

# EMC TEST REPORT

**Report No.:** TS13060107-EME**Model No.:** TTD-VM2501R, TTD-VM2500R**Issued Date:** Aug. 08, 2013

**Applicant:** Tranwo Technology Corp.  
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**Test Method/ Standard:** FCC Part 15 Subpart C Section §15.205, §15.207, §15.209,  
§15.247, DA 00-705 and ANSI C63.4/2003

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## Table of Contents

|                                                                                  |    |
|----------------------------------------------------------------------------------|----|
| Summary of Tests.....                                                            | 4  |
| 1. General information .....                                                     | 5  |
| 1.1 Identification of the EUT .....                                              | 5  |
| 1.2 Additional information about the EUT.....                                    | 5  |
| 1.3 Antenna description.....                                                     | 6  |
| 1.4 Adapter information .....                                                    | 6  |
| 1.5 Peripherals equipment .....                                                  | 6  |
| 2. Test specifications .....                                                     | 7  |
| 2.1 Test standard.....                                                           | 7  |
| 2.2 Operation mode .....                                                         | 7  |
| 2.3 Measurement Uncertainty .....                                                | 7  |
| 2.4 Test equipment .....                                                         | 8  |
| 3. 20dB Bandwidth test .....                                                     | 9  |
| 3.1 Operating environment.....                                                   | 9  |
| 3.2 Test setup & procedure .....                                                 | 9  |
| 3.3 Measured data of modulated bandwidth test results .....                      | 9  |
| 4. Carrier Frequency Separation test .....                                       | 11 |
| 4.1 Operating environment.....                                                   | 11 |
| 4.2 Test setup & procedure.....                                                  | 11 |
| 4.3 Measured data of Carrier Frequency Separation test result .....              | 11 |
| 5. Number of hopping frequencies test .....                                      | 14 |
| 5.1 Operating environment.....                                                   | 14 |
| 5.2 Test setup & procedure.....                                                  | 14 |
| 5.3 Measured data of number of hopping frequencies test result.....              | 14 |
| 6. Time of Occupancy (dwell time) & Duty Cycle Correction Factor test .....      | 16 |
| 6.1 Operating environment.....                                                   | 16 |
| 6.2 Test setup & procedure .....                                                 | 16 |
| 6.3 Measured data of Maximum Output Power test results .....                     | 16 |
| 7. Maximum Output Power test .....                                               | 20 |
| 7.1 Operating environment.....                                                   | 20 |
| 7.2 Test setup & procedure.....                                                  | 20 |
| 7.3 Measured data of Maximum Output Power test results .....                     | 20 |
| 8. RF Antenna Conducted Spurious test.....                                       | 21 |
| 8.1 Operating environment.....                                                   | 21 |
| 8.2 Test setup & procedure.....                                                  | 21 |
| 8.3 Measured data of the highest RF Antenna Conducted Spurious test result ..... | 21 |
| 9. Radiated Emission test .....                                                  | 23 |
| 9.1 Operating environment.....                                                   | 23 |
| 9.2 Test setup & procedure.....                                                  | 23 |
| 9.3 Emission limits.....                                                         | 25 |
| 9.4 Radiated spurious emission test data.....                                    | 26 |



|                                                                         |    |
|-------------------------------------------------------------------------|----|
| 9.4.1 Measurement results: frequencies equal to or less than 1 GHz..... | 26 |
| 9.4.2 Measurement results: frequency above 1GHz .....                   | 27 |
| 10. Emission on the band edge §FCC 15.247(d).....                       | 30 |
| 10.1 Operating environment.....                                         | 30 |
| 10.2 Test setup & procedure.....                                        | 30 |
| 10.3 Test Result .....                                                  | 30 |
| 11. Power Line Conducted Emission test §FCC 15.207 .....                | 31 |
| 11.1 Operating environment.....                                         | 31 |
| 11.2 Test setup & procedure .....                                       | 31 |
| 11.3 Emission limit.....                                                | 32 |
| 11.4 Power Line Conducted Emission test data .....                      | 32 |



## Summary of Tests

| Test Item                             | Reference      | Results |
|---------------------------------------|----------------|---------|
| 20dB Bandwidth test                   | 15.247(a)(1)   | Pass    |
| Carrier Frequency Separation test     | 15.247(a)(1)   | Pass    |
| Number of hopping frequencies test    | 15.247(a)(1)   | Pass    |
| Time of Occupancy (dwell time) test   | 15.247(a)(1)   | Pass    |
| Maximum Output Power test             | 15.247(b)      | Pass    |
| RF Antenna Conducted Spurious test    | 15.247(d)      | Pass    |
| Radiated Spurious Emission test       | 15.205, 15.209 | Pass    |
| Emission on the Band Edge test        | 15.247(d)      | Pass    |
| AC Power Line Conducted Emission test | 15.207         | Pass    |



## 1. General information

### 1.1 Identification of the EUT

Product: Wireless Video Baby Monitor

Model No.: TTD-VM2501R

FCC ID.: O6LTTD-VM2501R

Frequency Range: 2408MHz~2468MHz

Available Hopping Channels: 31 channels

Frequency of Each Channel:  $2408+2k$ ,  $k=0\sim30$

Type of Modulation: GFSK, FHSS

Rated Power: 1. DC 6 V from adapter  
2. DC 3.7 V from battery

Power Cord: N/A

Sample Received: Jun. 13, 2013

Test Date(s): Jun. 24, 2013~Aug. 08, 2013

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

### 1.2 Additional information about the EUT

The EUT is Wireless Video Baby Monitor, and was defined as information technology equipment.

The customer confirmed TTD-VM2500R is a series model to TTD-VM2501R (EUT), the different model numbers are served as marketing strategy.

For more detail features, please refer to User's manual as file name "Installation guide.pdf"



### 1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 0dBi  
Antenna Type : Monopole Antenna  
Connector Type : Fixed Type Antenna

### 1.4 Adapter information

The EUT will be supplied with a power supply from below list:

| No.     | Brand                                | Model no.  | Specification                                     |
|---------|--------------------------------------|------------|---------------------------------------------------|
| Adapter | SALOM ELECTRIC<br>(XIAMEN) CO., LTD. | SSW-2256US | I/P: 100-240V~, 50-60Hz, 0.2A<br>O/P: 6.0V, 800mA |

### 1.5 Peripherals equipment

| Peripherals                    | Brand  | Model No.   | Serial No. | Description of Data Cable |
|--------------------------------|--------|-------------|------------|---------------------------|
| Wireless Video<br>Baby Monitor | Tranwo | TTD-VM2501T | N/A        | N/A                       |

## 2. Test specifications

### 2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section §15.205, §15.207, §15.209, §15.247, DA 00-705 and ANSI C63.4/2003.

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

### 2.2 Operation mode

The EUT is supplied with DC 6 V from adapter (Test voltage: 120Vac, 60Hz).

The EUT is the type of transmitter and receiver equipment and transmits RF signal.

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

### 2.3 Measurement Uncertainty

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 |
| Conducted Emission | 2.08 dB     |            |         |

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

## 2.4 Test equipment

| Equipment                         | Brand           | Model No.                 | Serial No.  | Calibration Date | Next Calibration Date |
|-----------------------------------|-----------------|---------------------------|-------------|------------------|-----------------------|
| EMI Test Receiver                 | Rohde & Schwarz | ESCI                      | 100018      | 2012/11/30       | 2013/11/29            |
| Spectrum Analyzer                 | Rohde&schwarz   | FSP30                     | 100137      | 2013/06/21       | 2014/06/21            |
| Spectrum Analyzer                 | Rohde&schwarz   | FSEK30                    | 100186      | 2013/01/23       | 2014/01/23            |
| Horn Antenna (1-18G)              | Schwarzbeck     | BBHA 9120 D               | 9120D-456   | 2012/09/03       | 2014/09/03            |
| Horn Antenna (14-42G)             | SHWARZBECK      | BBHA 9170                 | BBHA9170159 | 2012/09/05       | 2014/09/05            |
| Broadband Antenna                 | SCHWARZBECK     | VULB 9168                 | 9168-172    | 2011/07/26       | 2013/07/25            |
| Loop Antenna                      | RolfHeine       | LA-285                    | 02/10033    | 2012/03/20       | 2014/03/20            |
| Pre-Amplifier                     | MITEQ           | AFS44-00102650--42-10P-44 | 1495287     | 2011/10/27       | 2013/10/26            |
| Pre-Amplifier                     | MITEQ           | JS4-26004000--27-8A       | 828825      | 2012/09/18       | 2014/09/18            |
| Power Meter                       | Anritsu         | ML2495A                   | 0844001     | 2012/10/09       | 2013/10/09            |
| Power Sensor                      | Anritsu         | MA2411B                   | 0738452     | 2012/10/09       | 2013/10/09            |
| Temperature&Humidity Test Chamber | TERCHY          | MHU-225LRU (SA)           | 950838      | 2013/06/14       | 2014/06/14            |
| Two-Line V-Network                | Rohde&schwarz   | ESH3-Z5                   | 838979/014  | 2012/10/29       | 2013/10/29            |
| EMI Test Receiver                 | Rohde & Schwarz | ESCI                      | 100018      | 2012/11/30       | 2013/11/29            |

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

### 3. 20dB Bandwidth test

#### 3.1 Operating environment

Temperature: 23 °C  
 Relative Humidity: 55 %  
 Atmospheric Pressure: 1008 hPa  
 Test Date: Jul. 31, 2013~Aug. 08, 2013

