refer to the Attachment D.

# 9. Fundamental Frequency Tolerance

## 9.1 Test Standard and Limit

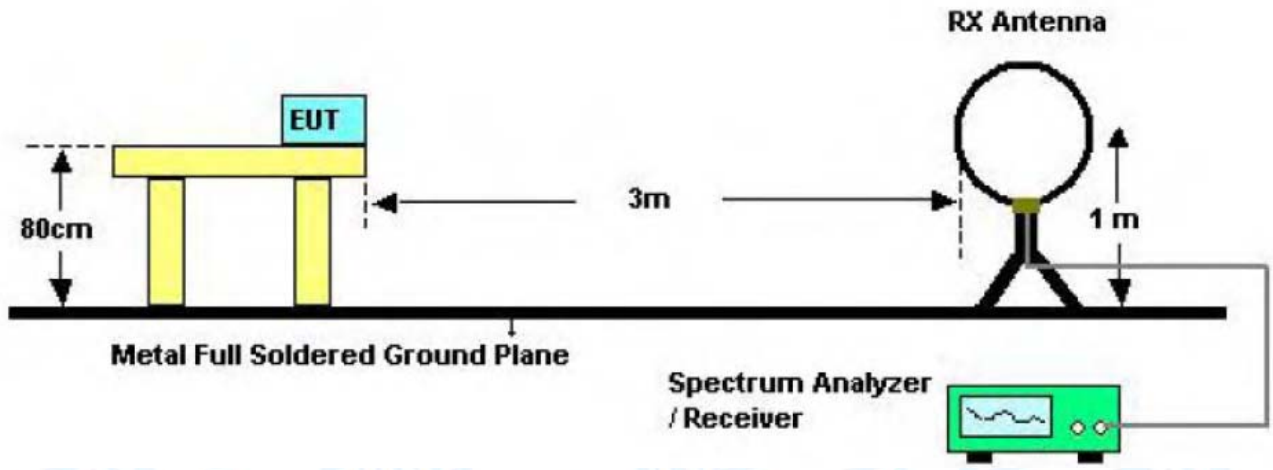
### 9.1.1 Test Standard

FCC Part 15.225 (e)

### 9.1.2 Test Limit

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

## 9.2 Test Setup




## 9.3 Test Procedure

The transmitter output signal was picked up by coil antenna connected to the frequency counter. The center frequency was measured with 30Hz RBW and 1kHz span. During the test, the EUT was placed in a thermal chamber until thermal balance and lasting appropriate time.

## 9.4 Deviation From Test Standard

No deviation

## 9.5 EUT Operating Condition

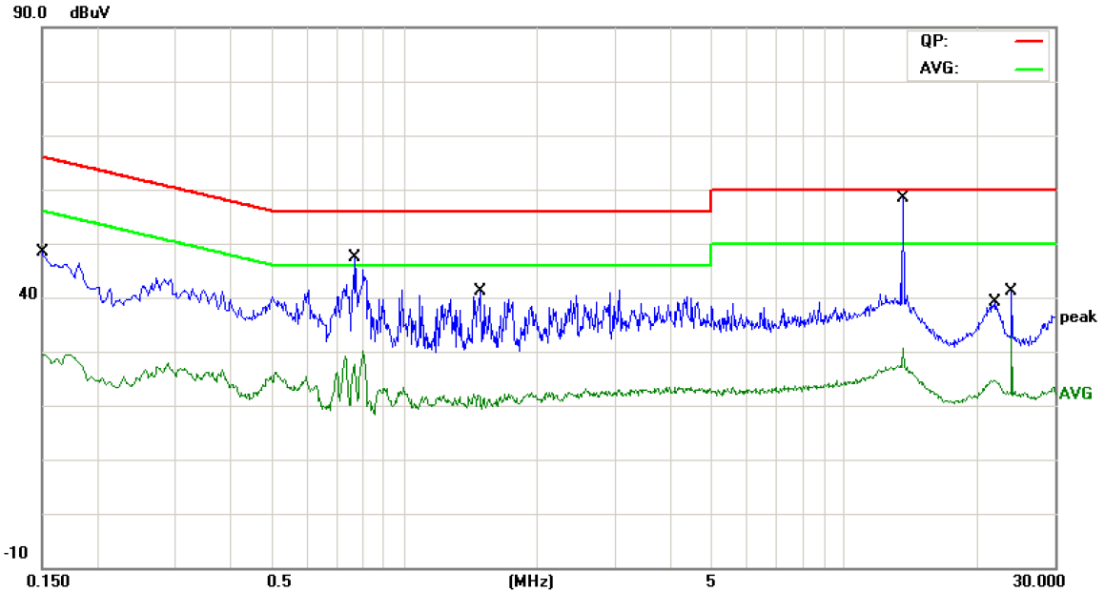
The EUT was set to continuously transmitting in the max power during the test.

