LABCODE: 500069-0

# FCC PART 22H, PART 24E

# MEASUREMENT AND TEST REPORT

For

## Techfaith Wireless Technology Group Limited

No.10A, Tower D2, IT Park, Electronic Town, Jiu Xian Qiao North Road, Chaoyang District, Beijing, China

## FCC ID: UJQT700

| Report Type: | Product Type: |
|---|---|
| Original Report | GSM /WCDMA mobile pad |

| | |
|---|---|
| **Test Engineer:** | Ares Liu |
| **Report Number:** | R2DG131217003-00E |
| **Report Date:** | 2014-02-26 |
| **Reviewed By:** | Ivan Cao<br>RF Leader |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.69 Pulongcun, Puxinhu Industrial Zone,<br>Tangxia, Dongguan, Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br>www.baclcorp.com.cn |

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

The *Techfaith Wireless Technology Group Limited*'s product, model number: *T700 (FCC ID: UJQT700)* (the "EUT") in this report was a *GSM /WCDMA mobile pad,* which was measured approximately: 21.3 cm (L) x 13.5 cm (W) x 2.0 cm (H), rated input voltage: DC 3.7 V from lithium battery or DC 5V from adapter.

Adapter information: ToughShield
Model: STC-A22O50I1500C40
Input: AC 100-240V, 50/60Hz, 0.3A
Output: DC 5.0V, 1.5A

** All measurement and test data in this report was gathered from production sample serial number: 131217003 (Assigned by BACL.Dongguan). The EUT was received on 2013-11-19.*

## Objective

This report is prepared on behalf of *Techfaith Wireless Technology Group Limited* in accordance with Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's 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 15B JBP submissions with FCC ID: *UJQT700*
FCC Part15C DSS submissions with FCC ID: *UJQT700 for Bluetooth BDR, EDR mode.*
FCC Part15C DTS submissions with FCC ID: *UJQT700 for Bluetooth LE mode.*
FCC Part15C DXX submissions with FCC ID: *UJQT700.*
FCC Part15C DTS submissions with FCC ID: *UJQT700 for wifi.*

## 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).

## 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.

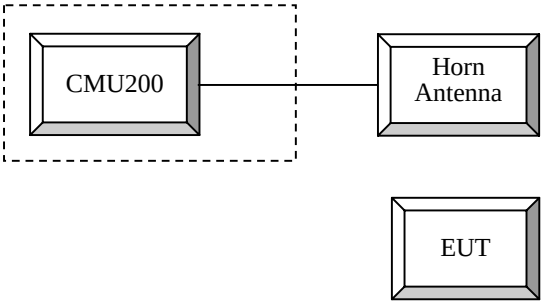
## Equipment Modifications

No modification was made to the EUT.

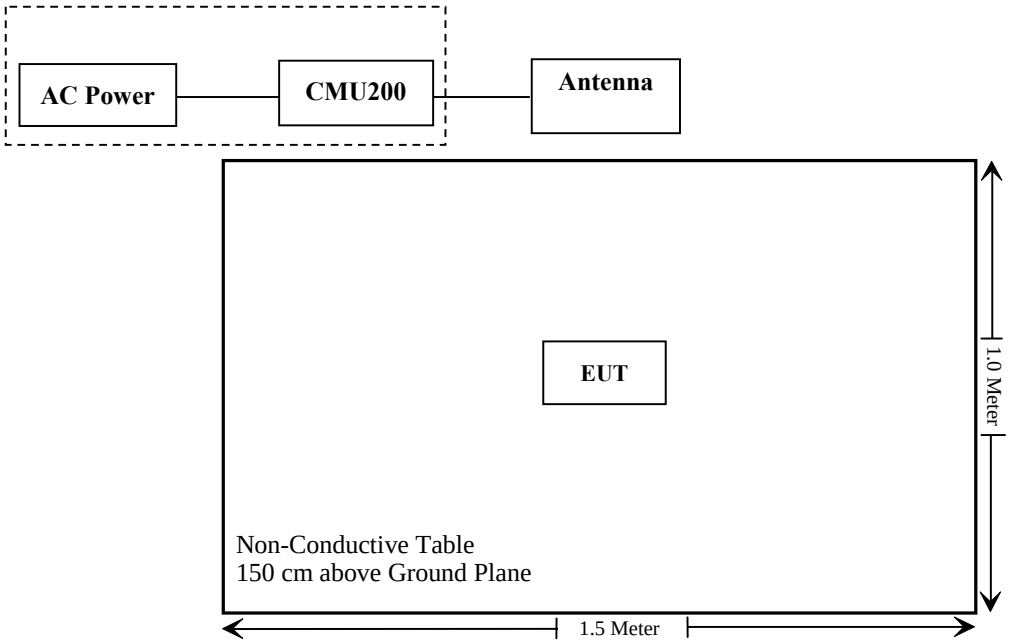
## Support Equipment List and Details

| 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 |

# FCC §1.1310 & §2.1093- RF EXPOSURE

## Applicable Standard

FCC§1.1310 and §2.1093.

## Test Result

Compliance, please refer to the SAR report: R1DG131217003-20.

# FCC §2.1047 - MODULATION CHARACTERISTIC

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 stabe)
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 stabe)
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 |
| | βc | Not Applicable |
| | βd | Not Applicable |
| | βec | Not Applicable |
| | βc/βd | 8/15 |
| | βhs | Not Applicable |
| | βed | 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 | | | |
| | βc | 2/15 | 12/15 | 15/15 | 15/15 |
| | βd | 15/15 | 15/15 | 8/15 | 4/15 |
| | βec | - | - | - | - |
| | βc/βd | 2/15 | 12/15 | 15/8 | 15/4 |
| | βhs | 4/15 | 24/15 | 30/15 | 30/15 |
| | βed | Not Applicable | | | |
| HSDPA Specific Settings | 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 = βhs/βc | 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 General Settings | Loopback Mode | Test Mode 1 | | | | |
| | Rel99 RMC | 12.2kbps RMC | | | | |
| | HSDPA FRC | H-Set1 | | | | |
| | HSUPA Test | HSUPA Loopback | | | | |
| | Power Control Algorithm | Algorithm2 | | | | |
| | βc | 11/15 | 6/15 | 15/15 | 2/15 | 15/15 |
| | βd | 15/15 | 15/15 | 9/15 | 15/15 | 0 |
| | βec | 209/225 | 12/15 | 30/15 | 2/15 | 5/15 |
| | βc/βd | 11/15 | 6/15 | 15/9 | 2/15 | - |
| | βhs | 22/15 | 12/15 | 30/15 | 4/15 | 5/15 |
| | βed | 1309/225 | 94/75 | 47/15<br>47/15 | 56/75 | 47/15 |
| HSDPA Specific Settings | 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 = βhs/βc | 30/15 | | | | |
| HSUPA Specific 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 | 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 | |

*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 |
|---|---|---|---|---|---|
| HP | Signal Generator | 8648A | 3426A00831 | 2013-11-06 | 2014-11-05 |
| Sunol Sciences | Antenna | JB3 | A060611-1 | 2011-09-06 | 2014-09-05 |
| EMCO | Adjustable dipole antenna | 3121C | 9109-753 | N/A | N/A |
| HP | Amplifier | 8447E | 2434A02181 | 2013-09-06 | 2014-09-05 |
| R&S | EMI Test Receiver | ESCI | 100224 | 2013-05-06 | 2014-05-05 |
| Giga | Signal Generator | 1026 | 320408 | 2013-05-09 | 2014-05-08 |
| Mini-Circuit | Amplifier | ZVA-213-S+ | 054201245 | 2013-2-19 | 2014-2-18 |
| TDK RF | Horn Antenna | HRN-0118 | 130 084 | 2012-09-06 | 2015-09-05 |
| ETS LINDGREN | Horn Antenna | 3115 | 000 527 35 | 2012-09-06 | 2015-09-05 |
| R&S | Spectrum Analyzer | FSEM | DE31388 | 2013-05-07 | 2014-05-06 |

*** 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:** | 18.6~23.5 °C |
| **Relative Humidity:** | 23~60 % |
| **ATM Pressure:** | 100.5~102.1 kPa |

*The testing was performed by Ares Liu from 2013-12-24 to 2014-02-18.*

### Conducted Power

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

| Band | Channel No. | Peak Output Power (dBm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GSM | GPRS 1 TX Slot | GPRS 2 TX Slot | GPRS 3 TX Slot | GPRS 4 TX Slot | EDGE 1 TX Slot | EDGE 2 TX Slot | EDGE 3 TX Slot | EDGE 4 TX Slot |
| Cellular | 128 | 31.59 | 31.41 | 30.69 | 29.1 | 27.27 | 26.7 | 25.61 | 23.25 | 21.11 |
| | 190 | 31.38 | 31.25 | 30.48 | 28.95 | 27.05 | 27 | 25.77 | 23.42 | 21.3 |
| | 251 | 31.38 | 31.23 | 30.53 | 28.94 | 27.08 | 27.02 | 25.76 | 23.4 | 21.26 |
| PCS | 512 | 28.49 | 28.25 | 27.16 | 25.06 | 22.35 | 26 | 25.78 | 24.64 | 22.57 |
| | 661 | 28.62 | 28.55 | 27.48 | 25.38 | 22.39 | 26.17 | 26.07 | 24.71 | 22.58 |
| | 810 | 28.84 | 28.42 | 27.34 | 25.27 | 22.35 | 26.12 | 26.05 | 24.92 | 22.65 |

**WCDMA Band II:**

| Mode | 3GPP Sub Test | Ave. 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 | 21.24 | 3.27 | 21.11 | 3.29 | 21.02 | 3.40 |
| HSDPA | 1 | 21.18 | 3.21 | 21.09 | 3.12 | 21.11 | 3.14 |
| | 2 | 21.14 | 3.17 | 20.97 | 3.00 | 21.10 | 3.13 |
| | 3 | 21.06 | 3.09 | 20.92 | 2.95 | 20.94 | 2.97 |
| | 4 | 20.92 | 2.95 | 20.90 | 2.93 | 20.89 | 2.92 |
| HSUPA | 1 | 21.07 | 3.10 | 20.88 | 2.91 | 20.91 | 2.94 |
| | 2 | 21.08 | 3.11 | 20.96 | 2.99 | 20.99 | 3.02 |
| | 3 | 21.01 | 3.04 | 20.83 | 2.86 | 20.92 | 2.95 |
| | 4 | 21.05 | 3.08 | 20.99 | 3.02 | 20.89 | 2.92 |
| | 5 | 20.81 | 2.84 | 20.76 | 2.79 | 20.77 | 2.80 |

**WCDMA Band V:**

| Mode | 3GPP Sub Test | Ave. 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 | 21.82 | 3.20 | 21.93 | 2.99 | 21.82 | 3.11 |
| HSDPA | 1 | 21.71 | 3.09 | 21.82 | 2.88 | 21.71 | 3.00 |
| | 2 | 21.68 | 3.06 | 21.79 | 2.85 | 21.68 | 2.97 |
| | 3 | 21.65 | 3.03 | 21.76 | 2.82 | 21.65 | 2.94 |
| | 4 | 21.74 | 3.12 | 21.85 | 2.91 | 21.74 | 3.03 |
| HSUPA | 1 | 21.78 | 3.16 | 21.89 | 2.95 | 21.78 | 3.07 |
| | 2 | 21.52 | 2.90 | 21.63 | 2.69 | 21.52 | 2.81 |
| | 3 | 21.59 | 2.97 | 21.7 | 2.76 | 21.59 | 2.88 |
| | 4 | 21.74 | 3.12 | 21.85 | 2.91 | 21.74 | 3.03 |
| | 5 | 21.63 | 3.01 | 21.74 | 2.80 | 21.63 | 2.92 |

ERP & EIRP

GSM:

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| **850 MHz Band** | | | | | | | | |
| 824.200 | H | 106.32 | 31.3 | 0.0 | 1 | 30.3 | 38.4 | 8.1 |
| 824.200 | V | 98.61 | 26.7 | 0.0 | 1 | 25.7 | 38.4 | 12.7 |
| 836.600 | H | 105.71 | 30.8 | 0.0 | 1 | 29.8 | 38.4 | 8.6 |
| 836.600 | V | 98.13 | 26.3 | 0.0 | 1 | 25.3 | 38.4 | 13.1 |
| 848.800 | H | 104.92 | 30.1 | 0.0 | 1 | 29.1 | 38.4 | 9.3 |
| 848.800 | V | 97.98 | 26.3 | 0.0 | 1 | 25.3 | 38.4 | 13.1 |
| **1900 MHz Band** | | | | | | | | |
| 1850.200 | H | 87.10 | 15.2 | 11.4 | 1.4 | 25.2 | 33.0 | 7.8 |
| 1850.200 | V | 89.91 | 18 | 11.4 | 1.4 | 28.0 | 33.0 | 5.0 |
| 1880.000 | H | 87.33 | 15.7 | 11.7 | 1.4 | 26.0 | 33.0 | 7.0 |
| 1880.000 | V | 89.39 | 17.9 | 11.7 | 1.4 | 28.2 | 33.0 | 4.8 |
| 1909.800 | H | 87.69 | 16.3 | 11.8 | 1.4 | 26.7 | 33.0 | 6.3 |
| 1909.800 | V | 88.92 | 17.9 | 11.8 | 1.4 | 28.3 | 33.0 | 4.7 |

EGPRS:

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| **850 MHz Band** | | | | | | | | |
| 824.200 | H | 102.11 | 27.1 | 0.0 | 1 | 26.1 | 38.4 | 12.3 |
| 824.200 | V | 97.90 | 26 | 0.0 | 1 | 25.0 | 38.4 | 13.4 |
| 836.600 | H | 101.83 | 26.9 | 0.0 | 1 | 25.9 | 38.4 | 12.5 |
| 836.600 | V | 97.35 | 25.6 | 0.0 | 1 | 24.6 | 38.4 | 13.8 |
| 848.800 | H | 100.89 | 26.1 | 0.0 | 1 | 25.1 | 38.4 | 13.3 |
| 848.800 | V | 96.78 | 25.1 | 0.0 | 1 | 24.1 | 38.4 | 14.3 |
| **1900 MHz Band** | | | | | | | | |
| 1850.200 | H | 87.32 | 15.5 | 11.4 | 1.4 | 25.5 | 33.0 | 7.5 |
| 1850.200 | V | 88.09 | 16.2 | 11.4 | 1.4 | 26.2 | 33.0 | 6.8 |
| 1880.000 | H | 87.63 | 16 | 11.7 | 1.4 | 26.3 | 33.0 | 6.7 |
| 1880.000 | V | 88.14 | 16.7 | 11.7 | 1.4 | 27.0 | 33.0 | 6.0 |
| 1909.800 | H | 86.64 | 15.3 | 11.8 | 1.4 | 25.7 | 33.0 | 7.3 |
| 1909.800 | V | 88.42 | 17.4 | 11.8 | 1.4 | 27.8 | 33.0 | 5.2 |

WCDMA Band II:

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBµV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| 1852.400 | H | 80.27 | 8.4 | 11.5 | 1.4 | 18.5 | 33.0 | 14.5 |
| 1852.400 | V | 84.48 | 12.6 | 11.5 | 1.4 | 22.7 | 33.0 | 10.3 |
| 1880.000 | H | 80.56 | 9 | 11.7 | 1.4 | 19.3 | 33.0 | 13.7 |
| 1880.000 | V | 84.87 | 13.4 | 11.7 | 1.4 | 23.7 | 33.0 | 9.3 |
| 1907.600 | H | 80.42 | 9 | 11.8 | 1.4 | 19.4 | 33.0 | 13.6 |
| 1907.600 | V | 84.78 | 13.7 | 11.8 | 1.4 | 24.1 | 33.0 | 8.9 |

WCDMA Band V:

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBµV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| 826.400 | H | 89.34 | 14.3 | 0.0 | 1 | 13.3 | 38.4 | 19.7 |
| 826.400 | V | 94.12 | 22.2 | 0.0 | 1 | 21.2 | 38.4 | 11.8 |
| 836.600 | H | 89.13 | 14.2 | 0.0 | 1 | 13.2 | 38.4 | 25.2 |
| 836.600 | V | 93.86 | 22.1 | 0.0 | 1 | 21.1 | 38.4 | 17.3 |
| 846.600 | H | 88.28 | 13.4 | 0.0 | 1 | 12.4 | 38.4 | 20.6 |
| 846.600 | V | 94.46 | 22.8 | 0.0 | 1 | 21.8 | 38.4 | 11.2 |

# FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH

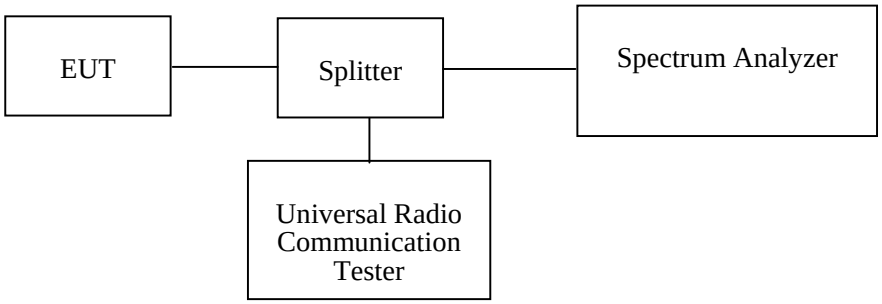
## Applicable Standard

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 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 | 2013-06-16 | 2014-06-15 |

*** 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

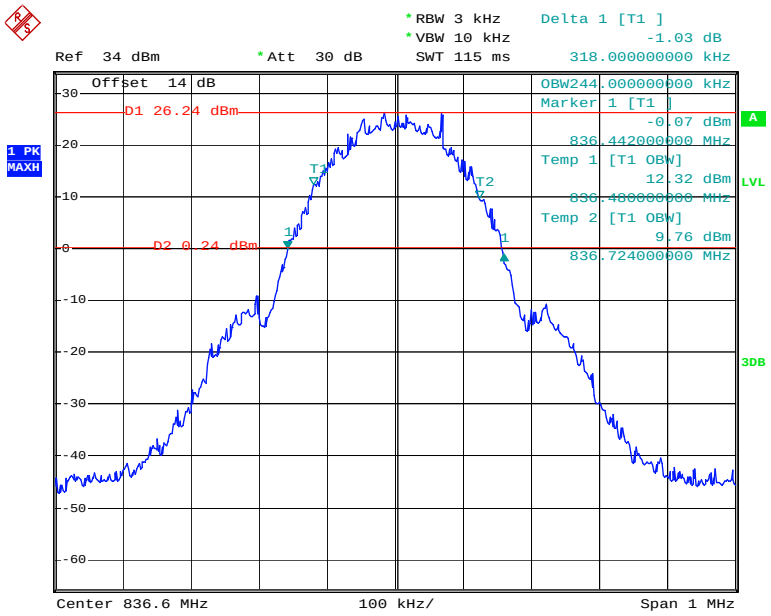
| | |
|---|---|
| **Temperature:** | 18.6~23.5 °C |
| **Relative Humidity:** | 23~60 % |
| **ATM Pressure:** | 100.5~102.1 kPa |

*The testing was performed by Ares Liu from 2013-12-25 to 2014-02-18.*

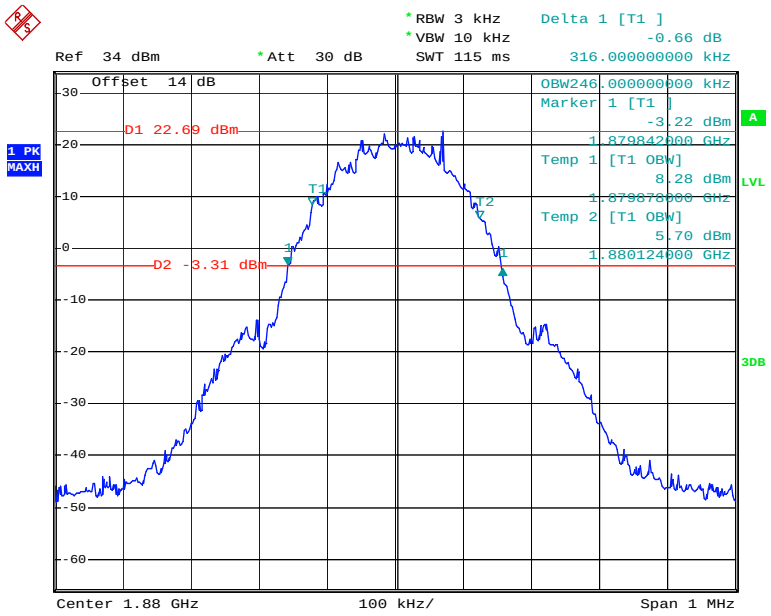
| Band | Channel No. | Mode | 99% Occupied Bandwidth | 26 dB Occupied Bandwidth |
|---|---|---|---|---|
| | | | kHz | kHz |
| Cellular | 190 | GMSK | 244 | 318 |
| | | 8DPSK | 242 | 318 |
| PCS | 661 | GMSK | 246 | 316 |
| | | 8DPSK | 244 | 310 |
| WCDMA Band Ⅱ | 9400 | Rel99 | 4160 | 4720 |
| | | HSDPA | 4160 | 4720 |
| | | HSUPA | 4160 | 4720 |
| WCDMA Band V | 4183 | Rel99 | 4144 | 4720 |
| | | HSDPA | 4160 | 4720 |
| | | HSUPA | 4144 | 4720 |

Please refer to the following plots.

