

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

For

MAXWEST INTERNATIONAL LIMITED

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

FCC ID: 2AEN3NITRO5

Report Type: Original Report	Product Type: Mobile Phone
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Report Number: RDG150603001-00C	
Report Date: 2015-06-23	
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TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
TEST FACILITY	5
SYSTEM TEST CONFIGURATION.....	6
JUSTIFICATION	6
EQUIPMENT MODIFICATIONS	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
CONFIGURATION OF TEST SETUP	6
BLOCK DIAGRAM OF TEST SETUP	7
SUMMARY OF TEST RESULTS	8
FCC §1.1310 & §2.1093- RF EXPOSURE	9
APPLICABLE STANDARD	9
TEST RESULT	9
FCC §2.1047 - MODULATION CHARACTERISTIC	10
FCC § 2.1046, § 22.913 (A) & § 24.232 (C) - RF OUTPUT POWER.....	11
APPLICABLE STANDARD	11
TEST PROCEDURE	11
TEST EQUIPMENT LIST AND DETAILS.....	15
TEST DATA	15
FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH	21
APPLICABLE STANDARD	21
TEST PROCEDURE	21
TEST EQUIPMENT LIST AND DETAILS.....	21
TEST DATA	21
FCC §2.1051, §22.917(A) & §24.238(A) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS	28
APPLICABLE STANDARD	28
TEST PROCEDURE	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST DATA	28
FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS	37
APPLICABLE STANDARD	37
TEST PROCEDURE	37
TEST EQUIPMENT LIST AND DETAILS.....	37
TEST DATA	38
FCC §22.917(A) & §24.238(A) - BAND EDGES.....	40
APPLICABLE STANDARD	40
TEST PROCEDURE	40
TEST EQUIPMENT LIST AND DETAILS.....	40
TEST DATA	40

FCC §2.1055, §22.355 & §24.235 - FREQUENCY STABILITY.....52
 APPLICABLE STANDARD52
 TEST PROCEDURE52
 TEST EQUIPMENT LIST AND DETAILS.....53
 TEST DATA53

FINAL

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The MAXWEST INTERNATIONAL LIMITED's product, model number: Nitro 5 (FCC ID: 2AEN3NITRO5) (the "EUT") in this report was a Mobile Phone(named Nitro 5 by applicant), which was measured approximately: 14.5 cm (L) x 7.1 cm (W) x 1.0 cm (H), rated input voltage: DC3.7V rechargeable Li-ion battery or DC5.0V charging from adapter.

Adapter information:

Model: MAXWEST

Input: AC100-240V, 50/60Hz 0.2A

Output: DC5.0V, 1A

All measurement and test data in this report was gathered from production sample serial number: 201505000456 (Assigned by applicant). The EUT was received on 2015-06-03.

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: 2AEN3NITRO5.

FCC Part 15C DSS submissions with FCC ID: 2AEN3NITRO5.

FCC Part 15C DTS submissions with FCC ID: 2AEN3NITRO5.

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.

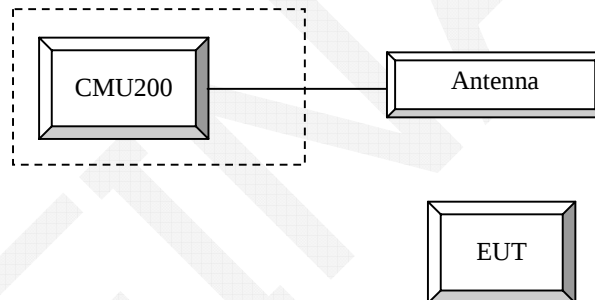
Equipment Modifications

No modification was made to the EUT.

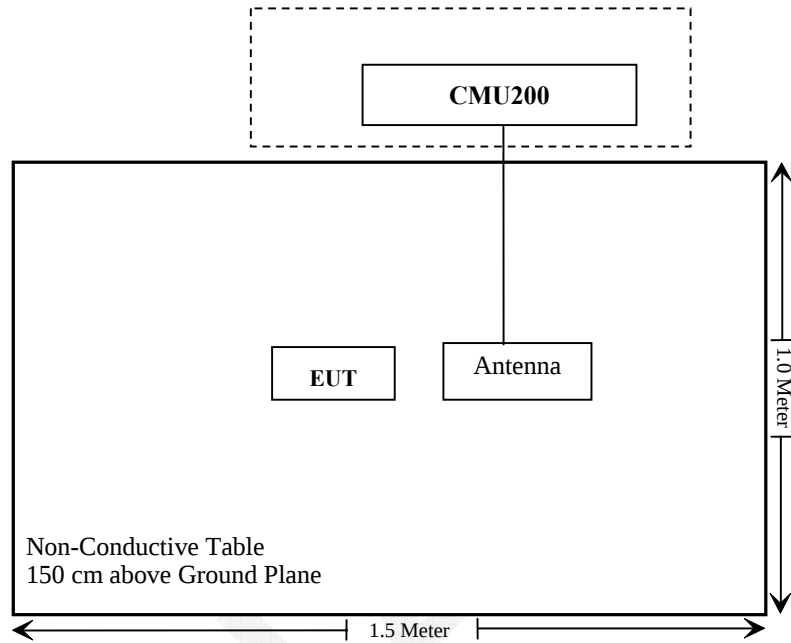
Support Equipment List and Details

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

Configuration of Test Setup



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: RDG150603001-20.

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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.

FINAL

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 stable)

BCCH Channel > choose desired 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 / 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 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 (Note 3)	β_d	β_{HS} (Note 1)	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 $\beta_{hs} = 30/15 * \beta_c$. 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
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:	25.5 °C
Relative Humidity:	54 %
ATM Pressure:	99.9 kPa

The testing was performed by Dean Liu on 2015-06-12.

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

Band	Channel No.	Peak Output Power (dBm)								
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	31.49	31.48	29.36	27.56	25.64	25.81	25.44	24.15	21.95
	190	31.57	31.55	29.48	27.72	25.82	26.05	25.59	24.21	21.83
	251	31.53	31.50	29.51	27.78	25.84	26.00	25.62	24.12	21.57
PCS	512	28.22	28.25	25.90	24.35	22.37	23.62	23.41	21.78	19.50
	661	28.27	28.30	26.04	24.53	22.52	24.17	23.97	22.37	20.36
	810	28.39	28.38	26.17	24.71	22.74	25.11	24.87	23.44	22.74

WCDMA Band II

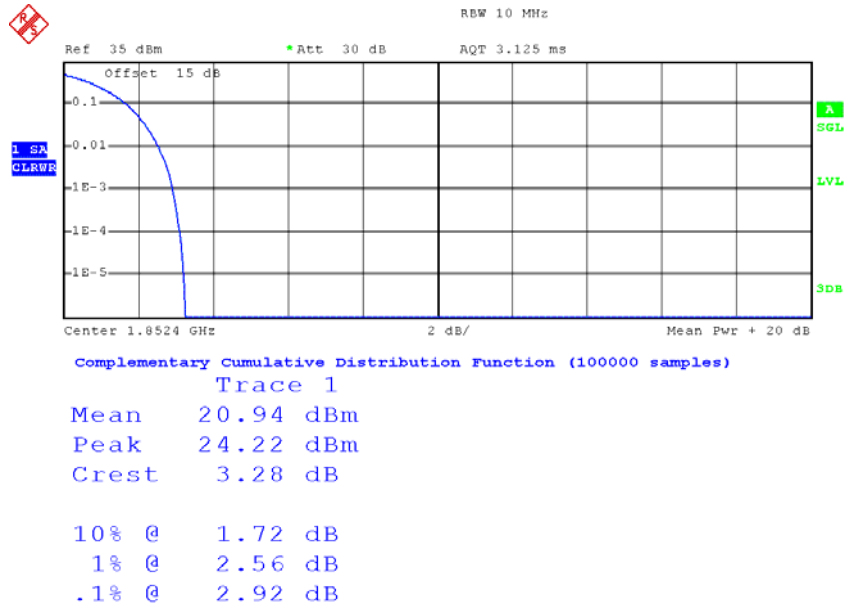
Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99	1	21.28	2.92	21.28	3.28	21.24	3.24
HSDPA	1	20.95	2.94	20.48	3.27	20.96	3.23
	2	21.04	2.93	20.59	3.26	21.07	3.24
	3	21.18	2.94	20.78	3.26	21.25	3.21
	4	21.06	2.89	20.56	3.25	21.01	3.22
DC-HSDPA	1	20.88	2.89	20.53	3.13	20.87	3.18
	2	21.13	2.91	20.51	3.21	21.11	3.22
	3	21.11	2.95	20.73	3.22	21.16	3.16
	4	21.15	2.86	20.50	3.24	20.69	3.13
HSUPA	1	21.02	2.91	20.63	3.28	20.54	3.21
	2	21.01	2.92	20.67	3.25	20.80	3.24
	3	21.05	2.94	20.59	3.21	20.94	3.21
	4	21.02	2.93	20.77	3.24	20.72	3.20
	5	21.03	2.92	20.73	3.21	20.88	3.21
HSPA+	1	20.87	2.91	20.45	3.17	20.83	3.18

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	21.89	3.41	21.72	3.15	21.99	3.26
HSDPA	1	21.05	3.25	21.50	3.14	21.14	3.22
	2	21.04	3.26	21.48	3.15	21.15	3.24
	3	21.03	3.29	21.49	3.12	21.14	3.24
	4	21.02	3.39	21.51	3.18	21.12	3.23
DC-HSDPA	1	20.96	3.14	21.43	3.22	21.17	3.25
	2	20.93	3.12	21.37	3.17	21.12	3.21
	3	20.88	3.26	21.35	3.23	21.11	3.19
	4	20.91	3.13	21.48	3.20	21.16	3.21
HSUPA	1	20.76	3.38	21.10	3.08	20.75	3.24
	2	20.75	3.40	21.12	3.09	20.74	3.22
	3	20.69	3.38	21.15	3.04	20.73	3.20
	4	20.71	3.39	21.13	3.08	20.72	3.26
	5	20.73	3.38	21.15	3.08	20.71	3.27
HSPA+	1	20.58	3.32	20.85	3.16	20.73	3.19

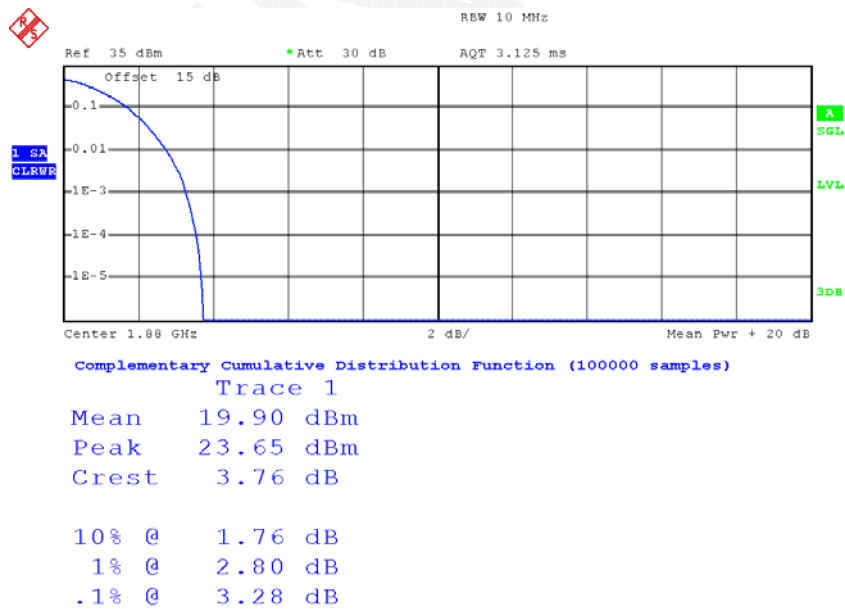
Peak-to-average ratio (PAR)
WCDMA Band II

Low Channel



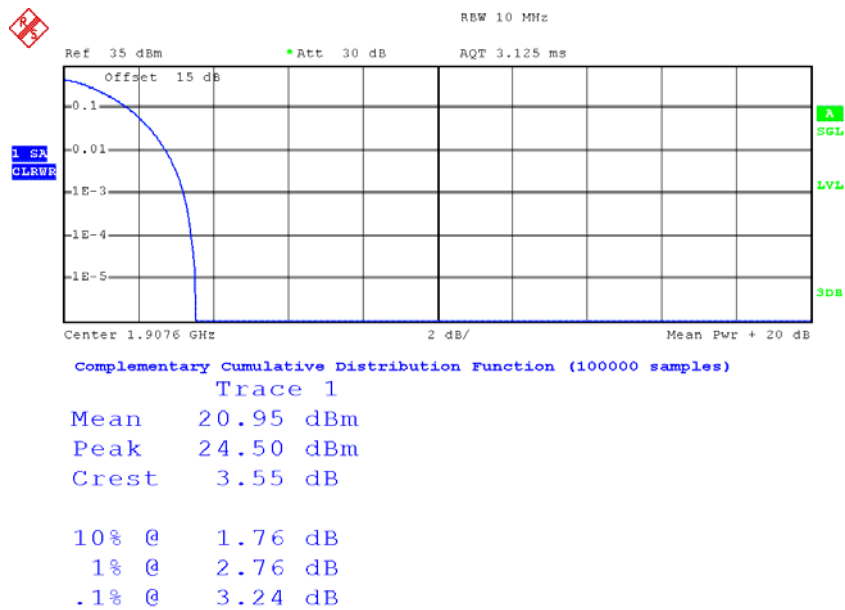
Date: 5.JUN.2015 16:13:21

Middle Channel



Date: 5.JUN.2015 16:12:26

High Channel



Date: 5.JUN.2015 16:12:56

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	105.23	30.3	0.0	1.0	29.3	38.5	9.2
836.600	V	103.96	32.2	0.0	1.0	31.2	38.5	7.3
EGPRS 850_ Middle Channel								
836.600	H	100.35	25.4	0.0	1.0	24.4	38.5	14.1
836.600	V	98.27	26.5	0.0	1.0	25.5	38.5	13.0
Band V_ Middle Channel								
836.600	H	96.37	21.4	0.0	1.0	20.4	38.5	18.1
836.600	V	94.45	22.7	0.0	1.0	21.7	38.5	16.8
PCS 1900_ Middle Channel								
1880.000	H	88.14	16.5	11.7	1.4	26.8	33.0	6.2
1880.000	V	89.30	17.8	11.7	1.4	28.1	33.0	4.9
EGPRS 1900_ Middle Channel								
1880.000	H	84.54	12.9	11.7	1.4	23.2	33.0	9.8
1880.000	V	84.87	13.4	11.7	1.4	23.7	33.0	9.3
Band II_ Middle Channel								
1880.000	H	81.40	9.8	11.7	1.4	20.1	33.0	12.9
1880.000	V	82.03	10.6	11.7	1.4	20.9	33.0	12.1