#### 3.2 Test setup & procedure

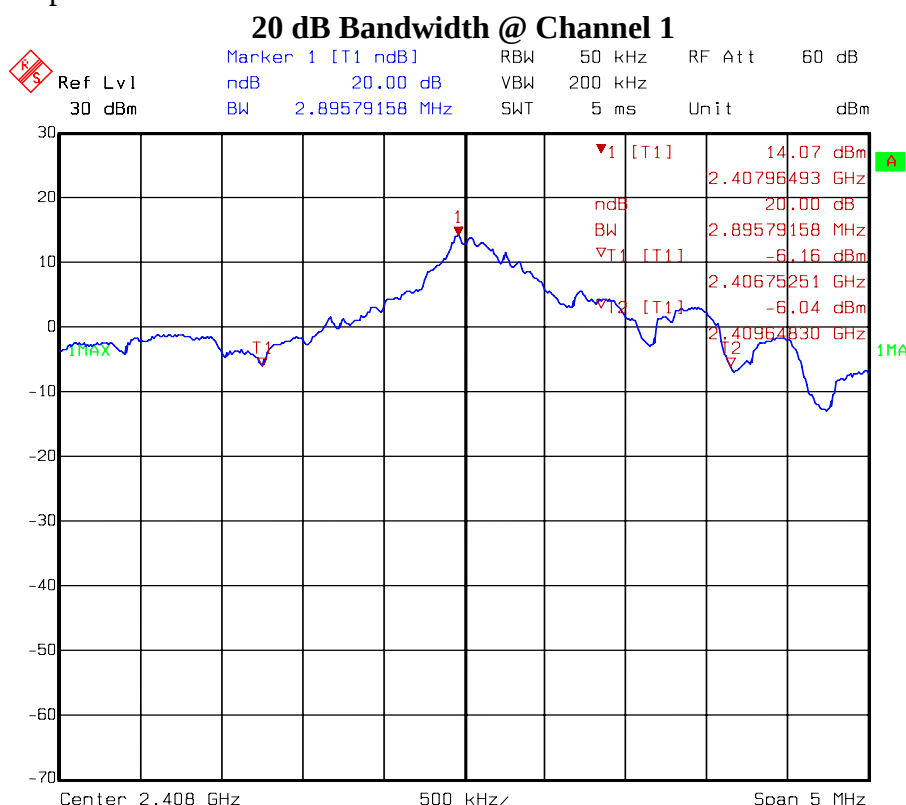
**The test procedure was according to FCC measurement guidelines DA 00-705.**

The 20dB bandwidth per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set  $\geq 1\%$  of the Span, the video bandwidth  $\geq$  RBW, and the SPAN may equal to approximately 2 to 3 times the 20dB bandwidth. The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

#### 3.3 Measured data of modulated bandwidth test results

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 1       | 2408            | 2.895                |
| 17      | 2440            | 2.895                |
| 31      | 2468            | 2.555                |

Please see the plot below.





### 20 dB Bandwidth @ Channel 17



### 20 dB Bandwidth @ Channel 31



## 4. Carrier Frequency Separation test

### 4.1 Operating environment

Temperature: 23 °C  
 Relative Humidity: 55 %  
 Atmospheric Pressure: 1008 hPa  
 Test Date: Jul. 12, 2013

### 4.2 Test setup & procedure

**The test procedure was according to FCC measurement guidelines DA 00-705.**

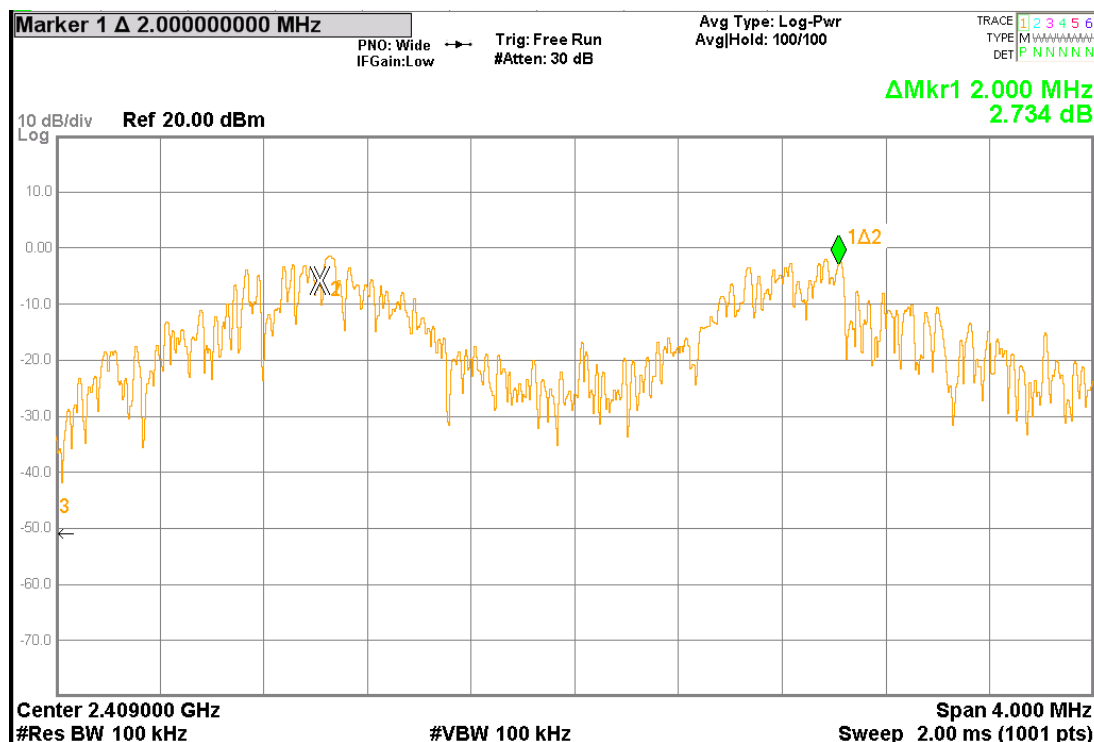
The carrier frequency separation per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at  $\geq 1\%$  of the span, the video bandwidth  $\geq$  RBW, and the SPAN was wide enough to capture the peaks of two adjacent channels. The carrier frequency separation result is in the following Table.

### 4.3 Measured data of Carrier Frequency Separation test result

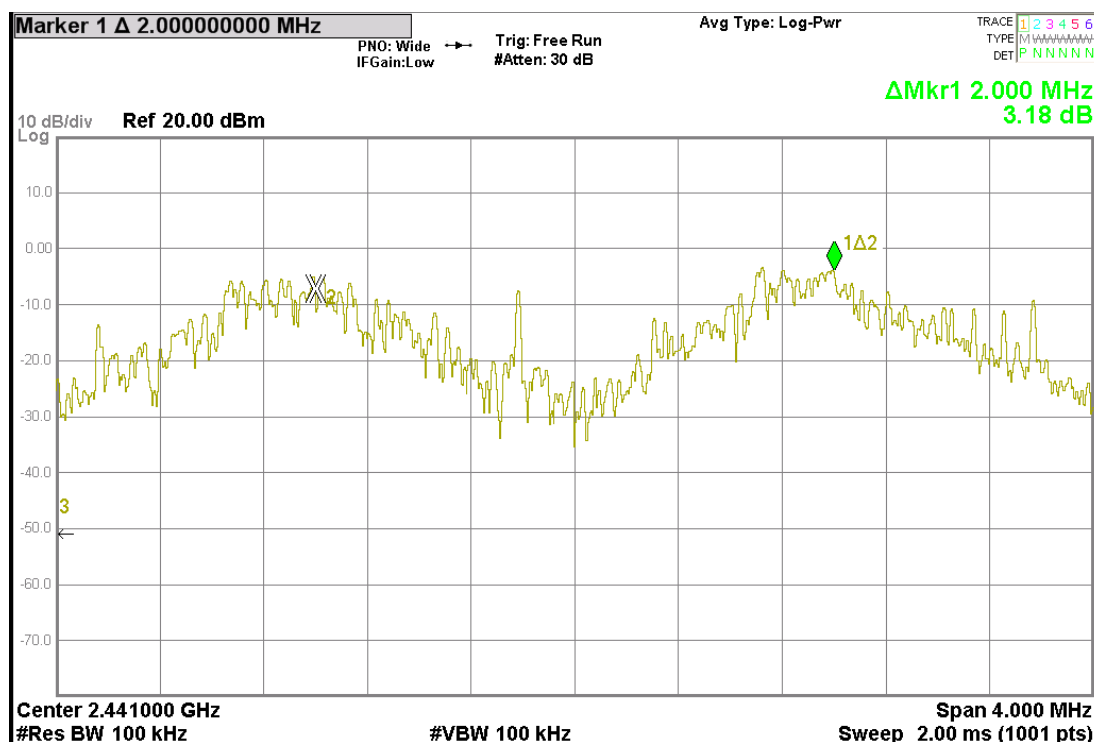
| Channel       | Frequency (MHz) | Carrier freq. Separation (MHz) | Limit 20dB BW*2/3(kHz) |
|---------------|-----------------|--------------------------------|------------------------|
| Channel 1~2   | 2408            | 2.000                          | 1930                   |
|               | 2409            |                                |                        |
| Channel 17~18 | 2440            | 2.000                          | 1930                   |
|               | 2441            |                                |                        |
| Channel 30~31 | 2467            | 2.008                          | 1703                   |
|               | 2468            |                                |                        |

Please see the plot below.

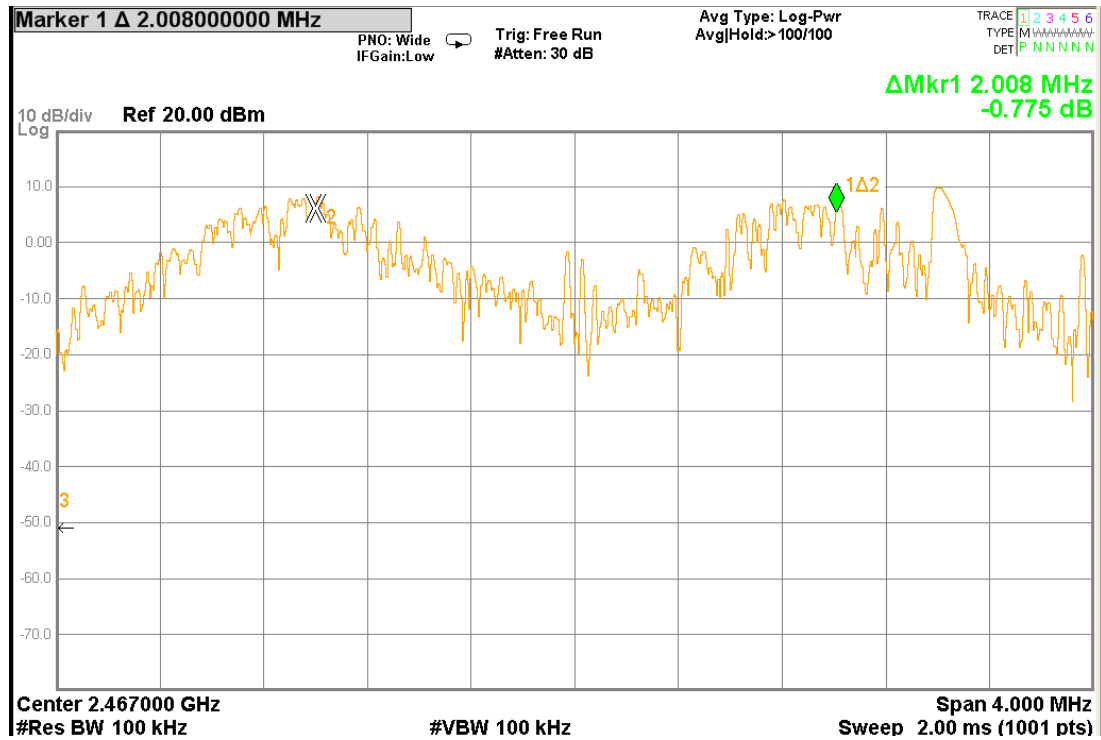
### Carrier Frequency Separation @ Channel 1~2



