



FCC RF Test Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : Mobile Wideband Internet Device
BRAND NAME : ZTE
MODEL NAME : V72A
FCC ID : Q78-V72A
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DSS) Spread Spectrum Transmitter

The product was received on Dec. 28, 2012 and completely tested on Jan. 23, 2013. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.



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APPENDIX A. PHOTOGRAPHS OF EUT

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SUMMARY OF TEST RESULT

| Report Section | FCC Rule | IC Rule | Description | Limit | Result | Remark |
|----------------|-----------------------|-----------|--|--|--------|---|
| 3.1 | 15.247(a)(1) | A8.4(2) | Number of Channels | ≥ 15Chs | Pass | - |
| 3.2 | 15.247(a)(1) | A8.1(b) | Hopping Channel Separation | ≥ 2/3 of 20dB BW | Pass | - |
| 3.3 | 15.247(a)(1) | A8.1(d) | Dwell Time of Each Channel | ≤ 0.4sec in 31.6sec period | Pass | - |
| 3.4 | 15.247(a)(1) | A8.1(a) | 20dB Bandwidth | NA | Pass | - |
| 3.5 | 15.247(b)(1) | A8.1(b) | Peak Output Power | ≤ 1 w for 1Mbps ≤ 125 Mw for 2, 3Mbps | Pass | - |
| 3.6 | 15.247(d) | A8.5 | Conducted Band Edges | ≤ 20dBc | Pass | - |
| 3.7 | 15.247(d) | A8.5 | Conducted Spurious Emission | ≤ 20dBc | Pass | - |
| 3.8 | 15.247(d) | A8.5 | Radiated Band Edges and Radiated Spurious Emission | 15.209(a) & 15.247(d) | Pass | Under limit 5.9 dB at 215.268 MHz |
| 3.9 | 15.207 | Gen 7.2.4 | AC Conducted Emission | 15.207(a) | Pass | Under limit 8.88 dB at 0.410 MHz |
| 3.10 | 15.203 & 15.247(b) | A8.4 | Antenna Requirement | N/A | Pass | - |

1 General Description

1.1 Applicant

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.2 Manufacturer

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.3 Feature of Equipment Under Test

| Product Feature | |
|---------------------------------|--|
| Equipment | Mobile Wideband Internet Device |
| Brand Name | ZTE |
| Model Name | V72A |
| FCC ID | Q78-V72A |
| EUT supports Radios application | GSM/GPRS/EGPRS/WCDMA/HSPA/WLAN 11bgn/Bluetooth |
| HW Version | dcuB |
| SW Version | ZIG_US_V72AV1.0.0B01 |
| EUT Stage | Identical Prototype |

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

| Product Specification subjective to this standard | |
|---|---|
| Tx/Rx Frequency Range | 2402 MHz ~ 2480 MHz |
| Number of Channels | 79 |
| Carrier Frequency of Each Channel | 2402+n*1 MHz; n=0~78 |
| Maximum Output Power to Antenna | Bluetooth BDR (1Mbps) : 7.39 dBm (0.0055 W) Bluetooth EDR (2Mbps) : 8.04 dBm (0.0064 W) Bluetooth EDR (3Mbps) : 8.40 dBm (0.0069 W) |
| Antenna Type | PIFA Antenna type with gain 1.00 dBi |
| Type of Modulation | Bluetooth BDR (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK |

1.5 Testing Site

| | | | | |
|---------------------------|--|---------|-----------|--------------------------------|
| Test Site | SPORTON INTERNATIONAL (KUNSHAN) INC. | | | |
| Test Site Location | No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958 | | | |
| Test Site No. | Sporton Site No. | | | FCC/IC Registration No. |
| | TH01-KS | CO01-KS | 03CH01-KS | 149928/4086E-1 |

1.6 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC Public Notice DA 00-705
- ♦ ANSI C63.4-2003 and ANSI C63.10-2009

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Preliminary tests were performed in different data rate and recorded the RF output power in the following table:

| Channel | Frequency | Bluetooth RF Output Power | | |
|---------|-----------|---------------------------|----------------|-----------------|
| | | Data Rate / Modulation | | |
| | | GFSK | $\pi/4$ -DQPSK | 8-DPSK |
| | | 1Mbps | 2Mbps | 3Mbps |
| Ch00 | 2402MHz | 6.83 dBm | 7.49 dBm | 7.79 dBm |
| Ch39 | 2441MHz | 7.13 dBm | 7.83 dBm | 8.18 dBm |
| Ch78 | 2480MHz | 7.39 dBm | 8.04 dBm | 8.40 dBm |

Remark:

1. All the test data for each data rate were verified, but only the worst case was reported.
 2. The data rate was set in 3Mbps for all the test items due to the highest RF output power.
- a. The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and ANSI C63.10-2009 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 KHz to 30 MHz), radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). Pre-scanned tests, X, Y, Z in three orthogonal panels, and different data rates were conducted to determine the final configuration (X plane as worst plane) from all possible combinations, and the worst mode of radiated spurious emissions is Bluetooth 3Mbps mode, and recorded in this report.
 - b. AC power line Conducted Emission was tested under maximum output power.

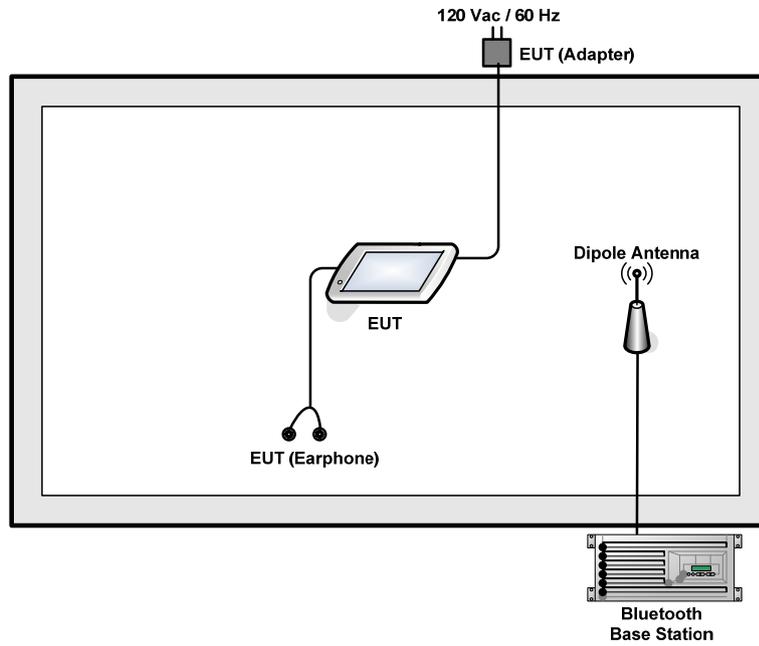
2.2 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

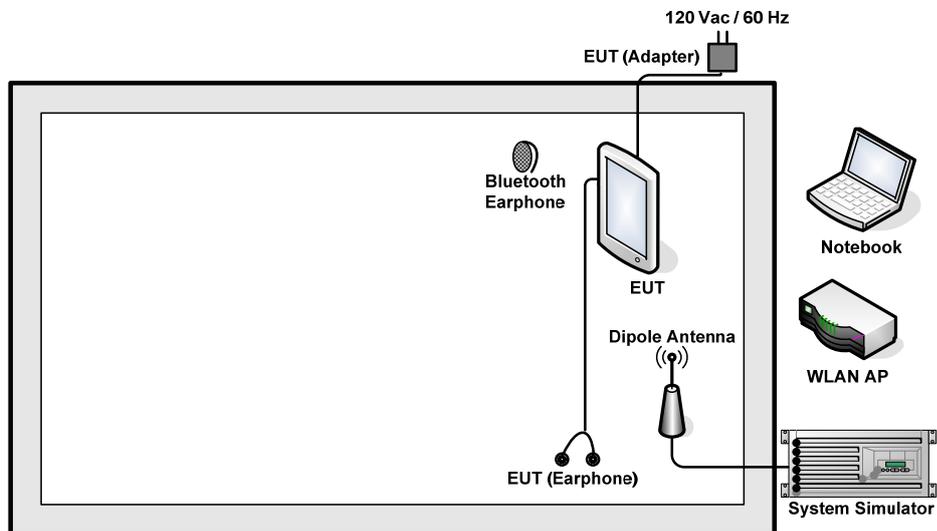
| Summary table of Test Cases | | | |
|---|--|---------------------------------------|-------------------------------|
| Test Item | Data Rate / Modulation | | |
| | Bluetooth BDR 1Mbps GFSK | Bluetooth EDR 2Mbps $\pi/4$ -DQPSK | Bluetooth EDR 3Mbps 8-DPSK |
| Conducted Test Cases | Mode 1: CH00_2402 MHz | Mode 4: CH00_2402 MHz | Mode 7: CH00_2402 MHz |
| | Mode 2: CH39_2441 MHz | Mode 5: CH39_2441 MHz | Mode 8: CH39_2441 MHz |
| | Mode 3: CH78_2480 MHz | Mode 6: CH78_2480 MHz | Mode 9: CH78_2480 MHz |
| Radiated Test Cases | Bluetooth EDR 3Mbps 8-DPSK | | |
| | Mode 1: CH00_2402 MHz | | |
| | Mode 2: CH39_2441 MHz | | |
| | Mode 3: CH78_2480 MHz | | |
| AC Conducted Emission | Mode 1 : GSM850 Idle + Bluetooth Link + WLAN Link + Adapter + Earphone | | |
| <p>Remark: For radiated test cases, the worst mode data rate 3Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and the conducted spurious emissions and conducted band edge measurement for each data rate are no worse than 3Mbps, and no other significantly frequencies found in conducted spurious emission.</p> | | | |

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

| Item | Equipment | Trade Name | Model Name | FCC ID | Data Cable | Power Cord |
|------|------------------------|------------|------------|--------------|------------|--|
| 1. | System Simulator | R&S | CMU 200 | N/A | N/A | Unshielded, 1.8 m |
| 2. | Bluetooth Base Station | R&S | CBT | FCC DoC | N/A | Unshielded, 1.8 m |
| 3. | DC Power Supply | GWINSTEK | GPS-3030D | N/A | N/A | Unshielded, 1.8 m |
| 4. | WLAN AP | D-Link | DIR-855 | KA2DIR855A2 | N/A | Unshielded, 1.8 m |
| 5. | Notebook | DELL | P08S | QDS-BRCM1030 | N/A | AC I/P: Unshielded, 0.9 m DC O/P: Shielded, 1.8 m |
| 6. | Bluetooth Earphone | Nokia | BH-106 | QTLBH-106 | N/A | N/A |

2.5 Description of RF Function Operation Test Setup

For Bluetooth function, the RF utility, “ADB” was installed in EUT which was programmed in order to make the EUT into the engineering modes to contact with Bluetooth base station for continuous transmitting and receiving signals.

2.6 Measurement Results Explanation Example

For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and 10dB attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and 10dB attenuator factor.

Offset = RF cable loss + attenuator factor.

Following table shows an offset computation example with cable loss 5.6 dB.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 5.6 + 10 = 15.6 (dB)

For radiated band edges and spurious emission test :

Per part 15.35(c), the EUT Bluetooth average emission level could be determined by the peak emission level applying duty cycle correction factor, to represent averaging over the whole pulse train.

The average level is derived from the peak level corrected with "Duty cycle correction factor".

$$\text{Average Emission Level(dBuV/m)} = \text{Peak Emission Level(dBuV/m)} + \text{Duty cycle correction factor(dB)}$$

$$\text{Duty cycle correction factor(dB)} = 20 * \log(\text{Duty cycle}).$$

Duty cycle = On time / 100 milliseconds

On time = dwell time * hopping number in 100 ms

For example : bluetooth with dwell time 2.9ms and 2 hops in 100 ms, then

$$\text{Duty cycle correction factor(dB)} = 20 * \log((2.9 * 2) / 100) = -24.73 \text{ dB}$$

Following shows an average computation example with duty cycle correction factor = -24.73dB, and the peak emission level is 45.61 dBuV/m.

Example :

$$\begin{aligned} \text{Average Emission Level(dBuV/m)} &= \text{Peak Emission Level(dBuV/m)} + \text{duty cycle correction factor(dB)} \\ &= 45.61 + (-24.73) = 20.88 \text{ (dBuV/m)} \end{aligned}$$

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

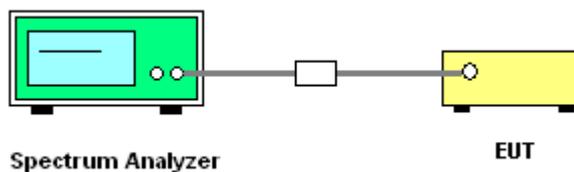
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW \geq 1% of the span; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

3.1.4 Test Setup



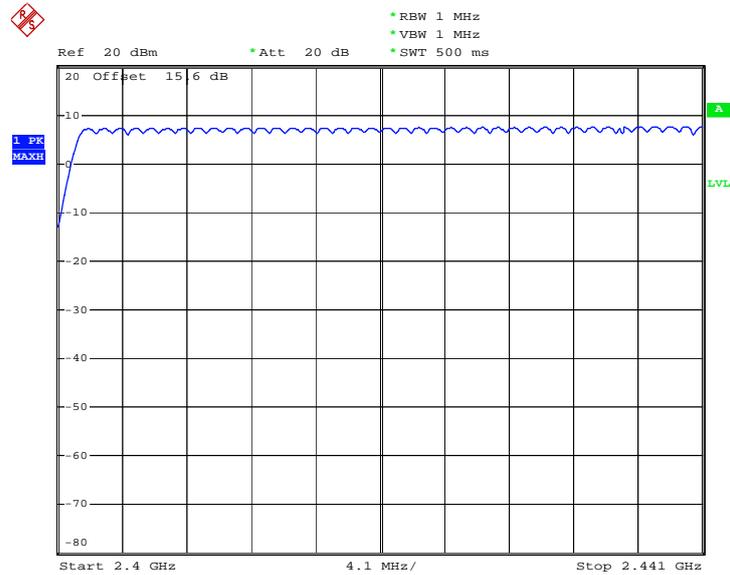
3.1.5 Test Result of Number of Hopping Frequency

| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

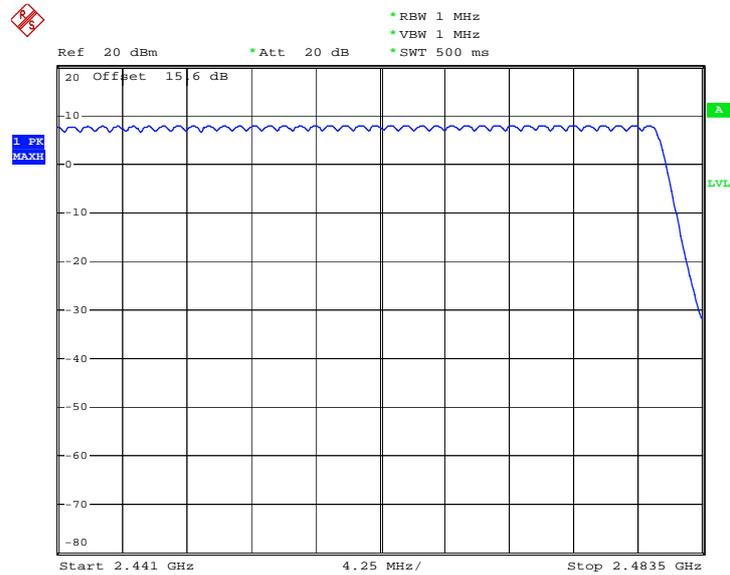
| Number of Hopping (Channel) | Adaptive Frequency Hopping (Channel) | Limits (Channel) | Pass/Fail |
|-----------------------------|--------------------------------------|------------------|-----------|
| 79 | ≥ 20 | > 15 | Pass |



