

FCC TEST REPORT

(PART 24)

REPORT NO.: RF120502C13-1

MODEL NO.: F-12D

FCC ID: VQK-F12D

RECEIVED: May 02, 2012

TESTED: May 16, 2012

ISSUED: May 31, 2012

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 |
|---------------|-------------------|--------------|
| RF120502C13-1 | Original release | May 31, 2012 |



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1 CERTIFICATION

PRODUCT: Mobile Phone

MODEL: F-12D

BRAND: FOMA

APPLICANT: FUJITSU LIMITED

TESTED: May 16, 2012

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: FCC Part 24, Subpart E

The above equipment (model: F-12D) 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 :  , **DATE :** May 31, 2012
Pettie Chen / Specialist

APPROVED BY :  , **DATE :** May 31, 2012
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 | RESULT | REMARK |
| 2.1046 24.232 | Equivalent isotropically radiated power | PASS | Meet the requirement of limit. |
| 2.1055 24.235 | Frequency Stability | 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 -22.77dB at 30.00MHz. |

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 | 150kHz~30MHz | 2.44 dB |
| Radiated emissions | 30MHz ~ 200MHz | 2.93 dB |
| | 200MHz ~1000MHz | 2.95 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.



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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 Agilent | N9038A | MY51210203 | Dec. 22, 2011 | Dec. 21, 2012 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSU43 | 101261 | Dec. 21, 2011 | Dec. 20, 2012 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-472 | Dec. 20, 2011 | Dec. 19, 2012 |
| HORN Antenna SCHWARZBECK | BBHA 9120 D | 9120D-969 | Dec. 20, 2011 | Dec. 19, 2012 |
| ORN Antenna SCHWARZBECK | BBHA 9170 | 9170-480 | Dec. 20, 2011 | Dec. 19, 2012 |
| Preamplifier EMCI | EMC 012645 | 980115 | Dec. 30, 2011 | Dec. 29, 2012 |
| Preamplifier EMCI | EMC 330H | 980112 | Dec. 30, 2011 | Dec. 29, 2012 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 309219/4 | Oct. 21, 2011 | Oct. 20, 2012 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 250130/4 | Jan. 02, 2012 | Jan. 01, 2013 |
| RF signal cable Worken | RG-213 | NA | Jan. 02, 2012 | Jan. 01, 2013 |
| Software | E3 6.120103 | NA | NA | NA |
| Antenna Tower MF | MFA-440H | NA | NA | NA |
| Turn Table MF | MFT-201SS | NA | NA | NA |
| Antenna Tower & Turn Table Controller MF | MF-7802 | NA | NA | NA |
| Mini-Circuits Power Splitter | ZN2PD-9G | NA | May 25, 2011 | May 24, 2012 |
| JFW 20dB attenuation | 50HF-020-SMA | NA | NA | NA |
| Universal Radio Communication Tester R&S | CMU200 | 123121 | Oct. 13, 2011 | Oct. 12, 2012 |

- 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 9.
 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 460141.
 5. The IC Site Registration No. is IC 7450F-4.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|--------------------------|-------------------------------------------------|
| EUT | Mobile Phone |
| MODEL NO. | F-12D |
| POWER SUPPLY | 3.7Vdc (Li-ion battery) 5.4Vdc (Adapter) |
| MODULATION TYPE | GSM, GPRS: GMSK |
| FREQUENCY RANGE | GSM, GPRS: 1850.2MHz ~ 1909.8MHz |
| MAX. EIRP POWER | GSM: 0.36Watts |
| MULTI-SLOTS CLASS | 12 |
| ANTENNA TYPE | $\lambda/4$ Monopole antenna with -2.75dBi gain |
| DATA CABLE | NA |
| I/O PORTS | Refer to user's manual |
| ACCESSORY DEVICES | Battery |

NOTE:

1. The EUT consumes power from the following internal Li-ion battery and wireless charger.

| | |
|----------------|------------------------|
| BATTERY | |
| BRAND | Fujitsu Limited |
| MODEL | F25 |
| RATING | 3.7Vdc, 1800mAh, 6.7Wh |

