BACL
Bay Area Compliance Labs Corp.

FCC PART 22H, PART 24E

FCC PART 27

MEASUREMENT AND TEST REPORT

For

MAXWEST INTERNATIONAL LIMITED.

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

FCC ID: 2AEN3ASTRO5GOLTE

Report Type:	Product Type:
Original Report	Mobile Phone

Report Number:	RDG181218001-00D
Report Date:	2019-01-14
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		Mobile Phone
EUT Model:		Astro 5 GO LTE
Rated Input Voltage:		DC3.7V from Li-ion Rechargeable Battery or DC5V from adapter
Adapter Information	**Model:**	DCS10-0501000F
	Input:	AC100-240V, 50/60Hz 0.3A
	Output:	DC5V, 1000mA
External Dimension:		Length (144.2 mm)*Width (73.2 mm)*High (10.7 mm)
Serial Number:		181218001
EUT Received Date:		2018.12.19

Objective

This report is prepared on behalf of ***MAXWEST INTERNATIONAL LIMITED.*** in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E Part 27 of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AEN3ASTRO5GOLTE.
FCC Part 15C DSS submissions with FCC ID: 2AEN3ASTRO5GOLTE.
FCC Part 15B JBP submissions with FCC ID: 2AEN3ASTRO5GOLTE.

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

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

SYSTEM TEST CONFIGURATION

Justification

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

The test items were performed with the EUT operating at testing mode. The device supports GSM/GPRS/ EDGE 850/1900 band,WCDMA/HSUPA/HPDPA Band 2 and band 5, LTE band 2, 4, 5, 7.

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	110 822
R&S	Wideband Radio Communication Tester	CMW500	147473
Un-known	ANTENNA	/	/

Configuration of Test Setup
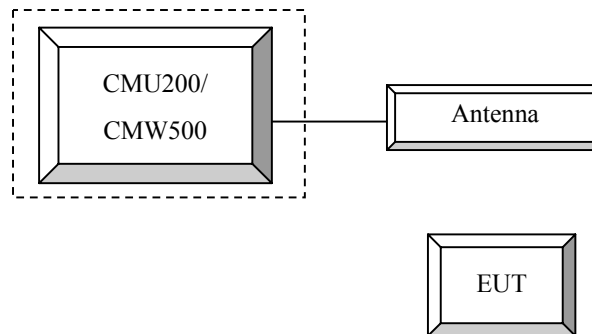
Block Diagram of Test Setup

CMW500/CMU200

EUT   Antenna

1.0 Meter

Non-Conductive Table
150 cm above Ground Plane

1.5 Meter
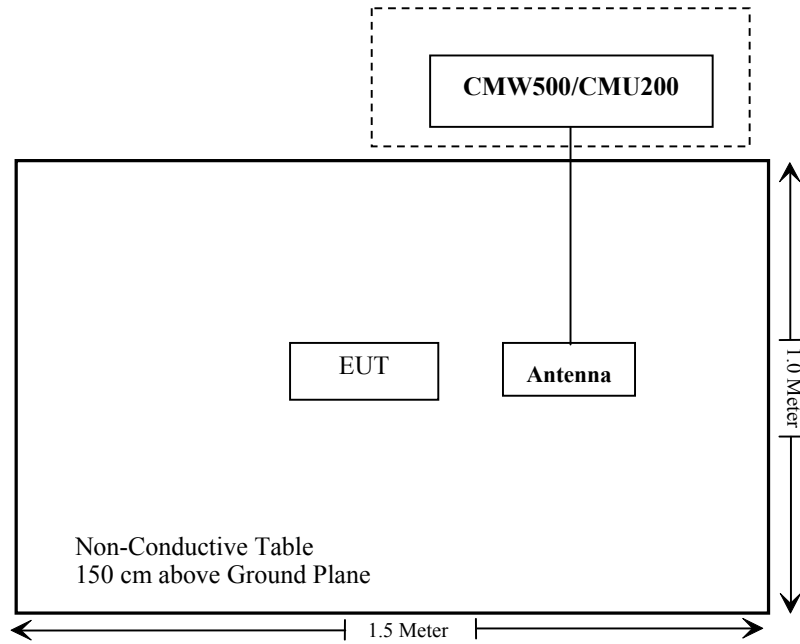
SUMMARY OF TEST RESULTS

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

FCC §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG181218001-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

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

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

Applicable Standard

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

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

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

According to §27.50

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

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

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

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

Test Procedure

GSM/GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection   Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal   Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
          > Slot configuration   > Uplink/Gamma
          > 33 dBm for GPRS 850
          > 30 dBm for GPRS 1900
          > 27 dBm for EGPRS 850
          > 26 dBm for EGPRS 1900
BS Signal   Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset >   + 0 Hz
Mode >   BCCH and TCH
BCCH Level >   -85 dBm (May need to adjust if link is not stable)
BCCH Channel >   choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type >   Off
P0 >   4 dB
Slot Config >   Unchanged (if already set under MS signal)
TCH >   choose desired test channel
Hopping >   Off
Main Timeslot >   3
Network   Coding Scheme >   CS4 (GPRS) and MCS5 (EGPRS)

 Bit Stream >   2E9-1 PSR Bit Stream
AF/RF   Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection   Press Signal on to turn on the signal and change settings

WCDMA-Release 99

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

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

WCDMA HSDPA

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

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

WCDMA HSUPA

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

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

HSPA+

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

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

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

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

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

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

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

DC-HSDPA

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

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

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

LTE (FDD):

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

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

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

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

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 18	≤ 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	100035	2018-08-03	2019-08-03
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
EMCO	Adjustable Dipole Antenna	3121C	9109-753	Not Required	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
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
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2018-02-24	2019-02-28
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
R&S	Universal Radio Communication Tester	CMU200	110 822	2018-12-14	2019-12-14
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

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

Test Data

Environmental Conditions

Temperature:	21~25.3°C
Relative Humidity:	37~44 %
ATM Pressure:	100.2~101.3 kPa

* The testing was performed by Vern Shen, Carrie He and Vito Chen on 2018-12-22~2018-12-29.

Conducted Output Power

Cellular Band & PCS Band

Band	Channel No.	Conducted Peak Output Power (dBm)								
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	32.90	32.90	30.85	28.95	26.93	25.81	25.62	24.70	23.54
	190	32.90	32.95	30.82	28.94	26.95	26.01	25.78	25.26	23.92
	251	32.90	32.89	30.74	28.90	26.96	26.03	25.78	25.23	23.48
PCS	512	29.30	29.35	27.12	25.54	23.51	25.70	25.51	24.88	23.56
	661	29.30	29.32	27.04	25.48	23.69	25.59	25.58	24.96	23.45
	810	29.40	29.35	26.97	25.40	23.55	25.3	25.21	24.37	23.24

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	23.82	3.44	23.88	3.12	23.85	3.16
HSDPA	1	23.98	3.72	23.84	4.76	23.61	4.44
	2	23.89	3.70	23.81	4.73	23.58	4.39
	3	23.81	3.68	23.78	4.71	23.56	4.41
	4	23.87	3.75	23.77	4.81	23.54	4.48
HSUPA	1	23.98	5.52	23.81	5.52	23.58	5.96
	2	23.88	5.51	23.80	5.49	23.56	5.91
	3	23.85	5.61	23.77	5.47	23.55	5.89
	4	23.77	5.48	23.71	5.53	23.49	5.84
	5	23.75	5.44	23.69	5.46	23.47	5.81

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	23.58	3.84	23.56	3.68	23.55	3.36
HSDPA	1	23.70	5.68	24.44	5.92	23.43	3.52
	2	23.68	5.66	24.41	5.89	23.40	3.48
	3	23.65	5.60	24.39	5.87	23.38	3.44
	4	23.60	5.57	24.34	5.94	23.34	3.51
HSUPA	1	23.65	5.76	23.32	5.36	23.23	5.48
	2	23..60	5.78	23.28	5.31	23.20	5.51
	3	23.57	5.68	23.21	5.38	23.18	5.49
	4	23.54	5.64	23.19	5.41	23.14	5.38
	5	23.51	5.71	23.18	5.48	23.11	5.34

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	21.45	21.88	21.06
		RB1#3	21.4	21.97	21.04
		RB1#5	21.13	21.74	20.82
		RB3#0	21.15	21.93	21.01
		RB3#3	21.12	21.86	20.94
		RB6#0	19.84	20.83	19.9
	16QAM	RB1#0	19.64	20.86	19.86
		RB1#3	19.88	21.03	19.94
		RB1#5	19.68	20.79	19.74
		RB3#0	20.96	21.91	21.42
		RB3#3	20.96	21.83	21.36
		RB6#0	18.9	20.05	19.51
3MHz	QPSK	RB1#0	22.75	22.45	22.01
		RB1#8	22.76	22.42	21.75
		RB1#14	22.7	22.21	21.37
		RB6#0	21.37	21.43	20.89
		RB6#9	21.51	21.3	20.5
		RB15#0	21.42	21.41	20.74
	16QAM	RB1#0	21.64	21.49	20.89
		RB1#8	21.87	21.5	20.67
		RB1#14	21.89	21.29	20.31
		RB6#0	20.3	20.64	20.07
		RB6#9	20.49	20.53	19.68
		RB15#0	20.41	20.55	20.03
5MHz	QPSK	RB1#0	22.32	22.15	22.04
		RB1#13	22.87	22.46	22
		RB1#24	22.58	21.78	21.05
		RB15#0	21.3	21.34	21.04
		RB15#10	21.54	21.2	20.67
		RB25#0	21.33	21.23	20.81
	16QAM	RB1#0	20.63	21.36	21.09
		RB1#13	21.42	21.68	21.1
		RB1#24	21.25	21.04	20.16
		RB15#0	21.16	21.35	21.07
		RB15#10	21.42	21.2	20.67
		RB25#0	20.35	20.35	20.01

10MHz	QPSK	RB1#0	21.54	22.42	22.55
		RB1#25	22.32	22.32	22.39
		RB1#49	23.27	22.21	21.61
		RB25#0	20.79	21.44	21.63
		RB25#25	21.87	21.35	21.12
		RB50#0	21.34	21.4	21.41
	16QAM	RB1#0	20.68	21.5	21.47
		RB1#25	21.68	21.4	21.35
		RB1#49	22.68	21.32	20.56
		RB25#0	20.68	21.44	21.66
		RB25#25	21.79	21.34	21.14
		RB50#0	20.37	20.56	20.67
15MHz	QPSK	RB1#0	21.68	22.71	21.96
		RB1#38	22.78	22.29	22.33
		RB1#74	23.38	21.91	20.89
		RB36#0	21.05	21.6	21.38
		RB36#39	22.31	21.11	20.85
		RB75#0	21.72	21.38	21.15
	16QAM	RB1#0	20.79	21.83	21.22
		RB1#38	22.16	21.39	21.63
		RB1#74	22.73	21.01	20.21
		RB36#0	20.95	21.62	21.4
		RB36#39	22.23	21.11	20.86
		RB75#0	20.76	20.55	20.33
20MHz	QPSK	RB1#0	20.8	23.24	21.65
		RB1#50	22.42	22.36	22.35
		RB1#99	22.98	22.87	21.81
		RB50#0	20.46	21.74	21.02
		RB50#50	22.03	21.46	21.32
		RB100#0	21.31	21.59	21.18
	16QAM	RB1#0	19.75	22.37	21.09
		RB1#50	21.62	21.43	21.84
		RB1#99	22.23	22	21.33
		RB50#0	20.36	21.69	21.04
		RB50#50	21.95	21.41	21.32
		RB100#0	20.44	20.7	20.43

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.36	21.89	23.71
		RB1#3	23.37	21.89	23.72
		RB1#5	23.4	21.78	23.56
		RB3#0	23.56	22.19	23.51
		RB3#3	23.53	22.27	23.45
		RB6#0	22.5	21.31	22.41
	16QAM	RB1#0	23.16	23.77	22.3
		RB1#3	23.22	23.76	22.34
		RB1#5	23.21	23.84	22.36
		RB3#0	23.57	22.25	23.55
		RB3#3	23.59	22.18	23.54
		RB6#0	21.84	21.07	21.77
3MHz	QPSK	RB1#0	23.39	21.85	23.74
		RB1#8	23.39	21.83	23.75
		RB1#14	23.38	21.94	23.77
		RB6#0	22.47	21.33	22.56
		RB6#9	22.49	21.22	22.44
		RB15#0	22.48	20.89	22.44
	16QAM	RB1#0	22.93	23.08	22.75
		RB1#8	22.92	23.75	22.77
		RB1#14	22.91	23.83	22.74
		RB6#0	21.58	21.23	21.88
		RB6#9	21.54	21.33	21.88
		RB15#0	21.7	20.77	21.71
5MHz	QPSK	RB1#0	23.42	21.93	23.44
		RB1#13	23.37	22.03	23.39
		RB1#24	23.48	23.58	23.39
		RB15#0	22.39	20.99	22.46
		RB15#10	22.45	20.95	22.58
		RB25#0	22.53	20.79	22.47
	16QAM	RB1#0	22.36	23.77	22.71
		RB1#13	22.39	23.79	22.66
		RB1#24	22.45	23.37	22.69
		RB15#0	22.58	21.09	22.55
		RB15#10	22.48	21.04	22.54
		RB25#0	21.86	20.63	21.71

10MHz	QPSK	RB1#0	23.31	23.51	23.5
		RB1#25	23.32	21.96	23.48
		RB1#49	23.41	21.96	23.5
		RB25#0	22.36	20.96	22.5
		RB25#25	22.41	22.4	22.58
		RB50#0	22.4	20.98	22.49
	16QAM	RB1#0	22.86	22.69	22.57
		RB1#25	22.94	23.32	22.55
		RB1#49	22.87	23.49	22.58
		RB25#0	22.46	20.95	22.47
		RB25#25	22.6	22.5	22.48
		RB50#0	21.65	20.78	21.79
15MHz	QPSK	RB1#0	23.28	23.48	23.52
		RB1#38	23.32	22.03	23.47
		RB1#74	23.4	23.56	23.51
		RB36#0	22.48	22.47	22.51
		RB36#39	22.4	21.04	22.59
		RB75#0	22.48	20.95	22.53
	16QAM	RB1#0	22.89	23.24	22.78
		RB1#38	22.89	23.31	22.75
		RB1#74	22.92	23.31	22.71
		RB36#0	22.38	22.45	22.48
		RB36#39	22.52	20.94	22.58
		RB75#0	21.62	20.69	21.7
20MHz	QPSK	RB1#0	22.1	21.99	22.07
		RB1#50	22.09	20.59	22.04
		RB1#99	22.22	22.11	22.09
		RB50#0	20.99	21.05	21.04
		RB50#50	21	19.64	21.13
		RB100#0	21.06	19.5	20.99
	16QAM	RB1#0	21.23	21.59	21.99
		RB1#50	21.23	21.88	21.93
		RB1#99	21.36	21.71	21.9
		RB50#0	20.99	21.04	21.08
		RB50#50	21.02	19.57	20.99
		RB100#0	20.16	19.17	20.3

LTE Band 5

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	21.59	21.48	21.51
		RB1#3	21.6	21.55	21.5
		RB1#5	21.6	21.53	21.57
		RB3#0	21.53	21.69	21.56
		RB3#3	21.58	21.77	21.62
		RB6#0	20.65	20.73	20.69
	16QAM	RB1#0	21.2	21.41	20.27
		RB1#3	21.2	21.43	20.52
		RB1#5	21.17	21.4	20.53
		RB3#0	21.57	21.8	21.65
		RB3#3	21.61	21.75	21.64
		RB6#0	19.88	19.81	19.8
3MHz	QPSK	RB1#0	21.48	21.5	21.53
		RB1#8	21.55	21.46	21.59
		RB1#14	21.53	21.5	21.51
		RB6#0	20.58	20.66	20.67
		RB6#9	20.6	20.64	20.63
		RB15#0	20.68	20.67	20.68
	16QAM	RB1#0	20.8	20.95	20.56
		RB1#8	20.73	20.96	20.56
		RB1#14	20.7	20.88	20.57
		RB6#0	19.67	19.89	19.77
		RB6#9	19.64	19.9	19.83
		RB15#0	19.77	19.79	19.77
5MHz	QPSK	RB1#0	21.6	21.75	21.61
		RB1#13	21.52	21.74	21.55
		RB1#24	21.62	21.75	21.46
		RB15#0	20.68	20.67	20.64
		RB15#10	20.67	20.68	20.63
		RB25#0	20.7	20.65	20.6
	16QAM	RB1#0	20.16	21.6	20.8
		RB1#13	20.14	21.7	20.75
		RB1#24	20.09	21.63	20.76
		RB15#0	20.58	20.74	20.66
		RB15#10	20.57	20.74	20.69
		RB25#0	19.77	19.68	19.81
10MHz	QPSK	RB1#0	21.47	21.57	21.62
		RB1#25	21.49	21.6	21.65
		RB1#49	21.57	21.71	21.6
		RB25#0	20.7	20.67	20.7
		RB25#25	20.69	20.76	20.73
		RB50#0	20.64	20.63	20.75
	16QAM	RB1#0	20.82	21.3	20.16
		RB1#25	20.88	21.36	20.2
		RB1#49	20.88	21.42	20.14
		RB25#0	20.58	20.63	20.64
		RB25#25	20.59	20.62	20.79
		RB50#0	19.81	19.81	19.78

LTE Band 7

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	20.74	20.67	20.46
		RB1#13	20.85	20.67	20.39
		RB1#24	20.84	20.73	20.47
		RB15#0	19.73	19.8	19.67
		RB15#10	19.8	19.79	19.73
		RB25#0	19.77	19.68	19.71
	16QAM	RB1#0	20.11	21.28	20.54
		RB1#13	20.16	21.15	20.44
		RB1#24	20.11	21.3	20.52
		RB15#0	19.74	19.76	19.62
		RB15#10	19.75	19.72	19.67
		RB25#0	19.58	19.46	19.38
10MHz	QPSK	RB1#0	20.61	20.48	20.67
		RB1#25	20.61	20.5	20.61
		RB1#49	20.61	20.53	20.68
		RB25#0	19.7	19.66	19.73
		RB25#25	19.8	19.82	19.66
		RB50#0	19.81	19.7	19.69
	16QAM	RB1#0	20.74	20.64	20.04
		RB1#25	20.65	20.69	20.01
		RB1#49	20.7	20.69	20.06
		RB25#0	19.7	19.68	19.7
		RB25#25	19.71	19.84	19.67
		RB50#0	19.53	19.52	19.43
15MHz	QPSK	RB1#0	20.61	20.55	20.76
		RB1#38	20.59	20.6	20.68
		RB1#74	20.59	20.55	20.48
		RB36#0	19.77	19.67	19.81
		RB36#39	19.75	19.77	19.78
		RB75#0	19.75	19.67	19.69
	16QAM	RB1#0	20.66	21.4	20.73
		RB1#38	20.78	21.32	20.6
		RB1#74	20.69	21.36	20.79
		RB36#0	19.82	19.77	19.8
		RB36#39	19.8	19.83	19.7
		RB75#0	19.51	19.47	19.4
20MHz	QPSK	RB1#0	20.99	20.87	20.74
		RB1#50	20.85	20.76	20.78
		RB1#99	20.94	20.76	20.93
		RB50#0	19.73	19.69	19.71
		RB50#50	19.78	19.74	19.76
		RB100#0	19.78	19.77	19.75
	16QAM	RB1#0	20.2	20.44	21.01
		RB1#50	20.2	20.92	20.93
		RB1#99	20.26	20.98	21.11
		RB50#0	19.78	19.7	19.73
		RB50#50	19.76	19.74	19.75
		RB100#0	19.43	19.44	19.56

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	5.80	5.00	5.28	13
	100 RB		6.20	5.72	5.72	13
16QAM	1 RB	20 MHz	6.36	5.28	5.40	13
	100 RB		7.36	6.72	6.80	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	6.88	7.72	5.00	13
	100 RB		5.96	5.76	5.56	13
16QAM	1 RB	20 MHz	5.84	5.32	5.68	13
	100 RB		6.80	6.68	6.56	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	6.84	5.12	5.52	13
	50 RB		5.48	5.96	5.72	13
16QAM	1 RB	10 MHz	6.32	5.40	6.64	13
	50 RB		6.68	7.04	7.00	13

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

ERP & EIRP

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850 Middle Channel								
836.60	H	95.96	21.73	0.00	0.50	21.23	38.45	17.22
836.60	V	101.13	29.87	0.00	0.50	29.37	38.45	9.08
EDGE 850 Middle Channel								
836.60	H	91.03	16.80	0.00	0.50	16.30	38.45	22.15
836.60	V	97.44	26.18	0.00	0.50	25.68	38.45	12.77
WCDMA Band V Middle Channel								
836.60	H	85.17	10.94	0.00	0.50	10.44	38.45	28.01
836.60	V	93.89	22.63	0.00	0.50	22.13	38.45	16.32

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
PCS 1900 Middle Channel								
1880.00	H	94.62	19.84	11.14	1.56	29.42	33.00	3.58
1880.00	V	93.37	18.40	11.14	1.56	27.98	33.00	5.02
EDGE 1900 Middle Channel								
1880.00	H	91.14	16.36	11.14	1.56	25.94	33.00	7.06
1880.00	V	90.36	15.39	11.14	1.56	24.97	33.00	8.03
WCDMA Band II Middle Channel								
1880.00	H	87.27	12.49	11.14	1.56	22.07	33.00	10.93
1880.00	V	87.26	12.29	11.14	1.56	21.87	33.00	11.13

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

LTE Band 2

Frequency (MHz)	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)			
1880.00	1.40	QPSK	H	87.97	13.19	11.14	1.56	22.77	33.00	10.23
1880.00			V	87.36	12.39	11.14	1.56	21.97	33.00	11.03
1880.00	3.00		H	88.12	13.34	11.14	1.56	22.92	33.00	10.08
1880.00			V	87.44	12.47	11.14	1.56	22.05	33.00	10.95
1880.00	5.00		H	88.31	13.53	11.14	1.56	23.11	33.00	9.89
1880.00			V	87.06	12.09	11.14	1.56	21.67	33.00	11.33
1880.00	10.00		H	88.09	13.31	11.14	1.56	22.89	33.00	10.11
1880.00			V	86.08	11.11	11.14	1.56	20.69	33.00	12.31
1880.00	15.00		H	87.21	12.43	11.14	1.56	22.01	33.00	10.99
1880.00			V	85.47	10.50	11.14	1.56	20.08	33.00	12.92
1880.00	20.00		H	88.85	14.07	11.14	1.56	**23.65**	33.00	9.35
1880.00			V	88.16	13.19	11.14	1.56	22.77	33.00	10.23
1880.00	1.40	16QAM	H	88.04	13.26	11.14	1.56	22.84	33.00	10.16
1880.00			V	87.42	12.45	11.14	1.56	22.03	33.00	10.97
1880.00	3.00		H	88.76	13.98	11.14	1.56	23.56	33.00	9.44
1880.00			V	87.94	12.97	11.14	1.56	22.55	33.00	10.45
1880.00	5.00		H	88.76	13.98	11.14	1.56	23.56	33.00	9.44
1880.00			V	87.98	13.01	11.14	1.56	22.59	33.00	10.41
1880.00	10.00		H	88.11	13.33	11.14	1.56	22.91	33.00	10.09
1880.00			V	86.74	11.77	11.14	1.56	21.35	33.00	11.65
1880.00	15.00		H	87.39	12.61	11.14	1.56	22.19	33.00	10.81
1880.00			V	85.74	10.77	11.14	1.56	20.35	33.00	12.65
1880.00	20.00		H	88.91	14.13	11.14	1.56	**23.71**	33.00	9.29
1880.00			V	88.45	13.48	11.14	1.56	23.06	33.00	9.94

LTE Band 4

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1732.50	1.40	QPSK	H	90.62	15.41	10.70	1.52	**24.59**	30.00	5.41
1732.50			V	88.39	12.88	10.70	1.52	22.06	30.00	7.94
1732.50	3.00		H	90.34	15.13	10.70	1.52	24.31	30.00	5.69
1732.50			V	88.97	13.46	10.70	1.52	22.64	30.00	7.36
1732.50	5.00		H	90.10	14.89	10.70	1.52	24.07	30.00	5.93
1732.50			V	88.96	13.45	10.70	1.52	22.63	30.00	7.37
1732.50	10.00		H	89.83	14.62	10.70	1.52	23.80	30.00	6.20
1732.50			V	89.24	13.73	10.70	1.52	22.91	30.00	7.09
1732.50	15.00		H	89.01	13.80	10.70	1.52	22.98	30.00	7.02
1732.50			V	88.92	13.41	10.70	1.52	22.59	30.00	7.41
1732.50	20.00		H	88.85	13.64	10.70	1.52	**22.82**	30.00	7.18
1732.50			V	87.33	11.82	10.70	1.52	21.00	30.00	9.00
1732.50	1.40	16QAM	H	90.55	15.34	10.70	1.52	**24.52**	30.00	5.48
1732.50			V	88.54	13.03	10.70	1.52	22.21	30.00	7.79
1732.50	3.00		H	90.55	15.34	10.70	1.52	24.52	30.00	5.48
1732.50			V	89.15	13.64	10.70	1.52	22.82	30.00	7.18
1732.50	5.00		H	90.03	14.82	10.70	1.52	24.00	30.00	6.00
1732.50			V	89.07	13.56	10.70	1.52	22.74	30.00	7.26
1732.50	10.00		H	89.94	14.73	10.70	1.52	23.91	30.00	6.09
1732.50			V	89.84	14.33	10.70	1.52	23.51	30.00	6.49
1732.50	15.00		H	90.10	14.89	10.70	1.52	24.07	30.00	5.93
1732.50			V	89.31	13.80	10.70	1.52	22.98	30.00	7.02
1732.50	20.00		H	88.03	12.82	10.70	1.52	**22.00**	30.00	8.00
1732.50			V	87.85	12.34	10.70	1.52	21.52	30.00	8.48

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	1.40	QPSK	H	86.11	11.88	0.00	0.50	11.38	38.45	27.07
836.50			V	95.90	24.64	0.00	0.50	24.14	38.45	14.31
836.50	3.00		H	86.37	12.14	0.00	0.50	11.64	38.45	26.81
836.50			V	96.97	25.71	0.00	0.50	**25.21**	38.45	13.24
836.50	5.00		H	86.25	12.02	0.00	0.50	11.52	38.45	26.93
836.50			V	96.36	25.10	0.00	0.50	24.60	38.45	13.85
836.50	10.00		H	86.30	12.07	0.00	0.50	11.57	38.45	26.88
836.50			V	95.84	24.58	0.00	0.50	**24.08**	38.45	14.37
836.50	1.40	16QAM	H	85.85	11.62	0.00	0.50	11.12	38.45	27.33
836.50			V	95.78	24.52	0.00	0.50	24.02	38.45	14.43
836.50	3.00		H	85.46	11.23	0.00	0.50	10.73	38.45	27.72
836.50			V	96.82	25.56	0.00	0.50	**25.06**	38.45	13.39
836.50	5.00		H	85.95	11.72	0.00	0.50	11.22	38.45	27.23
836.50			V	96.24	24.98	0.00	0.50	24.48	38.45	13.97
836.50	10.00		H	85.83	11.60	0.00	0.50	11.10	38.45	27.35
836.50			V	95.48	24.22	0.00	0.50	**23.72**	38.45	14.73

LTE Band 7

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)			
2535.00	5.00	QPSK	H	85.29	12.20	12.21	1.79	22.62	33.00	10.38
2535.00			V	84.90	11.52	12.21	1.79	21.94	33.00	11.06
2535.00	10.00		H	86.47	13.38	12.21	1.79	23.80	33.00	9.20
2535.00			V	85.63	12.25	12.21	1.79	22.67	33.00	10.33
2535.00	15.00		H	86.20	13.11	12.21	1.79	23.53	33.00	9.47
2535.00			V	85.32	11.94	12.21	1.79	22.36	33.00	10.64
2535.00	20.00		H	86.77	13.68	12.21	1.79	**24.10**	33.00	8.90
2535.00			V	85.30	11.92	12.21	1.79	22.34	33.00	10.66
2535.00	5.00	16QAM	H	86.63	13.54	12.21	1.79	23.96	33.00	9.04
2535.00			V	86.53	13.15	12.21	1.79	23.57	33.00	9.43
2535.00	10.00		H	86.48	13.39	12.21	1.79	23.81	33.00	9.19
2535.00			V	86.40	13.02	12.21	1.79	23.44	33.00	9.56
2535.00	15.00		H	86.50	13.41	12.21	1.79	23.83	33.00	9.17
2535.00			V	85.59	12.21	12.21	1.79	22.63	33.00	10.37
2535.00	20.00		H	87.22	14.13	12.21	1.79	**24.55**	33.00	8.45
2535.00			V	85.45	12.07	12.21	1.79	22.49	33.00	10.51

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

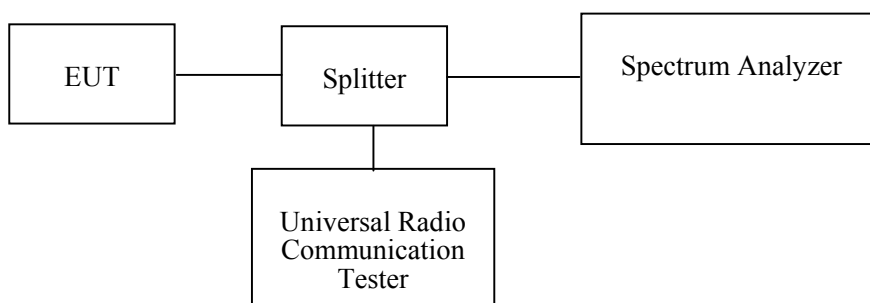# FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH

Applicable Standard

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

Test Procedure

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

The 26 dB & 99% bandwidth was recorded.

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	101121	2018-03-23	2019-03-23
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way 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:	24.4~26.3°C
Relative Humidity:	36~51 %
ATM Pressure:	100.2~100.9 kPa

The testing was performed by Carrie He from 2018-12-27 to 2019-01-12.

Test Mode: Transmitting

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

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GSM	0.246	0.314
		EDGE	0.244	0.314
PCS		PCS	0.248	0.318
		EDGE	0.246	0.312
WCDMA Band II		Rel 99	4.180	4.740
		HSDPA	4.200	4.680
		HSUPA	4.200	4.720
WCDMA Band V		Rel 99	4.160	4.700
		HSDPA	4.160	4.720
		HSUPA	4.160	4.720

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.104	1.302
		16QAM	1.104	1.374
	3 MHz	QPSK	2.700	3.024
		16QAM	2.688	3.012
	5 MHz	QPSK	4.540	5.340
		16QAM	4.560	5.340
	10 MHz	QPSK	9.000	9.800
		16QAM	8.960	9.920
	15 MHz	QPSK	13.620	16.440
		16QAM	13.620	15.060
	20 MHz	QPSK	18.000	19.920
		16QAM	18.080	20.480
LTE Band 4	1.4 MHz	QPSK	1.110	1.356
		16QAM	1.116	1.386
	3 MHz	QPSK	2.700	3.120
		16QAM	2.700	3.120
	5 MHz	QPSK	4.540	5.320
		16QAM	4.560	5.440
	10 MHz	QPSK	8.960	9.800
		16QAM	8.960	9.840
	15 MHz	QPSK	13.560	15.540
		16QAM	13.560	15.060
	20 MHz	QPSK	18.000	19.840
		16QAM	18.080	20.080
LTE Band 5	1.4 MHz	QPSK	1.116	1.320
		16QAM	1.110	1.314
	3 MHz	QPSK	2.700	3.036
		16QAM	2.700	3.048
	5 MHz	QPSK	4.560	5.420
		16QAM	4.520	5.340
	10 MHz	QPSK	8.960	9.760
		16QAM	9.040	9.920

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 7	5 MHz	QPSK	4.540	5.560
		16QAM	4.540	5.500
	10 MHz	QPSK	9.000	9.920
		16QAM	9.000	9.840
	15 MHz	QPSK	13.620	17.340
		16QAM	13.620	16.620
	20 MHz	QPSK	18.080	20.160
		16QAM	18.080	24.400

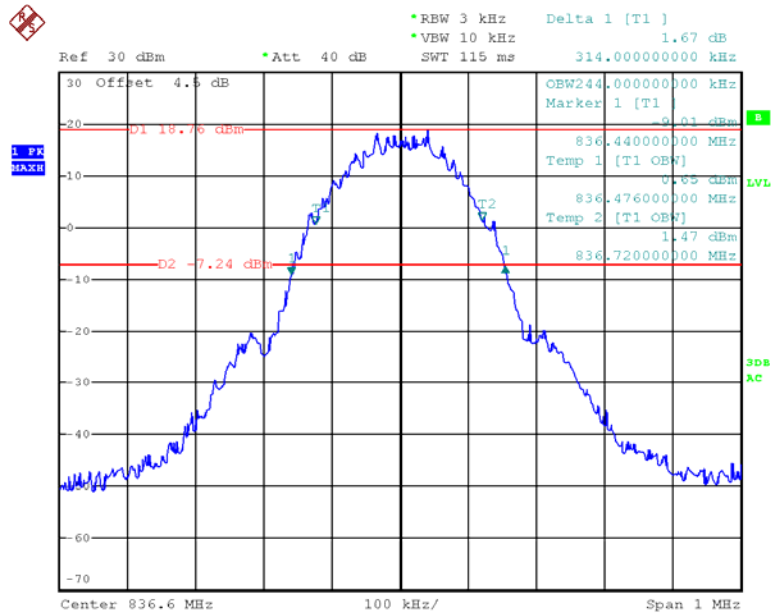**GSM 850 Cellular Band**
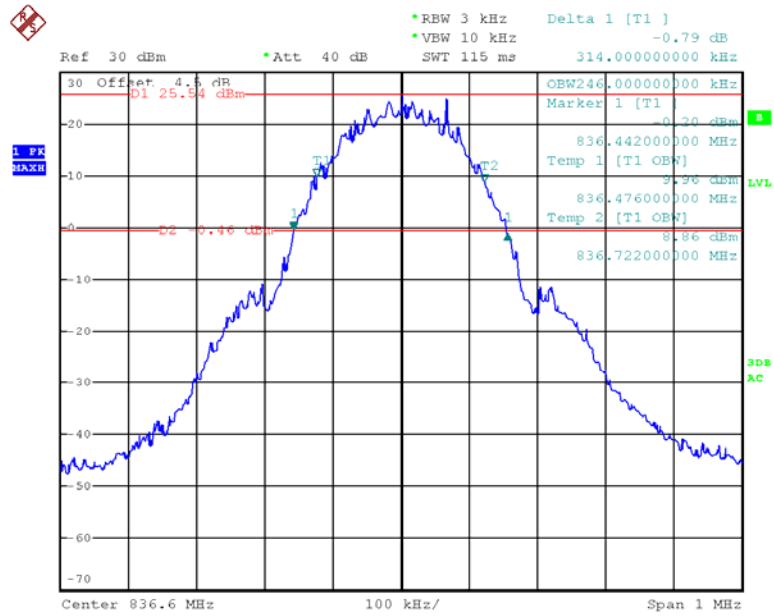
Date: 28.DEC.2018 10:45:32
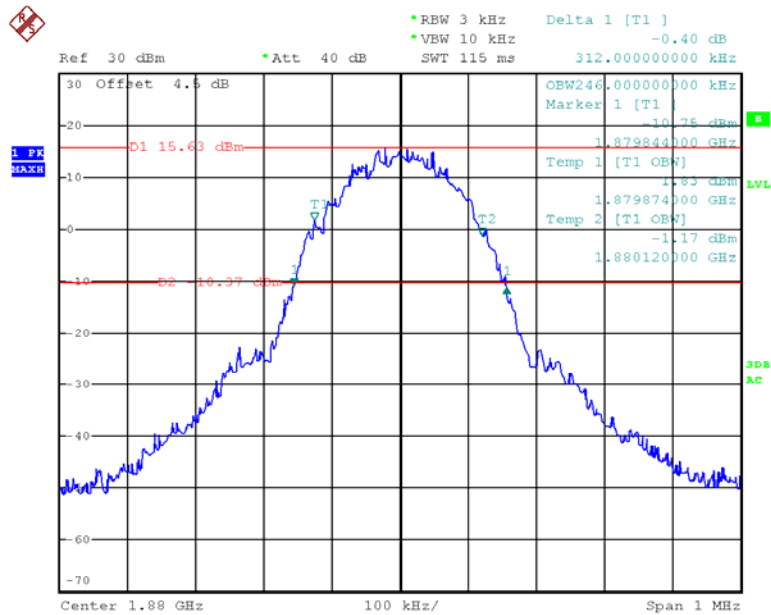
GSM PCS1900 Cellular Band
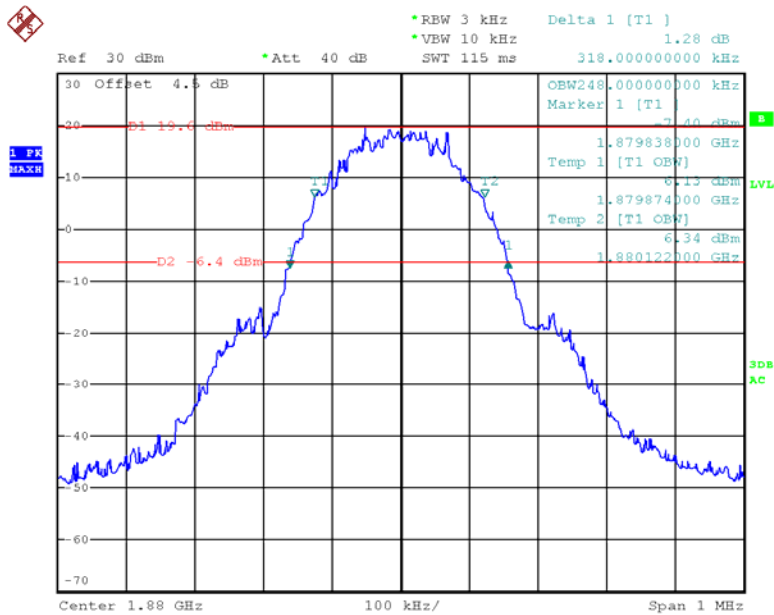
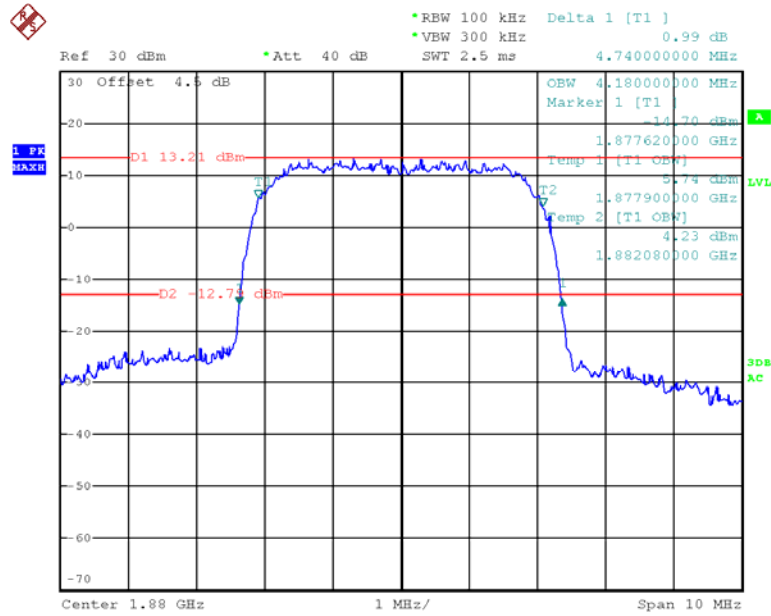Date: 28.DEC.2018 10:50:21

EDGE 850 Cellular Band

Date: 28.DEC.2018 11:00:29
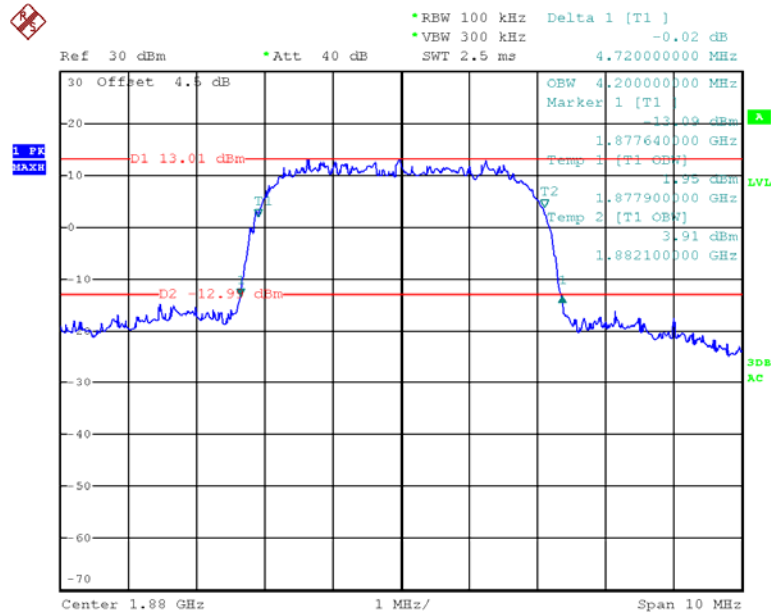
EDGE PCS1900 Cellular Band