**GMSK Cellular Band**

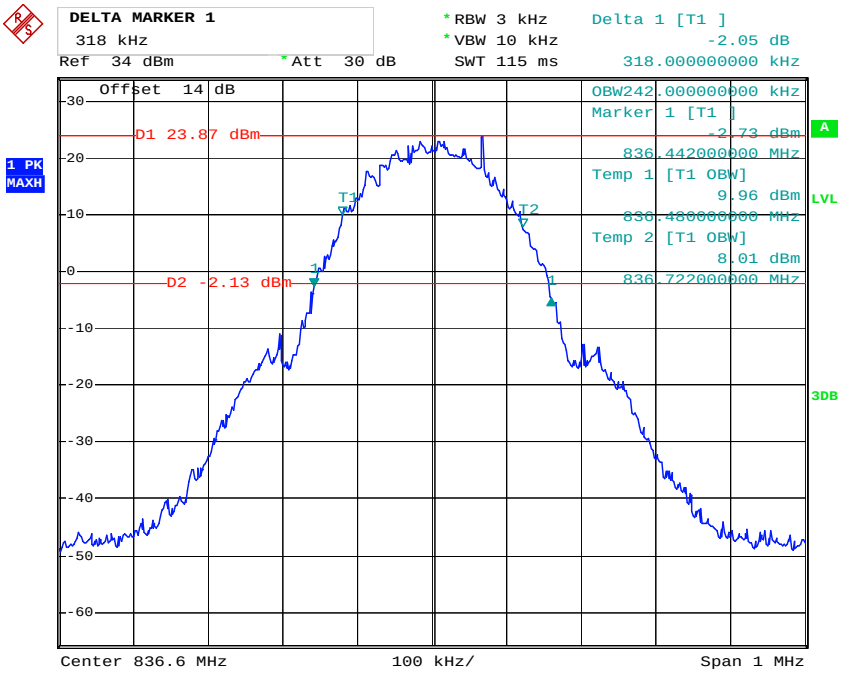


## GMSK PCS Band



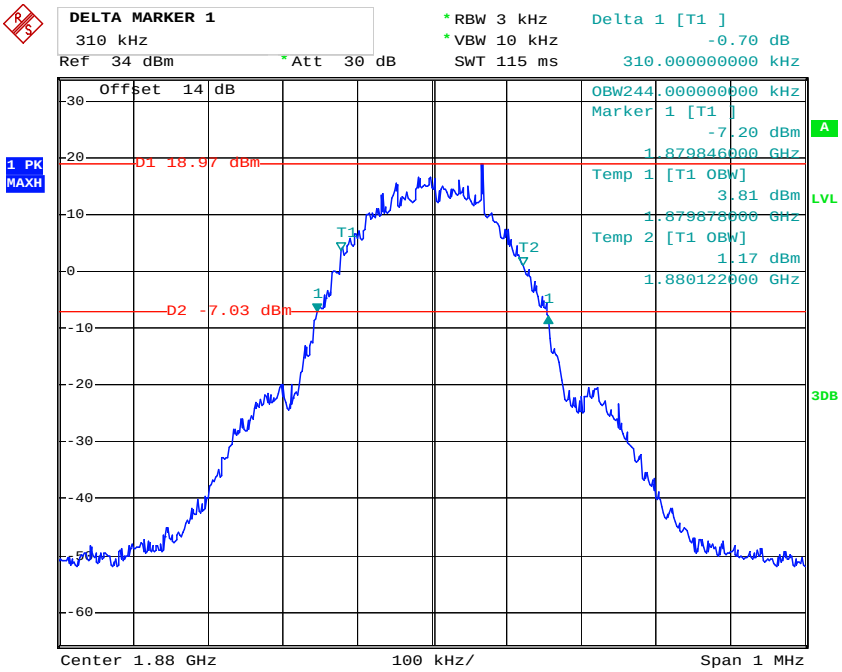

Date: 25.DEC.2013 14:59:14

## 8DPSK Cellular Band



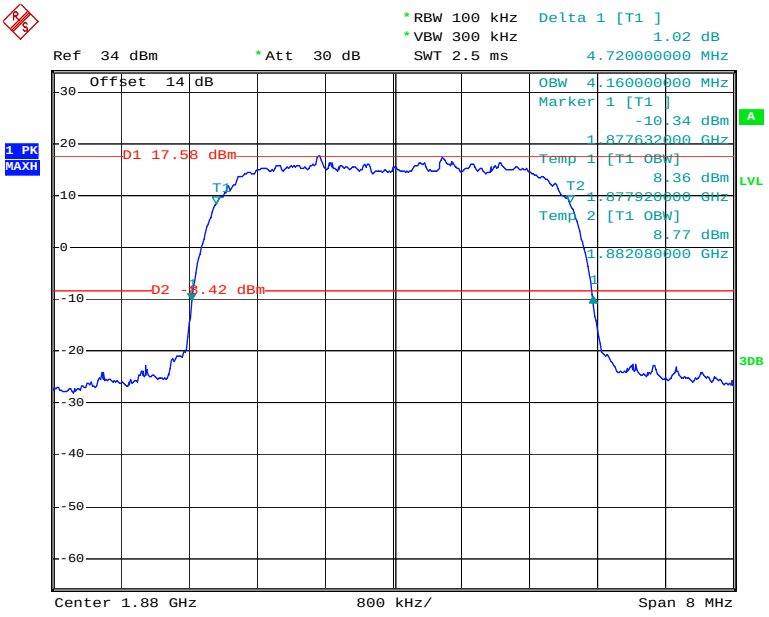

Date: 25.DEC.2013 17:42:21

## 8DPSK PCS 1900



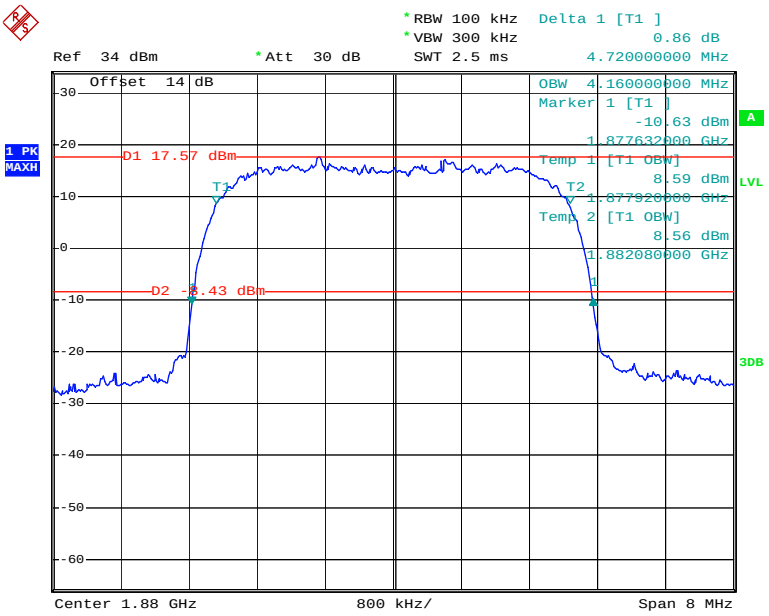

Date: 25.DEC.2013 17:44:06

## WCDMA Band II



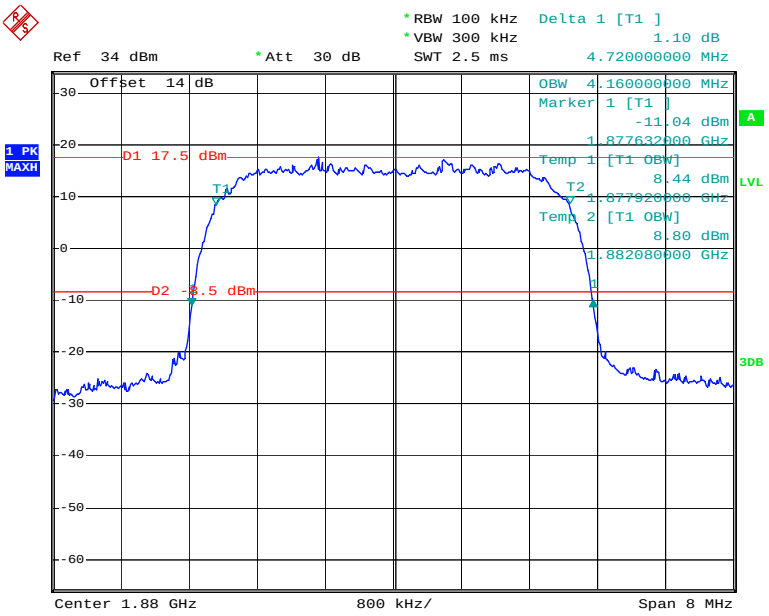

Date: 25.DEC.2013 11:34:57

## HSDPA Band II



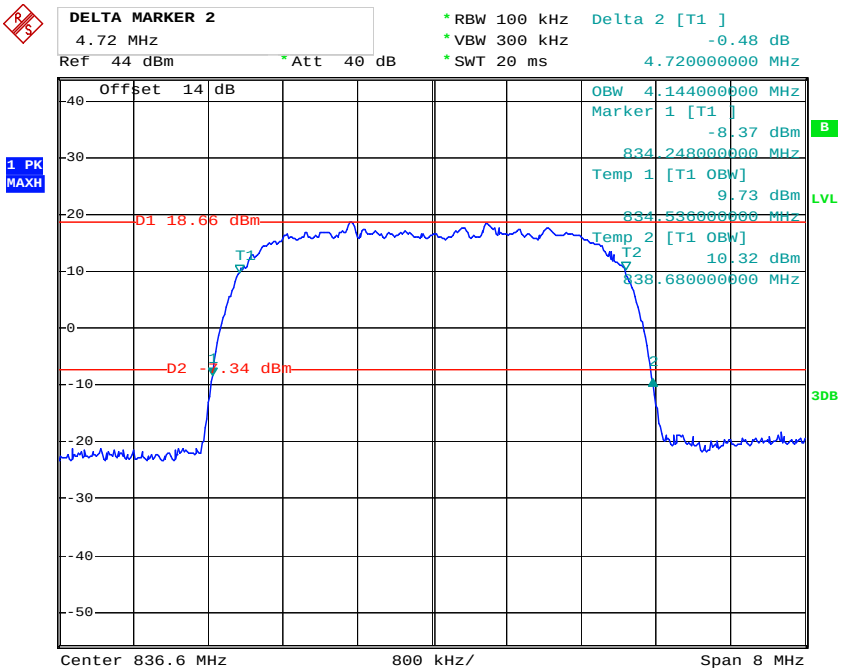

Date: 25.DEC.2013 11:37:25

## HSUPA Band II



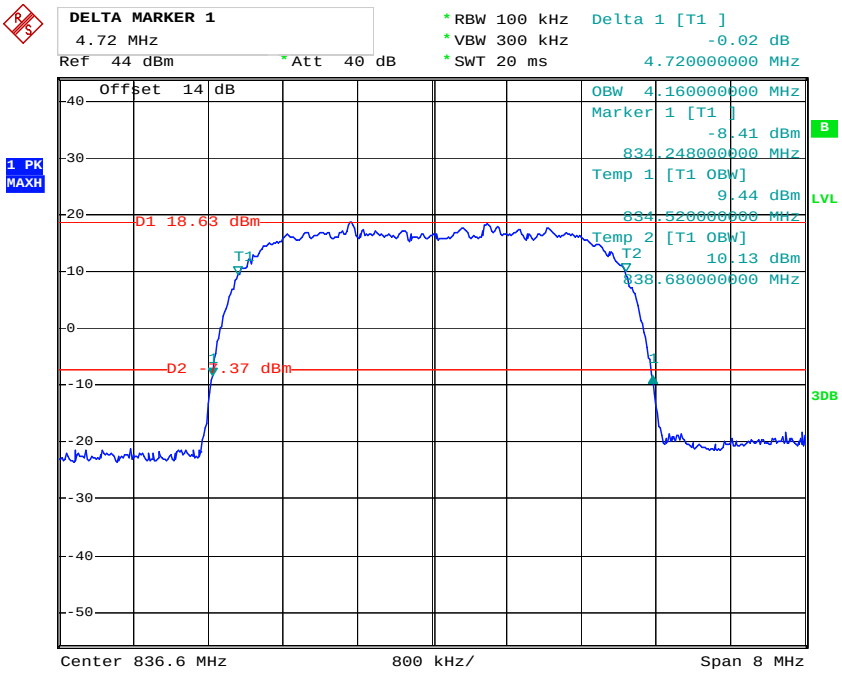

Date: 25.DEC.2013 11:38:41

## WCDMA Band V



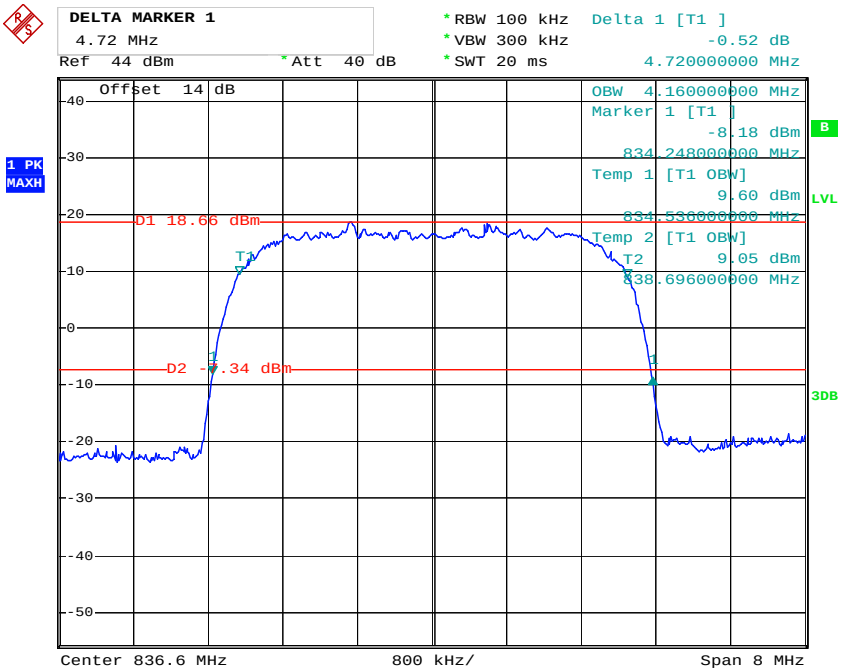

Date: 18.FEB.2014 11:26:58

## HSDPA Band V




Date: 18.FEB.2014 11:32:00

## HSUPA Band V




Date: 18.FEB.2014 11:28:18

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

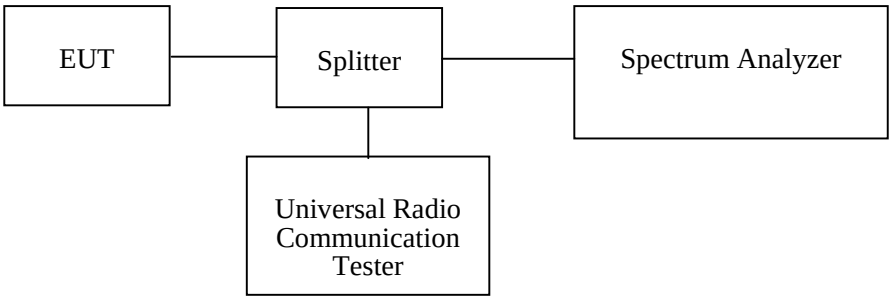
## Applicable Standard

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. Sufficient scans were taken to show any out of band emissions up to 10$^{th}$ 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

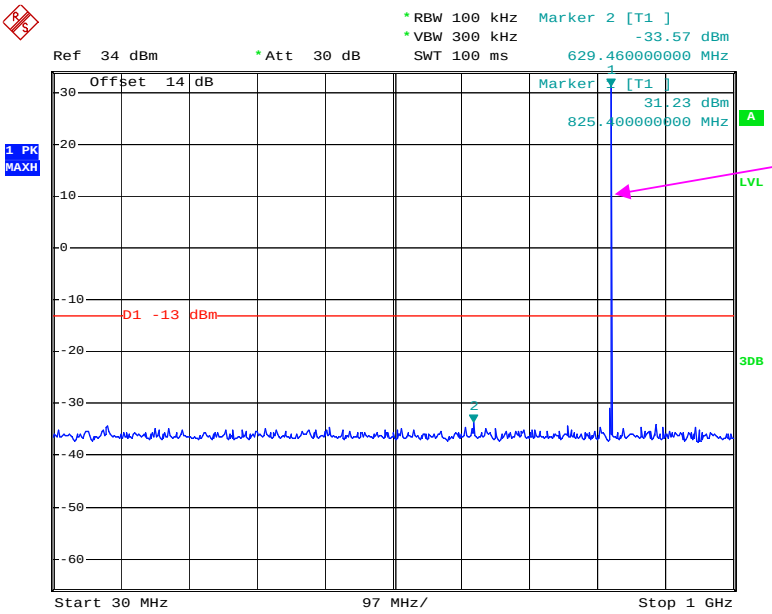
### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 18.6~23.5 °C |
| **Relative Humidity:** | 23~60 % |
| **ATM Pressure:** | 100.5~102.1 kPa |

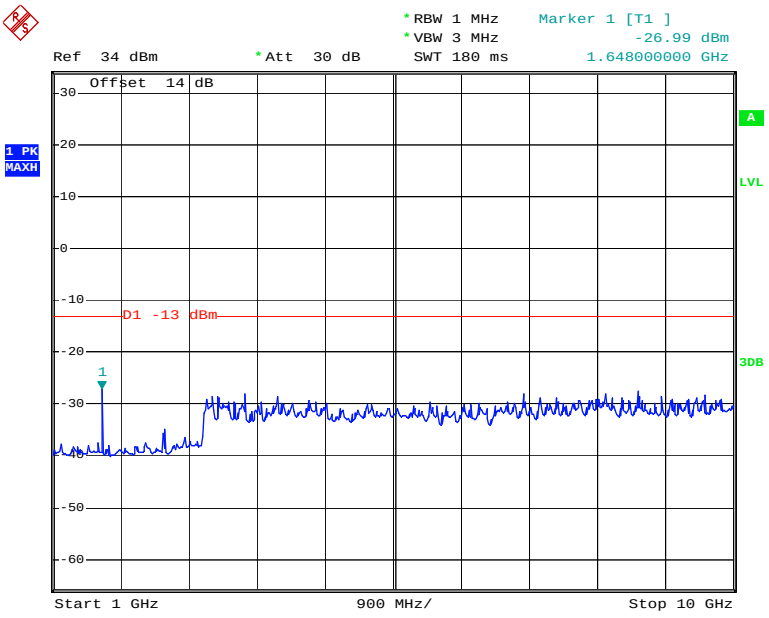
*The testing was performed by Ares Liu from 2013-12-25 to 2014-02-18.*

Please refer to the following plots.

