FCC PART 22H, PART 24E

FCC PART 27

MEASUREMENT AND TEST REPORT

For

DT Research, Inc.

6F, No.1, NingPo E. St.Taipei 100, Taiwan

FCC ID: YE3800I
Model: DT301

Report Type:	**Product Name:**
Class II Permissive Change	Mobile Tablet

Report Number:	RDG170823002-00A1
Report Date:	2017-09-07
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)

The *DT Research Inc.*'s product, model number: *DT301 (FCC ID: YE3800I)* (the "EUT") in this report was a *Mobile Tablet,* which was measured approximately: 190 mm (H) x 279 mm (W) x 21.9 mm (D), rated input voltage: DC 11.4V rechargeable Li-ion battery or DC19V charging from adapter.

Adapter information:
Model: A11-065N1A
UP/N: A065R112L
Input: 100-240V~50/60Hz, 1.7A
Output: 19V, 3.42A, 65W

All measurement and test data in this report was gathered from production sample serial number: 170823002 (Assigned by BACL, Dongguan). The EUT was received on 2017-08-23.

Objective

This report is prepared on behalf of ***DT Research, Inc.*** in accordance with: Part 2-Subpart J, Part 22-Subpart H, Part 24-Subpart E and part 27 of the Federal Communications Commission's rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, spurious radiated emission, frequency stability and band edge.

This is a CIIPC application of the device, the differences between the original device and the current one are as follows:
1) Added LTE bands: 2/5/17;
2) Added WCDMA bands: 2/5;
3) Added GPS module;
4) Changed the battery 7.2V to 11.4V and it`s related power manage schematic was changed;
5) SSD was changed.

Other parts are identical to the previously certified.

The changes item 3,4 and 5 were proved haven`t effect the original bands; and the test results for the additional bands were recorded in this report.

Related Submittal(s)/Grant(s)

The original report was issud on 2016-07-11.

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

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO 17025 by CNAS(Lab code: L5662). And accredited to ISO 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Dongguan) was 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.

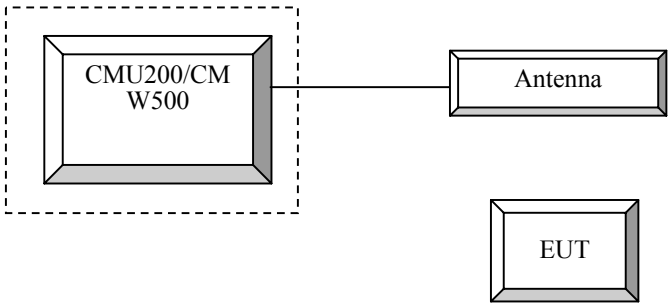
Equipment Modifications

No modification was made to the EUT.

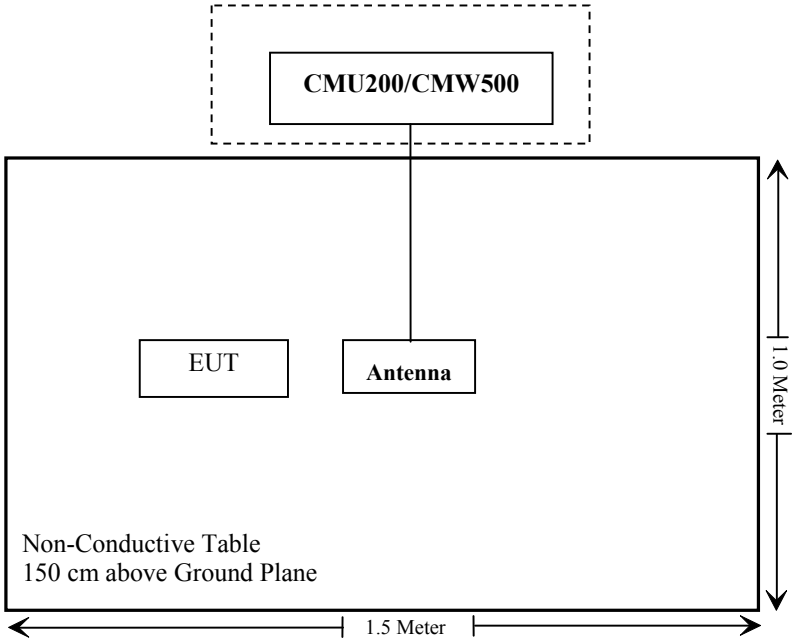
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universial Radio Communication Tester	CMU200	109 038
R&S	Wideband Radio Communication Tester	CMW500	149216
N/A	ANTENNA	N/A	N/A

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1093	RF Exposure	Compliance
§2.1046; § 22.913 (a); § 24.232 (c); §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	Spurious Radiation Emissions	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: RDG170823002-20A1.

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 FCC §2.1046 and §27.50 (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.

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
	βc / βd	8/15

WCDMA HSDPA

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/ βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs=βhs/ βc	30/15			

WCDMA HSUPA

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

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subset	**1**	**2**	**3**	**4**	**5**
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/ βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
	MPR(dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs=βhs/ βc	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_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	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	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2014-11-06	2017-11-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2016-12-08	2017-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
HP	Signal Generator	1026	320408	2016-12-08	2017-12-08
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	Chamber A-1	4m	2017-09-01	2018-09-01
Unknown	Coaxial Cable	Chamber B-1	0.75m	2017-09-01	2018-09-01
Unknown	Coaxial Cable	Chamber A-2	10m	2017-09-01	2018-09-01
Unknown	Coaxial Cable	Chamber B-2	8m	2017-09-01	2018-09-01
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2017-05-06	2018-05-06
R&S	Wideband Radio Communication Tester	CMW500	149216	2016-10-08	2017-10-08
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Spectrum Analyzer	FSU 26	200256	2016-12-08	2017-12-08

*** 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:	27.8 °C
Relative Humidity:	57 %
ATM Pressure:	100 kPa

The testing was performed by Pean Zhu on 2017-09-03.

Conducted Output Power

WCDMA Band Ⅱ

Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99 (QPSK)	1	22.39	3.17	22.64	3.04	22.91	2.95
HSDPA (QPSK)	1	22.34	3.52	22.55	3.01	22.74	3.02
	2	22.25	3.14	22.58	2.95	22.72	3.04
	3	22.38	3.06	22.63	3.14	22.80	2.95
	4	22.33	2.98	22.58	3.21	22.73	3.05
HSUPA (QPSK)	1	22.31	3.21	22.53	3.05	22.87	3.01
	2	22.28	3.36	22.48	2.99	22.86	3.11
	3	22.34	2.99	22.48	3.01	22.78	3.04
	4	22.21	3.05	22.58	3.11	22.89	2.89
	5	22.38	3.14	22.55	3.04	22.82	2.94
DC-HSDPA (QPSK)	1	22.38	3.09	22.61	3.06	22.82	3.06
	2	22.33	3.15	22.52	3.11	22.80	3.14
	3	22.19	3.32	22.53	3.05	22.85	3.02
	4	22.23	3.18	22.58	3.41	22.90	3.14
HSPA+ (16QAM)	1	22.26	3.25	22.51	3.21	22.77	3.05

WCDMA Band V

Mode	3GPP Sub Test	Average Output Power (dBm)					
		Low Channel (Ave. Power)	Low Channel (PAR)	Middle Channel (Ave. Power)	Middle Channel (PAR)	High Channel (Ave. Power)	High Channel (PAR)
Rel 99 (QPSK)	1	22.85	2.95	22.86	3.08	22.76	3.27
HSDPA (QPSK)	1	22.75	3.03	22.84	3.14	22.68	3.20
	2	22.70	3.14	22.75	3.06	22.62	3.41
	3	22.56	3.25	22.84	3.14	22.62	3.12
	4	22.63	3.02	22.70	3.02	22.62	2.95
HSUPA (QPSK)	1	22.73	2.98	22.64	3.21	22.57	3.14
	2	22.71	3.04	22.67	3.23	22.62	3.06
	3	22.68	3.06	22.64	3.09	22.72	3.19
	4	22.58	2.96	22.71	3.05	22.75	3.05
	5	22.76	3.11	22.63	3.14	22.69	3.21
DC-HSDPA (QPSK)	1	22.84	3.10	22.79	2.96	22.67	3.09
	2	22.55	3.16	22.80	3.05	22.66	3.01
	3	22.81	3.03	22.70	3.15	22.52	3.28
	4	22.58	3.01	22.63	3.16	22.53	3.27
HSPA+ (16QAM)	1	22.63	2.98	22.69	3.25	22.55	3.25

LTE Band II

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	23.65	23.71	23.76
		1#3	23.69	23.75	23.71
		1#5	23.68	23.61	23.64
		3#0	23.71	23.67	23.69
		3#3	23.66	23.74	23.67
		6#0	22.66	22.71	22.79
	16-QAM	1#0	22.50	22.53	22.56
		1#3	22.51	22.54	22.57
		1#5	22.54	22.61	22.56
		6#0	21.56	21.57	21.84
3 MHz	QPSK	1#0	23.65	23.69	23.72
		1#8	23.69	23.65	23.71
		1#14	23.71	23.74	23.72
		10#0	22.60	22.78	22.75
		10#5	22.63	22.74	22.70
		15#0	22.56	22.59	22.62
	16-QAM	1#0	22.61	22.63	22.67
		1#8	22.57	22.59	22.61
		1#14	22.55	22.61	22.64
		15#0	21.76	21.79	21.82
5 MHz	QPSK	1#0	23.66	23.67	23.71
		1#13	23.71	23.75	23.72
		1#24	23.78	23.76	23.74
		10#0	22.75	22.76	22.78
		10#15	22.71	22.72	22.75
		25#0	22.62	22.59	22.57
	16-QAM	1#0	22.66	22.71	22.76
		1#13	22.61	22.68	22.65
		1#24	22.64	22.69	22.63
		25#0	21.79	21.67	21.73

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10 MHz	QPSK	1#0	23.13	23.16	23.24
		1#25	23.29	23.31	23.35
		1#49	23.21	23.32	23.28
		25#0	22.12	22.25	22.36
		25#25	22.15	22.21	22.23
		50#0	22.04	22.08	22.12
	16-QAM	1#0	22.98	22.96	23.01
		1#25	23.13	23.16	23.24
		1#49	23.10	23.09	23.14
		50#0	22.08	22.03	22.17
15 MHz	QPSK	1#0	23.68	23.67	23.72
		1#38	23.75	23.79	23.84
		1#74	23.66	23.62	23.69
		36#0	22.50	22.54	22.61
		36#39	22.57	22.63	22.65
		75#0	22.46	22.49	22.56
	16-QAM	1#0	22.54	22.67	22.72
		1#38	22.61	22.75	22.79
		1#74	22.58	22.62	22.63
		75#0	22.01	22.10	22.08
20 MHz	QPSK	1#0	23.75	23.74	23.76
		1#50	23.73	23.76	23.78
		1#99	23.64	23.65	23.67
		50#0	22.54	22.53	22.57
		50#50	22.51	22.53	22.54
		100#0	22.54	22.36	22.41
	16-QAM	1#0	22.81	22.93	22.91
		1#50	22.82	22.96	22.97
		1#99	22.74	22.76	22.71
		100#0	21.54	21.64	21.68

LTE Band V

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	23.26	23.31	23.42
		1#3	23.25	23.35	23.46
		1#5	23.29	23.34	23.37
		3#0	23.31	23.41	23.25
		3#3	23.26	23.16	23.24
		6#0	22.32	22.41	22.46
	16QAM	1#0	22.10	22.23	22.35
		1#3	22.08	22.18	22.26
		1#5	22.13	22.21	22.23
		6#0	21.34	21.53	21.57
3 MHz	QPSK	1#0	23.27	23.23	23.26
		1#8	23.24	23.29	23.31
		1#14	23.17	23.21	23.25
		10#0	22.31	22.36	23.39
		10#5	22.32	22.37	23.42
		15#0	22.31	22.26	22.35
	16QAM	1#0	22.82	22.93	23.02
		1#8	22.78	22.86	23.75
		1#14	22.82	22.97	22.83
		15#0	21.36	21.46	21.56
5 MHz	QPSK	1#0	23.32	23.35	23.36
		1#13	23.36	23.39	23.41
		1#24	23.37	23.42	23.46
		10#0	22.26	22.37	22.45
		10#15	22.27	22.35	22.36
		25#0	22.16	22.07	22.17
	16QAM	1#0	22.55	22.65	22.71
		1#13	22.56	22.63	22.68
		1#24	22.67	22.71	22.62
		25#0	21.14	21.16	21.35
10 MHz	QPSK	1#0	23.28	23.37	23.43
		1#25	23.30	23.39	23.45
		1#49	23.25	23.31	23.37
		25#0	22.14	22.28	22.21
		25#25	22.25	22.34	22.34
		50#0	22.11	22.17	22.13
	16QAM	1#0	22.14	22.23	22.35
		1#25	22.16	22.18	22.37
		1#49	22.20	22.23	22.32
		50#0	21.14	21.26	21.34

LTE Band 17

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.72	23.29	23.27
		1#13	23.26	23.35	23.31
		1#24	23.52	23.54	23.56
		10#0	21.95	22.13	22.08
		10#15	22.31	22.32	22.35
		25#0	22.10	22.18	22.23
	16QAM	1#0	22.15	22.57	22.35
		1#13	22.43	22.53	22.56
		1#24	22.66	22.67	22.71
		25#0	21.16	21.35	21.39
10 MHz	QPSK	1#0	22.85	22.95	23.06
		1#25	23.37	23.38	23.27
		1#49	23.01	23.12	23.15
		25#0	22.79	22.86	22.91
		25#25	22.21	22.31	22.35
		50#0	21.99	22.08	22.12
	16QAM	1#0	21.69	22.58	21.98
		1#25	22.20	22.36	22.39
		1#49	21.89	22.02	22.07
		50#0	21.34	21.49	21.53

PAR, Band II

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	3.88	4.58	3.53	13
	100 RB		6.31	6.47	6.15	13
16QAM	1 RB	20 MHz	4.87	5.19	4.49	13
	100 RB		7.05	7.15	7.02	13

PAR, Band V

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.84	3.65	4.07	13
	50 RB		5.58	5.38	5.35	13
16QAM	1 RB	10 MHz	5.93	4.74	5.06	13
	50 RB		6.92	7.00	7.16	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	2.95	3.56	3.81	13
	50 RB		5.26	5.38	5.45	13
16QAM	1 RB	10 MHz	4.26	4.58	5.00	13
	50 RB		6.06	5.29	6.28	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)			
WCDMA Band V Middle Channel								
836.600	H	95.21	20.3	0.0	1	19.3	38.5	19.2
836.600	V	92.52	20.7	0.0	1	19.7	38.5	18.8

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band II Middle Channel								
1880.000	H	81.95	9.3	11.7	2.7	18.3	33.0	14.7
1880.000	V	83.02	10.6	11.7	2.7	19.6	33.0	5.4

LTE Band II

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 1.4M BW Middle Channel 1880.000 **MHz**								
1880.000	H	79.06	6.4	11.7	2.7	15.4	33.0	17.6
1880.000	V	82.87	10.4	11.7	2.7	19.4	33.0	13.6
16-QAM 1.4M BW Middle Channel 1880.000 **MHz**								
1880.000	H	79.75	7.1	11.7	2.7	16.1	33.0	16.9
1880.000	V	81.85	9.4	11.7	2.7	18.4	33.0	14.6
QPSK 3M BW Middle Channel 1880.000 **MHz**								
1880.000	H	79.84	7.2	11.7	2.7	16.2	33.0	16.8
1880.000	V	81.98	9.5	11.7	2.7	18.5	33.0	14.5
16-QAM 3M BW Middle Channel 1880.000 **MHz**								
1880.000	H	79.91	7.3	11.7	2.7	16.3	33.0	16.7
1880.000	V	81.97	9.5	11.7	2.7	18.5	33.0	14.5
QPSK 5M BW Middle Channel 1880.000 **MHz**								
1880.000	H	80.01	7.4	11.7	2.7	16.4	33.0	16.6
1880.000	V	81.69	9.2	11.7	2.7	18.2	33.0	14.8
16-QAM 5M BW Middle Channel 1880.000 **MHz**								
1880.000	H	77.68	5.1	11.7	2.7	14.1	33.0	18.9
1880.000	V	81.69	9.2	11.7	2.7	18.2	33.0	14.8
QPSK 10M BW Middle Channel 1880.000 **MHz**								
1880.000	H	79.71	7.1	11.7	2.7	16.1	33.0	16.9
1880.000	V	81.98	9.5	11.7	2.7	18.5	33.0	14.5
16-QAM 10M BW Middle Channel 1880.000 **MHz**								
1880.000	H	80.21	7.6	11.7	2.7	16.6	33.0	16.4
1880.000	V	81.14	8.7	11.7	2.7	17.7	33.0	15.3
QPSK 15M BW Middle Channel 1880.000 **MHz**								
1880.000	H	78.71	6.1	11.7	2.7	15.1	33.0	17.9
1880.000	V	80.65	8.2	11.7	2.7	17.2	33.0	15.8
16-QAM 15M BW Middle Channel 1880.000 **MHz**								
1880.000	H	79.31	6.7	11.7	2.7	15.7	33.0	17.3
1880.000	V	80.88	8.4	11.7	2.7	17.4	33.0	15.6
QPSK 20M BW Middle Channel 1880.000 **MHz**								
1880.000	H	78.65	6	11.7	2.7	15.0	33.0	18.0
1880.000	V	79.85	7.4	11.7	2.7	16.4	33.0	16.6
16-QAM 20M BW Middle Channel 1880.000 **MHz**								
1880.000	H	78.32	5.7	11.7	2.7	14.7	33.0	18.3
1880.000	V	80.74	8.3	11.7	2.7	17.3	33.0	15.7

LTE Band V

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 MHz								
836.500	H	91.02	16.1	0.0	1	15.1	38.5	23.4
836.500	V	92.32	20.5	0.0	1	19.5	38.5	19.0
16-QAM 1.4 MHz Middle Channel 836.500 MHz								
836.500	H	90.47	15.5	0.0	1	14.5	38.5	24.0
836.500	V	91.96	20.2	0.0	1	19.2	38.5	19.3
QPSK 3 MHz Middle Channel 836.500 MHz								
836.500	H	90.35	15.4	0.0	1	14.4	38.5	24.1
836.500	V	91.99	20.2	0.0	1	19.2	38.5	19.3
16-QAM 3 MHz Middle Channel 836.500 MHz								
836.500	H	90.23	15.3	0.0	1	14.3	38.5	24.2
836.500	V	91.69	19.9	0.0	1	18.9	38.5	19.6
QPSK 5 MHz Middle Channel 836.500 MHz								
836.500	H	89.87	14.9	0.0	1	13.9	38.5	24.6
836.500	V	91.27	19.5	0.0	1	18.5	38.5	20.0
16-QAM 5 MHz Middle Channel 836.500 MHz								
836.500	H	89.68	14.8	0.0	1	13.8	38.5	24.7
836.500	V	91.13	19.3	0.0	1	18.3	38.5	20.2
QPSK 10 MHz Middle Channel 836.500 MHz								
836.500	H	88.10	13.2	0.0	1	12.2	38.5	26.3
836.500	V	91.02	19.2	0.0	1	18.2	38.5	20.3
16-QAM 10 MHz Middle Channel 836.500 MHz								
836.500	H	87.76	12.8	0.0	1	11.8	38.5	26.7
836.500	V	91.57	19.8	0.0	1	18.8	38.5	19.7

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 MHz								
710.000	H	90.30	13.5	0.0	0.9	12.6	34.8	22.2
710.000	V	93.49	19.1	0.0	0.9	18.2	34.8	16.6
16-QAM 5 MHz Middle Channel 710.000 MHz								
710.000	H	89.57	12.8	0.0	0.9	11.9	34.8	22.9
710.000	V	92.61	18.3	0.0	0.9	17.4	34.8	17.4
QPSK 10 MHz Middle Channel 710.000 MHz								
710.000	H	89.71	12.9	0.0	0.9	12.0	34.8	22.8
710.000	V	92.24	17.9	0.0	0.9	17.0	34.8	17.8
16-QAM 10 MHz Middle Channel 710.000 MHz								
710.000	H	88.92	12.1	0.0	0.9	11.2	34.8	23.6
710.000	V	92.52	18.2	0.0	0.9	17.3	34.8	17.5

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

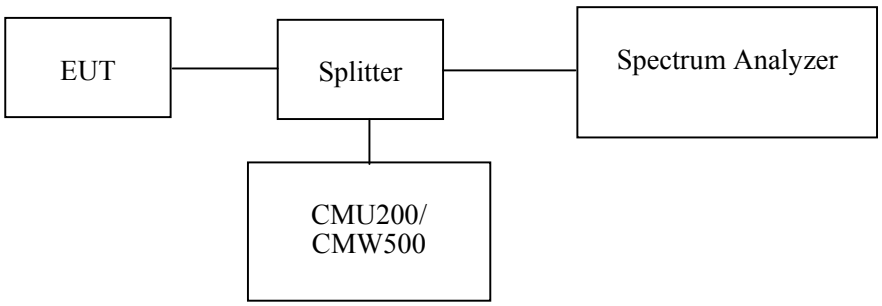
Applicable Standard

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

Test Procedure

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

The 26 dB & 99% bandwidth was recorded.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	831259/019	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	149216	2016-10-08	2017-10-08
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	27.6~27.8 °C
Relative Humidity:	53~57 %
ATM Pressure:	100~100.2 kPa

The testing was performed by Pean Zhu from 2017-08-31 to 2017-09-01.

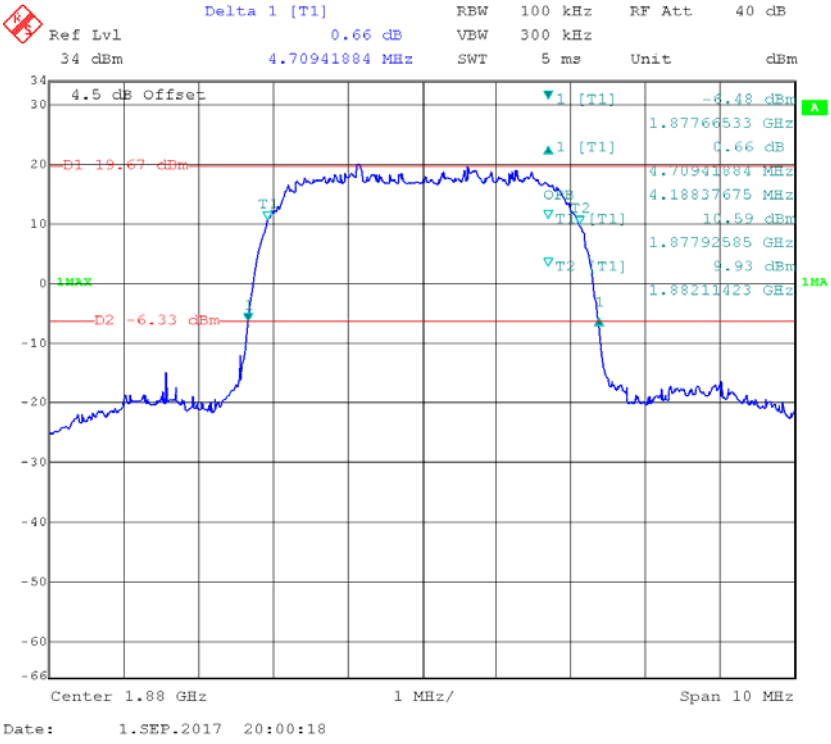
Test Mode: Transmitting

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

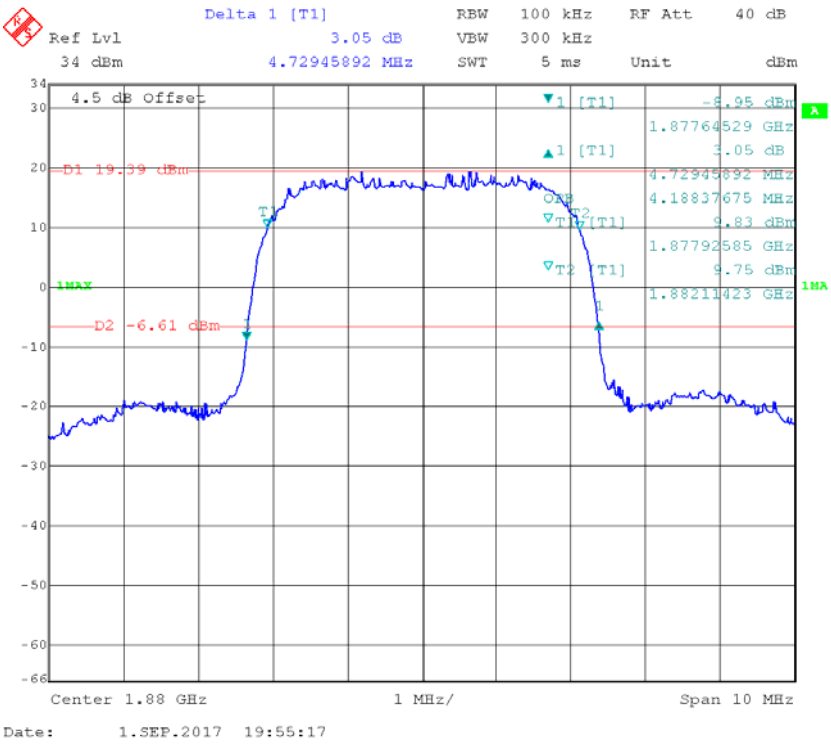
Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
WCDMA Band II	M	Rel 99	4.188	4.709
		HSDPA	4.188	4.729
		HSUPA	4.188	4.709
WCDMA Band V		Rel 99	4.168	4.729
		HSDPA	4.148	4.709
		HSUPA	4.168	4.709

Band	Test Modulation	Test Bandwidth (MHz)	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
LTE Band II	QPSK	1.4	M	1.112	1.335
		3		2.778	3.234
		5		4.549	5.150
		10		9.098	10.461
		15		13.647	15.451
		20		18.277	20.441
	16QAM	1.4	M	1.118	1.353
		3		2.790	3.246
		5		4.549	5.230
		10		9.098	10.341
		15		13.587	15.210
		20		18.196	20.361
LTE Band V	QPSK	1.4	M	1.106	1.335
		3		2.778	3.198
		5		4.509	5.110
		10		9.138	10.341
	16QAM	1.4	M	1.118	1.341
		3		2.777	3.222
		5		4.529	5.170
		10		9.058	10.301
LTE Band 17	QPSK	5	M	4.529	5.130
		10		8.978	9.910
	16QAM	5	M	4.529	5.170
		10		8.938	9.830

