FCC PART 22H, PART 24E

MEASUREMENT AND TEST REPORT

For

CLC HONG KONG LIMITED

1011A, 10/F., Harbour Centre Tower 1, No. 1 Hok Cheung St., Hung Hom, Kowloon, Hong Kong

FCC ID: 2AG4WE700

Report Type:	Product Name:
Original Report	Ram 7

Test Engineer:	Tom Tang
Report Number:	RDG170612005C
Report Date:	2017-06-18
Reviewed By:	Henry Ding EMC Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65525123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***CLC HONG KONG LIMITED***'s product, model number: ***E700 (FCC ID: 2AG4WE700)*** (the "EUT") in this report was a ***Ram 7,*** which was measured approximately: 13.0 cm (L) × 6.0 cm (W) × 1.3 cm (H), rated input voltage: DC3.7V battery or DC5.0V charging from adapter.

Adapter information:
Model: PMC43
Input: 100-240V~ 50/60Hz
Output: DC5.0V 1000mA

**All measurement and test data in this report was gathered from final production sample, serial number: 170612005 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-06-12, and EUT conformed to test requirement.*

Objective

This report is prepared on behalf of ***CLC HONG KONG 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: 2AG4WE700.
FCC Part 15C DSS submissions with FCC ID: 2AG4WE700.
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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, Part 22 Subpart H, Part 24 Subpart E.

Applicable Standards: TIA/EIA 603-D-2010.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu).

Test Facility

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication 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 April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. 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.

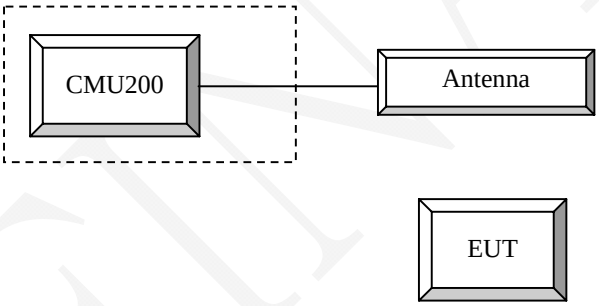
Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universial Radio Communication Tester	CMU200	11-9435686-111

Configuration of Test Setup



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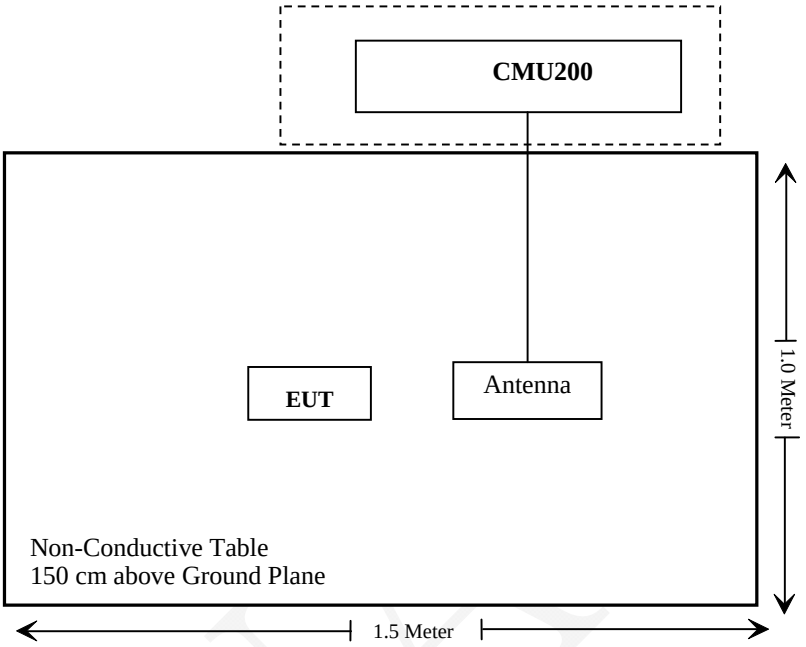
Block Diagram of Test Setup



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: RDG170612005-20.

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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..

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 Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection Press Signal on to turn on the signal and change settings

Radiated method:

ANSI/TIA-603-D section 2.2.17

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
	βc / βd	8/15

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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			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/ βd	2/15	12/15	15/8	15/4
	βhs	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=βhs/ βc	30/15			

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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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	6751	2017-06-16	2020-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2017-05-23	2018-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2017-05-23	2018-05-22
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09
R&S	Universal Radio Communication Tester	CMU200	11-9435686-111	2016-07-28	2017-07-27

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	28.2 °C
Relative Humidity:	56.4 %
ATM Pressure:	100.1 kPa

The testing was performed by Tom Tang on 2017-06-23.

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	32.46	32.45	31.11	29.24	27.99	26.33	24.91	23.47	21.89
	190	32.68	32.73	31.57	29.46	27.85	26.52	24.85	23.26	21.51
	251	32.57	32.78	31.95	29.64	28.08	26.35	24.94	23.34	21.70
PCS	512	29.48	29.67	28.36	26.53	25.41	25.15	23.61	22.05	20.41
	661	30.08	29.77	28.54	26.50	25.29	25.27	23.81	22.28	20.73
	810	29.95	29.75	28.50	26.60	25.40	25.53	23.93	22.46	20.92

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 (QPSK)	1	22.36	3.05	22.48	3.61	22.64	2.58
HSDPA (QPSK)	1	22.35	3.12	22.56	3.50	22.50	2.61
	2	22.41	3.06	22.37	3.50	22.47	2.54
	3	22.26	3.11	22.37	3.46	22.43	2.62
	4	22.17	3.11	22.40	3.52	22.59	2.64
HSUPA (QPSK)	1	22.25	3.11	22.47	3.47	22.50	2.74
	2	22.17	3.13	22.25	3.46	22.49	2.56
	3	22.15	3.11	22.34	3.56	22.44	2.69
	4	22.11	3.23	22.33	3.51	22.61	2.74
	5	22.31	3.14	22.39	3.43	22.56	2.55
DC-HSDPA (QPSK)	1	22.41	3.14	22.40	3.46	22.39	2.62
	2	22.23	3.09	22.31	3.44	22.54	2.76
	3	22.42	3.10	22.23	3.49	22.65	2.65
	4	22.22	3.12	22.40	3.47	22.59	2.74
HSPA+ (16QAM)	1	22.24	3.10	22.45	3.54	22.57	2.62

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 (QPSK)	1	22.28	3.63	22.40	3.38	22.10	3.50
HSDPA (QPSK)	1	22.11	3.60	22.21	3.31	22.11	3.61
	2	22.21	3.65	22.41	3.52	22.20	3.50
	3	22.17	3.70	22.37	3.49	22.01	3.64
	4	22.13	3.74	22.33	3.49	22.33	3.64
HSUPA (QPSK)	1	22.14	3.78	22.34	3.40	22.02	3.56
	2	22.15	3.79	22.20	3.53	22.18	3.65
	3	22.01	3.76	22.21	3.46	22.15	3.42
	4	22.17	3.58	22.37	3.38	22.15	3.58
	5	22.19	3.56	22.20	3.29	22.25	3.53
DC-HSDPA (QPSK)	1	22.17	3.80	22.37	3.47	22.04	3.65
	2	22.09	3.77	22.29	3.31	22.13	3.41
	3	22.13	3.76	22.33	3.39	22.39	3.44
	4	22.18	3.81	22.38	3.50	22.14	3.43
HSPA+ (16QAM)	1	22.23	3.78	22.43	3.52	22.22	3.47

EIRP/ERP:

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)			
GSM 850_Middle Channel								
836.600	H	105.86	28.8	0.0	0.6	28.2	38.5	10.3
836.600	V	102.53	27.5	0.0	0.6	26.9	38.5	11.6
EDGE 850_Middle Channel								
836.600	H	100.67	23.6	0.0	0.6	23.0	38.5	15.5
836.600	V	97.62	22.6	0.0	0.6	22.0	38.5	16.5
WCDMA Band V Middle Channel								
836.600	H	96.75	19.7	0.0	0.6	19.1	38.5	19.4
836.600	V	91.39	16.4	0.0	0.6	15.8	38.5	22.7

Part 24E

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)			
PCS 1900_Middle Channel								
1880.000	H	95.58	22	8.0	0.9	29.1	33.0	3.9
1880.000	V	91.97	19.6	8.0	0.9	26.7	33.0	6.3
EDGE 1900_Middle Channel								
1880.000	H	92.67	19.1	8.0	0.9	26.2	33.0	6.8
1880.000	V	86.49	14.1	8.0	0.9	22.2	33.0	11.8
WCDMA Band II Middle Channel								
1880.000	H	86.44	12.8	8.0	0.9	19.9	33.0	13.1
1880.000	V	83.79	11.4	8.0	0.9	18.5	33.0	14.5

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 = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

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

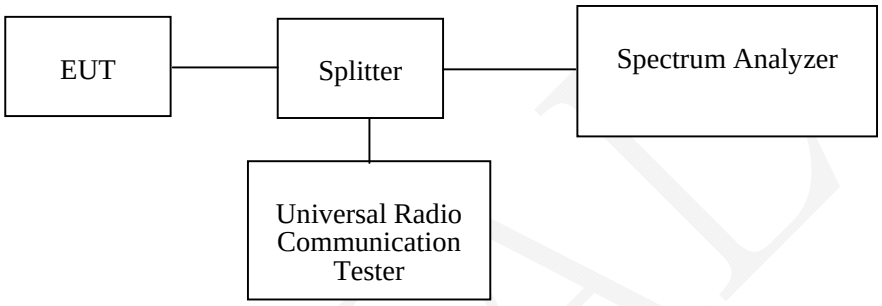
Applicable Standard

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
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
Unknown	RF Attenuator	10dB	10dB-2	Each Time	/
Unknown	RF Cable	Unknown	C-2	Each Time	/
Unknown	Two-way Spliter	Unknown	OE0120121	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	28.2 ~29.1 °C
Relative Humidity:	43.6 ~ 56.4 %
ATM Pressure:	100.1 kPa

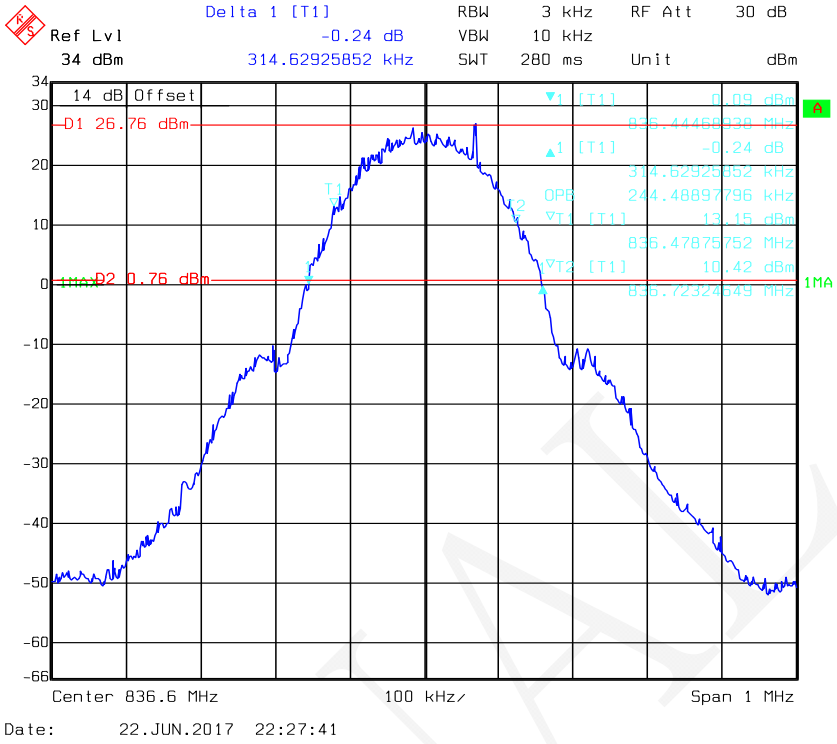
The testing was performed by Tom Tang on 2017-06-22 & 2017-06-23.

Test Mode: Transmitting

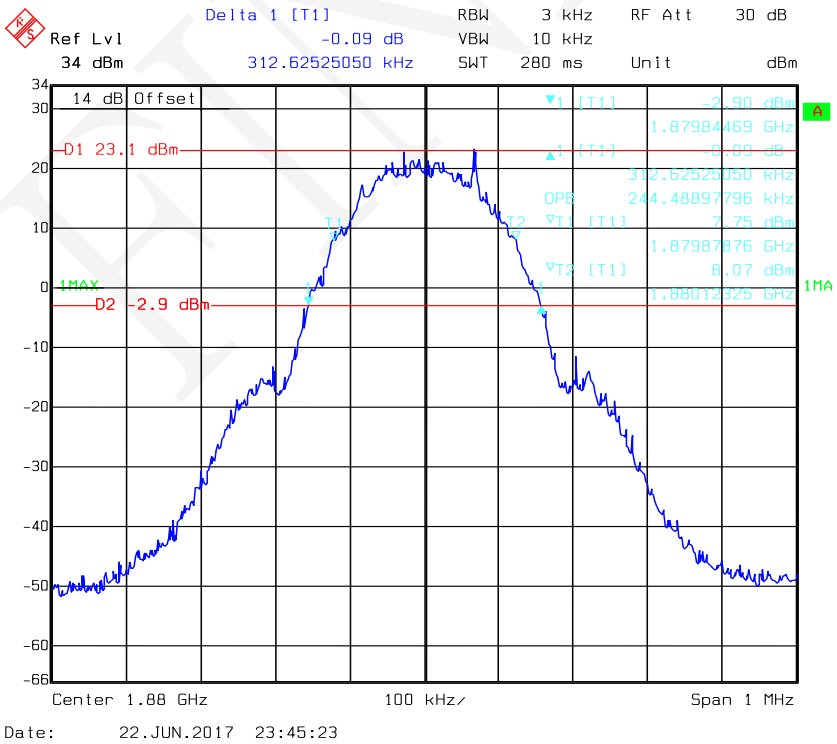
Test Result: Compliant. Please refer to the following table and plots.