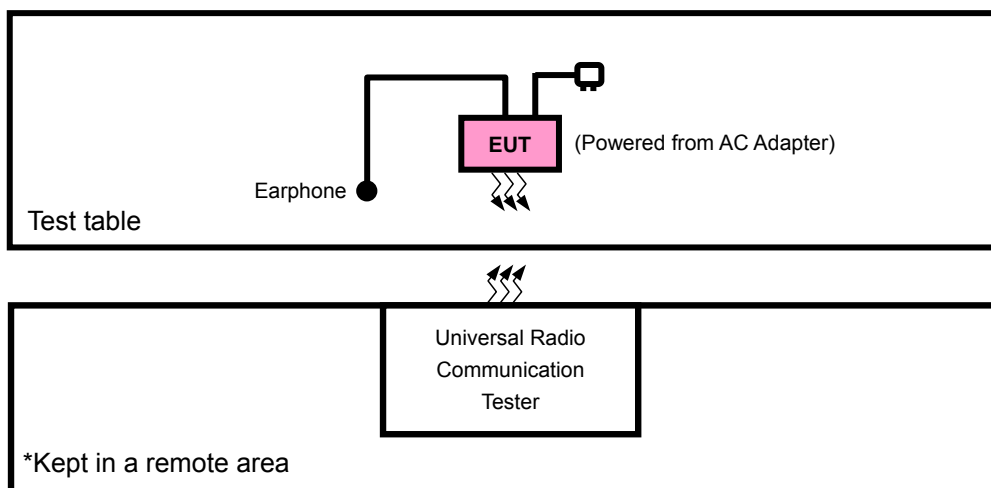
2. The following accessory is for support units only.

| PRODUCT | BRAND | MODEL | DESCRIPTION |
|---------|-------|-------|-------------------------------------------------------|
| Adapter | SMK | NA | I/P: 100-240Vac, 50-60Hz, 0.12A O/P: 5.4Vdc, 700mA |

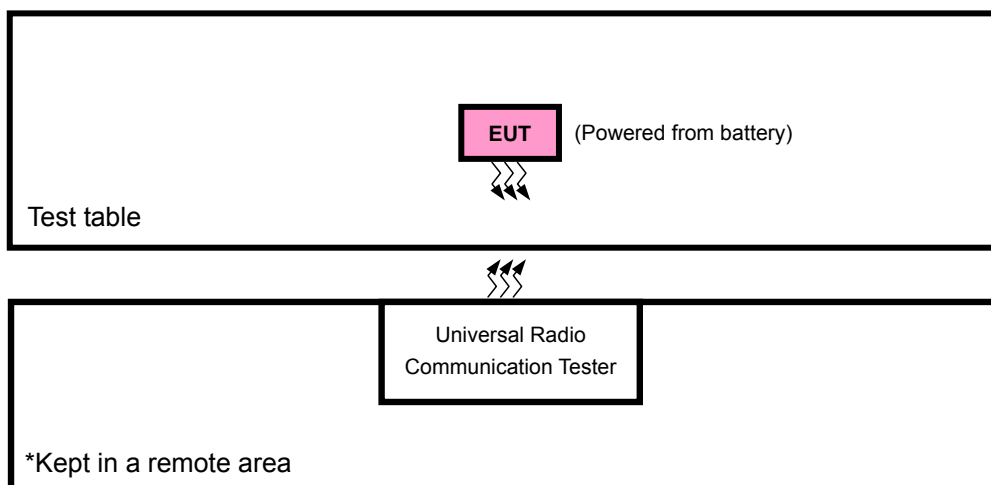
3. SW version is R09.4e.
4. HW version is V1.3.0.
5. IMEI Code: 352179050009170.
6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST



FOR E.I.R.P. 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 | EARPHONE | HTC | NA | NA | NA |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|-----------------------------------------------------|
| 1 | 1.2m audio cable. |

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

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 X-plane for EIRP, Z-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

GSM MODE

| TEST ITEM | AVAILABLE CHANNEL | TESTED CHANNEL | MODE |
|---------------------|-------------------|----------------|------|
| EIRP | 512 to 810 | 512, 661, 810 | GSM |
| FREQUENCY STABILITY | 512 to 810 | 661 | GSM |
| OCCUPIED BANDWIDTH | 512 to 810 | 512, 661, 810 | GSM |
| BAND EDGE | 512 to 810 | 512, 810 | GSM |
| CONDCUDED EMISSION | 512 to 810 | 661 | GSM |
| RADIATED EMISSION | 512 to 810 | 661 | GSM |
| RADIATED EMISSION | 512 to 810 | 661 | GSM |

TEST CONDITION:

| TEST ITEM | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---------------------|--------------------------|--------------|--------------|
| EIRP | 25deg. C, 65%RH | 3.7Vdc | Phoenix Chen |
| FREQUENCY STABILITY | 25deg. C, 65%RH | 3.7Vdc | Phoenix Chen |
| OCCUPIED BANDWIDTH | 25deg. C, 65%RH | 3.7Vdc | Phoenix Chen |
| BAND EDGE | 25deg. C, 65%RH | 3.7Vdc | Phoenix Chen |
| CONDCUDED EMISSION | 25deg. C, 65%RH | 3.7Vdc | Phoenix Chen |
| RADIATED EMISSION | 25deg. C, 65%RH | 120Vac, 60Hz | Kay Wu |