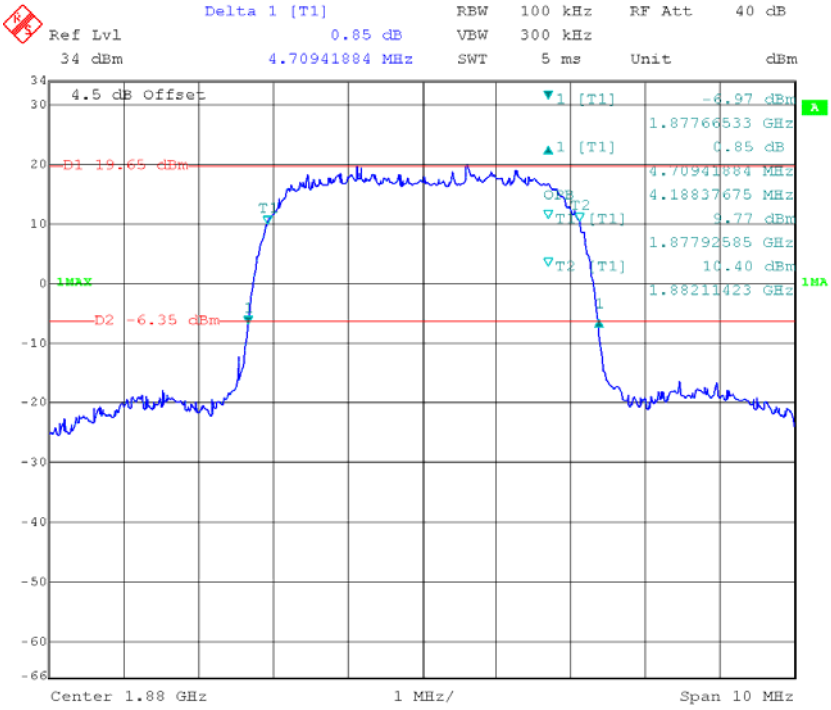
REL99 Band II



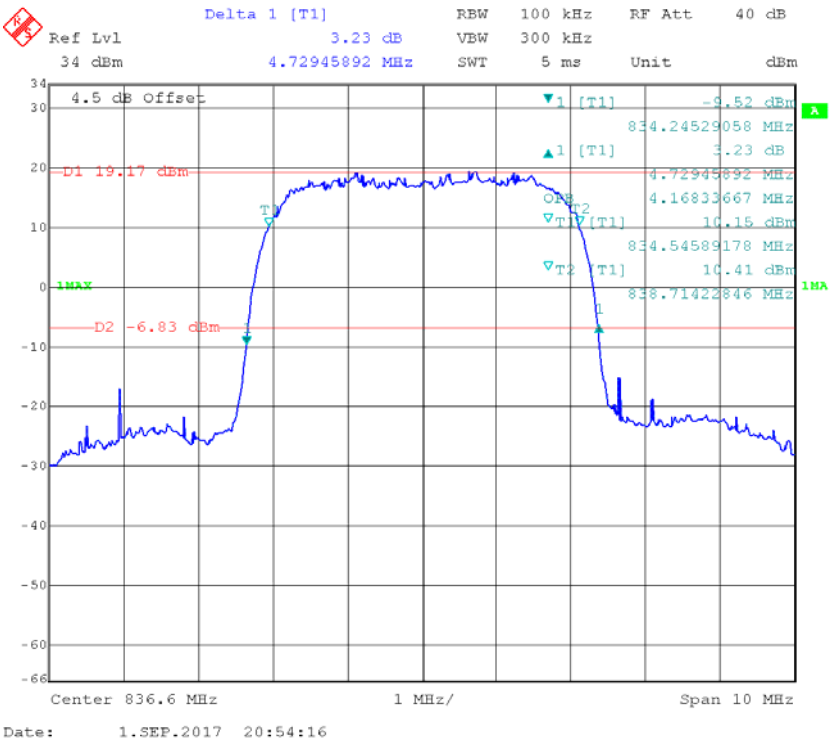
HSDPA Band II



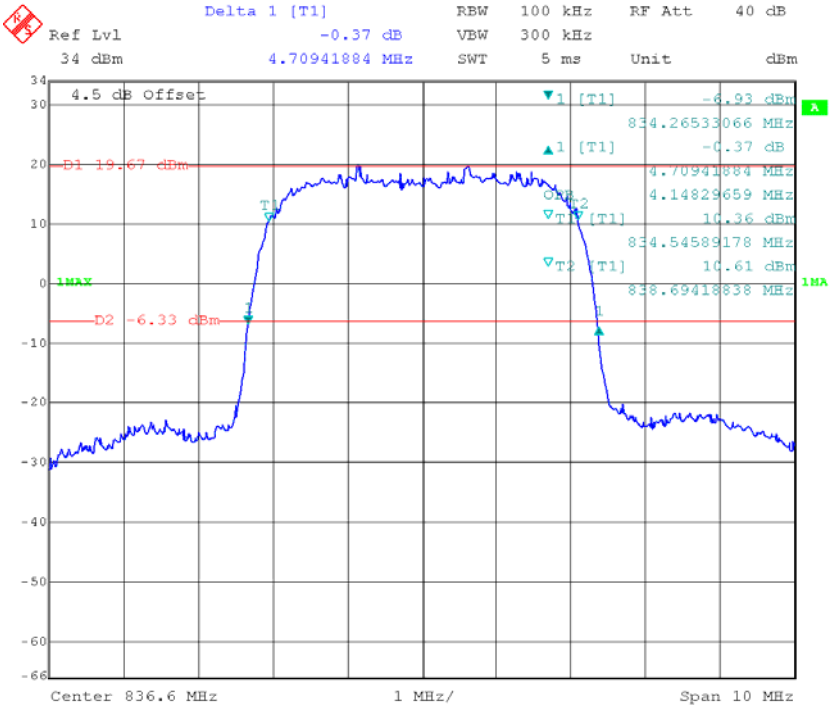
HSUPA Band II



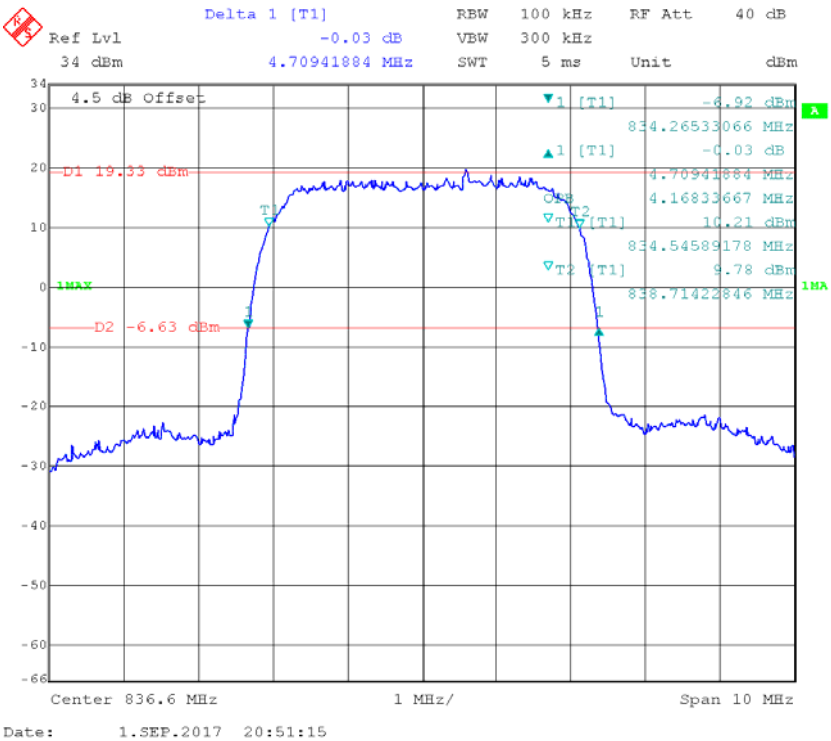
REL99 Band V



HSDPA Band V

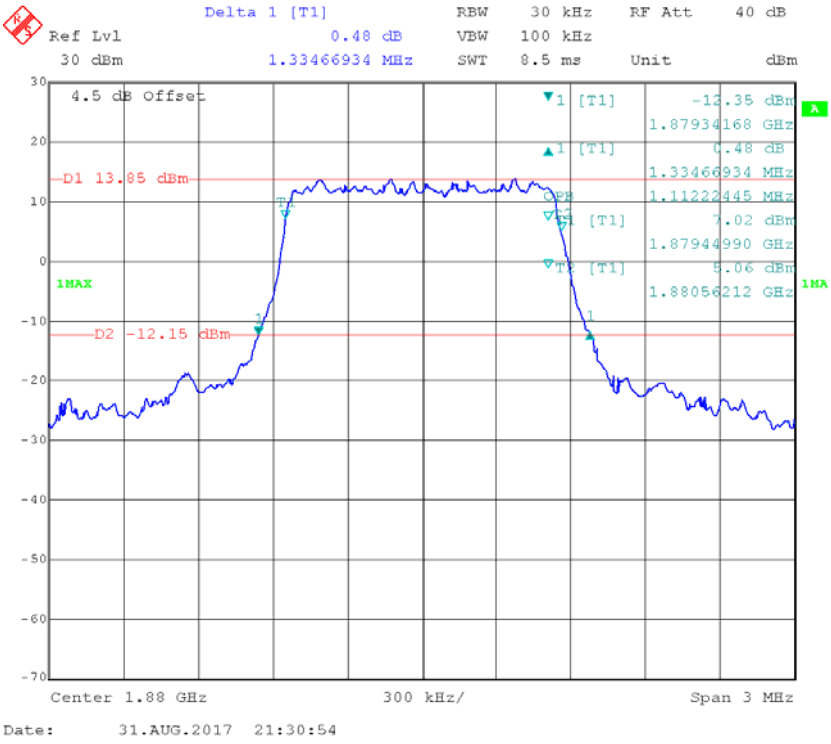


HSUPA Band V

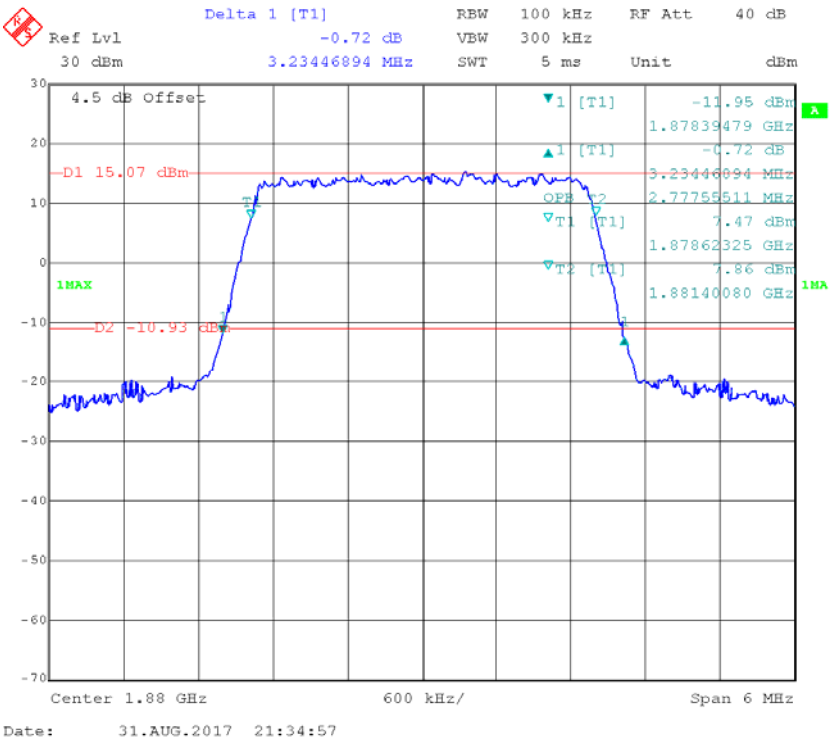


LTE Band II:

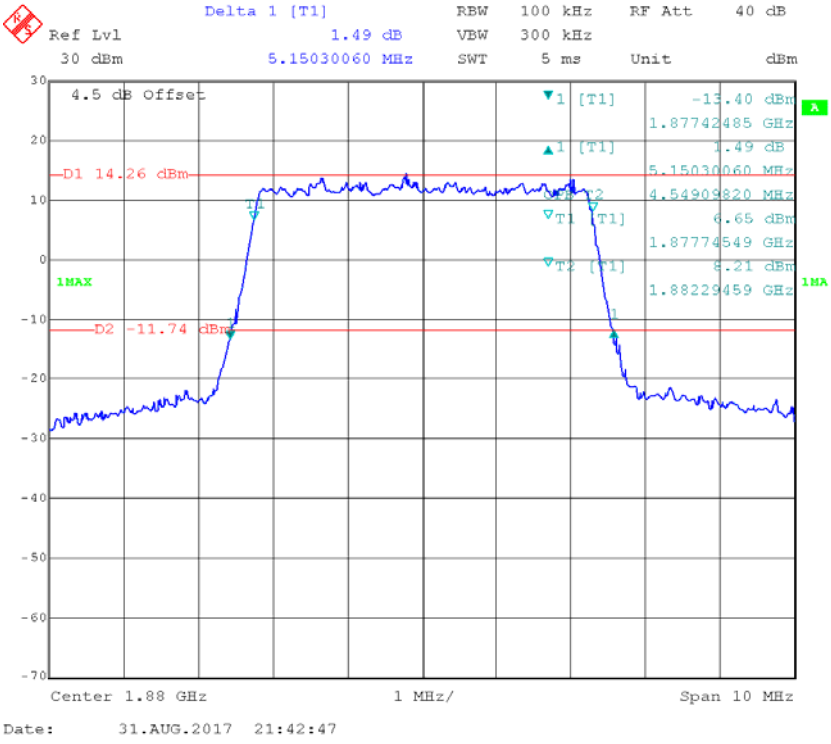
QPSK_1.4 MHz



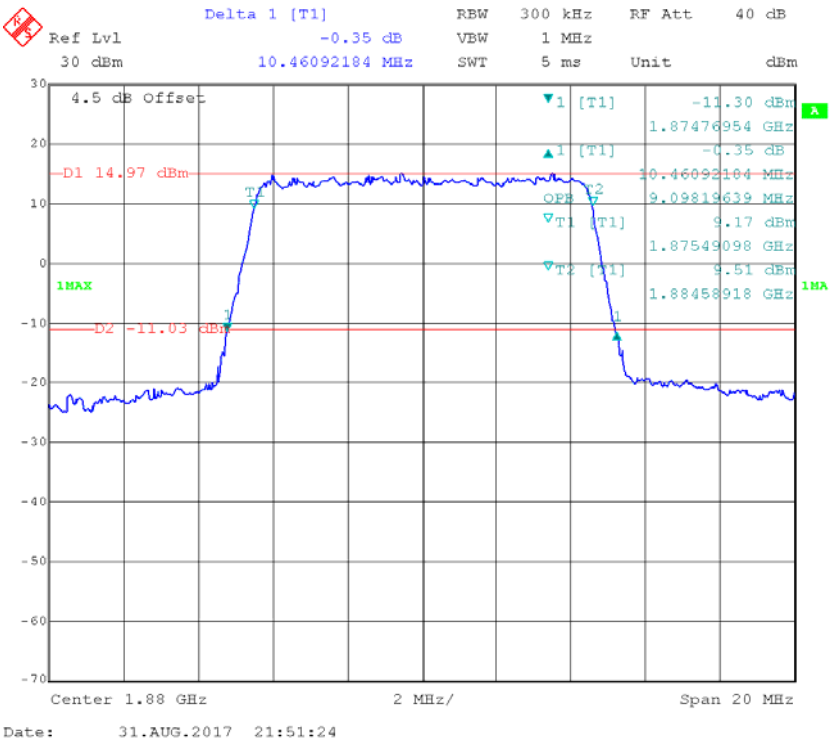
QPSK_3 MHz



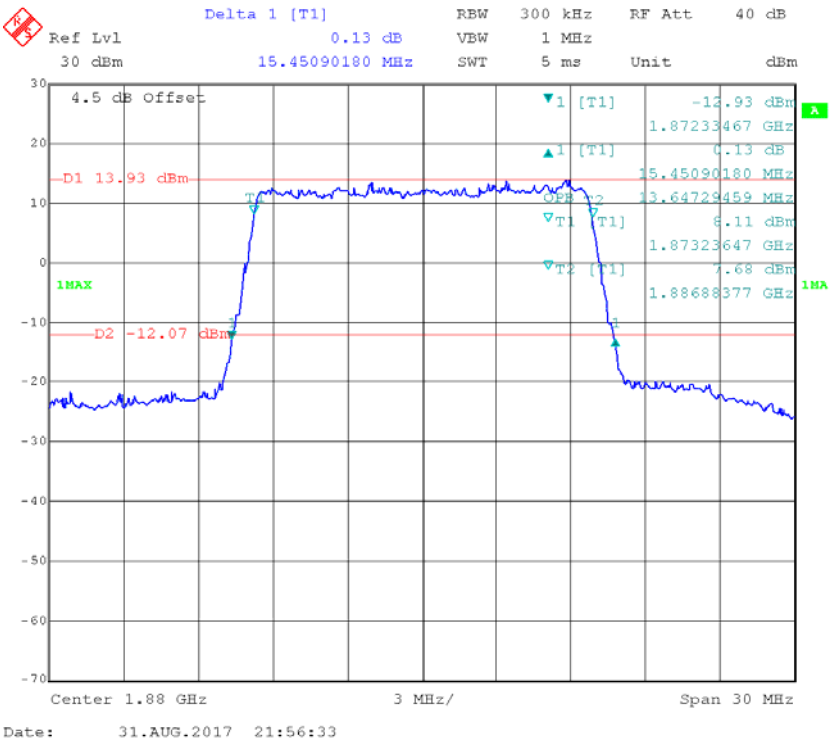
QPSK_5 MHz



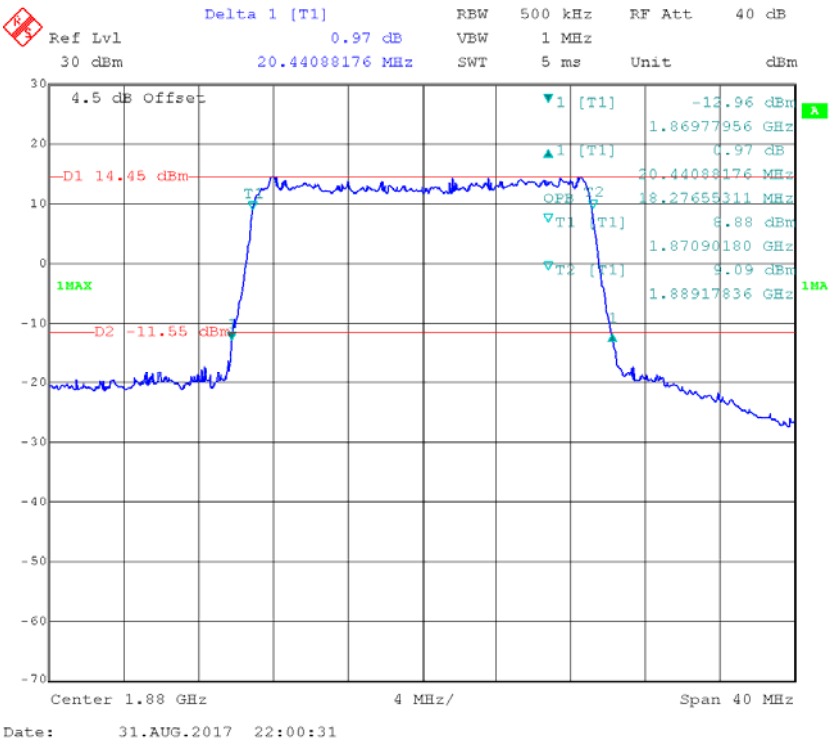
QPSK_10 MHz



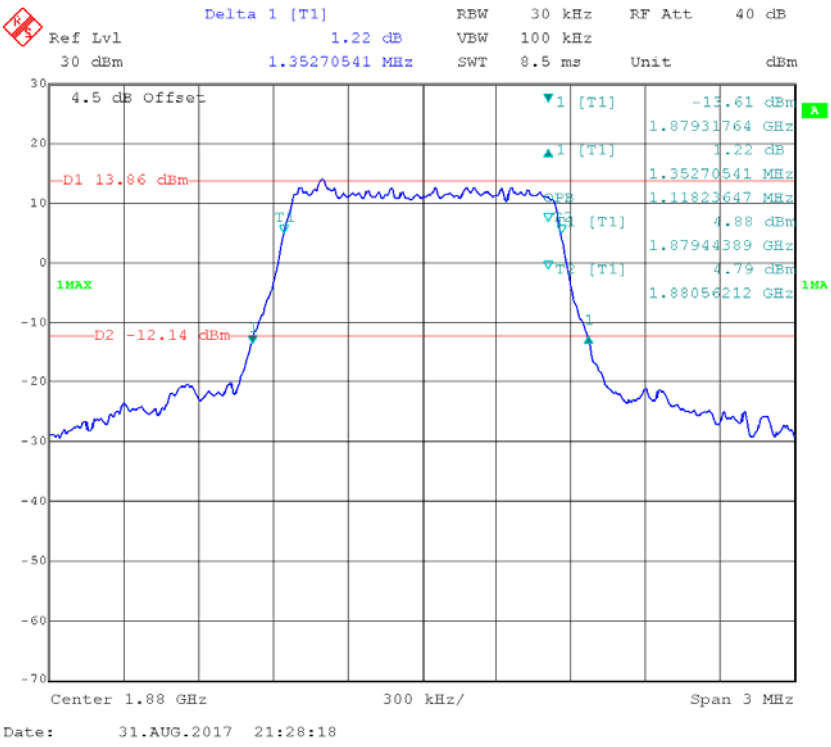
QPSK_15 MHz



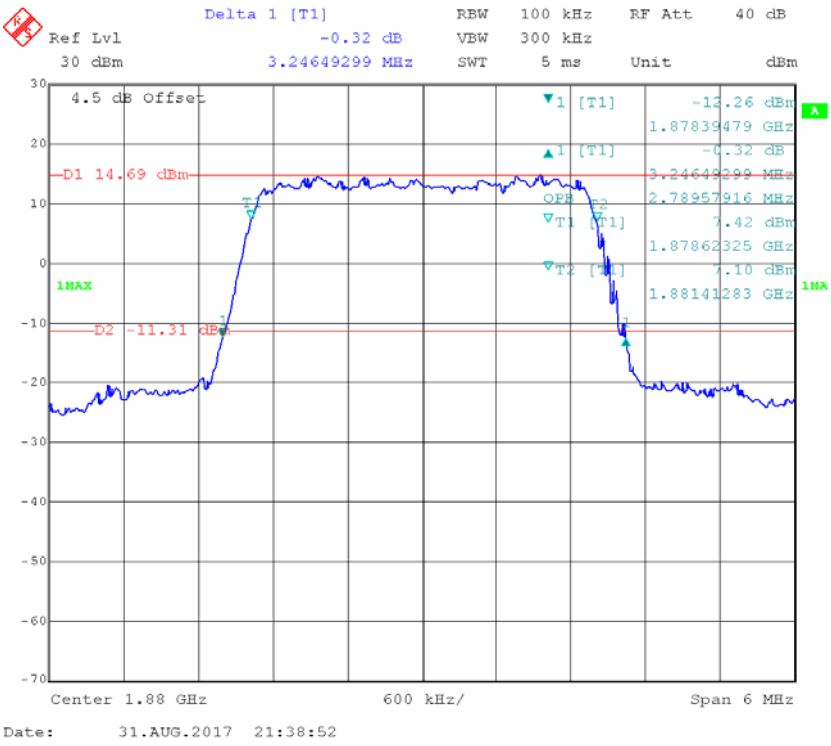
QPSK_20 MHz



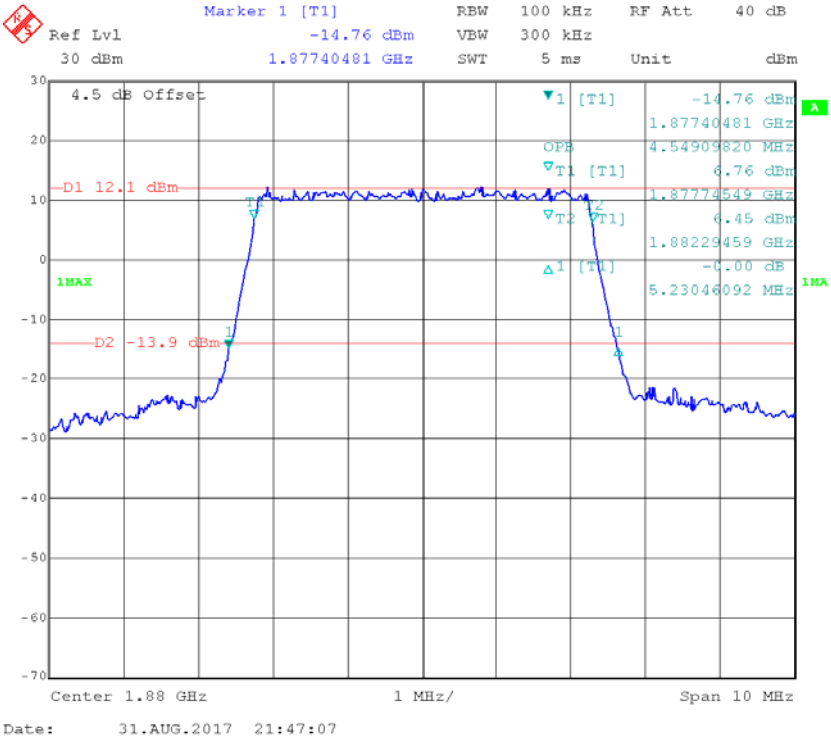
16-QAM_1.4 MHz



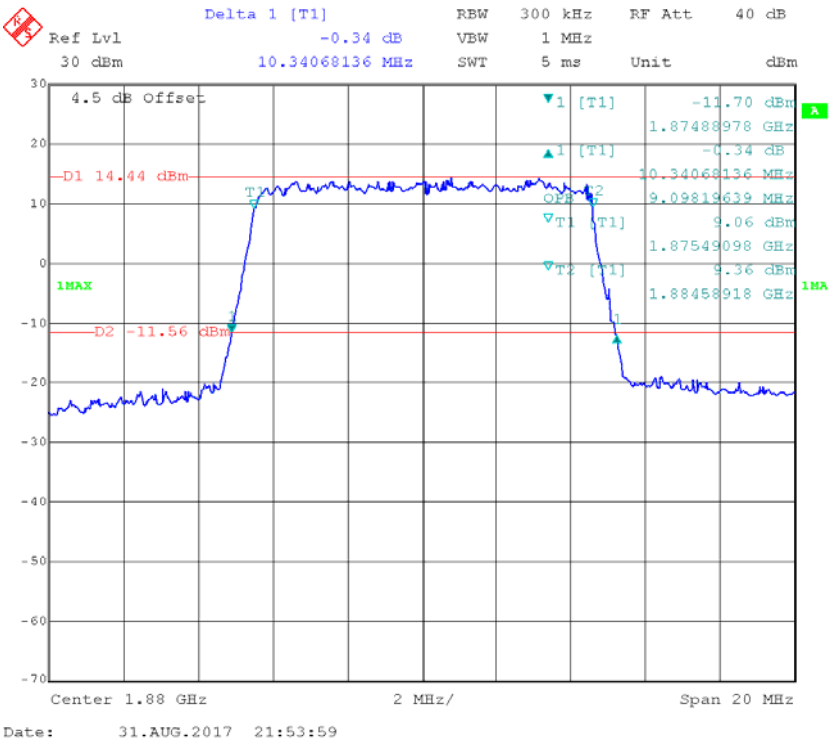
16-QAM_3 MHz



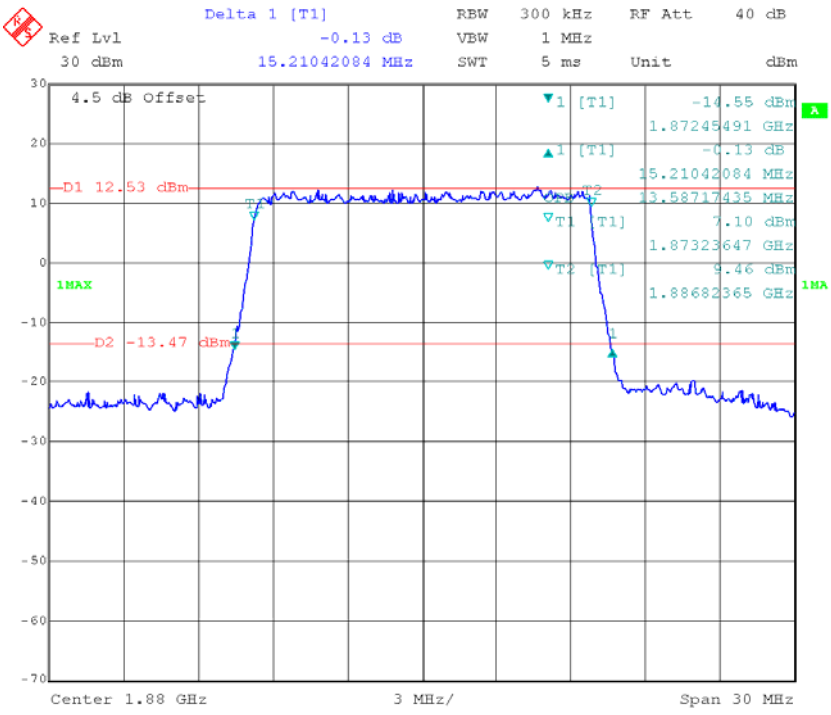
16-QAM_5 MHz



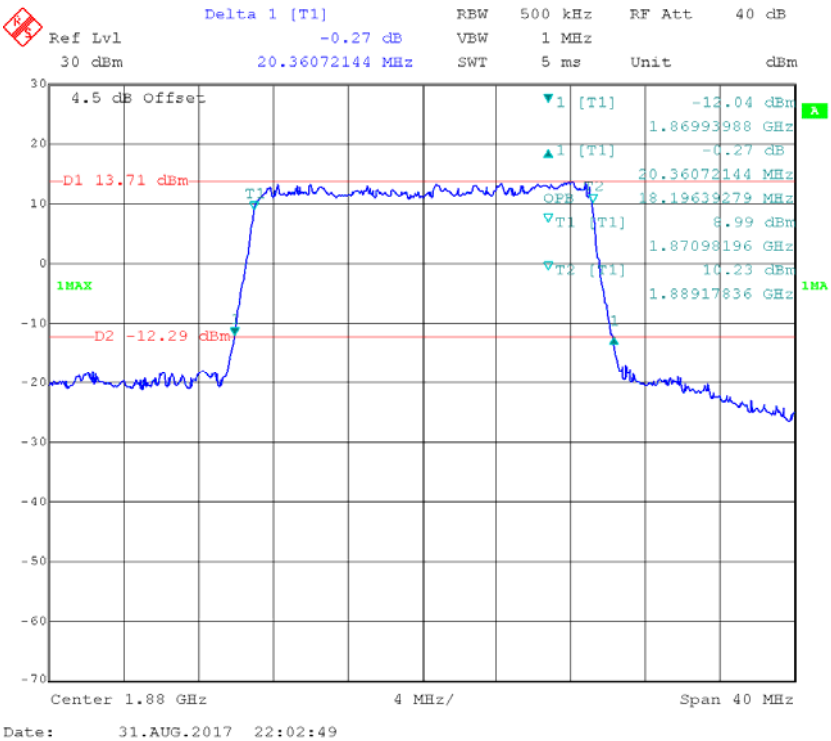
16-QAM_10 MHz



16-QAM_15 MHz

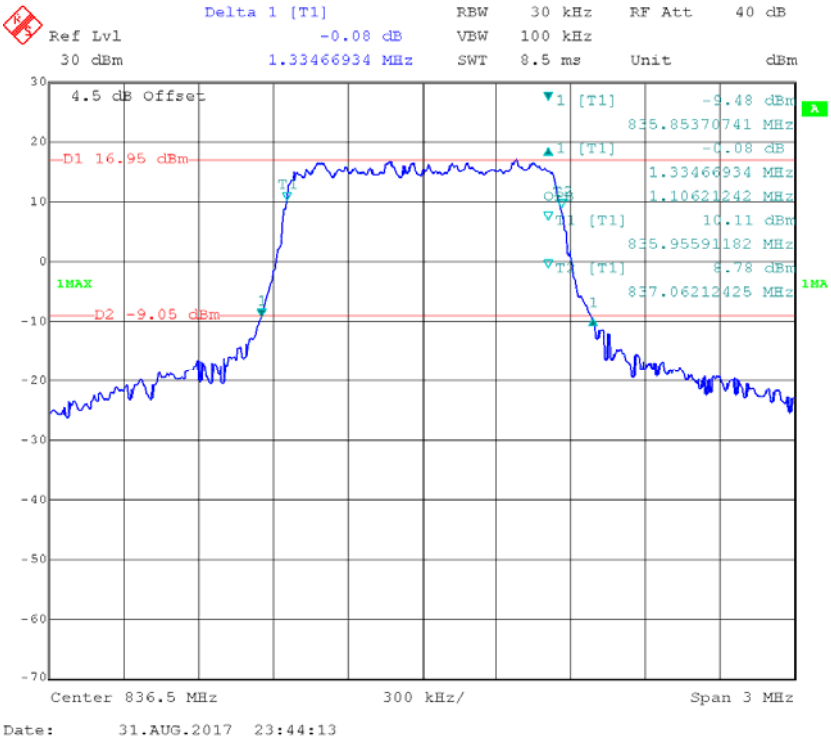


16-QAM_20 MHz

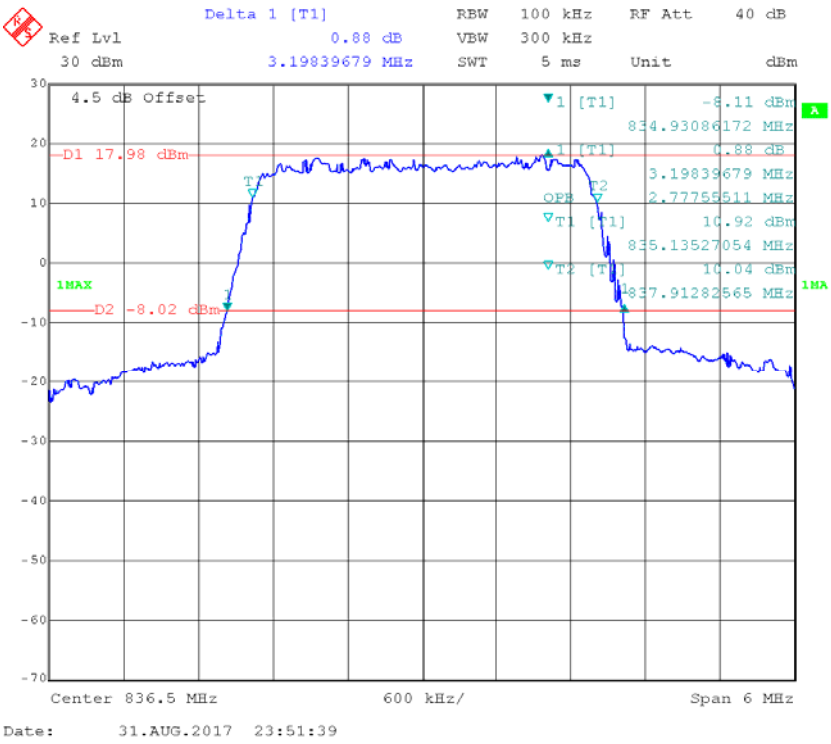


LTE Band V:

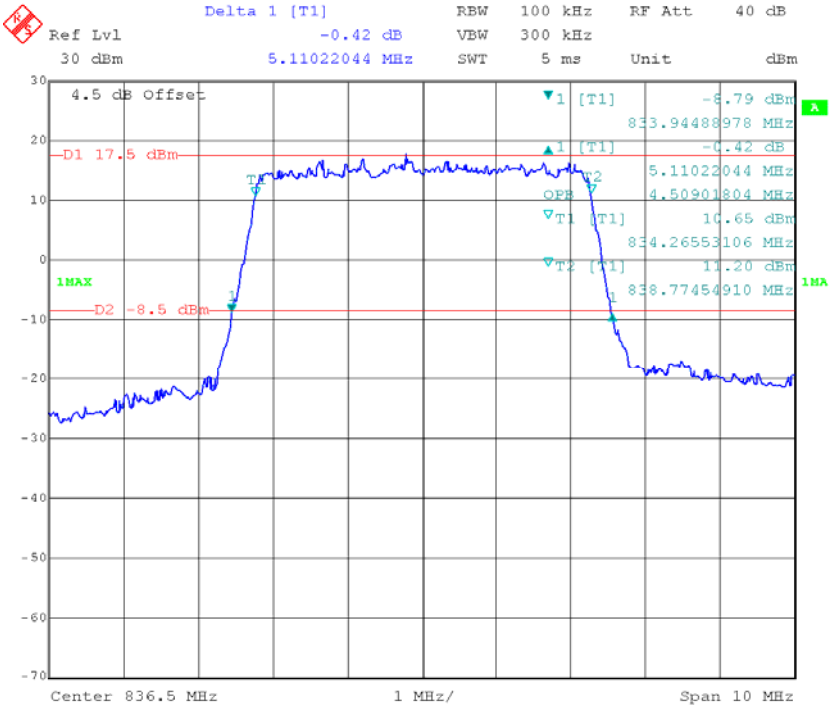
QPSK_1.4 MHz



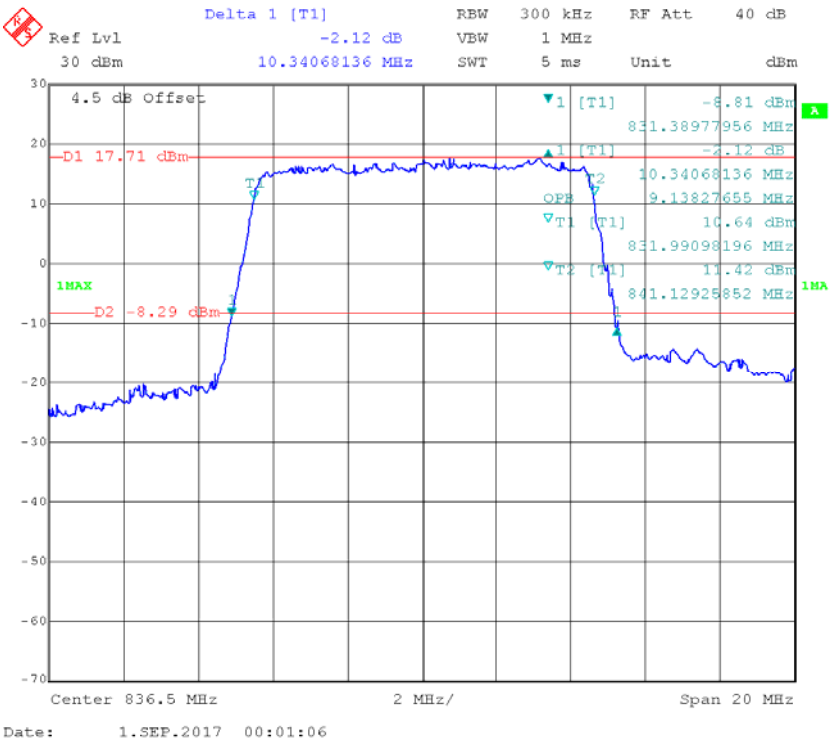
QPSK_3 MHz



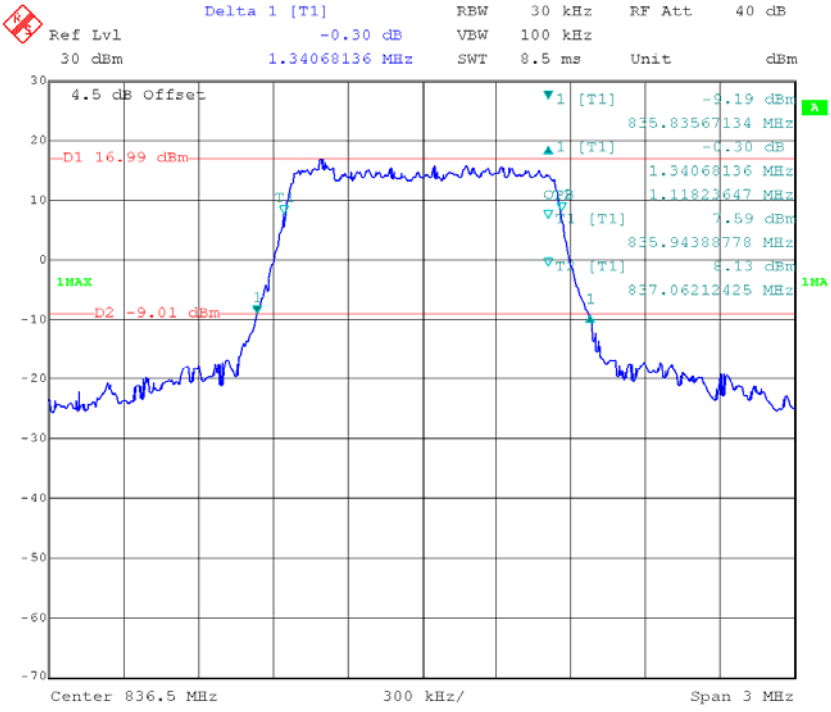
QPSK_5 MHz



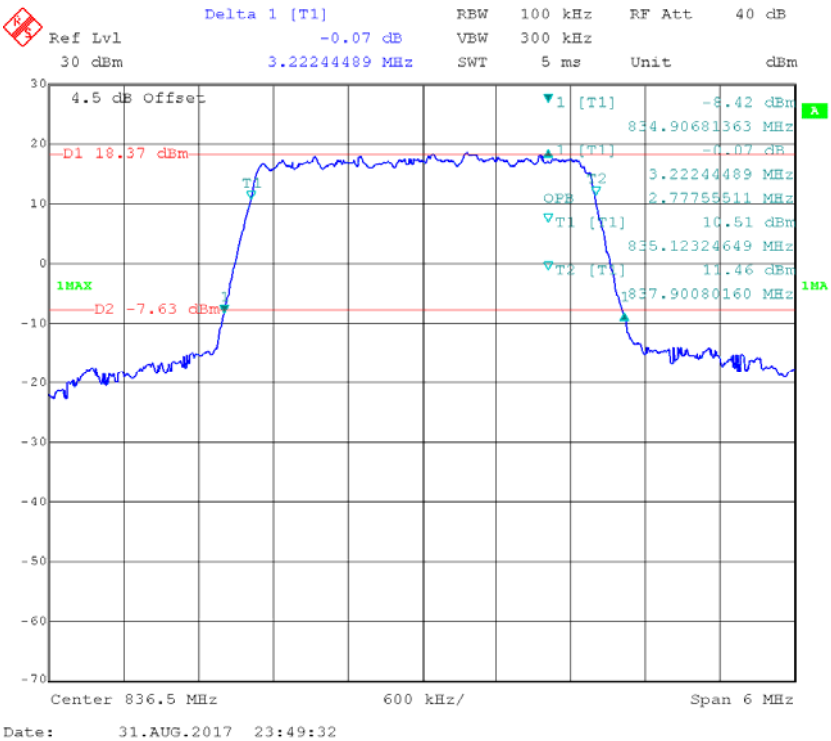
QPSK_10 MHz



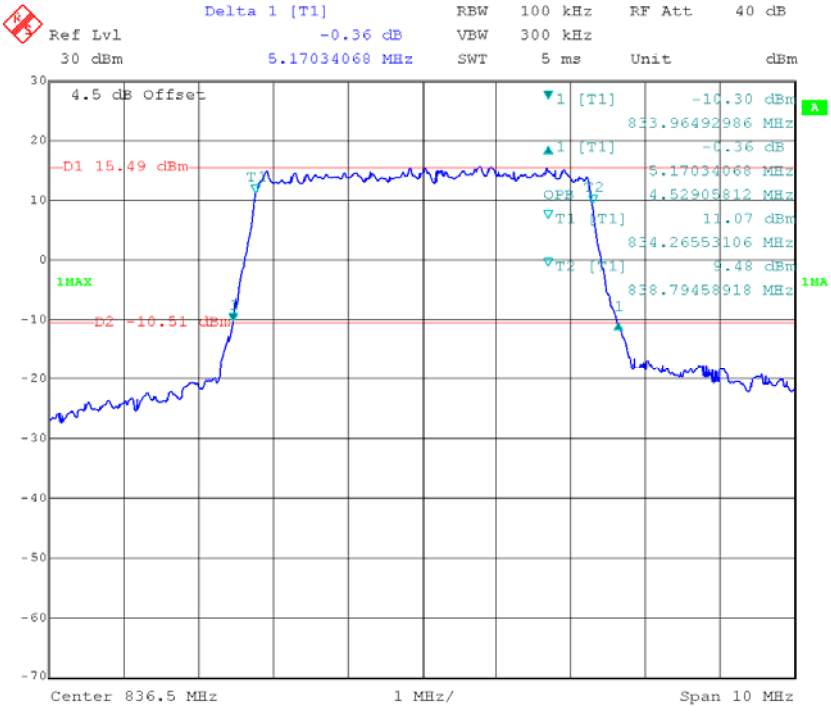
16-QAM_1.4 MHz



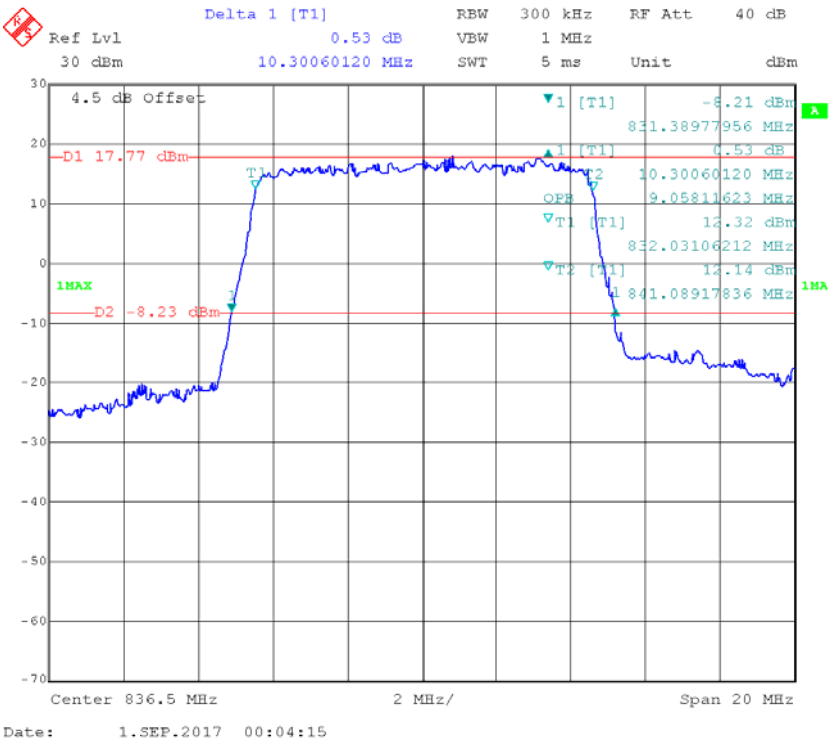
16-QAM_3 MHz



16-QAM_5 MHz

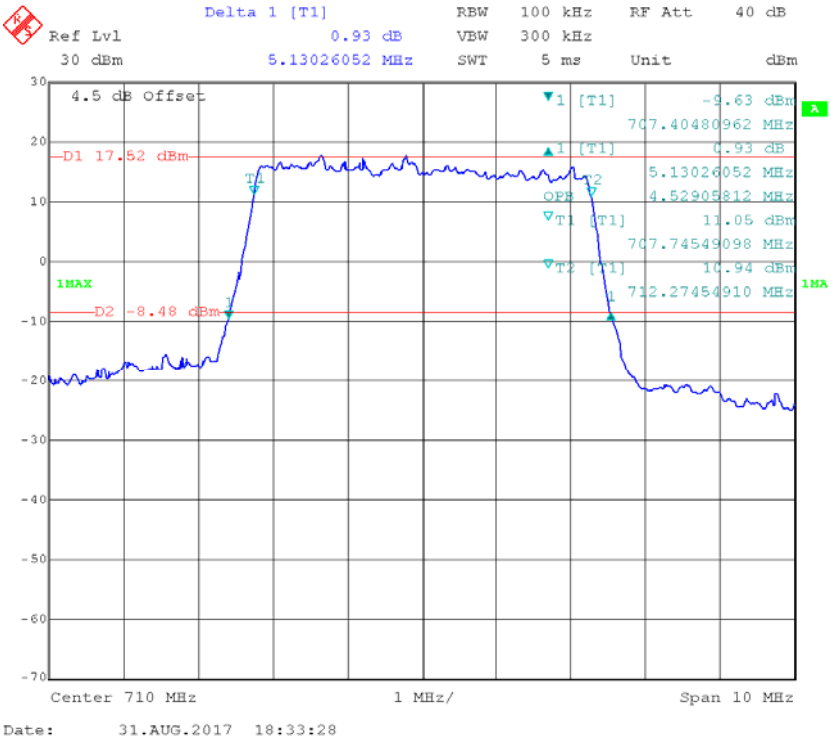


16-QAM_10 MHz

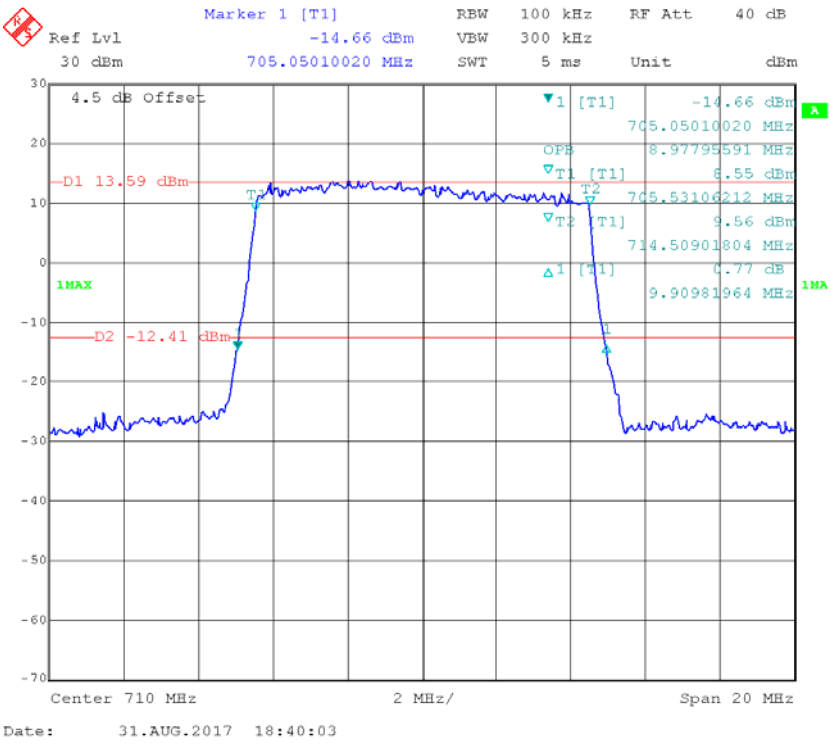


LTE Band 17:

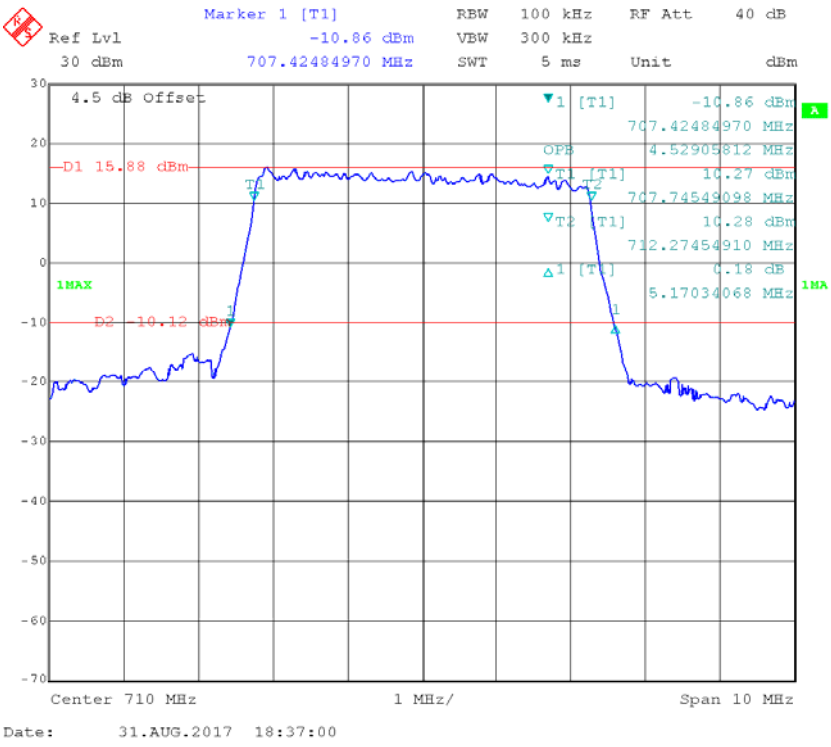
QPSK_5 MHz



QPSK_10 MHz

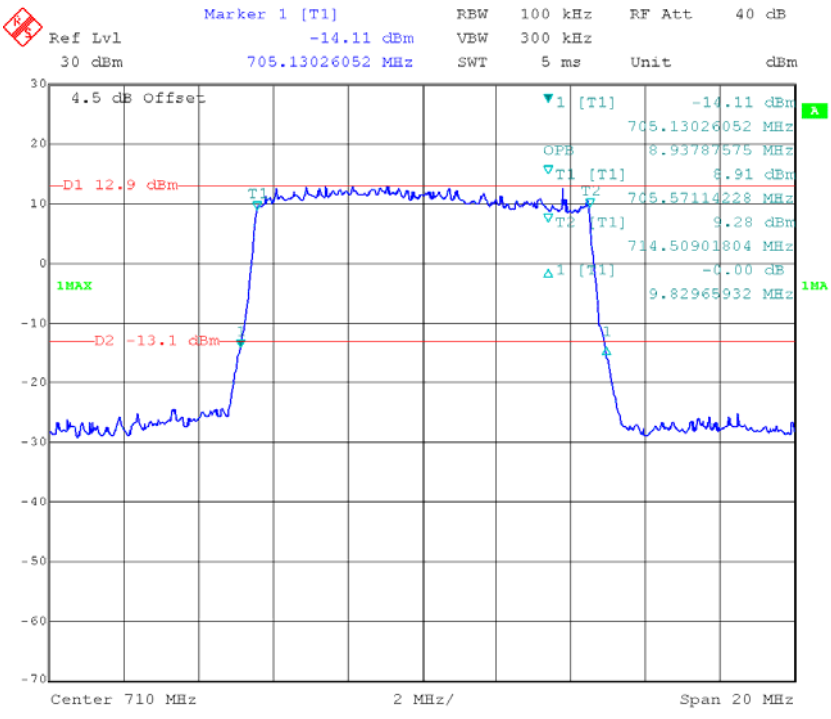


16-QAM_5 MHz



Date: 31.AUG.2017 18:37:00

16-QAM_10 MHz



Date: 31.AUG.2017 18:41:32

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

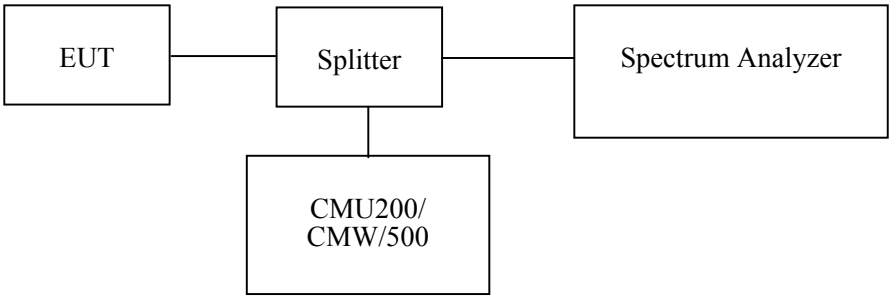
Applicable Standard

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

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

Test Procedure

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	831259/019	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	149216	2016-10-08	2017-10-08
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/

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

Test Data

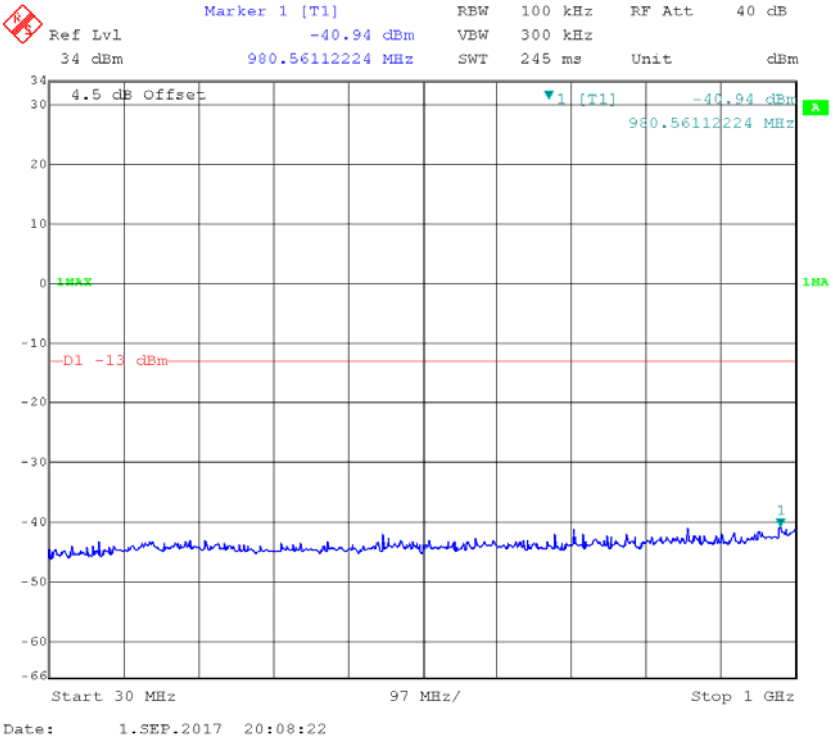
Environmental Conditions

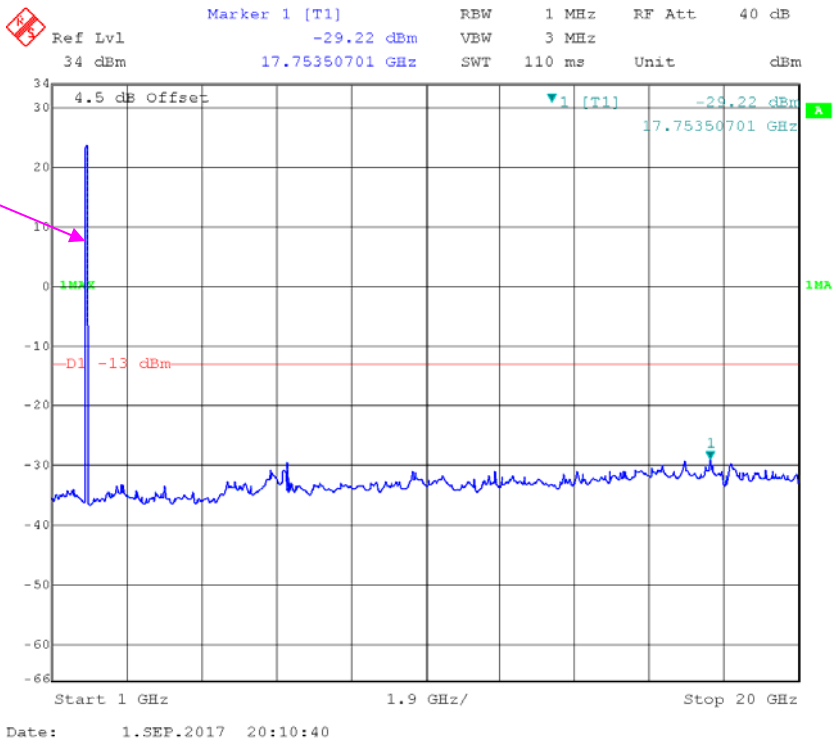
Temperature:	27.6~27.8 °C
Relative Humidity:	53~57 %
ATM Pressure:	100~100.2 kPa

The testing was performed by Pean Zhu from 2017-08-31 to 2017-09-01.

Please refer to the following plots.

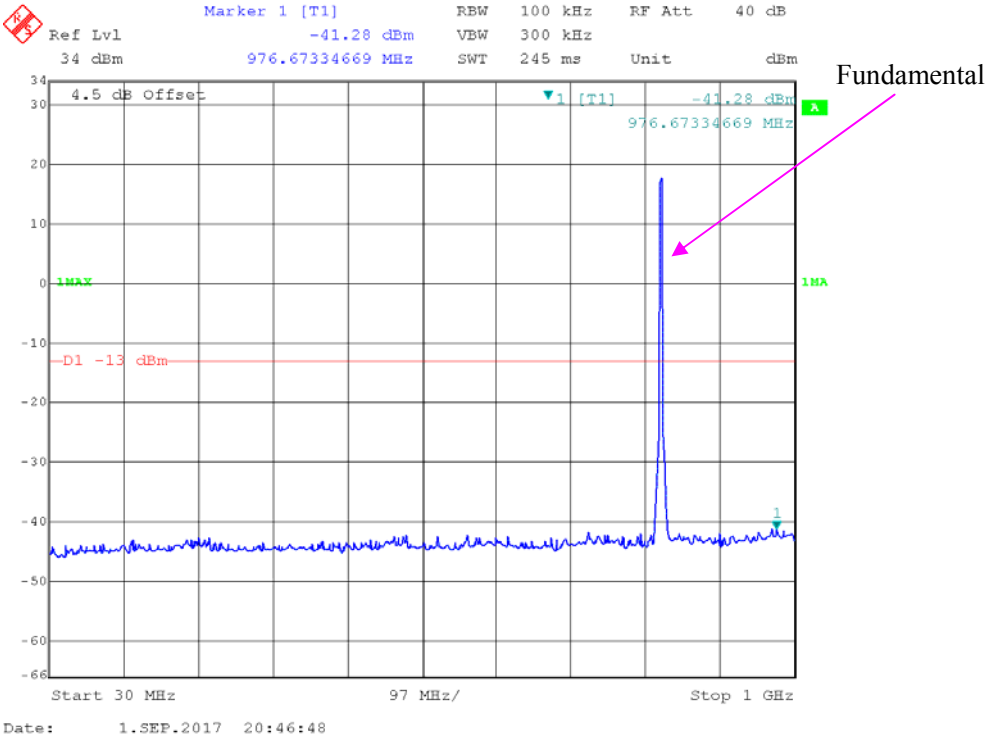
REL99 Band II_ Middle Channel

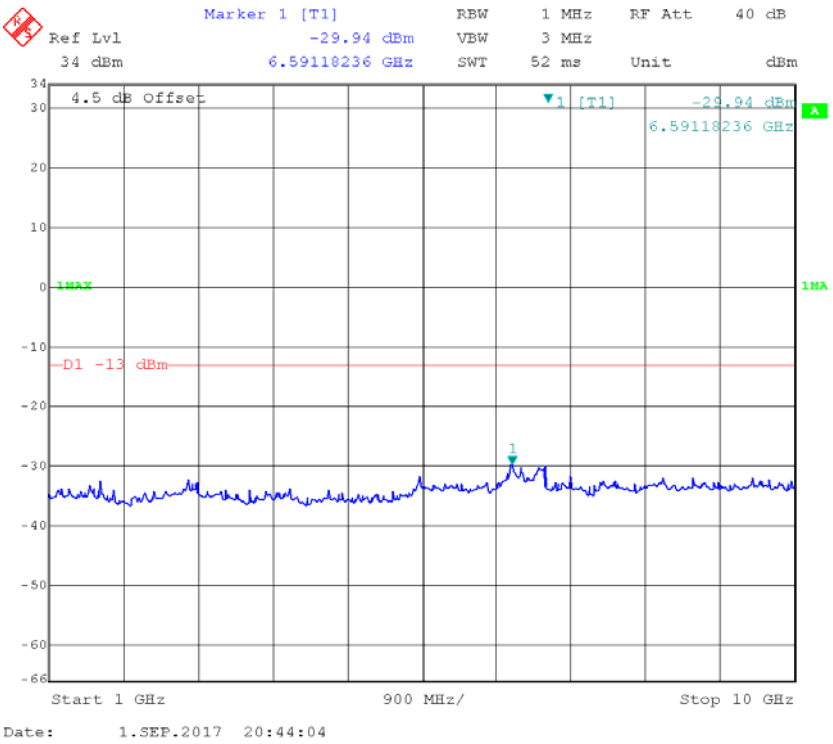




Fundamental

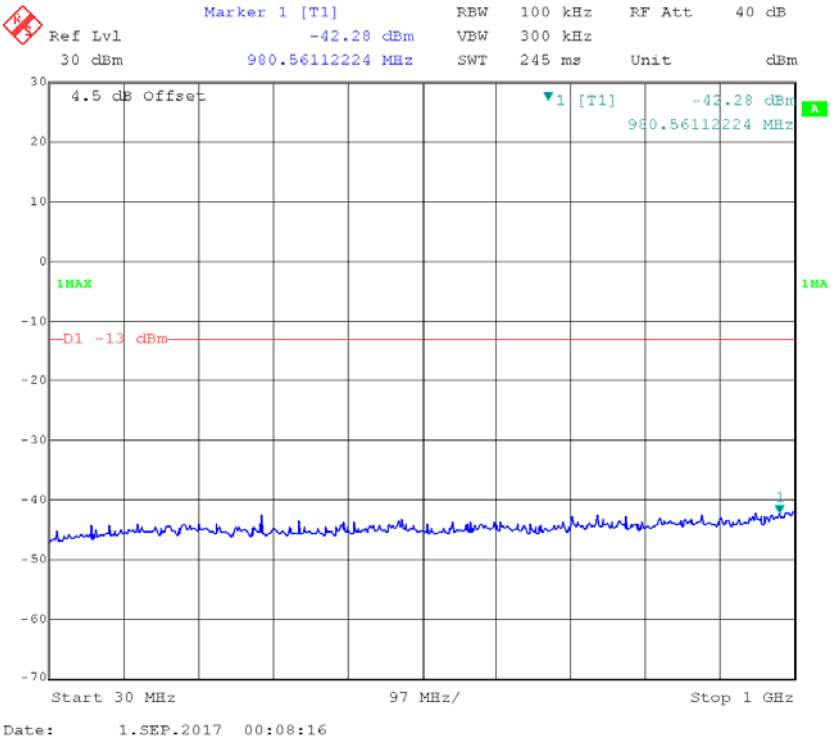
REL99 Band V_ Middle Channel

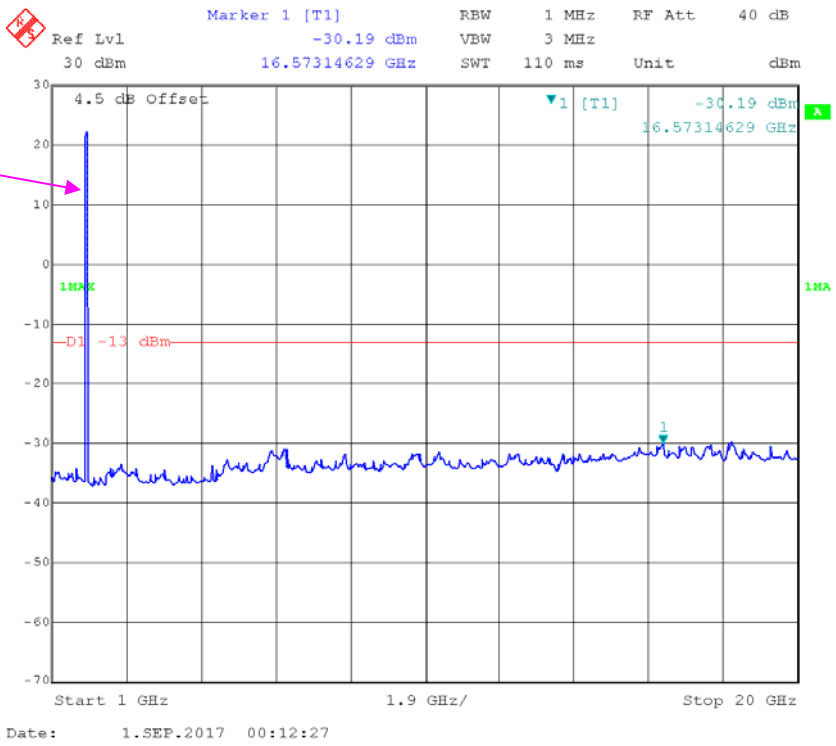




LTE Band II (Middle Channel)

