TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 22H, PART 24E

FCC PART 27

MEASUREMENT AND TEST REPORT

For

Quanzhou Tesunho Electronics Co., Ltd

2#, 5F E-19# Phase 2 Xunmei, Quanzhou, Fujian, China

FCC ID: 2AKS9TH682

Report Type:	**Product Type:**
Original Report	IP Trunking Radio

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		IP Trunking Radio
EUT Model:		TH-682
Multiple Model:		TH-518U, TH-681U, TH-683
FCC ID:		2AKS9TH682
Rated Input Voltage:		DC 3.7V from battery or DC12V form adapter
Adapter Information	**Model:**	ZM-01A1210
	Input:	100-240VAC, 50/60Hz 0.5A Max
	Output:	12V, 1000mA
External Dimension:		135.2mm(L)x60 mm (W)x 41.2mm(H)
Serial Number:		180926050-1(Model:*TH-682*) 180926050-2(Model: *TH-518U*)
EUT Received Date:		2018.09.27

Note: The series product, models TH-682, TH-518U, TH-681U and TH-683 are electrically identical, we selected TH-682 for fully test, radiation emissions test with each model, please refer to the declaration letter for details.

Objective

This report is prepared on behalf of ***Quanzhou Tesunho Electronics Co., Ltd*** 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)

N/A

Test Methodology

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

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

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

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

Measurement Uncertainty

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

Test Facility

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

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218,the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Justification

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

The test items were performed with the EUT operating at testing mode. The device operates on WCDMA Band 2/5, and LTE band 2/4/5/12/17, test was performed with channels as below table:

Frequency Bands	Bandwidth (MHz)	Test Frequency(MHz)		
		Low	Middle	High
WCDMA Band 2	4.2	1852.4	1880	1907.6
WCDMA Band 5	4.2	826.4	836.6	846.6
LTE Band 2	1.4	1850.7	1880	1909.3
	3	1851.5	1880	1908.5
	5	1852.5	1880	1907.5
	10	1855	1880	1905
	15	1857.5	1880	1902.5
	20	1860	1880	1900
LTE Band 4	1.4	1710.7	1732.5	1754.3
	3	1711.5	1732.5	1753.5
	5	1712.5	1732.5	1752.5
	10	1715	1732.5	1750
	15	1717.5	1732.5	1747.5
	20	1720	1732.5	1745
LTE Band 5	1.4	824.7	836.5	848.3
	3	825.5	836.5	847.5
	5	826.5	836.5	846.5
	10	829	836.5	844
LTE Band 12	1.4	699.7	707.5	715.3
	3	700.5	707.5	714.5
	5	701.5	707.5	713.5
	10	704	707.5	711
LTE Band 17	5	706.5	710	713.5
	10	709	710	711

For LTE band 2 and 4, 10/15/20MHz bandwidth only supports QPSK modulation, 16QAM was not enabled,
For LTE band 5/12/17, 10MHz bandwidth only supports QPSK modulation, 16QAM was not enabled.

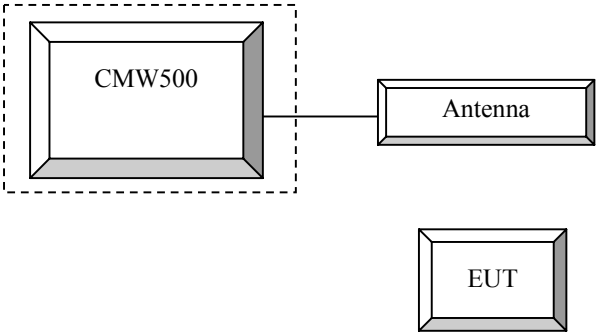
Equipment Modifications

No modification was made to the EUT.

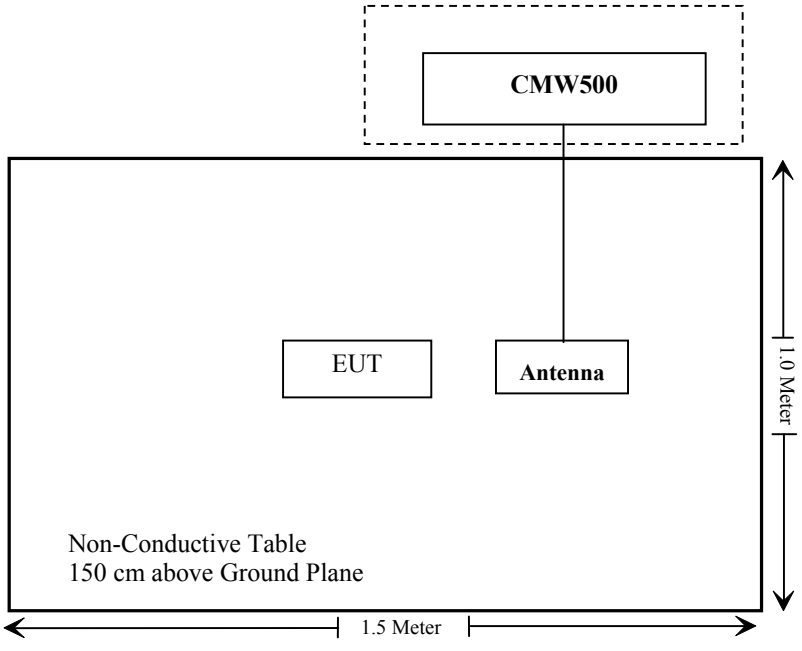
Support Equipment List and Details

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

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1093	RF Exposure	Compliance
§2.1046; § 22.913 (a); § 24.232 (c); §27.50	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905 § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
§ 2.1051, § 22.917 (a); § 24.238 (a); §27.53	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053 § 22.917 (a); § 24.238 (a); §27.53	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: RXM180926050-20.

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

WCDMA-Release 99

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

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

WCDMA HSDPA

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

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

WCDMA HSUPA

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

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

HSPA+

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

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

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

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

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

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

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

DC-HSDPA

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

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

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

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

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

LTE (FDD):

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

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

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

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

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

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

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

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

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

Radiated method:

ANSI/TIA-603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Agilent	Signal Generator	E8247C	MY43321350	2017-12-11	2018-12-11
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/

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

Test Data

Environmental Conditions

Temperature:	25.8~28°C
Relative Humidity:	34~47 %
ATM Pressure:	100.8~101.2 kPa

** The testing was performed by Sunny Cen & Blake Yang on 2018-09-30~2018-11-08.*

Conducted Output Power

WCDMA Band II

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.75	2.60	21.26	3.12	19.42	3.32
HSDPA	1	22.03	3.88	20.39	4.12	18.43	4.48
	2	22.00	3.89	20.30	4.14	18.38	4.47
	3	21.99	3.90	20.43	4.07	18.43	4.43
	4	21.94	3.90	20.39	4.12	18.45	4.45
HSUPA	1	21.20	4.28	19.78	4.20	18.13	4.20
	2	21.14	4.18	19.69	4.22	18.15	4.17
	3	21.16	4.20	19.68	4.16	18.18	4.17
	4	21.24	4.28	19.75	4.20	18.10	4.11
	5	21.21	4.26	19.68	4.16	18.15	4.25
DC-HSDPA	1	21.18	4.18	19.82	4.23	18.07	4.21
	2	21.21	4.26	19.69	4.13	18.13	4.24
	3	21.10	4.21	19.70	4.14	18.15	4.10
	4	21.21	4.29	19.74	4.17	18.03	4.24
HSPA+ (16QAM)	1	21.16	4.26	19.68	4.24	18.03	4.18

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	19.62	3.12	19.75	3.24	19.69	3.08
HSDPA	1	18.60	4.04	18.62	3.96	18.67	3.96
	2	22.02	3.88	20.38	4.04	18.46	4.41
	3	21.97	3.80	20.44	4.05	18.46	4.39
	4	22.02	3.80	20.34	4.07	18.40	4.53
HSUPA	1	18.15	4.00	18.05	3.48	18.14	4.08
	2	21.11	4.29	19.76	4.17	18.04	4.21
	3	21.24	4.25	19.77	4.20	18.16	4.19
	4	21.17	4.25	19.80	4.22	18.09	4.11
	5	21.24	4.22	19.73	4.22	18.07	4.11
DC-HSDPA	1	21.11	4.22	19.83	4.20	18.04	4.11
	2	21.17	4.21	19.72	4.23	18.10	4.22
	3	21.18	4.33	19.74	4.23	18.08	4.20
	4	21.13	4.23	19.70	4.13	18.13	4.18
HSPA+ (16QAM)	1	21.19	4.31	19.75	4.16	18.13	4.17

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	21.93	21.62	21.92
		1#3	21.99	21.55	21.90
		1#5	21.93	21.64	21.80
		3#0	22.04	21.61	21.87
		3#3	22.14	21.63	21.74
		6#0	20.99	20.78	20.78
	16QAM	1#0	21.31	20.32	20.52
		1#3	21.51	20.46	20.91
		1#5	21.34	20.34	20.60
		3#0	21.01	20.74	20.89
		3#3	21.13	20.65	20.77
		6#0	19.84	19.49	19.88
3MHz	QPSK	1#0	22.07	21.97	21.59
		1#8	22.09	21.69	21.62
		1#14	22.01	21.98	21.64
		6#0	20.95	20.63	20.83
		6#9	21.03	20.58	20.70
		15#0	21.06	20.62	20.88
	16QAM	1#0	21.23	21.29	21.34
		1#8	21.12	20.89	20.78
		1#14	21.19	21.30	20.90
		6#0	19.84	19.79	19.91
		6#9	20.11	19.88	19.76
		15#0	20.13	19.83	19.90
5MHz	QPSK	1#0	21.84	21.73	21.85
		1#13	21.76	21.56	21.85
		1#24	21.61	21.77	21.83
		15#0	21.05	20.58	20.84
		15#10	20.95	20.64	20.76
		25#0	21.14	20.66	20.86
	16QAM	1#0	20.62	21.00	20.50
		1#13	20.53	20.80	20.32
		1#24	20.23	21.16	20.28
		15#0	19.99	19.50	19.87
		15#10	20.08	19.48	19.90
		25#0	20.22	19.79	19.92

10MHz	QPSK	1#0	22.03	21.59	21.22
		1#25	21.89	21.61	21.36
		1#49	21.75	21.70	21.44
		25#0	21.01	20.39	20.25
		25#25	20.65	20.45	20.37
		50#0	20.86	20.48	20.32
15MHz	QPSK	1#0	21.02	21.04	20.95
		1#38	20.49	20.64	20.65
		1#74	20.59	20.56	20.67
		36#0	20.77	20.61	20.75
		36#39	20.77	20.63	20.42
		75#0	20.61	20.73	20.69
20MHz	QPSK	1#0	21.41	20.85	20.69
		1#50	20.92	20.56	20.43
		1#99	21.00	20.44	20.42
		50#0	20.93	20.61	20.29
		50#50	20.87	20.38	20.22
		100#0	21.11	20.61	20.29

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	20.41	20.33	20.18
		1#3	20.19	19.81	19.87
		1#5	19.90	19.99	19.77
		3#0	20.16	19.83	19.94
		3#3	19.88	19.86	19.68
		6#0	19.98	20.04	19.92
	16QAM	1#0	19.57	20.12	19.31
		1#3	19.22	19.66	19.01
		1#5	19.29	19.92	18.85
		3#0	19.13	19.90	18.95
		3#3	19.29	19.58	18.85
		6#0	19.30	19.93	19.03
3MHz	QPSK	1#0	19.31	19.05	19.06
		1#8	19.06	18.54	18.59
		1#14	18.89	18.69	18.65
		6#0	18.90	18.65	18.84
		6#7	19.01	18.70	18.56
		15#0	18.84	18.55	18.59
	16QAM	1#0	20.22	19.23	18.57
		1#8	19.92	18.95	18.25
		1#14	19.80	18.84	18.32
		6#0	19.91	18.96	18.35
		6#7	19.95	18.79	18.20
		15#0	19.73	18.92	18.07
5MHz	QPSK	1#0	20.30	19.99	20.05
		1#13	20.06	19.64	19.77
		1#24	20.05	19.62	19.52
		15#0	20.05	19.72	19.64
		15#10	20.07	19.60	19.52
		25#0	19.85	19.79	19.74
	16QAM	1#0	18.86	18.42	19.33
		1#13	18.43	18.04	19.08
		1#24	18.51	18.12	18.89
		15#0	18.59	18.11	18.96
		15#10	18.62	18.23	18.84
		25#0	18.39	18.22	18.97

10MHz	QPSK	1#0	20.39	19.98	20.37
		1#24	19.88	19.57	20.11
		1#49	19.87	19.56	19.98
		25#0	20.18	19.60	20.02
		25#25	20.14	19.64	20.09
		50#0	20.15	19.46	19.87
15MHz	QPSK	1#0	20.21	20.11	20.09
		1#38	19.95	19.74	19.56
		1#74	19.89	19.72	19.85
		36#0	19.72	19.90	19.76
		36#39	19.96	19.70	19.90
		75#0	19.92	19.71	19.65
20MHz	QPSK	1#0	20.26	20.09	20.39
		1#49	19.82	19.55	20.00
		1#99	19.97	19.86	19.99
		50#0	20.07	19.86	20.12
		50#50	20.06	19.77	19.86
		100#0	19.86	19.67	20.17

LTE Band 5

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.92	22.74	22.25
		1#3	22.57	22.31	21.96
		1#5	22.43	22.20	21.78
		3#0	22.42	22.45	21.95
		3#3	22.61	22.49	22.01
		6#0	22.67	22.36	21.84
	16QAM	1#0	21.67	21.25	21.89
		1#3	21.36	21.05	21.46
		1#5	21.42	20.86	21.61
		3#0	21.22	20.86	21.48
		3#3	21.22	20.90	21.44
		6#0	21.17	20.86	21.47
3MHz	QPSK	1#0	23.11	22.54	22.30
		1#8	22.74	22.27	21.89
		1#14	22.72	22.16	21.92
		6#0	22.89	22.02	22.04
		6#9	22.69	22.31	21.94
		15#0	22.65	22.13	21.98
	16QAM	1#0	22.43	21.98	21.06
		1#8	22.17	21.47	20.72
		1#14	22.01	21.47	20.69
		6#0	22.08	21.50	20.59
		6#9	21.98	21.50	20.53
		15#0	22.16	21.72	20.57
5MHz	QPSK	1#0	22.85	22.49	22.57
		1#13	22.35	22.30	22.13
		1#24	22.40	22.08	22.12
		15#0	22.36	22.19	22.03
		15#10	22.57	22.27	22.29
		25#0	22.55	22.15	22.36
	16QAM	1#0	20.87	20.99	21.24
		1#13	20.43	20.53	20.80
		1#24	20.59	20.76	20.86
		15#0	20.66	20.53	20.82
		15#10	20.47	20.69	20.74
		25#0	20.38	20.66	21.02
10MHz	QPSK	1#0	22.85	22.69	22.47
		1#25	22.51	22.45	22.11
		1#49	22.63	22.46	21.94
		25#0	22.66	22.20	22.11
		25#25	22.39	22.20	22.00
		50#0	22.54	22.21	22.24

LTE Band 12

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.83	22.78	22.58
		1#3	22.53	22.42	22.29
		1#5	22.64	22.56	22.21
		3#0	22.58	22.50	22.36
		3#3	22.52	22.41	22.24
		6#0	22.58	22.31	22.21
	16QAM	1#0	21.11	21.85	21.74
		1#3	20.89	21.48	21.22
		1#5	20.80	21.45	21.26
		3#0	20.80	21.39	21.25
		3#3	20.91	21.63	21.45
		6#0	20.74	21.50	21.52
3MHz	QPSK	1#0	22.61	22.69	22.77
		1#8	22.07	22.17	22.23
		1#14	22.17	22.18	22.36
		6#0	22.27	22.36	22.54
		6#9	22.39	22.37	22.33
		15#0	22.28	22.18	22.44
	16QAM	1#0	21.55	21.53	21.94
		1#8	21.12	21.24	21.71
		1#14	21.06	21.03	21.42
		6#0	21.36	21.29	21.73
		6#9	21.14	21.28	21.75
		15#0	21.10	21.29	21.66
5MHz	QPSK	1#0	22.49	22.52	22.62
		1#13	22.27	22.20	22.13
		1#24	22.09	22.20	22.26
		15#0	22.11	22.29	22.17
		15#10	22.07	22.27	22.11
		25#0	22.17	22.19	22.22
	16QAM	1#0	21.36	20.96	21.88
		1#13	20.85	20.68	21.54
		1#24	21.11	20.61	21.54
		15#0	21.07	20.42	21.51
		15#10	21.12	20.73	21.57
		25#0	21.11	20.51	21.62
10MHz	QPSK	1#0	22.57	22.61	22.69
		1#25	22.07	22.42	22.49
		1#49	22.36	22.27	22.43
		25#0	22.08	22.09	22.36
		25#25	22.14	22.31	22.22
		50#0	22.03	22.20	22.44

LTE Band 17

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.15	22.03	22.04
		1#13	21.92	21.71	21.54
		1#24	21.80	21.49	21.59
		15#0	21.91	21.70	21.57
		15#10	21.76	21.82	21.64
		25#0	21.78	21.58	21.61
	16QAM	1#0	20.51	20.99	21.35
		1#13	20.26	20.49	21.10
		1#24	20.13	20.61	21.14
		15#0	20.11	20.50	20.81
		15#10	20.12	20.53	20.93
		25#0	20.04	20.54	20.90
10MHz	QPSK	1#0	22.25	22.13	22.07
		1#25	21.91	21.84	21.84
		1#49	21.77	21.60	21.76
		25#0	21.88	21.70	21.88
		25#25	21.95	21.83	21.70
		50#0	21.91	21.71	21.74

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	4.76	4.68	4.72	13
	100 RB		6.36	6.32	6.40	13
16QAM	1 RB	5 MHz	5.80	5.68	5.52	13
	25 RB		6.28	6.28	6.16	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	4.80	4.64	4.64	13
	100 RB		6.36	6.36	6.36	13
16QAM	1 RB	5 MHz	5.80	5.68	5.64	13
	25 RB		6.36	6.04	6.16	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	4.68	4.96	4.76	13
	50 RB		5.16	5.44	5.32	13
16QAM	1 RB	5 MHz	5.72	6.04	5.44	13
	25 RB		6.28	6.52	6.12	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	3.88	4.36	4.92	13
	50 RB		5.36	5.36	5.24	13
16QAM	1 RB	5 MHz	4.88	5.80	5.04	13
	25 RB		5.76	6.28	5.92	13

PAR, Band 17

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.68	4.88	4.92	13
	50 RB		5.32	5.20	5.16	13
16QAM	1 RB	5 MHz	5.80	5.56	5.00	13
	25 RB		6.28	6.04	6.08	13

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

ERP & EIRP

WCDMA:

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 5 Middle Channel								
836.60	H	82.04	7.12	0.00	0.97	6.15	38.45	32.30
836.60	V	92.87	21.08	0.00	0.97	20.11	38.45	18.34
WCDMA Band 2 Middle Channel								
1880.00	H	84.32	11.71	11.66	2.66	20.71	33.00	12.29
1880.00	V	88.02	15.55	11.66	2.66	24.55	33.00	8.45

LTE Band 2 Middle Channel:

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1880.000	1.4	QPSK	H	82.46	9.85	11.66	2.66	18.85	33.00	14.15
1880.000			V	87.74	15.27	11.66	2.66	24.27	33.00	8.73
1880.000	3		H	82.14	9.53	11.66	2.66	18.53	33.00	14.47
1880.000			V	87.12	14.65	11.66	2.66	23.65	33.00	9.35
1880.000	5		H	81.78	9.17	11.66	2.66	18.17	33.00	14.83
1880.000			V	86.81	14.34	11.66	2.66	23.34	33.00	9.66
1880.000	10		H	82.38	9.77	11.66	2.66	18.77	33.00	14.23
1880.000			V	87.87	15.40	11.66	2.66	24.40	33.00	8.60
1880.000	15		H	81.31	8.70	11.66	2.66	17.70	33.00	15.30
1880.000			V	86.15	13.68	11.66	2.66	22.68	33.00	10.32
1880.000	20		H	80.56	7.95	11.66	2.66	16.95	33.00	16.05
1880.000			V	84.13	11.66	11.66	2.66	20.66	33.00	12.34
1880.000	1.4	16QAM	H	81.32	8.71	11.66	2.66	17.71	33.00	15.29
1880.000			V	86.01	13.54	11.66	2.66	22.54	33.00	10.46
1880.000	3		H	81.04	8.43	11.66	2.66	17.43	33.00	15.57
1880.000			V	85.77	13.30	11.66	2.66	22.30	33.00	10.70
1880.000	5		H	80.71	8.10	11.66	2.66	17.10	33.00	15.90
1880.000			V	85.68	13.21	11.66	2.66	22.21	33.00	10.79

LTE Band 4 Middle Channel:

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1732.500	1.4	QPSK	H	82.46	8.41	10.90	2.51	16.80	30.00	13.20
1732.500			V	88.65	14.28	10.90	2.51	22.67	30.00	7.33
1732.500	3		H	81.67	7.62	10.90	2.51	16.01	30.00	13.99
1732.500			V	88.05	13.68	10.90	2.51	22.07	30.00	7.93
1732.500	5		H	80.55	6.50	10.90	2.51	14.89	30.00	15.11
1732.500			V	87.87	13.50	10.90	2.51	21.89	30.00	8.11
1732.500	10		H	80.29	6.24	10.90	2.51	14.63	30.00	15.37
1732.500			V	87.13	12.76	10.90	2.51	21.15	30.00	8.85
1732.500	15		H	80.69	6.64	10.90	2.51	15.03	30.00	14.97
1732.500			V	87.24	12.87	10.90	2.51	21.26	30.00	8.74
1732.500	20		H	79.73	5.68	10.90	2.51	14.07	30.00	15.93
1732.500			V	86.72	12.35	10.90	2.51	20.74	30.00	9.26
1732.500	1.4	16QAM	H	82.21	8.16	10.90	2.51	16.55	30.00	13.45
1732.500			V	88.25	13.88	10.90	2.51	22.27	30.00	7.73
1732.500	3		H	81.63	7.58	10.90	2.51	15.97	30.00	14.03
1732.500			V	87.85	13.48	10.90	2.51	21.87	30.00	8.13
1732.500	5		H	80.31	6.26	10.90	2.51	14.65	30.00	15.35
1732.500			V	87.36	12.99	10.90	2.51	21.38	30.00	8.62

LTE Band 5

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
836.50	1.4	QPSK	H	85.54	10.61	0.00	0.97	9.64	38.45	28.81
836.50			V	96.47	24.68	0.00	0.97	23.71	38.45	14.74
836.50	3		H	85.28	10.35	0.00	0.97	9.38	38.45	29.07
836.50			V	96.11	24.32	0.00	0.97	23.35	38.45	15.10
836.50	5		H	84.85	9.92	0.00	0.97	8.95	38.45	29.50
836.50			V	95.68	23.89	0.00	0.97	22.92	38.45	15.53
836.50	10		H	83.69	8.76	0.00	0.97	7.79	38.45	30.66
836.50			V	94.70	22.91	0.00	0.97	21.94	38.45	16.51
836.50	1.4	16QAM	H	84.98	10.05	0.00	0.97	9.08	38.45	29.37
836.50			V	96.25	24.46	0.00	0.97	23.49	38.45	14.96
836.50	3		H	84.76	9.83	0.00	0.97	8.86	38.45	29.59
836.50			V	95.88	24.09	0.00	0.97	23.12	38.45	15.33
836.50	5		H	84.56	9.63	0.00	0.97	8.66	38.45	29.79
836.50			V	95.27	23.48	0.00	0.97	22.51	38.45	15.94

LTE Band 12 Middle Channel:

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
707.500	1.4	QPSK	H	86.32	9.46	0.00	0.94	8.52	34.77	26.25
707.500			V	97.18	22.76	0.00	0.94	21.82	34.77	12.95
707.500	3		H	85.72	8.86	0.00	0.94	7.92	34.77	26.85
707.500			V	96.54	22.12	0.00	0.94	21.18	34.77	13.59
707.500	5		H	84.37	7.51	0.00	0.94	6.57	34.77	28.20
707.500			V	95.91	21.49	0.00	0.94	20.55	34.77	14.22
707.500	10		H	85.72	8.86	0.00	0.94	7.92	34.77	26.85
707.500			V	96.54	22.12	0.00	0.94	21.18	34.77	13.59
707.500	1.4	16QAM	H	86.17	9.31	0.00	0.94	8.37	34.77	26.40
707.500			V	97.15	22.73	0.00	0.94	21.79	34.77	12.98
707.500	3		H	85.54	8.68	0.00	0.94	7.74	34.77	27.03
707.500			V	96.31	21.89	0.00	0.94	20.95	34.77	13.82
707.500	5		H	83.76	6.90	0.00	0.94	5.96	34.77	28.81
707.500			V	95.45	21.03	0.00	0.94	20.09	34.77	14.68

LTE Band 17

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
710.00	5	QPSK	H	83.75	6.94	0.00	0.94	6.00	34.77	28.77
710.00			V	94.65	20.29	0.00	0.94	19.35	34.77	15.42
710.00	10		H	82.10	5.29	0.00	0.94	4.35	34.77	30.42
710.00			V	93.24	18.88	0.00	0.94	17.94	34.77	16.83
710.00	5	16QAM	H	83.35	6.54	0.00	0.94	5.60	34.77	29.17
710.00			V	94.17	19.81	0.00	0.94	18.87	34.77	15.90

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

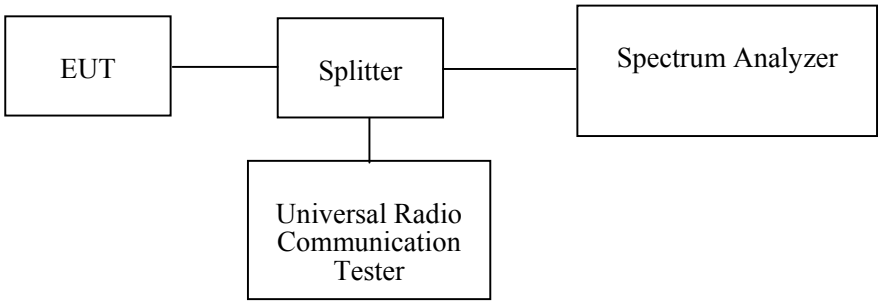
Applicable Standard

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	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	N/A
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each time	N/A

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

Test Data

Environmental Conditions

Temperature:	26.7~28.3°C
Relative Humidity:	42~46 %
ATM Pressure:	100~100.8 kPa

The testing was performed by Swim Lv from 2018-09-30 to 2018-11-15.

Test Mode: Transmitting

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

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
WCDMA Band II	M	Rel 99	4.148	4.721
		HSDPA	4.148	4.743
		HSUPA	4.148	4.741
WCDMA Band V		Rel 99	4.168	4.740
		HSDPA	4.148	4.764
		HSUPA	4.168	4.760

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.112	1.305
		16QAM	1.110	1.326
	3 MHz	QPSK	2.705	2.949
		16QAM	2.688	2.976
	5 MHz	QPSK	4.549	5.043
		16QAM	4.520	5.040
	10 MHz	QPSK	8.938	9.836
	15 MHz	QPSK	13.527	15.066
	20 MHz	QPSK	17.956	19.388

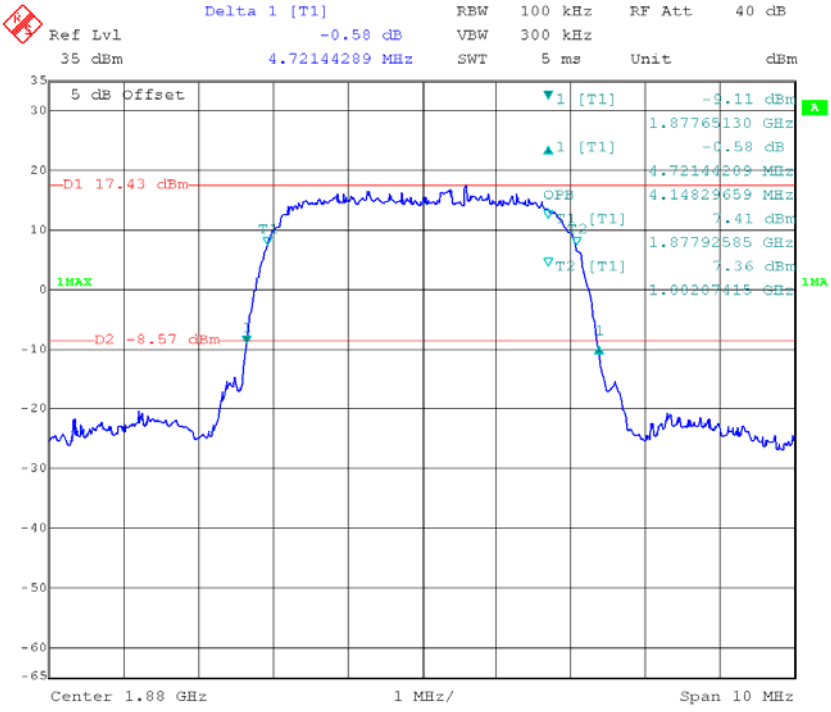
Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 4	1.4 MHz	QPSK	1.112	1.294
		16QAM	1.110	1.314
	3 MHz	QPSK	2.705	2.934
		16QAM	2.700	2.988
	5 MHz	QPSK	4.549	5.040
		16QAM	4.520	5.040
	10 MHz	QPSK	8.938	9.882
	15 MHz	QPSK	13.527	14.980
	20 MHz	QPSK	17.876	19.365

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 5	1.4 MHz	QPSK	1.112	1.290
		16QAM	1.110	1.326
	3 MHz	QPSK	2.705	2.931
		16QAM	2.700	2.976
	5 MHz	QPSK	4.549	5.068
		16QAM	4.520	5.040
	10 MHz	QPSK	9.018	9.848

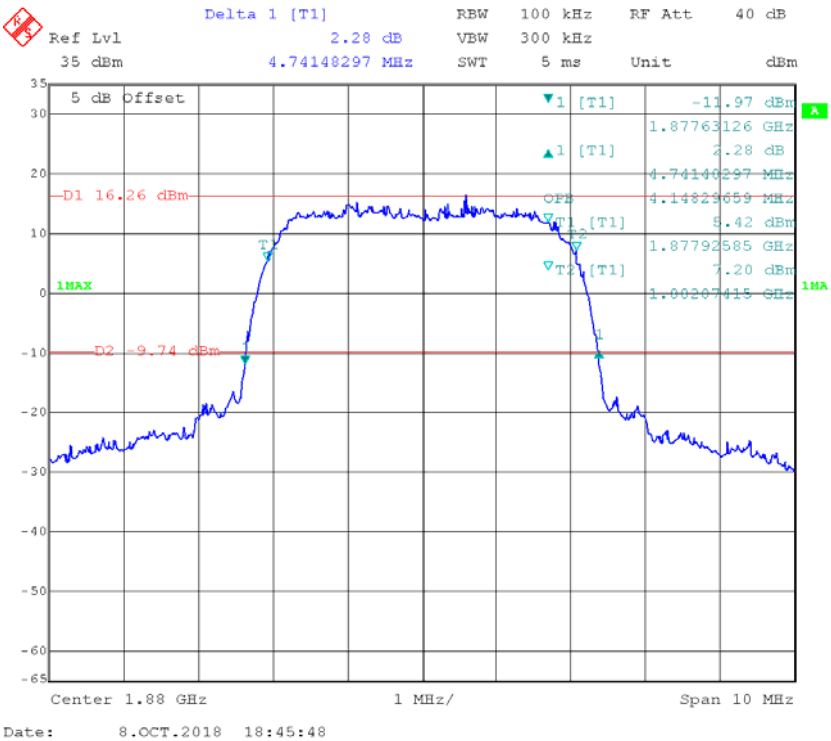
Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 12	1.4 MHz	QPSK	1.100	1.314
		16QAM	1.104	1.308
	3 MHz	QPSK	2.693	2.933
		16QAM	2.700	2.958
	5 MHz	QPSK	4.549	5.083
		16QAM	4.520	5.040
	10 MHz	QPSK	9.018	9.870

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 17	5 MHz	QPSK	4.529	5.040
		16QAM	4.540	5.060
	10 MHz	QPSK	8.978	9.762