Number of Hopping Channel Plot on Channel 00 - 78



Date: 9.JAN.2013 15:00:03



Date: 9.JAN.2013 15:04:39

3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

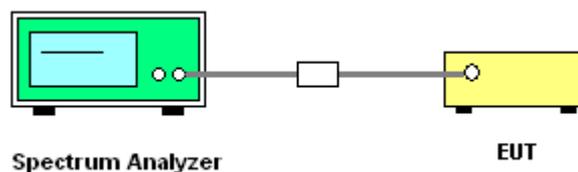
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels; $RBW \geq 1\%$ of the span;
 $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.2.4 Test Setup

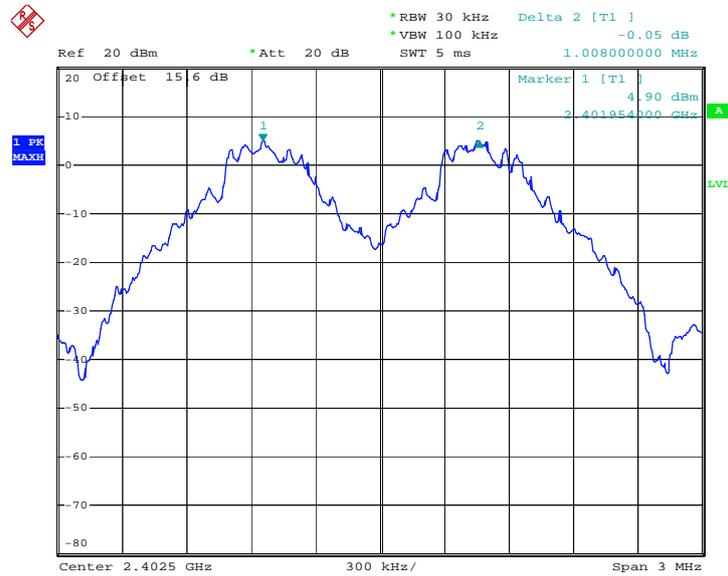


3.2.5 Test Result of Hopping Channel Separation

| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 1Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

| Channel | Frequency (MHz) | Frequency Separation (MHz) | (2/3 of 20dB BW) Limits (MHz) | Pass/Fail |
|---------|-----------------|----------------------------|-------------------------------|-----------|
| 00 | 2402 | 1.008 | 0.6240 | Pass |
| 39 | 2441 | 1.002 | 0.6213 | Pass |
| 78 | 2480 | 1.002 | 0.6240 | Pass |

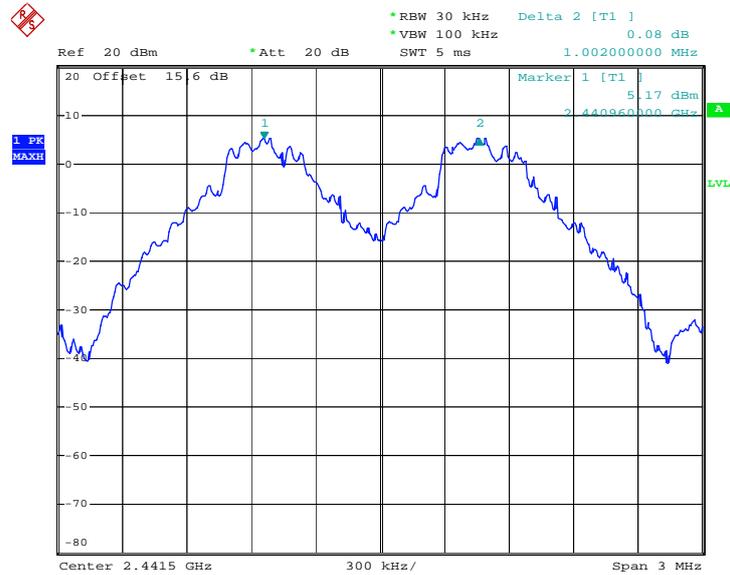
Channel Separation Plot on Channel 00 - 01



Date : 9.JAN.2013 14:30:43

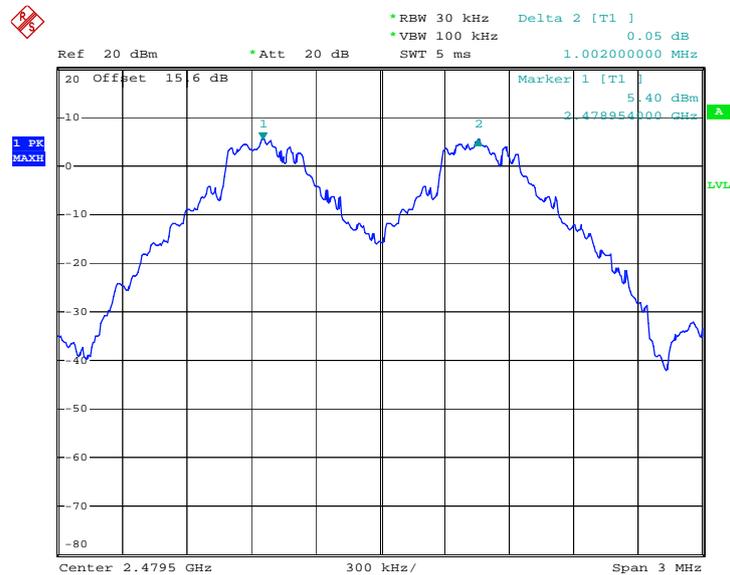


Channel Separation Plot on Channel 39 - 40



Date: 9.JAN.2013 14:31:23

Channel Separation Plot on Channel 77 - 78



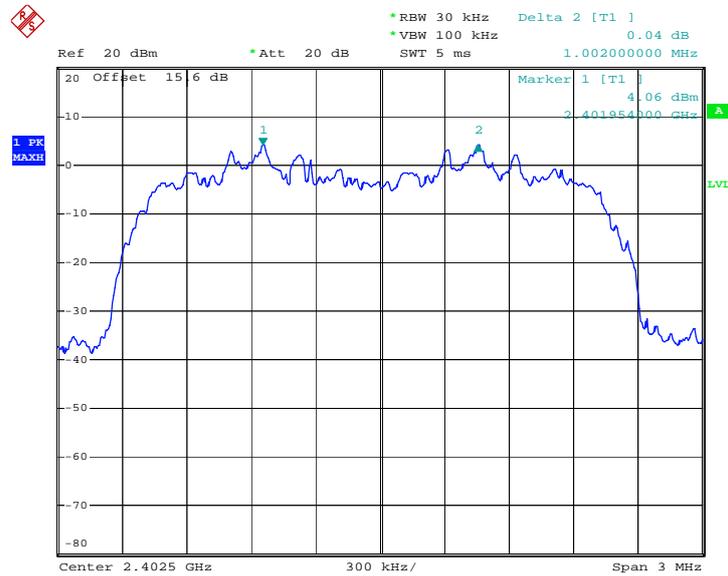
Date: 9.JAN.2013 14:32:02



| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 2Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

| Channel | Frequency (MHz) | Frequency Separation (MHz) | (2/3 of 20dB BW) Limits (MHz) | Pass/Fail |
|---------|-----------------|----------------------------|-------------------------------|-----------|
| 00 | 2402 | 1.002 | 0.8680 | Pass |
| 39 | 2441 | 1.002 | 0.8840 | Pass |
| 78 | 2480 | 1.008 | 0.8800 | Pass |

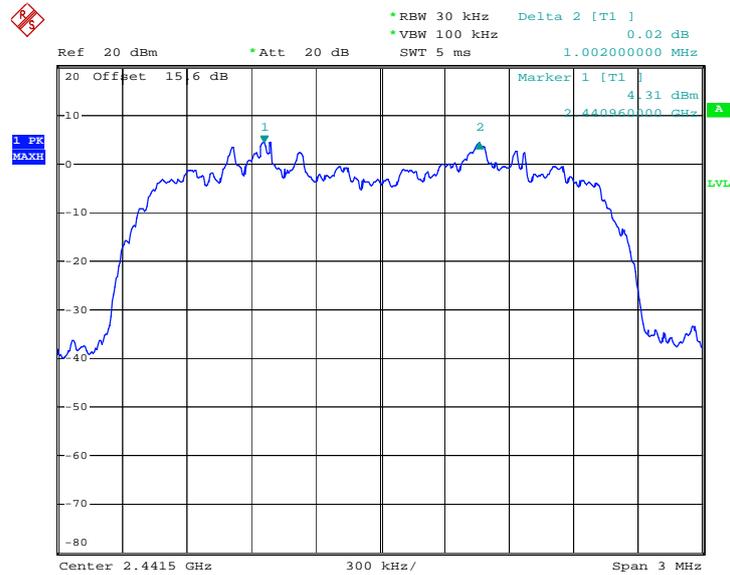
Channel Separation Plot on Channel 00 - 01



Date: 9.JAN.2013 14:32:41

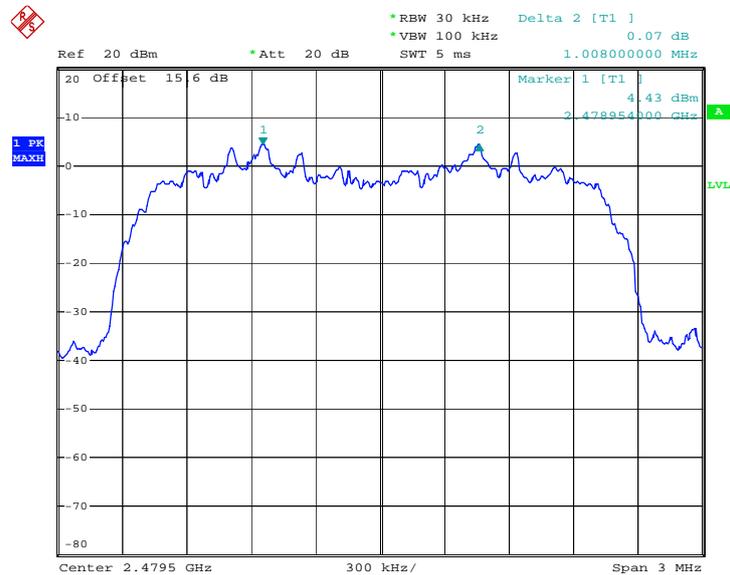


Channel Separation Plot on Channel 39 - 40



Date: 9.JAN.2013 14:33:50

Channel Separation Plot on Channel 77 - 78



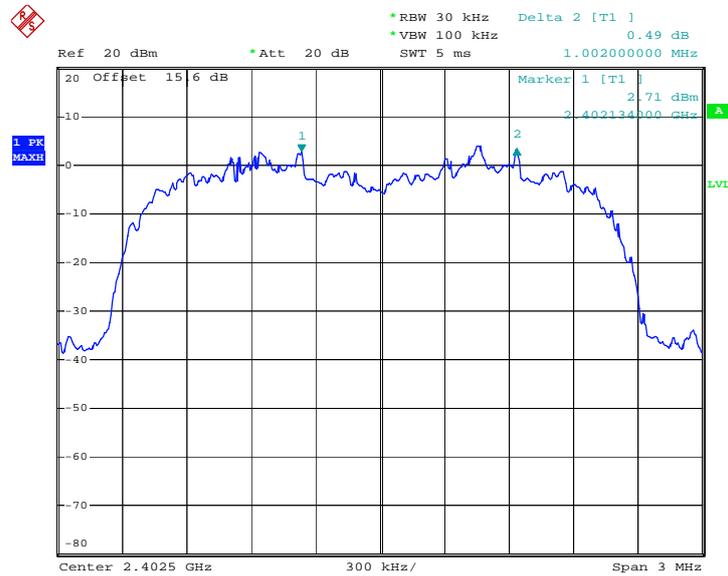
Date: 9.JAN.2013 14:34:34



| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

| Channel | Frequency (MHz) | Frequency Separation (MHz) | (2/3 of 20dB BW) Limits (MHz) | Pass/Fail |
|---------|-----------------|----------------------------|-------------------------------|-----------|
| 00 | 2402 | 1.002 | 0.8680 | Pass |
| 39 | 2441 | 1.002 | 0.8760 | Pass |
| 78 | 2480 | 1.002 | 0.8800 | Pass |

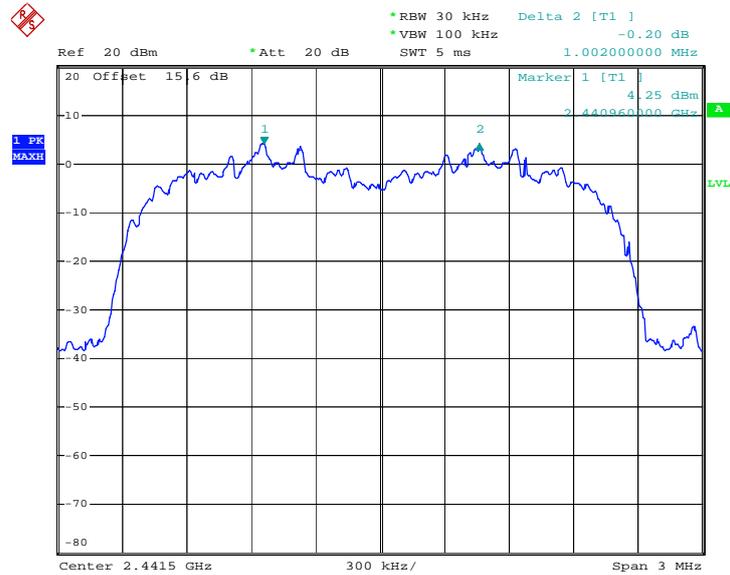
Channel Separation Plot on Channel 00 - 01



