FCC PART 22H, PART 24E

MEASUREMENT AND TEST REPORT

For

MAXWEST INTERNATIONAL LIMITED

No.1, Longgang Road,Buji,Longgang,ShenzhenCity,Guangdong Province, P.R. China

FCC ID: 2AEN3ASTROX5

Report Type:	Product Type:
Original Report	Mobile Phone

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Report Number:	RDG150803001-00C
Report Date:	2015-08-18
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *MAXWEST INTERNATIONAL LIMITED*'s product, model number:*Astro X5 (FCC ID: 2AEN3ASTROX5)* (the "EUT") in this report was a *Mobile Phone (namedAstro X5 by applicant),* which was measured approximately: 14.37cm (L) x 7.28 cm (W) x 0.95 cm (H), rated input voltage: DC3.8V rechargeable Li-ion battery or DC5.0V charging from adapter.

Adapter information: Travel Charger
Model: A98A-050100U-US1
Input: AC100-240V, 50/60 Hz, 0.2A;
Output: DC 5V, 1000mA

All measurement and test data in this report was gathered from production sample serial number: 150803001 (Assigned by applicant). The EUT was received on 2015-08-04.

Objective

This report is prepared on behalf of *MAXWEST INTERNATIONAL 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: 2AEN3ASTROX5.
FCC Part 15C DSS submissions with FCC ID: 2AEN3ASTROX5.
FCC Part 15C DTS submissions with FCC ID: 2AEN3ASTROX5.

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 facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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.

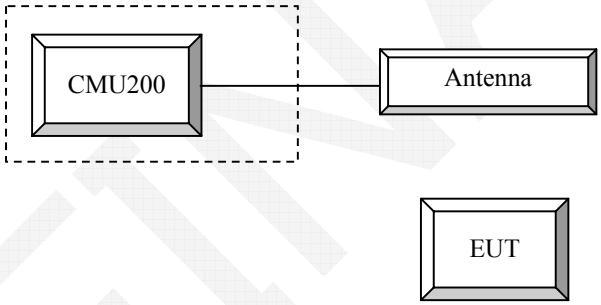
Equipment Modifications

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



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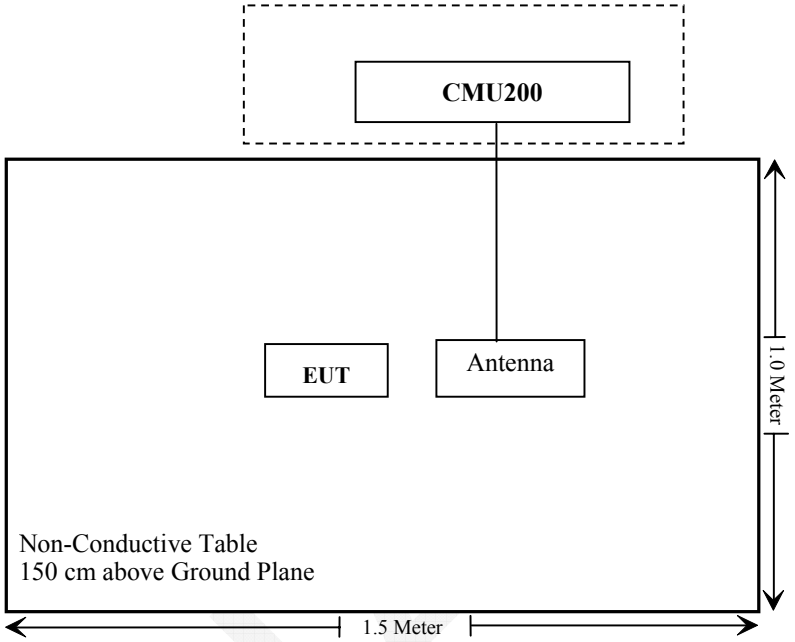
Block Diagram of Test Setup



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

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FCC §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG150803001-20.

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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.

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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

GPRS/EGPRS

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

Channel Type > Off
P0 > 4 dB
Slot Config > Unchanged (if already set under MS signal)
TCH > choose desired test channel
Hopping > Off
Main Timeslot > 3
Network Coding Scheme > CS4 (GPRS) and MCS5 (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

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 / βd	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			
	Ahs= β hs/ β 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 General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/ βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	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				
	Ahs= βhs/ βc	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_FCIs	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 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_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_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 β_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

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.
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.

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	2015-05-09	2016-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2015-05-09	2016-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
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	2012-09-06	2015-09-06

*** 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:	26.8~27.1 °C
Relative Humidity:	57~60 %
ATM Pressure:	100~100.2 kPa

The testing was performed by Allen Qiao on 2015-08-11 and 2015-08-18.

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	33.30	33.25	31.78	29.68	27.35	26.87	24.25	22.05	20.45
	190	33.35	33.15	31.65	29.58	27.68	26.04	24.73	22.62	20.36
	251	33.63	33.47	31.36	29.47	27.67	26.35	24.15	22.45	20.40
PCS	512	30.21	30.12	28.47	26.70	24.52	24.21	23.17	21.34	19.36
	661	30.38	30.24	28.54	26.46	24.15	24.62	23.98	21.63	19.65
	810	30.62	30.45	28.75	26.75	24.27	24.25	23.63	21.35	19.14

WCDMA Band Ⅱ

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	21.57	2.96	21.54	2.96	21.68	2.72
HSDPA	1	21.52	2.90	21.65	3.12	21.81	2.68
	2	21.66	3.07	21.60	3.13	21.55	2.57
	3	21.61	2.76	21.48	2.90	21.70	2.55
	4	21.48	2.94	21.42	2.89	21.66	2.57
DC-HSDPA	1	21.52	2.77	21.49	2.85	21.71	2.68
	2	21.40	3.07	21.44	3.11	21.55	2.67
	3	21.37	2.95	21.59	2.82	21.55	2.65
	4	21.55	3.00	21.36	3.02	21.77	2.83
HSUPA	1	21.64	2.77	21.57	3.03	21.50	2.81
	2	21.36	3.04	21.59	2.85	21.65	2.86
	3	21.57	2.78	21.62	2.95	21.79	2.57
	4	21.61	2.81	21.73	3.13	21.80	2.85
	5	21.56	3.04	21.59	3.05	21.74	2.58
HSPA+	1	21.25	2.86	21.36	2.89	21.49	2.68

WCDMA Band Ⅴ

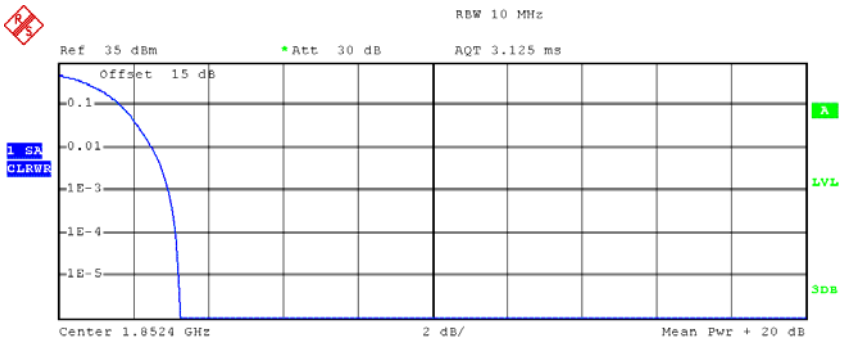
Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99	1	21.34	3.44	21.7	3.32	21.65	3.52
HSDPA	1	21.21	2.8	21.81	3.14	21.43	2.85
	2	21.13	3.09	21.76	3.03	21.70	2.58
	3	21.43	2.93	21.67	3.00	21.52	2.63
	4	21.56	2.95	21.93	2.80	21.79	2.65
DC-HSDPA	1	21.23	3.08	21.78	2.73	21.48	2.87
	2	21.36	3.16	21.83	2.92	21.78	2.93
	3	21.20	3.18	21.65	2.88	21.50	2.93
	4	21.49	3.17	21.79	3.00	21.72	2.77
HSUPA	1	21.44	2.76	21.95	3.02	21.85	2.53
	2	21.58	3.08	21.73	3.00	21.66	2.85
	3	21.30	2.91	21.66	3.14	21.76	2.57
	4	21.49	3.11	21.76	2.93	21.47	2.83
	5	21.59	2.83	21.71	2.84	21.52	2.90
HSPA+	1	21.34	2.75	21.51	2.71	21.38	2.84

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

Peak-to-average ratio (PAR)

WCDMA Band Ⅱ

Low Channel

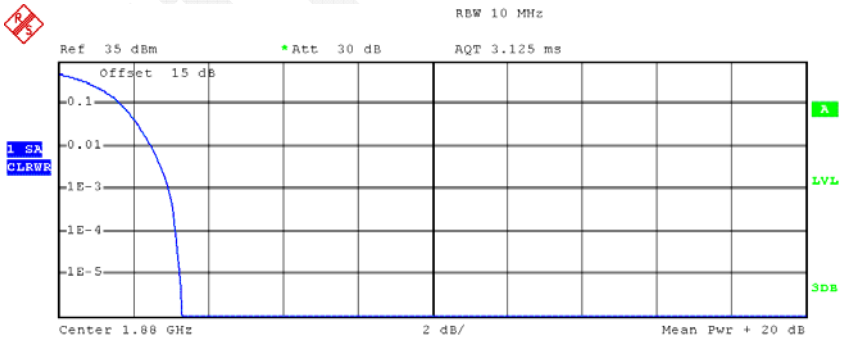


Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	23.70 dBm
Peak	26.97 dBm
Crest	3.27 dB
10% @	1.68 dB
1% @	2.52 dB
.1% @	2.96 dB

Date: 11.AUG.2015 18:01:17

Middle Channel

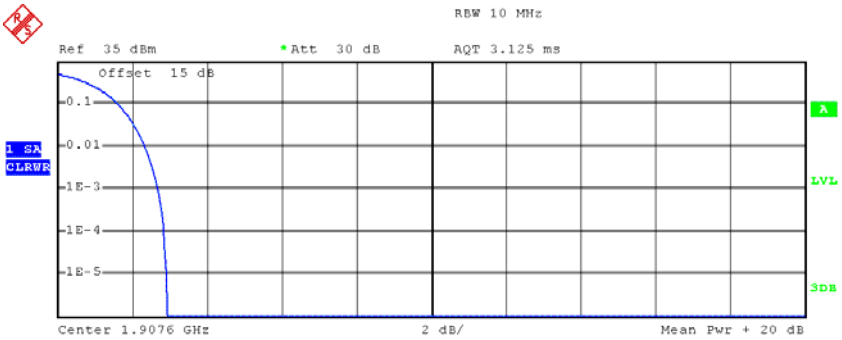


Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	24.50 dBm
Peak	27.81 dBm
Crest	3.32 dB
10% @	1.68 dB
1% @	2.52 dB
.1% @	2.96 dB

Date: 11.AUG.2015 17:59:07

High Channel



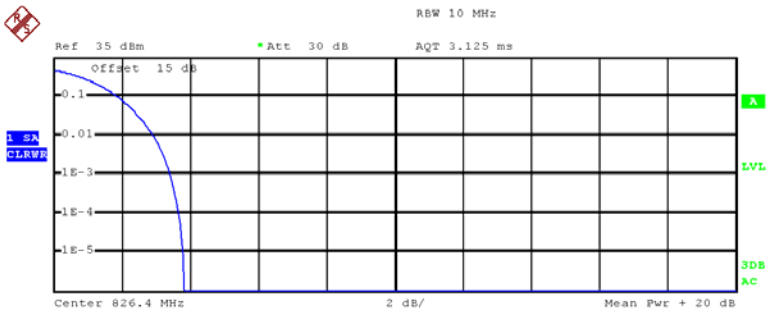
Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	24.09 dBm
Peak	27.04 dBm
Crest	2.95 dB
10% @	1.64 dB
1% @	2.36 dB
.1% @	2.72 dB

Date: 11.AUG.2015 18:01:50

WCDMA Band Ⅴ

Low Channel

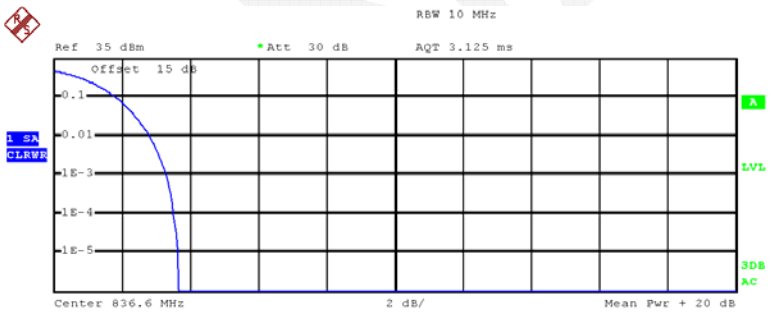


Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	22.50 dBm
Peak	26.33 dBm
Crest	3.83 dB
10 %	1.92 dB
1 %	2.92 dB
.1 %	3.44 dB
.01 %	3.68 dB

Date: 18.AUG.2015 16:31:31

Middle Channel

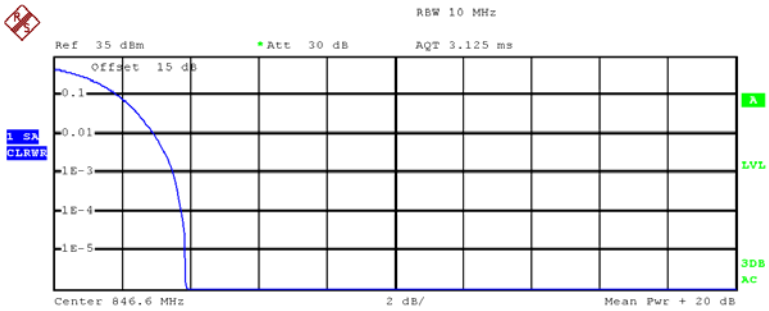


Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	22.39 dBm
Peak	26.05 dBm
Crest	3.66 dB
10 %	1.88 dB
1 %	2.84 dB
.1 %	3.32 dB
.01 %	3.52 dB

Date: 18.AUG.2015 16:27:06

High Channel



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	22.03 dBm
Peak	25.91 dBm
Crest	3.87 dB
10 %	1.92 dB
1 %	2.96 dB
.1 %	3.52 dB
.01 %	3.76 dB

Date: 18.AUG.2015 16:28:56

ERP & EIRP

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)			
GSM 850_Middle Channel								
836.600	H	99.03	24.1	0.0	1.0	23.1	38.5	15.4
836.600	V	106.31	34.5	0.0	1.0	33.5	38.5	5.0
EGPRS 850_ Middle Channel								
836.600	H	93.03	18.1	0.0	1.0	17.1	38.5	21.4
836.600	V	99.33	27.5	0.0	1.0	26.5	38.5	12.0
WCDMA Band V_Middle Channel								
836.600	H	87.73	12.8	0.0	1.0	11.8	38.5	26.7
836.600	V	93.68	21.9	0.0	1.0	20.9	38.5	17.6
PCS 1900_Middle Channel								
1880.000	H	91.25	19.7	11.7	1.4	30.0	33.0	3.0
1880.000	V	86.63	15.2	11.7	1.4	25.5	33.0	7.5
EGPRS 1900_Middle Channel								
1880.000	H	86.04	14.4	11.7	1.4	24.7	33.0	8.3
1880.000	V	80.51	9.1	11.7	1.4	19.4	33.0	13.6
WCDMA Band II_ Middle Channel								
1880.000	H	83.06	11.5	11.7	1.4	21.8	33.0	11.2
1880.000	V	78.56	7.1	11.7	1.4	17.4	33.0	15.6

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

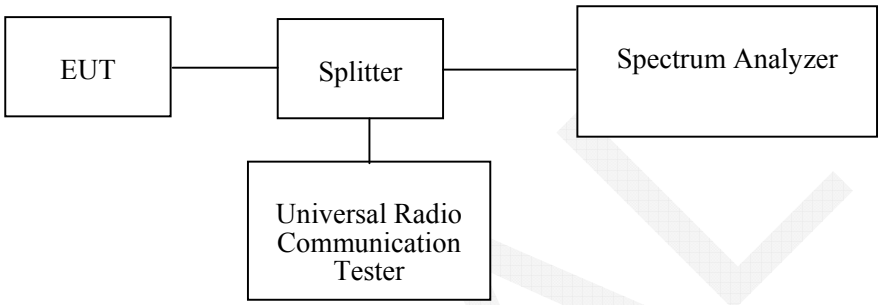
Applicable Standard

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	2015-05-09	2016-05-09

*** 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:	26.8-27.3 °C
Relative Humidity:	57-59 %
ATM Pressure:	99.8-100.2kPa

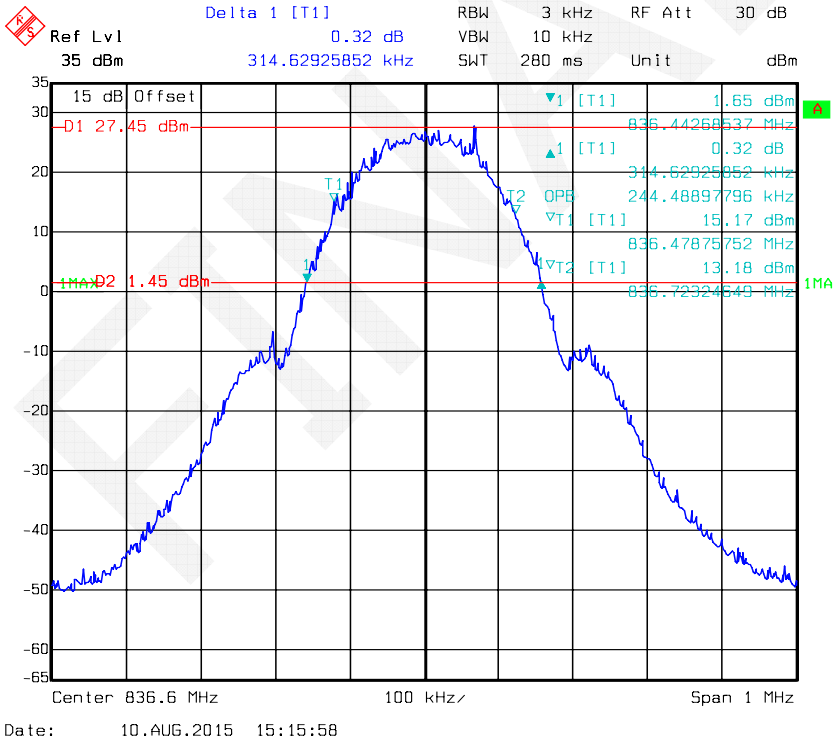
The testing was performed by Allen Qiao on 2015-08-10&2015-08-11&2015-08-12.

