

# Variant FCC RF Test Report

APPLICANT : Honeywell International Inc.  
EQUIPMENT : 99EX Mobile computer  
BRAND NAME : Honeywell  
MODEL NAME : 99GX  
FCC ID : HD599EXL0  
STANDARD : FCC Part 15 Subpart C §15.247  
CLASSIFICATION : Digital Spread Spectrum (DSS)

This is a variant report which is only valid combine with the original test report. The product was received on Jun. 15, 2011 and completely tested on Jul. 27, 2011. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 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 INC., the test report shall not be reproduced except in full.

Reviewed by:



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Jones Tsai / Manager



**SPORTON INTERNATIONAL INC.**

No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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## REVISION HISTORY

| REPORT NO.   | VERSION | DESCRIPTION                                                                                                                                                                                                                                                                                                   | ISSUED DATE   |
|--------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| FR0D0904-14A | Rev. 01 | This is a variant report which can be referred to appendix C for product equality declaration. All the test cases were performed in original report which can be referred to Sporton Report No. FR0D0904-04A as appendix D. Based on original report, only worst case of radiated emission test was verified. | Aug. 11, 2011 |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |
|              |         |                                                                                                                                                                                                                                                                                                               |               |



## SUMMARY OF TEST RESULT

| Report Section | FCC Rule           | IC Rule | Description                   | Limit                 | Result | Remark                                  |
|----------------|--------------------|---------|-------------------------------|-----------------------|--------|-----------------------------------------|
| 3.1            | 15.247(d)          | A8.5    | Frequency Band Edges          | $\leq 20\text{dBc}$   | Pass   | -                                       |
| 3.2            | 15.247(d)          | A8.5    | Transmitter Radiated Emission | 15.209(a) & 15.247(d) | Pass   | Under limit<br>8.78 dB at<br>2483.5 MHz |
| 3.3            | 15.203 & 15.247(b) | A8.4    | Antenna Requirement           | N/A                   | Pass   | -                                       |



# 1 General Description

## 1.1 Applicant

Honeywell International Inc.

9680 Old Bailes Road, Fort Mill, SC 29707 USA

## 1.2 Manufacturer

Honeywell International Inc.

9680 Old Bailes Road, Fort Mill, SC 29707 USA

## 1.3 Feature of Equipment Under Test

| Product Feature & Specification   |                                                                                                                                       |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Equipment                         | 99EX Mobile computer                                                                                                                  |
| Brand Name                        | Honeywell                                                                                                                             |
| Model Name                        | 99GX                                                                                                                                  |
| FCC ID                            | HD599EXL0                                                                                                                             |
| Sample 1                          | EUT with 55 keypad options                                                                                                            |
| Sample 2                          | EUT with 43 keypad options                                                                                                            |
| Sample 3                          | EUT with 34 keypad options                                                                                                            |
| Tx/Rx Frequency Range             | 2400 MHz ~ 2483.5 MHz                                                                                                                 |
| Number of Channels                | 79                                                                                                                                    |
| Carrier Frequency of Each Channel | 2402+n*1 MHz; n=0~78                                                                                                                  |
| Channel Spacing                   | 1 MHz                                                                                                                                 |
| Maximum Output Power to Antenna   | Bluetooth (1Mbps) : 2.88 dBm (0.0019 W)<br>Bluetooth EDR (2Mbps) : 3.25 dBm (0.0021 W)<br>Bluetooth EDR (3Mbps) : 3.86 dBm (0.0024 W) |
| Antenna Type                      | PIFA Antenna with gain 3 dBi                                                                                                          |
| HW Version                        | 5                                                                                                                                     |
| SW Version                        | 26.02                                                                                                                                 |
| Type of Modulation                | Bluetooth (1Mbps) : GFSK<br>Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK<br>Bluetooth EDR (3Mbps) : 8-DPSK                                  |
| EUT Stage                         | Production Unit                                                                                                                       |

### Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Testing Site

|                           |                                                                                                                                                              |                                |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| <b>Test Site</b>          | SPORTON INTERNATIONAL INC.                                                                                                                                   |                                |
| <b>Test Site Location</b> | No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park,<br>Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL: +886-3-3273456 / FAX: +886-3-3284978 |                                |
| <b>Test Site No.</b>      | <b>Sporton Site No.</b>                                                                                                                                      | <b>FCC/IC Registration No.</b> |
|                           | 03CH07-HY                                                                                                                                                    | 722060/4086B-1                 |

## 1.5 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
- ♦ IC RSS-210 Issue 8

### 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 (DoC), recorded in a separate test report.

## 1.6 Ancillary Equipment List

| Item | Equipment   | Trade Name | Model Name  | FCC ID  | Data Cable      | Power Cord                                                 |
|------|-------------|------------|-------------|---------|-----------------|------------------------------------------------------------|
| 1.   | LCD Monitor | Lenovo     | 6135-AB1    | FCC DoC | Shielded, 1.6 m | Unshielded, 1.8 m                                          |
| 2.   | Notebook    | DELL       | Vostro 1510 | FCC DoC | N/A             | AC I/P:<br>Unshielded, 1.2 m<br>DC O/P:<br>Shielded, 1.8 m |
| 3.   | iPod        | Apple      | A1285       | FCC DoC | Shielded, 1.0 m | N/A                                                        |
| 4.   | Cradle      | Honeywell  | 99EX-HB     | N/A     | N/A             | N/A                                                        |
| 5.   | Adapter     | ENG        | 3A-902DB12  | N/A     | N/A             | N/A                                                        |
| 6.   | USB Cable   | N/A        | N/A         | N/A     | N/A             | N/A                                                        |

## 2 Test Configuration of Equipment Under Test

### 2.1 RF Output Power

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   | 2.23 dBm                  | 2.68 dBm       | 3.35 dBm        |
| Ch39    | 2441MHz   | 2.88 dBm                  | 3.25 dBm       | 3.83 dBm        |
| Ch78    | 2480MHz   | 2.78 dBm                  | 3.24 dBm       | <b>3.86 dBm</b> |