Band	Channel No.	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	190	GSM	0.244	0.315
		EDGE	0.248	0.315
PCS	661	PCS	0.244	0.313
		EDGE	0.248	0.317
WCDMA Band Ⅱ	9400	Rel 99	4.168	4.709
	9400	HSDPA	4.168	4.709
	9400	HSUPA	4.168	4.709
WCDMA Band V	4175	Rel 99	4.168	4.689
	4175	HSDPA	4.168	4.709
	4175	HSUPA	4.168	4.709

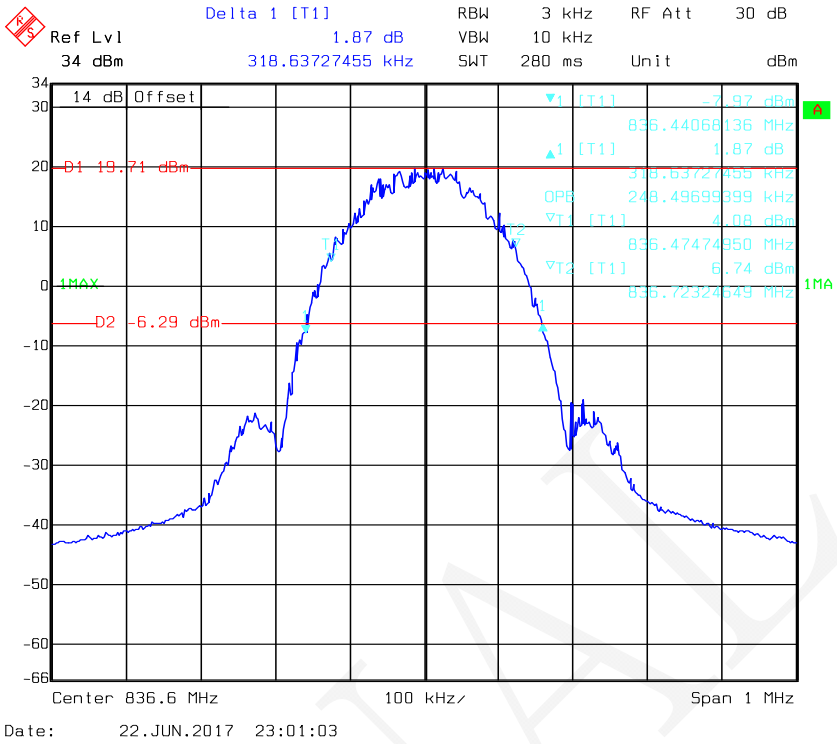
GMSK 850 Cellular Band



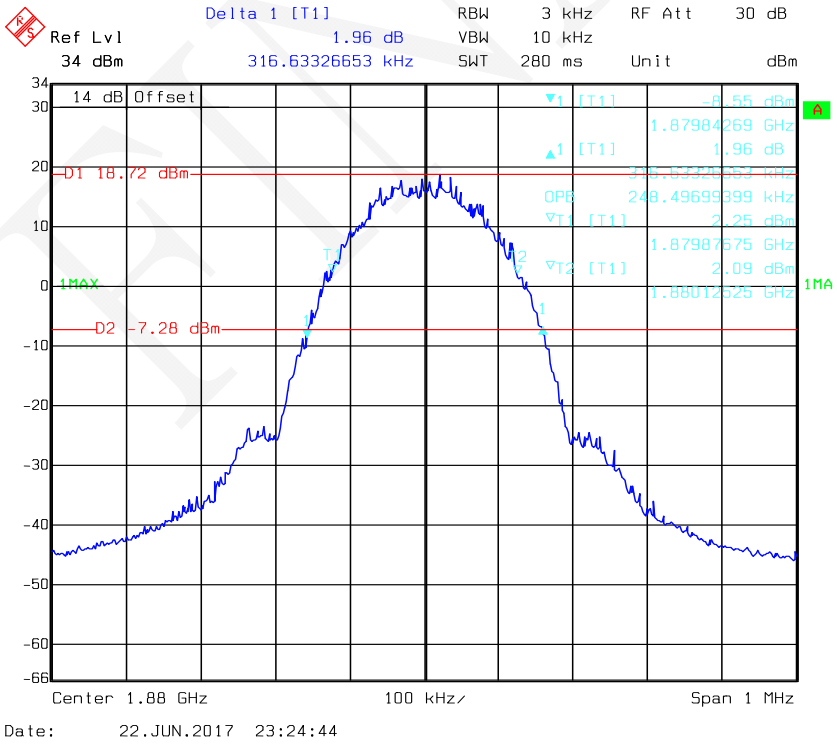
GMSK PCS Band



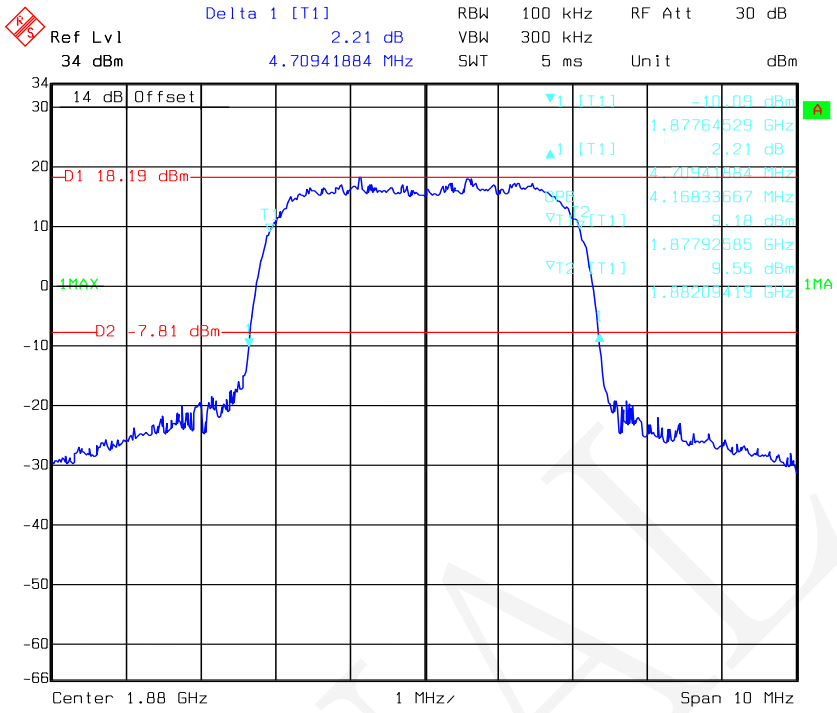
EDGE 850 Cellular Band



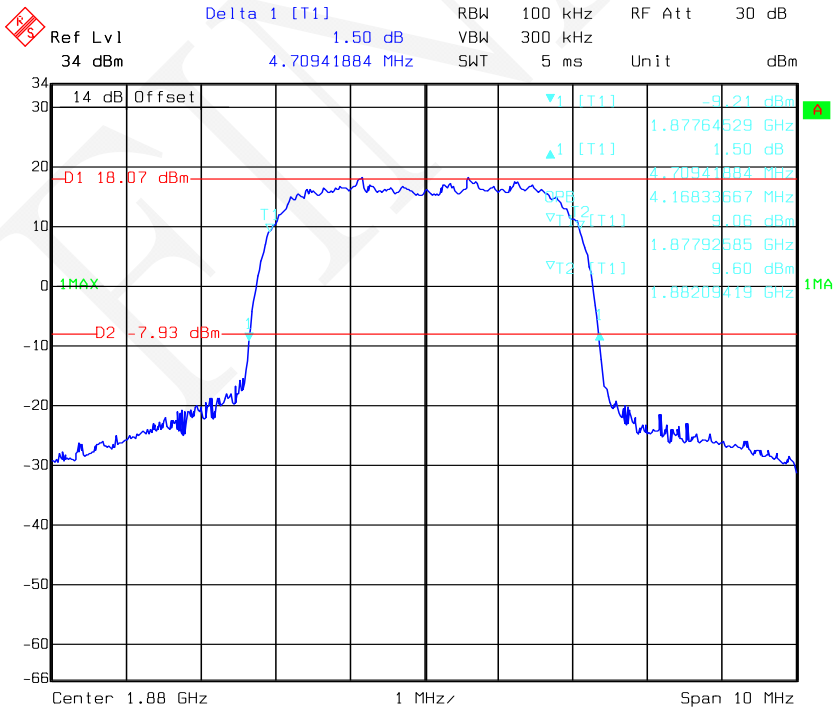
EDGE PCS Band



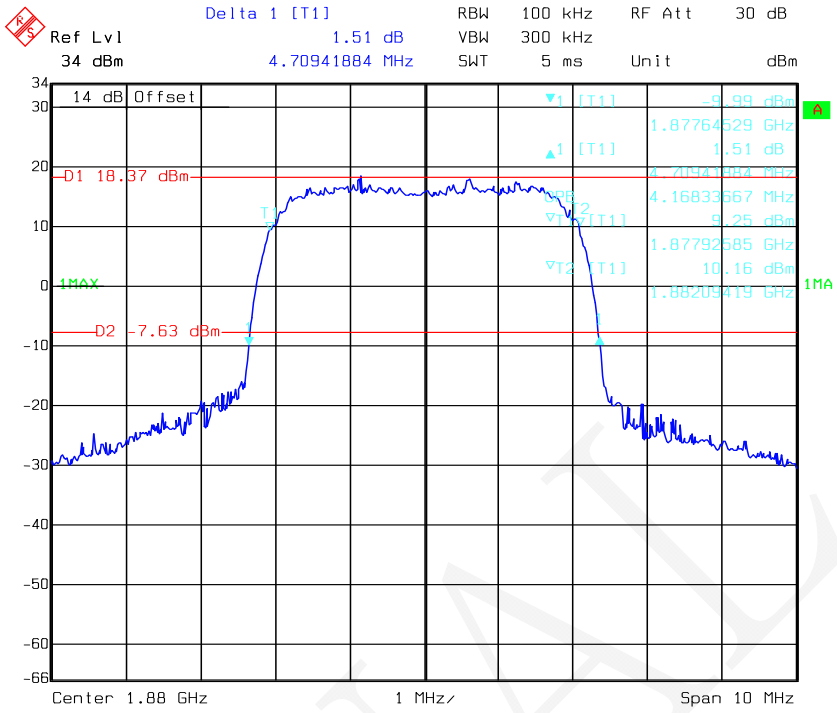
REL99 Band II



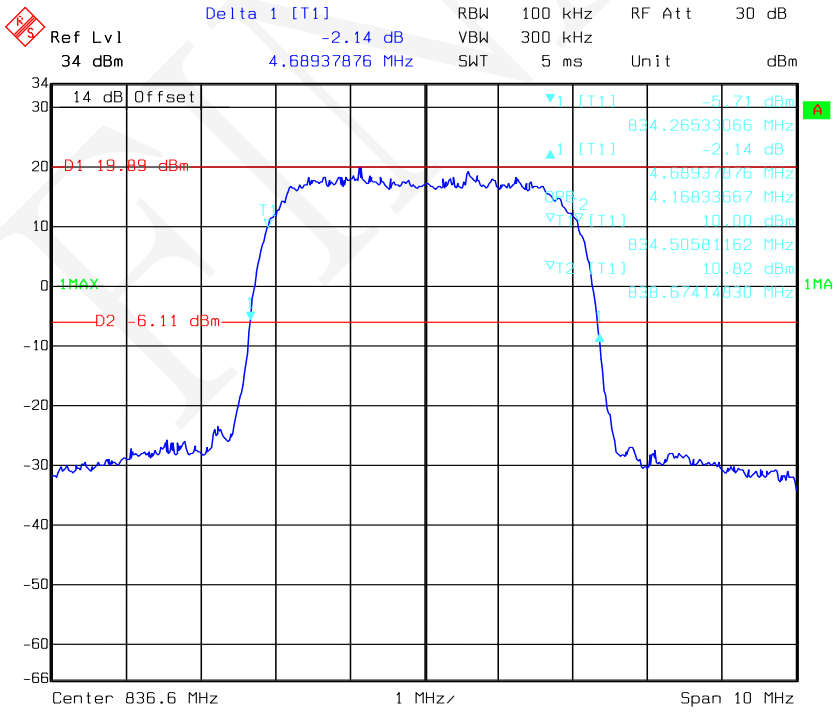
HSDPA Band II



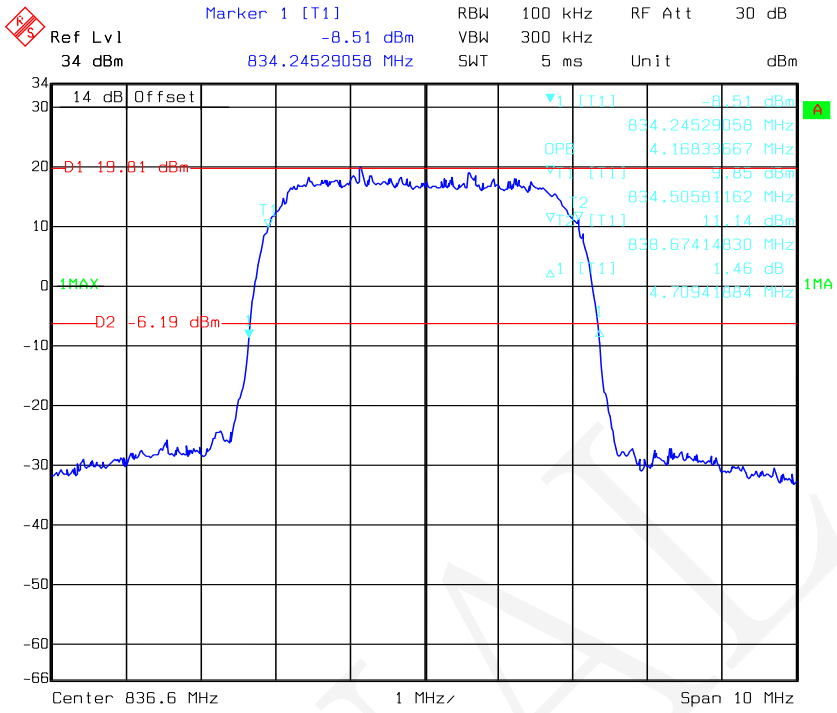
HSUPA Band II