Test Mode: Transmitting

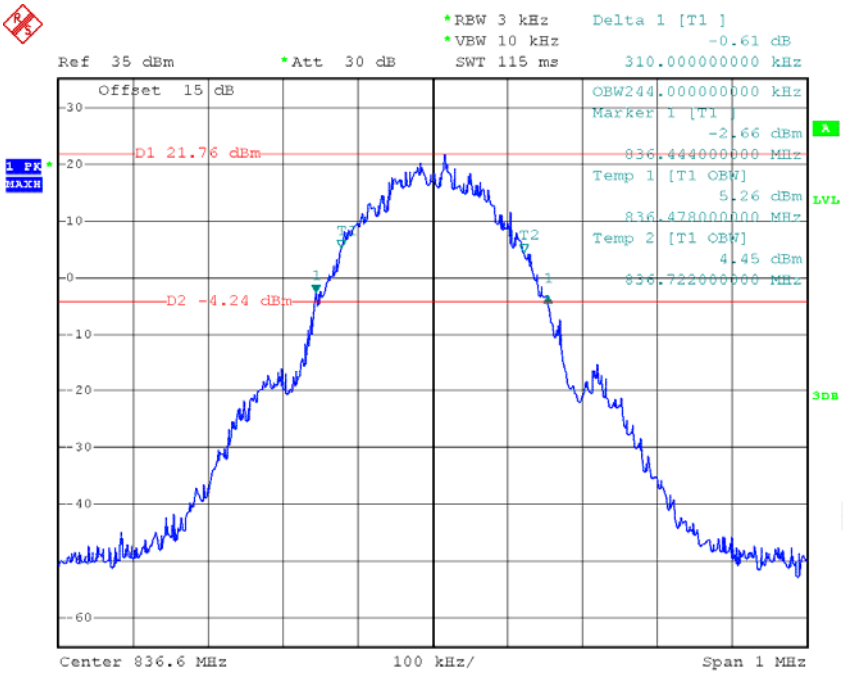
Test Result: Compliant. Please refer to the following table and plots.

	Channel No.	Mode	99% Occupied Bandwidth (kHz)	26 dB Occupied Bandwidth (kHz)
Cellular	190	GSM	244.49	314.63
		EDGE	244	310
PCS	661	PCS	244.49	314.63
		EDGE	244	310
WCDMA Band Ⅱ	9400	Rel 99	4168.34	4729.46
	9400	HSDPA	4168.34	4729.46
	9400	HSUPA	4168.34	4689.38
WCDMA Band V	4183	Rel 99	4168.34	4689.38
	4183	HSDPA	4188.38	4729.46
	4183	HSUPA	4148.3	4729.46

