

# FCC TEST REPORT

## (PART 24)

**REPORT NO.:** RF140630C01-8

**MODEL NO.:** F-02G

**FCC ID:** VQK-F02G

**RECEIVED:** Aug. 05, 2014

**TESTED:** Sep. 09 ~ Sep. 10, 2014

**ISSUED:** Sep. 12, 2014

**APPLICANT:** FUJITSU LIMITED

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**ISSUED BY:** Bureau Veritas Consumer Products Services  
(H.K.) Ltd., Taoyuan Branch

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**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

| ISSUE NO.     | REASON FOR CHANGE | DATE ISSUED   |
|---------------|-------------------|---------------|
| RF140630C01-8 | Original release  | Sep. 12, 2014 |



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## 1 CERTIFICATION

**PRODUCT:** Smart Phone

**MODEL:** F-02G

**BRAND:** FUJITSU

**APPLICANT:** FUJITSU LIMITED

**TESTED:** Sep. 09 ~ Sep. 10, 2014

**TEST SAMPLE:** ENGINEERING SAMPLE

**STANDARDS:** FCC Part 24, Subpart E

The above equipment (model: F-02G) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** : Celine Chou , **DATE** : Sep. 12, 2014  
Celine Chou / Specialist

**APPROVED BY** : Bruce Chen , **DATE** : Sep. 12, 2014  
Bruce Chen / Project Engineer

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 24 & Part 2 |                                         |        |                                                                                     |
|----------------------------------------|-----------------------------------------|--------|-------------------------------------------------------------------------------------|
| STANDARD SECTION                       | TEST TYPE                               | RESULT | REMARK                                                                              |
| 2.1046<br>24.232                       | Equivalent isotropically radiated power | PASS   | Meet the requirement of limit.                                                      |
| 2.1055<br>24.235                       | Frequency Stability                     | PASS   | Meet the requirement of limit.                                                      |
| 2.1049<br>24.238(b)                    | Occupied Bandwidth                      | PASS   | Meet the requirement of limit.                                                      |
| 24.238(b)                              | Band Edge Measurements                  | PASS   | Meet the requirement of limit.                                                      |
| 2.1051<br>24.238                       | Conducted Spurious Emissions            | PASS   | Meet the requirement of limit.                                                      |
| 2.1053<br>24.238                       | Radiated Spurious Emissions             | PASS   | Meet the requirement of limit.<br>Minimum passing margin is -14.32dB at 3819.60MHz. |

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT        | FREQUENCY       | UNCERTAINTY |
|--------------------|-----------------|-------------|
| Radiated emissions | 30MHz ~ 200MHz  | 3.86 dB     |
|                    | 200MHz ~1000MHz | 3.87 dB     |
|                    | 1GHz ~ 18GHz    | 2.29 dB     |
|                    | 18GHz ~ 40GHz   | 2.29 dB     |

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



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## 2.2 TEST SITE AND INSTRUMENTS

| DESCRIPTION & MANUFACTURER              | MODEL NO.                    | SERIAL NO.           | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|-----------------------------------------|------------------------------|----------------------|---------------------|-------------------------|
| Test Receiver<br>ROHDE & SCHWARZ        | ESIB7                        | 100187               | Jan. 02, 2014       | Jan. 01, 2015           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ    | FSP40                        | 100039               | Mar. 03, 2014       | Mar. 02, 2015           |
| BILOG Antenna<br>SCHWARZBECK            | VULB9168                     | 9168-160             | Feb. 26, 2014       | Feb. 25, 2015           |
| HORN Antenna<br>SCHWARZBECK             | 9120D                        | 209                  | Sep. 12, 2013       | Sep. 11, 2014           |
| HORN Antenna<br>SCHWARZBECK             | BBHA 9170                    | BBHA9170241          | Feb. 17, 2014       | Feb. 16, 2015           |
| Preamplifier<br>Agilent                 | 8447D                        | 2944A10633           | Oct. 07, 2013       | Oct. 06, 2014           |
| Preamplifier<br>Agilent                 | 8449B                        | 3008A01964           | Aug. 26, 2014       | Aug. 25, 2015           |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 104                 | 214378/4             | Aug. 26, 2014       | Aug. 25, 2015           |
| RF signal cable<br>HUBER+SUHNNER        | SUCOFLEX 106                 | 12738/6<br>+309224/4 | Aug. 26, 2014       | Aug. 25, 2015           |
| Software<br>BV ADT                      | ADT_Radiated_<br>V7.6.15.9.4 | NA                   | NA                  | NA                      |
| Antenna Tower<br>inn-co GmbH            | MA 4000                      | 013303               | NA                  | NA                      |
| Antenna Tower Controller<br>inn-co GmbH | CO2000                       | 017303               | NA                  | NA                      |
| Turn Table<br>BV ADT                    | TT100                        | TT93021703           | NA                  | NA                      |
| Turn Table Controller<br>BV ADT         | SC100                        | SC93021703           | NA                  | NA                      |
| Mini-Circuits Power Splitter            | ZN2PD-9G                     | NA                   | Sep. 09, 2014       | Sep. 08, 2015           |
| JFW 20dB attenuation                    | 50HF-020-SMA                 | NA                   | NA                  | NA                      |

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 3.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 988962.

5. The IC Site Registration No. is IC 7450F-3.

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                          |                                                                                                                   |
|--------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>EUT</b>               | Smart Phone                                                                                                       |
| <b>MODEL NO.</b>         | F-02G                                                                                                             |
| <b>POWER SUPPLY</b>      | 3.8Vdc (Battery)<br>5Vdc (Adapter or cradle when normal charging)<br>9Vdc (Adapter or cradle when quick charging) |
| <b>MODULATION TYPE</b>   | <b>GSM, GPRS:</b> GMSK                                                                                            |
| <b>FREQUENCY RANGE</b>   | 1850.2MHz ~ 1909.8MHz                                                                                             |
| <b>MAX. EIRP POWER</b>   | <b>GSM:</b> 135.330mW (21.33dBm)                                                                                  |
| <b>MULTI-SLOTS CLASS</b> | 33                                                                                                                |
| <b>ANTENNA TYPE</b>      | $\lambda/4$ Monopole antenna with -2.2dBi gain                                                                    |
| <b>DATA CABLE</b>        | N/A                                                                                                               |
| <b>I/O PORTS</b>         | Refer to user's manual                                                                                            |
| <b>ACCESSORY DEVICES</b> | Refer to Note as below                                                                                            |

