FCC PART 22H, PART 24E

FCC PART 27

MEASUREMENT AND TEST REPORT

For

MAXWEST INTERNATIONAL LIMITED.

No.1,Longgang Road,Buji, Longgang,Shenzhen,China

FCC ID: 2AEN3NITRO4SLTE

Report Type:	Product Type:
Original Report	Mobile Phone

Report Number:	RDG180601001-00C
Report Date:	2018-07-19
Reviewed By:	Jerry Zhang EMC Manager
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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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	Mobile Phone	
EUT Model:	Nitro 4S LTE	
FCC ID:	2AEN3NITRO4SLTE	
Rated Input Voltage:	DC3.7V from Li-ion Rechargeable Battery or DC5V from adapter	
Adapter Information	**Model Name:**	Nitro 4S LTE
	Input:	AC100-240V, 50/60Hz 0.2A
	Output:	DC5.0V, 0.5A
External Dimension:	Length (126 mm)*Width (66 mm)*High (10 mm)	
Serial Number:	180601001	
EUT Received Date:	2018.06.01	

Objective

This report is prepared on behalf of *MAXWEST INTERNATIONAL LIMITED.* in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules. Part 2, Part 27 of the Federal Communication Commissions 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 DTS submissions with FCC ID: 2AEN3NITRO4SLTE.
FCC Part 15C DSS submissions with FCC ID: 2AEN3NITRO4SLTE.
FCC Part 15B JBP submissions with FCC ID: 2AEN3NITRO4SLTE.

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 test site has been approved by the FCC 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 test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

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. The device support GSM/GPRS/ EDGE 850 band and 1900 band, WCDMA/HSUPA/HPDPA Band 2 and band 5, LTE band 2,4, 5, 12 and 17.
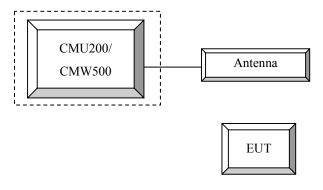
Equipment Modifications

No modification was made to the EUT.
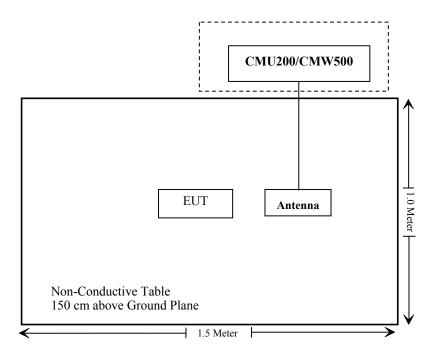
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universial Radio Communication Tester	CMU200	109038
R&S	Wideband Radio Communication Tester	CMW500	147473
N/A	ANTENNA	N/A	N/A

Configuration of Test Setup

Block Diagram of Test Setup

CMU200/CMW500

EUT

Antenna

1.0 Meter

Non-Conductive Table
150 cm above Ground Plane

1.5 Meter

SUMMARY OF TEST RESULTS

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

Compliant, please refer to the SAR report: RDG180601001-20.

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) & § 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
	$\beta c/ \beta d$	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				
	$Ahs=\beta hs/ \beta c$	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_FCls		E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	

HSPA+

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

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

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.

Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

DC-HSDPA

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

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

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK

Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.

Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.

LTE (FDD):

The following tests were conducted according to the test requirements in 3GPP TS36.101

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 / 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
...					
NS_32	·	·	·	·	·

Note 1:   Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Radiated method:

ANSI/TIA-603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31

* 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:	24.2°C
Relative Humidity:	45 %
ATM Pressure:	99.7 kPa

* The testing was performed by Blake Yang & Vern Shen on 2018-07-07

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	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	31.60	31.78	31.02	29.27	28.03	26.44	25.62	23.74	22.56
	190	31.70	31.92	31.11	29.44	28.21	26.47	25.58	23.71	22.53
	251	31.90	31.89	31.08	29.45	28.17	26.53	25.64	23.83	22.71
PCS	512	27.60	27.54	27.02	25.58	24.41	26.63	25.82	24.01	22.96
	661	27.30	27.21	26.74	25.29	24.04	26.44	25.51	23.77	22.79
	810	27.00	26.95	26.44	24.98	23.82	26.12	25.34	23.54	22.59

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	20.63	2.52	20.34	2.68	20.33	2.76
HSDPA	1	19.53	3.72	19.34	3.00	19.16	3.52
	2	19.44	3.91	19.38	3.97	19.12	3.90
	3	19.37	3.86	19.32	3.92	19.09	3.90
	4	19.99	4.01	19.28	4.00	19.17	3.96
HSUPA	1	19.51	3.60	19.33	3.76	19.15	3.96
	2	19.33	3.96	20.23	3.92	19.11	3.93
	3	19.42	4.01	20.07	4.01	19.19	3.91
	4	19.45	4.00	20.14	3.89	19.21	3.91
	5	19.36	3.90	19.94	3.90	19.08	3.96

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	21.33	3.12	21.81	2.96	21.76	3.00
HSDPA	1	20.29	3.28	20.76	3.32	20.71	4.40
	2	20.46	3.97	20.53	3.96	20.50	3.92
	3	20.21	3.88	20.27	3.86	20.31	3.98
	4	20.00	3.92	20.04	3.87	20.06	3.90
HSUPA	1	20.45	3.68	20.43	3.52	20.55	3.92
	2	20.20	4.01	20.20	3.89	20.25	3.97
	3	20.09	3.87	20.20	3.92	20.06	4.00
	4	20.04	3.93	20.19	3.99	20.09	3.93
	5	19.94	3.88	19.97	3.88	20.00	3.91

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	21.60	21.75	21.51
		1#3	21.40	21.61	21.24
		1#5	21.51	21.75	21.25
		3#0	21.32	21.73	21.40
		3#3	21.35	21.73	21.31
		6#0	20.40	20.79	20.54
	16QAM	1#0	20.25	20.67	20.61
		1#3	20.31	20.64	20.40
		#5	20.49	20.77	20.46
		3#0	20.32	20.94	20.43
		3#3	20.88	21.01	20.37
		6#0	19.85	19.91	19.65
3MHz	QPSK	1#0	21.43	21.44	21.29
		1#8	21.49	21.41	21.22
		1#14	21.63	21.49	21.12
		6#0	20.70	20.60	20.42
		6#9	20.86	20.75	20.38
		15#0	20.78	20.68	20.41
	16QAM	1#0	20.95	20.65	20.23
		1#8	21.03	20.72	20.24
		1#14	21.17	20.86	20.22
		6#0	19.79	19.70	19.37
		6#9	19.95	19.87	19.44
		15#0	19.88	19.72	19.50
5MHz	QPSK	1#0	21.49	21.34	20.99
		1#13	21.19	21.01	20.75
		1#24	21.50	21.40	20.95
		15#0	20.40	20.14	19.82
		15#10	20.51	20.23	19.93
		25#0	20.43	20.20	19.83
	16QAM	1#0	20.37	20.64	19.95
		1#13	20.13	20.35	19.82
		1#24	20.52	20.77	20.11
		15#0	19.44	19.16	18.83
		15#10	19.58	19.27	19.03
		25#0	19.56	19.26	18.94

		1#0	20.99	20.68	20.21
10MHz	QPSK	1#25	21.12	20.95	20.39
		1#49	20.69	21.03	20.52
		25#0	20.40	20.00	19.24
		25#25	20.23	20.23	19.72
		50#0	20.37	20.15	19.49
	16QAM	1#0	20.48	19.86	19.12
		1#25	20.69	20.20	19.41
		1#49	20.24	20.31	19.68
		25#0	19.46	19.06	18.39
		25#25	19.30	19.31	18.91
		50#0	19.45	19.21	18.60
15MHz	QPSK	1#0	21.04	20.52	20.40
		1#38	20.80	20.80	19.87
		1#74	20.22	21.02	20.49
		36#0	20.27	19.68	19.05
		36#39	19.73	20.13	19.34
		75#0	20.00	19.91	19.15
	16QAM	1#0	20.52	19.64	19.60
		1#38	20.44	20.02	19.28
		1#74	19.82	20.30	19.88
		36#0	19.34	18.74	18.09
		36#39	18.82	19.18	14.81
		75#0	19.12	19.00	14.53
20MHz	QPSK	1#0	21.30	21.41	21.04
		1#50	21.17	21.22	19.95
		1#99	21.39	21.44	21.33
		50#0	20.97	20.13	19.87
		50#50	19.71	21.40	19.21
		100#0	20.39	20.72	19.52
	16QAM	1#0	20.60	20.08	21.01
		1#50	20.60	20.85	20.76
		1#99	19.29	21.09	20.58
		50#0	20.05	19.38	20.95
		50#50	18.79	20.25	20.55
		100#0	19.51	19.66	20.62

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	21.91	20.39	22.18
		1#3	21.67	19.98	22.19
		1#5	21.76	20.04	22.12
		3#0	21.55	20.11	21.98
		3#3	21.54	19.94	21.99
		6#0	20.55	19.06	21.07
	16QAM	1#0	20.55	19.45	20.95
		1#3	20.49	19.14	21.01
		1#5	20.66	19.25	20.95
		3#0	20.63	19.17	20.97
		3#3	20.73	19.03	20.96
		6#0	19.50	18.15	19.91
3MHz	QPSK	1#0	21.52	20.41	22.08
		1#8	21.37	19.76	22.12
		1#14	21.60	19.79	22.11
		6#0	20.39	19.16	21.07
		6#7	20.57	18.84	21.09
		15#0	20.46	18.99	21.04
	16QAM	1#0	20.89	19.57	20.98
		1#8	20.90	19.01	20.97
		1#14	21.12	19.05	20.93
		6#0	19.44	18.29	19.96
		6#7	19.66	17.96	19.95
		15#0	19.53	18.02	20.07
5MHz	QPSK	1#0	21.30	20.52	22.13
		1#13	21.10	19.50	21.87
		1#24	21.77	19.80	22.13
		15#0	20.00	18.74	20.97
		15#10	20.35	18.52	21.11
		25#0	20.18	18.69	21.08
	16QAM	1#0	20.17	19.81	21.16
		1#13	20.07	18.89	21.01
		1#24	20.79	19.22	21.06
		15#0	19.04	17.82	20.00
		15#10	19.39	17.60	20.13
		25#0	19.27	17.80	20.12

10MHz	QPSK	1#0	20.89	20.38	20.54
		1#24	21.58	19.57	21.58
		1#49	21.35	19.00	21.64
		25#0	20.25	19.01	20.02
		25#25	20.66	18.41	20.85
		50#0	20.50	18.75	20.45
	16QAM	1#0	20.35	19.51	19.39
		1#24	21.13	18.80	20.57
		1#49	20.92	18.24	20.68
		25#0	19.29	18.13	19.08
		25#25	19.74	17.51	19.93
		50#0	19.51	17.85	19.49
15MHz	QPSK	1#0	21.14	20.89	19.88
		1#38	21.58	19.33	20.99
		1#74	20.85	19.08	21.86
		36#0	20.36	19.06	19.28
		36#39	20.34	18.11	20.70
		75#0	20.34	18.60	19.99
	16QAM	1#0	20.55	19.99	19.25
		1#38	21.12	18.50	20.44
		1#74	20.45	18.34	21.27
		36#0	19.35	18.24	18.33
		36#39	19.39	17.33	19.77
		75#0	19.40	17.87	19.11
20MHz	QPSK	1#0	21.50	21.86	19.95
		1#49	21.75	19.85	20.52
		1#99	20.20	19.74	21.94
		50#0	20.79	19.76	18.91
		50#50	20.13	18.55	20.52
		100#0	20.50	19.24	19.76
	16QAM	1#0	20.74	21.07	19.46
		1#49	21.16	19.12	20.12
		1#99	19.61	19.04	21.57
		50#0	19.83	18.83	17.97
		50#50	19.22	17.64	19.54
		100#0	19.61	18.31	18.8

LTE Band 5

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.32	22.22	22.44
		1#3	22.39	22.26	22.37
		1#5	22.32	22.25	22.45
		3#0	22.41	22.32	22.41
		3#3	22.42	22.30	22.41
		6#0	21.30	21.27	21.47
	16QAM	1#0	21.30	21.24	21.58
		1#3	21.38	21.30	21.54
		1#5	21.31	21.30	21.56
		3#0	21.43	21.50	21.45
		3#3	21.41	21.54	21.47
		6#0	20.23	20.25	20.45
3MHz	QPSK	1#0	22.28	22.22	22.48
		1#8	22.24	22.27	22.48
		1#14	22.18	22.28	22.44
		6#0	21.27	21.25	21.47
		6#9	21.23	21.26	21.46
		15#0	21.29	21.29	21.50
	16QAM	1#0	21.80	21.37	21.47
		1#8	21.75	21.41	21.47
		1#14	21.67	21.40	21.47
		6#0	20.33	20.27	20.37
		6#9	20.31	20.29	20.36
		15#0	20.4	20.43	20.52
5MHz	QPSK	1#0	22.86	22.66	22.44
		1#13	22.28	22.17	22.10
		1#24	22.28	22.35	22.38
		15#0	21.33	21.26	21.39
		15#0	21.28	21.34	21.10
		25#0	21.26	21.29	21.20
	16QAM	1#0	21.22	21.63	21.52
		1#13	21.14	21.53	21.10
		1#24	21.17	21.65	21.44
		15#0	20.38	20.28	20.37
		15#0	20.35	20.31	20.12
		25#0	20.64	20.37	20.24
10MHz	QPSK	1#0	22.35	22.26	22.37
		1#25	22.29	21.88	22.30
		1#49	21.92	22.42	22.07
		25#0	21.23	21.11	21.38
		25#25	21.12	21.34	21.20
		50#0	21.28	21.26	21.41
	16QAM	1#0	21.83	21.40	21.40
		1#25	21.82	21.10	21.37
		1#49	21.50	21.55	21.08
		25#0	20.31	20.24	20.44
		25#25	20.17	20.37	20.31
		50#0	20.3	20.32	20.41

LTE Band 12

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.15	21.80	21.92
		1#3	22.11	21.83	21.80
		1#5	22.04	21.81	21.81
		3#0	21.95	21.86	21.72
		3#3	21.95	21.85	21.80
		6#0	21.00	20.81	20.96
	16QAM	1#0	20.86	20.94	20.90
		1#3	20.91	20.93	20.87
		1#5	20.87	20.90	20.94
		3#0	21.05	20.83	20.88
		3#3	21.11	20.81	20.99
		6#0	19.87	19.77	19.92
3MHz	QPSK	1#0	22.05	21.79	21.96
		1#8	22.07	21.81	22.05
		1#14	21.91	21.79	22.09
		10#0	21.01	20.80	20.94
		10#5	20.98	20.80	20.99
		15#0	20.99	20.84	21.00
	16QAM	1#0	21.29	20.95	20.89
		1#8	21.38	20.91	20.97
		1#14	21.38	20.85	20.97
		10#0	19.95	19.79	19.86
		10#5	19.96	19.77	19.88
		15#0	19.96	19.78	20.04
5MHz	QPSK	1#0	22.06	21.86	21.97
		1#13	21.95	21.87	21.96
		1#24	21.90	21.94	22.03
		10#0	21.01	20.87	20.98
		10#15	21.01	20.81	21.02
		25#0	20.95	20.82	20.90
	16QAM	1#0	20.78	21.17	20.89
		1#13	20.83	21.09	20.97
		1#24	20.84	21.05	21.02
		10#0	19.98	19.82	19.97
		10#15	20.00	19.74	20.03
		25#0	19.98	19.79	20.09
10MHz	QPSK	1#0	22.62	21.92	21.83
		1#25	21.93	21.84	22.02
		1#49	21.87	22.03	21.79
		25#0	20.94	20.90	20.78
		25#25	20.90	20.84	20.93
		50#0	20.93	20.89	20.87
	16QAM	1#0	21.36	21.09	20.83
		1#25	21.45	20.94	20.83
		1#49	21.32	21.03	20.97
		25#0	19.98	19.89	19.85
		25#25	19.91	19.90	20.03
		50#0	19.92	19.87	19.93

LTE Band 17

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.42	21.88	22.30
		1#12	21.91	21.87	22.04
		1#24	21.89	22.01	22.08
		15#0	20.92	20.87	21.02
		15#10	20.90	20.90	21.05
		25#0	20.87	20.88	20.94
	16QAM	1#0	20.81	21.10	21.11
		1#12	20.77	21.11	21.24
		1#24	20.71	21.15	21.20
		15#0	19.93	19.85	20.20
		15#10	19.92	19.88	20.50
		25#0	19.89	20.20	20.42
10MHz	QPSK	1#0	22.36	21.80	21.84
		1#24	21.92	21.90	22.02
		1#49	21.93	21.79	21.66
		25#0	20.83	20.82	20.80
		25#25	20.87	20.90	20.95
		50#0	20.89	20.86	20.86
	16QAM	1#0	21.37	20.92	20.85
		1#24	21.30	20.95	20.92
		1#49	21.39	21.07	20.77
		25#0	19.85	19.82	19.91
		25#25	19.93	19.93	20.04
		50#0	19.94	19.89	19.91

PAR, Band 2

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	3.52	3.88	5.04	13
	100 RB		6.28	6.48	6.56	13
16QAM	1 RB	20 MHz	4.56	4.76	5.92	13
	100 RB		7.12	7.12	7.24	13

PAR, Band 4

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.08	4.56	4.72	13
	100 RB		3.76	6.44	6.56	13
16QAM	1 RB	20 MHz	4.76	5.16	5.84	13
	100 RB		4.88	7.12	7.24	13

PAR, Band 5

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	3.76	4.52	3.68	13
	50 RB		5.40	5.36	5.56	13
16QAM	1 RB	10 MHz	4.68	5.36	4.56	13
	50 RB		6.24	6.12	6.44	13

PAR, Band 12

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	2.40	4.04	4.24	13
	50 RB		5.12	5.40	5.12	13
16QAM	1 RB	10 MHz	3.40	4.80	5.00	13
	50 RB		6.04	6.20	6.00	13

PAR, Band 17

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.52	4.28	3.60	13
	50 RB		5.36	5.20	5.08	13
16QAM	1 RB	10 MHz	5.40	5.12	4.76	13
	50 RB		6.08	6.00	5.92	13

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

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								
836.600	H	95.48	20.6	0.0	1	19.6	38.45	18.9
836.600	V	104.38	32.6	0.0	1	31.6	38.45	6.9
EDGE 850 Middle Channel								
836.600	H	90.75	15.8	0.0	1	14.8	38.45	23.7
836.600	V	100.16	28.4	0.0	1	27.4	38.45	11.1
WCDMA Band V Middle Channel								
836.600	H	86.66	11.7	0.0	1	10.7	38.45	27.8
836.600	V	94.85	23.1	0.0	1	22.1	38.45	16.4

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)			
PCS 1900 Middle Channel								
1880.000	H	92.15	19.5	11.7	2.7	28.5	33.00	4.5
1880.000	V	93.28	20.8	11.7	2.7	29.8	33.00	3.2
EDGE 1900 Middle Channel								
1880.000	H	89.85	17.2	11.7	2.7	26.2	33.00	6.8
1880.000	V	90.91	18.4	11.7	2.7	27.4	33.00	5.6
WCDMA Band II Middle Channel								
1880.000	H	85.37	12.8	11.7	2.7	21.8	33.00	11.2
1880.000	V	86.82	14.4	11.7	2.7	23.4	33.00	9.6

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

LTE Band 2

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)			
QPSK 1.4 MHz Middle Channel								
1880.000	H	87.43	14.8	11.7	2.7	23.8	33.00	9.2
1880.000	V	85.12	12.7	11.7	2.7	21.7	33.00	11.3
16QAM 1.4 MHz Middle Channel								
1880.000	H	86.87	14.3	11.7	2.7	23.3	33.00	9.7
1880.000	V	84.65	12.2	11.7	2.7	21.2	33.00	11.8
QPSK 3 MHz Middle Channel								
1880.000	H	86.94	14.3	11.7	2.7	23.3	33.00	9.7
1880.000	V	84.05	11.6	11.7	2.7	20.6	33.00	12.4
16QAM 3 MHz Middle Channel								
1880.000	H	86.03	13.4	11.7	2.7	22.4	33.00	10.6
1880.000	V	83.73	11.3	11.7	2.7	20.3	33.00	12.7
QPSK 5 MHz Middle Channel								
1880.000	H	85.48	12.9	11.7	2.7	21.9	33.00	11.1
1880.000	V	82.38	9.9	11.7	2.7	18.9	33.00	14.1
16QAM 5 MHz Middle Channel								
1880.000	H	84.95	12.3	11.7	2.7	21.3	33.00	11.7
1880.000	V	82.24	9.8	11.7	2.7	18.8	33.00	14.2
QPSK 10 MHz Middle Channel								
1880.000	H	83.75	11.1	11.7	2.7	20.1	33.00	12.9
1880.000	V	81.69	9.2	11.7	2.7	18.2	33.00	14.8
16QAM 10 MHz Middle Channel								
1880.000	H	83.46	10.9	11.7	2.7	19.9	33.00	13.1
1880.000	V	81.31	8.8	11.7	2.7	17.8	33.00	15.2
QPSK 15 MHz Middle Channel								
1880.000	H	83.60	11	11.7	2.7	20.0	33.00	13.0
1880.000	V	80.53	8.1	11.7	2.7	17.1	33.00	15.9
16QAM 15 MHz Middle Channel								
1880.000	H	82.96	10.4	11.7	2.7	19.4	33.00	13.6
1880.000	V	80.23	7.8	11.7	2.7	16.8	33.00	16.2
QPSK 20 MHz Middle Channel								
1880.000	H	86.21	13.6	11.7	2.7	22.6	33.00	10.4
1880.000	V	82.43	10	11.7	2.7	19.0	33.00	14.0
16QAM 20 MHz Middle Channel								
1880.000	H	85.35	12.7	11.7	2.7	21.7	33.00	11.3
1880.000	V	81.58	9.1	11.7	2.7	18.1	33.00	14.9