Date: 28.DEC.2018 11:02:40

WCDMA Band II, Rel 99

Date: 12.JAN.2019 16:48:05

WCDMA Band II, HSUPA

Date: 12.JAN.2019 16:49:50

WCDMA Band II, HSDPA
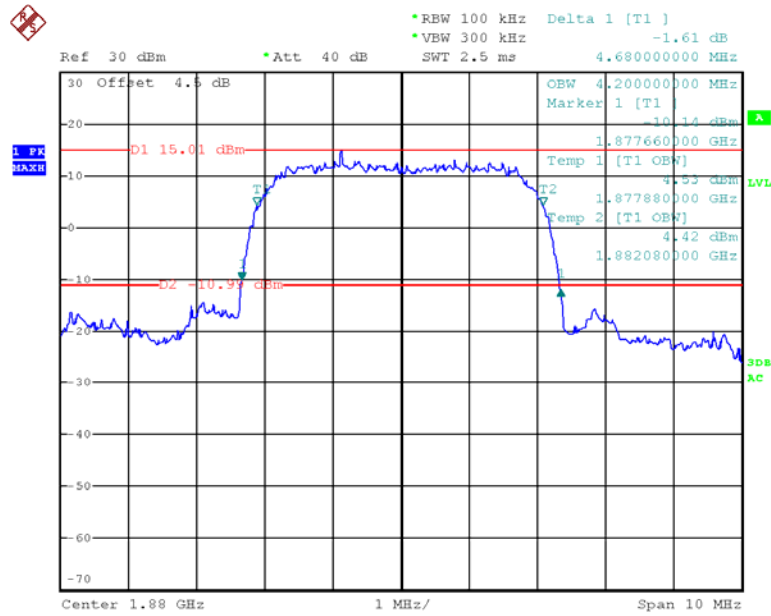
Date: 12.JAN.2019 16:54:26

WCDMA Band V, Rel 99
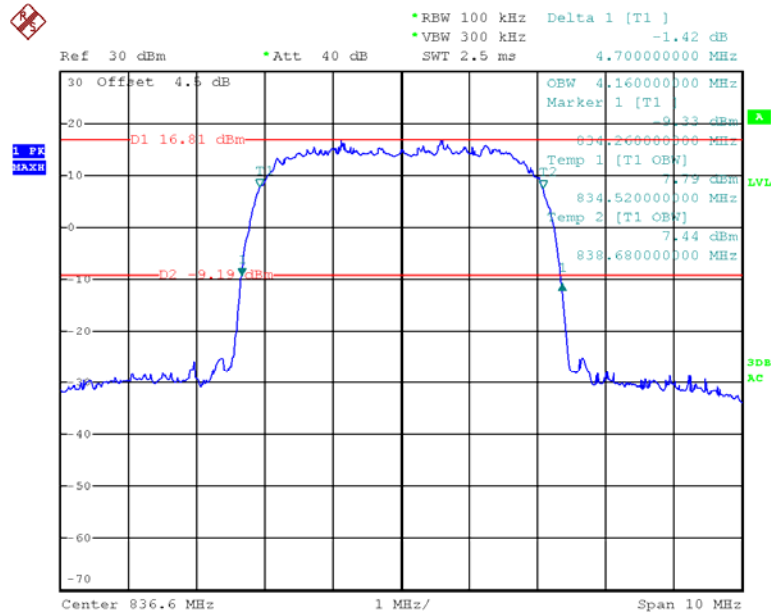
Date: 12.JAN.2019 16:45:27

WCDMA Band V, HSUPA
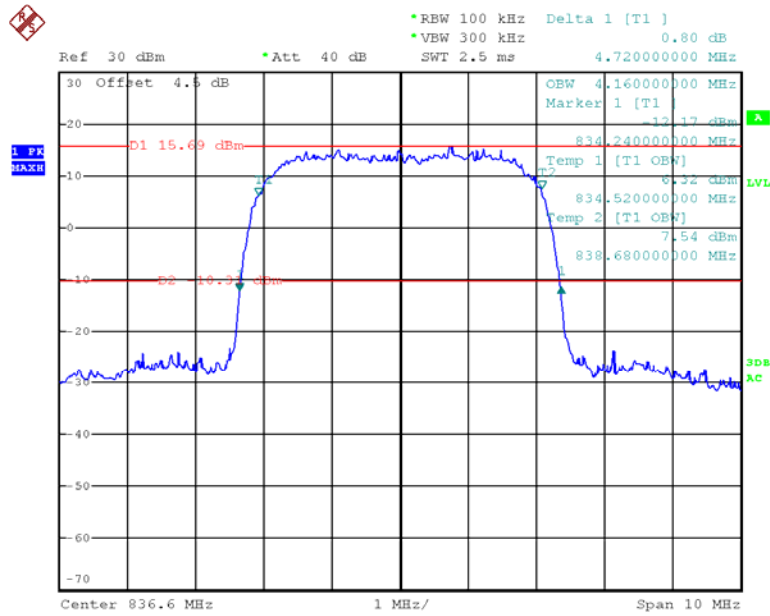
Date: 12.JAN.2019 16:50:51

WCDMA Band V, HSDPA
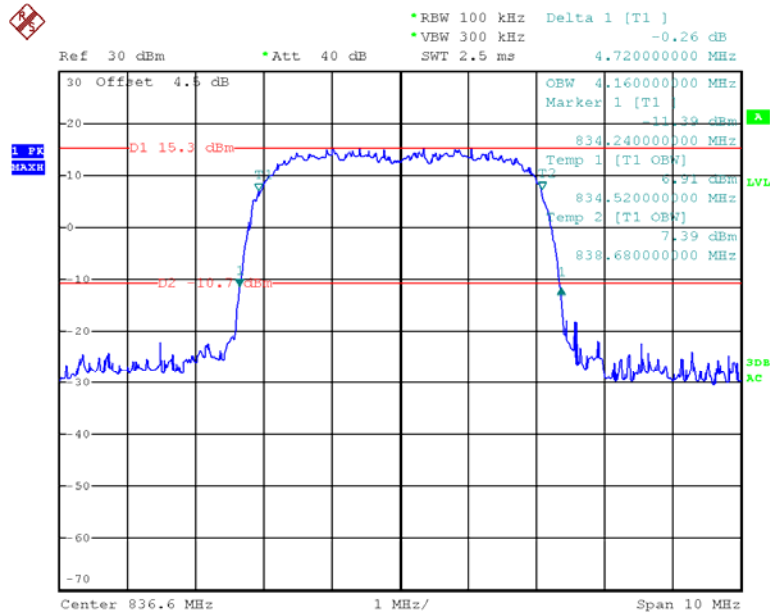
Date: 12.JAN.2019 16:53:19

LTE Band 2

QPSK_1.4 MHz
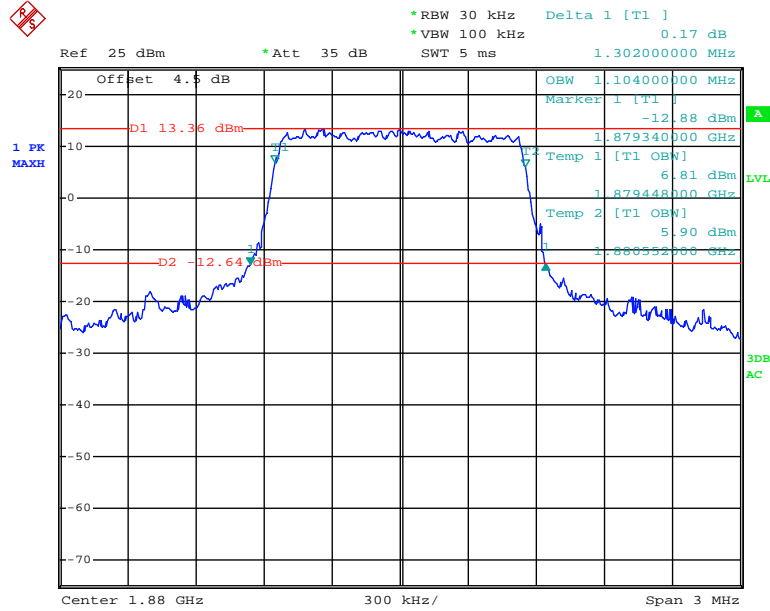
Date: 27.DEC.2018 09:53:27

QPSK_3 MHz
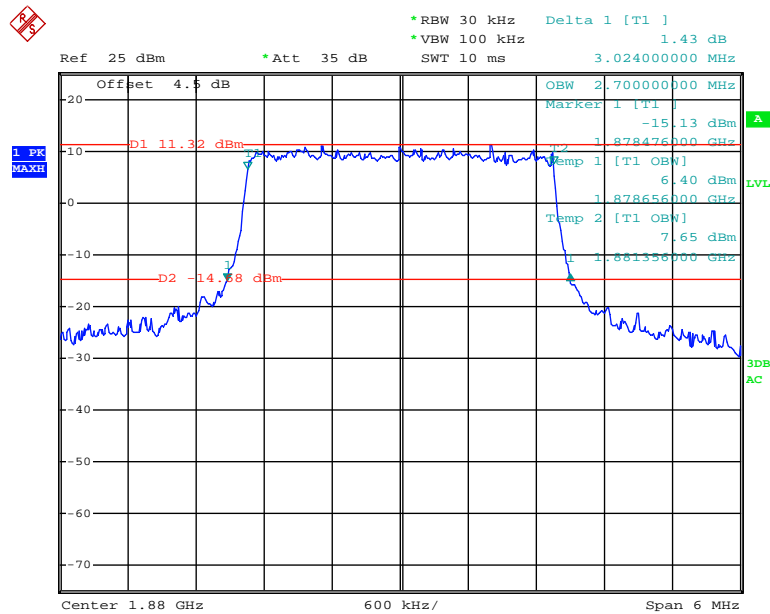
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QPSK_5 MHz
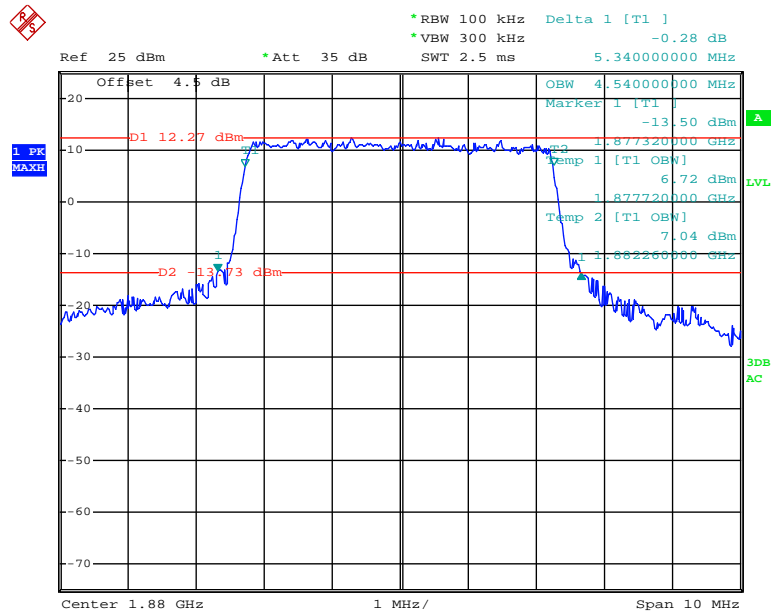
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QPSK_10 MHz
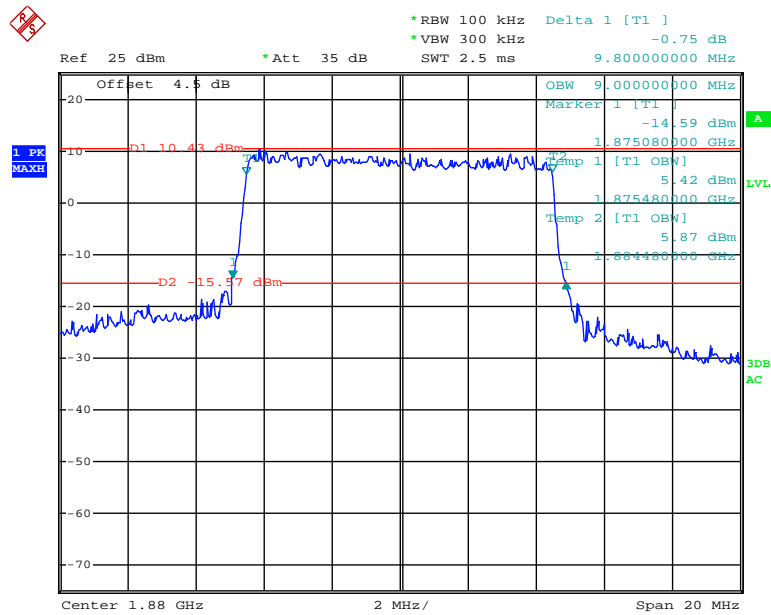
Date: 27.DEC.2018 10:05:20

QPSK_15 MHz
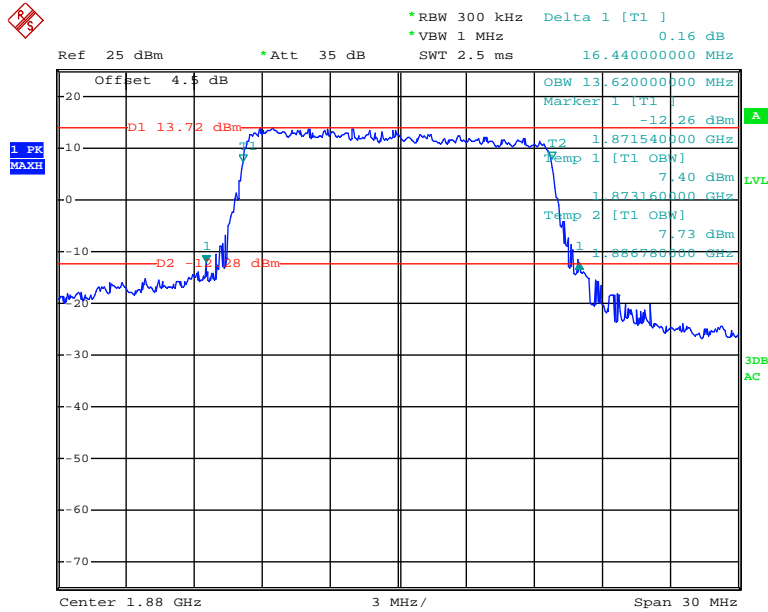
Date: 27.DEC.2018 10:10:10

QPSK_20 MHz
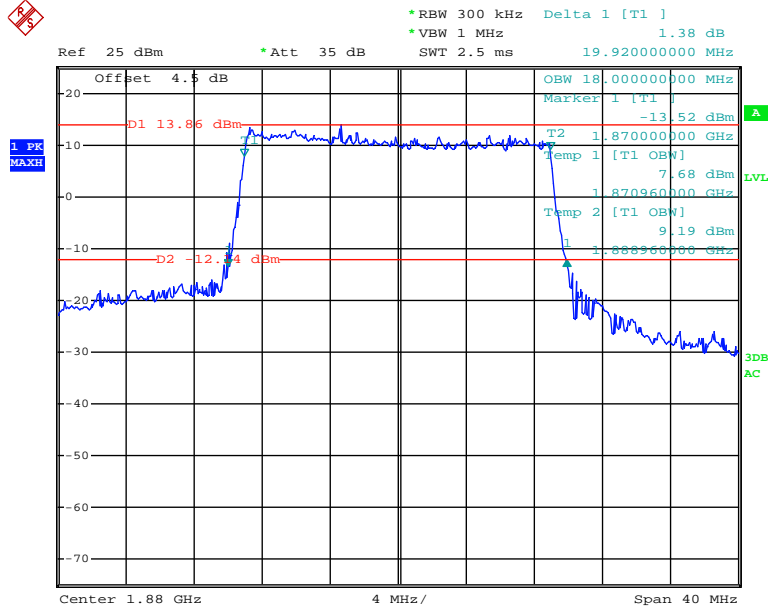
Date: 27.DEC.2018 10:13:24

16QAM_1.4 MHz
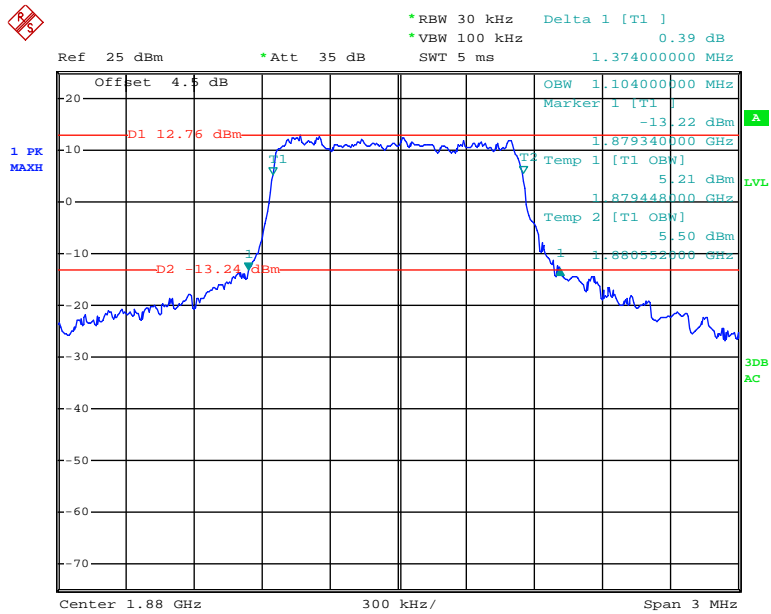
Date: 27.DEC.2018 09:54:01

16QAM_3 MHz
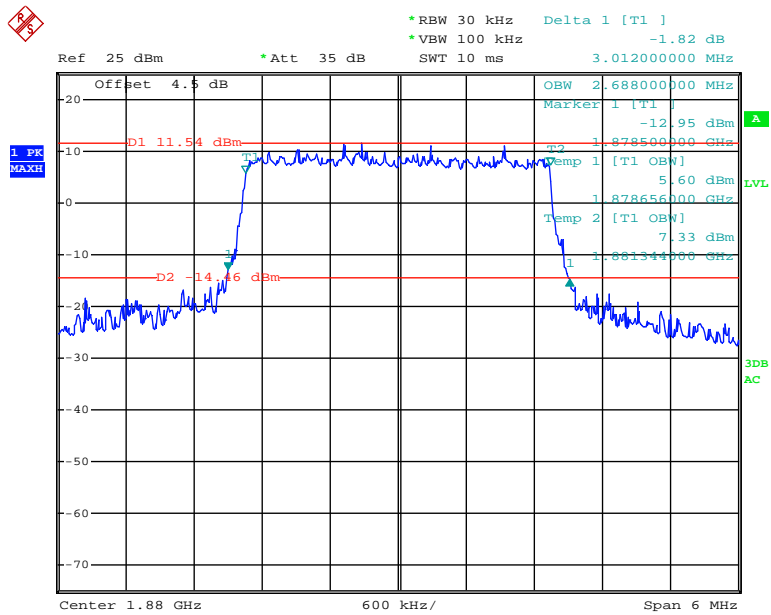
Date: 27.DEC.2018 10:01:04

16QAM_5 MHz
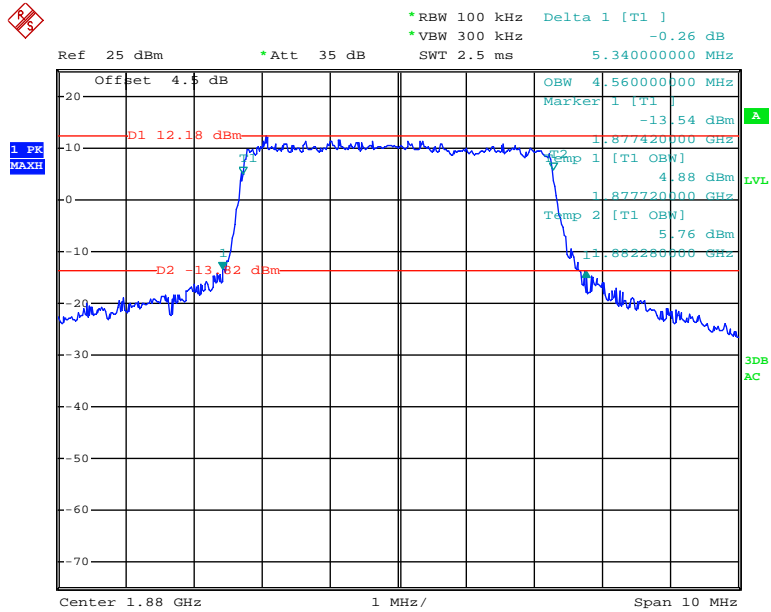
Date: 27.DEC.2018 10:04:04

16QAM_10 MHz
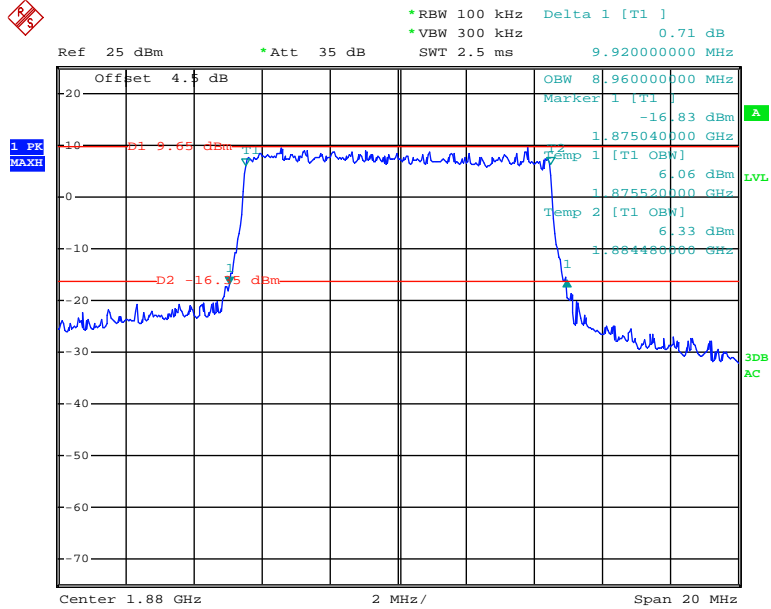
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16QAM_15 MHz
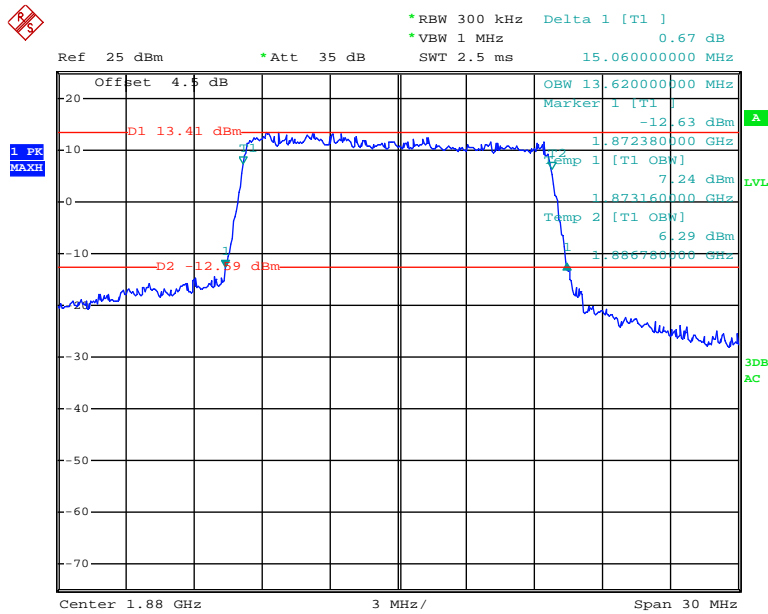
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16QAM_20 MHz
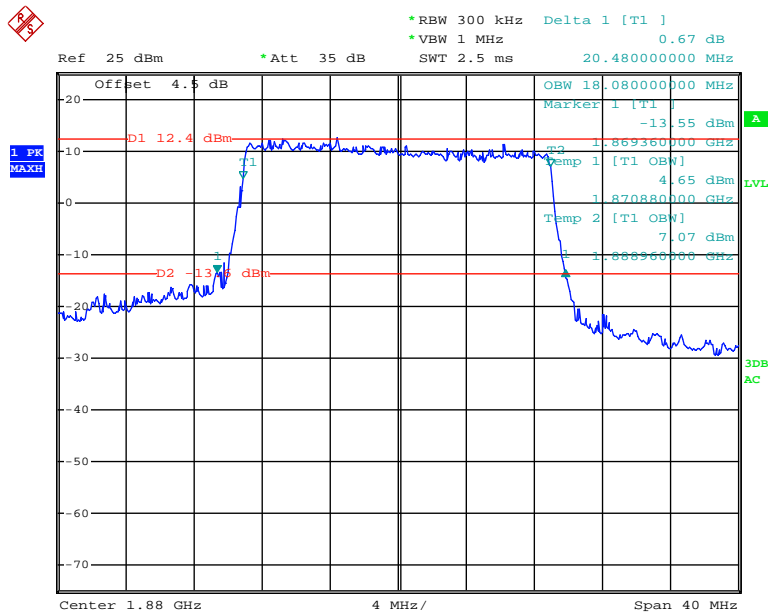
Date: 27.DEC.2018 10:14:05

LTE Band 4

QPSK_1.4 MHz
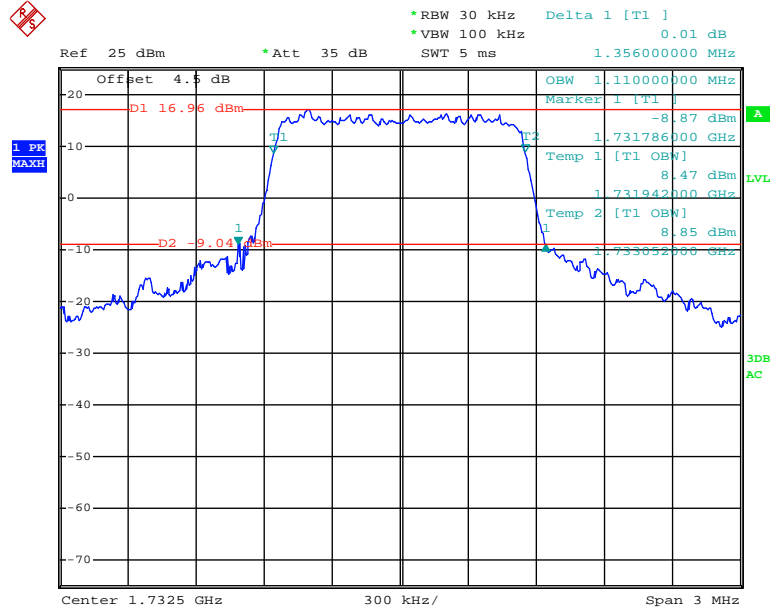
Date: 27.DEC.2018 10:14:42

QPSK_3 MHz
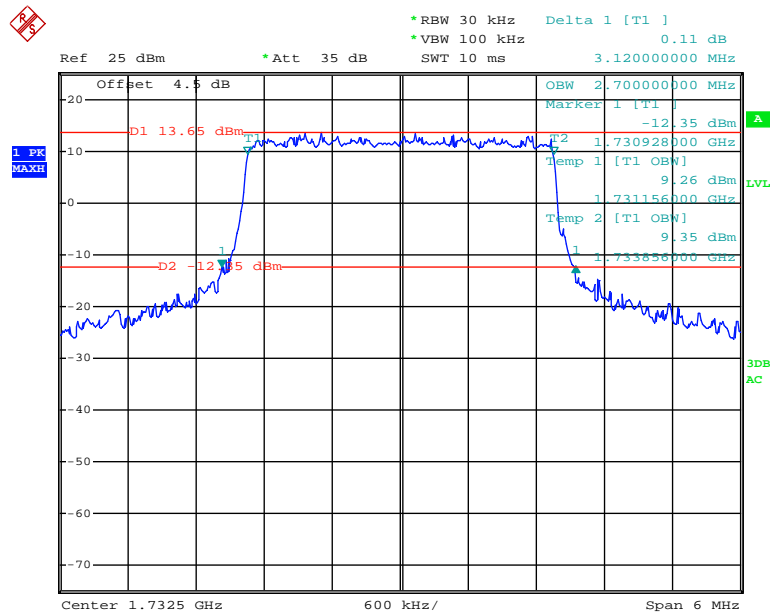
Date: 27.DEC.2018 10:17:05

QPSK_5 MHz
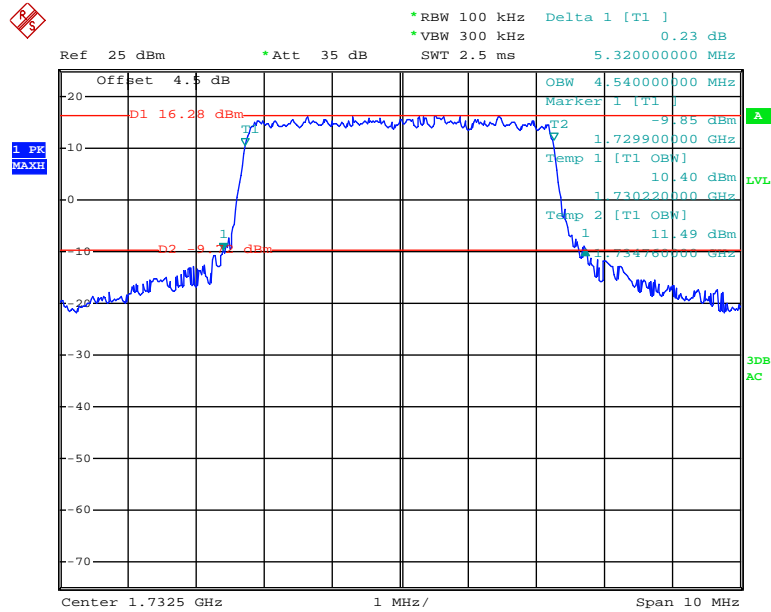
Date: 27.DEC.2018 10:22:52

QPSK_10 MHz
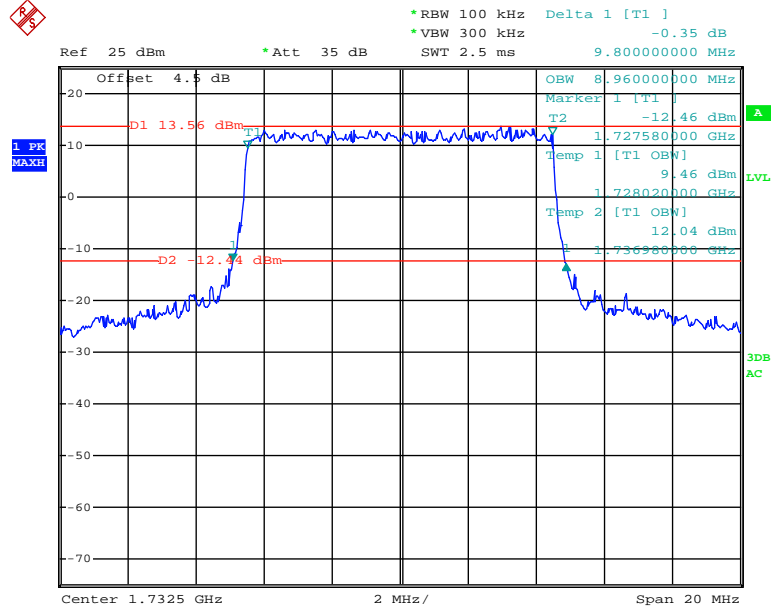
Date: 27.DEC.2018 10:24:53

QPSK_15 MHz
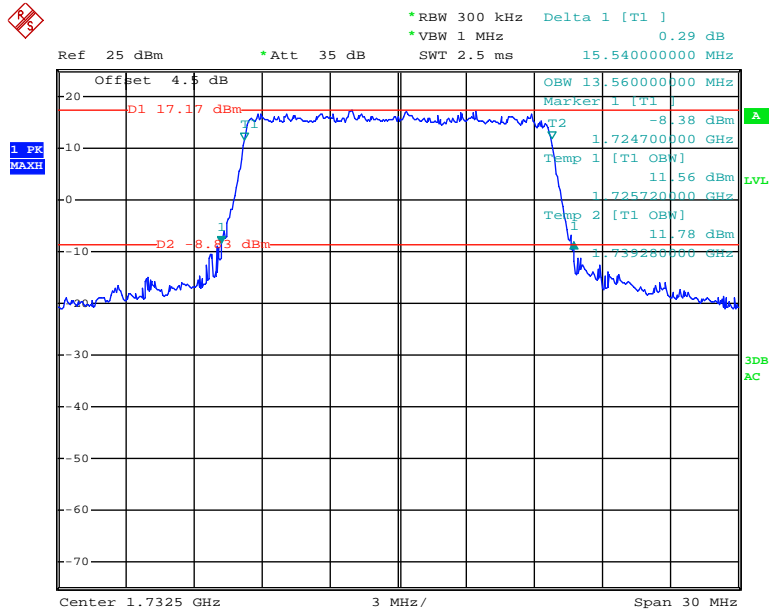
Date: 27.DEC.2018 10:27:03

QPSK_20 MHz
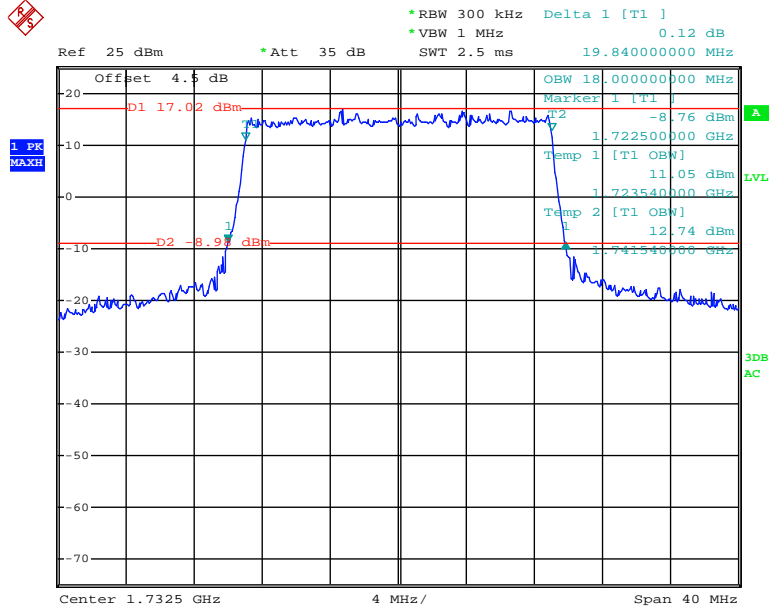
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16QAM_1.4 MHz
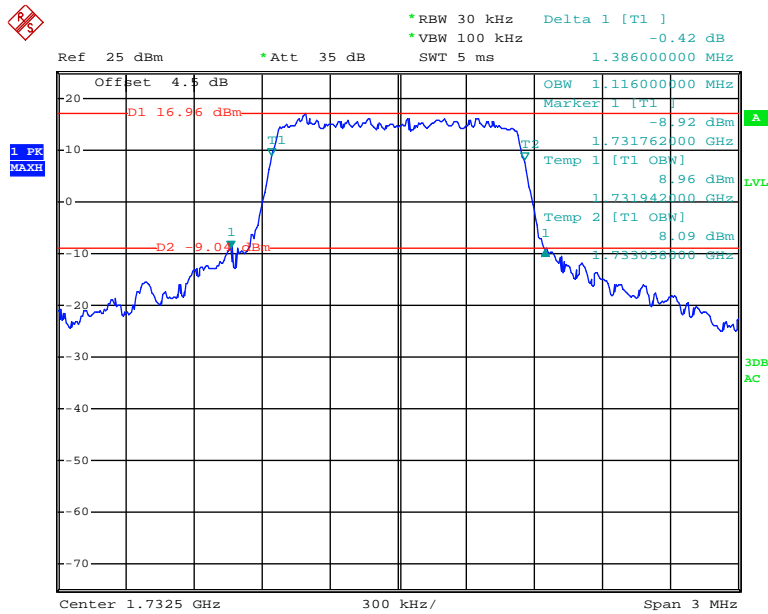
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16QAM_3 MHz
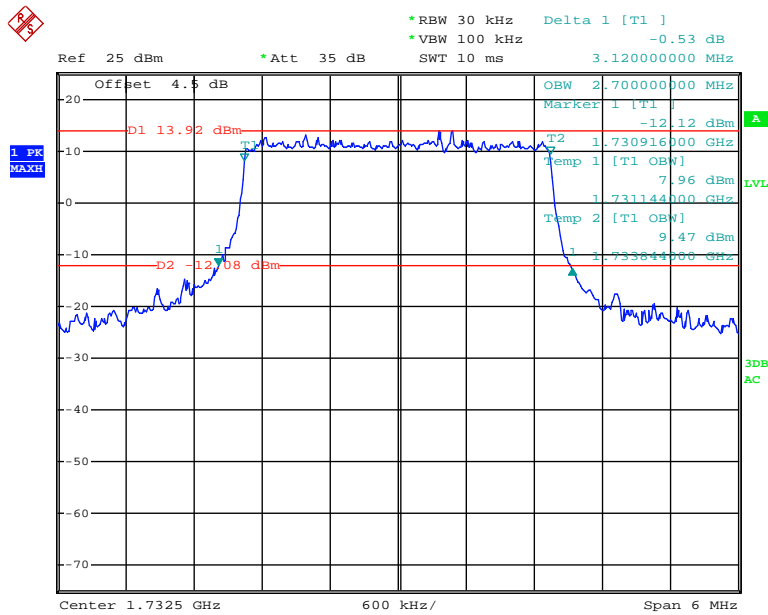
Date: 27.DEC.2018 10:17:39