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:

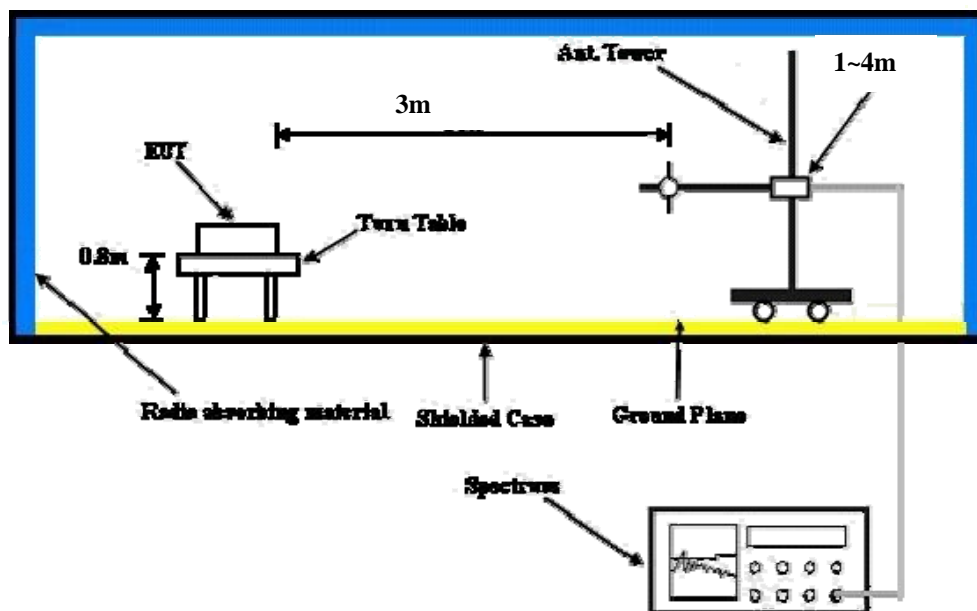
- a. All measurements were done at low, middle and high operational frequency range. RWB and VBW is 1MHz for GSM and 5MHz for WCDMA mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees 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 & WCDMA 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.

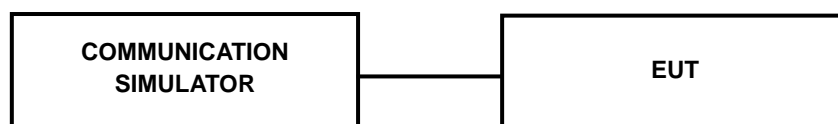
4.1.3 TEST SETUP

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 | 30.03 | 30.01 | 29.96 |
| GPRS 8 | 29.99 | 30.01 | 30.00 |
| GPRS 10 | 29.06 | 29.14 | 28.98 |
| GPRS 11 | 27.31 | 27.30 | 27.58 |
| GPRS 12 | 26.34 | 26.18 | 26.33 |
| DTM 9 (GPRS) | 28.97 | 29.03 | 29.01 |
| DTM 11 (GPRS) | 27.18 | 27.19 | 27.51 |

EIRP POWER (dBm)

GSM 1900

| Plane | Channel | Frequency (MHz) | LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(W) | Polarization (H/V) |
|-------|---------|-----------------|-----------|-----------------------|-----------|---------|--------------------|
| Y | 512 | 1850.2 | -12.60 | 38.19 | 25.59 | 0.36 | H |
| | 661 | 1880.0 | -13.09 | 38.70 | 25.61 | 0.36 | H |
| | 810 | 1909.8 | -13.79 | 39.35 | 25.56 | 0.36 | H |
| | 512 | 1850.2 | -23.80 | 38.48 | 14.68 | 0.03 | V |
| | 661 | 1880.0 | -24.03 | 38.59 | 14.56 | 0.03 | V |
| | 810 | 1909.8 | -24.11 | 38.87 | 14.76 | 0.03 | V |

