TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 22H, PART 24E,PART 27

MEASUREMENT AND TEST REPORT

For

MAXWEST COMMUNICATION LIMITED

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

FCC ID: 2ASP8NITRO5GO

Report Type:	**Product Type:**
Original Report	Mobile Phone

Report Number:	RDG190718007-00D
Report Date:	2019-08-12
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		Mobile Phone
EUT Model:		Nitro 5 GO
Operation modes:		GSM Voice, GPRS Data, WCDMA(R99 (Voice+Data), HSDPA/HSUPA)
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 : 31.23dBm; PCS 1900: 28.57 dBm WCDMA Band 2: 22.67 dBm; WCDMA Band 4: 23.21 dBm; WCDMA Band 5: 22.86 dBm
Modulation Type:		GMSK, QPSK, 16QAM
Rated Input Voltage:		DC 3.7V from adapter or charging from DC 5V adapter
Adapter Information	**Model:**	Nitro 5 GO
	Input:	AC 100-240V 50/60Hz 0.2A
	Output:	DC 5V 1000mA
External Dimension:		144mm(L)*73mm(W)*10.2mm(H)
Serial Number:		190718007
EUT Received Date:		2019-07-18

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, Part 27of 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: 2ASP8NITRO5GO
FCC Part 15C DTS submissions with FCC ID: 2ASP8NITRO5GO
FCC Part 15C DSS submissions with FCC ID: 2ASP8NITRO5GO

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℃
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.

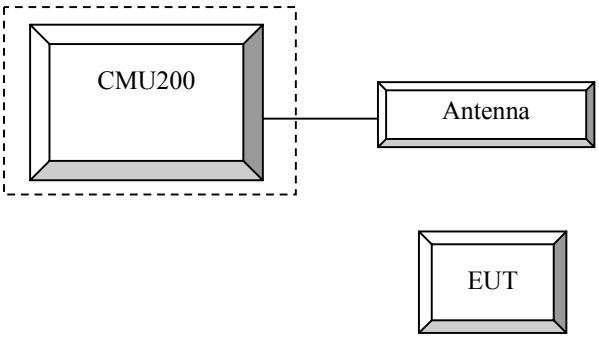
Equipment Modifications

No modification was made to the EUT.

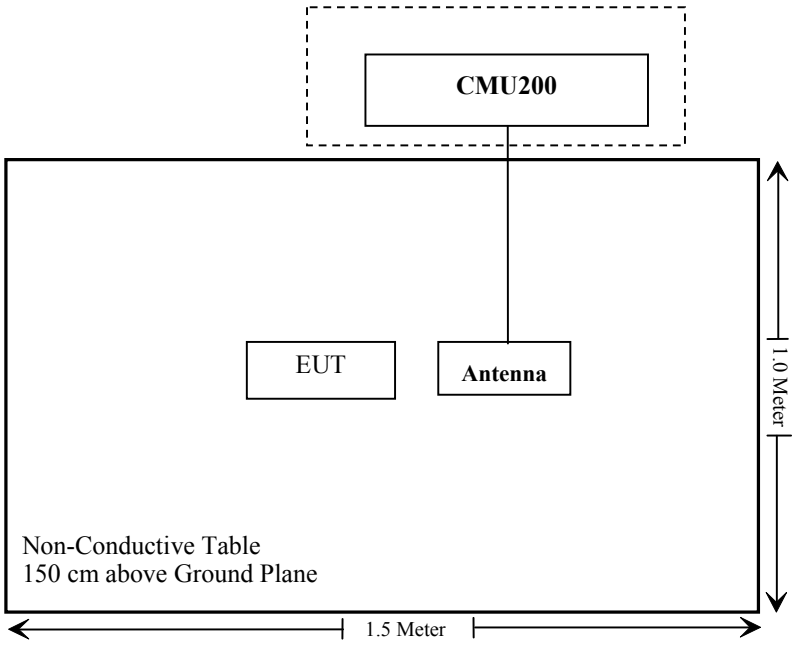
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universial Radio Communication Tester	CMU200	106 891
Un-Known	ANTENNA	Un-Known	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: RDG190718007-20.

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.

FCC § 2.1046, § 22.913 (a) & § 24.232 (c) & § 27.50- 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

(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
	βc / βd	8/15

WCDMA HSDPA

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	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			

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	

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-10	2019-12-10
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	Not Required	/
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2018-05-06	2019-05-06
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
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
R&S	Universal Radio Communication Tester	CMU200	110 822	2018-12-14	2019-12-14
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

Test Items:	Radiation Below 1GHz	Radiation Above 1GHz	Conducted Output Power
Temperature:	24.0 °C	28.2 °C	26.6 °C
Relative Humidity:	60%	60 %	70 %
ATM Pressure:	99.5 kPa	99.5 kPa	100.3 kPa
Tester:	Sunny Cen	Neil Liao	Carrie He
Test Date:	2019-08-07	2019-08-07	2019-07-29

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	31.19	30.88	29.75	28.87
	190	31.50	31.20	30.89	29.76	28.97
	251	31.60	31.17	30.87	29.76	28.99
PCS	512	29.40	29.03	28.65	27.24	26.21
	661	29.40	29.05	28.69	27.26	26.26
	810	29.50	29.20	28.76	27.51	26.45

WCDMA Band 2

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	23.60	2.58	23.37	2.75	23.47	2.55
HSDPA	1	22.57	2.96	22.40	3.22	22.47	3.71
	2	22.28	2.71	22.66	3.01	22.48	3.65
	3	22.82	2.98	22.56	3.36	22.20	4.00
	4	22.84	3.13	22.32	3.31	22.40	3.72
HSUPA	1	22.54	3.36	22.37	4.03	22.50	3.57
	2	22.47	3.27	22.62	3.92	22.44	3.33
	3	22.25	3.23	22.22	4.13	22.70	3.33
	4	22.71	3.48	22.48	3.79	22.38	3.56
	5	22.74	3.33	22.21	4.02	22.24	3.30

WCDMA Band 4

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	23.21	2.70	23.18	2.52	23.09	2.43
HSDPA	1	22.07	3.10	22.15	2.96	22.18	3.51
	2	22.30	2.83	22.26	2.73	22.31	3.27
	3	22.12	3.30	22.09	3.20	22.15	3.65
	4	22.32	3.39	21.92	2.93	22.14	3.75
HSUPA	1	22.06	3.07	22.24	3.88	22.19	3.51
	2	22.26	3.11	22.25	3.91	22.31	3.22
	3	22.32	2.79	22.42	3.87	22.46	3.60
	4	22.18	3.00	22.11	3.78	21.95	3.55
	5	21.81	3.07	22.33	3.69	22.09	3.68

WCDMA Band 5

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	22.92	2.61	22.91	2.87	22.85	2.58
HSDPA	1	21.88	3.74	21.81	3.65	21.80	3.59
	2	21.77	3.95	21.99	3.89	22.02	3.65
	3	21.94	3.74	21.64	3.73	21.59	3.30
	4	21.86	3.52	22.07	3.60	21.63	3.39
HSUPA	1	21.96	3.36	21.83	4.03	21.87	3.16
	2	21.82	3.60	21.87	3.91	21.93	3.24
	3	21.77	3.19	21.93	3.79	21.97	3.43
	4	21.80	3.09	21.91	4.15	22.14	2.87
	5	21.70	3.55	21.93	3.87	22.00	3.02

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	93.70	19.47	0.00	0.50	18.97	38.45	19.48
836.60	V	101.74	30.48	0.00	0.50	29.98	38.45	8.47
PCS 1900 Middle Channel								
1880.00	H	89.73	17.12	11.66	2.66	26.12	33.00	6.88
1880.00	V	93.45	20.98	11.66	2.66	29.98	33.00	3.02

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)			
WCDMA R99 Band 2 middle channel								
1880.00	H	82.08	9.47	11.66	2.66	18.47	33.00	14.53
1880.00	V	84.97	12.50	11.66	2.66	21.50	33.00	11.50
WCDMA R99 Band 4 middle channel								
1732.60	H	77.46	3.41	10.90	2.51	11.80	30.00	18.20
1732.60	V	83.11	8.74	10.90	2.51	17.13	30.00	12.87
WCDMA R99 Band 5 middle channel								
836.60	H	83.74	9.51	0.00	0.50	9.01	38.45	29.44
836.60	V	91.50	20.24	0.00	0.50	19.74	38.45	18.71

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 & §27.53- OCCUPIED BANDWIDTH

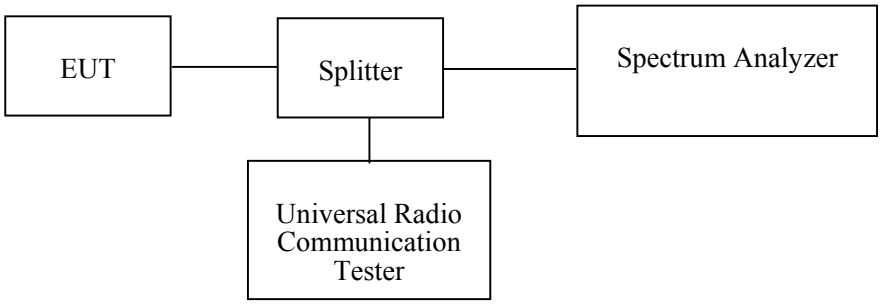
Applicable Standard

FCC §2.1049, §22.917, §22.905, §24.238 and §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	FSV40	101474	2019-01-09	2020-01-09
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010013	Each time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each time	/

*** 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

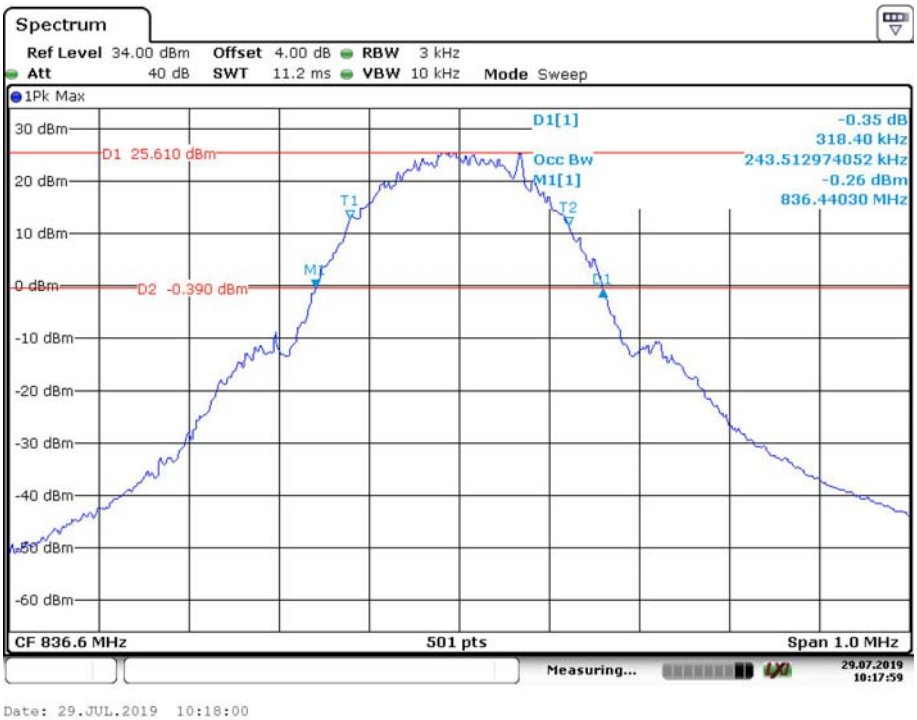
Temperature:	26.6 °C
Relative Humidity:	70 %
ATM Pressure:	100.3 kPa
Tester:	Carrie He
Test Date:	2019-07-29

Test Mode: Transmitting

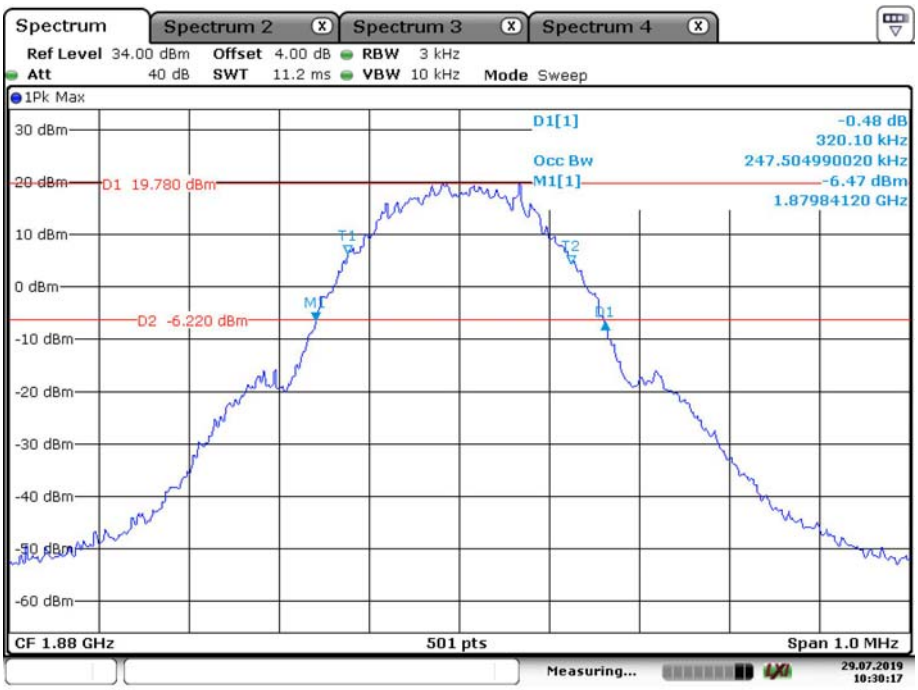
Test Result: Compliance. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	Middle	GSM	0.244	0.318
PCS		GSM	0.248	0.320
WCDMA Band 2		Rel 99	4.172	4.710
		HSDPA	4.172	4.719
		HSUPA	4.172	4.709
WCDMA Band 4		Rel 99	4.172	4.704
		HSDPA	4.172	4.717
		HSUPA	4.192	4.721
WCDMA Band 5		Rel 99	4.172	4.704
		HSDPA	4.192	4.723
		HSUPA	4.172	4.712

