

FCC TEST REPORT

(Part 24)

REPORT NO.: RF110823C01-4

MODEL NO.: T-01D

FCC ID: VQK-T01D

RECEIVED: Aug. 23, 2011

TESTED: Sep. 01 ~ Sep. 07, 2011

ISSUED: Sep. 14, 2011

APPLICANT: FUJITSU LIMITED

ADDRESS: 1-1, Kamikodanaka 4-chome, Nakahara-ku,
Kawasaki 211-8588, Japan

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

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou
Hsiang, Taipei Hsien 244, Taiwan, R.O.C.

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 |
|------------------|-------------------|---------------|
| Original release | N/A | Sep. 14, 2011 |

1 CERTIFICATION

PRODUCT: Mobile Phone

MODEL: T-01D

BRAND: FOMA

APPLICANT: FUJITSU LIMITED

TESTED: Sep. 01 ~ Sep. 07, 2011

TEST SAMPLE: ENGINEERING SAMPLE

TEST STANDARDS: FCC Part 24, Subpart E

ANSI C63.4-2003

The above equipment (model: T-01D) 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 : Andrea Hsia , DATE: Sep. 14, 2011
Andrea Hsia / Specialist

APPROVED BY : Gary Chang , DATE: Sep. 14, 2011
Gary Chang / Technical Manager

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 AND LIMIT | RESULT | REMARK |
| 2.1046 24.232 | Maximum Peak Output Power Limit: max. 2 watts e.i.r.p peak power | PASS | Meet the requirement of limit. Max. e.i.r.p is 28.6dBm at 1880.0MHz. |
| 2.1055 24.235 | Frequency Stability AFC Freq. Error vs. Voltage AFC Freq. Error vs. Temperature Limit: max. +/-2.5ppm | PASS | Meet the requirement of limit. |
| 2.1049 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 24.238 | Conducted Spurious Emissions | PASS | Meet the requirement of limit. |
| 2.1053 24.238 | Radiated Spurious Emissions | PASS | Meet the requirement of limit. Minimum passing margin is -19.7dB at 9251.0MHz. |

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 |
|---------------------|-----------------|-------------|
| Conducted emissions | 9kHz~30MHz | 2.44 dB |
| Radiated emissions | 30MHz ~ 200MHz | 3.34 dB |
| | 200MHz ~1000MHz | 3.35 dB |
| | 1GHz ~ 18GHz | 2.26 dB |
| | 18GHz ~ 40GHz | 1.94 dB |

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

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | | |
|--------------------------|---|-------------|
| EUT | Mobile Phone | |
| MODEL NO. | T-01D | |
| FCC ID | VQK-T01D | |
| POWER SUPPLY | 3.7Vdc (Li-ion battery) 5.4Vdc (Adapter) | |
| MODULATION TYPE | GMSK | |
| FREQUENCY RANGE | 1850.2MHz ~ 1909.8MHz | |
| MAX. EIRP POWER | GSM | 0.7244Watts |
| | GPRS | 0.6918Watts |
| MULTI-SLOTS CLASS | 8 | |
| ANTENNA TYPE | λ/4 Monopole antenna with -1.5dBi gain | |
| DATA CABLE | NA | |
| I/O PORTS | Refer to user's manual | |
| ACCESSORY DEVICES | Battery | |

NOTE:

- The EUT use the following Li-ion battery:

| | |
|---------------|------------------------|
| BRAND | Fujitsu Limited |
| MODEL | F24 |
| RATING | 3.7Vdc, 1400mAh, 5.2Wh |

- The following accessories are for support units only.

| PRODUCT | BRAND | DESCRIPTION |
|-----------|-------|---|
| Adapter | SMK | I/P: 100-240Vac, 50-60Hz, 0.12A O/P: 5.4Vdc, 700mA |
| USB cable | NA | 0.8m non-shielded cable without core |

- SW: R13.1.
- HW: V2.1.0.
- IMEI Code: 355079040012606.
- The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

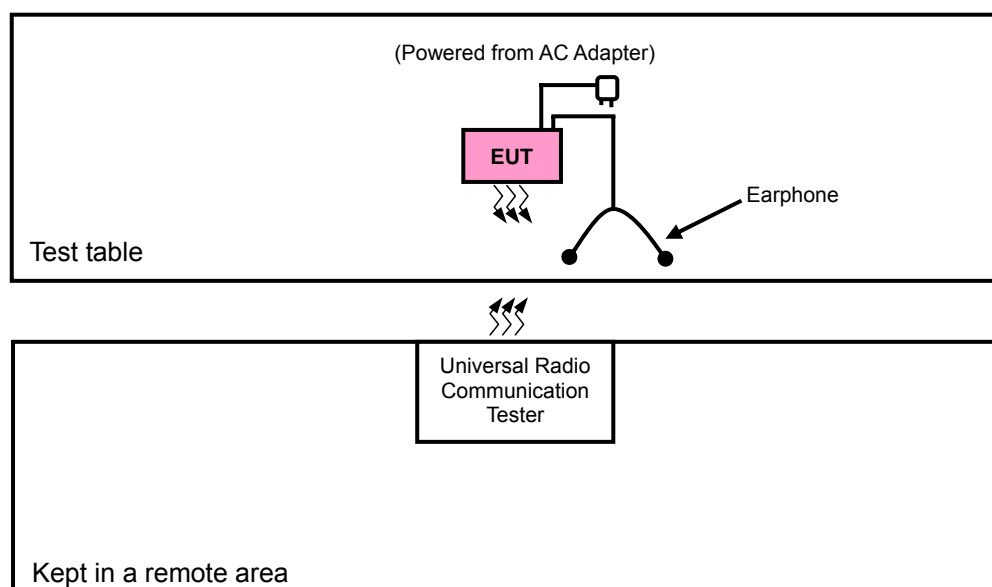
299 channels are provided to this EUT. Therefore, the low, middle and high channels are chosen for testing.

| | CHANNEL | FREQUENCY | TX MODE |
|--------|---------|------------|-----------|
| LOW | 512 | 1850.2 MHz | GSM, GPRS |
| MIDDLE | 661 | 1880.0 MHz | GSM, GPRS |
| HIGH | 810 | 1909.8 MHz | GSM, GPRS |

NOTE:

1. Below 1 GHz, the channel 512, 661, and 810 were pre-tested in chamber. The channel 810 was chosen for final test.
2. Above 1 GHz, the channel 512, 661, and 810 were tested individually.
3. The worst case for final test is chosen when the power control level set 0.
4. The channel space is 0.2MHz.
5. The EUT has GSM & GPRS functions. After pre-testing, GSM function is the worst case for all the emission tests.

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | APPLICABLE TO | | | | | | | DESCRIPTION |
|--------------------------|---------------|----|----|----|----|-------|-------|-------------|
| | OP | FS | OB | BE | CE | RE<1G | RE≥1G | |
| - | √ | √ | √ | √ | √ | √ | √ | - |

Where **OP**: Output power
OB: Occupied bandwidth
CE: Conducted spurious emissions
RE≥1G: Radiated emission above 1GHz
FS: Frequency stability
BE: Band edge
RE<1G: Radiated emission below 1GHz

OUTPUT POWER MEASUREMENT:

- ☒ 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 (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | AXIS |
|-------------------|----------------|-----------------------|------|
| 512 to 810 | 512, 661, 810 | GSM, GPRS | Y |

FREQUENCY STABILITY MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY |
|-------------------|----------------|-----------------------|
| 512 to 810 | 661 | GSM |

OCCUPIED BANDWIDTH MEASUREMENT:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY |
|-------------------|----------------|-----------------------|
| 512 to 810 | 512, 661, 810 | GSM, GPRS |

BAND EDGE MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY |
|-------------------|----------------|-----------------------|
| 512 to 810 | 512, 810 | GSM, GPRS |

CONDUCTED SPURIOUS EMISSIONS MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY |
|-------------------|----------------|-----------------------|
| 512 to 810 | 512, 661, 810 | GSM |

RADIATED EMISSION MEASUREMENT (BELOW 1 GHz):