### Carrier Frequency Separation @ Channel 17~18



### Carrier Frequency Separation @ Channel 30~31



## 5. Number of hopping frequencies test

### 5.1 Operating environment

Temperature: 25 °C  
 Relative Humidity: 55 %  
 Atmospheric Pressure: 1008 hPa  
 Test Date: Jul. 16, 2013

### 5.2 Test setup & procedure

**The test procedure was according to FCC measurement guidelines DA 00-705.**

The number of hopping frequencies per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at  $\geq 1\%$  of the span, the video bandwidth  $\geq$  RBW, and the SPAN was the frequency band of operation. The carrier frequency separation result is in the following Table.

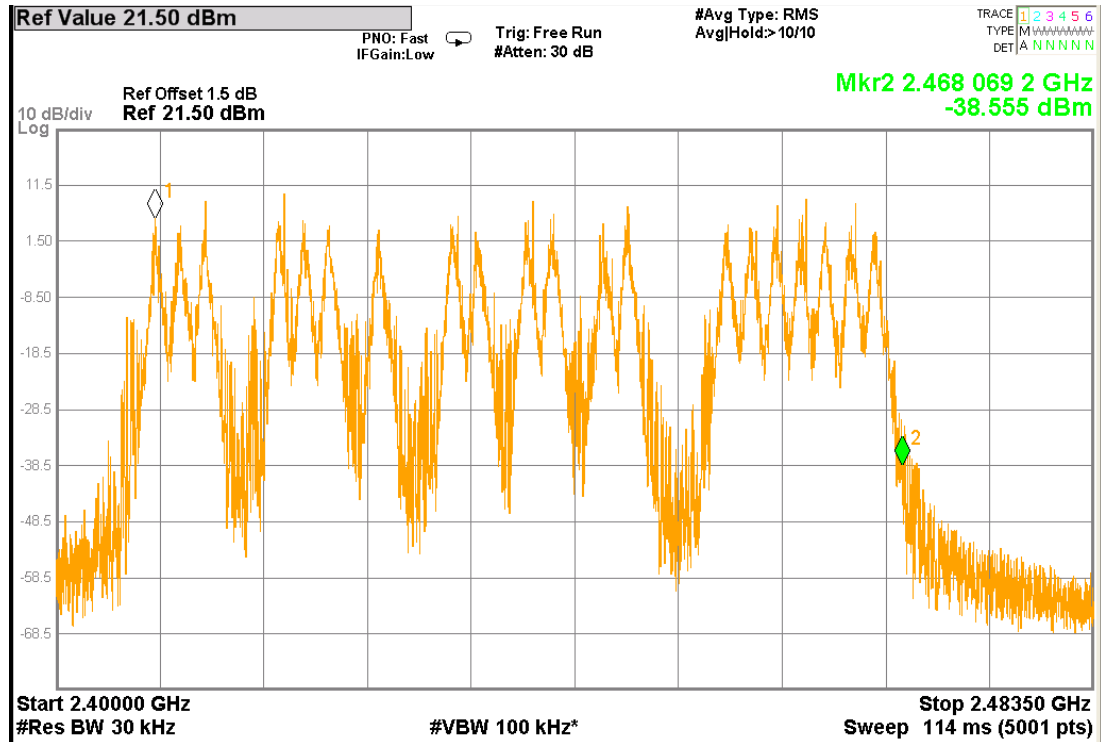
### 5.3 Measured data of number of hopping frequencies test result

| Frequency Range (MHz) | Hopping Channels |
|-----------------------|------------------|
| 2408~2468             | 20               |

Note: According to 15.247 paragraph (g): Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission.

The system declares the EUT supports 31 channels. However, the system distributes its transmissions from 16~20 hopping channels during each transmission, so we define the EUT supports 20 hopping channels.

## Number of hopping frequencies



## 6. Time of Occupancy (dwell time) & Duty Cycle Correction Factor test

### 6.1 Operating environment

Temperature: 24 °C  
 Relative Humidity: 55 %  
 Atmospheric Pressure: 1008 hPa  
 Test Date: Jul. 16, 2013~Jul. 19, 2013

### 6.2 Test setup & procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The time of occupancy (dwell time) per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth  $\geq$  RBW, and the zero span function of spectrum analyzer was enable. The EUT has its hopping function enable.

### 6.3 Measured data of Maximum Output Power test results

The total sweep time is  $0.4 \text{ s} \times 20 \text{ Channels} = 8 \text{ s}$

Time of occupancy (dwell time) for Ch 1

Number of Hops in 8s=16, Single Pulse Width = 0.00137 sec

Dwell time = Pulse Width  $\times$  16 = 0.022 s

Time of occupancy (dwell time) for Ch 17

Number of Hops in 8s=16, Single Pulse Width = 0.00153 sec

Dwell time = Pulse Width  $\times$  16 = 0.0244 s

Time of occupancy (dwell time) for Ch 31

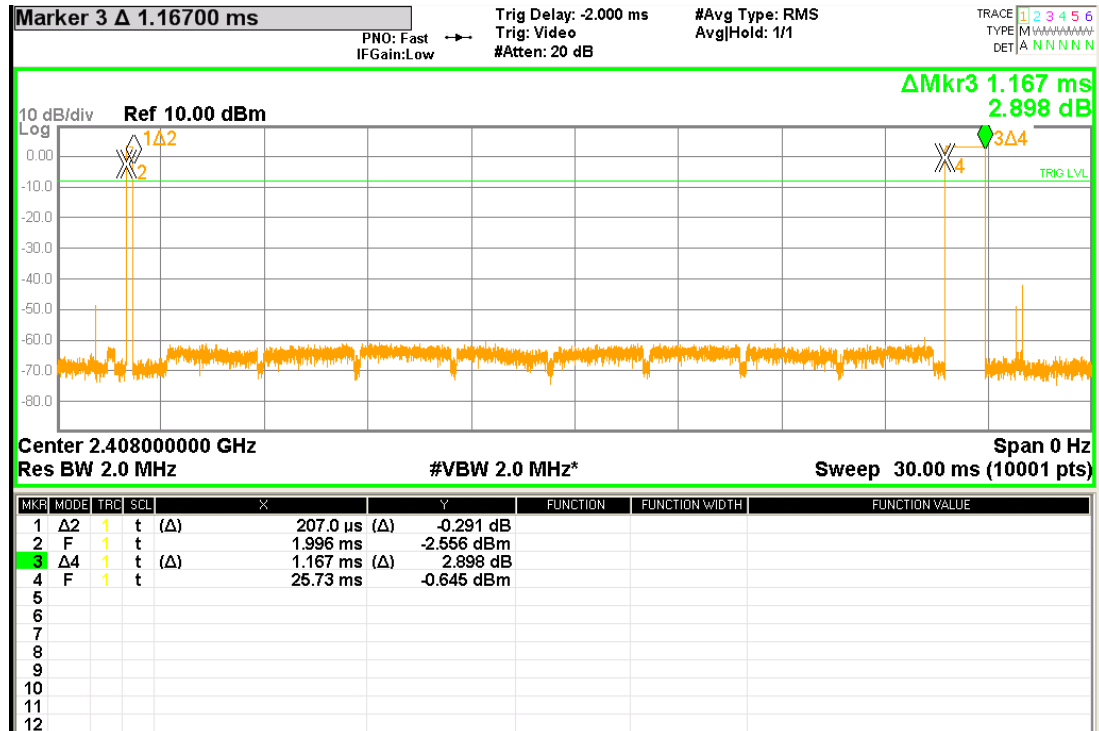
Number of Hops in 8s=16, Single Pulse Width = 0.00163 sec

Dwell time = Pulse Width  $\times$  16 = 0.0261 s

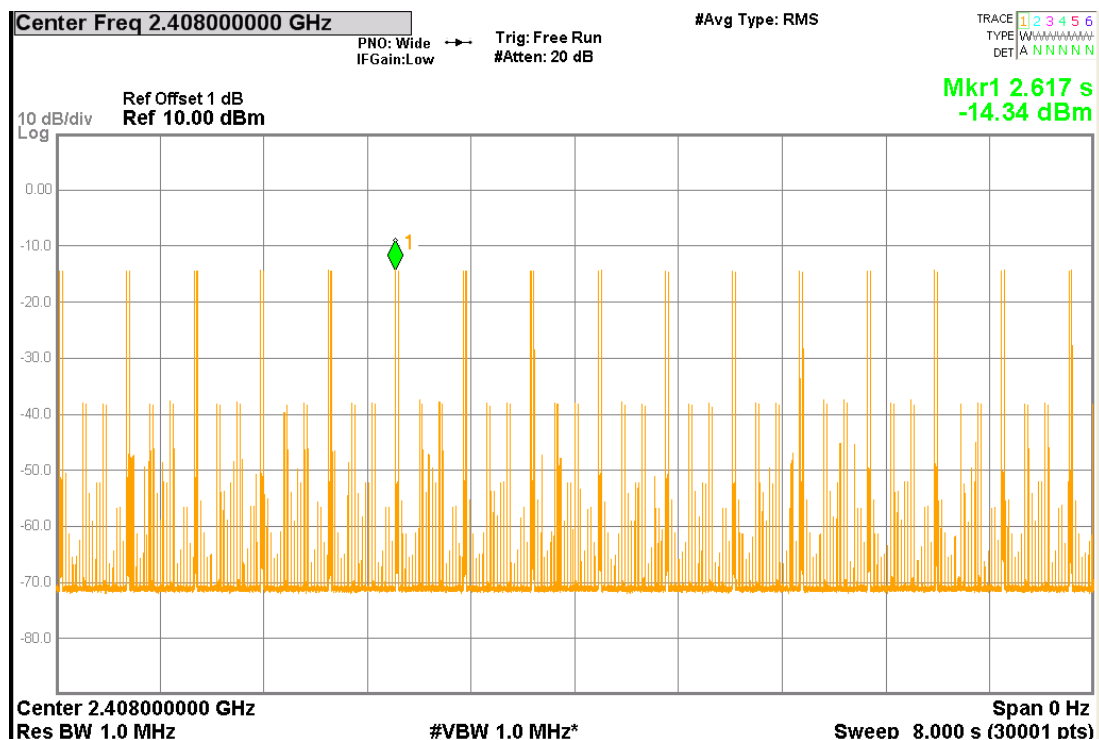
| Channel | Short on time (ms) | Long on time (ms) | Pulse duration (ms) | Number of pulse | Measure time (s) | Dwell time (s) | Limit (s) |
|---------|--------------------|-------------------|---------------------|-----------------|------------------|----------------|-----------|
| 1       | 0.207              | 1.167             | 1.37                | 16              | 8                | 0.0220         | 0.4       |
| 17      | 0.204              | 1.323             | 1.53                | 16              | 8                | 0.0244         | 0.4       |
| 31      | 0.21               | 1.419             | 1.63                | 16              | 8                | 0.0261         | 0.4       |

Please see the plot below.