## 9.6 Test Data

Please refer to the Attachment E.

# Attachment A-- Conducted Emission Test Data

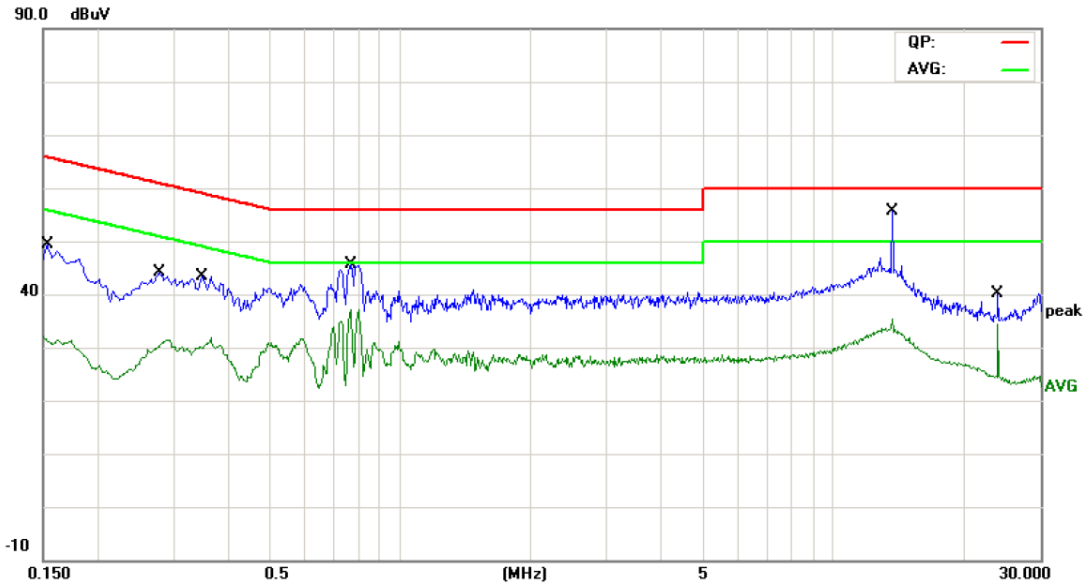
| | | | |
|---|---|---|---|
| **Temperature:** | 23.8℃ | **Relative Humidity:** | 41% |
| **Test Voltage:** | AC 120V/60 Hz | | |
| **Terminal:** | Line | | |
| **Test Mode:** | TX Mode | | |
| **Remark:** | Only worst case is reported. | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.1500 | 33.72 | 9.70 | 43.42 | 65.99 | -22.57 | QP |
| 2 | | 0.1500 | 18.80 | 9.70 | 28.50 | 55.99 | -27.49 | AVG |
| 3 | | 0.7740 | 29.22 | 9.72 | 38.94 | 56.00 | -17.06 | QP |
| 4 | | 0.7740 | 16.72 | 9.72 | 26.44 | 46.00 | -19.56 | AVG |
| 5 | | 1.4860 | 20.30 | 9.75 | 30.05 | 56.00 | -25.95 | QP |
| 6 | | 1.4860 | 10.65 | 9.75 | 20.40 | 46.00 | -25.60 | AVG |
| 7 | * | 13.5660 | 47.46 | 9.94 | 57.40 | 60.00 | -2.60 | QP |
| 8 | | 13.5660 | 26.83 | 9.94 | 36.77 | 50.00 | -13.23 | AVG |
| 9 | | 22.0060 | 22.81 | 10.05 | 32.86 | 60.00 | -27.14 | QP |
| 10 | | 22.0060 | 13.04 | 10.05 | 23.09 | 50.00 | -26.91 | AVG |
| 11 | | 23.9980 | 31.39 | 10.10 | 41.49 | 60.00 | -18.51 | QP |
| 12 | | 23.9980 | 23.71 | 10.10 | 33.81 | 50.00 | -16.19 | AVG |

**Remark:**
**1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)**
**2. Margin (dB) =QuasiPeak/Average (dBuV)-Limit (dBuV)**

| | | | |
|---|---|---|---|
| **Temperature:** | 23.8℃ | **Relative Humidity:** | 41% |
| **Test Voltage:** | AC 120V/60 Hz | | |
| **Terminal:** | Neutral | | |
| **Test Mode:** | TX Mode | | |
| **Remark:** | Only worst case is reported. | | |