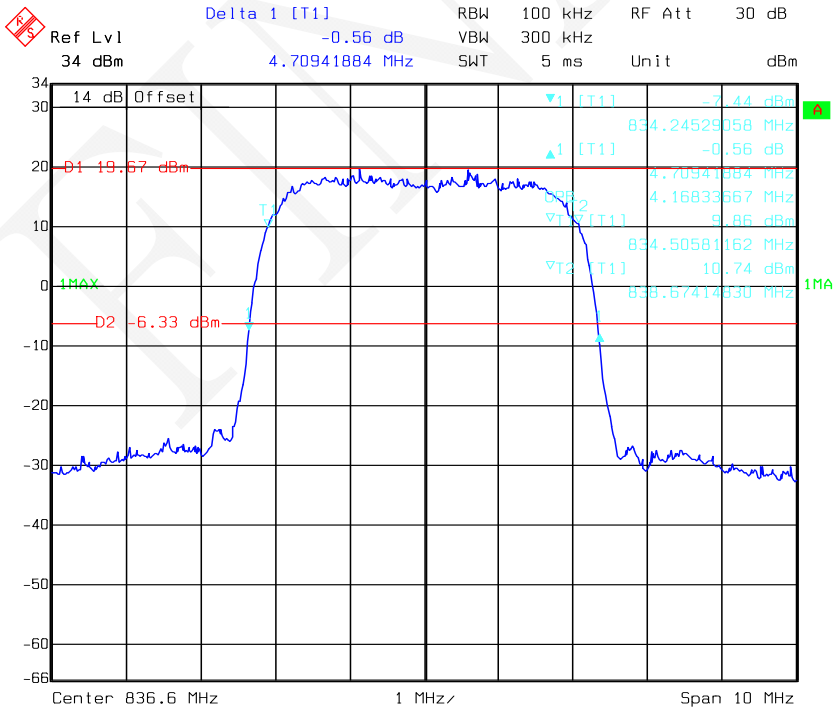
REL99 Band V



HSDPA Band V



HSUPA Band V



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

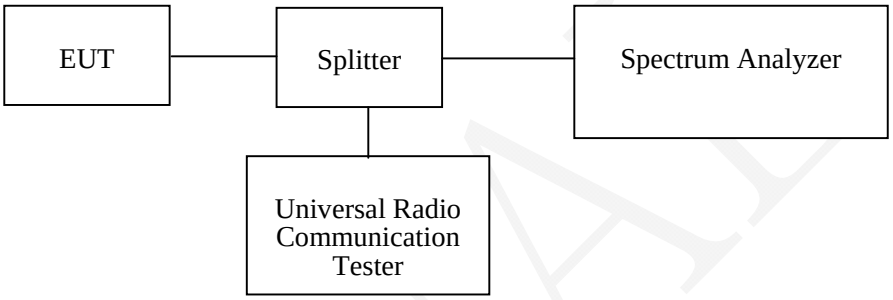
Applicable Standard

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
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
Unknown	RF Attenuator	10dB	10dB-2	Each Time	/
Unknown	RF Cable	Unknown	C-2	Each Time	/
Unknown	Two-way Spliter	Unknown	OE0120121	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

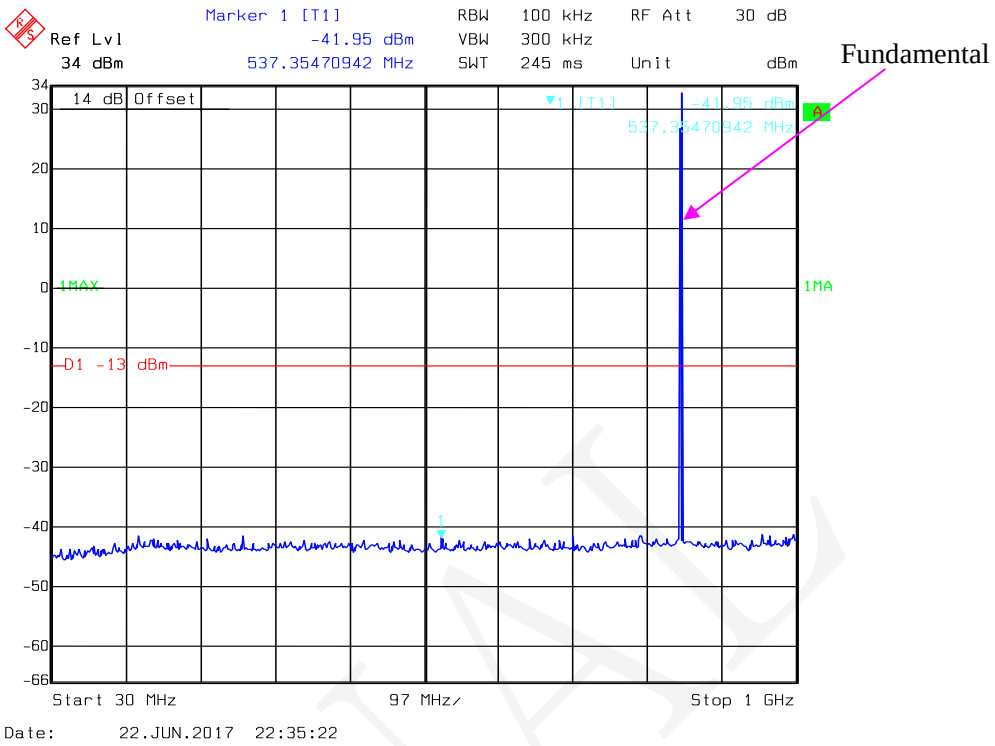
Temperature:	28.2 ~ 29.1 °C
Relative Humidity:	43.6 ~ 56.4 %
ATM Pressure:	100.1 kPa

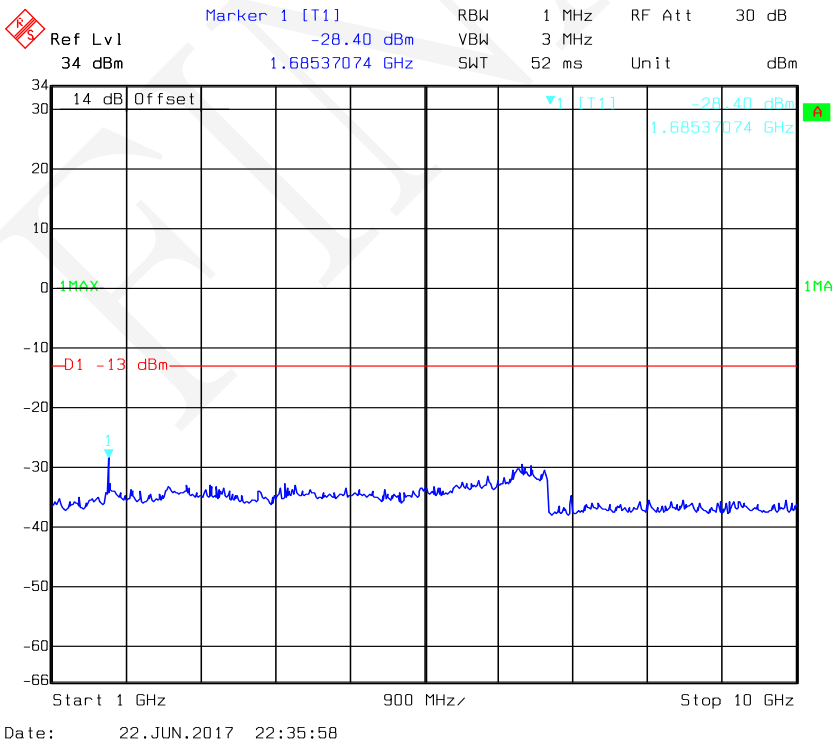
The testing was performed by Tom Tang on 2017-06-22 & 2017-06-23.

Please refer to the following plots.

