

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

For

HONG KONG IPRO TECHNOLOGY CO., LIMITED

FLAT/RM A3, 9/F SILVERCORP INT TOWER 707-713 NATHAN RD MONGKOK,
HONGKONG

FCC ID: PQ4IPROWAVE50

Report Type: Original Report	Product Type: Smart Mobile Phone
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Report Number: RDG151123005-00C	
Report Date: 2015-11-30	
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FINAL

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *HONG KONG IPRO TECHNOLOGY CO.,LIMITED.* 's product, model number: *WAVE 5.0(FCC ID: PQ4IPROWAVE50)* (the "EUT") in this report was a *Smart Mobile Phone*, which was measured approximately: 14.3 cm (L) x 7.1 cm (W) x 1.4 cm (H), rated input voltage: DC 3.7V rechargeable Li-ion battery or DC5.0V charging from adapter.

Adapter information:

Model: NTR-S05

Input: AC100-240V, 50/60 Hz, 150mA

Output: DC 5V, 700mA

All measurement and test data in this report was gathered from production sample serial number: IPROWAVE5.0000001 (Assigned by applicant). The EUT was received on 2015-11-24.

Objective

This report is prepared on behalf of *HONG KONG IPRO TECHNOLOGY CO.,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: PQ4IPROWAVE50

FCC Part 15C DSS submissions with FCC ID: PQ4IPROWAVE50

FCC Part 15C DTS submissions with FCC ID: PQ4IPROWAVE50

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.

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 06, 2015.

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.

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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.

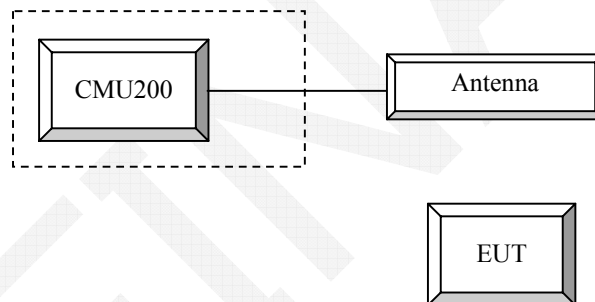
Equipment Modifications

No modification was made to the EUT.

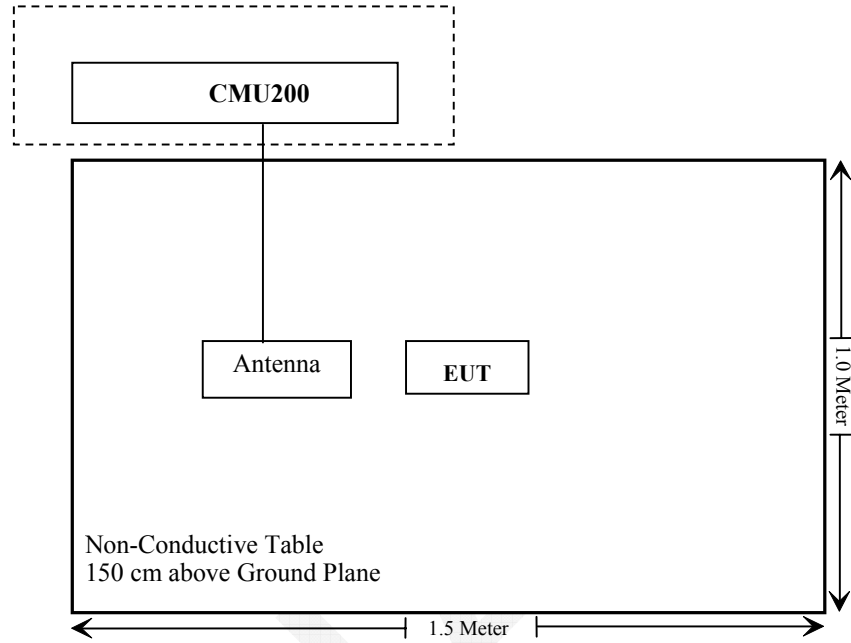
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	109038
N/A	ANTENNA	N/A	N/A

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

Compliant, please refer to the SAR report: RDG151123005-20.

FINAL

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.

F I N A L

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..

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Procedure

GSM/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 MCS5 (EGPRS)

Bit Stream > 2E9-1 PSR Bit Stream
 AF/RF Connection Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
 Press Signal on to turn on the signal and change settings

WCDMA-Release 99

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c / β_d	8/15

WCDMA HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c / β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	$A_{hs} = \beta_{hs} / \beta_c$	30/15			

WCDMA HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subset	1	2	3	4	5
WCDMA A 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
	CM(dB)	1.0	3.0	2.0	3.0	1.0
MPR(dB)	0	2	1	2	0	
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	$A_{hs}=\beta_{hs}/\beta_c$	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCI	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	

HSPA+

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105

- Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{nr} = 30/15 * \beta_c$.
- Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
- Note 3: DPDCH is not configured, therefore the β_c is set to 1 and $\beta_d = 0$ by default.
- Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
- Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

DC-HSDPA

The following tests were conducted according to the test requirements in Table C.8.1.12 of 3GPP TS 34.121-1

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
<p>Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.</p> <p>Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.</p>		

Radiated method:

ANSI/TIA-603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS LINDGREN	Horn Antenna	3115	000 527 35	2013-09-06	2016-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-02-19	2016-02-19
Giga	Signal Generator	1026	320408	2015-05-09	2016-05-09
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2013-09-06	2016-09-06

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

Test Data**Environmental Conditions**

Temperature:	24.8 °C
Relative Humidity:	42%
ATM Pressure:	101.2 kPa

The testing was performed by Allen Qiao on 2015-11-28.

Conducted Output 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	32.40	31.97	31.15	29.62	28.71	25.87	25	22.83	21.75
	190	32.30	31.85	31.08	29.50	28.66	25.86	25	22.80	21.71
	251	32.30	31.75	31.02	29.45	28.64	25.82	25	22.77	21.67
PCS	512	29.20	29.24	28.23	26.37	25.59	25.28	24	22.27	21.16
	661	29.60	29.55	28.56	26.75	25.98	25.31	24	22.32	21.21
	810	30.30	30.23	29.40	27.54	26.80	25.47	24	22.38	21.25

WCDMA Band (PART 24E)

Mode	3GPP Sub Test	Average 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	22.28	2.92	21.98	2.60	21.91	2.60
HSDPA	1	21.22	3.22	20.85	2.75	20.79	3.04
	2	21.07	3.18	20.87	2.77	20.83	2.93
	3	21.11	3.13	20.97	2.89	20.89	2.95
	4	21.17	3.20	20.93	2.92	20.84	2.88
HSUPA	1	21.21	3.24	20.92	2.95	20.86	2.81
	2	21.13	3.19	20.88	2.98	20.96	3.01
	3	21.08	3.37	21.00	2.71	20.81	2.93
	4	21.30	3.32	21.03	2.97	20.98	2.83
	5	21.28	3.42	20.81	2.91	20.90	2.80
DC-HSDPA	1	21.25	3.27	20.94	2.76	20.79	2.82
	2	21.11	3.17	20.86	2.85	20.76	2.91
	3	21.18	3.41	21.00	2.93	20.85	2.89
	4	21.17	3.29	20.82	2.90	21.01	2.79
HSPA+	1	21.29	3.40	20.96	2.68	20.86	3.01

WCDMA Band V (PART 22H)

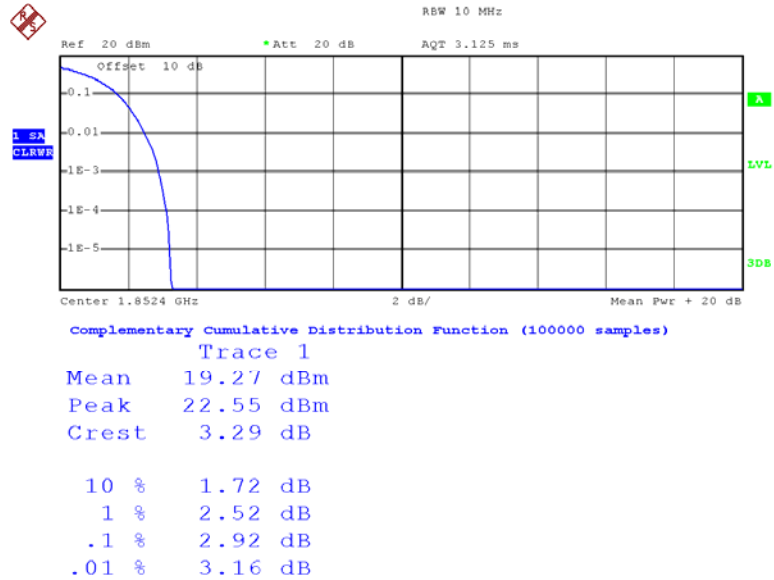
Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99	1	22.82	2.92	22.77	3.04	23.01	3.00
HSDPA	1	21.77	3.51	21.72	3.32	21.92	3.35
	2	21.74	3.36	21.61	3.46	21.85	3.31
	3	21.87	3.45	21.71	3.23	21.87	3.26
	4	21.68	3.48	21.65	3.36	22.04	3.12
DC-HSDPA	1	21.79	3.43	21.76	3.29	21.97	3.38
	2	21.93	3.29	21.63	3.33	21.92	3.24
	3	21.90	3.39	21.89	3.45	22.03	3.15
	4	21.71	3.31	21.81	3.39	21.98	3.22
	5	21.86	3.26	21.78	3.25	21.88	3.27
HSUPA	1	21.80	3.45	21.70	3.43	22.05	3.15
	2	21.85	3.25	21.74	3.22	21.86	3.17
	3	21.76	3.50	21.78	3.42	21.98	3.28
	4	21.73	3.37	21.88	3.25	21.92	3.23
HSPA+	1	21.75	3.31	21.65	3.24	22.05	3.11

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

Peak-to-average ratio (PAR)

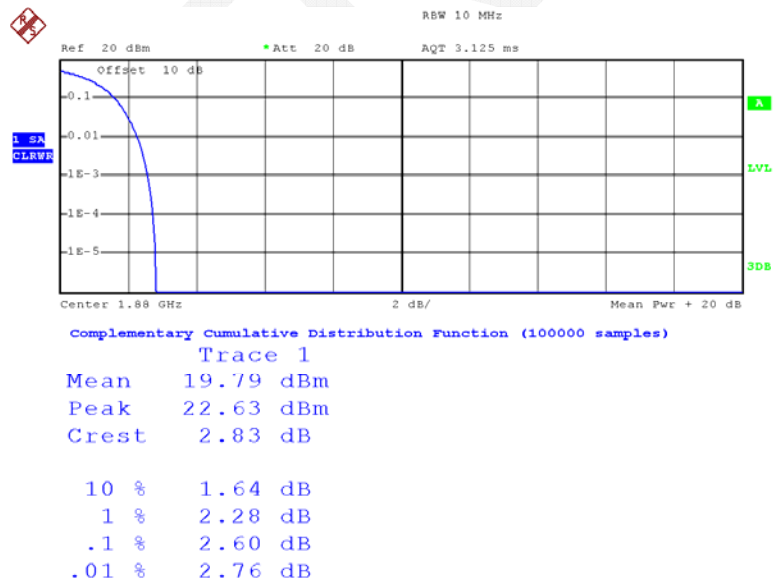
WCDMA Band (PART 24E)

Low Channel



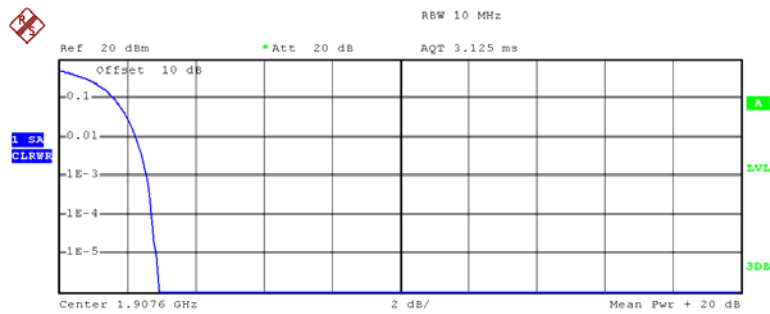
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Middle Channel



Date: 28.NOV.2015 13:13:08

High Channel



Complementary Cumulative Distribution Function (100000 samples)

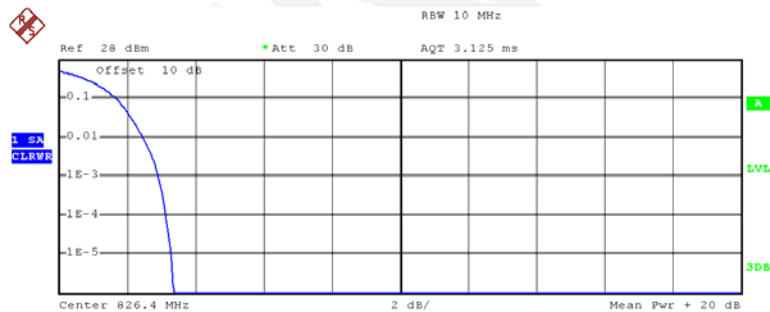
Trace 1

Mean	19.76 dBm
Peak	22.70 dBm
Crest	2.94 dB
10 %	1.64 dB
1 %	2.28 dB
.1 %	2.60 dB
.01 %	2.72 dB

Date: 28.NOV.2015 13:13:19

WCDMA Band V (PART 22H)

Low Channel



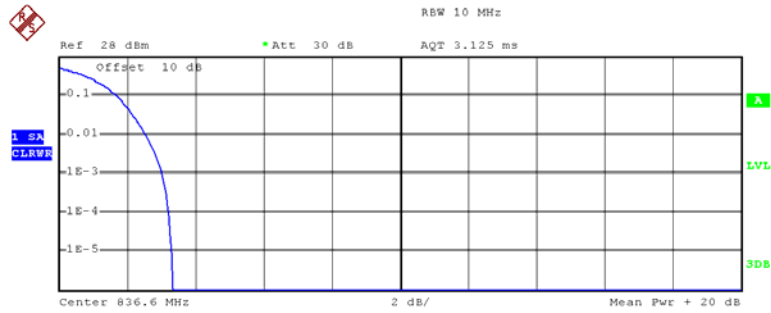
Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean	21.19 dBm
Peak	24.56 dBm
Crest	3.37 dB
10 %	1.72 dB
1 %	2.48 dB
.1 %	2.92 dB
.01 %	3.16 dB

Date: 28.NOV.2015 13:21:16

Middle Channel



Complementary Cumulative Distribution Function (100000 samples)

