# PARTIAL FCC TEST REPORT

# (PART 22)

| | |
|---|---|
| **REPORT NO.:** | RF140806C22 |
| **MODEL NO.:** | UCAN 3G |
| **FCC ID:** | RLS-STAVL1432 |
| **RECEIVED:** | Aug. 06, 2014 |
| **TESTED:** | Jan. 15, 2015 |
| **ISSUED:** | Jan. 16, 2015 |

| | |
|---|---|
| **APPLICANT:** | SYSTEMS & TECHNOLOGY CORP. |
| **ADDRESS:** | 18-5F, No.79, Hsin Tai Wu Road, Sec. 1, Hsichih District, New Taipei City, Taiwan, R.O.C. |

| | |
|---|---|
| **ISSUED BY:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch |
| **LAB ADDRESS:** | No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, 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. |

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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# RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|---|---|---|
| RF140806C22 | Original release | Jan. 16, 2015 |

# 1 CERTIFICATION

| | |
|---|---|
| **PRODUCT:** | GPS Vehicle Tracking Device |
| **MODEL:** | UCAN 3G |
| **BRAND:** | CAREU |
| **APPLICANT:** | SYSTEMS & TECHNOLOGY CORP. |
| **TESTED:** | Jan. 15, 2015 |
| **TEST SAMPLE:** | Production Unit |
| **STANDARDS:** | **FCC PART 22, Subpart H** |

The above equipment (model: UCAN 3G) 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** : Gina Liu **, DATE :** Jan. 16, 2015

Gina Liu / Specialist

**APPROVED BY** : Sam chen **, DATE :** Jan. 16, 2015

Sam Chen / Senior Project Engineer

# 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 22 & Part 2 | | | |
|---|---|---|---|
| **STANDARD SECTION** | **TEST TYPE** | **RESULT** | **REMARK** |
| 2.1046<br>22.913 (a) | Effective Radiated Power | PASS | Meet the requirement of limit. |
| 2.1055<br>22.355 | Frequency Stability | NA | Refer to Note |
| 2.1049 | Occupied Bandwidth | NA | Refer to Note |
| 22.917 | Band Edge Measurements | NA | Refer to Note |
| 2.1051<br>22.917 | Conducted Spurious Emissions | NA | Refer to Note |
| 2.1053<br>22.917 | Radiated Spurious Emissions | PASS | Meet the requirement of limit.<br>Minimum passing margin is<br>-5.60dB at 2509.20MHz. |

Note: only E.R.P and R.S.E. test was performed for this addendum. Refer to 7 layers report no.: MDE_UBLOX_1404_FCCa for other test data.

## 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 | 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.

## 2.2 TEST SITE AND INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|---|---|---|---|---|
| Test Receiver<br>ROHDE & SCHWARZ | ESCI | 100744 | Apr. 15, 2014 | Apr. 14, 2015 |
| Spectrum Analyzer<br>ROHDE & SCHWARZ | FSU43 | 101261 | Dec. 10, 2014 | Dec. 09, 2015 |
| BILOG Antenna<br>SCHWARZBECK | VULB9168 | 9168-472 | Feb. 27. 2014 | Feb. 26, 2015 |
| HORN Antenna<br>SCHWARZBECK | BBHA 9120 D | 9120D-969 | Feb. 19, 2014 | Feb. 18, 2015 |
| HORN Antenna<br>SCHWARZBECK | BBHA 9170 | 9170-480 | Aug. 27, 2014 | Aug. 26, 2015 |
| Preamplifier<br>EMCI | EMC 012645 | 980115 | Dec. 12, 2014 | Dec. 11, 2015 |
| Preamplifier<br>EMCI | EMC 184045 | 980116 | Jan. 13, 2014 | Jan. 12, 2015 |
| Preamplifier<br>EMCI | EMC 330H | 980071 | Feb. 27, 2014 | Feb. 26, 2015 |
| RF signal cable<br>HUBER+SUHNNER | SUCOFLEX 104 | 309219/4<br>2950114 | Oct. 18, 2014 | Oct. 17, 2015 |
| RF signal cable<br>HUBER+SUHNNER | SUCOFLEX 104 | 250130/4 | Oct. 18, 2014 | Oct. 17, 2015 |
| RF signal cable<br>Worken | RG-213 | NA | Nov. 07, 2014 | Nov. 06, 2015 |
| Software<br>BV ADT | E3<br>6.120103 | NA | NA | NA |
| Antenna Tower<br>MF | MFA-440H | NA | NA | NA |
| Turn Table<br>MF | MFT-201SS | NA | NA | NA |
| Antenna Tower &Turn Table Controller<br>MF | MF-7802 | NA | NA | NA |
| Power Splitter<br>Woken | 2-18GHz 2Way SMA<br>Fwd.:30W/Rev.:2W<br>Isolated Power | COM412W5E3 | Apr. 17, 2014 | Apr. 16, 2015 |
| JFW 20dB attenuation | 50HF-020-SMA | NA | NA | NA |
| Communications Tester-Wireless | E5515C | MY52102544 | Sep. 11, 2014 | Sep. 10, 2016 |
| Radio Communication Analyzer | MT8820C | 6201300640 | Aug. 01, 2013 | Jul. 31, 2015 |