LTE Band 4

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)			
QPSK 1.4 MHz Middle Channel								
1732.500	H	87.95	13.9	10.9	2.5	22.3	30.00	7.7
1732.500	V	87.20	12.8	10.9	2.5	21.2	30.00	8.8
16QAM 1.4 MHz Middle Channel								
1732.500	H	87.42	13.4	10.9	2.5	21.8	30.00	8.2
1732.500	V	86.57	12.2	10.9	2.5	20.6	30.00	9.4
QPSK 3 MHz Middle Channel								
1732.500	H	86.39	12.3	10.9	2.5	20.7	30.00	9.3
1732.500	V	85.40	11	10.9	2.5	19.4	30.00	10.6
16QAM 3 MHz Middle Channel								
1732.500	H	85.86	11.8	10.9	2.5	20.2	30.00	9.8
1732.500	V	84.93	10.6	10.9	2.5	19.0	30.00	11.0
QPSK 5 MHz Middle Channel								
1732.500	H	85.83	11.8	10.9	2.5	20.2	30.00	9.8
1732.500	V	84.95	10.6	10.9	2.5	19.0	30.00	11.0
16QAM 5 MHz Middle Channel								
1732.500	H	85.14	11.1	10.9	2.5	19.5	30.00	10.5
1732.500	V	83.75	9.4	10.9	2.5	17.8	30.00	12.2
QPSK 10 MHz Middle Channel								
1732.500	H	85.29	11.2	10.9	2.5	19.6	30.00	10.4
1732.500	V	83.54	9.2	10.9	2.5	17.6	30.00	12.4
16QAM 10 MHz Middle Channel								
1732.500	H	84.93	10.9	10.9	2.5	19.3	30.00	10.7
1732.500	V	82.95	8.6	10.9	2.5	17.0	30.00	13.0
QPSK 15 MHz Middle Channel								
1732.500	H	86.12	12.1	10.9	2.5	20.5	30.00	9.5
1732.500	V	85.17	10.8	10.9	2.5	19.2	30.00	10.8
16QAM 15 MHz Middle Channel								
1732.500	H	85.65	11.6	10.9	2.5	20.0	30.00	10.0
1732.500	V	84.71	10.3	10.9	2.5	18.7	30.00	11.3
QPSK 20 MHz Middle Channel								
1732.500	H	85.53	11.5	10.9	2.5	19.9	30.00	10.1
1732.500	V	83.96	9.6	10.9	2.5	18.0	30.00	12.0
16QAM 20 MHz Middle Channel								
1732.500	H	84.68	10.6	10.9	2.5	19.0	30.00	11.0
1732.500	V	82.82	8.5	10.9	2.5	16.9	30.00	13.1

LTE Band 5

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)			
QPSK　1.4 MHz　Middle Channel								
836.500	H	88.78	13.9	0.0	1	12.9	38.45	25.6
836.500	V	96.85	25.1	0.0	1	24.1	38.45	14.4
16QAM　1.4 MHz　Middle Channel								
836.500	H	87.65	12.7	0.0	1	11.7	38.45	26.8
836.500	V	96.54	24.7	0.0	1	23.7	38.45	14.8
QPSK　3 MHz　Middle Channel								
836.500	H	88.62	13.7	0.0	1	12.7	38.45	25.8
836.500	V	96.81	25	0.0	1	24.0	38.45	14.5
16QAM　3 MHz　Middle Channel								
836.500	H	87.64	12.7	0.0	1	11.7	38.45	26.8
836.500	V	96.12	24.3	0.0	1	23.3	38.45	15.2
QPSK　5 MHz　Middle Channel								
836.500	H	87.89	13	0.0	1	12.0	38.45	26.5
836.500	V	96.75	25	0.0	1	24.0	38.45	14.5
16QAM　5 MHz　Middle Channel								
836.500	H	87.38	12.5	0.0	1	11.5	38.45	27.0
836.500	V	96.04	24.2	0.0	1	23.2	38.45	15.3
QPSK　10 MHz　Middle Channel								
836.500	H	88.58	13.7	0.0	1	12.7	38.45	25.8
836.500	V	96.58	24.8	0.0	1	23.8	38.45	14.7
16QAM　10 MHz　Middle Channel								
836.500	H	87.25	12.3	0.0	1	11.3	38.45	27.2
836.500	V	96.05	24.3	0.0	1	23.3	38.45	15.2

LTE Band 12

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)			
QPSK 1.4 MHz Middle Channel								
707.500	H	83.98	7.1	0.0	0.9	6.2	34.77	28.6
707.500	V	93.32	18.9	0.0	0.9	18.0	34.77	16.8
16QAM 1.4 MHz Middle Channel								
707.500	H	83.51	6.7	0.0	0.9	5.8	34.77	29.0
707.500	V	93.21	18.8	0.0	0.9	17.9	34.77	16.9
QPSK 3 MHz Middle Channel								
707.500	H	83.71	6.9	0.0	0.9	6.0	34.77	28.8
707.500	V	93.04	18.6	0.0	0.9	17.7	34.77	17.1
16QAM 3 MHz Middle Channel								
707.500	H	83.15	6.3	0.0	0.9	5.4	34.77	29.4
707.500	V	92.64	18.2	0.0	0.9	17.3	34.77	17.5
QPSK 5 MHz Middle Channel								
707.500	H	83.42	6.6	0.0	0.9	5.7	34.77	29.1
707.500	V	92.92	18.5	0.0	0.9	17.6	34.77	17.2
16QAM 5 MHz Middle Channel								
707.500	H	82.62	5.8	0.0	0.9	4.9	34.77	29.9
707.500	V	92.44	18	0.0	0.9	17.1	34.77	17.7
QPSK 10 MHz Middle Channel								
707.500	H	82.64	5.8	0.0	0.9	4.9	34.77	29.9
707.500	V	92.51	18.1	0.0	0.9	17.2	34.77	17.6
16QAM 10 MHz Middle Channel								
707.500	H	82.35	5.5	0.0	0.9	4.6	34.77	30.2
707.500	V	92.42	18	0.0	0.9	17.1	34.77	17.7

LTE Band 17

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)			
QPSK 5 MHz Middle Channel								
710.000	H	82.21	5.4	0.0	0.9	4.5	34.77	30.3
710.000	V	92.98	18.6	0.0	0.9	17.7	34.77	17.1
16QAM 5 MHz Middle Channel								
710.000	H	81.45	4.6	0.0	0.9	3.7	34.77	31.1
710.000	V	92.35	18	0.0	0.9	17.1	34.77	17.7
QPSK 10 MHz Middle Channel								
710.000	H	82.14	5.3	0.0	0.9	4.4	34.77	30.4
710.000	V	92.56	18.2	0.0	0.9	17.3	34.77	17.5
16QAM 10 MHz Middle Channel								
710.000	H	91.11	14.3	0.0	0.9	13.4	34.77	21.4
710.000	V	92.34	18	0.0	0.9	17.1	34.77	17.7

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
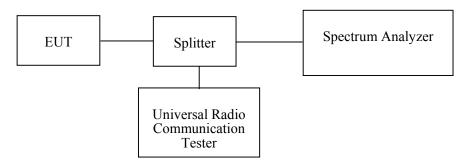
Applicable Standard

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.

```
┌─────────┐      ┌─────────┐      ┌──────────────────┐
│   EUT   │──────│ Splitter│──────│ Spectrum Analyzer│
└─────────┘      └────┬────┘      └──────────────────┘
                      │
              ┌───────────────┐
              │ Universal Radio│
              │ Communication │
              │    Tester     │
              └───────────────┘
```

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
narda	Attenuator	6dB	6dB-1	Each time	N/A
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:	25.8~25.9°C
Relative Humidity:	51 %
ATM Pressure:	100.8~101.1 kPa

The testing was performed by Kami Zhou & Tiago Huang on 2018-06-06 & 2018-07-19.

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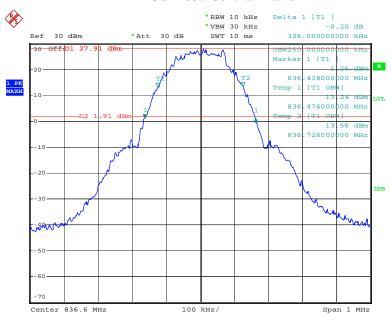
Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GSM	0.250	0.326
		EDGE	0.252	0.312
PCS		PCS	0.244	0.322
		EDGE	0.248	0.318
WCDMA Band II		Rel 99	4.22	4.94
		HSDPA	4.22	4.90
		HSUPA	4.22	4.90
WCDMA Band V		Rel 99	4.20	4.88
		HSDPA	4.22	4.90
		HSUPA	4.20	4.88

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.104	1.284
		16QAM	1.104	1.296
	3 MHz	QPSK	2.700	2.928
		16QAM	2.688	2.952
	5 MHz	QPSK	4.560	5.052
		16QAM	4.540	5.052
	10 MHz	QPSK	9.000	9.772
		16QAM	8.960	9.652
	15 MHz	QPSK	13.560	15.052
		16QAM	13.560	15.052
	20 MHz	QPSK	18.000	19.532
		16QAM	18.080	19.760
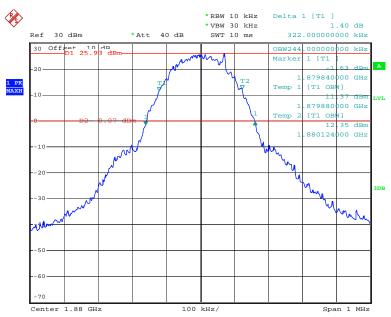
Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 4	1.4 MHz	QPSK	1.104	1.290
		16QAM	1.104	1.296
	3 MHz	QPSK	2.700	2.932
		16QAM	2.700	2.930
	5 MHz	QPSK	4.560	5.100
		16QAM	4.520	5.080
	10 MHz	QPSK	8.960	9.800
		16QAM	8.960	9.720
	15 MHz	QPSK	13.620	15.030
		16QAM	13.620	15.090
	20 MHz	QPSK	18.080	19.650
		16QAM	18.08	19.81
LTE Band 5	1.4 MHz	QPSK	1.098	1.278
		16QAM	1.104	1.284
	3 MHz	QPSK	2.700	2.916
		16QAM	2.688	2.964
	5 MHz	QPSK	4.540	5.080
		16QAM	4.520	5.040
	10 MHz	QPSK	8.960	9.800
		16QAM	8.960	9.720
LTE Band 12	1.4 MHz	QPSK	1.116	1.314
		16QAM	1.104	1.284
	3 MHz	QPSK	2.700	2.964
		16QAM	2.700	2.952
	5 MHz	QPSK	4.560	5.120
		16QAM	4.580	5.112
	10 MHz	QPSK	9.040	9.920
		16QAM	9.040	9.800
LTE Band 17	5 MHz	QPSK	4.540	5.020
		16QAM	4.540	5.040
	10 MHz	QPSK	9.000	10.280
		16QAM	8.960	9.720

GSM 850 Cellular Band
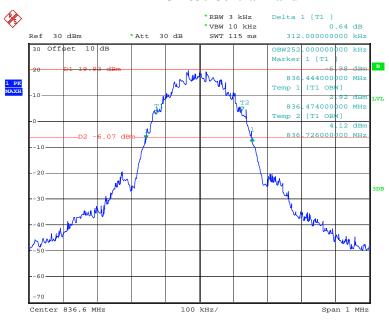
Date: 7.JUN.2018 23:49:09

GSM PCS1900 Cellular Band
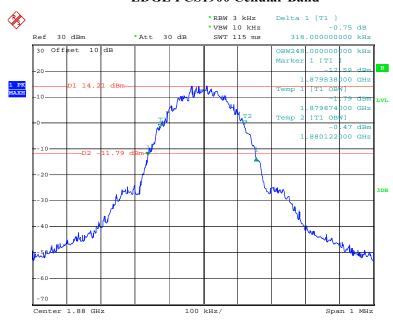
Date: 8.JUN.2018 00:01:19

EDGE 850 Cellular Band
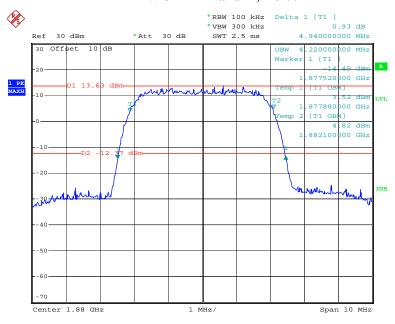
Date: 22.JUN.2018 01:04:41

EDGE PCS1900 Cellular Band
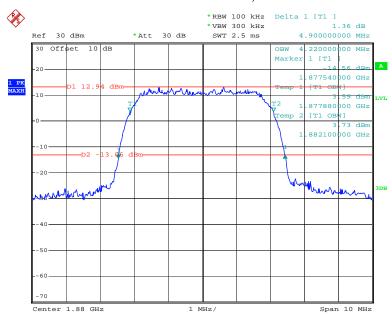
Date: 22.JUN.2018 01:13:49

WCDMA Band II, Rel 99

Date: 8.JUN.2018 19:48:46
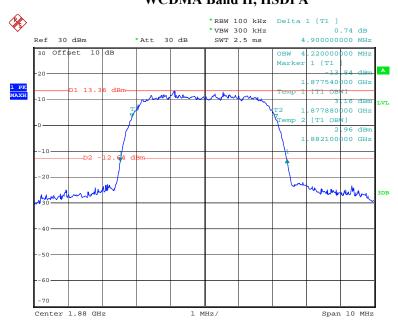
WCDMA Band II, HSUPA

Date: 8.JUN.2018 20:52:50

WCDMA Band II, HSDPA

```
                                    *RBW 100 kHz   Delta 1 [T1 ]
                                    *VBW 300 kHz            0.74 dB
         Ref  30 dBm     *Att  30 dB    SWT 2.5 ms    4.900000000 MHz
    30 Offset 10 dB                         OBW 4.220000000 MHz
                                            Marker 1 [T1 ]
    -20                                              -13.84 dBm      A
                                                1.877540000 GHz
1 PK    D1 13.36 dBm                         Temp 1 [T1 OBW]
MAXH -10                                                3.16 dBm    LVL
                                            T2  1.877880000 GHz
     0                                      Temp 2 [T1 OBW]
                                                       2.96 dBm
    -10                                          1.882100000 GHz
        D2 -12.64 dBm
    -20                                                             3DB
    -30
    -40
    -50
    -60
    -70
    Center 1.88 GHz          1 MHz/          Span 10 MHz
```
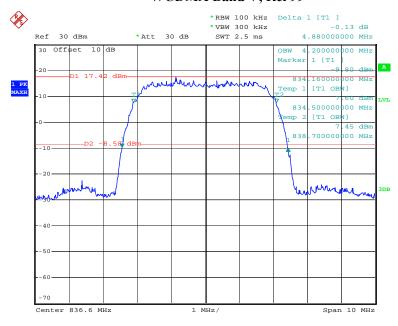
Date: 8.JUN.2018 20:42:16

WCDMA Band V, Rel 99

```
                                    *RBW 100 kHz   Delta 1 [T1 ]
                                    *VBW 300 kHz           -0.13 dB
         Ref  30 dBm     *Att  30 dB    SWT 2.5 ms    4.880000000 MHz
    30 Offset 10 dB                         OBW 4.200000000 MHz
                                            Marker 1 [T1 ]
    -20                                               -9.80 dBm     A
                                              834.160000000 MHz
1 PK    D1 17.42 dBm                         Temp 1 [T1 OBW]
MAXH -10                                                7.60 dBm    LVL
                                            T2
                                              834.500000000 MHz
     0                                      Temp 2 [T1 OBW]
                                                       7.45 dBm
    -10 D2 -8.58 dBm                           838.700000000 MHz
    -20                                                             3DB
    -40
    -50
    -60
    -70
    Center 836.6 MHz         1 MHz/          Span 10 MHz
```

Date: 8.JUN.2018 20:46:49

WCDMA Band V, HSUPA
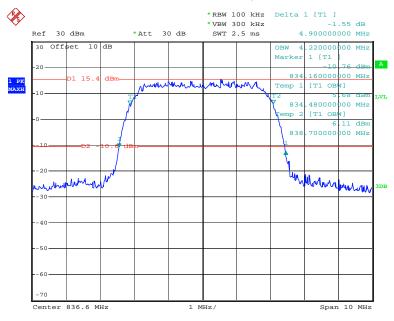
Date: 8.JUN.2018 20:50:42
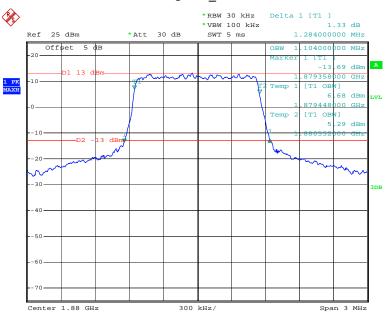
WCDMA Band V, HSDPA

Date: 8.JUN.2018 20:08:51

LTE Band 2

QPSK_1.4 MHz
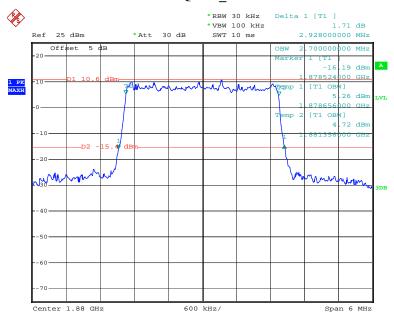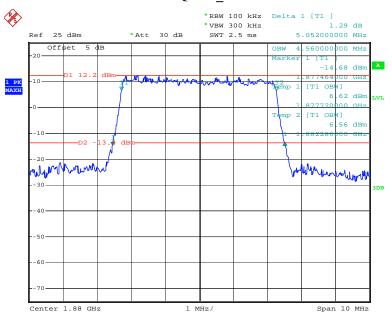
Date: 19.JUL.2018 19:35:33

QPSK_3 MHz
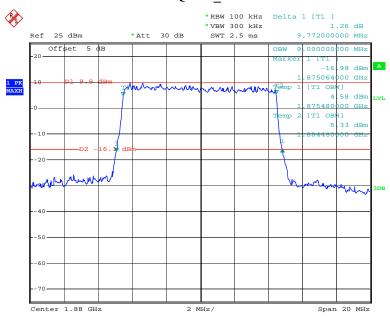
Date: 19.JUL.2018 19:38:13

QPSK_5 MHz
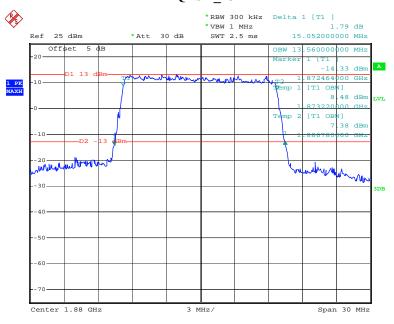
Date: 19.JUL.2018 19:41:54

QPSK_10 MHz
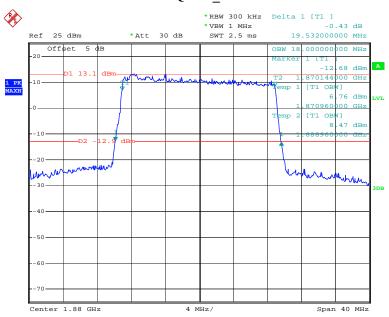
Date: 19.JUL.2018 19:43:03

QPSK_15 MHz
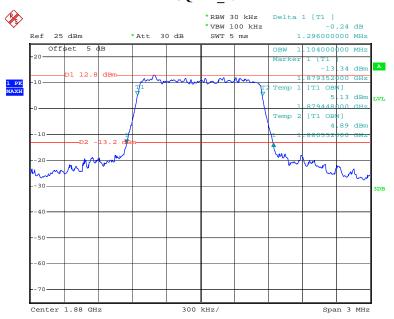
Date: 19.JUL.2018 19:44:50

QPSK_20 MHz
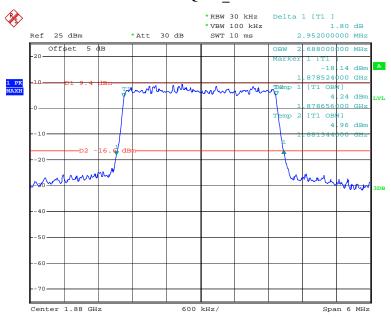
Date: 19.JUL.2018 19:46:37

16QAM_1.4 MHz
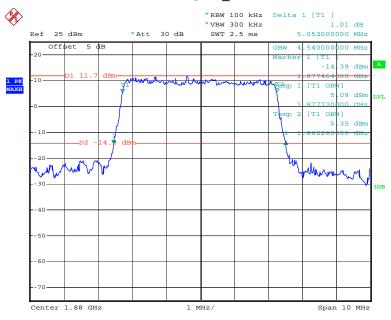
Date: 19.JUL.2018 19:36:52