#### NOTE:

1. The EUT contains the following accessories.

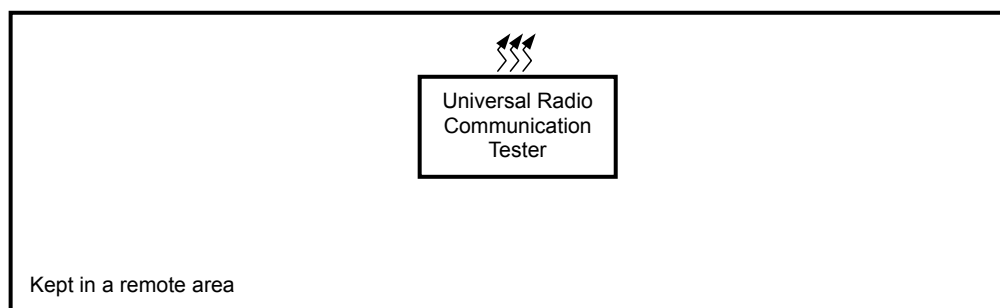
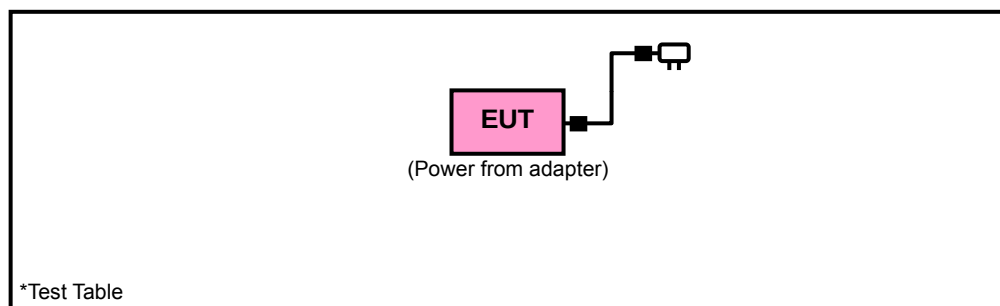
| PRODUCT | BRAND           | MODEL | DESCRIPTION                                                                 |
|---------|-----------------|-------|-----------------------------------------------------------------------------|
| Battery | NTT docomo      | NA    | 3.8Vdc, 3500mA, 13.3Wh                                                      |
| Cradle  | Fujitsu Limited | F47   | Input: 5.0Vdc, 1.5A<br>9.0Vdc, 1.5A<br>Output: 5.0Vdc, 1.5A<br>9.0Vdc, 1.5A |

2. The following adapter is support unit only.

| PRODUCT | BRAND      | MODEL         | DESCRIPTION                                                                                                                                      |
|---------|------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Adapter | NTT docomo | AC Adaptor 05 | Input: 100-240Vac, 0.12A, 50-60Hz, 0.4A<br>Output: 5.0Vdc, 1.5A<br>9.0Vdc, 1.5A<br>Power line:<br>1.25m cable with two cores attached on adapter |

3. SW version is R15Ae.
4. HW version is V2.1.0.
5. IMEI Code: 354014060011254.
6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 CONFIGURATION OF SYSTEM UNDER TEST



### 3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT                              | BRAND      | MODEL NO.     | SERIAL NO. | FCC ID |
|-----|--------------------------------------|------------|---------------|------------|--------|
| 1   | Adapter                              | NTT docomo | AC Adaptor 05 | NA         | NA     |
| 2   | Universal Radio Communication Tester | R&S        | CMU200        | 117260     | NA     |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|-----------------------------------------------------|
| 1   | NA                                                  |
| 2   | NA                                                  |

**NOTE:**

1. For item 1: 1.25m DC cable with 2 cores.
2. Item 1 is provided by the client.
3. Item 2 acted as a communication partner to transfer data.

### 3.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Z-plane. Following channel(s) was (were) selected for the final test as listed below:

Test results are presented in the report as below.

| Test Mode | Test Condition     |
|-----------|--------------------|
| A         | Power from adapter |
| B         | Power from battery |

#### GSM MODE

| EUT CONFIGURE MODE | TEST ITEM                    | AVAILABLE CHANNEL | TESTED CHANNEL | MODE      |
|--------------------|------------------------------|-------------------|----------------|-----------|
| A                  | EIRP                         | 512 to 810        | 512, 661, 810  | GSM       |
| B                  | FREQUENCY STABILITY          | 512 to 810        | 661            | GSM       |
| A                  | OCCUPIED BANDWIDTH           | 512 to 810        | 512, 661, 810  | GSM, GPRS |
| A                  | BAND EDGE                    | 512 to 810        | 512, 810       | GSM, GPRS |
| A                  | CONDCUDED EMISSION           | 512 to 810        | 512, 661, 810  | GSM, GPRS |
| A                  | RADIATED EMISSION BELOW 1GHz | 512 to 810        | 512            | GSM       |
| A                  | RADIATED EMISSION ABOVE 1GHz | 512 to 810        | 512, 661, 810  | GSM       |

#### TEST CONDITION:

| TEST ITEM           | ENVIRONMENTAL CONDITIONS | INPUT POWER  | TESTED BY  |
|---------------------|--------------------------|--------------|------------|
| EIRP                | 21deg. C, 71%RH          | 120Vac, 60Hz | Nick Hsu   |
| FREQUENCY STABILITY | 24deg. C, 64%RH          | 3.9Vdc       | Match Tsui |
| OCCUPIED BANDWIDTH  | 24deg. C, 64%RH          | 120Vac, 60Hz | Match Tsui |
| BAND EDGE           | 24deg. C, 64%RH          | 120Vac, 60Hz | Match Tsui |
| CONDCUDED EMISSION  | 24deg. C, 64%RH          | 120Vac, 60Hz | Match Tsui |
| RADIATED EMISSION   | 21deg. C, 71%RH          | 120Vac, 60Hz | Nick Hsu   |