16QAM_5 MHz
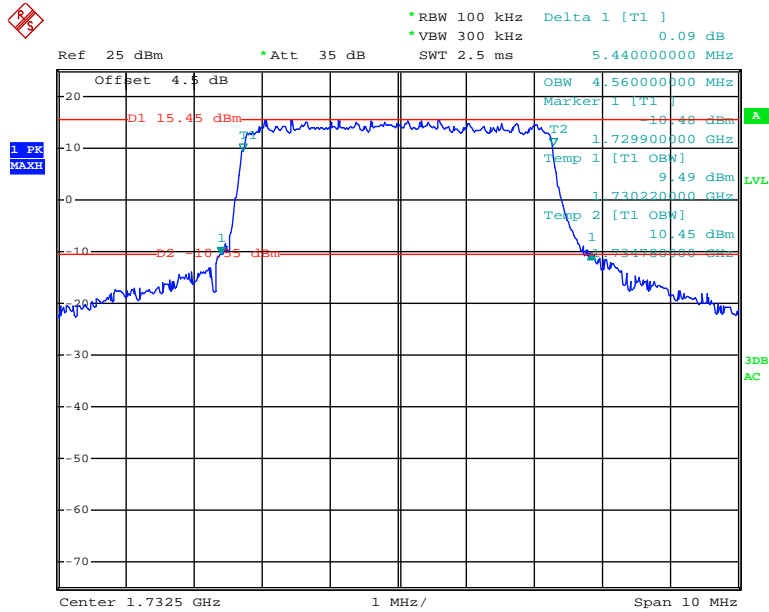
Date: 27.DEC.2018 10:23:37

16QAM_10 MHz
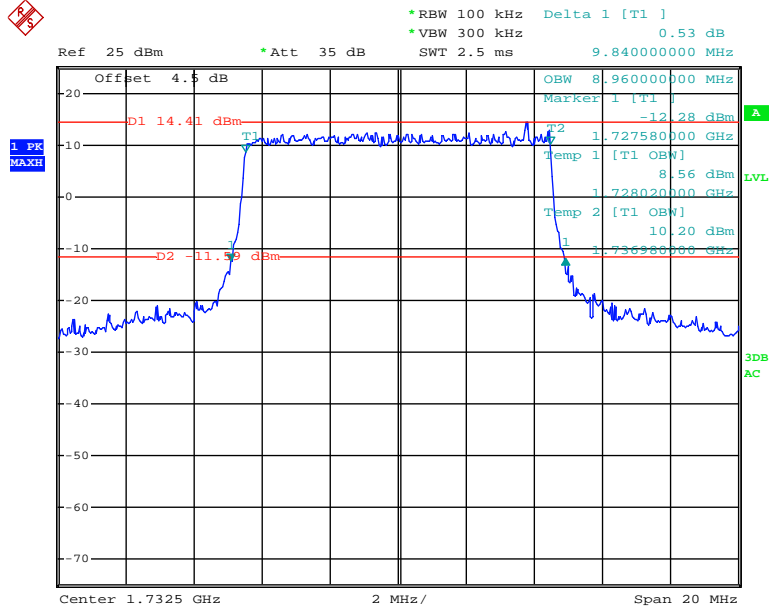
Date: 27.DEC.2018 10:25:32

16QAM_15 MHz
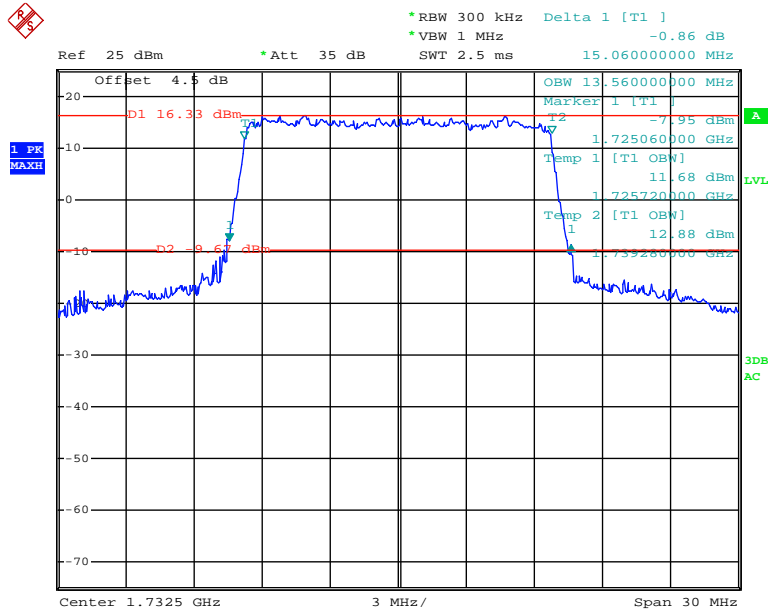
Date: 27.DEC.2018 10:27:38

16QAM_20 MHz
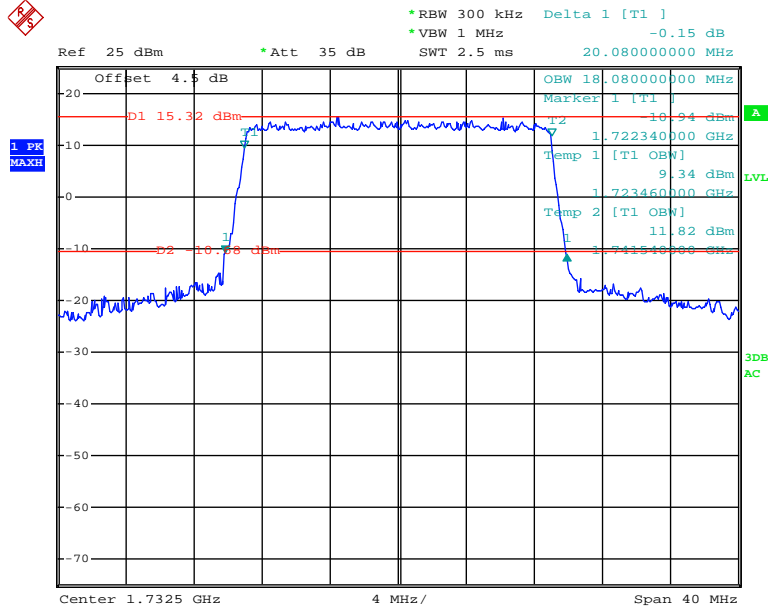
Date: 27.DEC.2018 10:31:45

LTE Band 5:

QPSK_1.4 MHz
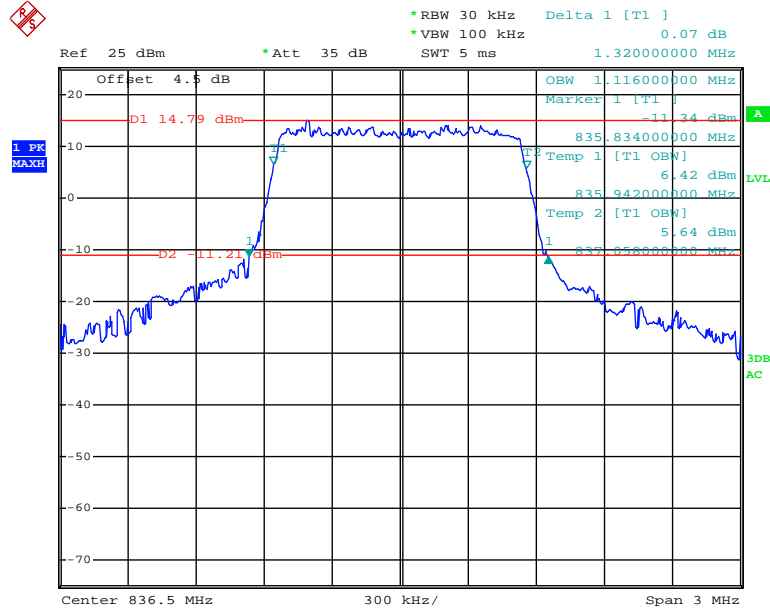
Date: 27.DEC.2018 10:32:12

QPSK_3 MHz
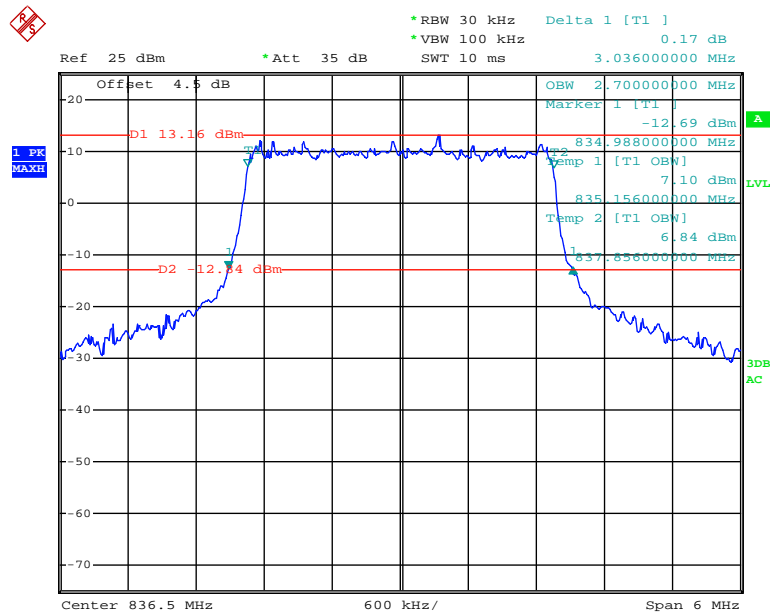
Date: 27.DEC.2018 10:33:53

QPSK_5 MHz
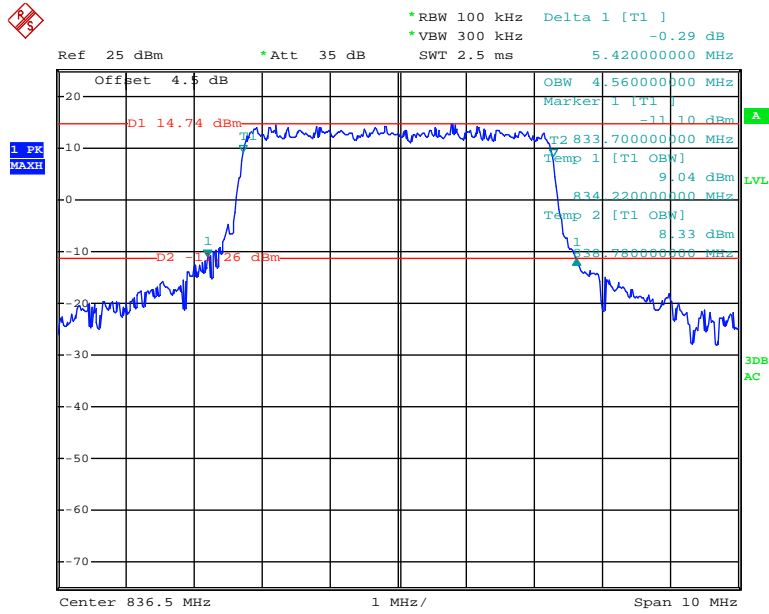
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QPSK_10 MHz
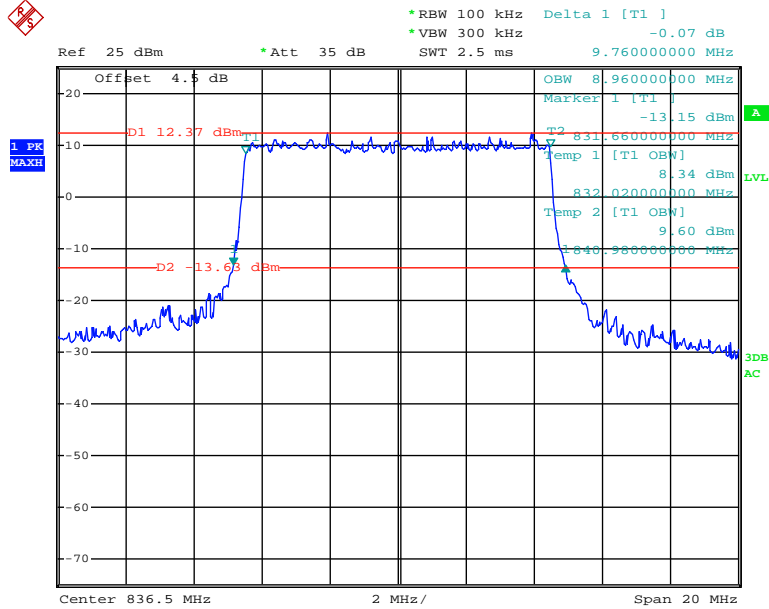
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16QAM_1.4 MHz
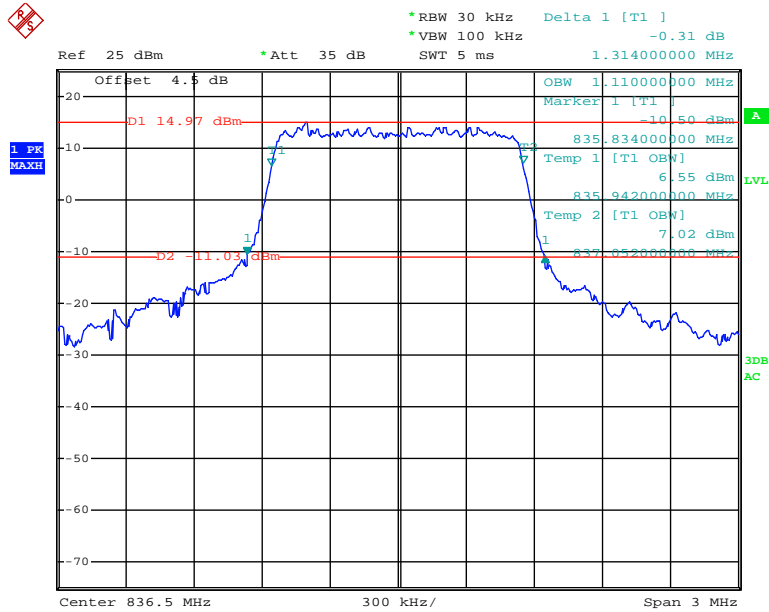
Date: 27.DEC.2018 10:32:44

16QAM_3 MHz
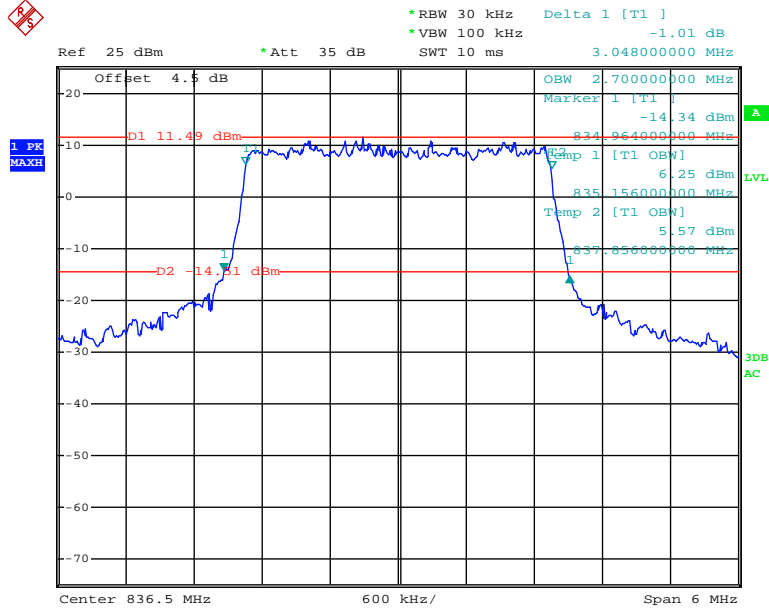
Date: 27.DEC.2018 10:34:22

16QAM_5 MHz
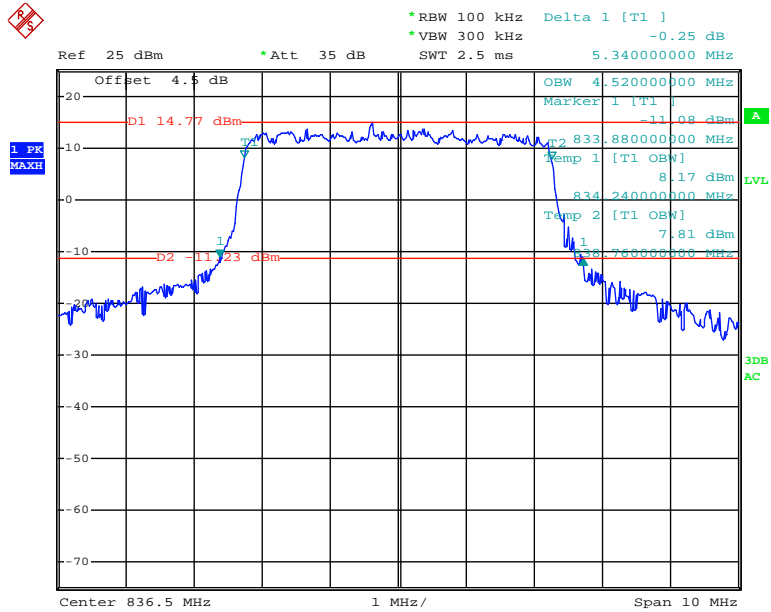
Date: 27.DEC.2018 10:36:23

16QAM_10 MHz
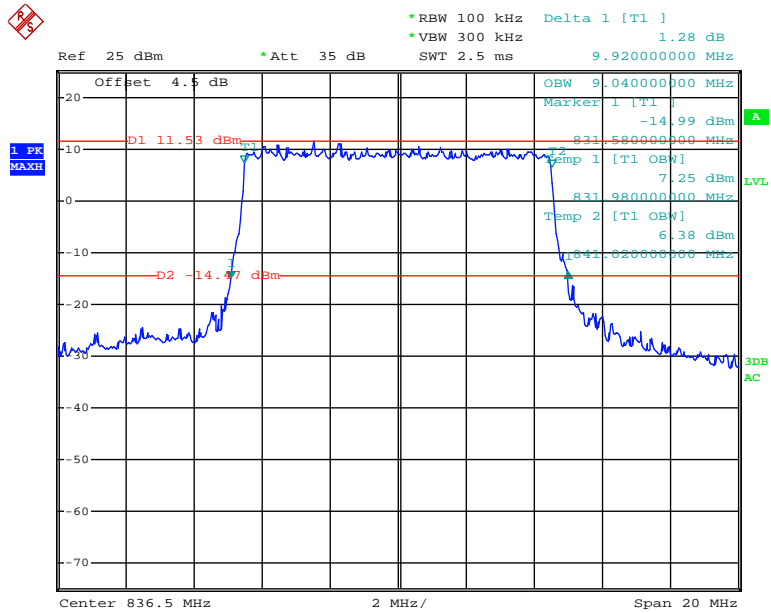
Date: 27.DEC.2018 10:38:45

LTE Band 7:

QPSK_5 MHz
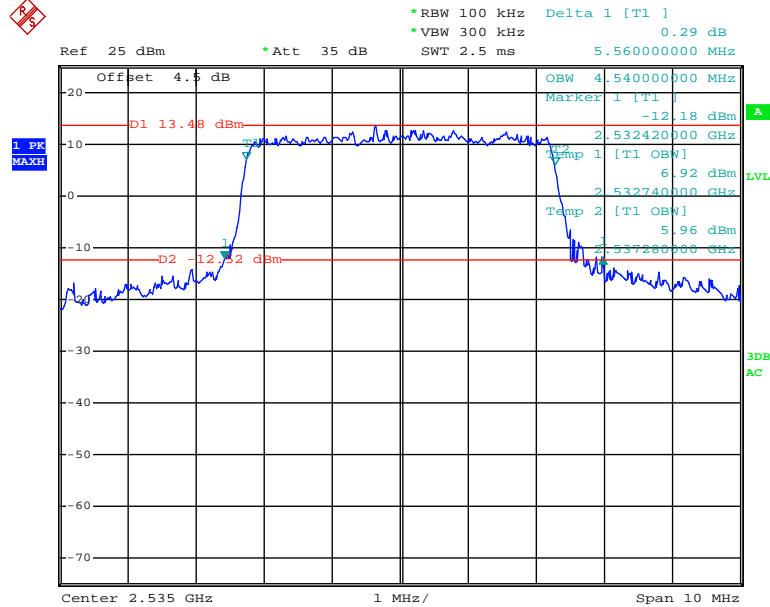
Date: 27.DEC.2018 10:39:28

QPSK_10 MHz
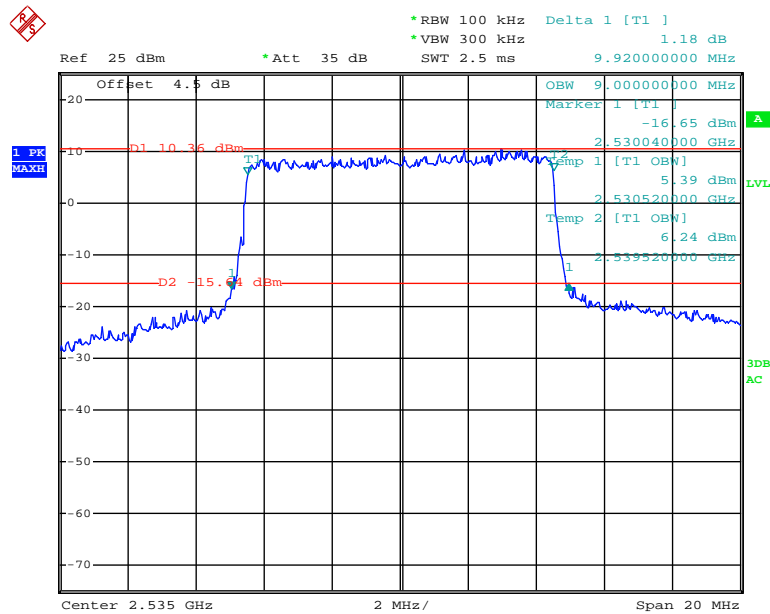
Date: 27.DEC.2018 10:41:11

QPSK_15 MHz
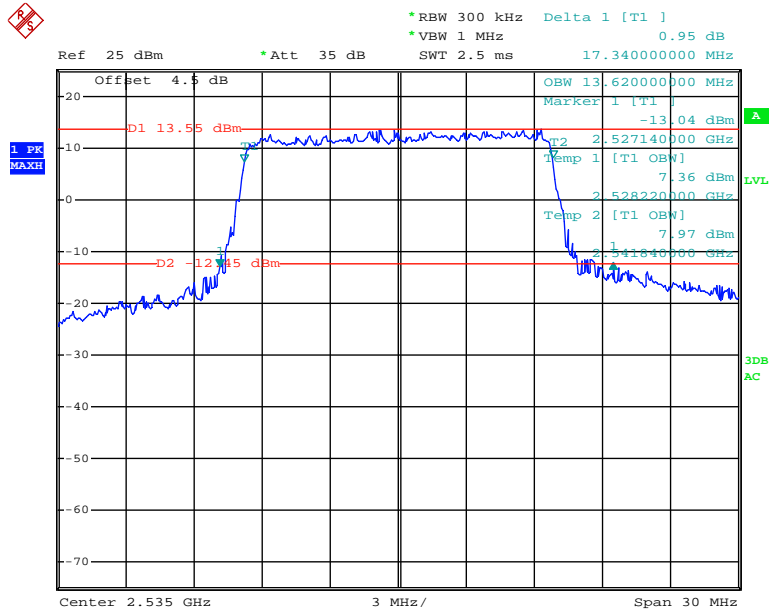
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QPSK_20 MHz
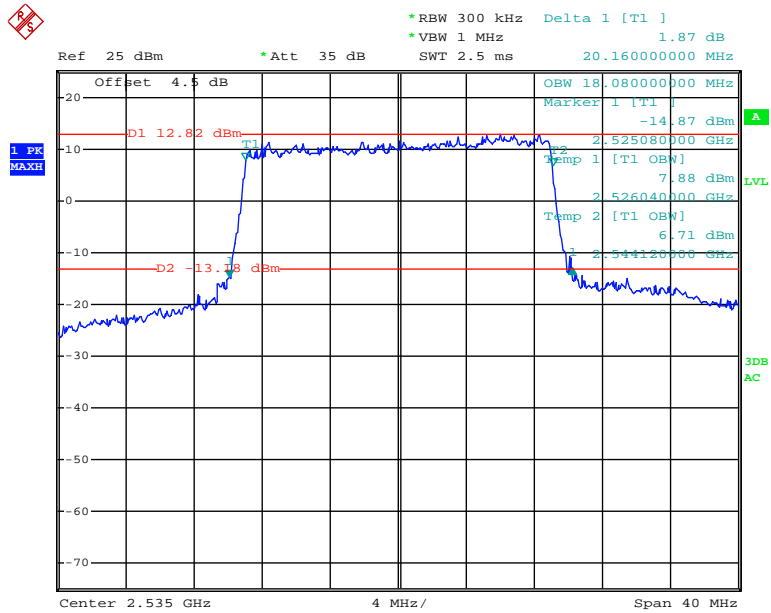
Date: 27.DEC.2018 10:47:47

16QAM_5 MHz
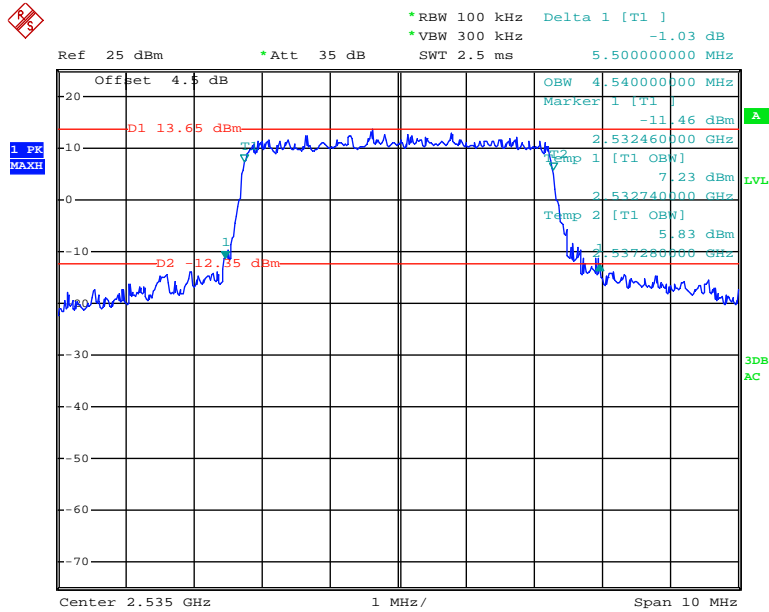
Date: 27.DEC.2018 10:40:00

16QAM_10 MHz
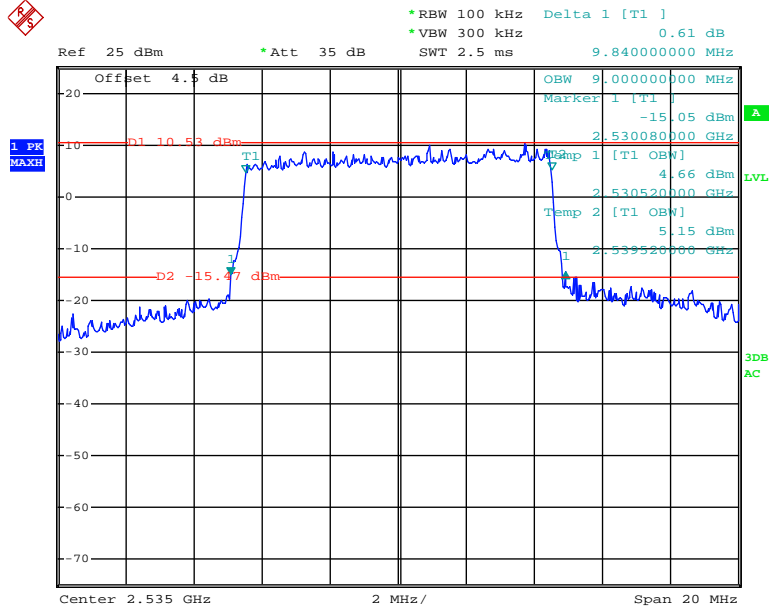
Date: 27.DEC.2018 10:42:19

16QAM_15 MHz
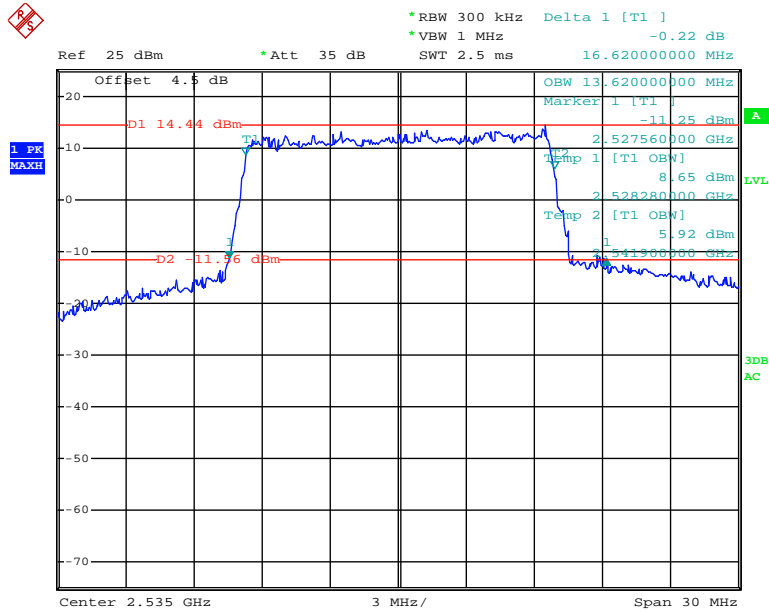
Date: 27.DEC.2018 10:46:32

16QAM_20 MHz
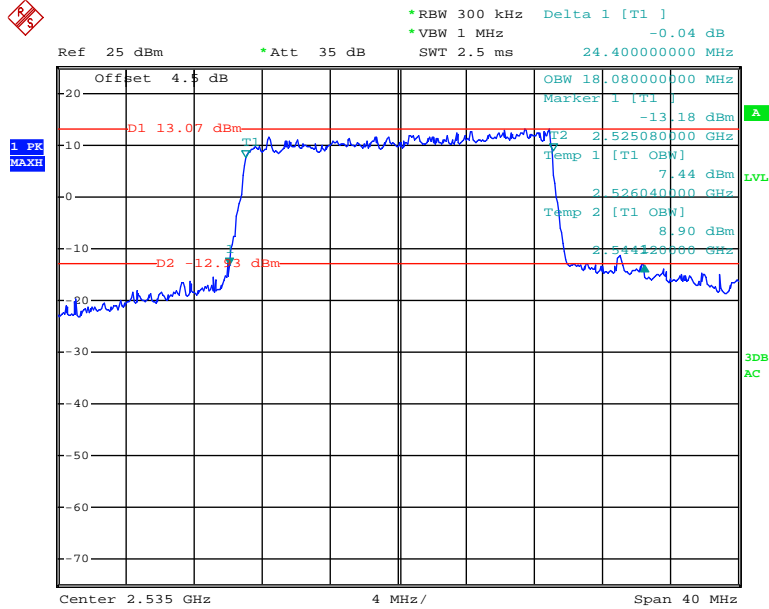
Date: 27.DEC.2018 10:53:49

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.

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	101121	2018-03-23	2019-03-23
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way 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:	24.4~24.9°C
Relative Humidity:	36~38 %
ATM Pressure:	100.2~100.9 kPa

The testing was performed by Carrie He from 2018-12-28 to 2018-12-29.

Please refer to the following plots.

GSM850_Middle Channel
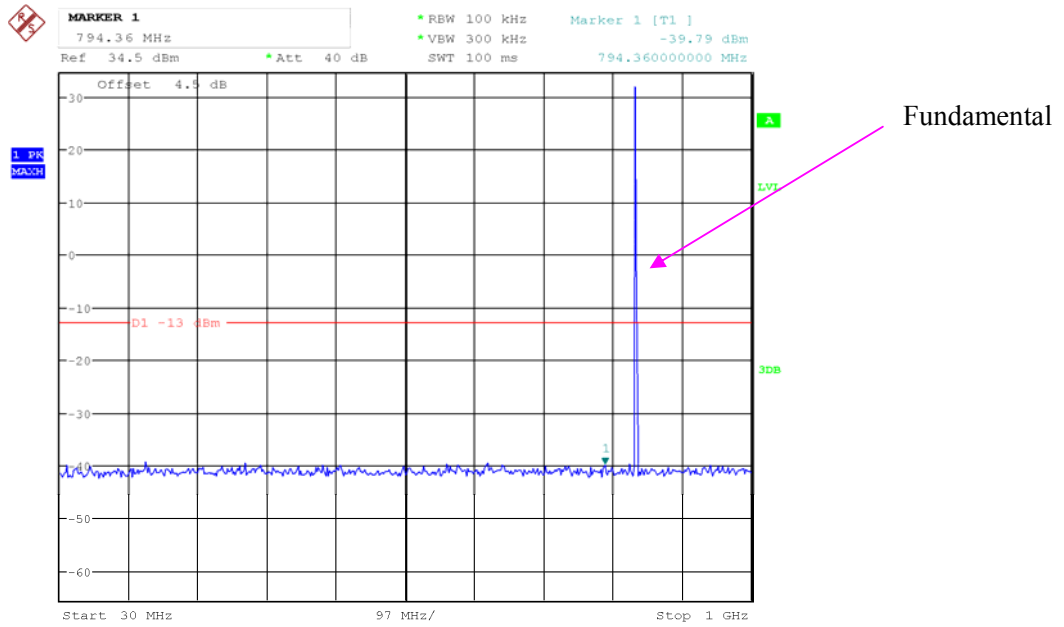
Date: 28.DEC.2018 11:26:31
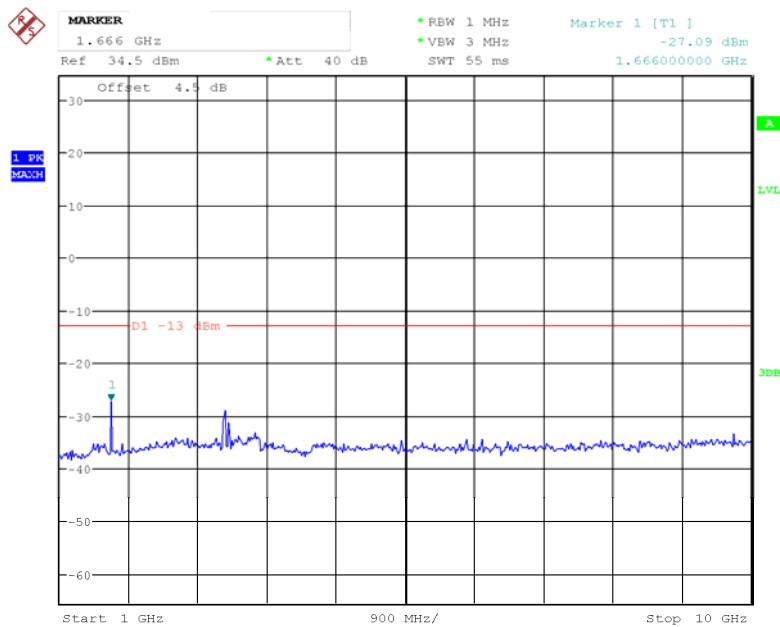
Date: 28.DEC.2018 11:27:13

PCS 1900_ Middle Channel
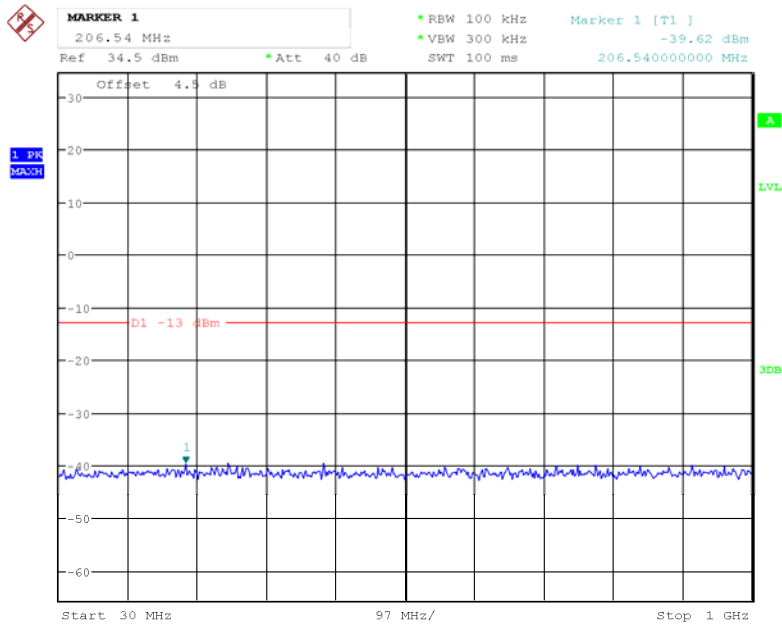
Date: 28.DEC.2018 11:29:23

Fundamental
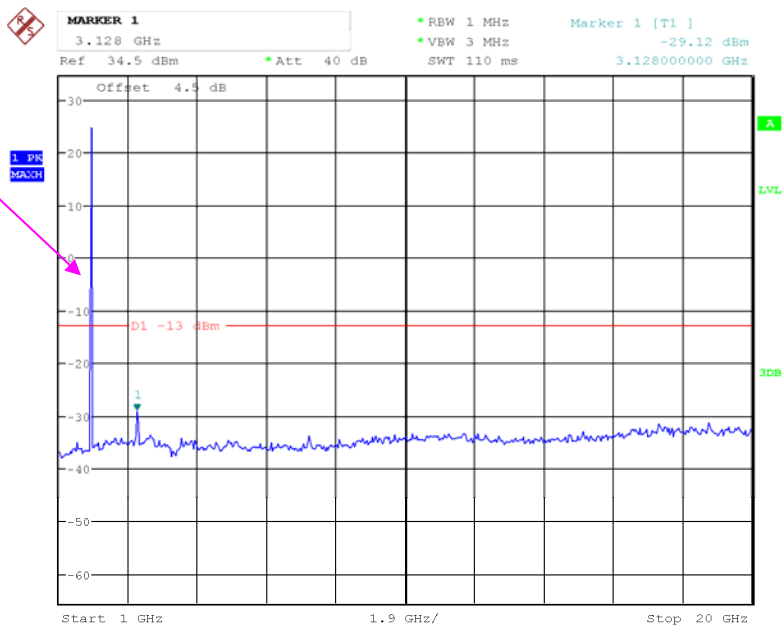
Date: 28.DEC.2018 11:28:42

WCDMA Band II,Rel99

```
         R&S                    Marker 1 [T1]              RBW    100 kHz    RF Att    40 dB
              Ref Lvl                    -40.89 dBm        VBW    300 kHz
              30 dBm            994.16833667 MHz           SWT    245 ms     Unit       dBm
     30
          4.5 dB Offset                            ▼1 [T1]          -40.89 dBm      A
     20                                                        994.16833667 MHz
     10

      0
     1MAX                                                                         1MA
    -10
     D1 -13 dBm
    -20

    -30

    -40                                                                           1
    -50

    -60

    -70
      Start 30 MHz                        97 MHz/                    Stop 1 GHz
     Date:       29.DEC.2018  10:12:35
```

```
         R&S                    Marker 1 [T1]              RBW    1 MHz      RF Att    40 dB
              Ref Lvl                    -28.90 dBm        VBW    3 MHz
              30 dBm            17.79158317 GHz            SWT    110 ms     Unit       dBm
     30
          4.5 dB Offset                            ▼1 [T1]          -28.90 dBm      A
     20                                                        17.79158317 GHz
     10

      0
     1MAX                                                                         1MA
    -10
     D1 -13 dBm
    -20

    -30                                                                    1
    -40

    -50

    -60

    -70
      Start 1 GHz                         1.9 GHz/                   Stop 20 GHz
     Date:       29.DEC.2018  10:14:05
```

Fundamental

WCDMA Band V,Rel99

```
              Marker 1 [T1]           RBW    100 kHz   RF Att    40 dB
 Ref Lvl                  -41.82 dBm  VBW    300 kHz
  30 dBm          998.05611222 MHz    SWT    245 ms    Unit        dBm
```

```
 30
      4.5 dB Offset                              ▼1 [T1]      -41.82 dBm    A
                                                      998.05611222 MHz
 20

 10                                                                      Fundamental

  0

     1MAX                                                       1MA
-10
   D1 -13 dBm
-20

-30

-40

-50

-60

-70
 Start 30 MHz                    97 MHz/                      Stop 1 GHz
```

Date: 29.DEC.2018   10:16:35

```
              Marker 1 [T1]           RBW    1 MHz     RF Att    40 dB
 Ref Lvl                  -29.55 dBm  VBW    3 MHz
  30 dBm           6.95190381 GHz     SWT    52 ms     Unit        dBm
```

```
 30
      4.5 dB Offset                              ▼1 [T1]      -29.55 dBm    A
                                                       6.95190381 GHz
 20

 10

  0

     1MAX                                                       1MA
-10
   D1 -13 dBm
-20

-30                                              1

-40

-50

-60

-70
 Start 1 GHz                     900 MHz/                     Stop 10 GHz
```

Date: 29.DEC.2018   10:15:33

LTE Band 2 (Middle Channel)

QPSK_1.4 MHz

		Marker 1 [T1]		RBW	100 kHz	RF Att	30 dB
Ref Lvl		-51.99 dBm		VBW	300 kHz		
20 dBm		961.12224449 MHz		SWT	245 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -51.99 dBm
961.12224449 MHz

A

D1 -13 dBm

1MA

Start 30 MHz   97 MHz/   Stop 1 GHz

Date: 29.DEC.2018 08:53:15

		Marker 1 [T1]		RBW	1 MHz	RF Att	40 dB
Ref Lvl		-29.27 dBm		VBW	3 MHz		
30 dBm		18.26492986 GHz		SWT	105 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -29.27 dBm
18.26492986 GHz

A

Fundamental

1MAX

D1 -13 dBm

1MA

Start 1 GHz   1.78 GHz/   Stop 18.8 GHz

Date: 29.DEC.2018 08:53:29

QPSK_3 MHz

```
                          Marker 1 [T1]              RBW    100 kHz    RF Att    30 dB
          Ref Lvl                  -52.24 dBm        VBW    300 kHz
           20 dBm           984.44889780 MHz         SWT    245 ms     Unit      dBm
```

```
  20
          4.5 dB Offset                                  ▼1 [T1]        -52.24 dBm    A
  10                                                              984.44889780 MHz
   0
 -10
          1  D1 -13 dBm                                                          1MA
 -20
 -30
 -40
 -50                                                                          1
                                                                              ▼
 -60
 -70
 -80
      Start 30 MHz                      97 MHz/                    Stop 1 GHz
```

```
      Date:      29.DEC.2018  08:55:40
```

```
                          Marker 1 [T1]              RBW    1 MHz      RF Att    40 dB
          Ref Lvl                  -30.68 dBm        VBW    3 MHz
           30 dBm            18.69298597 GHz          SWT    105 ms     Unit      dBm
```