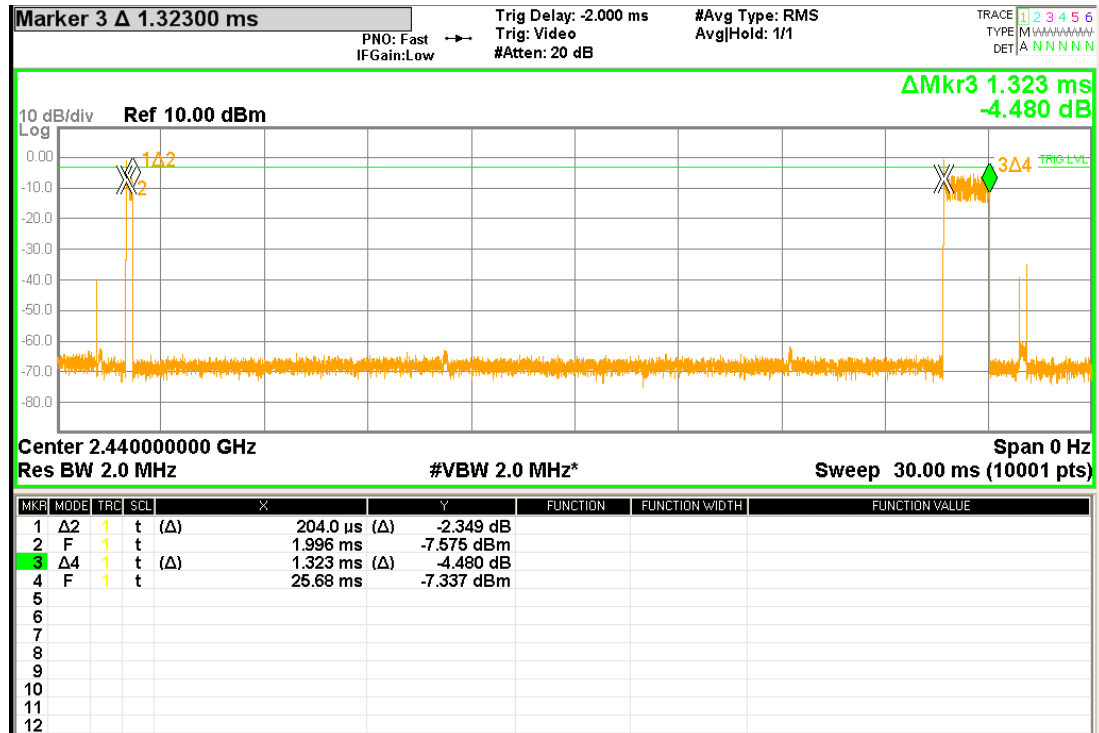
### Dwell time (Pulse time) @ Channel 1



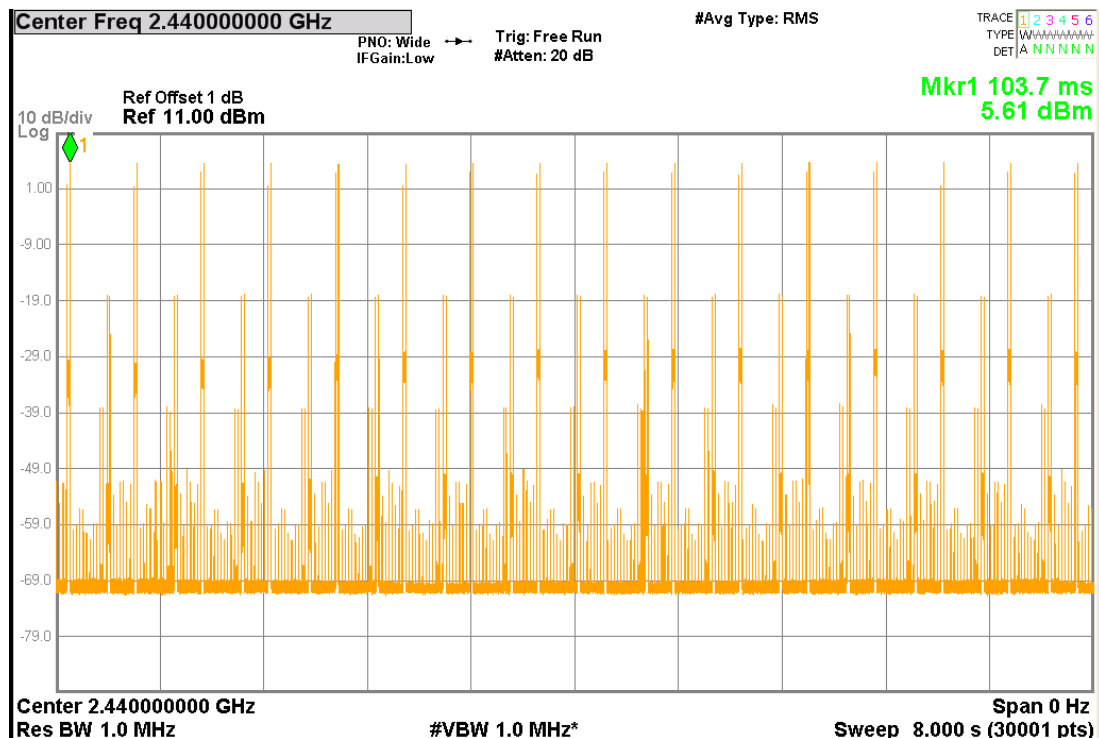
### Dwell time (Number of pulse) @ Channel 1



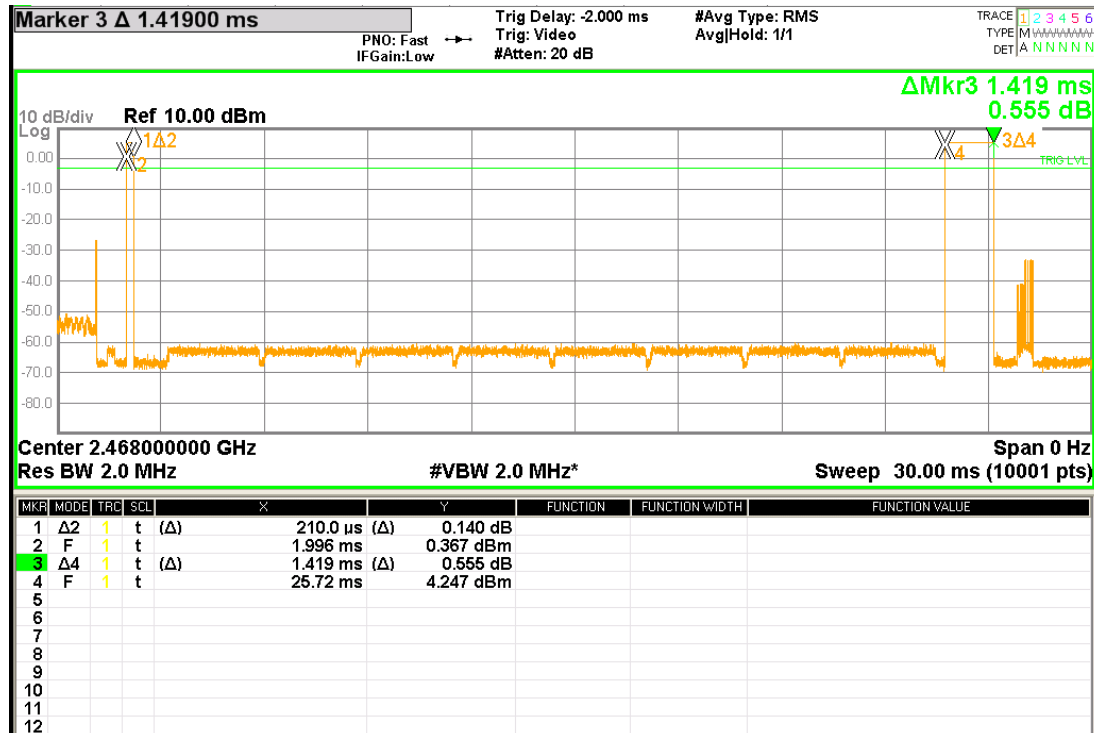
### Dwell time (Pulse time) @ Channel 17



