



TESTING LABORATORY
CERTIFICATE #4820.01



FCC PART 22H, PART 24E
FCC PART 27
MEASUREMENT AND TEST REPORT

For

MAXWEST COMMUNICATION LIMITED

ROOM 1802B FORTRESS TOWER 250 KING'S ROAD, NORTH POINT HONG KONG

FCC ID: 2ASP8NITRO4X

Report Type: Original Report	Product Type: Mobile Phone
Report Number:	RDG190401001-00D
Report Date:	2019-04-28
Reviewed By:	Jerry Zhang EMC Manager <i>Jerry Zhang</i>
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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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	5
MEASUREMENT UNCERTAINTY	5
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	12
TEST EQUIPMENT LIST AND DETAILS.....	16
TEST DATA	16
FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH	20
APPLICABLE STANDARD	20
TEST PROCEDURE	20
TEST EQUIPMENT LIST AND DETAILS.....	20
TEST DATA	20
FCC §2.1051, §22.917(A) & §24.238(A) & §27.53 - 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 & §27.53 - SPURIOUS RADIATED EMISSIONS	36
APPLICABLE STANDARD	36
TEST PROCEDURE	36
TEST EQUIPMENT LIST AND DETAILS.....	37
TEST DATA	37
FCC §22.917(A) & §24.238(A) & §27.53- 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& §27.54 - FREQUENCY STABILITY.....	52

APPLICABLE STANDARD52
TEST PROCEDURE52
TEST EQUIPMENT LIST AND DETAILS.....53
TEST DATA53

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	Mobile Phone
EUT Model:	Nitro 4X
Operation modes:	GSM Voice, GPRS Data, WCDMA(R99 (Voice+Data), HSDPA/HSUPA/HSPA+)
Operation Frequency:	GSM 850: 824-849 MHz(TX); 869-894 MHz(RX) PCS 1900: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) WCDMA Band 5: 824-849 MHz(TX); 869-894 MHz(RX)
Maximum Output Power: (Conducted)	GSM 850 : 31.50 dBm; PCS 1900: 29.60 dBm WCDMA Band 2: 23.93 dBm; WCDMA Band 4: 22.98 dBm WCDMA Band 5: 24.16 dBm
Modulation Type:	GMSK, QPSK, 16QAM
Rated Input Voltage:	DC3.8V from Battery or DC5V from adapter
Adapter#1 Information	Model: Nitro 4X
	Input: AC 100-240V, 50/60Hz, 0.5A
	Output: DC5V, 500mA
Adapter#2 Information	Model: SC/10WA050050US
	Input: AC 100-240V, 50/60Hz, 0.5A
	Output: DC5V, 500mA
External Dimension:	124.5 mm(L)*64 mm(W)*10 mm(H)
Serial Number:	190401001
EUT Received Date:	2019-04-02

Objective

This report is prepared on behalf of *MAXWEST COMMUNICATION LIMITED* in accordance with: Part 2-Subpart J, Part 22-Subpart H, Part 24-Subpart E and part 27 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 15C DSS submissions with FCC ID: 2ASP8NITRO4X
FCC Part 15C DTS submissions with FCC ID: 2ASP8NITRO4X

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
 Part 27 – Miscellaneous wireless communications services

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

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz: 5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1 °C
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

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 Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

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.

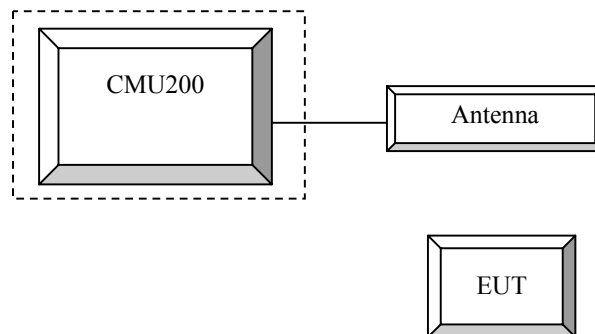
Equipment Modifications

No modification was made to the EUT.

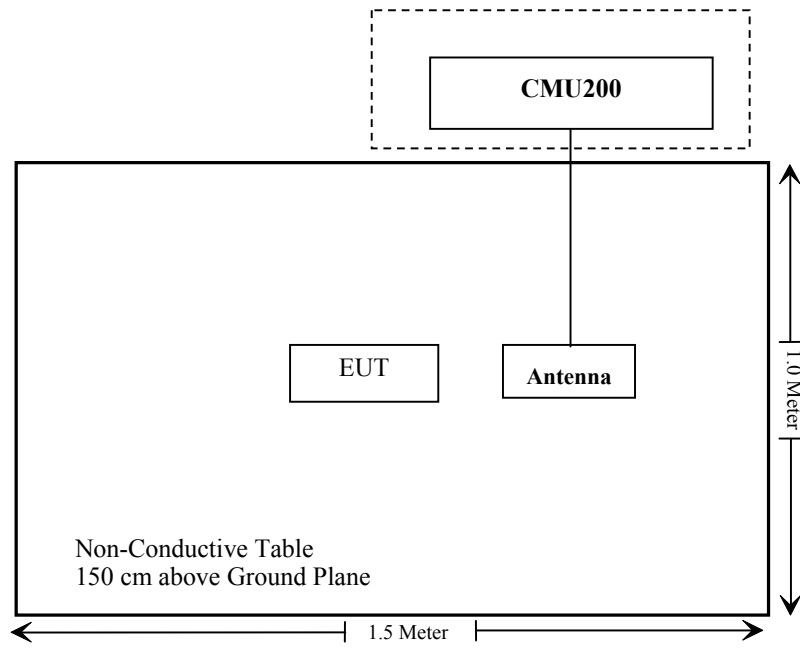
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	106 891
Un-known	ANTENNA	Un-known	/

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
FCC§1.1310, §2.1093	RF Exposure	Compliance
FCC§2.1046;§ 22.913 (a); § 24.232 (c);§27.50	RF Output Power	Compliance
FCC§ 2.1047	Modulation Characteristics	Not Applicable
FCC§ 2.1049; § 22.905 § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
FCC§ 2.1051, § 22.917 (a); § 24.238 (a); §27.53;	Spurious Emissions at Antenna Terminal	Compliance
FCC§ 2.1053 § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliance
FCC§ 22.917 (a); § 24.238 (a); §27.53;	Out of band emission, Band Edge	Compliance
FCC§ 2.1055 § 22.355; § 24.235; §27.54	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

FCC §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RDG190401001-20A.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E, Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC § 2.1046, § 22.913 (a) & § 24.232 (c) - RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

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.

According to §27.50

(a)(3) Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(c) (10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(d), (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(h),(2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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

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 General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	-
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
MPR(dB)	0	2	1	2	0	
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	$A_{hs}=\beta_{hs}/\beta_c$	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCI	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI 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_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105

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

DC-HSDPA

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2018-08-03	2019-08-03
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
R&S	Universal Radio Communication Tester	CMU200	106 891	2018-12-14	2019-12-14
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

* **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:	26.5 °C
Relative Humidity:	63 %
ATM Pressure:	100 kPa

* The testing was performed by Carrie He on 2019-04-11

Test Result: Compliance

Conducted Output Power

Cellular Band & PCS Band

Band	Channel No.	Conducted Peak Output Power (dBm)				
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
Cellular	128	31.50	31.45	29.79	28.39	26.85
	190	31.40	31.35	29.60	28.26	26.85
	251	31.40	31.26	29.49	28.10	26.59
PCS	512	29.60	29.45	28.52	27.73	26.46
	661	29.40	29.15	28.36	27.66	26.53
	810	29.30	28.86	28.24	27.51	26.40

WCDMA Band II

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	23.93	2.92	22.66	2.96	23.24	2.68
HSDPA	1	20.38	4.72	22.37	4.08	22.28	3.92
	2	20.55	4.98	22.64	4.24	22.17	4.17
	3	20.37	4.51	22.30	4.13	22.49	4.19
	4	20.37	4.47	22.11	4.11	22.40	3.73
HSUPA	1	20.83	5.36	22.22	4.68	22.28	5.12
	2	20.55	4.98	22.64	4.24	22.17	4.17
	3	20.59	4.22	22.21	4.34	22.52	4.06
	4	20.44	4.17	22.25	4.09	22.50	3.92
	5	20.14	4.34	22.34	4.08	22.65	3.48
HSPA+ (16QAM)	1	20.23	4.17	22.33	3.96	22.25	3.74

WCDMA Band IV

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.17	2.72	22.98	2.72	22.39	3.04
HSDPA	1	21.93	4.28	21.76	3.64	21.48	4.24
	2	21.65	4.41	22.02	3.61	21.76	4.32
	3	22.18	4.20	21.50	3.57	21.76	4.29
	4	22.18	4.19	21.82	3.66	21.71	4.47
HSUPA	1	21.72	5.00	21.81	4.36	21.37	5.72
	2	21.99	4.98	21.63	4.19	21.60	5.52
	3	21.97	4.86	21.82	4.66	21.25	5.93
	4	22.02	5.02	21.68	4.29	21.57	5.83
HSPA+ (16QAM)	1	21.99	4.83	21.50	4.51	21.41	5.66

WCDMA Band V

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	24.16	3.12	23.95	3.20	23.93	3.04
HSDPA	1	23.26	3.92	21.08	4.56	23.50	4.32
	2	23.55	3.62	20.83	4.45	23.22	4.53
	3	23.51	4.09	20.82	4.56	23.39	4.29
	4	23.30	3.70	20.98	4.44	23.61	4.03
HSUPA	1	23.56	4.96	21.43	5.92	23.19	4.24
	2	23.62	4.96	21.55	5.97	23.26	4.41
	3	23.28	4.78	21.69	5.81	22.97	4.23
	4	23.68	4.94	21.39	5.72	22.95	4.27
	5	23.61	4.94	21.48	5.67	23.12	4.01
HSPA+ (16QAM)	1	23.80	4.83	21.70	5.99	23.23	4.52

ERP & EIRP

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850 Middle Channel								
836.60	H	96.97	22.74	0.00	0.50	22.24	38.45	16.21
836.60	V	104.96	33.70	0.00	0.50	33.20	38.45	5.25
WCDMA Band V Middle Channel								
836.60	H	83.85	9.62	0.00	0.50	9.12	38.45	29.33
836.60	V	92.05	20.79	0.00	0.50	20.29	38.45	18.16

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM1900 Middle Channel								
1880.00	H	87.22	14.61	11.66	2.66	23.61	33.00	9.39
1880.00	V	88.53	16.06	11.66	2.66	25.06	33.00	7.94
WCDMA Band II Middle Channel								
1880.00	H	81.09	8.48	11.66	2.66	17.48	33.00	15.52
1880.00	V	81.47	9.00	11.66	2.66	18.00	33.00	15.00

Part 27

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band IV Middle Channel								
1732.60	H	84.69	10.64	10.90	2.51	19.03	30.00	10.97
1732.60	V	85.83	11.46	10.90	2.51	19.85	30.00	10.15

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

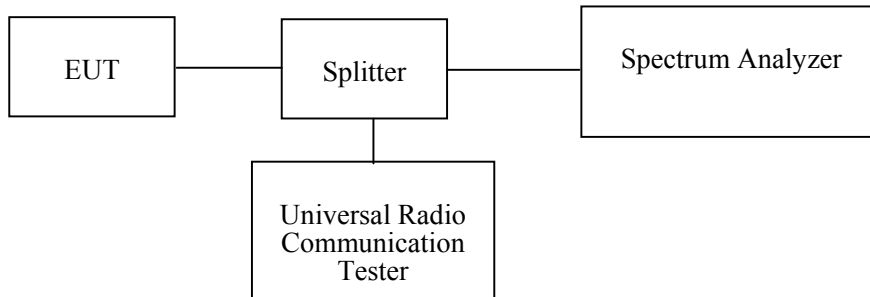
Applicable Standard

FCC §2.1049, §22.917, §22.905, §24.238, §27.53

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	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

* **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:	26.5 °C
Relative Humidity:	63 %
ATM Pressure:	100 kPa

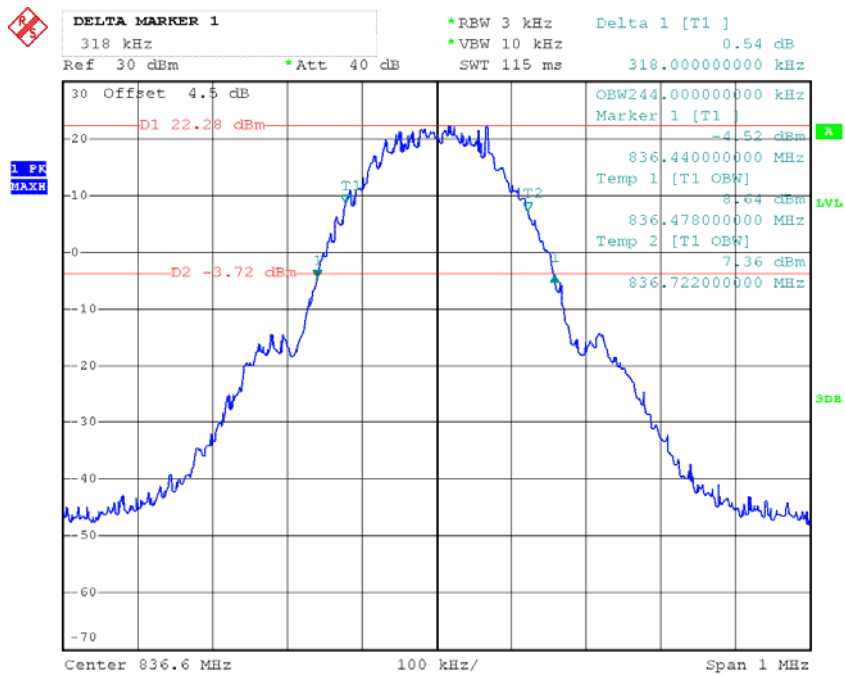
* The testing was performed by Carrie He on 2019-04-11

