



# FCC TEST REPORT

## Part 15 subpart C

### Client Information:

Applicant: SUNLUX IOT TECHNOLOGY(GUANGDONG) INC.

Applicant add.: RM.401, NO.7 KEHUI FIRST STREET, SCIENCE ROAD, SCIENCE CITY,  
LOUGANG DISTRICT, GUANGZHOU, CHINA.

### Product Information:

Product Name: Barcode Scanner

Model No.: XL-9530, XL-9529, XL-9528, XL-9310, XL-9309, XL-9300, XL-9322, XL-9200, XL-9539, XL-9538, XL-9228, XL-9038, XL-960, SCA-009

Brand Name: --

FCC ID: 2AK8MXL9530

**Standards:** CFR 47 PART Subpart C: 2017 section 15.225

**Test procedure used:** ANSI C63.10-2013

### Prepared By:

#### UL-CCIC Company Limited

Add. : Electronic Building, Parage Electronic Industrial Park, No. 8 Nanyun Er Road,  
Guangzhou Science Park, Guangzhou, 510663 China

Date of Receipt: Jan. 05, 2017

Date of Test: Mar. 17~ Mar.22, 2017

Date of Issue: Mar.27, 2017

Test Result: Pass

This device described above has been tested by Dongguan Yaxu(AiT) Technology Limited, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Reviewed by:

Approved by:



## 1 Version

| Revision Record |         |            |          |        |
|-----------------|---------|------------|----------|--------|
| Version         | Chapter | Date       | Modifier | Remark |
| 00              | --      | 2017-03-27 | --       | --     |
|                 |         |            |          |        |
|                 |         |            |          |        |



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### 3 Test Summary

| TEST                                  | TEST REQUIREMENT                | TEST METHOD                      | RESULT |
|---------------------------------------|---------------------------------|----------------------------------|--------|
| Radiated Emission<br>(9 kHz to 1 GHz) | FCC PART 15 C<br>section 15.225 | ANSI C 63.10:<br>Clasue 6.4, 6.5 | PASS   |
| Conduction Emissions                  | FCC PART 15 C<br>section 15.207 | ANSI C63.10:<br>Clause 6.2       | PASS   |
| Occupied Bandwidth                    | FCC PART 15 C<br>section 15.225 | ANSI C 63.10<br>Clasue 6.9       | PASS   |
| Frequency Stability                   | FCC PART 15 C<br>section 15.225 | ANSI C 63.10<br>Clasue 6.8       | PASS   |

**Remark:**

N/A: not applicable. Refer to the relative section for the details.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radio Frequency.

#### 3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, the maximum value of the uncertainty as below:

| No. | Item                         | Uncertainty |
|-----|------------------------------|-------------|
| 1   | Conducted Emission Test      | 1.20dB      |
| 2   | Radiated Emission Test       | 3.30dB      |
| 3   | RF power,conducted           | 0.16dB      |
| 4   | RF power density,conducted   | 0.24dB      |
| 5   | Spurious emissions,conducted | 0.21dB      |
| 6   | All emissions,radiated(<1G)  | 4.68dB      |
| 7   | All emissions,radiated(>1G)  | 4.89dB      |



## 4 Test Facility

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

**.CNAS- Registration No: L6177**

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2005 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Apr. 18, 2013

**.FCC- Registration No: 248337**

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Dongguan Yaxu (AiT) Technology Limited have been registered by Federal Communications Commission (FCC) on Aug.29, 2014.

**.Industry Canada(IC)-Registration No: IC6819A-1**

The 3m Semi-Anechoic Chamber and 3m of Dongguan Yaxu (AiT) Technology Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Oct. 01, 2014.

### 4.1 Deviation from standard

None

### 4.2 Abnormalities from standard conditions

None



## 5 General Information

### 5.1 General Description of EUT

|                                         |                                                                                                                                                                                                                                                                               |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Manufacturer:                           | SUNLUX IOT TECHNOLOGY(GUANGDONG) INC.                                                                                                                                                                                                                                         |
| Manufacturer Address:                   | RM.401, NO.7 KEHUI FIRST STREET, SCIENCE ROAD, SCIENCE CITY, LOUGANG DISTRICT, GUANGZHOU, CHINA.                                                                                                                                                                              |
| EUT Name:                               | Barcode Scanner                                                                                                                                                                                                                                                               |
| Model No.:                              | XL-9530                                                                                                                                                                                                                                                                       |
| Derivative model No.:                   | XL-9529, XL-9528, XL-9310, XL-9309, XL-9300, XL-9322, XL-9200, XL-9539, XL-9538, XL-9228, XL-9038, XL-960, SCA-009                                                                                                                                                            |
| Model Differences:                      | All models: XL-9530, XL-9529, XL-9528, XL-9310, XL-9309, XL-9300, XL-9322, XL-9200, XL-9539, XL-9538, XL-9228, XL-9038, XL-960, SCA-009 have same circuit diagram, PCB layout, voltage, power, have similar construction, only shape of enclosure and model number different. |
| Operation frequency:                    | 13.56MHz                                                                                                                                                                                                                                                                      |
| Modulation Technology:<br>Antenna Type: | The Tx is a ASK modulation by internal signal with a dedicated or integral antenna.                                                                                                                                                                                           |
| Antenna Gain:                           | Maximum 0 dBi                                                                                                                                                                                                                                                                 |
| Brand Name:                             | --                                                                                                                                                                                                                                                                            |
| H/W No.:                                | XL-9529_M_V1.2                                                                                                                                                                                                                                                                |
| S/W No.:                                | 00                                                                                                                                                                                                                                                                            |
| Serial No.:                             | N/A                                                                                                                                                                                                                                                                           |
| Power Supply Range:                     | DC 3.7V from battery                                                                                                                                                                                                                                                          |
| Power Supply:                           | DC 3.7V from battery                                                                                                                                                                                                                                                          |