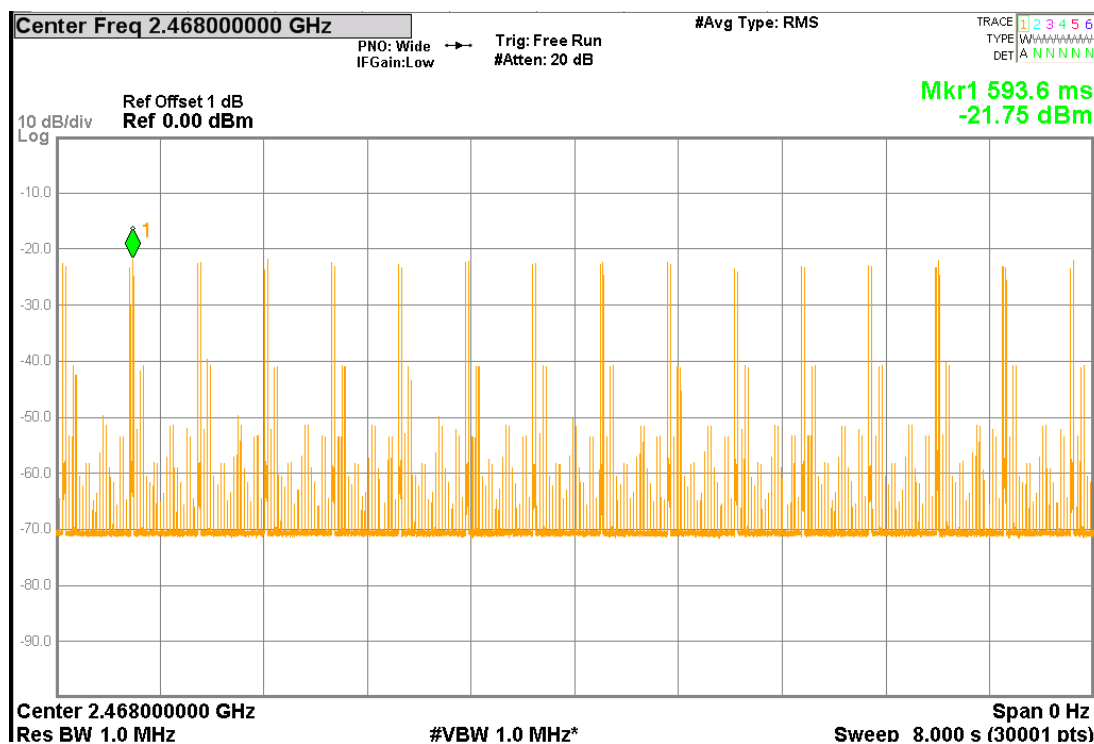
### Dwell time (Number of pulse) @ Channel 17



### Dwell time (Pulse time) @ Channel 31



### Dwell time (Number of pulse) @ Channel 31



## 7. Maximum Output Power test

### 7.1 Operating environment

Temperature: 23 °C  
 Relative Humidity: 55 %  
 Atmospheric Pressure: 1008 hPa  
 Test Date: Jul. 17, 2013

### 7.2 Test setup & procedure

**The test procedure was according to FCC measurement guidelines DA 00-705.**

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (2 dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

### 7.3 Measured data of Maximum Output Power test results

| Channel | Frequency<br>(MHz) | Output Power<br>(dBm) | Total Power<br>(mW) | Limit<br>(dBm) | Margin<br>(dB) |
|---------|--------------------|-----------------------|---------------------|----------------|----------------|
|         |                    | (PK)                  | (PK)                |                |                |
| 1       | 2408               | 17                    | 50.12               | 20.97          | -3.97          |
| 17      | 2440               | 17.97                 | 62.66               | 20.97          | -3.00          |
| 31      | 2468               | 18.61                 | 72.61               | 20.97          | -2.36          |

## 8. RF Antenna Conducted Spurious test

## 8.1 Operating environment

|                       |               |     |
|-----------------------|---------------|-----|
| Temperature:          | 23            | °C  |
| Relative Humidity:    | 55            | %   |
| Atmospheric Pressure: | 1008          | hPa |
| Test Date:            | Jul. 12, 2013 |     |

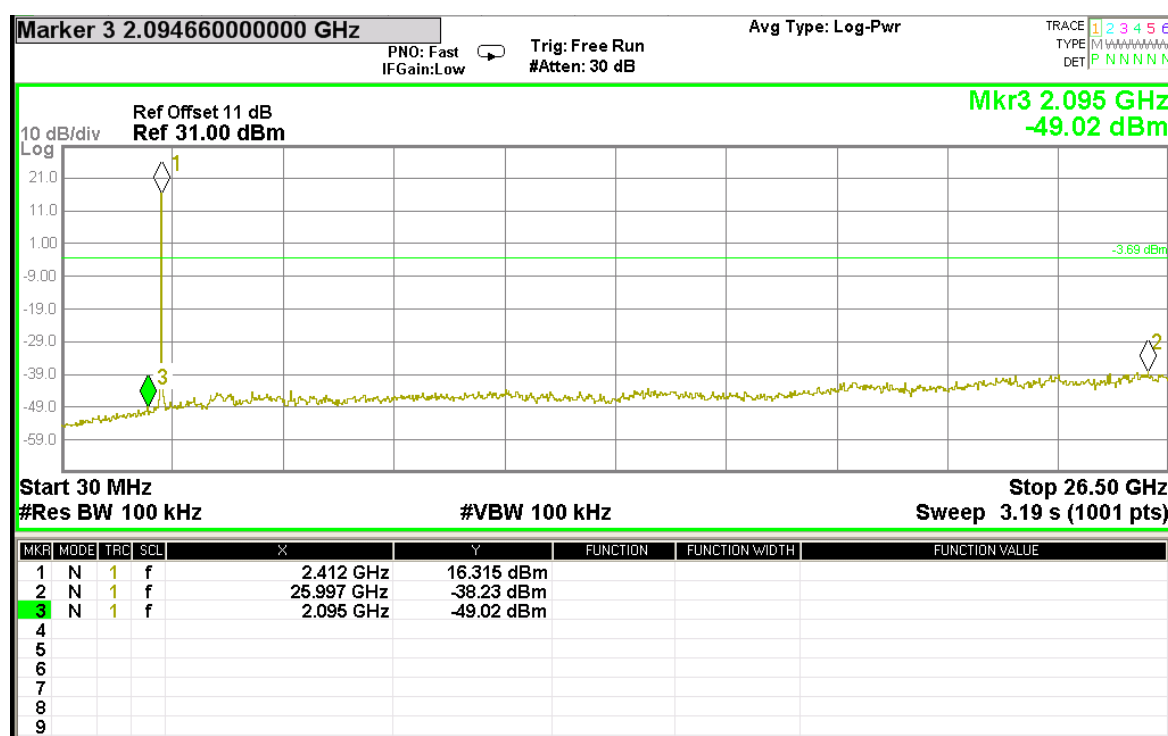
## 8.2 Test setup & procedure

**The test procedure was according to FCC measurement guidelines DA 00-705.**

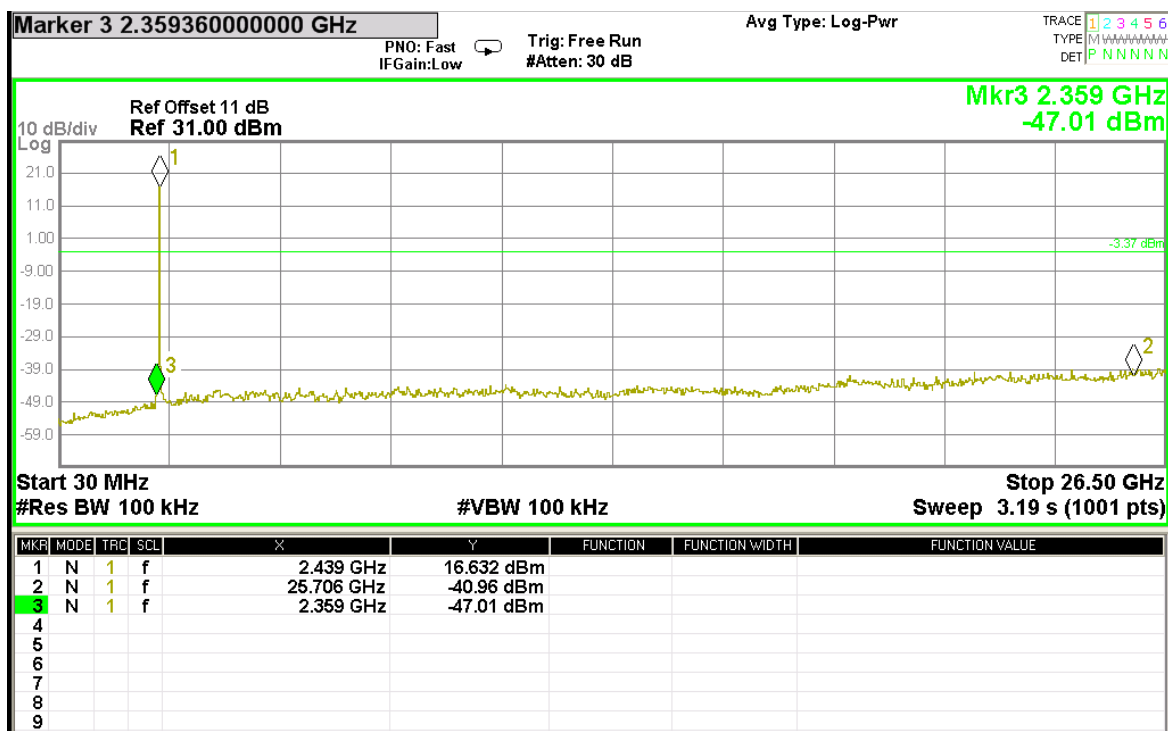
The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (c) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The table below is the results from the highest emission for each channel within the authorized band. This table was used to determine the spurious limits for each channel.

