

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: Original Report	Product Type: GSM /WCDMA mobile pad
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Report Number: R2DG131217003-00E	
Report Date: 2014-02-26	
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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-A22050I1500C40
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.

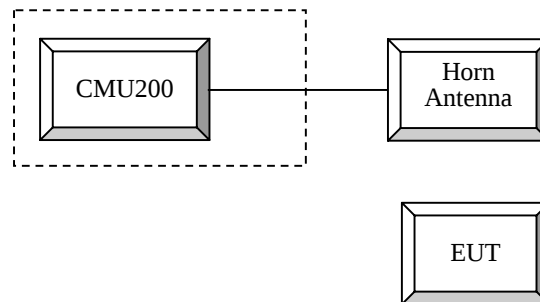
Equipment Modifications

No modification was made to the EUT.

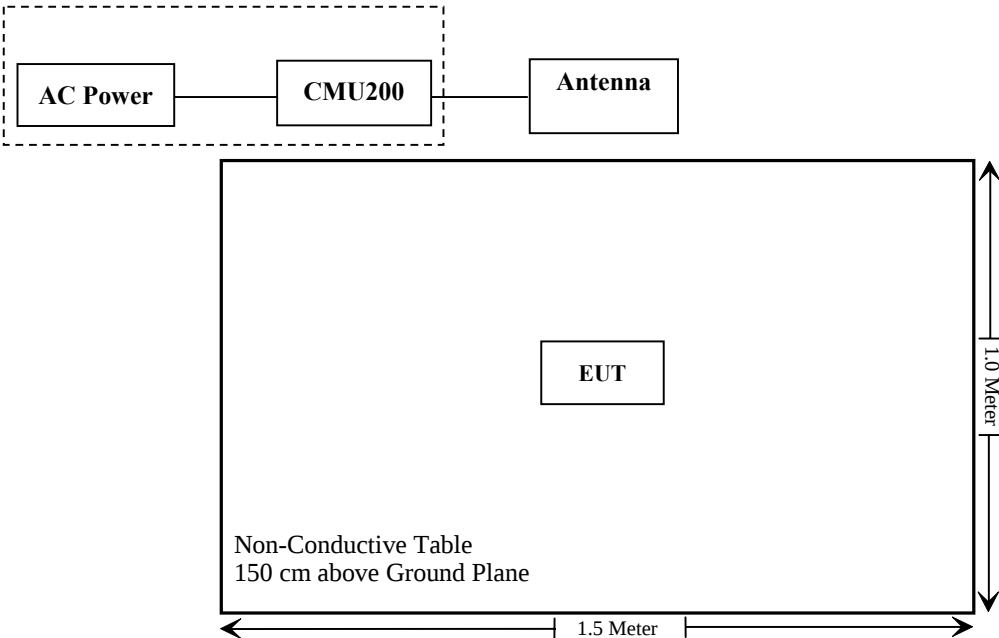
Support Equipment List and Details

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; § 22.913 (a); § 24.232 (c)	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905 § 22.917; § 24.238	Occupied Bandwidth	Compliance
§ 2.1051, § 22.917 (a); § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053 § 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 § 22.355; § 24.235	Frequency stability vs. temperature 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 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
	β_c	Not Applicable
	β_d	Not Applicable
	β_{ec}	Not Applicable
	β_c/β_d	8/15
	β_{hs}	Not Applicable
	β_{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			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_{ec}	-	-	-	-
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	β_{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 = β_{hs}/β_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 General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	-
	β_{hs}	22/15	12/15	30/15	4/15	5/15
HSDPA Specific Settings	β_{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 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 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		
				E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		
				E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		
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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

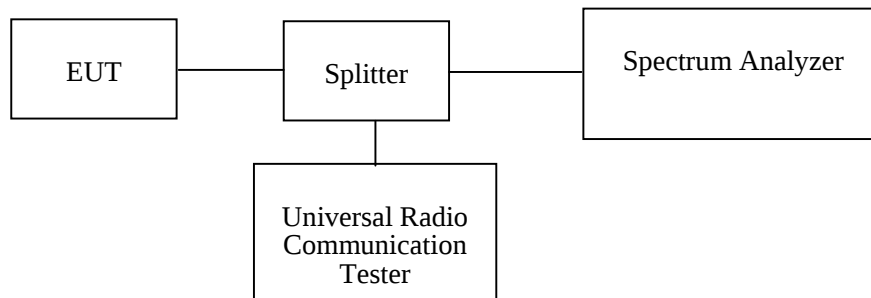
Applicable Standard

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

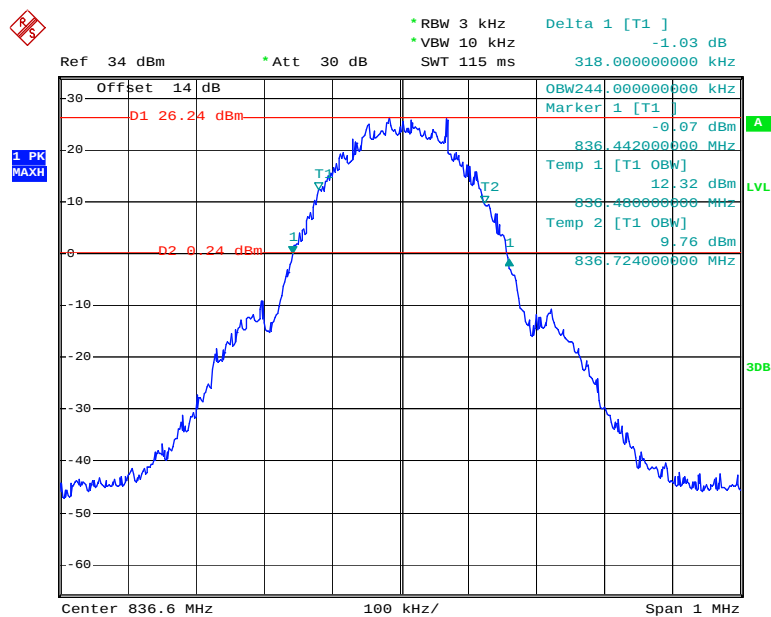
Temperature:	18.6~23.5 °C
Relative Humidity:	23~60 %
ATM Pressure:	100.5~102.1 kPa

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

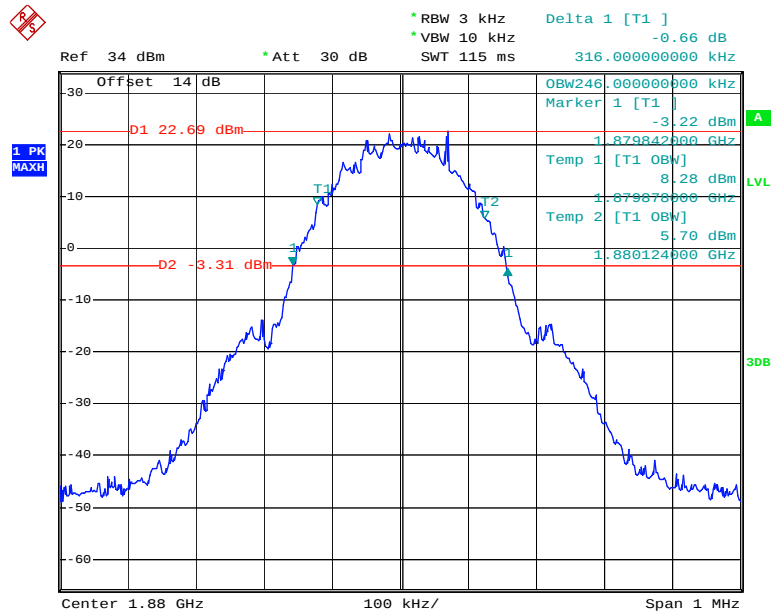
Please refer to the following plots.