Fundamental →

```
  30
          4.5 dB Offset                                  ▼1 [T1]        -30.68 dBm    A
  20                                                               18.69298597 GHz
  10
   0
          1MAX
 -10
          D1 -13 dBm                                                             1MA
 -20
 -30                                                                          1
 -40
 -50
 -60
 -70
      Start 1 GHz                      1.78 GHz/                   Stop 18.8 GHz
```

```
      Date:      29.DEC.2018  08:55:50
```

QPSK_5 MHz

```
       Marker 1 [T1]              RBW    100 kHz   RF Att    30 dB
  Ref Lvl             -52.44 dBm  VBW    300 kHz
   20 dBm          1.00000000 GHz  SWT   245 ms    Unit        dBm
```

```
 20
     4.5 dB Offset                      ▼1 [T1]        -52.44 dBm   A
 10                                          1.00000000 GHz
  0
-10
   D1 -13 dBm                                                  1MA
-20
-30
-40
-50
-60
-70
-80
  Start 30 MHz              97 MHz/              Stop 1 GHz
```

Date: 29.DEC.2018   08:56:07

```
       Marker 1 [T1]              RBW    1 MHz     RF Att    40 dB
  Ref Lvl             -29.75 dBm  VBW    3 MHz
   30 dBm          18.30060120 GHz  SWT  105 ms    Unit        dBm
```

```
 30
     4.5 dB Offset                      ▼1 [T1]        -29.75 dBm   A
 20                                          18.30060120 GHz
 10
  0
   1MAX                                                       1MA
-10
   D1 -13 dBm
-20
                                                          1
-30
-40
-50
-60
-70
  Start 1 GHz              1.78 GHz/             Stop 18.8 GHz
```

Fundamental

Date: 29.DEC.2018   08:56:17

QPSK_10 MHz

```
            Marker 1 [T1]           RBW    100 kHz    RF Att    30 dB
  Ref Lvl                 -51.96 dBm    VBW    300 kHz
   20 dBm          976.67334669 MHz    SWT    245 ms     Unit      dBm
```

```
  20
      4.5 dB Offset                         ▼1 [T1]        -51.96 dBm    A
  10                                             976.67334669 MHz

   0

 -10
    D1 -13 dBm                                                          1MA

 -20

 -30

 -40

 -50                                                              1
                                                                  ▼
 -60

 -70

 -80
   Start 30 MHz                    97 MHz/                 Stop 1 GHz
```

Date: 29.DEC.2018 08:56:38

```
            Marker 1 [T1]           RBW    1 MHz      RF Att    40 dB
  Ref Lvl                 -30.03 dBm    VBW    3 MHz
   30 dBm          18.26492986 GHz     SWT    105 ms     Unit      dBm
```

```
  30
      4.5 dB Offset                         ▼1 [T1]        -30.03 dBm    A
  20                                              18.26492986 GHz

  10

   0
    1MAX                                                                1MA
 -10

    D1 -13 dBm
 -20

 -30                                                             1
                                                                 ▼
 -40

 -50

 -60

 -70
   Start 1 GHz                     1.78 GHz/               Stop 18.8 GHz
```

Fundamental

Date: 29.DEC.2018 08:56:48

QPSK_15 MHz

```
                          Marker 1 [T1]              RBW    100 kHz    RF Att    30 dB
          Ref Lvl                    -52.31 dBm      VBW    300 kHz
           20 dBm              988.33667335 MHz      SWT    245 ms     Unit       dBm

     20
          4.5 dB Offset                                    ▼1 [T1]          -52.31 dBm    A
     10                                                             988.33667335 MHz

      0

    -10
         1 D1 -13 dBm                                                                1MA
    -20

    -30

    -40

    -50                                                                              1
                                                                                     ▼
    -60

    -70

    -80
         Start 30 MHz                    97 MHz/                     Stop 1 GHz
         Date:       29.DEC.2018  08:57:12
```

```
                          Marker 1 [T1]              RBW    1 MHz      RF Att    40 dB
          Ref Lvl                    -30.36 dBm      VBW    3 MHz
           30 dBm               18.30060120 GHz      SWT    105 ms     Unit       dBm

     30
          4.5 dB Offset                                    ▼1 [T1]          -30.36 dBm    A
     20                                                              18.30060120 GHz

     10
Fundamental
      0
         1MAX                                                                        1MA
    -10
         D1 -13 dBm
    -20

    -30                                                                              1
                                                                                     ▼
    -40

    -50

    -60

    -70
         Start 1 GHz                    1.78 GHz/                    Stop 18.8 GHz
         Date:       29.DEC.2018  08:57:22
```

QPSK_20 MHz

LTE Band 4 (Middle Channel)

QPSK_1.4 MHz

	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-52.48 dBm	VBW	300 kHz		
20 dBm	986.39278557 MHz	SWT	245 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]　　-52.48 dBm
986.39278557 MHz

A

D1 -13 dBm

1MA

Start 30 MHz　　　　　97 MHz/　　　　　Stop 1 GHz

Date:　　29.DEC.2018　08:58:14

	Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	-30.81 dBm	VBW	3 MHz		
30 dBm	17.09599198 GHz	SWT	94 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]　　-30.81 dBm
17.09599198 GHz

A

Fundamental

1MAX

D1 -13 dBm

1MA

Start 1 GHz　　　　　1.6325 GHz/　　　　　Stop 17.325 GHz

Date:　　29.DEC.2018　08:58:24

QPSK_3 MHz

	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-52.48 dBm	VBW	300 kHz		
20 dBm	980.56112224 MHz	SWT	245 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]　　-52.48 dBm
980.56112224 MHz

A

D1 -13 dBm

1MA

Start 30 MHz　　　　97 MHz/　　　　Stop 1 GHz

Date:　　29.DEC.2018　08:58:41

	Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	-30.35 dBm	VBW	3 MHz		
30 dBm	6.95420842 GHz	SWT	94 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]　　-30.35 dBm
6.95420842 GHz

A

Fundamental

1MAX

D1 -13 dBm

1MA

Start 1 GHz　　　　1.6325 GHz/　　　　Stop 17.325 GHz

Date:　　29.DEC.2018　08:58:51

QPSK_5 MHz

Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-52.63 dBm	VBW	300 kHz	
20 dBm	996.11222445 MHz	SWT	245 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -52.63 dBm
996.11222445 MHz

D1 -13 dBm

Start 30 MHz   97 MHz/   Stop 1 GHz

Date: 29.DEC.2018 08:59:08

Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	-29.63 dBm	VBW	3 MHz	
30 dBm	6.95420842 GHz	SWT	94 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -29.63 dBm
6.95420842 GHz

Fundamental

D1 -13 dBm

Start 1 GHz   1.6325 GHz/   Stop 17.325 GHz

Date: 29.DEC.2018 08:59:18

QPSK_10 MHz

```
                    Marker 1 [T1]              RBW    100 kHz   RF Att    30 dB
     Ref Lvl                    -51.87 dBm     VBW    300 kHz
       20 dBm           990.28056112 MHz       SWT    245 ms    Unit       dBm
```
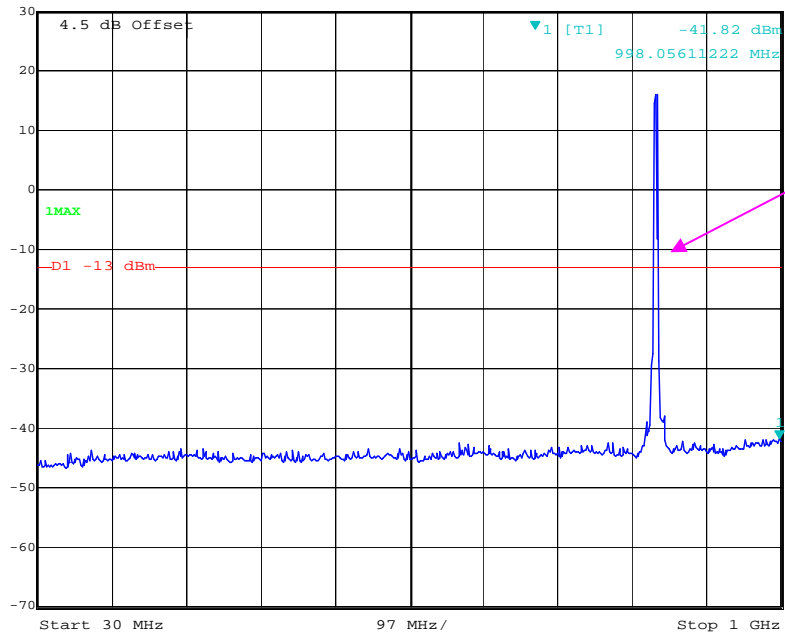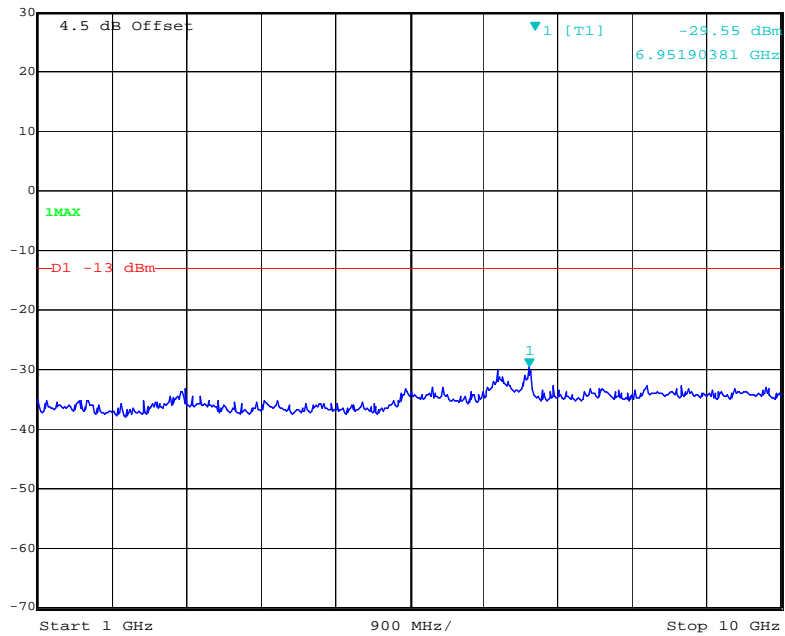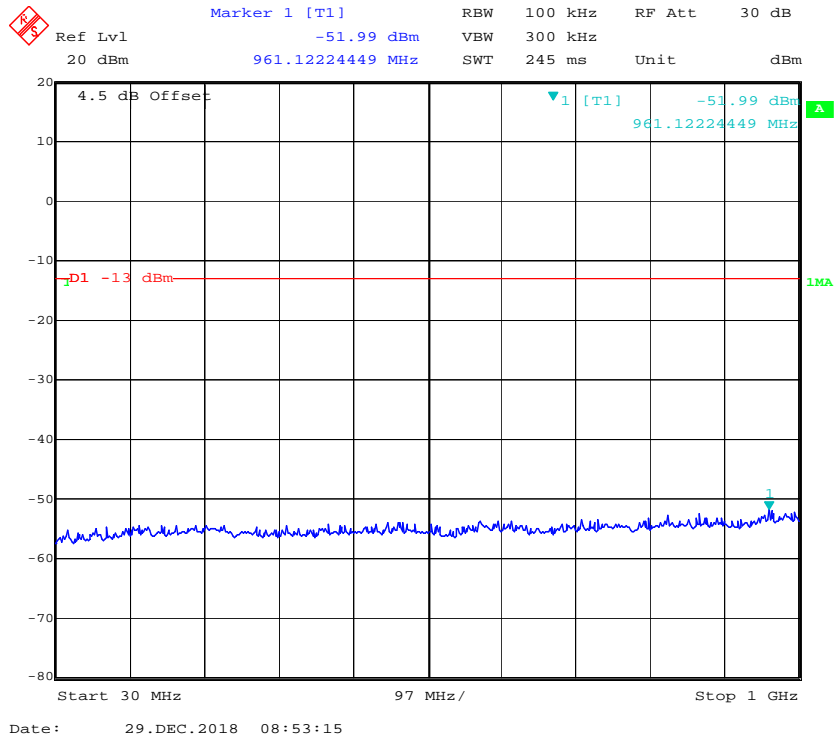


```
     Start 30 MHz                97 MHz/                      Stop 1 GHz
     Date:       29.DEC.2018  08:59:36
```

```
                    Marker 1 [T1]              RBW      1 MHz   RF Att    40 dB
     Ref Lvl                    -30.00 dBm     VBW      3 MHz
       30 dBm           17.09599198 GHz        SWT     94 ms    Unit       dBm
```
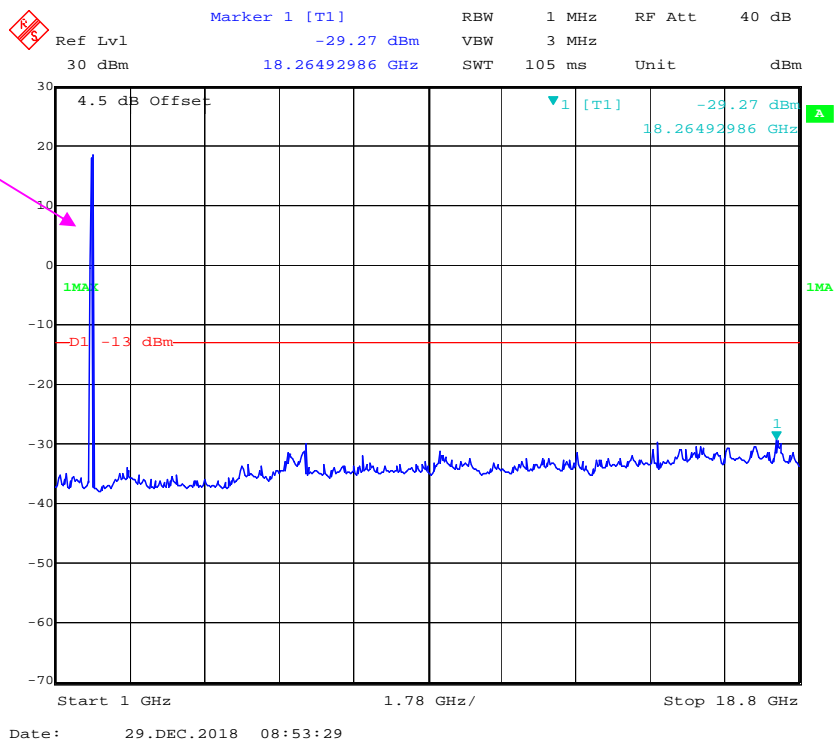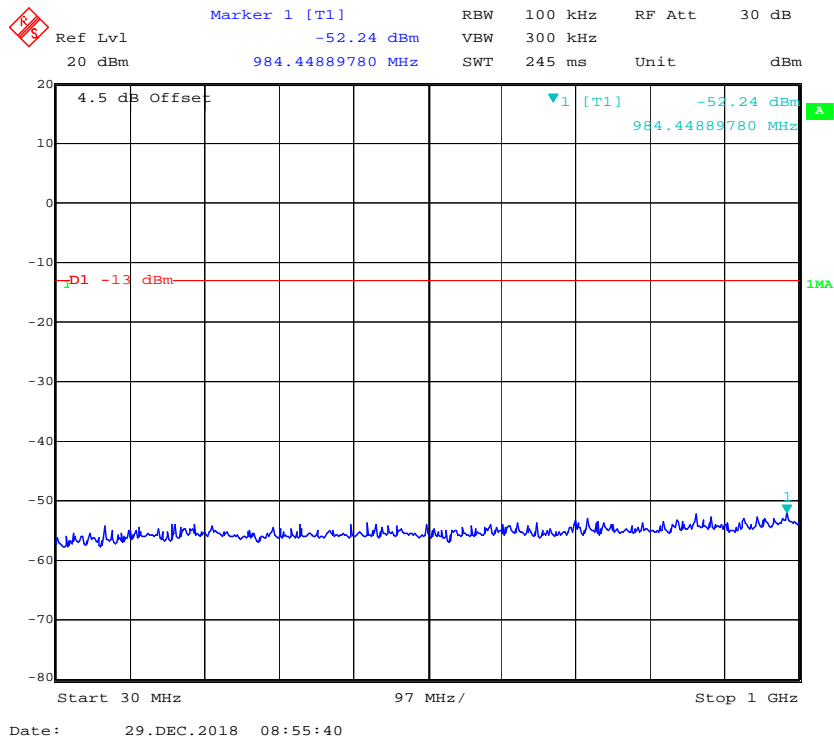
Fundamental


```
     Start 1 GHz                 1.6325 GHz/                  Stop 17.325 GHz
     Date:       29.DEC.2018  08:59:46
```

QPSK_15 MHz

	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-52.30 dBm	VBW	300 kHz		
20 dBm	988.33667335 MHz	SWT	245 ms	Unit	dBm

4.5 dB Offset

▼1 [T1] -52.30 dBm
988.33667335 MHz

A

D1 -13 dBm

1MA

Start 30 MHz　　　　97 MHz/　　　　Stop 1 GHz

Date:　　29.DEC.2018　09:00:07

	Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	-30.76 dBm	VBW	3 MHz		
30 dBm	16.60526052 GHz	SWT	94 ms	Unit	dBm

Fundamental

4.5 dB Offset

▼1 [T1] -30.76 dBm
16.60526052 GHz

A

1MAX

D1 -13 dBm

1MA

Start 1 GHz　　　　1.6325 GHz/　　　　Stop 17.325 GHz

Date:　　29.DEC.2018　09:00:17

QPSK_20 MHz

	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-51.88 dBm	VBW	300 kHz		
20 dBm	996.11222445 MHz	SWT	245 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -51.88 dBm
996.11222445 MHz

A

D1 -13 dBm

1MA

Start 30 MHz   97 MHz/   Stop 1 GHz

Date: 29.DEC.2018 09:00:38

	Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	-30.68 dBm	VBW	3 MHz		
30 dBm	6.98692385 GHz	SWT	94 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -30.68 dBm
6.98692385 GHz

A

Fundamental

1MAX

D1 -13 dBm

1MA

Start 1 GHz   1.6325 GHz/   Stop 17.325 GHz

Date: 29.DEC.2018 09:00:49

LTE Band 5 (Middle Channel)

QPSK_1.4 MHz


```
                        Marker 1 [T1]        RBW    100 kHz   RF Att   40 dB
        Ref Lvl                 -42.64 dBm   VBW    300 kHz
        30 dBm           972.78557114 MHz    SWT    245 ms    Unit        dBm
```

Fundamental

```
Start 30 MHz                    97 MHz/                    Stop 1 GHz
Date:        29.DEC.2018  09:01:05
```



```
                        Marker 1 [T1]        RBW    1 MHz     RF Att   30 dB
        Ref Lvl                 -35.75 dBm   VBW    3 MHz
        20 dBm           1.64941884 GHz      SWT    42 ms     Unit        dBm
```

```
Start 1 GHz                     736.5 MHz/                  Stop 8.365 GHz
Date:        29.DEC.2018  09:01:15
```

QPSK_3 MHz

```
         Marker 1 [T1]              RBW    100 kHz   RF Att   40 dB
Ref Lvl                -41.04 dBm   VBW    300 kHz
  30 dBm         976.67334669 MHz   SWT    245 ms    Unit      dBm
```

Fundamental

```
Start 30 MHz               97 MHz/              Stop 1 GHz
Date:       29.DEC.2018   09:01:32
```

```
         Marker 1 [T1]              RBW    1 MHz     RF Att   30 dB
Ref Lvl                -40.56 dBm   VBW    3 MHz
  20 dBm          6.96284569 GHz    SWT    42 ms     Unit      dBm
```
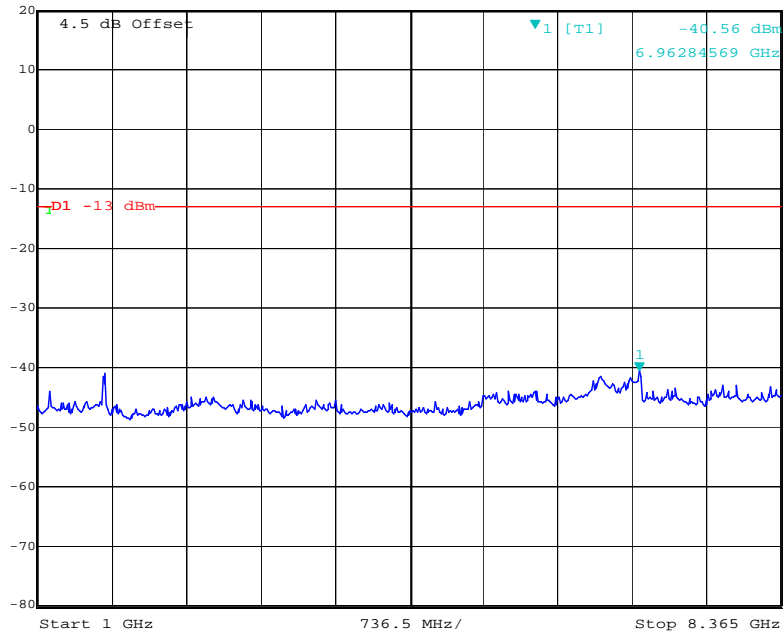
```
Start 1 GHz               736.5 MHz/            Stop 8.365 GHz
Date:       29.DEC.2018   09:01:41
```

QPSK_5 MHz

```
         Marker 1 [T1]              RBW    100 kHz    RF Att    40 dB
Ref Lvl                 -42.07 dBm   VBW    300 kHz
  30 dBm          998.05611222 MHz   SWT    245 ms     Unit       dBm
```

Fundamental

```
 30
     4.5 dB Offset                                  ▼1 [T1]      -42.07 dBm  A
 20                                                           998.05611222 MHz
 10
  0
-10  1MAX                                                                1MA
    D1 -13 dBm
-20
-30
-40
-50
-60
-70
  Start 30 MHz                 97 MHz/                      Stop 1 GHz
```

Date:　　　29.DEC.2018　09:01:58

```
         Marker 1 [T1]              RBW    1 MHz      RF Att    30 dB
Ref Lvl                 -40.75 dBm   VBW    3 MHz
  20 dBm           6.97760521 GHz    SWT    42 ms      Unit       dBm
```

```
 20
     4.5 dB Offset                                  ▼1 [T1]      -40.75 dBm  A
 10                                                           6.97760521 GHz
  0
-10
    D1 -13 dBm                                                          1MA
-20
-30
-40                                                 1
-50
-60
-70
-80
  Start 1 GHz                  736.5 MHz/                   Stop 8.365 GHz
```

Date:　　　29.DEC.2018　09:02:08

QPSK_10 MHz

```
                        Marker 1 [T1]          RBW    100 kHz    RF Att    40 dB
     Ref Lvl                  -42.21 dBm       VBW    300 kHz
      30 dBm            998.05611222 MHz       SWT    245 ms     Unit        dBm
```



```
     Start 30 MHz                    97 MHz/                    Stop 1 GHz
     Date:        29.DEC.2018  09:02:29
```

```
                        Marker 1 [T1]          RBW      1 MHz    RF Att    30 dB
     Ref Lvl                  -40.40 dBm       VBW      3 MHz
      20 dBm              6.87428858 GHz       SWT     42 ms     Unit        dBm
```



```
     Start 1 GHz                    736.5 MHz/                  Stop 8.365 GHz
     Date:        29.DEC.2018  09:02:38
```

LTE Band 7 (Middle Channel)

QPSK_5 MHz

	Marker 1 [T1]	RBW	100 kHz	RF Att	30 dB
Ref Lvl	-50.97 dBm	VBW	300 kHz		
10 dBm	972.78557114 MHz	SWT	245 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -50.97 dBm
972.78557114 MHz

D1 -25 dBm

Start 30 MHz   97 MHz/   Stop 1 GHz

Date: 29.DEC.2018 09:15:09

	Marker 1 [T1]	RBW	1 MHz	RF Att	40 dB
Ref Lvl	-30.68 dBm	VBW	3 MHz		
30 dBm	17.78637275 GHz	SWT	140 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -30.68 dBm
17.78637275 GHz

Fundamental

1MAX

D1 -25 dBm

Start 1 GHz   2.435 GHz/   Stop 25.35 GHz

Date: 29.DEC.2018 09:15:19

QPSK_10 MHz

```
       R&S        Marker 1 [T1]            RBW   100 kHz   RF Att   30 dB
             Ref Lvl             -51.50 dBm  VBW   300 kHz
              10 dBm       976.67334669 MHz  SWT   245 ms    Unit     dBm
```

```
10
        4.5 dB Offset                           ▼1 [T1]      -51.50 dBm   A
 0                                                       976.67334669 MHz

-10

-20
                                                                        1MA
    1MAX
   D1 -25 dBm
-30

-40

-50                                                                   1

-60

-70

-80

-90
    Start 30 MHz              97 MHz/              Stop 1 GHz
```

Date:　　　29.DEC.2018 09:15:41

```
       R&S        Marker 1 [T1]            RBW   1 MHz    RF Att   40 dB
             Ref Lvl             -30.82 dBm  VBW   3 MHz
              30 dBm       17.10320641 GHz   SWT   140 ms    Unit     dBm
```
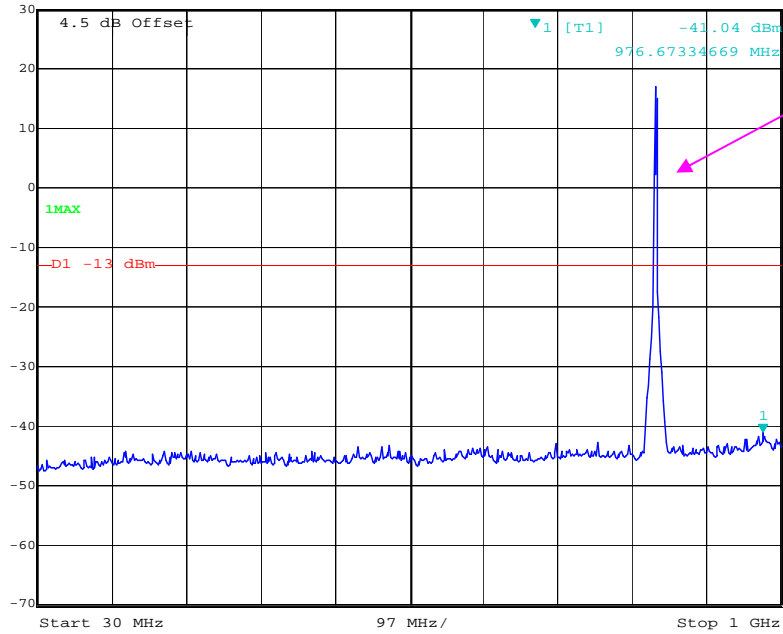
Fundamental

```
30
        4.5 dB Offset                           ▼1 [T1]      -30.82 dBm   A
20                                                      17.10320641 GHz

10

 0
    1MAX                                                                1MA

-10

-20
   D1 -25 dBm
-30                                                      1

-40

-50

-60

-70
    Start 1 GHz              2.435 GHz/              Stop 25.35 GHz
```

Date:　　　29.DEC.2018 09:15:51

QPSK_15 MHz

	Marker 1 [T1]		RBW	100 kHz	RF Att	30 dB
Ref Lvl		-52.19 dBm	VBW	300 kHz		
10 dBm		966.95390782 MHz	SWT	245 ms	Unit	dBm

```
10                                                                    A
   4.5 dB Offset                              ▼1 [T1]    -52.19 dBm
 0                                                  966.95390782 MHz
-10

-20
   1MAX
  D1 -25 dBm                                                      1MA
-30

-40

-50                                                              1
                                                                 ▼
   www~www~www~www~www~www~www~www~www~www~www
-60

-70

-80

-90
   Start 30 MHz              97 MHz/              Stop 1 GHz
```

Date:　　29.DEC.2018　09:16:15

	Marker 1 [T1]		RBW	1 MHz	RF Att	40 dB
Ref Lvl		-29.76 dBm	VBW	3 MHz		
30 dBm		6.90450902 GHz	SWT	140 ms	Unit	dBm

Fundamental

```
30                                                                    A
   4.5 dB Offset                              ▼1 [T1]    -29.76 dBm
20                                                   6.90450902 GHz
10

 0
   1MAX
-10                                                              1MA

-20
  D1 -25 dBm
-30        1
           ▼
   ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-40

-50

-60

-70
   Start 1 GHz              2.435 GHz/           Stop 25.35 GHz
```

Date:　　29.DEC.2018　09:16:25

QPSK_20 MHz

```
         R&S      Marker 1 [T1]              RBW    100 kHz    RF Att    30 dB
                  Ref Lvl            -51.37 dBm     VBW    300 kHz
                  10 dBm      988.33667335 MHz      SWT    245 ms     Unit      dBm
```
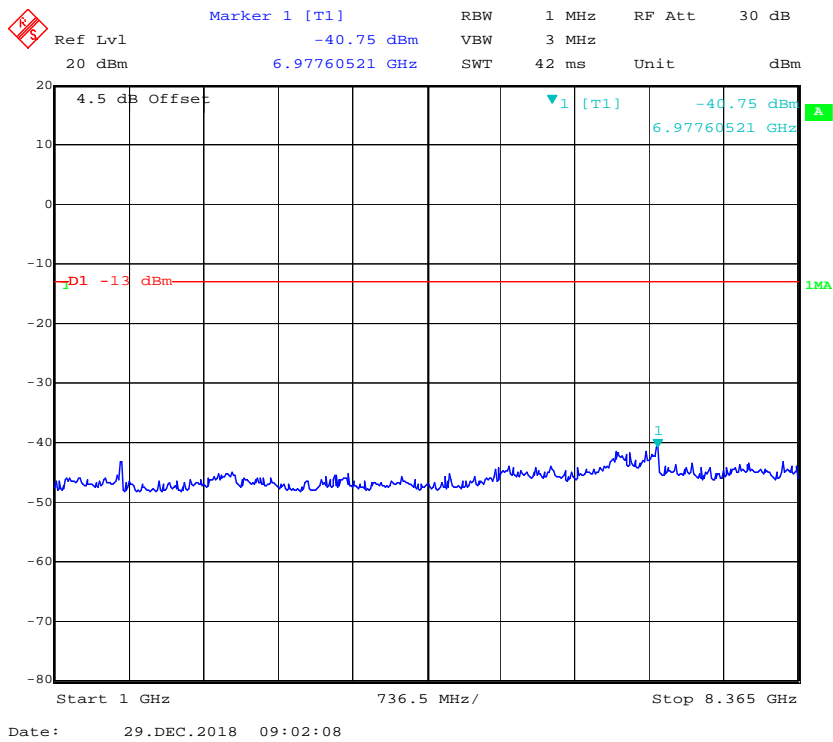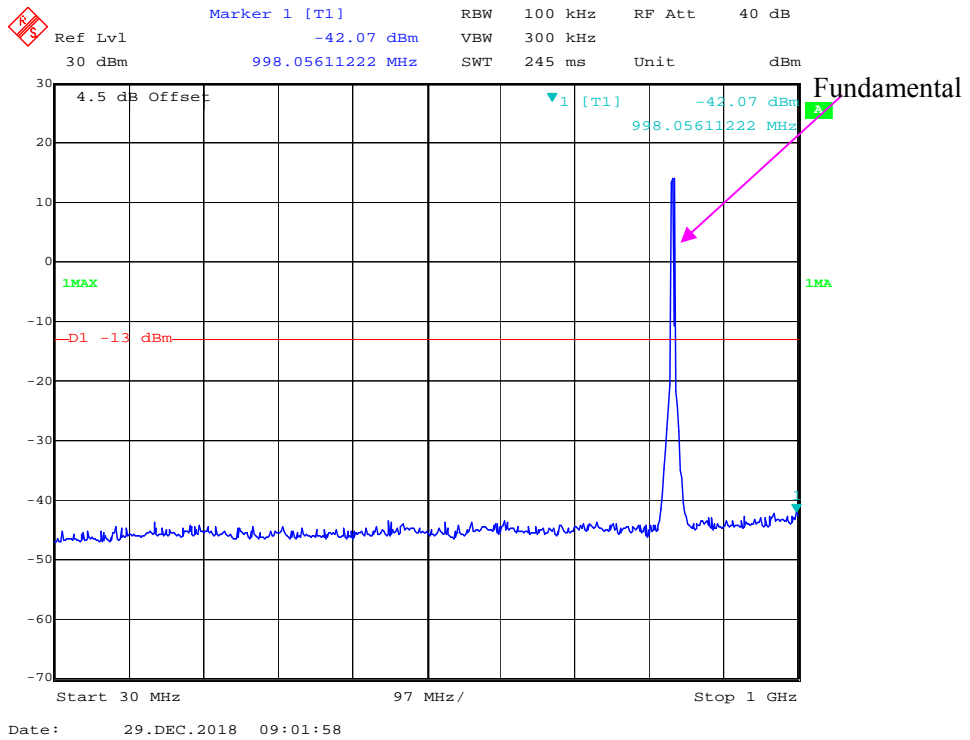
4.5 dB Offset

Marker 1 [T1] -51.37 dBm at 988.33667335 MHz

```
Start 30 MHz                  97 MHz/                    Stop 1 GHz
Date:        29.DEC.2018   09:16:49
```

```
         R&S      Marker 1 [T1]              RBW      1 MHz    RF Att    40 dB
                  Ref Lvl            -29.14 dBm     VBW      3 MHz
                  30 dBm       18.37194389 GHz      SWT    140 ms     Unit      dBm
```
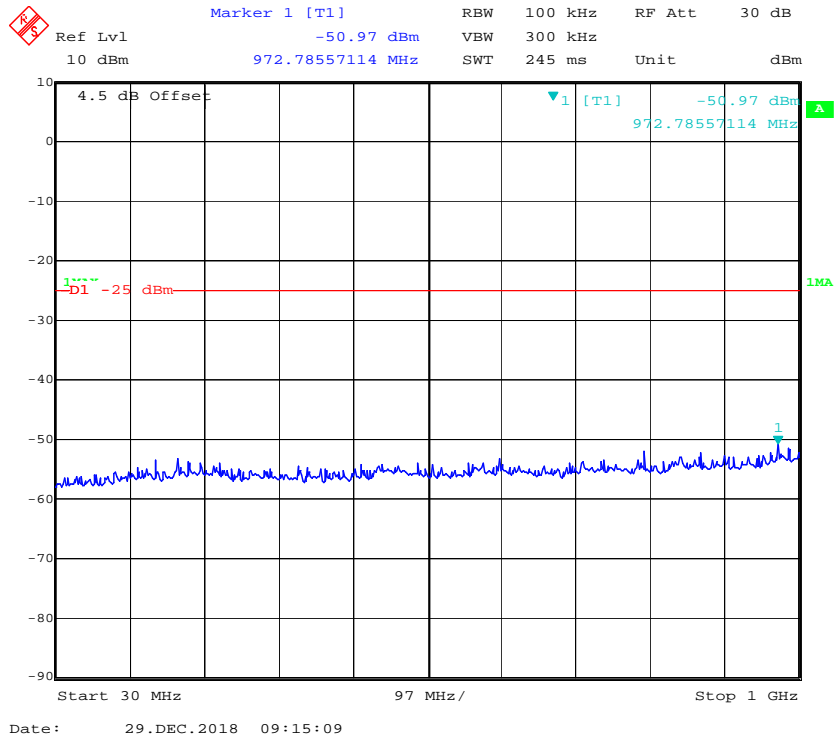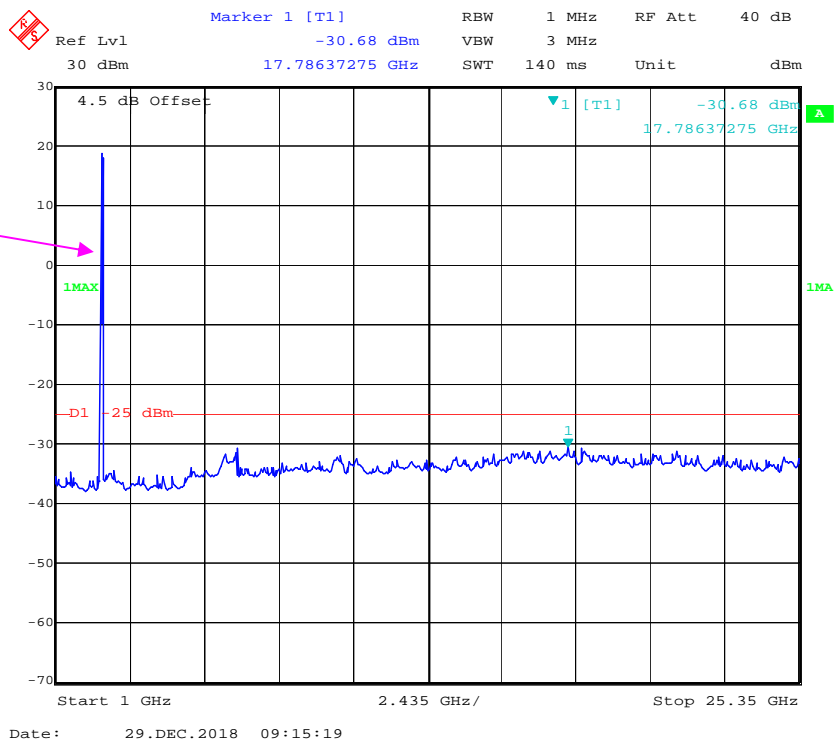
4.5 dB Offset

Marker 1 [T1] -29.14 dBm at 18.37194389 GHz

Fundamental

```
Start 1 GHz                  2.435 GHz/                 Stop 25.35 GHz
Date:        29.DEC.2018   09:17:00
```

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	100035	2018-08-03	2019-08-03
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Sonoma	Amplifier	310N	185914	2018-10-13	2019-10-13
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
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2016-11-18	2019-11-18
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
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF2500-2750MS-1439-001	1437001	2018-06-16	2019-06-16

* 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:	21~25.3°C
Relative Humidity:	37~44 %
ATM Pressure:	100.2~101.3 kPa

* The testing was performed by Vern Shen and Vito Chen on 2018-12-22~2018-12-29.