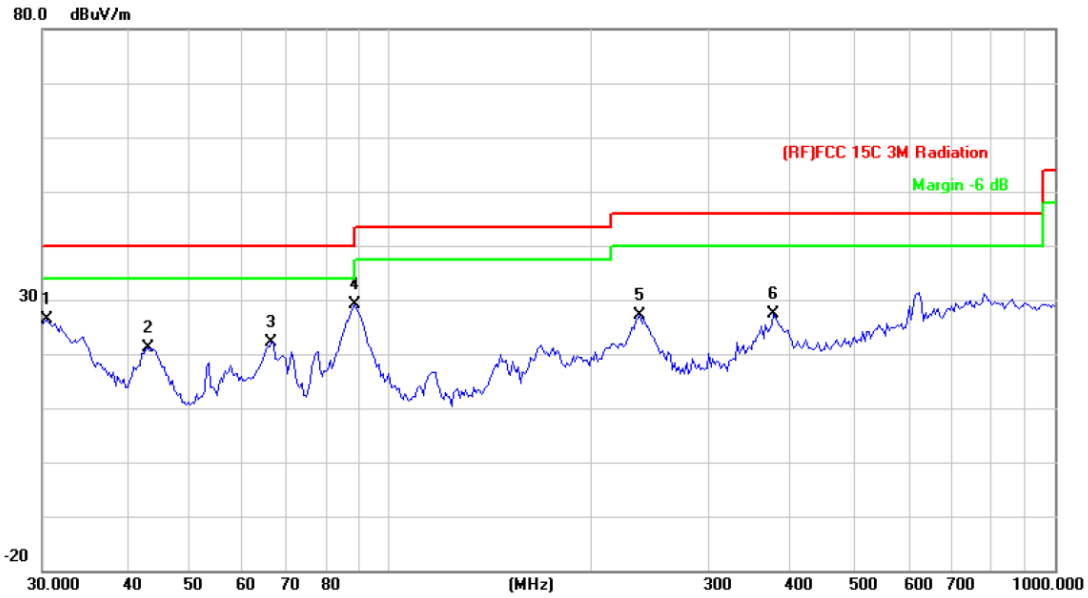

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.1539 | 32.91 | 9.80 | 42.71 | 65.78 | -23.07 | QP |
| 2 | | 0.1539 | 20.70 | 9.80 | 30.50 | 55.78 | -25.28 | AVG |
| 3 | | 0.2779 | 29.11 | 9.80 | 38.91 | 60.88 | -21.97 | QP |
| 4 | | 0.2779 | 19.89 | 9.80 | 29.69 | 50.88 | -21.19 | AVG |
| 5 | | 0.3500 | 29.31 | 9.80 | 39.11 | 58.96 | -19.85 | QP |
| 6 | | 0.3500 | 20.20 | 9.80 | 30.00 | 48.96 | -18.96 | AVG |
| 7 | | 0.7700 | 33.73 | 9.80 | 43.53 | 56.00 | -12.47 | QP |
| 8 | * | 0.7700 | 27.03 | 9.80 | 36.83 | 46.00 | -9.17 | AVG |
| 9 | | 13.6300 | 33.30 | 9.97 | 43.27 | 60.00 | -16.73 | QP |
| 10 | | 13.6300 | 22.82 | 9.97 | 32.79 | 50.00 | -17.21 | AVG |
| 11 | | 24.0020 | 28.99 | 10.10 | 39.09 | 60.00 | -20.91 | QP |
| 12 | | 24.0020 | 25.32 | 10.10 | 35.42 | 50.00 | -14.58 | AVG |

**Remark:**
**1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)**
**2. Margin (dB) =QuasiPeak/Average (dBuV)-Limit (dBuV)**

# Attachment B-- Radiated Emission Test Data

## 30MHz~1GHz

| | | | |
|---|---|---|---|
| **Temperature:** | 25℃ | **Relative Humidity:** | 55% |
| **Test Voltage:** | AC 120/60Hz | | |
| **Ant. Pol.** | Horizontal | | |
| **Test Mode:** | TX Mode | | |
| **Remark:** | Only worst case is reported. | | |