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

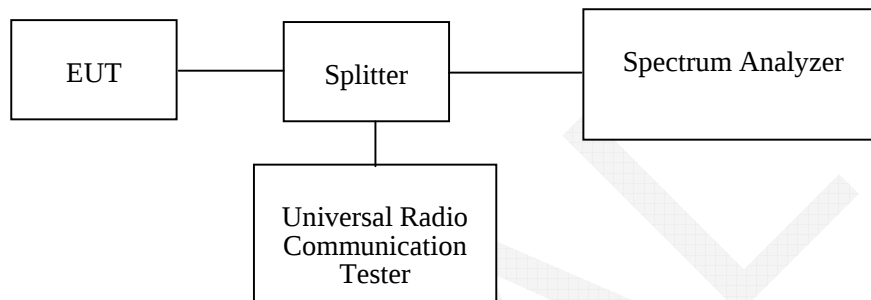
Applicable Standard

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:	25.6~26.9 °C
Relative Humidity:	55~61 %
ATM Pressure:	99.9 ~100.2kPa

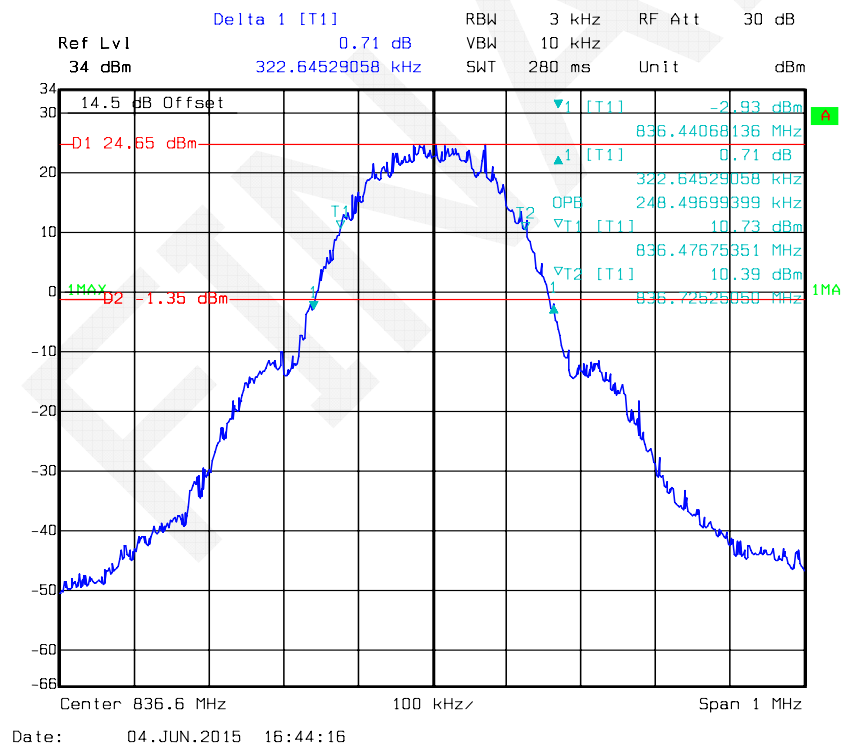
The testing was performed by Dean Liu on 2015-06-04 & 2015-06-23.

Test Mode: Transmitting

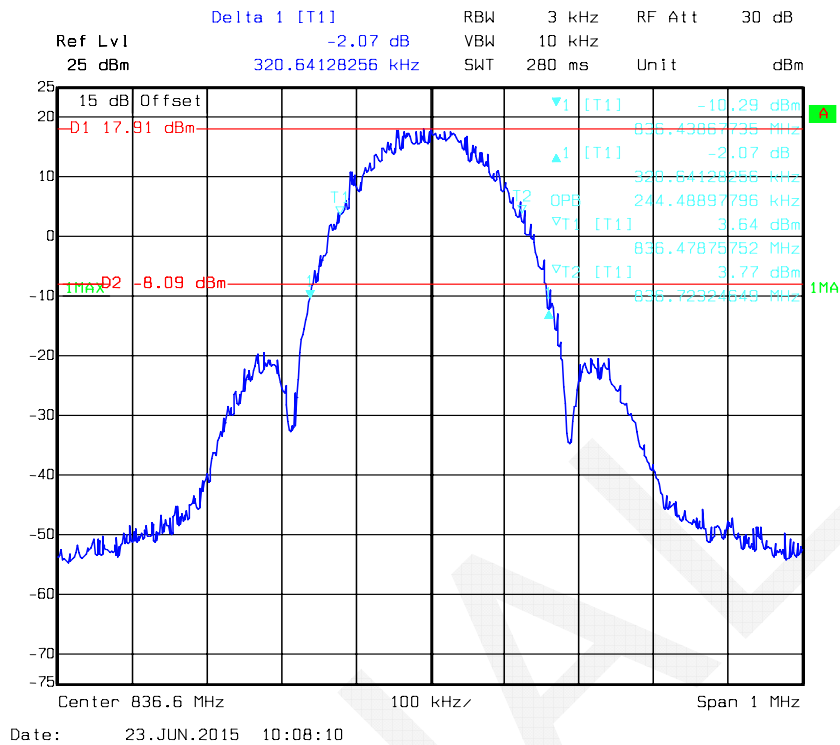
Test Result: Compliant. Please refer to the following table and plots.

	Channel No.	Mode	99% Occupied Bandwidth (kHz)	26 dB Occupied Bandwidth (kHz)
Cellular	190	GSM	248	323
		EDGE	244	320
PCS	661	PCS	246	315
		EDGE	244	318
WCDMA Band II	9400	Rel 99	4108	4729
	9400	HSDPA	4108	4729
	9400	HSUPA	4108	4729
WCDMA Band V	4183	Rel 99	4108	4729
	4183	HSDPA	4108	4990
	4183	HSUPA	4108	4729