- ☒ 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 (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | AXIS |
|-------------------|----------------|-----------------------|------|
| 512 to 810 | 661 | GSM | Y |

RADIATED EMISSION MEASUREMENT (ABOVE 1 GHz):

- ☒ 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 (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | AXIS |
|-------------------|----------------|-----------------------|------|
| 512 to 810 | 512, 661, 810 | GSM | Y |

TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---------------|--------------------------|--------------|-------------|
| OP | 25deg. C, 65%RH | 120Vac, 60Hz | David Huang |
| FS | 25deg. C, 65%RH | 120Vac, 60Hz | David Huang |
| OB | 25deg. C, 65%RH | 120Vac, 60Hz | David Huang |
| EM | 25deg. C, 65%RH | 120Vac, 60Hz | David Huang |
| BE | 25deg. C, 65%RH | 120Vac, 60Hz | David Huang |
| CE | 25deg. C, 65%RH | 120Vac, 60Hz | David Huang |
| RE < 1G | 25deg. C, 65%RH | 120Vac, 60Hz | David Huang |
| RE ≥ 1G | 25deg. C, 65%RH | 120Vac, 60Hz | David Huang |

3.3 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 C63.4-2003

ANSI/TIA/EIA-603-C 2004

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

3.4 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 | UNIVERSAL RADIO COMMUNICATION TESTER | R&S | CMU200 | 104484 | NA |

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

NOTE 1: All power cords of the above support units are non shielded (1.8m).

NOTE 2: Item 1 acted as a communication partners to transfer data.

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

The radiated peak output power shall be according to the specific rule Part 24.232(b) that “Mobile / Portable station are limited to 2 watts e.i.r.p” and 24.232(c) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|------------------------------|-------------|---------------------|-------------------------|
| Test Receiver ROHDE & SCHWARZ | ESIB7 | 100212 | Aug. 02, 2011 | Aug. 01, 2012 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSP 40 | 100041 | Jul. 21, 2011 | Jul. 20, 2012 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-160 | Apr. 13, 2011 | Apr. 12, 2012 |
| HORN Antenna SCHWARZBECK | 9120D | 209 | Aug. 25, 2011 | Aug. 24, 2012 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | BBHA9170243 | Dec. 27, 2010 | Dec. 26, 2011 |
| Preamplifier Agilent | 8447D | 2944A10633 | Nov. 02, 2010 | Nov. 01, 2011 |
| Preamplifier Agilent | 8449B | 3008A01964 | Nov. 02, 2010 | Nov. 01, 2011 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 295014/4 | Aug. 19, 2011 | Aug. 18, 2012 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 12738/6 | Aug. 19, 2011 | Aug. 18, 2012 |
| Software ADT. | ADT_Radiated_ V7.6.15.9.2 | NA | NA | NA |
| Antenna Tower inn-co GmbH | MA 4000 | 013303 | NA | NA |
| Antenna Tower Controller inn-co GmbH | CO2000 | 017303 | NA | NA |
| Turn Table ADT. | TT100. | TT93021703 | NA | NA |
| Turn Table Controller ADT. | SC100. | SC93021703 | 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.

4.1.3 TEST PROCEDURES

EIRP MEASUREMENT:

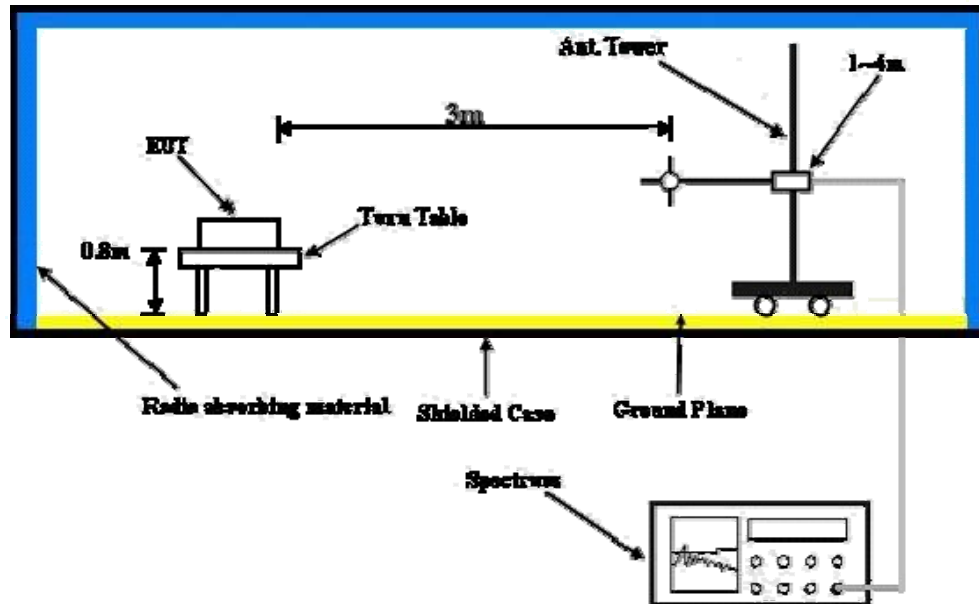
- a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (GSM & GPRS) RWB and VBW is 1MHz for GSM & GPRS.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated 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 c. 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:

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

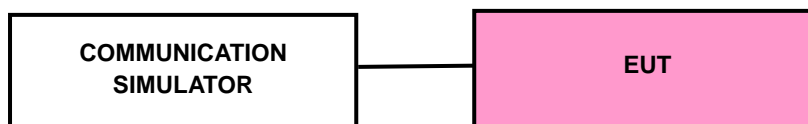
4.1.4 TEST SETUP

EIRP POWER 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).

4.1.5 EUT OPERATING CONDITIONS

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

4.1.6 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

| CH | FREQ. | GSM | GPRS 8 |
|-----|-----------|-------|--------|
| 512 | 1850.2MHz | 29.13 | 28.89 |
| 661 | 1880.0MHz | 28.97 | 28.66 |
| 810 | 1909.8MHz | 29.16 | 28.98 |

EIRP POWER

FOR GSM MODE

| EIRP POWER | | | | | |
|-------------|-----------------|-----------------|------------------------|--------------|--------|
| CHANNEL NO. | FREQUENCY (MHz) | S.G VALUE (dBm) | CORRECTION FACTOR (dB) | OUTPUT POWER | |
| | | | | dBm | Watt |
| 512 | 1850.2 | 20.1 | 8.4 | 28.5 | 0.7079 |
| 661 | 1880.0 | 20.0 | 8.6 | 28.6 | 0.7244 |
| 810 | 1909.8 | 19.7 | 8.5 | 28.2 | 0.6607 |

FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

| CHANNEL NO. | FREQUENCY (MHz) | S.G VALUE (dBm) | CORRECTION FACTOR (dB) | OUTPUT POWER | |
|-------------|-----------------|-----------------|------------------------|--------------|--------|
| | | | | dBm | Watt |
| 512 | 1850.2 | 19.8 | 8.4 | 28.2 | 0.6607 |
| 661 | 1880.0 | 19.8 | 8.6 | 28.4 | 0.6918 |
| 810 | 1909.8 | 19.4 | 8.5 | 27.9 | 0.6166 |

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

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

According to the FCC part 24.235 shall be tested the frequency stability. The rule is defined that "The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The frequency error rate is according to the JTC standard that the frequency error rate shall be accurate to within 2.5ppm of the received frequency from the base station. The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with the 2.1055(a)(1) -30°C $\sim 55^{\circ}\text{C}$.