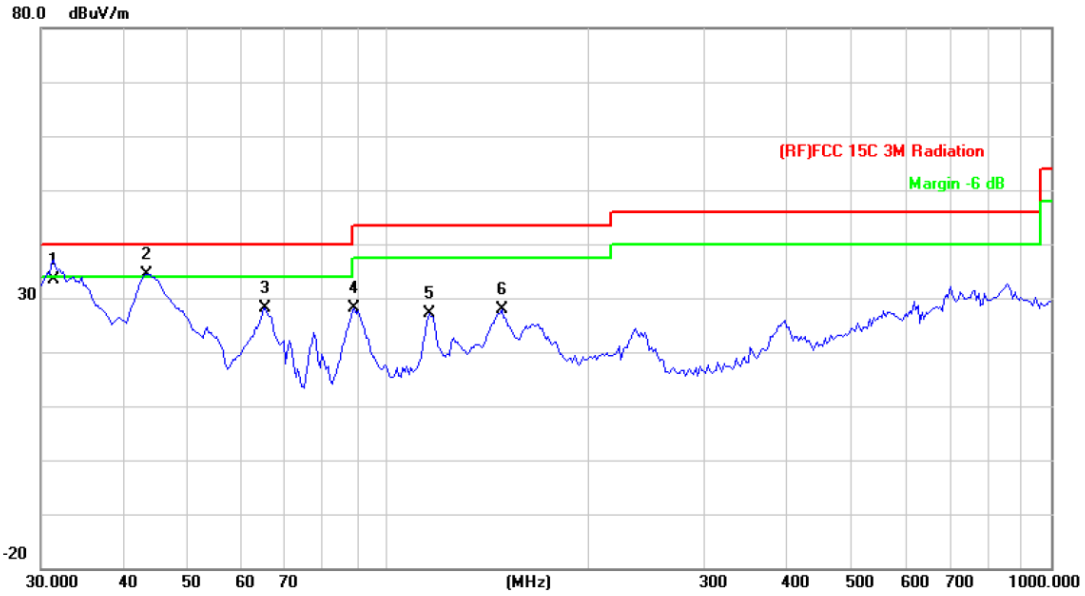



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 30.4238 | 39.75 | -13.27 | 26.48 | 40.00 | -13.52 | peak |
| 2 | | 43.2017 | 41.70 | -20.55 | 21.15 | 40.00 | -18.85 | peak |
| 3 | | 66.2662 | 45.87 | -23.70 | 22.17 | 40.00 | -17.83 | peak |
| 4 | | 88.3421 | 50.97 | -21.96 | 29.01 | 43.50 | -14.49 | peak |
| 5 | | 237.4760 | 45.10 | -17.91 | 27.19 | 46.00 | -18.81 | peak |
| 6 | | 377.2591 | 40.68 | -13.35 | 27.33 | 46.00 | -18.67 | peak |

*:Maximum data x:Over limit !:over margin

**Remark:**
**1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)**
**2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)**
**3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)**

| Temperature: | 25℃ | Relative Humidity: | 55% |
|---|---|---|---|
| Test Voltage: | AC 120/60Hz | | |
| Ant. Pol. | Vertical | | |
| Test Mode: | TX Mode | | |
| Remark: | Only worst case is reported. | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 31.2893 | 47.41 | -13.91 | 33.50 | 40.00 | -6.50 | QP |
| 2 | * | 43.2017 | 54.99 | -20.55 | 34.44 | 40.00 | -5.56 | peak |
| 3 | | 65.3432 | 51.96 | -23.77 | 28.19 | 40.00 | -11.81 | peak |
| 4 | | 88.9639 | 50.06 | -21.93 | 28.13 | 43.50 | -15.37 | peak |
| 5 | | 115.3205 | 49.24 | -22.23 | 27.01 | 43.50 | -16.49 | peak |
| 6 | | 148.4410 | 49.30 | -21.51 | 27.79 | 43.50 | -15.71 | peak |

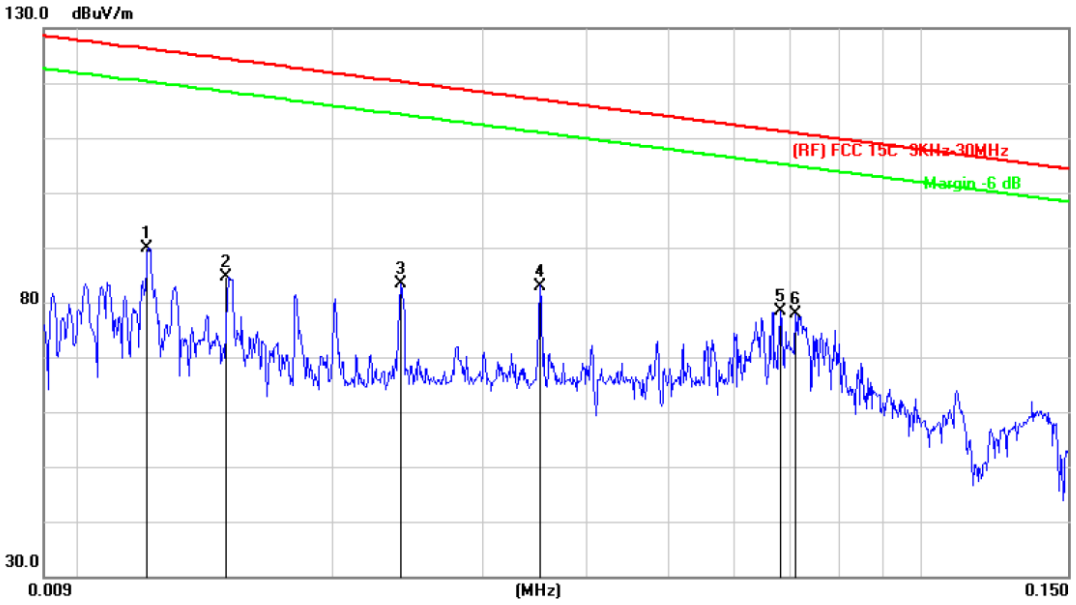
*:Maximum data x:Over limit !:over margin

