

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

For

Shenzhen KVD Communication Equipment

Lenovo R&D Center 2F-B, South First Road, High-tech Park, Nanshan District, Shenzhen China

FCC ID: 2ADTE-X20L

Report Type: Original Report	Product Type: Mobile phone
Report Number: RDG171130004-00D	
Report Date: 2017-12-20	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.(Dongguan).

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **Shenzhen KVD Communication Equipment**'s product, model number: **X20L (FCC ID: 2ADTE-X20L)** (the "EUT") in this report was a **Mobile phone**, which was measured approximately: 145.5mm (L) x 71.9mm (W) x 8.8mm (H), rated input voltage:DC 3.8V from battery or DC 5V from adapter.

Adapter Information:

Model: HJ-0501000E1-US

Input: AC100-240V~50/60Hz 0.2A

Output: DC5V, 1000mA

**All measurement and test data in this report was gathered from production sample serial number: 171130004 (Assigned by BACL,Dongguan). The EUT was received on 2017-11-25.*

Objective

This report is prepared on behalf of *Shenzhen KVD Communication Equipment* 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: 2ADTE-X20L.

FCC Part 15C DSS submissions with FCC ID: 2ADTE-X20L.

FCC Part 15B JBP submissions with FCC ID: 2ADTE-X20L.

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

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L5662). And accredited to ISO/IEC 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.

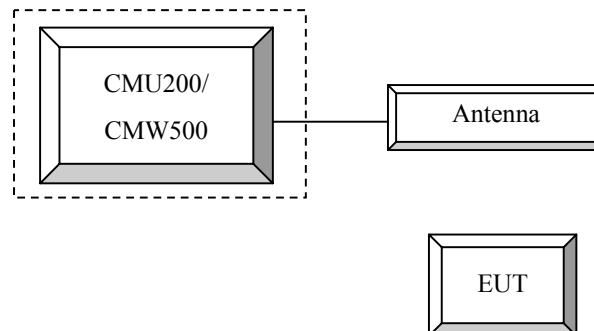
Equipment Modifications

No modification was made to the EUT.

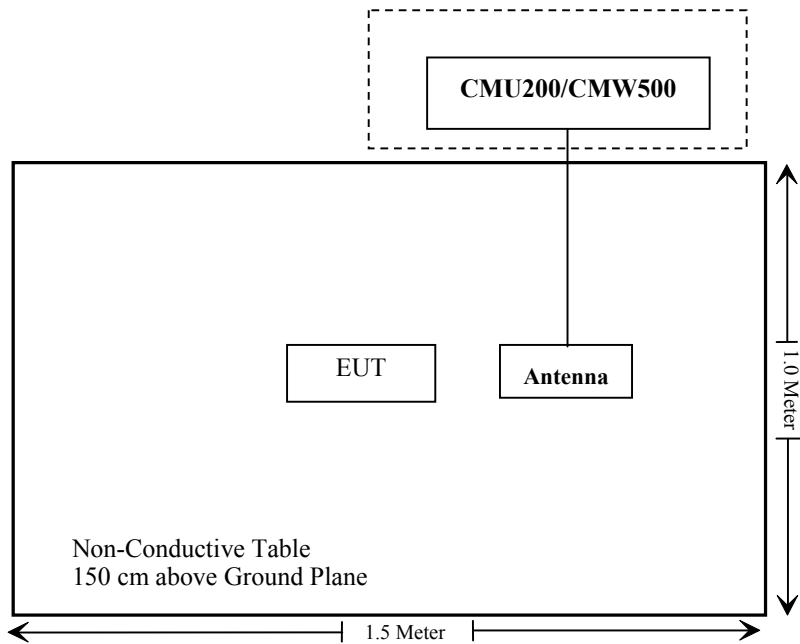
Support Equipment List and Details

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

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

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

FCC §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG171130004-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

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

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

Applicable Standard

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

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

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

According to §27.50

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

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

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

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

Test Procedure

GSM/GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900

Press Connection control to choose the different menus

Press RESET > choose all the reset all settings

Connection Press Signal Off to turn off the signal and change settings

Network Support > GSM + GPRS or GSM + EGSM

Main Service > Packet Data

Service selection > Test Mode A – Auto Slot Config. off

MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850

> 30 dBm for GPRS 1900

> 27 dBm for EGPRS 850

> 26 dBm for EGPRS 1900

BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel

Frequency Offset > + 0 Hz

Mode > BCCH and TCH

BCCH Level > -85 dBm (May need to adjust if link is not stable)

BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off

P0 > 4 dB

Slot Config > Unchanged (if already set under MS signal)

TCH > choose desired test channel

Hopping > Off

Main Timeslot > 3

Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)

Bit Stream > 2E9-1 PSR Bit Stream

AF/Rf Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input

Connection Press Signal on to turn on the signal and change settings

WCDMA-Release 99

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

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	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	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	Spectrum Analyzer	FSIQ 26	831929/005	2017-08-31	2018-08-31
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
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each Time	/
Unknown	RF Attenuator	6dB	6dB-1	Each Time	/
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31

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

Test Data**Environmental Conditions**

Temperature:	27.9~29°C
Relative Humidity:	48~52 %
ATM Pressure:	100.2~100.4 kPa

* The testing was performed by Blake Yang & Steven Zuo from 2017-11-28 to 2017-12-14.

Conducted Output Power**Cellular Band & PCS Band**

Band	Channel No.	Conducted Peak Output Power (dBm)								
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	32.34	32.31	31.61	30.03	29.03	26.09	25.23	24.19	23.15
	190	32.47	32.47	31.74	30.21	29.11	26.17	25.35	24.22	23.20
	251	32.30	32.32	31.60	30.02	29.04	26.23	25.39	24.23	23.17
PCS	512	29.71	29.90	29.11	27.35	26.23	25.63	24.24	23.37	22.29
	661	29.47	29.50	28.84	27.12	26.11	25.58	24.22	23.25	22.31
	810	29	29.02	28.38	26.64	25.59	25.35	24.07	23.19	22.08

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	22.69	2.75	22.51	3.18	22.42	2.88
HSDPA	1	22.50	2.77	22.36	3.19	22.15	2.78
	2	22.43	2.69	22.43	3.21	22.06	2.96
	3	22.52	2.73	22.30	3.14	22.11	2.93
	4	22.55	2.73	22.25	3.08	22.17	2.79
HSUPA	1	22.53	2.80	22.27	3.21	22.13	2.92
	2	22.57	2.79	22.33	3.17	22.15	2.89
	3	22.46	2.65	22.44	3.07	22.17	2.80
	4	22.61	2.66	22.35	3.14	22.13	2.96
	5	22.57	2.74	22.37	3.17	22.19	2.81
DC-HSDPA	1	22.44	2.70	22.36	3.24	22.18	2.89
	2	22.51	2.71	22.30	3.13	22.17	2.80
	3	22.50	2.66	22.30	3.15	22.02	2.92
	4	22.48	2.81	22.28	3.17	22.03	2.94
HSPA+	1	22.46	2.77	22.34	3.14	22.09	2.91

WCDMA Band IV

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.86	2.87	22.79	3.36	22.76	3.26
HSDPA	1	22.65	2.83	22.68	3.35	22.64	3.21
	2	22.75	2.85	22.70	3.34	22.54	3.28
	3	22.77	2.93	22.70	3.26	22.69	3.20
	4	22.62	2.82	22.61	3.41	22.62	3.23
HSUPA	1	22.60	2.85	22.72	3.30	22.67	3.29
	2	22.68	2.91	22.58	3.25	22.68	3.34
	3	22.60	2.87	22.70	3.42	22.51	3.28
	4	22.65	2.90	22.62	3.39	22.64	3.33
	5	22.72	2.86	22.69	3.25	22.68	3.25
DC-HSDPA	1	22.79	2.80	22.56	3.29	22.62	3.16
	2	22.65	2.83	22.55	3.37	22.66	3.23
	3	22.65	2.90	22.63	3.37	22.65	3.18
	4	22.66	2.83	22.64	3.40	22.62	3.31
HSPA+	1	22.62	2.90	22.71	3.39	22.67	3.32

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	22.41	2.95	22.21	2.90	22.48	3.06
HSDPA	1	22.19	2.96	22.07	2.79	22.25	3.07
	2	22.18	2.89	22.12	2.97	22.35	3.03
	3	22.28	2.89	22.12	2.94	22.29	3.11
	4	22.26	2.90	22.05	2.81	22.42	2.96
HSUPA	1	22.22	2.87	22.10	2.93	22.28	2.99
	2	22.21	2.99	21.98	2.95	22.22	3.09
	3	22.21	2.95	21.97	2.82	22.23	3.10
	4	22.28	2.87	22.07	2.85	22.35	3.11
	5	22.16	3.02	21.96	2.87	22.39	3.03
DC-HSDPA	1	22.21	2.90	22.12	2.89	22.38	3.08
	2	22.24	2.94	22.11	2.93	22.36	3.03
	3	22.20	2.99	22.13	2.93	22.40	2.99
	4	22.22	2.85	22.12	2.86	22.34	3.12
HSPA+	1	22.24	3.00	22.12	2.78	22.28	3.06

LTE Band 2 (PART 24)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.96	22.13	21.83
		1#3	22.95	22.15	21.77
		1#5	23.13	22.16	21.74
		3#0	22.77	22.30	21.65
		3#1	22.52	22.10	21.69
		3#3	22.92	22.29	21.61
		6#0	21.84	21.22	20.93
	16QAM	1#0	21.87	21.67	21.73
		1#3	21.96	21.75	21.73
		1#5	22.18	21.76	21.79
		3#0	21.67	21.63	21.80
		3#1	21.62	21.74	21.61
		3#3	21.63	21.76	21.63
		6#0	20.89	20.50	20.41
3MHz	QPSK	1#0	22.70	22.23	21.55
		1#8	22.70	22.12	21.44
		1#14	22.96	22.20	21.42
		8#0	22.79	22.17	21.58
		8#4	22.66	22.11	21.45
		8#7	22.70	22.19	21.42
		15#0	21.46	21.26	21.58
	16QAM	1#0	21.51	21.53	21.50
		1#7	21.45	21.50	21.49
		1#14	21.56	21.56	21.56
		8#0	21.43	21.44	21.46
		8#4	21.52	21.43	21.59
		8#7	21.49	21.51	21.43
		15#0	20.83	20.56	20.42
5MHz	QPSK	1#0	22.16	21.73	21.00
		1#12	21.70	21.70	21.05
		1#24	22.03	21.71	21.19
		12#0	22.12	21.70	21.06
		12#6	22.01	21.76	21.17
		12#11	22.01	21.67	21.05
		25#0	20.81	20.74	20.39
	16QAM	1#0	21.13	21.05	21.15
		1#12	21.12	21.09	21.13
		1#24	21.20	21.08	21.10
		12#0	21.08	21.04	21.04
		12#6	21.10	21.17	21.05
		12#11	21.07	21.10	21.06
		25#0	20.79	20.64	20.49

10MHz	QPSK	1#0	21.84	21.78	21.97
		1#24	21.68	21.77	21.68
		1#49	21.48	21.61	21.71
		25#0	20.90	20.87	20.96
		25#12	20.91	20.87	20.86
		25#24	20.87	20.83	20.84
		50#0	20.63	20.71	20.66
	16QAM	1#0	21.76	21.71	21.69
		1#24	21.62	21.70	21.74
		1#49	21.62	21.73	21.73
		25#0	20.74	20.61	20.64
		25#12	20.80	20.68	20.63
		25#24	20.63	20.73	20.71
		50#0	20.62	20.67	20.62
15MHz	QPSK	1#0	21.68	21.73	21.62
		1#37	21.80	21.68	21.69
		1#74	21.66	21.66	21.60
		36#0	20.83	20.91	20.94
		36#17	20.83	20.84	20.99
		36#35	20.96	20.94	20.97
		75#0	20.57	20.63	20.60
	16QAM	1#0	21.74	21.76	21.78
		1#37	21.77	21.78	21.74
		1#74	21.74	21.66	21.73
		36#0	20.97	20.77	20.79
		36#17	20.85	20.88	20.61
		36#35	20.93	20.84	20.70
		75#0	20.50	20.68	20.65
20MHz	QPSK	1#0	22.96	22.11	21.74
		1#49	22.82	22.30	21.67
		1#99	22.83	22.14	21.76
		50#0	22.85	22.25	21.65
		50#24	22.75	22.19	21.61
		50#49	22.80	22.27	21.76
		100#0	21.60	21.75	21.79
	16QAM	1#0	21.79	21.45	21.17
		1#49	21.76	21.35	21.28
		1#99	21.62	21.40	21.21
		50#0	21.76	21.46	21.18
		50#24	21.70	21.48	21.27
		50#49	21.72	21.34	21.19
		100#0	20.65	20.66	20.36

LTE Band 4 (PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.85	22.73	21.50
		1#3	22.93	22.79	21.45
		1#5	22.89	22.75	21.49
		3#0	22.97	22.81	21.56
		3#1	22.96	22.74	21.59
		3#3	22.95	22.87	21.42
		6#0	21.91	21.53	21.30
	16QAM	1#0	21.87	21.52	20.70
		1#3	21.91	21.45	20.73
		1#5	21.87	21.44	20.78
		3#0	21.88	21.54	20.86
		3#1	21.77	21.45	20.77
		3#3	21.81	21.45	20.73
		6#0	20.89	20.44	20.34
3MHz	QPSK	1#0	22.84	22.48	21.46
		1#7	22.81	22.41	21.44
		1#14	22.72	22.47	21.52
		8#0	22.80	22.32	21.40
		8#4	22.80	22.45	21.44
		8#7	22.79	22.39	22.48
		15#0	21.20	21.38	21.37
	16QAM	1#0	22.33	22.21	20.76
		1#7	22.47	22.17	20.88
		1#14	22.52	22.20	20.74
		8#0	22.56	22.23	20.70
		8#4	22.47	22.14	20.84
		8#7	22.52	22.30	20.89
		15#0	20.41	20.33	20.29
5MHz	QPSK	1#0	22.82	22.53	21.59
		1#12	22.85	22.61	21.63
		1#24	22.74	22.59	21.69
		12#0	22.83	22.64	21.56
		12#6	22.82	22.51	21.69
		12#11	22.74	22.63	21.57
		25#0	21.37	21.40	21.48
	16QAM	1#0	21.69	21.69	20.80
		1#12	21.60	21.53	20.73
		1#24	21.68	21.59	20.78
		12#0	21.71	21.62	20.81
		12#6	21.75	21.57	20.74
		12#11	21.75	21.54	20.89
		25#0	20.54	20.62	20.45

10MHz	QPSK	1#0	22.98	22.87	21.57
		1#24	22.92	22.77	21.50
		1#49	22.89	22.81	21.58
		25#0	22.87	22.70	21.50
		25#12	22.94	22.84	21.45
		25#24	22.82	22.74	21.42
		50#0	21.43	21.31	21.33
	16QAM	1#0	22.14	22.00	20.79
		1#24	22.18	22.19	20.73
		1#49	22.10	22.11	20.75
		25#0	22.20	22.14	20.79
		25#12	22.16	22.13	20.72
		25#24	22.13	22.08	20.75
		50#0	20.48	20.41	20.56
15MHz	QPSK	1#0	23.06	22.82	21.80
		1#37	22.98	22.71	21.60
		1#74	23.10	22.87	21.70
		36#0	23.06	22.77	21.79
		36#17	23.09	22.87	21.69
		36#35	23.01	22.76	21.76
		75#0	21.52	21.50	21.57
	16QAM	1#0	22.16	22.16	20.72
		1#37	22.24	22.11	20.82
		1#74	22.12	22.08	20.78
		36#0	22.12	22.07	20.85
		36#17	22.19	22.08	20.89
		36#35	22.22	22.00	20.91
		75#0	20.24	20.22	20.21
20MHz	QPSK	1#0	22.94	22.91	21.51
		1#49	22.89	22.69	21.52
		1#99	22.91	22.67	21.55
		50#0	23.00	22.64	21.54
		50#24	22.96	22.63	21.55
		50#49	22.98	22.73	21.66
		100#0	21.31	21.44	21.42
	16QAM	1#0	22.03	22.02	20.89
		1#49	22.17	22.05	20.93
		1#99	22.26	22.04	20.83
		50#0	22.12	22.01	20.92
		50#24	22.17	22.09	20.86
		50#49	22.18	21.96	20.97
		100#0	20.47	20.36	20.48

LTE Band 5 (PART 22)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	23.01	22.91	22.93
		1#3	23.06	22.92	22.96
		1#5	23.03	22.97	22.87
		3#0	23.08	22.99	22.86
		3#1	23.10	22.99	22.80
		3#3	23.06	22.81	22.85
		6#0	22.01	21.98	22.00
	16QAM	1#0	22.11	22.01	21.83
		1#3	22.17	22.04	21.96
		1#5	22.09	22.03	21.84
		3#0	22.20	21.99	21.96
		3#1	22.01	21.97	21.91
		3#3	22.11	22.05	21.82
		6#0	21.61	21.79	21.70
3MHz	QPSK	1#0	22.93	22.78	22.70
		1#7	22.90	22.71	22.74
		1#14	22.85	22.76	22.78
		8#0	22.83	22.82	22.72
		8#4	22.99	22.84	22.66
		8#7	22.85	22.78	22.73
		15#0	22.34	22.41	22.32
	16QAM	1#0	22.07	21.92	21.89
		1#7	22.04	22.02	21.92
		1#14	22.20	22.05	21.87
		8#0	22.07	22.09	21.96
		8#4	22.14	21.96	21.95
		8#7	22.08	21.96	21.89
		15#0	21.49	21.46	21.31
5MHz	QPSK	1#0	23.08	22.92	22.74
		1#12	23.02	22.83	22.80
		1#24	23.02	22.87	22.70
		12#0	23.03	22.96	22.87
		12#6	22.96	22.83	22.83
		12#11	23.05	22.97	22.70
		25#0	22.00	21.87	21.99
	16QAM	1#0	22.24	22.14	21.73
		1#12	22.40	22.23	21.89
		1#24	22.34	22.29	21.85
		12#0	22.31	22.13	21.89
		12#6	22.28	22.20	21.74
		12#11	22.27	22.24	21.83
		25#0	21.07	21.05	20.90

10MHz	QPSK	1#0	23.04	22.70	22.67
		1#24	22.99	22.86	22.61
		1#49	23.09	22.74	22.69
		25#0	23.02	22.80	22.56
		25#12	22.95	22.86	22.62
		25#24	23.06	22.86	22.51
		50#0	22.25	22.24	22.25
	16QAM	1#0	22.35	22.27	22.09
		1#24	22.42	22.20	21.94
		1#49	22.33	22.17	21.93
		25#0	22.49	22.15	22.05
		25#12	22.40	22.21	22.07
		25#24	22.32	22.12	21.94
		50#0	21.02	20.91	21.04

LTE Band 7 (PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.74	22.94	21.88
		1#12	22.46	22.89	21.79
		1#24	22.53	22.93	21.73
		12#0	21.60	21.57	21.40
		12#6	21.33	21.51	21.49
		12#11	21.53	21.52	21.48
		25#0	21.80	21.80	21.60
	16QAM	1#0	22.42	22.35	21.93
		1#12	22.29	22.33	21.83
		1#24	22.57	22.38	21.98
		12#0	21.85	21.63	21.07
		12#6	21.69	21.73	21.07
		12#11	21.91	21.71	20.94
		25#0	20.77	20.75	20.67
10MHz	QPSK	1#0	22.90	22.85	21.80
		1#24	22.92	22.98	21.82
		1#49	22.85	22.80	21.77
		25#0	21.70	21.55	21.31
		25#12	21.59	21.54	21.35
		25#24	21.63	21.51	21.33
		50#0	20.70	20.65	20.78
	16QAM	1#0	21.76	21.75	21.38
		1#24	21.71	21.73	21.39
		1#49	21.71	21.85	21.34
		25#0	21.23	21.26	20.68
		25#12	21.38	21.27	20.66
		25#24	21.38	21.40	20.79
		50#0	20.59	20.60	20.43
15MHz	QPSK	1#0	22.33	22.39	22.06
		1#37	22.30	22.32	22.04
		1#74	22.32	22.22	22.05
		36#0	21.47	21.55	20.78
		36#17	21.54	21.52	20.71
		36#35	21.42	21.52	20.76
		75#0	20.41	20.39	20.46
	16QAM	1#0	22.01	22.07	21.47
		1#37	22.07	22.08	21.41
		1#74	21.92	21.91	21.41
		36#0	21.07	21.00	20.65
		36#17	21.06	21.03	20.68
		36#35	21.12	21.03	20.67
		75#0	20.36	20.40	20.36

20MHz	QPSK	1#0	22.14	22.03	21.61
		1#49	22.03	22.15	21.75
		1#99	22.11	22.01	21.70
		50#0	21.67	21.56	20.64
		50#24	21.52	21.66	20.70
		50#49	21.61	21.55	20.66
		100#0	20.58	20.57	20.66
	16QAM	1#0	21.81	21.74	20.84
		1#49	21.72	21.81	20.86
		1#99	21.82	21.81	20.82
		50#0	20.96	20.84	20.36
		50#24	20.86	20.82	20.30
		50#49	20.94	20.77	20.27
		100#0	20.20	20.16	20.11

LTE Band 12 (PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	23.19	23.27	23.20
		1#3	23.26	23.03	23.15
		1#5	23.21	23.11	23.05
		3#0	23.23	23.18	23.18
		3#1	23.24	23.01	23.11
		3#3	23.17	23.15	23.14
		6#0	22.21	22.13	22.15
	16QAM	1#0	21.15	21.16	21.10
		1#3	21.09	21.08	21.16
		1#5	21.06	21.13	21.11
		3#0	21.17	21.03	21.06
		3#1	21.11	21.02	21.06
		3#3	21.17	21.01	21.16
		6#0	20.77	20.71	20.72
3MHz	QPSK	1#0	23.18	23.01	22.99
		1#7	23.06	22.98	22.95
		1#14	23.05	23.05	22.89
		8#0	23.06	22.93	22.94
		8#4	23.06	23.08	22.98
		8#7	23.09	23.01	22.85
		15#0	21.97	21.87	21.89
	16QAM	1#0	22.34	22.13	22.05
		1#7	22.17	22.26	22.10
		1#14	22.21	22.19	21.94
		8#0	22.28	22.23	22.02
		8#4	22.27	22.12	22.05
		8#7	22.23	22.27	21.90
		15#0	20.92	20.97	20.88
5MHz	QPSK	1#0	23.33	23.03	22.82
		1#12	23.14	23.01	22.82
		1#24	23.24	22.96	22.89
		12#0	23.12	23.04	22.76
		12#6	23.25	23.01	22.76
		12#11	23.12	23.00	22.80
		25#0	21.94	21.96	21.91
	16QAM	1#0	22.63	22.57	22.11
		1#12	22.57	22.58	22.24
		1#24	22.57	22.58	22.18
		12#0	22.66	22.45	22.28
		12#6	22.58	22.58	22.20
		12#11	22.64	22.53	22.15
		25#0	20.96	20.96	20.98

10MHz	QPSK	1#0	20.79	20.86	20.73
		1#24	20.90	20.86	20.78
		1#49	20.84	20.84	20.77
		25#0	20.78	20.79	20.80
		25#12	20.73	20.81	20.81
		25#24	20.75	20.80	20.71
		50#0	20.10	20.00	20.09
	16QAM	1#0	20.05	20.05	20.01
		1#24	20.14	20.13	20.02
		1#49	20.16	20.17	20.20
		25#0	20.19	20.10	20.17
		25#12	20.04	20.00	20.13
		25#24	20.19	20.11	20.12
		50#0	20.03	19.95	19.91

LTE Band 17(PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	23.43	23.30	23.35
		1#12	23.36	23.16	23.13
		1#24	23.36	23.15	23.30
		12#0	23.26	23.21	23.22
		12#6	23.33	23.16	23.27
		12#11	23.40	23.28	23.21
		25#0	22.23	22.27	22.24
	16QAM	1#0	22.49	22.44	22.34
		1#12	22.38	22.44	22.47
		1#24	22.47	22.38	22.35
		12#0	22.45	22.39	22.30
		12#6	22.36	22.34	22.45
		12#11	22.37	22.43	22.35
		25#0	21.50	21.43	21.44
10MHz	QPSK	1#0	23.40	23.30	23.35
		1#24	23.28	23.37	23.13
		1#49	23.37	23.33	23.01
		25#0	23.27	23.30	23.06
		25#12	23.39	23.24	23.19
		25#24	23.35	23.22	23.07
		50#0	22.33	22.37	22.22
	16QAM	1#0	22.31	22.20	22.28
		1#24	22.21	22.37	22.36
		1#49	22.22	22.31	22.37
		25#0	22.30	22.36	22.20
		25#12	22.32	22.38	22.40
		25#24	22.24	22.34	22.36
		50#0	21.13	21.10	21.25

PAR, Band 2

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.14	4.37	3.14	13
	100 RB		7.40	7.33	7.28	13
16QAM	1 RB	20 MHz	5.08	5.58	4.14	13
	100 RB		8.84	8.21	8.19	13

PAR, Band 4

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.94	3.90	3.99	13
	100 RB		7.41	7.55	7.51	13
16QAM	1 RB	20 MHz	6.21	4.45	4.86	13
	100 RB		8.70	8.73	7.95	13

PAR, Band 5

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	3.39	3.92	3.61	13
	50 RB		6.03	6.49	6.08	13
16QAM	1 RB	10 MHz	4.24	4.97	4.59	13
	50 RB		6.73	7.87	7.48	13

PAR, Band 7

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	3.19	2.63	2.16	13
	100 RB		7.85	7.73	7.24	13
16QAM	1 RB	20 MHz	3.99	3.73	3.04	13
	100 RB		8.52	8.53	8.08	13

PAR, Band 12

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	3.87	3.78	3.67	13
	50 RB		6.31	6.92	6.26	13
16QAM	1 RB	10 MHz	4.89	5.12	4.57	13
	50 RB		7.69	8.16	7.01	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	3.55	3.42	3.53	13
	50 RB		6.16	6.31	6.14	13
16QAM	1 RB	10 MHz	4.29	4.21	4.35	13
	50 RB		7.31	7.46	7.07	13

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

ERP & EIRP

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850 Middle Channel								
836.600	H	94.73	19.8	0.0	1	18.8	38.5	19.7
836.600	V	102.10	30.3	0.0	1	29.3	38.5	9.2
EDGE 850 Middle Channel								
836.600	H	88.86	13.9	0.0	1	12.9	38.5	25.6
836.600	V	96.86	25.1	0.0	1	24.1	38.5	14.4
WCDMA Band V Middle Channel								
836.600	H	86.21	11.3	0.0	1	10.3	38.5	28.2
836.600	V	95.76	24	0.0	1	23.0	38.5	15.5

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
PCS 1900 Middle Channel								
1880.000	H	90.75	18.1	11.7	2.7	27.1	33.0	5.9
1880.000	V	89.26	16.8	11.7	2.7	25.8	33.0	7.2
EDGE 1900 Middle Channel								
1880.000	H	86.61	14	11.7	2.7	23.0	33.0	10.0
1880.000	V	85.02	12.6	11.7	2.7	21.6	33.0	11.4
WCDMA Band II Middle Channel								
1880.000	H	84.85	12.2	11.7	2.7	21.2	33.0	11.8
1880.000	V	84.56	12.1	11.7	2.7	21.1	33.0	11.9

Part 27

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band IV Middle Channel								
1732.600	H	87.62	13.6	10.9	2.5	22.0	30.0	8.0
1732.600	V	87.36	13	10.9	2.5	21.4	30.0	8.6

Note:

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

LTE Band 2

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 1.4 MHz Middle Channel								
1880.000	H	87.15	14.5	11.7	2.7	23.5	33.0	9.5
1880.000	V	87.76	15.3	11.7	2.7	24.3	33.0	8.7
16QAM 1.4 MHz Middle Channel								
1880.000	H	86.64	14	11.7	2.7	23.0	33.0	10.0
1880.000	V	87.43	15	11.7	2.7	24.0	33.0	9.0
QPSK 3 MHz Middle Channel								
1880.000	H	86.77	14.2	11.7	2.7	23.2	33.0	9.8
1880.000	V	87.16	14.7	11.7	2.7	23.7	33.0	9.3
16QAM 3 MHz Middle Channel								
1880.000	H	86.49	13.9	11.7	2.7	22.9	33.0	10.1
1880.000	V	87.86	15.4	11.7	2.7	24.4	33.0	8.6
QPSK 5 MHz Middle Channel								
1880.000	H	87.52	14.9	11.7	2.7	23.9	33.0	9.1
1880.000	V	87.98	15.5	11.7	2.7	24.5	33.0	8.5
16QAM 5 MHz Middle Channel								
1880.000	H	87.36	14.8	11.7	2.7	23.8	33.0	9.2
1880.000	V	87.75	15.3	11.7	2.7	24.3	33.0	8.7
QPSK 10 MHz Middle Channel								
1880.000	H	86.49	13.9	11.7	2.7	22.9	33.0	10.1
1880.000	V	86.65	14.2	11.7	2.7	23.2	33.0	9.8
16QAM 10 MHz Middle Channel								
1880.000	H	86.32	13.7	11.7	2.7	22.7	33.0	10.3
1880.000	V	86.34	13.9	11.7	2.7	22.9	33.0	10.1
QPSK 15 MHz Middle Channel								
1880.000	H	86.27	13.7	11.7	2.7	22.7	33.0	10.3
1880.000	V	86.68	14.2	11.7	2.7	23.2	33.0	9.8
16QAM 15 MHz Middle Channel								
1880.000	H	85.79	13.2	11.7	2.7	22.2	33.0	10.8
1880.000	V	86.16	13.7	11.7	2.7	22.7	33.0	10.3
QPSK 20 MHz Middle Channel								
1880.000	H	85.46	12.9	11.7	2.7	21.9	33.0	11.1
1880.000	V	85.83	13.4	11.7	2.7	22.4	33.0	10.6
16QAM 20 MHz Middle Channel								
1880.000	H	85.27	12.7	11.7	2.7	21.7	33.0	11.3
1880.000	V	85.66	13.2	11.7	2.7	22.2	33.0	10.8

LTE Band 4

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 1.4 MHz Middle Channel								
1732.500	H	88.46	14.4	10.9	2.5	22.8	30.0	7.2
1732.500	V	89.85	15.5	10.9	2.5	23.9	30.0	6.1
16QAM 1.4 MHz Middle Channel								
1732.500	H	88.16	14.1	10.9	2.5	22.5	30.0	7.5
1732.500	V	89.32	15	10.9	2.5	23.4	30.0	6.6
QPSK 3 MHz Middle Channel								
1732.500	H	88.37	14.3	10.9	2.5	22.7	30.0	7.3
1732.500	V	88.64	14.3	10.9	2.5	22.7	30.0	7.3
16QAM 3 MHz Middle Channel								
1732.500	H	88.18	14.1	10.9	2.5	22.5	30.0	7.5
1732.500	V	88.43	14.1	10.9	2.5	22.5	30.0	7.5
QPSK 5 MHz Middle Channel								
1732.500	H	88.12	14.1	10.9	2.5	22.5	30.0	7.5
1732.500	V	88.34	14	10.9	2.5	22.4	30.0	7.6
16QAM 5 MHz Middle Channel								
1732.500	H	87.75	13.7	10.9	2.5	22.1	30.0	7.9
1732.500	V	87.97	13.6	10.9	2.5	22.0	30.0	8.0
QPSK 10 MHz Middle Channel								
1732.500	H	87.38	13.3	10.9	2.5	21.7	30.0	8.3
1732.500	V	87.96	13.6	10.9	2.5	22.0	30.0	8.0
16QAM 10 MHz Middle Channel								
1732.500	H	87.09	13	10.9	2.5	21.4	30.0	8.6
1732.500	V	87.27	12.9	10.9	2.5	21.3	30.0	8.7
QPSK 15 MHz Middle Channel								
1732.500	H	86.53	12.5	10.9	2.5	20.9	30.0	9.1
1732.500	V	86.96	12.6	10.9	2.5	21.0	30.0	9.0
16QAM 15 MHz Middle Channel								
1732.500	H	86.17	12.1	10.9	2.5	20.5	30.0	9.5
1732.500	V	86.48	12.1	10.9	2.5	20.5	30.0	9.5
QPSK 20 MHz Middle Channel								
1732.500	H	86.57	12.5	10.9	2.5	20.9	30.0	9.1
1732.500	V	86.94	12.6	10.9	2.5	21.0	30.0	9.0
16QAM 20 MHz Middle Channel								
1732.500	H	86.46	12.4	10.9	2.5	20.8	30.0	9.2
1732.500	V	86.69	12.3	10.9	2.5	20.7	30.0	9.3

LTE Band 5

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 1.4 MHz Middle Channel								
836.500	H	85.83	10.9	0.0	1	9.9	38.5	28.6
836.500	V	96.28	24.5	0.0	1	23.5	38.5	15.0
16QAM 1.4 MHz Middle Channel								
836.500	H	85.63	10.7	0.0	1	9.7	38.5	28.8
836.500	V	96.03	24.2	0.0	1	23.2	38.5	15.3
QPSK 3 MHz Middle Channel								
836.500	H	85.24	10.3	0.0	1	9.3	38.5	29.2
836.500	V	96.82	25	0.0	1	24.0	38.5	14.5
16QAM 3 MHz Middle Channel								
836.500	H	85.04	10.1	0.0	1	9.1	38.5	29.4
836.500	V	96.61	24.8	0.0	1	23.8	38.5	14.7
QPSK 5 MHz Middle Channel								
836.500	H	84.96	10	0.0	1	9.0	38.5	29.5
836.500	V	96.34	24.5	0.0	1	23.5	38.5	15.0
16QAM 5 MHz Middle Channel								
836.500	H	84.75	9.8	0.0	1	8.8	38.5	29.7
836.500	V	96.05	24.3	0.0	1	23.3	38.5	15.2
QPSK 10 MHz Middle Channel								
836.500	H	84.37	9.4	0.0	1	8.4	38.5	30.1
836.500	V	95.75	24	0.0	1	23.0	38.5	15.5
16QAM 10 MHz Middle Channel								
836.500	H	84.26	9.3	0.0	1	8.3	38.5	30.2
836.500	V	95.46	23.7	0.0	1	22.7	38.5	15.8

LTE Band 7

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								
2535.000	H	80.93	8.3	13.1	3.1	18.3	33.0	14.7
2535.000	V	83.27	12.1	13.1	3.1	22.1	33.0	10.9
16QAM 5 MHz Middle Channel								
2535.000	H	80.49	7.9	13.1	3.1	17.9	33.0	15.1
2535.000	V	82.67	11.5	13.1	3.1	21.5	33.0	11.5
QPSK 10 MHz Middle Channel								
2535.000	H	80.18	7.6	13.1	3.1	17.6	33.0	15.4
2535.000	V	82.72	11.6	13.1	3.1	21.6	33.0	11.4
16QAM 10 MHz Middle Channel								
2535.000	H	80.05	7.4	13.1	3.1	17.4	33.0	15.6
2535.000	V	82.53	11.4	13.1	3.1	21.4	33.0	11.6
QPSK 15 MHz Middle Channel								
2535.000	H	79.85	7.2	13.1	3.1	17.2	33.0	15.8
2535.000	V	81.49	10.3	13.1	3.1	20.3	33.0	12.7
16QAM 15 MHz Middle Channel								
2535.000	H	79.45	6.8	13.1	3.1	16.8	33.0	16.2
2535.000	V	81.17	10	13.1	3.1	20.0	33.0	13.0
QPSK 20 MHz Middle Channel								
2535.000	H	79.68	7.1	13.1	3.1	17.1	33.0	15.9
2535.000	V	81.73	10.6	13.1	3.1	20.6	33.0	12.4
16QAM 20 MHz Middle Channel								
2535.000	H	79.52	6.9	13.1	3.1	16.9	33.0	16.1
2535.000	V	81.45	10.3	13.1	3.1	20.3	33.0	12.7

LTE Band 12

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 1.4 MHz Middle Channel								
707.500	H	83.12	6.3	0.0	0.9	5.4	34.8	29.4
707.500	V	95.02	20.6	0.0	0.9	19.7	34.8	15.1
16QAM 1.4 MHz Middle Channel								
707.500	H	82.95	6.1	0.0	0.9	5.2	34.8	29.6
707.500	V	94.86	20.4	0.0	0.9	19.5	34.8	15.3
QPSK 3 MHz Middle Channel								
707.500	H	82.67	5.8	0.0	0.9	4.9	34.8	29.9
707.500	V	94.58	20.2	0.0	0.9	19.3	34.8	15.5
16QAM 3 MHz Middle Channel								
707.500	H	82.52	5.7	0.0	0.9	4.8	34.8	30.0
707.500	V	94.37	20	0.0	0.9	19.1	34.8	15.7
QPSK 5 MHz Middle Channel								
707.500	H	82.21	5.4	0.0	0.9	4.5	34.8	30.3
707.500	V	94.16	19.7	0.0	0.9	18.8	34.8	16.0
16QAM 5 MHz Middle Channel								
707.500	H	82.18	5.3	0.0	0.9	4.4	34.8	30.4
707.500	V	94.06	19.6	0.0	0.9	18.7	34.8	16.1
QPSK 10 MHz Middle Channel								
707.500	H	81.87	5	0.0	0.9	4.1	34.8	30.7
707.500	V	94.02	19.6	0.0	0.9	18.7	34.8	16.1
16QAM 10 MHz Middle Channel								
707.500	H	81.66	4.8	0.0	0.9	3.9	34.8	30.9
707.500	V	93.87	19.5	0.0	0.9	18.6	34.8	16.2

LTE Band 17

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
710.000	H	82.32	5.5	0.0	0.9	4.6	34.8	30.2
710.000	V	94.86	20.5	0.0	0.9	19.6	34.8	15.2
16QAM 5 MHz Middle Channel								
710.000	H	82.65	5.8	0.0	0.9	4.9	34.8	29.9
710.000	V	94.54	20.2	0.0	0.9	19.3	34.8	15.5
QPSK 10 MHz Middle Channel								
710.000	H	82.41	5.6	0.0	0.9	4.7	34.8	30.1
710.000	V	94.05	19.7	0.0	0.9	18.8	34.8	16.0
16QAM 10 MHz Middle Channel								
710.000	H	81.05	4.2	0.0	0.9	3.3	34.8	31.5
710.000	V	93.58	19.2	0.0	0.9	18.3	34.8	16.5

Note:

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

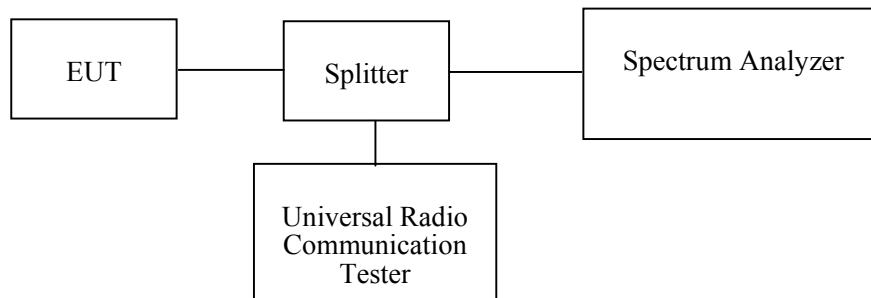
FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH**Applicable Standard**

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

Test Procedure

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

The 26 dB & 99% bandwidth was recorded.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSIQ 26	831929/005	2017-08-31	2018-08-31
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	RF Attenuator	10dB	10dB-1	Each Time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Splitter	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:	23.5~24.6°C
Relative Humidity:	42~50 %
ATM Pressure:	101.4~101.5 kPa

The testing was performed by Pean Zhu from 2017-11-26 to 2017-12-04.

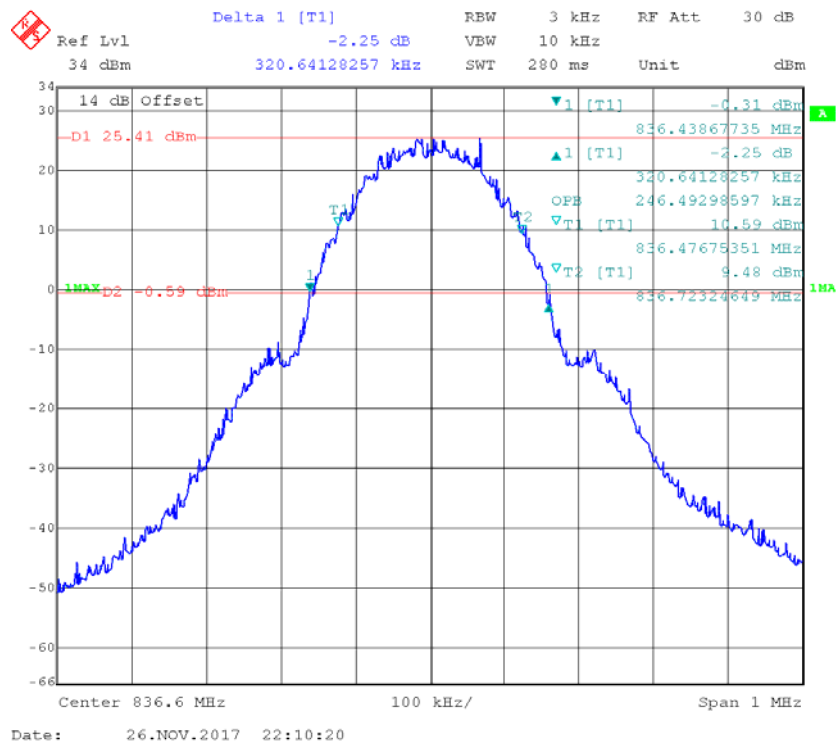
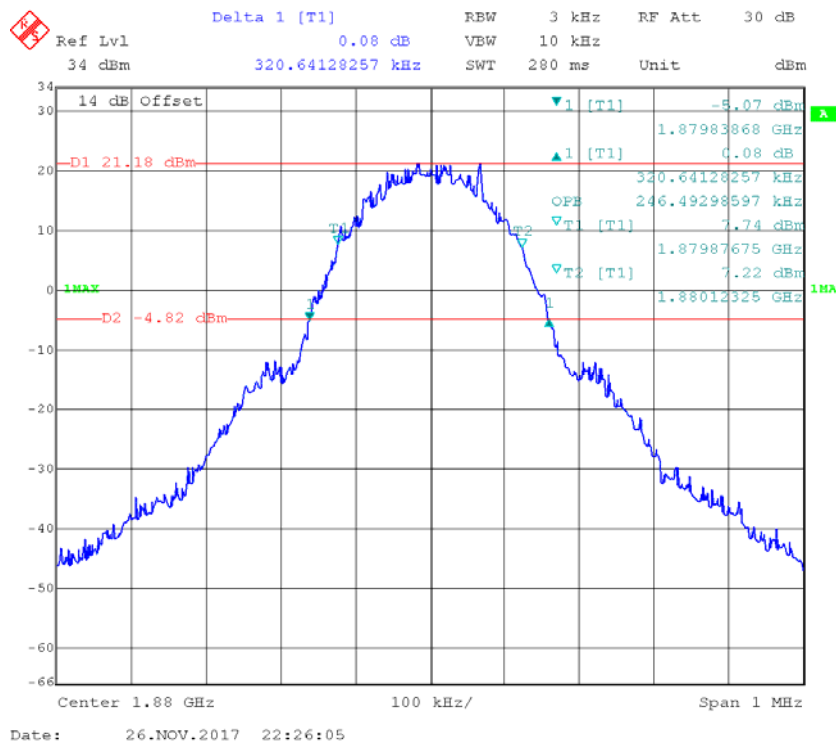
Test Mode: Transmitting

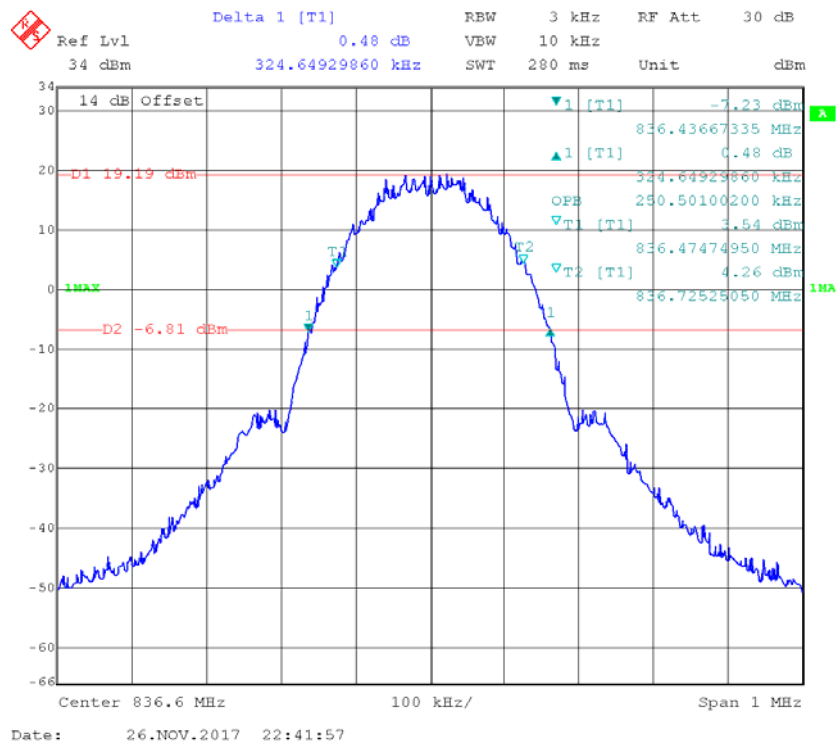
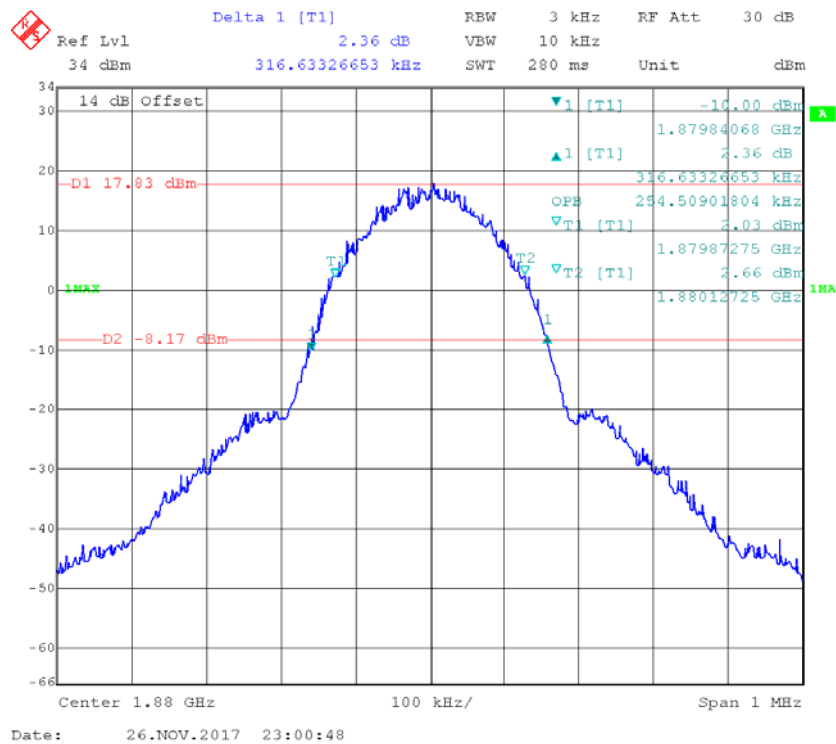
Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GSM	0.246	0.321
		EDGE	0.251	0.325
PCS		PCS	0.246	0.321
		EDGE	0.255	0.317
WCDMA Band II		Rel 99	4.228	4.910
		HSDPA	4.228	4.890
		HSUPA	4.208	4.910
WCDMA Band IV		Rel 99	4.208	4.899
		HSDPA	4.208	4.910
		HSUPA	4.228	4.910
WCDMA Band V		Rel 99	4.248	4.93
		HSDPA	4.248	4.91
		HSUPA	4.228	4.891

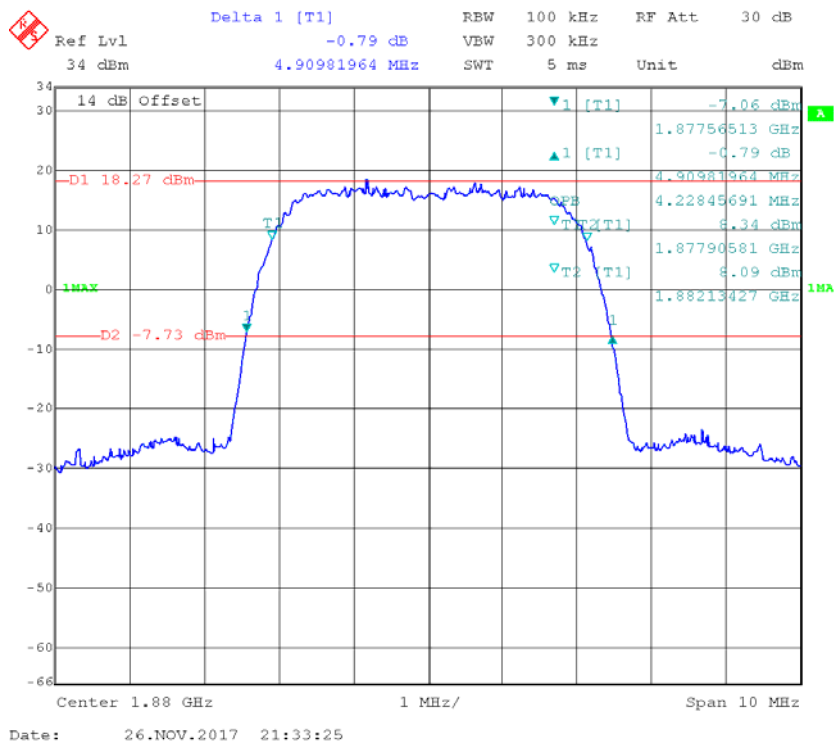
Band	Test Modulation	Test Bandwidth (MHz)	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
LTE Band 2	QPSK	1.4	M	1.106	1.287
		3		2.693	2.922
		5		4.549	5.094
		10		8.978	9.897
		15		13.587	15.077
		20		17.956	19.596
	16QAM	1.4	M	1.106	1.293
		3		2.693	2.958
		5		4.549	5.130
		10		9.018	9.817
		15		13.587	15.017
		20		18.036	19.076

Band	Test Modulation	Test Bandwidth (MHz)	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
LTE Band 4	QPSK	1.4	M	1.100	1.293
		3		2.705	2.937
		5		4.549	5.097
		10		8.978	9.780
		15		13.587	14.140
		20		18.036	19.419
	16QAM	1.4	M	1.112	1.305
		3		2.705	2.961
		5		4.549	5.137
		10		8.978	9.780
		15		13.527	14.960
		20		17.956	19.579
LTE Band 5	QPSK	1.4	M	1.100	1.281
		3		2.693	2.925
		5		4.549	5.077
		10		9.058	9.937
	16QAM	1.4	M	1.106	1.287
		3		2.693	2.961
		5		4.549	5.117
		10		9.018	9.857
LTE Band 7	QPSK	5	M	4.549	5.110
		10		8.978	9.910
		15		13.647	15.291
		20		18.036	19.770
	16QAM	5	M	4.549	5.150
		10		8.978	9.830
		15		13.647	145.230
		20		18.116	19.609
LTE Band 12	QPSK	1.4	M	1.106	1.281
		3		2.693	2.901
		5		4.549	5.081
		10		9.018	9.961
	16QAM	1.4	M	1.106	1.287
		3		2.693	2.925
		5		4.549	5.081
		10		8.978	9.761
LTE Band 17	QPSK	5	M	4.549	5.086
		10		8.978	9.986
	16QAM	5	M	4.549	5.126
		10		9.018	9.786

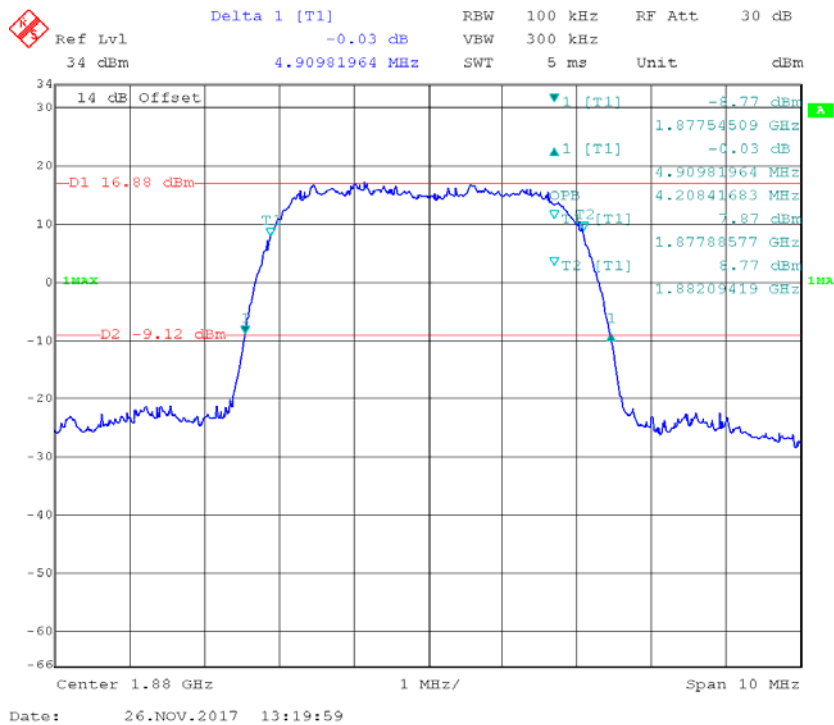
GSM 850 Cellular Band**GSM PCS1900 Cellular Band**

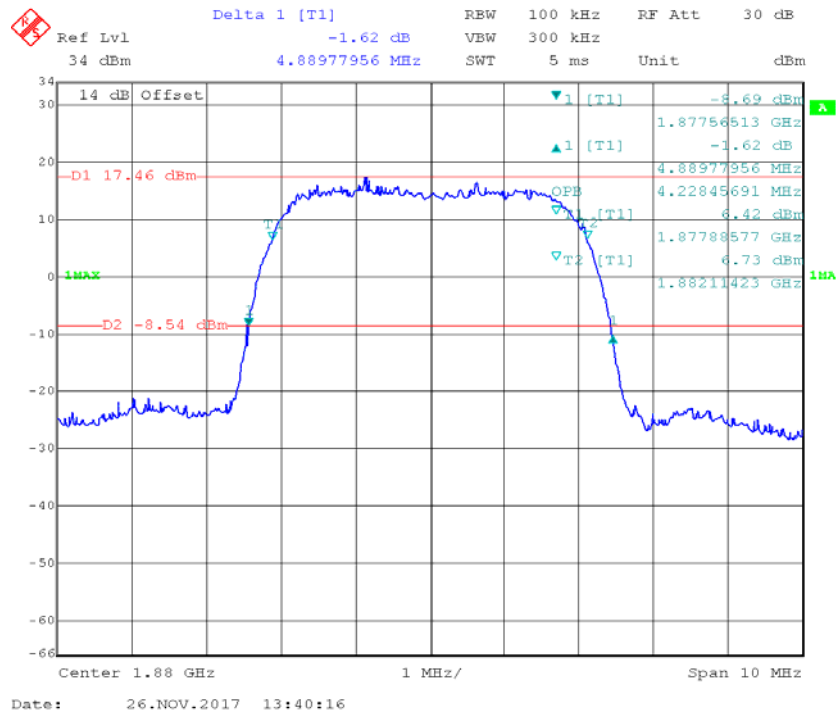
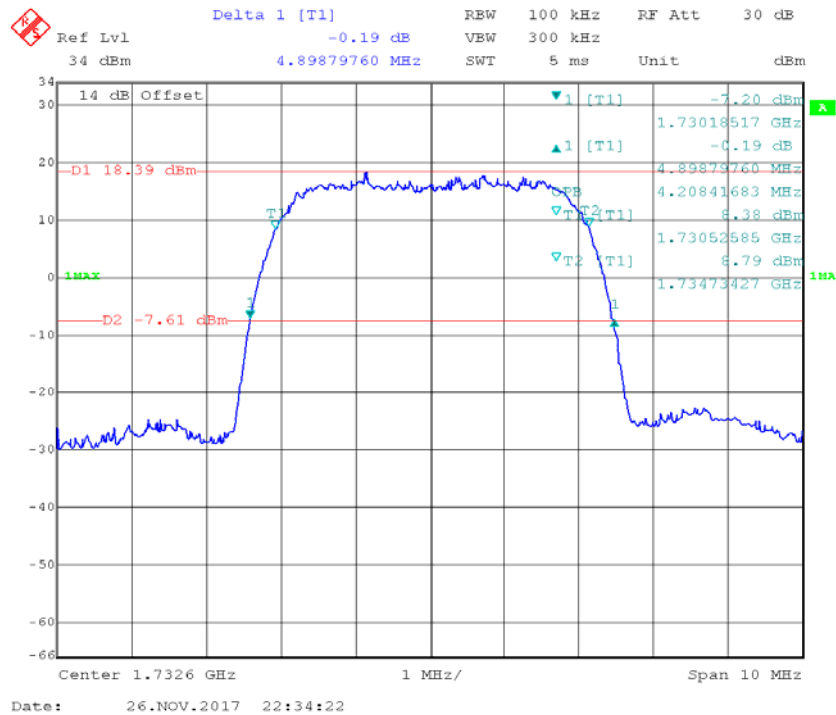
EDGE 850 Cellular Band**EDGE PCS1900 Cellular Band**