GSM Cellular 850

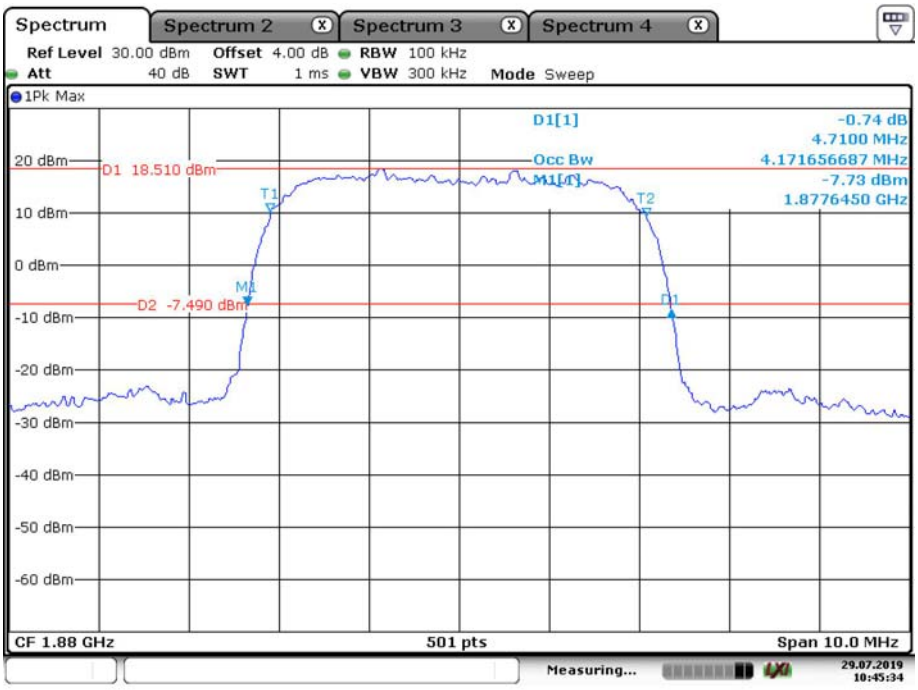


GSM PCS 1900



Date: 29.JUL.2019 10:30:17

WCDMA Band 2 Rel 99



Date: 29.JUL.2019 10:45:34

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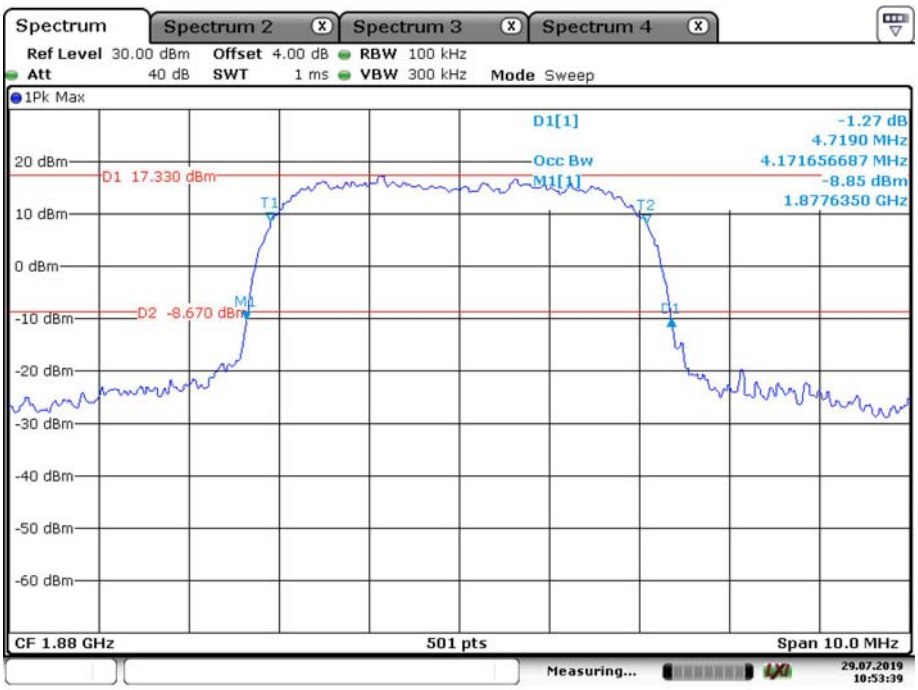
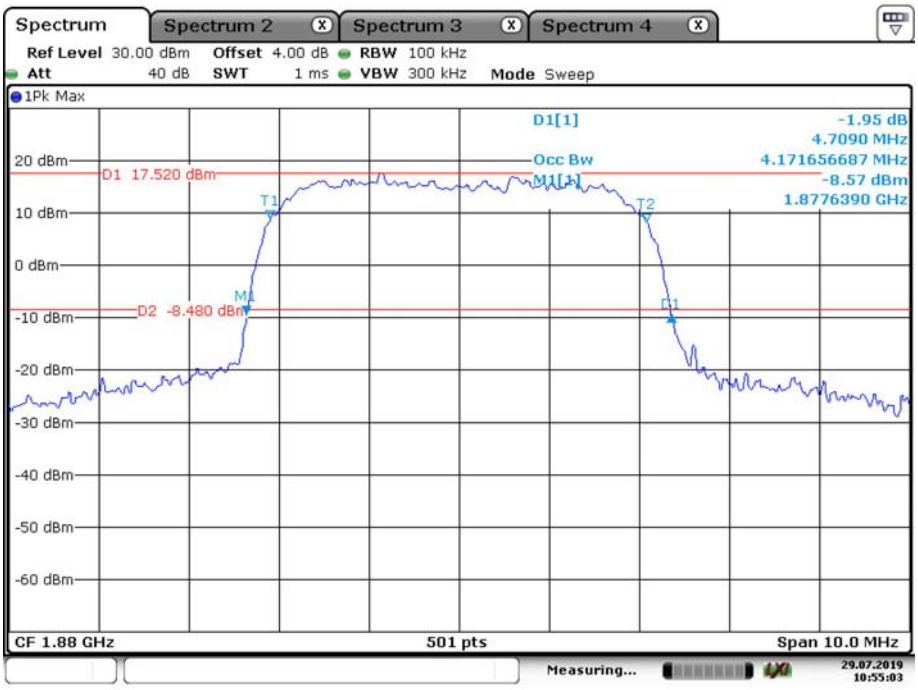