## GSM850 Low Channel

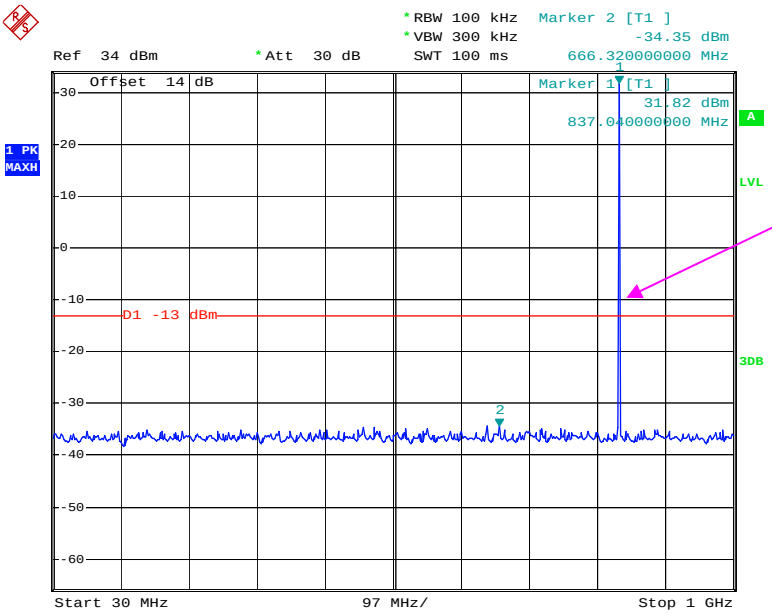



Date: 25.DEC.2013 14:41:39



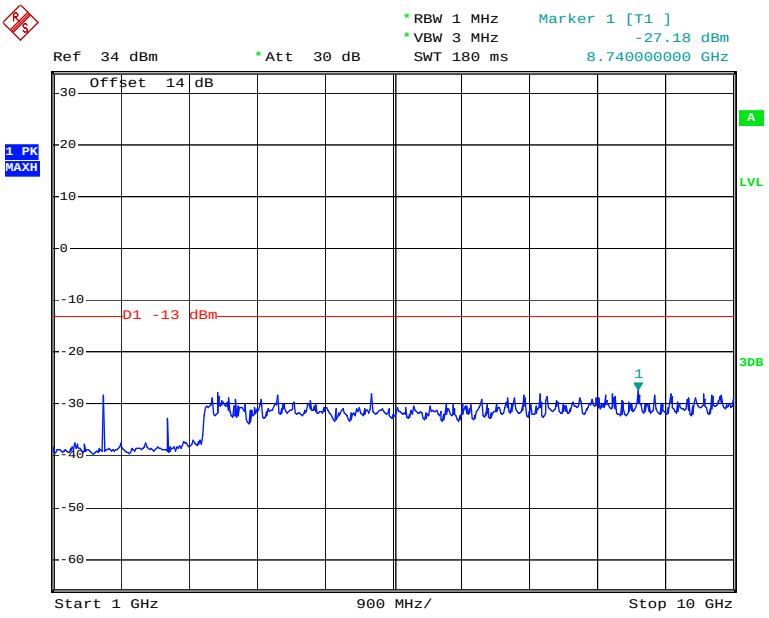

Date: 25.DEC.2013 14:42:04

## GSM850 Middle Channel



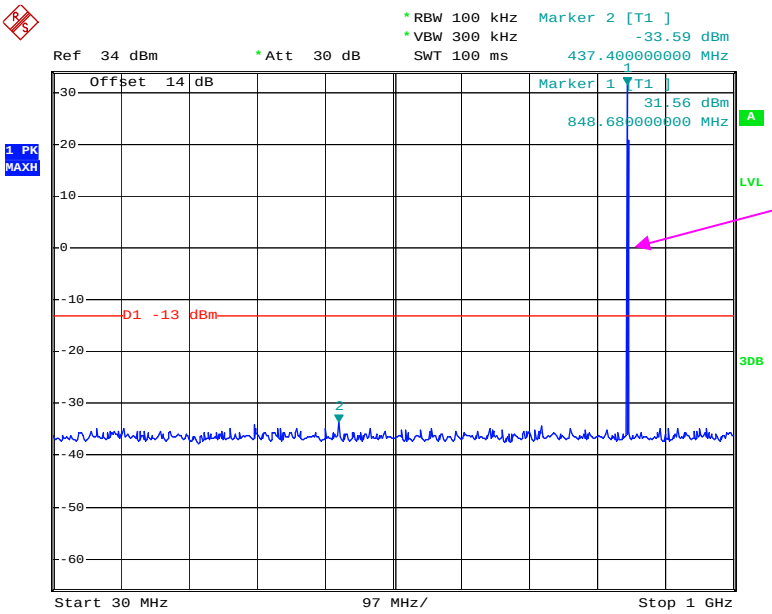

Fundamental

Date: 25.DEC.2013 14:43:16



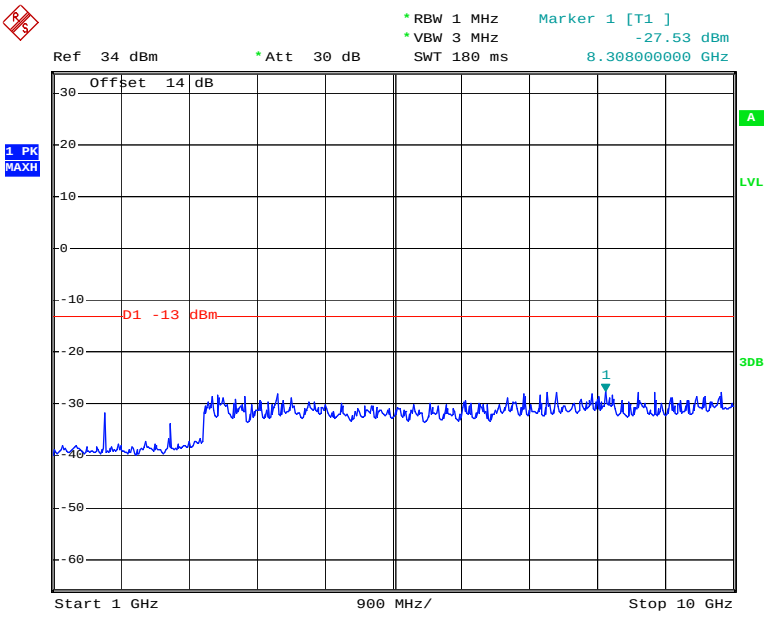

Date: 25.DEC.2013 14:42:50

## GSM850 High Channel



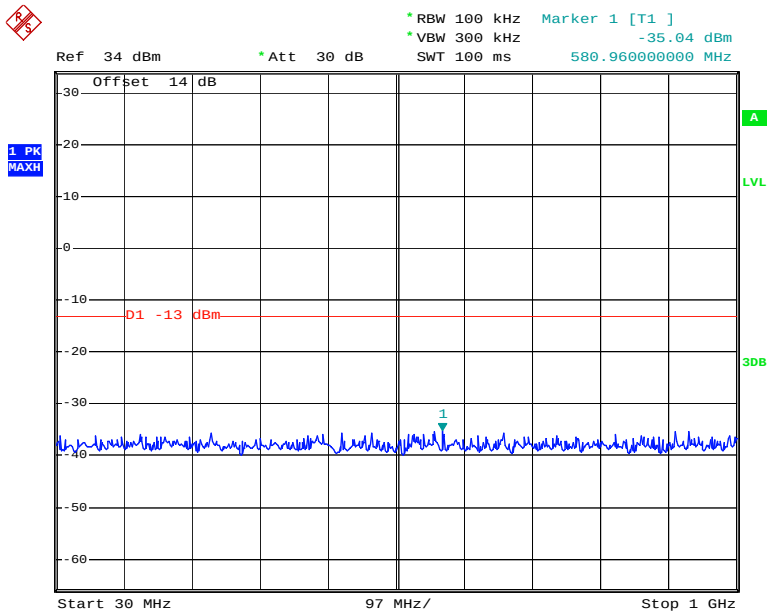

Fundamental

Date: 25.DEC.2013 14:43:48

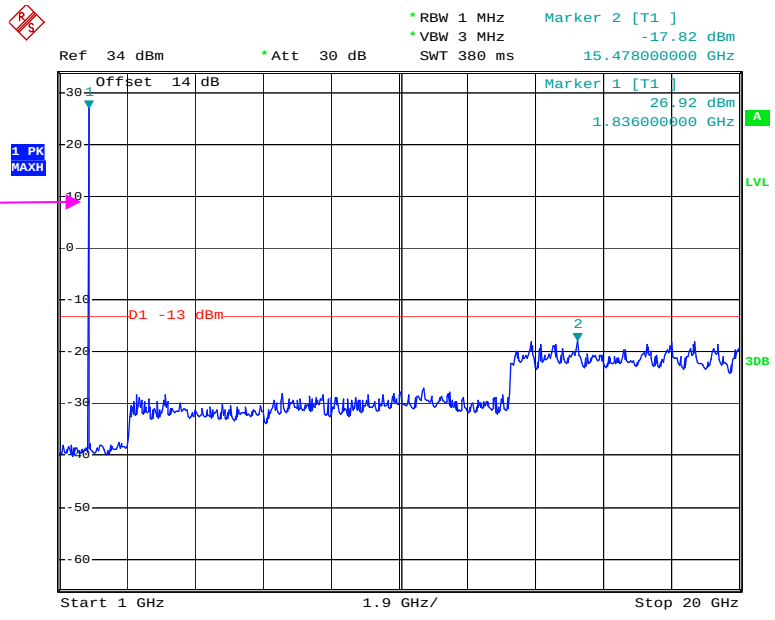



Date: 25.DEC.2013 14:44:48

## PCS 1900 Low Channel



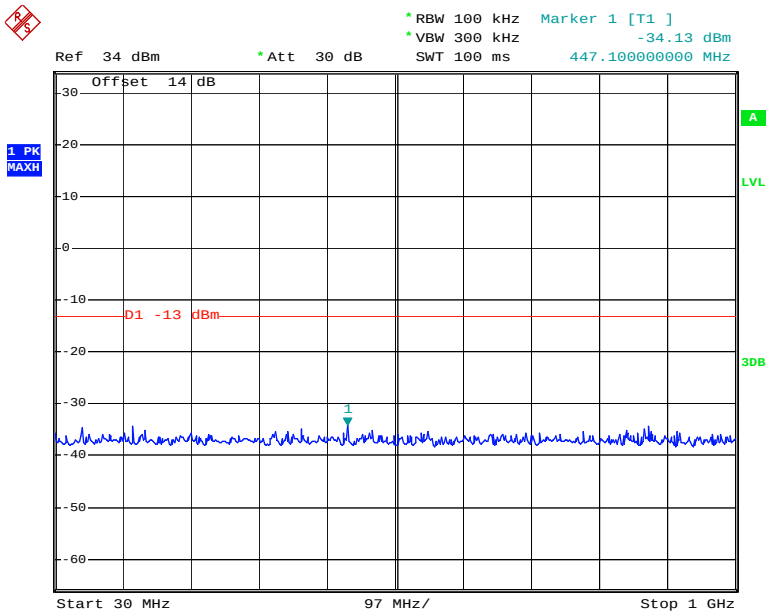

Date: 25.DEC.2013 14:51:18



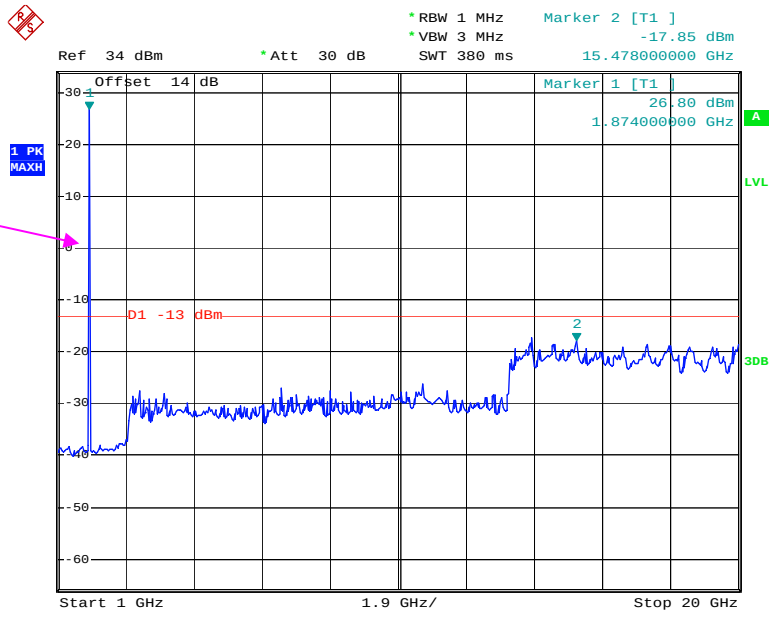

Fundamental

Date: 25.DEC.2013 14:48:30

## PCS 1900 Middle Channel



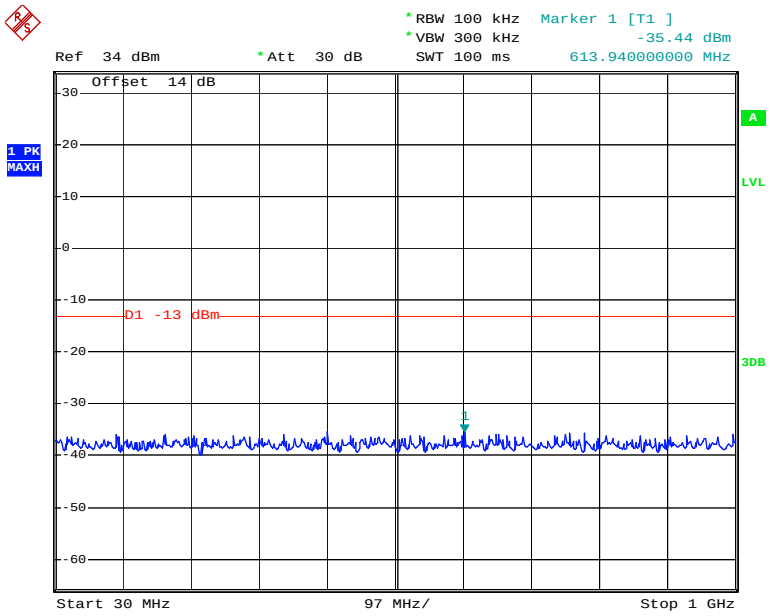

Date: 25.DEC.2013 14:54:42



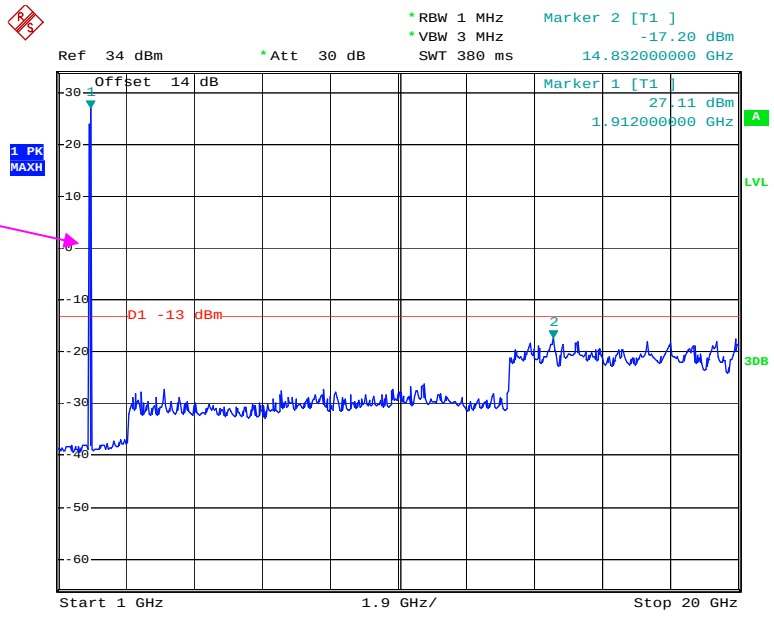

Fundamental

Date: 25.DEC.2013 14:54:22

## PCS 1900 High Channel



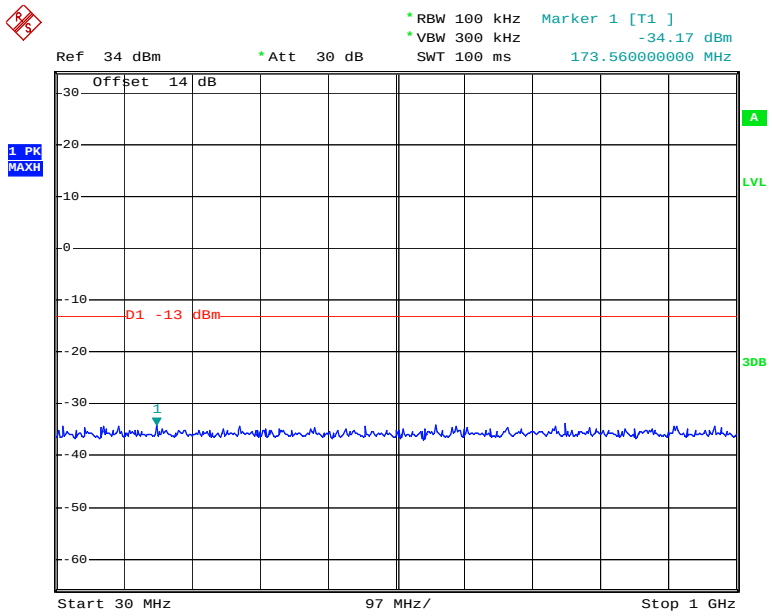

Date: 25.DEC.2013 14:51:30



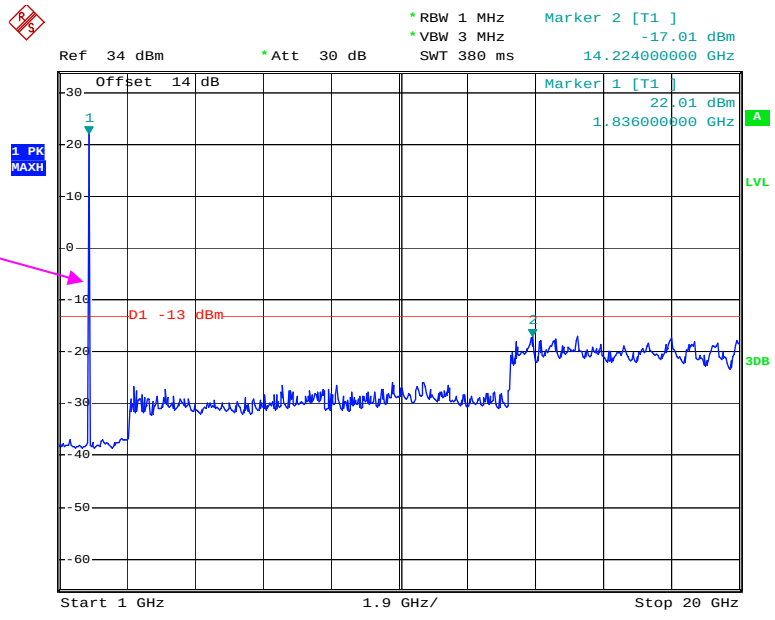

Fundamental

Date: 25.DEC.2013 14:53:46

## WCDMA Band II Low Channel



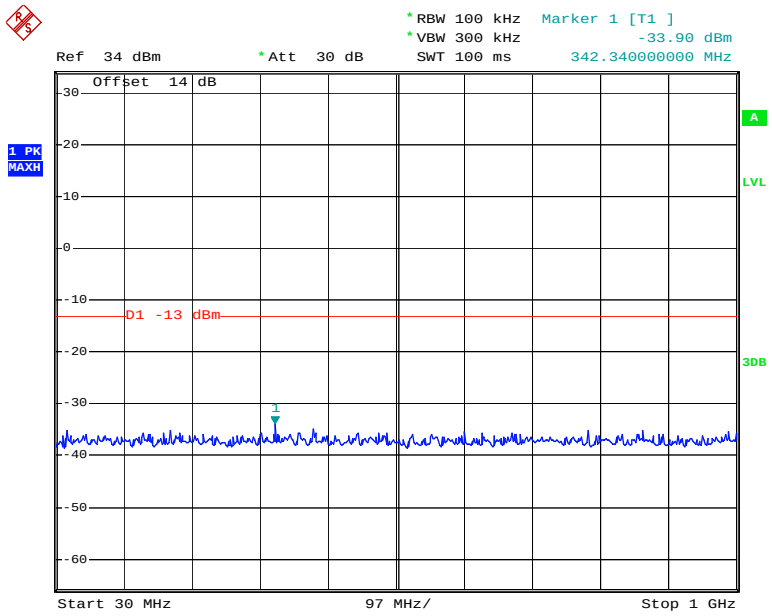

Date: 25.DEC.2013 11:41:09



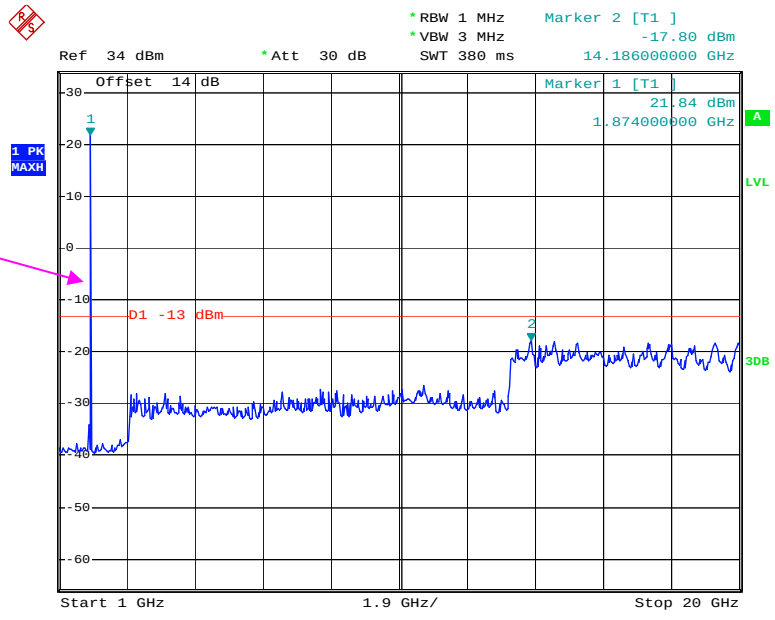

Fundamental

Date: 25.DEC.2013 11:44:06

**WCDMA Band II Middle Channel**



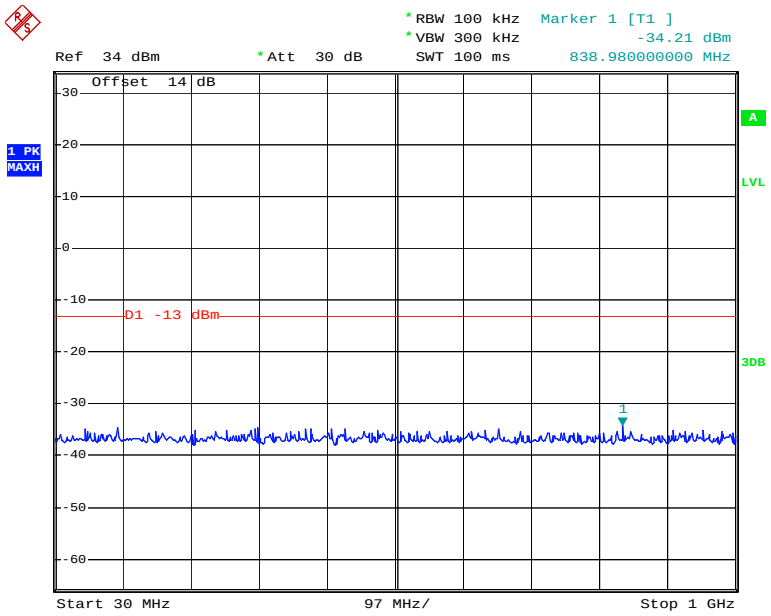

Date: 25.DEC.2013 11:45:09



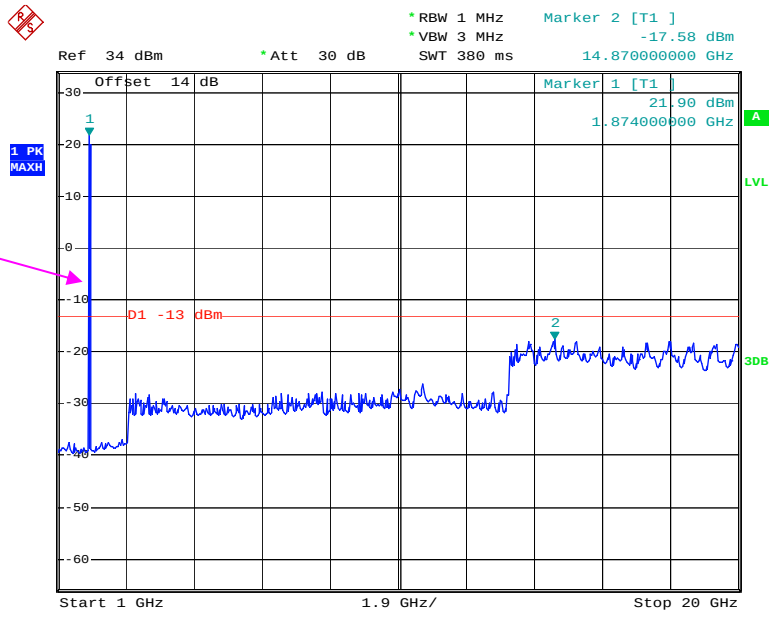

Fundamental

Date: 25.DEC.2013 11:44:45

## WCDMA Band II High Channel



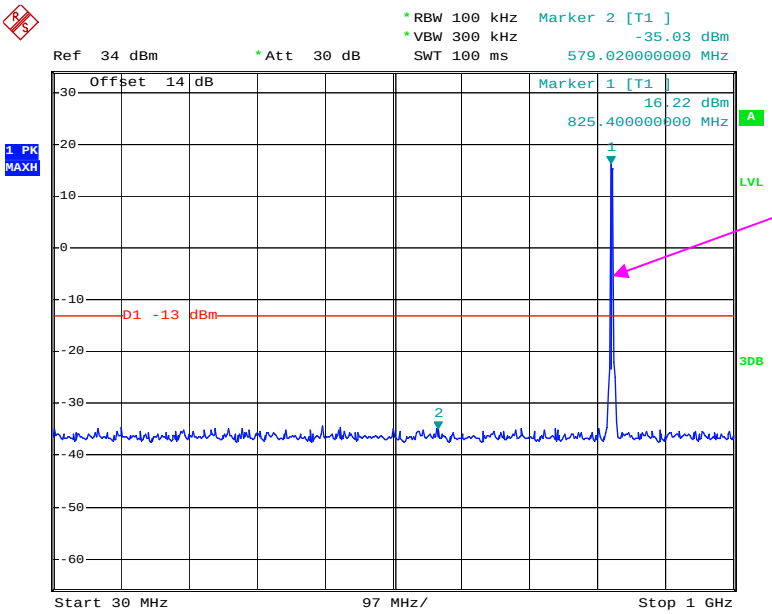

Date: 25.DEC.2013 11:45:37




Fundamental

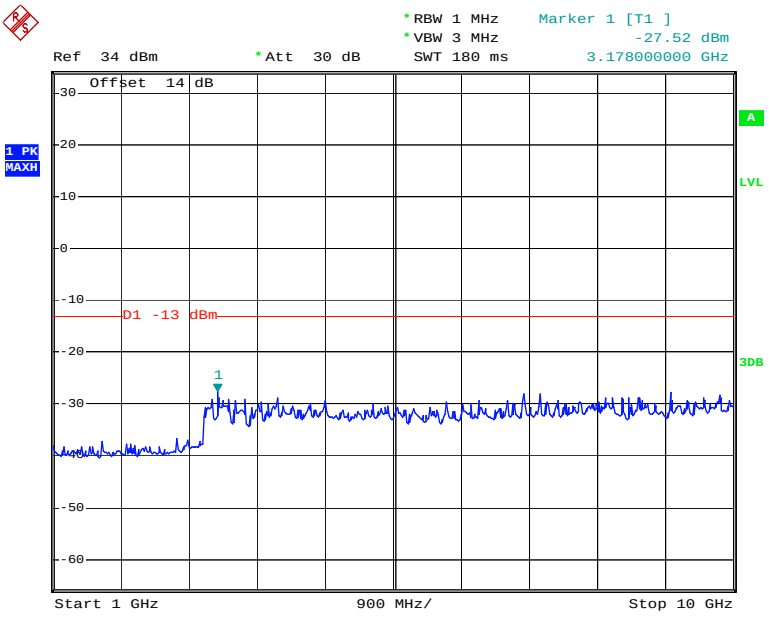
Date: 25.DEC.2013 11:47:26

## WCDMA Band V Low Channel



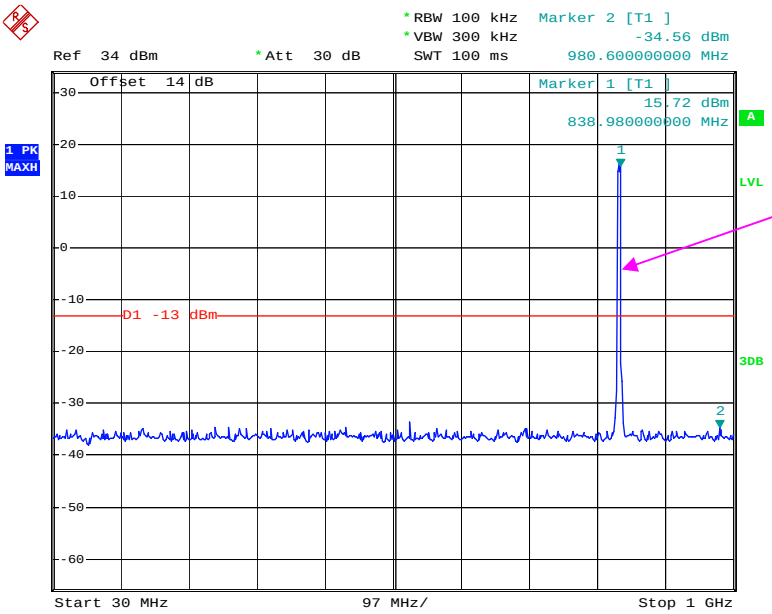

Fundamental

Date: 18.FEB.2014 11:03:43



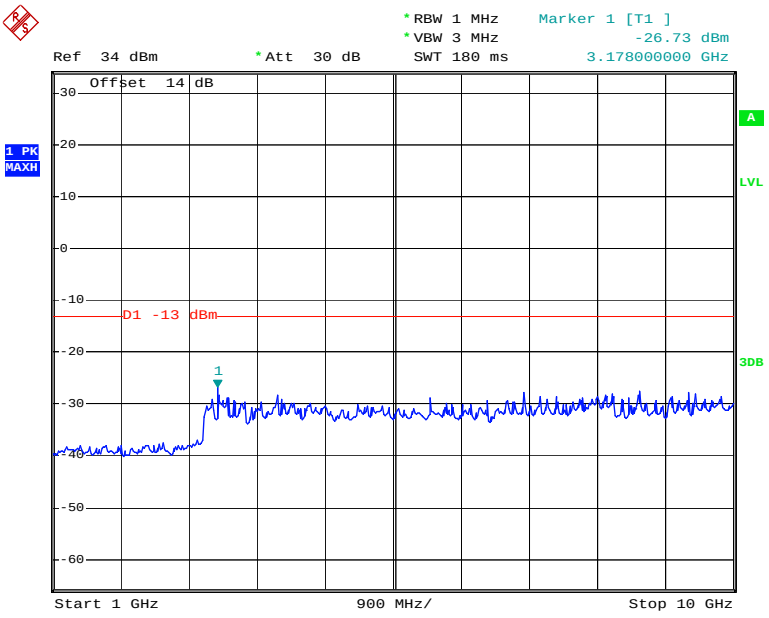

Date: 18.FEB.2014 11:03:06

## WCDMA Band V Middle Channel



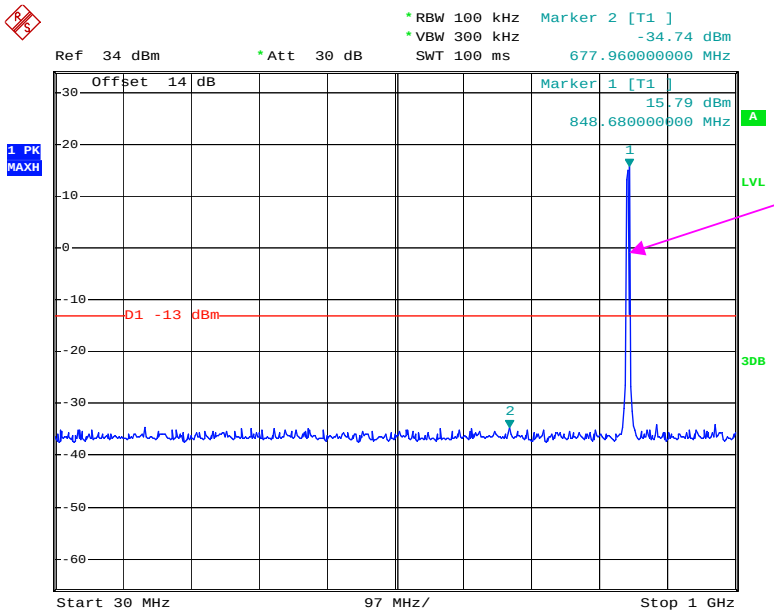

Fundamental

Date: 18.FEB.2014 11:04:30



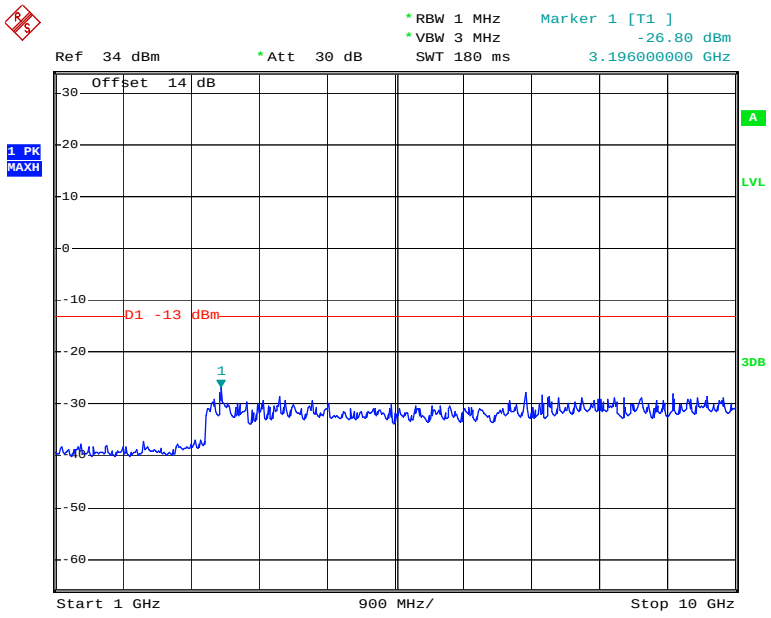

Date: 18.FEB.2014 11:06:31

## WCDMA Band V High Channel




Fundamental

Date: 18.FEB.2014 11:06:00




Date: 18.FEB.2014 11:06:48

# 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 (TXpwr in Watts/0.001) – the absolute level

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

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| HP | Signal Generator | 8648A | 3426A00831 | 2013-11-06 | 2014-11-05 |