WCDMA Band II, Rel 99

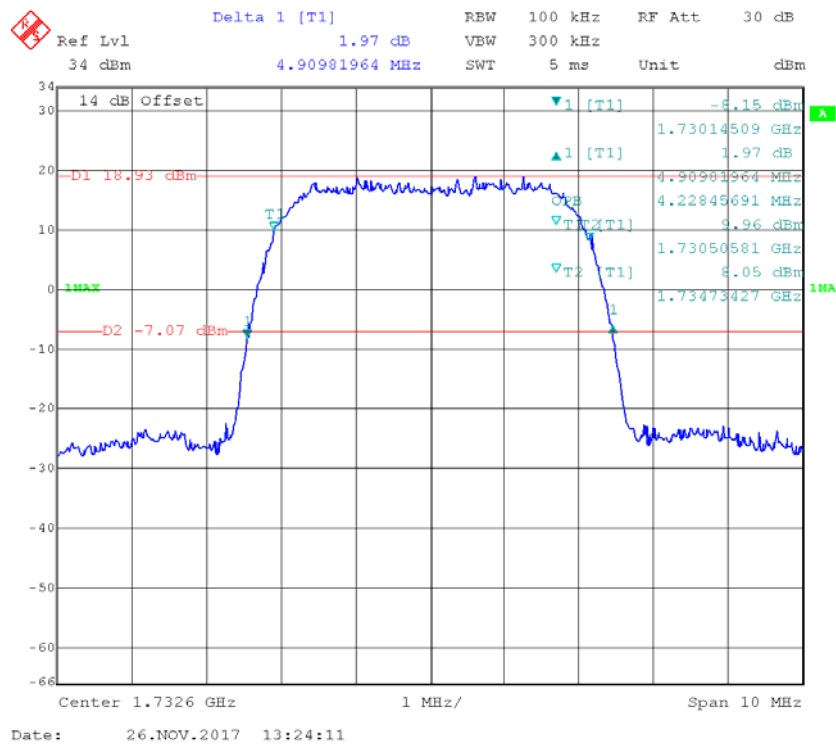


WCDMA Band II, HSUPA

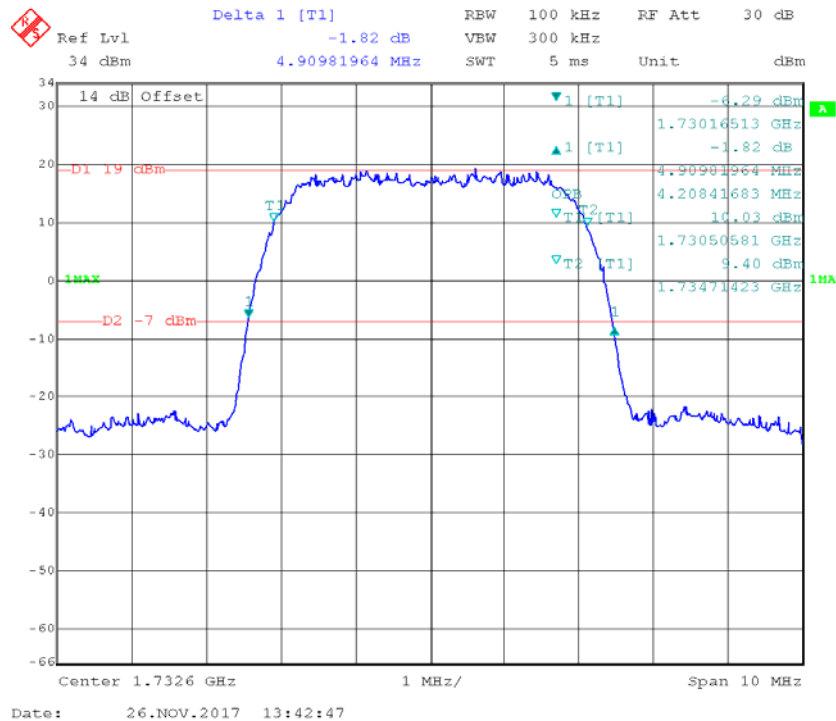


WCDMA Band II, HSDPA**WCDMA Band IV, Rel 99**

WCDMA Band IV, HSUPA



WCDMA Band IV, HSDPA



[illegible]

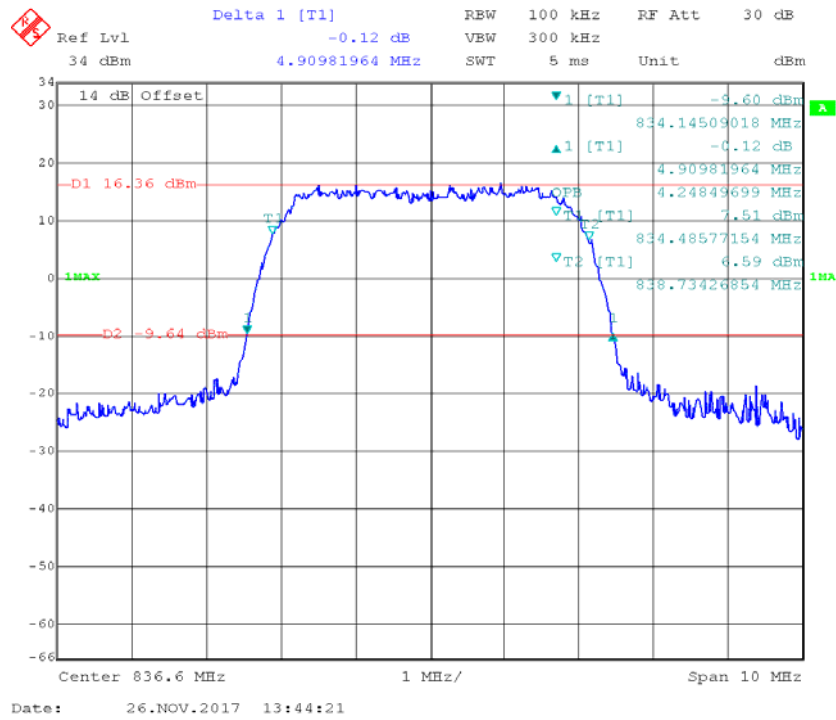
Delta 1 [T1] -1.92 dB
 Ref Lvl 34 dBm
 RBW 100 kHz
 RF Att 30 dB
 Unit dBm
 SWT 5 ms

14 dB Offset
 D1 17.78 dBm
 D2 -8.22 dBm
 1 MAX
 1 [T1] -7.58 dBm
 1 [T1] -1.92 dB
 4.89098196 MHz
 4.22845691 MHz
 834.16513026 MHz
 834.48577154 MHz
 838.71422884 MHz
 1 [T1] 6.86 dBm
 1 [T1] 6.85 dBm
 1 MAX

Center 836.6 MHz
 1 MHz/
 Span 10 MHz

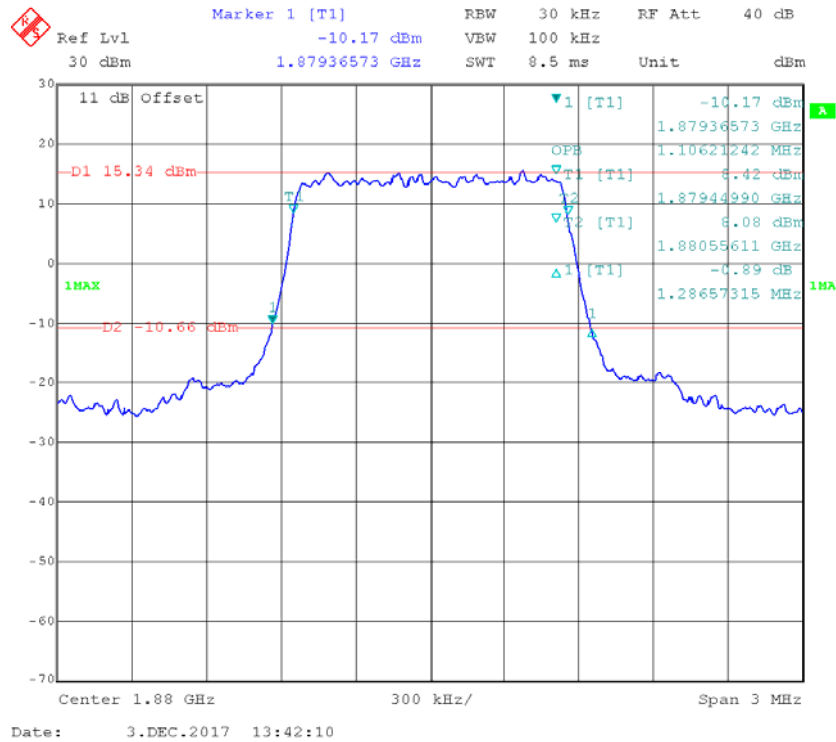
Date: 26.NOV.2017 13:26:41

WCDMA Band V, HSDPA

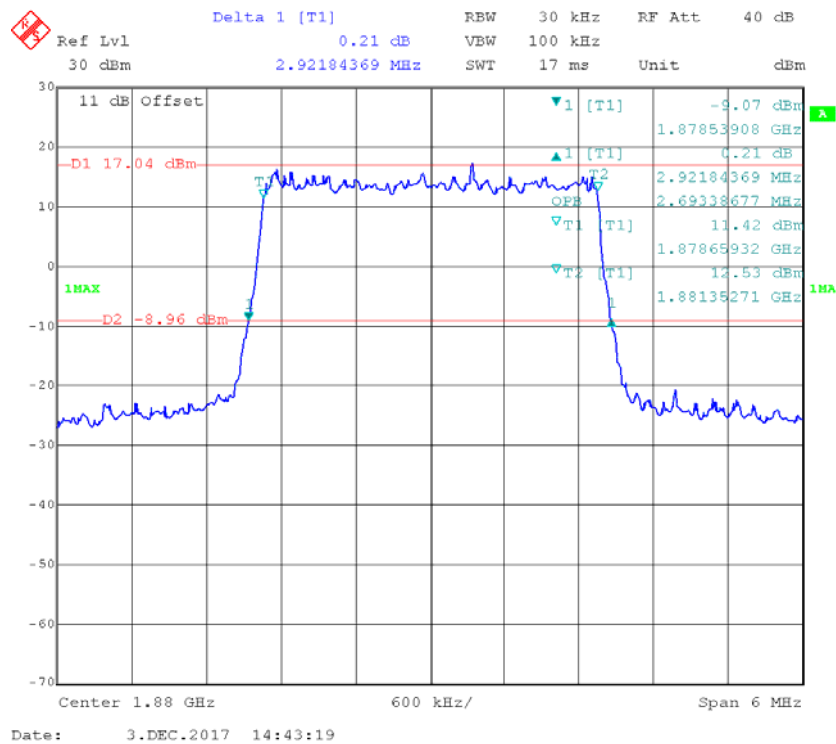


LTE Band 2

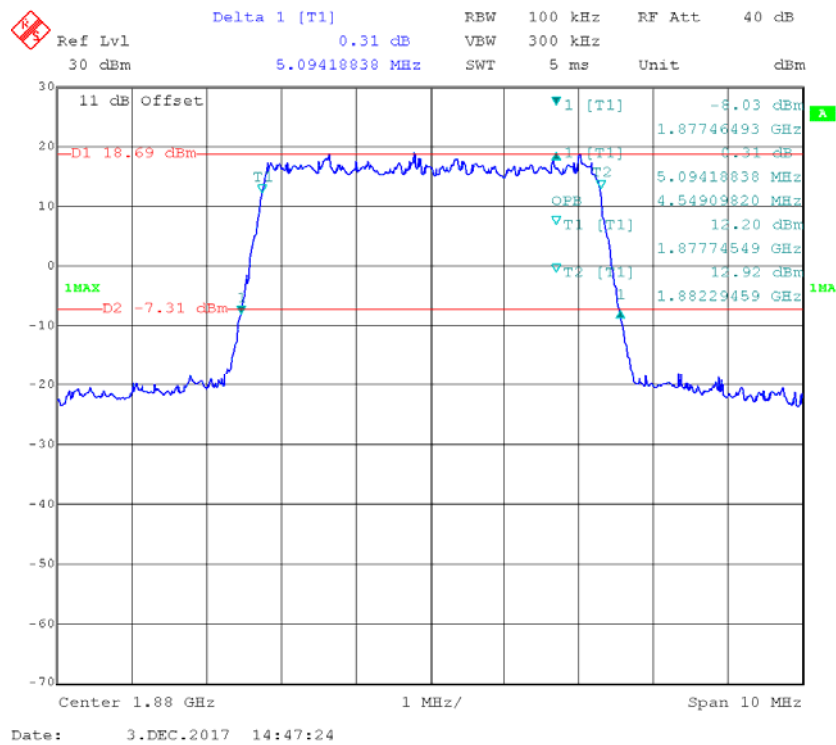
QPSK_1.4 MHz



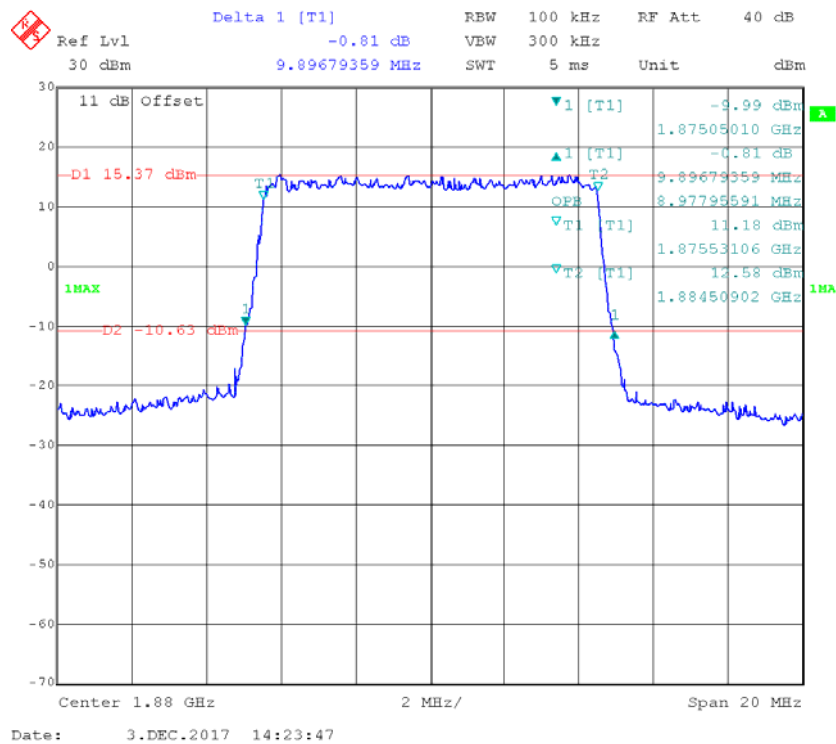
QPSK_3 MHz



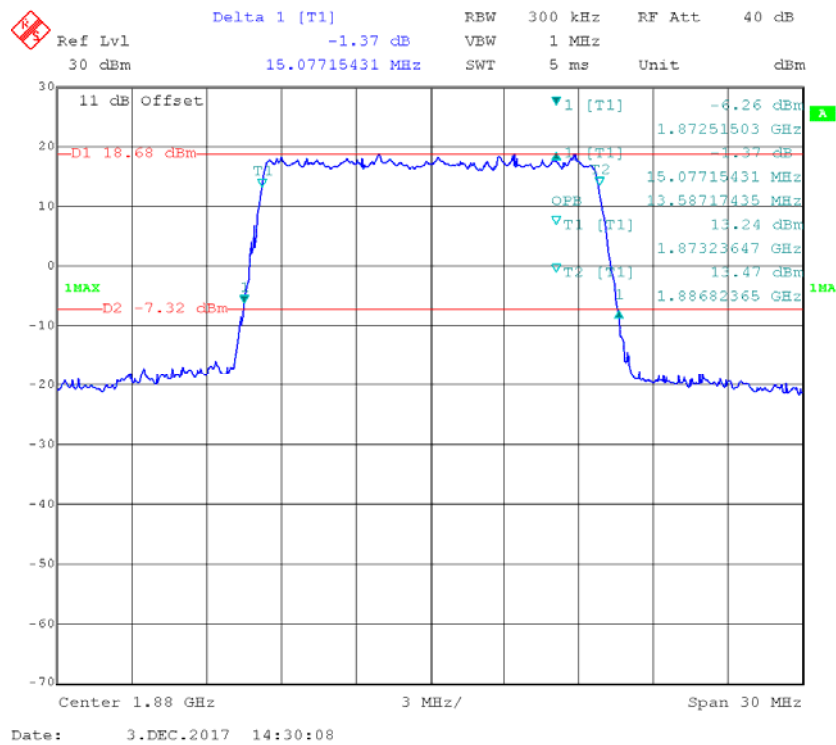
QPSK_5 MHz



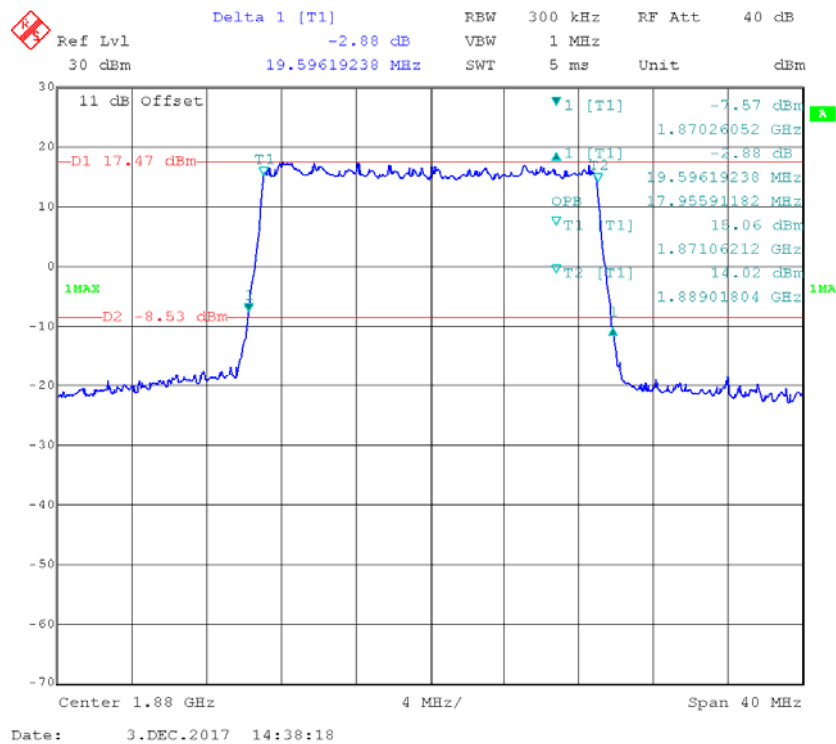
QPSK_10 MHz

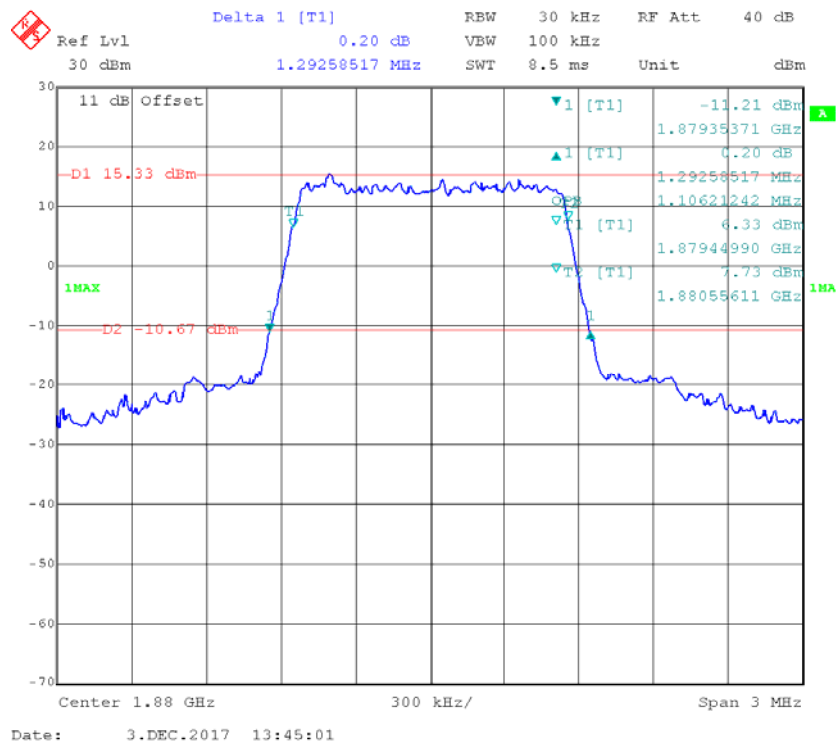
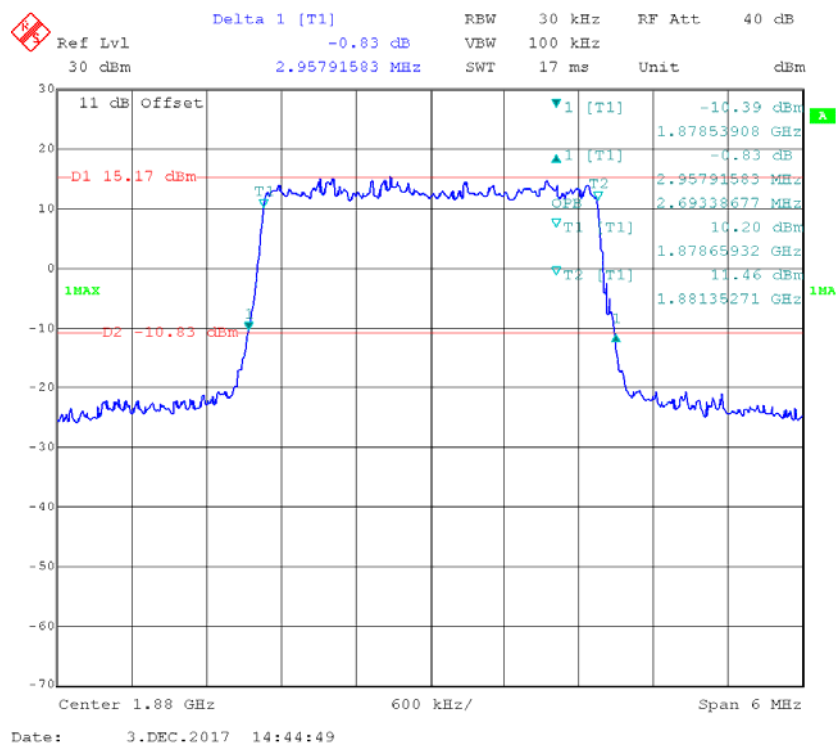


QPSK_15 MHz

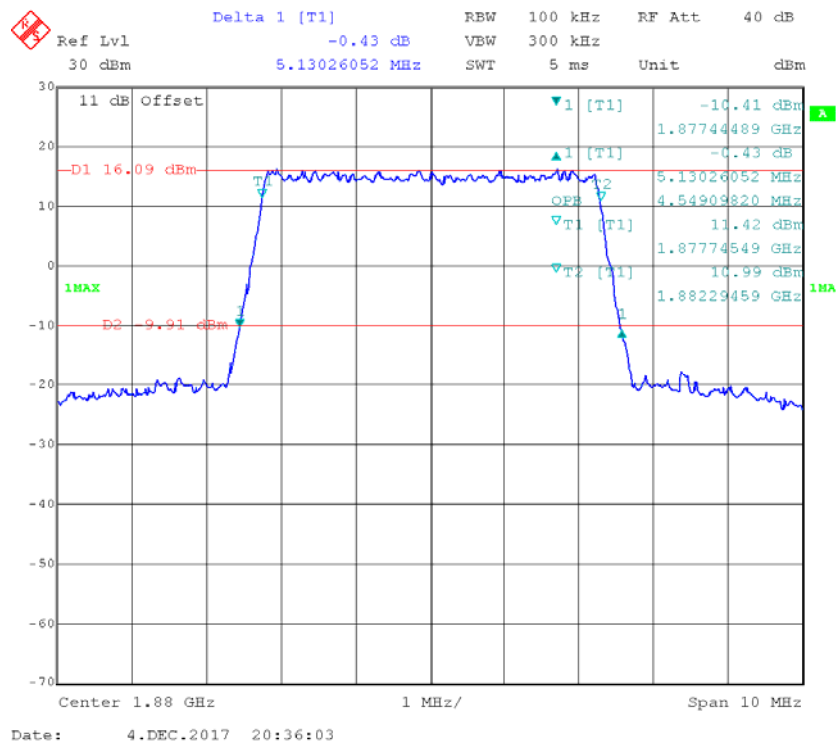


QPSK_20 MHz

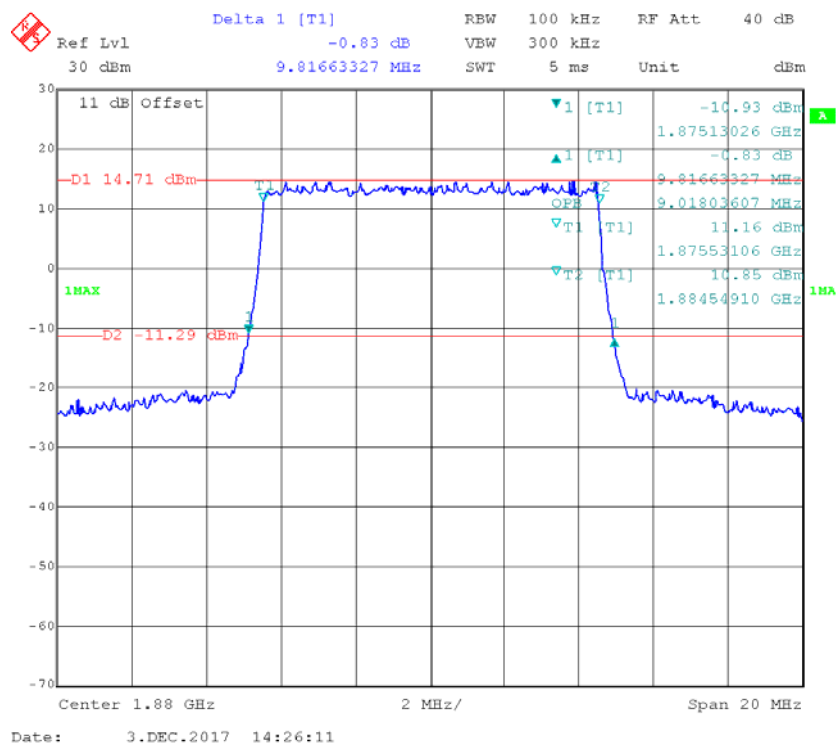


16QAM_1.4 MHz**16QAM_3 MHz**

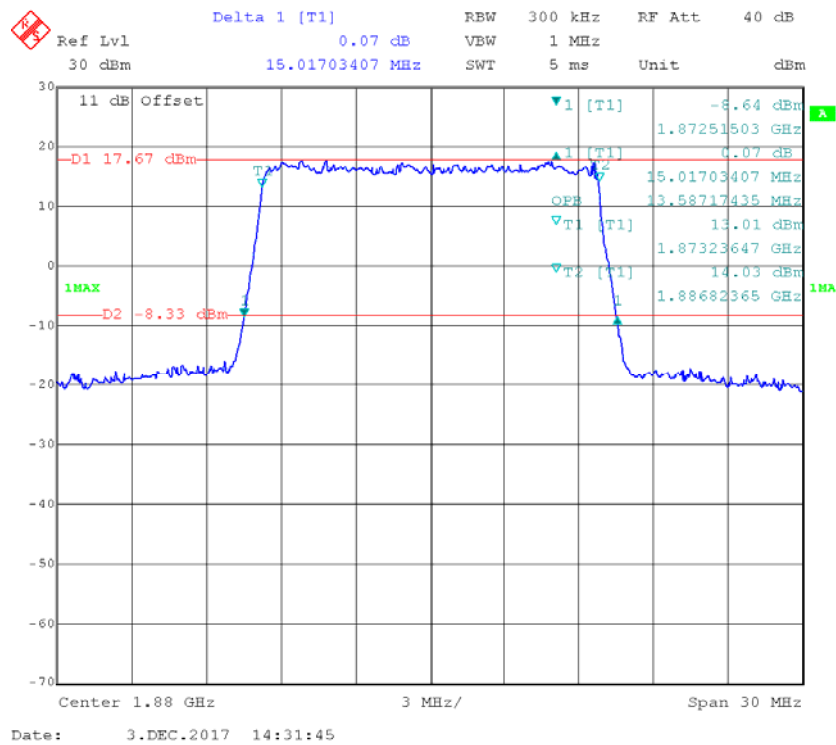
16QAM_5 MHz



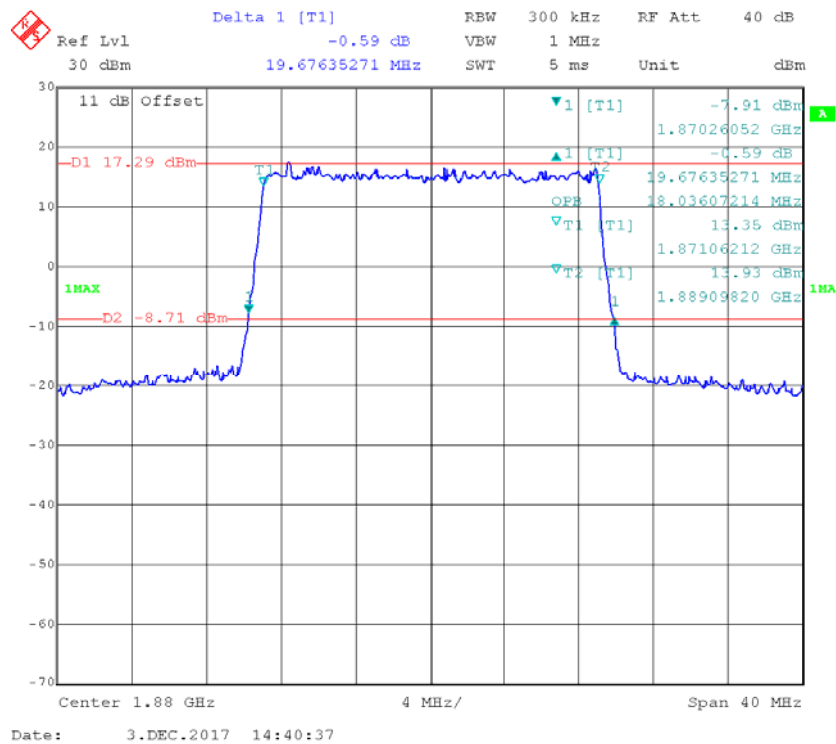
16QAM_10 MHz

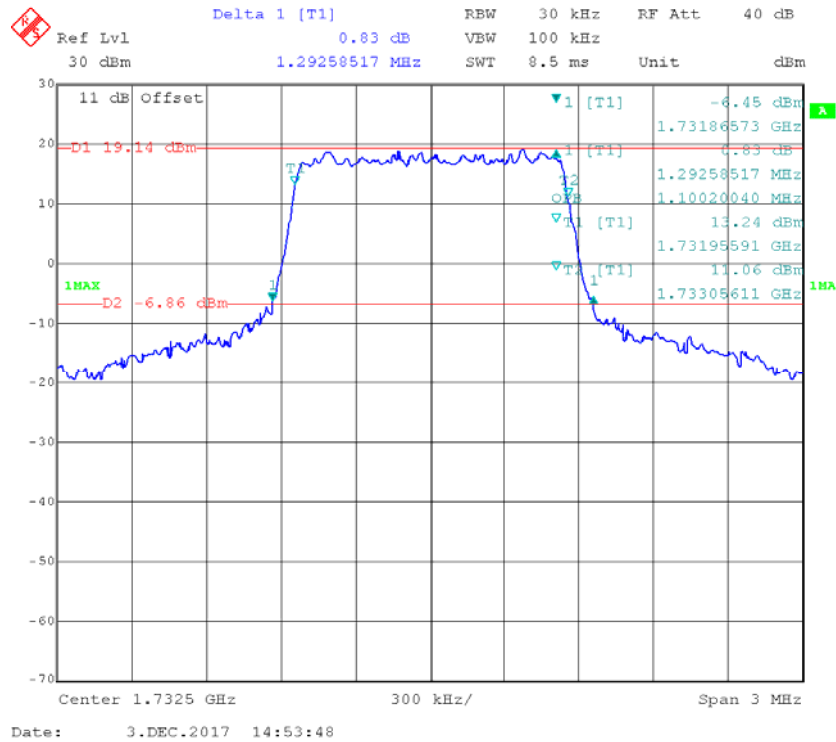
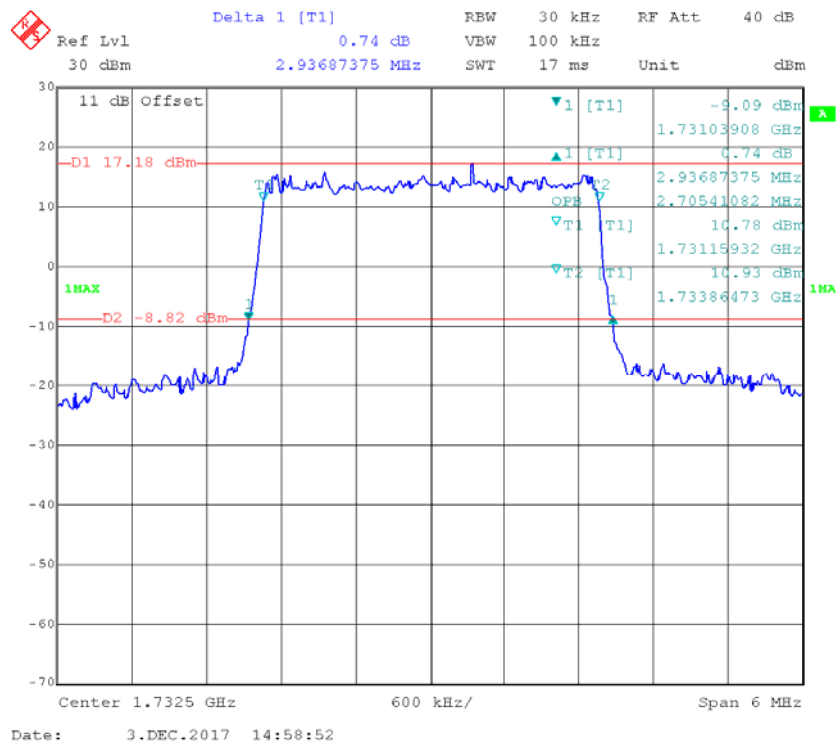


16QAM_15 MHz

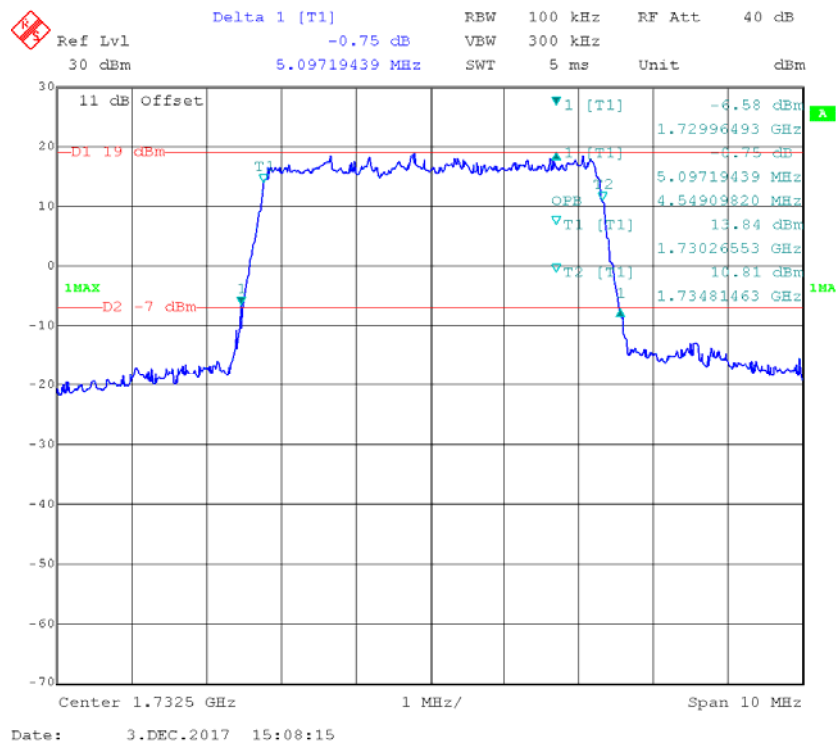


16QAM_20 MHz

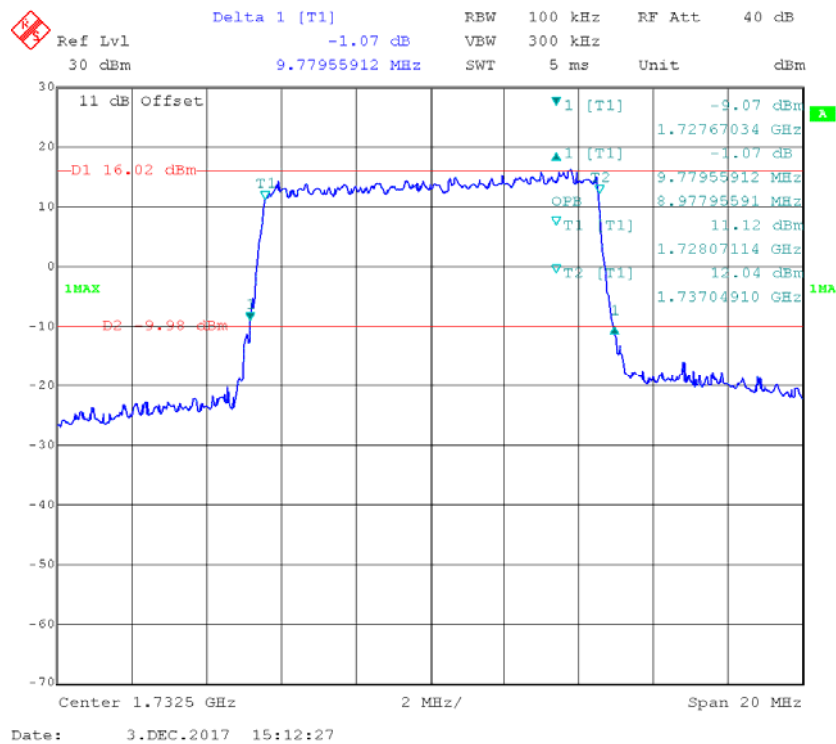


LTE Band 4:**QPSK_1.4 MHz****QPSK_3 MHz**

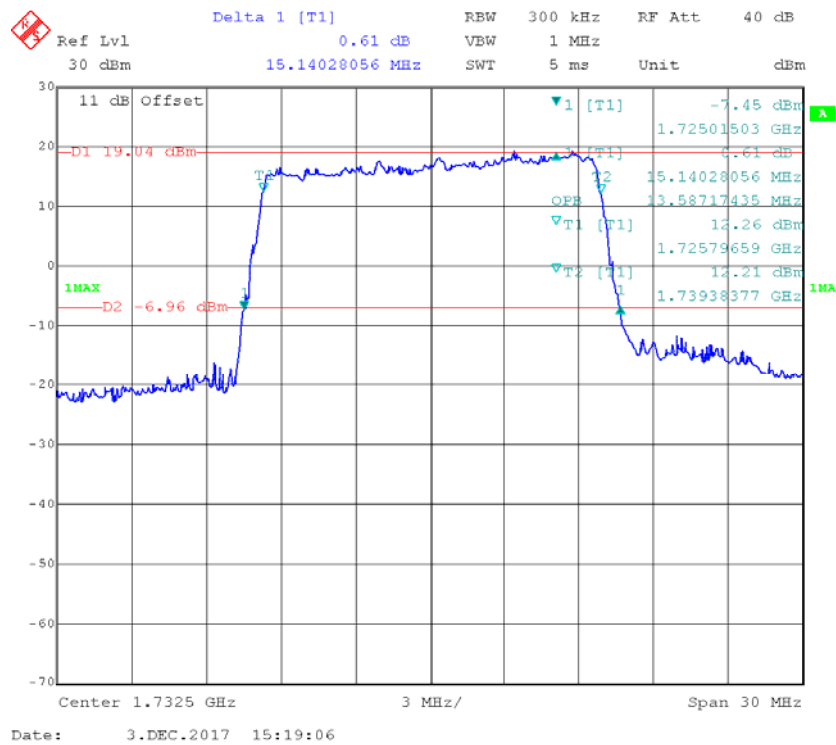
QPSK_5 MHz



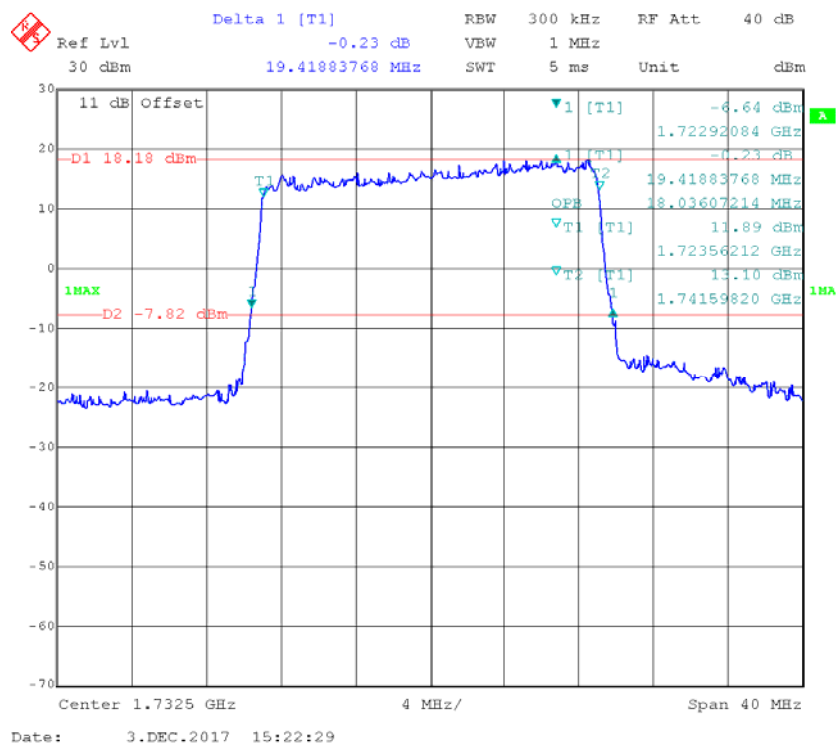
QPSK_10 MHz

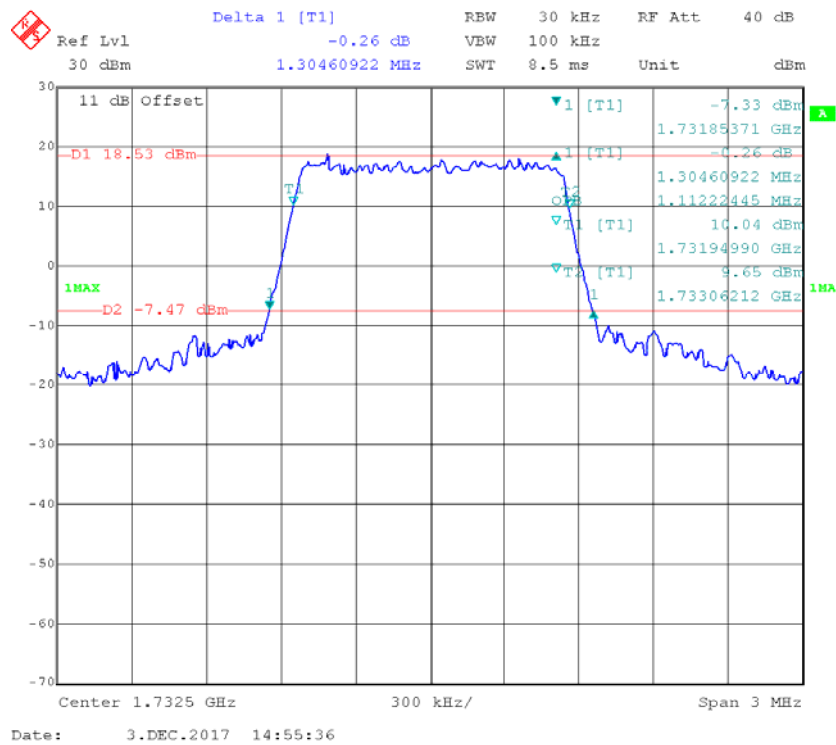
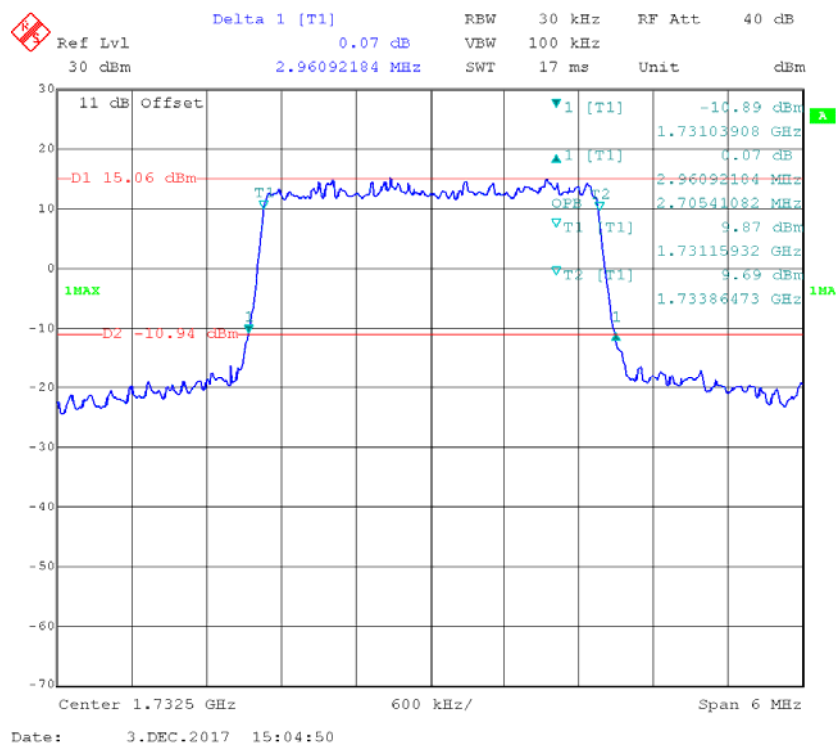


QPSK_15 MHz



QPSK_20 MHz



16QAM_1.4 MHz**16QAM_3 MHz**

Delta 1 [T1] 0.70 dB

Ref Lvl 30 dBm

RBW 100 kHz

VBW 300 kHz

SWT 5 ms

RF Att 40 dB

Unit dBm

11 dB Offset

D1 17.46 dBm

D2 -8.54 dBm

1 [T1] 1.72998497 GHz

2 [T1] 1.73024549 GHz

1MA

Center 1.7325 GHz

1 MHz/

Span 10 MHz

Date: 3.DEC.2017 15:09:45

Ref Lvl 30 dBm

Marker 1 [T1] -11.45 dBm

RBW 100 kHz RF Att 40 dB

VBW 300 kHz

SWT 5 ms Unit dBm

11 dB Offset

D1 15.59 dBm

D2 -10.41 dBm

1MAX

1MA

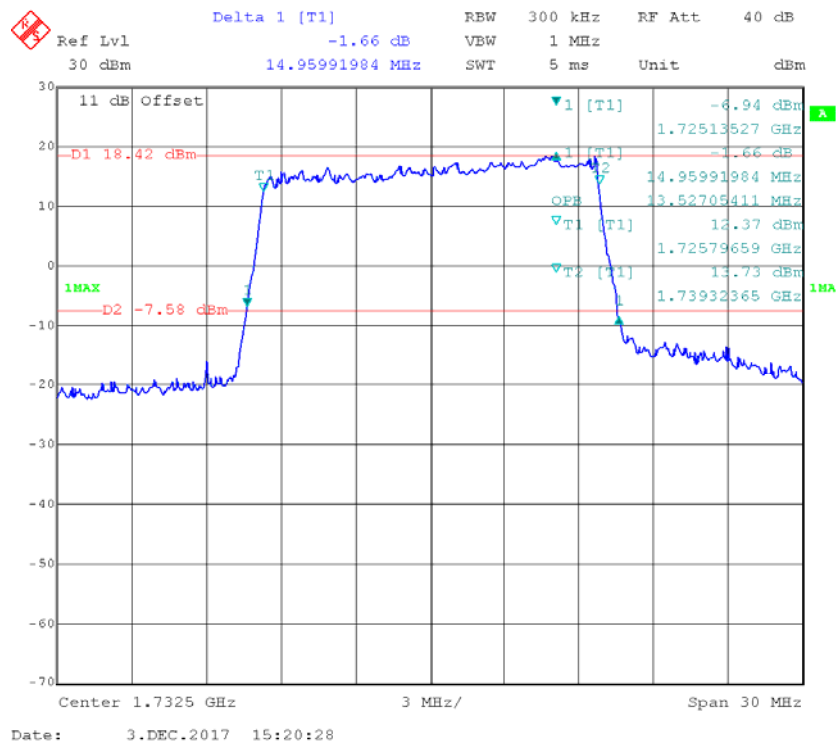
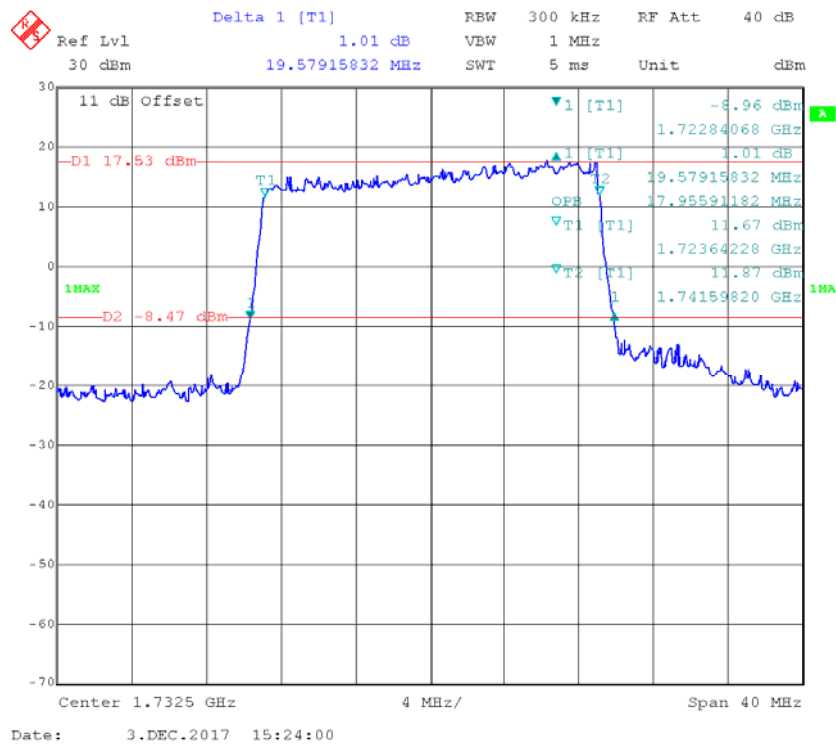
Center 1.7325 GHz

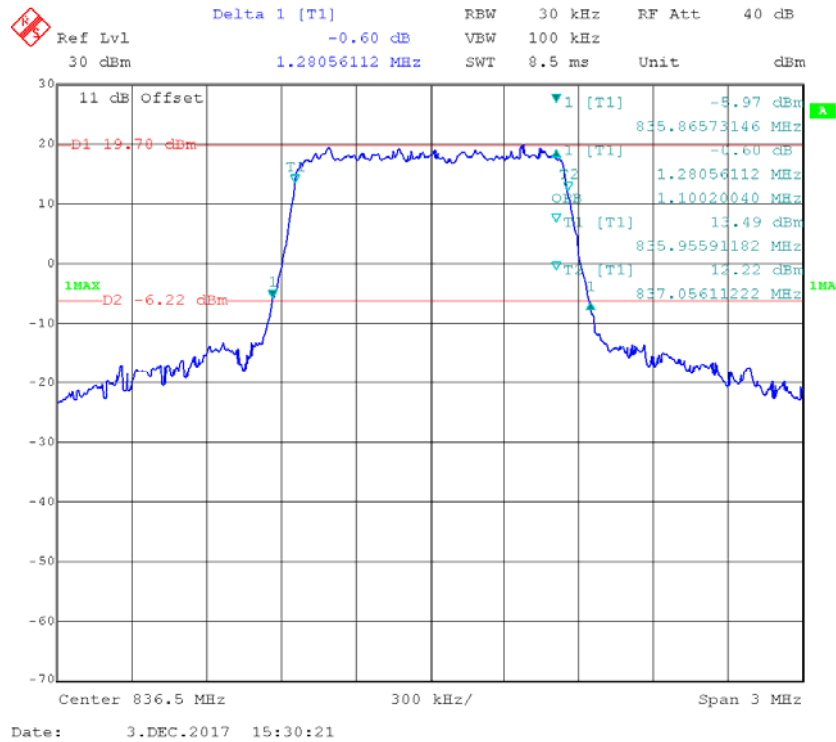
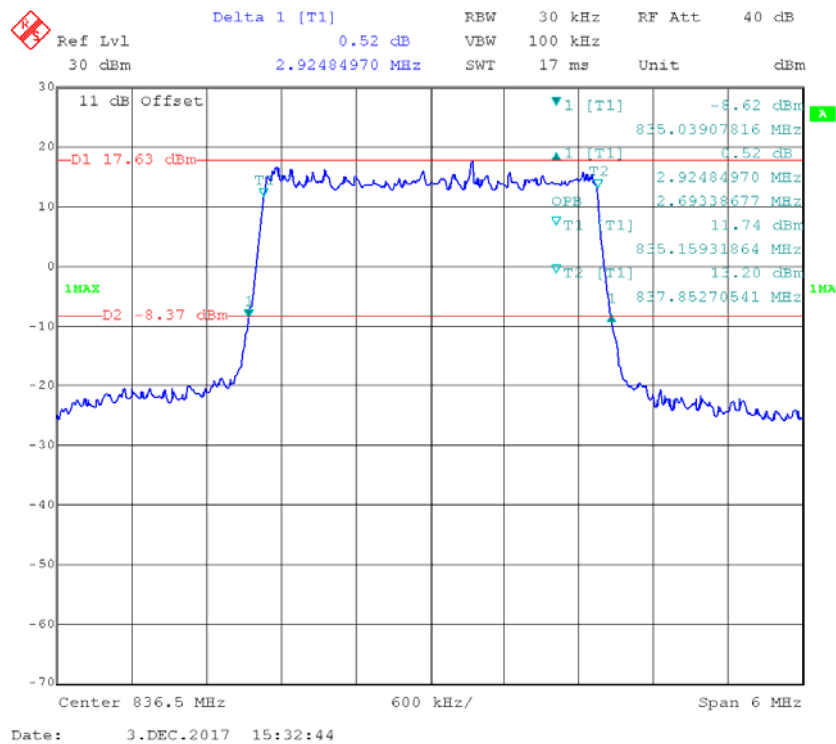
2 MHz/

Span 20 MHz

Date: 3.DEC.2017 15:14:55

Marker	Value
1 [T1]	-11.45 dBm
1.72767034 GHz	
8.97795591 MHz	
10.57 dBm	
1.72807114 GHz	
10.53 dBm	
1.73704910 GHz	
0.08 dB	
9.77955912 MHz	

16QAM_15 MHz**16QAM_20 MHz**

LTE Band 5:**QPSK_1.4 MHz****QPSK_3 MHz**

Ref Lvl 30 dBm
Delta 1 [T1] 0.13 dB
RBW 30 kHz
VBW 100 kHz
RF Att 40 dB
Unit dBm

l1 dB Offset
D1 -19.63 dBm
D2 -6.37 dBm
1MAX

Center 836.5 MHz
Span 3 MHz

Marker	Freq [MHz]	Power [dBm]
T1	835.85971944	-6.34
T2	835.94989980	-6.65
T3	837.05611222	-11.00

Ref Lvl 30 dBm Delta 1 [T1] 0.12 dB RBW 30 kHz RF Att 40 dB
 30 dBm 2.96092184 MHz SWT 17 ms Unit dBm

11 dB Offset

D1 15.69 dBm

D2 -10.31 dBm

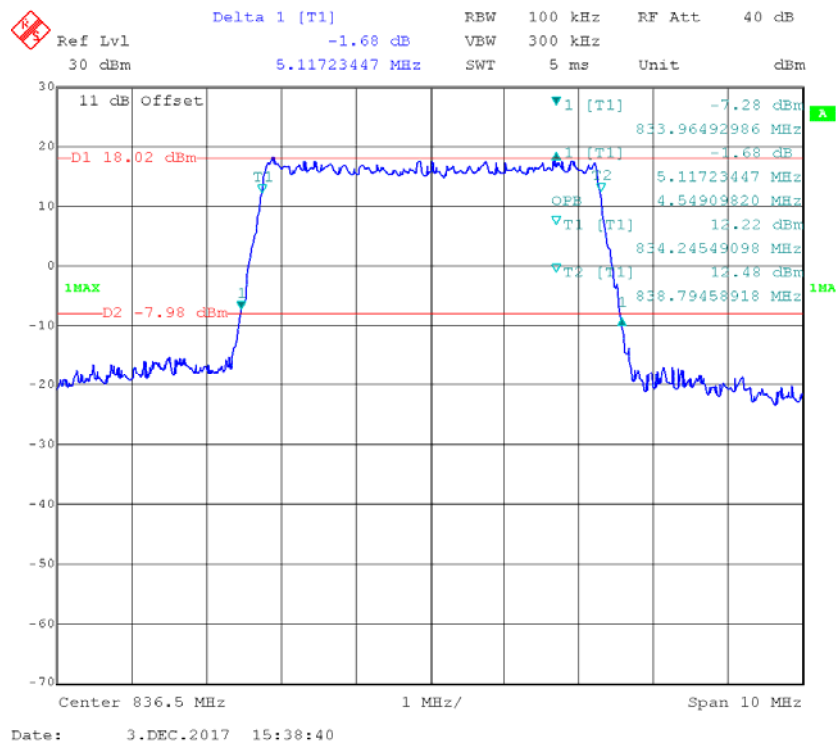
1MA

▼1 [T1] -10.44 dBm
 835.03907816 MHz
 ▲1 [T1] 0.12 dB
 2.96092184 MHz
 OFF 2.69238677 MHz
 ▼T1 [T1] 10.81 dBm
 835.15931864 MHz
 ▼T2 [T1] 12.06 dBm
 837.85270541 MHz