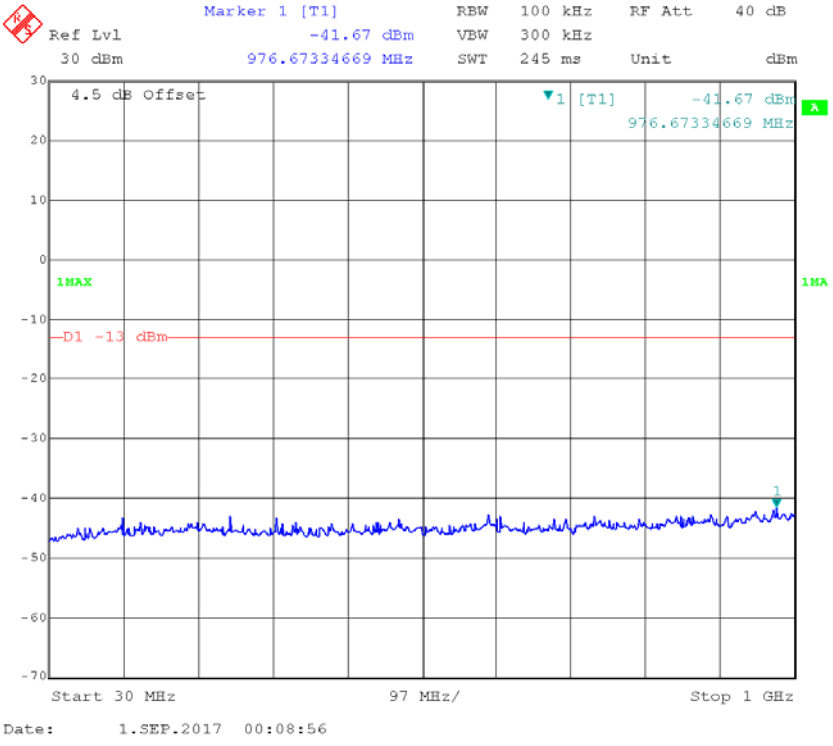
QPSK_1.4 MHz

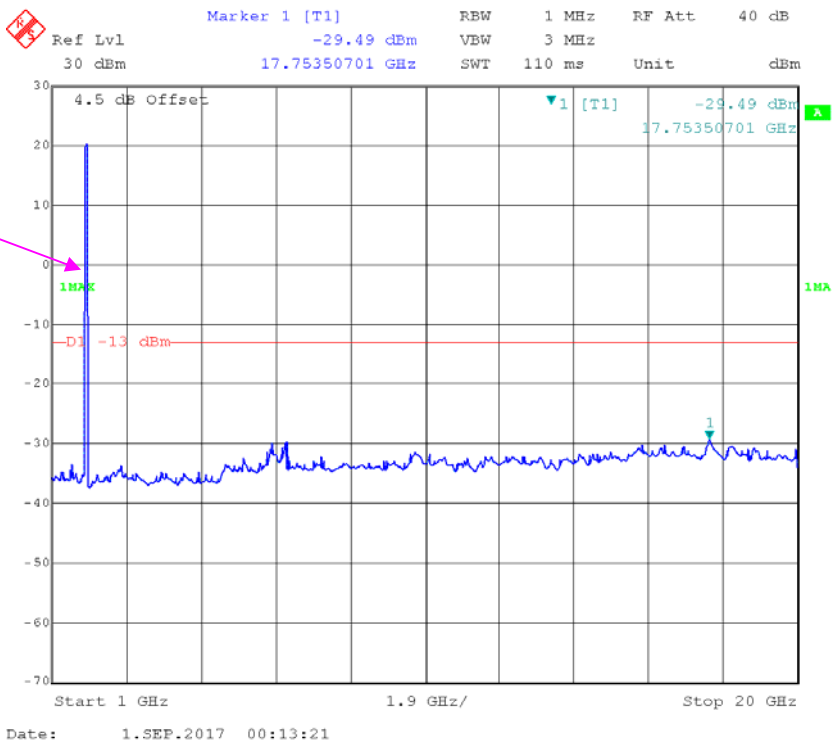




Fundamental

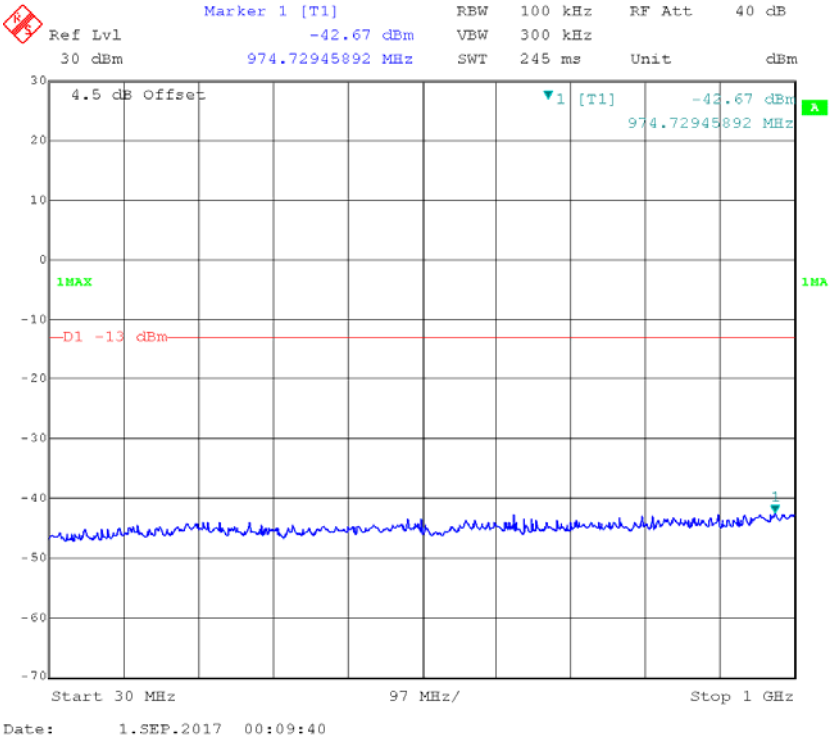
QPSK_3 MHz

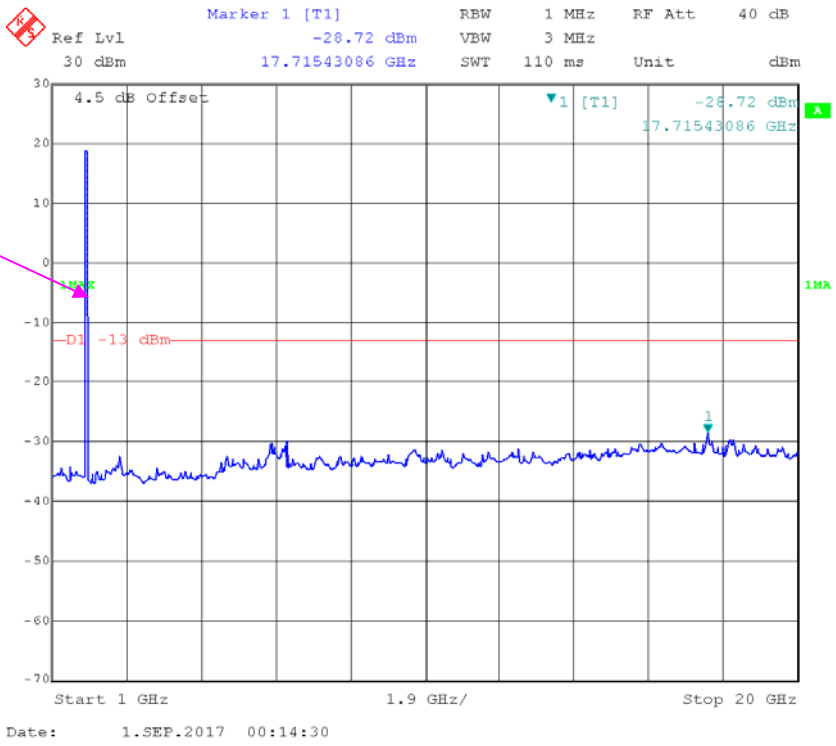




Fundamental

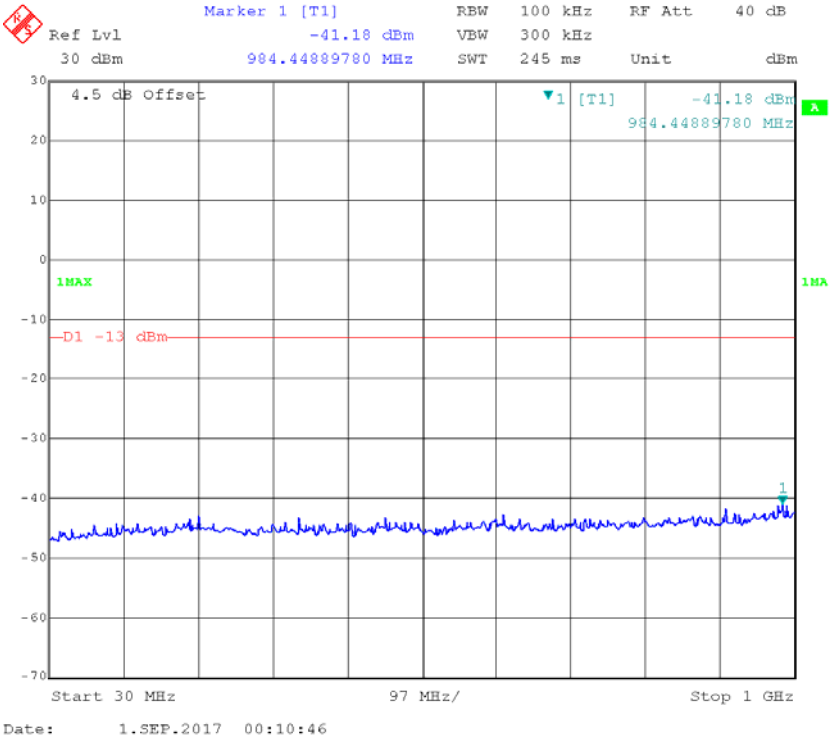
QPSK_5 MHz

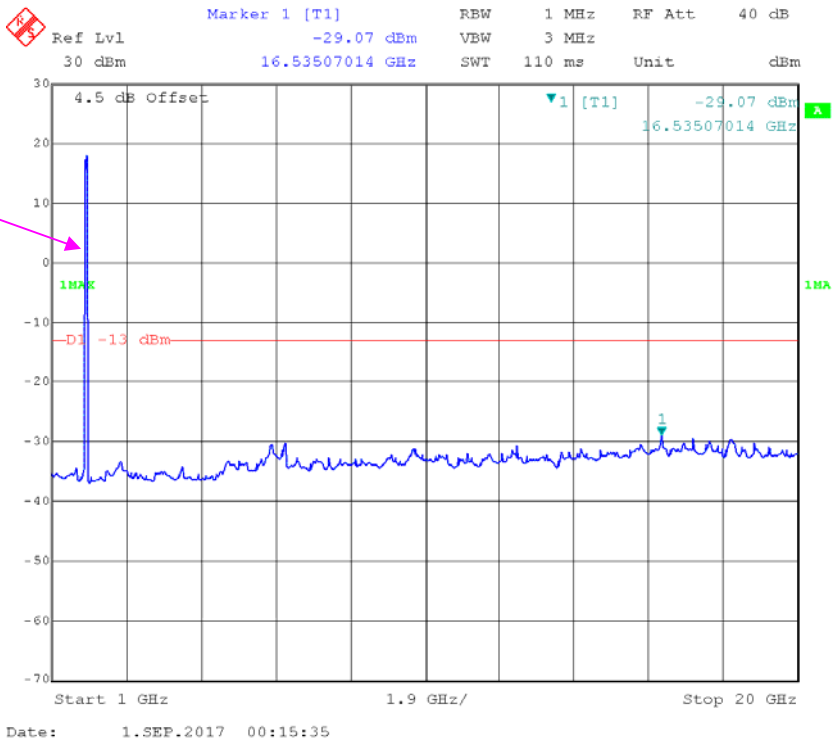




Fundamental

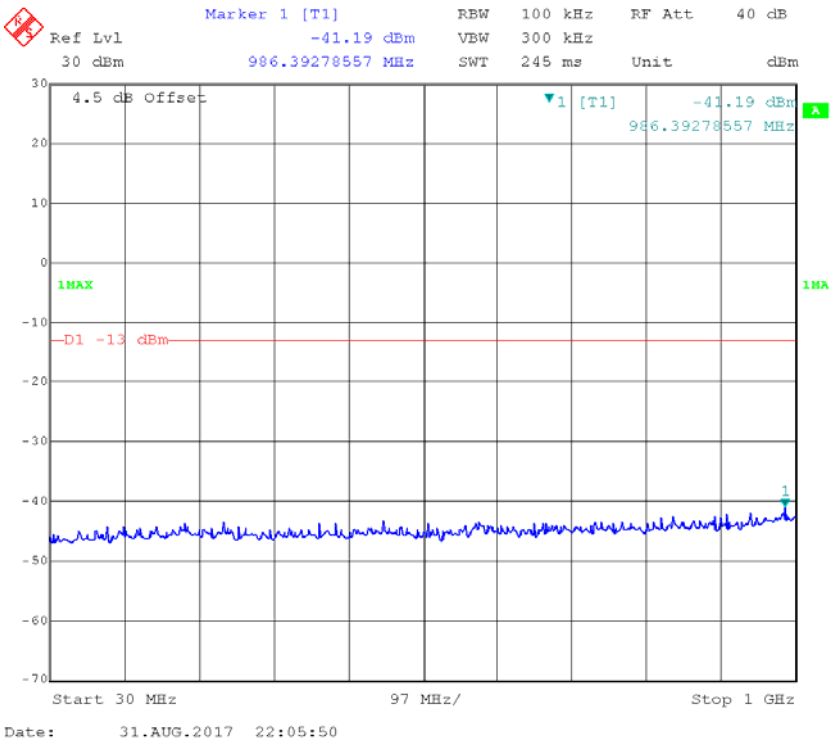
QPSK_10 MHz

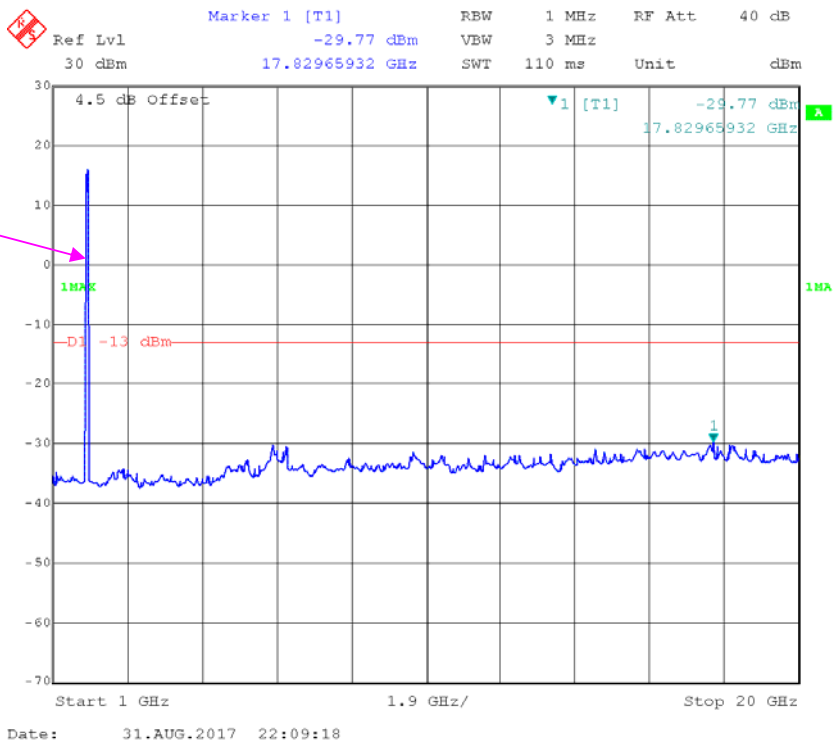




Fundamental

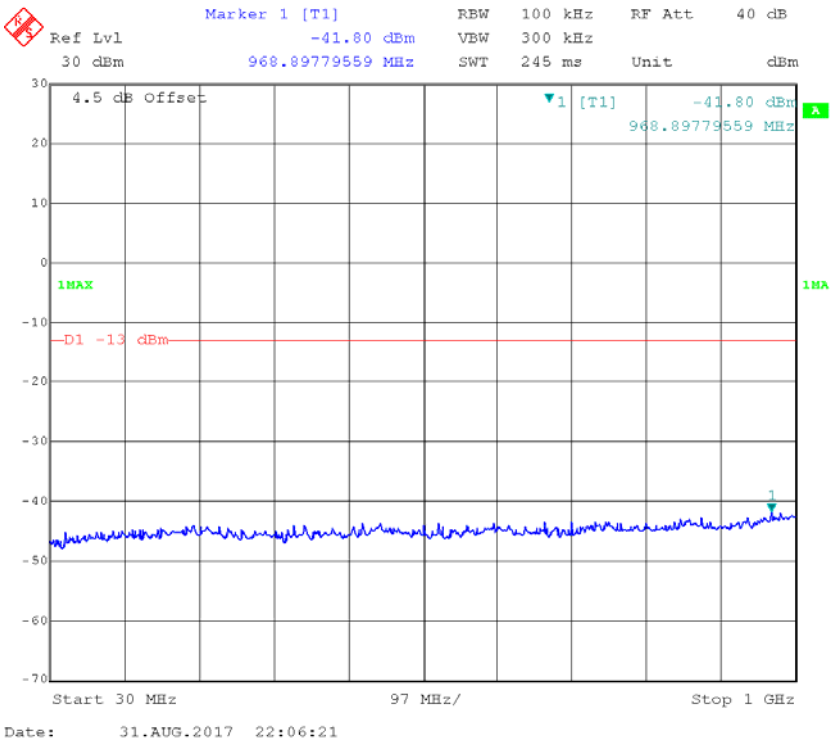
QPSK_15 MHz

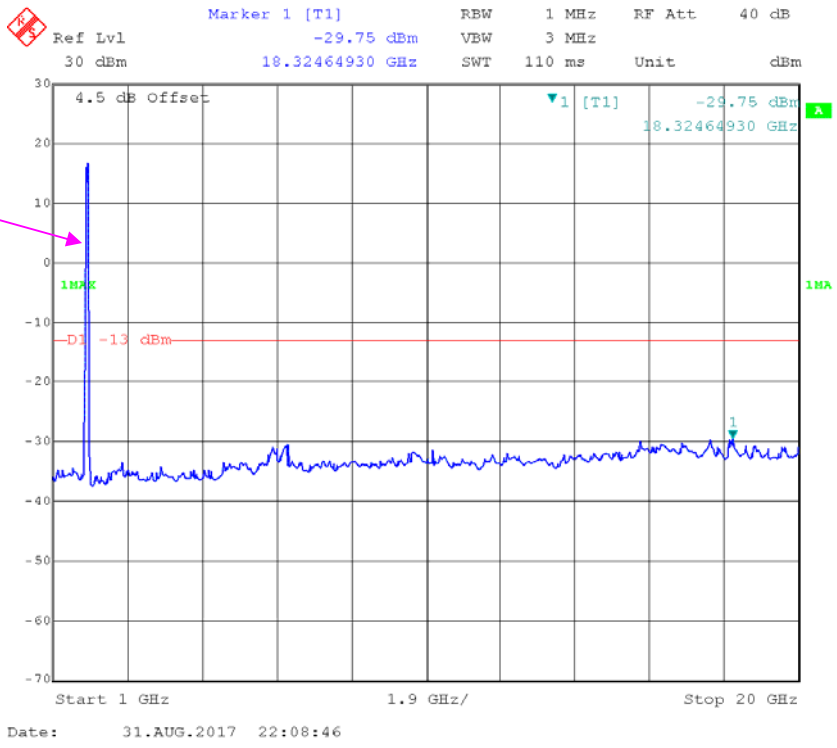




Fundamental

QPSK_20 MHz

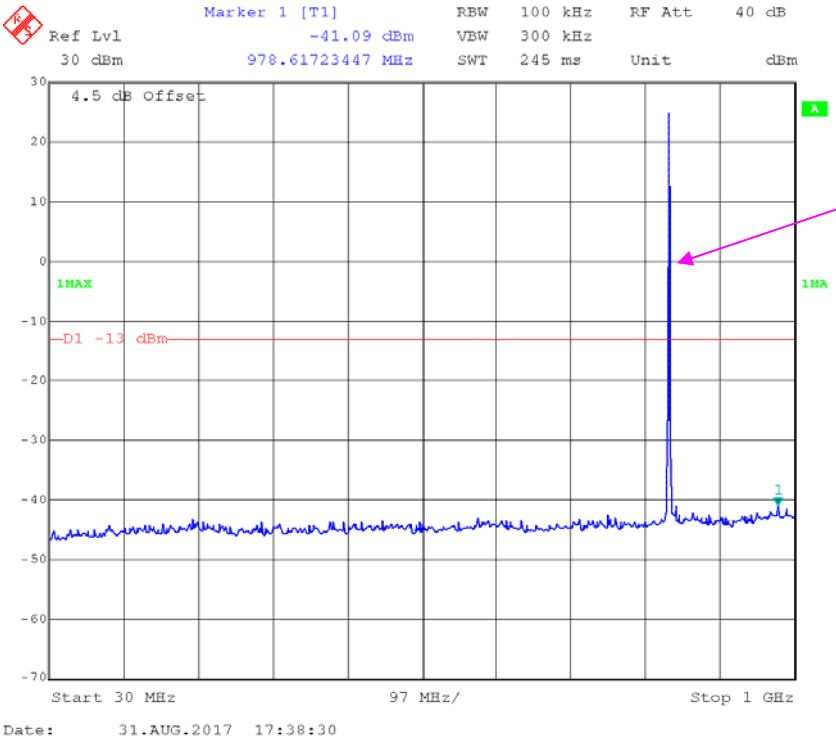


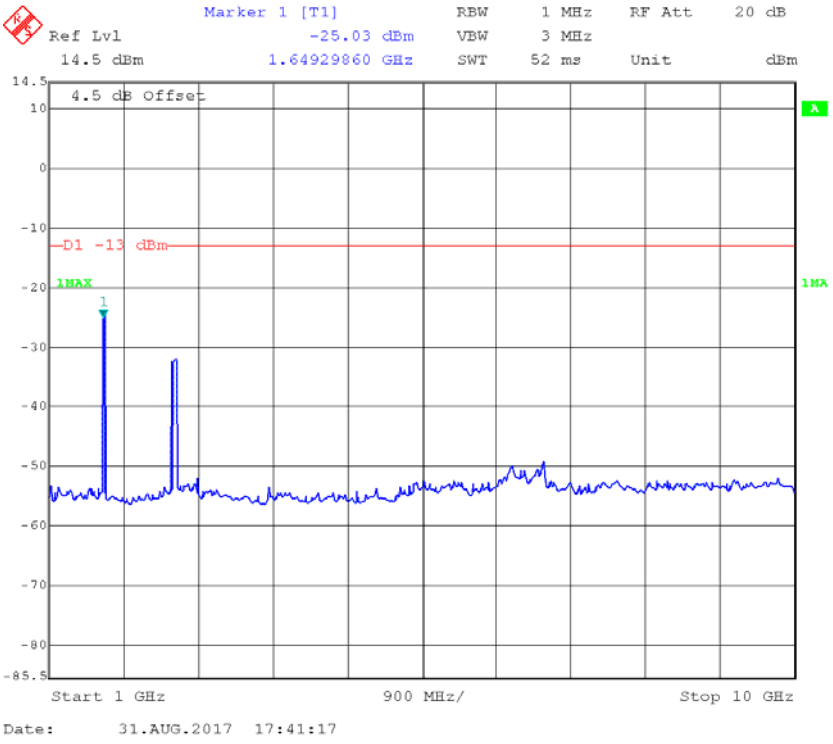


Fundamental

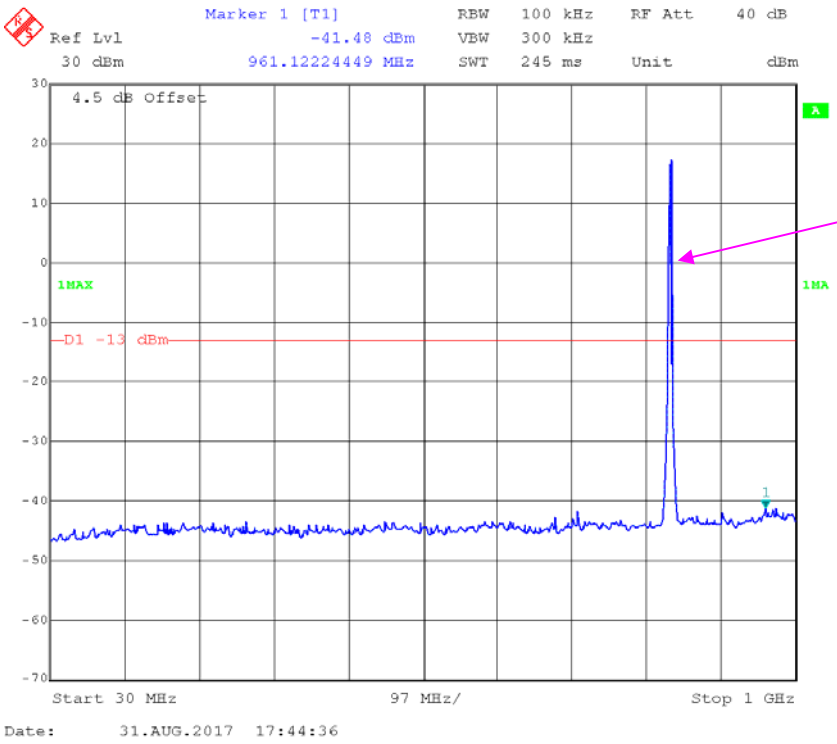
LTE Band V (Middle Channel)

QPSK_1.4 MHz

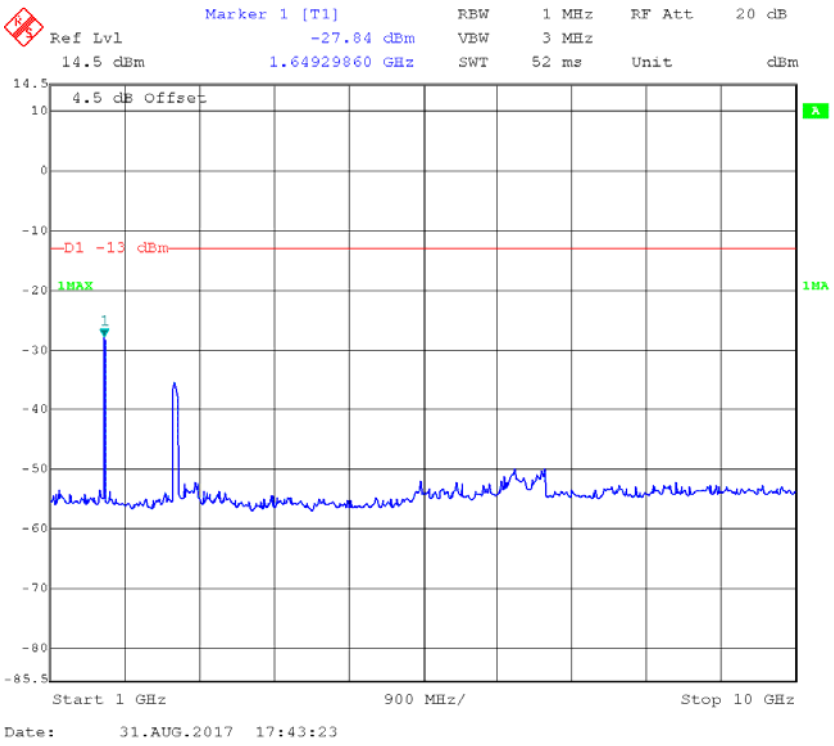




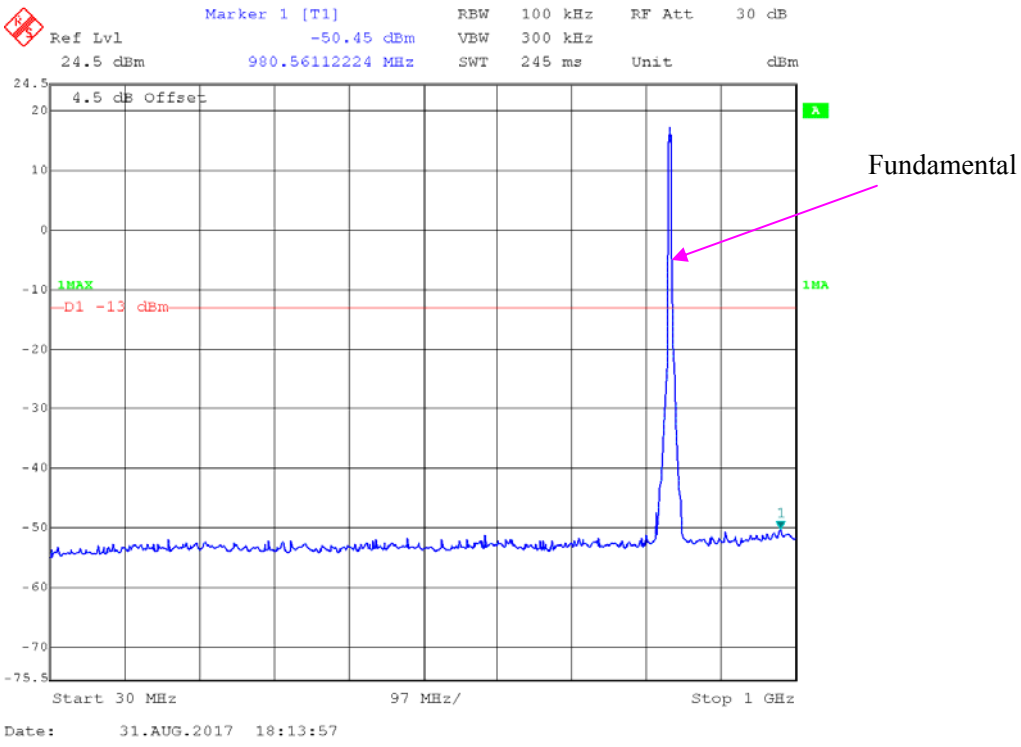
QPSK_3 MHz

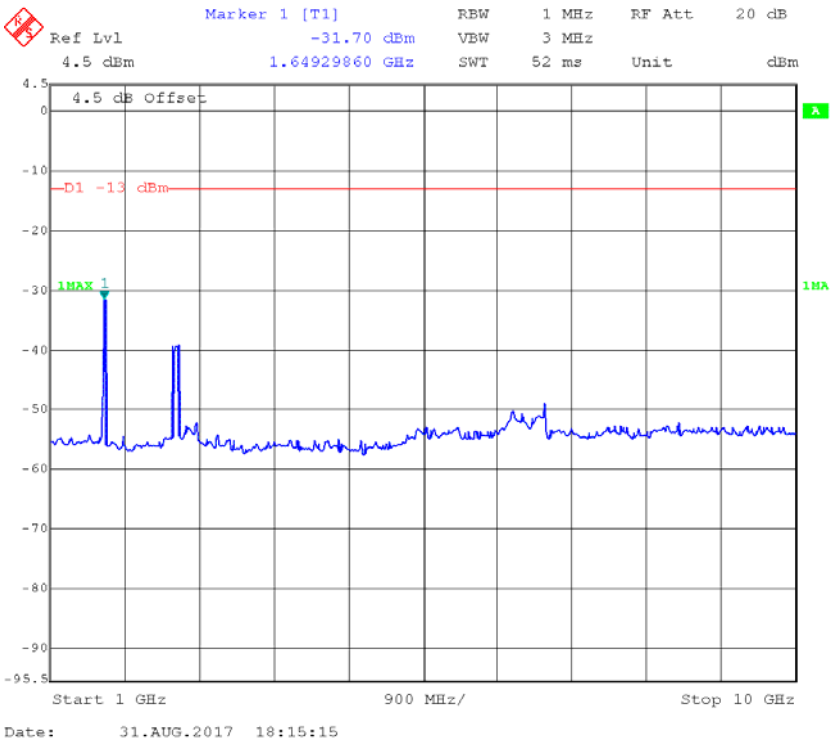


Fundamental

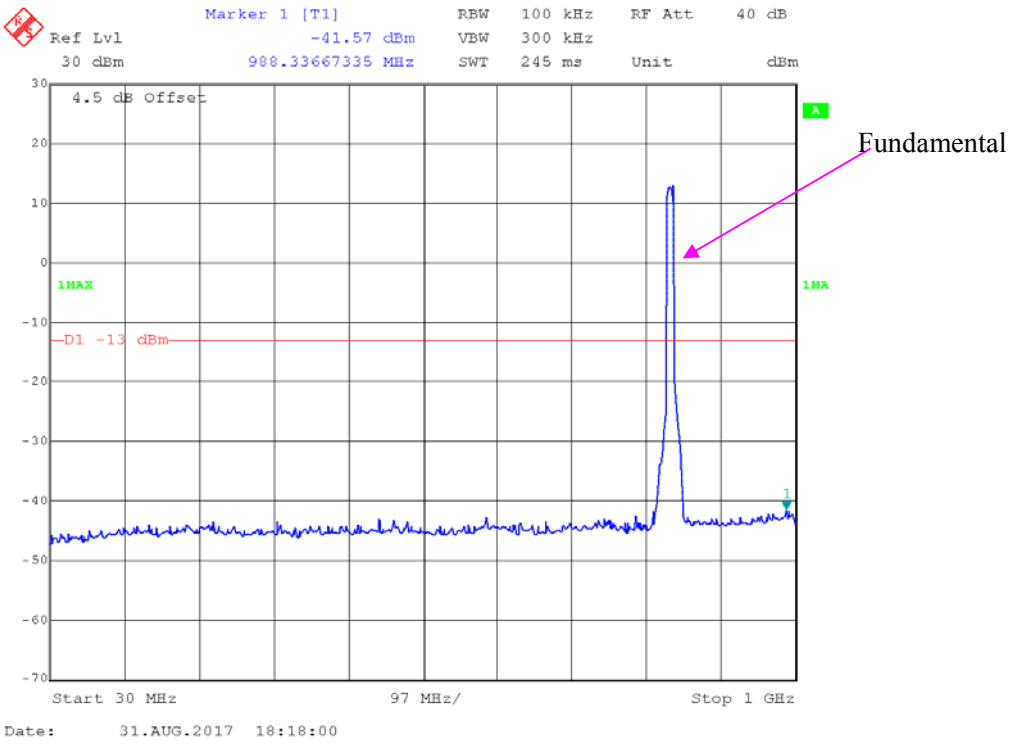


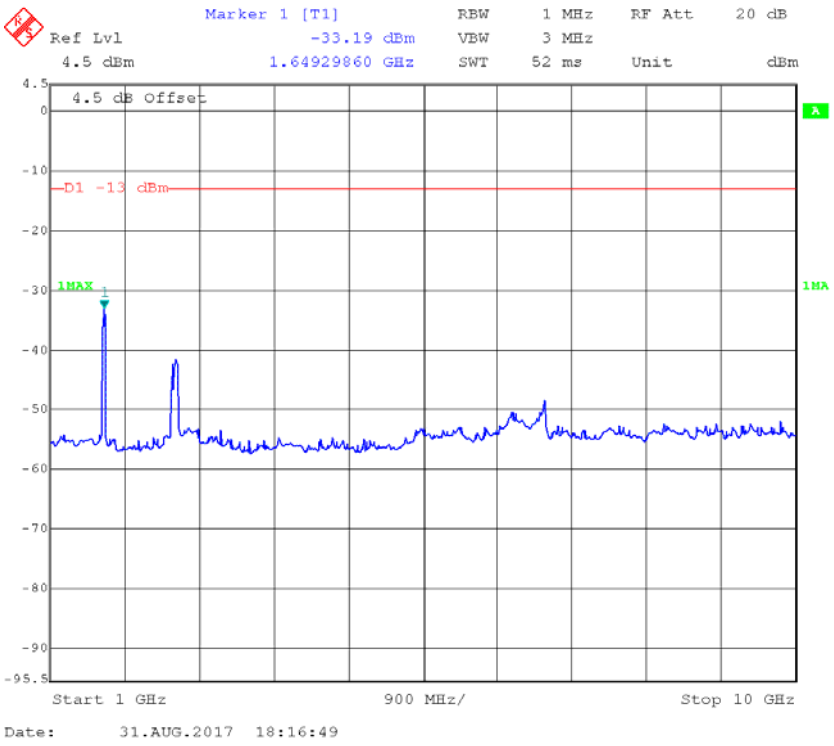
QPSK_5 MHz


Marker 1 [T1]
Ref Lvl
24.5 dBm
-50.45 dBm
980.56112224 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
4.5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 31.AUG.2017 18:13:57
Fundamental