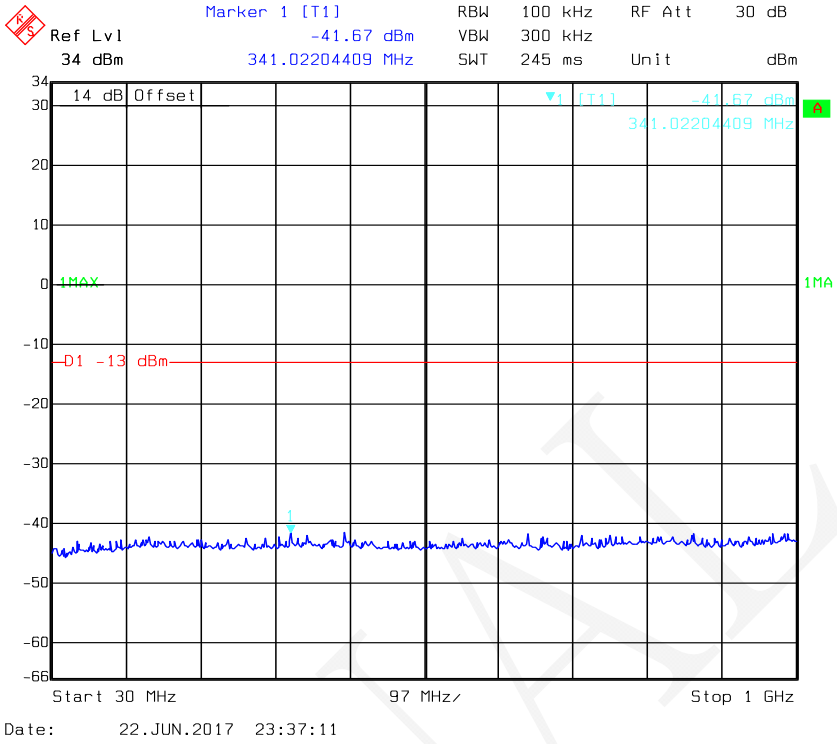
FINAL

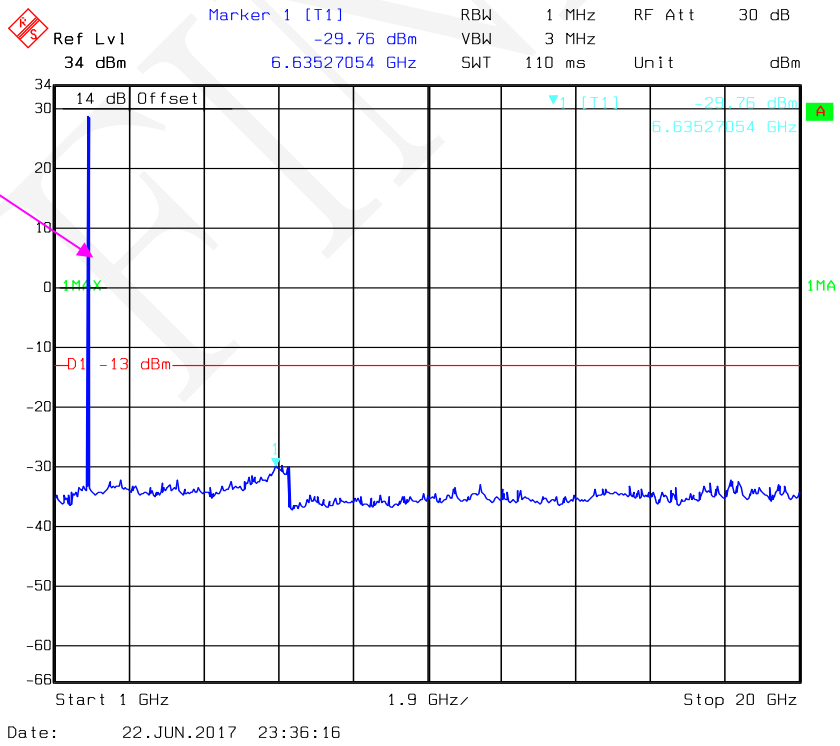
GSM850_Middle Channel





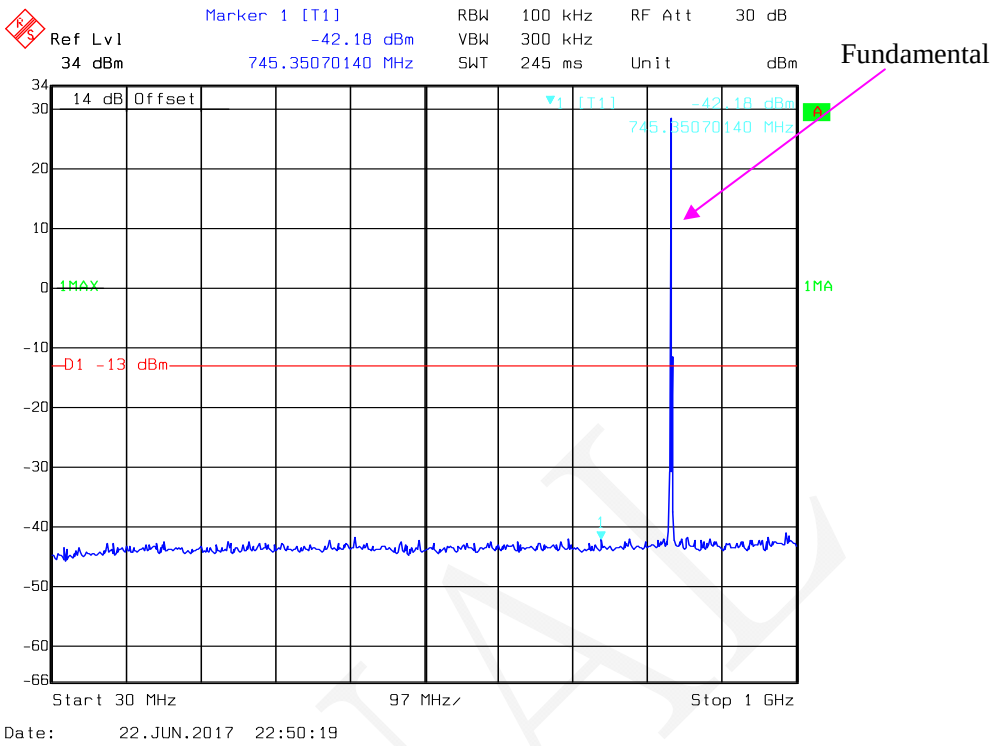
PCS 1900_ Middle Channel

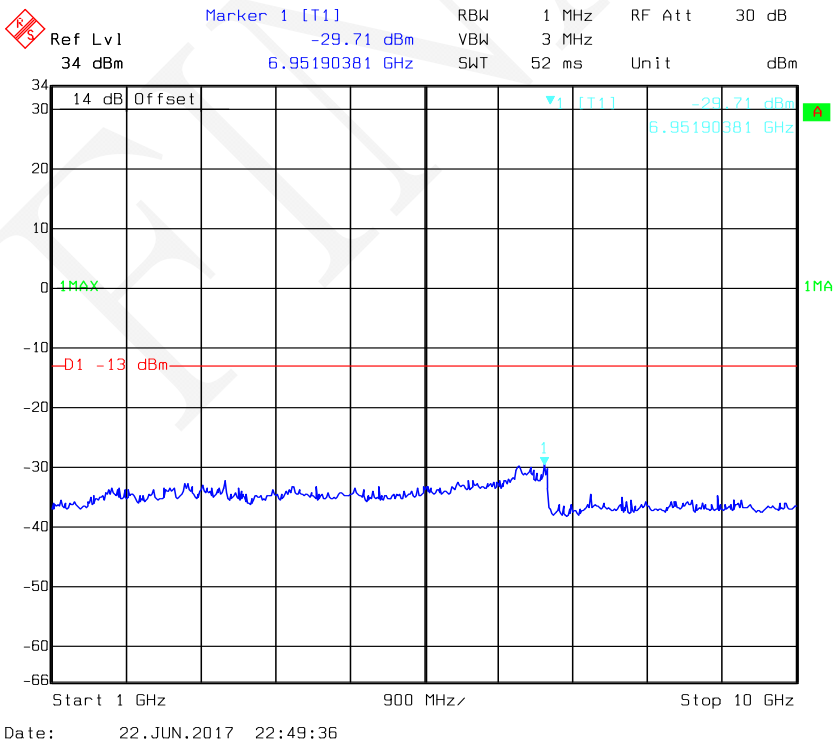




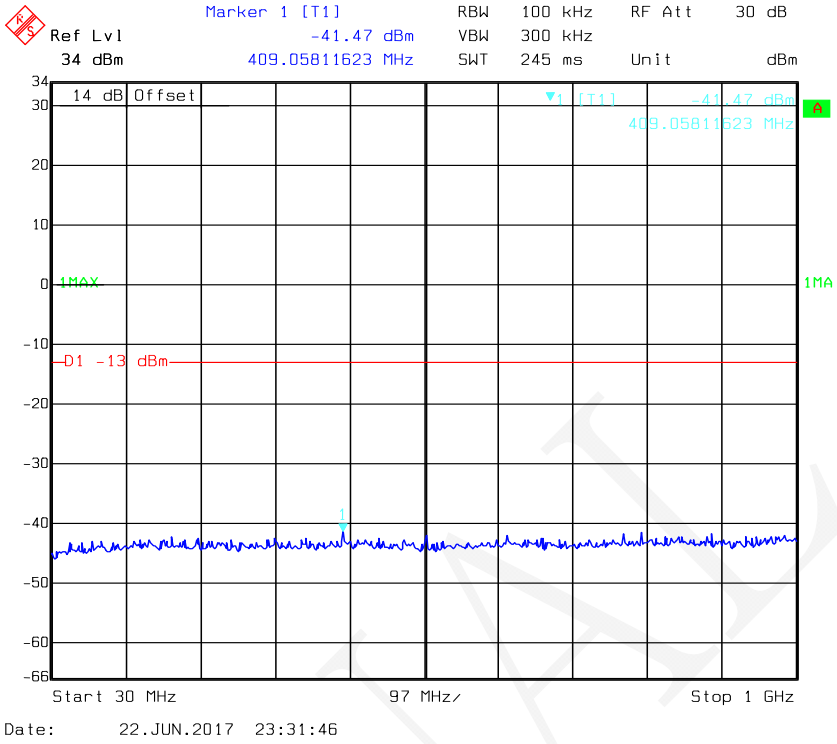
Fundamental

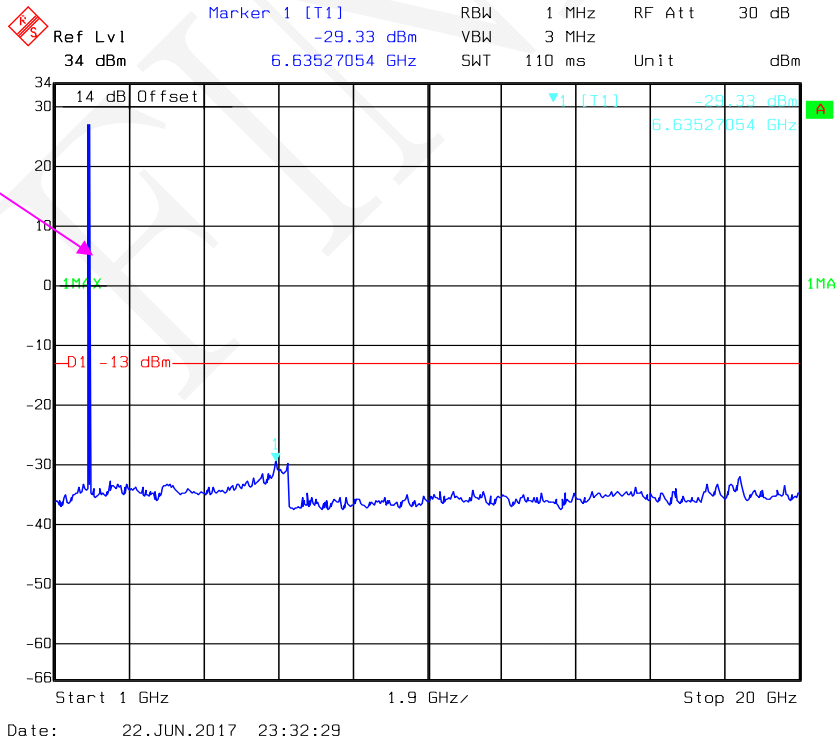
EDGE850_Middle Channel





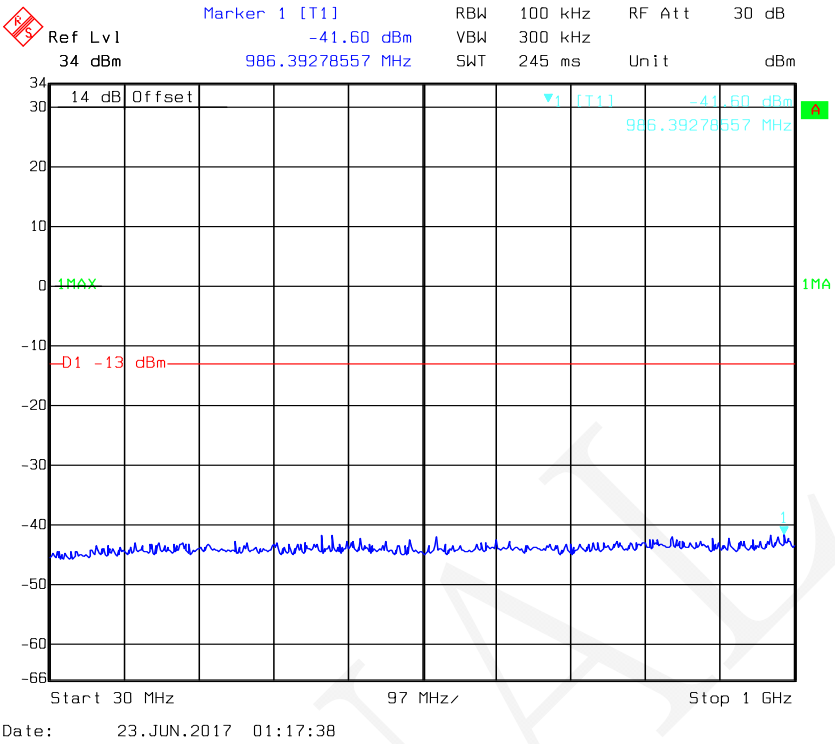
EDGE 1900_ Middle Channel

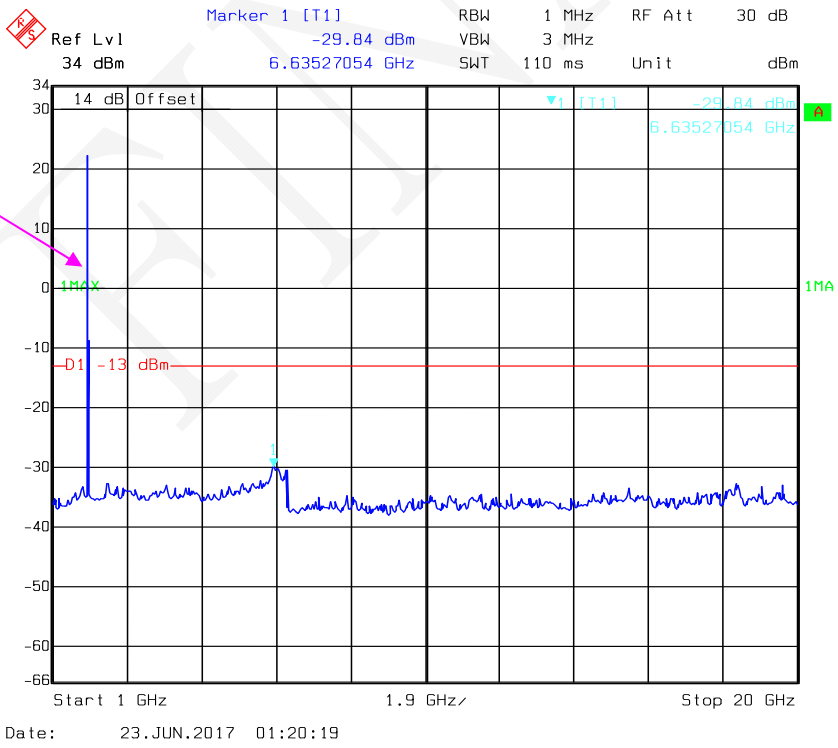




Fundamental

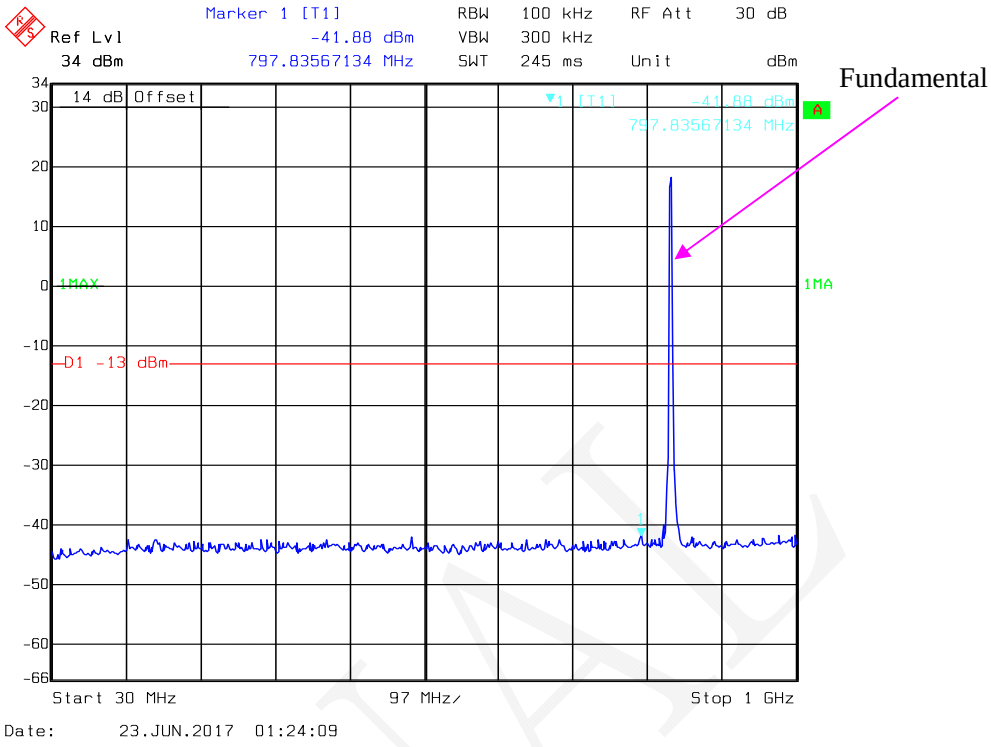
REL99 Band II_ Middle Channel

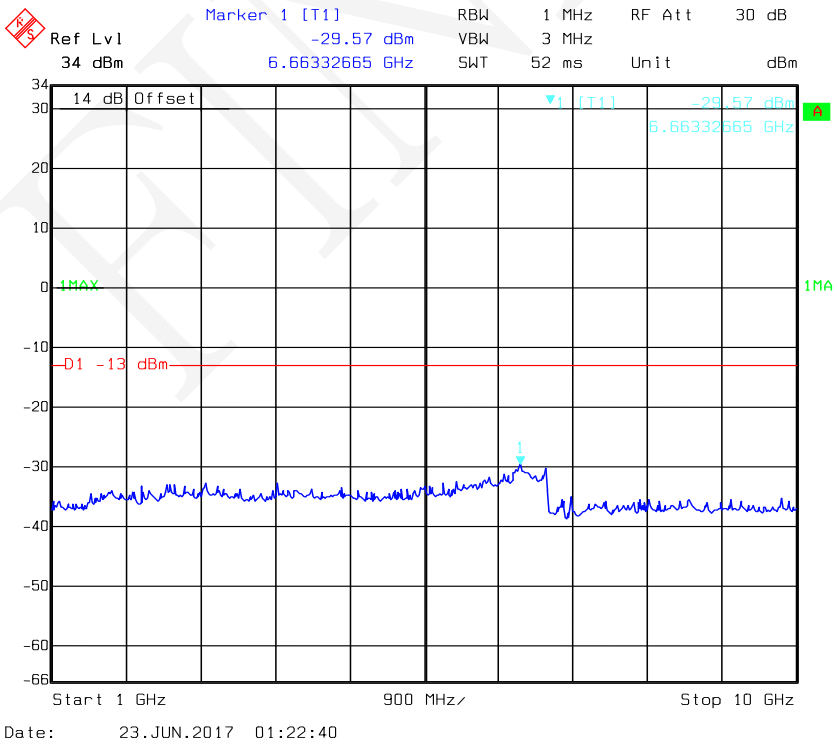




Fundamental

REL99 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)

FINAL

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	6751	2017-06-16	2020-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2017-05-23	2018-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2017-05-23	2018-05-22
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2017-05-20	2018-05-19
HP	Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1315	2016-08-18	2017-08-18
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1312	2016-08-18	2017-08-18

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	27.9 °C
Relative Humidity:	48.1 %
ATM Pressure:	100.1 kPa

The testing was performed by Tom Tang on 2017-06-25.

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)			
GSM850, Frequency:836.600 MHz								
1673.200	H	57.29	-45.8	7.9	0.8	-38.7	-13.0	25.7
1673.200	V	54.13	-47.2	7.9	0.8	-40.1	-13.0	27.1
2509.800	H	55.40	-44.4	8.9	1.3	-36.8	-13.0	23.8
2509.800	V	52.77	-44.8	8.9	1.3	-37.2	-13.0	24.2
735.900	H	39.24	-65.6	0.0	0.6	-66.2	-13.0	53.2
746.700	V	40.28	-65.4	0.0	0.6	-66.0	-13.0	53.0
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	52.15	-51	7.9	0.8	-43.9	-13.0	30.9