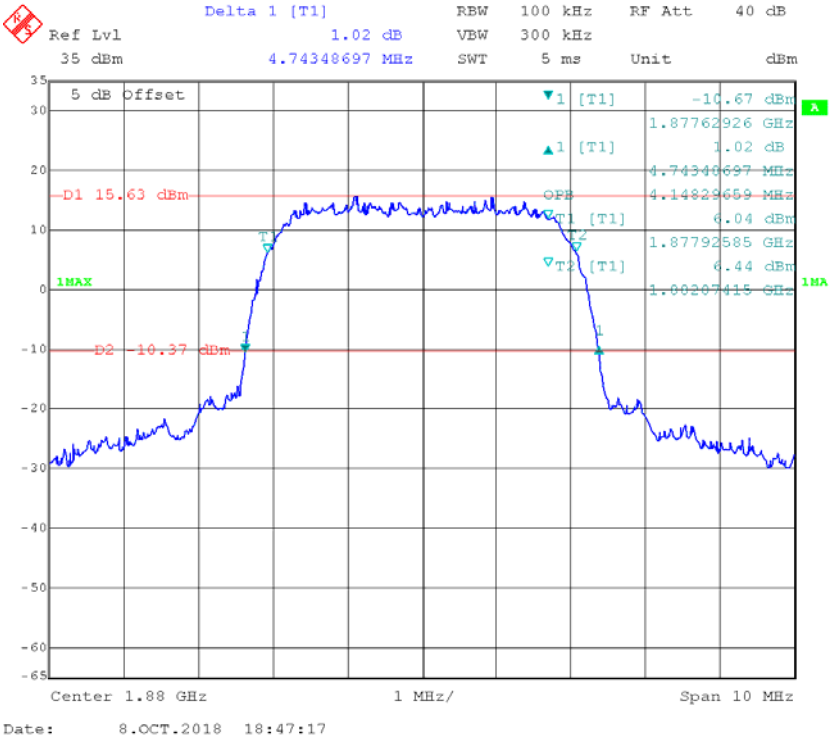
WCDMA Band II, Rel 99



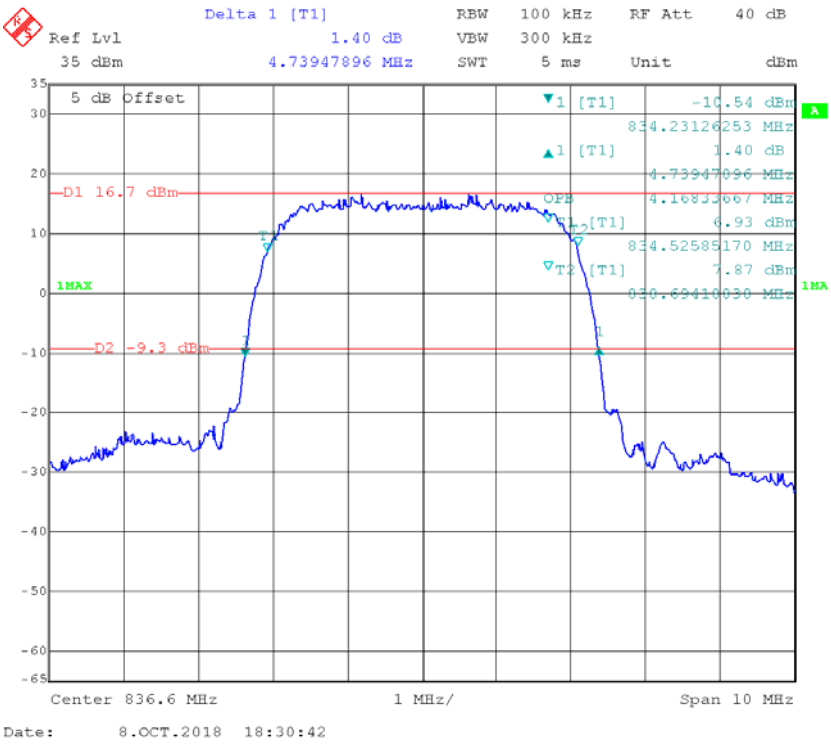
WCDMA Band II, HSUPA



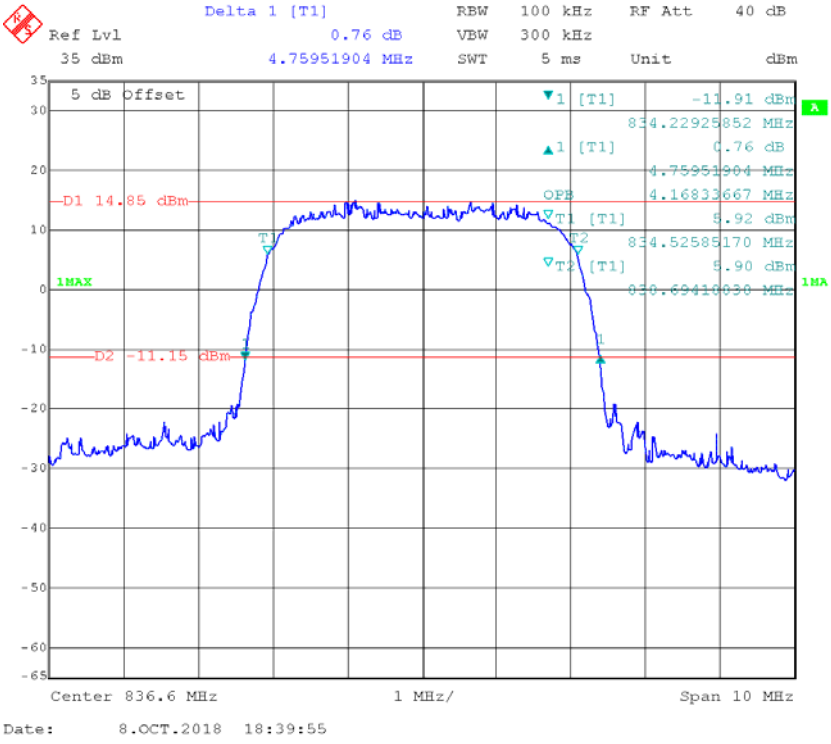
WCDMA Band II, HSDPA



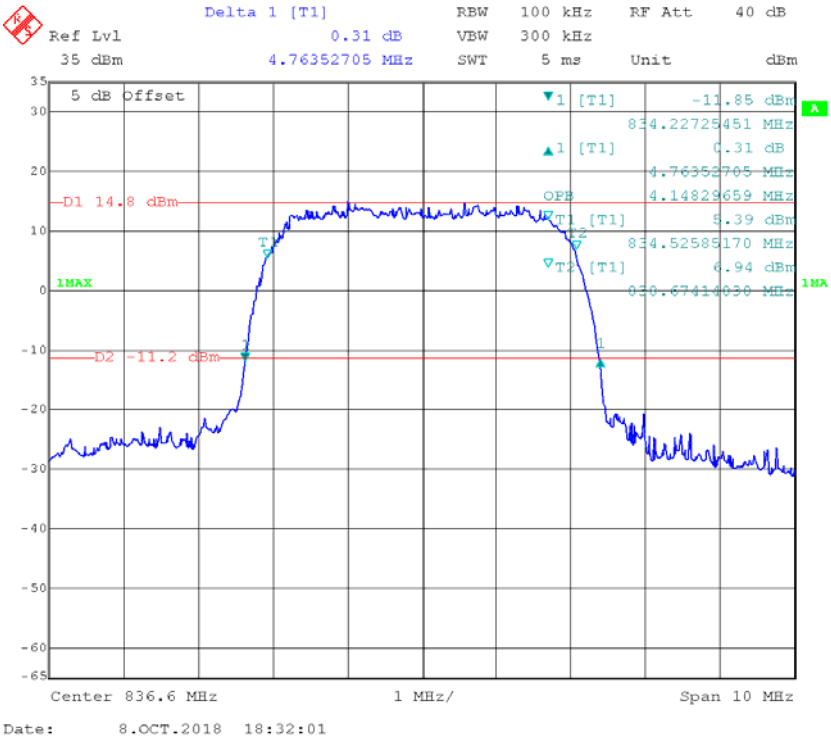
WCDMA Band V, Rel 99



WCDMA Band V, HSUPA

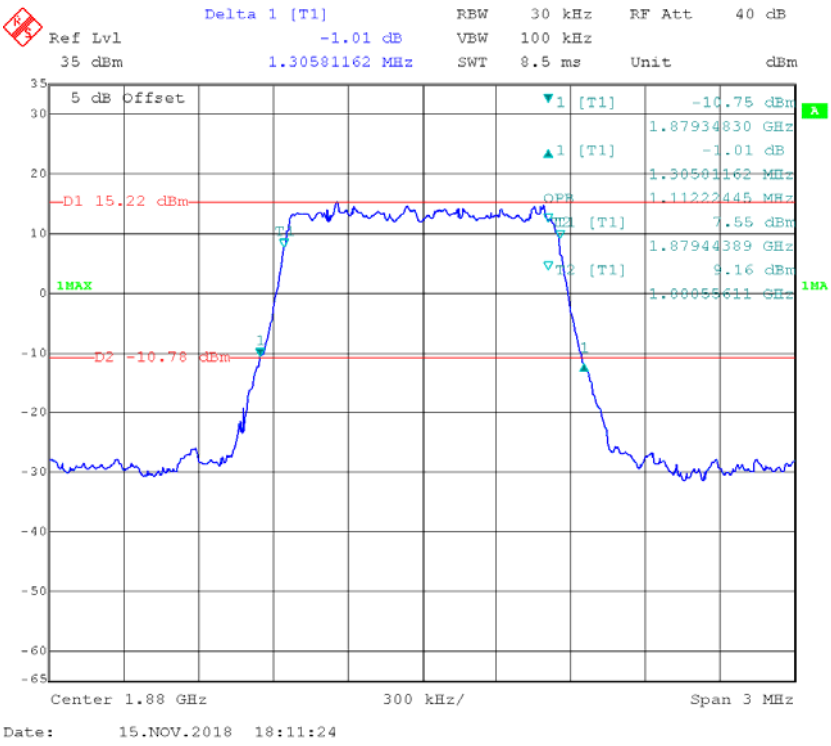


WCDMA Band V, HSDPA

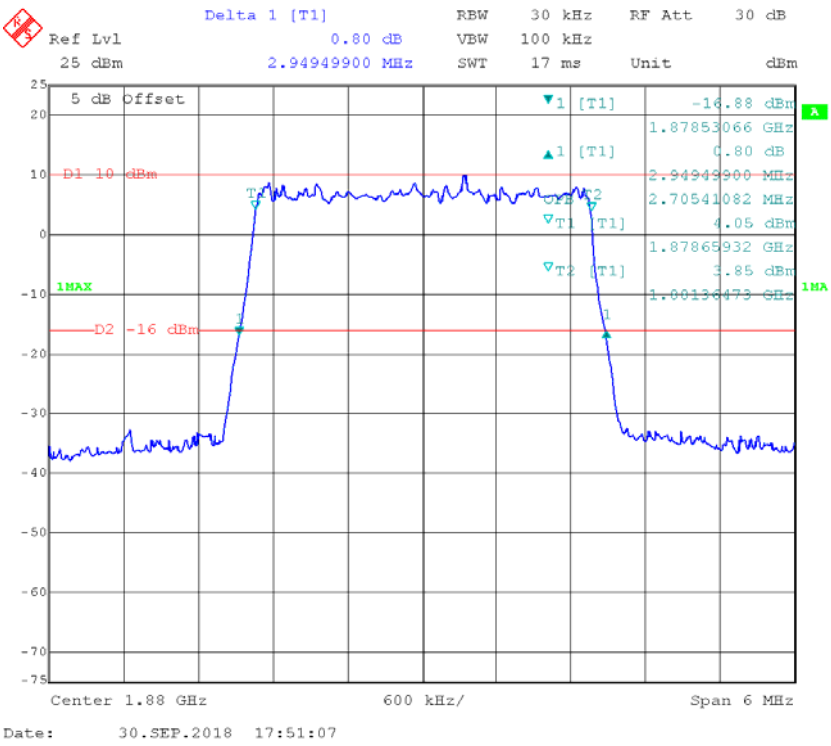


LTE Band 2

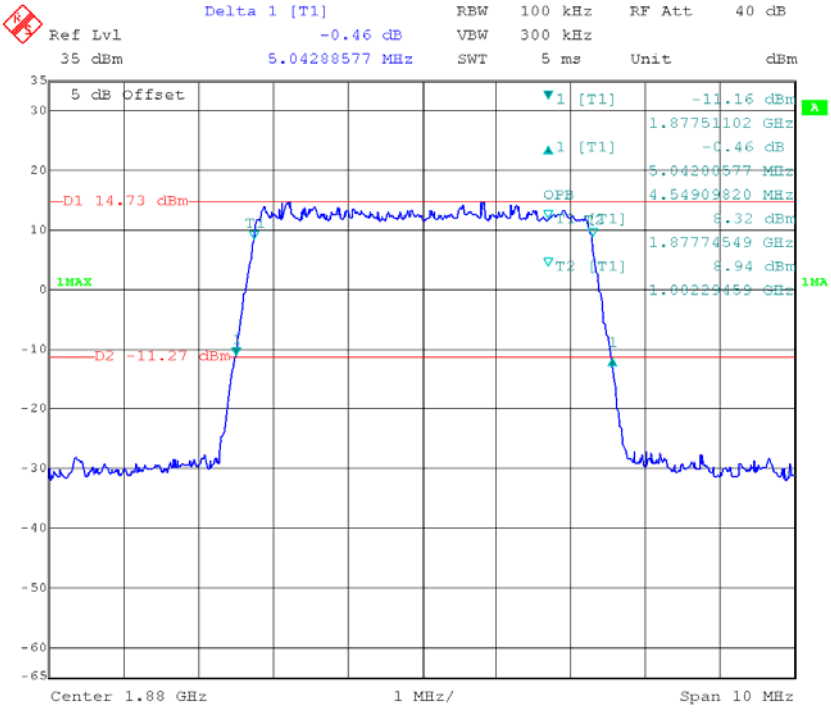
QPSK_1.4 MHz



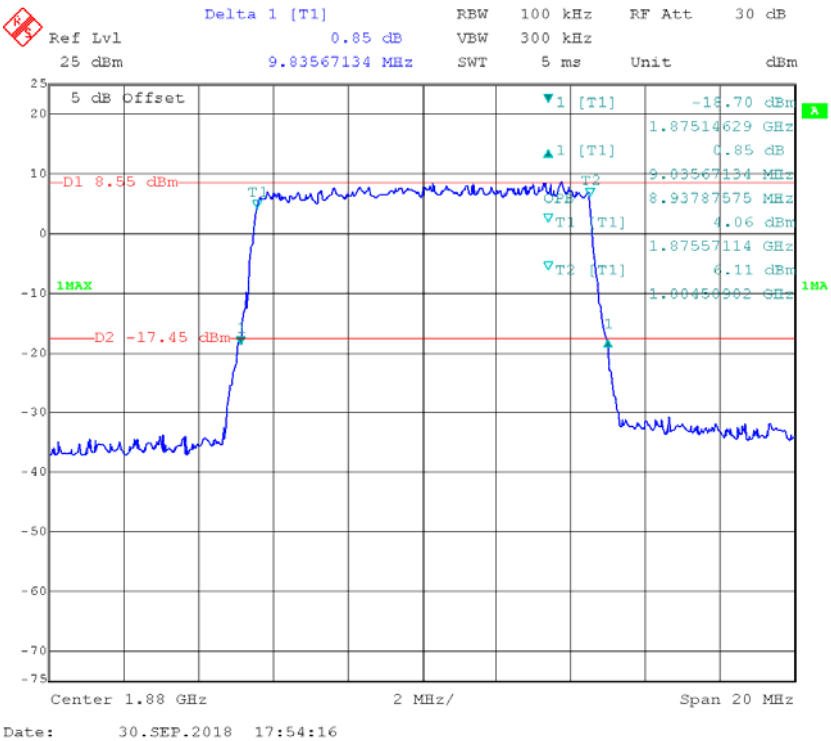
QPSK_3 MHz



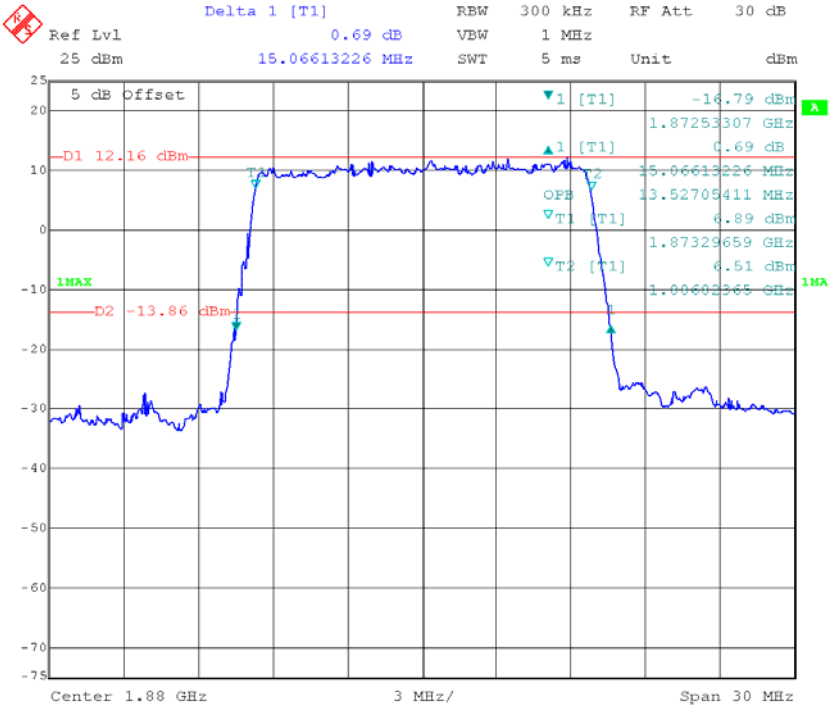
QPSK_5 MHz



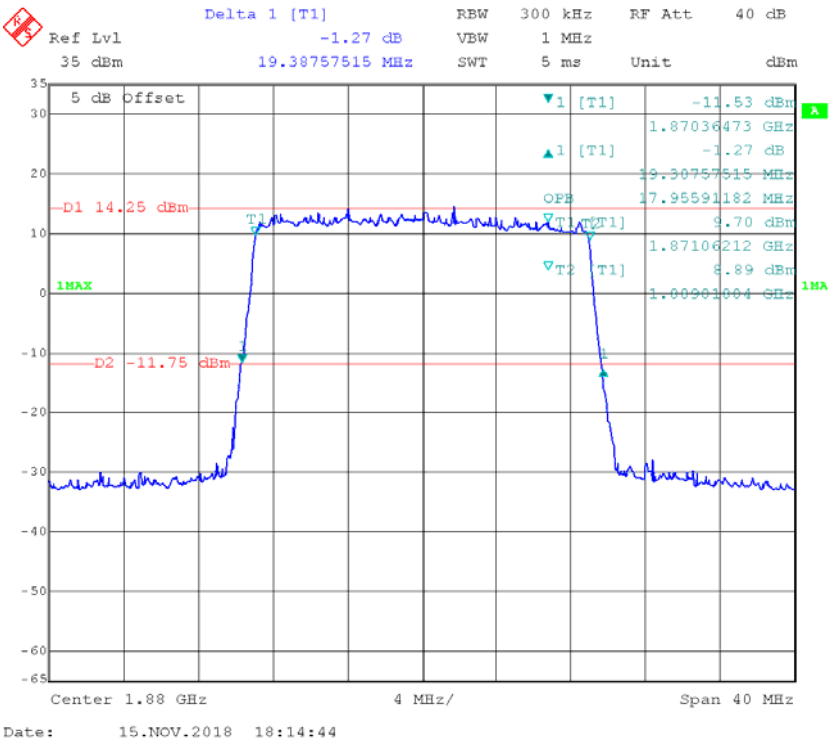
QPSK_10 MHz



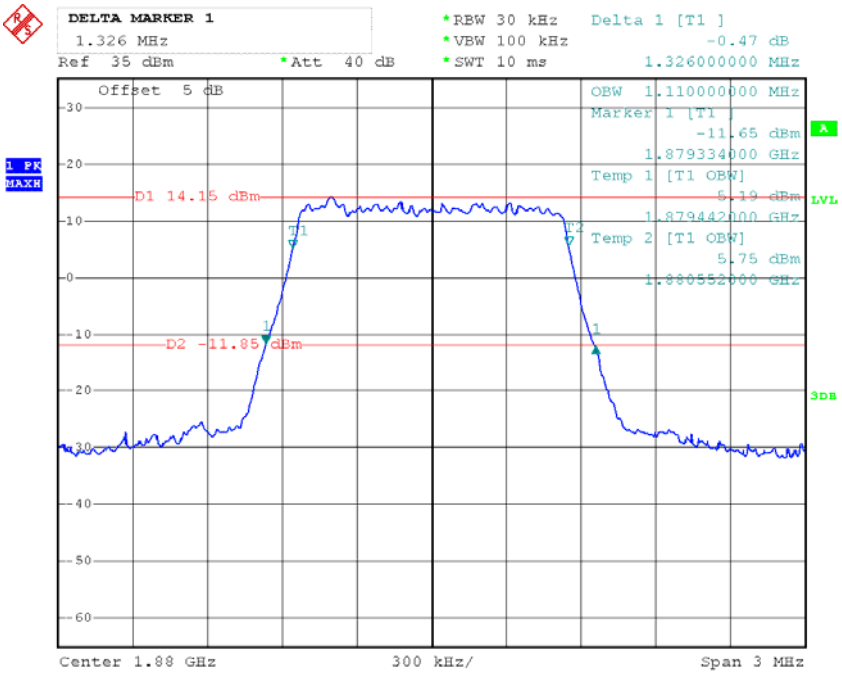
QPSK_15 MHz



QPSK_20 MHz

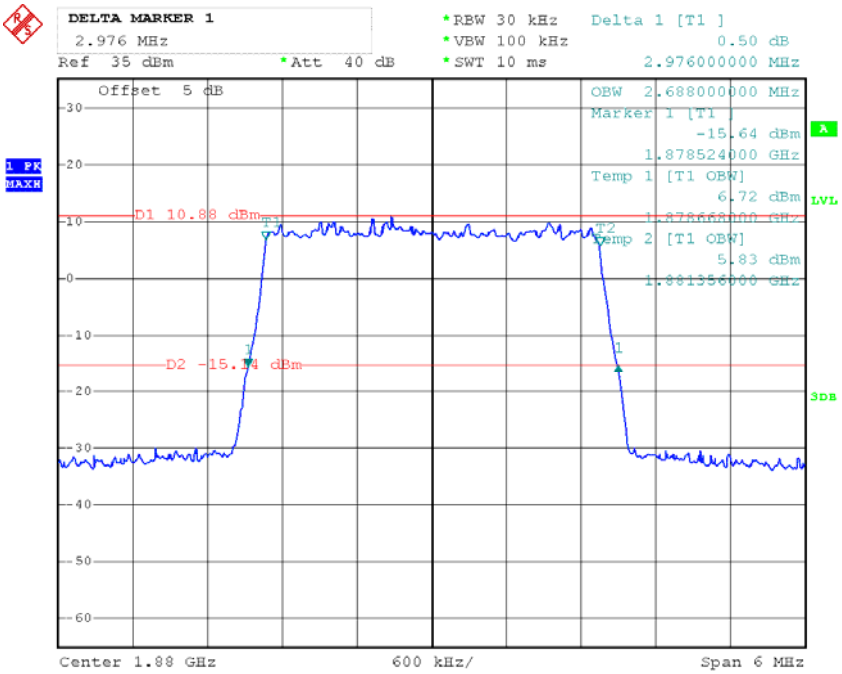


16QAM_1.4 MHz



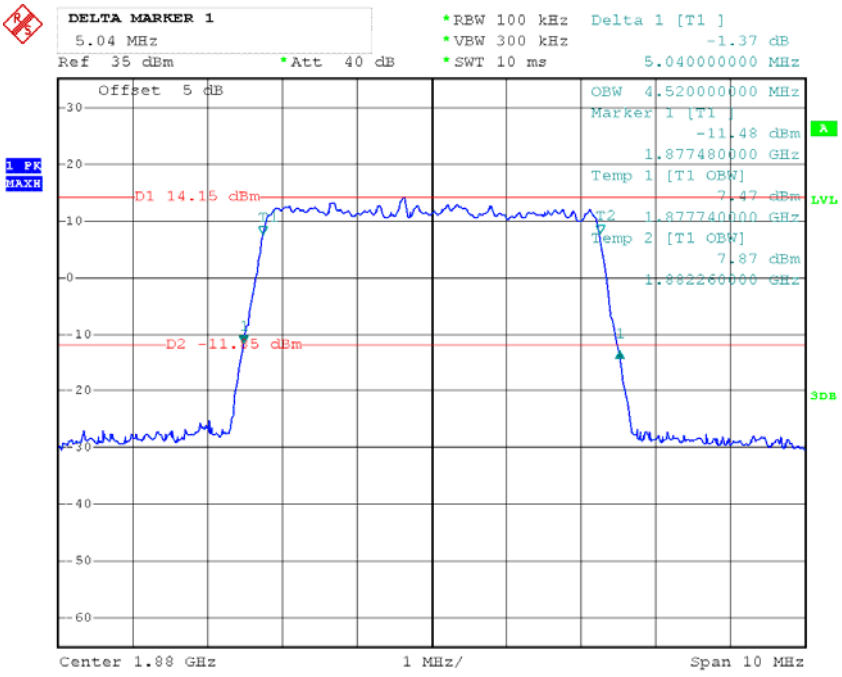
Date: 9.NOV.2018 13:07:59

16QAM_3 MHz



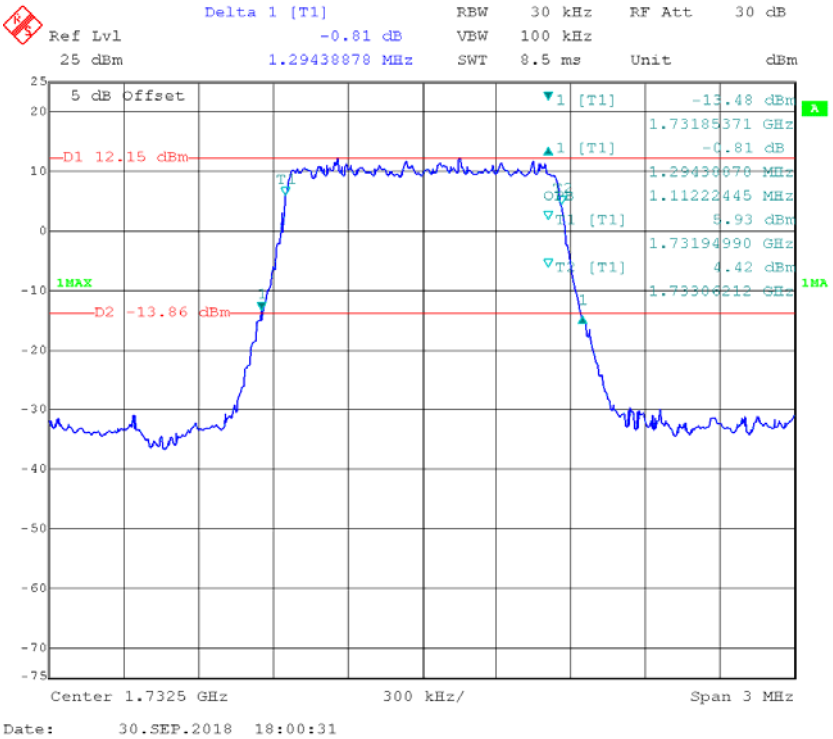
Date: 9.NOV.2018 13:11:12

16QAM_5 MHz

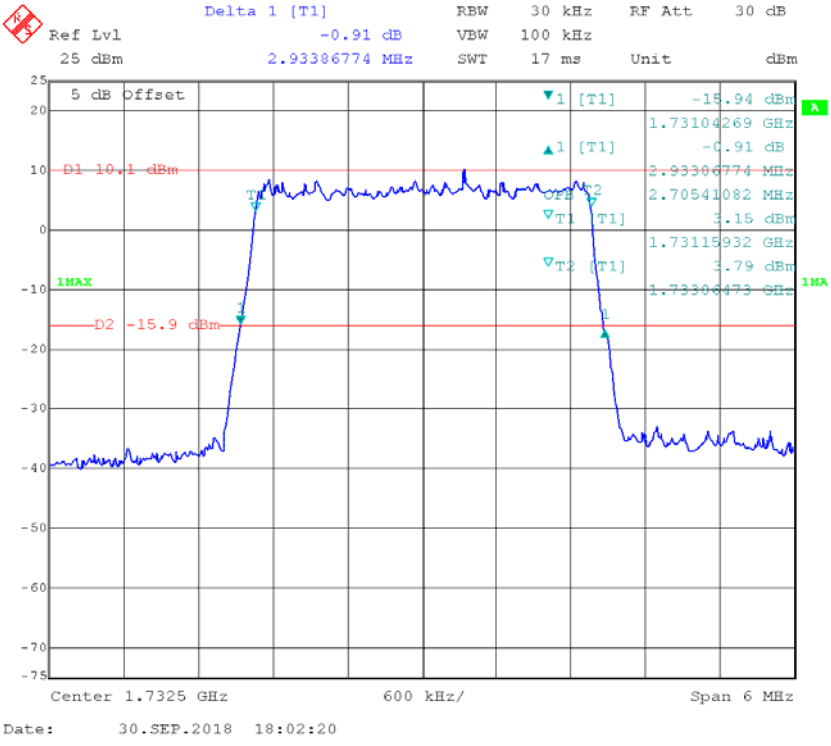


LTE Band 4:

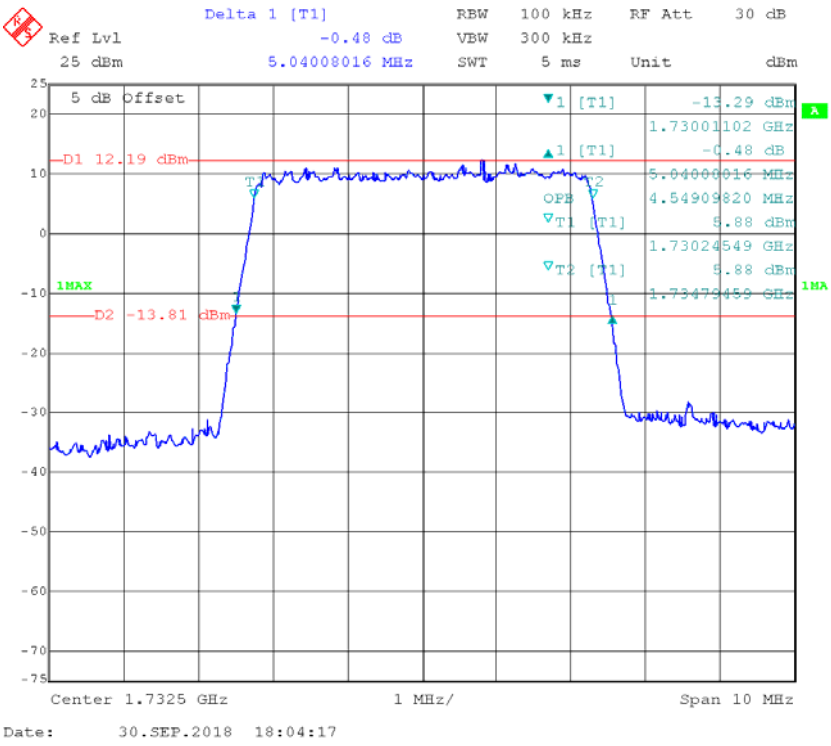
QPSK_1.4 MHz



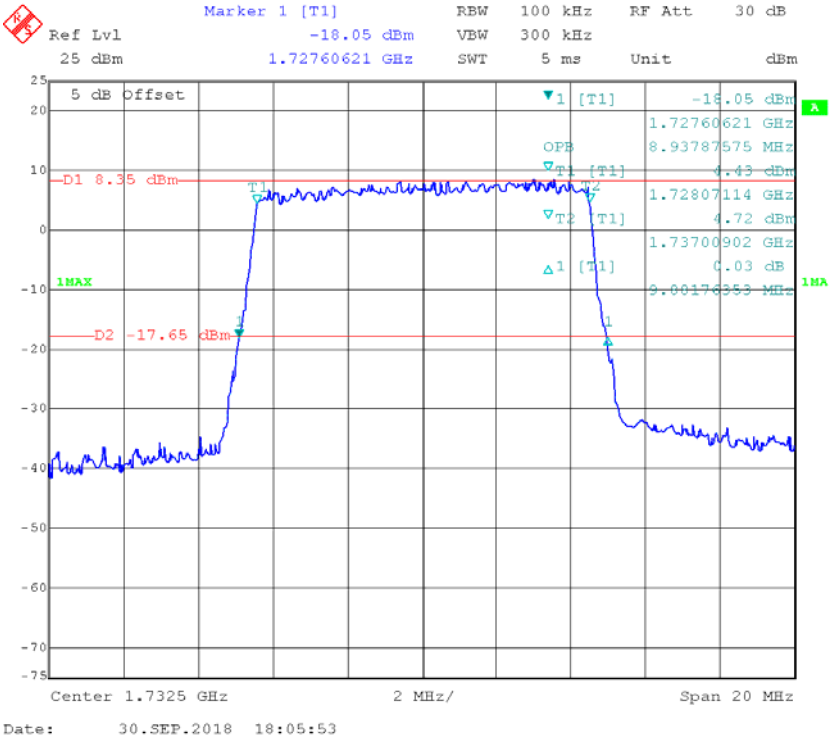
QPSK_3 MHz



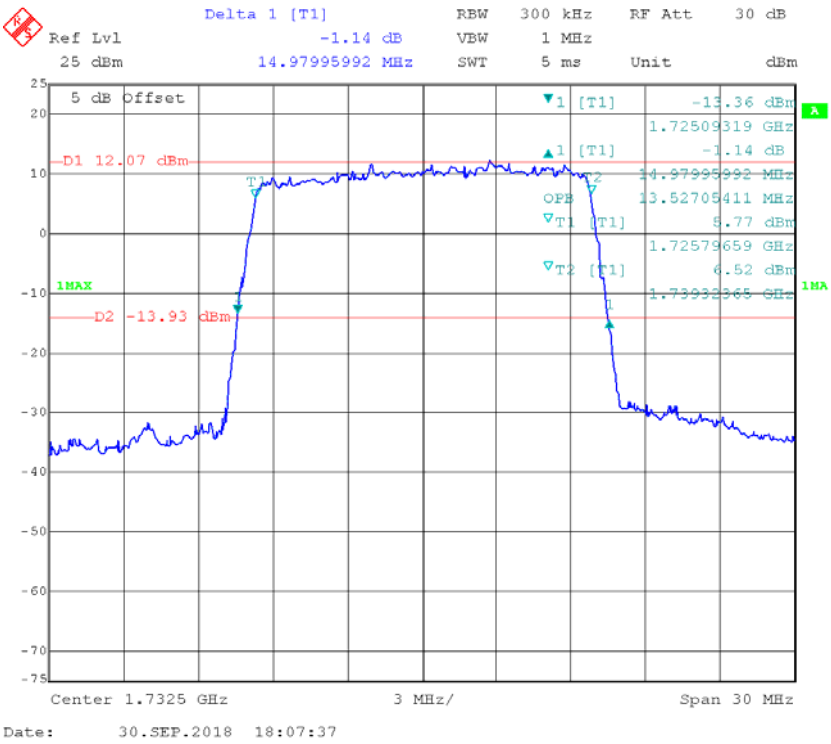
QPSK_5 MHz



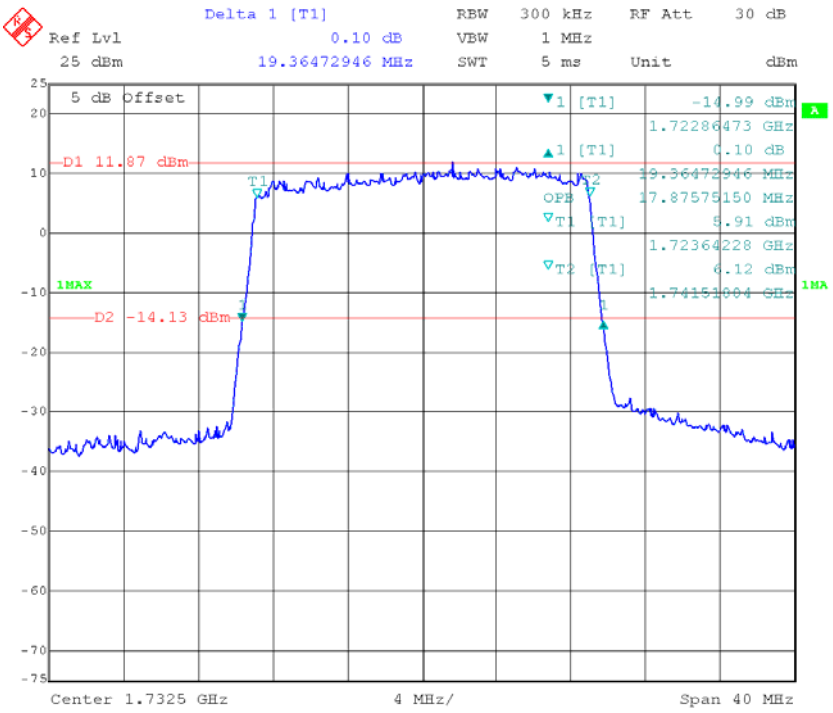
QPSK_10 MHz



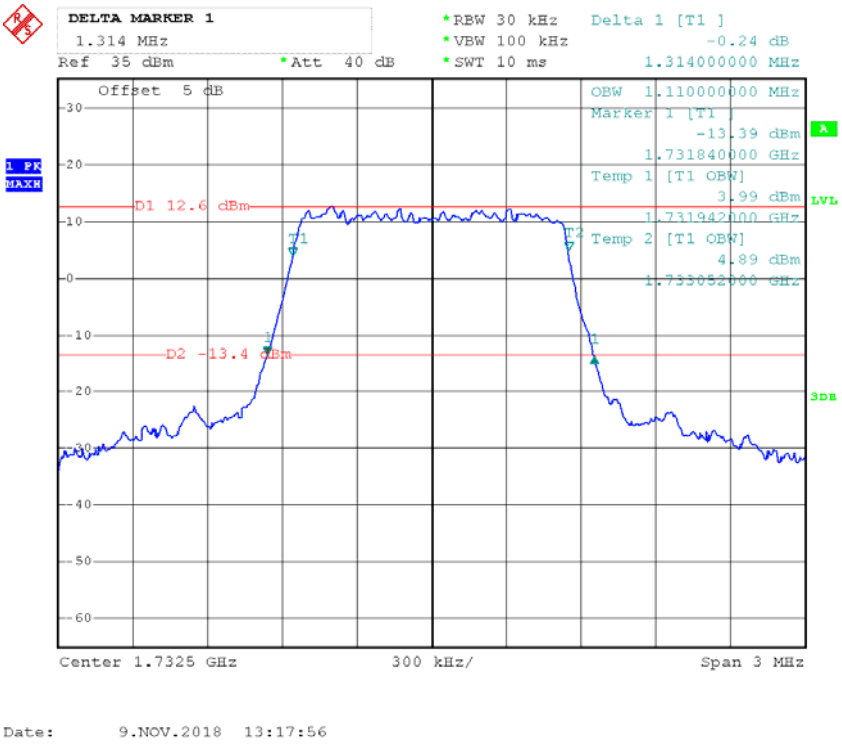
QPSK_15 MHz



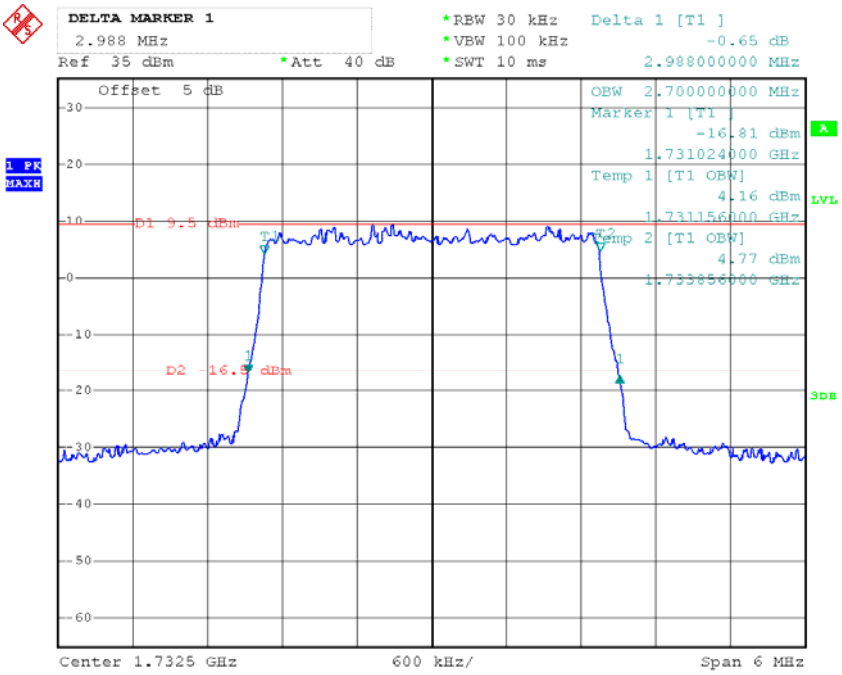
QPSK_20 MHz



16QAM_1.4 MHz

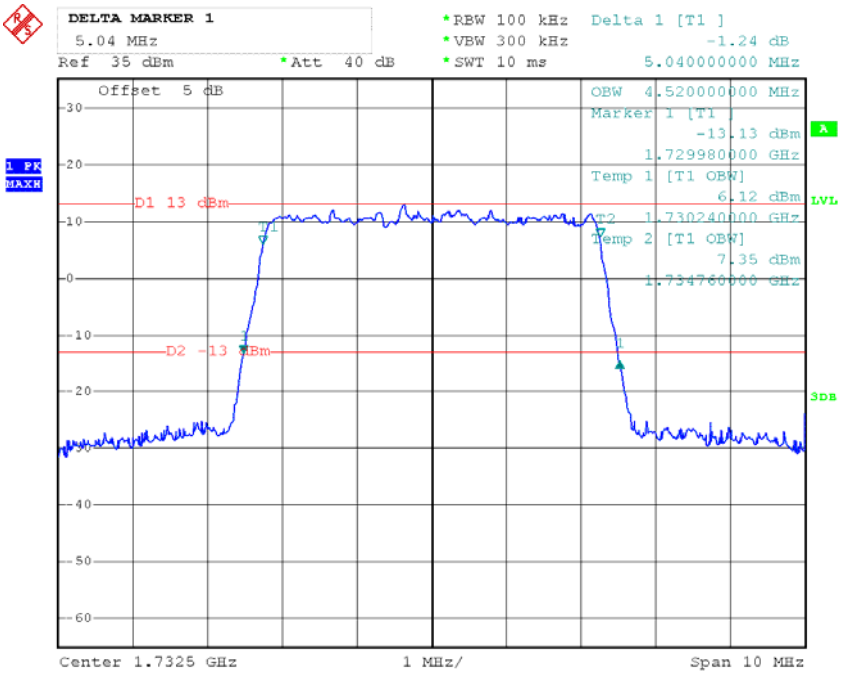


16QAM_3 MHz



Date: 9.NOV.2018 13:16:25

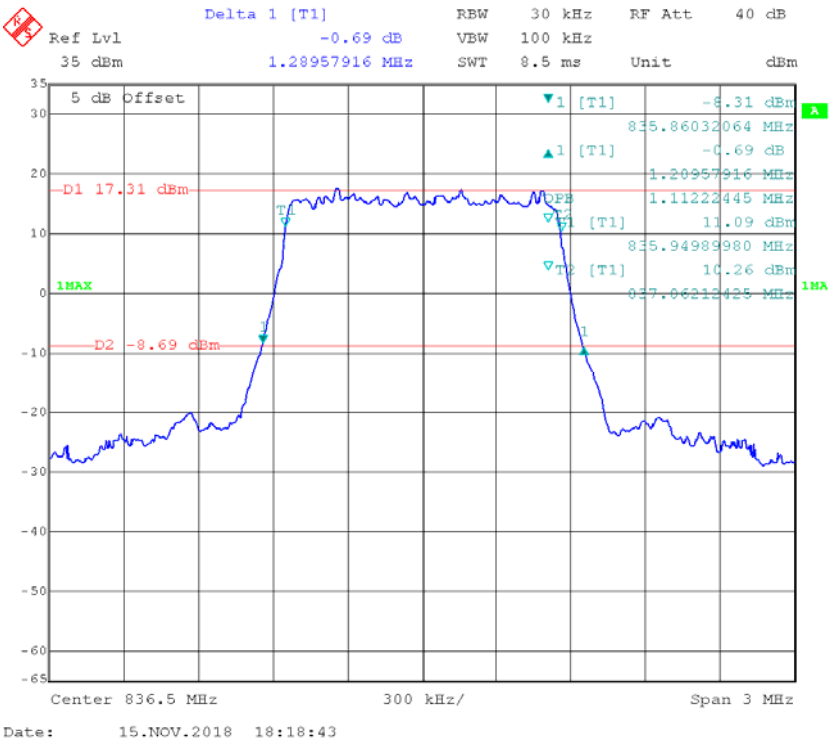
16QAM_5 MHz



Date: 9.NOV.2018 13:14:01

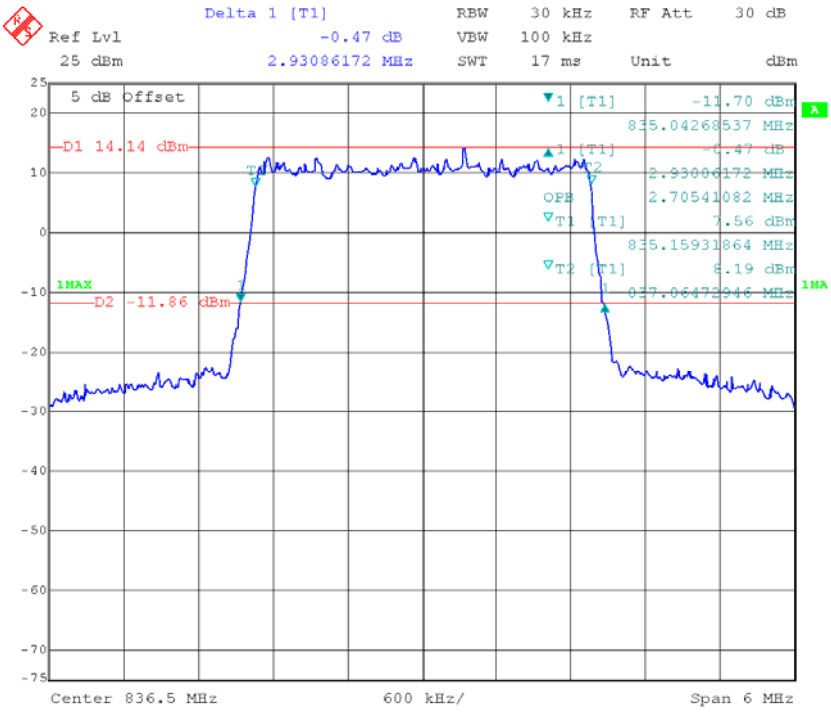
LTE Band 5:

QPSK_1.4 MHz



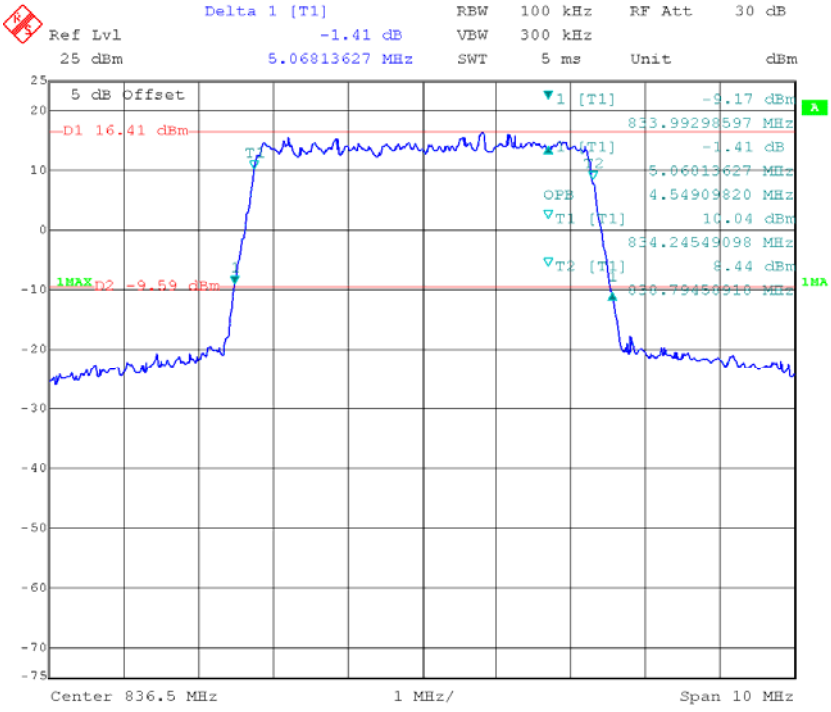
Date: 15.NOV.2018 18:18:43

QPSK_3 MHz

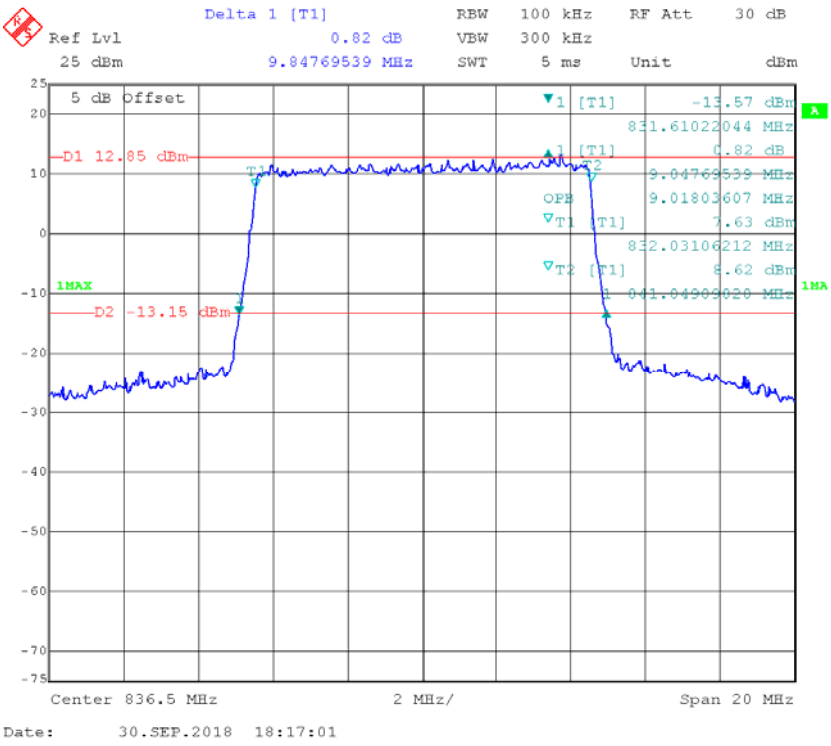


Date: 30.SEP.2018 18:12:51

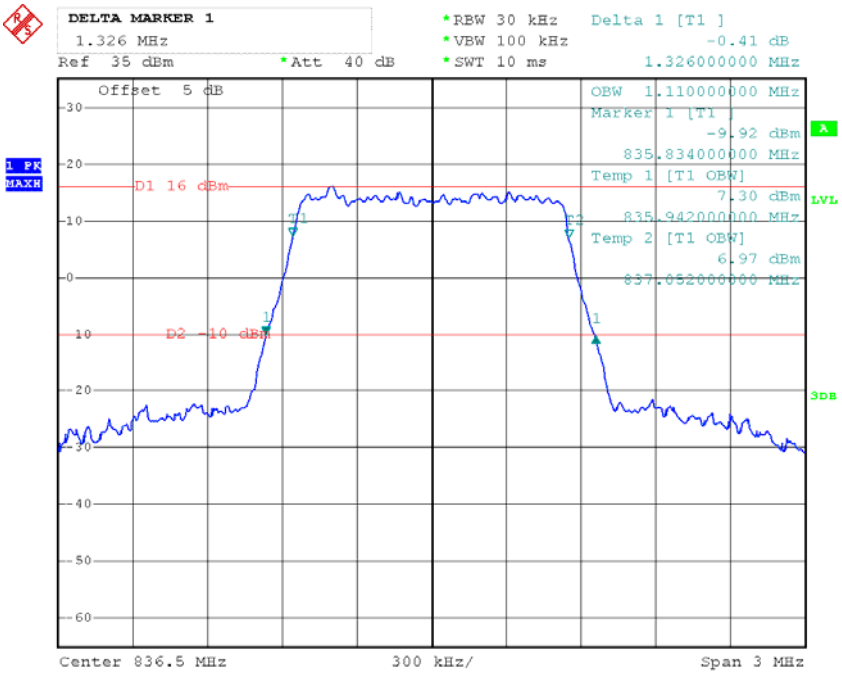
QPSK_5 MHz



QPSK_10 MHz

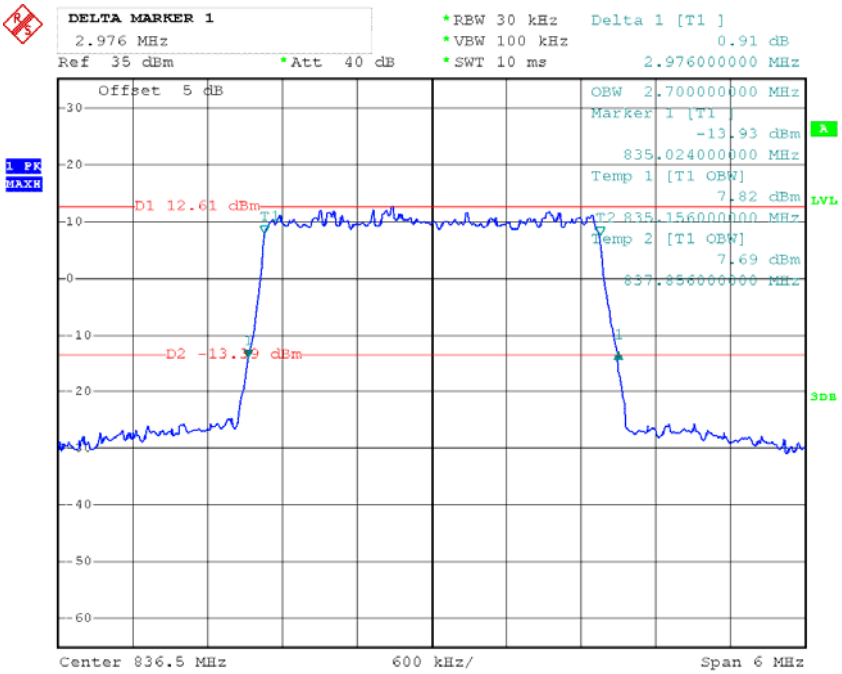


16QAM_1.4 MHz



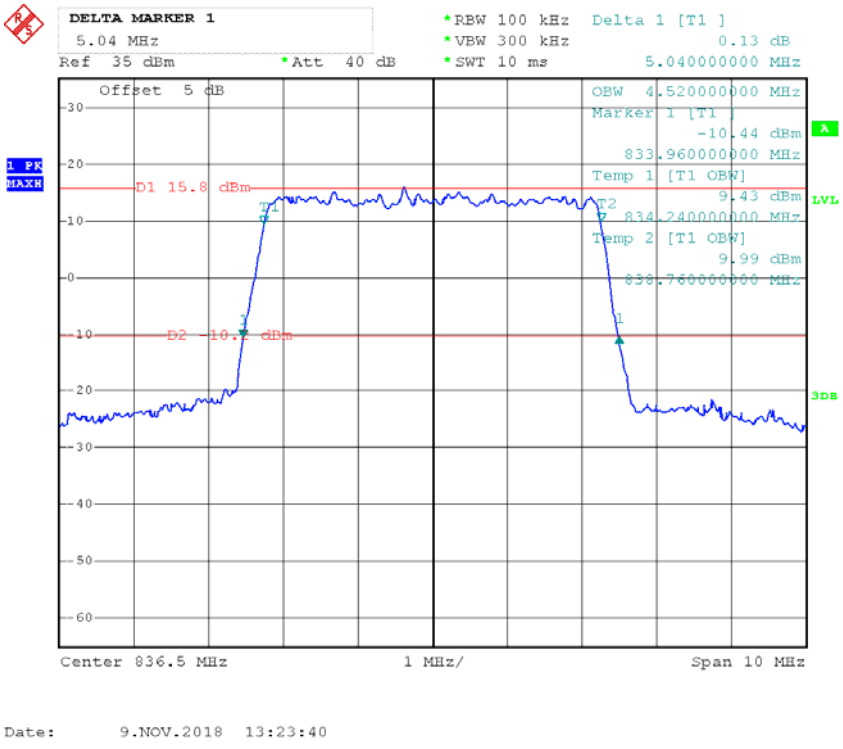
Date: 9.NOV.2018 13:20:18

16QAM_3 MHz



Date: 9.NOV.2018 13:22:04

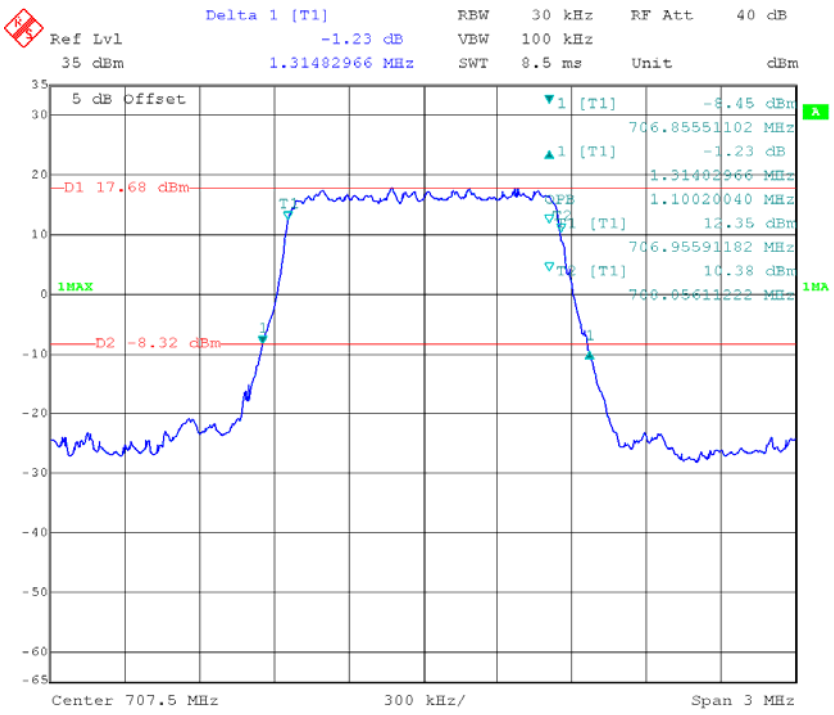
16QAM_5 MHz



Date: 9.NOV.2018 13:23:40

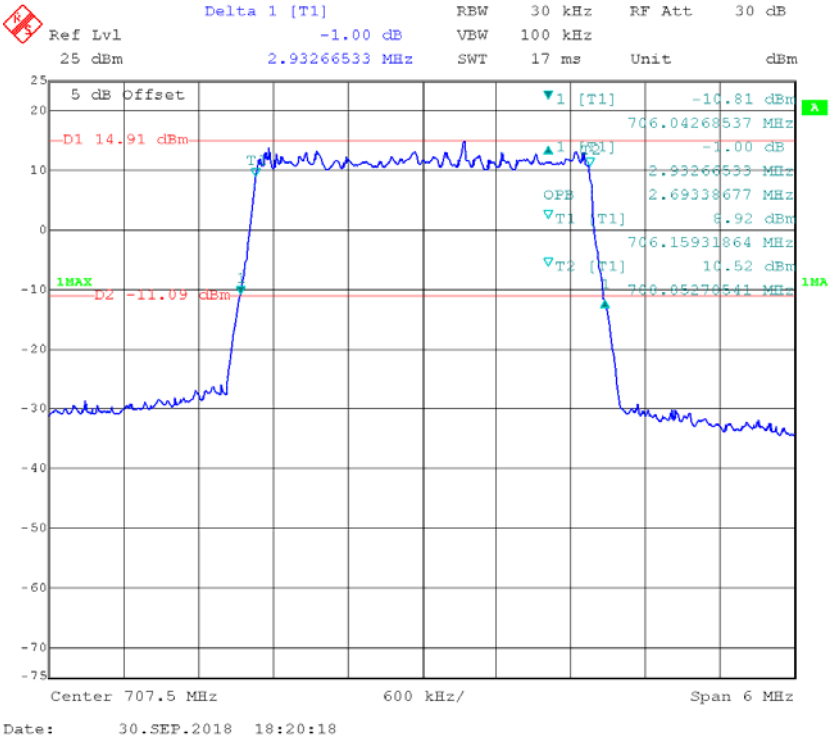
LTE Band 12:

QPSK_1.4 MHz

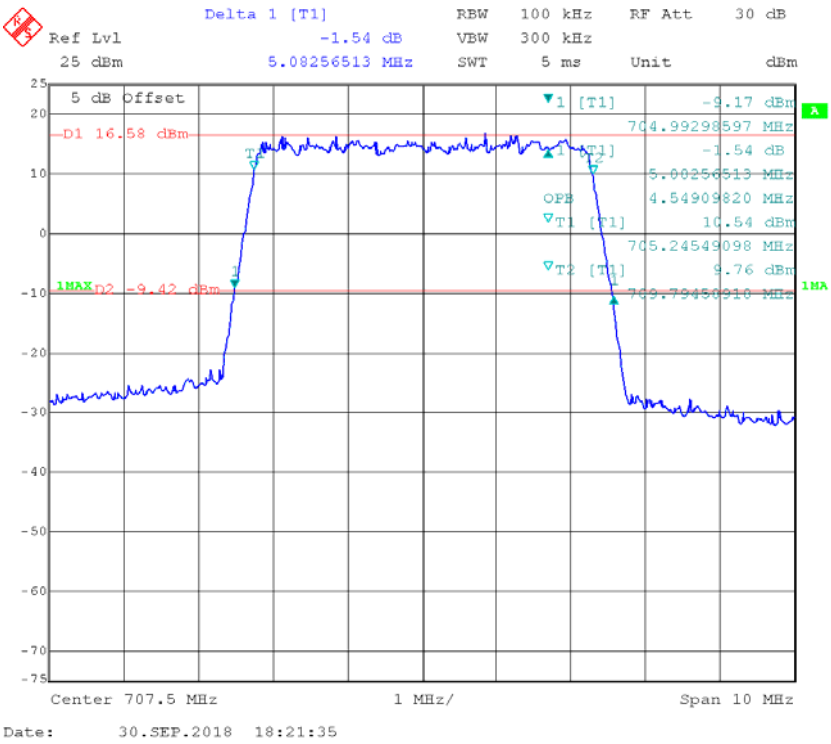


Date: 15.NOV.2018 18:09:26

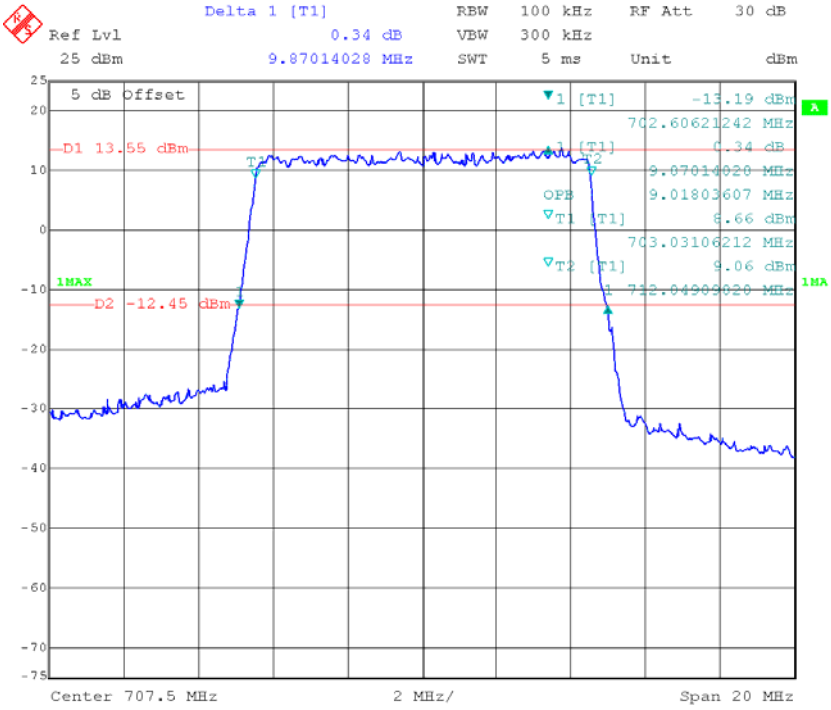
QPSK_3 MHz



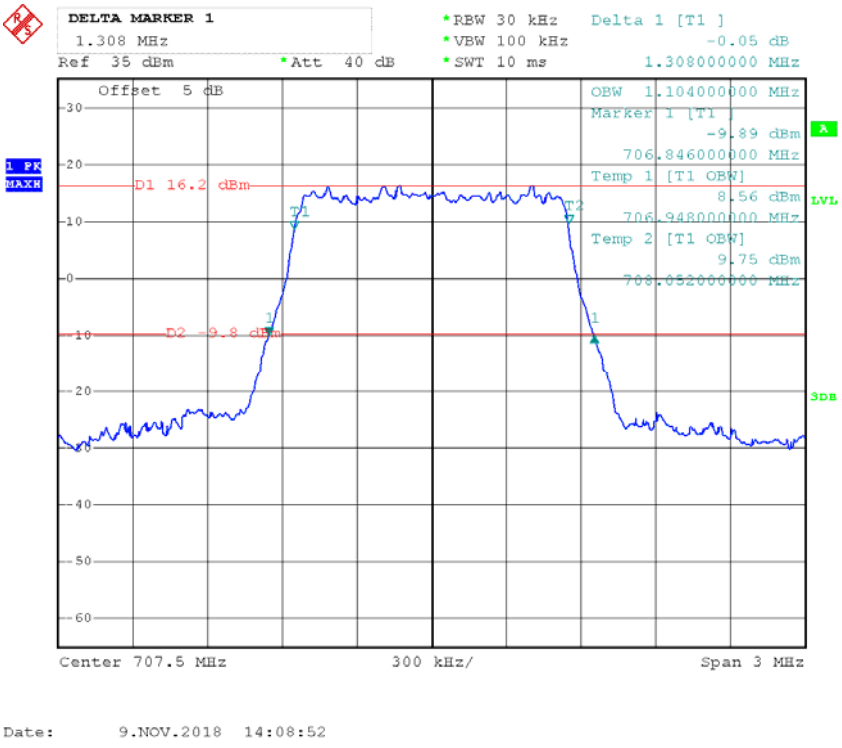
QPSK_5 MHz



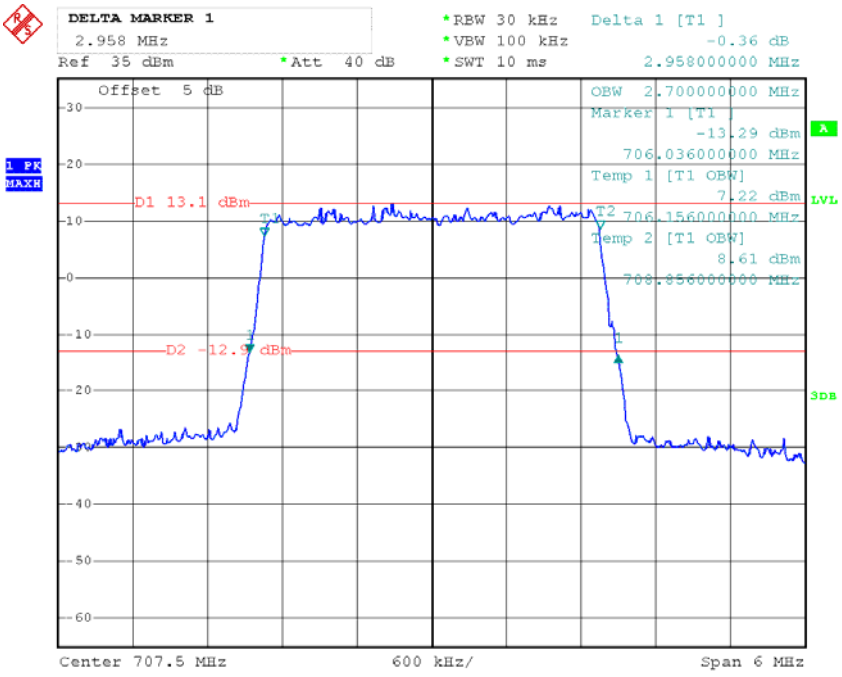
QPSK_10 MHz



16QAM_1.4 MHz

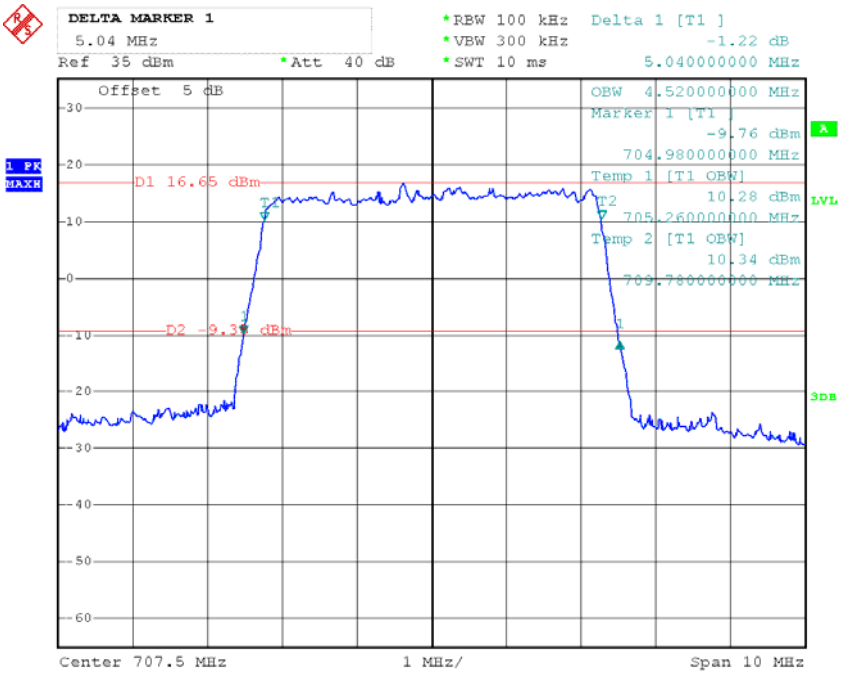


16QAM_3 MHz



Date: 9.NOV.2018 14:10:26

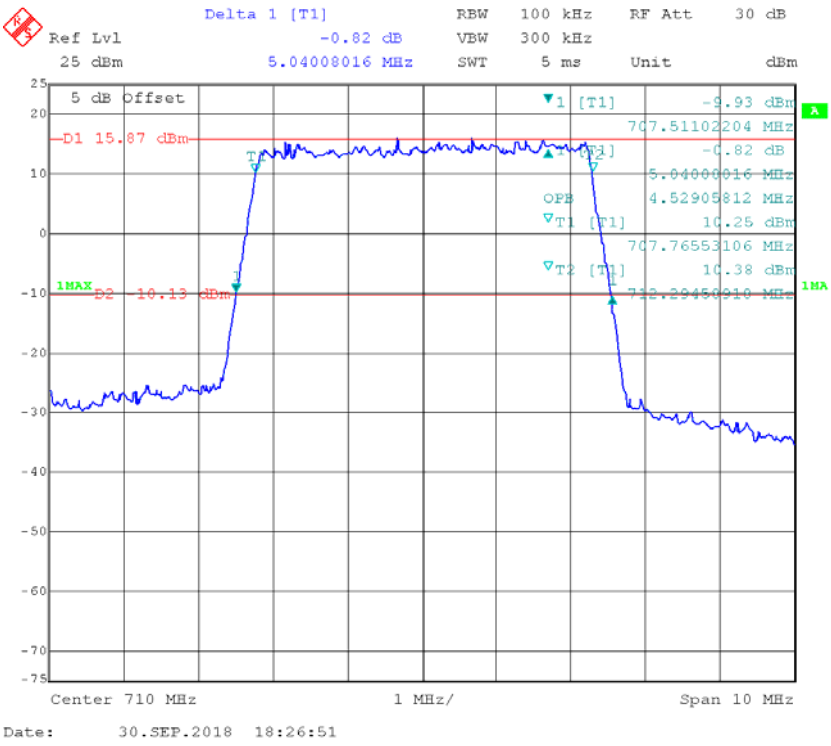
16QAM_5 MHz



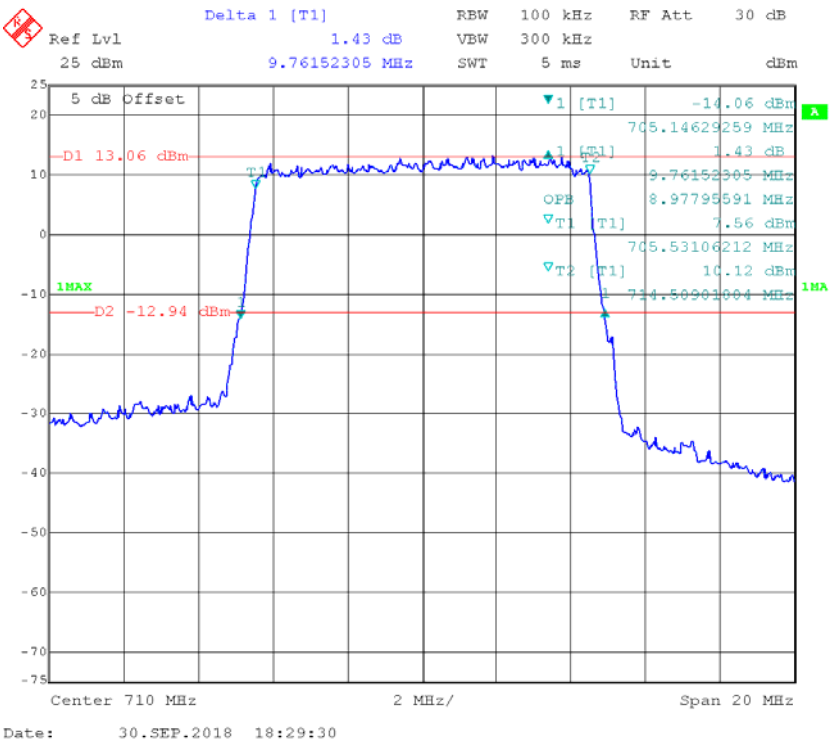
Date: 9.NOV.2018 13:25:35

LTE Band 17:

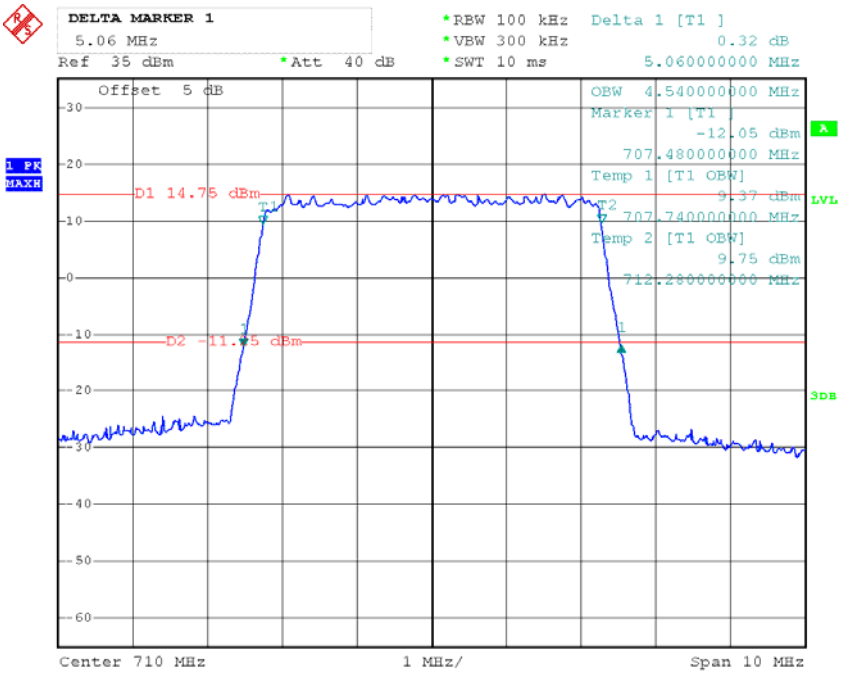
QPSK_5 MHz



QPSK_10 MHz



16QAM_5 MHz


DELTA MARKER 1
5.06 MHz
Ref 35 dBm
*Att 40 dB
*RBW 100 kHz
*VBW 300 kHz
*SWT 10 ms
Delta 1 [T1]
0.32 dB
5.060000000 MHz
Offset 5 dB
OBW 4.540000000 MHz
Marker 1 [T1]
-12.05 dBm
707.480000000 MHz
Temp 1 [T1 OBW]
9.37 dBm
707.740000000 MHz
Temp 2 [T1 OBW]
9.75 dBm
712.280000000 MHz
D1 14.75 dBm
D2 -11.25 dBm
1 PK MAXH
A
LVL
3DB
Center 710 MHz
1 MHz/
Span 10 MHz
Date: 9.NOV.2018 13:27:14

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

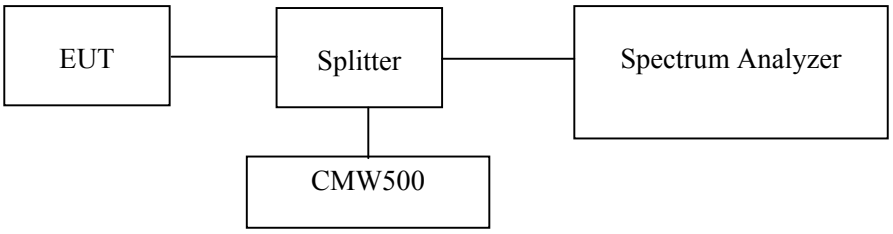
Applicable Standard

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

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

Test Procedure

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



Test Equipment List and Details

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

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

Test Data

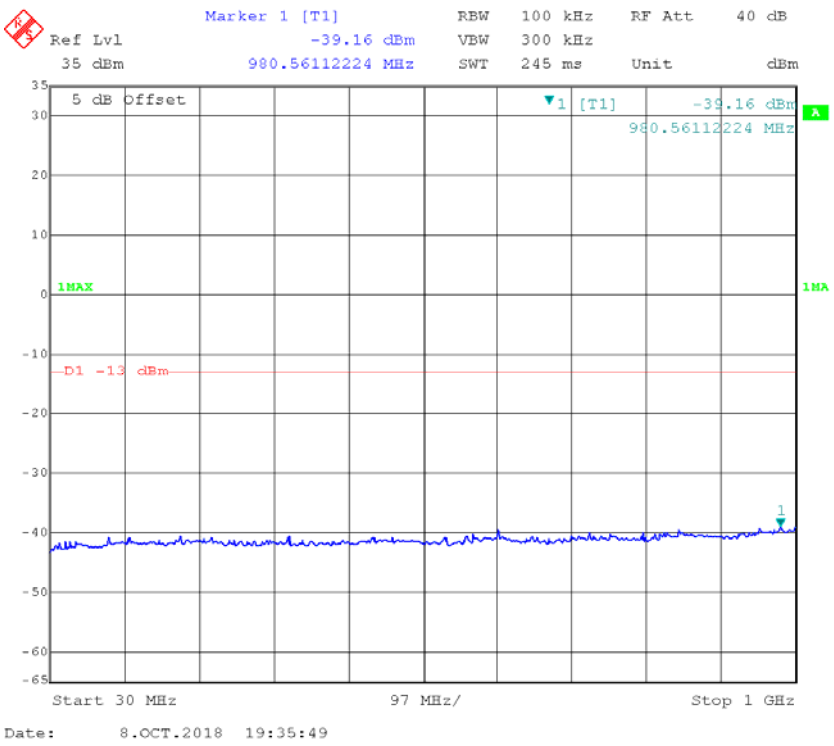
Environmental Conditions

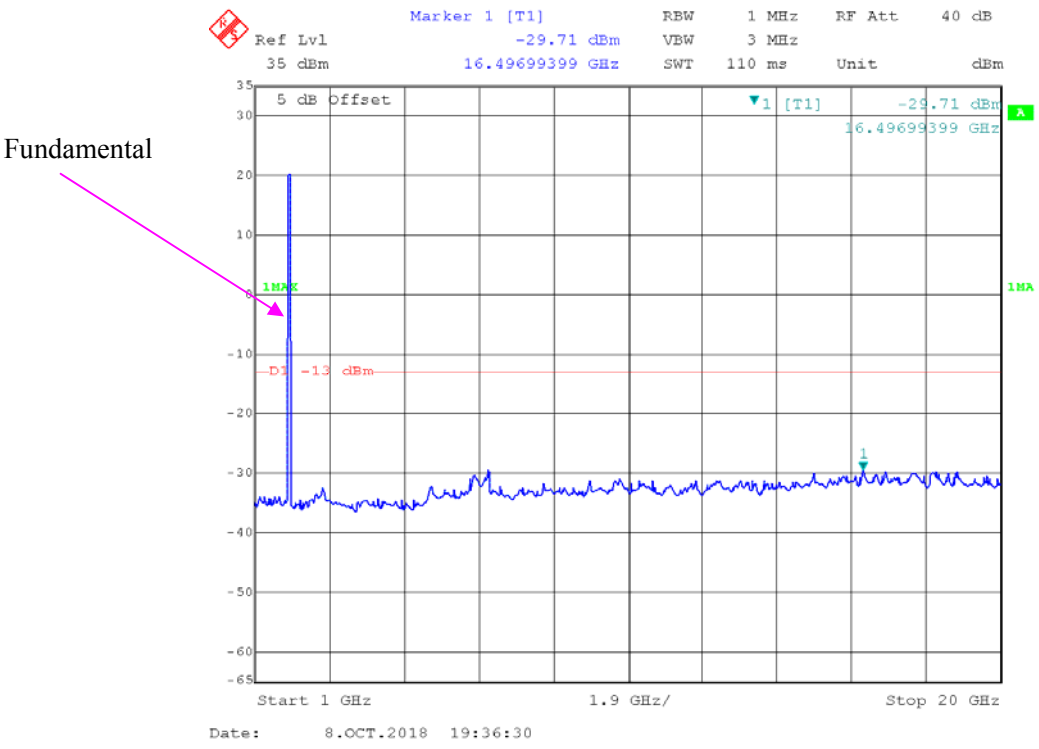
Temperature:	26.7~27.6°C
Relative Humidity:	46~58 %
ATM Pressure:	100.5~100.8 kPa

The testing was performed by Swim Lv from 2018-09-30 to 2018-10-08.

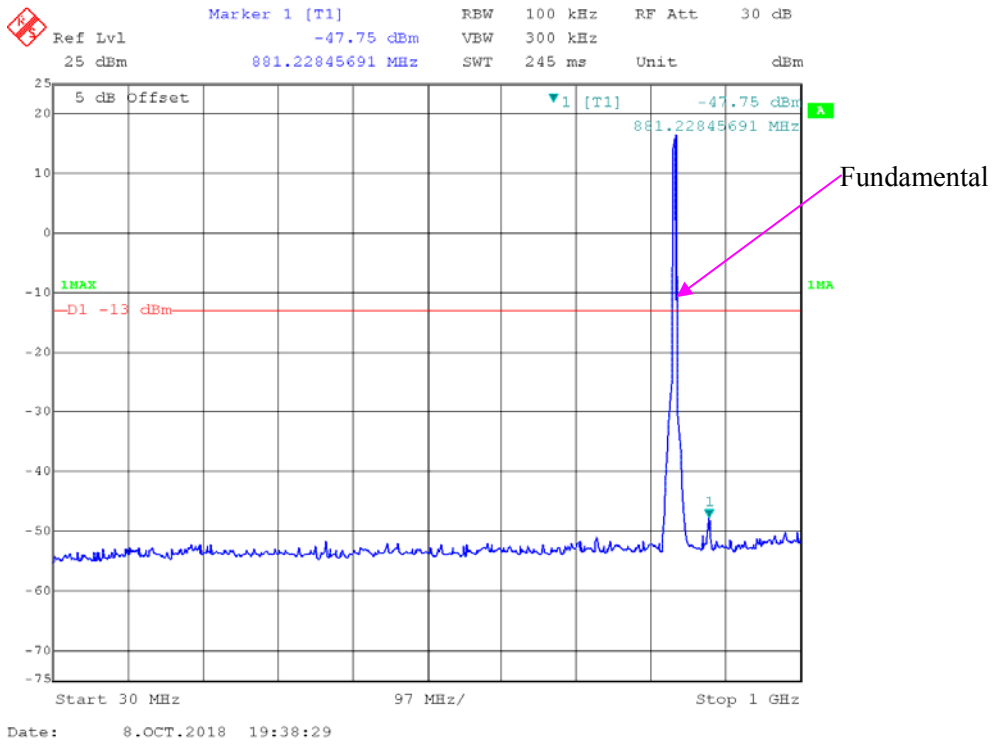
Please refer to the following plots.

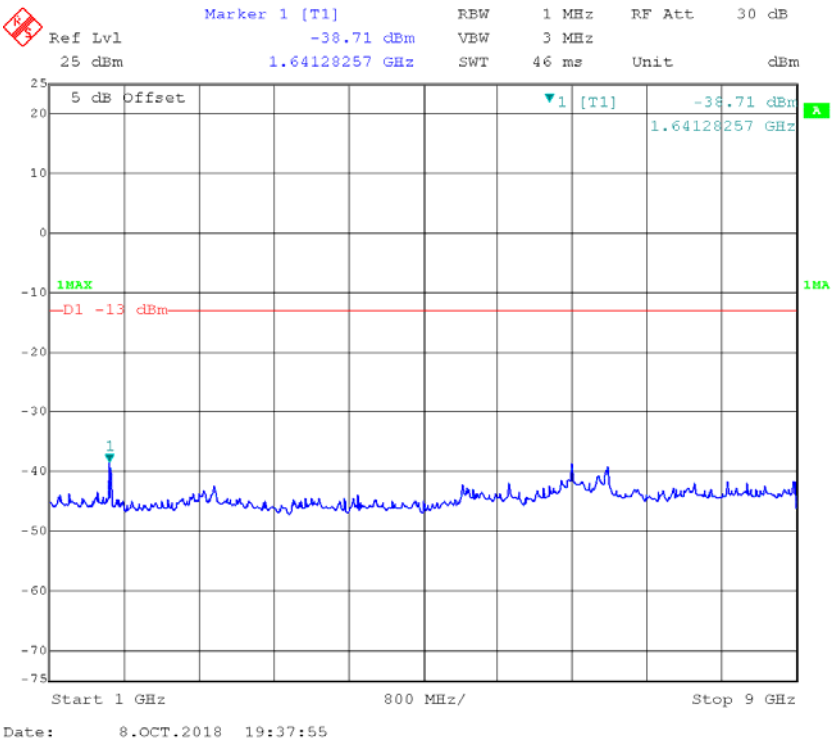
WCDMA Band II,Rel99





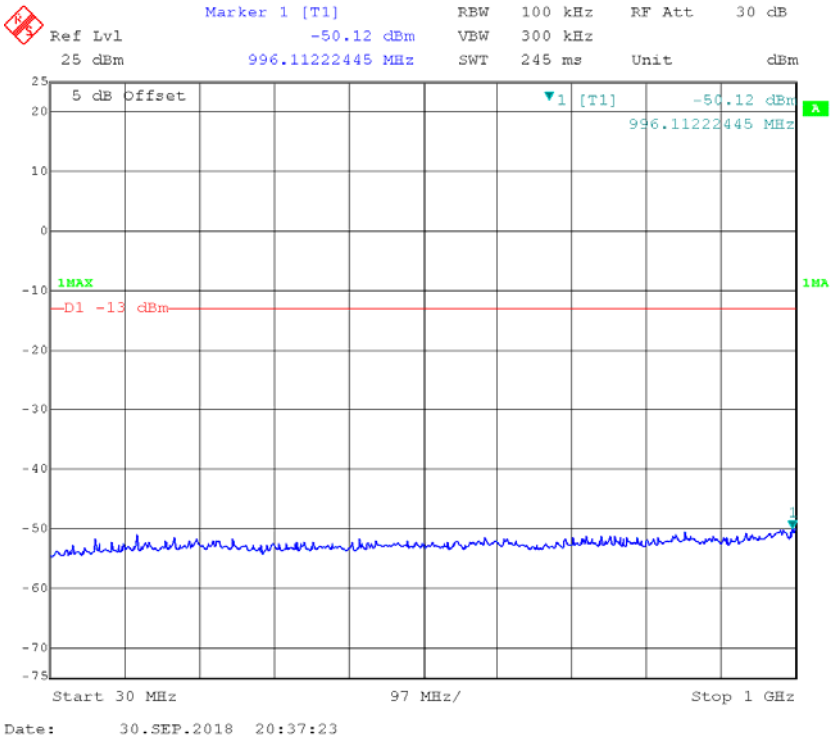
WCDMA Band V,Rel99

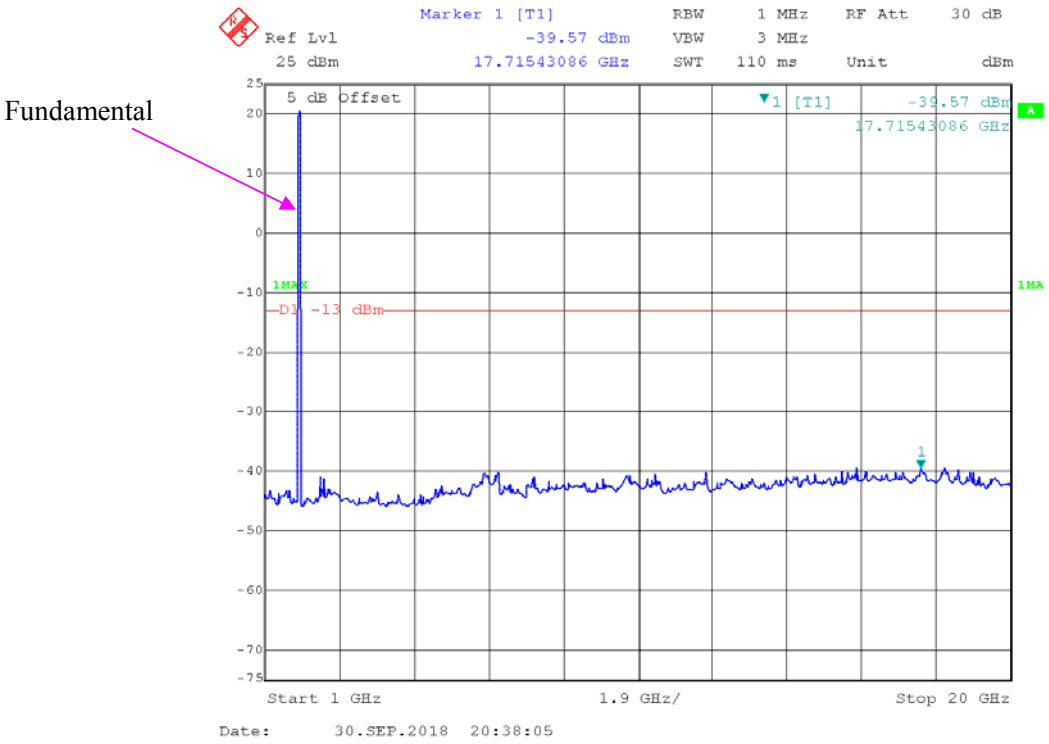




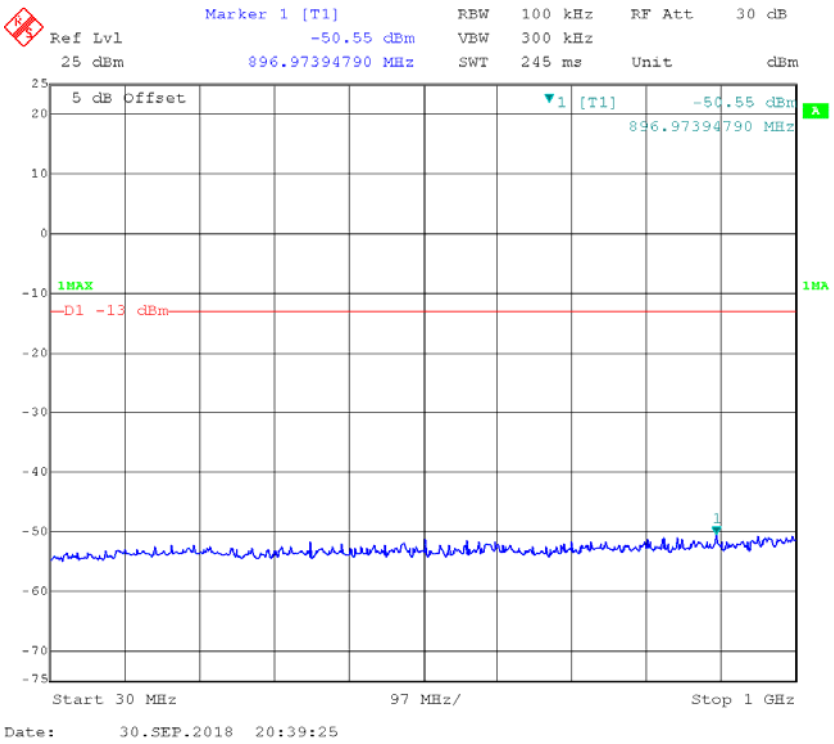
LTE Band 2 (Middle Channel)

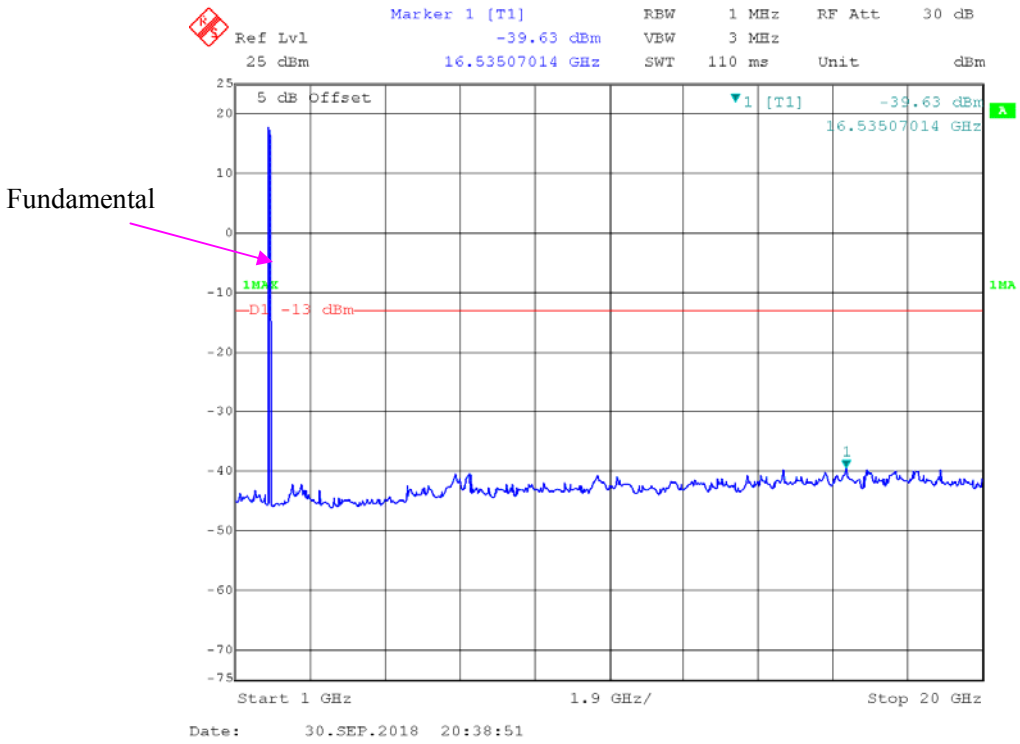
QPSK_1.4 MHz



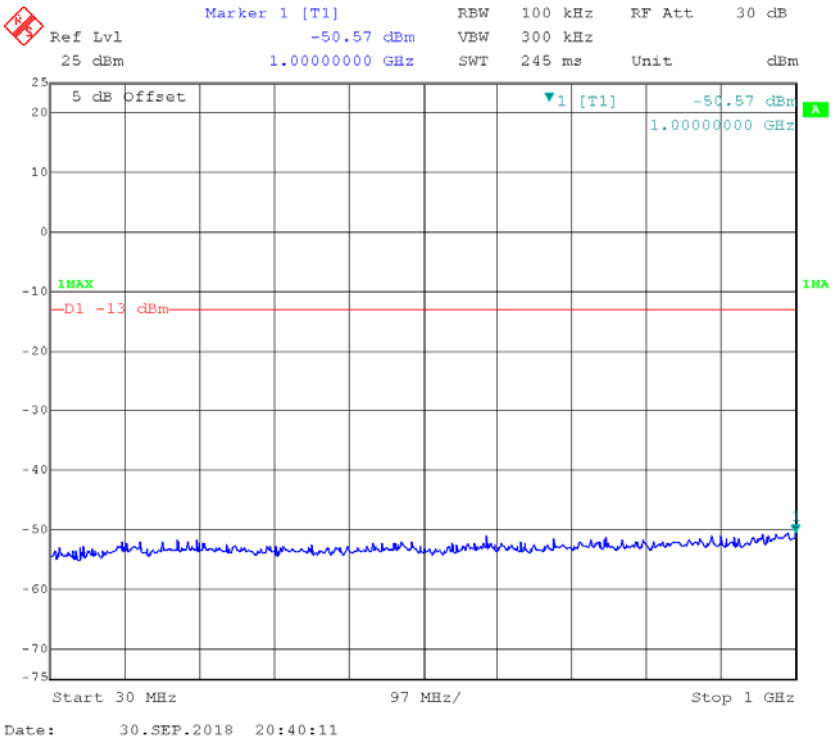

Fundamental
Marker 1 [T1]
Ref Lvl
25 dBm
-39.57 dBm
17.71543086 GHz
RBW 1 MHz
VBW 3 MHz
SWT 110 ms
RF Att 30 dB
Unit dBm
5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 1 GHz
1.9 GHz/
Stop 20 GHz
Date: 30.SEP.2018 20:38:05

QPSK_3 MHz

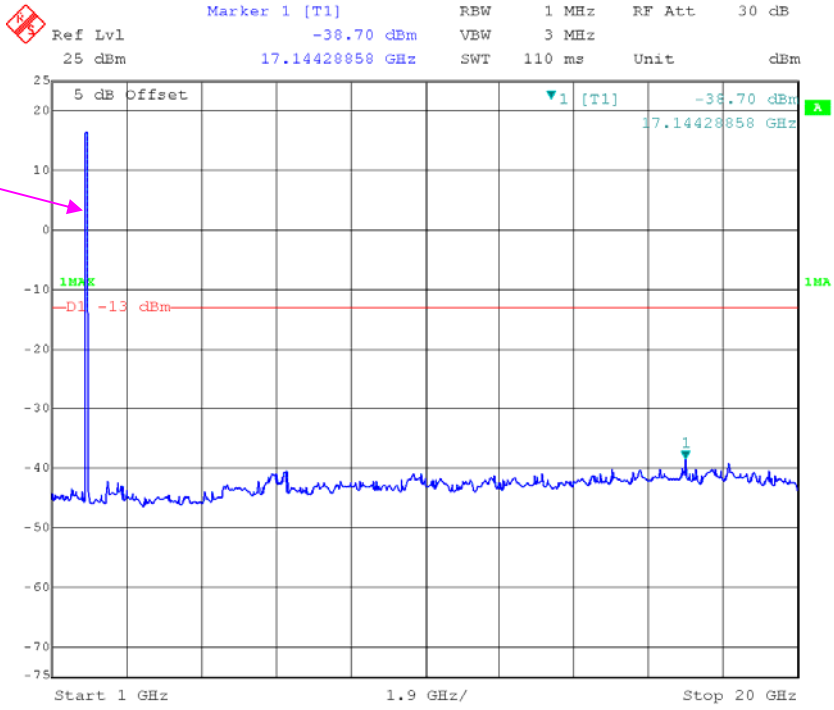

Marker 1 [T1]
Ref Lvl
25 dBm
-50.55 dBm
896.97394790 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 20:39:25


Fundamental
Marker 1 [T1]
Ref Lvl
25 dBm
-39.63 dBm
16.53507014 GHz
RBW 1 MHz
VBW 3 MHz
SWT 110 ms
RF Att 30 dB
Unit dBm
5 dB offset
1 [T1]
-39.63 dBm
16.53507014 GHz
1MAX
D1 -13 dBm
1MA
Start 1 GHz
1.9 GHz/
Stop 20 GHz
Date: 30.SEP.2018 20:38:51

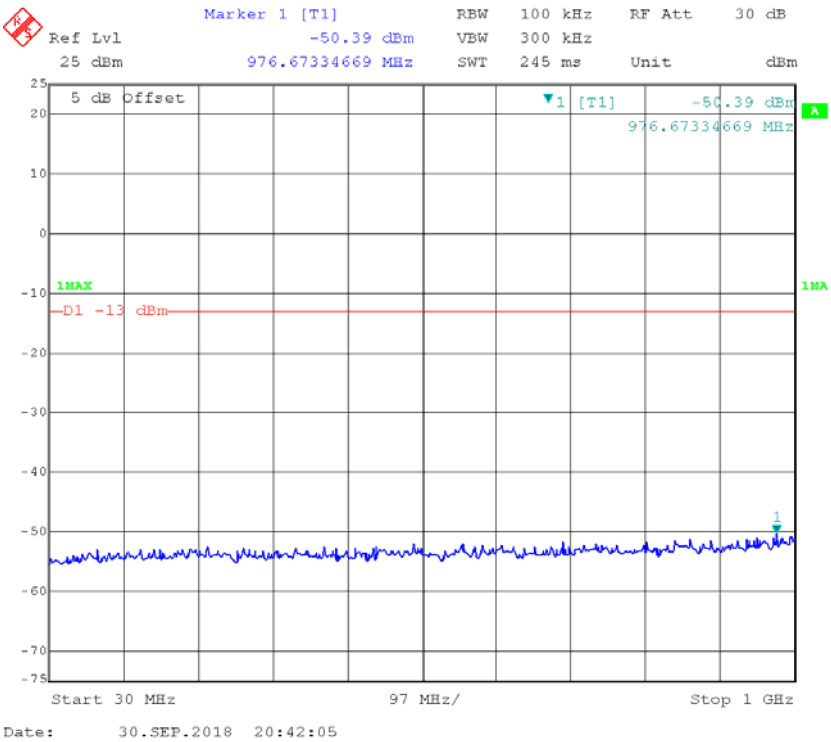
QPSK_5 MHz

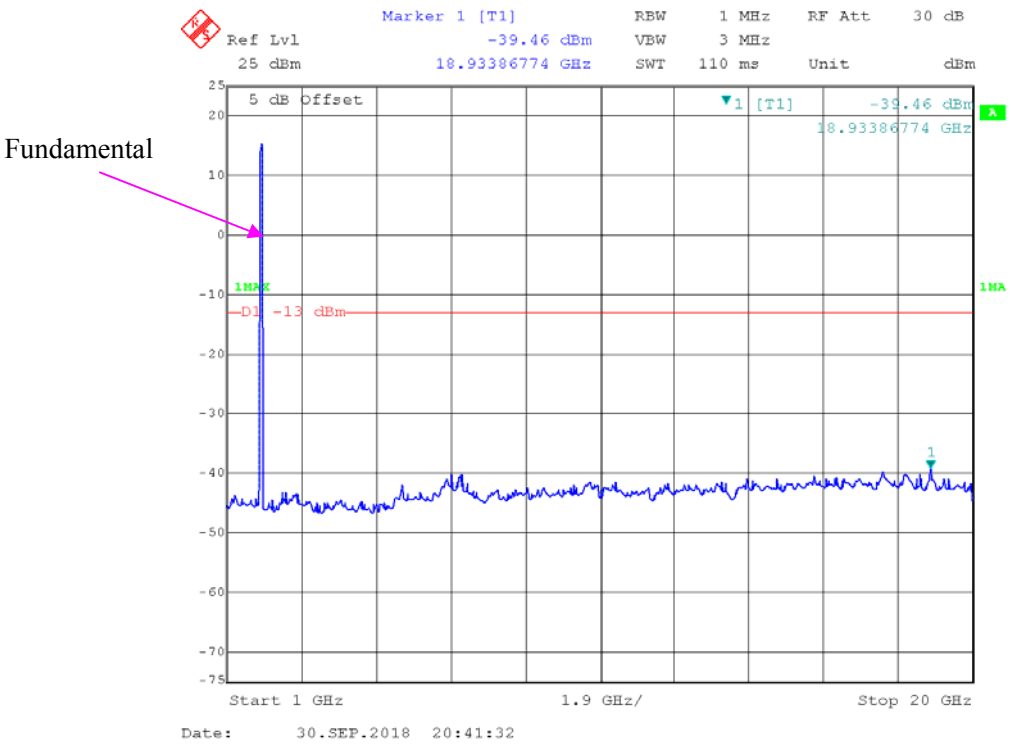

Marker 1 [T1]
Ref Lvl
25 dBm
-50.57 dBm
1.00000000 GHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
5 dB offset
1 [T1]
-50.57 dBm
1.00000000 GHz
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 20:40:11

Fundamental

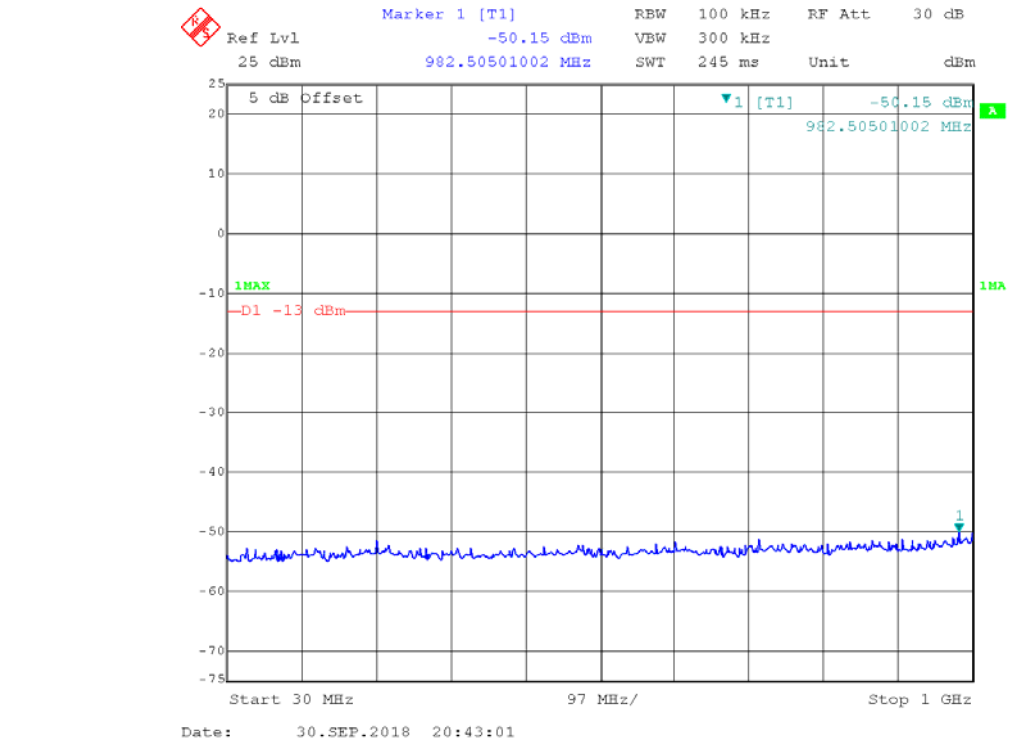


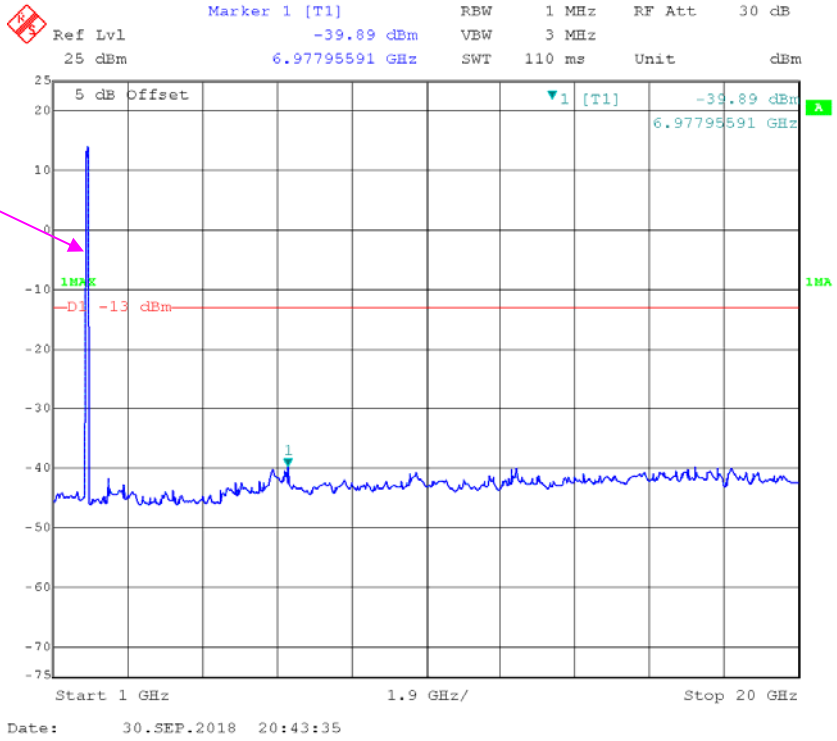
QPSK_10 MHz



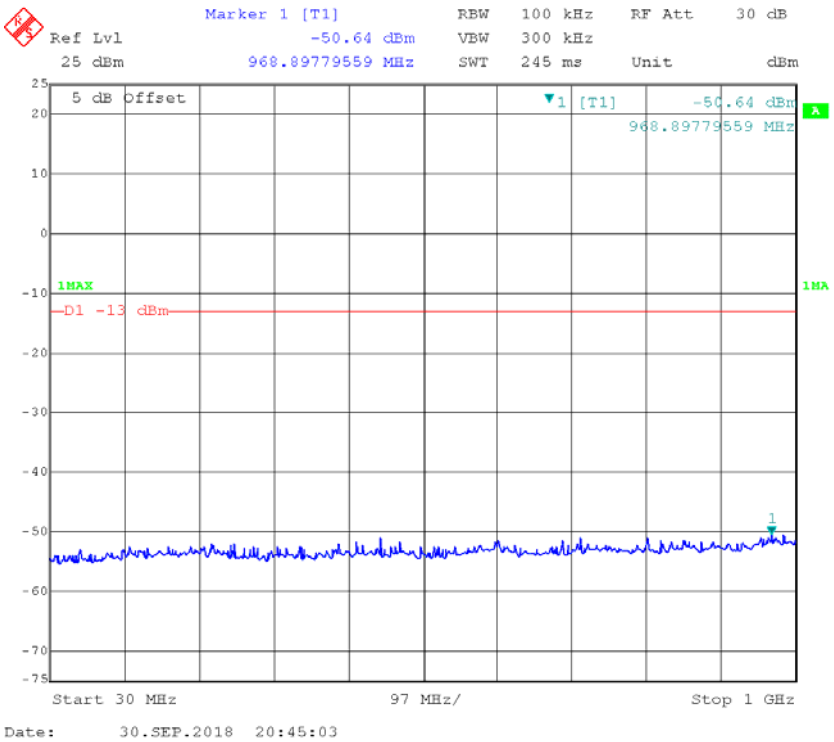

Fundamental
Marker 1 [T1]
Ref Lvl
25 dBm
-39.46 dBm
18.93386774 GHz
RBW 1 MHz
VBW 3 MHz
SWT 110 ms
RF Att 30 dB
Unit dBm
5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 1 GHz
1.9 GHz/
Stop 20 GHz
Date: 30.SEP.2018 20:41:32

