# FCC Test Report

for

## POS Terminal

| | | |
|---|---|---|
| **Trade Name** | : | **VeriFone** |
| **Model Number** | : | **PP1000se v3** |
| **FCC ID** | : | **B32PP1000SECTLS** |
| **Report Number** | : | **RF-V040-1404-158** |
| **Date of Receipt** | : | **April 14, 2014** |
| **Date of Report** | : | **May 6, 2014** |

Prepared for

## VeriFone Inc.

1400 West Stanford Ranch Road, Suite 200, Rocklin, CA, 95765, UNITED STATES

Prepared by

## Central Research Technology Co.

## EMC Test Laboratory

11, Lane 41, Fushuen St., Jungshan Chiu, Taipei, Taiwan, 104, R.O.C.

NVLAP LAB CODE 200575-0

# Certification

| | | |
|---|---|---|
| **Equipment Under Test** | : | POS Terminal |
| **Model No.** | : | PP1000se v3 |
| **FCC ID** | : | B32PP1000SECTLS |
| **Applicant** | : | VeriFone Inc. |
| **Address** | : | 1400 West Stanford Ranch Road, Suite 200, Rocklin, CA, 95765, UNITED STATES |
| **Applicable Standards** | : | **FCC Part 15, Subpart C** |
| **Date of Testing** | : | April 15 ~ 28, 2014 |
| **Deviation** | : | N/A |
| **Condition of Test Sample** | : | Mass Production |

We, **Central Research Technology Co**., hereby certify that one sample of the designated product was tested in our facility during the period mentioned above. The test records, data evaluation and Equipment Under Test (EUT) configurations shown in the present report are true and accurate representation of the measurements of the sample's RF characteristics under the conditions herein specified.

The test results show that the EUT as described in the present report is in compliance with the requirements set forth in the standards mentioned above and apply to the tested sample identified in the present report only. The test report shall not be reproduced, except in its entirety, without the written approval of Central Research Technology Co.

**PREPARED BY** : Cathy Chen , **DATE :** May 6, 2014
(Cathy Chen/ Technical Manager)

**APPROVED BY** : J. Y. Shih , **DATE :** May 6, 2014
(Tsun-Yu Shih/General Manager)

# Contents

# 1. General Description

## 1.1 General Description of EUT

| | | |
|---|---|---|
| Equipment Under Test | : | POS Terminal |
| Model No. | : | PP1000se v3 |
| Power in | : | 5Vdc~12Vdc |
| PSU Specification | : | Trade Name: VeriFone<br>Model No.: CAP009092U<br>P/N: PWR282-001-01-A<br>Input : 100-240V~, 50/60Hz, 500mA<br>Output : 9Vdc, 1A |
| Test Voltage | : | 120Vac/60Hz to the power adaptor |
| Frequency Range | : | 13.56MHz |
| Channel Numbers | : | 1 |
| Function Modulation | : | ASK |
| Function Description | : | |

The EUT is used to transmit and receive signal both. Please refer to the user's manual for the details.

## 1.2 Test Methodology

For this E.U.T., the radiated emissions and conducted emission measurement performed according to the procedures illustrated in ANSI C63.4:2009 and other required are illustrated in separate sections of this test report for detail.

## 1.3 Test Mode

### Pre-scan Mode

| Test Mode | Test Voltage |
|---|---|
| Mode 1 | Power Adaptor:CAP009092U |
| Mode 2 | 5Vdc by USB |
| Mode 3 | 12Vdc by DC power source |

According to the preliminary test, It was found that the Mode 1 is the worst. It was taken as the representative condition for test and its data are recorded in the present document.

## 1.4 Applied standards

(1) Field strength of Fundametal

According to 15.225(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.

(2) Band Edge

According to 15.225(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. According to 15.225(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.

(3) Radiation emission

According to 15.225(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.

(4) Frequency tolerance

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

(5) Radiated emission limits, general requirements.

According to 15.209, except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|---|---|---|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 ** | 3 |
| 88 - 216 | 150 ** | 3 |
| 216 - 960 | 200 ** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

(6) 20dB Bandwidth

According to 15.215(c) requires the device must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates.

(7) Conduction Emission Requirement

For intentional device, according to §15.207(a) line conduction emission limit is as below table.

| Frequency of Emission (MHz) | Conducted 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.

(8) Restricted Band

| Frequency (MHz) | Frequency (MHz) | Frequency (MHz) | Frequency (GHz) |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1]0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| [2]1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - 156.52525 | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.7 - 156.9 | 2690 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 162.0125 - 167.17 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 240 - 285 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 322 - 335.4 | 3600 - 4400 | (2) |
| 13.36 - 13.41 | | | |

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

(9) Antenna 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 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

## 1.5 The Support Units

### Conducted Emission Test

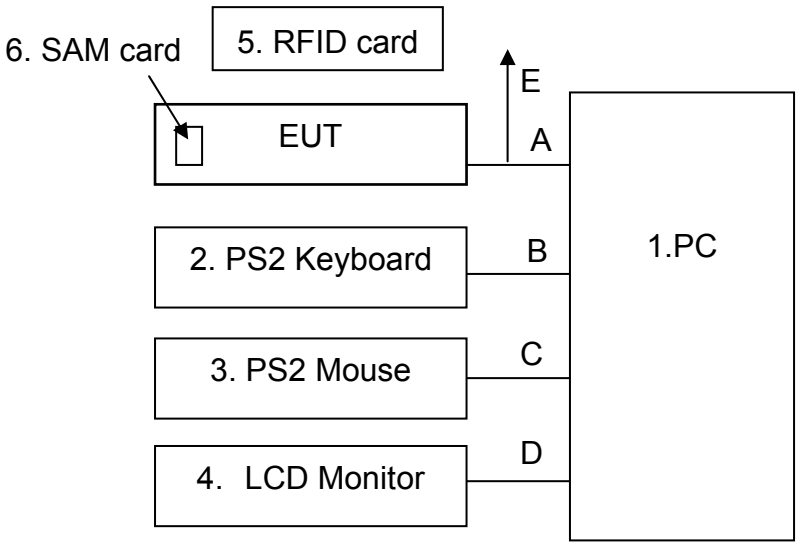
| No. | Unit | Model No. | FCC ID | Trade Name | Power Cord | Supported by lab. |
|---|---|---|---|---|---|---|
| 1. | PC | Elite 8200 MT | N/A | HP | N/A | ✓ |
| 2. | PS2 Keyboard | SK-8110 | DoC | DELL | N/A | ✓ |
| 3. | PS2 Mouse | MO71KC | DoC | DELL | N/A | ✓ |
| 4. | LCD MONITOR | f1723 | DoC | HP | N/A | ✓ |
| 5. | RFID card | N/A | N/A | N/A | N/A | |
| 6. | SAM Card | N/A | N/A | N/A | N/A | |

### Radiated Emission Test

| No. | Unit | Model No. | FCC ID | Trade Name | Power Cord | Supported by lab. |
|---|---|---|---|---|---|---|
| 1. | Notebook | LATITUDE D400 | N/A | DELL | N/A | ✓ |
| 2. | USB Mouse | N12ROU | DoC | ACER | N/A | ✓ |
| 3. | RFID card | N/A | N/A | N/A | N/A | |
| 4. | SAM Card | N/A | N/A | N/A | N/A | |

## 1.6 Layout of Setup

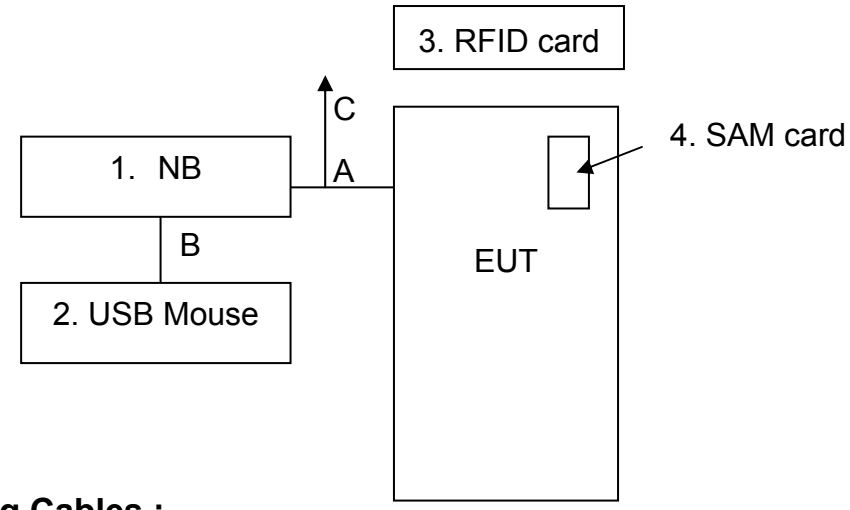
### Conducted Emission Test




**Connecting Cables :**

| No. | Cable | Length | Shielded | Core | Shielded Backshell | Supported by lab. |
|---|---|---|---|---|---|---|
| A | RJ45 to RS232 Cable | 1.7m | | | | |
| B | PS2 Keyboard Cable | 1.8m | ✓ | | | ✓ |
| C | PS2 Mouse Cable | 1.8m | ✓ | | | ✓ |
| D | VGA Cable | 1.7m | ✓ | | | ✓ |
| E | DC Power Line | 1.8m | | | | |

## Radiated Emission Test




### Connecting Cables :

| No. | Cable | Length | Shielded | Core | Shielded Backshell | Supported by lab. |
|---|---|---|---|---|---|---|
| A | RJ45 to RS232 Cable | 1.7m | | | | |
| B | USB Mouse Cable | 1.8m | ✓ | | | ✓ |
| C | DC Power Line | 1.8m | | | | |

### Justification:

For both conducted and radiated emission below 1GHz, the system was configured for typical fashion as a customer could use it normally.

For radiated emission, measurement of radiated emission from digital circuit is performed with normal transmitting.

## 1.7 Test Capability

### Test Facility

The test facility used for evaluating the conformance of the EUT with each standard in the present report meets what required in CISPR16-1-4, CISPR16-2-3 and ANSI C63.4: 2009.

| Test Room | Type of Test Room | Descriptions |
|---|---|---|
| TR1 | 10m semi-anechoic chamber (23m×14m×9m) | Complying with the NSA requirements set in documents CISPR 22 and ANSI C63.4:2009. For the radiated emission measurement. |
| TR11 | 3m semi-anechoic chamber (9m × 6m × 6m) | |
| TR13 | Test site | For the RF conducted emission measurement. |
| TR5 | Shielding Room (8m×5m×4m) | For the conducted emission measurement. |

## Test Laboratory Competence Information

Central Research Technology Co. has been accredited / filed / authorized by the agencies listed in the following table.

| Certificate | Nation | Agency | Code | Mark |
|---|---|---|---|---|
| Accreditation Certificate | USA | NVLAP | 200575-0 | ISO/IEC 17025 |
| | R.O.C. (Taiwan) | TAF | 0905 | ISO/IEC 17025 |
| | R.O.C. (Taiwan) | BSMI | SL2-IN-E-0033,<br>SL2-IS-E-0033,<br>SL2-R1/R2-E-0033,<br>SL2-A1-E-0033<br>SL2-L1-E-0033 | ISO/IEC 17025 |
| Site Filing Document | USA | FCC | 474046,TW1053 | Test facility list & NSA Data |
| | Canada | IC | 4699A-1,-3 | Test facility list & NSA Data |
| | Japan | VCCI | R-1527,C-1609, C-4400,<br>T-1441, T-1334, G-10, G-614 | Test facility list & NSA Data |
| Authorization Certificate | Germany | TUV | 10021687 | ISO/IEC 17025 |
| | Norway | Nemko | ELA 212 | ISO/IEC 17025 |

The copy of each certificate can be downloaded from our web site: www.crc-lab.com

## 1.8 Measurement Uncertainty

The assessed measurement uncertainty with a suitable coverage factor K to ensure 95% confidence level for the normal distribution are shown as below, the values are less than $U_{cispr}$ in table 1 of CISPR 16-4-2.

| Test Item | Measurement Uncertainty | |
|---|---|---|
| Radiated Emission: (30MHz~200MHz) | Horizontal: 3.3dB；Vertical: 4.1dB | |
| Radiated Emission: (200MHz~1GHz) | Horizontal: 3.8dB；Vertical: 5.1dB | |
| Conducted Emission | ESH2-Z5 | 3.0dB |
| | ENV 4200 | 3.0dB |

# 2. Conducted Emission Measurement

**Test Data: Pass**

## 2.1 Limits for Emission Measurement

For intentional device, according to §15.207(a) line conduction emission limit is as below table.

| Frequency of Emission (MHz) | Conducted 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.

