

# EMC TEST REPORT

**Report No.** : TS14020009-EME  
**Model No.** : 1200769  
**Issued Date** : Feb. 13, 2014  
**Remark** : C version

**Applicant:** Jebsee Electronics Co., Ltd.  
24-3, Sin Le Road Tainan, Taiwan

**Test Method/ Standard:** 47 CFR FCC Part 15.239 & ANSI C63.4 2009

**Test By:** Intertek Testing Services Taiwan Ltd.  
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Corn Shang/ Engineer

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**Title** Senior Engineer

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### Summary of Tests

| Test                                    | Reference             | Results  |
|-----------------------------------------|-----------------------|----------|
| Bandwidth of fundamental frequency      | 15.239(a)             | Complies |
| Field strength of fundamental frequency | 15.239(b)             | Complies |
| Radiated emission                       | 15.239(b)&(c), 15.209 | Complies |

## 1. General information

### 1.1 Identification of the EUT

|                            |                            |
|----------------------------|----------------------------|
| Product:                   | FM transmitter             |
| Model No.:                 | 1200769                    |
| FCC ID.:                   | DT91200769                 |
| Frequency Range:           | 88.1MHz to 107.9MHz        |
| Channel Number:            | 3 channels                 |
| Frequency of Each Channel: | 88.1MHz, 98.1MHz, 107.9MHz |
| Access scheme:             | FM                         |
| Power Supply:              | DC 13.8 V from battery     |
| Power Cord:                | N/A                        |
| Sample Received:           | Feb. 05, 2014              |
| Sample condition:          | Workable                   |
| Test Date(s):              | Feb. 10, 2014              |

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Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.

## 1.2 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain: 0 dBi

Antenna Type: Dipole antenna

Connector Type: N/A

## 1.3 Peripherals equipment

| Peripherals | Manufacturer | Product No. | Serial No.   | FCC ID           |
|-------------|--------------|-------------|--------------|------------------|
| iPad mini   | APPLE        | MT531TA/A   | F85LG24QF196 | FCC DoC Approved |

## **2. Test specifications**

### **2.1 Test standard**

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.239.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

### **2.2 Operation mode**

EUT transmits continuously as power on and press button to change different channel.

## 2.3 Test equipment

| Equipment                         | Brand           | Model No.                     | Serial No.  | Calibration Date | Next Calibration Date |
|-----------------------------------|-----------------|-------------------------------|-------------|------------------|-----------------------|
| ESCI EMI Test Receiver            | Rohde & Schwarz | ESCI                          | 100018      | 2013/12/03       | 2014/12/02            |
| Spectrum Analyzer                 | Rohde&schwarz   | FSEK30                        | 100186      | 2014/01/20       | 2015/01/19            |
| Horn Antenna (1-18G)              | Schwarzbeck     | BBHA 9120 D                   | 9120D-456   | 2012/09/03       | 2014/09/02            |
| Horn Antenna (14-42G)             | SHWARZBECK      | BBHA 9170                     | BBHA9170159 | 2012/09/05       | 2014/09/04            |
| Broadband Antenna                 | SCHWARZBECK     | VULB 9168                     | 9168-172    | 2013/08/08       | 2015/08/07            |
| Loop Antenna                      | RolfHeine       | LA-285                        | 02/10033    | 2012/03/20       | 2014/03/19            |
| Pre-Amplifier                     | MITEQ           | AFS44-00102650<br>--42-10P-44 | 1495287     | 2013/10/27       | 2015/10/26            |
| Pre-Amplifier                     | MITEQ           | JS4-26004000--2<br>7-8A       | 828825      | 2012/9/18        | 2014/9/17             |
| Power Meter                       | Anritsu         | ML2495A                       | 0844001     | 2013/10/10       | 2014/10/09            |
| Power Sensor                      | Anritsu         | MA2411B                       | 0738452     | 2013/10/10       | 2014/10/09            |
| Temperature&Humidity Test Chamber | TERCHY          | MHU-225LRU (SA)               | 950838      | 2013/06/14       | 2014/06/13            |
| Two-Line -V-Network               | Rohde&schwarz   | ESH3-Z5                       | 825562/003  | 2013/10/12       | 2014/10/11            |
| Two-Line V-Network                | Rohde&schwarz   | ESH3-Z5                       | 838979/014  | 2013/10/12       | 2014/10/11            |
| Singal Analyzer                   | Agilent         | N9030A                        | MY51380492  | 2013/09/19       | 2014/09/18            |

Note: The above equipments are within the valid calibration period.