### **3.5 EUT OPERATING CONDITIONS**

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

### **3.6 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 24**

**ANSI/TIA/EIA-603-C 2004**

**NOTE:** All test items have been performed and recorded as per the above standards.

## 4 TEST TYPES AND RESULTS

### 4.1 OUTPUT POWER MEASUREMENT

#### 4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile and portable stations are limited to 2 watts EIRP

#### 4.1.2 TEST PROCEDURES

##### EIRP MEASUREMENT:

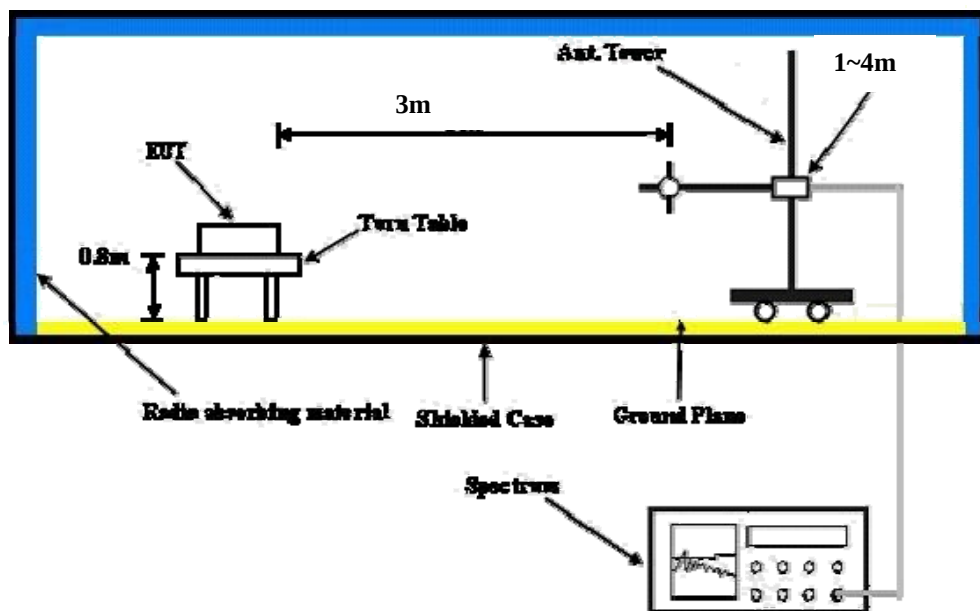
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

##### CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with GSM & GPRS link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

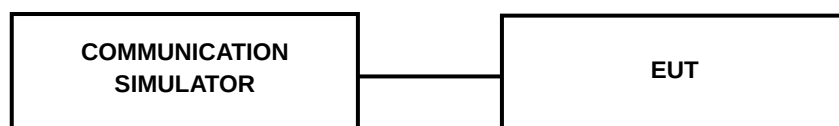
### 4.1.3 TEST SETUP

#### EIRP MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### CONDUCTED POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.4 TEST RESULTS

##### CONDUCTED OUTPUT POWER (dBm)

| Band            | GSM1900 |        |        |
|-----------------|---------|--------|--------|
| Channel         | 512     | 661    | 810    |
| Frequency (MHz) | 1850.2  | 1880.0 | 1909.8 |
| GSM (GSM)       | 29.62   | 29.58  | 29.65  |
| GPRS 8          | 29.60   | 29.56  | 29.64  |
| GPRS 10         | 26.57   | 26.53  | 26.70  |
| GPRS 11         | 24.59   | 24.55  | 24.63  |
| GPRS 12         | 23.13   | 23.09  | 23.17  |
| GPRS 30         | 29.56   | 29.52  | 29.60  |
| GPRS 31         | 26.58   | 26.54  | 26.62  |
| GPRS 32         | 24.56   | 24.52  | 24.60  |
| GPRS 33         | 23.13   | 23.09  | 23.17  |
| DTM 9 (GPRS)    | 26.51   | 26.47  | 26.55  |
| DTM 11 (GPRS)   | 24.48   | 24.44  | 24.52  |

### EIRP POWER (dBm)

|                                                     |             |                |                       |                        |            |             |             |
|-----------------------------------------------------|-------------|----------------|-----------------------|------------------------|------------|-------------|-------------|
| MODE                                                |             | TX channel 512 |                       |                        |            |             |             |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm)  | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 1850.20     | -17.16         | 18.94                 | 1.07                   | 20.01      | 33.00       | -12.99      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm)  | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 1850.20     | -14.71         | 20.26                 | 1.07                   | 21.33      | 33.00       | -11.67      |

|                                                     |             |                |                       |                        |            |             |             |
|-----------------------------------------------------|-------------|----------------|-----------------------|------------------------|------------|-------------|-------------|
| MODE                                                |             | TX channel 661 |                       |                        |            |             |             |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm)  | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 1880.00     | -16.93         | 18.57                 | 1.12                   | 19.69      | 33.00       | -13.31      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm)  | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 1880.00     | -14.66         | 19.71                 | 1.12                   | 20.83      | 33.00       | -12.17      |

|                                                     |             |                |                       |                        |            |             |             |
|-----------------------------------------------------|-------------|----------------|-----------------------|------------------------|------------|-------------|-------------|
| MODE                                                |             | TX channel 810 |                       |                        |            |             |             |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |                |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm)  | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 1909.80     | -16.56         | 18.86                 | 1.11                   | 19.97      | 33.00       | -13.03      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |                |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm)  | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 1909.80     | -15.75         | 19.59                 | 1.11                   | 20.70      | 33.00       | -12.30      |

**NOTE:** Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

## 4.2 FREQUENCY STABILITY MEASUREMENT

### 4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

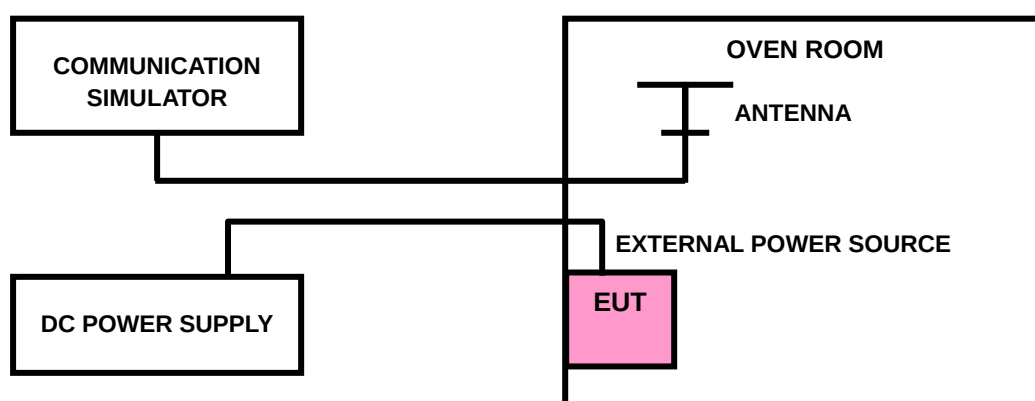
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### 4.2.2 TEST PROCEDURE

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

**NOTE:** The frequency error was recorded frequency error from the communication simulator.

### 4.2.3 TEST SETUP



## 4.2.4 TEST RESULTS

### FREQUENCY ERROR vs. VOLTAGE

| VOLTAGE (Volts) | FREQUENCY ERROR (ppm) | LIMIT (ppm) |
|-----------------|-----------------------|-------------|
|                 | GSM                   |             |
| 4.29            | -0.014                | 2.5         |
| 3.90            | -0.013                | 2.5         |
| 3.51            | -0.013                | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.51Vdc to 4.29Vdc.