### 5.2 Test Location

All tests were performed at:

Dongguan Yaxu (AiT) Technology Limited

No.22, Jinqianling Third Street, Jitigang, Huangjiang, Dongguan, Guangdong, China

Tel.: +86.769.82020499 Fax.: +86.769.82020495



## 6 Equipment Used during Test

| No                                                                                                                                                               | Test Equipment                      | Manufacturer | Model No         | Serial No  | Cal. Date  | Cal. Due Date |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------|------------------|------------|------------|---------------|
| 1                                                                                                                                                                | SIGNAL ANALYZER                     | R&S          | FSV40            | 101470     | 2016.06.29 | 2017.06.28    |
| 2                                                                                                                                                                | EMI Measuring Receiver              | R&S          | ESR              | 101660     | 2016.06.29 | 2017.06.28    |
| 3                                                                                                                                                                | Low Noise Pre Amplifier             | Tsj          | MLA-10K01-B01-27 | 1205323    | 2016.06.29 | 2017.06.28    |
| 4                                                                                                                                                                | TRILOG Super Broadband test Antenna | SCHWARZBECK  | VULB9160         | 9160-3206  | 2016.06.29 | 2017.06.28    |
| 5                                                                                                                                                                | 50Ω Coaxial Switch                  | Anritsu      | MP59B            | 6200264416 | 2016.06.29 | 2017.06.28    |
| 6                                                                                                                                                                | EMI Test Receiver                   | R&S          | ESCI             | 100124     | 2016.06.29 | 2017.06.28    |
| 7                                                                                                                                                                | LISN                                | Kyoritsu     | KNW-242          | 8-837-4    | 2016.06.29 | 2017.06.28    |
| 8                                                                                                                                                                | LISN                                | Kyoritsu     | KNW-407          | 8-1789-3   | 2016.06.29 | 2017.06.28    |
| 9                                                                                                                                                                | 50Ω Coaxial Switch                  | Anritsu      | MP59B            | 6200264417 | 2016.06.29 | 2017.06.28    |
| 10                                                                                                                                                               | Loop Antenna                        | ETS          | 6512             | 00165355   | 2016.06.29 | 2017.06.28    |
| 11                                                                                                                                                               | Radiated Cable 1#<br>(30MHz-1GHz)   | FUJIKURA     | 5D-2W            | 01         | 2016.12.25 | 2017.12.24    |
| 12                                                                                                                                                               | Radiated Cable 2#<br>(1GHz -25GHz)  | FUJIKURA     | 10D2W            | 02         | 2016.12.25 | 2017.12.24    |
| 13                                                                                                                                                               | Conducted Cable<br>1#(9KHz-30MHz)   | FUJIKURA     | 1D-2W            | 01         | 2016.12.25 | 2017.12.24    |
| 14                                                                                                                                                               | SMA Antenna<br>connector            | Dosin        | Dosin-SMA        | N/A        | N/A        | N/A           |
| Note: The SMA antenna connector is soldered on the PCB board in order to perform conducted tests and this SMA antenna connector is listed in the equipment list. |                                     |              |                  |            |            |               |



## 7 Test Results

### 7.1 E.U.T. test conditions

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Voltage:                         | DC 3.7 V (fully-charged battery)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Requirements:                         | <b>15.31(e)</b> : For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.                                                                                                                                                                            |
| Operating Environment:                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Temperature:                          | 22-25.0 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Humidity:                             | 48-55% RH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Atmospheric Pressure:                 | 1001-1010 mbar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Test frequencies and frequency range: | <p>According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:</p> <p>According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:</p> |

**Number of fundamental frequencies to be tested in EUT transmit band**

| Frequency range in which device operates | Number of frequencies | Location in frequency range of operation    |
|------------------------------------------|-----------------------|---------------------------------------------|
| 1 MHz or less                            | 1                     | Middle                                      |
| 1 MHz to 10 MHz                          | 2                     | 1 near top and 1 near bottom                |
| More than 10 MHz                         | 3                     | 1 near top, 1 near middle and 1 near bottom |

**Frequency range of radiated emission measurements**

| Lowest frequency generated in the device | Upper frequency range of measurement                                                                                    |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 9 kHz to below 10 GHz                    | 10 <sup>th</sup> harmonic of highest fundamental frequency or to 40 GHz, whichever is lower                             |
| At or above 10 GHz to below 30 GHz       | 5 <sup>th</sup> harmonic of highest fundamental frequency or to 100 GHz, whichever is lower                             |
| At or above 30 GHz                       | 5 <sup>th</sup> harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified |

Remark: Test frequency is 13.56 MHz.

## 7.2 Antenna Requirement

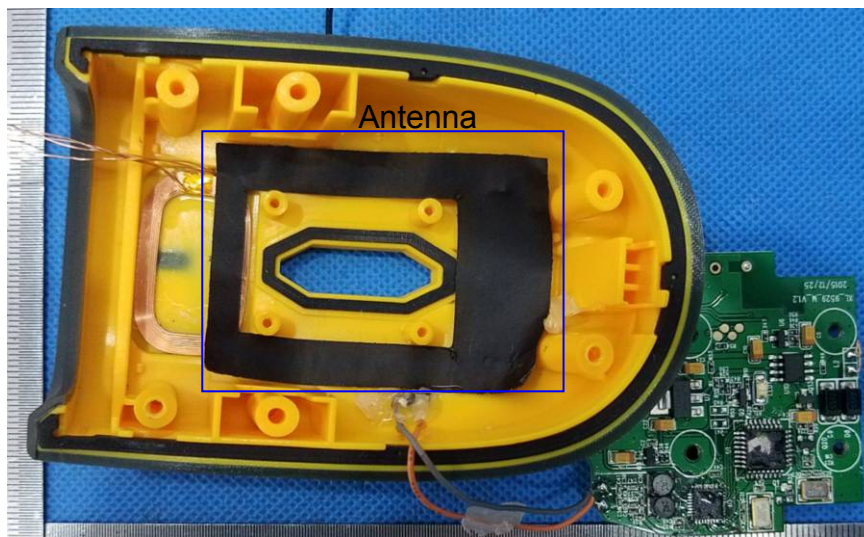
### Standard requirement

15.203 requirement:

For intentional device. According to 15.203, 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.