EUT Operation Mode: Transmitting

Cellular Band (PART 22H)

30 MHz-10 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM850, Frequency:836.600 MHz								
1673.200	H	58.86	-45.52	10.5	1.27	-36.3	-13.0	23.3
1673.200	V	52.58	-51.73	10.5	1.27	-42.5	-13.0	29.5
2509.800	H	55.21	-47.56	12.2	1.25	-36.6	-13.0	23.6
2509.800	V	56.54	-47.62	12.2	1.25	-36.7	-13.0	23.7
3346.400	H	52.70	-48.49	12.3	1.58	-37.8	-13.0	24.8
3346.400	V	49.94	-50.18	12.3	1.58	-39.5	-13.0	26.5
897.180	H	35.84	-59.84	0.0	0.51	-60.4	-13.0	47.4
732.280	V	40.96	-55.91	0.0	0.42	-56.3	-13.0	43.3
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	45.01	-59.37	10.5	1.27	-50.1	-13.0	37.1
1673.200	V	43.91	-60.4	10.5	1.27	-51.2	-13.0	38.2
2509.800	H	43.43	-59.34	12.2	1.25	-48.4	-13.0	35.4
2509.800	V	41.45	-62.71	12.2	1.25	-51.8	-13.0	38.8
3346.400	H	47.18	-54.01	12.3	1.58	-43.3	-13.0	30.3
3346.400	V	46.79	-53.33	12.3	1.58	-42.7	-13.0	29.7
897.180	H	36.96	-58.72	0.0	0.51	-59.2	-13.0	46.2
887.480	V	35.35	-57.28	0.0	0.51	-57.8	-13.0	44.8

PCS Band (PART 24E)

30 MHz-20 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM1900, Frequency:1880.000 MHz								
3760.000	H	63.91	-36.3	12.3	1.53	-25.6	-13.0	12.6
3760.000	V	59.16	-40.75	12.3	1.53	-30.0	-13.0	17.0
5640.000	H	52.78	-42.52	13.0	1.28	-30.8	-13.0	17.8
5640.000	V	54.63	-40.98	13.0	1.28	-29.3	-13.0	16.3
7520.000	H	47.60	-43.92	12.8	1.33	-32.4	-13.0	19.4
7520.000	V	50.81	-41.4	12.8	1.33	-29.9	-13.0	16.9
823.460	H	36.64	-61.2	0.0	0.49	-61.7	-13.0	48.7
732.280	V	40.62	-56.25	0.0	0.42	-56.7	-13.0	43.7
WCDMA Band II R99,Frequency: 1880.000 MHz								
3760.000	H	54.39	-45.82	12.3	1.53	-35.1	-13.0	22.1
3760.000	V	53.11	-46.8	12.3	1.53	-36.1	-13.0	23.1
5640.000	H	40.41	-54.89	13.0	1.28	-43.2	-13.0	30.2
5640.000	V	38.37	-57.24	13.0	1.28	-45.5	-13.0	32.5
823.460	H	37.84	-60	0.0	0.49	-60.5	-13.0	47.5
848.860	V	36.92	-56.98	0.0	0.5	-57.5	-13.0	44.5

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	56.95	-43.26	12.25	1.53	-32.54	-13.00	19.54
3760.00	V	48.52	-51.39	12.25	1.53	-40.67	-13.00	27.67
5640.00	H	40.34	-54.96	13.00	1.28	-43.24	-13.00	30.24
5640.00	V	39.56	-56.05	13.00	1.28	-44.33	-13.00	31.33
693.14	H	39.60	-61.40	0.00	0.38	-61.78	-13.00	48.78
832.82	V	36.84	-57.58	0.00	0.50	-58.08	-13.00	45.08

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	46.07	-54.90	12.21	1.60	-44.29	-13.00	31.29
3465.00	V	44.49	-55.07	12.21	1.60	-44.46	-13.00	31.46
5197.50	H	38.67	-57.41	12.92	1.36	-45.85	-13.00	32.85
5197.50	V	37.84	-58.21	12.92	1.36	-46.65	-13.00	33.65
846.74	H	38.40	-58.76	0.00	0.50	-59.26	-13.00	46.26
802.12	V	37.81	-57.62	0.00	0.49	-58.11	-13.00	45.11

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	44.23	-60.15	10.52	1.27	-50.90	-13.00	37.90
1673.00	V	43.05	-61.26	10.52	1.27	-52.01	-13.00	39.01
2509.50	H	39.74	-63.03	12.20	1.24	-52.07	-13.00	39.07
2509.50	V	39.50	-64.66	12.20	1.24	-53.70	-13.00	40.70
3346.00	H	48.09	-53.10	12.26	1.58	-42.42	-13.00	29.42
3346.00	V	48.00	-52.12	12.26	1.58	-41.44	-13.00	28.44
666.32	H	38.85	-62.57	0.00	0.37	-62.94	-13.00	49.94
802.12	V	35.89	-59.54	0.00	0.49	-60.03	-13.00	47.03

LTE Band 7 (30MHz-26.5GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency: 2535.000 MHz								
5070.00	H	37.77	-58.54	12.97	1.41	-46.98	-25.00	21.98
5070.00	V	39.51	-56.57	12.97	1.41	-45.01	-25.00	20.01
7605.00	H	37.38	-54.00	12.84	1.40	-42.56	-25.00	17.56
7605.00	V	37.09	-54.96	12.84	1.40	-43.52	-25.00	18.52
866.14	H	36.96	-59.63	0.00	0.50	-60.13	-25.00	35.13
908.82	V	35.24	-56.73	0.00	0.51	-57.24	-25.00	32.24

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

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

Applicable Standard

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

Test Procedure

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	101121	2018-03-23	2019-03-23
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way 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:	24.4~25.4°C
Relative Humidity:	36~47 %
ATM Pressure:	100.2~100.9 kPa

The testing was performed by Carrie He from 2018-12-27 to 2018-12-29.

Test Mode: Transmitting

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

GSM 850, Left Band Edge
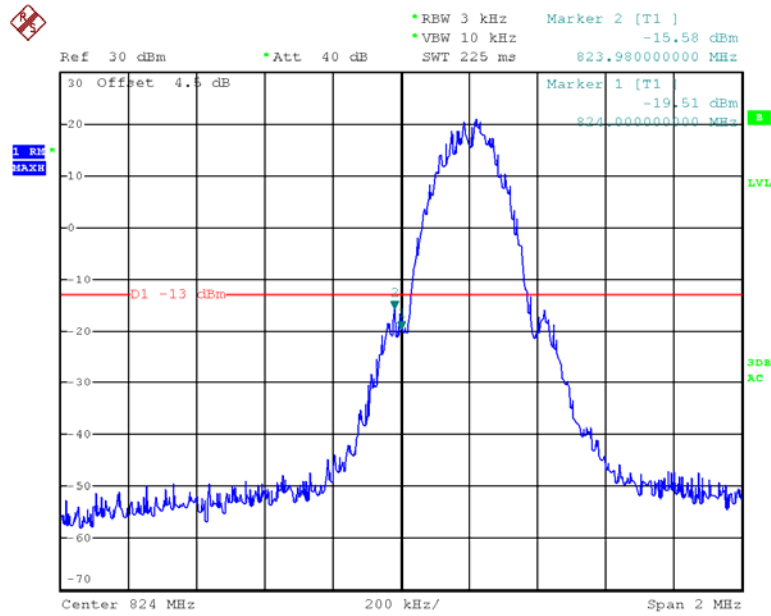
Date: 28.DEC.2018 10:38:30

GSM 850, Right Band Edge
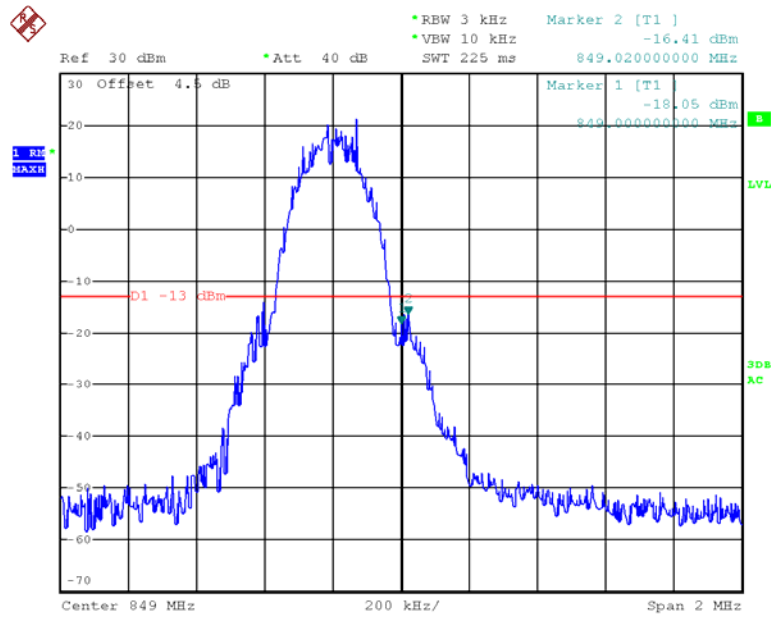
Date: 28.DEC.2018 10:40:23

GSM 1900, Left Band Edge
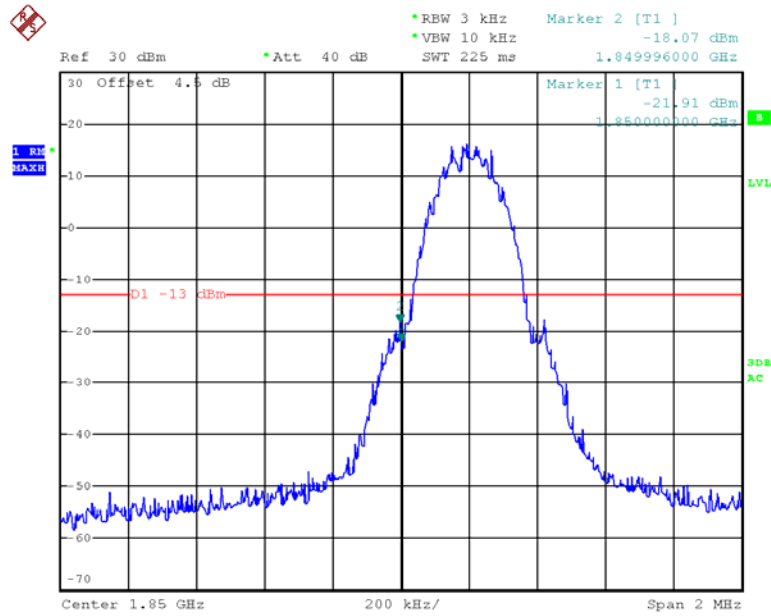
Date: 28.DEC.2018 10:52:30

GSM 1900, Right Band Edge
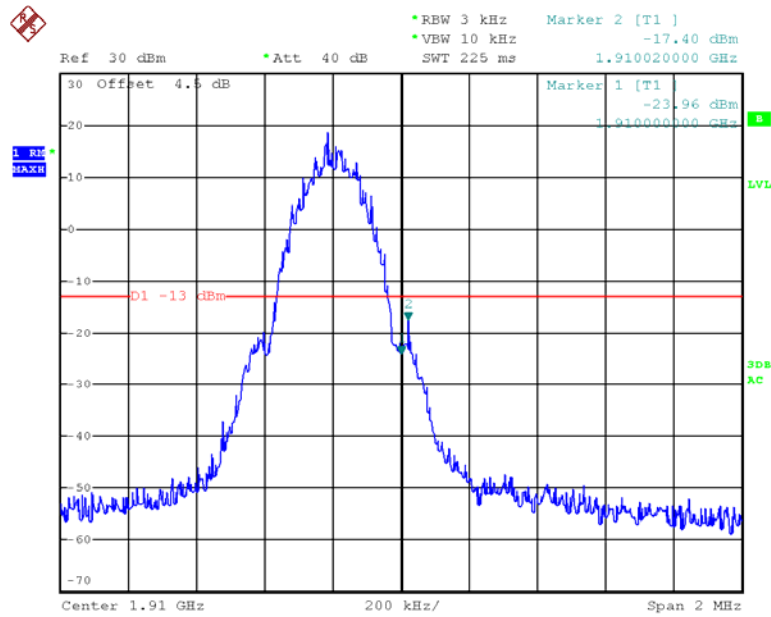
Date: 28.DEC.2018 10:53:27

EDGE 850, Left Band Edge
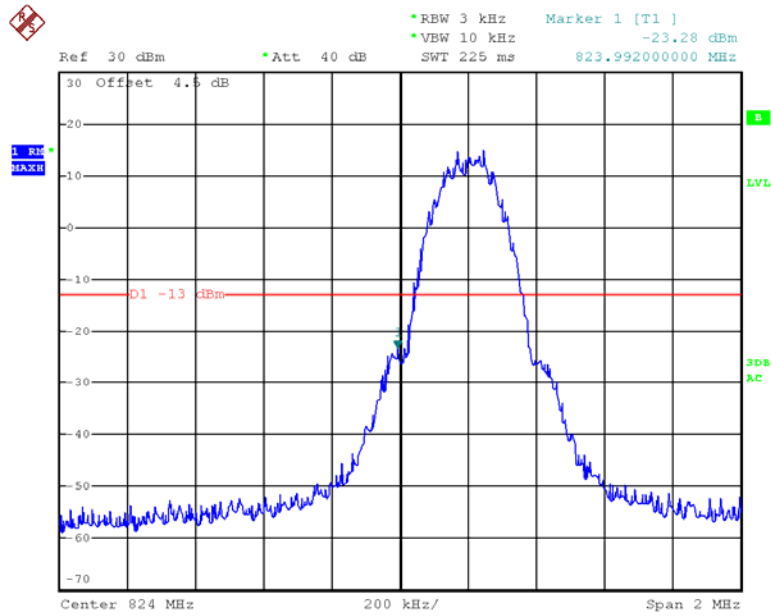
Date: 28.DEC.2018 10:57:51

EDGE 850, Right Band Edge
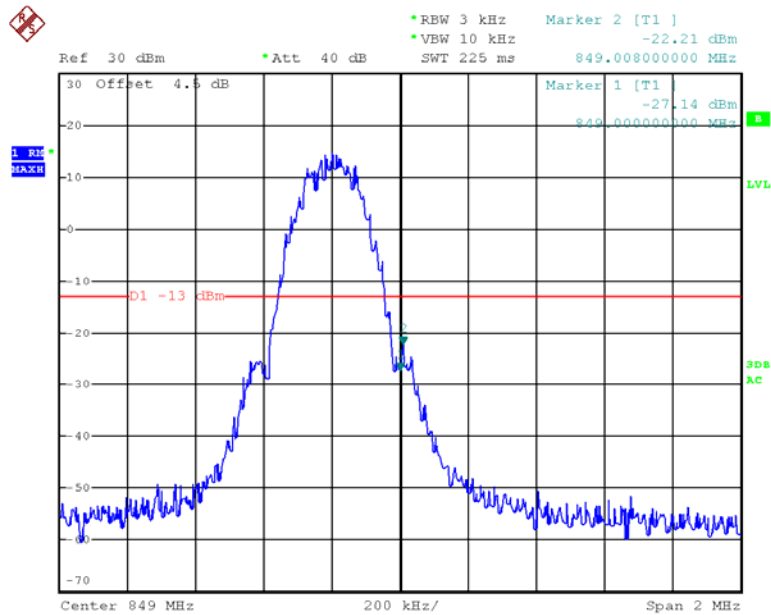
Date: 28.DEC.2018 10:58:47

EDGE 1900, Left Band Edge
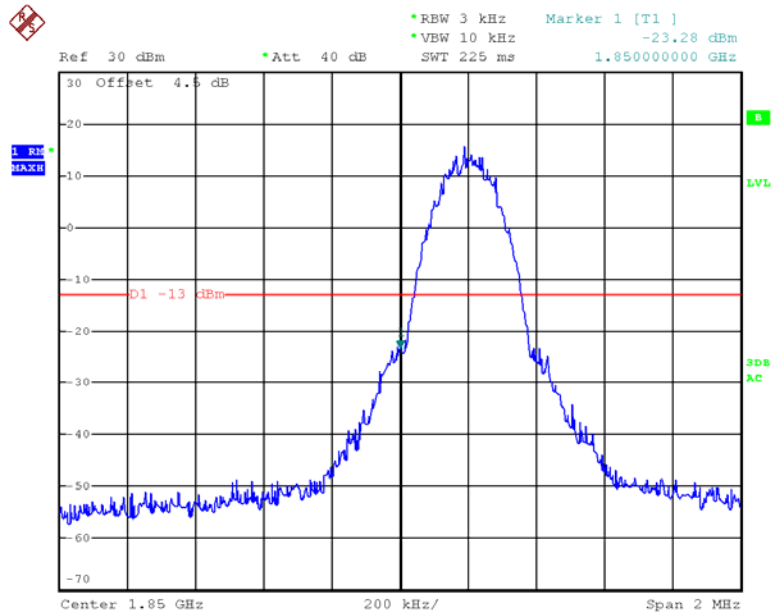
Date: 28.DEC.2018 11:04:43

EDGE 1900, Right Band Edge
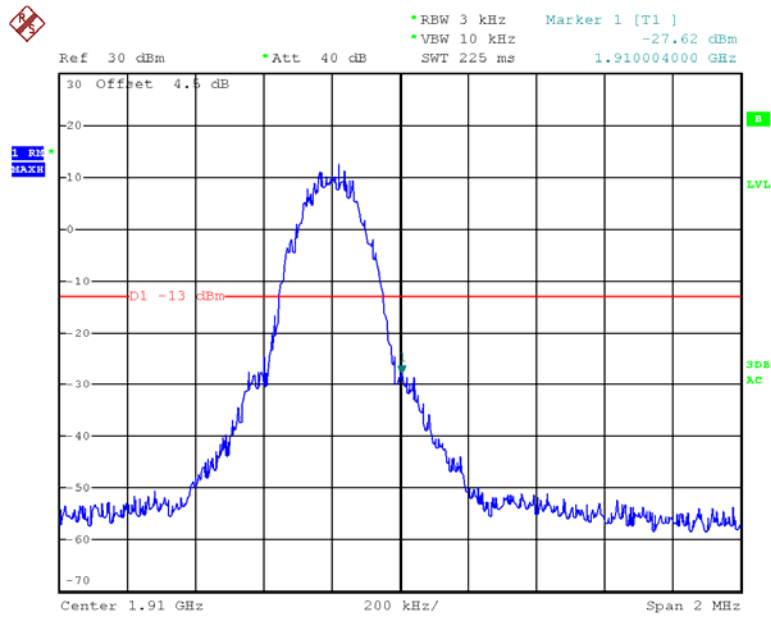
Date: 28.DEC.2018 11:05:50

WCDMA Band II Rel 99, Left Band Edge

Marker 1 [T1]		RBW	50 kHz	RF Att	40 dB
Ref Lvl	-33.97 dBm	VBW	200 kHz	
30 dBm	1.84993988 GHz	SWT	10 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]　　　-33.97 dBm
1.84993988 GHz
A

1MAX

D1 -13 dBm

1RM

Center 1.85 GHz　　　　　1 MHz/　　　　　Span 10 MHz
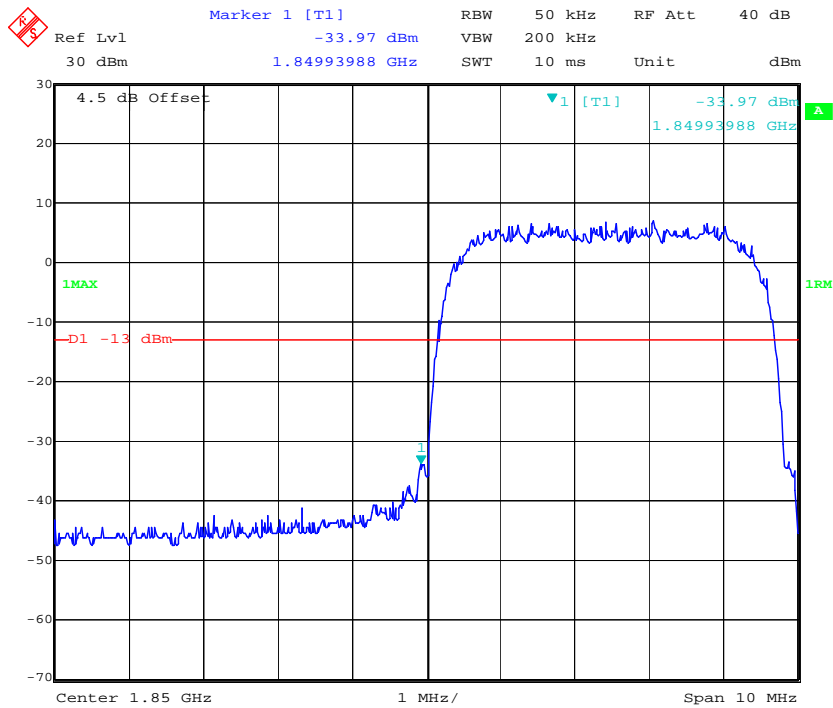
Date:　　　29.DEC.2018　11:05:46

WCDMA Band II Rel 99, Right Band Edge

Marker 1 [T1]		RBW	50 kHz	RF Att	40 dB
Ref Lvl	-30.60 dBm	VBW	200 kHz	
30 dBm	1.91000000 GHz	SWT	10 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]　　　-30.60 dBm
1.91000000 GHz
A

1MAX

D1 -13 dBm

1RM

Center 1.91 GHz　　　　　1 MHz/　　　　　Span 10 MHz
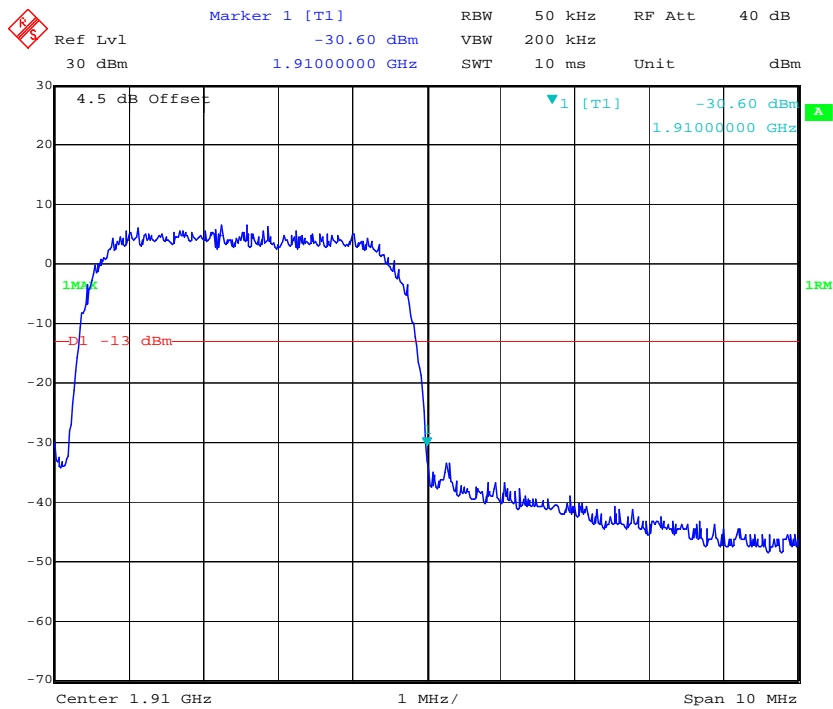
Date:　　　29.DEC.2018　11:06:43

WCDMA Band II HSDPA, Left Band Edge

Marker 1 [T1]	RBW	50 kHz	RF Att	40 dB
Ref Lvl	-31.76 dBm	VBW	200 kHz	
30 dBm	1.84973948 GHz	SWT	10 ms	Unit	dBm

```
 30
         4.5 dB Offset                        ▼1 [T1]      -31.76 dBm   A
                                                          1.84973948 GHz
 20

 10

  0
1MAX                                                                    1RM
-10
   D1 -13 dBm

-20

-30                                               1
                                                ▼
-40

-50

-60

-70
   Center 1.85 GHz              1 MHz/                 Span 10 MHz
```

Date:　　　29.DEC.2018　11:02:46

WCDMA Band II HSDPA, Right Band Edge

Marker 1 [T1]	RBW	50 kHz	RF Att	40 dB
Ref Lvl	-25.06 dBm	VBW	200 kHz	
30 dBm	1.91052104 GHz	SWT	10 ms	Unit	dBm

```
 30
         4.5 dB Offset                        ▼1 [T1]      -25.06 dBm   A
                                                          1.91052104 GHz
 20

 10

  0
1MAX                                                                    1RM
-10
   D1 -13 dBm

-20

-30                                               1
                                                  ▼
-40

-50

-60

-70
   Center 1.91 GHz              1 MHz/                 Span 10 MHz
```
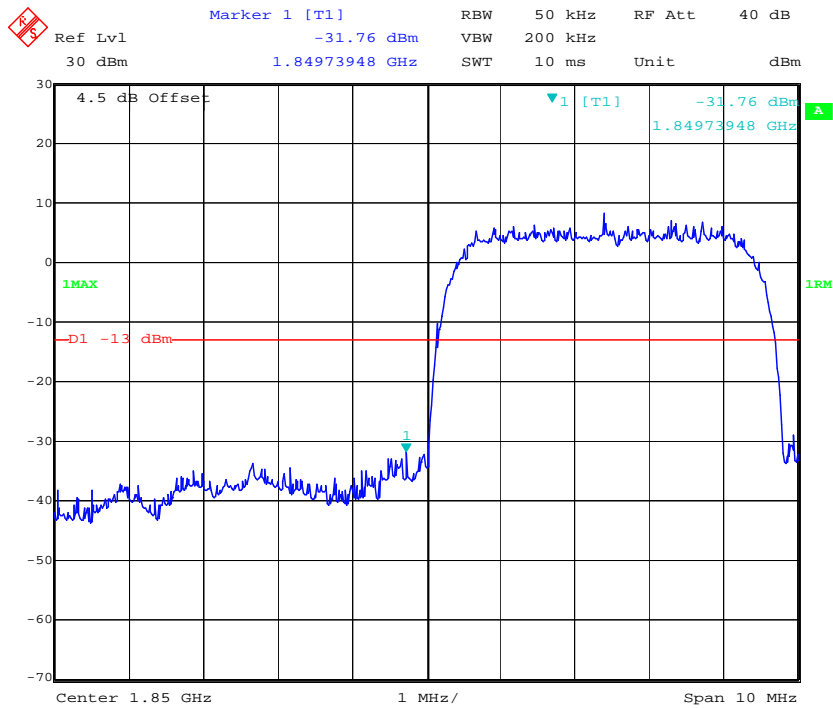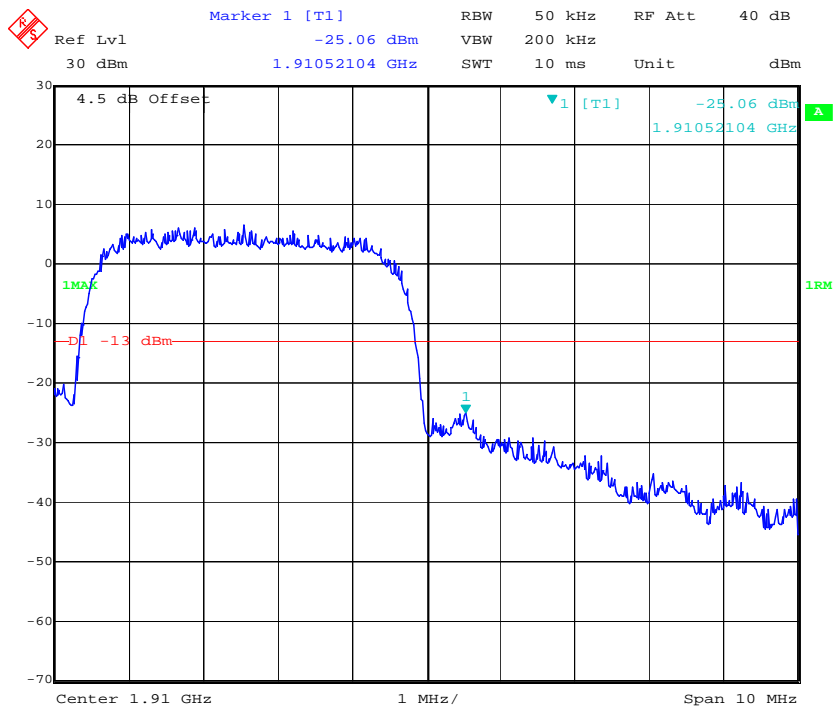
Date:　　　29.DEC.2018　11:04:10

WCDMA Band II HSUPA, Left Band Edge

	Marker 1 [T1]	RBW	50 kHz	RF Att	40 dB
Ref Lvl	-25.48 dBm	VBW	200 kHz		
30 dBm	1.84993988 GHz	SWT	10 ms	Unit	dBm

4.5 dB Offset   ▼1 [T1]   -25.48 dBm [A]
                                            1.84993988 GHz

1MAX   1RM

D1 -13 dBm

Center 1.85 GHz   1 MHz/   Span 10 MHz
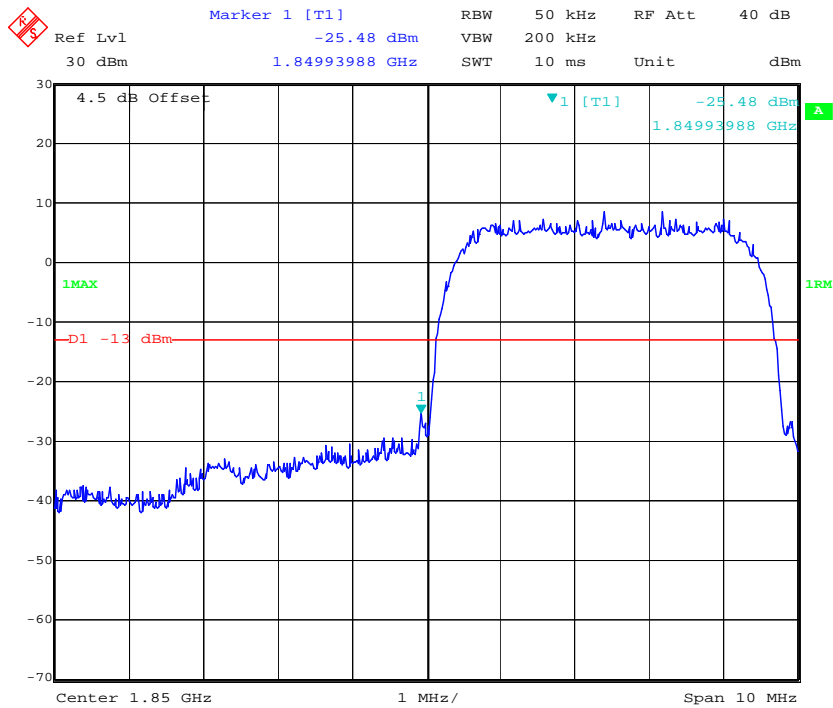
Date: 29.DEC.2018 10:51:31

WCDMA Band II HSUPA, Right Band Edge

	Marker 1 [T1]	RBW	50 kHz	RF Att	40 dB
Ref Lvl	-21.65 dBm	VBW	200 kHz		
30 dBm	1.91006012 GHz	SWT	10 ms	Unit	dBm

4.5 dB Offset   ▼1 [T1]   -21.65 dBm [A]
                                            1.91006012 GHz

1MAX   1RM

D1 -13 dBm

Center 1.91 GHz   1 MHz/   Span 10 MHz

Date: 29.DEC.2018 10:54:00

WCDMA Band V Rel 99, Left Band Edge

	Marker 1 [T1]		RBW	50 kHz	RF Att	40 dB
Ref Lvl		-28.42 dBm	VBW	200 kHz		
30 dBm		823.95991984 MHz	SWT	10 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -28.42 dBm
823.95991984 MHz

A

1MAX

1RM

D1 -13 dBm

1

Center 824 MHz   1 MHz/   Span 10 MHz

Date: 29.DEC.2018 11:07:28
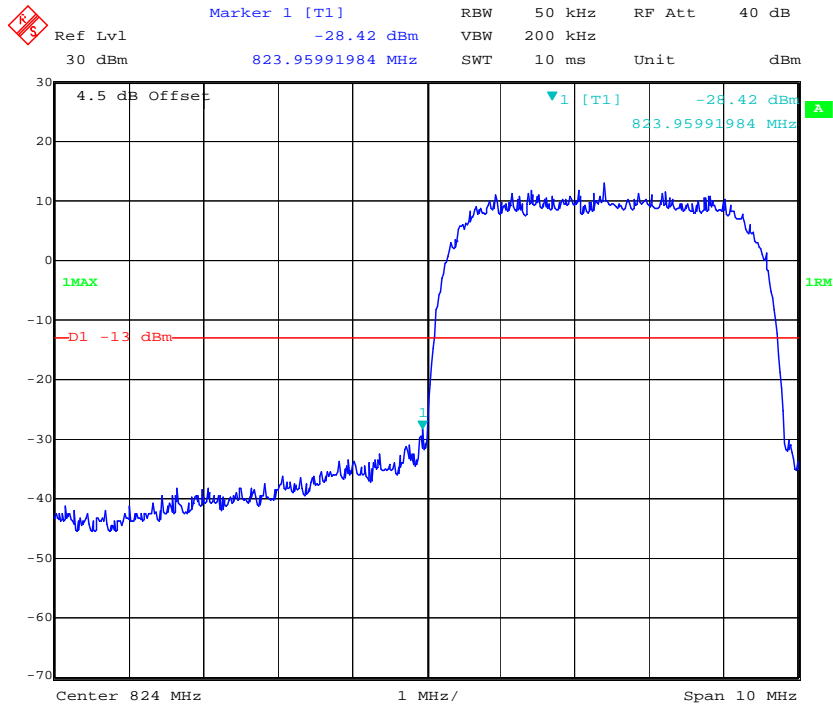
WCDMA Band V Rel 99, Right Band Edge

	Marker 1 [T1]		RBW	50 kHz	RF Att	40 dB
Ref Lvl		-25.06 dBm	VBW	200 kHz		
30 dBm		849.00000000 MHz	SWT	10 ms	Unit	dBm

4.5 dB Offset

▼1 [T1]   -25.06 dBm
849.00000000 MHz

A

1MAX

1RM

D1 -13 dBm

Center 849 MHz   1 MHz/   Span 10 MHz

Date: 29.DEC.2018 11:08:17
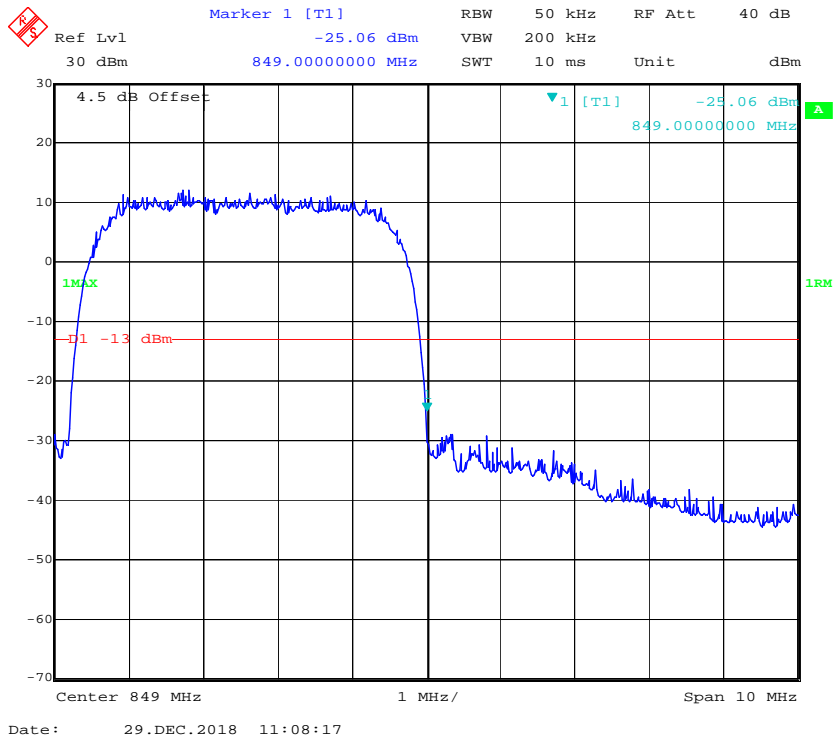
WCDMA Band V HSDPA, Left Band Edge

Marker 1 [T1]		RBW	50 kHz	RF Att	40 dB	
Ref Lvl	-18.03 dBm	VBW	200 kHz			
30 dBm	823.89979960 MHz	SWT	10 ms	Unit	dBm	

4.5 dB Offset
▼1 [T1] -18.03 dBm
823.89979960 MHz

1MAX
D1 -13 dBm
1RM

Center 824 MHz   1 MHz/   Span 10 MHz
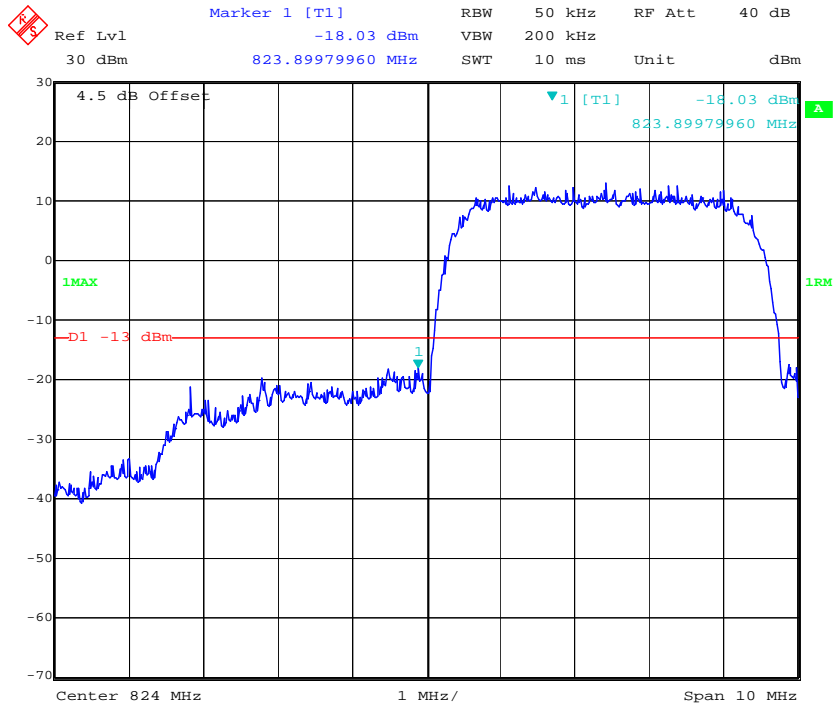
Date: 29.DEC.2018 11:01:17

WCDMA Band V HSDPA, Right Band Edge

Marker 1 [T1]		RBW	50 kHz	RF Att	40 dB	
Ref Lvl	-15.52 dBm	VBW	200 kHz			
30 dBm	849.48096192 MHz	SWT	10 ms	Unit	dBm	

4.5 dB Offset
▼1 [T1] -15.52 dBm
849.48096192 MHz

1MAX
D1 -13 dBm
1RM

Center 849 MHz   1 MHz/   Span 10 MHz

Date: 29.DEC.2018 10:59:31

WCDMA Band V HSUPA, Left Band Edge

Marker 2 [T1]	-16.94 dBm
	823.87975952 MHz

Ref Lvl 30 dBm   RBW 50 kHz   VBW 200 kHz   SWT 10 ms   RF Att 40 dB   Unit dBm

4.5 dB Offset

▼2 [T1] -16.94 dBm 823.87975952 MHz
▽1 [T1] -18.88 dBm 824.00000000 MHz

1MAX   1RM

D1 -13 dBm

Center 824 MHz   1 MHz/   Span 10 MHz

Date: 29.DEC.2018 10:56:07
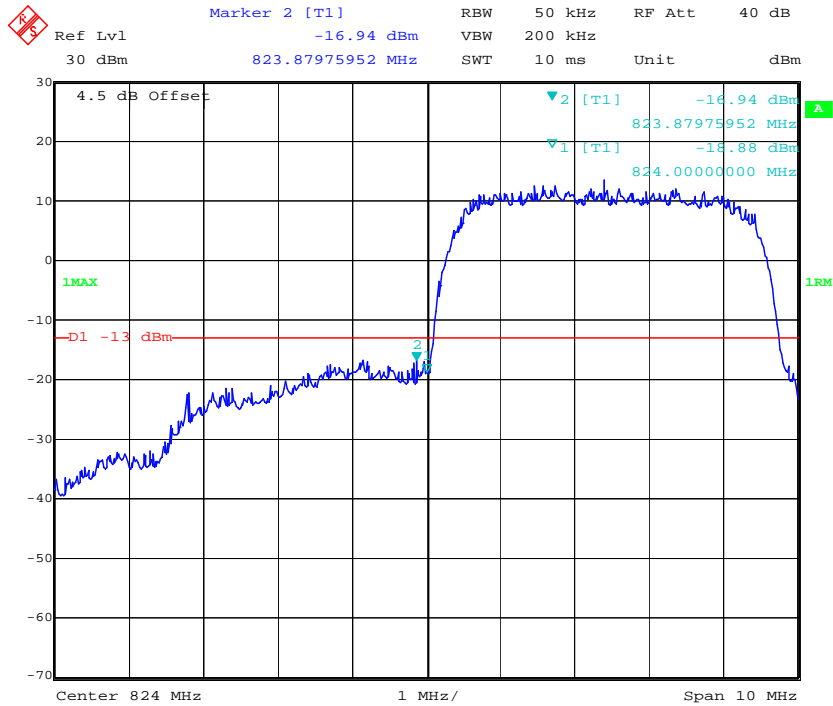
WCDMA Band V HSUPA, Right Band Edge