**Remark:**

1. The data rate was set in 3Mbps for all the test items due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

## 2.2 Test Mode

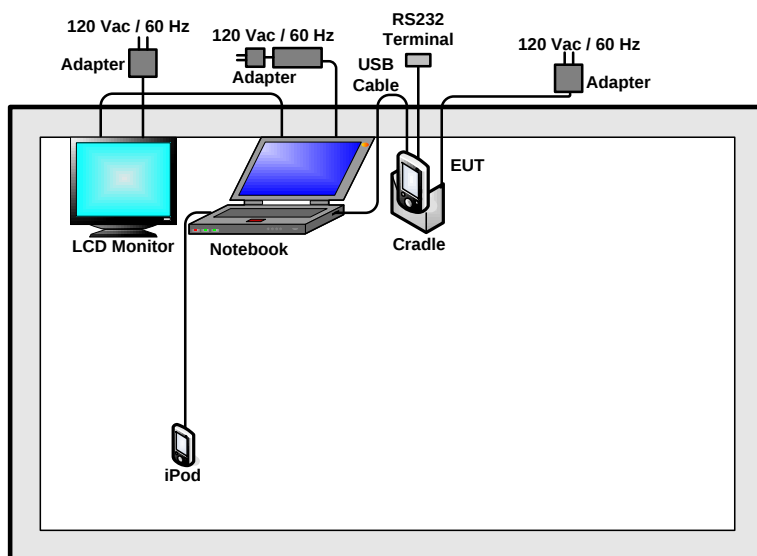
The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

The following tables are showing the test modes as the worst cases and recorded in this report.

| Test Cases                                                                                                                                                                                                                                                                                                  |                         |                                       |                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------|--------------------------------------------|
| Test Item                                                                                                                                                                                                                                                                                                   | Data Rate / Modulation  |                                       |                                            |
|                                                                                                                                                                                                                                                                                                             | Bluetooth 1Mbps<br>GFSK | Bluetooth EDR 2Mbps<br>$\pi/4$ -DQPSK | Bluetooth EDR 3Mbps<br>8-DPSK              |
| Radiated<br>TCs                                                                                                                                                                                                                                                                                             | N/A                     | N/A                                   | Mode 1: CH78_2480 MHz<br>+ TC for Sample 1 |
| <b>Remark:</b> <ol style="list-style-type: none"> <li>For radiated TCs, the data rate was set in 3Mbps due to the highest RF output power; only the data of these modes was reported.</li> <li>TC stands for Test Configuration, and consists of USB cable, RS232 terminal, cradle, and adapter.</li> </ol> |                         |                                       |                                            |

### 2.3 Connection Diagram of Test System



## 2.4 RF Utility

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

### 3 Test Result

#### 3.1 Band Edges Measurement

##### 3.1.1 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.

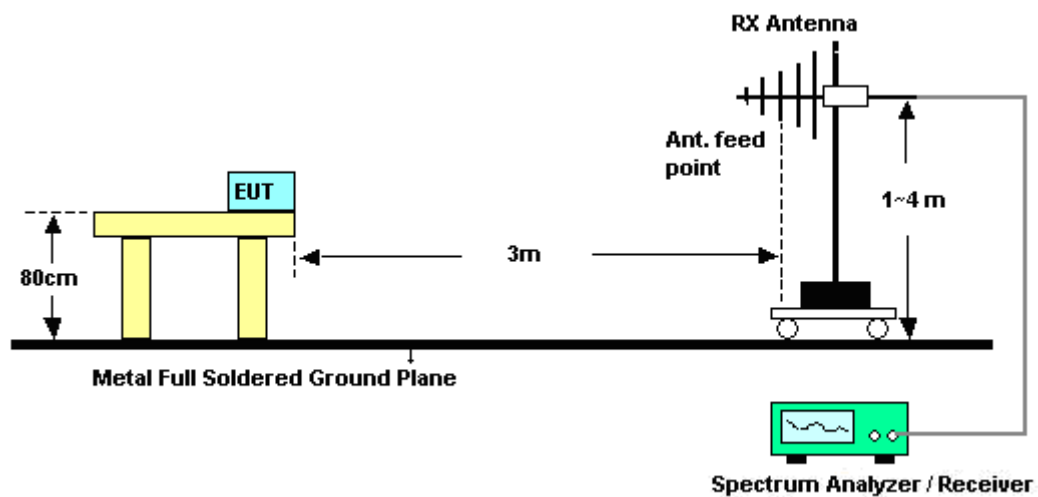
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW)  $\geq$  RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

### 3.1.4 Test Setup



### 3.1.5 Test Result of Radiated Band Edges

|                       |        |                            |             |
|-----------------------|--------|----------------------------|-------------|
| <b>Test Mode :</b>    | Mode 1 | <b>Temperature :</b>       | 24~25°C     |
| <b>Test Channel :</b> | 78     | <b>Relative Humidity :</b> | 50~51%      |
|                       |        | <b>Test Engineer :</b>     | Ivan Chiang |

| ANTENNA POLARITY : HORIZONTAL |                     |                         |                             |                           |                             |                         |                            |                      |                         |         |
|-------------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency<br>( MHz )          | Level<br>( dBuV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBuV/m ) | Read<br>Level<br>( dBuV ) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
| 2483.5                        | 64.52               | -9.48                   | 74                          | 59.96                     | 32.28                       | 6.18                    | 33.9                       | 100                  | 297                     | Peak    |
| 2483.5                        | 45.22               | -8.78                   | 54                          | 40.66                     | 32.28                       | 6.18                    | 33.9                       | 100                  | 297                     | Average |

Summary results of marker-delta method:

| Test mode           | Maximum field strength of<br>the fundamental emission<br>(dBμV/m) | Delta<br>Result<br>(dB) | Average<br>Result<br>(dBμV/m) | Average<br>Limit<br>(dBμV/m) | Margin<br>(dB) | Result |
|---------------------|-------------------------------------------------------------------|-------------------------|-------------------------------|------------------------------|----------------|--------|
| Single Carrier Mode | 95.74                                                             | 50.52                   | 45.22                         | 54                           | -8.78          | Pass   |
| Hopping Mode        | 95.74                                                             | 51.35                   | 44.39                         | 54                           | -9.61          | Pass   |