**NOTE:** 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 10.
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 690701.
5. The IC Site Registration No. is IC 7450F-10.

# 3 GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | | |
|---|---|---|
| **EUT** | GPS Vehicle Tracking Device | |
| **MODEL NO.** | UCAN 3G | |
| **POWER SUPPLY** | 3.7Vdc (battery) | |
| **MODULATION TYPE** | **GSM/GPRS** | GMSK |
| | **EDGE** | GMSK, 8PSK |
| | **WCDMA** | BPSK |
| **FREQUENCY RANGE** | **GSM/GPRS/EDGE** | 824.2MHz ~ 848.8MHz |
| | **WCDMA** | 826.4MHz ~ 846.6MHz |
| **MAX. ERP POWER** | **GSM** | 1.16mW |
| | **WCDMA** | 0.10mW |
| **ANTENNA TYPE** | Fixed Internal Antenna | |
| **I/O PORTS** | Refer to users' manual | |
| **DATA CABLE** | Refer to NOTE as below | |
| **ACCESSORY DEVICES** | Refer to NOTE as below | |

**NOTE:**

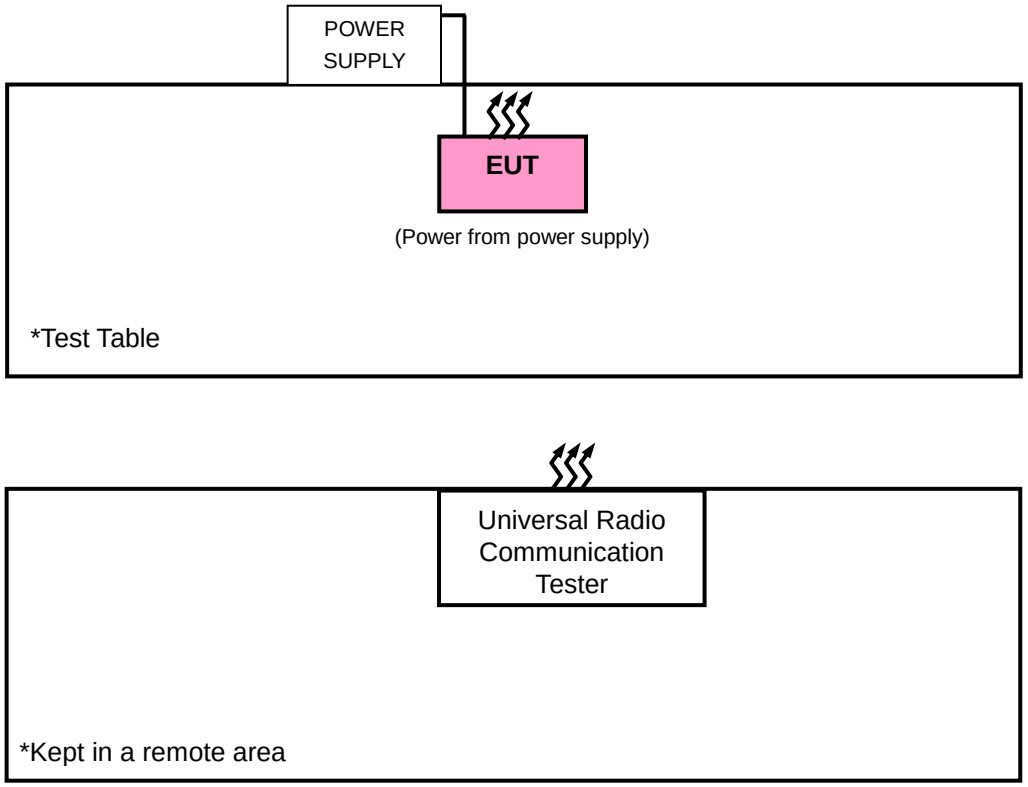
1. The EUT contains following accessory devices.