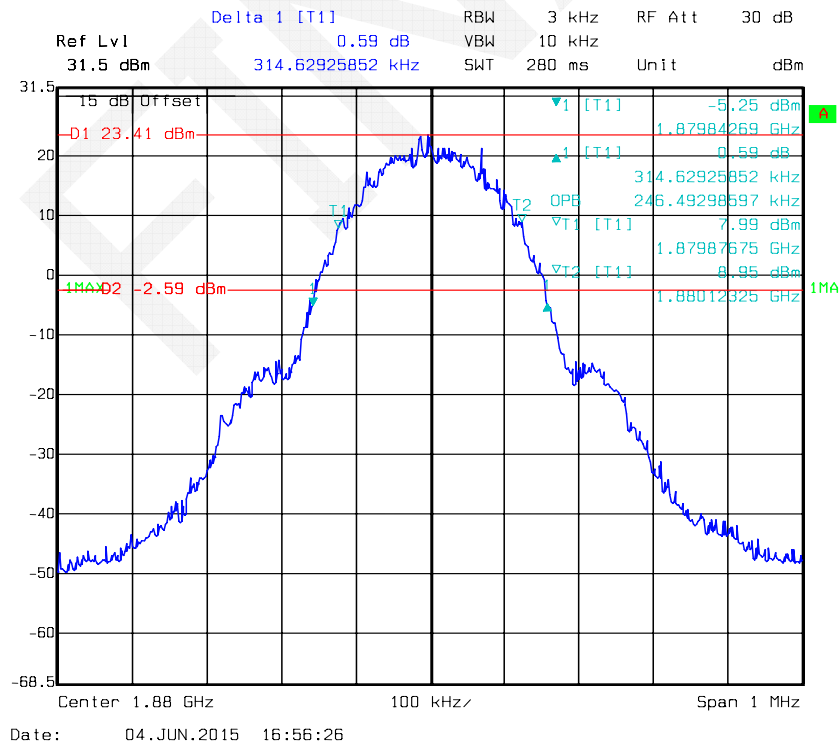
GMSK 850 Cellular Band



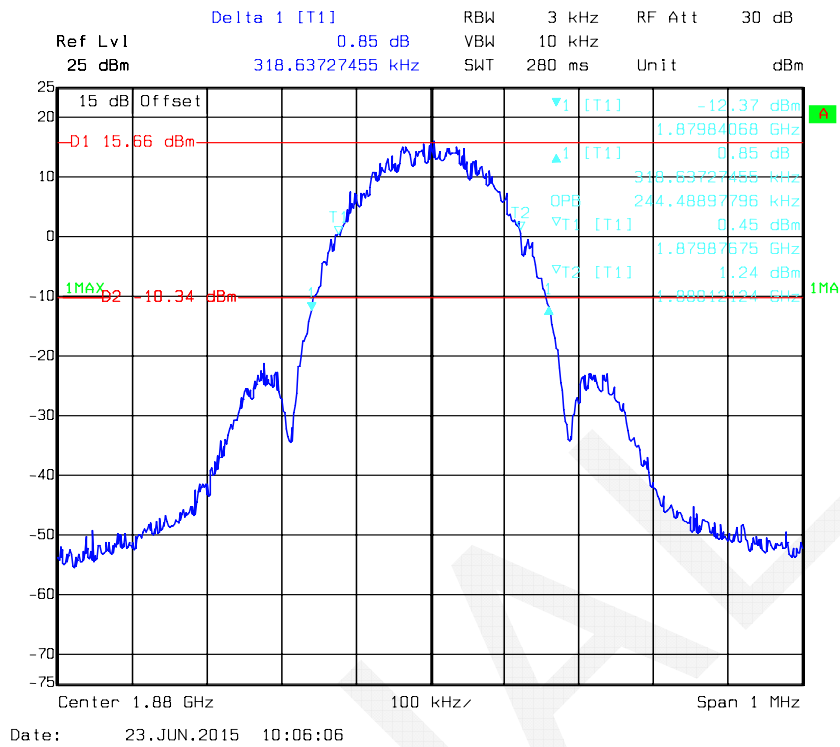
EDGE 850 Cellular Band



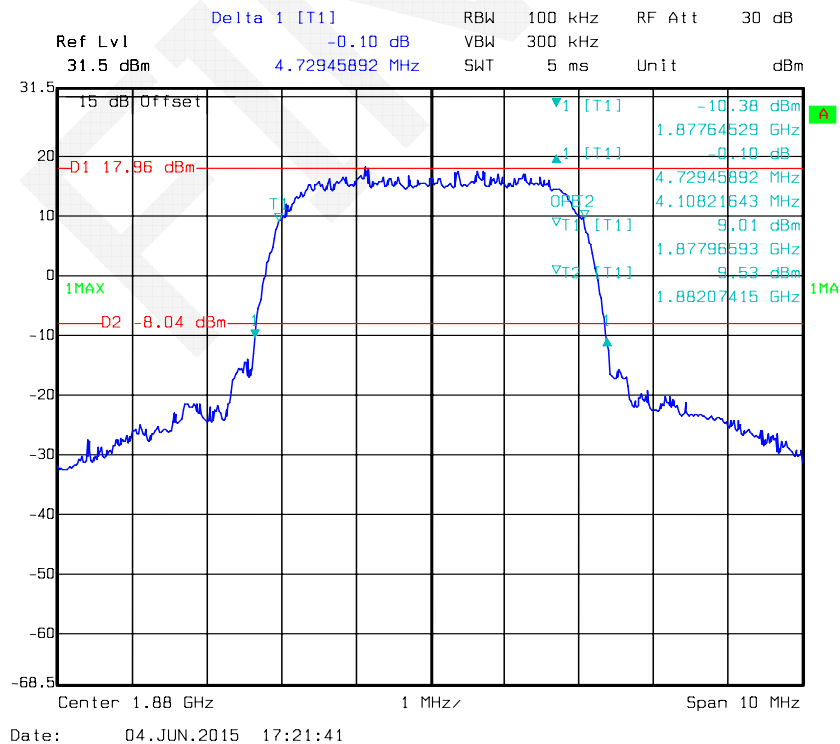
GMSK PCS Band



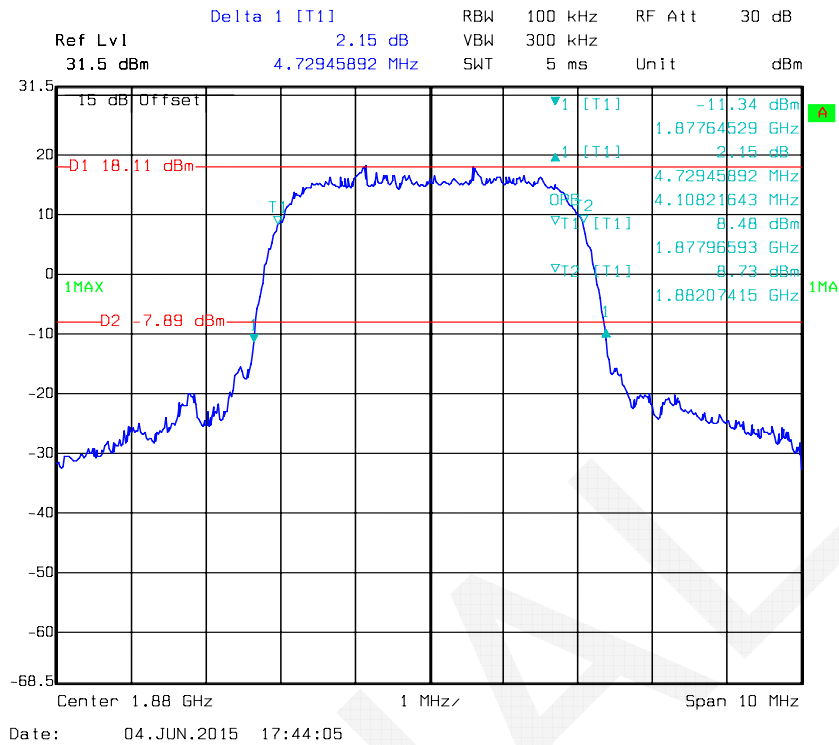
EDGE PCS Band



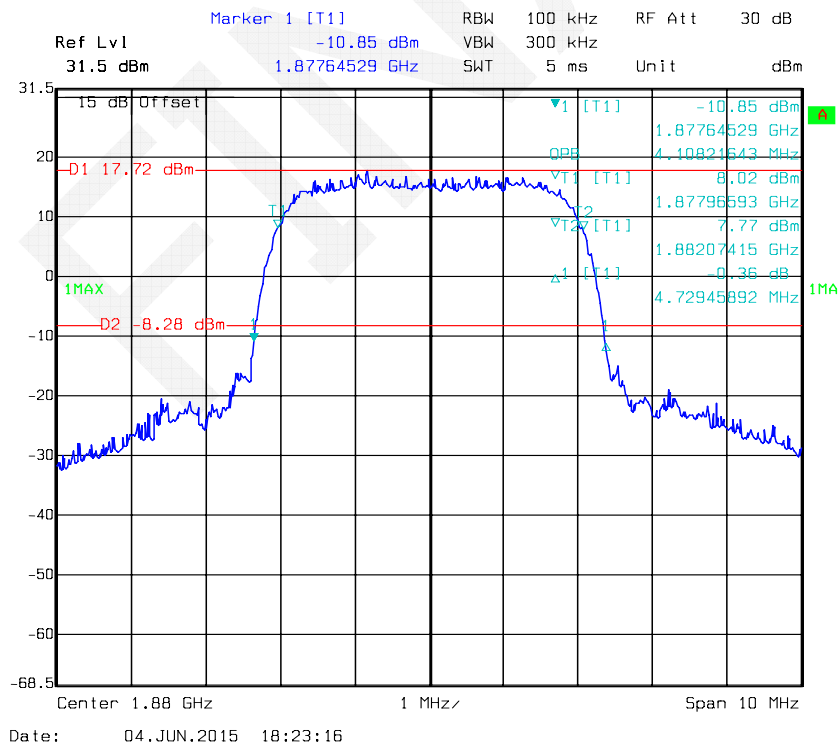
REL99 Band II



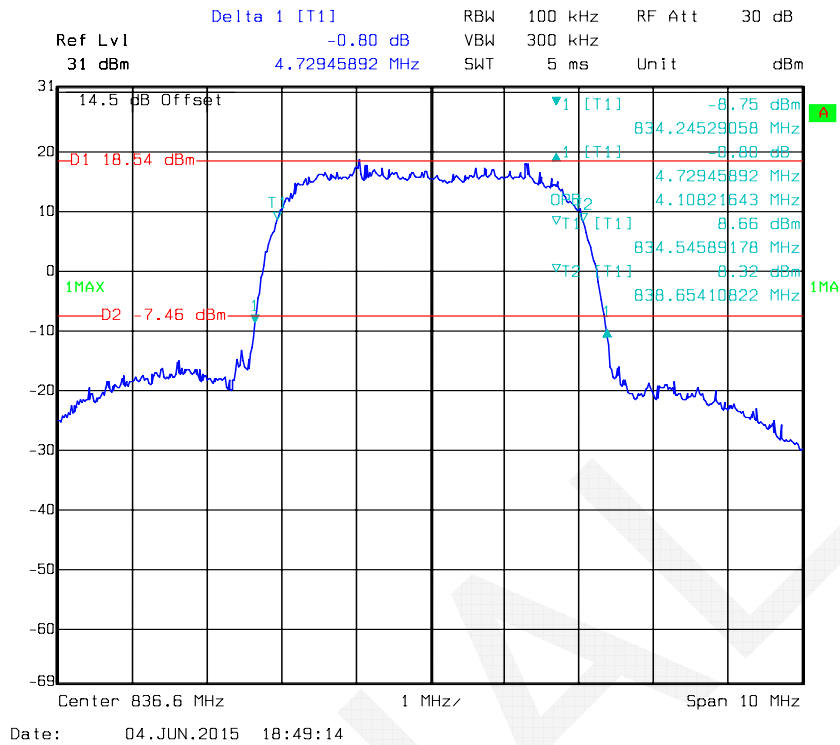
HSDPA Band II



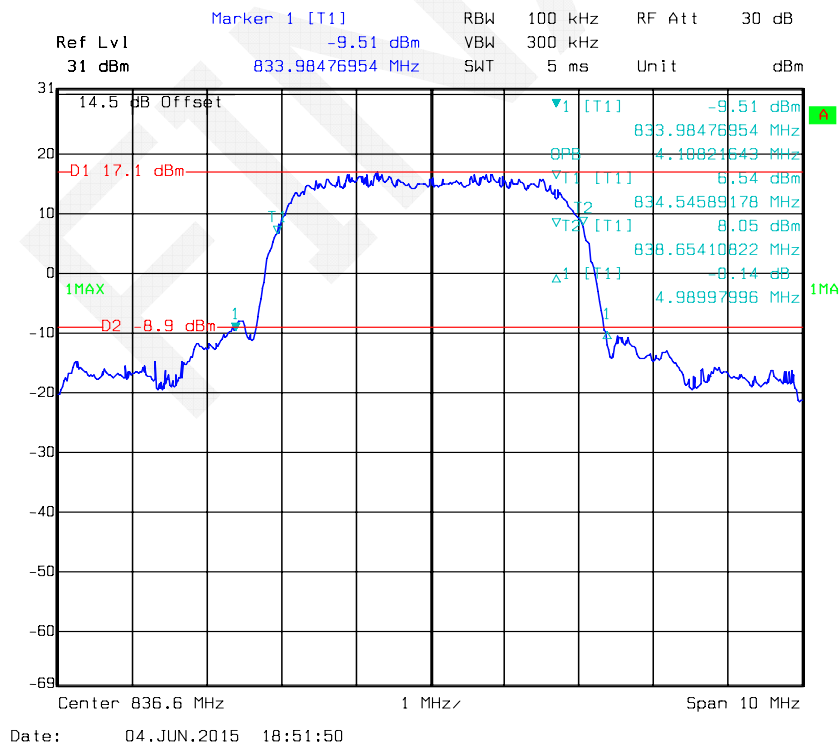
HSUPA Band II



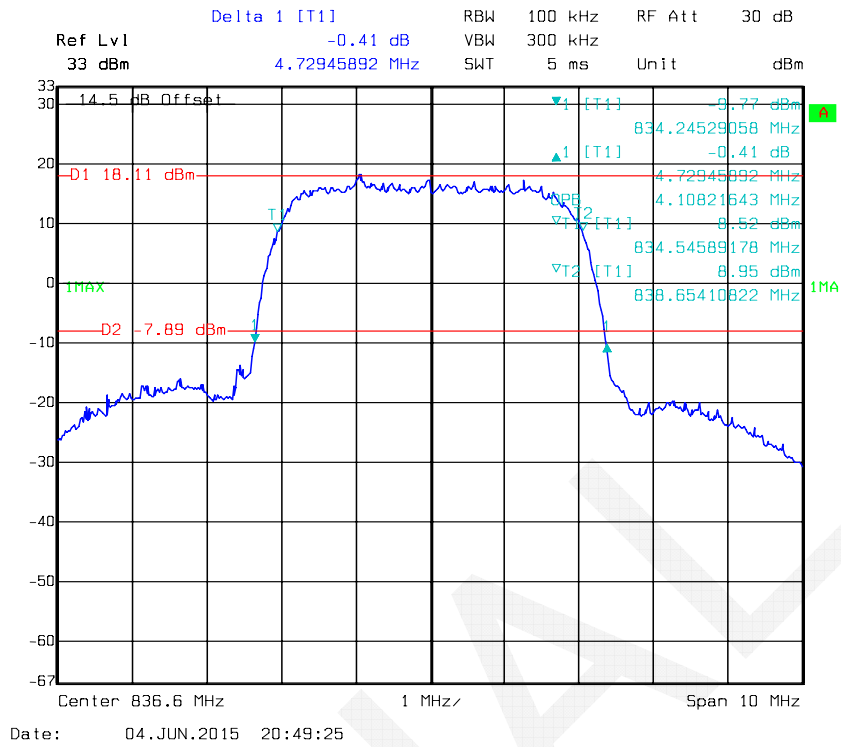
REL99 Band V



HSDPA Band V



HSUPA Band V



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

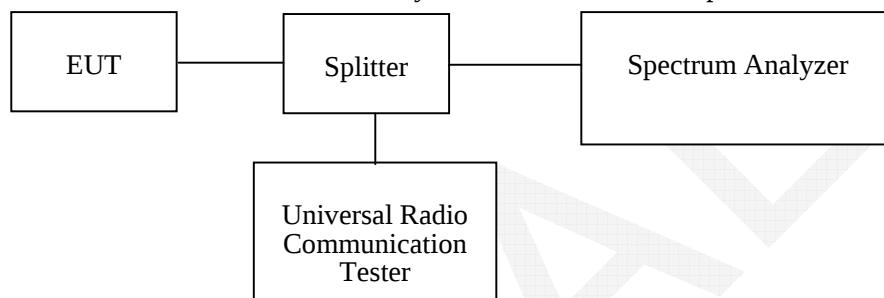
Applicable Standard

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

* **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

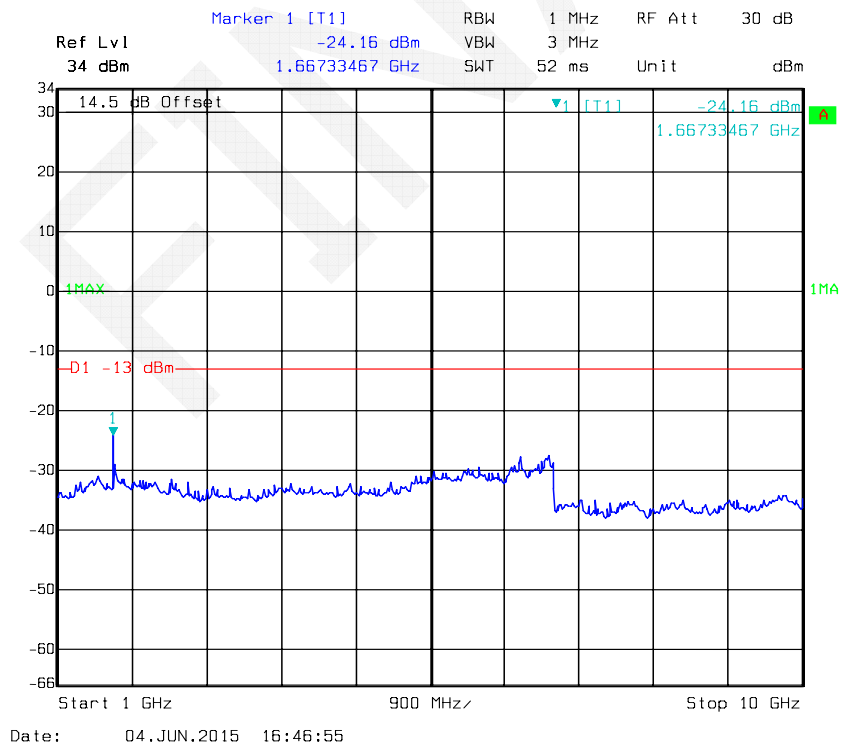
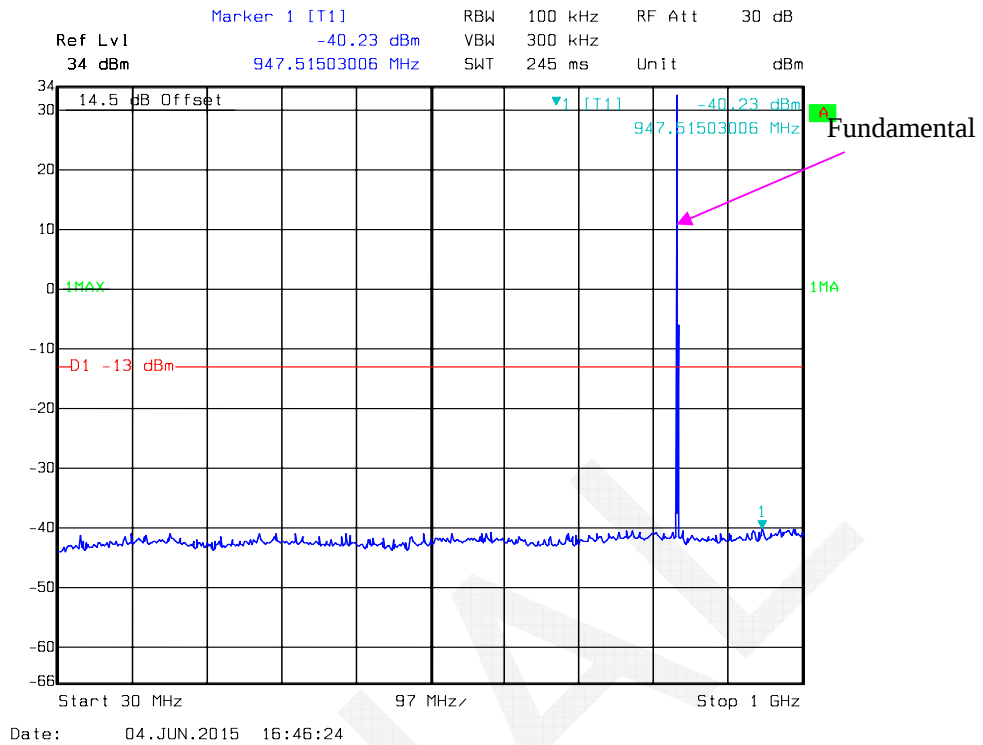
Environmental Conditions

Temperature:	26.8 °C
Relative Humidity:	54 %
ATM Pressure:	99.8 kPa

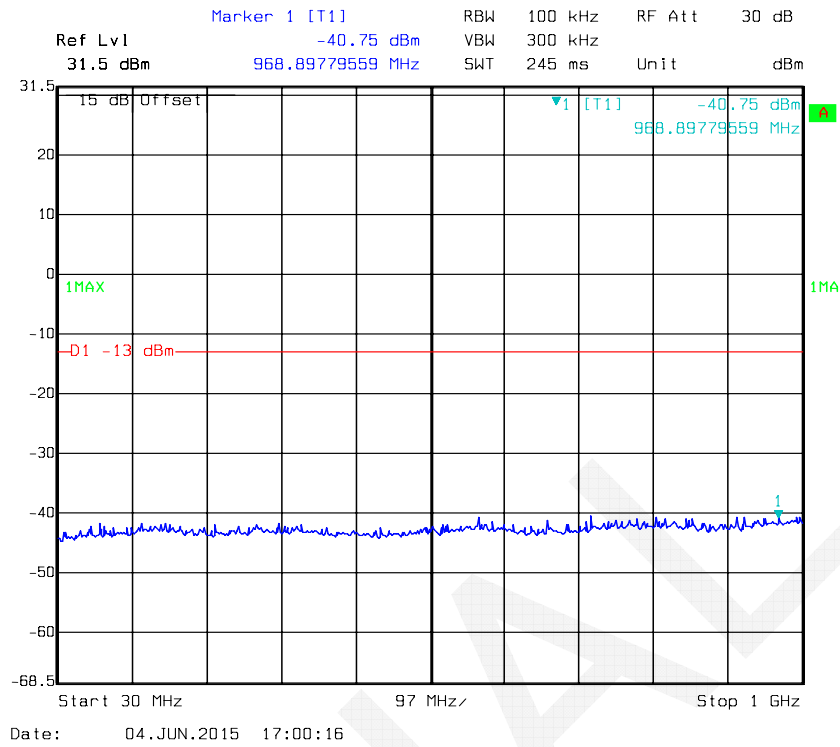
The testing was performed by Dean Liu on 2015-06-04.

Please refer to the following plots.