### EUT Antenna

The antenna is an ISM Band Loop Antenna and no consideration of replacement. The best case gain of the antenna is 0 dBi.



**Test result:** The unit does meet the FCC requirements.

### 7.3 Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

**Test Requirement:** FCC Part 15 C section 15.207  
**Test Method:** ANSI C63.10: Clause 6.2  
**Frequency Range:** 150 kHz to 30 MHz  
**Detector:** Peak for pre-scan (9 kHz Resolution Bandwidth)  
**Test Limit**

**Limits for conducted disturbance at the mains ports of class B**

| Frequency Range<br>(MHz) | Class B Limit dB( $\mu$ V) |          |
|--------------------------|----------------------------|----------|
|                          | Quasi-peak                 | Average  |
| 0.15 to 0.50             | 66 to 56                   | 56 to 46 |
| 0.50 to 5                | 56                         | 46       |
| 5 to 30                  | 60                         | 50       |

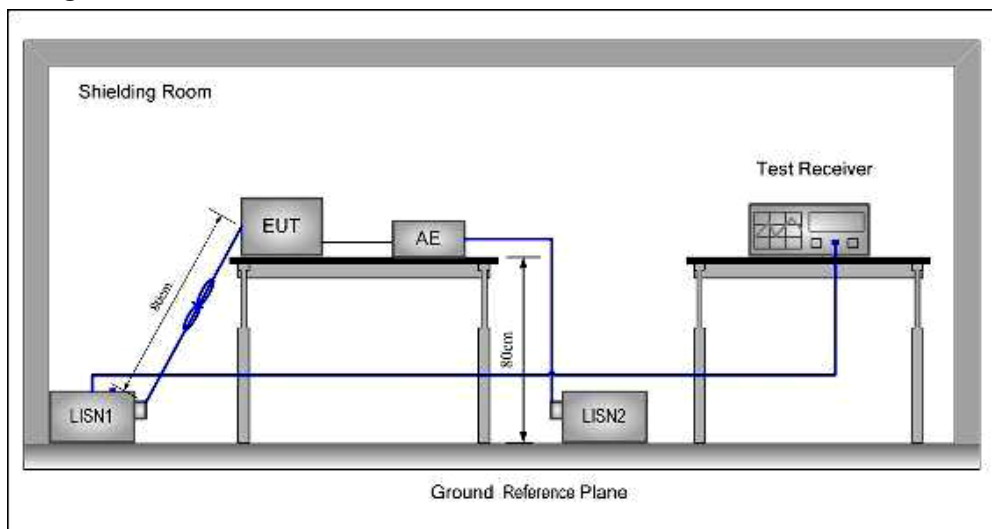
NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

#### EUT Operation:

Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

#### Test Configuration:





**Test procedure:**

1. The mains terminal disturbance voltage test was conducted in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a  $50\Omega/50\mu\text{H} + 5\Omega$  linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