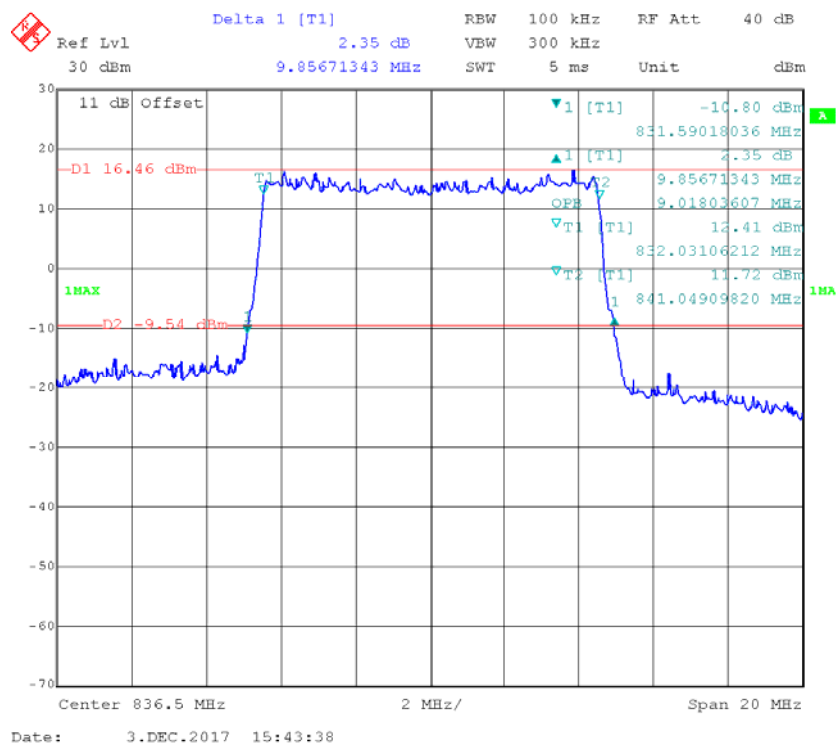
Center 836.5 MHz 600 kHz/ Span 6 MHz

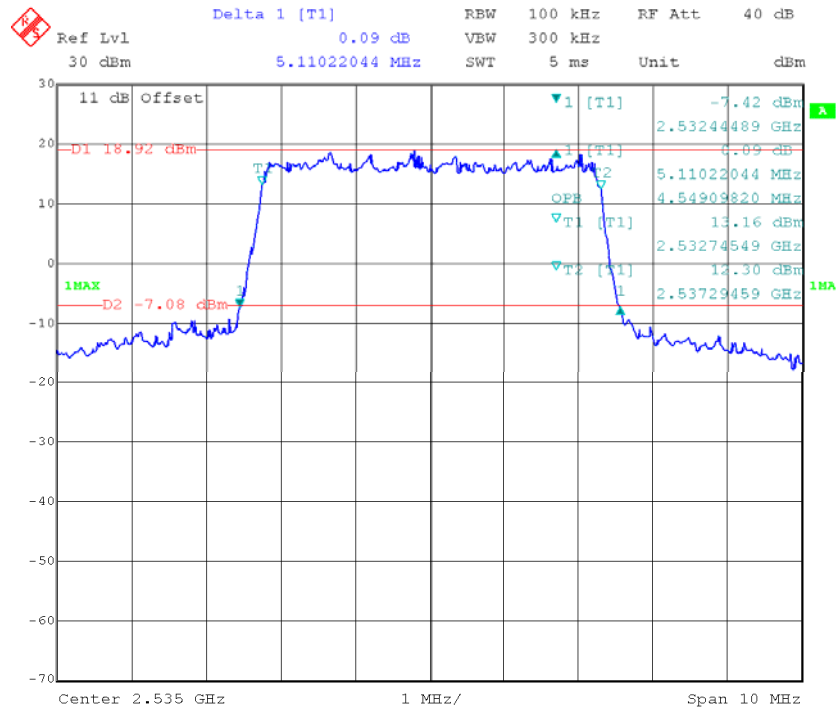
Date: 3.DEC.2017 15:34:14

16QAM_5 MHz

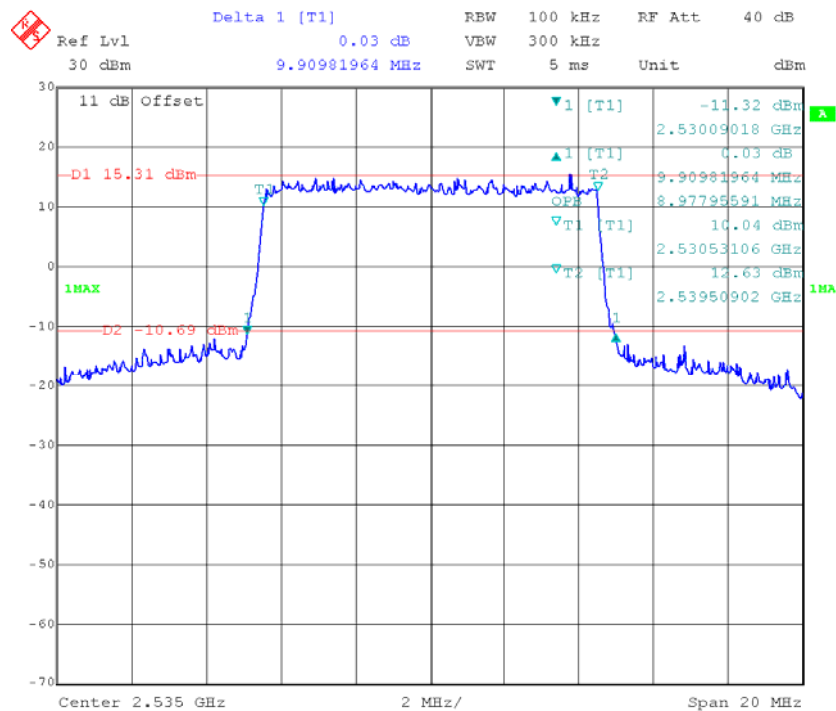


16QAM_10 MHz



LTE Band 7:**QPSK_5 MHz**

Date: 3.DEC.2017 15:49:27

QPSK_10 MHz

Date: 3.DEC.2017 16:00:35

Delta 1 [T1] RBW 300 kHz RF Att 40 dB
 Ref Lvl -1.01 dB VBW 1 MHz
 30 dBm 15.29058116 MHz SWT 5 ms Unit dBm

11 dB Offset
 D1 19.21 dBm
 D2 -6.79 dBm
 1 [T1] -1.01 dB
 2 [T1] 15.29058116 MHz
 OFF 13.64729459 MHz
 T1 [T1] 13.90 dBm
 T2 [T1] 2.52823647 GHz
 1 12.19 dBm
 1 2.54188377 GHz

Center 2.535 GHz 3 MHz/ Span 30 MHz

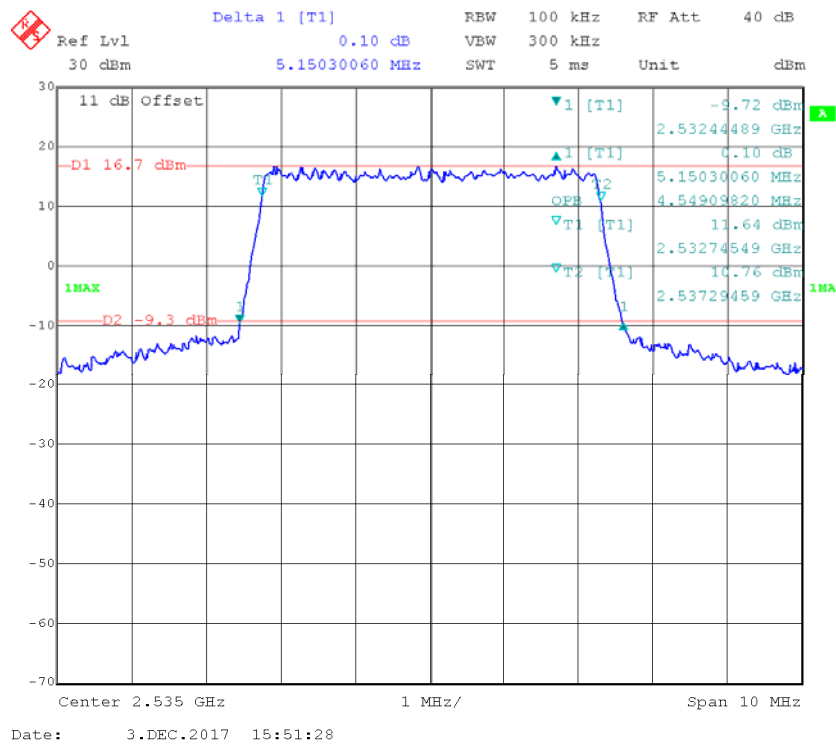
Date: 3.DEC.2017 16:38:36

 Delta 1 [T1] RBW 300 kHz RF Att 40 dB
 Ref Lvl 1.08 dB VBW 1 MHz
 30 dBm 19.76953908 MHz SWT 5 ms Unit dBm

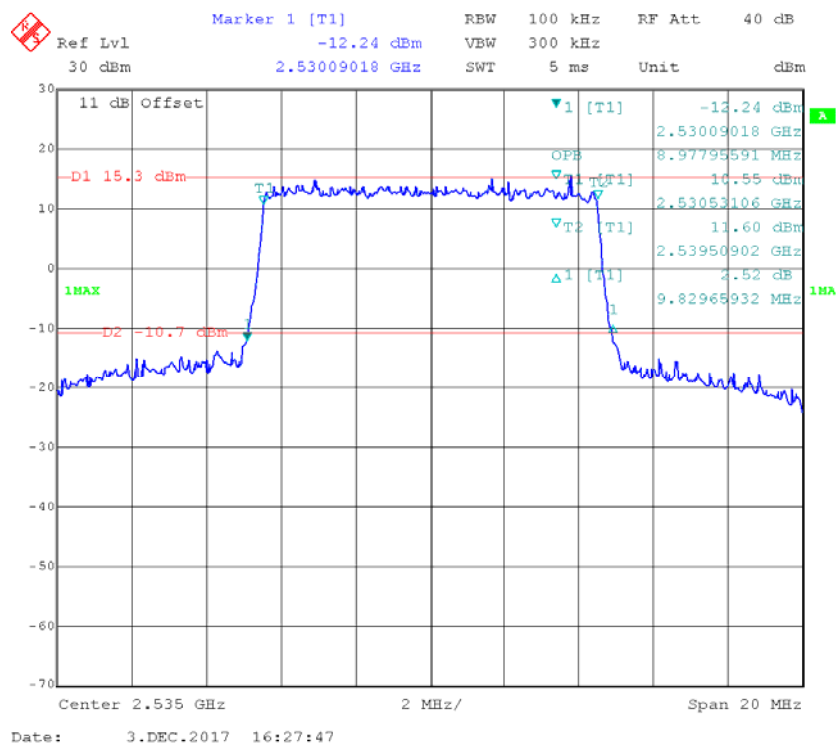
11 dB Offset
 D1 17.55 dBm
 D2 -8.45 dBm
 1MAX
 1 [T1] -6.78 dBm
 2.52502004 GHz
 1.08 dB
 19.76953908 MHz
 18.03607214 MHz
 T1 [T1] 12.77 dBm
 2.52598196 GHz
 T2 [T1] 11.66 dBm
 2.54401804 GHz
 1MA
 Center 2.535 GHz 4 MHz/ Span 40 MHz

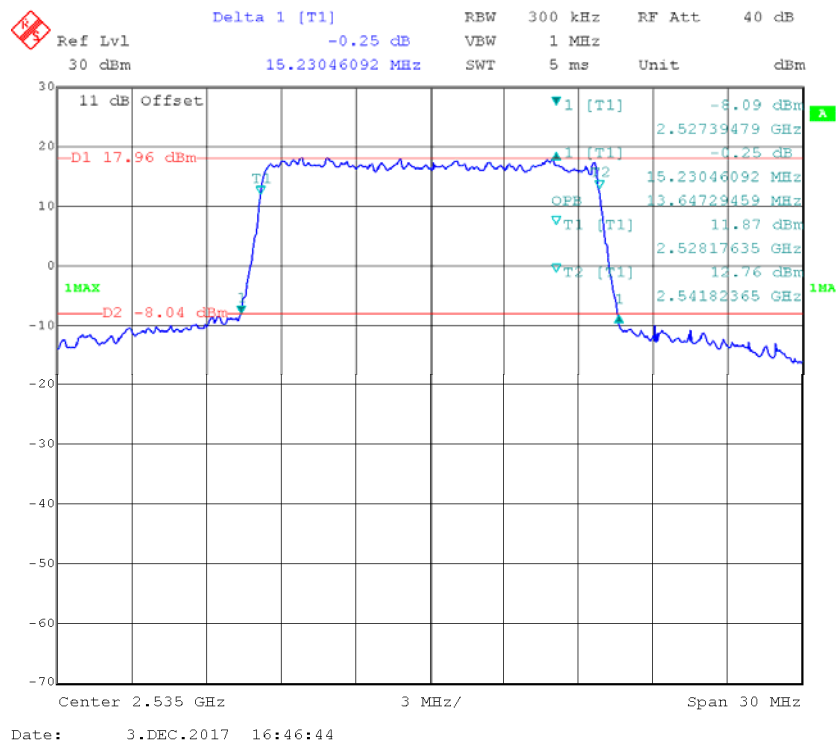
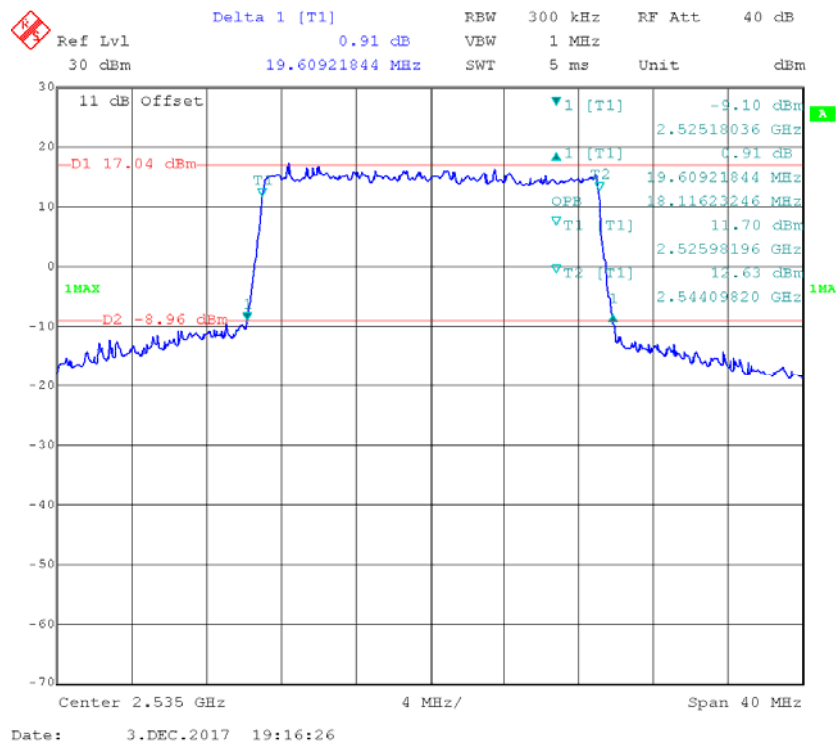
Date: 3.DEC.2017 19:13:20

16QAM_5 MHz

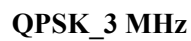


16QAM_10 MHz

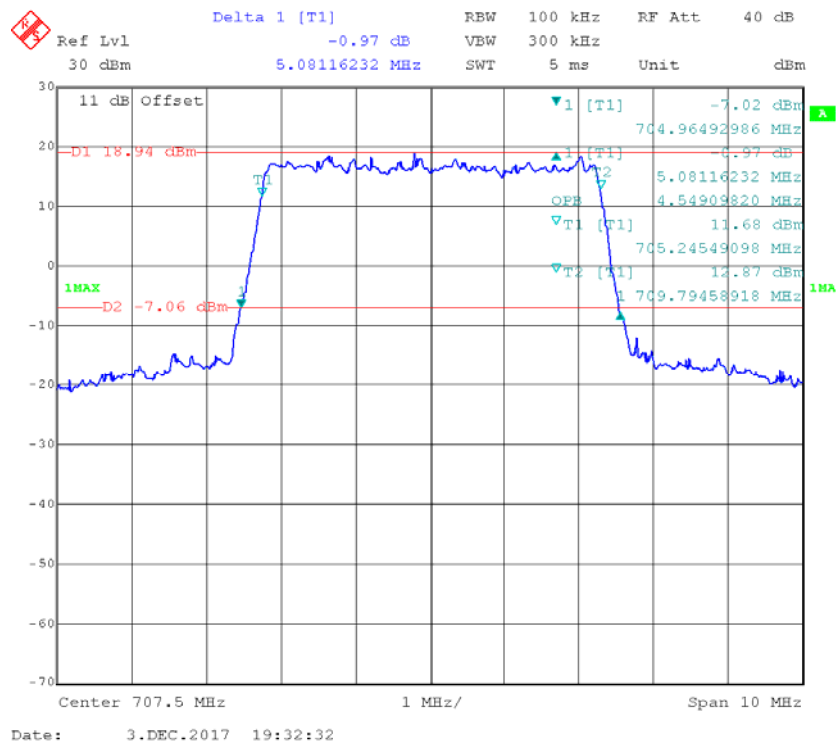


16QAM_15 MHz**16QAM_20 MHz**

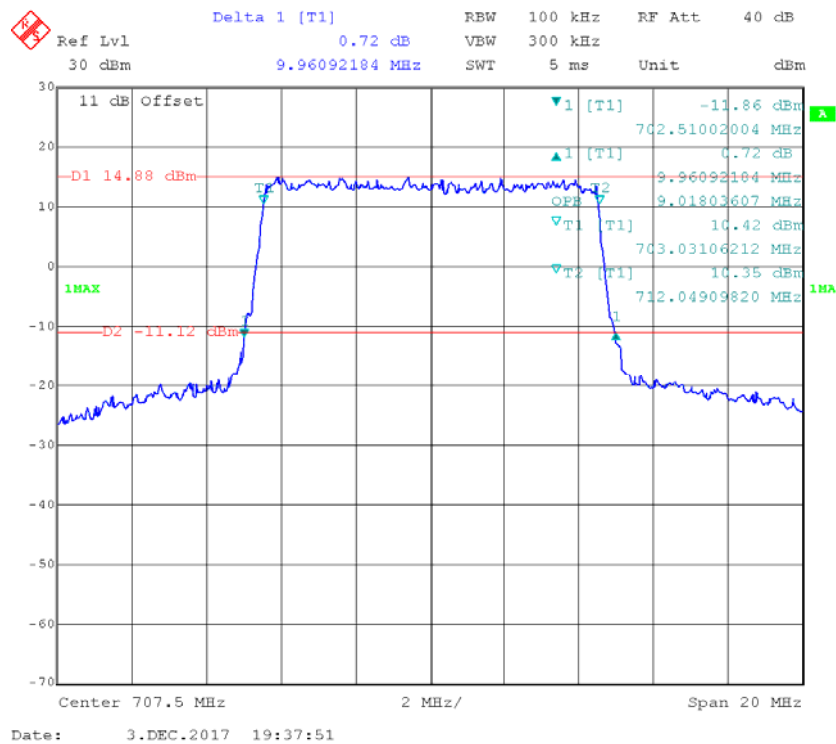
QPSK_1.4 MHz

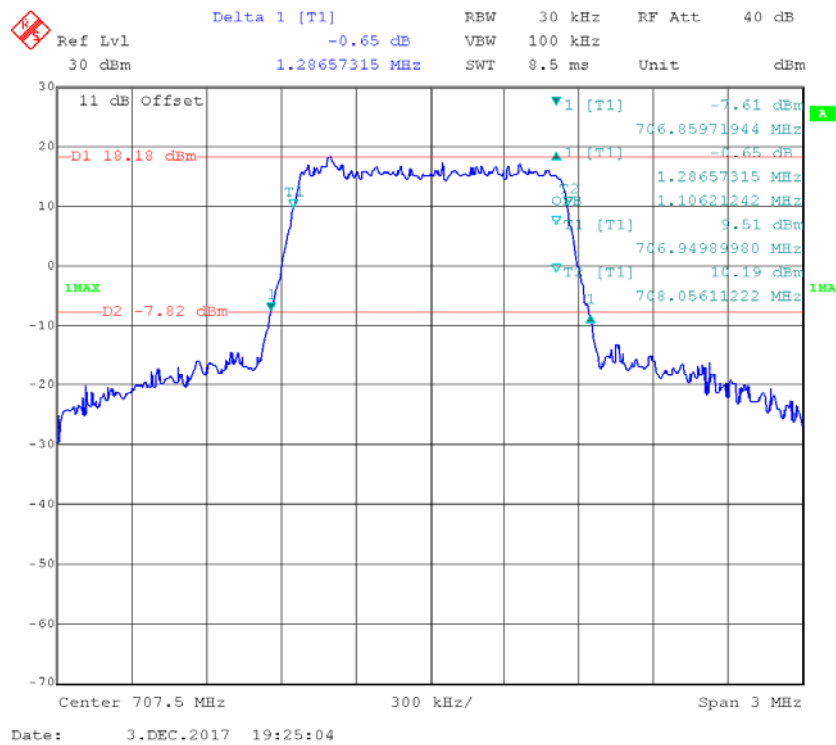
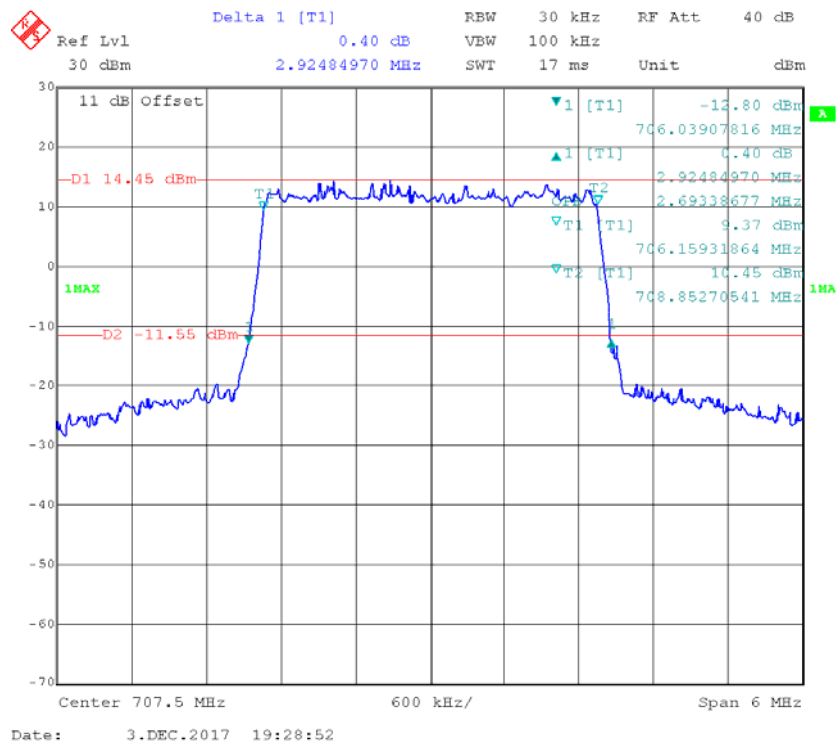


QPSK_5 MHz

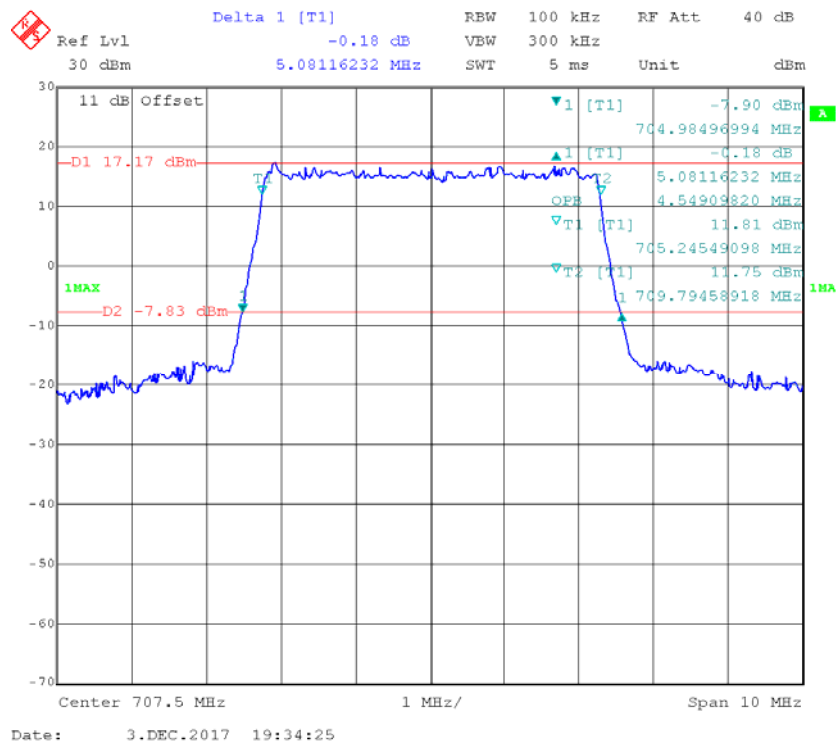


QPSK_10 MHz

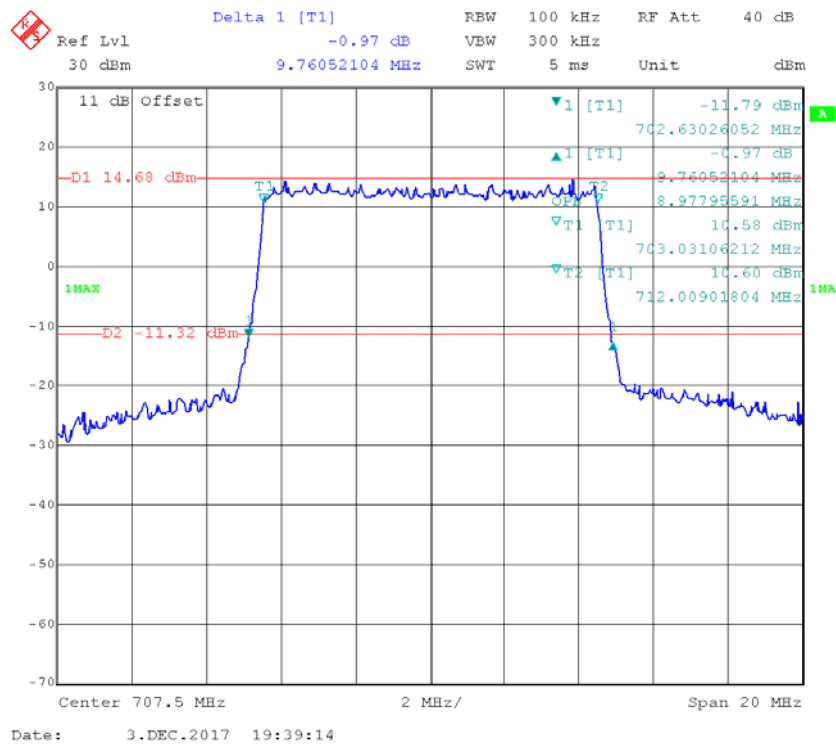


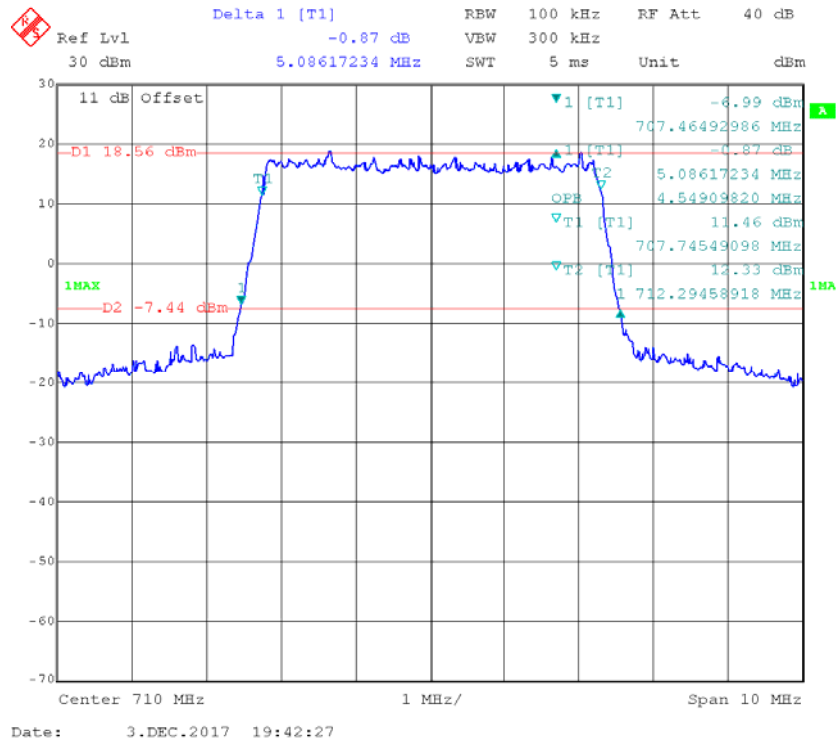
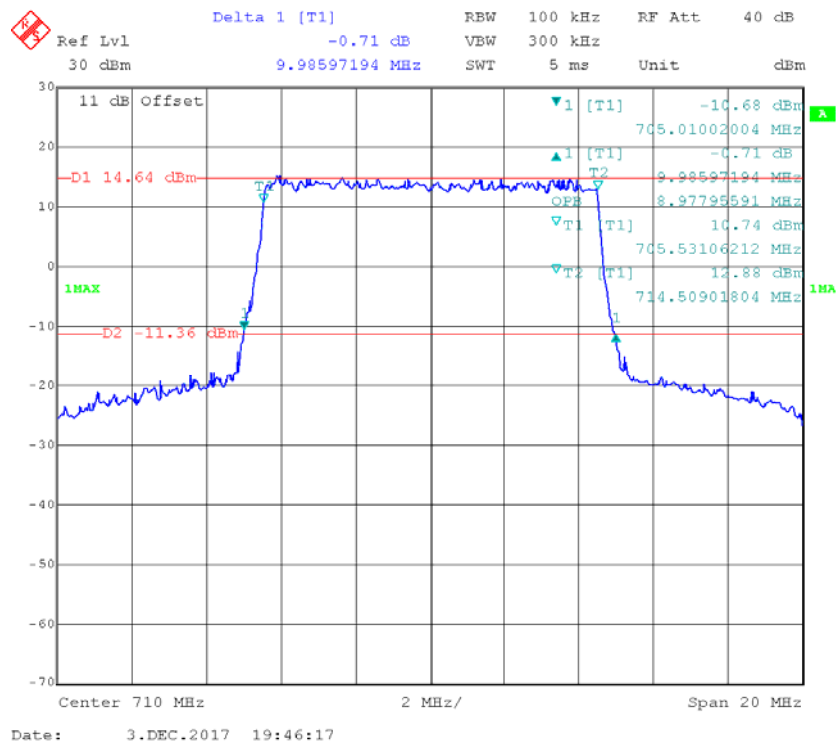
16QAM_1.4 MHz**16QAM_3 MHz**

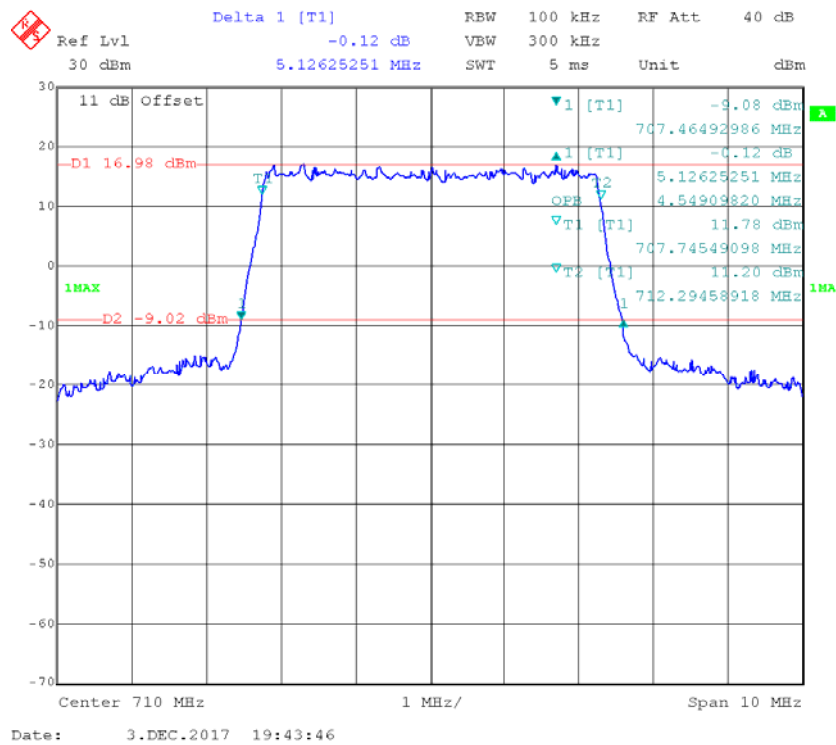
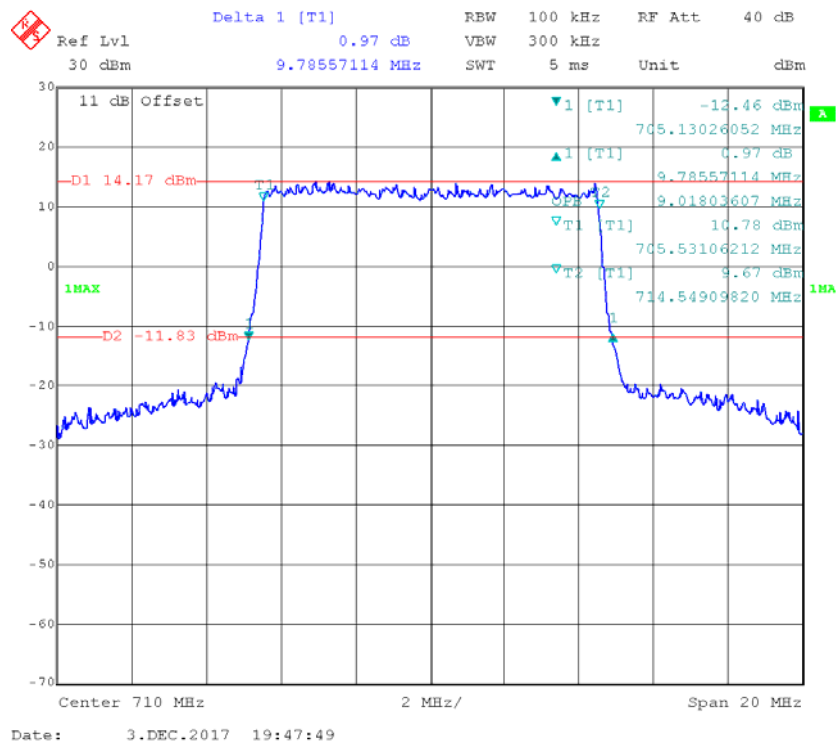
16QAM_5 MHz



16QAM_10 MHz



LTE Band 17:**QPSK_5 MHz****QPSK_10 MHz**

16QAM_5 MHz**16QAM_10 MHz**

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

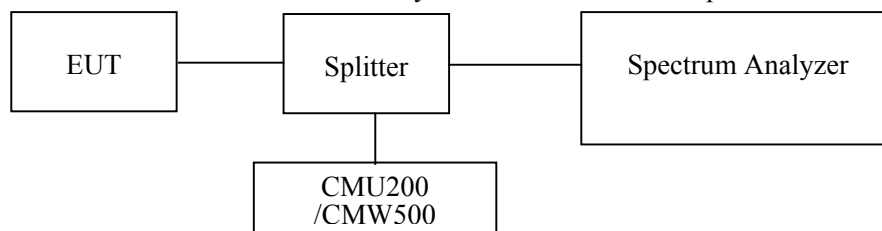
Applicable Standard

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
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
Unknown	RF Attenuator	10dB	10dB-1	Each Time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSIQ 26	831929/005	2017-08-31	2018-08-31

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

Test Data

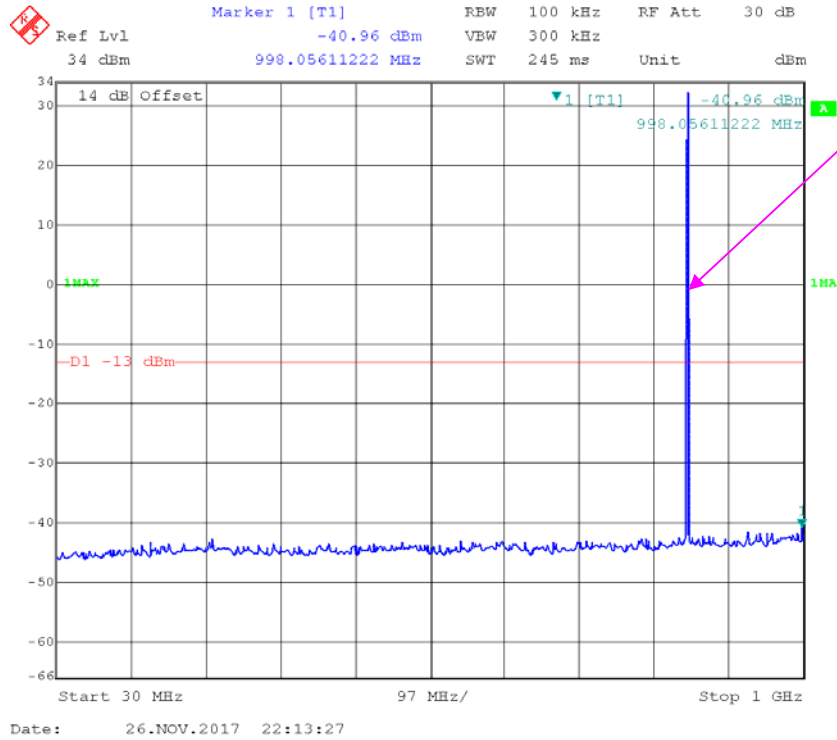
Environmental Conditions

Temperature:	23.5~24.6°C
Relative Humidity:	42~50 %
ATM Pressure:	101.4 kPa

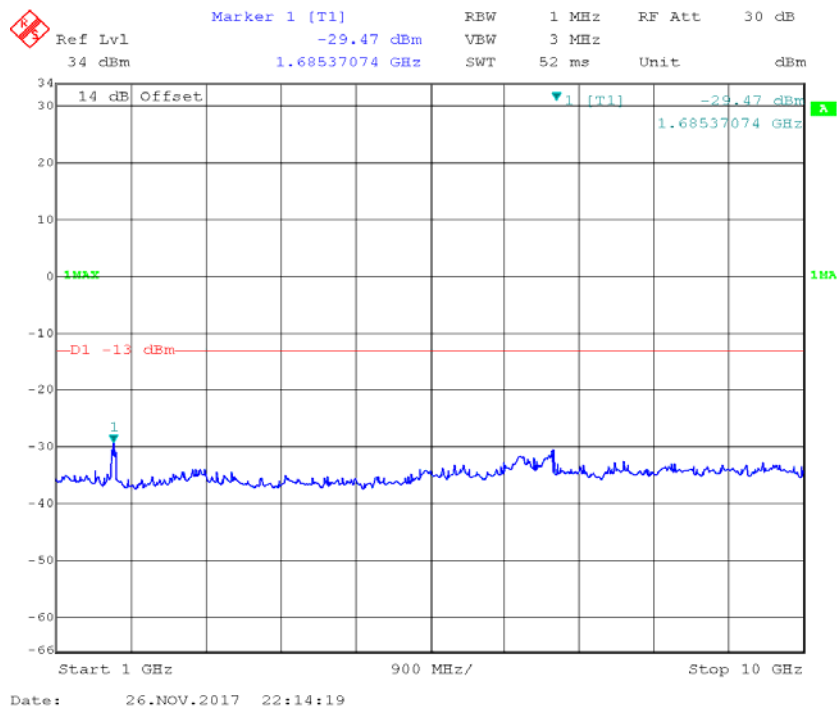
The testing was performed by Pean Zhu from 2017-11-26 to 2017-12-03.

Please refer to the following plots.

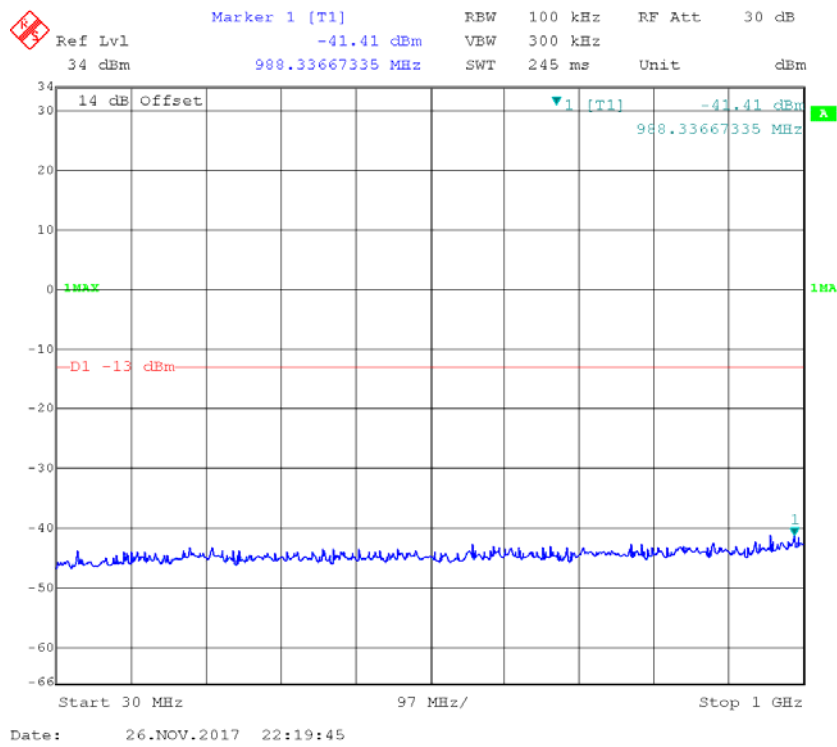
GSM850_Middle Channel



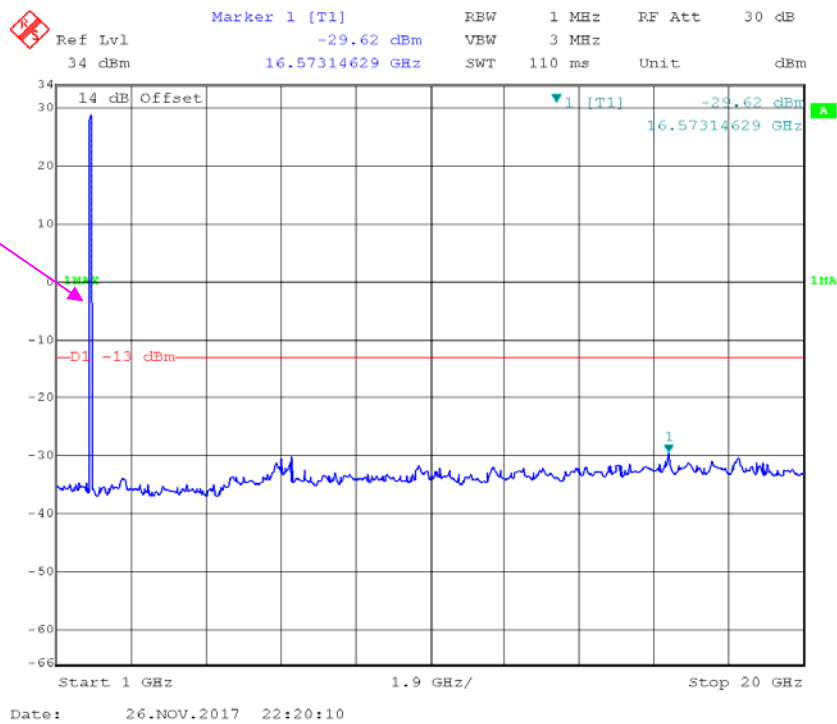
Fundamental



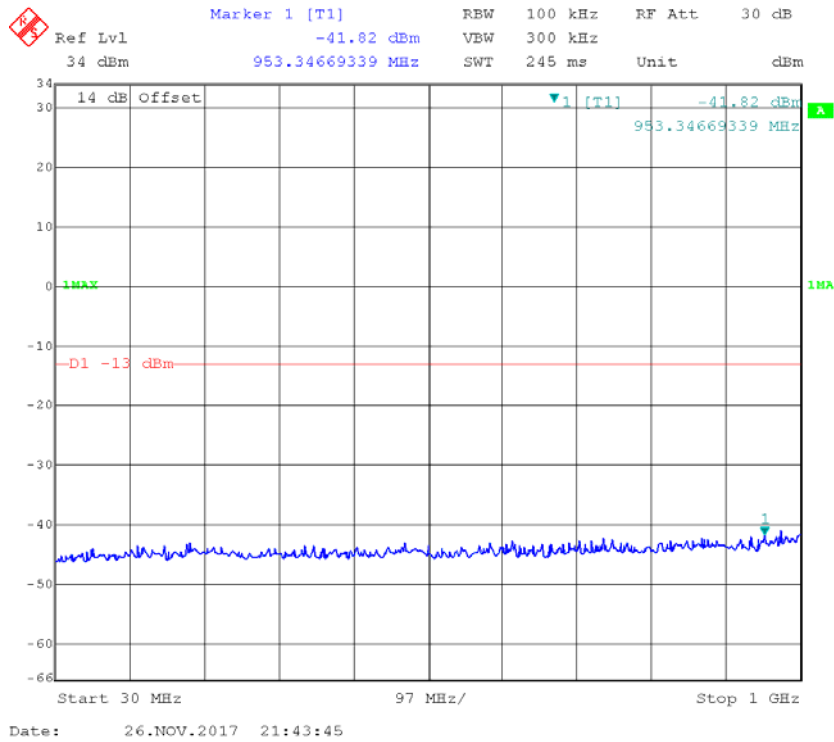
PCS 1900_ Middle Channel



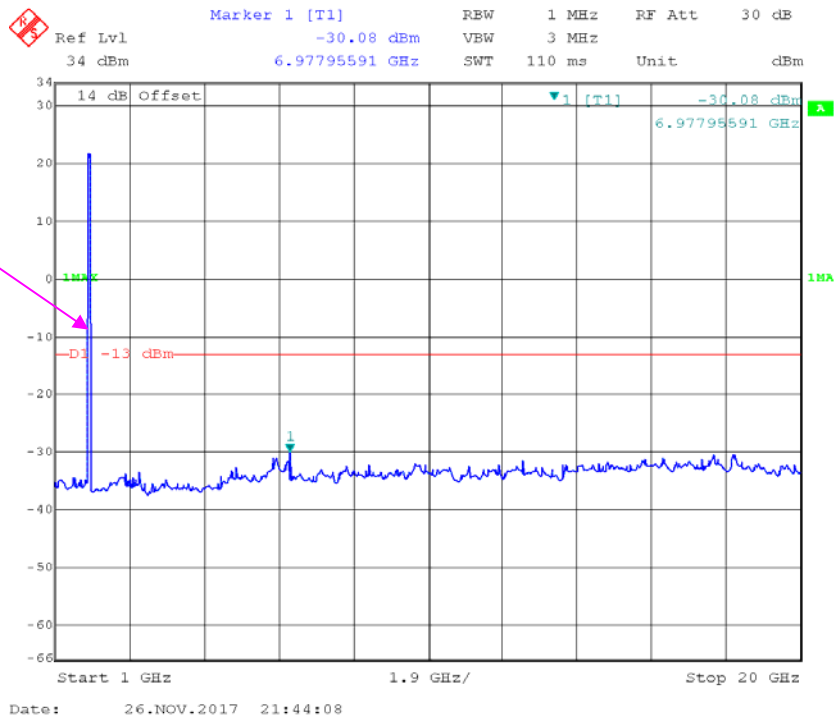
Fundamental



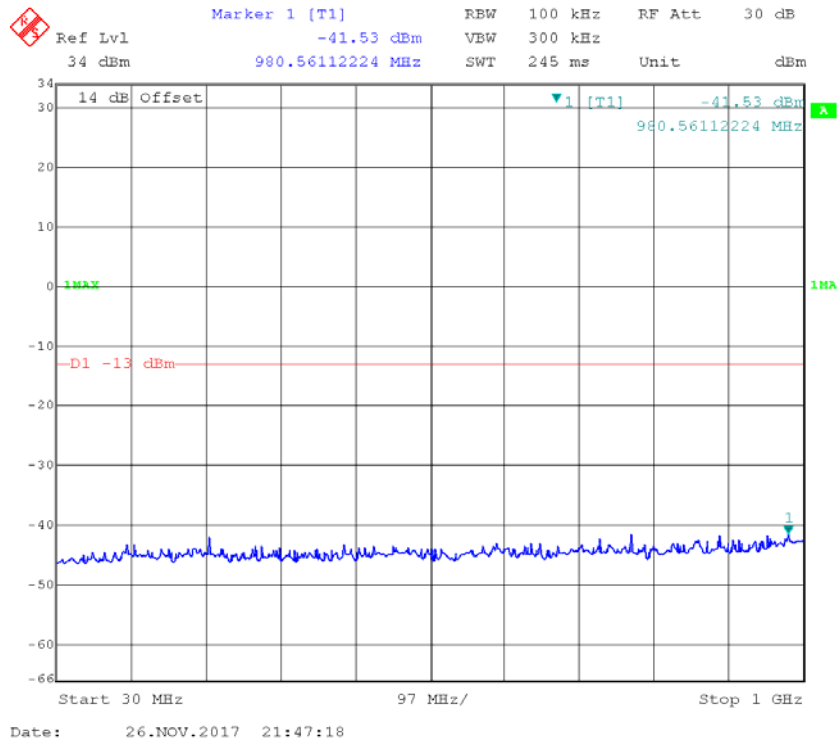
WCDMA Band II, Rel99



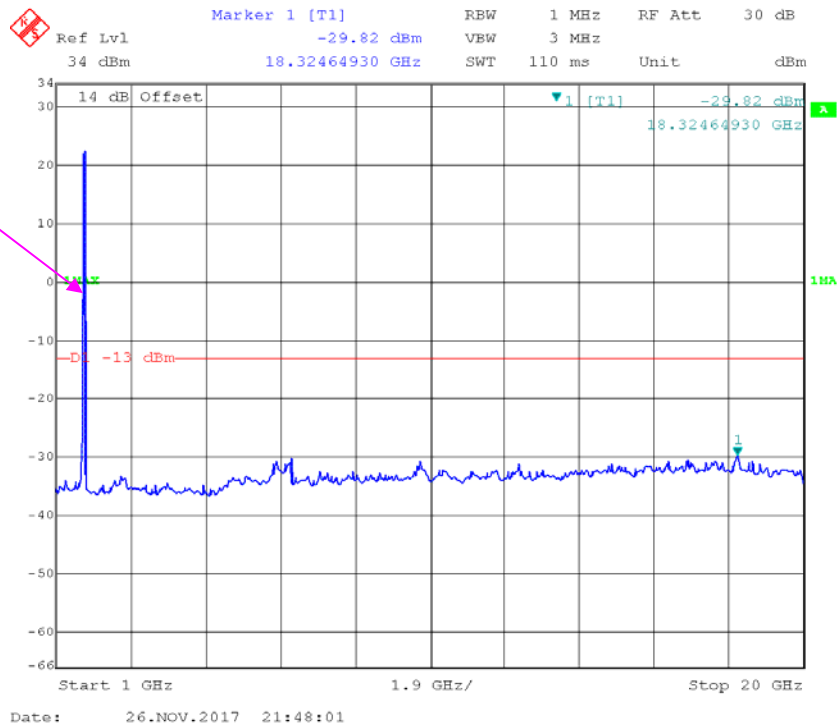
Fundamental



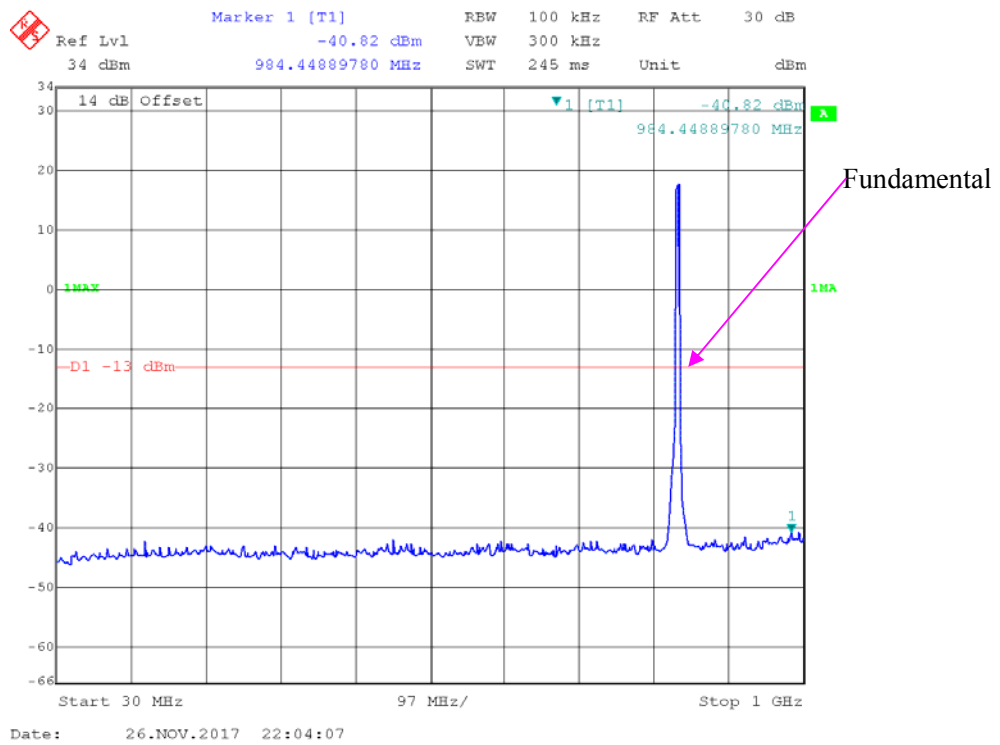
WCDMA Band IV, Rel99



Fundamental

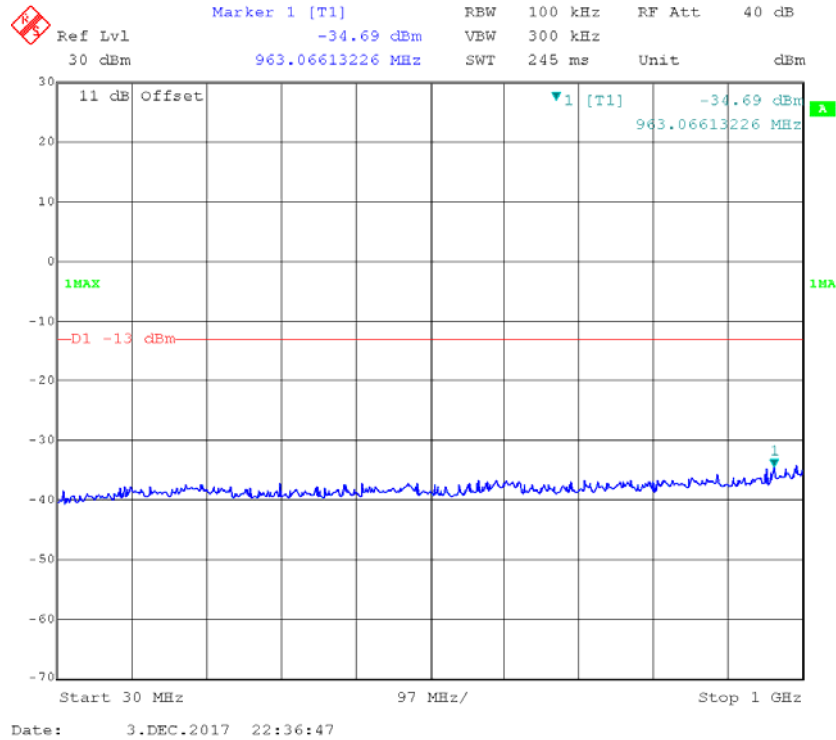


WCDMA Band V, Rel99

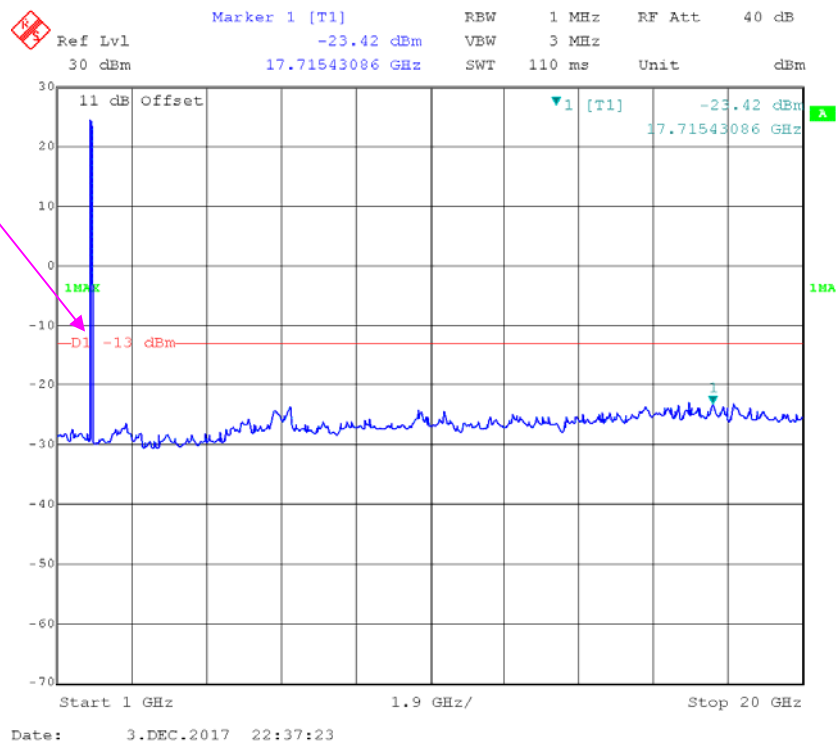


LTE Band 2 (Middle Channel)