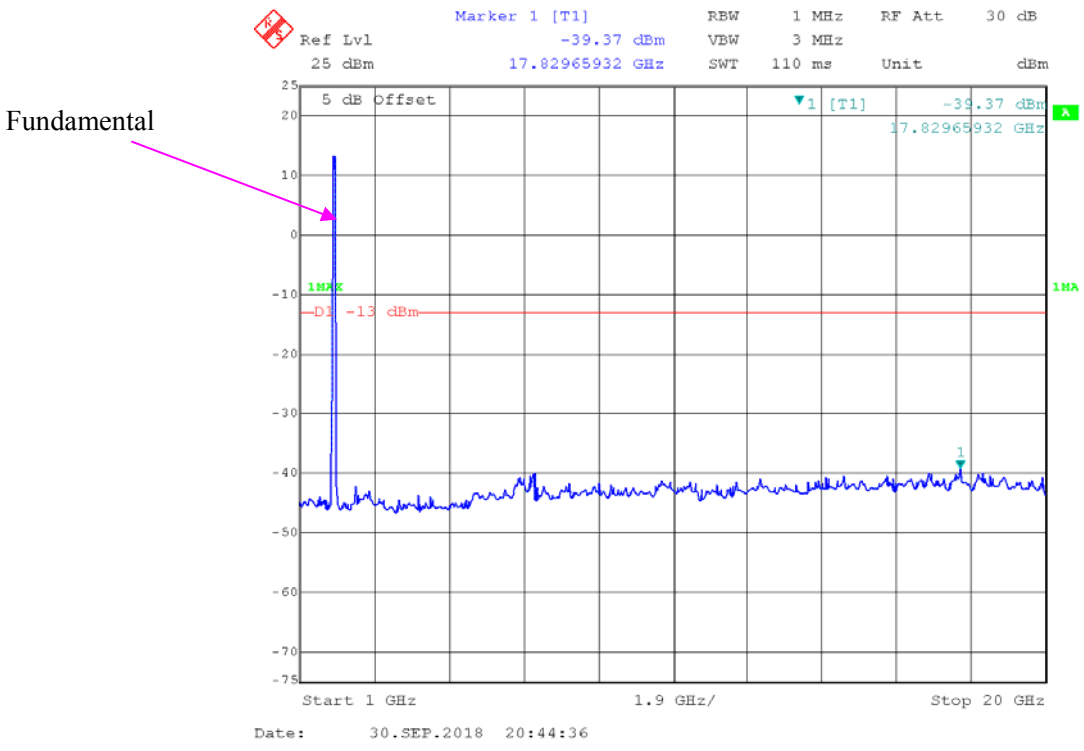
QPSK_15 MHz


Marker 1 [T1]
Ref Lvl
25 dBm
-50.15 dBm
982.50501002 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 20:43:01


Fundamental
Marker 1 [T1]
Ref Lvl
25 dBm
-39.89 dBm
6.97795591 GHz
RBW 1 MHz
VBW 3 MHz
SWT 110 ms
RF Att 30 dB
Unit dBm
5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 1 GHz
1.9 GHz/
Stop 20 GHz
Date: 30.SEP.2018 20:43:35

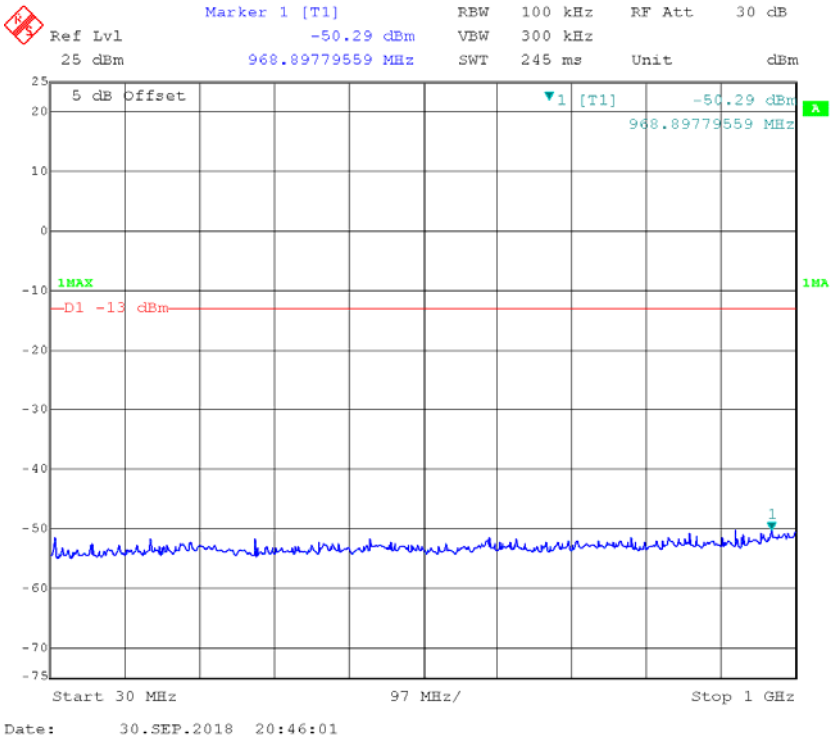
QPSK_20 MHz


Marker 1 [T1]
Ref Lvl
25 dBm
-50.64 dBm
968.89779559 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 20:45:03

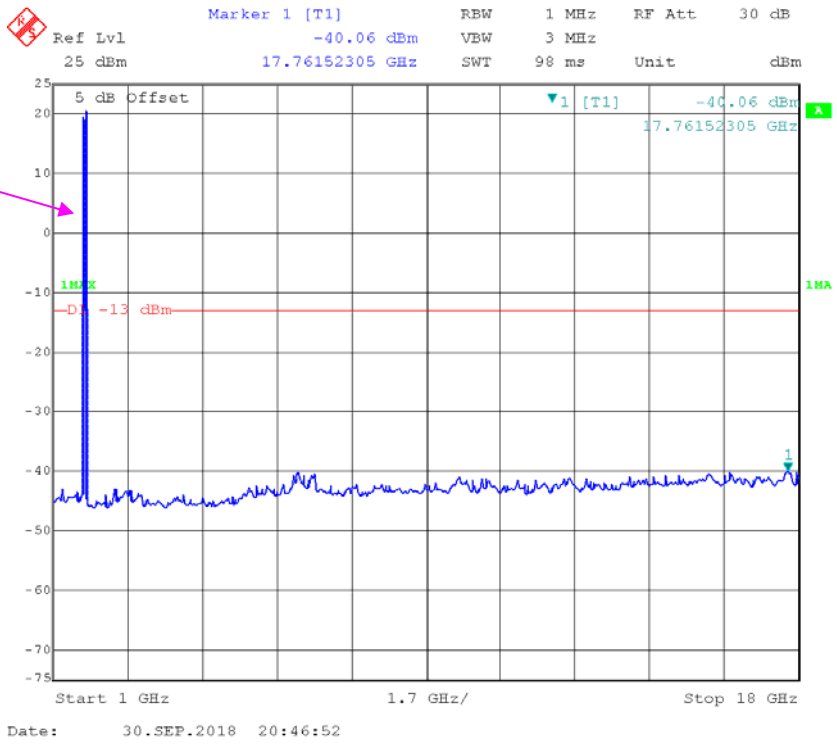


LTE Band 4 (Middle Channel)

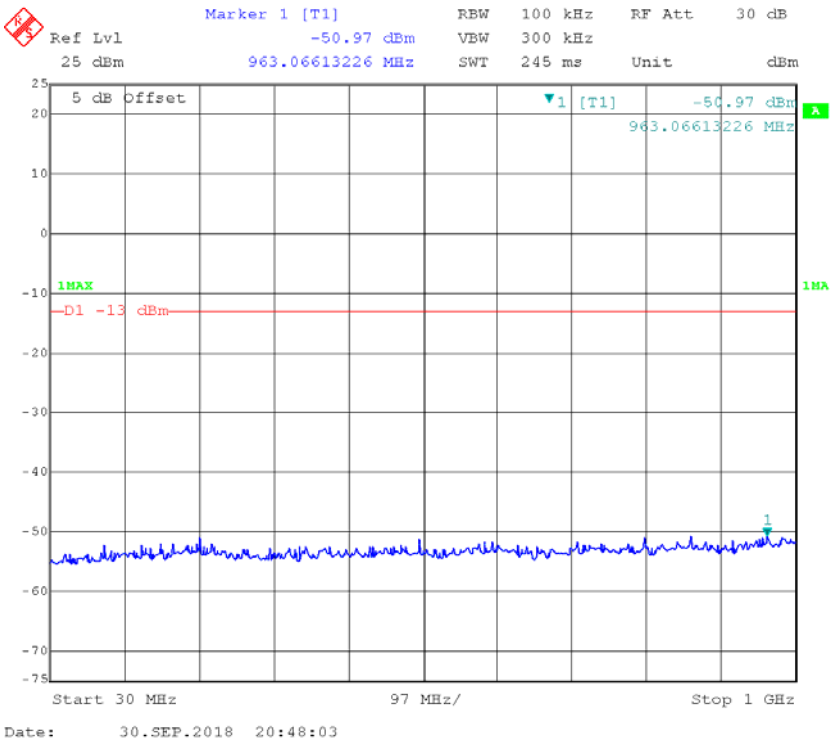
QPSK_1.4 MHz



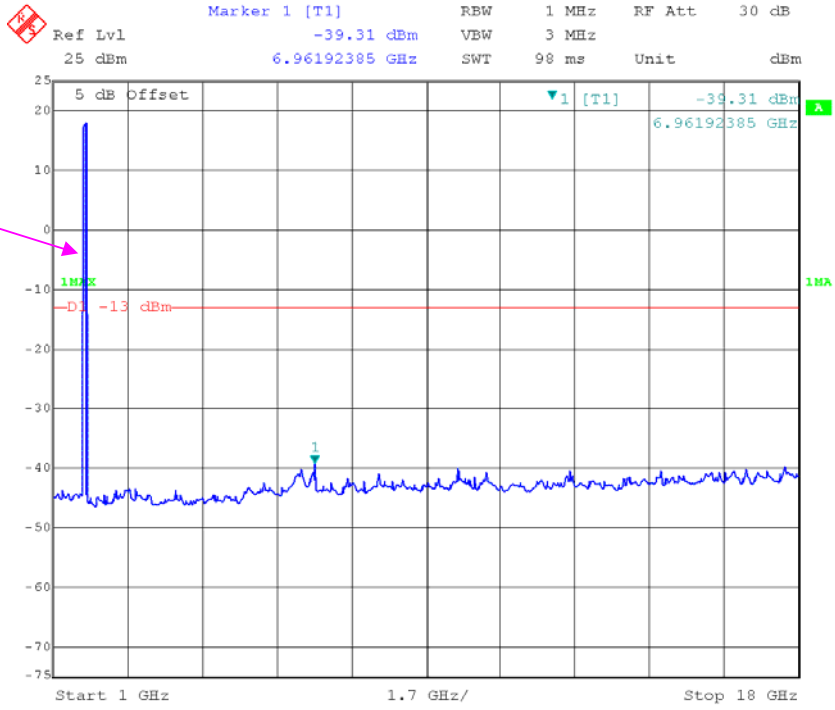
Fundamental



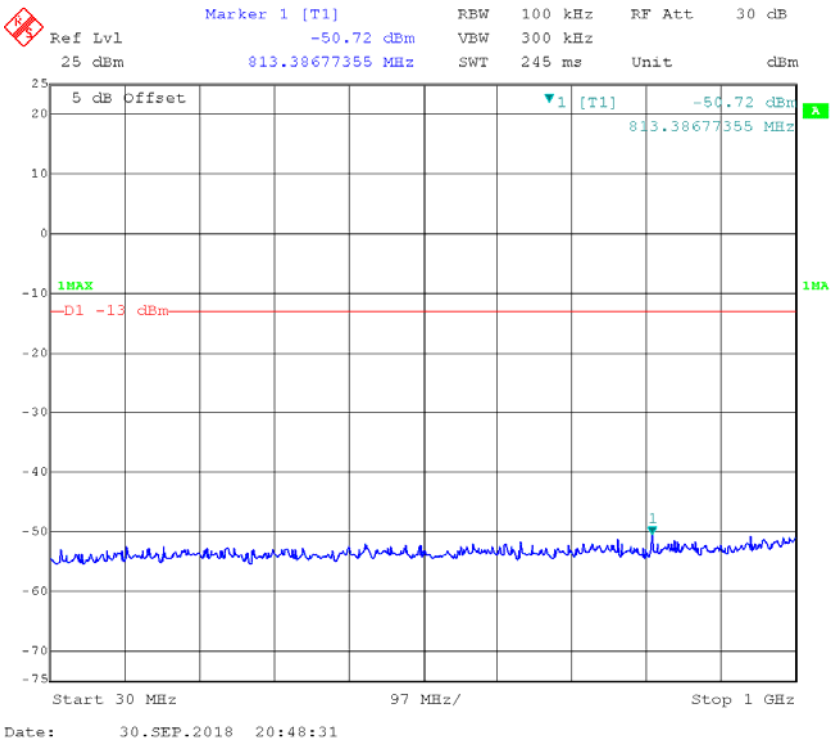
QPSK_3 MHz



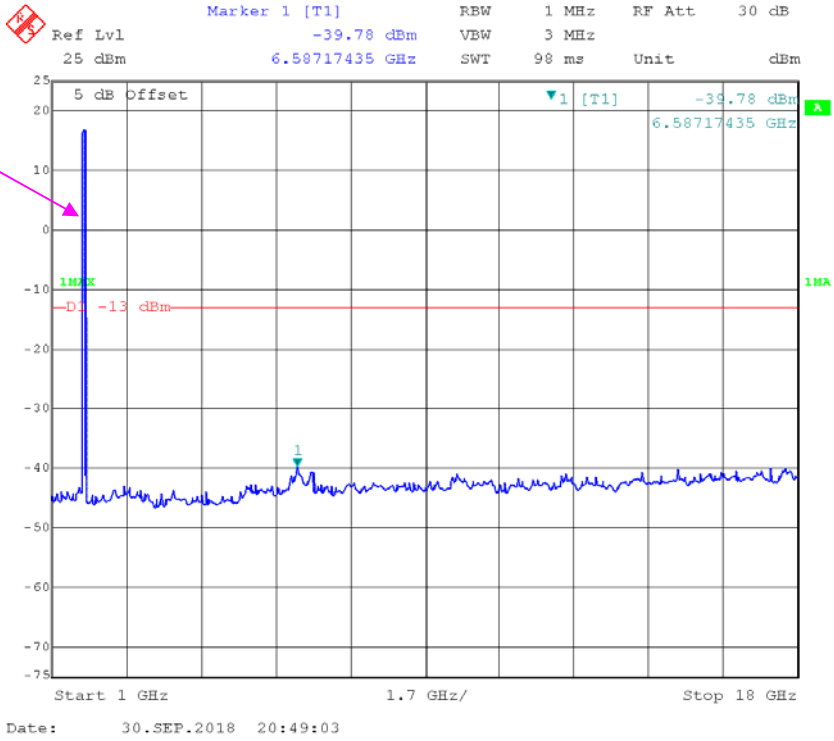
Fundamental



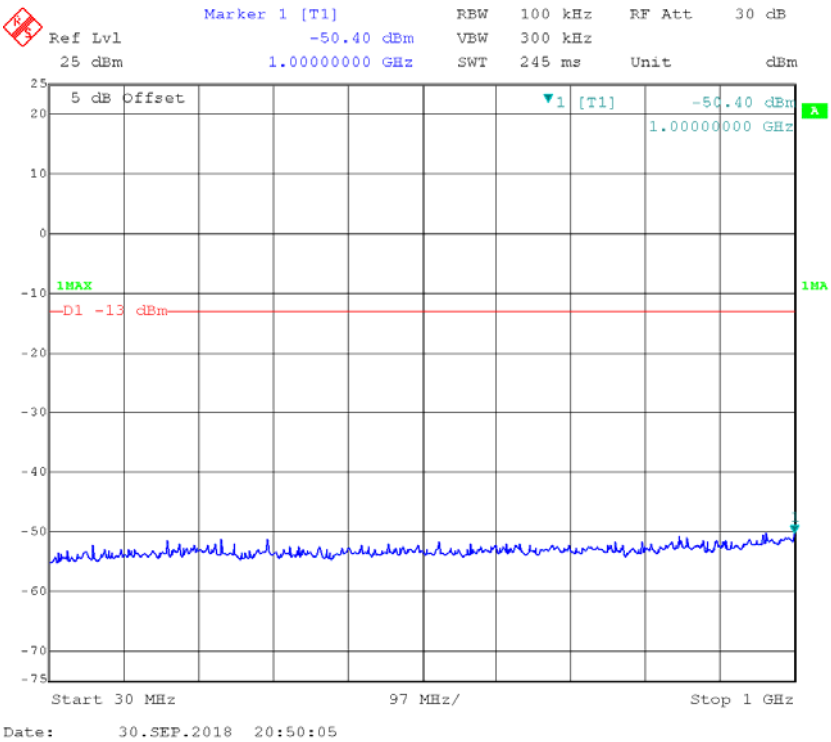
QPSK_5 MHz

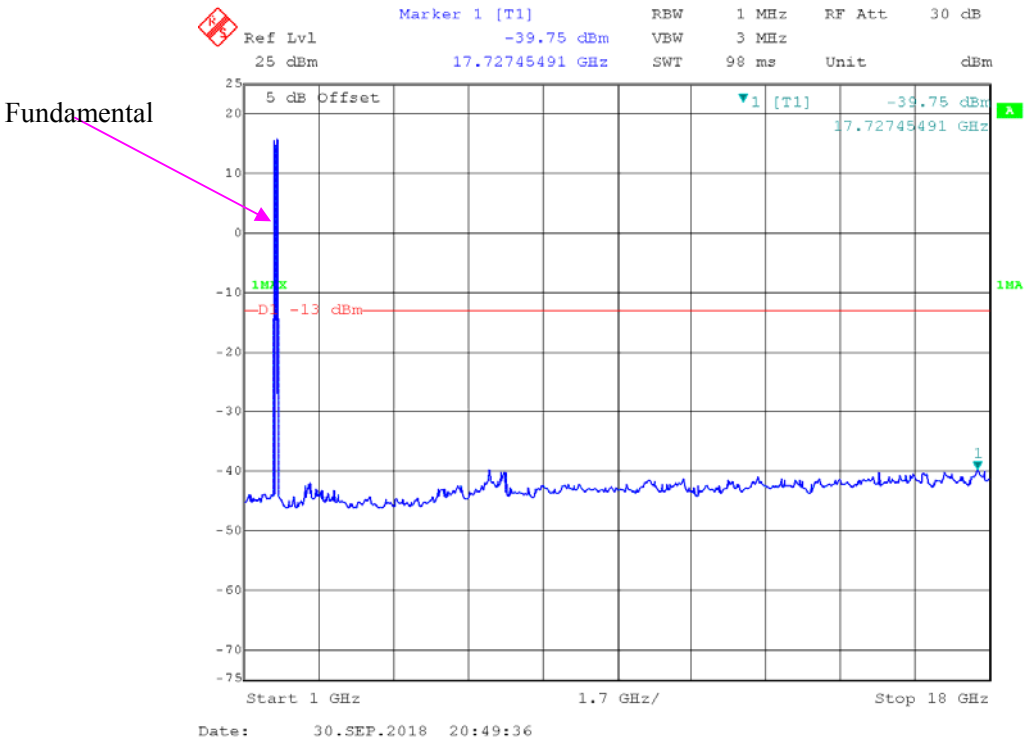


Fundamental

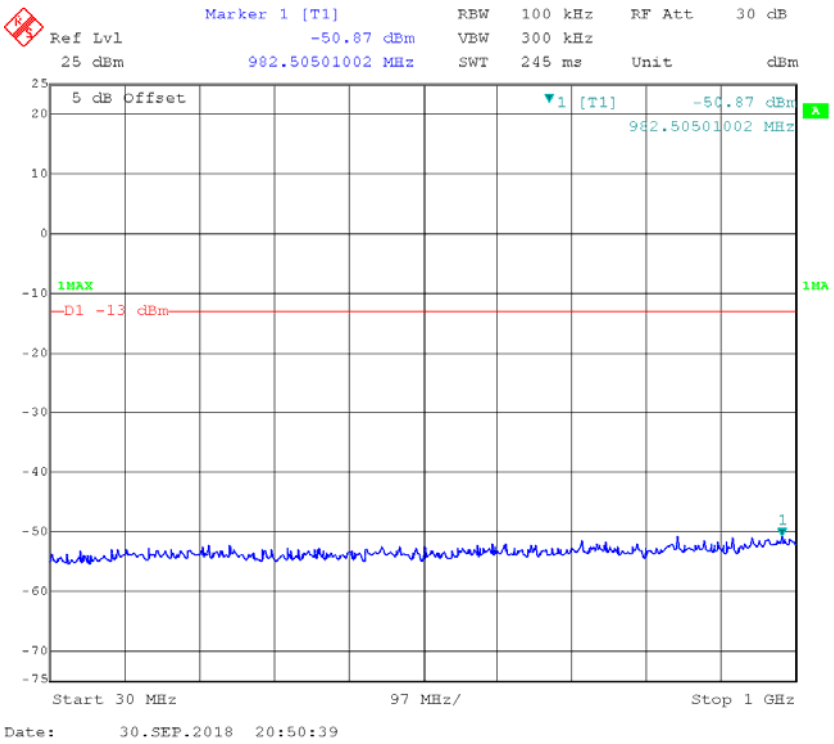


QPSK_10 MHz

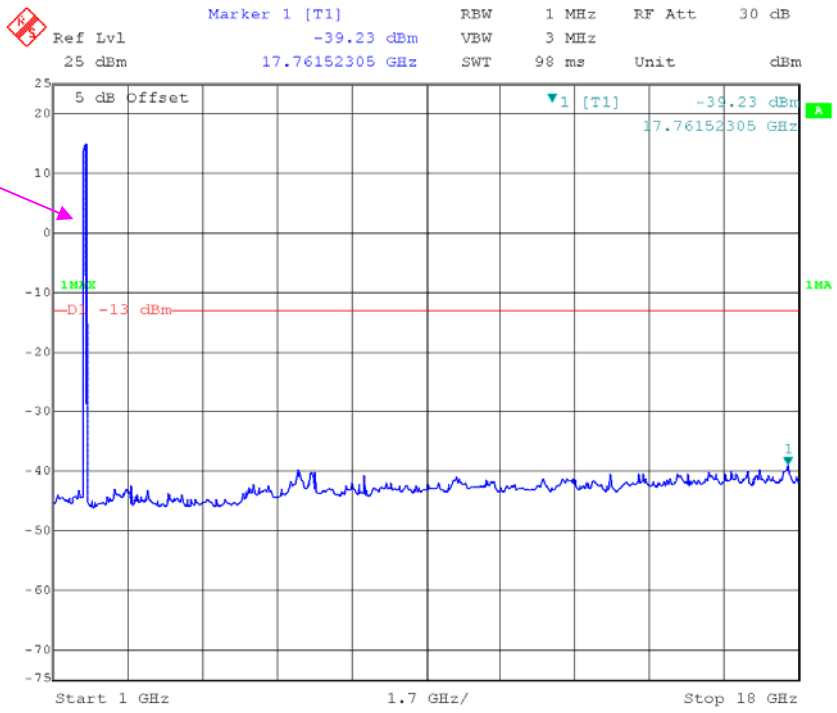



Fundamental
Marker 1 [T1]
Ref Lvl
25 dBm
-39.75 dBm
17.72745491 GHz
RBW 1 MHz
VBW 3 MHz
SWT 98 ms
RF Att 30 dB
Unit dBm
5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 1 GHz
1.7 GHz/
Stop 18 GHz
Date: 30.SEP.2018 20:49:36

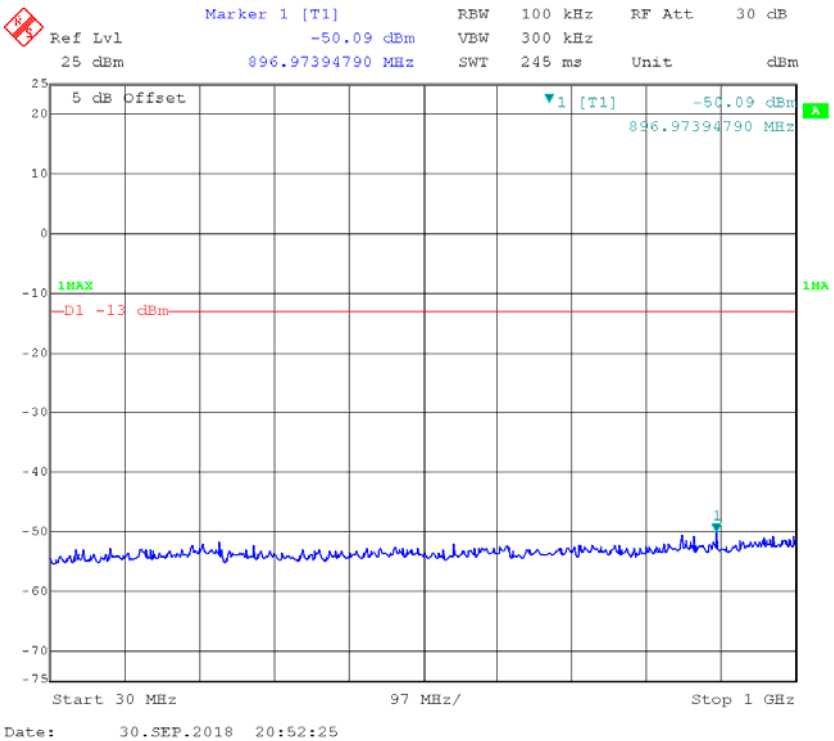
QPSK_15 MHz

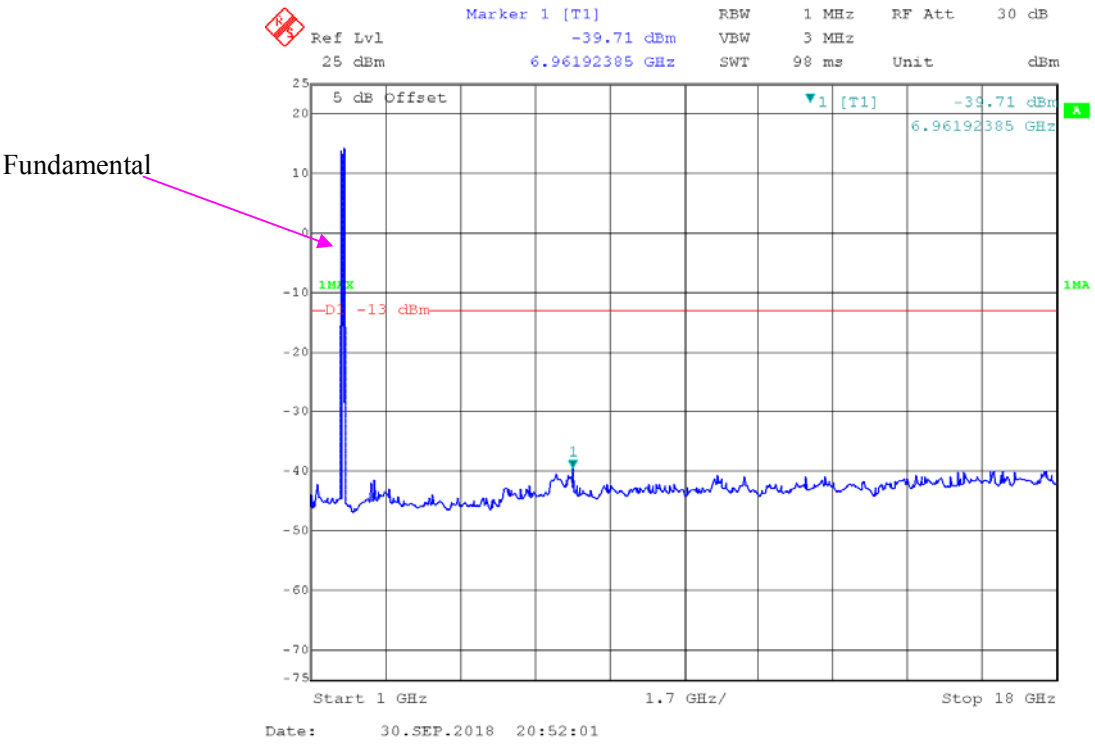

Marker 1 [T1]
Ref Lvl
25 dBm
-50.87 dBm
982.50501002 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 30 dB
Unit dBm
5 dB Offset
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 20:50:39

Fundamental



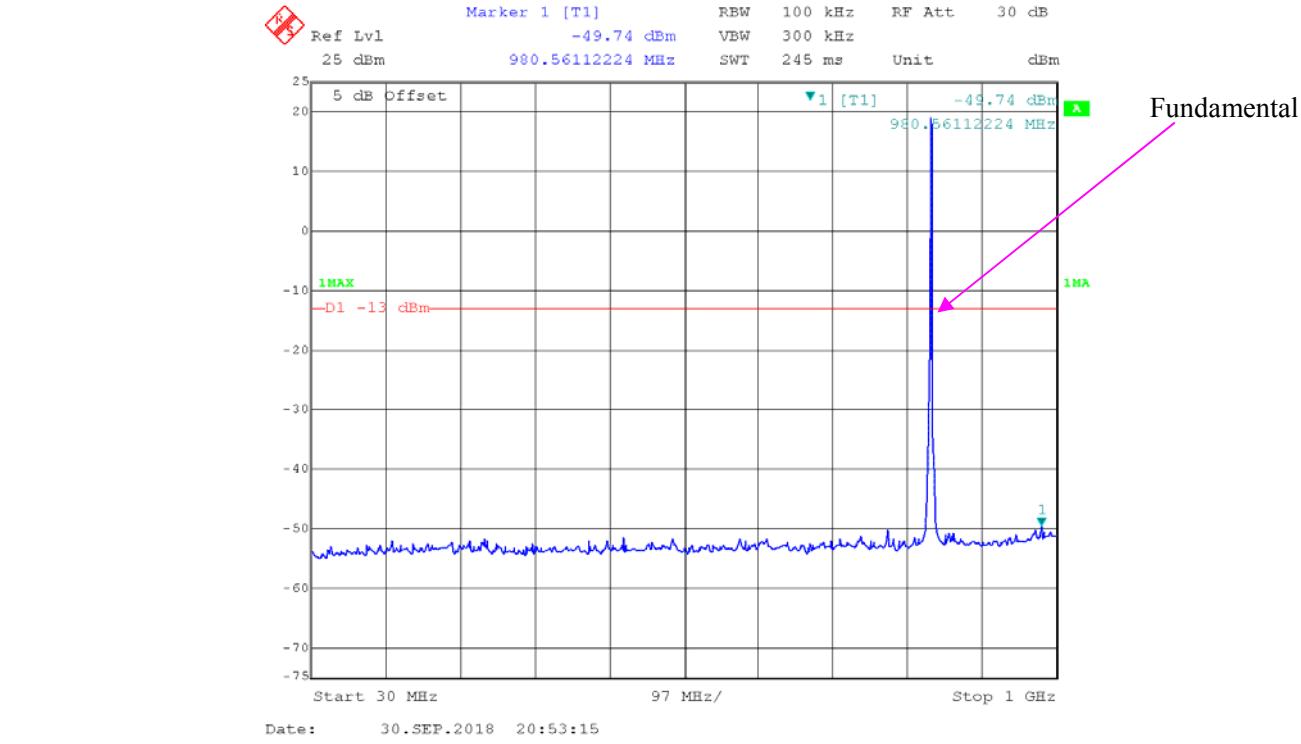
QPSK_20 MHz

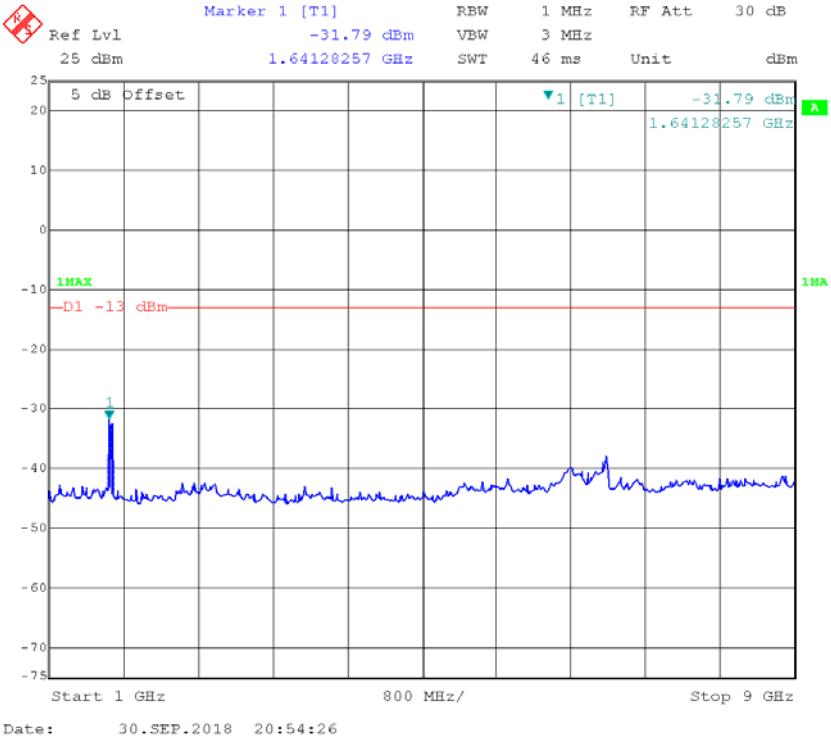




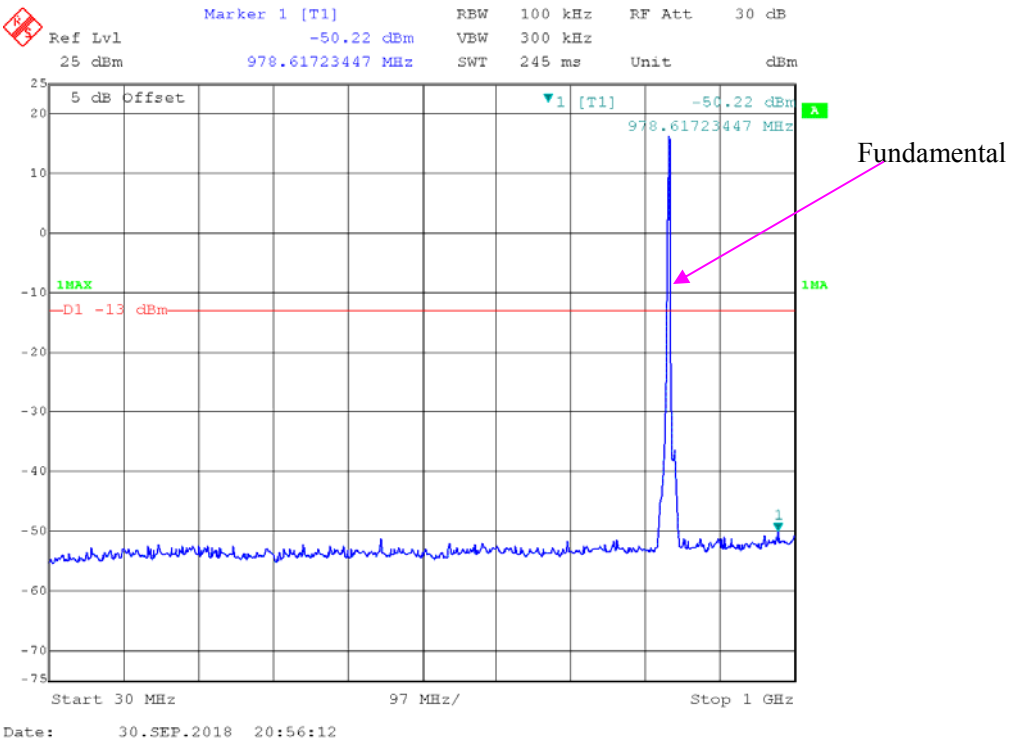
LTE Band 5 (Middle Channel)

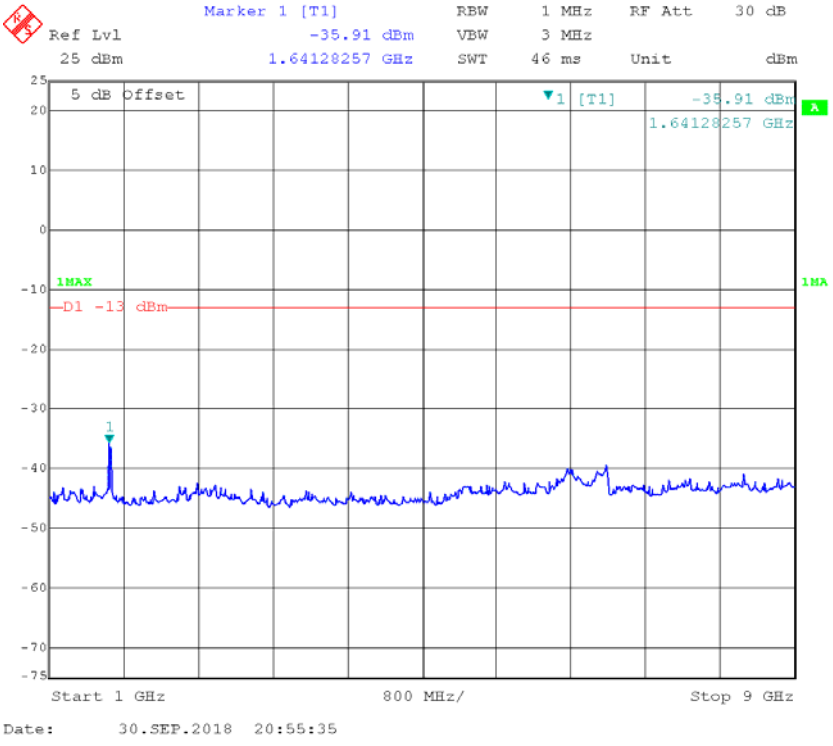
QPSK_1.4 MHz



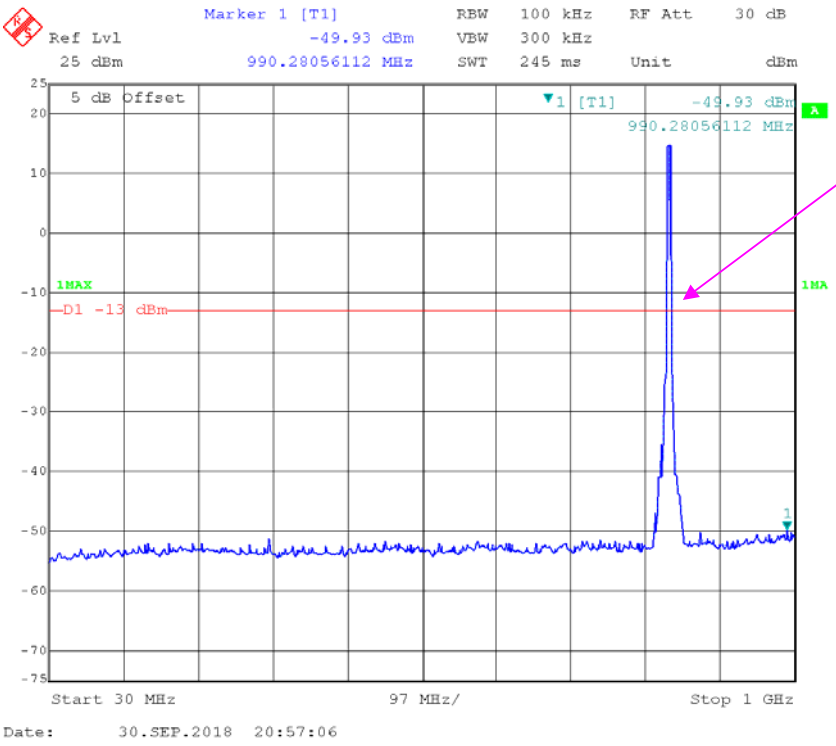

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-31.79 dBm
VBW 3 MHz
25 dBm
1.64128257 GHz
SWT 46 ms
Unit dBm
5 dB Offset
1 [T1]
-31.79 dBm
1.64128257 GHz
1MAX
D1 -13 dBm
1MA
Start 1 GHz
800 MHz/
Stop 9 GHz
Date: 30.SEP.2018 20:54:26

QPSK_3 MHz

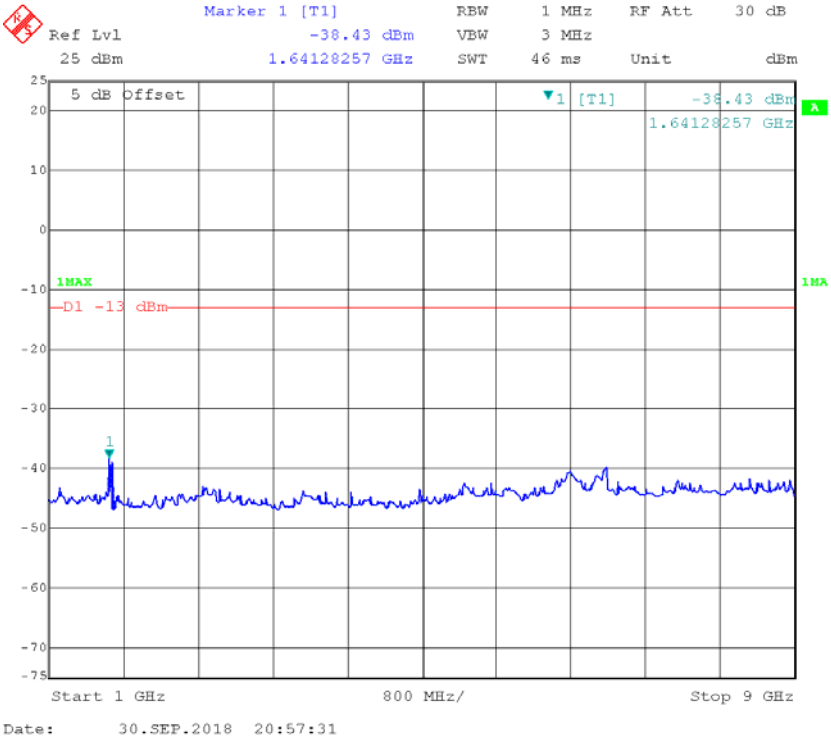

Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
-50.22 dBm
VBW 300 kHz
25 dBm
978.61723447 MHz
SWT 245 ms
Unit dBm
5 dB Offset
1 [T1]
-50.22 dBm
978.61723447 MHz
Fundamental
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 20:56:12