GMSK Cellular Band



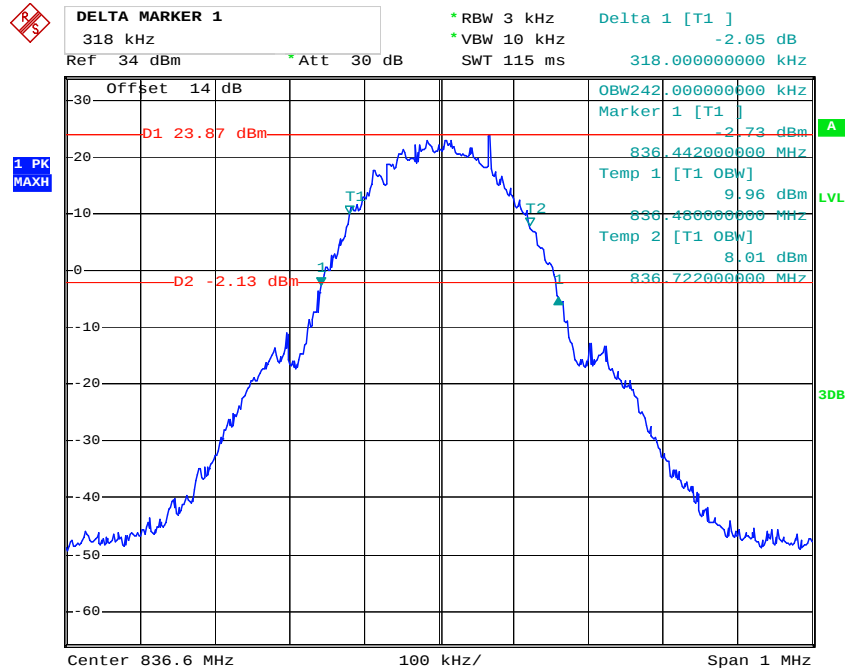
Date: 25.DEC.2013 14:28:28

GMSK PCS Band



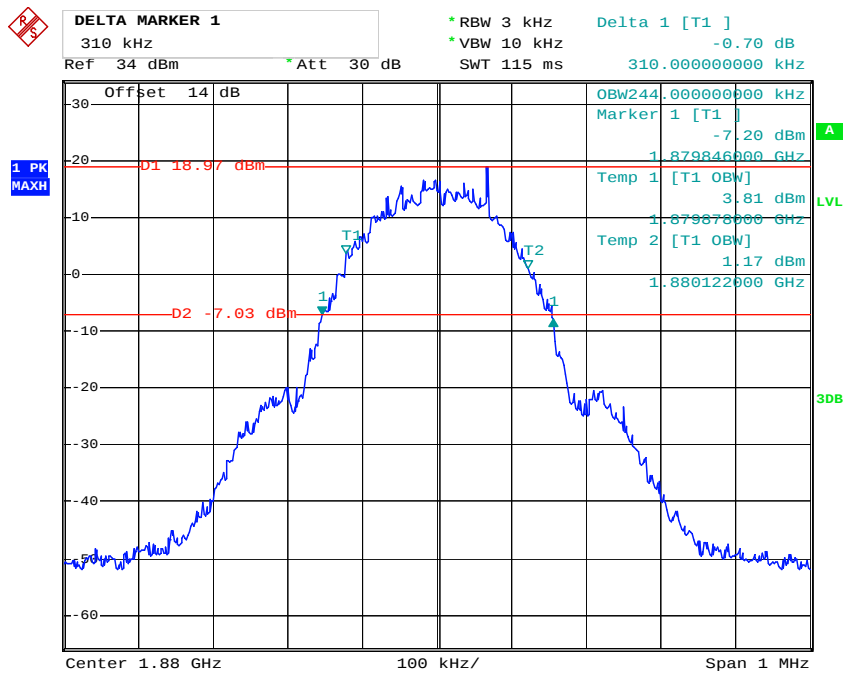
Date: 25.DEC.2013 14:59:14

8DPSK Cellular Band



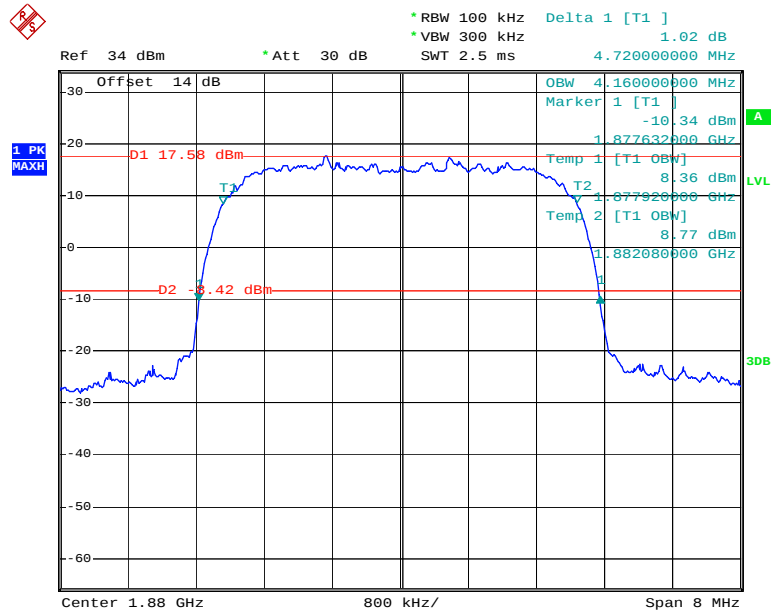
Date: 25.DEC.2013 17:42:21

8DPSK PCS 1900

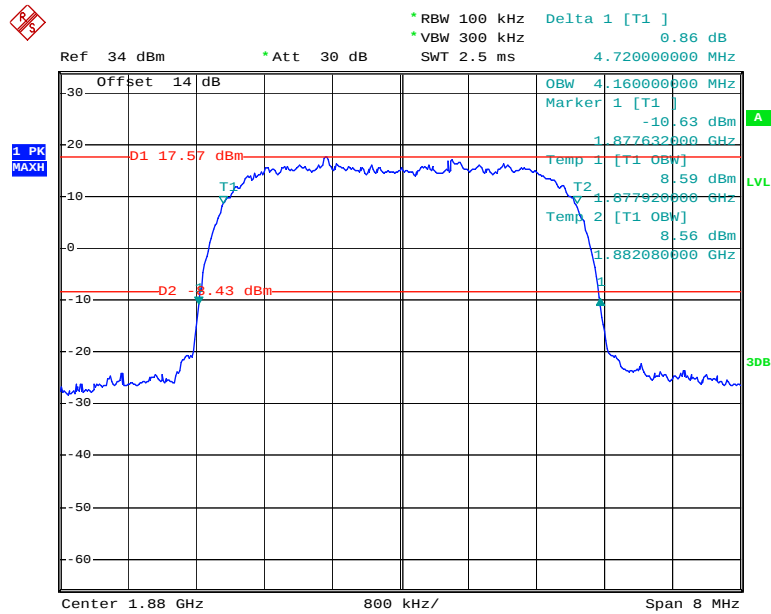


Date: 25.DEC.2013 17:44:06

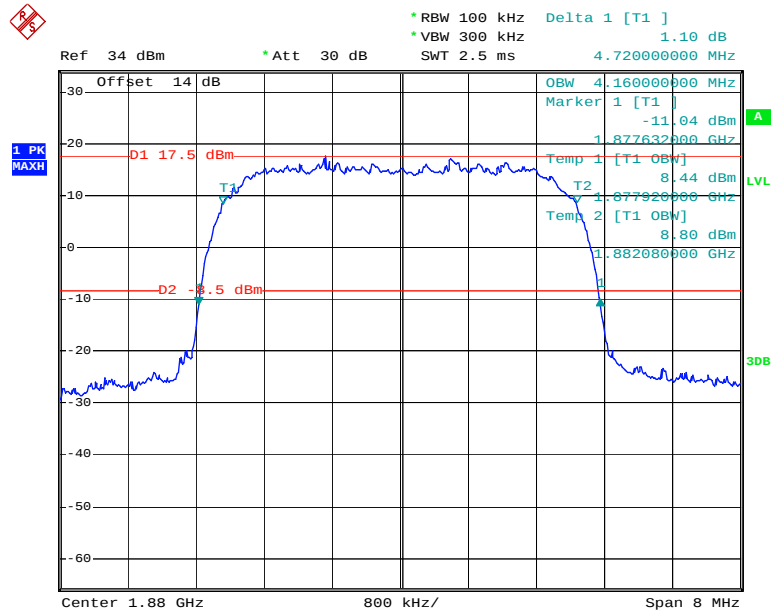
WCDMA Band II



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

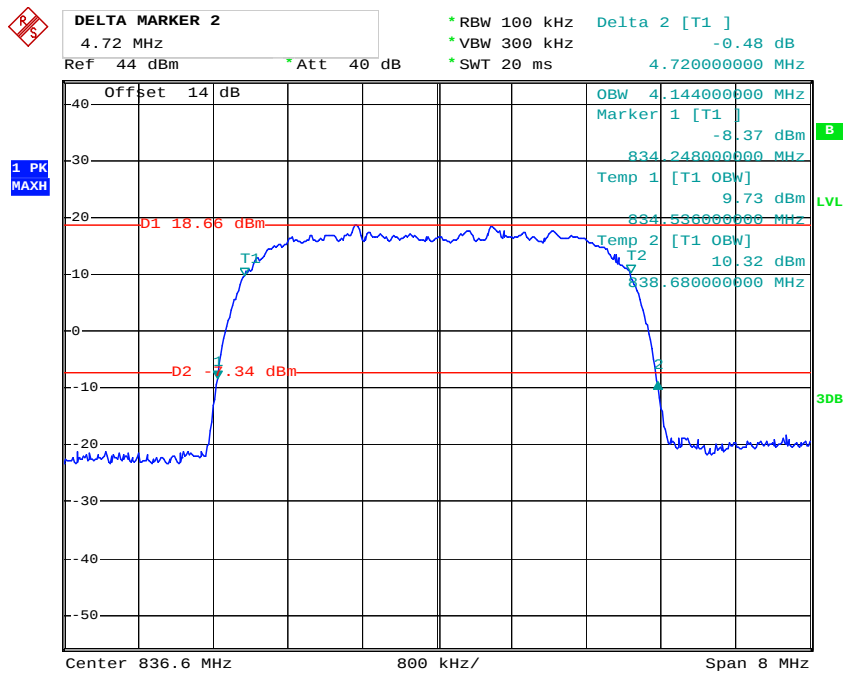
HSDPA Band II

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

HSUPA Band II

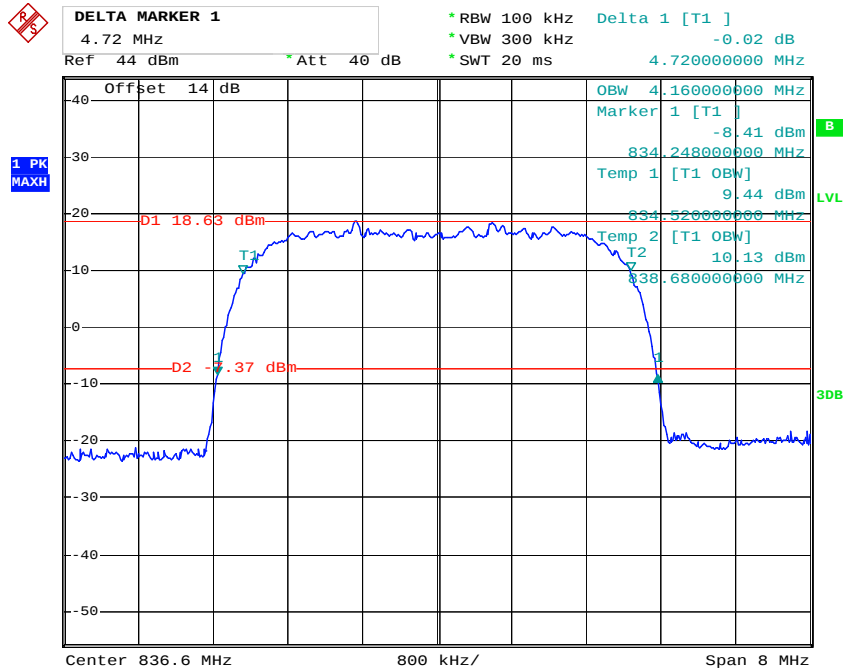
Date: 25.DEC.2013 11:38:41

WCDMA Band V



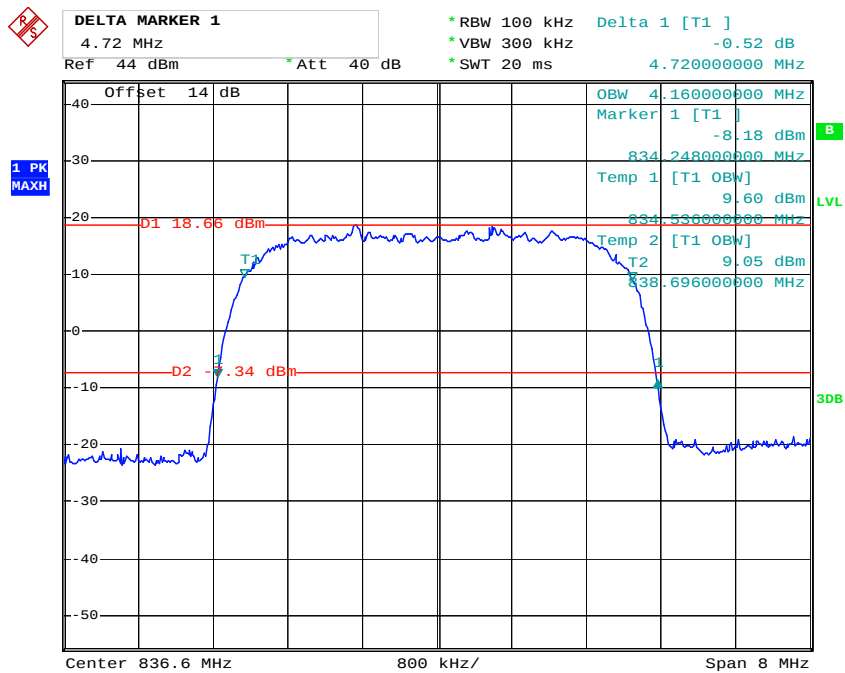
Date: 18.FEB.2014 11:26:58

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

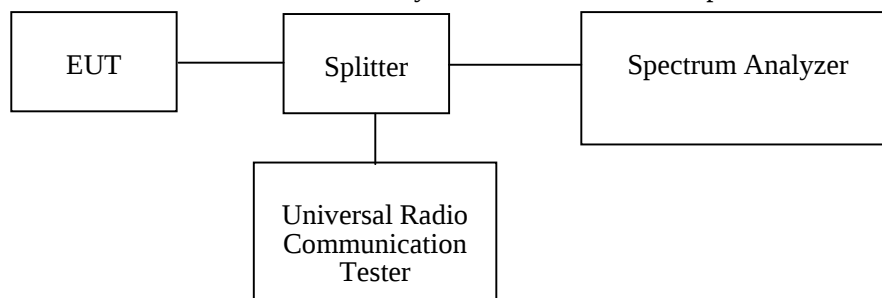
Applicable Standard

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 10th 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

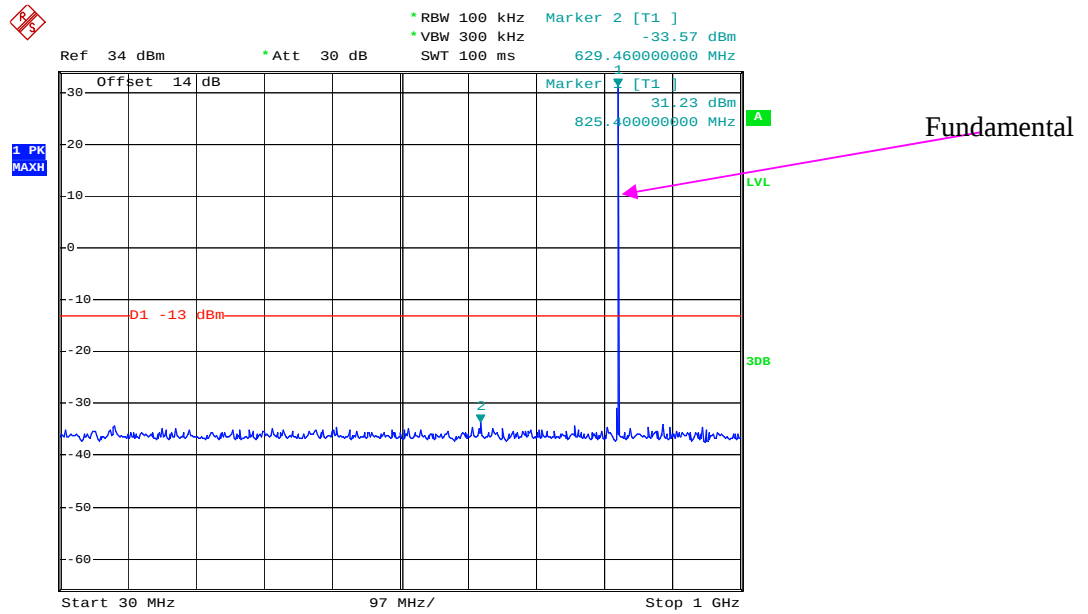
Environmental Conditions

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

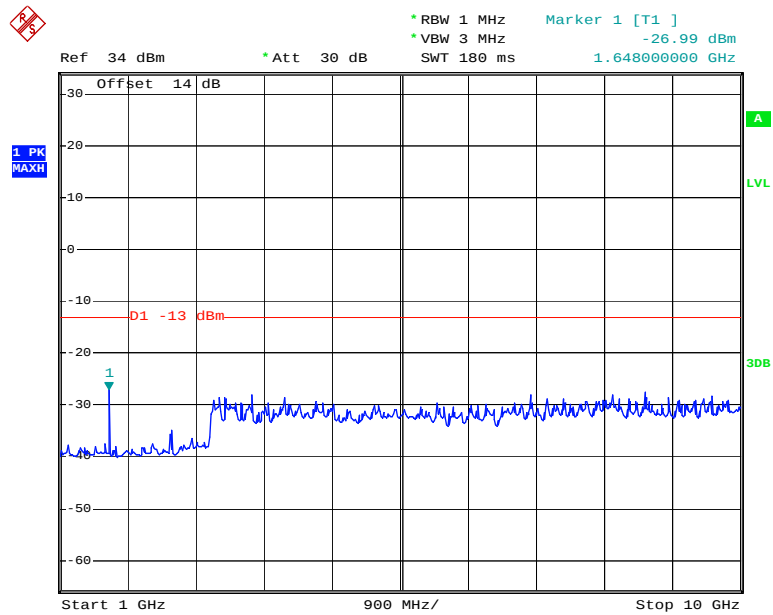
The testing was performed by Ares Liu from 2013-12-25 to 2014-02-18.

