



TESTING LABORATORY
CERTIFICATE #4820.01



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

For

MFOURTEL MEXICO S.A. DE C.V.

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FCC ID: CLNM4CONNECT1-L

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		M4 Connect 1-L
EUT Model:		M4 Connect 1-L
FCC ID:		CLNM4CONNECT1-L
Rated Input Voltage:		12 VDC from adapter
Adapter Information	Model:	RD1201000-C55-91MG
	Input:	100-240VAC~50/60Hz 0.5A
	Output:	DC 12V, 1A
External Dimension:		115mm(L)*118.5mm(W)*46mm(H)
Serial Number:		181114008
EUT Received Date:		2018.11.22

Objective

This report is prepared on behalf of **MFOURTEL MEXICO S.A. DE C.V.** 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: CLNM4CONNECT1-L.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services
Part 27 – Miscellaneous wireless communications services

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

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

Measurement Uncertainty

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

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

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

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D 2010.

The test items were performed with the EUT operating at testing mode. The device supports WCDMA/HSUPA/HPDPA/HSPA+/DC-HSDPA Band 2 and band 5, LTE band 4.

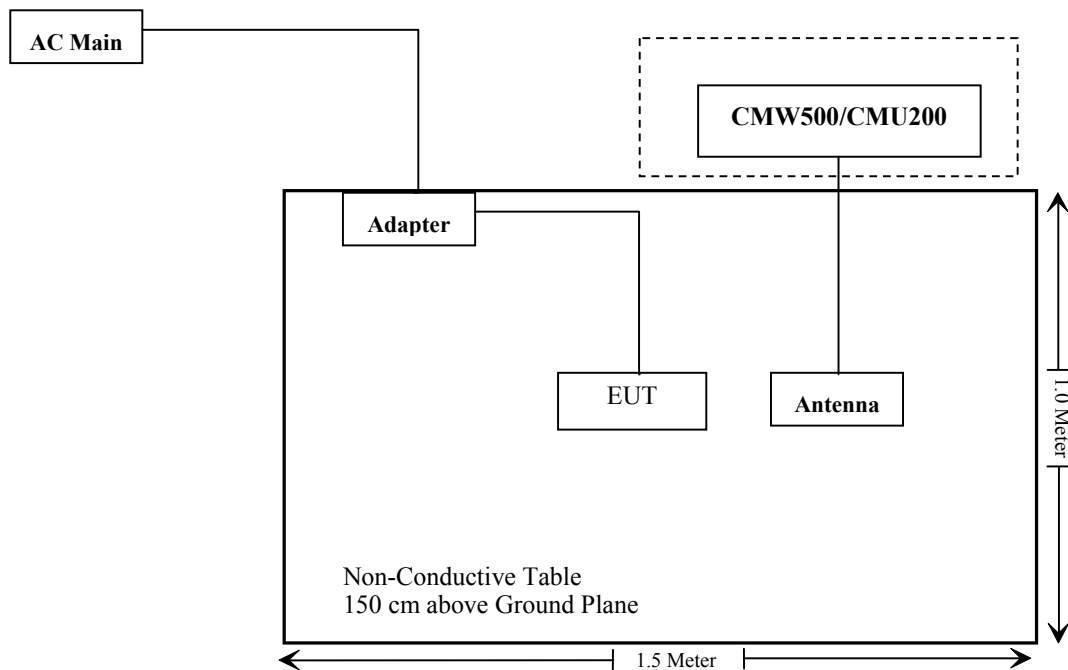
Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	106 891
R&S	Wideband Radio Communication Tester	CMW500	147473
N/A	ANTENNA	N/A	N/A

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1091	Maximum Permissible Exposure	Compliance
§2.1046; § 22.913 (a); § 24.232 (c); §27.50	RF Output Power	Compliance
§ 2.1047(d)	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

§1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
WLAN	2412-2462	4	2.51	25	316.23	20.00	0.16	1.0
WCDMA band 2	1850-1910	3	2.00	23	199.53	20.00	0.08	1.0
WCDMA Band 5	824-849	2.5	1.78	23	199.53	20.00	0.07	0.55
LTE band 4	1710-1755	3	2.00	23	199.53	20.00	0.08	1.0

The WLAN and WWAN can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$=S_{WLAN}/S_{limit-WLAN} + S_{WWAN}/S_{limit-WWAN}$$

$$=0.16/1+0.07/0.55$$

$$=0.29$$

$$< 1.0$$

Result: The device meet FCC MPE at 20 cm distance

FCC §2.1047(d) - 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

WCDMA-Release 99

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c / β_d	8/15

WCDMA HSDPA

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c / β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	$A_{hs} = \beta_{hs} / \beta_c$	30/15			

WCDMA HSUPA

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

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

HSPA+

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

Sub-test	β_c (Note 3)	β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.

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

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

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

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

DC-HSDPA

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

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

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

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
64 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	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
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	23 ¹	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
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
R&S	Universal Radio Communication Tester	CMU200	106 891	2017-12-14	2018-12-14
Agilent	Signal Generator	E8247C	MY43321350	2017-12-11	2018-12-11
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

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

Test Data**Environmental Conditions**

Temperature:	25.8 °C
Relative Humidity:	39 ~ 45 %
ATM Pressure:	100.2 ~ 100.5 kPa

* The testing was performed by Tyler Pan & Vern Shen on 2018-11-27 & 2018-11-29.

Conducted Output Power**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	22.54	3.04	22.21	3.04	22.49	3.04
HSDPA	1	20.81	3.80	20.54	3.40	20.72	4.16
	2	20.76	3.77	20.51	3.39	20.66	4.11
	3	20.73	3.84	20.44	3.33	20.53	3.98
	4	20.69	3.81	20.36	3.41	20.42	3.93
HSUPA	1	20.76	3.32	20.48	3.72	20.67	3.96
	2	20.73	3.36	20.39	3.68	20.55	3.81
	3	20.61	3.31	20.28	3.73	20.49	3.88
	4	20.55	3.44	20.21	3.66	20.38	3.92
DC-HSDPA	1	20.46	3.29	20.18	3.39	20.33	3.76
	2	20.78	3.71	20.51	3.38	20.68	4.02
	3	20.63	3.77	20.44	3.33	20.55	3.94
	4	20.55	3.74	20.37	3.29	20.43	3.89
HSPA+ (16QAM)	1	20.35	3.73	20.26	3.31	20.34	3.88
	1	20.71	3.77	20.42	3.46	20.61	3.91

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	22.36	3.12	21.41	3.16	22.27	3.20
HSDPA	1	21.81	3.84	20.88	3.76	21.73	3.76
	2	21.77	3.81	20.73	3.71	21.65	3.71
	3	21.69	3.78	20.65	3.78	21.54	3.69
	4	21.58	3.77	20.52	3.69	21.42	3.66
HSUPA	1	21.68	3.92	20.79	3.80	21.61	3.44
	2	21.55	3.81	20.71	3.78	21.48	3.41
	3	21.48	3.88	20.68	3.76	21.37	3.39
	4	21.43	3.82	20.56	3.81	21.26	3.44
DC-HSDPA	1	21.36	3.87	20.43	3.77	21.22	3.46
	2	21.77	3.77	20.81	3.73	21.68	3.71
	3	21.56	3.72	20.72	3.79	21.53	3.73
	4	21.44	3.69	20.59	3.64	21.44	3.71
HSPA+ (16QAM)	1	21.36	3.71	20.42	3.68	21.26	3.68
	1	21.63	3.66	20.74	3.61	21.58	3.66

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	22.39	22.55	22.34
		RB1#3	21.92	21.20	21.27
		RB1#5	21.92	21.18	21.21
		RB3#0	21.88	21.13	21.28
		RB3#3	21.85	21.23	21.23
		RB6#0	20.98	20.22	20.35
	16QAM	RB1#0	21.15	20.19	20.44
		RB1#3	21.15	20.30	20.42
		RB1#5	21.19	20.30	20.39
		RB3#0	21.02	20.33	20.63
		RB3#3	21.01	20.44	20.60
		RB6#0	20.19	19.56	19.77
3MHz	QPSK	RB1#0	21.93	21.38	21.49
		RB1#8	21.80	21.30	21.35
		RB1#14	21.74	21.33	21.39
		RB6#0	20.98	20.26	20.45
		RB6#9	20.96	20.37	20.46
		RB15#0	21.01	20.33	20.49
	16QAM	RB1#0	21.59	20.45	20.68
		RB1#8	21.56	20.50	20.49
		RB1#14	21.52	20.57	20.53
		RB6#0	20.24	19.63	19.77
		RB6#9	20.23	19.74	19.77
		RB15#0	20.29	19.65	19.89
5MHz	QPSK	RB1#0	22.00	21.40	21.58
		RB1#13	21.79	21.31	21.40
		RB1#24	21.67	21.35	21.32
		RB15#0	20.98	20.26	20.66
		RB15#10	20.87	20.34	20.51
		RB25#0	20.94	20.35	20.51
	16QAM	RB1#0	20.98	20.59	20.82
		RB1#13	20.86	20.62	20.57
		RB1#24	20.76	20.71	20.53
		RB15#0	20.19	19.56	19.92
		RB15#10	20.09	19.65	19.90
		RB25#0	20.18	19.69	19.91

10MHz	QPSK	RB1#0	21.93	21.30	21.90
		RB1#25	21.50	21.23	21.52
		RB1#49	21.44	21.42	21.37
		RB25#0	20.83	20.27	20.91
		RB25#25	20.65	20.37	20.63
		RB50#0	20.67	20.36	20.65
	16QAM	RB1#0	21.53	20.38	21.03
		RB1#25	21.25	20.43	20.73
		RB1#49	21.15	20.73	20.51
		RB25#0	20.06	19.65	20.18
		RB25#25	19.94	19.75	19.99
		RB50#0	19.87	19.74	19.90
15MHz	QPSK	RB1#0	21.90	21.36	21.47
		RB1#38	21.39	21.18	21.71
		RB1#74	21.31	21.33	21.33
		RB36#0	20.64	20.21	20.80
		RB36#39	20.44	20.37	20.66
		RB75#0	20.60	20.39	20.71
	16QAM	RB1#0	21.48	20.44	21.03
		RB1#38	21.14	20.40	21.30
		RB1#74	21.01	20.65	20.87
		RB36#0	19.84	19.58	19.98
		RB36#39	19.82	19.73	19.85
		RB75#0	19.86	19.78	19.89
20MHz	QPSK	RB1#0	21.49	20.87	20.77
		RB1#50	21.35	21.18	21.55
		RB1#99	20.86	21.11	20.93
		RB50#0	20.44	20.27	20.44
		RB50#50	20.33	20.41	20.62
		RB100#0	20.38	20.40	20.54
	16QAM	RB1#0	20.74	20.03	20.43
		RB1#50	20.69	20.48	21.45
		RB1#99	20.23	20.51	20.65
		RB50#0	19.60	19.51	19.62
		RB50#50	19.69	19.66	19.83
		RB100#0	19.74	19.76	19.74

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	5.12	5.44	4.04	13
	100 RB		6.20	6.40	6.40	13
16QAM	1 RB	20 MHz	5.88	5.72	5.04	13
	100 RB		7.08	7.16	7.08	13

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

ERP & EIRP

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 Middle Channel								
836.60	H	95.16	20.24	0.00	0.97	19.27	38.45	19.18
836.60	V	96.35	24.56	0.00	0.97	23.59	38.45	14.86
WCDMA Band II Middle Channel								
1880.00	H	82.78	10.17	11.66	2.66	19.17	33.00	13.83
1880.00	V	81.53	9.06	11.66	2.66	18.06	33.00	14.94

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 4

Frequency (MHz)	BW (MHz)	Modulation	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)			
1732.50	1.40	QPSK	V	88.65	14.60	10.90	2.51	22.99	30.00	7.01
1732.50			H	89.83	15.46	10.90	2.51	23.85	30.00	6.15
1732.50	3.00		V	88.7	14.65	10.90	2.51	23.04	30.00	6.96
1732.50			H	89.93	15.56	10.90	2.51	23.95	30.00	6.05
1732.50	5.00		V	88.74	14.69	10.90	2.51	23.08	30.00	6.92
1732.50			H	89.81	15.44	10.90	2.51	23.83	30.00	6.17
1732.50	10.00		V	88.2	14.15	10.90	2.51	22.54	30.00	7.46
1732.50			H	89.24	14.87	10.90	2.51	23.26	30.00	6.74
1732.50	15.00		V	88.86	14.81	10.90	2.51	23.20	30.00	6.80
1732.50			H	89.97	15.60	10.90	2.51	23.99	30.00	6.01
1732.50	20.00		V	88.29	14.24	10.90	2.51	22.63	30.00	7.37
1732.50			H	90.63	16.26	10.90	2.51	24.65	30.00	5.35
1732.50	1.40	16QAM	V	88.17	14.12	10.90	2.51	22.51	30.00	7.49
1732.50			H	89.42	15.05	10.90	2.51	23.44	30.00	6.56
1732.50	3.00		V	88.31	14.26	10.90	2.51	22.65	30.00	7.35
1732.50			H	89.54	15.17	10.90	2.51	23.56	30.00	6.44
1732.50	5.00		V	88.16	14.11	10.90	2.51	22.50	30.00	7.50
1732.50			H	89.49	15.12	10.90	2.51	23.51	30.00	6.49
1732.50	10.00		V	88.27	14.22	10.90	2.51	22.61	30.00	7.39
1732.50			H	89.68	15.31	10.90	2.51	23.70	30.00	6.30
1732.50	15.00		V	88.57	14.52	10.90	2.51	22.91	30.00	7.09
1732.50			H	89.85	15.48	10.90	2.51	23.87	30.00	6.13
1732.50	20.00		V	88.67	14.62	10.90	2.51	23.01	30.00	6.99
1732.50			H	89.95	15.58	10.90	2.51	23.97	30.00	6.03

Note:

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

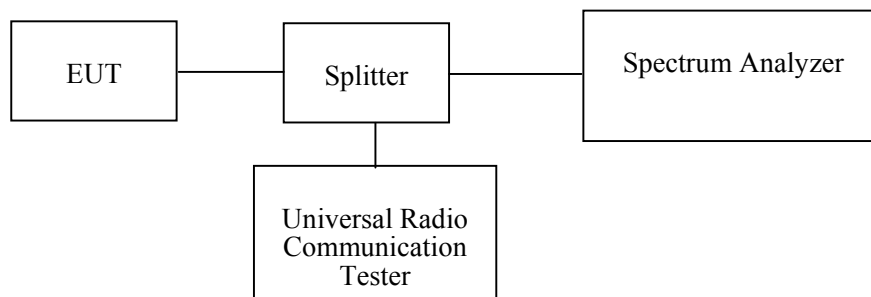
FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH**Applicable Standard**

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

Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The 26 dB & 99% bandwidth was recorded.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

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

Test Data**Environmental Conditions**

Temperature:	25.5~26.4°C
Relative Humidity:	43 ~ 51 %
ATM Pressure:	99.9~100.7 kPa

The testing was performed by Andy Huang from 2018-11-24 to 2018-12-24.

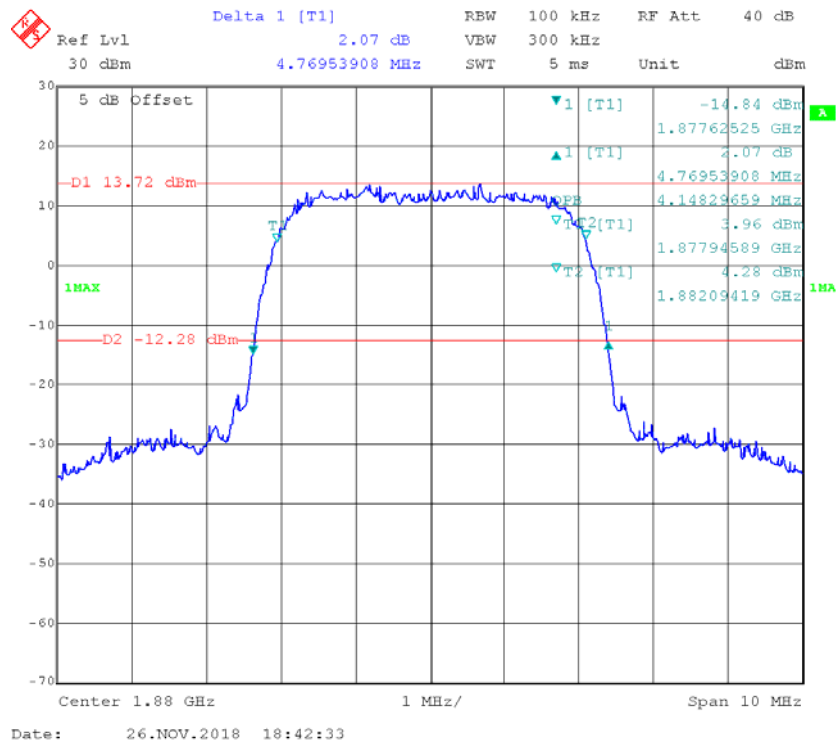
Test Mode: Transmitting

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

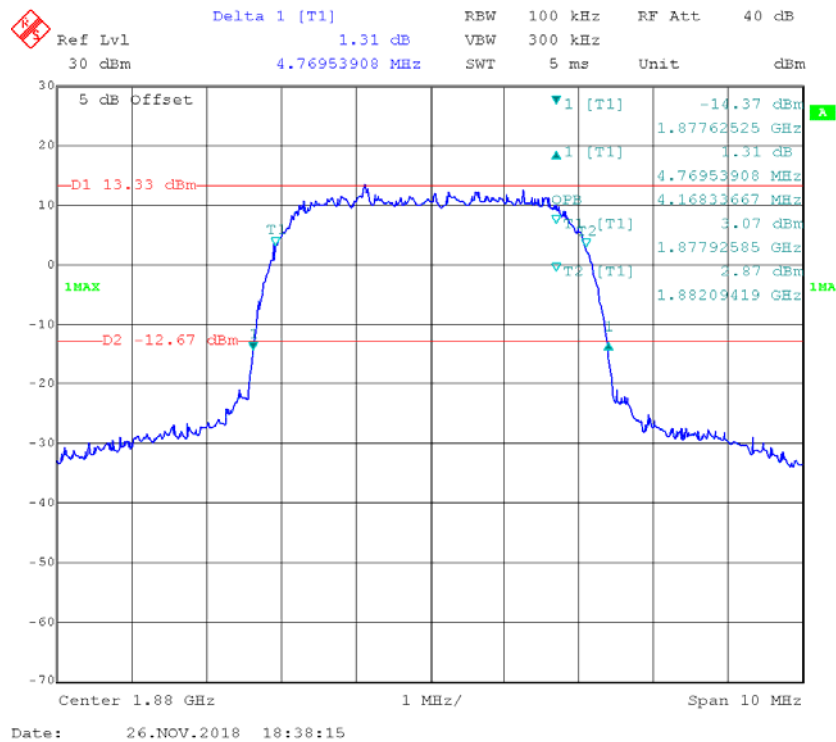
Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
WCDMA Band II	M	Rel 99	4.148	4.770
		HSDPA	4.148	4.770
		HSUPA	4.168	4.770
WCDMA Band V		Rel 99	4.148	4.770
		HSDPA	4.128	4.749
		HSUPA	4.128	4.770