**Note :** Average result = Maximum field strength – Delta result

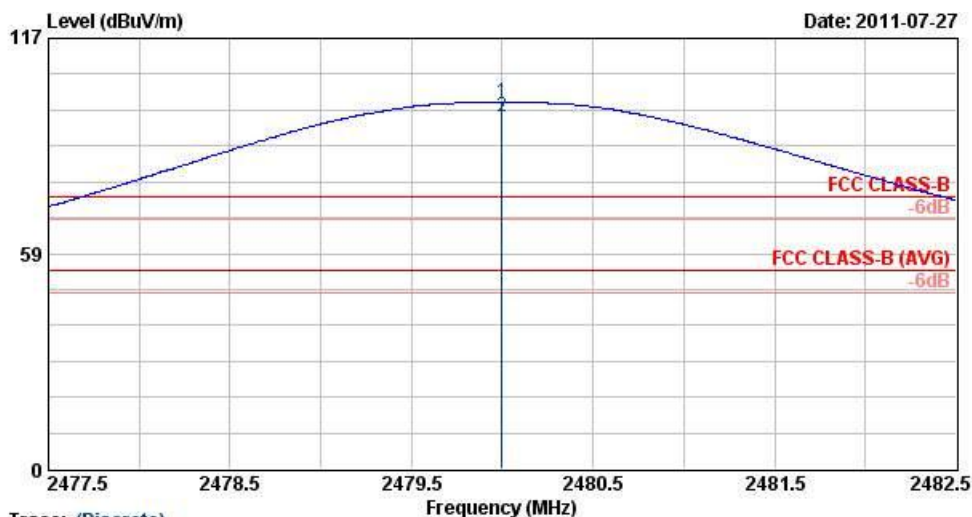
| ANTENNA POLARITY : VERTICAL |                     |                         |                             |                           |                             |                         |                            |                      |                         |         |
|-----------------------------|---------------------|-------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| Frequency<br>( MHz )        | Level<br>( dBuV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBuV/m ) | Read<br>Level<br>( dBuV ) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
| 2483.5                      | 58.72               | -15.28                  | 74                          | 54.16                     | 32.28                       | 6.18                    | 33.9                       | 100                  | 0                       | Peak    |
| 2483.5                      | 39.47               | -14.53                  | 54                          | 34.91                     | 32.28                       | 6.18                    | 33.9                       | 100                  | 0                       | Average |

Summary results of marker-delta method:

| Test mode           | Maximum field strength of<br>the fundamental emission<br>(dBμV/m) | Delta<br>Result<br>(dB) | Average<br>Result<br>(dBμV/m) | Average<br>Limit<br>(dBμV/m) | Margin<br>(dB) | Result |
|---------------------|-------------------------------------------------------------------|-------------------------|-------------------------------|------------------------------|----------------|--------|
| Single Carrier Mode | 89.46                                                             | 50.35                   | 39.11                         | 54                           | -14.89         | Pass   |
| Hopping Mode        | 89.46                                                             | 49.99                   | 39.47                         | 54                           | -14.53         | Pass   |

**Note :** Average result = Maximum field strength – Delta result

|                 |             |                     |            |
|-----------------|-------------|---------------------|------------|
| Test Mode :     | Mode 1      | Temperature :       | 24~25°C    |
| Test Channel :  | 78          | Relative Humidity : | 50~51%     |
| Test Engineer : | Ivan Chiang | Polarization :      | Horizontal |

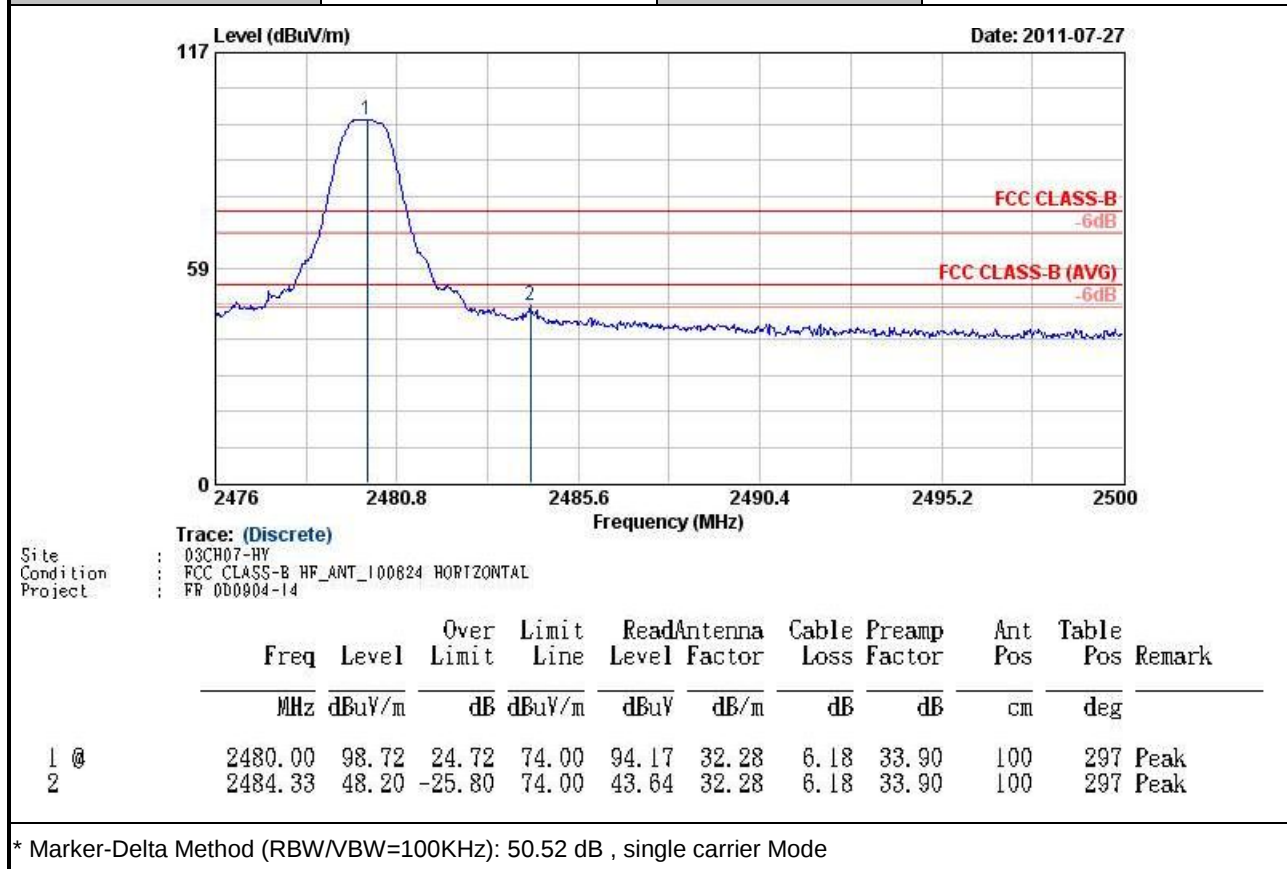


Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : FCC CLASS-B HF\_ANT\_100824 HORIZONTAL  
 Project : FR 0D0904-14