Test Mode: Transmitting

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

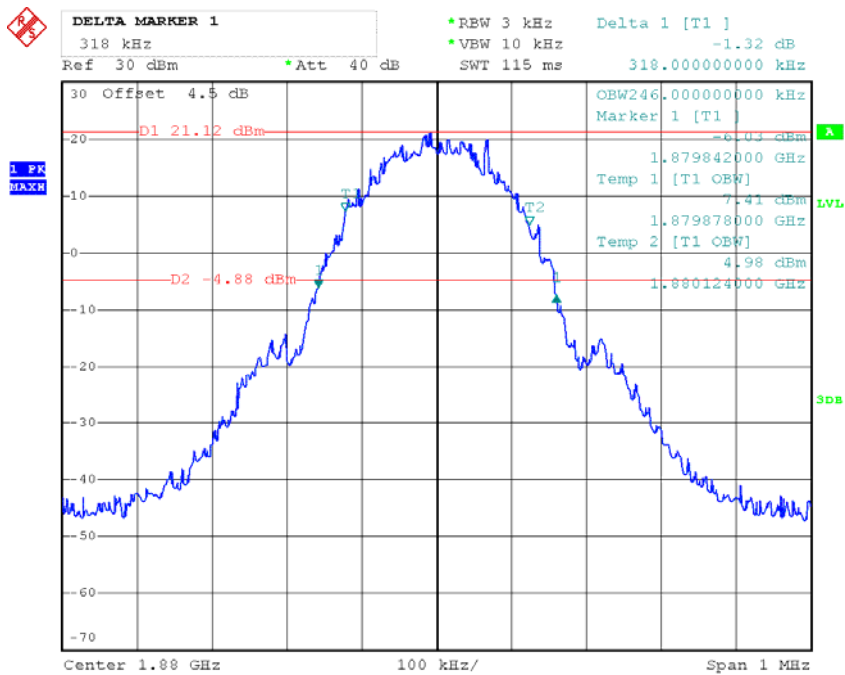
Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	Middle	GSM	0.244	0.318
PCS		GSM	0.246	0.318
WCDMA Band 2		Rel 99	4.160	4.700
		HSDPA	4.160	4.700
		HSUPA	4.160	4.700
WCDMA Band 4		Rel 99	4.140	4.700
		HSDPA	4.180	4.700
		HSUPA	4.160	4.720
WCDMA Band 5		Rel 99	4.160	4.680
		HSDPA	4.180	4.720
		HSUPA	4.180	4.720