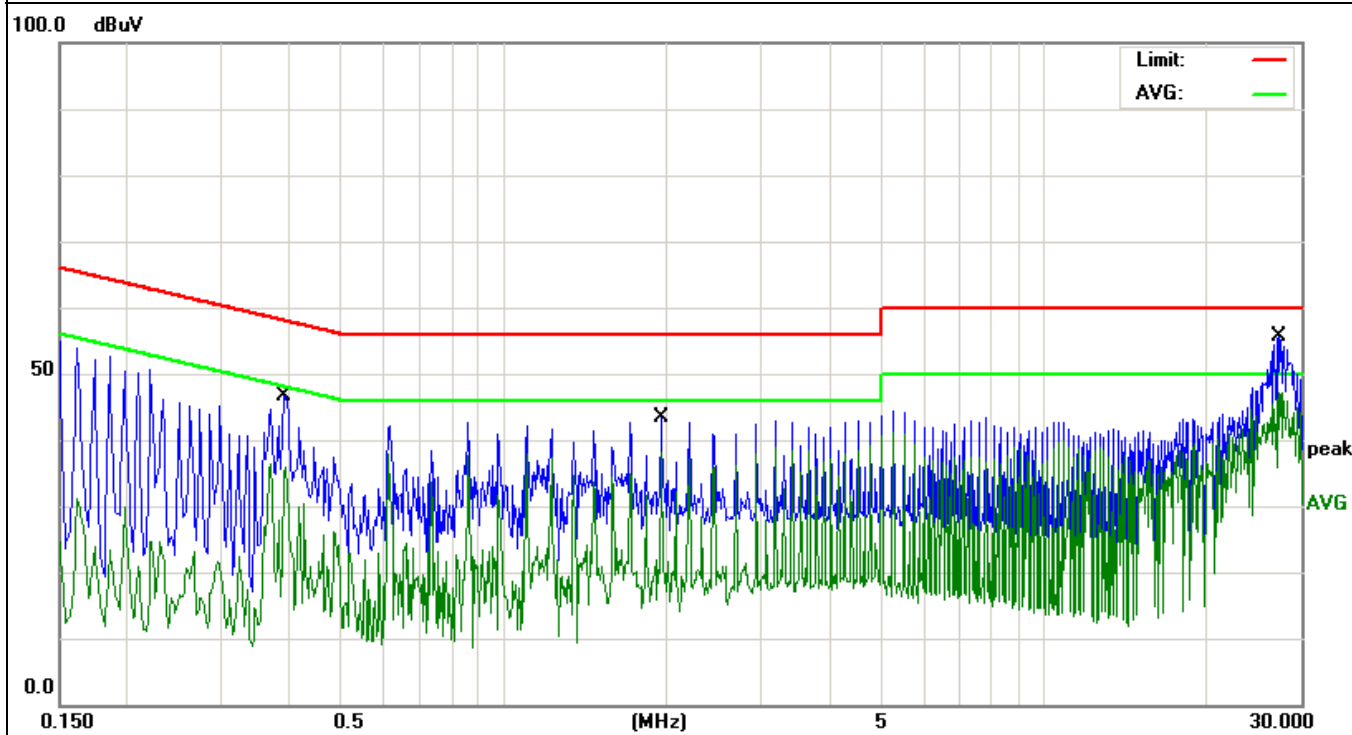


## 1. Test results

|                |                                                             |                     |            |
|----------------|-------------------------------------------------------------|---------------------|------------|
| EUT :          | Barcode Scanner                                             | Model Name. :       | XL-9530    |
| Temperature :  | 26 °C                                                       | Relative Humidity : | 54%        |
| Pressure :     | 1010hPa                                                     | Test Date :         | 2017-03-20 |
| Test Mode :    | TX mode (worst case)                                        | Phase :             | Line       |
| Test Voltage : | DC 12V from adapter(for receiver), AC 120V/60Hz for adapter |                     |            |

| Frequency (MHz) | Meter Reading (dBμV) | Factor(dB) | Emission Level (dBμV) | Limits (dBμV) | Margin (dB) | Detector   |
|-----------------|----------------------|------------|-----------------------|---------------|-------------|------------|
| 0.3891          | 36.23                | 10.13      | 46.36                 | 58.08         | -11.72      | Quasi-Peak |
| 0.3891          | 26.07                | 10.13      | 36.20                 | 48.08         | -11.88      | Average    |
| 1.9638          | 31.56                | 9.99       | 41.55                 | 56.00         | -14.45      | Quasi-Peak |
| 1.9638          | 25.17                | 9.99       | 35.16                 | 46.00         | -10.84      | Average    |
| 27.3061         | 40.16                | 2.05       | 42.21                 | 60.00         | -17.79      | Quasi-Peak |
| 27.3061         | 29.95                | 2.05       | 32.00                 | 50.00         | -18.00      | Average    |

Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

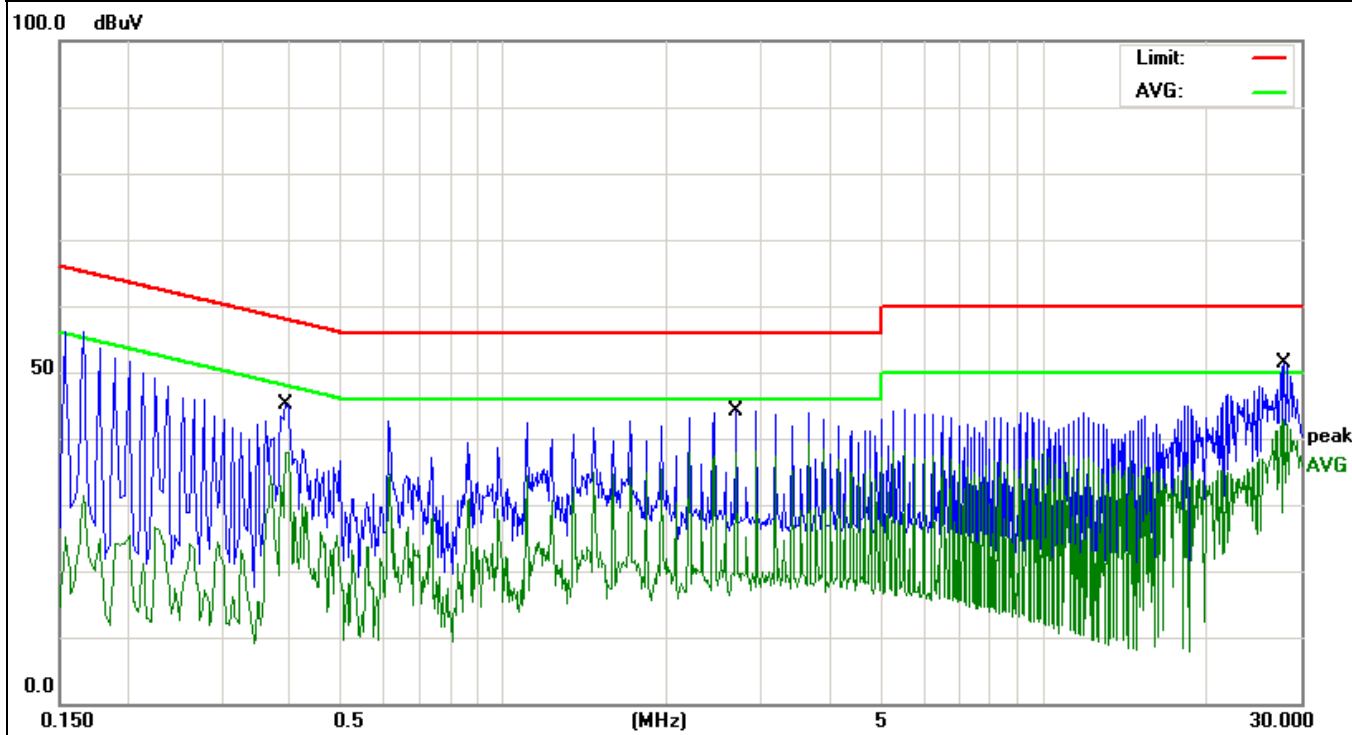




|               |                                                             |                     |            |
|---------------|-------------------------------------------------------------|---------------------|------------|
| EUT :         | Barcode Scanner                                             | Model Name. :       | XL-9530    |
| Temperature : | 26 °C                                                       | Relative Humidity : | 54%        |
| Pressure :    | 1010hPa                                                     | Test Date :         | 2017-03-10 |
| Test Mode :   | TX mode (worst case)                                        | Phase :             | Neutral    |
| Test Voltage: | DC 12V from adapter(for receiver), AC 120V/60Hz for adapter |                     |            |

| Frequency (MHz) | Meter Reading (dBμV) | Factor(dB) | Emission Level (dBμV) | Limits (dBμV) | Margin (dB) | Detector   |
|-----------------|----------------------|------------|-----------------------|---------------|-------------|------------|
| 0.3941          | 34.10                | 10.13      | 44.23                 | 57.98         | -13.75      | Quasi-Peak |
| 0.3941          | 28.00                | 10.13      | 38.13                 | 47.98         | -9.85       | Average    |
| 2.6947          | 32.59                | 10.02      | 42.61                 | 56.00         | -13.39      | Quasi-Peak |
| 2.6947          | 27.52                | 10.02      | 37.54                 | 46.00         | -8.46       | Average    |
| 27.9188         | 48.95                | 2.01       | 50.96                 | 60.00         | -9.04       | Quasi-Peak |
| 27.9188         | 39.86                | 2.01       | 41.87                 | 50.00         | -8.13       | Average    |

Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.





## 7.4 Radiated Emissions

**Test Requirement:** FCC Part 15 C section 15.225

**Test Method:** ANSI C63.10: Clause 6.4, 6.5

**Measurement Distance:** 3 m (Semi-Anechoic Chamber)

**Test Status:** Test in transmitting mode.

**Requirements:**

the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

**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.i.e. **124.0dB $\mu$ V/m @ 3 m.**

**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. i.e. **90.5dB $\mu$ V/m @ 3 m.**

**15.225l:** 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. i.e. **80.5dB $\mu$ V/m @ 3 m.**

**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

Out of band emissions shall not exceed:

| Frequency range (MHz)                                | Quasi-peak limits(dB $\mu$ V/m) |
|------------------------------------------------------|---------------------------------|
| 0.009-0.49                                           | 128.5-93.8                      |
| 0.49-1.705                                           | 73.8-63.0                       |
| 1.705 - 30.0                                         | 69.5                            |
| 30 to 88                                             | 40.0                            |
| 88 to 216                                            | 43.5                            |
| 216 to 960                                           | 46.0                            |
| Above 960                                            | 54.0                            |
| At transitional frequencies the lower limit applies. |                                 |

**Test Procedure:**

1) 9 kHz to 30 MHz emissions:

For testing performed with the loop antenna. The center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specied distance from the EUT.During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

2) 30 MHz to 1 GHz emissions:

For testing performed with the bi-log type antenna. The measurement is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

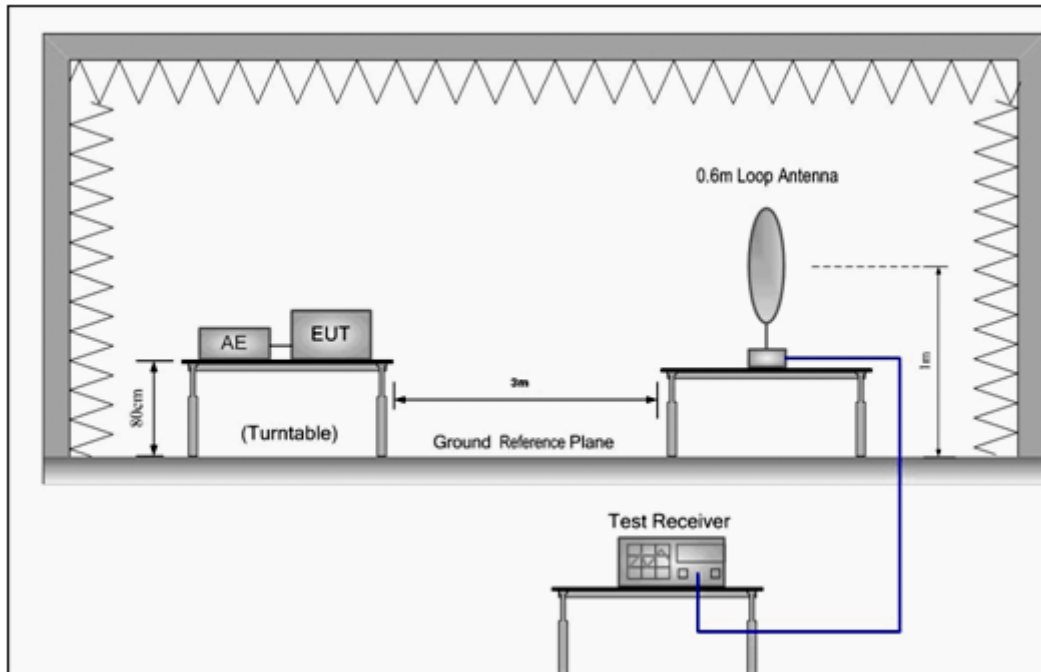
Pre-test the EUT in continuous transmitting mode with setup as stand-alone in X, Y, Z threes axes, found the worst case is Y axes and report the data.