| ITEM | BRAND | MODEL | SPECIFICATION |
|---|---|---|---|
| Battery 1 | AE energy | AE382030P | 3.7Vdc, 130mAh |
| Battery 2 | SYNergy | AHB372026PS | 3.7Vdc, 145mAh |
| 3G Module | u blox | SARA-U260 | -- |

2. 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 CONFIGURATION OF SYSTEM UNDER TEST

**FOR RADIATION EMISSION 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 | DC POWER SUPPLY | Topward | 3303D | N/A | NA |
| 2 | UNIVERSAL RADIO COMMUNICATION TESTER | R&S | CMU200 | 123295 | NA |

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

**NOTE:**

1. All power cords of the above support units are non shielded (1.8m).
2. 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 Y-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

**GSM MODE**

| EUT CONFIGURE MODE | TEST ITEM | AVAILABLE CHANNEL | TESTED CHANNEL | MODE |
|---|---|---|---|---|
| - | ERP | 128 to 251 | - | GSM, EDGE |
| - | RADIATED EMISSION | 128 to 251 | 189 | GSM, EDGE |

**WCDMA MODE**

| EUT CONFIGURE MODE | TEST ITEM | AVAILABLE CHANNEL | TESTED CHANNEL | MODE |
|---|---|---|---|---|
| - | ERP | 4132 to 4233 | - | WCDMA |
| - | RADIATED EMISSION | 4132 to 4233 | 4182 | WCDMA |

**TEST CONDITION:**

| TEST ITEM | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|---|---|---|---|
| ERP | 25deg. C, 65%RH | 120Vac, 60Hz | Gavin Wu |
| RADIATED EMISSION | 25deg. C, 65%RH | 120Vac, 60Hz | Gavin 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 22**
**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 / Portable station are limited to 7 watts e.r.p.

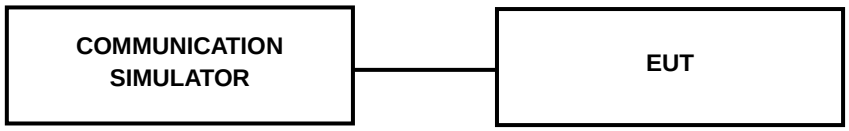
### 4.1.2 TEST PROCEDURES

**CONDUCTED POWER MEASUREMENT:**

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA & CDMA & LTE 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

**CONDUCTED POWER MEASUREMENT:**



### 4.1.4 TEST RESULTS

**CONDUCTED OUTPUT POWER (dBm)**

| Band | GSM850 | | |
|---|---|---|---|
| Channel | 128 | 189 | 251 |
| Frequency (MHz) | 824.2 | 836.4 | 848.8 |
| GPRS 8 (GMSK, 1 slot) | **32.80** | 32.55 | 32.61 |
| GPRS 10 (GMSK, 2 slot) | 32.77 | 32.52 | 32.59 |
| GPRS 11 (GMSK, 3 slot) | 31.99 | 31.69 | 31.77 |
| GPRS 12 (GMSK, 4 slot) | 30.79 | 30.49 | 30.59 |
| EDGE 8 (GMSK, 1 Uplink) | **32.80** | 32.54 | 32.60 |
| EDGE 10 (GMSK, 2 Uplink) | 32.77 | 32.51 | 32.58 |
| EDGE 11 (GMSK, 3 Uplink) | 31.99 | 31.68 | 31.76 |
| EDGE 12 (GMSK, 4 Uplink) | 30.78 | 30.49 | 30.59 |

