# FCC TEST REPORT

FOR

Technaxx Deutshland GmbH & Co., KG

Bluetooth FM Transmitter

Model No.: FMT900

Additional Model No.: BT20

| | | |
|---|---|---|
| Prepared for | : | Technaxx Deutshland GmbH & Co., KG |
| Address | : | Kruppstrasse 105 60388 Frankfurt am Main Germany |
| Prepared by | : | Shenzhen LCS Compliance Testing Laboratory Ltd. |
| Address | : | 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China |
| Tel | : | (+86)755-82591330 |
| Fax | : | (+86)755-82591332 |
| Web | : | www.LCS-cert.com |
| Mail | : | webmaster@LCS-cert.com |
| Date of receipt of test sample | : | November 29, 2018 |
| Number of tested samples | : | 2 |
| Serial number | : | Prototype |
| Date of Test | : | November 29, 2018~January 17, 2019 |
| Date of Report | : | January 17, 2019 |

# FCC TEST REPORT

## FCC CFR 47 PART 15.239

| | | |
|---|---|---|
| **Report Reference No. ..... :** | | **LCS181129015AEB** |
| Date of Issue ..... : | | January 17, 2019 |
| **Testing Laboratory Name ..... :** | | **Shenzhen LCS Compliance Testing Laboratory Ltd.** |
| Address ..... : | | 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China |
| Testing Location/ Procedure..... : | | Full application of Harmonised standards ■<br>Partial application of Harmonised standards □<br>Other standard testing method □ |
| **Applicant's Name..... :** | | **Technaxx Deutshland GmbH & Co., KG** |
| Address ..... : | | Kruppstrasse 105 60388 Frankfurt am Main Germany |
| **Test Specification** | | |
| Standard..... : | | FCC CFR 47 Part 15.239 |
| Test Report Form No. ..... : | | LCSEMC-1.0 |
| TRF Originator ..... : | | Shenzhen LCS Compliance Testing Laboratory Ltd. |
| Master TRF ..... : | | Dated 2011-03 |



| | | |
|---|---|---|
| **Test Item Description. ..... :** | | **Bluetooth FM Transmitter** |
| Trade Mark..... : | | N/A |
| Model/ Type reference..... : | | FMT900 |
| Ratings ..... : | | Input: DC 12-24V<br>USB Output1: DC 5V, 2.4A; USB Output2: DC 5V, 1A |
| **Result ..... :** | | **Positive** |

| Compiled by: | Supervised by: | Approved by: |
|---|---|---|
| Dick Su | Calvin Weng | Gavin Liang |
| Dick Su / File administrators | Calvin Weng / Technique principal | Gavin Liang/ Manager |

# FCC -- TEST REPORT

| | |
|---|---|
| **Test Report No. :** **LCS181129015AEB** | January 17, 2019<br>Date of issue |

| | |
|---|---|
| Type / Model..... | : FMT900 |
| EUT..... | : Bluetooth FM Transmitter |
| **Applicant.....** | **: Technaxx Deutshland GmbH & Co., KG** |
| Address..... | : Kruppstrasse 105 60388 Frankfurt am Main Germany |
| Telephone..... | : / |
| Fax..... | : / |
| **Manufacturer.....** | **: Technaxx Deutshland GmbH & Co., KG** |
| Address..... | : Kruppstrasse 105 60388 Frankfurt am Main Germany |
| Telephone..... | : / |
| Fax..... | : / |
| **Factory.....** | : **Technaxx Deutshland GmbH & Co., KG** |
| Address..... | : Kruppstrasse 105 60388 Frankfurt am Main Germany |
| Telephone..... | : / |
| Fax..... | : / |

| | |
|---|---|
| **Test Result** | **Positive** |

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

# Revision History

| Revision | Issue Date | Revisions | Revised By |
|---|---|---|---|
| 00 | January 17, 2019 | Initial Issue | Gavin Liang |
| | | | |
| | | | |

# TABLE OF CONTENTS

# 1. GENERAL INFORMATION

## 1.1 Description of Device (EUT)

| | | |
|---|---|---|
| EUT | : | Bluetooth FM Transmitter |
| Test Model | : | FMT900 |
| Additional Model No. | : | BT20 |
| Model Declaration | : | PCB board, structure and internal of these model(s) are the same, Only the model name is different for these models. |
| Power Supply | : | Input: DC 12-24V<br>USB Output1: DC 5V, 2.4A; USB Output2: DC 5V, 1A |
| Hardware version | : | V1.5 |
| Software version | : | V1.0 |
| Bluetooth | : | |
| Operation frequency | : | 2402 – 2480 MHz |
| Bluetooth Version | : | V2.1 |
| Bluetooth Channel Number | : | 79 Channels |
| Bluetooth Channel Spacing | : | 1MHz |
| Bluetooth Modulation Type | : | GFSK, π/4-DQPSK |
| Antenna Description | : | PCB Antenna, -0.68 dBi |
| FM | : | |
| Frequency Range | : | 88.1~107.9MHz |
| Channel number | : | 199 |
| Channel Spacing | : | 100KHz |
| Channel frequency | : | 88.1~107.9 MHz(Channel Number: 199,<br>Channel Frequency=88.1+0.1(K-1), K=1, 2, 3 ……199) |
| Modulation Type | : | FM |
| Antenna Gain | : | Internal antenna, 1.0dBi (Max.) |

## 1.2. Host System Configuration List and Details

| Manufacturer | Description | Model | Serial Number | Certificate |
|---|---|---|---|---|
| -- | -- | -- | -- | -- |

## 1.3. External I/O Cable

| I/O Port Description | Quantity | Cable |
|---|---|---|
| USB | 1 | N/A |
| TF Card Slot | 1 | N/A |

## 1.4. Description of Test Facility

FCC Registration Number. is 254912.

Industry Canada Registration Number. is 9642A-1.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

NVLAP Registration Code is 600167-0

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

## 1.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

## 1.6. Measurement Uncertainty

| Test Item | | Frequency Range | Uncertainty | Note |
|---|---|---|---|---|
| Radiation Uncertainty | : | 9KHz~30MHz | ±3.10dB | (1) |
| | | 30MHz~200MHz | ±2.96dB | (1) |
| | | 200MHz~1000MHz | ±3.10dB | (1) |
| | | 1GHz~26.5GHz | ±3.80dB | (1) |
| | | 26.5GHz~40GHz | ±3.90dB | (1) |
| Conduction Uncertainty | : | 150kHz~30MHz | ±1.63dB | (1) |
| Power disturbance | : | 30MHz~300MHz | ±1.60dB | (1) |

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 1.7 Description Of Test Modes

The FM Transmitter is powered by a battery which is DC 12V. In the audio port and MIC port give a 2.5 kHz tone at a level 16 dB higher than that required to produce a frequency deviation of +/-37.5KHz kHz and make it works in TX mode(88.1MHz, 98.1MHz and 107.9MHz).

# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR PART 15C 15.207, 15.209 and 15.239.

## 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

## 2.2 EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209, 15.239 under the FCC Rules Part 15 Subpart C.

## 2.3 General Test Procedures

### 2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

### 2.3.2 Radiated Emissions

The EUT is placed on a turn table 0.8 meter above ground for below 1GHz and 1.5m for above 1GHz. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013.

## 2.4. Test Sample

The application provides 2 samples to meet requirement;

| Sample Number | Description |
|---|---|
| Sample 1 | Engineer sample – continuous transmit with RF connector |
| Sample 2 | Engineer sample – continuous transmit with antenna |

# 3. SYSTEM TEST CONFIGURATION

## 3.1 Justification

The system was configured for testing in a continuous transmit condition.

## 3.2 EUT Exercise Software

N/A.

## 3.3 Special Accessories

N/A.

## 3.4 Block Diagram/Schematics

Please refer to the related document.

## 3.5 Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

## 3.6 Test Setup

Please refer to the test setup photo.

# 4. SUMMARY OF TEST RESULTS

| Applied Standard: FCC Part 15 Subpart C: §15.239 | | | | |
|---|---|---|---|---|
| FCC Rules | Description of Test | Test Sample | Result | Remark |
| §15.239(a) | 99% and 20dB Occupied Bandwidth | Sample 1 | Compliant | Note 1 |
| §15.239(b) | Field strength of fundamental | Sample 1 | Compliant | Note 1 |
| §15.239(c)<br>§15.209 | Radiated Emission | Sample 1 | Compliant | Note 1 |
| §15.207 | AC Conducted Emissions | Sample 1 | N/A* | Note 3 |
| §15.203 | Antenna Requirements | Sample 1 | Compliant | Note 1 |
| §15.247(i)§2.1093 | RF Exposure | -/- | Compliant | Note 2 |

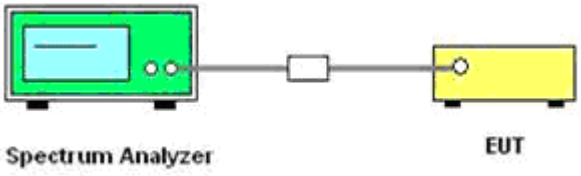
*Remark:*
*1. Note 1 – Test results inside test report;*
*2. Note 2 – Test results in other test report (RF Exposure Evaluation).*
*3. Note 3 – Not Applicable!!!*

# 5. 99% and 20 dB Bandwidth

5.1 Limit

According to §15.239 (a) Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

5.2 Block Diagram of Test Setup




5.3 Test Procedure

a. Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel.

b. RBW ≥1% of the 20dB bandwidth

c. VBW ≥RBW.

d. Detector function = peak.

e. Trace = max hold.

5.4 Test Results

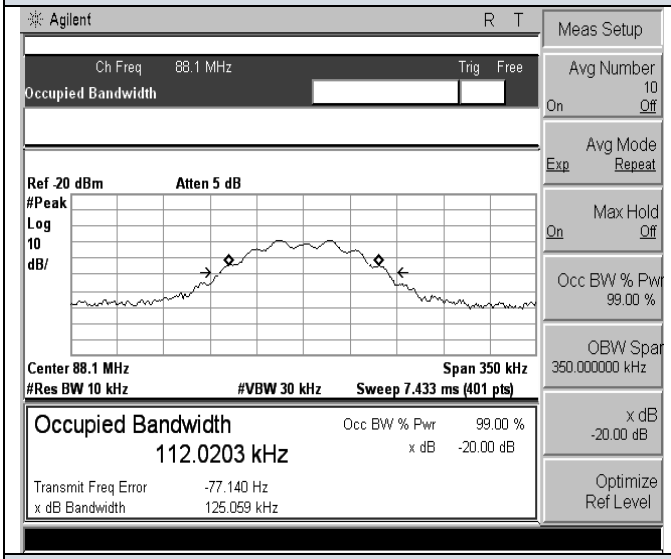
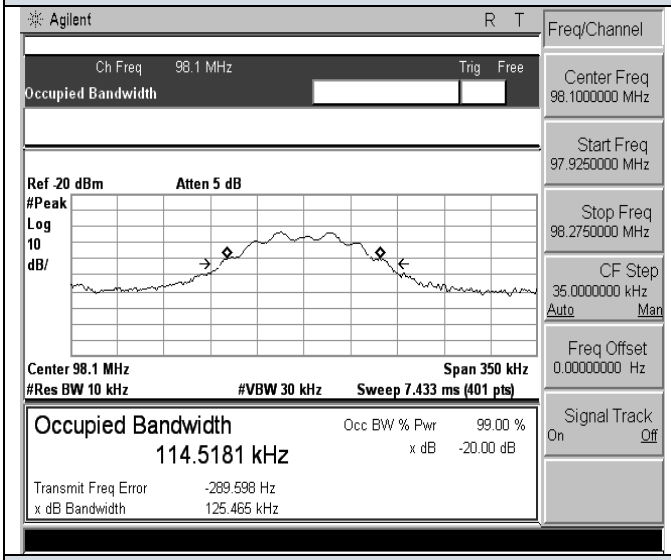
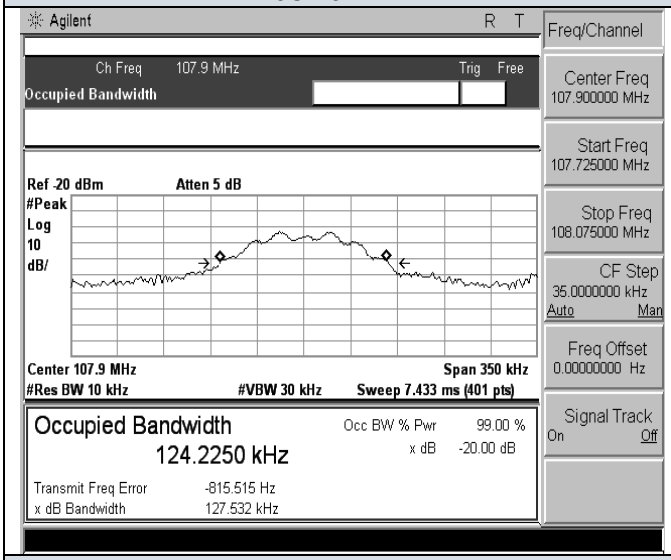
*PASS*

| Frequency (MHz) | 99% Occupied Bandwidth (KHz) | 20dB Bandwidth (KHz) | Limit (KHz) | Conclusion |
|---|---|---|---|---|
| 88.1 | 112.0203 | 125.059 | 200 | Pass |
| 98.1 | 114.5181 | 125.465 | 200 | Pass |
| 107.9 | 124.2250 | 127.532 | 200 | Pass |