Note:
For a device with a permanent antenna operating at or below 30 MHz, the FCC will accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

## 2.2 Test Instruments

| Test Site and Equipment | Manufacturer | Model No./ Serial No. | Last Calibration Date | Calibration Due Date |
|---|---|---|---|---|
| Test Receiver | R&S | ESCS 30/ 836858/021 | Jan. 15, 2014 | Jan. 15, 2015 |
| LISN | R&S | ESH2-Z5/ 880669/039 | March 20, 2014 | March 20, 2015 |
| 2nd LISN | R&S | ENV4200/ 833209/010 | April 2, 2014 | April 2, 2015 |
| 50Ω terminator | N/A | N/A/ 001 | Aug. 19, 2013 | Aug. 19, 2014 |
| RF Switch | R&S | RSU28/ 338965/002 | Aug. 19, 2013 | Aug. 19, 2014 |
| RF Cable | N/A | N/A/ C0052 ~ 56 | Aug. 19, 2013 | Aug. 19, 2014 |
| Dummy Load | N/A | 50Ω 1/4W Resistance | NCR | NCR |
| Test Software | Audix | e3/ Ver. 5.2004-2-19k | NCR | NCR |
| TR5 shielded room | ETS LINDGREN | TR5/ 15353-F | NCR | NCR |

Note:
1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

### Instrument Setting

| IF BW | Measurement Time | Detector | Trace | Comment |
|---|---|---|---|---|
| 9kHz | 1 second | Quasi-Peak / Average | Maxhold | |

### Climatic Condition

Ambient Temperature：24°C; Relative Humidity : 35%

## 2.3 Test Procedures

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. If the EUT is tabletop equipment, it was placed on a non-conducted table with a height of 0.8 meters above the reference ground plane and 0.4 meters from the conducting wall of the shielded room. Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane.

c. Connect the EUT's power source to the appropriate power mains through the LISN.

d. All the other peripherals are connected to the 2$^{nd}$ LISN, if any.

e. The LISN was placed 0.8 meters from the EUT and at least 0.8 meters from other units and other metal planes.

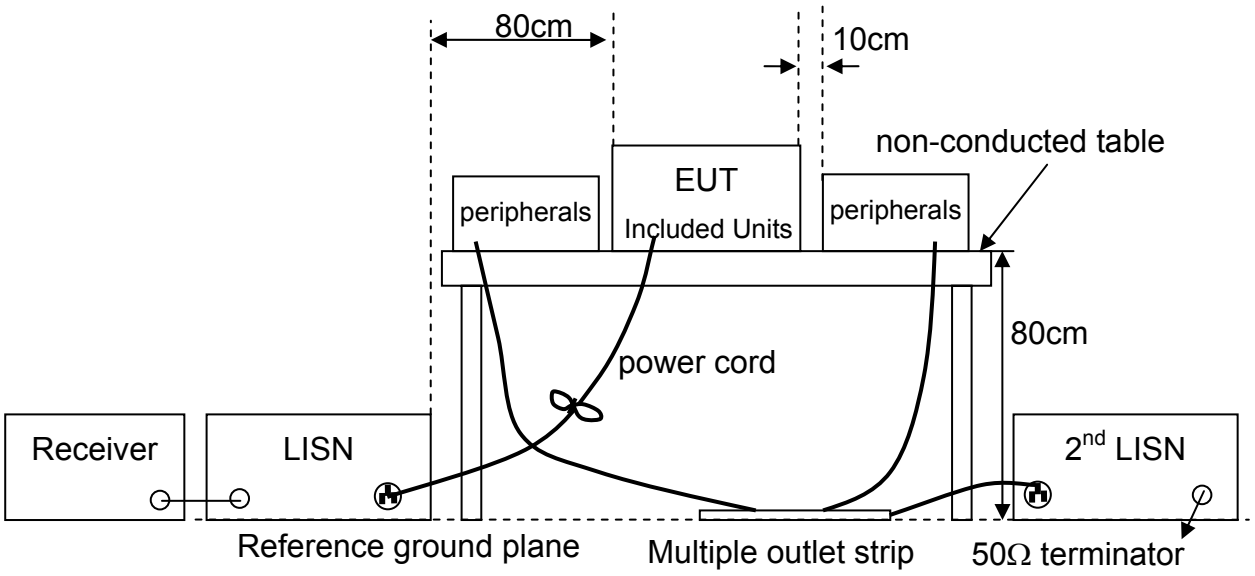
f. Measure the conducted emissions on each power line (Neutral Line and Line 1 – Hot side) of the EUT's power source by using the test receiver connected to the coupling RF output port of LISN.

g. Rapidly scan the signal from 150kHz to 30MHz by using the receiver through the Maximum-Peak detector to determine those frequencies associated with higher emission levels for each measured line.

h. Then measure the maximum level of conducted disturbance for each frequency found from step g. by using the receiver through the Quasi-Peak and Average detectors per CISPR 16-1.

i. Record the level for each frequency and compare with the required limit.

## 2.4 Test Configurations

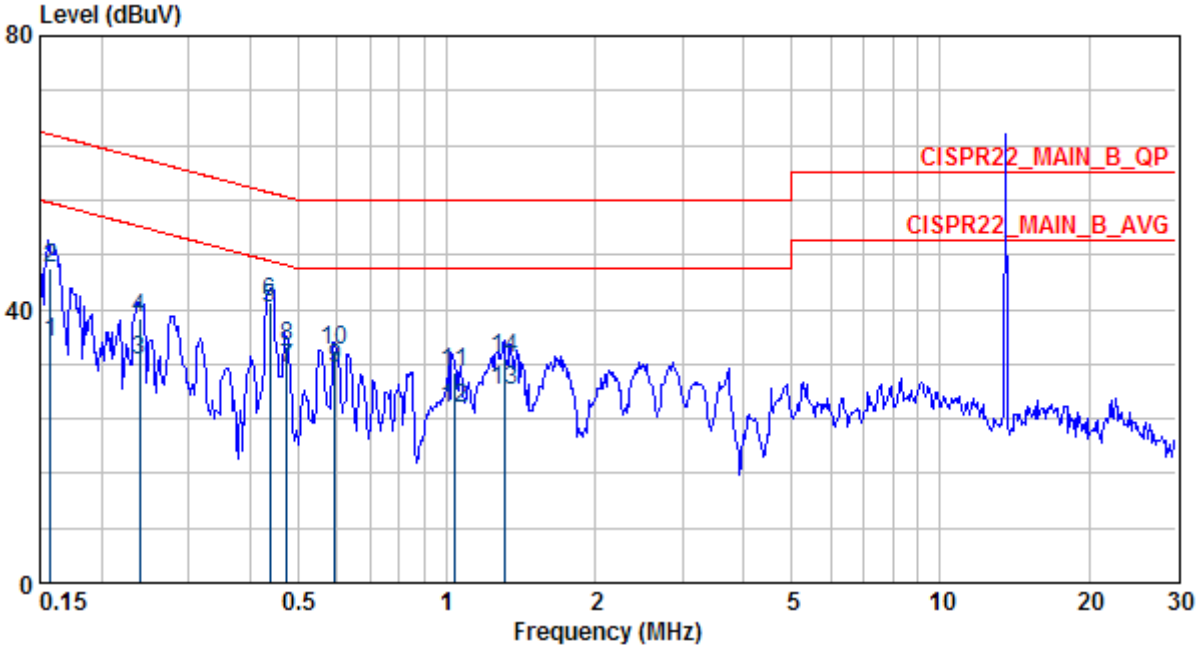


## 2.5 Test Data

**Test Mode** : **Mode 1, Continuous Transmitting, with antenna**

**Tester** : Der-Jan Ken **Frequency Range** : 150kHz~30MHz

**Phase** : Line




| | Freq | Level | Factor | Read Level | Limit Line | Over Limit | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | | |
| 1 | 0.158 | 35.17 | 0.28 | 34.89 | 55.59 | -20.41 | LINE | AVERAGE |
| 2 | 0.158 | 45.92 | 0.28 | 45.64 | 65.59 | -19.66 | LINE | QP |
| 3 | 0.239 | 32.57 | 0.29 | 32.28 | 52.13 | -19.55 | LINE | AVERAGE |
| 4 | 0.239 | 38.63 | 0.29 | 38.34 | 62.13 | -23.49 | LINE | QP |
| 5 @ | 0.439 | 40.12 | 0.31 | 39.81 | 47.08 | -6.96 | LINE | AVERAGE |
| 6 | 0.439 | 40.97 | 0.31 | 40.66 | 57.08 | -16.11 | LINE | QP |
| 7 | 0.475 | 31.38 | 0.31 | 31.07 | 46.42 | -15.04 | LINE | AVERAGE |
| 8 | 0.475 | 34.45 | 0.31 | 34.14 | 56.42 | -21.97 | LINE | QP |
| 9 | 0.595 | 31.28 | 0.32 | 30.96 | 46.00 | -14.72 | LINE | AVERAGE |
| 10 | 0.595 | 33.92 | 0.32 | 33.60 | 56.00 | -22.08 | LINE | QP |
| 11 | 1.036 | 30.75 | 0.36 | 30.39 | 56.00 | -25.25 | LINE | QP |
| 12 | 1.036 | 25.62 | 0.36 | 25.26 | 46.00 | -20.38 | LINE | AVERAGE |
| 13 | 1.310 | 28.07 | 0.38 | 27.69 | 46.00 | -17.93 | LINE | AVERAGE |
| 14 | 1.310 | 32.95 | 0.38 | 32.57 | 56.00 | -23.05 | LINE | QP |