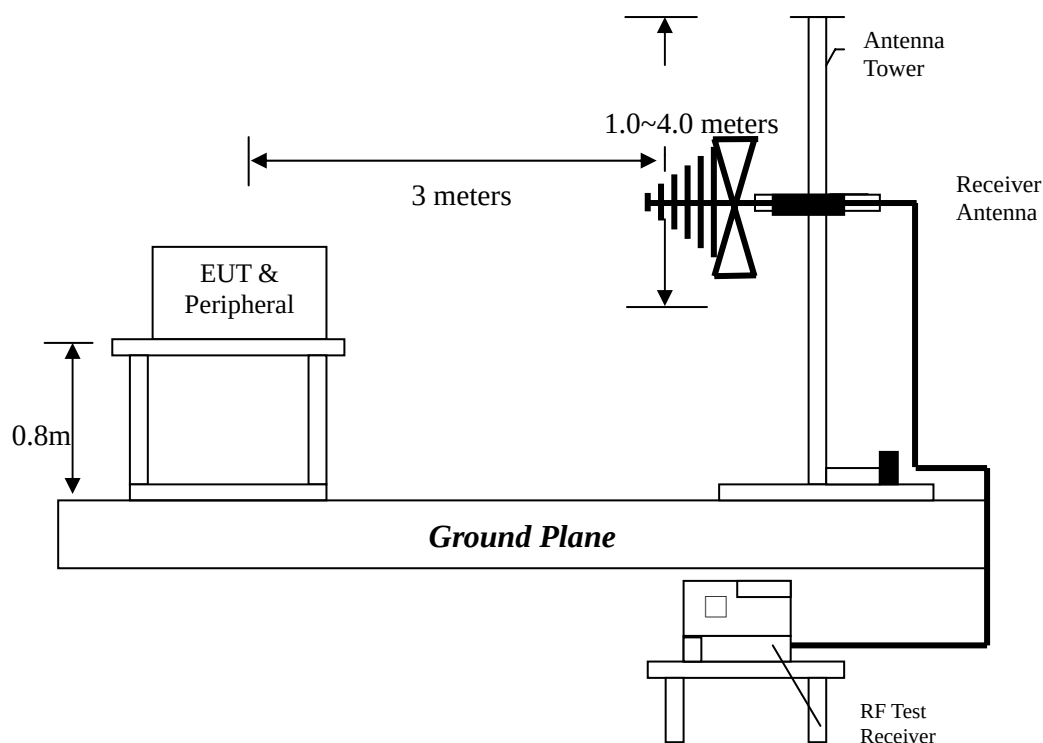
### 3. Radiated emission test FCC 15.239 (b)&(c)

#### 3.1 Operating environment

|                       |               |     |
|-----------------------|---------------|-----|
| Temperature:          | 20            | °C  |
| Relative Humidity:    | 50            | %   |
| Atmospheric Pressure: | 1008          | hPa |
| Test data:            | Feb. 10, 2014 |     |

#### 3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/ 3MHz VBW) recorded also on the report. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

### 3.3 Emission limit

#### 3.3.1 Fundamental emission limit

| Frequency<br>(MHz) | Field Strength of Fundamental |             |
|--------------------|-------------------------------|-------------|
|                    | (uV/m@3m)                     | (dBuV/m@3m) |
| 88-108             | 250                           | 48          |

The emission limit above is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

#### 3.3.2 General radiated emission limits

| Frequency<br>MHz | 15.209 Limits<br>(dB $\mu$ V/m@3m) |
|------------------|------------------------------------|
| 30-88            | 40                                 |
| 88-216           | 43.5                               |
| 216-960          | 46                                 |
| Above 960        | 54                                 |