GSM 850 Cellular Band



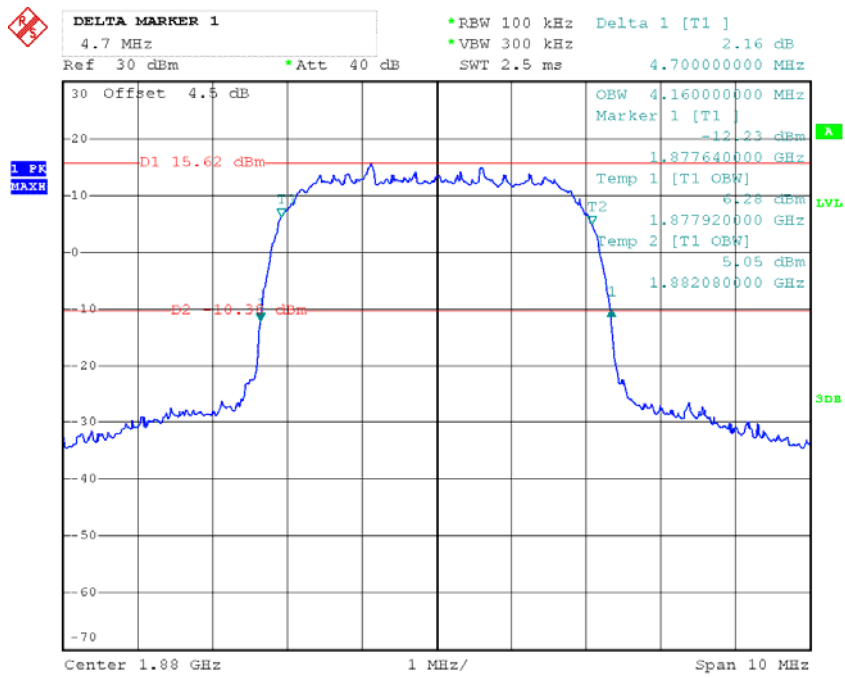
Date: 11.APR.2019 16:35:39

GSM PCS1900 Cellular Band



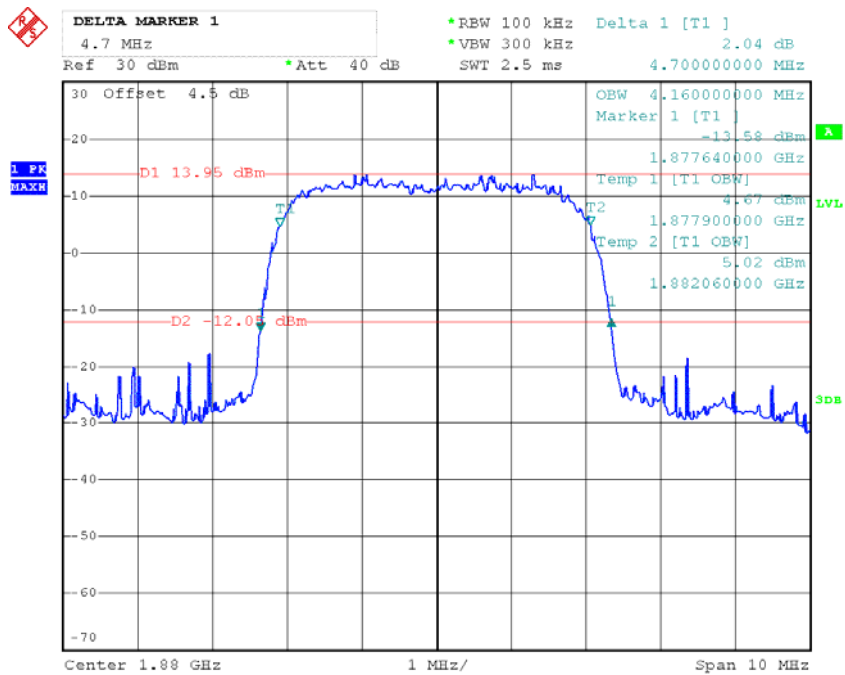
Date: 11.APR.2019 16:44:20

REL99 Band II



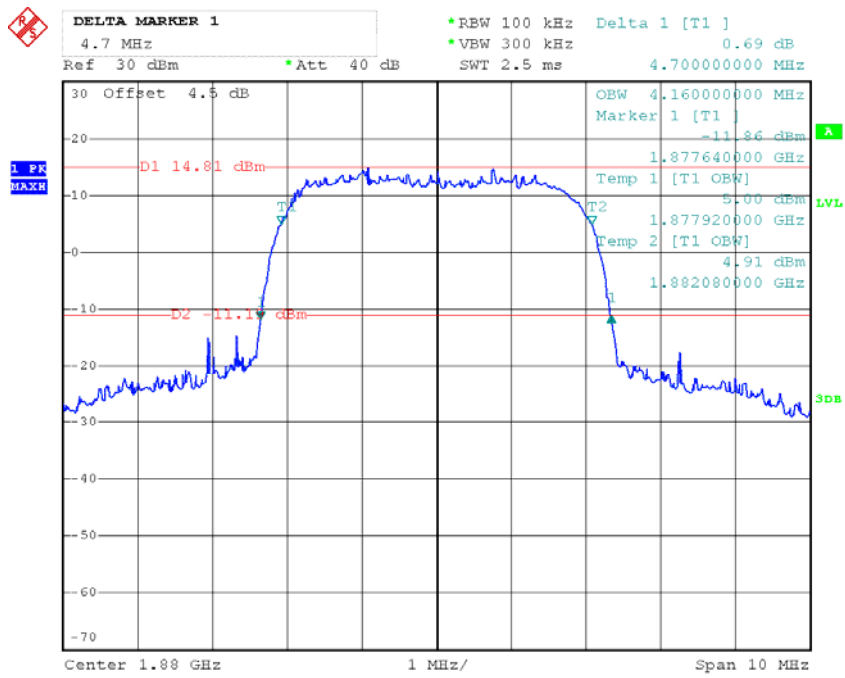
Date: 11.APR.2019 10:51:12

HSDPA Band II



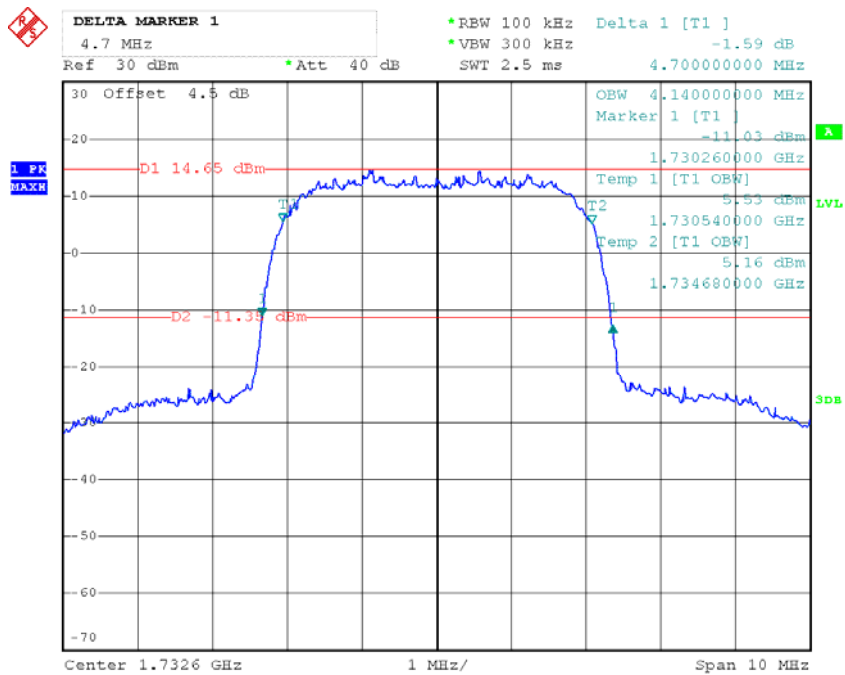
Date: 11.APR.2019 10:56:43

HSUPA Band II



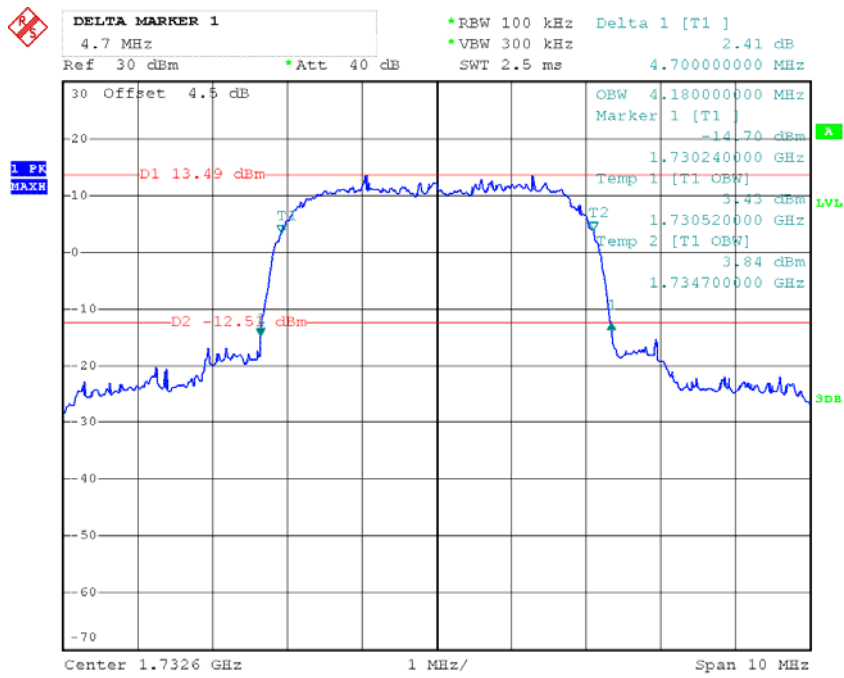
Date: 11.APR.2019 11:03:23

REL99 Band IV



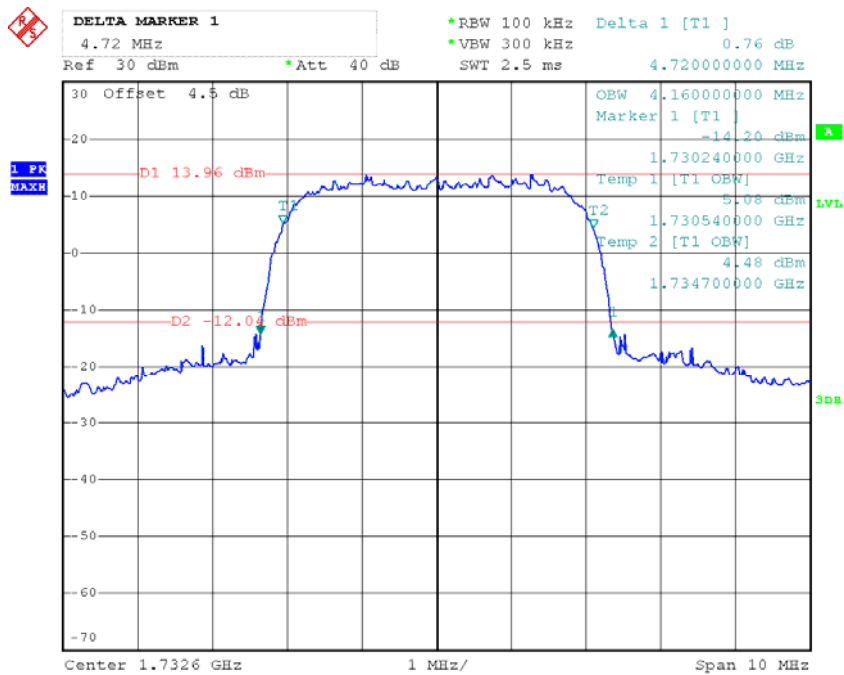
Date: 11.APR.2019 10:53:06

HSDPA Band IV



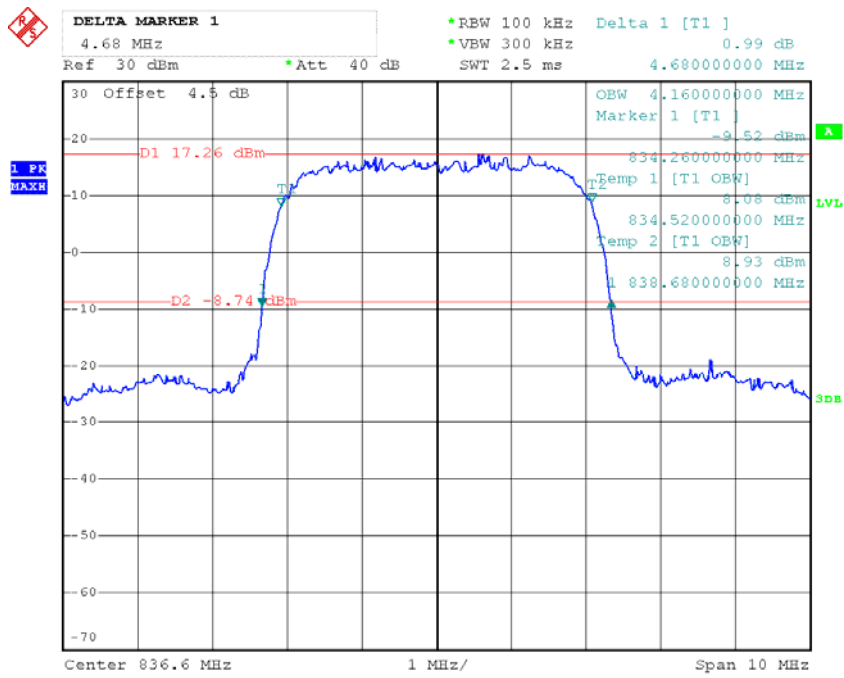
Date: 11.APR.2019 10:58:15

HSUPA Band IV



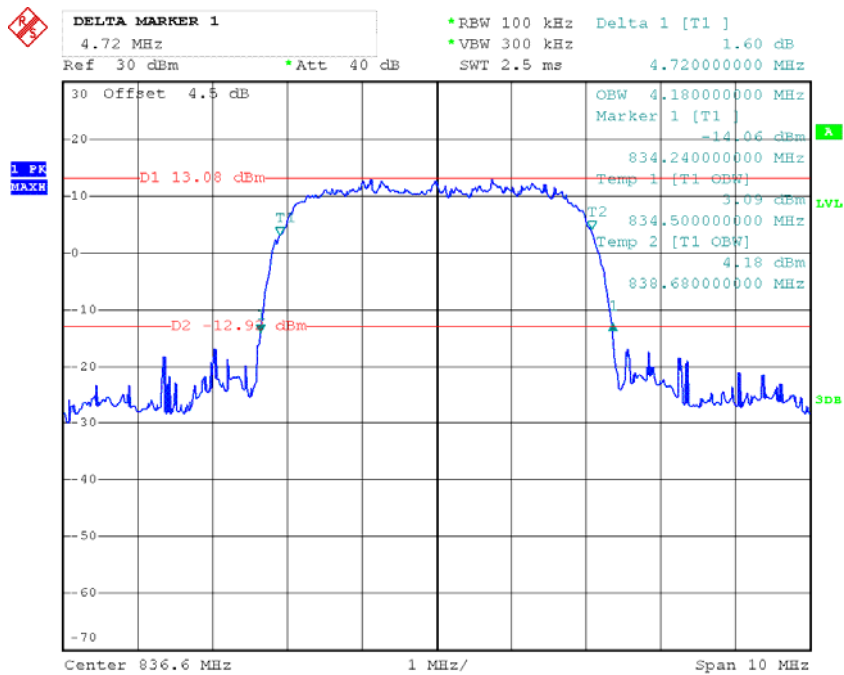
Date: 11.APR.2019 11:07:23

REL99 Band V



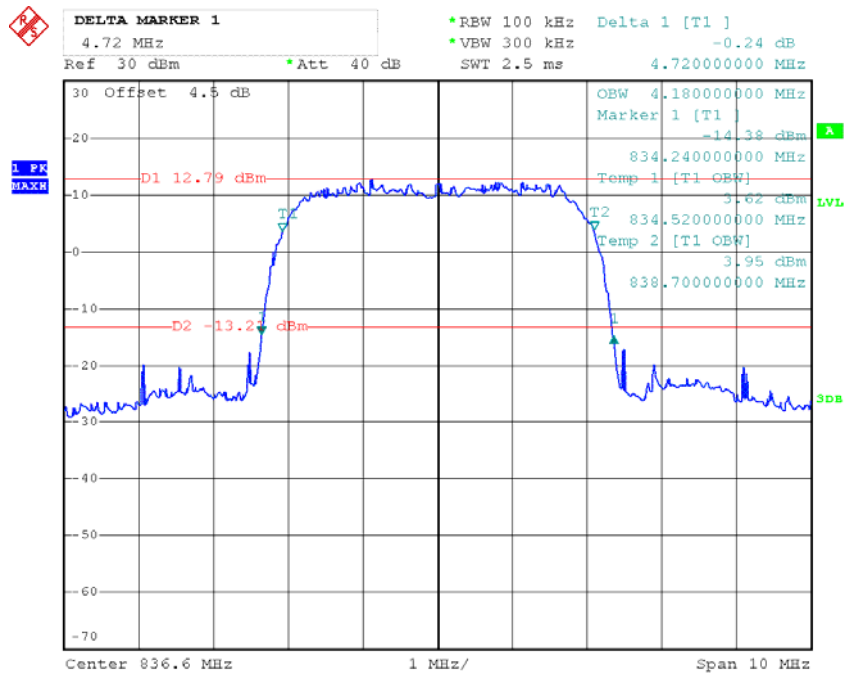
Date: 11.APR.2019 10:54:30

HSDPA Band V



Date: 11.APR.2019 11:00:05

HSUPA Band V



Date: 11.APR.2019 11:08:31

FCC §2.1051, §22.917(a) & §24.238(a) & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

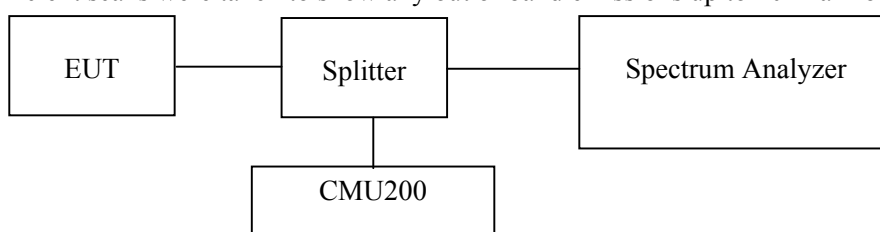
Applicable Standard

FCC §2.1051, §22.917(a) , §24.238(a), §27.53.

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	FSU 26	200256	2019-01-04	2020-01-04
R&S	EMI Test Receiver	ESPI	100120	2018-12-10	2019-12-10
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

* **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

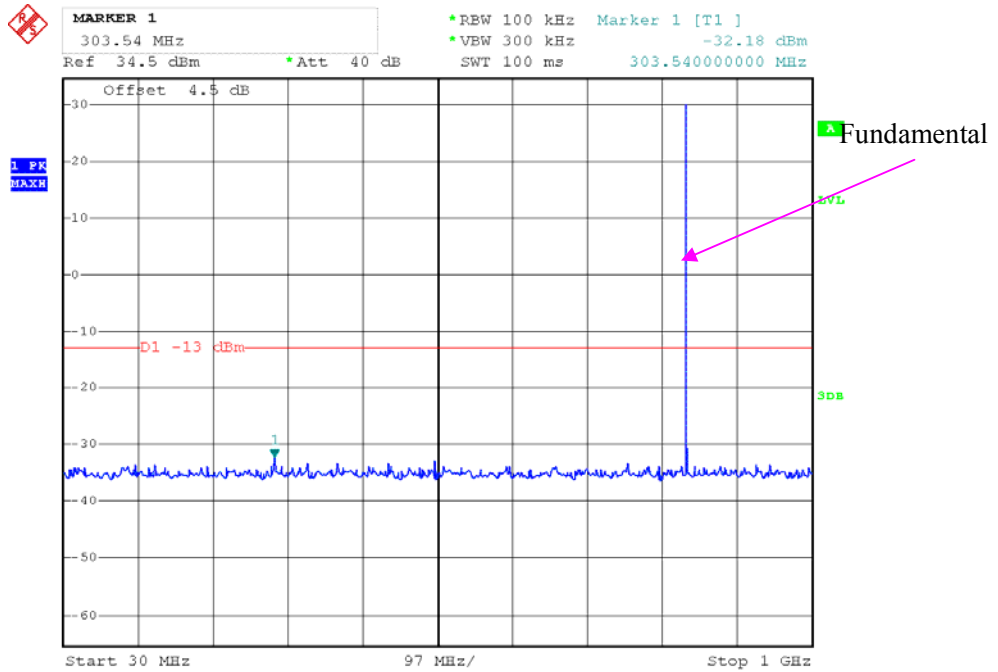
Environmental Conditions

Temperature:	26.5 °C
Relative Humidity:	63 %
ATM Pressure:	100 kPa

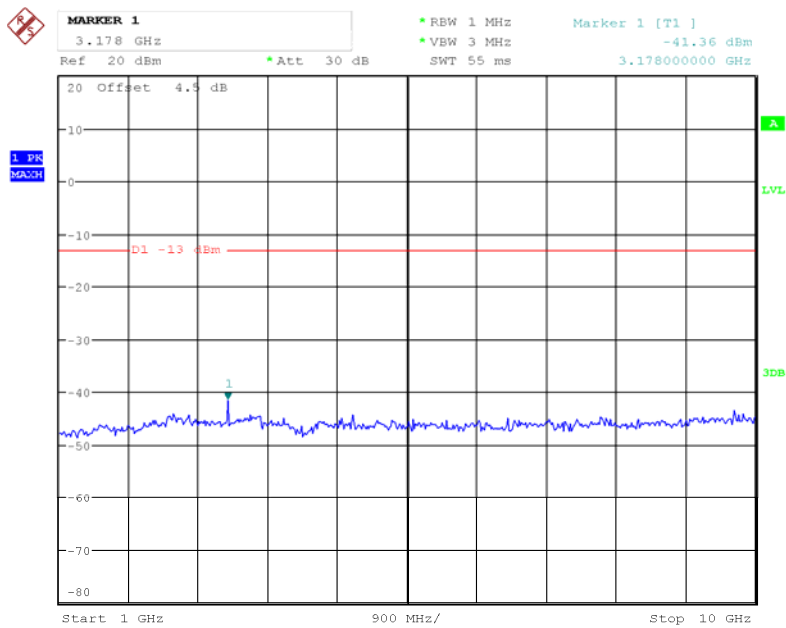
* The testing was performed by Carrie He on 2019-04-11