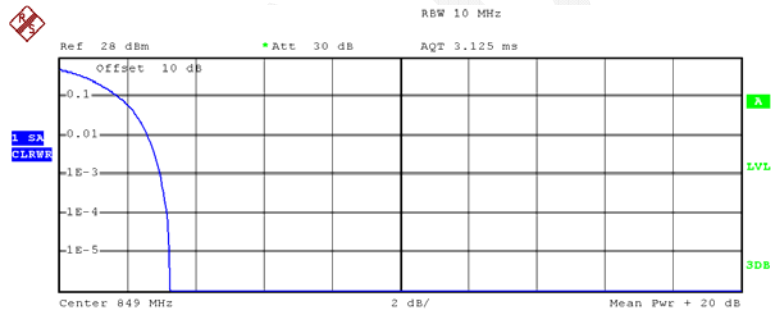
Trace 1

Mean 21.01 dBm
 Peak 24.35 dBm
 Crest 3.34 dB

10 % 1.72 dB
 1 % 2.56 dB
 .1 % 3.04 dB
 .01 % 3.24 dB

Date: 28.NOV.2015 13:19:38

High Channel



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 20.33 dBm
 Peak 23.57 dBm
 Crest 3.25 dB

10 % 1.76 dB
 1 % 2.60 dB
 .1 % 3.00 dB
 .01 % 3.20 dB

Date: 28.NOV.2015 13:19:08

ERP & EIRP

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850_Middle Channel								
836.600	H	96.65	21.7	0.0	1.0	20.7	38.5	17.8
836.600	V	104.00	32.2	0.0	1.0	31.2	38.5	7.3
EGPRS 850_Middle Channel								
836.600	H	92.74	17.8	0.0	1.0	16.8	38.5	21.7
836.600	V	97.58	25.8	0.0	1.0	24.8	38.5	13.7
WCDMA Band V_Middle Channel								
836.600	H	91.85	16.9	0.0	1.0	15.9	38.5	22.6
836.600	V	93.22	21.4	0.0	1.0	20.4	38.5	18.1

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
PCS 1900_Middle Channel								
1880.000	H	90.07	18.5	11.7	1.4	28.8	33.0	4.2
1880.000	V	89.76	18.3	11.7	1.4	28.6	33.0	4.4
EGPRS1900_Middle Channel								
1880.000	H	86.18	14.6	11.7	1.4	24.9	33.0	8.1
1880.000	V	85.82	14.4	11.7	1.4	24.7	33.0	8.3
WCDMA Band II_Middle Channel								
1880.000	H	81.83	10.2	11.7	1.4	20.5	33.0	12.5
1880.000	V	81.05	9.6	11.7	1.4	19.9	33.0	13.1

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = SG Level - Cable loss + Antenna Gain
- 3) Margin = Limit - Absolute Level

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

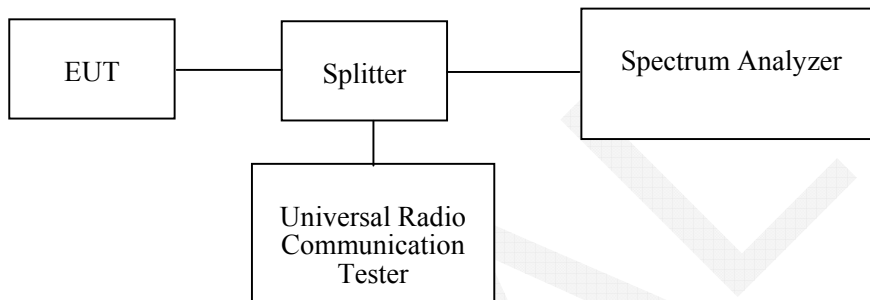
Applicable Standard

FCC §2.1049, §22.917 and §22.905, §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	2015-11-23	2016-11-22
R&S	Universal Radio Communication Tester	CMU200	109 038	2015-07-28	2016-07-27

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

Test Data

Environmental Conditions

Temperature:	24.8 °C
Relative Humidity:	43 %
ATM Pressure:	101.2 kPa

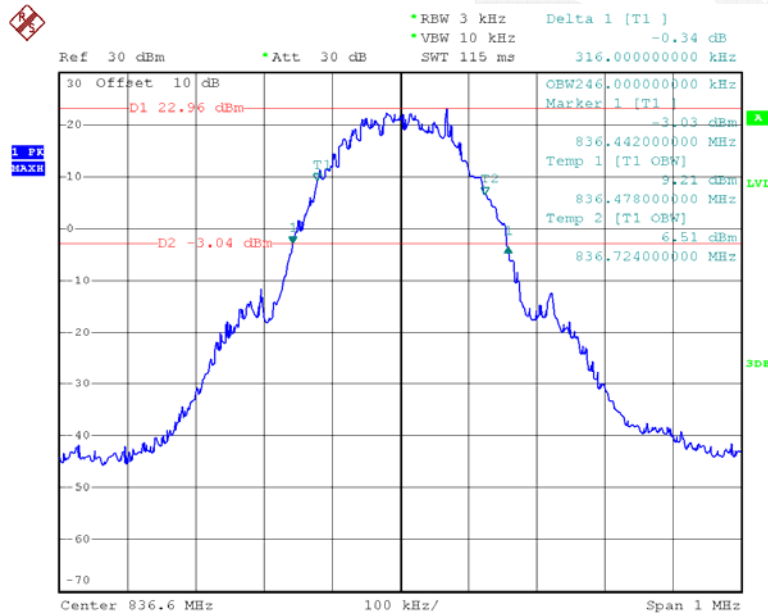
The testing was performed by Allen Qiao on 2015-11-28.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

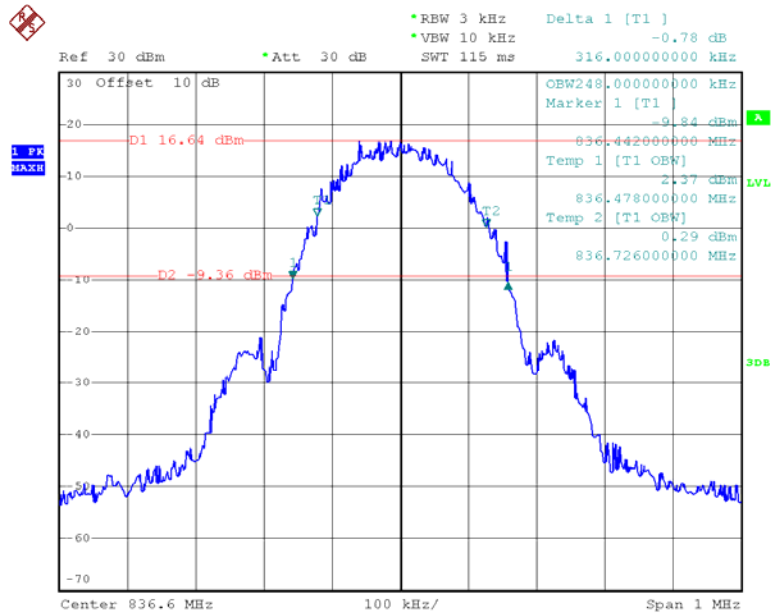
Band	Channel No.	Mode	99% Occupied Bandwidth	26 dB Occupied Bandwidth
			kHz	kHz
Cellular	190	GSM	246	316
		EDGE	248	316
PCS	661	PCS	246	318
		EDGE	250	318
WCDMA Band	9400	Rel 99	4180	4740
	9400	HSDPA	4180	4740
	9400	HSUPA	4180	4740
WCDMA Band V	4183	Rel 99	4160	4720
	4183	HSDPA	4160	4700
	4183	HSUPA	4160	4700