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring antenna and the closed point of any part of the device or system

Measurement uncertainty was calculated in accordance with TR 100 028-1.

| Parameter         | Uncertainty |            |         |
|-------------------|-------------|------------|---------|
| Radiated Emission | Below 1 GHz | Vertical   | 3.90 dB |
|                   |             | Horizontal | 3.86 dB |
|                   | Above 1 GHz | Vertical   | 5.74 dB |
|                   |             | Horizontal | 5.55 dB |

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

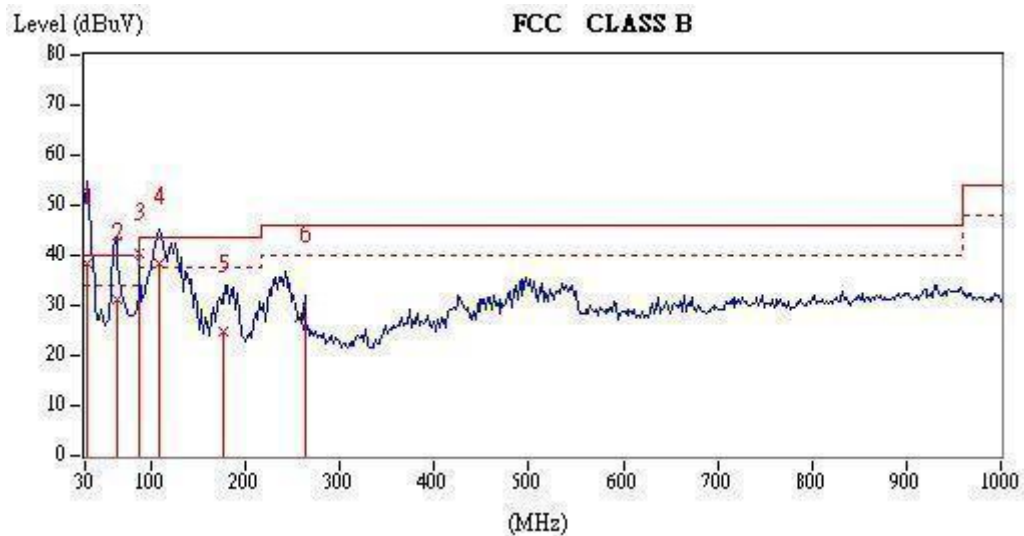
### 3.4 Radiated emission test data

EUT : 1200769  
Test Condition : Tx at low channel  
Polarization : Vertical

| Polarization<br>(circle) | Frequency<br>(MHz) | Detector | Corr.<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Calculated<br>dBuV/m | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------------|--------------------|----------|---------------------------|-------------------|----------------------|-------------------|----------------|
| Vertical                 | 31.94              | QP       | 14.10                     | 22.13             | 36.23                | 40.00             | -3.77          |
| Vertical                 | 62.98              | QP       | 14.17                     | 16.93             | 31.10                | 40.00             | -8.90          |
| Vertical                 | 88.10              | AV       | 9.33                      | 32.33             | 41.66                | 48.00             | -6.34          |
| Vertical                 | 109.54             | QP       | 11.20                     | 27.10             | 38.30                | 43.50             | -5.20          |
| Vertical                 | 176.20             | QP       | 13.92                     | 10.87             | 24.79                | 43.50             | -18.71         |
| Vertical                 | 264.30             | QP       | 14.38                     | 16.08             | 30.46                | 46.00             | -15.54         |

