

# FCC PART 22H, PART 24E MEASUREMENT AND TEST REPORT

For

## Hewlett-Packard Company

1501 Page Mill Road, M/S1419, Palo Alto, CA 94304, United States

**FCC ID: B94HHB15C**

|                                        |                                                                                                                                                                                                                                                         |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>Tablet                                                                                                                                                                                                                          |
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| <b>Report Number:</b>                  | R2DG130719001-00D                                                                                                                                                                                                                                       |
| <b>Report Date:</b>                    | 2013-08-31                                                                                                                                                                                                                                              |
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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *Hewlett-Packard Company*'s product, model number: *HSTNH-B15C (FCC ID: B94HHB15C)* (the "EUT") in this report was a *Tablet*, which was measured approximately: 26.5 cm (L) x 17.5 cm (W) x 1.5 cm (H), rated input voltage: DC 3.7V from lithium battery or DC 5V from adapter.

Adapter Information: HP  
MODEL: ADS-12B-06 05010G  
INPUT: 100-240Vac, 50/60Hz, 0.3A Max  
OUTPUT: DC 5.0V, 2.0A

*\* All measurement and test data in this report was gathered from production sample serial number: 130719001 (Assigned by BACL.Dongguan). The EUT was received on 2013-07-29.*

### Objective

This report is prepared on behalf of *Hewlett-Packard Company* in accordance with Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, spurious radiated emission, frequency stability and band edge.

### Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: *HSTNH-B15C* for Wifi.  
FCC Part 15C DSS submissions with FCC ID: *B94HHB15C* for Bluetooth.  
FCC Part 15B JBP submissions with FCC ID: *B94HHB15C*.

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services  
Part 24 Subpart E - Personal Communication Services

Applicable Standards: TIA/EIA 603-D-2010, ANSI C63.4-2003.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan), the radiated testing was performed at an antenna-to-EUT distance of 3 meters.

**Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Dongguan) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 500069-0).



The current scope of accreditations can be found at <http://ts.nist.gov/standards/scopes/5000690.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The EUT was configured for testing according to TIA/EIA-603-D-2010.

The test items were performed with the EUT operating at testing mode.

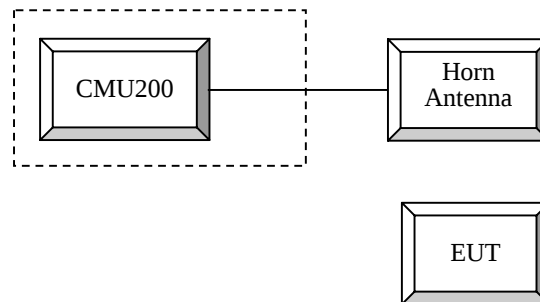
### Equipment Modifications

No modification was made to the EUT.

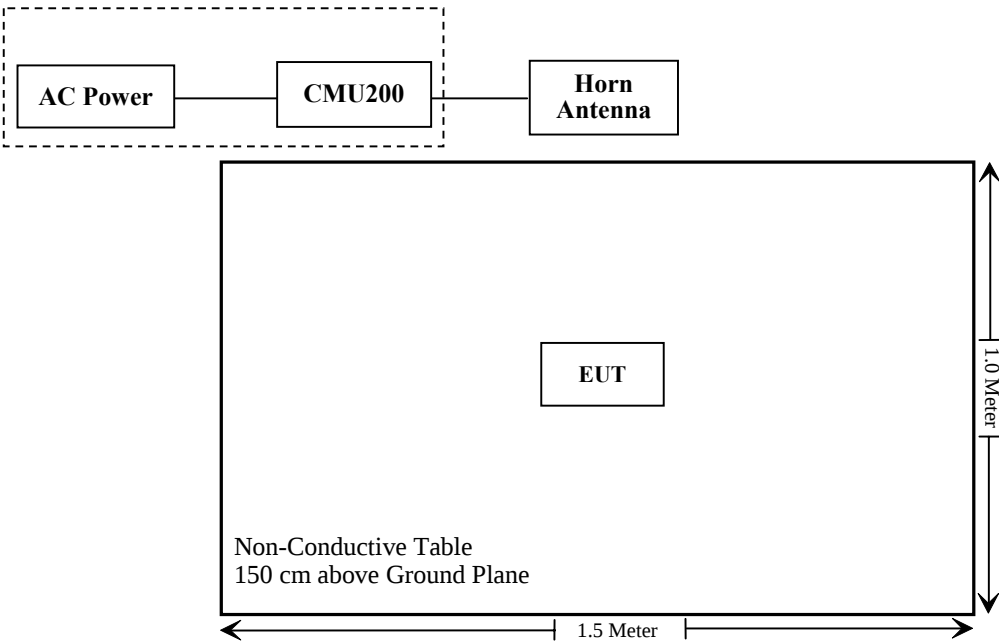
### Support Equipment List and Details

| Manufacturer | Description                          | Model  | Serial Number |
|--------------|--------------------------------------|--------|---------------|
| R & S        | Universal Radio Communication Tester | CMU200 | 109038        |

### Configuration of Test Setup



Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| FCC Rules                                | Description of Test                                                    | Result         |
|------------------------------------------|------------------------------------------------------------------------|----------------|
| §1.1310, §2.1093                         | RF Exposure                                                            | Compliance     |
| §2.1046;<br>§ 22.913 (a); § 24.232 (c)   | RF Output Power                                                        | Compliance     |
| § 2.1047                                 | Modulation Characteristics                                             | Not Applicable |
| § 2.1049; § 22.905<br>§ 22.917; § 24.238 | Occupied Bandwidth                                                     | Compliance     |
| § 2.1051,<br>§ 22.917 (a); § 24.238 (a)  | Spurious Emissions at Antenna Terminal                                 | Compliance     |
| § 2.1053<br>§ 22.917 (a); § 24.238 (a)   | Field Strength of Spurious Radiation                                   | Compliance     |
| § 22.917 (a); § 24.238 (a)               | Out of band emission, Band Edge                                        | Compliance     |
| § 2.1055<br>§ 22.355; § 24.235           | Frequency stability vs. temperature<br>Frequency stability vs. voltage | Compliance     |

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## **FCC §1.1310 & §2.1093- RF EXPOSURE**

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### **Applicable Standard**

FCC§1.1310 and §2.1093.

### **Test Result**

Compliance, please refer to the SAR report: R1DG130719001-20

## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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According to FCC § 2.1047(d), Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

## **FCC § 2.1046, § 22.913 (a) & § 24.232 (c) - RF OUTPUT POWER**

### **Applicable Standard**

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

### **Test Procedure**

#### **GSM**

Function: Menu select > GSM Mobile Station > GSM 850/1900  
Press Connection control to choose the different menus  
Press RESET > choose all the reset all settings  
Connection Press Signal Off to turn off the signal and change settings  
Network Support > GSM + only  
MS Signal  
    > 33 dBm for GSM 850  
    > 30 dBm for GSM 1900  
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel  
Frequency Offset > + 0 Hz  
Mode > BCCH and TCH  
BCCH Level > -85 dBm (May need to adjust if link is not stable)  
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]  
Channel Type > Off  
P0 > 4 dB  
TCH > choose desired test channel  
Hopping > Off  
AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input  
Connection Press Signal on to turn on the signal and change settings

#### **GPRS/EGPRS**

Function: Menu select > GSM Mobile Station > GSM 850/1900  
Press Connection control to choose the different menus  
Press RESET > choose all the reset all settings  
Connection Press Signal Off to turn off the signal and change settings  
Network Support > GSM + GPRS or GSM + EGSM  
Main Service > Packet Data  
Service selection > Test Mode A – Auto Slot Config. off  
MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting  
    > Slot configuration > Uplink/Gamma  
    > 33 dBm for GPRS 850  
    > 30 dBm for GPRS 1900  
    > 27 dBm for EGPRS 850  
    > 26 dBm for EGPRS 1900  
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel  
Frequency Offset > + 0 Hz  
Mode > BCCH and TCH  
BCCH Level > -85 dBm (May need to adjust if link is not stable)  
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off  
 P0 > 4 dB  
 Slot Config > Unchanged (if already set under MS signal)  
 TCH > choose desired test channel  
 Hopping > Off  
 Main Timeslot > 3  
 Network Coding Scheme > CS4 (GPRS) and MCS9 (EGPRS)  
 Bit Stream > 2E9-1 PSR Bit Stream  
 AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input  
 Connection Press Signal on to turn on the signal and change settings

## UMTS Rel 99

|                        | Mode                    | Rel99          |
|------------------------|-------------------------|----------------|
|                        | Subtest                 | -              |
| WCDMA General Settings | Loopback Mode           | Test Mode 1    |
|                        | Rel99 RMC               | 12.2kbps RMC   |
|                        | HSDPA FRC               | Not Applicable |
|                        | HSUPA Test              | Not Applicable |
|                        | Power Control Algorithm | Algorithm2     |
|                        | $\beta_c$               | Not Applicable |
|                        | $\beta_d$               | Not Applicable |
|                        | $\beta_{ec}$            | Not Applicable |
|                        | $\beta_c/\beta_d$       | 8/15           |
|                        | $\beta_{hs}$            | Not Applicable |
|                        | $\beta_{ed}$            | Not Applicable |

## UMTS Rel 6 HSDPA

|                         | Mode                                 | Rel6 HSDPA     | Rel6 HSDPA | Rel6 HSDPA | Rel6 HSDPA |
|-------------------------|--------------------------------------|----------------|------------|------------|------------|
|                         | Subtest                              | 1              | 2          | 3          | 4          |
| WCDMA General Settings  | Loopback Mode                        | Test Mode 1    |            |            |            |
|                         | Rel99 RMC                            | 12.2kbps RMC   |            |            |            |
|                         | HSDPA FRC                            | H-Set1         |            |            |            |
|                         | HSUPA Test                           | Not Applicable |            |            |            |
|                         | Power Control Algorithm              | Algorithm 2    |            |            |            |
|                         | $\beta_c$                            | 2/15           | 12/15      | 15/15      | 15/15      |
|                         | $\beta_d$                            | 15/15          | 15/15      | 8/15       | 4/15       |
|                         | $\beta_{ec}$                         | -              | -          | -          | -          |
|                         | $\beta_c/\beta_d$                    | 2/15           | 12/15      | 15/8       | 15/4       |
|                         | $\beta_{hs}$                         | 4/15           | 24/15      | 30/15      | 30/15      |
| HSDPA Specific Settings | $\beta_{ed}$                         | Not Applicable |            |            |            |
|                         | DACK                                 | 8              |            |            |            |
|                         | DNAK                                 | 8              |            |            |            |
|                         | DCQI                                 | 8              |            |            |            |
|                         | Ack-Nack repetition factor           | 3              |            |            |            |
|                         | CQI Feedback (Table 5.2B.4)          | 4ms            |            |            |            |
|                         | CQI Repetition Factor (Table 5.2B.4) | 2              |            |            |            |
|                         | Ahs = $\beta_{hs}/\beta_c$           | 30/15          |            |            |            |