**Detector** Peak for pre-scan

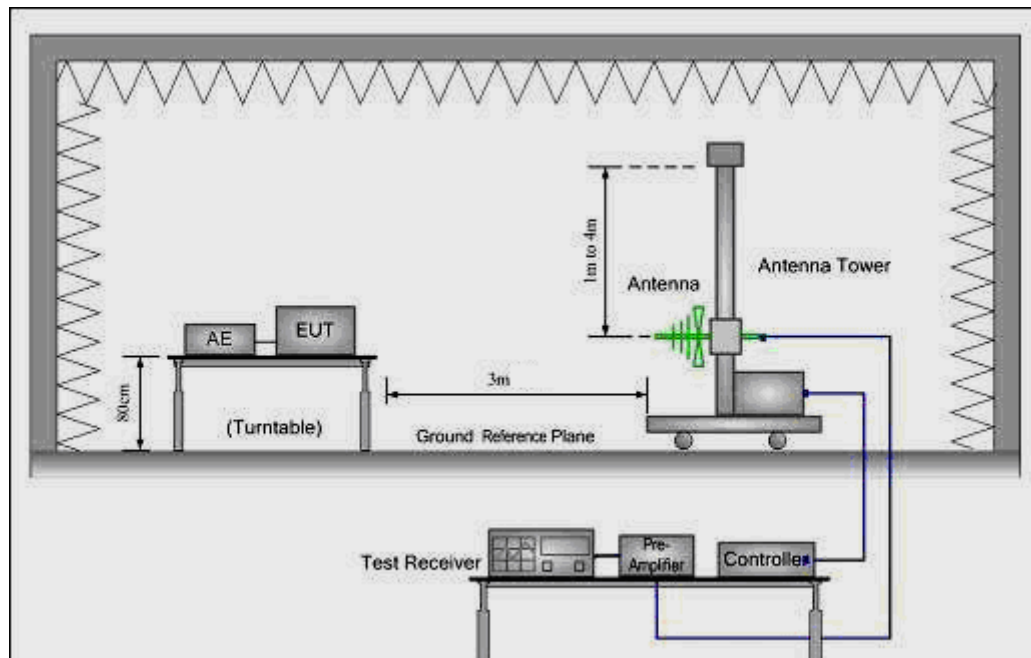
| Test Receiver test setup | Detector      |                |                 |
|--------------------------|---------------|----------------|-----------------|
|                          | 9 kHz-150 kHz | 150 kHz-30 MHz | 30 MHz-1000 MHz |
| RBW                      | 200 Hz        | 9 kHz          | 120 kHz         |
| VBW                      | ≥ RBW         | ≥ RBW          | ≥ RBW           |
| Sweep                    | auto          | auto           | auto            |
| Detector function        | QP            | QP             | QP              |
| Trace                    | max hold      | max hold       | max hold        |

### Test Configuration:

- 1) 9 kHz to 30 MHz emissions:



- 2) 30 MHz to 1 GHz emissions:



**2. Intentional Emission and Spectrum Mask**

| Test Frequency<br>(MHz) | Quasi-Peak (dB $\mu$ V/m) |            | Limits<br>(dB $\mu$ V/m) | Over Limit (dB) |            |
|-------------------------|---------------------------|------------|--------------------------|-----------------|------------|
|                         | Vertical                  | Horizontal |                          | Vertical        | Horizontal |
| 13.11                   | 12.40                     | 13.80      | 69.50                    | -57.10          | -55.70     |
| 13.41                   | 15.80                     | 16.80      | 80.50                    | -64.70          | -63.70     |
| 13.551                  | 23.60                     | 21.50      | 90.50                    | -66.90          | -69.00     |
| 13.562                  | 38.90                     | 38.40      | 124.00                   | -85.10          | -85.60     |
| 13.565                  | 40.80                     | 42.10      | 90.50                    | -49.70          | -48.40     |
| 13.71                   | 12.80                     | 14.60      | 80.50                    | -67.70          | -65.90     |
| 14.01                   | 21.10                     | 22.20      | 69.50                    | -48.40          | -47.30     |

**3. Spurious Emission: below 30 MHz**

| Test Frequency<br>(MHz) | Quasi-Peak (dB $\mu$ V/m) |            | Limits<br>(dB $\mu$ V/m) | Over Limit (dB) |            |
|-------------------------|---------------------------|------------|--------------------------|-----------------|------------|
|                         | Vertical                  | Horizontal |                          | Vertical        | Horizontal |
| 2.254                   | 25.70                     | 26.50      | 69.50                    | -43.80          | -43.00     |
| 10.247                  | 25.70                     | 26.50      | 69.50                    | -43.80          | -43.00     |
| 27.12                   | 25.70                     | 26.50      | 69.50                    | -43.80          | -43.00     |