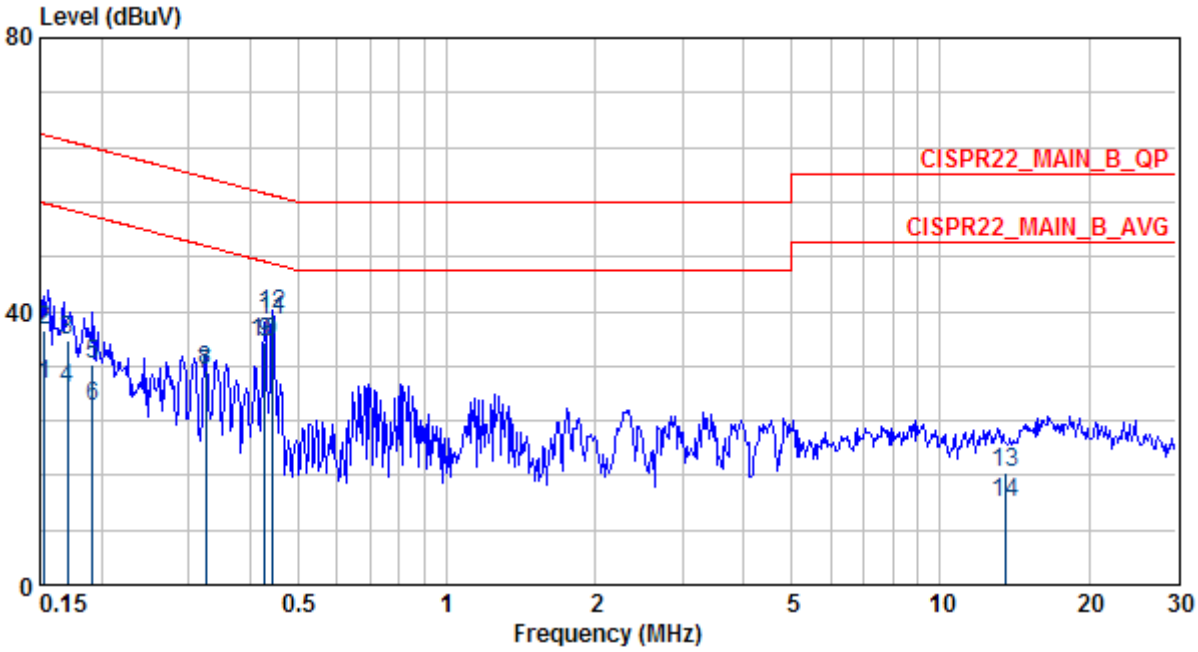
Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.
4. Tx Fundamental for reference only. Please refer to next page.

**Test Mode** : **Mode 1, Continuous Transmitting, with dummy load**

**Tester** : Der-Jan Ken **Frequency Range** : 150kHz~30MHz

**Phase** : Line




| | Freq | Level | Factor | Read Level | Limit Line | Over Limit | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | | |
| 1 | 0.153 | 29.16 | 0.28 | 28.88 | 55.84 | -26.67 | LINE | AVERAGE |
| 2 | 0.153 | 37.23 | 0.28 | 36.95 | 65.84 | -28.60 | LINE | QP |
| 3 | 0.171 | 35.71 | 0.28 | 35.43 | 64.93 | -29.21 | LINE | QP |
| 4 | 0.171 | 28.72 | 0.28 | 28.44 | 54.93 | -26.20 | LINE | AVERAGE |
| 5 | 0.191 | 32.18 | 0.29 | 31.89 | 63.98 | -31.80 | LINE | QP |
| 6 | 0.191 | 26.01 | 0.29 | 25.72 | 53.98 | -27.97 | LINE | AVERAGE |
| 7 | 0.325 | 30.65 | 0.30 | 30.35 | 49.57 | -18.92 | LINE | AVERAGE |
| 8 | 0.325 | 31.37 | 0.30 | 31.07 | 59.57 | -28.20 | LINE | QP |
| 9 | 0.428 | 35.57 | 0.31 | 35.26 | 57.29 | -21.72 | LINE | QP |
| 10 | 0.428 | 35.50 | 0.31 | 35.19 | 47.29 | -11.79 | LINE | AVERAGE |
| 11 | 0.444 | 38.78 | 0.31 | 38.47 | 56.99 | -18.20 | LINE | QP |
| 12 @ | 0.444 | 39.51 | 0.31 | 39.20 | 46.99 | -7.47 | LINE | AVERAGE |
| 13 | 13.560 | 16.26 | 0.91 | 15.35 | 60.00 | -43.74 | LINE | QP |
| 14 | 13.560 | 12.09 | 0.91 | 11.18 | 50.00 | -37.91 | LINE | AVERAGE |

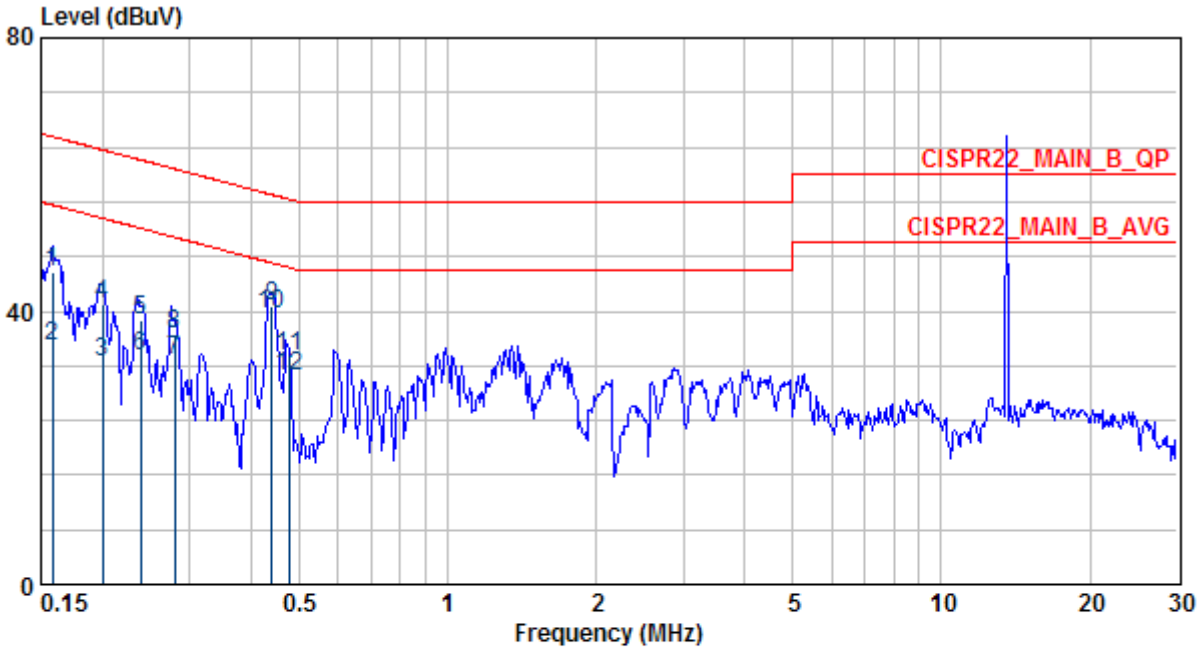
Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

**Test Mode** : **Mode 1, Continuous Transmitting, with antenna**

**Tester** : Der-Jan Ken **Frequency Range** : 150kHz~30MHz

**Phase** : Neutral

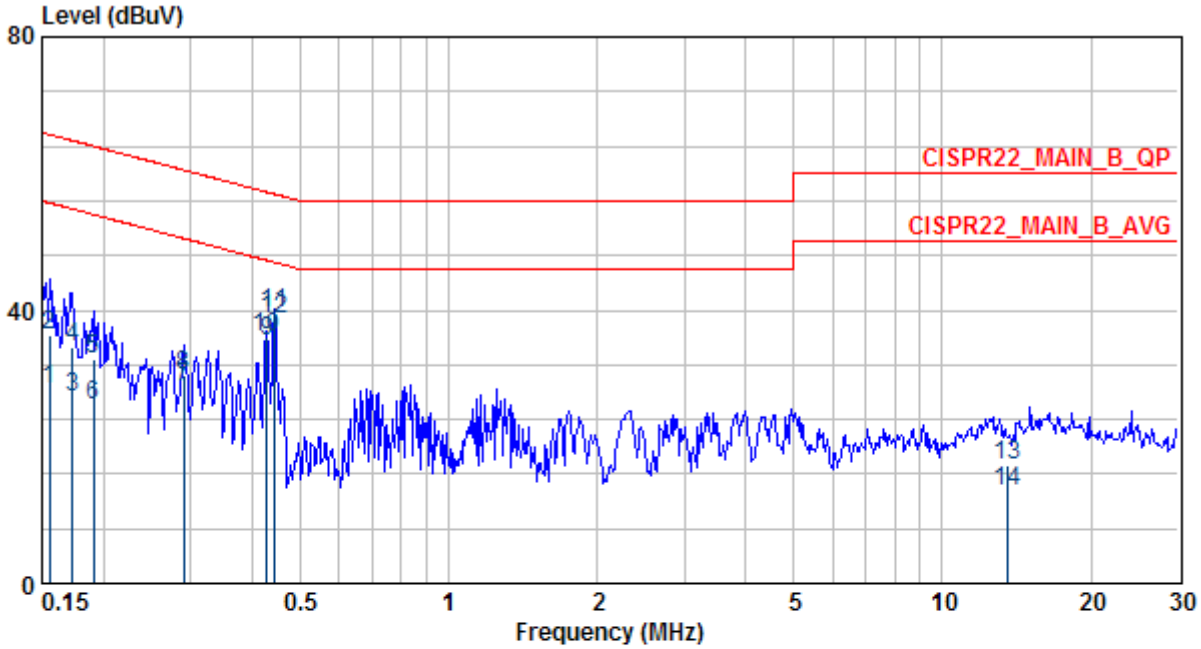



| | Freq | Level | Factor | Read Level | Limit Line | Over Limit | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | | |
| 1 | 0.158 | 45.60 | 0.31 | 45.29 | 65.56 | -19.96 | NEUTRAL | QP |
| 2 | 0.158 | 34.88 | 0.31 | 34.57 | 55.56 | -20.68 | NEUTRAL | AVERAGE |
| 3 | 0.200 | 32.66 | 0.32 | 32.34 | 53.62 | -20.96 | NEUTRAL | AVERAGE |
| 4 | 0.200 | 40.94 | 0.32 | 40.62 | 63.62 | -22.68 | NEUTRAL | QP |
| 5 | 0.239 | 38.74 | 0.32 | 38.42 | 62.12 | -23.38 | NEUTRAL | QP |
| 6 | 0.239 | 33.40 | 0.32 | 33.08 | 52.12 | -18.72 | NEUTRAL | AVERAGE |
| 7 | 0.279 | 32.88 | 0.32 | 32.56 | 50.83 | -17.95 | NEUTRAL | AVERAGE |
| 8 | 0.279 | 36.53 | 0.32 | 36.21 | 60.83 | -24.30 | NEUTRAL | QP |
| 9 | 0.440 | 40.73 | 0.33 | 40.40 | 57.07 | -16.33 | NEUTRAL | QP |
| 10 @ | 0.440 | 39.70 | 0.33 | 39.37 | 47.07 | -7.36 | NEUTRAL | AVERAGE |
| 11 | 0.476 | 33.38 | 0.33 | 33.05 | 56.41 | -23.02 | NEUTRAL | QP |
| 12 | 0.476 | 30.56 | 0.33 | 30.23 | 46.41 | -15.84 | NEUTRAL | AVERAGE |

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.
4. Tx Fundamental for reference only. Please refer to next page.