*Remark:*

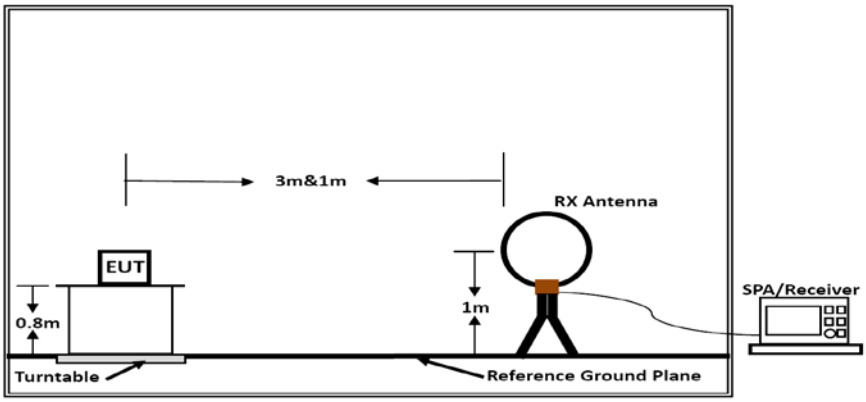
*1) Test results including cable loss;*

*2) Please refer to following test plots;.*

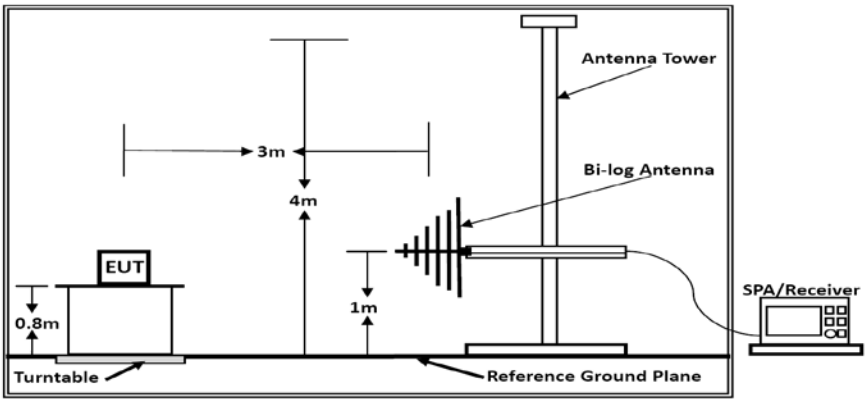
| 99% and 20dB Bandwidth | |
|---|---|
| FM | |
|  | |
| 88.10 MHz | |
|  | |
| 98.10 MHz | |
|  | |
| 107.90 MHz | |

# 6. Radiated Measurement

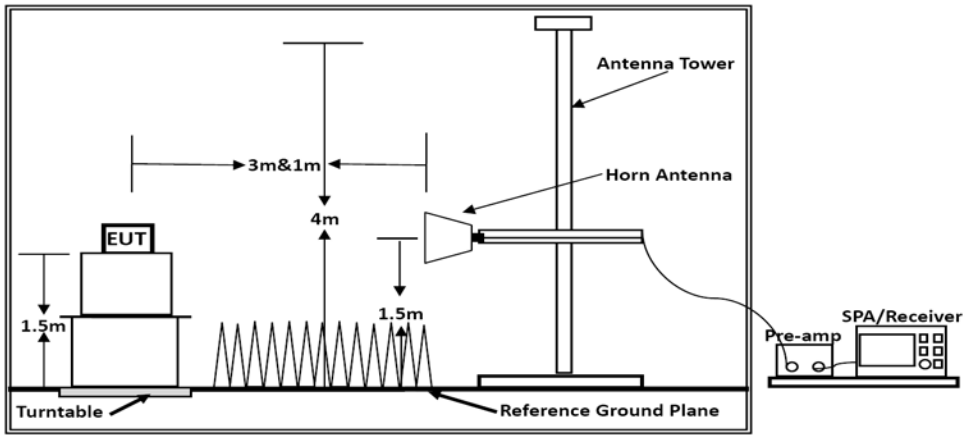
## 6.1 Block Diagram of Test Setup




Below 30MHz




Below 1GHz




Above 1GHz

## 6.2 Standard Applicable

According to FCC part §15.205 (b): The field strength of any emissions within the permitted 200 kHz band shall not exceed 250 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

According to §15.205 (c): The field strength of any emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed the general radiated emission limits in §15.209.

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 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 |

Remark:
(1) Emission level dBμV = 20 log Emission level μV/m
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) Distance is the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.

6.3 Instruments Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | $10^{th}$ carrier harmonic |
| RB / VB (Emission in restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average |
| RB / VB (Emission in non-restricted band) | 1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average |

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG |
| Start ~ Stop Frequency | 150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB/VB 120kHz/1MHz for QP |

6.4 Test Procedures

**1) Sequence of testing 9 kHz to 30 MHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

**Final measurement:**

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

**2) Sequence of testing 30 MHz to 1 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

**Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

**3) Sequence of testing 1 GHz to 18 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

**Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

**4) Sequence of testing above 18 GHz**

**Setup:**

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

**Premeasurement:**

--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

**Final measurement:**

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

6.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

6.6 Results of Radiated Emissions (9 KHz~30MHz)

| | | | |
|---|---|---|---|
| Temperature | 23.8℃ | Humidity | 59% |
| Test Engineer | Tom Liu | Configurations | FM |

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark |
|---|---|---|---|---|
| - | - | - | - | See Note |

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

6.7. Results of Radiated Emissions (30 – 1000 MHz)

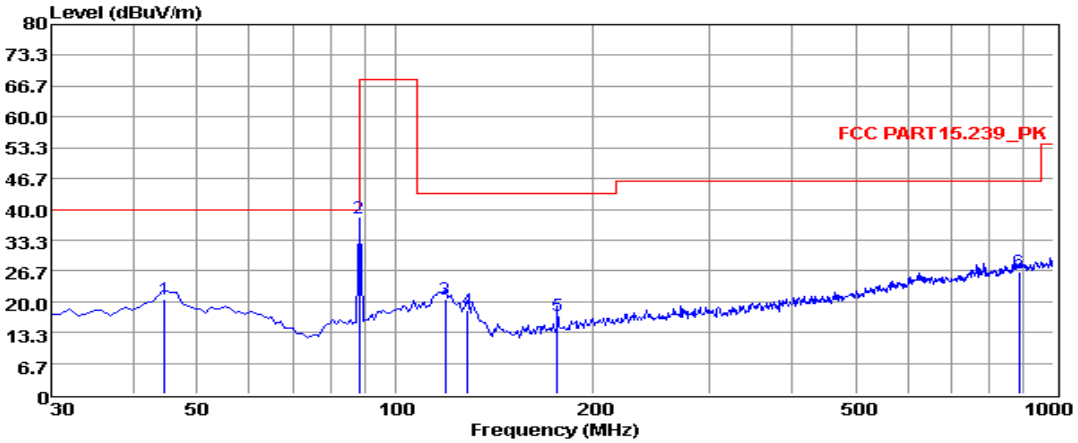
**PASS.**

Only record the worst test result in this report.