16QAM_3 MHz
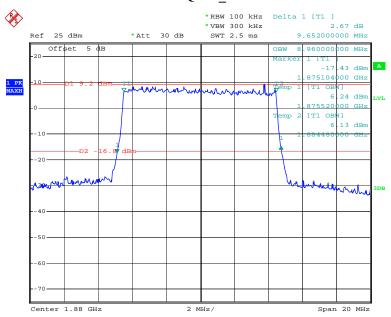
Date: 19.JUL.2018 19:39:42

16QAM_5 MHz
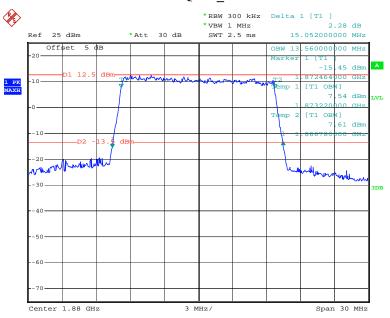
Date: 19.JUL.2018 19:41:16

16QAM_10 MHz
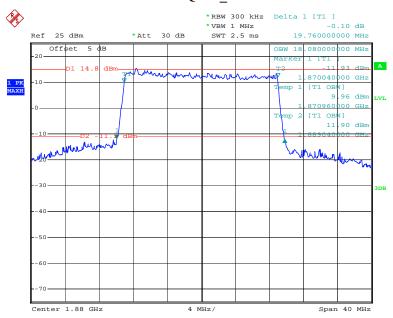
Date: 19.JUL.2018 19:43:56

16QAM_15 MHz

Date: 19.JUL.2018 19:45:30

16QAM_20 MHz
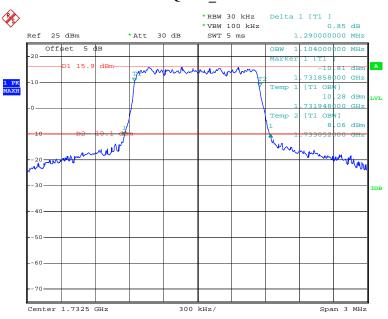
Date: 19.JUL.2018 21:23:15

LTE Band 4:

QPSK_1.4 MHz
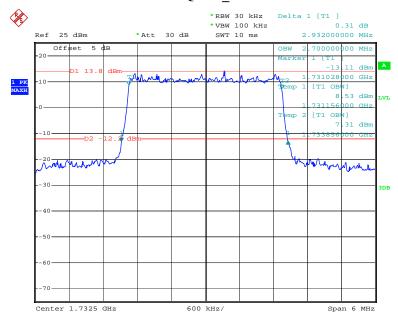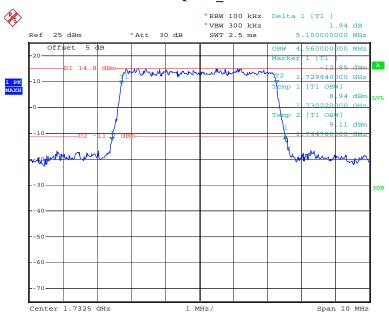
Date: 19.JUL.2018 20:04:15

QPSK_3 MHz
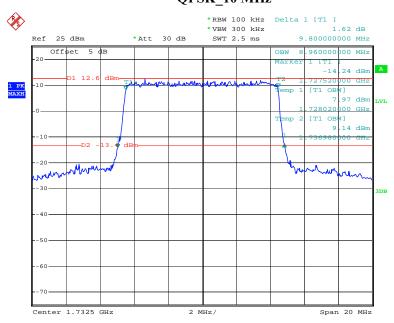
Date: 19.JUL.2018 20:02:31

QPSK_5 MHz
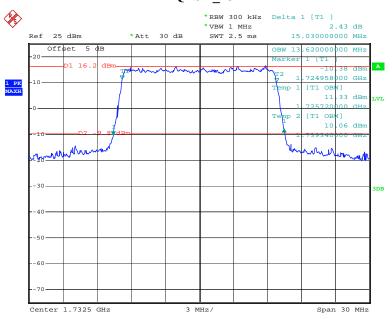
Date: 19.JUL.2018 19:59:42

QPSK_10 MHz
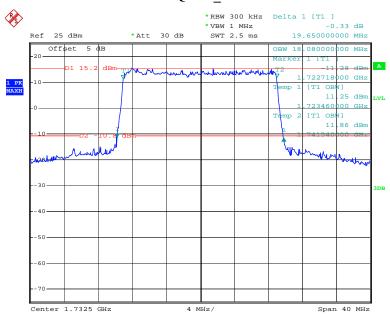
Date: 19.JUL.2018 19:58:42

QPSK_15 MHz
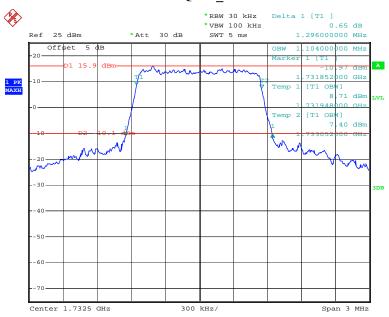
Date: 19.JUL.2018 20:05:19

QPSK_20 MHz
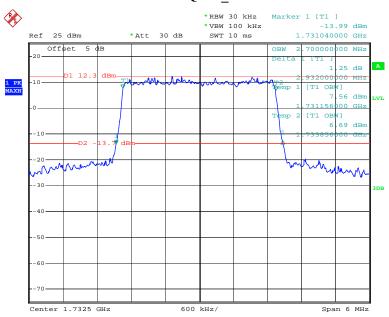
Date: 19.JUL.2018 20:06:46

16QAM_1.4 MHz
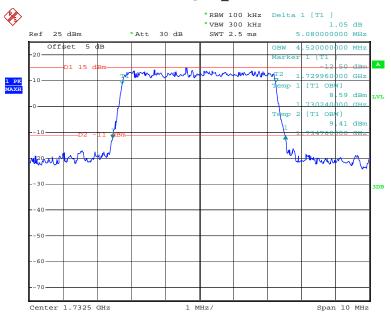
Date: 19.JUL.2018 20:03:51

16QAM_3 MHz
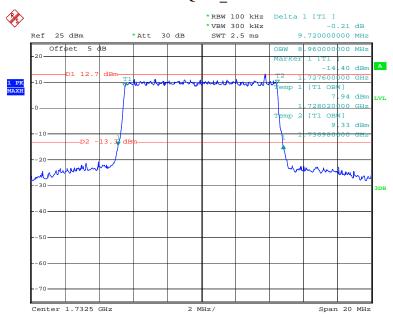
Date: 19.JUL.2018 20:01:41

16QAM_5 MHz
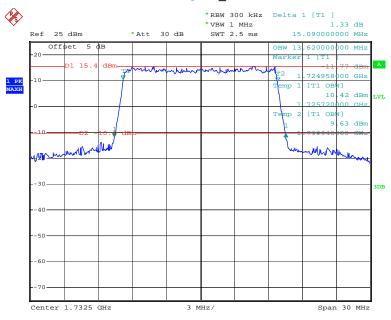
Date: 19.JUL.2018 20:00:21

16QAM_10 MHz
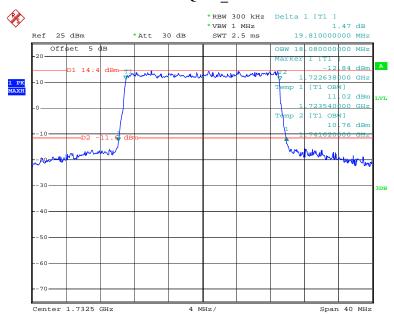
Date: 19.JUL.2018 19:58:01

16QAM_15 MHz

Date: 19.JUL.2018 20:06:01

16QAM_20 MHz
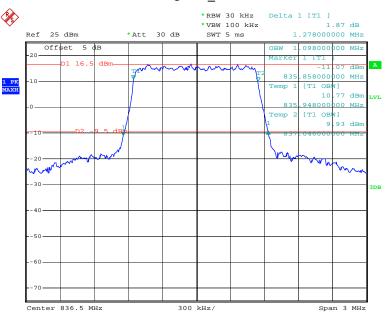
Date: 19.JUL.2018 20:07:21

LTE Band 5:

QPSK_1.4 MHz
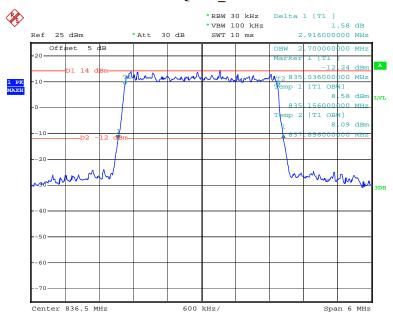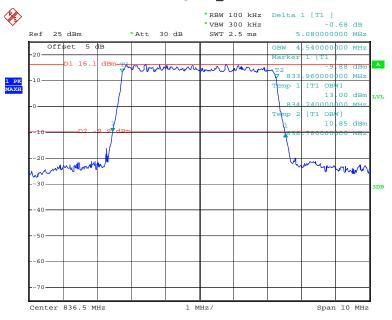
Date: 19.JUL.2018 21:05:00

QPSK_3 MHz
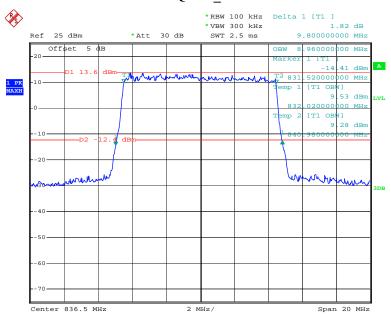
Date: 19.JUL.2018 21:03:06

QPSK_5 MHz
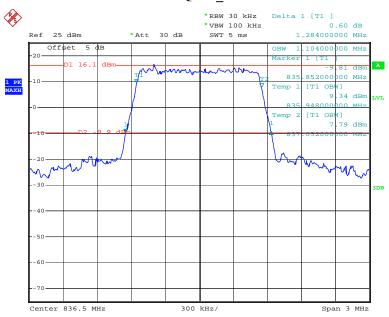
Date: 19.JUL.2018 20:58:15

QPSK_10 MHz
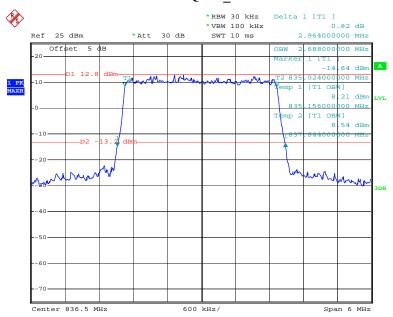
Date: 19.JUL.2018 20:59:50

16QAM_1.4 MHz
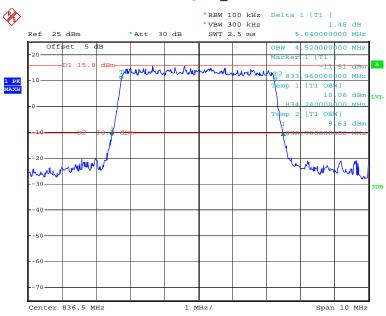
Date: 19.JUL.2018 21:05:30

16QAM_3 MHz
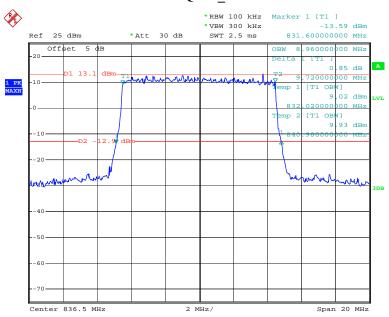
Date: 19.JUL.2018 21:03:56

16QAM_5 MHz

Date: 19.JUL.2018 20:58:48

16QAM_10 MHz
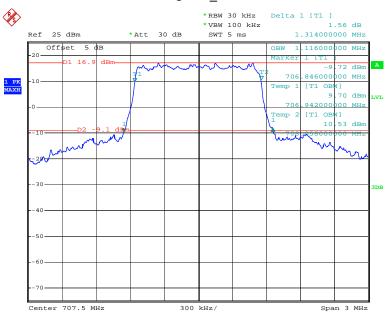
Date: 19.JUL.2018 21:01:16

LTE Band 12:

QPSK_1.4 MHz
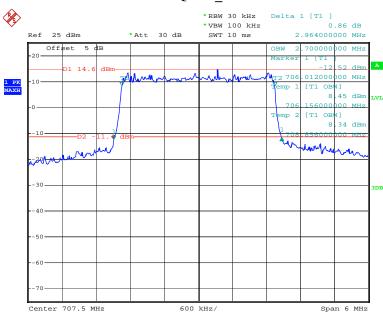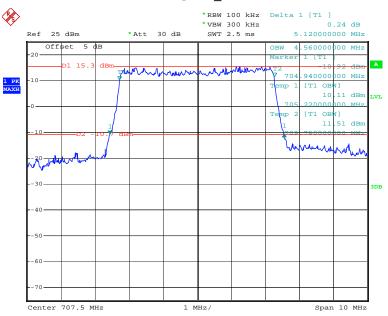
Date: 19.JUL.2018 20:09:50

QPSK_3 MHz
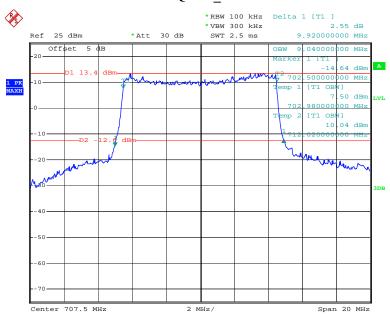
Date: 19.JUL.2018 20:12:00

QPSK_5 MHz
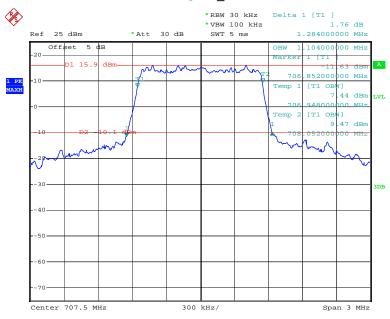
Date: 19.JUL.2018 21:20:17

QPSK_10 MHz
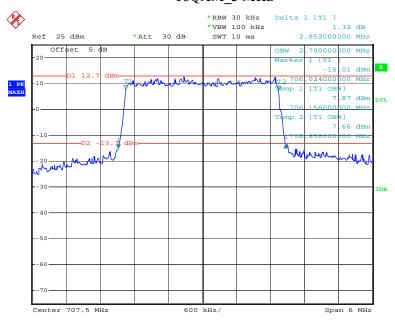
Date: 19.JUL.2018 21:17:56

16QAM_1.4 MHz
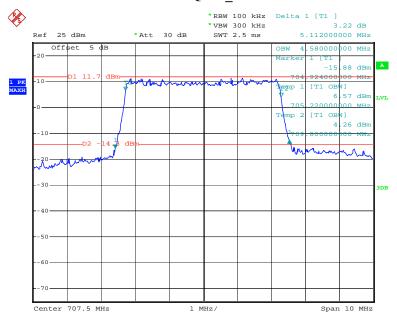
Date: 19.JUL.2018 20:10:44

16QAM_3 MHz
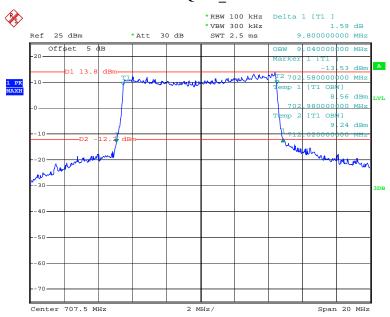
Date: 19.JUL.2018 20:12:49

16QAM_5 MHz

*RBW 100 kHz	Delta 1 [T1]	
*VBW 300 kHz		3.22 dB
Ref 25 dBm	*Att 30 dB SWT 2.5 ms	5.112000000 MHz

Offset 5 dB

OBW 4.580000000 MHz
Marker 1 [T1]
-15.88 dBm
704.924000000 MHz
Temp 1 [T1 OBW]
6.57 dBm
705.220000000 MHz
Temp 2 [T1 OBW]
4.26 dBm
709.800000000 MHz

D1 11.7 dBm
D2 -14.3 dBm

1 PK
MAXH

A
LVL
3DB

Center 707.5 MHz   1 MHz/   Span 10 MHz

Date: 19.JUL.2018 20:22:04

16QAM_10 MHz

*RBW 100 kHz	Delta 1 [T1]	
*VBW 300 kHz		1.59 dB
Ref 25 dBm	*Att 30 dB SWT 2.5 ms	9.800000000 MHz

Offset 5 dB

OBW 9.040000000 MHz
Marker 1 [T1]
-13.53 dBm
702.580000000 MHz
Temp 1 [T1 OBW]
8.56 dBm
702.980000000 MHz
Temp 2 [T1 OBW]
9.24 dBm
712.020000000 MHz

D1 13.8 dBm
D2 -12.2 dBm

1 PK
MAXH

A
LVL
3DB

Center 707.5 MHz   2 MHz/   Span 20 MHz

Date: 19.JUL.2018 21:19:17

LTE Band 17:

QPSK_5 MHz
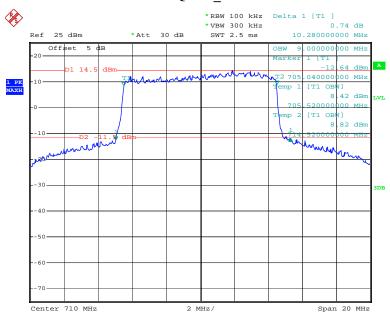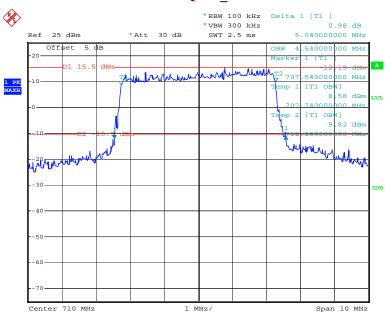
Date: 19.JUL.2018 21:14:13

QPSK_10 MHz
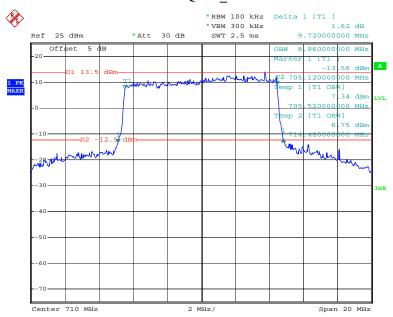
Date: 19.JUL.2018 20:46:16

16QAM_5 MHz

Date: 19.JUL.2018 21:14:56

16QAM_10 MHz

Date: 19.JUL.2018 20:34:48

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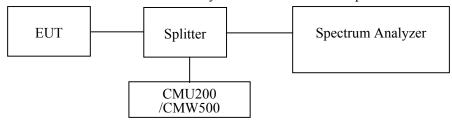
Applicable Standard

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.

```
┌─────────┐      ┌──────────┐      ┌──────────────────┐
│   EUT   │──────│ Splitter │──────│ Spectrum Analyzer │
└─────────┘      └──────────┘      └──────────────────┘
                      │
                 ┌──────────┐
                 │ CMU200   │
                 │ /CMW500  │
                 └──────────┘
```

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04

* 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
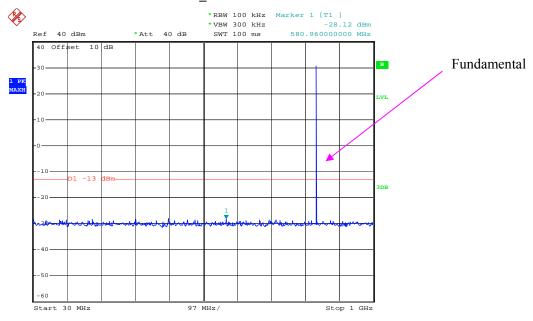
Temperature:	26.5~27.1°C
Relative Humidity:	54 ~61 %
ATM Pressure:	101.2~101.9 kPa
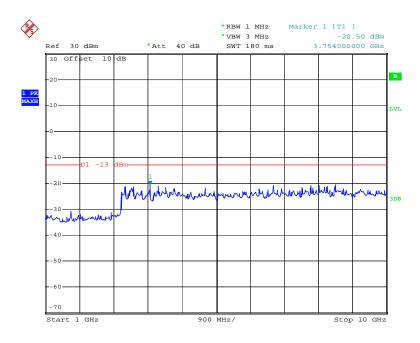
The testing was performed by Kami Zhou & Tiago Huang from 2018-06-06 to 2018-06-10.