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

GSM850_Middle Channel

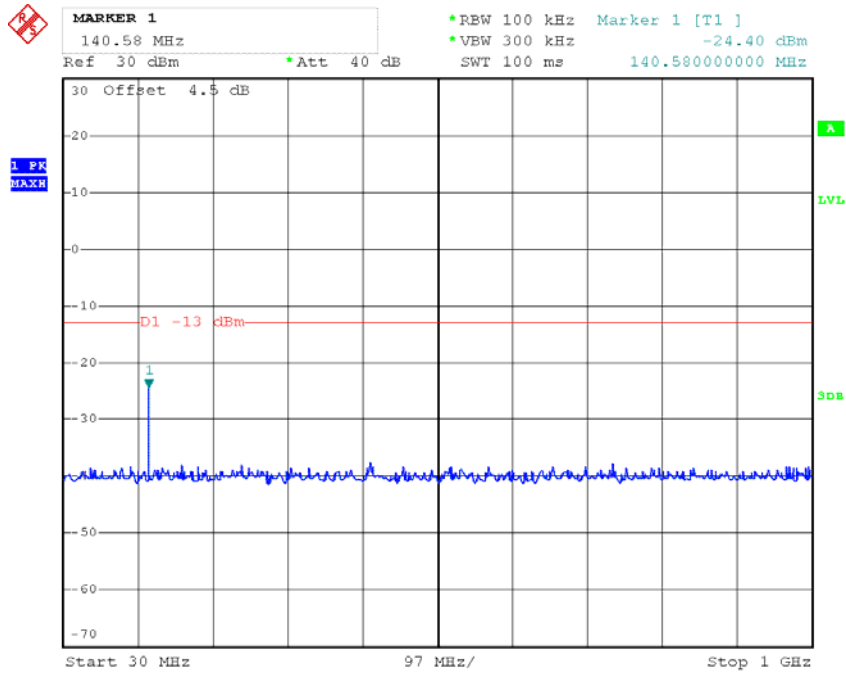


Date: 11.APR.2019 16:37:34



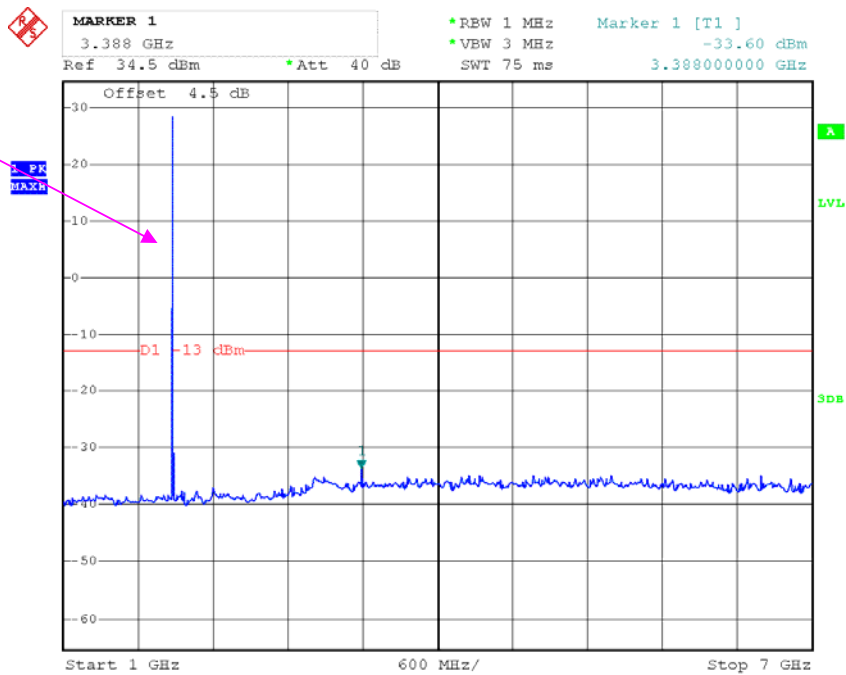
Date: 11.APR.2019 16:57:23

PCS 1900_ Middle Channel

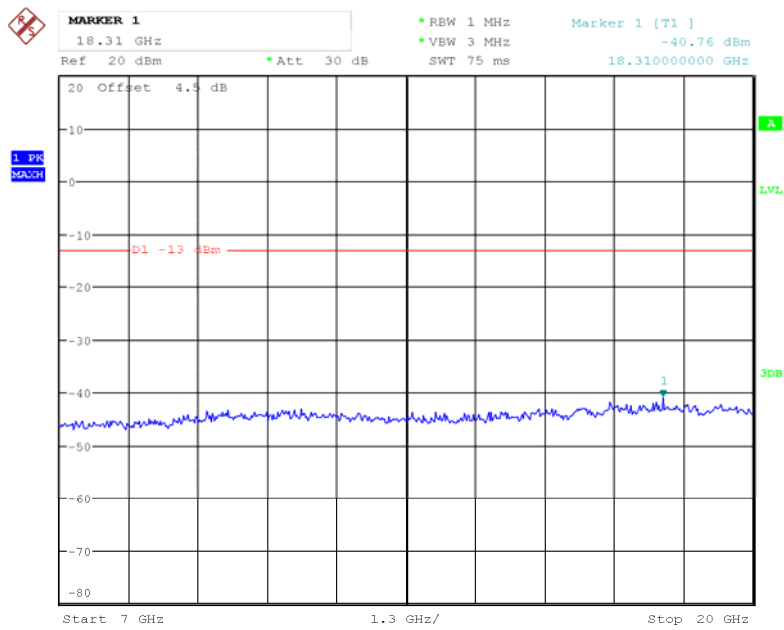


Date: 11.APR.2019 16:47:47

Fundamental

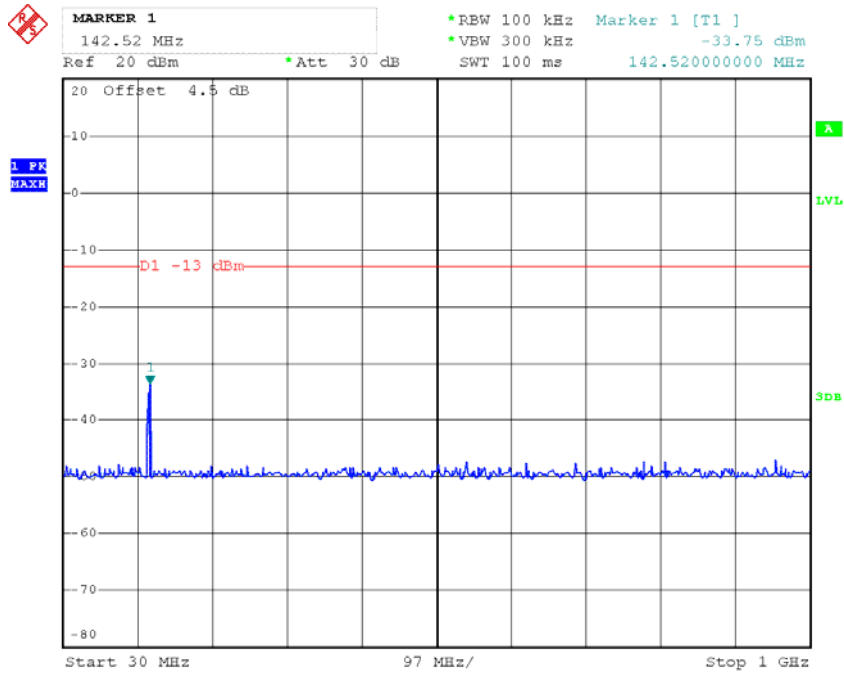


Date: 11.APR.2019 16:48:59

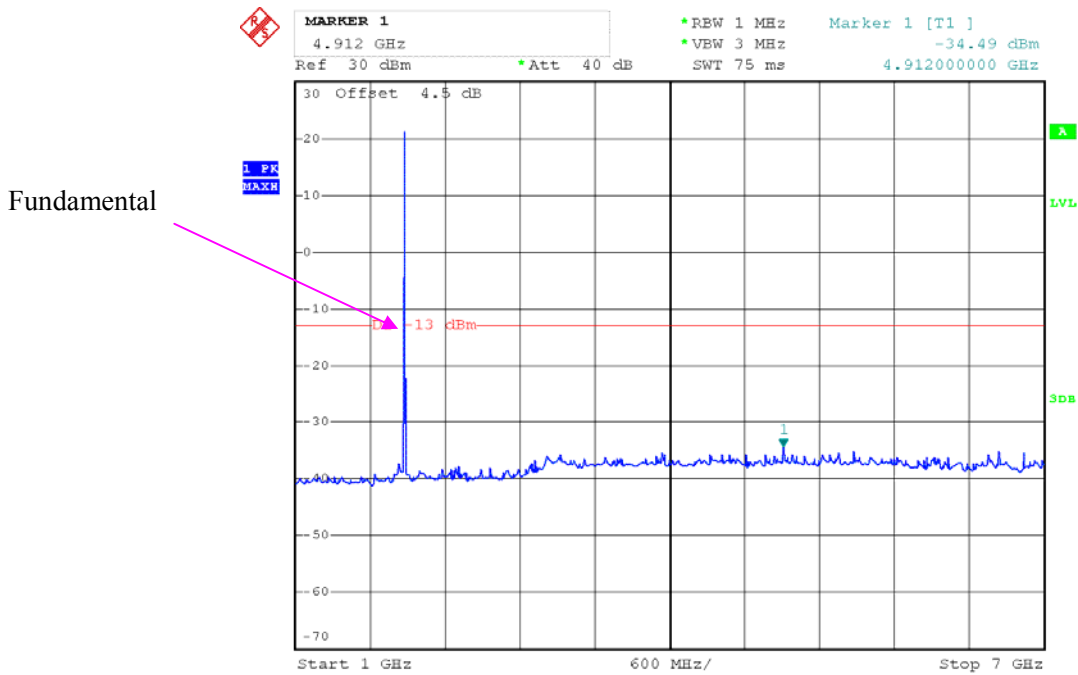


Date: 11.APR.2019 16:58:25

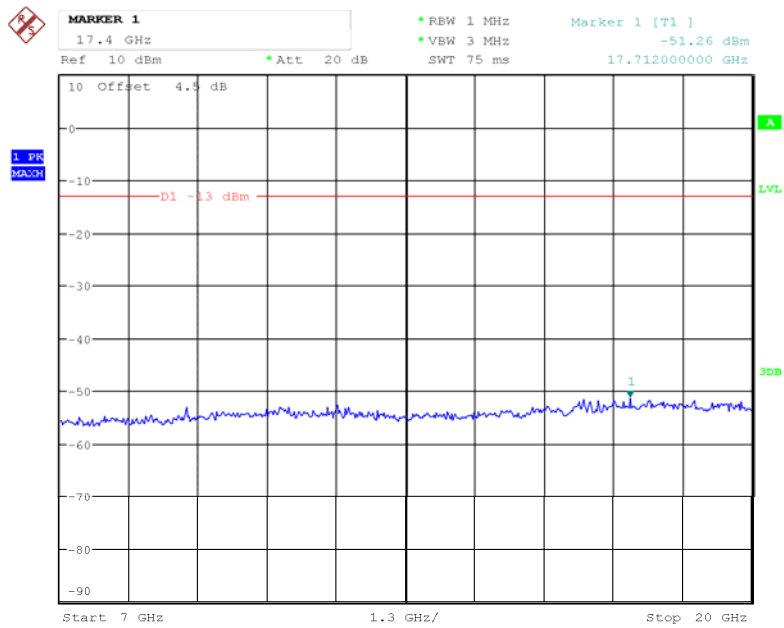
REL99 Band II_Middle Channel



Date: 11.APR.2019 15:23:14

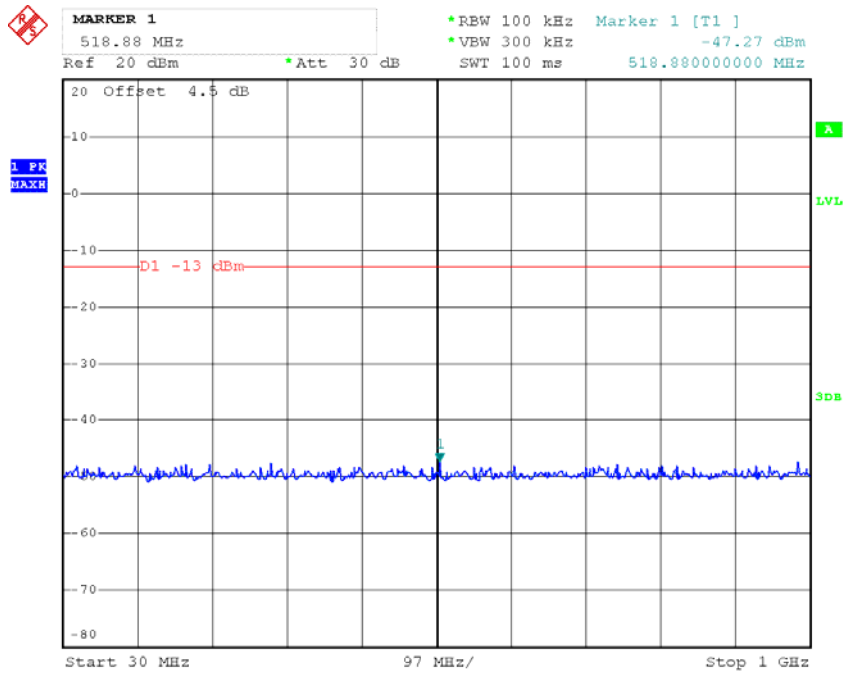


Date: 11.APR.2019 15:29:37



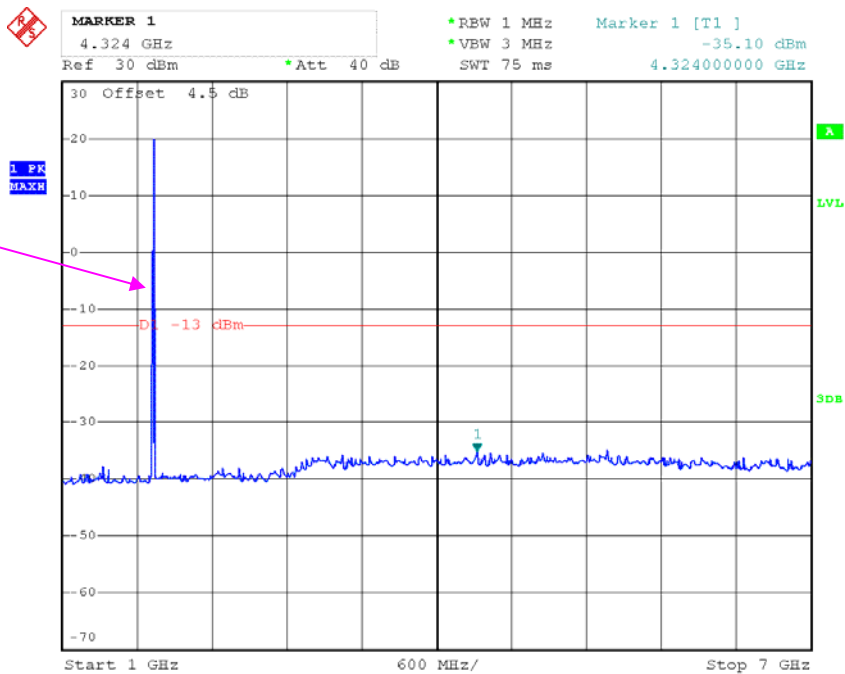
Date: 11.APR.2019 14:35:44

REL99 Band IV_ Middle Channel

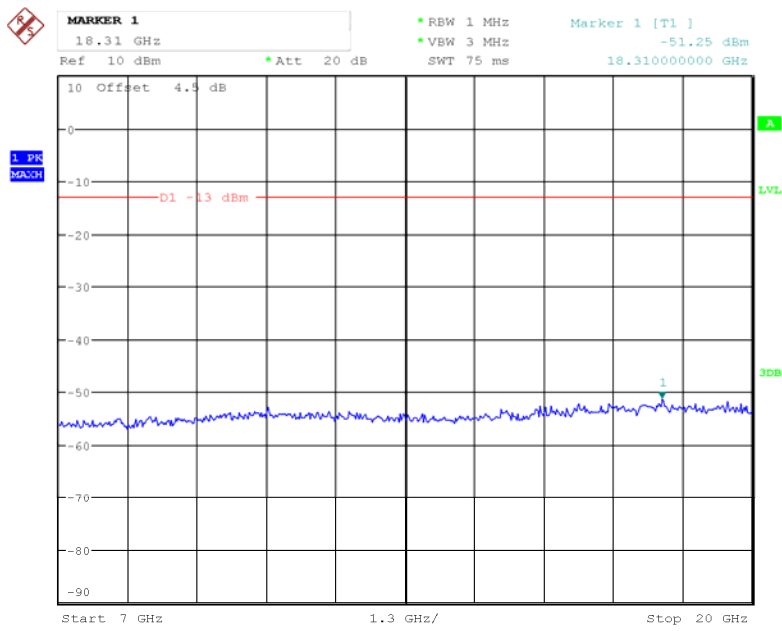


Date: 11.APR.2019 15:23:52

Fundamental

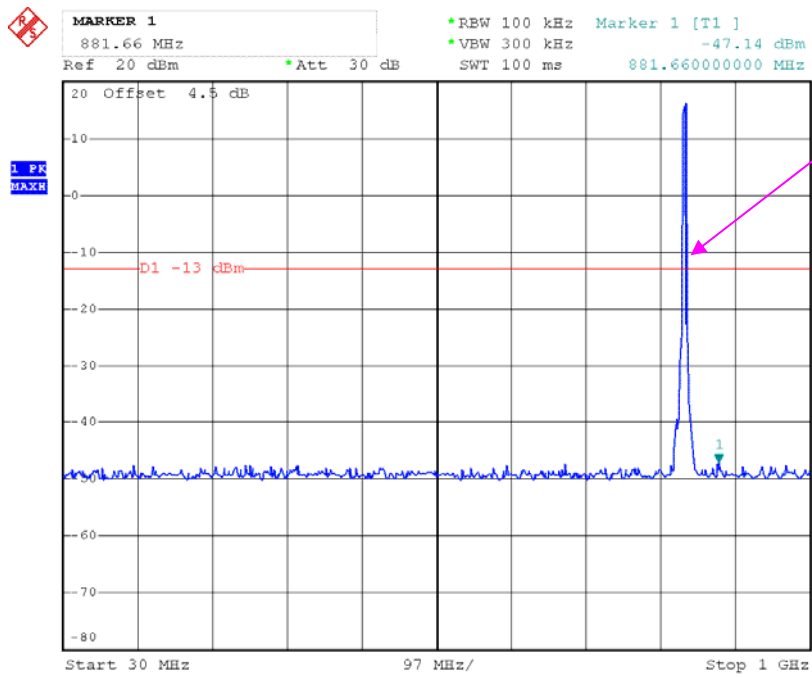


Date: 11.APR.2019 15:28:49



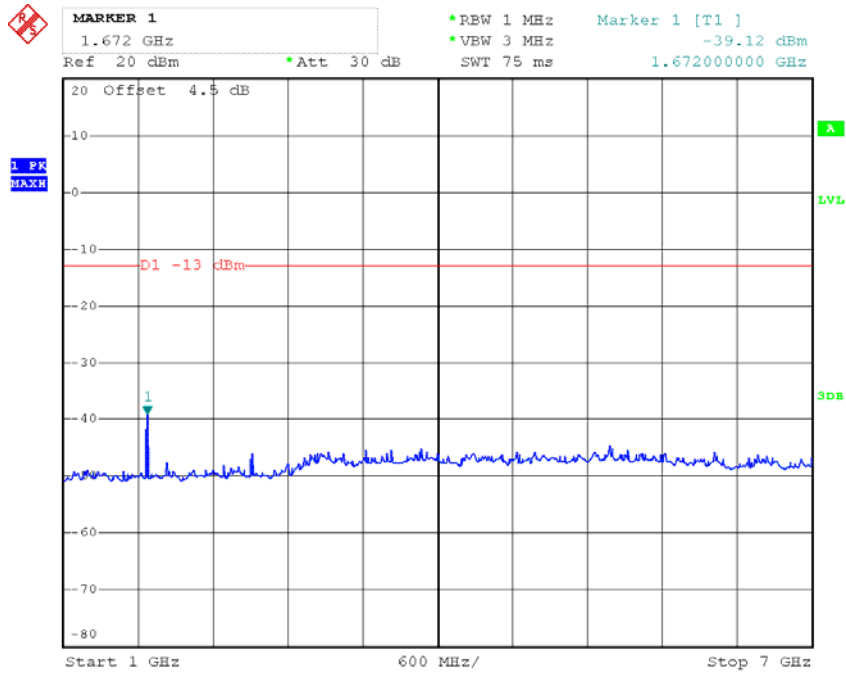
Date: 11.APR.2019 14:36:13

REL99 Band V_Middle Channel

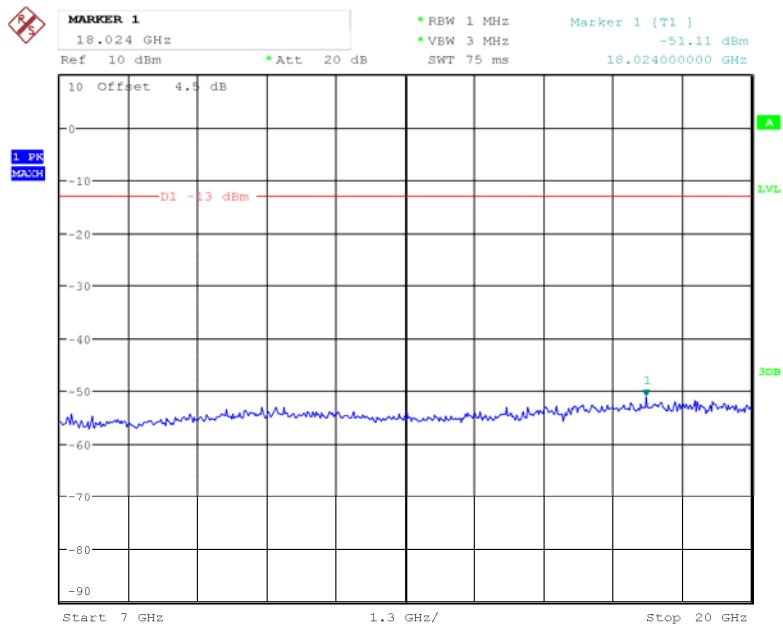


Fundamental

Date: 11.APR.2019 15:26:34



Date: 11.APR.2019 15:27:53



Date: 11.APR.2019 14:36:32

FCC §2.1053, §22.917 & §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

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 = $43 + 10 \text{Log}_{10}(\text{power out in Watts})$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2018-08-03	2019-08-03
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Sonoma	Amplifier	310N	185914	2018-10-13	2019-10-13
Agilent	Signal Generator	E8247C	MY43321350	2018-12-11	2019-12-11
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2017-01-05	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2017-01-05	2020-01-04
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF1850-1910MS-0935V2	0935V2	2018-06-16	2019-06-16
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2016-11-18	2019-11-18

* **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:	26.5 °C
Relative Humidity:	63 %
ATM Pressure:	100 kPa

* The testing was performed by Neil Liao and Vern Shen on 2019-03-20 and 2019-03-22.

Test Result: Compliance.

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)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM850, Frequency:836.600 MHz								
1673.200	H	62.95	-51.26	10.6	0.73	-41.4	-13.0	28.4
1673.200	V	60.24	-54.57	10.6	0.73	-44.7	-13.0	31.7
2509.800	H	60.28	-52.74	13.1	1.25	-40.9	-13.0	27.9
2509.800	V	57.62	-55.43	13.1	1.25	-43.6	-13.0	30.6