**Remark:**
**1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)**
**2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)**
**3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)**

# Attachment C--Electric Field Strength of Fundamental and Outside the Allocated bands

## (1) Electric Field Strength of Fundamental

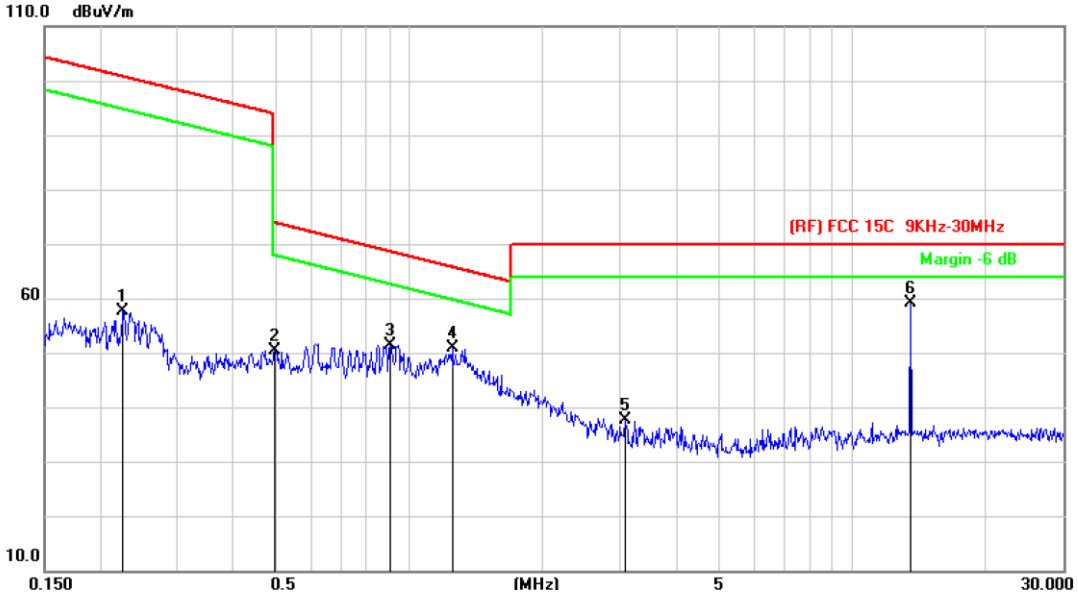
| | | | |
|---|---|---|---|
| **Temperature:** | 25℃ | **Relative Humidity:** | 55% |
| **Test Voltage:** | AC 120/60Hz | | |
| **Ant. Pol.** | Ant. 0° | | |
| **Test Mode:** | TX Mode | | |
| **Remark:** | N/A | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 0.0120 | 98.62 | -8.64 | 89.98 | 126.30 | -36.32 | peak |
| 2 | | 0.0149 | 93.33 | -8.67 | 84.66 | 124.41 | -39.75 | peak |
| 3 | | 0.0240 | 92.16 | -8.80 | 83.36 | 120.26 | -36.90 | peak |
| 4 | | 0.0352 | 91.97 | -8.97 | 83.00 | 116.93 | -33.93 | peak |
| 5 | * | 0.0680 | 87.30 | -9.03 | 78.27 | 111.20 | -32.93 | peak |
| 6 | | 0.0709 | 86.76 | -9.00 | 77.76 | 110.83 | -33.07 | peak |

**Remark:**
**1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)**
**2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)**
**3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)**