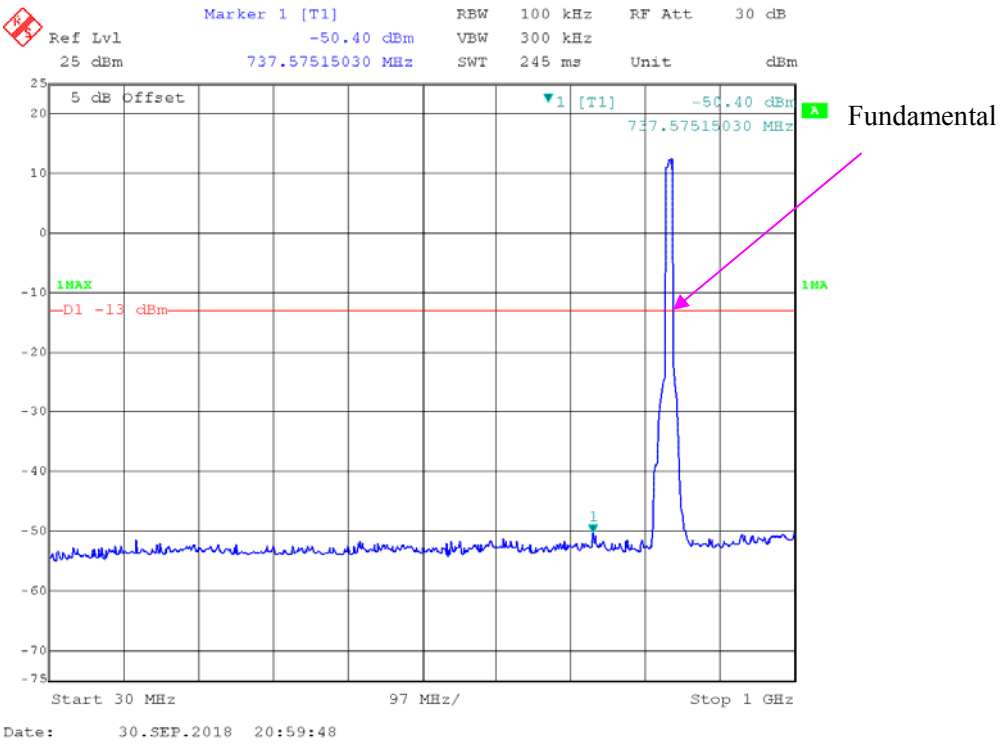
QPSK_5 MHz

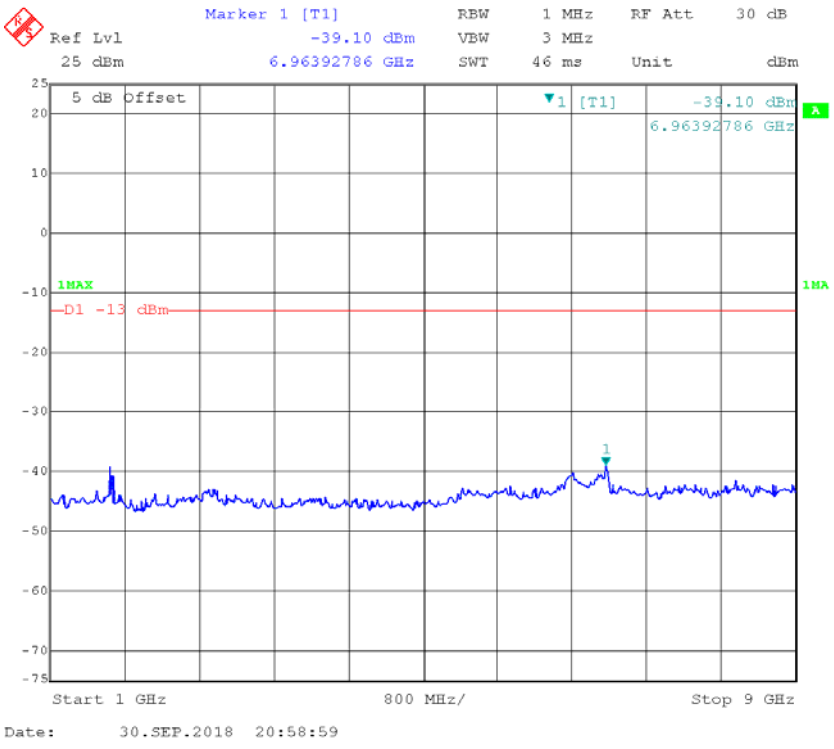


Fundamental


Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-38.43 dBm
VBW 3 MHz
25 dBm
1.64128257 GHz
SWT 46 ms
Unit dBm
5 dB Offset
1 [T1]
-38.43 dBm
1.64128257 GHz
1MAX
D1 -13 dBm
1MA
Start 1 GHz
800 MHz/
Stop 9 GHz
Date: 30.SEP.2018 20:57:31

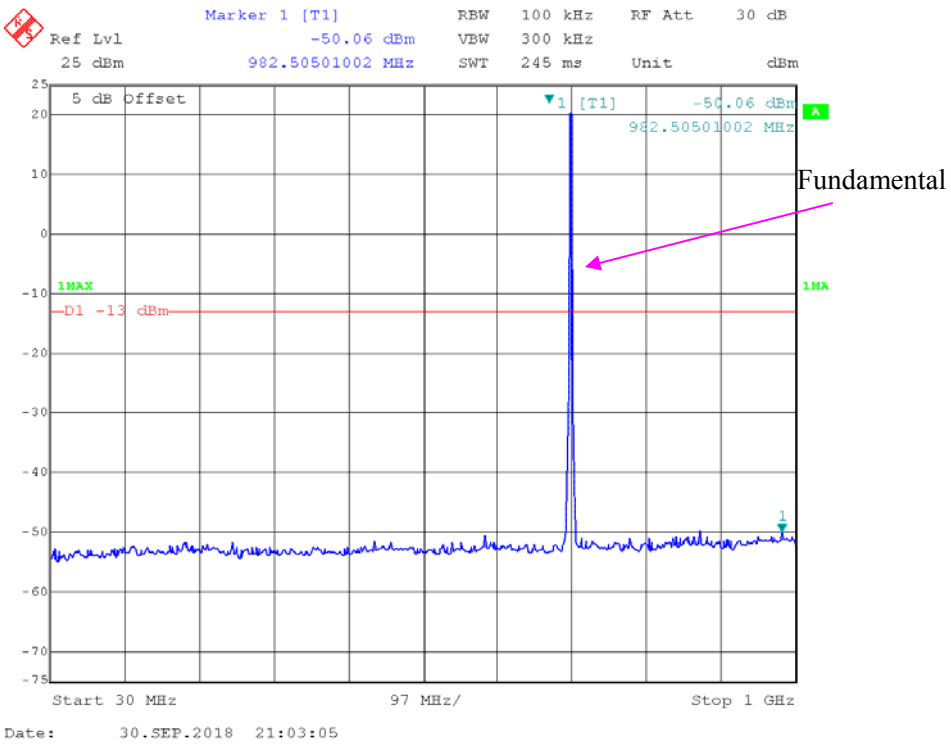
QPSK_10 MHz

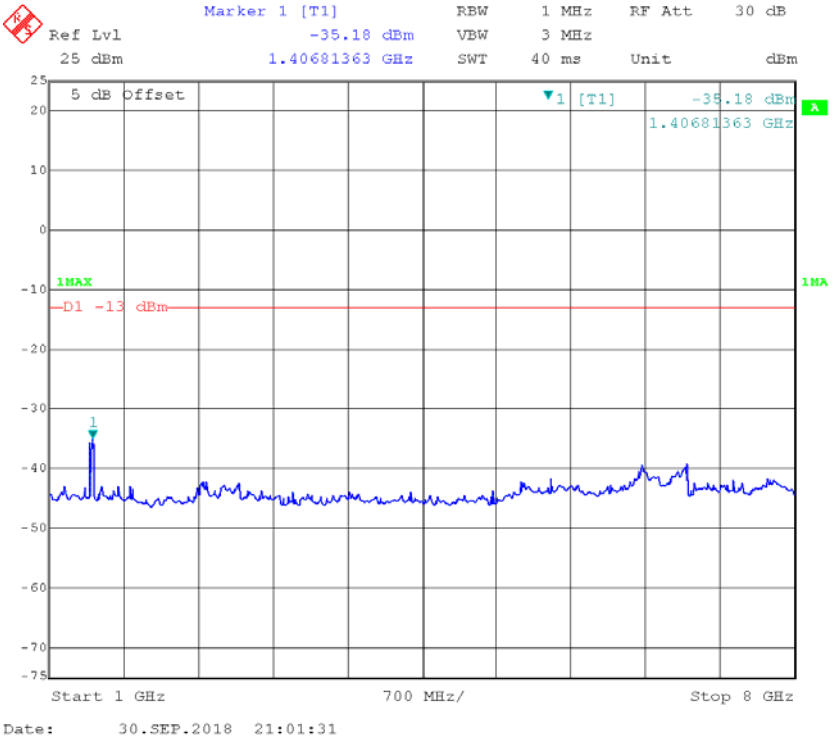

Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
-50.40 dBm
VBW 300 kHz
25 dBm
737.57515030 MHz
SWT 245 ms
Unit dBm
5 dB Offset
1 [T1]
-50.40 dBm
737.57515030 MHz
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 20:59:48
Fundamental



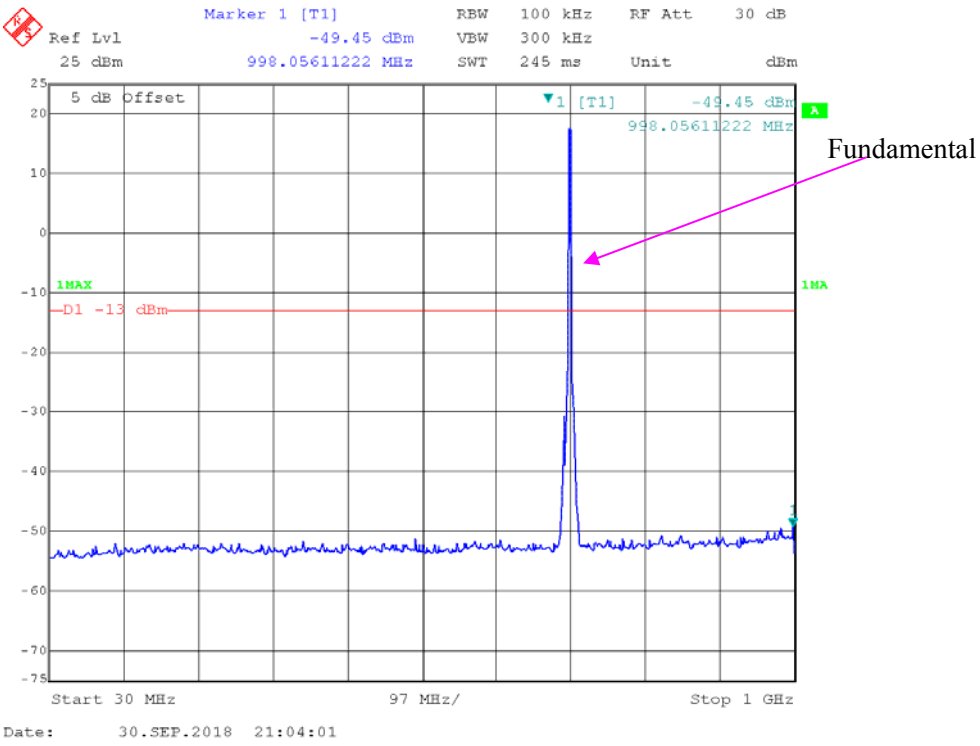
LTE Band 12 (Middle Channel)

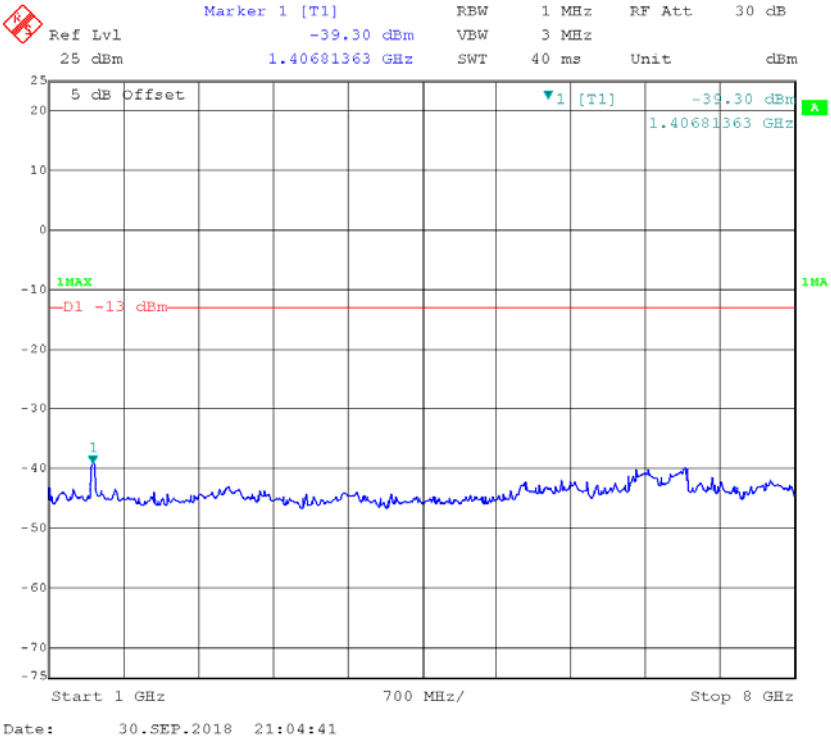
QPSK_1.4 MHz



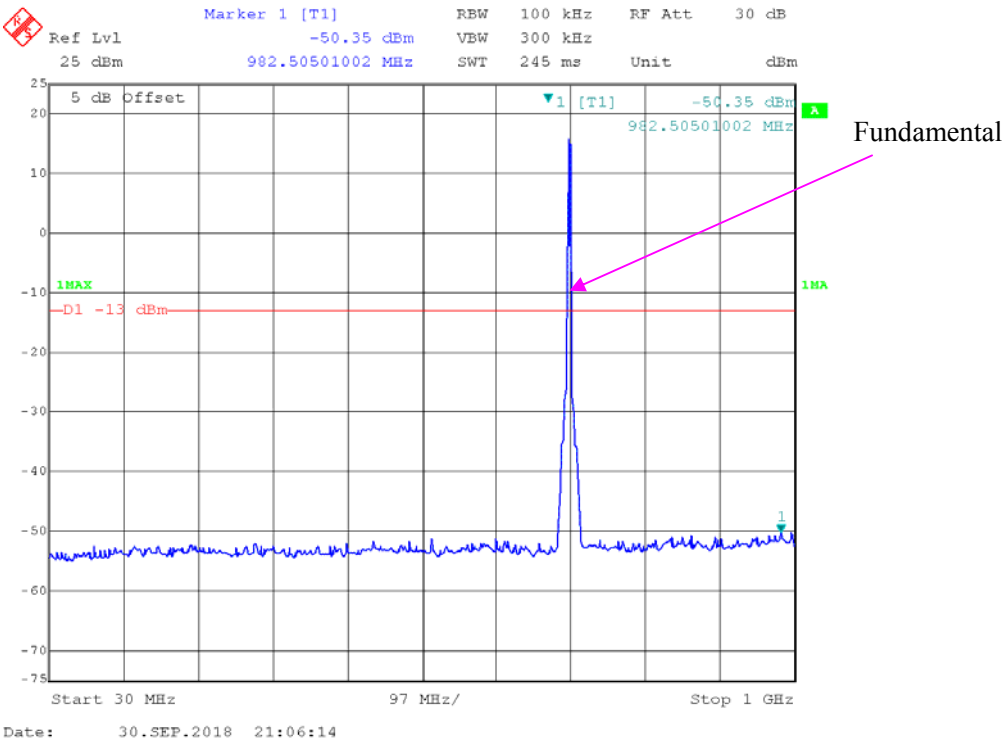

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-35.18 dBm
VBW 3 MHz
25 dBm
1.40681363 GHz
SWT 40 ms
Unit dBm
5 dB Offset
1 [T1]
-35.18 dBm
1.40681363 GHz
1MAX
D1 -13 dBm
1MA
Start 1 GHz
700 MHz/
Stop 8 GHz
Date: 30.SEP.2018 21:01:31

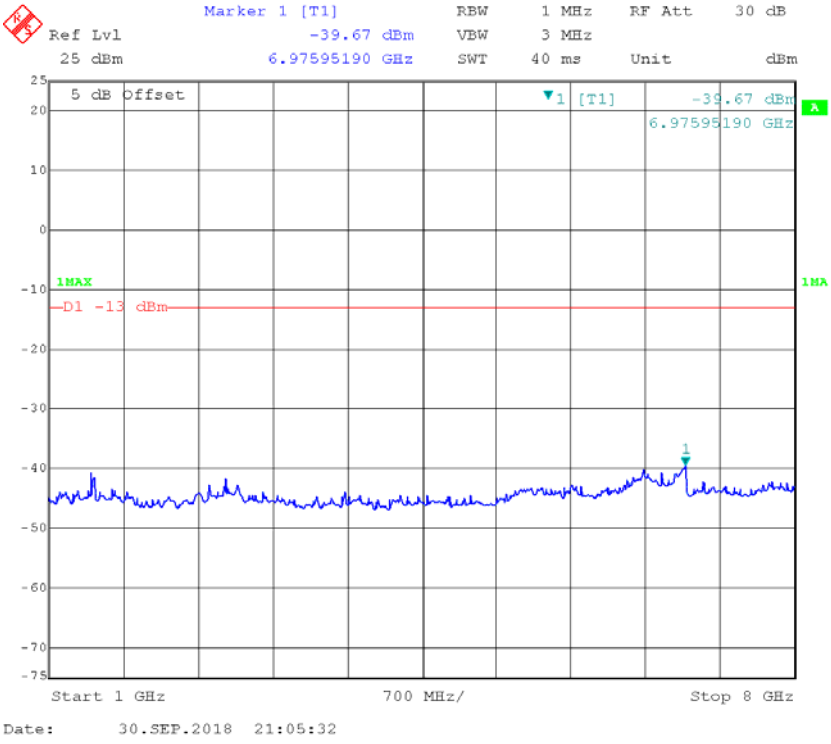
QPSK_3 MHz


Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
-49.45 dBm
VBW 300 kHz
25 dBm
998.05611222 MHz
SWT 245 ms
Unit dBm
5 dB Offset
1 [T1]
-49.45 dBm
998.05611222 MHz
Fundamental
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 21:04:01

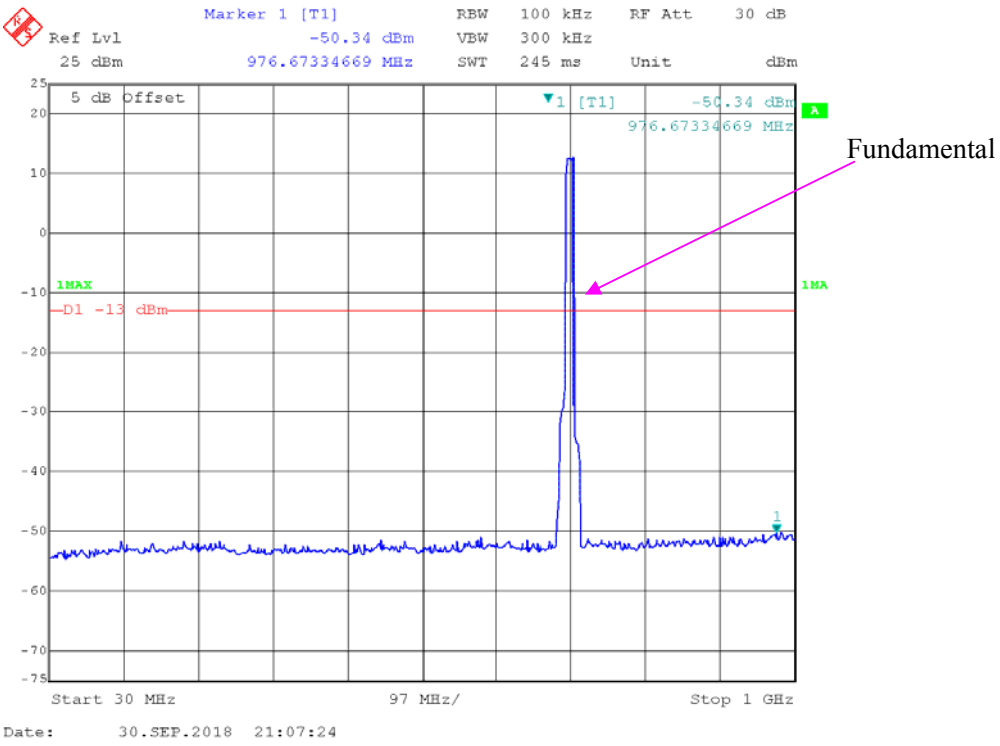

Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-39.30 dBm
VBW 3 MHz
25 dBm
1.40681363 GHz
SWT 40 ms
Unit dBm
5 dB Offset
1 [T1]
-39.30 dBm
1.40681363 GHz
1MAX
D1 -13 dBm
1MA
Start 1 GHz
700 MHz/
Stop 8 GHz
Date: 30.SEP.2018 21:04:41

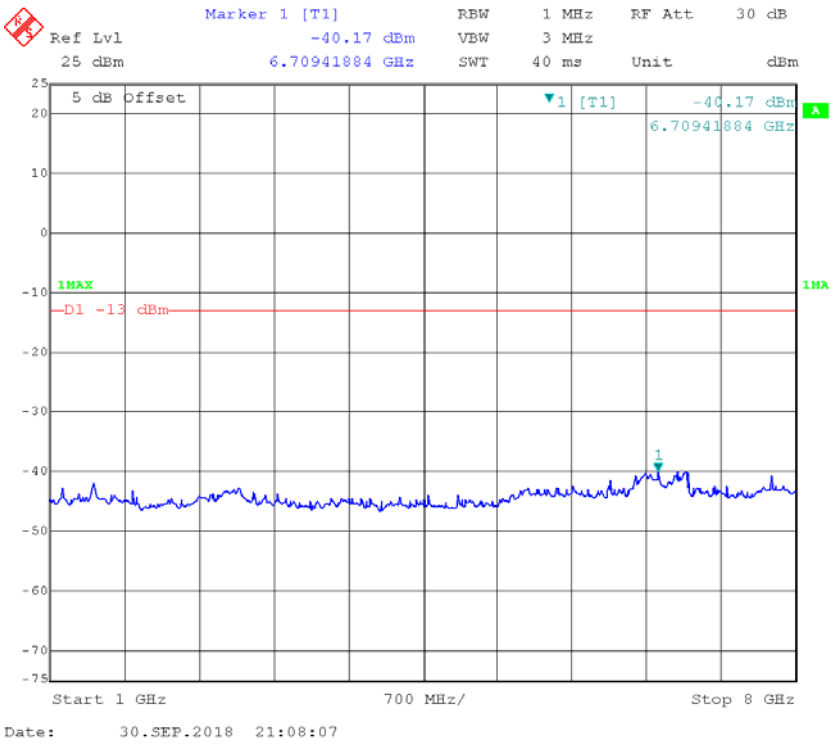
QPSK_5 MHz


Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
-50.35 dBm
VBW 300 kHz
25 dBm
982.50501002 MHz
SWT 245 ms
Unit dBm
5 dB Offset
1 [T1]
-50.35 dBm
982.50501002 MHz
Fundamental
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 21:06:14


Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-39.67 dBm
VBW 3 MHz
25 dBm
6.97595190 GHz
SWT 40 ms
Unit dBm
5 dB Offset
1 [T1]
-39.67 dBm
6.97595190 GHz
1MAX
D1 -13 dBm
1MA
Start 1 GHz
700 MHz/
Stop 8 GHz
Date: 30.SEP.2018 21:05:32

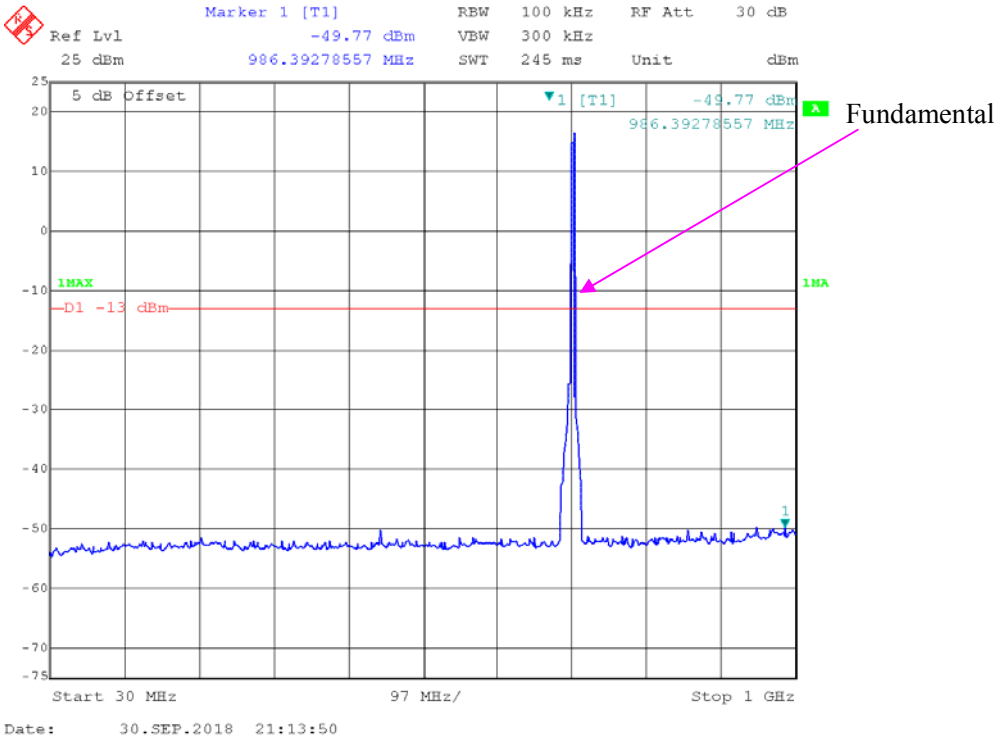
QPSK_10 MHz

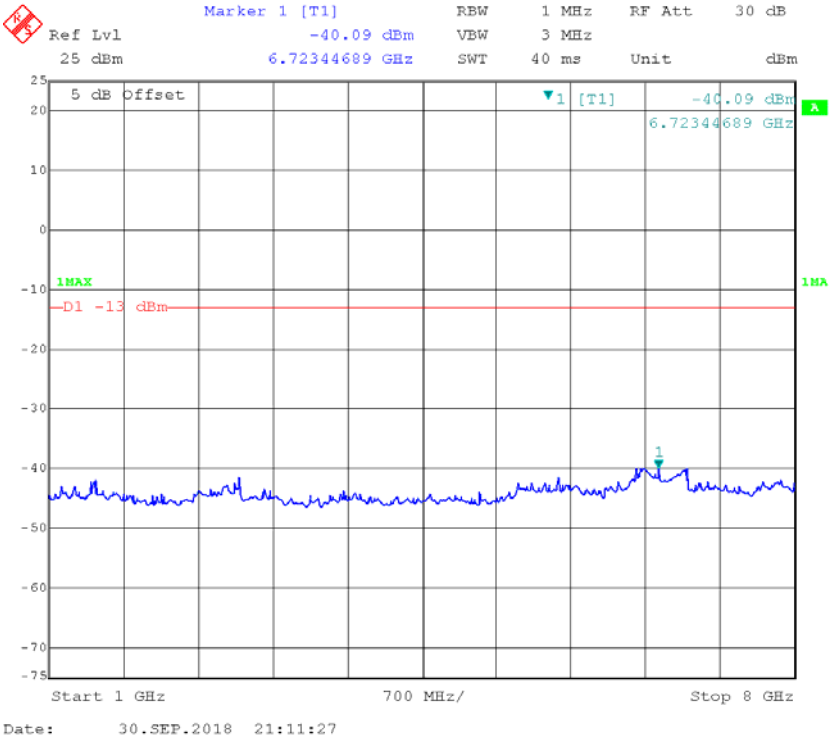

Marker 1 [T1]
RBW 100 kHz
RF Att 30 dB
Ref Lvl
-50.34 dBm
VBW 300 kHz
25 dBm
976.67334669 MHz
SWT 245 ms
Unit dBm
5 dB Offset
1 [T1]
-50.34 dBm
976.67334669 MHz
Fundamental
1MAX
D1 -13 dBm
1MA
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 30.SEP.2018 21:07:24



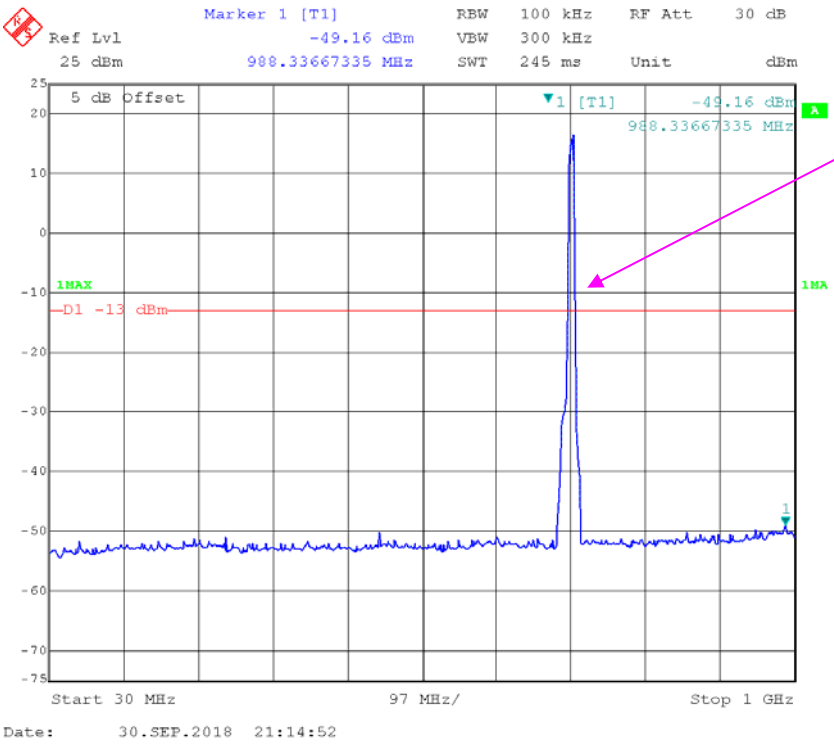
LTE Band 17 (Middle Channel)

QPSK_5 MHz

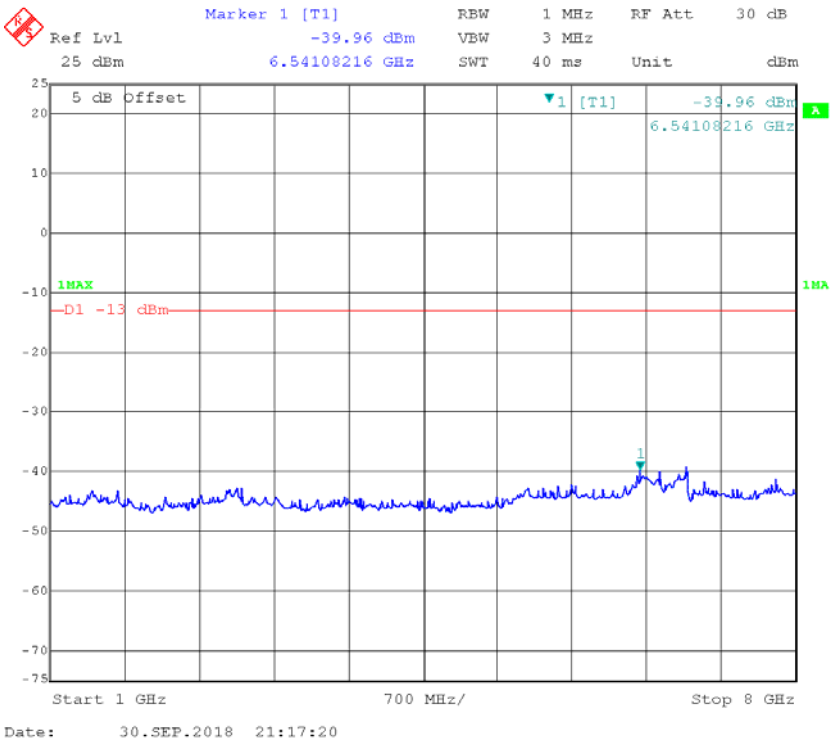




QPSK_10 MHz



Fundamental


Marker 1 [T1]
RBW 1 MHz
RF Att 30 dB
Ref Lvl
-39.96 dBm
VBW 3 MHz
25 dBm
6.54108216 GHz
SWT 40 ms
Unit dBm
5 dB Offset
1 [T1]
-39.96 dBm
6.54108216 GHz
1MAX
D1 -13 dBm
1MA
Start 1 GHz
700 MHz/
Stop 8 GHz
Date: 30.SEP.2018 21:17:20

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

Applicable Standard

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

Test Procedure

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

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

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

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Signal Generator	E8247C	MY43321350	2017-12-11	2018-12-11
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF1850-1910MS-0935V2	0935V2	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	2018-06-16	2019-06-16

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

Test Data

Environmental Conditions

Temperature:	25.8~26.7°C
Relative Humidity:	34 %
ATM Pressure:	100.8 kPa

** The testing was performed by Sunny Cen & Blake Yang on 2018-09-30.*

EUT Operation Mode: Transmitting(TH-682 was the worst)

30 MHz-10 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	51.87	-62.34	10.6	0.73	-52.5	-13.0	39.5
1673.200	V	52.16	-62.65	10.6	0.73	-52.8	-13.0	39.8
2509.800	H	50.66	-62.36	13.1	1.25	-50.5	-13.0	37.5
2509.800	V	51.48	-61.57	13.1	1.25	-49.7	-13.0	36.7
3346.400	H	46.53	-64.13	13.8	1.61	-51.9	-13.0	38.9
3346.400	V	47.32	-63.39	13.8	1.61	-51.2	-13.0	38.2
684.000	H	43.67	-57.87	0.0	0.91	-58.8	-13.0	45.8
684.000	V	45.35	-58.79	0.0	0.91	-59.7	-13.0	46.7

30 MHz-20 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	47.63	-61.17	13.8	1.63	-49.0	-13.0	36.0
3760.000	V	48.21	-60.46	13.8	1.63	-48.3	-13.0	35.3
5640.000	H	46.25	-59.78	14.0	1.31	-47.1	-13.0	34.1
5640.000	V	46.48	-59.43	14.0	1.31	-46.7	-13.0	33.7
276.000	H	42.57	-66.36	0.0	0.51	-66.9	-13.0	53.9
276.000	V	45.24	-66.03	0.0	0.51	-66.5	-13.0	53.5

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								
3760.00	H	49.36	-59.44	13.76	1.63	-47.31	-13.00	34.31
3760.00	V	50.21	-58.46	13.76	1.63	-46.33	-13.00	33.33
5640.00	H	46.25	-59.78	14.02	1.31	-47.07	-13.00	34.07
5640.00	V	46.48	-59.43	14.02	1.31	-46.72	-13.00	33.72
583.00	H	45.72	-56.77	0.00	0.75	-57.52	-13.00	44.52
583.00	V	46.68	-59.03	0.00	0.75	-59.78	-13.00	46.78

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								
3465.00	H	47.93	-62.31	13.91	1.62	-50.02	-13.00	37.02
3465.00	V	48.36	-61.92	13.91	1.62	-49.63	-13.00	36.63
5197.50	H	45.87	-60.55	14.00	1.52	-48.07	-13.00	35.07
5197.50	V	46.25	-60.24	14.00	1.52	-47.76	-13.00	34.76
387.00	H	44.23	-61.08	0.00	0.60	-61.68	-13.00	48.68
387.00	V	47.87	-60.54	0.00	0.60	-61.14	-13.00	48.14

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								
1673.00	H	54.28	-59.94	10.61	0.73	-50.06	-13.00	37.06
1673.00	V	55.16	-59.66	10.61	0.73	-49.78	-13.00	36.78
2509.50	H	50.46	-62.56	13.11	1.25	-50.70	-13.00	37.70
2509.50	V	52.73	-60.32	13.11	1.25	-48.46	-13.00	35.46
3346.00	H	47.72	-62.94	13.83	1.61	-50.72	-13.00	37.72
3346.00	V	48.25	-62.46	13.83	1.61	-50.24	-13.00	37.24
493.00	H	43.25	-61.02	0.00	0.70	-61.72	-13.00	48.72
493.00	V	47.54	-59.78	0.00	0.70	-60.48	-13.00	47.48

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								
1415.00	H	49.53	-63.97	9.08	1.22	-56.11	-13.00	43.11
1415.00	V	51.85	-62.18	9.08	1.22	-54.32	-13.00	41.32
2122.50	H	55.27	-57.52	11.27	1.11	-47.36	-13.00	34.36
2122.50	V	58.76	-54.01	11.27	1.11	-43.85	-13.00	30.85
2830.00	H	61.75	-50.33	13.34	1.36	-38.35	-13.00	25.35
2830.00	V	62.43	-49.88	13.34	1.36	-37.90	-13.00	24.90
298.00	H	47.52	-61.14	0.00	0.52	-61.66	-13.00	48.66
298.00	V	48.62	-61.47	0.00	0.52	-61.99	-13.00	48.99

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								
1420.00	H	47.32	-66.28	9.10	1.23	-58.41	-13.00	45.41
1420.00	V	49.65	-64.45	9.10	1.23	-56.58	-13.00	43.58
2130.00	H	50.16	-62.59	11.22	1.11	-52.48	-13.00	39.48
2130.00	V	54.53	-58.19	11.22	1.11	-48.08	-13.00	35.08
2840.00	H	48.25	-63.79	13.42	1.36	-51.73	-13.00	38.73
2840.00	V	50.11	-62.17	13.42	1.36	-50.11	-13.00	37.11
357.00	H	42.65	-63.81	0.00	0.57	-64.38	-13.00	51.38
357.00	V	46.82	-62.13	0.00	0.57	-62.70	-13.00	49.70

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

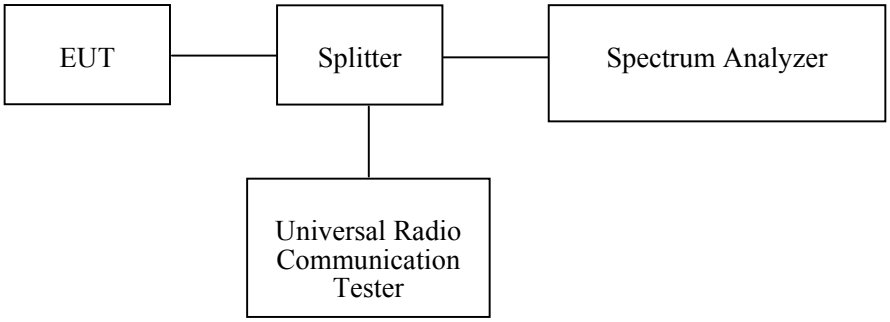
Applicable Standard

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	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	N/A
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each time	N/A

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

Test Data

Environmental Conditions

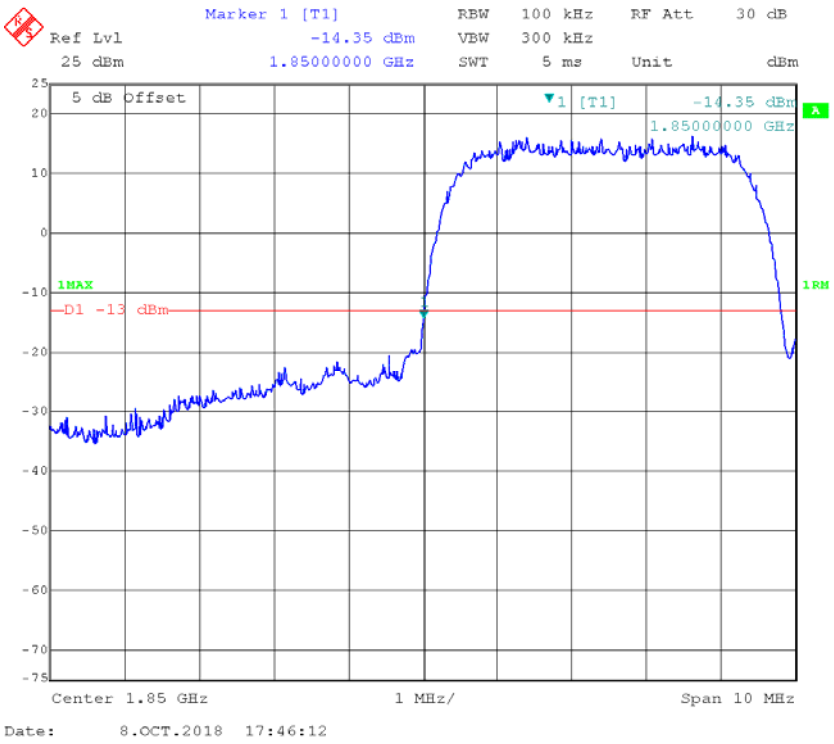
Temperature:	26.7~28.3°C
Relative Humidity:	42~58 %
ATM Pressure:	100~100.8 kPa

The testing was performed by Swim Lv from 2018-09-30 to 2018-11-15.