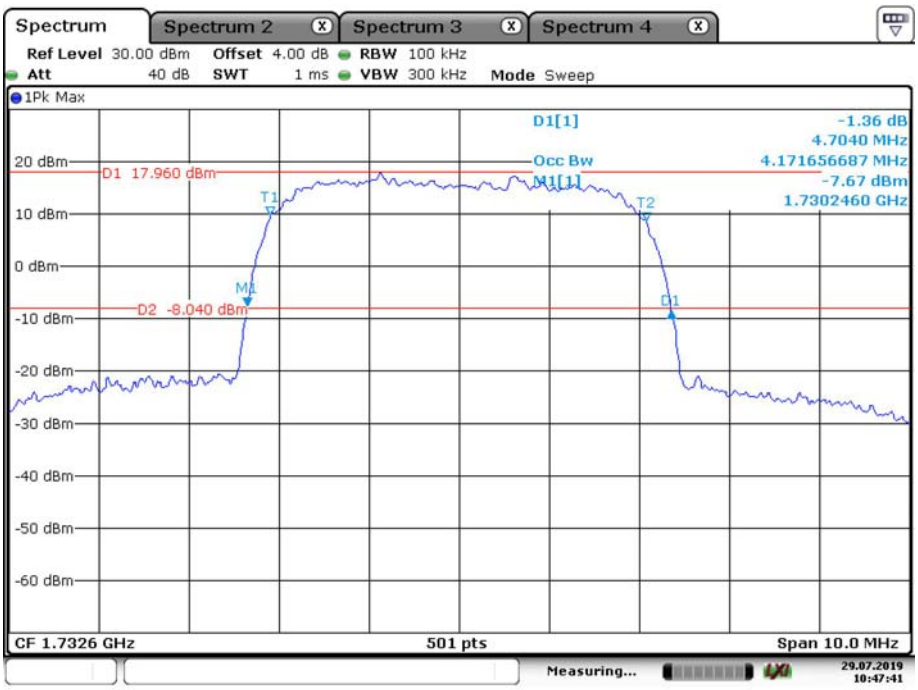
Date: 29.JUL.2019 10:53:39

WCDMA Band 2 HSUPA



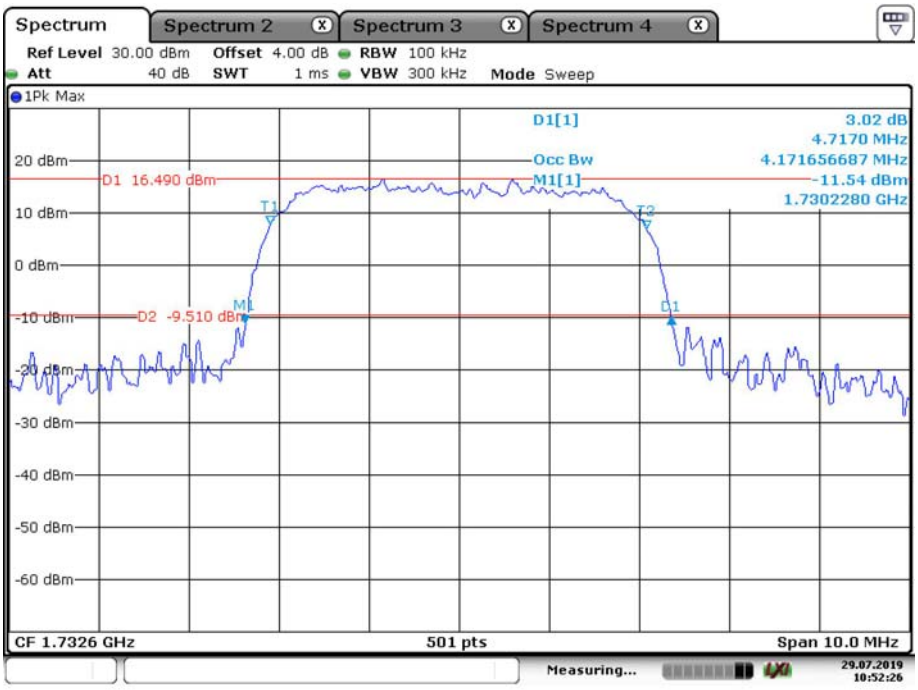
Date: 29.JUL.2019 10:55:04

WCDMA Band 4 Rel 99



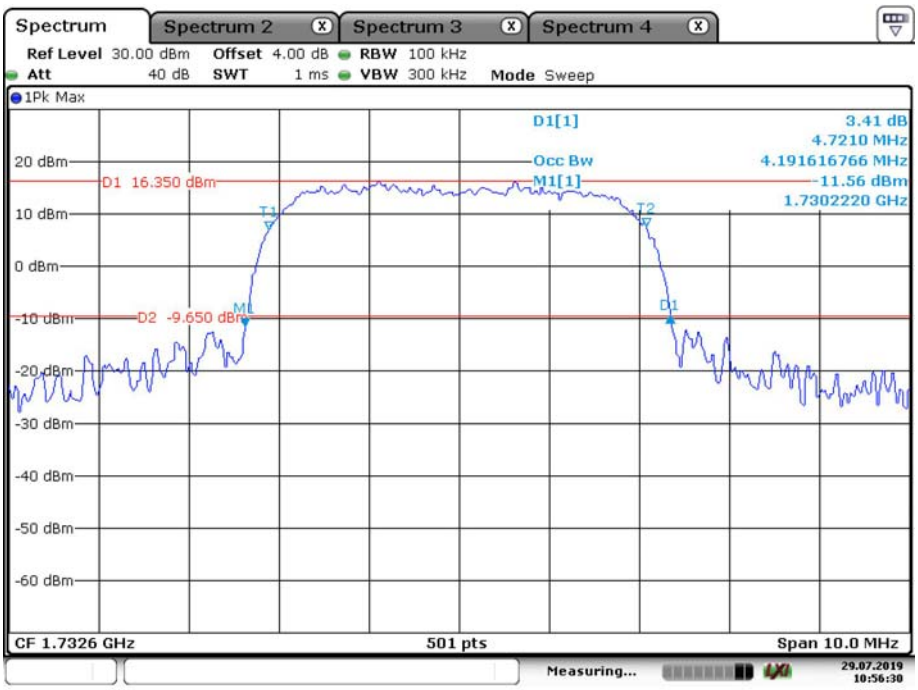
Date: 29.JUL.2019 10:47:41

WCDMA Band 4 HSDPA



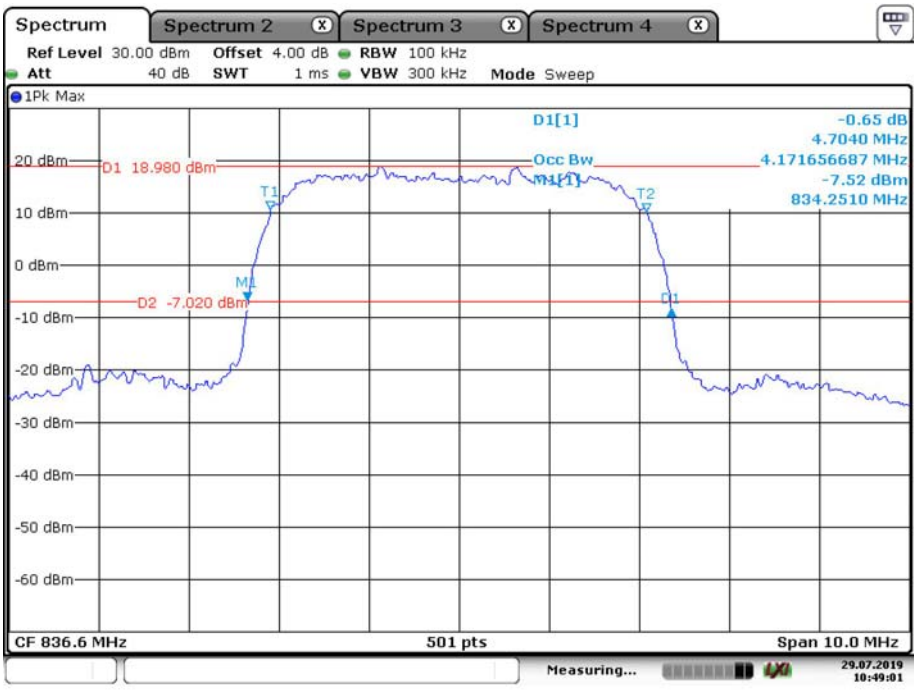
Date: 29.JUL.2019 10:52:27

WCDMA Band 4 HSUPA



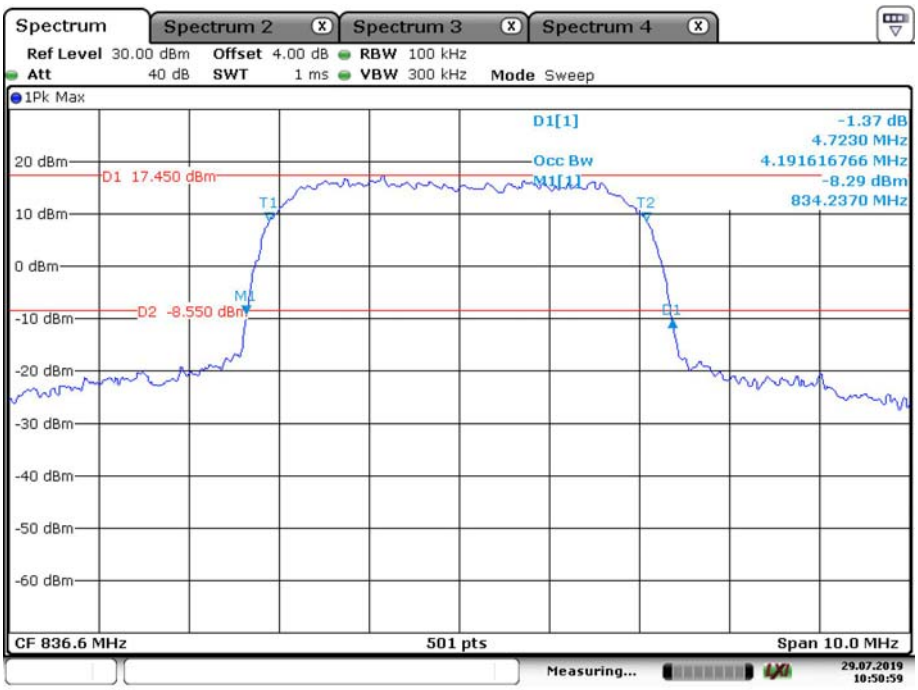
Date: 29.JUL.2019 10:56:31

WCDMA Band 5 Rel 99



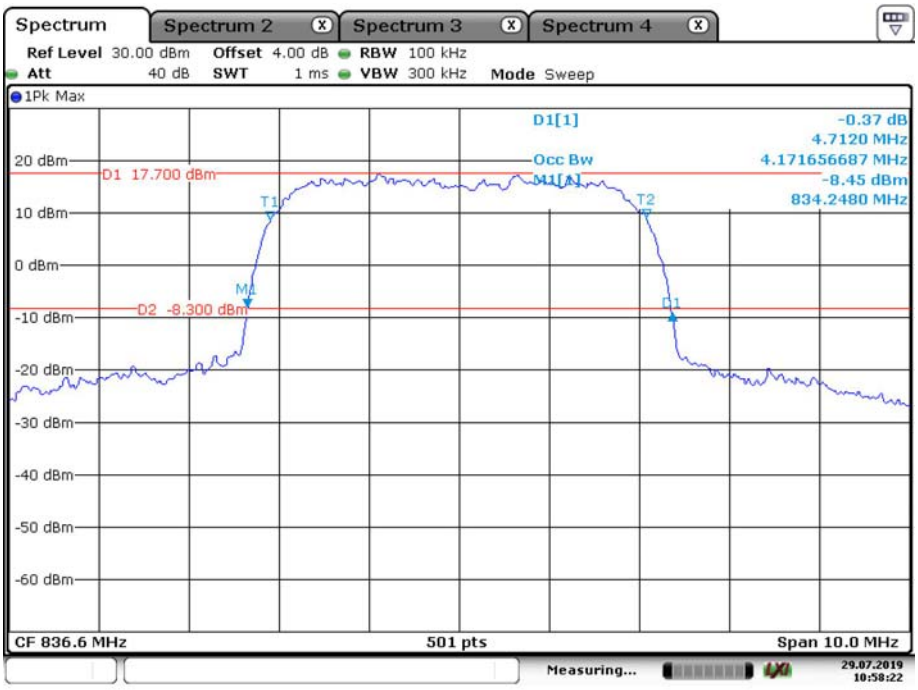
Date: 29.JUL.2019 10:49:02

WCDMA Band 5 HSDPA



Date: 29.JUL.2019 10:51:00

WCDMA Band 5 HSUPA



Date: 29.JUL.2019 10:58:22

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

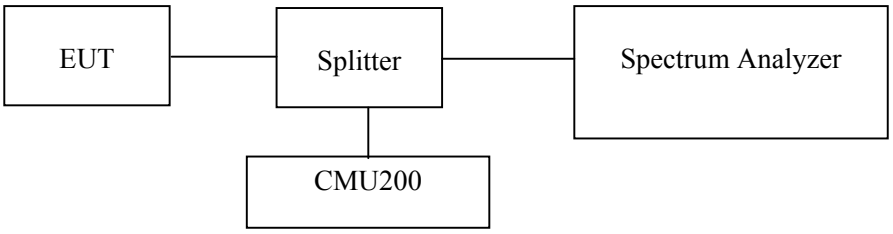
Applicable Standard

FCC §2.1051, §22.917(a) , §24.238(a) and §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	FSV40	101474	2019-01-09	2020-01-09
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010013	Each time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each time	/

*** 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).

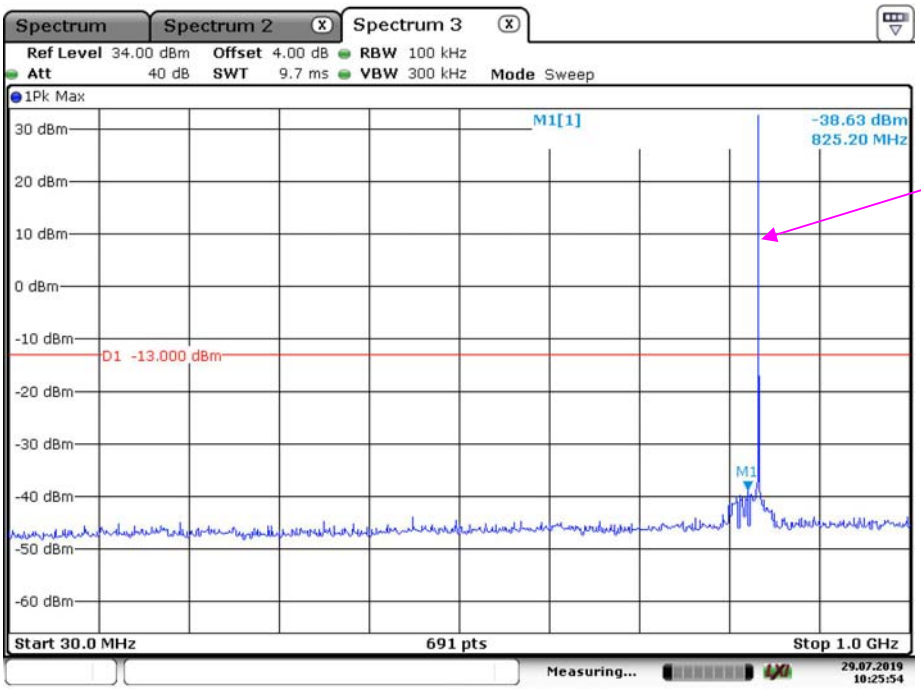
Test Data

Environmental Conditions

Temperature:	26.6 °C
Relative Humidity:	70 %
ATM Pressure:	100.3 kPa
Tester:	Carrie He
Test Date:	2019-07-29

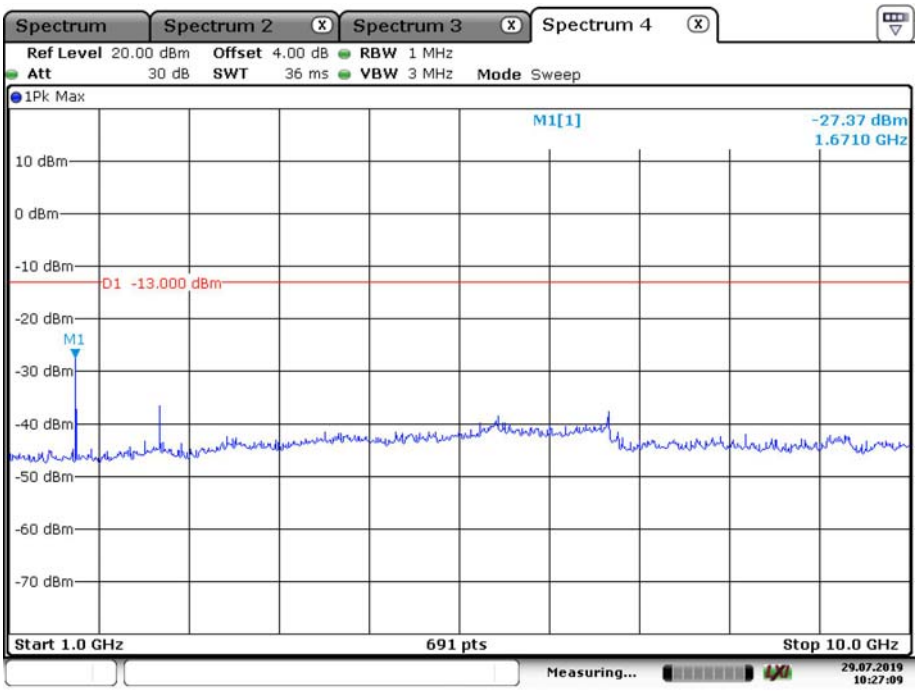
Test Result: Compliance. Please refer to the following plots.