Band	Test Channel	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 4	M	1.4 MHz	QPSK	1.148	1.810
			16QAM	1.190	1.828
		3 MHz	QPSK	2.705	3.210
			16QAM	2.717	3.451
		5 MHz	QPSK	4.569	5.531
			16QAM	4.569	5.531
		10 MHz	QPSK	9.018	10.501
			16QAM	9.018	10.301
		15 MHz	QPSK	13.647	16.323
			16QAM	13.527	16.353
		20 MHz	QPSK	18.036	21.323
			16QAM	18.036	21.082

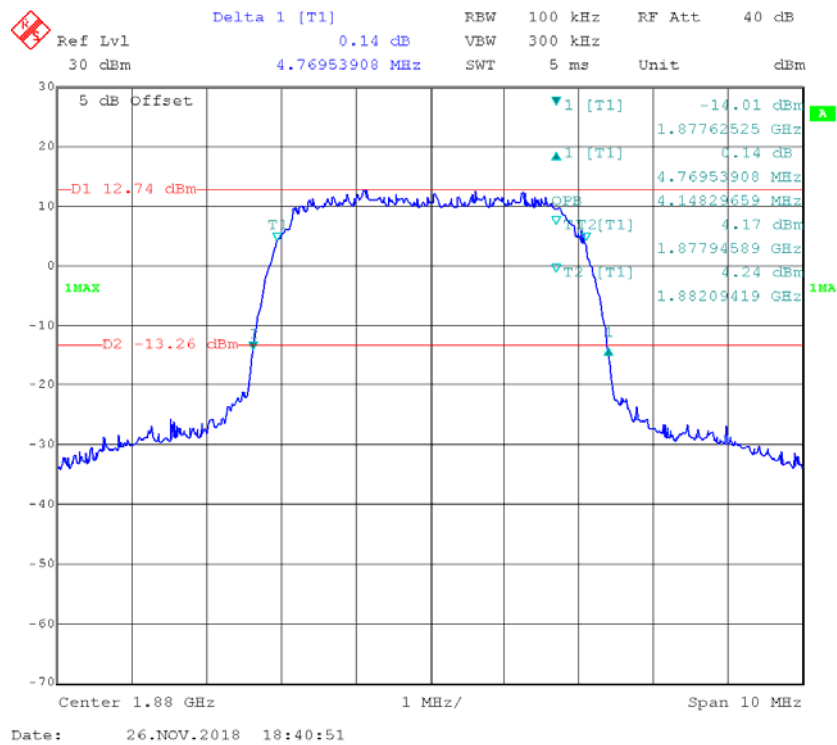
WCDMA Band II, Rel 99



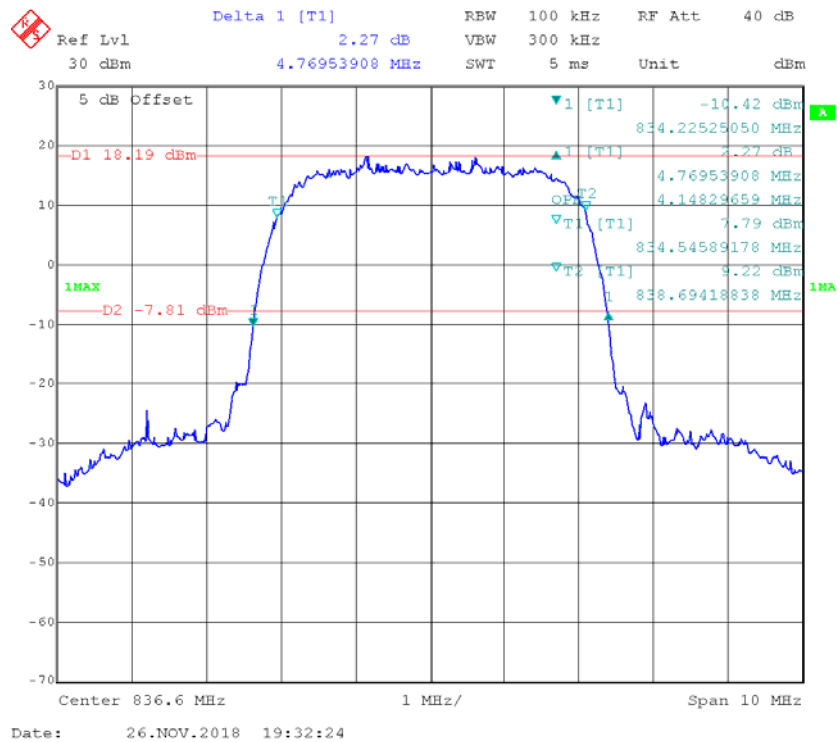
WCDMA Band II, HSUPA

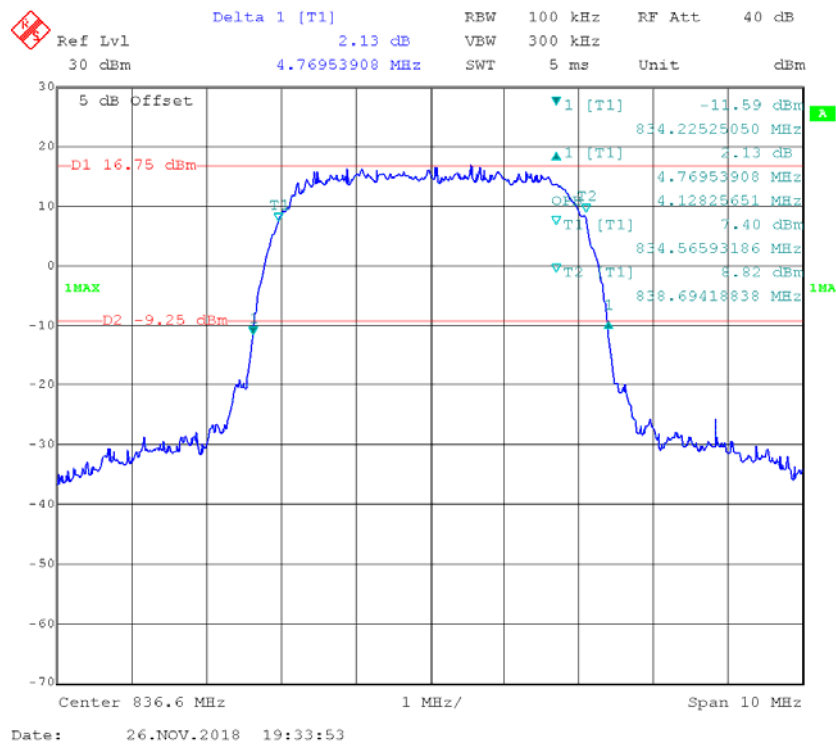
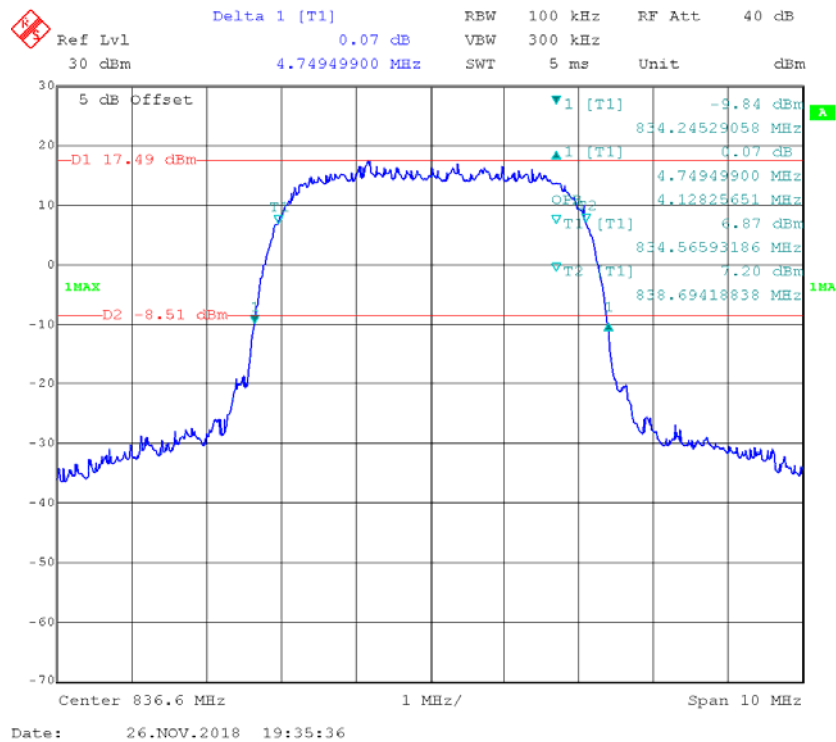


WCDMA Band II, HSDPA



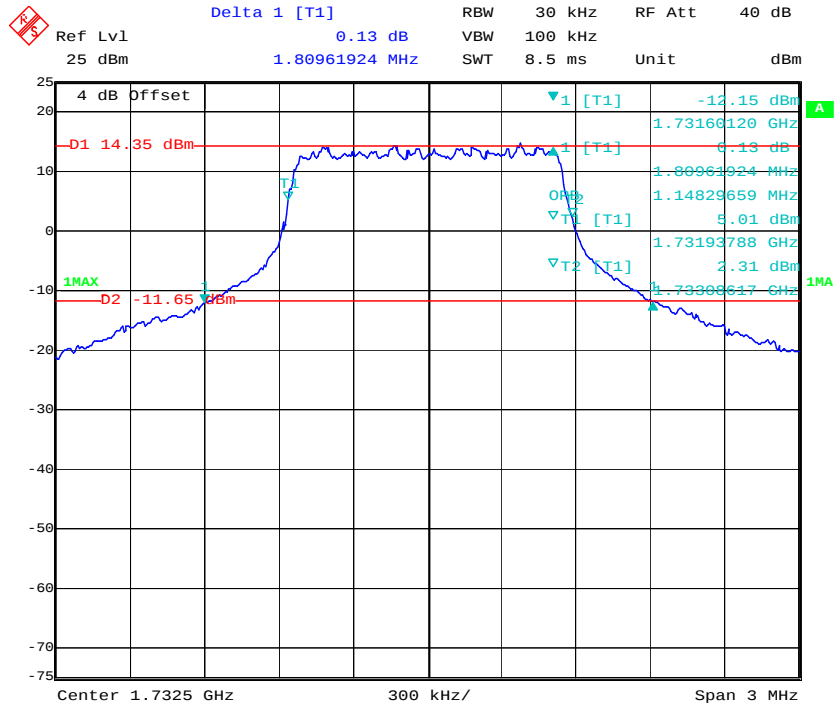
WCDMA Band V, Rel 99



WCDMA Band V, HSUPA**WCDMA Band V, HSDPA**

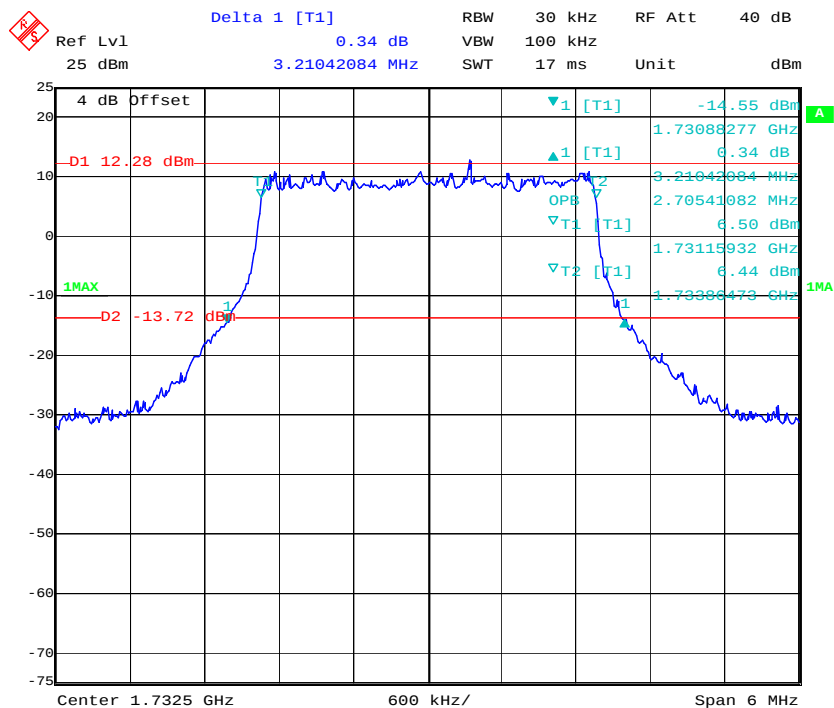
LTE Band 4

QPSK_1.4 MHz



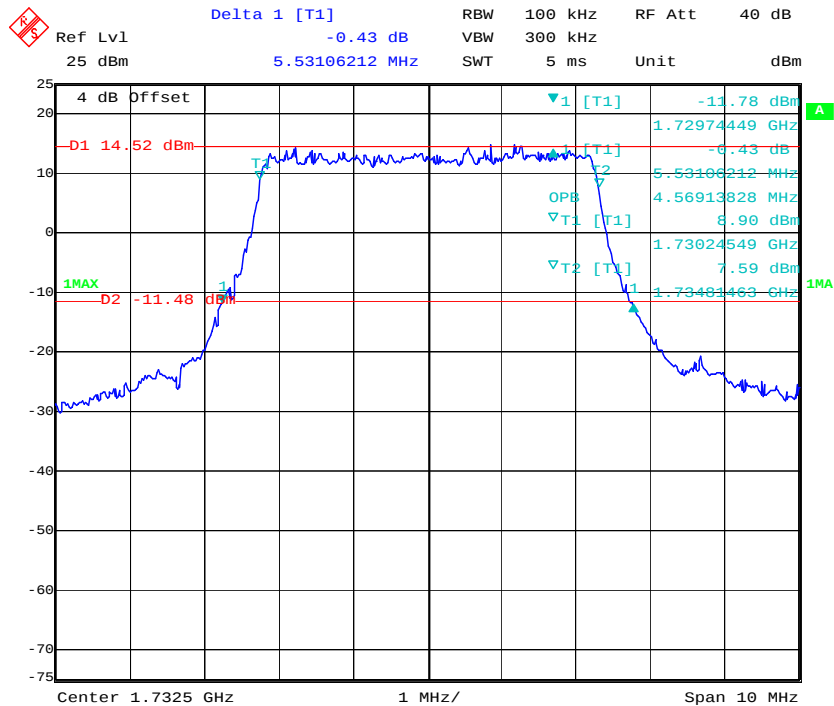
Date: 24.NOV.2018 16:46:49

QPSK_3 MHz



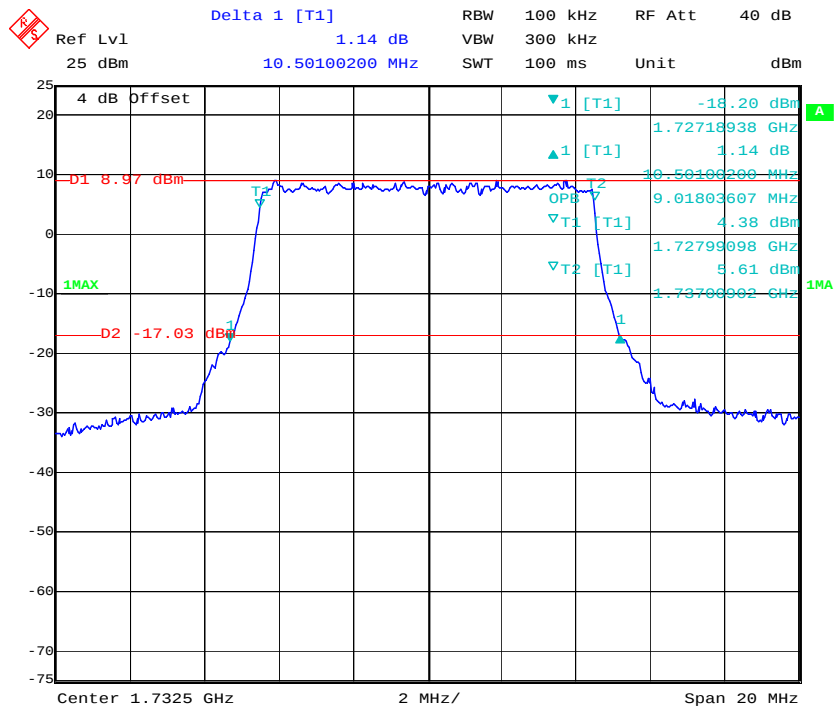
Date: 24.NOV.2018 16:56:08

QPSK_5 MHz



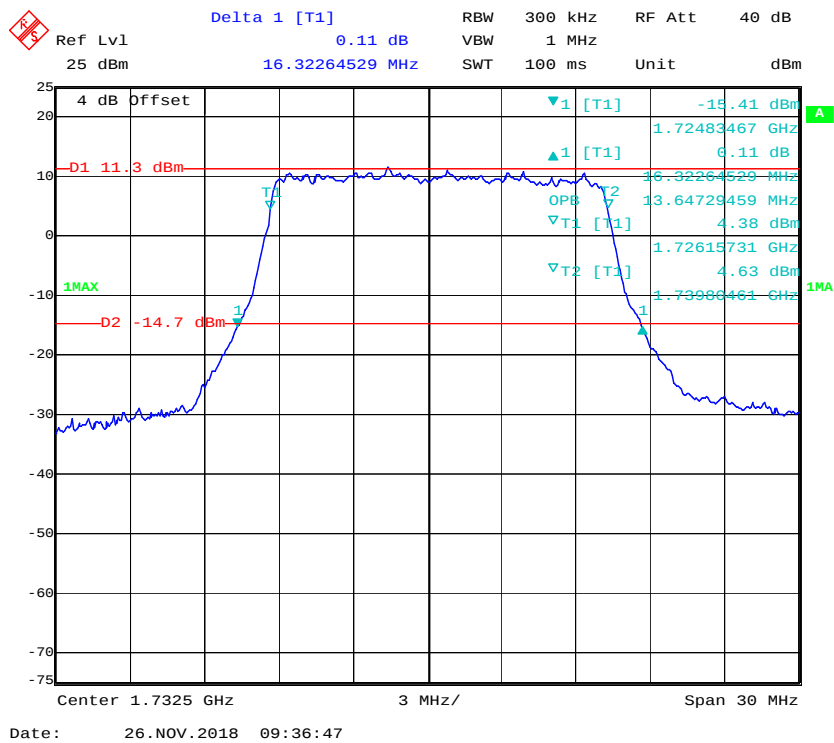
Date: 24.NOV.2018 17:06:06

QPSK_10 MHz

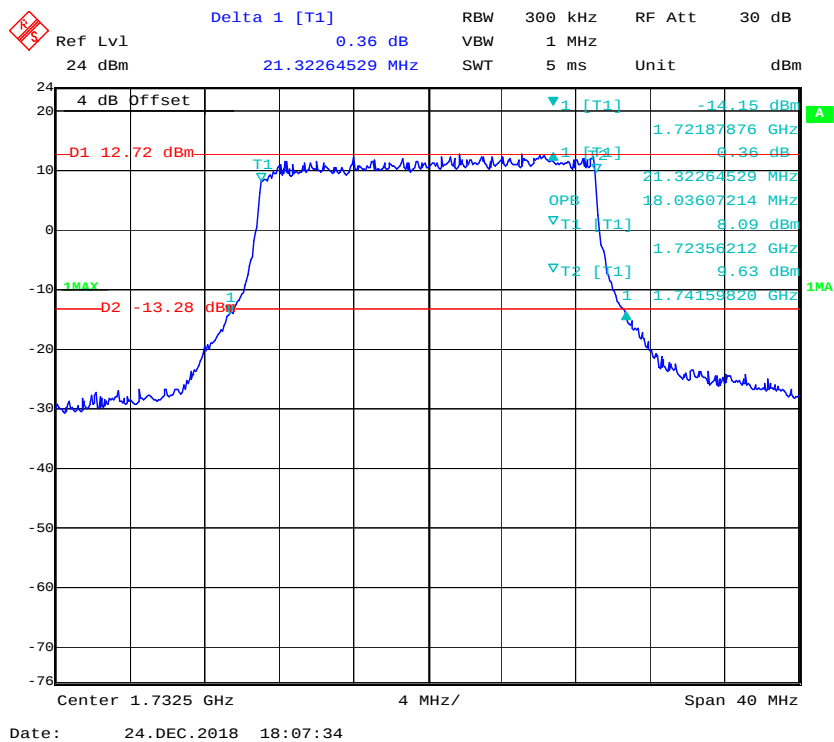


Date: 26.NOV.2018 09:30:30

QPSK_15 MHz



QPSK_20 MHz



[illegible]

The screenshot displays a spectrum analyzer interface with a blue signal trace. The y-axis represents power in dBm, ranging from -75 to 25. The x-axis represents frequency in GHz, centered at 1.7325 GHz with a 600 kHz span.