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss

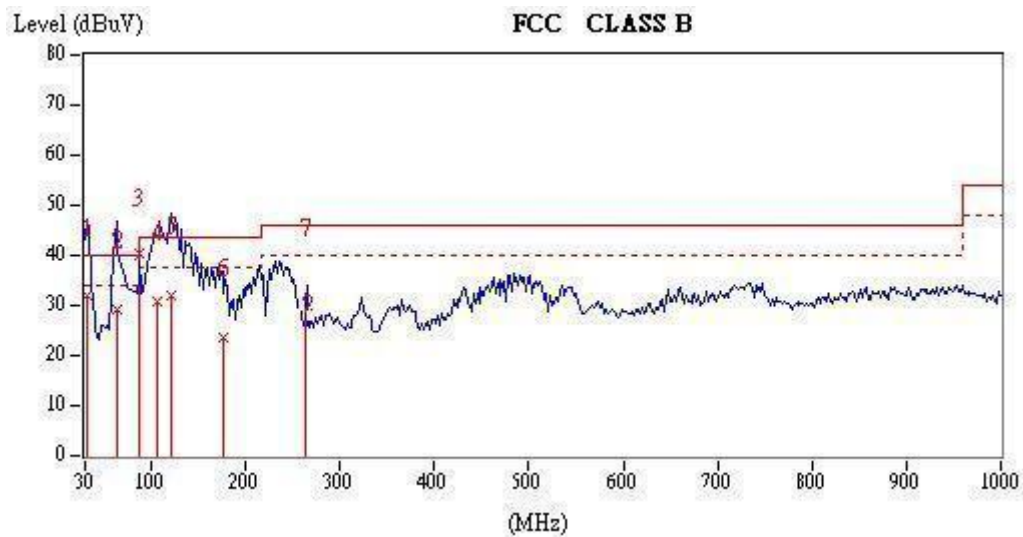


EUT : 1200769  
Test Condition : Tx at low channel  
Polarization : Horizontal

| Polarization<br>(circle) | Frequency<br>(MHz) | Detector | Corr.<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Calculated<br>dBuV/m | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------------|--------------------|----------|---------------------------|-------------------|----------------------|-------------------|----------------|
| Horizontal               | 31.94              | QP       | 14.10                     | 17.84             | 31.94                | 40.00             | -8.06          |
| Horizontal               | 62.98              | QP       | 14.17                     | 15.13             | 29.30                | 40.00             | -10.70         |
| Horizontal               | 88.10              | AV       | 9.33                      | 31.45             | 40.78                | 48.00             | -7.22          |
| Horizontal               | 105.66             | QP       | 10.71                     | 20.19             | 30.90                | 43.50             | -12.60         |
| Horizontal               | 121.18             | QP       | 12.45                     | 19.56             | 32.01                | 43.50             | -11.49         |
| Horizontal               | 176.20             | QP       | 13.92                     | 9.71              | 23.63                | 43.50             | -19.87         |
| Horizontal               | 264.30             | QP       | 14.38                     | 17.27             | 31.65                | 46.00             | -14.35         |