Marker 2 [T1]   -17.33 dBm   849.77154309 MHz

Ref Lvl 30 dBm   RBW 50 kHz   VBW 200 kHz   SWT 10 ms   RF Att 40 dB   Unit dBm

4.5 dB Offset

▼2 [T1] -17.33 dBm 849.77154309 MHz
▽1 [T1] -18.80 dBm 849.00000000 MHz

1MAX   1RM

D1 -13 dBm

Center 849 MHz   1 MHz/   Span 10 MHz

Date: 29.DEC.2018 10:57:23

LTE Band 2

QPSK_1.4MHz_ 6 RB_ Left

Date: 27.DEC.2018 13:16:44

QPSK_1.4MHz_ 6 RB_ Right
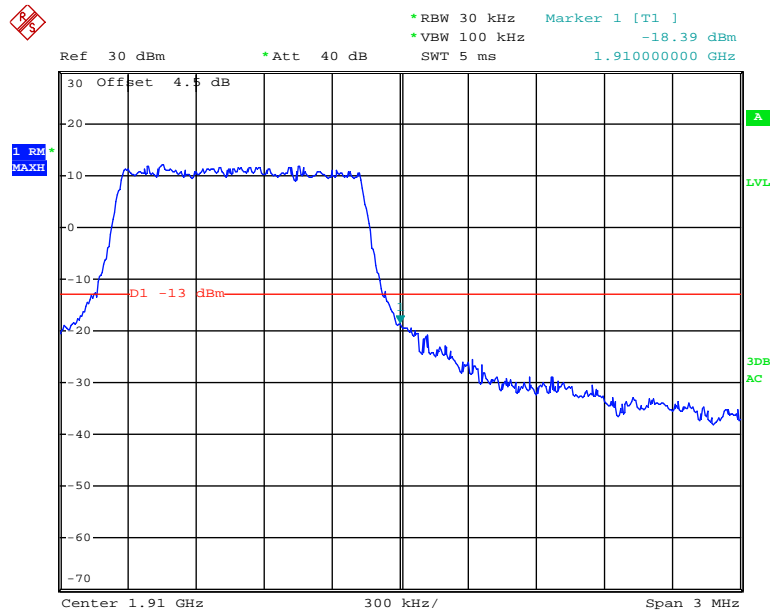
Date: 27.DEC.2018 13:19:15

QPSK_3MHz_ 15 RB_ Left

```
                                    *RBW 30 kHz    Marker 1 [T1 ]
                                    *VBW 100 kHz             -17.13 dBm
Ref  30 dBm          *Att  40 dB    SWT 10 ms       1.850000000 GHz
```
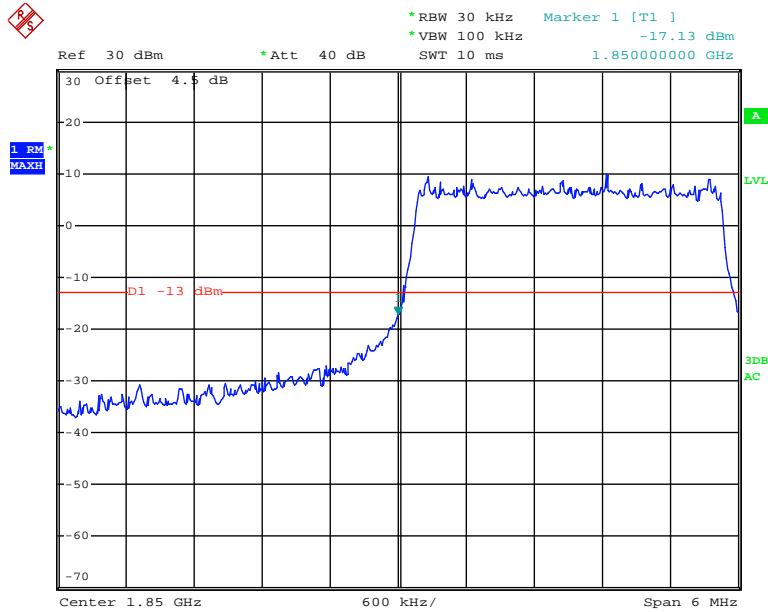
Date: 27.DEC.2018 13:21:18

QPSK_3MHz_ 15 RB_ Right

```
                                    *RBW 30 kHz    Marker 1 [T1 ]
                                    *VBW 100 kHz             -17.20 dBm
Ref  30 dBm          *Att  40 dB    SWT 10 ms       1.910000000 GHz
```
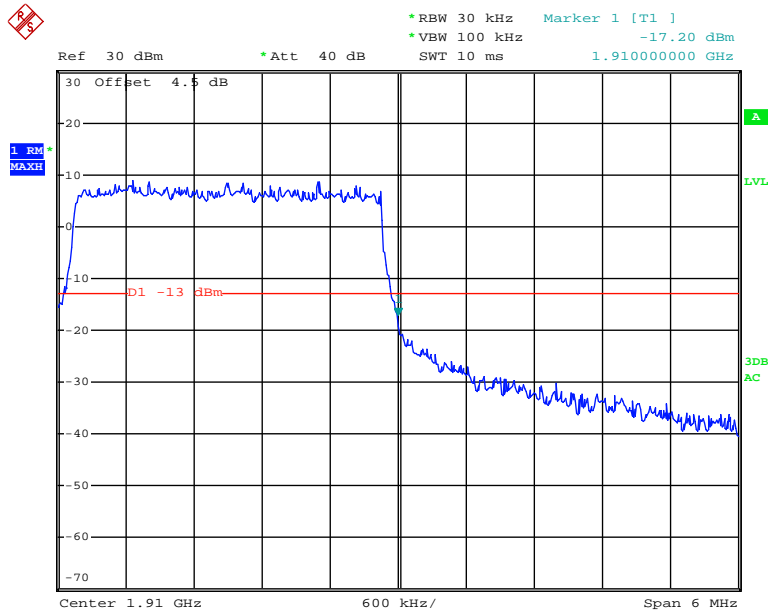
Date: 27.DEC.2018 13:24:03

QPSK_5MHz_ 25 RB_ Left

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -22.16 dBm
          Ref  30 dBm      *Att  40 dB   *SWT 100 ms       1.850000000 GHz
```

30 Offset 4.5 dB

A
LVL
D1 -13 dBm
3DB
AC

1 RM
MAXH

Center 1.85 GHz   1 MHz/   Span 10 MHz
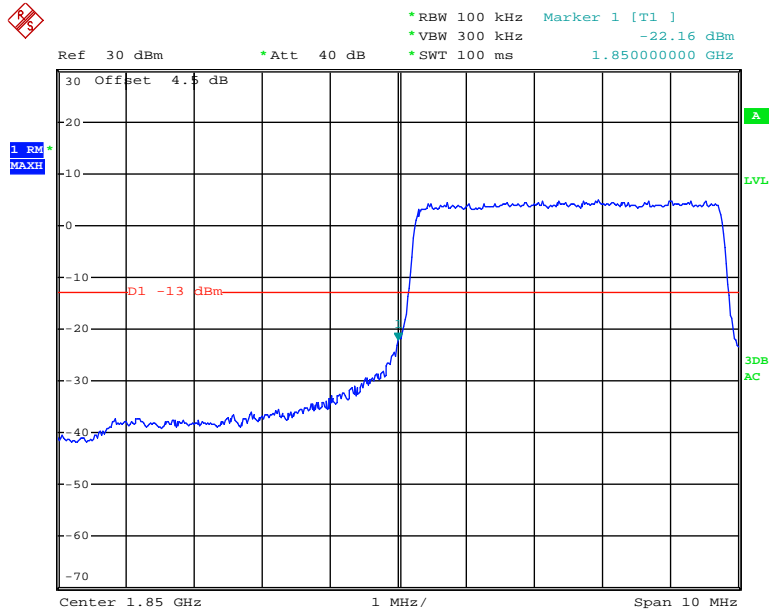
Date: 27.DEC.2018 13:31:43

QPSK_5MHz_ 25 RB_ Right

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -29.28 dBm
          Ref  30 dBm      *Att  40 dB   *SWT 100 ms       1.910000000 GHz
```

30 Offset 4.5 dB

A
LVL
D1 -13 dBm
3DB
AC

1 RM
MAXH

Center 1.91 GHz   1 MHz/   Span 10 MHz
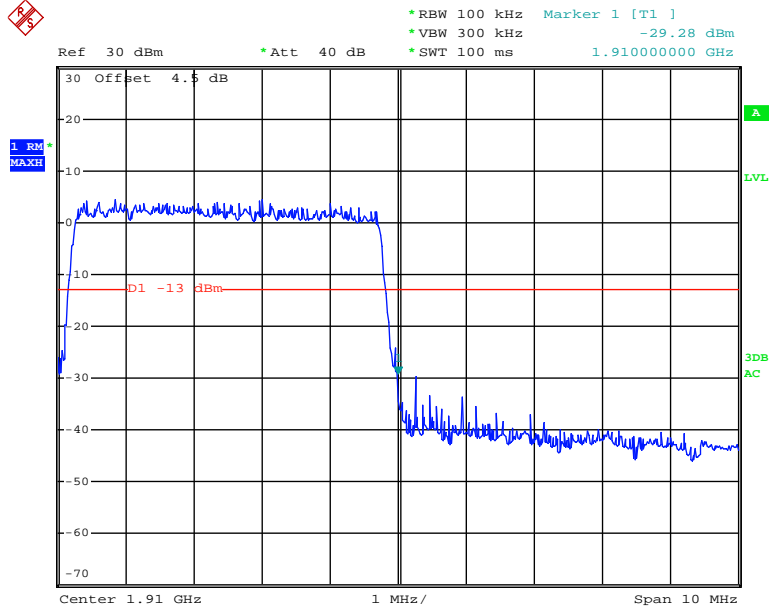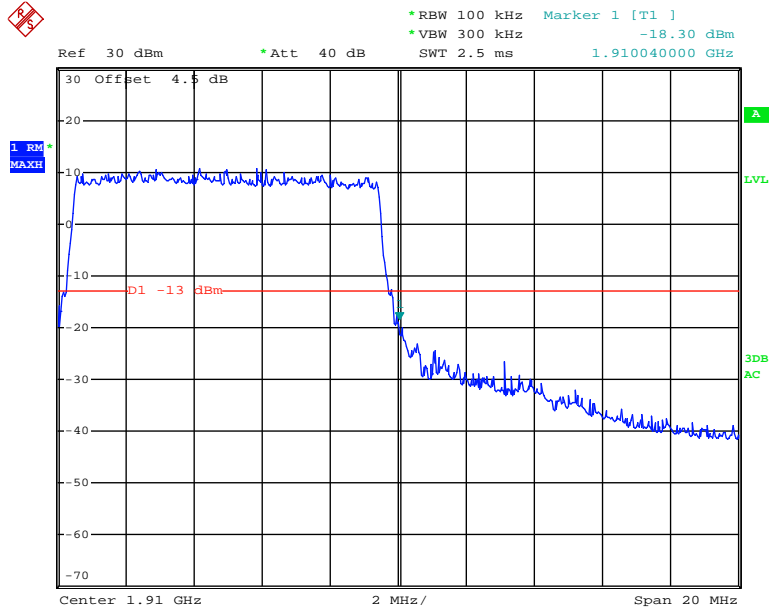
Date: 27.DEC.2018 13:41:55

QPSK_10MHz_ 50 RB_ Left
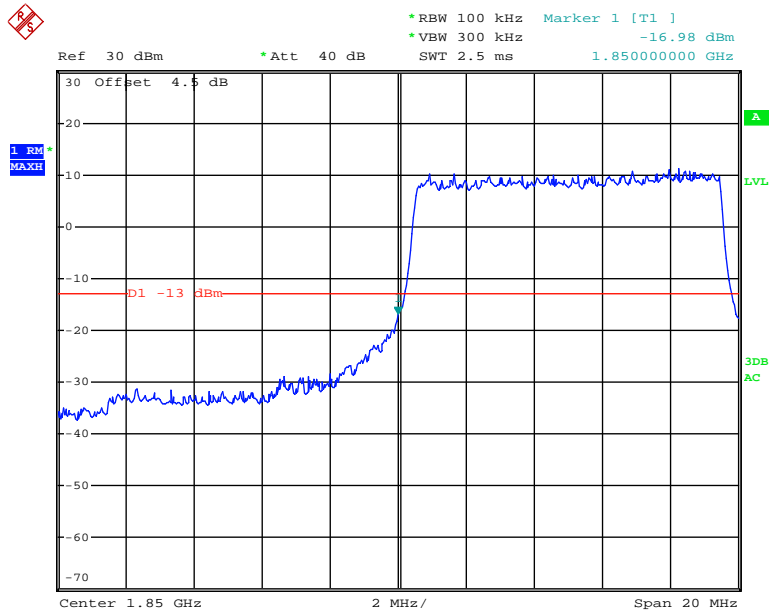
Date: 27.DEC.2018　13:48:33

QPSK_10MHz_ 50 RB_ Right
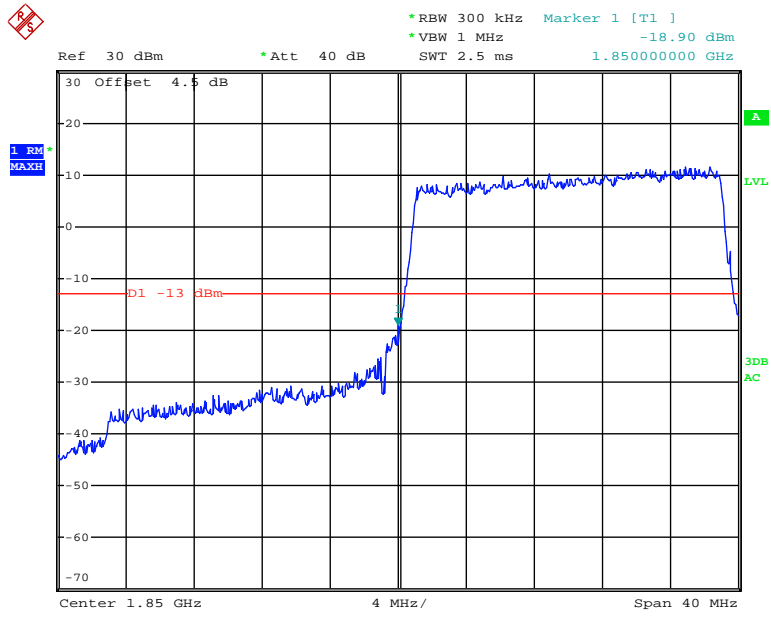

Date: 27.DEC.2018　13:50:28

QPSK_15MHz_ 75 RB_ Left

```
                                    *RBW 300 kHz   Marker 2 [T1 ]
                                    *VBW 1 MHz                  -14.90 dBm
         Ref  30 dBm      *Att  40 dB    SWT 2.5 ms      1.849820000 GHz
        30 Offset  4.5 dB                      Marker 1 [T1 ]
                                                          -16.20 dBm
       20                                             1.850000000 GHz   A

       10                                                          LVL

        0

      -10
         D1 -13 dBm
      -20
                                                                  3DB
                                                                  AC
      -30

      -40

      -50

      -60

      -70
         Center 1.85 GHz         3 MHz/           Span 30 MHz
```
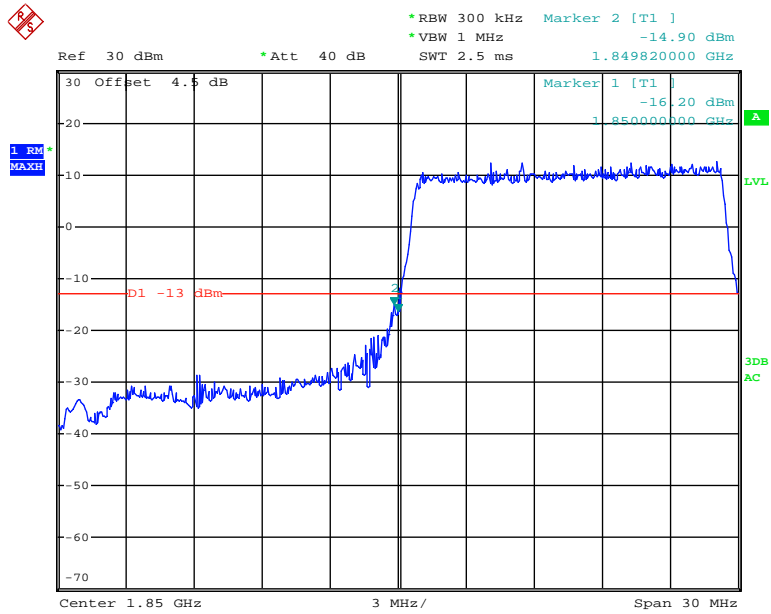
Date: 27.DEC.2018 14:19:40

QPSK_15MHz_ 75 RB_ Right

```
                                    *RBW 300 kHz   Marker 1 [T1 ]
                                    *VBW 1 MHz                  -14.17 dBm
         Ref  30 dBm      *Att  40 dB    SWT 2.5 ms      1.910000000 GHz
        30 Offset  4.5 dB                                          A

       20

       10                                                          LVL

        0

      -10
         D1 -13 dBm
      -20
                                                                  3DB
                                                                  AC
      -30

      -40

      -50

      -60

      -70
         Center 1.91 GHz         3 MHz/           Span 30 MHz
```
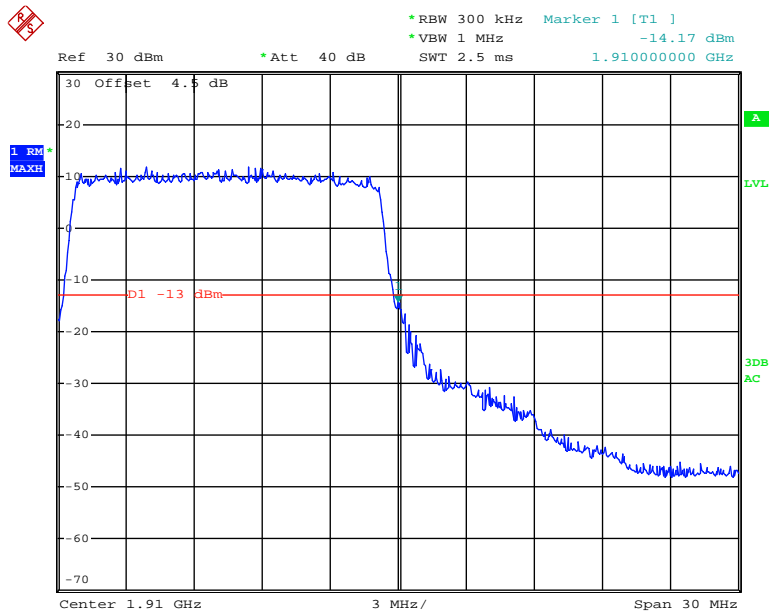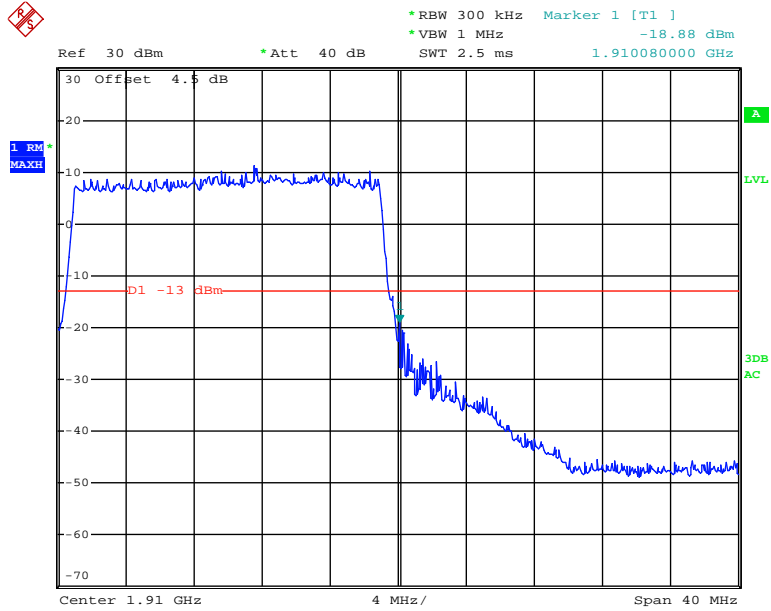
Date: 27.DEC.2018 13:57:12
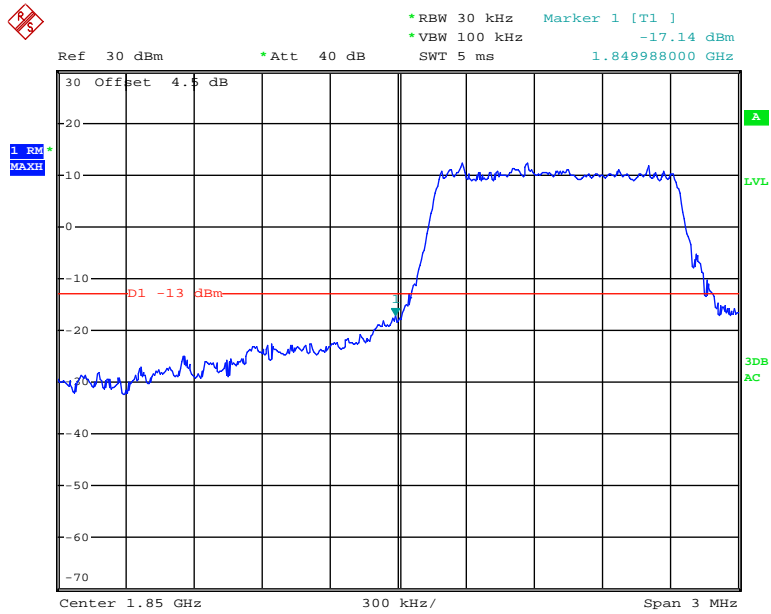
QPSK_20MHz_ FULL RB_ Left

Date: 27.DEC.2018 14:01:50

QPSK_20MHz_ FULL RB_ Right

Date: 27.DEC.2018 14:06:21

16QAM_1.4MHz_ 6 RB_ Left

Date: 27.DEC.2018 13:17:26

16QAM_1.4MHz_ 6 RB_ Right
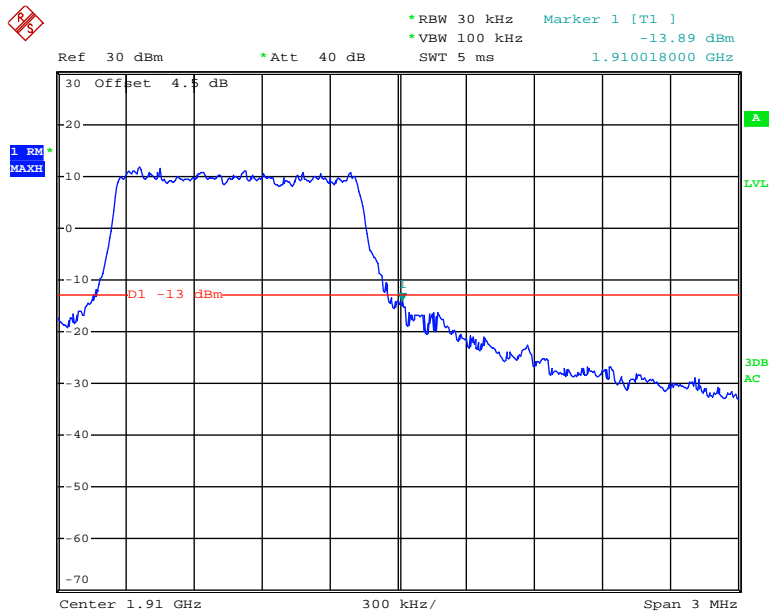
Date: 27.DEC.2018 13:19:57

16QAM_3MHz_ 15 RB_ Left


```
*RBW 30 kHz    Marker 1 [T1 ]
*VBW 100 kHz                -18.30 dBm
Ref  30 dBm        *Att  40 dB    SWT 10 ms        1.849988000 GHz
```
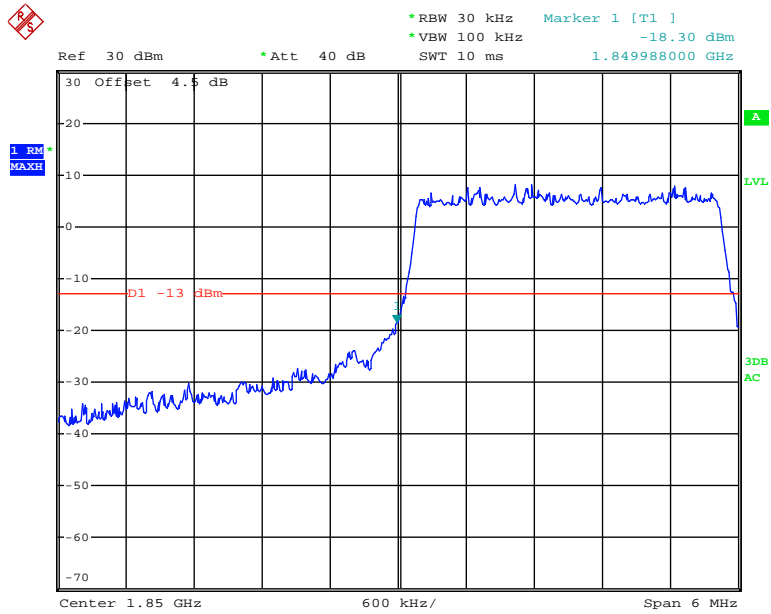
Date: 27.DEC.2018 13:21:51

16QAM_3MHz_ 15 RB_ Right


```
*RBW 30 kHz    Marker 1 [T1 ]
*VBW 100 kHz                -17.91 dBm
Ref  30 dBm        *Att  40 dB    SWT 10 ms        1.910000000 GHz
```
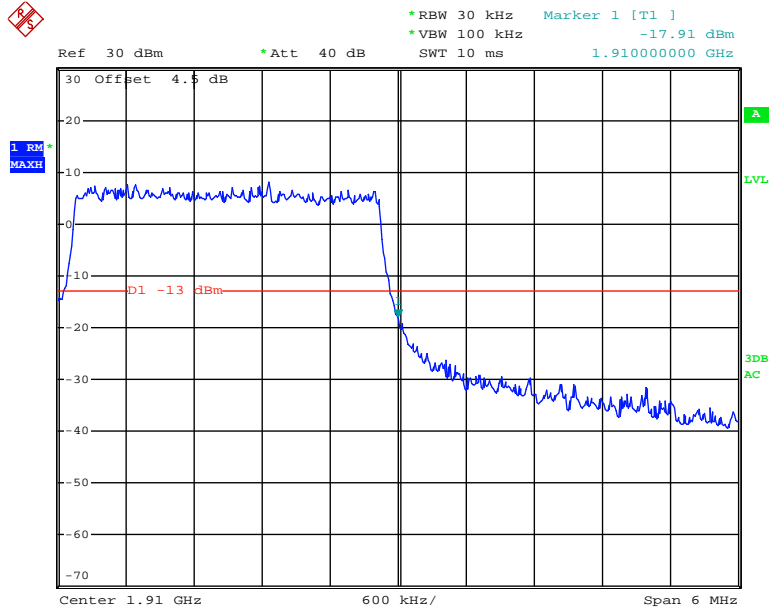
Date: 27.DEC.2018 13:24:36

16QAM_5MHz_ 25 RB_ Left
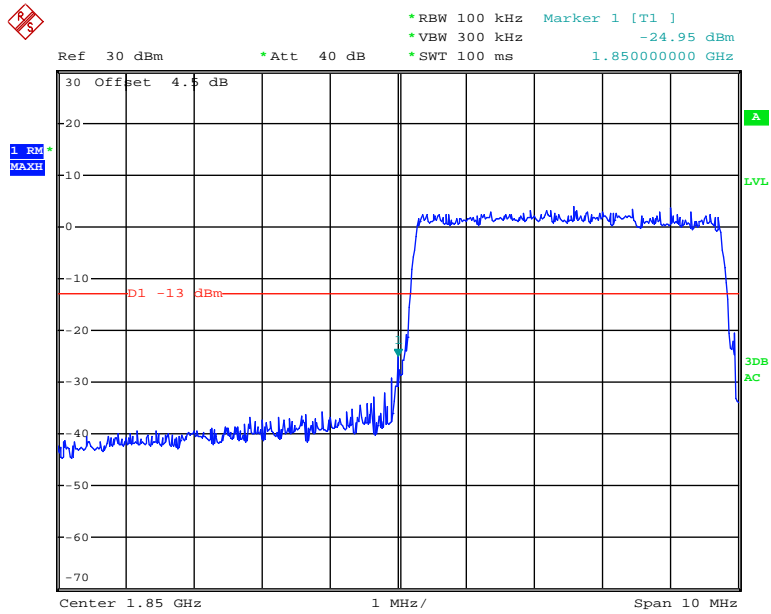
Date: 27.DEC.2018 13:37:47

16QAM_5MHz_ 25 RB_ Right
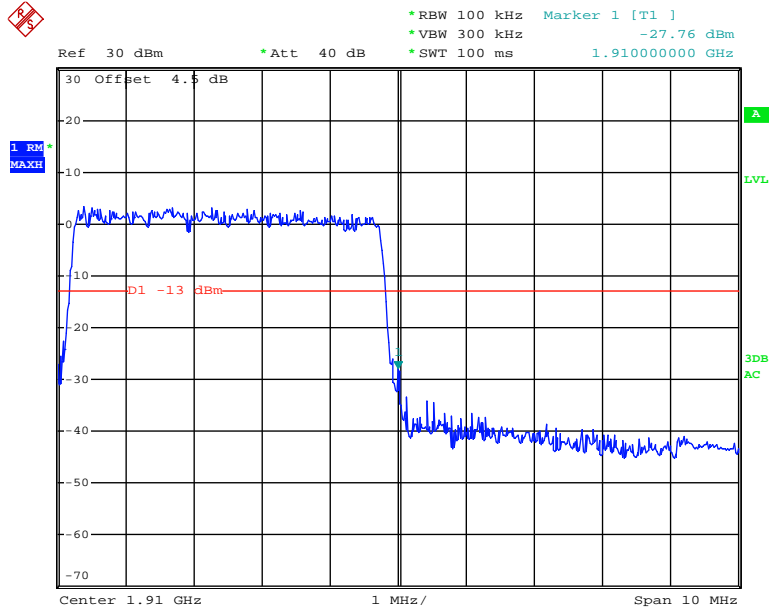

Date: 27.DEC.2018 13:43:21

16QAM_10MHz_ 50 RB_ Left

```
                              *RBW 100 kHz   Marker 1 [T1 ]
                              *VBW 300 kHz              -19.24 dBm
   Ref  30 dBm    *Att  40 dB  SWT 2.5 ms        1.850000000 GHz
  30 Offset  4.5 dB
  -20                                                          A
1 RM*
MAXH
  -10                                                         LVL

    0

  -10
      D1 -13 dBm
  -20

  -30                                                        3DB
                                                             AC
  -40

  -50

  -60

  -70
   Center 1.85 GHz        2 MHz/            Span 20 MHz
```
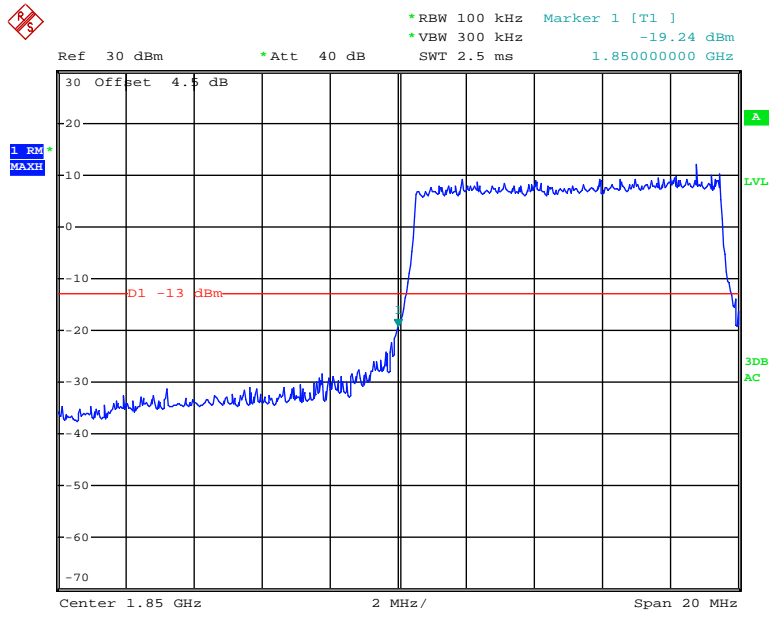
Date: 27.DEC.2018 13:49:05

16QAM_10MHz_ 50 RB_ Right

```
                              *RBW 100 kHz   Marker 1 [T1 ]
                              *VBW 300 kHz              -20.45 dBm
   Ref  30 dBm    *Att  40 dB  SWT 2.5 ms        1.910080000 GHz
  30 Offset  4.5 dB
  -20                                                          A
1 RM*
MAXH
  -10                                                         LVL

    0

  -10
      D1 -13 dBm
  -20

  -30                                                        3DB
                                                             AC
  -40

  -50

  -60

  -70
   Center 1.91 GHz        2 MHz/            Span 20 MHz
```
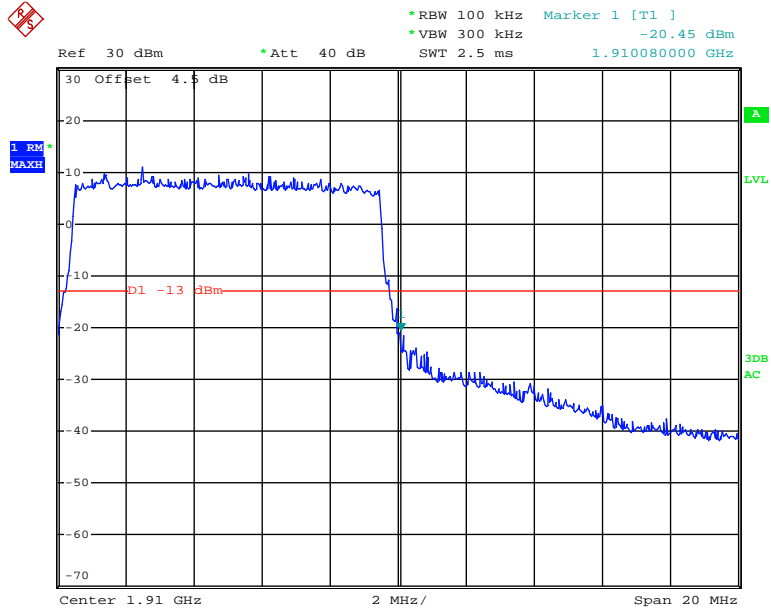
Date: 27.DEC.2018 13:50:59

16QAM_15MHz_ 75 RB_ Left

```
                                            *RBW 300 kHz   Marker 1 [T1 ]
                                            *VBW 1 MHz                  -17.13 dBm
              Ref  30 dBm       *Att  40 dB  SWT 2.5 ms      1.850000000 GHz
```
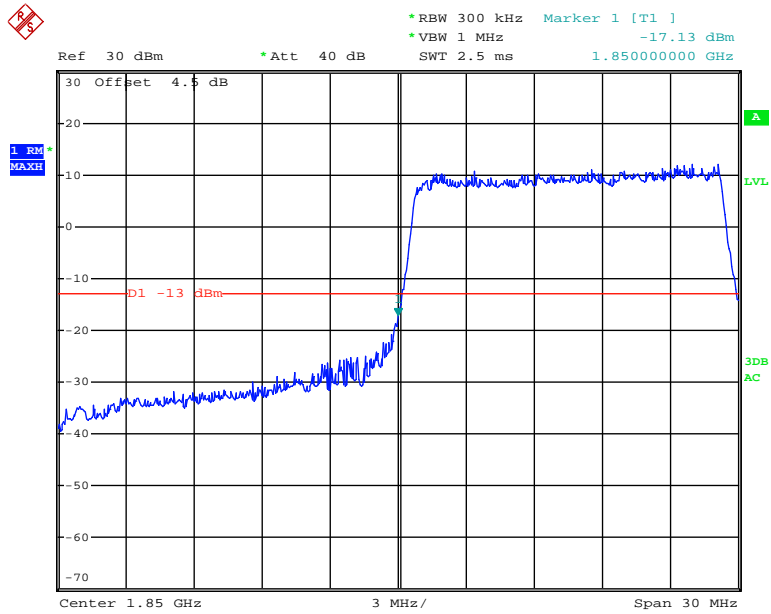
Date: 27.DEC.2018 13:55:02

16QAM_15MHz_ 75 RB_ Right

```
                                            *RBW 300 kHz   Marker 1 [T1 ]
                                            *VBW 1 MHz                  -17.45 dBm
              Ref  30 dBm       *Att  40 dB  SWT 2.5 ms      1.910120000 GHz
```
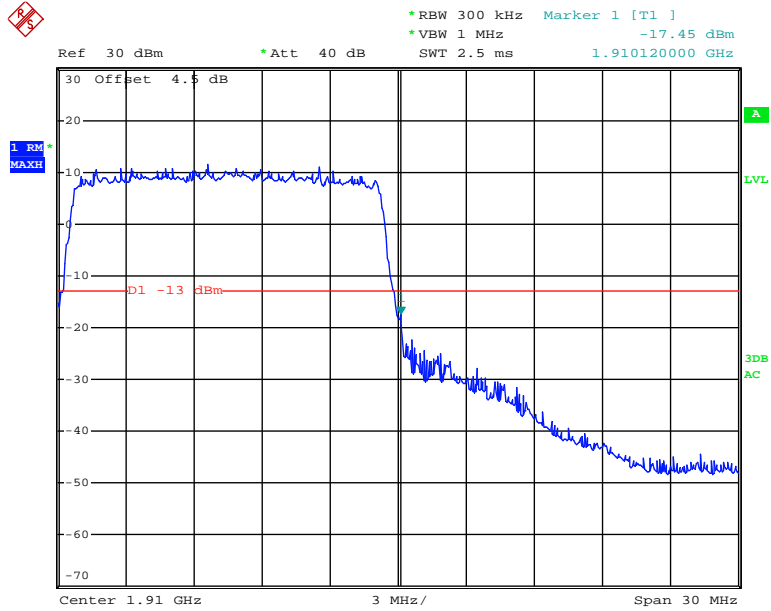
Date: 27.DEC.2018 13:58:17

16QAM_20MHz_ FULL RB_ Left

	*RBW 300 kHz	Marker 1 [T1]
	*VBW 1 MHz	-17.72 dBm
Ref 30 dBm	*Att 40 dB SWT 2.5 ms	1.850000000 GHz

```
30 Offset  4.5 dB                                                    A
-20
1 RM*
MAXH                                                                LVL
-10
-0
-10
D1 -13 dBm
-20
-30                                                                 3DB
                                                                    AC
-40
-50
-60
-70
Center 1.85 GHz              4 MHz/              Span 40 MHz
```
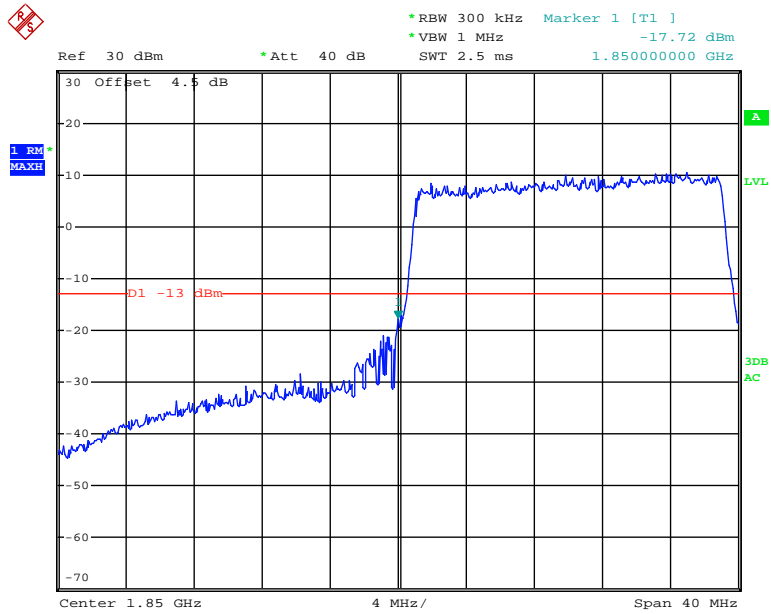
Date: 27.DEC.2018 14:02:27