Parameters:

- Ref Lvl: 25 dBm
- Delta 1 [T1]: 0.60 dB
- RBW: 30 kHz
- VBW: 100 kHz
- SWT: 17 ms
- RF Att: 40 dB
- Unit: dBm

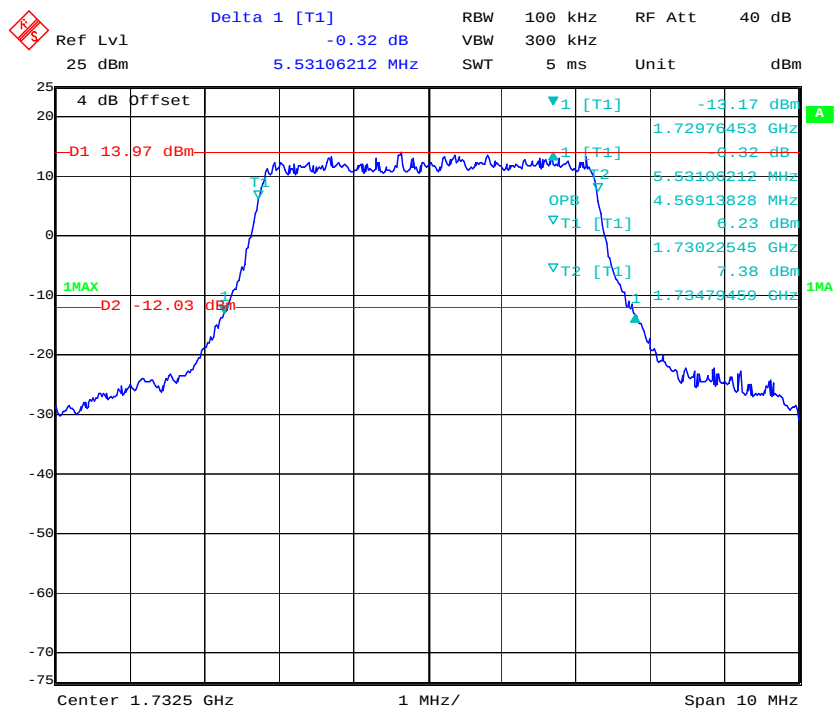
Measurements:

- D1: 10.67 dBm
- D2: -15.3 dBm
- OPB [2]: 2.71743487 MHz
- T1 [T1]: 5.74 dBm
- T2 [T1]: 3.71 dBm
- 1MAX: -15.3 dBm
- 1MA: -15.3 dBm
- 1: 1.73083467 GHz
- 2: 1.73115932 GHz
- 3: 1.73307675 GHz

Other Labels:

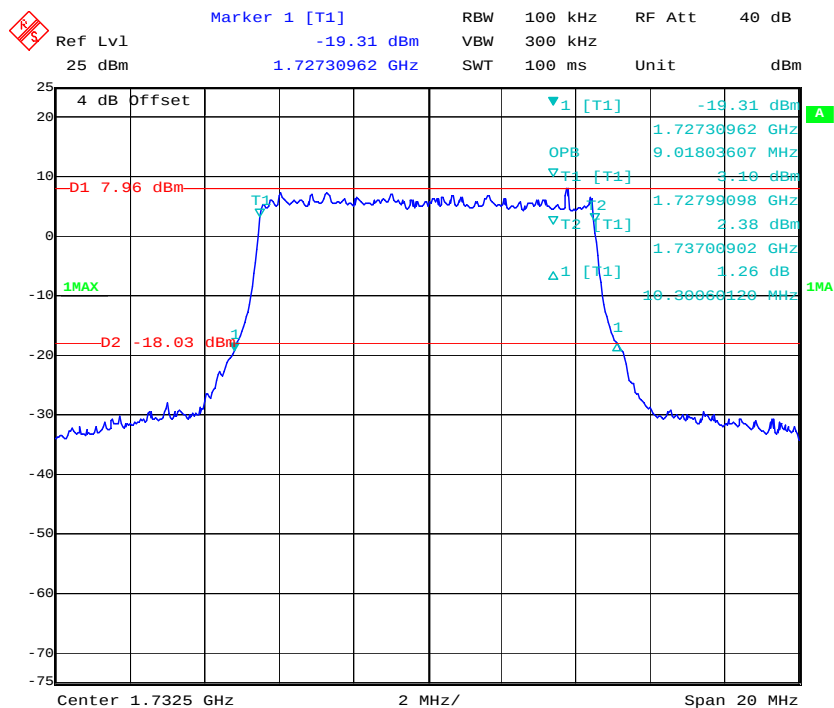
- 4 dB Offset
- Center 1.7325 GHz
- Span 6 MHz
- Date: 24.NOV.2018 16:57:49

16QAM_5 MHz



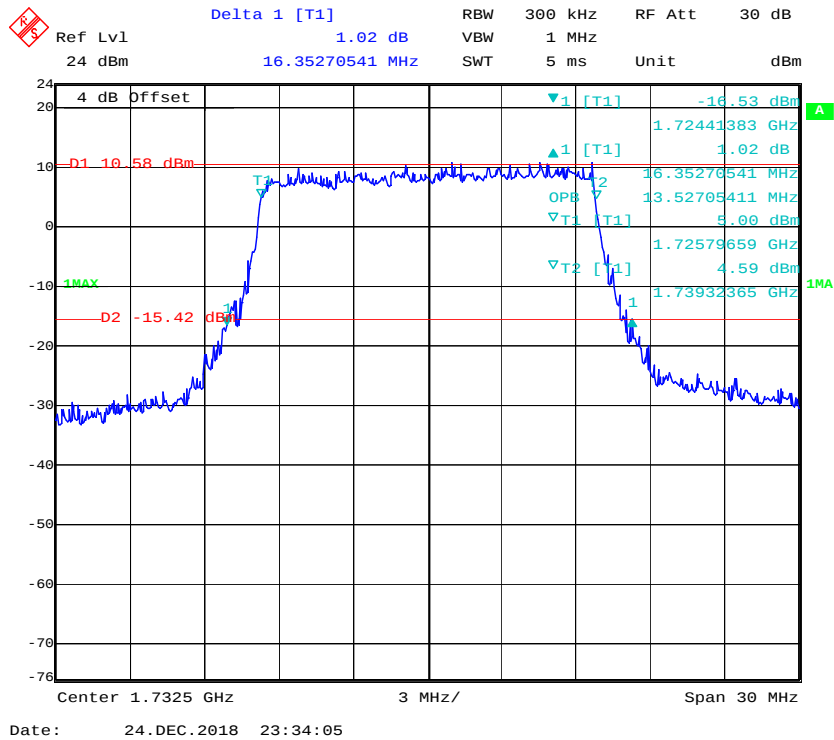
Date: 24.NOV.2018 17:07:32

16QAM_10 MHz

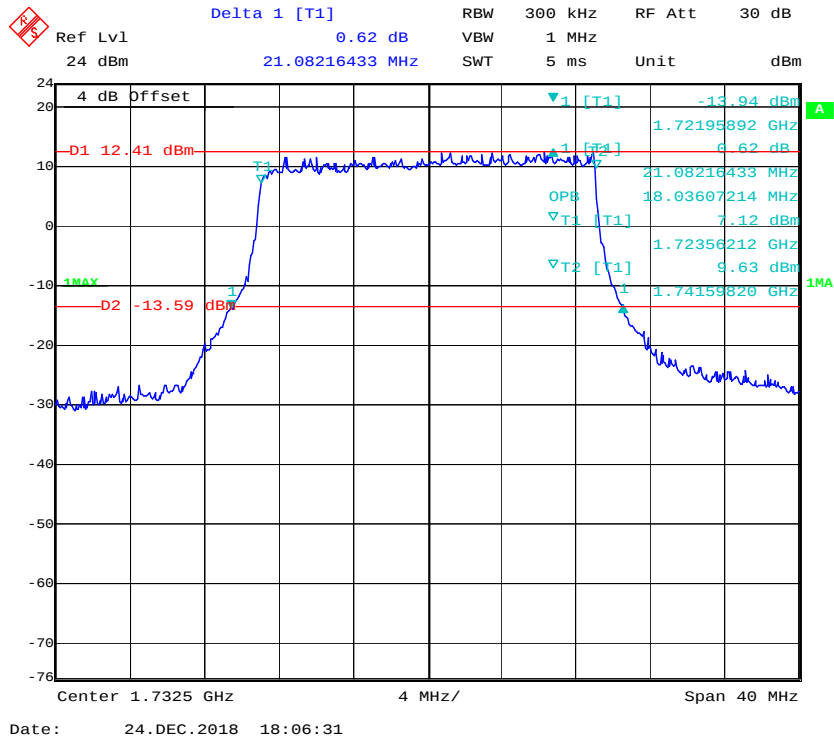


Date: 26.NOV.2018 09:32:07

16QAM_15 MHz



16QAM_20 MHz



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

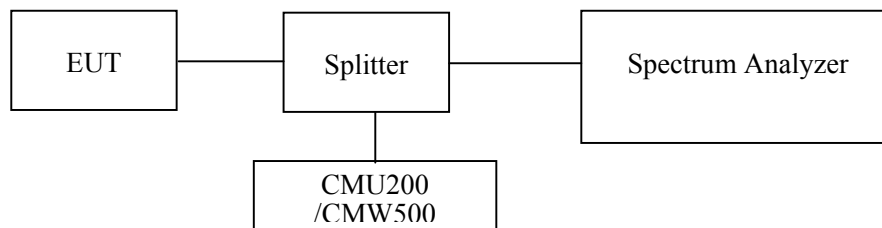
Applicable Standard

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

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

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

Test Data

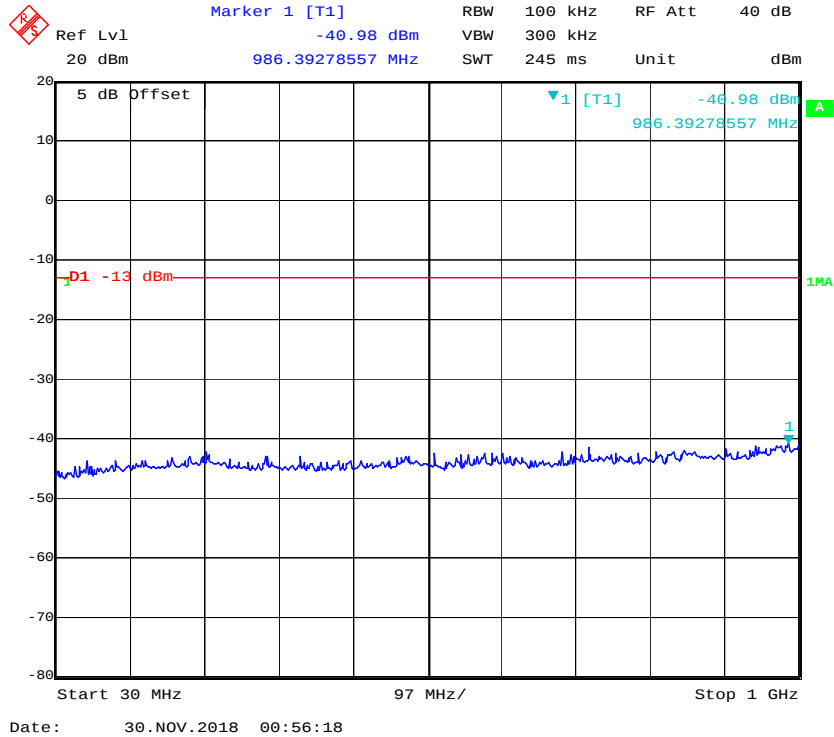
Environmental Conditions

Temperature:	25.4~25.5°C
Relative Humidity:	50 ~ 53 %
ATM Pressure:	99.9~100.5 kPa

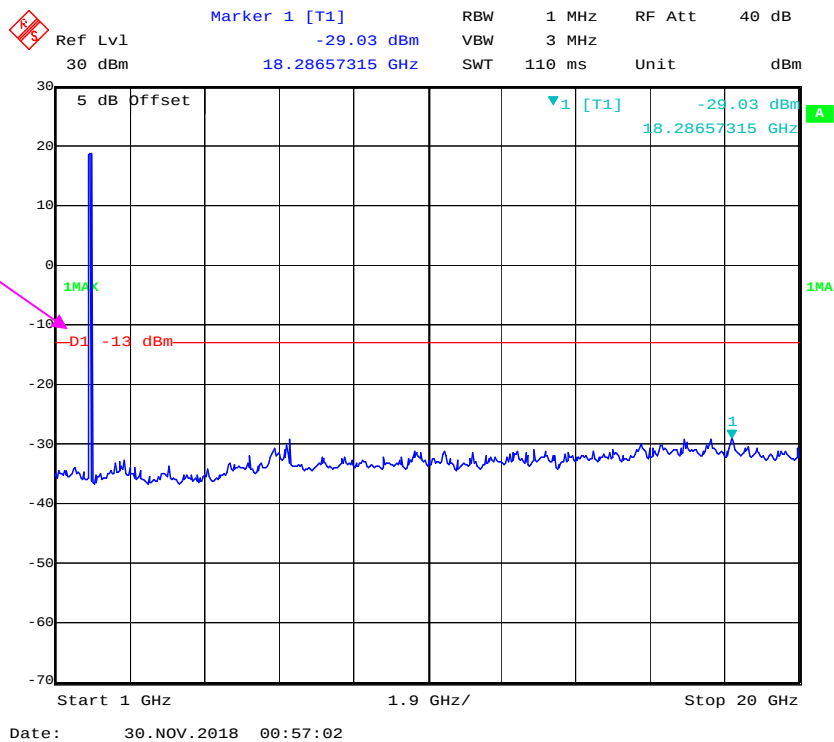
The testing was performed by Andy Huang from 2018-11-26 to 2018-11-30.

Please refer to the following plots.