Marker 1 [T1]
Ref Lvl
4.5 dBm
-31.70 dBm
1.64929860 GHz
RBW 1 MHz
VBW 3 MHz
SWT 52 ms
RF Att 20 dB
Unit dBm
4.5 dB Offset
D1 -13 dBm
1MAX
1MA
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 31.AUG.2017 18:15:15

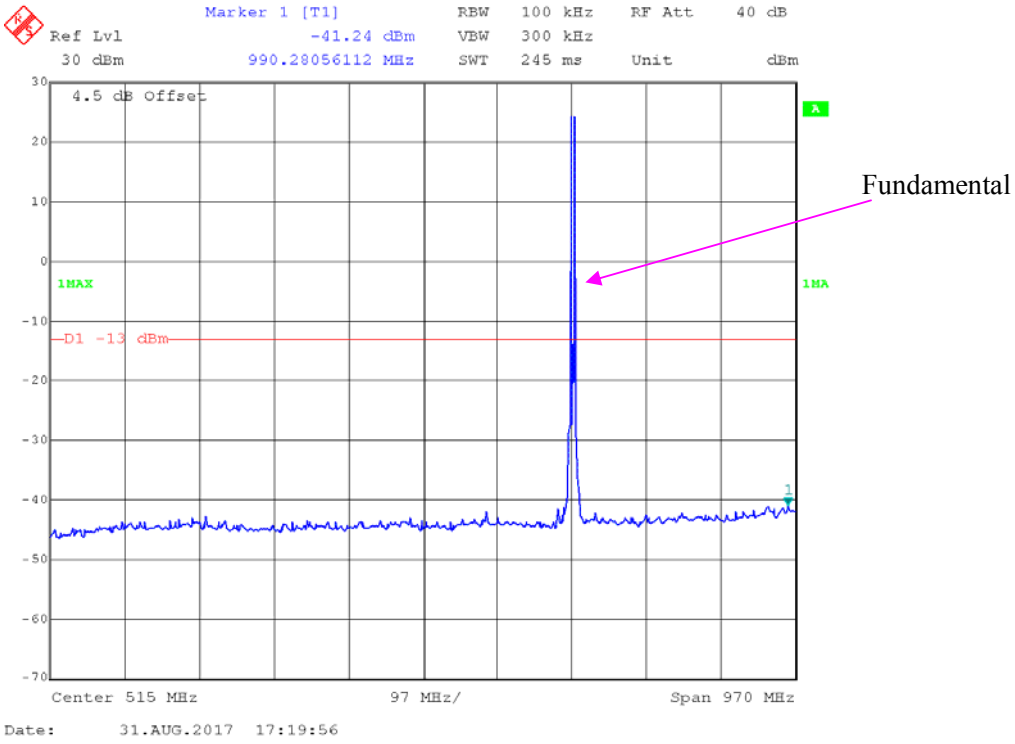
QPSK_10 MHz

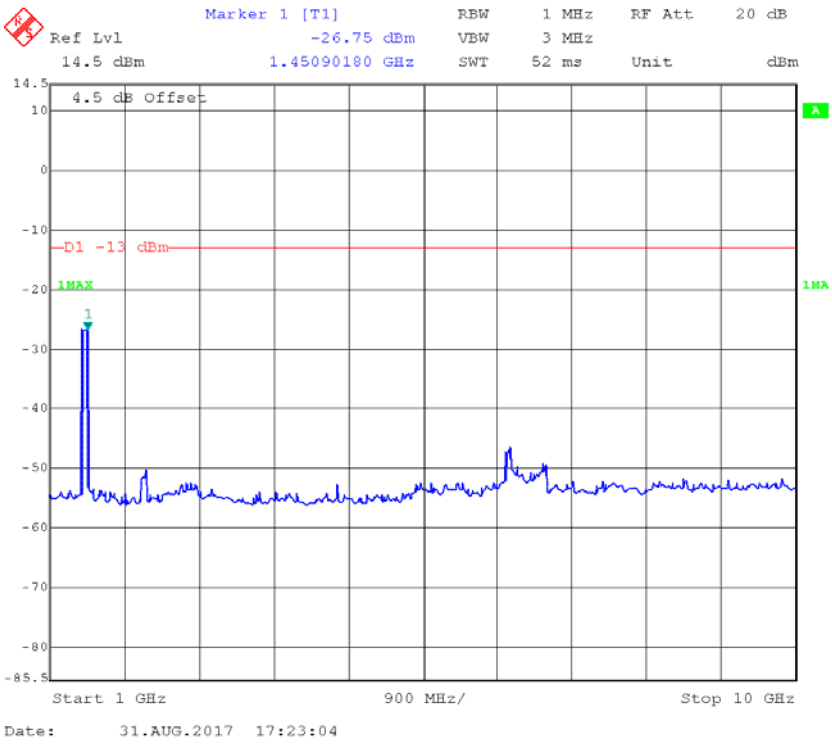

Marker 1 [T1]
Ref Lvl
30 dBm
-41.57 dBm
988.33667335 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 40 dB
Unit dBm
4.5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 31.AUG.2017 18:18:00
Fundamental


Marker 1 [T1]
Ref Lvl
4.5 dBm
-33.19 dBm
1.64929860 GHz
RBW 1 MHz
VBW 3 MHz
SWT 52 ms
RF Att 20 dB
Unit dBm
4.5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 31.AUG.2017 18:16:49

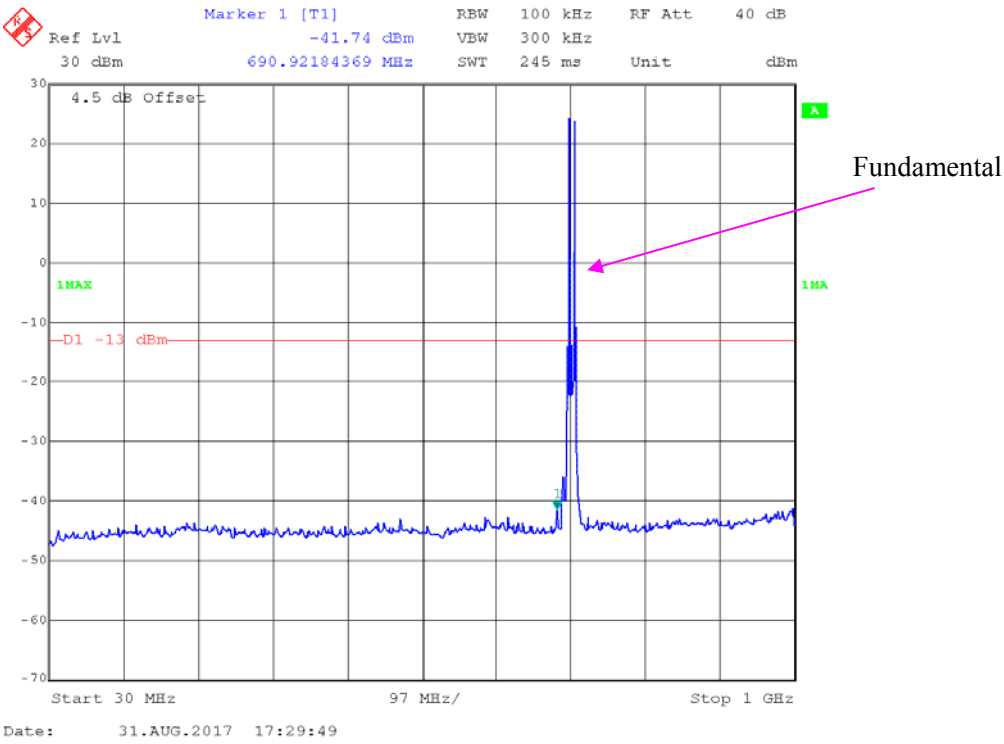
LTE Band 17 (Middle Channel)

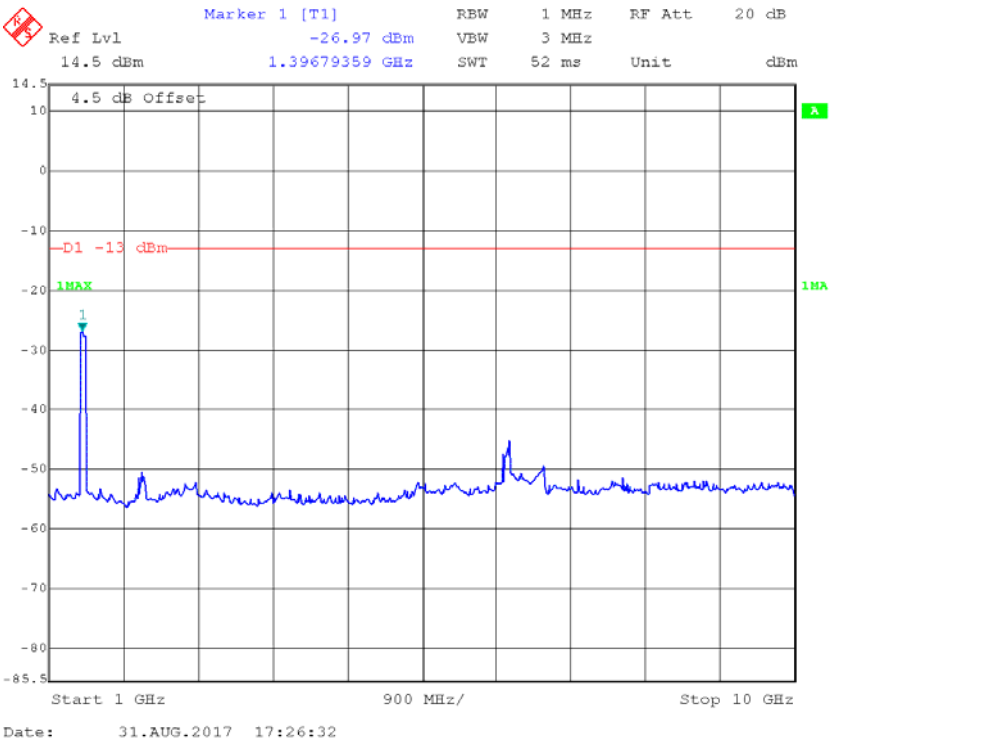
QPSK_5 MHz





QPSK_10 MHz


Marker 1 [T1]
Ref Lvl
-41.74 dBm
30 dBm
690.92184369 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 40 dB
Unit dBm
4.5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 31.AUG.2017 17:29:49
Fundamental


Marker 1 [T1]
Ref Lvl
-26.97 dBm
14.5 dBm
1.39679359 GHz
RBW 1 MHz
VBW 3 MHz
SWT 52 ms
RF Att 20 dB
Unit dBm
4.5 dB Offset
D1 -13 dBm
1MAX
1MA
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 31.AUG.2017 17:26:32

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

Applicable Standard

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

Test Procedure

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

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

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

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

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2016-09-01	2017-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2014-11-06	2017-11-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2016-12-08	2017-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
HP	Signal Generator	1026	320408	2016-12-08	2017-12-08
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	Chamber A-1	4m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber B-1	0.75m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber A-2	10m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	Chamber B-2	8m	2016-09-01	2017-09-01
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
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
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	2017-05-06	2018-05-06
R&S	Wideband Radio Communication Tester	CMW500	149216	2016-10-08	2017-10-08
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Spectrum Analyzer	FSU 26	200256	2016-12-08	2017-12-08

*** 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:	27.8 °C
Relative Humidity:	48 %
ATM Pressure:	100.2 kPa

The testing was performed by Pean Zhu on 2017-08-30.

EUT Operation Mode: Transmitting (Per pre-test all modes, the worst case as below)

Cellular Band

30MHz-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	49.02	-65.2	10.6	0.7	-55.3	-13.0	42.3
1673.200	V	47.64	-67.2	10.6	0.7	-57.3	-13.0	44.3
2509.800	H	58.15	-54.9	13.1	1.2	-43.0	-13.0	30.0
2509.800	V	49.77	-63.3	13.1	1.2	-51.4	-13.0	38.4
3346.400	H	46.75	-63.9	13.8	1.6	-51.7	-13.0	38.7
3346.400	V	45.62	-65.1	13.8	1.6	-52.9	-13.0	39.9
2765.000	H	45.88	-66.4	13.1	1.3	-54.6	-13.0	41.6
2765.000	V	45.09	-67.3	13.1	1.3	-55.5	-13.0	42.5

PCS Band

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)			
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	47.24	-61.6	13.8	1.6	-49.4	-13.0	36.4
3760.000	V	46.39	-62.3	13.8	1.6	-50.1	-13.0	37.1
5640.000	H	46.83	-59.2	14.0	1.3	-46.5	-13.0	33.5
5640.000	V	46.32	-59.6	14.0	1.3	-46.9	-13.0	33.9
3995.000	H	45.76	-62.8	14.0	1.5	-50.3	-13.0	37.3
3995.000	V	45.51	-63	14.0	1.5	-50.5	-13.0	37.5
289.000	H	47.21	-57.4	0.0	0.5	-57.9	-13.0	44.9
289.000	V	48.19	-58.2	0.0	0.5	-58.7	-13.0	45.7

LTE Band II (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	47.83	-61	13.8	1.6	-48.8	-13.0	35.8
3760.000	V	47.46	-61.2	13.8	1.6	-49.0	-13.0	36.0
5640.000	H	46.59	-59.4	14.0	1.3	-46.7	-13.0	33.7
5640.000	V	46.24	-59.7	14.0	1.3	-47.0	-13.0	34.0
4135.000	H	45.67	-63.4	13.8	1.4	-51.0	-13.0	38.0
4135.000	V	45.38	-63.8	13.8	1.4	-51.4	-13.0	38.4
92.000	H	49.78	-54.7	0.0	0.3	-55.0	-13.0	42.0
92.000	V	50.24	-57.5	0.0	0.3	-57.8	-13.0	44.8

LTE Band V (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								
1673.000	H	48.76	-65.5	10.6	0.7	-55.6	-13.0	42.6
1673.000	V	47.38	-67.4	10.6	0.7	-57.5	-13.0	44.5
2509.500	H	57.89	-55.1	13.1	1.2	-43.2	-13.0	30.2
2509.500	V	49.51	-63.5	13.1	1.2	-51.6	-13.0	38.6
3346.000	H	46.49	-64.2	13.8	1.6	-52.0	-13.0	39.0
3346.000	V	45.36	-65.3	13.8	1.6	-53.1	-13.0	40.1
2125.000	H	45.62	-67.2	11.2	1.1	-57.1	-13.0	44.1
2125.000	V	44.83	-67.9	11.2	1.1	-57.8	-13.0	44.8
881.000	H	58.80	-34.3	0.0	1	-35.3	-13.0	22.3
883.000	V	48.90	-46.5	0.0	1	-47.5	-13.0	34.5

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	49.02	-64.6	9.1	1.2	-56.7	-13.0	43.7
1420.000	V	47.64	-66.5	9.1	1.2	-58.6	-13.0	45.6
2130.000	H	58.15	-54.6	11.2	1.1	-44.5	-13.0	31.5
2130.000	V	49.77	-63	11.2	1.1	-52.9	-13.0	39.9
2840.000	H	46.75	-65.3	13.4	1.4	-53.3	-13.0	40.3
2840.000	V	45.62	-66.7	13.4	1.4	-54.7	-13.0	41.7
3550.000	H	45.88	-64.3	14.0	1.6	-51.9	-13.0	38.9
3550.000	V	45.09	-65.1	14.0	1.6	-52.7	-13.0	39.7
2765.000	H	44.78	-67.5	13.1	1.3	-55.7	-13.0	42.7
2765.000	V	44.53	-67.9	13.1	1.3	-56.1	-13.0	43.1
294.000	H	48.31	-56.2	0.0	0.5	-56.7	-13.0	43.7
294.000	V	49.76	-56.4	0.0	0.5	-56.9	-13.0	43.9

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

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

Applicable Standard

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

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

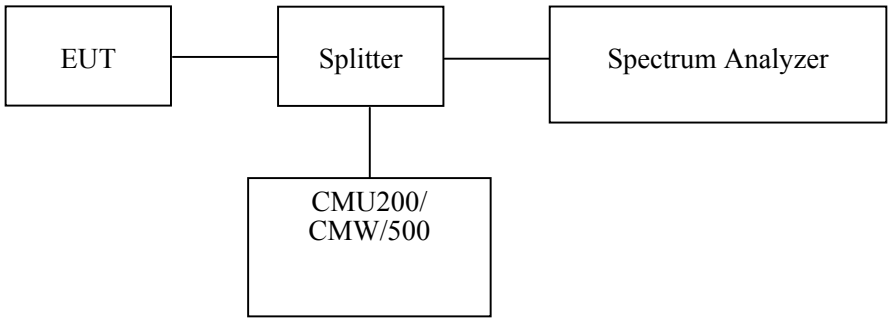
According to §27.53 (h), AWS emission limits—(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

According to §27.53 (m), (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Test Procedure

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

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSEM	831259/019	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	149216	2016-10-08	2017-10-08
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
E-Microwave	DC Blocking	EMDCB-00036	0E01201047	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/

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

Test Data

Environmental Conditions

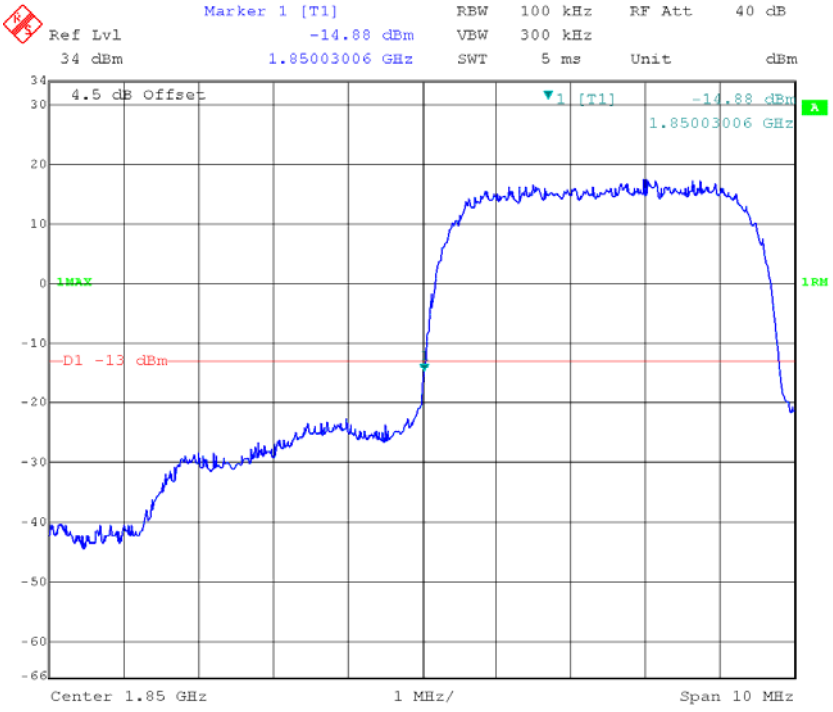
Temperature:	27.6~27.8 °C
Relative Humidity:	53~57 %
ATM Pressure:	100~100.2 kPa

The testing was performed by Pean Zhu from 2017-08-31 to 2017-09-01.

Test Mode: Transmitting

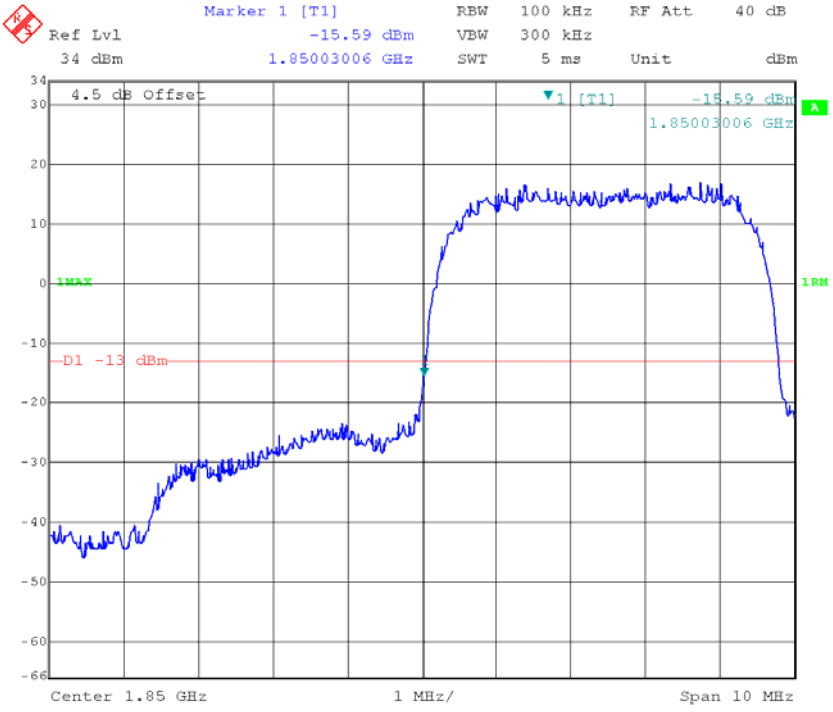
Test Result: Compliant. Please refer to the following plots.