*UMTS Rel 6 HSPA (HSDPA & HSUPA)*

|                               | Mode                                 | Rel6 HSUPA                                                                                                                                   | Rel6 HSUPA | Rel6 HSUPA                                                                                                                                   | Rel6 HSUPA | Rel6 HSUPA |
|-------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|
|                               | Subtest                              | 1                                                                                                                                            | 2          | 3                                                                                                                                            | 4          | 5          |
| WCDMA<br>General<br>Settings  | Loopback Mode                        | Test Mode 1                                                                                                                                  |            |                                                                                                                                              |            |            |
|                               | Rel99 RMC                            | 12.2kbps RMC                                                                                                                                 |            |                                                                                                                                              |            |            |
|                               | HSDPA FRC                            | H-Set1                                                                                                                                       |            |                                                                                                                                              |            |            |
|                               | HSUPA Test                           | HSUPA Loopback                                                                                                                               |            |                                                                                                                                              |            |            |
|                               | Power Control Algorithm              | Algorithm2                                                                                                                                   |            |                                                                                                                                              |            |            |
|                               | $\beta_c$                            | 11/15                                                                                                                                        | 6/15       | 15/15                                                                                                                                        | 2/15       | 15/15      |
|                               | $\beta_d$                            | 15/15                                                                                                                                        | 15/15      | 9/15                                                                                                                                         | 15/15      | 0          |
|                               | $\beta_{ec}$                         | 209/225                                                                                                                                      | 12/15      | 30/15                                                                                                                                        | 2/15       | 5/15       |
|                               | $\beta_c/\beta_d$                    | 11/15                                                                                                                                        | 6/15       | 15/9                                                                                                                                         | 2/15       | -          |
|                               | $\beta_{hs}$                         | 22/15                                                                                                                                        | 12/15      | 30/15                                                                                                                                        | 4/15       | 5/15       |
| HSDPA<br>Specific<br>Settings | $\beta_{ed}$                         | 1309/225                                                                                                                                     | 94/75      | 47/15                                                                                                                                        | 56/75      | 47/15      |
|                               | DACK                                 | 8                                                                                                                                            |            |                                                                                                                                              |            |            |
|                               | DNAK                                 | 8                                                                                                                                            |            |                                                                                                                                              |            |            |
|                               | DCQI                                 | 8                                                                                                                                            |            |                                                                                                                                              |            |            |
|                               | Ack-Nack repetition factor           | 3                                                                                                                                            |            |                                                                                                                                              |            |            |
|                               | CQI Feedback (Table 5.2B.4)          | 4ms                                                                                                                                          |            |                                                                                                                                              |            |            |
|                               | CQI Repetition Factor (Table 5.2B.4) | 2                                                                                                                                            |            |                                                                                                                                              |            |            |
|                               | $A_{hs} = \beta_{hs}/\beta_c$        | 30/15                                                                                                                                        |            |                                                                                                                                              |            |            |
| HSUPA<br>Specific<br>Settings | D E-DPCCH                            | 6                                                                                                                                            | 8          | 8                                                                                                                                            | 5          | 7          |
|                               | DHARQ                                | 0                                                                                                                                            | 0          | 0                                                                                                                                            | 0          | 0          |
|                               | AG Index                             | 20                                                                                                                                           | 12         | 15                                                                                                                                           | 17         | 12         |
|                               | ETFCI (from 34.121 Table C.11.1.3)   | 75                                                                                                                                           | 67         | 92                                                                                                                                           | 71         | 67         |
|                               | Associated Max UL Data Rate kbps     | 242.1                                                                                                                                        | 174.9      | 482.8                                                                                                                                        | 205.8      | 308.9      |
|                               | Reference E_TFCIs                    | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 |            | E-TFCI 11<br>E-TFCI PO 4<br>E-TFCI 92<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO 23<br>E-TFCI 75<br>E-TFCI PO 26<br>E-TFCI 81<br>E-TFCI PO 27 |            |            |
|                               |                                      |                                                                                                                                              |            |                                                                                                                                              |            |            |
|                               |                                      |                                                                                                                                              |            |                                                                                                                                              |            |            |
|                               |                                      |                                                                                                                                              |            |                                                                                                                                              |            |            |

Radiated method:

ANSI/TIA 603-D section 2.2.17

**Test Equipment List and Details**

| Manufacturer   | Description               | Model      | Serial Number | Calibration Date | Calibration Due Date |
|----------------|---------------------------|------------|---------------|------------------|----------------------|
| R&S            | Spectrum analyzer         | FSEM 30    | 849016/001    | 2012-9-4         | 2013-9-3             |
| Sunol Sciences | Antenna                   | JB3        | A060611-1     | 2012-9-6         | 2015-9-5             |
| TDK RF         | horn antenna              | HRN-0118   | 130 084       | 2012-9-6         | 2015-9-5             |
| EMCO           | Adjustable dipole antenna | 3121C      | 9109-753      | N/A              | N/A                  |
| ETS LINDGREN   | horn antenna              | 3115       | 000 527 35    | 2012-9-6         | 2015-9-5             |
| HP             | Signal Generator          | 8648A      | 3426A00831    | 2012-11-29       | 2013-11-28           |
| Giga           | Signal Generator          | 1026       | 320408        | 2013-5-9         | 2014-5-8             |
| HP             | HP AMPLIFIER              | 8447E      | 2434A02181    | N/A              | N/A                  |
| Mini-Circuit   | Amplifier                 | ZVA-213-S+ | 54201245      | N/A              | N/A                  |
| R&S            | EMI TEST RECEIVER         | ESCI       | 100224        | 2013-5-6         | 2014-5-5             |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 28 °C    |
| <b>Relative Humidity:</b> | 65 %     |
| <b>ATM Pressure:</b>      | 99.4 kPa |

The testing was performed by Leon Chen on 2013-08-20.

**Conducted Power****Cellular Band (Part 22H) & PCS Band (Part 24E)**

| Band     | Channel No. | Conducted Output Power (dBm) |                |                |                |                |
|----------|-------------|------------------------------|----------------|----------------|----------------|----------------|
|          |             | GSM                          | GPRS 1 TX Slot | GPRS 2 TX Slot | GPRS 3 TX Slot | GPRS 4 TX Slot |
| Cellular | 128         | 32.04                        | 31.98          | 29             | 27.98          | 25.57          |
|          | 190         | 32.04                        | 31.98          | 29.06          | 28.02          | 26             |
|          | 251         | 32.04                        | 31.97          | 29.06          | 28.04          | 26             |
| PCS      | 512         | 28.45                        | 28.47          | 25.48          | 24.52          | 22.5           |
|          | 661         | 28.59                        | 28.61          | 25.62          | 24.67          | 22.67          |
|          | 810         | 28.73                        | 28.74          | 25.76          | 24.76          | 22.8           |

**WCDMA Band II**

| Mode        | 3GPP Sub Test | Conducted Output Power (dBm) |                   |                             |                      |                           |                    |
|-------------|---------------|------------------------------|-------------------|-----------------------------|----------------------|---------------------------|--------------------|
|             |               | Low Channel (Ave. Power)     | Low Channel (PAR) | Middle Channel (Ave. Power) | Middle Channel (PAR) | High Channel (Ave. Power) | High Channel (PAR) |
| Rel 99      | 1             | 23.17                        | 3.16              | 22.95                       | 3.29                 | 22.95                     | 3.27               |
| Rel 6 HSDPA | 1             | 22.73                        | 3.23              | 22.72                       | 3.29                 | 22.66                     | 3.36               |
|             | 2             | 22.86                        | 3.29              | 22.77                       | 3.35                 | 22.80                     | 3.33               |
|             | 3             | 23.01                        | 3.27              | 22.75                       | 3.26                 | 22.82                     | 3.5                |
|             | 4             | 23.06                        | 3.44              | 22.7                        | 3.39                 | 22.78                     | 3.48               |
| Rel 6 HSUPA | 1             | 22.75                        | 3.05              | 22.73                       | 3.36                 | 22.81                     | 3.42               |
|             | 2             | 22.99                        | 3.36              | 22.69                       | 3.46                 | 22.81                     | 3.34               |
|             | 3             | 22.87                        | 3.37              | 22.69                       | 3.5                  | 22.67                     | 3.49               |
|             | 4             | 23.05                        | 3.23              | 22.65                       | 3.24                 | 22.69                     | 3.54               |
|             | 5             | 22.93                        | 3.51              | 22.62                       | 3.52                 | 22.69                     | 3.49               |

Note: peak-to-average ratio (PAR) – PAR <13 dB

**ERP & EIRP**

| Channel No.          | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method |                        |                 | Absolute Level (dBm) | Limit (dBm) |
|----------------------|-------------|-------------------------|--------------------|------------------------|-----------------|----------------------|-------------|
|                      |             |                         | S.G. Level (dBm)   | Antenna Gain (dBd/dBi) | Cable Loss (dB) |                      |             |
| GSM 850              |             |                         |                    |                        |                 |                      |             |
| 128<br>(824.2 MHz)   | H           | 104.74                  | 29.7               | 0.0                    | 1               | 28.7                 | 38.4        |
|                      | V           | 100.09                  | 28.2               | 0.0                    | 1               | 27.2                 | 38.4        |
| 190<br>(836.6 MHz)   | H           | 105.93                  | 31.0               | 0.0                    | 1               | 30.0                 | 38.4        |
|                      | V           | 99.73                   | 27.9               | 0.0                    | 1               | 26.9                 | 38.4        |
| 251<br>(848.8 MHz)   | H           | 105.36                  | 30.6               | 0.0                    | 1               | 29.6                 | 38.4        |
|                      | V           | 100.05                  | 28.4               | 0.0                    | 1               | 27.4                 | 38.4        |
| PCS 1900             |             |                         |                    |                        |                 |                      |             |
| 512<br>(1850.2 MHz)  | H           | 88.96                   | 17.1               | 11.4                   | 1.4             | 27.1                 | 33.0        |
|                      | V           | 90.73                   | 18.8               | 11.4                   | 1.4             | 28.8                 | 33.0        |
| 661<br>(1880.0 MHz)  | H           | 90.45                   | 18.9               | 11.7                   | 1.4             | 29.2                 | 33.0        |
|                      | V           | 91.39                   | 19.9               | 11.7                   | 1.4             | 30.2                 | 33.0        |
| 810<br>(1909.8 MHz)  | H           | 88.67                   | 17.3               | 11.8                   | 1.4             | 27.7                 | 33.0        |
|                      | V           | 91.56                   | 20.5               | 11.8                   | 1.4             | 30.9                 | 33.0        |
| WCDMA Band II        |             |                         |                    |                        |                 |                      |             |
| 9262<br>(1852.4 MHz) | H           | 80.45                   | 8.7                | 11.4                   | 1.4             | 18.7                 | 33.0        |
|                      | V           | 84.21                   | 12.3               | 11.4                   | 1.4             | 22.3                 | 33.0        |
| 9400<br>(1880.0 MHz) | H           | 83.93                   | 12.3               | 11.7                   | 1.4             | 22.6                 | 33.0        |
|                      | V           | 84.90                   | 13.4               | 11.7                   | 1.4             | 23.7                 | 33.0        |
| 9538<br>(1907.4 MHz) | H           | 82.82                   | 11.4               | 11.8                   | 1.4             | 21.8                 | 33.0        |
|                      | V           | 85.42                   | 14.3               | 11.8                   | 1.4             | 24.7                 | 33.0        |

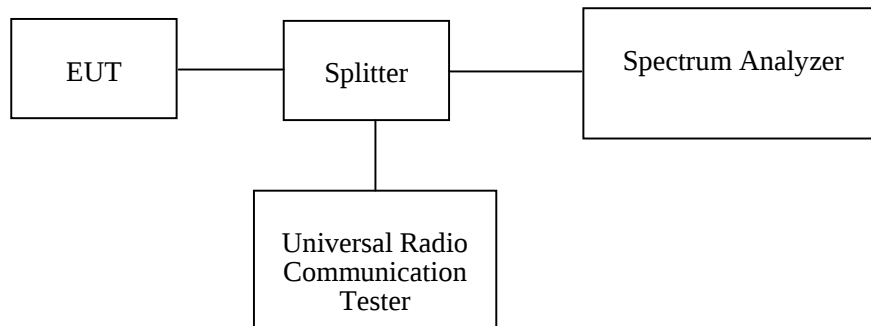
**FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH****Applicable Standard**

FCC §2.1049, §22.917, §22.905 and §24.238.