### 8.3 Measured data of the highest RF Antenna Conducted Spurious test result

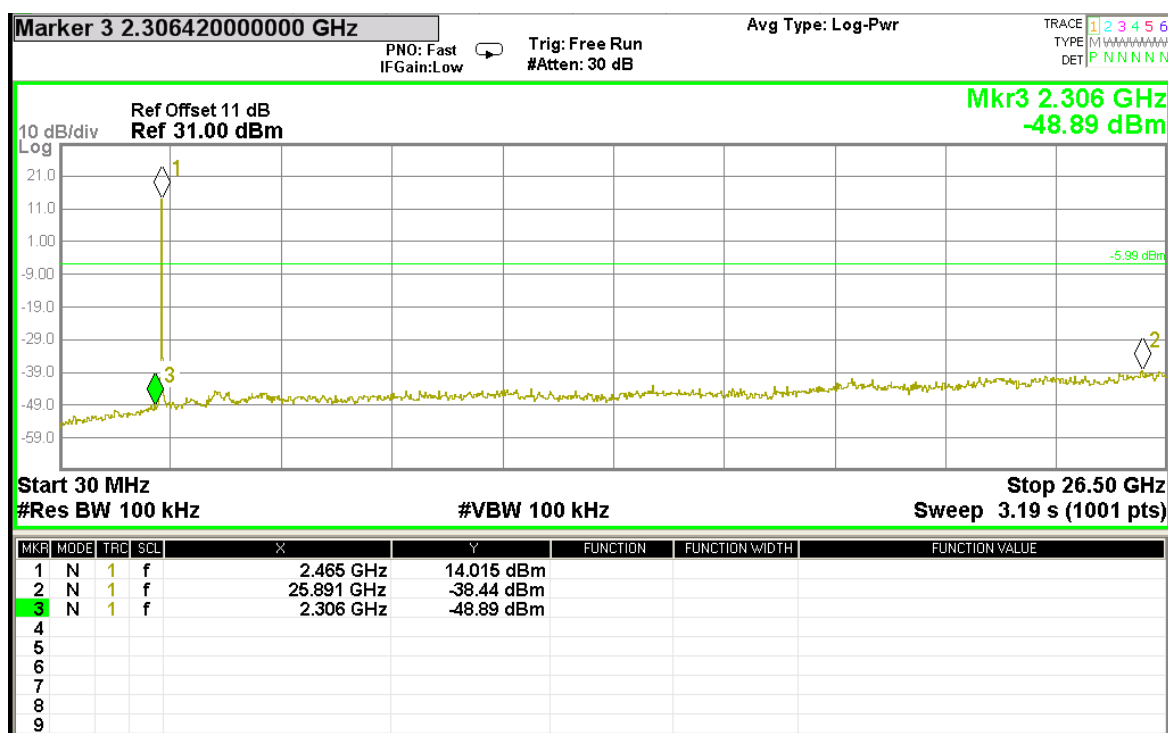
### Conducted spurious @ Channel 1



### Conducted spurious @ Channel 17



### Conducted spurious @ Channel 31



## 9. Radiated Emission test

### 9.1 Operating environment

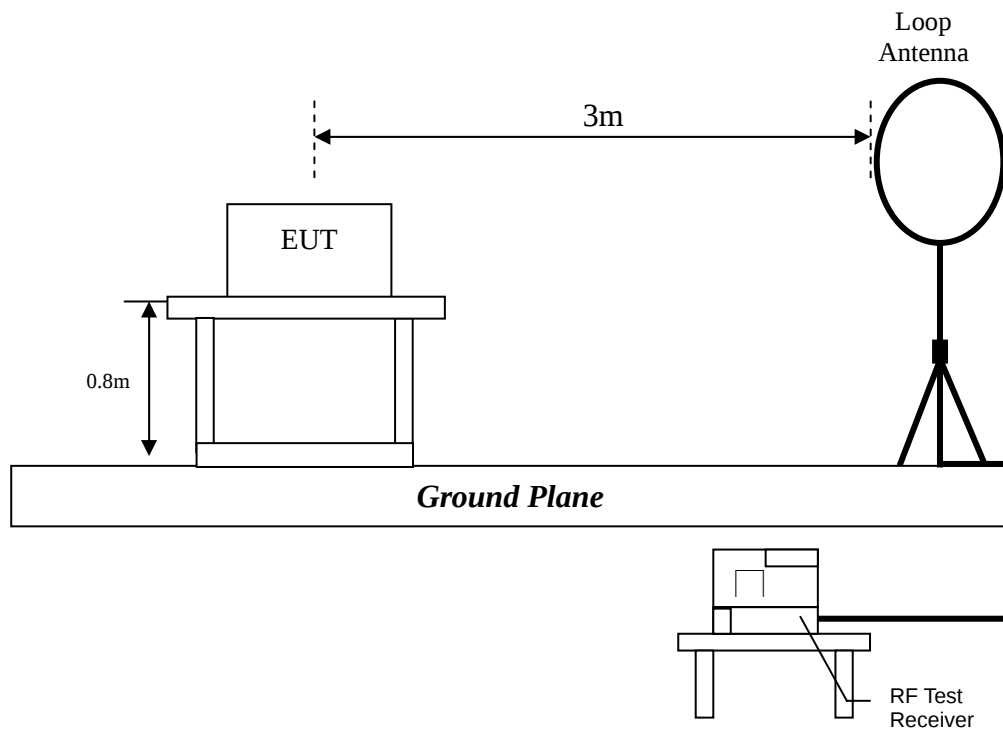
Temperature: 28 °C  
Relative Humidity: 52 %  
Atmospheric Pressure: 1008 hPa  
Test Date: Jul. 04, 2013~Jul. 17, 2013

### 9.2 Test setup & procedure

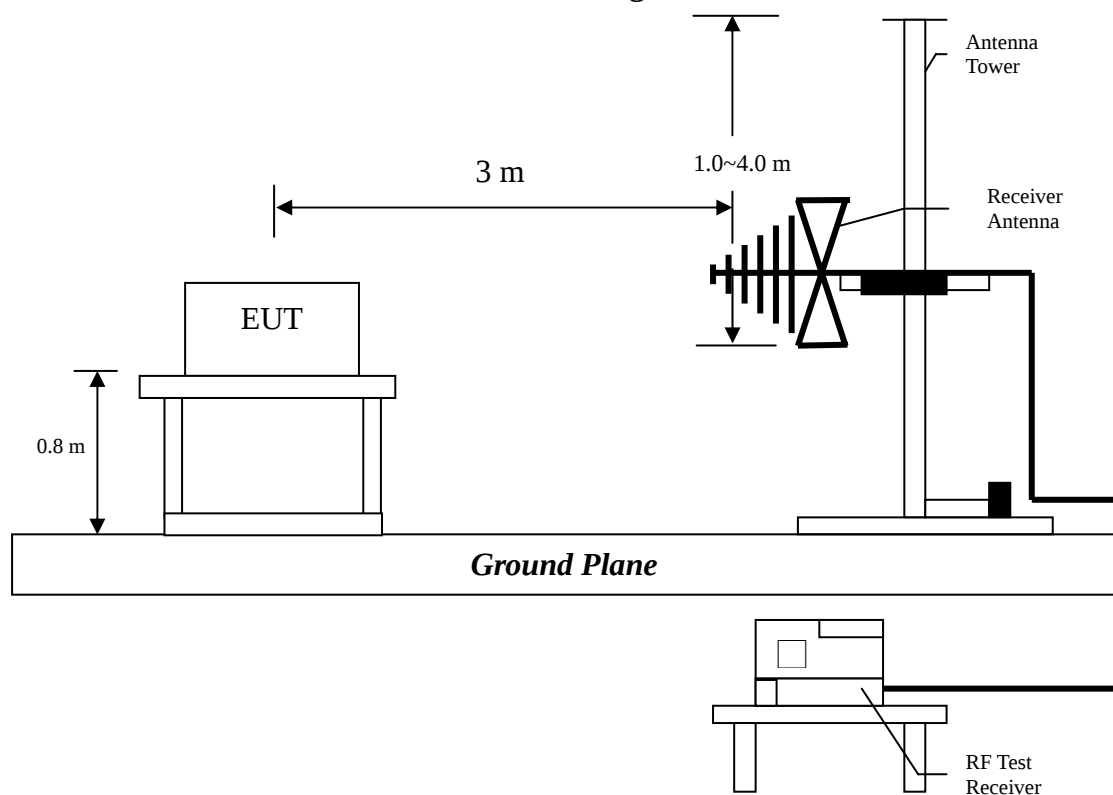
The test procedure was according to FCC measurement guidelines DA 00-705 and ANSI C63.4/2003.

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

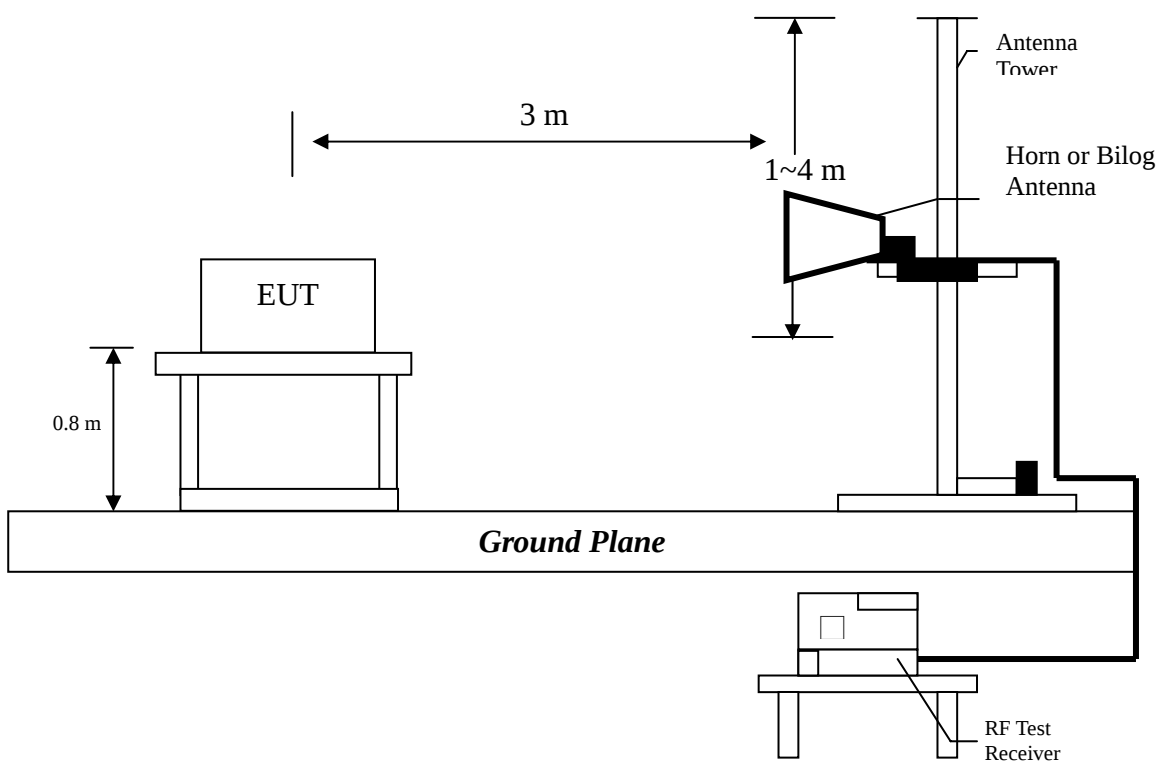
**Radiated emission from 9kHz to 30MHz uses Loop Antenna:**



**Radiated emission from 30MHz to 1GHz uses Bilog Antenna:**



**Radiated emission above 1GHz uses Horn Antenna:**



The signal is maximized through rotation and placement in the three orthogonal axes. According to §15.33(a), the spectrum shall be investigated from the lowest radio frequency signal generated in the device, to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Spectrum Analyzer Resolution Bandwidth is 100kHz or greater for frequencies 30MHz to 1GHz, 1MHz – for frequencies above 1GHz.