4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED UNTIL | CALIBRATED UNTIL |
|---|-----------------|------------|------------------|------------------|
| Spectrum Analyzer Agilent | E4446A | MY43360128 | Feb. 22, 2011 | Feb. 21, 2012 |
| Hewlett Packard RF cable | 8120-6192 | 01428251 | NA | NA |
| RF cable | SUCOFLEX 104 | 257029 | Sep. 11, 2010 | Sep. 10, 2011 |
| WIT Standard Temperature & Humidity Chamber | MHU-225AU | 920842 | Jun. 15, 2011 | Jun. 14, 2012 |

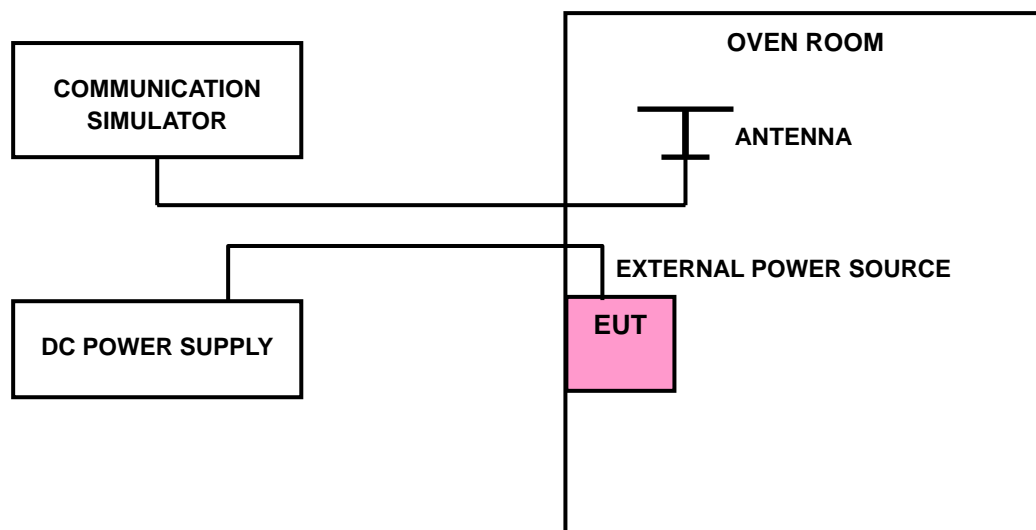
NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST PROCEDURE

- Because of the measure the carrier frequency under the condition of the AFC lock, it shall be used the mobile station in the GSM link mode. This is accomplished with the use of the R&S CMU200 simulator station. The oven room could control the temperatures and humidity. The GSM link channel is the 661
- Power must be removed when changing from one temperature to another or one voltage to another voltage. 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 various Volts from the minimum 3.33Volts to 4.07Volts. 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 ± 0.5 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 GSM simulator.

4.2.4 TEST SETUP



4.2.5 TEST RESULTS

| AFC FREQUENCY ERROR vs. VOLTAGE | | | |
|---------------------------------|----------------------|-----------------------|-------------|
| VOLTAGE (Volts) | FREQUENCY ERROR (Hz) | FREQUENCY ERROR (ppm) | LIMIT (ppm) |
| 4.07 | -48 | -0.026 | 2.5 |
| 3.33 | -53 | -0.028 | 2.5 |

NOTE: The applicant defined the normal working voltage of the battery is from 3.33Vdc to 4.07Vdc.

| AFC FREQUENCY ERROR vs. TEMP. | | | |
|-------------------------------|----------------------|-----------------------|-------------|
| TEMP. () | FREQUENCY ERROR (Hz) | FREQUENCY ERROR (ppm) | LIMIT (ppm) |
| 55 | -59 | -0.031 | 2.5 |
| 50 | -54 | -0.029 | 2.5 |
| 40 | -51 | -0.027 | 2.5 |
| 30 | -48 | -0.026 | 2.5 |
| 20 | -53 | -0.028 | 2.5 |
| 10 | -55 | -0.029 | 2.5 |
| 0 | -56 | -0.030 | 2.5 |
| -10 | -58 | -0.031 | 2.5 |
| -20 | -52 | -0.028 | 2.5 |
| -30 | -48 | -0.026 | 2.5 |

4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

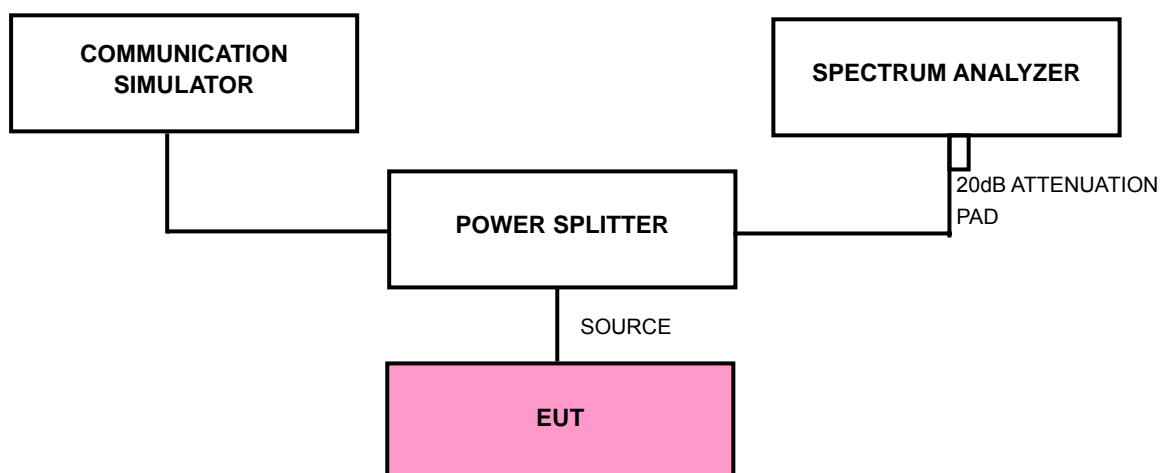
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the totalmean power of a given emission.

4.3.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|------------------------------|--------------|------------|---------------------|-------------------------|
| SPECTRUM ANALYZER R&S | FSP40 | 100039 | Jan. 11, 2011 | Jan. 10, 2012 |
| Mini-Circuits Power Splitter | ZN2PD-9G | NA | Mar. 24, 2011 | Mar. 23, 2012 |
| RF cable | SUCOFLEX 104 | 274403/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| RF cable | SUCOFLEX 104 | 250729/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| RF cable | SUCOFLEX 104 | 214377/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| JFW 20dB attenuation | 50HF-020-SMA | NA | NA | NA |

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

4.3.3 TEST SETUP



4.3.4 TEST PROCEDURES

- a. The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (GSM/GPRS) (low, middle and high operational frequency range.)
- b. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. 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.

4.3.5 EUT OPERATING CONDITION

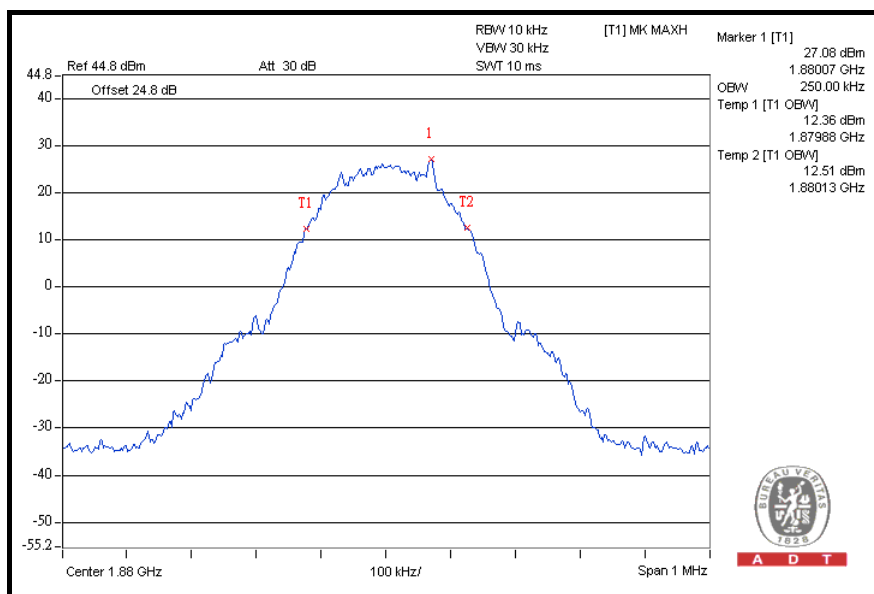
- a. The EUT makes a call to the communication simulator.
- b. The communication simulator station system controlled a EUT to export maximum and minimum output power under transmission mode and specific channel frequency.