GSM850 Middle Channel



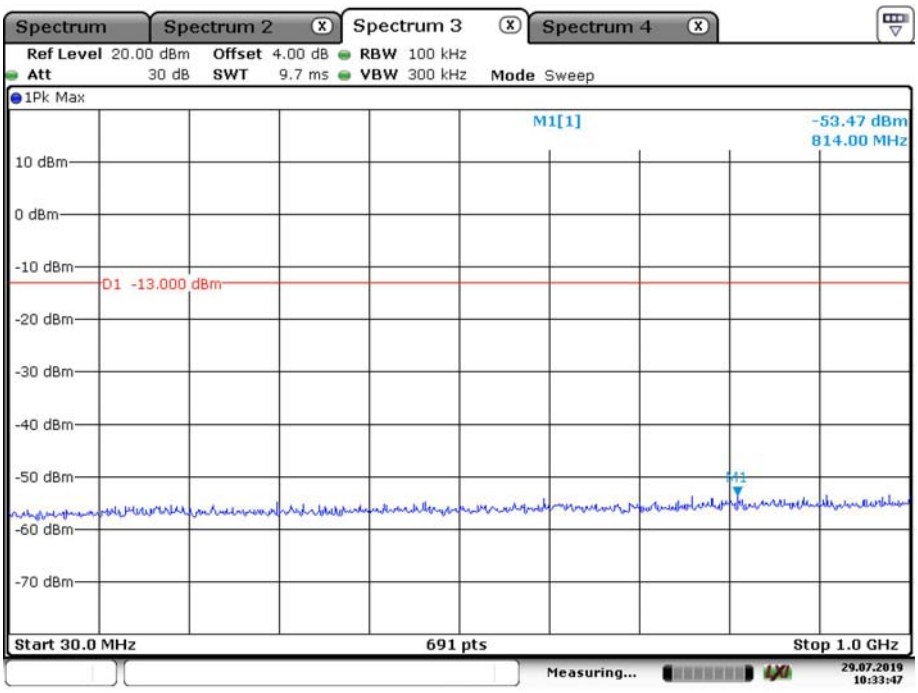
Fundamental

Date: 29.JUL.2019 10:25:54



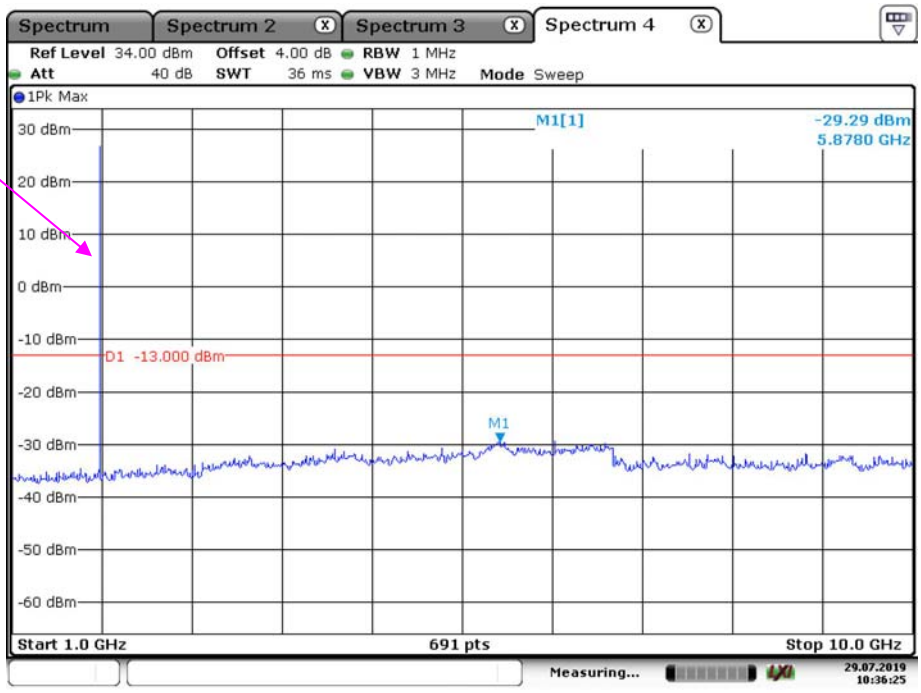
Date: 29.JUL.2019 10:27:10

PCS 1900 Middle Channel

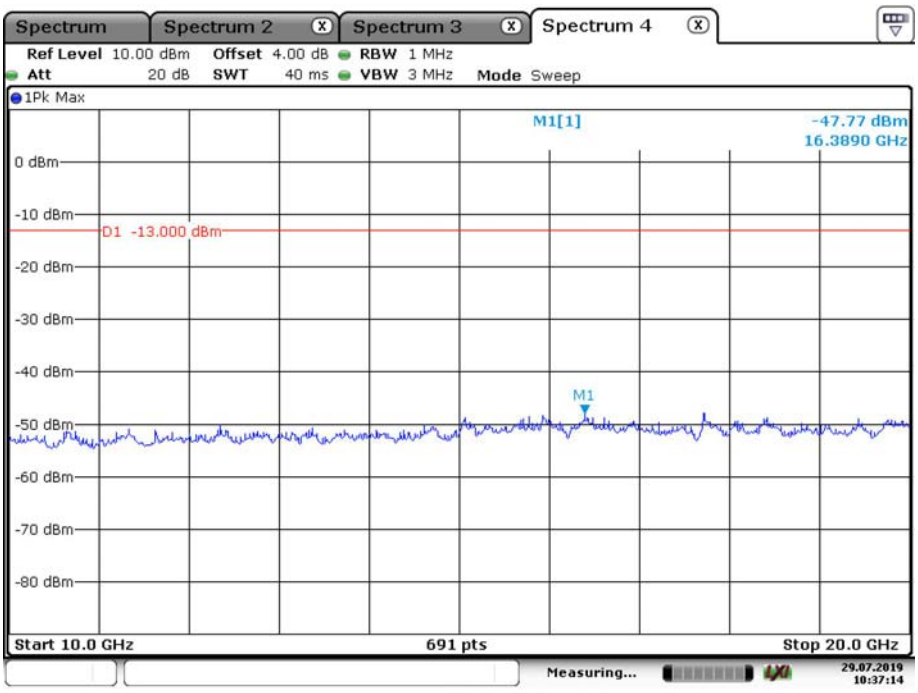


Date: 29.JUL.2019 10:33:48

Fundamental

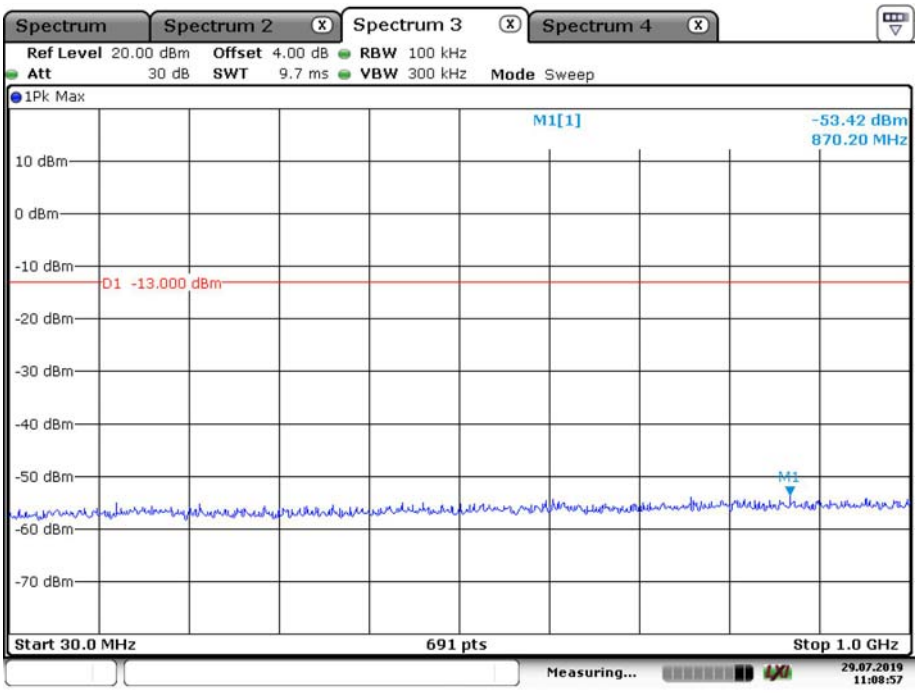


Date: 29.JUL.2019 10:36:25



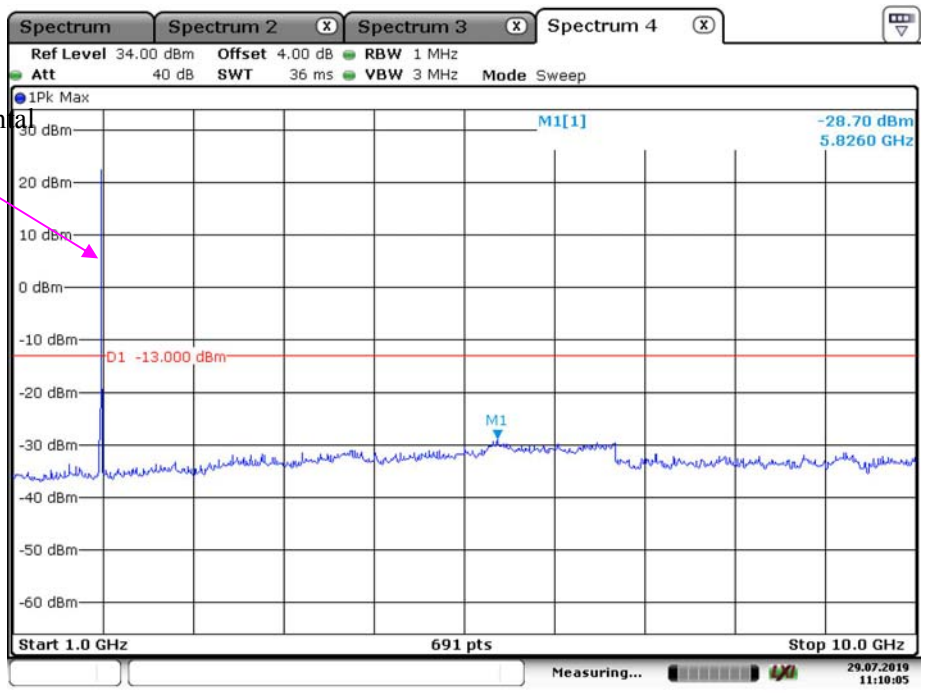
Date: 29.JUL.2019 10:37:14

WCDMA Band 2 Rel 99 Middle Channel

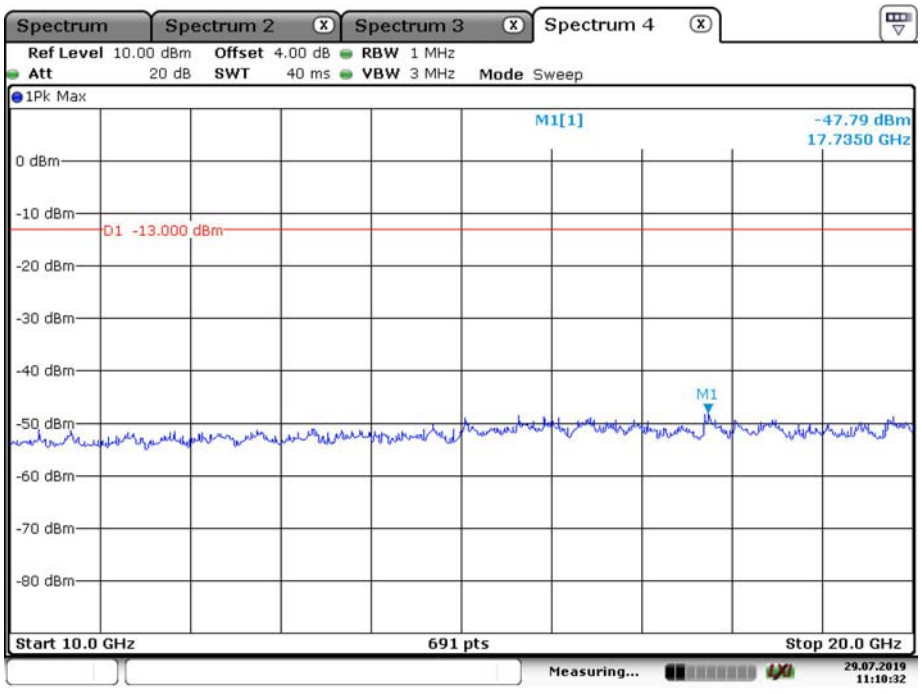


Date: 29.JUL.2019 11:08:57

Fundamental

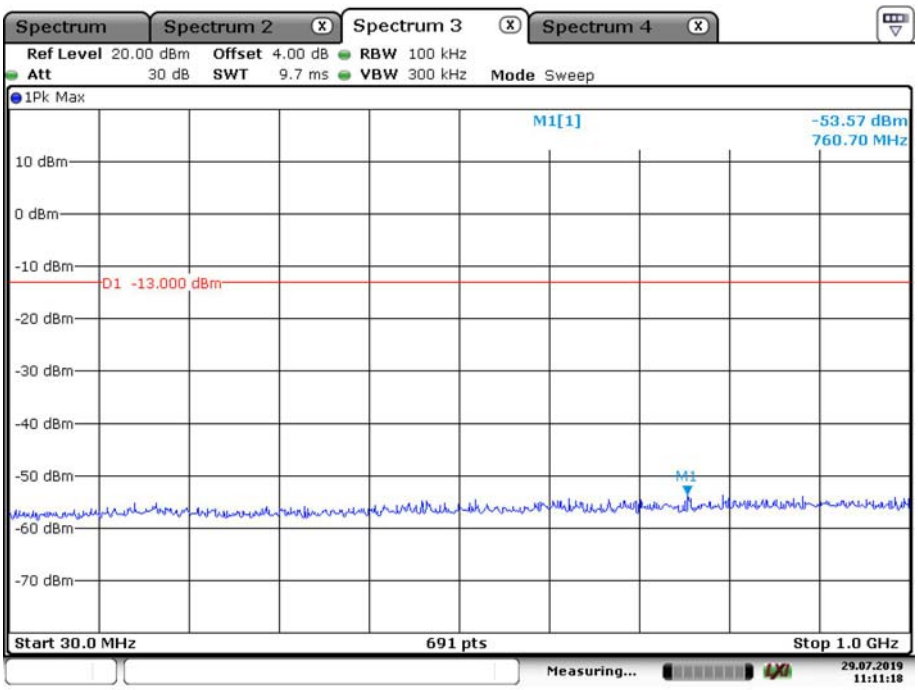


Date: 29.JUL.2019 11:10:05



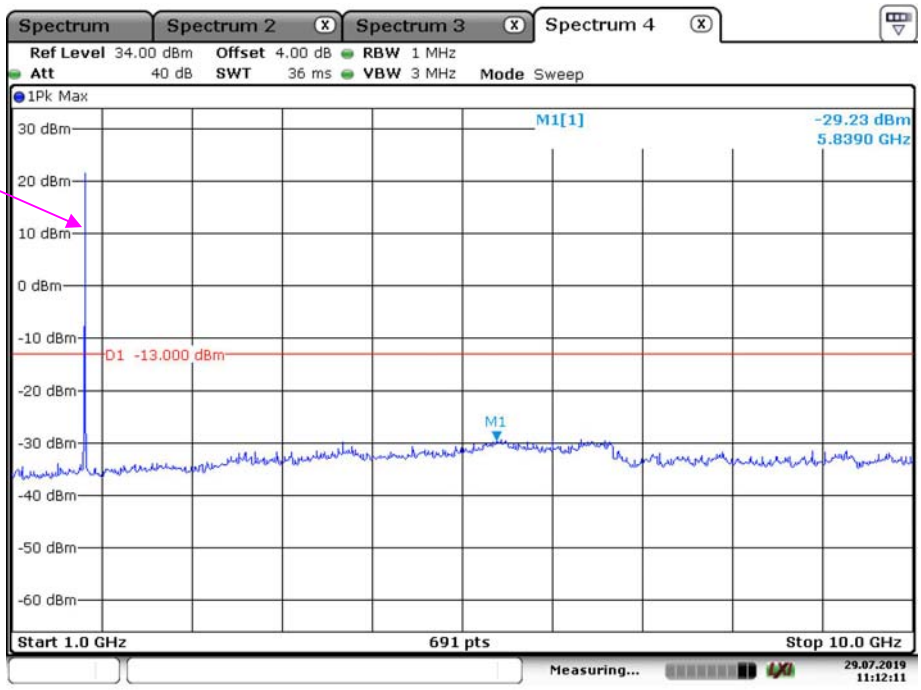
Date: 29.JUL.2019 11:10:32

WCDMA Band 4 Rel 99 Middle Channel

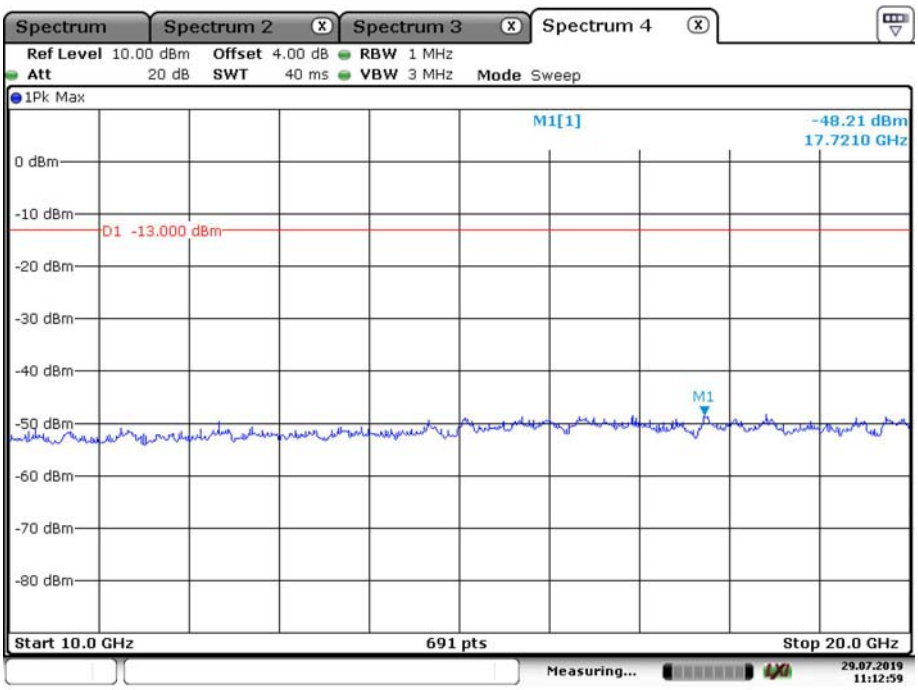


Date: 29.JUL.2019 11:11:18

Fundamental

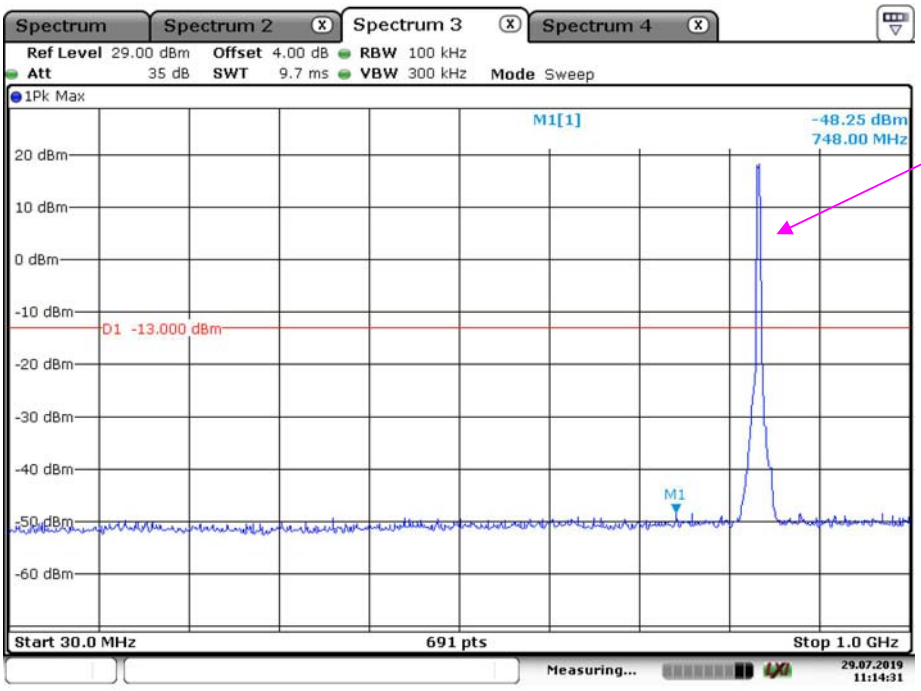


Date: 29.JUL.2019 11:12:11



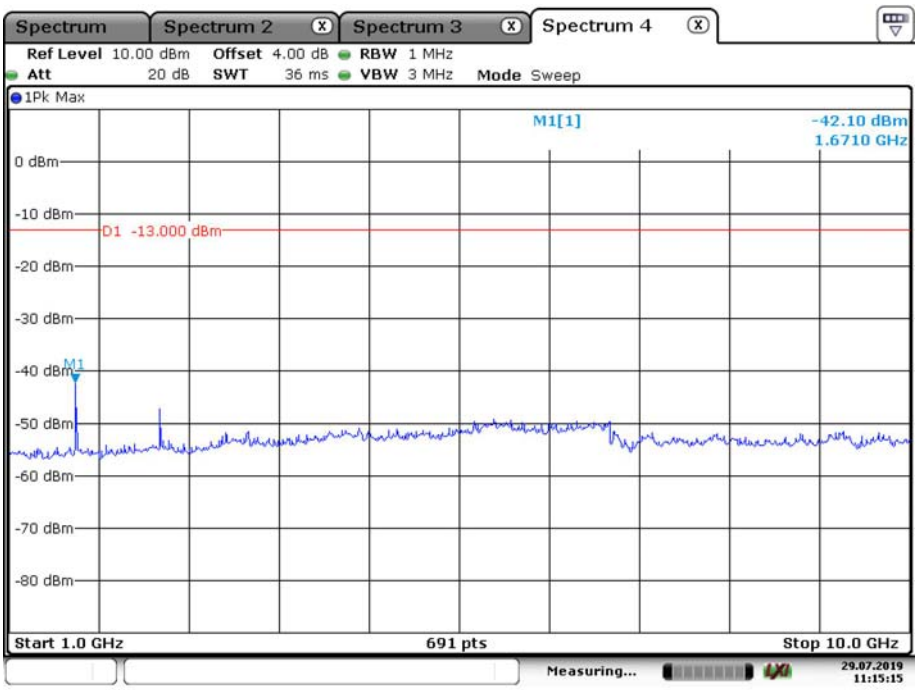
Date: 29.JUL.2019 11:12:59

WCDMA Band 5 Rel 99 Middle Channel



Fundamental

Date: 29.JUL.2019 11:14:31



Date: 29.JUL.2019 11:15:16

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 (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-10	2019-12-10
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	Not Required	/
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
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
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
R&S	Universal Radio Communication Tester	CMU200	110 822	2018-12-14	2019-12-14
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2016-11-18	2019-11-18
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2019-06-27	2020-06-27
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	2019-06-16	2020-06-16
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2019-06-16	2020-06-16
Sinoscite	Band-stop filter	BSF1850-1910MS-0935V2	0935V2	2019-06-16	2020-06-16

*** 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

Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	24.0 °C	28.2 °C
Relative Humidity:	60%	60 %
ATM Pressure:	99.5 kPa	99.5 kPa
Tester:	Sunny Cen	Neil Liao
Test Date:	2019-08-07	2019-08-07

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	63.37	-50.84	10.6	0.73	-41.0	-13.0	28.0
1673.200	V	61.91	-52.9	10.6	0.73	-43.0	-13.0	30.0
2509.800	H	63.67	-49.35	13.1	1.25	-37.5	-13.0	24.5
2509.800	V	62.93	-50.12	13.1	1.25	-38.3	-13.0	25.3
3346.400	H	49.11	-61.55	13.8	1.61	-49.3	-13.0	36.3