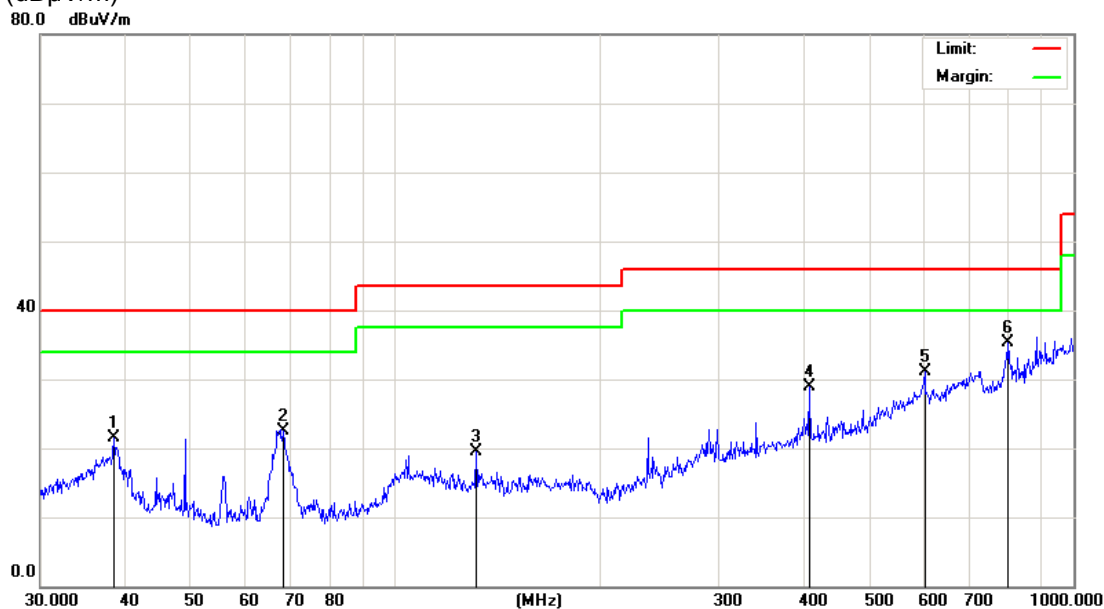


#### 4. Spurious Emission: above 30 MHz

Vertical:

Peak scan

Level (dB $\mu$ V/m)



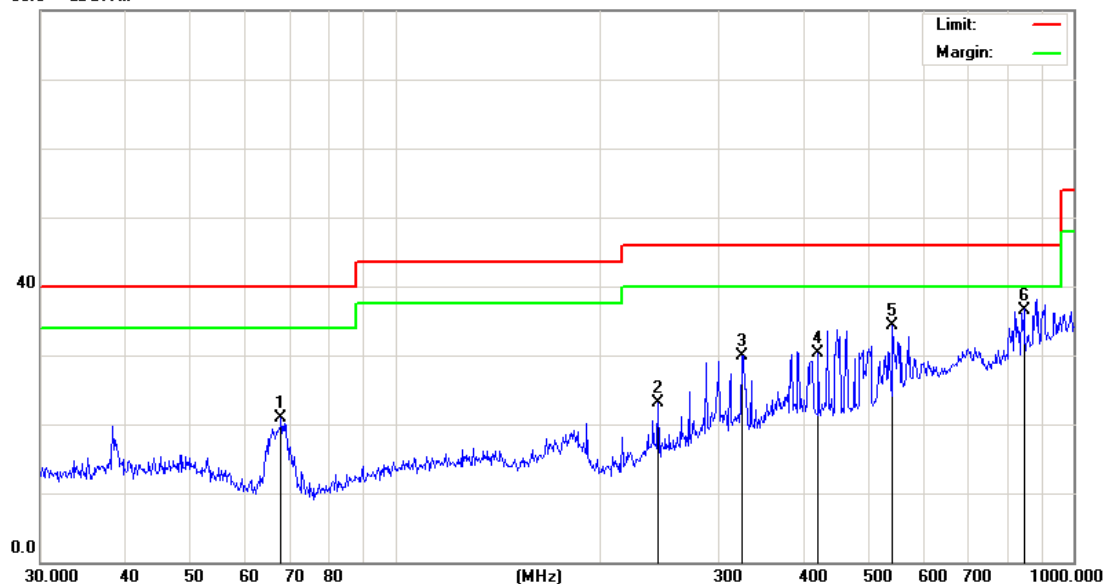
Quasi-peak measurement

| No. | Mk. | Freq.    | Reading    | Correct | Measure-     | Limit        | Over   |          |
|-----|-----|----------|------------|---------|--------------|--------------|--------|----------|
|     |     | MHz      | Level      | Factor  | ment         |              |        | Detector |
|     |     |          | dB $\mu$ V | dB      | dB $\mu$ V/m | dB $\mu$ V/m | dB     |          |
| 1   |     | 38.4808  | 38.16      | -16.66  | 21.50        | 40.00        | -18.50 | QP       |
| 2   |     | 68.3906  | 41.47      | -19.06  | 22.41        | 40.00        | -17.59 | QP       |
| 3   |     | 131.7572 | 34.45      | -14.85  | 19.60        | 43.50        | -23.90 | QP       |
| 4   |     | 407.5144 | 35.26      | -6.45   | 28.81        | 46.00        | -17.19 | QP       |
| 5   |     | 603.5392 | 32.21      | -1.16   | 31.05        | 46.00        | -14.95 | QP       |
| 6   | *   | 801.7862 | 32.09      | 3.30    | 35.39        | 46.00        | -10.61 | QP       |



Horizontal:

Peak scan

Level (dB $\mu$ V/m)80.0 dB $\mu$ V/m

Quasi-peak measurement

| No. | Mk. | Freq.    | Reading Level | Correct Factor | Measurement  | Limit        | Over   |
|-----|-----|----------|---------------|----------------|--------------|--------------|--------|
|     |     | MHz      | dB $\mu$ V    | dB             | dB $\mu$ V/m | dB $\mu$ V/m | dB     |
| 1   |     | 67.9128  | 39.23         | -18.33         | 20.90        | 40.00        | -19.10 |
| 2   |     | 244.2321 | 37.08         | -14.00         | 23.08        | 46.00        | -22.92 |
| 3   |     | 324.4560 | 38.75         | -8.75          | 30.00        | 46.00        | -16.00 |
| 4   |     | 420.5803 | 36.84         | -6.63          | 30.21        | 46.00        | -15.79 |
| 5   |     | 541.3721 | 38.54         | -4.14          | 34.40        | 46.00        | -11.60 |
| 6   | *   | 845.0878 | 35.46         | 1.14           | 36.60        | 46.00        | -9.40  |

The field strength is calculated by adding the Antenna Factor, Cable Factor & Peramplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor - Peramplifier Factor.