GMSK 850 Cellular Band



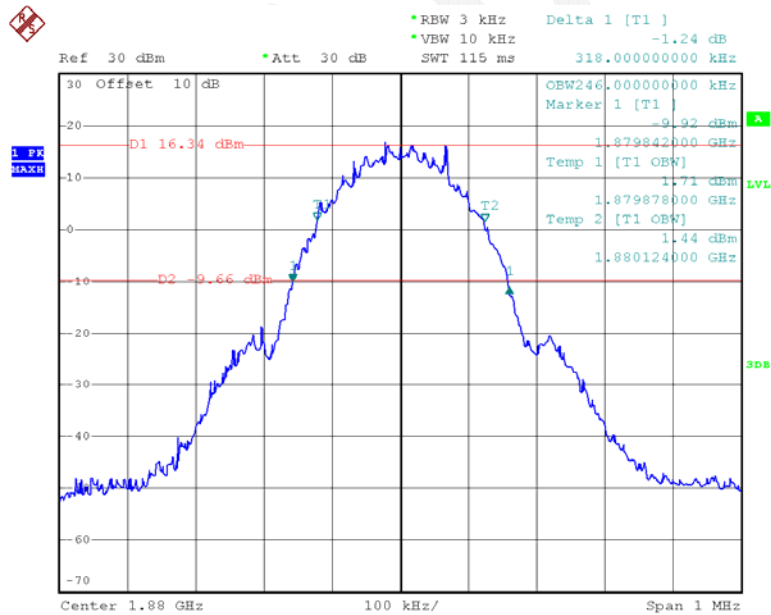
Date: 28.NOV.2015 12:48:38

EDGE 850 Cellular Band



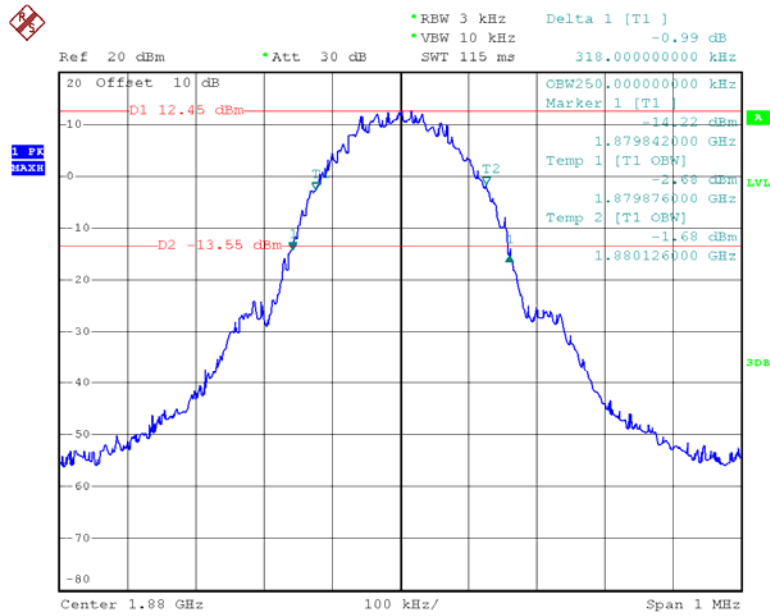
Date: 28.NOV.2015 12:38:33

GMSK PCS Band



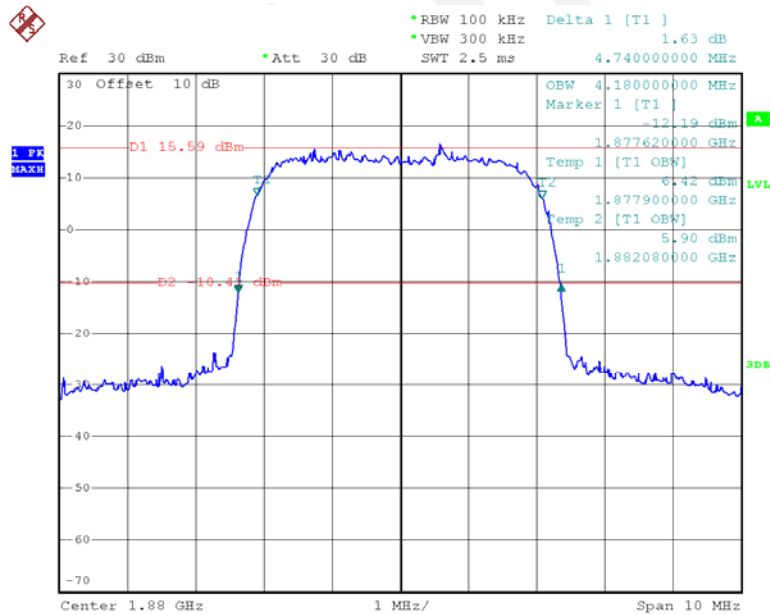
Date: 28.NOV.2015 12:59:07

EDGE PCS Band



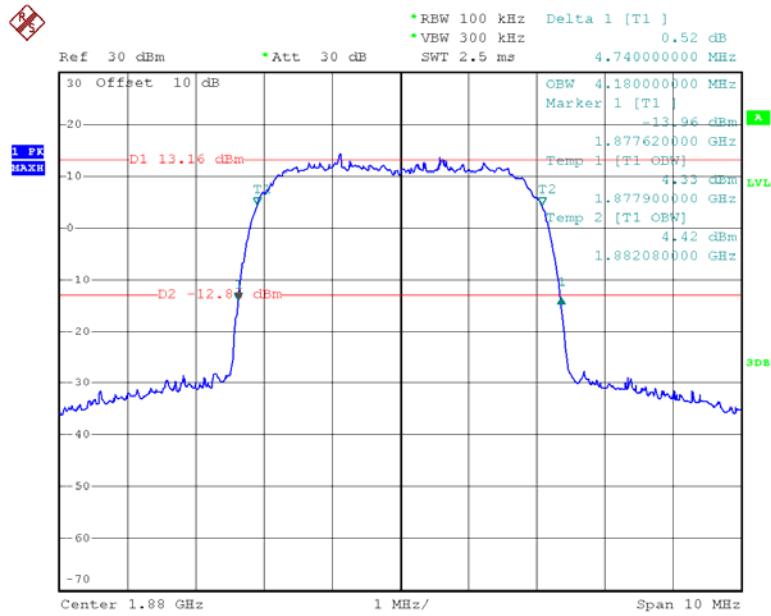
Date: 28.NOV.2015 12:29:31

REL99 Band II



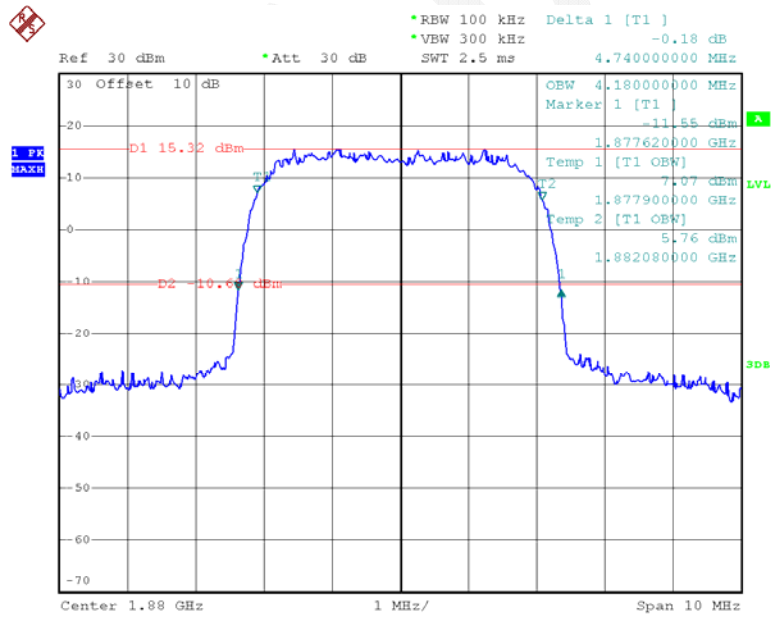
Date: 28.NOV.2015 13:32:55

HSDPA Band II



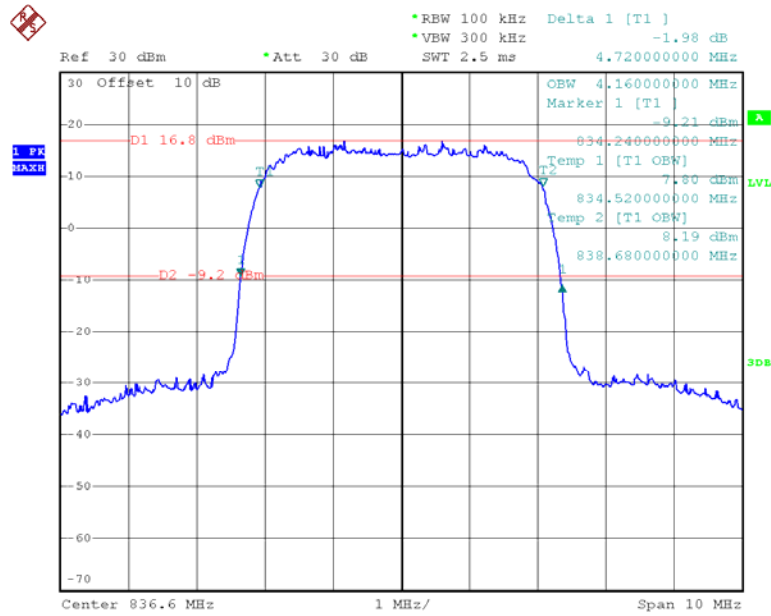
Date: 28.NOV.2015 18:33:14

HSUPA Band II



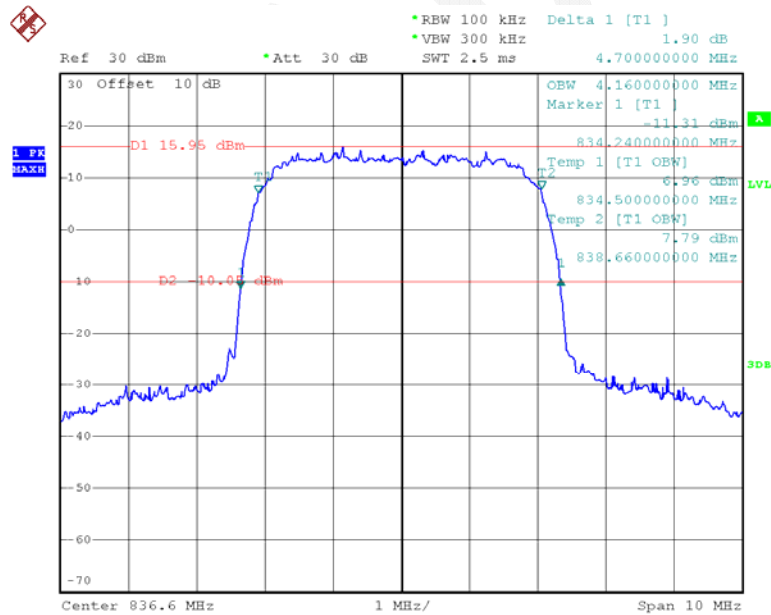
Date: 28.NOV.2015 13:29:56

REL99 Band V



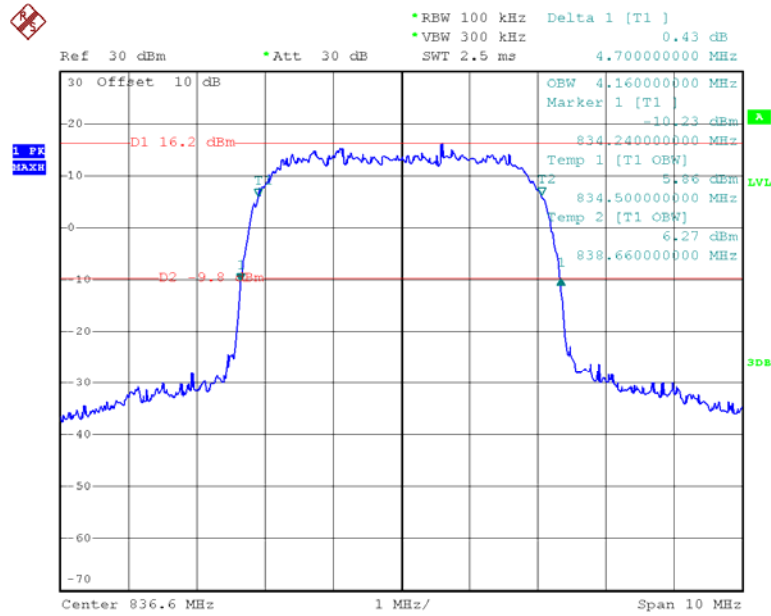
Date: 28.NOV.2015 13:24:29

HSDPA Band V



Date: 28.NOV.2015 13:36:18

HSUPA Band V



Date: 28.NOV.2015 13:27:04

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

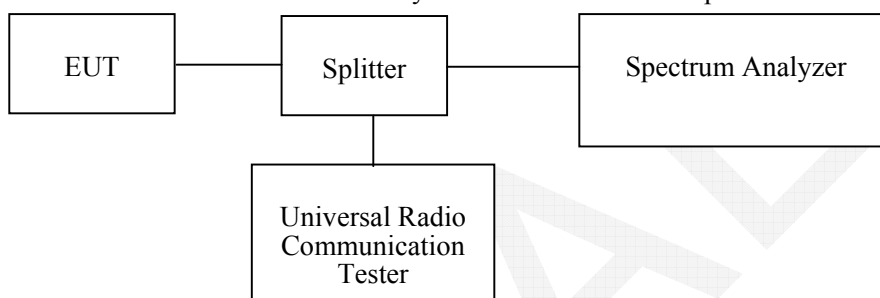
Applicable Standard

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	2015-11-23	2016-11-22
R&S	Universal Radio Communication Tester	CMU200	109 038	2015-07-28	2016-07-27

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

Test Data

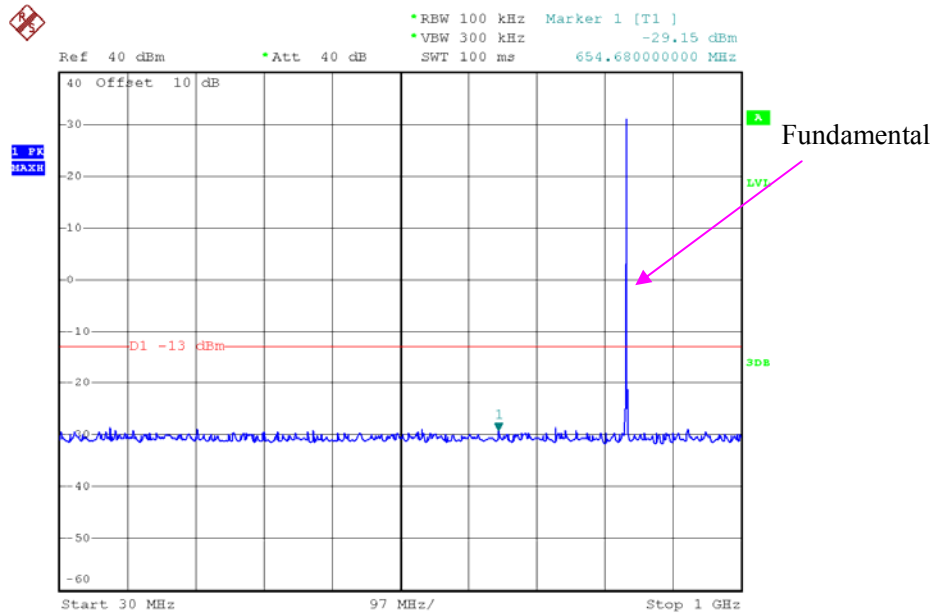
Environmental Conditions

Temperature:	24.8 °C
Relative Humidity:	43 %
ATM Pressure:	101.2 kPa

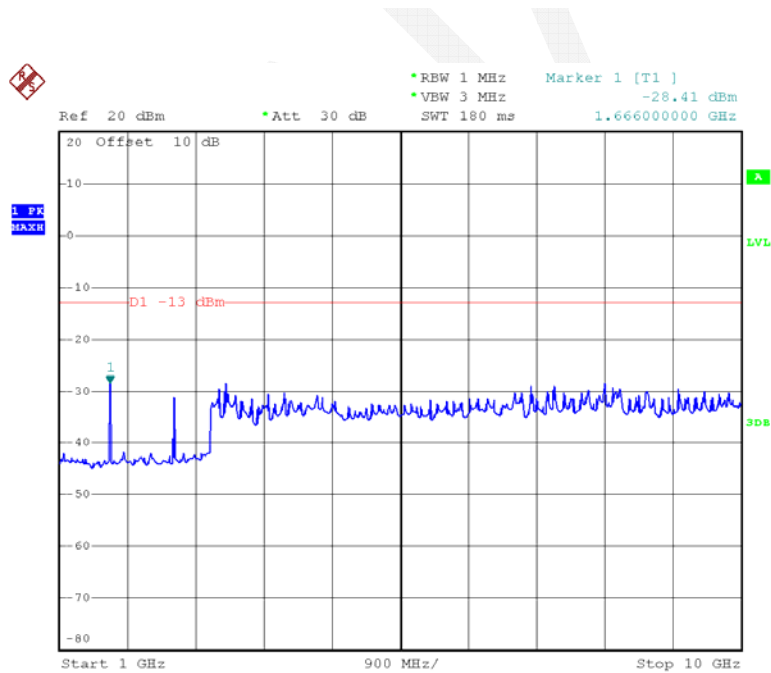
The testing was performed by Allen Qiao on 2015-11-28

Please refer to the following plots.