4.3.6 TEST RESULTS

FOR GSM MODE

| CHANNEL | FREQUENCY (MHz) | 99% OCCUPIED BANDWIDTH (kHz) |
|---------|-----------------|------------------------------|
| 512 | 1850.2 | 250 |
| 661 | 1880.0 | 250 |
| 810 | 1909.8 | 248 |

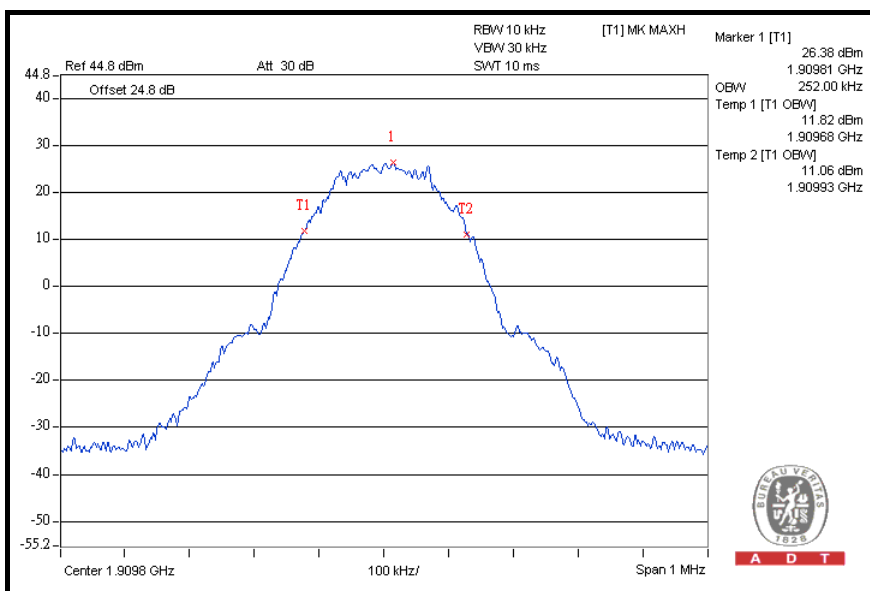
CH 661



FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

| CHANNEL | FREQUENCY (MHz) | 99% OCCUPIED BANDWIDTH (kHz) |
|---------|-----------------|------------------------------|
| 512 | 1850.2 | 250 |
| 661 | 1880.0 | 250 |
| 810 | 1909.8 | 252 |

CH 810



4.4 BAND EDGE MEASUREMENT

4.4.1 LIMITS OF BAND EDGE MEASUREMENT

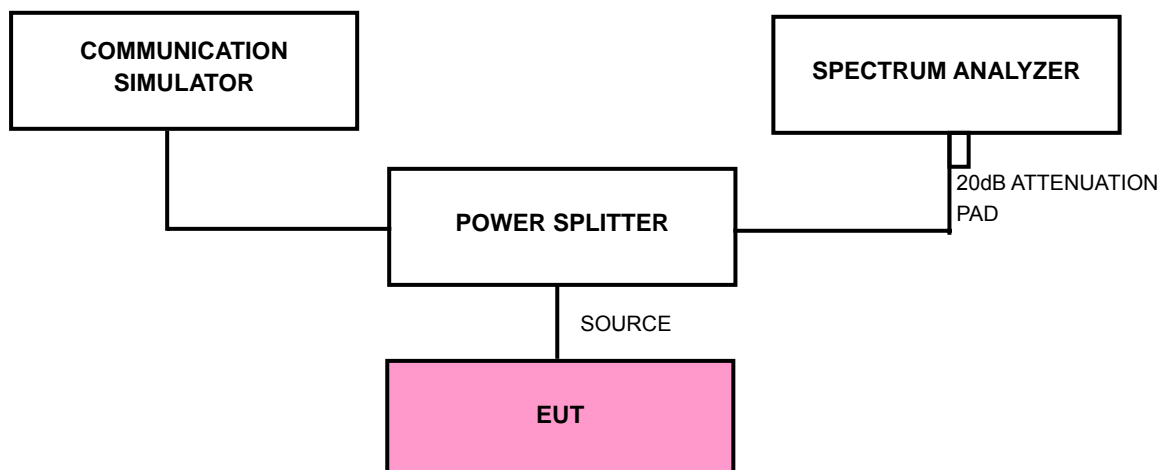
According to FCC 24.238(a) specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.4.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|------------------------------|--------------|------------|---------------------|-------------------------|
| SPECTRUM ANALYZER R&S | FSP40 | 100039 | Jan. 11, 2011 | Jan. 10, 2012 |
| Mini-Circuits Power Splitter | ZN2PD-9G | NA | May 25, 2011 | May 24, 2012 |
| RF cable | SUCOFLEX 104 | 274403/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| RF cable | SUCOFLEX 104 | 250729/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| RF cable | SUCOFLEX 104 | 214377/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| JFW 20dB attenuation | 50HF-020-SMA | NA | NA | NA |

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

4.4.3 TEST SETUP



4.4.4 TEST PROCEDURES

- a. The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 512 and 810 (GSM & GPRS) (low and high operational frequency range.)
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. 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 & GPRS).
- d. Record the max trace plot into the test report.