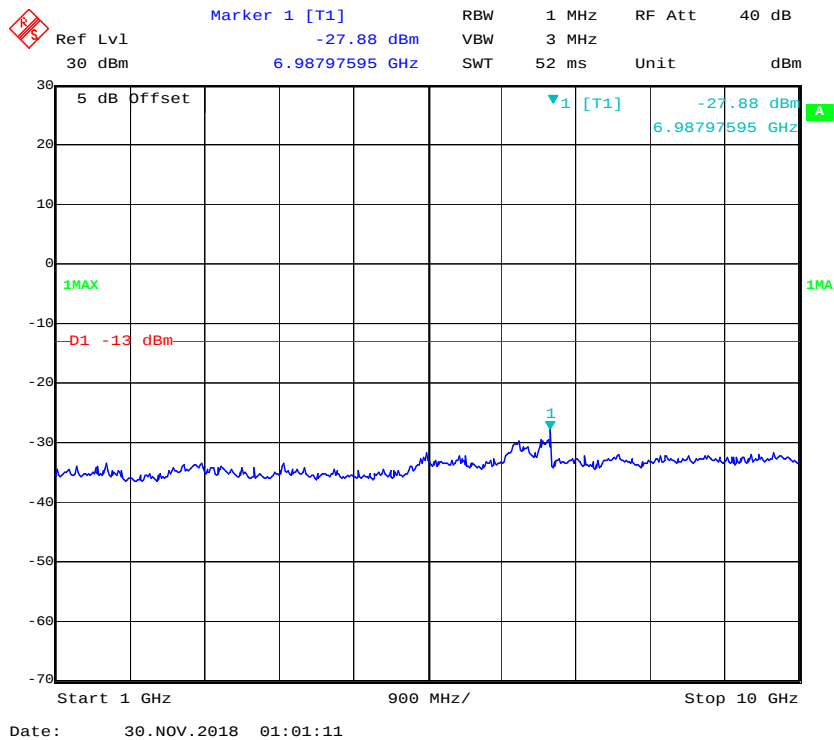
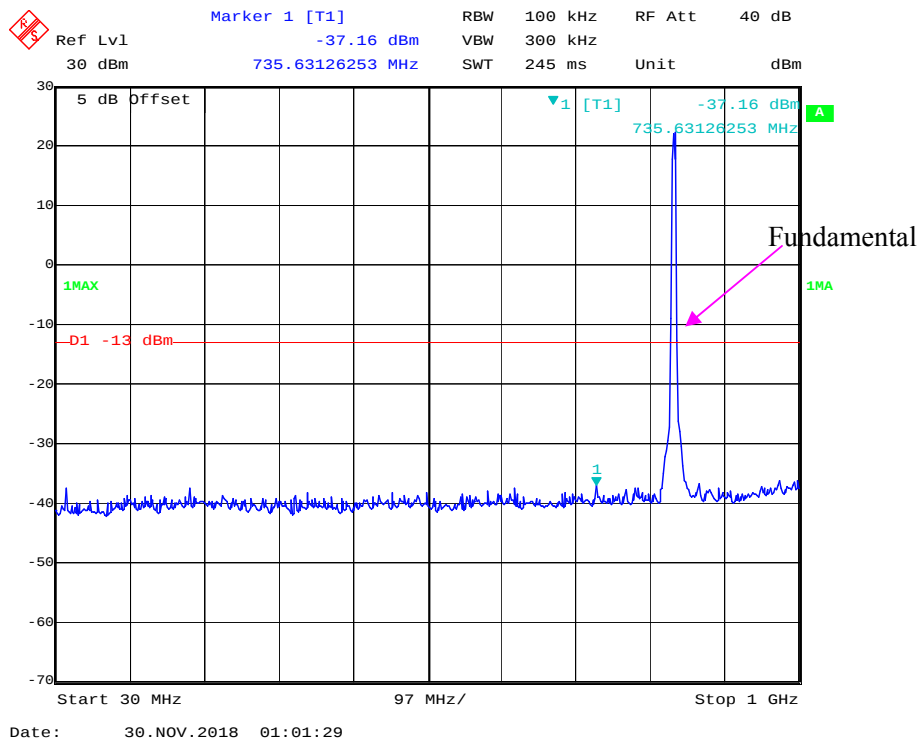
WCDMA Band II middle channel, Rel99



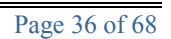
Fundamental



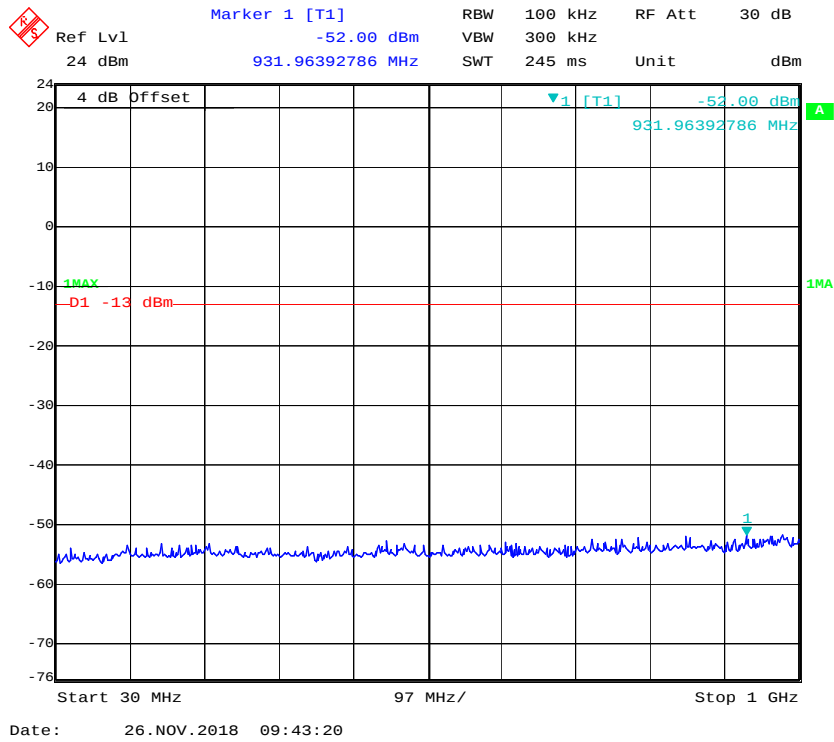
WCDMA Band V middle channel,Rel99



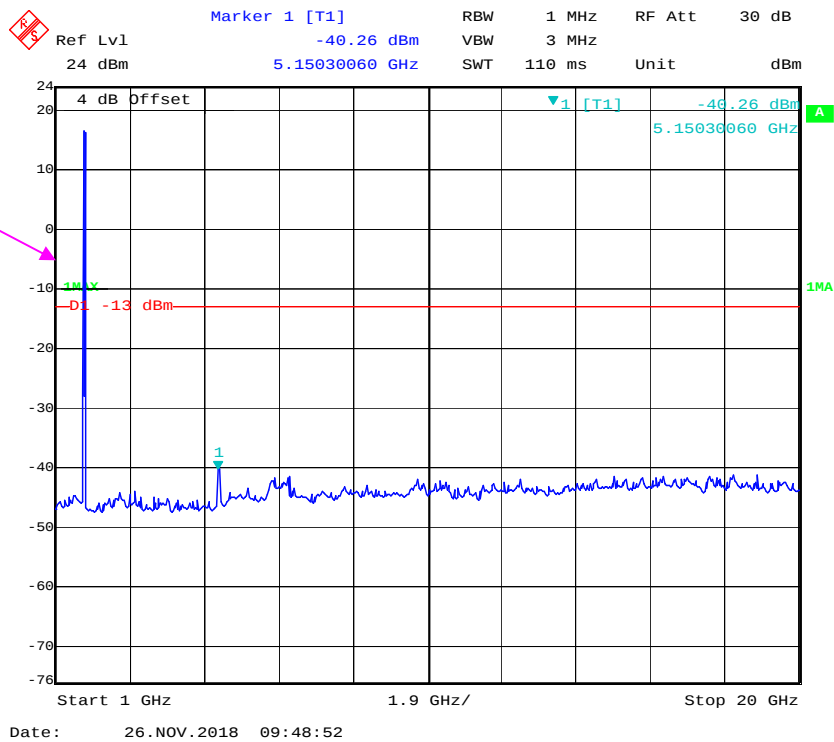
QPSK_1.4 MHz



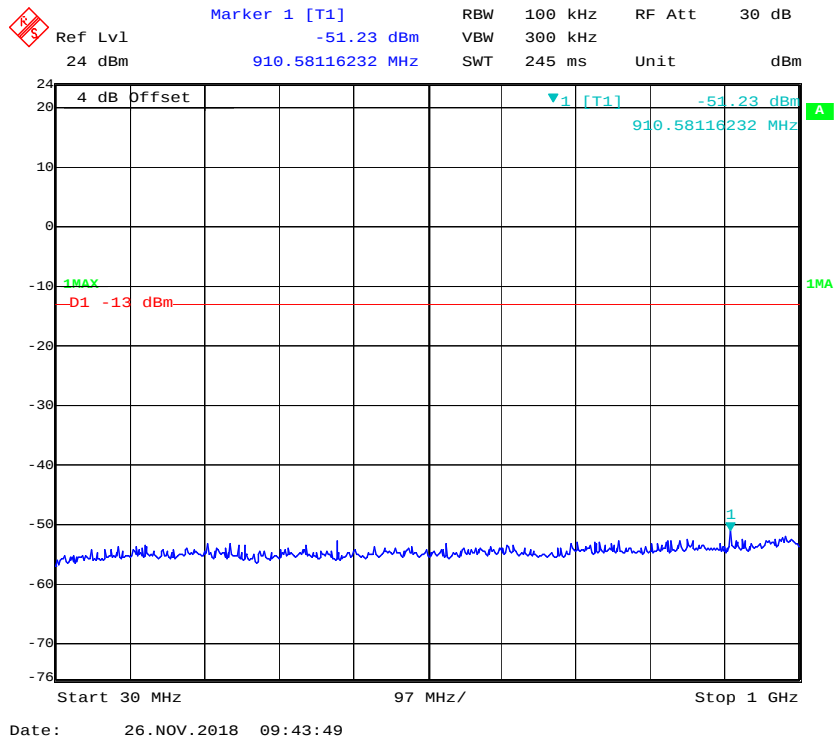
QPSK_3 MHz



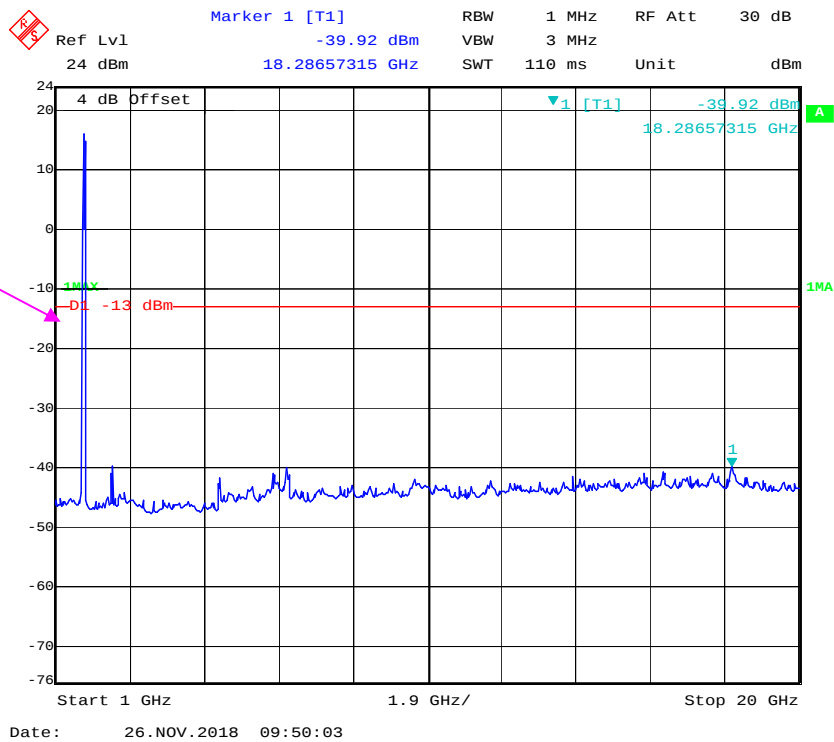
Fundamental



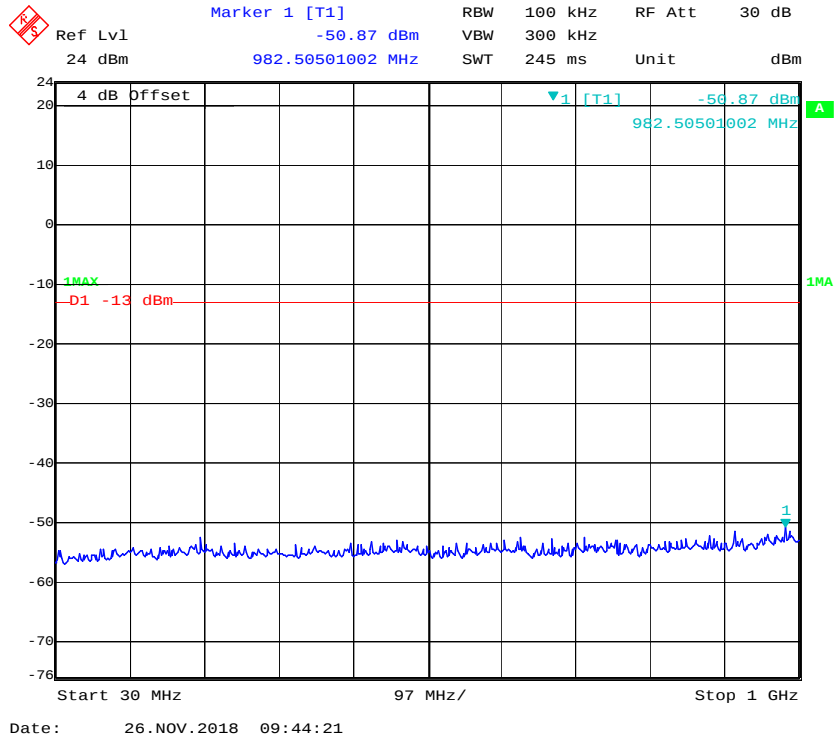
QPSK_10 MHz



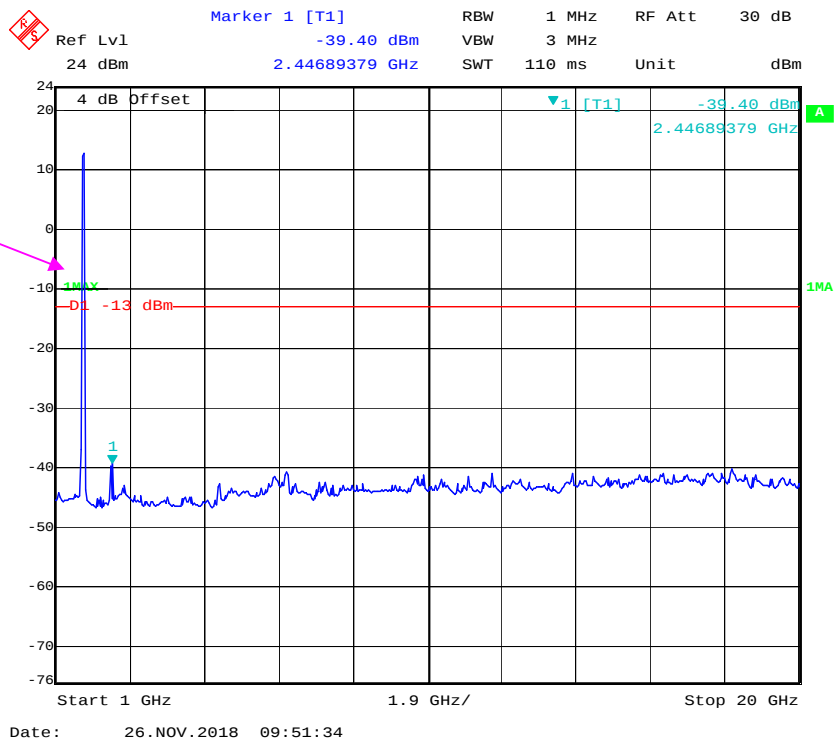
Fundamental



QPSK_20 MHz



Fundamental



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

Applicable Standard

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

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
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	2018-09-05	2019-09-05
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	2018-09-05	2019-09-05
Agilent	Signal Generator	E8247C	MY43321350	2017-12-11	2018-12-11
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	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF2500-2750MS-1439-001	1437001	2018-06-16	2019-06-16
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2016-11-18	2019-11-18

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

Test Data**Environmental Conditions**

Temperature:	24.5~25.8 °C
Relative Humidity:	39~43 %
ATM Pressure:	100.5 kPa

* The testing was performed by Tyler Pan & Vern Shen on 2018-11-29.

EUT Operation Mode: Transmitting

WCDMA Band V (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)			
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	52.17	-62.04	10.6	0.73	-52.2	-13.0	39.2
1673.200	V	54.97	-59.84	10.6	0.73	-50.0	-13.0	37.0
2509.800	H	53.53	-59.49	13.1	1.25	-47.6	-13.0	34.6
2509.800	V	48.22	-64.83	13.1	1.25	-53.0	-13.0	40.0
3346.400	H	46.50	-64.16	13.8	1.61	-51.9	-13.0	38.9
3346.400	V	46.37	-64.34	13.8	1.61	-52.1	-13.0	39.1
365.620	H	45.47	-60.66	0.0	0.58	-61.2	-13.0	48.2
299.660	V	46.82	-63.18	0.0	0.52	-63.7	-13.0	50.7

WCDMA Band II (30 MHz-20 GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	47.06	-61.74	13.8	1.63	-49.6	-13.0	36.6
3760.000	V	46.84	-61.83	13.8	1.63	-49.7	-13.0	36.7
5640.000	H	45.66	-60.37	14.0	1.31	-47.7	-13.0	34.7
5640.000	V	45.71	-60.2	14.0	1.31	-47.5	-13.0	34.5
365.620	H	45.82	-60.31	0.0	0.58	-60.9	-13.0	47.9
159.980	V	49.80	-62.54	0.0	0.4	-62.9	-13.0	49.9

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)			
Worst: 1.4MHz, QPSK, Frequency: 1732.500 MHz								
3465.00	H	51.69	-58.55	13.91	1.62	-46.26	-13.00	33.26
3465.00	V	52.25	-58.03	13.91	1.62	-45.74	-13.00	32.74
5197.50	H	66.84	-39.58	14.00	1.52	-27.10	-13.00	14.10
5197.50	V	71.15	-35.34	14.00	1.52	-22.86	-13.00	9.86
148.34	H	42.44	-63.95	0.00	0.37	-64.32	-13.00	51.32
400.54	V	38.87	-69.30	0.00	0.61	-69.91	-13.00	56.91

Note:

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

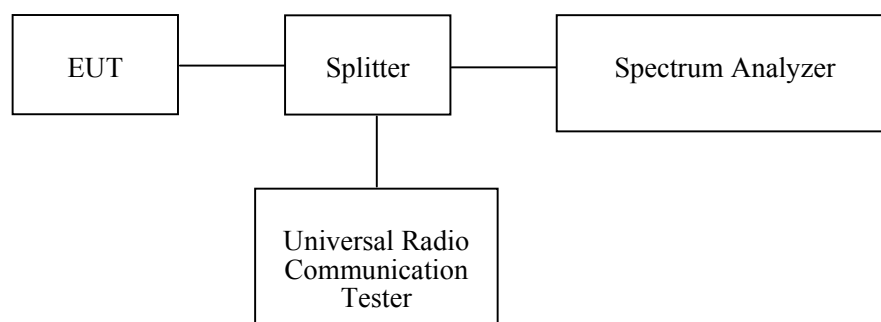
FCC §22.917(a) & §24.238(a) & §27.53 - BAND EDGES**Applicable Standard**

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

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

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

Test Data**Environmental Conditions**

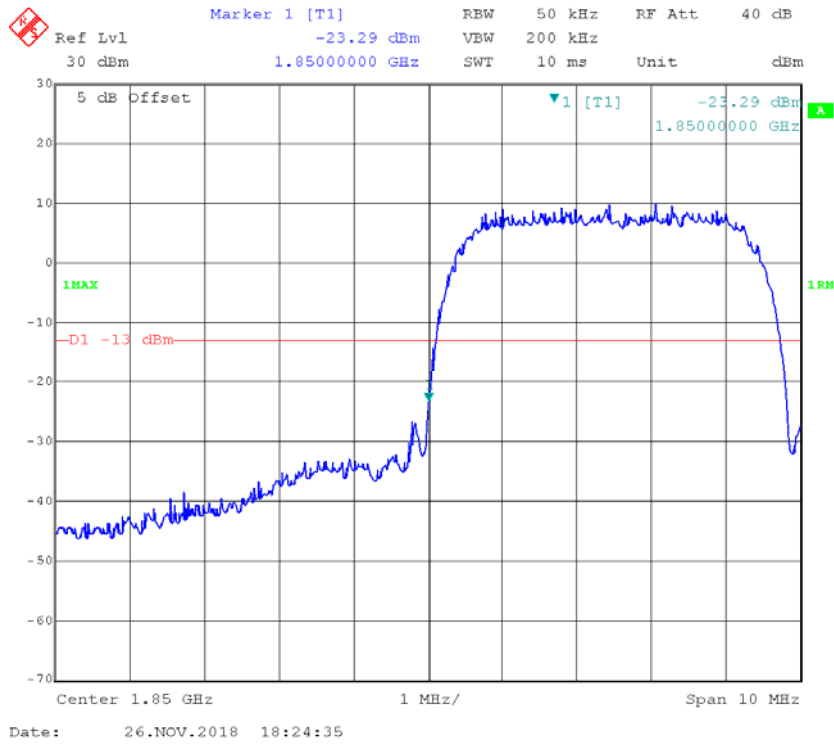
Temperature:	25.5~26.4°C
Relative Humidity:	43 ~ 51 %
ATM Pressure:	99.9~100.7 kPa

The testing was performed by Andy Huang from 2018-11-24 to 2018-11-26.