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

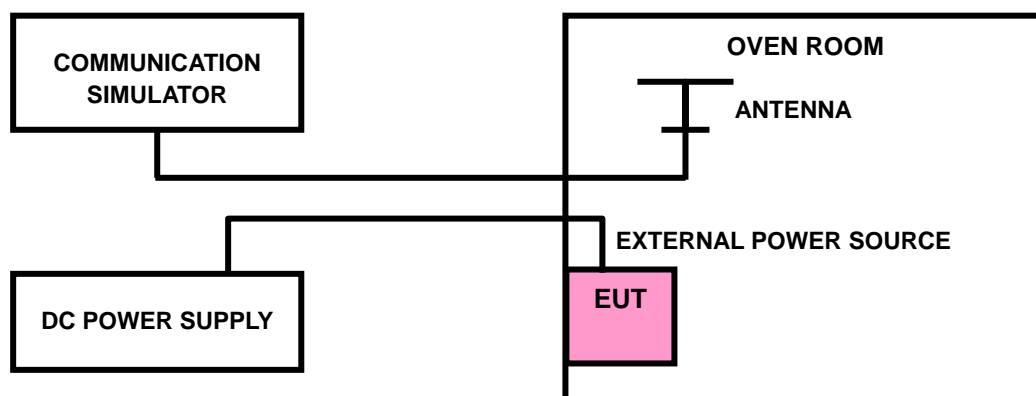
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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 | |
| 3.33 | -0.01 | 2.5 |
| 3.7 | -0.01 | 2.5 |
| 4.07 | -0.01 | 2.5 |

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

FREQUENCY ERROR vs. TEMPERATURE.

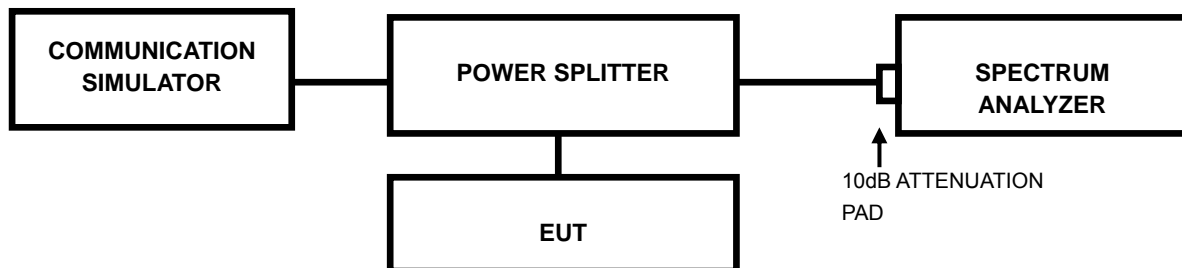
| TEMP. (°C) | FREQUENCY ERROR (ppm) | LIMIT (ppm) |
|------------|-----------------------|-------------|
| | GSM | |
| -10 | -0.01 | 2.5 |
| 0 | -0.01 | 2.5 |
| 10 | -0.01 | 2.5 |
| 20 | -0.01 | 2.5 |
| 30 | -0.01 | 2.5 |
| 40 | -0.01 | 2.5 |
| 50 | -0.01 | 2.5 |
| 55 | -0.01 | 2.5 |

4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 TEST PROCEDURES

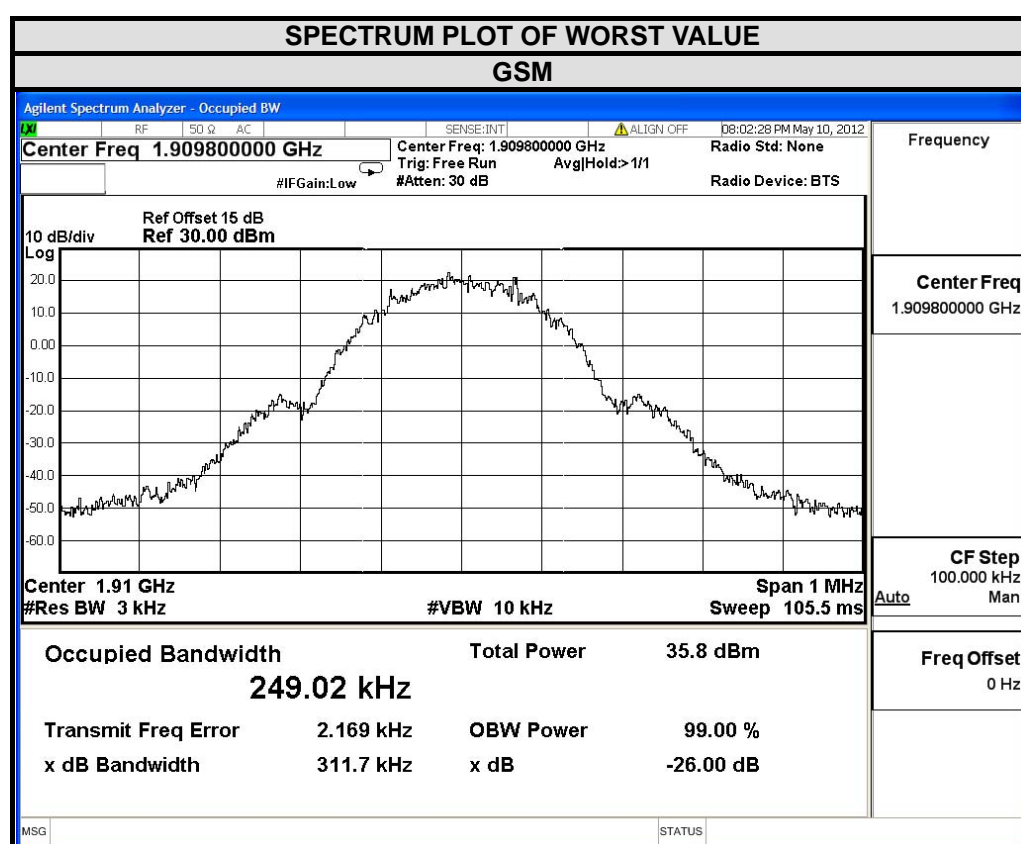
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function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