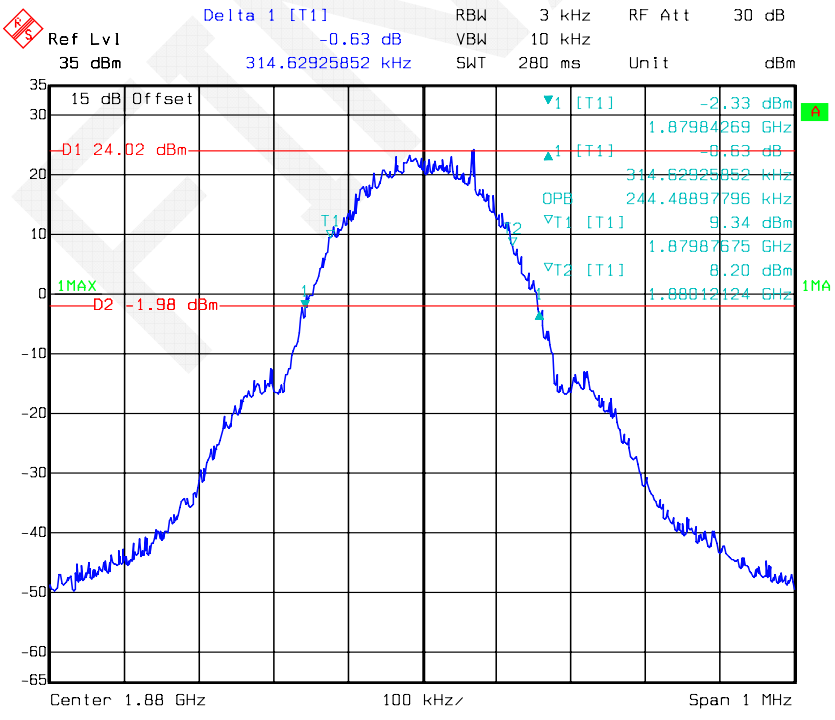
GMSK 850 Cellular Band



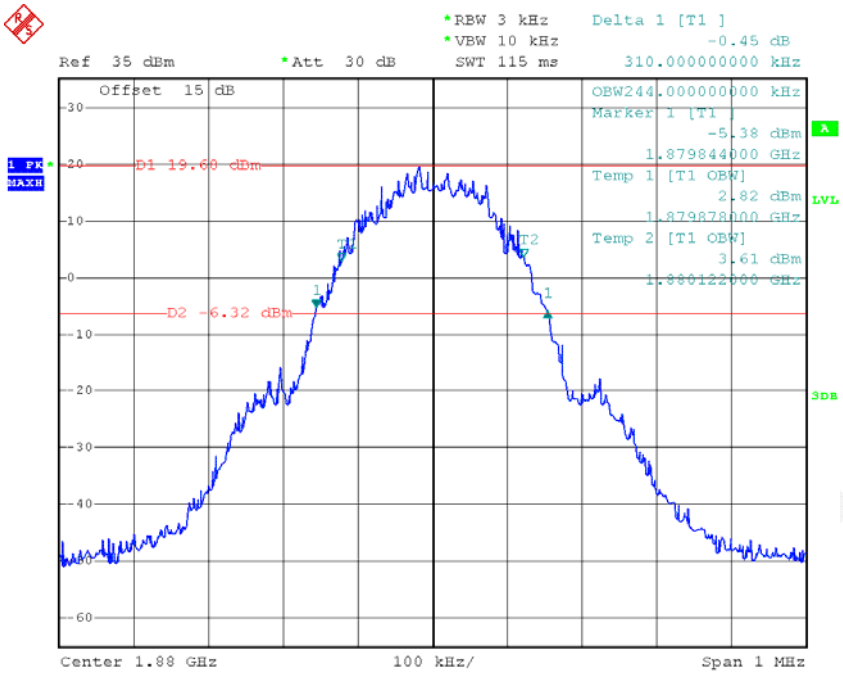
EDGE 850 Cellular Band



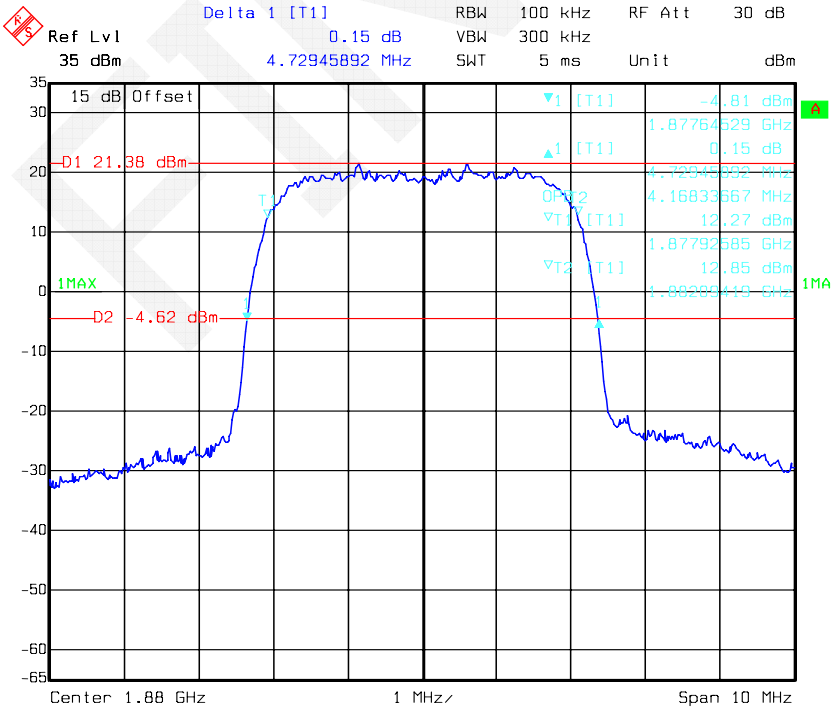
GMSK PCS Band



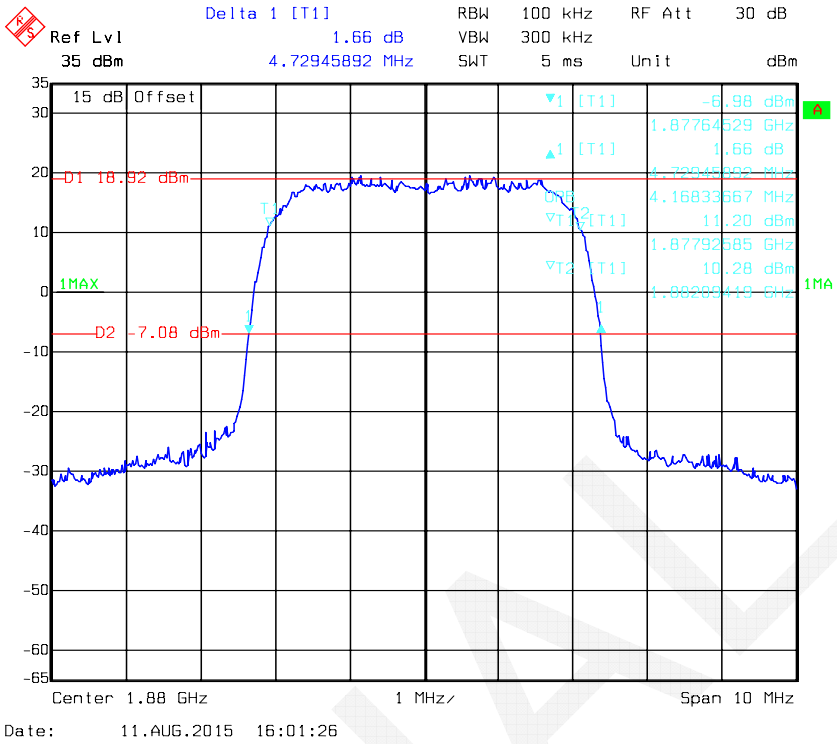
EDGE PCS Band



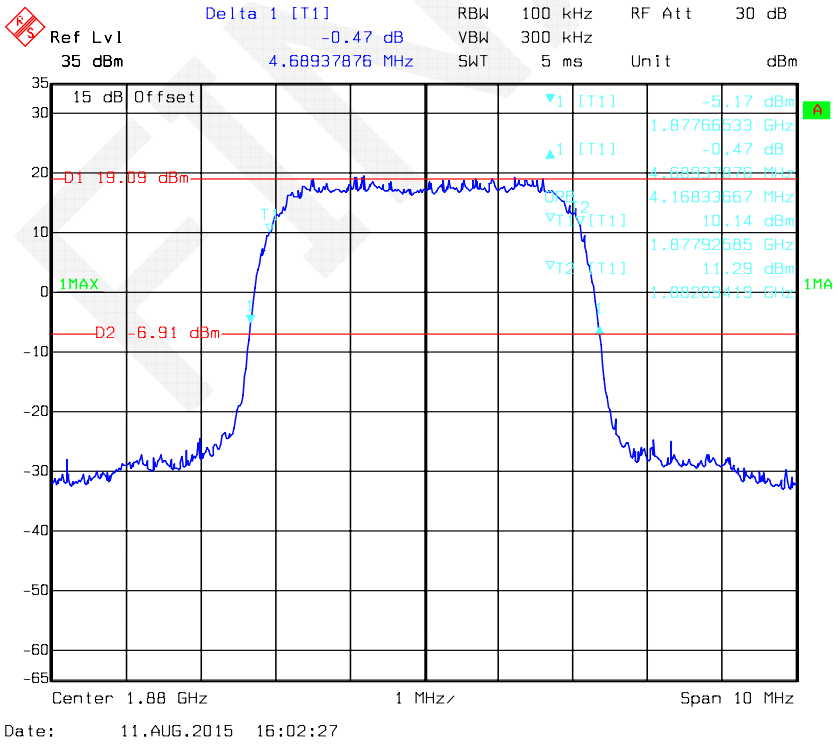
REL99 Band II



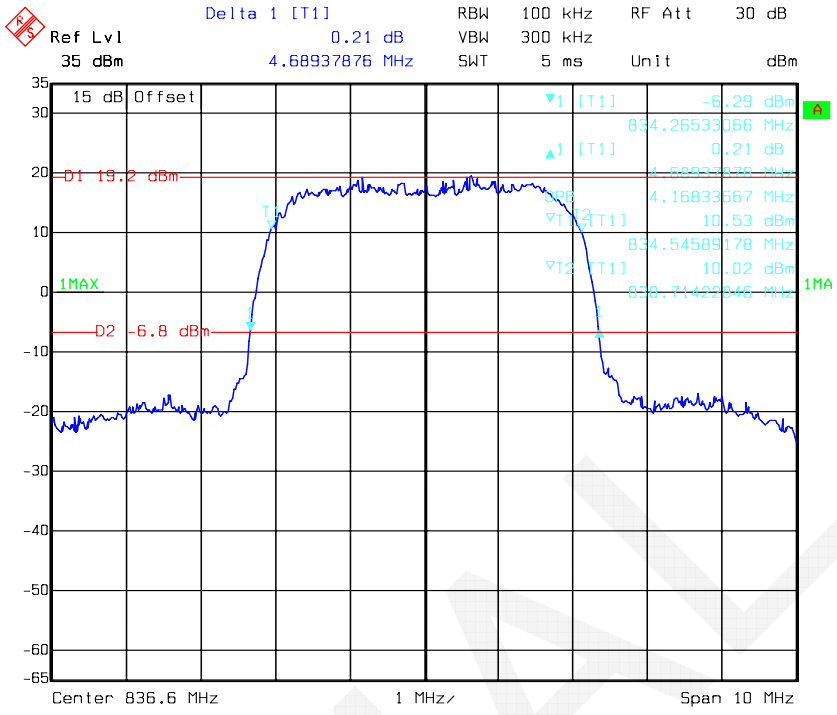
HSDPA Band II



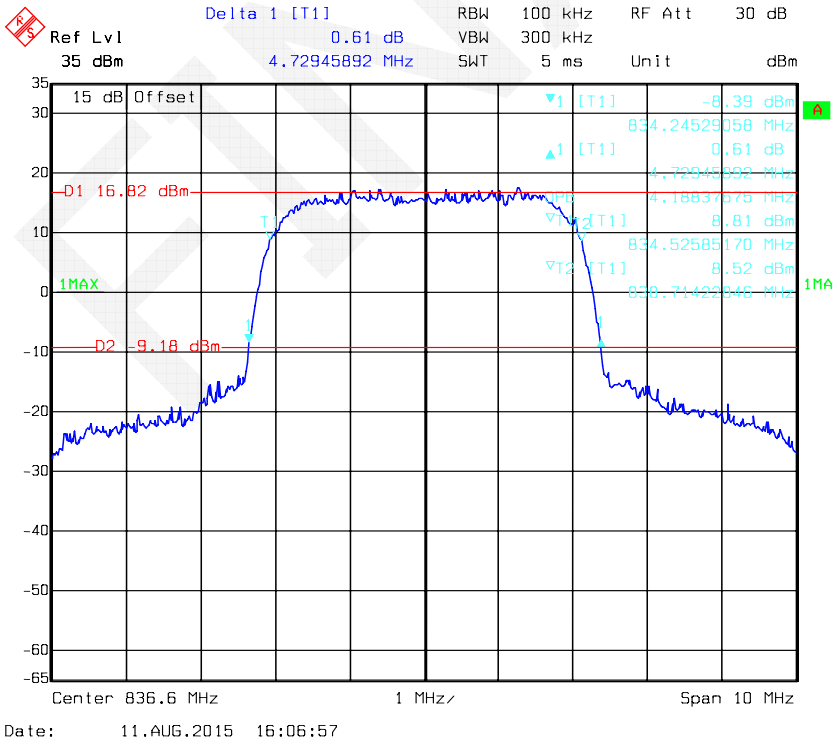
HSUPA Band II



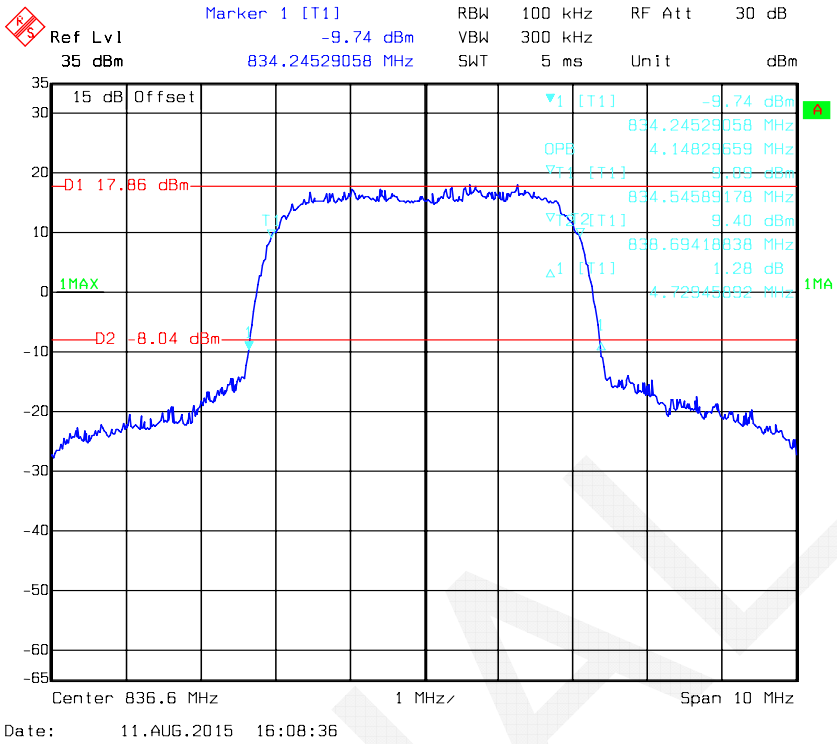
REL99 Band V



HSDPA Band V



HSUPA Band V


Marker 1 [T1]
-9.74 dBm
834.24529058 MHz
RBW 100 kHz
VBW 300 kHz
SWT 5 ms
RF Att 30 dB
Unit dBm
Ref Lvl
35 dBm
15 dB Offset
D1 17.86 dBm
D2 -8.04 dBm
1MAX
OPB
4.14829659 MHz
854.54589178 MHz
9.40 dBm
858.69418838 MHz
1.28 dB
Center 836.6 MHz
1 MHz/
Span 10 MHz
Date: 11.AUG.2015 16:08:36

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

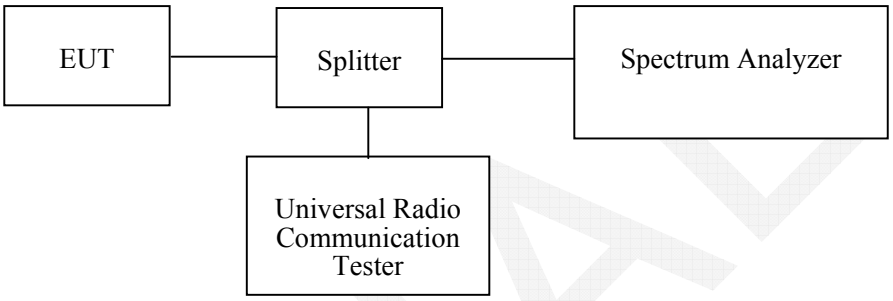
Applicable Standard

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	2015-05-09	2016-05-09
R&S	Spectrum Analyzer	FSEM	DE31388	2015-05-09	2016-05-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2015-05-09	2016-05-09

*** 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

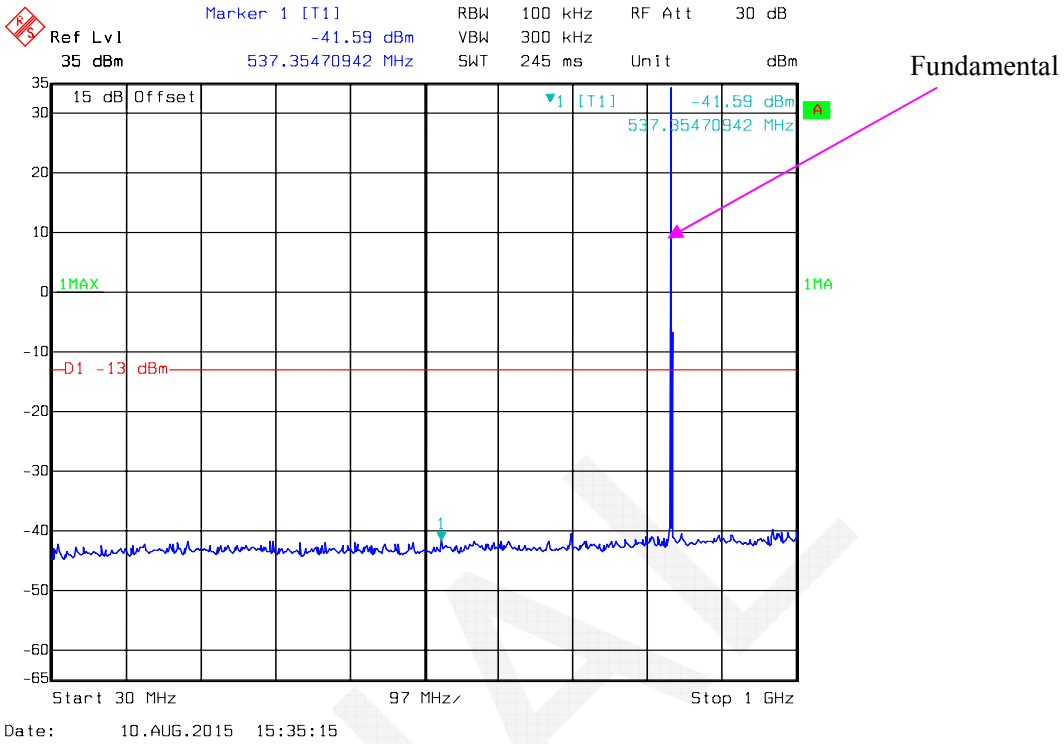
Environmental Conditions

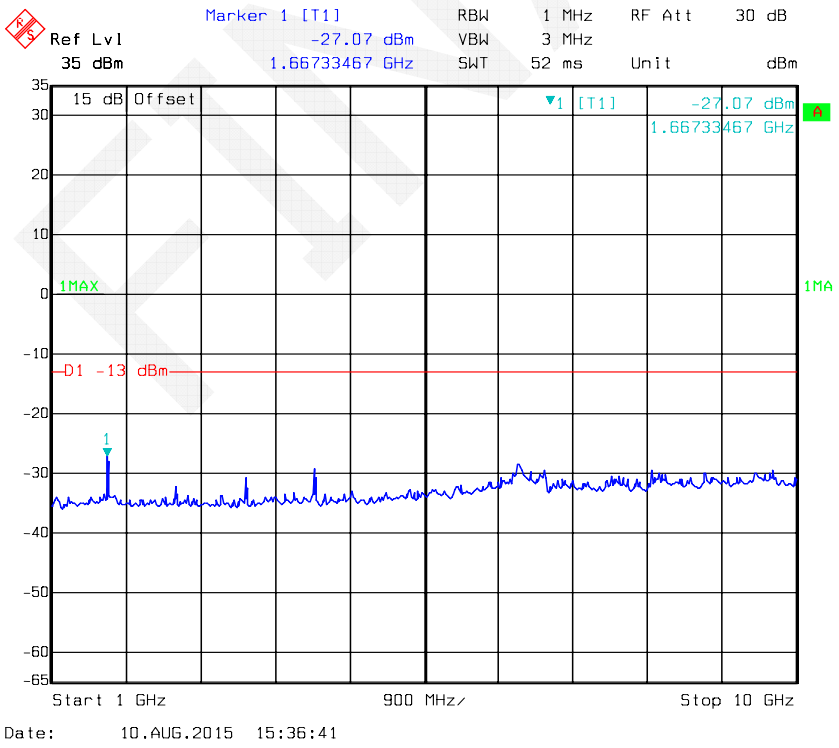
Temperature:	26.8-27.3 °C
Relative Humidity:	57-59 %
ATM Pressure:	99.8-100.2kPa

The testing was performed by Allen Qiao from 2015-08-10&2015-08-11&2015-08-12.

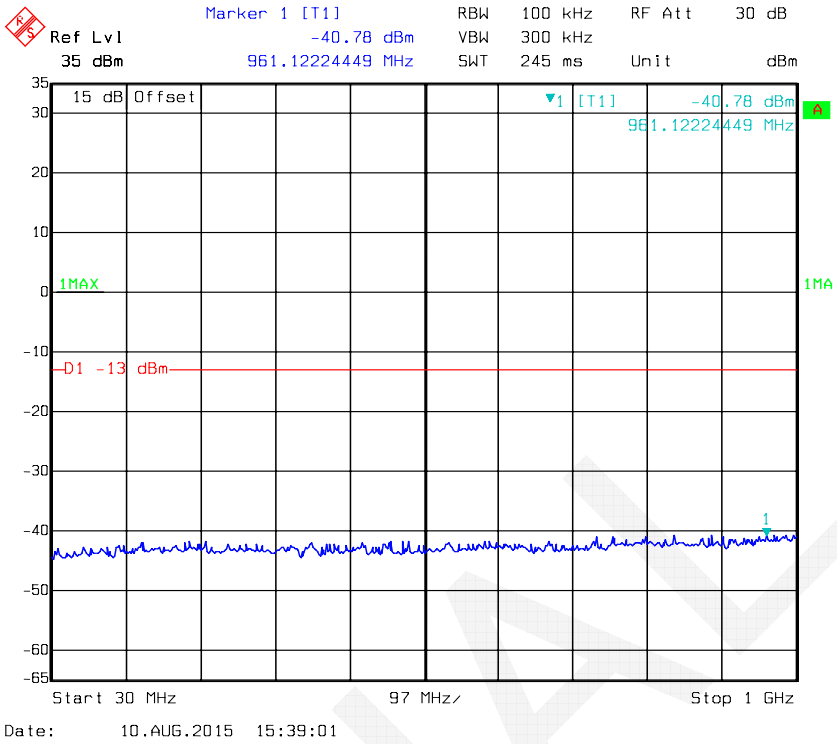
Please refer to the following plots.