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss

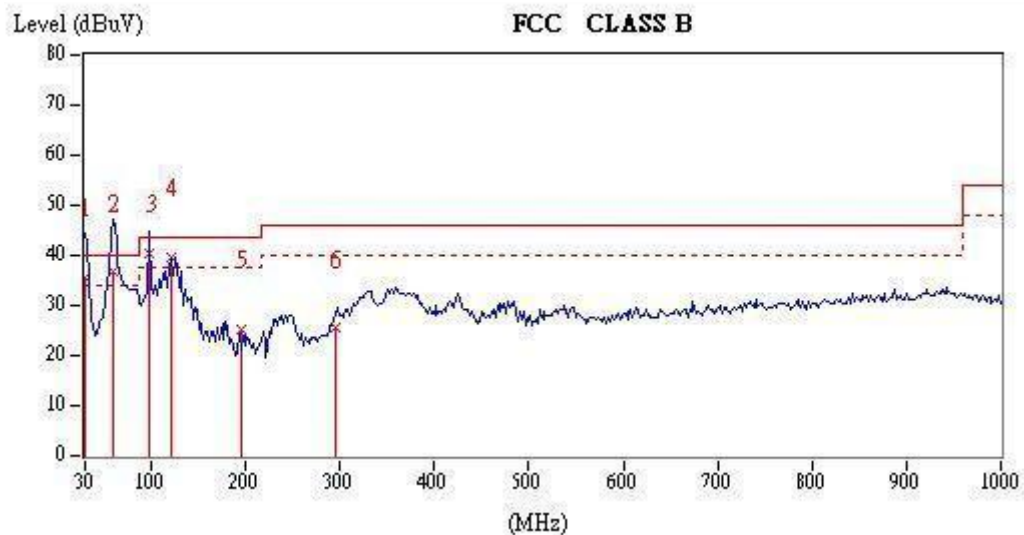


EUT : 1200769  
Test Condition : Tx at middle channel  
Polarization : Vertical

| Polarization<br>(circle) | Frequency<br>(MHz) | Detector | Corr.<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Calculated<br>dBuV/m | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------------|--------------------|----------|---------------------------|-------------------|----------------------|-------------------|----------------|
| Vertical                 | 30.00              | QP       | 14.15                     | 21.63             | 35.78                | 40.00             | -4.22          |
| Vertical                 | 59.10              | QP       | 14.81                     | 21.85             | 36.66                | 40.00             | -3.34          |
| Vertical                 | 98.10              | AV       | 9.81                      | 30.59             | 40.40                | 48.00             | -7.60          |
| Vertical                 | 121.18             | QP       | 12.45                     | 27.25             | 39.70                | 43.50             | -3.80          |
| Vertical                 | 196.20             | QP       | 12.26                     | 12.99             | 25.25                | 43.50             | -18.25         |
| Vertical                 | 294.30             | QP       | 15.62                     | 9.81              | 25.43                | 46.00             | -20.57         |

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss

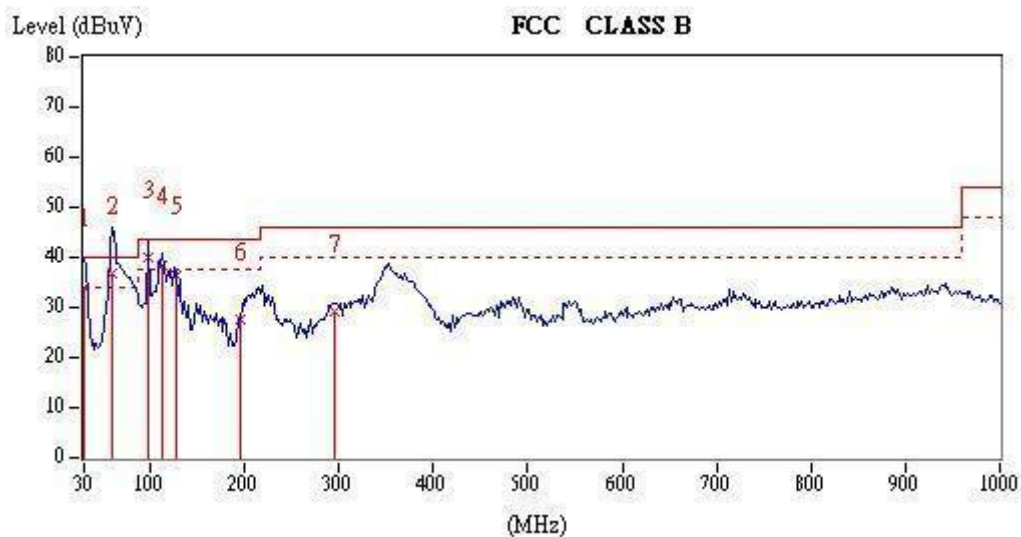


EUT : 1200769  
Test Condition : Tx at middle channel  
Polarization : Horizontal