Date: 9.JAN.2013 14:35:54

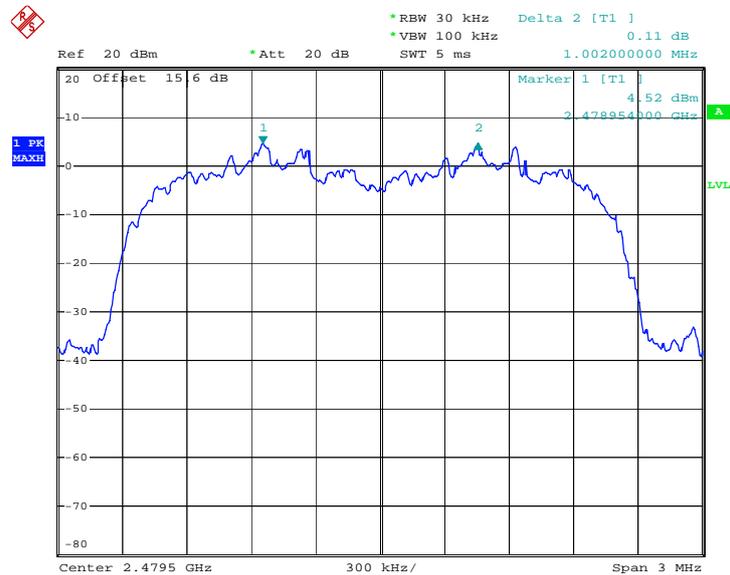


Channel Separation Plot on Channel 39 - 40



Date: 9.JAN.2013 14:36:34

Channel Separation Plot on Channel 77 - 78



Date: 9.JAN.2013 14:37:13

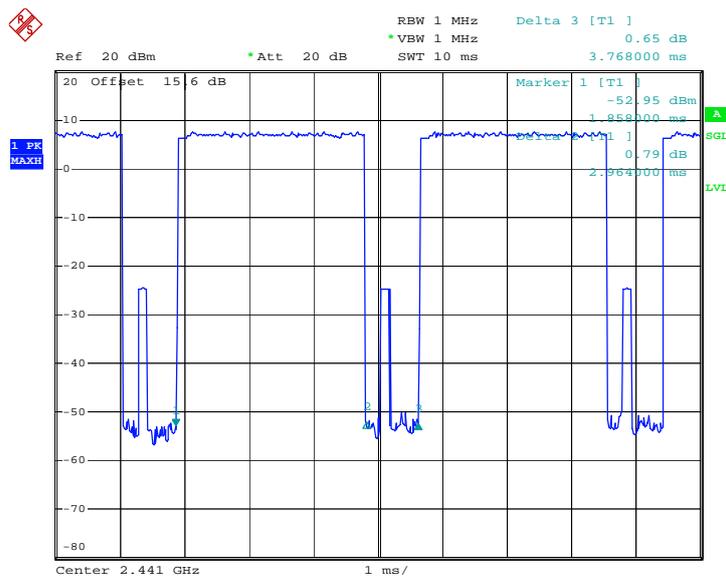
Remark:

1. In normal mode, hopping rate is 1600hops/s with 6 slots in 79 hopping channels.
 With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s),
 Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.

2. In AFH mode, hopping rate is 800hops/s with 6 slots in 20 hopping channels.
 With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 x 20) (s),
 Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.34 hops.

3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

Package Transfer Time Plot



Date: 9.JAN.2013 14:09:44

3.4 20dB Bandwidth Measurement

3.4.1 Limit of 20dB Bandwidth

Reporting only

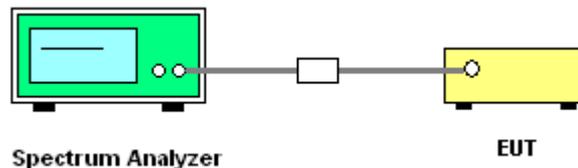
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;
RBW \geq 1% of the 20 dB bandwidth; VBW \geq RBW; Sweep = auto; Detector function = peak;
Trace = max hold.
5. Measure and record the results in the test report.

3.4.4 Test Setup

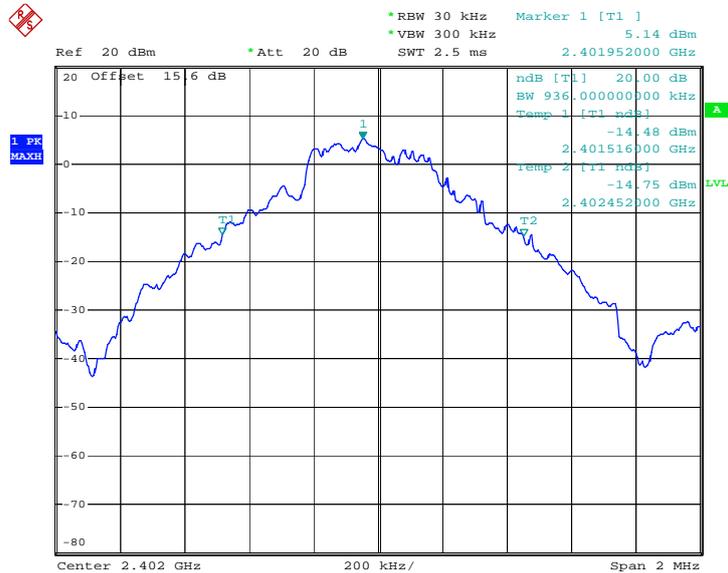


3.4.5 Test Result of 20dB Bandwidth

| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 1Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 00 | 2402 | 0.936 |
| 39 | 2441 | 0.932 |
| 78 | 2480 | 0.936 |

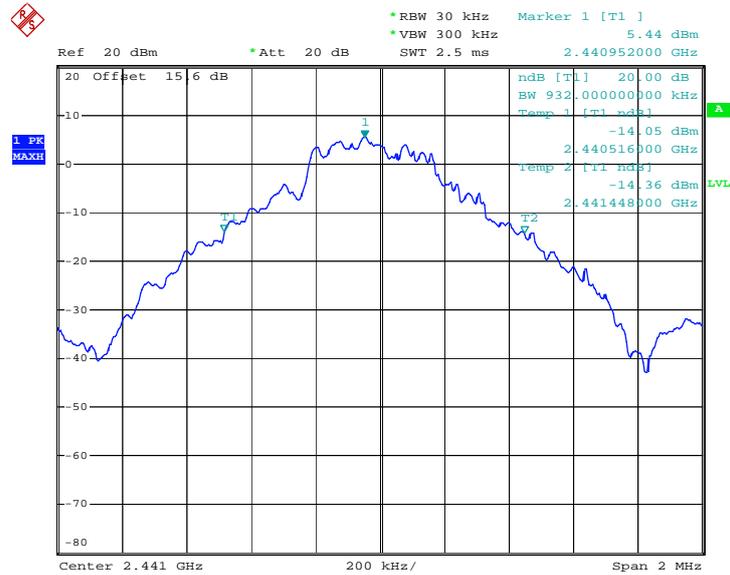
20 dB Bandwidth Plot on Channel 00



Date: 9.JAN.2013 14:39:51

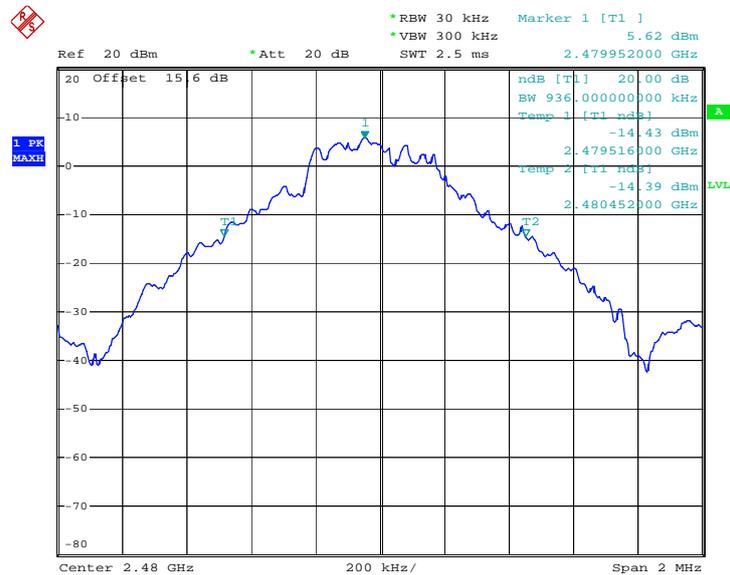


20 dB Bandwidth Plot on Channel 39



Date: 9.JAN.2013 14:40:15

20 dB Bandwidth Plot on Channel 78



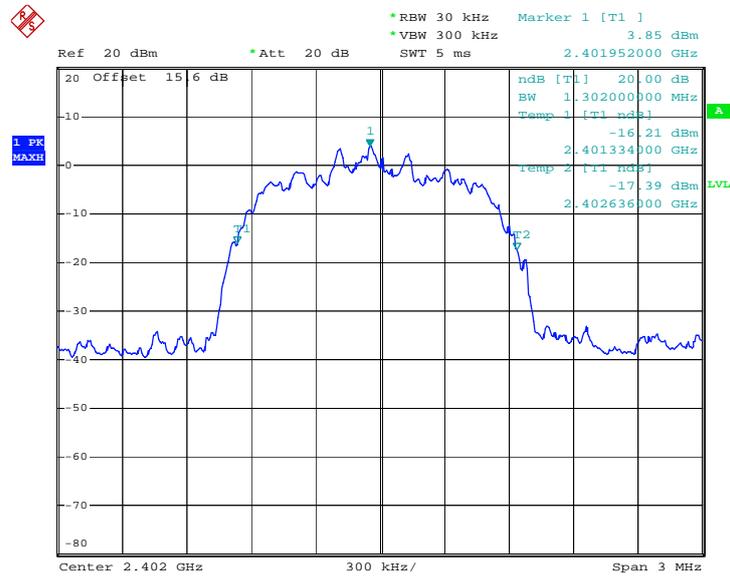
Date: 9.JAN.2013 14:40:38



| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 2Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 00 | 2402 | 1.302 |
| 39 | 2441 | 1.326 |
| 78 | 2480 | 1.320 |

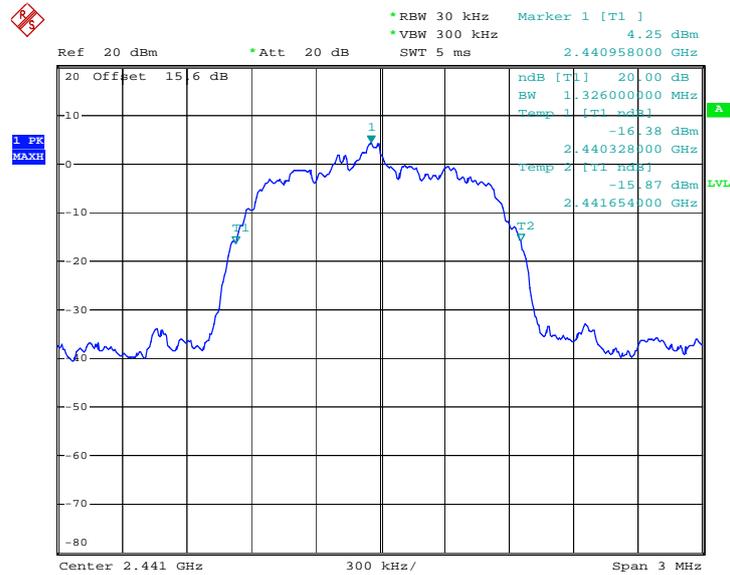
20 dB Bandwidth Plot on Channel 00



Date: 9.JAN.2013 14:40:54

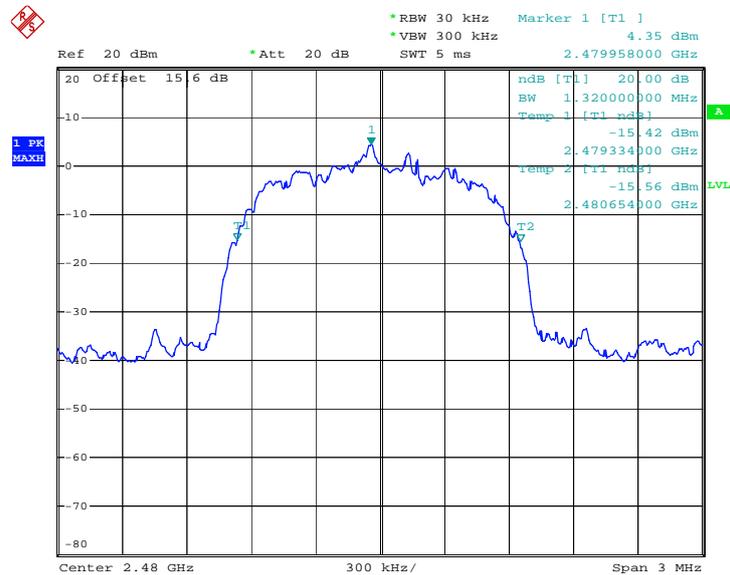


20 dB Bandwidth Plot on Channel 39



Date: 9.JAN.2013 17:54:12

20 dB Bandwidth Plot on Channel 78



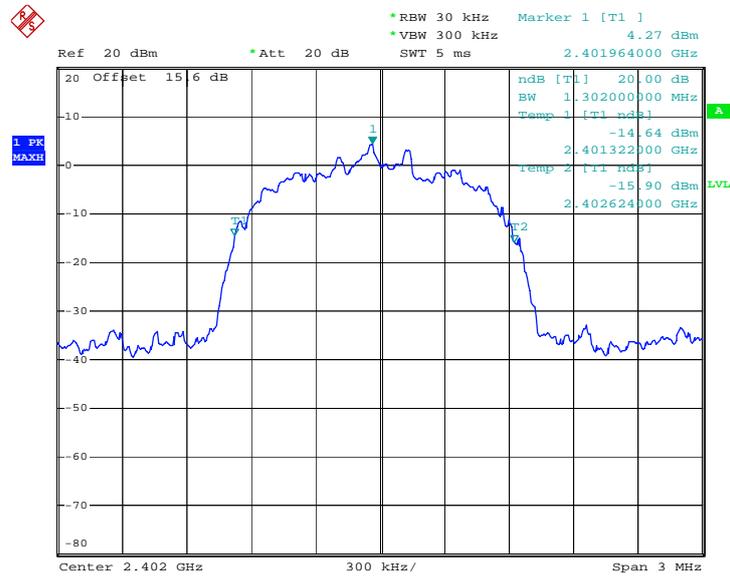
Date: 9.JAN.2013 17:56:33



| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) |
|---------|-----------------|----------------------|
| 00 | 2402 | 1.302 |
| 39 | 2441 | 1.314 |
| 78 | 2480 | 1.320 |