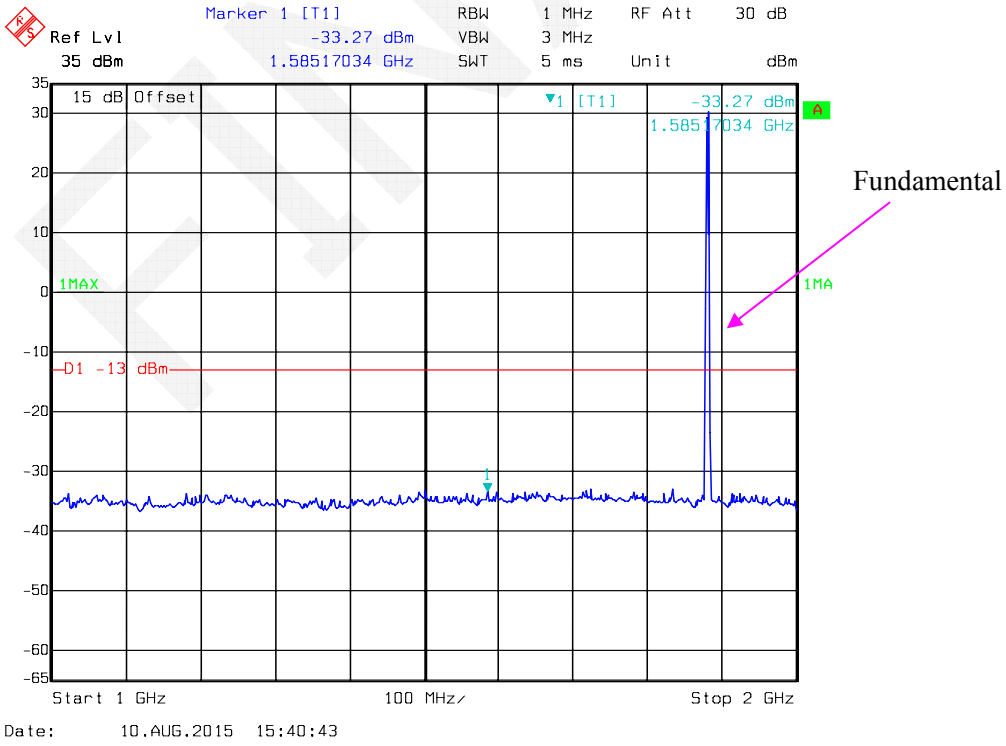
GSM850_Middle Channel

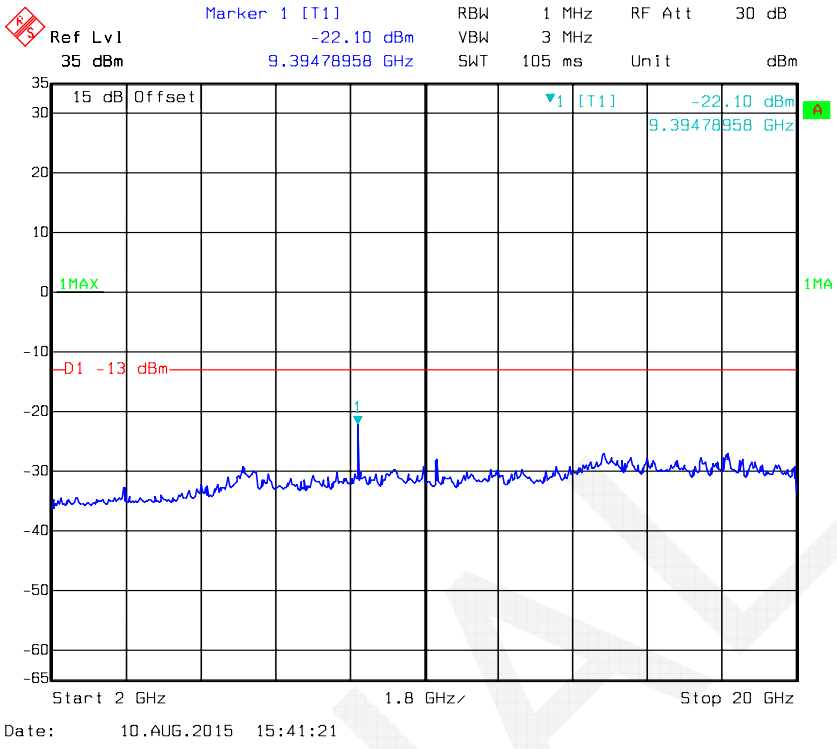




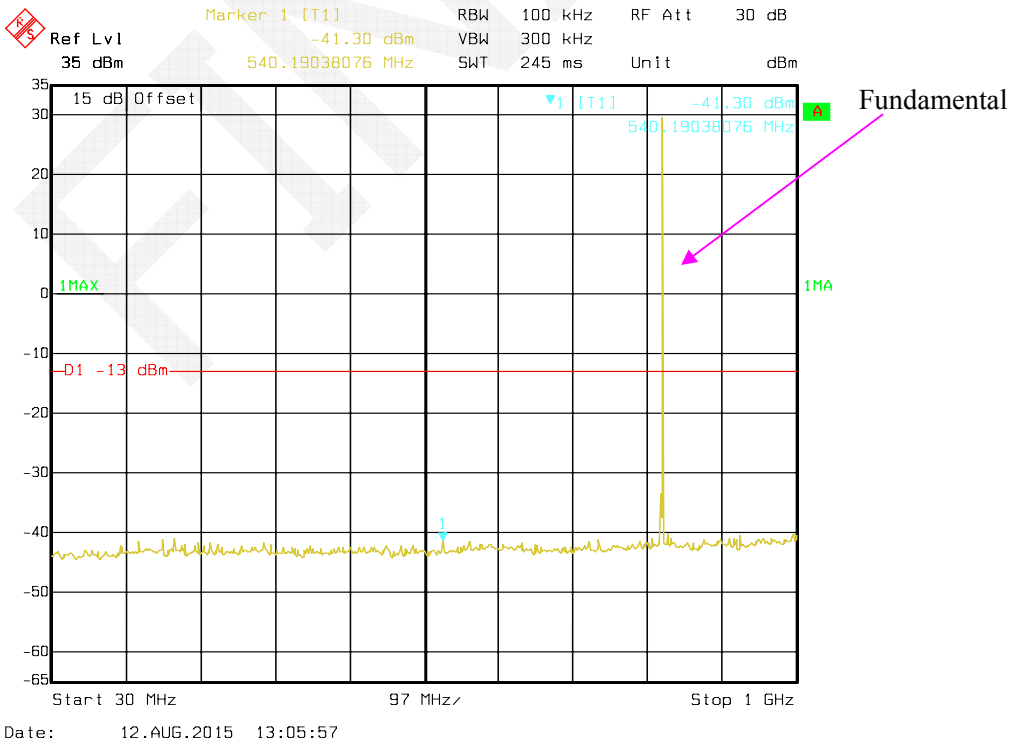
PCS 1900_ Middle Channel

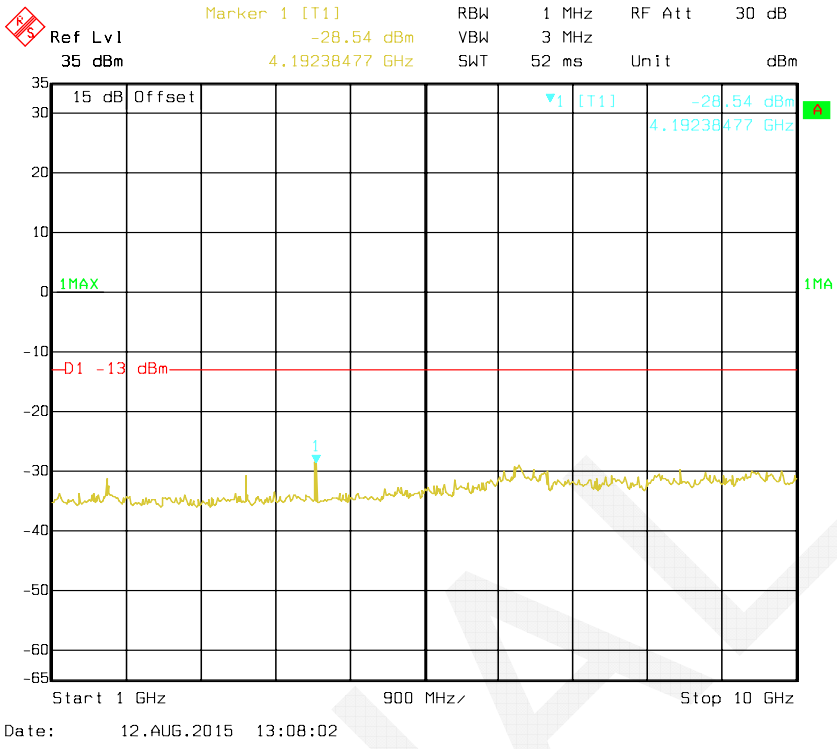




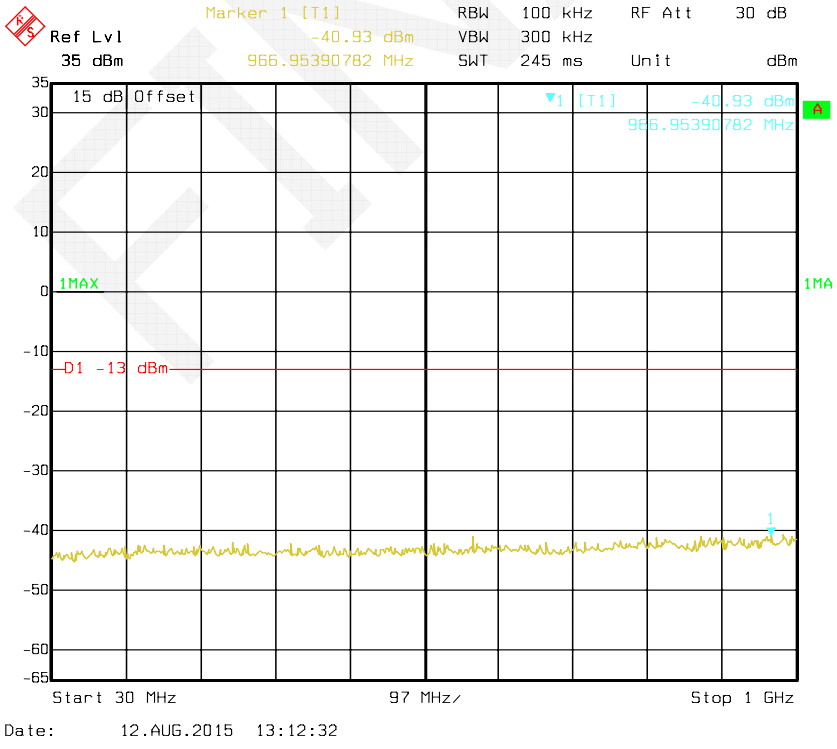


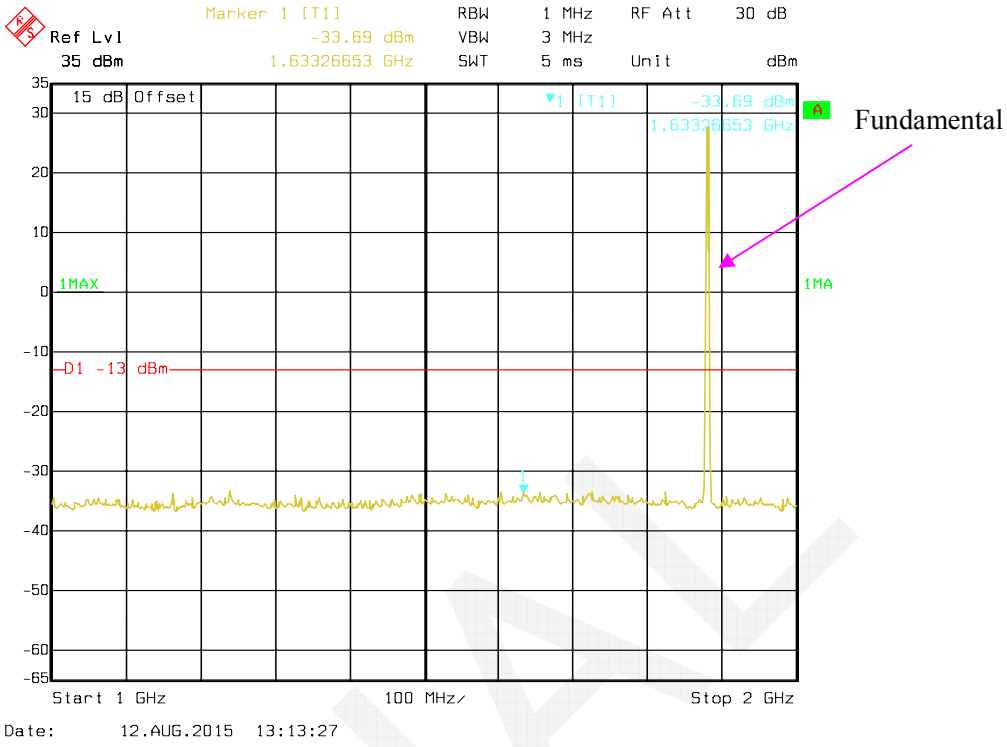
EDGE850_ Middle Channel

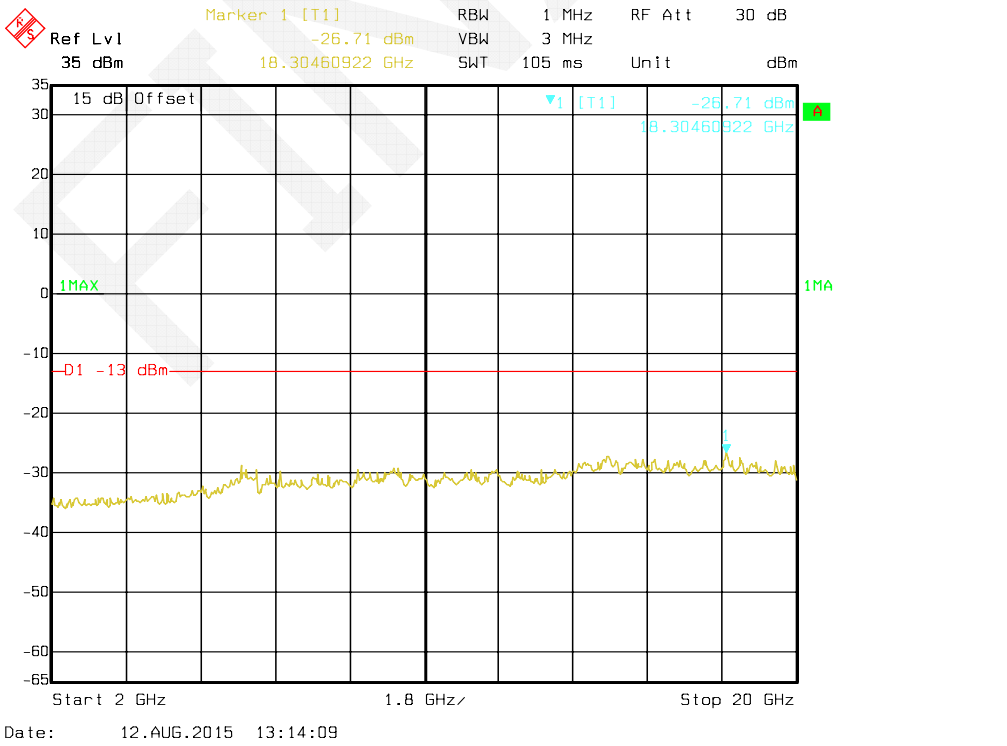




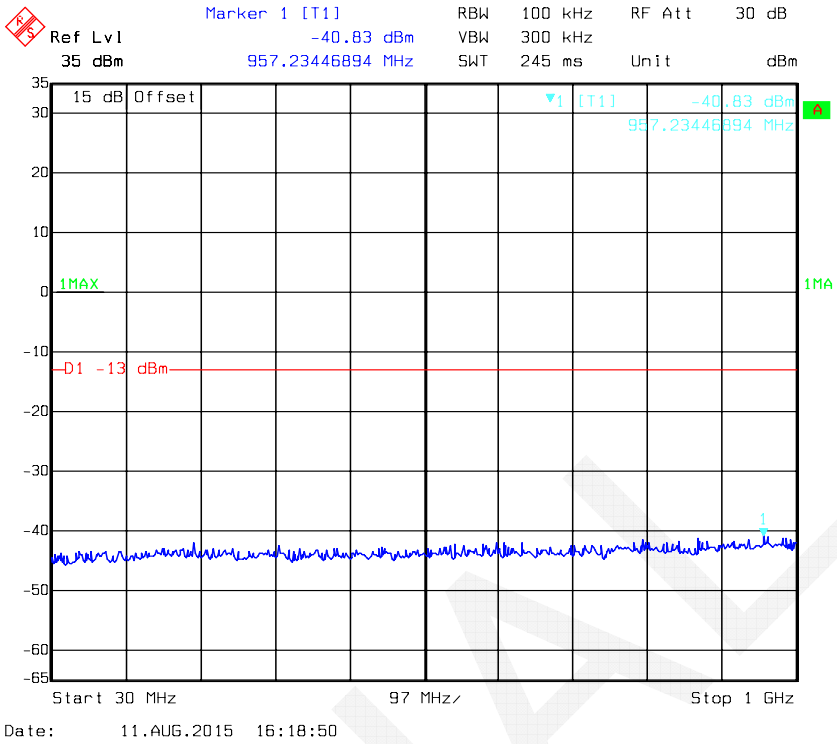
EDGE 1900_ Middle Channel

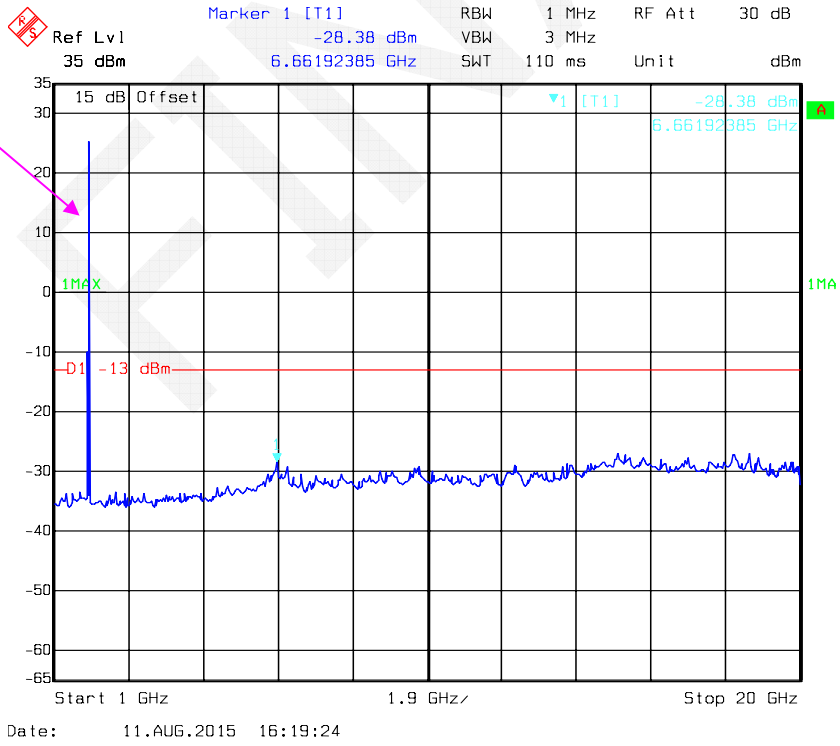



Marker 1 [T1]
-33.69 dBm
1.63326653 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 30 dB
Unit dBm
Ref Lvl
35 dBm
15 dB Offset
1MAX
D1 -13 dBm
1MA
Start 1 GHz
100 MHz/
Stop 2 GHz
Fundamental
Date: 12.AUG.2015 13:13:27


Marker 1 [T1]
-26.71 dBm
18.30460922 GHz
RBW 1 MHz
VBW 3 MHz
SWT 105 ms
RF Att 30 dB
Unit dBm
Ref Lvl
35 dBm
15 dB Offset
1MAX
D1 -13 dBm
1MA
Start 2 GHz
1.8 GHz/
Stop 20 GHz
Date: 12.AUG.2015 13:14:09