4.3.2 TEST SETUP



4.3.3 TEST RESULTS

| CHANNEL | FREQUENCY (MHz) | 99% OCCUPIED BANDWIDTH (kHz) |
|---------|--------------------|------------------------------|
| | | GSM |
| 512 | 1850.2 | 247.40 |
| 661 | 1880.0 | 248.75 |
| 810 | 1909.8 | 249.02 |

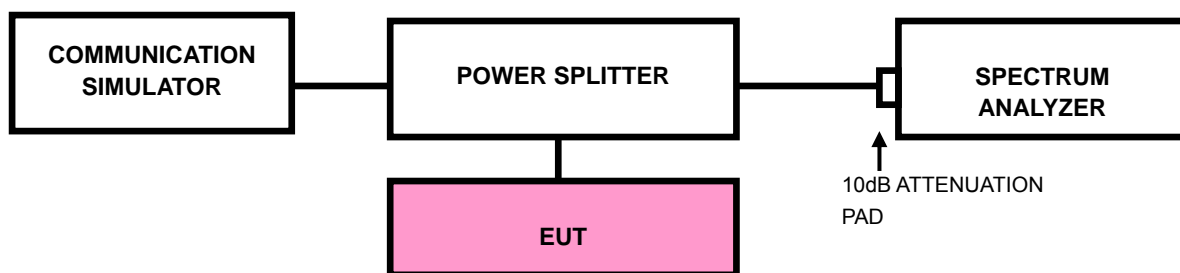


4.4 BAND EDGE MEASUREMENT

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



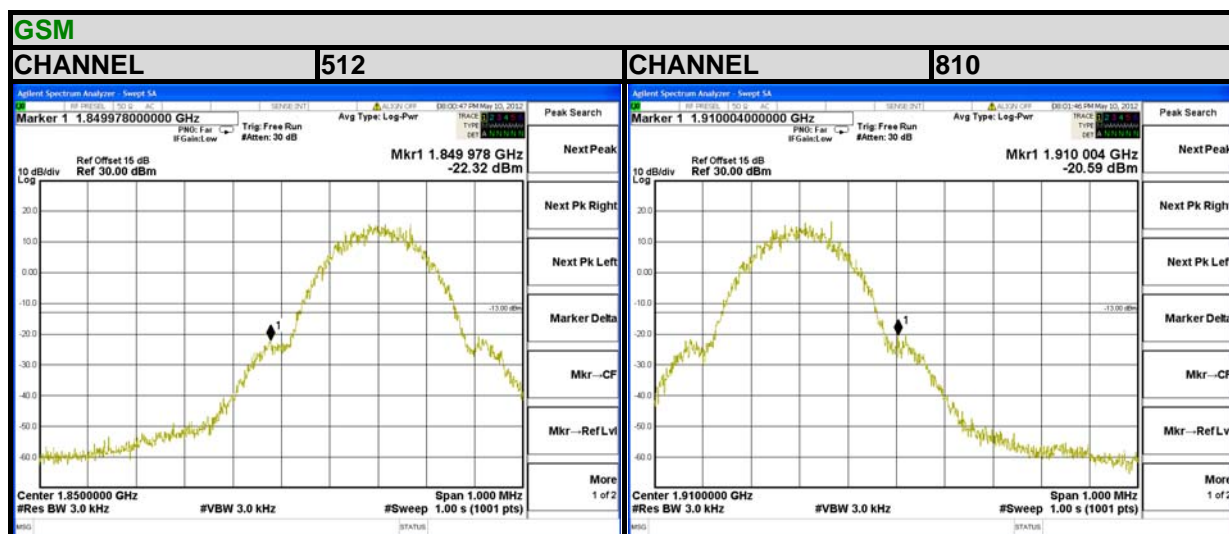
4.4.3 TEST PROCEDURES

- 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 3kHz (GSM).
- Record the max trace plot into the test report.