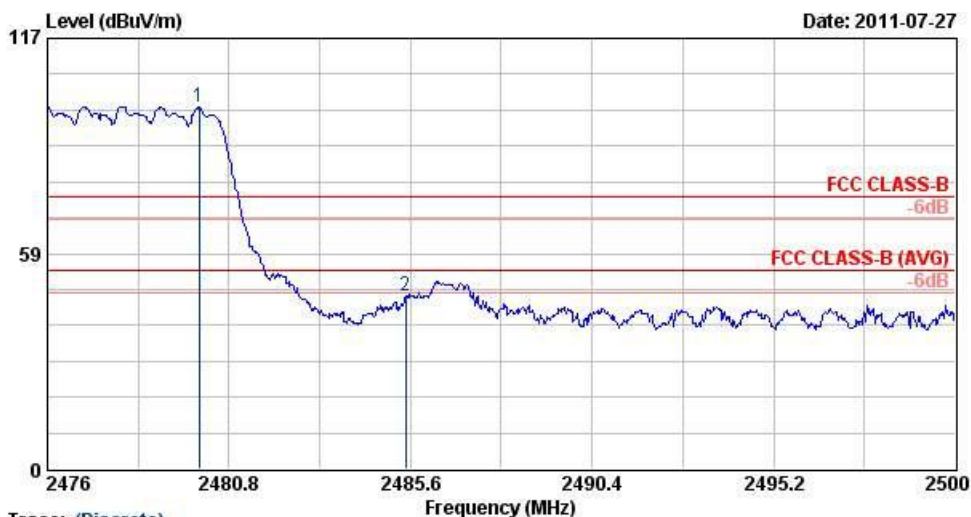
|     | Freq    | Level  | Over Limit | Limit Line | ReadAntenna Level Factor | Cable Loss Factor | Preamplifier Factor | Ant Pos | Table Pos | Remark      |
|-----|---------|--------|------------|------------|--------------------------|-------------------|---------------------|---------|-----------|-------------|
|     | MHz     | dBuV/m | dB         | dBuV/m     | dBuV                     | dB/m              | dB                  | dB      | cm        | deg         |
| 1 @ | 2480.00 | 99.81  | 25.81      | 74.00      | 95.25                    | 32.28             | 6.18                | 33.90   | 100       | 297 Peak    |
| 2 @ | 2480.00 | 95.74  | 41.74      | 54.00      | 91.18                    | 32.28             | 6.18                | 33.90   | 100       | 297 Average |

\* Maximum field strength of the fundamental emission

|                 |             |                     |            |
|-----------------|-------------|---------------------|------------|
| Test Mode :     | Mode 1      | Temperature :       | 24~25°C    |
| Test Channel :  | 78          | Relative Humidity : | 50~51%     |
| Test Engineer : | Ivan Chiang | Polarization :      | Horizontal |



|                 |             |                     |            |
|-----------------|-------------|---------------------|------------|
| Test Mode :     | Mode 1      | Temperature :       | 24~25°C    |
| Test Channel :  | 78          | Relative Humidity : | 50~51%     |
| Test Engineer : | Ivan Chiang | Polarization :      | Horizontal |



Trace: (Discrete)  
 Site : 03CH07-HY  
 Condition : FCC CLASS-B HF\_ANT\_100824 HORIZONTAL  
 Project : FR 0D0904-14

|     | Freq    | Level  | Over   | Limit  | Read  | Antenna | Cable | Preamp | Ant | Table |        |
|-----|---------|--------|--------|--------|-------|---------|-------|--------|-----|-------|--------|
|     | MHz     | dBuV/m | Limit  | Line   | Level | Factor  | Loss  | Factor | Pos | Pos   | Remark |
|     |         |        | dB     | dBuV/m | dBuV  | dB/m    | dB    | dB     | cm  | deg   |        |
| 1 @ | 2480.00 | 98.47  | 24.47  | 74.00  | 93.91 | 32.28   | 6.18  | 33.90  | 100 | 297   | Peak   |
| 2   | 2485.48 | 47.12  | -26.88 | 74.00  | 42.57 | 32.28   | 6.18  | 33.90  | 100 | 297   | Peak   |

\* Marker-Delta Method (RBW/VBW=100KHz): 51.35 dB , Hopping Mode

|                 |             |                     |          |
|-----------------|-------------|---------------------|----------|
| Test Mode :     | Mode 1      | Temperature :       | 24~25°C  |
| Test Channel :  | 78          | Relative Humidity : | 50~51%   |
| Test Engineer : | Ivan Chiang | Polarization :      | Vertical |

Level (dBuV/m)

117

59

0

2477.5

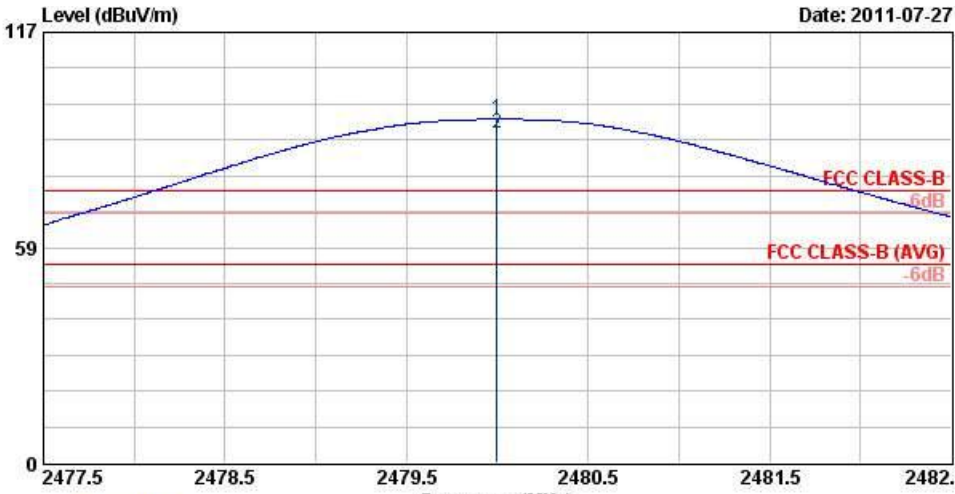
2478.5

2479.5

2480.5

2481.5

2482.5



Date: 2011-07-27

Trace: (Discrete)