| Sunol Sciences | Antenna | JB3 | A060611-1 | 2011-09-06 | 2014-09-05 |
| EMCO | Adjustable Dipole Antenna | 3121C | 9109-753 | N/A | N/A |
| HP | Amplifier | 8447E | 2434A02181 | 2013-09-06 | 2014-09-05 |
| R&S | EMI Test Receiver | ESCI | 100224 | 2013-05-06 | 2014-05-05 |
| Giga | Signal Generator | 1026 | 320408 | 2013-05-09 | 2014-05-08 |
| Mini-Circuit | Amplifier | ZVA-213-S+ | 054201245 | 2013-2-19 | 2014-2-18 |
| TDK RF | Horn Antenna | HRN-0118 | 130 084 | 2012-09-06 | 2015-09-05 |
| ETS LINDGREN | Horn Antenna | 3115 | 000 527 35 | 2012-09-06 | 2015-09-05 |
| R&S | Spectrum Analyzer | FSEM | DE31388 | 2013-05-07 | 2014-05-06 |

*** 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:** | 15.3~23.3 °C |
| **Relative Humidity:** | 49~62 % |
| **ATM Pressure:** | 100.5~102.1 kPa |

*The testing was performed by Ares Liu from 2013-12-25 to 2014-02-18.*

*EUT Operation Mode: Transmitting*

**GSM 850**

| 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 |
| **Low Channel, fo = 824.2 MHz** | | | | | | | | |
| 1648.400 | H | 41.79 | -59.3 | 10.5 | 1.5 | -50.3 | -13.0 | 37.3 |
| 1648.400 | V | 43.45 | -58.1 | 10.5 | 1.5 | -49.1 | -13.0 | 36.1 |
| 2472.600 | H | 41.92 | -56.1 | 12.9 | 2.6 | -45.8 | -13.0 | 32.8 |
| 2472.600 | V | 44.85 | -51.9 | 12.9 | 2.6 | -41.6 | -13.0 | 28.6 |
| 297.100 | H | 34.34 | -73.1 | 0.0 | 0.5 | -73.6 | -13.0 | 60.6 |
| 297.100 | V | 36.51 | -68.5 | 0.0 | 0.5 | -69.0 | -13.0 | 56.0 |
| **Middle Channel, fo = 836.6 MHz** | | | | | | | | |
| 1673.200 | H | 42.56 | -58.5 | 10.6 | 1.5 | -49.4 | -13.0 | 36.4 |
| 1673.200 | V | 43.72 | -57.7 | 10.6 | 1.5 | -48.6 | -13.0 | 35.6 |
| 2509.800 | H | 42.43 | -55.6 | 13.1 | 2.8 | -45.3 | -13.0 | 32.3 |
| 2509.800 | V | 45.04 | -52.1 | 13.1 | 2.8 | -41.8 | -13.0 | 28.8 |
| 297.100 | H | 34.26 | -73.2 | 0.0 | 0.5 | -73.7 | -13.0 | 60.7 |
| 297.100 | V | 35.64 | -69.4 | 0.0 | 0.5 | -69.9 | -13.0 | 56.9 |
| **High Channel, fo = 848.8 MHz** | | | | | | | | |
| 1697.600 | H | 42.13 | -58.9 | 10.8 | 1.5 | -49.6 | -13.0 | 36.6 |
| 1697.600 | V | 44.37 | -56.8 | 10.8 | 1.5 | -47.5 | -13.0 | 34.5 |
| 2546.400 | H | 42.13 | -54.4 | 13.1 | 2.8 | -44.1 | -13.0 | 31.1 |
| 2546.400 | V | 45.31 | -51.8 | 13.1 | 2.8 | -41.5 | -13.0 | 28.5 |
| 297.100 | H | 35.11 | -72.4 | 0.0 | 0.5 | -72.9 | -13.0 | 59.9 |
| 297.100 | V | 36.91 | -68.1 | 0.0 | 0.5 | -68.6 | -13.0 | 55.6 |