REL99 Band II, Left Band Edge



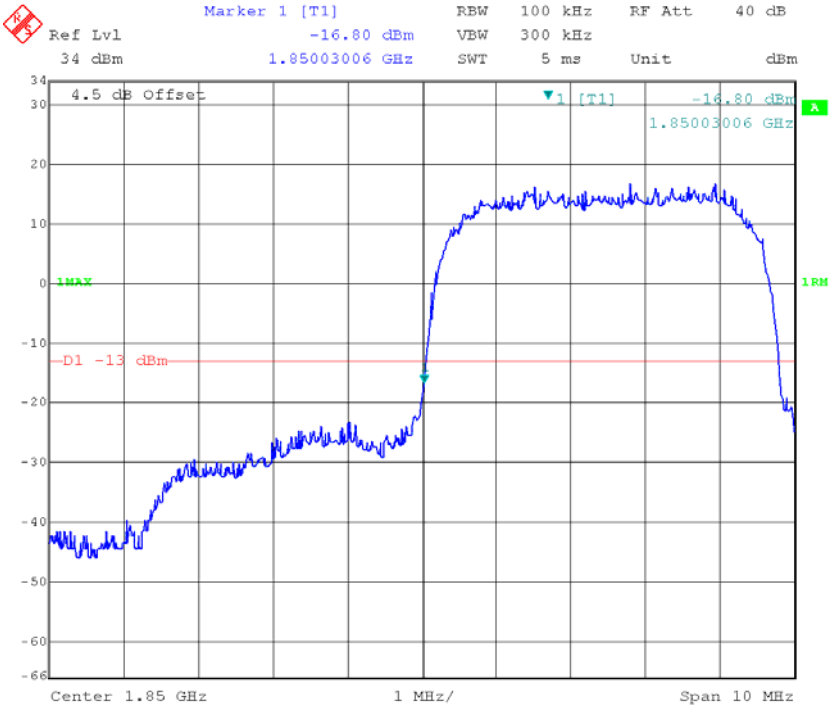
REL99 Band II, Right Band Edge

HSDPA Band II, Left Band Edge



HSDPA Band II, Right Band Edge

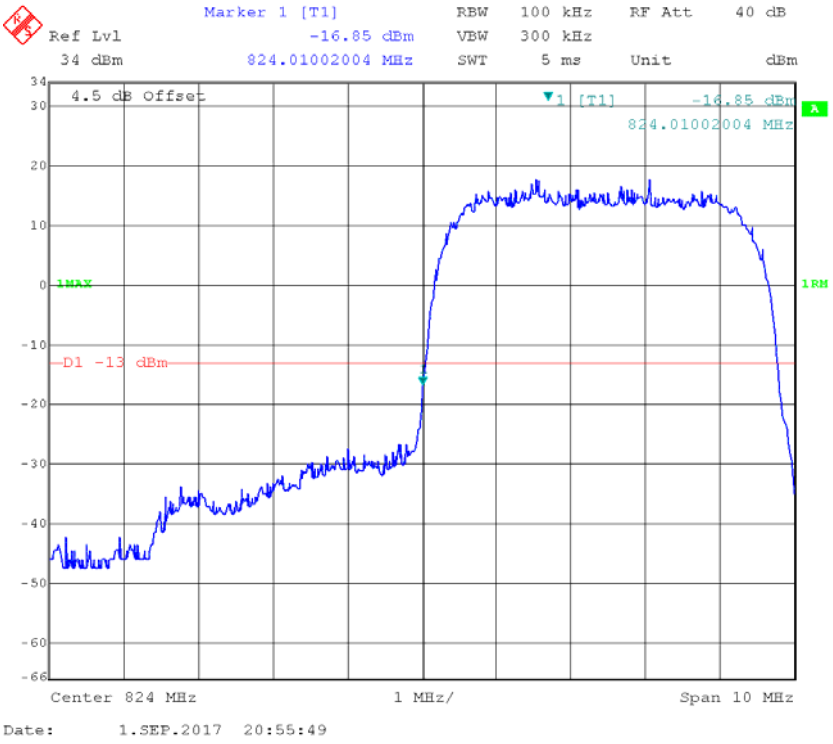
HSUPA Band II, Left Band Edge



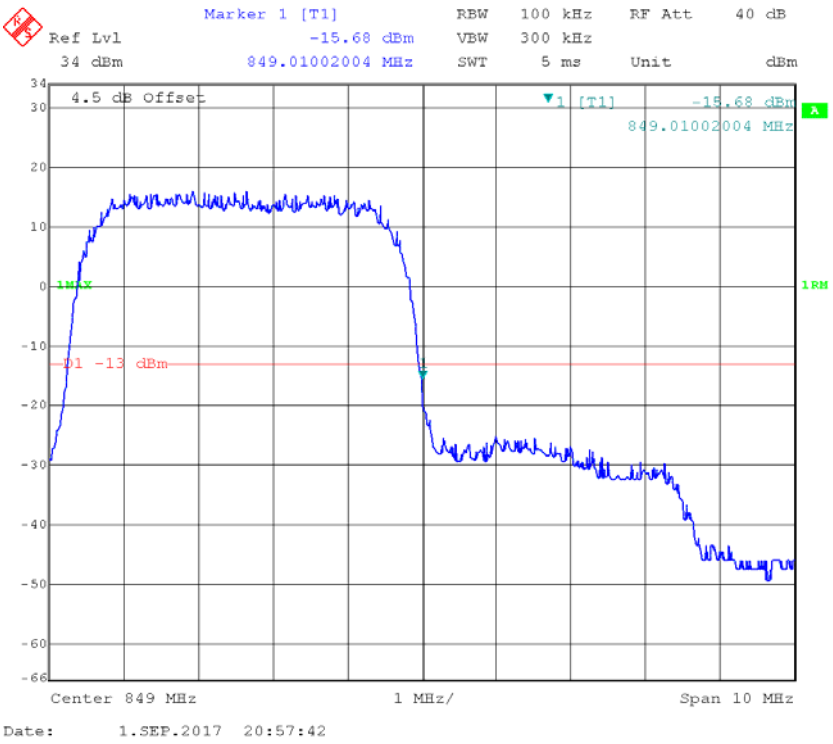
HSUPA Band II, Right Band Edge

WCDMA Band V

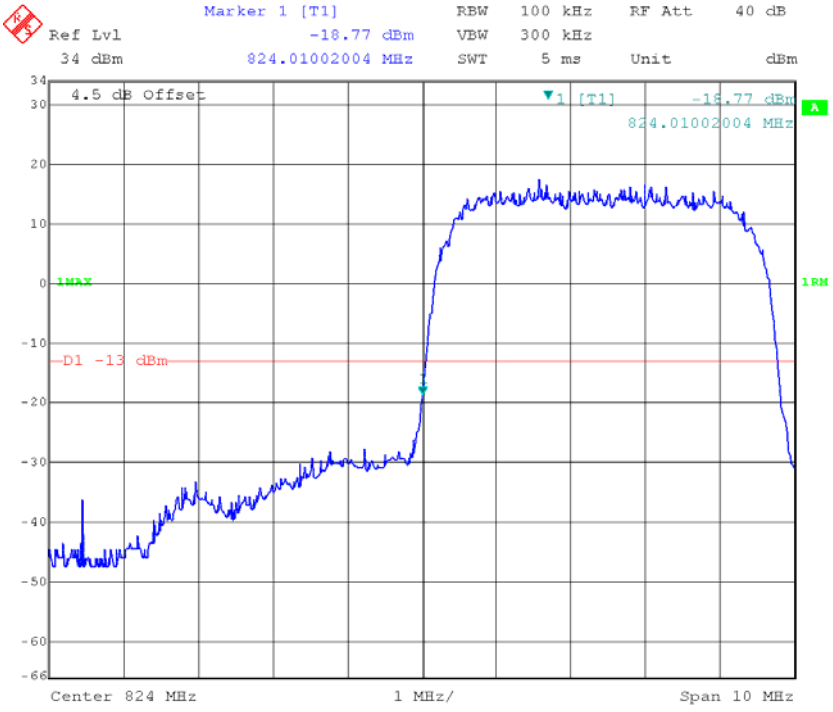
REL99 Band V, Left Band Edge



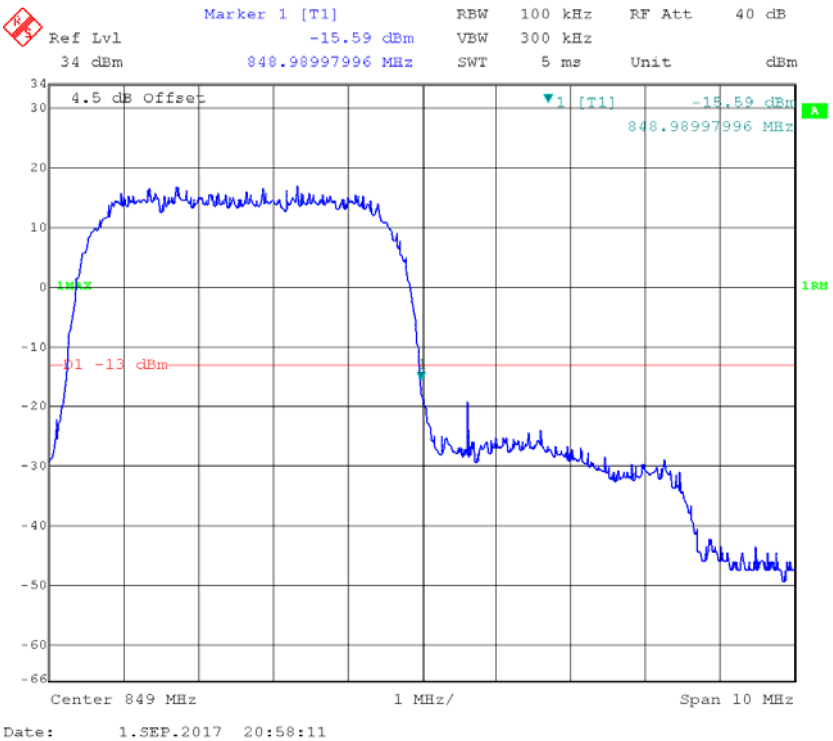
REL99 Band V Right Band Edge



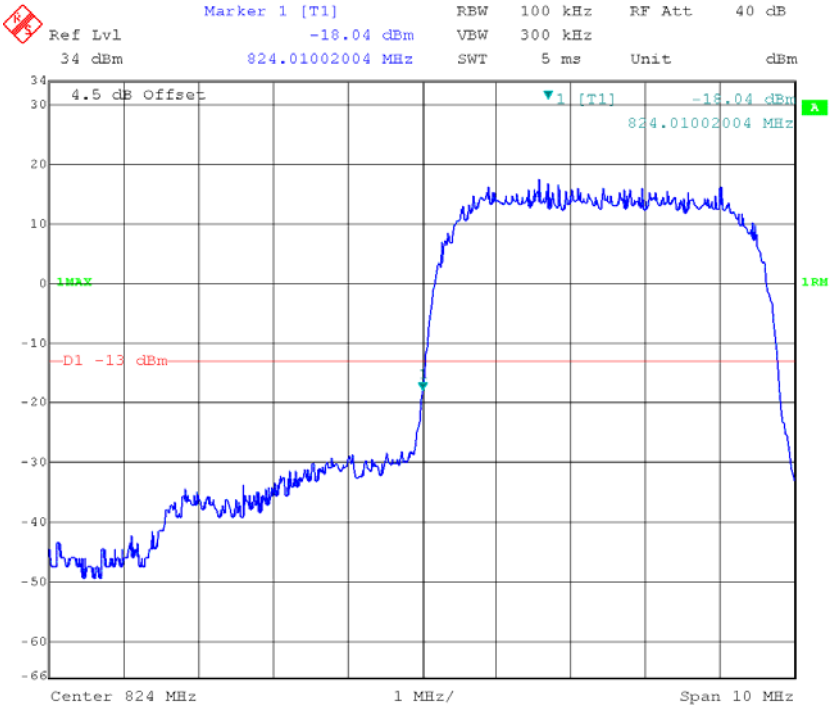
HSDPA Band V, Left Band Edge



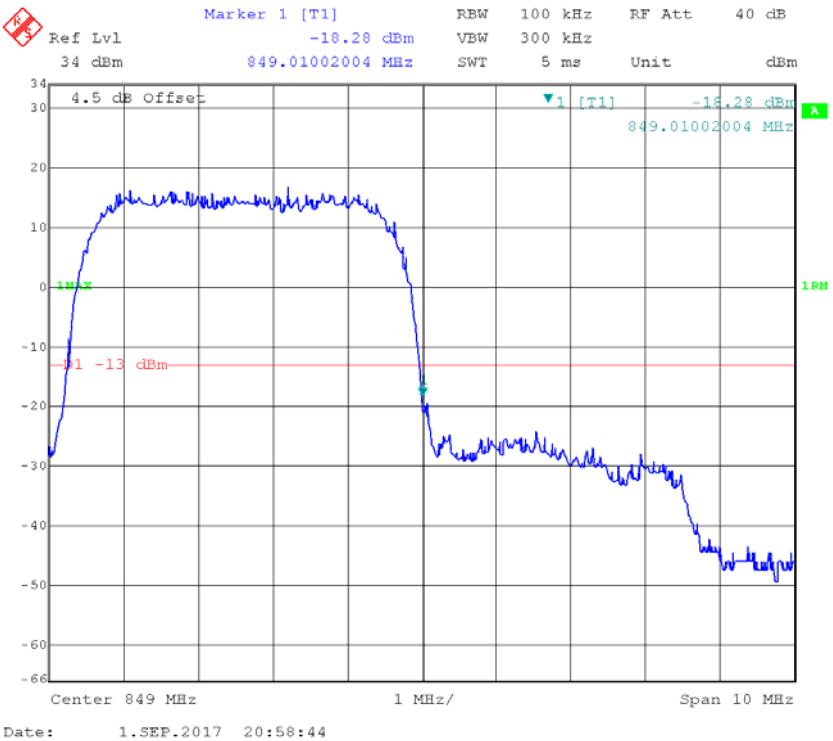
HSDPA Band V, Right Band Edge



HSUPA Band V, Left Band Edge

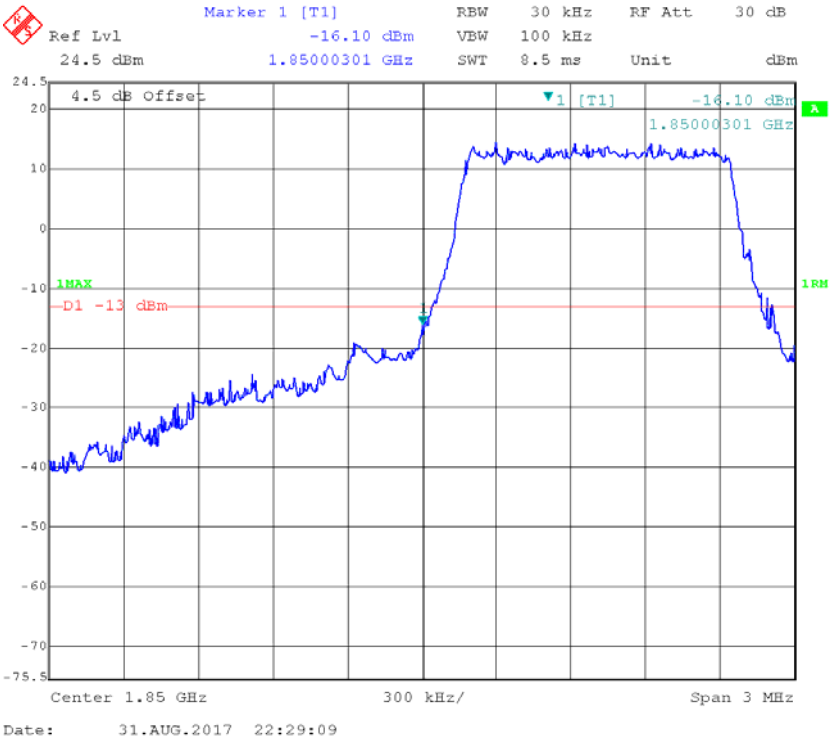


HSUPA Band V, Right Band Edge

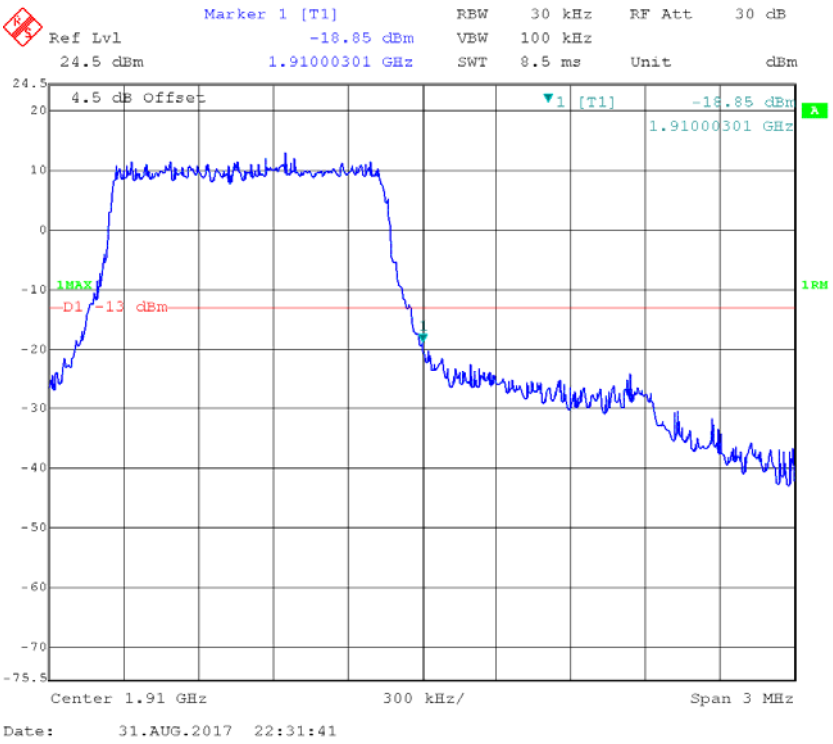


LTE Band II

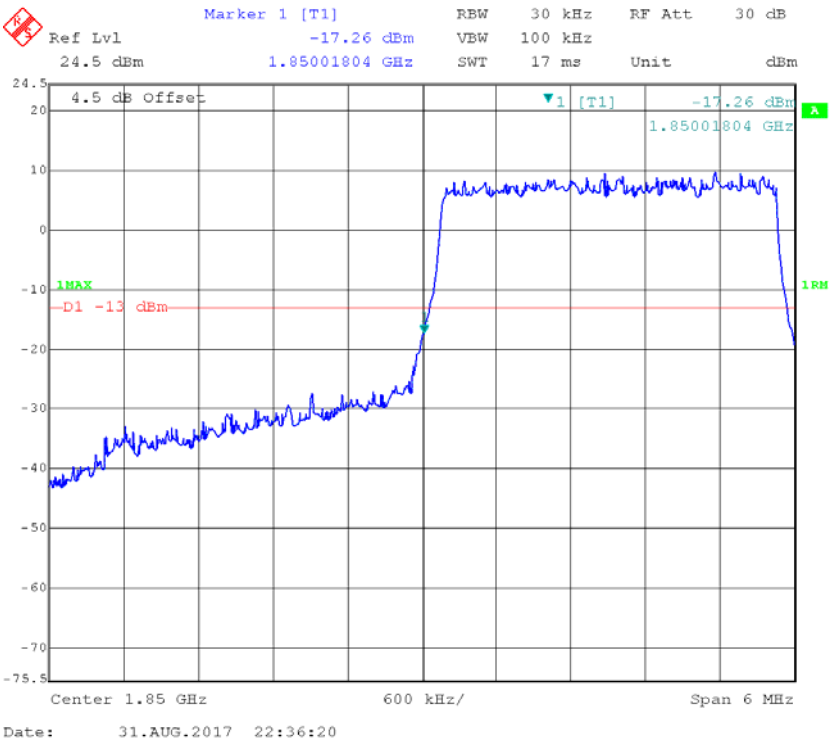
QPSK_1.4MHz_Left



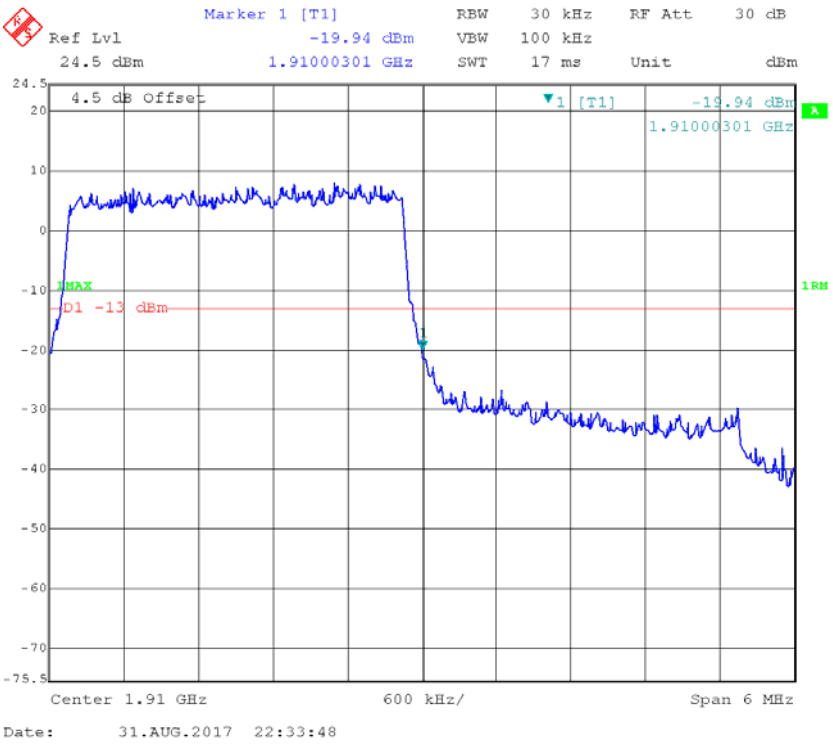
QPSK_1.4MHz_ Right



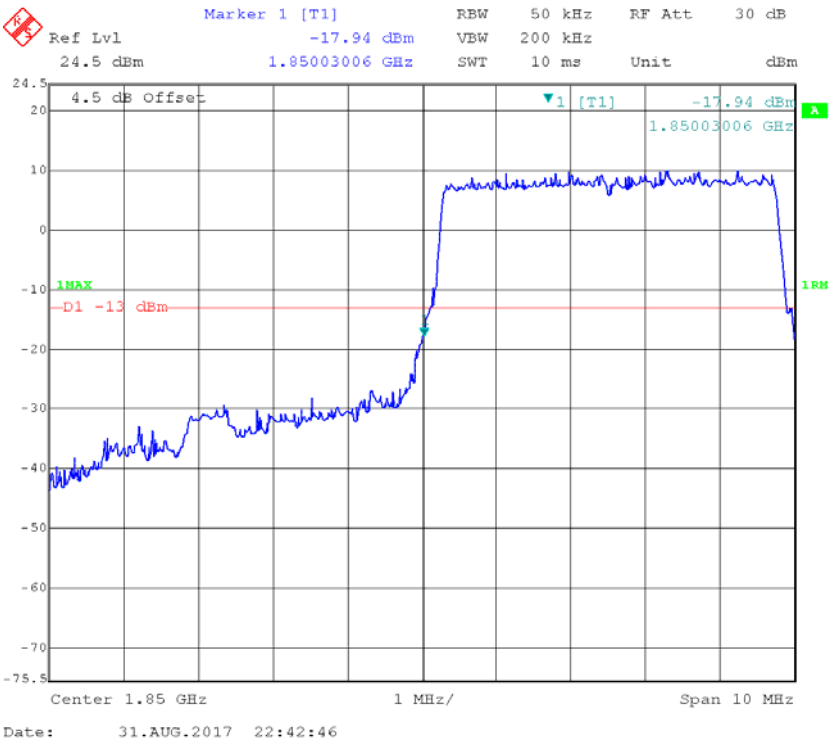
QPSK_3MHz_Left



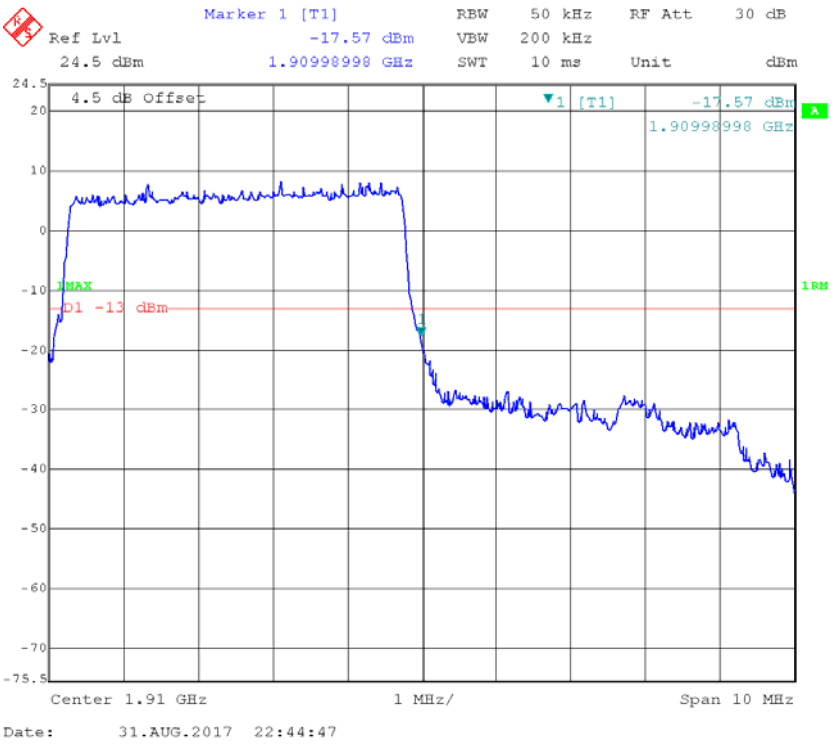
QPSK_3MHz_Right



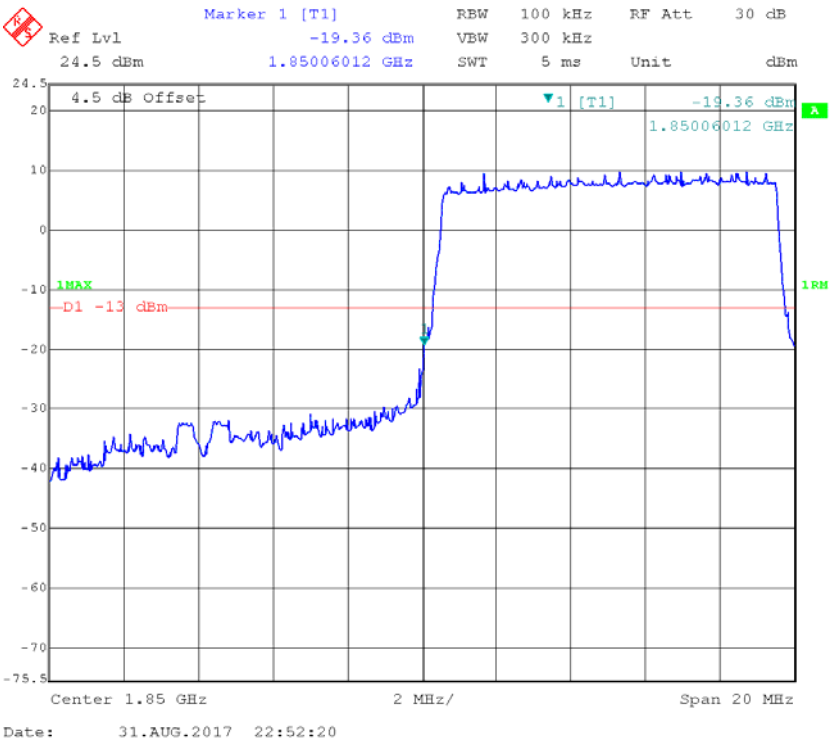
QPSK_5MHz_Left



QPSK_5MHz_Right

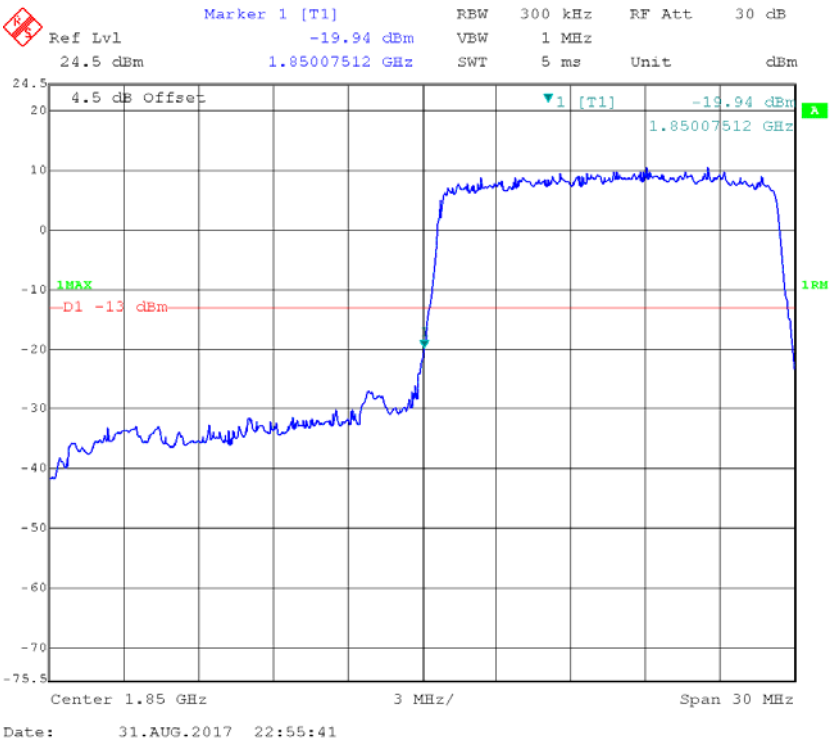


QPSK_10MHz_Left

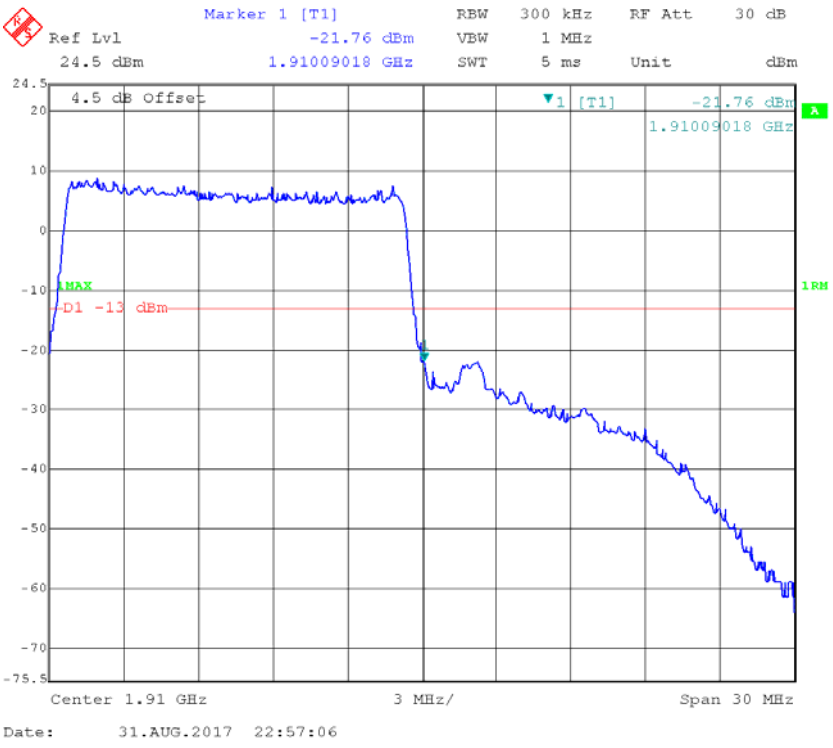


QPSK_10MHz_Right

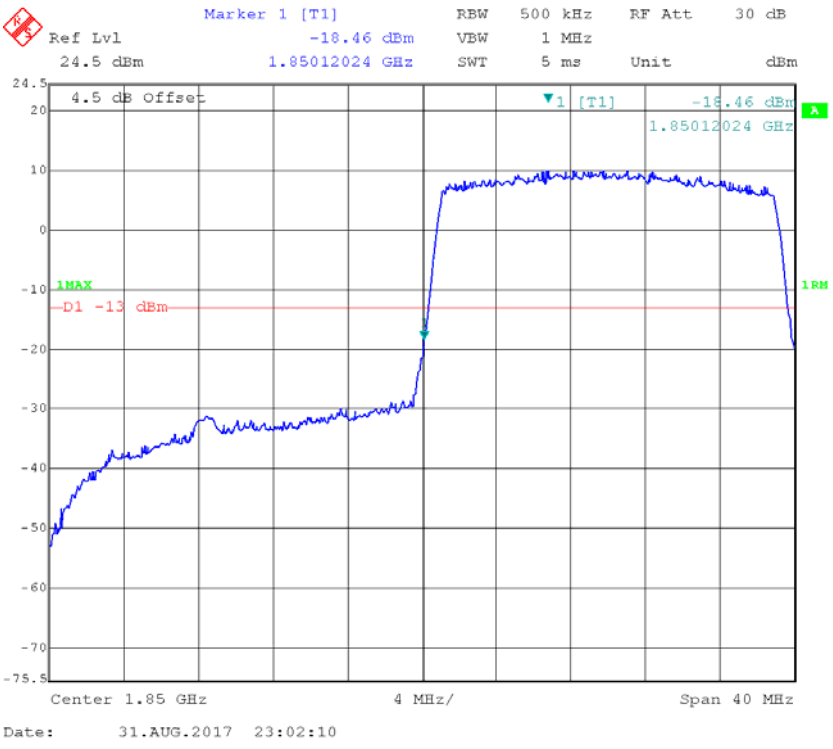
QPSK_15MHz_Left



QPSK_15MHz_Right

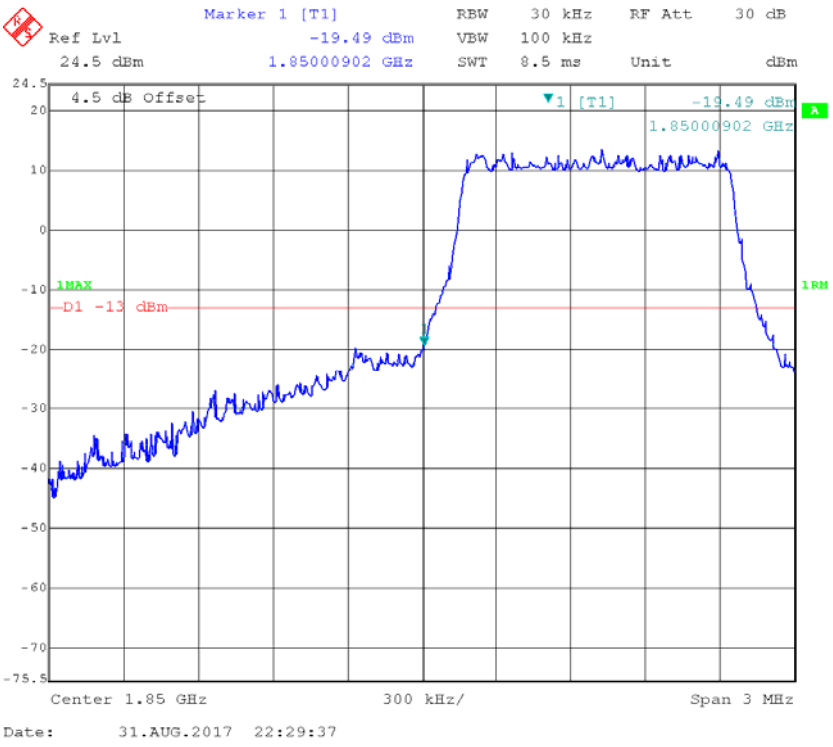


QPSK_20MHz_Left

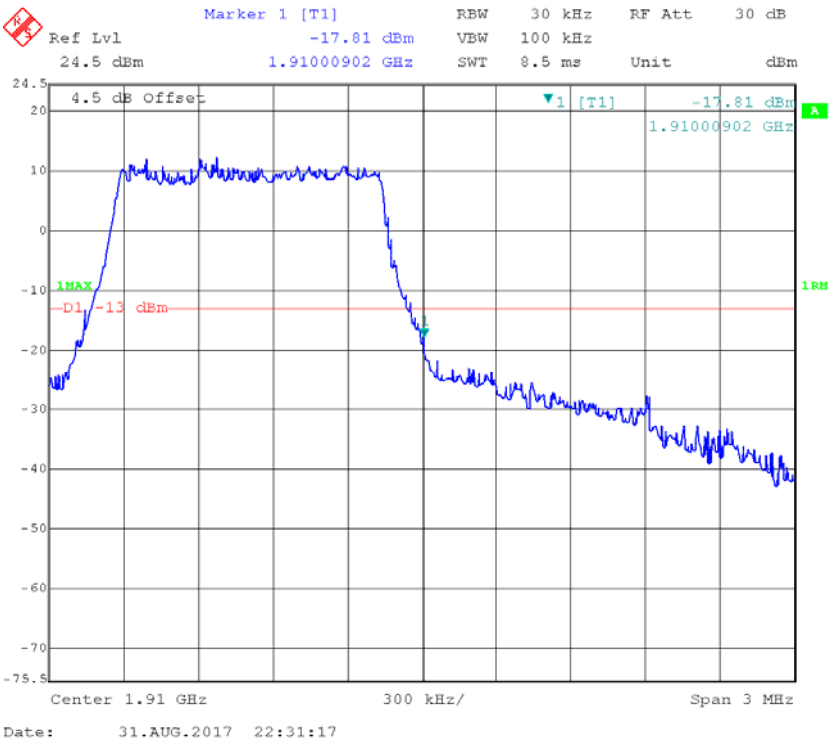


QPSK_20MHz_Right

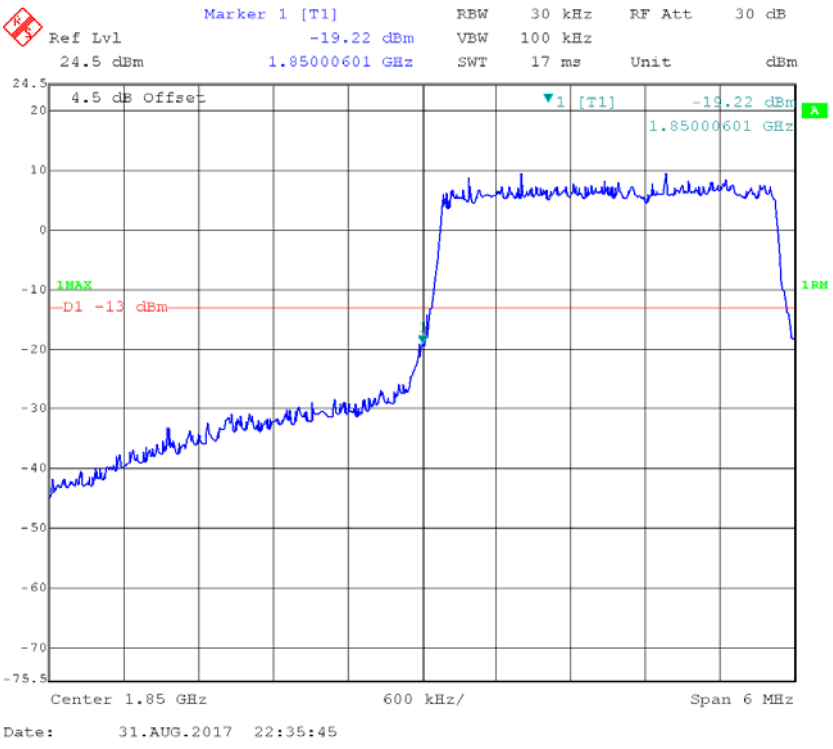
16-QAM_1.4MHz_Left



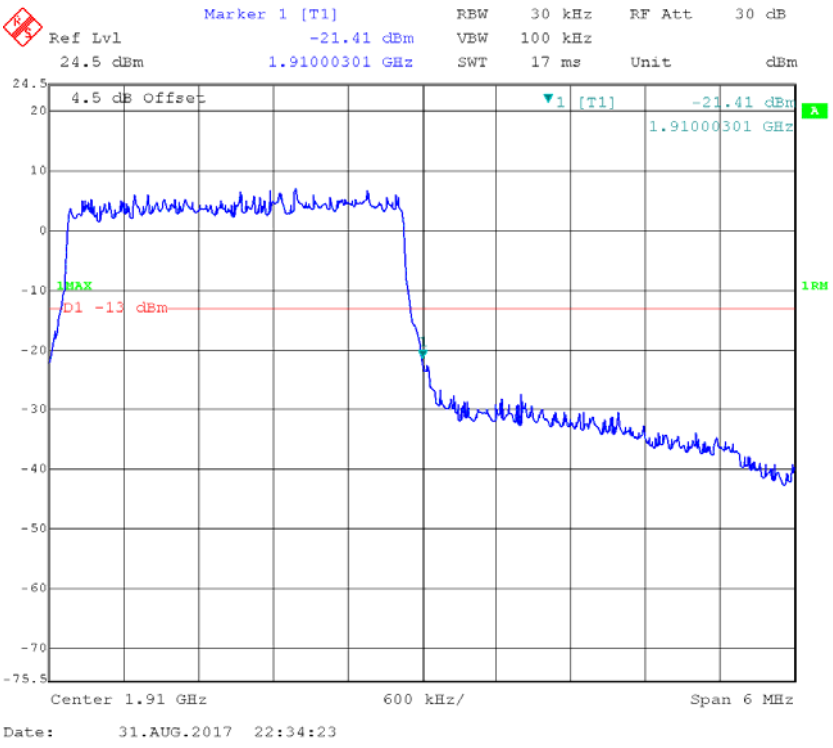
16-QAM_1.4MHz_Right



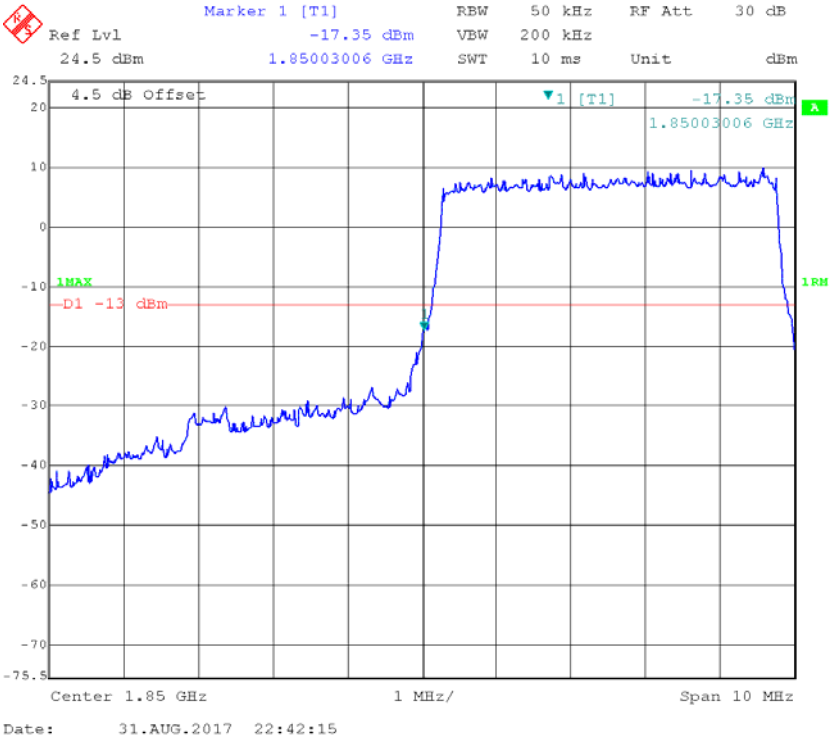
16-QAM_3MHz_Left



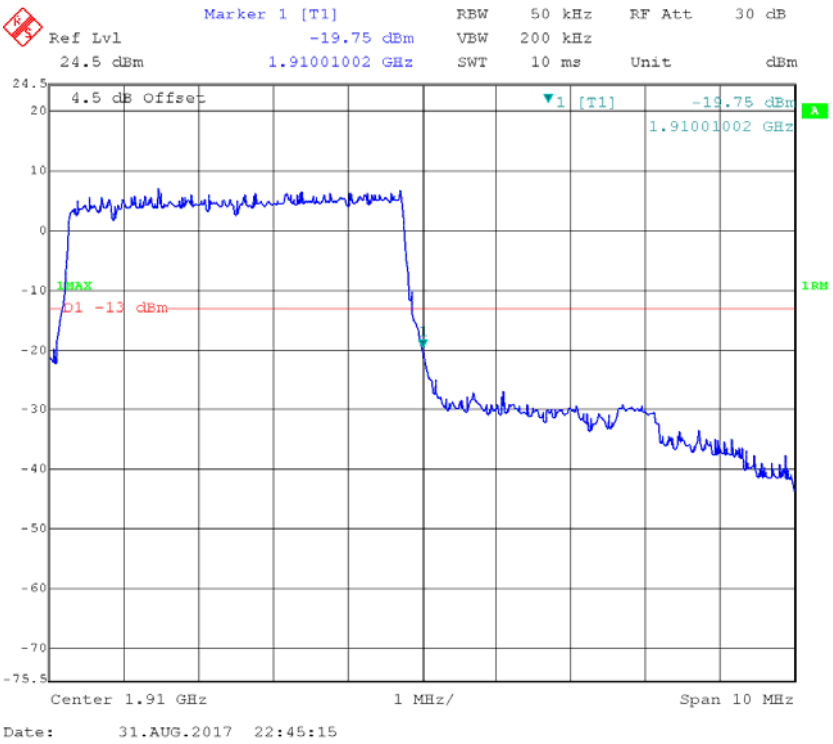
16-QAM_3MHz_Right



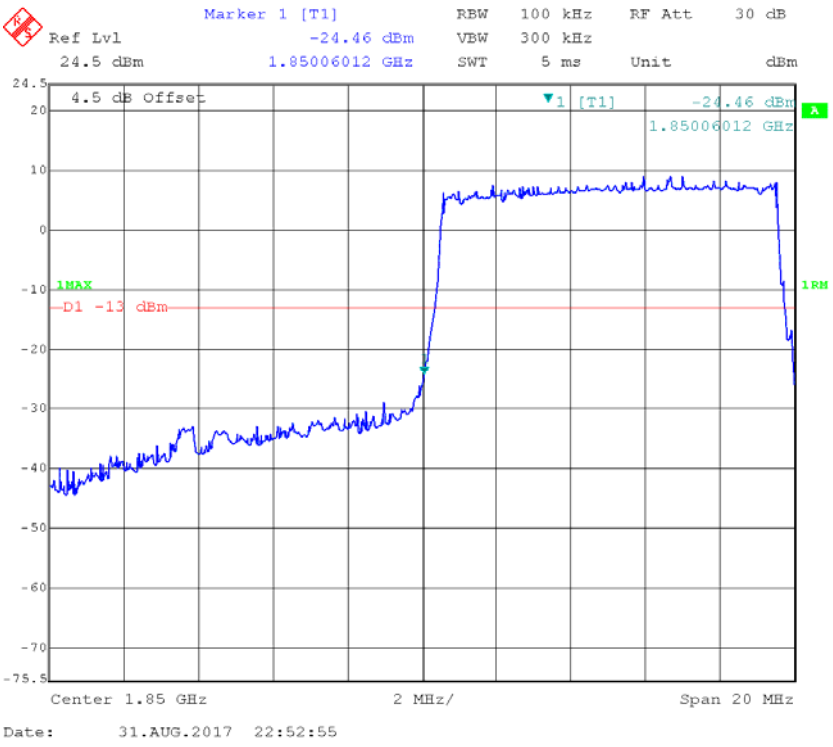
16-QAM_5MHz_Left



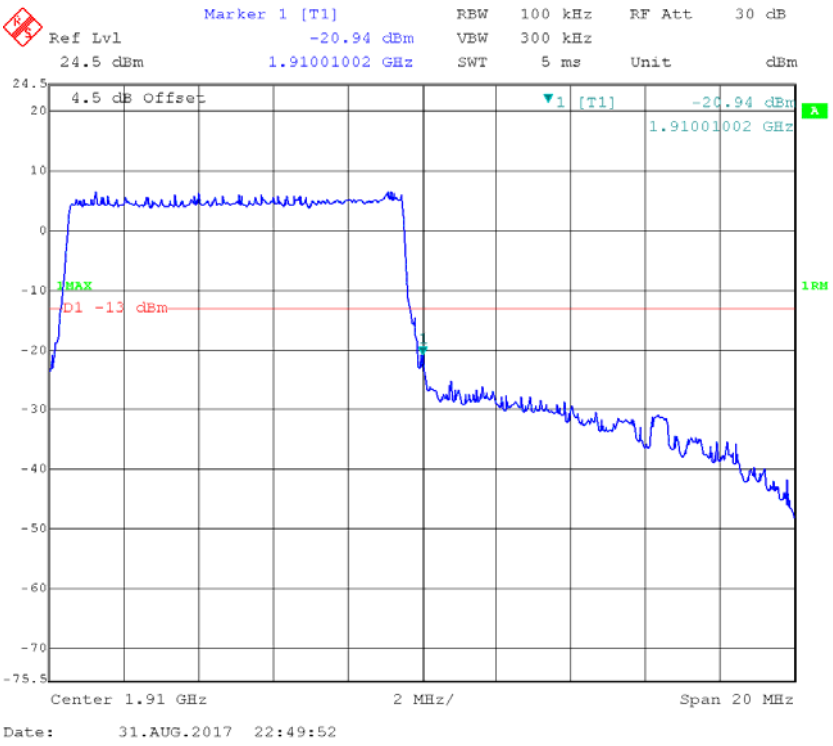
16-QAM_5MHz_Right



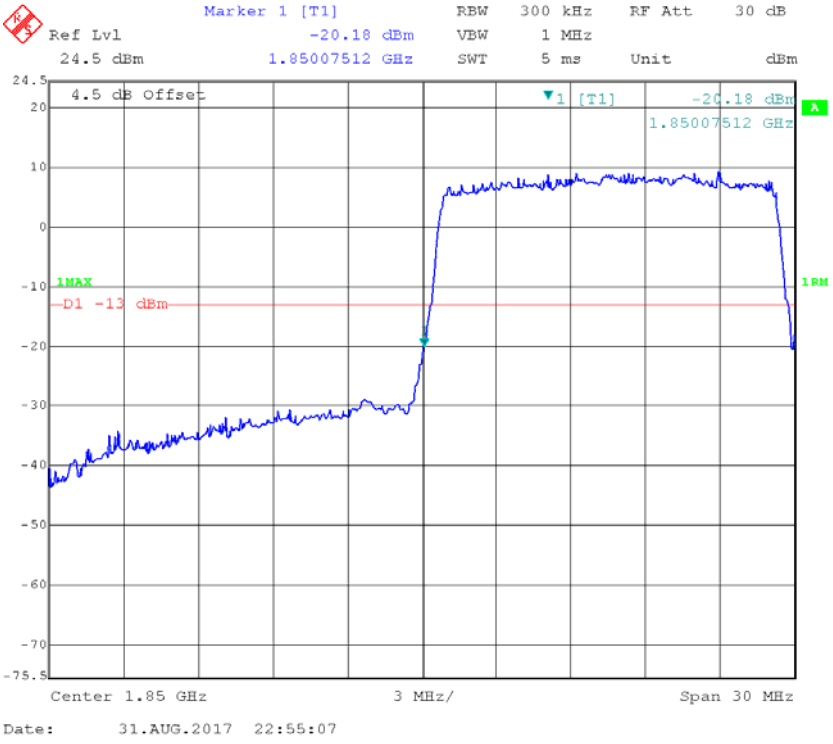
16-QAM_10MHz_Left



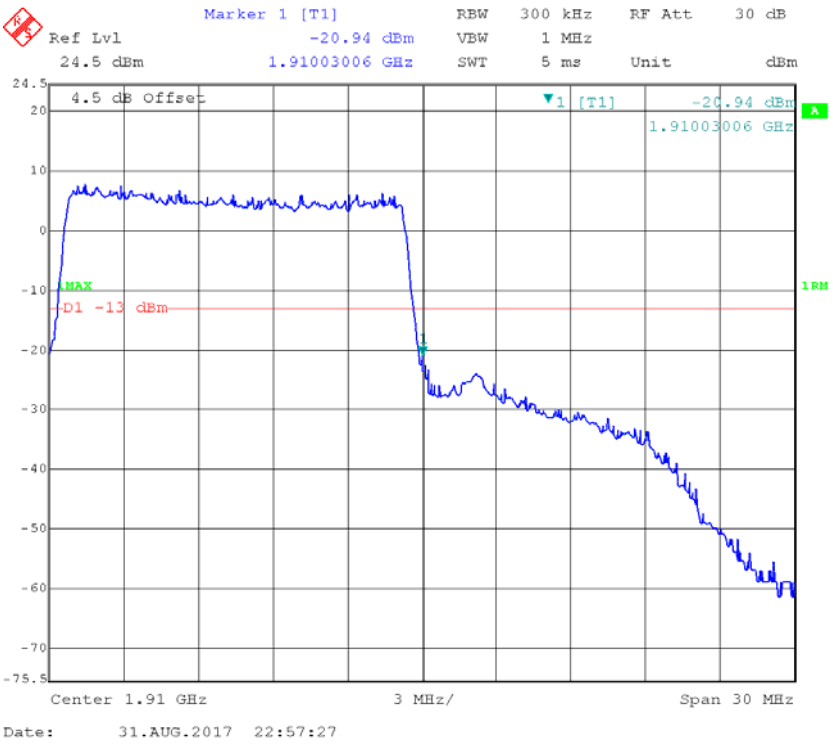
16-QAM_10MHz_Right



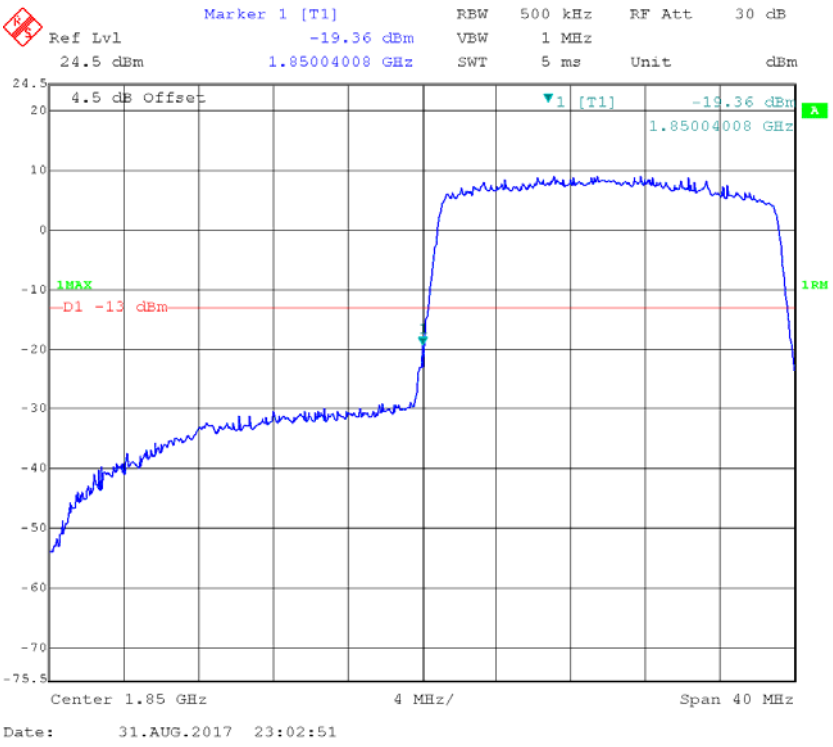
16-QAM_15MHz_Left



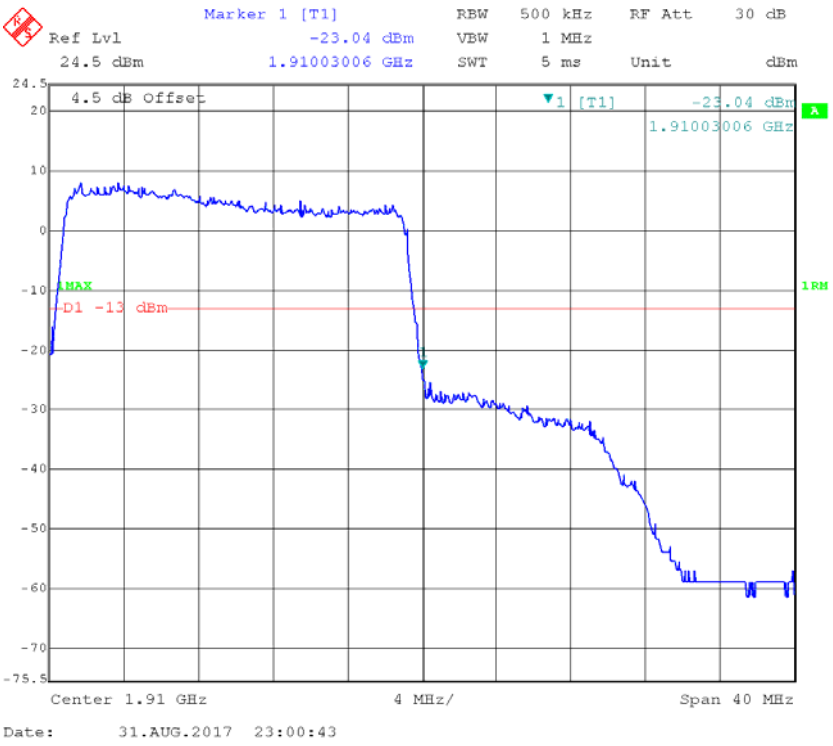
16-QAM_15MHz_Right



16-QAM_20MHz_Left

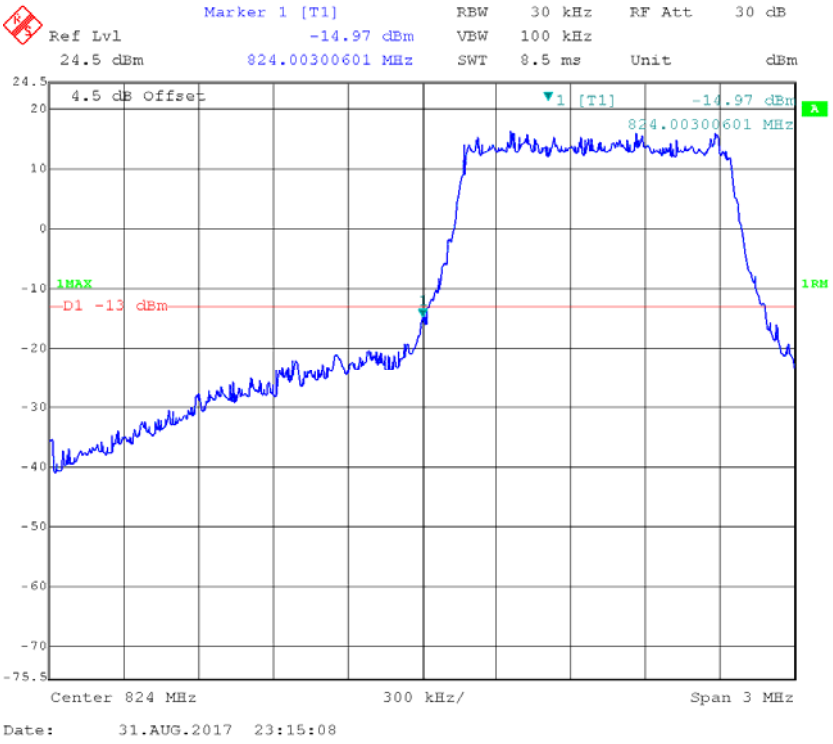


16-QAM_20MHz_Right

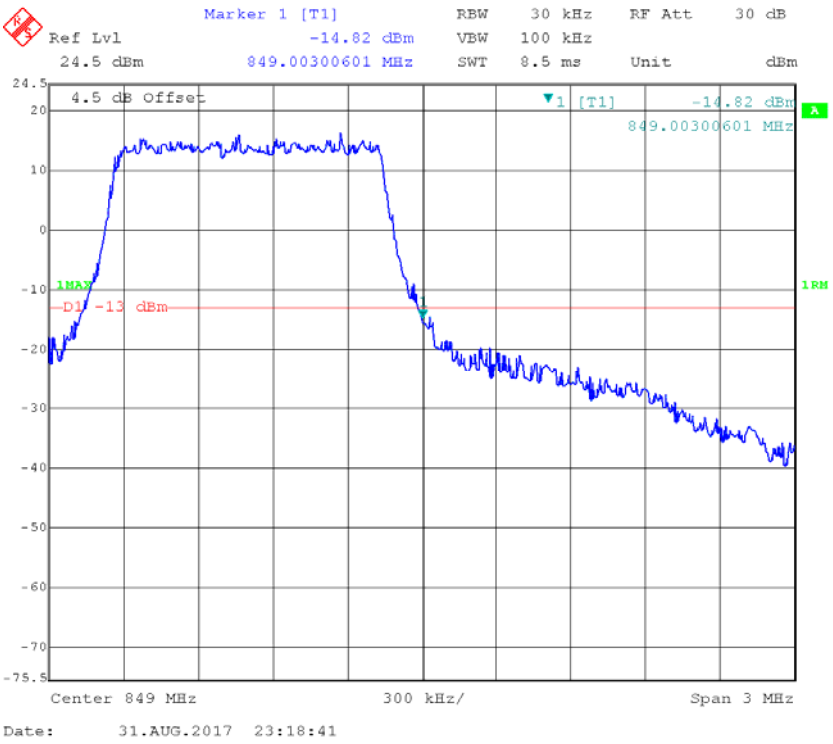


LTE Band V

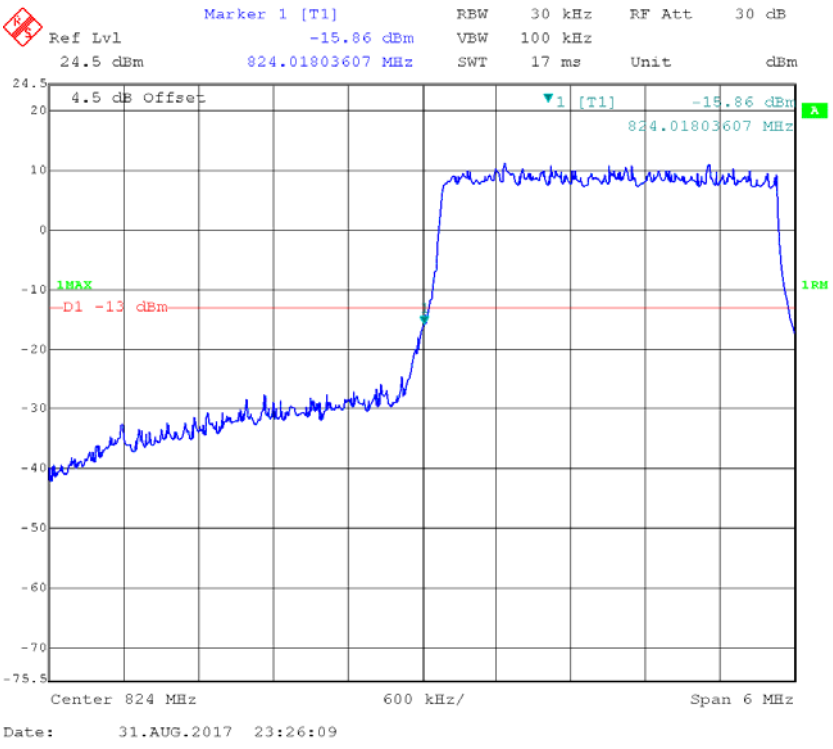
QPSK_1.4MHz_Left



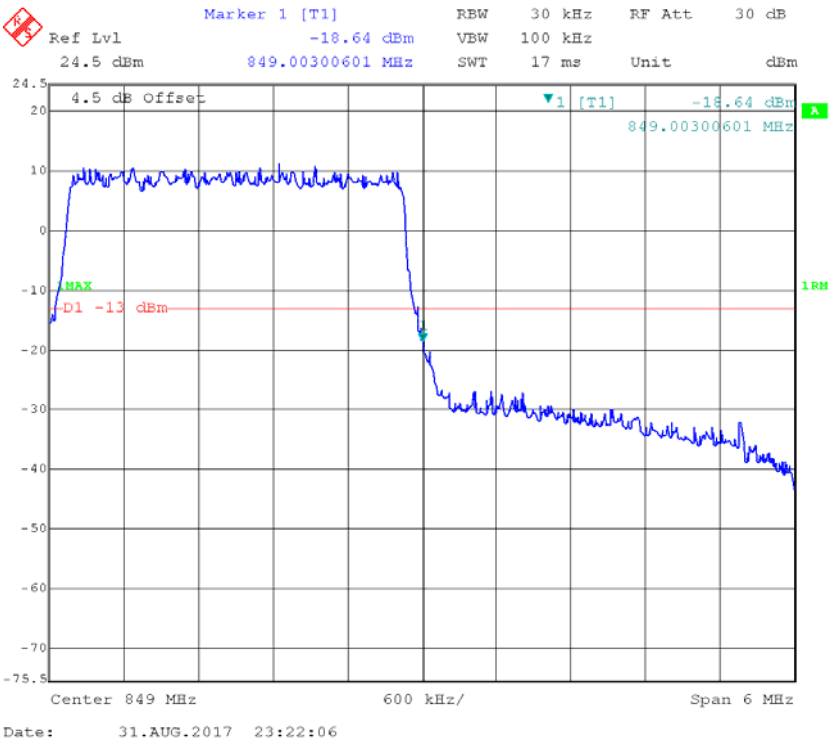
QPSK_1.4MHz_Right



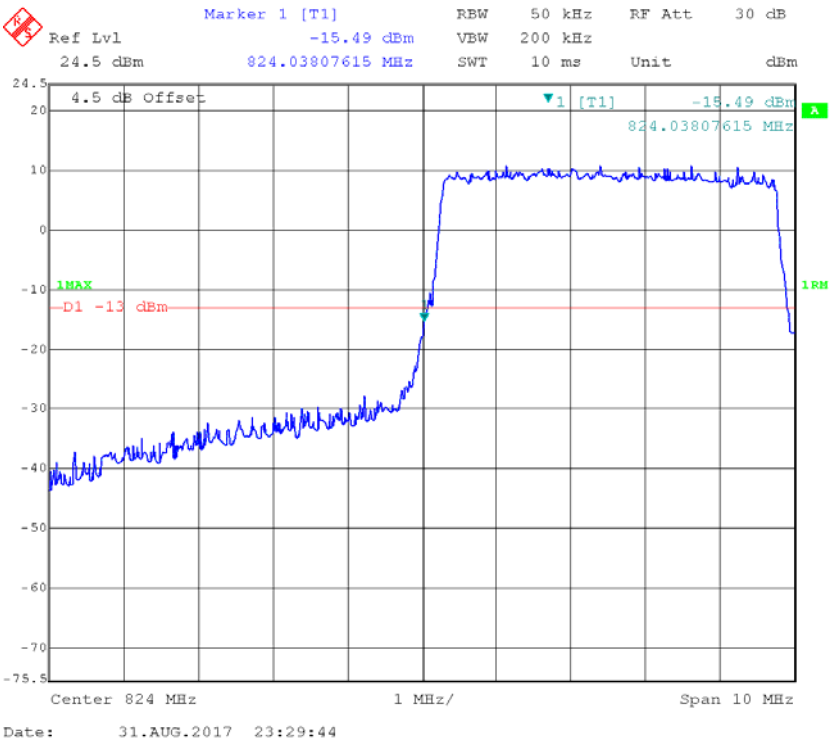
QPSK_3MHz_Left