16QAM_20MHz_ FULL RB_ Right

	*RBW 300 kHz	Marker 1 [T1]
	*VBW 1 MHz	-21.63 dBm
Ref 30 dBm	*Att 40 dB SWT 2.5 ms	1.910000000 GHz

```
30 Offset  4.5 dB                                                    A
-20
1 RM*
MAXH                                                                LVL
-10
-0
-10
D1 -13 dBm
-20
-30                                                                 3DB
                                                                    AC
-40
-50
-60
-70
Center 1.91 GHz              4 MHz/              Span 40 MHz
```
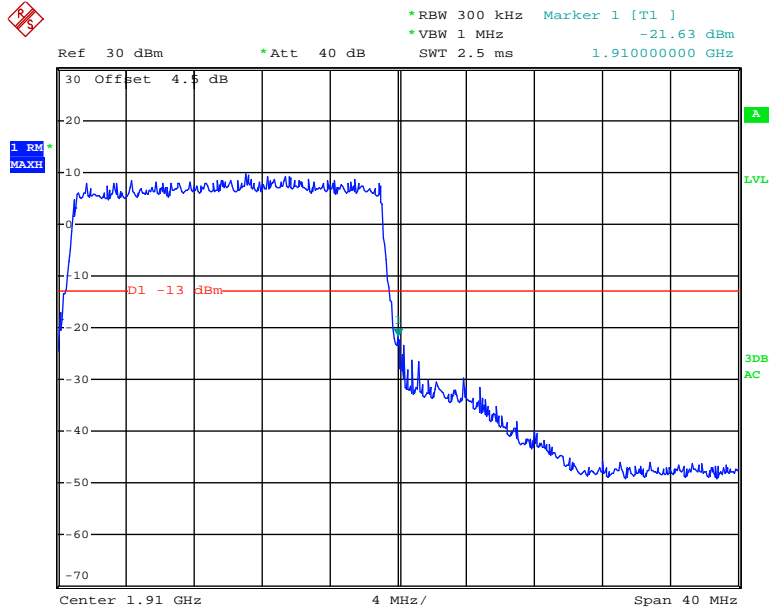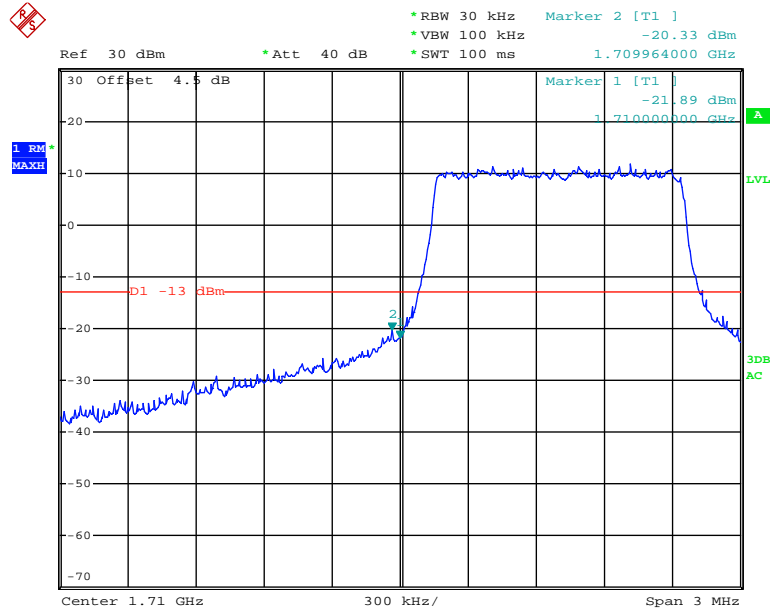
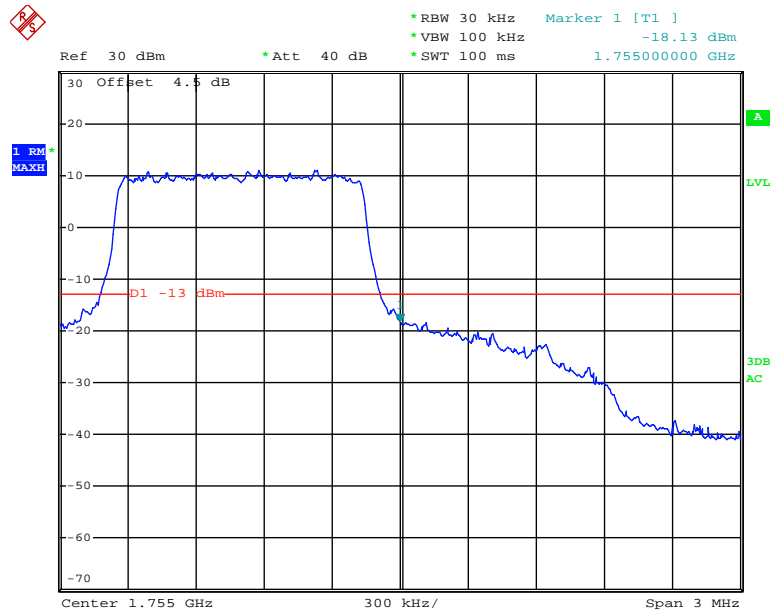Date: 27.DEC.2018 14:05:37

LTE Band 4

QPSK_1.4MHz_ 6 RB_ Left

Date: 27.DEC.2018 14:25:31

QPSK_1.4MHz_ 6 RB_ Right

Date: 27.DEC.2018 14:23:30

QPSK_3MHz_ 15 RB_ Left

```
                                    *RBW 30 kHz    Marker 1 [T1 ]
                                    *VBW 100 kHz          -19.09 dBm
         Ref  30 dBm      *Att  40 dB   *SWT 100 ms    1.710000000 GHz
```

30 Offset 4.5 dB

D1 -13 dBm

Center 1.71 GHz   600 kHz/   Span 6 MHz
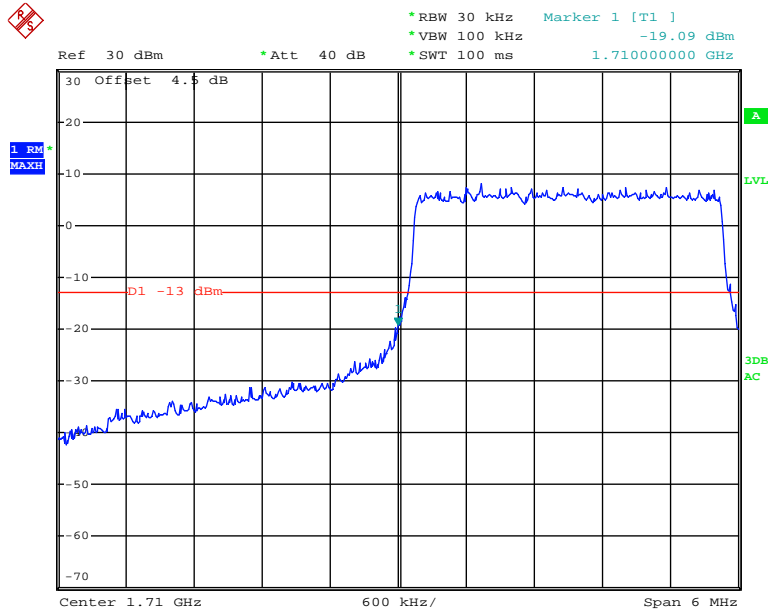
Date: 27.DEC.2018 14:35:46

QPSK_3MHz_ 15 RB_ Right

```
                                    *RBW 30 kHz    Marker 1 [T1 ]
                                    *VBW 100 kHz          -19.31 dBm
         Ref  30 dBm      *Att  40 dB   *SWT 100 ms    1.755000000 GHz
```

30 Offset 4.5 dB

D1 -13 dBm

Center 1.755 GHz   600 kHz/   Span 6 MHz
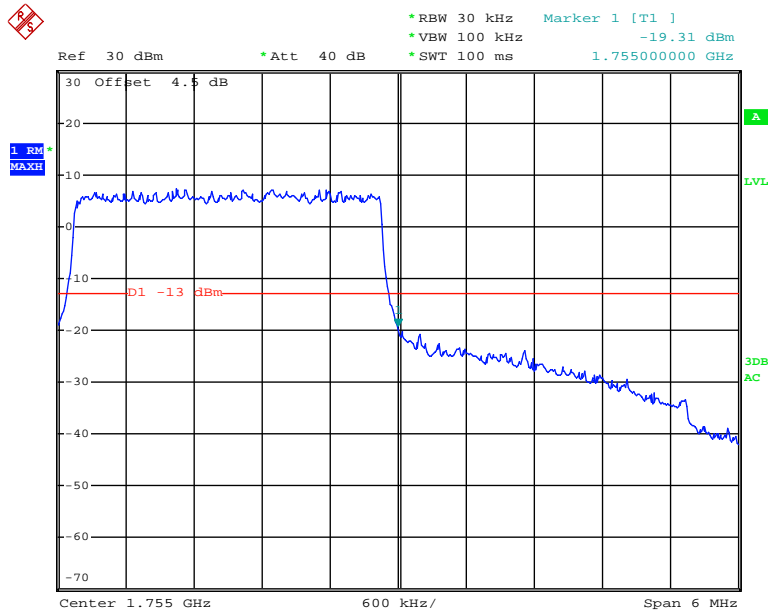
Date: 27.DEC.2018 14:33:32

QPSK_5MHz_ 25 RB_ Left

```
                                          *RBW 100 kHz   Marker 1 [T1 ]
                                          *VBW 300 kHz              -21.34 dBm
              Ref  30 dBm      *Att  40 dB  *SWT 100 ms        1.710000000 GHz
```

```
 30 Offset  4.5 dB                                                    A

-20

1 RM *
MAXH
-10                                                                  LVL

 0

-10
        D1 -13 dBm

-20                                                                  3DB
                                                                     AC
-30

-50

-60

-70
        Center 1.71 GHz            1 MHz/              Span 10 MHz
```
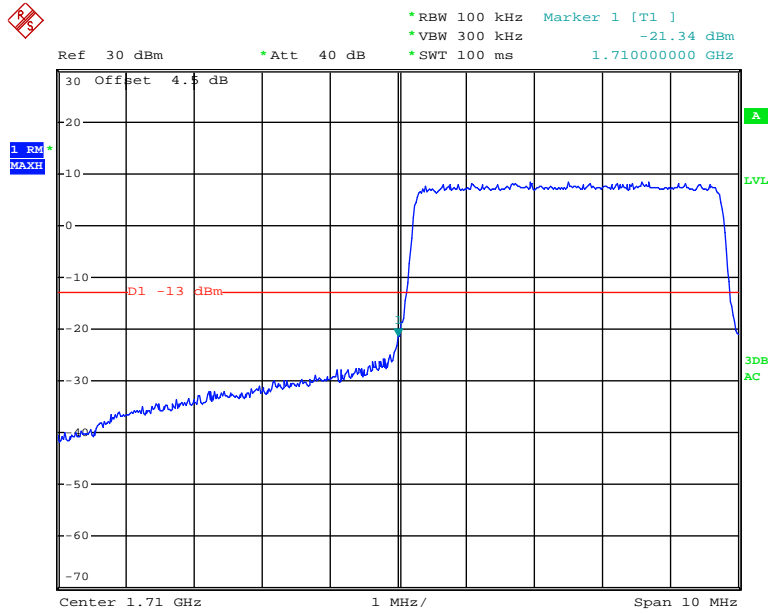
Date: 27.DEC.2018 14:41:35

QPSK_5MHz_ 25 RB_ Right

```
                                          *RBW 100 kHz   Marker 1 [T1 ]
                                          *VBW 300 kHz              -18.45 dBm
              Ref  30 dBm      *Att  40 dB  *SWT 100 ms        1.755000000 GHz
```

```
 30 Offset  4.5 dB                                                    A

-20

1 RM *
MAXH
-10                                                                  LVL

 0

-10
        D1 -13 dBm

-20                                                                  3DB
                                                                     AC
-30

-40

-50

-60

-70
        Center 1.755 GHz           1 MHz/              Span 10 MHz
```
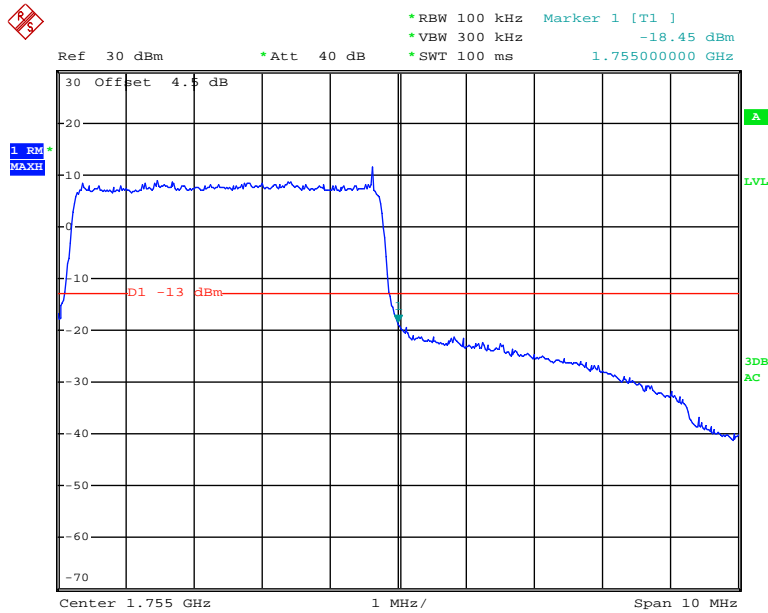
Date: 27.DEC.2018 14:39:42

QPSK_10MHz_ 50 RB_ Left

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -17.19 dBm
         Ref  30 dBm     *Att  40 dB   SWT 2.5 ms      1.710000000 GHz
```



```
         Center 1.71 GHz          2 MHz/              Span 20 MHz
```
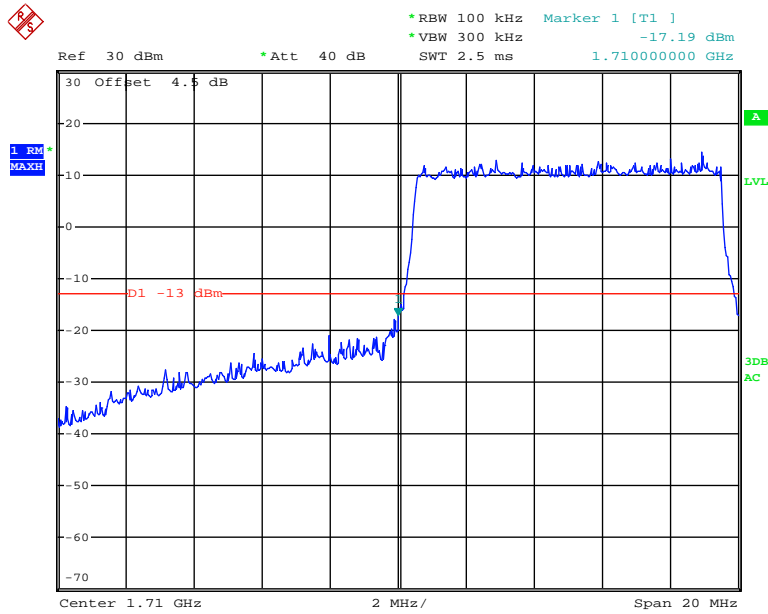
Date: 27.DEC.2018 15:01:47

QPSK_10MHz_ 50 RB_ Right

```
                                    *RBW 100 kHz   Marker 2 [T1 ]
                                    *VBW 300 kHz              -14.71 dBm
         Ref  30 dBm     *Att  40 dB   SWT 2.5 ms      1.755120000 GHz
                                                  Marker 1 [T1 ]
                                                            -16.41 dBm
                                                  1.755000000 GHz
```



```
         Center 1.755 GHz         2 MHz/              Span 20 MHz
```
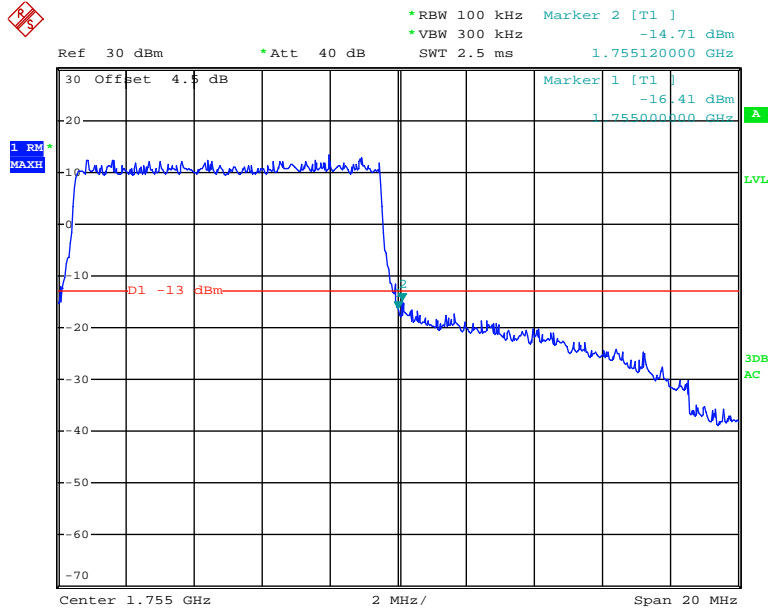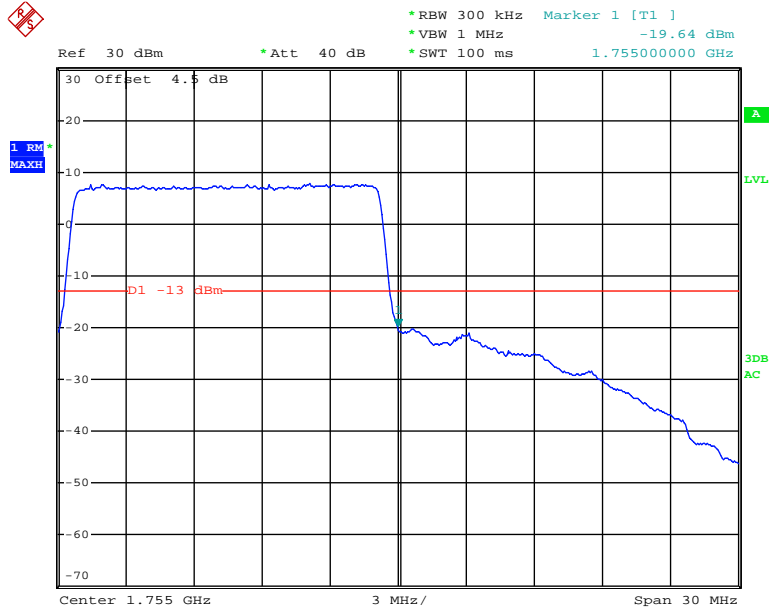
Date: 27.DEC.2018 14:43:35

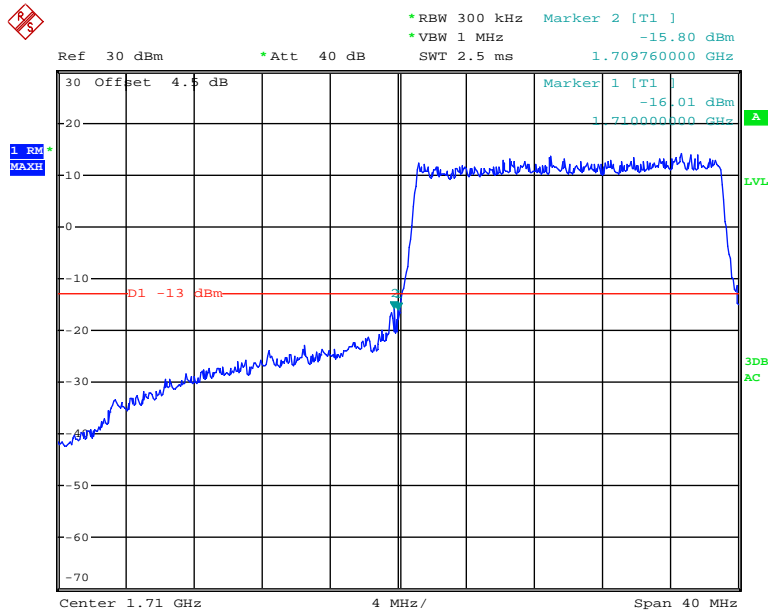## QPSK_15MHz_ 75 RB_ Left
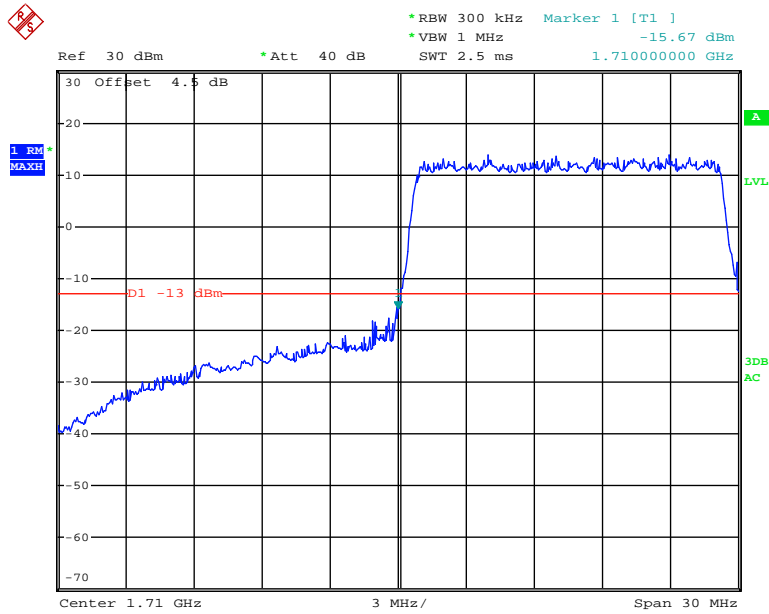
Date: 27.DEC.2018 15:06:13

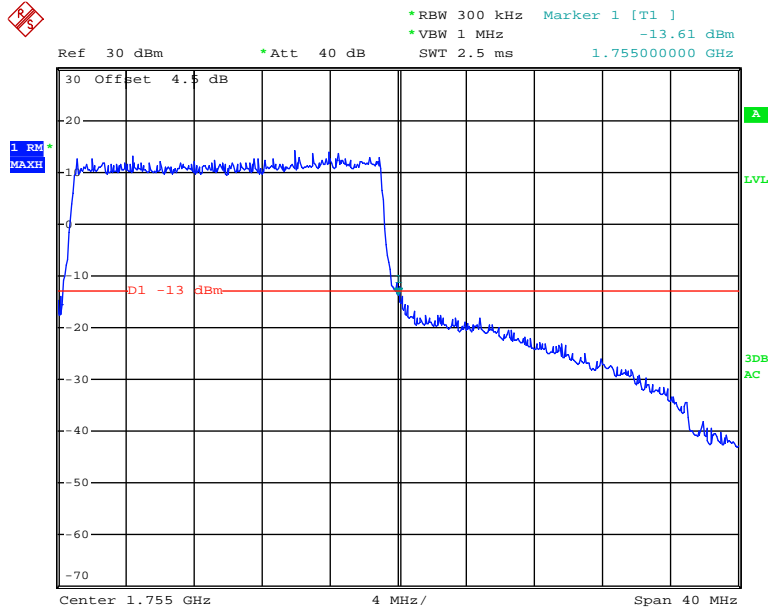## QPSK_15MHz_ 75 RB_ Right

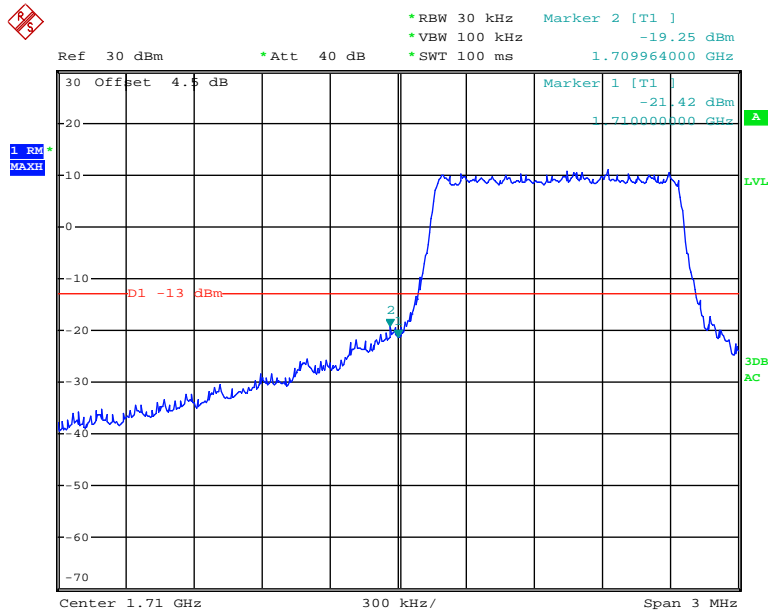Date: 27.DEC.2018 15:04:04

QPSK_20MHz_ FULL RB_ Left
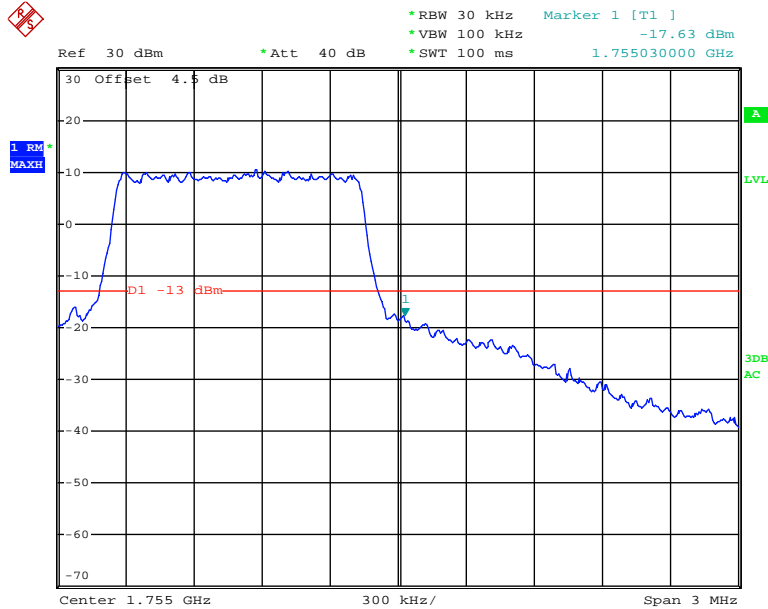

Date: 27.DEC.2018 15:10:27

QPSK_20MHz_ FULL RB_ Right
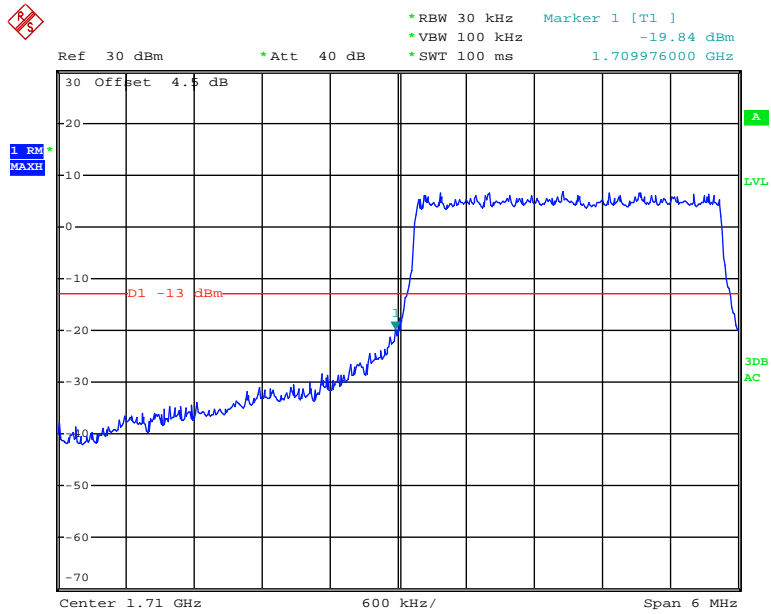

Date: 27.DEC.2018 15:08:14

16QAM_1.4MHz_ 6 RB_ Left

```
                                        *RBW 30 kHz    Marker 2 [T1 ]
                                        *VBW 100 kHz              -19.25 dBm
        Ref  30 dBm          *Att  40 dB *SWT 100 ms        1.709964000 GHz

     30 Offset  4.5 dB                              Marker 1 [T1 ]
                                                            -21.42 dBm
     -20                                                1.710000000 GHz       A

     -10                                                                      LVL

      0

     -10                    D1 -13 dBm

     -20                                     2                                3DB
                                                                             AC
     -30

     -40

     -50

     -60

     -70
        Center 1.71 GHz                300 kHz/              Span 3 MHz
```

Date: 27.DEC.2018 14:21:50

16QAM_1.4MHz_ 6 RB_ Right

```
                                        *RBW 30 kHz    Marker 1 [T1 ]
                                        *VBW 100 kHz              -17.63 dBm
        Ref  30 dBm          *Att  40 dB *SWT 100 ms        1.755030000 GHz

     30 Offset  4.5 dB                                                        A

     -20

     -10                                                                      LVL

      0

     -10                    D1 -13 dBm

     -20                                     1                                3DB
                                                                             AC
     -30

     -40

     -50

     -60

     -70
        Center 1.755 GHz               300 kHz/              Span 3 MHz
```

Date: 27.DEC.2018 14:29:28

16QAM_3MHz_ 15 RB_ Left

```
                                    *RBW 30 kHz    Marker 1 [T1 ]
                                    *VBW 100 kHz           -19.84 dBm
        Ref  30 dBm      *Att  40 dB  *SWT 100 ms      1.709976000 GHz
```

Date: 27.DEC.2018 14:34:49

16QAM_3MHz_ 15 RB_ Right

```
                                    *RBW 30 kHz    Marker 1 [T1 ]
                                    *VBW 100 kHz           -18.87 dBm
        Ref  30 dBm      *Att  40 dB  *SWT 100 ms      1.755000000 GHz
```
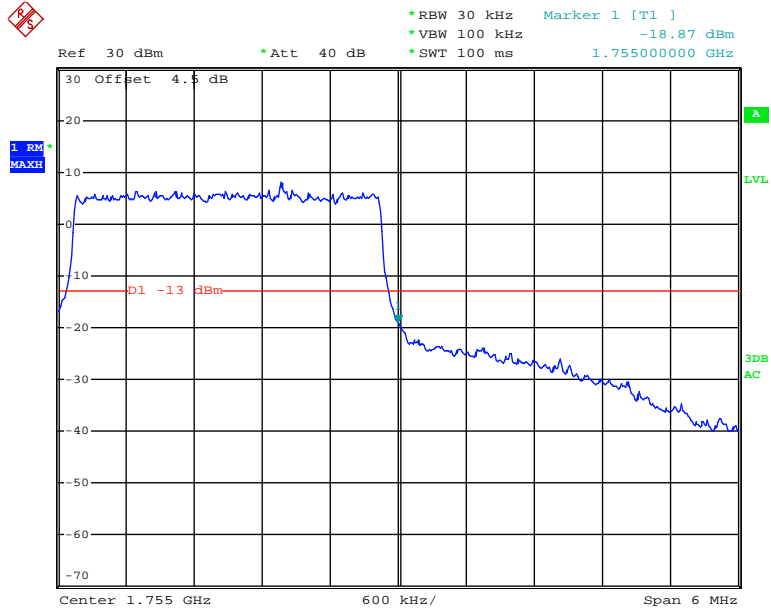
Date: 27.DEC.2018 14:32:26

16QAM_5MHz_ 25 RB_ Left


```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -22.23 dBm
Ref  30 dBm          *Att  40 dB    *SWT 100 ms      1.710000000 GHz
```
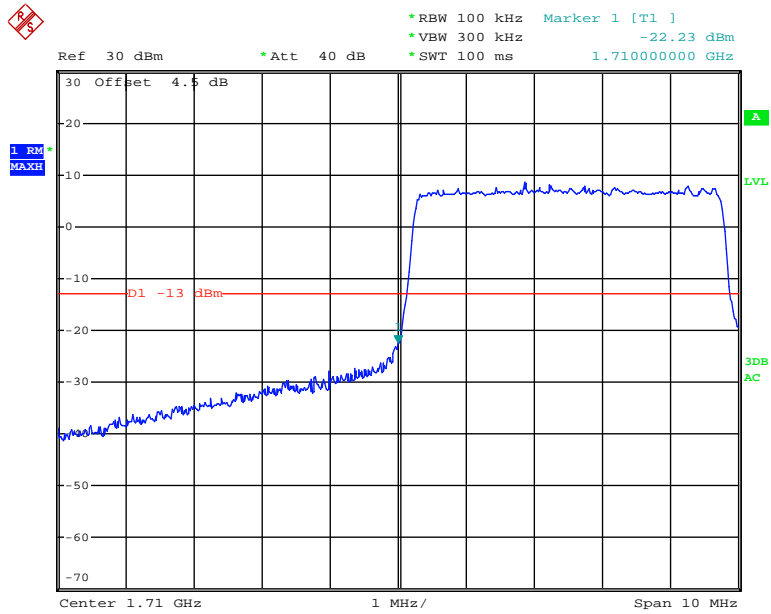
Date: 27.DEC.2018 14:41:05

16QAM_5MHz_ 25 RB_ Right


```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -17.59 dBm
Ref  30 dBm          *Att  40 dB    *SWT 100 ms      1.755000000 GHz
```
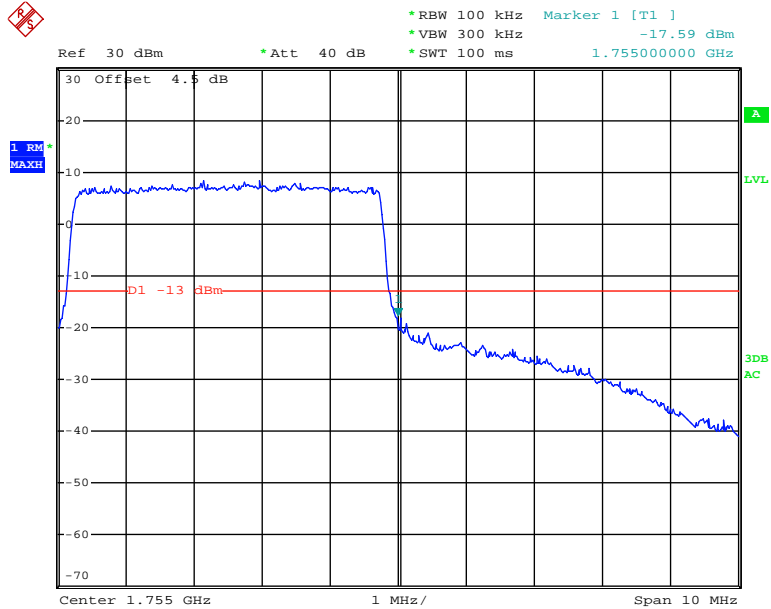
Date: 27.DEC.2018 14:37:04

16QAM_10MHz_ 50 RB_ Left

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz            -20.59 dBm
   Ref  30 dBm        *Att  40 dB   SWT 2.5 ms       1.710000000 GHz
   30 Offset  4.5 dB
```
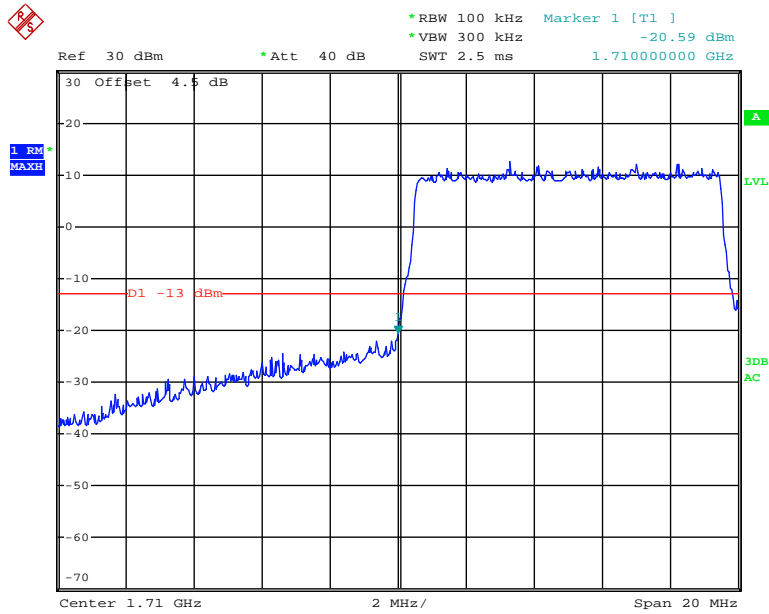
Date: 27.DEC.2018 15:01:04

16QAM_10MHz_ 50 RB_ Right

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz            -15.67 dBm
   Ref  30 dBm        *Att  40 dB   SWT 2.5 ms       1.755000000 GHz
   30 Offset  4.5 dB
```
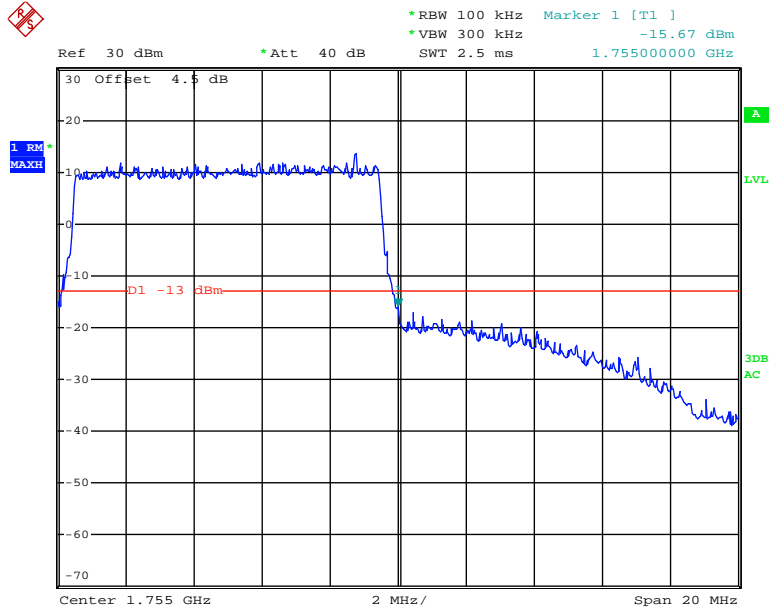
Date: 27.DEC.2018 14:42:44

16QAM_15MHz_ 75 RB_ Left

```
*RBW 300 kHz   Marker 1 [T1 ]
*VBW 1 MHz                -14.04 dBm
Ref  30 dBm      *Att  40 dB    SWT 2.5 ms      1.710000000 GHz
30 Offset  4.5 dB
```

Center 1.71 GHz   3 MHz/   Span 30 MHz
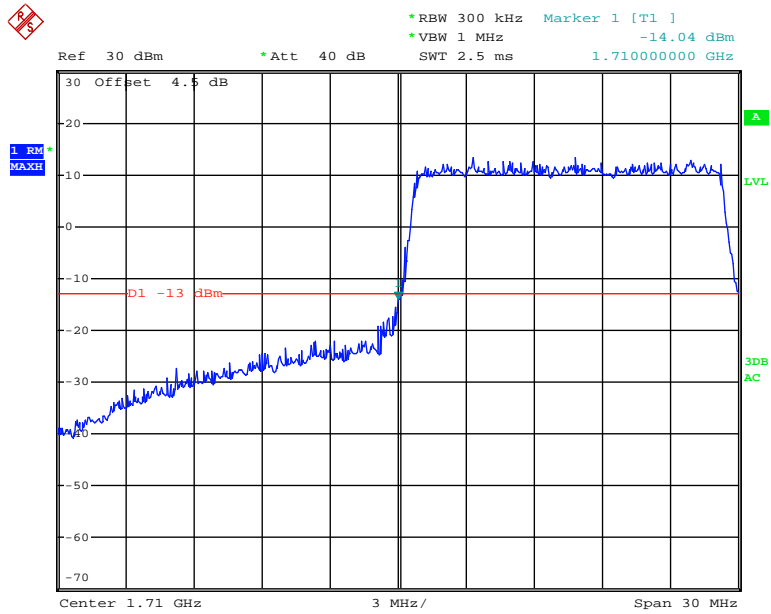
Date: 27.DEC.2018 15:05:24

16QAM_15MHz_ 75 RB_ Right

```
*RBW 300 kHz   Marker 1 [T1 ]
*VBW 1 MHz                -21.57 dBm
Ref  30 dBm      *Att  40 dB    *SWT 100 ms      1.755000000 GHz
30 Offset  4.5 dB
```

Center 1.755 GHz   3 MHz/   Span 30 MHz
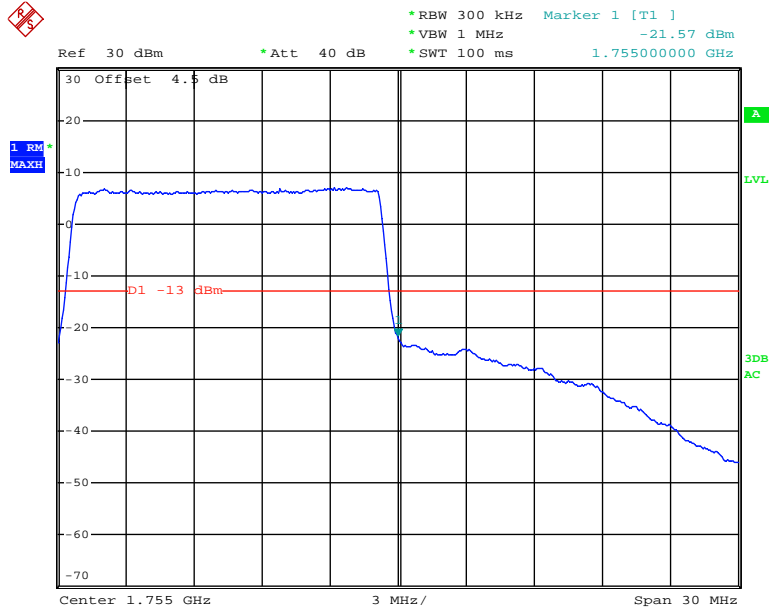
Date: 27.DEC.2018 15:03:05

16QAM_20MHz_ FULL RB_ Left