The EUT for testing is arranged on a fiberglass 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 3 meter reading using inverse scaling with distance.

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

### 9.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

| Frequency<br>(MHz) | Field Strength<br>(microvolts/meter) |
|--------------------|--------------------------------------|
| 0.009~0.490        | 2400/F(kHz)                          |
| 0.490~1.705        | 2400/F(kHz)                          |
| 1.705~30           | 30                                   |
| 30-88              | 100                                  |
| 88-216             | 150                                  |
| 216-960            | 200                                  |
| Above 960          | 500                                  |

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 instrument antenna and the closed point of any part of the device or system



## 9.4 Radiated spurious emission test data

### 9.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under Channel 1, Channel 17 and Channel 31. The worst case occurred at Channel 1.

EUT : TTD-VM2501R

Worst Case : TX mode at Channel 1

| Antenna<br>Polariz.<br>(V/H) | Freq.<br>(MHz) | Receiver<br>Detector | Corr.<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Corrected<br>Level<br>(dBuV/m) | Limit<br>@ 3 m<br>(dBuV/m) | Margin<br>(dB) |
|------------------------------|----------------|----------------------|---------------------------|-------------------|--------------------------------|----------------------------|----------------|
| V                            | 51.34          | QP                   | 12.90                     | 21.34             | 34.23                          | 40.00                      | -5.77          |
| V                            | 101.78         | QP                   | 7.64                      | 25.10             | 32.74                          | 43.50                      | -10.76         |
| V                            | 191.02         | QP                   | 12.00                     | 9.61              | 21.61                          | 43.50                      | -21.89         |
| V                            | 288.02         | QP                   | 13.70                     | 9.50              | 23.19                          | 46.00                      | -22.81         |
| V                            | 480.08         | QP                   | 18.43                     | 11.22             | 29.64                          | 46.00                      | -16.36         |
| V                            | 864.20         | QP                   | 23.70                     | 9.49              | 33.19                          | 46.00                      | -12.81         |
| H                            | 101.78         | QP                   | 9.03                      | 11.77             | 20.79                          | 43.50                      | -22.71         |
| H                            | 191.02         | QP                   | 11.27                     | 9.31              | 20.57                          | 43.50                      | -22.93         |
| H                            | 288.02         | QP                   | 13.85                     | 10.34             | 24.18                          | 46.00                      | -21.82         |
| H                            | 480.08         | QP                   | 18.64                     | 13.58             | 32.22                          | 46.00                      | -13.78         |
| H                            | 672.14         | QP                   | 21.52                     | 12.07             | 33.58                          | 46.00                      | -12.42         |
| H                            | 864.20         | QP                   | 24.12                     | 13.89             | 38.00                          | 46.00                      | -8.00          |

Remark:1. Corr. Factor = Antenna Factor + Cable Loss

2. Corrected Level = Reading + Corr. Factor

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

## 9.4.2 Measurement results: frequency above 1GHz

EUT : TTD-VM2501R

Test Condition : TX mode at Channel 1

| Frequency<br>(MHz) | Spectrum<br>Analyzer<br>Detector | Antenna<br>Polariz.<br>(H/V) | Preamplifier<br>Gain<br>(dB) | Correction<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Corrected<br>Level<br>(dBuV/m) | Limit<br>@ 3 m<br>(dBuV/m) | Margin<br>(dB) |
|--------------------|----------------------------------|------------------------------|------------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|
| 4816               | PK                               | V                            | 35.1                         | 38.54                          | 62.57             | 66.01                          | 74                         | -7.99          |
| 4816               | AV                               | V                            | 35.1                         | 38.54                          | 46.8              | 50.24                          | 54                         | -3.76          |
| 7224               | PK                               | V                            | 33                           | 44.6                           | 50.47             | 62.07                          | 74                         | -11.93         |
| 7224               | AV                               | V                            | 33                           | 44.6                           | 36.85             | 48.45                          | 54                         | -5.55          |
| 9632               | PK                               | V                            | 32.7                         | 49.3                           | 39.93             | 56.53                          | 74                         | -17.47         |
| 9632               | AV                               | V                            | 32.7                         | 49.3                           | 28.11             | 44.71                          | 54                         | -9.29          |
| 12040              | PK                               | V                            | 31.6                         | 50.87                          | 36.3              | 55.57                          | 74                         | -18.43         |
| 12040              | AV                               | V                            | 31.6                         | 50.87                          | 24.51             | 43.78                          | 54                         | -10.22         |
| 4816               | PK                               | H                            | 35.1                         | 38.54                          | 58.05             | 61.49                          | 74                         | -12.51         |
| 4816               | AV                               | H                            | 35.1                         | 38.54                          | 44.91             | 48.35                          | 54                         | -5.65          |
| 7224               | PK                               | H                            | 33                           | 44.6                           | 43.08             | 54.68                          | 74                         | -19.32         |
| 7224               | AV                               | H                            | 33                           | 44.6                           | 31.24             | 42.84                          | 54                         | -11.16         |
| 9632               | PK                               | H                            | 32.7                         | 49.3                           | 38.3              | 54.90                          | 74                         | -19.10         |
| 9632               | AV                               | H                            | 32.7                         | 49.3                           | 25.55             | 42.15                          | 54                         | -11.85         |
| 12040              | PK                               | H                            | 31.6                         | 50.87                          | 36.81             | 56.08                          | 74                         | -17.92         |
| 12040              | AV                               | H                            | 31.6                         | 50.87                          | 25.6              | 44.87                          | 54                         | -9.13          |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.



EUT : TTD-VM2501R

Test Condition : TX mode at Channel 17

| Frequency<br>(MHz) | Spectrum<br>Analyzer<br>Detector | Antenna<br>Polariz.<br>(H/V) | Preamp<br>Gain<br>(dB) | Correction<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Corrected<br>Level<br>(dBuV/m) | Limit<br>@ 3 m<br>(dBuV/m) | Margin<br>(dB) |
|--------------------|----------------------------------|------------------------------|------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|
| 4880               | PK                               | V                            | 35.1                   | 38.54                          | 61.62             | 65.06                          | 74                         | -8.94          |
| 4880               | AV                               | V                            | 35.1                   | 38.54                          | 46.68             | 50.12                          | 54                         | -3.88          |
| 7320               | PK                               | V                            | 33                     | 44.6                           | 46.58             | 58.18                          | 74                         | -15.82         |
| 7320               | AV                               | V                            | 33                     | 44.6                           | 36.25             | 47.85                          | 54                         | -6.15          |
| 9760               | PK                               | V                            | 32.7                   | 49.3                           | 44.37             | 60.97                          | 74                         | -13.03         |
| 9760               | AV                               | V                            | 32.7                   | 49.3                           | 32.11             | 48.71                          | 54                         | -5.29          |
| 12200              | PK                               | V                            | 31.6                   | 50.87                          | 35.81             | 55.08                          | 74                         | -18.92         |
| 12200              | AV                               | V                            | 31.6                   | 50.87                          | 25.1              | 44.37                          | 54                         | -9.63          |
| 4880               | PK                               | H                            | 35.1                   | 38.54                          | 56.86             | 60.30                          | 74                         | -13.70         |
| 4880               | AV                               | H                            | 35.1                   | 38.54                          | 45.51             | 48.95                          | 54                         | -5.05          |
| 7320               | PK                               | H                            | 33                     | 44.6                           | 48.07             | 59.67                          | 74                         | -14.33         |
| 7320               | AV                               | H                            | 33                     | 44.6                           | 35.96             | 47.56                          | 54                         | -6.44          |
| 9760               | PK                               | H                            | 32.7                   | 49.3                           | 41.92             | 58.52                          | 74                         | -15.48         |
| 9760               | AV                               | H                            | 32.7                   | 49.3                           | 30.12             | 46.72                          | 54                         | -7.28          |
| 12200              | PK                               | H                            | 31.6                   | 50.87                          | 34.25             | 53.52                          | 54                         | -0.48          |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.



EUT : TTD-VM2501R

Test Condition : TX mode at Channel 31

| Frequency<br>(MHz) | Spectrum<br>Analyzer<br>Detector | Antenna<br>Polariz.<br>(H/V) | Preamplifier<br>Gain<br>(dB) | Correction<br>Factor<br>(dB/m) | Reading<br>(dBuV) | Corrected<br>Level<br>(dBuV/m) | Limit<br>@ 3 m<br>(dBuV/m) | Margin<br>(dB) |
|--------------------|----------------------------------|------------------------------|------------------------------|--------------------------------|-------------------|--------------------------------|----------------------------|----------------|
| 4936               | PK                               | V                            | 35.1                         | 38.54                          | 65.12             | 68.56                          | 74                         | -5.44          |
| 4936               | AV                               | V                            | 35.1                         | 38.54                          | 50.18             | 53.62                          | 54                         | -0.38          |
| 7404               | PK                               | V                            | 33                           | 44.6                           | 48.45             | 60.05                          | 74                         | -13.95         |
| 7404               | AV                               | V                            | 33                           | 44.6                           | 36.05             | 47.65                          | 54                         | -6.35          |
| 9872               | PK                               | V                            | 33                           | 49.3                           | 52.23             | 68.53                          | 74                         | -5.47          |
| 9872               | AV                               | V                            | 33                           | 49.3                           | 37.16             | 53.46                          | 54                         | -0.54          |
| 12340              | PK                               | V                            | 33                           | 50.87                          | 35.62             | 53.49                          | 54                         | -0.51          |
| 4936               | PK                               | H                            | 35.1                         | 38.54                          | 56.51             | 59.95                          | 74                         | -14.05         |
| 4936               | AV                               | H                            | 35.1                         | 38.54                          | 43.94             | 47.38                          | 54                         | -6.62          |
| 7404               | PK                               | H                            | 33                           | 44.6                           | 54.17             | 65.77                          | 74                         | -8.23          |
| 7404               | AV                               | H                            | 33                           | 44.6                           | 41.29             | 52.89                          | 54                         | -1.11          |
| 9872               | PK                               | H                            | 33                           | 49.3                           | 48.96             | 65.26                          | 74                         | -8.74          |
| 9872               | AV                               | H                            | 33                           | 49.3                           | 36.48             | 52.78                          | 54                         | -1.22          |
| 12340              | PK                               | H                            | 33                           | 50.87                          | 40.31             | 58.18                          | 74                         | -15.82         |
| 12340              | AV                               | H                            | 33                           | 50.87                          | 28.07             | 45.94                          | 54                         | -8.06          |

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

## 10. Emission on the band edge §FCC 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

### 10.1 Operating environment

Temperature: 23 °C  
Relative Humidity: 55 %  
Atmospheric Pressure: 1008 hPa  
Test Date: Aug. 07, 2013

### 10.2 Test setup & procedure

Please refer to the section 9.2 of this report.