**Test Procedure**

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 3 kHz (Cellular /PCS) and the 26 dB & 99% bandwidth was recorded.

**Test Equipment List and Details**

| Manufacturer | Description       | Model  | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|--------|---------------|------------------|----------------------|
| R&S          | Spectrum analyzer | FSP 38 | 100478        | 2013-6-16        | 2014-6-15            |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

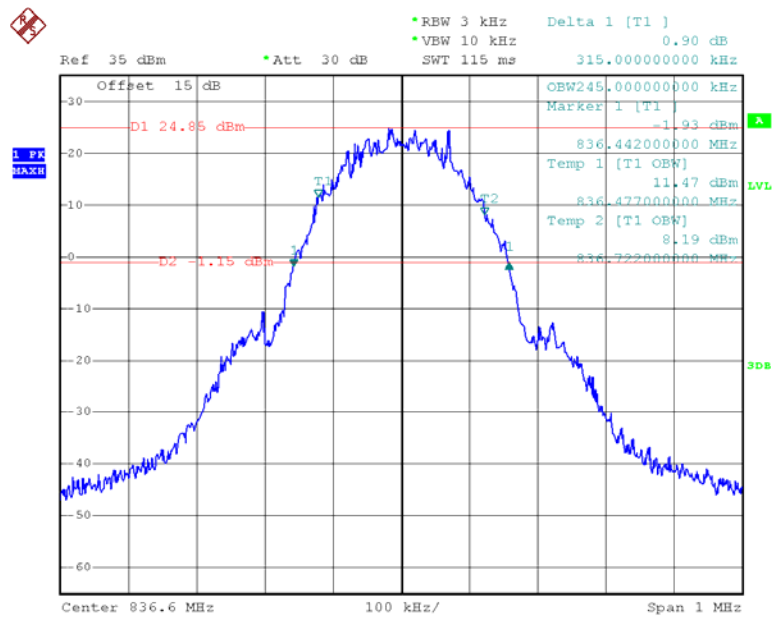
**Test Data****Environmental Conditions**

|                    |             |
|--------------------|-------------|
| Temperature:       | 25.9~28 °C  |
| Relative Humidity: | 59~65 %     |
| ATM Pressure:      | 99~100.1kPa |

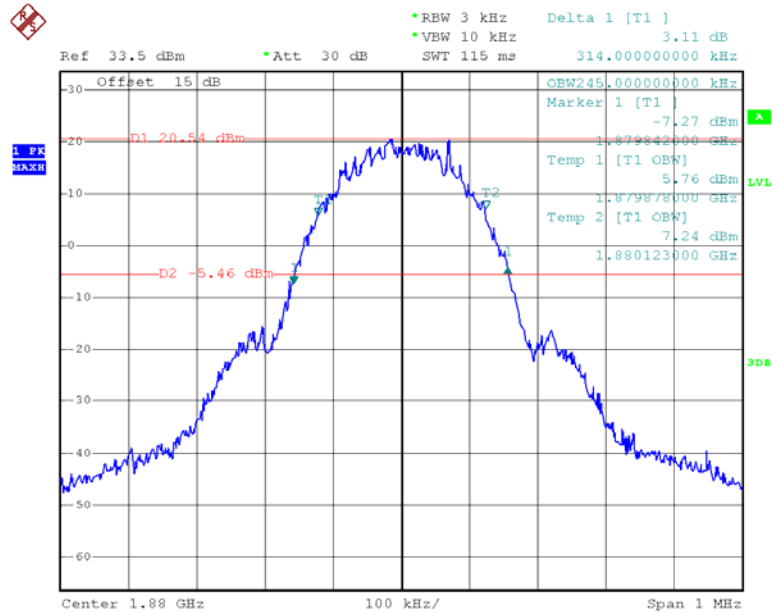
*The testing was performed by Leon Chen from 2013-08-20 to 2013-08-30.*

| Band             | Channel No. | Mode  | 99% Occupied Bandwidth | 26 dB Occupied Bandwidth |
|------------------|-------------|-------|------------------------|--------------------------|
|                  |             |       | MHz                    | MHz                      |
| Cellular         | 190         | GSM   | 0.245                  | 0.315                    |
| PCS              | 661         | GSM   | 0.245                  | 0.314                    |
| WCDMA<br>Band II | 9400        | WCMDA | 4.144                  | 4.732                    |
|                  |             | HSDPA | 4.16                   | 4.72                     |
|                  |             | HSUPA | 4.16                   | 4.736                    |

Please refer to the following plots.

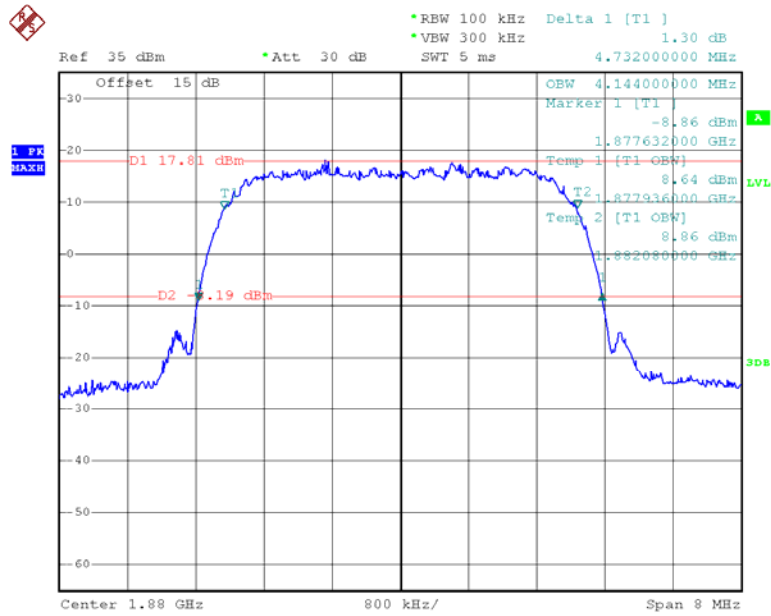
**GSM850**

Date: 20.AUG.2013 10:47:04

**GSM1900**

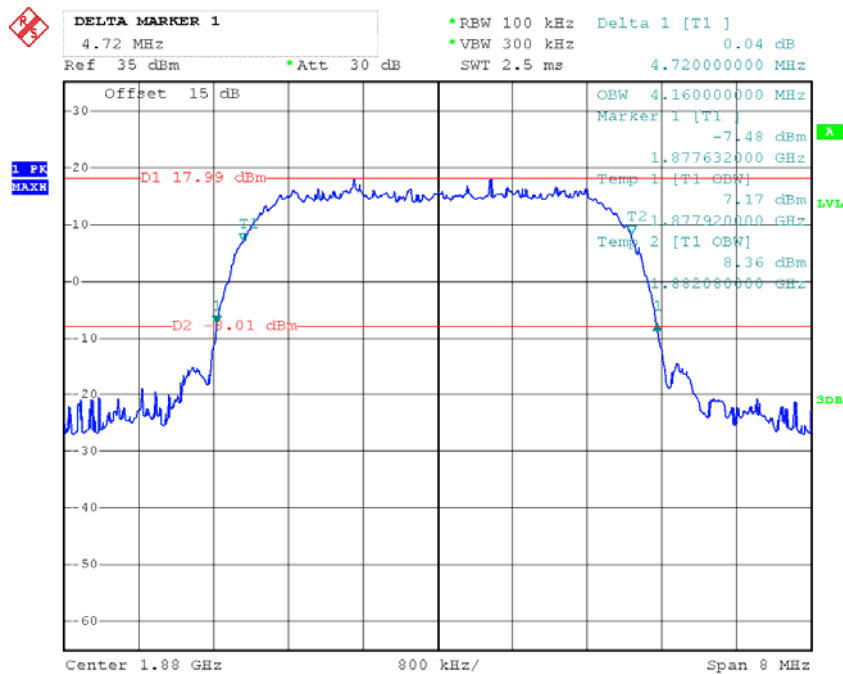
Date: 20.AUG.2013 10:24:52

# WCDMA



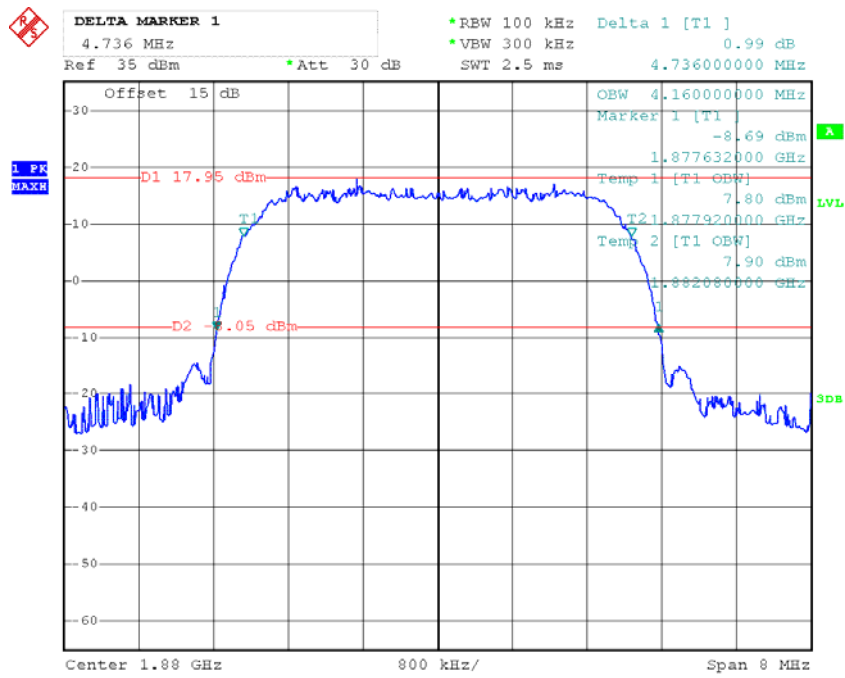
Date: 20.AUG.2013 10:51:57

# HSDPA



Date: 30.AUG.2013 10:08:23

# HSUPA



Date: 30.AUG.2013 10:09:30

## FCC §2.1051, §22.917(a) & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

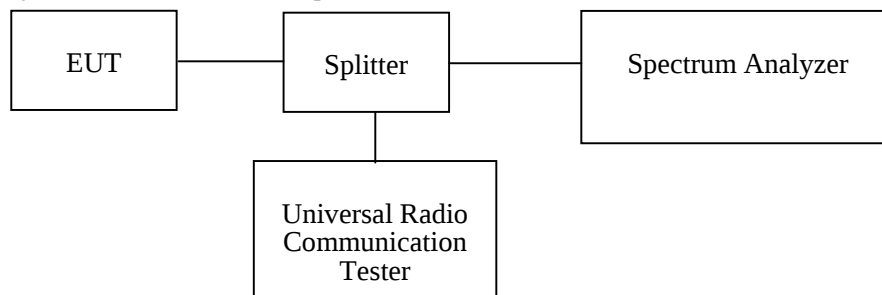
### Applicable Standard

FCC §2.1051, §22.917(a) and §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

### Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.