| Band | WCDMA V | | |
|---|---|---|---|
| Channel | 4132 | 4182 | 4233 |
| Frequency (MHz) | 826.4 | 836.4 | 846.6 |
| RMC 12.2K | **22.30** | 22.23 | 22.29 |
| HSDPA Subtest-1 | 22.24 | 22.17 | 22.23 |
| HSDPA Subtest-2 | 22.00 | 21.93 | 21.99 |
| HSDPA Subtest-3 | 21.73 | 21.66 | 21.72 |
| HSDPA Subtest-4 | 21.53 | 21.46 | 21.52 |
| HSUPA Subtest-1 | 21.94 | 21.87 | 21.93 |
| HSUPA Subtest-2 | 20.22 | 20.15 | 20.21 |
| HSUPA Subtest-3 | 20.96 | 20.89 | 20.95 |
| HSUPA Subtest-4 | 19.98 | 19.91 | 19.97 |
| HSUPA Subtest-5 | 21.20 | 21.13 | 21.19 |

## 4.2 RADIATED POWER ERP CALCULATION

Pursuant to FCC KDB 412172 D01 Determining ERP and EIRP v01, the ERP and EIRP can be determined from the results of the power measurement of the module, which is integrated into the host.

Based on the maximum conducted power measurement results and the antenna gain in the host, ERP are determined as below.

| Mode | MAX Output Power (dBm) | Ant Gain (dBi) | Ant Gain (dBd) | ERP (dBm) | ERP (W) | Part 22.913 Requirement | Result |
|---|---|---|---|---|---|---|---|
| GSM 850 | 32.80 | 0 | -2.15 | 30.65 | 1.16 | ERP<7W | Pass |
| WCDMA V | 22.30 | 0 | -2.15 | 20.15 | 0.10 | | Pass |

## 4.3 RADIATED EMISSION MEASUREMENT

### 4.3.1 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 is equal to -13dBm.

### 4.3.2 TEST PROCEDURES

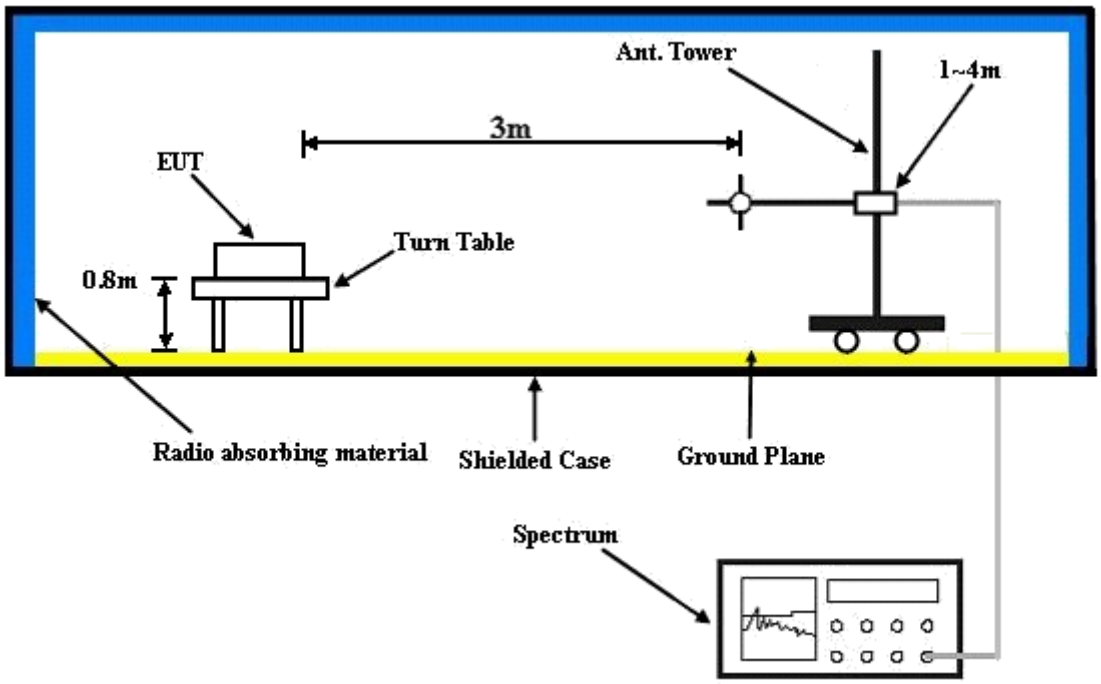
a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 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. EIRP = Output power level of S.G – TX cable loss + 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, E.R.P power = E.I.R.P power - 2.15dBi.