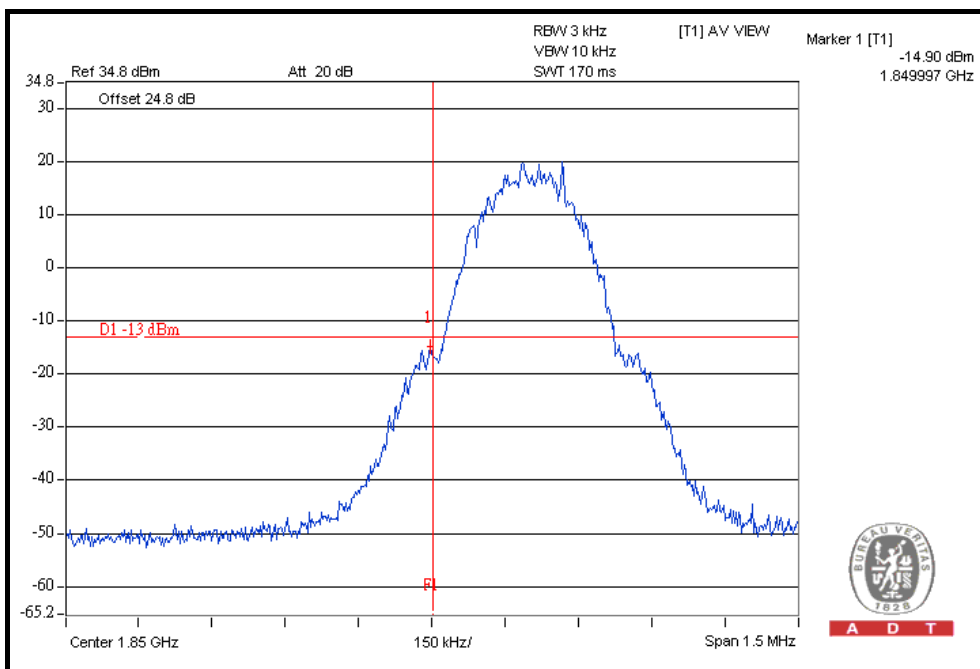
4.4.5 EUT OPERATING CONDITION

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

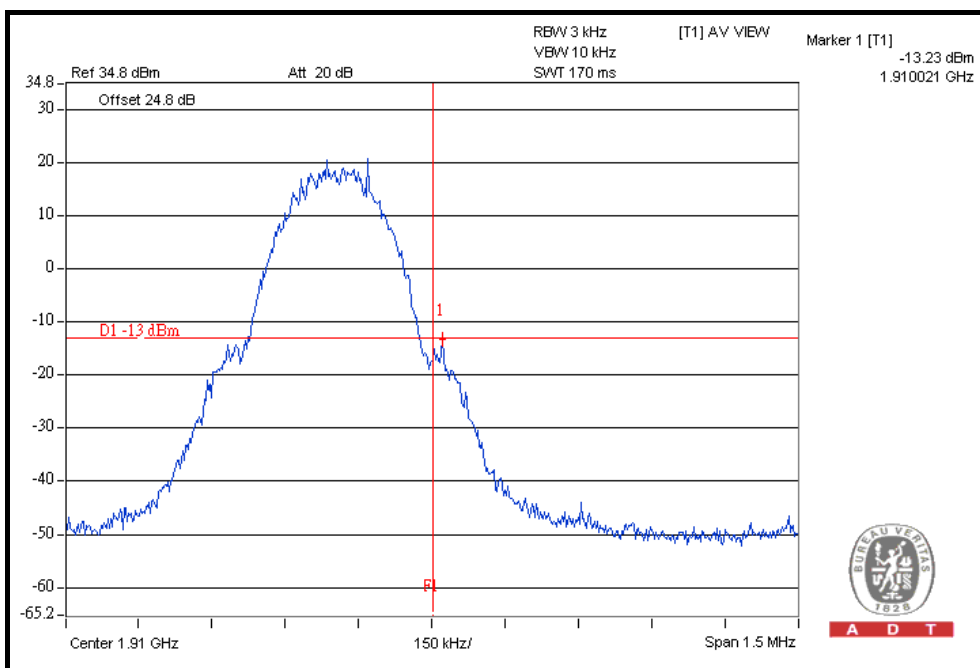
4.4.6 TEST RESULTS

FOR GSM MODE

LOWER BAND EDGE

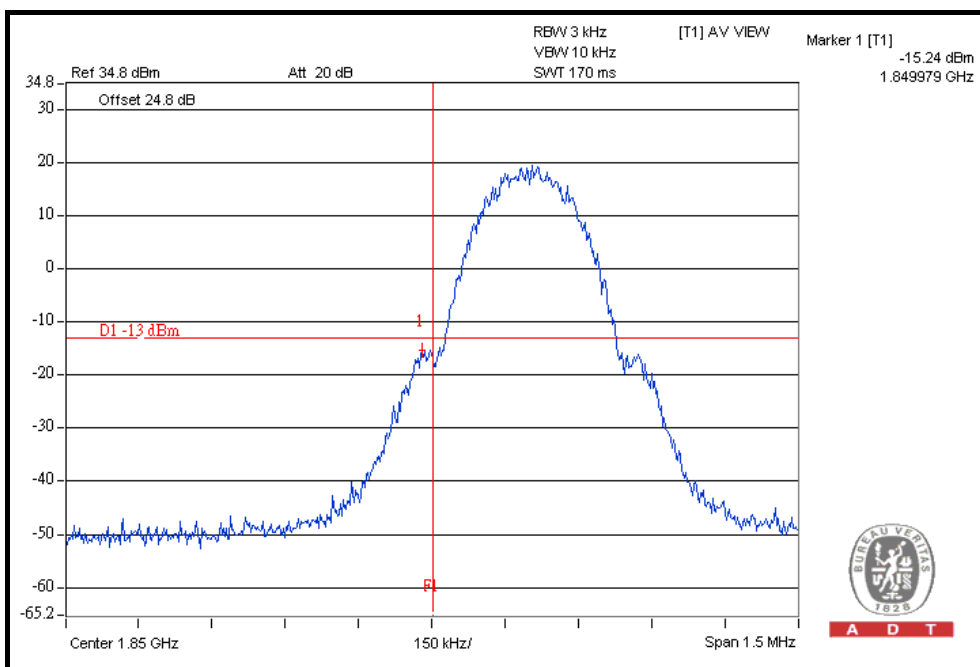


HIGHER BAND EDGE

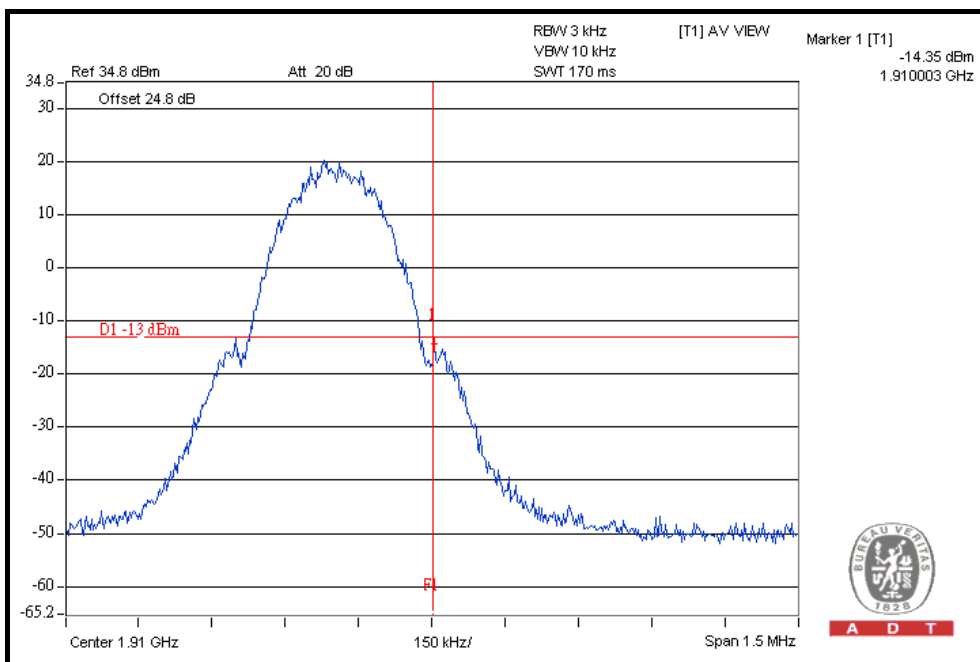


FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

LOWER BAND EDGE


A D T

HIGHER BAND EDGE


A D T

4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. The specified minimum attenuation becomes 43dB and the limit of emission equal to -13dBm .

4.5.2 TEST INSTRUMENTS

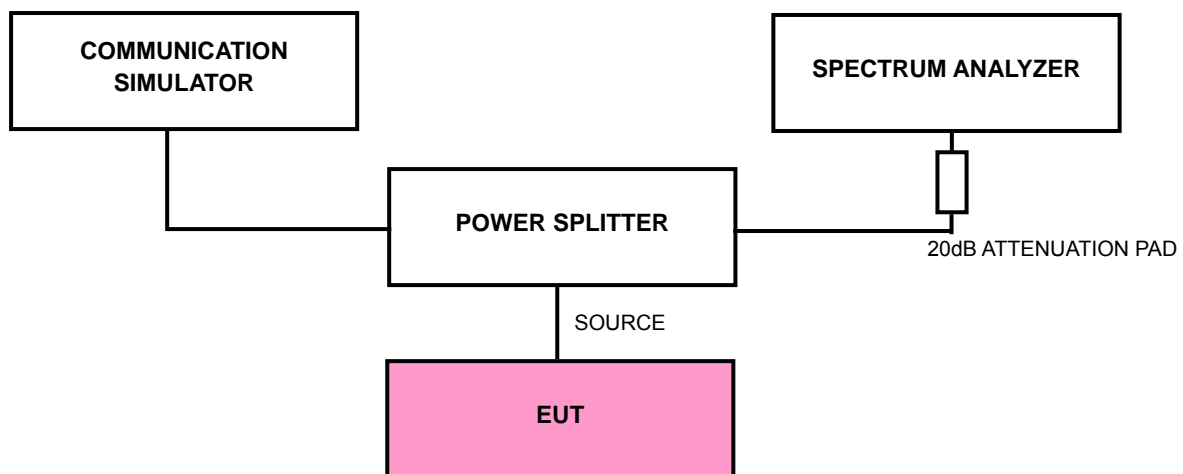
| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|------------------------------|--------------|------------|---------------------|-------------------------|
| SPECTRUM ANALYZER R&S | FSP40 | 100039 | Jan. 11, 2011 | Jan. 10, 2012 |
| Mini-Circuits Power Splitter | ZN2PD-9G | NA | May 25, 2011 | May 24, 2012 |
| RF cable | SUCOFLEX 104 | 274403/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| RF cable | SUCOFLEX 104 | 250729/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| RF cable | SUCOFLEX 104 | 214377/4 | Jan. 27, 2011 | Jan. 26, 2012 |
| JFW 20dB attenuation | 50HF-020-SMA | NA | NA | NA |

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

4.5.3 TEST PROCEDURE

- The EUT makes a phone call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (GSM) (low, middle and high operational frequency range.)
- The conducted spurious emission used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- 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.