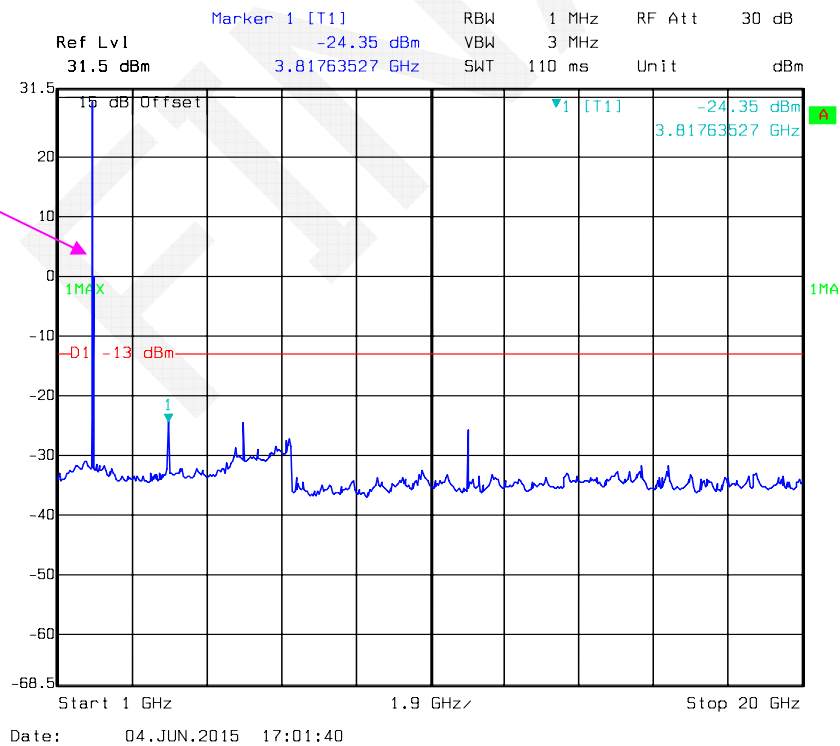
GSM850_Middle Channel



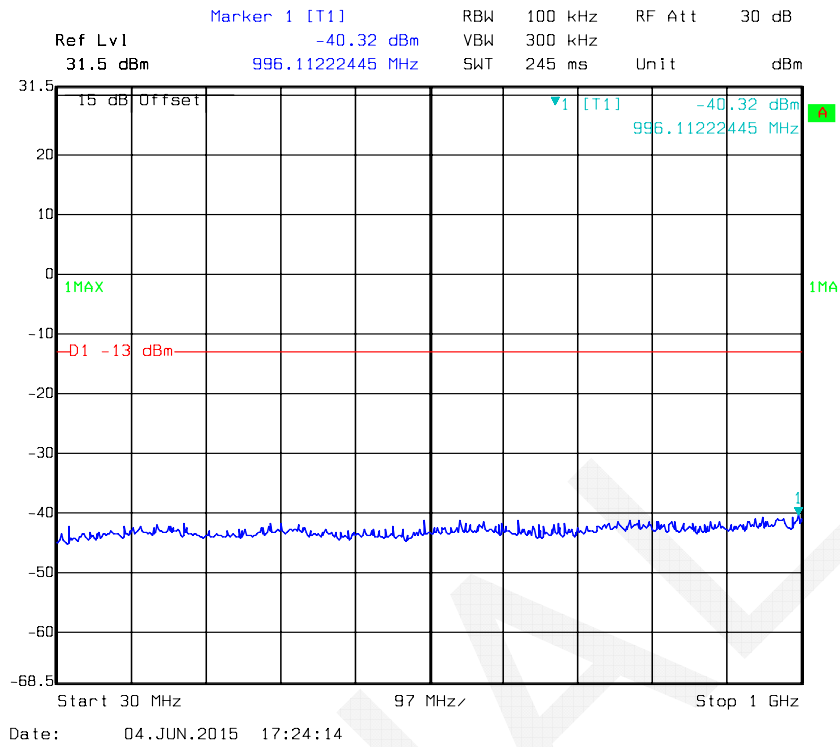
PCS 1900_ Middle Channel



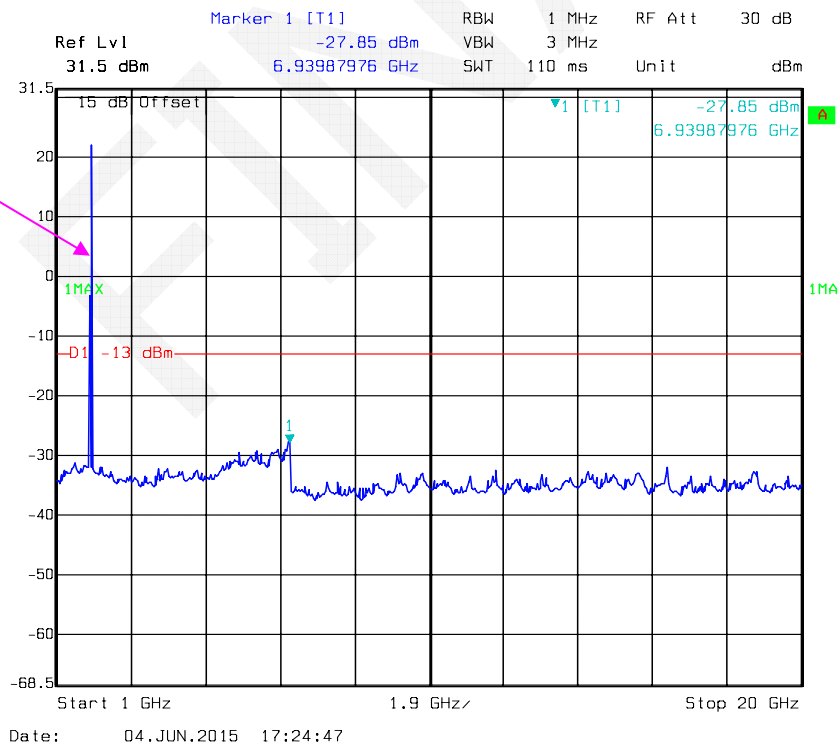
Fundamental



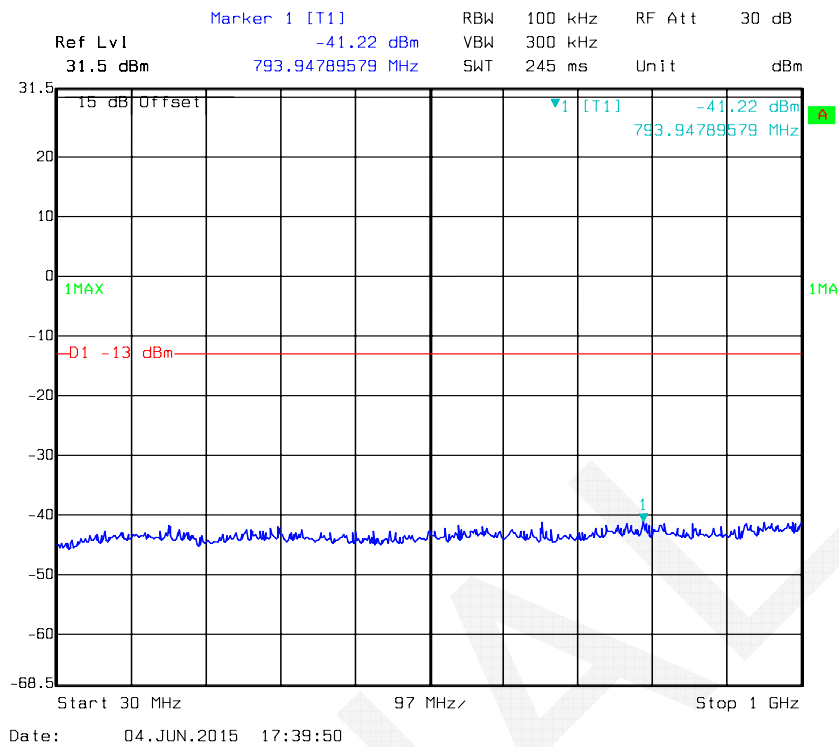
REL99 Band II_ Middle Channel



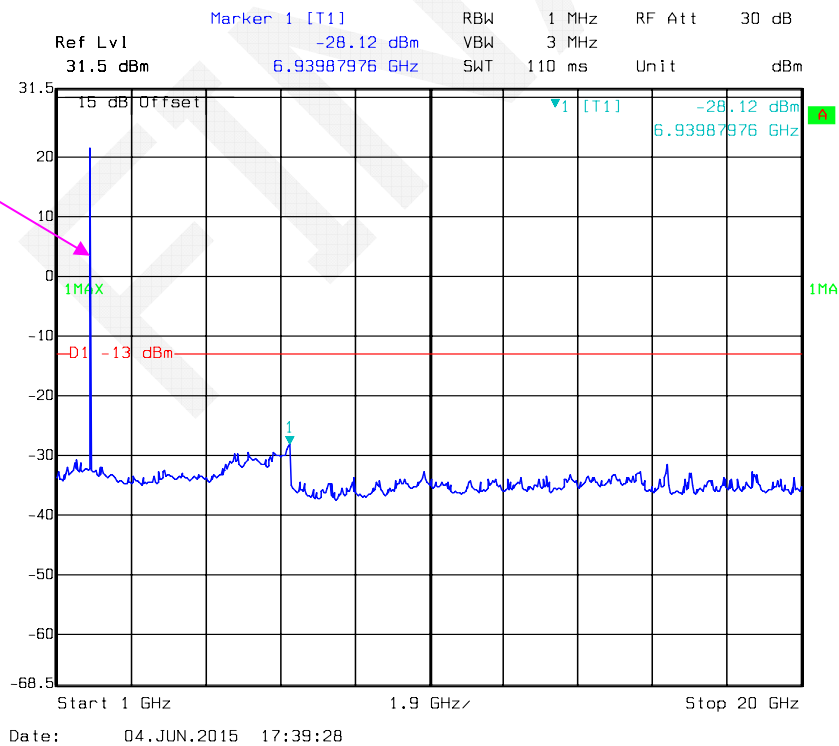
Fundamental



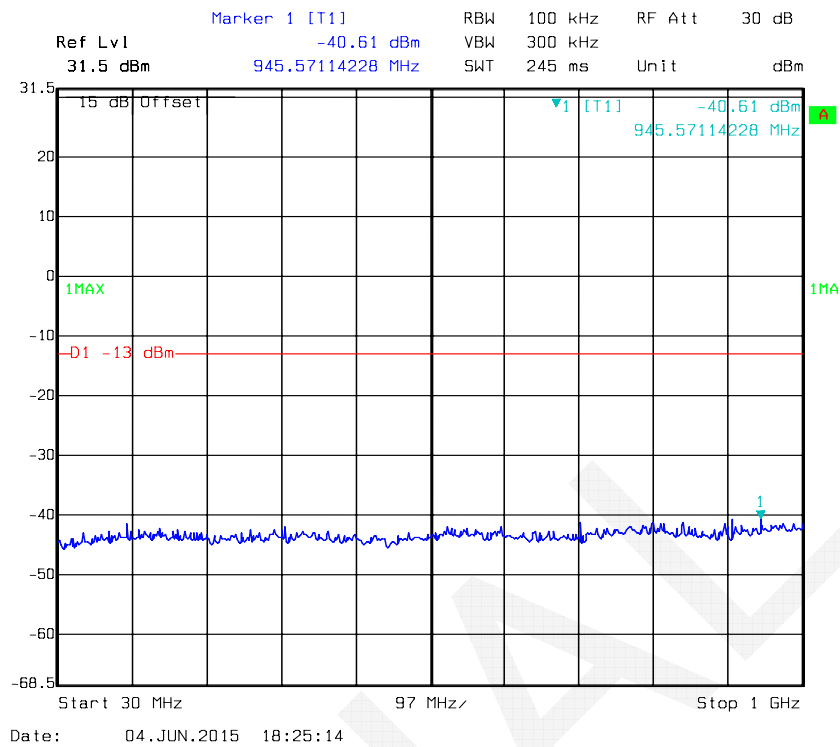
HSDPA Band II_ Middle Channel



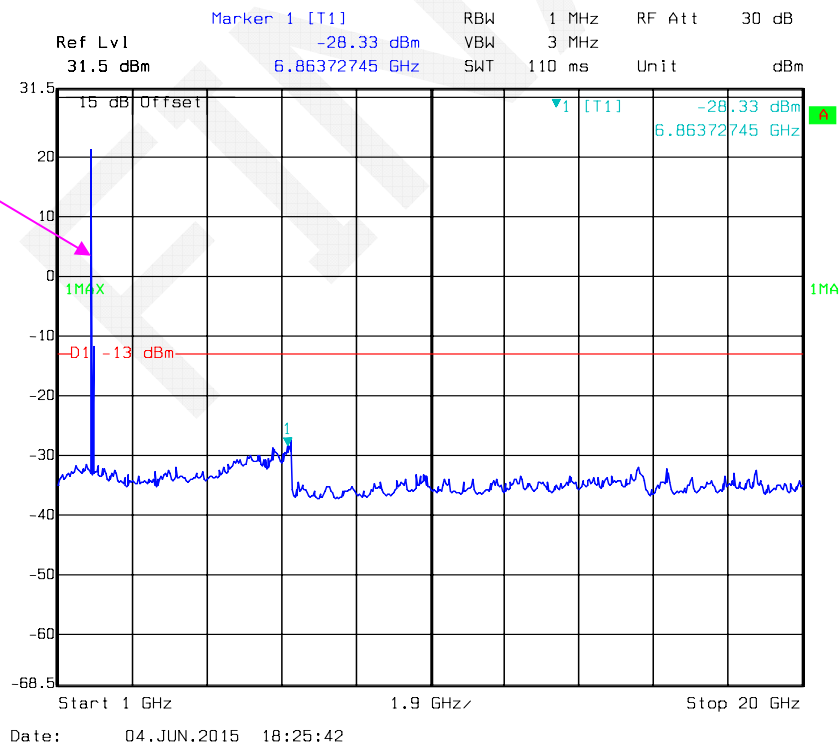
Fundamental



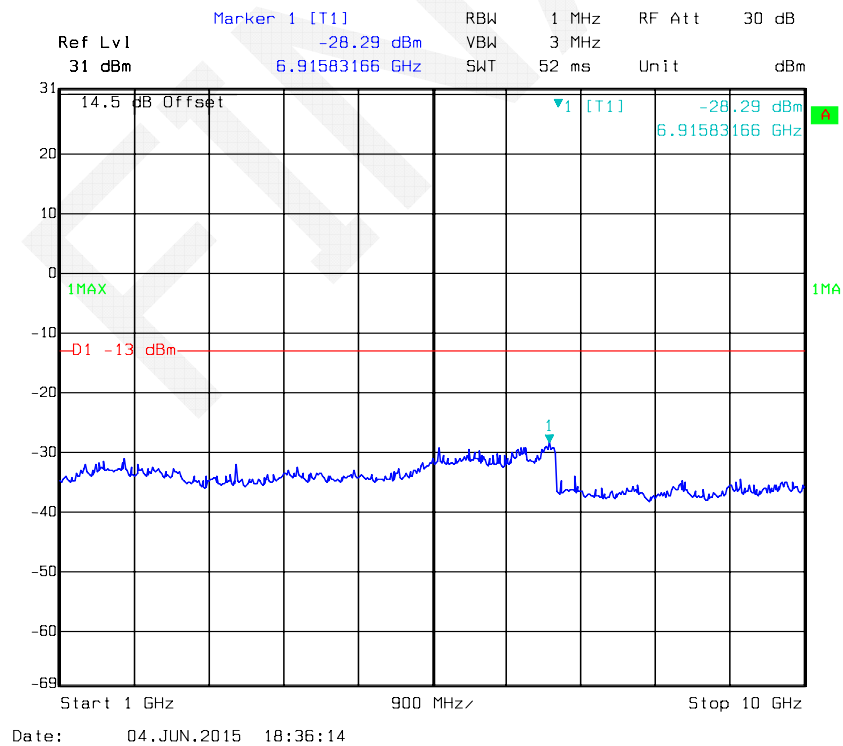
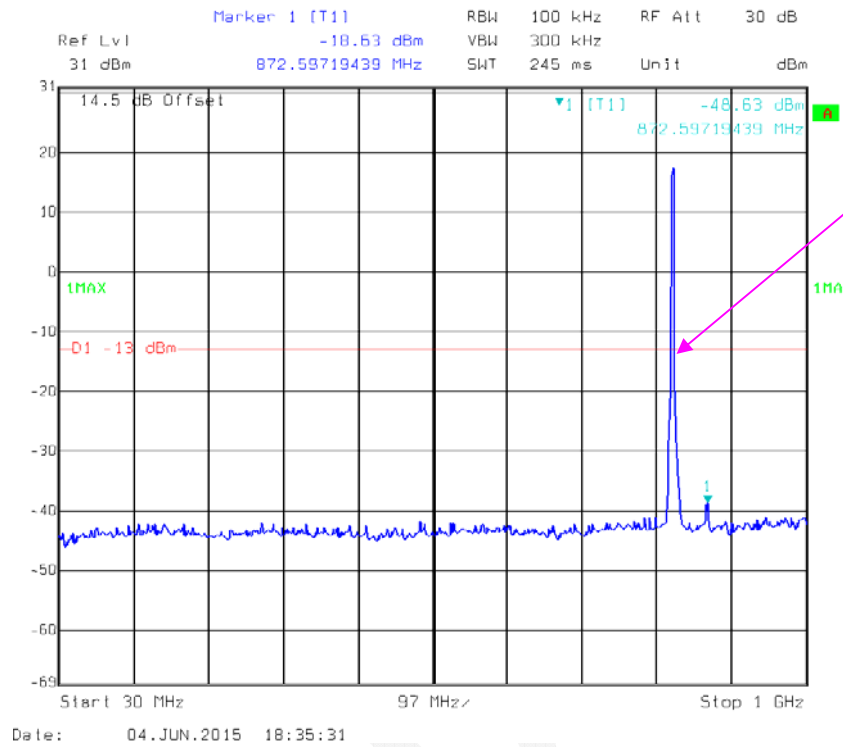
HSUPA Band II_ Middle Channel



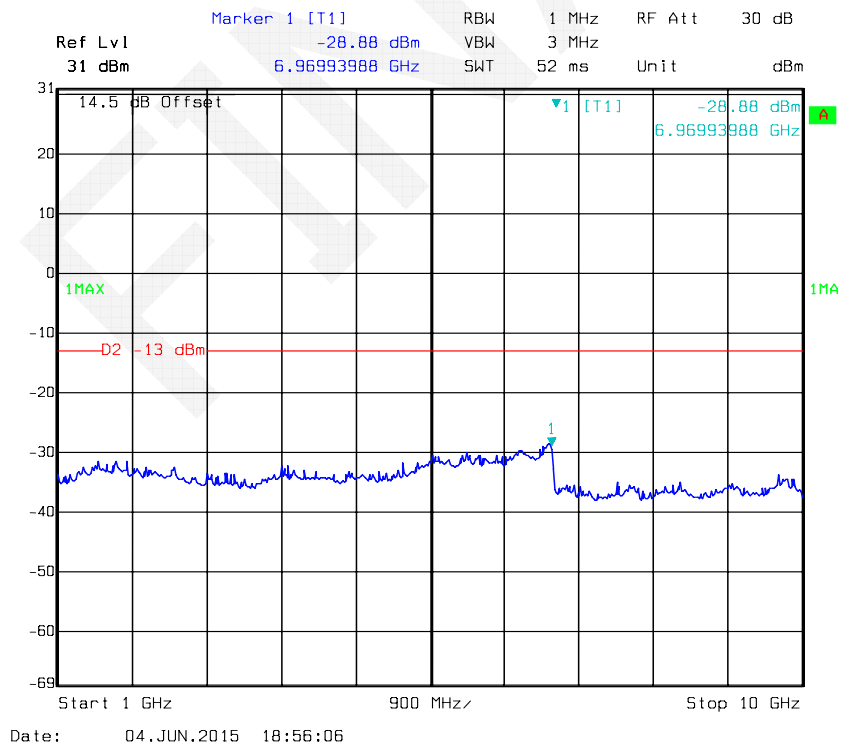
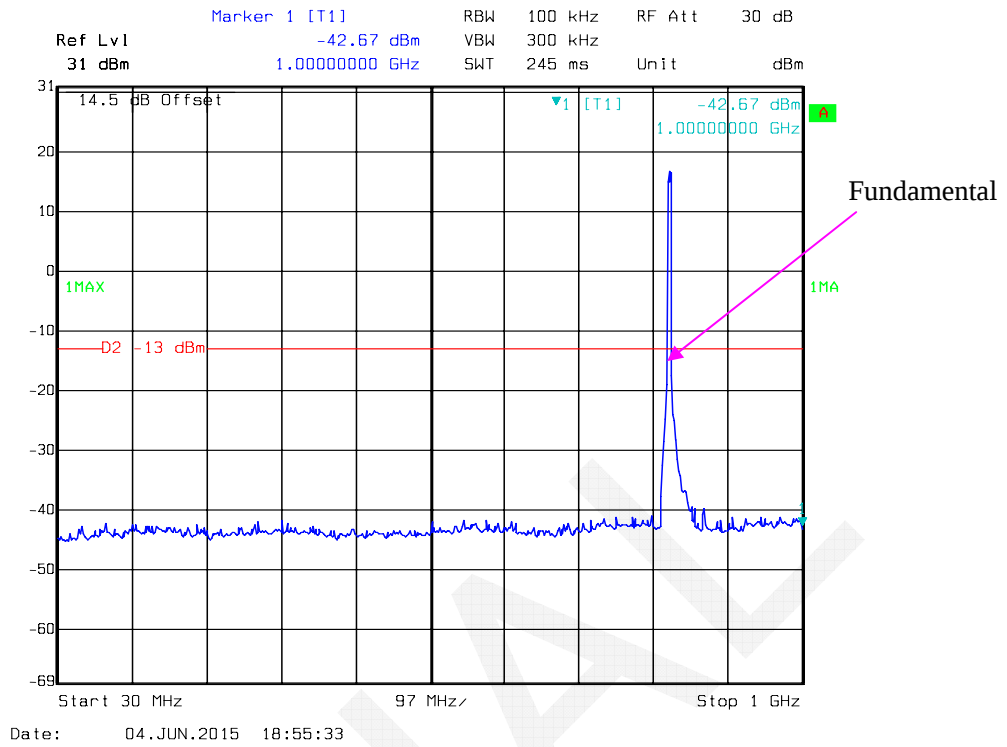
Fundamental



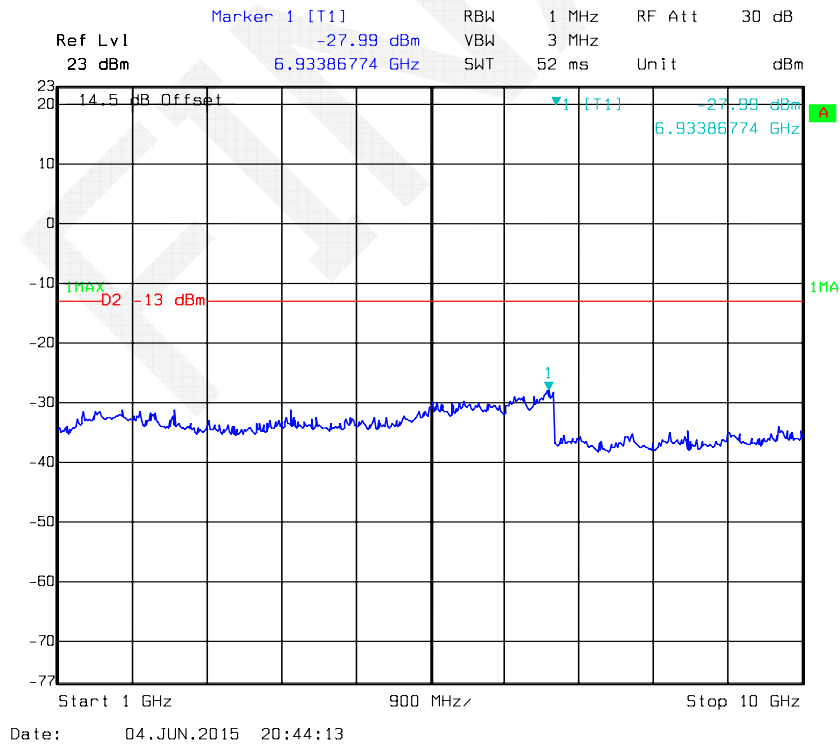
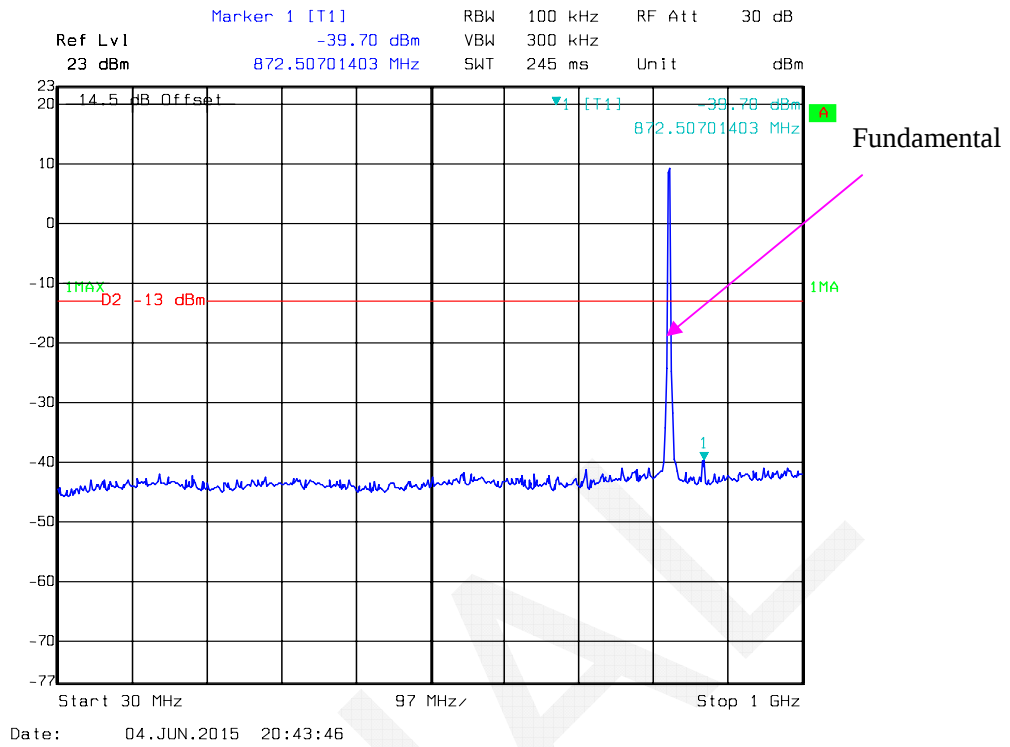
REL99 Band V_ Middle Channel



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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
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:	25.5 °C
Relative Humidity:	54 %