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

### 4.3.3 DEVIATION FROM TEST STANDARD

No deviation

### 4.3.4 TEST SETUP




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

### 4.3.5 TEST RESULTS

**GSM:**

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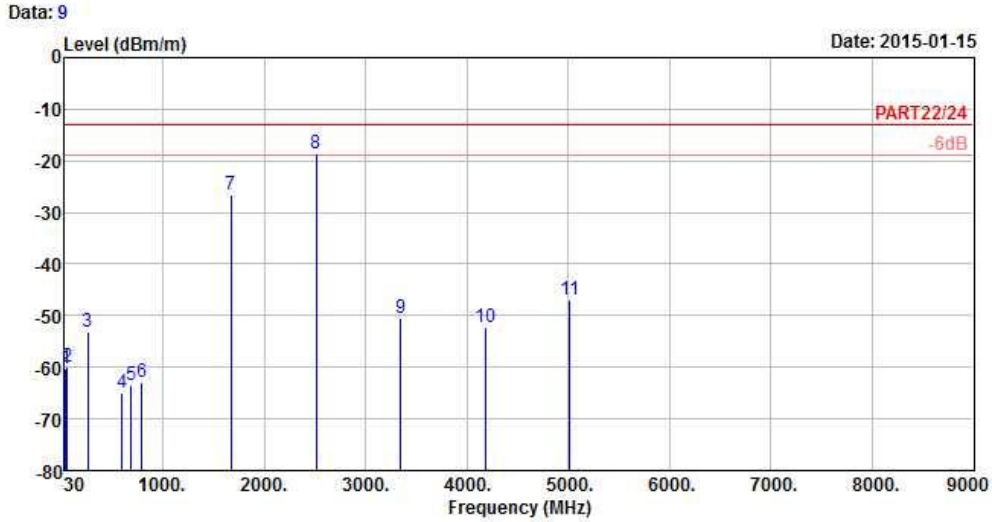
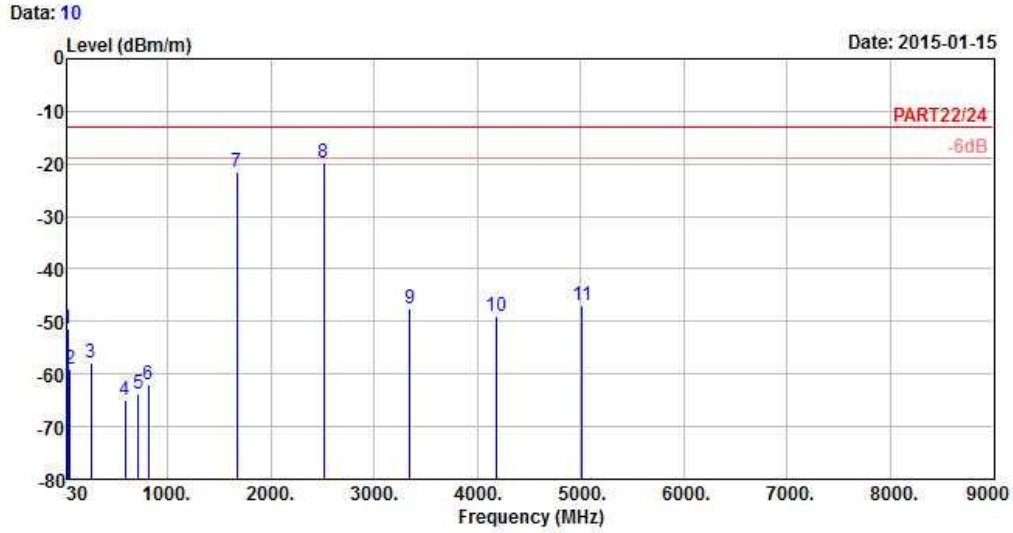