### Test Equipment List and Details

| Manufacturer | Description       | Model  | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|--------|---------------|------------------|----------------------|
| R&S          | Spectrum analyzer | FSP 38 | 100478        | 2013-6-16        | 2014-6-15            |

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

### Test Data

#### Environmental Conditions

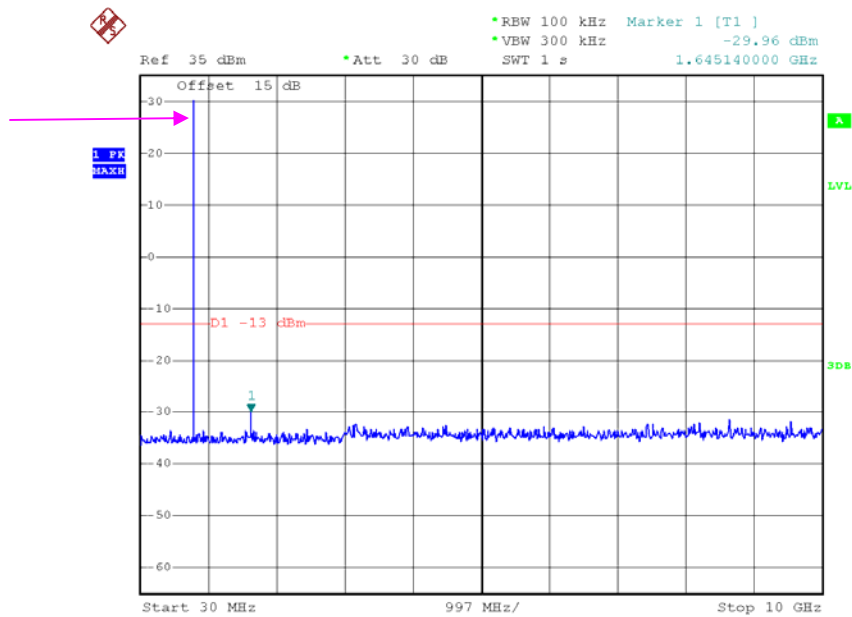
|                    |          |
|--------------------|----------|
| Temperature:       | 28 °C    |
| Relative Humidity: | 65 %     |
| ATM Pressure:      | 99.4 kPa |

*The testing was performed by Leon Chen on 2013-08-20.*

Please refer to the following plots.