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4.4.4 TEST RESULTS



4.5 CONDUCTED SPURIOUS EMISSIONS

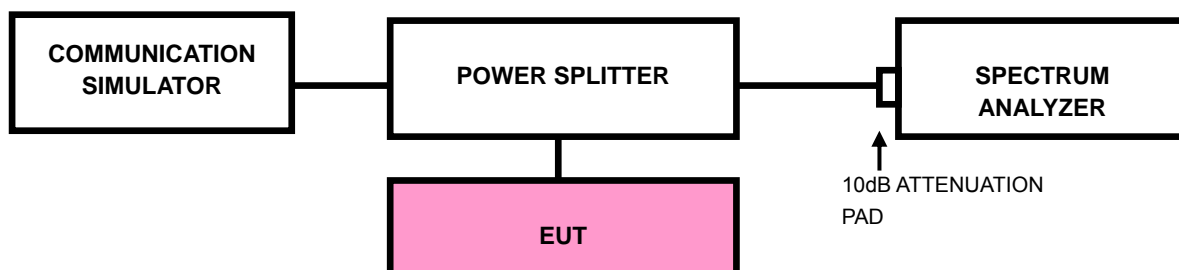
4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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 -13dBm .

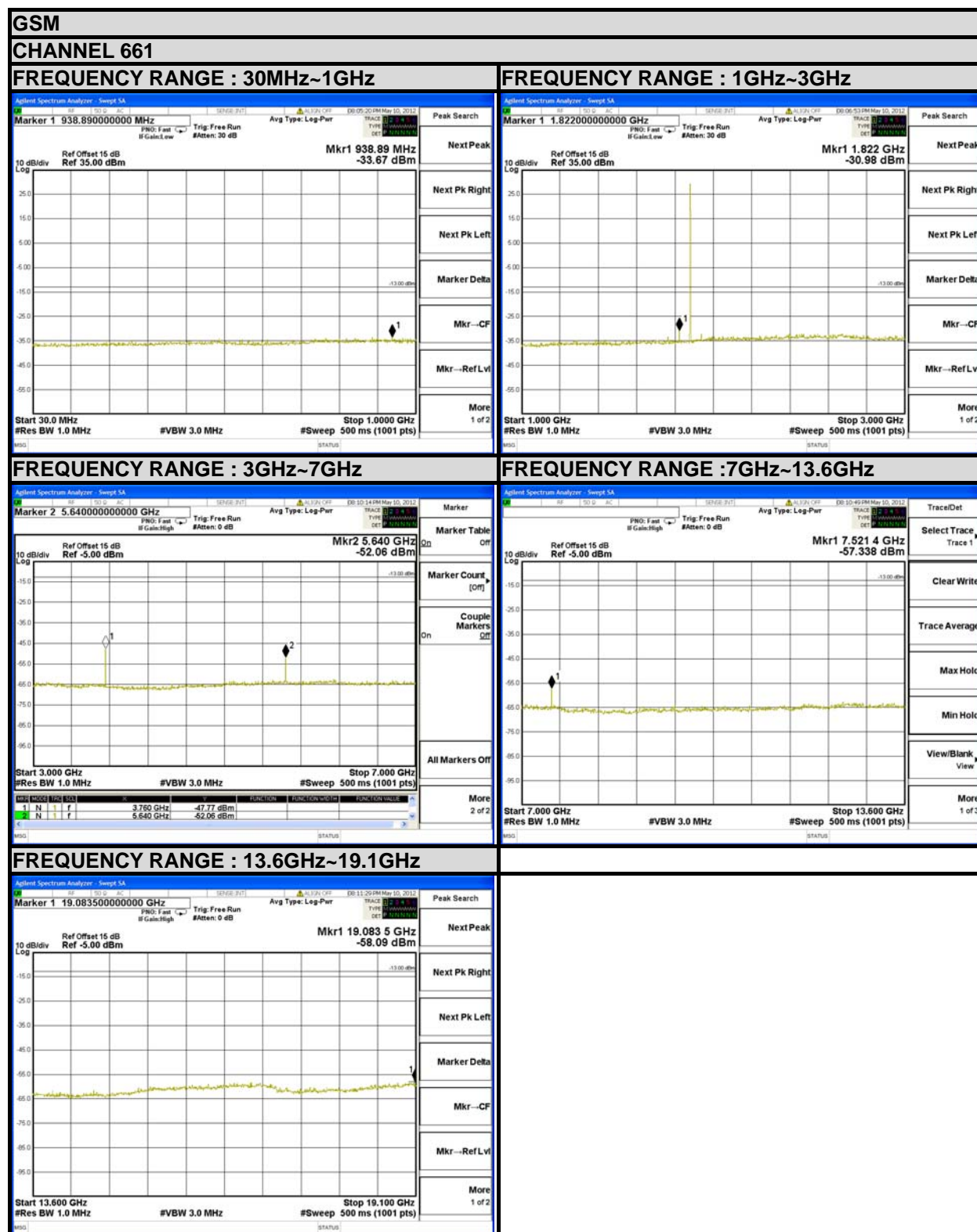
4.5.2 TEST PROCEDURE

- 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 30MHz to 19.1GHz. 10dB 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



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 -13dBm .