ATM Pressure:	100.2 kPa

The testing was performed by Dean Liu on 2015-06-11.

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	55.78	-45.3	10.6	1.5	-36.2	-13.0	23.2
1673.200	V	55.45	-45.9	10.6	1.5	-36.8	-13.0	23.8
2509.800	H	40.07	-58.0	13.1	2.8	-47.7	-13.0	34.7
2509.800	V	39.77	-57.3	13.1	2.8	-47.0	-13.0	34.0

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	44.75	-56.3	10.6	1.5	-47.2	-13.0	34.2
1673.200	V	45.00	-56.4	10.6	1.5	-47.3	-13.0	34.3

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	59.77	-34.5	13.8	2.9	-23.6	-13.0	10.6
3760.000	V	58.54	-34.5	13.8	2.9	-23.6	-13.0	10.6

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	39.95	-54.3	13.8	2.9	-43.4	-13.0	30.4
3760.000	V	41.45	-51.6	13.8	2.9	-40.7	-13.0	27.7

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

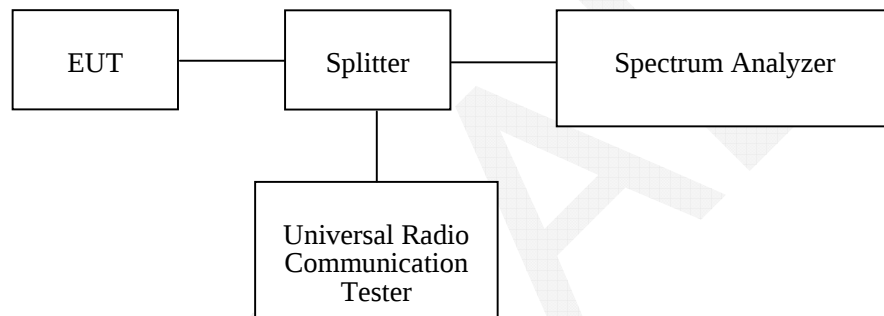
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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