4.5.4 TEST SETUP



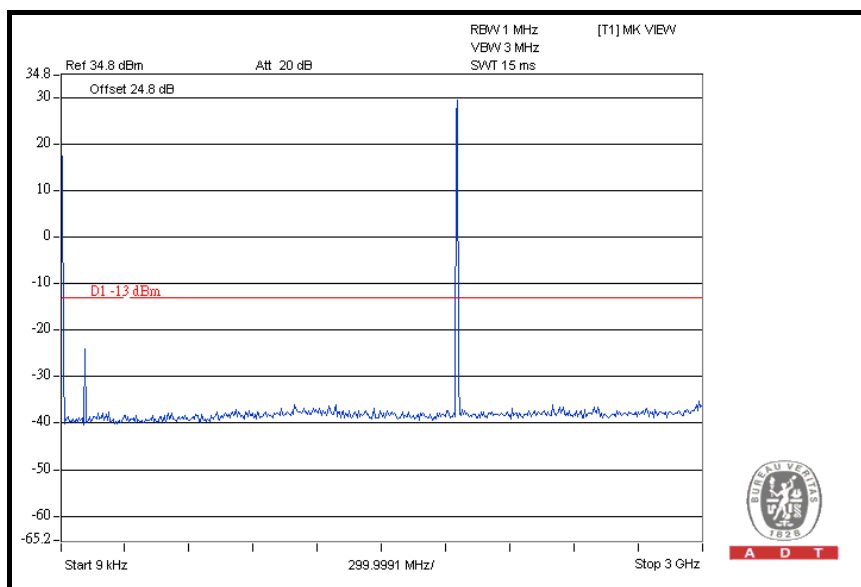
4.5.5 EUT OPERATING CONDITIONS

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

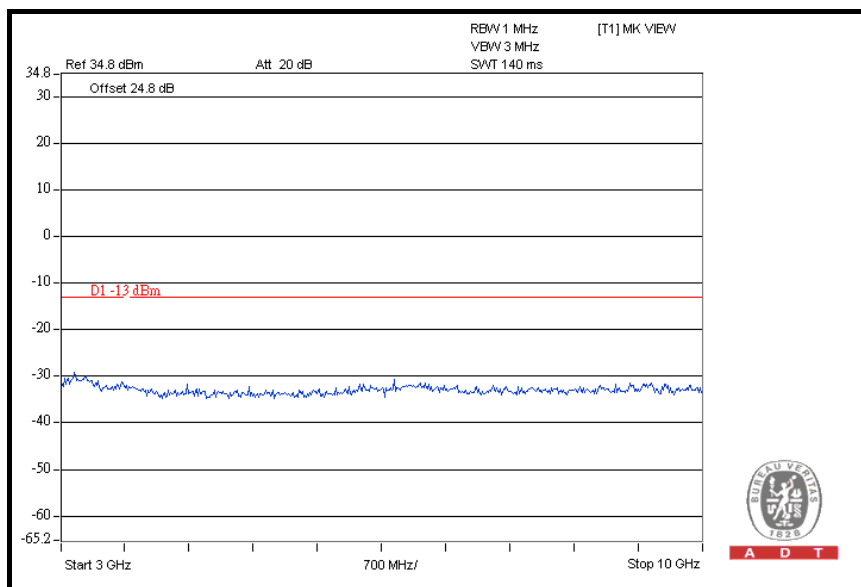
4.5.6 TEST RESULTS

FOR GSM:

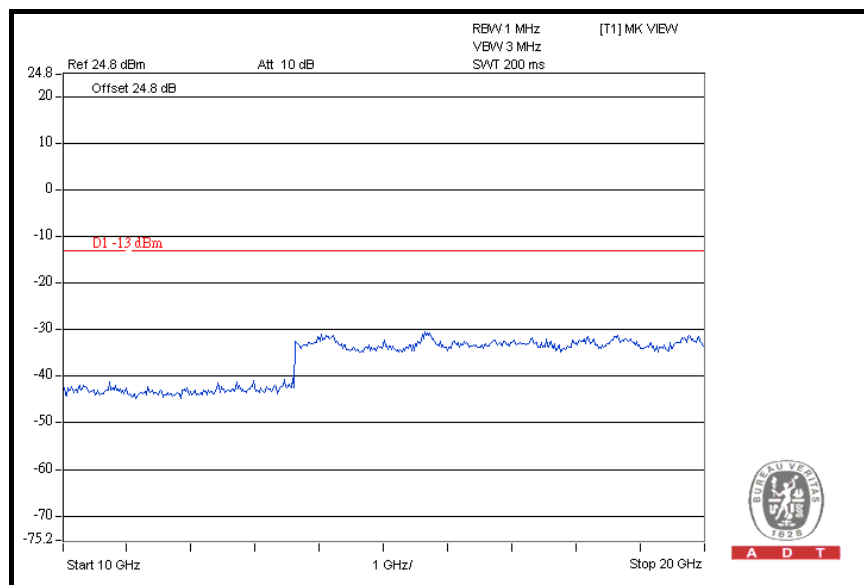
CH 512: 9kHz ~ 3GHz



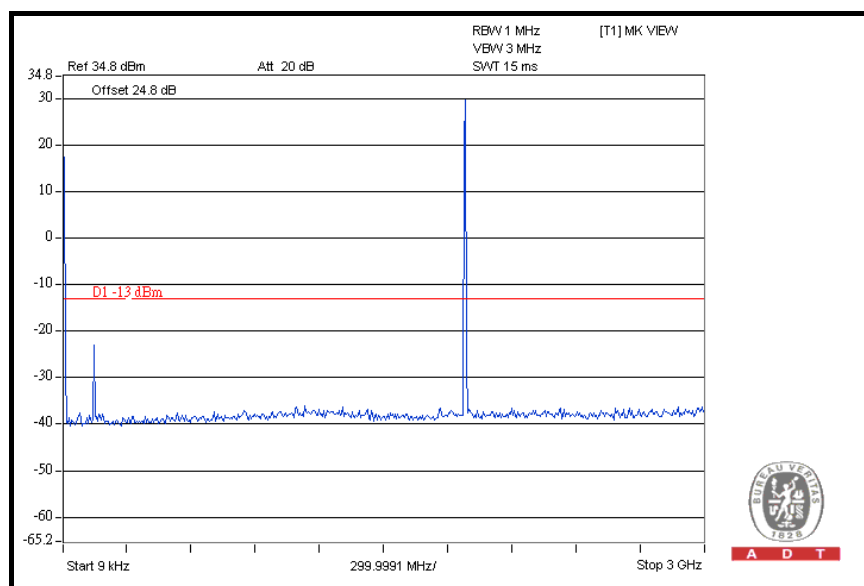
3GHz ~ 10GHz



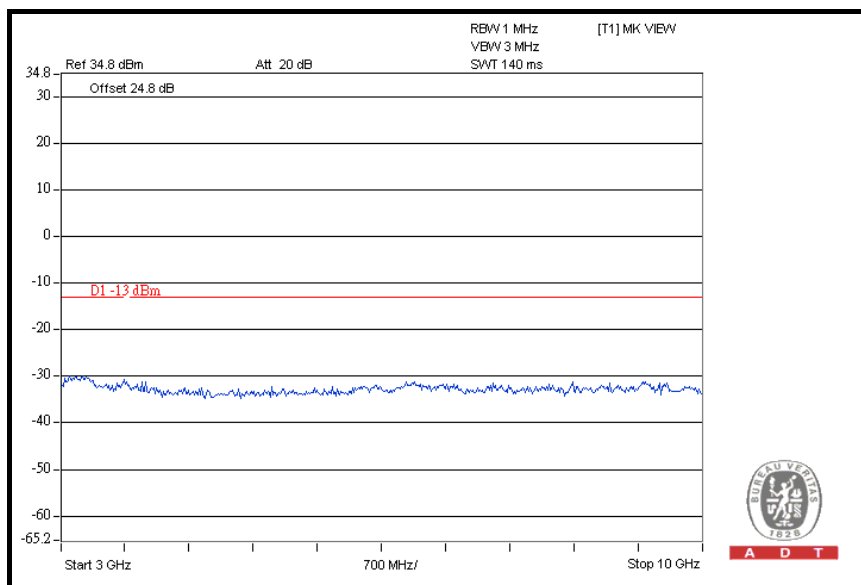
10GHz ~ 20GHz



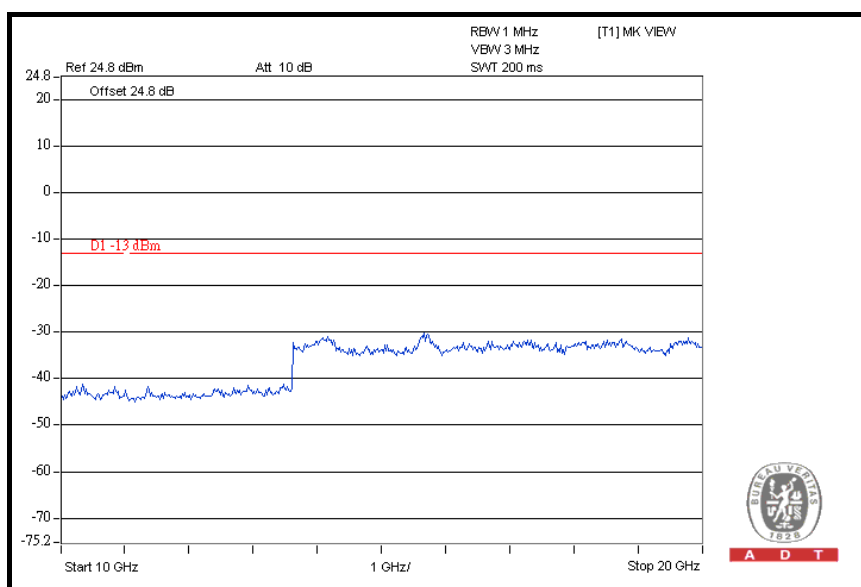
CH 661: 9kHz ~ 3GHz



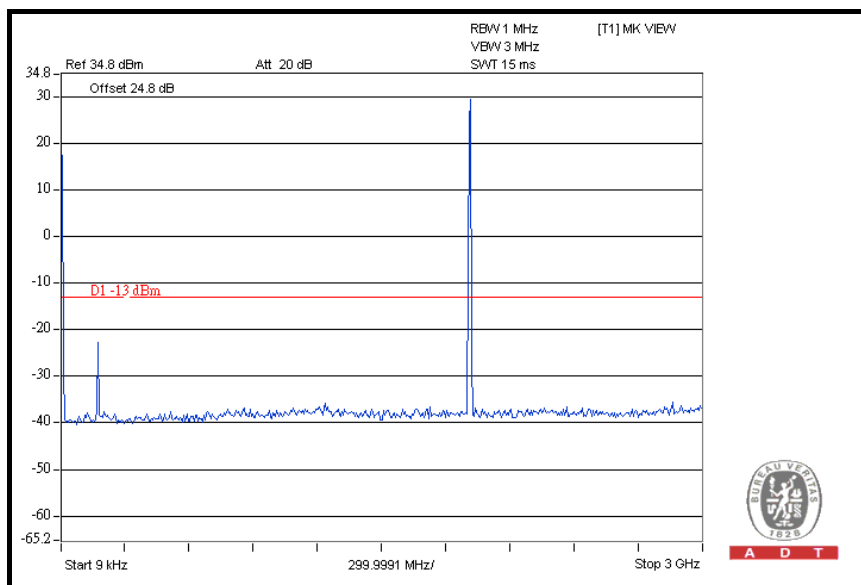
3GHz ~ 10GHz



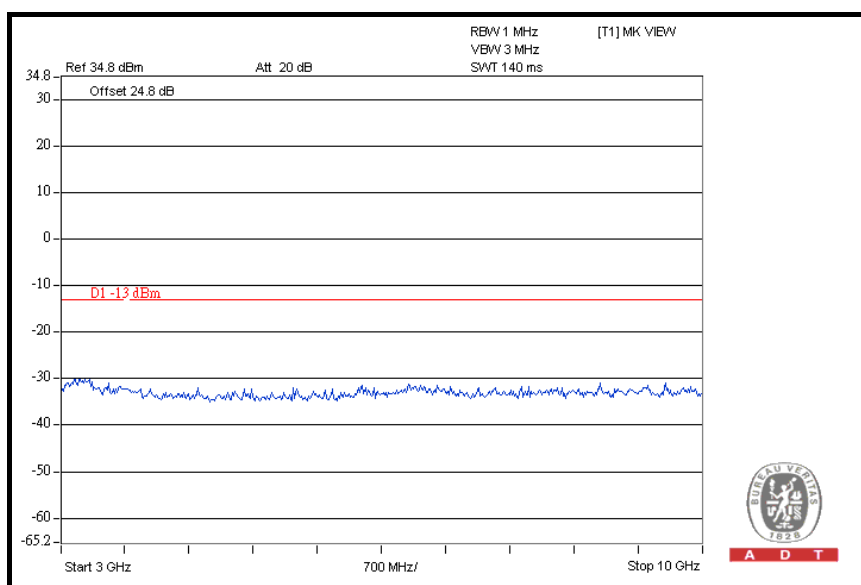
10GHz ~ 20GHz



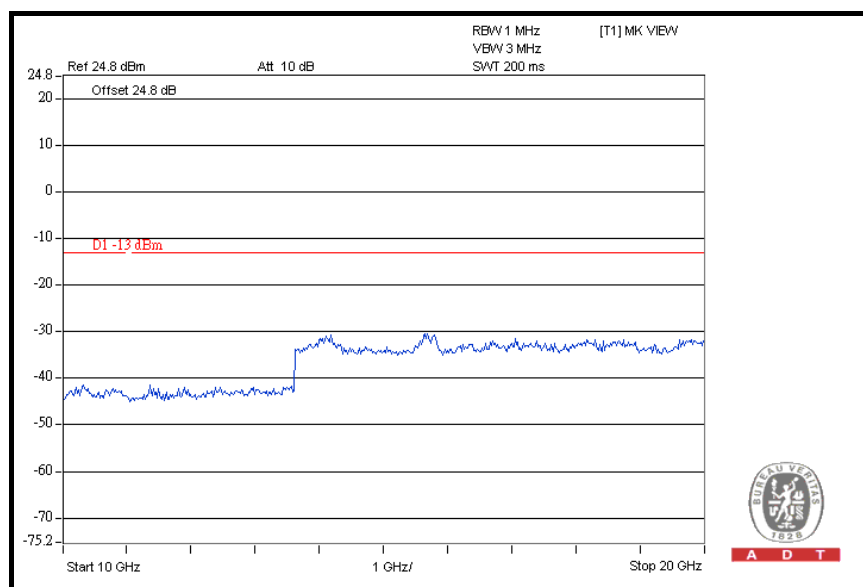
CH 810: 9kHz ~ 3GHz



3GHz ~ 10GHz



10GHz ~ 20GHz



4.6 RADIATED EMISSION MEASUREMENT

4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. The emission of limit equal to -13dBm .

4.6.2 TEST INSTRUMENTS

Same as 4.1.2.