Please refer to the following plots.

GSM850 Low Channel

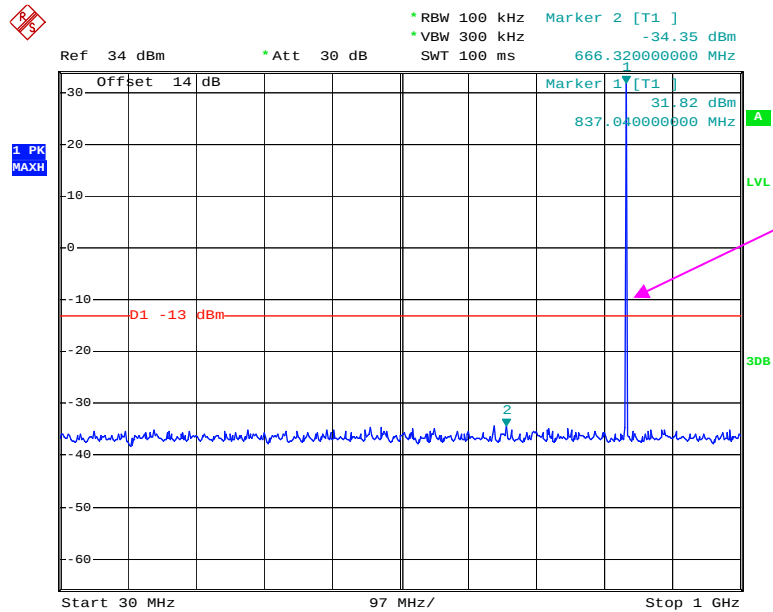


Date: 25.DEC.2013 14:41:39



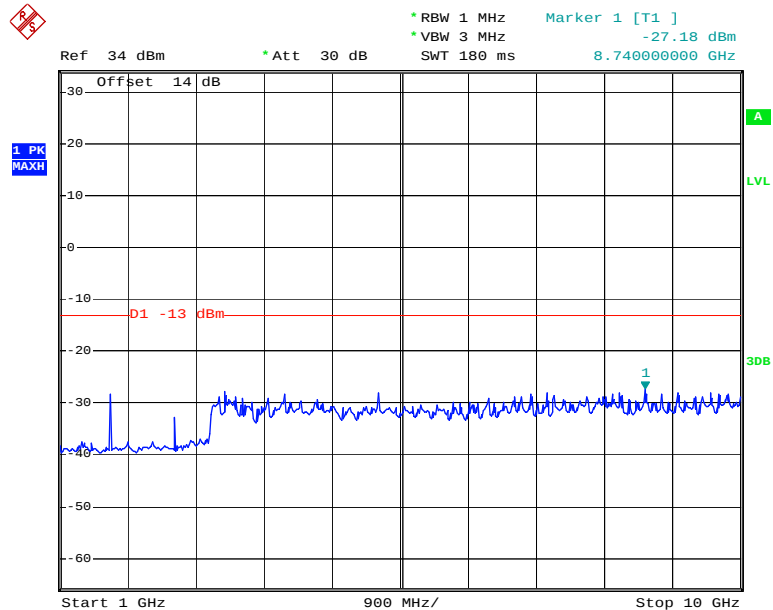
Date: 25.DEC.2013 14:42:04

GSM850 Middle Channel



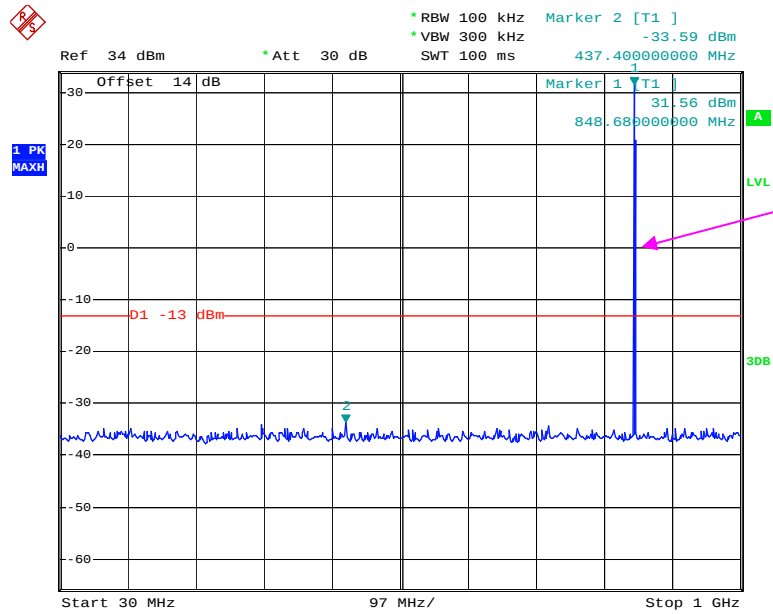
Fundamental

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

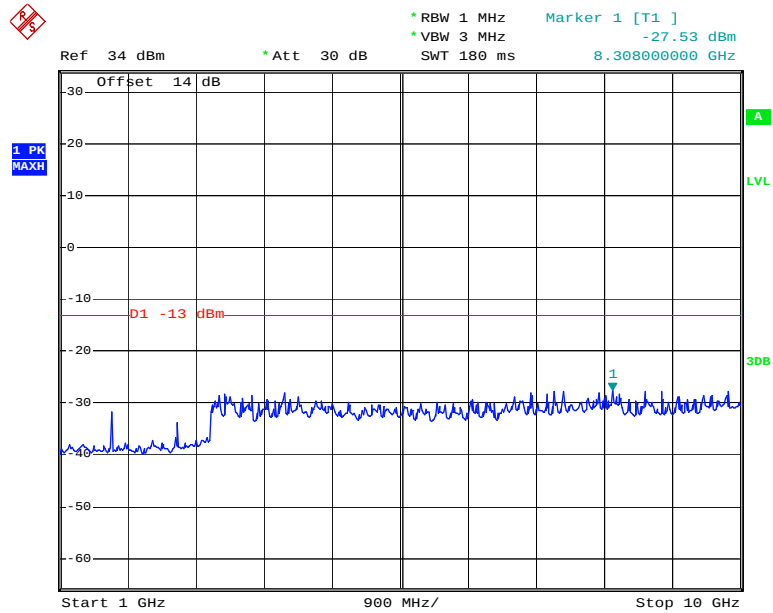


Date: 25.DEC.2013 14:42:50

GSM850 High Channel

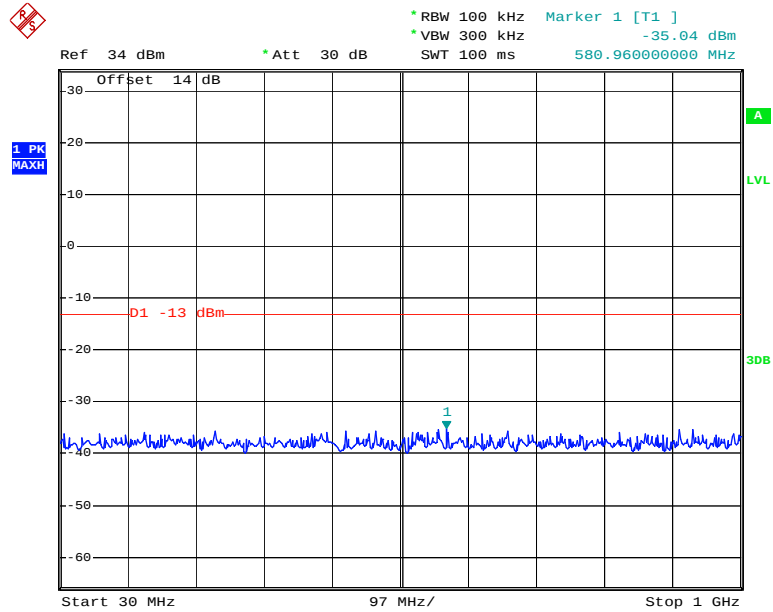


Date: 25.DEC.2013 14:43:48

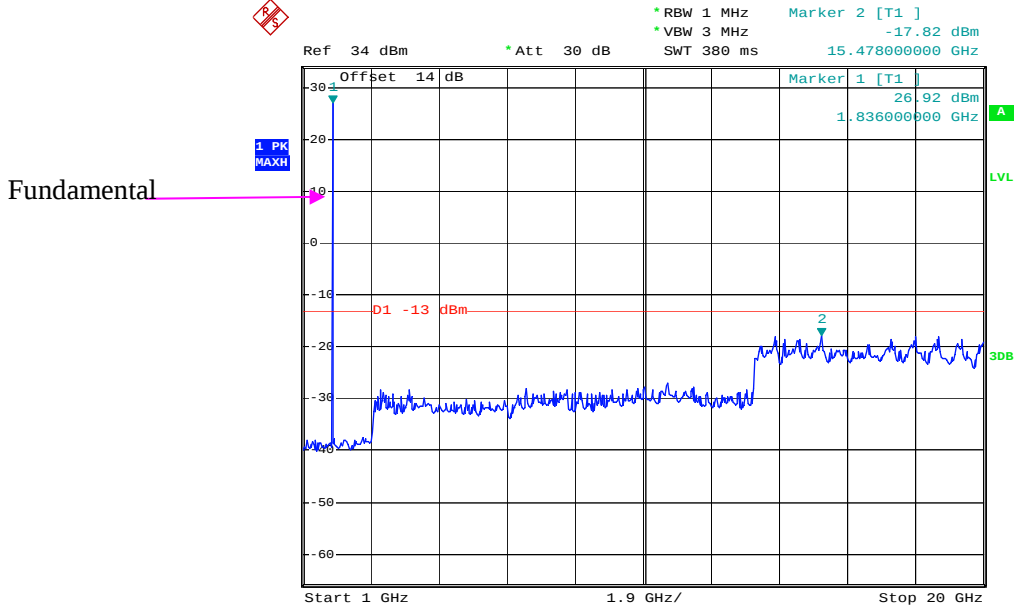


Date: 25.DEC.2013 14:44:48

PCS 1900 Low Channel

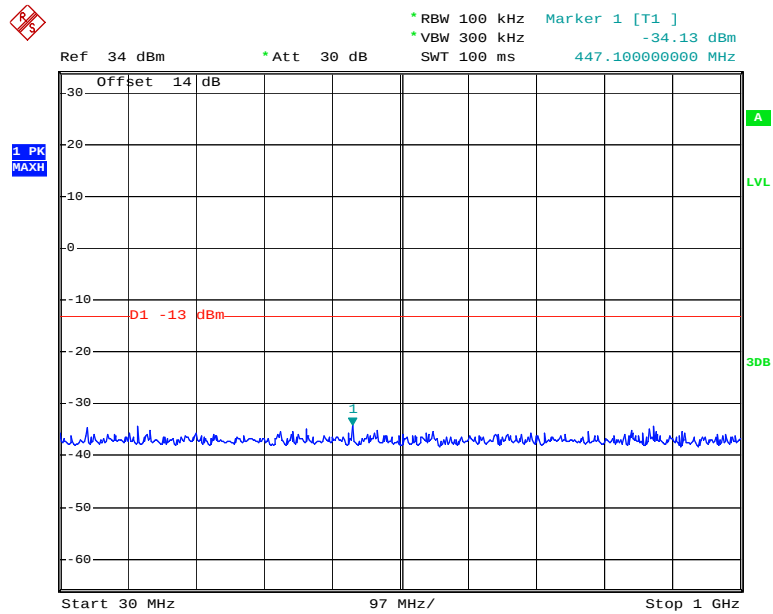


Date: 25.DEC.2013 14:51:18

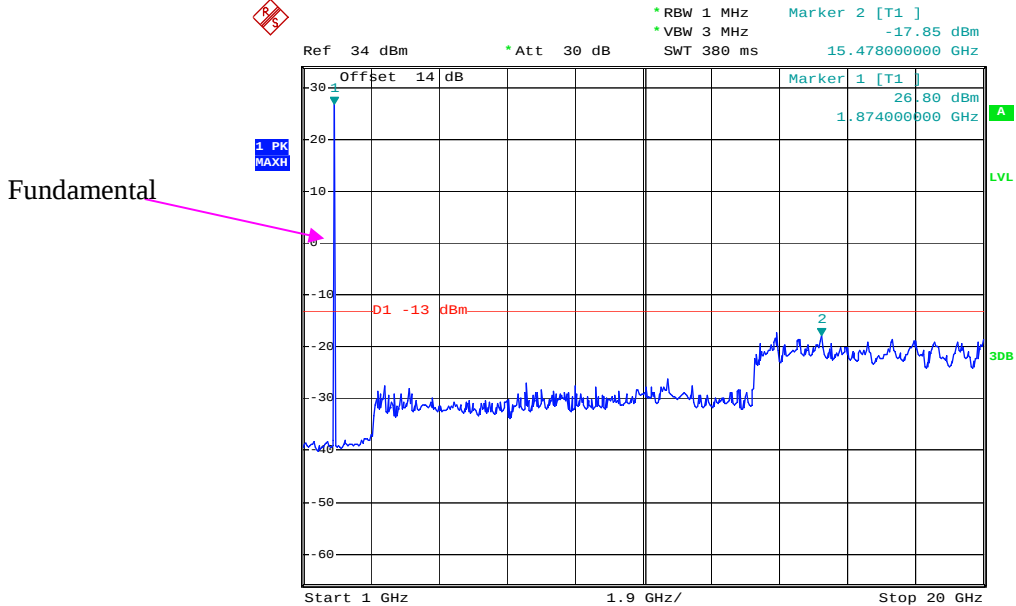


Date: 25.DEC.2013 14:48:30

PCS 1900 Middle Channel

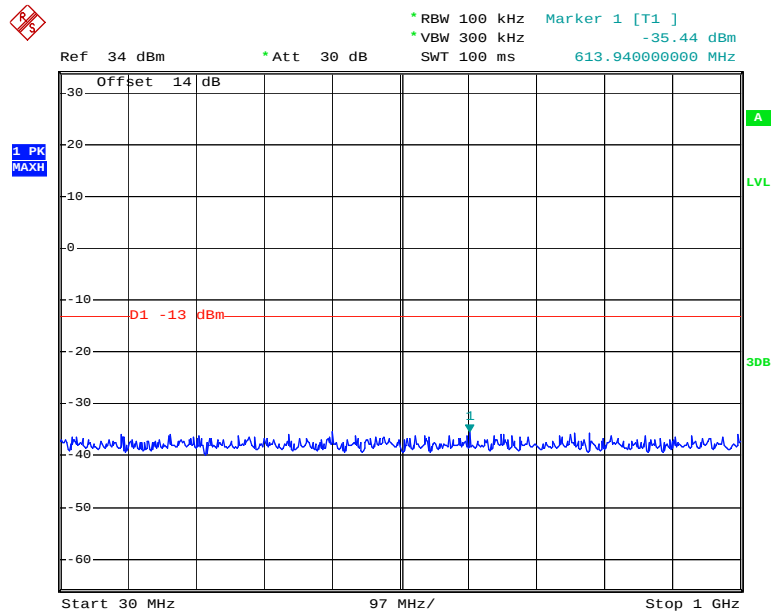