| | | | | | |
|---|---|---|---|---|---|
| **Test Mode** | **:** | **Mode 1, Continuous Transmitting, with dummy load** | | | |
| **Tester** | **:** | Der-Jan Ken | **Frequency Range** | **:** | 150kHz~30MHz |
| **Phase** | **:** | Neutral | | | |




| | Freq | Level | Factor | Read Level | Limit Line | Over Limit | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dBuV | dBuV | dB | | |
| 1 | 0.156 | 28.29 | 0.31 | 27.98 | 55.69 | -27.40 | NEUTRAL | AVERAGE |
| 2 | 0.156 | 36.34 | 0.31 | 36.03 | 65.69 | -29.35 | NEUTRAL | QP |
| 3 | 0.173 | 27.33 | 0.31 | 27.02 | 54.81 | -27.48 | NEUTRAL | AVERAGE |
| 4 | 0.173 | 34.61 | 0.31 | 34.30 | 64.81 | -30.20 | NEUTRAL | QP |
| 5 | 0.190 | 32.77 | 0.32 | 32.45 | 64.02 | -31.25 | NEUTRAL | QP |
| 6 | 0.190 | 26.06 | 0.32 | 25.74 | 54.02 | -27.96 | NEUTRAL | AVERAGE |
| 7 | 0.291 | 28.58 | 0.32 | 28.26 | 50.50 | -21.91 | NEUTRAL | AVERAGE |
| 8 | 0.291 | 30.54 | 0.32 | 30.22 | 60.50 | -29.95 | NEUTRAL | QP |
| 9 | 0.428 | 35.39 | 0.33 | 35.06 | 57.29 | -21.90 | NEUTRAL | QP |
| 10 | 0.428 | 35.90 | 0.33 | 35.57 | 47.29 | -11.39 | NEUTRAL | AVERAGE |
| 11 @ | 0.444 | 39.49 | 0.33 | 39.16 | 46.99 | -7.49 | NEUTRAL | AVERAGE |
| 12 | 0.444 | 38.78 | 0.33 | 38.45 | 56.99 | -18.20 | NEUTRAL | QP |
| 13 | 13.560 | 17.23 | 0.91 | 16.32 | 60.00 | -42.77 | NEUTRAL | QP |
| 14 | 13.560 | 13.38 | 0.91 | 12.47 | 50.00 | -36.62 | NEUTRAL | AVERAGE |

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

# 3. Field Strength of fundamental Measurement

**Test Result : PASS**

## 3.1 Applied Standard

According to 15.225(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.

According to 15.225(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.

According to 15.225(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.

## 3.2 Test Instruments

| Test Site and Equipment | Manufacturer | Model No./ Serial No. | Last Calibration Date | Calibration Due Date |
|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI/ 100019 | June 7, 2013 | June 7, 2014 |
| Loop Antenna | EMCO | 6502/ 20558 | Aug. 29, 2013 | Aug. 29, 2014 |
| RF Cable | N/A | N/A/ C0080 | Feb. 10, 2014 | Aug. 10, 2014 |
| Test Software | Audix | e3/ ARD-SPR-000282 | NCR | NCR |
| TR11 Semi – anechoic Chamber | ETS. LINDGREN | TR11/ 906-A | May 11, 2013 | May 11, 2014 |

Note:

1. The calibrations are traceable to NML/ROC.
2. The calibration date of the semi-anechoic chamber listed above is the date of NSA measurement.

### Instrument Setting

| RBW | VBW | Detector | Trace | Comment |
|---|---|---|---|---|
| 9kHz | N/A | Quasi-Peak | Maxhold | |

### Climatic Condition

Ambient Temperature：24°C; Relative Humidity ：61%

## 3.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. If the EUT is tabletop equipment, it should be placed on a wooden table with a height of 0.8 meters above the reference ground plane in the semi-anechoic chamber. If the EUT is floor-standing equipment, it should be placed on a non-conducted support with a height of 12 millimeters above the reference ground plane in the semi-anechoic chamber.

c. The EUT is set at 3m away from the receiving antenna.

d. Rapidly sweep the signal in the test frequency range by using the receiver through the Quasi-Peak detector.

e. Rotate the EUT from 0° to 360° and position the receiving loop antenna at 1~4 meters above the reference ground plane to determine the fundamental frequency and and bandedge and record them.

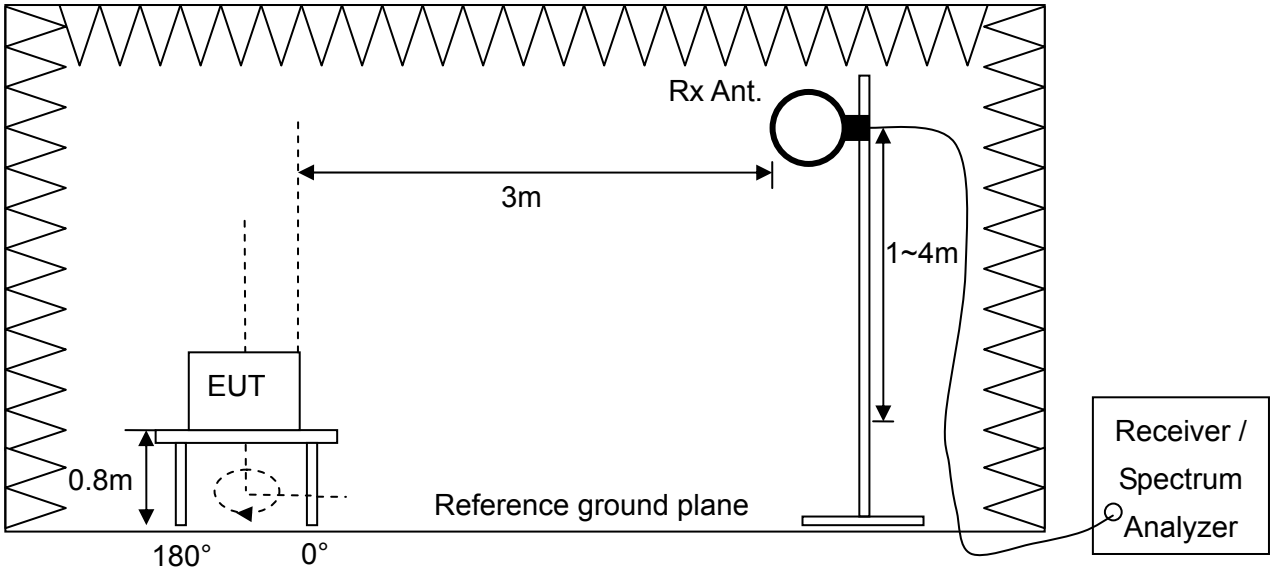
f. Then measure each frequency found from step e. by using the receiver with rotating the EUT and positioning the receiving antenna height to determine the maximum level.

g. Finely tune the antenna and turntable around the recorded position of each frequency found from step e.

h. Record and compare the maximum level with the required limit.

i. Change the receiving antenna to another polarization to measure field strength of fundamental by following step d. to g. again.

## 3.4 Test Configuration



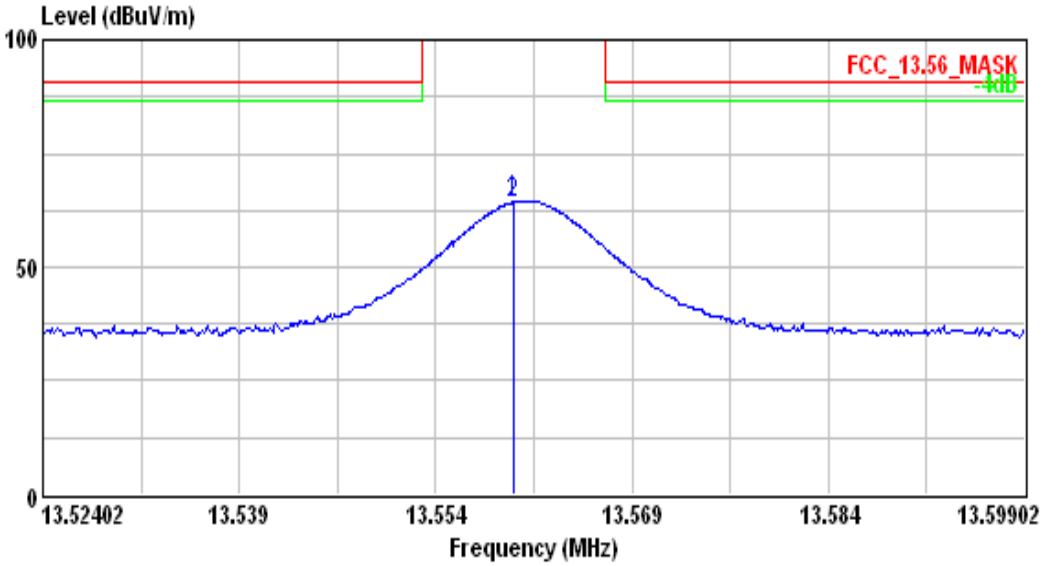
## 3.5 Test Results

### Field strength of fundamental

**Test Mode** : **Mode 1, Continuous Transmitting**

**Tester** : Liu

**Polarization** : **Horizontal**




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Ant Pos | Table Pos | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | |
| 1 | 13.560 | 64.59 | 50.23 | 14.36 | 124.00 | -59.41 | 100 | 182 | HORIZONTAL | Peak |
| 2 | 13.560 | 63.88 | 49.52 | 14.36 | 124.00 | -60.12 | 100 | 182 | HORIZONTAL | QP |

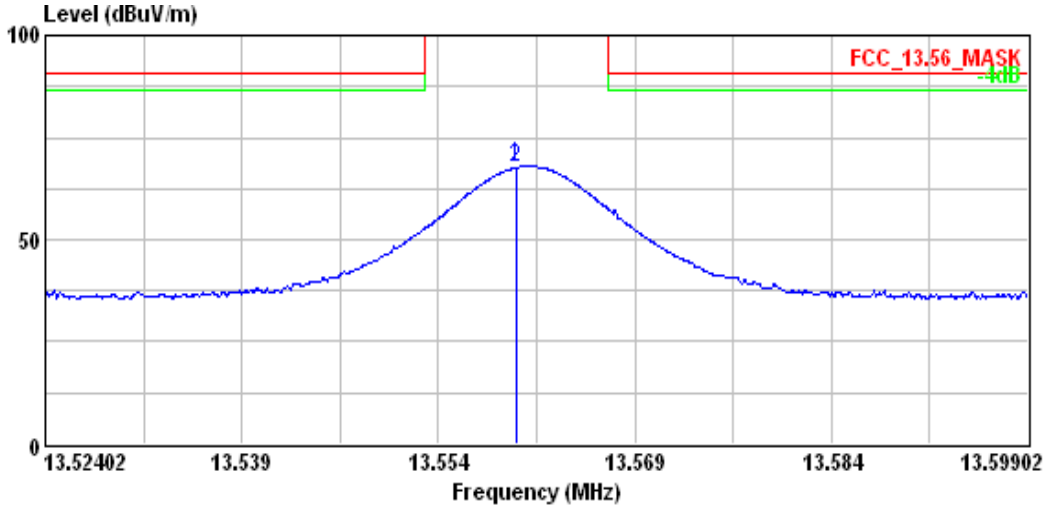
Note：

1. Factor (dB/m) = Cable Loss + Antenna Factor
2. Level (dBuV/m) @3m= Reading Level + Factor
3. Over Limit (dB) = Level – Limit Line@3m
4. The limit is 15848 (uV/m)=84dBuV/m @ 30 m , for main frequency < 30MHz, the formula transfers the limit at 30 m to 3m is $L_{30}$(dBuV/m) + 40 =124 dBuV/m