Remark:

According to 15.35 (b) When average radiated emission measurements are specified in the regulations, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules, e.g., see Section 15.255.



## 7.5 Occupied Bandwidth

**Test Requirement:** FCC Part 15 C section 15.215  
**Test Method:** ANSI C63.10: Clause 6.9  
Operation within the band 13.110 –14.010 MHz  
**Test Status:** Test in transmitting mode.

### Requirements:

15.215(c), Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the 20 dB bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### Test Procedure:

The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector. Record the 20 dB bandwidth of the carrier.

The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector. The vertical Scale is set to 10dB per division. The horizontal scale is set to 20 kHz per division. Read the down 20dB bandwidth of the carrier.

Set the spectrum analyzer: Span = 50 kHz

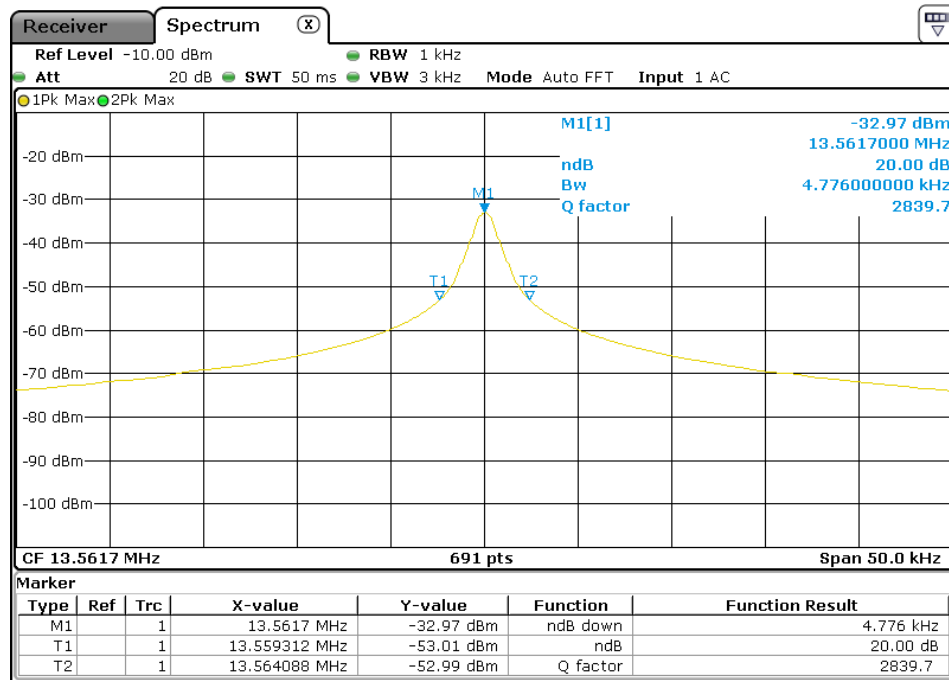
Set the spectrum analyzer: RBW = 1 kHz, VBW = 3 kHz

Sweep = auto; Detector Function = Peak. Trace = Max Hold.

Mark the peak frequency and -20dB points bandwidth.



Test plot as below:



20dB bandwidth lower frequency : 13.559312 MHz

20dB bandwidth upper frequency : 13.564088 MHz



## 7.6 Frequency Stability

**Test Requirement:** FCC Part 15 C section 15.225 (e)

**Test Method:** ANSI C63.10: Clause 6.8

**Test Status:** Test in transmitting mode.

**Requirements:**

**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.

**Test Procedure:**

1. The EUT was turn-up.
2. With all power removed, the temperature was decreased to -20°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
3. The temperature tests were performed for the worst case.
4. Variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C. The maximum frequency change was recorded.

**Test Result:**

Operating Frequency: 13.56000 MHz,

Limit: total emission within +/- 1.356kHz(+/- 0.01% of the operating frequency)

| Frequency stability vs. temperature |                          |                                                                  |
|-------------------------------------|--------------------------|------------------------------------------------------------------|
| Environment Temperature (°C)        | Measured Frequency (MHz) | Frequency Measure with Time Elapsed<br>Total emission within kHz |
| 50                                  | 13.56003                 | +0.03                                                            |
| 40                                  | 13.56004                 | +0.04                                                            |
| 30                                  | 13.56003                 | 0.03                                                             |
| 20                                  | 13.56000                 | reference                                                        |
| 10                                  | 13.56001                 | +0.01                                                            |
| 0                                   | 13.55998                 | -0.02                                                            |
| -10                                 | 13.55991                 | -0.09                                                            |
| -20                                 | 13.55993                 | -0.07                                                            |

| Frequency stability vs. input voltage |                          |                                                                      |
|---------------------------------------|--------------------------|----------------------------------------------------------------------|
| Power Supplied (Vdc)                  | Measured Frequency (MHz) | Frequency Measure with Time Elapsed<br>Total emission within Max kHz |
| 3.145                                 | 13.56001                 | 0.01                                                                 |
| 3.700                                 | 13.56000                 | reference                                                            |
| 4.070                                 | 13.56001                 | 0.01                                                                 |
| 4.255                                 | 13.56002                 | +0.02                                                                |

## 8 Photographs

### 8.1 Radiated Emission & Fundamental Emission (below 30 MHz)



### 8.2 Radiated Emission (30 MHz-1 GHz)



### 8.3 Conducted Emission Test Setup





#### **8.4 EUT Constructional Details**

Please refer to report No. 4787815735-1.

**--The End of Report--**