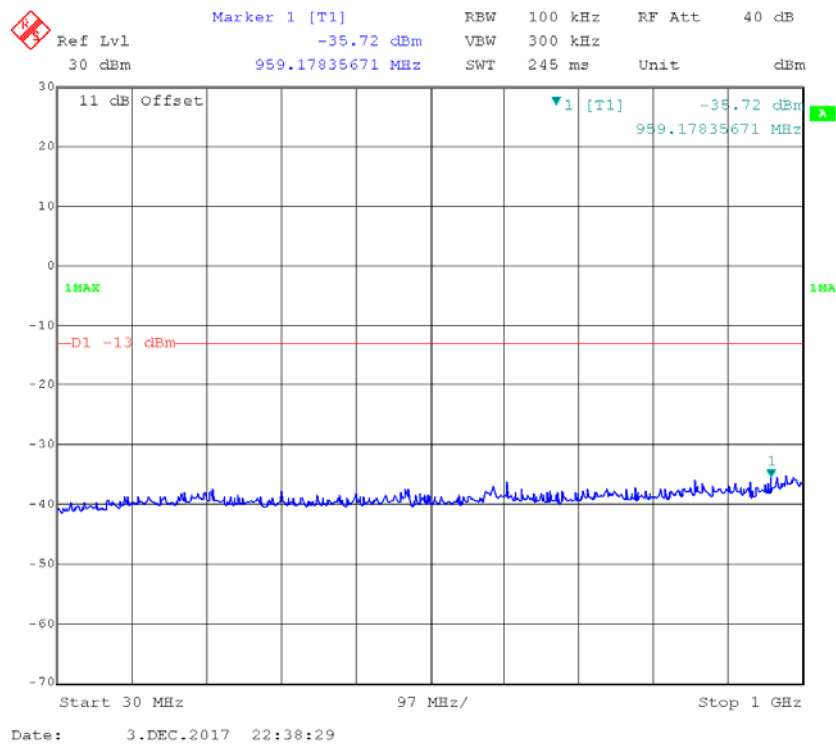
QPSK_1.4 MHz



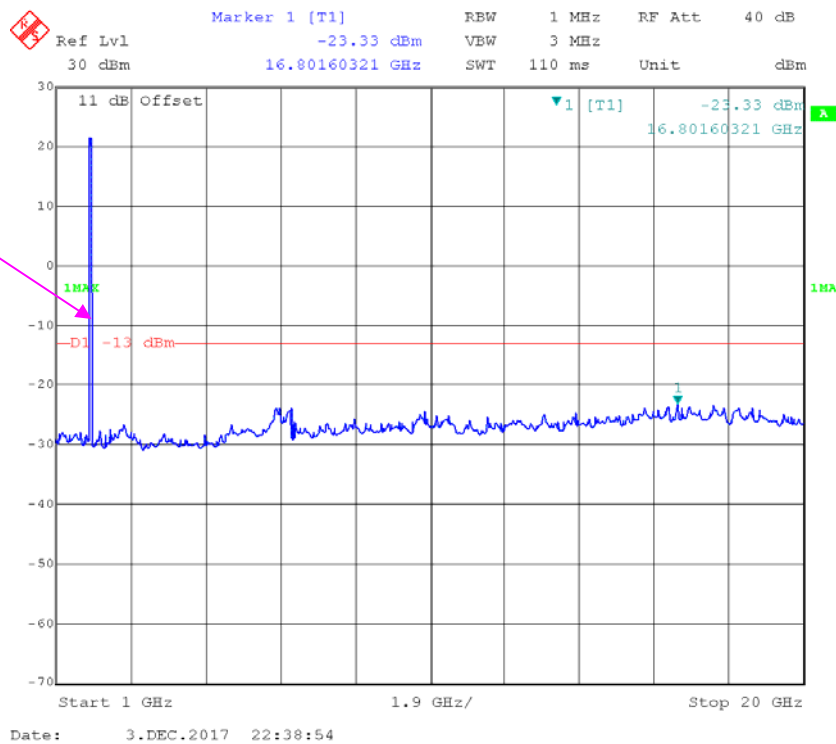
Fundamental



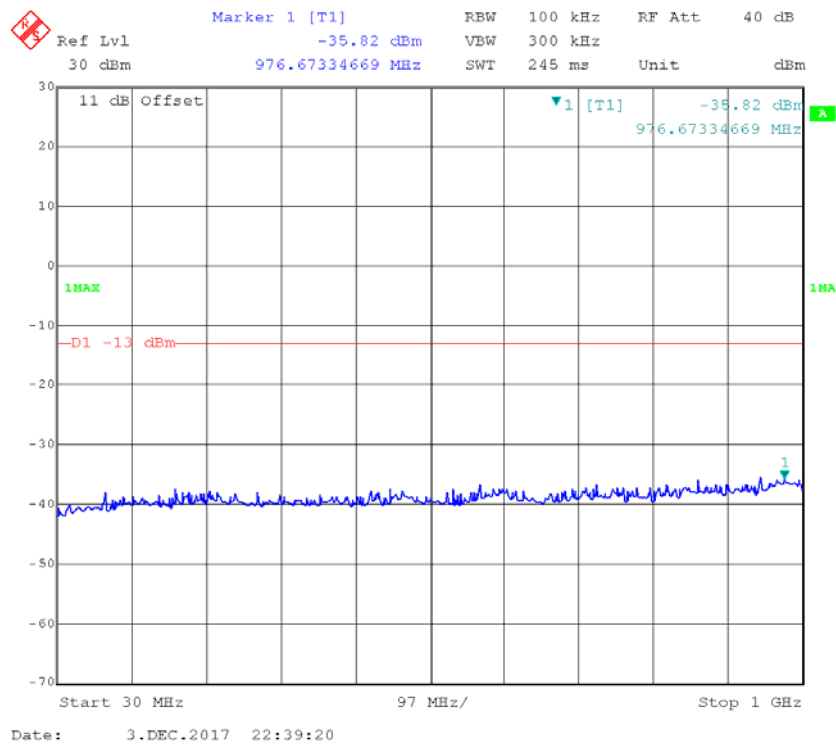
QPSK_3 MHz



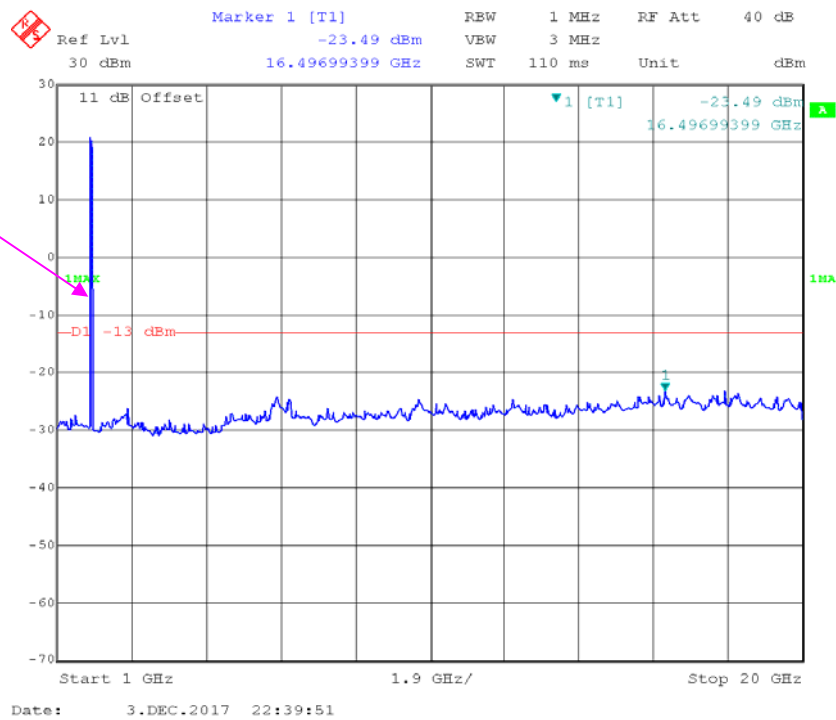
Fundamental



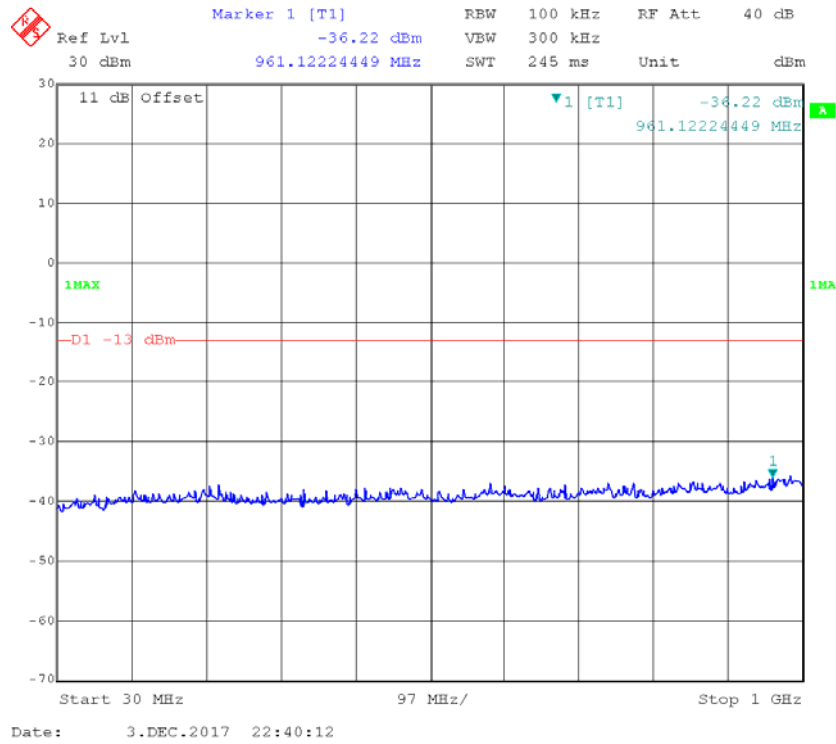
QPSK_5 MHz



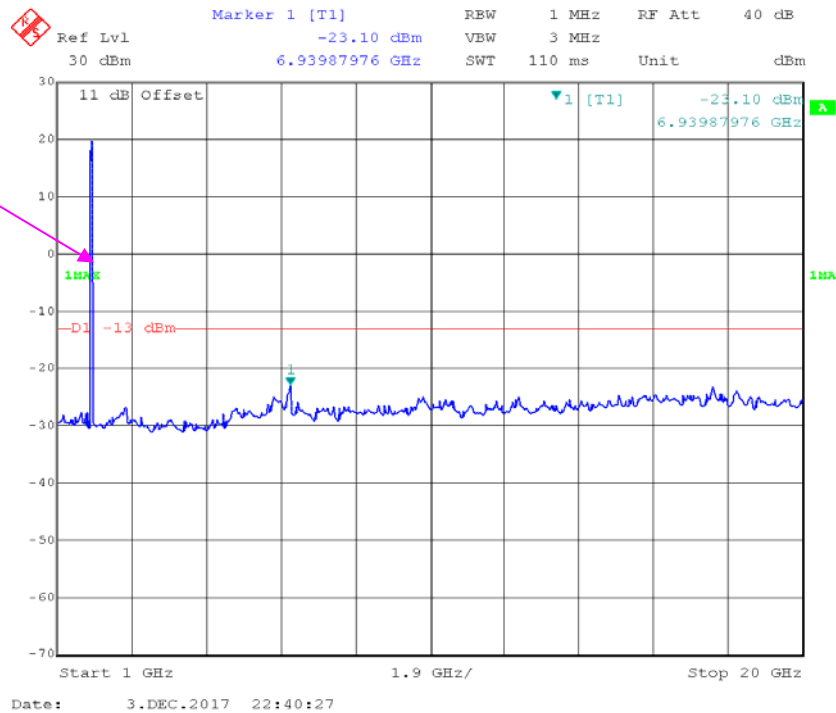
Fundamental



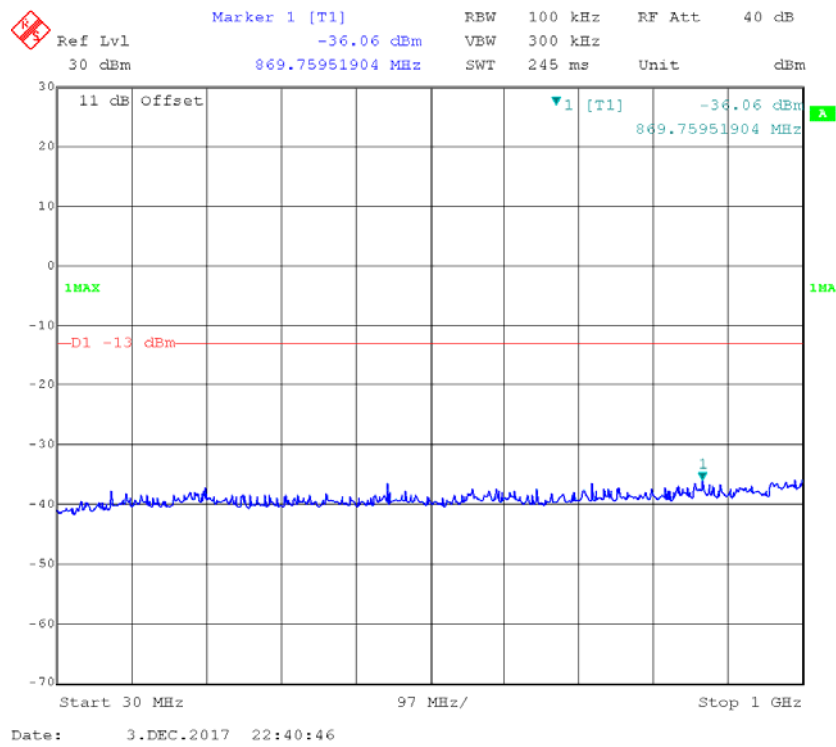
QPSK_10 MHz



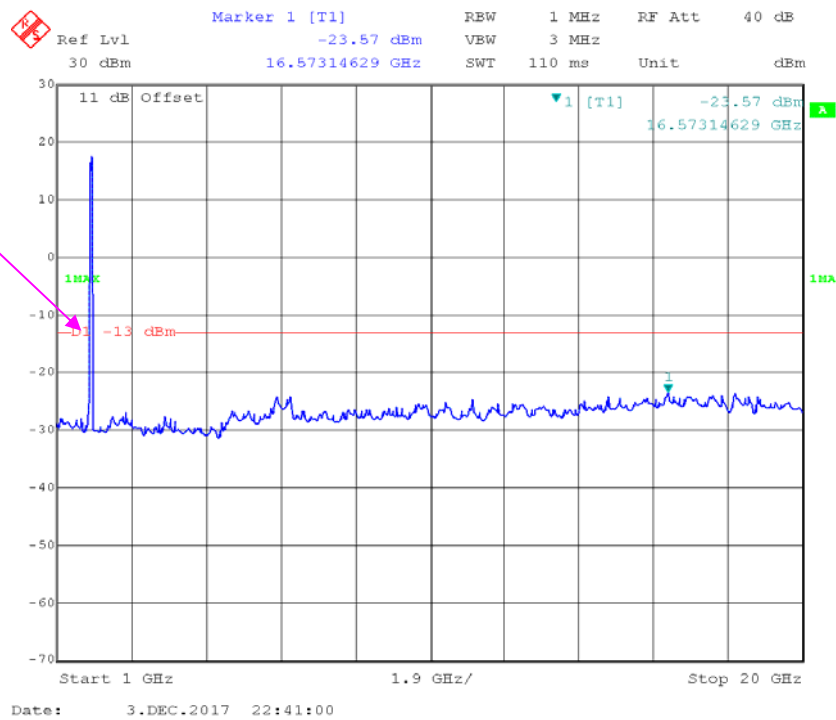
Fundamental



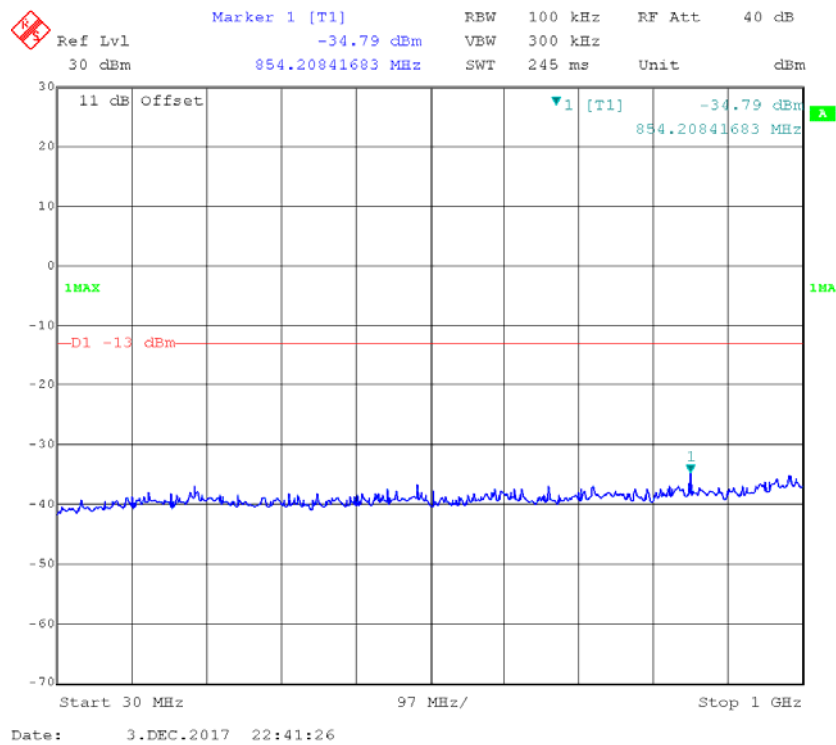
QPSK_15 MHz



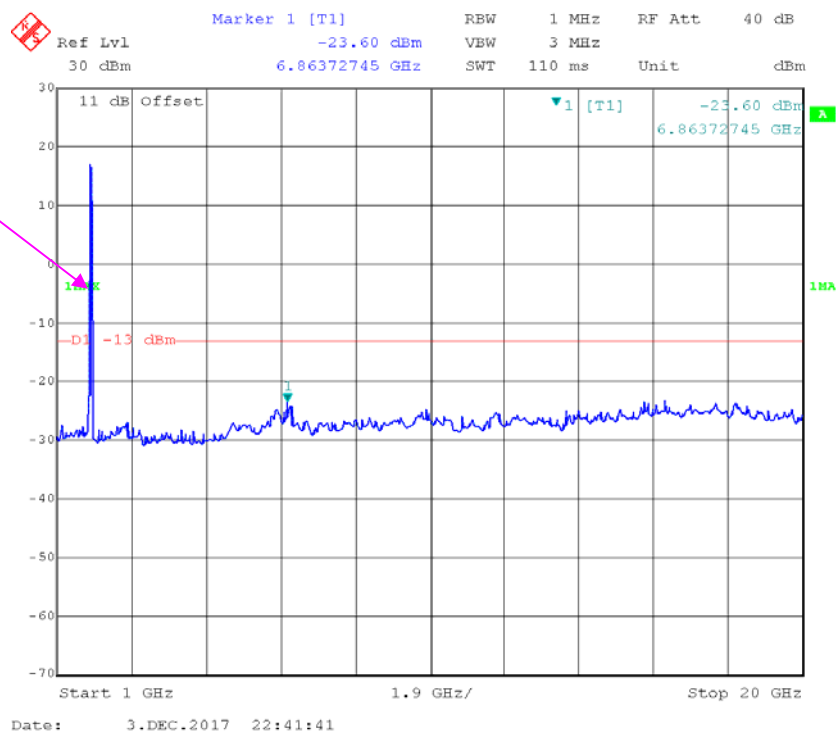
Fundamental



QPSK_20 MHz

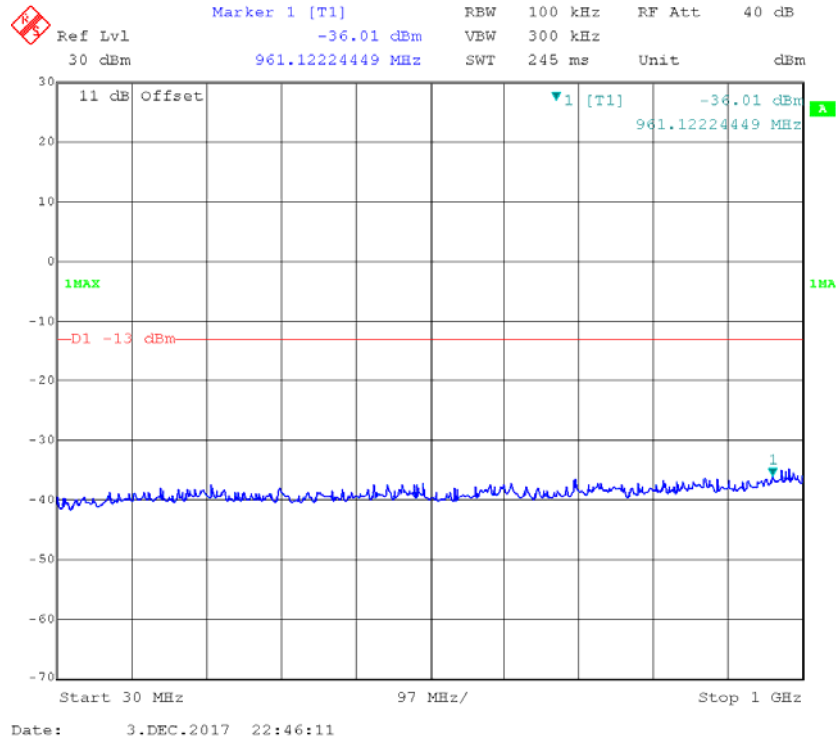


Fundamental

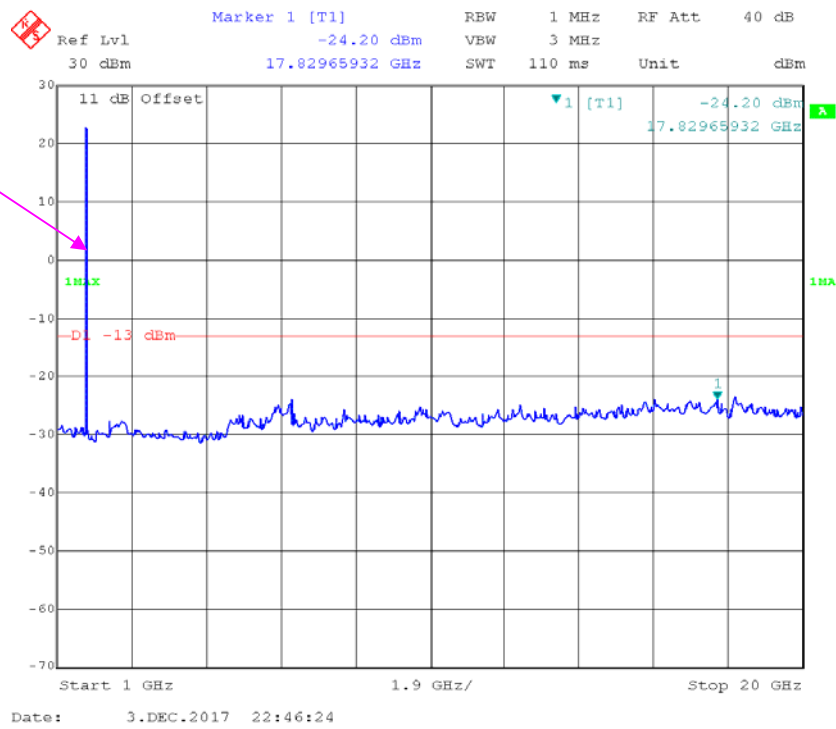


LTE Band 4 (Middle Channel)

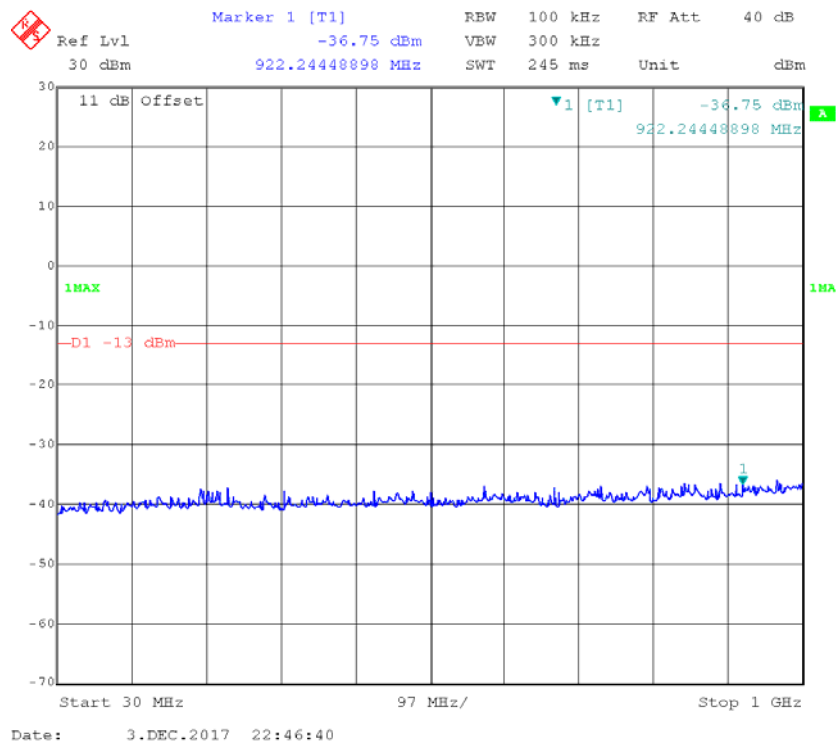
QPSK_1.4 MHz



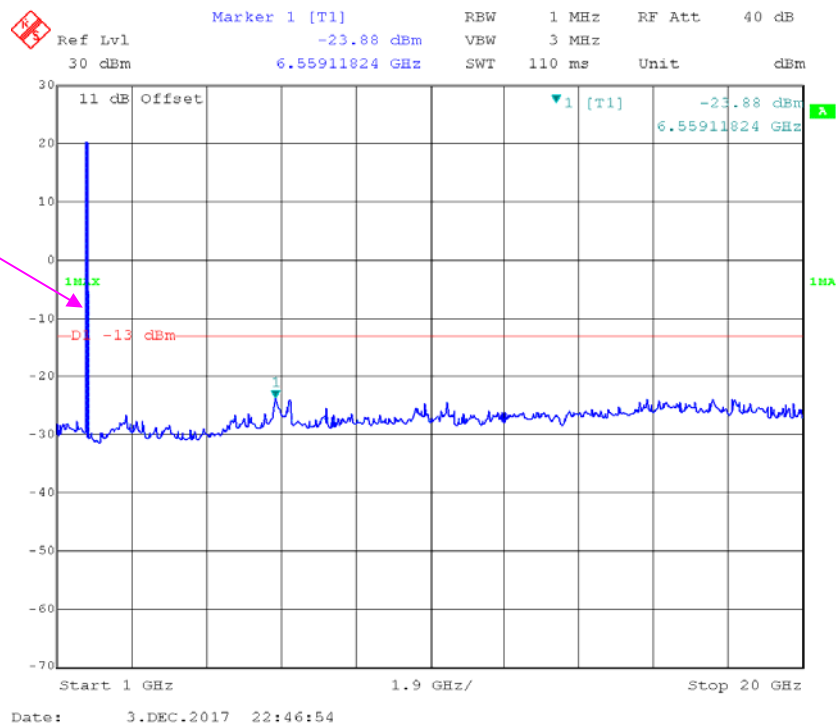
Fundamental



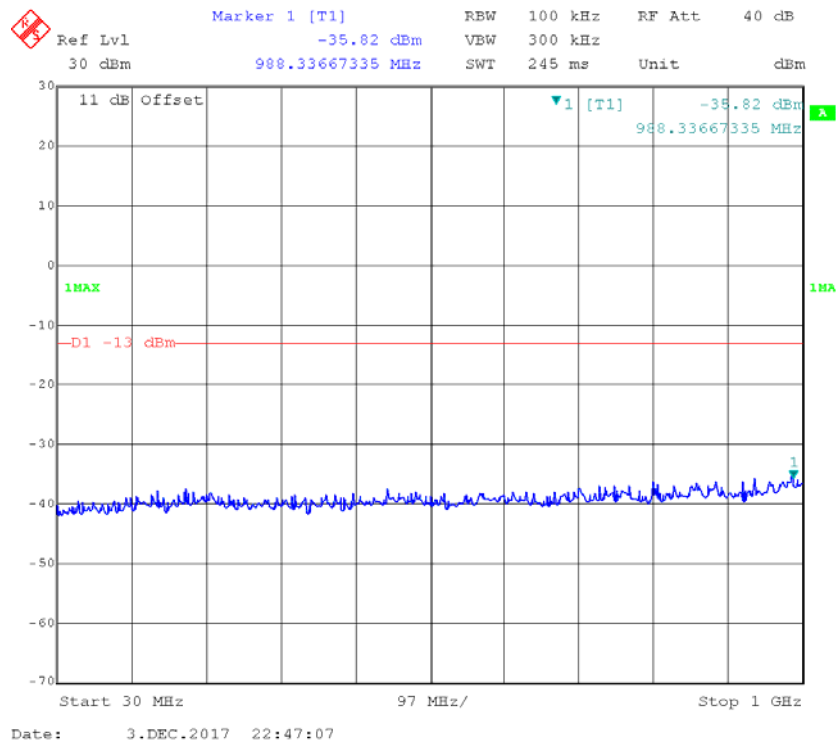
QPSK_3 MHz



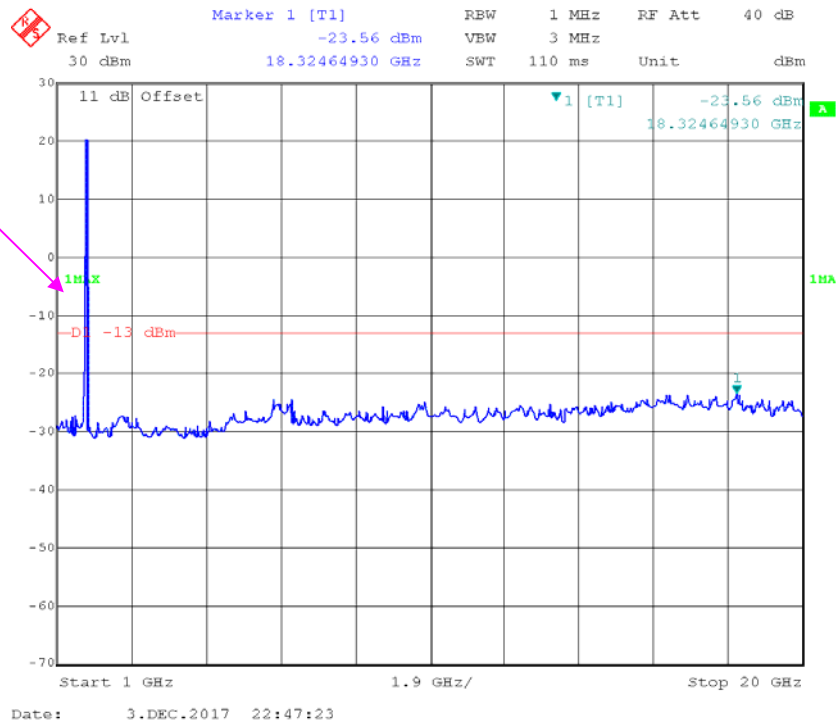
Fundamental



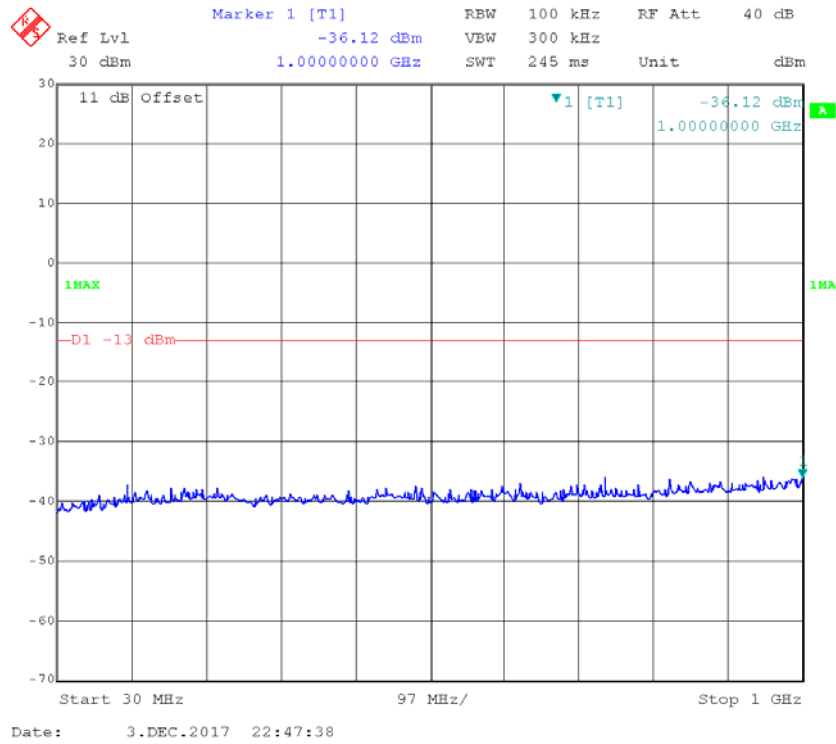
QPSK_5 MHz



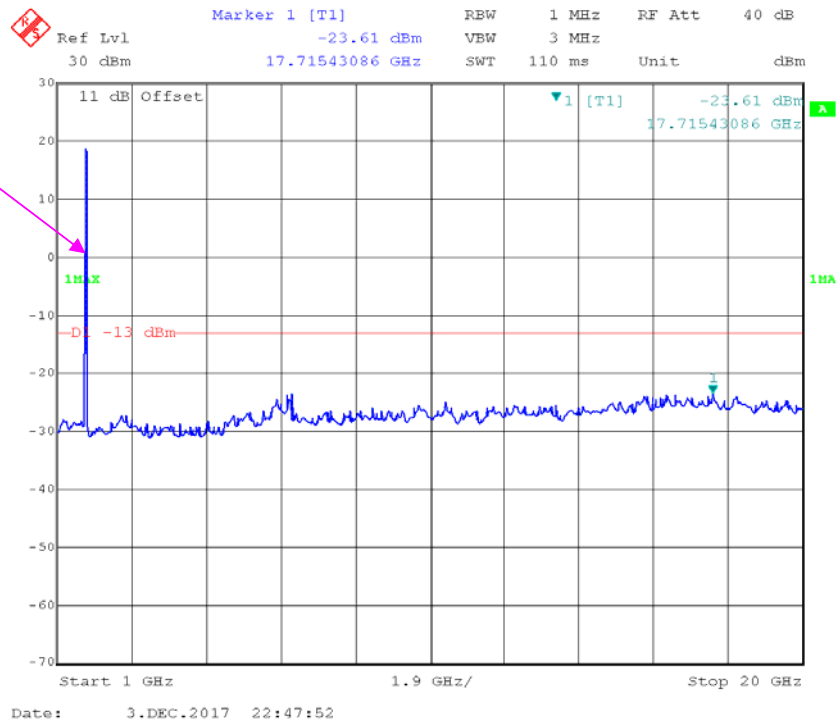
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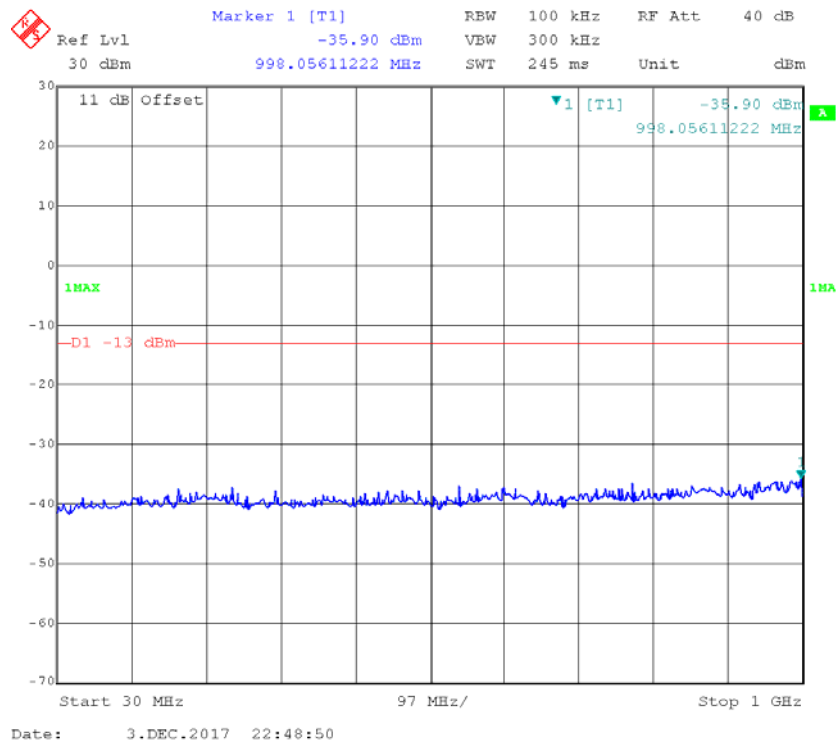
QPSK_10 MHz



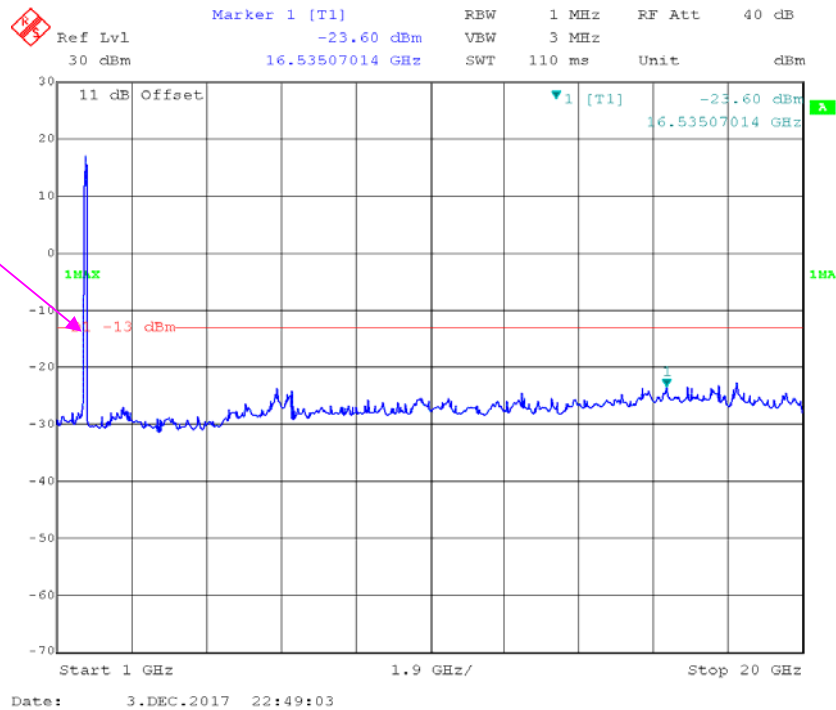
Fundamental



QPSK_20 MHz

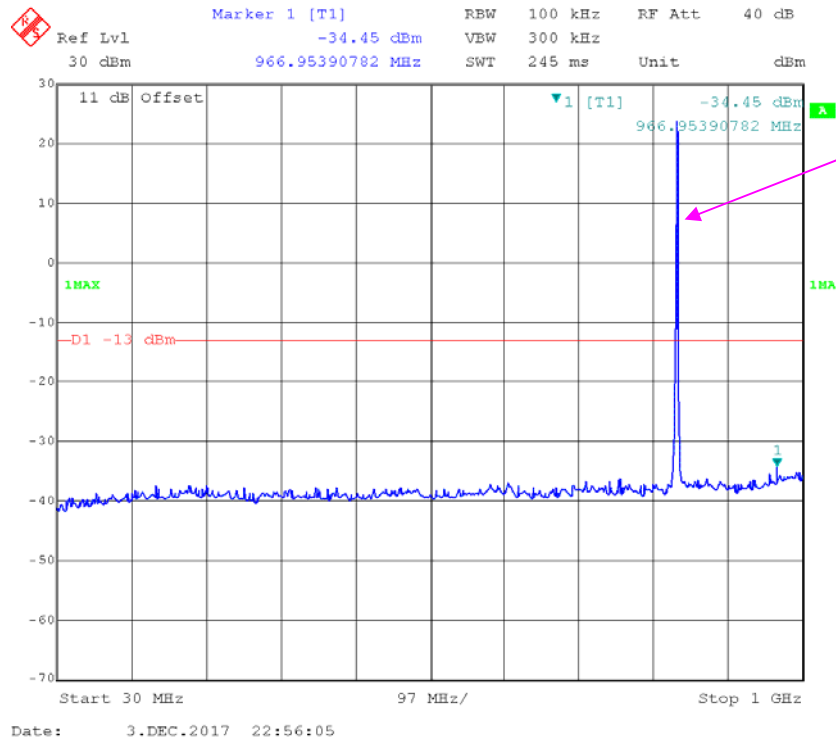


Fundamental

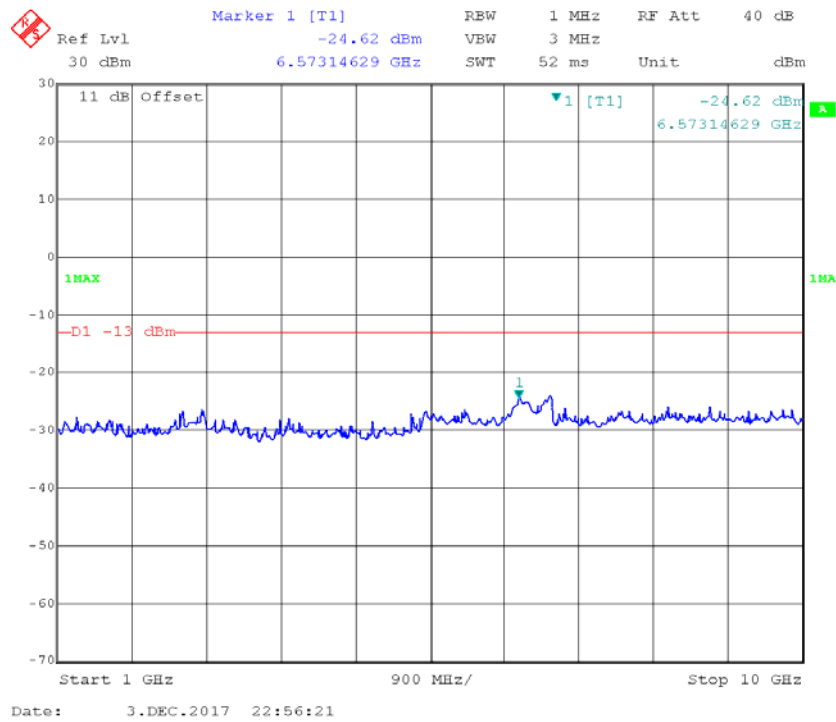


LTE Band 5 (Middle Channel)

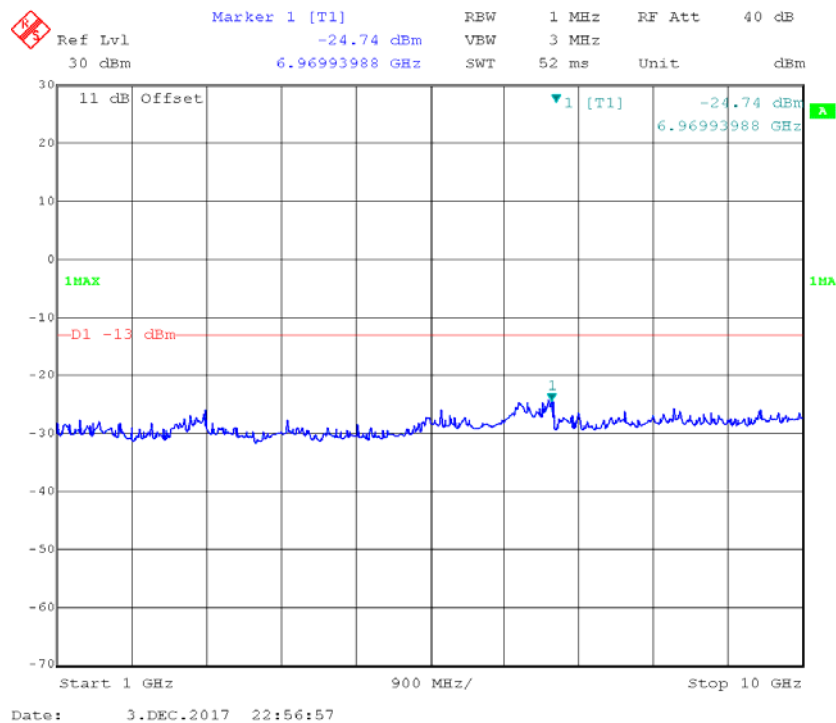
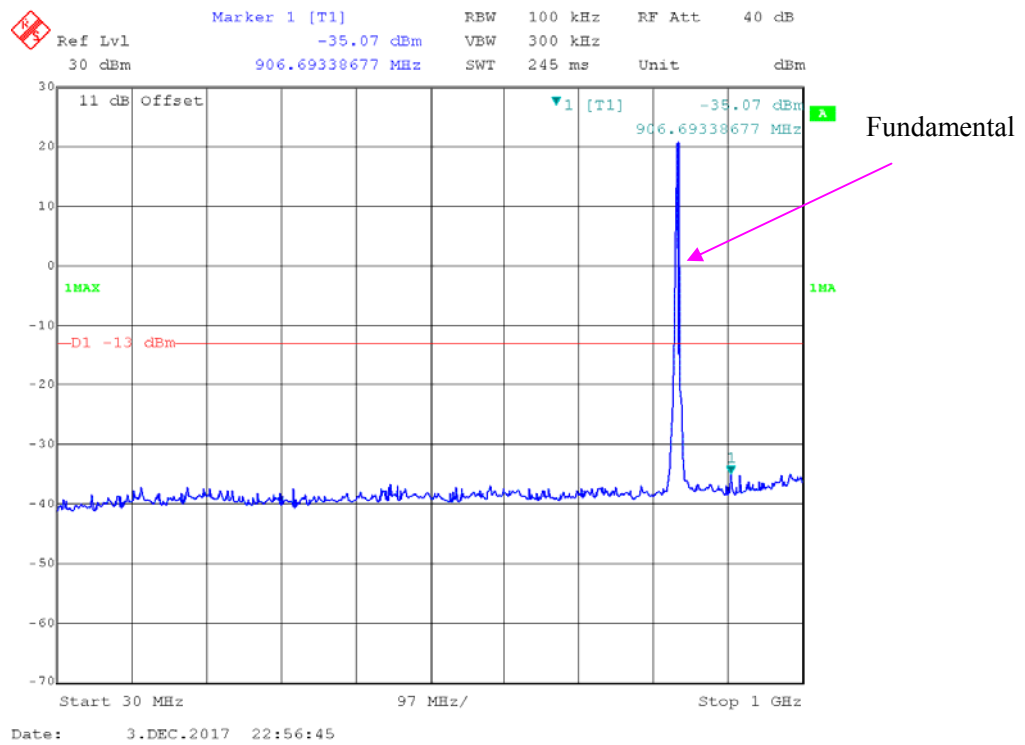
QPSK_1.4 MHz



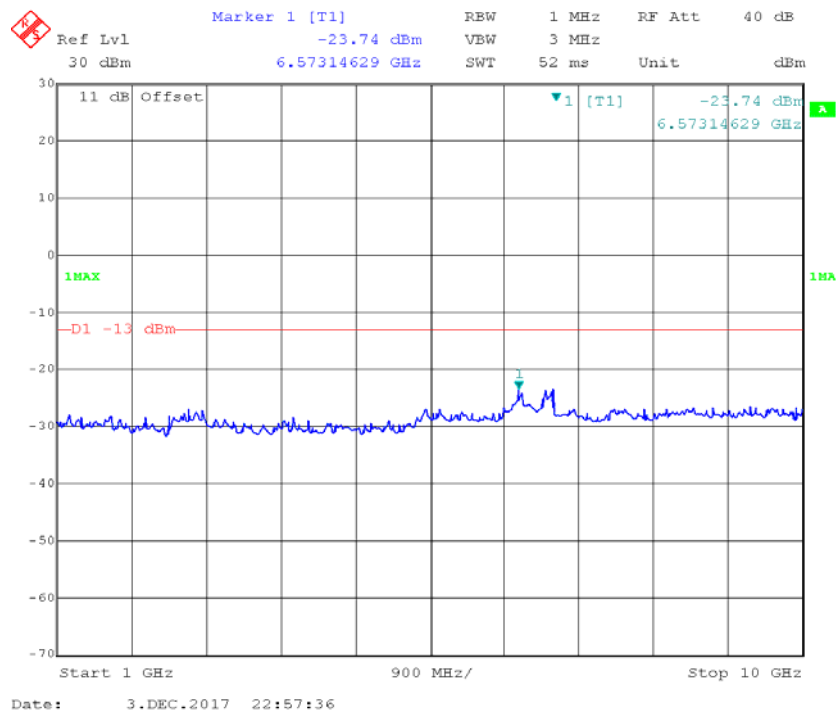
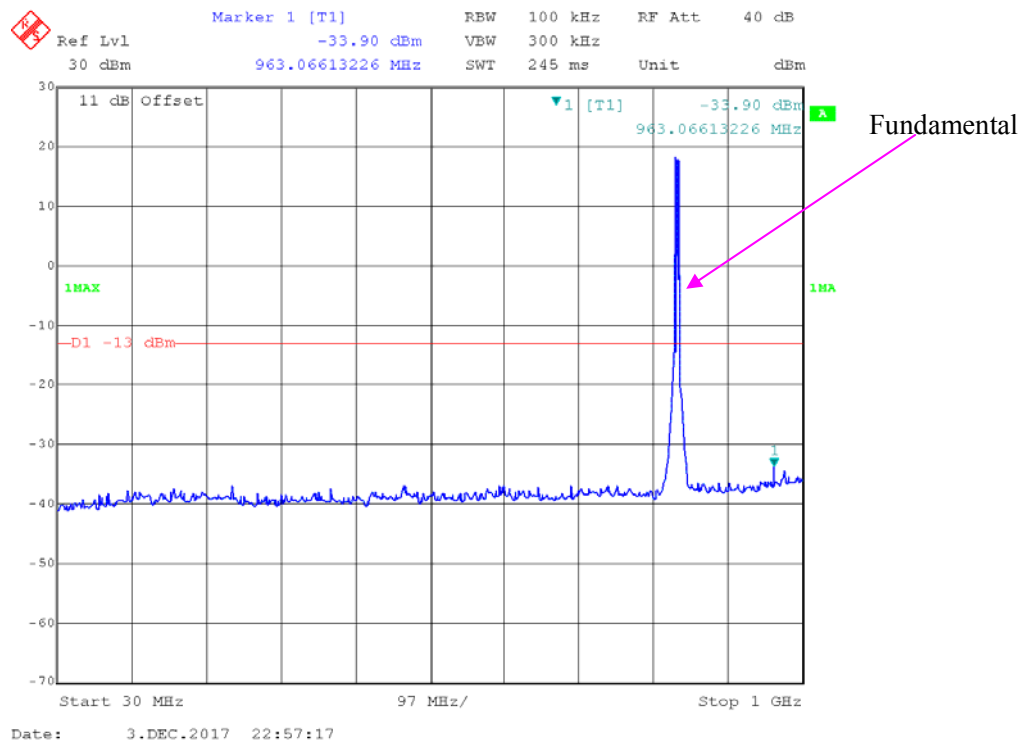
Fundamental



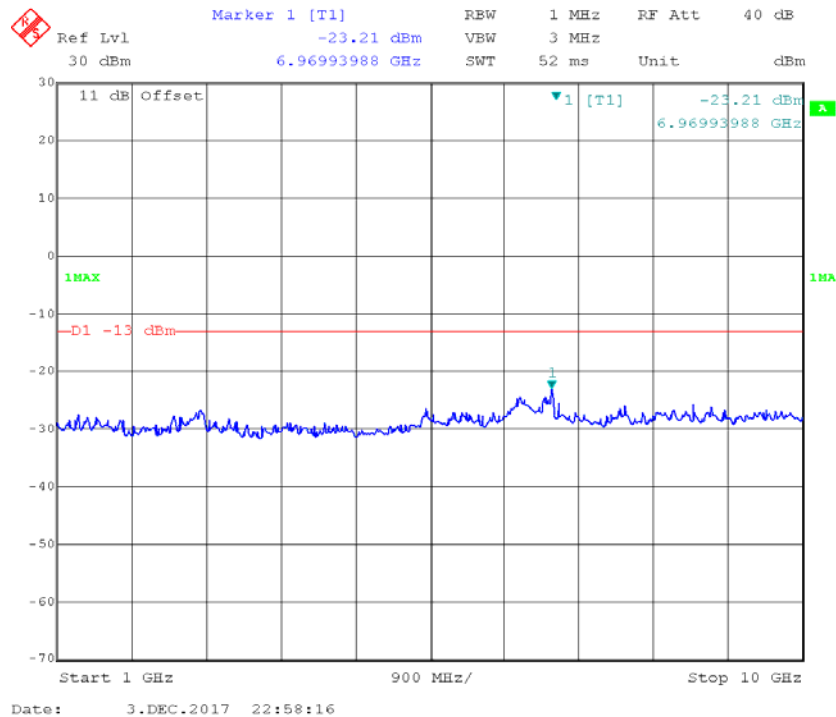
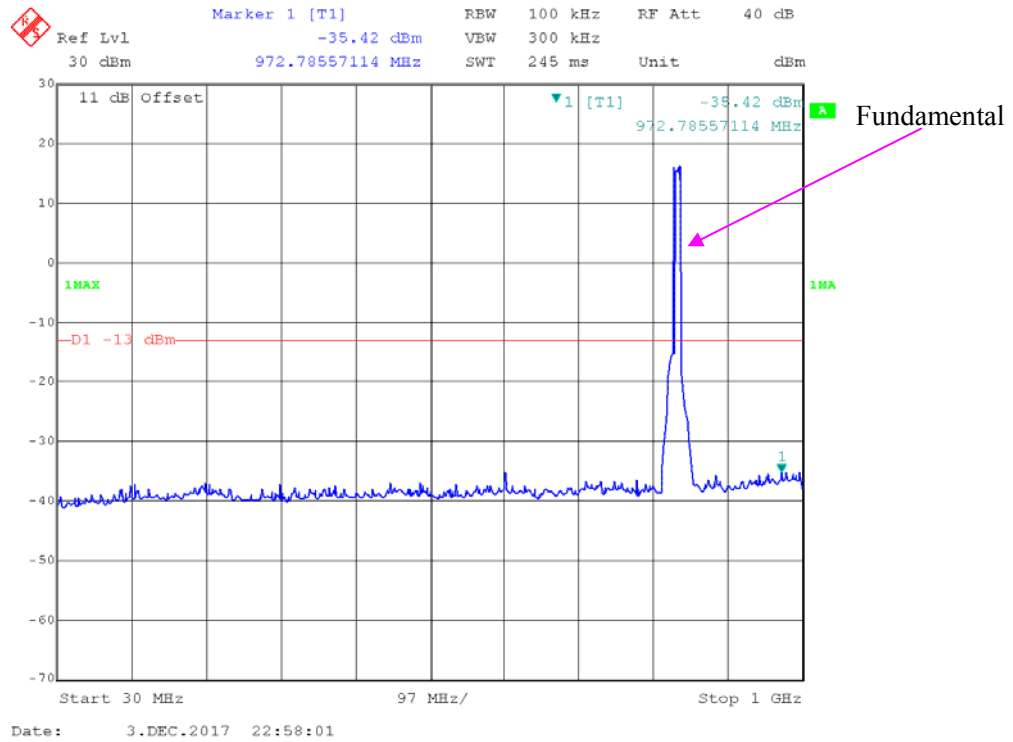
QPSK_3 MHz