The test data please refer to following page.

*88.1 MHz*

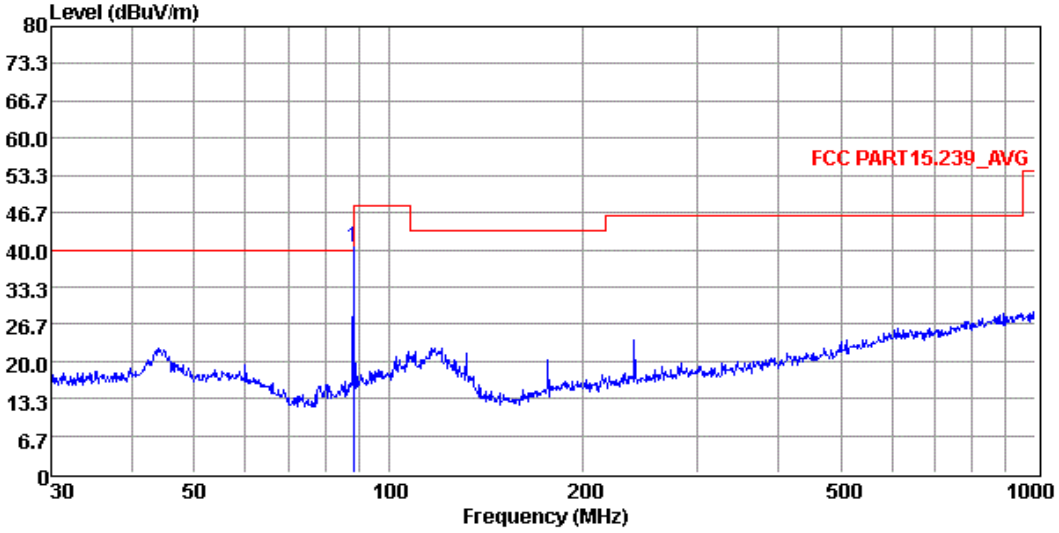
*Vertical*




Env./Ins: 23.9℃/55%
Test Mode: TX-88.1MHZ
pol: VERTICAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 44.55 | 6.51 | 0.41 | 13.55 | 20.47 | 40.00 | -19.53 | QP |
| 2 | 88.10 | 26.19 | 0.68 | 11.27 | 38.14 | 68.00 | -29.86 | Peak |
| 3 | 119.24 | 9.37 | 0.64 | 10.61 | 20.62 | 43.50 | -22.88 | QP |
| 4 | 128.94 | 8.41 | 0.67 | 9.09 | 18.17 | 43.50 | -25.33 | QP |
| 5 | 176.47 | 6.76 | 0.73 | 9.43 | 16.92 | 43.50 | -26.58 | QP |
| 6 | 886.51 | 3.52 | 1.87 | 20.95 | 26.34 | 46.00 | -19.66 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported



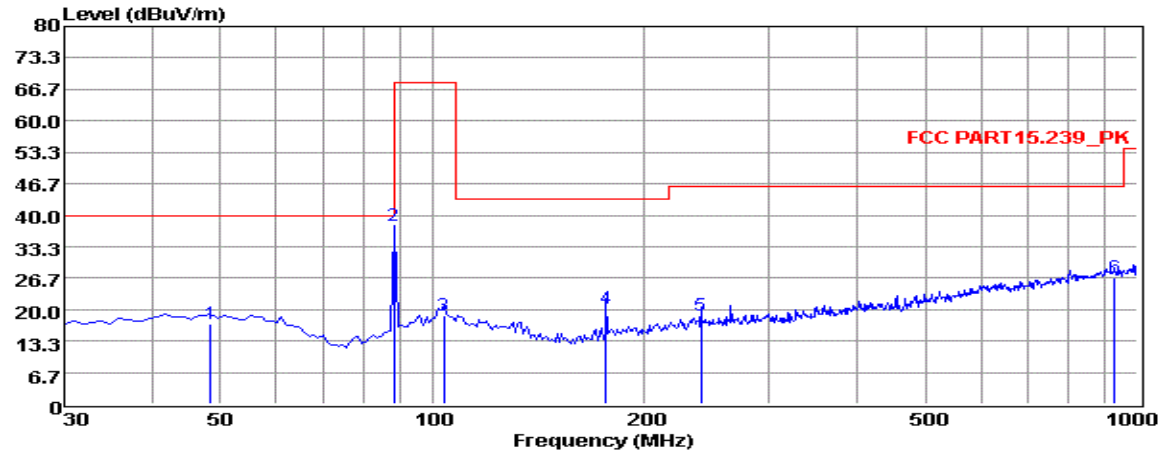

Env./Ins: 23.9℃/55%
Test Mode: TX-88.1MHZ
pol: VERTICAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 88.10 | 28.36 | 0.68 | 11.27 | 40.31 | 48.00 | -7.69 | Average |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