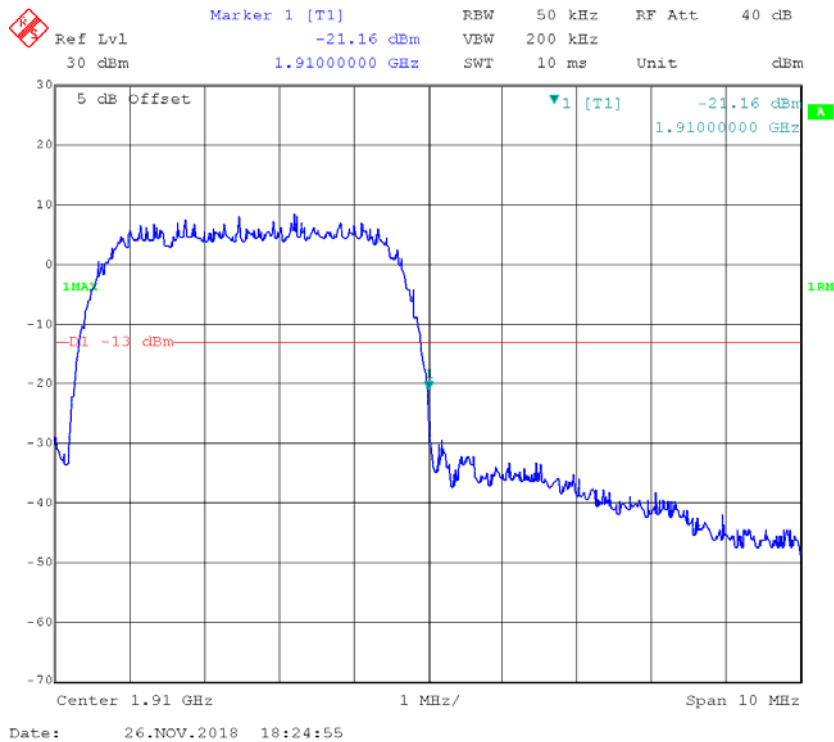
Test Mode: Transmitting

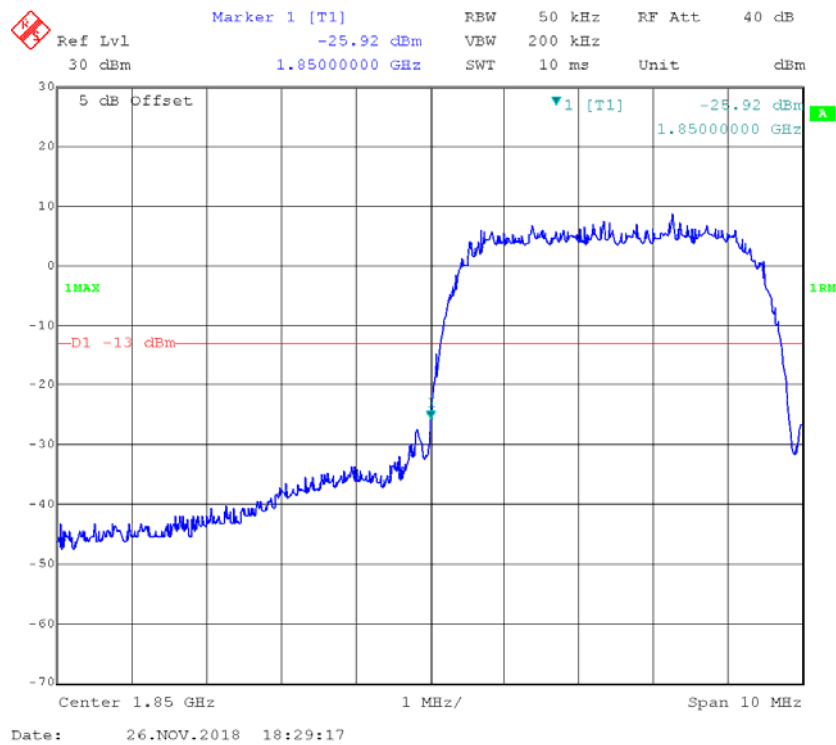
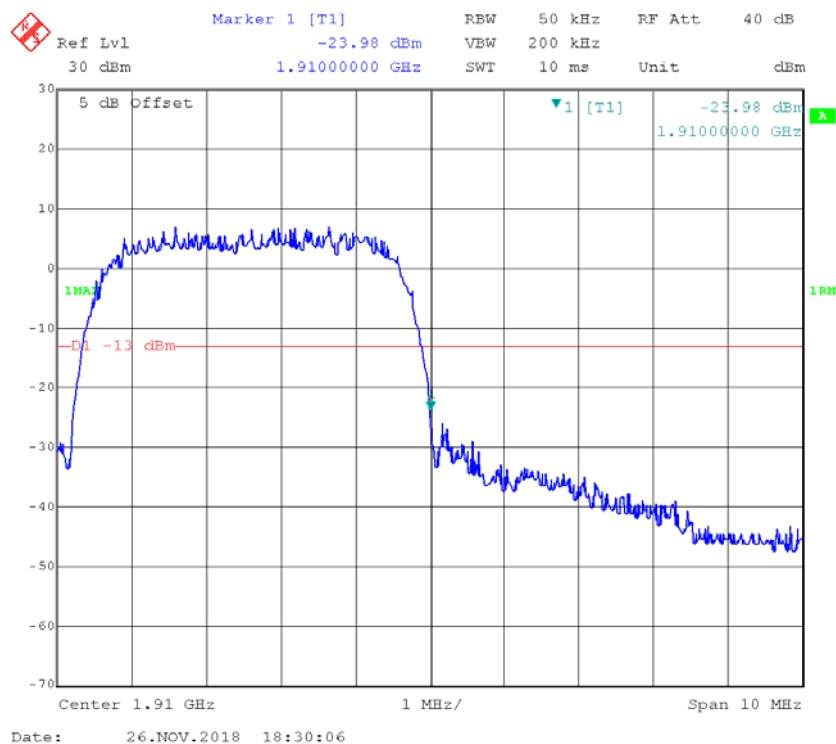
Test Result: Compliant. Please refer to the following plots.

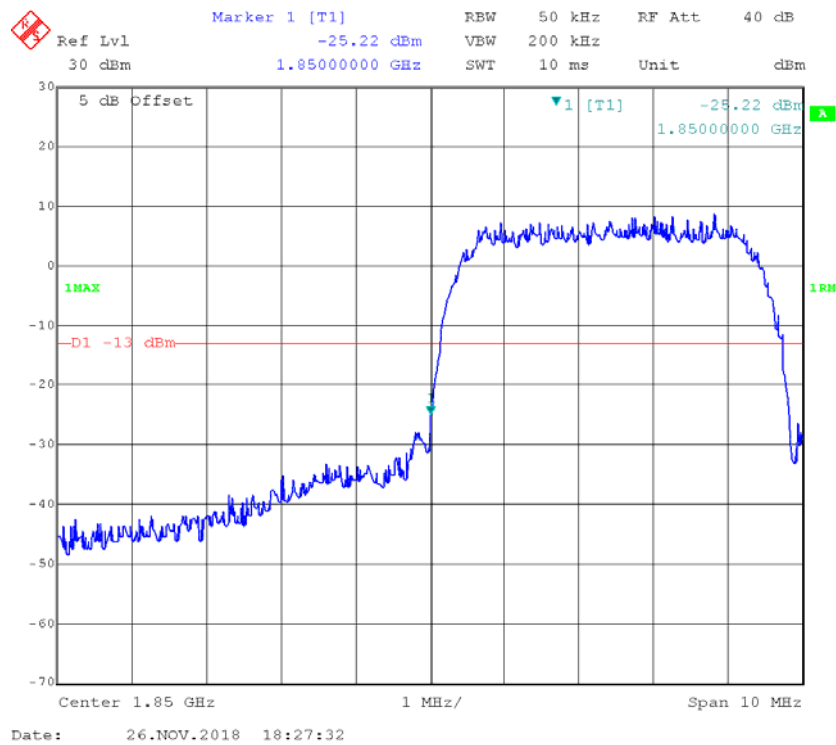
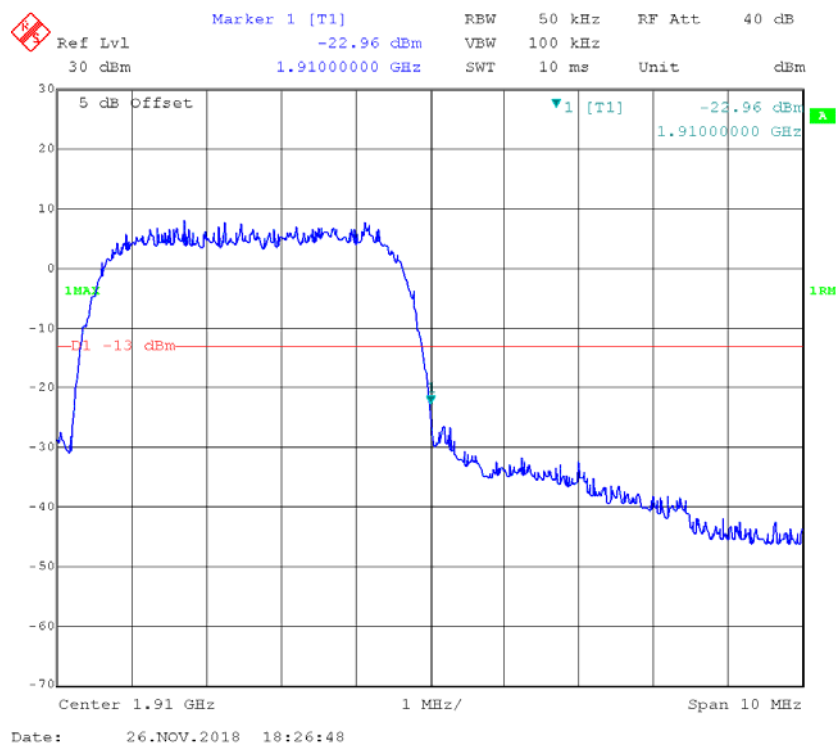
WCDMA Band II Rel 99, Left Band Edge

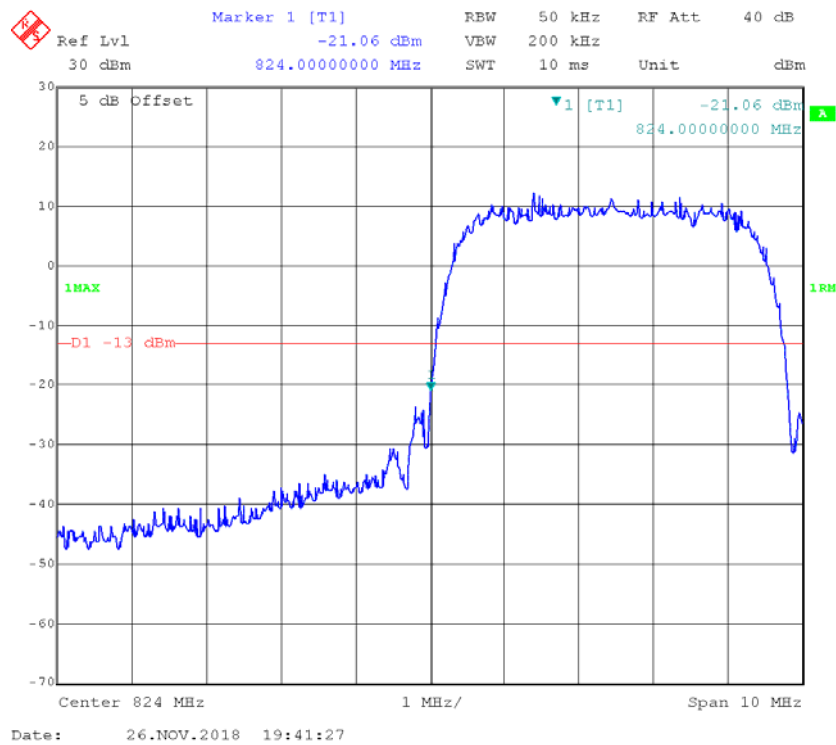
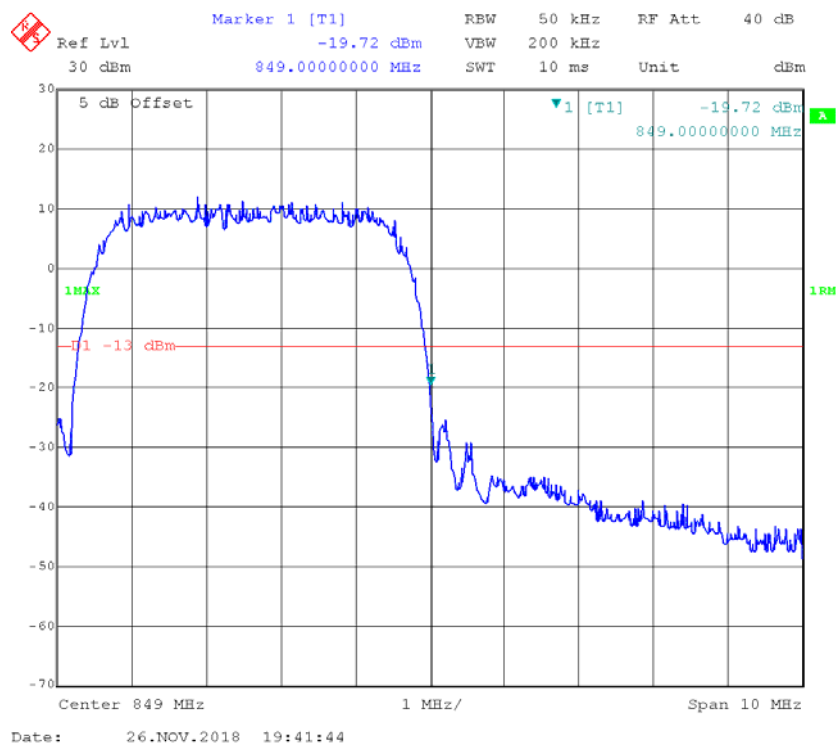


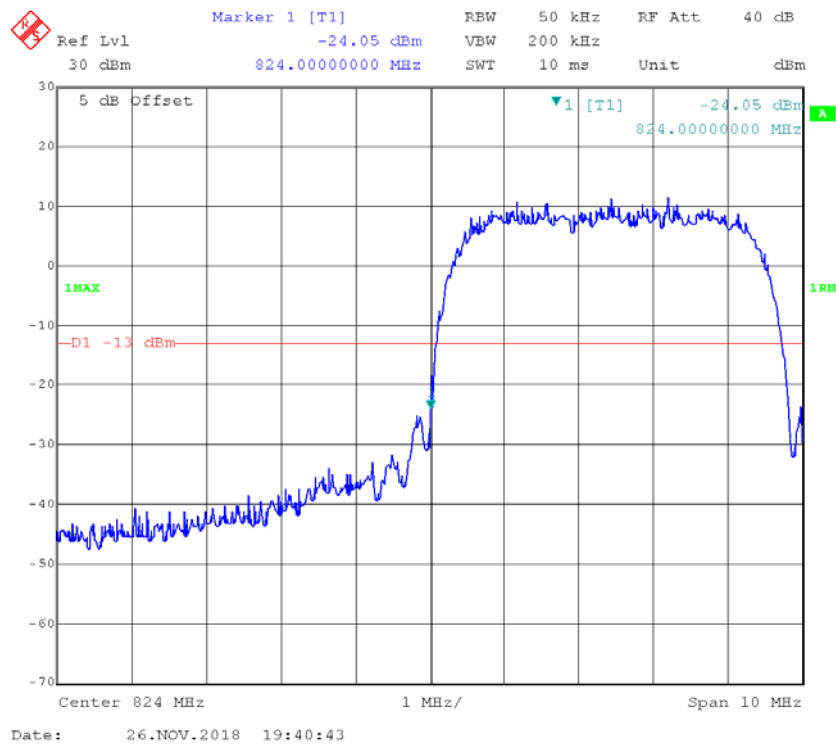
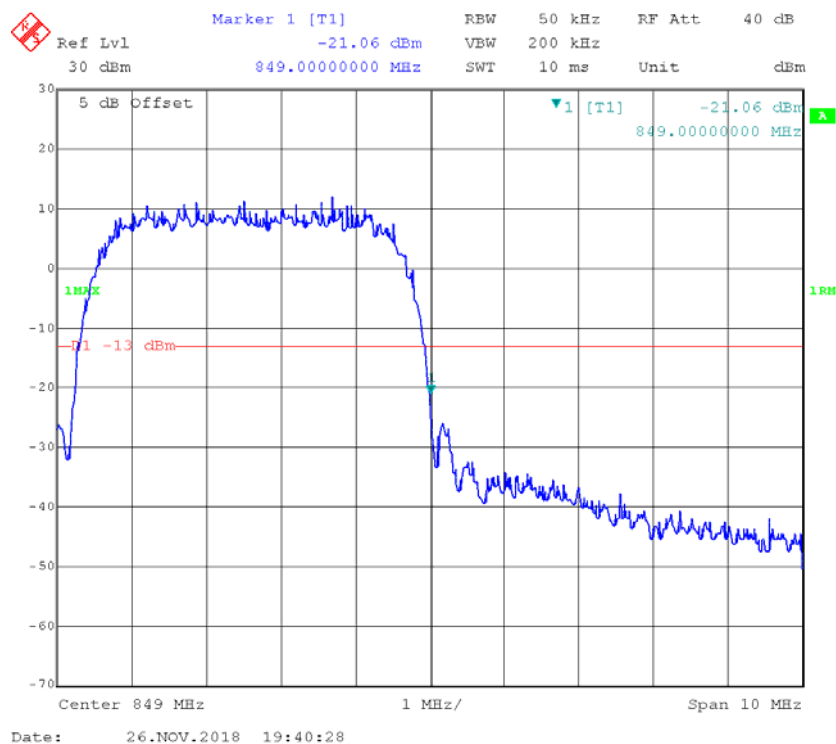
WCDMA Band II Rel 99, Right Band Edge