3346.400	H	48.49	-62.17	13.8	1.61	-50.0	-13.0	37.0
3346.400	V	47.21	-63.5	13.8	1.61	-51.3	-13.0	38.3
701.240	H	42.66	-58.21	0.0	0.38	-58.6	-13.0	45.6
74.620	V	57.89	-47.96	-2.7	0.18	-50.8	-13.0	37.8
WCDMA Band V, R99, Frequency:836.600 MHz								
1673.200	H	56.27	-57.94	10.6	0.73	-48.1	-13.0	35.1
1673.200	V	53.68	-61.13	10.6	0.73	-51.3	-13.0	38.3
2509.800	H	50.49	-62.53	13.1	1.25	-50.7	-13.0	37.7
2509.800	V	48.28	-64.77	13.1	1.25	-52.9	-13.0	39.9
3346.400	H	46.82	-63.84	13.8	1.61	-51.6	-13.0	38.6
3346.400	V	46.15	-64.56	13.8	1.61	-52.3	-13.0	39.3
881.660	H	50.87	-45.27	0.0	0.51	-45.8	-13.0	32.8
881.660	V	52.56	-40.26	0.0	0.51	-40.8	-13.0	27.8

PCS Band (PART 24E)

30 MHz-20 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM1900, Frequency:1880.000 MHz								
3760.000	H	56.64	-52.16	13.8	1.63	-40.0	-13.0	27.0
3760.000	V	53.82	-54.85	13.8	1.63	-42.7	-13.0	29.7
5640.000	H	47.65	-58.38	14.0	1.31	-45.7	-13.0	32.7
5640.000	V	47.18	-58.73	14.0	1.31	-46.0	-13.0	33.0
796.300	H	41.90	-56.72	0.0	0.49	-57.2	-13.0	44.2
367.560	V	48.57	-56.49	0.0	0.36	-56.9	-13.0	43.9
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	63.14	-45.66	13.8	1.63	-33.5	-13.0	20.5
3760.000	V	60.55	-48.12	13.8	1.63	-36.0	-13.0	23.0
5640.000	H	57.64	-48.39	14.0	1.31	-35.7	-13.0	22.7
5640.000	V	55.13	-50.78	14.0	1.31	-38.1	-13.0	25.1
701.240	H	42.56	-58.31	0.0	0.38	-58.7	-13.0	45.7
621.700	V	41.99	-57.48	0.0	0.36	-57.8	-13.0	44.8

Part 27

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band IV, R99, Frequency:1732.600 MHz								
3465.200	H	59.62	-50.62	13.9	1.62	-38.3	-13.0	25.3
3465.200	V	56.18	-54.09	13.9	1.62	-41.8	-13.0	28.8
5197.800	H	47.13	-59.29	14.0	1.52	-46.8	-13.0	33.8
5197.800	V	46.54	-59.95	14.0	1.52	-47.5	-13.0	34.5
299.660	H	49.81	-58.84	0.0	0.31	-59.2	-13.0	46.2
74.620	V	58.82	-47.03	-2.7	0.18	-49.9	-13.0	36.9

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) & §27.53- BAND EDGES

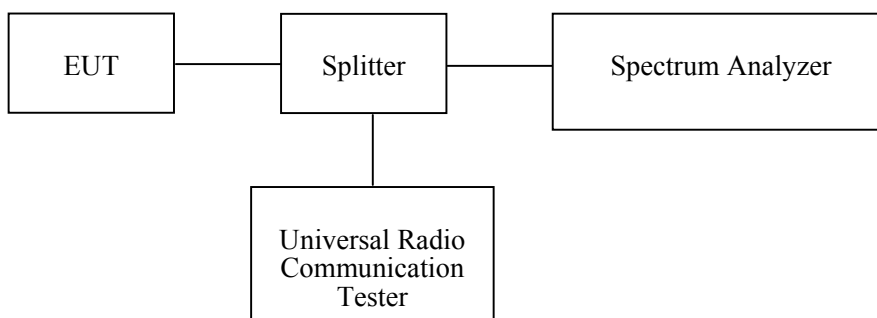
Applicable Standard

FCC § 2.1053, §22.917, § 24.238, § 27.53.

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	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

* **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

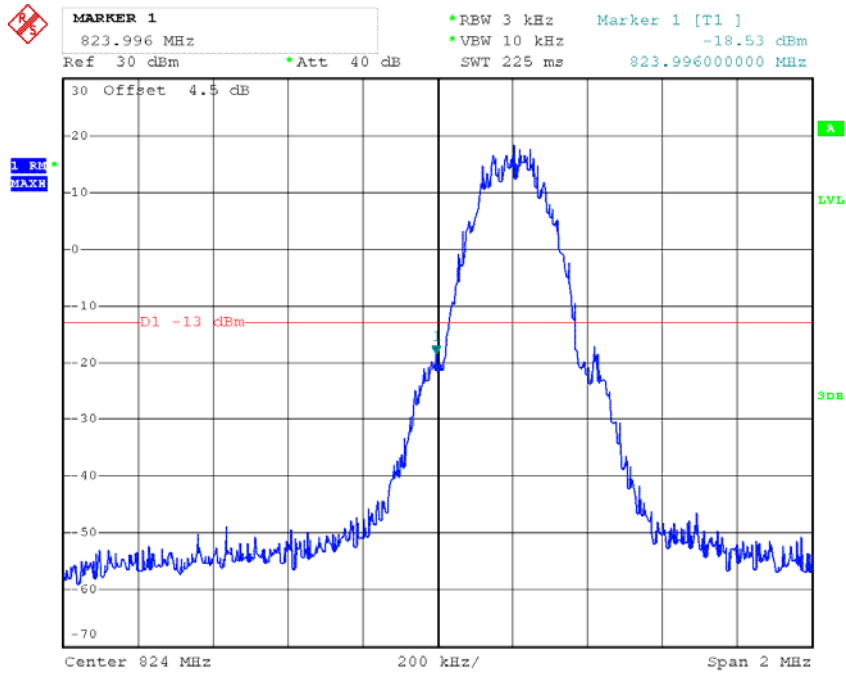
Temperature:	26.5 °C
Relative Humidity:	63 %
ATM Pressure:	100 kPa

* The testing was performed by Carrie He on 2019-04-11

Test Mode: Transmitting

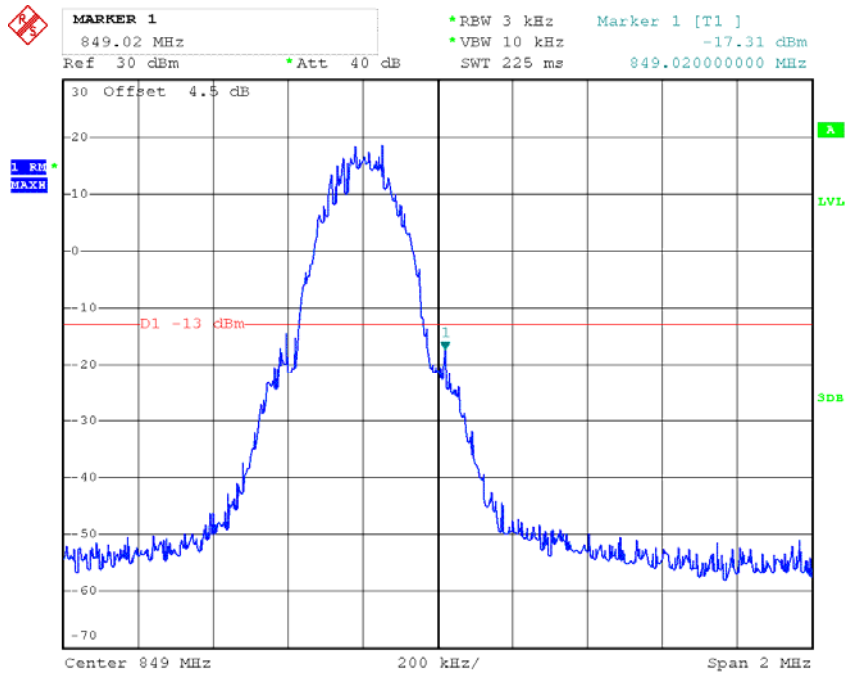
Test Result: Compliance. Please refer to the following plots.