Site : 966 Chamber 5
Condition: PART22/24 3m HORIZONTAL
Remark : GPRS850 Link
Tested by: Gavin Wu
Plane : Y

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | |
| 1 | 43.50 | -60.08 | -58.82 | -13.00 | -47.08 | -1.26 | Peak |
| 2 | 55.92 | -60.02 | -54.52 | -13.00 | -47.02 | -5.50 | Peak |
| 3 | 256.26 | -53.26 | -47.50 | -13.00 | -40.26 | -5.76 | Peak |
| 4 | 593.30 | -64.99 | -64.45 | -13.00 | -51.99 | -0.54 | Peak |
| 5 | 685.00 | -63.54 | -64.71 | -13.00 | -50.54 | 1.17 | Peak |
| 6 | 790.70 | -62.88 | -64.94 | -13.00 | -49.88 | 2.06 | Peak |
| 7 | 1672.80 | -26.45 | -12.61 | -13.00 | -13.45 | -13.84 | Peak |
| 8 pp | 2509.20 | -18.60 | -8.61 | -13.00 | -5.60 | -9.99 | Peak |
| 9 | 3345.60 | -50.47 | -41.11 | -13.00 | -37.47 | -9.36 | Peak |
| 10 | 4184.00 | -52.20 | -44.94 | -13.00 | -39.20 | -7.26 | Peak |
| 11 | 5018.40 | -46.98 | -43.96 | -13.00 | -33.98 | -3.02 | Peak |




Site : 966 Chamber 5
Condition: PART22/24 3m VERTICAL
Remark : GPRS850 Link
Tested by: Gavin Wu
Plane : Y

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | |
| 1 | 35.13 | -51.47 | -48.90 | -13.00 | -38.47 | -2.57 | Peak |
| 2 | 56.19 | -58.93 | -53.43 | -13.00 | -45.93 | -5.50 | Peak |
| 3 | 255.99 | -57.85 | -52.09 | -13.00 | -44.85 | -5.76 | Peak |
| 4 | 590.50 | -65.05 | -64.43 | -13.00 | -52.05 | -0.62 | Peak |
| 5 | 714.40 | -63.65 | -65.20 | -13.00 | -50.65 | 1.55 | Peak |
| 6 | 814.50 | -61.98 | -64.19 | -13.00 | -48.98 | 2.21 | Peak |
| 7 | 1672.80 | -21.63 | -7.79 | -13.00 | -8.63 | -13.84 | Peak |
| 8 pp | 2509.20 | -19.81 | -9.82 | -13.00 | -6.81 | -9.99 | Peak |
| 9 | 3345.60 | -47.58 | -38.22 | -13.00 | -34.58 | -9.36 | Peak |
| 10 | 4182.00 | -49.06 | -41.80 | -13.00 | -36.06 | -7.26 | Peak |
| 11 | 5018.40 | -47.06 | -44.04 | -13.00 | -34.06 | -3.02 | Peak |