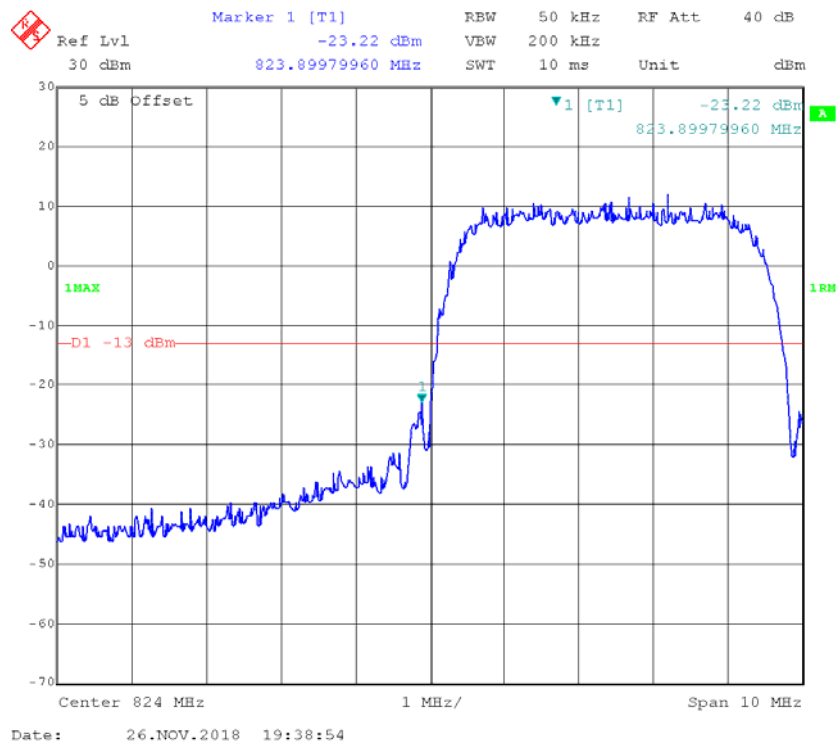
WCDMA Band II HSUPA, Left Band Edge**WCDMA Band II HSUPA, Right Band Edge**

WCDMA Band II HSDPA, Left Band Edge**WCDMA Band II HSDPA, Right Band Edge**

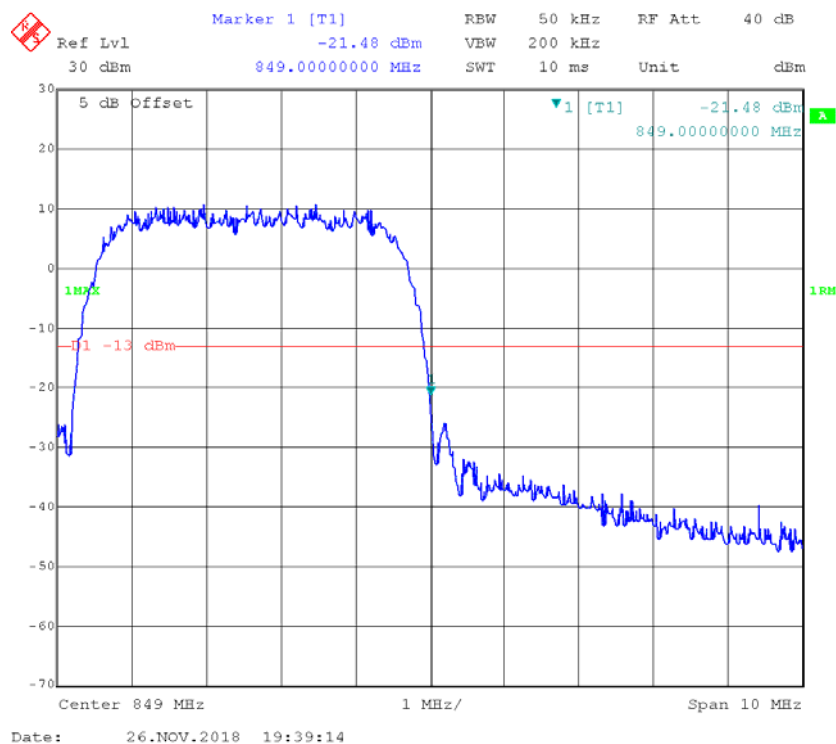
WCDMA Band V Rel 99, Left Band Edge**WCDMA Band V Rel 99, Right Band Edge**

WCDMA Band V HSUPA, Left Band Edge**WCDMA Band V HSUPA, Right Band Edge**

WCDMA Band V HSDPA, Left Band Edge

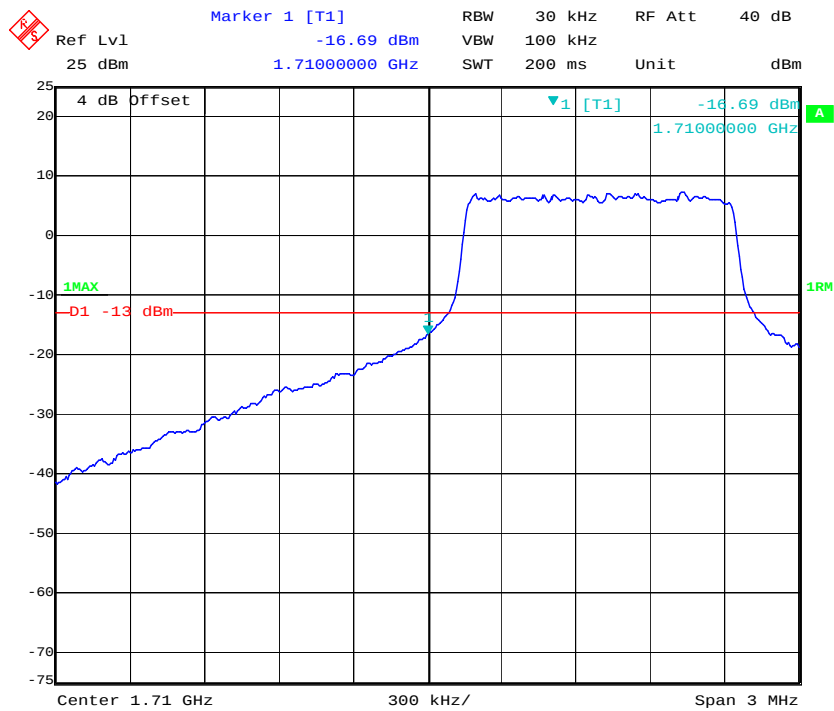


WCDMA Band V HSDPA, Right Band Edge

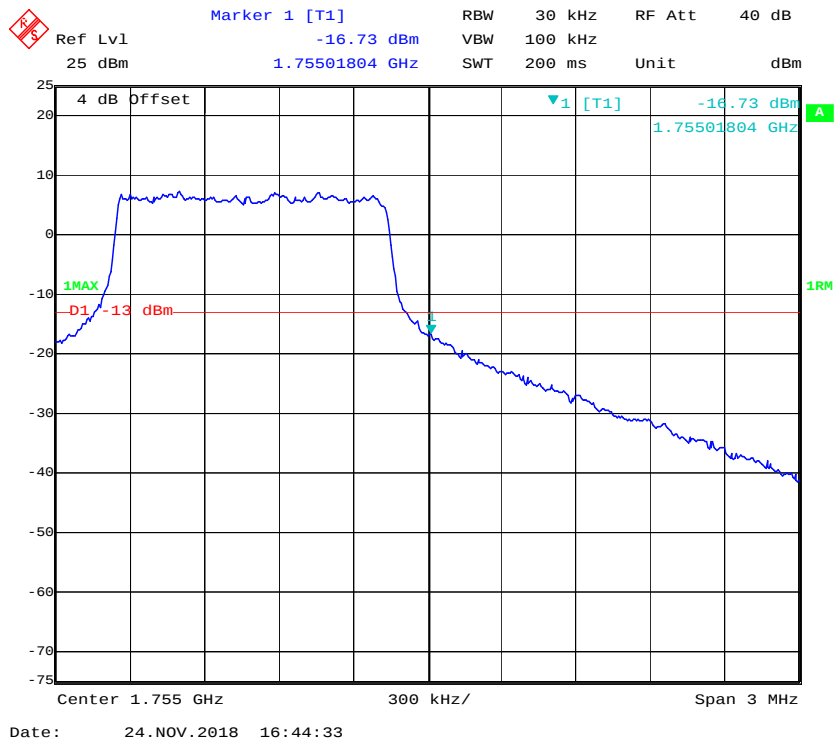


LTE Band IV

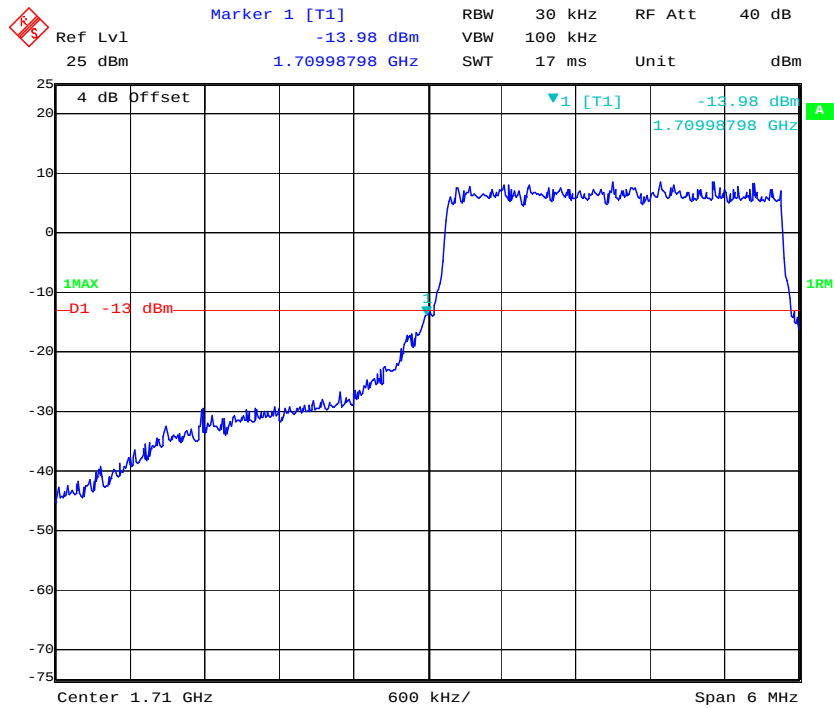
QPSK_1.4MHz_6 RB_ Left



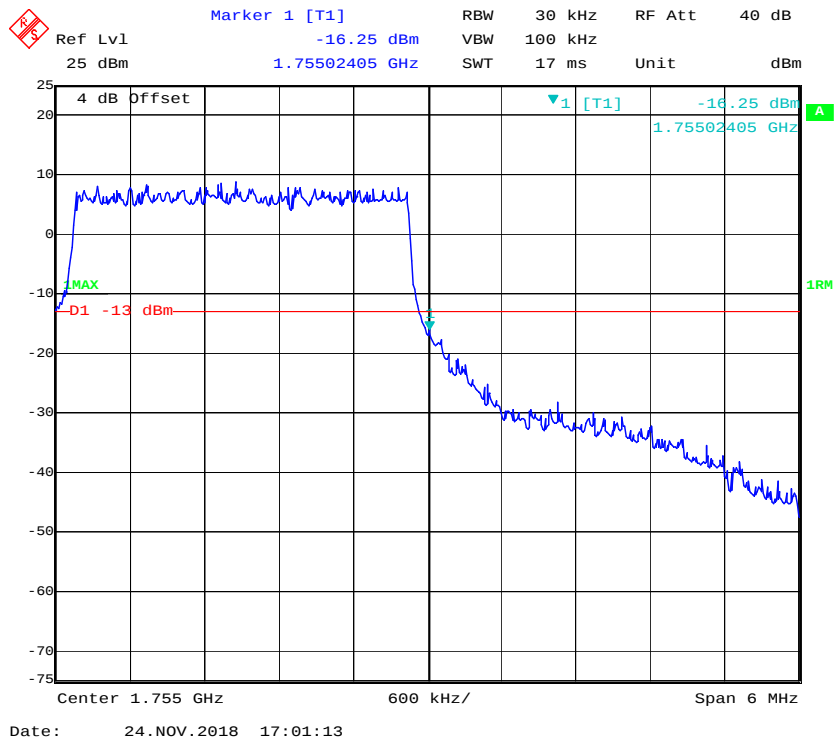
QPSK_1.4MHz_6 RB_ Right



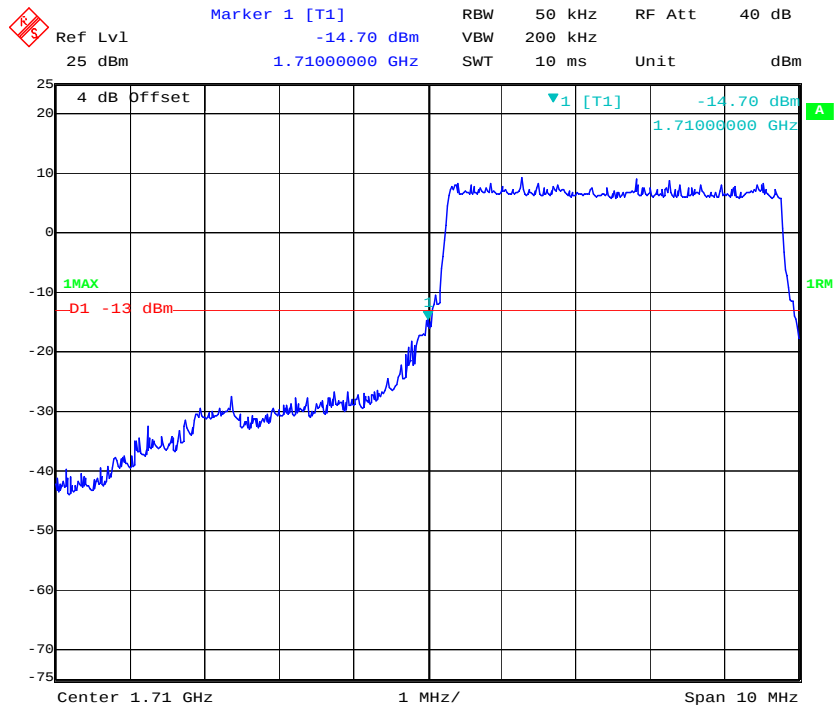
QPSK_3MHz_15 RB_ Left



QPSK_3MHz_15 RB_ Right

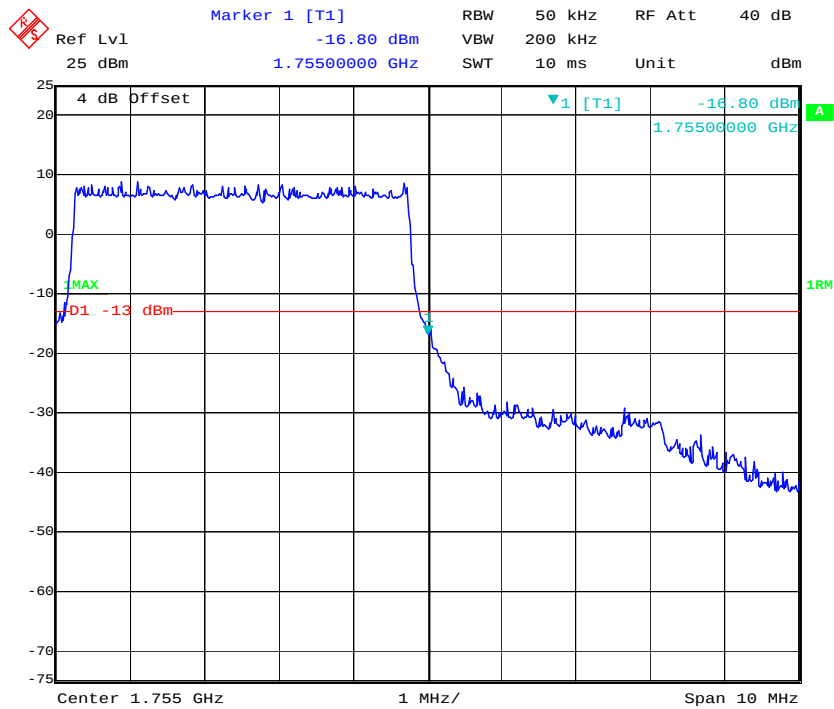


QPSK_5MHz_25 RB_ Left



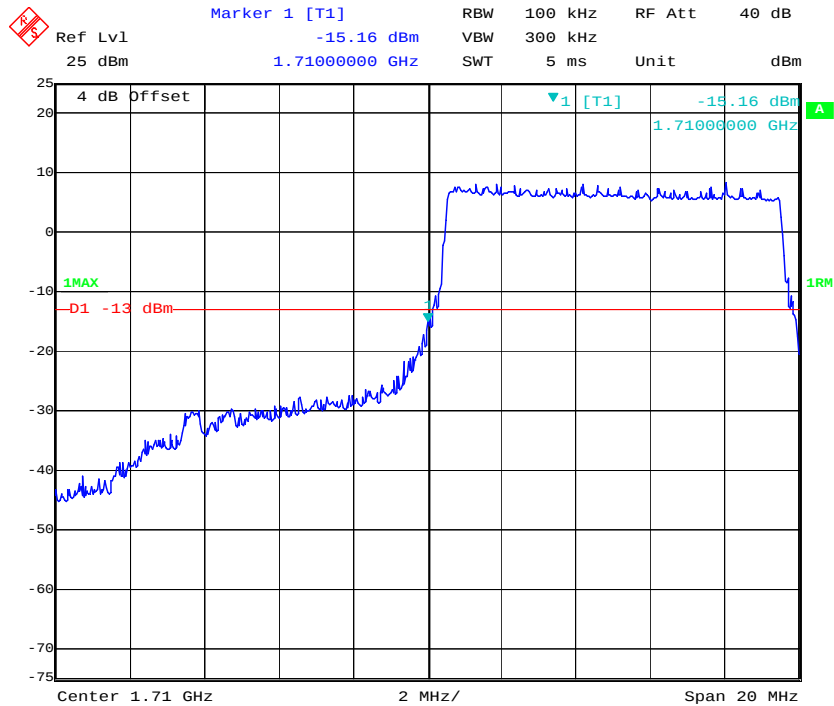
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QPSK_5MHz_25 RB_ Right