Please refer to the following plots.

GSM850_Middle Channel


```
                                          *RBW 100 kHz   Marker 1 [T1 ]
                                          *VBW 300 kHz             -28.12 dBm
   Ref  40 dBm         *Att  40 dB    SWT 100 ms     580.960000000 MHz
```

Fundamental

```
Date: 7.JUN.2018  23:51:44
```



```
                                          *RBW 1 MHz     Marker 1 [T1 ]
                                          *VBW 3 MHz               -20.50 dBm
   Ref  30 dBm         *Att  40 dB    SWT 180 ms     3.754000000 GHz
```
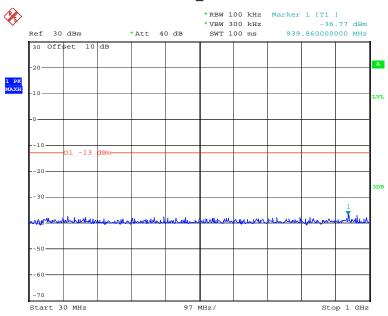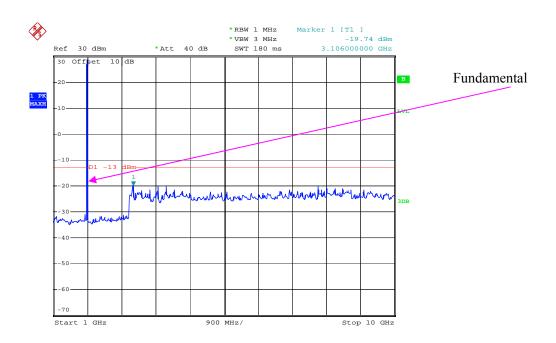
```
Date: 7.JUN.2018  23:52:45
```

PCS 1900_ Middle Channel

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz            -36.77 dBm
        Ref  30 dBm      *Att  40 dB   SWT 100 ms    939.860000000 MHz
   30 Offset  10 dB                                                      A
   -20

1 PK
MAXH  -10
   -0
   --10
        D1 -13 dBm                                                      LVL
   --20
   --30                                                                 3DB
                                                                    1
   --50
   --60
   --70
   Start 30 MHz              97 MHz/                Stop 1 GHz
```

Date: 7.JUN.2018 23:55:39

```
                                    *RBW 1 MHz    Marker 1 [T1 ]
                                    *VBW 3 MHz             -19.74 dBm
        Ref  30 dBm      *Att  40 dB   SWT 180 ms    3.106000000 GHz
   30 Offset  10 dB                                                      B
   -20

1 PK
MAXH  -10
   -0                                                      Fundamental
   --10
        D1 -13 dBm
   --20      1                                                         LVL
   --30
   --40                                                                3DB
   --50
   --60
   --70
   Start 1 GHz               900 MHz/               Stop 10 GHz
```

Date: 7.JUN.2018 23:57:27

*RBW 1 MHz   Marker 1 [T1]
*VBW 3 MHz   -22.91 dBm
Ref 20 dBm   *Att 20 dB   SWT 200 ms   15.460000000 GHz

20 Offset 10 dB

1 PK
MAXH

B

LVL

D1 -13 dBm

3DB

Start 10 GHz   1 GHz/   Stop 20 GHz

Date: 7.JUN.2018   23:58:01

WCDMA Band II,Rel99

*RBW 100 kHz   Marker 1 [T1]
*VBW 300 kHz   -38.69 dBm
Ref 30 dBm   *Att 30 dB   SWT 100 ms   685.720000000 MHz

30 Offset 10 dB

1 PK
MAXH

A

LVL

D1 -13 dBm

3DB

Start 30 MHz   97 MHz/   Stop 1 GHz

Date: 10.JUN.2018   21:32:53

Fundamental

```
                                        *RBW 1 MHz     Marker 1 [T1 ]
                                        *VBW 3 MHz              -15.47 dBm
          Ref  30 dBm      *Att 30 dB    SWT 180 ms      3.754000000 GHz
          30 Offset  10 dB                                                  B
    -20
1 PK
MAXH  -10                                                                   LVL
     -0
    -10
          D1 -13 dBm          1
    -20
    -30                                                                     3DB
    -40
    -50
    -60
    -70
          Start 1 GHz            900 MHz/            Stop 10 GHz
```

Date: 10.JUN.2018 21:33:09

```
                                        *RBW 1 MHz     Marker 1 [T1 ]
                                        *VBW 3 MHz              -22.70 dBm
          Ref  20 dBm      *Att 20 dB    SWT 200 ms     14.800000000 GHz
          20 Offset  10 dB                                                  B
    -10
1 PK
MAXH  -0                                                                    LVL
    -10
          D1 -13 dBm
    -20                         1
    -30                                                                     3DB
    -40
    -50
    -60
    -70
    -80
          Start 10 GHz            1 GHz/            Stop 20 GHz
```

Date: 10.JUN.2018 21:33:35

WCDMA Band V,Rel99


```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz           -38.54 dBm
Ref  30 dBm          *Att  30 dB    SWT 100 ms      710.940000000 MHz
```

Fundamental

```
Start 30 MHz              97 MHz/              Stop 1 GHz
```

Date: 10.JUN.2018 21:36:26


```
                                    *RBW 1 MHz     Marker 1 [T1 ]
                                    *VBW 3 MHz             -39.30 dBm
Ref  20 dBm          *Att  20 dB    SWT 180 ms      1.666000000 GHz
```

```
Start 1 GHz              900 MHz/             Stop 10 GHz
```
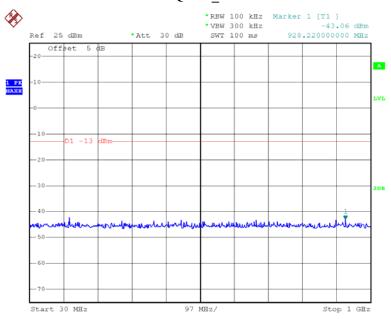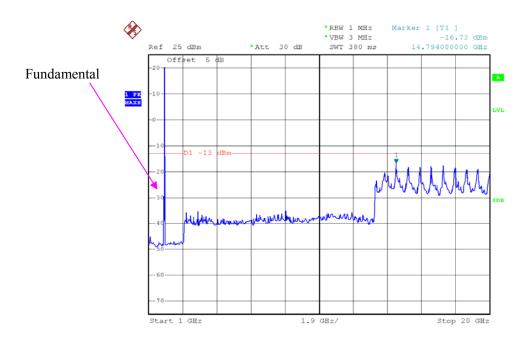
Date: 10.JUN.2018 21:37:01

LTE Band 2 (Middle Channel)

QPSK_1.4 MHz
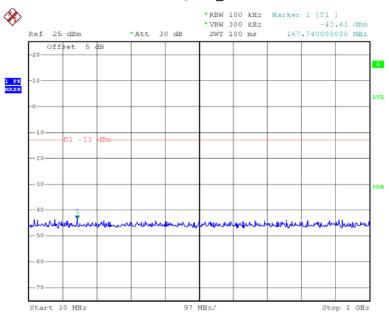
Date: 6.JUN.2018 14:07:29

Fundamental
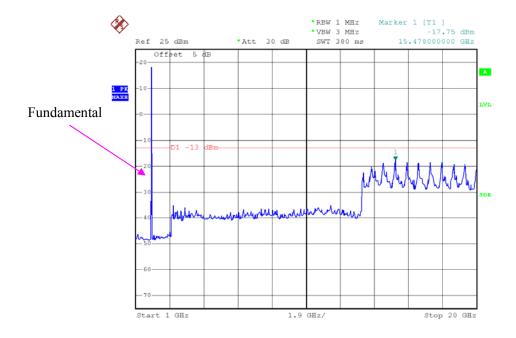
Date: 6.JUN.2018 14:08:03

QPSK_3 MHz
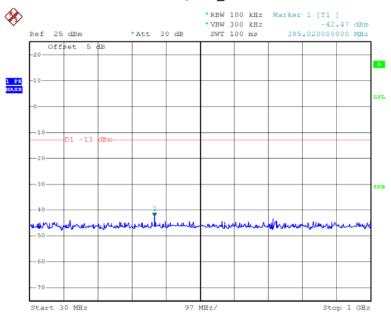
Date: 6.JUN.2018 14:08:45

Fundamental
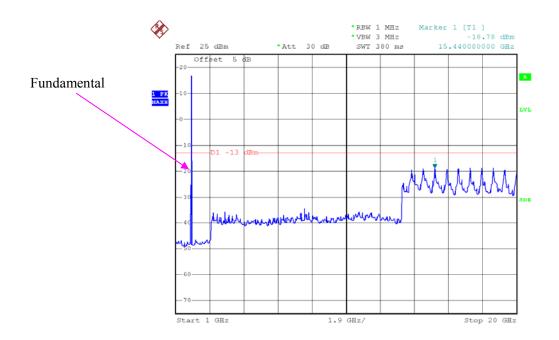
Date: 6.JUN.2018 14:08:26

QPSK_5 MHz
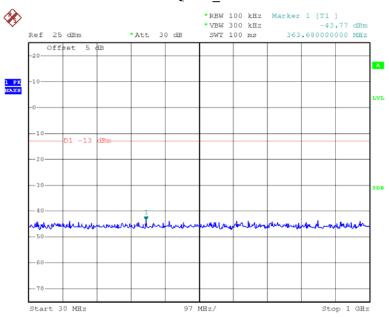
Date: 6.JUN.2018　14:09:00

Fundamental
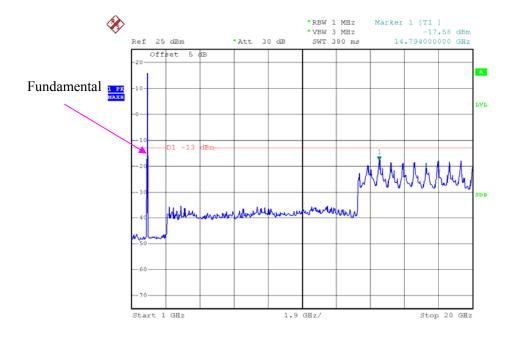
Date: 6.JUN.2018　14:09:19

QPSK_10 MHz
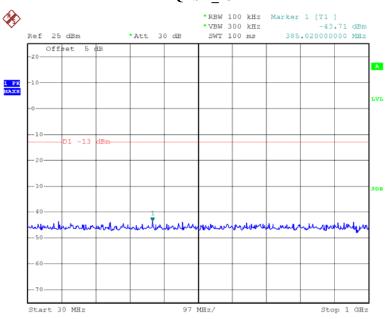
Date: 6.JUN.2018　14:10:13
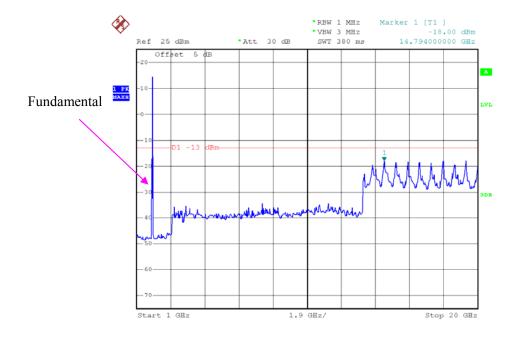
Date: 6.JUN.2018　14:09:53

QPSK_15 MHz
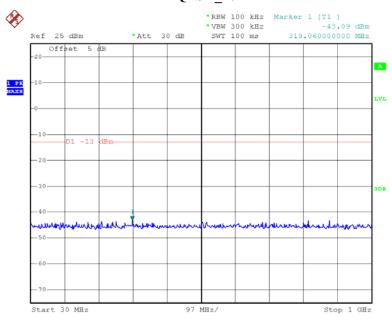
Date: 6.JUN.2018 14:10:28

Fundamental
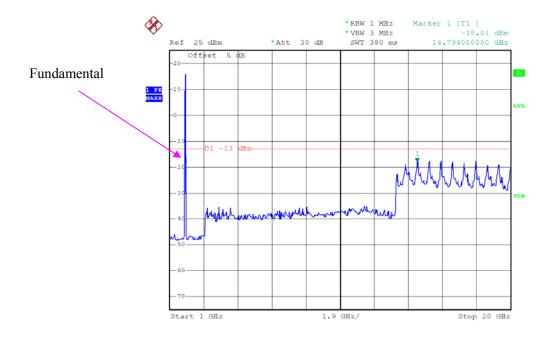
Date: 6.JUN.2018 14:11:04

QPSK_20 MHz
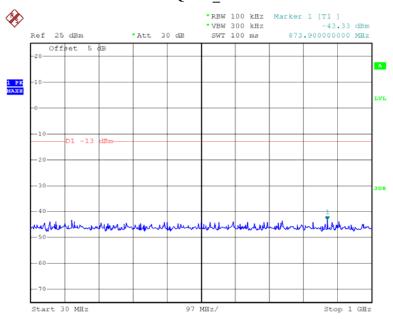
Date: 6.JUN.2018   14:19:05

Fundamental
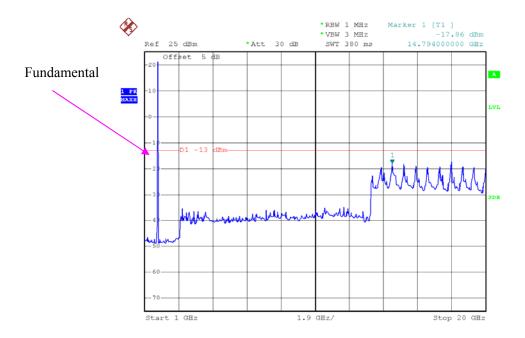
Date: 6.JUN.2018   14:12:23

LTE Band 4 (Middle Channel)

QPSK_1.4 MHz
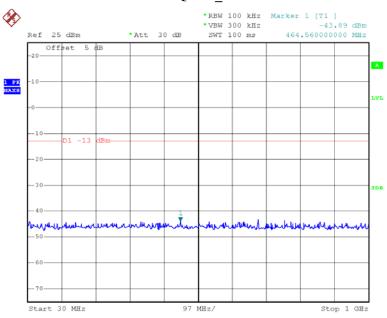
Date: 6.JUN.2018 14:24:07

Fundamental
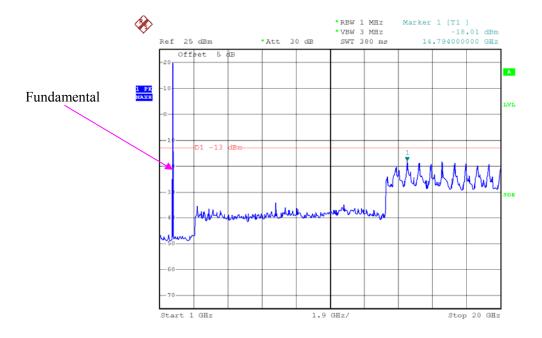
Date: 6.JUN.2018 14:23:49

QPSK_3 MHz
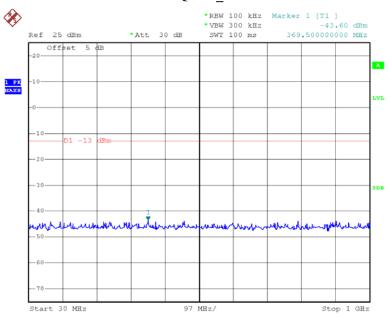
Date: 6.JUN.2018 14:23:11
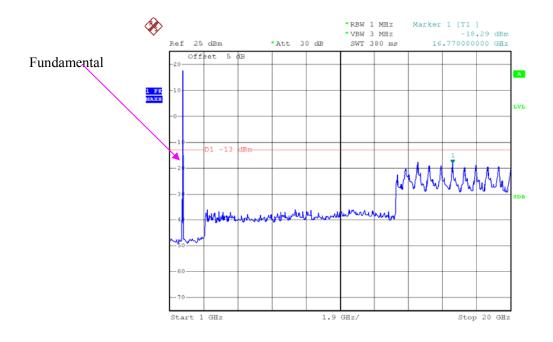
Date: 6.JUN.2018 14:23:33

QPSK_5 MHz
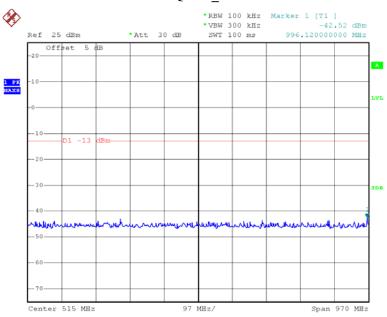
Date: 6.JUN.2018 14:22:55

Fundamental
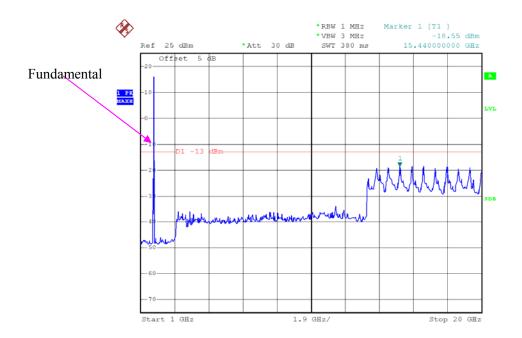
Date: 6.JUN.2018 14:22:42

QPSK_10 MHz
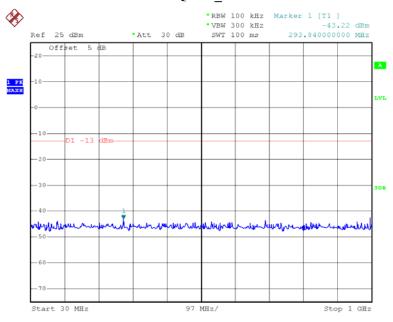
Date: 6.JUN.2018 14:21:39
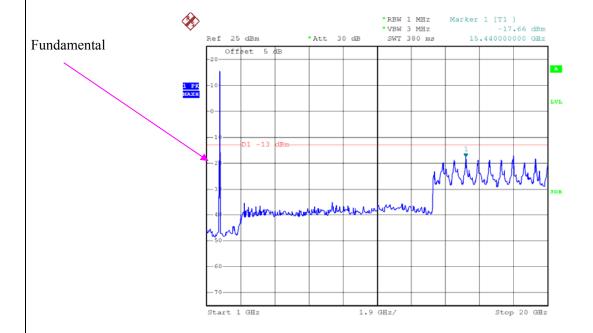
Date: 6.JUN.2018 14:22:17

QPSK_15 MHz

Fundamental
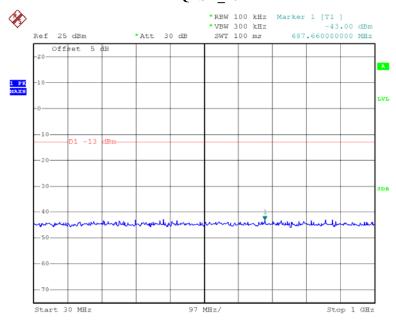
Date: 6.JUN.2018   14:21:29
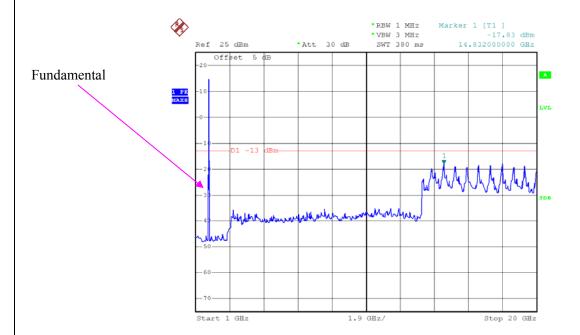
Date: 6.JUN.2018   14:21:13

QPSK_20 MHz
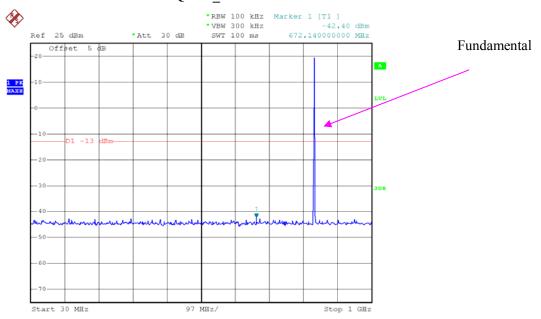
Date: 6.JUN.2018   14:20:14

Fundamental
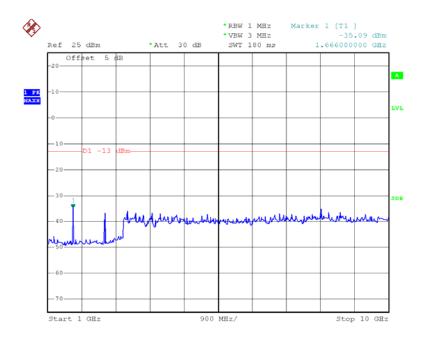
Date: 6.JUN.2018   14:20:42

LTE Band 5 (Middle Channel)

QPSK_1.4 MHz

Fundamental
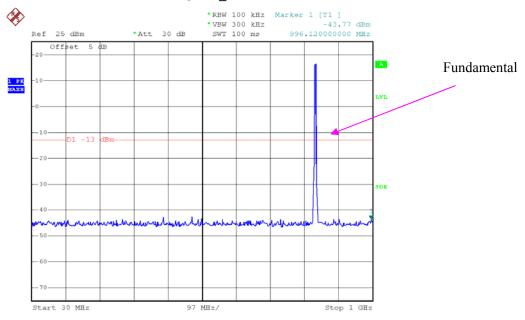
Date: 6.JUN.2018   14:26:25
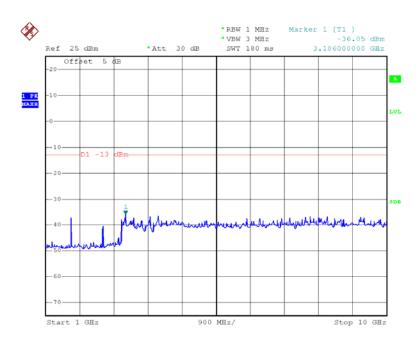
Date: 6.JUN.2018   14:26:44

QPSK_3 MHz

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz               -43.77 dBm
        Ref  25 dBm      *Att  30 dB  SWT 100 ms      996.120000000 MHz
           Offset  5 dB
```