**Test Mode** : **Mode 1, Continuous Transmitting**

**Tester** : Liu

**Polarization** : **Vertical**




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Ant Pos | Table Pos | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | |
| 1 @ | 13.560 | 68.01 | 53.65 | 14.36 | 124.00 | -55.99 | 134 | 184 | VERTICAL | Peak |
| 2 | 13.560 | 67.49 | 53.13 | 14.36 | 124.00 | -56.51 | 134 | 184 | VERTICAL | QP |

Note：

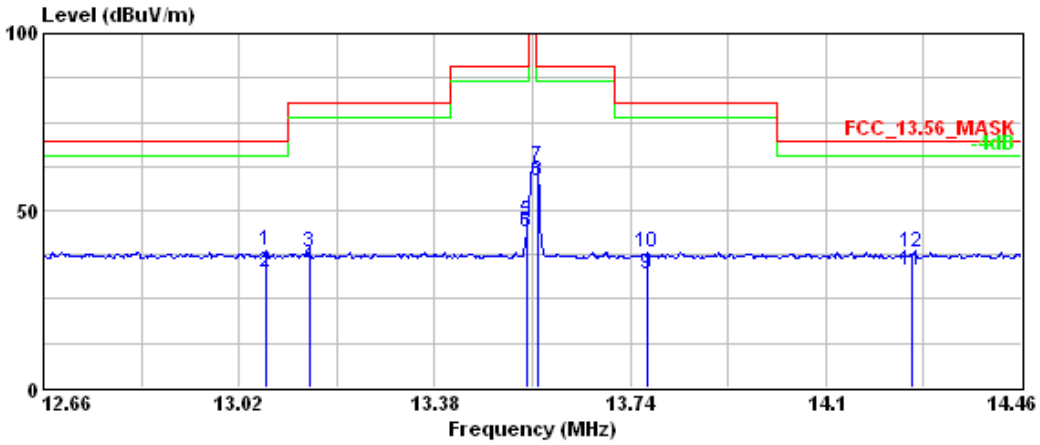
1. Factor (dB/m) = Cable Loss + Antenna Factor
2. Level (dBuV/m) @3m= Reading Level + Factor
3. Over Limit (dB) = Level – Limit Line@3m
4. The limit is 15848 (uV/m)=84dBuV/m @ 30 m , for main frequency < 30MHz, the formula transfers the limit at 30 m to 3m is $L_{30}$(dBuV/m) + 40 =124 dBuV/m

## Band Edge

**Test Mode** : **Mode 1, Continuous Transmitting**

**Tester** : Liu

**Polarization** : **Horizontal**




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Ant Pos | Table Pos | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | |
| 1 | 13.070 | 38.59 | 24.18 | 14.41 | 69.54 | -30.95 | 108 | 44 | HORIZONTAL | Peak |
| 2 | 13.070 | 32.57 | 18.16 | 14.41 | 69.54 | -36.97 | 108 | 44 | HORIZONTAL | QP |
| 3 | 13.150 | 38.24 | 23.84 | 14.40 | 80.51 | -42.27 | 110 | 153 | HORIZONTAL | Peak |
| 4 | 13.150 | 34.25 | 19.85 | 14.40 | 80.51 | -46.26 | 110 | 153 | HORIZONTAL | QP |
| 5 | 13.550 | 46.67 | 32.31 | 14.36 | 90.47 | -43.80 | 100 | 182 | HORIZONTAL | Peak |
| 6 | 13.550 | 43.75 | 29.39 | 14.36 | 90.47 | -46.72 | 100 | 182 | HORIZONTAL | QP |
| 7 @ | 13.570 | 62.30 | 47.94 | 14.36 | 90.47 | -28.17 | 100 | 182 | HORIZONTAL | Peak |
| 8 | 13.570 | 58.35 | 43.99 | 14.36 | 90.47 | -32.12 | 100 | 182 | HORIZONTAL | QP |
| 9 | 13.770 | 32.10 | 17.75 | 14.35 | 80.51 | -48.41 | 101 | 189 | HORIZONTAL | QP |
| 10 | 13.770 | 38.10 | 23.75 | 14.35 | 80.51 | -42.41 | 101 | 189 | HORIZONTAL | Peak |
| 11 | 14.260 | 32.96 | 18.67 | 14.29 | 69.54 | -36.58 | 110 | 214 | HORIZONTAL | QP |
| 12 | 14.260 | 38.15 | 23.86 | 14.29 | 69.54 | -31.39 | 110 | 214 | HORIZONTAL | Peak |

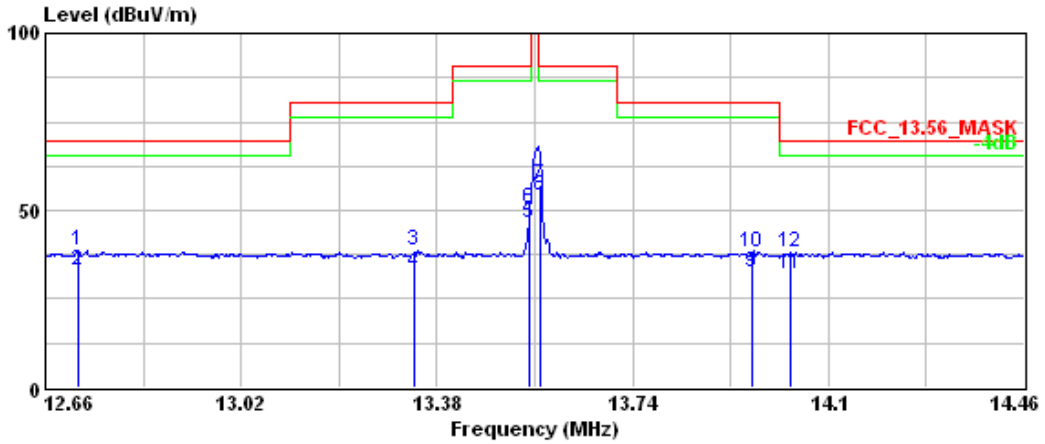
Note：

1. Factor (dB/m) = Cable Loss + Antenna Factor
2. Level (dBuV/m) @3m= Reading Level + Factor
3. Over Limit (dB) = Level – Limit Line@3m
4. The limit is 15848 (uV/m)=84dBuV/m @ 30 m , for main frequency < 30MHz, the formula transfers the limit at 30 m to 3m is $L_{30}$(dBuV/m) + 40 =124 dBuV/m

**Test Mode : Mode 1, Continuous Transmitting**

**Tester : Liu**

**Polarization : Vertical**




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Ant Pos | Table Pos | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | |
| 1 @ | 12.720 | 38.86 | 24.42 | 14.44 | 69.54 | -30.68 | 100 | 58 | VERTICAL | Peak |
| 2 | 12.720 | 33.00 | 18.56 | 14.44 | 69.54 | -36.54 | 100 | 58 | VERTICAL | QP |
| 3 | 13.340 | 38.59 | 24.21 | 14.38 | 80.51 | -41.92 | 102 | 60 | VERTICAL | Peak |
| 4 | 13.340 | 32.70 | 18.32 | 14.38 | 80.51 | -47.81 | 102 | 60 | VERTICAL | QP |
| 5 | 13.550 | 46.55 | 32.19 | 14.36 | 90.47 | -43.92 | 134 | 184 | VERTICAL | QP |
| 6 | 13.550 | 50.54 | 36.18 | 14.36 | 90.47 | -39.93 | 134 | 184 | VERTICAL | Peak |
| 7 | 13.570 | 57.03 | 42.67 | 14.36 | 90.47 | -33.44 | 134 | 184 | VERTICAL | Peak |
| 8 | 13.570 | 53.92 | 39.56 | 14.36 | 90.47 | -36.55 | 134 | 184 | VERTICAL | QP |
| 9 | 13.960 | 32.58 | 18.26 | 14.32 | 80.51 | -47.93 | 101 | 165 | VERTICAL | QP |
| 10 | 13.960 | 38.40 | 24.08 | 14.32 | 80.51 | -42.11 | 101 | 165 | VERTICAL | Peak |
| 11 | 14.030 | 31.84 | 17.52 | 14.32 | 69.54 | -37.70 | 103 | 215 | VERTICAL | QP |
| 12 | 14.030 | 38.25 | 23.93 | 14.32 | 69.54 | -31.29 | 103 | 215 | VERTICAL | Peak |

Note :

1. Factor (dB/m) = Cable Loss + Antenna Factor
2. Level (dBuV/m) @3m= Reading Level + Factor
3. Over Limit (dB) = Level – Limit Line@3m
4. The limit is 15848 (uV/m)=84dBuV/m @ 30 m , for main frequency < 30MHz, the formula transfers the limit at 30 m to 3m is $L_{30}$(dBuV/m) + 40 =124 dBuV/m

# 4. Radiated Emission

**Test Result : PASS**

## 4.1 Applied Standard

According to 15.225(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.

| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|---|---|---|
| 0.009 - 0.490 | 2400/F(kHz) | 300 |
| 0.490 - 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30.0 | 30 | 30 |
| 30 - 88 | 100 ** | 3 |
| 88 - 216 | 150 ** | 3 |
| 216 - 960 | 200 ** | 3 |
| Above 960 | 500 | 3 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

## 4.2 Test Instruments

| Test Site and Equipment | Manufacturer | Model No./ Serial No. | Last Calibration Date | Calibration Due Date |
|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI/ 100019 | June 7, 2013 | June 7, 2014 |
| Spectrum Analyzer | Agilent | E4407B/ MY45106795 | May 29, 2013 | May 29, 2014 |
| Loop Antenna | EMCO | 6502/ 20558 | Aug. 29, 2013 | Aug. 29, 2014 |
| Bi-Log Antenna | EMCO | 3142C/ 52088 | May 27, 2013 | May 27, 2014 |
| Pre-Amplifier | Mini-circuit | ZKL-2/ 004 | Feb. 10, 2014 | Aug. 10, 2014 |
| RF Cable | N/A | N/A/ C0080 | Feb. 10, 2014 | Aug. 10, 2014 |
| Test Software | Audix | e3/ ARD-SPR-000282 | NCR | NCR |
| TR11 Semi - anechoic Chamber | ETS. LINDGREN | TR11/ 906-A | May 11, 2013 | May 11, 2014 |

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR:No Calibration Required.
3. The calibration date of the semi-anechoic chamber listed above is the date of NSA measurement.

### Instrument Setting

| RBW | VBW | Detector | Trace | Comment |
|---|---|---|---|---|
| 9kHz | N/A | Quasi-Peak | Maxhold | Below 30MHz |
| 120kHz | N/A | Quasi-Peak | Maxhold | Below 1GHz |

## Climatic Condition

Ambient Temperature：24°C;  Relative Humidity ：61%

## 4.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.

b. A software provided by client enabled the EUT to transmit and receive data at specified channel frequencies individually.

c. If the EUT is tabletop equipment, it was placed on a non-conducted table with a height of 0.8 meters above the reference ground plane in the semi-anechoic chamber. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane in the semi-anechoic chamber.

d. The EUT is set at 3m away from the interference receiving antenna.

e. Rapidly sweep the signal in the test frequency range by using the spectrum through the Maximum-peak detector.

f. Rotate the EUT from 0° to 360° and position the receiving antenna at heights from 1 to 4 meters above the reference ground plane continuously to determine at least six frequencies associated with higher emission levels and record them.

g. For measurement of frequency above 1000MHz, the beamwidth of receiving horn antenna should keep covering EUT when the receiving horn antenna height varied.

h. Then measure each frequency found from step e. by using the spectrum with rotating the EUT and positioning the receiving antenna height to determine the maximum level.

i. Finely tune the antenna and turntable around the recorded position of each frequency found from step g.

j. For measurement of frequency below 1000MHz, set the receiver detector to be Quasi-Peak per CISPR 16-1 to find out the maximum level occurred.

k. For measurement of frequency above 1000MHz, set the spectrum detector to be Peak or Average to find out the maximum level occurred, if any.