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

Test Data

Environmental Conditions

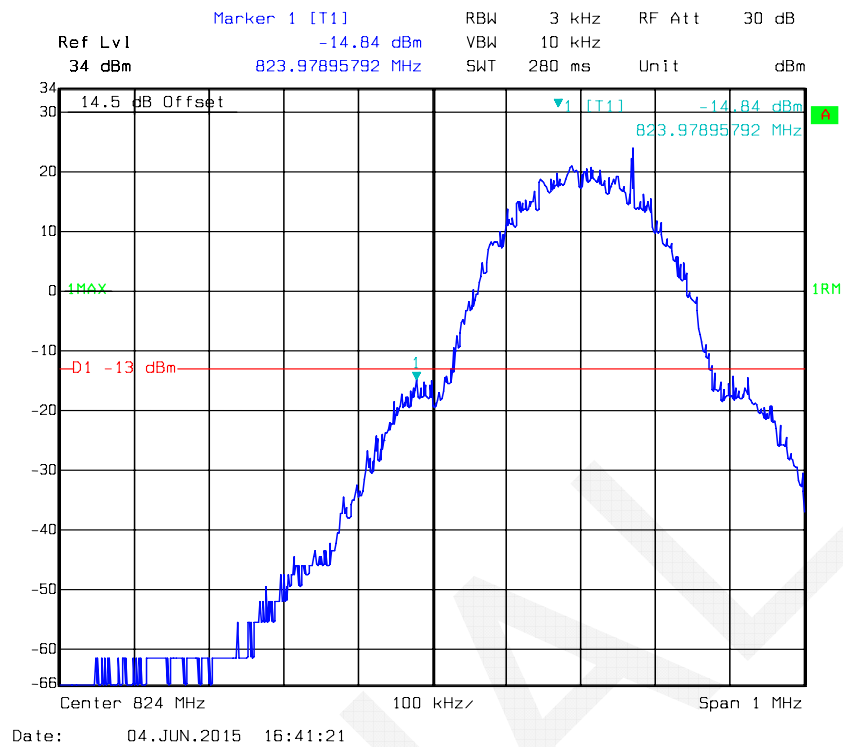
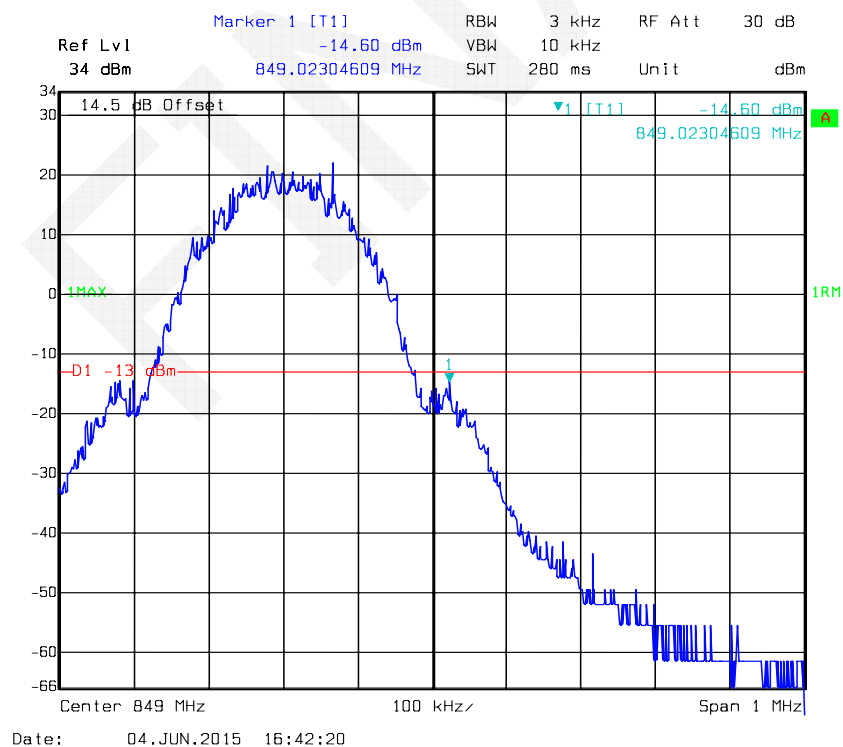
Temperature:	25.6~26.8°C
Relative Humidity:	55~59%
ATM Pressure:	99.9~100.2 kPa

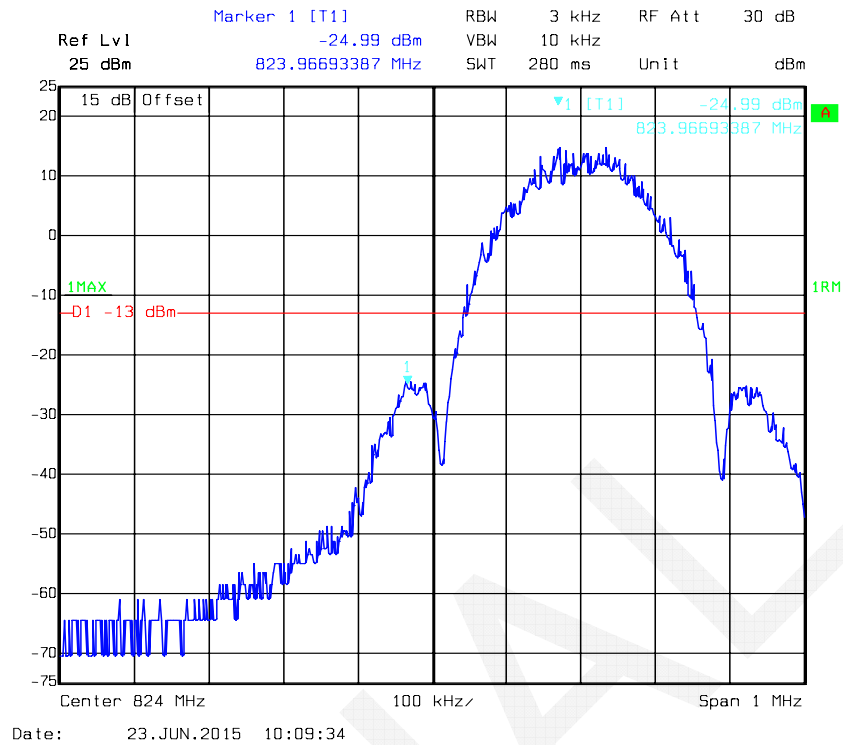
The testing was performed by Dean Liu on 2015-06-04 & 2015-06-23.

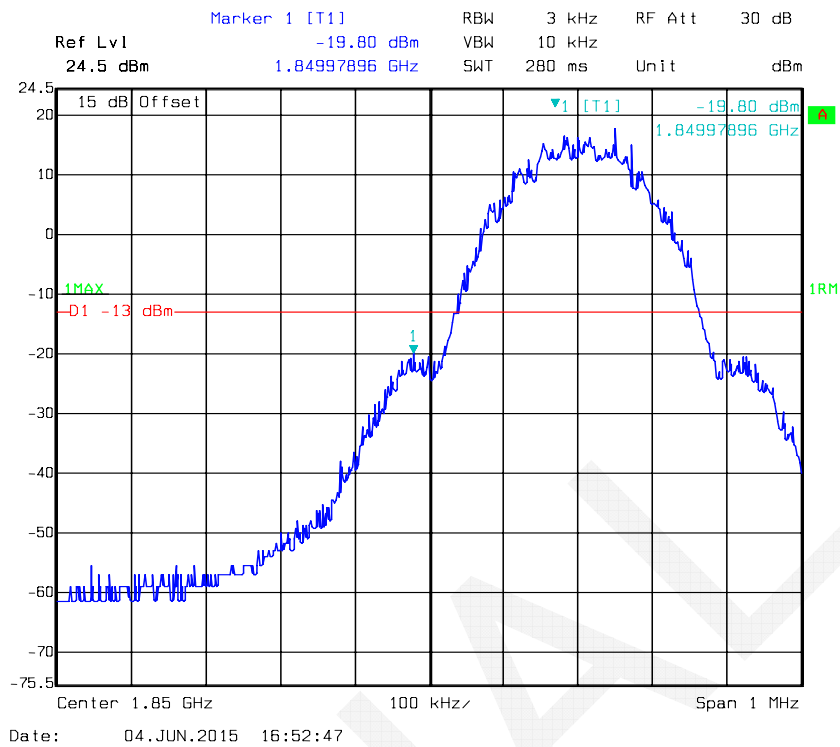
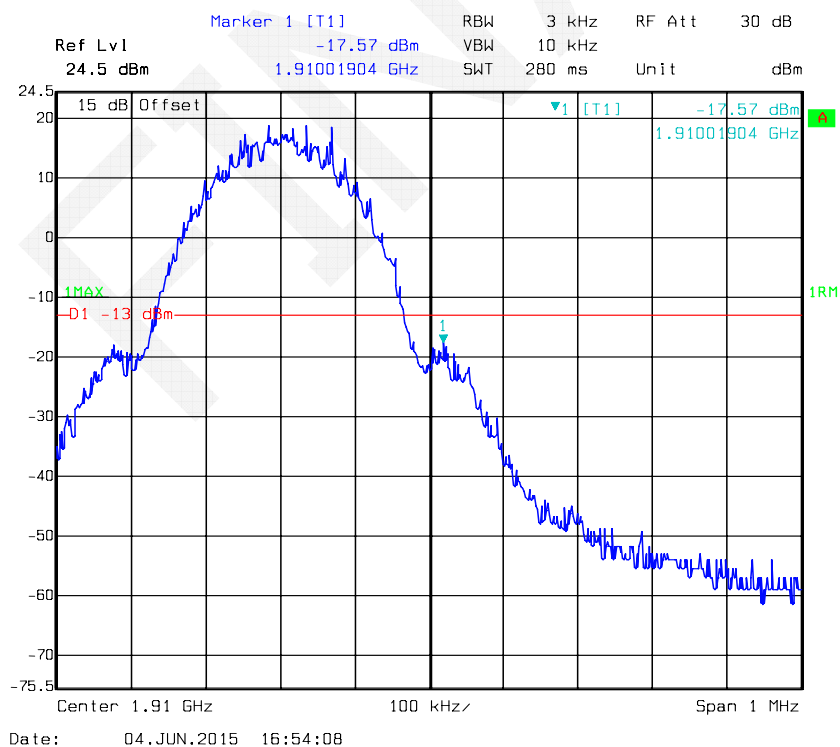
Test Mode: Transmitting

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

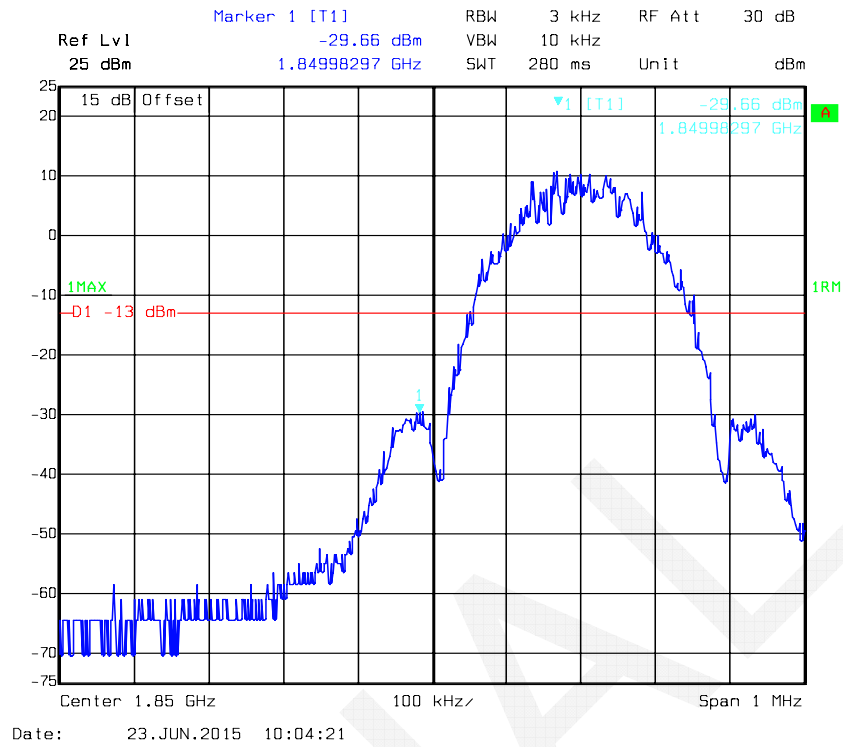
Band	Mode	Band Edge	Reading	Limit
			dBm	dBm
Cellular	GSM	Left	-14.84	≤ -13
		Right	-14.60	≤ -13
	EDGE	Left	-24.99	≤ -13
		Right	-23.84	≤ -13
PCS	PCS	Left	-19.80	≤ -13
		Right	-17.57	≤ -13
	EDGE	Left	-29.66	≤ -13
		Right	-27.89	≤ -13
WCDMA Band II	Rel 99	Left	-19.66	≤ -13
		Right	-16.83	≤ -13
	HSDPA	Left	-18.68	≤ -13
		Right	-18.44	≤ -13
	HSUPA	Left	-17.62	≤ -13
		Right	-19.11	≤ -13
WCDMA Band V	Rel 99	Left	-16.71	≤ -13
		Right	-15.32	≤ -13
	HSDPA	Left	-16.37	≤ -13
		Right	-14.27	≤ -13
	HSUPA	Left	-25.72	≤ -13
		Right	-20.11	≤ -13

GSM 850, Left Band Edge**GSM 850, Right Band Edge**

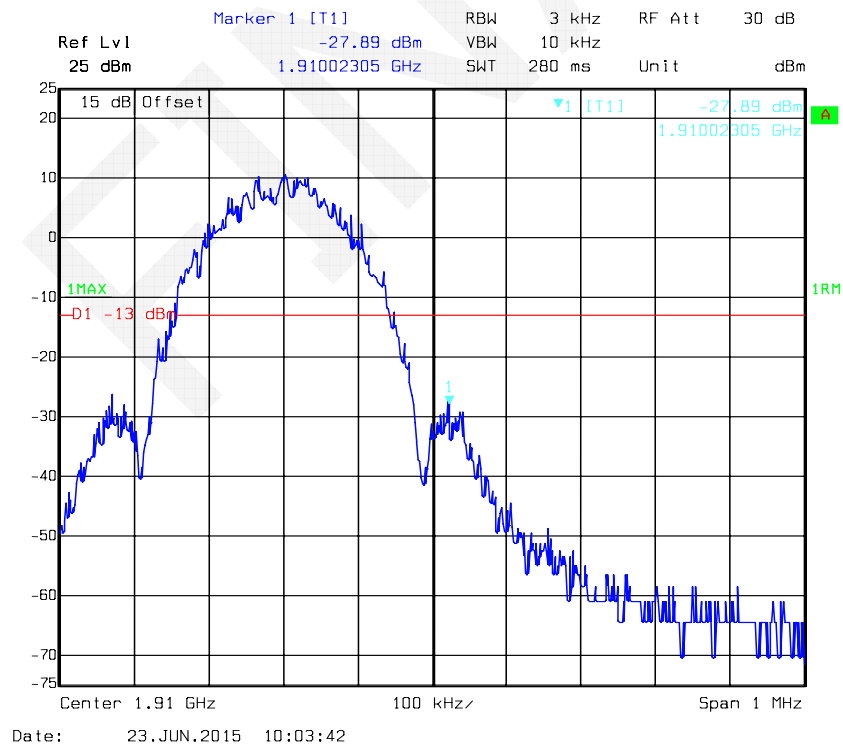
EDGE 850, Left Band Edge**EDGE 850, Right Band Edge**