Date: 25.DEC.2013 14:54:42

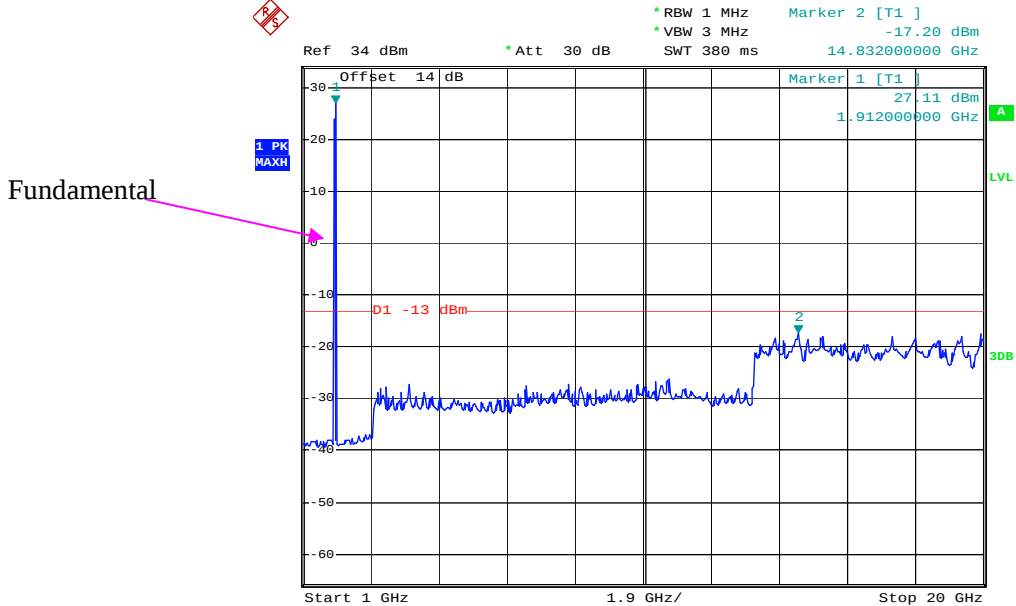


Date: 25.DEC.2013 14:54:22

PCS 1900 High Channel

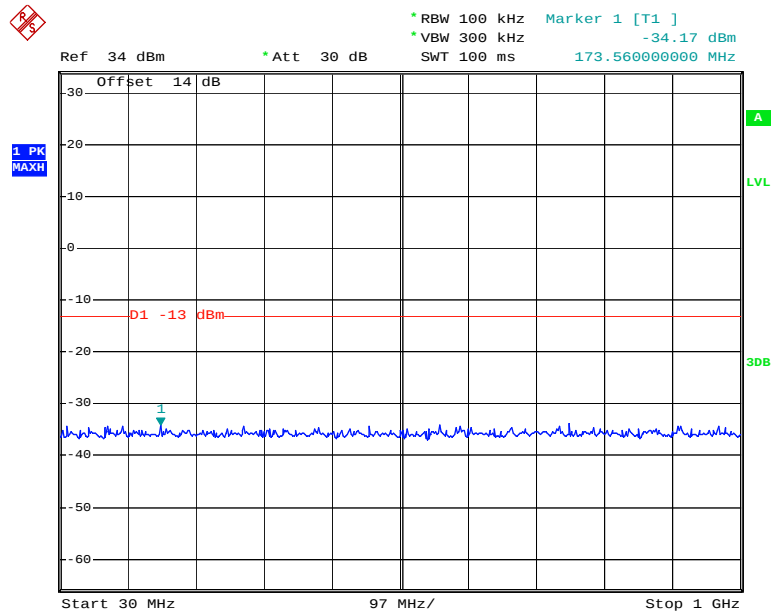


Date: 25.DEC.2013 14:51:30



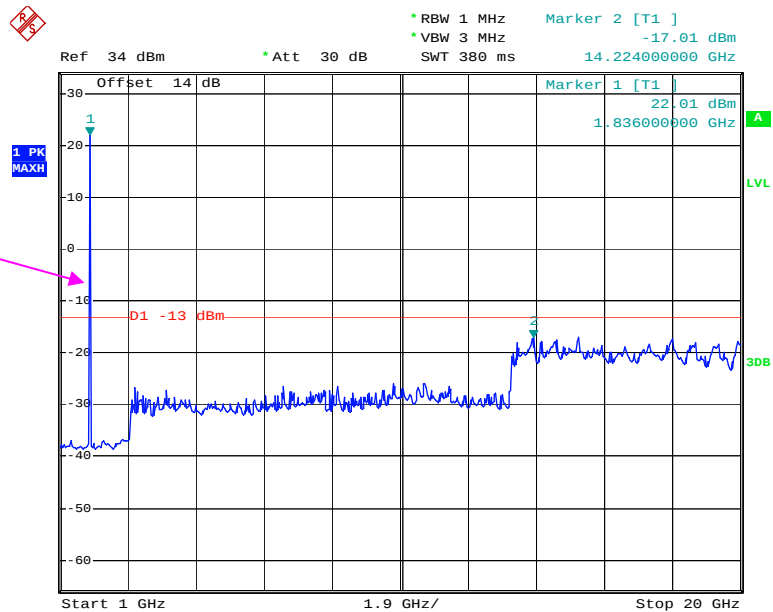
Date: 25.DEC.2013 14:53:46

WCDMA Band II Low Channel



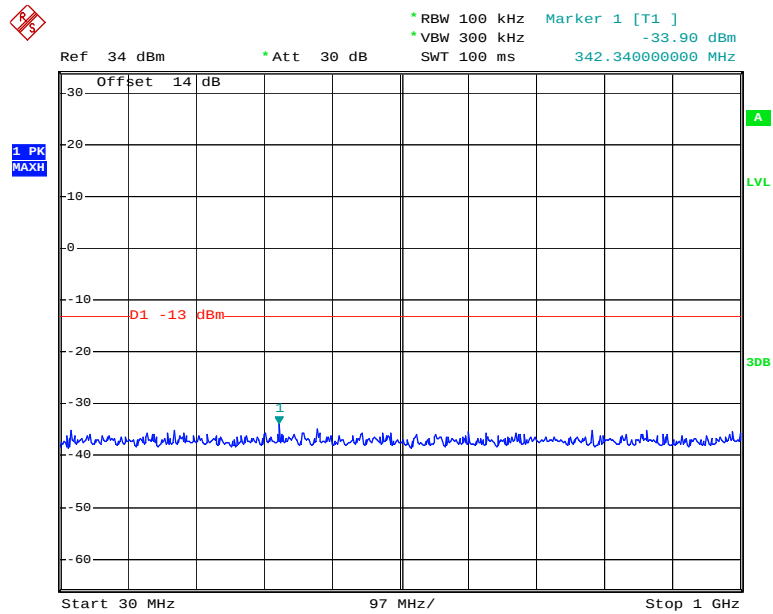
Date: 25.DEC.2013 11:41:09

Fundamental



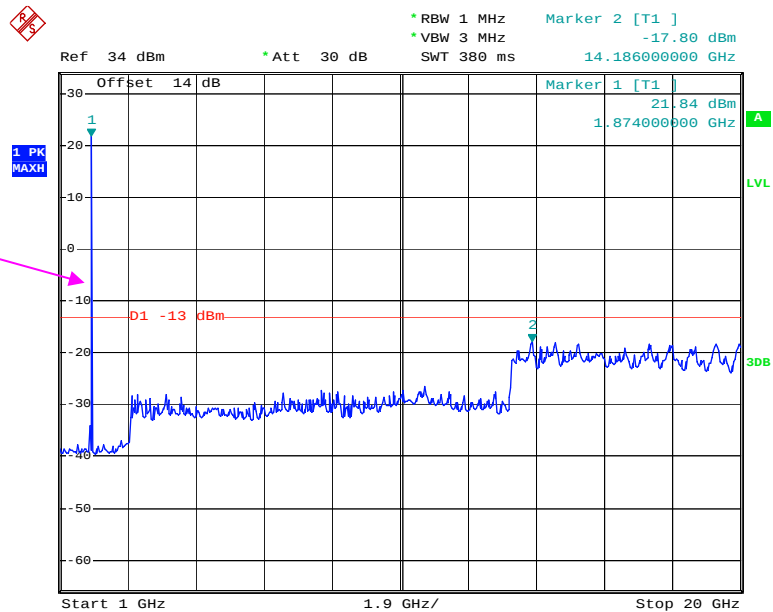
Date: 25.DEC.2013 11:44:06

WCDMA Band II Middle Channel



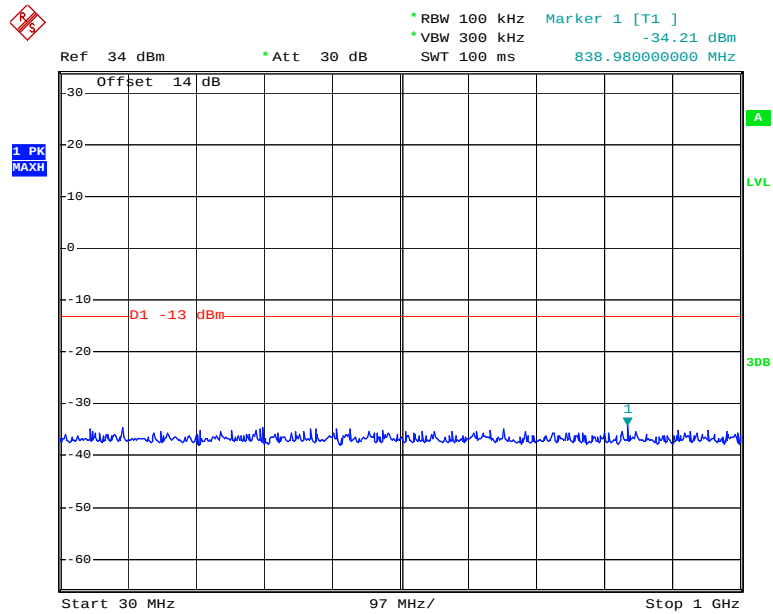
Date: 25.DEC.2013 11:45:09

Fundamental



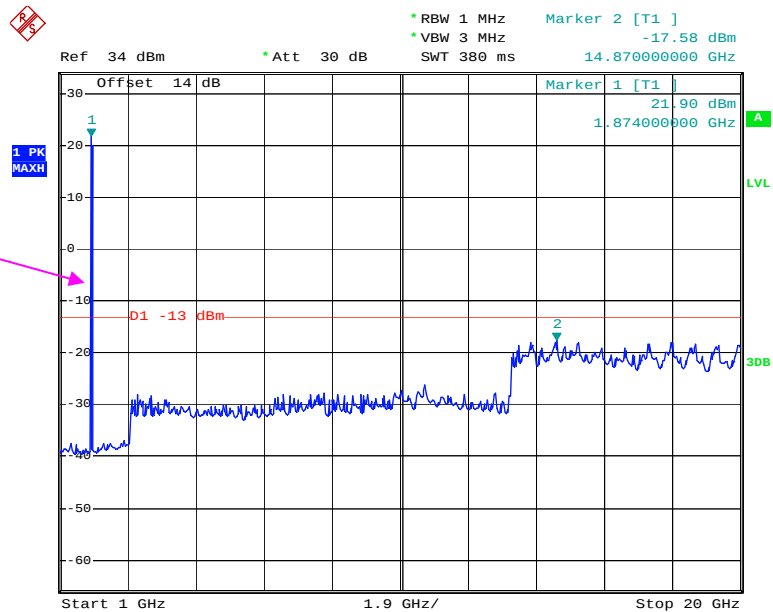
Date: 25.DEC.2013 11:44:45

WCDMA Band II High Channel



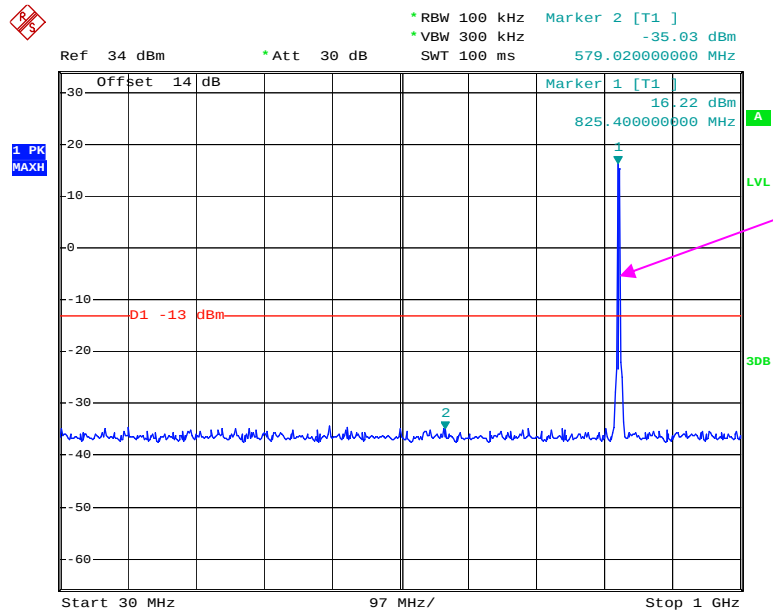
Date: 25.DEC.2013 11:45:37

Fundamental