**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 |
| **Low Channel, fo = 1850.2 MHz** | | | | | | | | |
| 3700.400 | H | 34.86 | -59.9 | 14.0 | 2.5 | -48.4 | -13.0 | 35.4 |
| 3700.400 | V | 36.47 | -57.9 | 14.0 | 2.5 | -46.4 | -13.0 | 33.4 |
| 296.800 | H | 33.52 | -74 | 0.0 | 0.5 | -74.5 | -13.0 | 61.5 |
| 296.800 | V | 34.85 | -70.2 | 0.0 | 0.5 | -70.7 | -13.0 | 57.7 |
| **Middle Channel, fo = 1880.0 MHz** | | | | | | | | |
| 3760.000 | H | 35.12 | -59.2 | 13.8 | 2.9 | -48.3 | -13.0 | 35.3 |
| 3760.000 | V | 36.71 | -56.4 | 13.8 | 2.9 | -45.5 | -13.0 | 32.5 |
| 296.800 | H | 33.87 | -73.6 | 0.0 | 0.5 | -74.1 | -13.0 | 61.1 |
| 296.800 | V | 35.16 | -69.9 | 0.0 | 0.5 | -70.4 | -13.0 | 57.4 |
| **High Channel, fo = 1909.8 MHz** | | | | | | | | |
| 3819.600 | H | 35.04 | -58.8 | 13.6 | 3.3 | -48.5 | -13.0 | 35.5 |
| 3819.600 | V | 36.58 | -55.6 | 13.6 | 3.3 | -45.3 | -13.0 | 32.3 |
| 296.800 | H | 33.66 | -73.8 | 0.0 | 0.5 | -74.3 | -13.0 | 61.3 |
| 296.800 | V | 35.34 | -69.7 | 0.0 | 0.5 | -70.2 | -13.0 | 57.2 |

**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 |
| **Low Channel, fo = 1852.4 MHz** | | | | | | | | |
| 3704.800 | H | 35.13 | -59.6 | 13.9 | 2.5 | -48.2 | -13.0 | 35.2 |
| 3704.800 | V | 36.45 | -57.8 | 13.9 | 2.5 | -46.4 | -13.0 | 33.4 |
| 356.200 | H | 32.25 | -68.4 | 0.0 | 0.6 | -69.0 | -13.0 | 56.0 |
| 356.200 | V | 33.72 | -64.3 | 0.0 | 0.6 | -64.9 | -13.0 | 51.9 |
| **Middle Channel, fo = 1880.0 MHz** | | | | | | | | |
| 3760.000 | H | 34.75 | -59.5 | 13.8 | 2.9 | -48.6 | -13.0 | 35.6 |
| 3760.000 | V | 35.60 | -57.5 | 13.8 | 2.9 | -46.6 | -13.0 | 33.6 |
| 356.200 | H | 32.83 | -67.8 | 0.0 | 0.6 | -68.4 | -13.0 | 55.4 |
| 356.200 | V | 33.96 | -64.1 | 0.0 | 0.6 | -64.7 | -13.0 | 51.7 |
| **High Channel, fo = 1907.6 MHz** | | | | | | | | |
| 3815.200 | H | 34.40 | -59.4 | 13.6 | 3.3 | -49.1 | -13.0 | 36.1 |
| 3815.200 | V | 36.20 | -56 | 13.6 | 3.3 | -45.7 | -13.0 | 32.7 |
| 356.200 | H | 33.17 | -67.5 | 0.0 | 0.6 | -68.1 | -13.0 | 55.1 |
| 356.200 | V | 34.06 | -64 | 0.0 | 0.6 | -64.6 | -13.0 | 51.6 |

## WCDMA Band V

| 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 |
| **Low Channel, fo = 826.400 MHz** | | | | | | | | |
| 1652.800 | H | 36.37 | -64.7 | 10.5 | 1.5 | -55.7 | -13.0 | 42.7 |
| 1652.800 | V | 38.41 | -63.1 | 10.5 | 1.5 | -54.1 | -13.0 | 41.1 |
| 356.200 | H | 32.53 | -68.1 | 0.0 | 0.6 | -68.7 | -13.0 | 55.7 |
| 356.200 | V | 32.74 | -65.3 | 0.0 | 0.6 | -65.9 | -13.0 | 52.9 |
| **Middle Channel, fo = 836.600 MHz** | | | | | | | | |
| 1673.200 | H | 35.77 | -65.3 | 10.6 | 1.5 | -56.2 | -13.0 | 43.2 |
| 1673.200 | V | 39.42 | -62 | 10.6 | 1.5 | -52.9 | -13.0 | 39.9 |
| 356.200 | H | 32.93 | -67.7 | 0.0 | 0.6 | -68.3 | -13.0 | 55.3 |
| 356.200 | V | 32.54 | -65.5 | 0.0 | 0.6 | -66.1 | -13.0 | 53.1 |
| **High Channel, fo = 846.600 MHz** | | | | | | | | |
| 1693.200 | H | 36.24 | -64.8 | 10.7 | 1.5 | -55.6 | -13.0 | 42.6 |
| 1693.200 | V | 38.75 | -62.5 | 10.7 | 1.5 | -53.3 | -13.0 | 40.3 |
| 356.200 | H | 32.25 | -68.4 | 0.0 | 0.6 | -69.0 | -13.0 | 56.0 |
| 356.200 | V | 33.87 | -64.2 | 0.0 | 0.6 | -64.8 | -13.0 | 51.8 |

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

## Applicable Standard

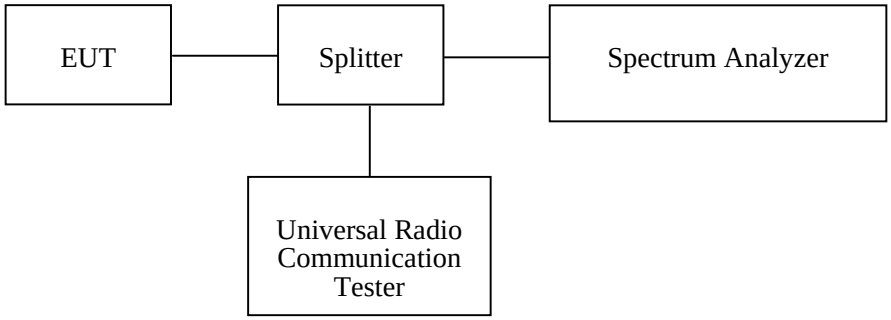
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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.




## 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

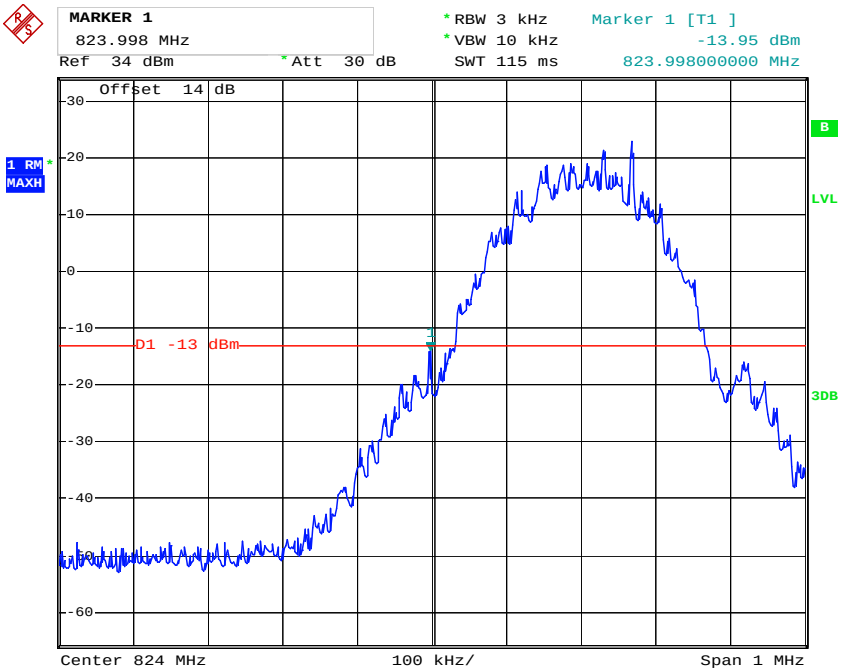
### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 18.6~23.5 °C |
| **Relative Humidity:** | 23~60 % |
| **ATM Pressure:** | 100.5~102.1 kPa |

*The testing was performed by Ares Liu from 2013-12-25 to 2014-02-18.*

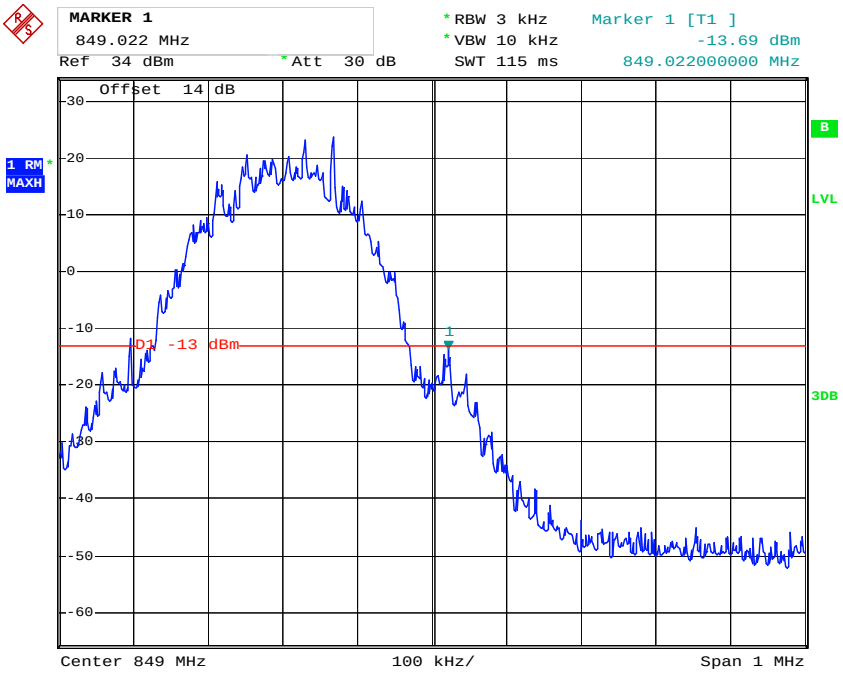
Please refer to the following tables and plots.