QPSK_5 MHz

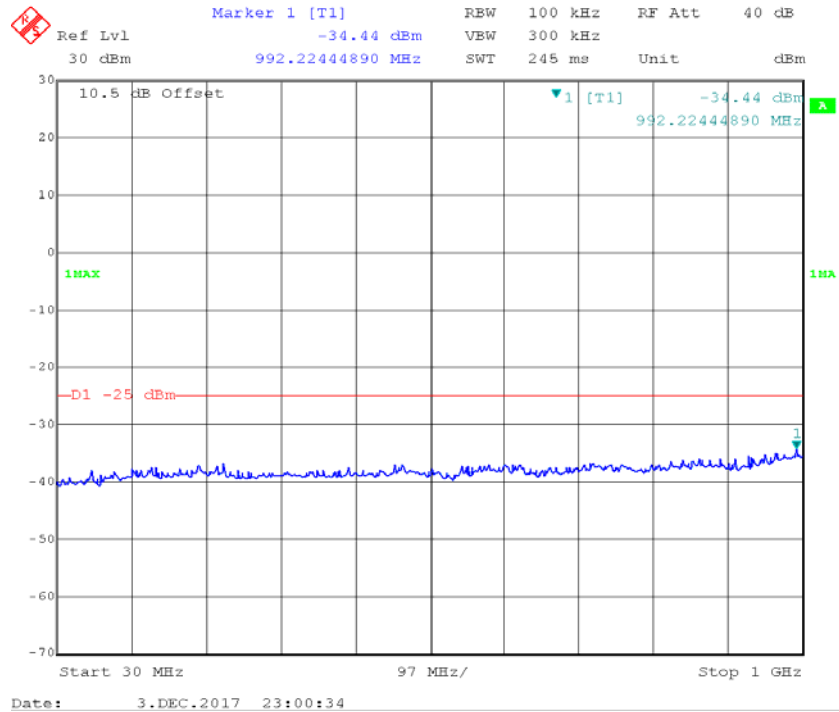


QPSK_10 MHz

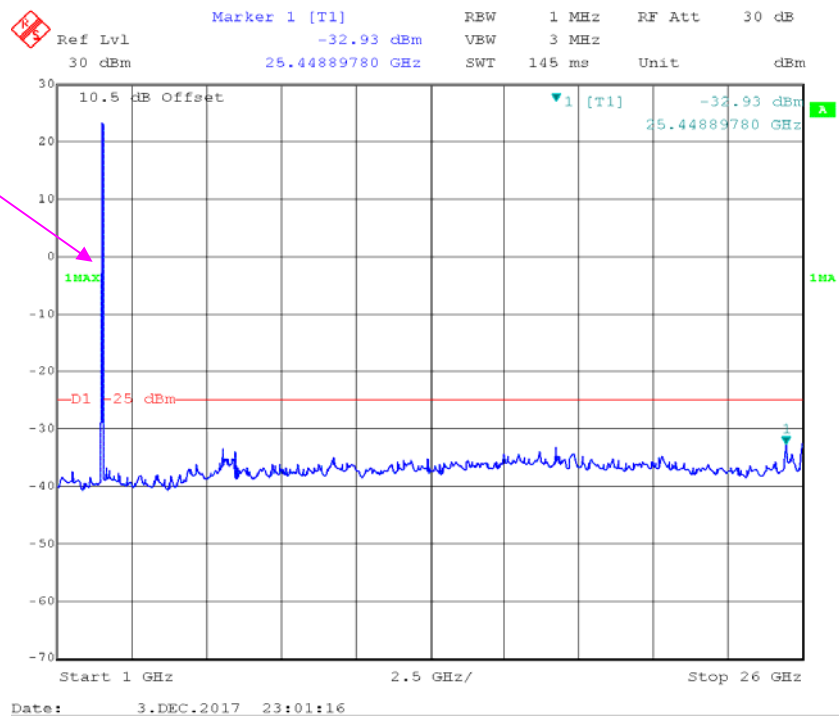


LTE Band 7

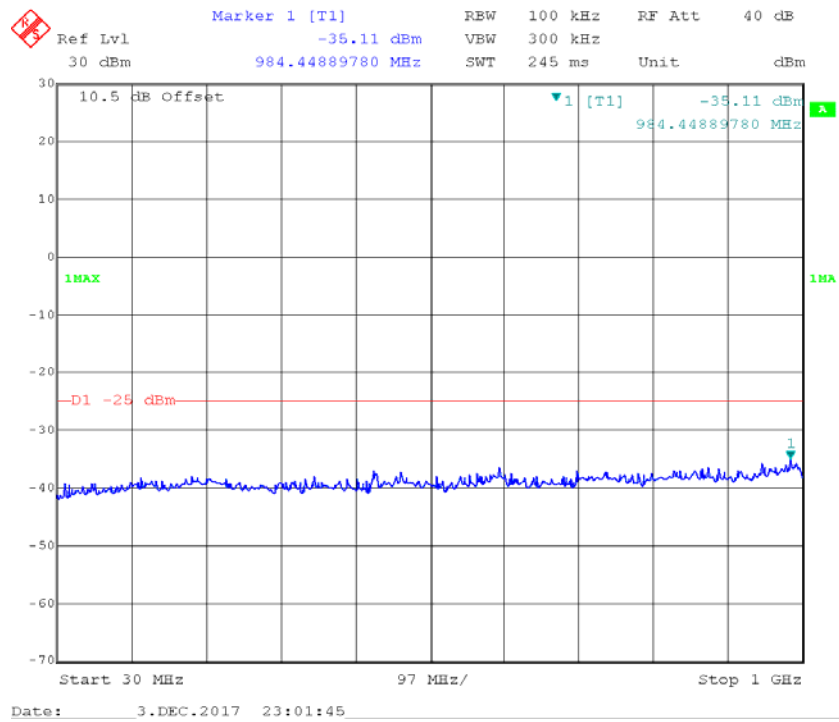
QPSK_5 MHz



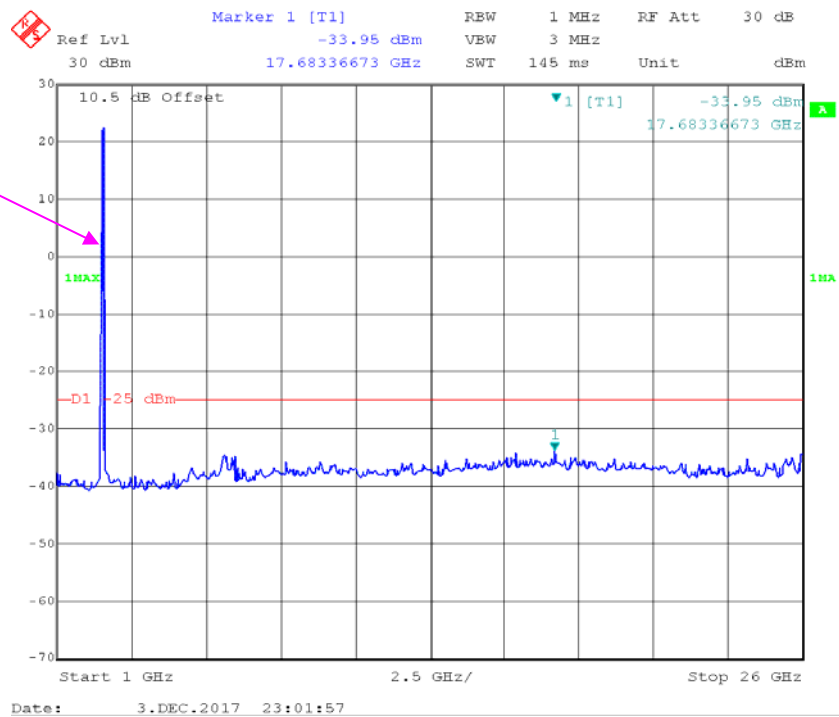
Fundamental



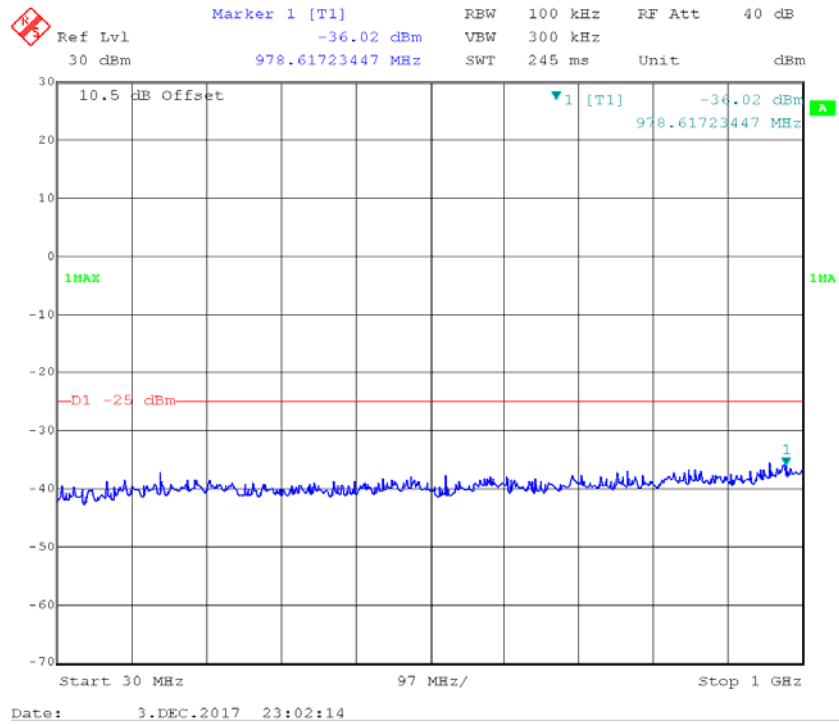
QPSK_10 MHz



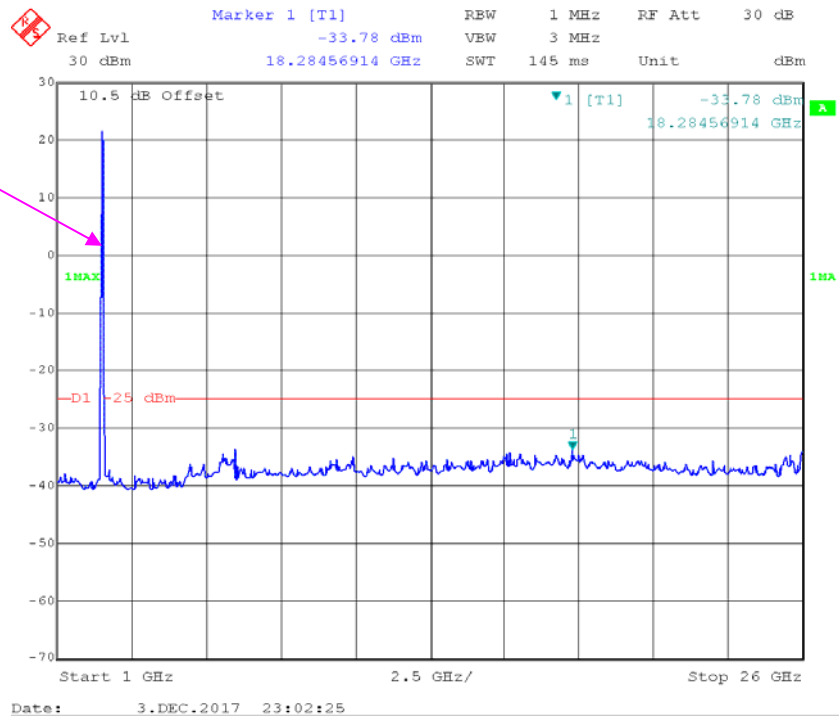
Fundamental



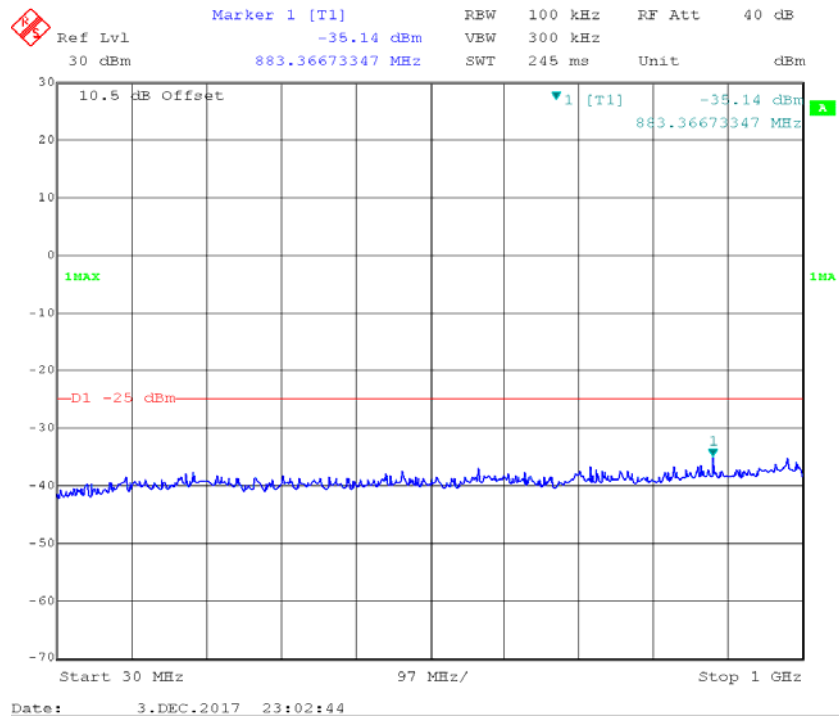
QPSK_15 MHz



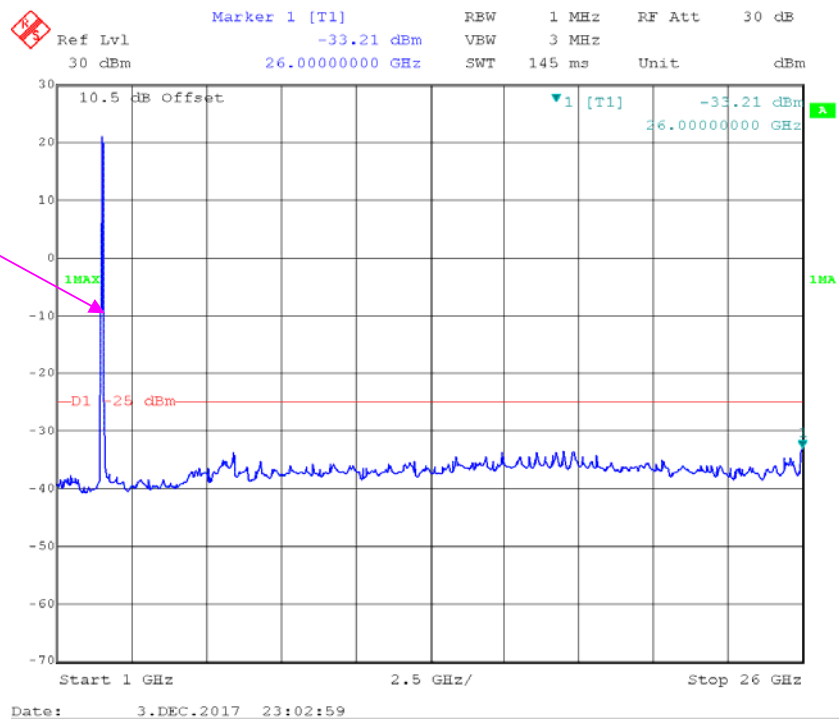
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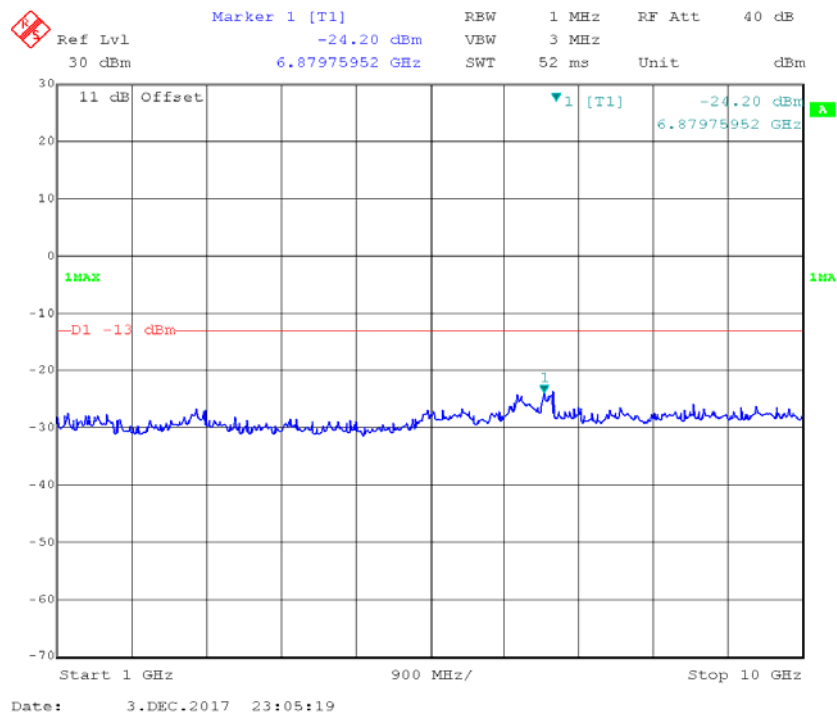
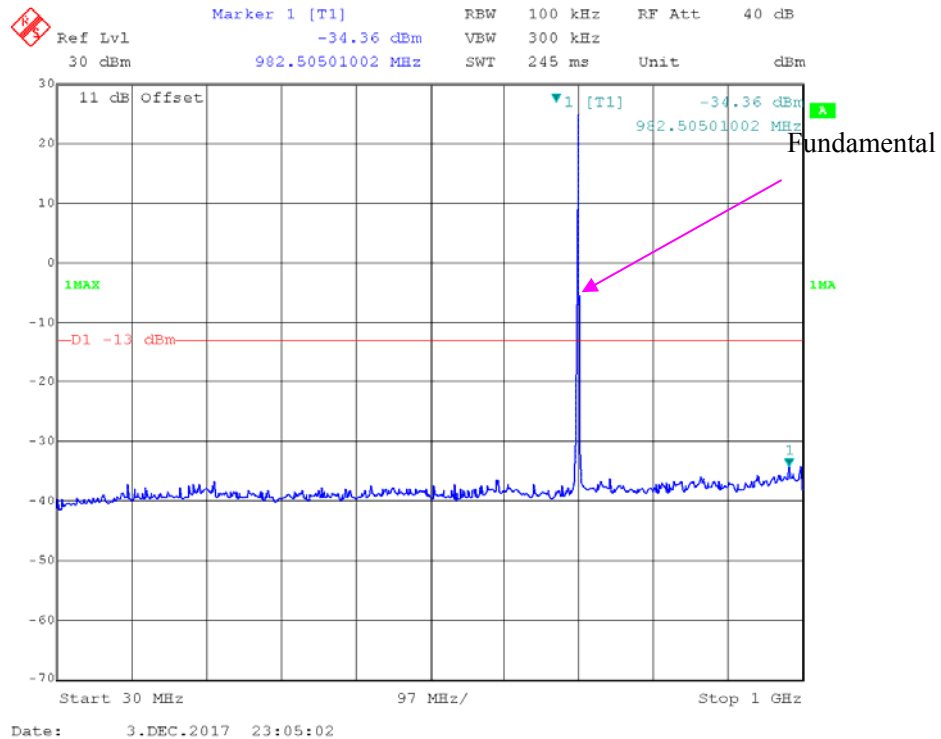


QPSK_20 MHz

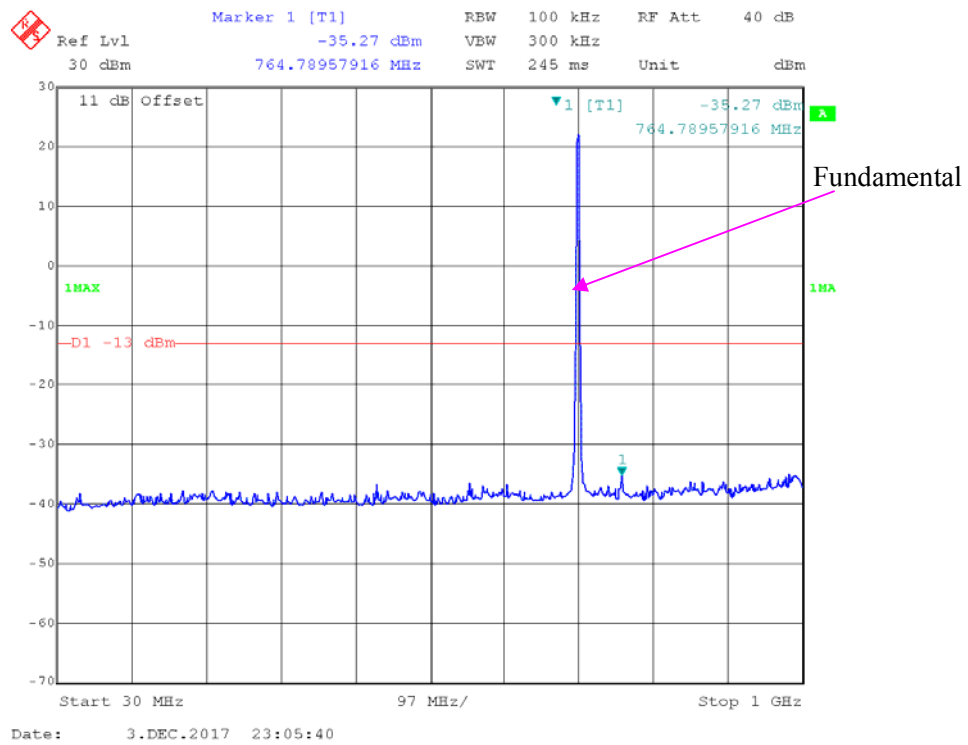


Fundamental

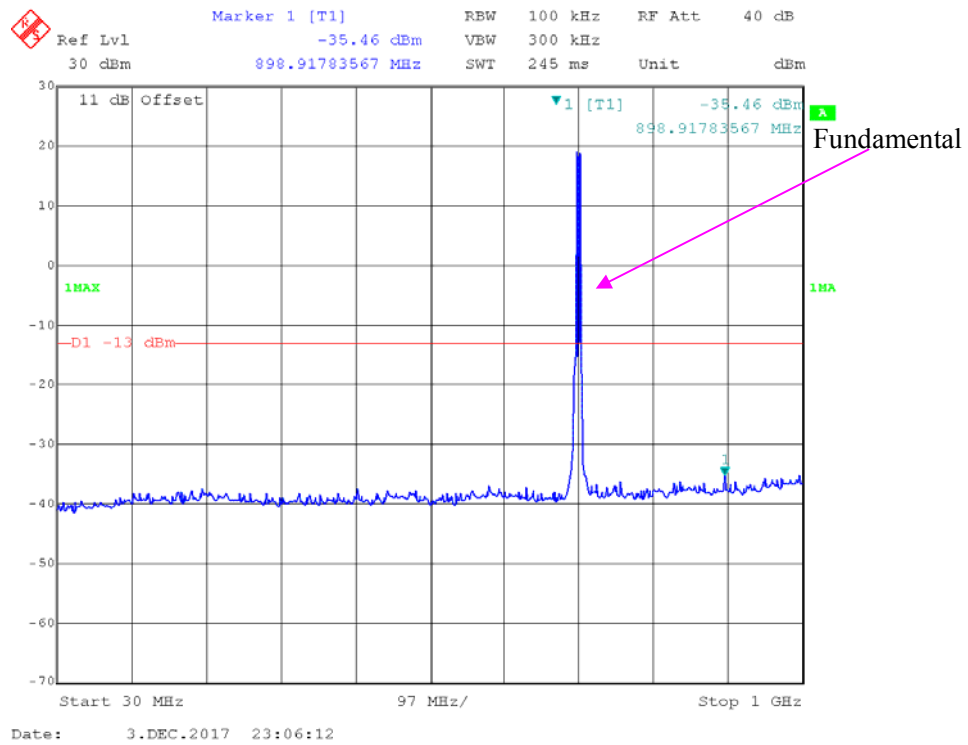


LTE Band 12 (Middle Channel)**QPSK_1.4 MHz**

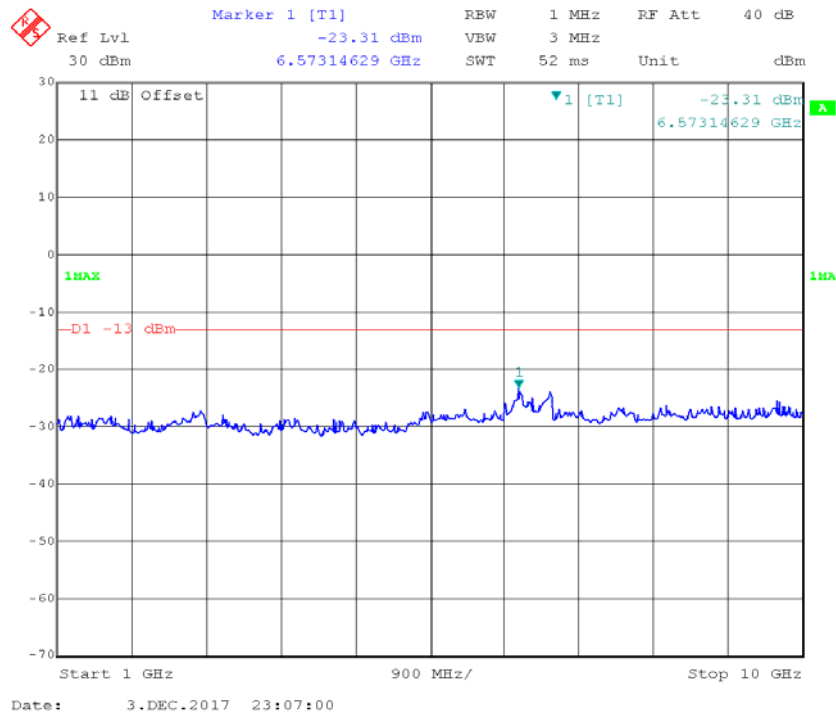
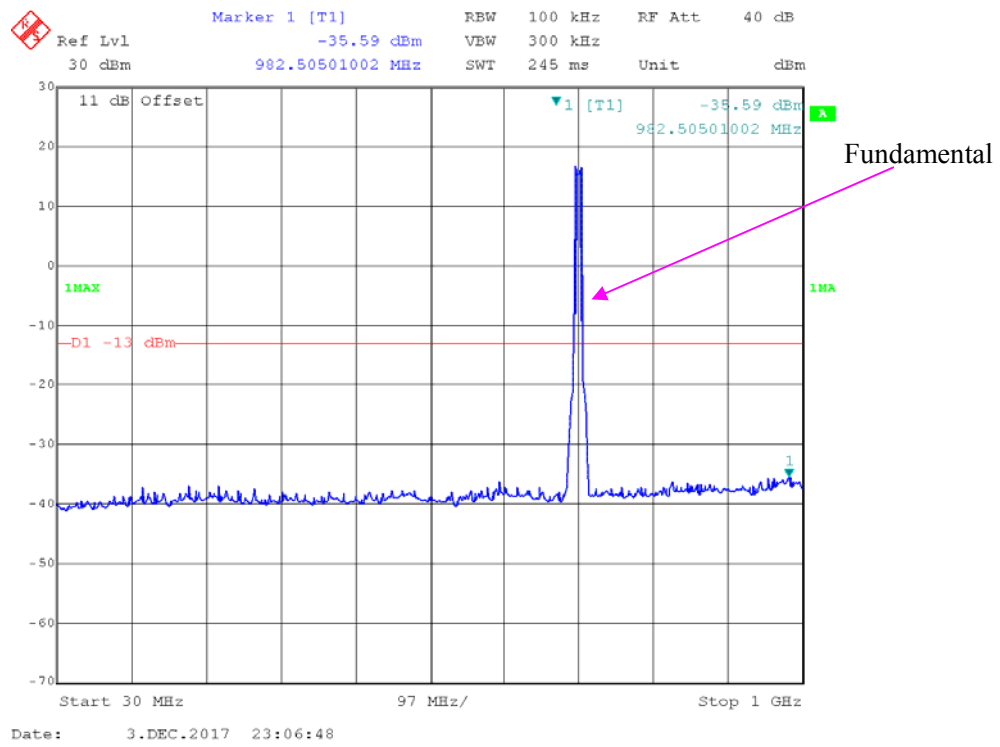
QPSK_3 MHz



QPSK_5 MHz

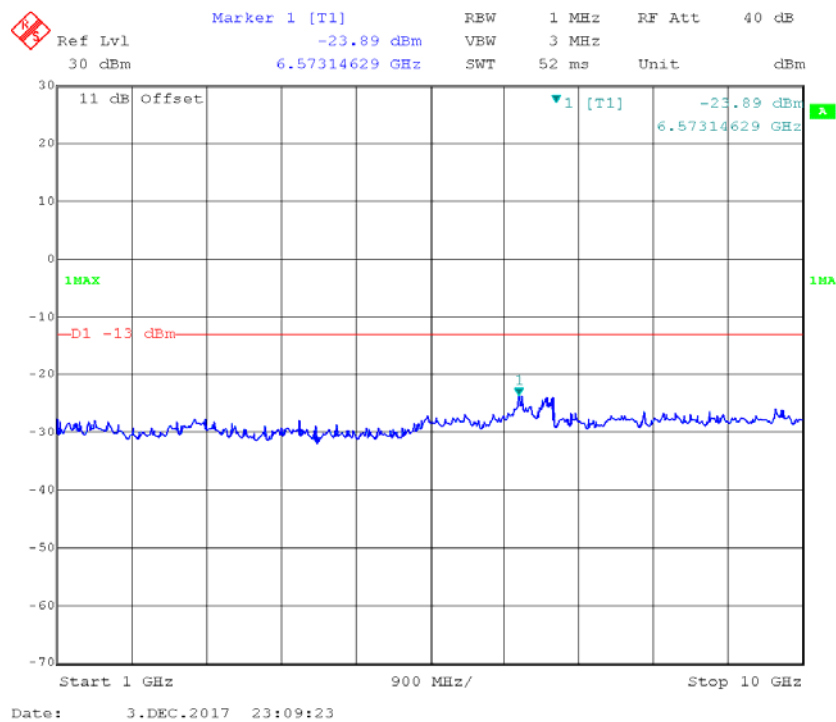
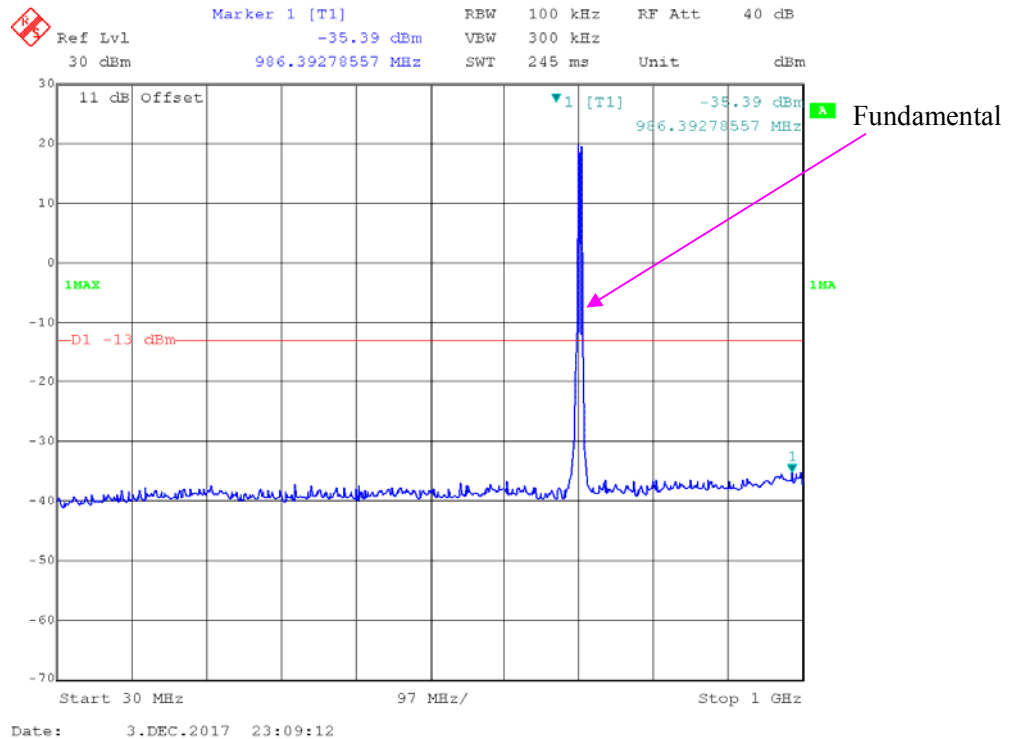


QPSK_10 MHz

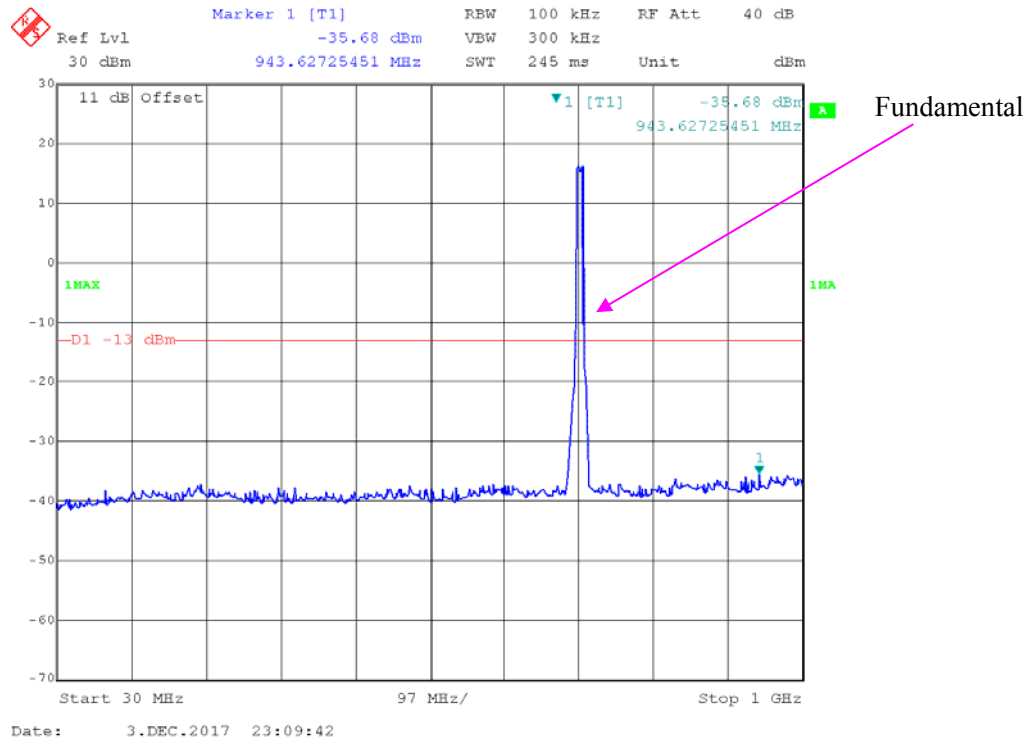


LTE Band 17 (Middle Channel)

QPSK_5 MHz



QPSK_10 MHz



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 Log₁₀ (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	2017-09-01	2018-09-01
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
HP	Amplifier	8447D	2727A05902	2017-09-05	2018-09-05
R&S	Spectrum Analyzer	FSIQ 26	831929/005	2017-08-31	2018-08-31
ETS LINDGREN	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Mini-Circuit	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
HP	Signal Generator	1026	320408	2016-12-08	2017-12-08
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05

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

Test Data**Environmental Conditions**

Temperature:	27.9~29°C
Relative Humidity:	48~52 %
ATM Pressure:	100.2~100.4 kPa

* The testing was performed by Blake Yang & Steven Zuo from 2017-11-28 to 2017-12-14.

EUT Operation Mode: Transmitting

Cellular Band (PART 22H)**30 MHz-10 GHz:**

50 MHz To GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM850, Frequency:836.600 MHz								
1673.200	H	59.48	-54.7	10.6	0.7	-44.8	-13.0	31.8
1673.200	V	61.69	-53.1	10.6	0.7	-43.2	-13.0	30.2
2509.800	H	54.49	-58.5	13.1	1.2	-46.6	-13.0	33.6
2509.800	V	55.55	-57.5	13.1	1.2	-45.6	-13.0	32.6
3346.400	H	48.15	-62.5	13.8	1.6	-50.3	-13.0	37.3
3346.400	V	48.51	-62.2	13.8	1.6	-50.0	-13.0	37.0
2004.000	H	45.46	-68.2	12.0	1.1	-57.3	-13.0	44.3
2004.000	V	46.25	-67.8	12.0	1.1	-56.9	-13.0	43.9
198.000	H	46.79	-62	0.0	0.5	-62.5	-13.0	49.5
42.000	V	50.40	-39.1	-23.8	0.2	-63.1	-13.0	50.1

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	59.64	-54.6	10.6	0.7	-44.7	-13.0	31.7
1673.200	V	61.57	-53.2	10.6	0.7	-43.3	-13.0	30.3
2509.800	H	54.22	-58.8	13.1	1.2	-46.9	-13.0	33.9
2509.800	V	55.52	-57.5	13.1	1.2	-45.6	-13.0	32.6
3346.400	H	47.86	-62.8	13.8	1.6	-50.6	-13.0	37.6
3346.400	V	48.53	-62.2	13.8	1.6	-50.0	-13.0	37.0
2095.000	H	45.07	-67.9	11.4	1.1	-57.6	-13.0	44.6
2095.000	V	45.98	-67	11.4	1.1	-56.7	-13.0	43.7
531.000	H	46.13	-57.4	0.0	0.7	-58.1	-13.0	45.1
197.000	V	47.52	-63.2	0.0	0.5	-63.7	-13.0	50.7

PCS Band (PART 24E)**30 MHz-20 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM1900, Frequency:1880.000 MHz								
3760.000	H	51.46	-57.3	13.8	1.6	-45.1	-13.0	32.1
3760.000	V	50.42	-58.2	13.8	1.6	-46.0	-13.0	33.0
5640.000	H	59.97	-46.1	14.0	1.3	-33.4	-13.0	20.4
5640.000	V	58.18	-47.7	14.0	1.3	-35.0	-13.0	22.0
4586.000	H	49.44	-59	14.2	1.8	-46.6	-13.0	33.6
4586.000	V	48.58	-59.9	14.2	1.8	-47.5	-13.0	34.5
212.000	H	45.84	-62.9	0.0	0.5	-63.4	-13.0	50.4
377.000	V	48.52	-60.1	0.0	0.6	-60.7	-13.0	47.7
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	51.58	-57.2	13.8	1.6	-45.0	-13.0	32.0
3760.000	V	50.42	-58.2	13.8	1.6	-46.0	-13.0	33.0
5640.000	H	58.83	-47.2	14.0	1.3	-34.5	-13.0	21.5
5640.000	V	57.35	-48.6	14.0	1.3	-35.9	-13.0	22.9
4427.000	H	47.38	-61.4	14.0	1.8	-49.2	-13.0	36.2
4427.000	V	47.68	-60.9	14.0	1.8	-48.7	-13.0	35.7
287.000	H	46.52	-62.3	0.0	0.5	-62.8	-13.0	49.8
376.000	V	47.83	-60.8	0.0	0.6	-61.4	-13.0	48.4

Part 27**30 MHz-20 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band IV ,Frequency:1732.600 MHz								
3465.200	H	54.18	-56.1	13.9	1.6	-43.8	-13.0	30.8
3465.200	V	53.85	-56.4	13.9	1.6	-44.1	-13.0	31.1
5197.800	H	58.86	-47.6	14.0	1.5	-35.1	-13.0	22.1
5197.800	V	57.33	-49.2	14.0	1.5	-36.7	-13.0	23.7
4425.000	H	47.60	-61.1	14.0	1.8	-48.9	-13.0	35.9
4425.000	V	47.76	-60.8	14.0	1.8	-48.6	-13.0	35.6
352.000	H	46.02	-60.6	0.0	0.6	-61.2	-13.0	48.2
176.000	V	48.31	-63.9	0.0	0.4	-64.3	-13.0	51.3

LTE Band 2 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 1880.000 MHz								
3760.000	H	61.71	-47.1	13.8	1.6	-34.9	-13.0	21.9
3760.000	V	68.56	-40.1	13.8	1.6	-27.9	-13.0	14.9
5640.000	H	58.81	-47.2	14.0	1.3	-34.5	-13.0	21.5
5640.000	V	62.31	-43.6	14.0	1.3	-30.9	-13.0	17.9
4125.000	H	46.06	-63	13.8	1.4	-50.6	-13.0	37.6
4125.000	V	45.38	-63.8	13.8	1.4	-51.4	-13.0	38.4
545.000	H	44.56	-58.7	0.0	0.7	-59.4	-13.0	46.4
545.000	V	46.25	-60.2	0.0	0.7	-60.9	-13.0	47.9

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)			
QPSK,Frequency:1732.500 MHz								
3465.000	H	60.64	-49.6	13.9	1.6	-37.3	-13.0	24.3
3465.000	V	66.72	-43.6	13.9	1.6	-31.3	-13.0	18.3
5197.500	H	58.86	-47.6	14.0	1.5	-35.1	-13.0	22.1
5197.500	V	62.35	-44.1	14.0	1.5	-31.6	-13.0	18.6
4155.000	H	46.05	-63	13.9	1.5	-50.6	-13.0	37.6
4155.000	V	45.28	-63.8	13.9	1.5	-51.4	-13.0	38.4
371.000	H	45.31	-60.6	0.0	0.6	-61.2	-13.0	48.2
371.000	V	47.02	-61.7	0.0	0.6	-62.3	-13.0	49.3

LTE Band 5 (30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 836.500 MHz								
1673.000	H	56.78	-57.4	10.6	0.7	-47.5	-13.0	34.5
1673.000	V	50.77	-64	10.6	0.7	-54.1	-13.0	41.1
2509.500	H	51.56	-61.5	13.1	1.2	-49.6	-13.0	36.6
2509.500	V	50.62	-62.4	13.1	1.2	-50.5	-13.0	37.5
3346.000	H	52.48	-58.2	13.8	1.6	-46.0	-13.0	33.0
3346.000	V	49.38	-61.3	13.8	1.6	-49.1	-13.0	36.1
2144.000	H	45.49	-67.2	11.1	1.1	-57.2	-13.0	44.2
2144.000	V	45.64	-67	11.1	1.1	-57.0	-13.0	44.0
351.000	H	45.17	-61.5	0.0	0.6	-62.1	-13.0	49.1
351.000	V	47.13	-61.9	0.0	0.6	-62.5	-13.0	49.5

LTE Band 7 (30MHz-26GHz)

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:2535.000 MHz								
5070.000	H	52.79	-54	13.9	1.3	-41.4	-25.0	16.4
5070.000	V	57.84	-48.8	13.9	1.3	-36.2	-25.0	11.2
7605.000	H	51.71	-48.6	13.2	1.4	-36.8	-25.0	11.8
7605.000	V	56.44	-44.3	13.2	1.4	-32.5	-25.0	7.5
4655.000	H	46.18	-62.3	14.3	1.8	-49.8	-25.0	24.8
4655.000	V	45.31	-63.3	14.3	1.8	-50.8	-25.0	25.8
665.000	H	45.32	-56.4	0.0	0.9	-57.3	-25.0	32.3
665.000	V	46.62	-57.8	0.0	0.9	-58.7	-25.0	33.7

LTE Band 12 (30MHz-10GHz)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:707.5MHz								
1415.000	H	55.65	-57.9	9.0	1.2	-50.1	-13.0	37.1
1415.000	V	51.78	-62.2	9.0	1.2	-54.4	-13.0	41.4
2122.500	H	51.69	-61.1	11.2	1.1	-51.0	-13.0	38.0
2122.500	V	50.48	-62.3	11.2	1.1	-52.2	-13.0	39.2
2830.000	H	52.44	-59.6	13.4	1.4	-47.6	-13.0	34.6
2830.000	V	49.31	-63	13.4	1.4	-51.0	-13.0	38.0
3537.500	H	48.49	-61.6	13.9	1.6	-49.3	-13.0	36.3
3537.500	V	47.84	-62.3	13.9	1.6	-50.0	-13.0	37.0
2615.000	H	44.68	-68.4	13.2	1.3	-56.5	-13.0	43.5
2615.000	V	44.37	-69	13.2	1.3	-57.1	-13.0	44.1
347.000	H	46.03	-60.8	0.0	0.6	-61.4	-13.0	48.4
347.000	V	47.52	-61.6	0.0	0.6	-62.2	-13.0	49.2

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	58.74	-54.9	9.1	1.2	-47.0	-13.0	34.0
1420.000	V	54.94	-59.2	9.1	1.2	-51.3	-13.0	38.3
2130.000	H	51.79	-61	11.2	1.1	-50.9	-13.0	37.9
2130.000	V	50.66	-62.1	11.2	1.1	-52.0	-13.0	39.0
2840.000	H	52.46	-59.6	13.4	1.4	-47.6	-13.0	34.6
2840.000	V	49.36	-62.9	13.4	1.4	-50.9	-13.0	37.9
3550.000	H	48.31	-61.8	14.0	1.6	-49.4	-13.0	36.4
3550.000	V	47.78	-62.4	14.0	1.6	-50.0	-13.0	37.0
2615.000	H	44.84	-68.2	13.2	1.3	-56.3	-13.0	43.3
2615.000	V	44.61	-68.7	13.2	1.3	-56.8	-13.0	43.8
455.000	H	46.53	-58	0.0	0.7	-58.7	-13.0	45.7
455.000	V	47.17	-60.5	0.0	0.7	-61.2	-13.0	48.2

Note:

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

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

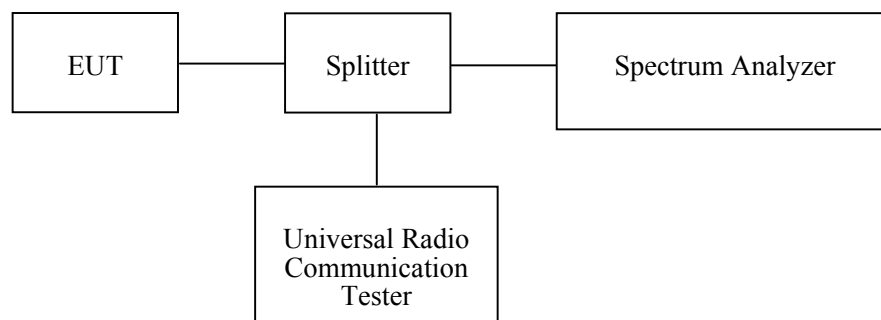
Applicable Standard

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

Test Procedure

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

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each Time	/
Unknown	RF Attenuator	6dB	6dB-1	Each Time	/
R&S	Spectrum Analyzer	FSIQ 26	831929/005	2017-08-31	2018-08-31

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

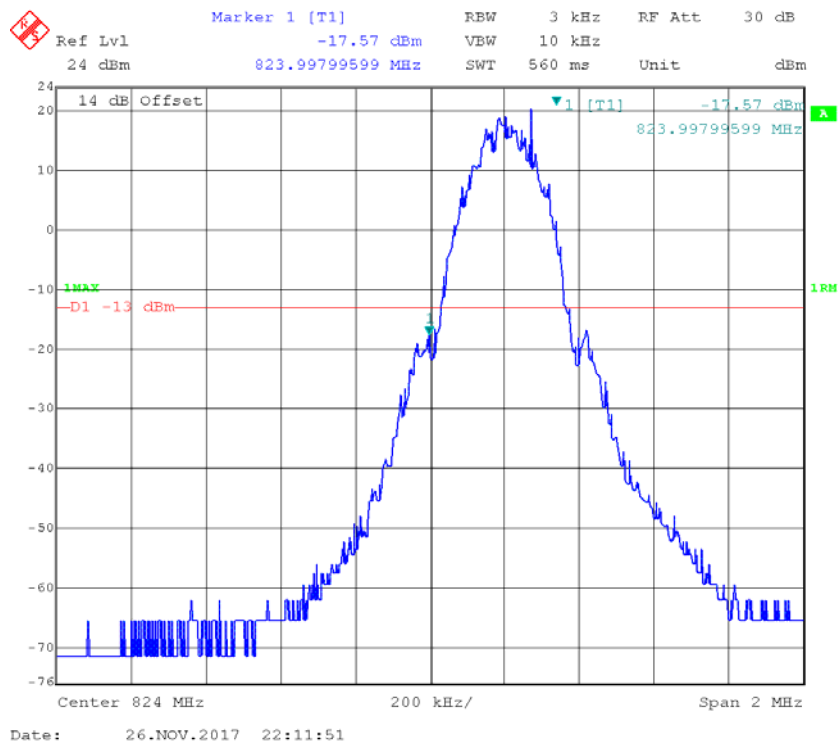
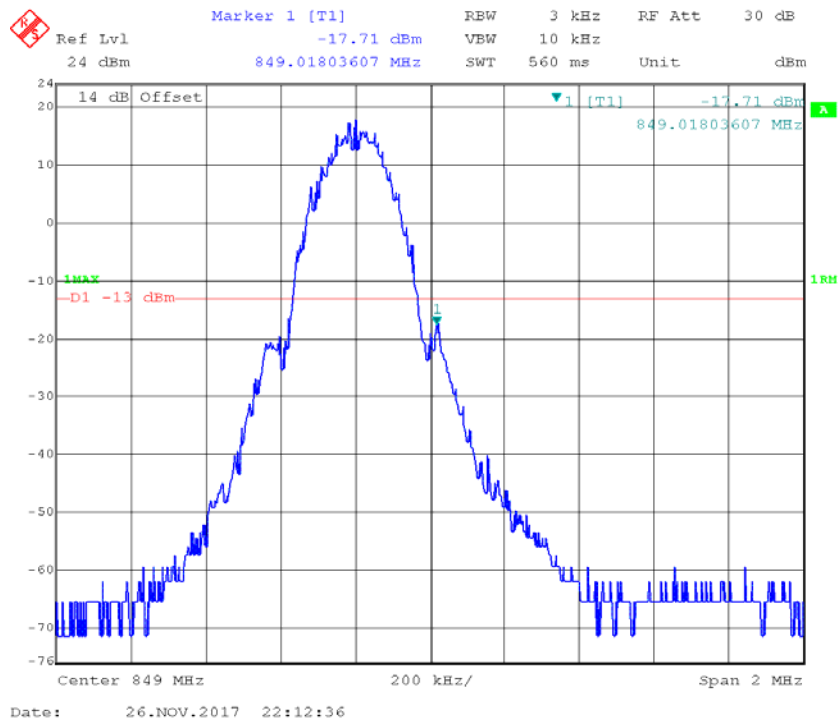
Test Data**Environmental Conditions**

Temperature:	22.1~24.6°C
Relative Humidity:	30~50 %
ATM Pressure:	101.4~101.5 kPa

The testing was performed by Pean Zhu from 2017-11-26 to 2017-12-19.

Test Mode: Transmitting

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

GSM 850, Left Band Edge**GSM 850, Right Band Edge**

Marker 1 [T1] RBW 3 kHz RF Att 30 dB
 Ref Lvl -17.57 dBm VBW 10 kHz
 24 dBm 1.84999800 GHz SWT 560 ms Unit dBm

14 dB Offset 1 [T1] -17.57 dBm
 1.84999800 GHz

MAX
 D1 -13 dBm

Center 1.85 GHz 200 kHz/ Span 2 MHz

Date: 26.NOV.2017 22:22:01

Ref Lvl 24 dBm

Marker 1 [T1] -19.77 dBm

REW 3 kHz RF Att 30 dB

VEW 10 kHz

SWT 560 ms Unit dBm

14 dB Offset

1 [T1] -19.77 dBm

1.91002204 GHz

1MAX

-D1 -13 dBm

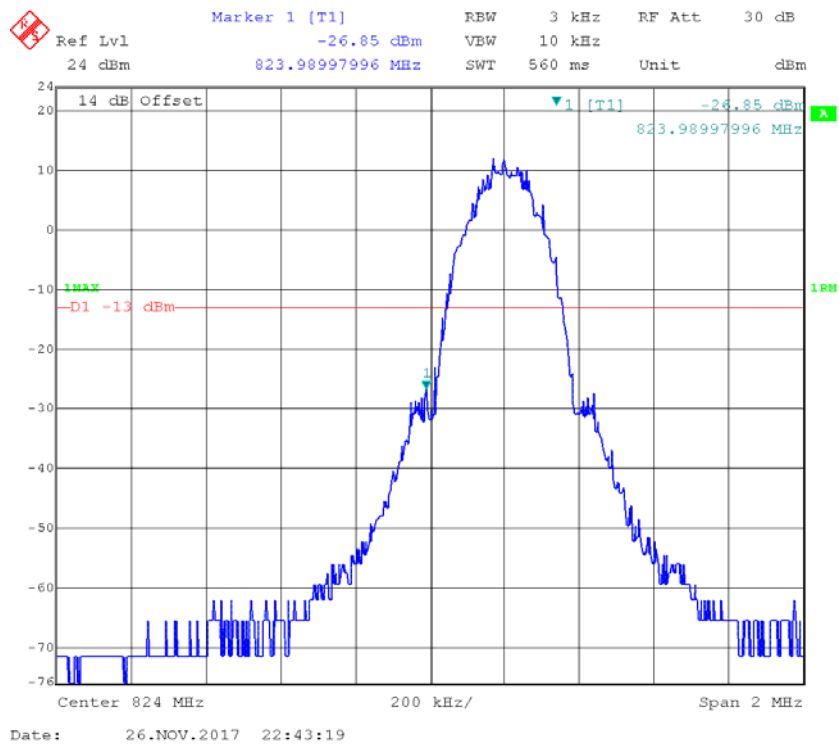
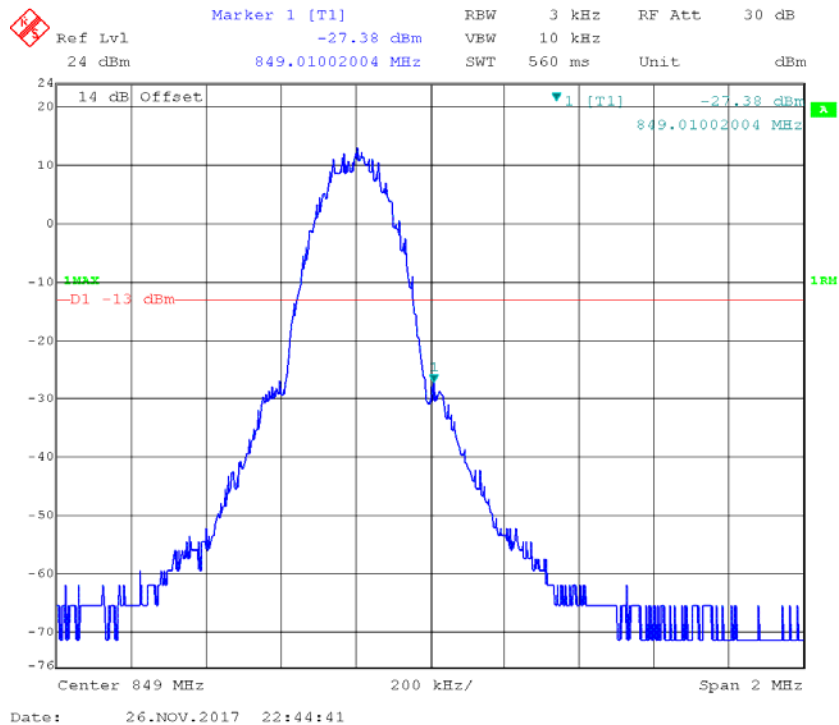
1RM

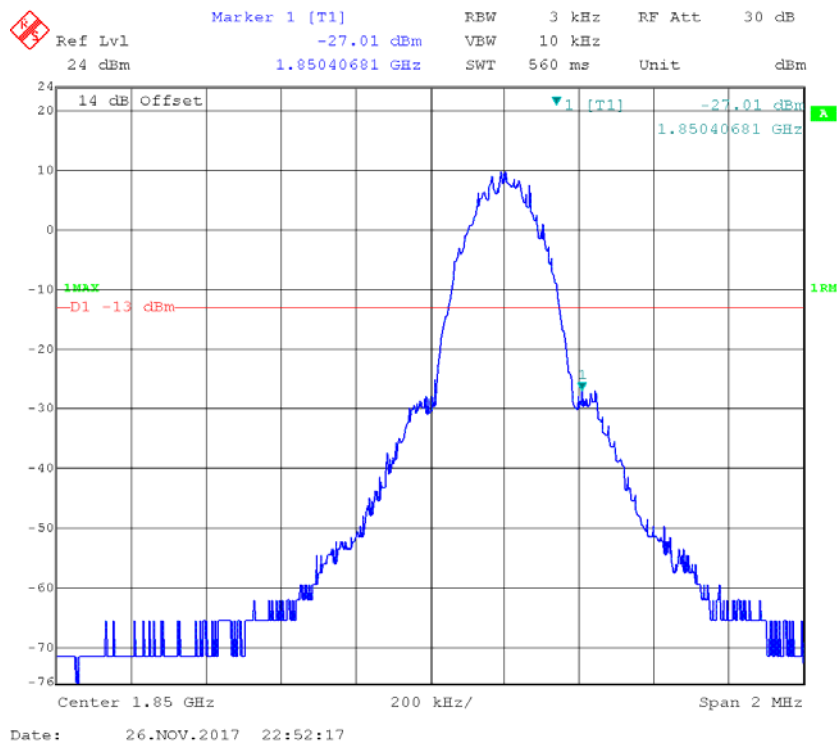
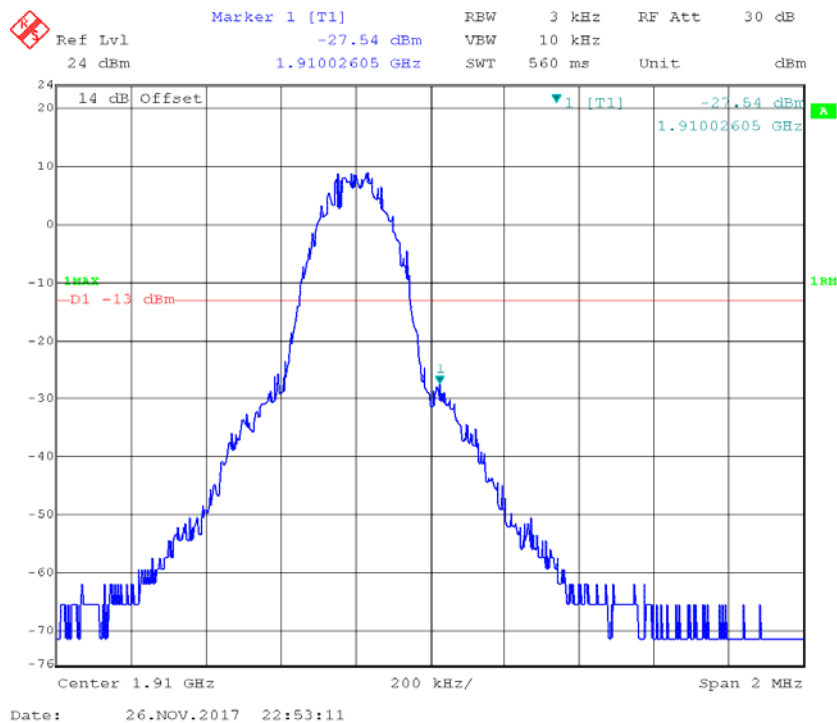
Center 1.91 GHz

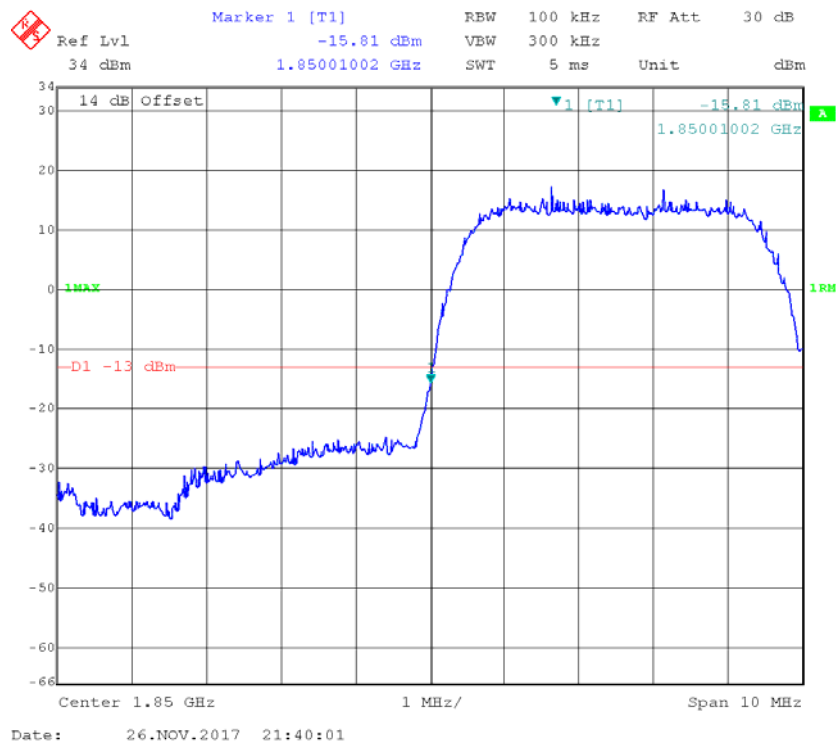
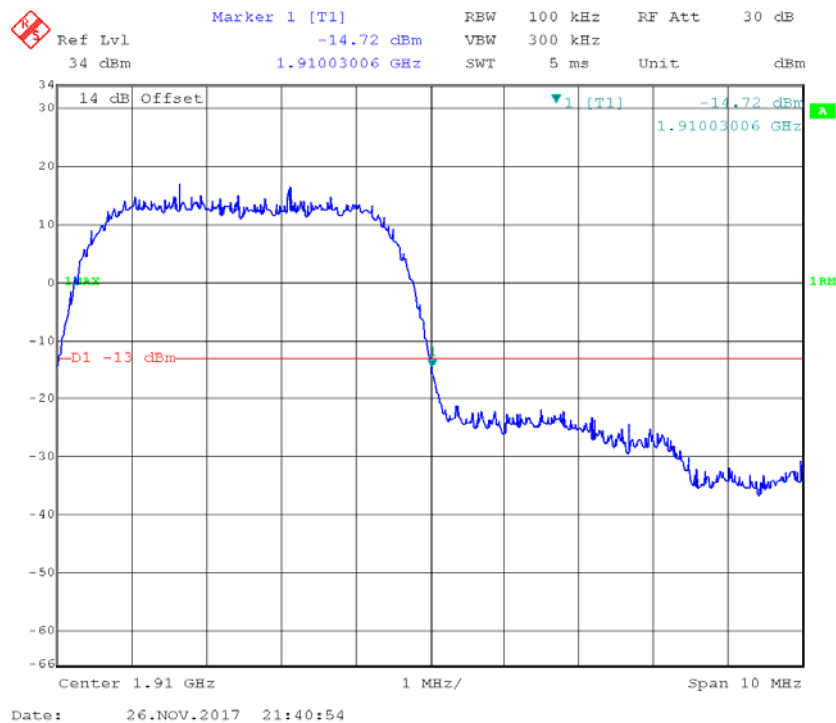
200 kHz/

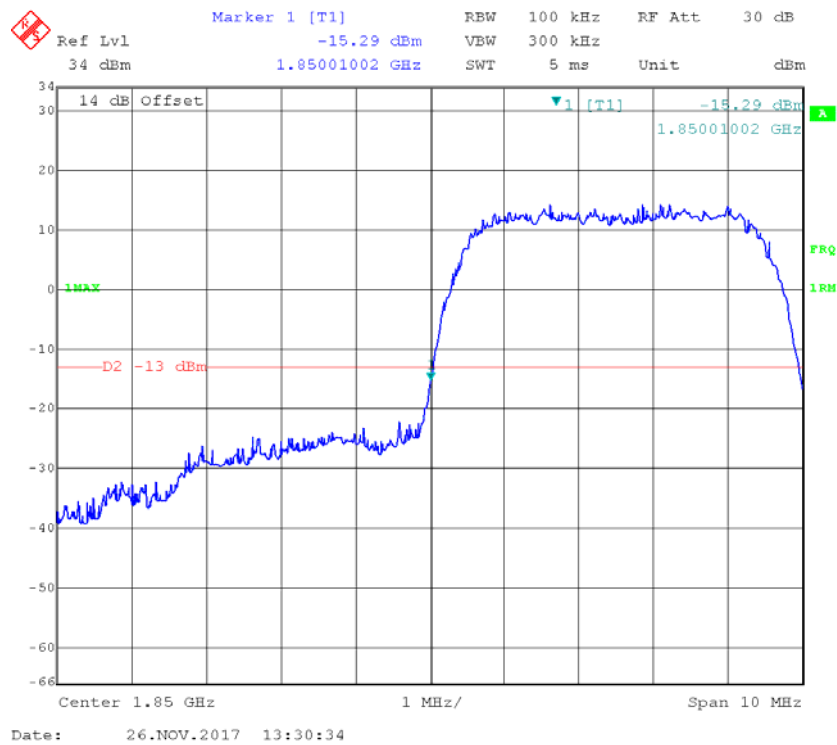
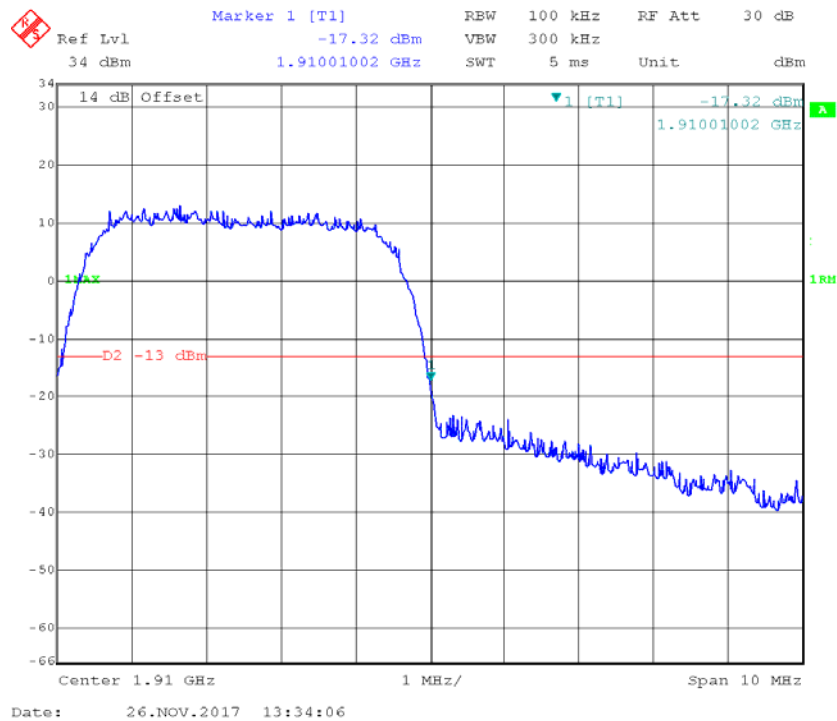
Span 2 MHz