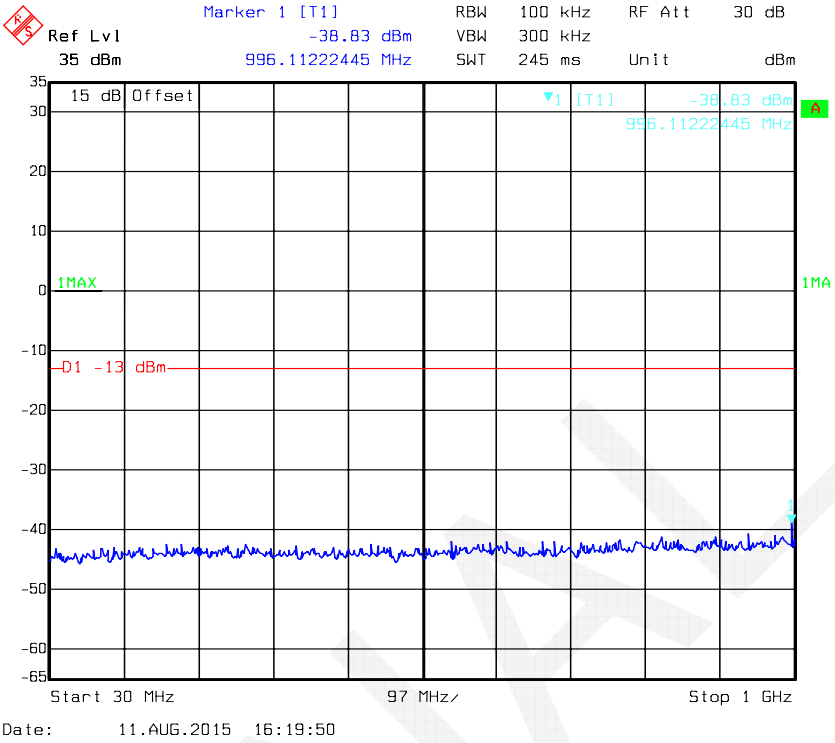
REL99 Band II_ Middle Channel

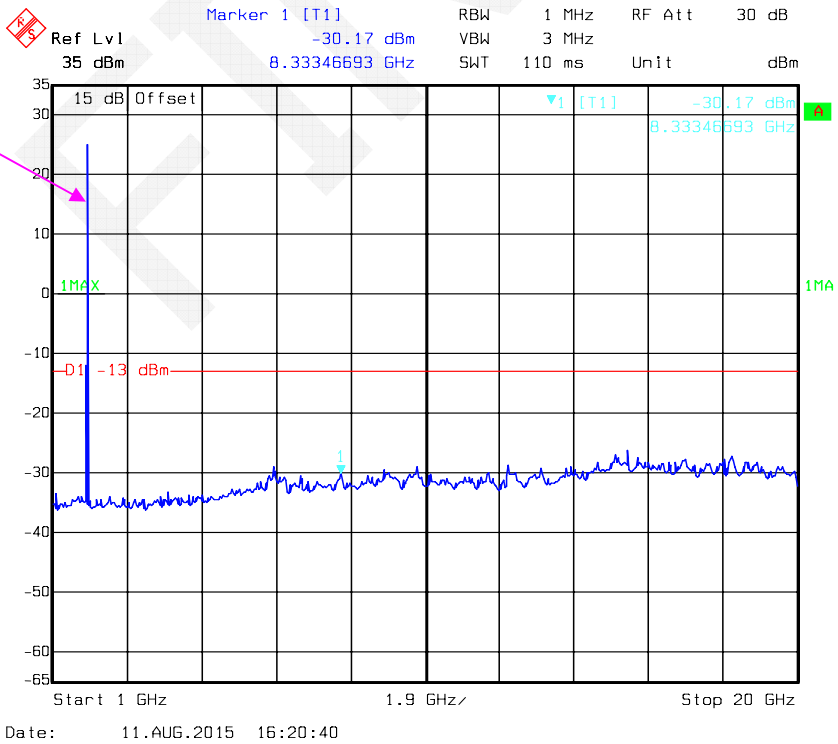




Fundamental

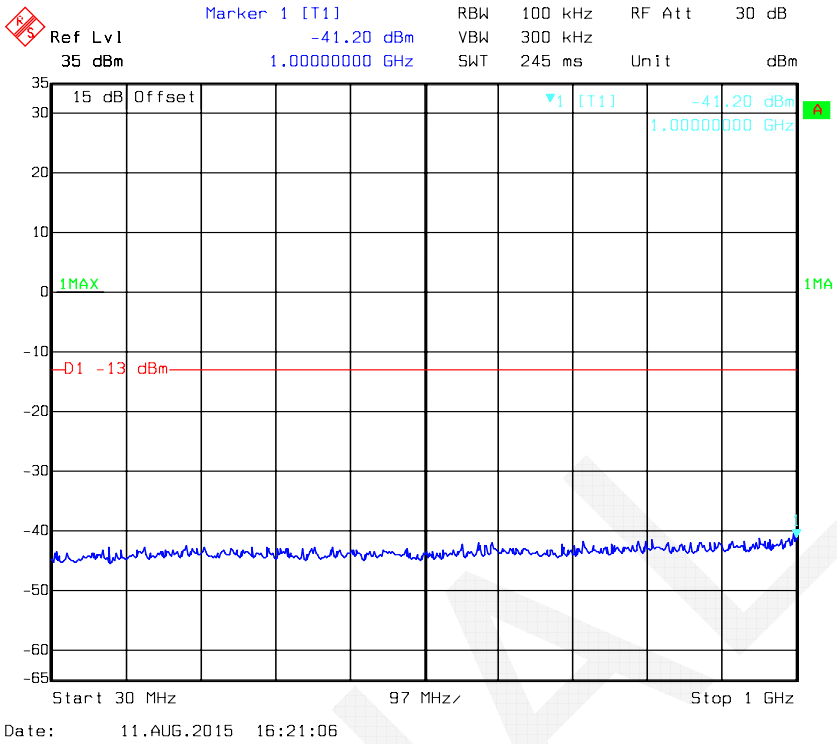
HSDPA Band II _Middle Channel

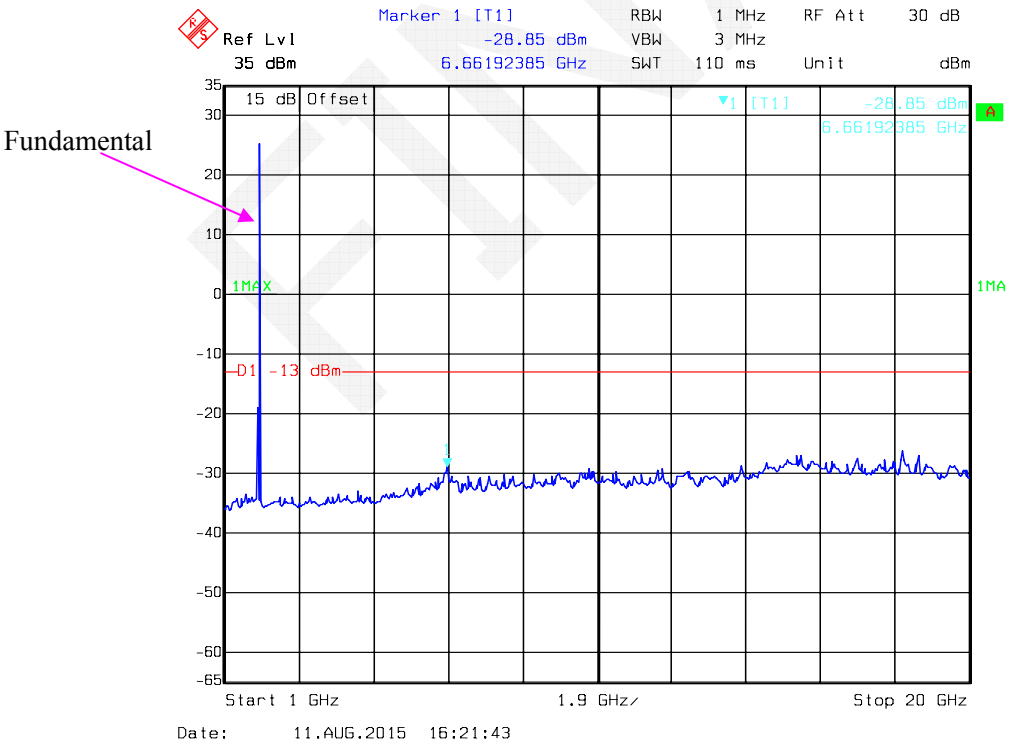




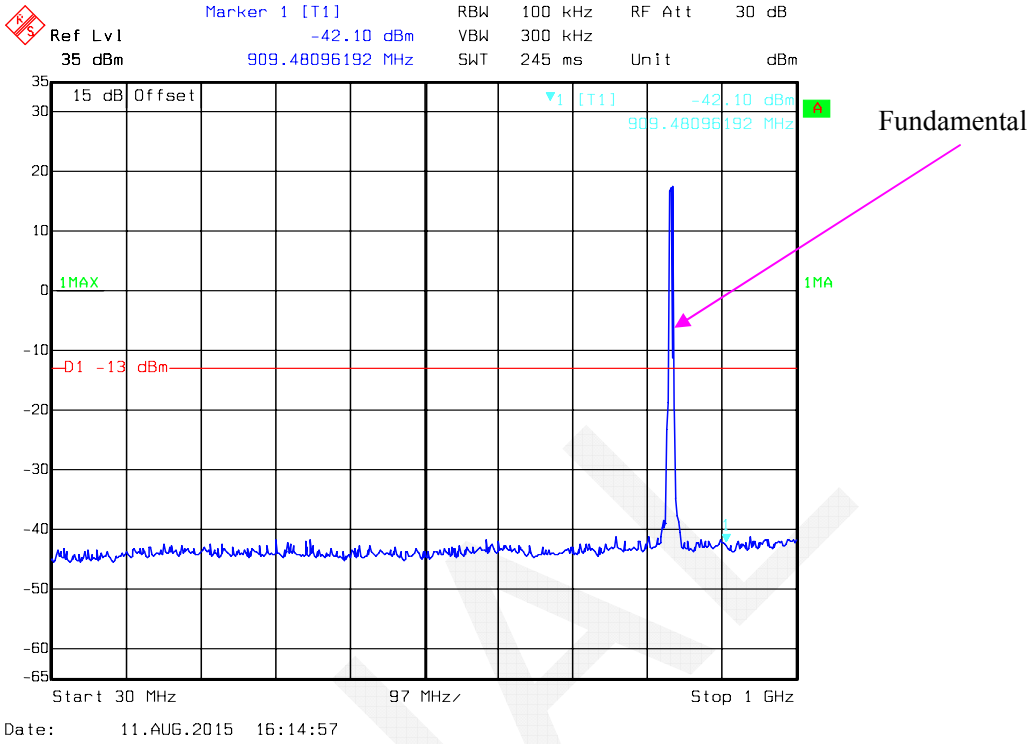
Fundamental

HSUPA Band II _ Middle Channel





REL99 Band V_ Middle Channel



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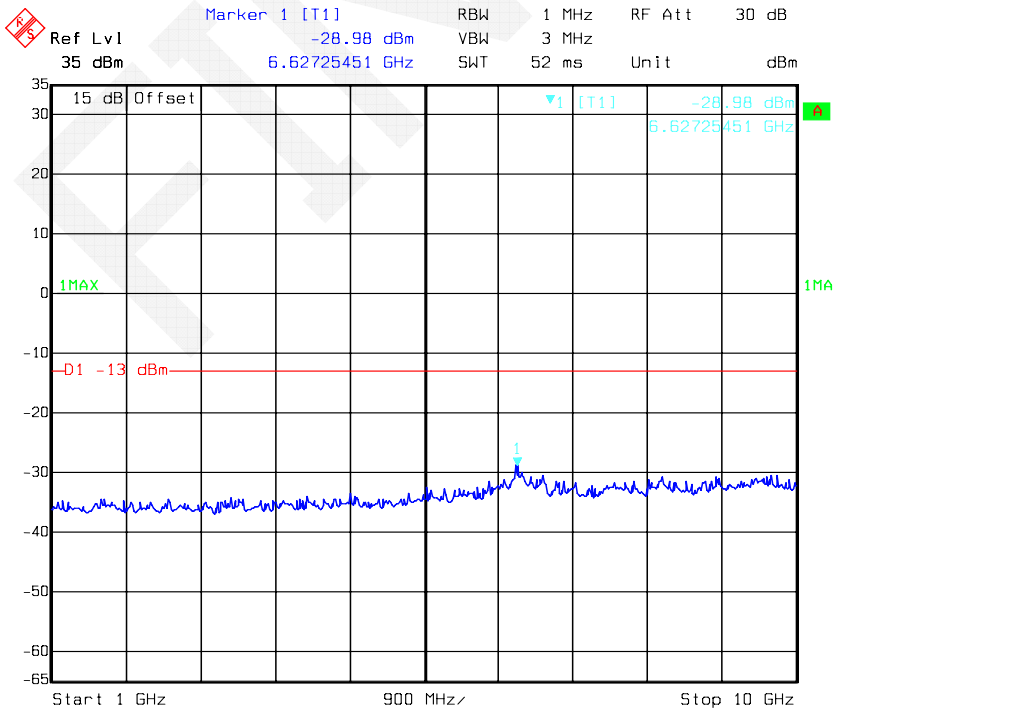

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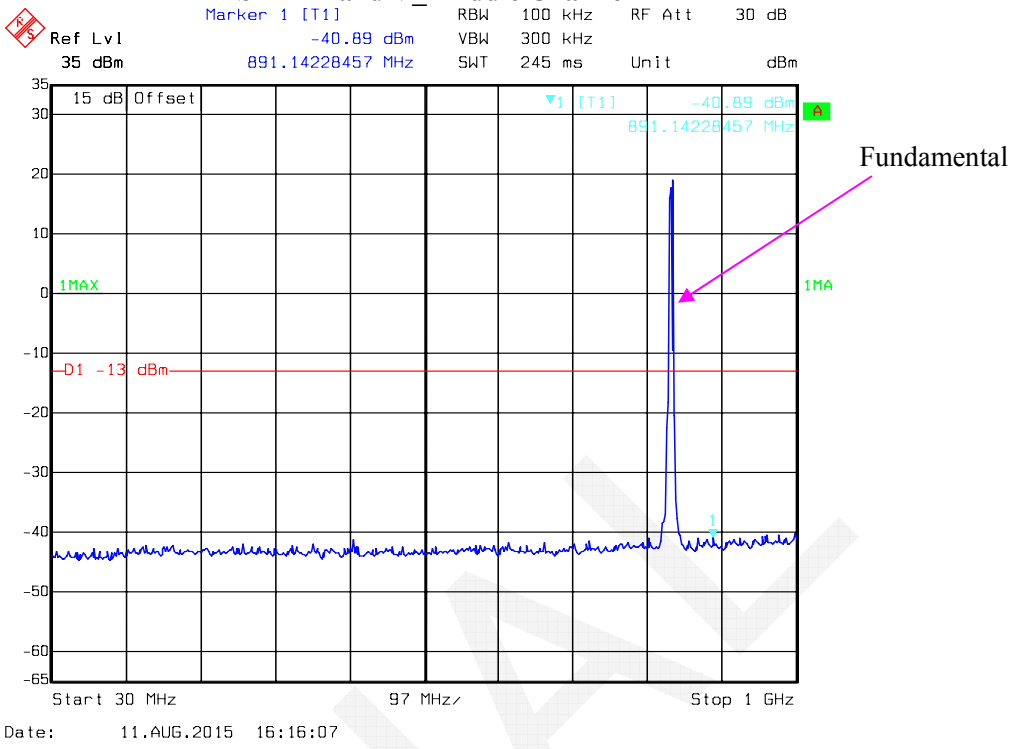
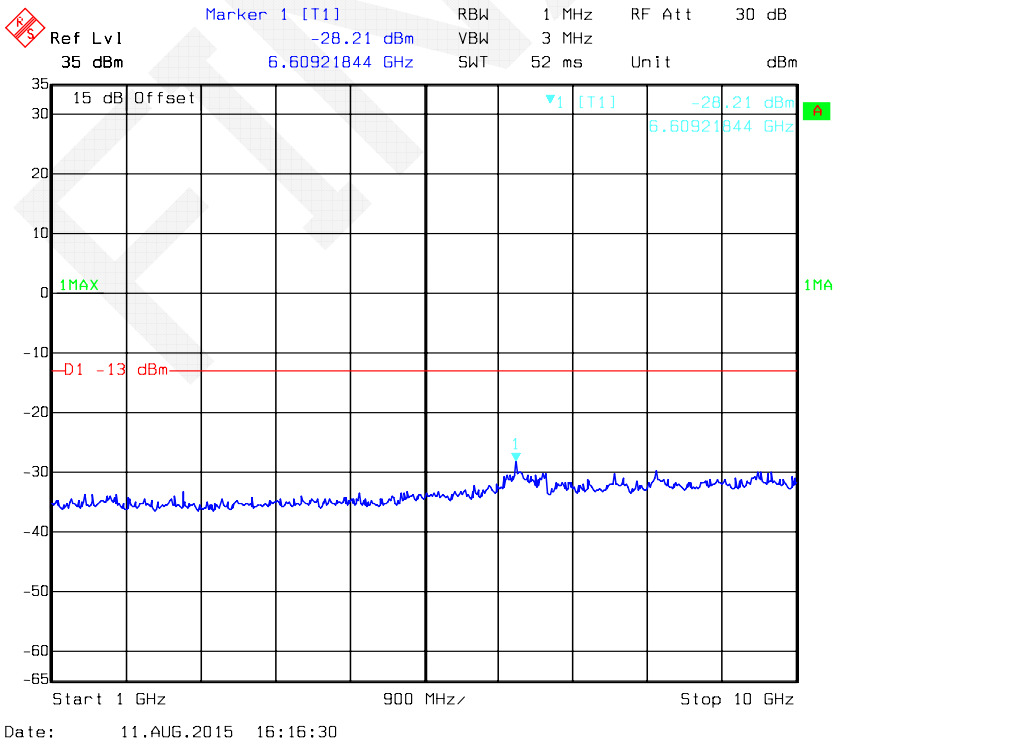
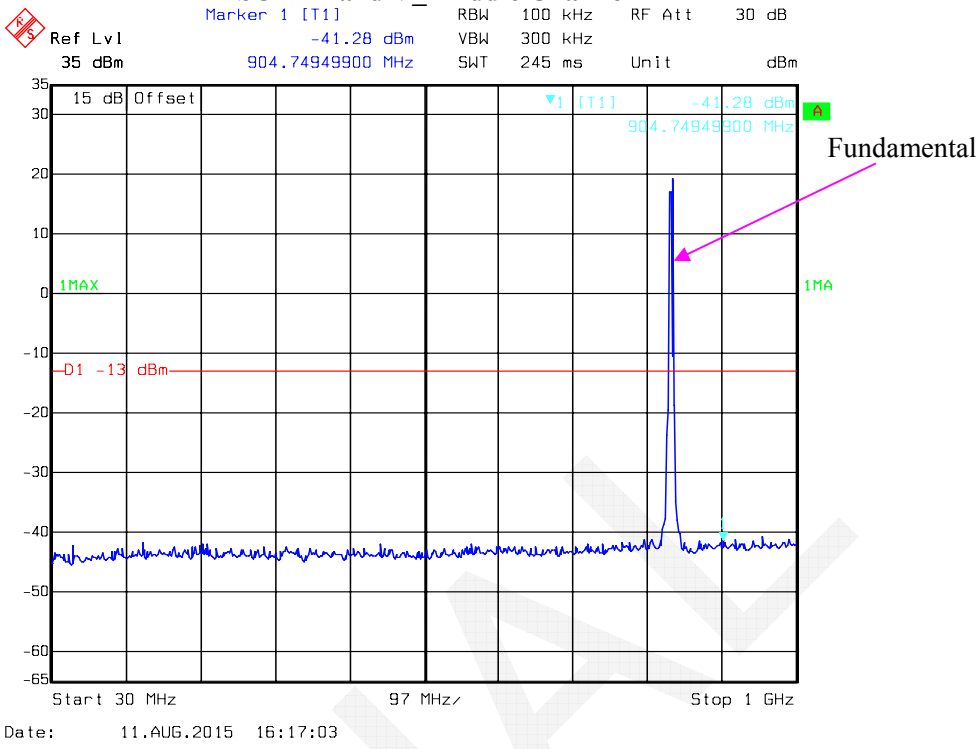
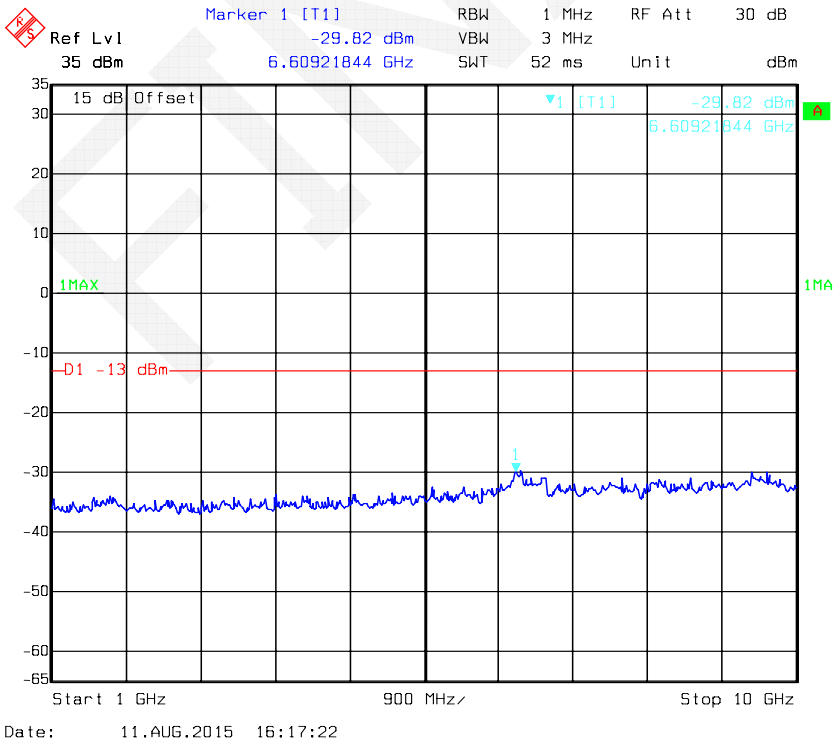
HSDPA Band V_ Middle Channel