### GSM850 Low Channel

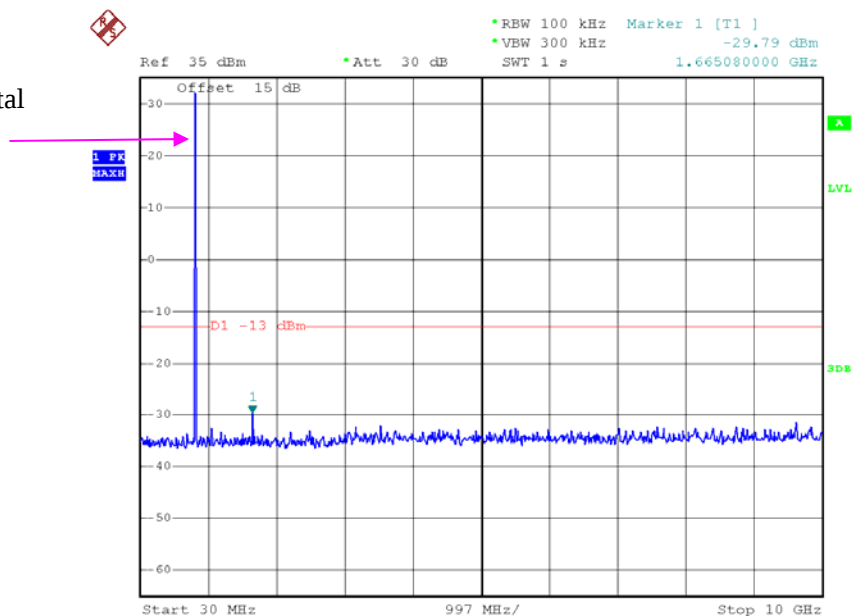
Fundamental



Date: 20.AUG.2013 10:37:05

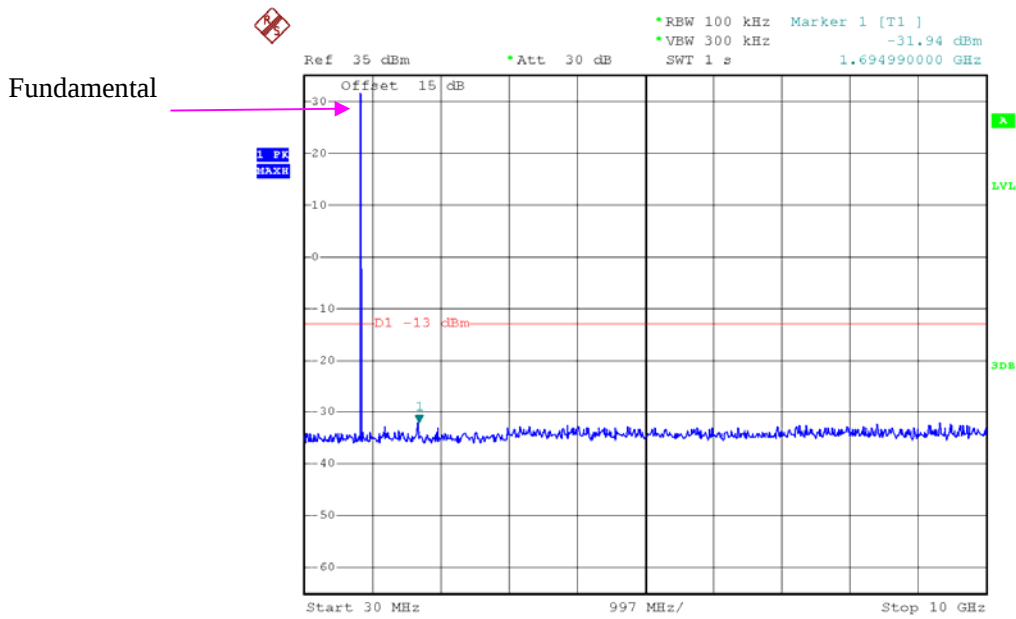
### GSM850 Middle Channel

Fundamental



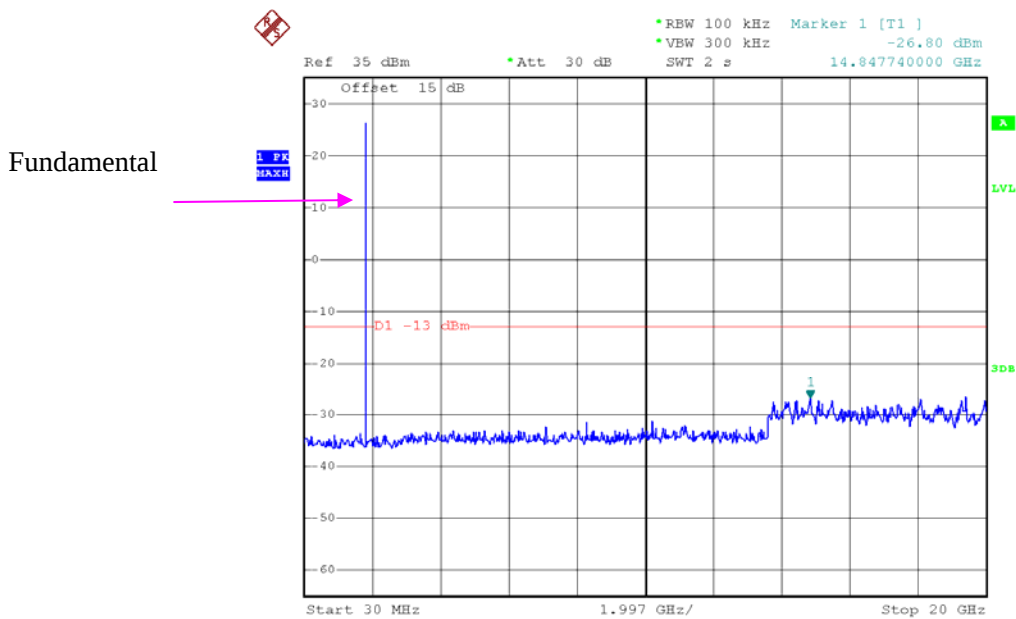
Date: 20.AUG.2013 10:37:54

### GSM850 High Channel



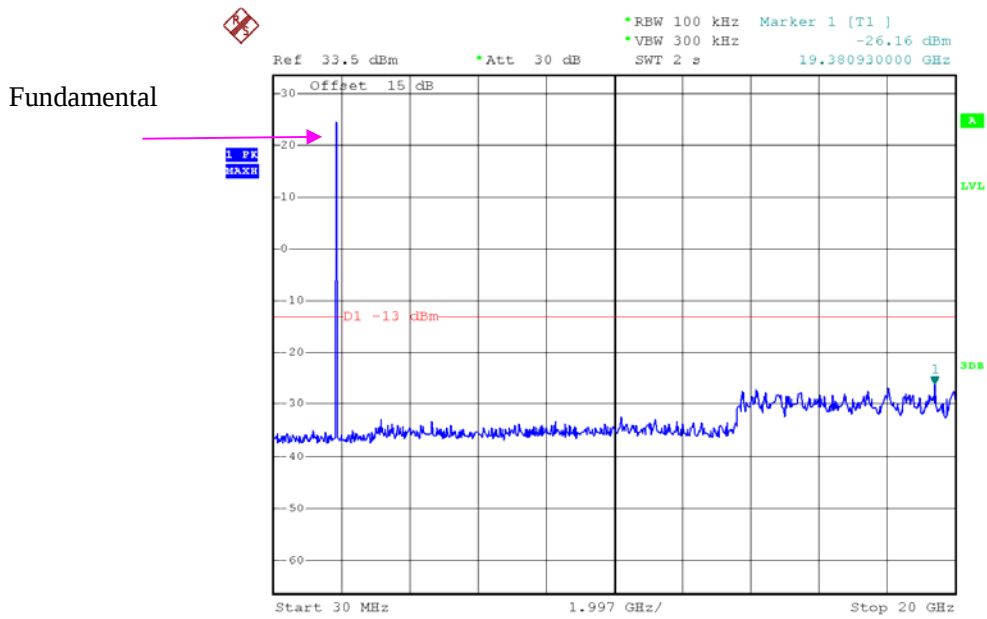
Date: 20.AUG.2013 10:40:00

### GSM1900 Low Channel



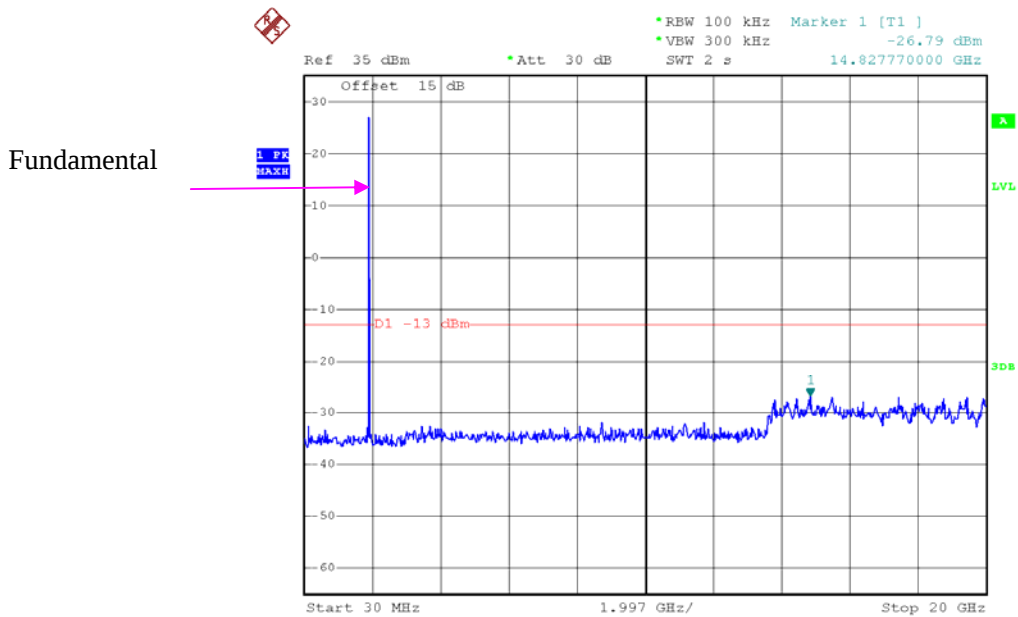
Date: 20.AUG.2013 10:31:31

### GSM1900 Middle Channel



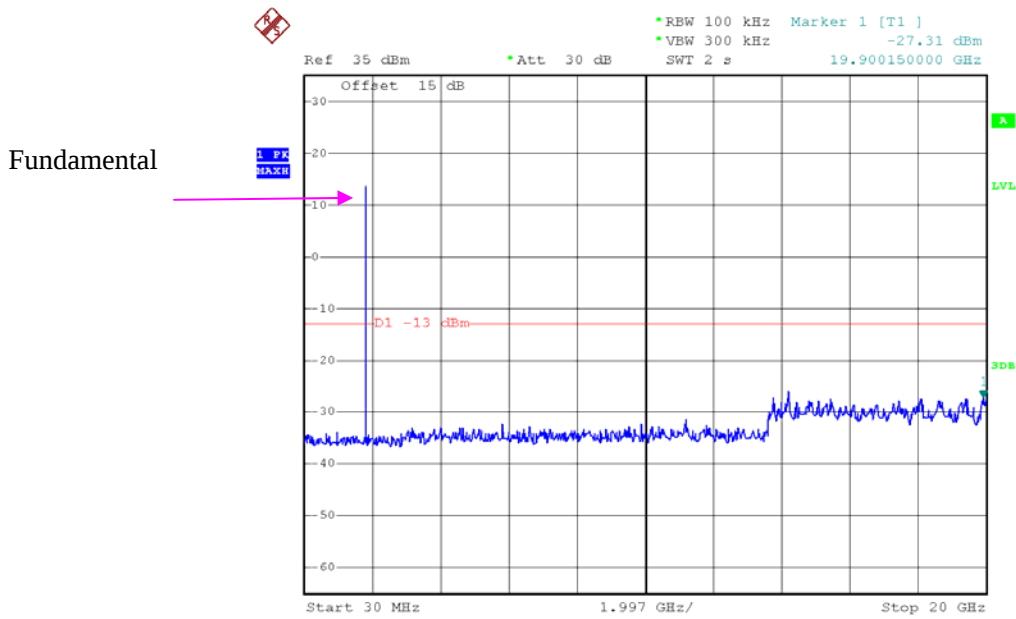
Date: 20.AUG.2013 10:27:23

### GSM1900 High Channel



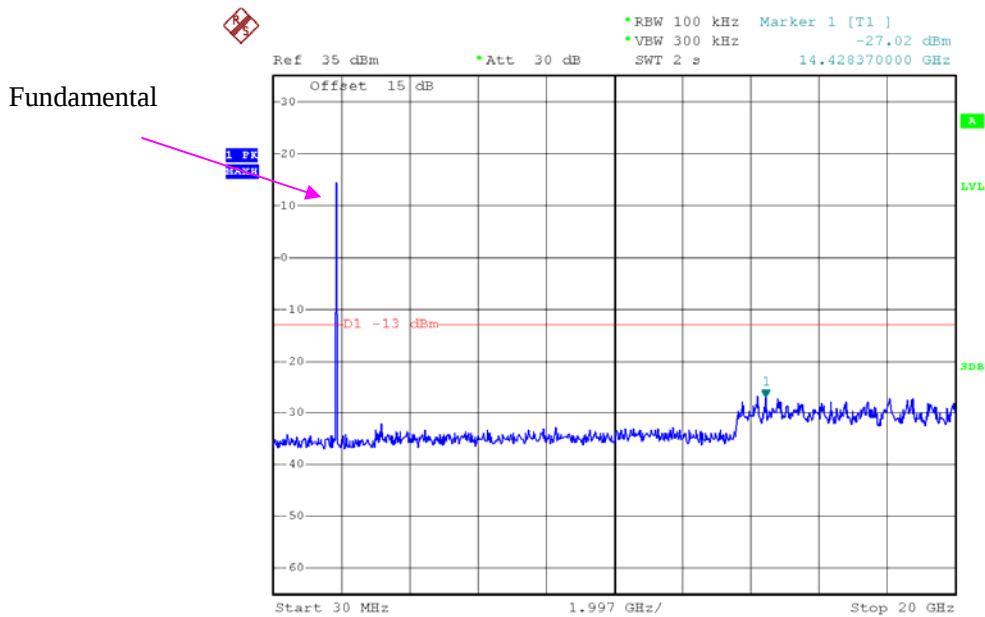
Date: 20.AUG.2013 10:30:36

### WCDMA Band II Low Channel



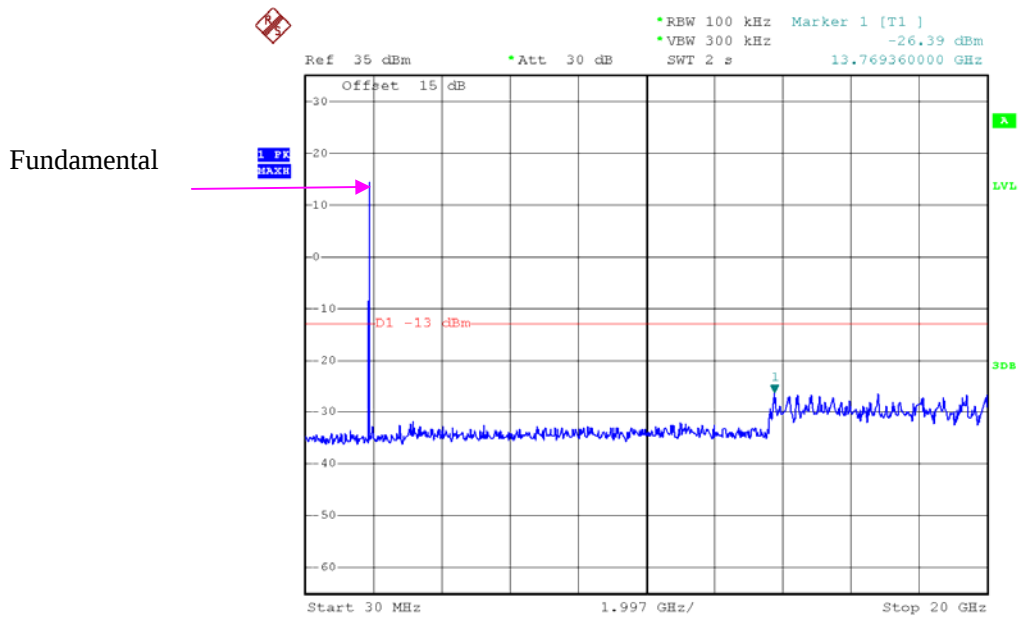
Date: 20.AUG.2013 10:57:49

### WCDMA Band II Channel



Date: 20.AUG.2013 10:57:01

# WCDMA Band II High Channel



Date: 20.AUG.2013 10:55:52

## FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS

### Applicable Standard

FCC § 2.1053, §22.917 and § 24.238.

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg(\text{TXpwr in Watts}/0.001)$  – the absolute level

Spurious attenuation limit in dB =  $43 + 10 \text{Log}_{10}(\text{power out in Watts})$

### Test Equipment List and Details

| Manufacturer   | Description               | Model      | Serial Number | Calibration Date | Calibration Due Date |
|----------------|---------------------------|------------|---------------|------------------|----------------------|
| R&S            | Spectrum analyzer         | FSEM 30    | 849016/001    | 2012-9-4         | 2013-9-3             |
| Sunol Sciences | Antenna                   | JB3        | A060611-1     | 2012-9-6         | 2015-9-5             |
| TDK RF         | horn antenna              | HRN-0118   | 130 084       | 2012-9-6         | 2015-9-5             |
| EMCO           | Adjustable dipole antenna | 3121C      | 9109-753      | N/A              | N/A                  |
| ETS LINDGREN   | horn antenna              | 3115       | 000 527 35    | 2012-9-6         | 2015-9-5             |
| HP             | Signal Generator          | 8648A      | 3426A00831    | 2012-11-29       | 2013-11-28           |
| Giga           | Signal Generator          | 1026       | 320408        | 2013-5-9         | 2014-5-8             |
| HP             | HP AMPLIFIER              | 8447E      | 2434A02181    | N/A              | N/A                  |
| Mini-Circuit   | Amplifier                 | ZVA-213-S+ | 54201245      | N/A              | N/A                  |
| R&S            | EMI TEST RECEIVER         | ESCI       | 100224        | 2013-5-6         | 2014-5-5             |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                           |         |
|---------------------------|---------|
| <b>Temperature:</b>       | 26.6 °C |
| <b>Relative Humidity:</b> | 66 %    |
| <b>ATM Pressure:</b>      | 99 kPa  |

The testing was performed by Leon Chen on 2013-08-22.