**EDGE:**

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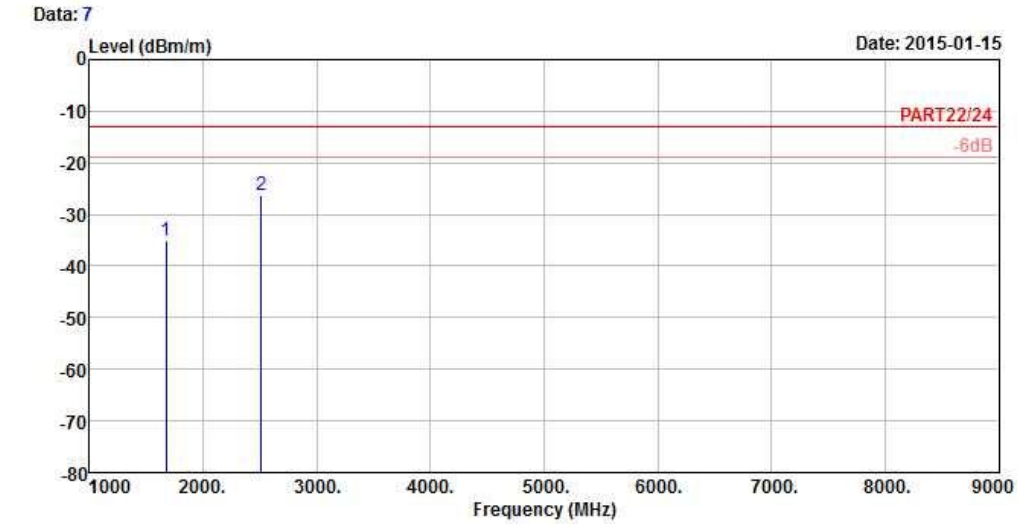
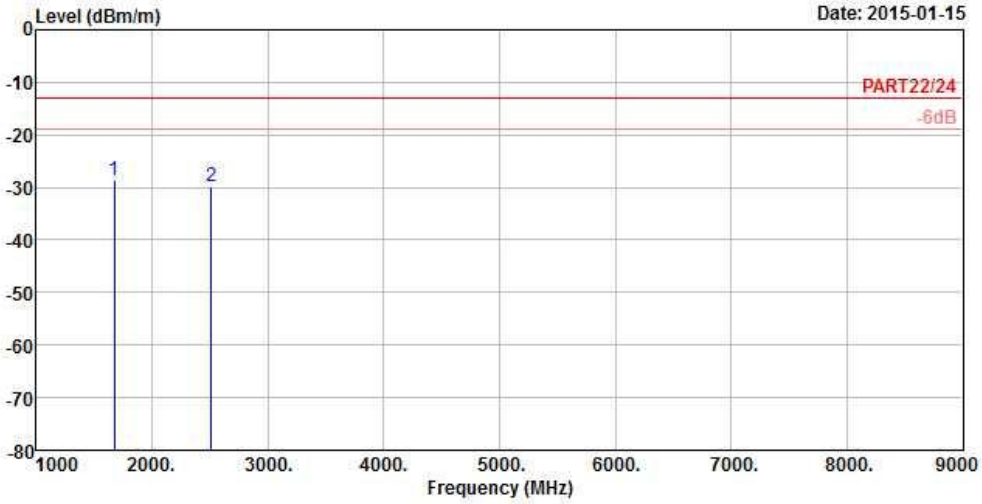



Site : 966 Chamber 5
Condition: PART22/24 3m HORIZONTAL
Remark : EDGE 850 Link
Tested by: Gavin Wu
Plane : Y

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | |
| 1 | 1672.80 | -35.00 | -21.16 | -13.00 | -22.00 | -13.84 | Peak |
| 2 pp | 2509.20 | -26.19 | -16.20 | -13.00 | -13.19 | -9.99 | Peak |