GSM850_Middle Channel

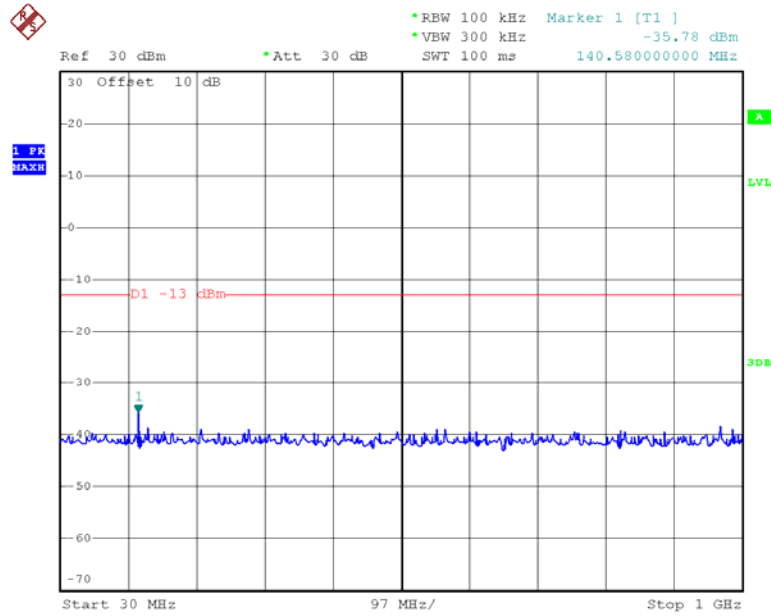


Date: 28.NOV.2015 12:51:36

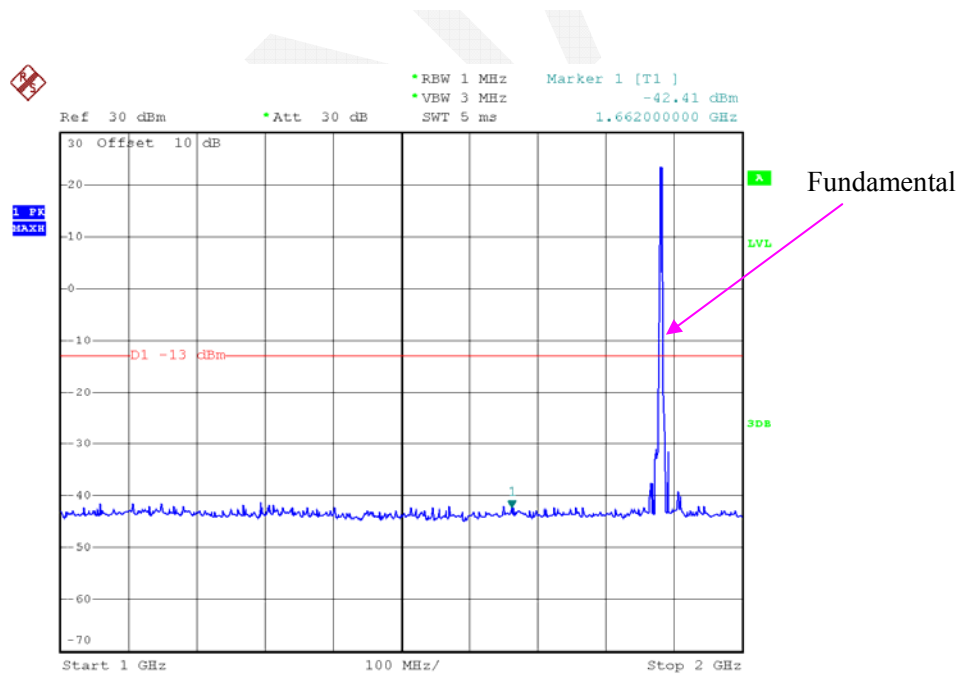


Date: 28.NOV.2015 12:52:27

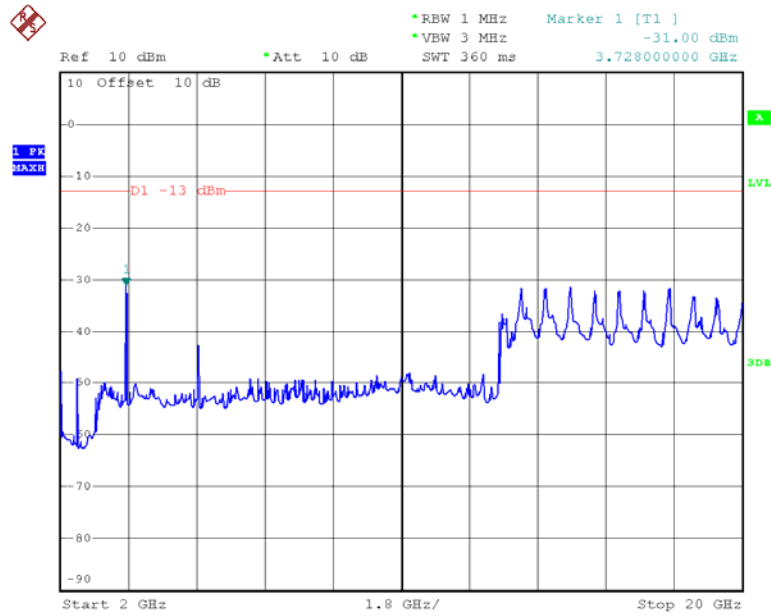
PCS 1900_ Middle Channel



Date: 28.NOV.2015 12:56:41

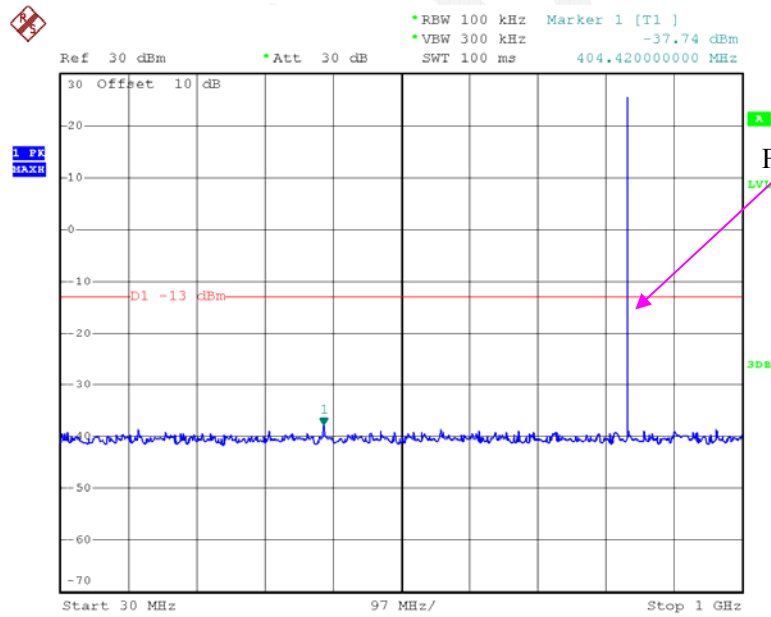


Date: 28.NOV.2015 12:56:26

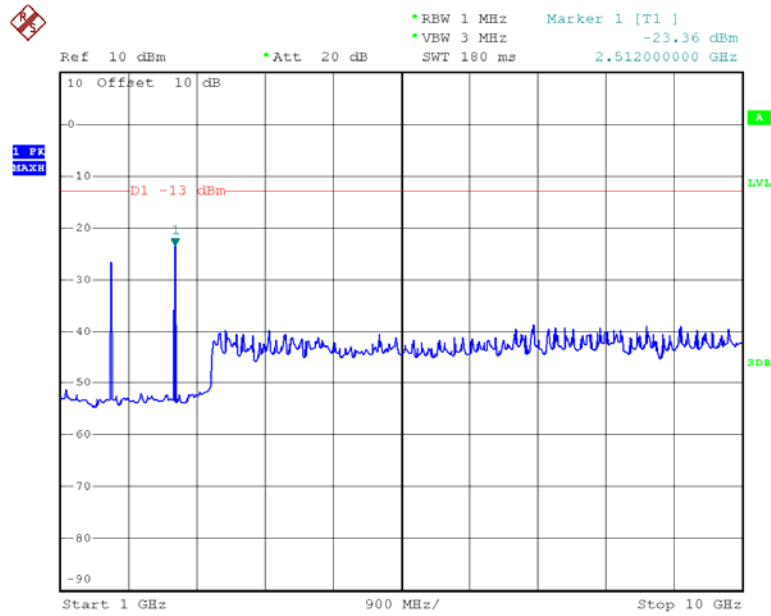


Date: 28.NOV.2015 12:55:51

EDGE850_Middle Channel

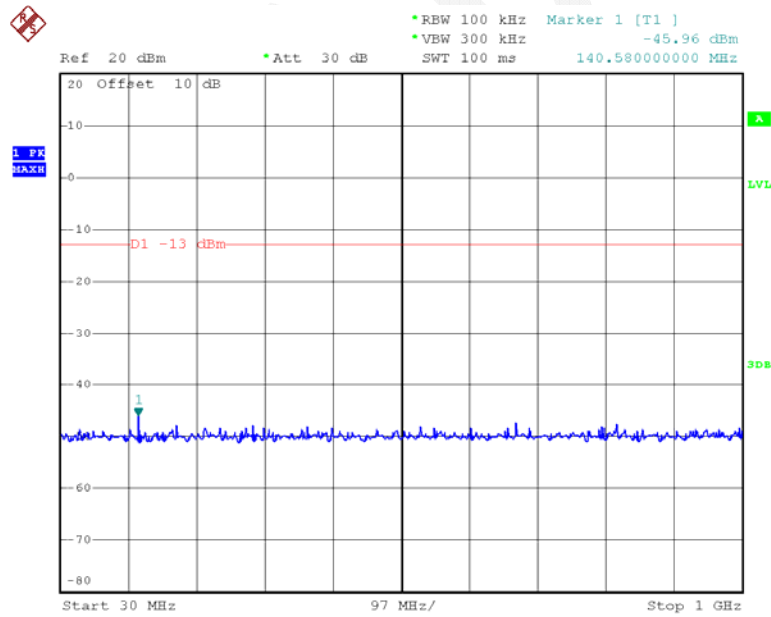


Date: 28.NOV.2015 12:35:46

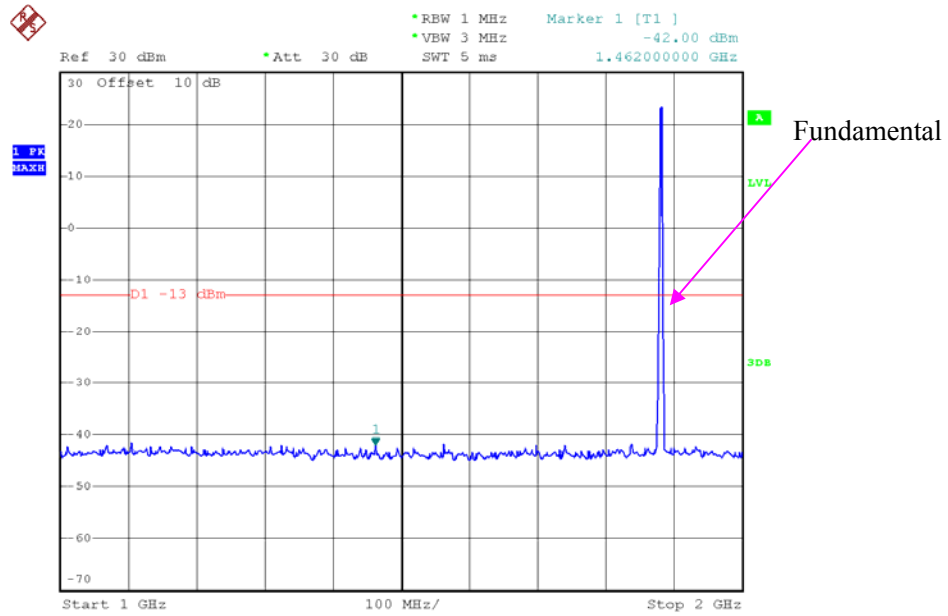


Date: 28.NOV.2015 12:37:09

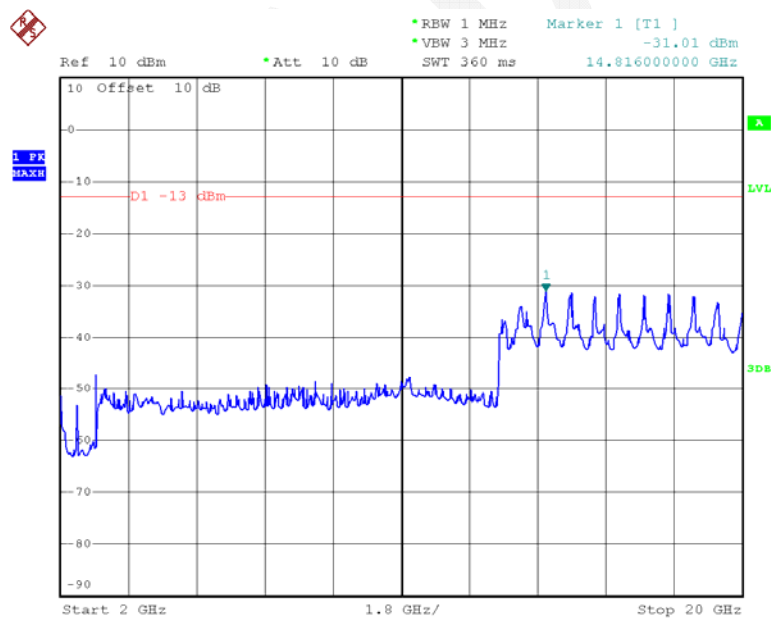
EDGE1900_Middle Channel



Date: 28.NOV.2015 12:30:07

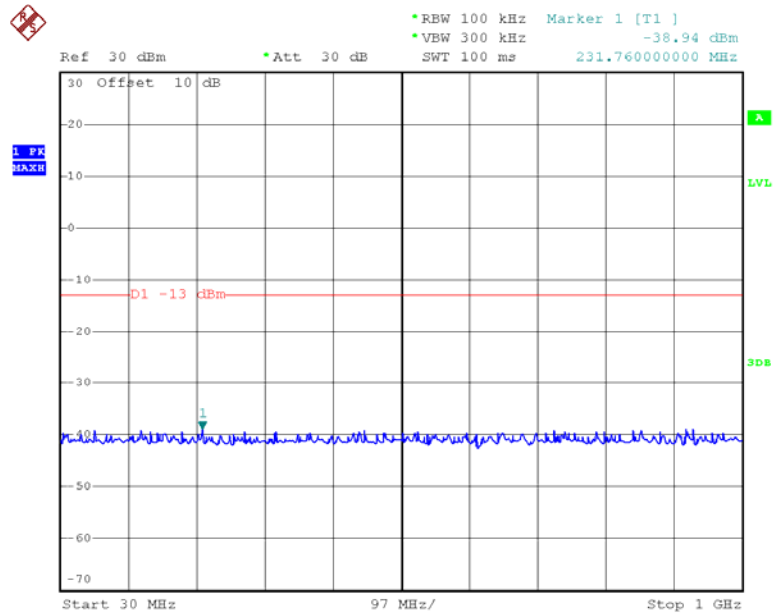


Date: 28.NOV.2015 12:31:52

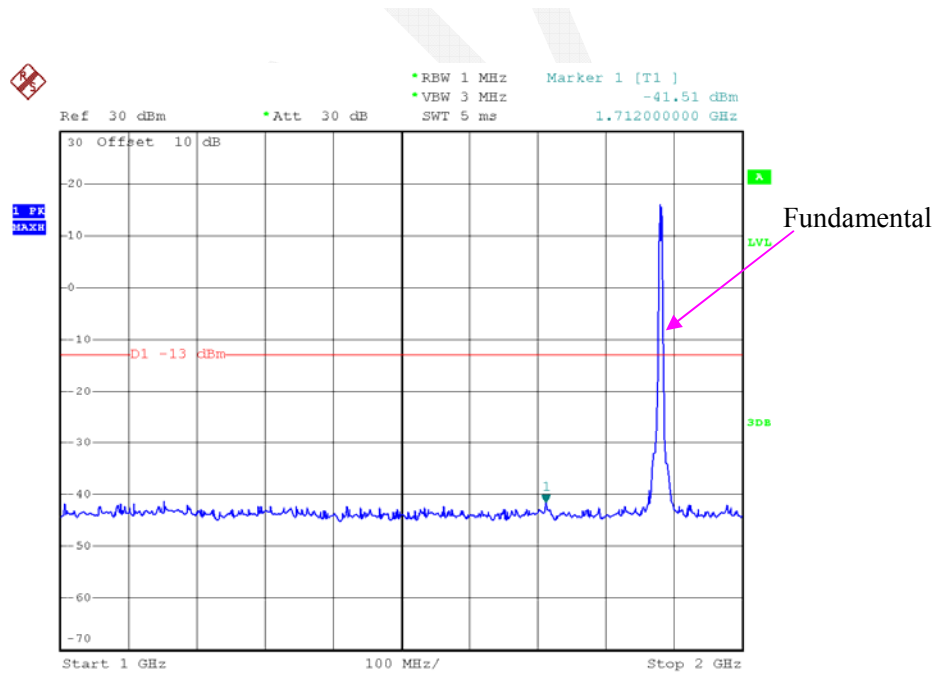


Date: 28.NOV.2015 12:33:11

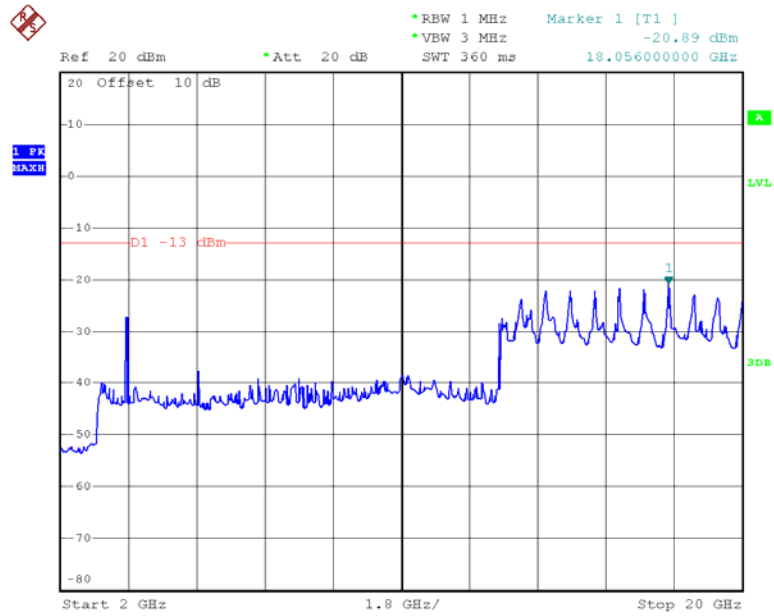
REL99 Band II_ Middle Channel



Date: 28.NOV.2015 13:07:39

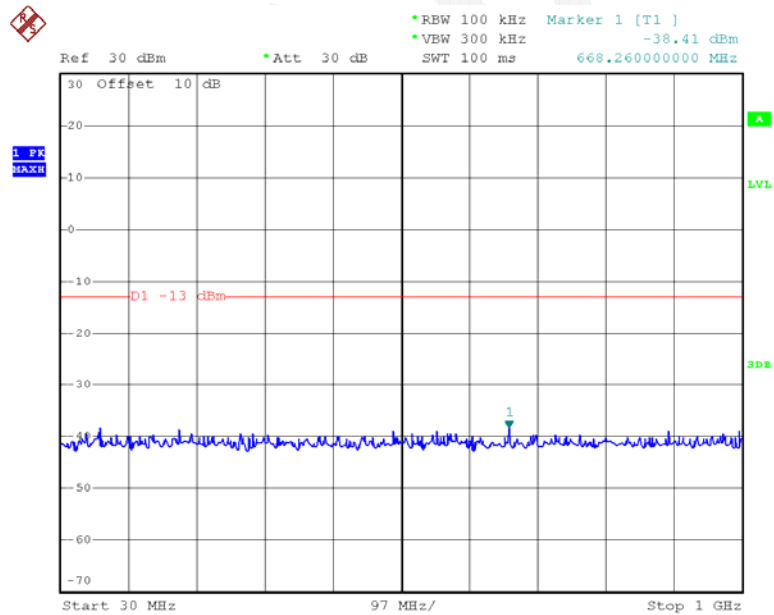


Date: 28.NOV.2015 13:08:04

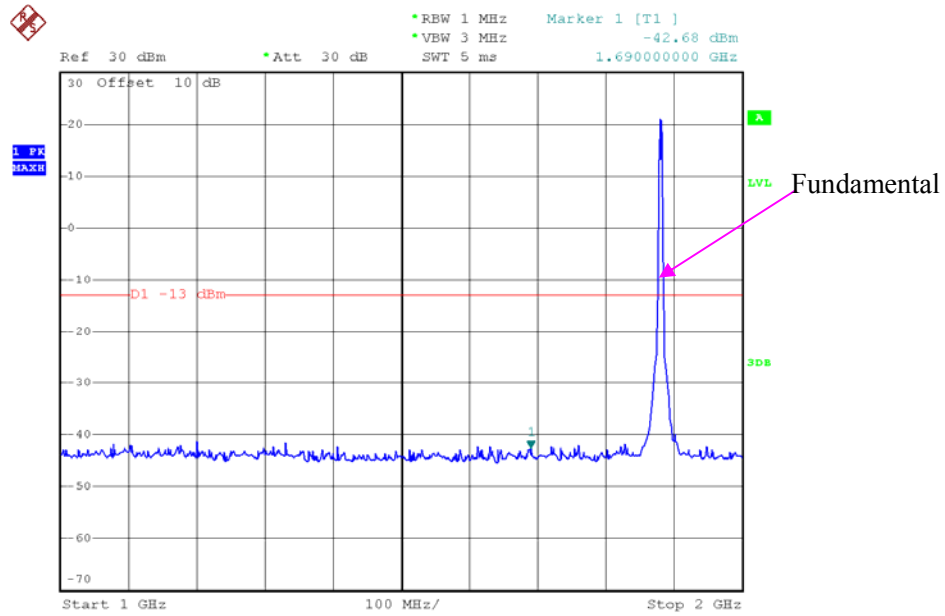


Date: 28.NOV.2015 13:08:28

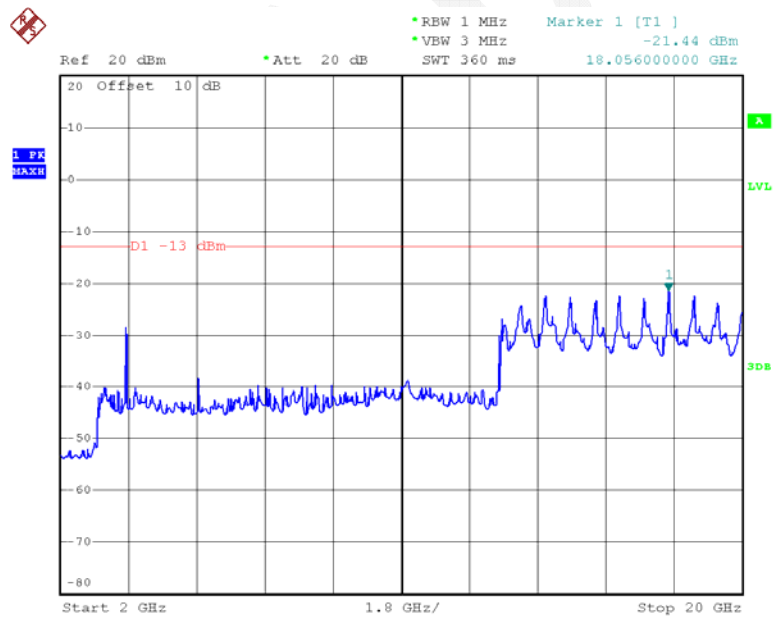
HSDPA Band II_Middle Channel



Date: 28.NOV.2015 13:32:05

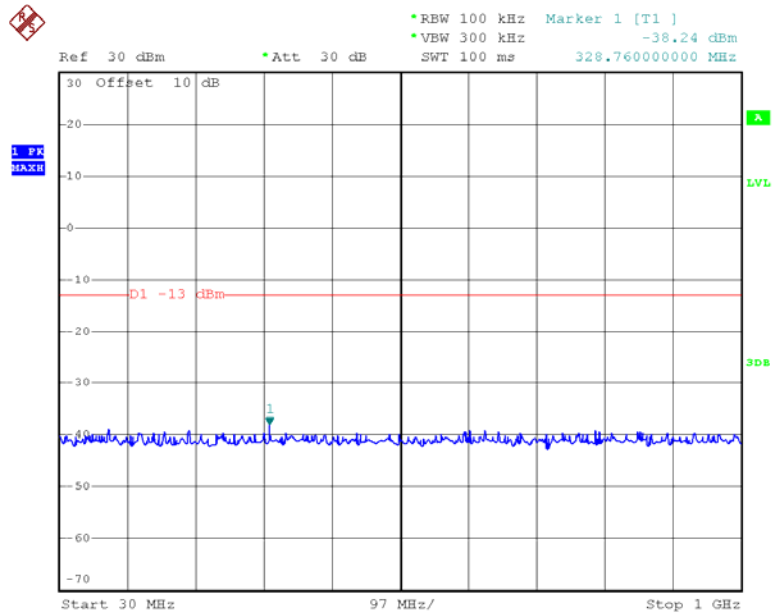


Date: 28.NOV.2015 13:31:50

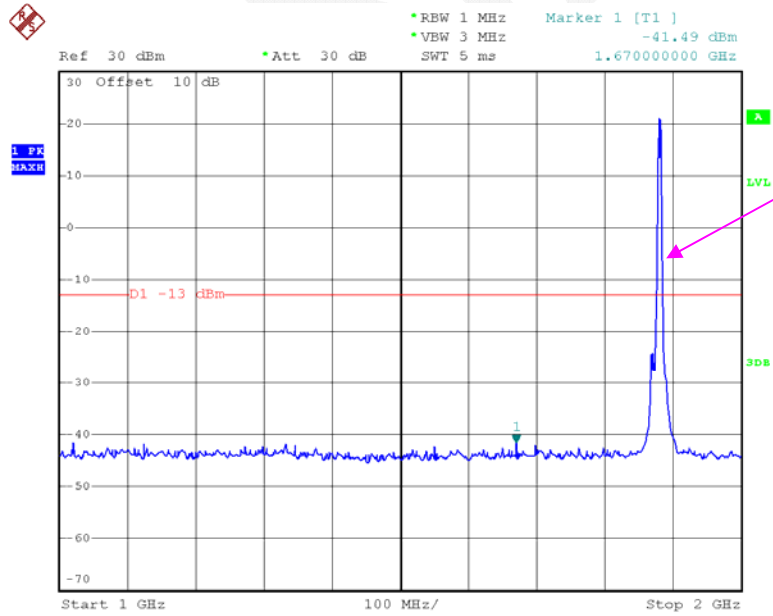


Date: 28.NOV.2015 13:31:32

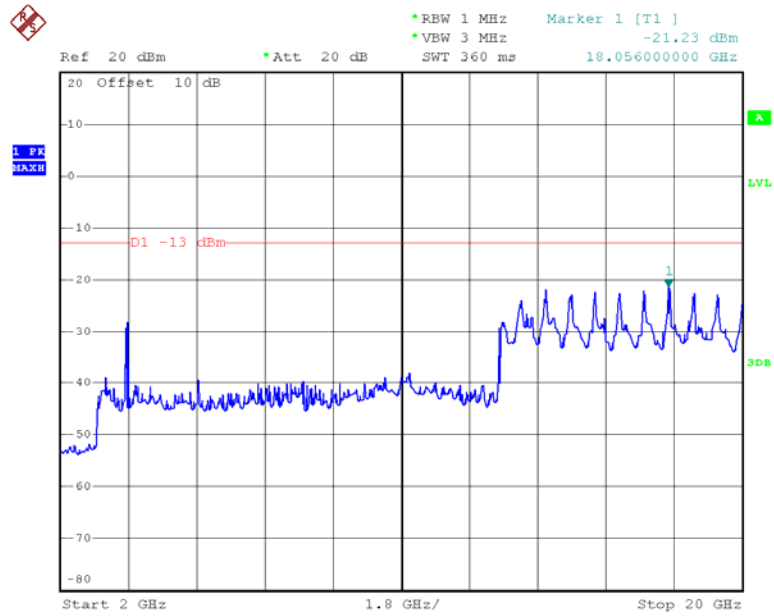
HSUPA Band II _ Middle Channel



Date: 28.NOV.2015 13:30:11

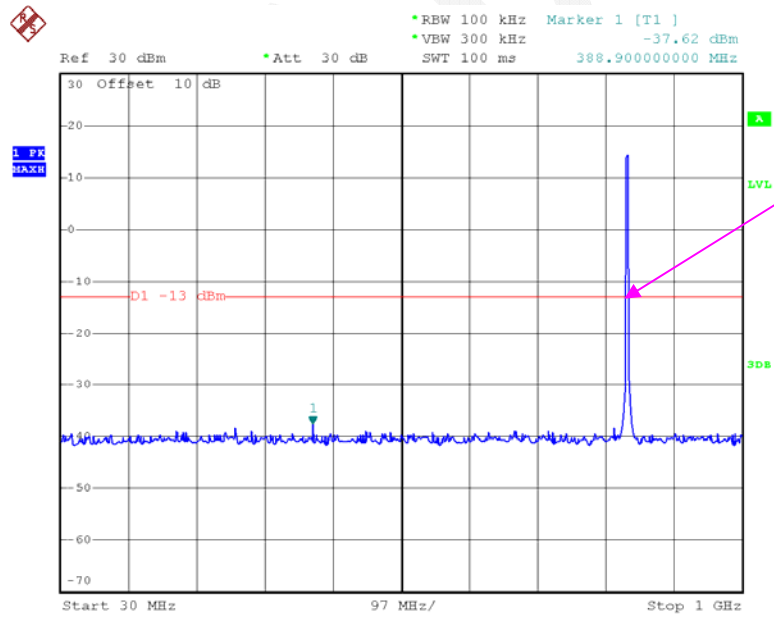


Date: 28.NOV.2015 13:30:30

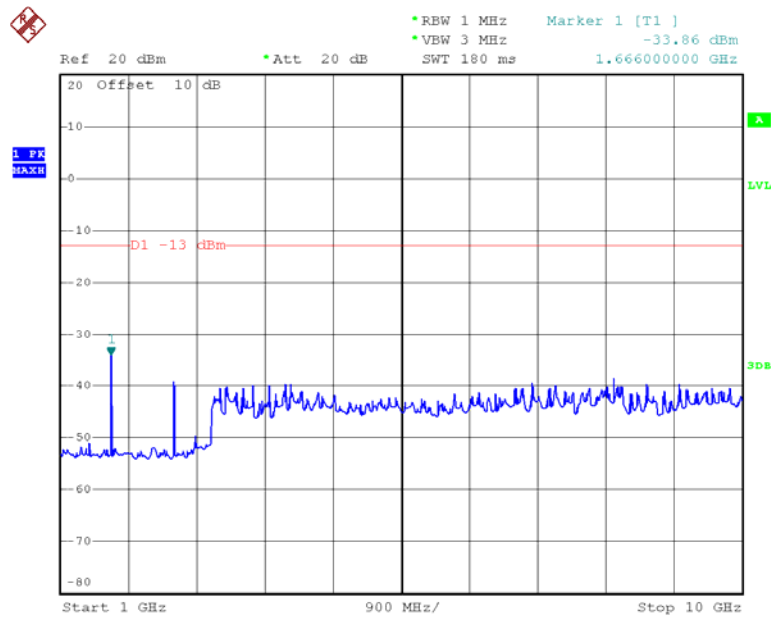


Date: 28.NOV.2015 13:30:49

REL99 Band V_Middle Channel

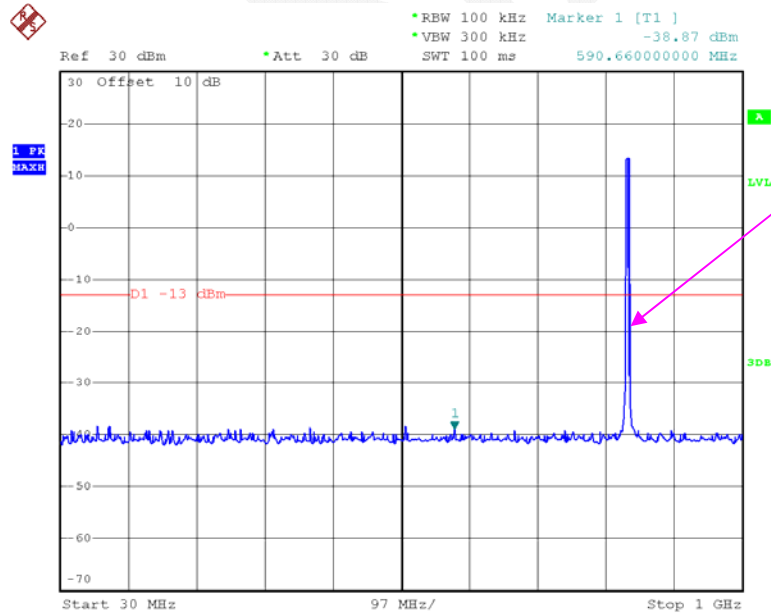


Date: 28.NOV.2015 13:24:54