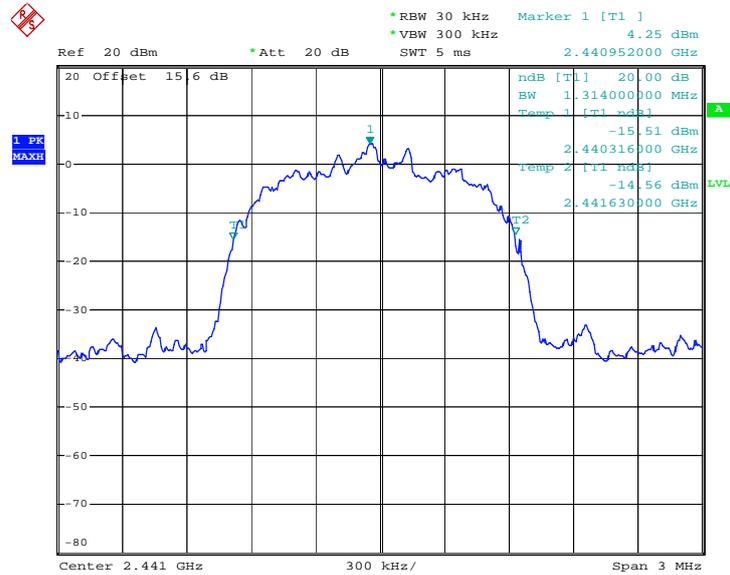
20 dB Bandwidth Plot on Channel 00



Date: 11.JAN.2013 11:45:17

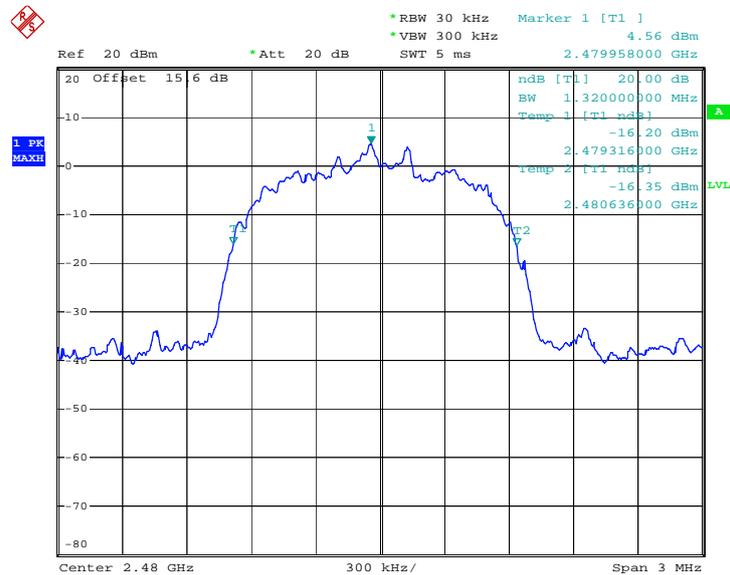


20 dB Bandwidth Plot on Channel 39



Date: 9.JAN.2013 14:42:15

20 dB Bandwidth Plot on Channel 78



Date: 9.JAN.2013 14:42:35

3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts. The power limit for 1Mbps is 1watt, and for 2Mbps, and 3Mbps are 0.125 watts.

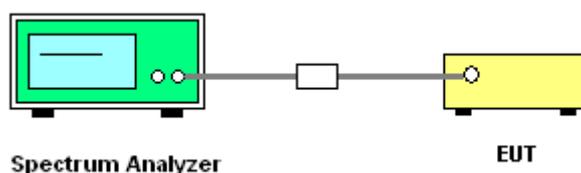
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.5.4 Test Setup

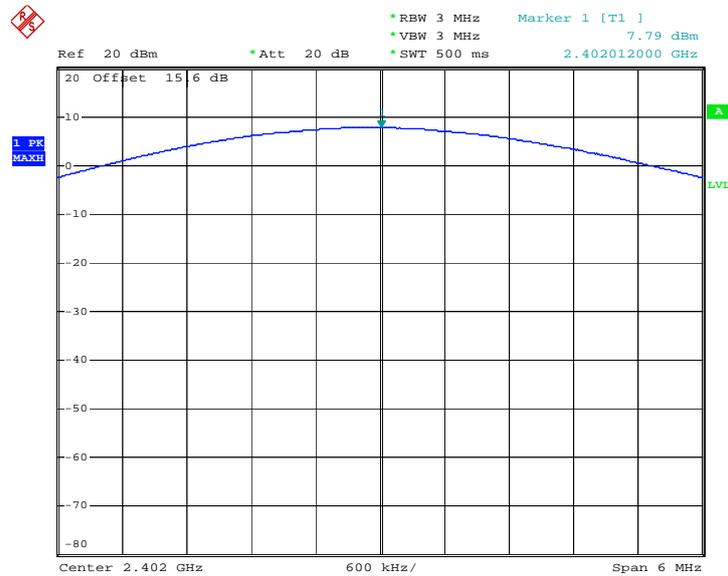


3.5.5 Test Result of Peak Output Power

| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

| Channel | Frequency (MHz) | RF Power (dBm) | | |
|---------|-----------------|----------------|-------------------|-----------|
| | | 8-DPSK | Max. Limits (dBm) | Pass/Fail |
| | | 3 Mbps | | |
| 00 | 2402 | 7.79 | 20.97 | Pass |
| 39 | 2441 | 8.18 | 20.97 | Pass |
| 78 | 2480 | 8.40 | 20.97 | Pass |

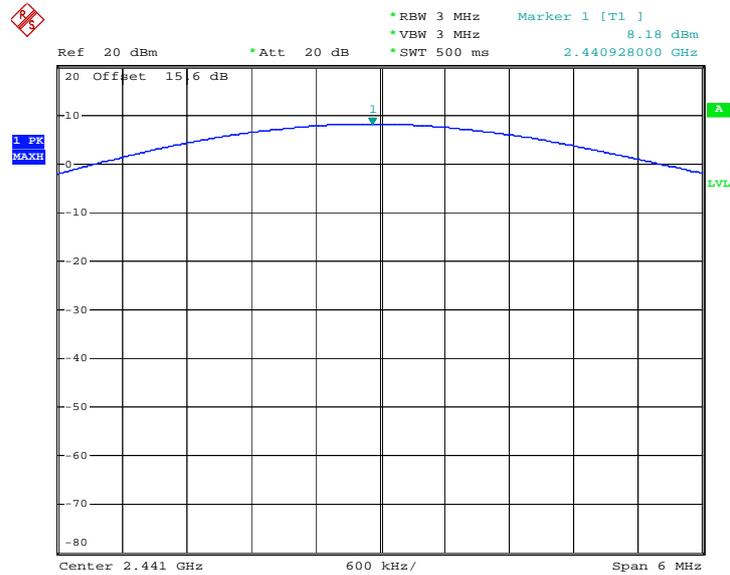
Peak Output Power Plot on Channel 00



Date: 9.JAN.2013 13:58:47

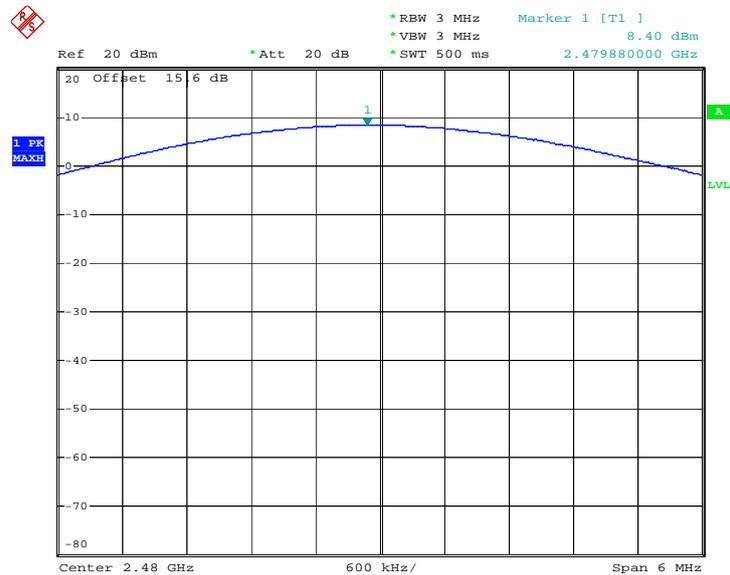


Peak Output Power Plot on Channel 39



Date: 9.JAN.2013 13:59:58

Peak Output Power Plot on Channel 78



Date: 9.JAN.2013 14:01:08

3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 KHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

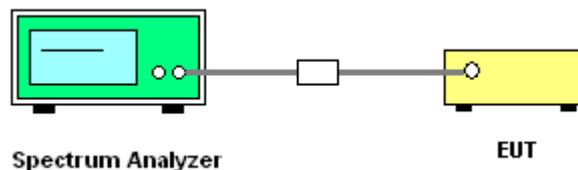
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 300KHz ($\geq 1\%$ span=30MHz), VBW = 300KHz (\geq RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300KHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

3.6.4 Test Setup

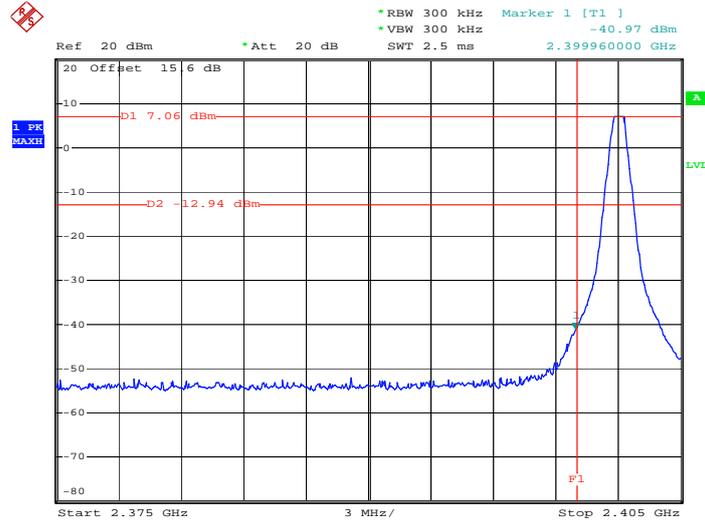




3.6.5 Test Result of Conducted Band Edges

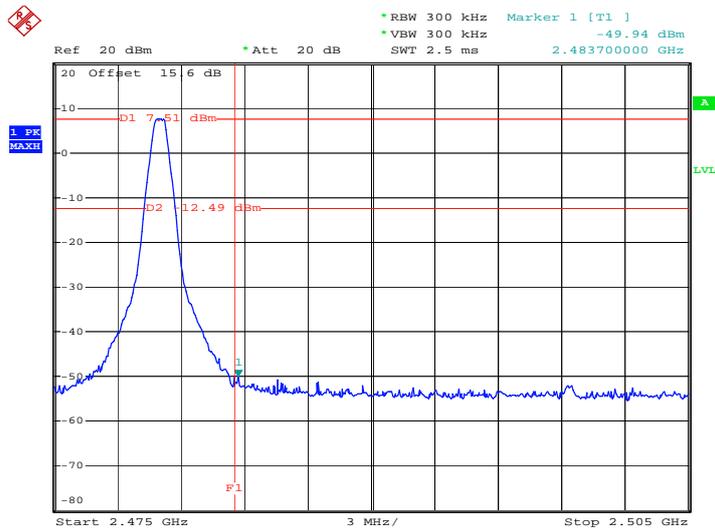
| | | | |
|----------------|-----------|---------------------|---------|
| Test Mode : | 1Mbps | Temperature : | 23~24°C |
| Test Channel : | 00 and 78 | Relative Humidity : | 47~48% |
| | | Test Engineer : | Lizy Li |

Low Band Edge Plot on Channel 00



Date: 9.JAN.2013 15:52:54

High Band Edge Plot on Channel 78

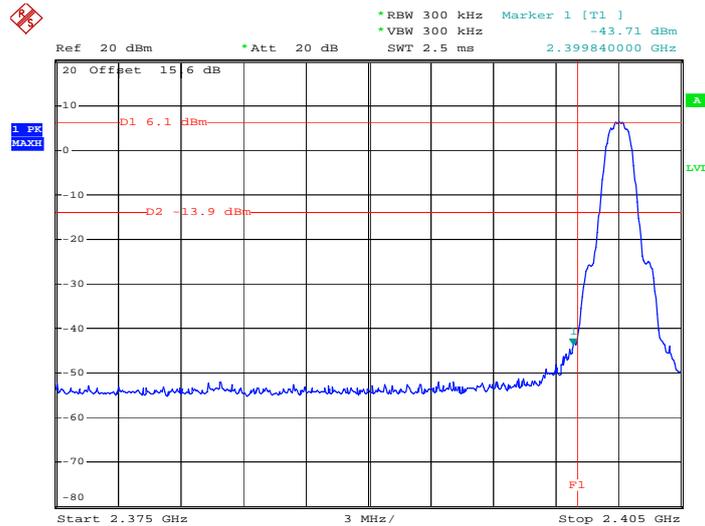


Date: 9.JAN.2013 15:24:03



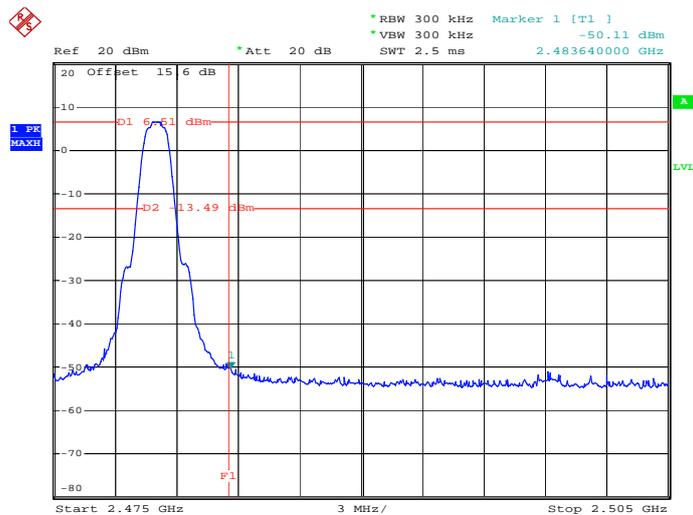
| | | | |
|----------------|-----------|---------------------|---------|
| Test Mode : | 2Mbps | Temperature : | 23~24°C |
| Test Channel : | 00 and 78 | Relative Humidity : | 47~48% |
| | | Test Engineer : | Lizy Li |