GSM 850, Left Band Edge



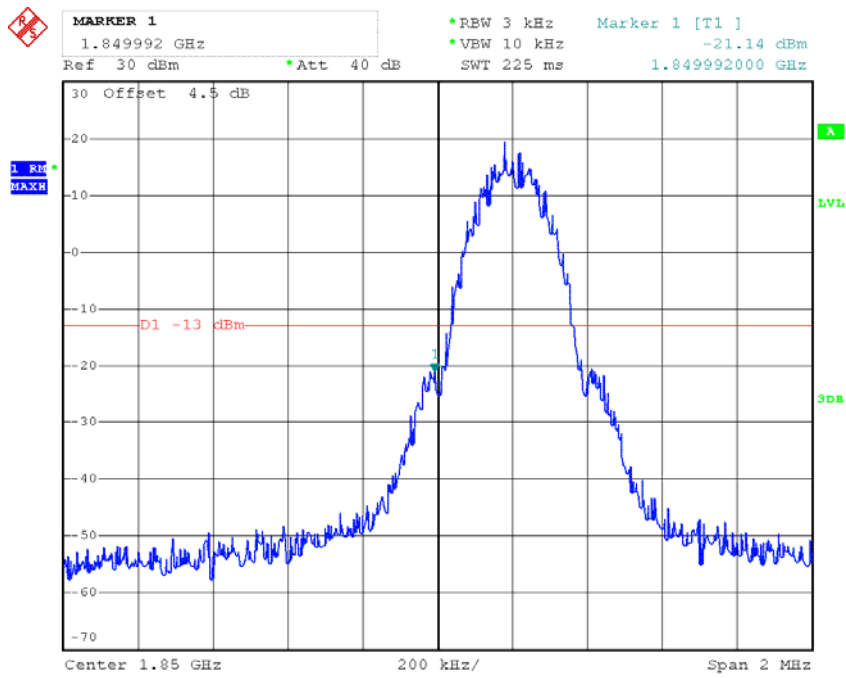
Date: 11.APR.2019 16:40:35

GSM 850, Right Band Edge



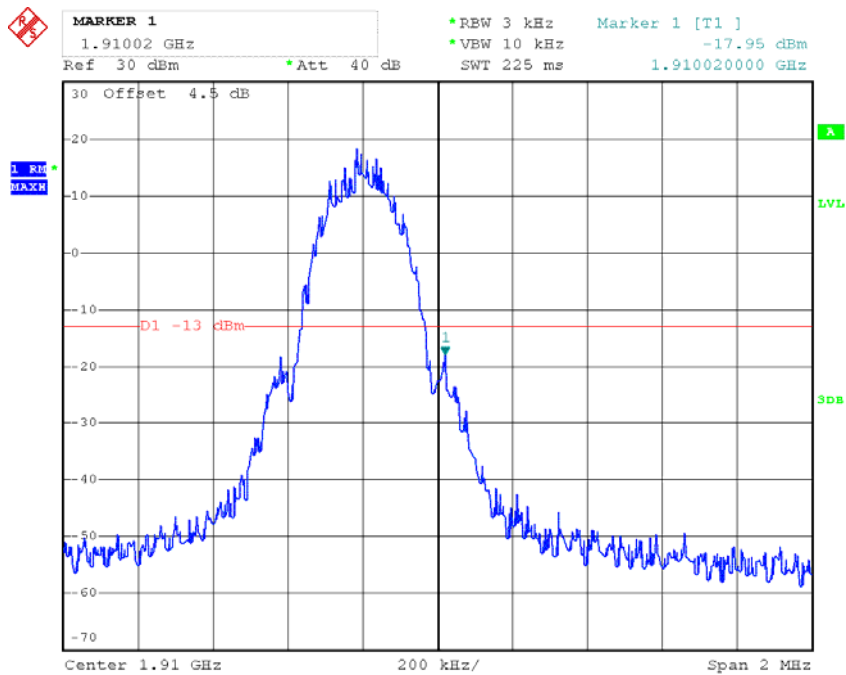
Date: 11.APR.2019 16:39:58

GSM 1900, Left Band Edge



Date: 11.APR.2019 16:45:27

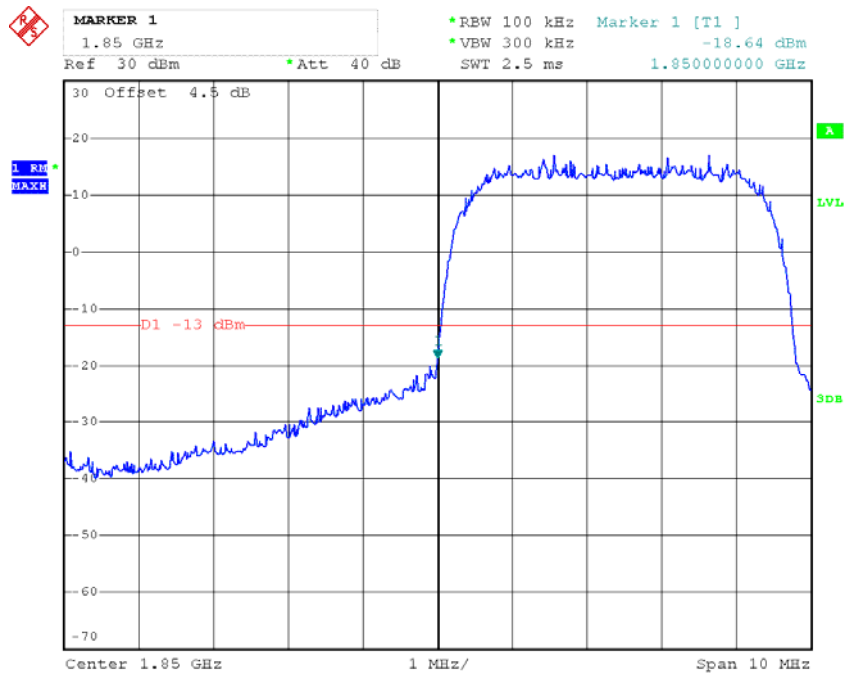
GSM 1900, Right Band Edge



Date: 11.APR.2019 16:46:26

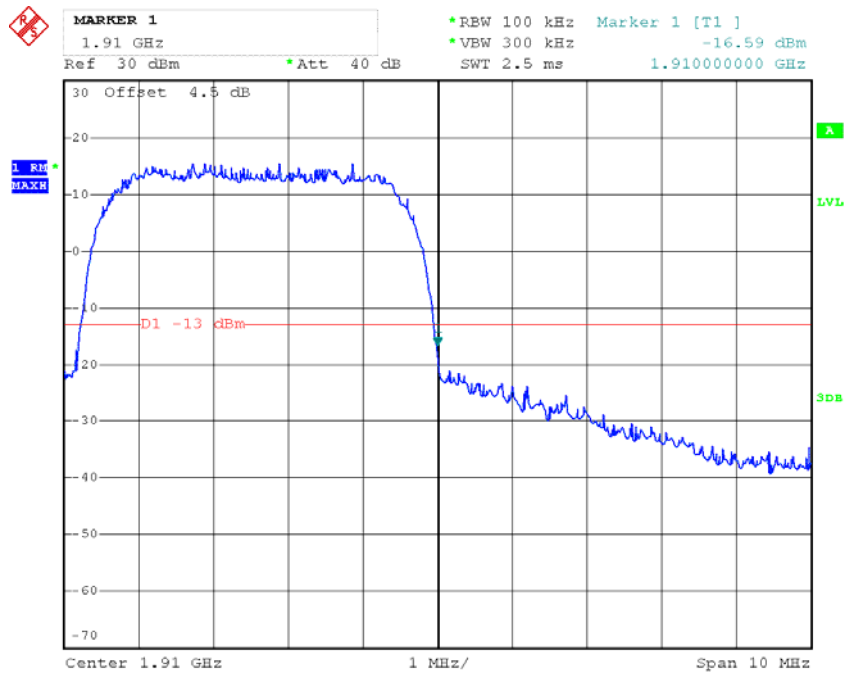
WCDMA Band II:

REL99 Band II, Left Band Edge



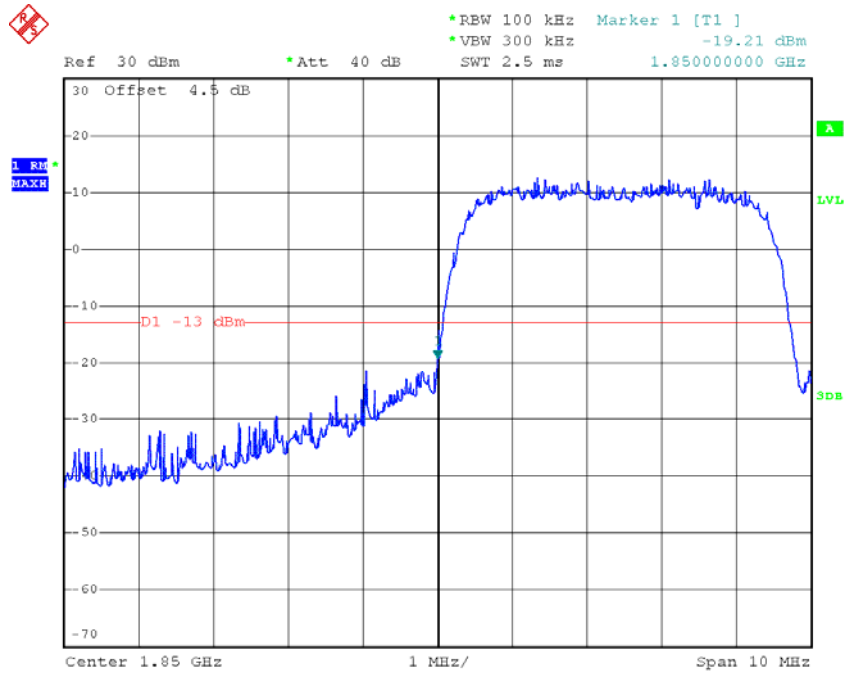
Date: 11.APR.2019 15:18:17

REL99 Band II, Right Band Edge



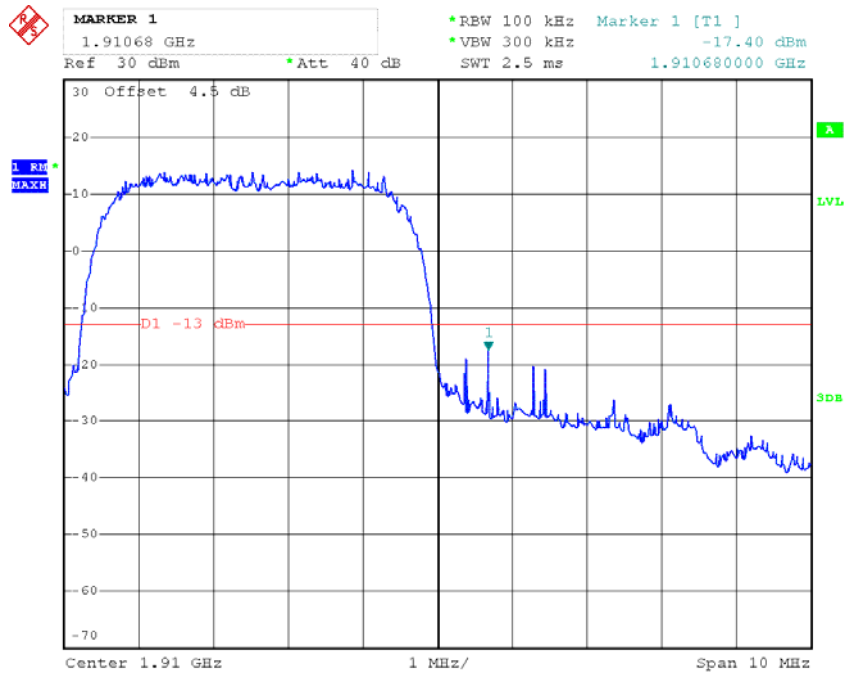
Date: 11.APR.2019 15:18:46

HSDPA Band II, Left Band Edge



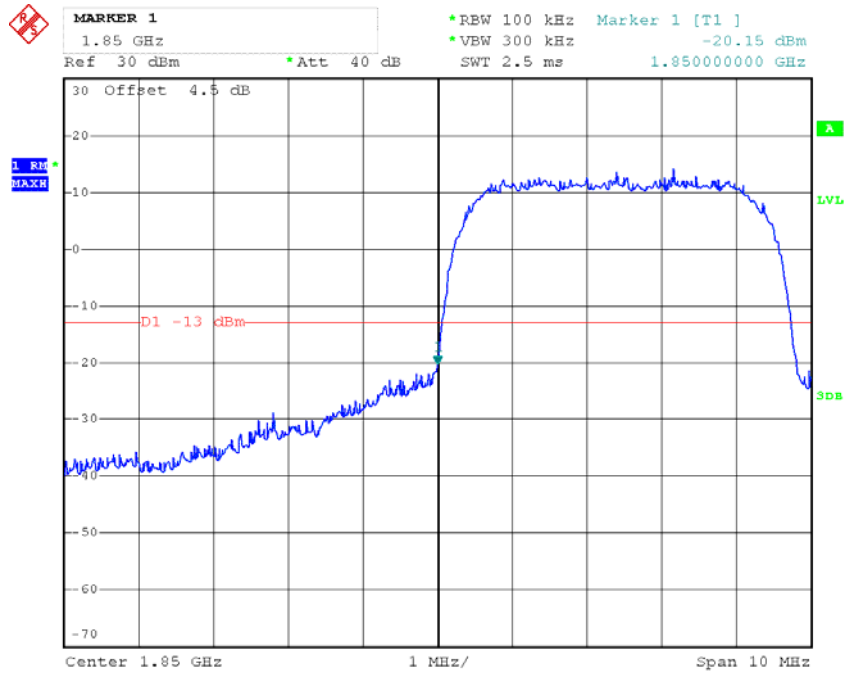
Date: 11.APR.2019 15:16:17

HSDPA Band II, Right Band Edge



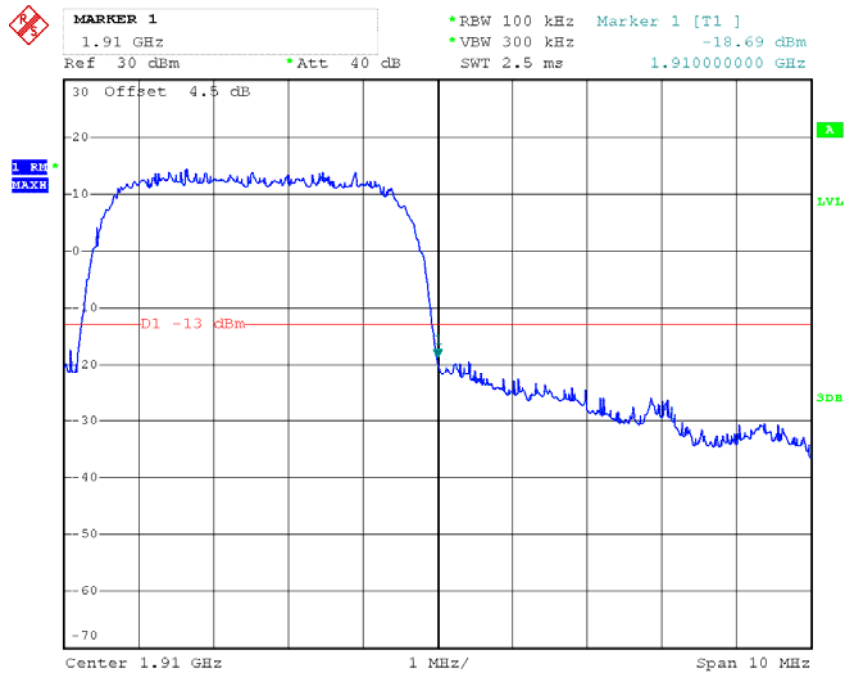
Date: 11.APR.2019 15:16:53

HSUPA Band II, Left Band Edge



Date: 11.APR.2019 15:04:12

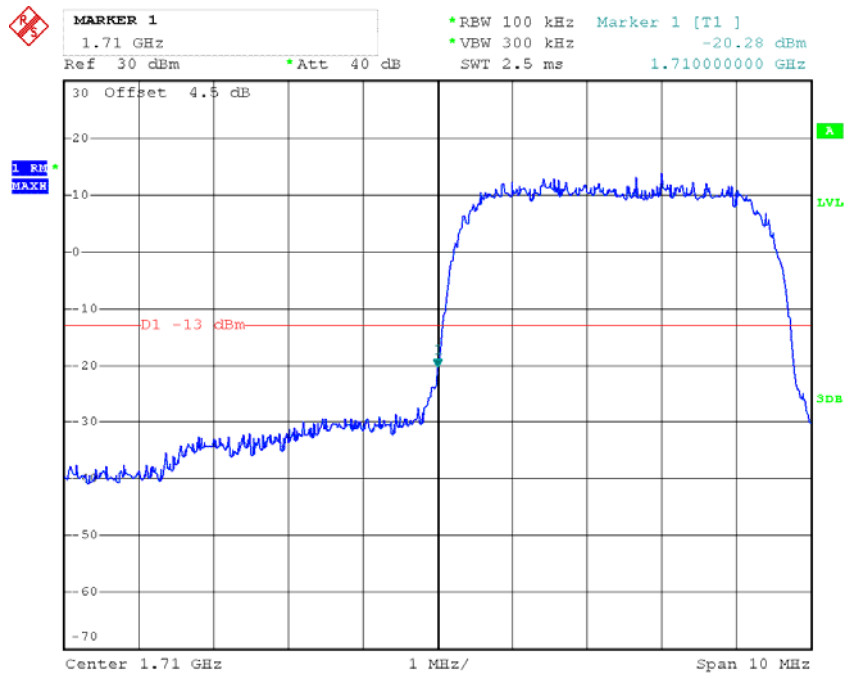
HSUPA Band II, Right Band Edge



Date: 11.APR.2019 15:05:10

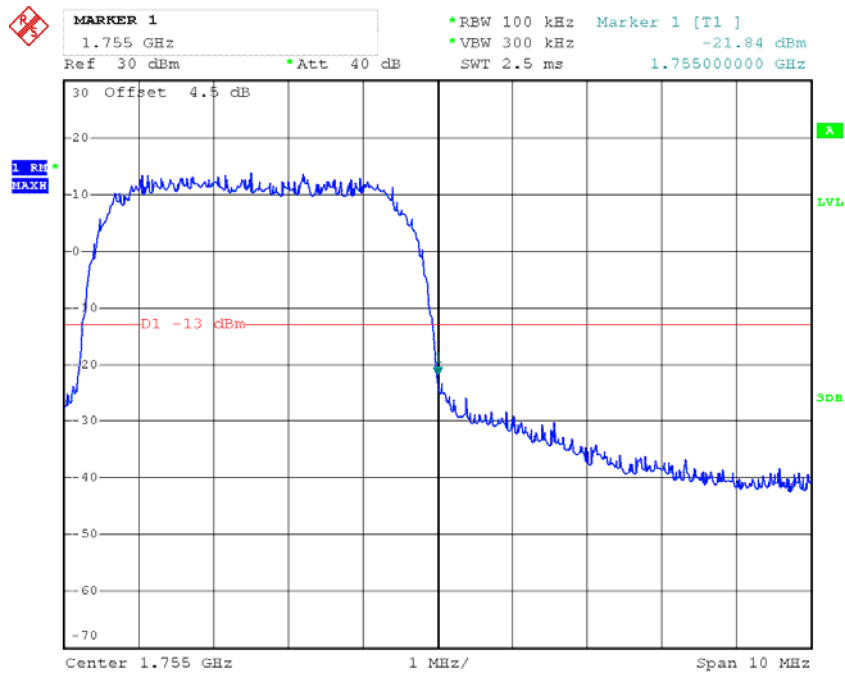
WCDMA Band IV

REL99 Band IV, Left Band Edge



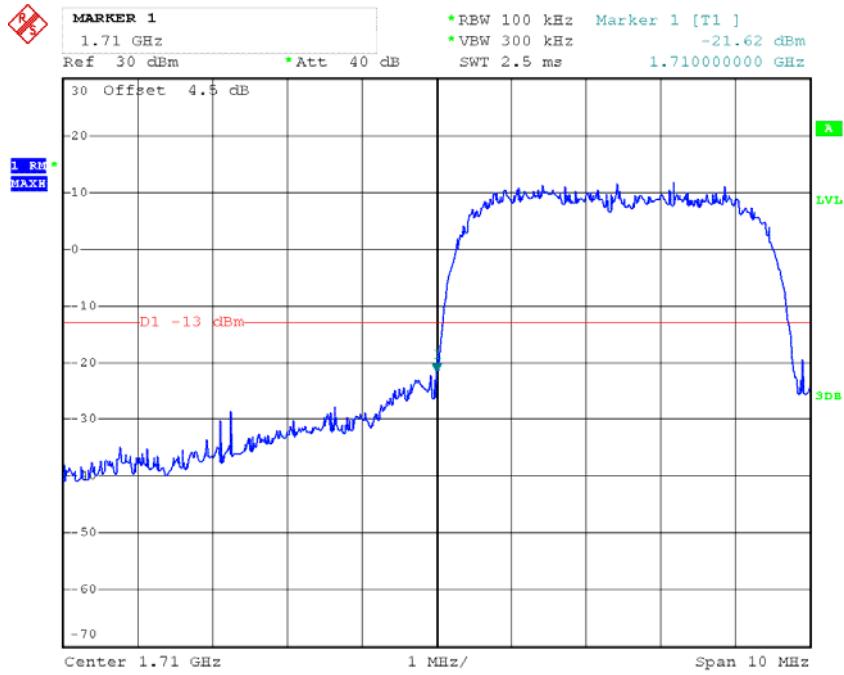
Date: 11.APR.2019 15:19:28

REL99 Band IV Right Band Edge



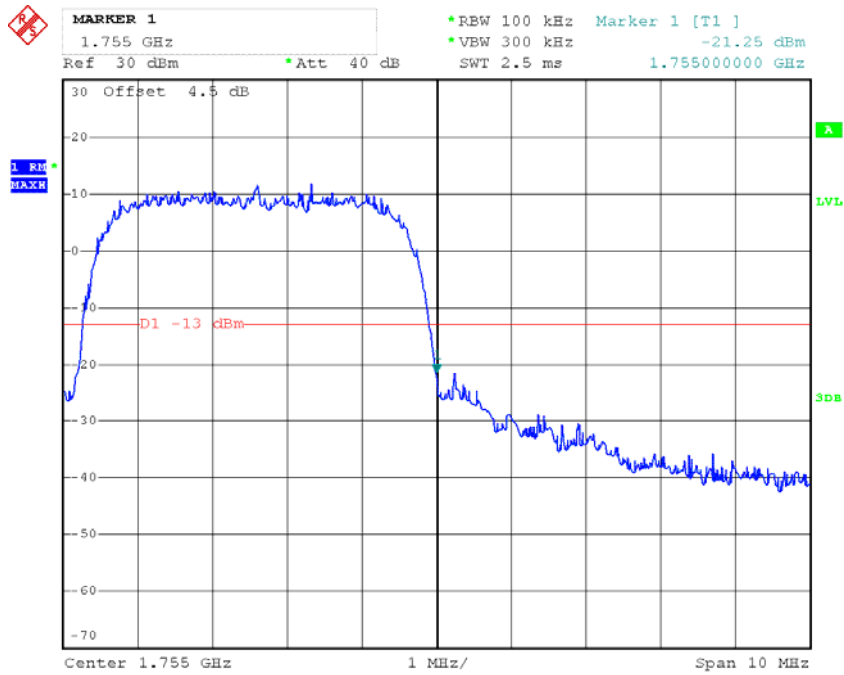
Date: 11.APR.2019 15:19:50

HSDPA Band IV, Left Band Edge



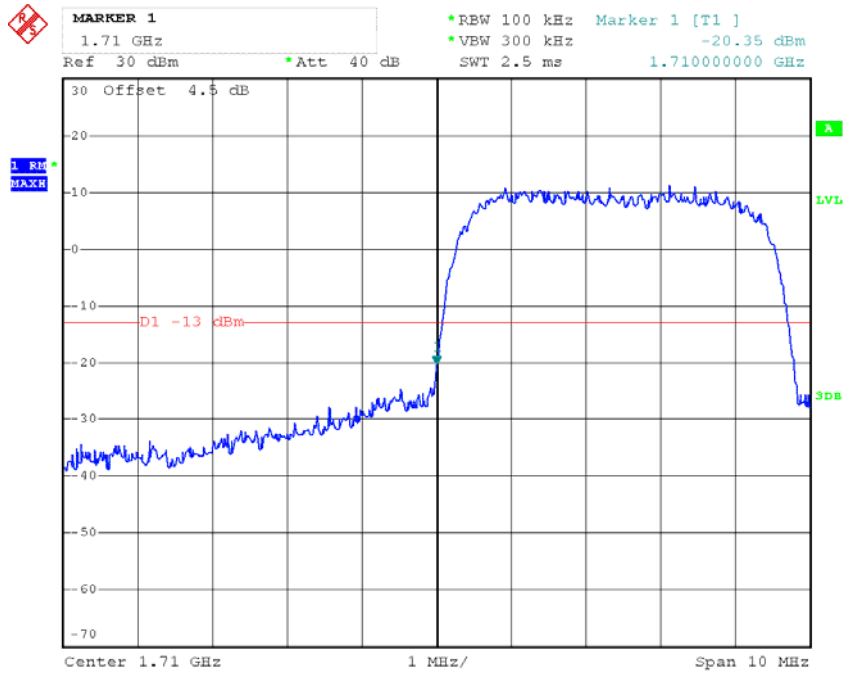
Date: 11.APR.2019 15:14:53

HSDPA Band IV, Right Band Edge



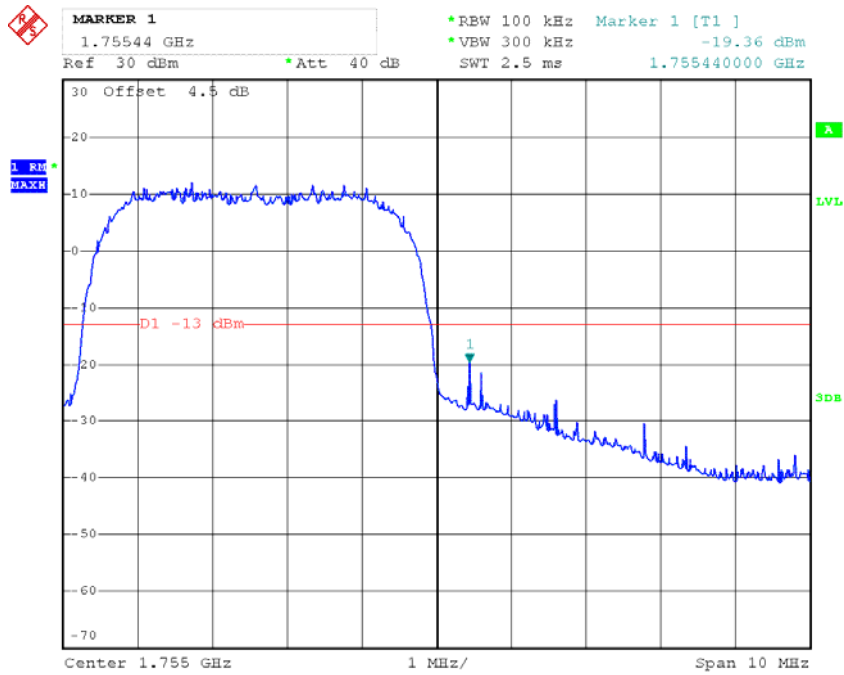
Date: 11.APR.2019 15:15:26

HSUPA Band IV, Left Band Edge



Date: 11.APR.2019 15:05:58

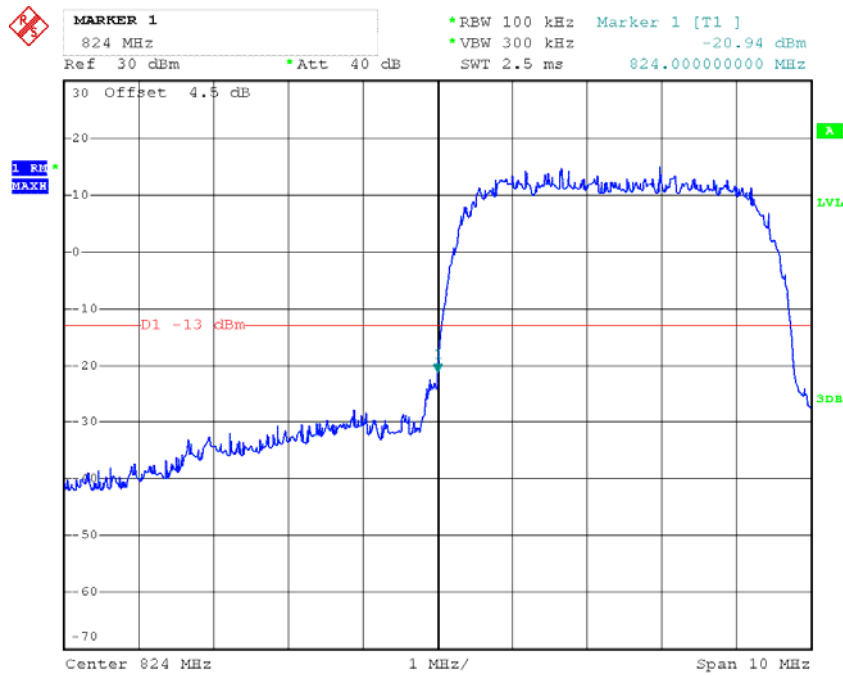
HSUPA Band IV, Right Band Edge



Date: 11.APR.2019 15:07:15

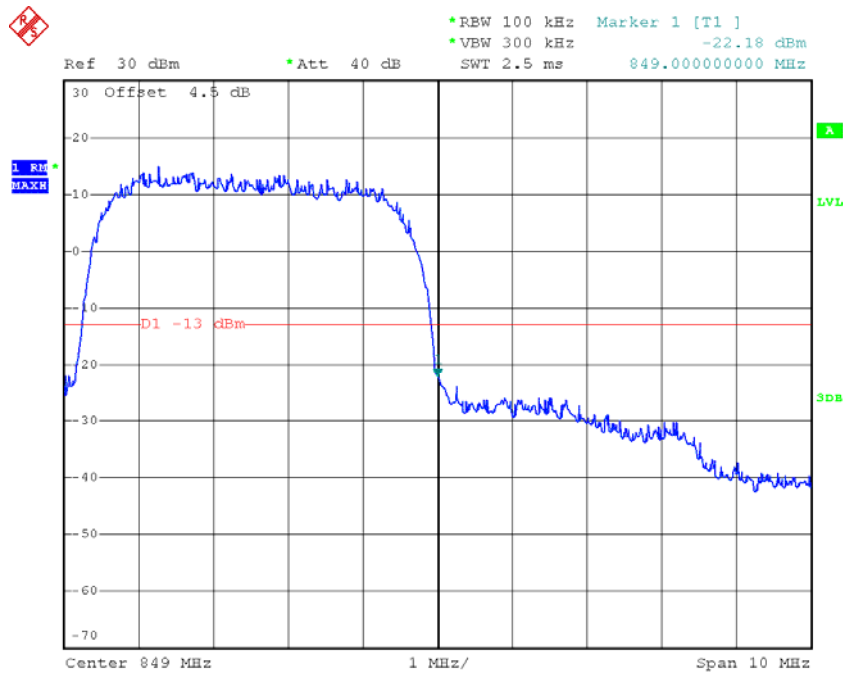
WCDMA Band V

REL99 Band V, Left Band Edge



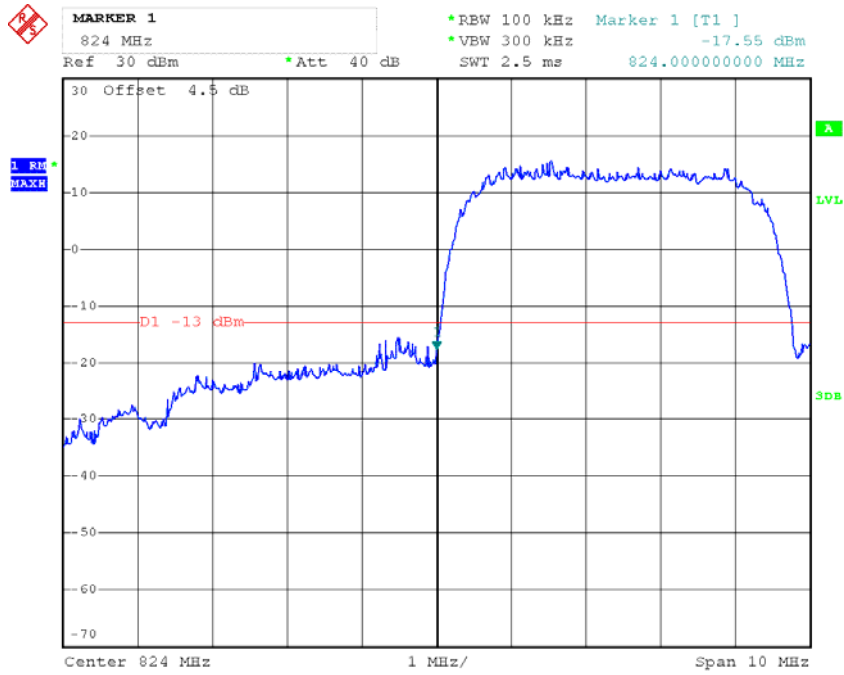
Date: 11.APR.2019 15:20:20

REL99 Band V, Right Band Edge



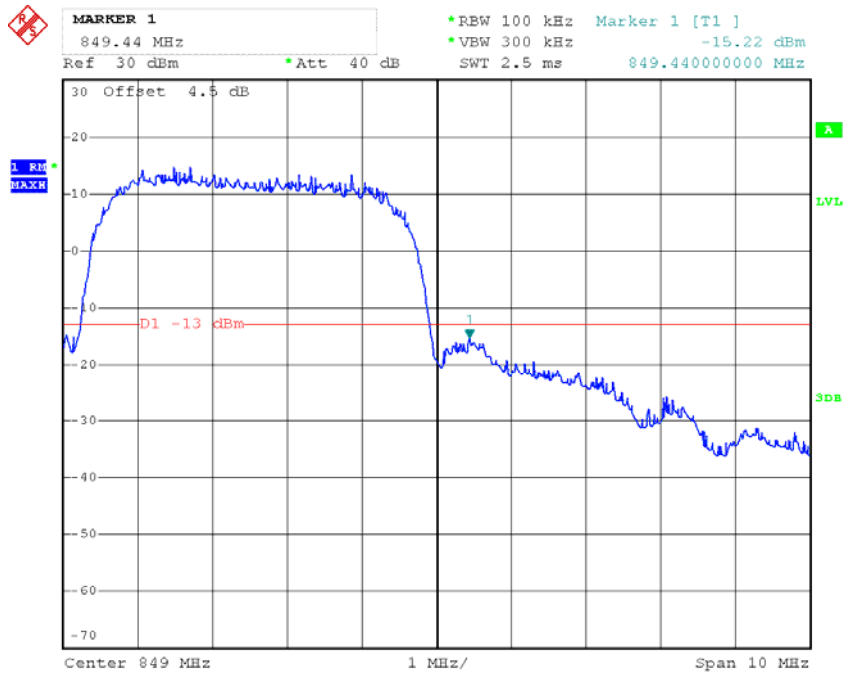
Date: 11.APR.2019 15:20:51

HSDPA Band V, Left Band Edge



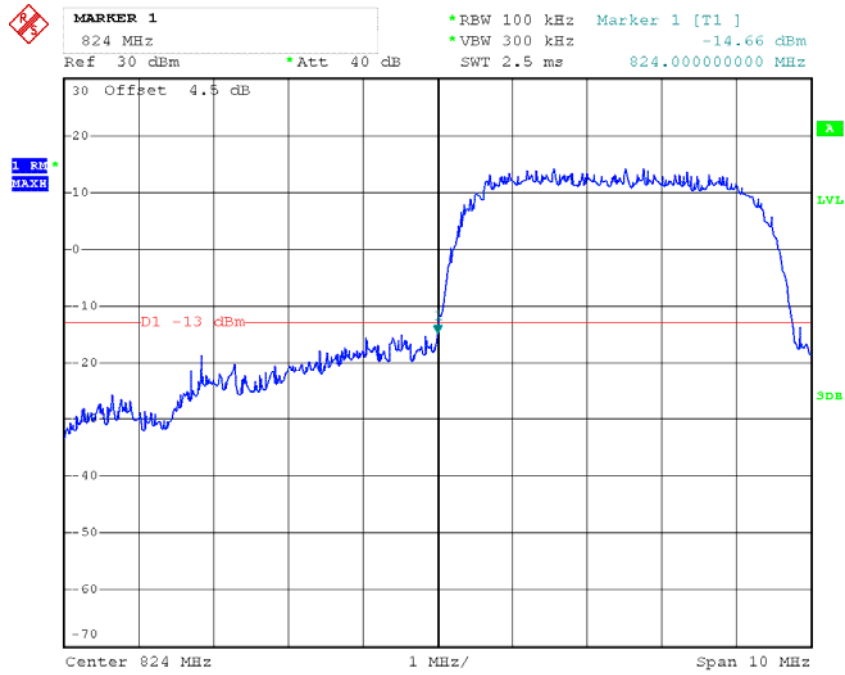
Date: 11.APR.2019 15:12:49

HSDPA Band V, Right Band Edge



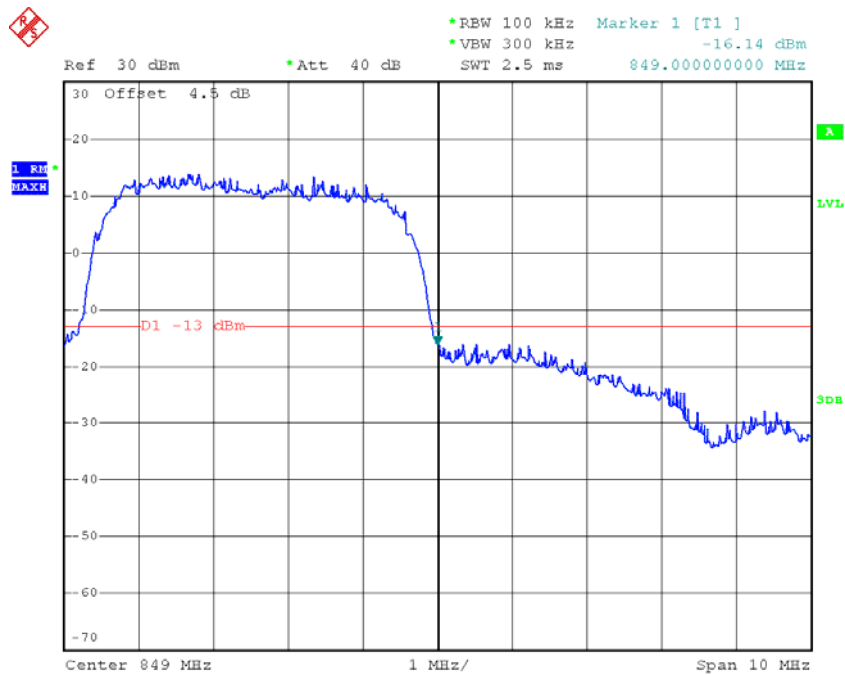
Date: 11.APR.2019 15:14:06

HSUPA Band V, Left Band Edge



Date: 11.APR.2019 15:07:51

HSUPA Band V, Right Band Edge



Date: 11.APR.2019 15:09:22

FCC §2.1055, §22.355 & §24.235& §27.54 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235,§27.54

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

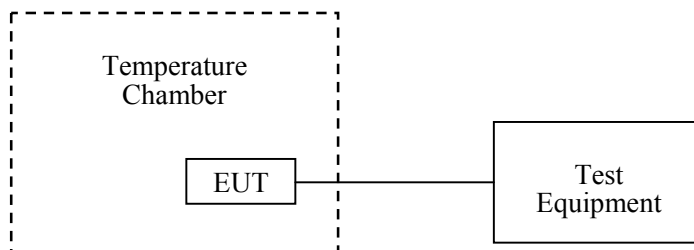
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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
R&S	Universal Radio Communication Tester	CMU200	106 891	2018-12-14	2019-12-14