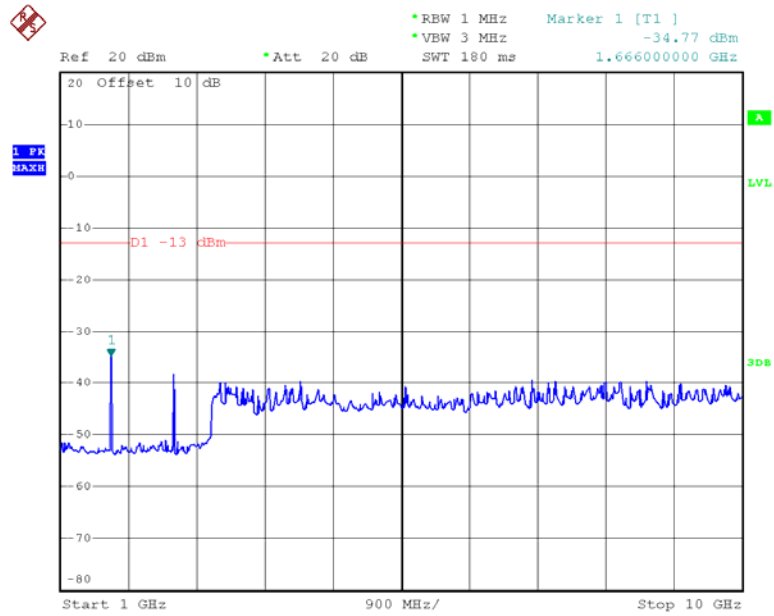


Date: 28.NOV.2015 13:25:17

HSDPA Band V_ Middle Channel

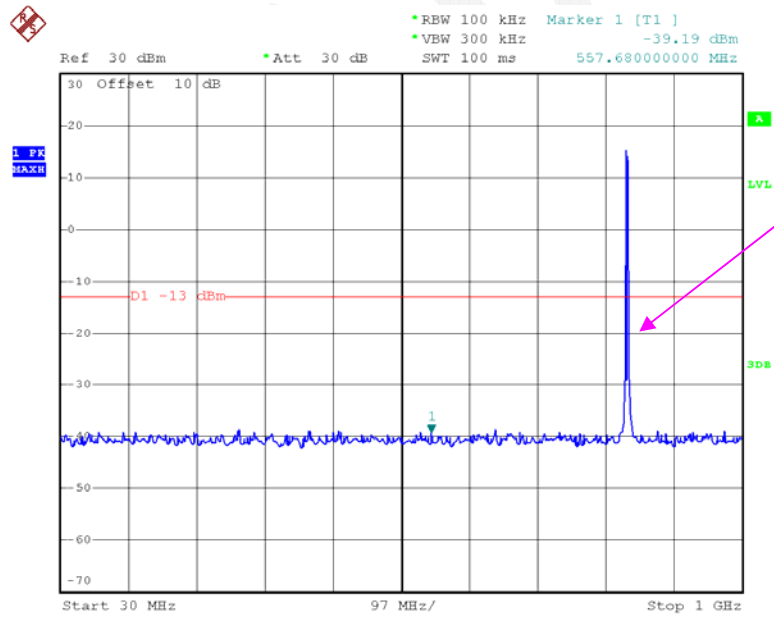


Date: 28.NOV.2015 13:37:04

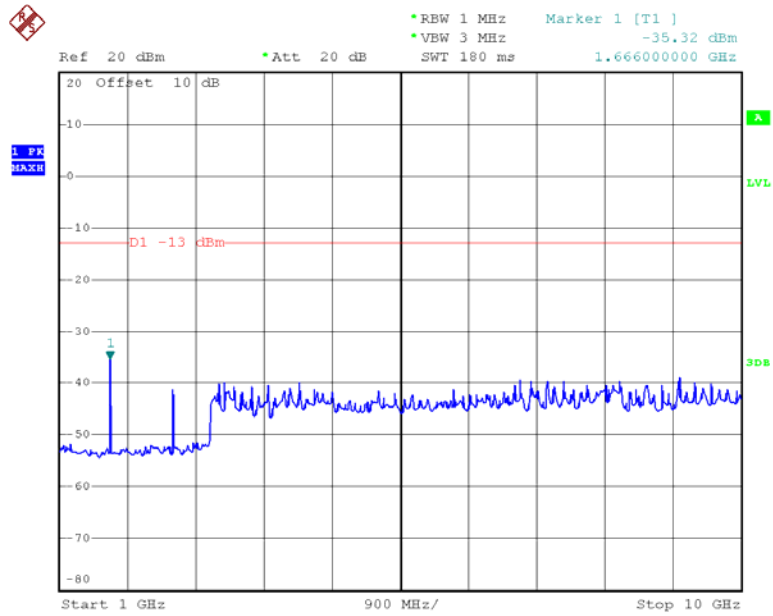


Date: 28.NOV.2015 13:37:39

HSUPA Band V_Middle Channel



Date: 28.NOV.2015 13:26:26



Date: 28.NOV.2015 13:25:55

FEMV

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 Log₁₀ (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2015-08-03	2016-08-02
Sunol Sciences	Antenna	JB3	A060611-3	2014-11-06	2017-11-05
HP	Amplifier	8447E	2434A02181	2015-09-01	2016-09-01
Agilent	Spectrum Analyzer	E4440A	SG43360054	2015-11-23	2016-11-22
ETS-Lindgren	Horn Antenna	3115	9808-5557	2015-09-06	2018-09-06
Mini-Circuit	Amplifier	ZVA-213-S+	054201245	2015-02-19	2016-02-19
Giga	Signal Generator	1026	320408	2015-05-09	2016-05-09
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2015-09-06	2018-09-06

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

Test Data

Environmental Conditions

Temperature:	24.5 °C
Relative Humidity:	42 %
ATM Pressure:	101.2 kPa

The testing was performed by Allen Qiao on 2015-11-28

EUT Operation Mode: Transmitting

Cellular Band (PART 22H)

30 MHz-10 GHz:

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)			
Frequency: 836.6 MHz								
1673.200	H	48.68	-52.4	10.6	1.5	-43.3	-13.0	30.3
1673.200	V	50.37	-51.0	10.6	1.5	-41.9	-13.0	28.9
2509.800	H	46.79	-51.2	13.1	2.8	-40.9	-13.0	27.9
2509.800	V	49.47	-47.6	13.1	2.8	-37.3	-13.0	24.3

For below 1GHz, all spurious emissions are 20 dB below the limit or are on the system noise floor level.

WCDMA Band V (PART 22H)