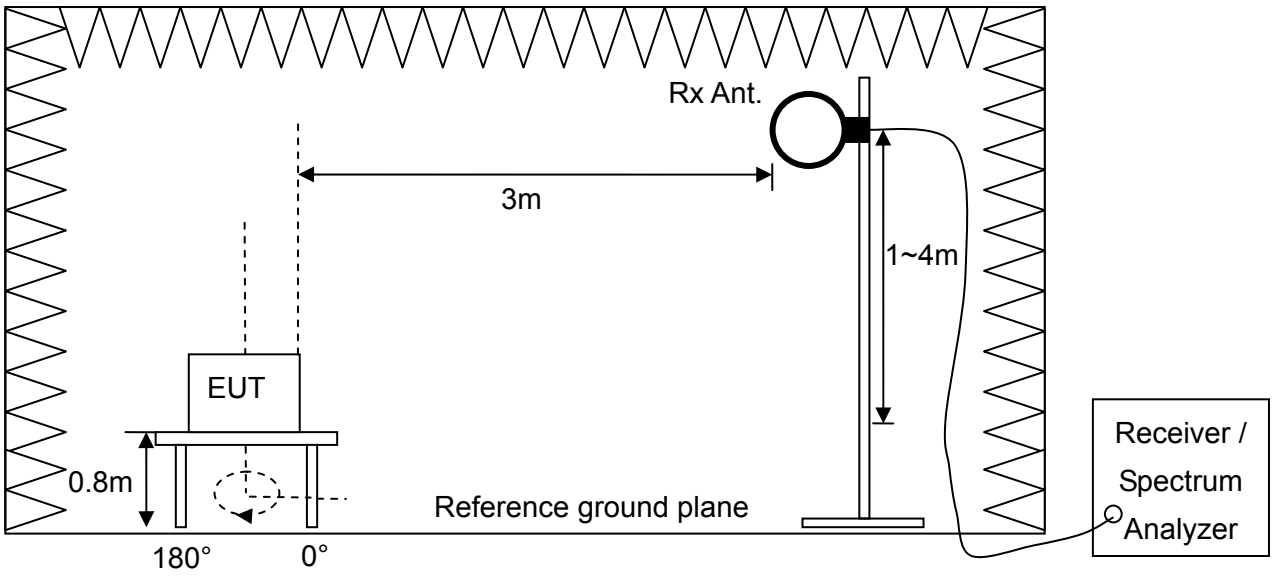
l. Record frequency, azimuth angle of the turntable, height, and polarization of the receiving antenna and compare the maximum level with the required limit.

m. Change the receiving antenna to another polarization to measure radiated emission by following step e. to l. again.

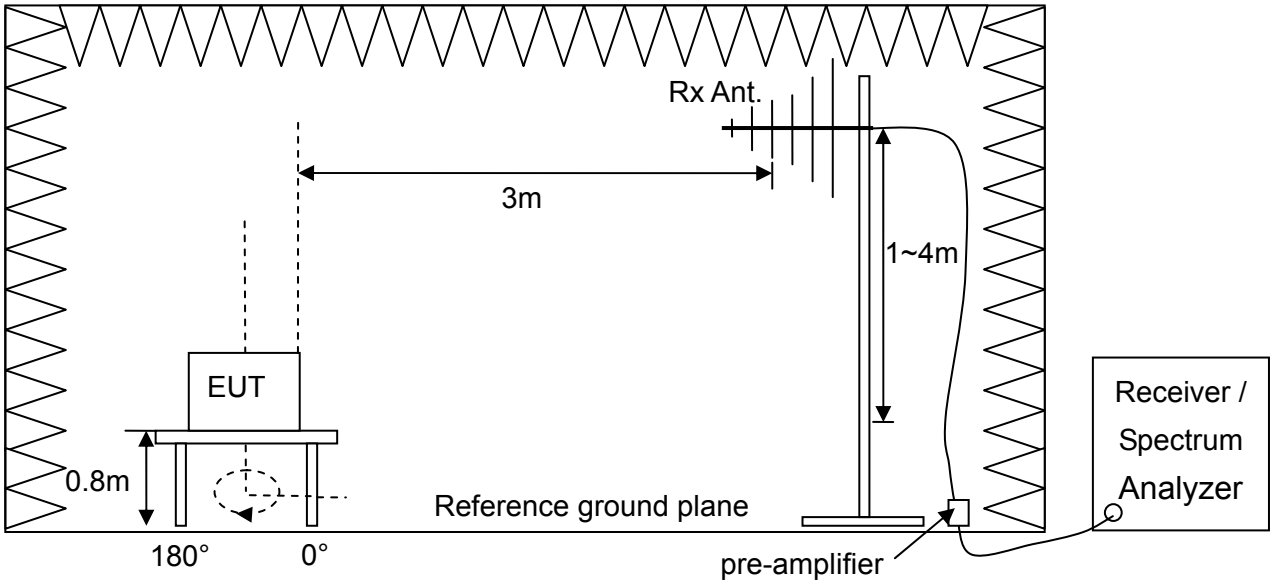
n. If the peak emission level measured from step e. is 4dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate Q.P. value will be measured and presented.

## 4.4 Test Configuration

**Radiated Emission Measurement below 30MHz**




**Radiated Emission Measurement above 30MHz**

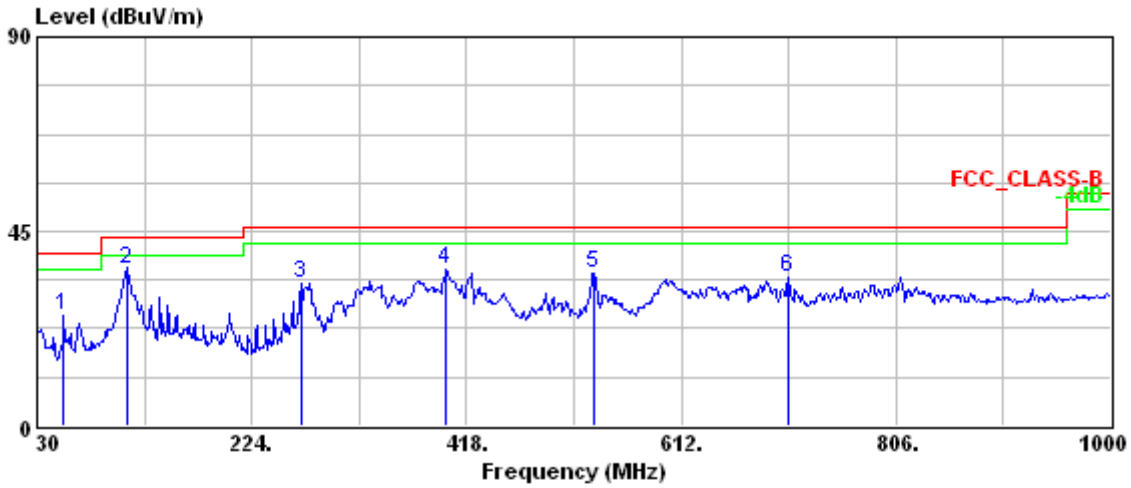


## 4.5 Test Results

**Test Mode** : **Mode 1, Continuous Transmitting**

**Tester** : Liu **Frequency Range** : 9kHz~1GHz

**Polarization** : **Horizontal**




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Ant Pos | Table Pos | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | |
| 1 | 54.030 | 25.34 | 44.00 | -18.66 | 40.00 | -14.66 | --- | --- | HORIZONTAL | Peak |
| 2 | 111.102 | 36.09 | 55.18 | -19.09 | 43.50 | -7.41 | 286 | 315 | HORIZONTAL | QP |
| 3 | 268.680 | 32.90 | 45.93 | -13.03 | 46.00 | -13.10 | --- | --- | HORIZONTAL | Peak |
| 4 | 399.400 | 36.41 | 45.26 | -8.85 | 46.00 | -9.59 | --- | --- | HORIZONTAL | Peak |
| 5 | 533.100 | 35.47 | 41.72 | -6.25 | 46.00 | -10.53 | --- | --- | HORIZONTAL | Peak |
| 6 | 708.100 | 34.30 | 37.61 | -3.31 | 46.00 | -11.70 | --- | --- | HORIZONTAL | Peak |

Note：

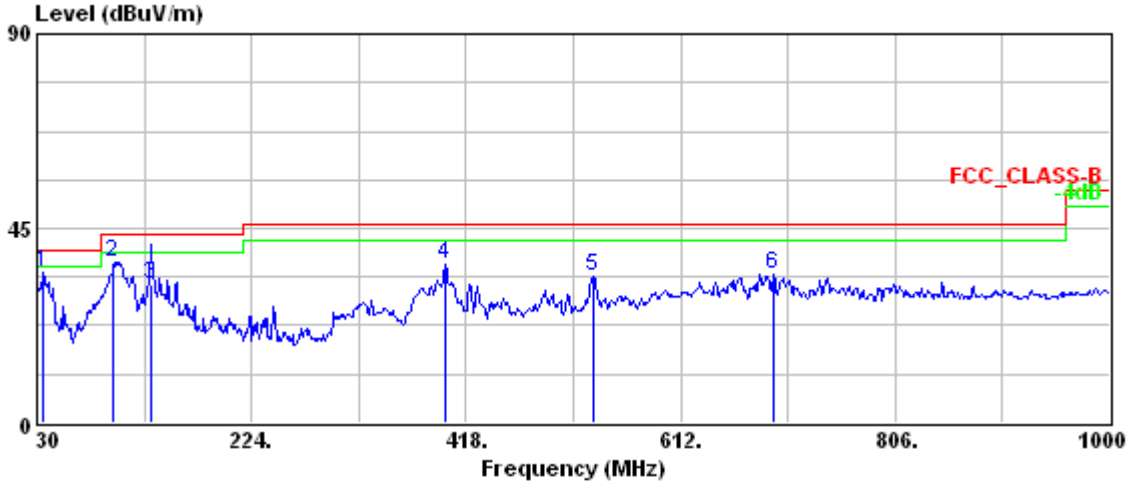
1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

**No signal can be detected from 9kHz to 30MHz, so the graphs are omitted below 30MHz.**

**Test Mode** : **Mode 1, Continuous Transmitting**

**Tester** : Liu **Frequency Range** : 9kHz~1GHz

**Polarization** : **Vertical**




| | Freq | Level | Read Level | Factor | Limit Line | Over Limit | Ant Pos | Table Pos | Pol/Phase | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV | dB/m | dBuV/m | dB | cm | deg | | |
| 1 @ | 35.940 | 34.87 | 46.98 | -12.11 | 40.00 | -5.13 | --- | --- | VERTICAL | Peak |
| 2 | 99.390 | 37.11 | 55.71 | -18.60 | 43.50 | -6.39 | --- | --- | VERTICAL | Peak |
| 3 | 132.877 | 31.93 | 50.91 | -18.98 | 43.50 | -11.57 | 101 | 167 | VERTICAL | QP |
| 4 | 399.400 | 36.63 | 45.48 | -8.85 | 46.00 | -9.37 | --- | --- | VERTICAL | Peak |
| 5 | 533.100 | 33.86 | 40.11 | -6.25 | 46.00 | -12.14 | --- | --- | VERTICAL | Peak |
| 6 | 696.200 | 34.48 | 37.97 | -3.49 | 46.00 | -11.52 | --- | --- | VERTICAL | Peak |

Note：

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor

**No signal can be detected from 9kHz to 30MHz, so the graphs are omitted below 30MHz.**

# 5. Frequency Tolerence

**Test Result : PASS**

## 5.1 Applied Standard

According to 15.225(e), the frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

## 5.2 Test Instruments

| Test Site and Equipment | Manufacturer | Model No./ Serial No. | Last Calibration Date | Calibration Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4405B/ MY45106706 | April 15, 2014 | April 15, 2015 |
| Temperature Chamber | Terchy | MHG-800LF/ 920224 | Aug. 16, 2013 | Aug. 16, 2014 |
| Adjustable DC Power Supply | instek | PSP-405/ C120177 | NCR | NCR |
| Voltage Meter | FLUKE | 187/ 91050091 | July 2, 2012 | July 2, 2014 |
| Test Site | N.A. | TR13 | NCR | NCR |

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR:No Calibration Required.