1673.200	V	49.75	-51.6	7.9	0.8	-44.5	-13.0	31.5
2509.800	H	54.09	-45.7	8.9	1.3	-38.1	-13.0	25.1
2509.800	V	51.82	-45.7	8.9	1.3	-38.1	-13.0	25.1
464.500	H	40.14	-70.9	0.0	0.4	-71.3	-13.0	58.3
473.700	V	39.30	-69.9	0.0	0.4	-70.3	-13.0	57.3

PCS Band

30MHz-20GHz:

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)			
GSM1900, Frequency:1880.000 MHz								
3760.000	H	53.90	-41	8.8	1.4	-33.6	-13.0	20.6
3760.000	V	51.38	-43.5	8.8	1.4	-36.1	-13.0	23.1
5640.000	H	52.71	-40.4	10.3	1.8	-31.9	-13.0	18.9
5640.000	V	49.46	-43.7	10.3	1.8	-35.2	-13.0	22.2
687.500	H	40.03	-65.4	0.0	0.6	-66.0	-13.0	53.0
690.200	V	41.35	-65.2	0.0	0.6	-65.8	-13.0	52.8
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	49.12	-45.8	8.8	1.4	-38.4	-13.0	25.4
3760.000	V	46.06	-48.8	8.8	1.4	-41.4	-13.0	28.4
5640.000	H	51.45	-41.7	10.3	1.8	-33.2	-13.0	20.2
5640.000	V	50.63	-42.5	10.3	1.8	-34.0	-13.0	21.0
464.500	H	39.97	-71.1	0.0	0.4	-71.5	-13.0	58.5
473.700	V	41.21	-68	0.0	0.4	-68.4	-13.0	55.4

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 = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

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

Applicable Standard

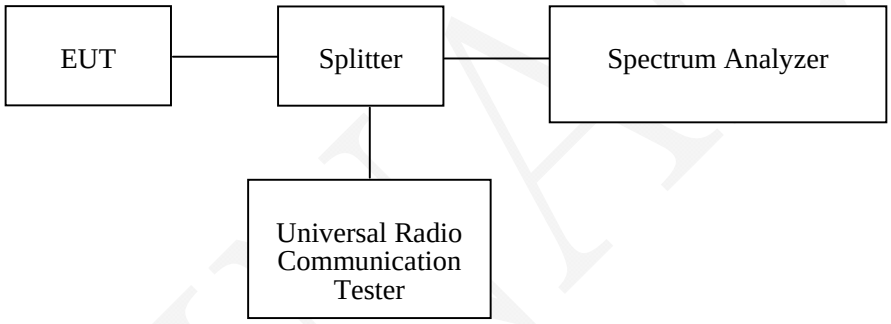
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
Unknown	RF Attenuator	10dB	10dB-2	Each Time	/
Unknown	RF Cable	Unknown	C-2	Each Time	/
Unknown	Two-way Spliter	Unknown	OE0120121	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	28.2 ~ 29.1 °C
Relative Humidity:	43.6 ~ 56.4 %
ATM Pressure:	100.1 kPa

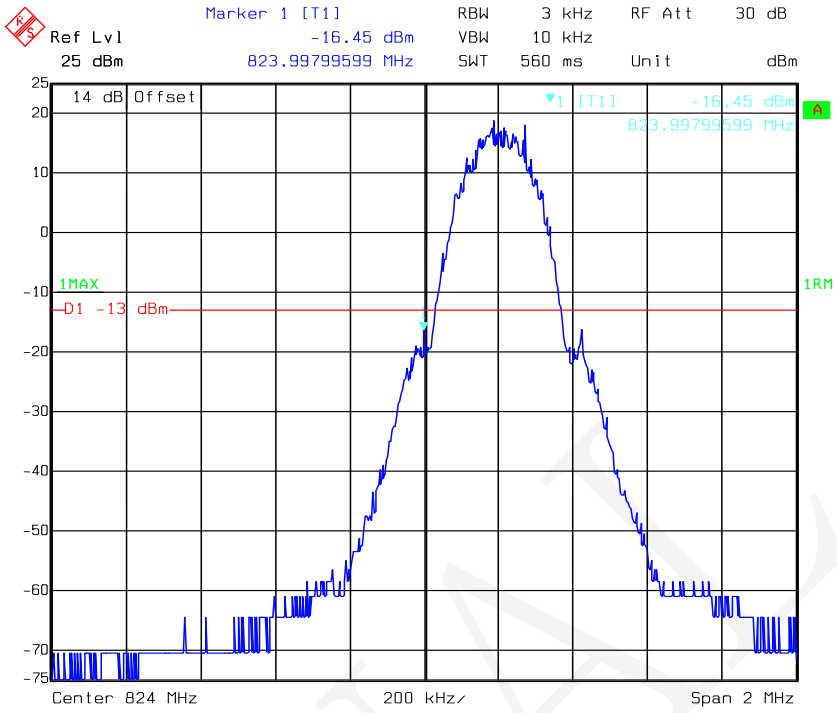
The testing was performed by Tom Tang on 2017-06-22 & 2017-06-23.

Test Mode: Transmitting

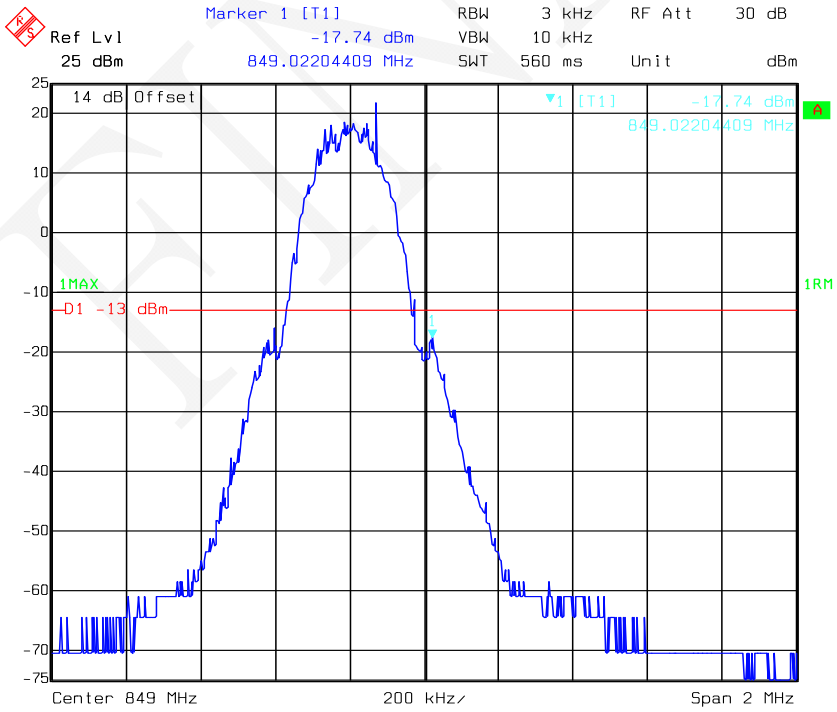
Test Result: Compliant. Please refer to the following plots.