**GSM 850, Left Band Edge**



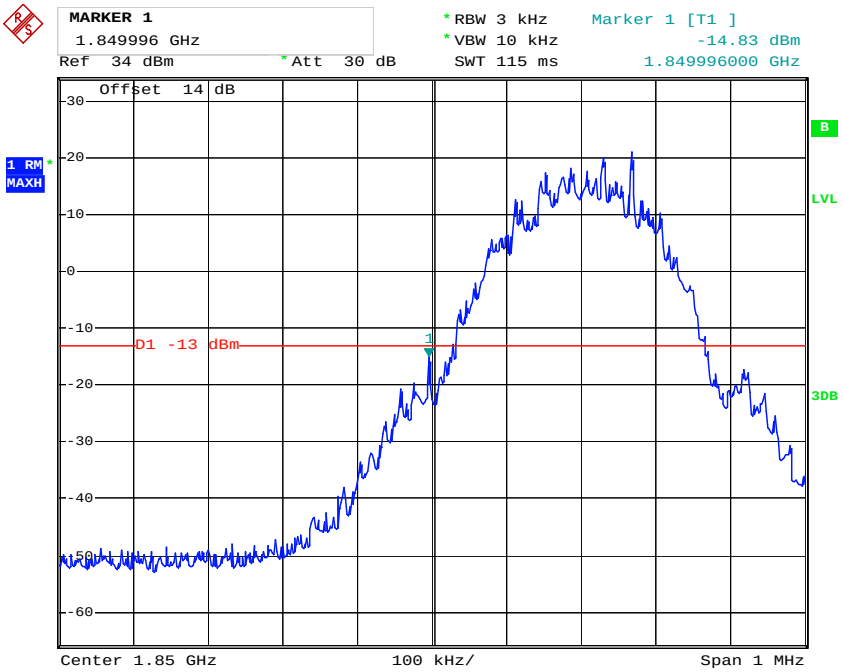

Date: 20.JAN.2014 16:05:29

**GSM 850, Right Band Edge**



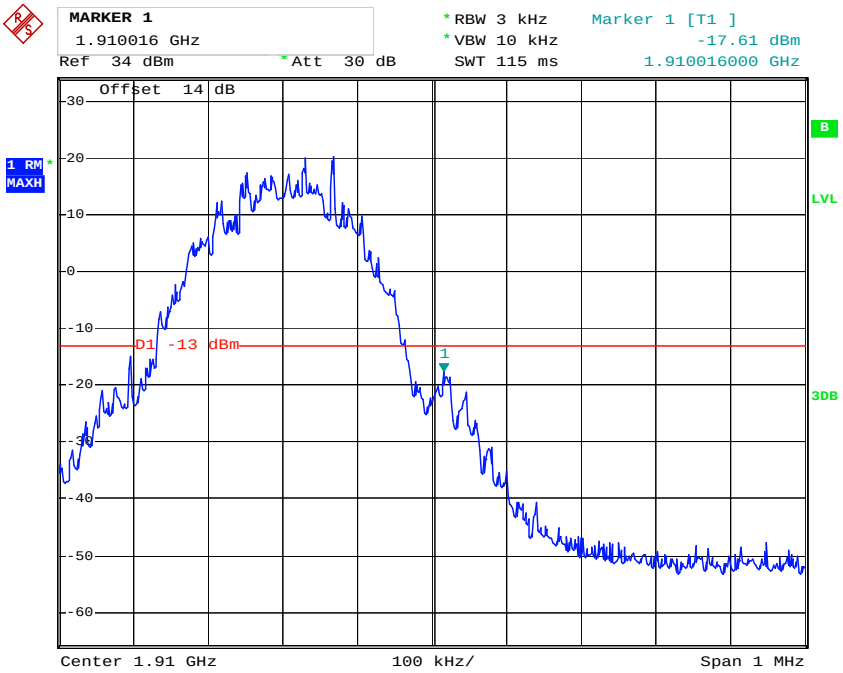

Date: 20.JAN.2014 16:09:31

**GSM 1900, Left Band Edge**



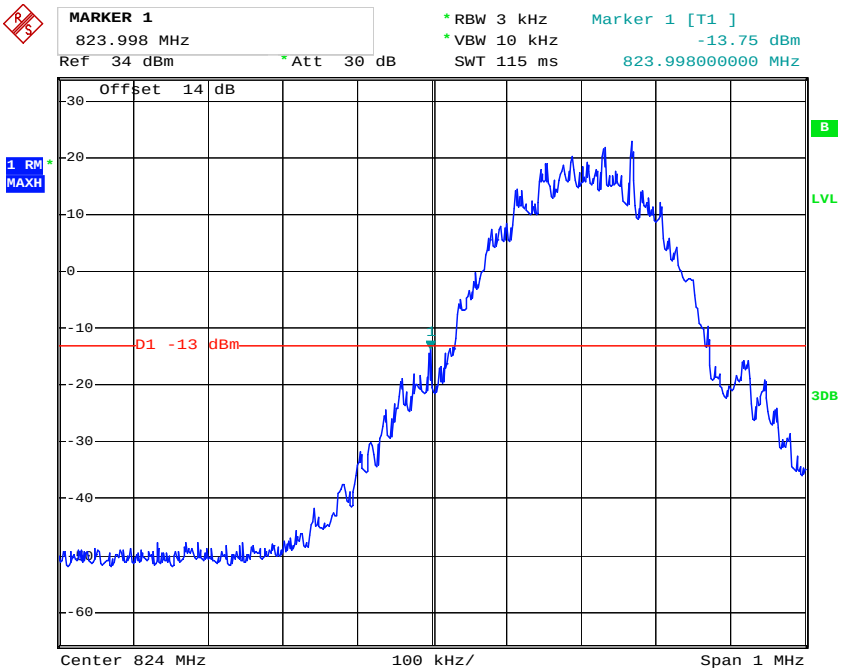

Date: 20.JAN.2014 16:13:47

**GSM 1900, Right Band Edge**



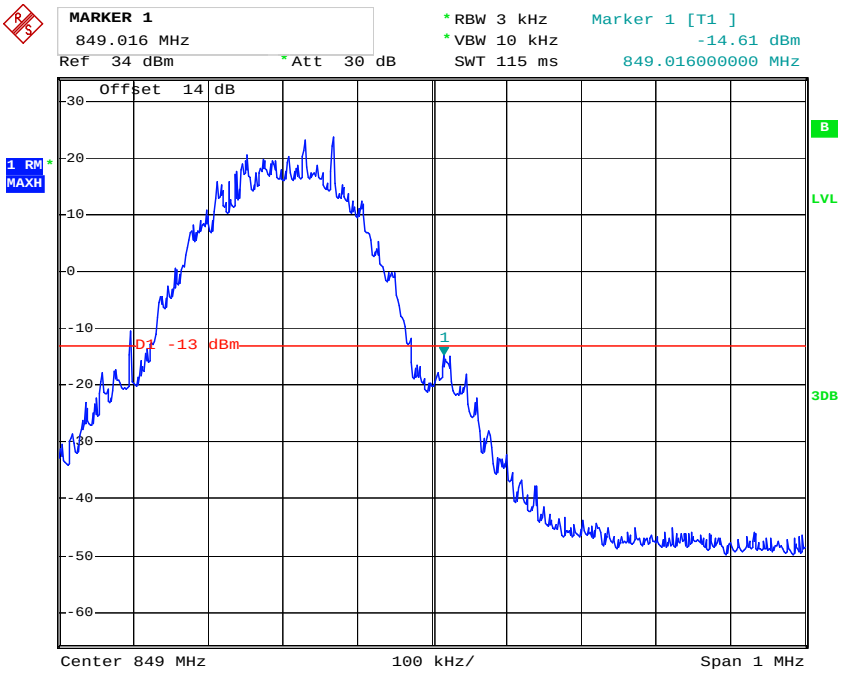

Date: 20.JAN.2014 16:15:44

**EGPRS 850, Left Band Edge**



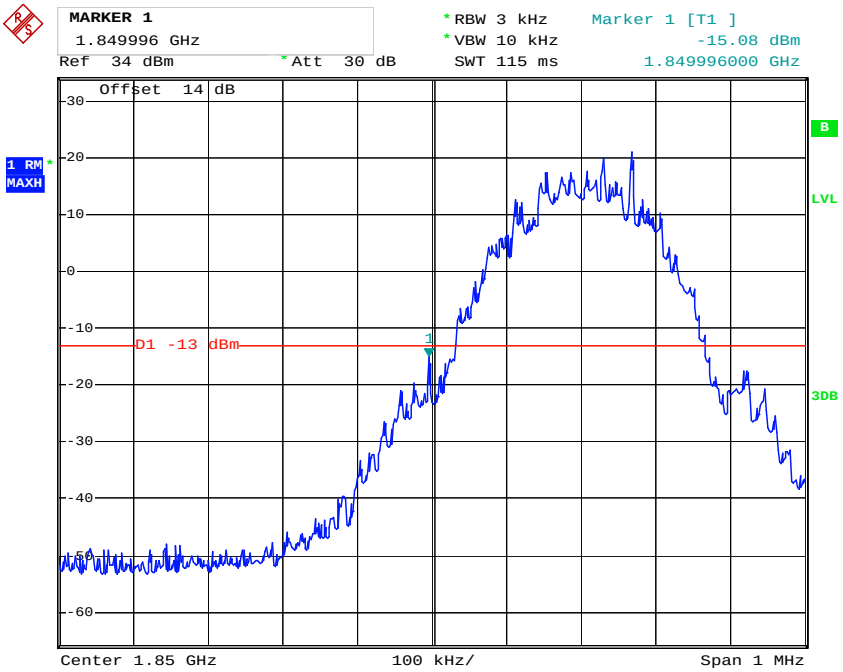

Date: 20.JAN.2014 16:06:58

**EGPRS 850, Right Band Edge**



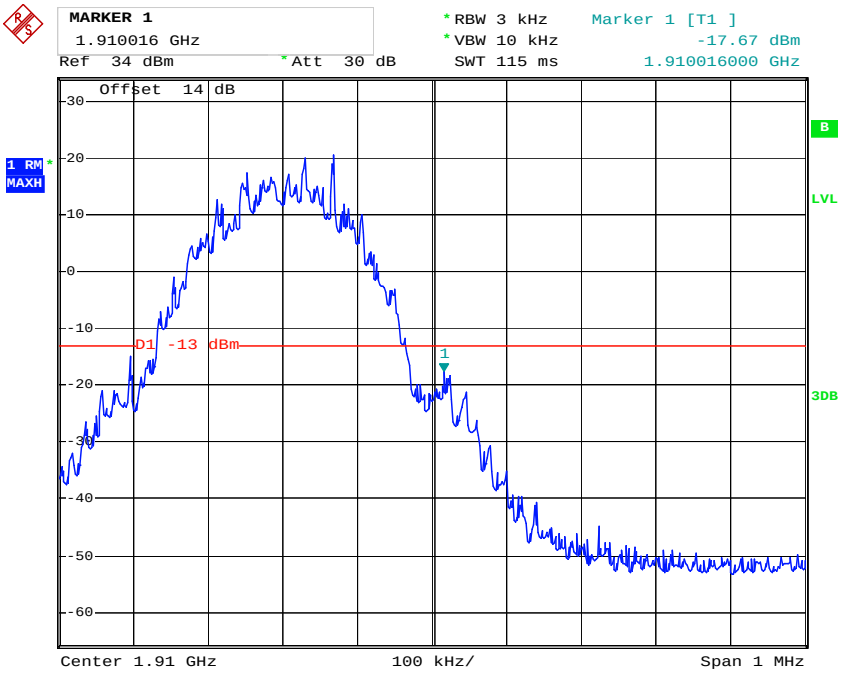

Date: 20.JAN.2014 16:11:43

**EGPRS 1900, Left Band Edge**



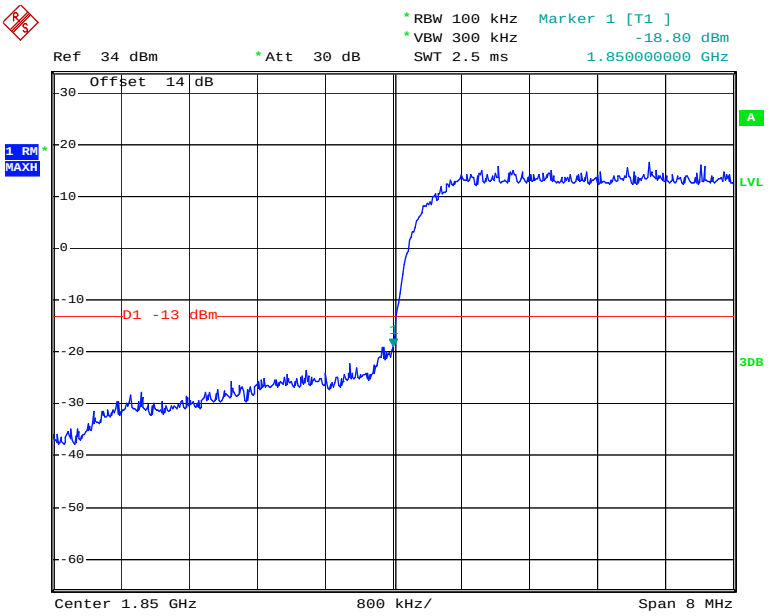

Date: 20.JAN.2014 16:14:34

**EGPRS 1900, Right Band Edge**



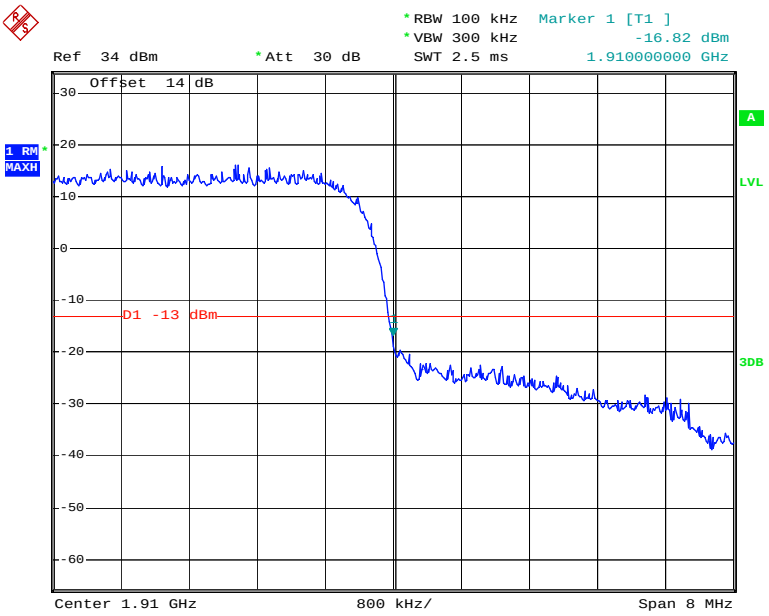

Date: 20.JAN.2014 16:16:36

**WCDMA Band II, Left Band Edge**



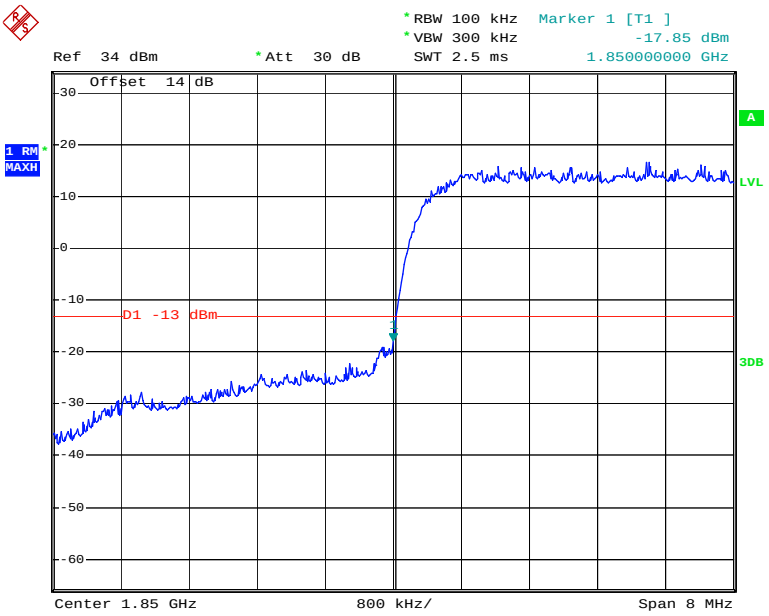

Date: 25.DEC.2013 13:48:28

**WCDMA Band II, Right Band Edge**



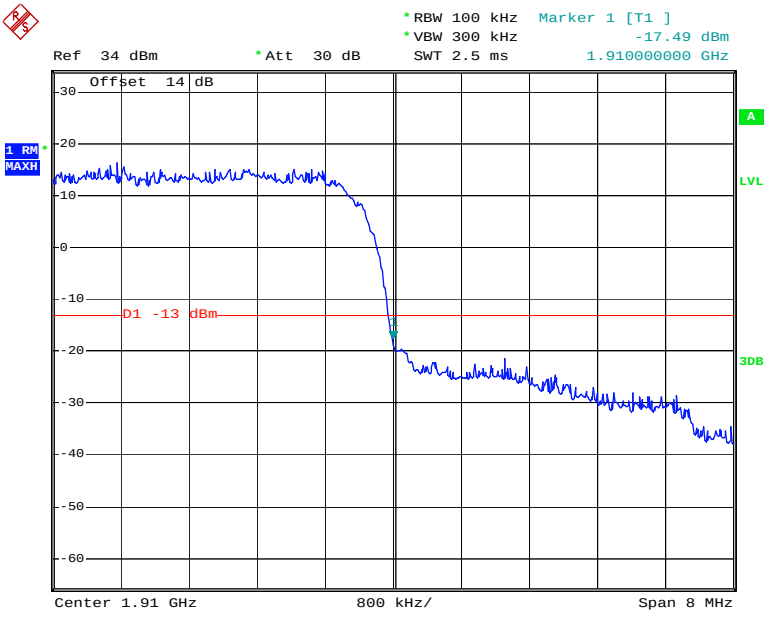

Date: 25.DEC.2013 13:47:55

**HSDPA Band II , Left Band Edge**



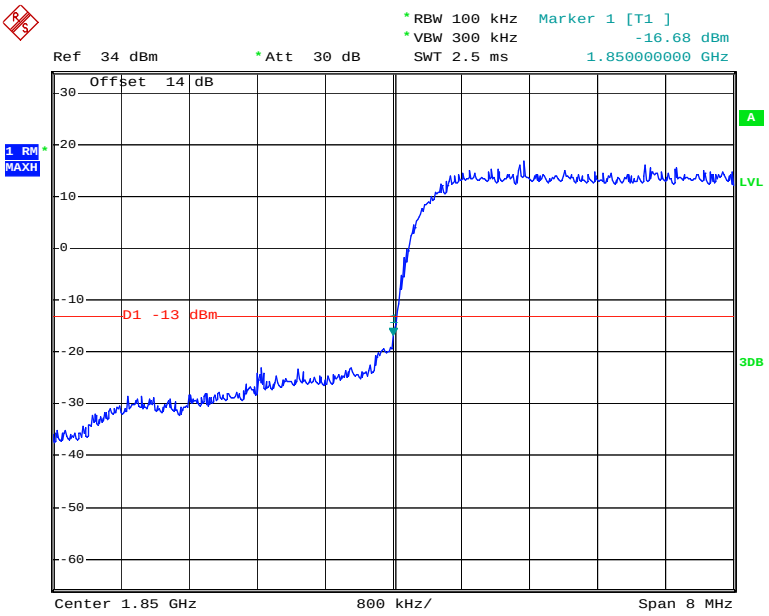

Date: 25.DEC.2013 13:48:38

**HSDPA Band II, Right Band Edge**



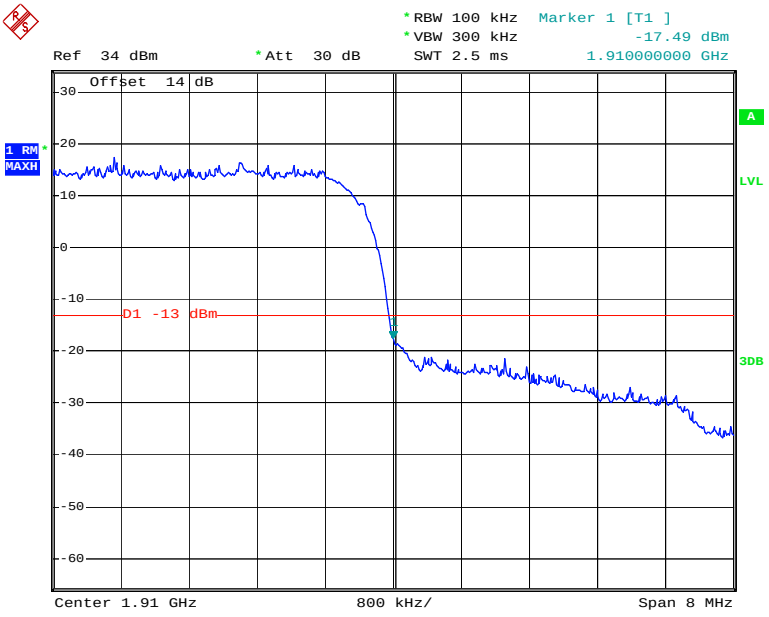

Date: 25.DEC.2013 13:49:00

**HSUPA Band II, Left Band Edge**



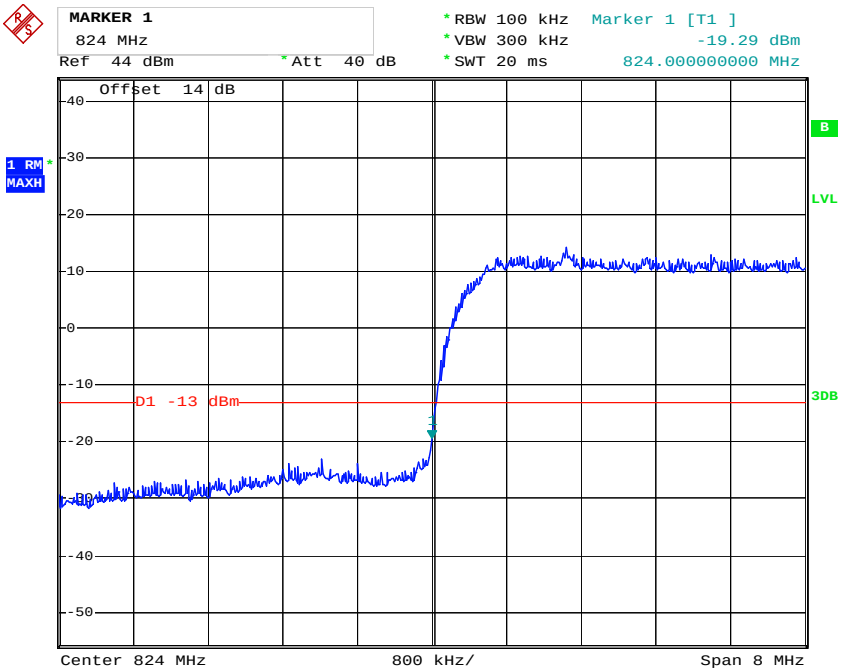

Date: 25.DEC.2013 13:50:06

**HSUPA Band II, Right Band Edge**



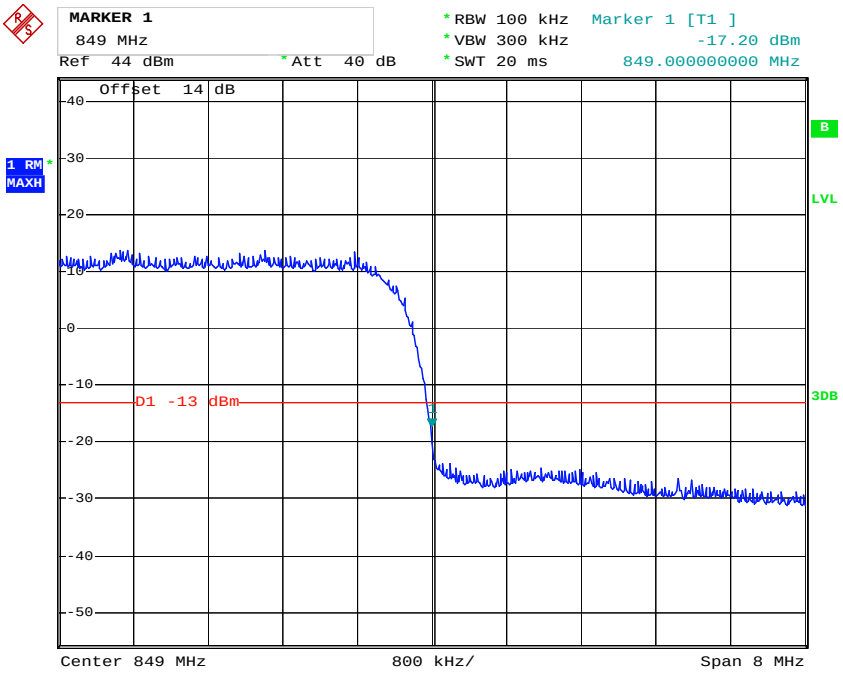

Date: 25.DEC.2013 13:49:33

## WCDMA Band V, Left Band Edge



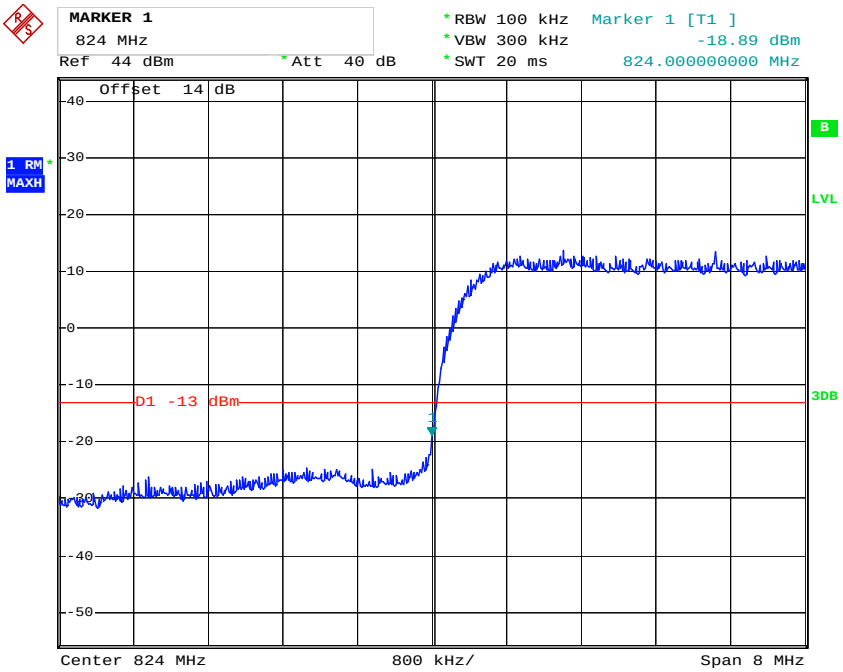

Date: 18.FEB.2014 11:23:26

## WCDMA Band V, Right Band Edge



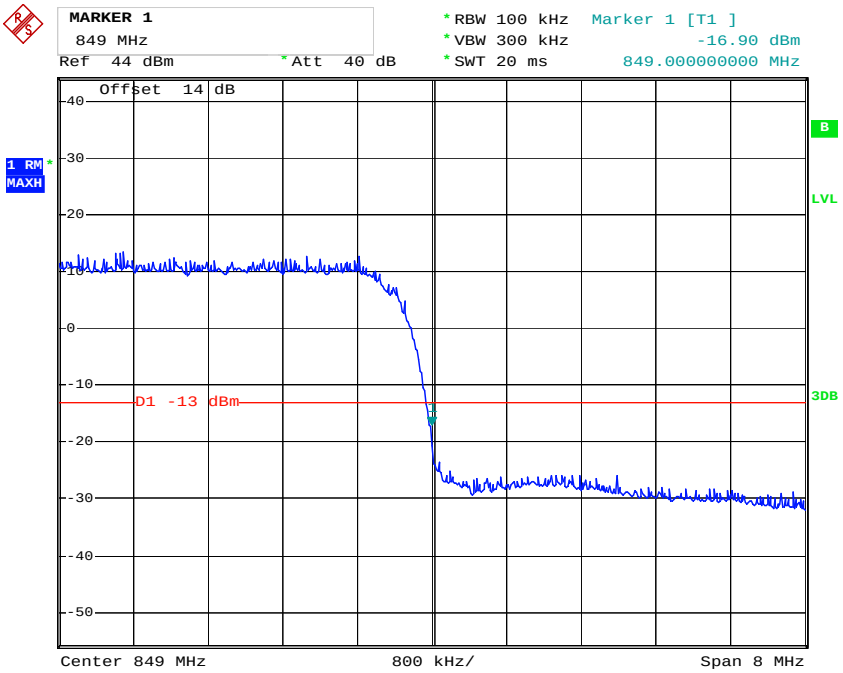

Date: 18.FEB.2014 11:22:23

**HSDPA Band V , Left Band Edge**



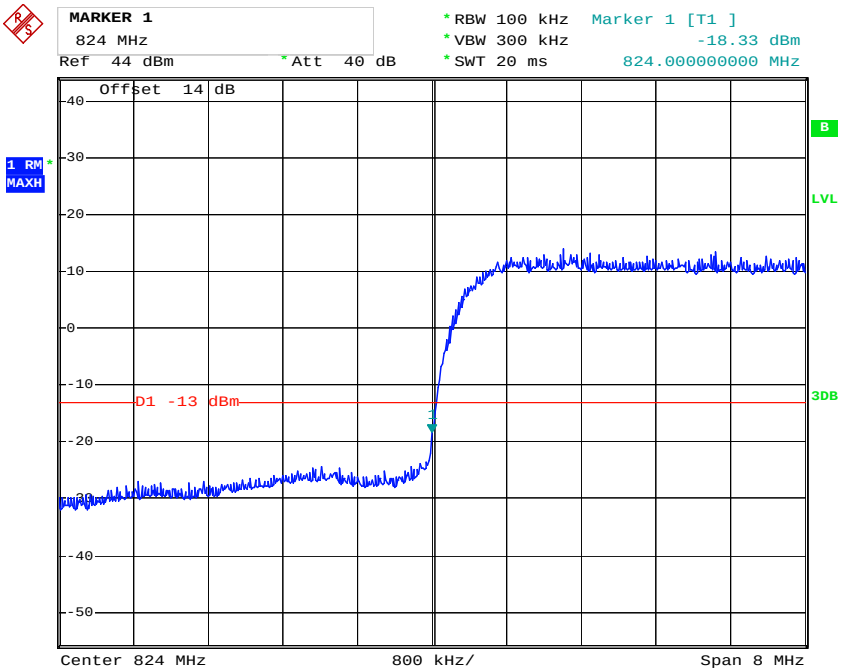

Date: 18.FEB.2014 11:38:16

**HSDPA Band V, Right Band Edge**



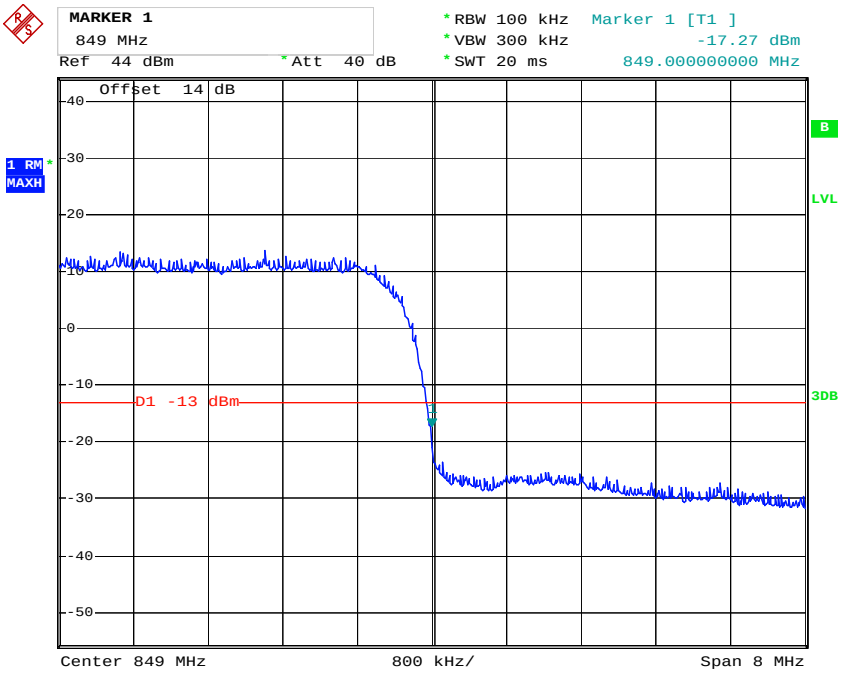

Date: 18.FEB.2014 11:38:34

**HSUPA Band V, Left Band Edge**




Date: 18.FEB.2014 11:33:14

**HSUPA Band V, Right Band Edge**




Date: 18.FEB.2014 11:33:48

# 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 |

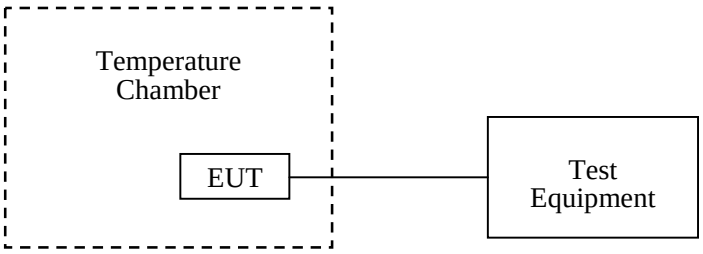
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

## 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 | High Temperature Test Chamber | DP1000 | 201105083-3 | 2013-7-31 | 2014-8-1 |
| 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:** | 18.6~23.5 °C |
| **Relative Humidity:** | 23~60 % |
| **ATM Pressure:** | 100.5~102.1 kPa |

*The testing was performed by Ares Liu from 2013-12-25 to 2014-02-18.*

### Cellular Band (Part 22H)

GSM (GMSK):

| Middle Channel, $f_c$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Limit** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | **ppm** |
| -30 | 3.7 | 16 | 0.019 | 2.5 |
| -20 | 3.7 | 15 | 0.018 | 2.5 |