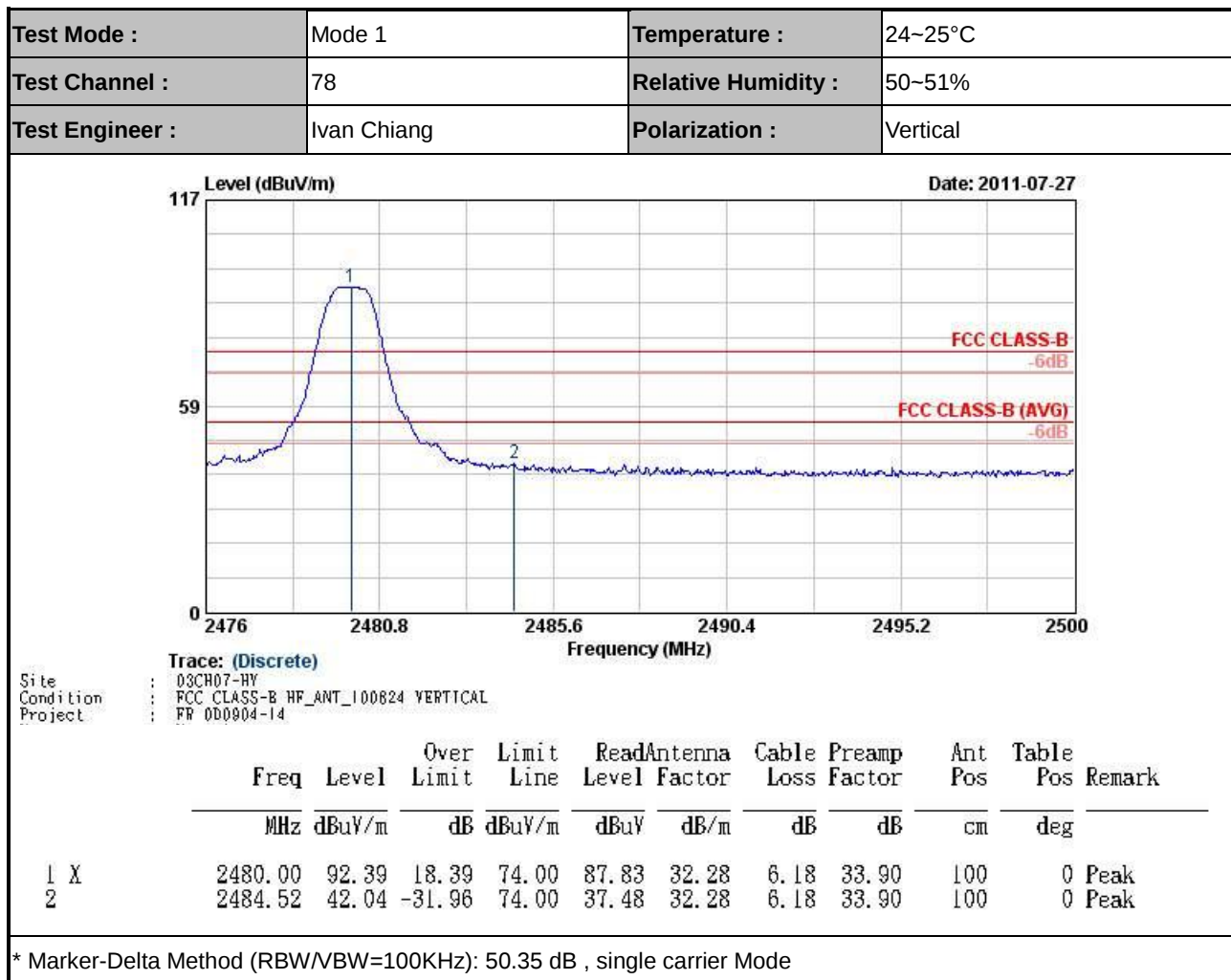
Site : 03CH07-HY

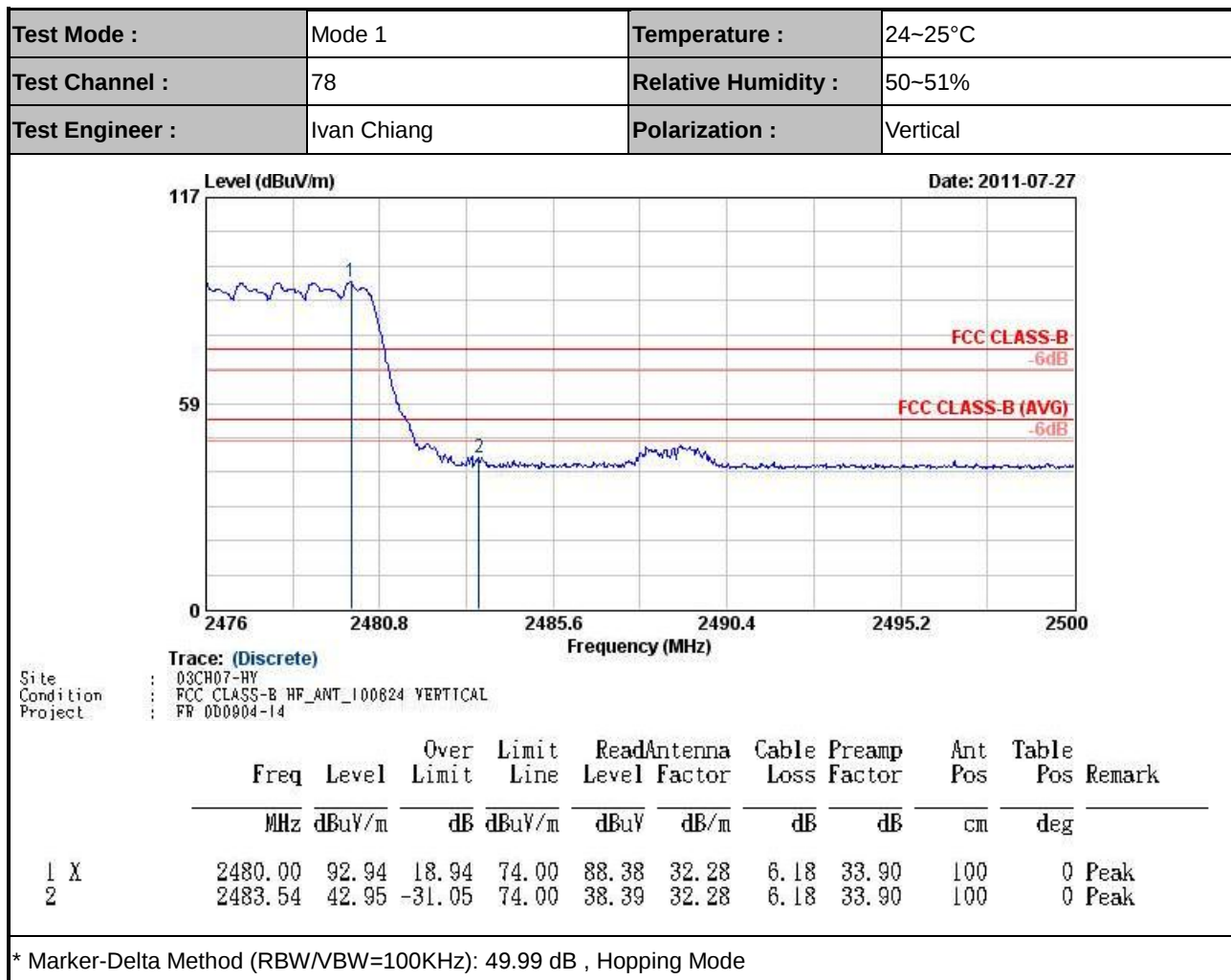
Condition : FCC CLASS-B HF\_ANT\_100824 VERTICAL