*88.1 MHz*

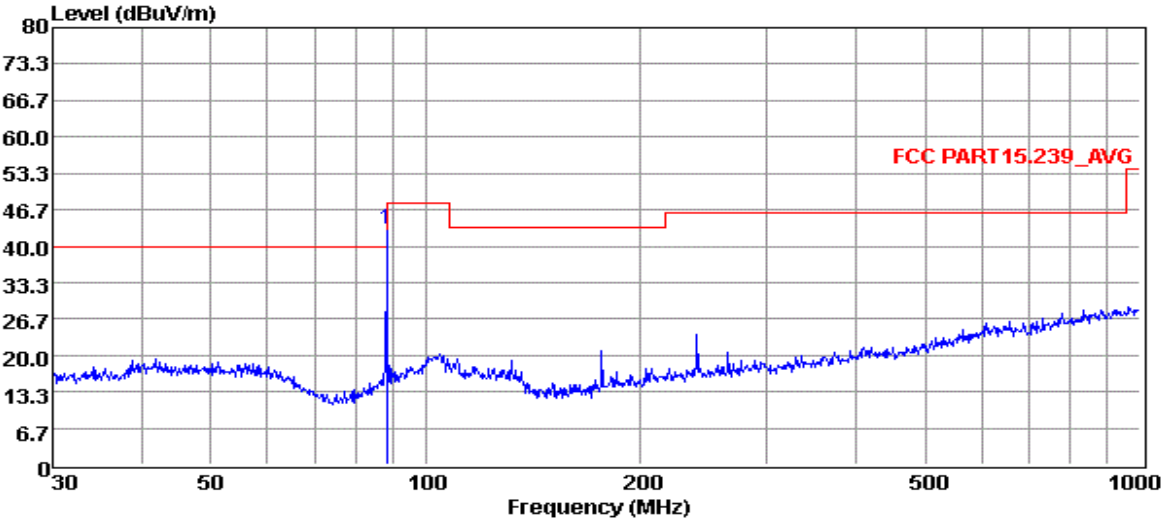
*Horizontal*




Env./Ins: 23.9℃/55%
Test Mode: TX-88.1MHZ
pol: HORIZONTAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 48.43 | 3.25 | 0.35 | 13.34 | 16.94 | 40.00 | -23.06 | QP |
| 2 | 88.10 | 25.68 | 0.68 | 11.27 | 37.63 | 68.00 | -30.37 | Peak |
| 3 | 103.72 | 5.30 | 0.61 | 12.82 | 18.73 | 68.00 | -49.27 | QP |
| 4 | 176.47 | 10.06 | 0.73 | 9.43 | 20.22 | 43.50 | -23.28 | QP |
| 5 | 240.49 | 5.54 | 1.01 | 12.09 | 18.64 | 46.00 | -27.36 | QP |
| 6 | 928.22 | 3.56 | 1.90 | 21.27 | 26.73 | 46.00 | -19.27 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported



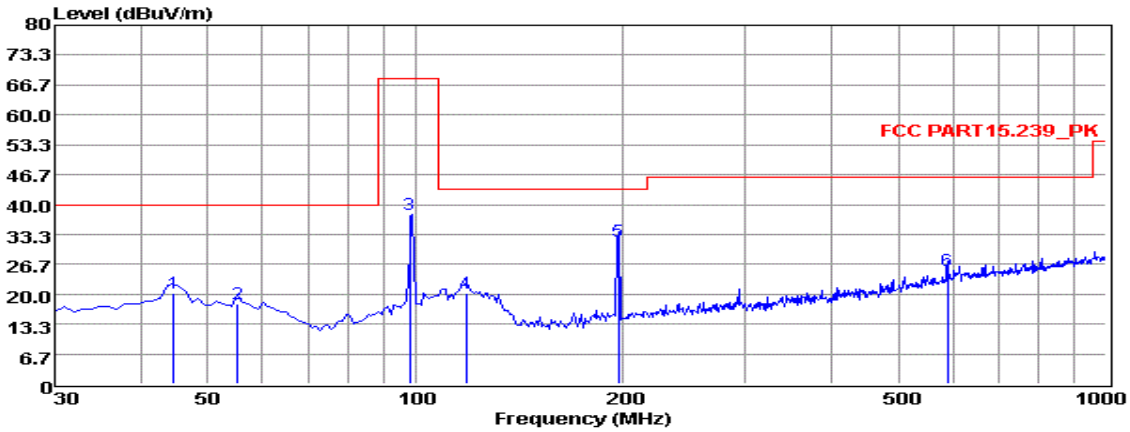

Env./Ins: 23.9℃/55%
Test Mode: TX-88.1MHZ
pol: HORIZONTAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 88.10 | 31.25 | 0.68 | 11.27 | 43.20 | 48.00 | -4.80 | Average |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

*98.1 MHz*

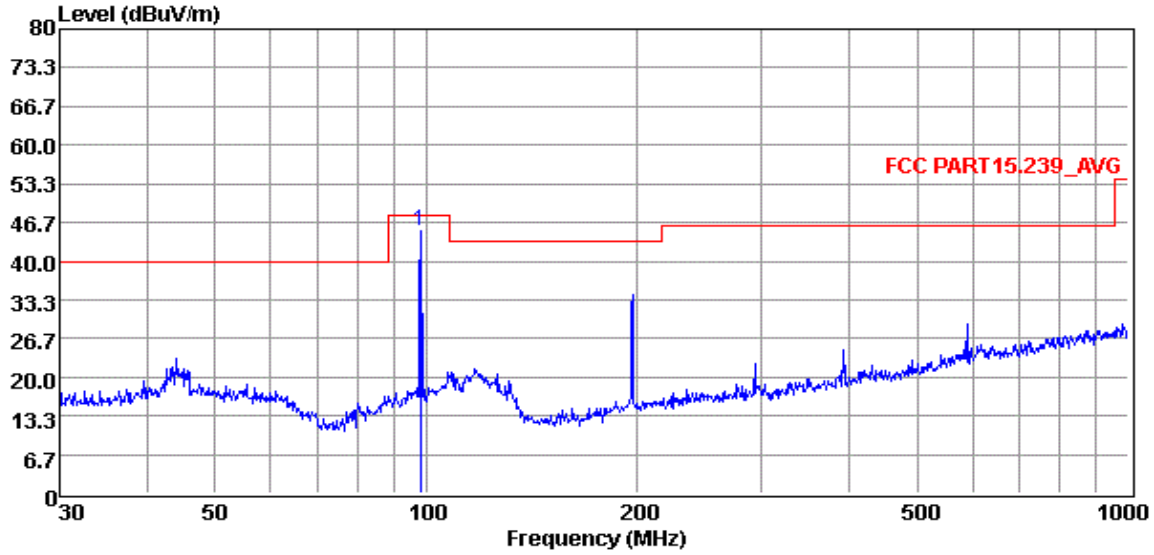
*Vertical*




Env./Ins: 23.9℃/55%
Test Mode: TX-98.1MHZ
pol: VERTICAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 44.55 | 6.38 | 0.41 | 13.55 | 20.34 | 40.00 | -19.66 | QP |
| 2 | 55.22 | 4.39 | 0.46 | 13.01 | 17.86 | 40.00 | -22.14 | QP |
| 3 | 98.10 | 24.26 | 0.61 | 13.04 | 37.91 | 68.00 | -30.09 | Peak |
| 4 | 118.27 | 8.77 | 0.64 | 10.79 | 20.20 | 43.50 | -23.30 | QP |
| 5 | 196.84 | 20.40 | 0.96 | 10.57 | 31.93 | 43.50 | -11.57 | QP |
| 6 | 588.72 | 5.69 | 1.40 | 18.24 | 25.33 | 46.00 | -20.67 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported



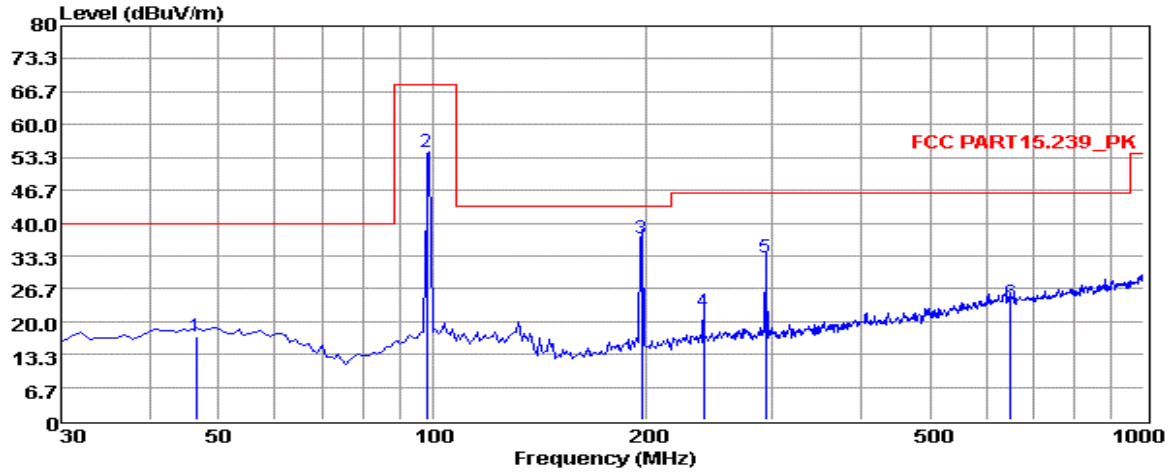

Env./Ins: 23.9℃/55%
Test Mode: TX-98.1MHZ
pol: VERTICAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 98.10 | 31.52 | 0.61 | 13.04 | 45.17 | 48.00 | -2.83 | Average |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

*98.1 MHz*

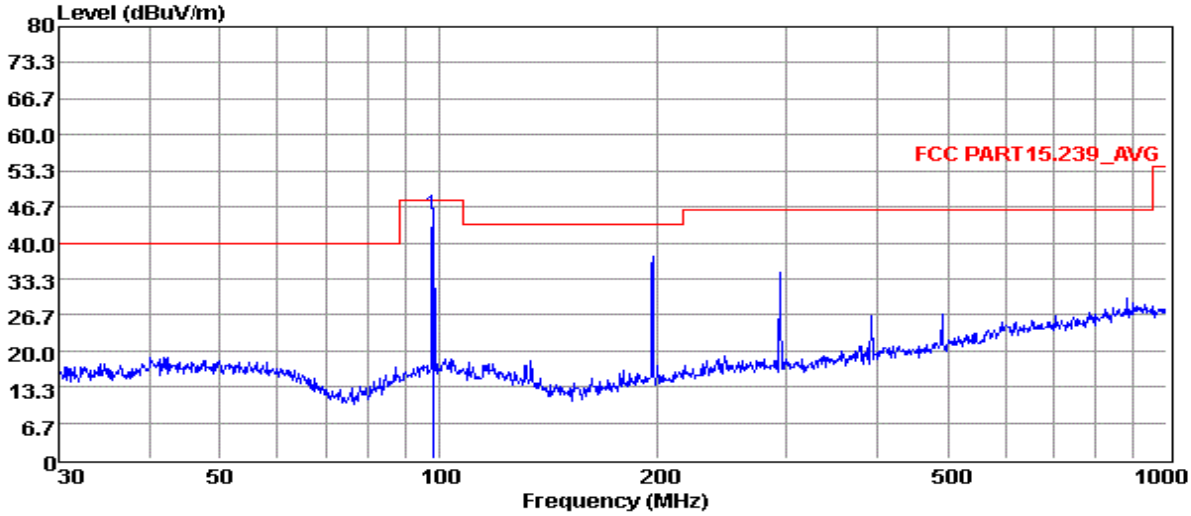
*Horizontal*




Env./Ins: 23.9℃/55%
Test Mode: TX-98.1MHZ
pol: HORIZONTAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 46.49 | 3.03 | 0.35 | 13.46 | 16.84 | 40.00 | -23.16 | QP |
| 2 | 98.10 | 40.80 | 0.61 | 13.04 | 54.45 | 68.00 | -13.55 | Peak |
| 3 | 196.84 | 25.28 | 0.96 | 10.57 | 36.81 | 43.50 | -6.69 | QP |
| 4 | 240.49 | 8.93 | 1.01 | 12.09 | 22.03 | 46.00 | -23.97 | QP |
| 5 | 293.84 | 19.02 | 1.08 | 12.94 | 33.04 | 46.00 | -12.96 | QP |
| 6 | 648.86 | 3.56 | 1.54 | 18.63 | 23.73 | 46.00 | -22.27 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported



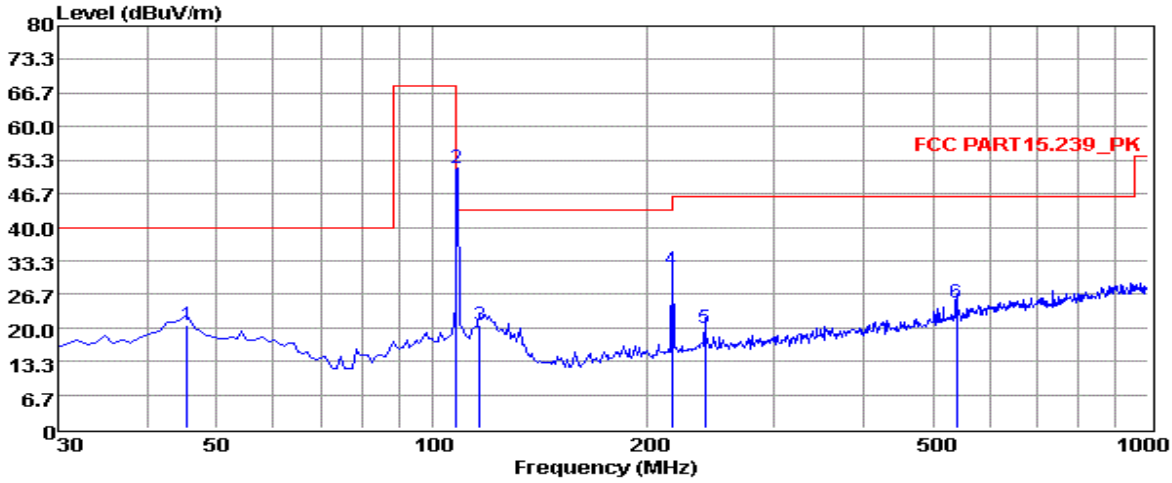

Env./Ins: 23.9℃/55%
Test Mode: TX-98.1MHZ
pol: HORIZONTAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 98.10 | 31.60 | 0.61 | 13.04 | 45.25 | 48.00 | -2.75 | Average |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