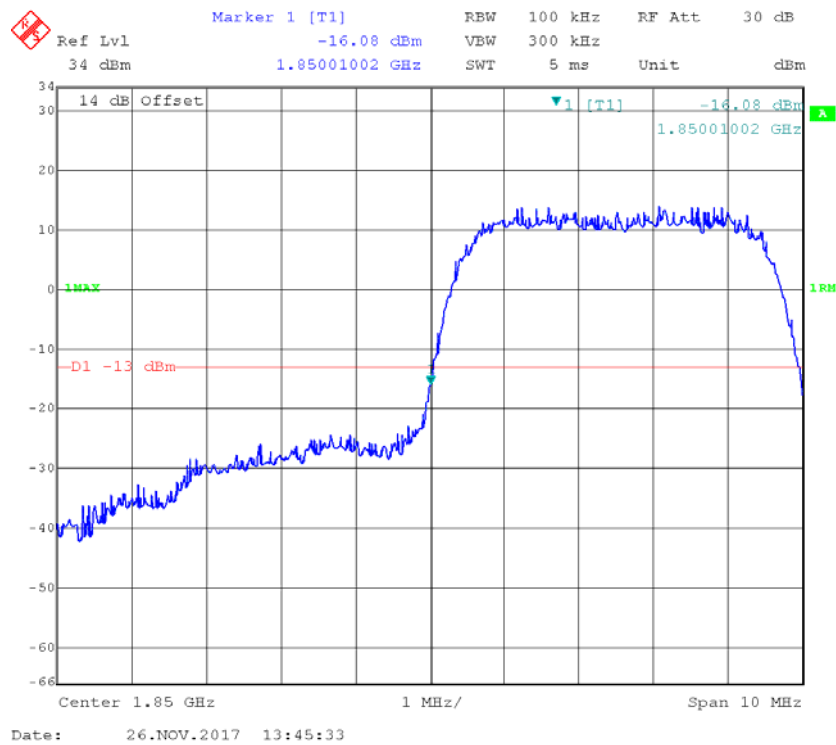
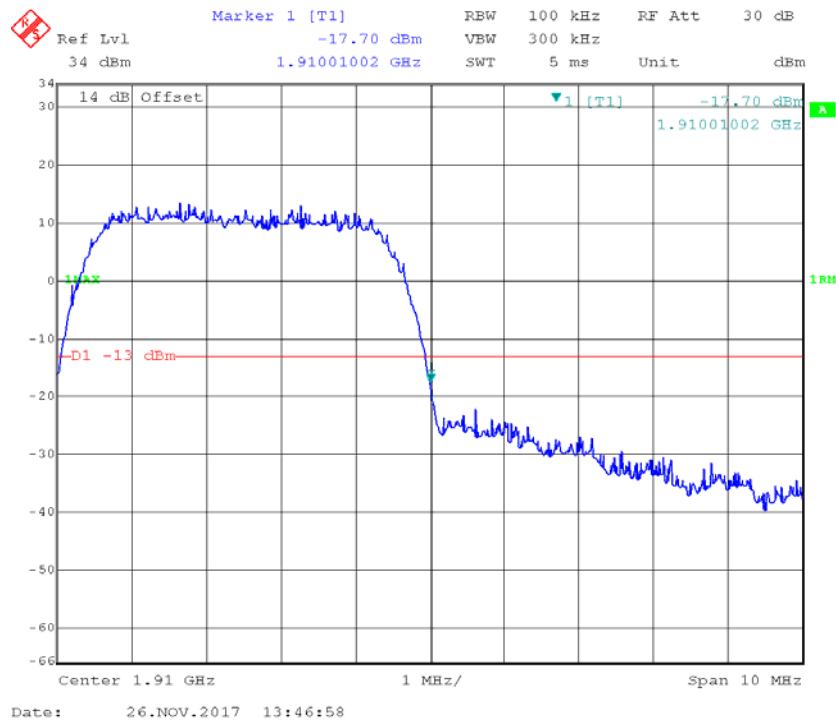
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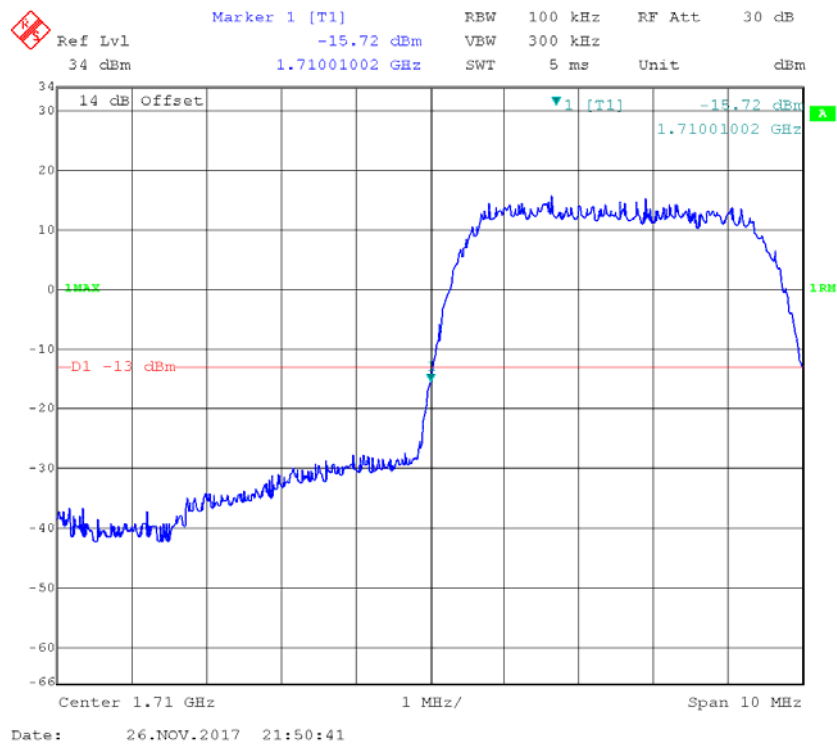
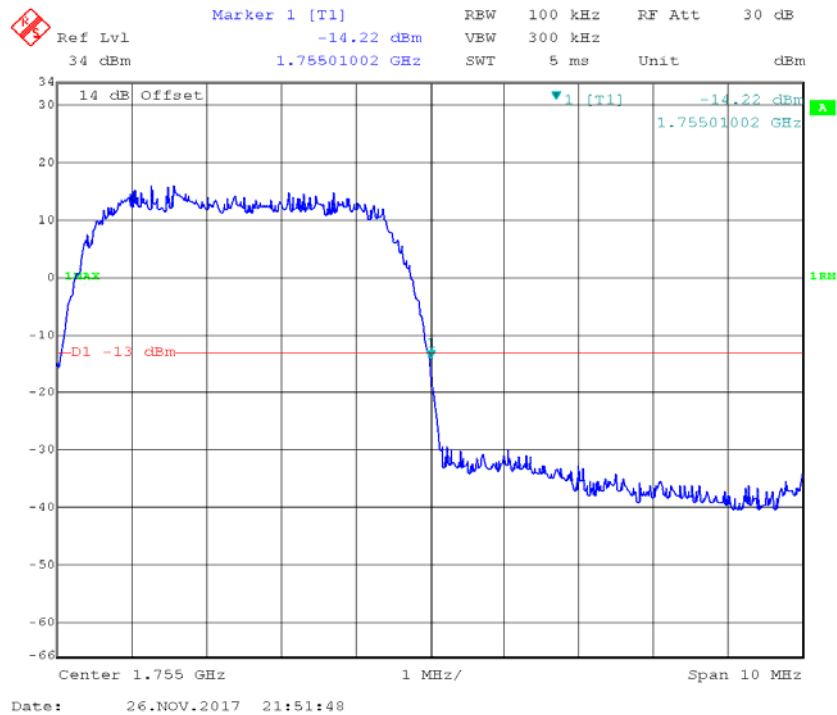
EDGE 850, Left Band Edge**EDGE 850, Right Band Edge**

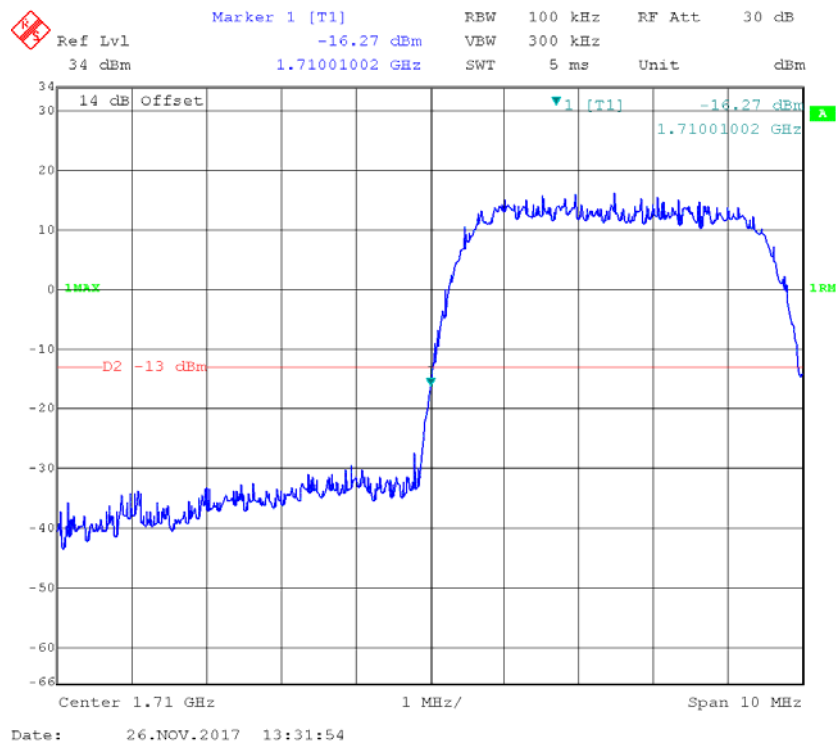
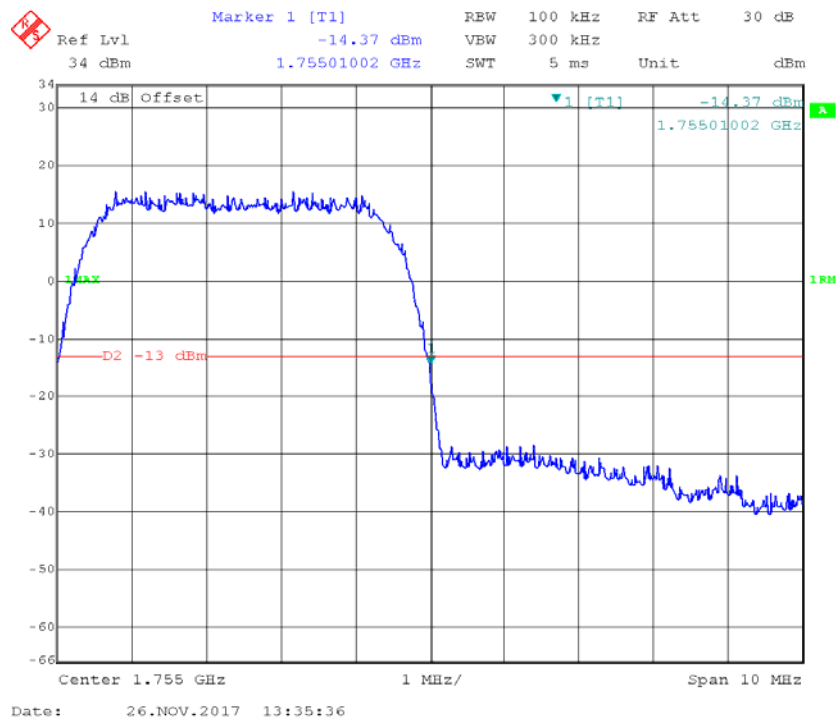
EDGE 1900, Left Band Edge**EDGE 1900, Right Band Edge**

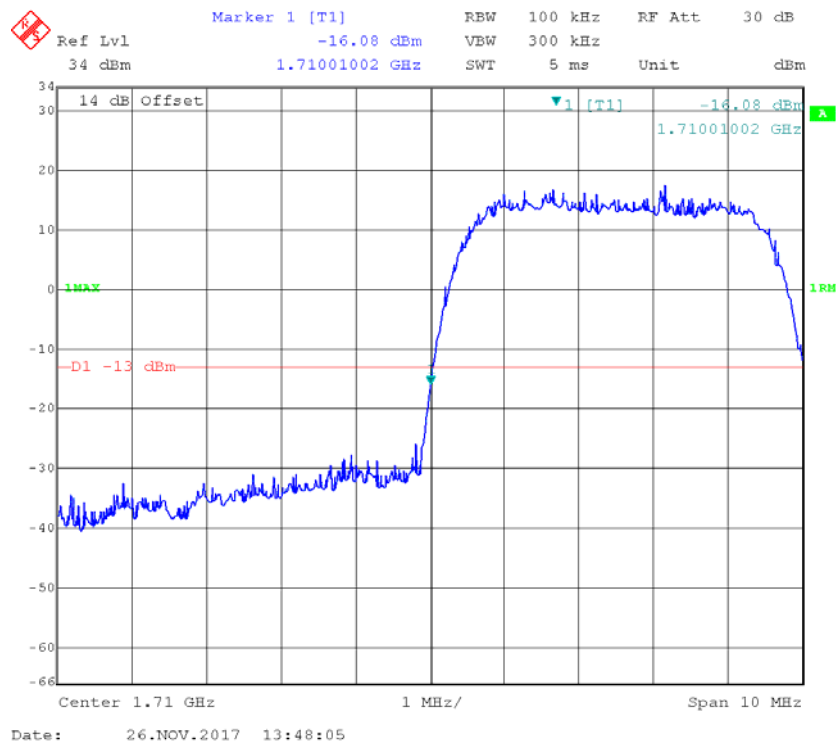
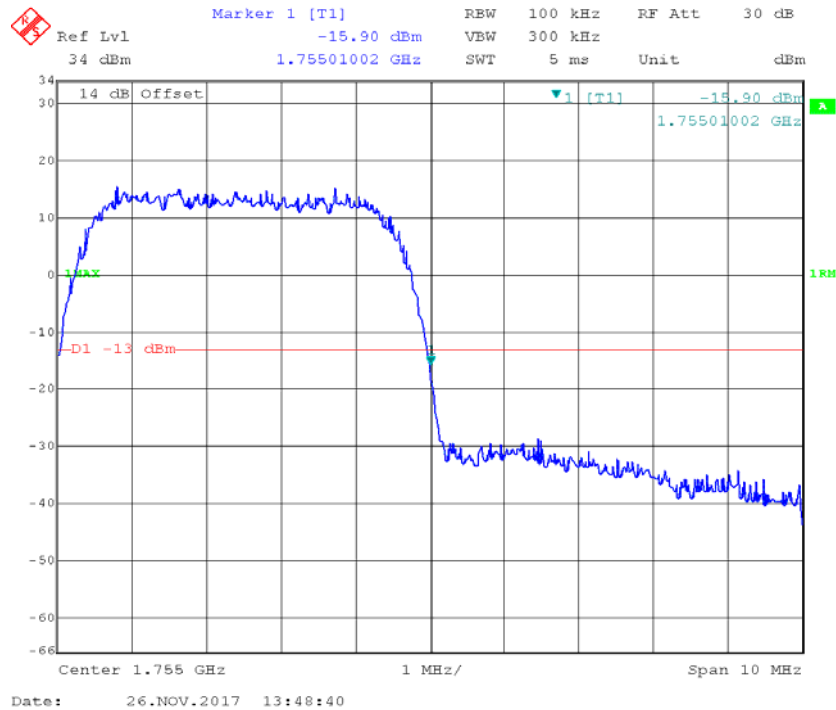
WCDMA Band II Rel 99, Left Band Edge**WCDMA Band II Rel 99, Right Band Edge**

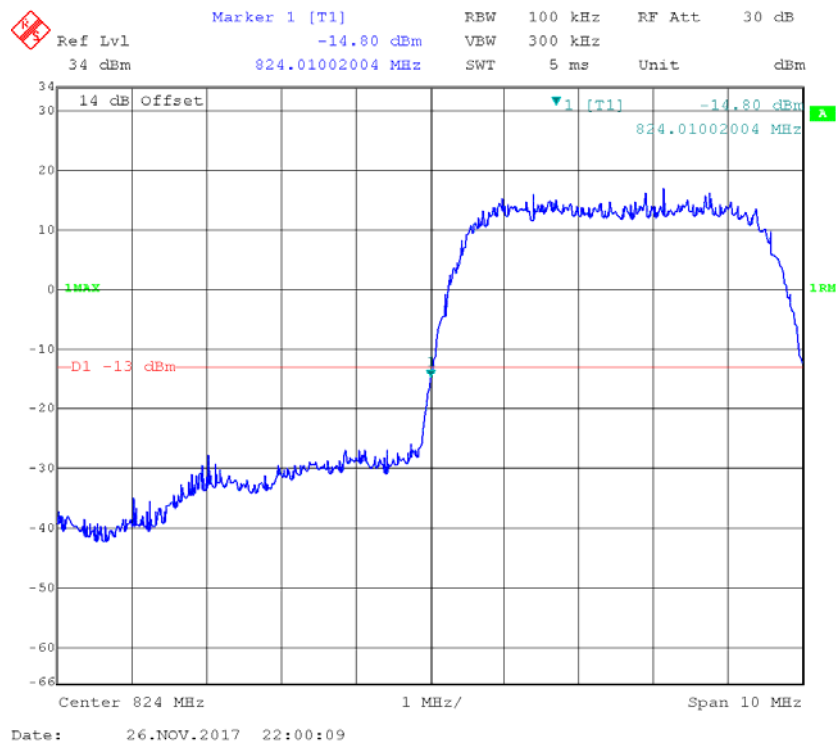
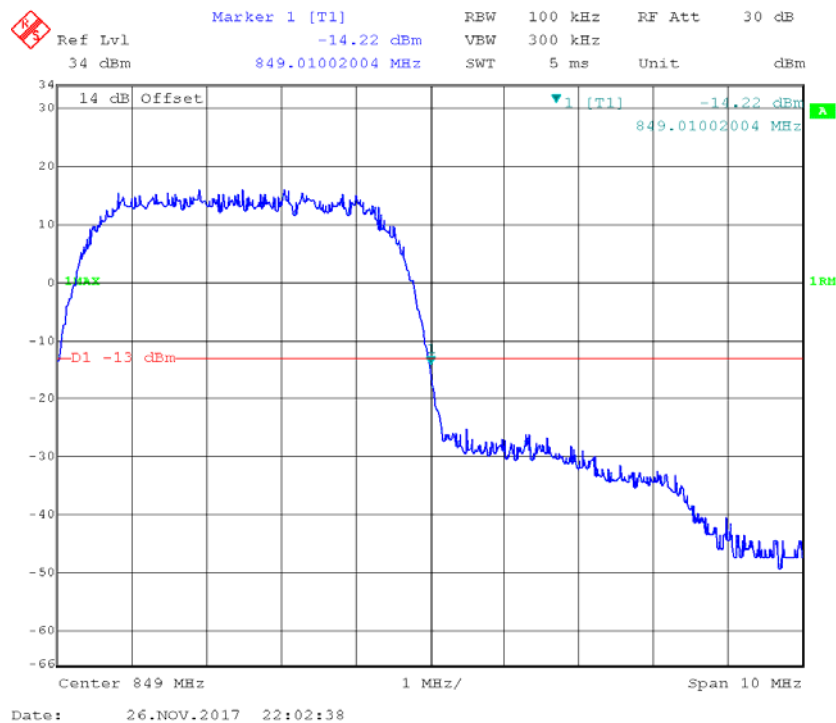
WCDMA Band II HSUPA, Left Band Edge**WCDMA Band II HSUPA, Right Band Edge**

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

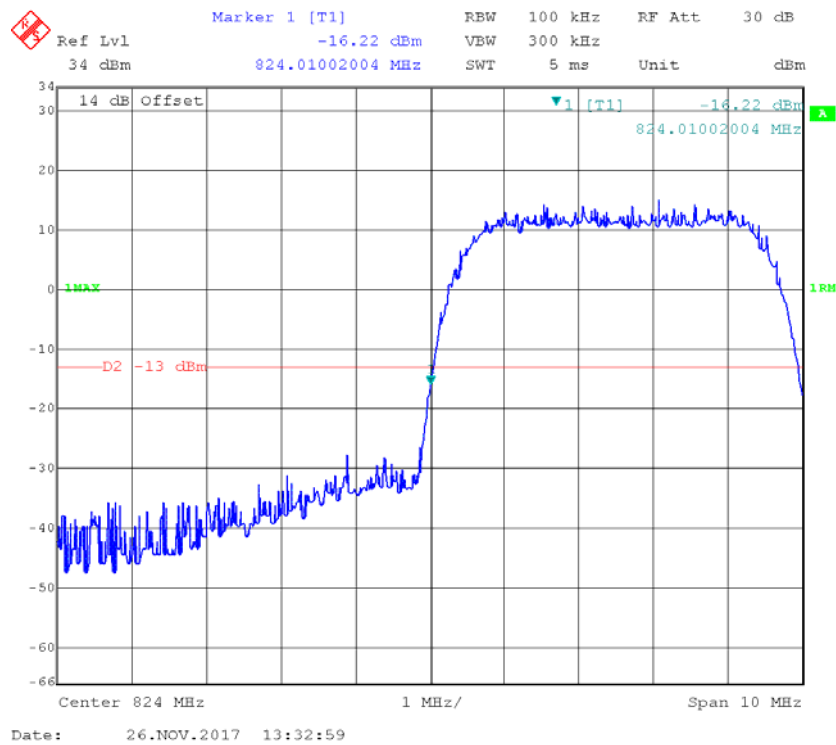
WCDMA Band IV Rel 99, Left Band Edge**WCDMA Band IV Rel 99, Right Band Edge**

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

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

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

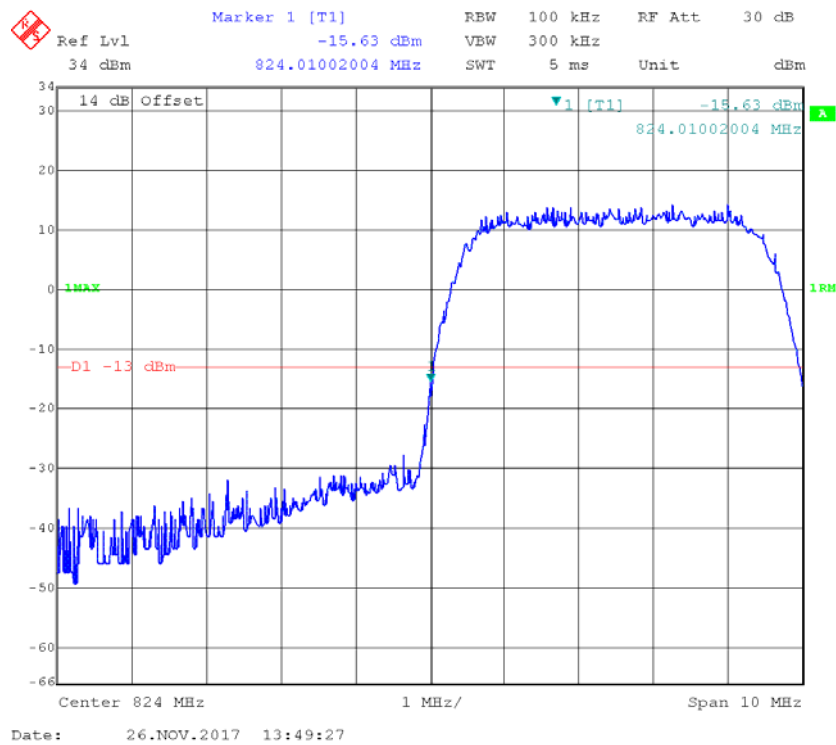
WCDMA Band V HSUPA, Left Band Edge



WCDMA Band V HSUPA, Right Band Edge



WCDMA Band V HSDPA, Left Band Edge

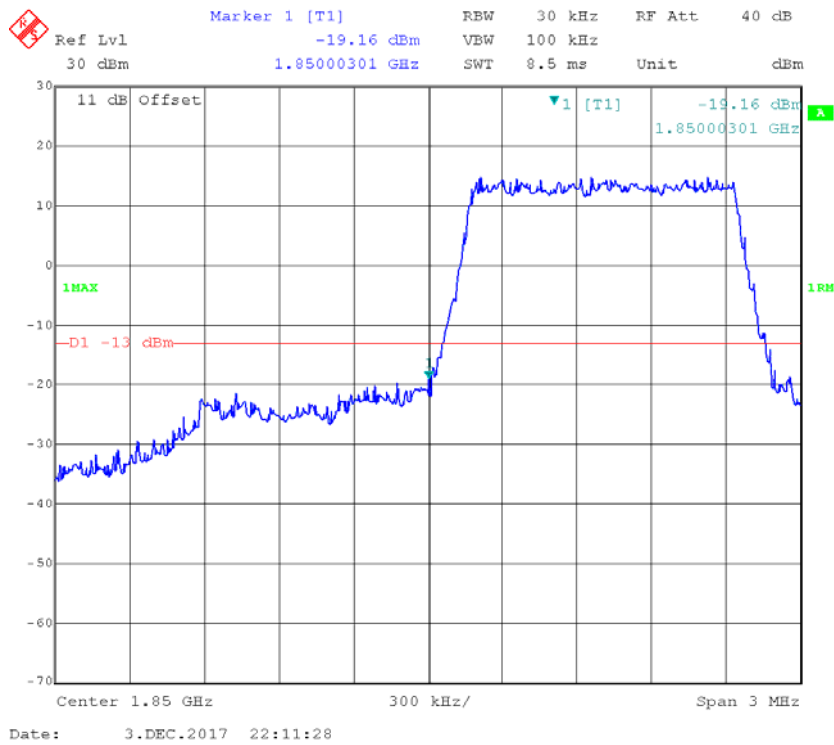


WCDMA Band V HSDPA, Right Band Edge



LTE Band II

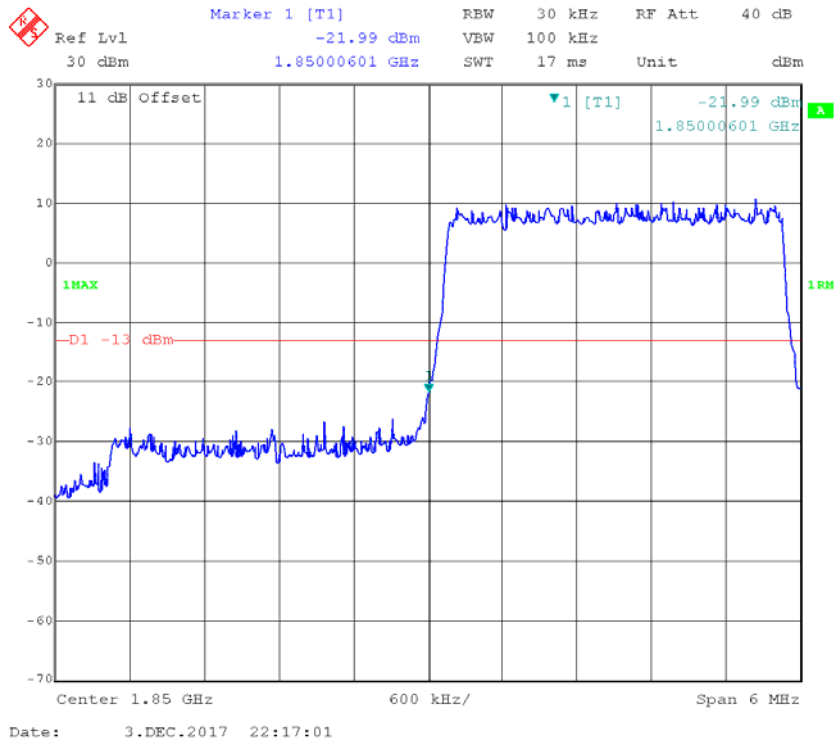
QPSK_1.4MHz_6 RB_ Left



QPSK_1.4MHz_6 RB_ Right



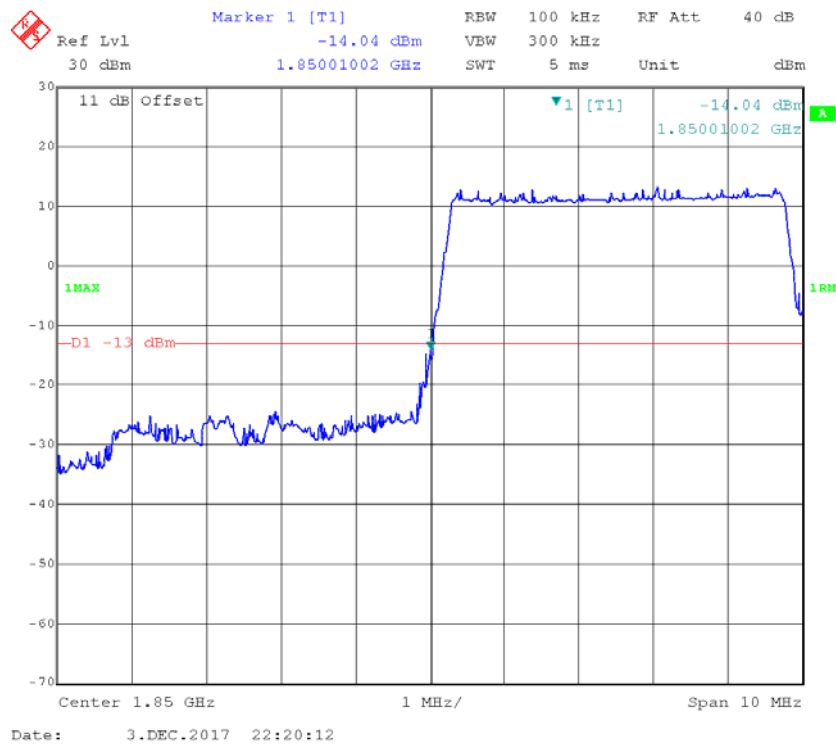
QPSK_3MHz_15 RB_ Left



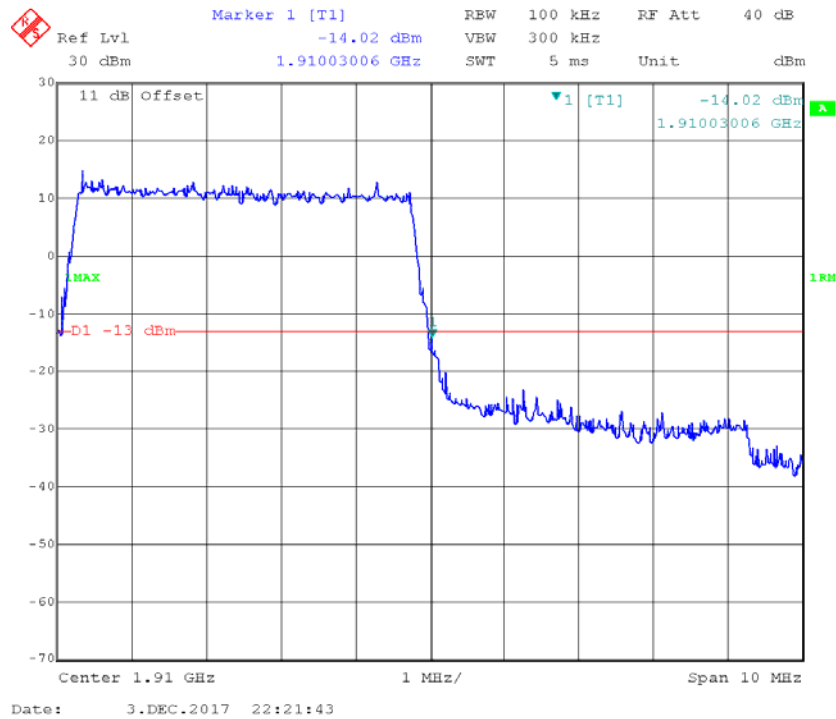
QPSK_3MHz_15 RB_ Right



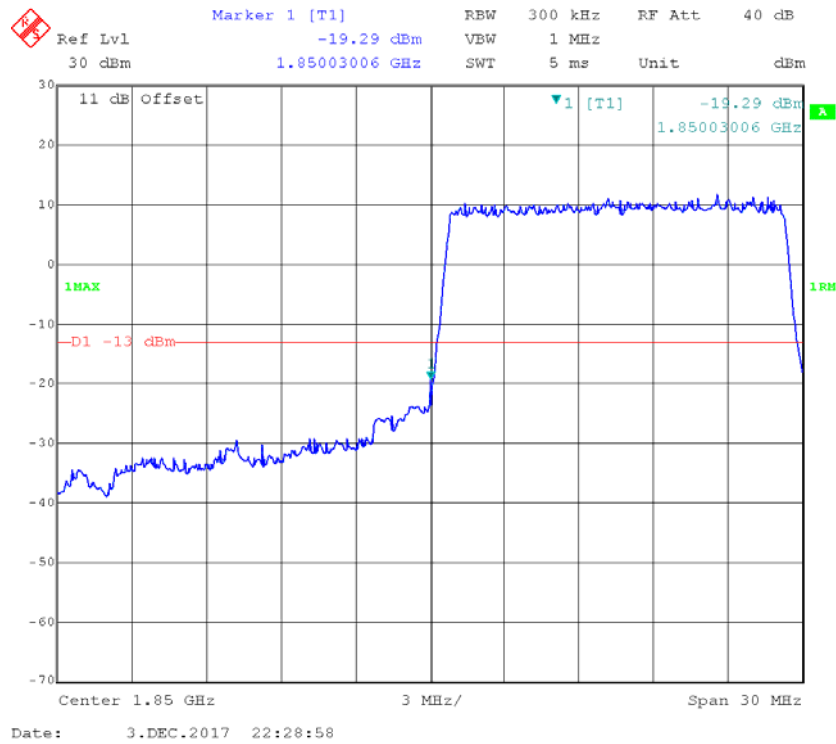
QPSK_5MHz_25 RB_ Left



QPSK_5MHz_25 RB_ Right



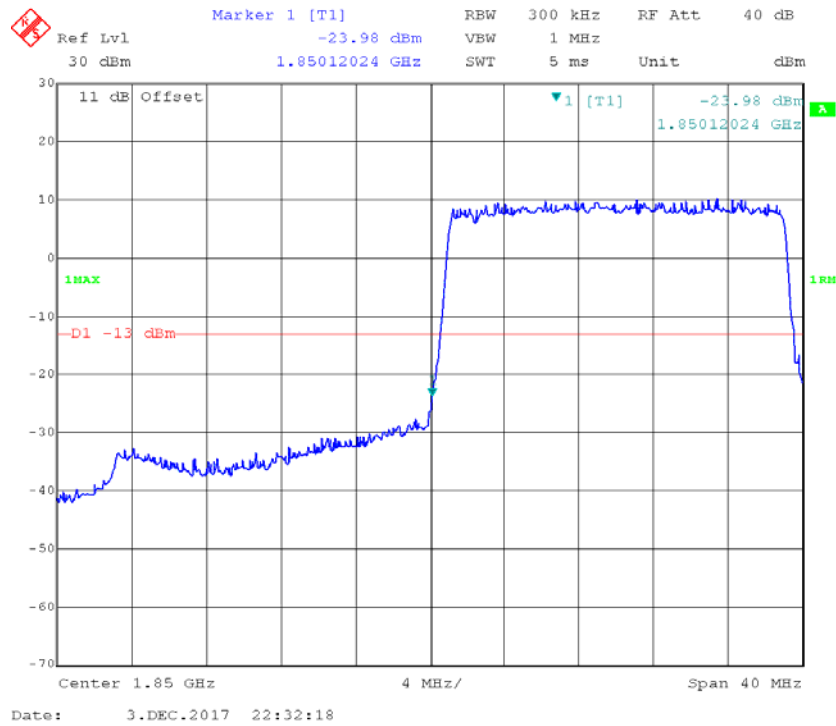
QPSK_15MHz_75 RB_Left



QPSK_15MHz_75 RB_Right

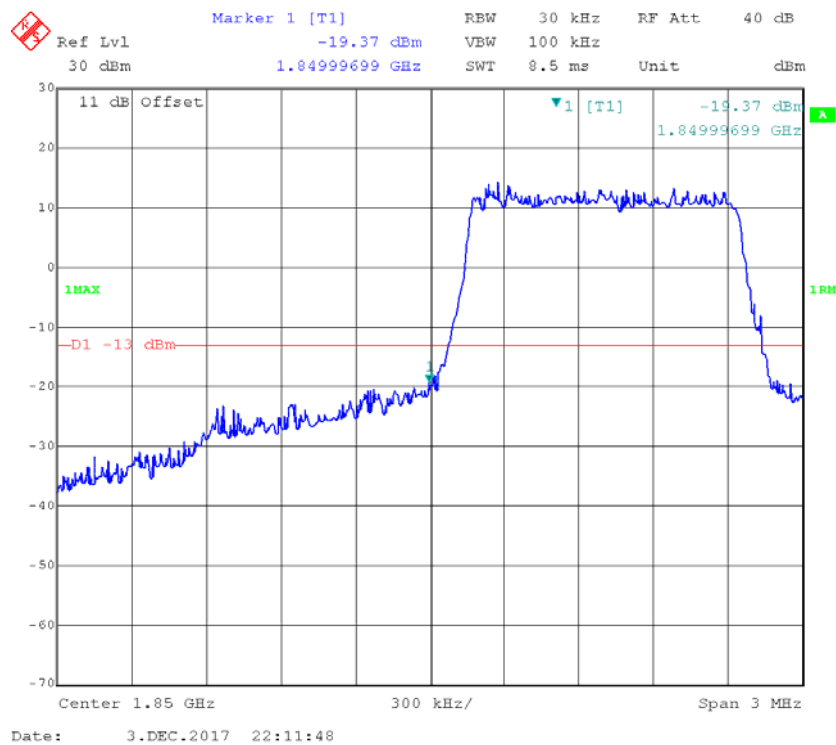
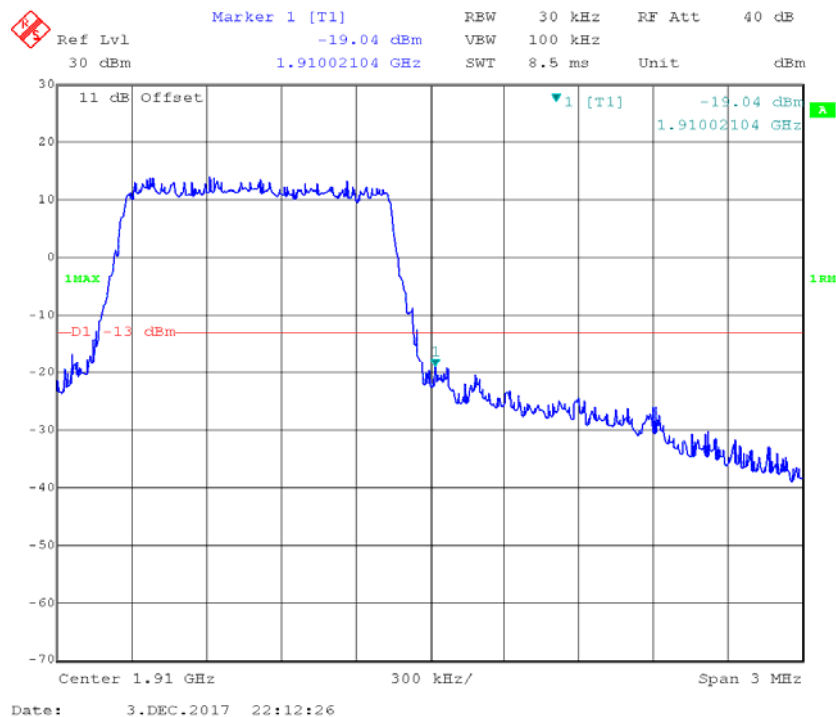


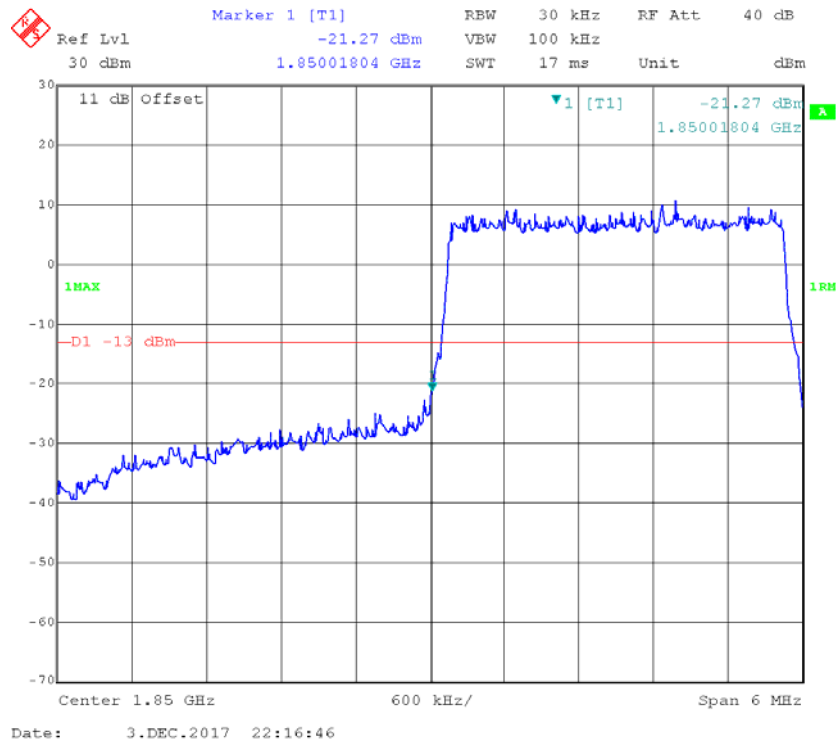
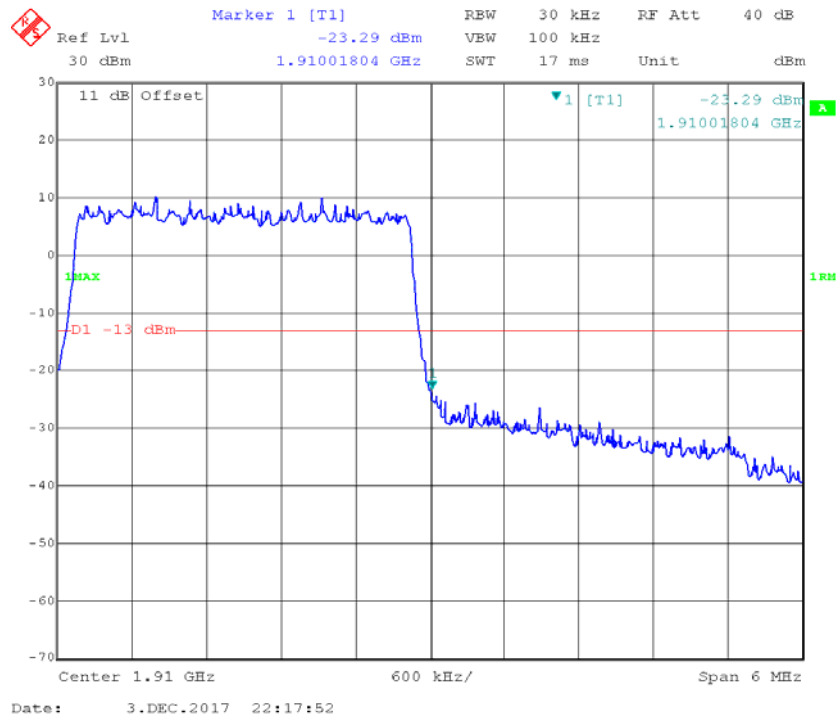
QPSK_20MHz_FULL RB_Left