4.6.2 TEST PROCEDURES

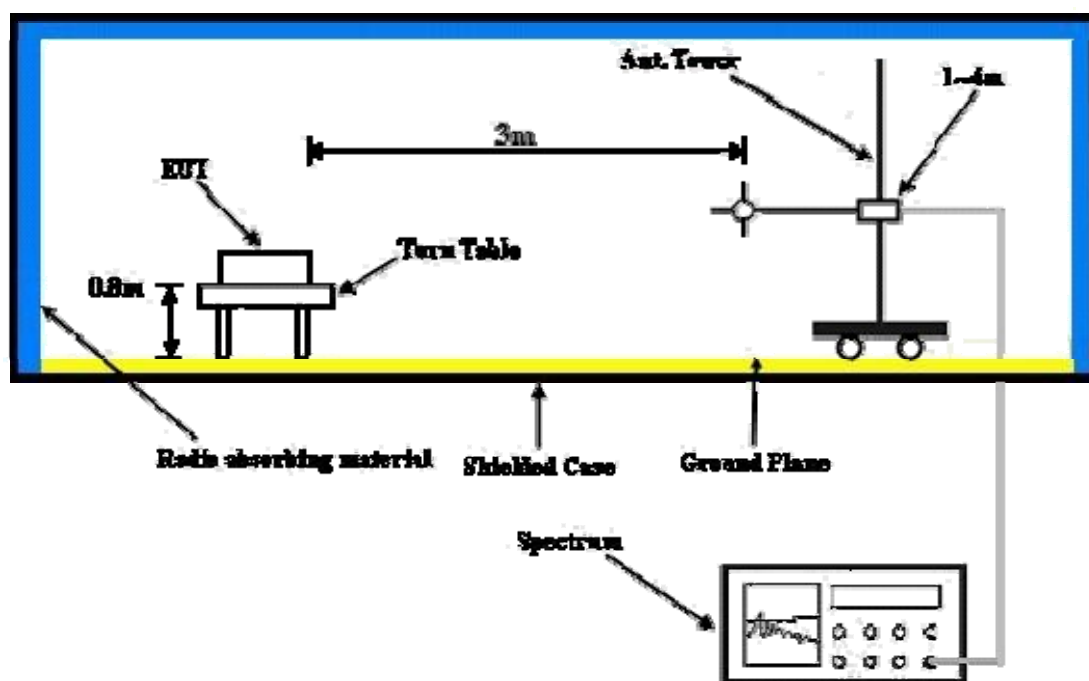
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 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,
 $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi}$.

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).

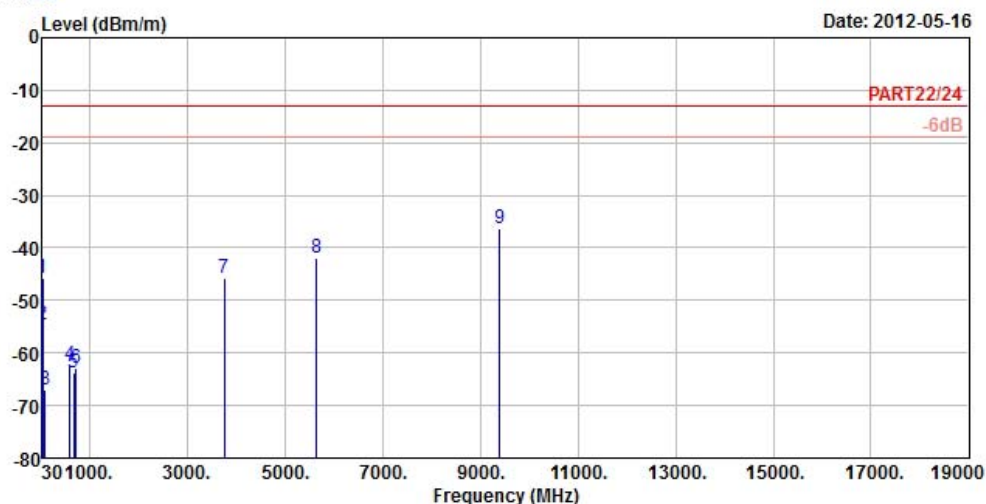
4.6.5 TEST RESULTS



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

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Data: 15



Site : 966 Chamber 5
Condition : PART22/24 3m EIRP_RSE_1G~19G_3 HORIZONTAL
Brand/Model: F-12D
Remark : PCS1900 Link
Tested by : Kay Wu
Temperature : 25°C
Humidity : 65%
Plane : Z