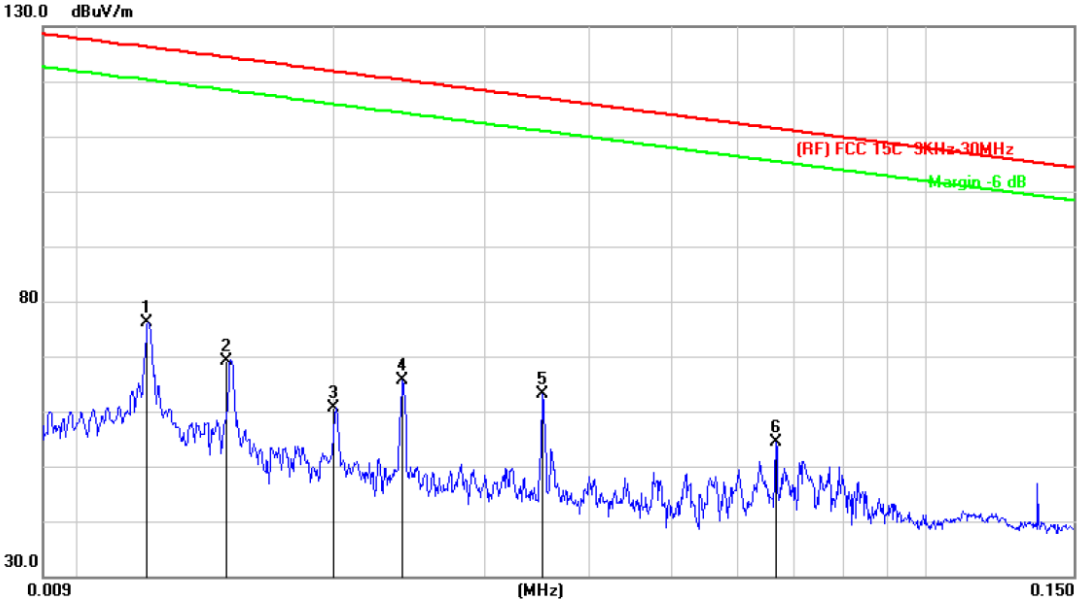
| Temperature: | 25℃ | Relative Humidity: | 55% |
|---|---|---|---|
| Test Voltage: | AC 120/60Hz | | |
| Ant. Pol. | Ant. 0° | | |
| Test Mode: | TX Mode | | |
| Remark: | N/A | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 0.2255 | 66.06 | -8.32 | 57.74 | 100.76 | -43.02 | peak |
| 2 | | 0.4964 | 60.76 | -10.32 | 50.44 | 73.89 | -23.45 | peak |
| 3 | | 0.9039 | 62.41 | -11.00 | 51.41 | 68.60 | -17.19 | peak |
| 4 | | 1.2484 | 61.92 | -11.15 | 50.77 | 65.75 | -14.98 | peak |
| 5 | | 3.0737 | 49.02 | -11.47 | 37.55 | 70.00 | -32.45 | peak |
| 6 | * | 13.5509 | 71.01 | -11.77 | 59.24 | 70.00 | -10.76 | peak |

**Remark:**
**1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)**
**2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)**
**3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)**