4.6.3 TEST PROCEDURES

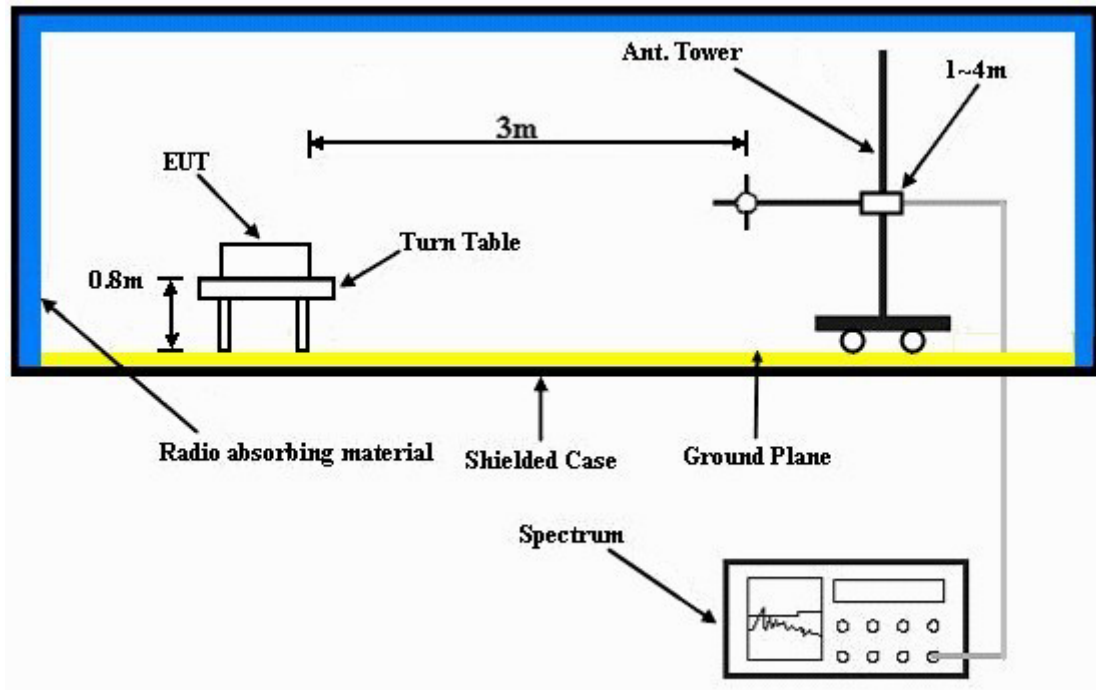
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 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. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



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

4.6.6 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.

4.6.7 TEST RESULTS

Below 1GHz

| | | | | | | |
|---|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| MODE | | TX channel 661 | | | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
| No. | Freq. (MHz) | Emission Level (dBuV) | Limit (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Power Value (dBm) |
| 1 | 70.82 | 26.3 | -13.0 | -60.6 | -7.7 | -68.3 |
| 2 | 164.13 | 31.2 | -13.0 | -56.0 | -7.7 | -63.7 |
| 3 | 251.60 | 23.6 | -13.0 | -63.1 | -7.7 | -70.8 |
| 4 | 385.73 | 25.6 | -13.0 | -61.2 | -7.8 | -69.0 |
| 5 | 545.13 | 29.5 | -13.0 | -57.3 | -7.8 | -65.1 |
| 6 | 677.31 | 32.0 | -13.0 | -54.5 | -7.8 | -62.3 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
| No. | Freq. (MHz) | Emission Level (dBuV) | Limit (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Power Value (dBm) |
| 1 | 45.55 | 31.9 | -13.0 | -54.4 | -7.7 | -62.1 |
| 2 | 70.82 | 31.8 | -13.0 | -55.3 | -7.7 | -63.0 |
| 3 | 134.97 | 28.3 | -13.0 | -58.2 | -7.7 | -65.9 |
| 4 | 164.13 | 25.7 | -13.0 | -61.4 | -7.7 | -69.1 |
| 5 | 306.03 | 24.8 | -13.0 | -62.0 | -7.8 | -69.8 |
| 6 | 385.73 | 27.8 | -13.0 | -59.0 | -7.8 | -66.8 |

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

Above 1GHz

| | | | | | | |
|---|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| MODE | | TX channel 512 | | | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
| No. | Freq. (MHz) | Emission Level (dBuV) | Limit (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Power Value (dBm) |
| 1 | 3700.4 | 55.6 | -13.0 | -50.1 | 9.9 | -40.2 |
| 2 | 5550.6 | 57.6 | -13.0 | -48.0 | 9.7 | -38.3 |
| 3 | 7400.8 | 60.1 | -13.0 | -43.5 | 7.9 | -35.6 |
| 4 | 9251.0 | 63.4 | -13.0 | -40.6 | 7.9 | -32.7 |
| 5 | 12951.4 | 62.4 | -13.0 | -41.8 | 7.9 | -33.9 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
| No. | Freq. (MHz) | Emission Level (dBuV) | Limit (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Power Value (dBm) |
| 1 | 3700.4 | 52.5 | -13.0 | -53.2 | 9.9 | -43.3 |
| 2 | 5550.6 | 55.9 | -13.0 | -49.7 | 9.7 | -40.0 |
| 3 | 7400.8 | 56.7 | -13.0 | -46.9 | 7.9 | -39.0 |
| 4 | 9251.0 | 57.0 | -13.0 | -47.0 | 7.9 | -39.1 |
| 5 | 12951.4 | 60.2 | -13.0 | -44.0 | 7.9 | -36.1 |
| MODE | | TX channel 661 | | | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
| No. | Freq. (MHz) | Emission Level (dBuV) | Limit (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Power Value (dBm) |
| 1 | 3760 | 51.3 | -13.0 | -54.5 | 9.9 | -44.6 |
| 2 | 5640 | 55.2 | -13.0 | -50.4 | 9.6 | -40.8 |
| 3 | 7520 | 56.0 | -13.0 | -48.0 | 7.9 | -40.1 |
| 4 | 9400 | 58.6 | -13.0 | -45.5 | 7.9 | -37.6 |
| 5 | 11280 | 61.4 | -13.0 | -42.9 | 7.9 | -35.0 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
| No. | Freq. (MHz) | Emission Level (dBuV) | Limit (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Power Value (dBm) |
| 1 | 3760 | 54.5 | -13.0 | -51.3 | 9.9 | -41.4 |
| 2 | 5640 | 56.9 | -13.0 | -48.7 | 9.6 | -39.1 |
| 3 | 7520 | 58.8 | -13.0 | -45.2 | 7.9 | -37.3 |
| 4 | 9400 | 62.6 | -13.0 | -41.5 | 7.9 | -33.6 |
| 5 | 11280 | 63.2 | -13.0 | -41.1 | 7.9 | -33.2 |

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

| | | | | | | |
|---|-------------|-----------------------|-------------|-----------------------|------------------------|-------------------|
| MODE | | TX channel 810 | | | | |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | |
| No. | Freq. (MHz) | Emission Level (dBuV) | Limit (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Power Value (dBm) |
| 1 | 3819.6 | 52.4 | -13.0 | -53.4 | 9.9 | -43.5 |
| 2 | 5729.4 | 51.4 | -13.0 | -54.2 | 9.6 | -44.6 |
| 3 | 7639.2 | 54.2 | -13.0 | -49.5 | 7.9 | -41.6 |
| 4 | 9549.0 | 56.3 | -13.0 | -47.7 | 7.9 | -39.8 |
| 5 | 11458.8 | 60.1 | -13.0 | -44.1 | 7.9 | -36.2 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | |
| No. | Freq. (MHz) | Emission Level (dBuV) | Limit (dBm) | S.G Power Value (dBm) | Correction Factor (dB) | Power Value (dBm) |
| 1 | 3819.6 | 54.2 | -13.0 | -51.6 | 9.9 | -41.7 |
| 2 | 5729.4 | 55.2 | -13.0 | -50.4 | 9.6 | -40.8 |
| 3 | 7639.2 | 57.1 | -13.0 | -46.6 | 7.9 | -38.7 |
| 4 | 9549.0 | 61.2 | -13.0 | -42.8 | 7.9 | -34.9 |
| 5 | 11458.8 | 61.4 | -13.0 | -42.8 | 7.9 | -34.9 |

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

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.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.
If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Email: service.adt@tw.bureauveritas.com

Web Site: www.adt.com.tw

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

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---