Low Band Edge Plot on Channel 00



Date: 9.JAN.2013 16:25:19

High Band Edge Plot on Channel 78

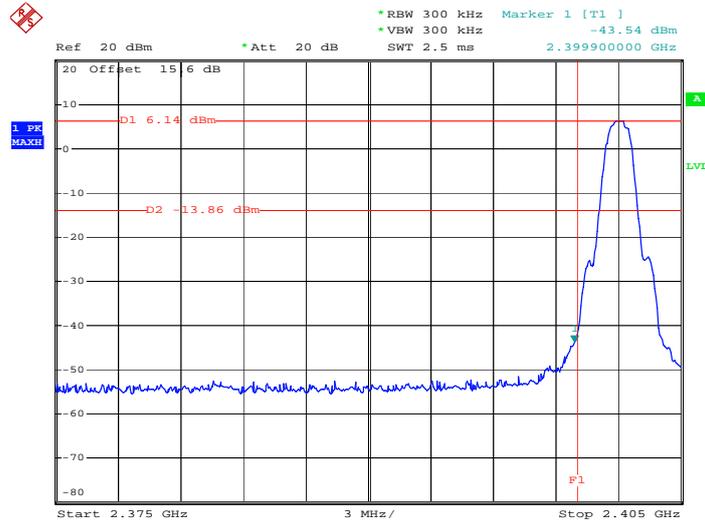


Date: 9.JAN.2013 16:27:44



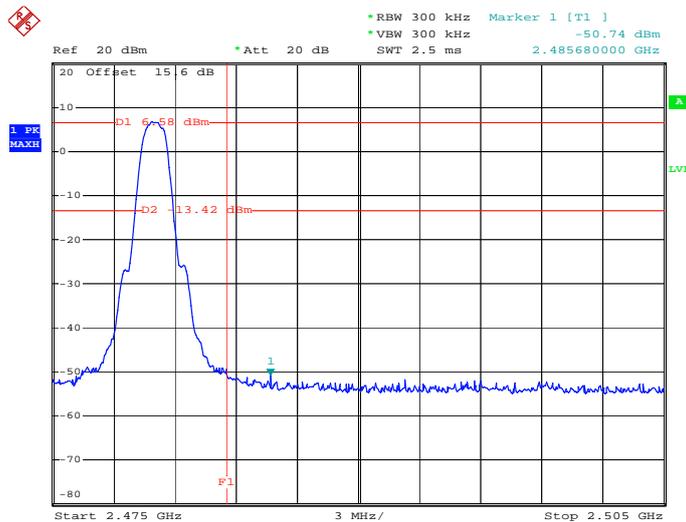
| | | | |
|----------------|-----------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Channel : | 00 and 78 | Relative Humidity : | 47~48% |
| | | Test Engineer : | Lizy Li |

Low Band Edge Plot on Channel 00



Date: 9.JAN.2013 16:29:51

High Band Edge Plot on Channel 78

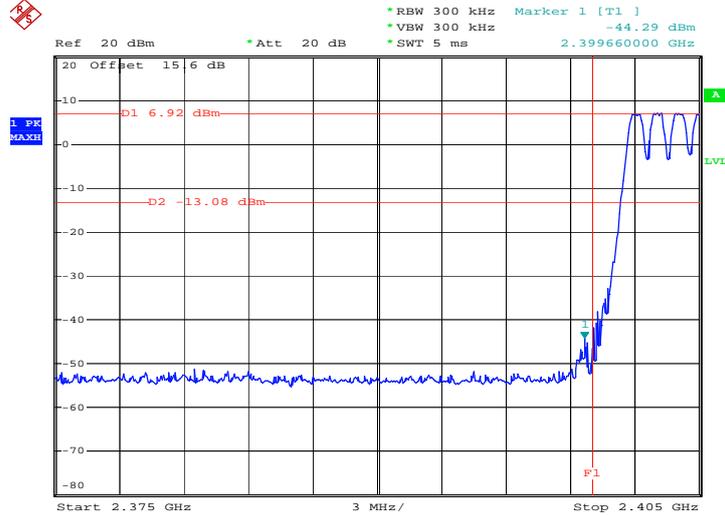


Date: 9.JAN.2013 16:28:53

3.6.6 Test Result of Conducted Hopping Mode Band Edges

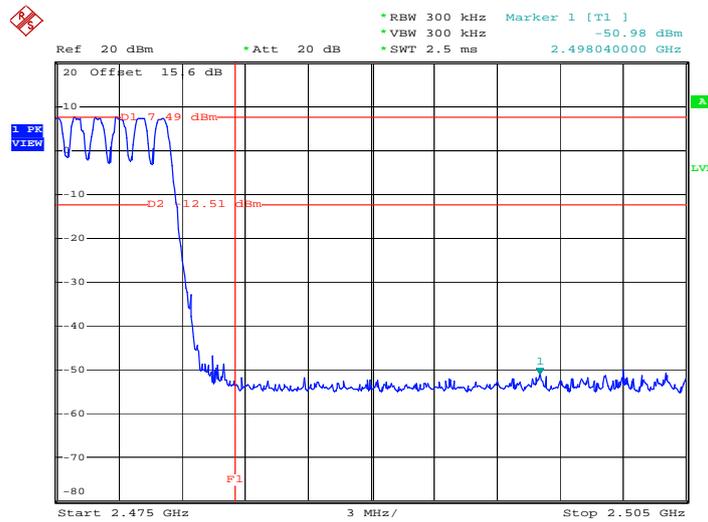
| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 1Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

Hopping Mode Low Band Edge Plot on Channel 00



Date: 9.JAN.2013 19:36:36

Hopping Mode High Band Edge Plot on Channel 78

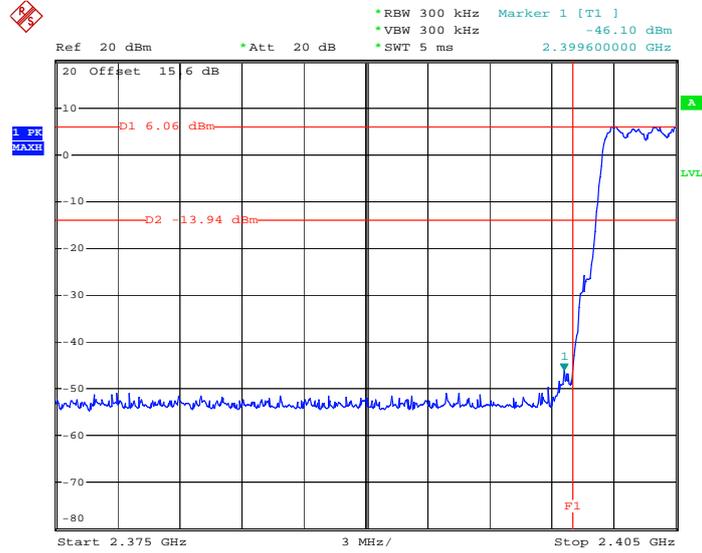


Date: 9.JAN.2013 19:38:14



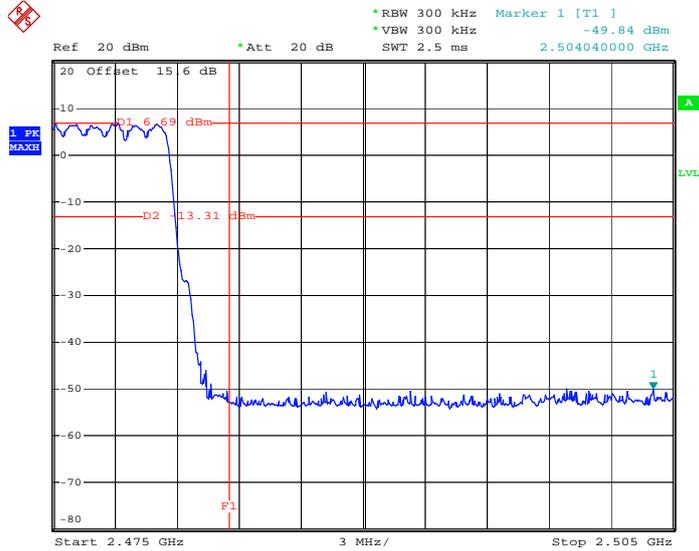
| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 2Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

Hopping Mode Low Band Edge Plot on Channel 00



Date: 9.JAN.2013 19:40:58

Hopping Mode High Band Edge Plot on Channel 78

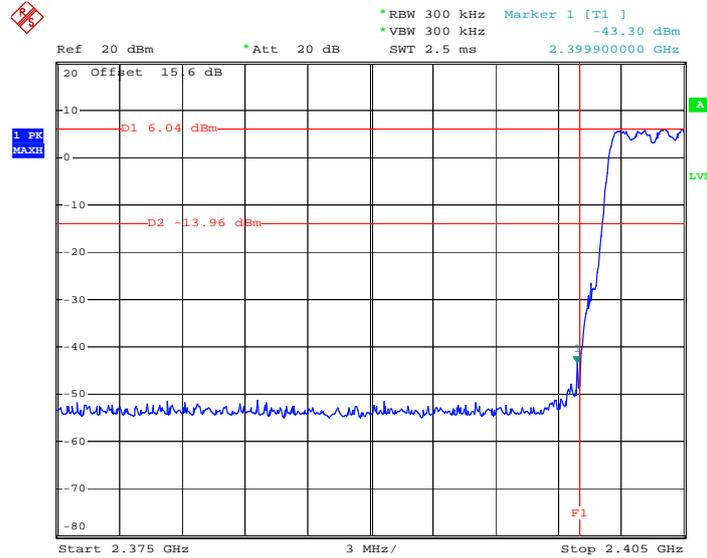


Date: 11.JAN.2013 11:39:05



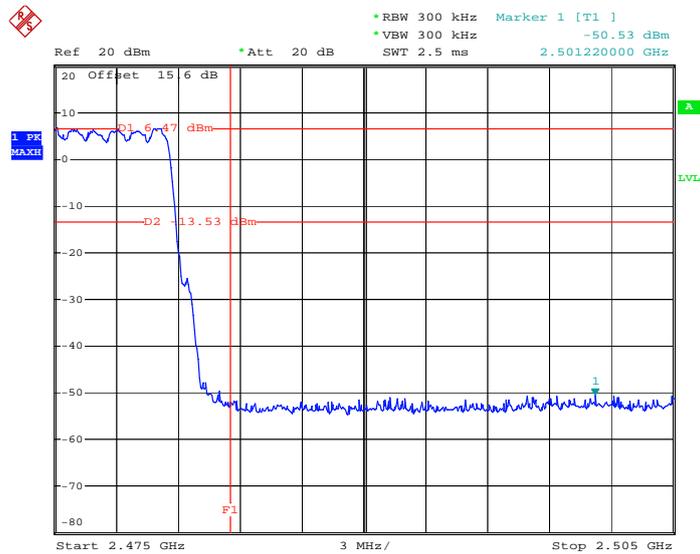
| | | | |
|-----------------|---------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Engineer : | Lizy Li | Relative Humidity : | 47~48% |

Hopping Mode Low Band Edge Plot on Channel 00



Date: 11.JAN.2013 11:42:52

Hopping Mode High Band Edge Plot on Channel 78



Date: 11.JAN.2013 11:41:07

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 KHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

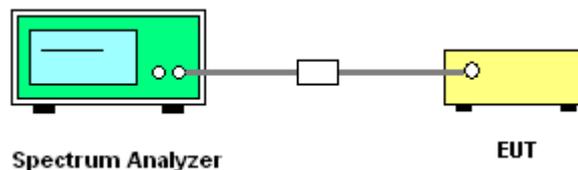
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedure

1. The testing follows the guidelines in Spurious RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 KHz, VBW = 300KHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 KHz RBW.
5. Measure and record the results in the test report.