GSM 1900, Left Band Edge**GSM 1900, Right Band Edge**

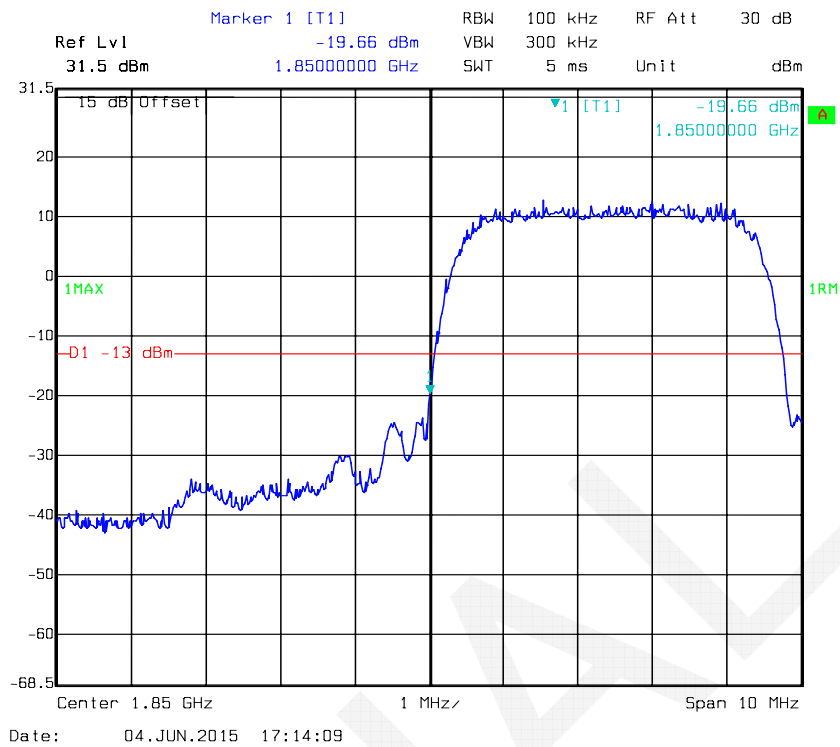
EDGE 1900, Left Band Edge



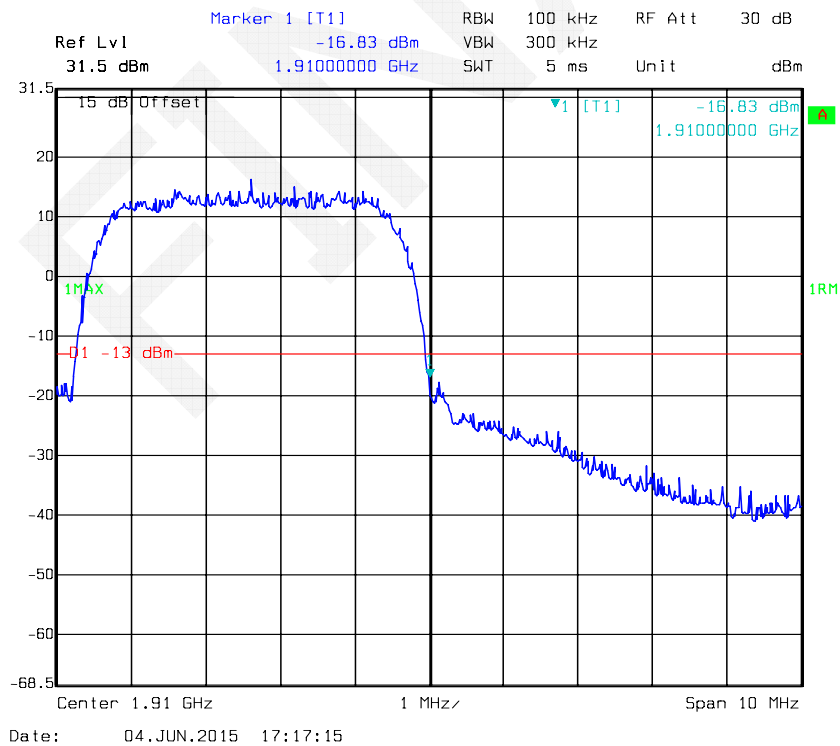
EDGE 1900, Right Band Edge



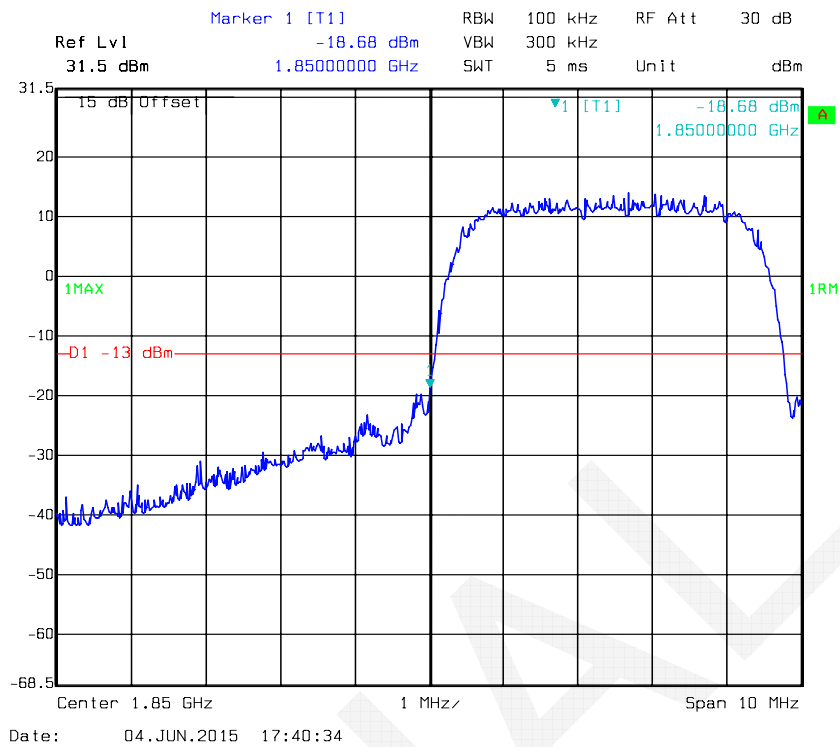
REL99 Band II, Left Band Edge



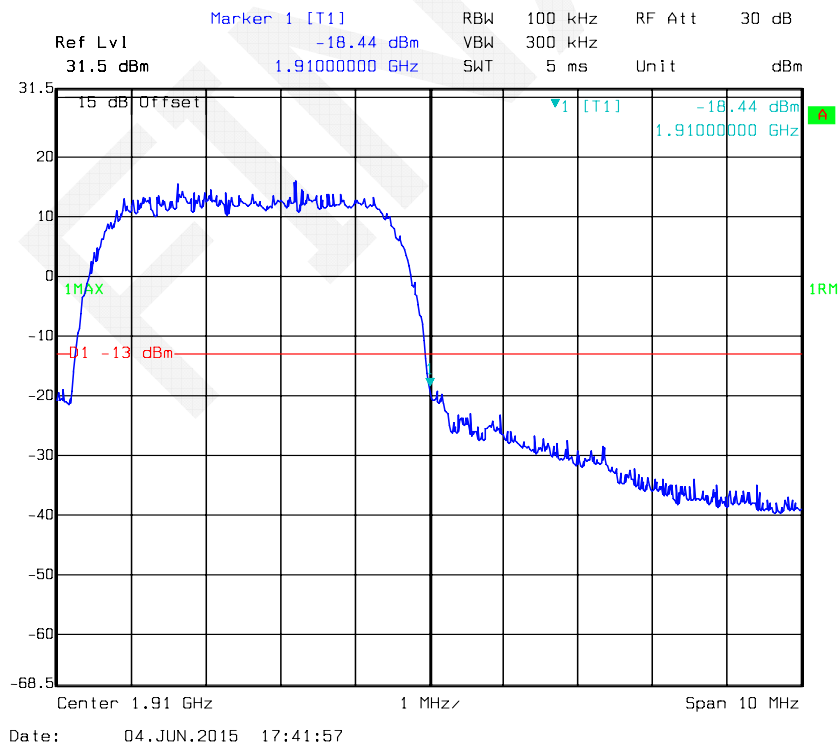
REL99 Band II, Right Band Edge



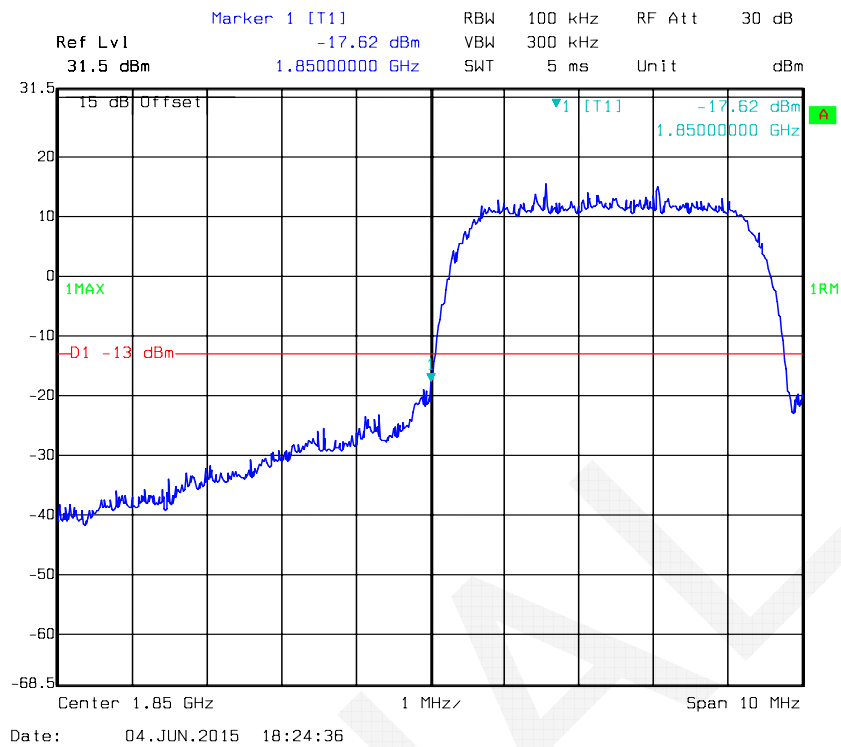
HSDPA Band II, Left Band Edge



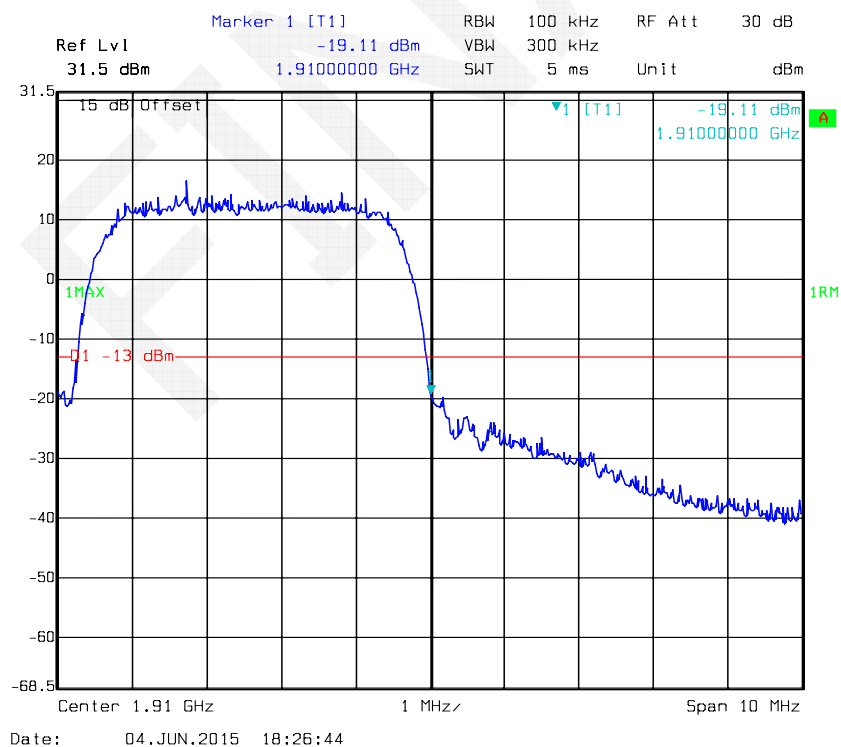
HSDPA Band II, Right Band Edge



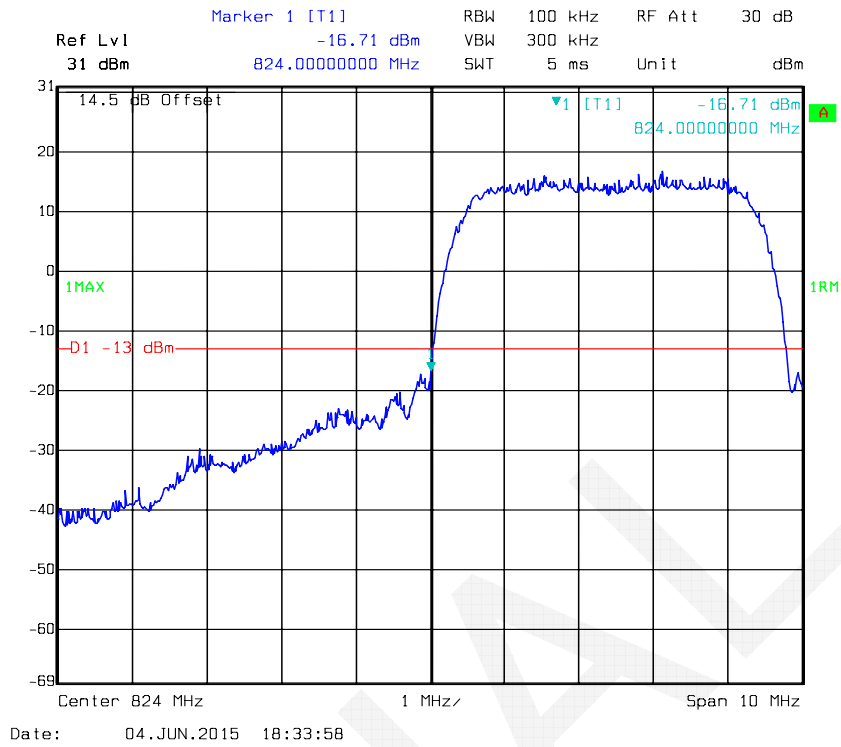
HSUPA Band II, Left Band Edge



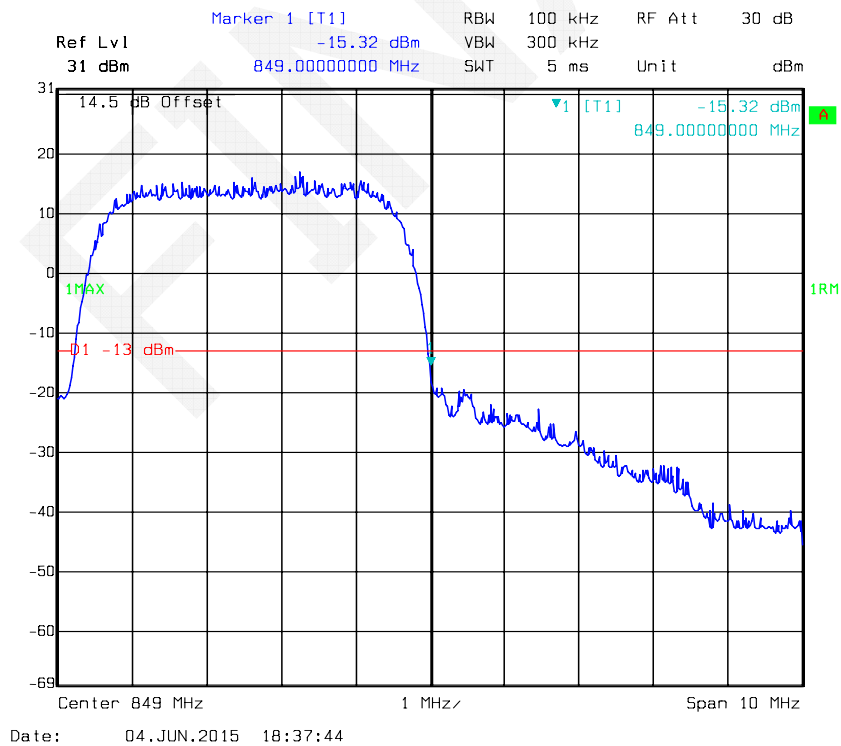
HSUPA Band II, Right Band Edge



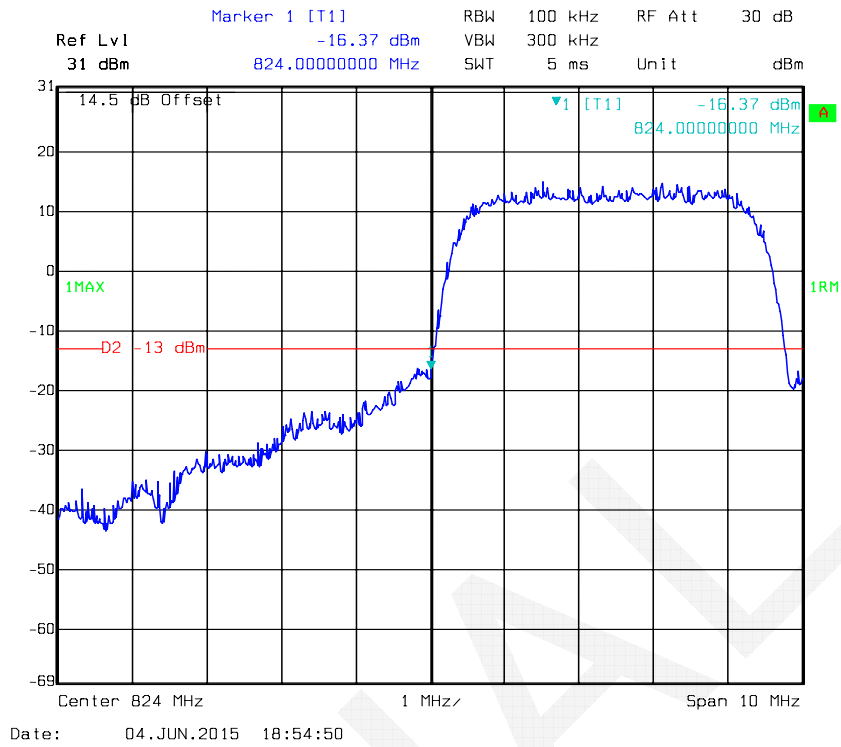
REL99 Band V, Left Band Edge



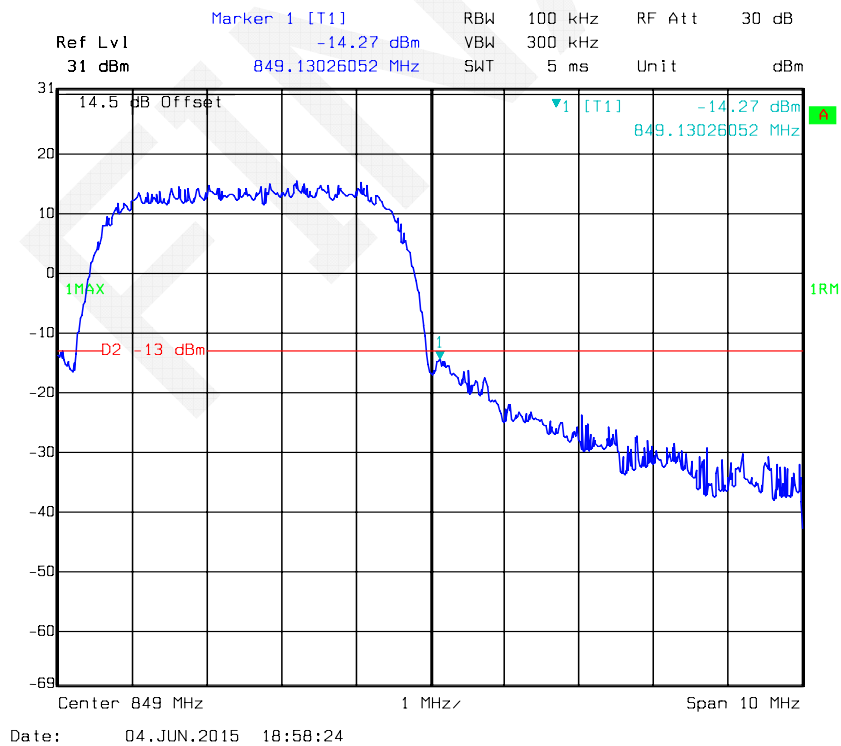
REL99 Band V, Right Band Edge



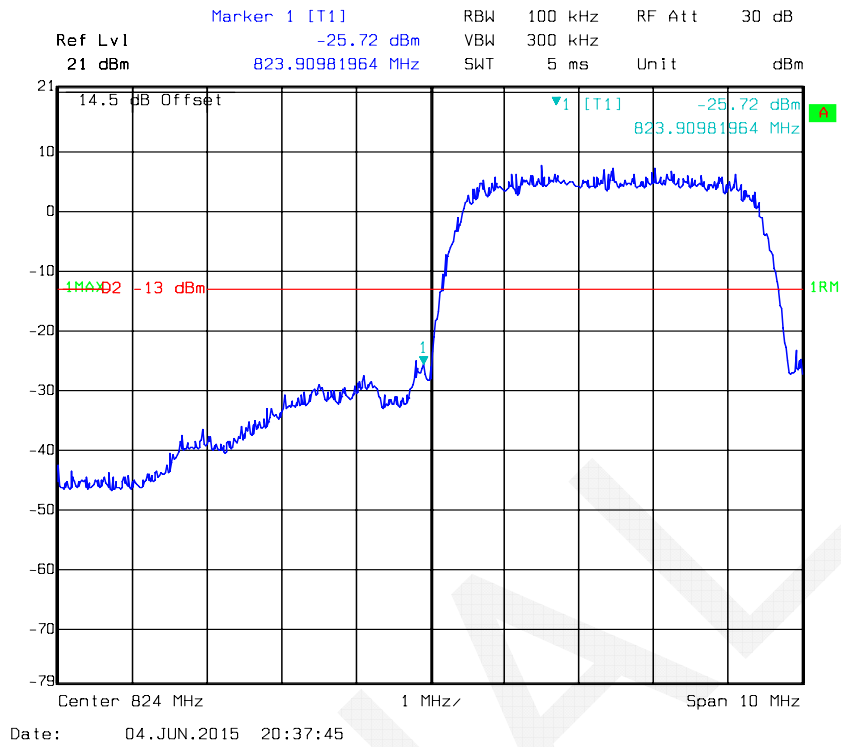
HSDPA Band V, Left Band Edge



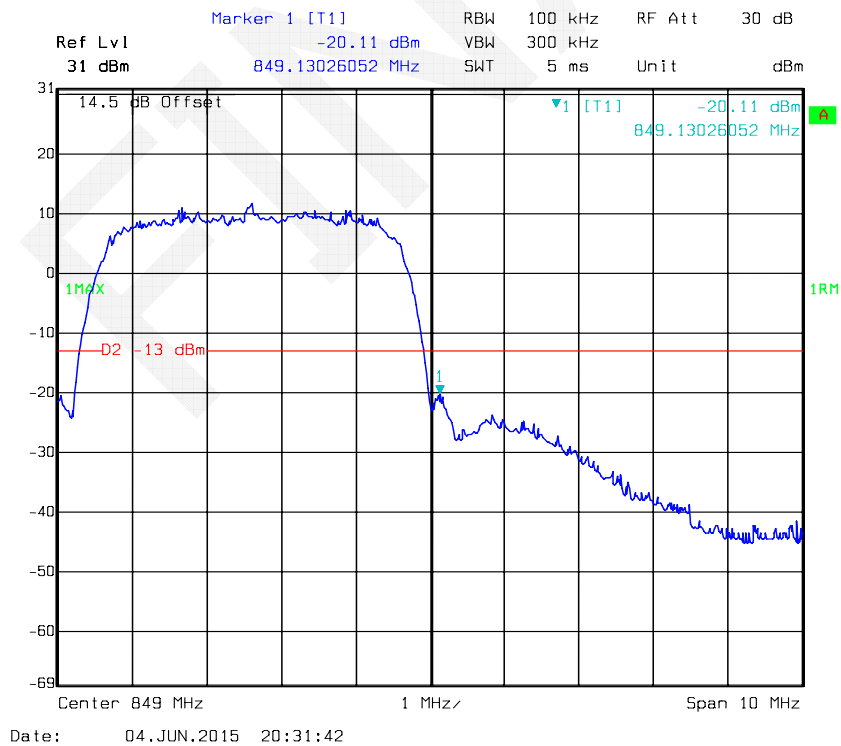
HSDPA Band V, Right Band Edge



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

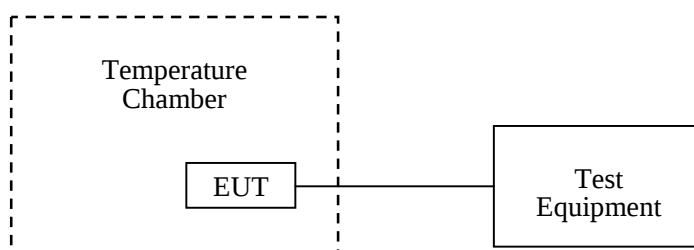
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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	2014-08-01	2015-08-01
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:	27.9 °C
Relative Humidity:	60 %
ATM Pressure:	100.2kPa

The testing was performed by Dean Liu on 2015-06-12.

Cellular Band (Part 22H)

GMSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.7	-35	-0.042	2.5
-20	3.7	-29	-0.035	2.5
-10	3.7	-21	-0.025	2.5
0	3.7	-19	-0.023	2.5
10	3.7	-32	-0.038	2.5
20	3.7	-27	-0.032	2.5
30	3.7	-26	-0.031	2.5
40	3.7	-28	-0.033	2.5
50	3.7	-30	-0.036	2.5
20	3.5	-28	-0.033	2.5
20	4.2	-33	-0.039	2.5

8PSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.7	-33	-0.039	2.5
-20	3.7	-36	-0.043	2.5
-10	3.7	-37	-0.044	2.5
0	3.7	-32	-0.038	2.5
10	3.7	-36	-0.043	2.5
20	3.7	-30	-0.036	2.5
30	3.7	-28	-0.033	2.5
40	3.7	-29	-0.035	2.5
50	3.7	-31	-0.037	2.5
20	3.5	-34	-0.041	2.5
20	4.2	-35	-0.042	2.5

WCDMA Band V: Re199

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.7	19	0.023	2.5
-20	3.7	17	0.020	2.5
-10	3.7	18	0.022	2.5
0	3.7	16	0.019	2.5
10	3.7	14	0.017	2.5
20	3.7	12	0.014	2.5
30	3.7	13	0.016	2.5
40	3.7	15	0.018	2.5
50	3.7	17	0.020	2.5
20	3.5	20	0.024	2.5
20	4.2	19	0.023	2.5

WCDMA Band V: HSDPA