Fundamental

```
        Date: 6.JUN.2018  14:28:32
```

```
                                    *RBW 1 MHz     Marker 1 [T1 ]
                                    *VBW 3 MHz                 -36.05 dBm
        Ref  25 dBm      *Att  30 dB  SWT 180 ms       3.106000000 GHz
           Offset  5 dB
```
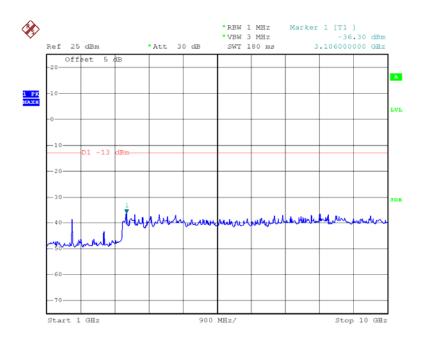
```
        Date: 6.JUN.2018  14:27:58
```

QPSK_5 MHz

Fundamental
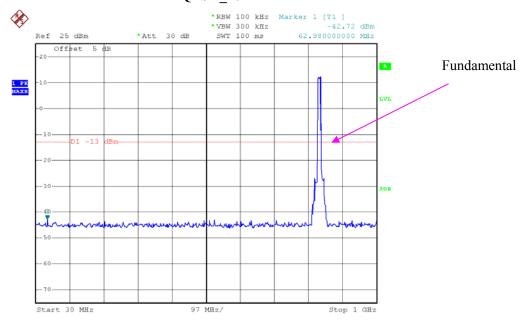
Date: 6.JUN.2018 14:29:22
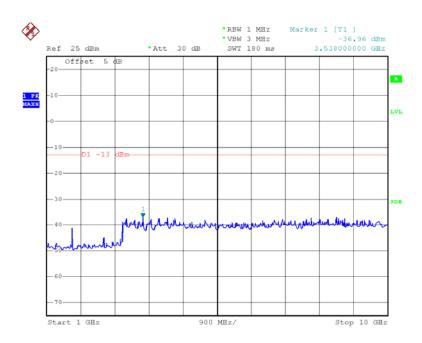
Date: 6.JUN.2018 14:29:48

QPSK_10 MHz

```
                                          *RBW 100 kHz   Marker 1 [T1 ]
                                          *VBW 300 kHz              -42.72 dBm
          Ref   25 dBm        *Att   30 dB   SWT 100 ms      62.980000000 MHz
            Offset  5 dB
```

Fundamental

```
Date: 6.JUN.2018  14:30:53
```

```
                                          *RBW 1 MHz    Marker 1 [T1 ]
                                          *VBW 3 MHz               -36.96 dBm
          Ref   25 dBm        *Att   30 dB   SWT 180 ms      3.538000000 GHz
            Offset  5 dB
```
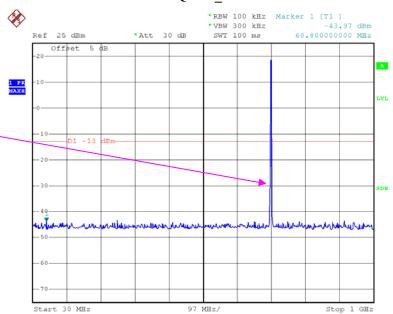
```
Date: 6.JUN.2018  14:30:03
```
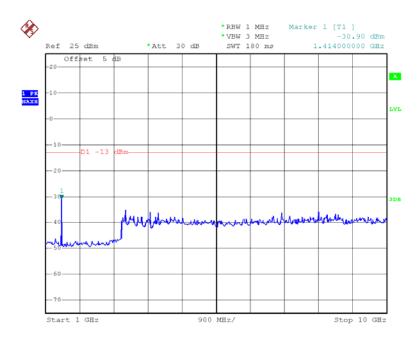
LTE Band 12 (Middle Channel)

QPSK_1.4 MHz

Fundamental

```
*RBW 100 kHz   Marker 1 [T1 ]
*VBW 300 kHz              -43.97 dBm
Ref  25 dBm        *Att  30 dB    SWT 100 ms       68.800000000 MHz
```

Date: 6.JUN.2018 14:35:38

```
*RBW 1 MHz    Marker 1 [T1 ]
*VBW 3 MHz               -30.90 dBm
Ref  25 dBm        *Att  30 dB    SWT 180 ms       1.414000000 GHz
```
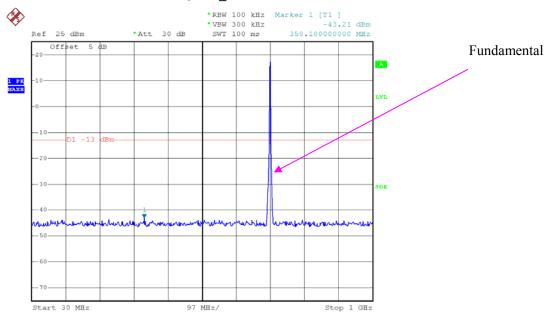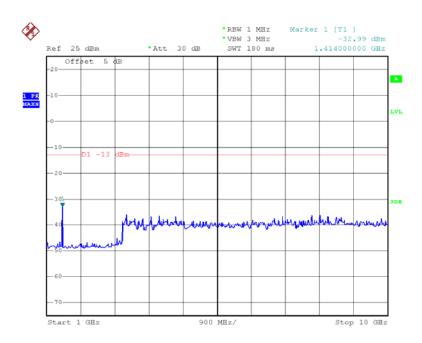
Date: 6.JUN.2018 14:35:19

QPSK_3 MHz

Fundamental
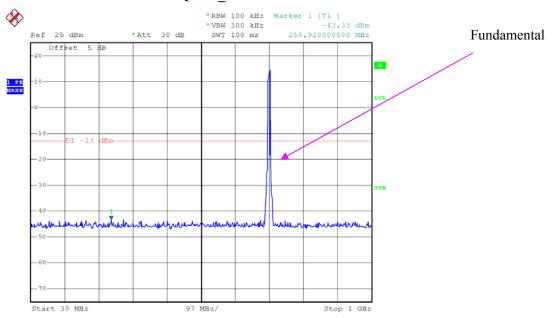
Date: 6.JUN.2018 14:34:42
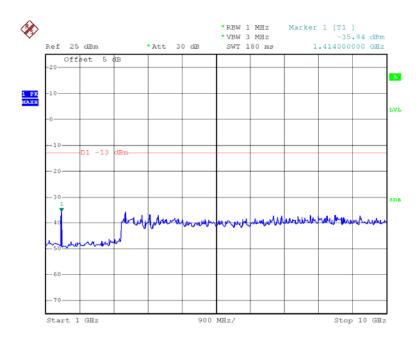
Date: 6.JUN.2018 14:35:06

QPSK_5 MHz

Fundamental
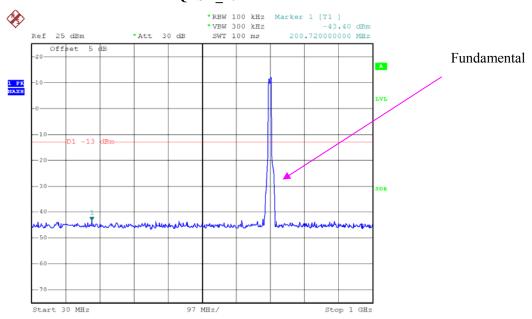
Date: 6.JUN.2018 14:34:13
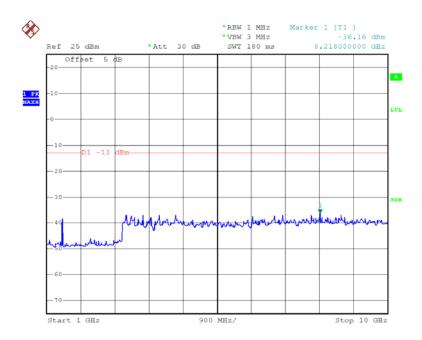
Date: 6.JUN.2018 14:33:49

QPSK_10 MHz

Fundamental
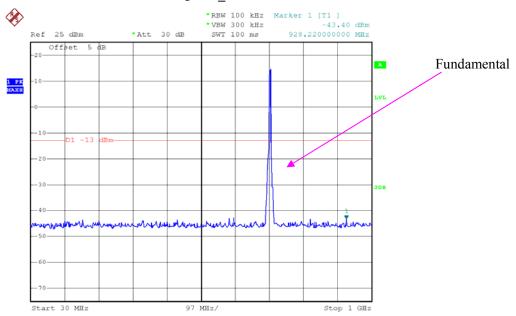
Date: 6.JUN.2018 14:33:20
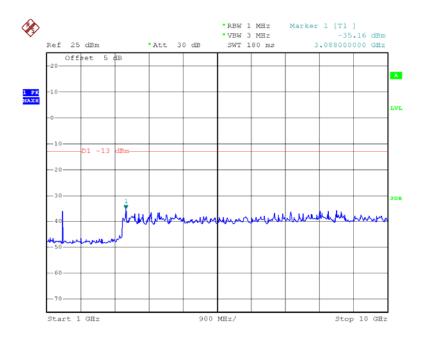
Date: 6.JUN.2018 14:33:34

LTE Band 17 (Middle Channel)

QPSK_5 MHz

Fundamental
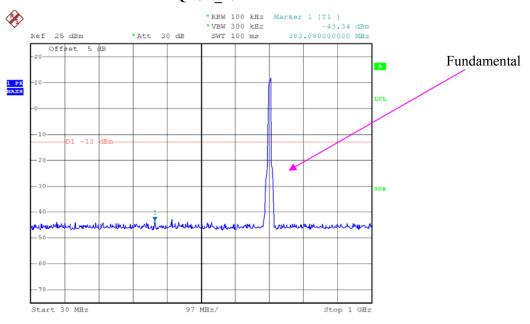
Date: 6.JUN.2018   14:39:35
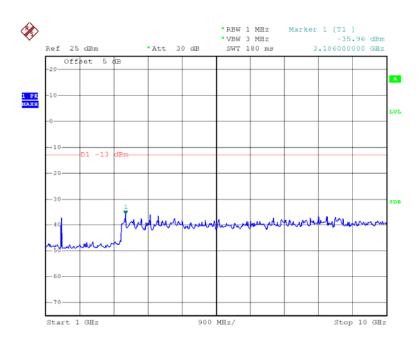
Date: 6.JUN.2018   14:39:15

QPSK_10 MHz

Fundamental

Date: 6.JUN.2018　14:40:01

Date: 6.JUN.2018　14:40:49

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
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05

* 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:	24.2 °C
Relative Humidity:	45 %
ATM Pressure:	99.7 kPa

* The testing was performed by Blake Yang & Vern Shen on 2018-07-07

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	59.35	-54.9	10.6	0.7	-45.0	-13.0	32.0
1673.200	V	63.07	-51.7	10.6	0.7	-41.8	-13.0	28.8
2509.800	H	59.82	-53.2	13.1	1.2	-41.3	-13.0	28.3
2509.800	V	63.54	-49.5	13.1	1.2	-37.6	-13.0	24.6
3346.400	H	59.13	-51.5	13.8	1.6	-39.3	-13.0	26.3
3346.400	V	63.32	-47.4	13.8	1.6	-35.2	-13.0	22.2
347.000	H	43.53	-63.3	0.0	0.6	-63.9	-13.0	50.9
347.000	V	45.88	-63.2	0.0	0.6	-63.8	-13.0	50.8

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 V R99,Frequency:836.600 MHz								
1673.200	H	50.72	-63.5	10.6	0.7	-53.6	-13.0	40.6
1673.200	V	58.15	-56.7	10.6	0.7	-46.8	-13.0	33.8
2509.800	H	49.63	-63.4	13.1	1.2	-51.5	-13.0	38.5
2509.800	V	52.46	-60.6	13.1	1.2	-48.7	-13.0	35.7
3346.400	H	48.63	-62	13.8	1.6	-49.8	-13.0	36.8
3346.400	V	50.54	-60.2	13.8	1.6	-48.0	-13.0	35.0
597.000	H	43.68	-58.5	0.0	0.8	-59.3	-13.0	46.3
597.000	V	48.87	-56.6	0.0	0.8	-57.4	-13.0	44.4

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	58.87	-49.9	13.8	1.6	-37.7	-13.0	24.7
3760.000	V	62.53	-46.1	13.8	1.6	-33.9	-13.0	20.9
5640.000	H	59.02	-47	14.0	1.3	-34.3	-13.0	21.3
5640.000	V	63.45	-42.5	14.0	1.3	-29.8	-13.0	16.8
516.000	H	46.57	-57.3	0.0	0.7	-58.0	-13.0	45.0
516.000	V	48.24	-58.7	0.0	0.7	-59.4	-13.0	46.4
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	62.03	-46.8	13.8	1.6	-34.6	-13.0	21.6
3760.000	V	68.32	-40.3	13.8	1.6	-28.1	-13.0	15.1
5640.000	H	50.35	-55.7	14.0	1.3	-43.0	-13.0	30.0
5640.000	V	53.42	-52.5	14.0	1.3	-39.8	-13.0	26.8
664.000	H	45.75	-55.9	0.0	0.9	-56.8	-13.0	43.8
664.000	V	48.97	-55.5	0.0	0.9	-56.4	-13.0	43.4

LTE Band 2 (30MHz-20GHz):

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)			
QPSK,Frequency:1880.000 MHz								
3760.000	H	68.54	-40.3	13.8	1.6	-28.1	-13.0	15.1
3760.000	V	72.74	-35.9	13.8	1.6	-23.7	-13.0	10.7
5640.000	H	49.86	-56.2	14.0	1.3	-43.5	-13.0	30.5
5640.000	V	52.63	-53.3	14.0	1.3	-40.6	-13.0	27.6
299.660	H	55.70	-52.9	0.0	0.5	-53.4	-13.0	40.4
299.660	V	54.11	-55.9	0.0	0.5	-56.4	-13.0	43.4

LTE Band 4 (30MHz-20GHz):

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)			
QPSK,Frequency:1732.500 MHz								
3465.000	H	63.42	-46.8	13.9	1.6	-34.5	-13.0	21.5
3465.000	V	65.87	-44.4	13.9	1.6	-32.1	-13.0	19.1
5197.500	H	49.65	-56.8	14.0	1.5	-44.3	-13.0	31.3
5197.500	V	50.21	-56.3	14.0	1.5	-43.8	-13.0	30.8
299.660	H	54.27	-54.4	0.0	0.5	-54.9	-13.0	41.9
299.660	V	54.32	-55.7	0.0	0.5	-56.2	-13.0	43.2

LTE Band 5 (30MHz-10GHz):

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)			
QPSK,Frequency: 836.500 MHz								
1673.200	H	50.84	-63.4	10.6	0.7	-53.5	-13.0	40.5
1673.200	V	53.72	-61.1	10.6	0.7	-51.2	-13.0	38.2
2509.800	H	58.45	-54.6	13.1	1.2	-42.7	-13.0	29.7
2509.800	V	60.38	-52.7	13.1	1.2	-40.8	-13.0	27.8
3346.400	H	45.63	-65	13.8	1.6	-52.8	-13.0	39.8
3346.400	V	46.82	-63.9	13.8	1.6	-51.7	-13.0	38.7
800.180	H	46.37	-52.3	0.0	0.9	-53.2	-13.0	40.2
299.660	V	56.11	-53.9	0.0	0.5	-54.4	-13.0	41.4

LTE Band 12 (30MHz-10GHz):

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)			
QPSK,Frequency:707.500 MHz								
1415.000	H	53.87	-59.6	9.1	1.2	-51.7	-13.0	38.7
1415.000	V	55.68	-58.3	9.1	1.2	-50.4	-13.0	37.4
2122.500	H	46.25	-66.5	11.3	1.1	-56.3	-13.0	43.3
2122.500	V	48.93	-63.8	11.3	1.1	-53.6	-13.0	40.6
2830.000	H	45.28	-66.8	13.3	1.4	-54.9	-13.0	41.9
2830.000	V	47.25	-65.1	13.3	1.4	-53.2	-13.0	40.2
800.180	H	46.13	-52.5	0.0	0.9	-53.4	-13.0	40.4
299.660	V	55.00	-55	0.0	0.5	-55.5	-13.0	42.5

LTE Band 17 (30MHz-10GHz)

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)			
QPSK,Frequency:710.000 MHz								
1420.000	H	64.25	-49.4	9.1	1.2	-41.5	-13.0	28.5
1420.000	V	65.83	-48.3	9.1	1.2	-40.4	-13.0	27.4
2130.000	H	61.02	-51.7	11.2	1.1	-41.6	-13.0	28.6
2130.000	V	62.14	-50.6	11.2	1.1	-40.5	-13.0	27.5
2840.000	H	47.53	-64.5	13.4	1.4	-52.5	-13.0	39.5
2840.000	V	48.72	-63.6	13.4	1.4	-51.6	-13.0	38.6
800.180	H	54.92	-43.7	0.0	0.9	-44.6	-13.0	31.6
299.660	V	56.14	-53.9	0.0	0.5	-54.4	-13.0	41.4

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

FCC §22.917(a) & §24.238(a) & §27.53 - BAND EDGES
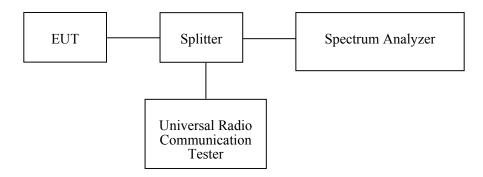
Applicable Standard

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.

```
┌─────────┐      ┌──────────┐      ┌─────────────────────┐
│   EUT   │──────│ Splitter │──────│  Spectrum Analyzer  │
└─────────┘      └──────────┘      └─────────────────────┘
                      │
                 ┌──────────────┐
                 │ Universal Radio │
                 │ Communication   │
                 │    Tester       │
                 └──────────────┘
```

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-08	2018-12-08

* 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:	26.5~28.7°C
Relative Humidity:	49 ~ 61 %
ATM Pressure:	101~101.9 kPa
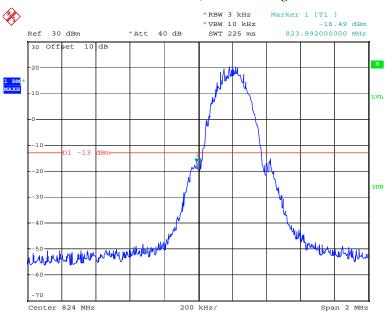
The testing was performed by Kami Zhou & Tiago Huang on 2018-06-06 on 2018-06-30.

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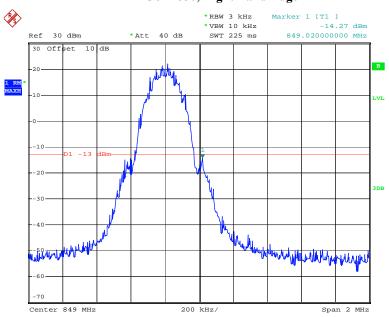
Test Result: Compliant. Please refer to the following plots.