FINAL

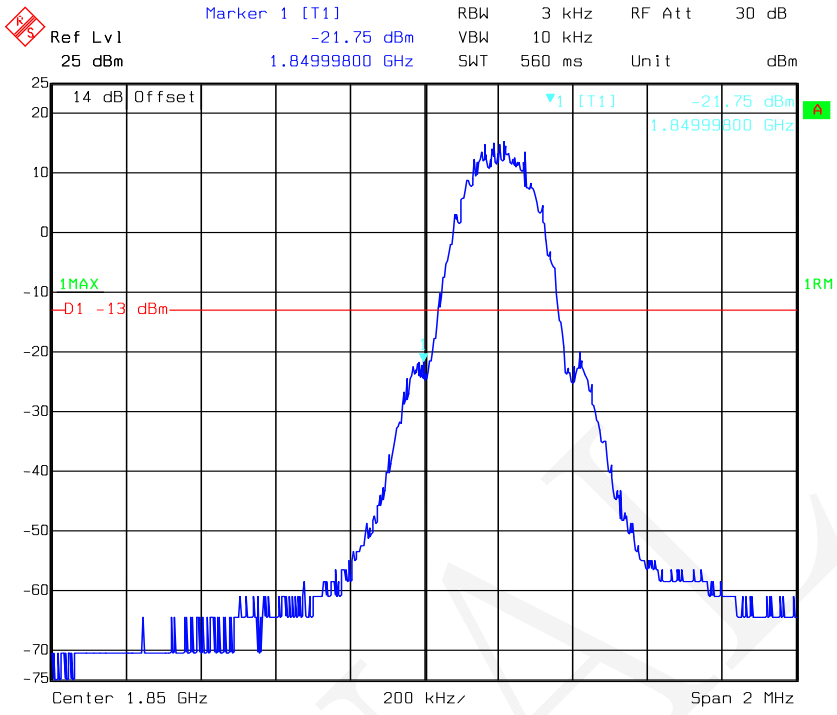
GSM 850, Left Band Edge



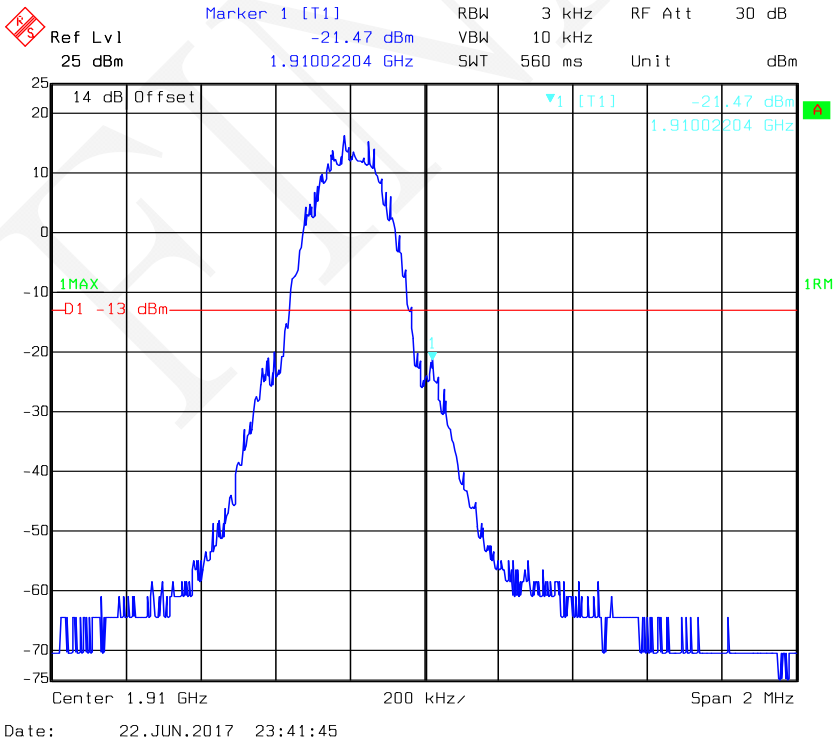
GSM 850, Right Band Edge



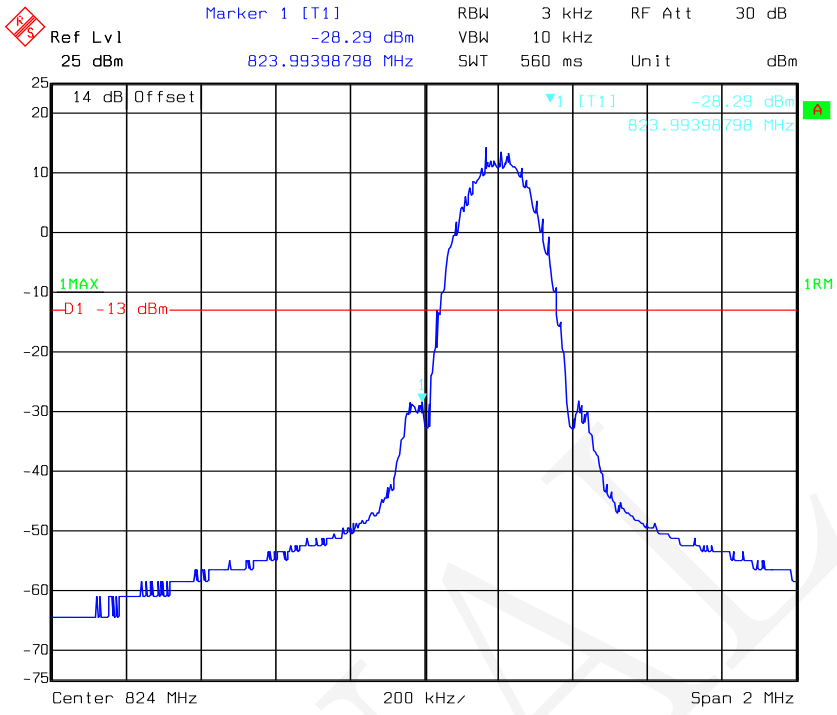
GSM 1900, Left Band Edge



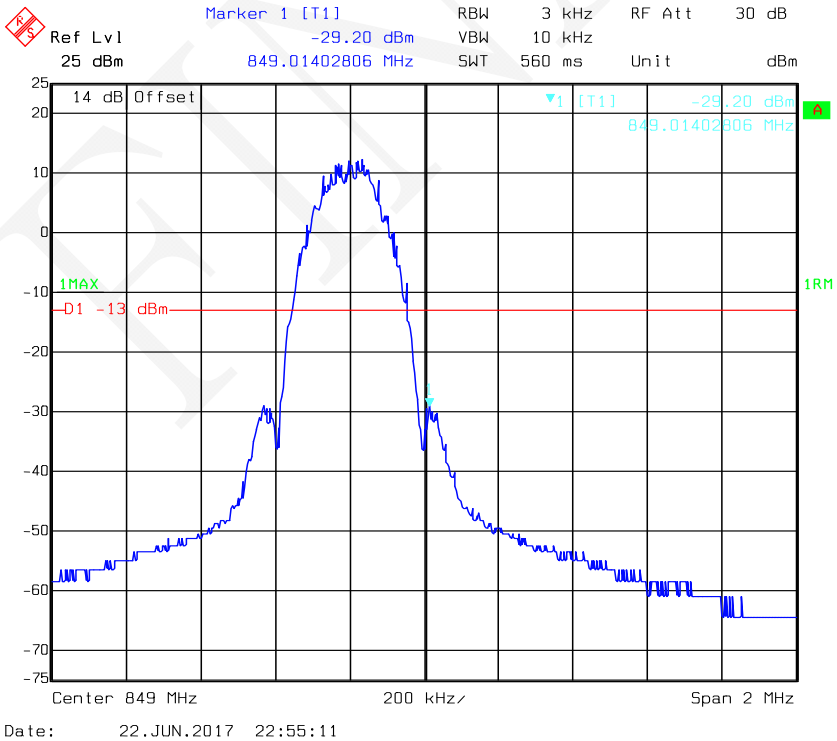
GSM 1900, Right Band Edge



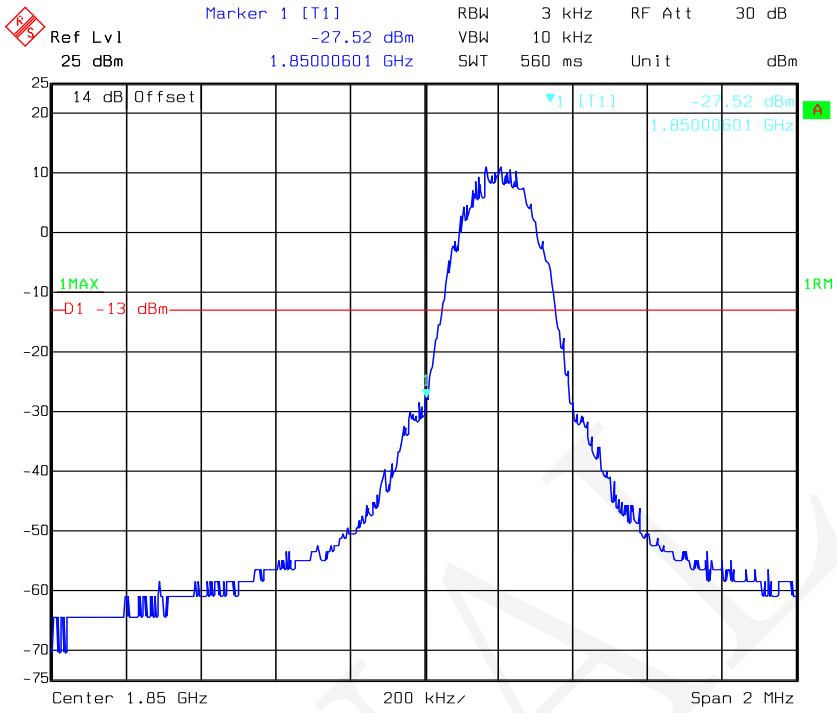
EDGE 850, Left Band Edge



EDGE 850, Right Band Edge

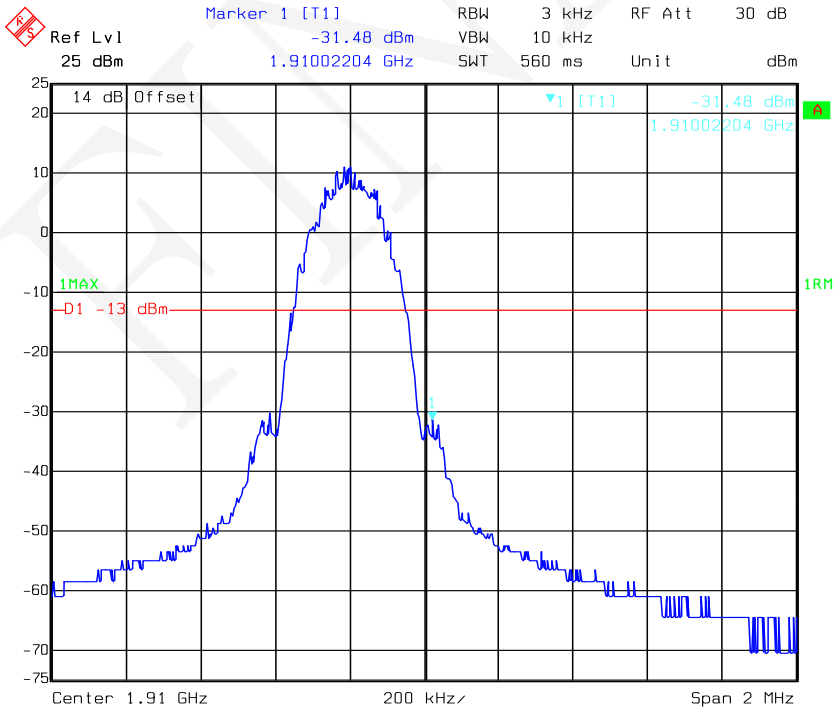


EDGE 1900, Left Band Edge



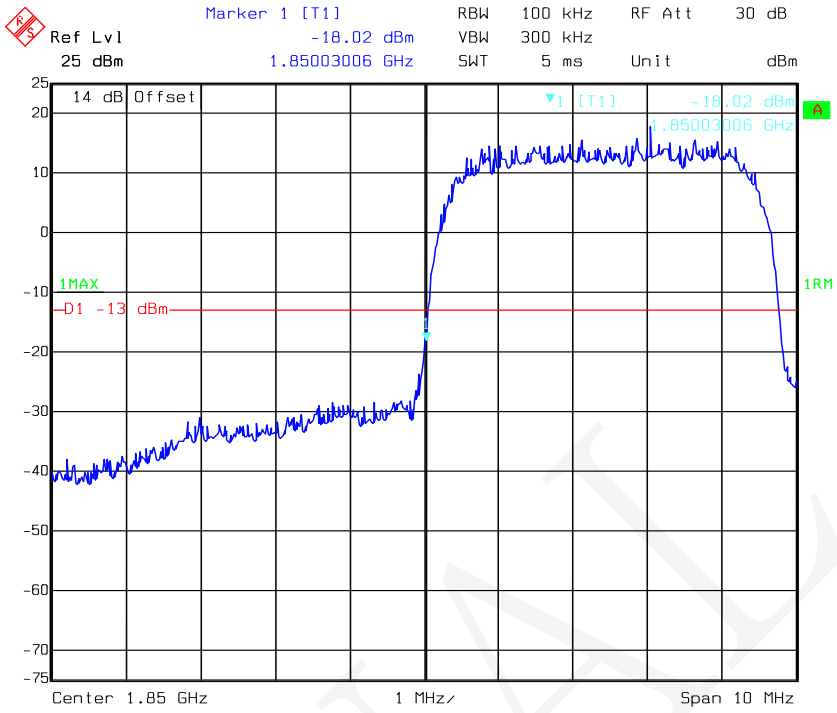
Date: 22.JUN.2017 23:27:06

EDGE 1900, Right Band Edge

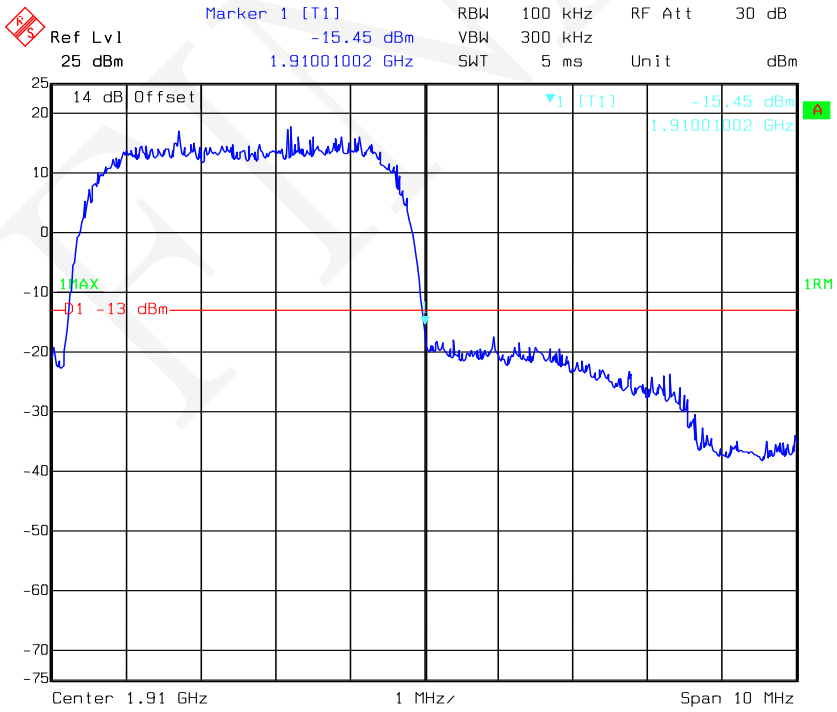


Date: 22.JUN.2017 23:28:59

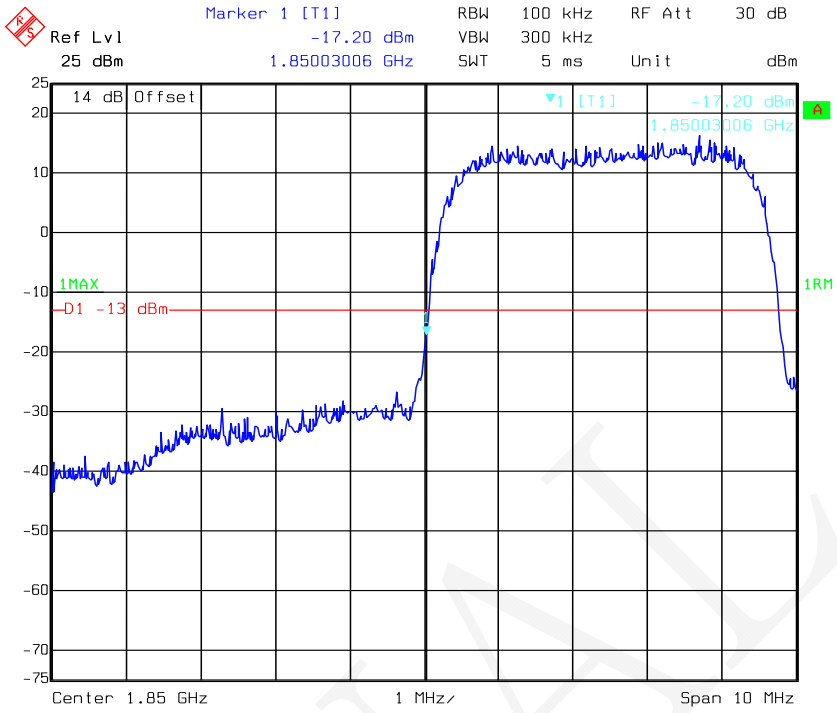
REL99 Band II, Left Band Edge



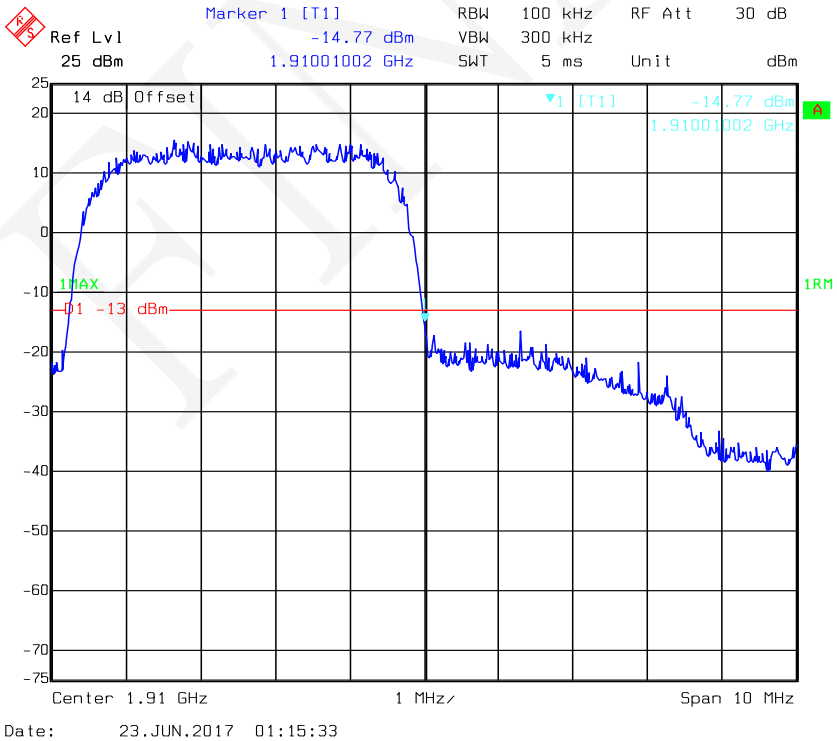
REL99 Band II, Right Band Edge



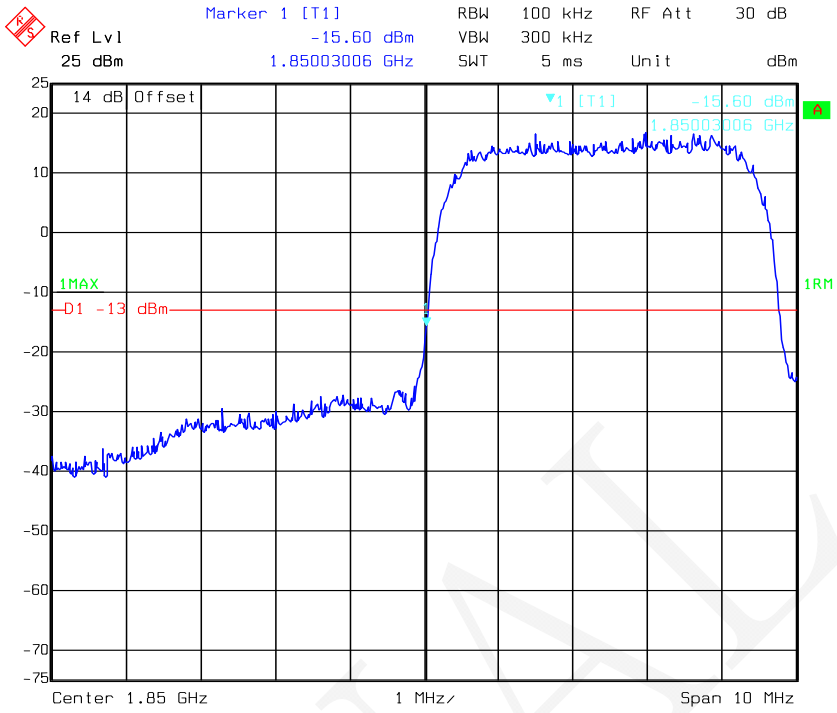
HSDPA Band II, Left Band Edge



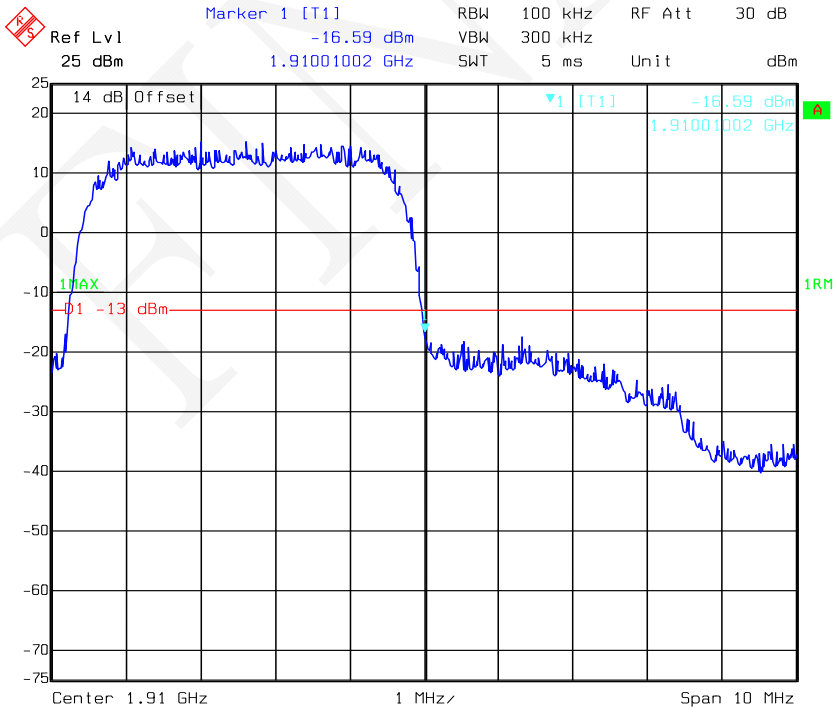
HSDPA Band II, Right Band Edge



HSUPA Band II, Left Band Edge

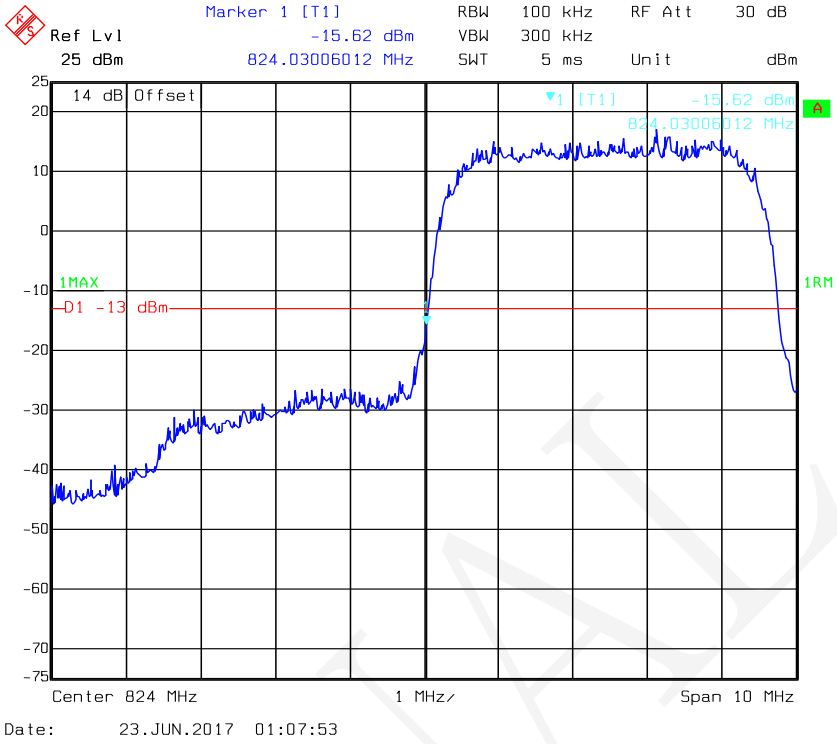


HSUPA Band II, Right Band Edge

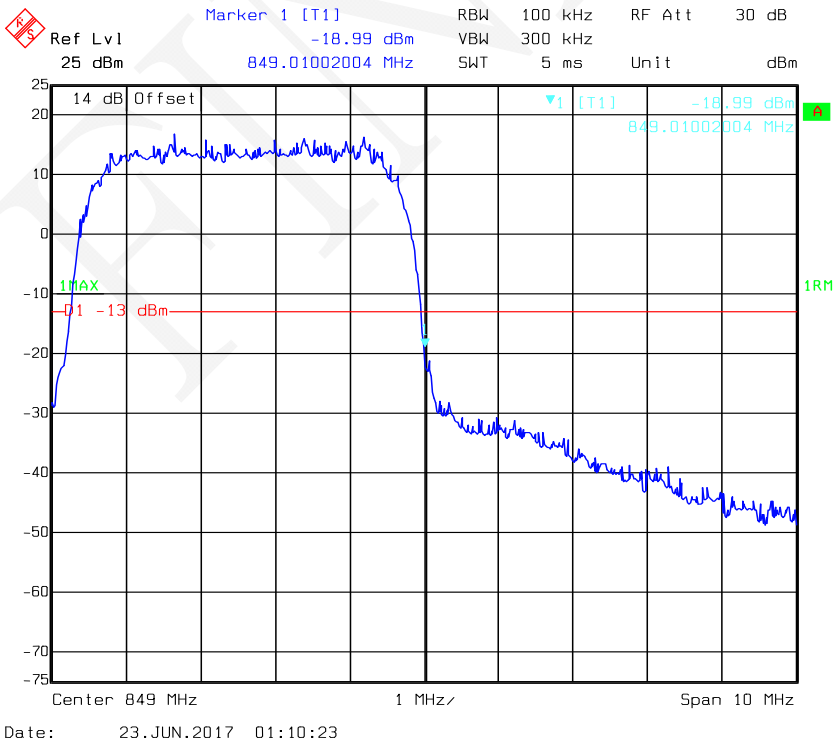


WCDMA Band V

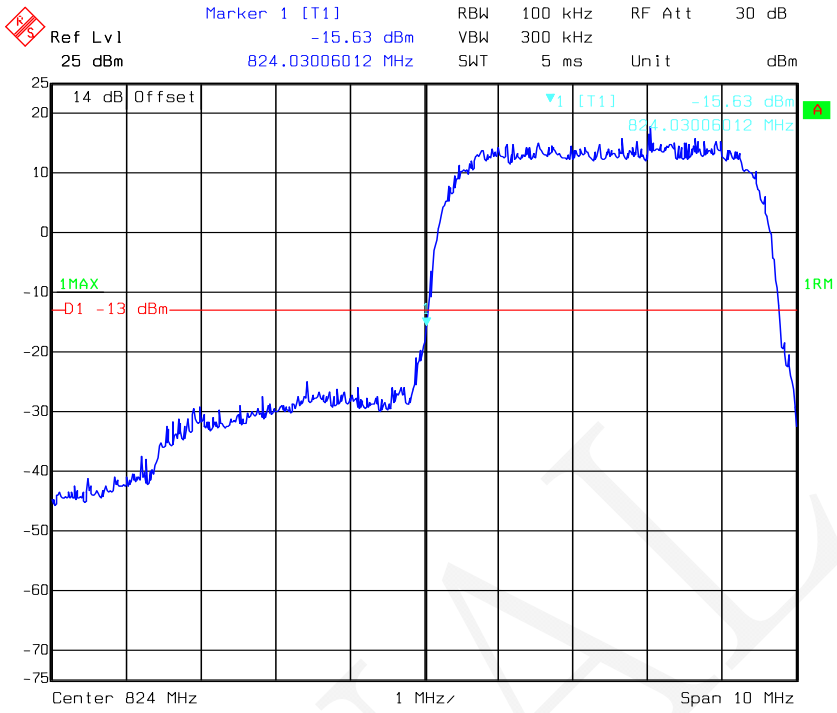
REL99 Band V, Left Band Edge



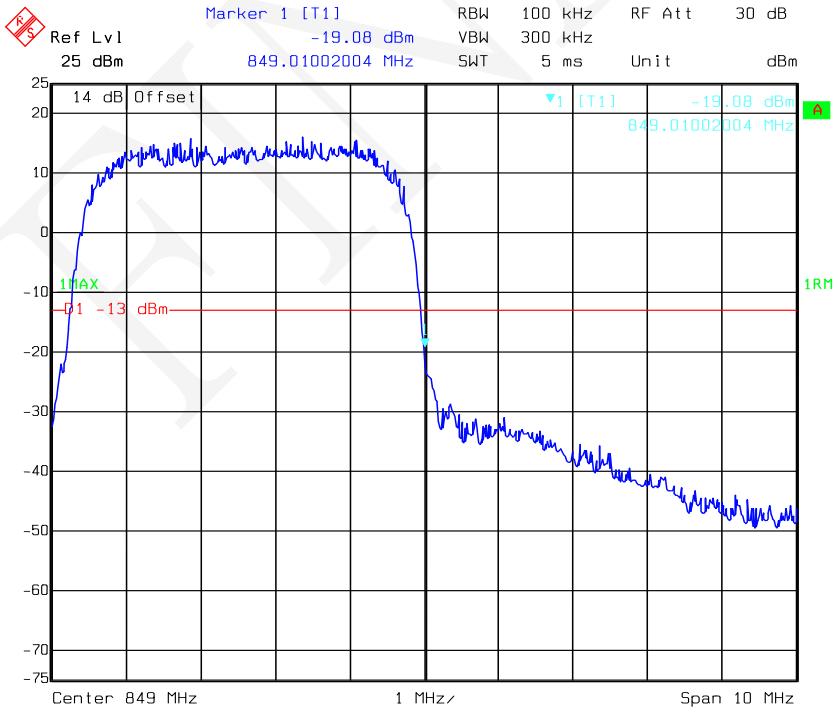
REL99 Band V Right Band Edge



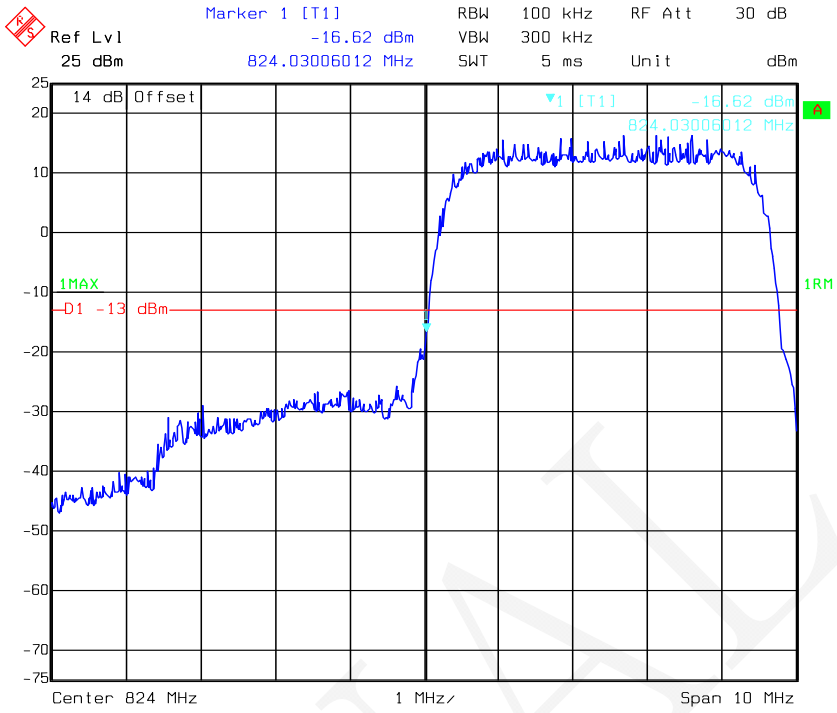
HSDPA Band V, Left Band Edge



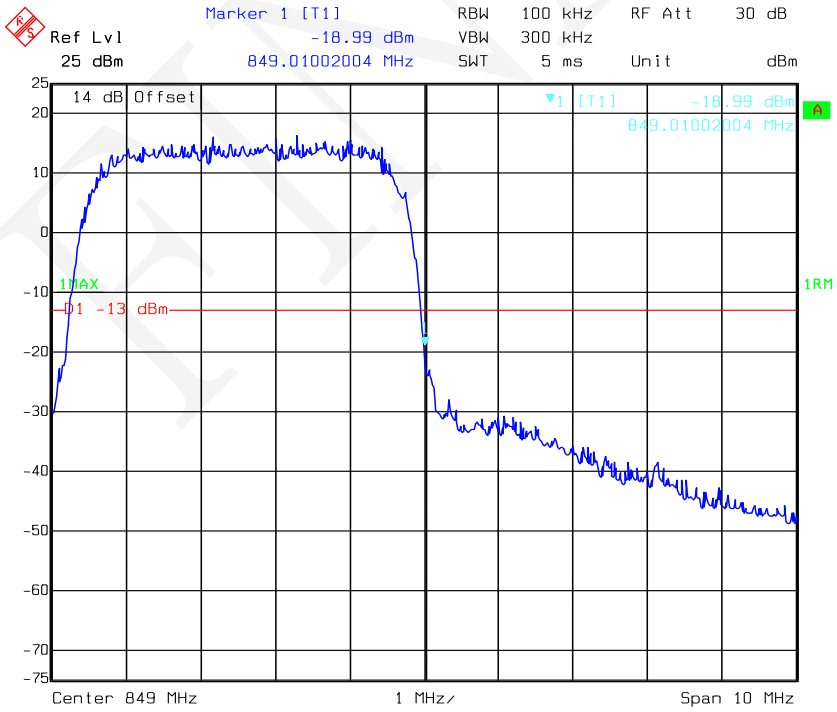
HSDPA Band V, Right Band Edge



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

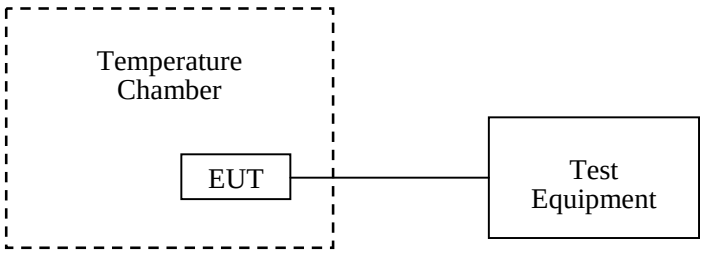
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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 to 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
FLUKE	Multimeter	1587	27870099	2016-12-30	2017-12-29
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-02	2017-12-01