3346.400	V	46.77	-63.94	13.8	1.61	-51.7	-13.0	38.7
427.000	H	45.53	-60.89	0.0	0.37	-61.3	-13.0	48.3
427.000	V	46.85	-56.9	0.0	0.37	-57.3	-13.0	44.3
WCDMA Band V, Frequency:836.600 MHz								
1673.200	H	59.71	-54.5	10.6	0.73	-44.6	-13.0	31.6
1673.200	V	57.68	-57.13	10.6	0.73	-47.3	-13.0	34.3
2509.800	H	50.78	-62.24	13.1	1.25	-50.4	-13.0	37.4
2509.800	V	55.77	-57.28	13.1	1.25	-45.4	-13.0	32.4
3346.400	H	46.32	-64.34	13.8	1.61	-52.1	-13.0	39.1
3346.400	V	45.87	-64.84	13.8	1.61	-52.6	-13.0	39.6
622.000	H	44.52	-57.57	0.0	0.36	-57.9	-13.0	44.9
622.000	V	47.85	-51.61	0.0	0.36	-52.0	-13.0	39.0

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	55.88	-52.92	13.8	1.63	-40.8	-13.0	27.8
3760.000	V	54.05	-54.62	13.8	1.63	-42.5	-13.0	29.5
5640.000	H	66.78	-39.25	14.0	1.31	-26.5	-13.0	13.5
5640.000	V	63.39	-42.52	14.0	1.31	-29.8	-13.0	16.8
389.000	H	47.53	-59.46	0.0	0.37	-59.8	-13.0	46.8
389.000	V	48.94	-55.5	0.0	0.37	-55.9	-13.0	42.9
WCDMA Band II, Frequency:1880.000 MHz								
3760.000	H	50.29	-58.51	13.8	1.63	-46.4	-13.0	33.4
3760.000	V	50.57	-58.1	13.8	1.63	-46.0	-13.0	33.0
5640.000	H	50.15	-55.88	14.0	1.31	-43.2	-13.0	30.2
5640.000	V	47.88	-58.03	14.0	1.31	-45.3	-13.0	32.3
568.000	H	44.75	-58.63	0.0	0.36	-59.0	-13.0	46.0
568.000	V	47.89	-52.99	0.0	0.36	-53.4	-13.0	40.4

AWS Band (PART 27)

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)			
WCDMA Band IV, Frequency:1732.600 MHz								
3465.200	H	49.72	-60.52	13.9	1.62	-48.2	-13.0	35.2
3465.200	V	47.52	-62.75	13.9	1.62	-50.5	-13.0	37.5
5197.800	H	49.45	-56.97	14.0	1.52	-44.5	-13.0	31.5
5197.800	V	47.43	-59.06	14.0	1.52	-46.6	-13.0	33.6
172.000	H	45.62	-65.43	0.0	0.24	-65.7	-13.0	52.7
172.000	V	48.95	-58.77	0.0	0.24	-59.0	-13.0	46.0

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

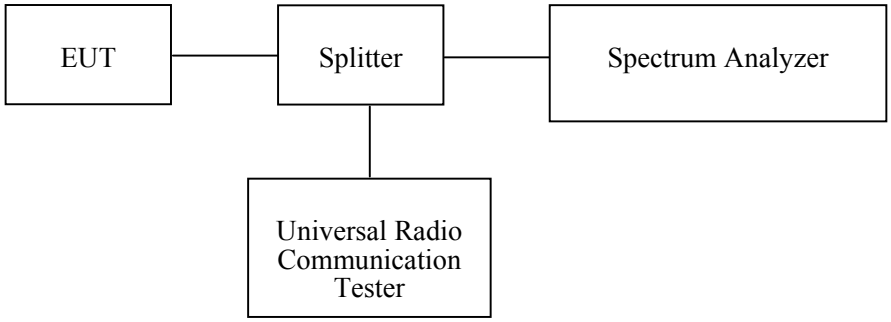
Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 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	FSV40	101474	2019-01-09	2020-01-09
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010013	Each time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each time	/

*** 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

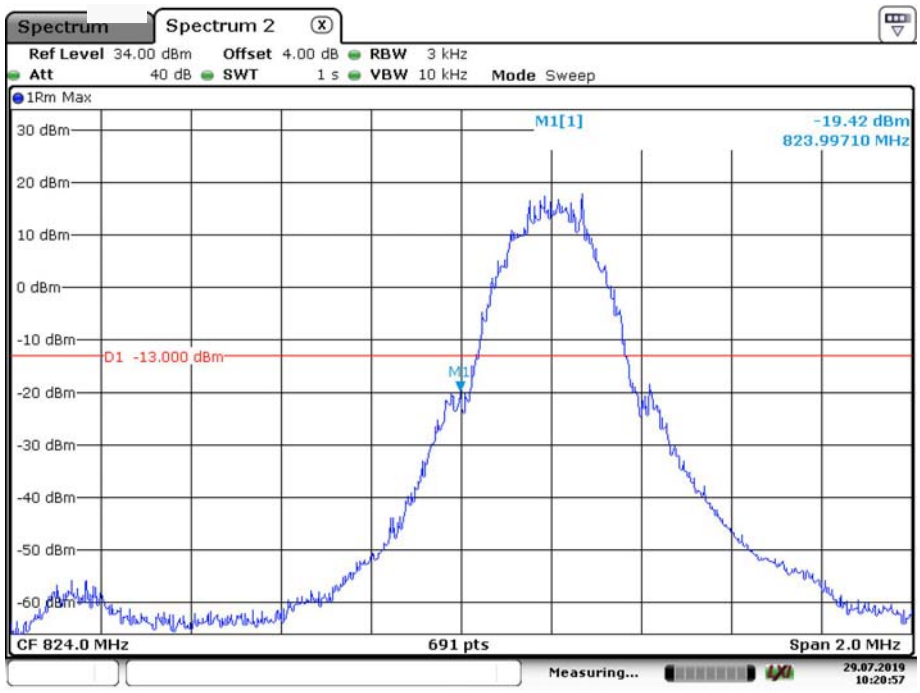
Environmental Conditions

Temperature:	26.6 °C
Relative Humidity:	70 %
ATM Pressure:	100.3 kPa
Tester:	Carrie He
Test Date:	2019-07-29

Test Mode: Transmitting

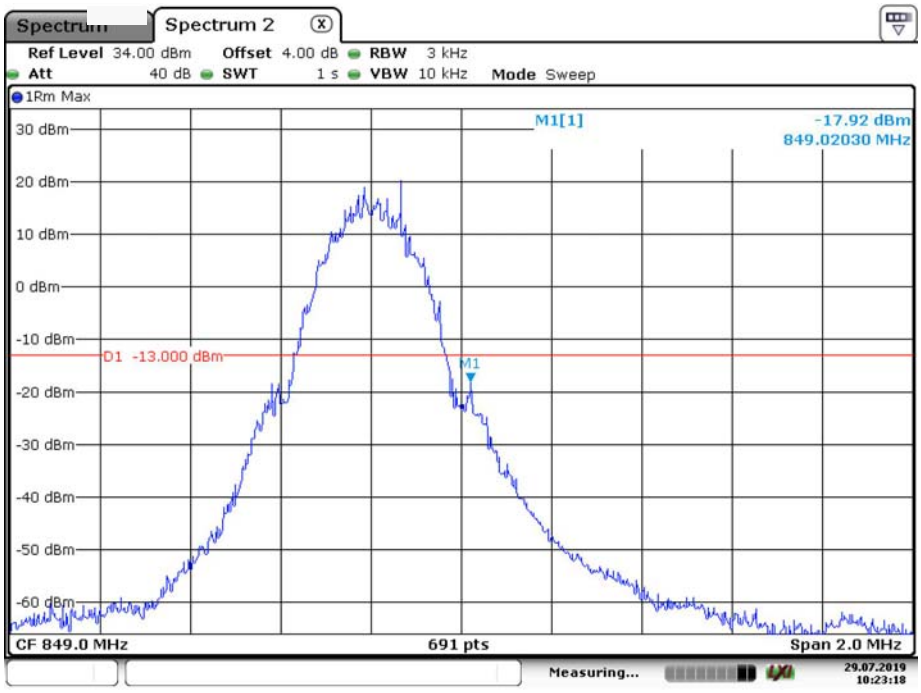
Test Result: Compliance. Please refer to the following plots.