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2019-03-26	2020-03-26
UNI-T	Multimeter	UT39A	M130199938	2018-05-09	2019-05-09
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A
R&S	EMI Test Receiver	ESPI	100120	2018-12-10	2019-12-10
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

* **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:	26.5 °C
Relative Humidity:	63 %
ATM Pressure:	100 kPa

* *The testing was performed by Carrie He on 2019-04-11*

Test Result: Compliance.

Cellular Band

GMSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.8	12	0.01076	2.5
-20		12	0.01315	
-10		-1	0.01076	
0		-6	0.00717	
10		1	0.01434	
20		-16	0.02152	
30		3	0.01913	
40		-9	0.01673	
50		6	0.00598	
20		3.6	-8	
20	4.35	-5	0.01315	

PCS Band

GMSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V _{DC}	Hz	ppm	
-30	3.8	2	0.01064	Pass
-20		8	0.00798	
-10		-13	0.00904	
0		-6	0.01064	
10		7	0.00691	
20		-34	0.01117	
30		11	0.00691	
40		8	0.00957	
50		11	0.00745	
20		3.6	6	
20	4.35	9	0.01011	

WCDMA Band II: R99

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V _{DC}	Hz	ppm	
-30	3.8	0.22	0.00012	Pass
-20		-0.10	-0.00005	
-10		0.09	0.00005	
0		0.20	0.00011	
10		0.16	0.00009	
20		0.26	0.00014	
30		0.04	0.00002	
40		0.31	0.00016	
50		0.29	0.00015	
20		3.6	0.32	
20	4.35	0.34	0.00018	

WCDMA Band V: R99

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.8	0.58	0.00031	2.5
-20		1.01	0.00054	
-10		0.36	0.00019	
0		0.00	0.00000	
10		0.42	0.00022	
20		0.16	0.00009	
30		0.51	0.00027	
40		0.22	0.00012	
50		0.15	0.00008	
20		3.6	0.14	
20	4.35	0.21	0.00011	

WCDMA Band IV:

REL99					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	1710.24	1754.68	1710	1755
-20		1710.21	1754.83	1710	1755
-10		1710.18	1754.80	1710	1755
0		1710.21	1754.89	1710	1755
10		1710.23	1754.78	1710	1755
20		1710.32	1754.68	1710	1755
30		1710.16	1754.52	1710	1755
40		1710.34	1754.71	1710	1755
50		1710.28	1754.93	1710	1755
20		3.6	1710.55	1754.93	1710
20	4.35	1710.13	1754.59	1710	1755

Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

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