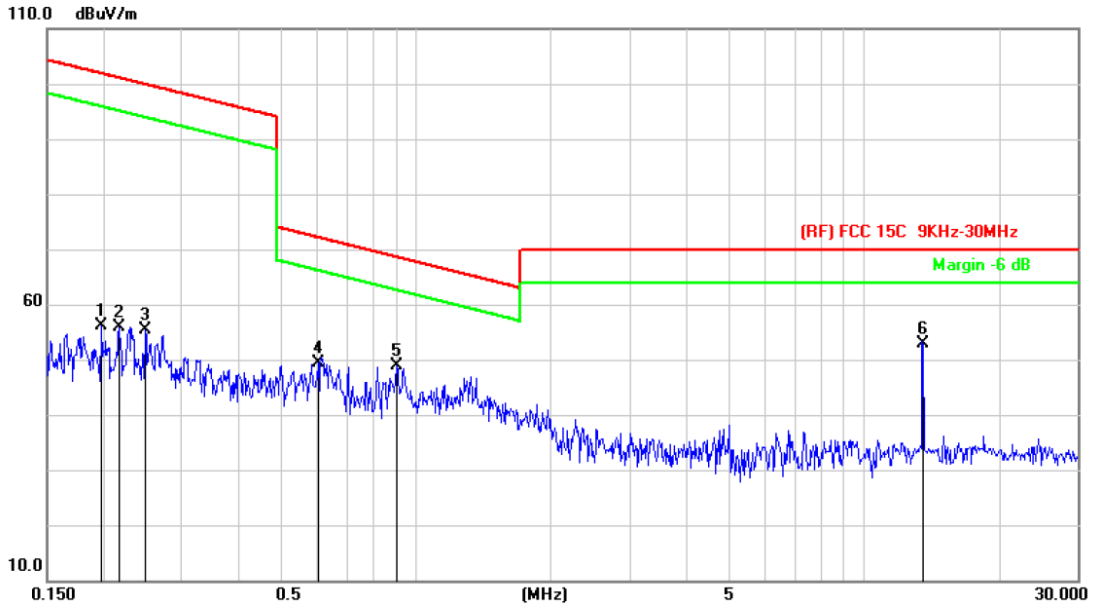
| | | | |
|---|---|---|---|
| **Temperature:** | 25℃ | **Relative Humidity:** | 55% |
| **Test Voltage:** | AC 120/60Hz | | |
| **Ant. Pol.** | Ant. 90° | | |
| **Test Mode:** | TX Mode | | |
| **Remark:** | N/A | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 0.0120 | 84.72 | -8.64 | 76.08 | 126.30 | -50.22 | peak |
| 2 | | 0.0149 | 77.92 | -8.67 | 69.25 | 124.41 | -55.16 | peak |
| 3 | | 0.0200 | 69.42 | -8.74 | 60.68 | 121.85 | -61.17 | peak |
| 4 | | 0.0240 | 74.49 | -8.80 | 65.69 | 120.26 | -54.57 | peak |
| 5 | | 0.0352 | 71.99 | -8.97 | 63.02 | 116.93 | -53.91 | peak |
| 6 | | 0.0665 | 63.44 | -9.05 | 54.39 | 111.39 | -57.00 | peak |

**Remark:**
**1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)**
**2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)**
**3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)**

| Temperature: | 25℃ | Relative Humidity: | 55% |
|---|---|---|---|
| Test Voltage: | AC 120/60Hz | | |
| Ant. Pol. | Ant. 90° | | |
| Test Mode: | TX Mode | | |
| Remark: | N/A | | |

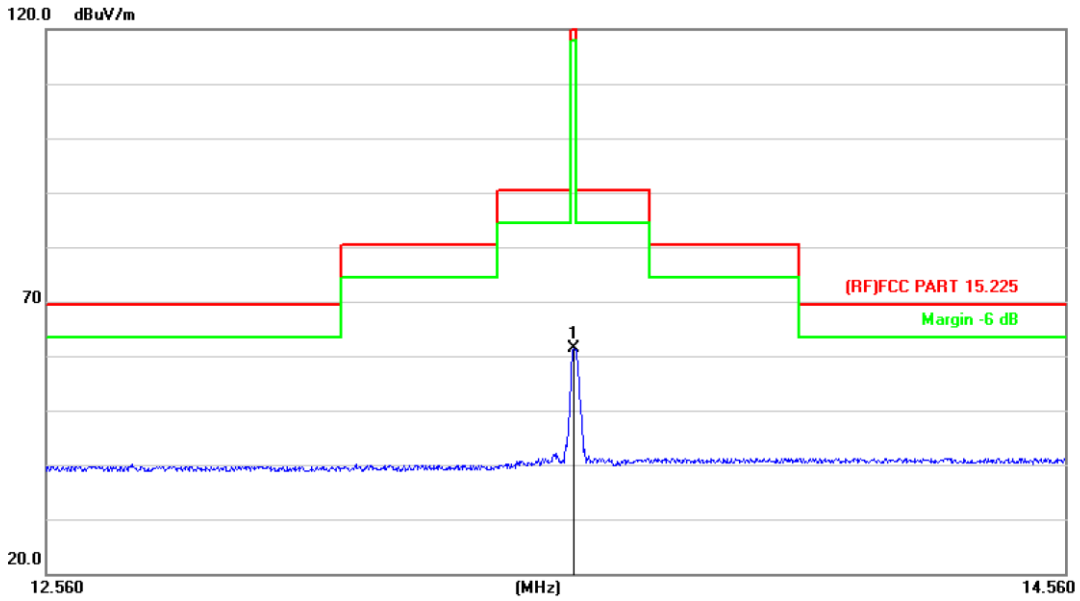



| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 0.1985 | 64.10 | -7.92 | 56.18 | 101.87 | -45.69 | peak |
| 2 | | 0.2174 | 64.19 | -8.21 | 55.98 | 101.08 | -45.10 | peak |
| 3 | | 0.2479 | 63.99 | -8.61 | 55.38 | 99.93 | -44.55 | peak |
| 4 | | 0.6040 | 59.95 | -10.52 | 49.43 | 72.15 | -22.72 | peak |
| 5 | | 0.9039 | 59.93 | -11.00 | 48.93 | 68.60 | -19.67 | peak |
| 6 | * | 13.5509 | 64.69 | -11.77 | 52.92 | 70.00 | -17.08 | peak |