### FREQUENCY ERROR vs. TEMPERATURE

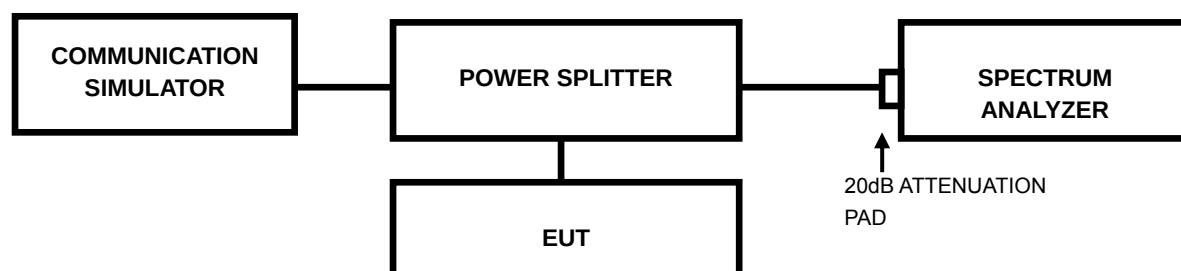
| TEMP. (°C) | FREQUENCY ERROR (ppm) | LIMIT (ppm) |
|------------|-----------------------|-------------|
|            | GSM                   |             |
| 55         | -0.015                | 2.5         |
| 50         | -0.013                | 2.5         |
| 40         | -0.010                | 2.5         |
| 30         | -0.009                | 2.5         |
| 20         | -0.013                | 2.5         |
| 10         | -0.013                | 2.5         |
| 0          | -0.018                | 2.5         |
| -10        | -0.021                | 2.5         |
| -20        | -0.020                | 2.5         |

## 4.3 OCCUPIED BANDWIDTH MEASUREMENT

### 4.3.1 TEST PROCEDURES

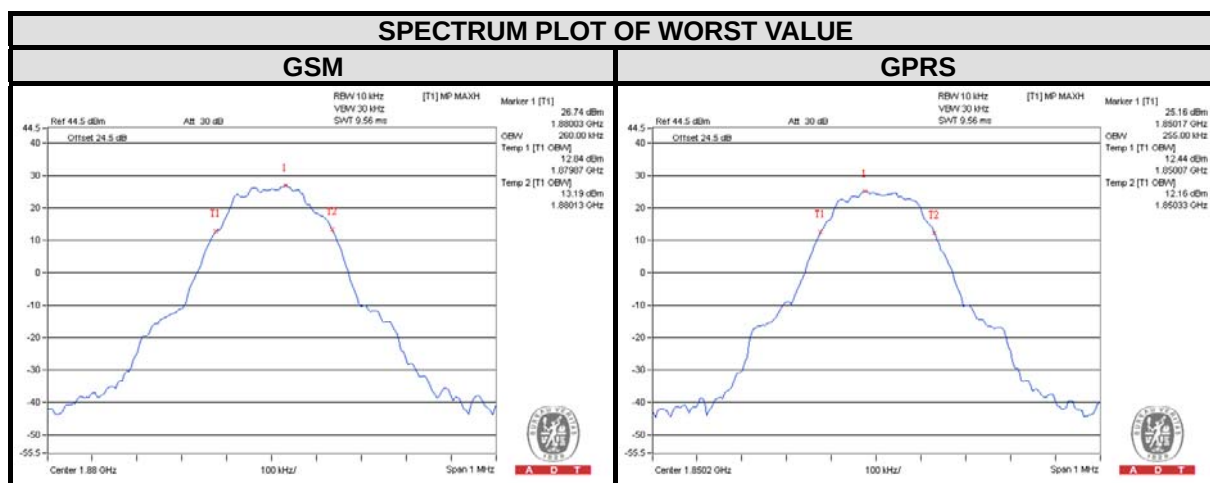
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

### 4.3.2 TEST SETUP



### 4.3.3 TEST RESULTS

| CHANNEL | FREQ.<br>(MHz) | 99% OCCUPIED BANDWIDTH (kHz) |      |
|---------|----------------|------------------------------|------|
|         |                | GSM                          | GPRS |
| 512     | 1850.2         | 255.0                        | 255  |
| 661     | 1880.0         | 260.0                        | 250  |
| 810     | 1909.8         | 255.0                        | 250  |