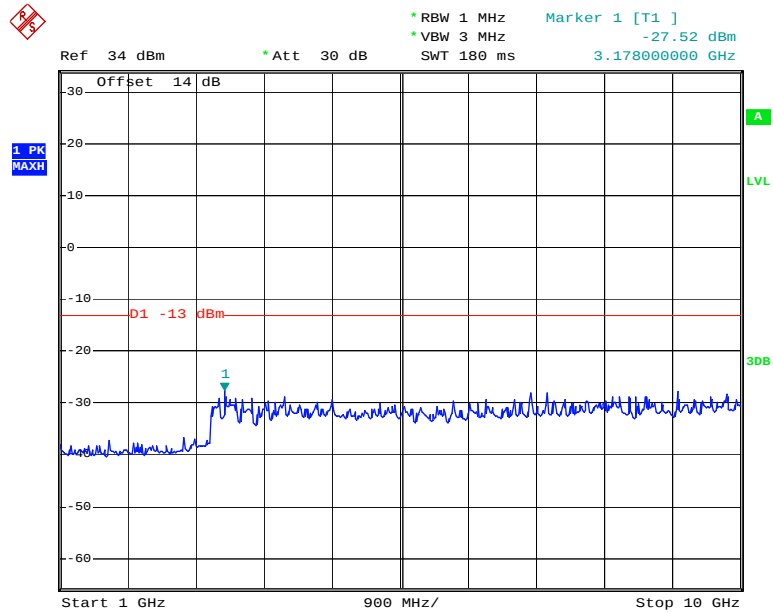


Date: 25.DEC.2013 11:47:26

WCDMA Band V Low Channel

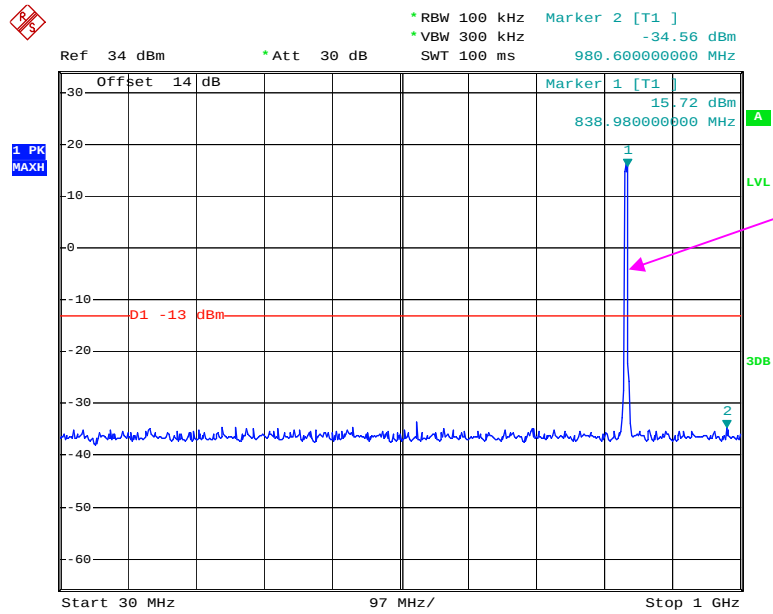


Date: 18.FEB.2014 11:03:43



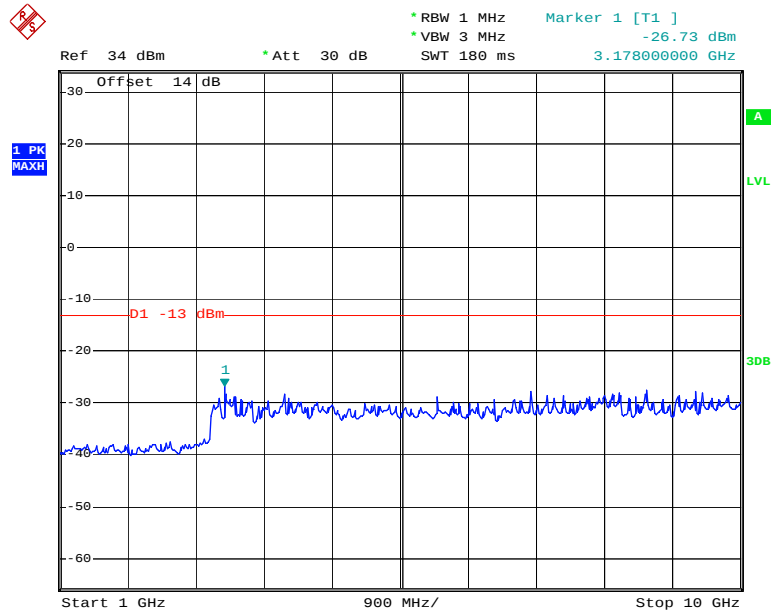
Date: 18.FEB.2014 11:03:06

WCDMA Band V Middle Channel



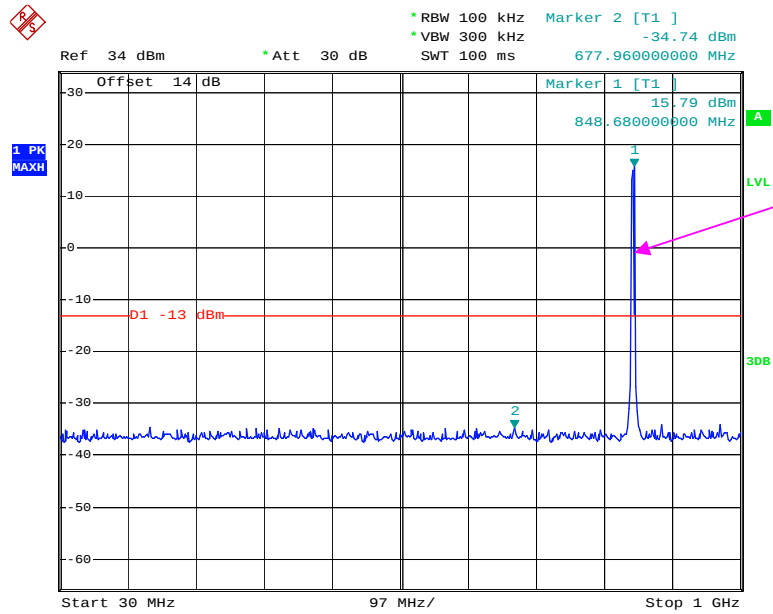
Fundamental

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

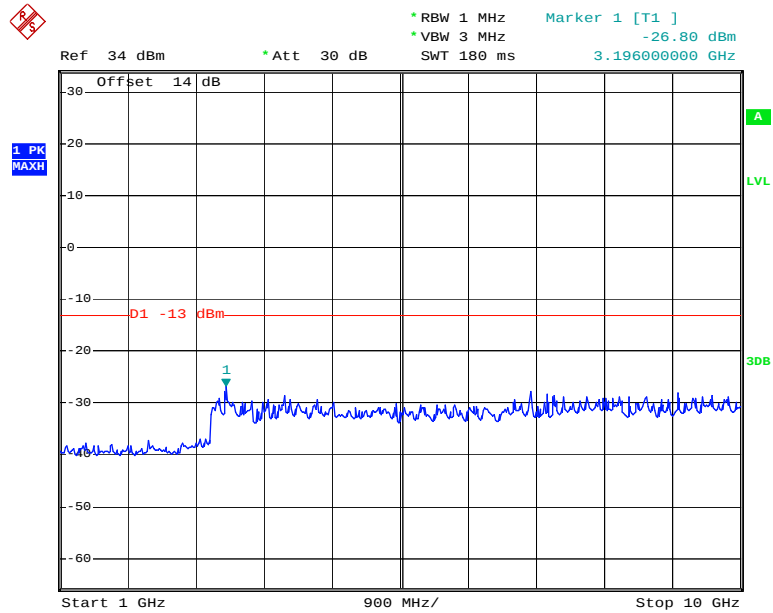


Date: 18.FEB.2014 11:06:31

WCDMA Band V High Channel



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

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

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

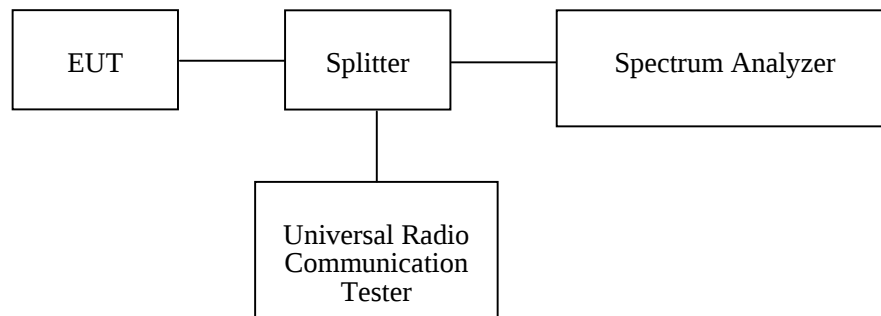
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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