GSM 850, Left Band Edge

```
                                    *RBW 3 kHz      Marker 1 [T1 ]
                                    *VBW 10 kHz              -16.49 dBm
    Ref  30 dBm         *Att  40 dB  SWT 225 ms    823.992000000 MHz
```



```
Center 824 MHz              200 kHz/                    Span 2 MHz
```
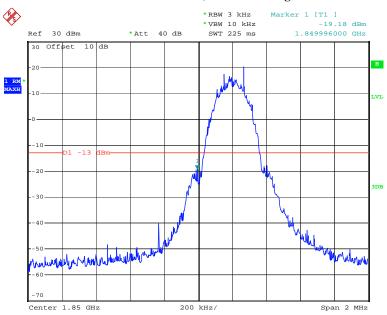
Date: 24.JUN.2018 15:01:19

GSM 850, Right Band Edge

```
                                    *RBW 3 kHz      Marker 1 [T1 ]
                                    *VBW 10 kHz              -14.27 dBm
    Ref  30 dBm         *Att  40 dB  SWT 225 ms    849.020000000 MHz
```



```
Center 849 MHz              200 kHz/                    Span 2 MHz
```
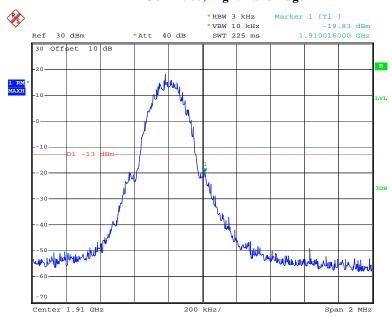
Date: 24.JUN.2018 15:02:08

GSM 1900, Left Band Edge

```
                                    *RBW 3 kHz    Marker 1 [T1 ]
                                    *VBW 10 kHz           -19.18 dBm
       Ref  30 dBm        *Att  40 dB    SWT 225 ms       1.849996000 GHz
```
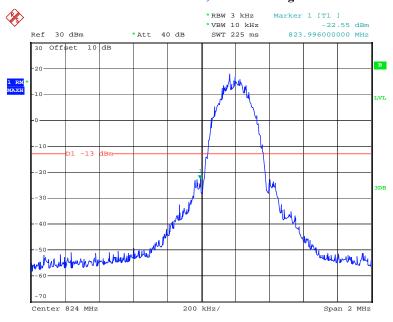
Date: 24.JUN.2018 15:18:45

GSM 1900, Right Band Edge

```
                                    *RBW 3 kHz    Marker 1 [T1 ]
                                    *VBW 10 kHz           -19.83 dBm
       Ref  30 dBm        *Att  40 dB    SWT 225 ms       1.910016000 GHz
```
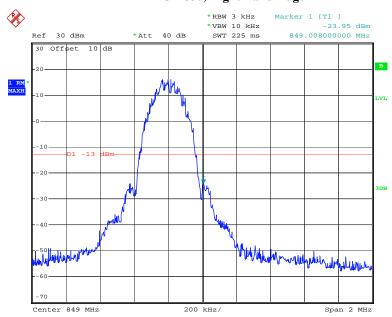
Date: 24.JUN.2018 15:22:02

EDGE 850, Left Band Edge

```
                                    *RBW 3 kHz      Marker 1 [T1 ]
                                    *VBW 10 kHz               -22.55 dBm
        Ref  30 dBm       *Att  40 dB   SWT 225 ms      823.996000000 MHz
```
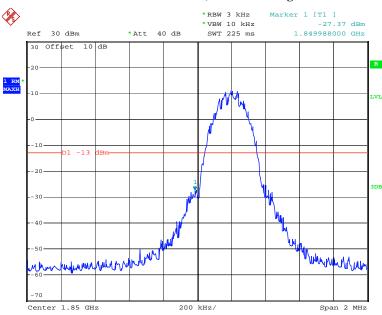
Date: 24.JUN.2018 15:04:17

EDGE 850, Right Band Edge

```
                                    *RBW 3 kHz      Marker 1 [T1 ]
                                    *VBW 10 kHz               -23.95 dBm
        Ref  30 dBm       *Att  40 dB   SWT 225 ms      849.008000000 MHz
```
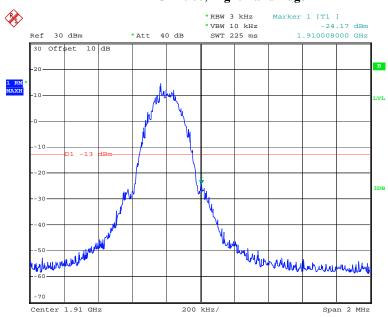
Date: 24.JUN.2018 15:05:15

EDGE 1900, Left Band Edge
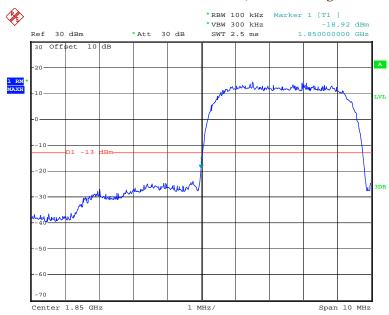
Date: 24.JUN.2018 15:15:57

EDGE 1900, Right Band Edge
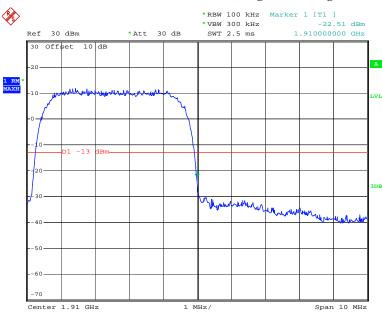
Date: 24.JUN.2018 15:14:40

WCDMA Band II Rel 99, Left Band Edge
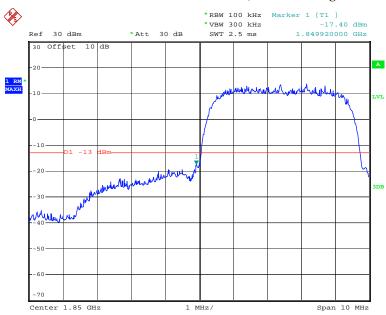
Date: 30.JUN.2018 00:28:32

WCDMA Band II Rel 99, Right Band Edge
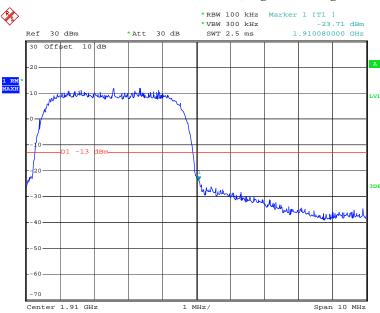
Date: 30.JUN.2018 00:29:18

WCDMA Band II HSUPA, Left Band Edge
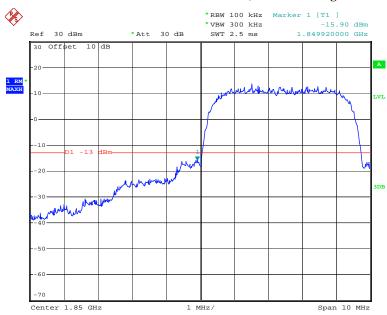
Date: 30.JUN.2018 00:38:53

WCDMA Band II HSUPA, Right Band Edge
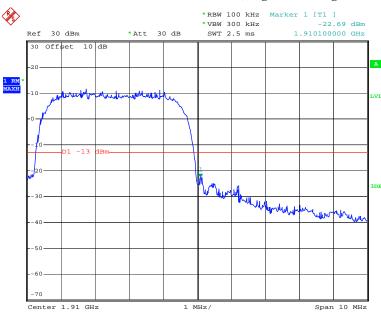
Date: 30.JUN.2018 00:39:22

WCDMA Band II HSDPA, Left Band Edge
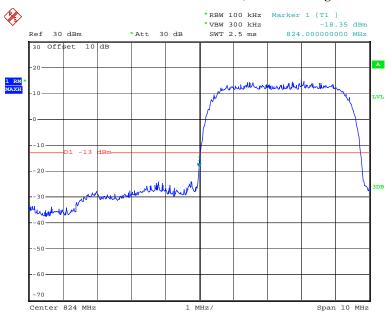
Date: 30.JUN.2018 00:35:26

WCDMA Band II HSDPA, Right Band Edge
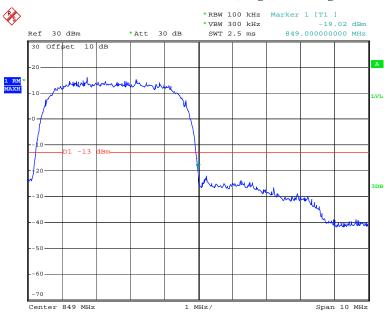
Date: 30.JUN.2018 00:36:06

WCDMA Band V Rel 99, Left Band Edge
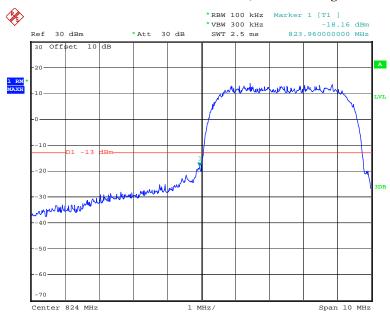
Date: 30.JUN.2018 00:30:29

WCDMA Band V Rel 99, Right Band Edge
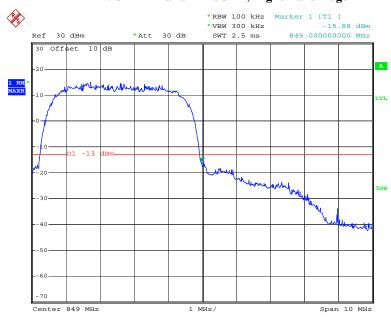
Date: 30.JUN.2018 00:31:28

WCDMA Band V HSUPA, Left Band Edge
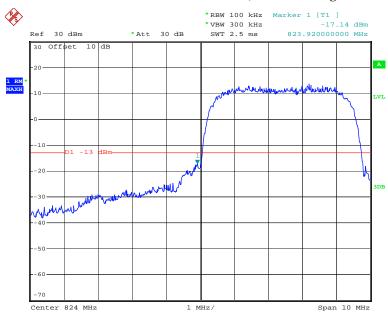
Date: 30.JUN.2018 00:40:12

WCDMA Band V HSUPA, Right Band Edge
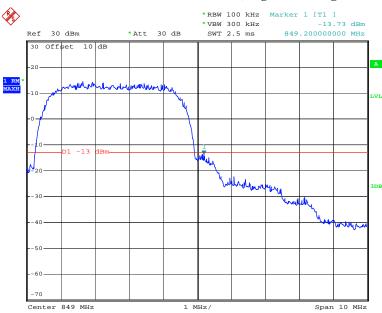
Date: 30.JUN.2018 00:41:22

WCDMA Band V HSDPA, Left Band Edge

Date: 30.JUN.2018 00:34:27
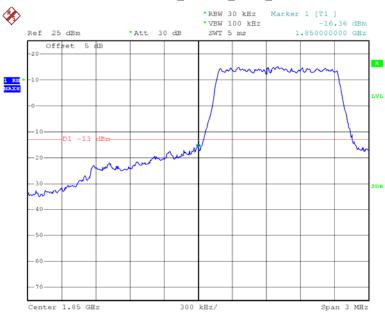
WCDMA Band V HSDPA, Right Band Edge

Date: 30.JUN.2018 00:33:35

LTE Band II

QPSK_1.4MHz_ 6 RB_ Left
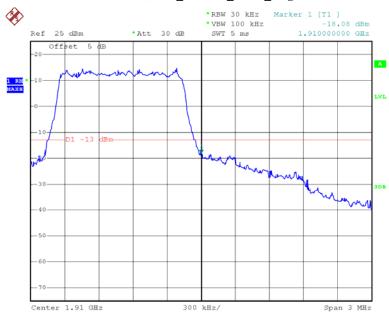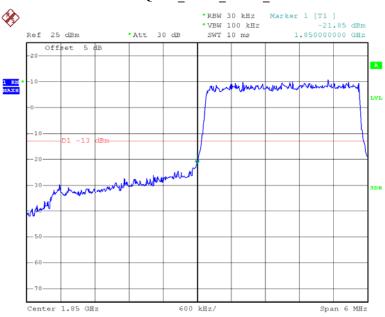
Date: 6.JUN.2018　09:30:23

QPSK_1.4MHz_ 6 RB_ Right
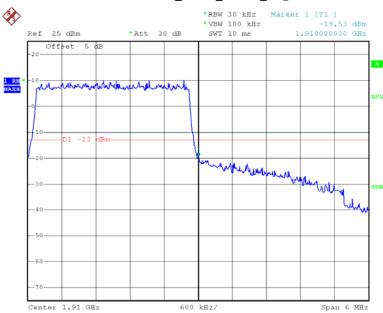
Date: 6.JUN.2018　09:35:05

QPSK_3MHz_ 15 RB_ Left
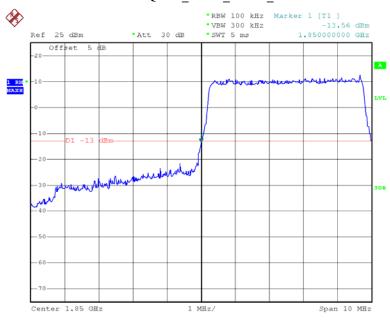
Date: 6.JUN.2018 09:51:04

QPSK_3MHz_ 15 RB_ Right
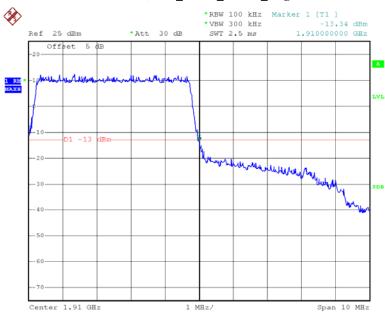
Date: 6.JUN.2018 09:53:01

QPSK_5MHz_ 25 RB_ Left
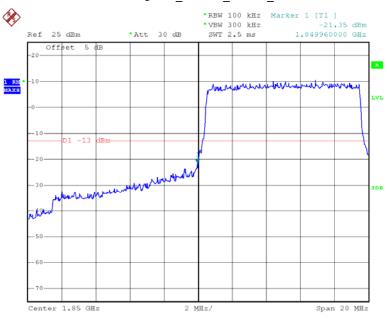
Date: 6.JUN.2018 09:59:07

QPSK_5MHz_ 25 RB_ Right
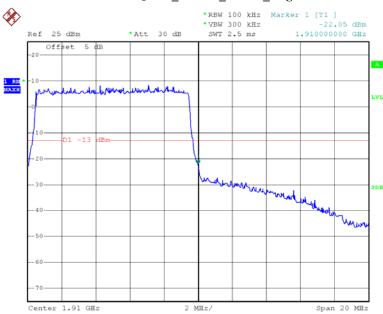
Date: 6.JUN.2018 09:54:36

QPSK_10MHz_ 50 RB_ Left
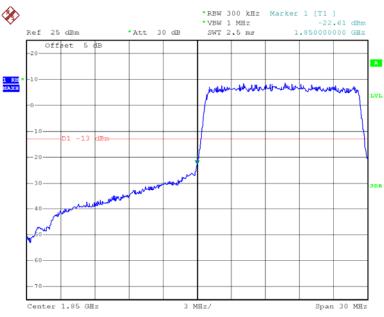
Date: 6.JUN.2018 10:03:31

QPSK_10MHz_ 50 RB_ Right
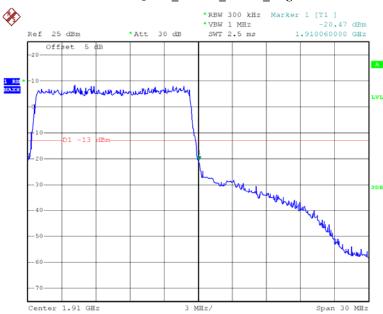
Date: 6.JUN.2018 10:07:42

QPSK_15MHz_ 75 RB_ Left
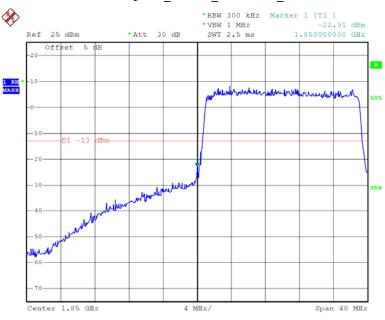
Date: 6.JUN.2018 10:10:58

QPSK_15MHz_ 75 RB_ Right
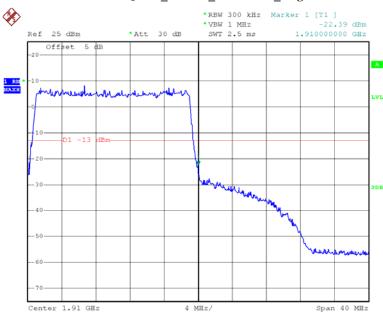
Date: 6.JUN.2018 10:09:27

QPSK_20MHz_ FULL RB_ Left
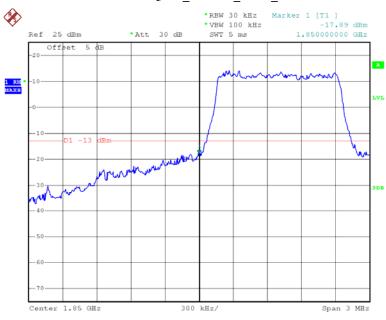
Date: 6.JUN.2018 10:12:38

QPSK_20MHz_ FULL RB_ Right
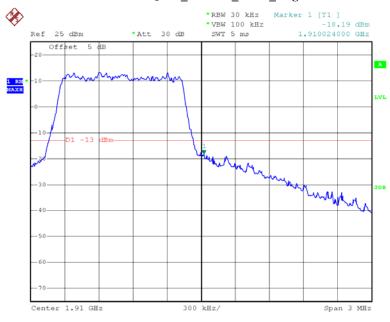
Date: 6.JUN.2018 10:14:04

16QAM_1.4MHz_ 6 RB_ Left
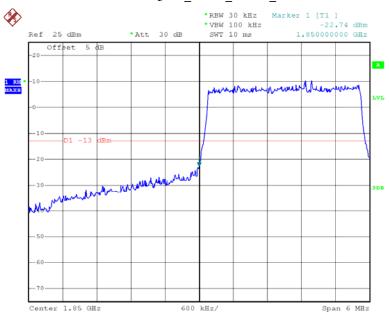
Date: 6.JUN.2018 09:31:59

16QAM_1.4MHz_ 6 RB_ Right
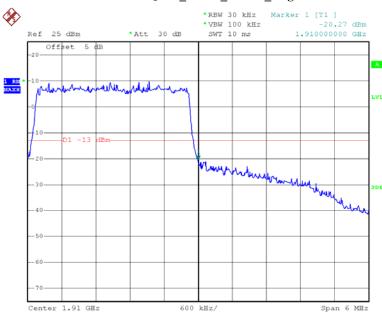
Date: 6.JUN.2018 09:33:37

16QAM_3MHz_ 15 RB_ Left
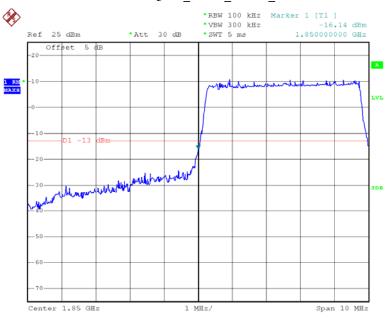
Date: 6.JUN.2018 09:51:51

16QAM_3MHz_ 15 RB_ Right
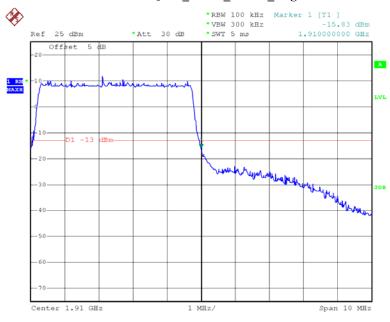
Date: 6.JUN.2018 09:52:38

16QAM_5MHz_ 25 RB_ Left
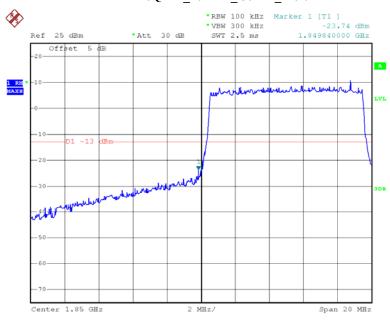
Date: 6.JUN.2018 09:56:28

16QAM_5MHz_ 25 RB_ Right
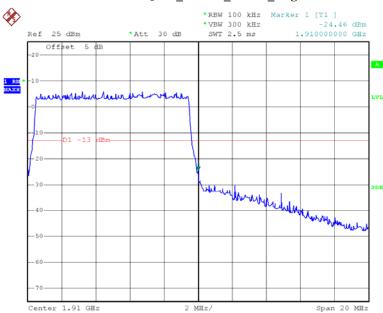
Date: 6.JUN.2018 09:55:16

16QAM_10MHz_ 50 RB_ Left
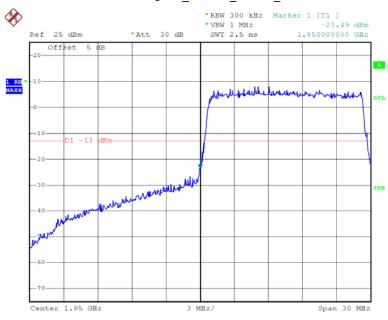
Date: 6.JUN.2018 10:04:07

16QAM_10MHz_ 50 RB_ Right
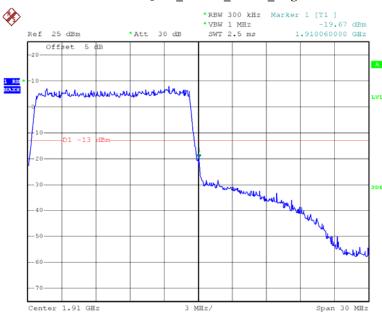
Date: 6.JUN.2018 10:06:44