3.7.4 Test Setup

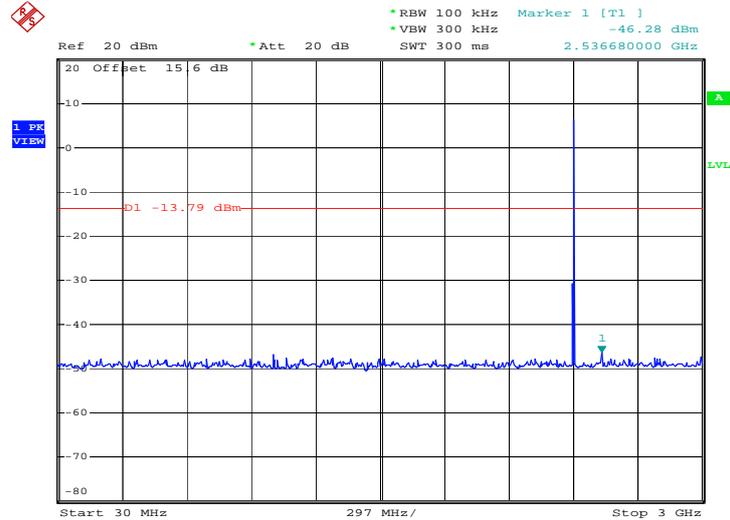




3.7.5 Test Results

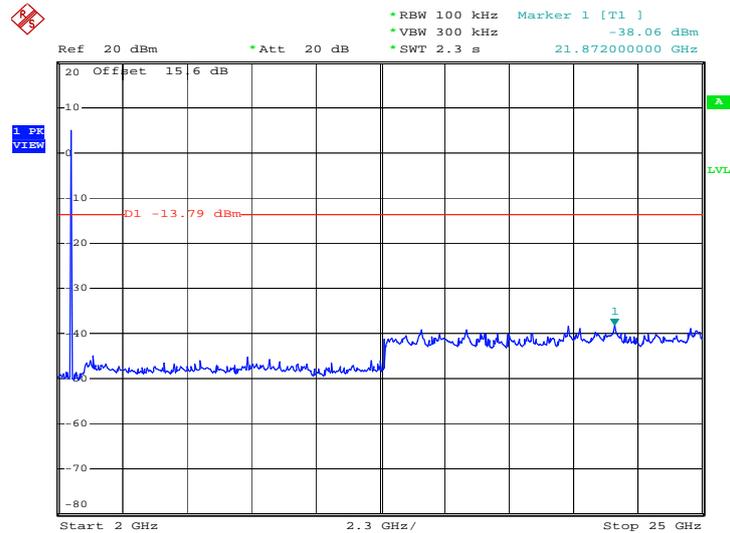
| | | | |
|----------------|-------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Channel : | 00 | Relative Humidity : | 47~48% |
| | | Test Engineer : | Lizy Li |

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 9.JAN.2013 14:54:40

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz

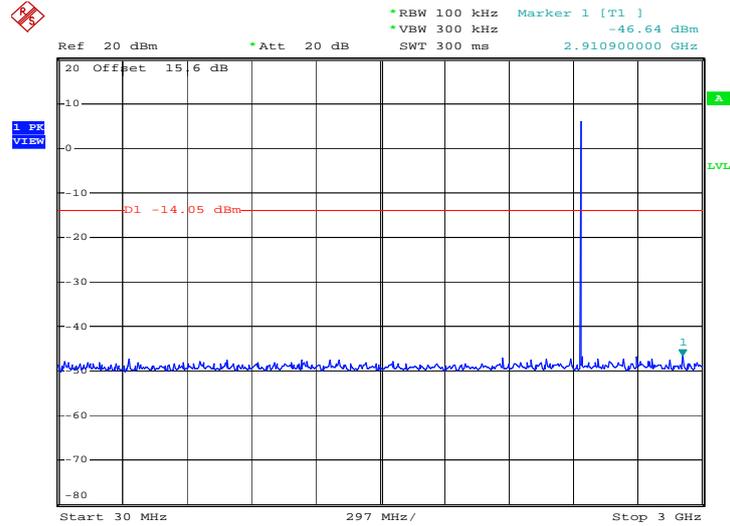


Date: 9.JAN.2013 19:31:28



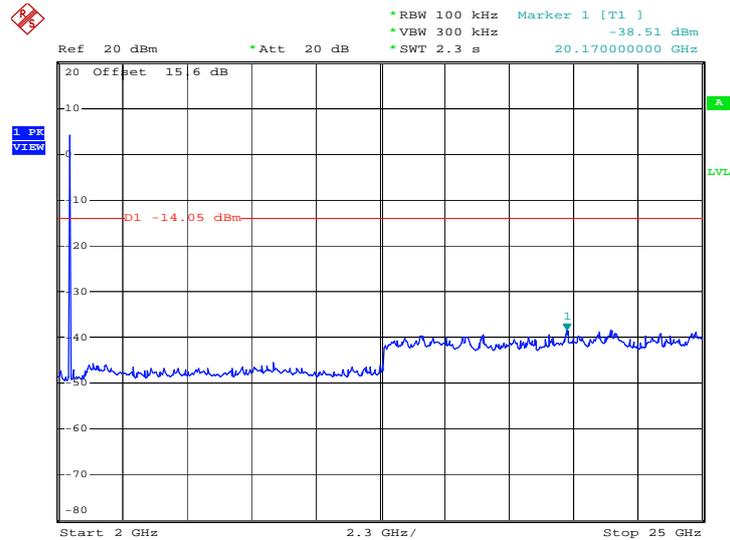
| | | | |
|----------------|-------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Channel : | 39 | Relative Humidity : | 47~48% |
| | | Test Engineer : | Lizy Li |

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 9.JAN.2013 14:55:44

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz

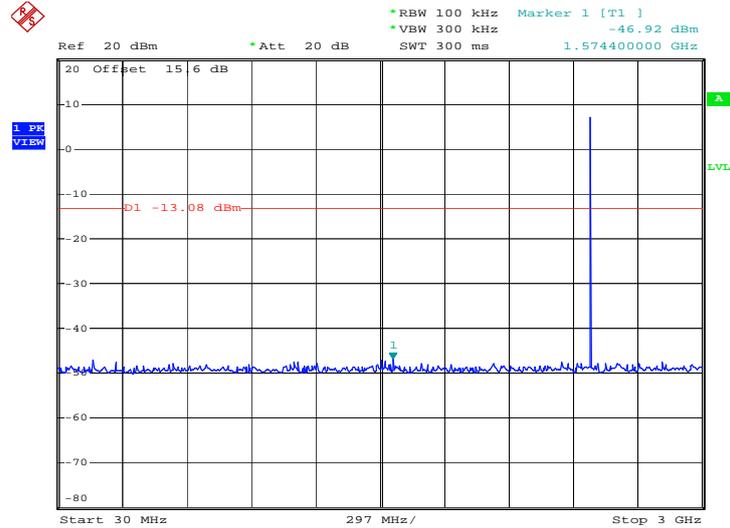


Date: 9.JAN.2013 19:29:07



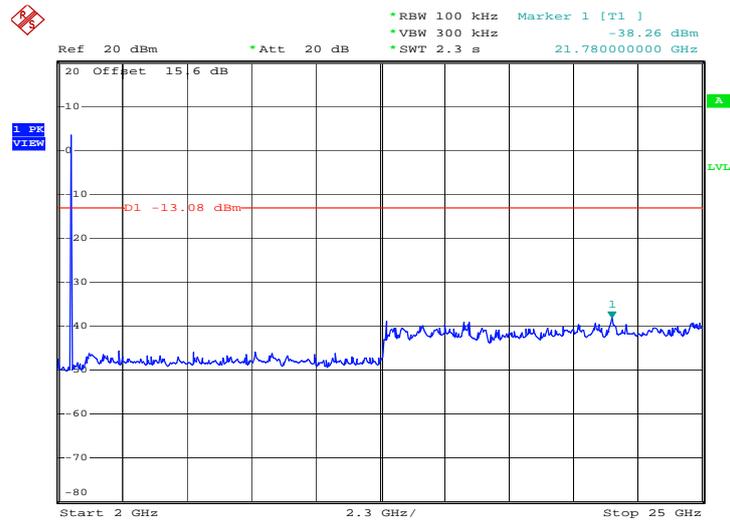
| | | | |
|----------------|-------|---------------------|---------|
| Test Mode : | 3Mbps | Temperature : | 23~24°C |
| Test Channel : | 78 | Relative Humidity : | 47~48% |
| | | Test Engineer : | Lizy Li |

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 9.JAN.2013 14:56:48

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz



Date: 9.JAN.2013 19:58:18

3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 KHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

| Frequency (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 |

3.8.2 Measuring Instruments

See list of measuring instruments of this test report.



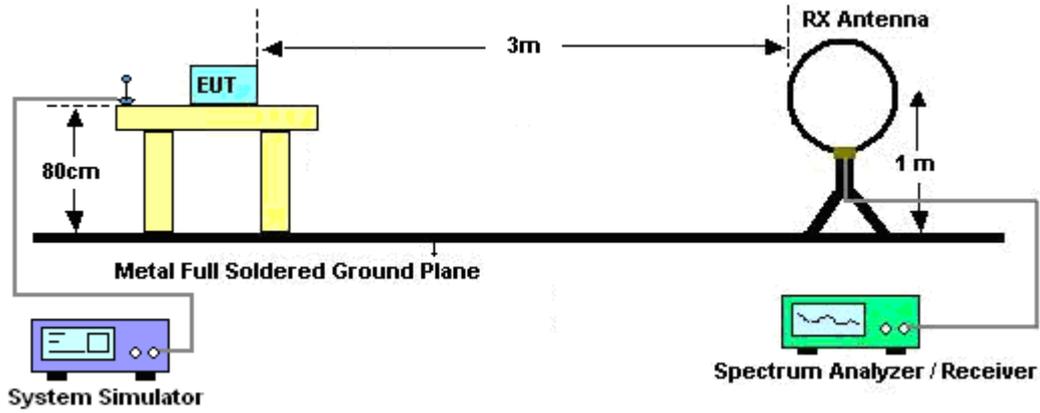
3.8.3 Test Procedures

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines and fulfills ANSI C63.4-2003 and the guidelines in ANSI C63.10-2009 test site requirement.
2. The EUT was placed on a turntable with 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 KHz for $f < 1 \text{ GHz}$, RBW=1MHz for $f > 1 \text{ GHz}$; VBW \geq RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - (3) For average measurement: use duty cycle correction factor method per 15.35(c).
Duty cycle = On time/100 milliseconds
On time = $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$
Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
Average Level = Peak Level + $20 * \log(\text{Duty cycle})$
8. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

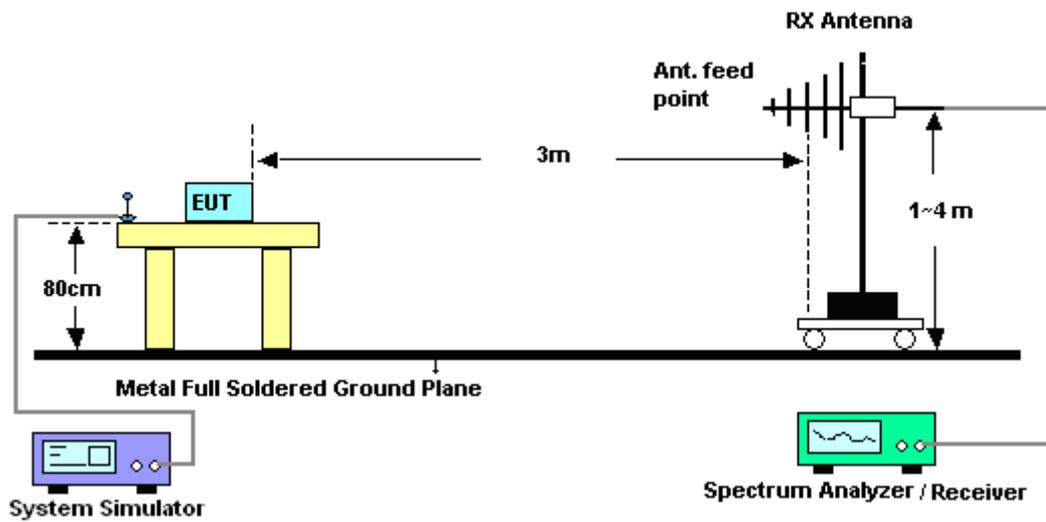
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (24.76dB) derived from $20 \log(\text{dwell time}/100\text{ms})$.

3.8.4 Test Setup

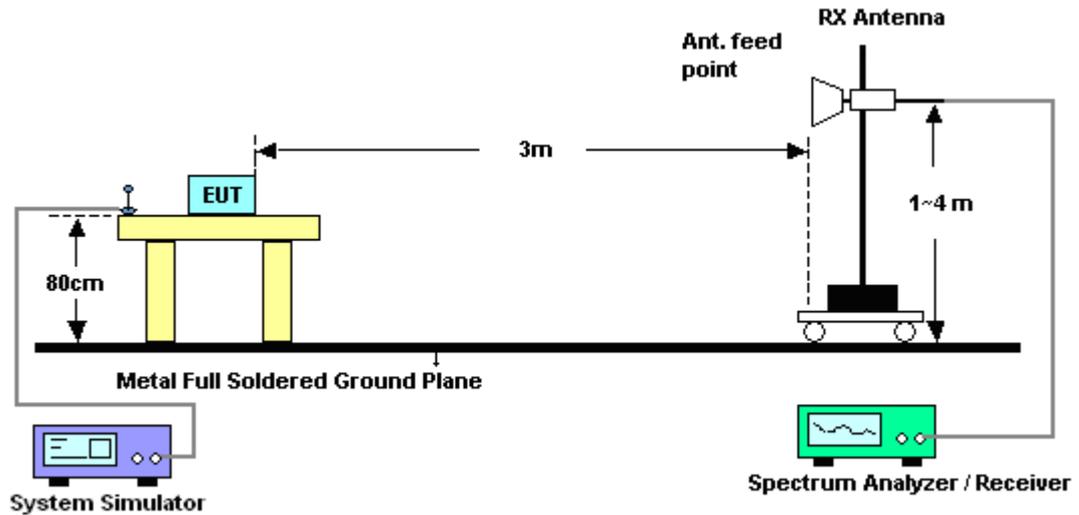
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

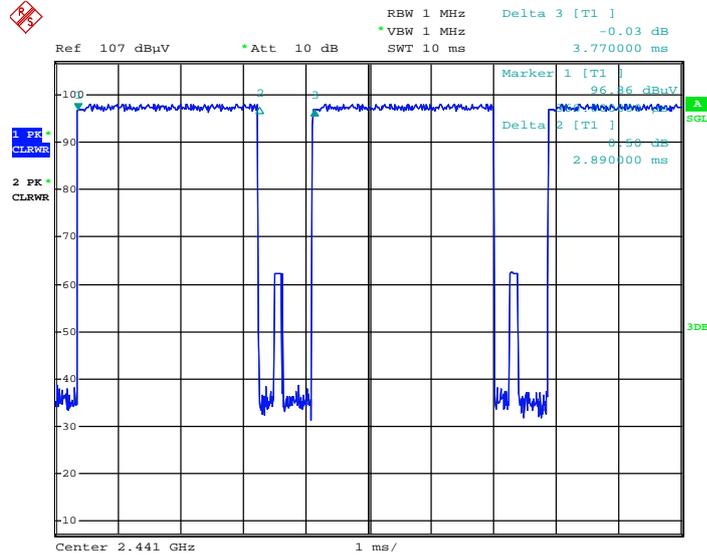


3.8.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

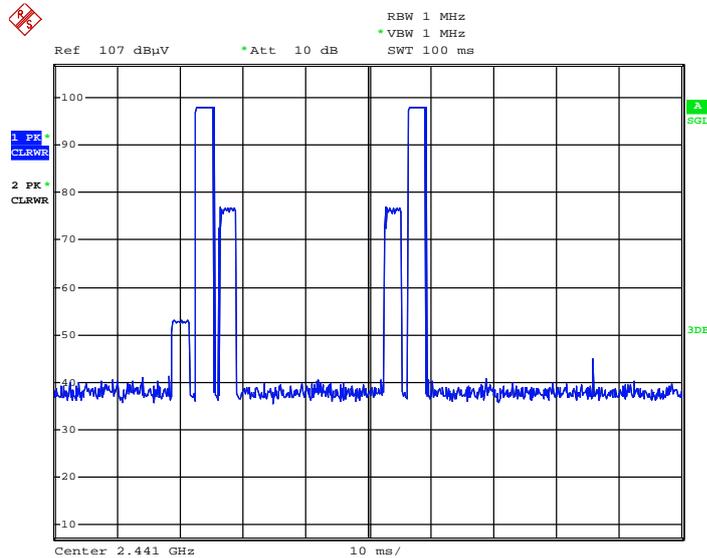
3.8.6 Duty cycle correction factor for average measurement

3DH5 on time/100ms (One Pulse) Plot on Channel 39



Date: 16.JAN.2013 13:25:36

3DH5 on time/100ms (Count Pulses) Plot on Channel 39



Date: 16.JAN.2013 13:26:27

Note:

1. Duty cycle = on time/100 milliseconds = 2 * 2.89 / 100 = 5.78 %
2. Duty cycle correction factor = 20*log(Duty cycle) = -24.76 dB
3. 3DH5 has the highest duty cycle and is reported.