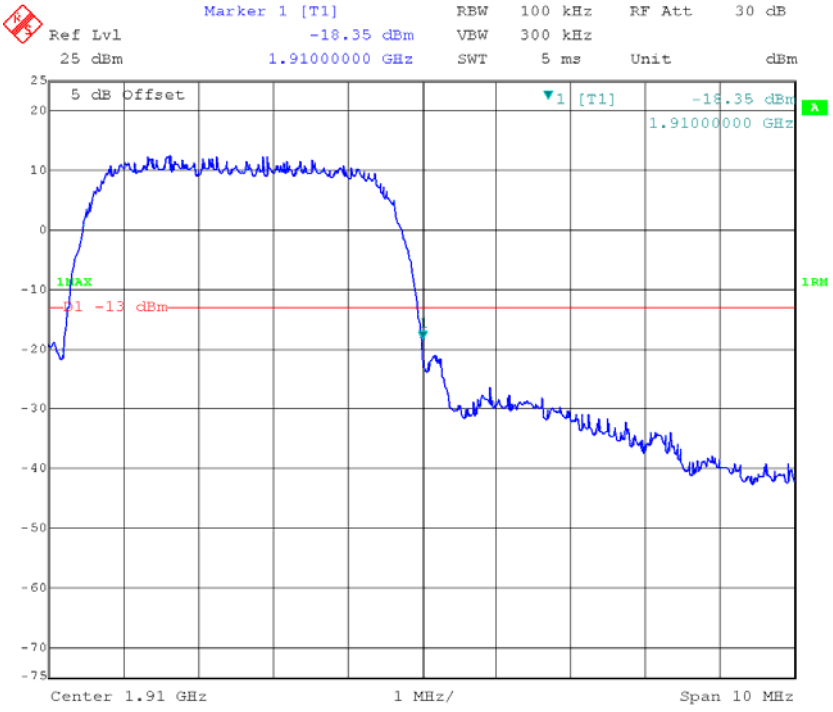
Test Mode: Transmitting

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

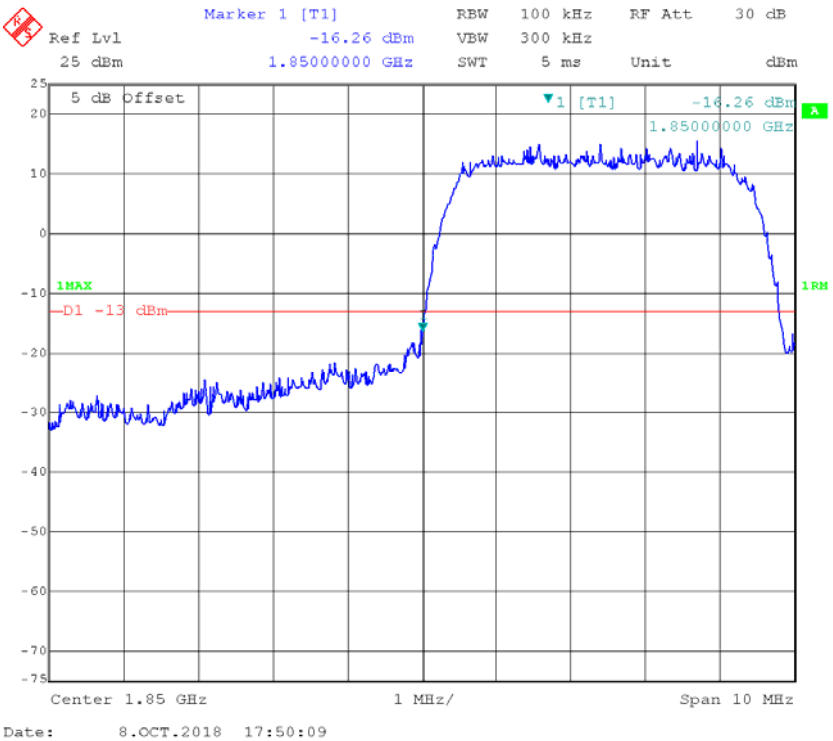
WCDMA Band II Rel 99, Left Band Edge



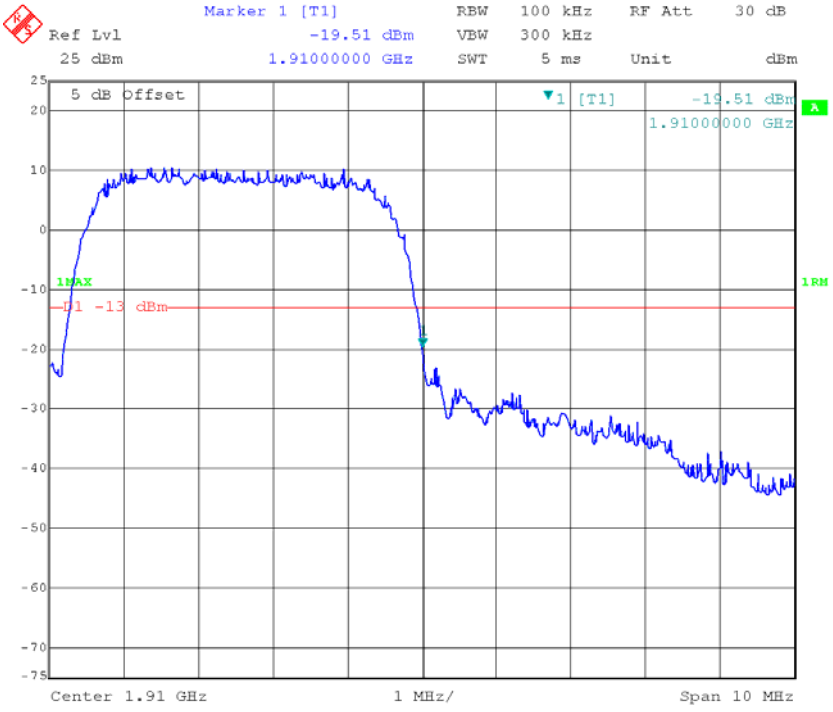
WCDMA Band II Rel 99, Right Band Edge



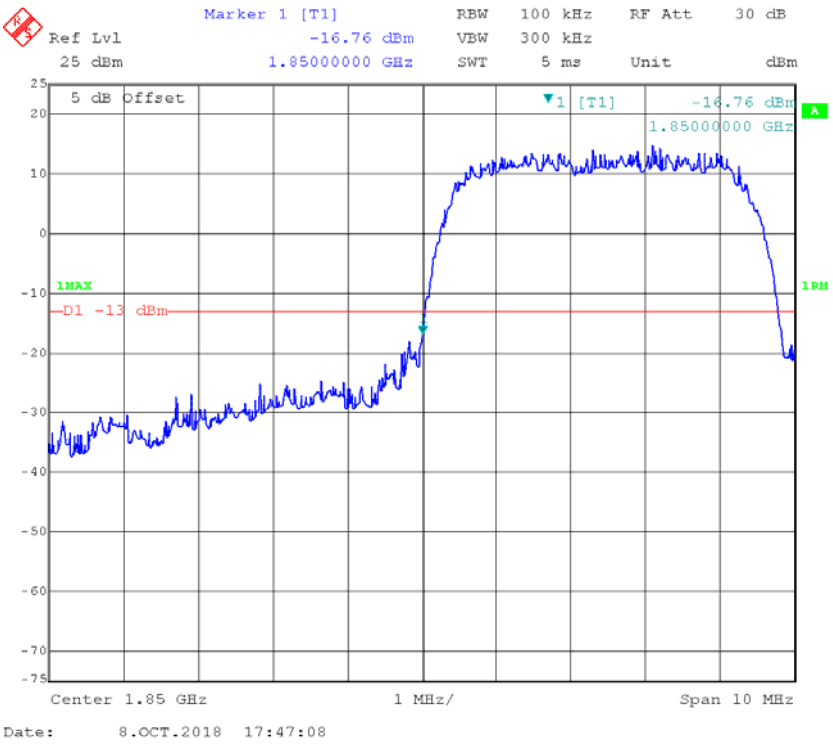
WCDMA Band II HSUPA, Left Band Edge



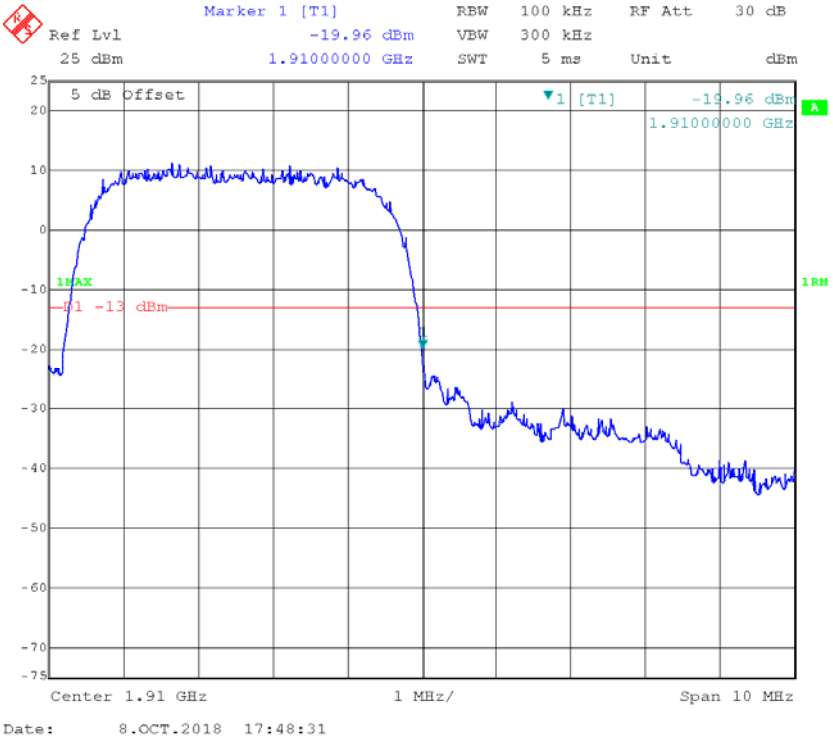
WCDMA Band II HSUPA, Right Band Edge



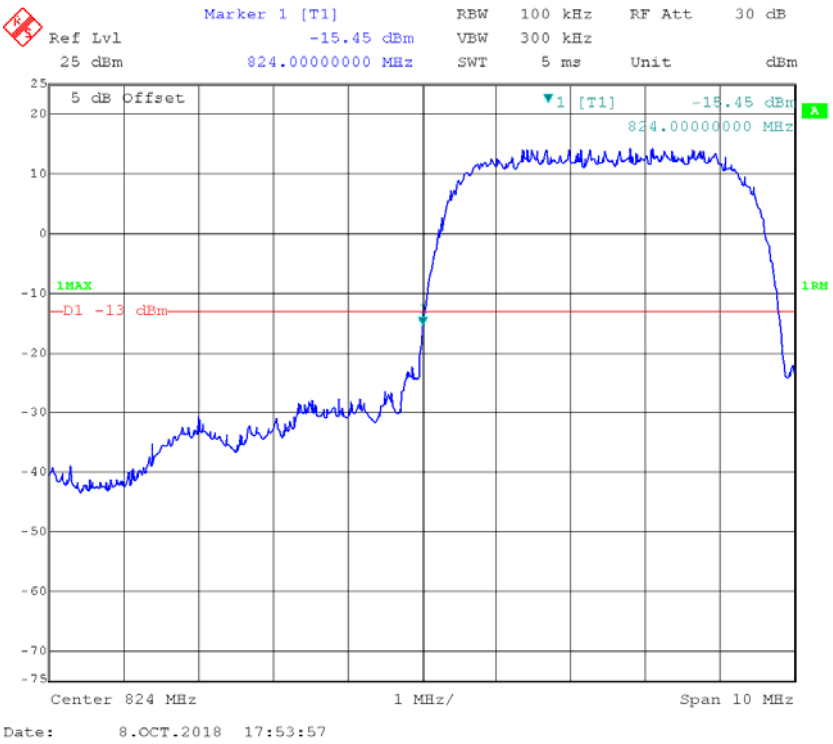
WCDMA Band II HSDPA, Left Band Edge



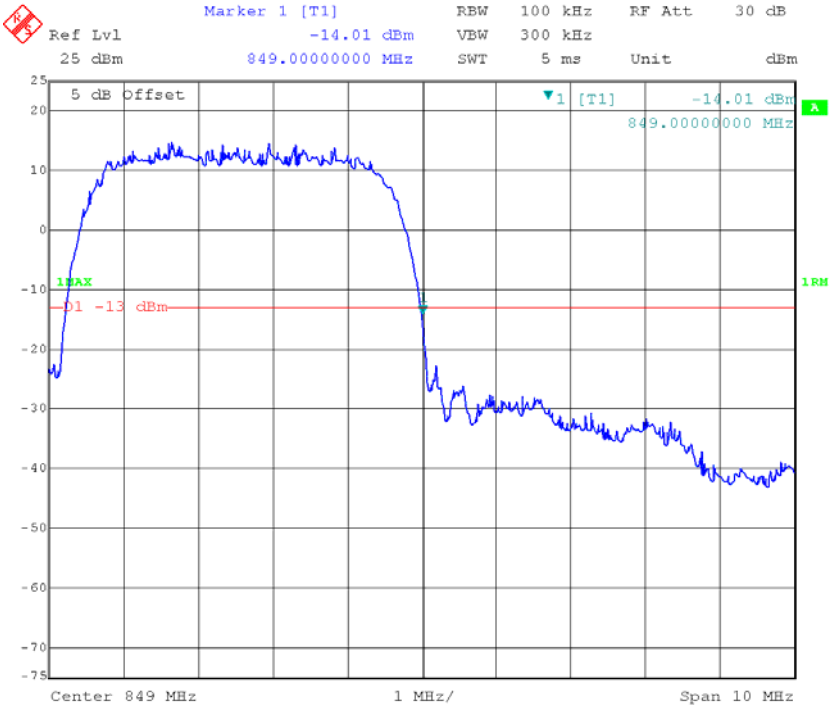
WCDMA Band II HSDPA, Right Band Edge



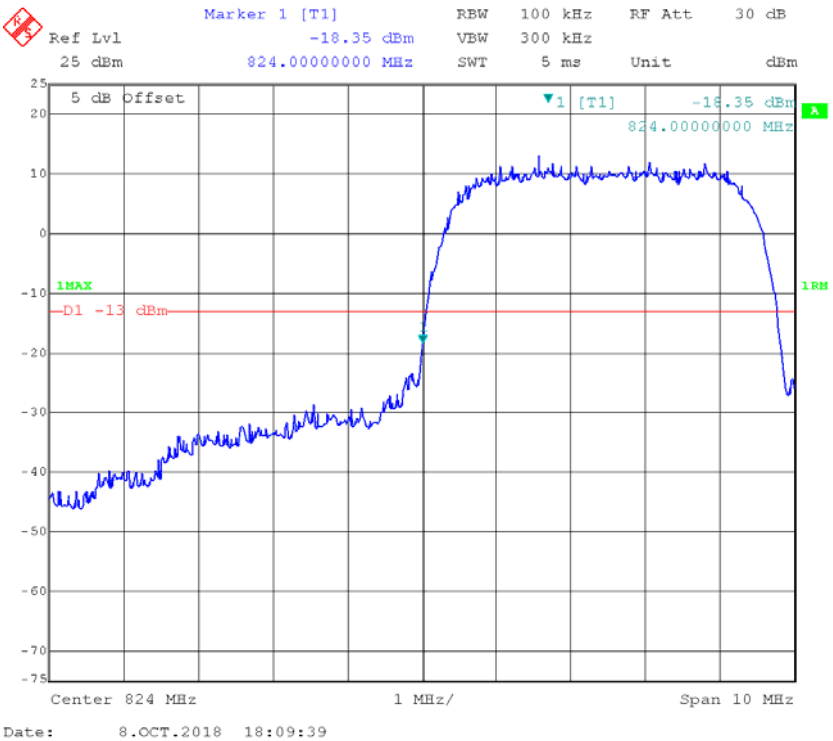
WCDMA Band V Rel 99, Left Band Edge



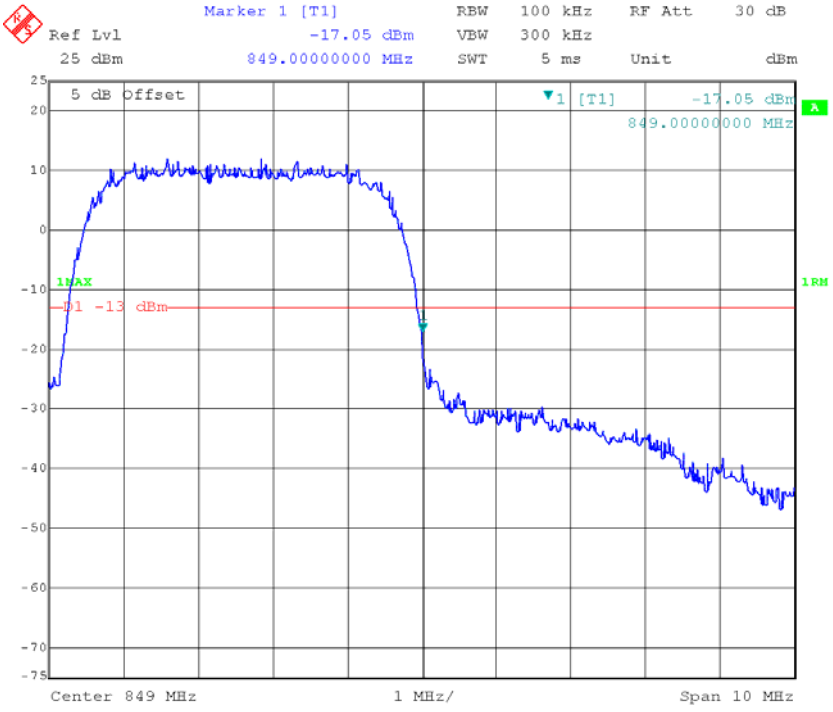
WCDMA Band V Rel 99, Right Band Edge



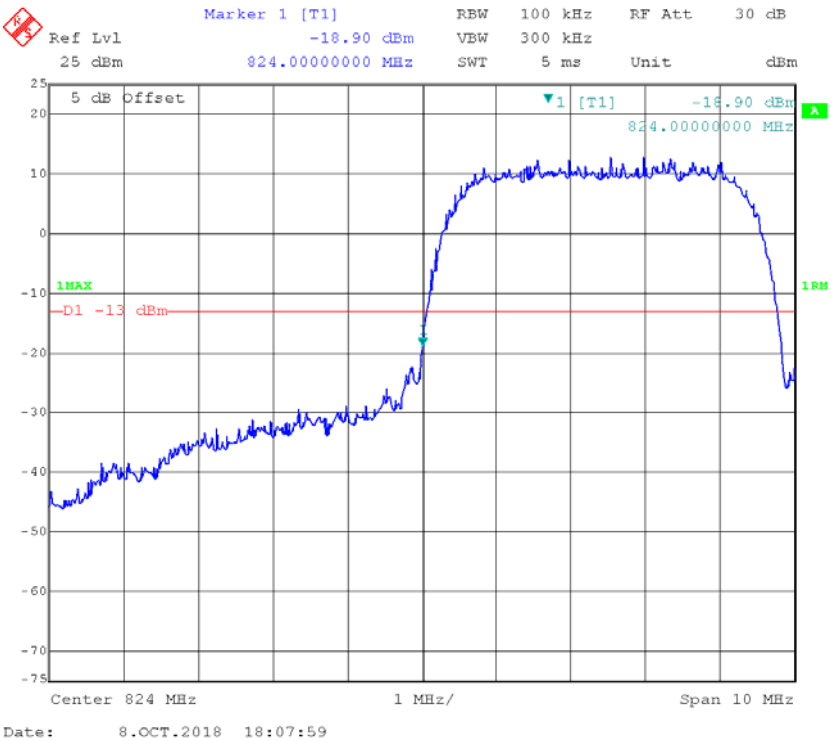
WCDMA Band V HSUPA, Left Band Edge



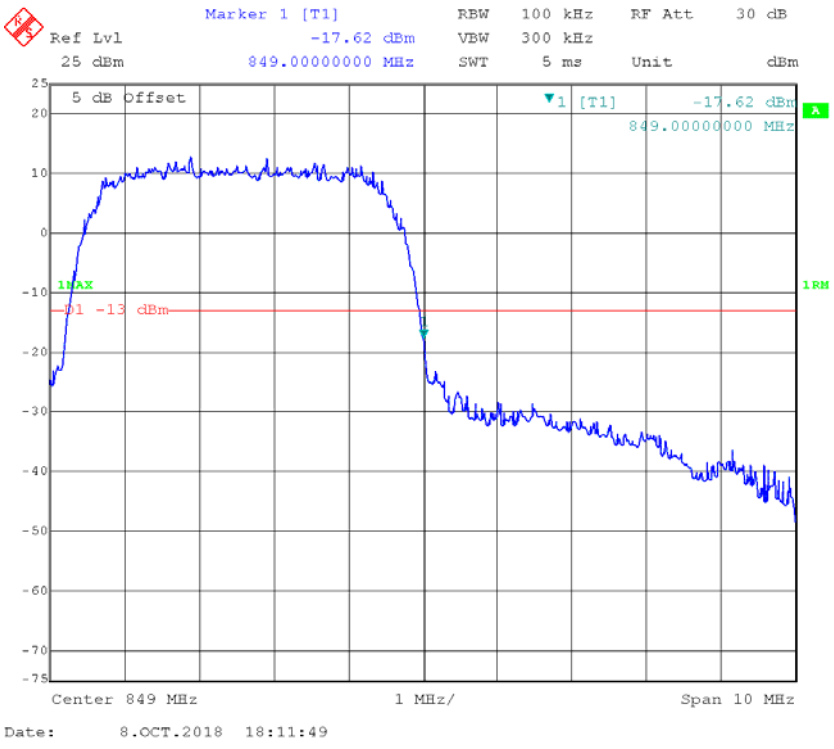
WCDMA Band V HSUPA, Right Band Edge



WCDMA Band V HSDPA, Left Band Edge

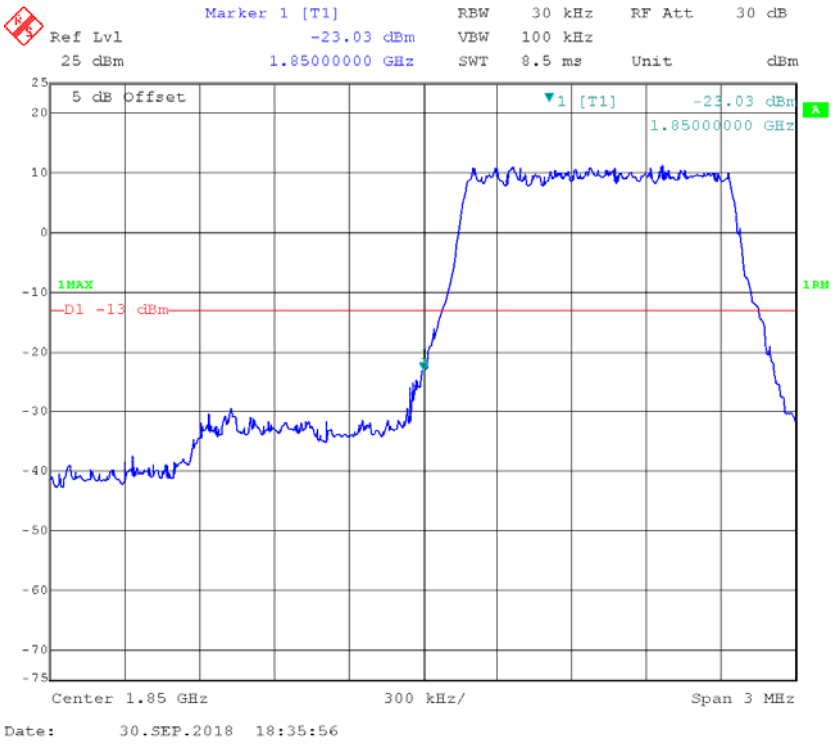


WCDMA Band V HSDPA, Right Band Edge

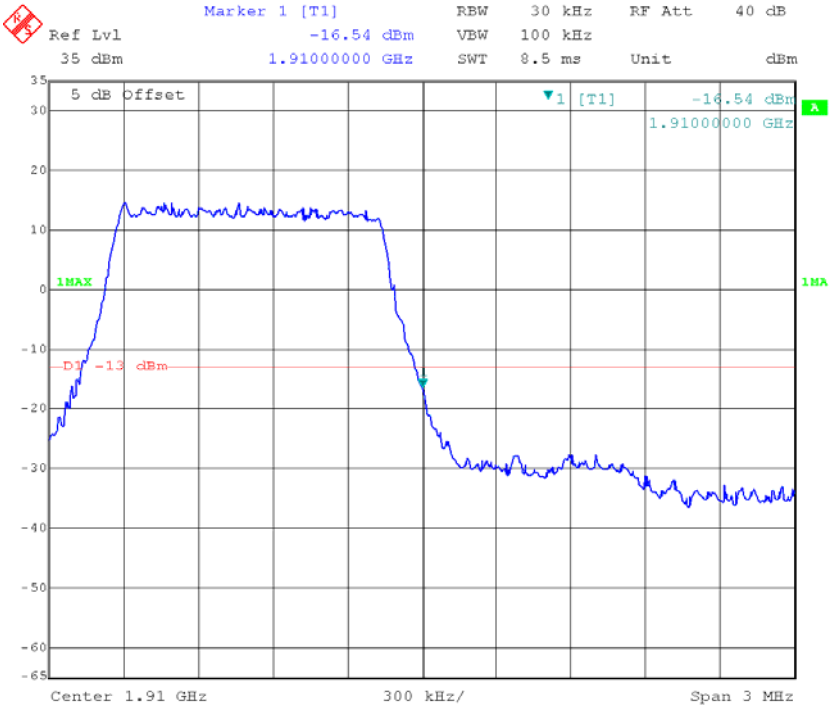


LTE Band II

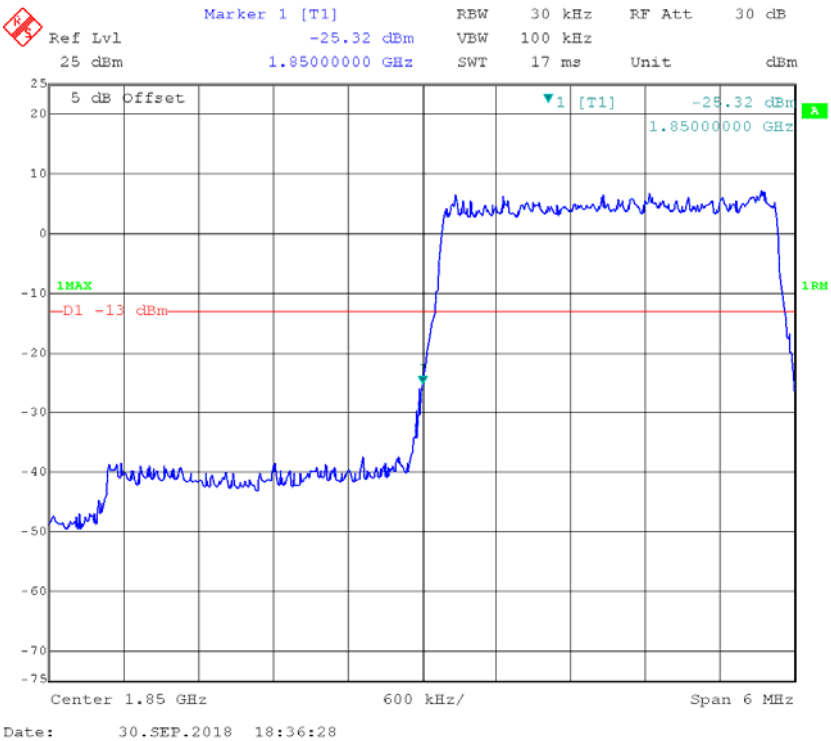
QPSK_1.4MHz_ 6 RB_ Left



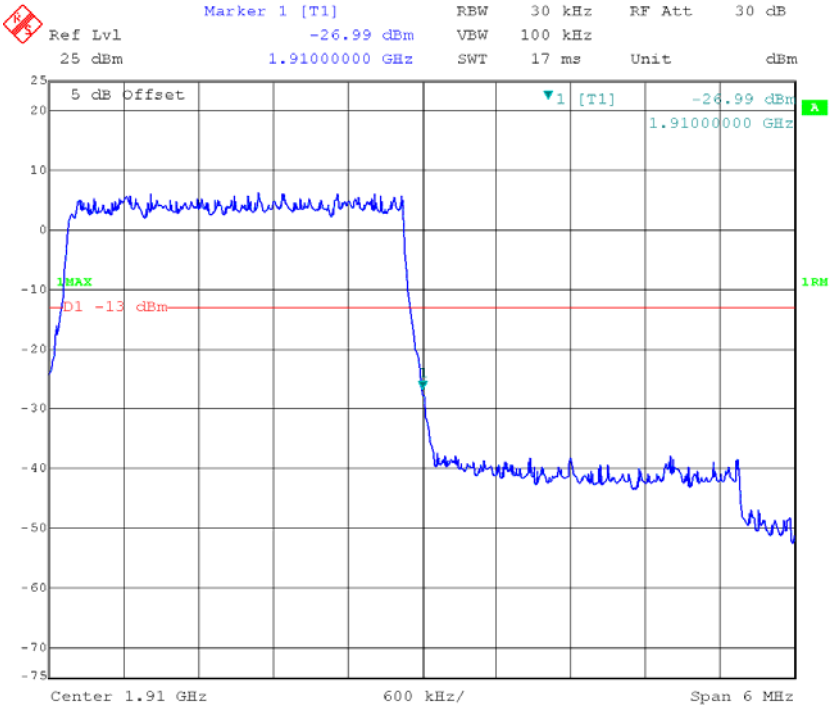
QPSK_1.4MHz_ 6 RB_ Right



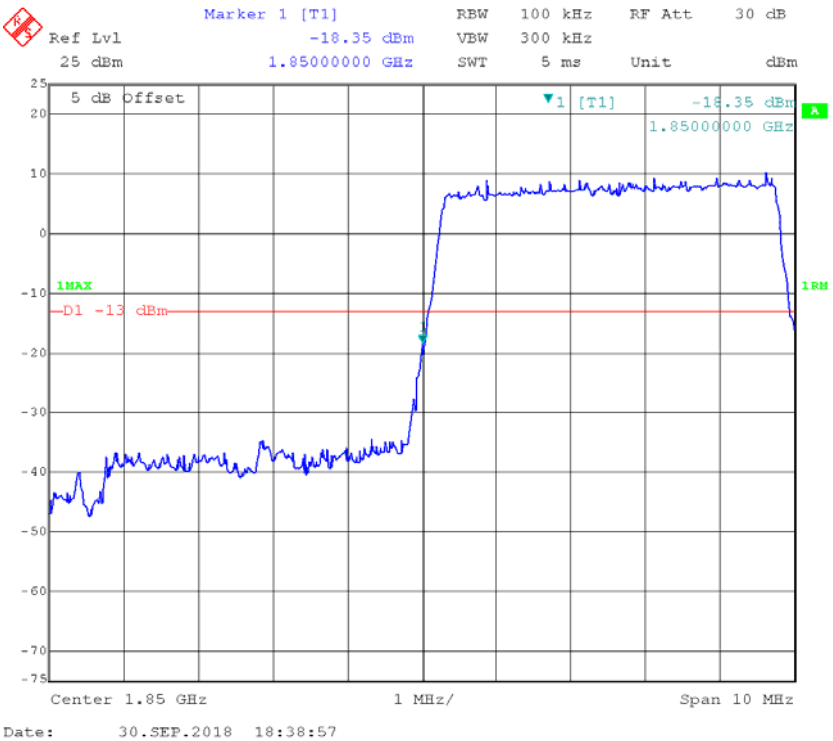
QPSK_3MHz_ 15 RB_ Left



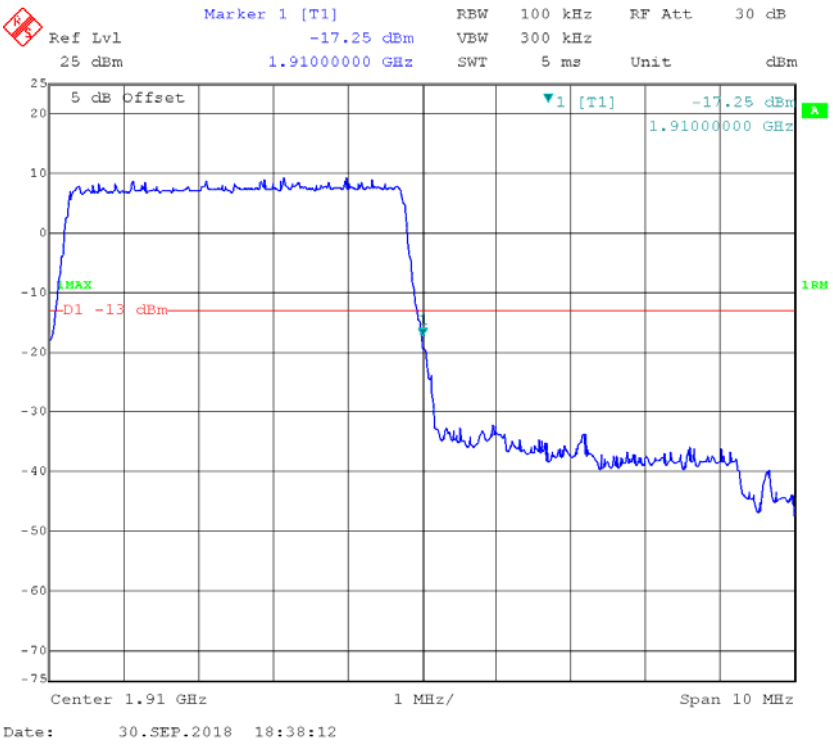
QPSK_3MHz_ 15 RB_ Right



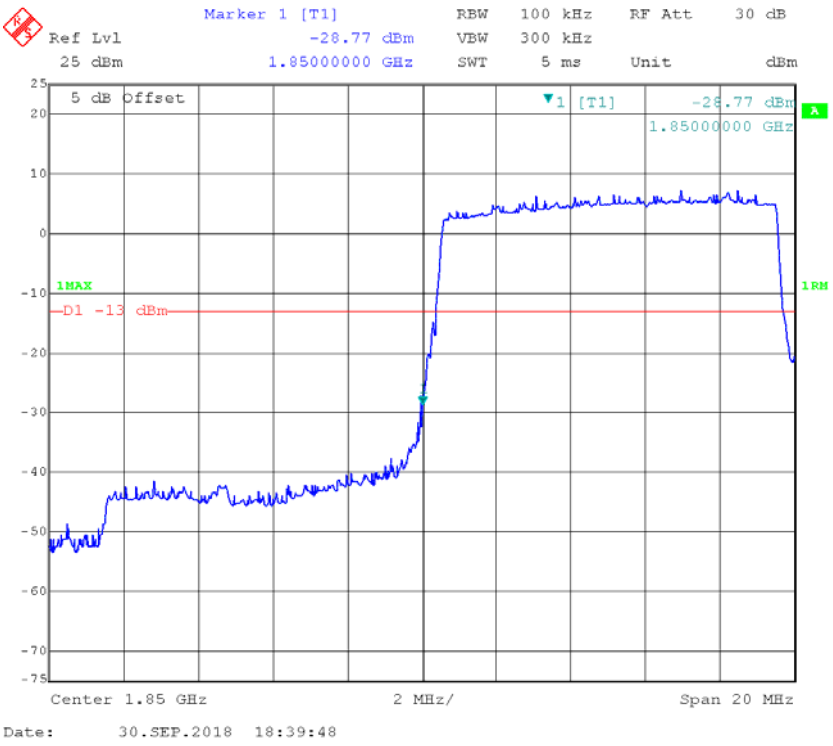
QPSK_5MHz_ 25 RB_ Left



QPSK_5MHz_ 25 RB_ Right

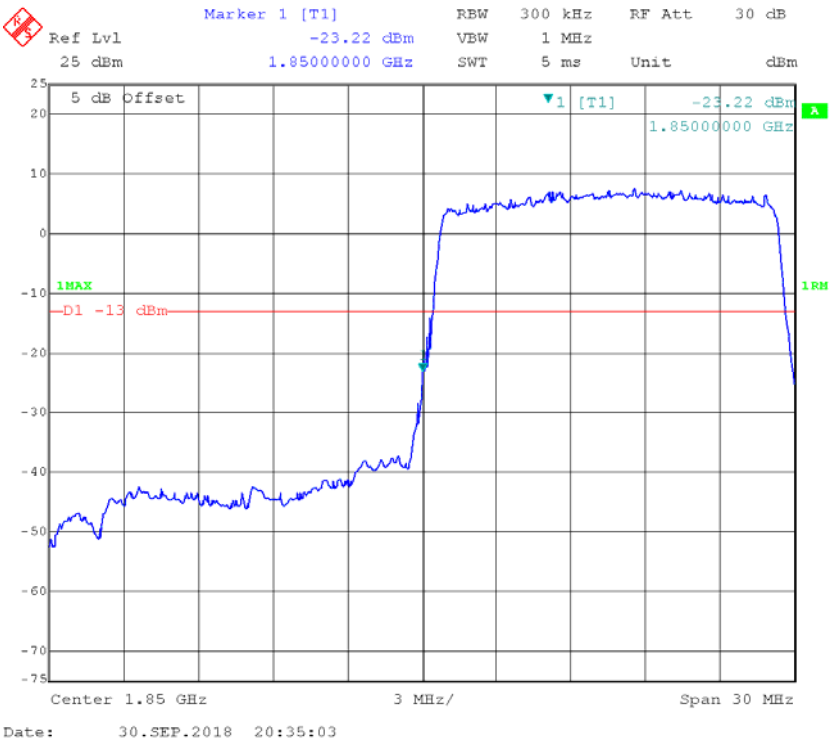


QPSK_10MHz_ 50 RB_ Left



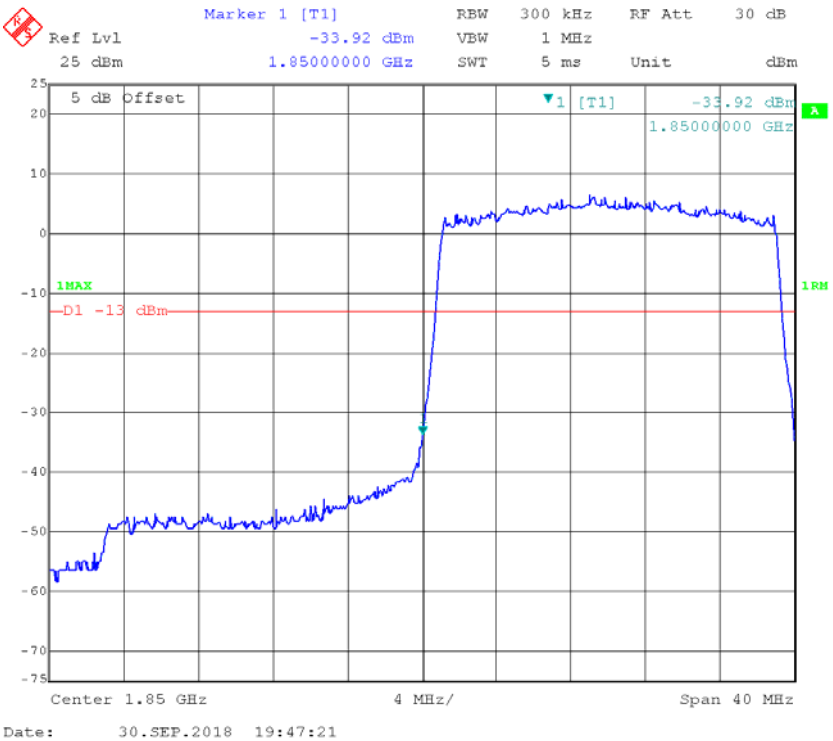
QPSK_10MHz_ 50 RB_ Right

QPSK_15MHz_ 75 RB_ Left

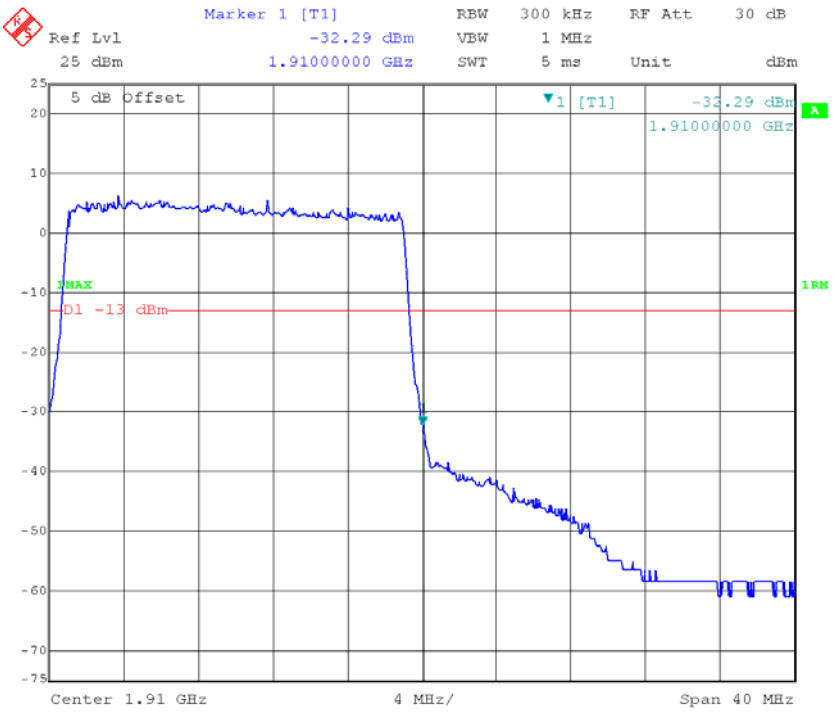


QPSK_15MHz_ 75 RB_ Right

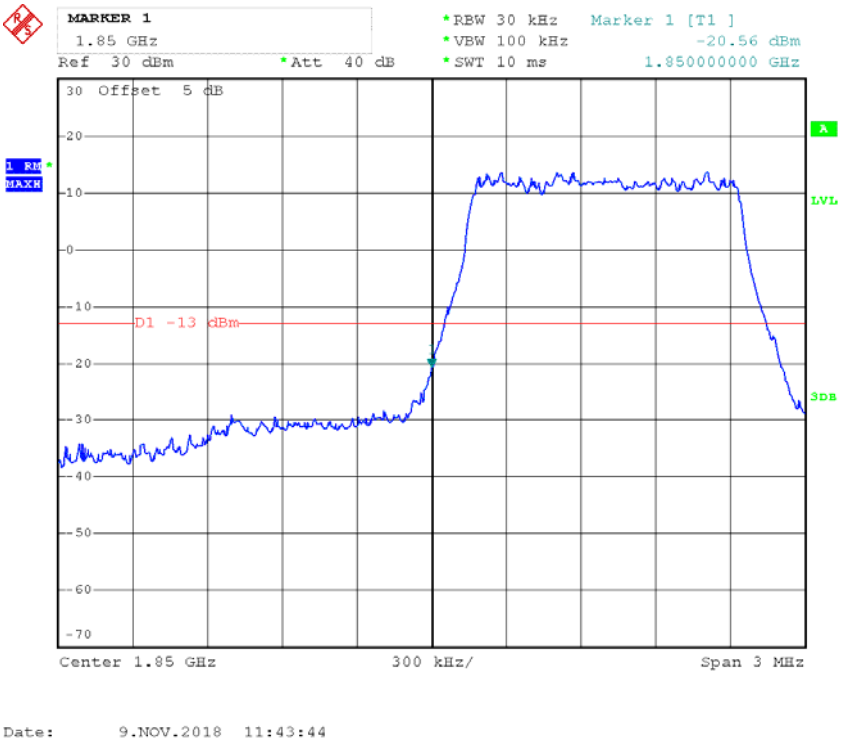
QPSK_20MHz_ FULL RB_ Left



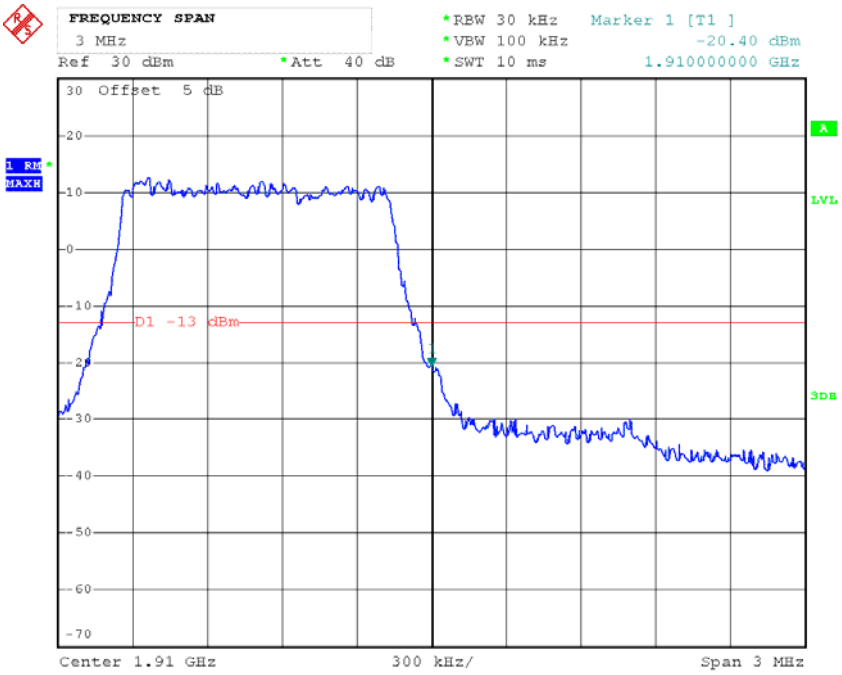
QPSK_20MHz_ FULL RB_ Right



16QAM_1.4MHz_ 6 RB_ Left

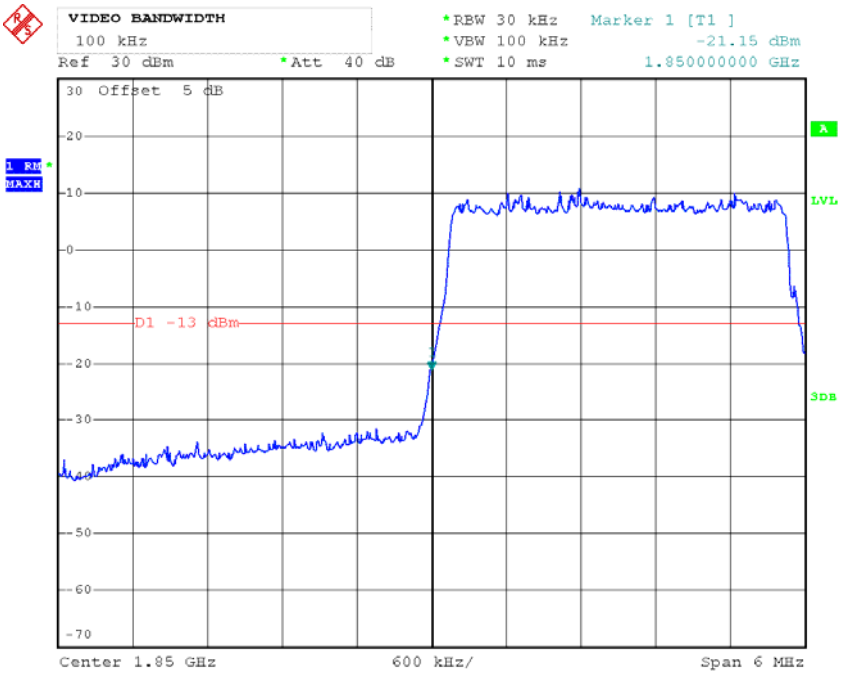


16QAM_1.4MHz_ 6 RB_ Right



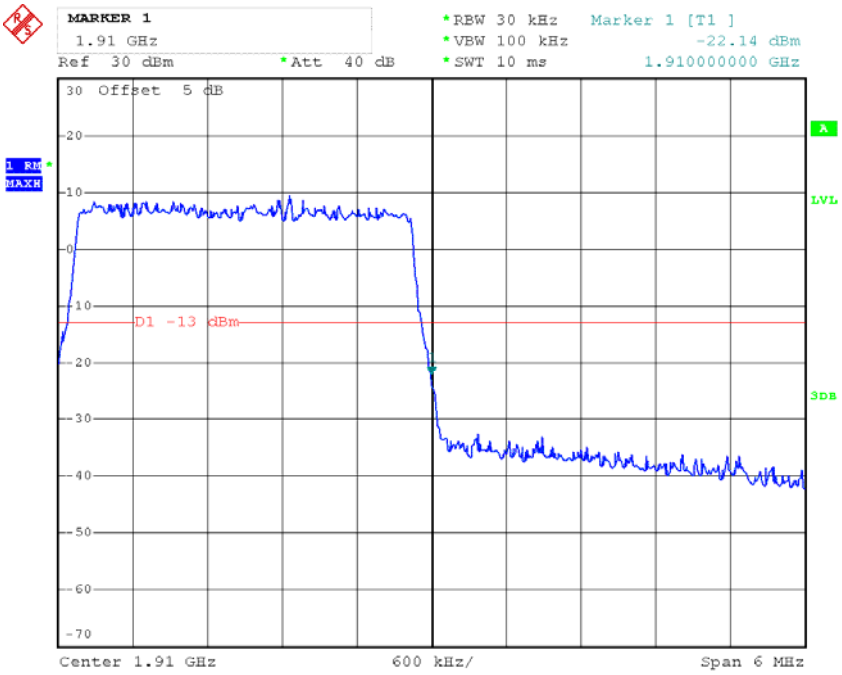
Date: 9.NOV.2018 11:42:36

16QAM_3MHz_ 15 RB_ Left



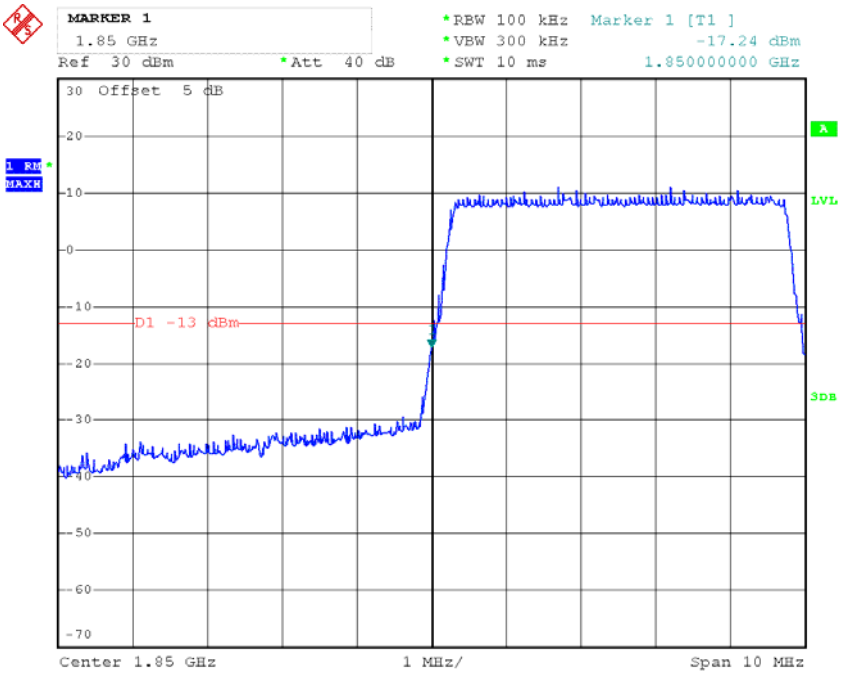
Date: 9.NOV.2018 11:40:51

16QAM_3MHz_ 15 RB_ Right



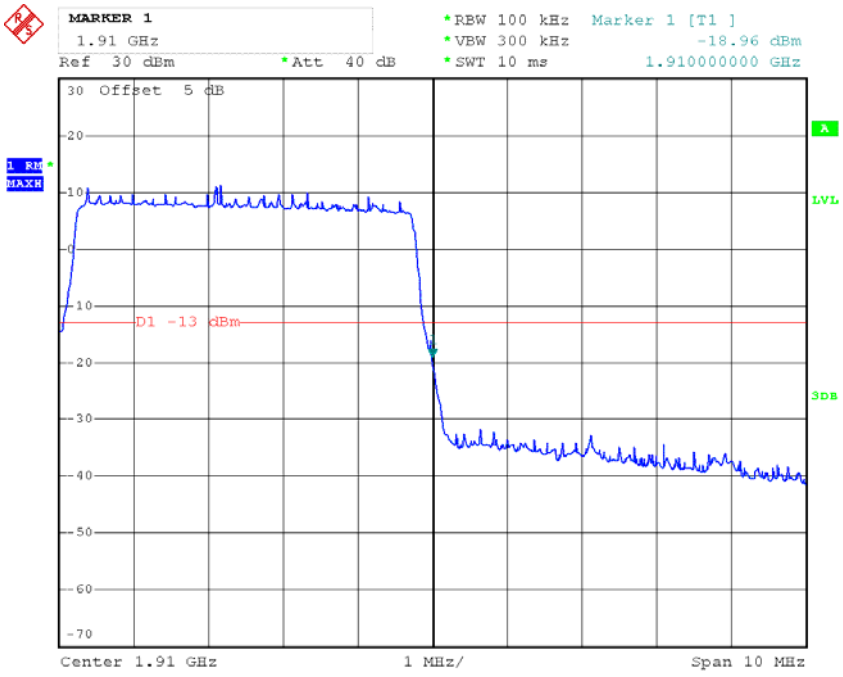
Date: 9.NOV.2018 11:41:34

16QAM_5MHz_ 25 RB_ Left



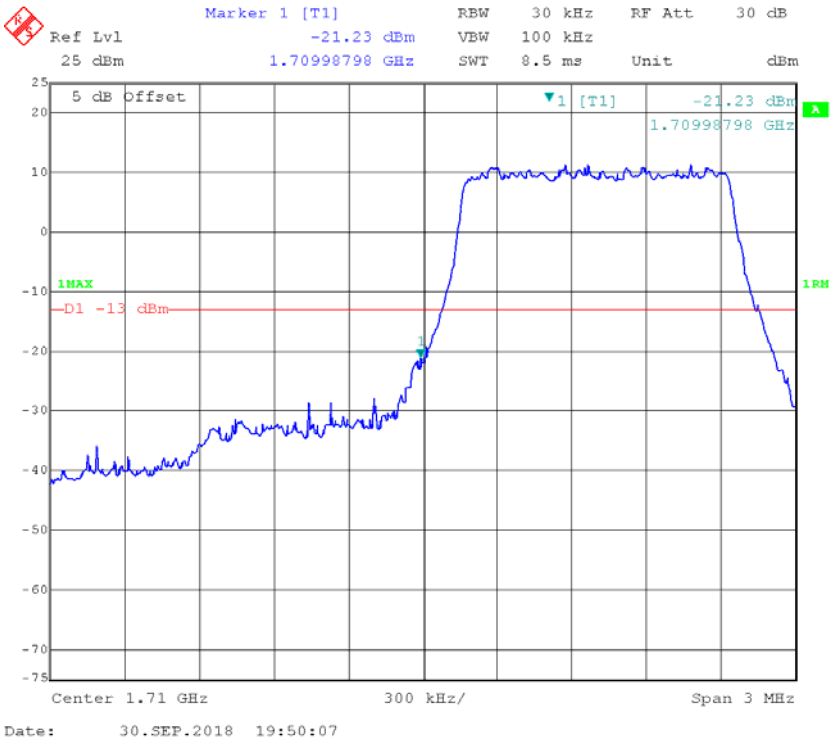
Date: 9.NOV.2018 11:37:48

16QAM_5MHz_ 25 RB_ Right



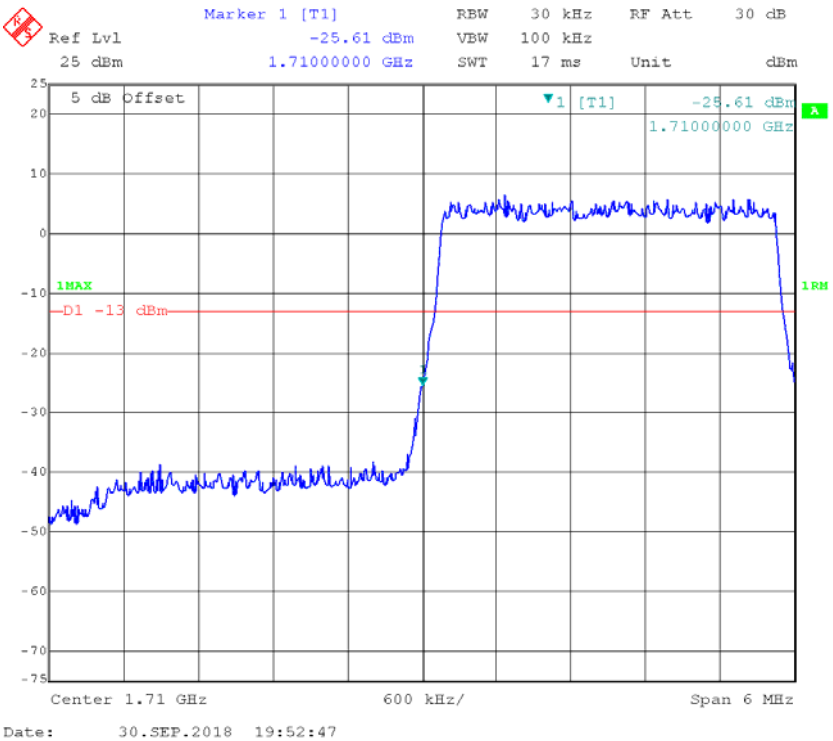
LTE Band IV

QPSK_1.4MHz_ 6 RB_ Left

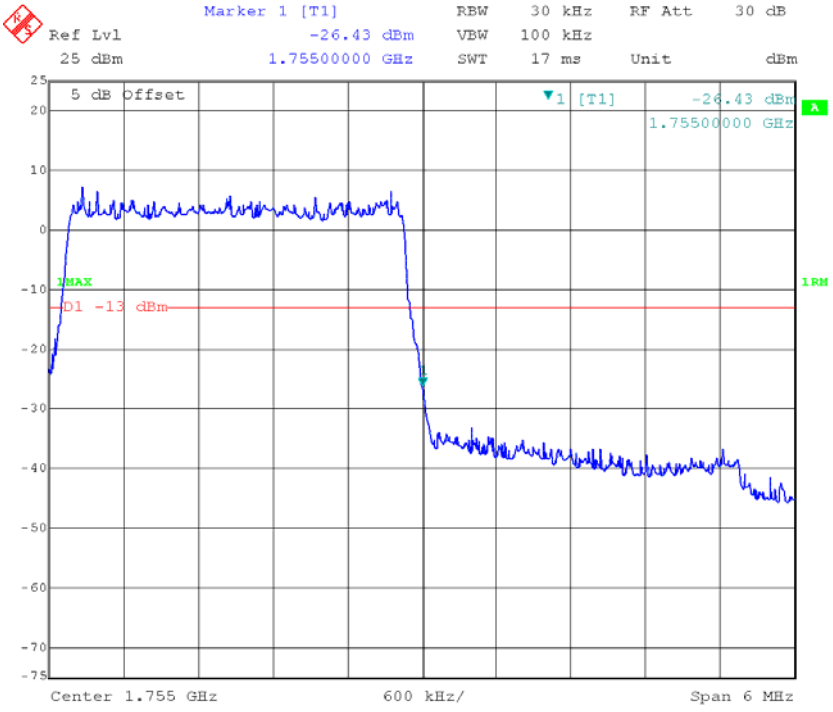


QPSK_1.4MHz_ 6 RB_ Right

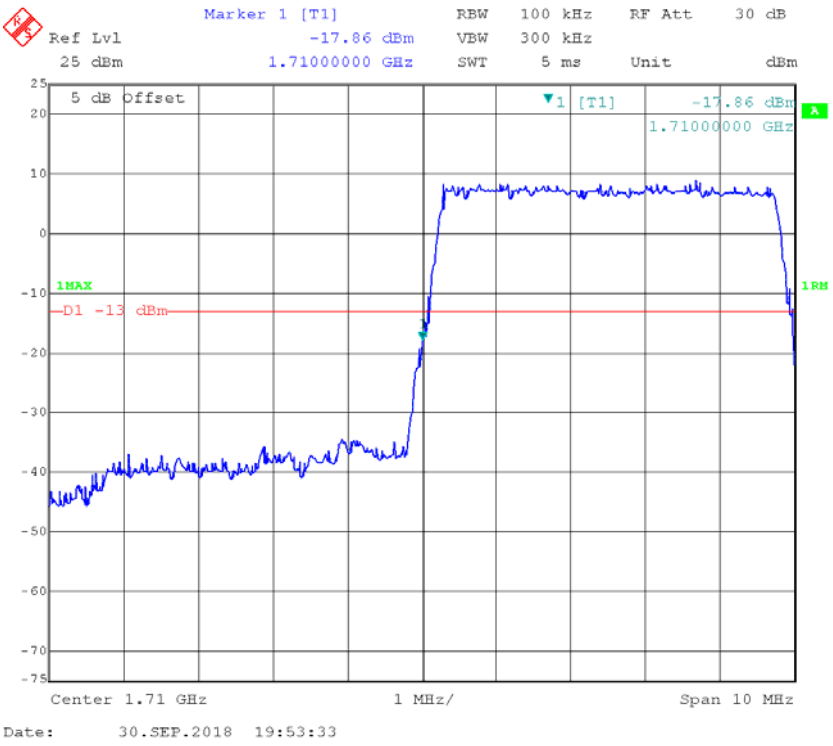
QPSK_3MHz_ 15 RB_ Left



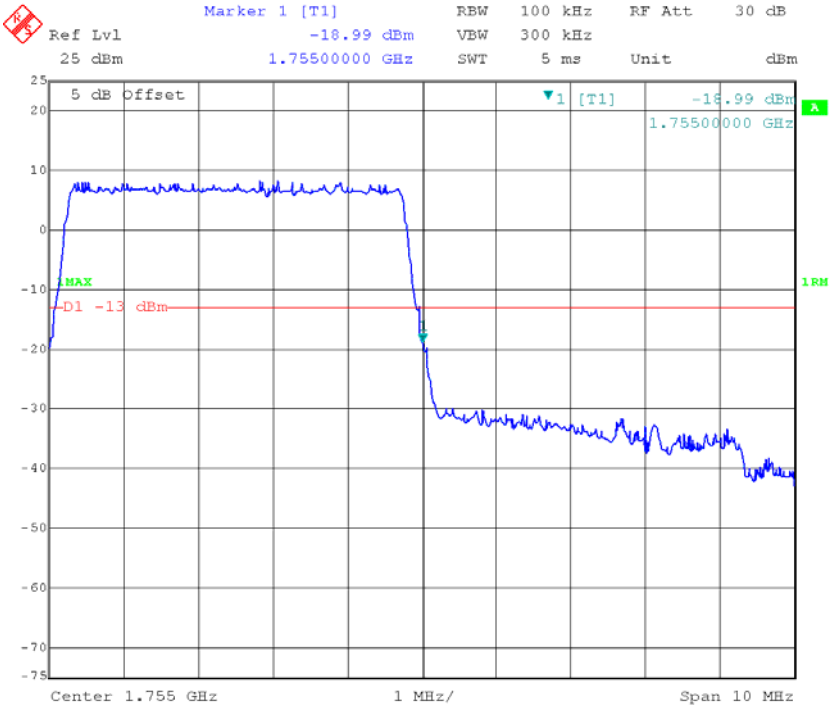
QPSK_3MHz_ 15 RB_ Right



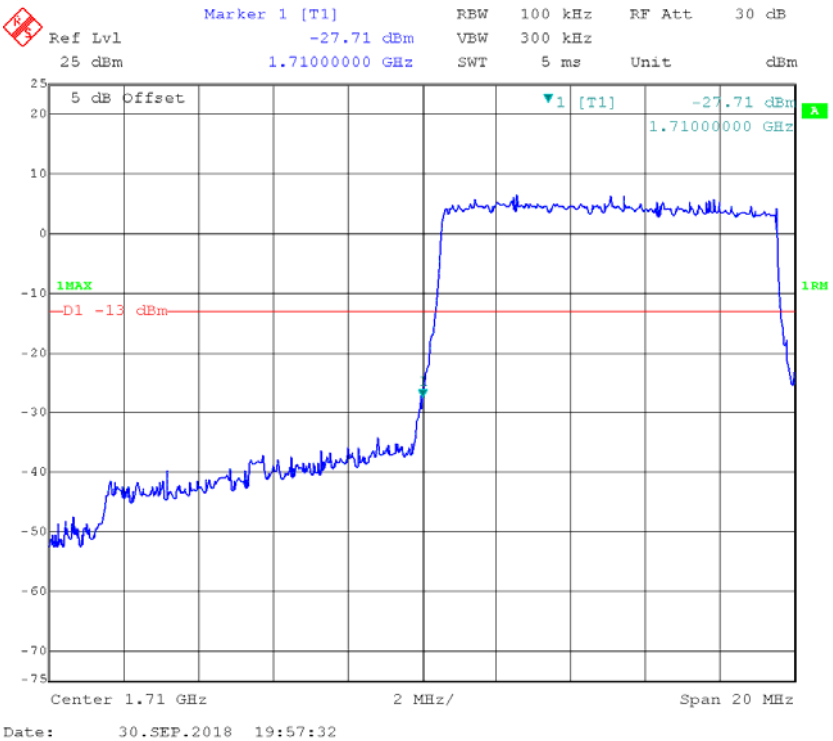
QPSK_5MHz_ 25 RB_ Left



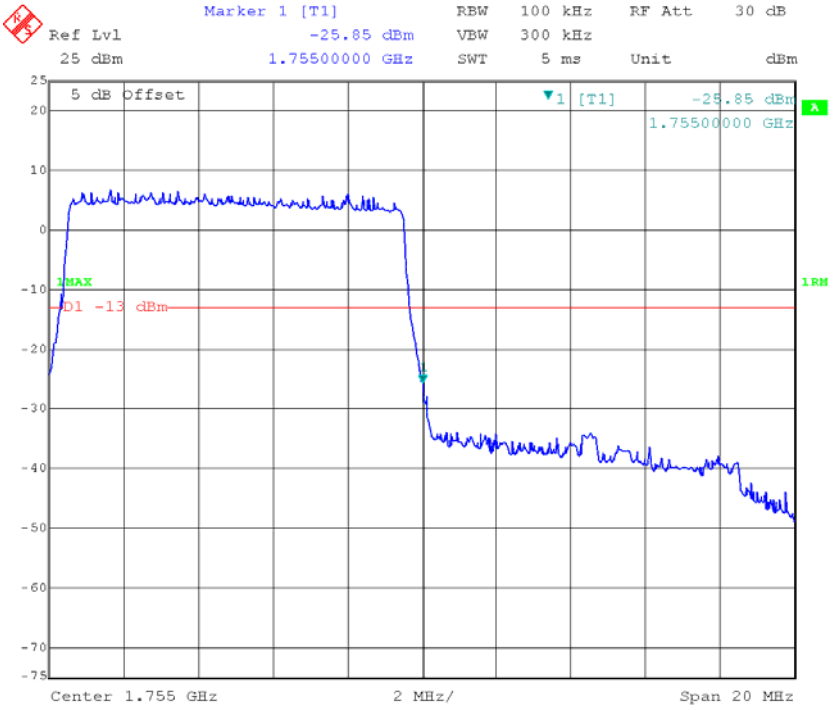
QPSK_5MHz_ 25 RB_ Right



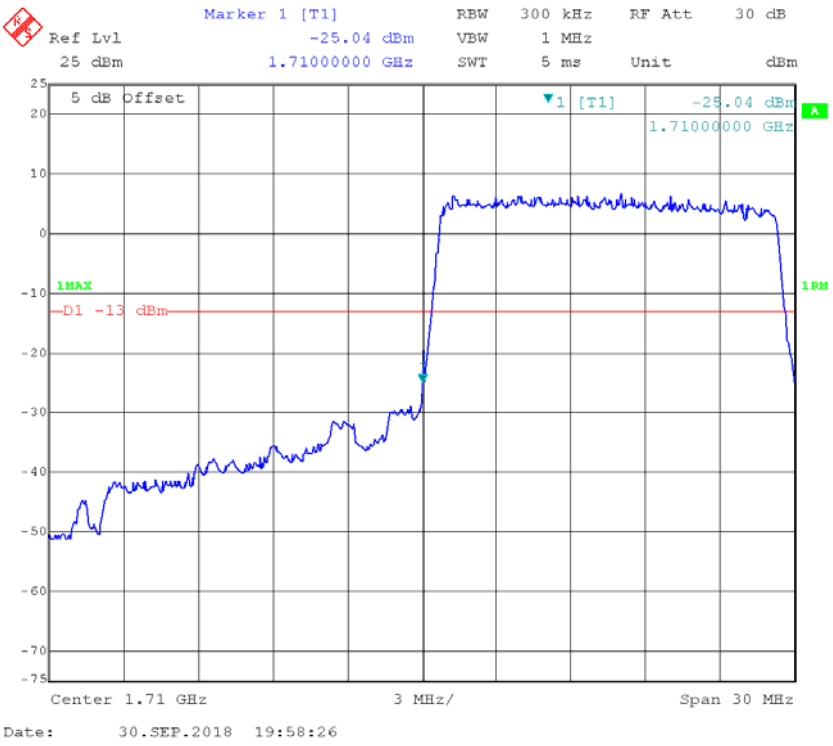
QPSK_10MHz_ 50 RB_ Left



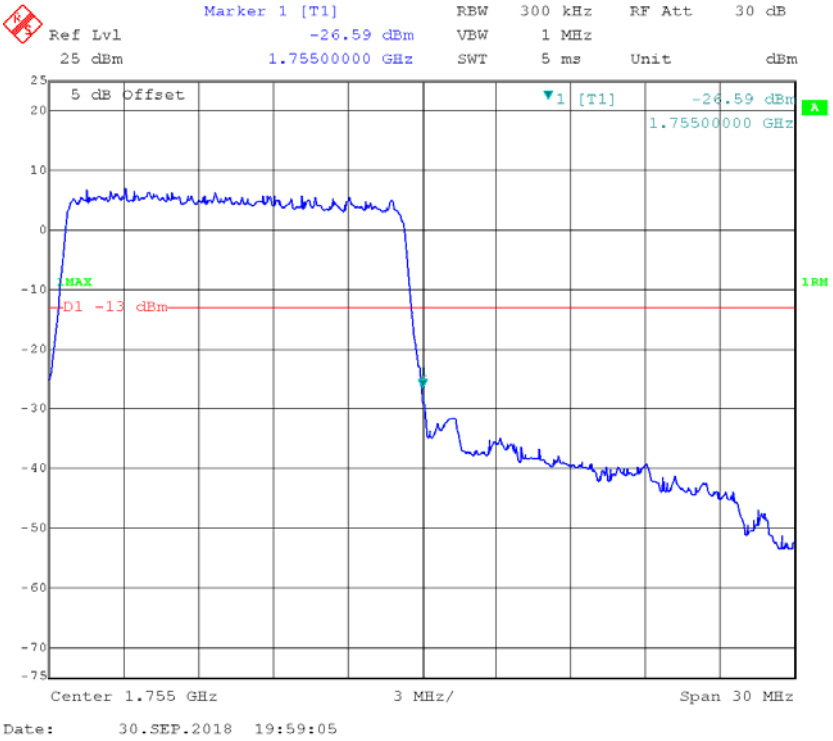
QPSK_10MHz_ 50 RB_ Right



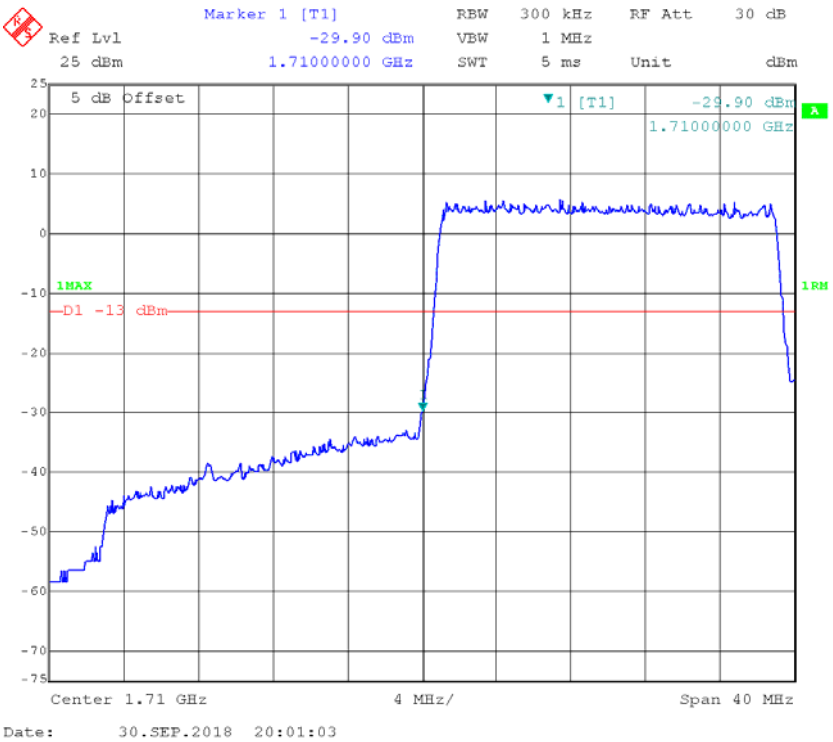
QPSK_15MHz_ 75 RB_ Left



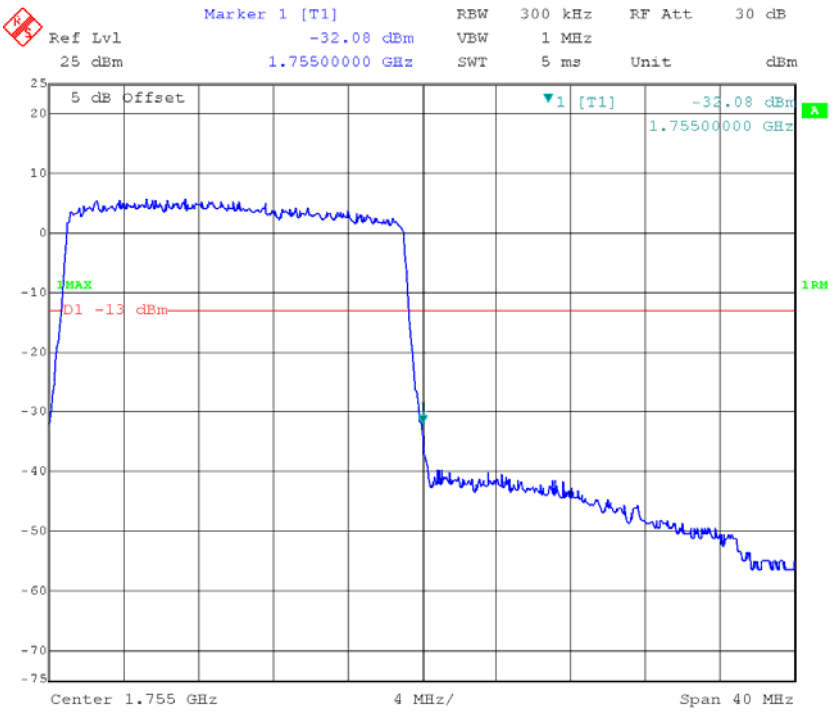
QPSK_15MHz_ 75 RB_ Right



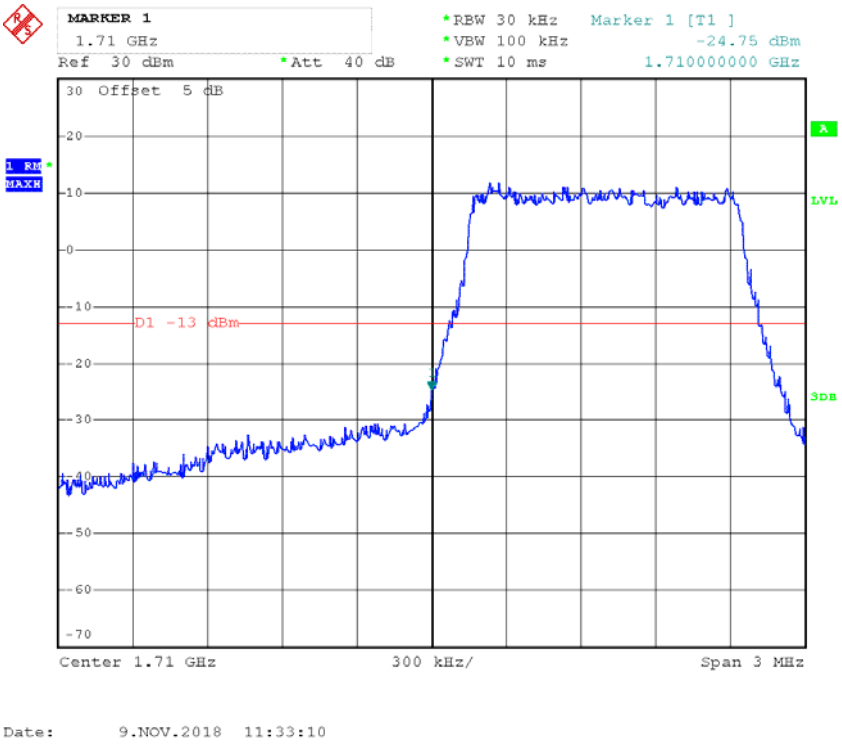
QPSK_20MHz_ FULL RB_ Left



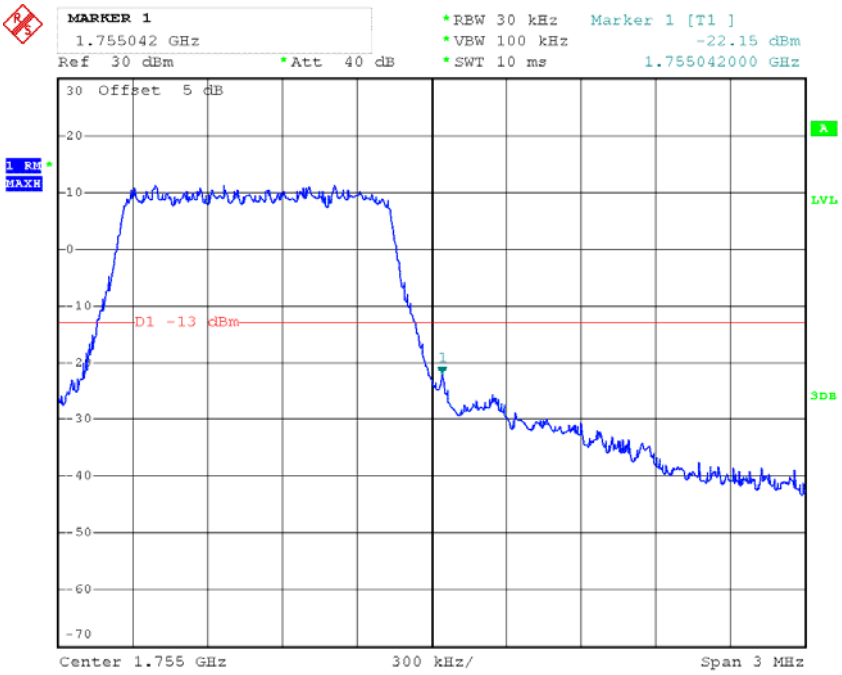
QPSK_20MHz_ FULL RB_ Right



16QAM_1.4MHz_ 6 RB_ Left

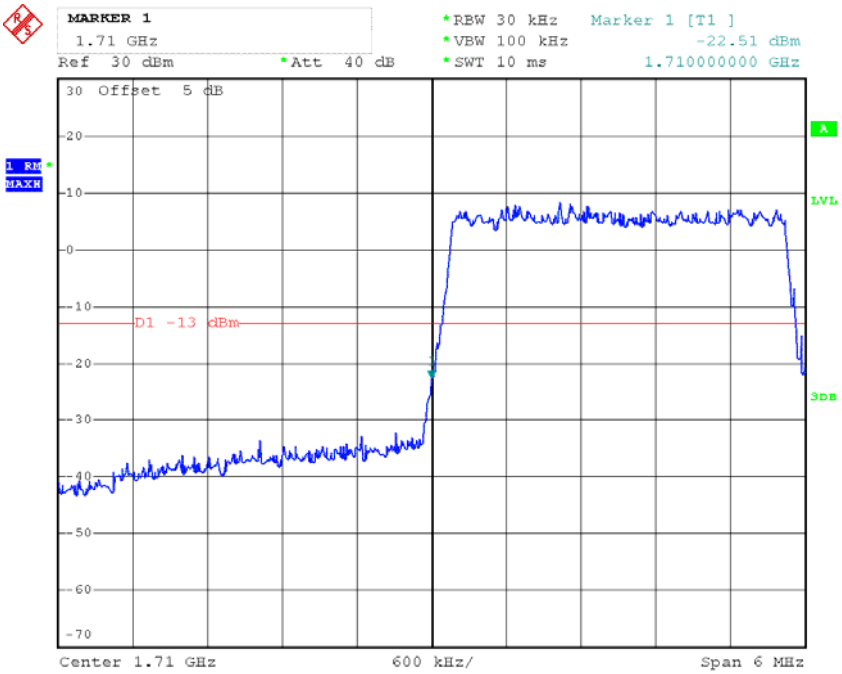


16QAM_1.4MHz_ 6 RB_ Right



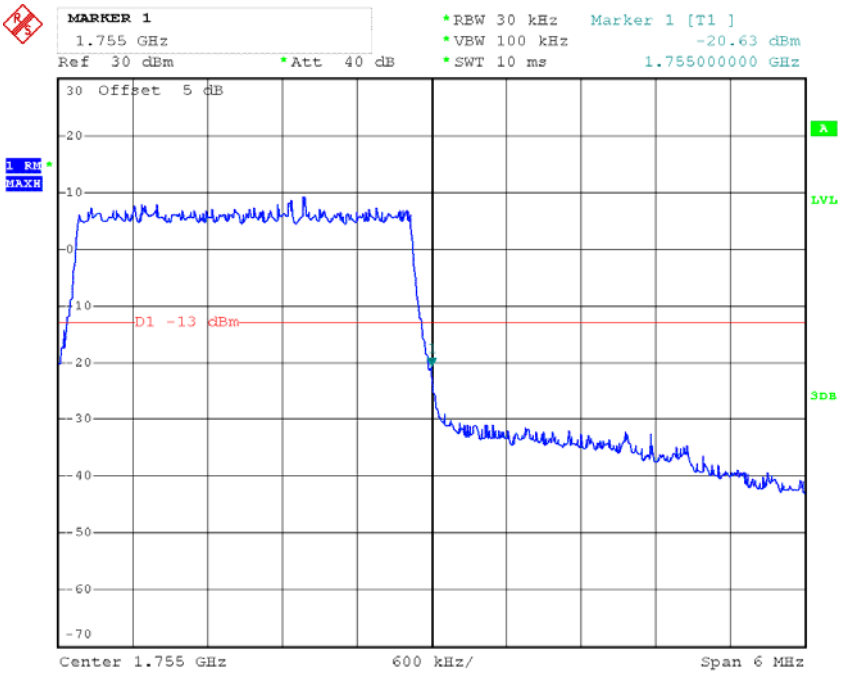
Date: 9.NOV.2018 11:32:23

16QAM_3MHz_ 15 RB_ Left



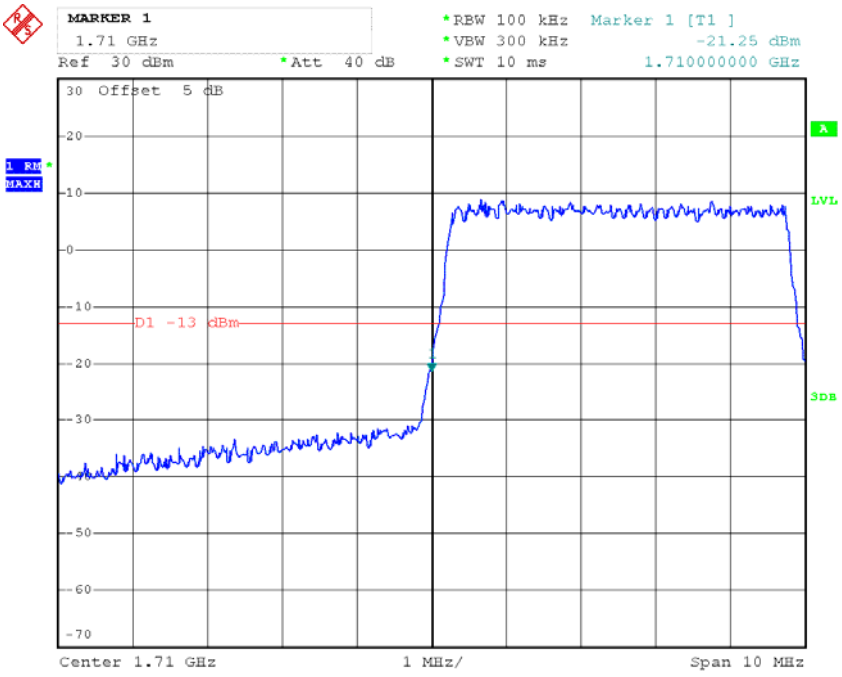
Date: 9.NOV.2018 11:33:48

16QAM_3MHz_ 15 RB_ Right



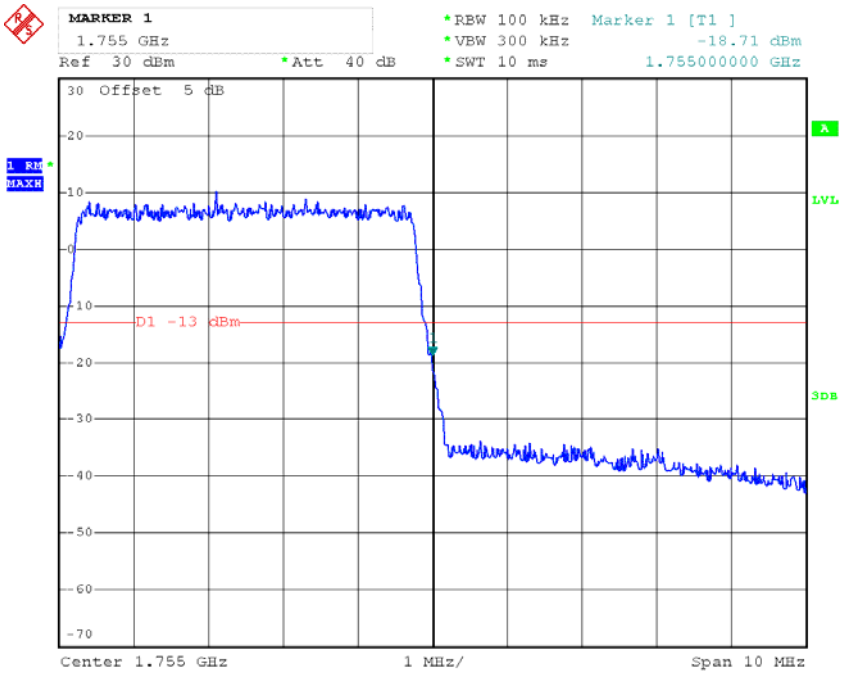
Date: 9.NOV.2018 11:34:52

16QAM_5MHz_ 25 RB_ Left