### 10.3 Test Result

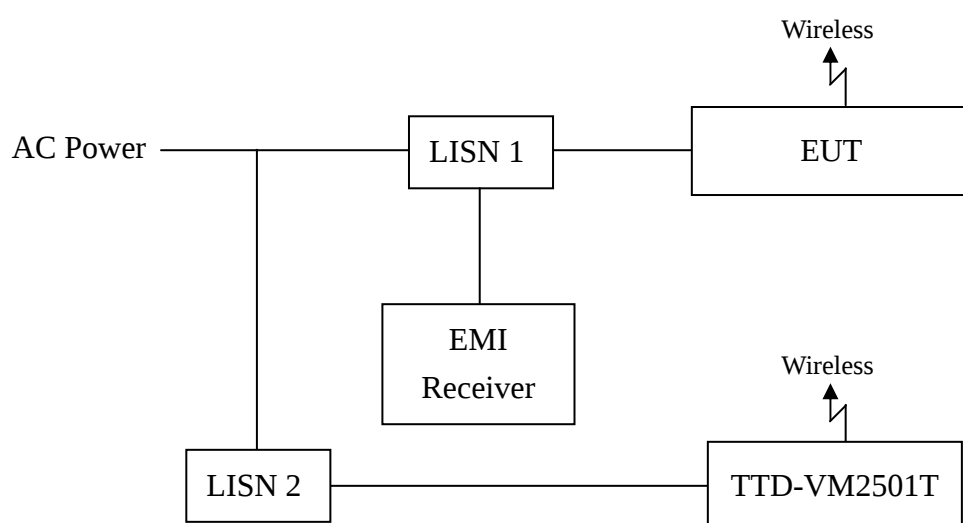
| Restricted Band (MHz) | Freq. (MHz) | Spectrum Analyzer Detector | Ant. Pol. (H/V) | Preamp. Gain (dB) | Correction Factor (dB/m) | Reading (dBuV) | Corrected Level (dBuV/m) | Limit @ 3 m (dBuV/m) | Margin (dB) |
|-----------------------|-------------|----------------------------|-----------------|-------------------|--------------------------|----------------|--------------------------|----------------------|-------------|
| 2310~2390             | 2389.86     | PK                         | V               | 38.021            | 31.849                   | 76.762         | 70.59                    | 74                   | -3.41       |
|                       | 2333.10     | AV                         | V               | 38.007            | 31.580                   | 52.527         | 46.10                    | 54                   | -7.90       |
| -                     | 2408.00     | PK                         | V               | 38.026            | 31.936                   | 119.031        | 112.94                   | -                    | 112.94      |
|                       | 2408.00     | AV                         | V               | 38.026            | 31.936                   | 105.621        | 99.53                    | -                    | 99.53       |
| -                     | 2468.00     | PK                         | V               | 38.042            | 32.221                   | 120.291        | 114.47                   | -                    | 114.47      |
|                       | 2468.00     | AV                         | V               | 38.042            | 32.221                   | 107.171        | 101.35                   | -                    | 101.35      |
| 2483.5~2500           | 2483.52     | PK                         | V               | 38.046            | 32.294                   | 78.211         | 72.46                    | 74                   | -1.54       |
|                       | 2484.16     | AV                         | V               | 38.046            | 32.297                   | 51.788         | 46.04                    | 54                   | -7.96       |

## 11. Power Line Conducted Emission test §FCC 15.207

### 11.1 Operating environment

Temperature: 23 °C  
 Relative Humidity: 52 %  
 Atmospheric Pressure 1008 hPa  
 Test Date: Jun. 24, 2013

### 11.2 Test setup & procedure



**The test procedure was according to ANSI C63.4/2003.**

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/50uH coupling impedance with 50 ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement. The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9 kHz.

The EUT configuration refers to the “Conducted set-up photo.pdf”.

### 11.3 Emission limit

| Freq.<br>(MHz) | Conducted Limit (dBuV) |          |
|----------------|------------------------|----------|
|                | Q.P.                   | Ave.     |
| 0.15~0.50      | 66 – 56*               | 56 – 46* |
| 0.50~5.00      | 56                     | 46       |
| 5.00~30.0      | 60                     | 50       |

\*Decreases with the logarithm of the frequency.

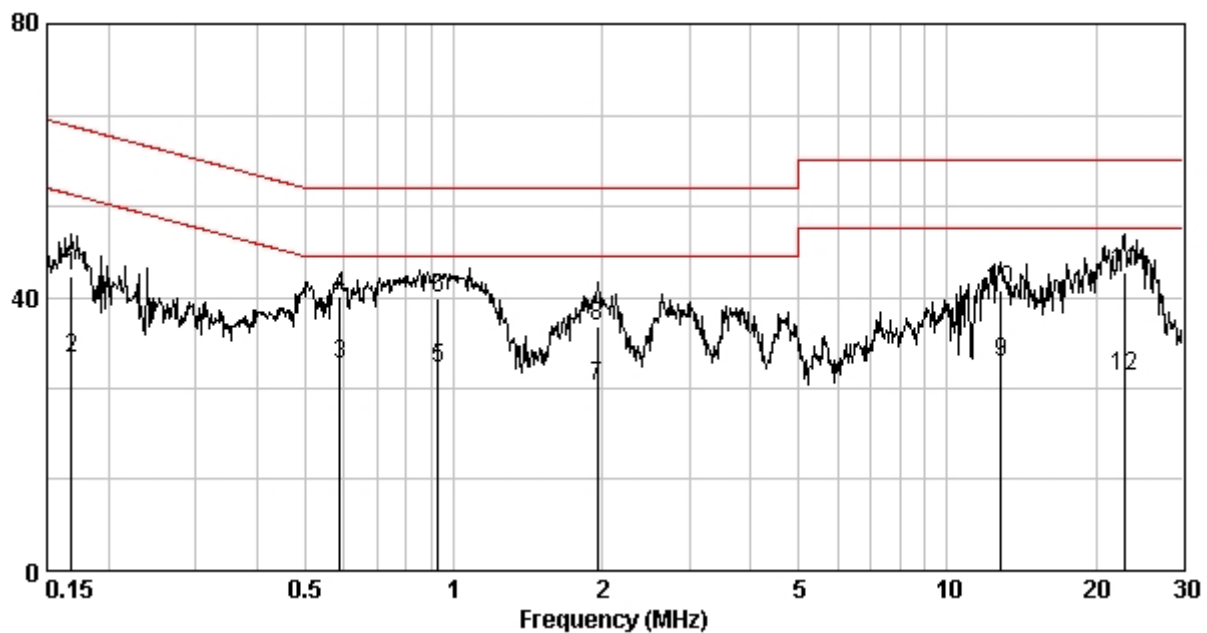
### 11.4 Power Line Conducted Emission test data

Phase: Line  
Model No.: TTD-VM2501R  
Operating mode: Tx mode

| Frequency<br>(MHz) | Corr.<br>Factor<br>(dB) | Level<br>Qp<br>(dBuV) | Limit<br>Qp<br>(dBuV) | Level<br>Av<br>(dBuV) | Limit<br>Av<br>(dBuV) | Margin<br>(dB) |        |
|--------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|--------|
|                    |                         |                       |                       |                       |                       | Qp             | Av     |
| 0.169              | 0.13                    | 43.07                 | 65.03                 | 31.01                 | 55.03                 | -21.96         | -24.02 |
| 0.589              | 0.18                    | 40.08                 | 56.00                 | 30.21                 | 46.00                 | -15.92         | -15.79 |
| 0.928              | 0.20                    | 39.96                 | 56.00                 | 29.67                 | 46.00                 | -16.04         | -16.33 |
| 1.959              | 0.27                    | 35.88                 | 56.00                 | 27.02                 | 46.00                 | -20.12         | -18.98 |
| 12.852             | 0.82                    | 40.92                 | 60.00                 | 30.52                 | 50.00                 | -19.08         | -19.48 |
| 22.775             | 1.24                    | 43.64                 | 60.00                 | 28.37                 | 50.00                 | -16.36         | -21.63 |

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral  
Model No.: TTD-VM2501R  
Operating mode: Tx mode

| Frequency<br>(MHz) | Corr.<br>Factor<br>(dB) | Level<br>Qp<br>(dBuV) | Limit<br>Qp<br>(dBuV) | Level<br>Av<br>(dBuV) | Limit<br>Av<br>(dBuV) | Margin<br>(dB) |        |
|--------------------|-------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|--------|
|                    |                         |                       |                       |                       |                       | Qp             | Av     |
| 0.150              | 0.10                    | 35.33                 | 66.00                 | 18.36                 | 56.00                 | -30.67         | -37.64 |
| 0.582              | 0.14                    | 39.52                 | 56.00                 | 30.00                 | 46.00                 | -16.48         | -16.00 |
| 0.844              | 0.15                    | 39.81                 | 56.00                 | 30.13                 | 46.00                 | -16.19         | -15.87 |
| 1.027              | 0.16                    | 40.16                 | 56.00                 | 28.42                 | 46.00                 | -15.84         | -17.58 |
| 12.852             | 0.66                    | 38.32                 | 60.00                 | 28.92                 | 50.00                 | -21.68         | -21.08 |
| 23.140             | 1.00                    | 40.23                 | 60.00                 | 25.06                 | 50.00                 | -19.77         | -24.94 |

Remark:

1. Corr. Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