EUT Operation Mode: Transmitting

**GSM 850**

| Frequency                             | Polar | S.A<br>Reading | S.G.<br>Level | Antenna<br>Gain | Cable<br>Loss | Absolute<br>Level | Limit | Margin |
|---------------------------------------|-------|----------------|---------------|-----------------|---------------|-------------------|-------|--------|
| MHz                                   | H/V   | dBμV           | dBm           | dBd/dBi         | dB            | dBm               | dBm   | dB     |
| <b>Low Channel, fo = 824.2 MHz</b>    |       |                |               |                 |               |                   |       |        |
| 1648.400                              | H     | 45.45          | -55.7         | 10.5            | 1.5           | -46.7             | -13.0 | 33.7   |
| 1648.400                              | V     | 48.81          | -52.8         | 10.5            | 1.5           | -43.8             | -13.0 | 30.8   |
| 2472.600                              | H     | 36.71          | -61.3         | 12.9            | 2.6           | -51.0             | -13.0 | 38.0   |
| 2472.600                              | V     | 38.52          | -58.2         | 12.9            | 2.6           | -47.9             | -13.0 | 34.9   |
| 624.610                               | H     | 35.13          | -57           | 0.0             | 0.8           | -57.8             | -13.0 | 44.8   |
| 624.610                               | V     | 33.69          | -54.6         | 0.0             | 0.8           | -55.4             | -13.0 | 42.4   |
| <b>Middle Channel, fo = 836.6 MHz</b> |       |                |               |                 |               |                   |       |        |
| 1673.200                              | H     | 46.36          | -54.7         | 10.6            | 1.5           | -45.6             | -13.0 | 32.6   |
| 1673.200                              | V     | 49.21          | -52.2         | 10.6            | 1.5           | -43.1             | -13.0 | 30.1   |
| 2509.800                              | H     | 37.11          | -60.9         | 13.1            | 2.8           | -50.6             | -13.0 | 37.6   |
| 2509.800                              | V     | 39.43          | -57.7         | 13.1            | 2.8           | -47.4             | -13.0 | 34.4   |
| 624.580                               | H     | 35.26          | -56.8         | 0.0             | 0.8           | -57.6             | -13.0 | 44.6   |
| 624.580                               | V     | 33.71          | -54.6         | 0.0             | 0.8           | -55.4             | -13.0 | 42.4   |
| <b>High Channel, fo = 848.8 MHz</b>   |       |                |               |                 |               |                   |       |        |
| 1697.600                              | H     | 48.50          | -52.5         | 10.8            | 1.5           | -43.2             | -13.0 | 30.2   |
| 1697.600                              | V     | 49.54          | -51.6         | 10.8            | 1.5           | -42.3             | -13.0 | 29.3   |
| 2546.400                              | H     | 38.54          | -58           | 13.1            | 2.8           | -47.7             | -13.0 | 34.7   |
| 2546.400                              | V     | 41.73          | -55.4         | 13.1            | 2.8           | -45.1             | -13.0 | 32.1   |
| 624.960                               | H     | 35.57          | -56.5         | 0.0             | 0.8           | -57.3             | -13.0 | 44.3   |
| 624.960                               | V     | 33.52          | -54.8         | 0.0             | 0.8           | -55.6             | -13.0 | 42.6   |

**GSM 1900**

| Frequency                              | Polar | S.A.Reading | S.G.Level | Antenna Gain | Cable Loss | Absolute Level | Limit | Margin |
|----------------------------------------|-------|-------------|-----------|--------------|------------|----------------|-------|--------|
| MHz                                    | H/V   | dBμV        | dBm       | dBd/dBi      | dB         | dBm            | dBm   | dB     |
| <b>Low Channel, fo = 1850.2 MHz</b>    |       |             |           |              |            |                |       |        |
| 3700.400                               | H     | 35.08       | -59.7     | 14.0         | 2.5        | -48.2          | -13.0 | 35.2   |
| 3700.400                               | V     | 36.74       | -57.6     | 14.0         | 2.5        | -46.1          | -13.0 | 33.1   |
| 624.610                                | H     | 35.06       | -57       | 0.0          | 0.8        | -57.8          | -13.0 | 44.8   |
| 624.610                                | V     | 33.89       | -54.4     | 0.0          | 0.8        | -55.2          | -13.0 | 42.2   |
| <b>Middle Channel, fo = 1880.0 MHz</b> |       |             |           |              |            |                |       |        |
| 3760.000                               | H     | 35.84       | -58.5     | 13.8         | 2.9        | -47.6          | -13.0 | 34.6   |
| 3760.000                               | V     | 37.17       | -55.9     | 13.8         | 2.9        | -45.0          | -13.0 | 32.0   |
| 624.580                                | H     | 35.16       | -56.9     | 0.0          | 0.8        | -57.7          | -13.0 | 44.7   |
| 624.580                                | V     | 33.46       | -54.8     | 0.0          | 0.8        | -55.6          | -13.0 | 42.6   |
| <b>High Channel, fo = 1909.8 MHz</b>   |       |             |           |              |            |                |       |        |
| 3819.600                               | H     | 35.29       | -58.5     | 13.6         | 3.3        | -48.2          | -13.0 | 35.2   |
| 3819.600                               | V     | 37.33       | -54.8     | 13.6         | 3.3        | -44.5          | -13.0 | 31.5   |
| 624.960                                | H     | 33.66       | -58.4     | 0.0          | 0.8        | -59.2          | -13.0 | 46.2   |
| 624.960                                | V     | 33.29       | -55       | 0.0          | 0.8        | -55.8          | -13.0 | 42.8   |

**WCDMA Band II**

| Frequency                              | Polar | S.A.Reading | S.G.Level | Antenna Gain | Cable Loss | Absolute Level | Limit | Margin |
|----------------------------------------|-------|-------------|-----------|--------------|------------|----------------|-------|--------|
| MHz                                    | H/V   | dBμV        | dBm       | dBd/dBi      | dB         | dBm            | dBm   | dB     |
| <b>Low Channel, fo = 1852.4 MHz</b>    |       |             |           |              |            |                |       |        |
| 3704.800                               | H     | 44.27       | -50.4     | 13.9         | 2.5        | -39.0          | -13.0 | 26.0   |
| 3704.800                               | V     | 42.13       | -52.1     | 13.9         | 2.5        | -40.7          | -13.0 | 27.7   |
| 624.610                                | H     | 35.11       | -57       | 0.0          | 0.8        | -57.8          | -13.0 | 44.8   |
| 624.610                                | V     | 33.92       | -54.4     | 0.0          | 0.8        | -55.2          | -13.0 | 42.2   |
| <b>Middle Channel, fo = 1880.0 MHz</b> |       |             |           |              |            |                |       |        |
| 3760.000                               | H     | 44.05       | -50.2     | 13.8         | 2.9        | -39.3          | -13.0 | 26.3   |
| 3760.000                               | V     | 41.41       | -51.7     | 13.8         | 2.9        | -40.8          | -13.0 | 27.8   |
| 624.580                                | H     | 35.32       | -56.8     | 0.0          | 0.8        | -57.6          | -13.0 | 44.6   |
| 624.580                                | V     | 33.64       | -54.7     | 0.0          | 0.8        | -55.5          | -13.0 | 42.5   |
| <b>High Channel, fo = 1907.4 MHz</b>   |       |             |           |              |            |                |       |        |
| 3814.800                               | H     | 43.71       | -50.1     | 13.6         | 3.3        | -39.8          | -13.0 | 26.8   |
| 3814.800                               | V     | 40.35       | -51.8     | 13.6         | 3.3        | -41.5          | -13.0 | 28.5   |
| 624.960                                | H     | 35.19       | -56.9     | 0.0          | 0.8        | -57.7          | -13.0 | 44.7   |
| 624.960                                | V     | 33.26       | -55       | 0.0          | 0.8        | -55.8          | -13.0 | 42.8   |

Notes: No emissions were detected below 1GHz.

## FCC §22.917(a) & §24.238(a) - BAND EDGES

### Applicable Standard

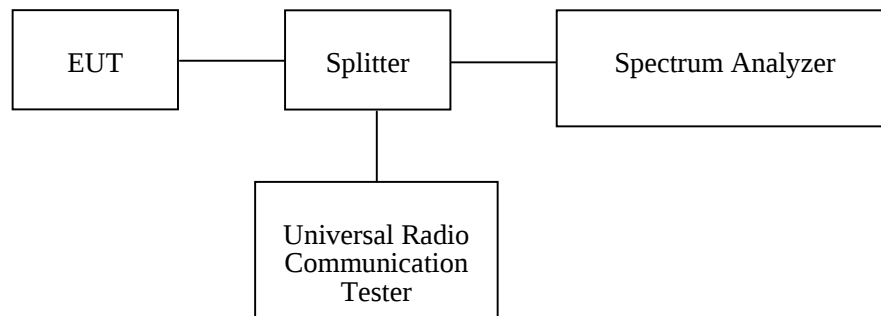
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to §24.238(a), the power of any emissions 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.

### Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency, RBW set to 3 kHz.



### Test Equipment List and Details

| Manufacturer | Description       | Model  | Serial Number | Calibration Date | Calibration Due Date |
|--------------|-------------------|--------|---------------|------------------|----------------------|
| R&S          | Spectrum analyzer | FSP 38 | 100478        | 2013-6-16        | 2014-6-15            |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

### Test Data

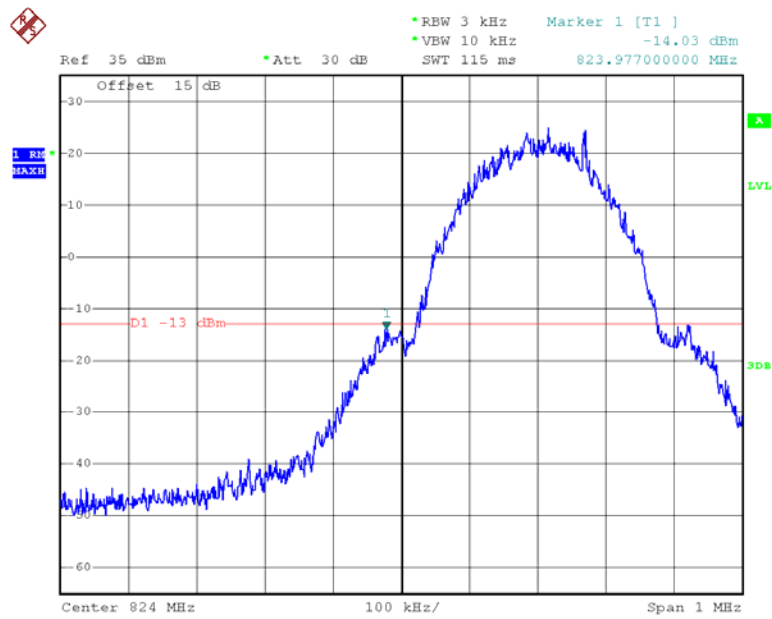
#### Environmental Conditions

|                    |              |
|--------------------|--------------|
| Temperature:       | 25.9~28 °C   |
| Relative Humidity: | 59~65 %      |
| ATM Pressure:      | 99~100.1 kPa |