3.8.7 Test Result of Radiated Band Edges

| | | | |
|----------------|-------|---------------------|-------------|
| Test Mode : | 3Mbps | Temperature : | 21~22°C |
| Test Channel : | 00 | Relative Humidity : | 45~46% |
| | | Test Engineer : | Allen Cheng |

| ANTENNA POLARITY : HORIZONTAL | | | | | | | | | | |
|-------------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
| 2383.17 | 44.2 | -29.8 | 74 | 40.79 | 32.83 | 2.09 | 31.51 | 100 | 152 | Peak |
| 2383.17 | 19.44 | -34.56 | 54 | - | - | - | - | - | - | Average |

| ANTENNA POLARITY : VERTICAL | | | | | | | | | | |
|-----------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
| 2387.49 | 45.11 | -28.89 | 74 | 41.65 | 32.86 | 2.11 | 31.51 | 100 | 122 | Peak |
| 2387.49 | 20.35 | -33.65 | 54 | - | - | - | - | - | - | Average |

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (24.76dB) derived from 20log (dwell time/100ms).

For example: Average level = 44.2dBuV/m – 24.76 (dB) = 19.44dBuV/m.

| | | | |
|----------------|-------|---------------------|-------------|
| Test Mode : | 3Mbps | Temperature : | 21~22°C |
| Test Channel : | 78 | Relative Humidity : | 45~46% |
| | | Test Engineer : | Allen Cheng |

| ANTENNA POLARITY : HORIZONTAL | | | | | | | | | | |
|-------------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
| 2483.5 | 62.4 | -11.6 | 74 | 58.74 | 33.01 | 2.16 | 31.51 | 100 | 128 | Peak |
| 2483.5 | 37.64 | -16.36 | 54 | - | - | - | - | - | - | Average |

| ANTENNA POLARITY : VERTICAL | | | | | | | | | | |
|-----------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
| 2483.5 | 53.6 | -20.4 | 74 | 49.94 | 33.01 | 2.16 | 31.51 | 100 | 265 | Peak |
| 2483.5 | 28.84 | -25.16 | 54 | - | - | - | - | - | - | Average |



3.8.8 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

NOTE: Below 1GHz for radiated emission measurement, pre-scanned all test modes and only choose the worst case mode was recorded in the report.

| | | | |
|------------------------|--|----------------------------|------------|
| Test Mode : | 3Mbps | Temperature : | 21~22°C |
| Test Channel : | 00 | Relative Humidity : | 45~46% |
| Test Engineer : | Allen Cheng | Polarization : | Horizontal |
| Remark : | 1. 2402 MHz is fundamental signal which can be ignored. 2. 2399 MHz and 7206 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 100.23 dBuV/m - 20dB = 80.23 dBuV/m. 3. Average measurement was not performed if peak level went lower than the average limit. | | |

| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 2399 | 61.81 | -18.42 | 80.23 | 58.35 | 32.86 | 2.11 | 31.51 | 100 | 129 | Peak |
| 2402 | 100.23 | - | - | 96.77 | 32.86 | 2.11 | 31.51 | 100 | 129 | Peak |
| 2402 | 75.47 | - | - | - | - | - | - | - | - | Average |
| 4804 | 45.87 | -28.13 | 74 | 39.16 | 35.17 | 3.08 | 31.54 | 100 | 12 | Peak |
| 7206 | 46.37 | -33.86 | 80.23 | 37.93 | 36.16 | 3.24 | 30.96 | 200 | 30 | Peak |

Note: Other harmonics are lower than background noise.



| | | | |
|------------------------|--|----------------------------|----------|
| Test Mode : | 3Mbps | Temperature : | 21~22°C |
| Test Channel : | 00 | Relative Humidity : | 45~46% |
| Test Engineer : | Allen Cheng | Polarization : | Vertical |
| Remark : | 1. 2402 MHz is fundamental signal which can be ignored. 2. 2399 MHz and 7206 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit. | | |

| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 2399 | 58.31 | -17.71 | 76.02 | 54.85 | 32.86 | 2.11 | 31.51 | 100 | 161 | Peak |
| 2402 | 96.02 | - | - | 92.56 | 32.86 | 2.11 | 31.51 | 100 | 161 | Peak |
| 2402 | 71.26 | - | - | - | - | - | - | - | - | Average |
| 4804 | 44.51 | -29.49 | 74 | 37.8 | 35.17 | 3.08 | 31.54 | 100 | 0 | Peak |
| 7206 | 46.98 | -29.04 | 76.02 | 38.54 | 36.16 | 3.24 | 30.96 | 100 | 112 | Peak |

Note: Other harmonics are lower than background noise.



| | | | |
|------------------------|--|----------------------------|------------|
| Test Mode : | 3Mbps | Temperature : | 21~22°C |
| Test Channel : | 39 | Relative Humidity : | 45~46% |
| Test Engineer : | Allen Cheng | Polarization : | Horizontal |
| Remark : | 1. 2441 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. | | |

| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
|-------------------|------------------|-------------------|-----------------------|---------------------|-----------------------|-------------------|----------------------|----------------|-------------------|---------|
| 2441 | 101.25 | - | - | 97.67 | 32.95 | 2.14 | 31.51 | 108 | 126 | Peak |
| 2441 | 76.49 | - | - | - | - | - | - | - | - | Average |
| 4882 | 45.45 | -28.55 | 74 | 38.67 | 35.18 | 3.12 | 31.52 | 100 | 209 | Peak |
| 7323 | 46.39 | -27.61 | 74 | 37.91 | 36.21 | 3.21 | 30.94 | 100 | 220 | Peak |

Note: Other harmonics are lower than background noise.

| | | | |
|------------------------|--|----------------------------|----------|
| Test Mode : | 3Mbps | Temperature : | 21~22°C |
| Test Channel : | 39 | Relative Humidity : | 45~46% |
| Test Engineer : | Allen Cheng | Polarization : | Vertical |
| Remark : | 1. 2441 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. | | |

| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
|-------------------|------------------|-------------------|-----------------------|---------------------|-----------------------|-------------------|----------------------|----------------|-------------------|---------|
| 2441 | 92.22 | - | - | 88.64 | 32.95 | 2.14 | 31.51 | 100 | 261 | Peak |
| 2441 | 67.46 | - | - | - | - | - | - | - | - | Average |
| 4882 | 45.18 | -28.82 | 74 | 38.4 | 35.18 | 3.12 | 31.52 | 100 | 166 | Peak |
| 7323 | 46.79 | -27.21 | 74 | 38.31 | 36.21 | 3.21 | 30.94 | 100 | 61 | Peak |

Note: Other harmonics are lower than background noise.



| | | | |
|------------------------|--|----------------------------|------------|
| Test Mode : | 3Mbps | Temperature : | 21~22°C |
| Test Channel : | 78 | Relative Humidity : | 45~46% |
| Test Engineer : | Allen Cheng | Polarization : | Horizontal |
| Remark : | 1. 2480 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. | | |

| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
|----------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 88.033 | 22.8 | -20.7 | 43.5 | 47.57 | 8.3 | 0.55 | 33.62 | - | - | Peak |
| 112.92 | 29.82 | -13.68 | 43.5 | 51.02 | 11.8 | 0.61 | 33.61 | - | - | Peak |
| 166.651 | 24.7 | -18.8 | 43.5 | 48.21 | 9.31 | 0.75 | 33.57 | - | - | Peak |
| 215.268 | 37.6 | -5.9 | 43.5 | 60.51 | 9.77 | 0.85 | 33.53 | 100 | 166 | Peak |
| 264.746 | 29.81 | -16.19 | 46 | 50.04 | 12.25 | 0.94 | 33.42 | - | - | Peak |
| 938.833 | 29.1 | -16.9 | 46 | 39.11 | 20.68 | 1.75 | 32.44 | - | - | Peak |
| 2480 | 101.33 | - | - | 97.67 | 33.01 | 2.16 | 31.51 | 100 | 169 | Peak |
| 2480 | 76.57 | - | - | - | - | - | - | - | - | Average |
| 4960 | 45.1 | -28.9 | 74 | 38.25 | 35.2 | 3.16 | 31.51 | 100 | 200 | Peak |
| 7440 | 46.12 | -27.88 | 74 | 37.59 | 36.27 | 3.18 | 30.92 | 100 | 320 | Peak |

Note: Other harmonics are lower than background noise.



| | | | |
|------------------------|--|----------------------------|----------|
| Test Mode : | 3Mbps | Temperature : | 21~22°C |
| Test Channel : | 78 | Relative Humidity : | 45~46% |
| Test Engineer : | Allen Cheng | Polarization : | Vertical |
| Remark : | 1. 2480 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit. | | |

| Frequency (MHz) | Level (dBμV/m) | Over Limit (dB) | Limit Line (dBμV/m) | Read Level (dBμV) | Antenna Factor (dB) | Cable Loss (dB) | Preamp Factor (dB) | Ant Pos (cm) | Table Pos (deg) | Remark |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 52.025 | 27.32 | -12.68 | 40 | 53.44 | 7.01 | 0.45 | 33.58 | 1000 | 209 | Peak |
| 65.343 | 21.35 | -18.65 | 40 | 49.24 | 5.2 | 0.5 | 33.59 | - | - | Peak |
| 100.934 | 24.42 | -19.08 | 43.5 | 46.83 | 10.62 | 0.58 | 33.61 | - | - | Peak |
| 216.024 | 25.61 | -20.39 | 46 | 48.46 | 9.83 | 0.85 | 33.53 | - | - | Peak |
| 268.485 | 24.14 | -21.86 | 46 | 44.28 | 12.34 | 0.94 | 33.42 | - | - | Peak |
| 938.833 | 29.93 | -16.07 | 46 | 39.94 | 20.68 | 1.75 | 32.44 | - | - | Peak |
| 2480 | 95.2 | - | - | 91.54 | 33.01 | 2.16 | 31.51 | 100 | 210 | Peak |
| 2480 | 70.44 | - | - | - | - | - | - | - | - | Average |
| 4960 | 45.33 | -28.67 | 74 | 38.48 | 35.2 | 3.16 | 31.51 | 100 | 112 | Peak |
| 7440 | 47.79 | -26.21 | 74 | 39.26 | 36.27 | 3.18 | 30.92 | 100 | 200 | Peak |

Note: Other harmonics are lower than background noise.

3.9 AC Conducted Emission Measurement

3.9.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) 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 the limits in the following table.

| Frequency of emission (MHz) | Conducted limit (dBuV) | |
|-----------------------------|------------------------|-----------|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

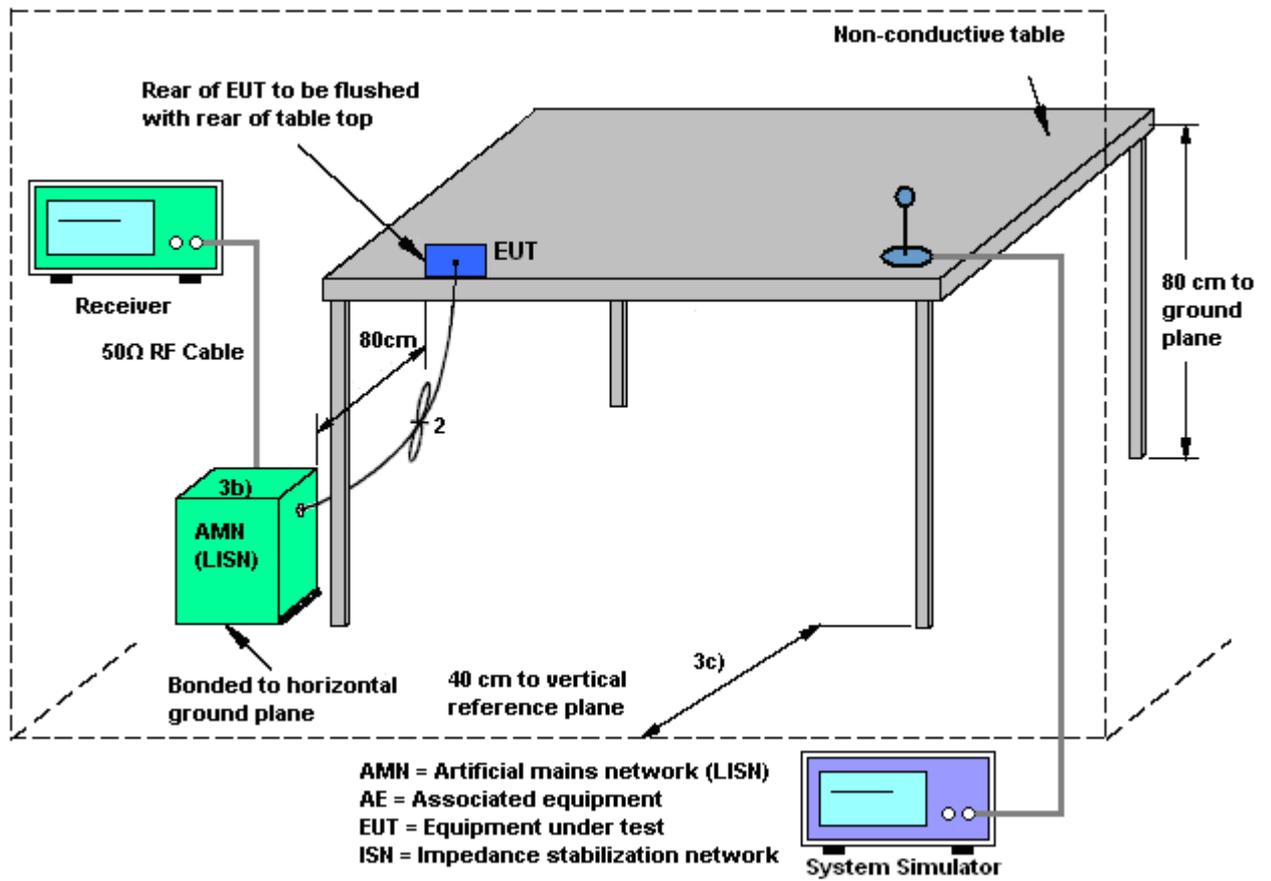
3.9.2 Measuring Instruments

See list of measuring instruments of this test report.