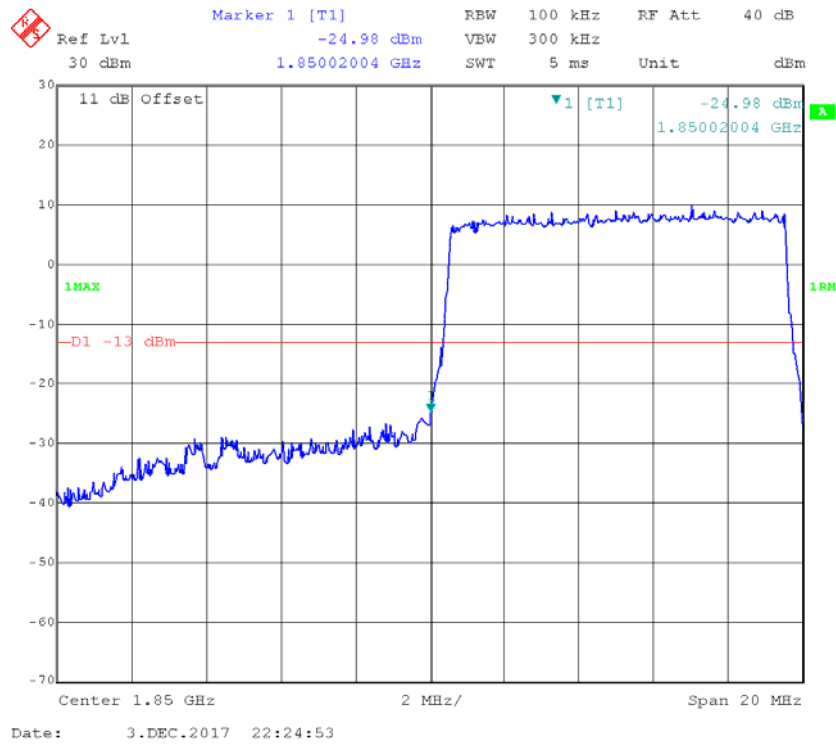


QPSK_20MHz_FULL RB_Right

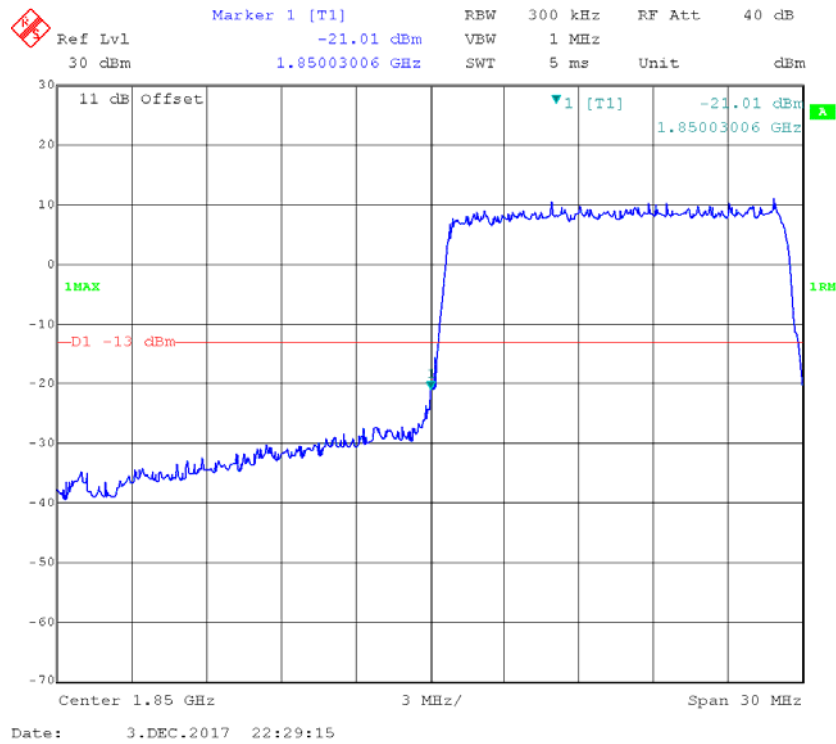


16QAM_1.4MHz_6 RB_ Left**16QAM_1.4MHz_6 RB_ Right**

16QAM_3MHz_15 RB_Left**16QAM_3MHz_15 RB_Right**

16QAM_10MHz_ 50 RB_ Left**16QAM_10MHz_ 50 RB_ Right**

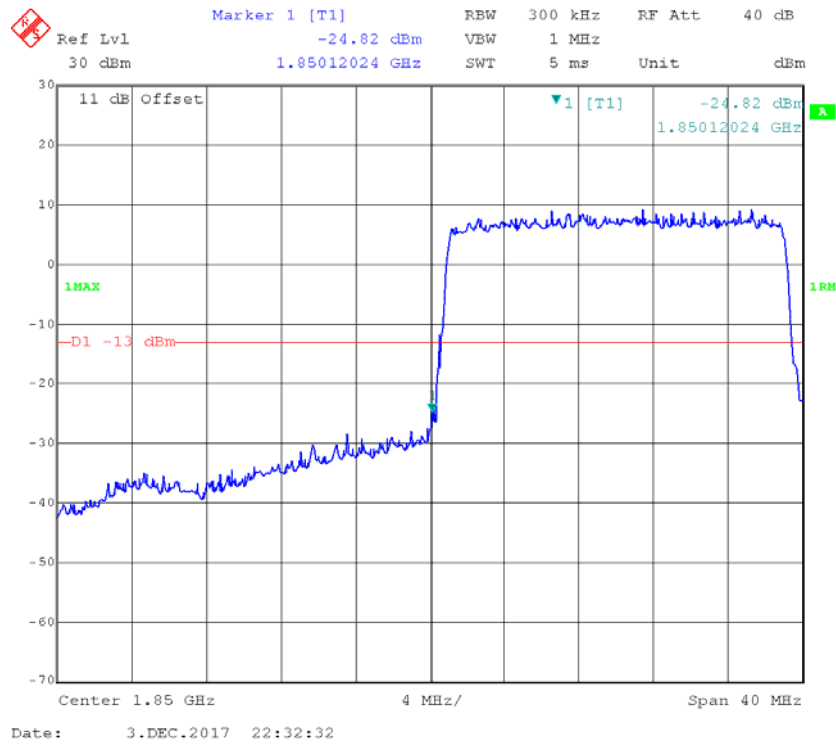
16QAM_15MHz_ 75 RB_ Left



16QAM_15MHz_ 75 RB_ Right



16QAM_20MHz_ FULL RB_ Left

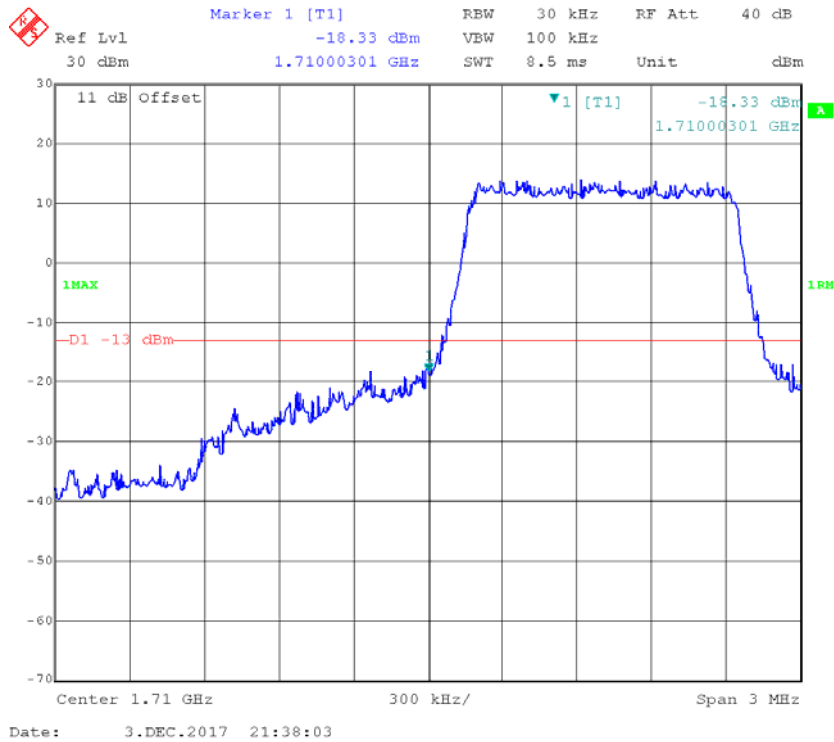


16QAM_20MHz_ FULL RB_ Right

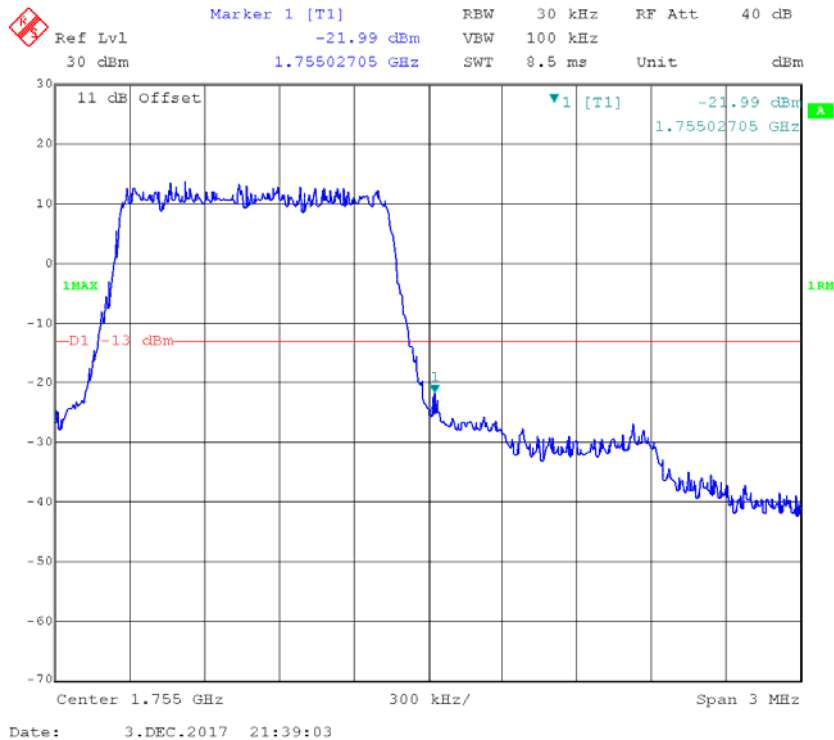


LTE Band IV

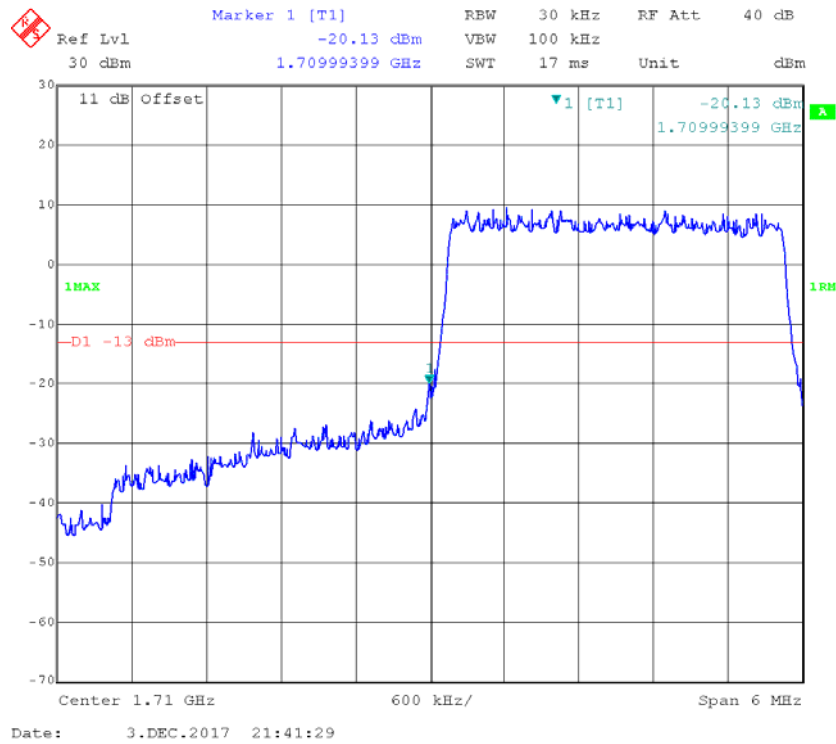
QPSK_1.4MHz_ 6 RB_ Left



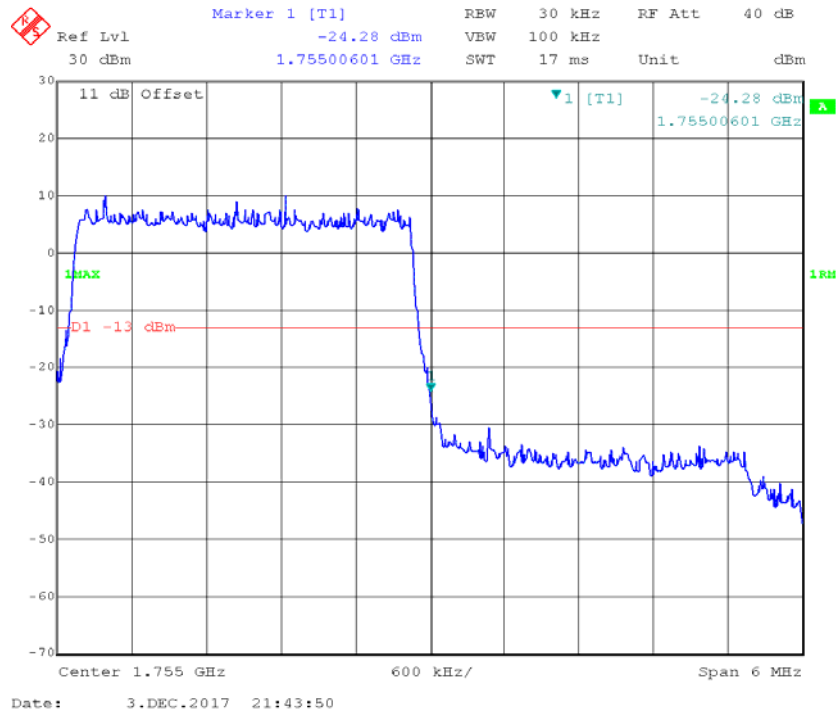
QPSK_1.4MHz_ 6 RB_ Right



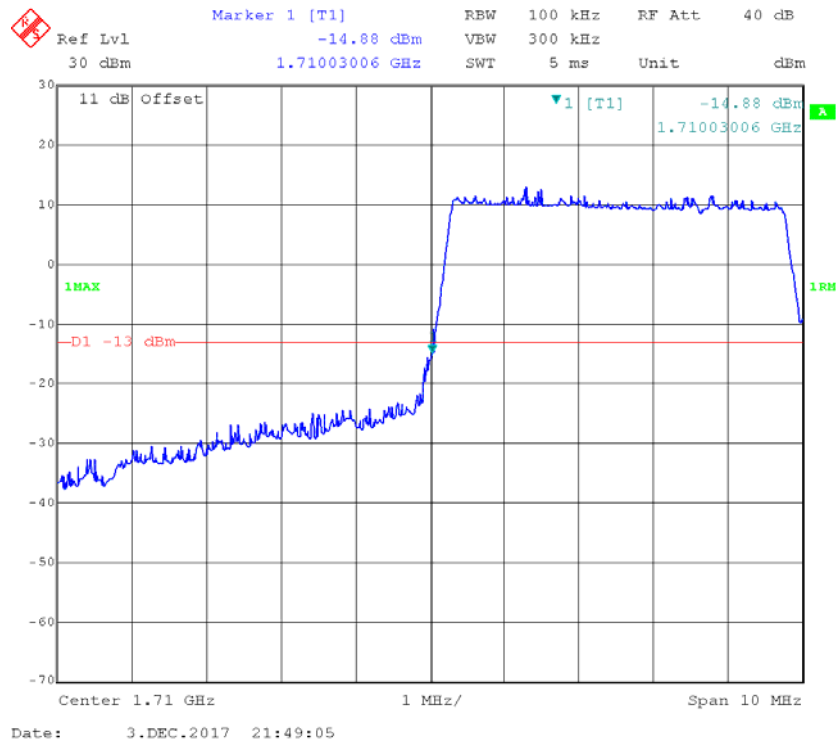
QPSK_3MHz_15 RB_Left



QPSK_3MHz_15 RB_Right



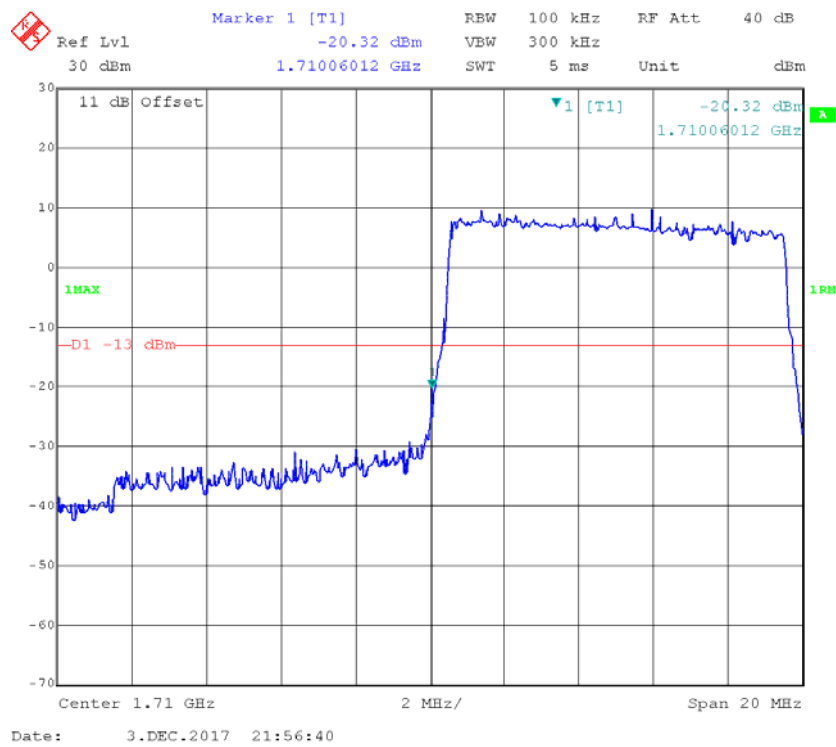
QPSK_5MHz_25 RB_Left



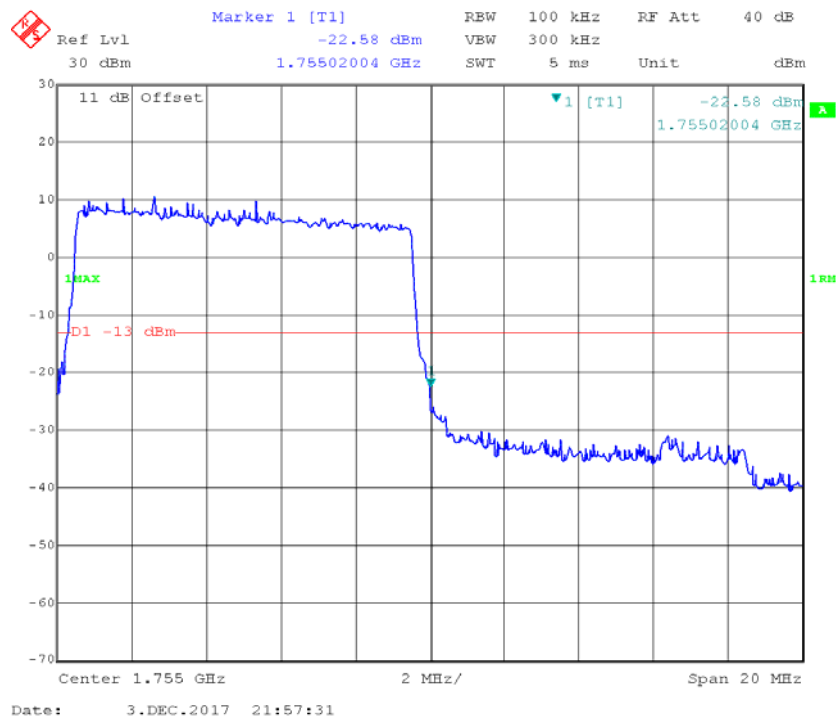
QPSK_5MHz_25 RB_Right



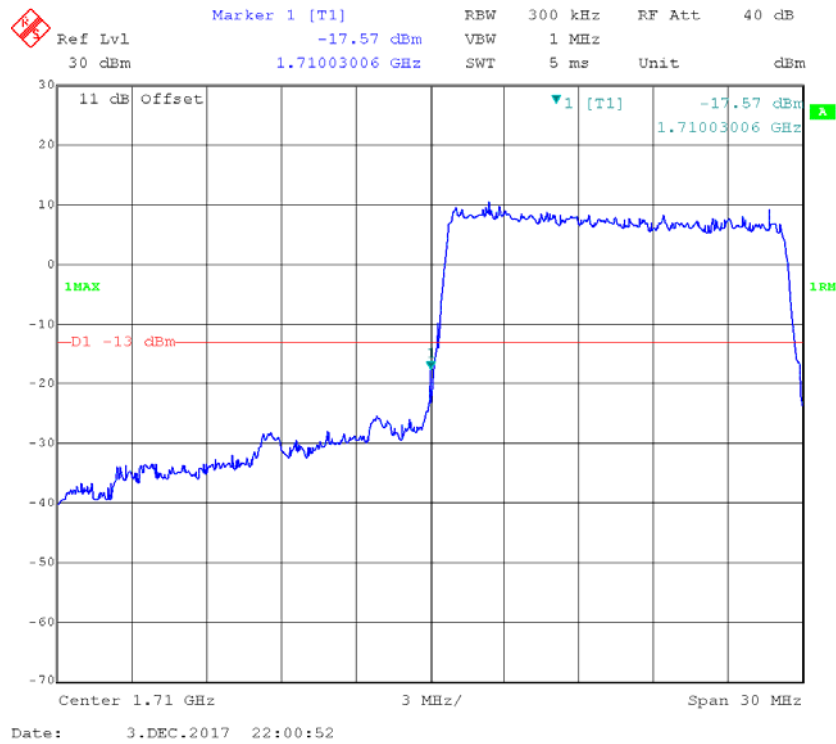
QPSK_10MHz_50 RB_ Left



QPSK_10MHz_50 RB_ Right



QPSK_15MHz_75 RB_Left



QPSK_15MHz_75 RB_Right



Marker 1 [T1]
 Ref Lvl 30 dBm
 -23.02 dBm
 1.70987976 GHz

RBW 300 kHz
 VBW 1 MHz
 SWT 5 ms
 RF Att 40 dB
 Unit dBm

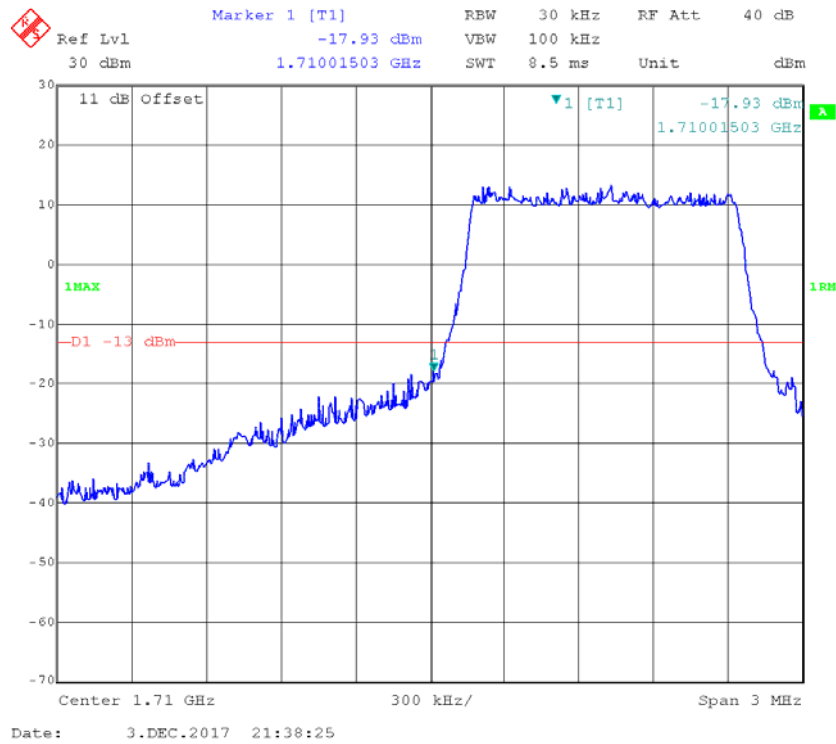
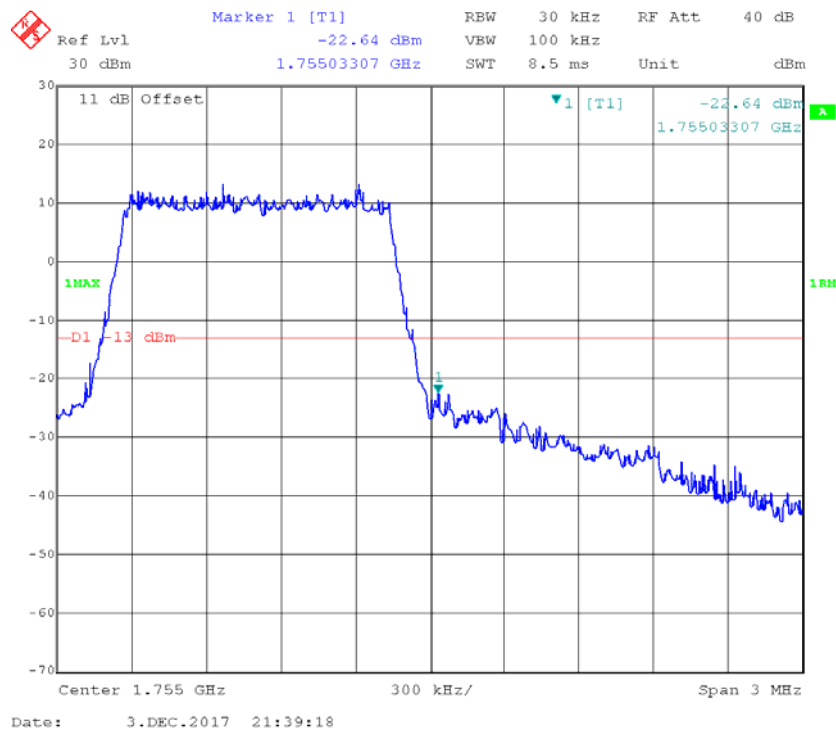
11 dB Offset
 1 [T1]
 -23.02 dBm
 1.70987976 GHz

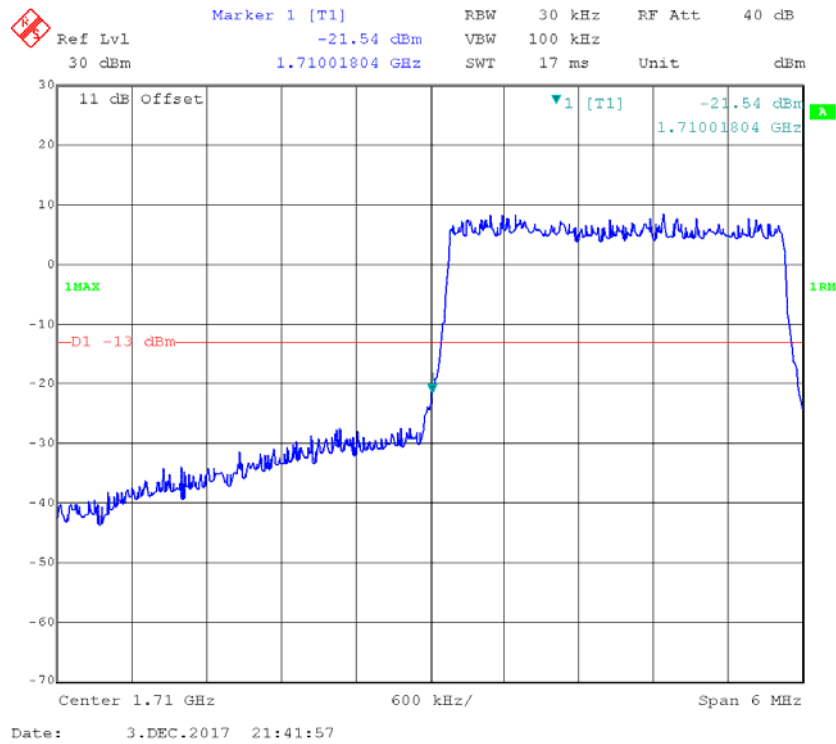
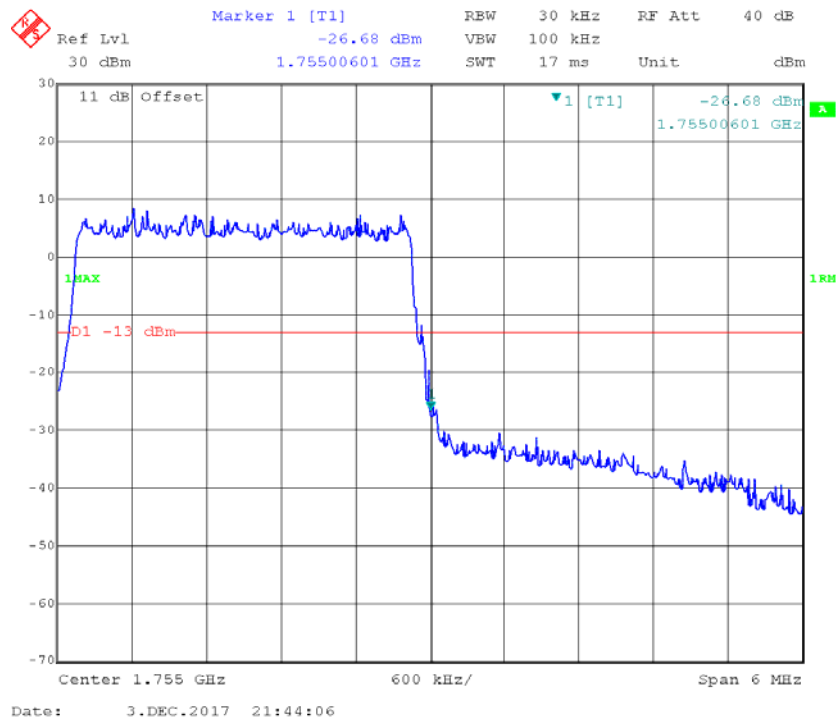
11 dB Offset
 -23.02 dBm
 1.70987976 GHz

Center 1.71 GHz
 4 MHz/
 Span 40 MHz

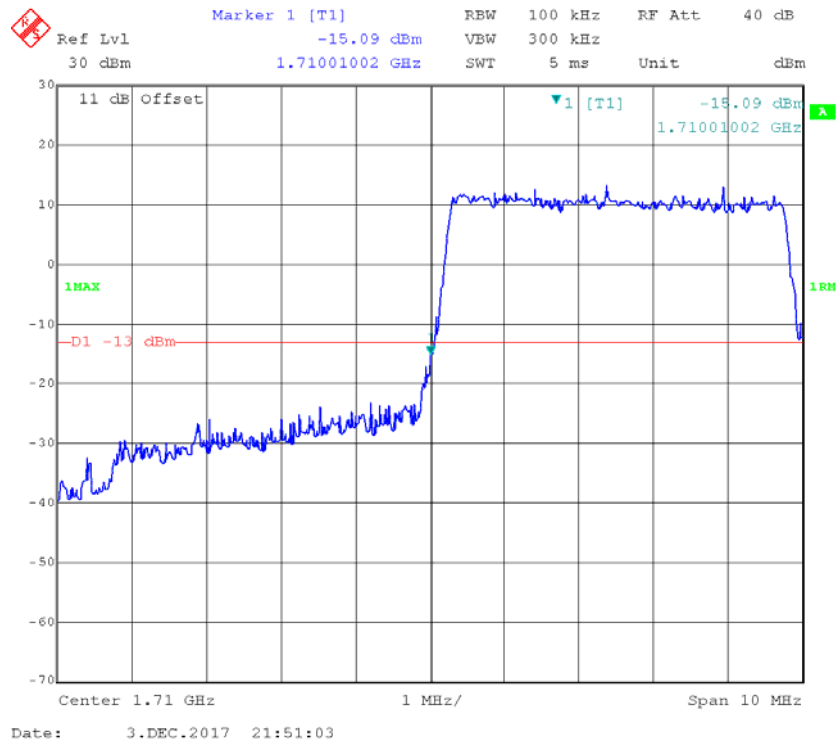
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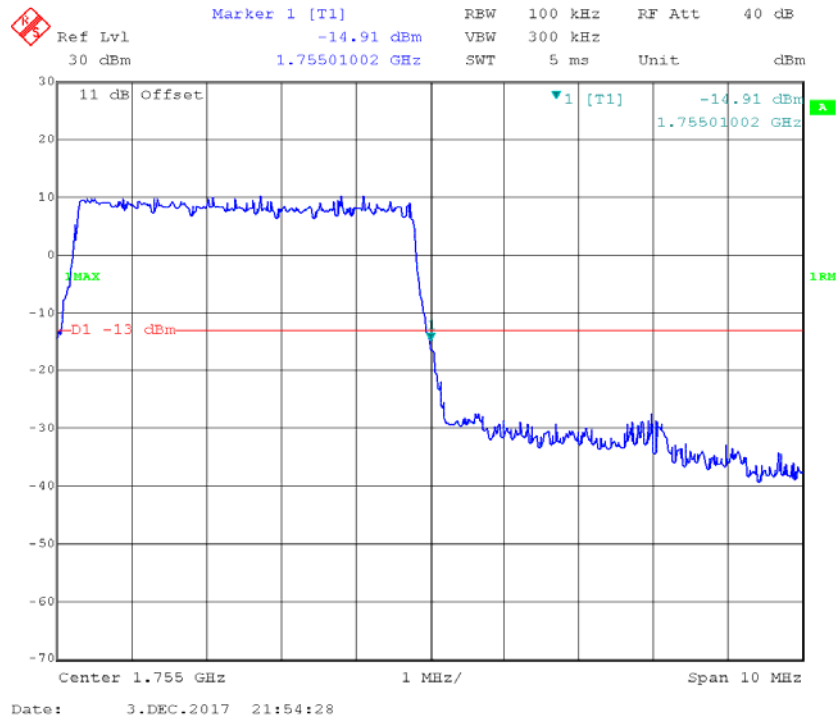
16QAM_1.4MHz_6 RB_ Left**16QAM_1.4MHz_6 RB_ Right**

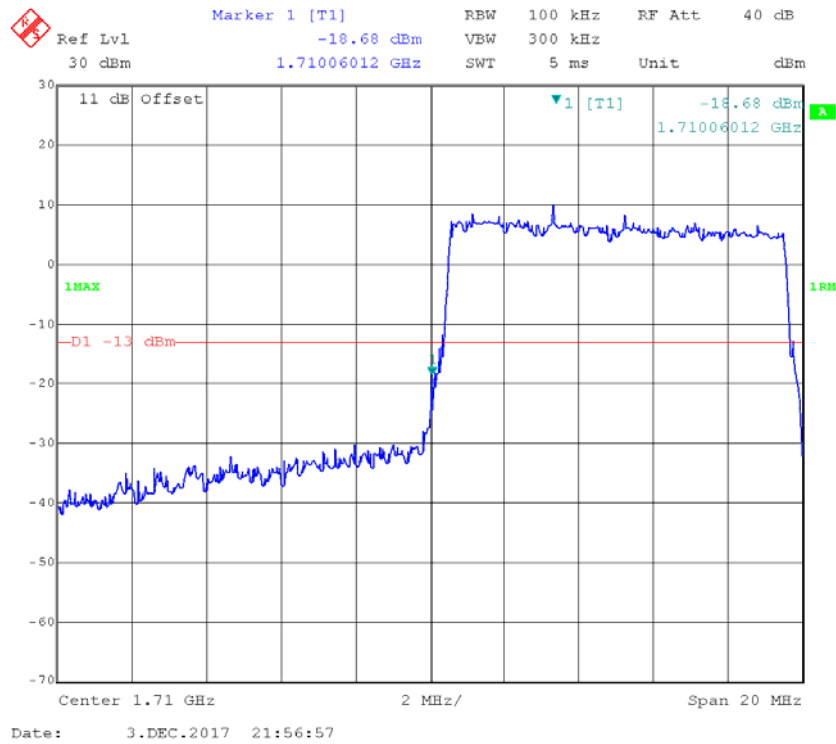
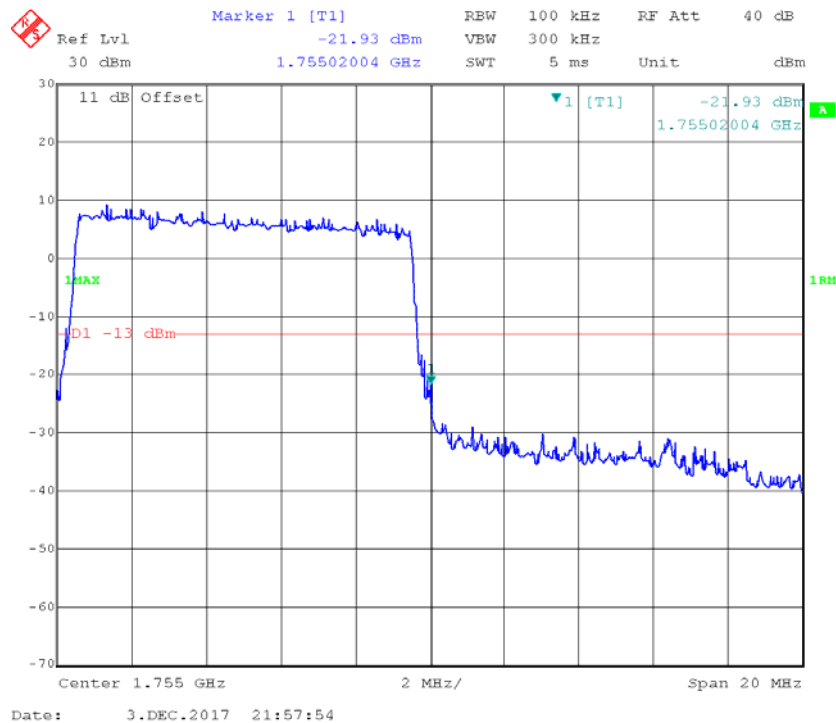
16QAM_3MHz_15 RB_ Left**16QAM_3MHz_15 RB_ Right**

16QAM_5MHz_25 RB_Left

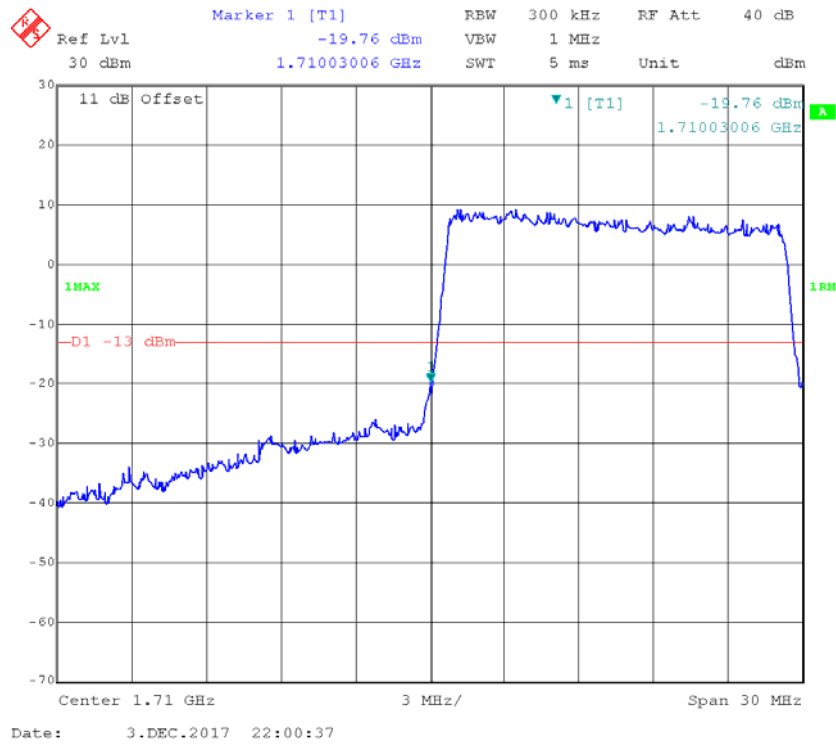


16QAM_5MHz_25 RB_Right



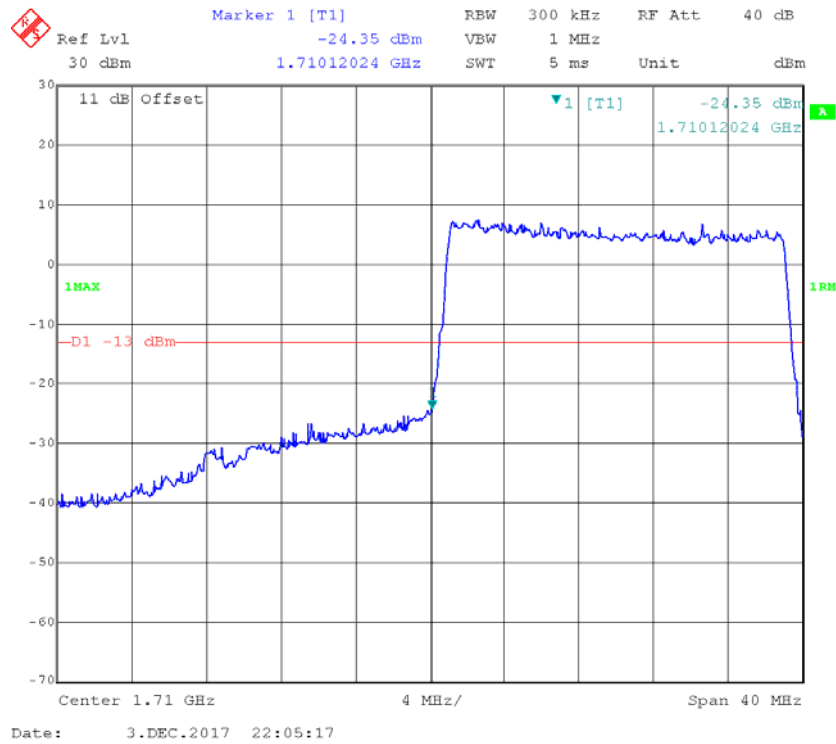
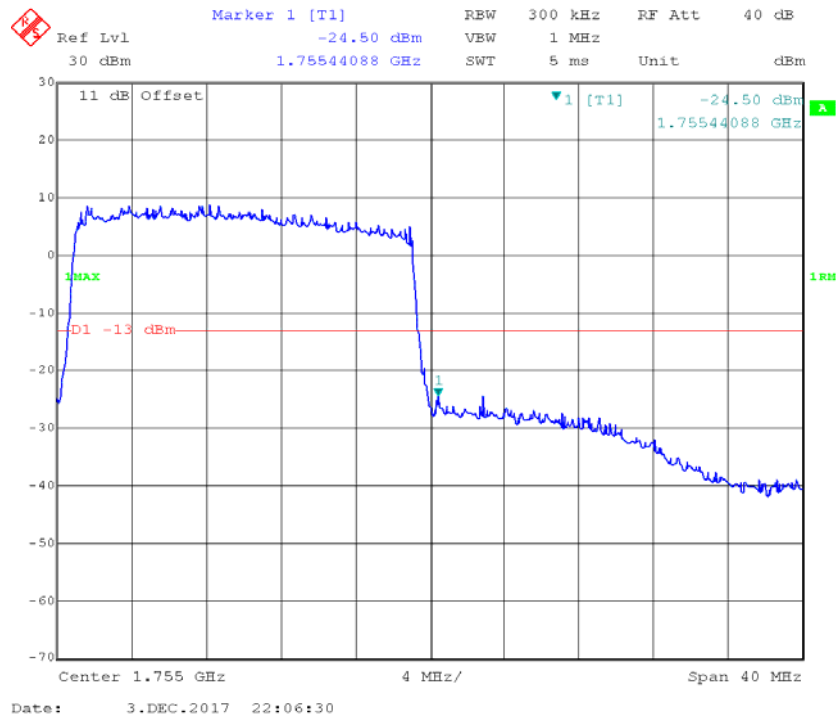
16QAM_10MHz_ 50 RB_ Left**16QAM_10MHz_ 50 RB_ Right**

16QAM_15MHz_ 75 RB_ Left

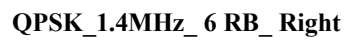


16QAM_15MHz_ 75 RB_ Right

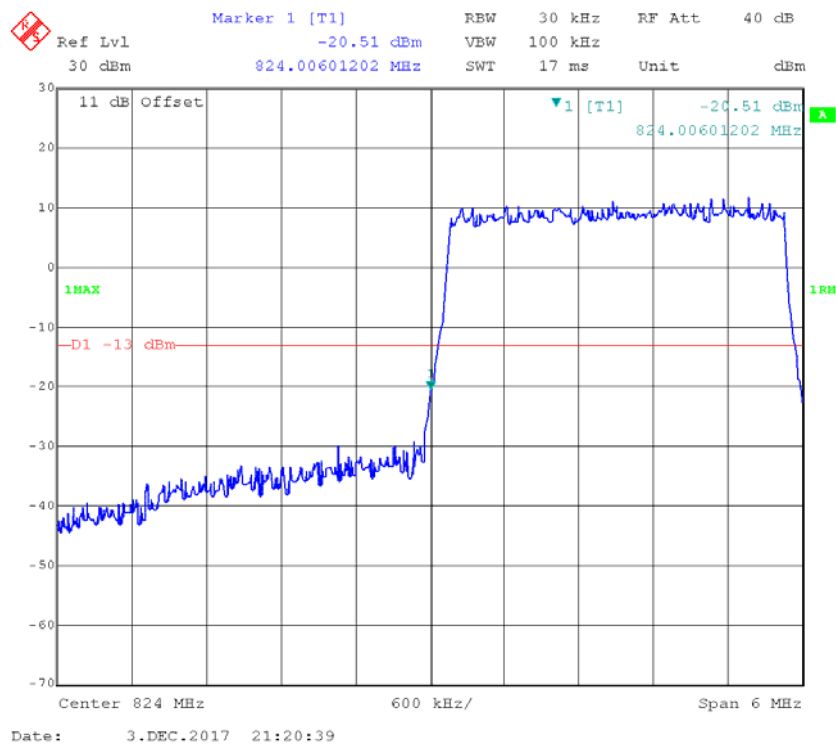


16QAM_20MHz_FULL RB_Left**16QAM_20MHz_FULL RB_Right**

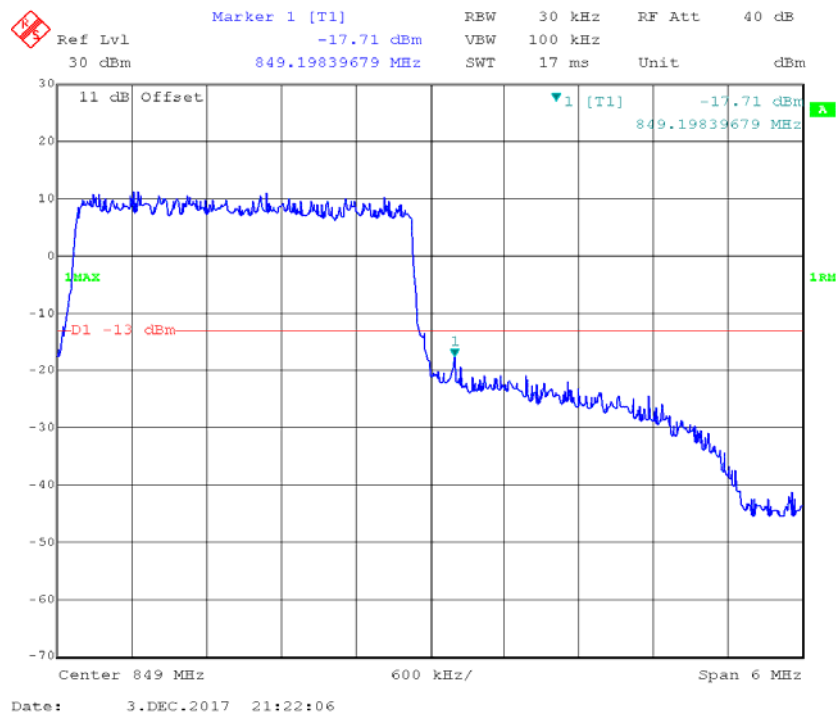
QPSK_1.4MHz_6 RB_Left



QPSK_3MHz_15 RB_ Left



QPSK_3MHz_15 RB_ Right

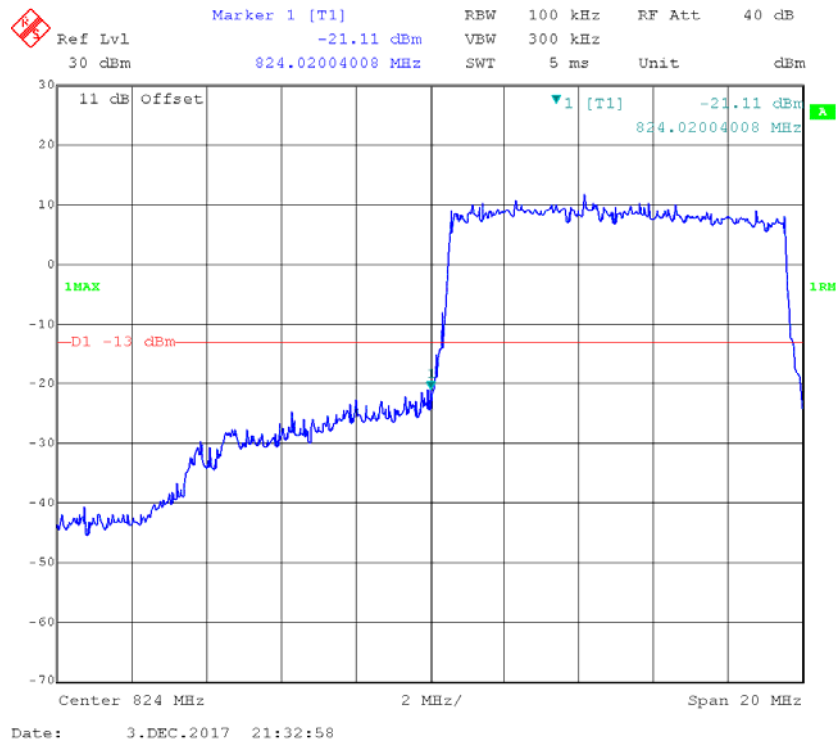


REF Lvl: 30 dBm
 Marker 1 [T1]: -14.04 dBm
 RBW: 100 kHz
 VBW: 300 kHz
 Span: 10 MHz
 Unit: dBm
 Center: 824 MHz
 Date: 3.DEC.2017 21:25:12

The plot shows a signal rising from approximately -40 dBm to 12 dBm. A red horizontal line is at -13 dBm. The signal level at the marker is -14.04 dBm.

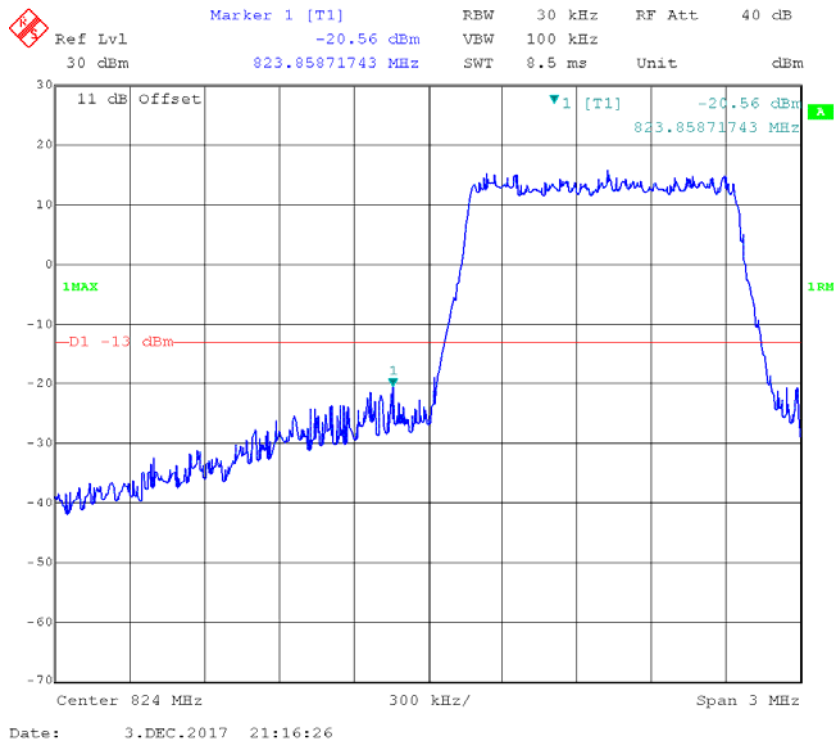
Ref Lvl 30 dBm
 Marker 1 [T1] -13.99 dBm
 RBW 100 kHz
 VBW 300 kHz
 RF Att 40 dB
 Span 10 MHz
 Center 849 MHz
 1 MHz/
 11 dB Offset
 [T1] -13.99 dBm
 849.07014028 MHz
 MAX
 -D1 -13 dBm
 1 RM

QPSK_10MHz_50 RB_ Left

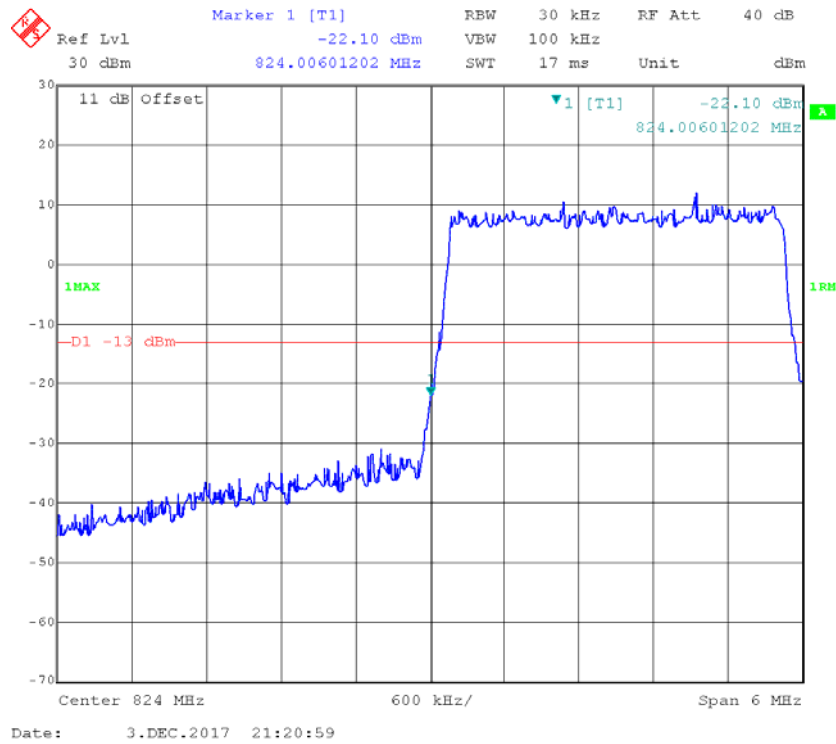


QPSK_10MHz_50 RB_ Right

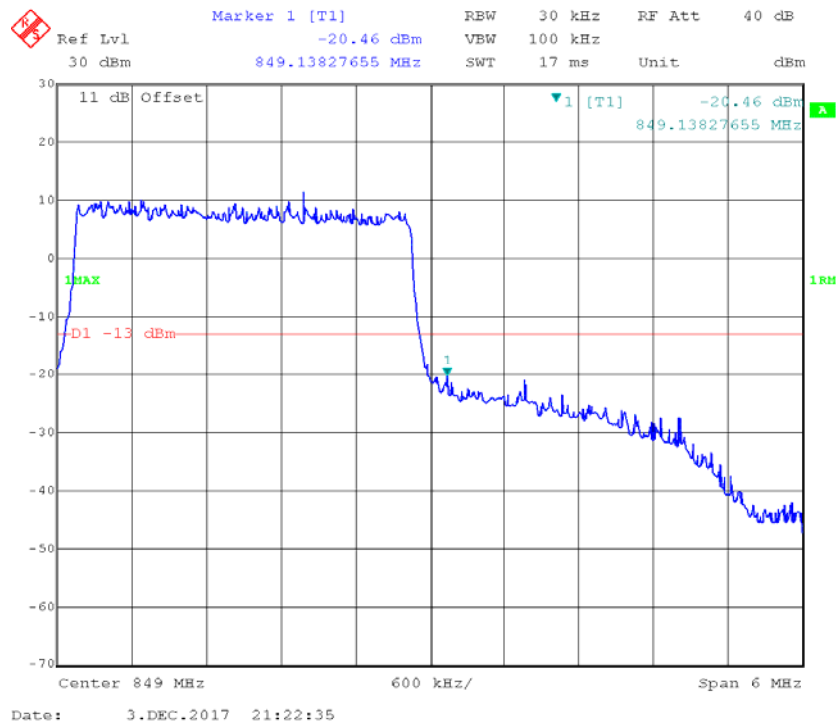


16QAM_1.4MHz_6 RB_ Left**16QAM_1.4MHz_6 RB_ Right**

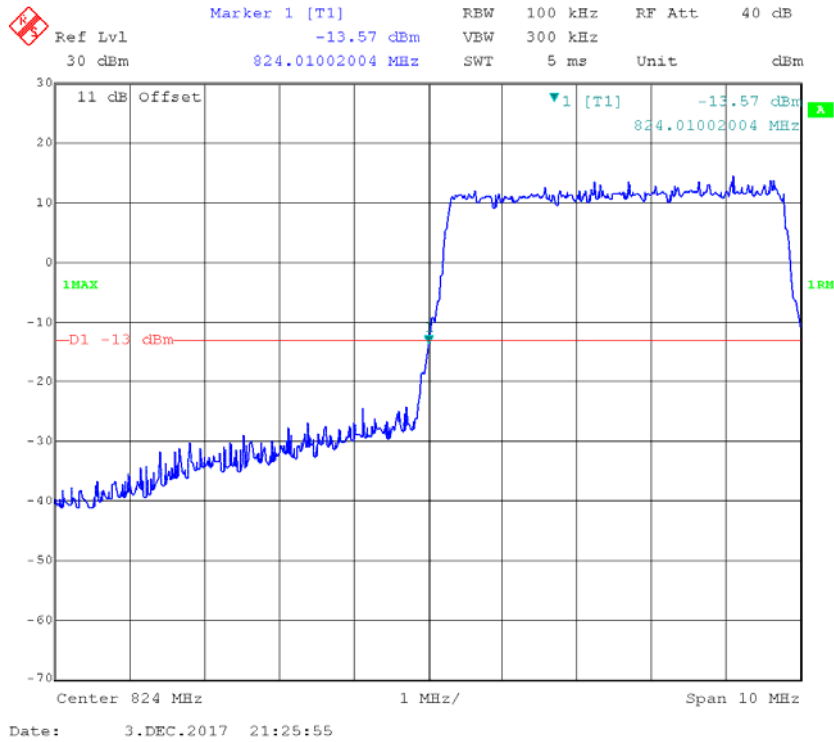
16QAM_3MHz_15 RB_Left



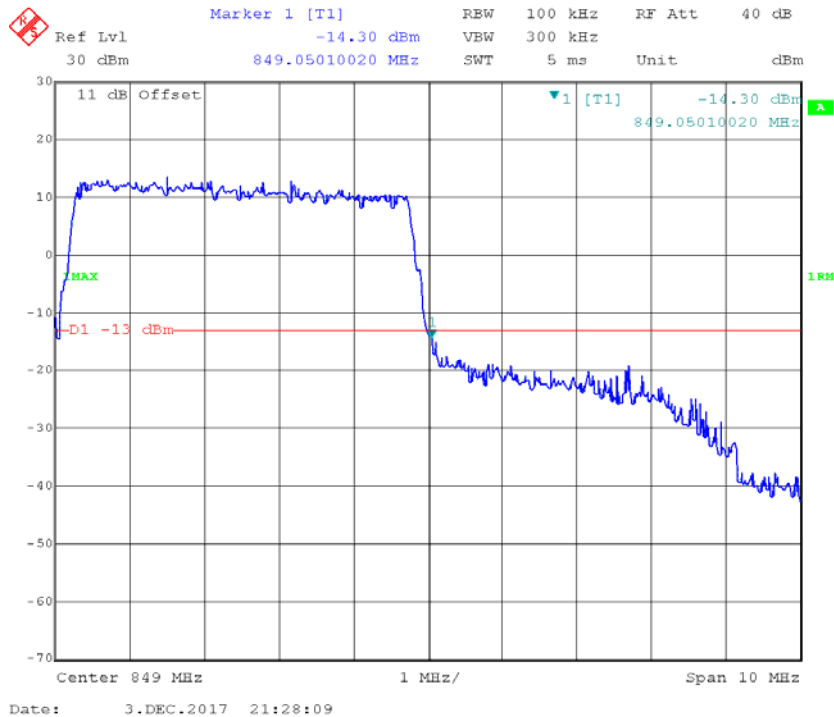
16QAM_3MHz_15 RB_Right



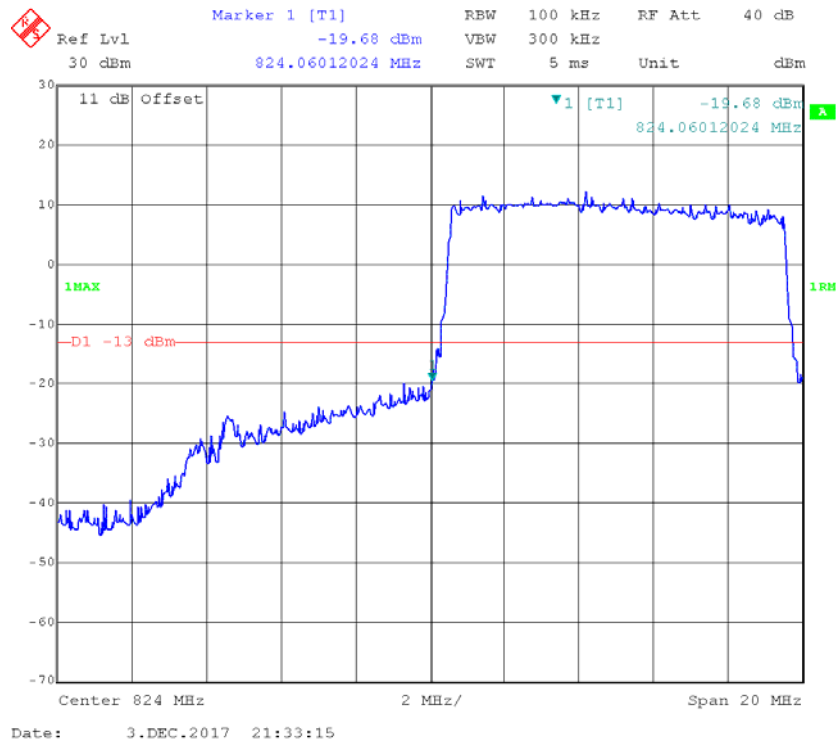
16QAM_5MHz_25 RB_Left



16QAM_5MHz_25 RB_Right



16QAM_10MHz_ 50 RB_ Left

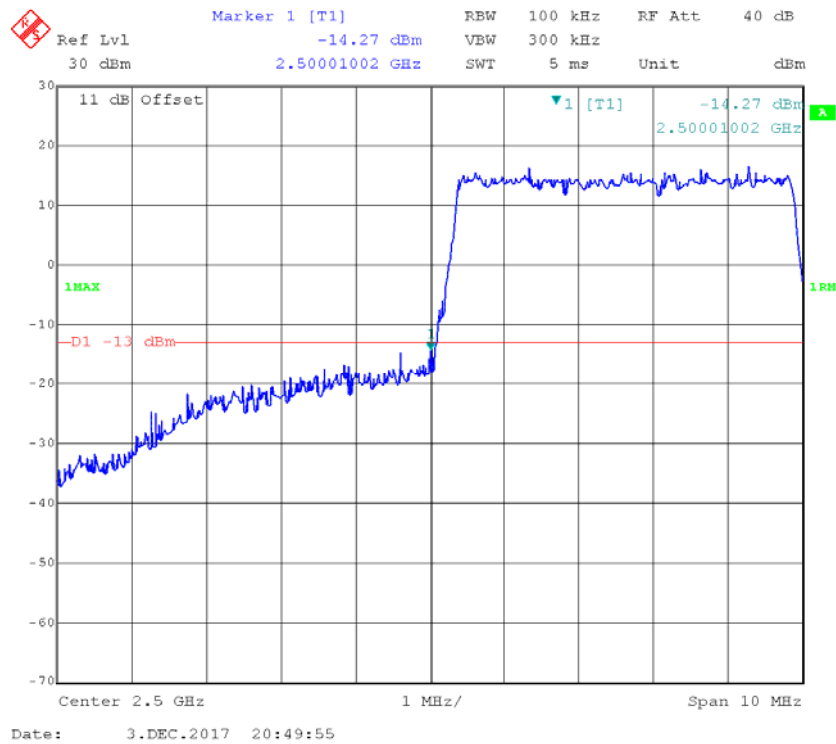


16QAM_10MHz_ 50 RB_ Right

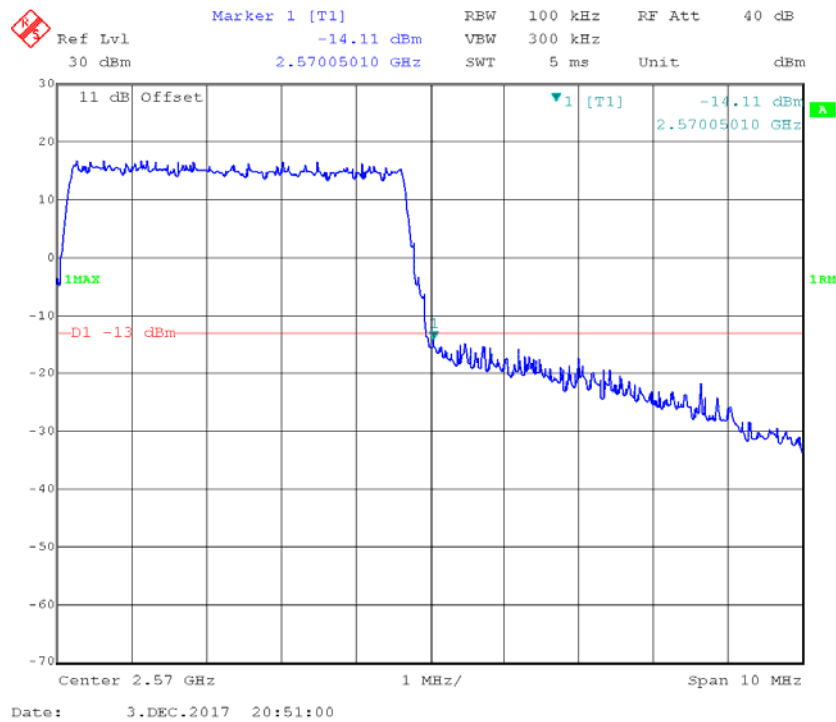


LTE Band VII

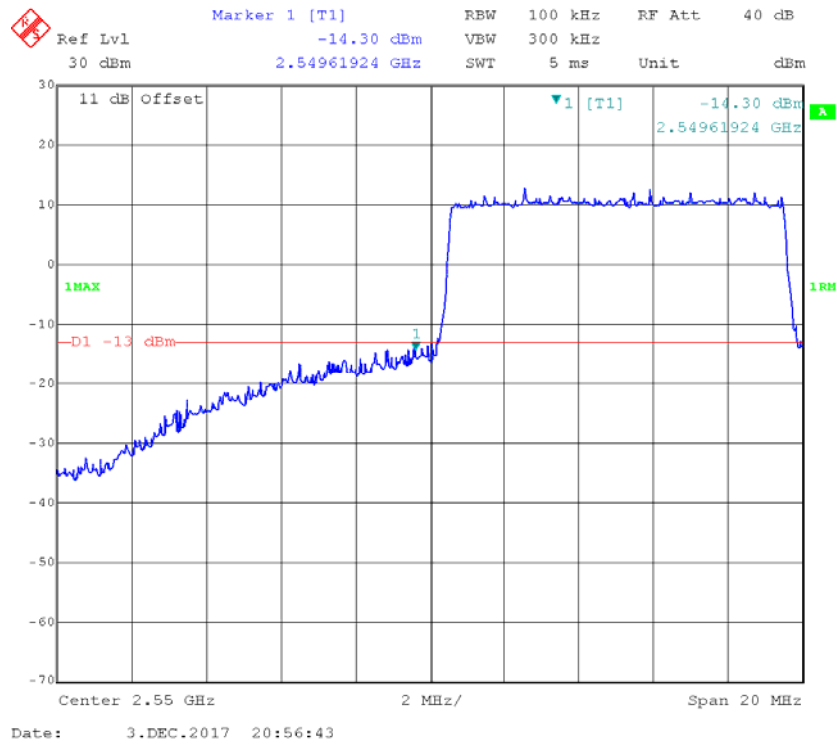
QPSK_5MHz_25 RB_ Left



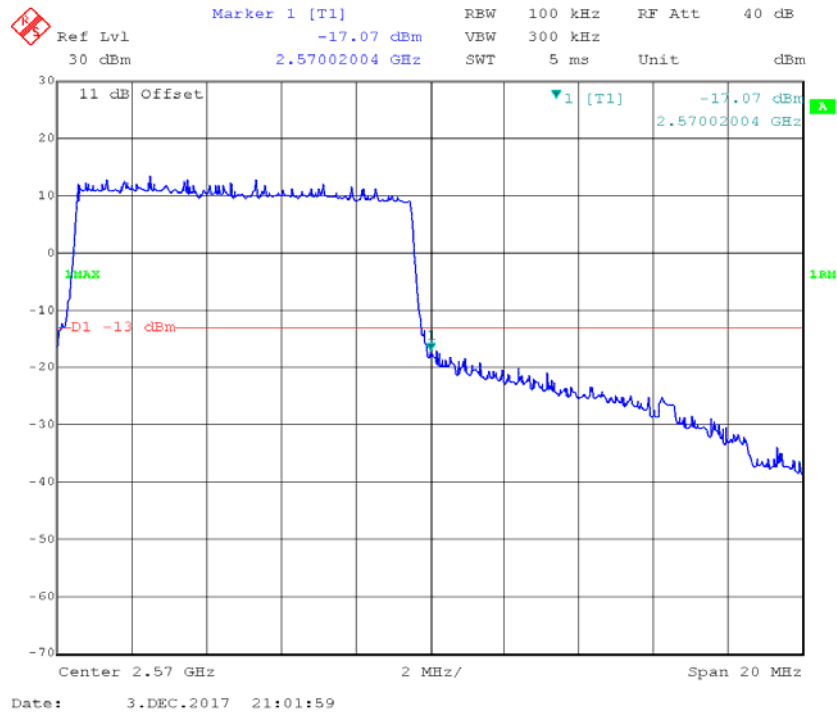
QPSK_5MHz_25 RB_ Right



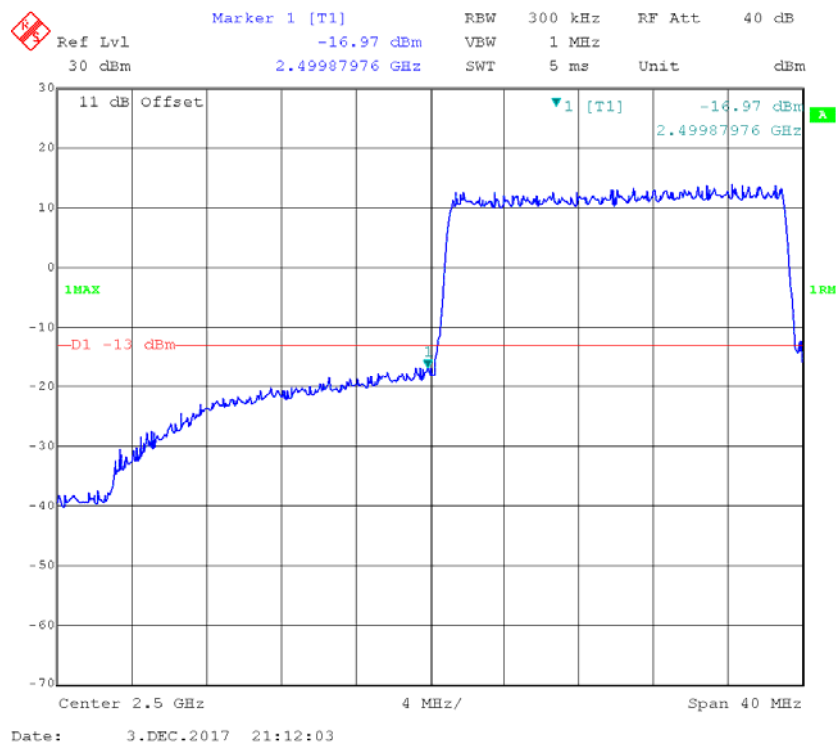
QPSK_10MHz_50 RB_Left



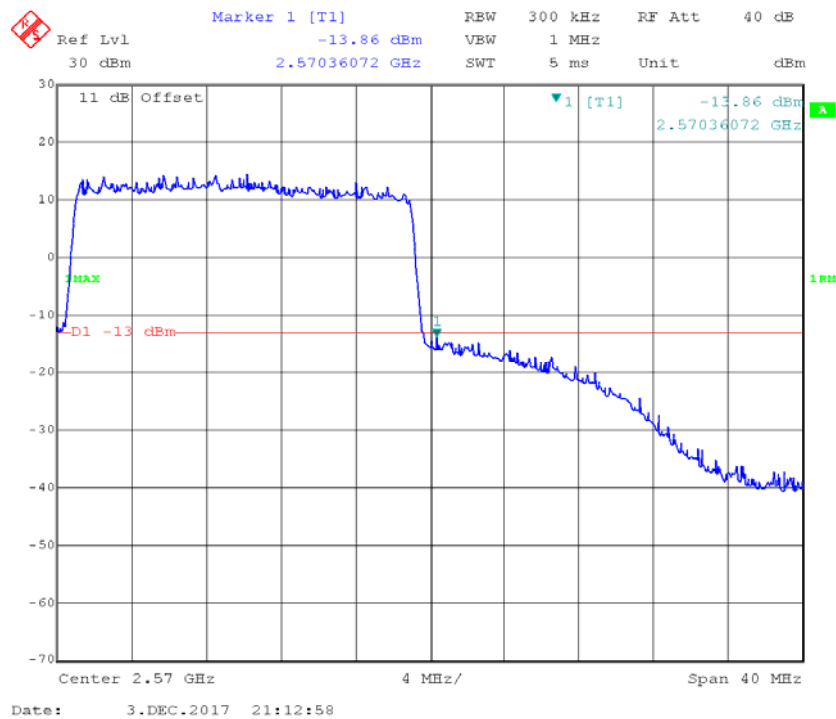
QPSK_10MHz_50 RB_Right

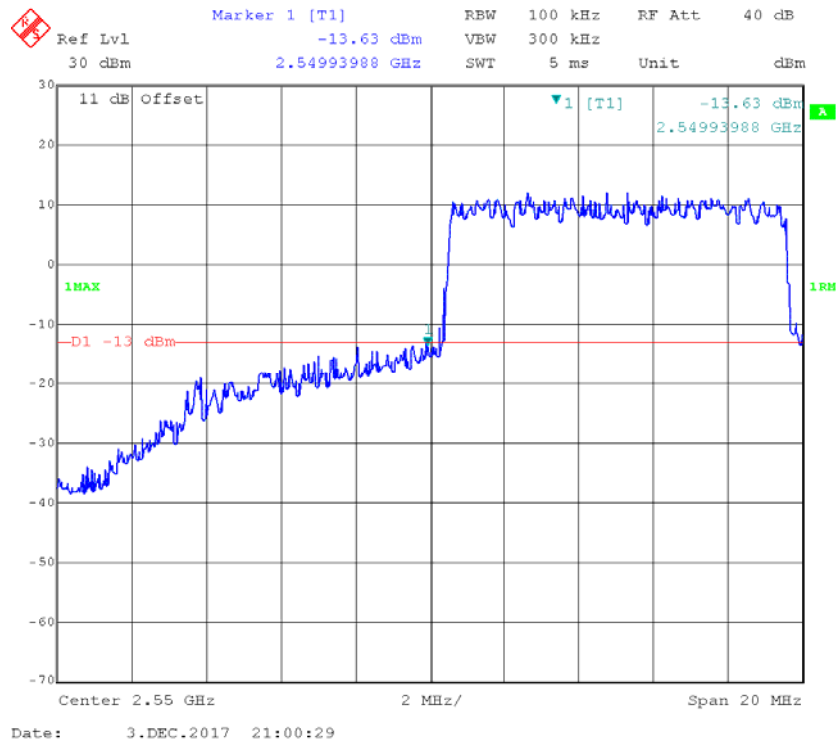
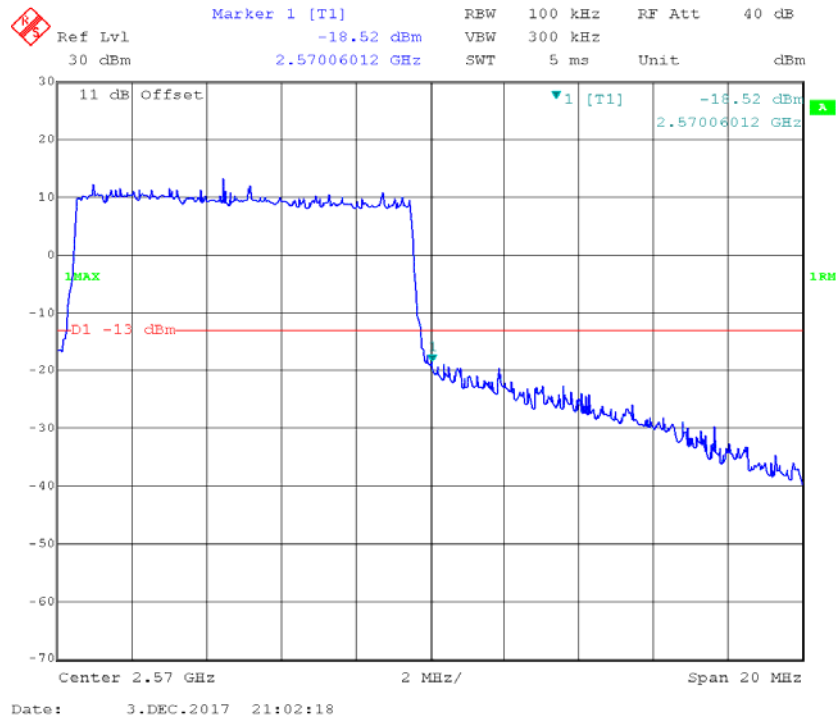