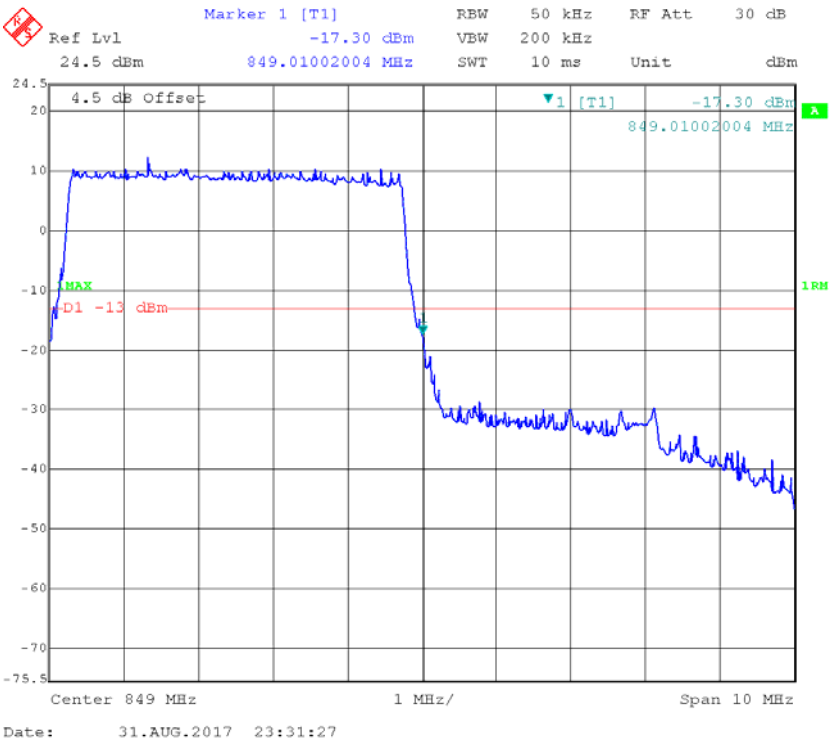
QPSK_3MHz_Right



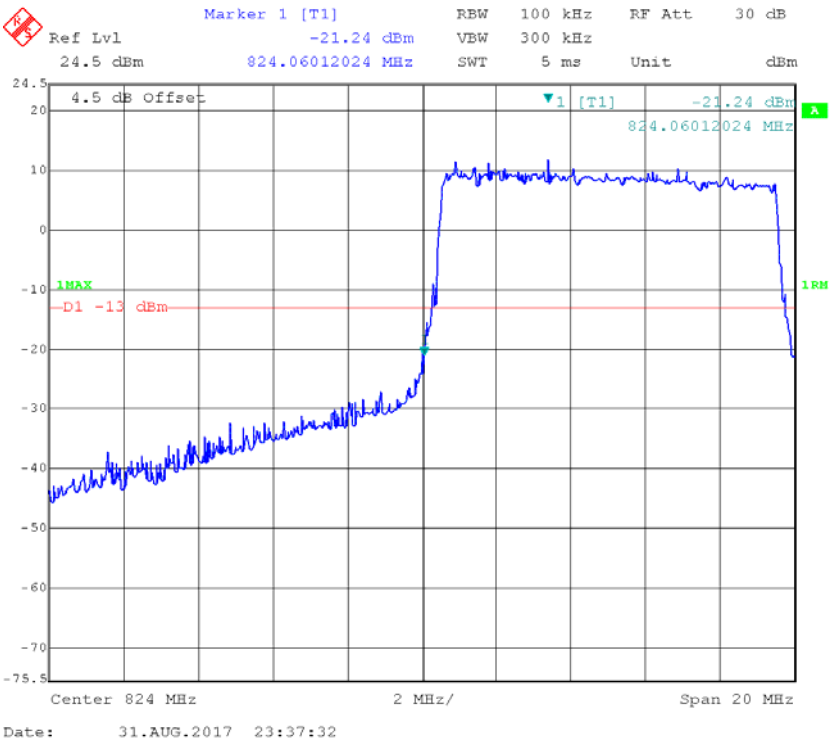
QPSK_5MHz_Left



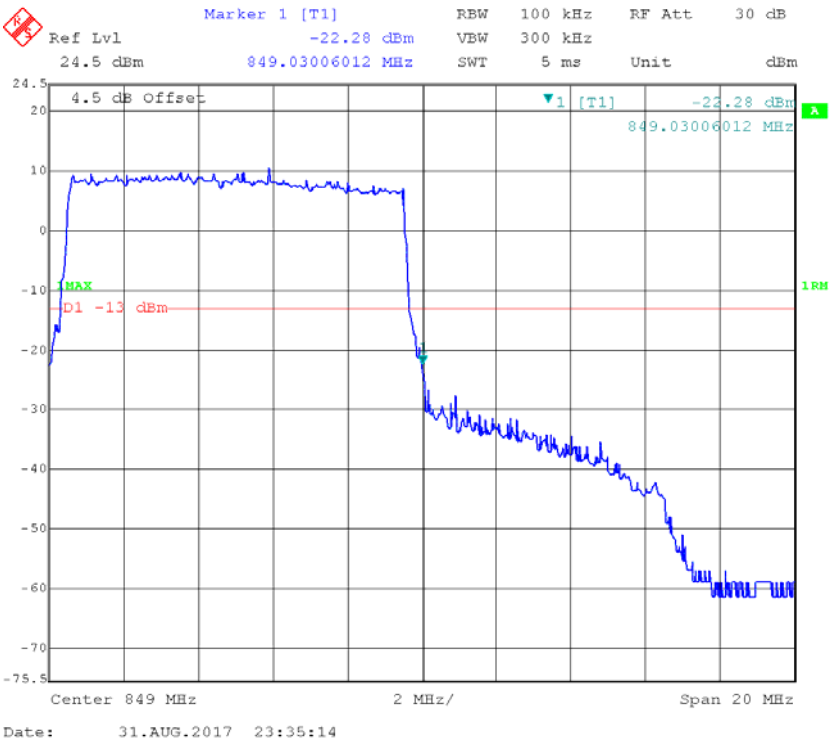
QPSK_5MHz_Right



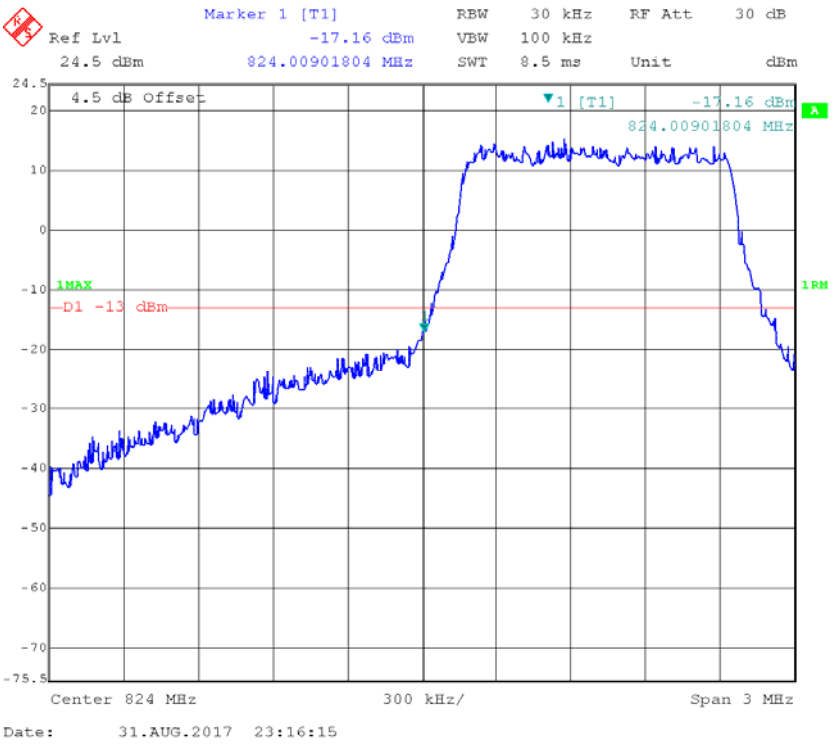
QPSK_10MHz_Left



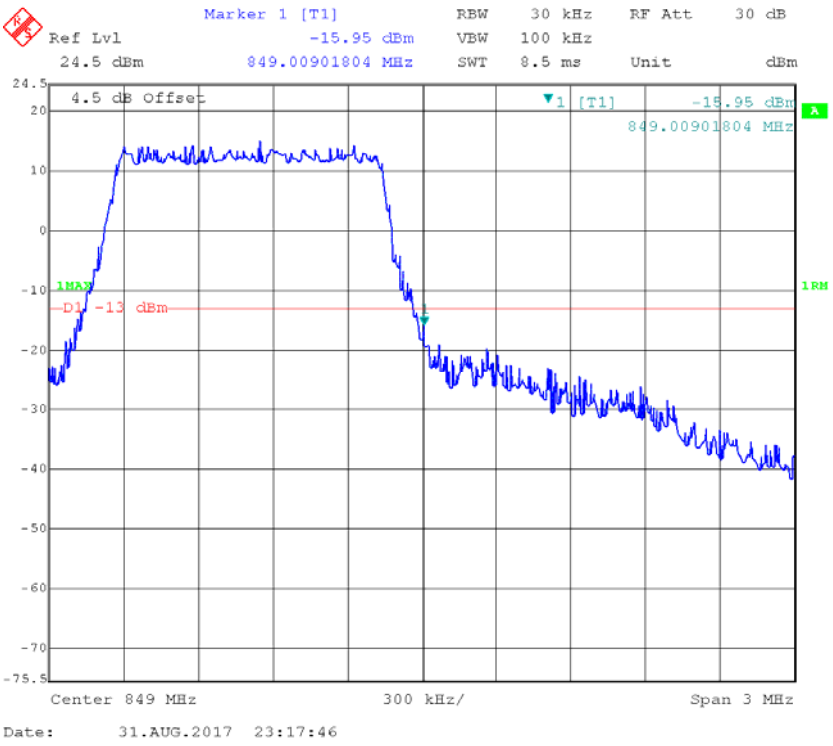
QPSK_10MHz_Right



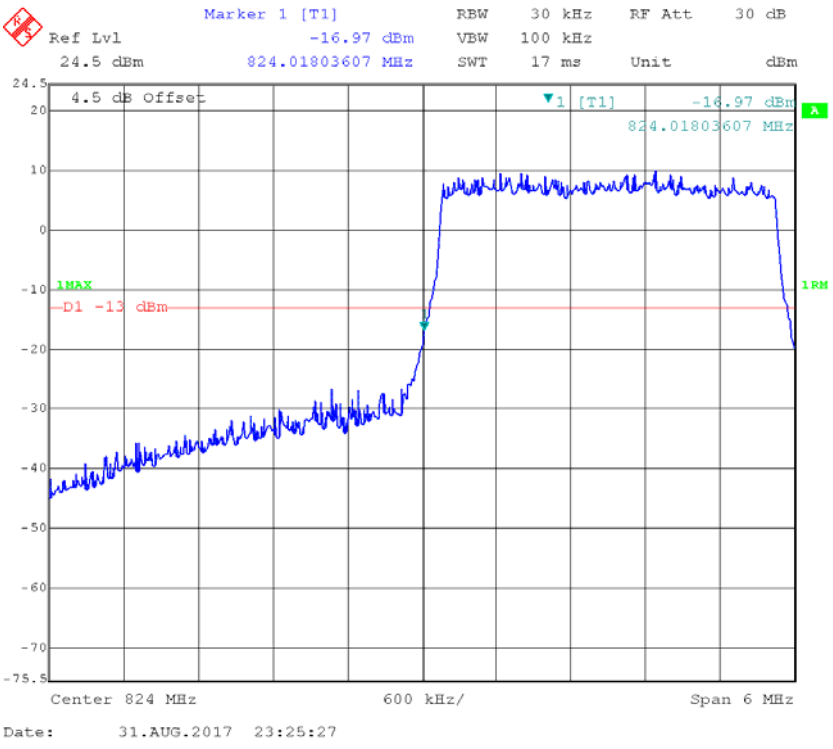
16-QAM_1.4MHz_Left



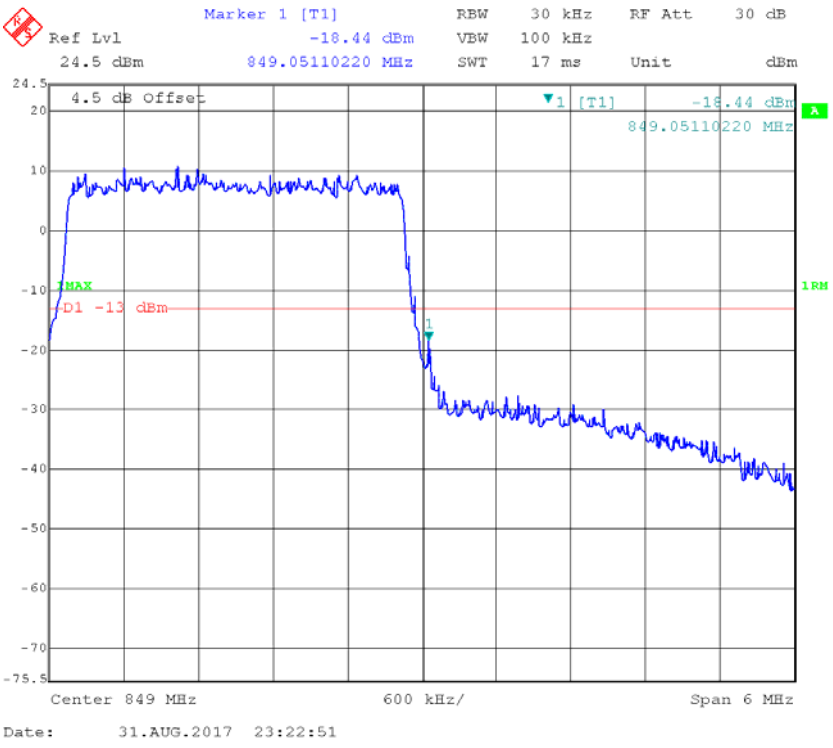
16-QAM_1.4MHz_Right



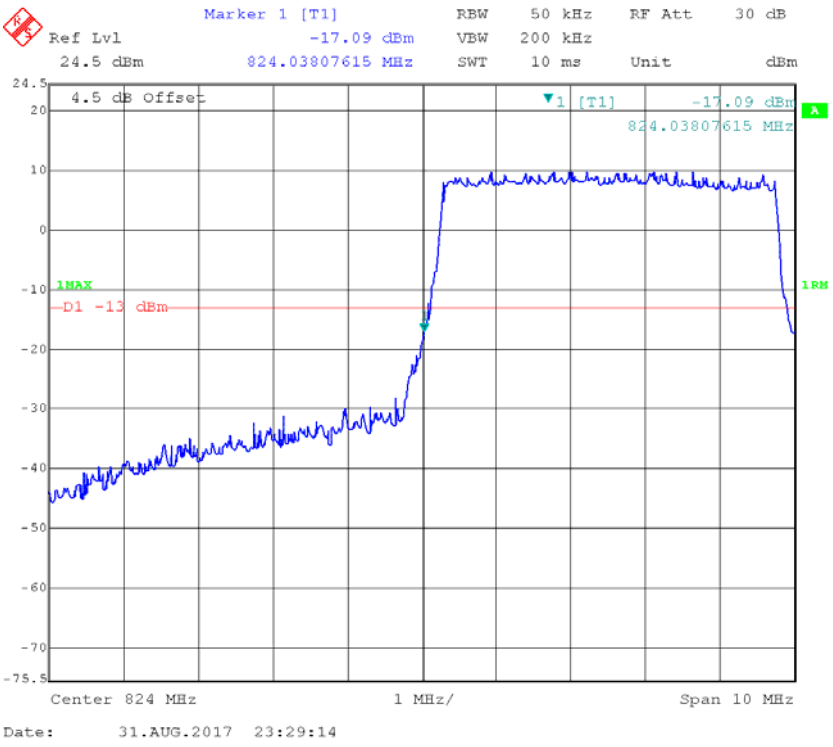
16-QAM_3MHz_Left



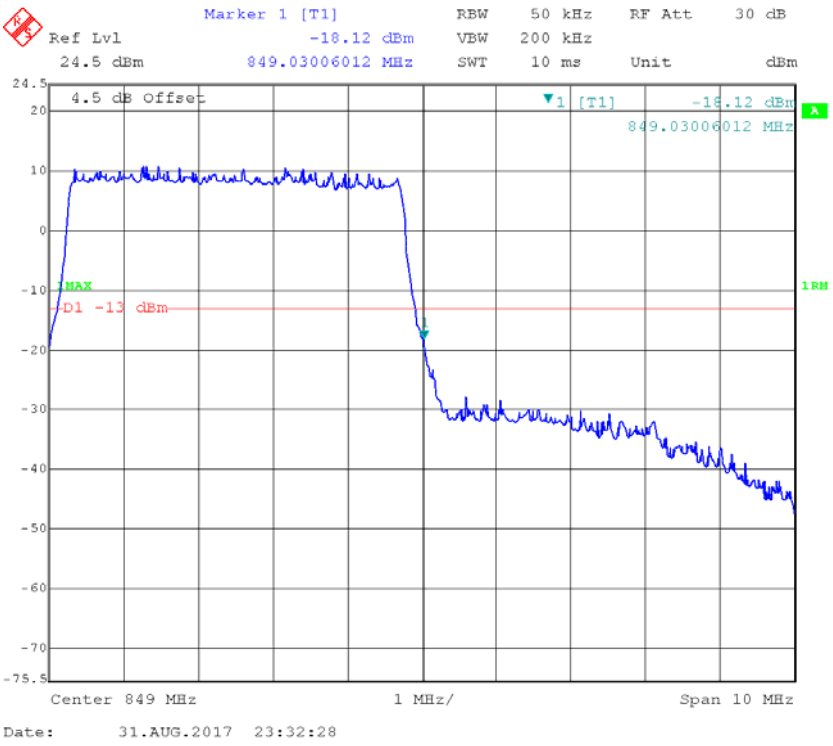
16-QAM_3MHz_Right



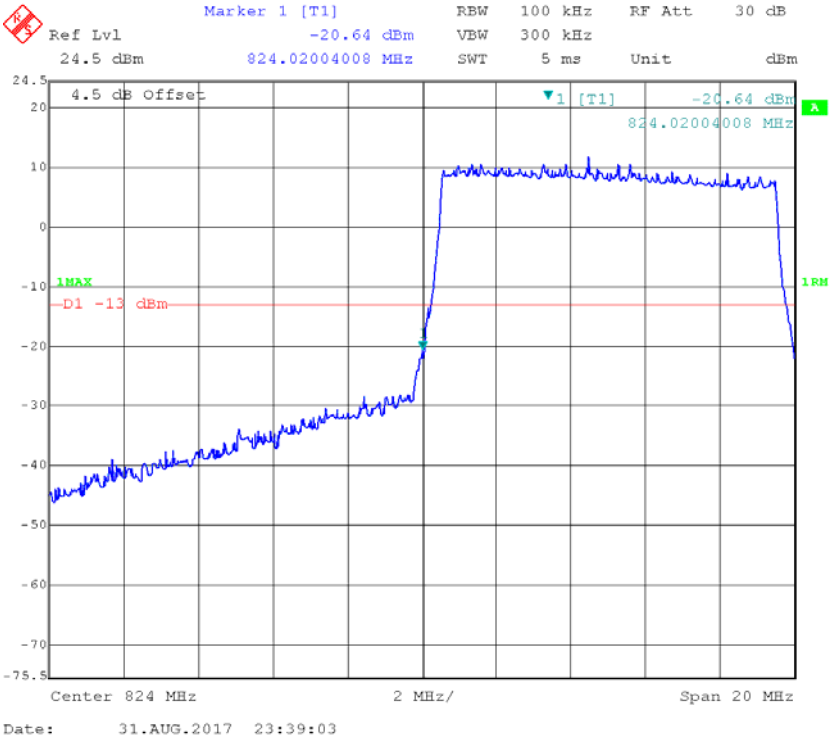
16-QAM_5MHz_Left



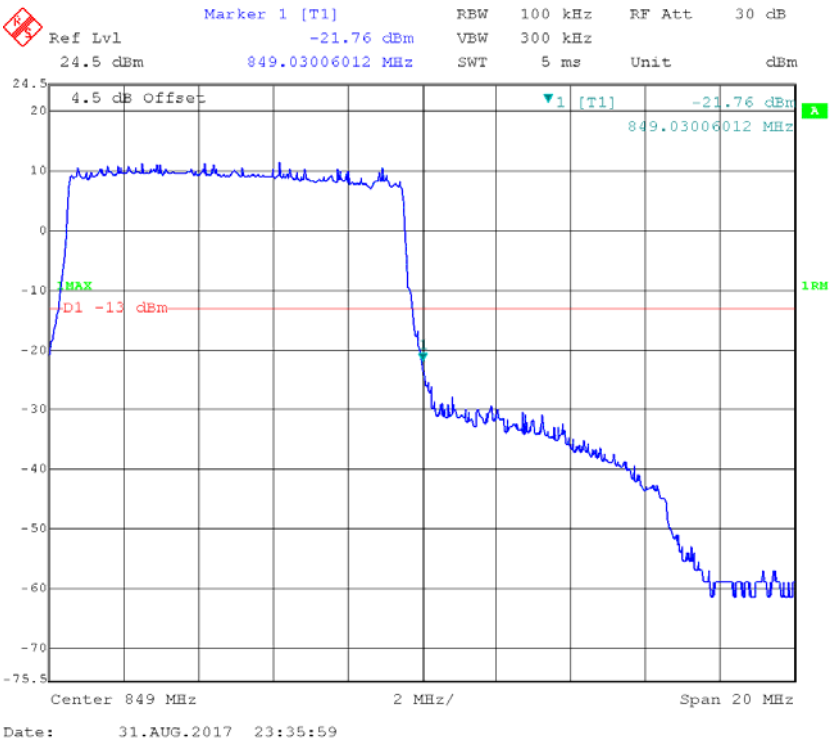
16-QAM_5MHz_Right



16-QAM_10MHz_Left

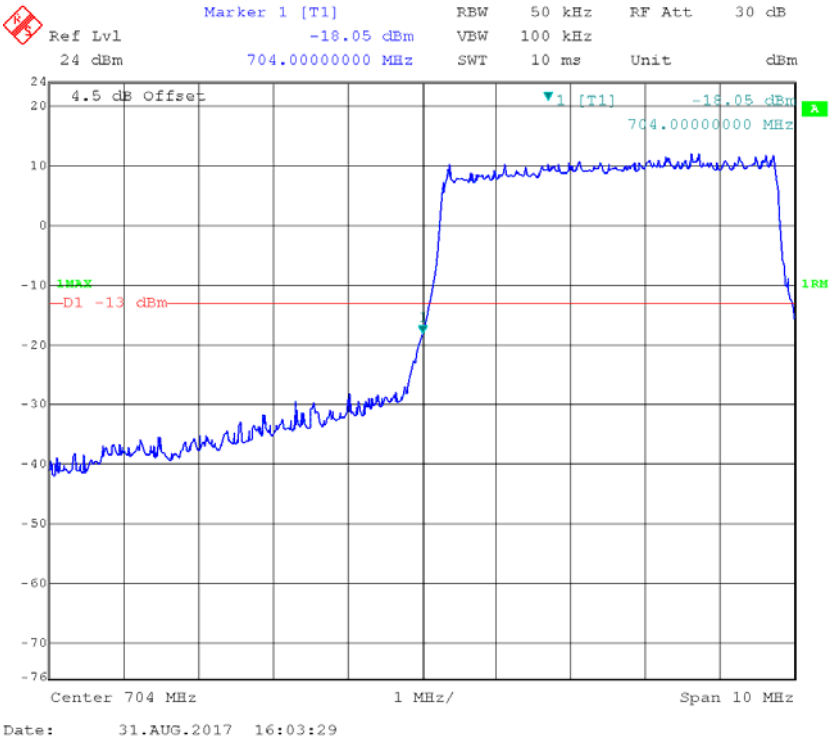


16-QAM_10MHz_Right

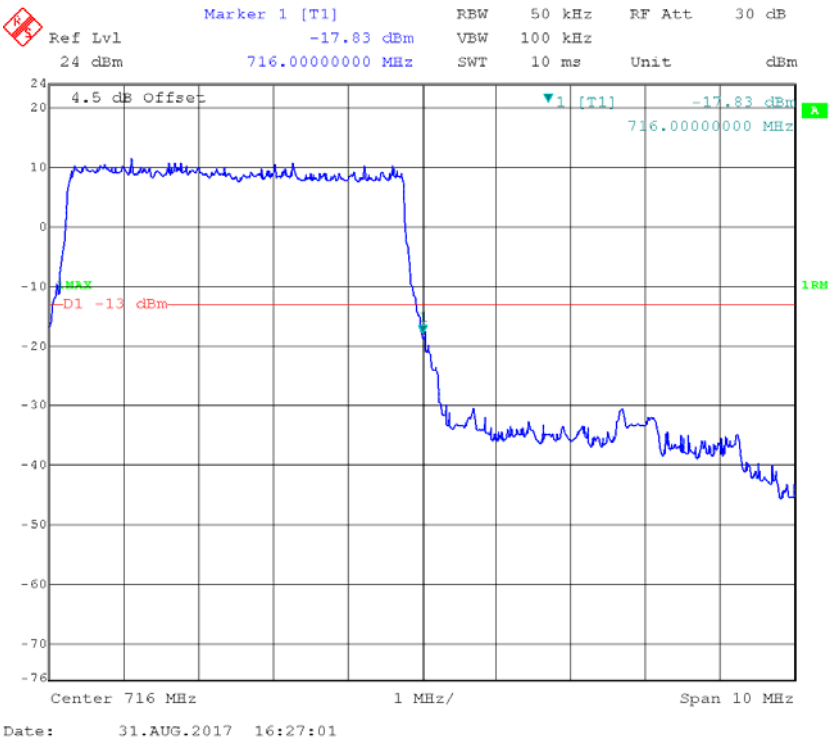


LTE Band 17

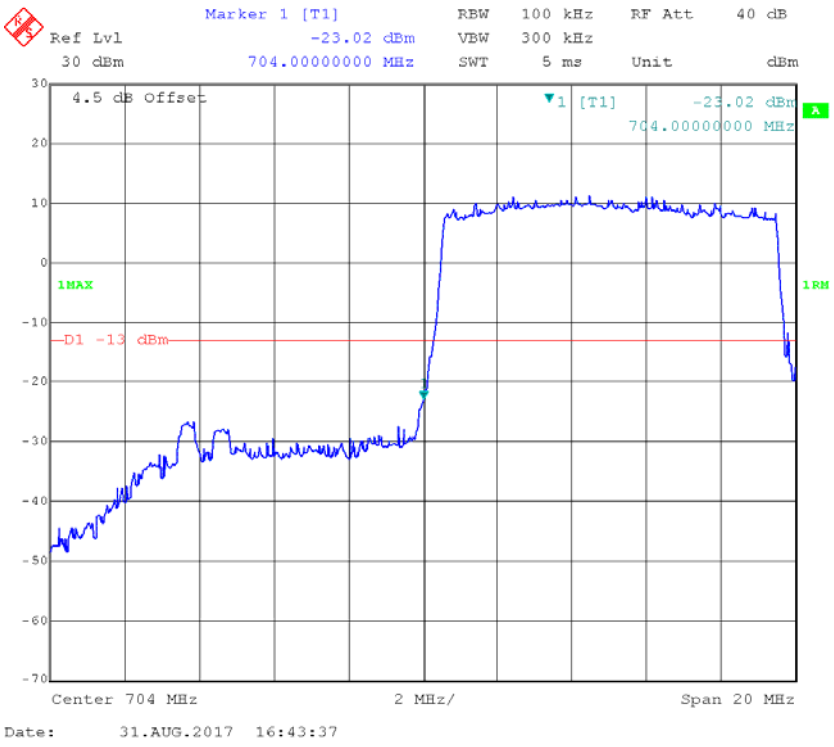
QPSK_5MHz_Left



QPSK_5MHz_Right

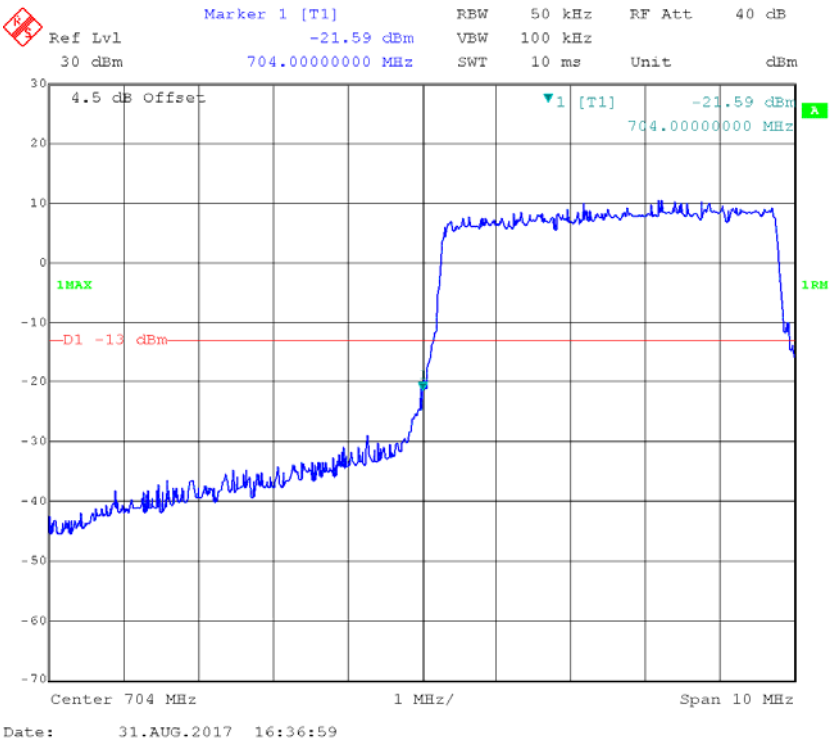


QPSK_10MHz_Left

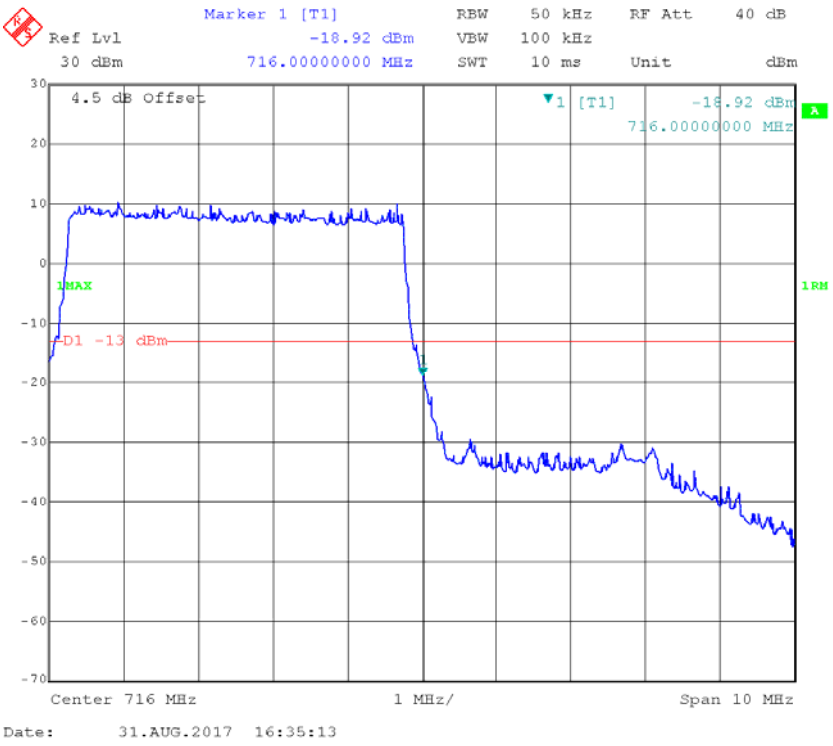


QPSK_10MHz_Right

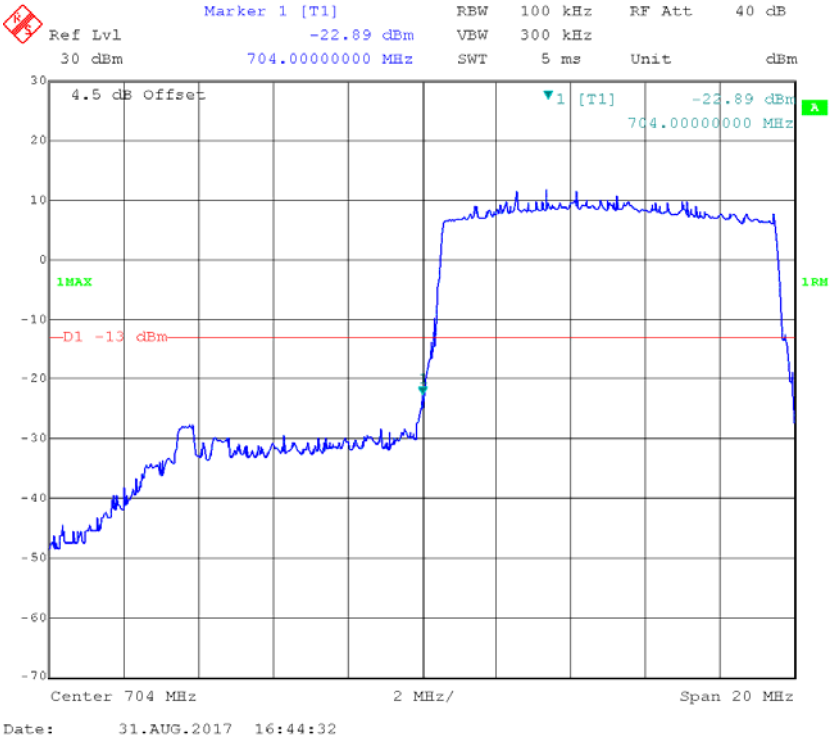
16-QAM_5MHz_Left



16-QAM_5MHz_Right



16-QAM_10MHz_Left



16-QAM_10MHz_Right

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.

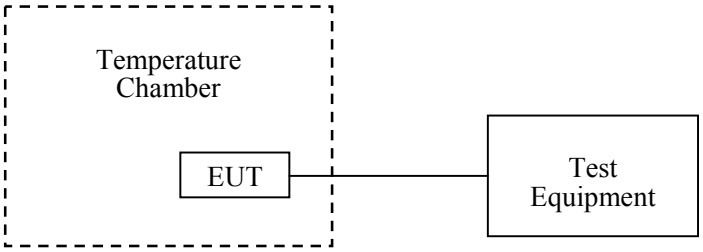
According to §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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	2016-09-10	2017-09-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	149216	2016-10-08	2017-10-08
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
UNI-T	Multimeter	UT39A	M130199938	2017-04-02	2018-04-02
Unknown	Coaxial Cable	0.1m	C-1	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:	27.8 °C
Relative Humidity:	57 %
ATM Pressure:	100 kPa

The testing was performed by Pean Zhu on 2017-09-01.

Test Result: Compliant. (the battery operation voltage is 9~11.4V, which was declared by manufacturer)

Cellular Band (Part 22H)

WCDMA Band V :

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	11.4	-3	-0.004	2.5
-20	11.4	4	0.005	2.5
-10	11.4	-2	-0.002	2.5
0	11.4	-5	-0.006	2.5
10	11.4	-3	-0.004	2.5
20	11.4	4	0.005	2.5
30	11.4	-5	-0.006	2.5
40	11.4	4	0.005	2.5
50	11.4	-3	-0.004	2.5
25	9.0	-6	-0.007	2.5

WCDMA Band II :

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	11.4	-3	-0.002	Pass
-20	11.4	-9	-0.005	Pass
-10	11.4	-4	-0.002	Pass
0	11.4	-12	-0.006	Pass
10	11.4	-12	-0.006	Pass
20	11.4	-7	-0.004	Pass