Project : FR 0D0904-14

|   | Freq | Level   | Over  | Limit  | ReadAntenna | Cable | Preamp | Ant  | Table |        |           |
|---|------|---------|-------|--------|-------------|-------|--------|------|-------|--------|-----------|
|   | MHz  | dBuV/m  | Limit | Line   | Level       | Loss  | Factor | Pos  | Pos   | Remark |           |
|   |      |         | dB    | dBuV/m | dBuV        | dB/m  | dB     | dB   | cm    | deg    |           |
| 1 | X    | 2480.00 | 93.49 | 19.49  | 74.00       | 88.93 | 32.28  | 6.18 | 33.90 | 100    | 0 Peak    |
| 2 | @    | 2480.00 | 89.46 | 35.46  | 54.00       | 84.90 | 32.28  | 6.18 | 33.90 | 100    | 0 Average |

\* Maximum field strength of the fundamental emission





## 3.2 Radiated Emission Measurement

### 3.2.1 Limit of Radiated 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<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(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                                |

### 3.2.2 Measuring Instruments

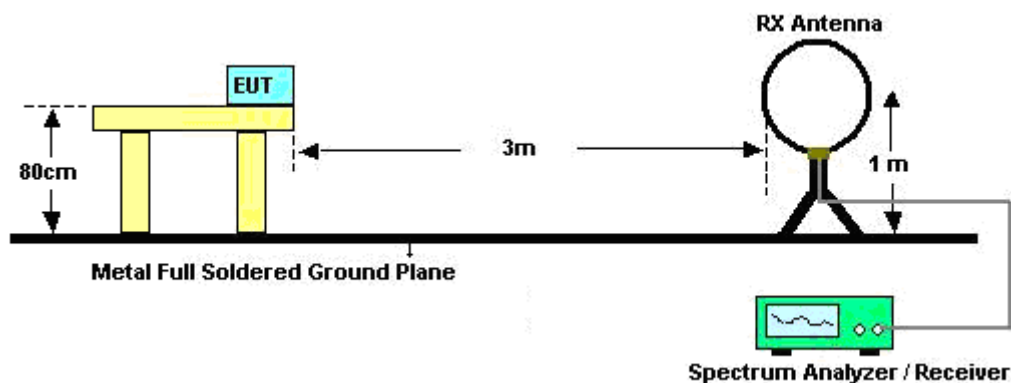
See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

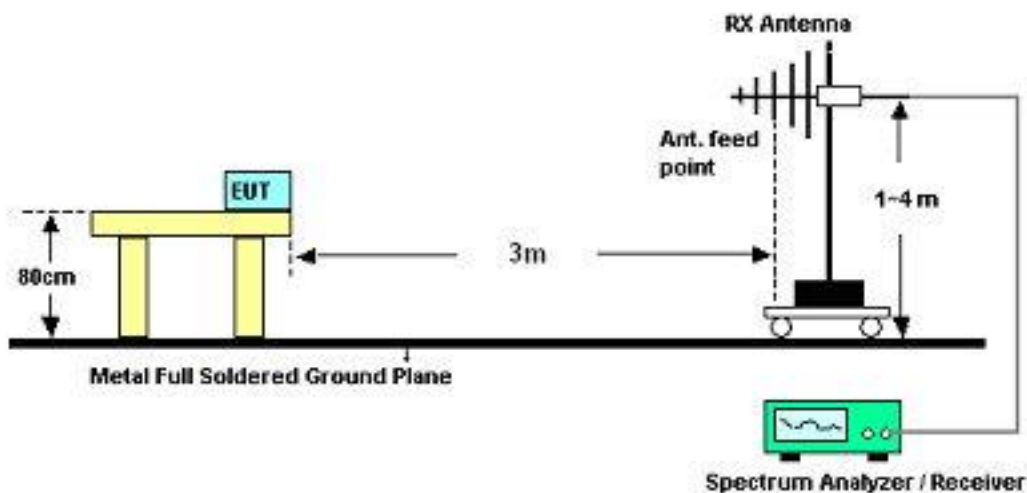
- The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
- Use the following spectrum analyzer settings:
  - Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold.
  - Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.  
Distance extrapolation factor =  $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$  (dB)
- Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.
- Measured average value for the peak value is greater than 54 dBuV/m

### 3.2.4 Test Setup

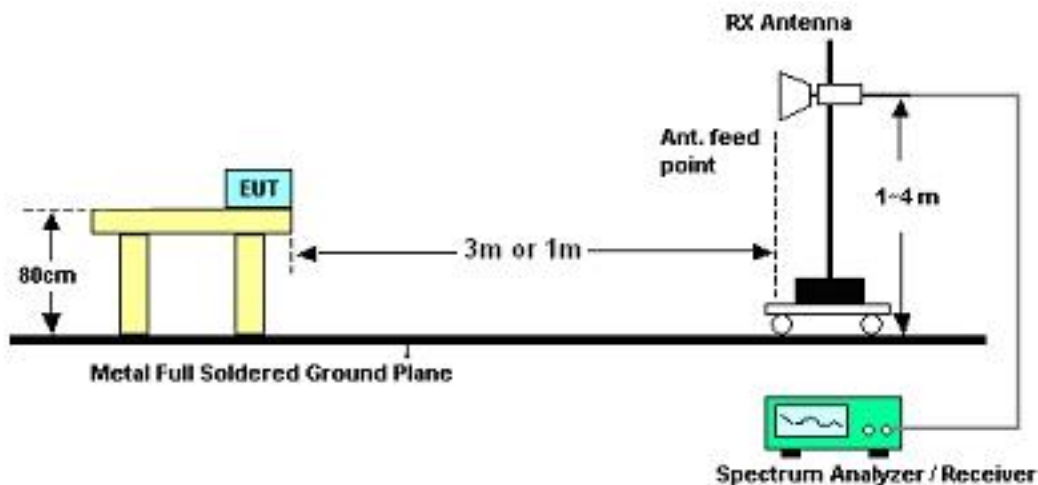
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.2.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

|                 |             |                     |         |  |
|-----------------|-------------|---------------------|---------|--|
| Test Engineer : | Ivan Chiang | Temperature :       | 24~25°C |  |
|                 |             | Relative Humidity : | 50~51%  |  |

| Frequency (MHz) | Level (dBuV) | Over Limit (dB) | Limit Line (dBuV) | Remark   |
|-----------------|--------------|-----------------|-------------------|----------|
| -               | -            | -               | -                 | See Note |

**Note:**

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

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBUV) + distance extrapolation factor.