*The testing was performed by Leon Chen from 2013-08-20 to 2013-08-30*

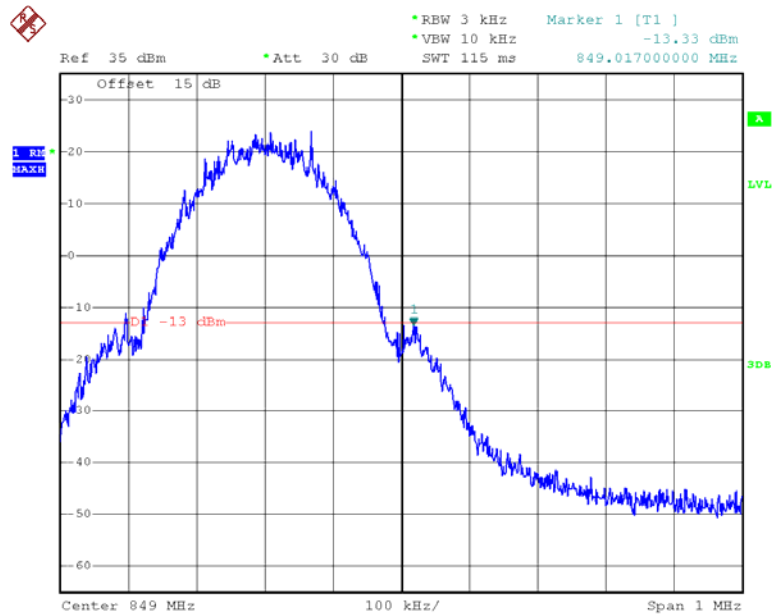
Please refer to the following tables and plots.