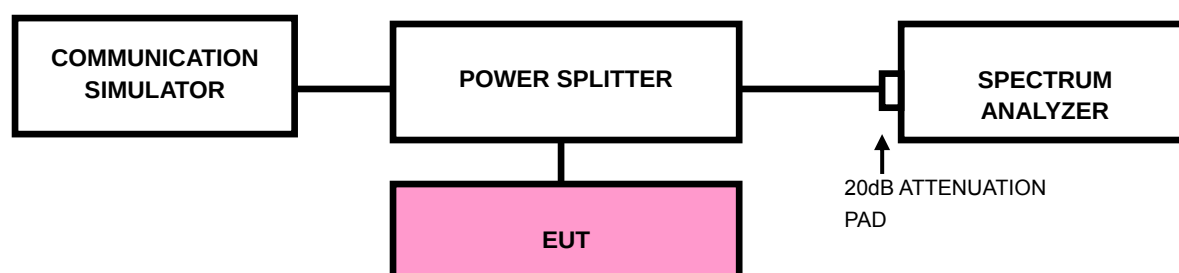


## 4.4 BAND EDGE MEASUREMENT

### 4.4.1 LIMITS OF BAND EDGE MEASUREMENT

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

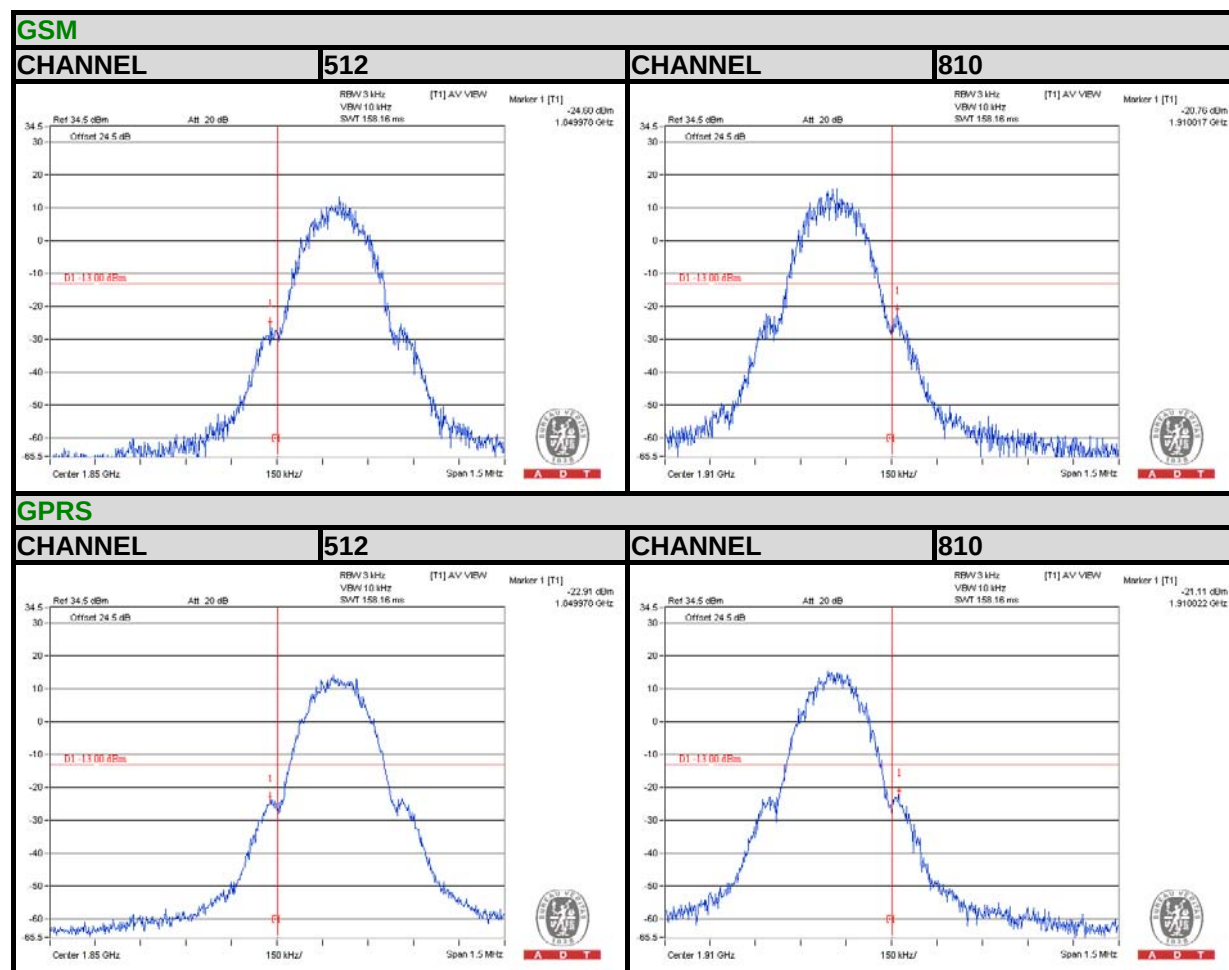
### 4.4.2 TEST SETUP



### 4.4.3 TEST PROCEDURES

- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1.5 MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GSM).
- Record the max trace plot into the test report.

## 4.4.4 TEST RESULTS



## 4.5 CONDUCTED SPURIOUS EMISSIONS

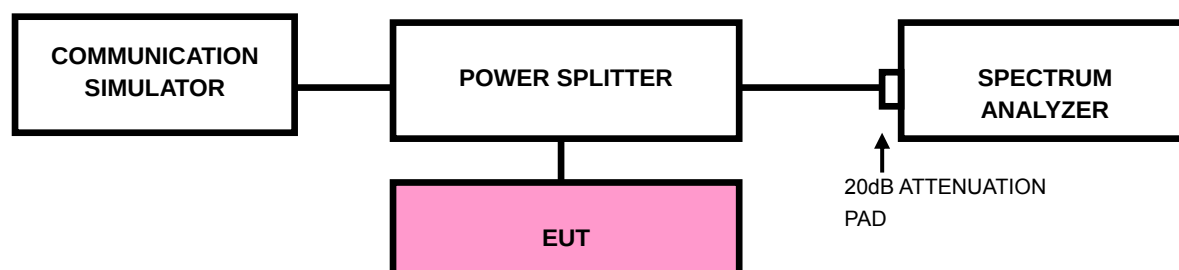
### 4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

### 4.5.2 TEST PROCEDURE

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 20GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