GSM 850, Left Band Edge



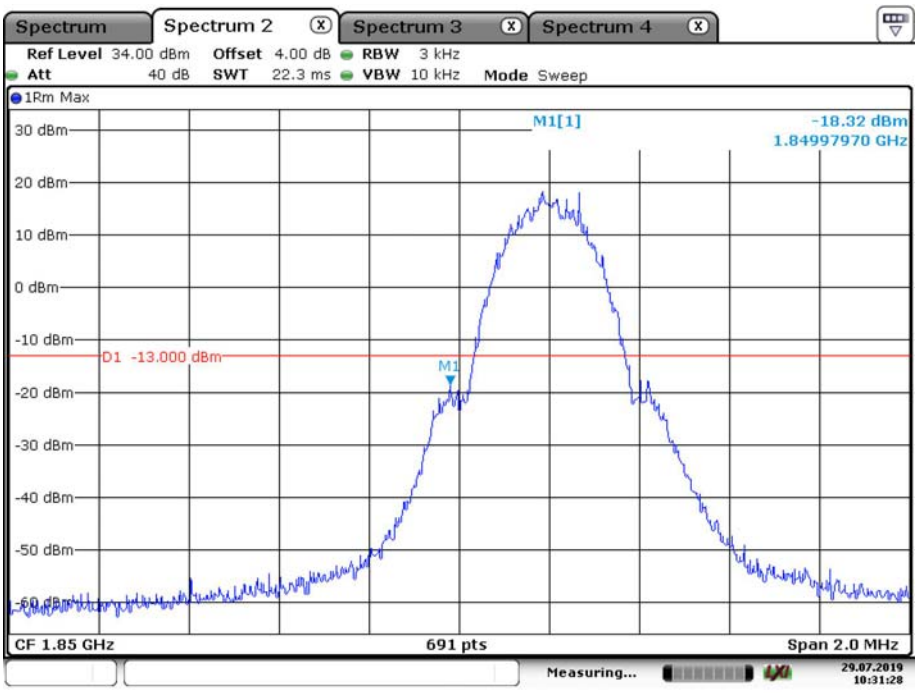
Date: 29.JUL.2019 10:20:57

GSM 850, Right Band Edge



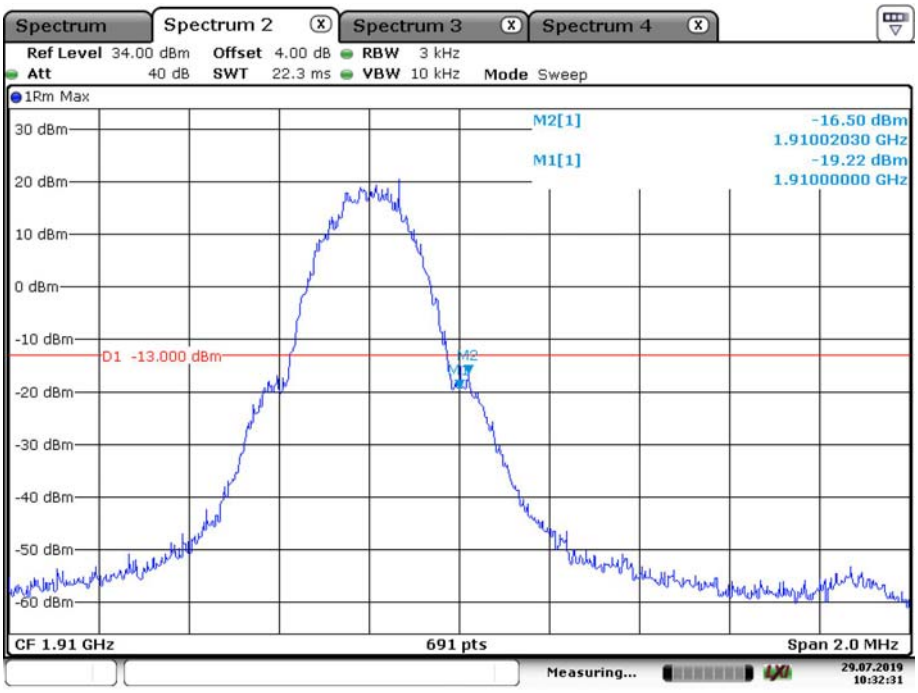
Date: 29.JUL.2019 10:23:19

GSM 1900, Left Band Edge



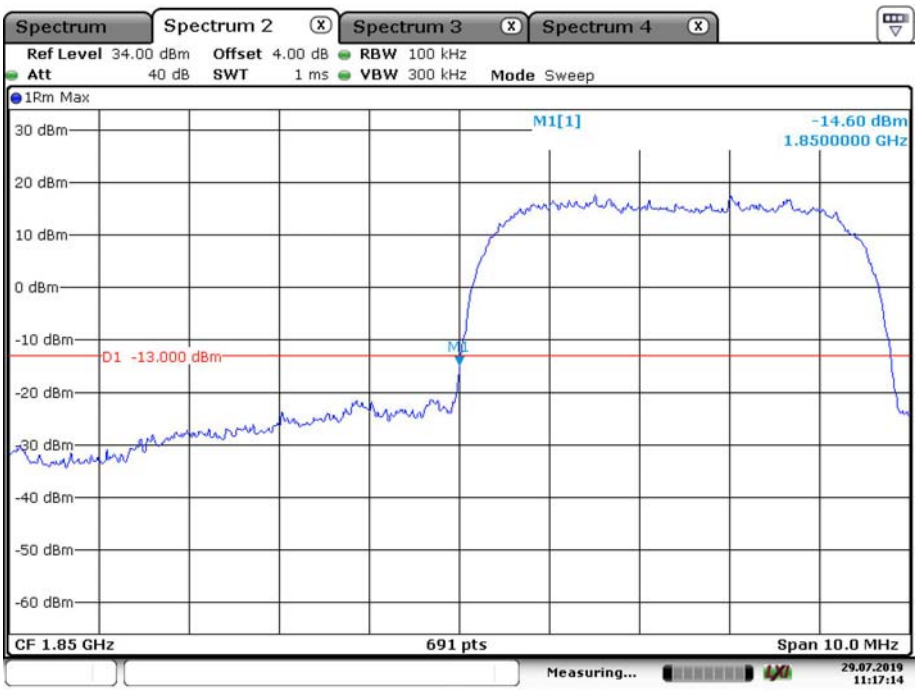
Date: 29.JUL.2019 10:31:28

GSM 1900, Right Band Edge



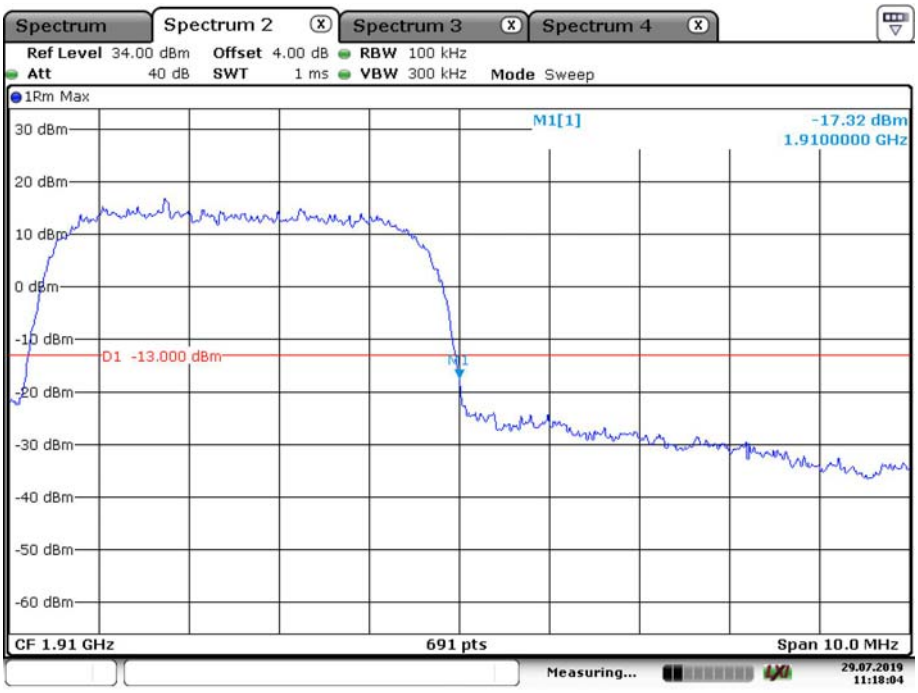
Date: 29.JUL.2019 10:32:32

WCDMA Band 2 Rel 99, Left Band Edge



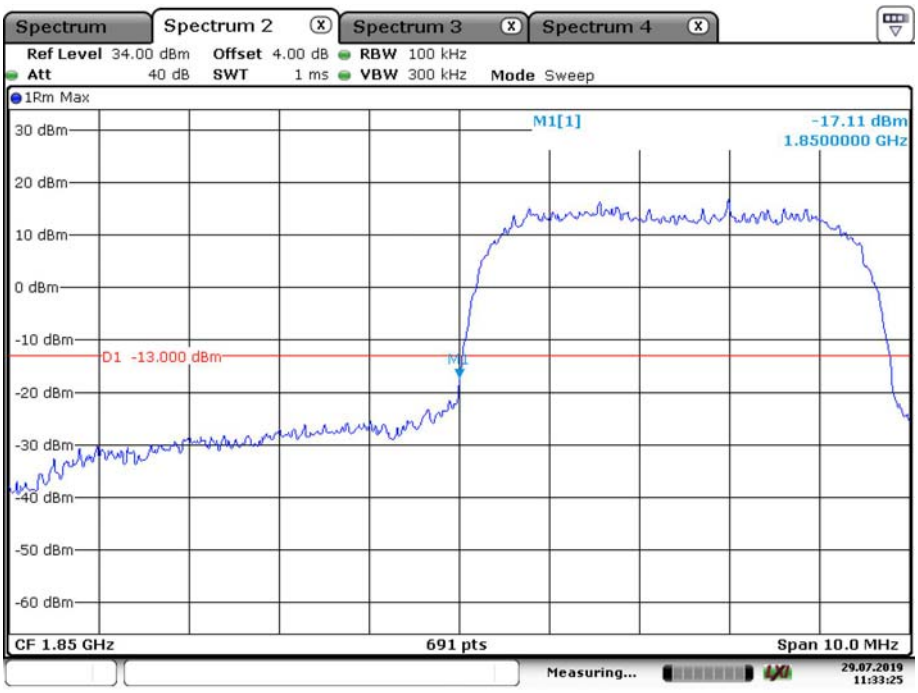
Date: 29.JUL.2019 11:17:15

WCDMA Band 2 Rel 99, Right Band Edge



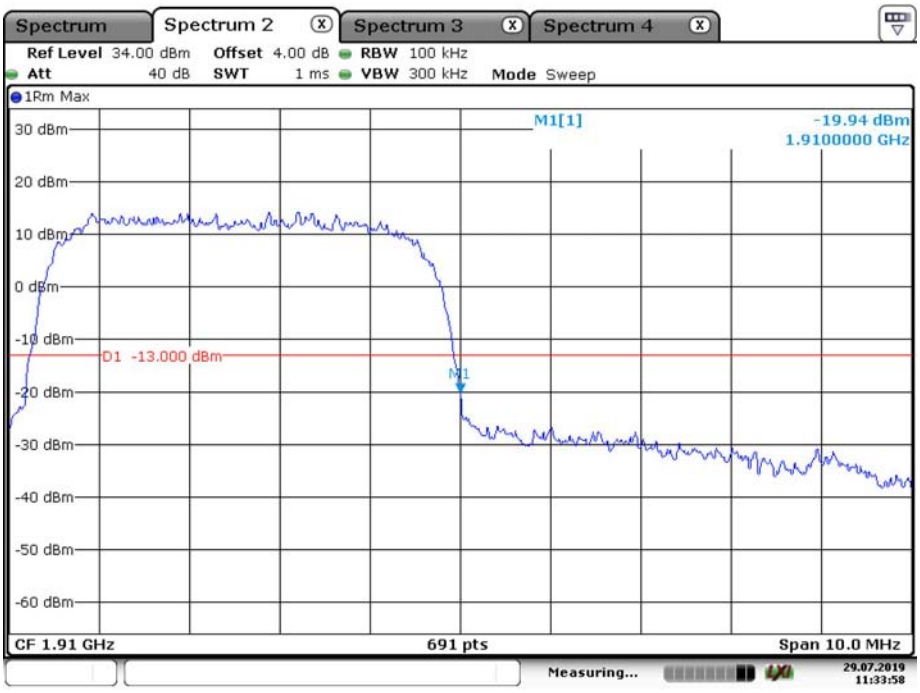
Date: 29.JUL.2019 11:18:05

WCDMA Band 2 HSDPA, Left Band Edge



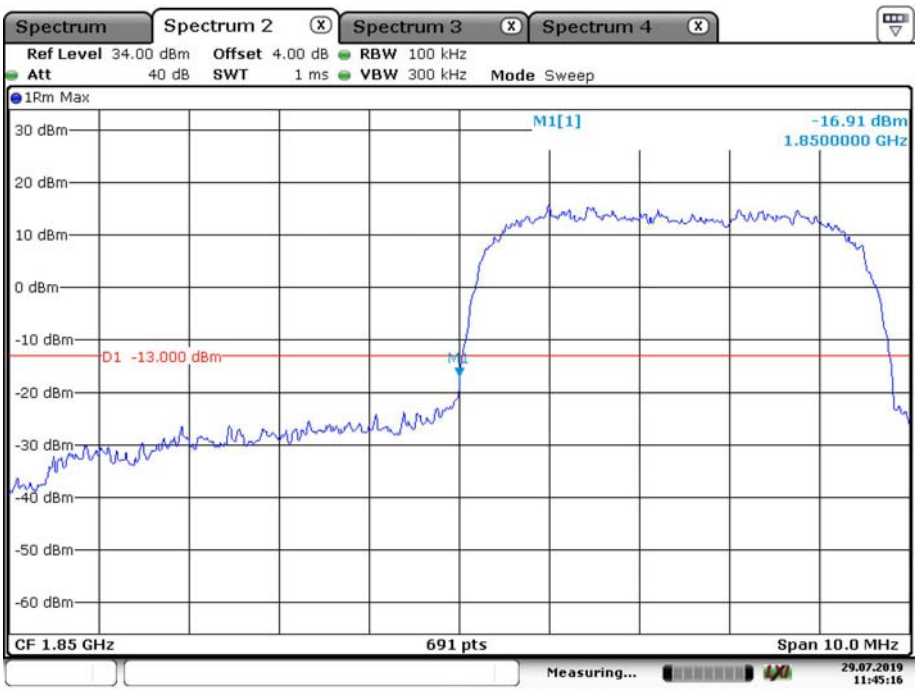
Date: 29.JUL.2019 11:33:25

WCDMA Band 2 HSDPA, Right Band Edge



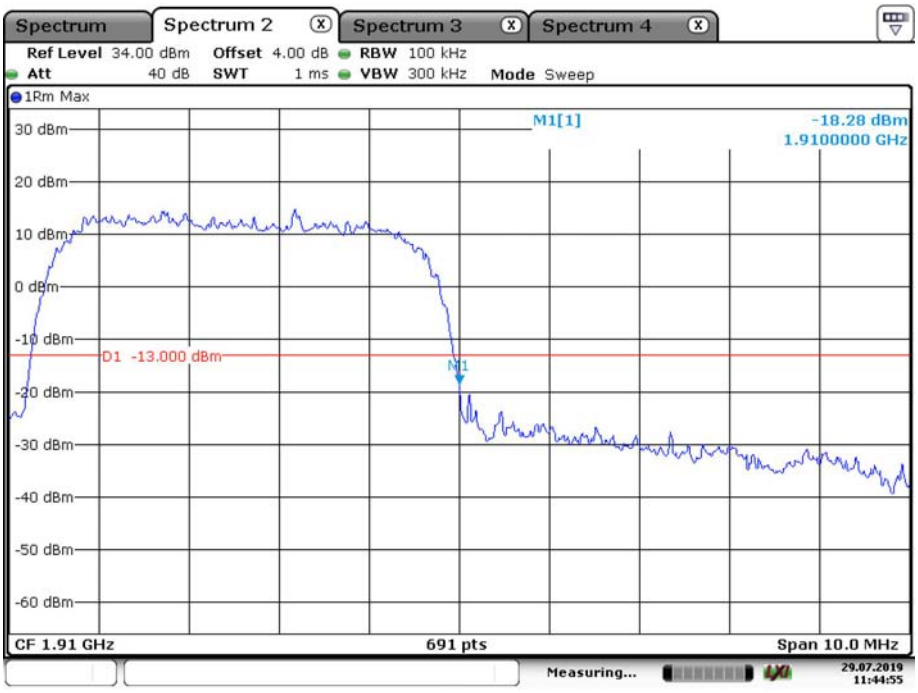
Date: 29.JUL.2019 11:33:58

WCDMA Band 2 HSUPA, Left Band Edge



Date: 29.JUL.2019 11:45:16

WCDMA Band 2 HSUPA, Right Band Edge



Date: 29.JUL.2019 11:44:55

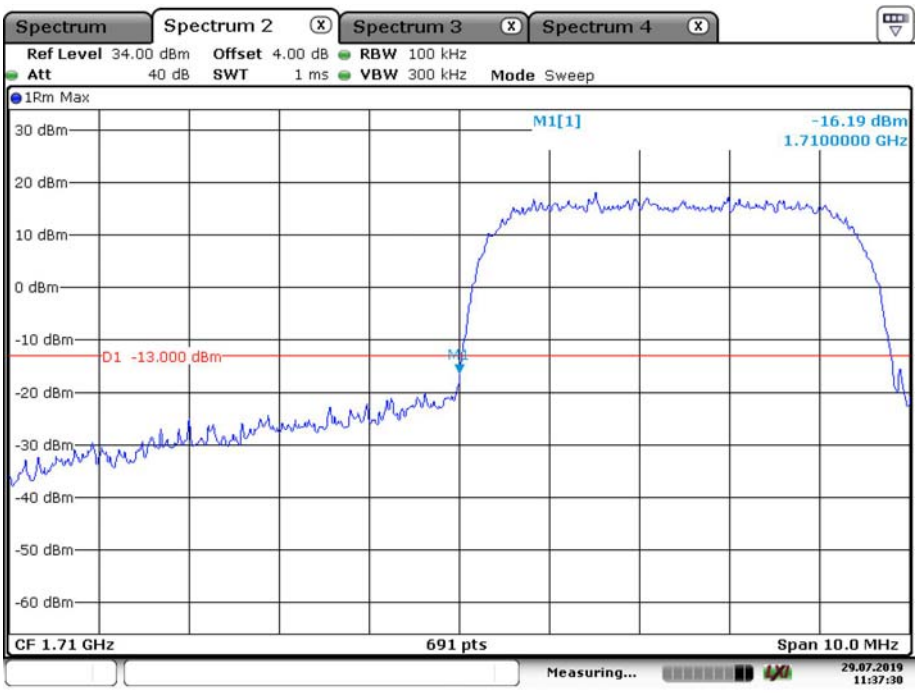
WCDMA Band 4 Rel 99, Left Band Edge

Date: 29.JUL.2019 11:21:37

WCDMA Band 4 Rel 99, Right Band Edge

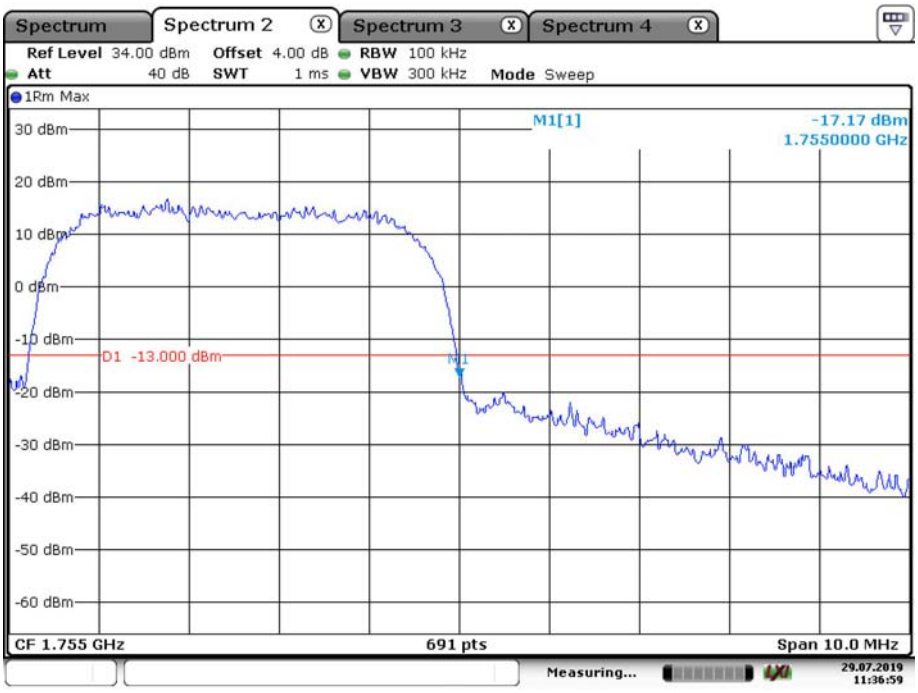
Date: 29.JUL.2019 11:22:41

WCDMA Band 4 HSDPA, Left Band Edge



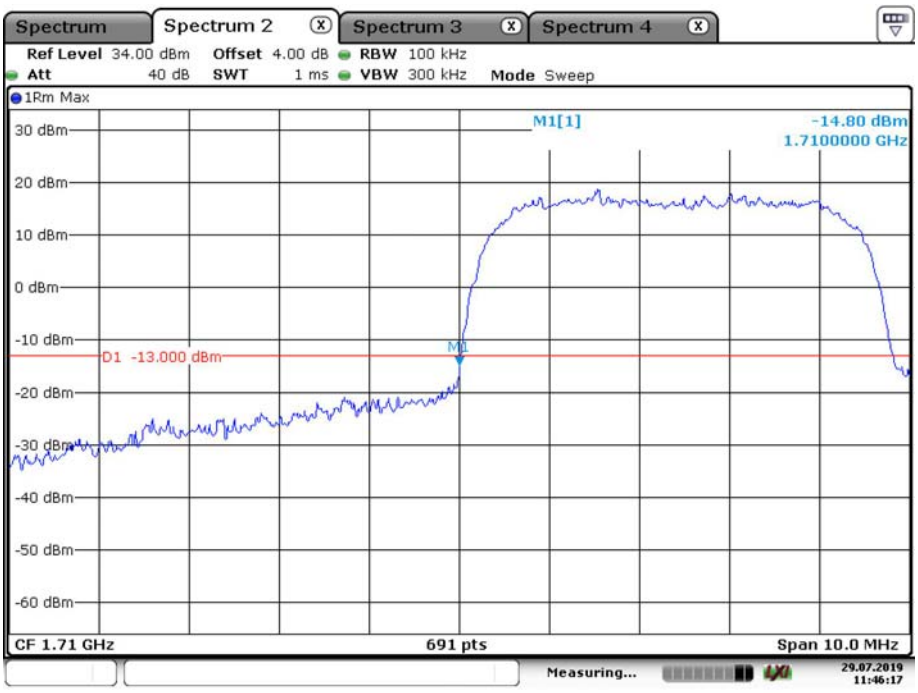
Date: 29.JUL.2019 11:37:30

WCDMA Band 4 HSDPA, Right Band Edge



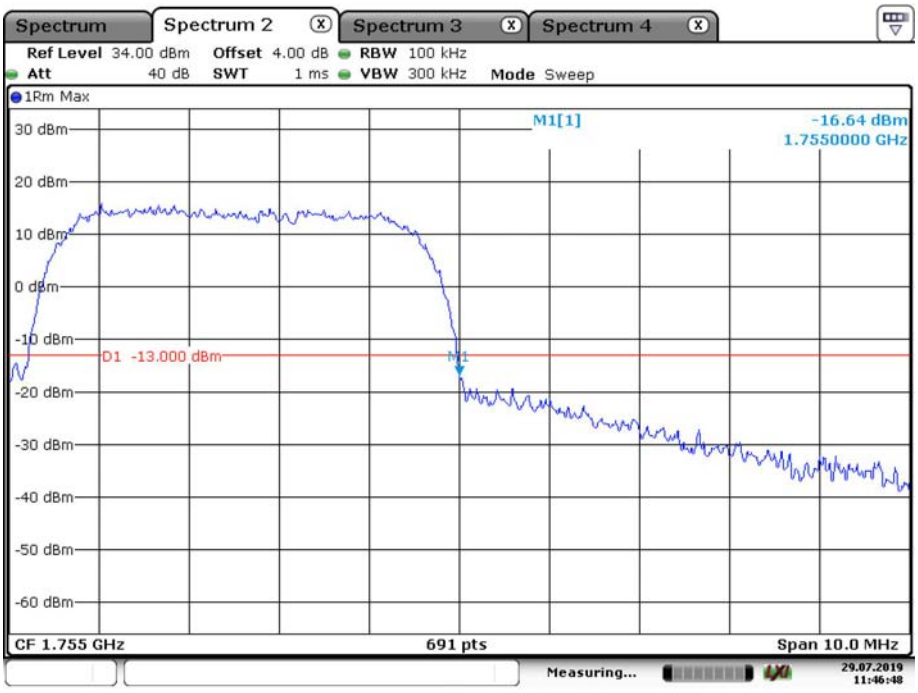
Date: 29.JUL.2019 11:36:59

WCDMA Band 4 HSUPA, Left Band Edge



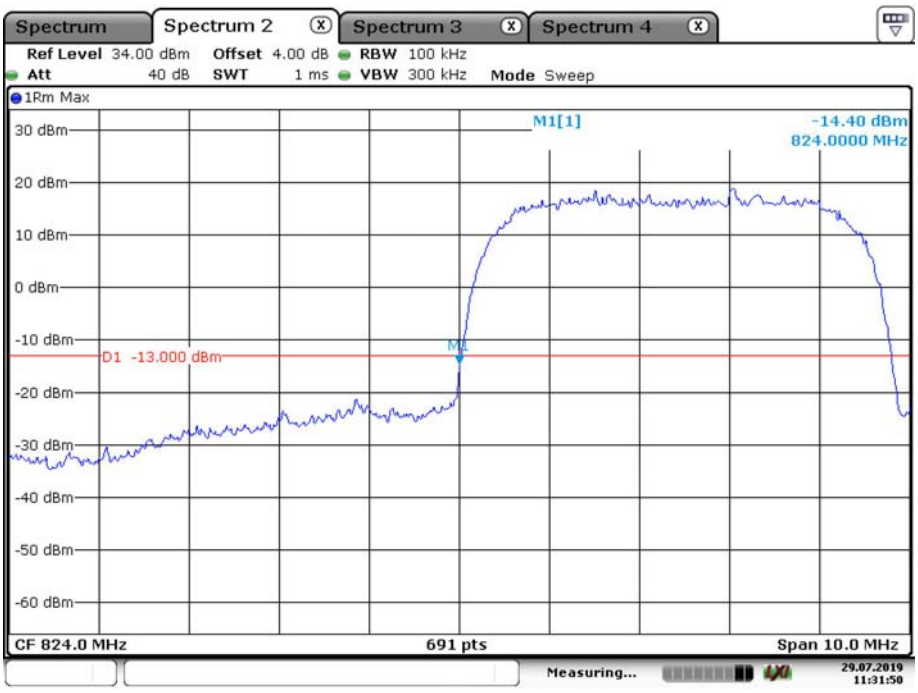
Date: 29.JUL.2019 11:46:17