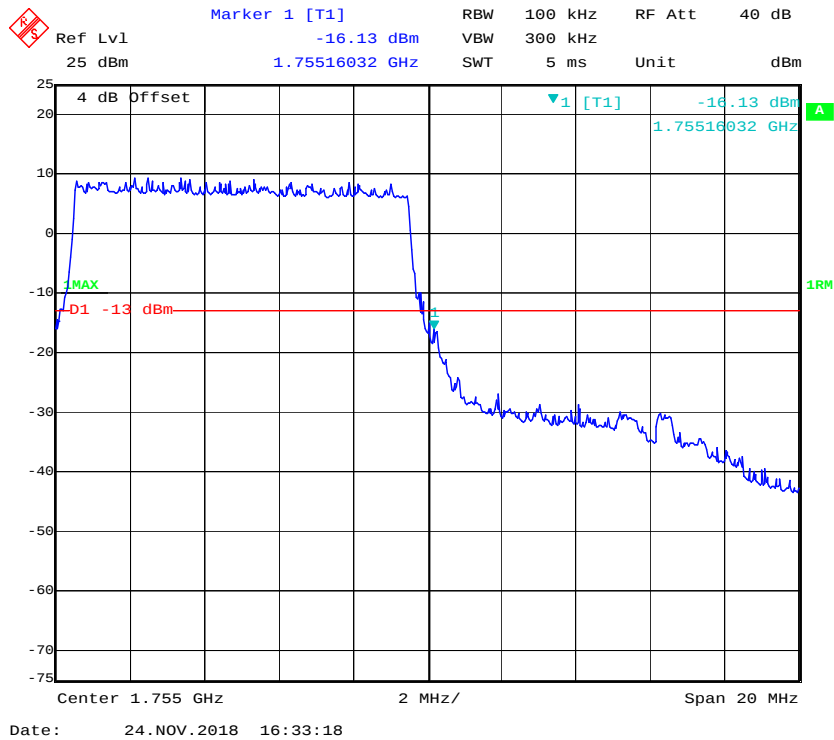


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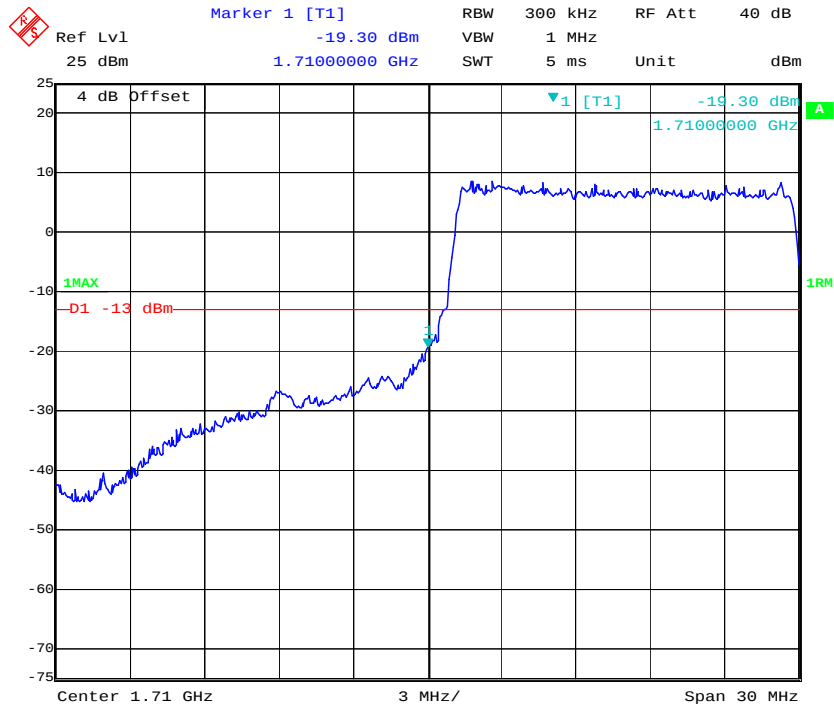
QPSK_10MHz_50 RB_Left



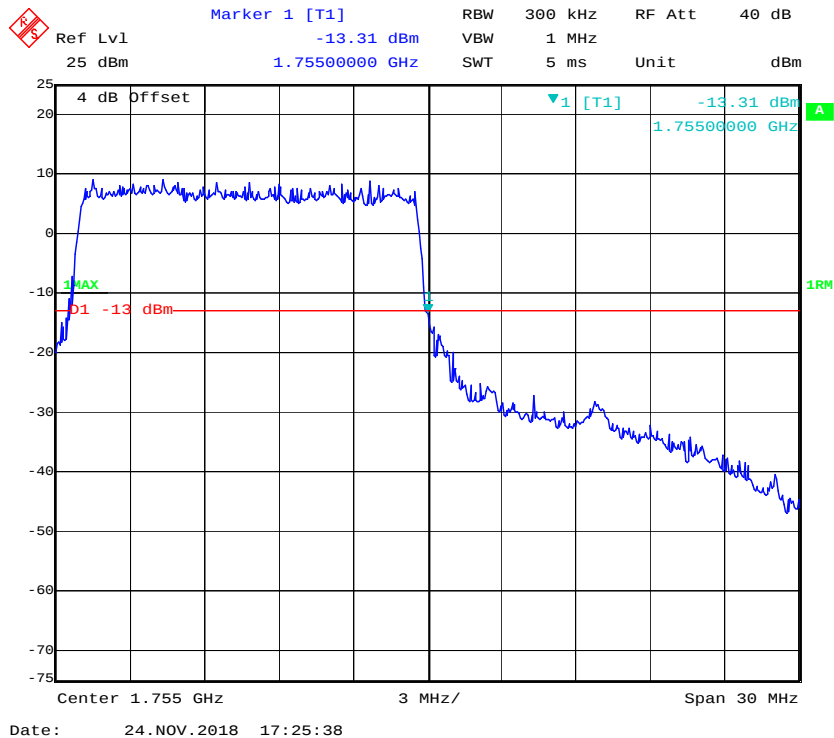
QPSK_10MHz_50 RB_Right



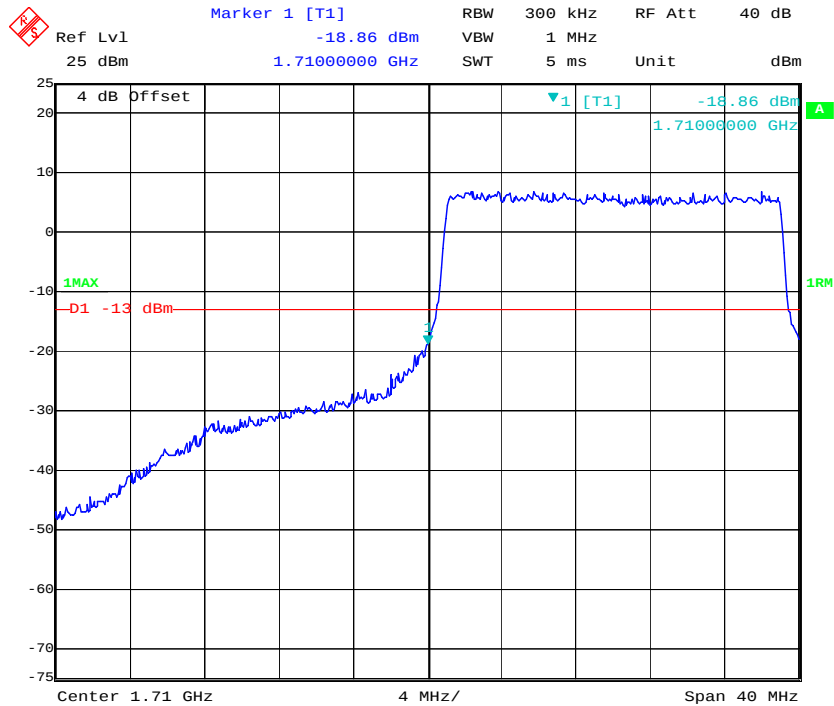
QPSK_15MHz_ 75 RB_ Left



QPSK_15MHz_ 75 RB_ Right

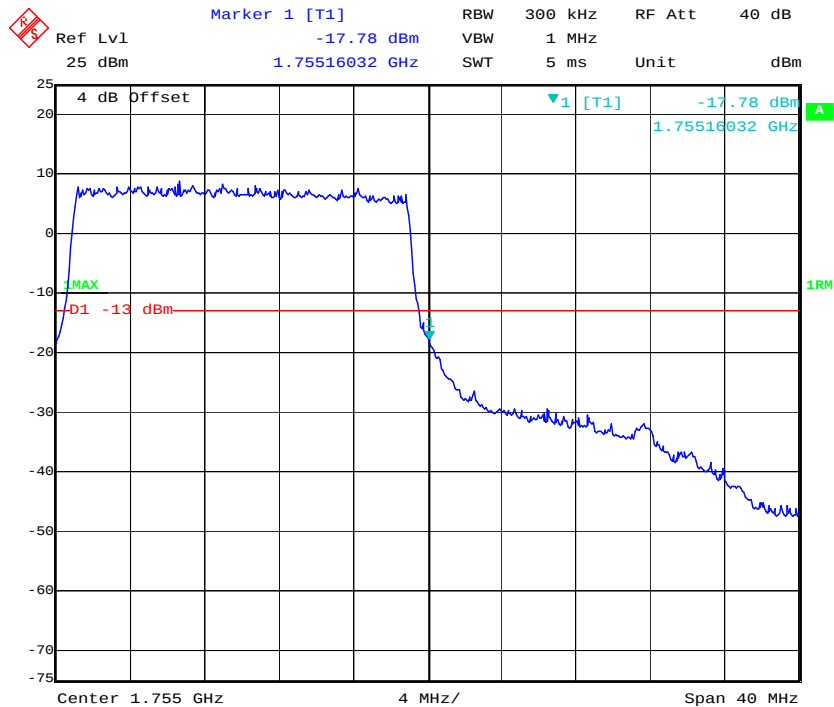


QPSK_20MHz_FULL RB_Left



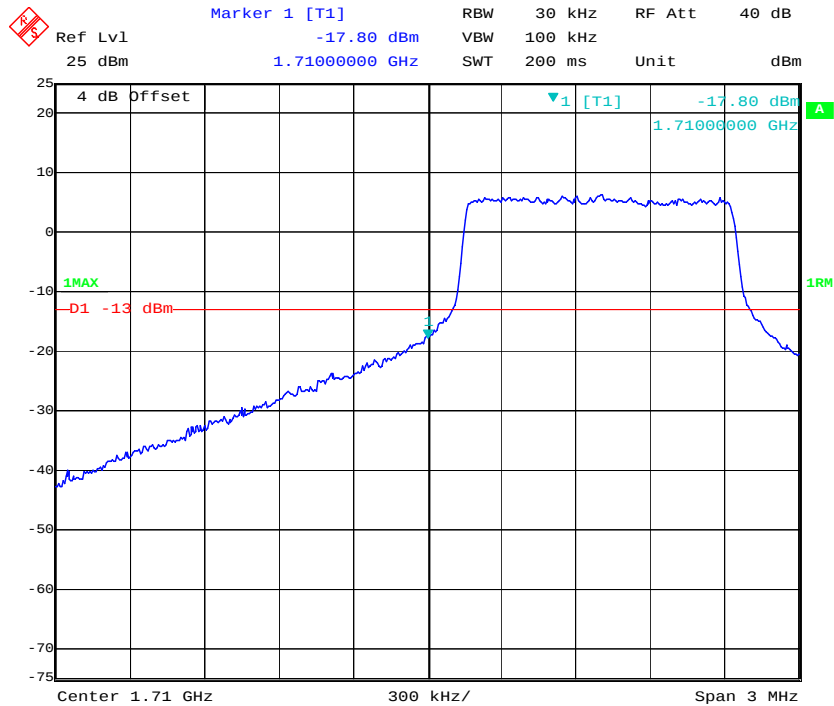
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QPSK_20MHz_FULL RB_Right

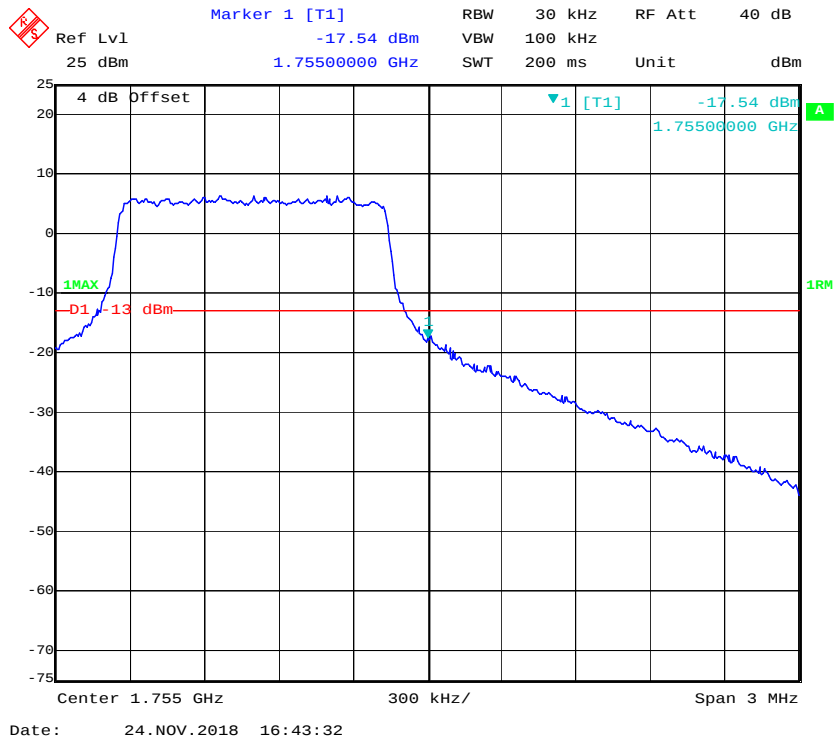


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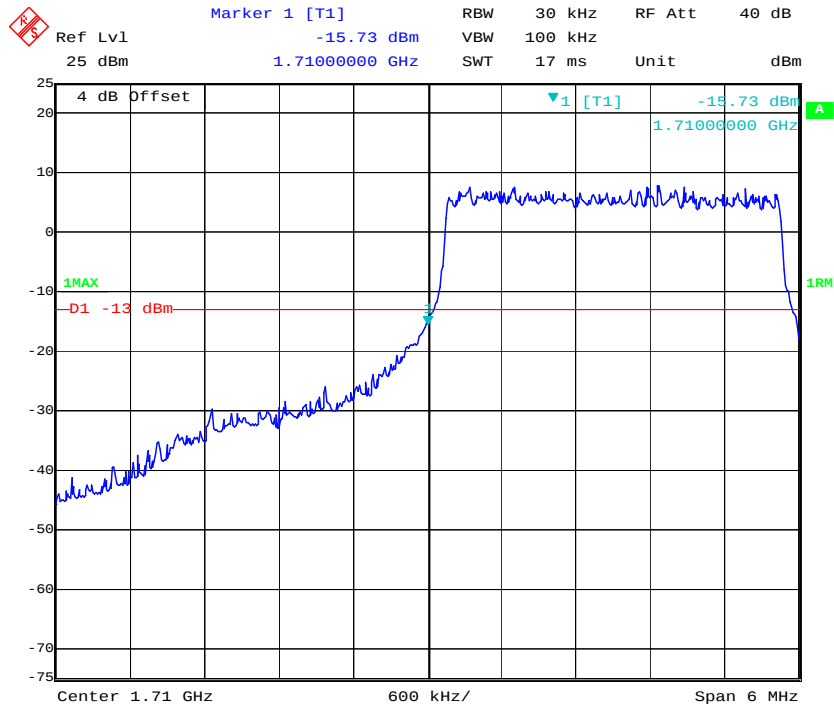
16QAM_1.4MHz_6 RB_ Left