| Polarization<br>(circle) | Frequency<br>(MHz) | Detector | Corr.<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Calculated<br>dBuV/m | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------------|--------------------|----------|---------------------------|-------------------|----------------------|-------------------|----------------|
| Horizontal               | 30.00              | QP       | 14.15                     | 20.02             | 34.17                | 40.00             | -5.83          |
| Horizontal               | 59.10              | QP       | 14.81                     | 21.97             | 36.78                | 40.00             | -3.22          |
| Horizontal               | 98.10              | AV       | 9.81                      | 29.36             | 39.17                | 48.00             | -8.83          |
| Horizontal               | 113.42             | QP       | 11.63                     | 26.96             | 38.60                | 43.50             | -4.90          |
| Horizontal               | 127.00             | QP       | 12.91                     | 23.69             | 36.60                | 43.50             | -6.90          |
| Horizontal               | 196.20             | QP       | 12.26                     | 15.23             | 27.49                | 43.50             | -16.01         |
| Horizontal               | 294.30             | QP       | 15.62                     | 13.44             | 29.06                | 46.00             | -16.94         |

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss

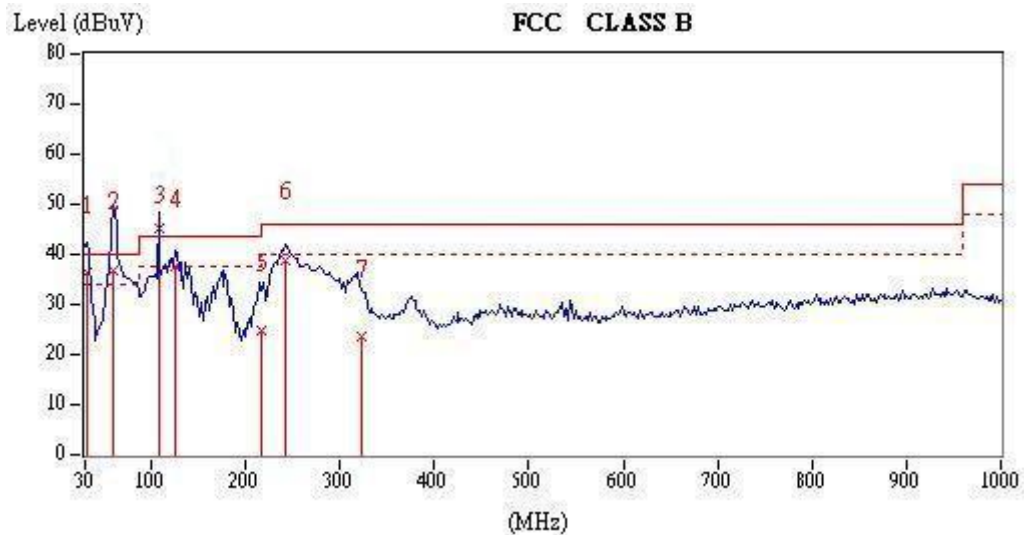


EUT : 1200769  
Test Condition : Tx at high channel  
Polarization : Vertical

| Polarization<br>(circle) | Frequency<br>(MHz) | Detector | Corr.<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Calculated<br>dBuV/m | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------------|--------------------|----------|---------------------------|-------------------|----------------------|-------------------|----------------|
| Vertical                 | 31.94              | QP       | 14.10                     | 22.13             | 36.23                | 40.00             | -3.77          |
| Vertical                 | 59.10              | QP       | 14.81                     | 22.07             | 36.88                | 40.00             | -3.12          |
| Vertical                 | 107.90             | AV       | 10.99                     | 34.24             | 45.23                | 48.00             | -2.77          |
| Vertical                 | 125.06             | QP       | 12.75                     | 24.70             | 37.45                | 43.50             | -6.05          |
| Vertical                 | 215.80             | QP       | 12.92                     | 13.69             | 26.61                | 43.50             | -16.89         |
| Vertical                 | 241.46             | QP       | 13.91                     | 25.03             | 38.94                | 46.00             | -7.06          |
| Vertical                 | 323.70             | QP       | 16.68                     | 6.89              | 23.57                | 46.00             | -22.43         |