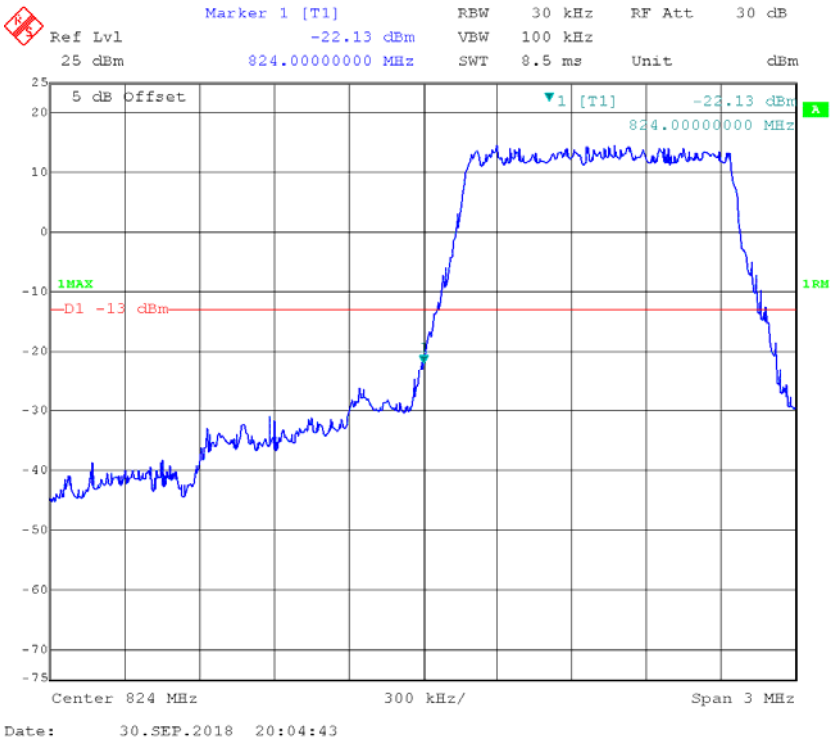
Date: 9.NOV.2018 11:37:02

16QAM_5MHz_ 25 RB_ Right

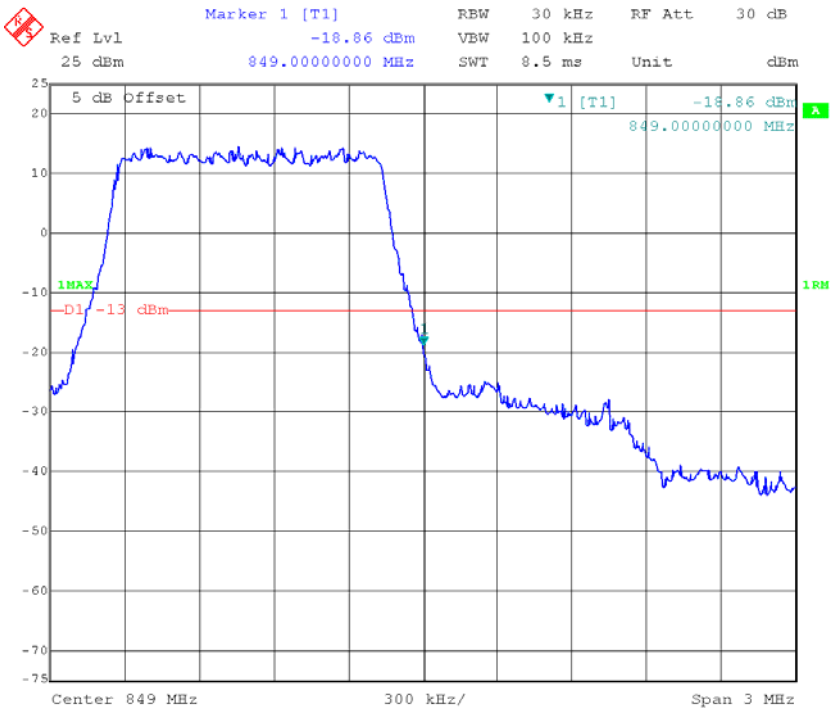


LTE Band 5

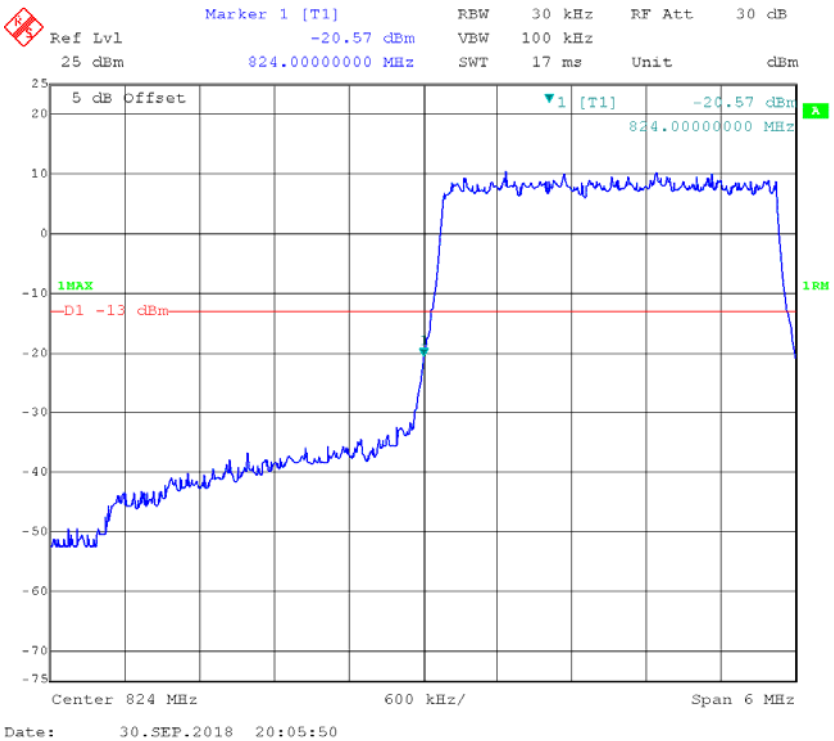
QPSK_1.4MHz_ 6 RB_ Left



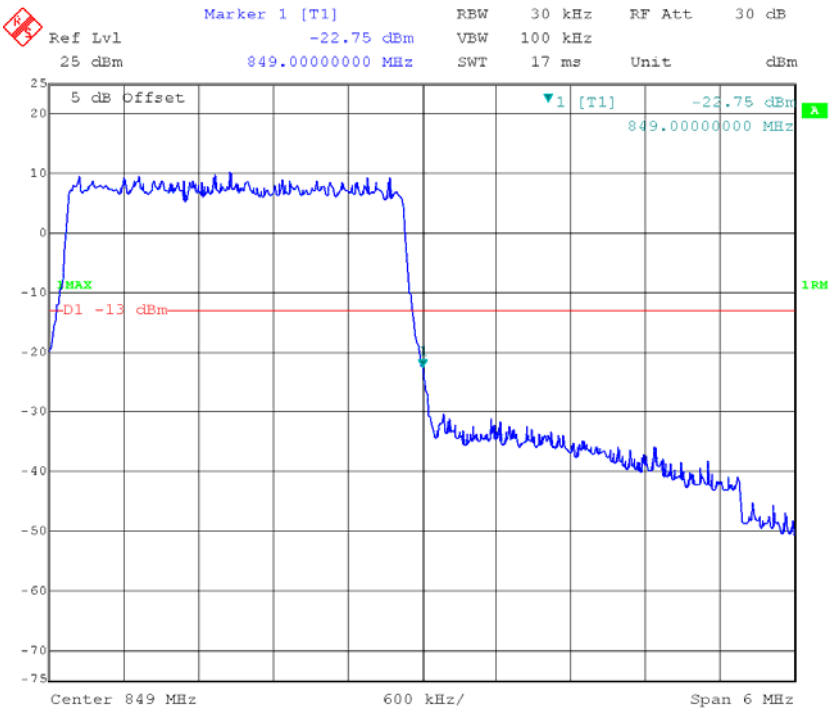
QPSK_1.4MHz_ 6 RB_ Right



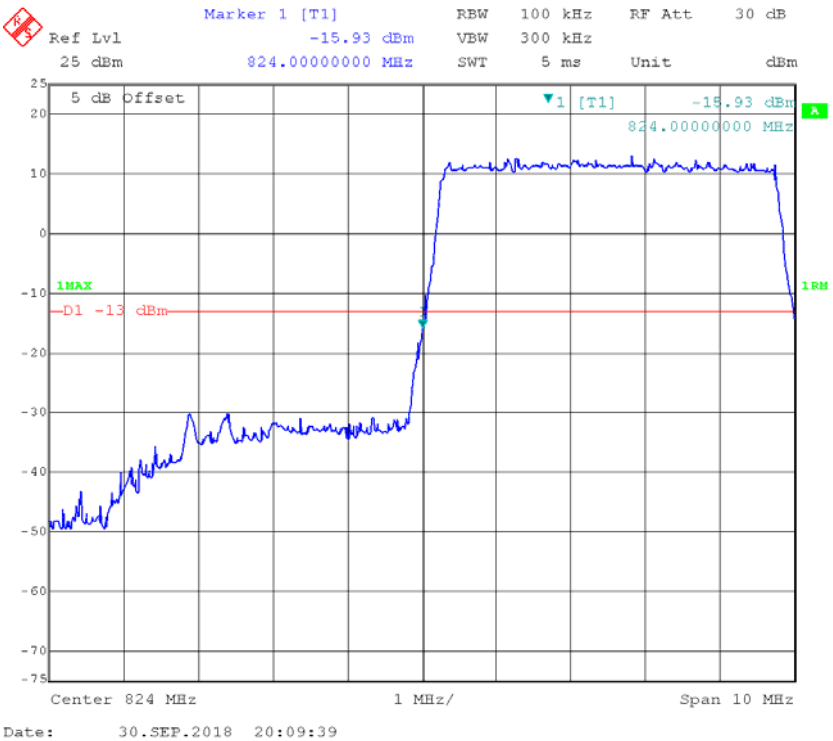
QPSK_3MHz_ 15 RB_ Left



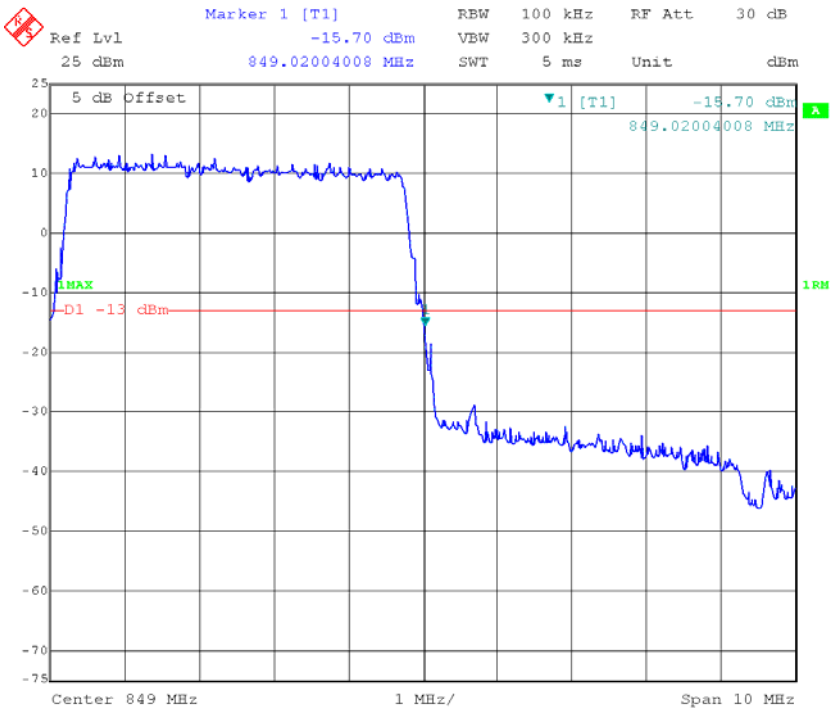
QPSK_3MHz_ 15 RB_ Right



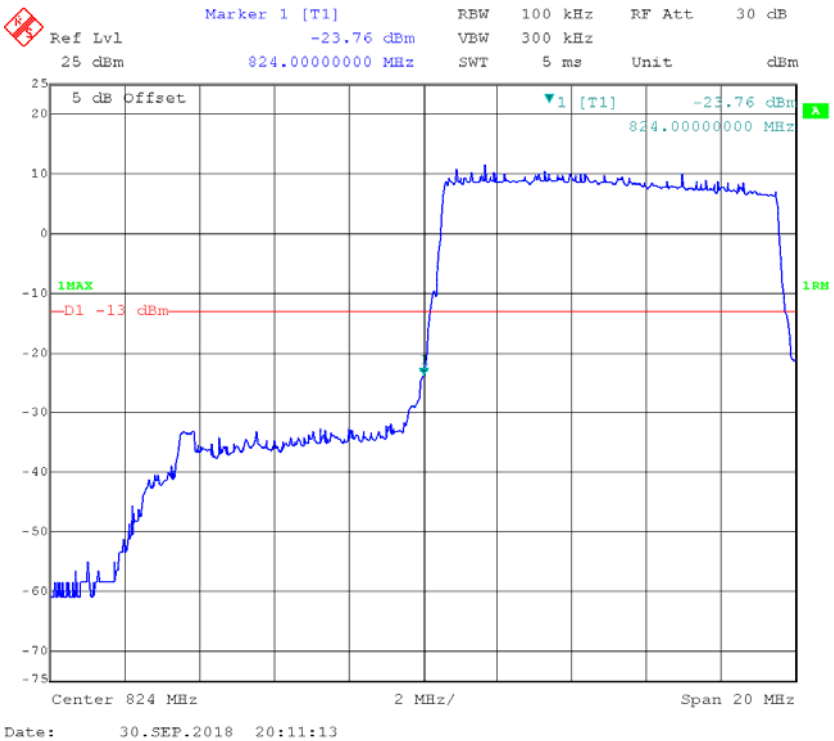
QPSK_5MHz_ 25 RB_ Left



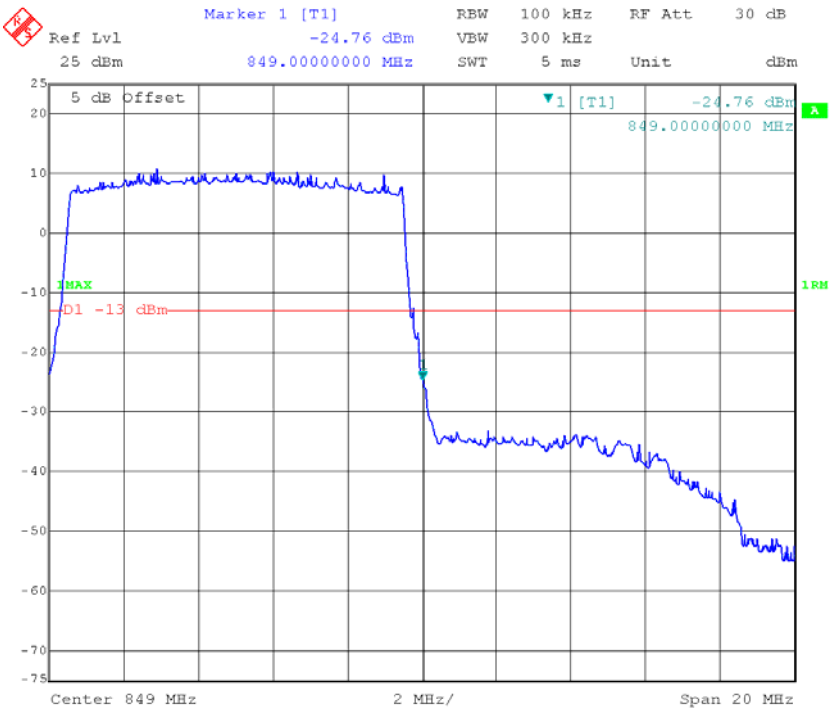
QPSK_5MHz_ 25 RB_ Right



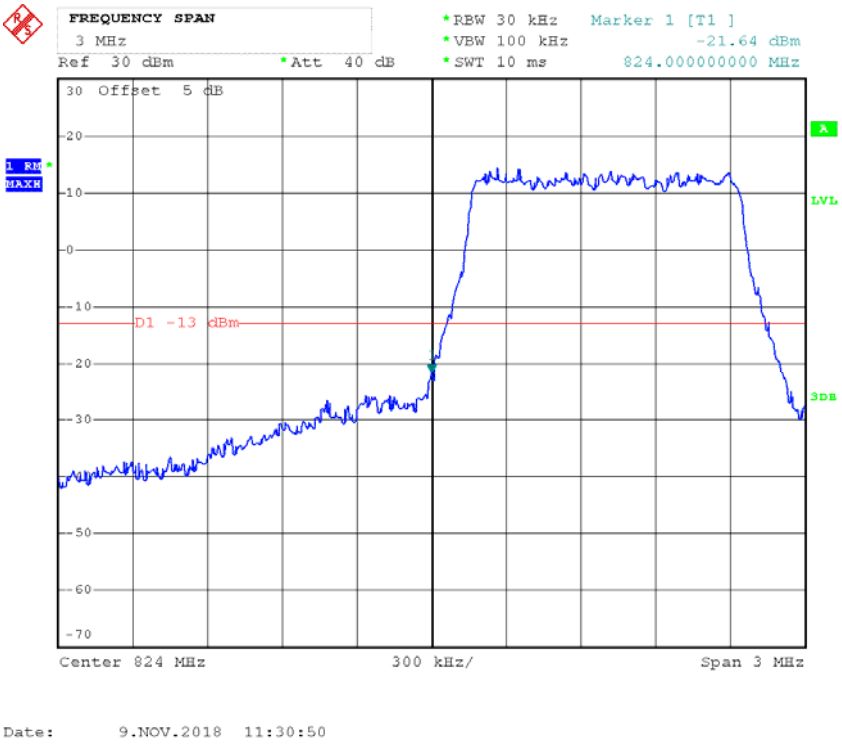
QPSK_10MHz_ 50 RB_ Left



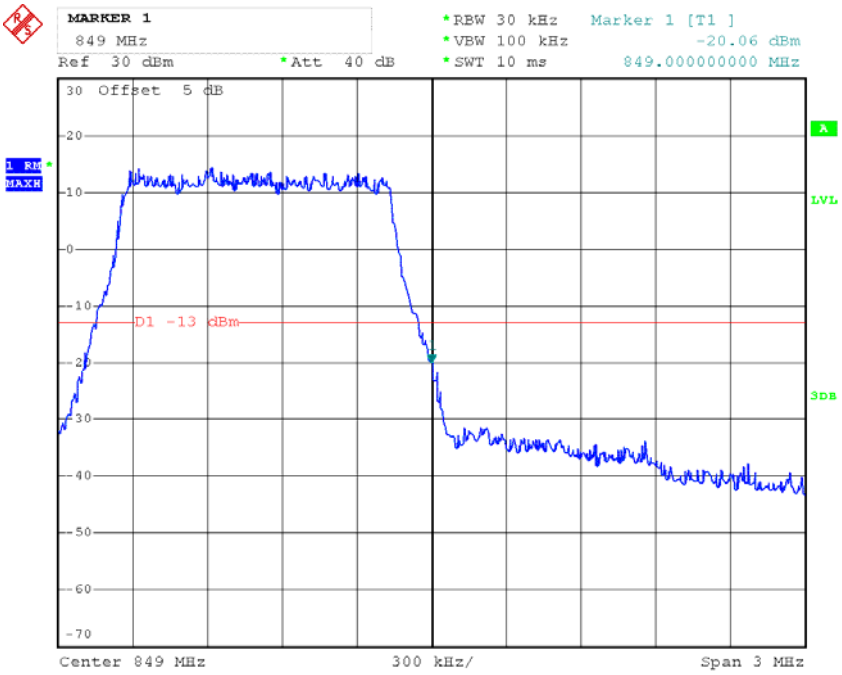
QPSK_10MHz_ 50 RB_ Right



16QAM_1.4MHz_ 6 RB_ Left



16QAM_1.4MHz_ 6 RB_ Right



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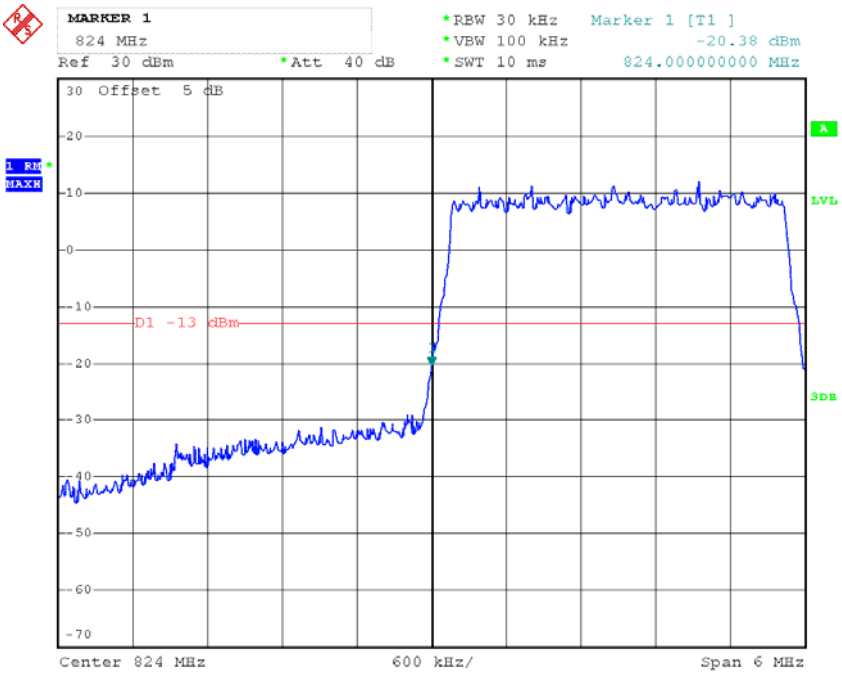
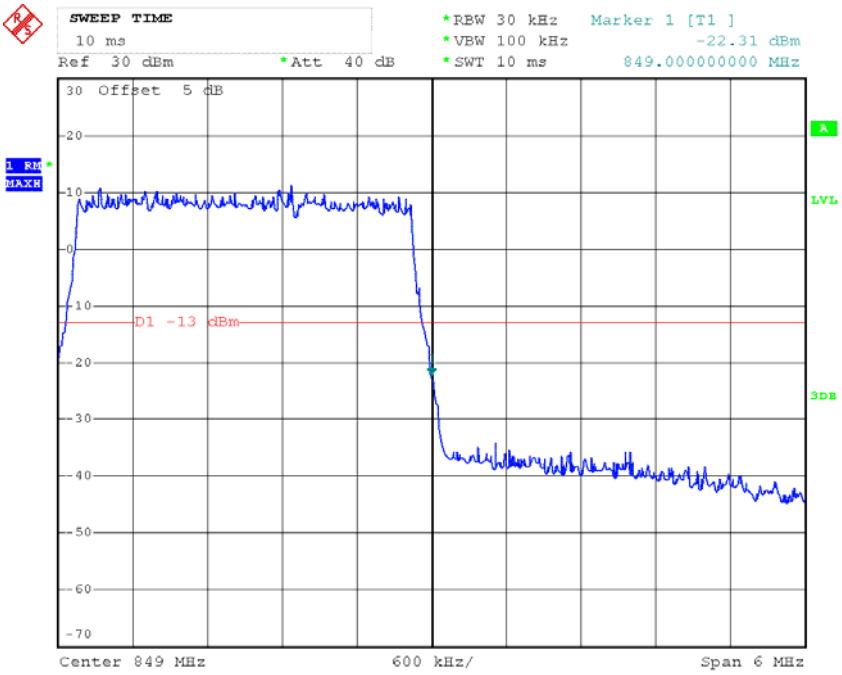
16QAM_3MHz_ 15 RB_ Left



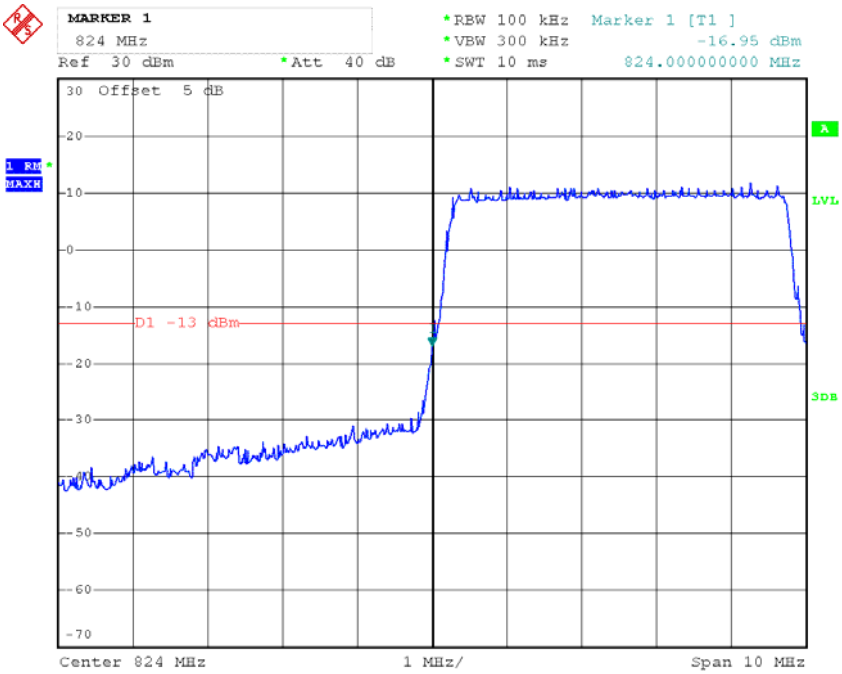
Date: 9.NOV.2018 11:29:52

16QAM_3MHz_ 15 RB_ Right



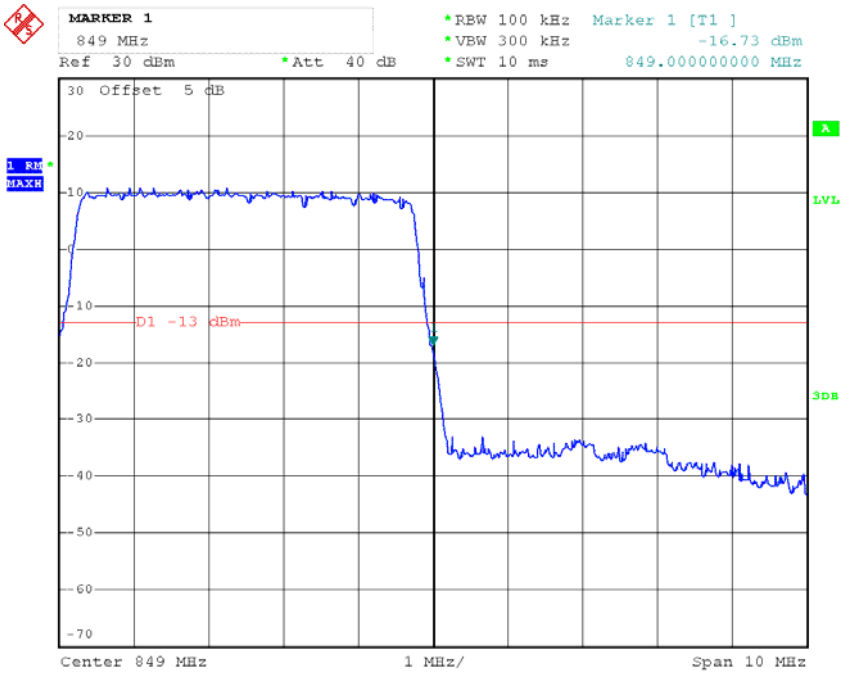
Date: 9.NOV.2018 11:29:03

16QAM_5MHz_ 25 RB_ Left



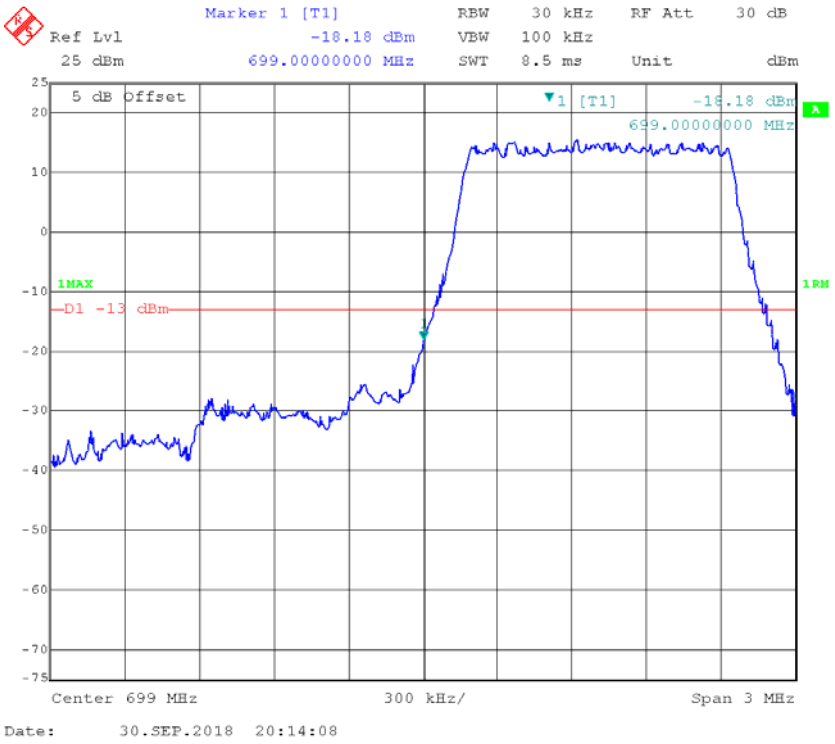
Date: 9.NOV.2018 11:27:24

16QAM_5MHz_ 25 RB_ Right

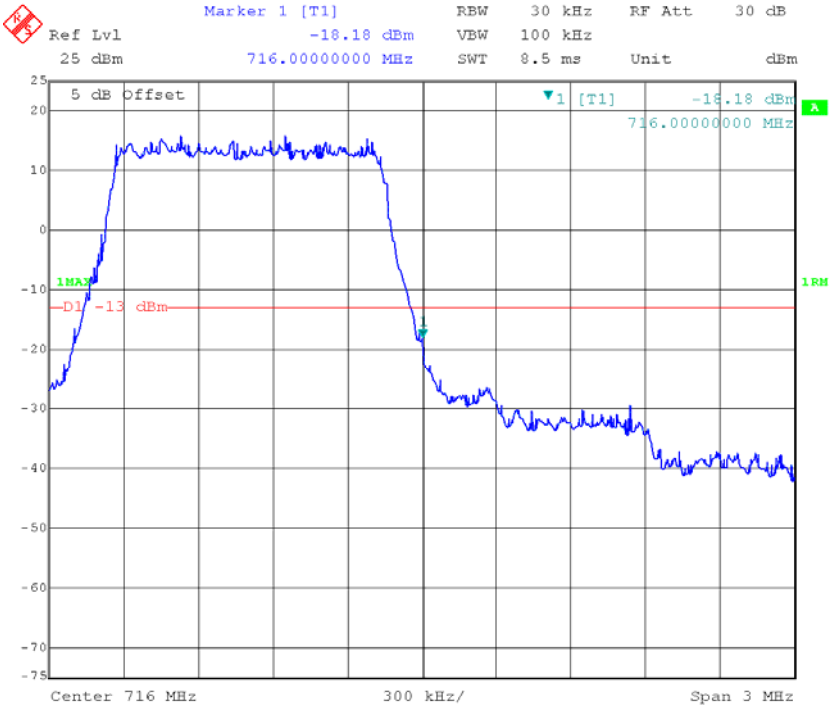


LTE Band 12

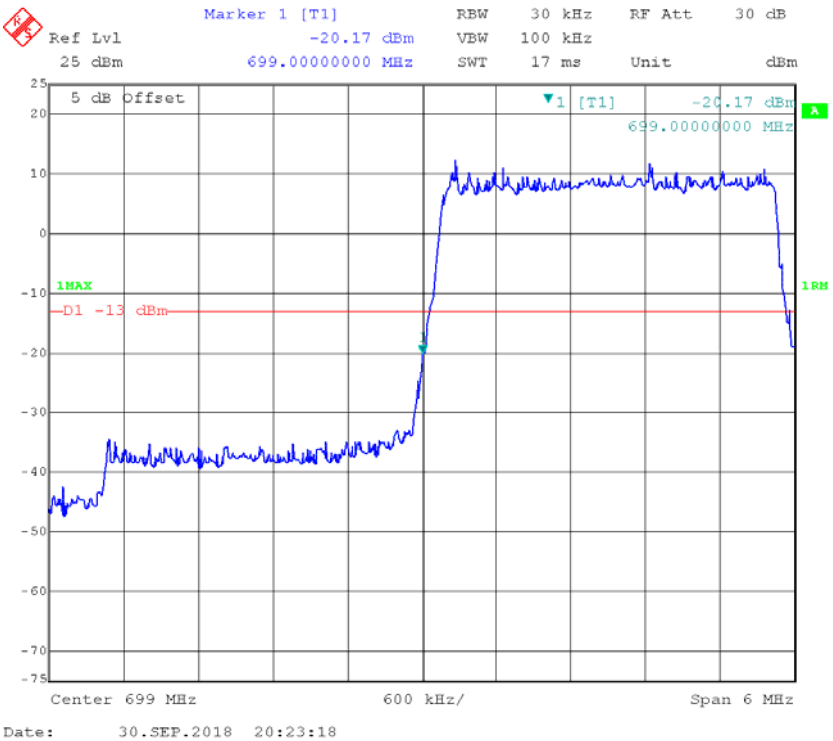
QPSK_1.4MHz_ 6 RB_ Left



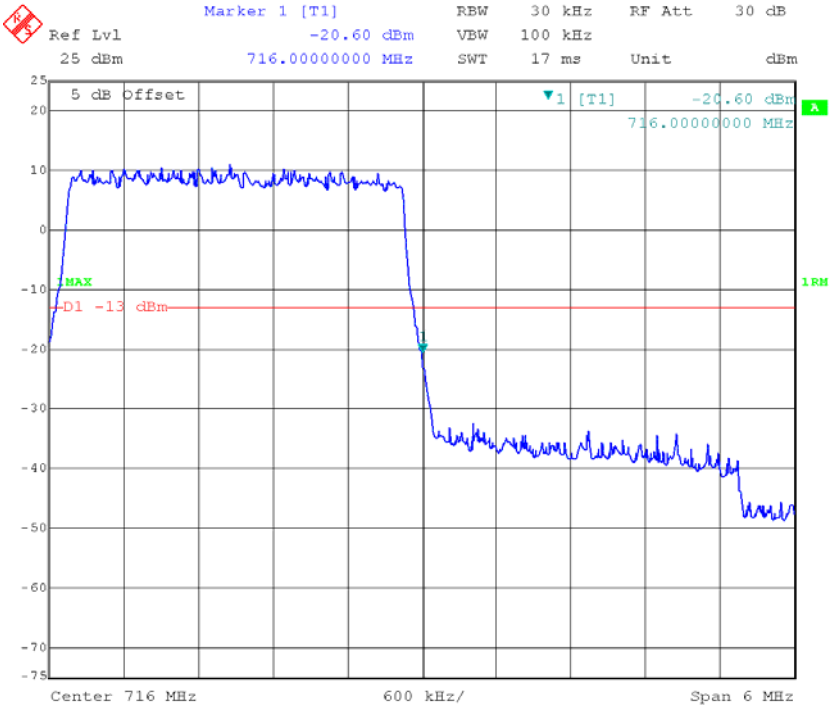
QPSK_1.4MHz_ 6 RB_ Right



QPSK_3MHz_ 15 RB_ Left



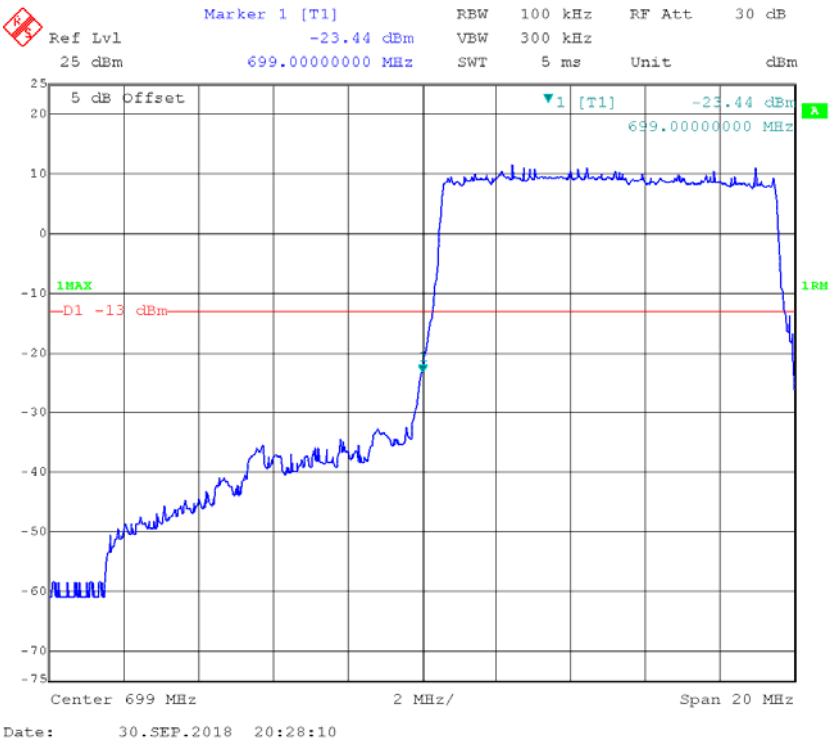
QPSK_3MHz_ 15 RB_ Right



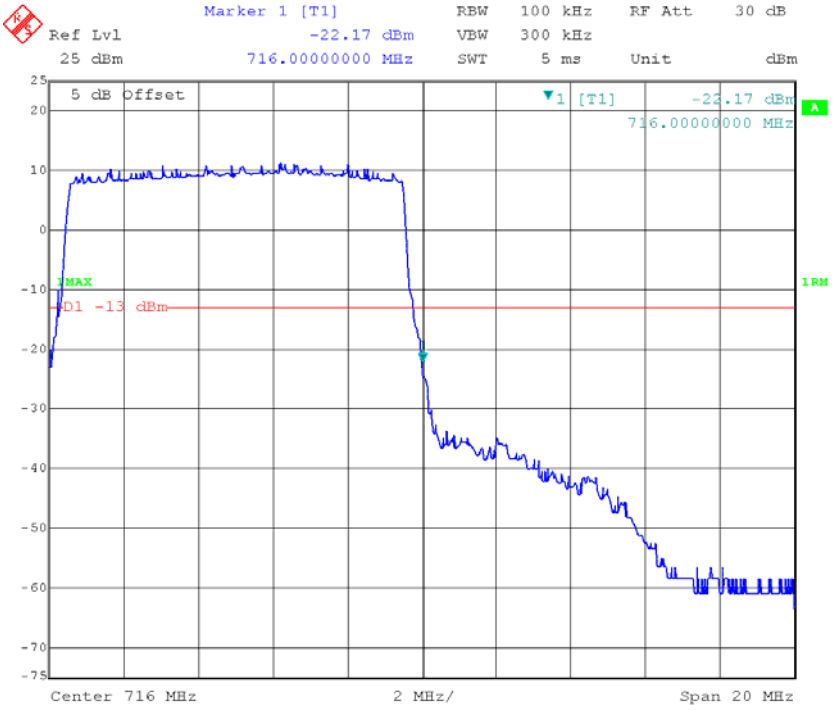
QPSK_5MHz_ 25 RB_ Left

QPSK_5MHz_ 25 RB_ Right

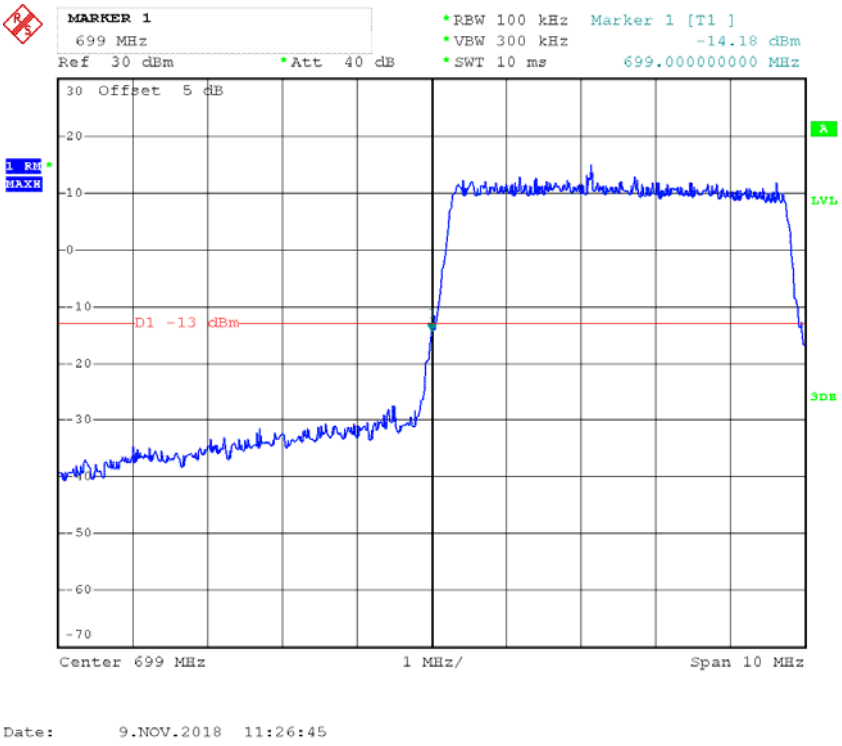
QPSK_10MHz_ 50 RB_ Left



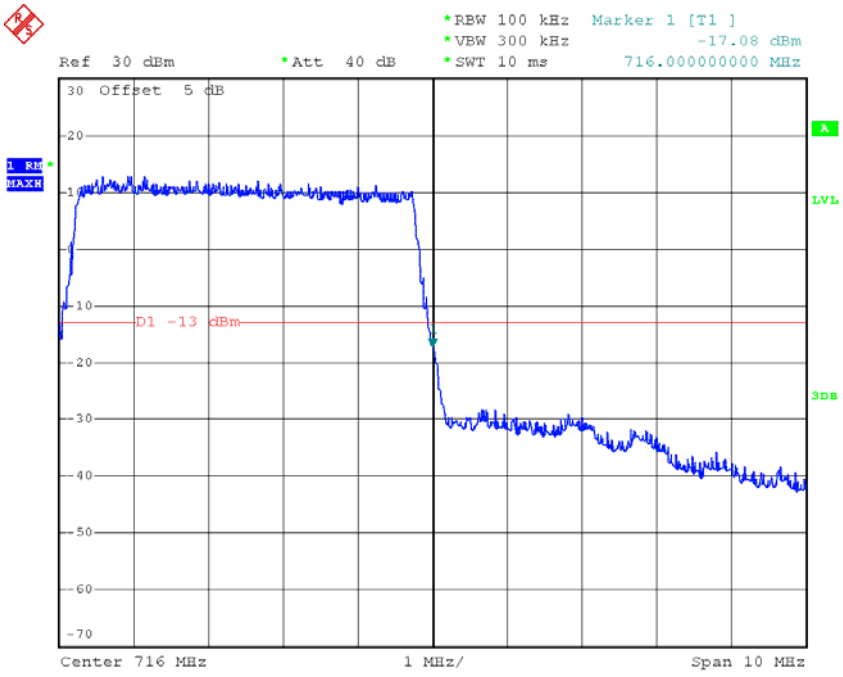
QPSK_10MHz_ 50 RB_ Right



16QAM_5MHz_ 25 RB_ Left

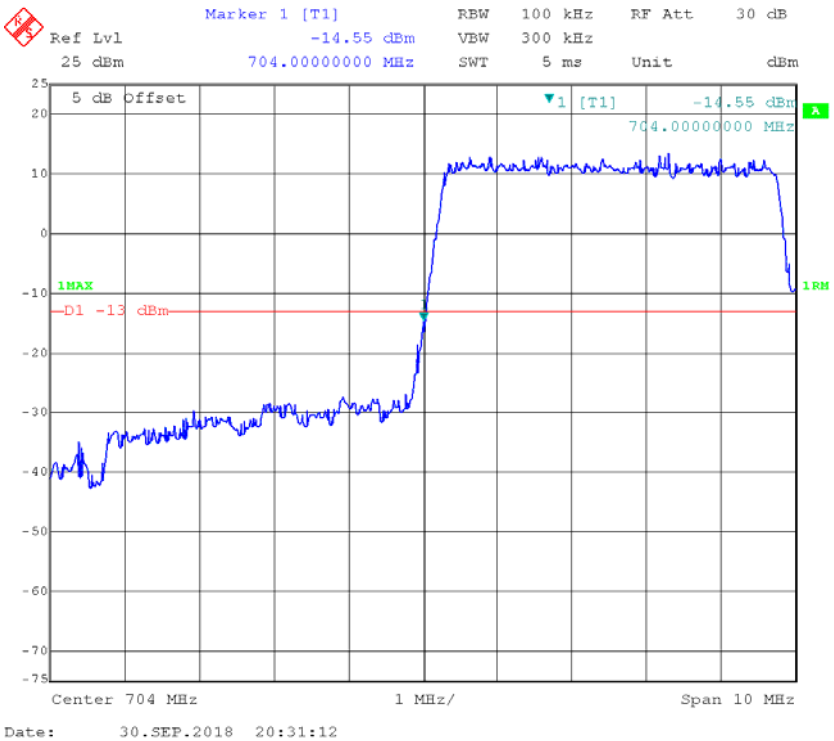


16QAM_5MHz_ 25 RB_ Right

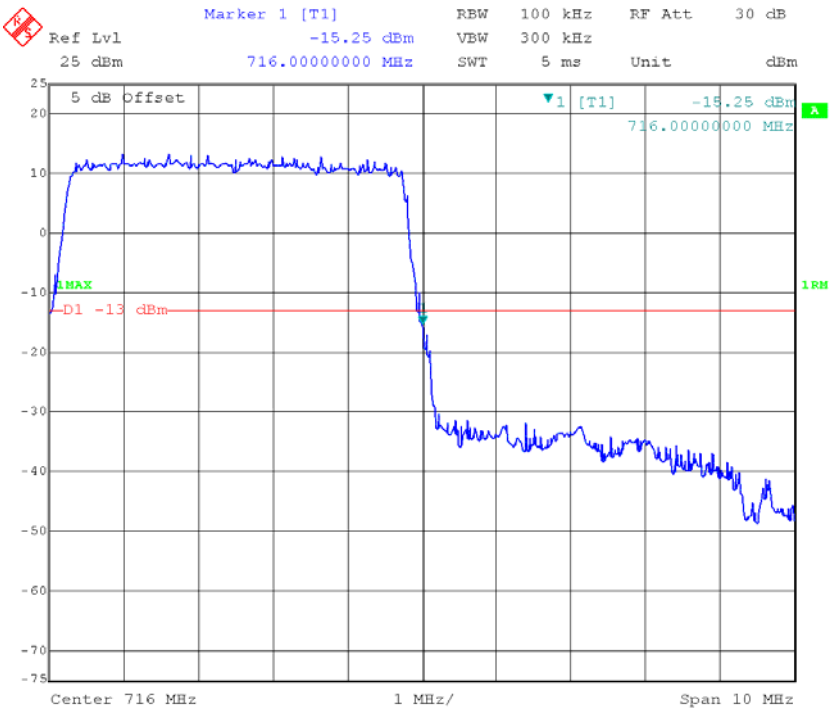


LTE Band 17

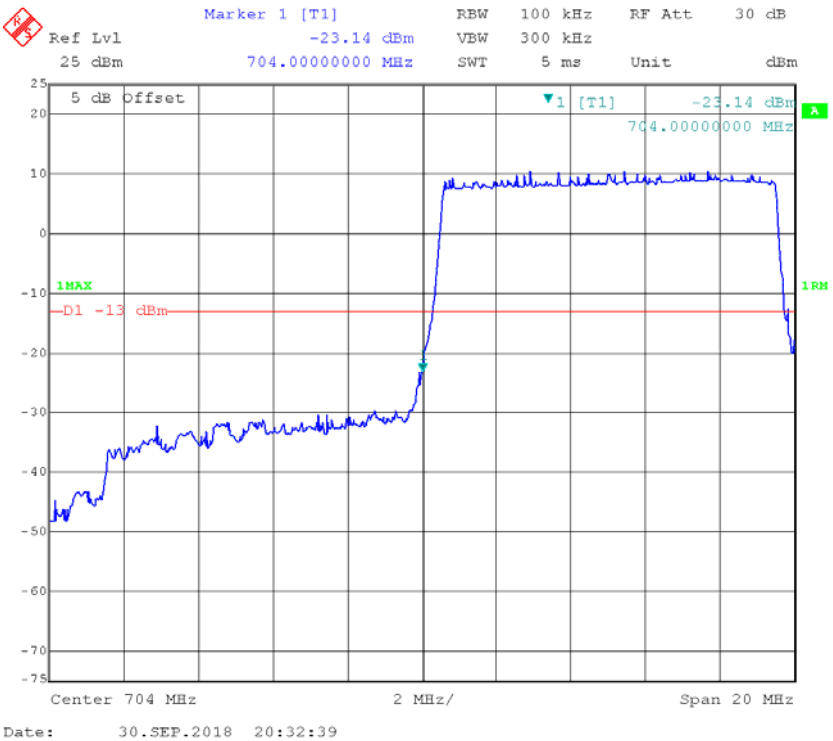
QPSK_5MHz_ 25 RB_ Left



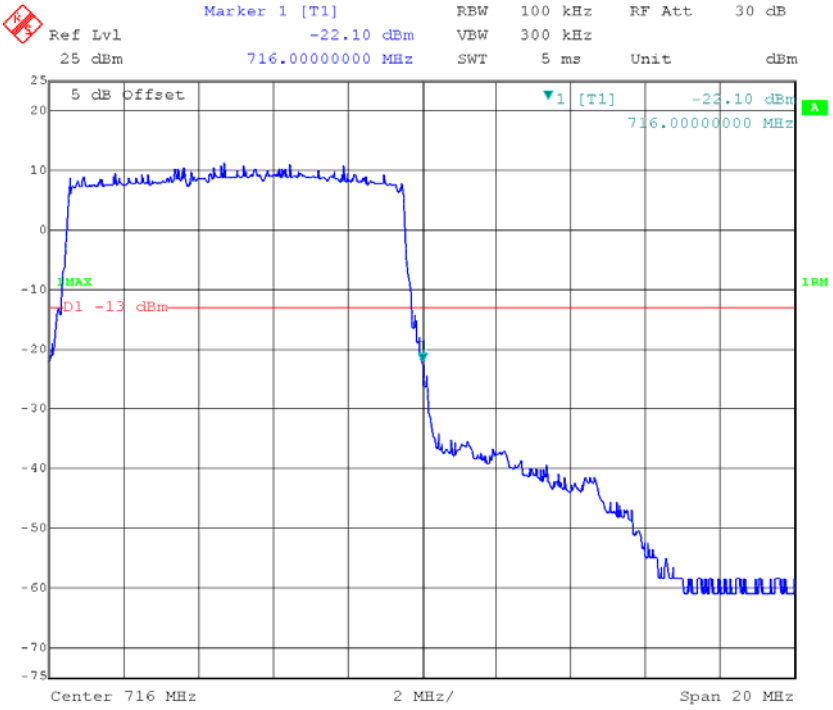
QPSK_5MHz_ 25 RB_ Right



QPSK_10MHz_ 50 RB_ Left

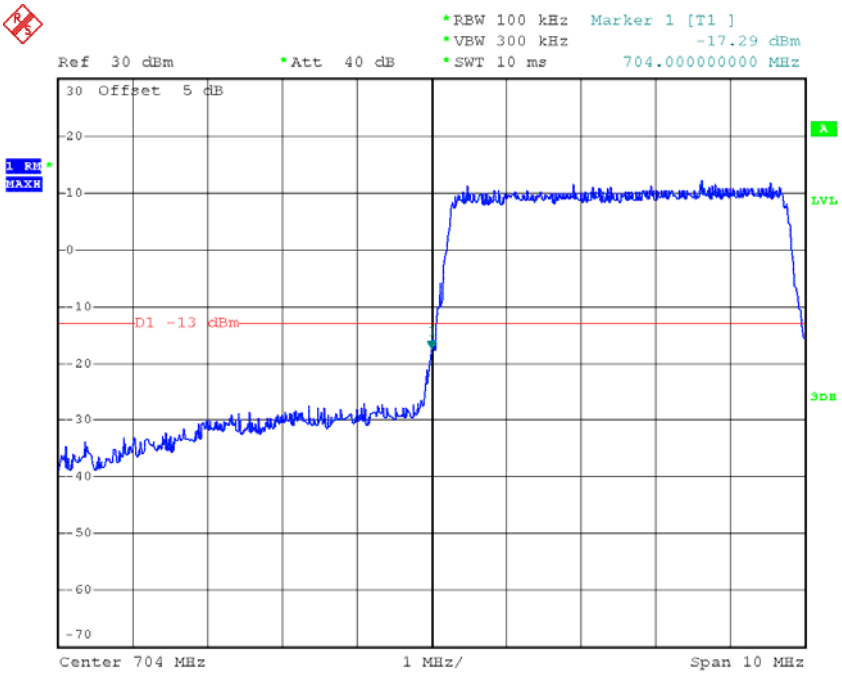


QPSK_10MHz_ 50 RB_ Right



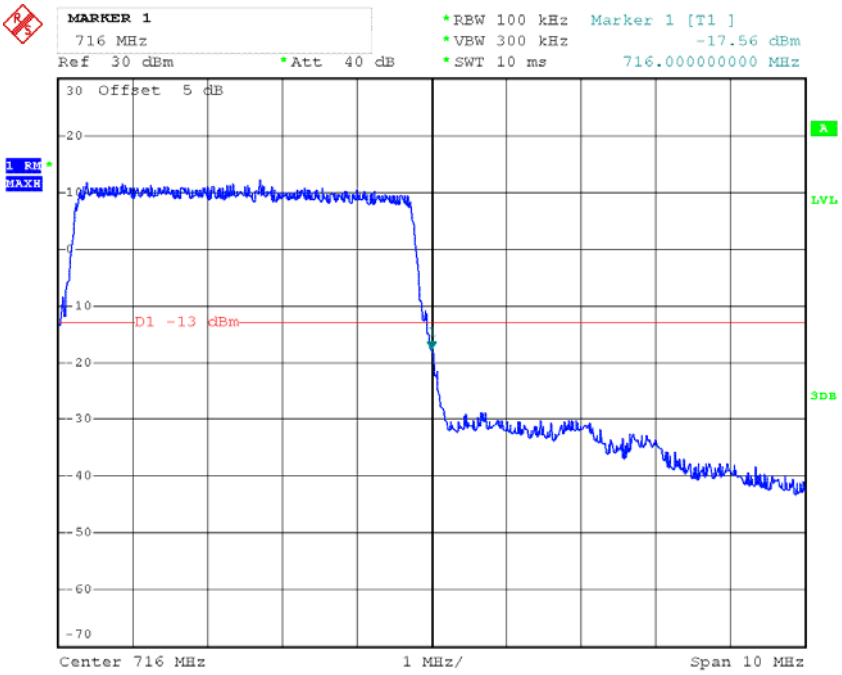
Date: 30.SEP.2018 20:33:17

16QAM_5MHz_ 25 RB_ Left



Date: 9.NOV.2018 11:23:54

16QAM_5MHz_ 25 RB_ Right



Date: 9.NOV.2018 11:24:28

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

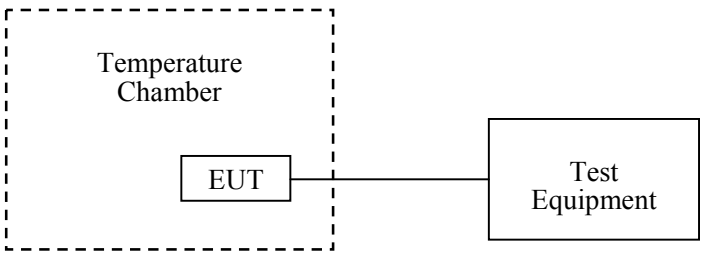
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	N/A
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2018-08-25	2019-08-25
UNI-T	Multimeter	UT39A	M130199938	2018-07-24	2019-07-24
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

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

Test Data

Environmental Conditions

Temperature:	26.7~28.3°C
Relative Humidity:	42~58 %
ATM Pressure:	100~100.8 kPa

The testing was performed by Swim Lv from 2018-09-30 to 2018-11-09.

WCDMA Band II: R99

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	9	0.00478723	Pass
-20		-2	-0.00106383	
-10		5	0.00265957	
0		8	0.00425532	
10		6	0.00319149	
20		4	0.00212766	
30		-9	-0.00478723	
40		8	0.00425532	
50		-5	-0.00265957	
20	3.5	2	0.00106383	
20	4.2	10	0.00531915	

WCDMA Band Ⅴ: R99

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.7	3	0.00358594	2.5
-20		8	0.00956251	
-10		-3	-0.00358594	
0		-1	-0.00119531	
10		-4	-0.00478126	
20		-9	-0.01075783	
30		-8	-0.00956251	
40		-5	-0.00597657	
50		-10	-0.01195314	
20	3.5	-7	-0.0083672	
20	4.2	8	0.00956251	

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	3.03	0.0016	Pass
-20		-12.37	-0.0066	