HSUPA Band V_ Middle Channel





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 Log_{10} (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	2015-05-09	2016-05-09
Sunol Sciences	Antenna	JB3	A060611-3	2014-07-28	2017-07-27
HP	Amplifier	8447E	2434A02181	2014-09-01	2015-09-01
R&S	Spectrum Analyzer	FSEM	DE31388	2015-05-09	2016-05-09
ETS LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2015-09-06
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	2012-09-06	2015-09-06

*** 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:	27.8 °C
Relative Humidity:	58%
ATM Pressure:	100.2kPa

The testing was performed by Allen Qiao on 2015-08-05.

EUT Operation Mode: Transmitting

Cellular Band

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)			
Middle Channel								
1673.200	H	54.07	-47.0	10.6	1.5	-37.9	-13.0	24.9
1673.200	V	50.88	-50.5	10.6	1.5	-41.4	-13.0	28.4
2509.800	H	41.90	-56.1	13.1	2.8	-45.8	-13.0	32.8
2509.800	V	38.44	-58.7	13.1	2.8	-48.4	-13.0	35.4

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

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)			
Middle Channel								
1673.200	H	43.72	-57.4	10.6	1.5	-48.3	-13.0	35.3
1673.200	V	41.46	-59.9	10.6	1.5	-50.8	-13.0	37.8

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

PCS Band

30 MHz-20 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)			
Middle Channel								
3760.000	H	45.45	-48.8	13.8	2.9	-37.9	-13.0	24.9
3760.000	V	43.98	-49.1	13.8	2.9	-38.2	-13.0	25.2

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

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)			
Middle Channel								
3760.000	H	41.69	-52.6	13.8	2.9	-41.7	-13.0	28.7
3760.000	V	40.11	-53	13.8	2.9	-42.1	-13.0	29.1

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

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

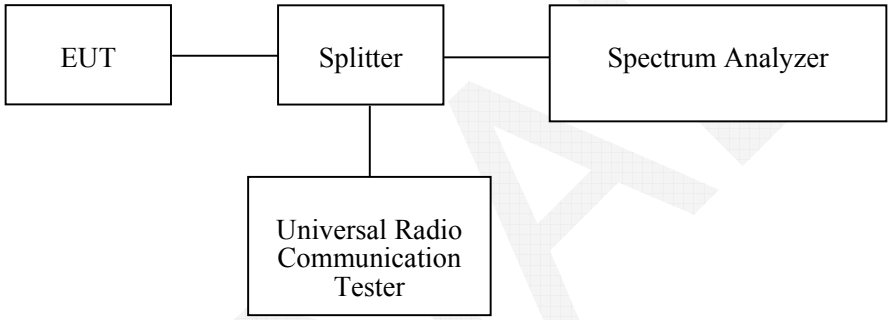
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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	2015-05-09	2016-05-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2015-05-09	2016-05-09

*** 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:	26.8-27.3 °C
Relative Humidity:	57-59 %
ATM Pressure:	99.8-100.2kPa

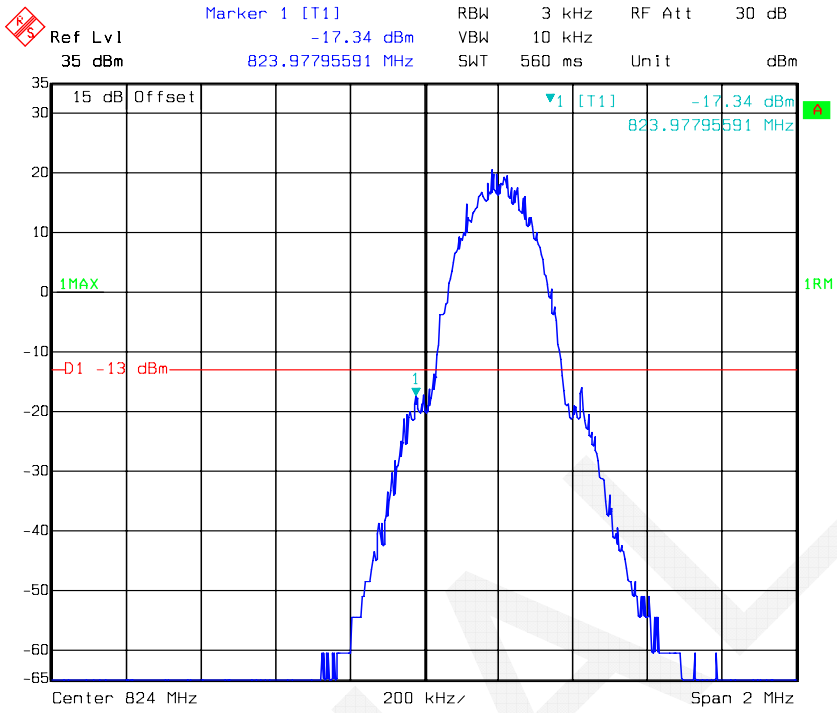
The testing was performed by Allen Qiao on 2015-08-10&2015-08-11&2015-08-12.

Test Mode: Transmitting

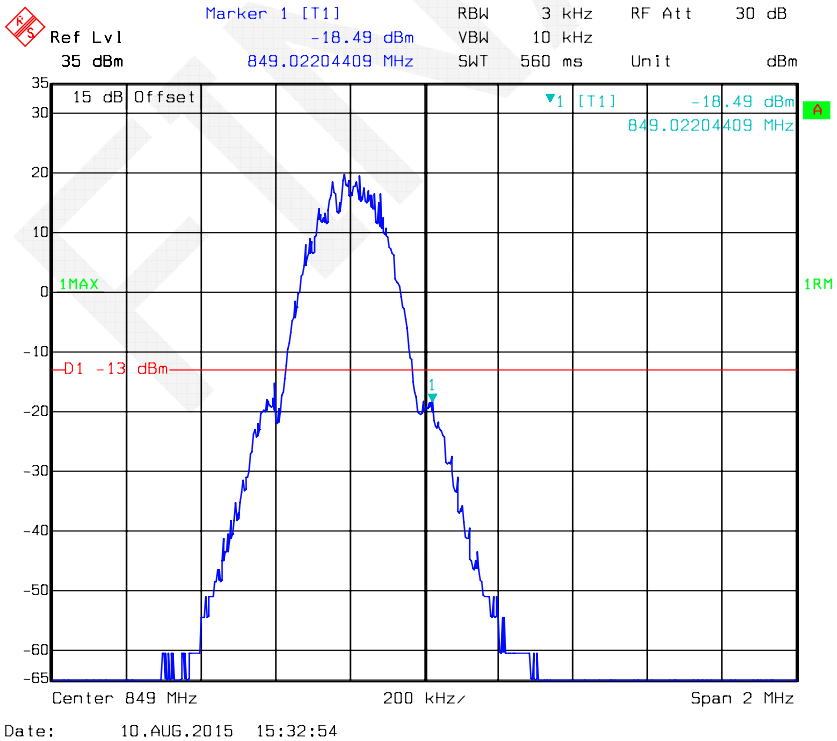
Test Result: Compliant. Please refer to the following plots.

FINAL

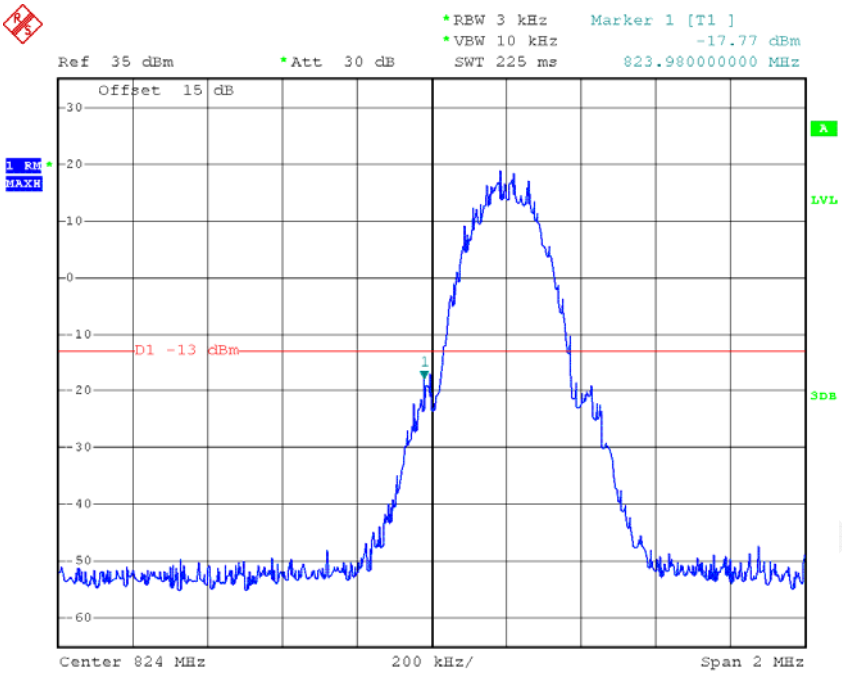
GSM 850, Left Band Edge



GSM 850, Right Band Edge

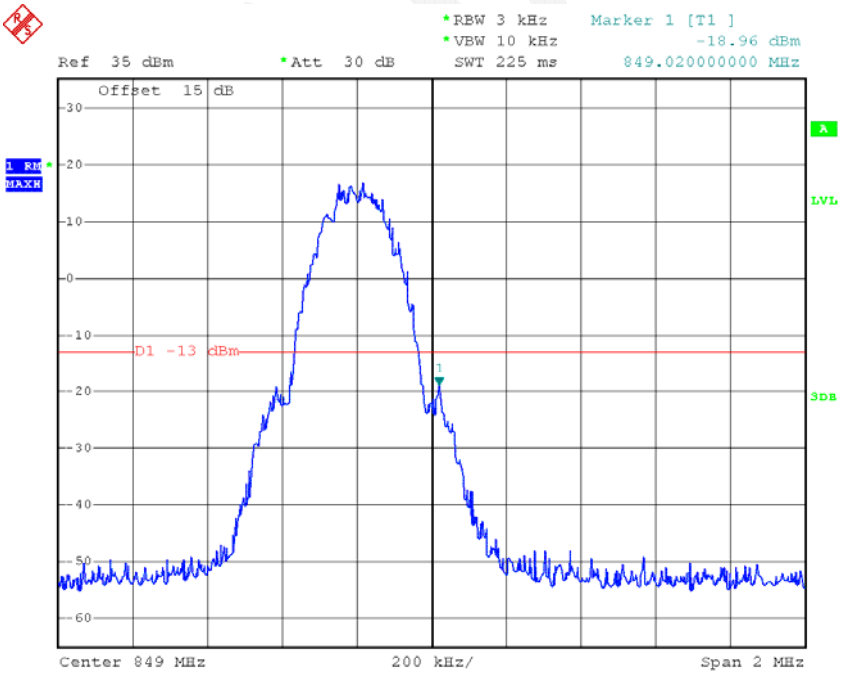


EDGE 850, Left Band Edge



Date: 12.AUG.2015 15:54:48

EDGE 850, Right Band Edge



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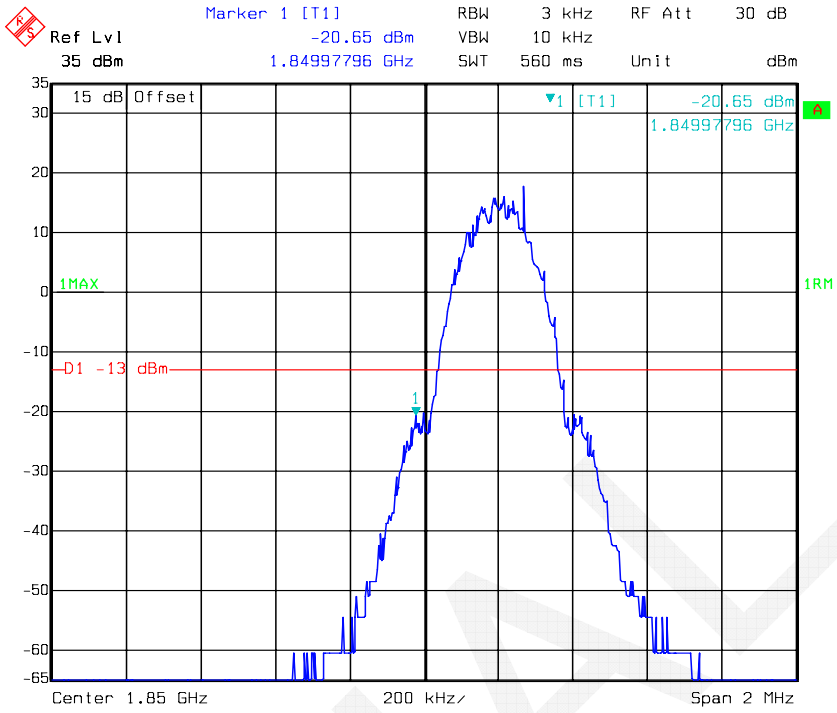
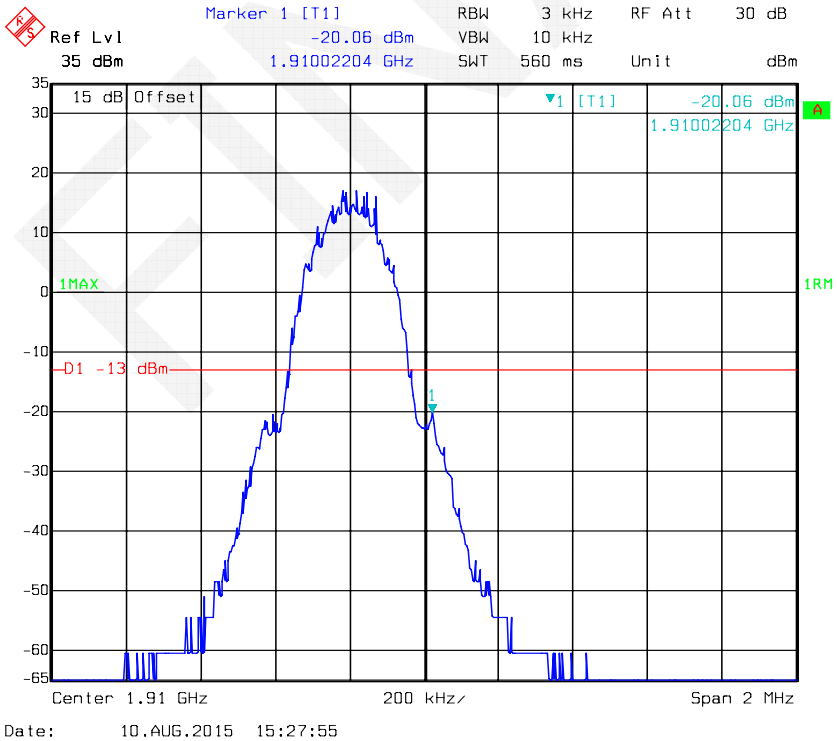
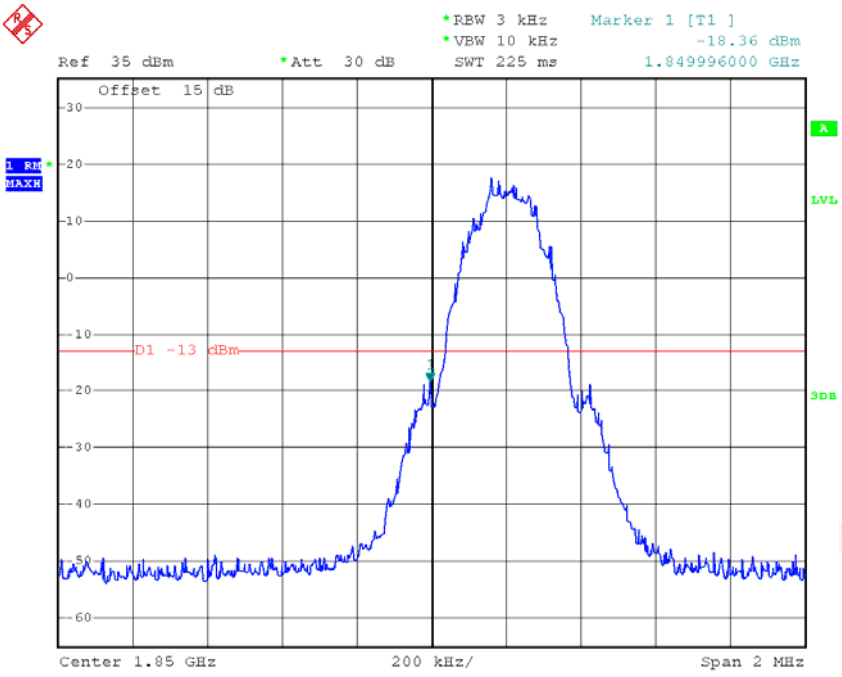
GSM 1900, Left Band Edge