3.9.3 Test Procedures

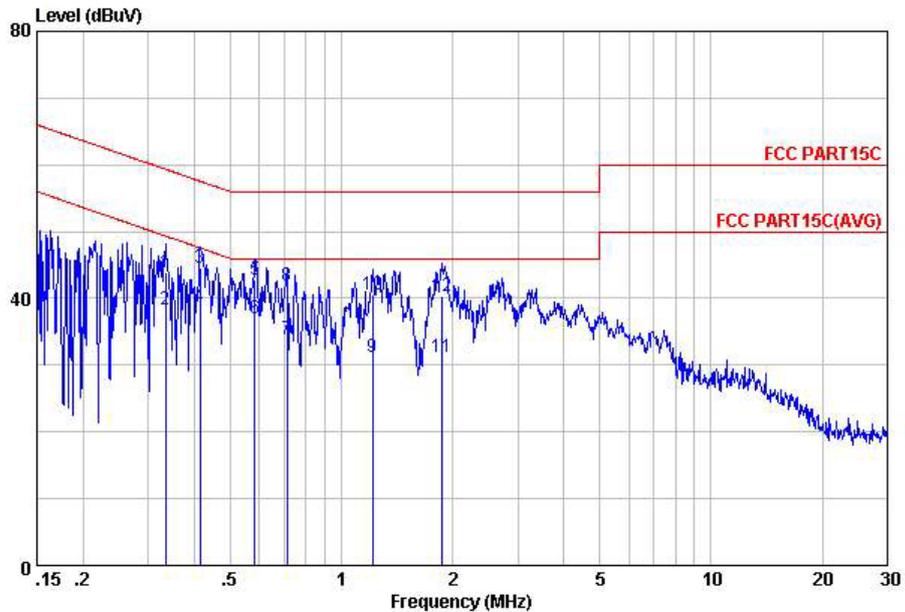
1. The test follows the guidelines in ANSI C63.4-2003 and ANSI C63.10-2009 test site requirement.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 KHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.9.4 Test Setup



3.9.5 Test Result of AC Conducted Emission

| | | | |
|-----------------|---|---------------------|---------|
| Test Mode : | Mode 1 | Temperature : | 19~20°C |
| Test Engineer : | Tom Wang | Relative Humidity : | 39~40% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Line |
| Function Type : | GSM850 Idle + Bluetooth Link + WLAN Link + Adapter + Earphone | | |
| Remark : | All emissions not reported here are more than 10 dB below the prescribed limit. | | |

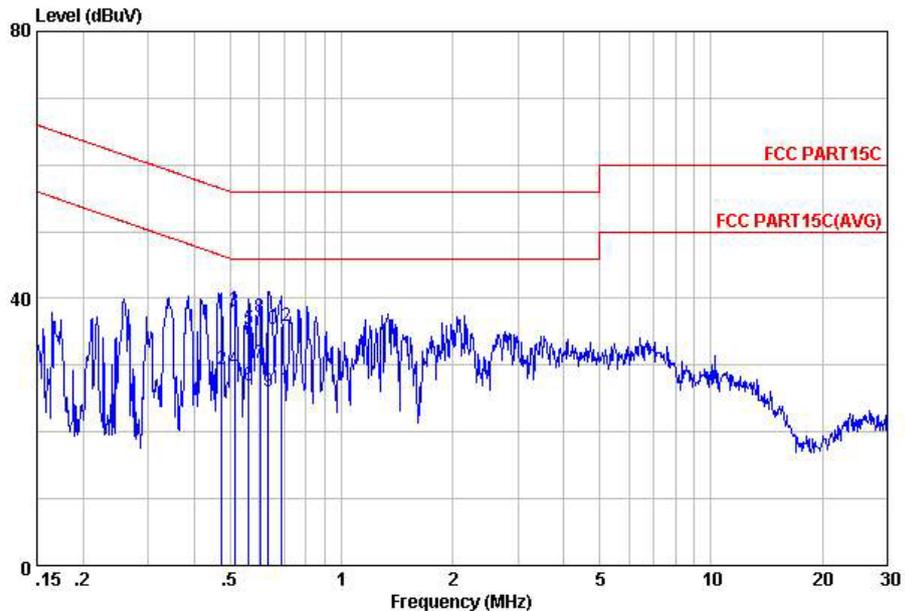


Site : C001-KS
 Condition: FCC PART15C LISN-111230 LINE

| | Freq | Level | Over | Limit | Read | LISN | Cable | Remark |
|----|------|-------|--------|-------|-------|--------|-------|---------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.33 | 43.97 | -15.38 | 59.35 | 33.81 | -0.08 | 10.24 | QP |
| 2 | 0.33 | 38.37 | -10.98 | 49.35 | 28.21 | -0.08 | 10.24 | Average |
| 3 | 0.41 | 44.57 | -12.98 | 57.55 | 34.40 | -0.08 | 10.25 | QP |
| 4 | 0.41 | 38.67 | -8.88 | 47.55 | 28.50 | -0.08 | 10.25 | Average |
| 5 | 0.58 | 42.88 | -13.12 | 56.00 | 32.70 | -0.08 | 10.26 | QP |
| 6 | 0.58 | 37.08 | -8.92 | 46.00 | 26.90 | -0.08 | 10.26 | Average |
| 7 | 0.71 | 33.78 | -12.22 | 46.00 | 23.60 | -0.09 | 10.27 | Average |
| 8 | 0.71 | 41.88 | -14.12 | 56.00 | 31.70 | -0.09 | 10.27 | QP |
| 9 | 1.22 | 31.18 | -14.82 | 46.00 | 21.00 | -0.10 | 10.28 | Average |
| 10 | 1.22 | 40.63 | -15.37 | 56.00 | 30.45 | -0.10 | 10.28 | QP |
| 11 | 1.88 | 31.19 | -14.81 | 46.00 | 21.00 | -0.11 | 10.30 | Average |
| 12 | 1.88 | 40.39 | -15.61 | 56.00 | 30.20 | -0.11 | 10.30 | QP |



| | | | |
|-----------------|---|---------------------|---------|
| Test Mode : | Mode 1 | Temperature : | 19~20°C |
| Test Engineer : | Tom Wang | Relative Humidity : | 39~40% |
| Test Voltage : | 120Vac / 60Hz | Phase : | Neutral |
| Function Type : | GSM850 Idle + Bluetooth Link + WLAN Link + Adapter + Earphone | | |
| Remark : | All emissions not reported here are more than 10 dB below the prescribed limit. | | |



Site : C001-KS
 Condition: FCC PART15C LISN-111230 NEUTRAL

| | Freq | Level | Over | Limit | Read | LISN | Cable | Remark |
|----|------|-------|--------|-------|-------|--------|-------|---------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.47 | 37.57 | -18.88 | 56.45 | 27.40 | -0.08 | 10.25 | QP |
| 2 | 0.47 | 29.47 | -16.98 | 46.45 | 19.30 | -0.08 | 10.25 | Average |
| 3 | 0.51 | 38.08 | -17.92 | 56.00 | 27.90 | -0.08 | 10.26 | QP |
| 4 | 0.51 | 29.48 | -16.52 | 46.00 | 19.30 | -0.08 | 10.26 | Average |
| 5 | 0.56 | 35.38 | -20.62 | 56.00 | 25.20 | -0.08 | 10.26 | QP |
| 6 | 0.56 | 26.98 | -19.02 | 46.00 | 16.80 | -0.08 | 10.26 | Average |
| 7 | 0.60 | 30.38 | -15.62 | 46.00 | 20.20 | -0.08 | 10.26 | Average |
| 8 | 0.60 | 37.18 | -18.82 | 56.00 | 27.00 | -0.08 | 10.26 | QP |
| 9 | 0.63 | 25.98 | -20.02 | 46.00 | 15.80 | -0.08 | 10.26 | Average |
| 10 | 0.63 | 35.38 | -20.62 | 56.00 | 25.20 | -0.08 | 10.26 | QP |
| 11 | 0.69 | 26.59 | -19.41 | 46.00 | 16.40 | -0.08 | 10.27 | Average |
| 12 | 0.69 | 35.79 | -20.21 | 56.00 | 25.60 | -0.08 | 10.27 | QP |



3.10 Antenna Requirements

3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 FCC rule.

3.10.2 Antenna Connected Construction

Non-standard connector used.

3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---------------------------|--------------|-----------|----------------|-----------------|------------------|---------------------------------|---------------|-----------------------|
| Spectrum Analyzer | R&S | FSP40 | 100319 | 9kHz~40GHz | Dec. 29, 2012 | Jan. 09, 2013~ Jan. 11, 2013 | Dec. 28, 2013 | Conducted (TH01-KS) |
| Power Meter | Agilent | E4416A | MY45101555 | N/A | Aug. 22, 2012 | Jan. 09, 2013~ Jan. 11, 2013 | Aug. 21, 2013 | Conducted (TH01-KS) |
| Power Sensor | Agilent | E9327A | MY44421198 | N/A | Aug. 22, 2012 | Jan. 09, 2013~ Jan. 11, 2013 | Aug. 21, 2013 | Conducted (TH01-KS) |
| DC Power Supply | GWINSTEK | GPS-3030D | E1884515 | N/A | Aug. 22, 2012 | Jan. 09, 2013~ Jan. 11, 2013 | Aug. 21, 2013 | Conducted (TH01-KS) |
| Thermal Chamber | Ten Billion | TTC-B3S | TBN-960502 | N/A | Dec. 29, 2012 | Jan. 09, 2013~ Jan. 11, 2013 | Dec. 28, 2013 | Conducted (TH01-KS) |
| Bluetooth Base Station | R&S | CBT | 100783 | N/A | Aug. 17, 2012 | Jan. 09, 2013~ Jan. 11, 2013 | Aug. 16, 2013 | Conducted (TH01-KS) |
| EMI Test Receiver | R&S | ESCI | 100534 | 9kHz~3GHz | Nov. 08, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | Nov. 07, 2013 | Radiation (03CH01-KS) |
| Spectrum Analyzer | R&S | FSP30 | 100400 | 9kHz~30GHz | Jun. 01, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | May 31, 2013 | Radiation (03CH01-KS) |
| Bilog Antenna | SCHAFFNER | CBL6112D | 23182 | 25MHz~2GHz | Dec. 07, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | Dec. 06, 2013 | Radiation (03CH01-KS) |
| Loop Antenna | R&S | HFH2-Z2 | 860004/ 001 | 9 kHz~30 MHz | Jul. 03, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | Jul. 02, 2014 | Radiation (03CH01-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 1908/7/13 | 00075957 | 1GHz~18GHz | Dec. 07, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | Dec. 06, 2013 | Radiation (03CH01-KS) |
| Amplifier | com-power | PA-103A | 161069 | 1MHz~1GHz | Jun. 01, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | May 31, 2013 | Radiation (03CH01-KS) |
| Amplifier | Agilent | 8449B | 3008A02370 | 1GHz~26.5GHz | Dec. 29, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | Dec. 28, 2013 | Radiation (03CH01-KS) |
| Active Horn Antenna | com-power | AHA-118 | 701023 | 1GHz~18GHz | Nov. 07, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | Nov. 06, 2013 | Radiation (03CH01-KS) |
| SHF-EHF Horn | Schwarzbeck | BBHA 9170 | 9170249 | 15GHz~40GHz | Nov. 23, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | Nov. 22, 2013 | Radiation (03CH01-KS) |
| Bluetooth Base Station | R&S | CBT | 100783 | N/A | Aug. 17, 2012 | Jan. 16, 2013~ Jan. 18, 2013 | Aug. 16, 2013 | Radiation (03CH01-KS) |
| EMI Receiver | R&S | ESCI7 | 100768 | 9kHz~7GHz | Jun. 01, 2012 | Jan. 23, 2013 | May 31, 2013 | Conduction (CO01-KS) |
| LISN | MessTec | AN3016 | 60103 | 9kHz~30MHz | Dec. 29, 2012 | Jan. 23, 2013 | Dec. 28, 2013 | Conduction (CO01-KS) |
| LISN | MessTec | AN3016 | 60105 | 9kHz~30MHz | Dec. 29, 2012 | Jan. 23, 2013 | Dec. 28, 2013 | Conduction (CO01-KS) |
| AC Power Source | Chroma | 61602 | ABP000000811 | N/A | Nov. 15, 2012 | Jan. 23, 2013 | Nov. 14, 2013 | Conduction (CO01-KS) |
| System Simulator | R&S | CMU200 | 837587/066 | 2G Full-Band | Dec. 29, 2012 | Jan. 23, 2013 | Dec. 28, 2013 | Conduction (CO01-KS) |



5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 KHz ~ 30 MHz)

| | |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 2.26 |
|---|------|

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

| | |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 2.54 |
|---|------|

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

| | |
|---|------|
| Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$) | 4.72 |
|---|------|



Appendix A. Photographs of EUT

Please refer to Sporton report number EP2D2802 as below.