### Cellular Band, Left Band Edge



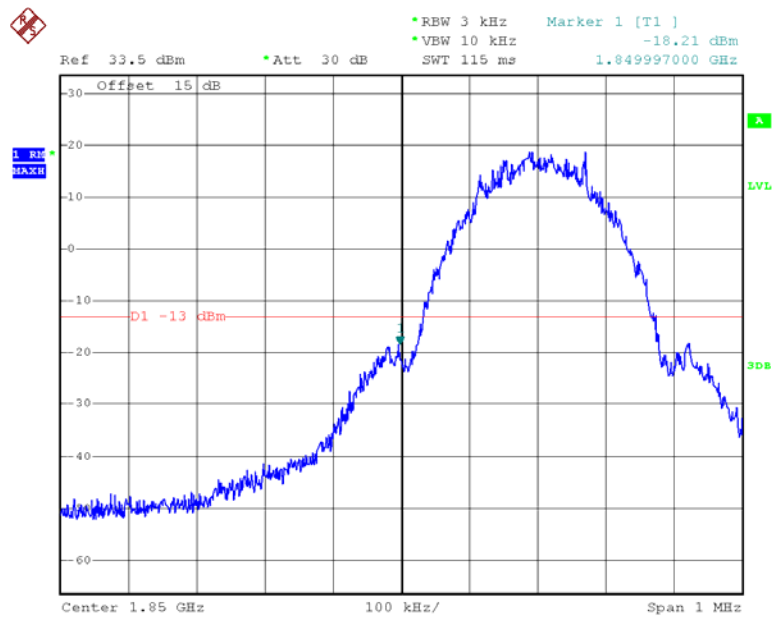
Date: 20.AUG.2013 10:44:19

### Cellular Band, Right Band Edge



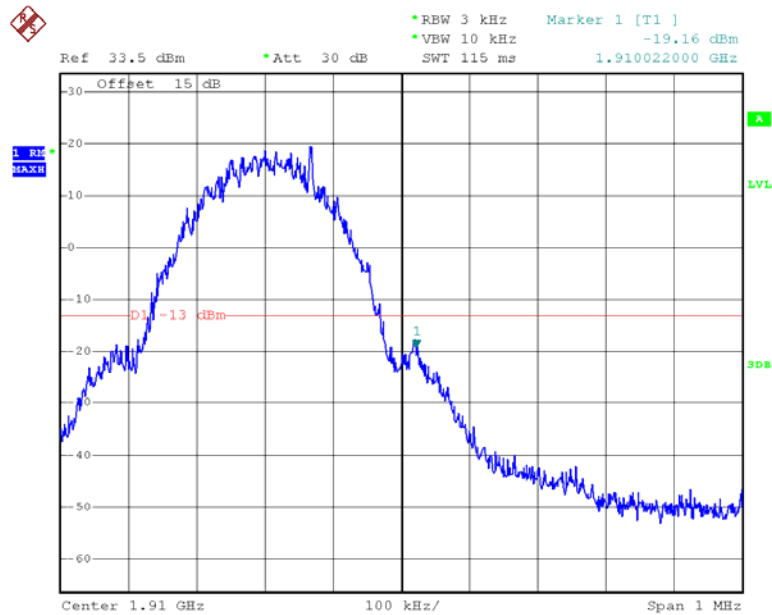
Date: 20.AUG.2013 10:42:06

### PCS Band, Left Band Edge



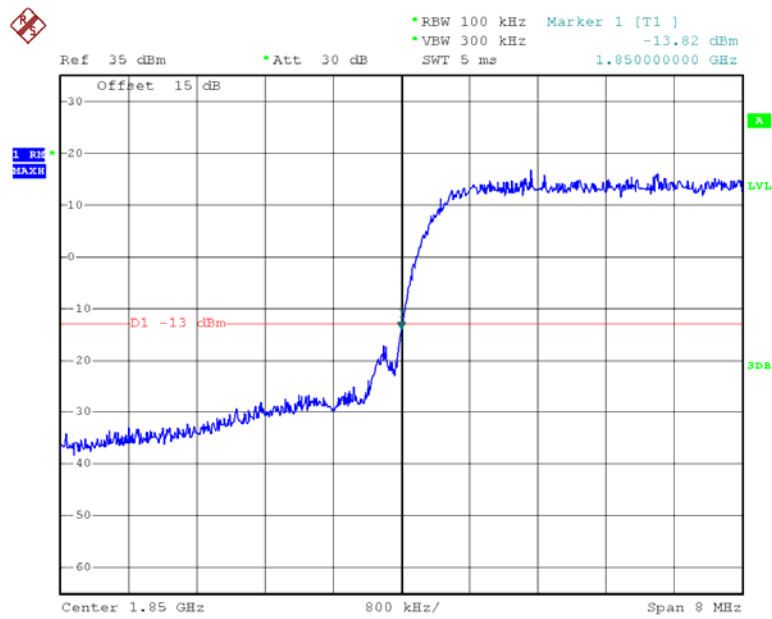
Date: 20.AUG.2013 10:20:28

### PCS Band, Right Band Edge



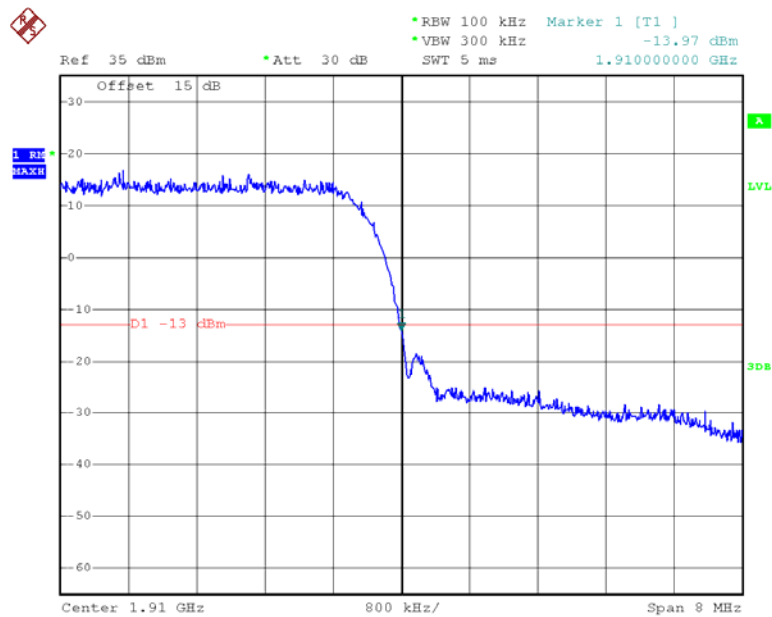
Date: 20.AUG.2013 10:21:27

### WCDMA Band II, Left Band Edge



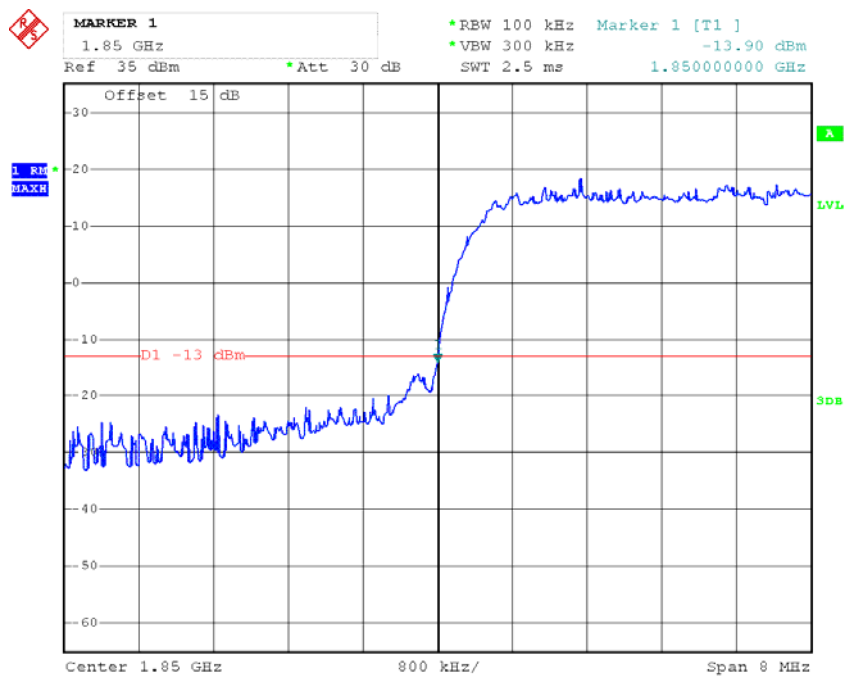
Date: 20.AUG.2013 10:54:12

### WCDMA Band II, Right Band Edge



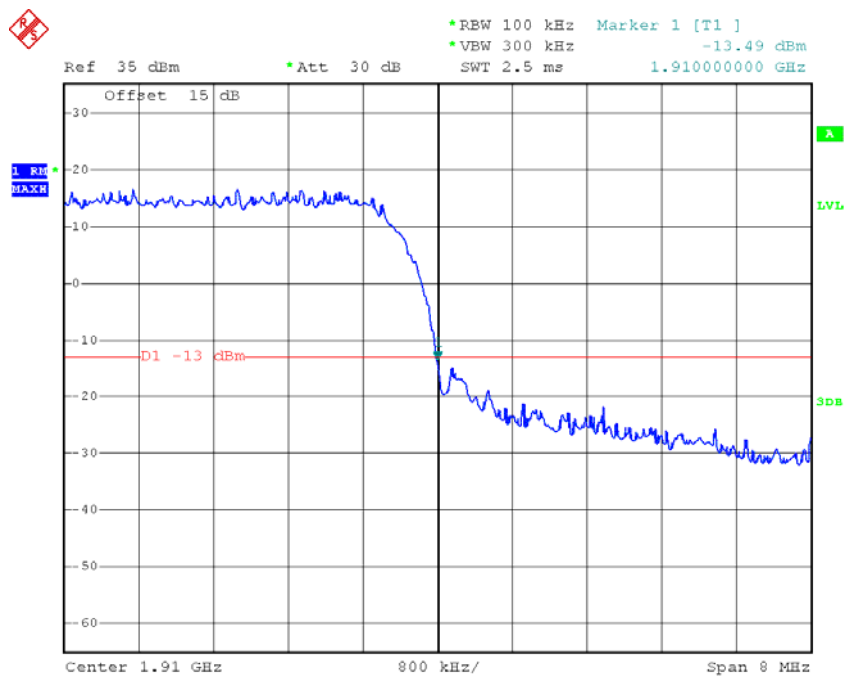
Date: 20.AUG.2013 10:55:00

## HSDPA, Left Band Edge



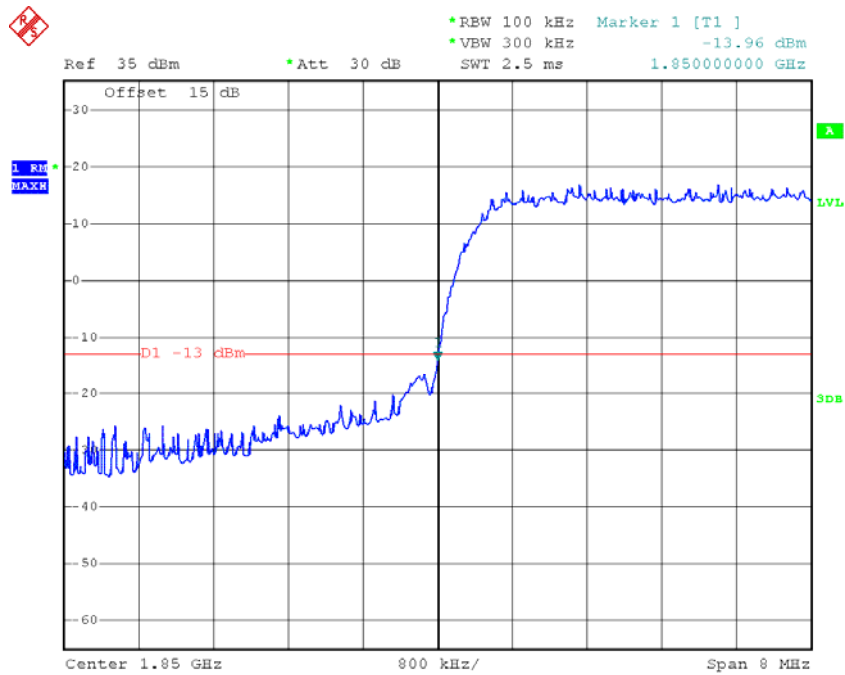
Date: 30.AUG.2013 10:24:11

## HSDPA, Right Band Edge



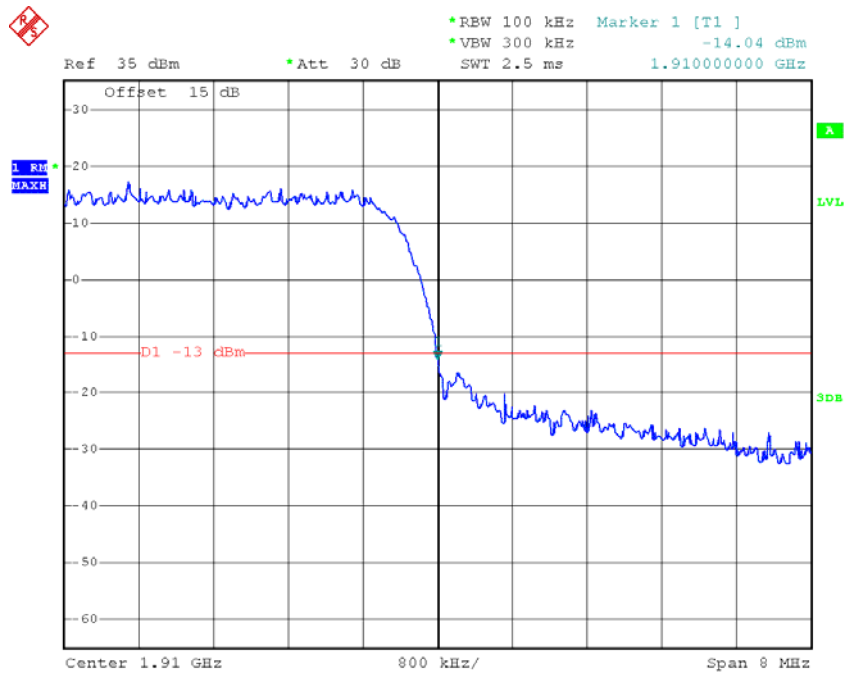
Date: 30.AUG.2013 10:27:01

### HSUPA, Left Band Edge



Date: 30.AUG.2013 10:24:50

### HSUPA, Right Band Edge



Date: 30.AUG.2013 10:27:10

## FCC §2.1055, §22.355 & §24.235 - FREQUENCY STABILITY

### Applicable Standard

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

| Frequency Range (MHz) | Base, fixed (ppm) | Mobile ≤ 3 watts (ppm) | Mobile ≤ 3 watts (ppm) |
|-----------------------|-------------------|------------------------|------------------------|
| 25 to 50              | 20.0              | 20.0                   | 50.0                   |
| 50 to 450             | 5.0               | 5.0                    | 50.0                   |
| 450 to 512            | 2.5               | 5.0                    | 5.0                    |
| 821 to 896            | 1.5               | 2.5                    | 2.5                    |
| 928 to 929.           | 5.0               | N/A                    | N/A                    |
| 929 to 960.           | 1.5               | N/A                    | N/A                    |
| 2110 to 2220          | 10.0              | N/A                    | N/A                    |

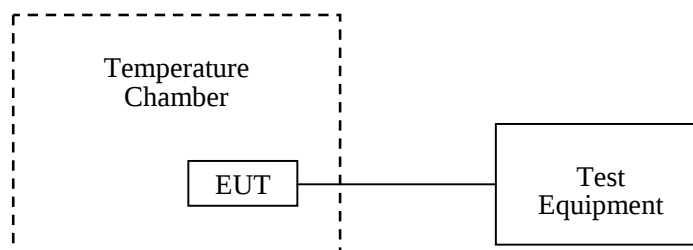
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### Test Procedure

**Frequency Stability vs. Temperature:** The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

**Frequency Stability vs. Voltage:** An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



**Test Equipment List and Details**

| Manufacturer | Description                          | Model  | Serial Number | Calibration Date | Calibration Due Date |
|--------------|--------------------------------------|--------|---------------|------------------|----------------------|
| Dongzhixu    | Humidity tester                      | DP1000 | 201105083-3   | 2013-7-3         | 2014-7-2             |
| R&S          | Universal Radio Communication Tester | CMU200 | 109 038       | 2013-5-2         | 2014-5-1             |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to National Primary Standards and International System of Units (SI).

**Test Data****Environmental Conditions**

|                    |          |
|--------------------|----------|
| Temperature:       | 25 °C    |
| Relative Humidity: | 56 %     |
| ATM Pressure:      | 100.0kPa |

The testing was performed by Leon Chen on 2012-08-15.

**Cellular Band (Part 22H)**

| Middle Channel, $f_c = 836.6$ MHz |                 |                 |                 |       |
|-----------------------------------|-----------------|-----------------|-----------------|-------|
| Temperature                       | Voltage         | Frequency Error | Frequency Error | Limit |
| °C                                | V <sub>DC</sub> | Hz              | ppm             | ppm   |
| -30                               | 3.7             | -3              | -0.004          | 2.5   |
| -20                               | 3.7             | 0               | 0.000           | 2.5   |
| -10                               | 3.7             | 2               | 0.002           | 2.5   |
| 0                                 | 3.7             | 5               | 0.006           | 2.5   |
| 10                                | 3.7             | 6               | 0.007           | 2.5   |
| 20                                | 3.7             | 7               | 0.008           | 2.5   |
| 30                                | 3.7             | 9               | 0.011           | 2.5   |
| 40                                | 3.7             | 12              | 0.014           | 2.5   |
| 50                                | 3.7             | 14              | 0.017           | 2.5   |
| 25                                | 3.6             | 17              | 0.020           | 2.5   |
| 25                                | 4.2             | 19              | 0.023           | 2.5   |

**PCS Band (Part 24E)**

| Middle Channel, $f_c = 1880.0$ MHz |                 |                 |                 |        |
|------------------------------------|-----------------|-----------------|-----------------|--------|
| Temperature                        | Voltage         | Frequency Error | Frequency Error | Result |
| °C                                 | V <sub>DC</sub> | Hz              | ppm             |        |
| -30                                | 3.7             | -36             | -0.019          | Pass   |
| -20                                | 3.7             | -32             | -0.017          | Pass   |
| -10                                | 3.7             | -30             | -0.016          | Pass   |
| 0                                  | 3.7             | -29             | -0.015          | Pass   |
| 10                                 | 3.7             | -27             | -0.014          | Pass   |
| 20                                 | 3.7             | -27             | -0.014          | Pass   |
| 30                                 | 3.7             | -25             | -0.013          | Pass   |
| 40                                 | 3.7             | -22             | -0.012          | Pass   |
| 50                                 | 3.7             | -20             | -0.011          | Pass   |
| 25                                 | 3.6             | -18             | -0.010          | Pass   |
| 25                                 | 4.2             | -16             | -0.009          | Pass   |

**WCDMA Band II**

| Middle Channel, $f_c = 1880.0$ MHz |                 |                 |                 |        |
|------------------------------------|-----------------|-----------------|-----------------|--------|
| Temperature                        | Voltage         | Frequency Error | Frequency Error | Result |
| °C                                 | V <sub>DC</sub> | Hz              | ppm             |        |
| -30                                | 3.7             | -15             | -0.008          | Pass   |
| -20                                | 3.7             | -11             | -0.006          | Pass   |
| -10                                | 3.7             | -8              | -0.004          | Pass   |
| 0                                  | 3.7             | -6              | -0.003          | Pass   |
| 10                                 | 3.7             | -3              | -0.002          | Pass   |
| 20                                 | 3.7             | -1              | -0.001          | Pass   |
| 30                                 | 3.7             | 2               | 0.001           | Pass   |
| 40                                 | 3.7             | 4               | 0.002           | Pass   |
| 50                                 | 3.7             | 8               | 0.004           | Pass   |
| 25                                 | 3.6             | 10              | 0.005           | Pass   |
| 25                                 | 4.2             | 13              | 0.007           | Pass   |

\*\*\*\*\* END OF REPORT \*\*\*\*\*