*107.9 MHz*

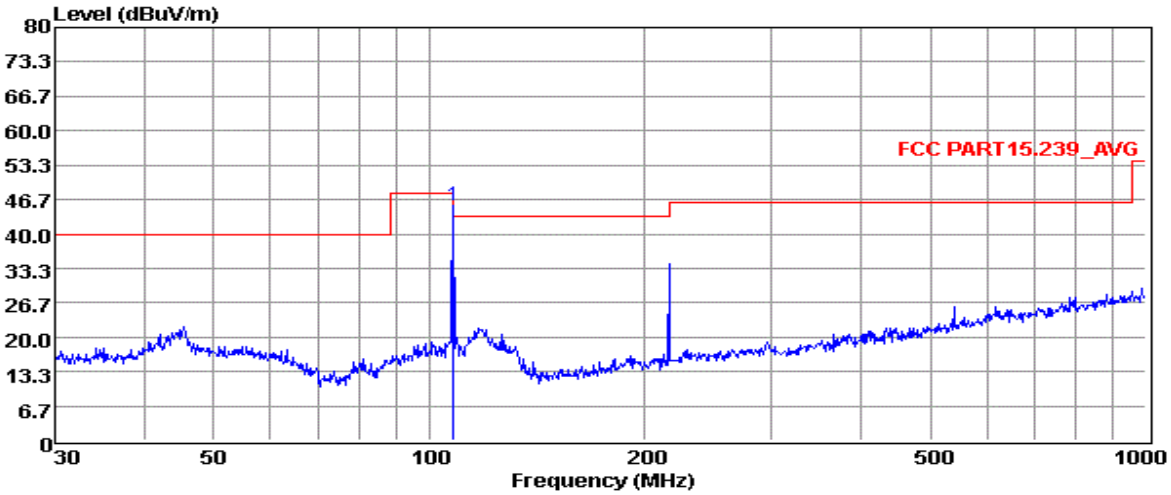
*Vertical*




Env./Ins: 23.9℃/55%
Test Mode: TX-107.9MHZ
pol: VERTICAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 45.52 | 6.64 | 0.41 | 13.52 | 20.57 | 40.00 | -19.43 | QP |
| 2 | 107.90 | 38.58 | 0.68 | 12.44 | 51.70 | 68.00 | -16.30 | Peak |
| 3 | 116.33 | 8.85 | 0.68 | 11.13 | 20.66 | 43.50 | -22.84 | QP |
| 4 | 216.24 | 19.70 | 0.88 | 11.08 | 31.66 | 46.00 | -14.34 | QP |
| 5 | 240.49 | 6.93 | 1.01 | 12.09 | 20.03 | 46.00 | -25.97 | QP |
| 6 | 539.25 | 6.12 | 1.45 | 17.31 | 24.88 | 46.00 | -21.12 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported



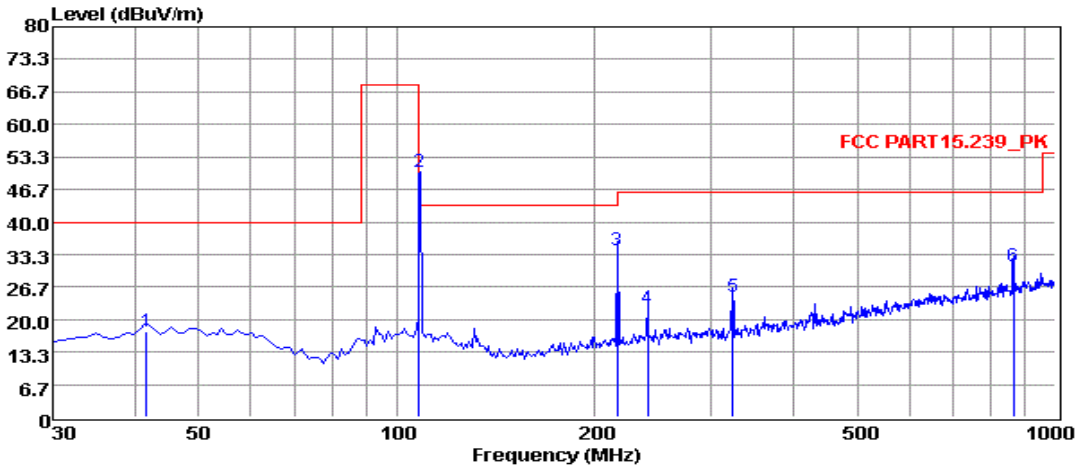

Env./Ins: 23.9℃/55%
Test Mode: TX-107.9MHZ
pol: VERTICAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 107.90 | 32.36 | 0.68 | 12.44 | 45.48 | 48.00 | -2.52 | Average |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

*107.9 MHz*

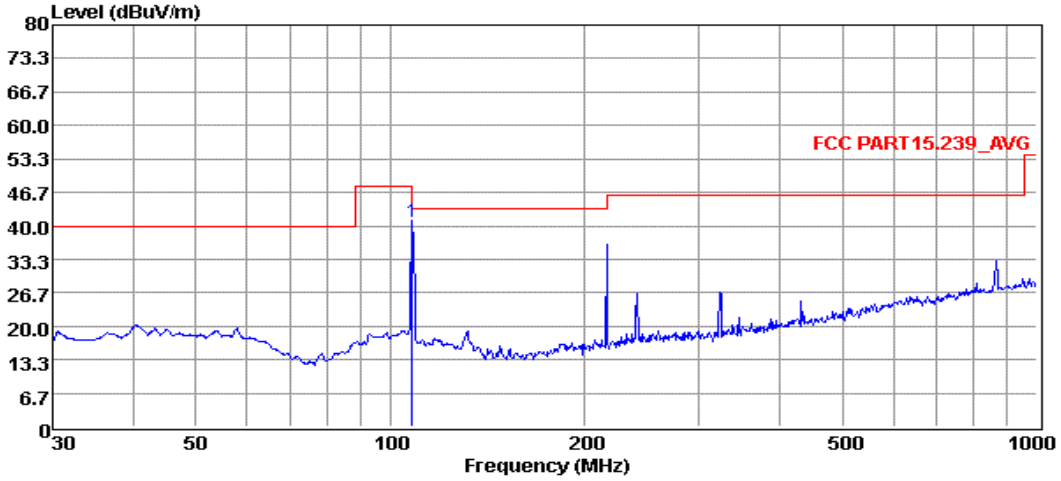
*Horizontal*




Env./Ins: 23.9℃/55%
Test Mode: TX-107.9MHZ
pol: HORIZONTAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 41.64 | 3.40 | 0.50 | 13.57 | 17.47 | 40.00 | -22.53 | QP |
| 2 | 107.90 | 37.06 | 0.68 | 12.44 | 50.18 | 68.00 | -17.82 | Peak |
| 3 | 216.24 | 22.10 | 0.88 | 11.08 | 34.06 | 46.00 | -11.94 | QP |
| 4 | 240.49 | 9.13 | 1.01 | 12.09 | 22.23 | 46.00 | -23.77 | QP |
| 5 | 323.91 | 9.98 | 1.10 | 13.48 | 24.56 | 46.00 | -21.44 | QP |
| 6 | 865.17 | 8.54 | 1.80 | 20.73 | 31.07 | 46.00 | -14.93 | QP |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported