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)			
Frequency: 836.6 MHz								
1673.200	H	56.24	-44.8	10.6	1.5	-35.7	-13.0	22.7
1673.200	V	54.03	-47.3	10.6	1.5	-38.2	-13.0	25.2

For below 1GHz, all spurious emissions are 20 dB below the limit or are on the system noise floor level.

PCS Band (PART 24E)**30 MHz-20 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency: 1880 MHz								
3760.000	H	57.51	-36.8	13.8	2.9	-25.9	-13.0	12.9
3760.000	V	54.15	-38.9	13.8	2.9	-28.0	-13.0	15.0

For below 1GHz, all spurious emissions are 20 dB below the limit or are on the system noise floor level.

WCDMA Band II (PART 24E)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB μ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency: 1880 MHz								
3760.000	H	64.86	-29.4	13.8	2.9	-18.5	-13.0	5.5
3760.000	V	60.39	-32.7	13.8	2.9	-21.8	-13.0	8.8

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = SG Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

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

Applicable Standard

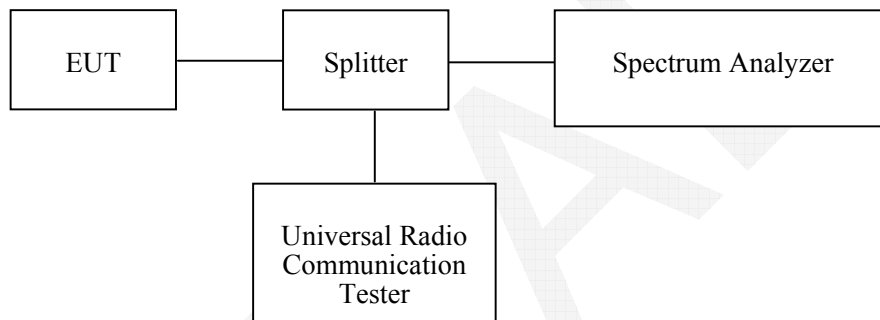
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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	2015-11-23	2016-11-22
R&S	Universal Radio Communication Tester	CMU200	109 038	2015-07-28	2016-07-27

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

Test Data

Environmental Conditions

Temperature:	24.8 °C
Relative Humidity:	42 %
ATM Pressure:	101.2 kPa

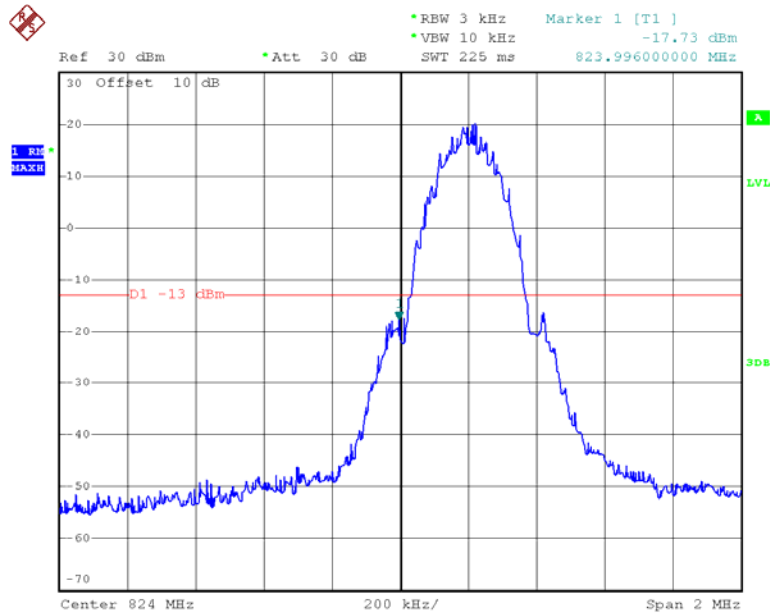
The testing was performed by Allen Qiao on 2015-11-28.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following plots.