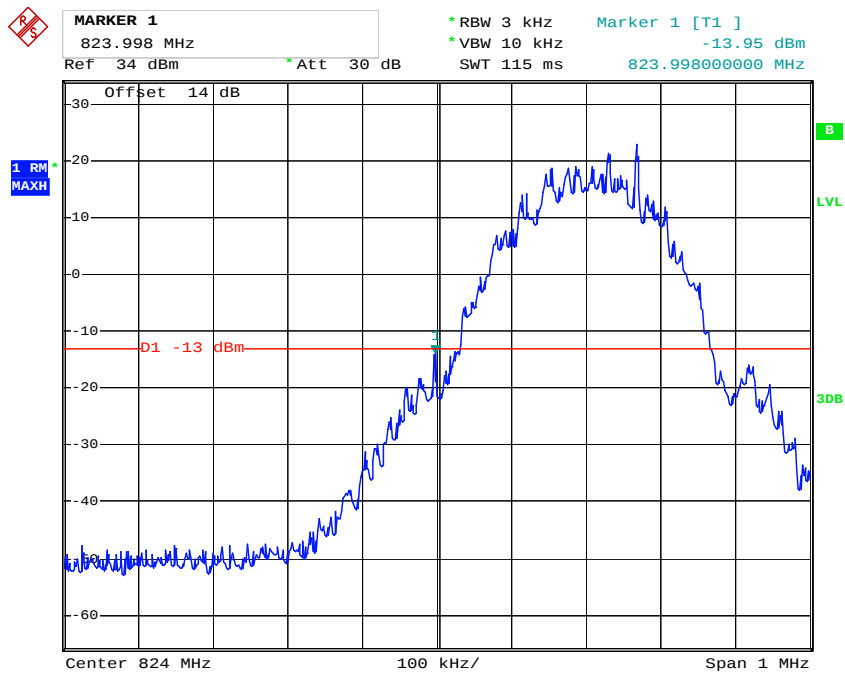
Environmental Conditions

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.

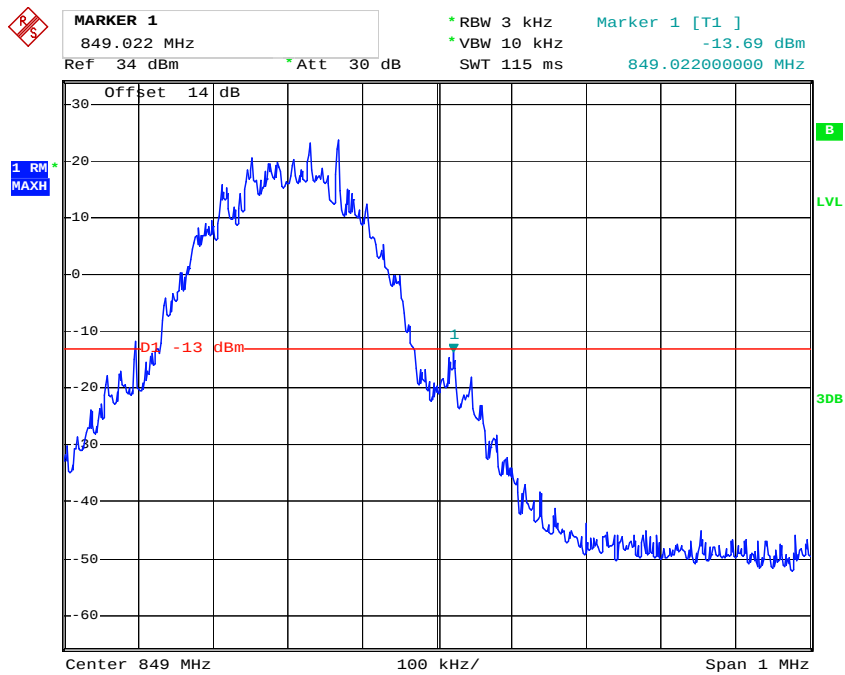
Please refer to the following tables and plots.