R&S	Universal Radio Communication Tester	CMU200	11-9435686-111	2016-07-28	2017-07-27
Unknown	RF Attenuator	10dB	10dB-2	Each Time	/
Unknown	RF Cable	Unknown	C-2	Each Time	/

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B “Implementation of traceability policy in accredited laboratories”.

Test Data

Environmental Conditions

Temperature:	28.2 °C
Relative Humidity:	56.4 %
ATM Pressure:	100.1 kPa

The testing was performed by Tom Tang on 2017-06-23.

FINAL

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	-10	-0.012	2.5
-20	3.7	-10	-0.012	2.5
-10	3.7	-6	-0.007	2.5
0	3.7	-10	-0.012	2.5
10	3.7	1	0.001	2.5
20	3.7	1	0.001	2.5
30	3.7	-11	-0.013	2.5
40	3.7	-2	-0.002	2.5
50	3.7	-4	-0.005	2.5
25	3.5	-7	-0.008	2.5
25	4.2	-7	-0.008	2.5

Cellular Band (Part 22H)

EDGE, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	9	0.011	2.5
-20	3.7	-8	-0.010	2.5
-10	3.7	-4	-0.005	2.5
0	3.7	5	0.006	2.5
10	3.7	3	0.004	2.5
20	3.7	2	0.002	2.5
30	3.7	10	0.012	2.5
40	3.7	6	0.007	2.5
50	3.7	3	0.004	2.5
25	3.5	9	0.011	2.5
25	4.2	1	0.001	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	3.7	3	0.002	Pass
-20	3.7	-2	-0.001	Pass
-10	3.7	-7	-0.004	Pass
0	3.7	-6	-0.003	Pass
10	3.7	1	0.001	Pass
20	3.7	-1	-0.001	Pass
30	3.7	-6	-0.003	Pass
40	3.7	2	0.001	Pass
50	3.7	-2	-0.001	Pass
25	3.5	2	0.001	Pass
25	4.2	-8	-0.004	Pass

PCS Band (Part 24E)

EDGE1900, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	-6	-0.003	Pass
-20	3.7	-14	-0.007	Pass
-10	3.7	1	0.001	Pass
0	3.7	-1	-0.001	Pass
10	3.7	-12	-0.006	Pass
20	3.7	-16	-0.009	Pass
30	3.7	-8	-0.004	Pass
40	3.7	2	0.001	Pass
50	3.7	-13	-0.007	Pass
25	3.5	-13	-0.007	Pass
25	4.2	2	0.001	Pass

WCDMA Band V REL99 :

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	3	0.004	2.5