### Instrument Setting

| RBW | VBW | Detector | Trace | Comment |
|---|---|---|---|---|
| 300Hz | 1kHz | Peak | Maxhold | |

### Climatic Condition

Ambient Temperature：25°C; Relative Humidity ：55%

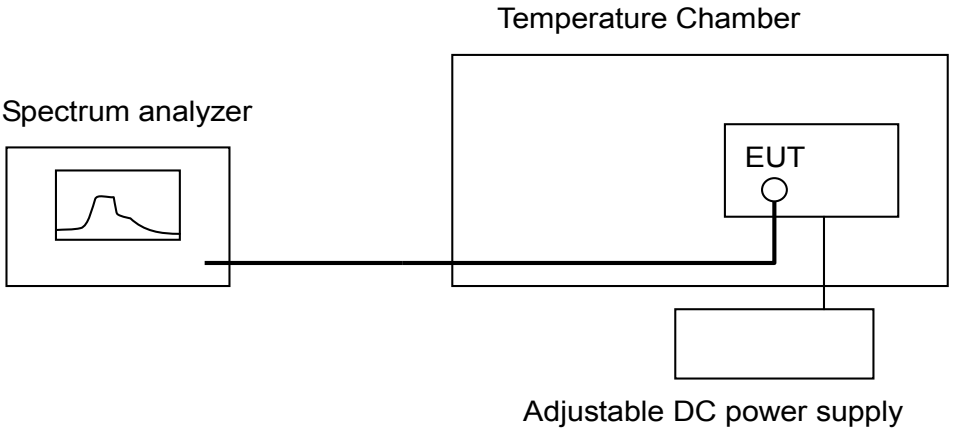
## 5.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage described in the user's manual supported by the manufacturer in test site TR13.

b. Measure the frequency tolerence by using the spectrum analyzer and following the test conditions described in FCC 15.225(e) to perform the normal and extreme conditions test.

c. Record the value and compare with the required limit.

## 5.4 Test Configuration



## 5.5 Test Results

**Test Mode : Mode 1, Continuous Transmitting**

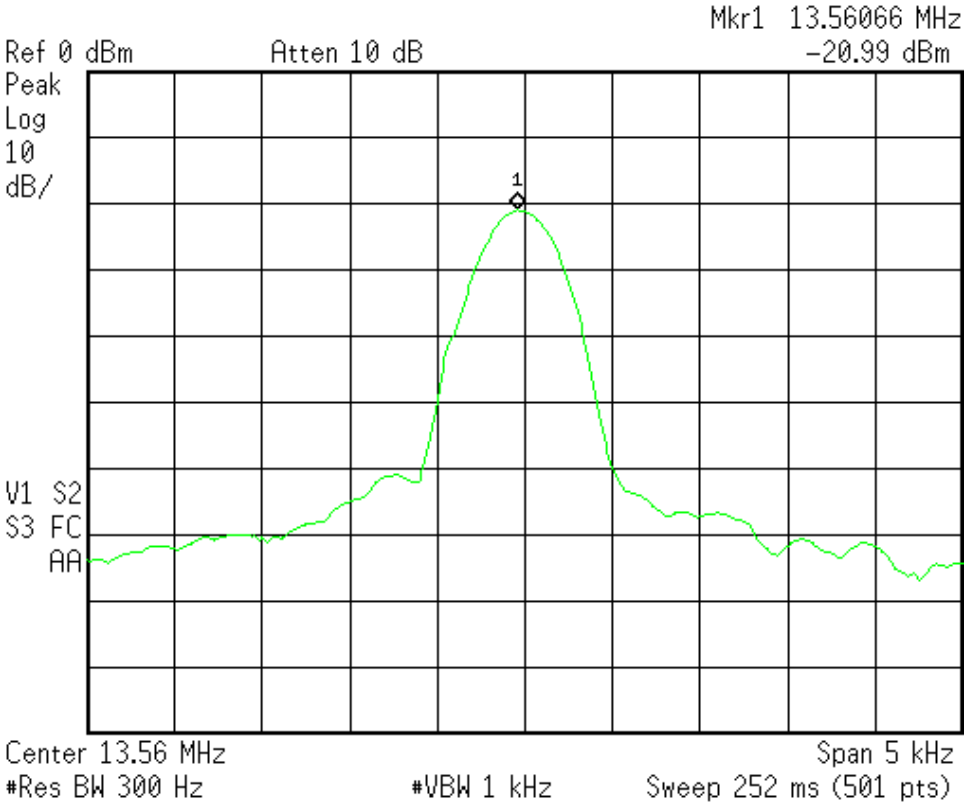
**Tester :** Jun

| Temperature (ºC) | DC Voltage (Volt) | Meas. Frequency (MHz) | Deviation (kHz) | Limit (kHz) | Margin (kHz) |
|---|---|---|---|---|---|
| 20ºC | 5 | 13.56066 | N/A | N/A | N/A |
| | 5.75 | 13.56066 | 0 | 1.356 | 1.356 |
| | 4.53(Note 3) | 13.56066 | 0 | 1.356 | 1.356 |
| -20ºC | 5 | 13.56075 | 0.09 | 1.356 | 1.266 |
| 50ºC | 5 | 13.56064 | 0.02 | 1.356 | 1.336 |

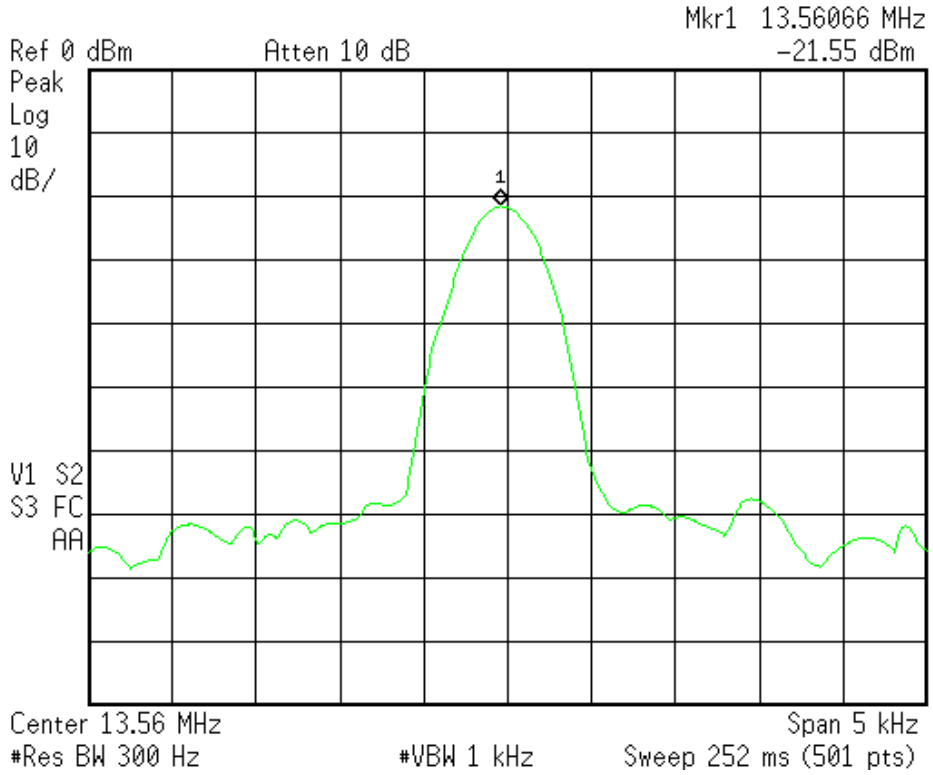
Note:

1. Deviation(kHz) = ｜Meas. Frequency – Meas. Frequency @20ºC/5Vdc｜
2. Margin (kHz)= Limit – Deviation
3. When Input voltage below 4.53 Vdc, the device can’t work normal.
4. The test results of 12Vdc is pass. The test data are omitted.