### 4.5.3 TEST SETUP

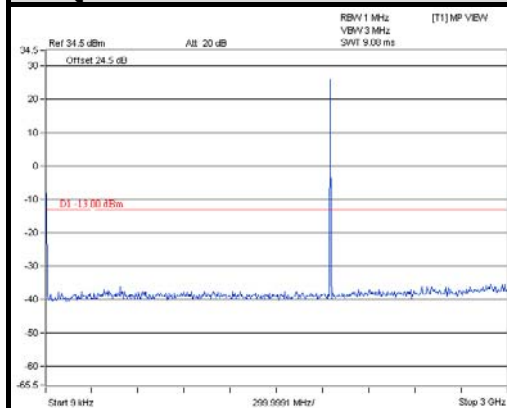


## 4.5.4 TEST RESULTS

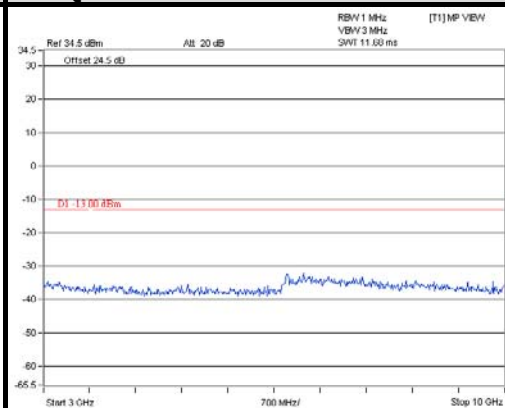
### GSM

#### CHANNEL 512

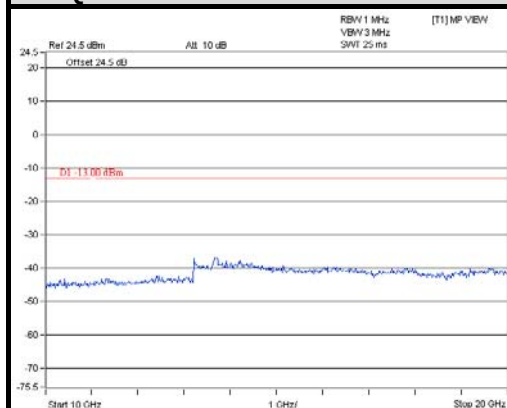
##### FREQUENCY RANGE : 9kHz~3GHz



##### FREQUENCY RANGE : 3GHz~10GHz



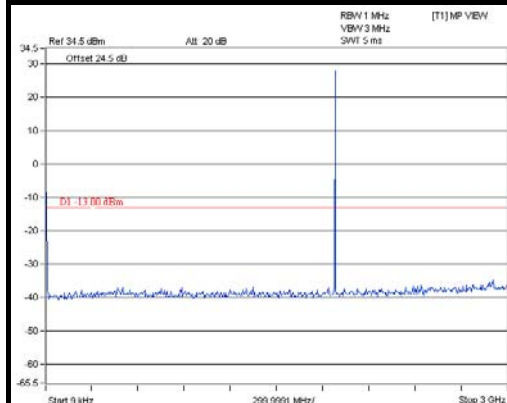
##### FREQUENCY RANGE : 10GHz~20GHz



# GSM

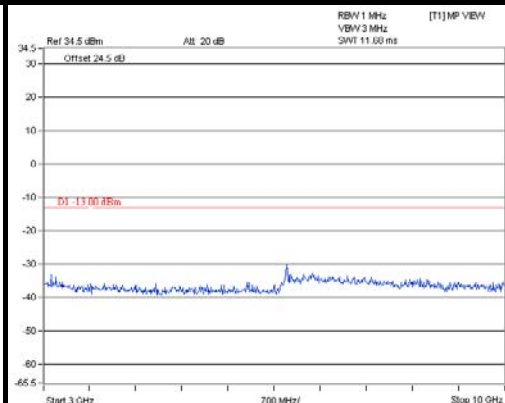
## CHANNEL 661

### FREQUENCY RANGE : 9kHz~3GHz



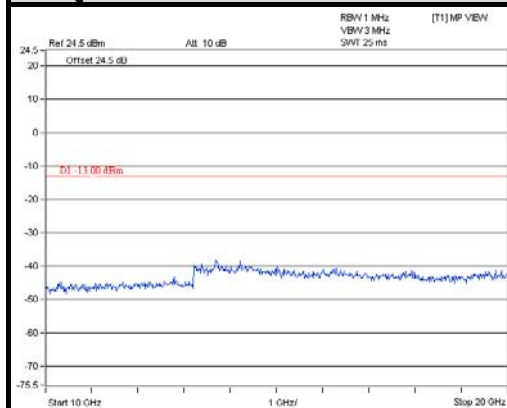
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### FREQUENCY RANGE : 3GHz~10GHz



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### FREQUENCY RANGE : 10GHz~20GHz

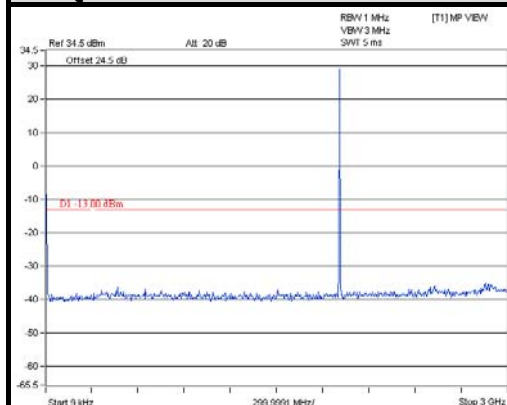


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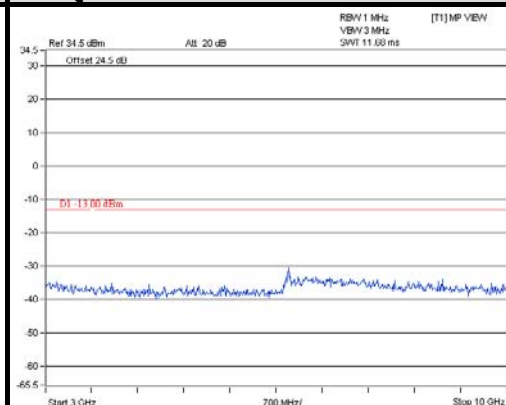
# GSM

## CHANNEL 810

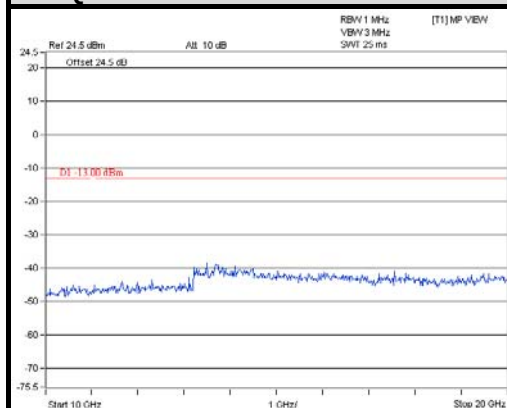
### FREQUENCY RANGE : 9kHz~3GHz



### FREQUENCY RANGE : 3GHz~10GHz



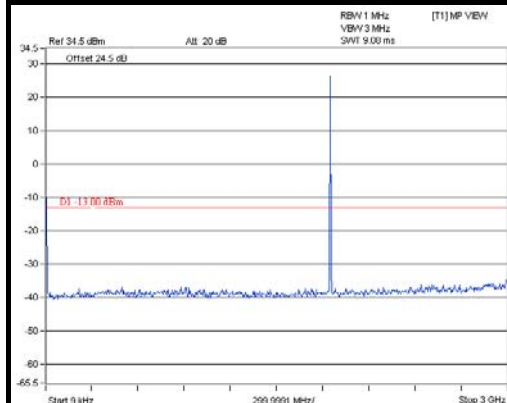
### FREQUENCY RANGE : 10GHz~20GHz



# GPRS

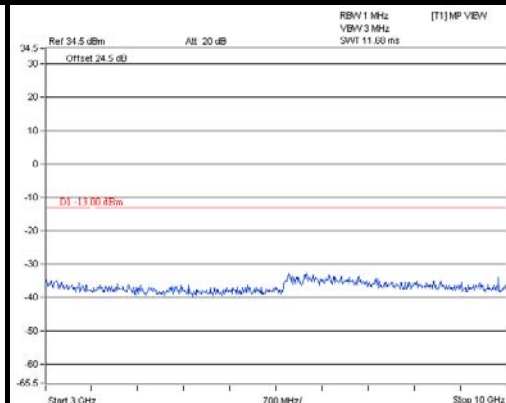
## CHANNEL 512

### FREQUENCY RANGE : 9kHz~3GHz



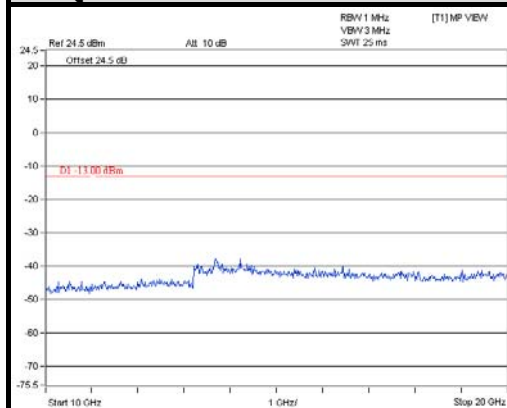
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### FREQUENCY RANGE : 3GHz~10GHz