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.7	21	0.025	2.5
-20	3.7	18	0.022	2.5
-10	3.7	20	0.024	2.5
0	3.7	19	0.023	2.5
10	3.7	15	0.018	2.5
20	3.7	13	0.016	2.5
30	3.7	14	0.017	2.5
40	3.7	18	0.022	2.5
50	3.7	17	0.020	2.5
20	3.5	16	0.019	2.5
20	4.2	20	0.024	2.5

WCDMA Band V: HSUPA

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.7	15	0.018	2.5
-20	3.7	13	0.016	2.5
-10	3.7	14	0.017	2.5
0	3.7	10	0.012	2.5
10	3.7	19	0.023	2.5
20	3.7	17	0.020	2.5
30	3.7	18	0.022	2.5
40	3.7	15	0.018	2.5
50	3.7	17	0.020	2.5
20	3.5	11	0.013	2.5
20	4.2	18	0.022	2.5

PCS Band (Part 24E)

GMSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.7	-37	-0.020	Pass
-20	3.7	-36	-0.019	Pass
-10	3.7	-34	-0.018	Pass
0	3.7	-31	-0.016	Pass
10	3.7	-35	-0.019	Pass
20	3.7	-30	-0.016	Pass
30	3.7	-28	-0.015	Pass
40	3.7	-29	-0.015	Pass
50	3.7	-33	-0.018	Pass
20	3.5	-40	-0.021	Pass
20	4.2	-32	-0.017	Pass

8PSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.7	-51	-0.027	Pass
-20	3.7	-45	-0.024	Pass
-10	3.7	-39	-0.021	Pass
0	3.7	-46	-0.024	Pass
10	3.7	-42	-0.022	Pass
20	3.7	-38	-0.020	Pass
30	3.7	-39	-0.021	Pass
40	3.7	-39	-0.021	Pass
50	3.7	-43	-0.023	Pass
20	3.5	-44	-0.023	Pass
20	4.2	-50	-0.027	Pass

WCDMA Band II: Re199

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V _{DC}	Hz	ppm	
-30	3.7	13	0.007	Pass
-20	3.7	12	0.006	Pass
-10	3.7	17	0.009	Pass
0	3.7	10	0.005	Pass
10	3.7	14	0.007	Pass
20	3.7	14	0.007	Pass
30	3.7	16	0.009	Pass
40	3.7	17	0.009	Pass
50	3.7	15	0.008	Pass
20	3.5	16	0.009	Pass
20	4.2	10	0.005	Pass

WCDMA Band II: HSDPA

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V _{DC}	Hz	ppm	
-30	3.7	-21	-0.011	Pass
-20	3.7	-19	-0.010	Pass
-10	3.7	-17	-0.009	Pass
0	3.7	-15	-0.008	Pass
10	3.7	-18	-0.010	Pass
20	3.7	-22	-0.012	Pass
30	3.7	-21	-0.011	Pass
40	3.7	-19	-0.010	Pass
50	3.7	-17	-0.009	Pass
20	3.5	-20	-0.011	Pass
20	4.2	-18	-0.010	Pass

WCDMA Band II: HSUPA

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V _{DC}	Hz	ppm	
-30	3.7	15	0.008	Pass
-20	3.7	13	0.007	Pass
-10	3.7	18	0.010	Pass
0	3.7	14	0.007	Pass
10	3.7	16	0.009	Pass
20	3.7	12	0.006	Pass
30	3.7	13	0.007	Pass
40	3.7	14	0.007	Pass
50	3.7	16	0.009	Pass
20	3.5	15	0.008	Pass
20	4.2	13	0.007	Pass

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