| -10 | 3.7 | 16 | 0.019 | 2.5 |
| 0 | 3.7 | 17 | 0.020 | 2.5 |
| 10 | 3.7 | 17 | 0.020 | 2.5 |
| 20 | 3.7 | 11 | 0.013 | 2.5 |
| 30 | 3.7 | 11 | 0.013 | 2.5 |
| 40 | 3.7 | 15 | 0.018 | 2.5 |
| 50 | 3.7 | 15 | 0.018 | 2.5 |
| 25 | $V_{end}$ point=3.5 | 14 | 0.017 | 2.5 |

EDGE:

| Middle Channel, $f_c$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Limit** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | **ppm** |
| -30 | 3.7 | 17 | 0.020 | 2.5 |
| -20 | 3.7 | 16 | 0.019 | 2.5 |
| -10 | 3.7 | 18 | 0.022 | 2.5 |
| 0 | 3.7 | 14 | 0.017 | 2.5 |
| 10 | 3.7 | 13 | 0.016 | 2.5 |
| 20 | 3.7 | 15 | 0.018 | 2.5 |
| 30 | 3.7 | 11 | 0.013 | 2.5 |
| 40 | 3.7 | 17 | 0.020 | 2.5 |
| 50 | 3.7 | 15 | 0.018 | 2.5 |
| 25 | $V_{end}$ point=3.5 | 17 | 0.020 | 2.5 |

**PCS Band (Part 24E)**

**GSM (GMSK):**

| Middle Channel, $f_c$ = 1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.7 | 1 | 0.001 | Pass |
| -20 | 3.7 | 0 | 0.000 | Pass |
| -10 | 3.7 | -2 | -0.001 | Pass |
| 0 | 3.7 | -1 | -0.001 | Pass |
| 10 | 3.7 | -4 | -0.002 | Pass |
| 20 | 3.7 | -5 | -0.003 | Pass |
| 30 | 3.7 | -3 | -0.002 | Pass |
| 40 | 3.7 | 1 | 0.001 | Pass |
| 50 | 3.7 | 0 | 0.000 | Pass |
| 25 | $V_{end}$ point=3.5 | -3 | -0.002 | Pass |

**EDGE:**

| Middle Channel, $f_c$ = 1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.7 | 2 | 0.001 | Pass |
| -20 | 3.7 | 4 | 0.002 | Pass |
| -10 | 3.7 | -2 | -0.001 | Pass |
| 0 | 3.7 | -4 | -0.002 | Pass |
| 10 | 3.7 | -5 | -0.003 | Pass |
| 20 | 3.7 | -6 | -0.003 | Pass |
| 30 | 3.7 | -5 | -0.003 | Pass |
| 40 | 3.7 | -2 | -0.001 | Pass |
| 50 | 3.7 | -3 | -0.002 | Pass |
| 25 | $V_{end}$ point=3.5 | 2 | 0.001 | Pass |

**Band II (Part 22H):**

**WCDMA (QPSK):**

| Middle Channel, $f_c$ = 1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Limit** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | **ppm** |
| -30 | 3.7 | -2 | -0.001 | Pass |
| -20 | 3.7 | -1 | -0.001 | Pass |
| -10 | 3.7 | 3 | 0.002 | Pass |
| 0 | 3.7 | 0 | 0.000 | Pass |
| 10 | 3.7 | 2 | 0.001 | Pass |
| 20 | 3.7 | 0 | 0.000 | Pass |
| 30 | 3.7 | 1 | 0.001 | Pass |
| 40 | 3.7 | 3 | 0.002 | Pass |
| 50 | 3.7 | -1 | -0.001 | Pass |
| 25 | $V_{end}$ point=3.5 | 2 | 0.001 | Pass |

**Band V (Part 22H):**

**WCDMA (QPSK):**

| Middle Channel, $f_c$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Limit** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | **ppm** |
| -30 | 3.7 | -3 | -0.004 | 2.5 |
| -20 | 3.7 | -1 | -0.001 | 2.5 |
| -10 | 3.7 | 4 | 0.005 | 2.5 |
| 0 | 3.7 | 5 | 0.006 | 2.5 |
| 10 | 3.7 | 1 | 0.001 | 2.5 |
| 20 | 3.7 | 2 | 0.002 | 2.5 |
| 30 | 3.7 | 3 | 0.004 | 2.5 |
| 40 | 3.7 | -2 | -0.002 | 2.5 |
| 50 | 3.7 | 4 | 0.005 | 2.5 |
| 25 | $V_{end}$ point=3.5 | 1 | 0.001 | 2.5 |

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