QPSK_20MHz_FULL RB_Left



QPSK_20MHz_FULL RB_Right



16QAM_10MHz_ 50 RB_ Left**16QAM_10MHz_ 50 RB_ Right**

Ref Lvl 30 dBm
 Marker 1 [T1] -14.30 dBm
 2.50003006 GHz
 RBW 300 kHz
 VBW 1 MHz
 SWT 5 ms
 RF Att 40 dB
 Unit dBm

11 dB Offset
 1 [T1] -14.30 dBm
 2.50003006 GHz
 1MAX
 -D1 -13 dBm
 1RM

Center 2.5 GHz 3 MHz/ Span 30 MHz

Date: 3.DEC.2017 21:05:51

REF Lvl: 30 dBm
 Marker 1 [T1]: -14.71 dBm
 2.57009018 GHz
 REW: 300 kHz
 VBW: 1 MHz
 SWT: 5 ms
 RF Att: 40 dB
 Unit: dBm

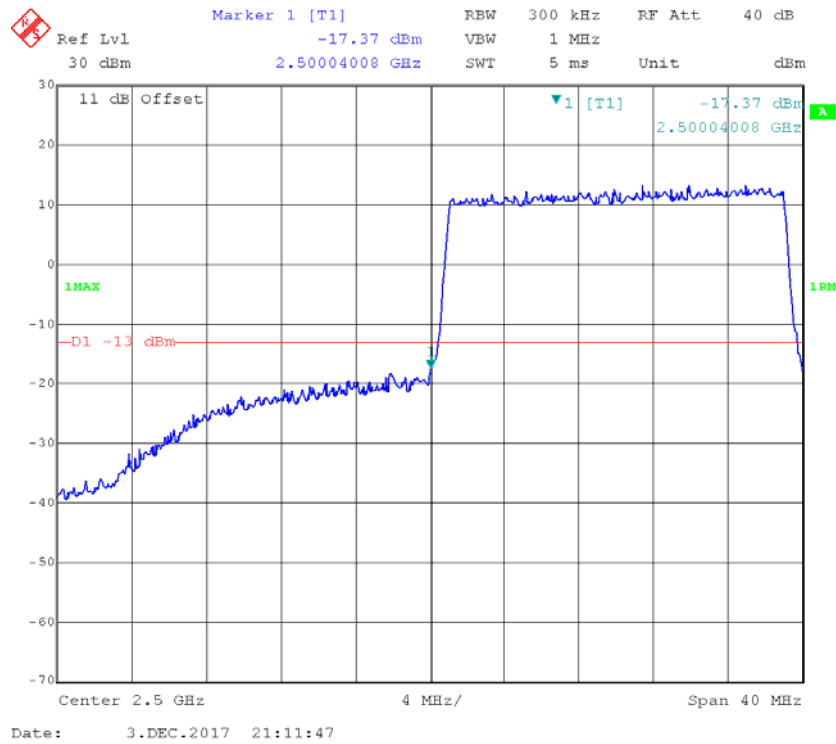
11 dB Offset
 1 [T1] -14.71 dBm
 2.57009018 GHz

MAX
 D1 -13 dBm

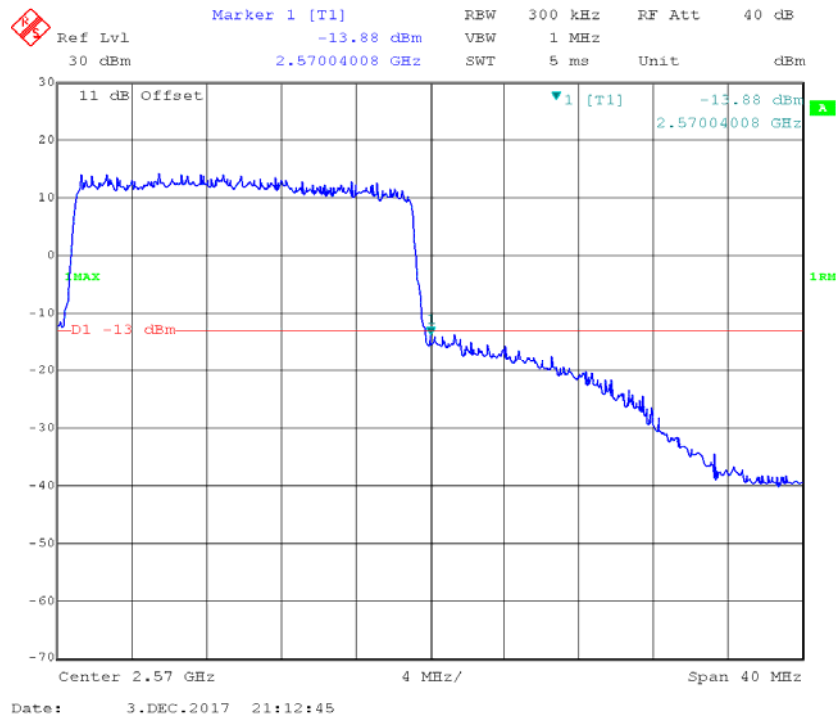
Center 2.57 GHz
 3 MHz/
 Span 30 MHz

Date: 3.DEC.2017 21:09:17

16QAM_20MHz_ FULL RB_ Left

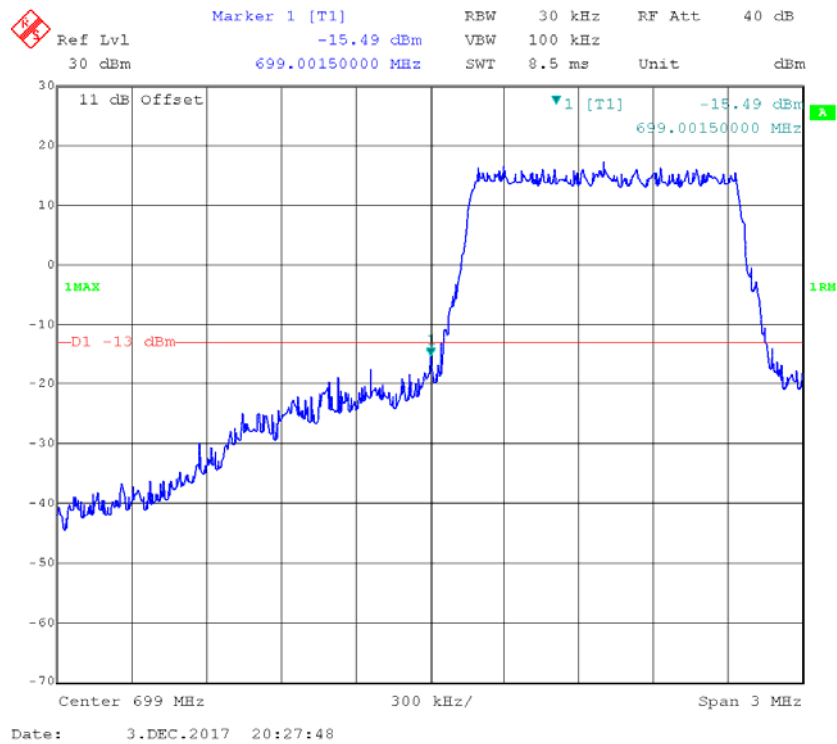


16QAM_20MHz_ FULL RB_ Right



LTE Band XII

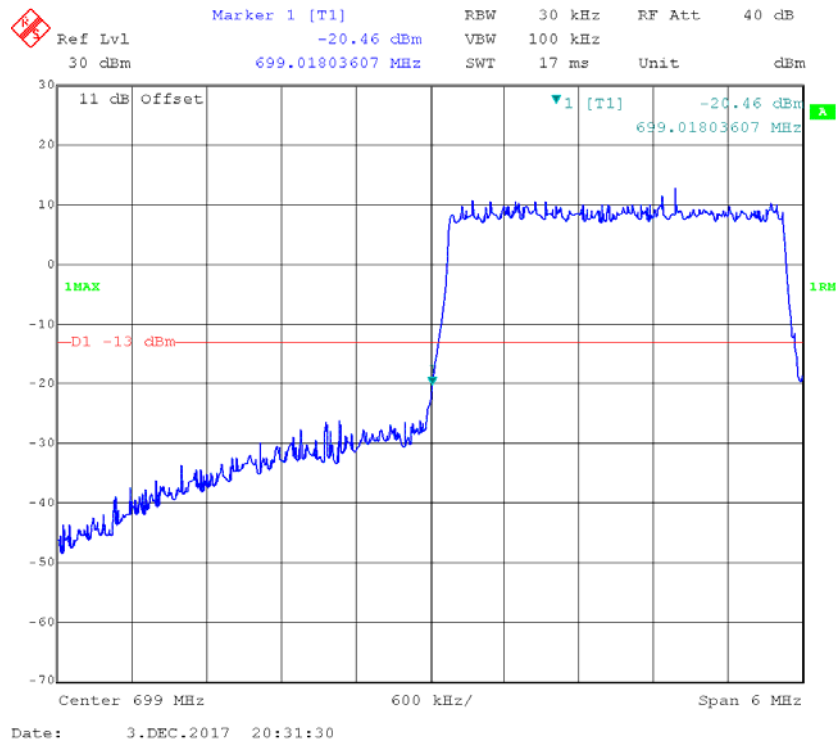
QPSK_1.4MHz_6 RB_ Left



QPSK_1.4MHz_6 RB_ Right



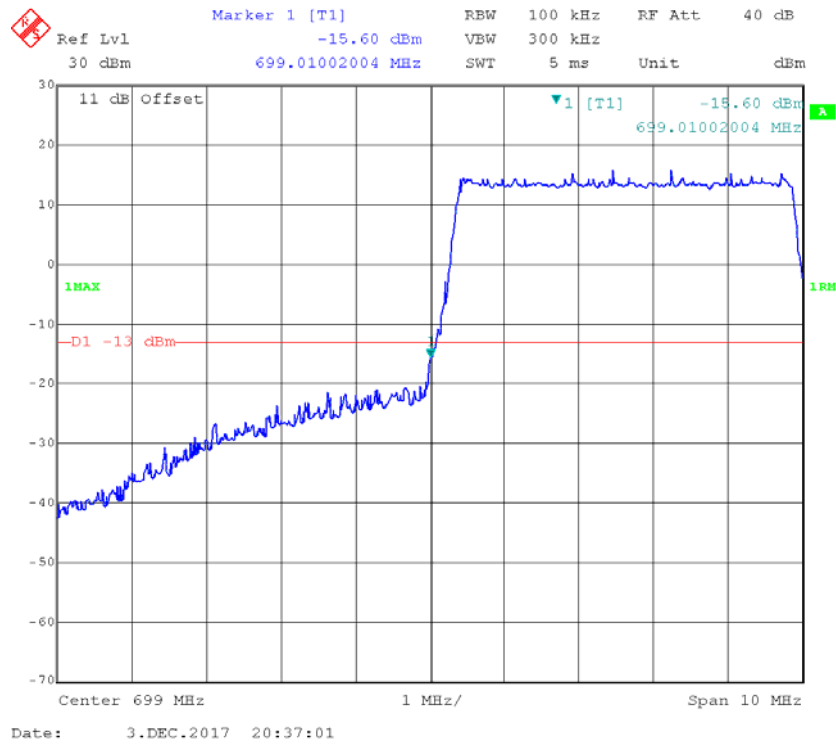
QPSK_3MHz_15 RB_Left



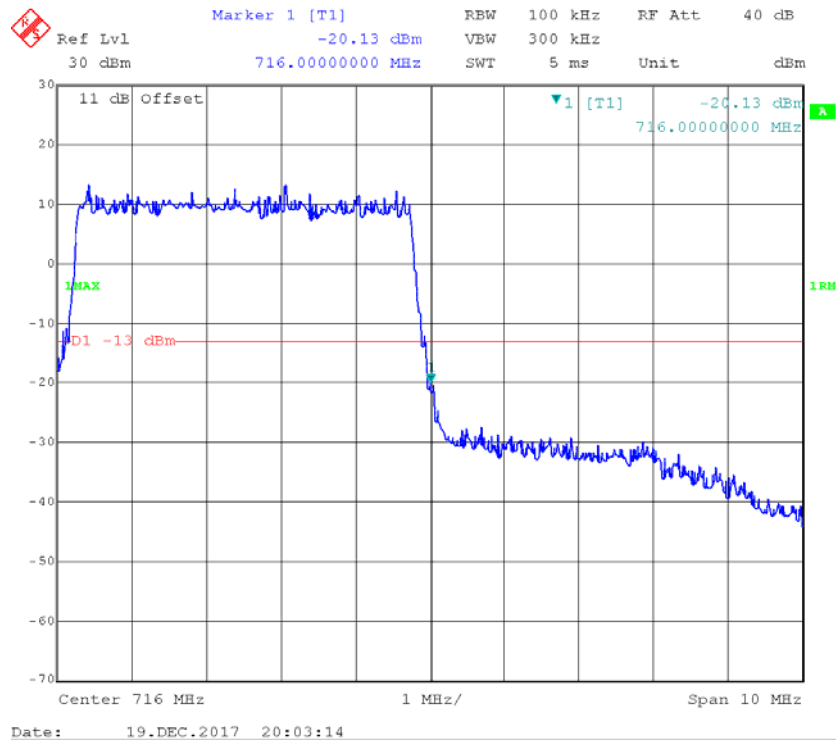
QPSK_3MHz_15 RB_Right



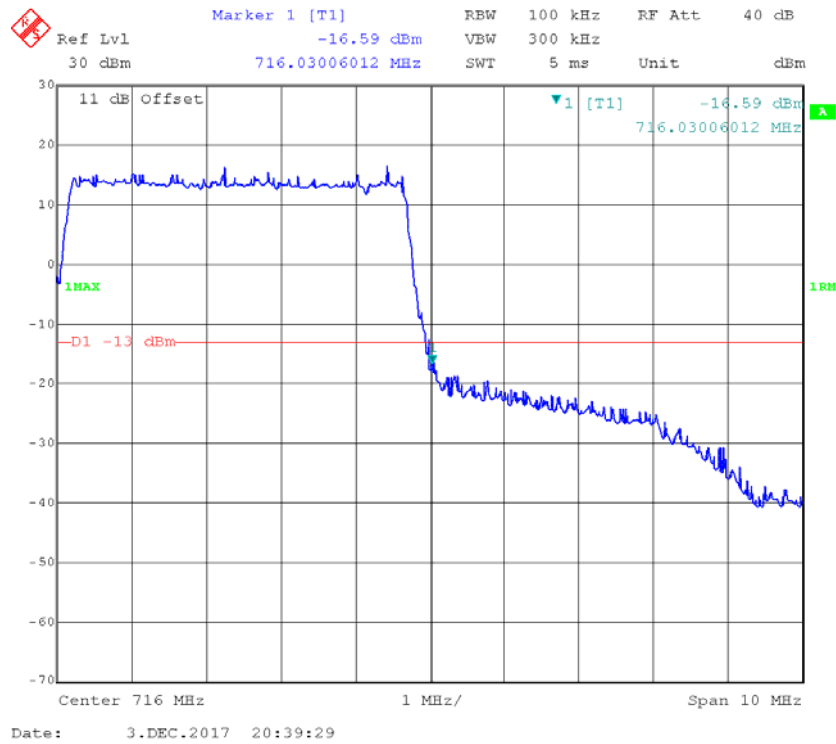
QPSK_5MHz_25 RB_Left



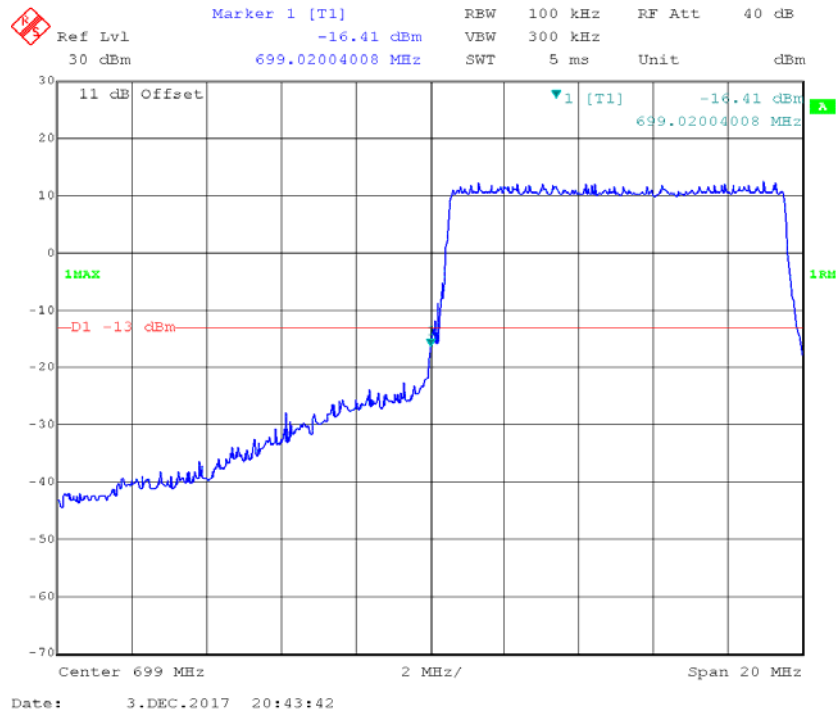
QPSK_5MHz_25 RB_Right

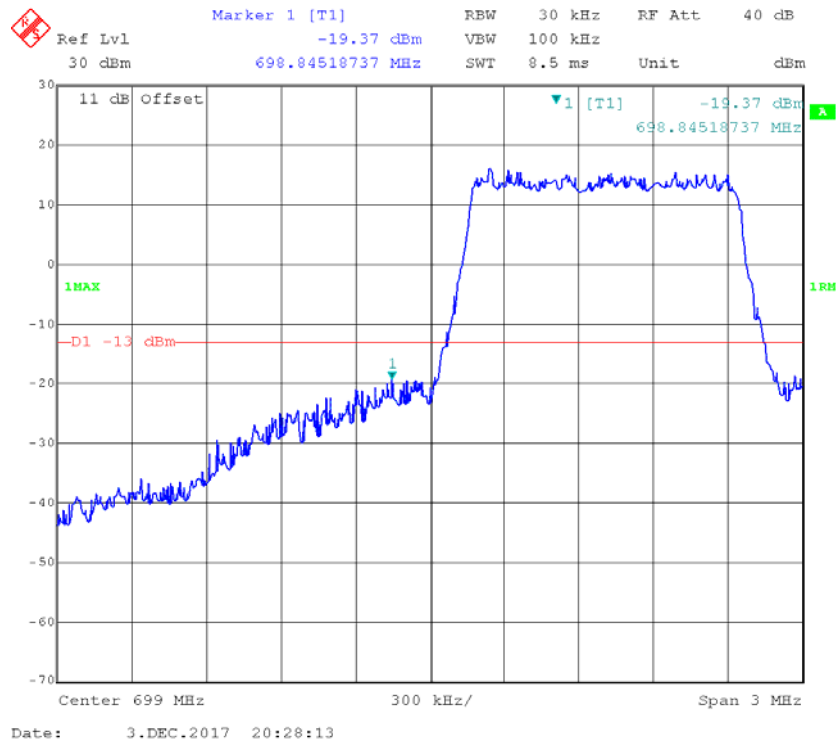
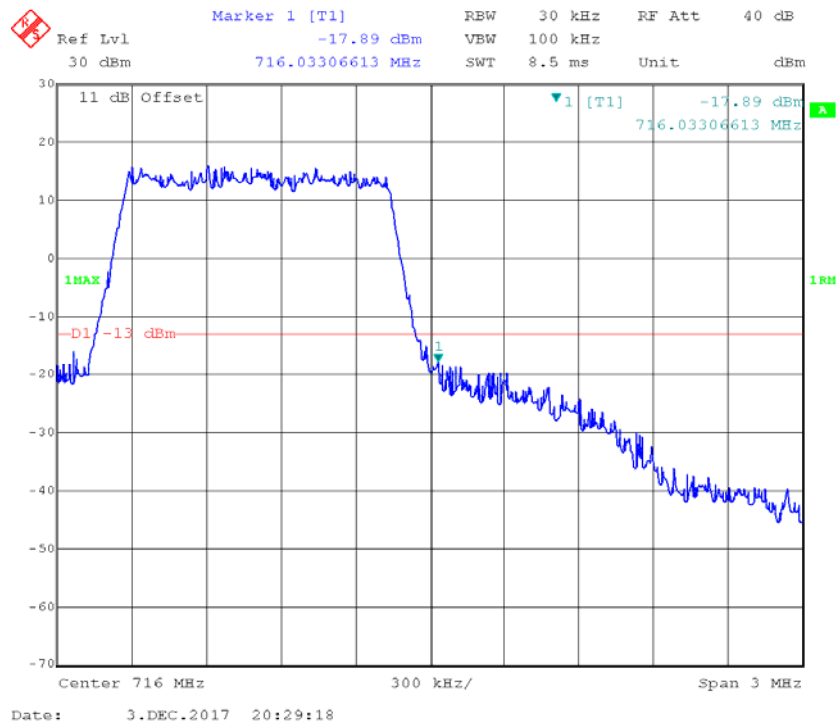


QPSK_10MHz_50 RB_Left

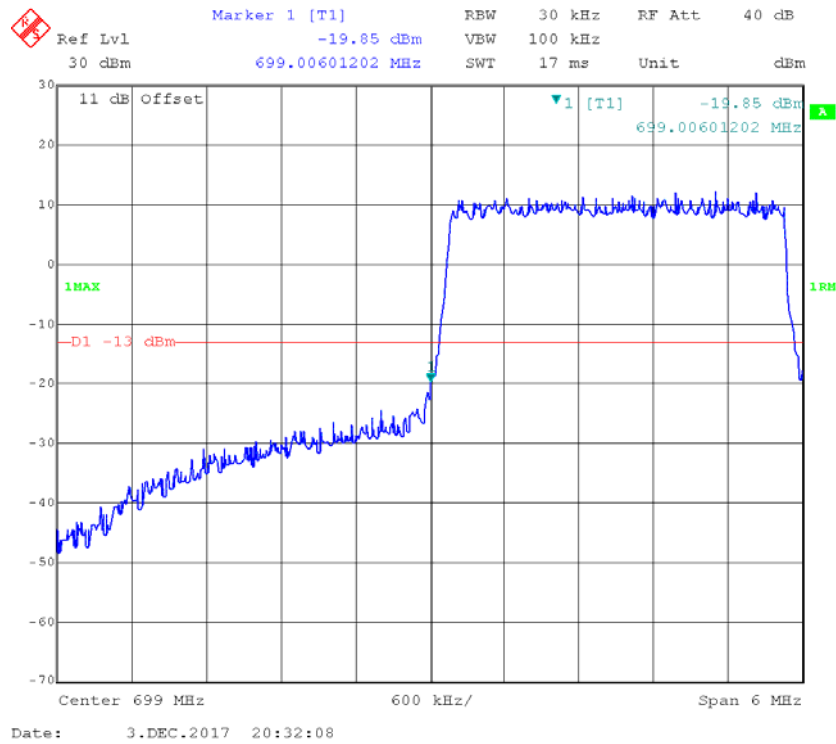


QPSK_10MHz_50 RB_Right



16QAM_1.4MHz_6 RB_ Left**16QAM_1.4MHz_6 RB_ Right**

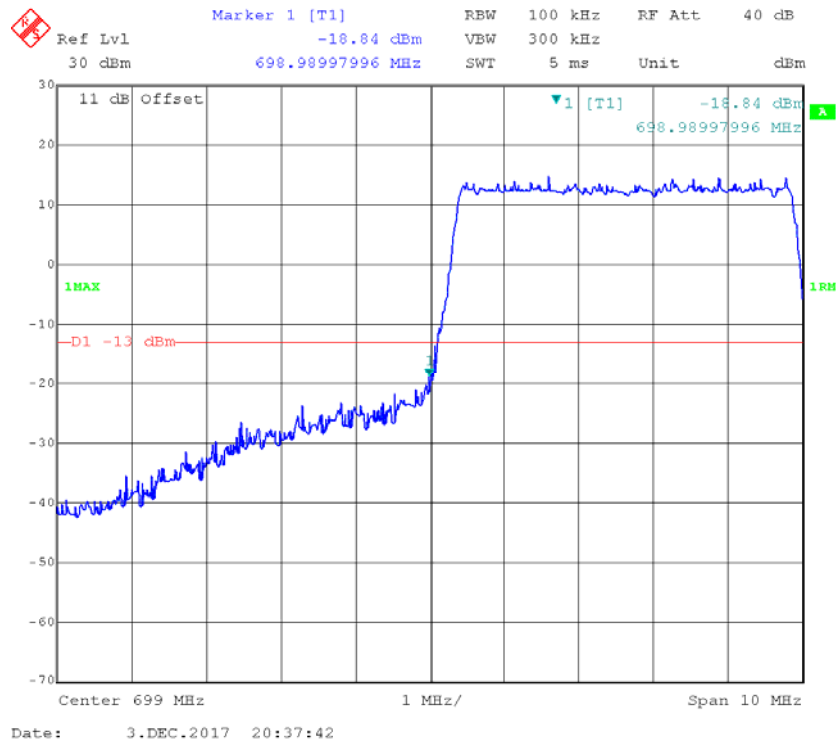
16QAM_3MHz_15 RB_ Left



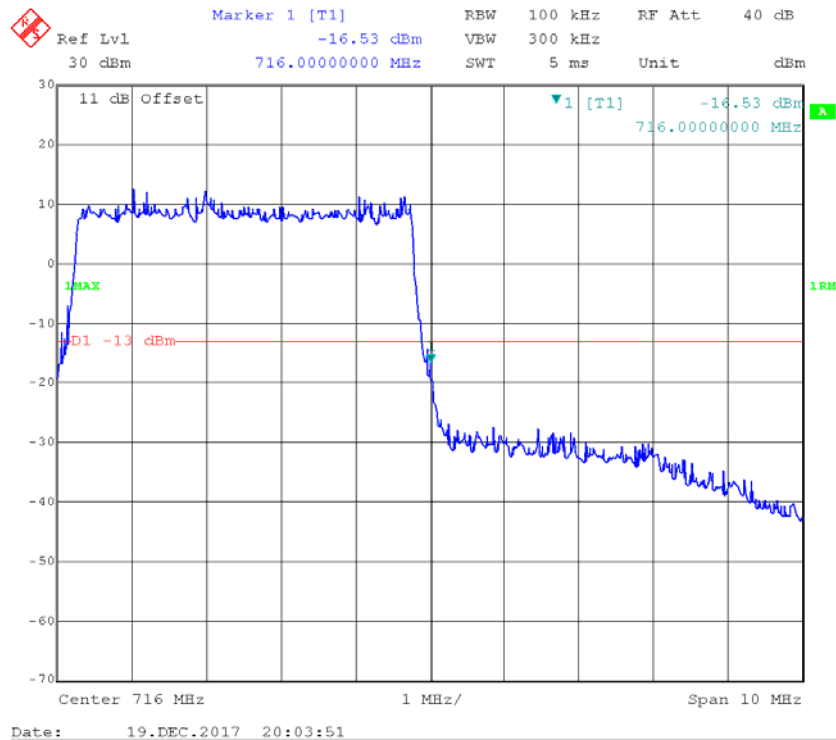
16QAM_3MHz_15 RB_ Right

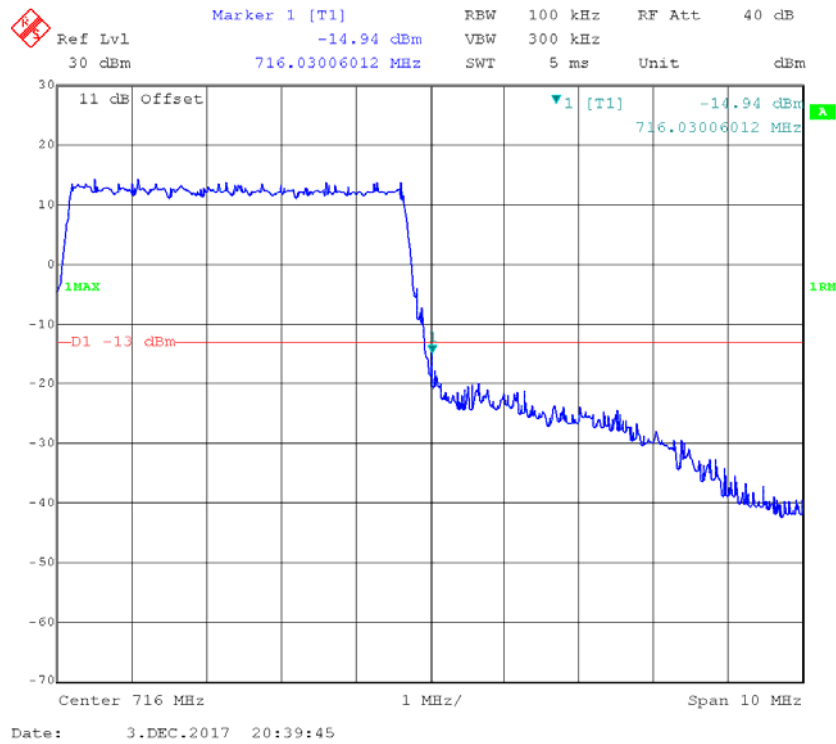
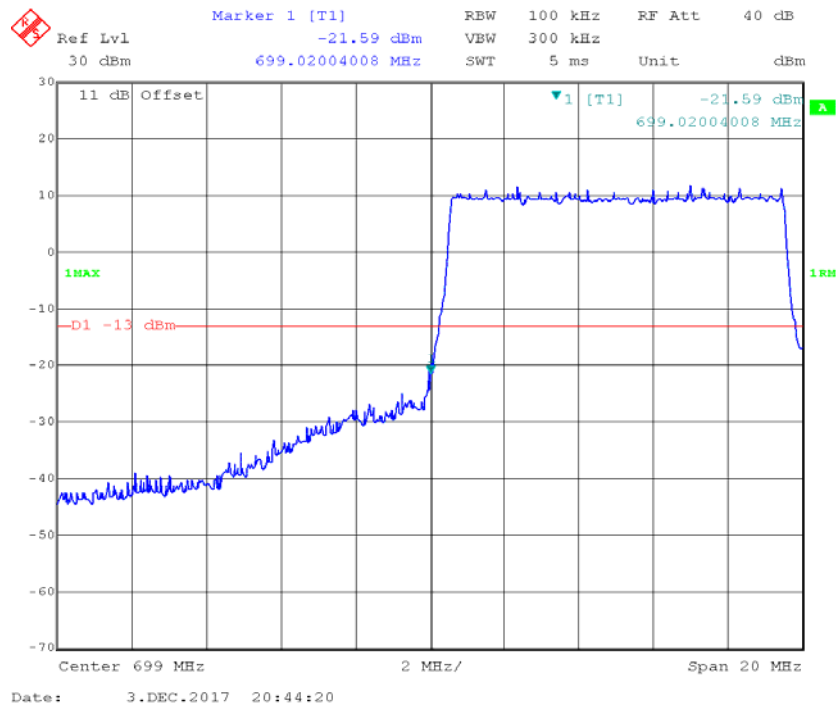


16QAM_5MHz_25 RB_Left



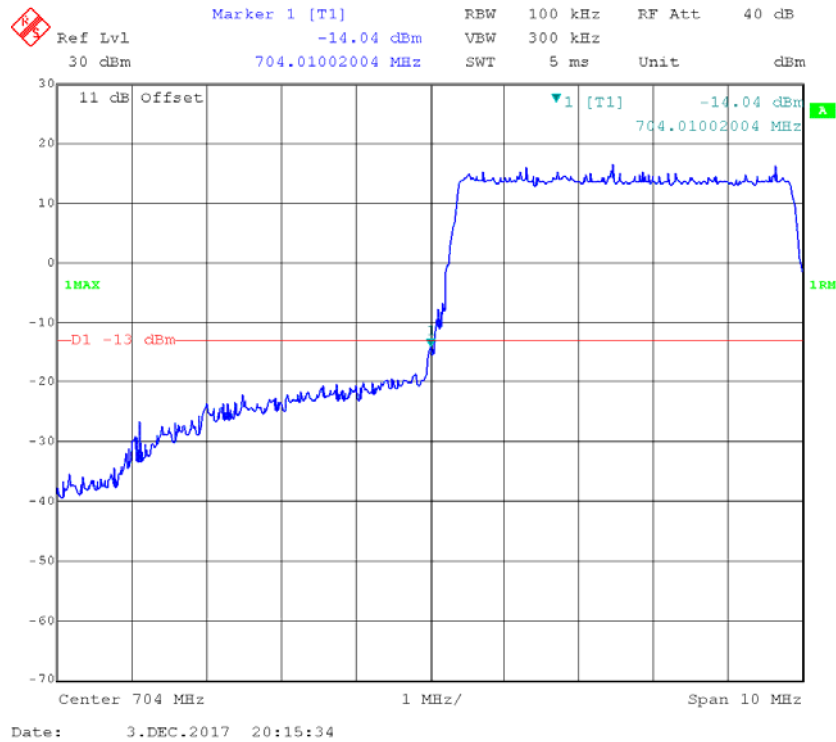
16QAM_5MHz_25 RB_Right



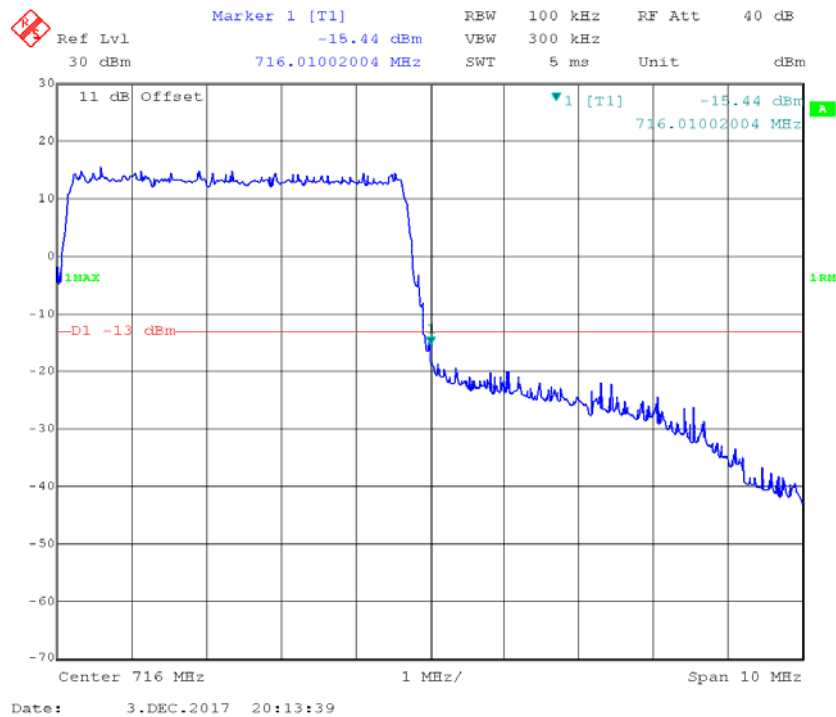
16QAM_10MHz_ 50 RB_ Left**16QAM_10MHz_ 50 RB_ Right**

LTE Band XVII

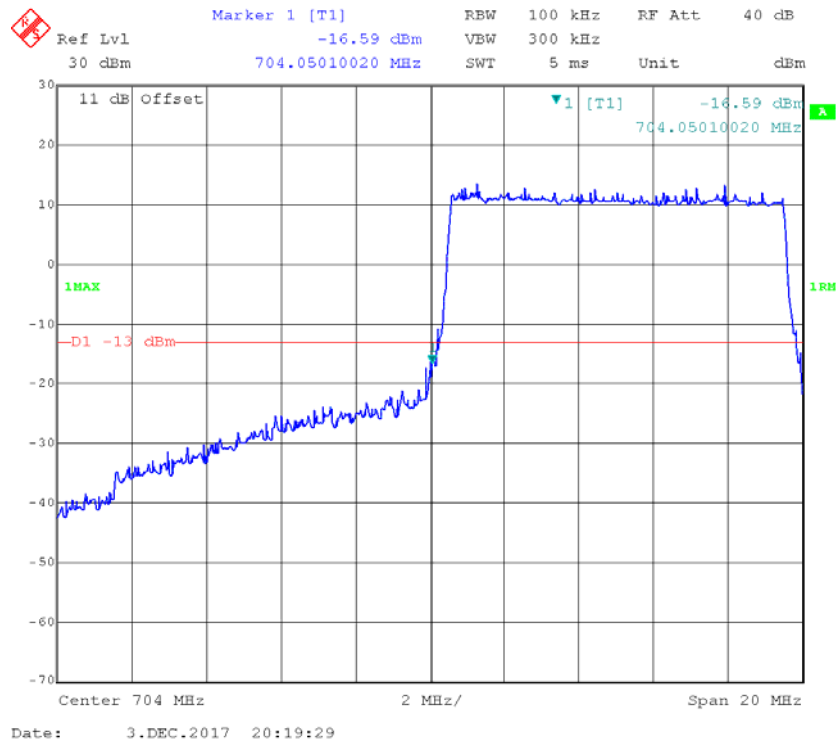
QPSK_5MHz_25 RB_ Left



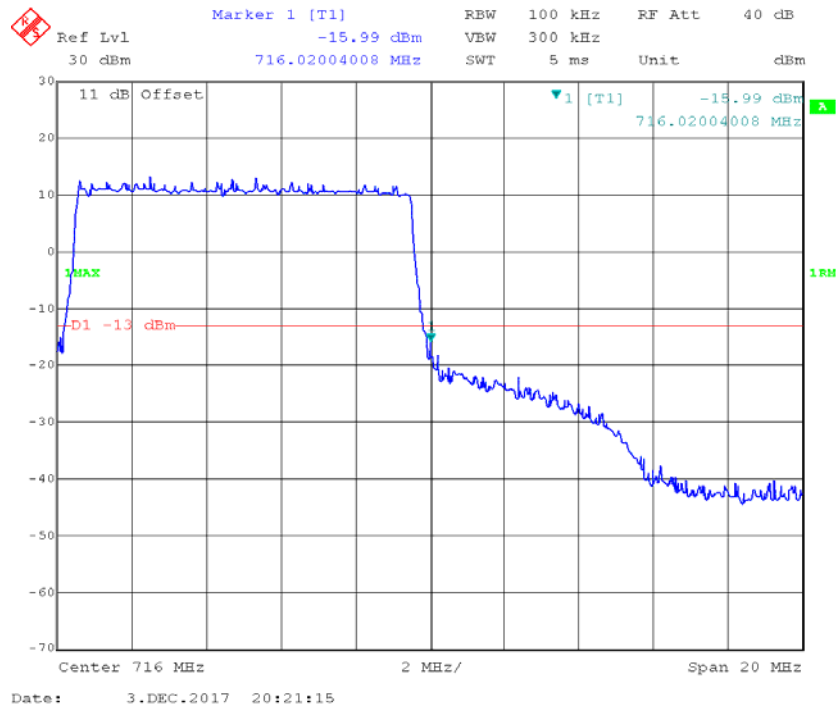
QPSK_5MHz_25 RB_ Right



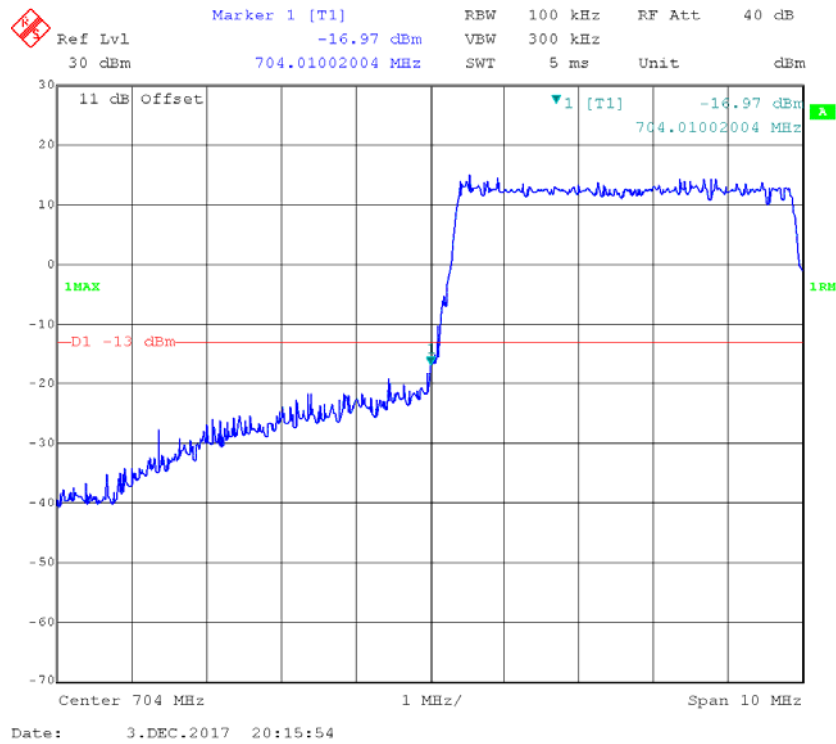
QPSK_10MHz_50 RB_Left



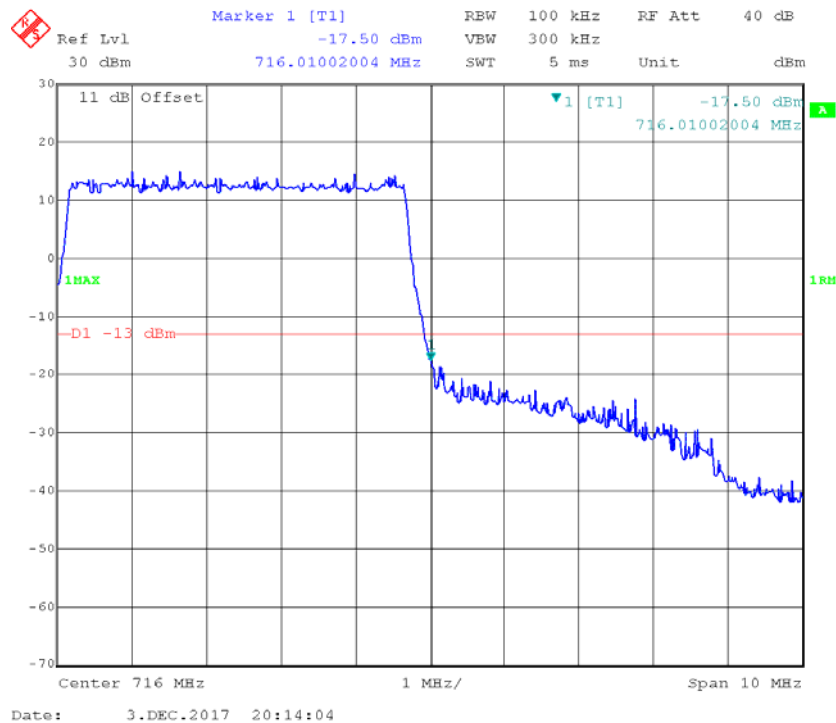
QPSK_10MHz_50 RB_Right



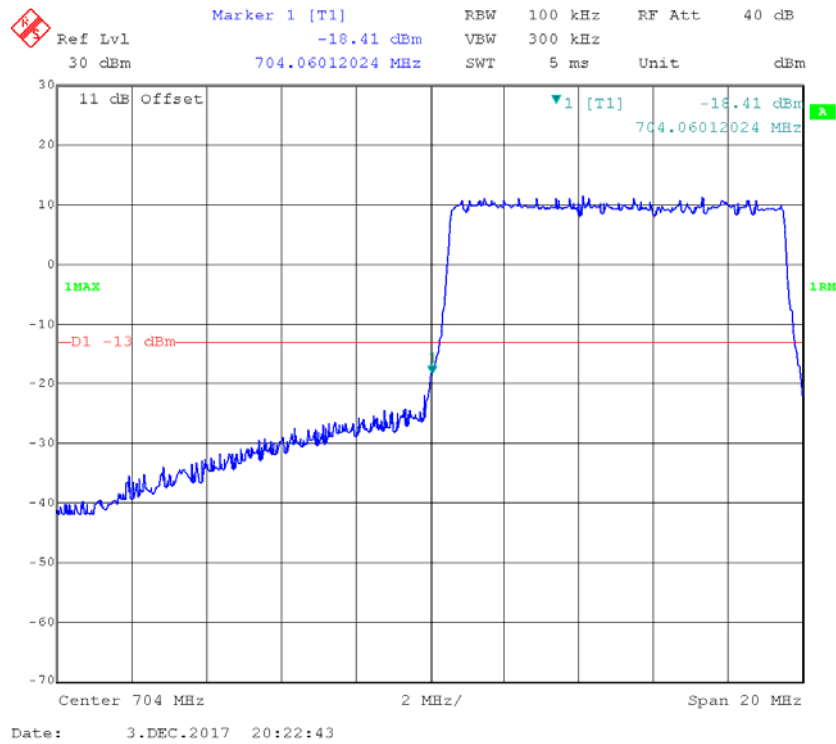
16QAM_5MHz_25 RB_ Left



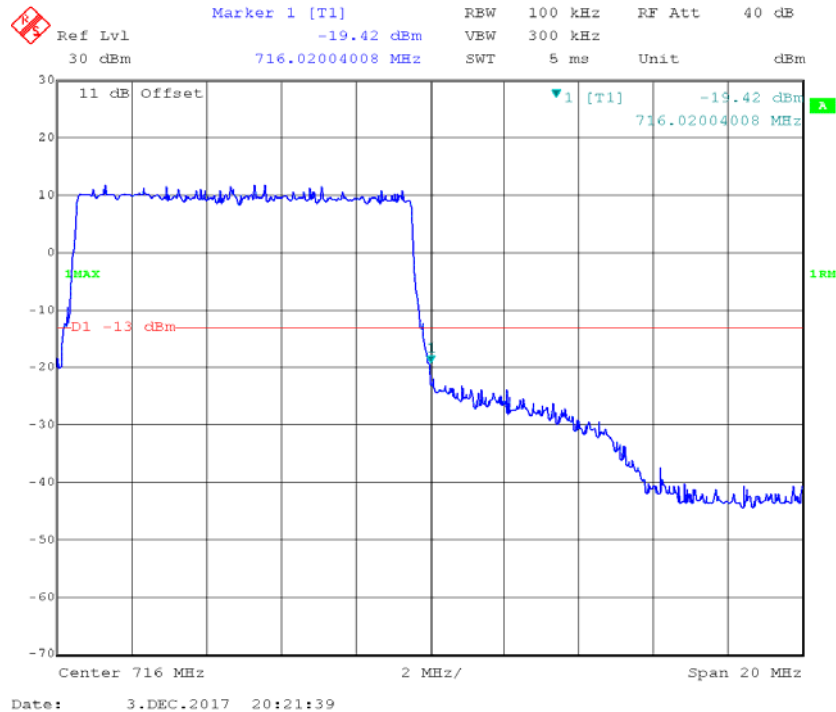
16QAM_5MHz_25 RB_ Right



16QAM_10MHz_ 50 RB_ Left



16QAM_10MHz_ 50 RB_ 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

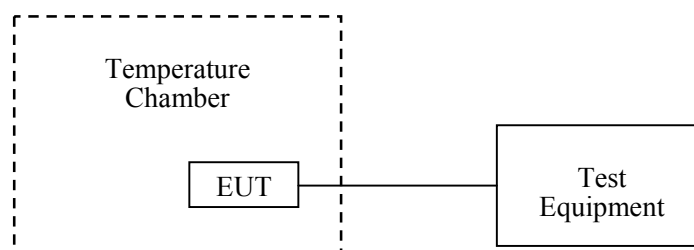
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
UNI-T	Multimeter	UT39A	M130199938	2017-04-02	2018-04-02
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Unknown	RF Attenuator	10dB	10dB-1	Each Time	/
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A

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

Test Data**Environmental Conditions**

Temperature:	25.9 °C
Relative Humidity:	47 %
ATM Pressure:	101.4 kPa

The testing was performed by Pean Zhu on 2017-12-01.

Cellular Band (Part 22H)

GMSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.8	-5	-0.006	2.5
-20		-8	-0.010	
-10		-9	-0.011	
0		-5	-0.006	
10		-11	-0.013	
20		-8	-0.010	
30		-10	-0.012	
40		-5	-0.006	
50		-6	-0.007	
25	3.6	-8	-0.010	
25	4.35	-9	-0.011	

8PSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{DC}	Hz	ppm	ppm
-30	3.8	-10	-0.012	2.5
-20		-7	-0.008	
-10		-7	-0.008	
0		-10	-0.012	
10		-8	-0.010	
20		-5	-0.006	
30		-12	-0.014	
40		-4	-0.005	
50		-4	-0.005	
25	3.6	-3	-0.004	
25	4.35	-5	-0.006	

PCS Band (Part 24E)

GMSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V_{DC}	Hz	ppm	
-30	3.8	-9	-0.005	Pass
-20		-5	-0.003	
-10		-7	-0.004	
0		-4	-0.002	
10		-5	-0.003	
20		-9	-0.005	
30		-14	-0.007	
40		-6	-0.003	
50		-8	-0.004	
25	3.6	-9	-0.005	
25	4.35	-6	-0.003	

8PSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V_{DC}	Hz	ppm	
-30	3.8	-6	-0.003	Pass
-20		-5	-0.003	
-10		-6	-0.003	
0		-1	-0.001	
10		-4	-0.002	
20		-11	-0.006	
30		-6	-0.003	
40		-11	-0.006	
50		-5	-0.003	
25	3.6	-3	-0.002	
25	4.35	-11	-0.006	

WCDMA Band II: R99

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V _{DC}	Hz	ppm	
-30	3.8	-6	-0.003	Pass
-20		-7	-0.004	
-10		-4	-0.002	
0		-10	-0.005	
10		-5	-0.003	
20		-7	-0.004	
30		0	0.000	
40		-7	-0.004	
50		-5	-0.003	
25	3.6	-8	-0.004	
25	4.35	-6	-0.003	

WCDMA Band IV: R99

Middle Channel, $f_c = 1732.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V _{DC}	Hz	ppm	
-30	3.8	-4	-0.002	Pass
-20		-8	-0.005	
-10		-1	-0.001	
0		-7	-0.004	
10		-13	-0.008	
20		-5	-0.003	
30		-5	-0.003	
40		-10	-0.006	
50		-4	-0.002	
25	3.6	-8	-0.005	
25	4.35	-3	-0.002	

WCDMA Band V: R99

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V _{DC}	Hz	ppm	
-30	3.8	-10	-0.012	Pass
-20		-10	-0.012	
-10		-5	-0.006	
0		-11	-0.013	
10		-8	-0.010	
20		-10	-0.012	
30		-8	-0.010	
40		-8	-0.010	
50		-5	-0.006	
25	3.6	-7	-0.008	
25	4.35	-12	-0.014	

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	16.77	0.0089	Pass
-20		16.04	0.0085	Pass
-10		15.57	0.0083	Pass
0		16.62	0.0088	Pass
10		16.08	0.0086	Pass
20		15.75	0.0084	Pass
30		15.65	0.0083	Pass
40		16.13	0.0086	Pass
50		15.84	0.0084	Pass
25	3.6	16.36	0.0087	Pass
25	4.35	15.64	0.0083	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	16.80	0.0089	Pass
-20		17.28	0.0092	Pass
-10		16.90	0.0090	Pass
0		16.37	0.0087	Pass
10		16.35	0.0087	Pass
20		15.99	0.0085	Pass
30		17.42	0.0093	Pass
40		16.76	0.0089	Pass
50		15.99	0.0085	Pass
25	3.6	17.65	0.0094	Pass
25	4.35	16.55	0.0088	Pass

LTE Band 4:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 1732.5$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	18.77	0.0108	Pass
-20		17.28	0.0100	Pass
-10		18.03	0.0104	Pass
0		18.79	0.0108	Pass
10		18.63	0.0108	Pass
20		18.22	0.0105	Pass
30		19.10	0.0110	Pass
40		18.83	0.0109	Pass
50		17.73	0.0102	Pass
25	3.6	17.26	0.0100	Pass
25	4.35	18.33	0.0106	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 1732.5$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	16.55	0.0096	Pass
-20		17.31	0.0100	Pass
-10		17.05	0.0098	Pass
0		16.81	0.0097	Pass
10		16.57	0.0096	Pass
20		16.44	0.0095	Pass
30		17.71	0.0102	Pass
40		17.20	0.0099	Pass
50		15.91	0.0092	Pass
25	3.6	18.22	0.0105	Pass
25	4.35	17.27	0.0100	Pass

LTE Band 5:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 836.5$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	21.84	0.0261	Pass
-20		21.45	0.0256	Pass
-10		21.05	0.0252	Pass
0		20.63	0.0247	Pass
10		21.42	0.0256	Pass
20		21.43	0.0256	Pass
30		20.89	0.0250	Pass
40		21.05	0.0252	Pass
50		20.57	0.0246	Pass
25	3.6	20.29	0.0243	Pass
25	4.35	21.21	0.0254	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 836.5$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	18.32	0.0219	Pass
-20		19.30	0.0231	Pass
-10		18.97	0.0227	Pass
0		19.70	0.0236	Pass
10		18.14	0.0217	Pass
20		18.79	0.0225	Pass
30		18.54	0.0222	Pass
40		19.04	0.0228	Pass
50		19.13	0.0229	Pass
25	3.6	17.98	0.0215	Pass
25	4.35	18.66	0.0223	Pass

LTE Band 7:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 2535$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	24.10	0.0095	Pass
-20		24.11	0.0095	Pass
-10		24.72	0.0098	Pass
0		24.07	0.0095	Pass
10		23.20	0.0092	Pass
20		25.39	0.0100	Pass
30		23.62	0.0093	Pass
40		24.70	0.0097	Pass
50		23.00	0.0091	Pass
25	3.6	24.51	0.0097	Pass
25	4.35	25.65	0.0101	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 2535$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	21.85	0.0086	Pass
-20		21.52	0.0085	Pass
-10		21.61	0.0085	Pass
0		21.49	0.0085	Pass
10		22.79	0.0090	Pass
20		23.24	0.0092	Pass
30		22.73	0.0090	Pass
40		22.55	0.0089	Pass
50		22.57	0.0089	Pass
25	3.6	21.61	0.0085	Pass
25	4.35	21.96	0.0087	Pass

LTE Band 12:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 707.5$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	19.25	0.0272	Pass
-20		19.24	0.0272	Pass
-10		18.70	0.0264	Pass
0		18.39	0.0260	Pass
10		19.03	0.0269	Pass
20		19.48	0.0275	Pass
30		18.36	0.0260	Pass
40		19.05	0.0269	Pass
50		17.89	0.0253	Pass
25	3.6	17.90	0.0253	Pass
25	4.35	18.99	0.0268	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 707.5$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	15.85	0.0224	Pass
-20		16.61	0.0235	Pass
-10		16.52	0.0233	Pass
0		17.44	0.0247	Pass
10		15.79	0.0223	Pass
20		16.38	0.0232	Pass
30		16.12	0.0228	Pass
40		16.49	0.0233	Pass
50		16.53	0.0234	Pass
25	3.6	15.92	0.0225	Pass
25	4.35	16.18	0.0229	Pass

LTE Band 17:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 710$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	18.21	0.0256	Pass
-20		17.23	0.0243	Pass
-10		17.18	0.0242	Pass
0		17.10	0.0241	Pass
10		17.05	0.0240	Pass
20		17.47	0.0246	Pass
30		17.39	0.0245	Pass
40		17.36	0.0245	Pass
50		17.13	0.0241	Pass
25	3.6	17.15	0.0242	Pass
25	4.35	16.97	0.0239	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 710$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{DC}	Hz	ppm	
-30	3.8	18.04	0.0254	Pass
-20		18.55	0.0261	Pass
-10		19.63	0.0276	Pass
0		18.47	0.0260	Pass
10		18.58	0.0262	Pass
20		18.87	0.0266	Pass
30		18.85	0.0265	Pass
40		18.43	0.0260	Pass
50		18.84	0.0265	Pass
25	3.6	19.00	0.0268	Pass
25	4.35	17.88	0.0252	Pass

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 *******