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### FREQUENCY RANGE : 10GHz~20GHz

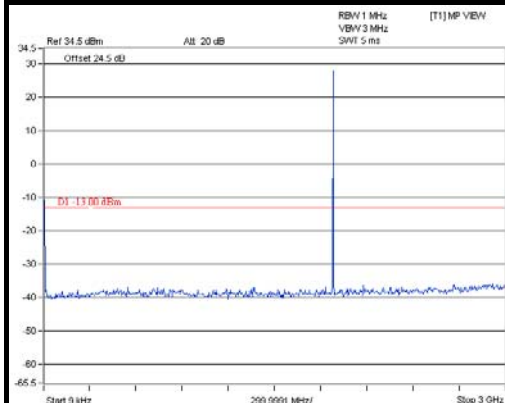


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# GPRS

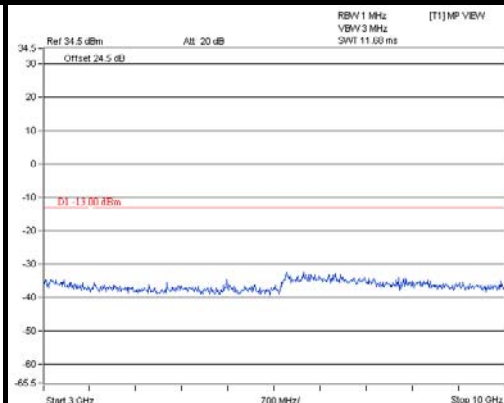
## CHANNEL 661

### FREQUENCY RANGE : 9kHz~3GHz



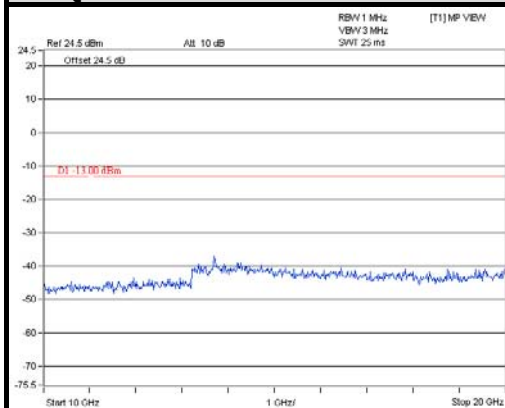
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### FREQUENCY RANGE : 3GHz~10GHz



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### FREQUENCY RANGE : 10GHz~20GHz

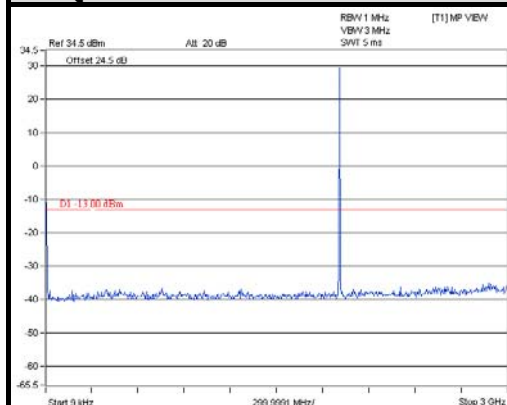


A D T

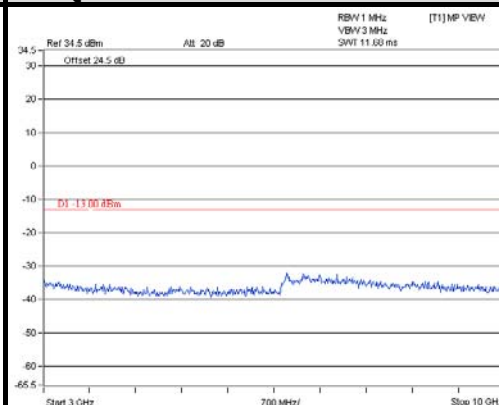
# GPRS

## CHANNEL 810

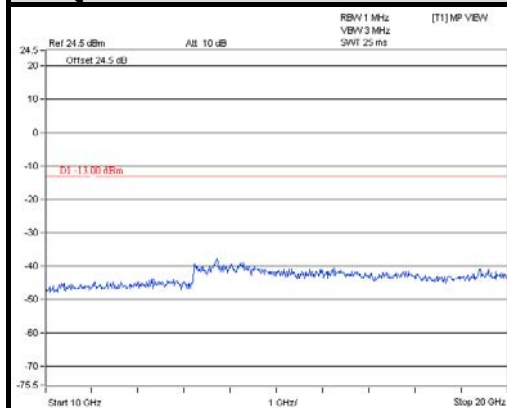
### FREQUENCY RANGE : 9kHz~3GHz



### FREQUENCY RANGE : 3GHz~10GHz



### FREQUENCY RANGE : 10GHz~20GHz



## 4.6 RADIATED EMISSION MEASUREMENT

### 4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

### 4.6.2 TEST PROCEDURES

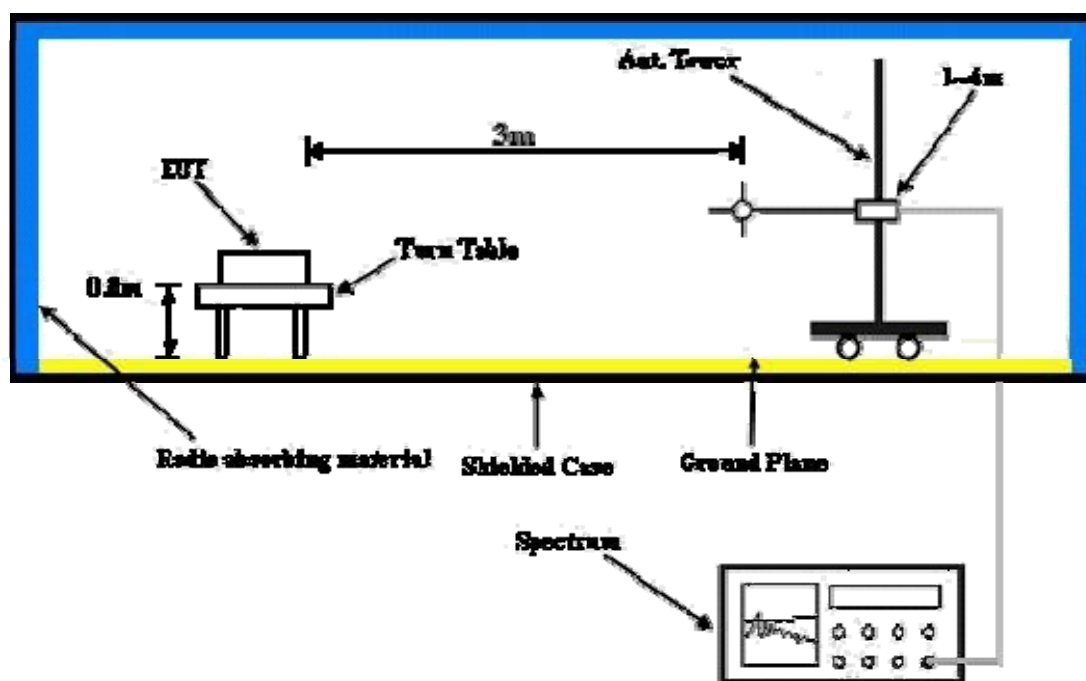
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G
- c.  $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ .
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  
 $\text{E.R.P power} = \text{E.I.R.P power} - 2.15\text{dBi}$ .