WCDMA Band 4 HSUPA, Right Band Edge



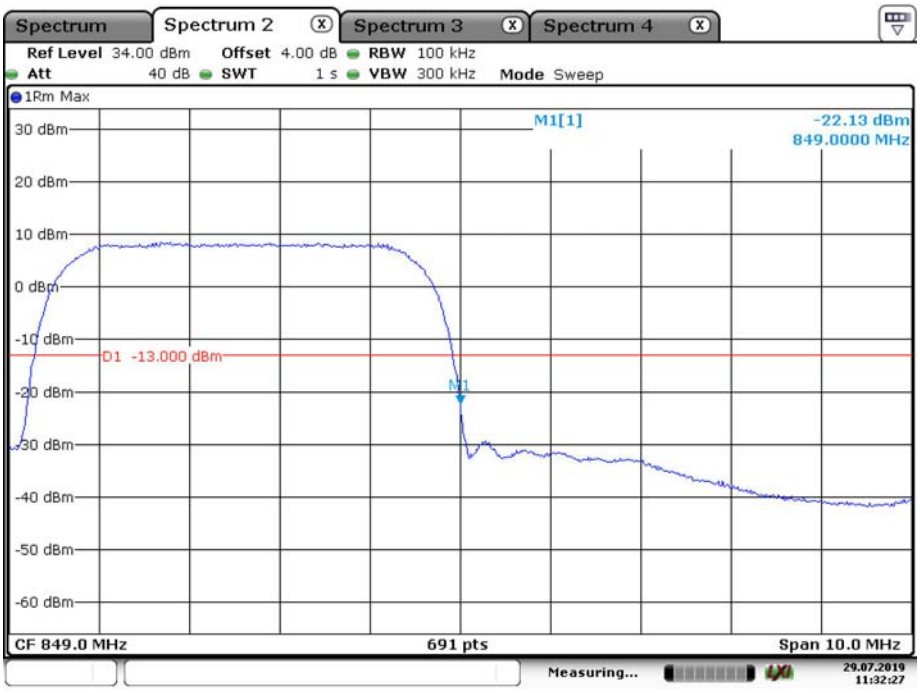
Date: 29.JUL.2019 11:46:48

WCDMA Band 5 Rel 99, Left Band Edge



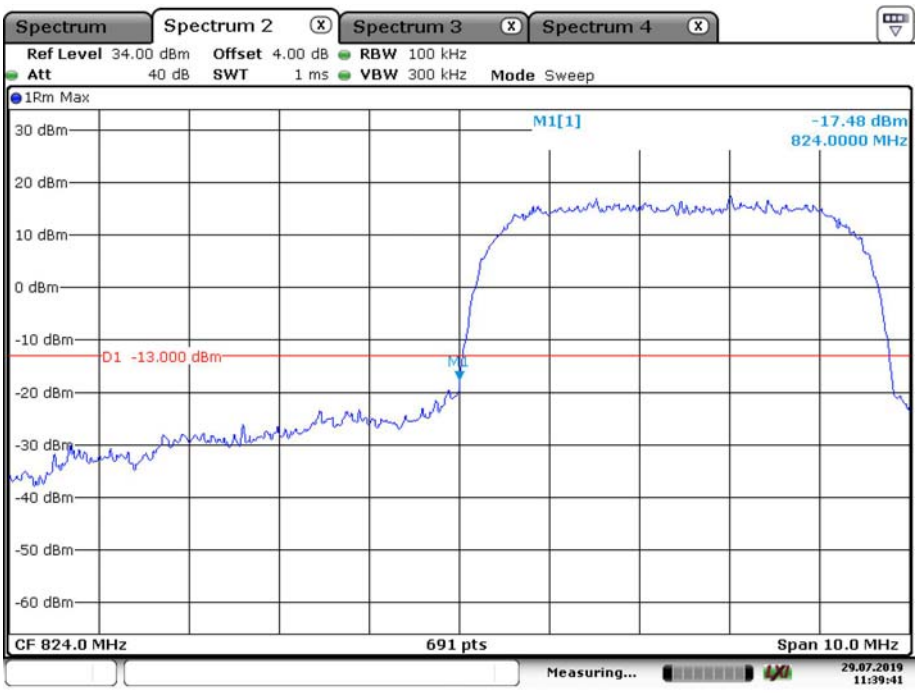
Date: 29.JUL.2019 11:31:51

WCDMA Band 5 Rel 99, Right Band Edge



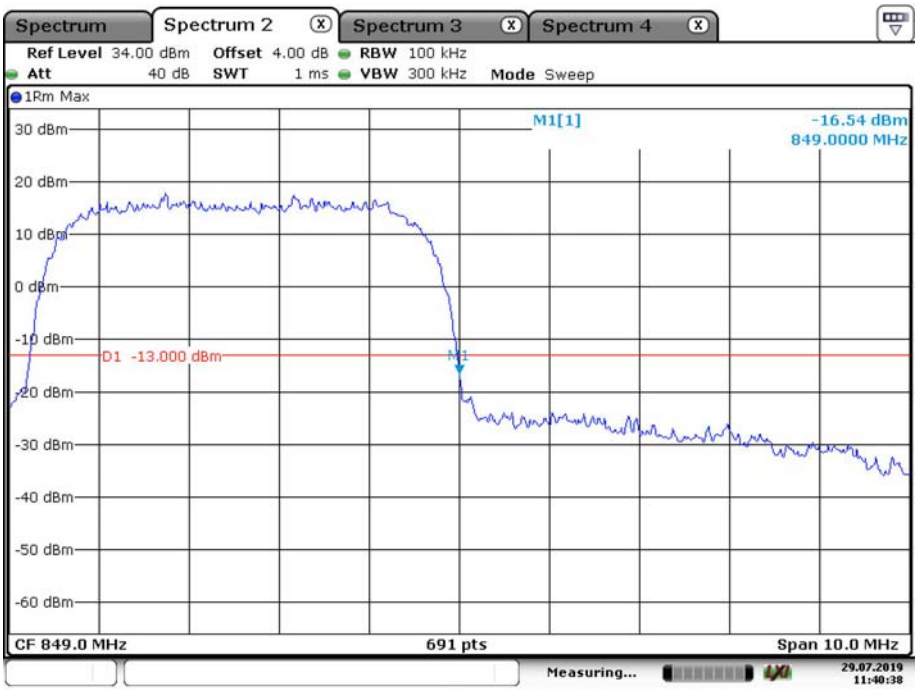
Date: 29.JUL.2019 11:32:27

WCDMA Band 5 HSDPA, Left Band Edge



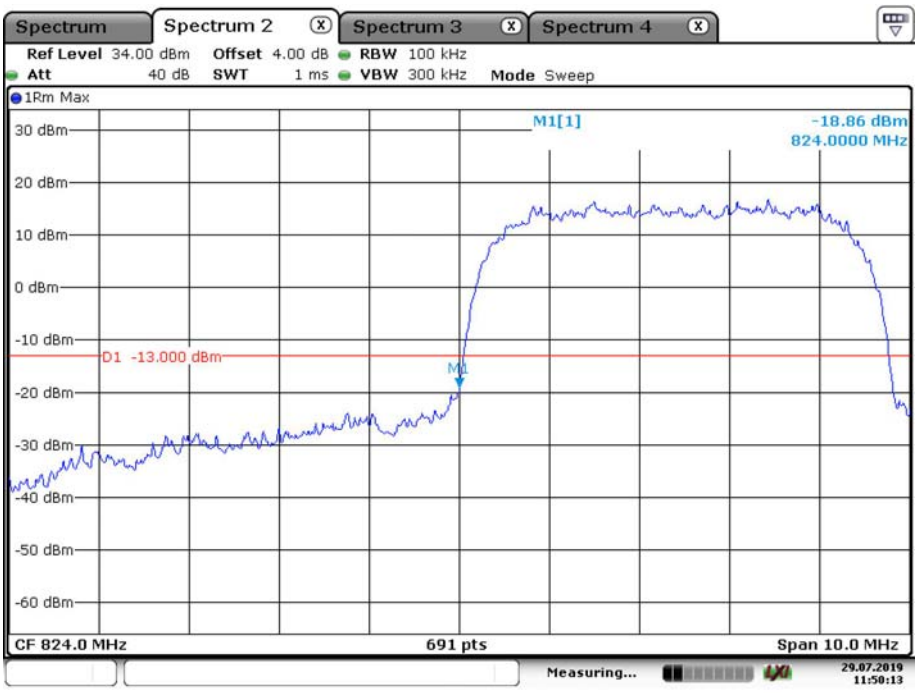
Date: 29.JUL.2019 11:39:41

WCDMA Band 5 HSDPA, Right Band Edge



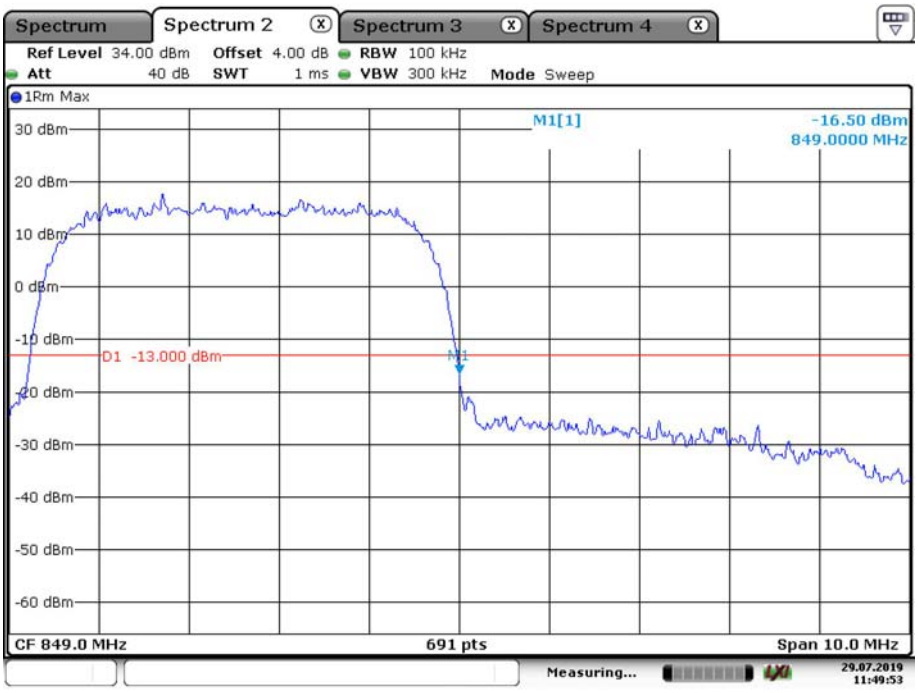
Date: 29.JUL.2019 11:40:38

WCDMA Band 5 HSUPA, Left Band Edge



Date: 29.JUL.2019 11:50:13

WCDMA Band 5 HSUPA, Right Band Edge



Date: 29.JUL.2019 11:49:54

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

Applicable Standard

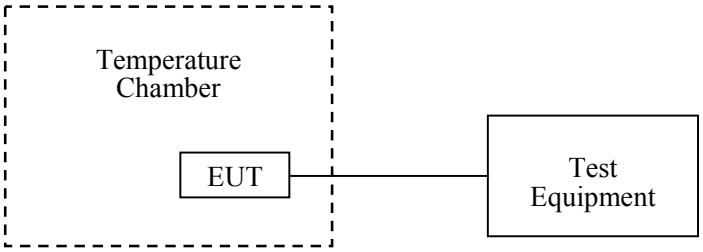
FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235, §27.54

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 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	Spectrum Analyzer	FSV40	101474	2019-01-09	2020-01-09
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010013	Each time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each time	/
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	2019-07-24	2020-07-24
Pro instrument	DC Power Supply	pps3300	3300012	N/A	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:	26.6 °C
Relative Humidity:	70 %
ATM Pressure:	100.3 kPa
Tester:	Carrie He
Test Date:	2019-07-29

Test Result: Compliance.

Cellular Band

GMSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	8	0.00956	2.5
-20		5	0.00598	
-10		9	0.01076	
0		10	0.01195	
10		7	0.00837	
20		11	0.01315	
30		9	0.01076	
40		2	0.00239	
50		8	0.00956	
20	3.5	4	0.00478	
20	4.2	12	0.01434	

PCS Band

GMSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	24	0.01277	Pass
-20		18	0.00957	
-10		20	0.01064	
0		15	0.00798	
10		8	0.00426	
20		26	0.01383	
30		11	0.00585	
40		9	0.00479	
50		22	0.01170	
20	3.5	17	0.00904	
20	4.2	13	0.00691	

WCDMA Band II: R99

Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.7	10	0.00532	Pass
-20		7	0.00372	
-10		9	0.00479	
0		5	0.00266	
10		2	0.00106	
20		11	0.00585	
30		15	0.00798	
40		2	0.00106	
50		0	0.00000	
20	3.5	3	0.00160	
20	4.2	4	0.00213	

WCDMA Band Ⅴ: R99

Middle Channel, f_c = 836.6 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30	3.7	1	0.00120	2.5
-20		6	0.00717	
-10		4	0.00478	
0		7	0.00837	
10		12	0.01434	
20		11	0.01315	
30		8	0.00956	
40		5	0.00598	
50		1	0.00120	
20	3.5	3	0.00359	
20	4.2	5	0.00598	

WCDMA Band Ⅳ:

WCDMA Band IV Rel 99					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	1710.240	1754.550	1710	1755
-20		1710.400	1754.690	1710	1755
-10		1710.160	1754.450	1710	1755
0		1710.410	1754.680	1710	1755
10		1710.390	1754.660	1710	1755
20		1710.304	1754.676	1710	1755
30		1710.260	1754.460	1710	1755
40		1710.260	1754.480	1710	1755
50		1710.510	1754.970	1710	1755
20	3.5	1710.400	1754.680	1710	1755
20	4.2	1710.180	1754.410	1710	1755

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