-20	3.7	11	0.013	2.5
-10	3.7	2	0.002	2.5
0	3.7	-1	-0.001	2.5
10	3.7	10	0.012	2.5
20	3.7	9	0.011	2.5
30	3.7	4	0.005	2.5
40	3.7	9	0.011	2.5
50	3.7	5	0.006	2.5
25	3.5	3	0.004	2.5
25	4.2	-1	-0.001	2.5

WCDMA Band II REL99 :

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	-6	-0.003	Pass
-20	3.7	-3	-0.002	Pass
-10	3.7	0	0.000	Pass
0	3.7	-2	-0.001	Pass
10	3.7	-2	-0.001	Pass
20	3.7	-7	-0.004	Pass
30	3.7	0	0.000	Pass
40	3.7	-11	-0.006	Pass
50	3.7	1	0.001	Pass
25	3.5	-1	-0.001	Pass
25	4.2	3	0.002	Pass

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	4	0.005	2.5
-20	3.7	4	0.005	2.5
-10	3.7	13	0.016	2.5
0	3.7	10	0.012	2.5
10	3.7	5	0.006	2.5
20	3.7	5	0.006	2.5
30	3.7	3	0.004	2.5
40	3.7	9	0.011	2.5
50	3.7	2	0.002	2.5
25	3.5	14	0.017	2.5
25	4.2	11	0.013	2.5

WCDMA Band Ⅱ HSDPA:

Middle Channel, f_c = 1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	-3	-0.002	Pass
-20	3.7	-3	-0.002	Pass
-10	3.7	3	0.002	Pass
0	3.7	5	0.003	Pass
10	3.7	3	0.002	Pass
20	3.7	7	0.004	Pass
30	3.7	4	0.002	Pass
40	3.7	-6	-0.003	Pass
50	3.7	2	0.001	Pass
25	3.5	8	0.004	Pass
25	4.2	-4	-0.002	Pass

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	5	0.006	2.5
-20	3.7	4	0.005	2.5
-10	3.7	5	0.006	2.5
0	3.7	3	0.004	2.5
10	3.7	7	0.008	2.5
20	3.7	11	0.013	2.5
30	3.7	11	0.013	2.5
40	3.7	3	0.004	2.5
50	3.7	6	0.007	2.5
25	3.5	11	0.013	2.5
25	4.2	10	0.012	2.5

WCDMA Band Ⅱ HSUPA:

Middle Channel, f_c = 1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	-3	-0.002	Pass
-20	3.7	-1	-0.001	Pass
-10	3.7	-4	-0.002	Pass
0	3.7	4	0.002	Pass
10	3.7	2	0.001	Pass
20	3.7	-4	-0.002	Pass
30	3.7	1	0.001	Pass
40	3.7	3	0.002	Pass
50	3.7	1	0.001	Pass
25	3.5	-8	-0.004	Pass
25	4.2	-8	-0.004	Pass

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