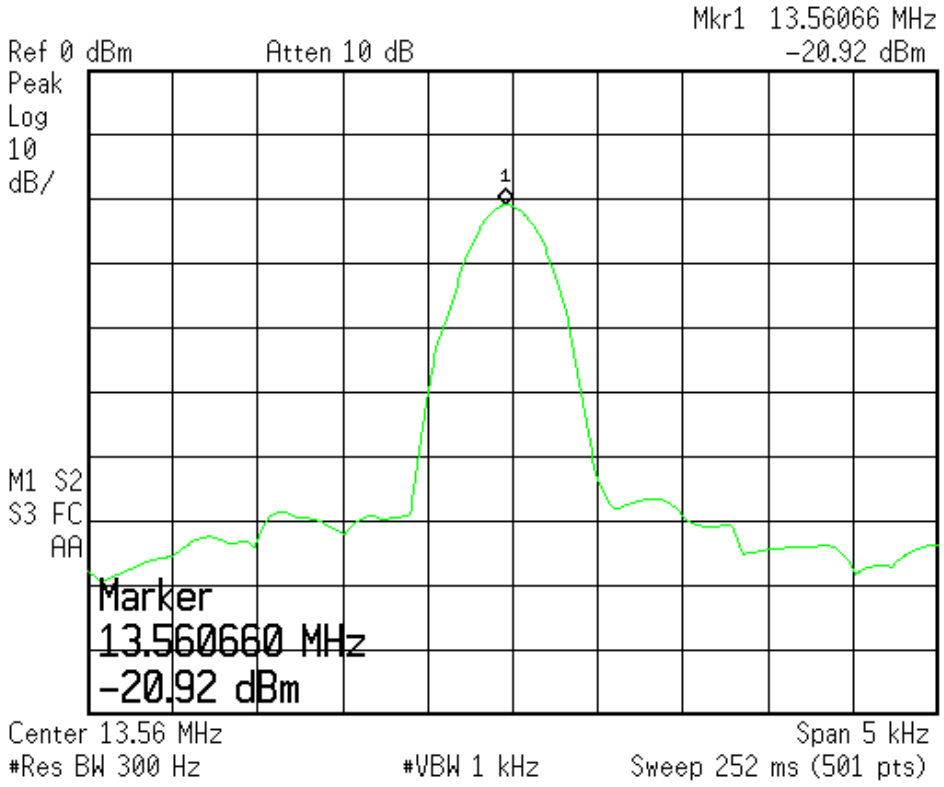
**20ºC, 5Vdc**



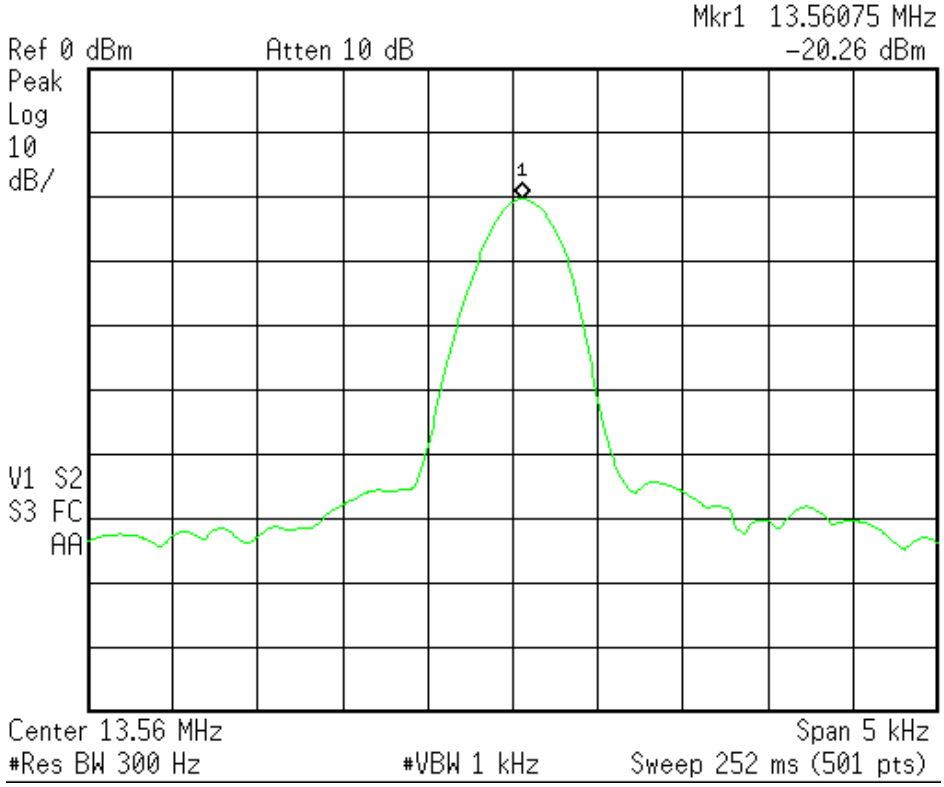

**20ºC, 5.75Vdc**



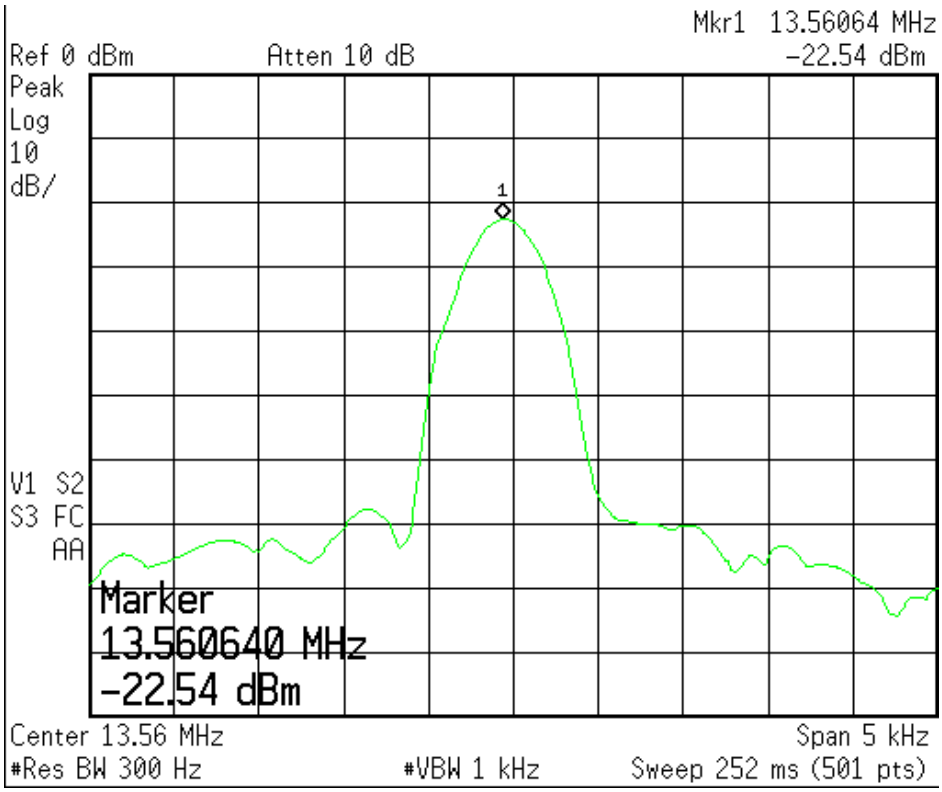
**20ºC, 4.53 Vdc**




**-20ºC, 5Vdc**



**50ºC, 5Vdc**


Mkr1 13.56064 MHz
Ref 0 dBm
Atten 10 dB
-22.54 dBm
Peak
Log
10
dB/
1
V1 S2
S3 FC
AA
Marker
13.560640 MHz
-22.54 dBm
Center 13.56 MHz
Span 5 kHz
#Res BW 300 Hz
#VBW 1 kHz
Sweep 252 ms (501 pts)

# 6. 20dB Bandwidth

**Test Result : PASS**

## 6.1 Applied Standard

According to 15.215(c) requires the device must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates.

According to 15.225, Operation should within the band 13.110 – 14.010 MHz.

## 6.2 Test Instruments

| Test Site and Equipment | Manufacturer | Model No./ Serial No. | Last Calibration Date | Calibration Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4405B/ MY45106706 | April 15, 2014 | April 15, 2015 |
| Test Site | N.A. | TR13 | NCR | NCR |

Note:

1.The calibrations are traceable to NML/ROC.

2.NCR : No Calibration Required.

### Instrument Setting

| RBW | VBW | Detector | Trace | Comment |
|---|---|---|---|---|
| 300Hz | 1kHz | Peak | Maxhold | |

### Climatic Condition

Ambient Temperature：25°C; Relative Humidity ：55%

## 6.3 Measurement Procedure

a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage described in the user's manual supported by the manufacturer in test site TR13.

b. Measure the 20dB bandwidth by using the spectrum analyzer and following the test conditions described in FCC 15.215.

c. Record the frequency and compare with the required limit.

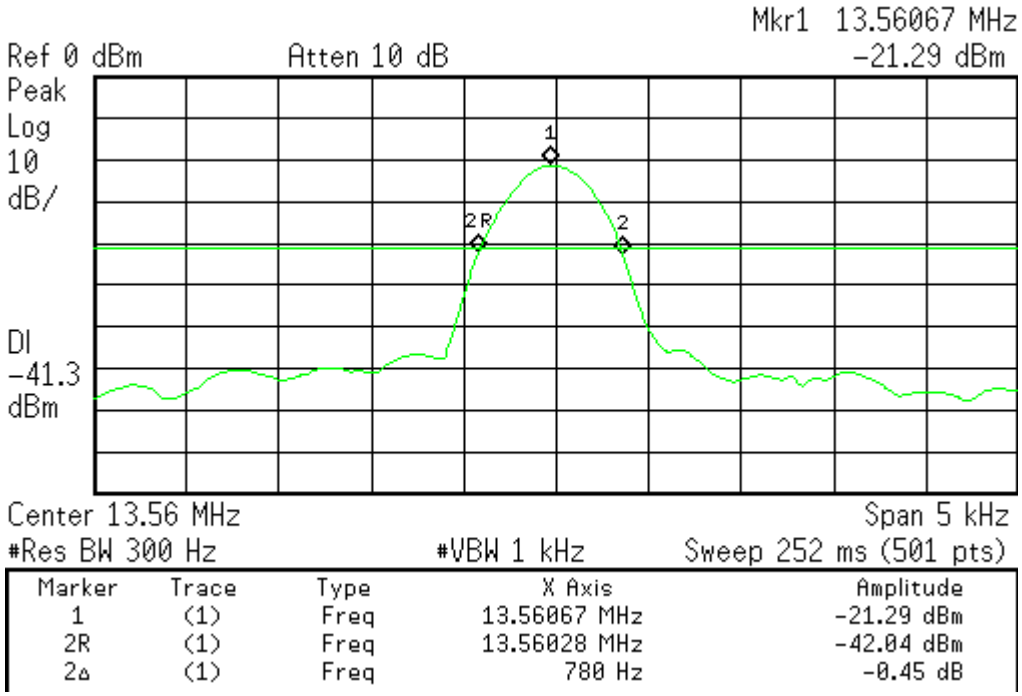
## 6.4 Test Configuration

## 6.5 Test Results

**Test Mode : Mode 1, Continuous Transmitting**

**Tester :** Bill

| Operating Frequency (MHz) | Limit (MHz) |
|---|---|
| 13.56 | 13.110~14.01 |



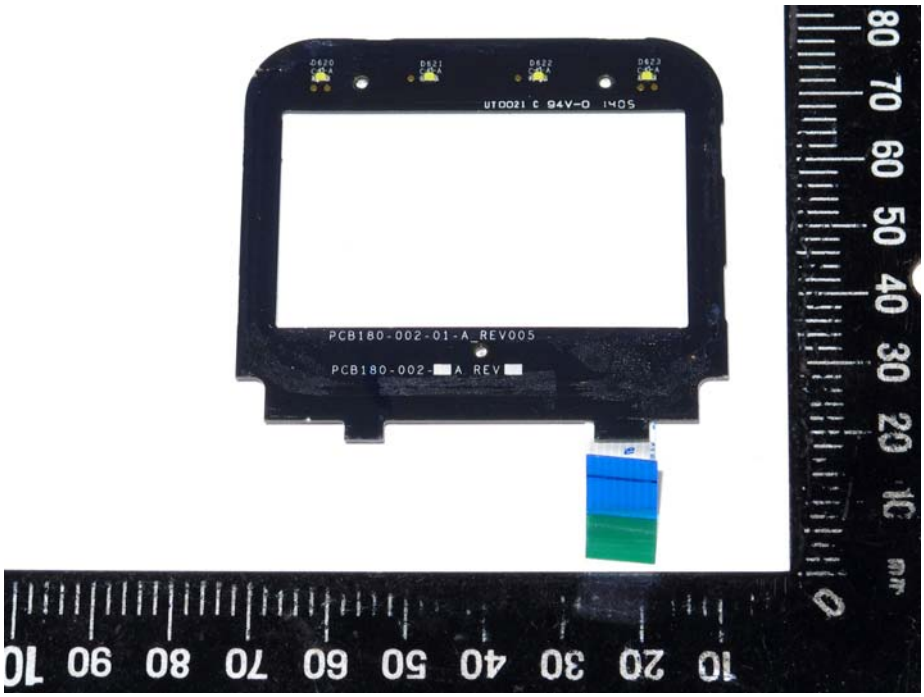
# 7. Antenna Requirement

## 7.1 Applied Standard

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 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

## 7.2 Antenna Type

The EUT use a permanently attached antenna




## 7.3 Applied Result

Comply the requirement.