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss

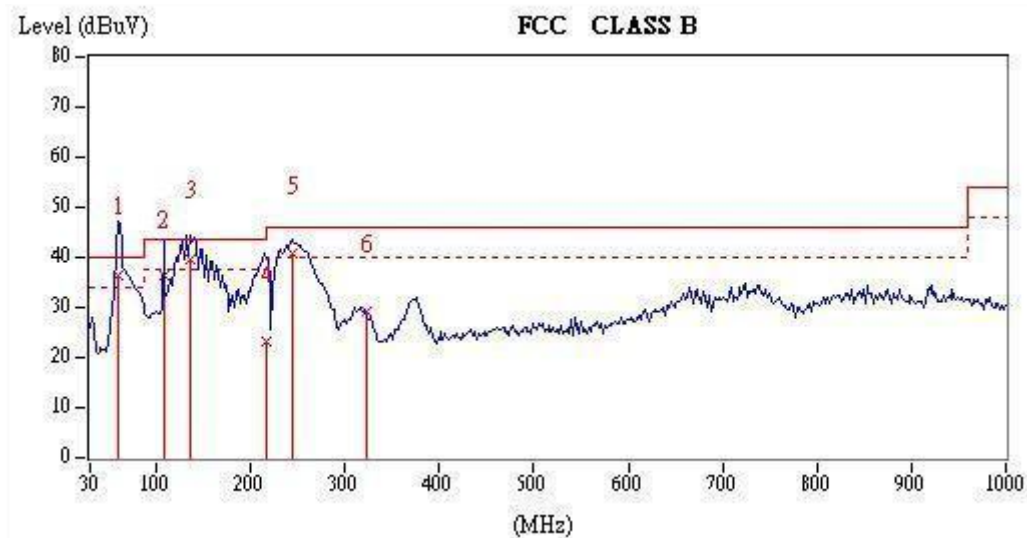


EUT : 1200769  
Test Condition : Tx at high channel  
Polarization : Horizontal

| Polarization<br>(circle) | Frequency<br>(MHz) | Detector | Corr.<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Calculated<br>dBuV/m | Limit<br>(dBuV/m) | Margin<br>(dB) |
|--------------------------|--------------------|----------|---------------------------|-------------------|----------------------|-------------------|----------------|
| Horizontal               | 59.10              | QP       | 14.81                     | 21.64             | 36.45                | 40.00             | -3.55          |
| Horizontal               | 107.90             | AV       | 10.99                     | 24.79             | 35.78                | 48.00             | -12.22         |
| Horizontal               | 136.70             | QP       | 14.09                     | 25.69             | 39.78                | 43.50             | -3.72          |
| Horizontal               | 215.80             | QP       | 12.92                     | 10.15             | 23.07                | 43.50             | -20.43         |
| Horizontal               | 243.40             | QP       | 14.04                     | 26.60             | 40.64                | 46.00             | -5.36          |
| Horizontal               | 323.70             | QP       | 16.68                     | 12.92             | 29.60                | 46.00             | -16.40         |

Remark:

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss



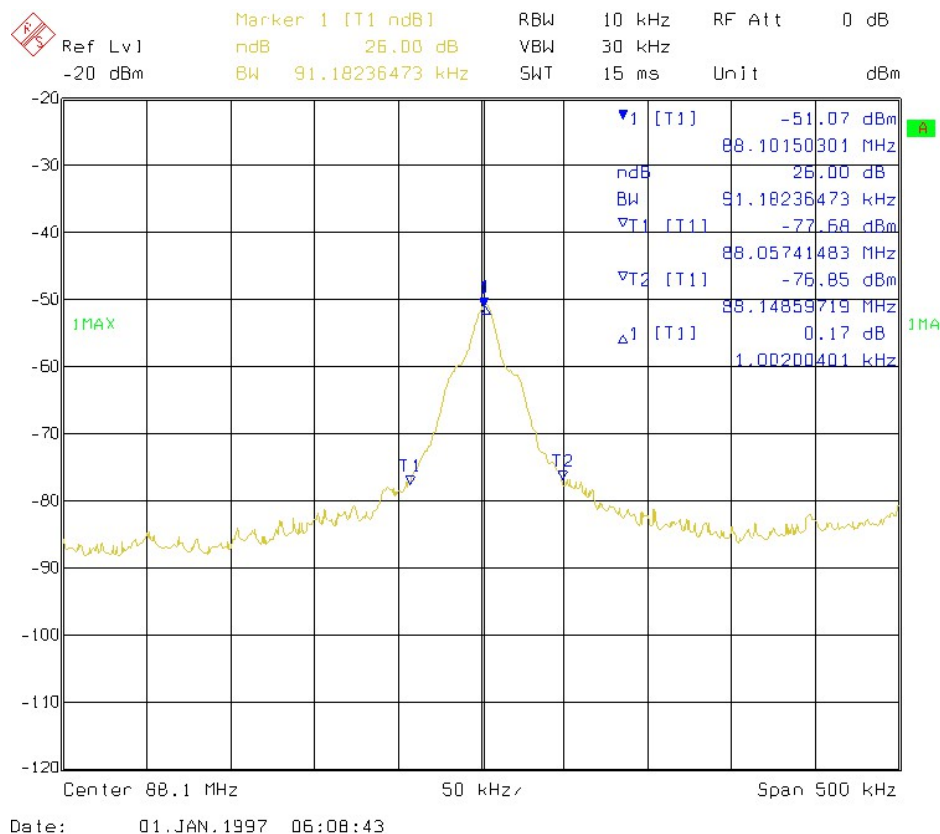
#### 4. Bandwidth of fundamental frequency FCC 15.239(a)

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operation frequency. The 200 kHz band shall lie wholly within the frequency range of 88-108 MHz.

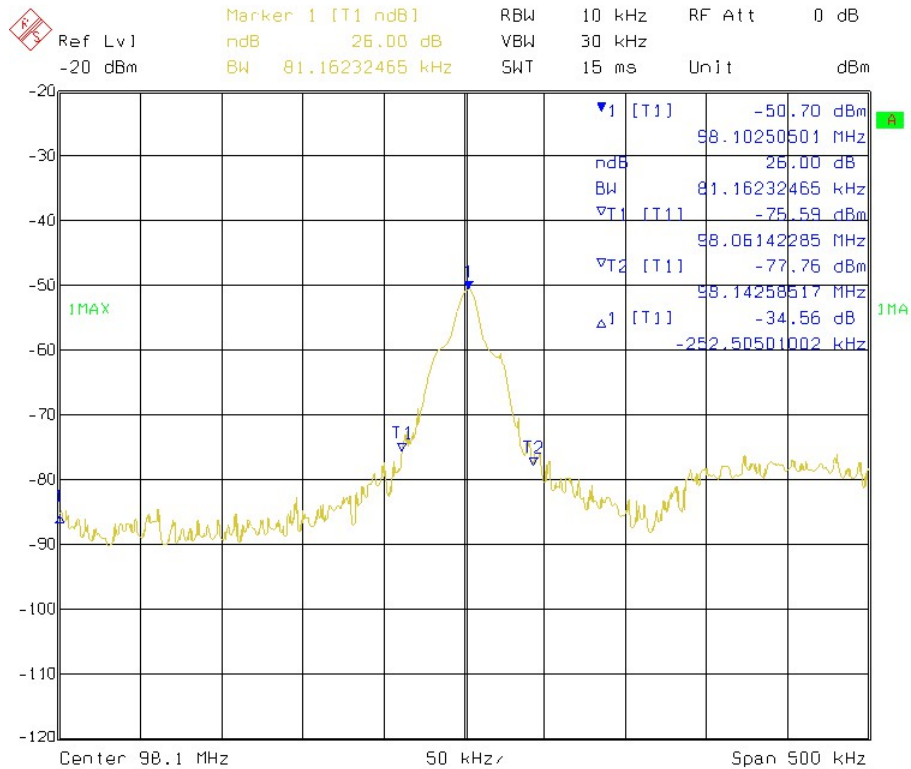
The bandwidth tests with audio input adjusted to maximize emission continuously transmitting mode more than 5 mins.

Please see the plot below.

#### Bandwidth @ Low channel



## Bandwidth @ Middle channel



## Bandwidth @ High channel