GSM 850, Left Band Edge



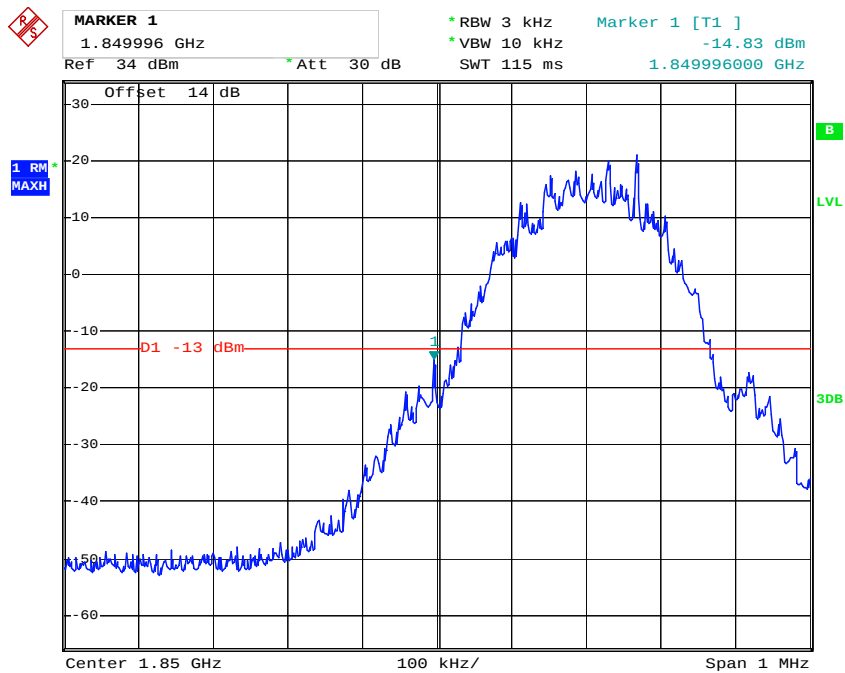
Date: 20.JAN.2014 16:05:29

GSM 850, Right Band Edge



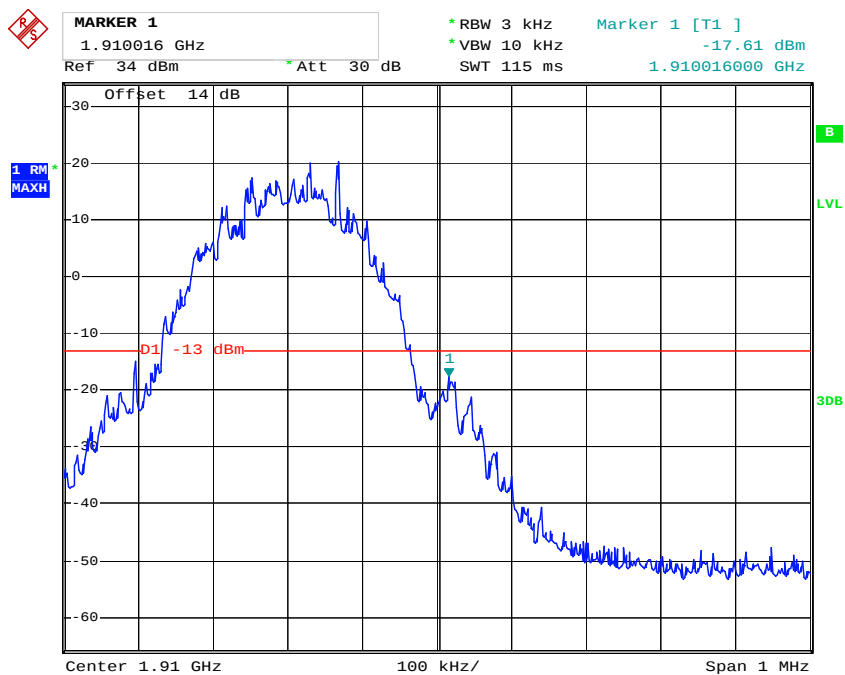
Date: 20.JAN.2014 16:09:31

GSM 1900, Left Band Edge



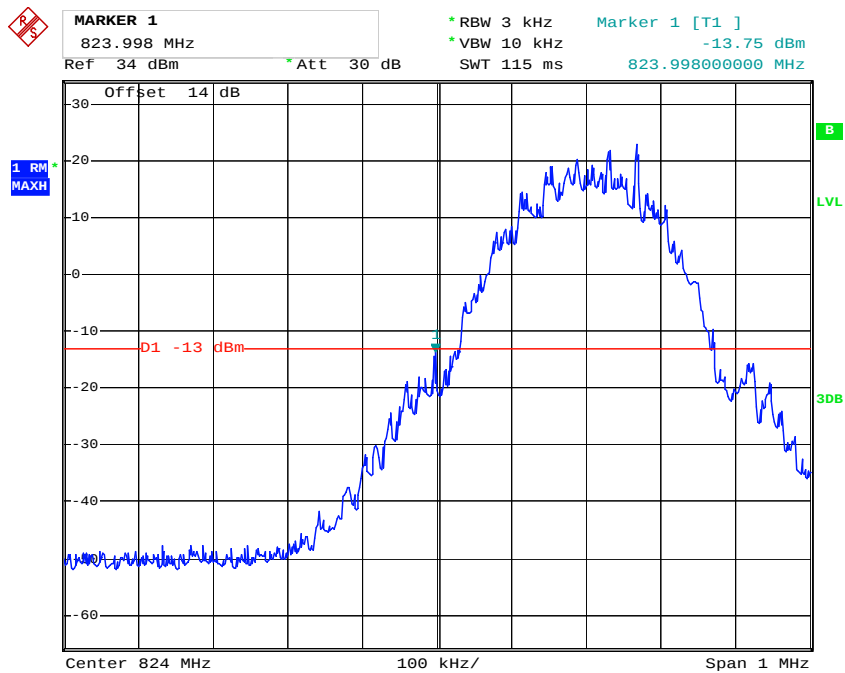
Date: 20.JAN.2014 16:13:47

GSM 1900, Right Band Edge



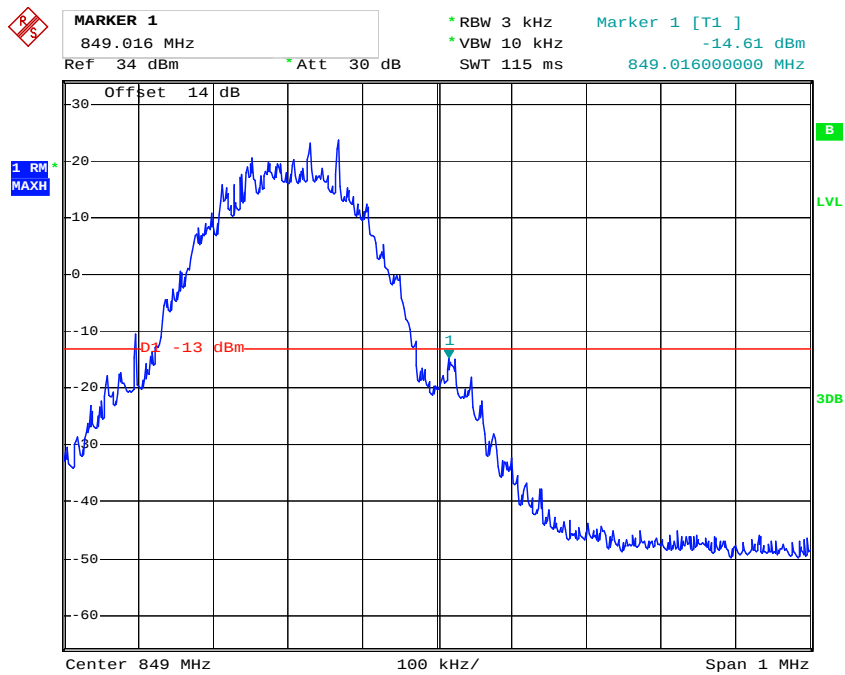
Date: 20.JAN.2014 16:15:44

EGPRS 850, Left Band Edge



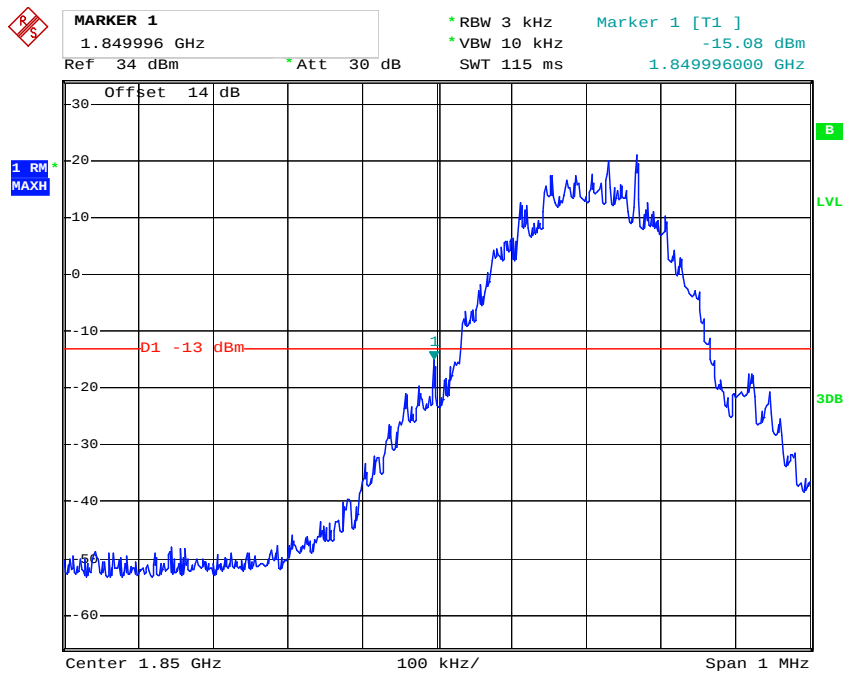
Date: 20.JAN.2014 16:06:58

EGPRS 850, Right Band Edge



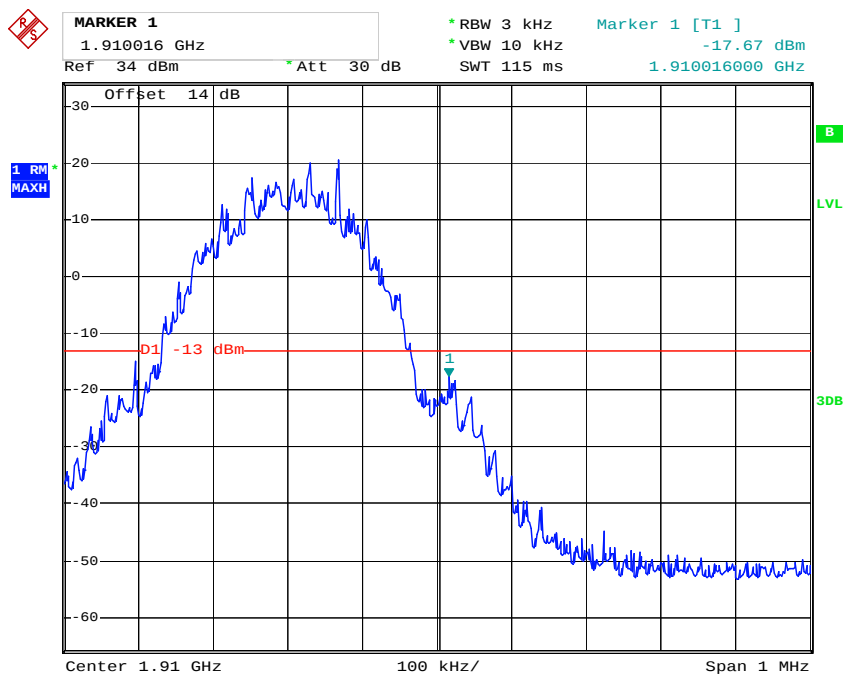
Date: 20.JAN.2014 16:11:43

EGPRS 1900, Left Band Edge



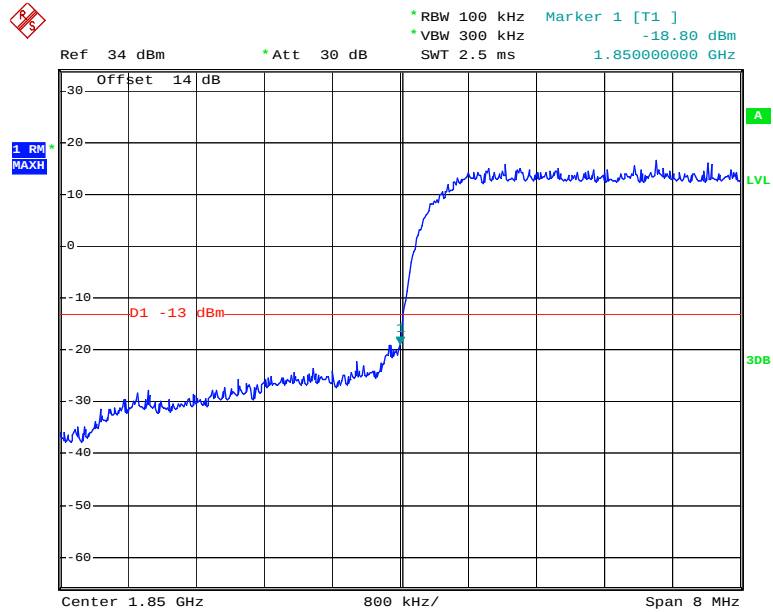
Date: 20.JAN.2014 16:14:34

EGPRS 1900, Right Band Edge



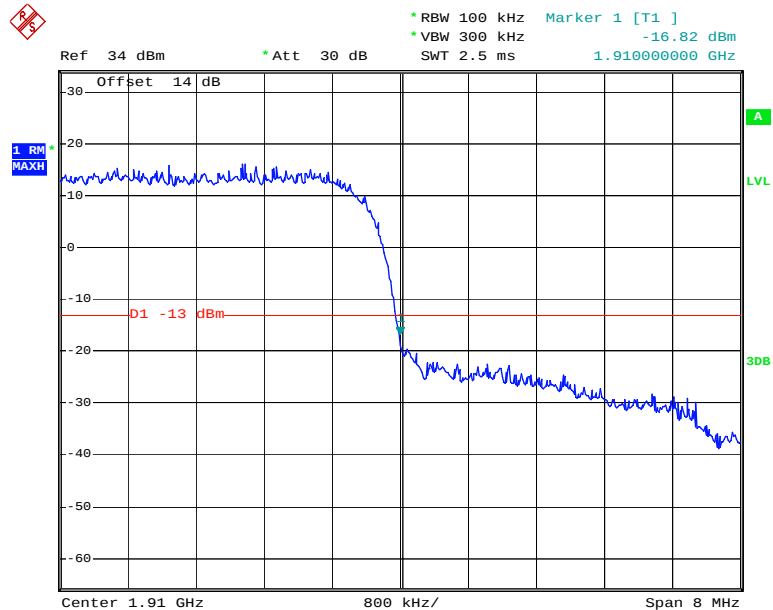
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WCDMA Band II, Left Band Edge