30	11.4	-2	-0.001	Pass
40	11.4	-12	-0.006	Pass
50	11.4	-2	-0.001	Pass
25	9.0	-8	-0.004	Pass

LTE Band II:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	11.4	-4.83	-0.0026	Pass
-20	11.4	-10.17	-0.0054	Pass
-10	11.4	-2.96	-0.0016	Pass
0	11.4	-7.41	-0.0039	Pass
10	11.4	-5.83	-0.0031	Pass
20	11.4	-1.83	-0.0010	Pass
30	11.4	-2.93	-0.0016	Pass
40	11.4	-9.06	-0.0048	Pass
50	11.4	-9.18	-0.0049	Pass
25	9.0	-9.33	-0.0050	Pass

16-QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	11.4	-10.05	-0.0053	Pass
-20	11.4	-9.79	-0.0052	Pass
-10	11.4	-5.98	-0.0032	Pass
0	11.4	-7.29	-0.0039	Pass
10	11.4	-5.28	-0.0028	Pass
20	11.4	-6.03	-0.0032	Pass
30	11.4	-5.71	-0.0030	Pass
40	11.4	-8.44	-0.0045	Pass
50	11.4	-4.98	-0.0026	Pass
25	9.0	-5.73	-0.0030	Pass

LTE Band V:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 836.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	11.4	-6.34	-0.0076	2.5
-20	11.4	-7.16	-0.0086	2.5
-10	11.4	-9.74	-0.0116	2.5
0	11.4	-3.24	-0.0039	2.5
10	11.4	-10.54	-0.0126	2.5
20	11.4	-1.59	-0.0019	2.5
30	11.4	-8.8	-0.0105	2.5
40	11.4	-2.47	-0.0030	2.5
50	11.4	-5.6	-0.0067	2.5
25	9.0	-5.07	-0.0061	2.5

16-QAM, Channel Bandwidth:10MHz Middle Channel, f_c =836.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	11.4	-5.21	-0.0062	2.5
-20	11.4	-5.76	-0.0069	2.5
-10	11.4	-9.34	-0.0112	2.5
0	11.4	-12.75	-0.0152	2.5
10	11.4	-6.88	-0.0082	2.5
20	11.4	-10.25	-0.0123	2.5
30	11.4	-3.57	-0.0043	2.5
40	11.4	-7.1	-0.0085	2.5
50	11.4	-6.72	-0.0080	2.5
25	9.0	-3.04	-0.0036	2.5

LTE Band 17:

QPSK, Channel Bandwidth:10MHz				
Temperature	**Voltage**	**F_L**	**F_H**	**Limit**
℃	**V_{DC}**	**MHz**	**MHz**	
-30	11.4	704.0501	715.9499	Within 704-716MHz
-20	11.4	704.0504	715.9492	
-10	11.4	704.0511	715.9494	
0	11.4	704.0512	715.9494	
10	11.4	704.0511	715.9491	
20	11.4	704.0503	715.9494	
30	11.4	704.0505	715.9498	
40	11.4	704.0506	715.9492	
50	11.4	704.0509	715.9493	
25	9.0	704.0503	715.9495	

16-QAM, Channel Bandwidth:10MHz				
Temperature	**Voltage**	**F_L**	**F_H**	**Result**
℃	**V_{DC}**	**MHz**	**MHz**	
-30	11.4	704.0503	715.9497	Within 704-716MHz
-20	11.4	704.0501	715.9493	
-10	11.4	704.0521	715.9495	
0	11.4	704.0515	715.9499	
10	11.4	704.0516	715.9490	
20	11.4	704.0507	715.9492	
30	11.4	704.0501	715.9493	
40	11.4	704.0509	715.9495	
50	11.4	704.0511	715.9496	
25	9.0	704.0505	715.9493	

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