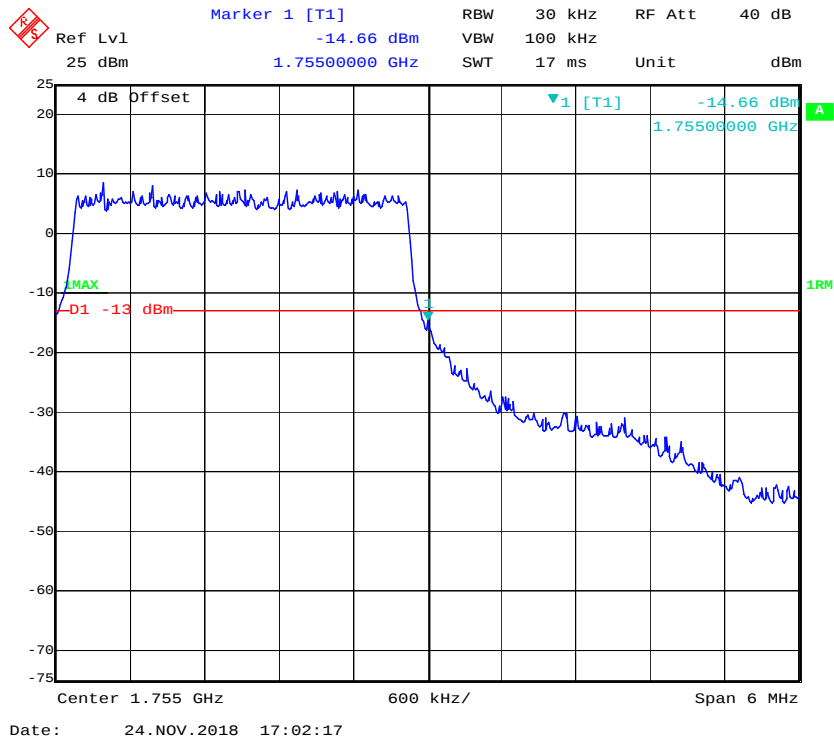
16QAM_1.4MHz_6 RB_ Right



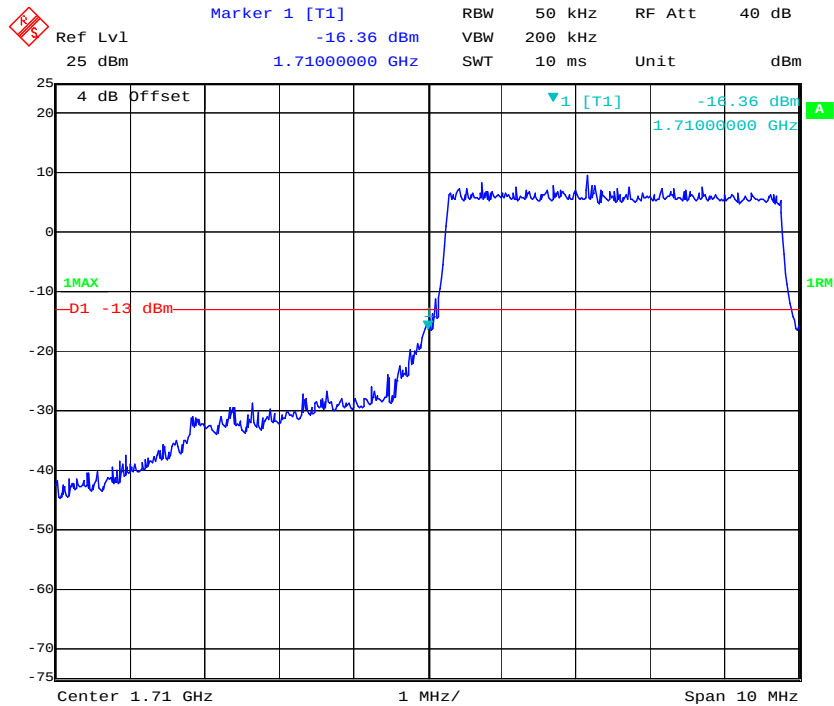
16QAM_3MHz_ 15 RB_ Left



16QAM_3MHz_ 15 RB_ Right

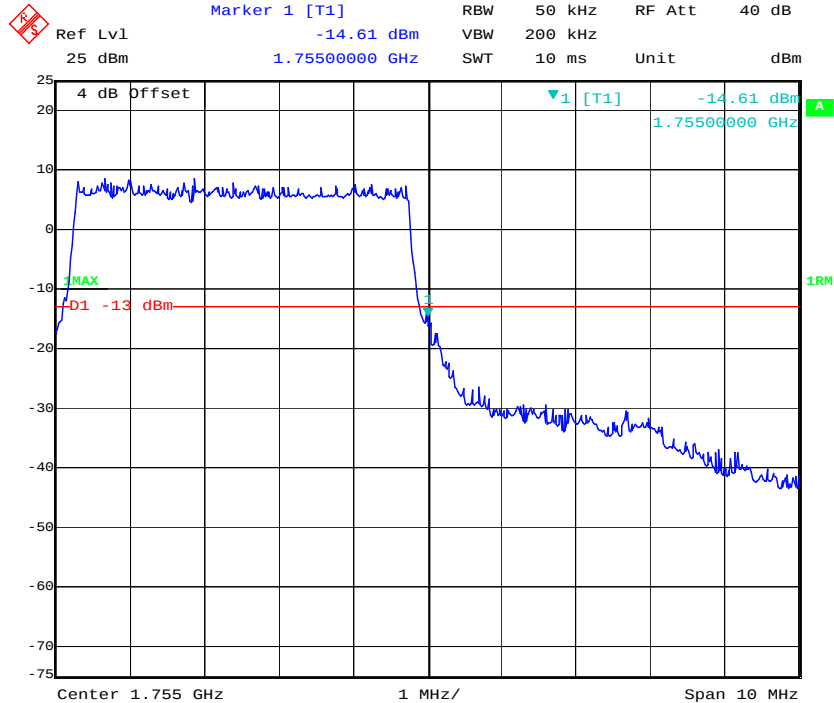


16QAM_5MHz_25 RB_ Left



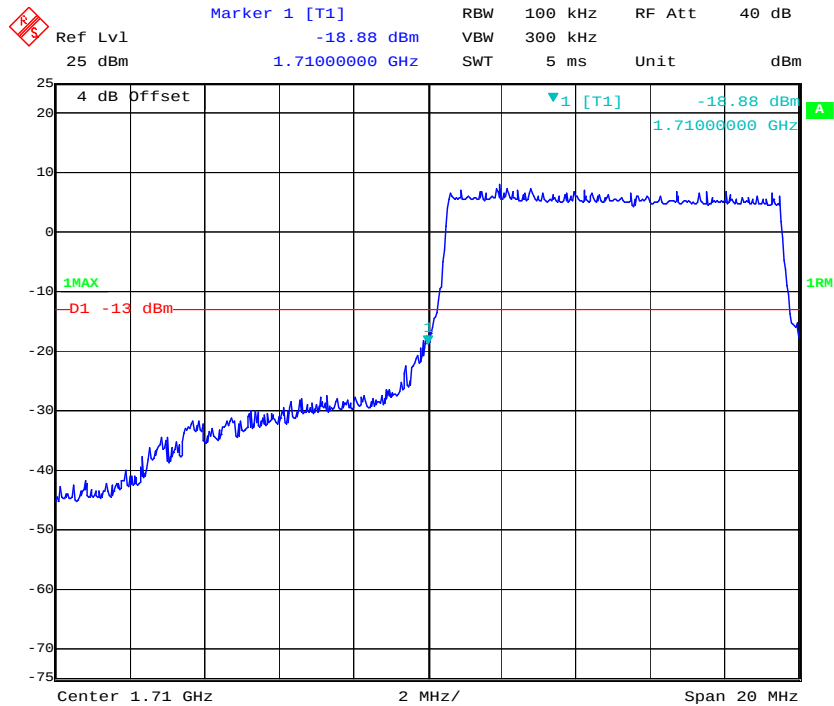
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16QAM_5MHz_25 RB_ Right

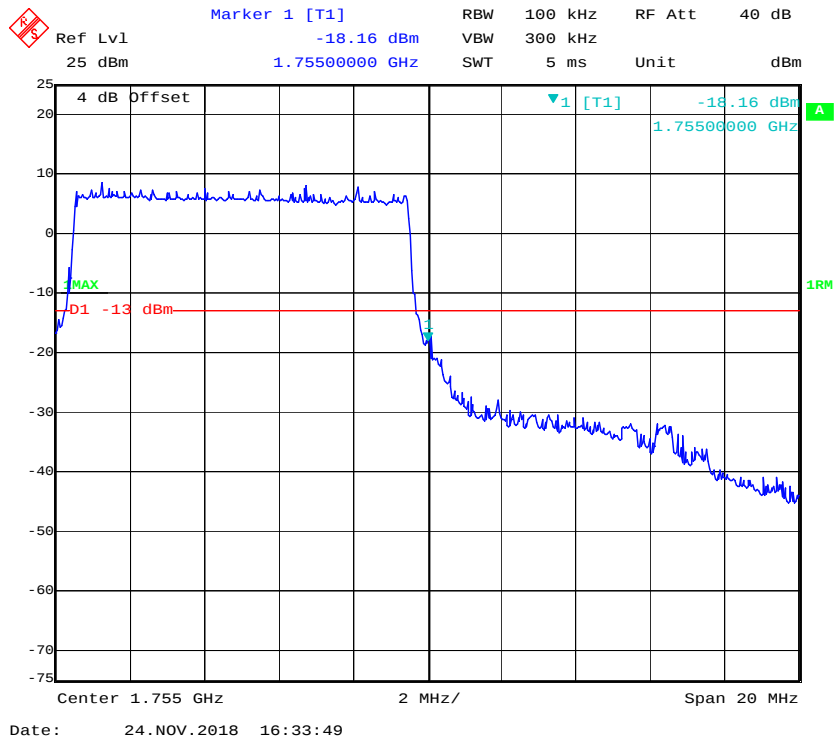


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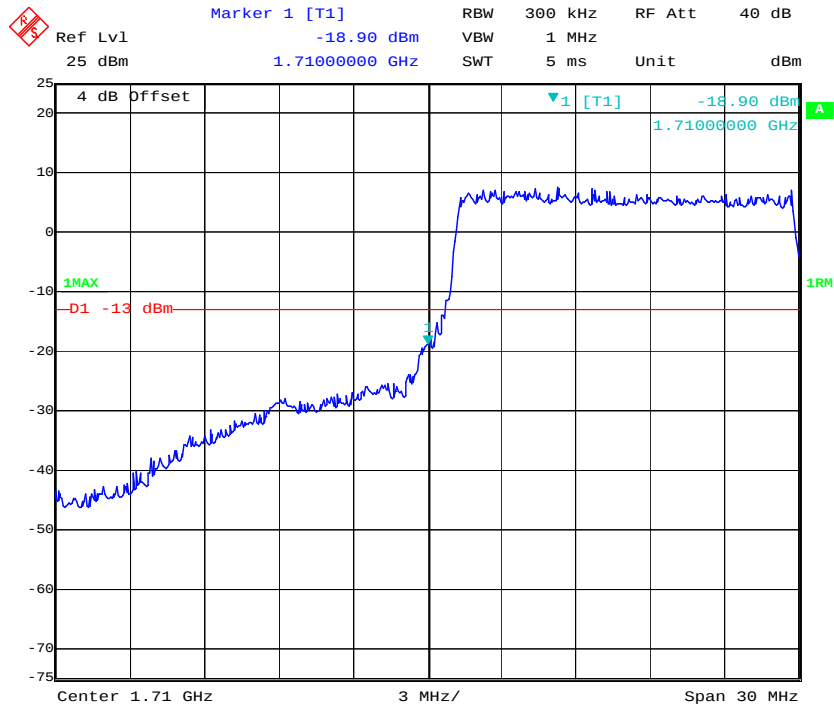
16QAM_10MHz_ 50 RB_ Left



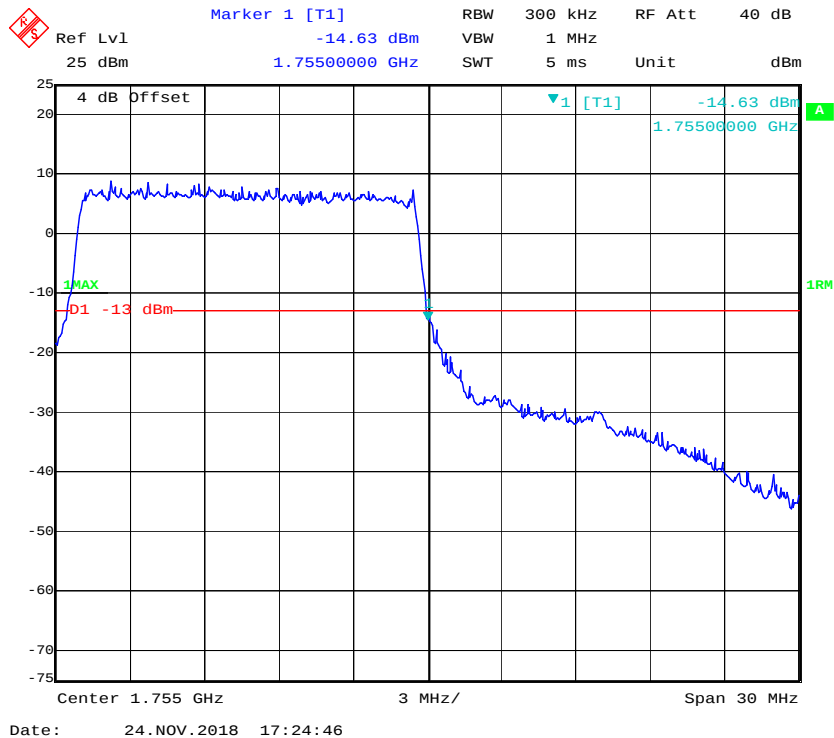
16QAM_10MHz_ 50 RB_ Right



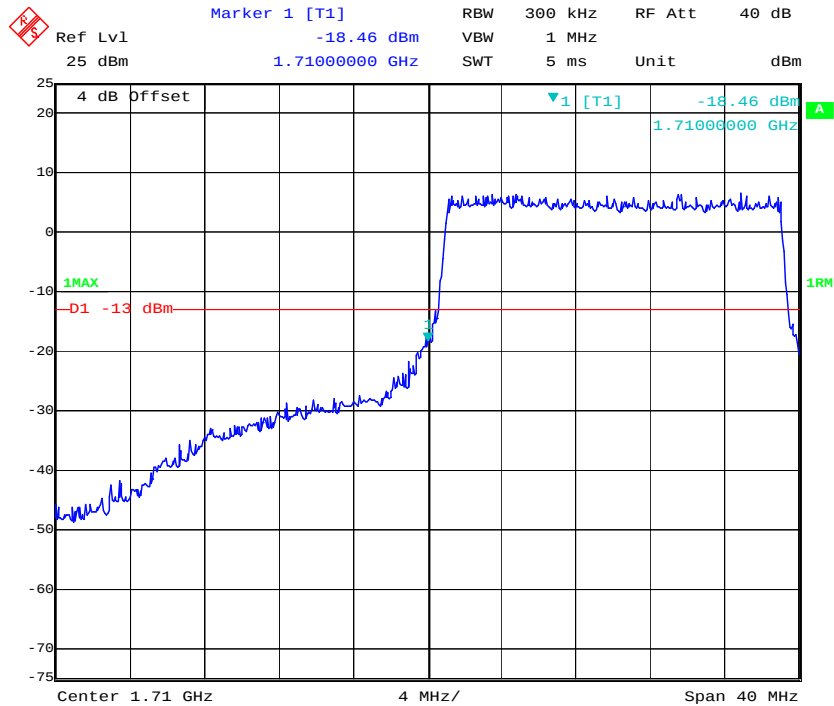
16QAM_15MHz_ 75 RB_ Left



16QAM_15MHz_ 75 RB_ Right

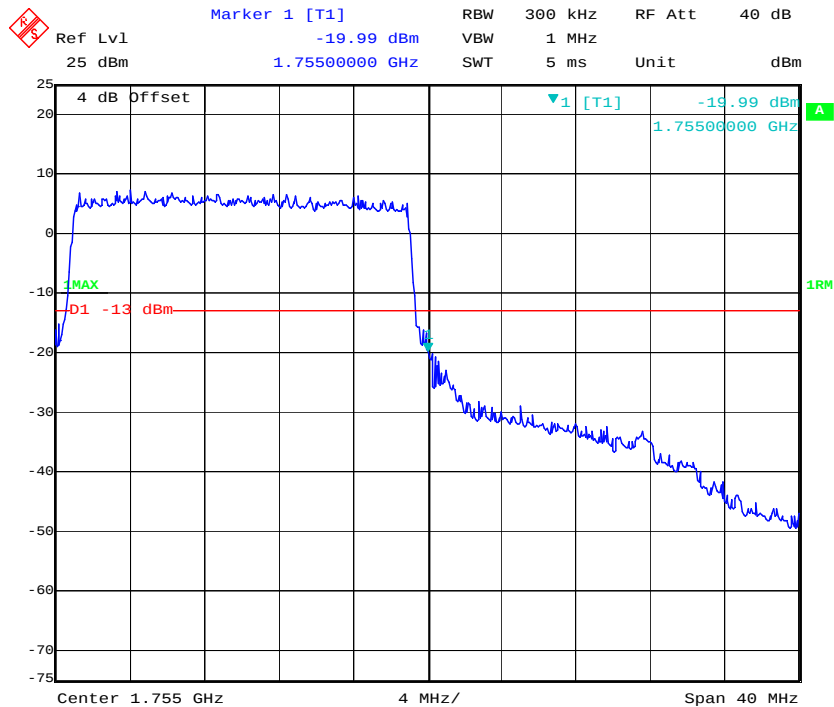


16QAM_20MHz_ FULL RB_ Left



Date: 24.NOV.2018 17:30:56

16QAM_20MHz_ FULL RB_ Right



Date: 24.NOV.2018 17:31:25

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

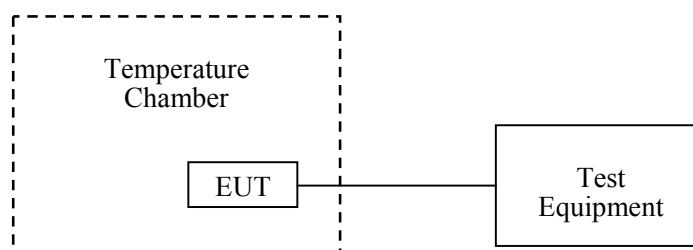
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC 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 AC 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 AC 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
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
R&S	Universal Radio Communication Tester	CMU200	109 038	2018-07-18	2019-07-18
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2018-03-26	2019-03-26
UNI-T	Multimeter	UT39A	M130199938	2018-07-24	2019-07-24
AOFN	AC Transformer	TDGC2-0.5	AC-01	2018-05-09	2019-05-09
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03

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

Test Data**Environmental Conditions**

Temperature:	25.5°C
Relative Humidity:	51 %
ATM Pressure:	99.9 kPa

The testing was performed by Andy Huang on 2018-11-26.

WCDMA Band II: R99

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V _{AC}	Hz	ppm	
-30	120	3	0.00160	Pass
-20		1	0.00053	
-10		2	0.00106	
0		5	0.00266	
10		4	0.00213	
20		5	0.00266	
30		3	0.00160	
40		6	0.00319	
50		4	0.00213	
20	102	1	0.00053	
20	138	2	0.00106	

WCDMA Band V: R99

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{AC}	Hz	ppm	ppm
-30	120	8	0.00956	2.5
-20		7	0.00837	
-10		8	0.00956	
0		3	0.00359	
10		6	0.00717	
20		5	0.00598	
30		5	0.00598	
40		4	0.00478	
50		7	0.00837	
20	102	2	0.00239	
20	138	3	0.00359	

LTE Band 4:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{AC}	F_L	F_H	F_L	F_H
-30	120	1710.531061	1754.509022	1710	1755
-20		1710.531053	1754.509021	1710	1755
-10		1710.531075	1754.509016	1710	1755
0		1710.531051	1754.509017	1710	1755
10		1710.531067	1754.509026	1710	1755
20		1710.531060	1754.509020	1710	1755
30		1710.531050	1754.509010	1710	1755
40		1710.531065	1754.509024	1710	1755
50		1710.531055	1754.509011	1710	1755
20	102	1710.531062	1754.509023	1710	1755
20	138	1710.531070	1754.509012	1710	1755

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{AC}	F_L	F_H	F_L	F_H
-30	120	1710.531057	1754.509020	1710	1755
-20		1710.531049	1754.509020	1710	1755
-10		1710.531070	1754.509020	1710	1755
0		1710.531056	1754.509020	1710	1755
10		1710.531062	1754.509020	1710	1755
20		1710.531060	1754.509020	1710	1755
30		1710.531051	1754.509020	1710	1755
40		1710.531055	1754.509020	1710	1755
50		1710.531058	1754.509020	1710	1755
20	102	1710.531050	1754.509020	1710	1755
20	138	1710.531064	1754.509020	1710	1755

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

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