**3.2.6 Test Result of Radiated Emission (30 MHz ~ 10<sup>th</sup> Harmonic)**

|                        |                                                       |                            |            |
|------------------------|-------------------------------------------------------|----------------------------|------------|
| <b>Test Mode :</b>     | Mode 1                                                | <b>Temperature :</b>       | 24~25°C    |
| <b>Test Channel :</b>  | 78                                                    | <b>Relative Humidity :</b> | 50~51%     |
| <b>Test Engineer :</b> | Ivan Chiang                                           | <b>Polarization :</b>      | Horizontal |
| <b>Remark :</b>        | 2480 MHz is Fundamental Signals which can be ignored. |                            |            |

| Frequency<br>( MHz ) | Level<br>( dBuV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBuV/m ) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 35.94                | 16.68               | -23.32                  | 40                          | 32.71                   | 14.86                       | 0.59                    | 31.48                      | 100                  | 137                     | Peak    |
| 191.46               | 20.09               | -23.41                  | 43.5                        | 41.24                   | 9.07                        | 1.28                    | 31.5                       | -                    | -                       | Peak    |
| 272.73               | 21.48               | -24.52                  | 46                          | 38.17                   | 13.03                       | 1.64                    | 31.36                      | -                    | -                       | Peak    |
| 450.5                | 20.7                | -25.3                   | 46                          | 32.09                   | 17.41                       | 2.3                     | 31.1                       | -                    | -                       | Peak    |
| 687.8                | 22.56               | -23.44                  | 46                          | 29.73                   | 20.75                       | 2.91                    | 30.83                      | -                    | -                       | Peak    |
| 993.7                | 26.66               | -27.34                  | 54                          | 28.92                   | 24.82                       | 3.5                     | 30.58                      | -                    | -                       | Peak    |
| 2358                 | 45.32               | -28.68                  | 74                          | 41.04                   | 32.13                       | 5.99                    | 33.84                      | 100                  | 297                     | Peak    |
| 2358                 | 33.16               | -20.84                  | 54                          | 28.88                   | 32.13                       | 5.99                    | 33.84                      | 100                  | 297                     | Average |
| 2480                 | 99.79               | -                       | -                           | 95.23                   | 32.28                       | 6.18                    | 33.9                       | 100                  | 297                     | Peak    |
| 2480                 | 95.88               | -                       | -                           | 91.32                   | 32.28                       | 6.18                    | 33.9                       | 100                  | 297                     | Average |
| 2483.5               | 64.52               | -9.48                   | 74                          | 59.96                   | 32.28                       | 6.18                    | 33.9                       | 100                  | 297                     | Peak    |
| 2483.5               | 45.22               | -8.78                   | 54                          | 40.66                   | 32.28                       | 6.18                    | 33.9                       | 100                  | 297                     | Average |



|                        |                                                       |                            |          |
|------------------------|-------------------------------------------------------|----------------------------|----------|
| <b>Test Mode :</b>     | Mode 1                                                | <b>Temperature :</b>       | 24~25°C  |
| <b>Test Channel :</b>  | 78                                                    | <b>Relative Humidity :</b> | 50~51%   |
| <b>Test Engineer :</b> | Ivan Chiang                                           | <b>Polarization :</b>      | Vertical |
| <b>Remark :</b>        | 2480 MHz is Fundamental Signals which can be ignored. |                            |          |

| Frequency<br>( MHz ) | Level<br>( dBuV/m ) | Over<br>Limit<br>( dB ) | Limit<br>Line<br>( dBuV/m ) | Read<br>Level<br>(dBuV) | Antenna<br>Factor<br>( dB ) | Cable<br>Loss<br>( dB ) | Preamp<br>Factor<br>( dB ) | Ant<br>Pos<br>( cm ) | Table<br>Pos<br>( deg ) | Remark  |
|----------------------|---------------------|-------------------------|-----------------------------|-------------------------|-----------------------------|-------------------------|----------------------------|----------------------|-------------------------|---------|
| 31.89                | 21.11               | -18.89                  | 40                          | 35.98                   | 16.04                       | 0.55                    | 31.46                      | 124                  | 309                     | Peak    |
| 115.05               | 22.39               | -21.11                  | 43.5                        | 41.75                   | 11.12                       | 1.08                    | 31.56                      | -                    | -                       | Peak    |
| 277.05               | 24.33               | -21.67                  | 46                          | 40.95                   | 13.1                        | 1.64                    | 31.36                      | -                    | -                       | Peak    |
| 433.7                | 20.21               | -25.79                  | 46                          | 31.96                   | 17.12                       | 2.26                    | 31.13                      | -                    | -                       | Peak    |
| 596.1                | 22.45               | -23.55                  | 46                          | 30.98                   | 19.71                       | 2.68                    | 30.92                      | -                    | -                       | Peak    |
| 738.9                | 23.32               | -22.68                  | 46                          | 29.52                   | 21.5                        | 3.03                    | 30.73                      | -                    | -                       | Peak    |
| 2390                 | 46.04               | -27.96                  | 74                          | 41.68                   | 32.18                       | 6.03                    | 33.85                      | 100                  | 0                       | Peak    |
| 2390                 | 33.36               | -20.64                  | 54                          | 29                      | 32.18                       | 6.03                    | 33.85                      | 100                  | 0                       | Average |
| 2480                 | 93.35               | -                       | -                           | 88.79                   | 32.28                       | 6.18                    | 33.9                       | 100                  | 0                       | Peak    |
| 2480                 | 89.64               | -                       | -                           | 85.08                   | 32.28                       | 6.18                    | 33.9                       | 100                  | 0                       | Average |
| 2483.5               | 58.72               | -15.28                  | 74                          | 54.16                   | 32.28                       | 6.18                    | 33.9                       | 100                  | 0                       | Peak    |
| 2483.5               | 39.47               | -14.53                  | 54                          | 34.91                   | 32.28                       | 6.18                    | 33.9                       | 100                  | 0                       | Average |