-10		-1.27	-0.0007	
0		-2.38	-0.0013	
10		1.58	0.0008	
20		-0.09	0.0000	
30		0.24	0.0001	
40		-5.12	-0.0027	
50		-6.51	-0.0035	
20	3.5	-5.71	-0.0030	
20	4.2	-5.78	-0.0031	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.7	4.71	0.0025	Pass
-20		0.97	0.0005	
-10		3.44	0.0018	
0		-3.58	-0.0019	
10		-12.11	-0.0064	
20		3.00	0.0016	
30		-7.48	-0.0040	
40		-12.91	-0.0069	
50		-1.08	-0.0006	
20	3.5	4.42	0.0024	
20	4.2	1.20	0.0006	

LTE Band 4:

QPSK, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	1710.33	1754.48	1710	1755
-20		1710.72	1754.49	1710	1755
-10		1710.38	1754.44	1710	1755
0		1710.49	1754.45	1710	1755
10		1710.43	1754.65	1710	1755
20		1710.47	1754.56	1710	1755
30		1710.64	1754.75	1710	1755
40		1710.47	1754.65	1710	1755
50		1710.32	1754.45	1710	1755
20	3.5	1710.52	1754.54	1710	1755
20	4.2	1710.48	1754.56	1710	1755

16QAM, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	1710.34	1754.63	1710	1755
-20		1710.20	1754.77	1710	1755
-10		1710.35	1754.94	1710	1755
0		1710.36	1754.77	1710	1755
10		1710.31	1754.86	1710	1755
20		1710.44	1754.83	1710	1755
30		1710.39	1754.93	1710	1755
40		1710.14	1754.98	1710	1755
50		1710.40	1754.97	1710	1755
20	3.5	1710.24	1754.78	1710	1755
20	4.2	1710.24	1754.77	1710	1755

LTE Band 5:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 836.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{AC}**	**Hz**	**ppm**	**ppm**
-30	3.7	-1.41	-0.0017	2.5
-20		-0.89	-0.0011	
-10		-1.34	-0.0016	
0		1.49	0.0018	
10		-3.00	-0.0036	
20		1.75	0.0021	
30		-2.10	-0.0025	
40		-2.70	-0.0032	
50		-2.56	-0.0031	
20	3.5	2.86	0.0034	
20	4.2	2.04	0.0024	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =836.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{AC}**	**Hz**	**ppm**	**ppm**
-30	3.7	-3.45	-0.0041	2.5
-20		-3.11	-0.0037	
-10		3.44	0.0041	
0		0.84	0.0010	
10		-1.59	-0.0019	
20		-3.06	-0.0037	
30		-1.71	-0.0020	
40		-2.63	-0.0031	
50		-1.95	-0.0023	
20	3.5	-3.24	-0.0039	
20	4.2	-1.18	-0.0014	

LTE Band 12:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	699.34	715.40	699	716
-20		699.34	715.33	699	716
-10		699.71	715.40	699	716
0		699.44	715.60	699	716
10		699.59	715.30	699	716
20		699.51	715.48	699	716
30		699.32	715.57	699	716
40		699.47	715.48	699	716
50		699.67	715.50	699	716
20	3.5	699.52	715.48	699	716
20	4.2	699.54	715.52	699	716

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.7	699.44	715.64	699	716
-20		699.09	715.57	699	716
-10		699.10	715.63	699	716
0		699.09	715.77	699	716
10		699.18	715.80	699	716
20		699.05	715.67	699	716
30		699.39	715.57	699	716
40		699.18	715.69	699	716
50		699.14	715.79	699	716
20	3.5	699.24	715.76	699	716
20	4.2	699.16	715.69	699	716

LTE Band 17:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{AC}	F_L	F_H	F_L	F_H
-30	3.7	704.55	715.62	704	716
-20		704.43	715.32	704	716
-10		704.73	715.60	704	716
0		704.47	715.35	704	716
10		704.75	715.47	704	716
20		704.58	715.47	704	716
30		704.38	715.39	704	716
40		704.60	715.50	704	716
50		704.53	715.61	704	716
20	3.5	704.56	715.48	704	716
20	4.2	704.48	715.32	704	716

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{AC}	F_L	F_H	F_L	F_H
-30	3.7	704.07	715.84	704	716
-20		704.38	715.92	704	716
-10		704.38	715.96	704	716
0		704.09	715.64	704	716
10		704.21	715.63	704	716
20		704.19	715.75	704	716
30		704.39	715.84	704	716
40		704.44	715.83	704	716
50		704.19	715.92	704	716
20	3.5	704.26	715.76	704	716
20	4.2	704.26	715.67	704	716

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

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