Env./Ins: 23.9℃/55%
Test Mode: TX-107.9MHZ
pol: HORIZONTAL

| | Freq | Reading | CabLos | Antfac | Measured | Limit | Over | Remark |
|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV | dB | dB/m | dBuV/m | dBuV/m | dB | |
| 1 | 107.90 | 29.20 | 0.68 | 12.44 | 42.32 | 48.00 | -5.68 | Average |

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

6.8. Results of Radiated Emissions (1 GHz – 2 GHz)

*Not recorded as emission levels at least 20dB lower than limit.*

# 7. Power Line Conducted Emissions (Not Applicable)

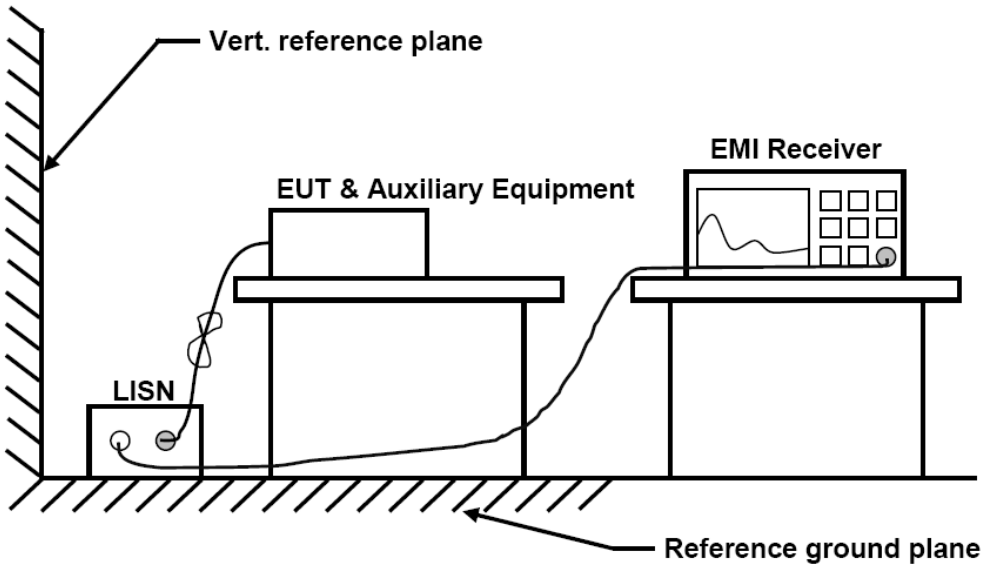
7.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

| Frequency Range (MHz) | Limits (dBμV) | |
|---|---|---|
| | 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 |

* Decreasing linearly with the logarithm of the frequency

7.2 Block Diagram of Test Setup




7.3 Test Results

*Not Applicable!!!*

*The device was powered by DC!!!*

# 8. ANTENNA REQUIREMENT

8.1 Standard Applicable

According to antenna requirement of §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. 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 re-placed 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.

8.2 Antenna Connected Construction

8.2.1. Standard Applicable

According to § 15.203 & RSS-Gen, 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.

8.2.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 1.0 dBi, and the antenna is connect to PCB board and no consideration of replacement. Please see EUT photo for details.

8.2.3. Results: Compliance.

# 9. LIST OF TEST EQUIPMENT

| Item | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. | Next Cal. |
|---|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | Agilent | E4407B | MY41440292 | 2018-06-16 | 2019-06-15 |
| 2 | Signal analyzer | Agilent | E4448A(External mixers to 40GHz) | US44300469 | 2018-06-16 | 2019-06-15 |
| 3 | RF Cable | Hubersuhner | Sucoflex104 | FP2RX2 | 2018-06-15 | 2019-06-17 |
| 4 | DC Filter | MPE | 23872C | N/A | 2018-06-15 | 2019-06-17 |
| 5 | 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH03-HY | 2018-06-15 | 2019-06-17 |
| 6 | Amplifier | SCHAFFNER | COA9231A | 18667 | 2018-06-15 | 2019-06-17 |
| 7 | Amplifier | Agilent | 8449B | 3008A02120 | 2018-06-16 | 2019-06-15 |
| 8 | Amplifier | MITEQ | AMF-6F-260400 | 9121372 | 2018-06-16 | 2019-06-15 |
| 9 | Spectrum Analyzer | Agilent | E4407B | MY41440292 | 2018-06-16 | 2019-06-15 |
| 10 | Signal analyzer | Agilent | E4448A(External mixers to 40GHz) | US44300469 | 2018-06-16 | 2019-06-15 |
| 11 | Loop Antenna | R&S | HFH2-Z2 | 860004/001 | 2018-06-15 | 2019-06-17 |
| 12 | By-log Antenna | SCHWARZBECK | VULB9163 | 9163-470 | 2018-06-10 | 2019-06-09 |
| 13 | Horn Antenna | EMCO | 3115 | 6741 | 2018-06-10 | 2019-06-09 |
| 14 | Horn Antenna | SCHWARZBECK | BBHA9170 | BBHA9170154 | 2018-06-10 | 2019-06-09 |
| 15 | RF Cable-R03m | Jye Bao | RG142 | CB021 | 2018-06-15 | 2019-06-17 |
| 16 | RF Cable-HIGH | SUHNER | SUCOFLEX 106 | 03CH03-HY | 2018-06-15 | 2019-06-17 |
| 17 | EMI Test Receiver | R&S | ESCI | 101142 | 2018-06-18 | 2019-06-18 |
| 18 | EMI Test Receiver | R&S | ESPI | 101840 | 2018-06-18 | 2019-06-18 |
| 19 | Artificial Mains | R&S | ENV216 | 101288 | 2018-06-18 | 2019-06-18 |
| 20 | EMI Test Software | AUDIX | E3 | N/A | N/A | N/A |
| Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD. | | | | | | |

# 10. TEST SETUP PHOTOGRAPHS OF THE EUT

Please refer to separated files for Test Setup Photos of the EUT.

# 11. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

# 12. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

----------THE END OF REPORT----------