16QAM_15MHz_ 75 RB_ Left
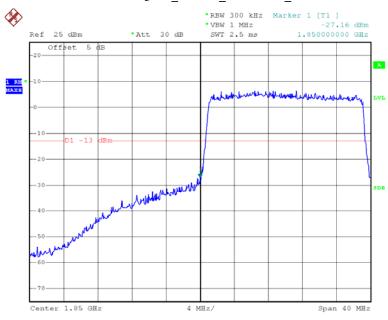
Date: 6.JUN.2018 10:10:28

16QAM_15MHz_ 75 RB_ Right
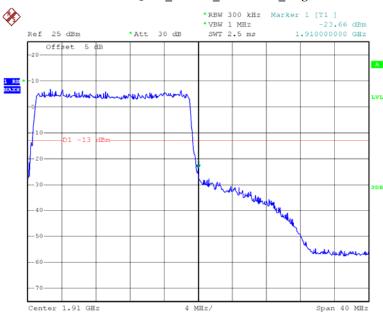
Date: 6.JUN.2018 10:09:55

16QAM_20MHz_ FULL RB_ Left

Date: 6.JUN.2018 10:13:00

16QAM_20MHz_ FULL RB_ Right
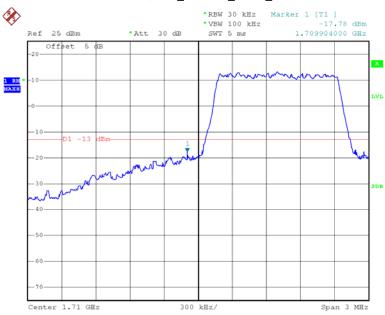
Date: 6.JUN.2018 10:13:44
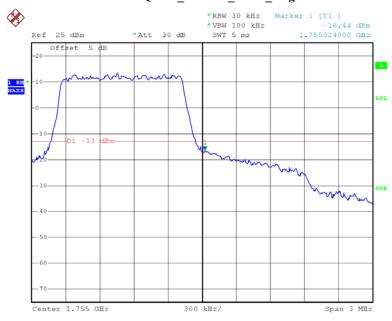
LTE Band IV

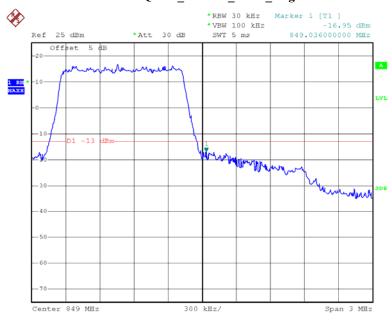### QPSK_1.4MHz_ 6 RB_ Left
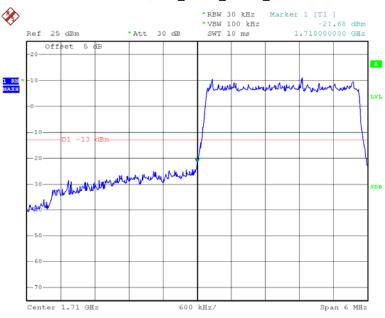
Date: 6.JUN.2018 10:23:51

QPSK_1.4MHz_ 6 RB_ Right
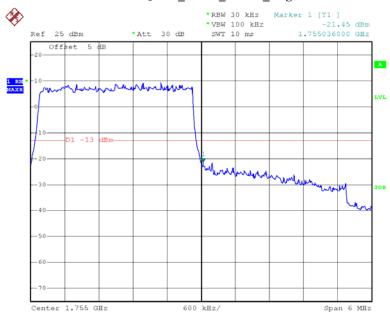
Date: 6.JUN.2018 10:20:32

QPSK_3MHz_ 15 RB_ Left
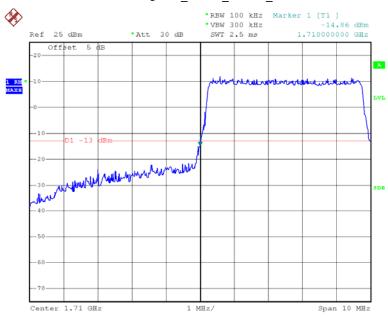
Date: 6.JUN.2018 10:26:28

QPSK_3MHz_ 15 RB_ Right
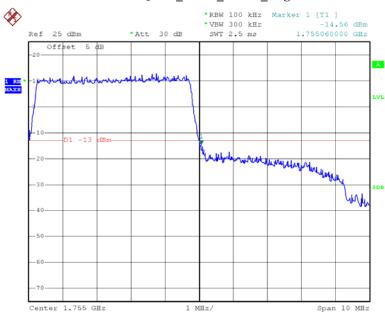
Date: 6.JUN.2018 10:28:14

QPSK_5MHz_ 25 RB_ Left
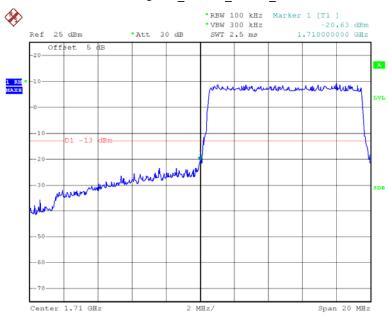
Date: 6.JUN.2018 10:31:10

QPSK_5MHz_ 25 RB_ Right
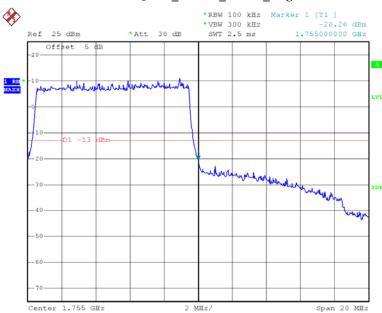
Date: 6.JUN.2018 10:29:15

QPSK_10MHz_ 50 RB_ Left
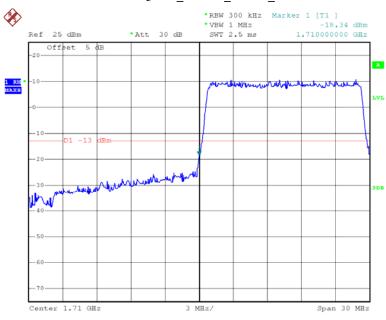
Date: 6.JUN.2018 10:33:47

QPSK_10MHz_ 50 RB_ Right
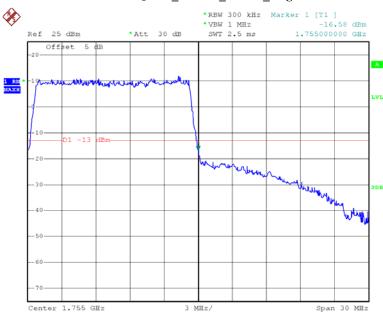
Date: 6.JUN.2018 10:36:39

QPSK_15MHz_ 75 RB_ Left
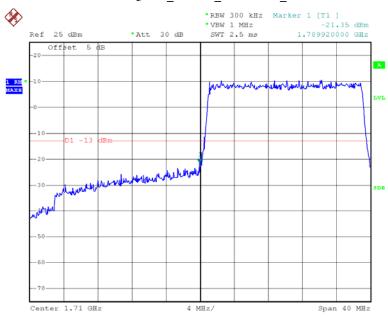
Date: 6.JUN.2018 10:40:05

QPSK_15MHz_ 75 RB_ Right
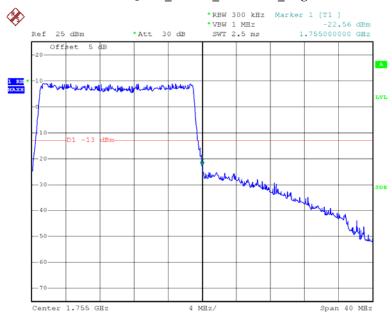
Date: 6.JUN.2018 10:38:14

QPSK_20MHz_ FULL RB_ Left
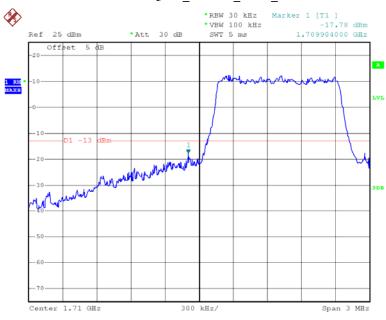
Date: 6.JUN.2018 10:41:05

QPSK_20MHz_ FULL RB_ Right
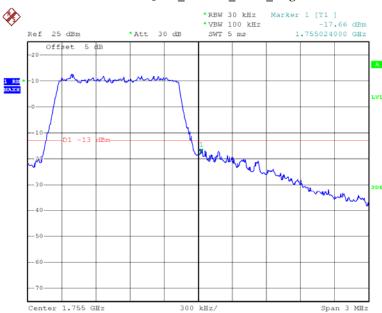
Date: 6.JUN.2018 10:42:51

16QAM_1.4MHz_ 6 RB_ Left
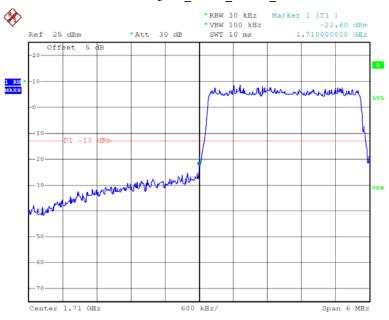
Date: 6.JUN.2018 10:22:54

16QAM_1.4MHz_ 6 RB_ Right
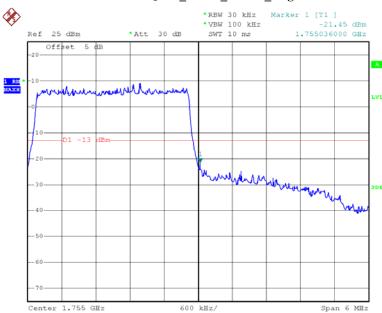
Date: 6.JUN.2018 10:22:18

16QAM_3MHz_ 15 RB_ Left
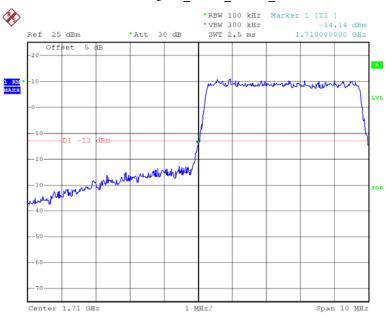
Date: 6.JUN.2018 10:26:49

16QAM_3MHz_ 15 RB_ Right
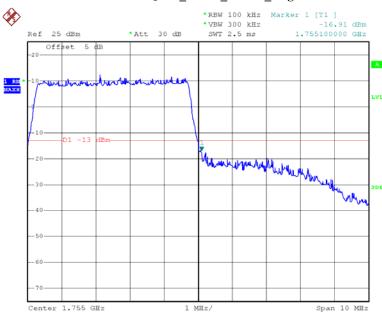
Date: 6.JUN.2018 10:27:34

16QAM_5MHz_ 25 RB_ Left
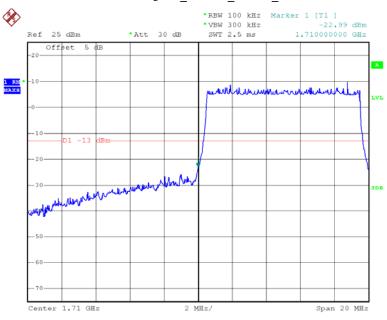
Date: 6.JUN.2018 10:32:15

16QAM_5MHz_ 25 RB_ Right
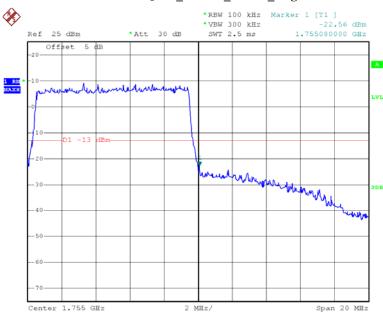
Date: 6.JUN.2018 10:29:47

16QAM_10MHz_ 50 RB_ Left
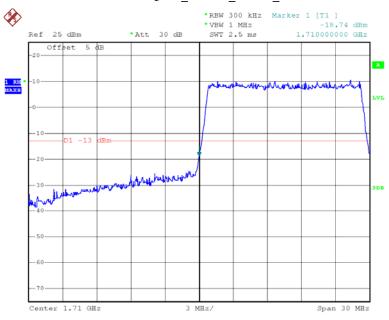
Date: 6.JUN.2018 10:34:06

16QAM_10MHz_ 50 RB_ Right
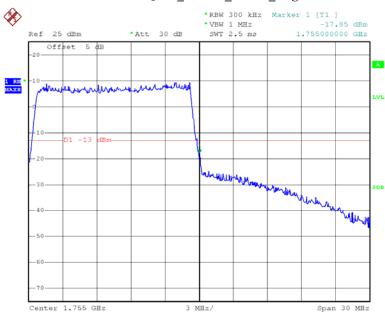
Date: 6.JUN.2018 10:35:50

16QAM_15MHz_ 75 RB_ Left

Date: 6.JUN.2018 10:39:30

16QAM_15MHz_ 75 RB_ Right
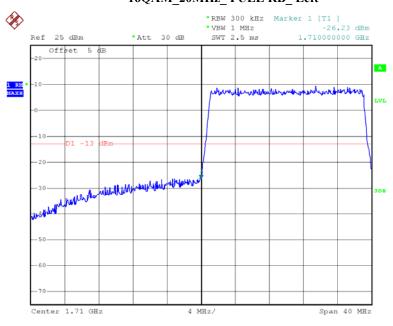
Date: 6.JUN.2018 10:38:43

16QAM_20MHz_ FULL RB_ Left
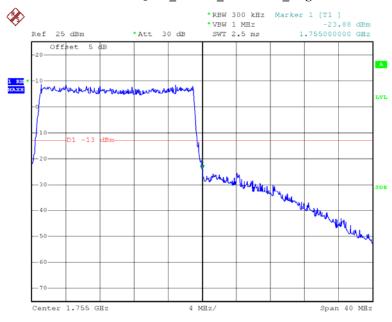
Date: 6.JUN.2018 10:41:32

16QAM_20MHz_ FULL RB_ Right
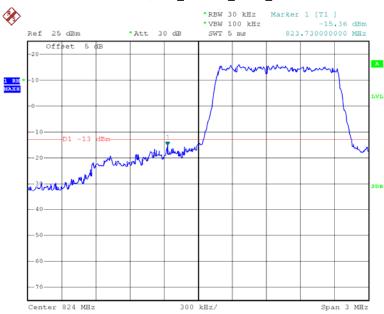
Date: 6.JUN.2018 10:42:18

LTE Band V

QPSK_1.4MHz_ 6 RB_ Left
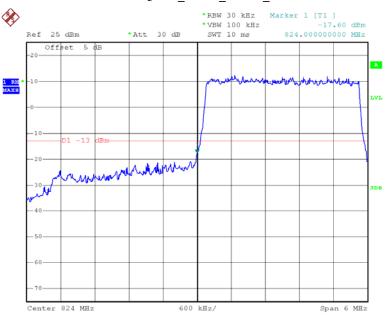
Date: 6.JUN.2018   10:44:23

QPSK_1.4MHz_ 6 RB_ Right
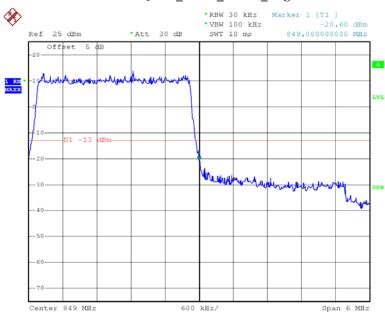
Date: 6.JUN.2018   10:46:54

QPSK_3MHz_ 15 RB_ Left
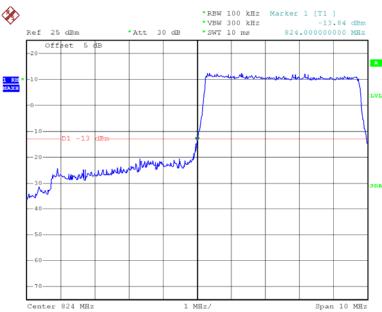
Date: 6.JUN.2018 10:51:28

QPSK_3MHz_ 15 RB_ Right
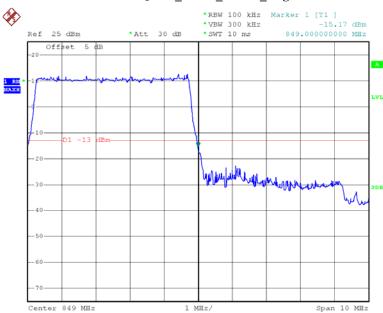
Date: 6.JUN.2018 10:49:28

QPSK_5MHz_ 25 RB_ Left

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -13.84 dBm
         Ref  25 dBm      *Att  30 dB    *SWT 10 ms      824.000000000 MHz
           Offset  5 dB
```
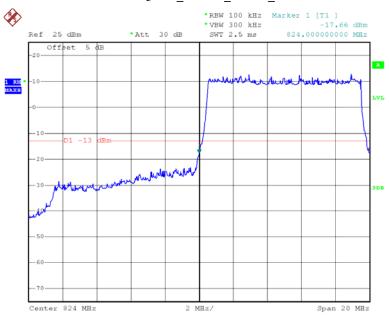
Date: 6.JUN.2018 10:52:59

QPSK_5MHz_ 25 RB_ Right

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -15.17 dBm
         Ref  25 dBm      *Att  30 dB    *SWT 10 ms      849.000000000 MHz
           Offset  5 dB
```
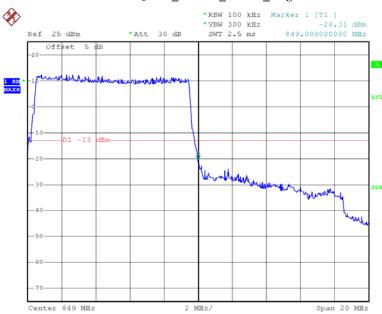
Date: 6.JUN.2018 10:55:31

QPSK_10MHz_ 50 RB_ Left
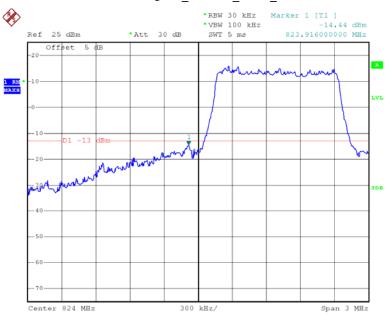
Date: 6.JUN.2018 10:58:52

QPSK_10MHz_ 50 RB_ Right
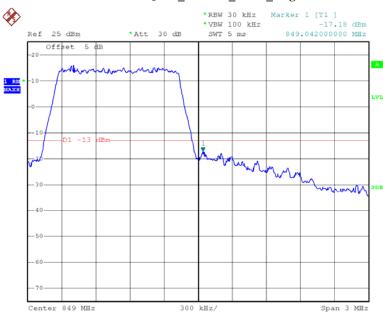
Date: 6.JUN.2018 10:57:05

16QAM_1.4MHz_ 6 RB_ Left
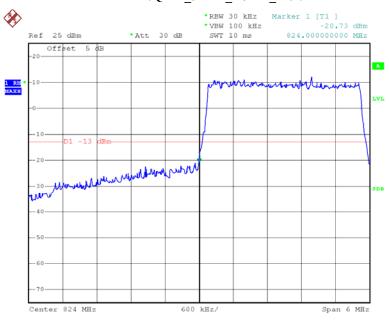
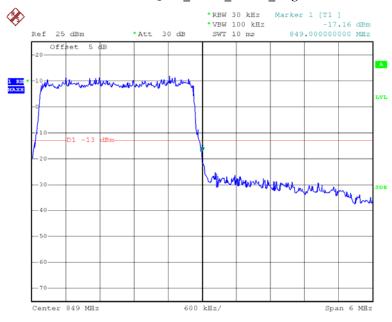Date: 6.JUN.2018 10:44:48

16QAM_1.4MHz_ 6 RB_ Right
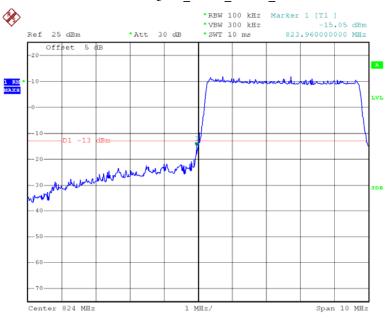

Date: 6.JUN.2018 10:46:23

16QAM_3MHz_ 15 RB_ Left
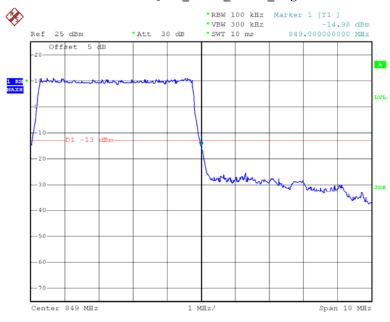

Date: 6.JUN.2018 10:50:44

16QAM_3MHz_ 15 RB_ Right

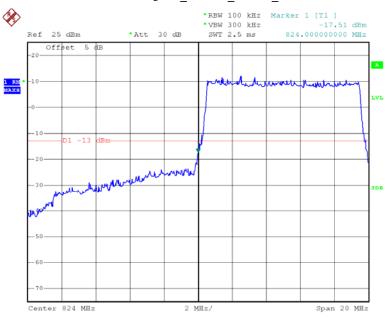Date: 6.JUN.2018 10:49:48

16QAM_5MHz_ 25 RB_ Left
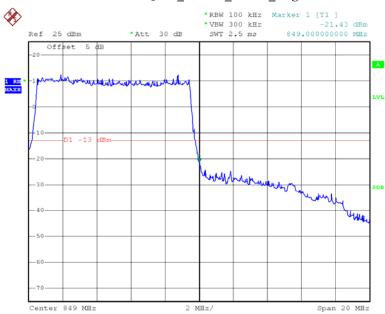

Date: 6.JUN.2018 10:53:25

16QAM_5MHz_ 25 RB_ Right

Date: 6.JUN.2018 10:54:05
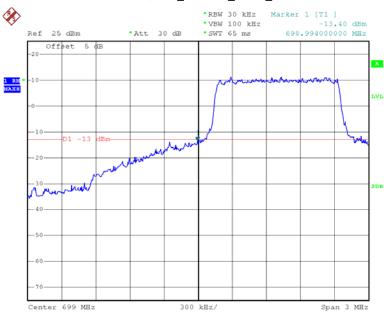
16QAM_10MHz_ 50 RB_ Left