Data: 8

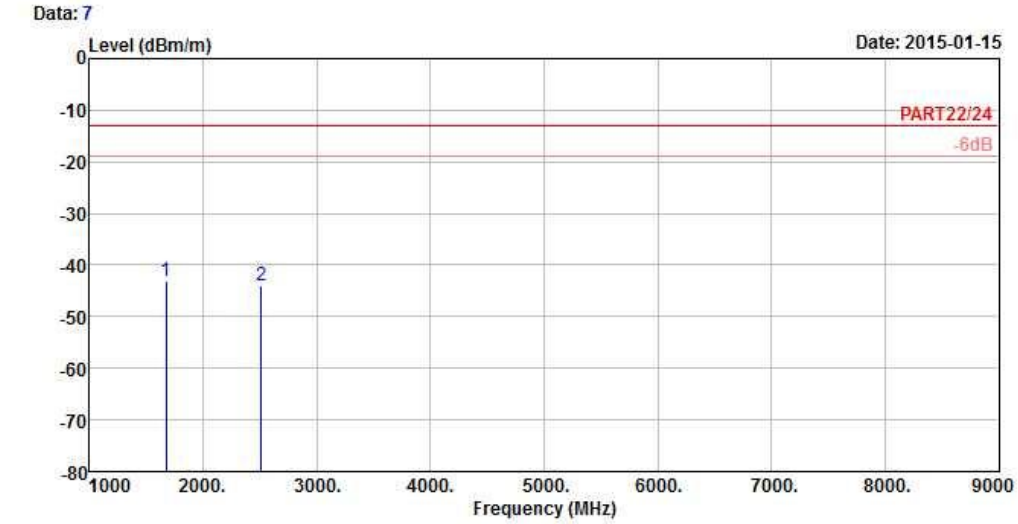



Site : 966 Chamber 5
Condition: PART22/24 3m VERTICAL
Remark : EDGE 850 Link
Tested by: Gavin Wu
Plane : Y

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | |
| 1 pp | 1672.80 | -28.50 | -14.66 | -13.00 | -15.50 | -13.84 | Peak |
| 2 | 2509.20 | -29.81 | -19.82 | -13.00 | -16.81 | -9.99 | Peak |

**WCDMA:**

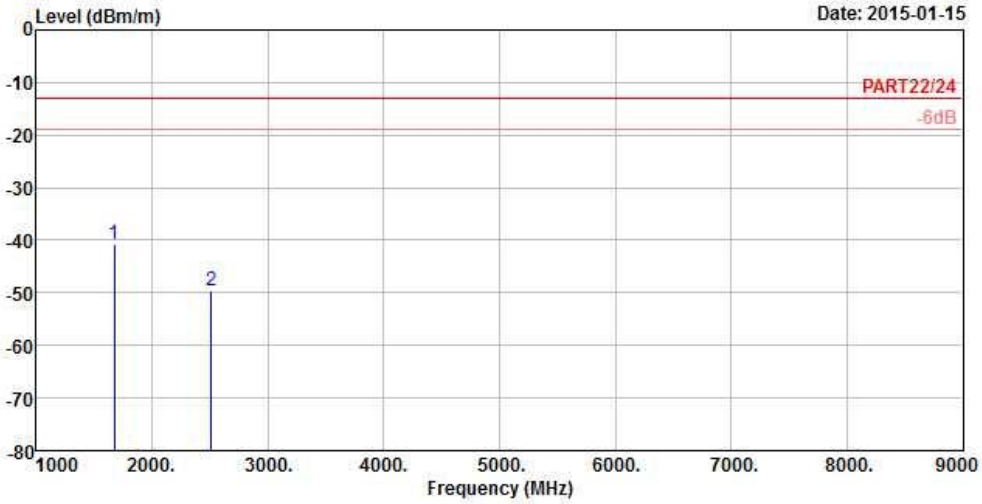
Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch




Site : 966 Chamber 5
Condition: PART22/24 3m HORIZONTAL
Remark : WCDMA Band V Link
Tested by: Gavin Wu
Plane : Y

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | |
| 1 pp | 1672.80 | -43.24 | -29.40 | -13.00 | -30.24 | -13.84 | Peak |
| 2 | 2509.20 | -44.11 | -34.12 | -13.00 | -31.11 | -9.99 | Peak |

Data: 8




Site : 966 Chamber 5
Condition: PART22/24 3m VERTICAL
Remark : WCDMA Band V Link
Tested by: Gavin Wu
Plane : Y

| | Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark |
|---|---|---|---|---|---|---|---|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | |
| 1 pp | 1672.80 | -40.65 | -26.81 | -13.00 | -27.65 | -13.84 | Peak |
| 2 | 2509.20 | -49.67 | -39.68 | -13.00 | -36.67 | -9.99 | Peak |

# 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/Telecom Lab**:
Tel: 886-3-5935343
Fax: 886-3-5935342

**Hwa Ya EMC/RF/Safety Lab**:
Tel: 886-3-3183232
Fax: 886-3-3270892

**Email:** service.adt@tw.bureauveritas.com
**Web Site**: www.bureauveritas-adt.com


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 were made to the EUT by the lab during the test.

**---END---**