GSM 1900, Right Band Edge



EDGE 1900, Left Band Edge



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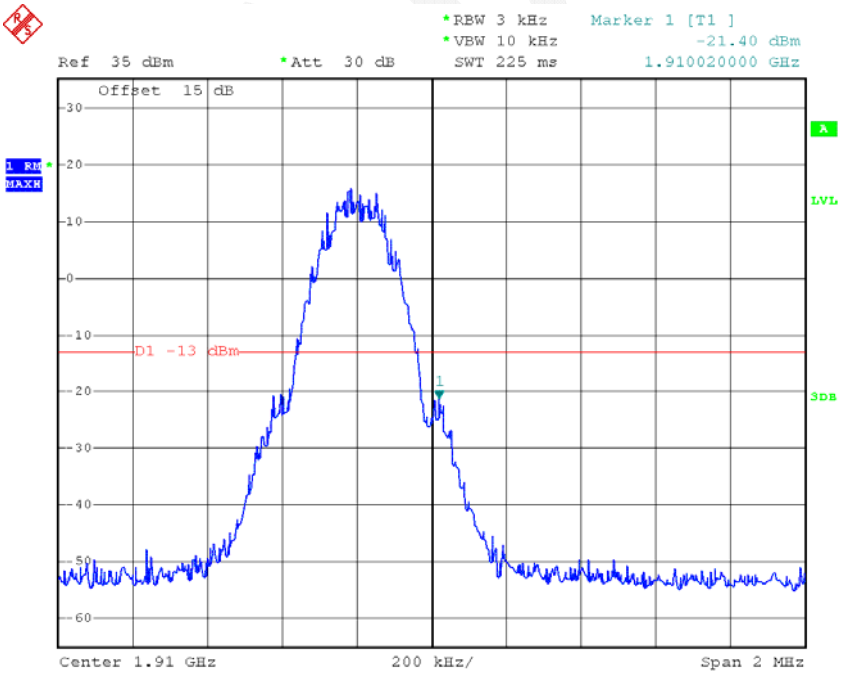
EDGE 1900, Right Band Edge



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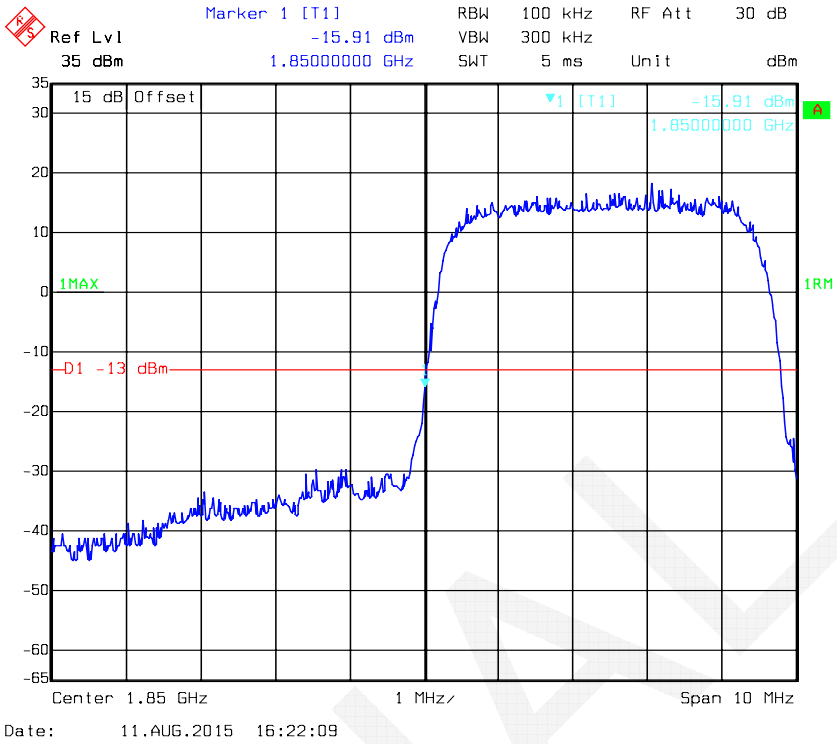
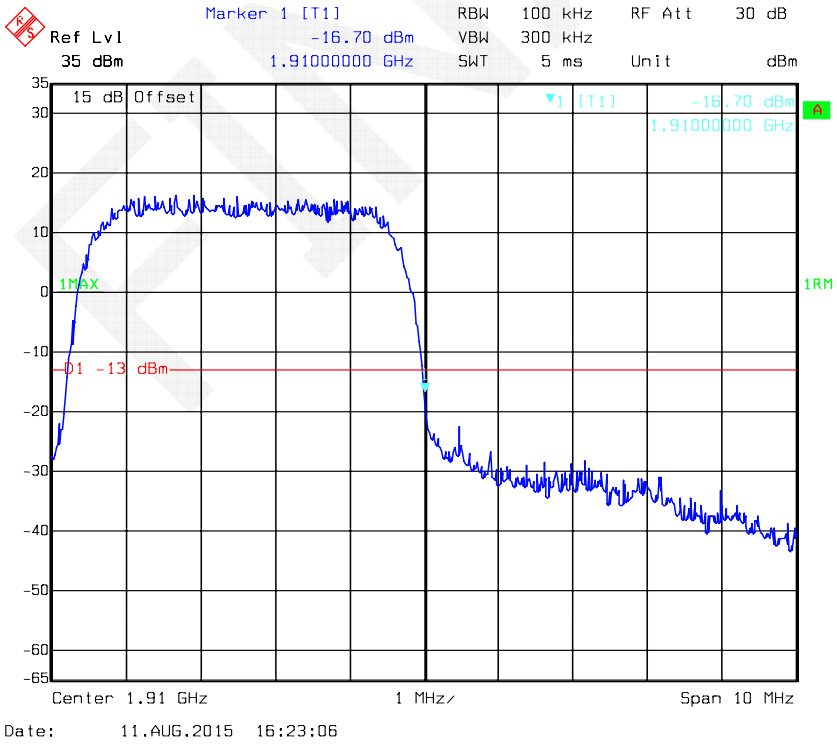
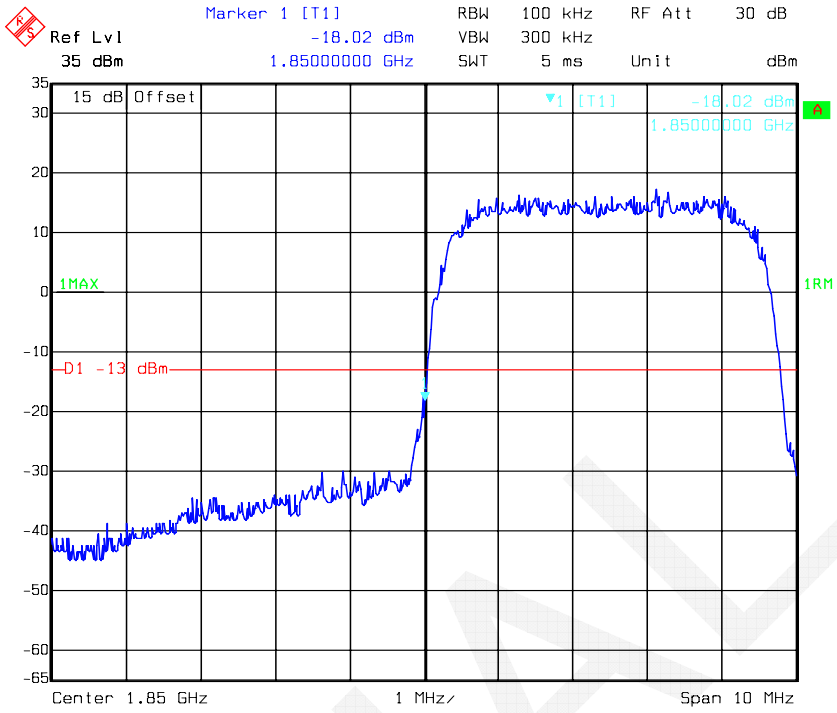
REL99 Band II, Left Band Edge