### **3.3 Antenna Requirements**

#### **3.3.1 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.

#### **3.3.2 Antenna Connected Construction**

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

#### **3.3.3 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 | Due Date      | Remark                |
|---------------------------|--------------|-----------|-------------|-----------------------|------------------|---------------|-----------------------|
| System Simulator          | R&S          | CMU200    | 117995      | N/A                   | Aug. 11, 2010    | Aug.10, 2011  | Conducted (TH02-HY)   |
| Spectrum Analyzer         | R&S          | FSP40     | 100055      | 9kHz~40GHz            | Jun. 13, 2011    | Jun. 12, 2012 | Conducted (TH02-HY)   |
| Power Meter               | Anritsu      | ML2495A   | 0932001     | N/A                   | Sep. 13, 2010    | Sep. 12, 2011 | Conducted (TH02-HY)   |
| Power Sensor              | Anritsu      | MA2411B   | 0846202     | N/A                   | Sep. 14, 2010    | Sep. 13, 2011 | Conducted (TH02-HY)   |
| Bilog Antenna             | SCHAFFNER    | CBL6111C  | 2726        | 30MHz ~ 1GHz          | Oct. 31, 2010    | Oct. 30, 2011 | Radiation (03CH07-HY) |
| Spectrum Analyzer         | R&S          | FSP30     | 101067      | 9KHz ~ 30GHz          | Dec. 03, 2010    | Dec. 02, 2011 | Radiation (03CH07-HY) |
| Double Ridge Horn Antenna | ESCO         | 3117      | 00075962    | 1GHz ~ 18GHz          | Aug. 19, 2010    | Aug. 18, 2011 | Radiation (03CH07-HY) |
| SHF-EHF Horn Antenna      | SCHWARZBECK  | BBHA 9170 | BBHA9170251 | 15GHz- 40GHz          | Oct. 18, 2010    | Oct. 17, 2011 | Radiation (03CH07-HY) |
| Pre Amplifier             | Agilent      | 8449B     | 3008A02362  | 1GHz~ 26.5GHz         | Dec. 06, 2010    | Dec. 05, 2011 | Radiation (03CH07-HY) |
| Pre Amplifier             | COM-POWER    | PA-103A   | 161241      | 10-1000MHz.32 dB.GAIN | Mar. 29, 2011    | Mar. 28, 2012 | Radiation (03CH07-HY) |
| Loop Antenna              | R&S          | HFH2-Z2   | 860004/001  | 9 kHz~30 MHz          | Jul. 29, 2010    | Jul. 28, 2011 | Radiation (03CH07-HY) |

## 5 Uncertainty of Evaluation

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

| Contribution                                                                             | Uncertainty of $X_i$ |                          | $u(X_i)$ |
|------------------------------------------------------------------------------------------|----------------------|--------------------------|----------|
|                                                                                          | dB                   | Probability Distribution |          |
| Receiver Reading                                                                         | 0.41                 | Normal (k=2)             | 0.21     |
| Antenna Factor Calibration                                                               | 0.83                 | Normal (k=2)             | 0.42     |
| Cable Loss Calibration                                                                   | 0.25                 | Normal (k=2)             | 0.13     |
| Pre-Amplifier Gain Calibration                                                           | 0.27                 | Normal (k=2)             | 0.14     |
| RCV/SPA Specification                                                                    | 2.50                 | Rectangular              | 0.72     |
| Antenna Factor Interpolation for Frequency                                               | 1.00                 | Rectangular              | 0.29     |
| Site Imperfection                                                                        | 1.43                 | Rectangular              | 0.83     |
| Mismatch                                                                                 | +0.39 / -0.41        | U-Shape                  | 0.28     |
| <b>Combined Standard Uncertainty <math>U_c(y)</math></b>                                 | <b>1.27</b>          |                          |          |
| <b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b> | <b>2.54</b>          |                          |          |

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

| Contribution                                                                                                                  | Uncertainty of $X_i$ |                          | $u(X_i)$ | $C_i$ | $C_i * u(X_i)$ |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------|----------|-------|----------------|
|                                                                                                                               | dB                   | Probability Distribution |          |       |                |
| Receiver Reading                                                                                                              | $\pm 0.10$           | Normal (k=2)             | 0.10     | 1     | 0.10           |
| Antenna Factor Calibration                                                                                                    | $\pm 1.70$           | Normal (k=2)             | 0.85     | 1     | 0.85           |
| Cable Loss Calibration                                                                                                        | $\pm 0.50$           | Normal (k=2)             | 0.25     | 1     | 0.25           |
| Receiver Correction                                                                                                           | $\pm 2.00$           | Rectangular              | 1.15     | 1     | 1.15           |
| Antenna Factor Directional                                                                                                    | $\pm 1.50$           | Rectangular              | 0.87     | 1     | 0.87           |
| Site Imperfection                                                                                                             | $\pm 2.80$           | Triangular               | 1.14     | 1     | 1.14           |
| Mismatch<br>Receiver VSWR $\Gamma_1 = 0.197$<br>Antenna VSWR $\Gamma_2 = 0.194$<br>Uncertainty = $20\log(1-\Gamma_1\Gamma_2)$ | +0.34 / -0.35        | U-Shape                  | 0.244    | 1     | 0.244          |
| <b>Combined Standard Uncertainty <math>U_c(y)</math></b>                                                                      | <b>2.36</b>          |                          |          |       |                |
| <b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>                                      | <b>4.72</b>          |                          |          |       |                |



## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP0D0904-14 as below.



## Appendix C. Product Equality Declaration

**Honeywell**

Honeywell Scanning and Mobility  
9680 Old Bailes Road  
Fort Mill, SC 29707 USA

Date: August 8, 2011

### Product Equality Declaration

We, Honeywell International Inc., declare on our sole responsibility for the product of 99GX (model name) as below:

The difference between 99GX and 99EX is:

1. Remove Camera
2. Remove GPS
3. Add handle and trigger

Except Listings above, the others are the same as previous version.

Should you have any questions or comments regarding this matter, please have my best attention.

Sincerely yours,

Contact Person: Michael Robinson  
Applicant: Honeywell International Inc.  
Tel: 315.554.6387  
Fax: 315.554.6393  
E-Mail: michael.robinson3@honeywell.com



## **Appendix D. Original Report**

Please refer to Sporton report number FR0D0904-04A as below.