| | Freq | Level | Read | Limit | Over | | |
|------|---------|--------|--------|--------|--------|--------|--------|
| | MHz | dBm/m | Level | Line | Limit | Factor | Remark |
| | | | dBm | dBm/m | dB | dB/m | |
| 1 | 30.27 | -45.80 | -46.87 | -13.00 | -32.80 | 1.07 | Peak |
| 2 | 37.56 | -54.57 | -52.62 | -13.00 | -41.57 | -1.95 | Peak |
| 3 | 89.40 | -67.14 | -56.59 | -13.00 | -54.14 | -10.55 | Peak |
| 4 | 598.90 | -62.15 | -61.75 | -13.00 | -49.15 | -0.40 | Peak |
| 5 | 668.90 | -63.70 | -64.59 | -13.00 | -50.70 | 0.89 | Peak |
| 6 | 716.50 | -62.90 | -64.46 | -13.00 | -49.90 | 1.56 | Peak |
| 7 | 3760.00 | -45.79 | -39.06 | -13.00 | -32.79 | -6.73 | Peak |
| 8 | 5640.00 | -41.99 | -42.20 | -13.00 | -28.99 | 0.21 | Peak |
| 9 pp | 9400.00 | -36.33 | -45.87 | -13.00 | -23.33 | 9.54 | Peak |



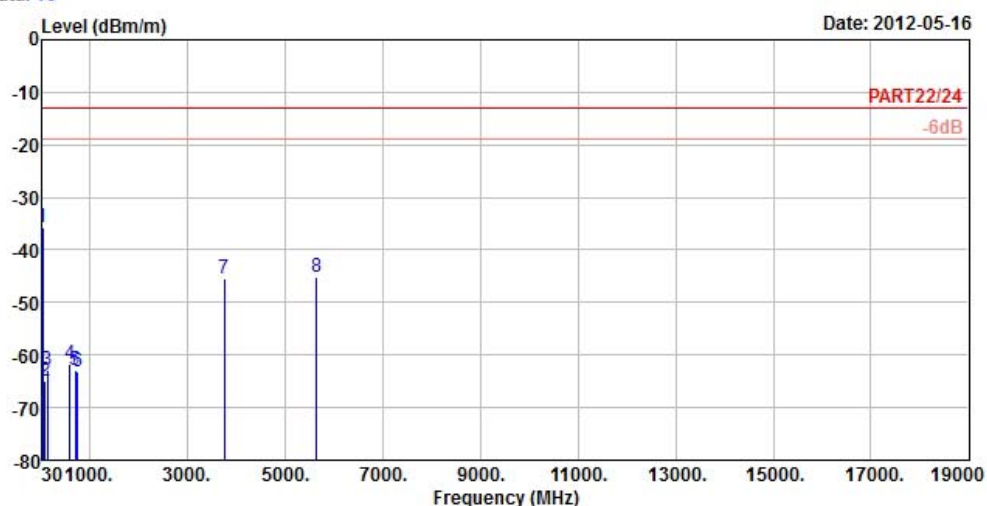
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Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

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Data: 16



Site : 966 Chamber 5
Condition : PART22/24 3m EIRP_RSE_1G~19G_3 VERTICAL
Brand/Model: F-12D
Remark : PCS1900 Link
Tested by : Kay Wu
Temperature : 25°C
Humidity : 65%
Plane : Z

| | | | Read | Limit | Over | | |
|------|---------|--------|--------|--------|--------|--------|--------|
| | Freq | Level | Level | Line | Limit | Factor | Remark |
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | |
| 1 pp | 30.00 | -35.77 | -36.84 | -13.00 | -22.77 | 1.07 | Peak |
| 2 | 85.89 | -64.95 | -54.49 | -13.00 | -51.95 | -10.46 | Peak |
| 3 | 137.73 | -63.01 | -56.82 | -13.00 | -50.01 | -6.19 | Peak |
| 4 | 596.80 | -61.59 | -61.13 | -13.00 | -48.59 | -0.46 | Peak |
| 5 | 707.40 | -62.99 | -64.49 | -13.00 | -49.99 | 1.50 | Peak |
| 6 | 752.20 | -63.09 | -64.90 | -13.00 | -50.09 | 1.81 | Peak |
| 7 | 3760.00 | -45.53 | -38.80 | -13.00 | -32.53 | -6.73 | Peak |
| 8 | 5640.00 | -45.08 | -45.29 | -13.00 | -32.08 | 0.21 | Peak |



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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:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

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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.



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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---