Date: 6.JUN.2018 10:58:14

16QAM_10MHz_ 50 RB_ Right

Date: 6.JUN.2018 10:57:36

LTE Band 12

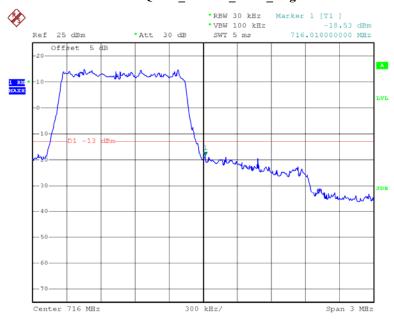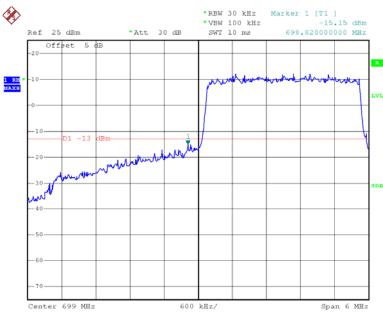### QPSK_1.4MHz_ 6 RB_ Left

Date: 6.JUN.2018   11:01:14
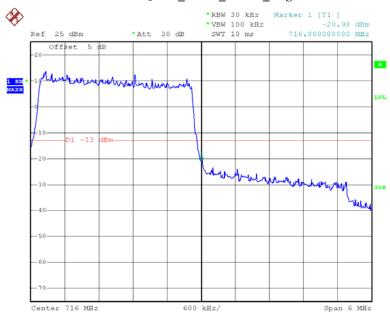
QPSK_1.4MHz_ 6 RB_ Right

Date: 6.JUN.2018   11:03:13

QPSK_3MHz_ 15 RB_ Left
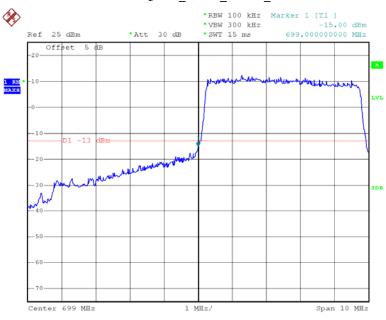
Date: 6.JUN.2018 11:08:30

QPSK_3MHz_ 15 RB_ Right
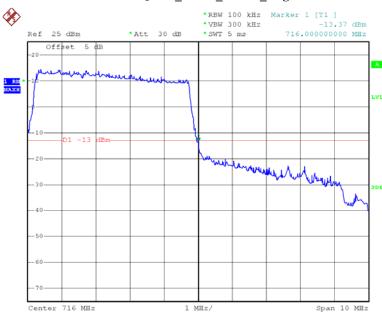
Date: 6.JUN.2018 11:06:28

QPSK_5MHz_ 25 RB_ Left
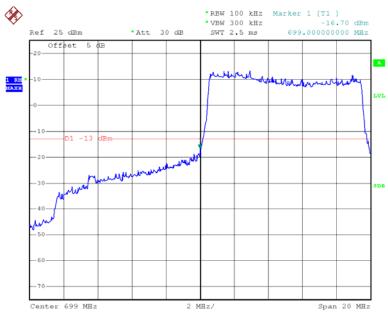
Date: 6.JUN.2018 11:09:37

QPSK_5MHz_ 25 RB_ Right
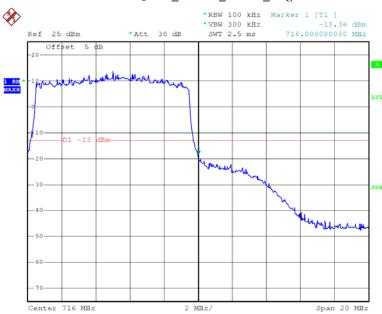
Date: 6.JUN.2018 11:14:03

QPSK_10MHz_ 50 RB_ Left

Date: 6.JUN.2018 11:18:36

QPSK_10MHz_ 50 RB_ Right
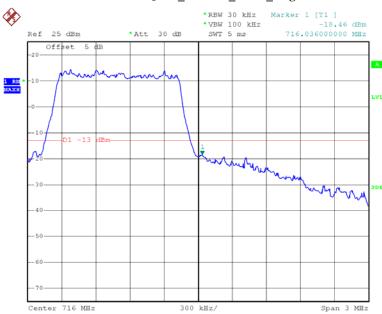
Date: 6.JUN.2018 11:20:17

16QAM_1.4MHz_ 6 RB_ Left
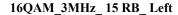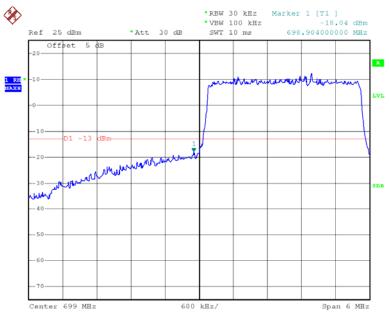
Date: 6.JUN.2018 11:01:40

16QAM_1.4MHz_ 6 RB_ Right
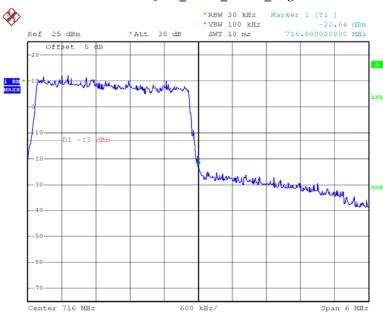
Date: 6.JUN.2018 11:02:45

16QAM_3MHz_ 15 RB_ Left
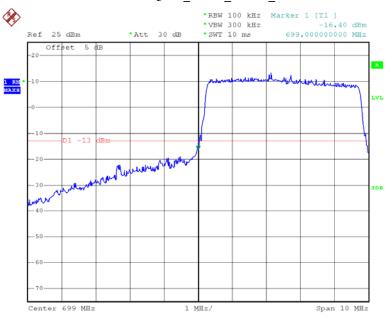
Date: 6.JUN.2018 11:08:04

16QAM_3MHz_ 15 RB_ Right
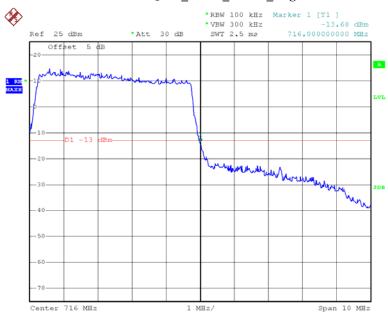
Date: 6.JUN.2018 11:06:47

16QAM_5MHz_ 25 RB_ Left
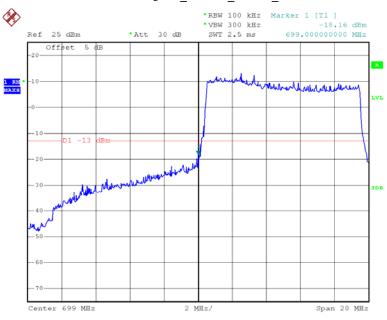
Date: 6.JUN.2018 11:10:20

16QAM_5MHz_ 25 RB_ Right
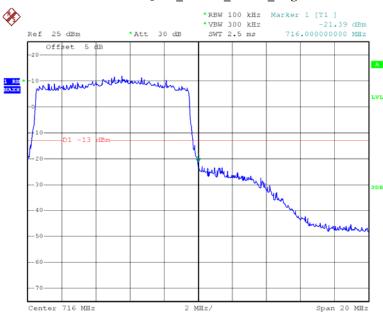
Date: 6.JUN.2018 11:12:28

16QAM_10MHz_ 50 RB_ Left

Date: 6.JUN.2018 11:18:59

16QAM_10MHz_ 50 RB_ Right

Date: 6.JUN.2018 11:19:27

LTE Band 17

QPSK_5MHz_ 25 RB_ Left
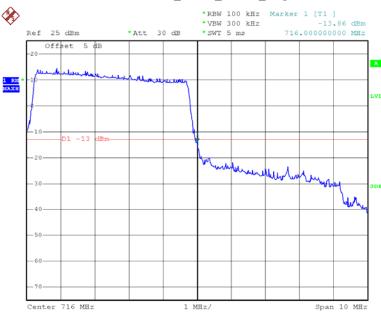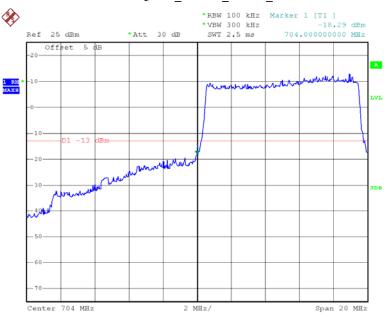
Date: 6.JUN.2018　11:26:18

QPSK_5MHz_ 25 RB_ Right
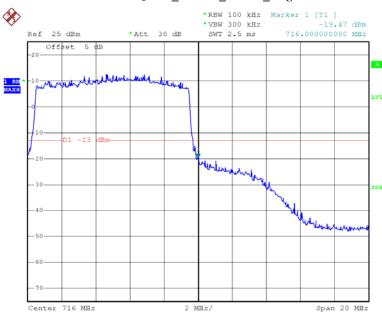
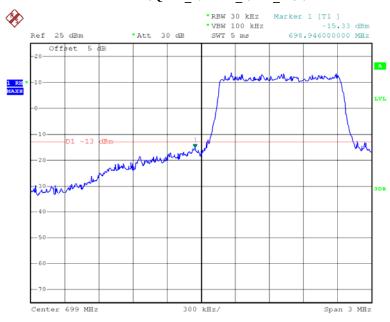Date: 6.JUN.2018　11:24:04

QPSK_10MHz_ 50 RB_ Left
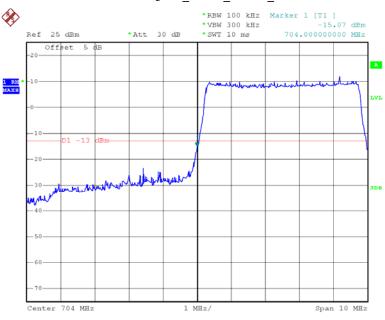
Date: 6.JUN.2018 11:21:35

QPSK_10MHz_ 50 RB_ Right
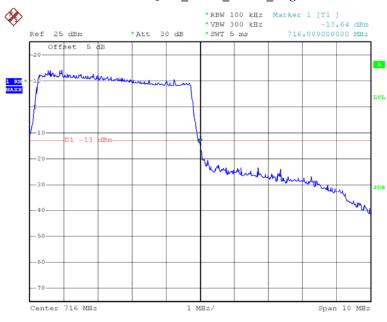
Date: 6.JUN.2018 11:23:08

16QAM_5MHz_ 25 RB_ Left
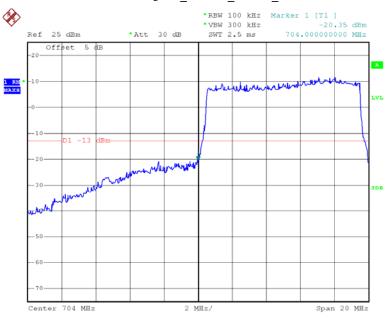
Date: 6.JUN.2018 11:25:56

16QAM_5MHz_ 25 RB_ Right
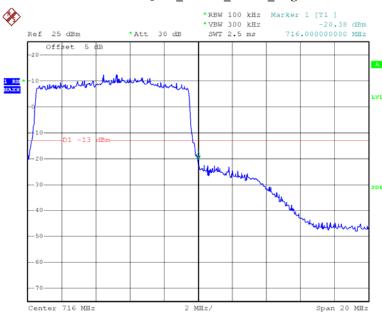
Date: 6.JUN.2018 11:24:40

16QAM_10MHz_ 50 RB_ Left

Date: 6.JUN.2018 11:22:00
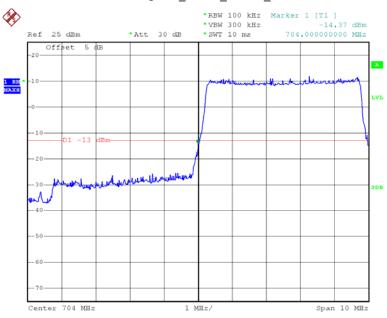
16QAM_10MHz_ 50 RB_ Right

Date: 6.JUN.2018 11:22:43

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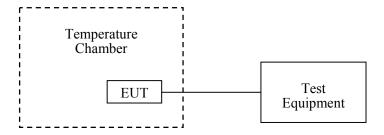
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
UNI-T	Multimeter	UT39A	M130199938	2018-04-02	2019-04-02
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Pro instrument	DC Power Supply	pps3300	N/A	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:	26.5 ~ 28.7 °C
Relative Humidity:	49 ~ 61 %
ATM Pressure:	101 ~ 101.9 kPa

The testing was performed by Kami Zhou & Tiago Huang from 2018-06-06 to 2018-06-30.

Cellular Band (Part 22H)

GMSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	Hz	ppm	ppm
-30		13	0.016	
-20		-2	-0.002	
-10		10	0.012	
0		7	0.008	
10	3.7	5	0.006	
20		4	0.005	2.5
30		6	0.007	
40		7	0.008	
50		14	0.017	
25	3.4	12	0.014	
25	4.2	6	0.007	

8PSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	Hz	ppm	ppm
-30		7	0.008	
-20		4	0.005	
-10		4	0.005	
0		-2	-0.002	
10	3.7	11	0.013	
20		6	0.007	2.5
30		14	0.017	
40		-2	-0.002	
50		2	0.002	
25	3.4	6	0.007	
25	4.2	5	0.006	

PCS Band (Part 24E)

GMSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
℃	V_{DC}	Hz	ppm	
-30		18	0.010	
-20		14	0.007	
-10		15	0.008	
0		6	0.003	
10	3.7	9	0.005	
20		10	0.005	Pass
30		14	0.007	
40		12	0.006	
50		14	0.007	
25	3.4	17	0.009	
25	4.2	15	0.008	

8PSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
℃	V_{DC}	Hz	ppm	
-30		14	0.007	
-20		-1	-0.001	
-10		8	0.004	
0		14	0.007	
10	3.7	7	0.004	
20		14	0.007	Pass
30		4	0.002	
40		2	0.001	
50		11	0.006	
25	3.4	12	0.006	
25	4.2	2	0.001	

WCDMA Band II: R99

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	V_{DC}	Hz	ppm	
-30		-1	-0.001	
-20		-10	-0.005	
-10		-9	-0.005	
0		4	0.002	
10	3.7	-11	-0.006	
20		-7	-0.004	Pass
30		-1	-0.001	
40		-7	-0.004	
50		-11	-0.006	
25	3.4	-6	-0.003	
25	4.2	-6	-0.003	

WCDMA Band Ⅴ: R99

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	Hz	ppm	ppm
-30		2	0.002	
-20		2	0.002	
-10		-13	-0.016	
0		2	0.002	
10	3.7	-7	-0.008	
20		-13	-0.016	2.5
30		-9	-0.011	
40		-3	-0.004	
50		-7	-0.008	
25	3.4	-10	-0.012	
25	4.2	-4	-0.005	

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	Hz	ppm	
-30		0.48	0.0003	
-20		4.80	0.0026	
-10		3.60	0.0019	
0		-1.01	-0.0005	
10	3.7	-2.65	-0.0014	
20		1.32	0.0007	Pass
30		4.10	0.0022	
40		8.25	0.0044	
50		-2.70	-0.0014	
25	3.4	-5.57	-0.0030	
25	4.2	-7.30	-0.0039	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	Hz	ppm	
-30		2.60	0.0010	
-20		-1.47	-0.0006	
-10		-2.80	-0.0011	
0		-4.40	-0.0017	
10	3.7	-6.71	-0.0026	
20		8.03	0.0032	Pass
30		11.36	0.0045	
40		-9.37	-0.0037	
50		-5.29	-0.0021	
25	3.4	10.08	0.0040	
25	4.2	13.76	0.0054	

LTE Band 4:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30		1710.480000	1754.530000	1710	1755
-20		1710.620000	1754.270000	1710	1755
-10		1710.460000	1754.670000	1710	1755
0		1710.380000	1754.860000	1710	1755
10	3.7	1710.520000	1754.520000	1710	1755
20		1710.480000	1754.480000	1710	1755
30		1710.750000	1754.610000	1710	1755
40		1710.250000	1754.380000	1710	1755
50		1710.370000	1754.750000	1710	1755
25	3.4	1710.460000	1754.690000	1710	1755
25	4.2	1710.860000	1754.380000	1710	1755

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30		1710.380000	1754.680000	1710	1755
-20		1710.150000	1754.280000	1710	1755
-10		1710.340000	1754.760000	1710	1755
0		1710.460000	1754.280000	1710	1755
10	3.7	1710.520000	1754.480000	1710	1755
20		1710.380000	1754.870000	1710	1755
30		1710.460000	1754.680000	1710	1755
40		1710.670000	1754.380000	1710	1755
50		1710.380000	1754.760000	1710	1755
25	3.4	1710.470000	1754.670000	1710	1755
25	4.2	1710.670000	1754.810000	1710	1755

LTE Band 5:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 836.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	**Hz**	**ppm**	**ppm**
-30	3.7	6.70	0.0026	2.5
-20		0.76	0.0003	
-10		5.80	0.0023	
0		3.00	0.0012	
10		-5.24	-0.0021	
20		-1.53	-0.0006	
30		1.84	0.0007	
40		-3.59	-0.0014	
50		-3.17	-0.0013	
25	3.4	7.48	0.0030	
25	4.2	11.23	0.0044	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =836.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	**Hz**	**ppm**	**ppm**
-30	3.7	2.15	0.0008	2.5
-20		10.77	0.0042	
-10		-5.11	-0.0020	
0		-3.56	-0.0014	
10		14.73	0.0058	
20		-3.17	-0.0013	
30		1.37	0.0005	
40		1.86	0.0007	
50		-4.07	-0.0016	
25	3.4	-5.13	-0.0020	
25	4.2	-8.95	-0.0035	

LTE Band 12:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_DC	F_L	F_H	F_L	F_H
-30		699.580000	715.580000	699	716
-20		699.830000	715.520000	699	716
-10		699.620000	715.480000	699	716
0		699.450000	715.640000	699	716
10	3.7	699.520000	715.440000	699	716
20		699.750000	715.380000	699	716
30		699.480000	715.420000	699	716
40		699.750000	715.580000	699	716
50		699.710000	715.470000	699	716
25	3.4	699.580000	715.670000	699	716
25	4.2	699.460000	715.550000	699	716

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_DC	F_L	F_H	F_L	F_H
-30		699.630000	715.570000	699	716
-20		699.580000	715.470000	699	716
-10		699.480000	715.620000	699	716
0		699.750000	715.380000	699	716
10	3.7	699.520000	715.440000	699	716
20		699.560000	715.680000	699	716
30		699.480000	715.460000	699	716
40		699.380000	715.680000	699	716
50		699.740000	715.280000	699	716
25	3.4	699.840000	715.780000	699	716
25	4.2	699.610000	715.640000	699	716

LTE Band 17:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30		704.530000	715.470000	704	716
-20		704.550000	715.410000	704	716
-10		704.560000	715.510000	704	716
0		704.580000	715.550000	704	716
10	3.7	704.520000	715.440000	704	716
20		704.640000	715.580000	704	716
30		704.620000	715.540000	704	716
40		704.690000	715.480000	704	716
50		704.570000	715.530000	704	716
25	3.4	704.580000	715.510000	704	716
25	4.2	704.640000	715.570000	704	716

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30		704.550000	715.520000	704	716
-20		704.580000	715.480000	704	716
-10		704.620000	715.420000	704	716
0		704.670000	715.590000	704	716
10	3.7	704.520000	715.480000	704	716
20		704.580000	715.630000	704	716
30		704.520000	715.420000	704	716
40		704.640000	715.380000	704	716
50		704.530000	715.450000	704	716
25	3.4	704.680000	715.520000	704	716
25	4.2	704.620000	715.480000	704	716

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 *****