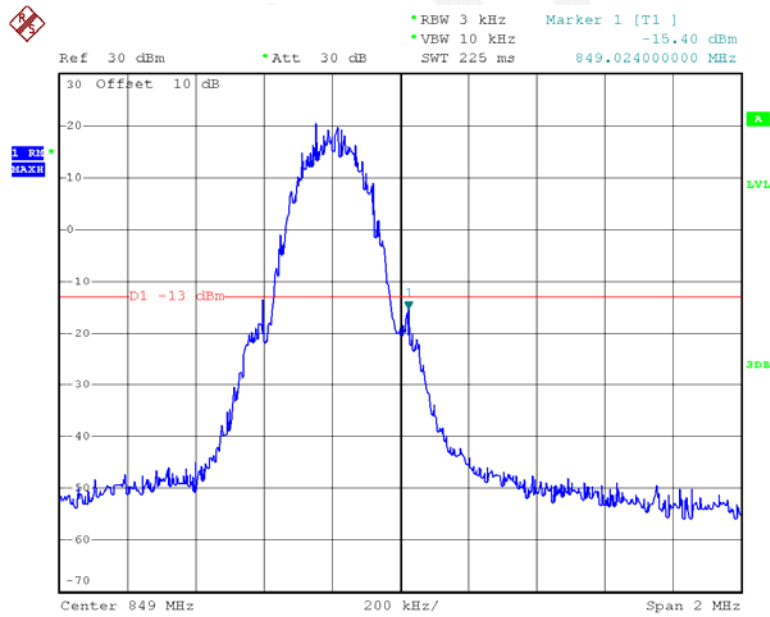
FEMVA

GSM 850, Left Band Edge



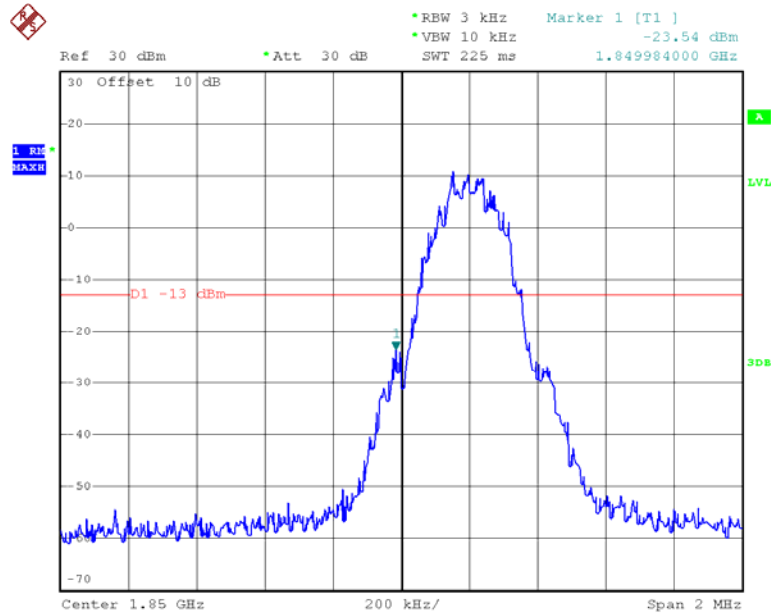
Date: 28.NOV.2015 12:50:04

GSM 850, Right Band Edge



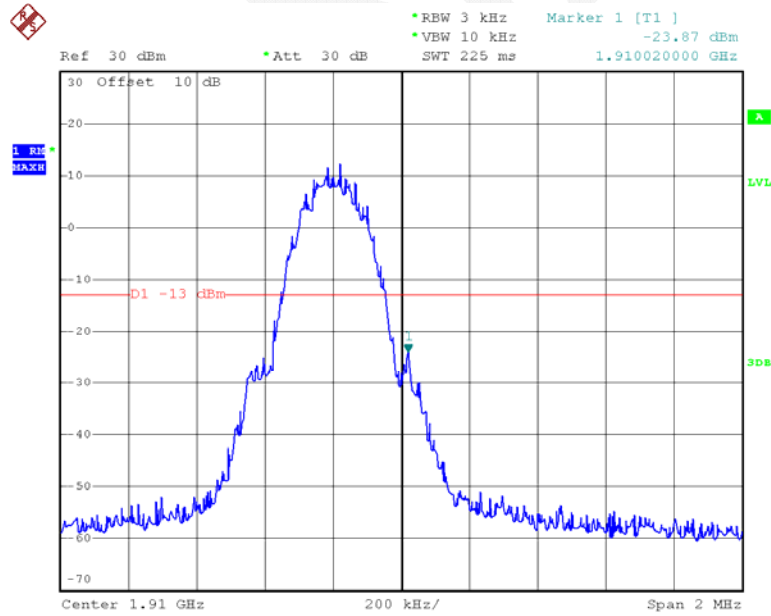
Date: 28.NOV.2015 12:50:37

PCS 1900, Left Band Edge



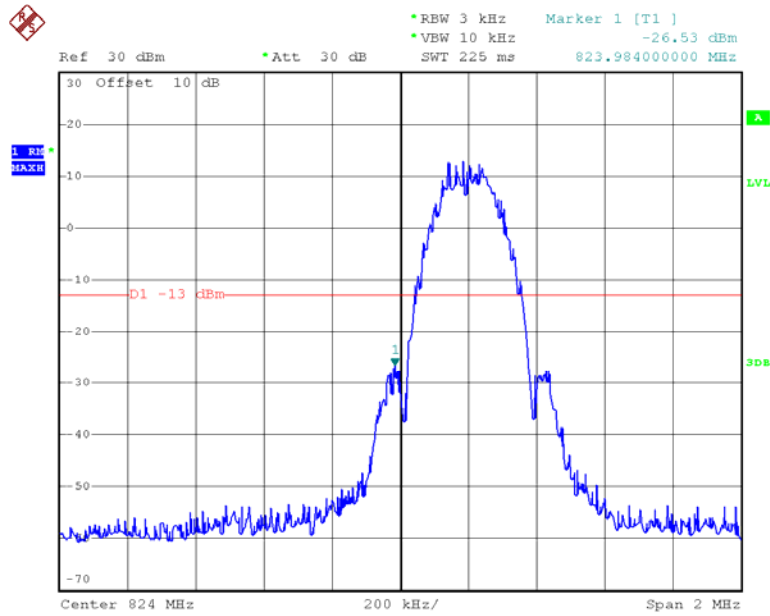
Date: 28.NOV.2015 13:00:06

PCS 1900, Right Band Edge



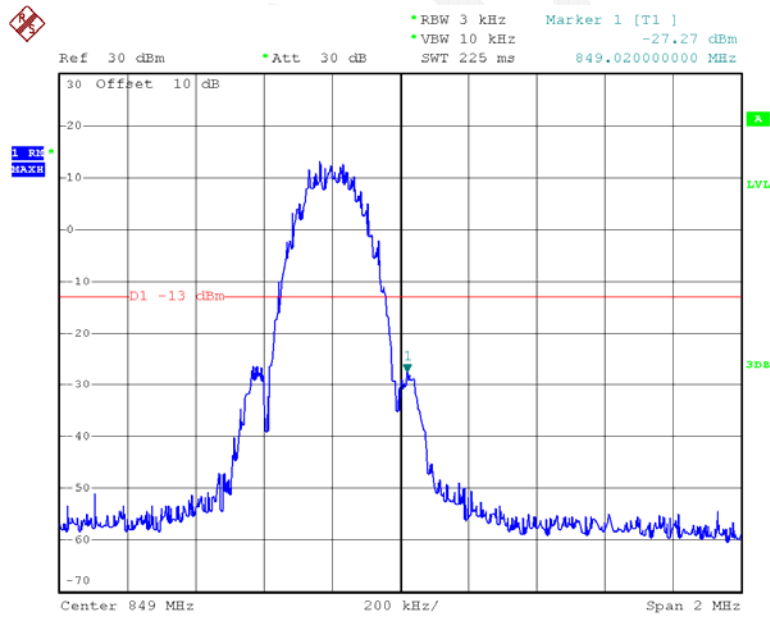
Date: 28.NOV.2015 13:00:42

EDGE850, Left Band Edge



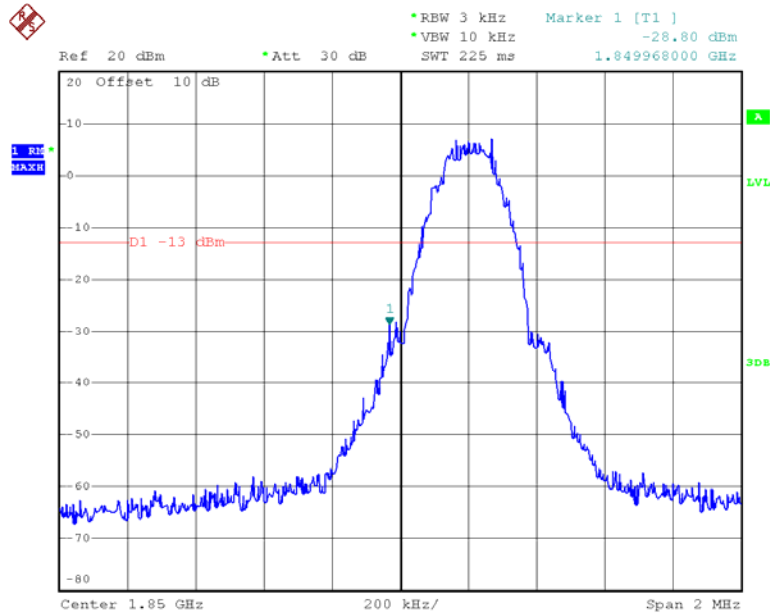
Date: 28.NOV.2015 13:57:42

EDGE850, Right Band Edge



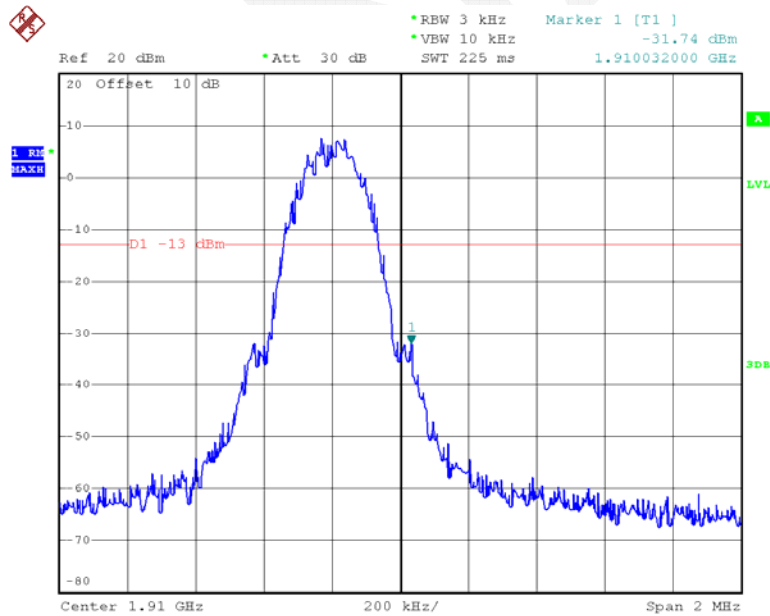
Date: 28.NOV.2015 13:56:47

EDGE 1900, Left Band Edge



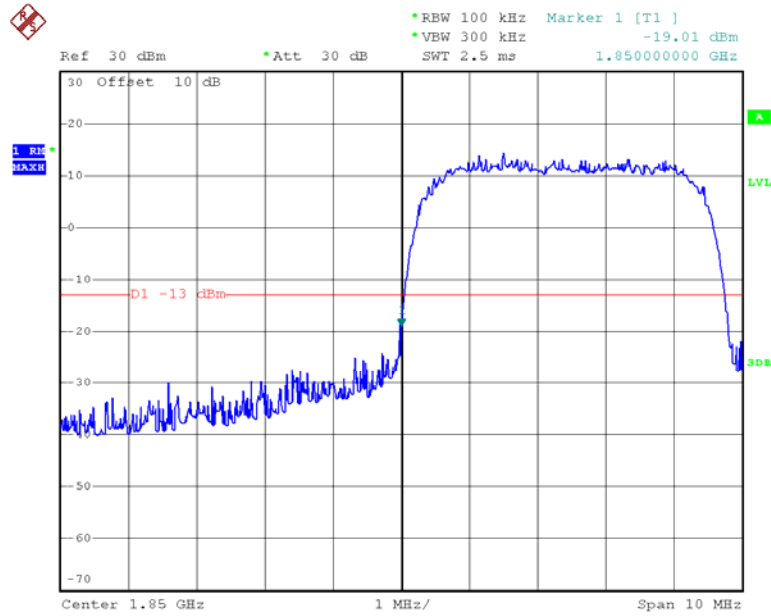
Date: 28.NOV.2015 12:25:35

EDGE 1900, Right Band Edge



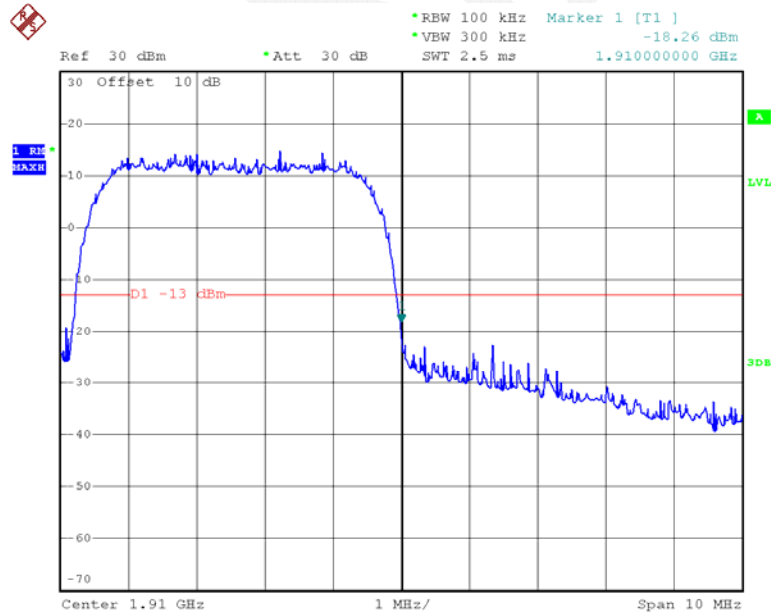
Date: 28.NOV.2015 12:26:09

REL99 Band II, Left Band Edge



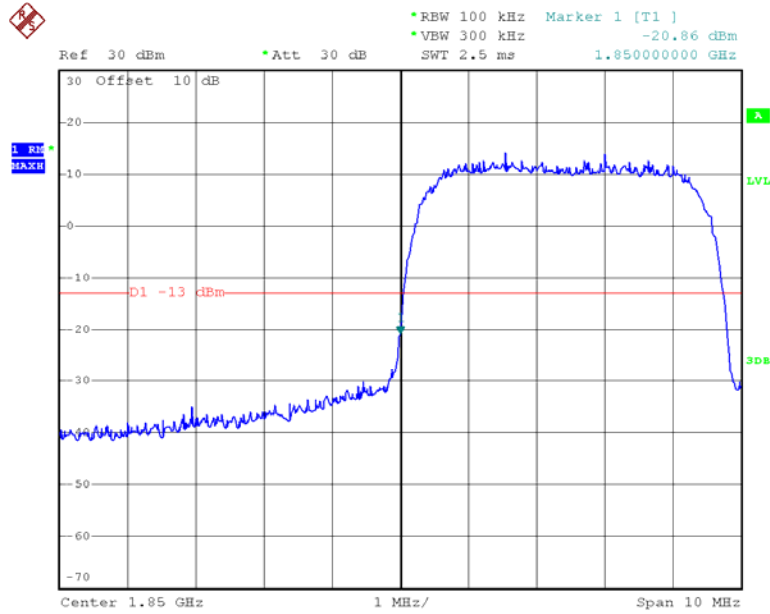
Date: 28.NOV.2015 13:34:30

REL99 Band II, Right Band Edge



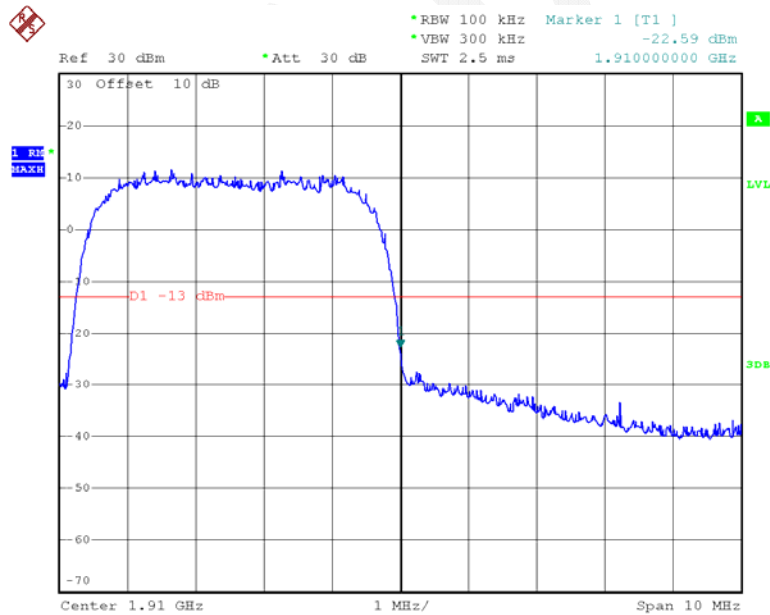
Date: 28.NOV.2015 13:34:12

HSDPA Band II, Left Band Edge



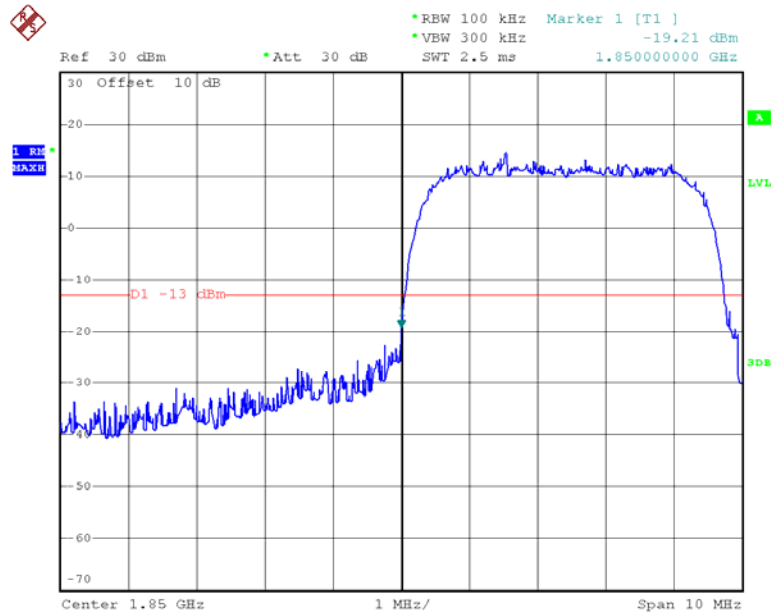
Date: 28.NOV.2015 18:33:50

HSDPA Band II, Right Band Edge



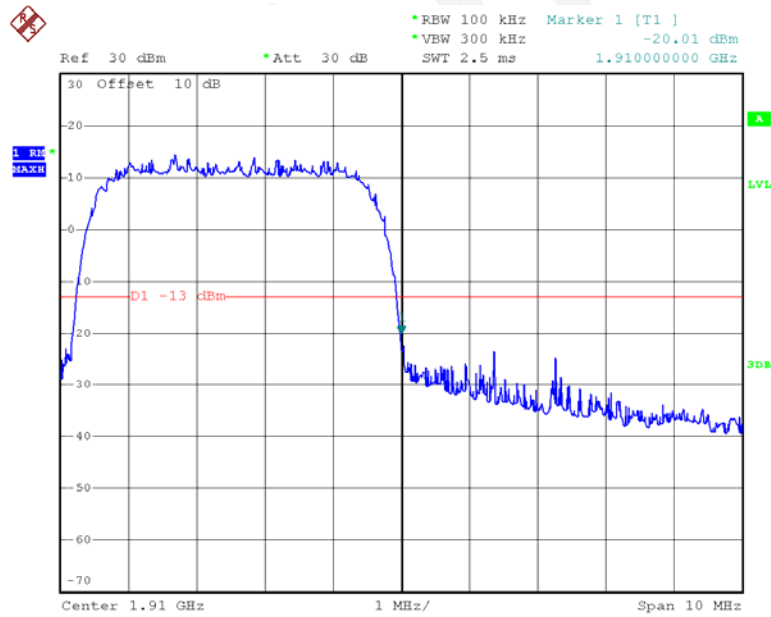
Date: 28.NOV.2015 18:34:09

HSUPA Band II, Left Band Edge



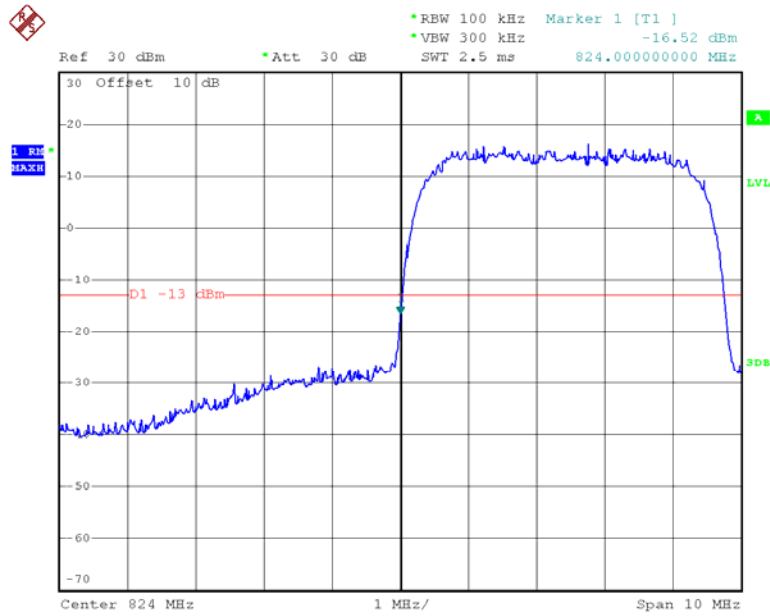
Date: 28.NOV.2015 13:28:42

HSUPA Band II, Right Band Edge



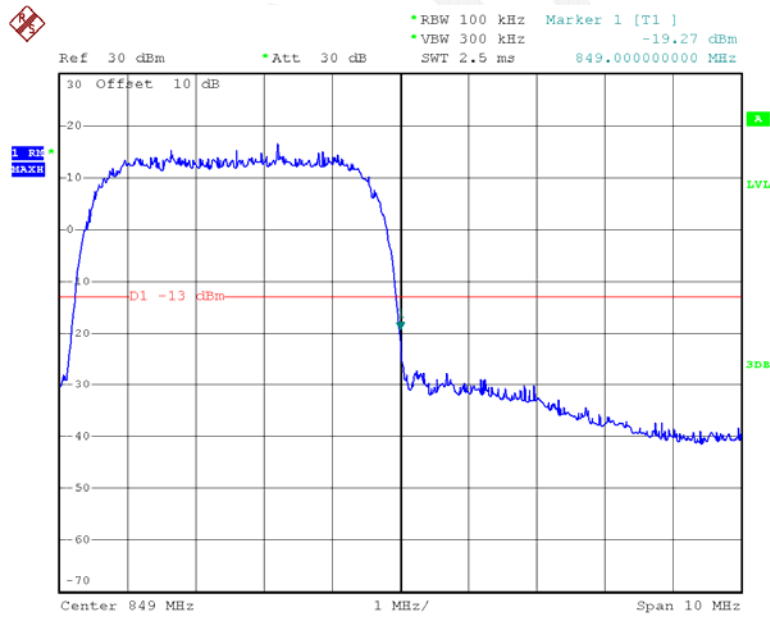
Date: 28.NOV.2015 13:28:18

REL99 Band V, Left Band Edge



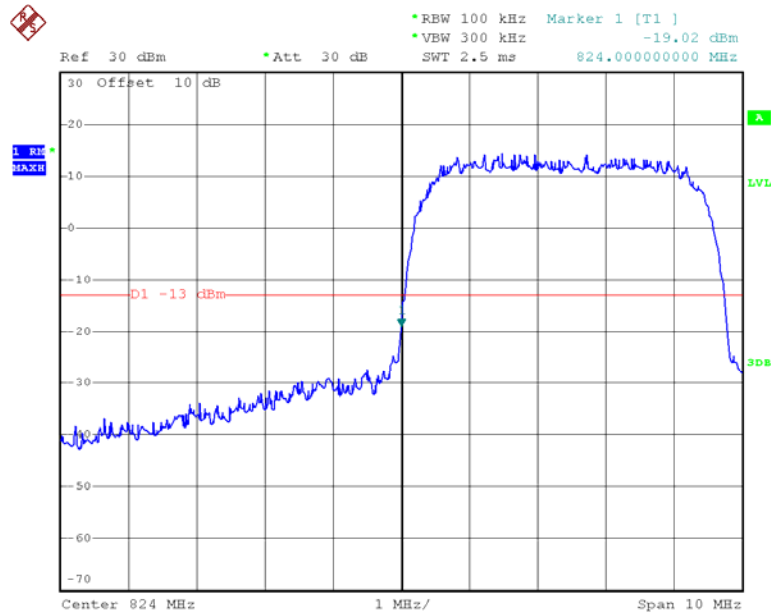
Date: 28.NOV.2015 13:23:14

REL99 Band V Right Band Edge



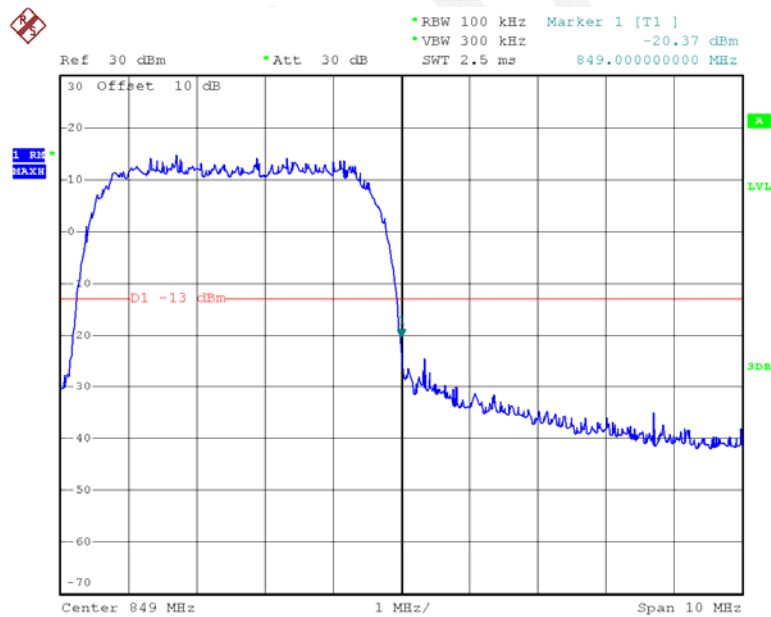
Date: 28.NOV.2015 13:23:31

HSDPA Band V, Left Band Edge



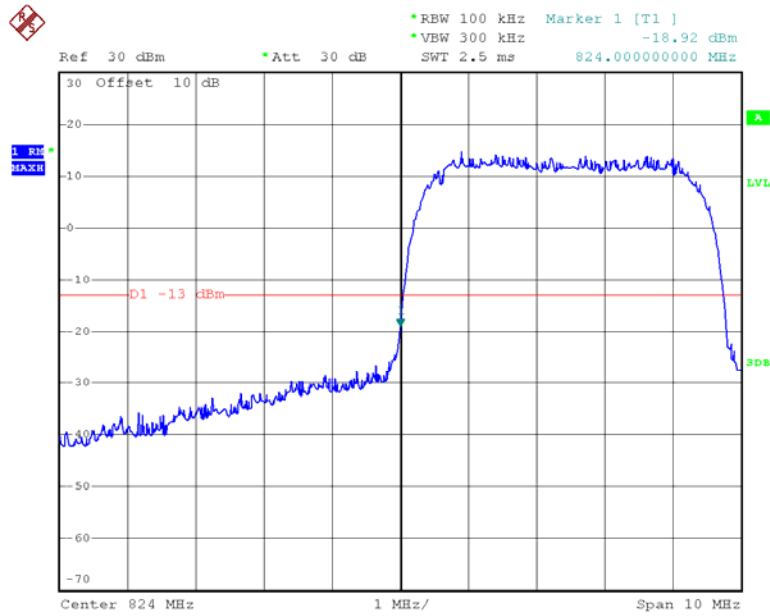
Date: 28.NOV.2015 13:35:19

HSDPA Band V, Right Band Edge



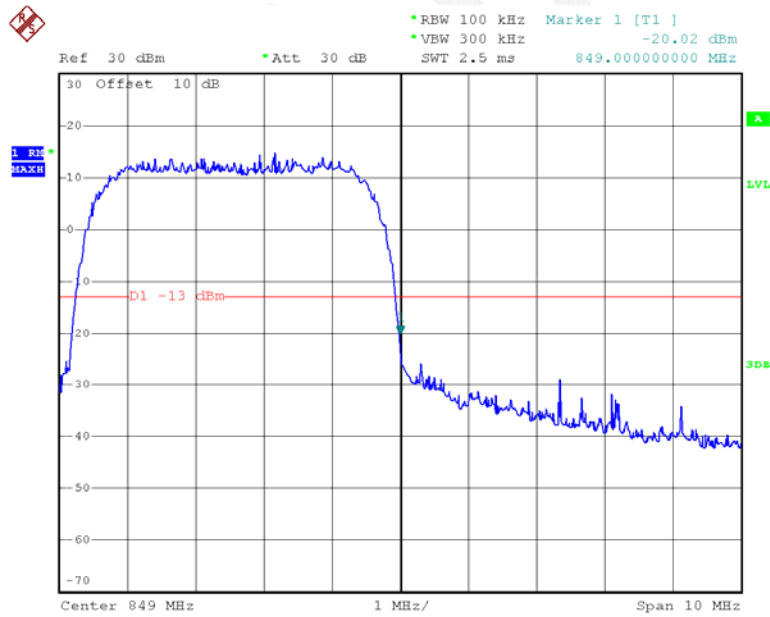
Date: 28.NOV.2015 13:35:05

HSUPA Band V, Left Band Edge



Date: 28.NOV.2015 13:27:32

HSUPA Band V, Right Band Edge



Date: 28.NOV.2015 13:27:48

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

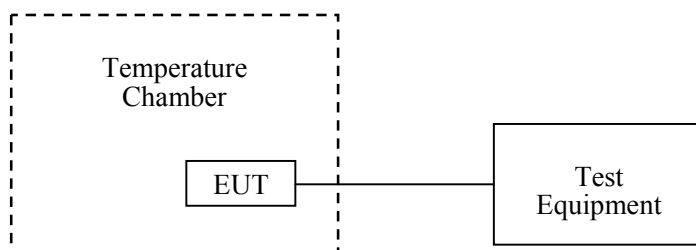
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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 from 85% 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	2015-09-10	2016-09-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2015-07-28	2016-07-27

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

Test Data

Environmental Conditions

Temperature:	24.5 °C
Relative Humidity:	42%
ATM Pressure:	101.2 kPa

The testing was performed by Allen Qiao on 2015-11-28

Cellular Band (Part 22H)

GMSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