**Remark:**
**1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)**
**2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)**
**3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)**

## (2) Test Fundamental and Outside the Allocated bands

| Temperature: | 25℃ | Relative Humidity: | 55% |
|---|---|---|---|
| Test Voltage: | AC 120/60Hz | | |
| Test Mode: | TX Mode | | |
| Remark: | N/A | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB/m | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 13.5600 | 73.15 | -11.77 | 61.38 | 124.00 | -62.62 | peak |

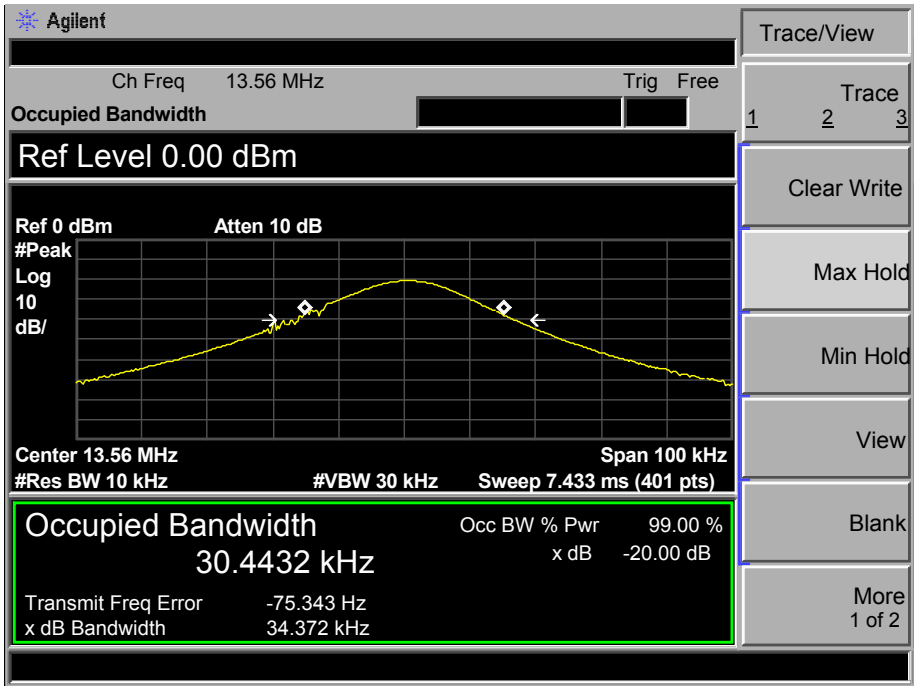
**Remark:**
**1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)**
**2. QuasiPeak (dBμV/m)= Corr. (dB/m)+ Read Level (dBμV)**
**3. Margin (dB) = QuasiPeak (dBμV/m)-Limit QPK(dBμV/m)**

# Attachment D-- Bandwidth Test Data

| Temperature: | 25 ℃ | Relative Humidity: | 55% |
|---|---|---|---|
| Test Voltage: | AC 120/60Hz | | |
| Test Mode: | TX Mode | | |

| Channel Frequency(MHz) | 99% Bandwidth(KHz) |
|---|---|
| 13.56 | 30.4432 |

**13.56 MHz**



# Attachment E--Fundamental Frequency Tolerance

| Frequency Stability Versus Temperature | | | |
|---|---|---|---|
| Temperature(℃) | Power Supply(V) | Measured Frequency (MHz) | Frequency Drift % |
| 50 | DC 3.80V | 13.560126 | 0.0000093 |
| 40 | | 13.560230 | 0.0000170 |
| 30 | | 13.560156 | 0.0000115 |
| 20 | | 13.560458 | 0.0000338 |
| 10 | | 13.560493 | 0.0000364 |
| 0 | | 13.560467 | 0.0000344 |
| -10 | | 13.560438 | 0.0000323 |
| -20 | | 13.560432 | 0.0000319 |
| **Frequency Stability Versus Temperature** | | | |
| Temperature(℃) | Power Supply(V) | Measured Frequency (MHz) | Frequency Drift % |
| 20 | DC 3.45 | 13.560438 | 0.0000323 |
| | DC 3.80 | 13.560425 | 0.0000313 |
| | DC 4.35 | 13.560411 | 0.0000303 |

**-----END OF REPORT------**