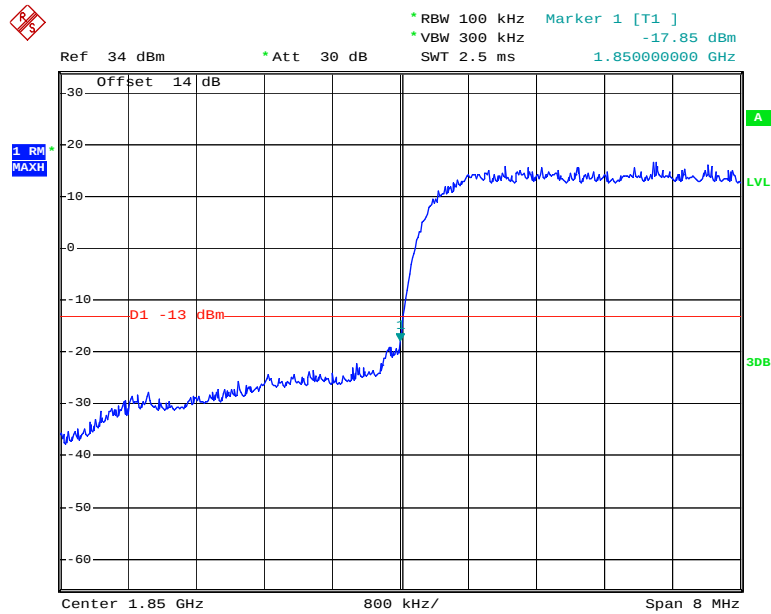
Date: 25.DEC.2013 13:48:28

WCDMA Band II, Right Band Edge



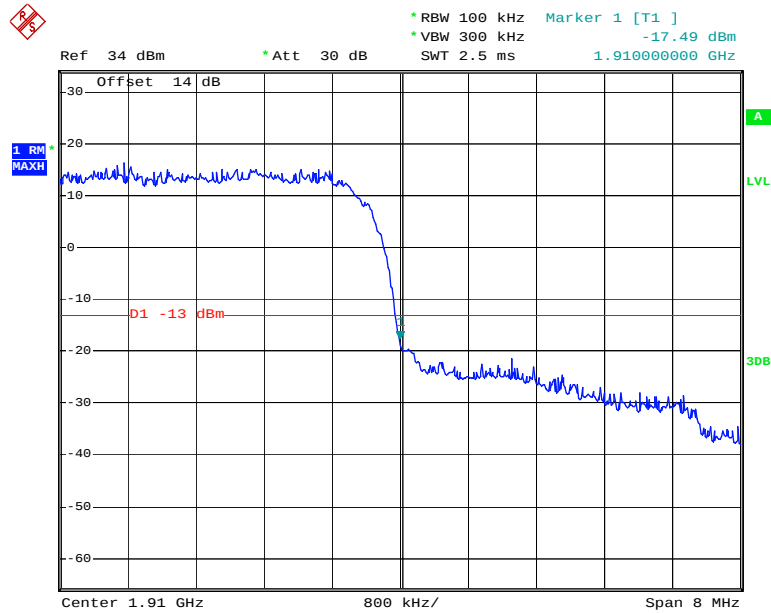
Date: 25.DEC.2013 13:47:55

HSDPA Band II , Left Band Edge



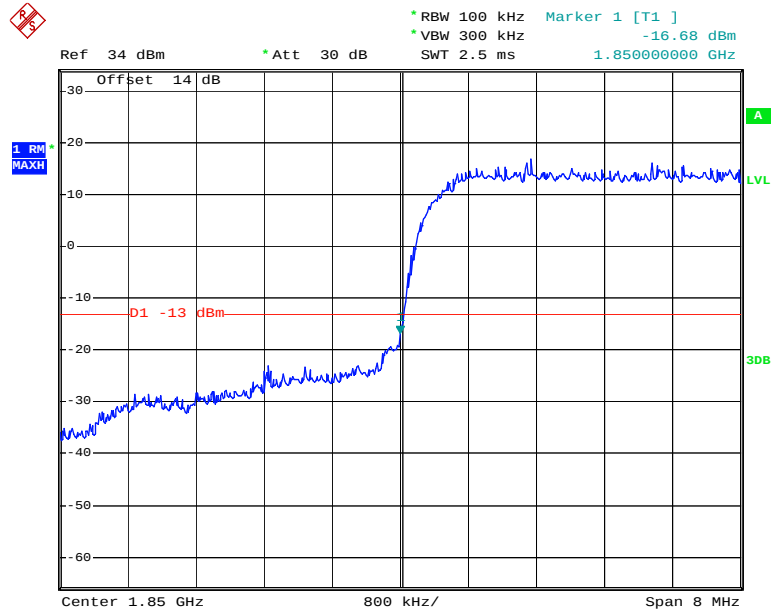
Date: 25.DEC.2013 13:48:38

HSDPA Band II, Right Band Edge



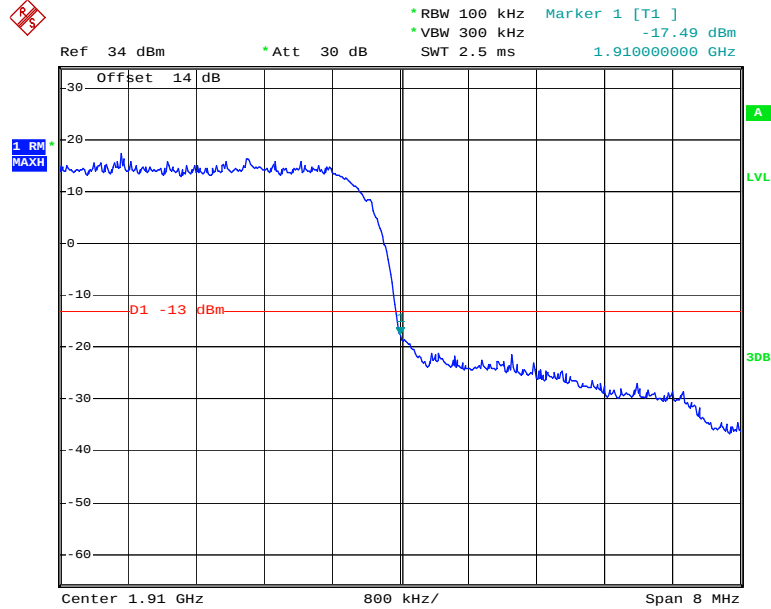
Date: 25.DEC.2013 13:49:00

HSUPA Band II, Left Band Edge



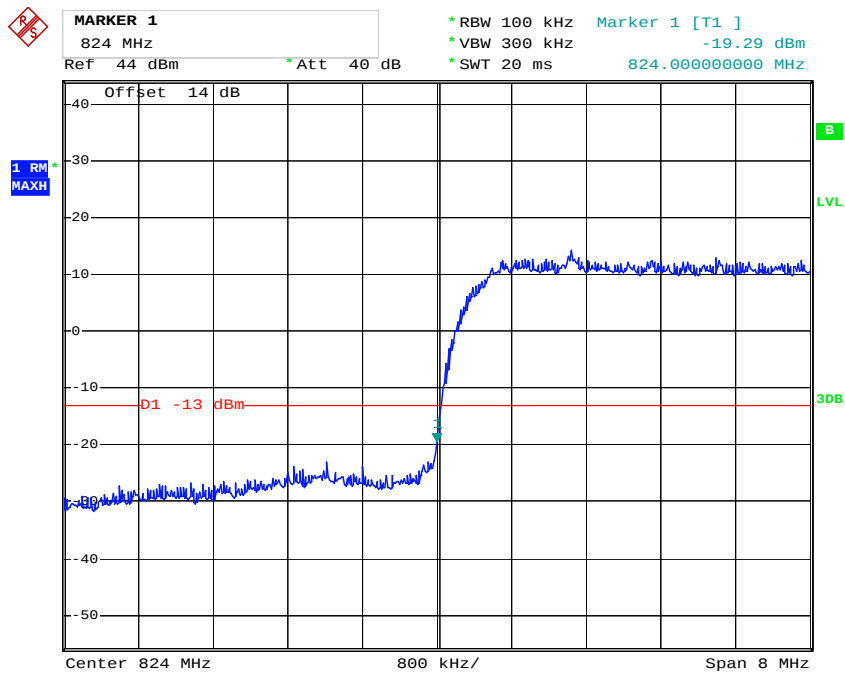
Date: 25.DEC.2013 13:50:06

HSUPA Band II, Right Band Edge



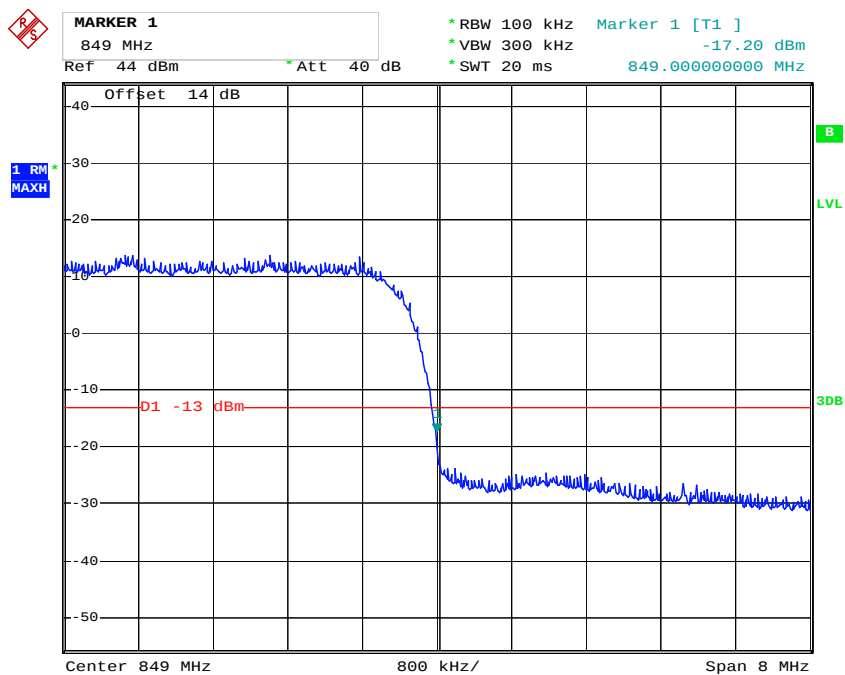
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WCDMA Band V, Left Band Edge



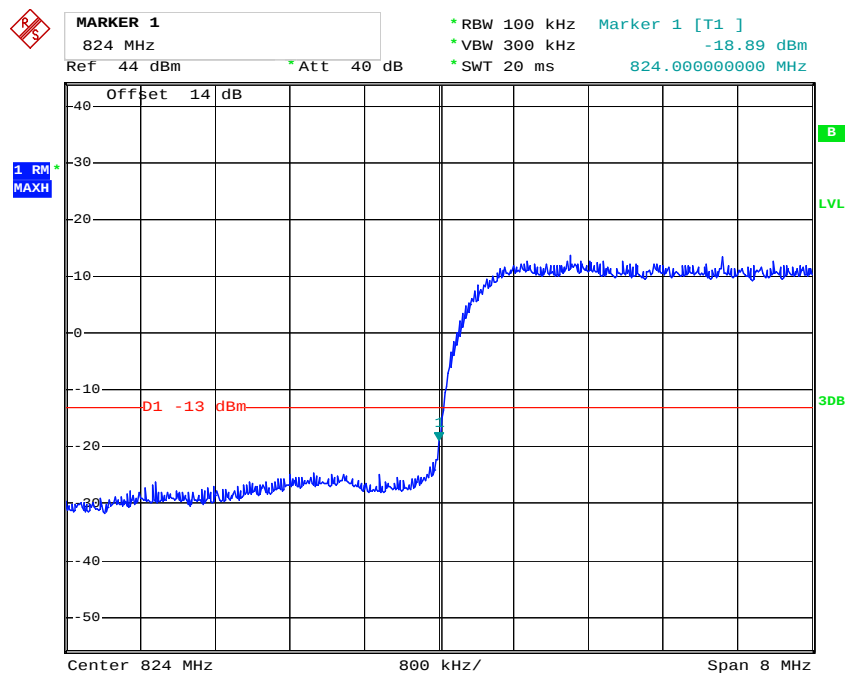
Date: 18.FEB.2014 11:23:26

WCDMA Band V, Right Band Edge



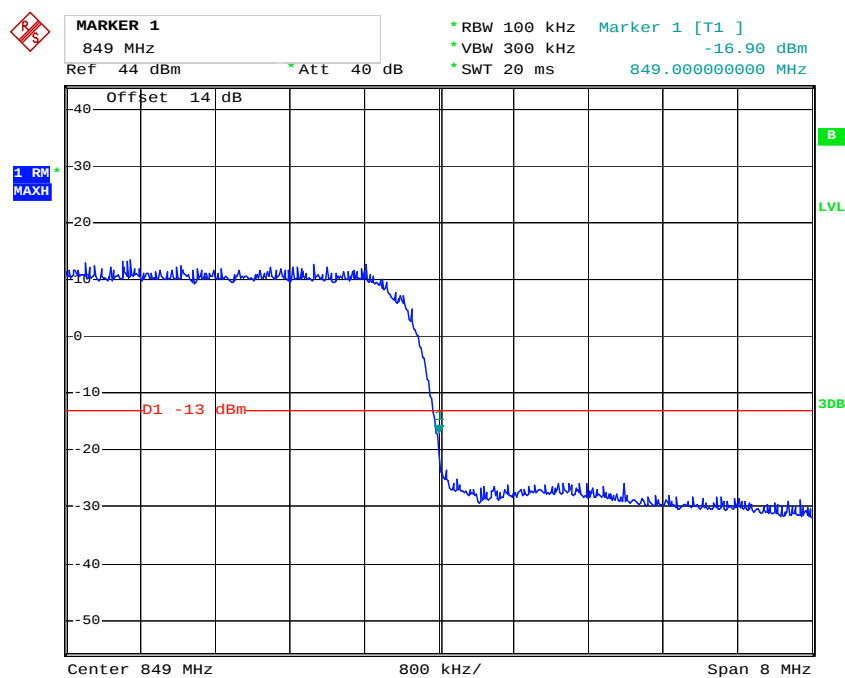
Date: 18.FEB.2014 11:22:23

HSDPA Band V , Left Band Edge



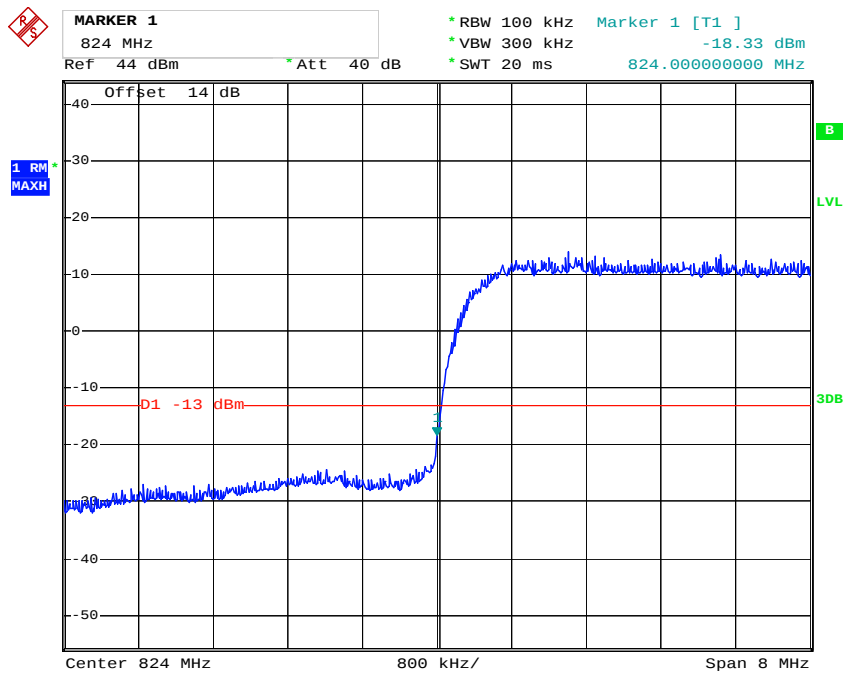
Date: 18.FEB.2014 11:38:16

HSDPA Band V , Right Band Edge



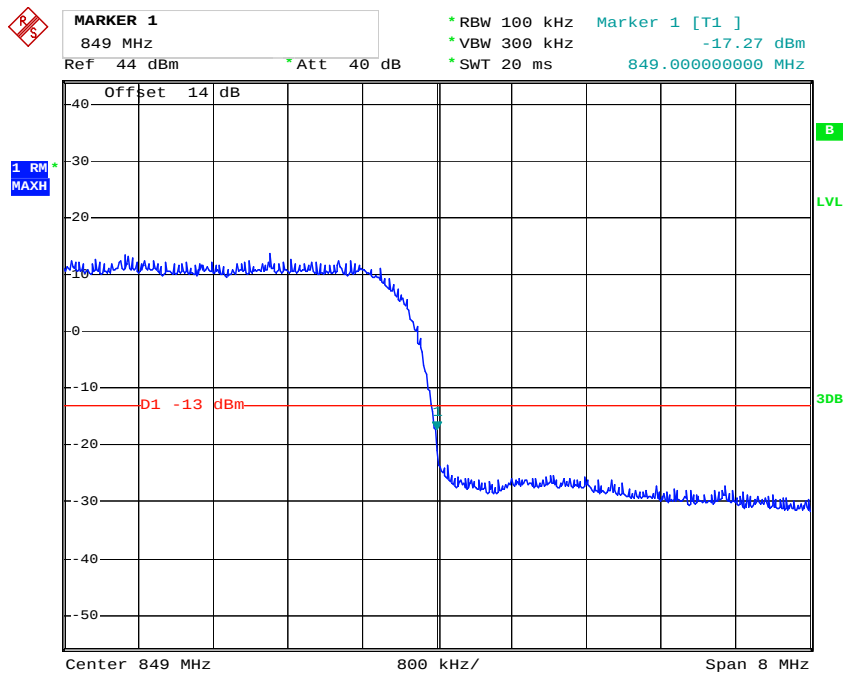
Date: 18.FEB.2014 11:38:34

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

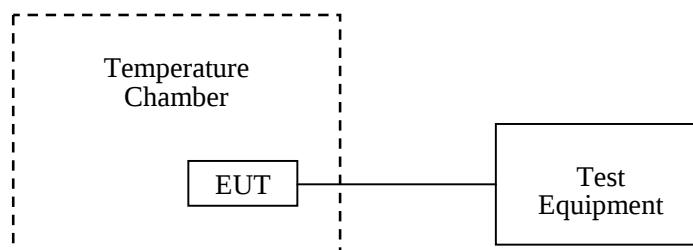
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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
°C	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
°C	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
°C	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
°C	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
°C	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
°C	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 *******