	V _{DC}	Hz	ppm	ppm
-30	3.7	-15	-0.018	2.5
-20		-19	-0.023	
-10		-12	-0.014	
0		-16	-0.019	
10		-17	-0.020	
20		-13	-0.016	
30		-19	-0.023	
40		-16	-0.019	
50		-13	-0.016	
25		3.5	-18	
	4.2	-13	-0.016	

EDGE, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
	V_{DC}	Hz	ppm	ppm
-30	3.7	13	0.016	2.5
-20		16	0.019	
-10		12	0.014	
0		19	0.023	
10		10	0.012	
20		17	0.020	
30		16	0.019	
40		15	0.018	
50		13	0.016	
25		3.5	16	
	4.2	15	0.018	

WCDMA Band V: Re199

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
	V_{DC}	Hz	ppm	ppm
-30	3.7	11	0.013	2.5
-20		17	0.020	
-10		10	0.012	
0		12	0.014	
10		16	0.019	
20		19	0.023	
30		14	0.017	
40		13	0.016	
50		10	0.012	
25		3.5	19	
25	4.2	15	0.018	

WCDMA Band V: HSDPA

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
	V_{DC}	Hz	ppm	ppm
-30	3.7	12	0.014	2.5
-20		14	0.017	
-10		11	0.013	
0		15	0.018	
10		18	0.022	
20		13	0.016	
30		17	0.020	
40		11	0.013	
50		16	0.019	
25		3.5	20	
25	4.2	16	0.019	

WCDMA Band V: HSUPA

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
	V_{DC}	Hz	ppm	ppm
-30	3.7	-21	-0.025	2.5
-20		-15	-0.018	
-10		-14	-0.017	
0		-20	-0.024	
10		-12	-0.014	
20		-25	-0.030	
30		-18	-0.022	
40		-13	-0.016	
50		-23	-0.027	
25		3.5	-20	
25	4.2	-13	-0.016	

PCS Band (Part 24E)

GMSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
	V_{DC}	Hz	ppm	
-30	3.7	-19	-0.010	Compliance
-20		-20	-0.011	
-10		-15	-0.008	
0		-16	-0.009	
10		-14	-0.007	
20		-18	-0.010	
30		-23	-0.012	
40		-18	-0.010	
50		-22	-0.012	
25	3.5	-24	-0.013	
	4.2	-19	-0.010	

EDGE, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
	V_{DC}	Hz	ppm	
-30	3.7	16	0.009	Compliance
-20		18	0.010	
-10		15	0.008	
0		12	0.006	
10		19	0.010	
20		13	0.007	
30		14	0.007	
40		10	0.005	
50		16	0.009	
25	3.5	17	0.009	
	4.2	13	0.007	

WCDMA Band II: Re199

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
	V_{DC}	Hz	ppm	
-30	3.7	17	0.009	Compliance
-20		15	0.008	
-10		10	0.005	
0		15	0.008	
10		10	0.005	
20		11	0.006	
30		10	0.005	
40		17	0.009	
50		12	0.006	
25	3.5	11	0.006	
25	4.2	16	0.009	

WCDMA Band II: HSDPA

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
	V_{DC}	Hz	ppm	
-30	3.7	18	0.010	Compliance
-20		12	0.006	
-10		14	0.007	
0		13	0.007	
10		16	0.009	
20		17	0.009	
30		19	0.010	
40		10	0.005	
50		19	0.010	
25	3.5	12	0.006	
25	4.2	13	0.007	

WCDMA Band II: HSUPA

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
	V _{DC}	Hz	ppm	
-30	3.7	18	0.010	Compliance
-20		16	0.009	
-10		15	0.008	
0		13	0.007	
10		19	0.010	
20		17	0.009	
30		21	0.011	
40		13	0.007	
50		19	0.010	
25		3.5	17	
25	4.2	15	0.008	

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