**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

### 4.6.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

## 4.6.5 TEST RESULTS

### BELOW 1GHz

|                          |                 |                 |                |
|--------------------------|-----------------|-----------------|----------------|
| MODE                     | TX channel 512  | FREQUENCY RANGE | Below 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 21deg. C, 71%RH | INPUT POWER     | 120Vac, 60 Hz  |
| TESTED BY                | Nick Hsu        |                 |                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |               |                       |                        |            |             |             |
|-----------------------------------------------------|-------------|---------------|-----------------------|------------------------|------------|-------------|-------------|
| No.                                                 | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 41.66       | -48.12        | -33.80                | -10.61                 | -44.41     | -13.00      | -31.41      |
| 2                                                   | 92.20       | -44.60        | -52.34                | 1.07                   | -51.27     | -13.00      | -38.27      |
| 3                                                   | 129.14      | -45.48        | -51.29                | -0.11                  | -51.40     | -13.00      | -38.40      |
| 4                                                   | 257.43      | -46.02        | -56.26                | 5.37                   | -50.89     | -13.00      | -37.89      |
| 5                                                   | 377.96      | -50.66        | -56.49                | 5.24                   | -51.25     | -13.00      | -38.25      |
| 6                                                   | 457.66      | -55.90        | -60.75                | 5.04                   | -55.71     | -13.00      | -42.71      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |               |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 37.78       | -39.12        | -34.05                | -11.18                 | -45.23     | -13.00      | -32.23      |
| 2                                                   | 57.21       | -41.96        | -39.98                | -8.20                  | -48.18     | -13.00      | -35.18      |
| 3                                                   | 134.97      | -51.24        | -53.30                | -0.21                  | -53.51     | -13.00      | -40.51      |
| 4                                                   | 251.60      | -55.12        | -63.28                | 5.40                   | -57.88     | -13.00      | -44.88      |
| 5                                                   | 379.90      | -52.15        | -57.08                | 5.25                   | -51.83     | -13.00      | -38.83      |
| 6                                                   | 420.72      | -52.02        | -55.49                | 5.21                   | -50.28     | -13.00      | -37.28      |

### REMARKS:

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



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## ABOVE 1GHz

|                          |                 |                 |                |
|--------------------------|-----------------|-----------------|----------------|
| MODE                     | TX channel 512  | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 21deg. C, 71%RH | INPUT POWER     | 120Vac, 60 Hz  |
| TESTED BY                | Nick Hsu        |                 |                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |               |                       |                        |            |             |             |
|-----------------------------------------------------|-------------|---------------|-----------------------|------------------------|------------|-------------|-------------|
| No.                                                 | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 3700.40     | -46.81        | -42.72                | 7.16                   | -35.56     | -13.00      | -22.56      |
| 2                                                   | 5550.60     | -51.52        | -40.57                | 6.78                   | -33.79     | -13.00      | -20.79      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |               |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 3700.40     | -47.63        | -43.76                | 7.16                   | -36.60     | -13.00      | -23.60      |
| 2                                                   | 5550.60     | -45.80        | -36.35                | 6.78                   | -29.57     | -13.00      | -16.57      |

## REMARKS:

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



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|                          |                 |                 |                |
|--------------------------|-----------------|-----------------|----------------|
| MODE                     | TX channel 661  | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 21deg. C, 71%RH | INPUT POWER     | 120Vac, 60 Hz  |
| TESTED BY                | Nick Hsu        |                 |                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |               |                       |                        |            |             |             |
|-----------------------------------------------------|-------------|---------------|-----------------------|------------------------|------------|-------------|-------------|
| No.                                                 | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 3760.00     | -41.87        | -37.52                | 7.10                   | -30.42     | -13.00      | -17.42      |
| 2                                                   | 5640.00     | -51.19        | -40.19                | 6.77                   | -33.42     | -13.00      | -20.42      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |               |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 3760.00     | -43.09        | -39.08                | 7.10                   | -31.98     | -13.00      | -18.98      |
| 2                                                   | 5640.00     | -52.42        | -42.65                | 6.77                   | -35.88     | -13.00      | -22.88      |

**REMARKS:**

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



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|                          |                 |                 |                |
|--------------------------|-----------------|-----------------|----------------|
| MODE                     | TX channel 810  | FREQUENCY RANGE | Above 1000 MHz |
| ENVIRONMENTAL CONDITIONS | 21deg. C, 71%RH | INPUT POWER     | 120Vac, 60 Hz  |
| TESTED BY                | Nick Hsu        |                 |                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |             |               |                       |                        |            |             |             |
|-----------------------------------------------------|-------------|---------------|-----------------------|------------------------|------------|-------------|-------------|
| No.                                                 | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 3819.60     | -40.38        | -35.77                | 7.05                   | -28.72     | -13.00      | -15.72      |
| 2                                                   | 5729.40     | -53.65        | -42.57                | 6.74                   | -35.83     | -13.00      | -22.83      |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M   |             |               |                       |                        |            |             |             |
| No.                                                 | Freq. (MHz) | Reading (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
| 1                                                   | 3819.60     | -38.51        | -34.37                | 7.05                   | -27.32     | -13.00      | -14.32      |
| 2                                                   | 5729.40     | -55.16        | -45.04                | 6.74                   | -38.30     | -13.00      | -25.30      |

**REMARKS:**

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



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## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

## 6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

The address and road map of all our labs can be found in our web site also.



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## **7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**