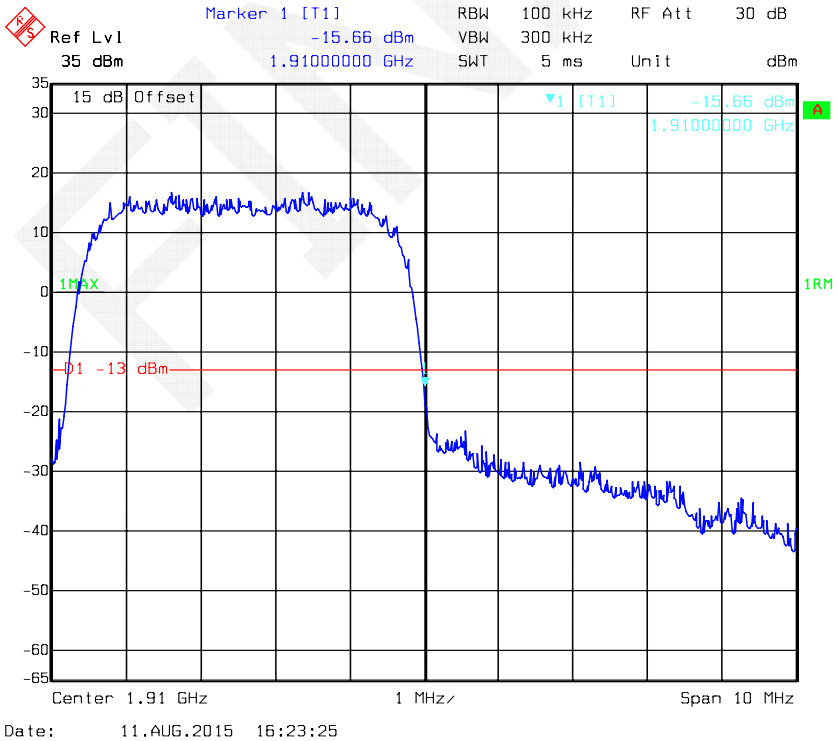
REL99 Band II, Right Band Edge



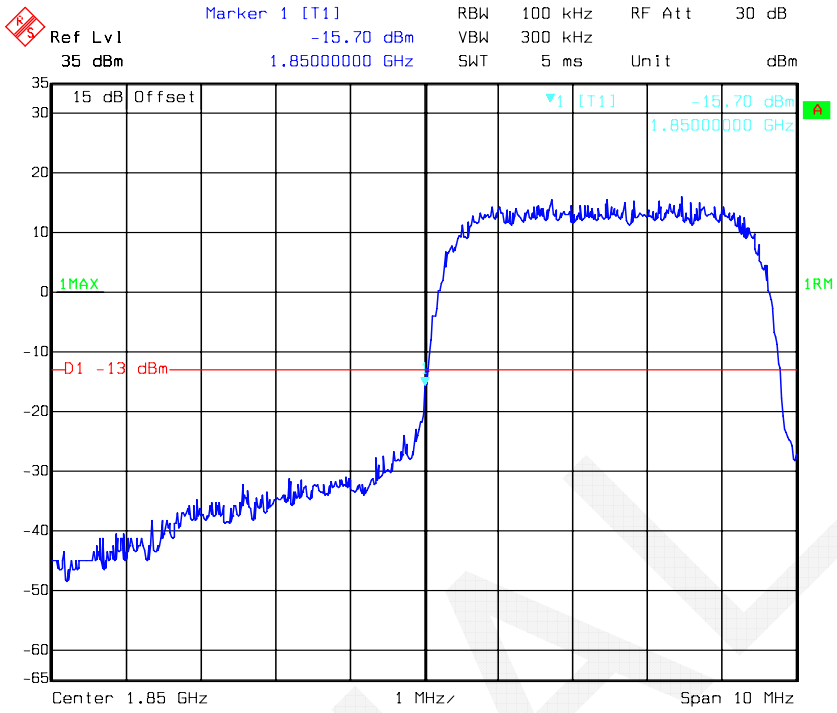
HSDPA Band II, Left Band Edge



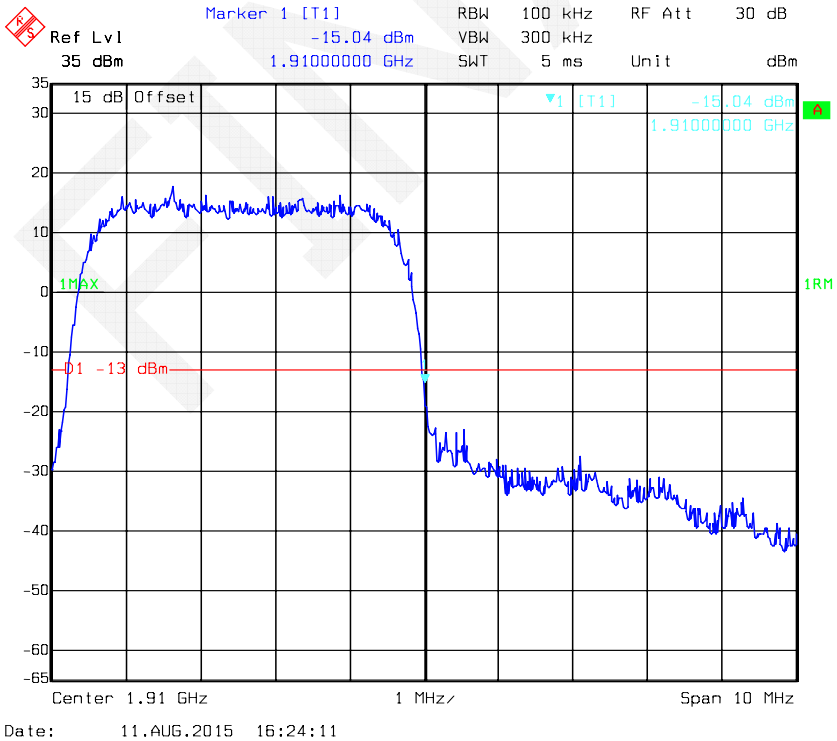
HSDPA Band II, Right Band Edge



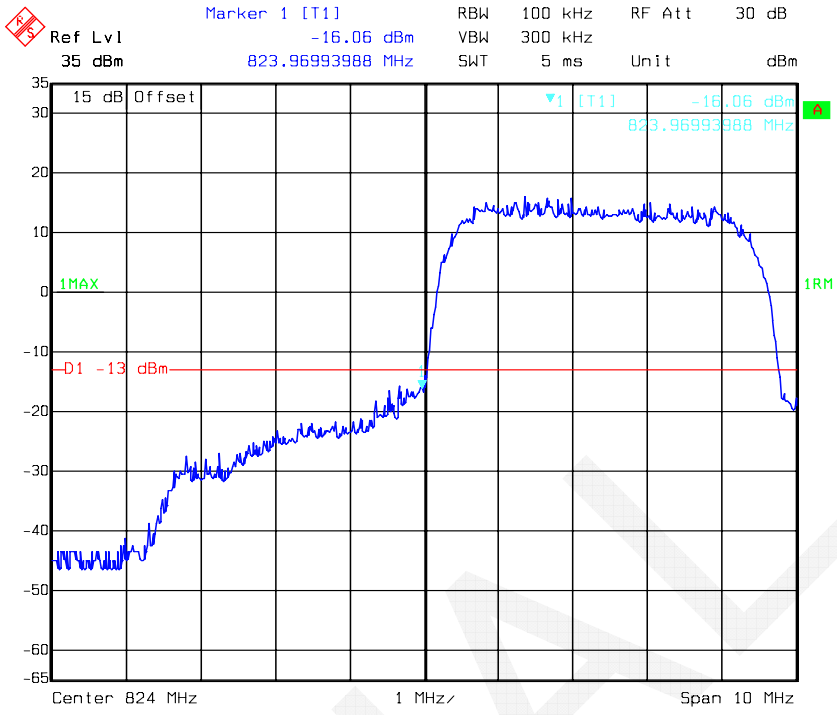
HSUPA Band II, Left Band Edge



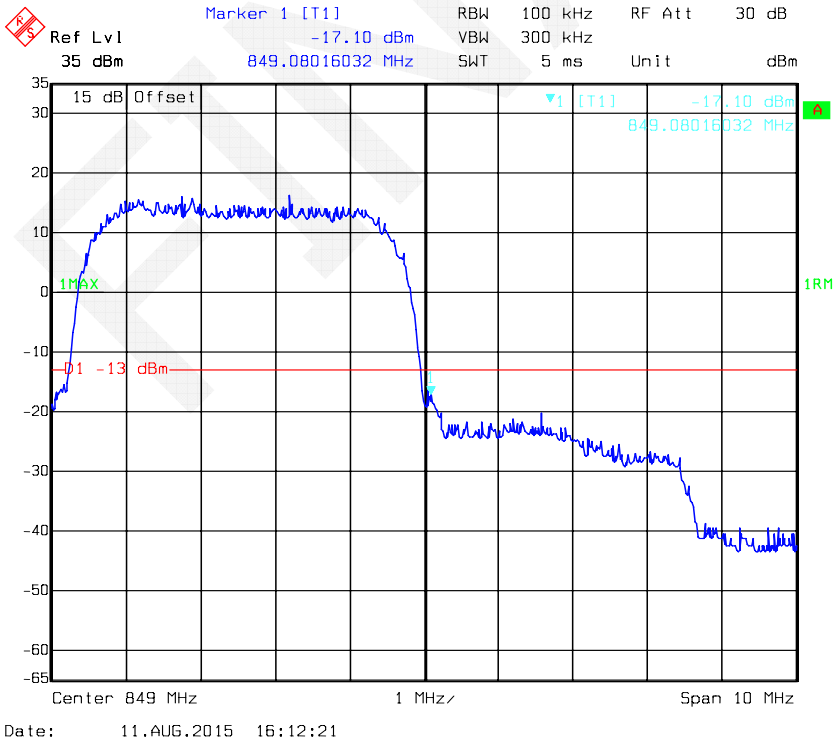
HSUPA Band II, Right Band Edge



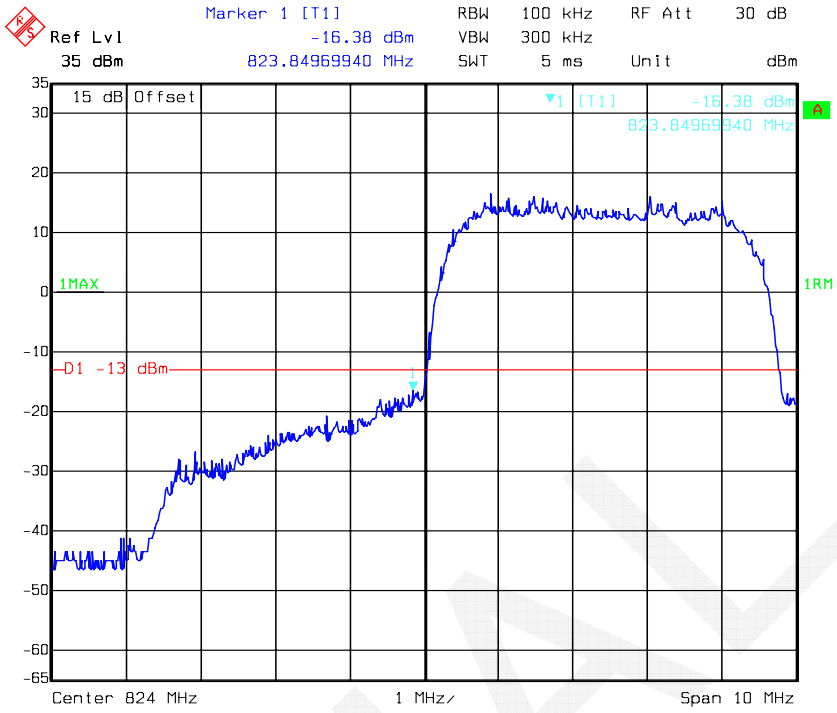
REL99 Band V, Left Band Edge



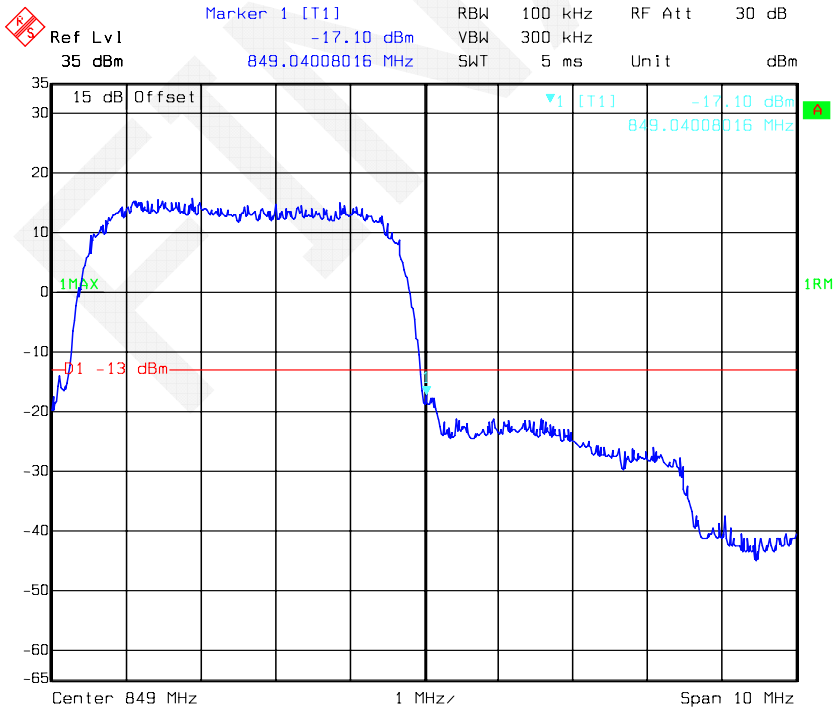
REL99 Band V, Right Band Edge



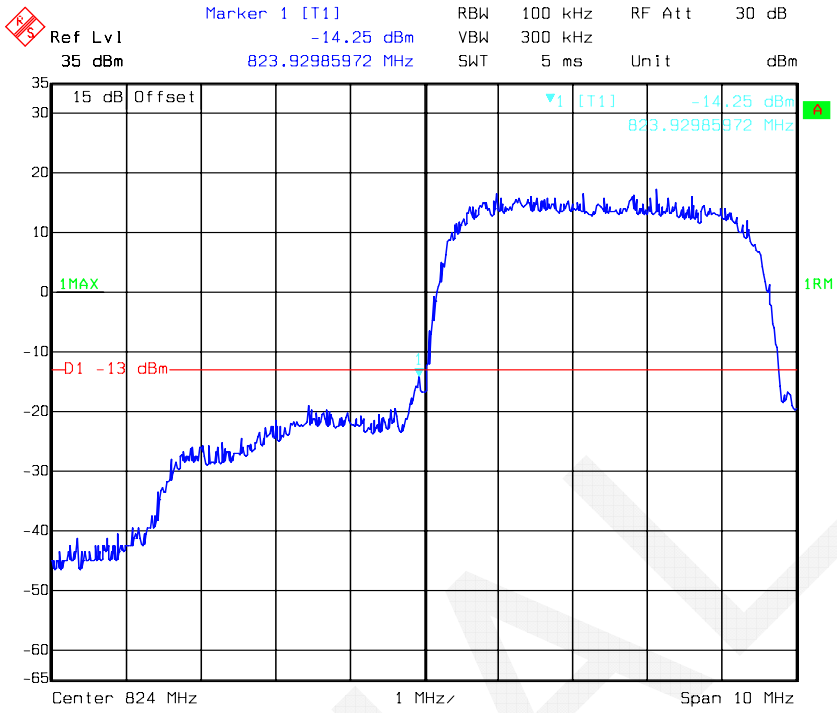
HSDPA Band V, Left Band Edge



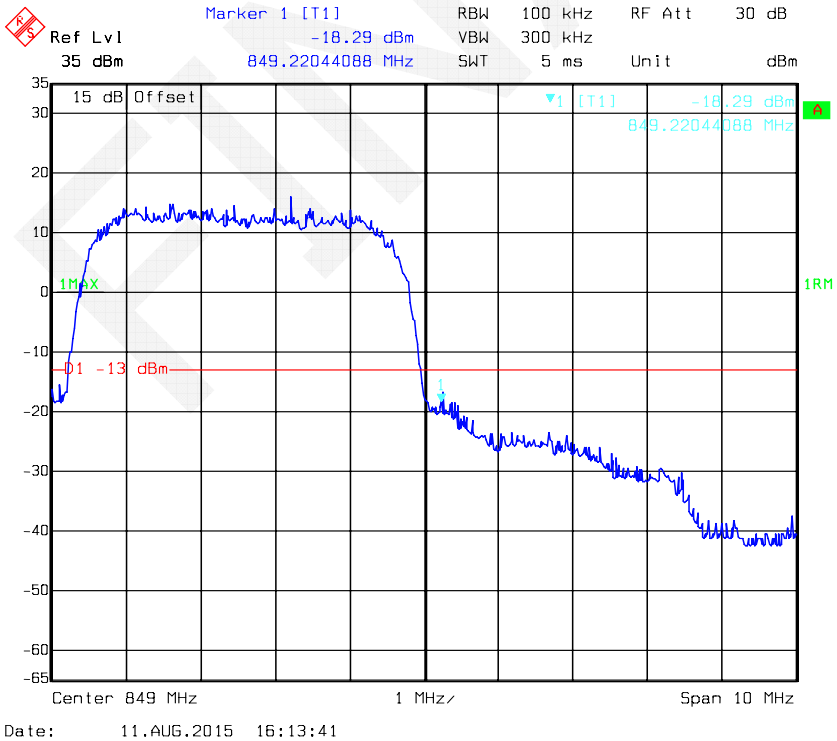
HSDPA Band V, Right Band Edge



HSUPA Band V, Left Band Edge



HSUPA Band V, Right Band Edge



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

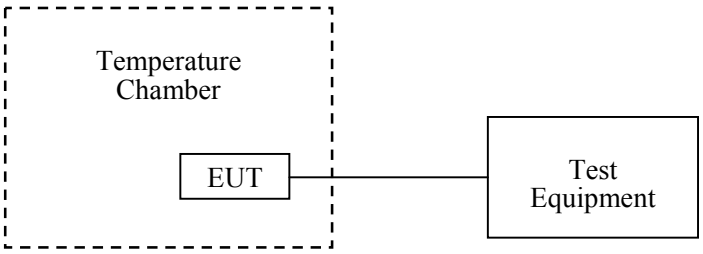
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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	2015-08-01	2016-08-01
R&S	Universal Radio Communication Tester	CMU200	109 038	2015-05-09	2016-05-09

*** 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:	27.3 °C
Relative Humidity:	59 %
ATM Pressure:	99.8kPa

The testing was performed by Allen Qiao on 2015-08-10.

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	3.8	33	0.039	2.5
-20	3.8	39	0.047	2.5
-10	3.8	34	0.041	2.5
0	3.8	30	0.036	2.5
10	3.8	35	0.042	2.5
20	3.8	38	0.045	2.5
30	3.8	33	0.039	2.5
40	3.8	34	0.041	2.5
50	3.8	39	0.047	2.5
25	3.6	32	0.038	2.5
	4.3	31	0.037	2.5

8PSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.8	33	0.039	2.5
-20	3.8	33	0.039	2.5
-10	3.8	34	0.041	2.5
0	3.8	31	0.037	2.5
10	3.8	33	0.039	2.5
20	3.8	37	0.044	2.5
30	3.8	38	0.045	2.5
40	3.8	29	0.035	2.5
50	3.8	37	0.044	2.5
25	3.6	32	0.038	2.5
	4.3	35	0.042	2.5

WCDMA Band V: Re199

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.8	38	0.045	2.5
-20	3.8	33	0.039	2.5
-10	3.8	35	0.042	2.5
0	3.8	36	0.043	2.5
10	3.8	39	0.047	2.5
20	3.8	30	0.036	2.5
30	3.8	37	0.044	2.5
40	3.8	31	0.037	2.5
50	3.8	34	0.041	2.5
25	3.6	32	0.038	2.5
	4.3	31	0.037	2.5

WCDMA Band V: HSDPA

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.8	31	0.037	2.5
-20	3.8	37	0.044	2.5
-10	3.8	36	0.043	2.5
0	3.8	38	0.045	2.5
10	3.8	34	0.041	2.5
20	3.8	30	0.036	2.5
30	3.8	39	0.047	2.5
40	3.8	32	0.038	2.5
50	3.8	36	0.043	2.5
25	3.6	37	0.044	2.5
	4.3	31	0.037	2.5

WCDMA Band V: HSUPA

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.8	36	0.043	2.5
-20	3.8	31	0.037	2.5
-10	3.8	36	0.043	2.5
0	3.8	32	0.038	2.5
10	3.8	30	0.036	2.5
20	3.8	34	0.041	2.5
30	3.8	30	0.036	2.5
40	3.8	31	0.037	2.5
50	3.8	37	0.044	2.5
25	3.6	36	0.043	2.5
	4.3	35	0.042	2.5

PCS Band (Part 24E)

GMSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.8	30	0.016	Pass
-20	3.8	32	0.017	Pass
-10	3.8	38	0.020	Pass
0	3.8	29	0.015	Pass
10	3.8	33	0.018	Pass
20	3.8	34	0.018	Pass
30	3.8	34	0.018	Pass
40	3.8	38	0.020	Pass
50	3.8	29	0.015	Pass
25	3.6	37	0.020	Pass
	4.3	38	0.020	Pass

8PSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.8	31	0.016	Pass
-20	3.8	29	0.015	Pass
-10	3.8	35	0.019	Pass
0	3.8	35	0.019	Pass
10	3.8	34	0.018	Pass
20	3.8	39	0.021	Pass
30	3.8	36	0.019	Pass
40	3.8	37	0.020	Pass
50	3.8	38	0.020	Pass
25	3.6	29	0.015	Pass
	4.3	35	0.019	Pass

WCDMA Band II: Re199

Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.8	35	0.019	Pass
-20	3.8	39	0.021	Pass
-10	3.8	36	0.019	Pass
0	3.8	34	0.018	Pass
10	3.8	38	0.020	Pass
20	3.8	38	0.020	Pass
30	3.8	36	0.019	Pass
40	3.8	29	0.015	Pass
50	3.8	34	0.018	Pass
25	3.6	38	0.020	Pass
	4.3	32	0.017	Pass

WCDMA Band II: HSDPA

Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.8	32	0.017	Pass
-20	3.8	30	0.016	Pass
-10	3.8	32	0.017	Pass
0	3.8	37	0.020	Pass
10	3.8	39	0.021	Pass
20	3.8	39	0.021	Pass
30	3.8	37	0.020	Pass
40	3.8	31	0.016	Pass
50	3.8	35	0.019	Pass
25	3.6	34	0.018	Pass
	4.3	37	0.020	Pass

WCDMA Band II: HSUPA

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	37	0.020	Pass
-20	3.8	36	0.019	Pass
-10	3.8	33	0.018	Pass
0	3.8	37	0.020	Pass
10	3.8	31	0.016	Pass
20	3.8	32	0.017	Pass
30	3.8	36	0.019	Pass
40	3.8	31	0.016	Pass
50	3.8	38	0.020	Pass
25	3.6	36	0.019	Pass
	4.3	31	0.016	Pass

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