```
                                    *RBW 300 kHz   Marker 1 [T1 ]
                                    *VBW 1 MHz                 -16.87 dBm
Ref  30 dBm        *Att  40 dB      SWT 2.5 ms        1.710000000 GHz
```
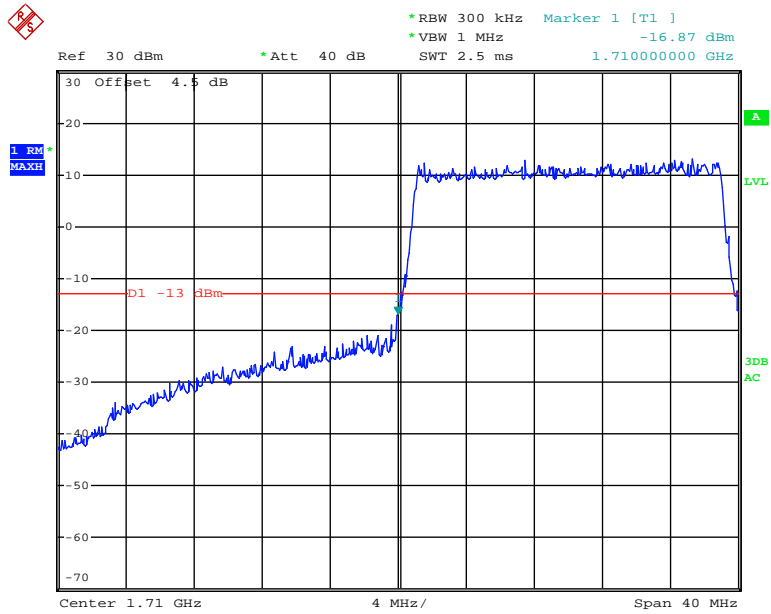
Date: 27.DEC.2018 15:09:10

16QAM_20MHz_ FULL RB_ Right


```
                                    *RBW 300 kHz   Marker 1 [T1 ]
                                    *VBW 1 MHz                 -15.83 dBm
Ref  30 dBm        *Att  40 dB      SWT 2.5 ms        1.755000000 GHz
```
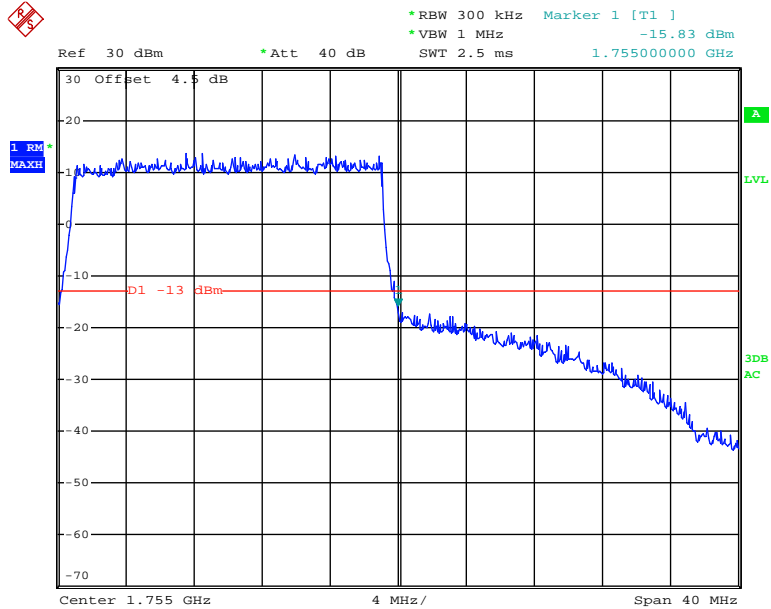
Date: 27.DEC.2018 15:07:23

LTE Band 5

QPSK_1.4MHz_ 6 RB_ Left
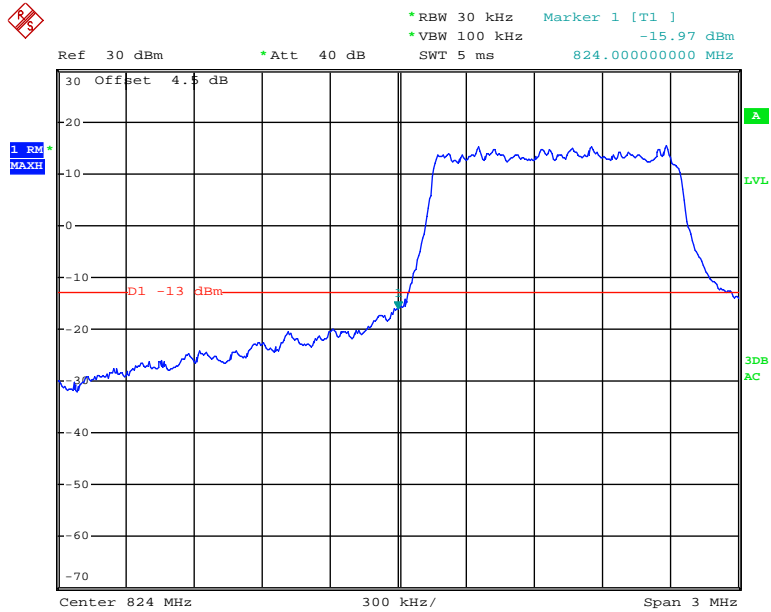
Date: 27.DEC.2018 15:19:06

QPSK_1.4MHz_ 6 RB_ Right
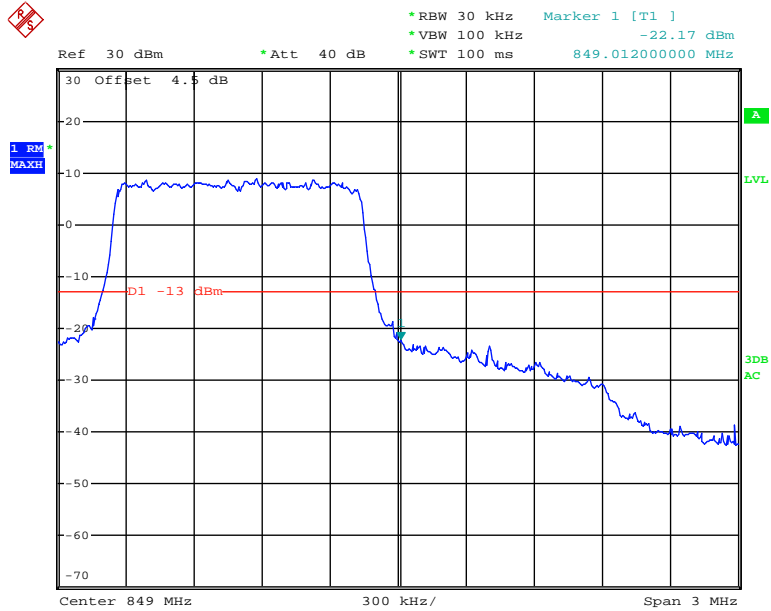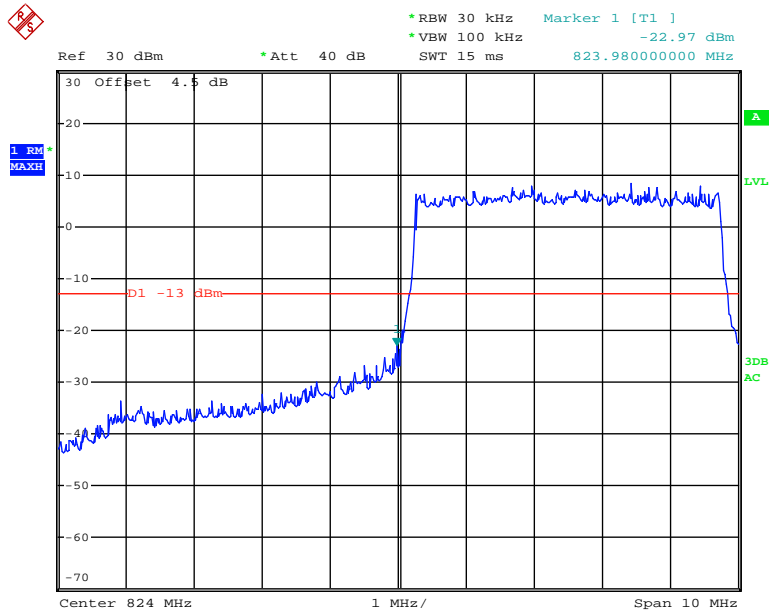

Date: 27.DEC.2018 15:12:40

QPSK_3MHz_ 15 RB_ Left

```
                                    *RBW 30 kHz    Marker 1 [T1 ]
                                    *VBW 100 kHz              -13.73 dBm
         Ref  30 dBm      *Att  40 dB    SWT 10 ms      824.000000000 MHz
```
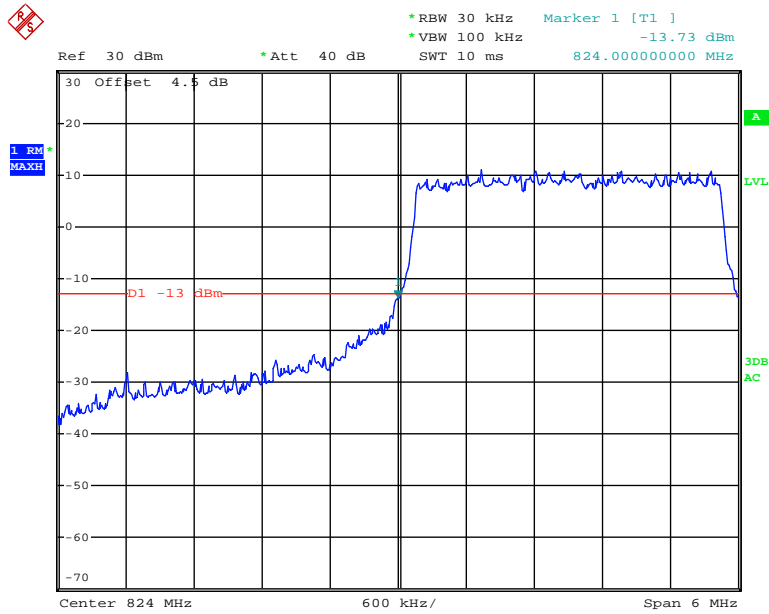
Date: 27.DEC.2018 15:29:02

QPSK_3MHz_ 15 RB_ Right

```
                                    *RBW 30 kHz    Marker 2 [T1 ]
                                    *VBW 100 kHz              -16.02 dBm
         Ref  30 dBm      *Att  40 dB    SWT 10 ms      849.060000000 MHz

                                                    Marker 1 [T1 ]
                                                             -17.75 dBm
                                                    849.000000000 MHz
```
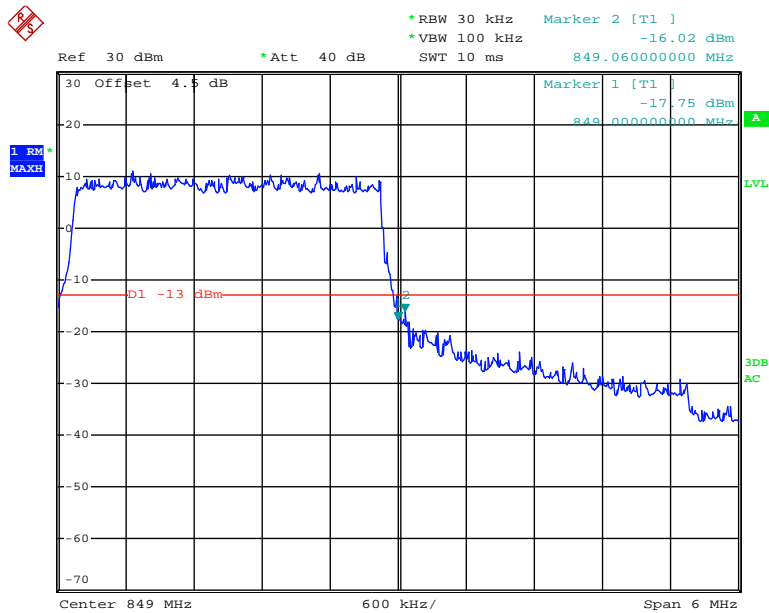
Date: 27.DEC.2018 15:26:11

QPSK_5MHz_ 25 RB_ Left

Date: 27.DEC.2018 15:32:40

QPSK_5MHz_ 25 RB_ Right
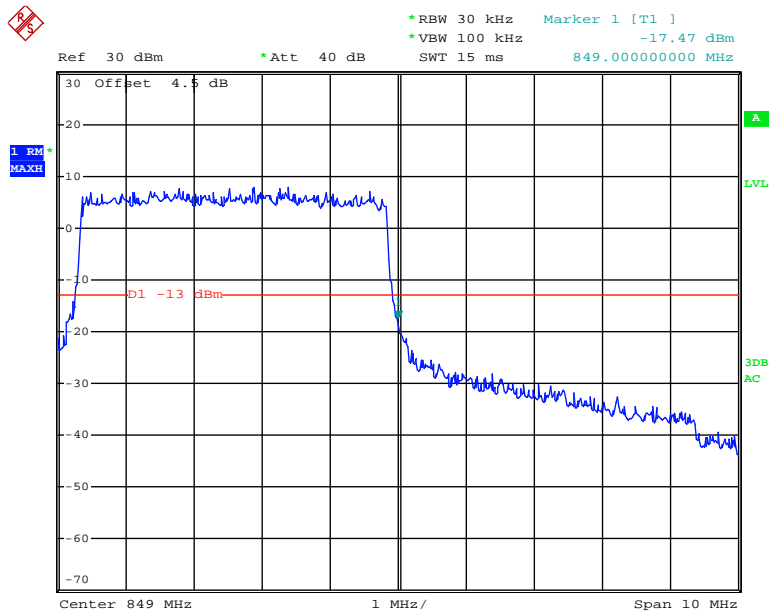
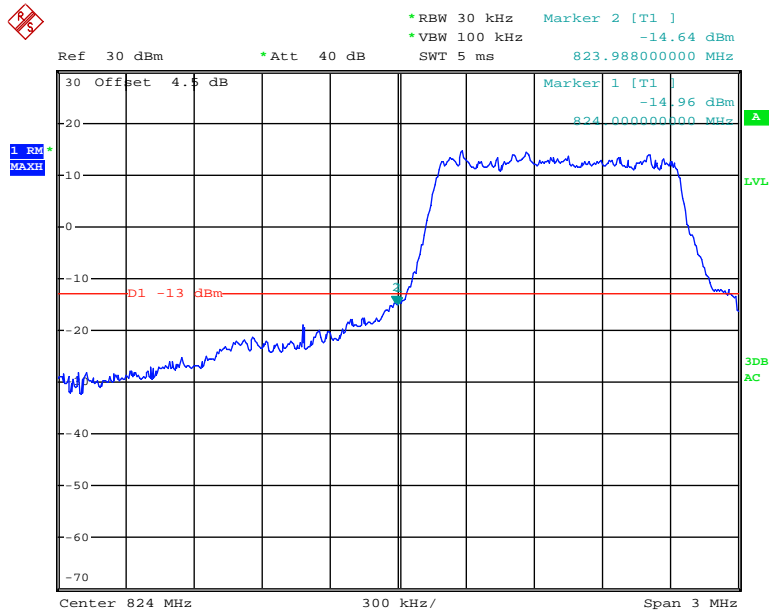Date: 27.DEC.2018 15:30:49

QPSK_10MHz_ 50 RB_ Left

```
                                          *RBW 100 kHz   Marker 1 [T1 ]
                                          *VBW 300 kHz            -18.36 dBm
          Ref  30 dBm          *Att  40 dB   SWT 2.5 ms     824.000000000 MHz
```
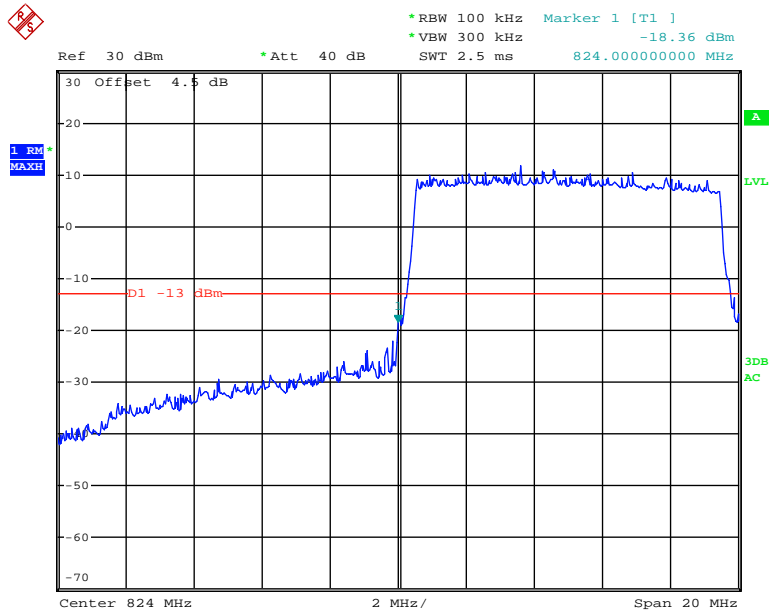
Date: 27.DEC.2018 15:37:43

QPSK_10MHz_ 50 RB_ Right

```
                                          *RBW 100 kHz   Marker 1 [T1 ]
                                          *VBW 300 kHz            -16.25 dBm
          Ref  30 dBm          *Att  40 dB   SWT 2.5 ms     849.000000000 MHz
```
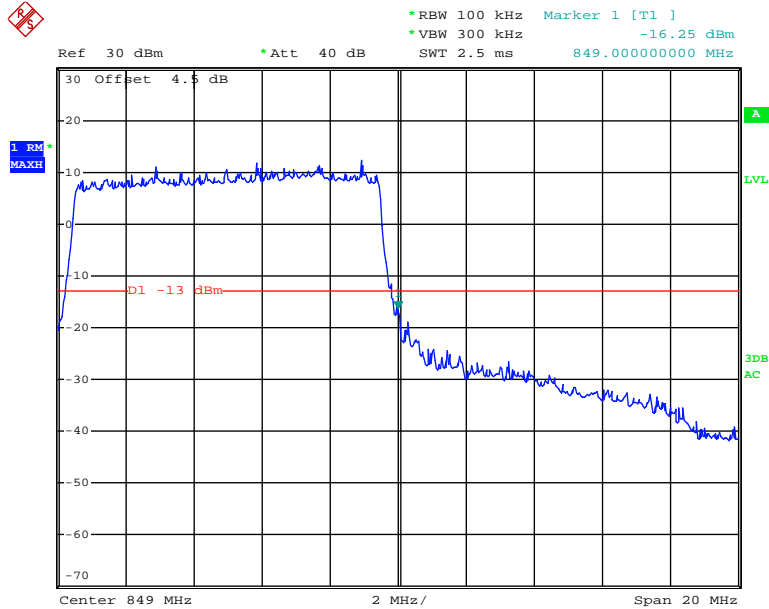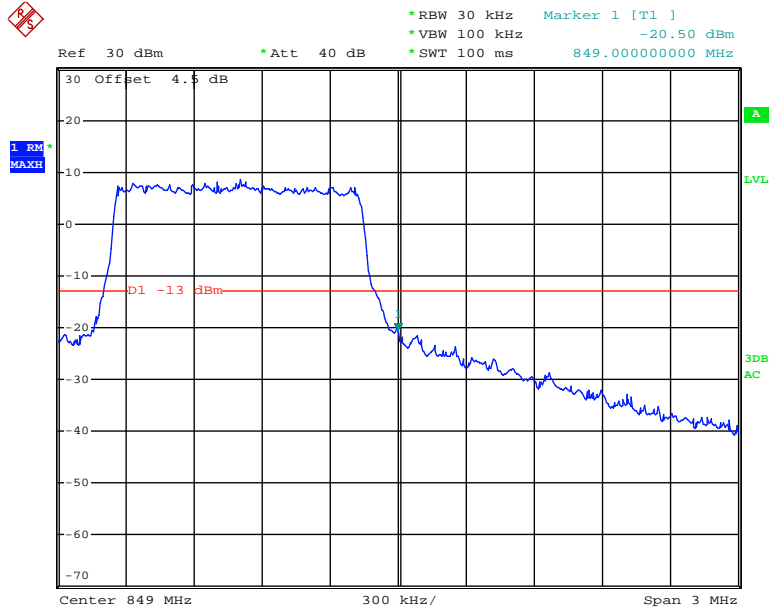
Date: 27.DEC.2018 15:35:56

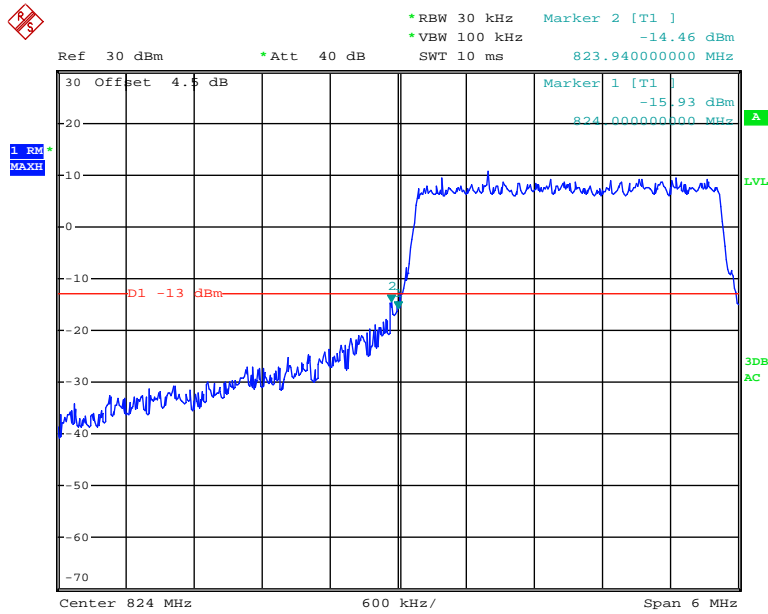**16QAM_1.4MHz_ 6 RB_ Left**

Date: 27.DEC.2018 15:16:50

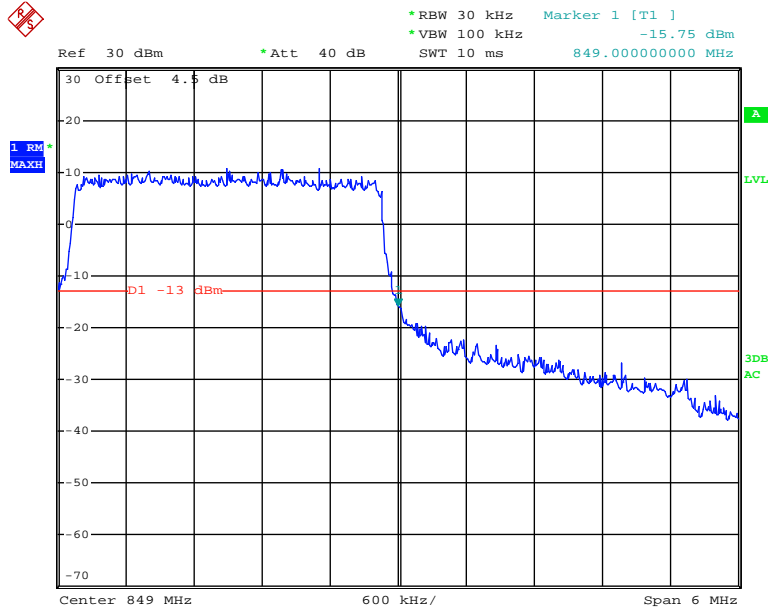**16QAM_1.4MHz_ 6 RB_ Right**

Date: 27.DEC.2018 15:11:54
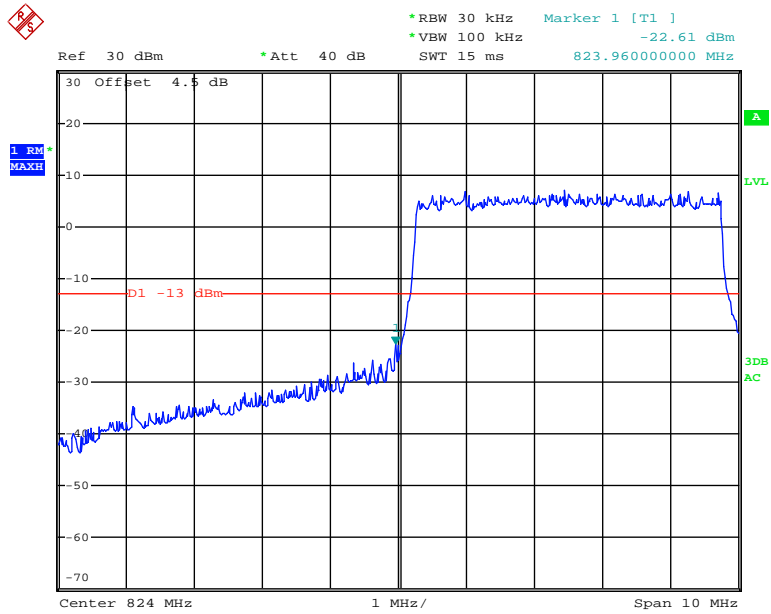
16QAM_3MHz_ 15 RB_ Left

Date: 27.DEC.2018 15:27:39
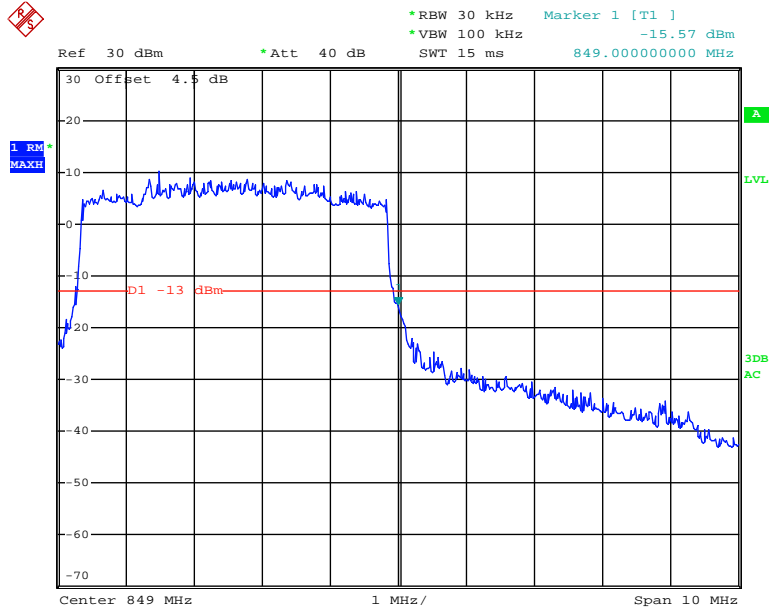
16QAM_3MHz_ 15 RB_ Right

Date: 27.DEC.2018 15:25:30
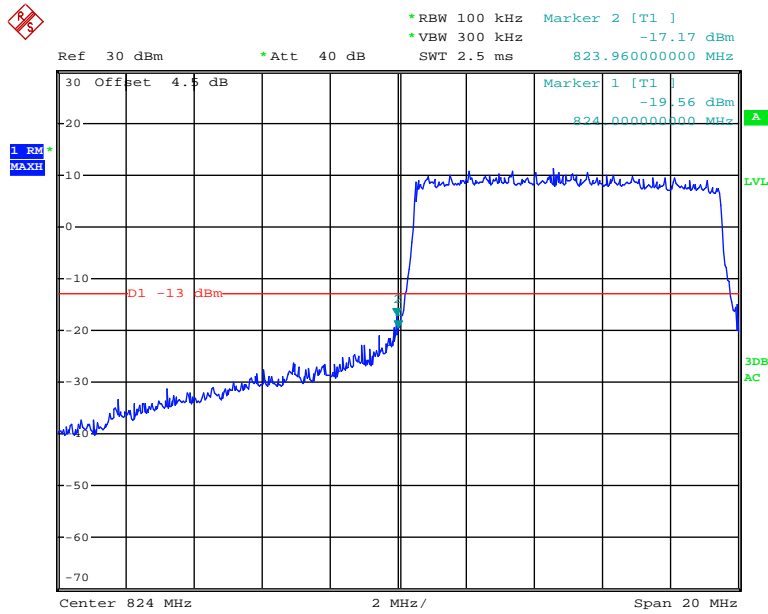
16QAM_5MHz_ 25 RB_ Left
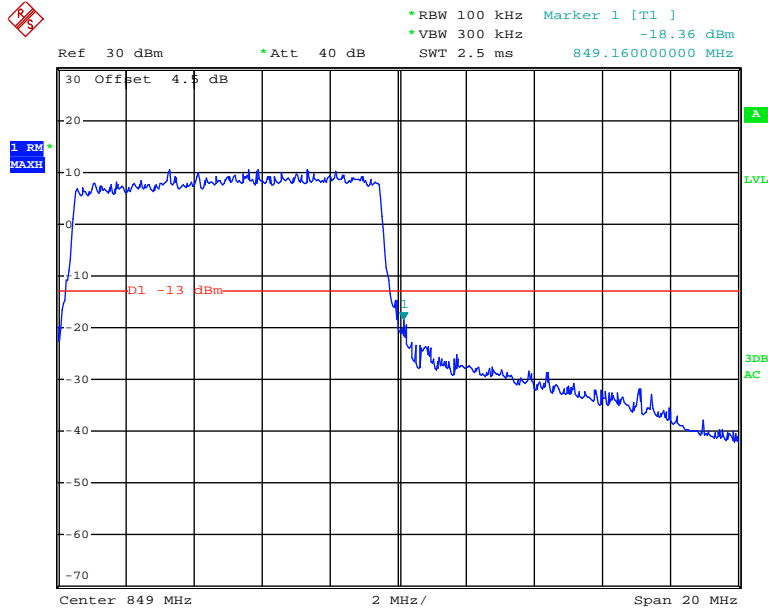

Date: 27.DEC.2018 15:32:02

16QAM_5MHz_ 25 RB_ Right

Date: 27.DEC.2018 15:30:11

16QAM_10MHz_ 50 RB_ Left
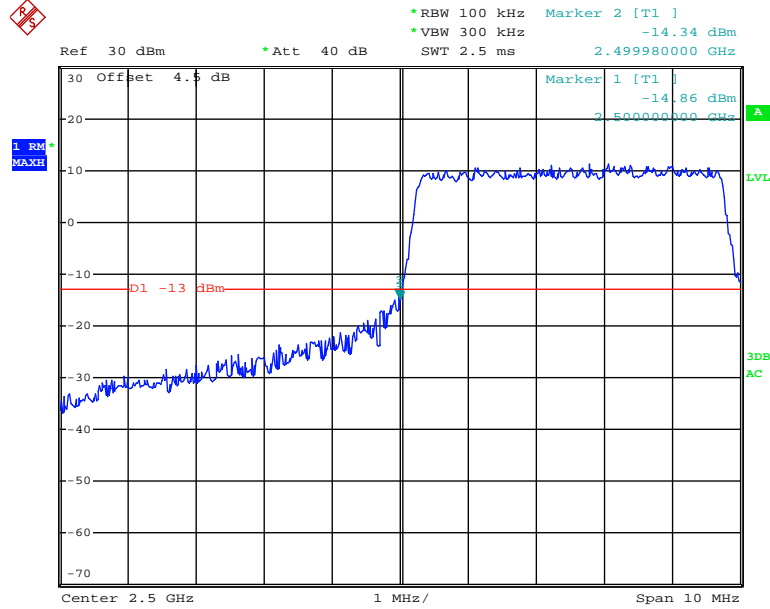

Date: 27.DEC.2018 15:36:59

16QAM_10MHz_ 50 RB_ Right
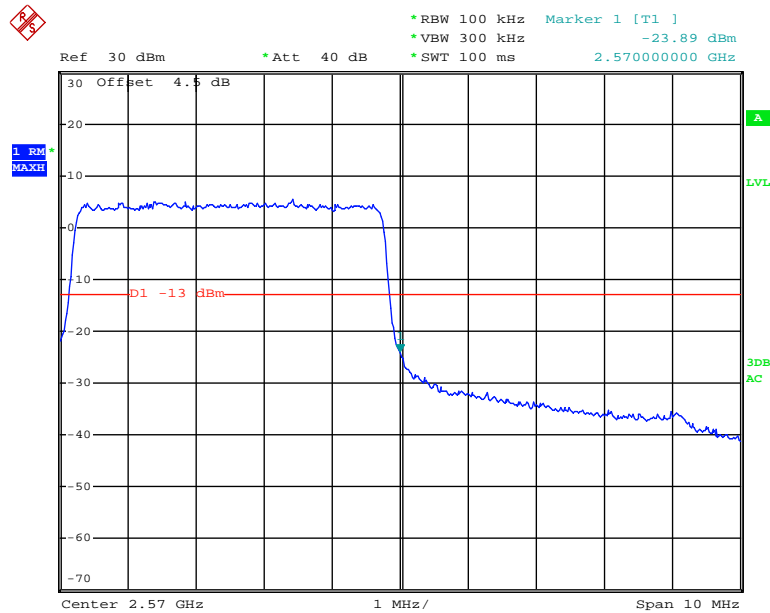

Date: 27.DEC.2018 15:35:10

LTE Band 7
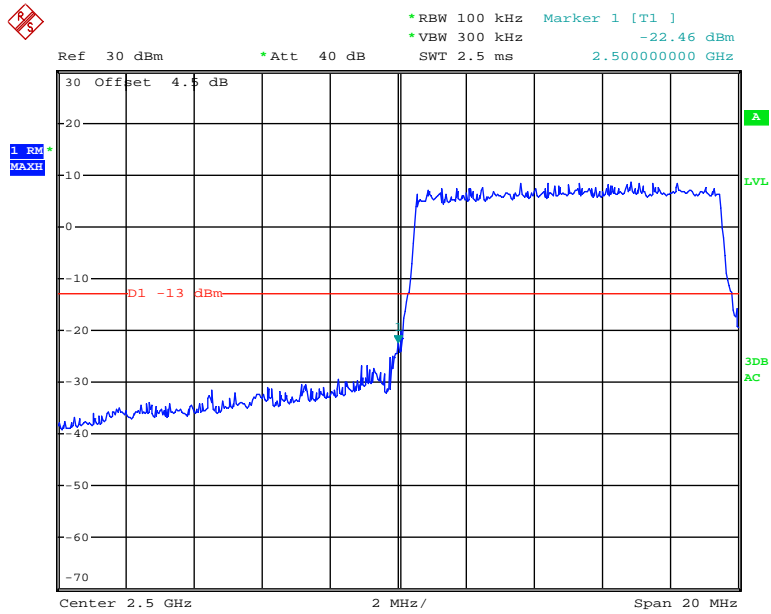
QPSK_5MHz_ 25 RB_ Left


```
                                          *RBW 100 kHz   Marker 2 [T1 ]
                                          *VBW 300 kHz          -14.34 dBm
   Ref  30 dBm            *Att  40 dB     SWT 2.5 ms       2.499980000 GHz
   30  Offset   4.5 dB                             Marker 1 [T1 ]
                                                          -14.86 dBm
  -20                                                 2.500000000 GHz    A
  -10                          ...........................................  LVL
   0
  -10       D1 -13 dBm
  -20
  -30                                                                      3DB
  -40                                                                      AC
  -50
  -60
  -70
   Center 2.5 GHz             1 MHz/              Span 10 MHz
```

Date: 27.DEC.2018 15:42:50

QPSK_5MHz_ 25 RB_ Right


```
                                          *RBW 100 kHz   Marker 1 [T1 ]
                                          *VBW 300 kHz          -23.89 dBm
   Ref  30 dBm            *Att  40 dB     *SWT 100 ms      2.570000000 GHz
   30  Offset   4.5 dB                                                     A
  -20
  -10
   0
  -10       D1 -13 dBm
  -20
  -30                                                                      3DB
  -40                                                                      AC
  -50
  -60
  -70
   Center 2.57 GHz            1 MHz/              Span 10 MHz
```

Date: 27.DEC.2018 15:40:41

QPSK_10MHz_ 50 RB_ Left

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -22.46 dBm
        Ref  30 dBm      *Att  40 dB   SWT 2.5 ms       2.500000000 GHz
```

30 Offset 4.5 dB

A

1 RM
MAXH

LVL

D1 -13 dBm

3DB
AC

Center 2.5 GHz   2 MHz/   Span 20 MHz

Date: 27.DEC.2018 15:49:55

QPSK_10MHz_ 50 RB_ Right

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -17.92 dBm
        Ref  30 dBm      *Att  40 dB   SWT 2.5 ms       2.570000000 GHz
```

30 Offset 4.5 dB

A

1 RM
MAXH

LVL

D1 -13 dBm

3DB
AC

Center 2.57 GHz   2 MHz/   Span 20 MHz
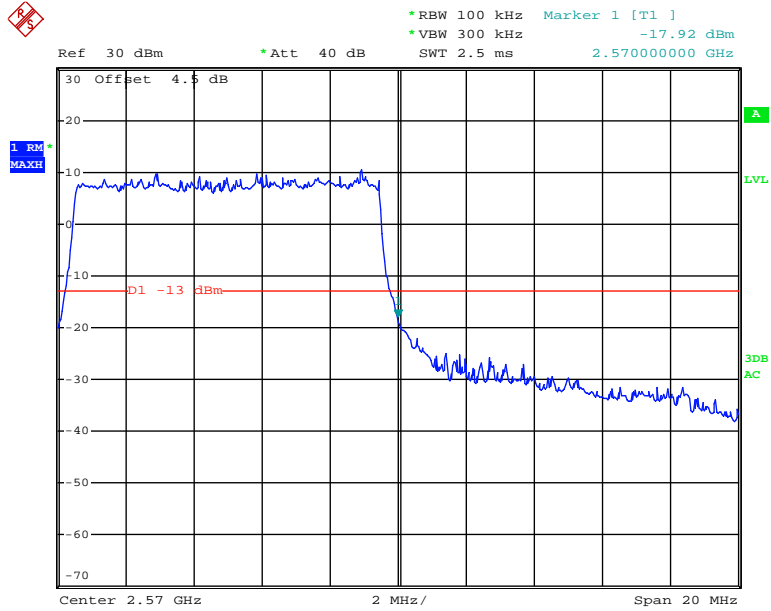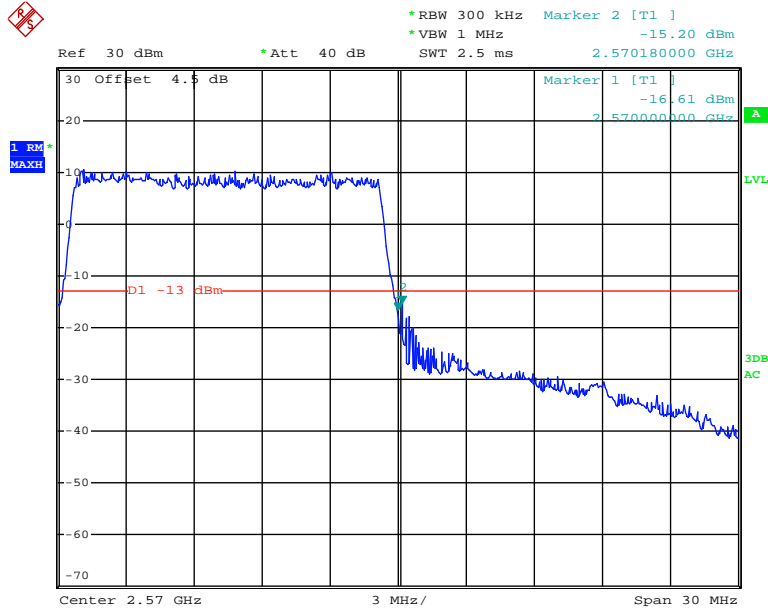
Date: 27.DEC.2018 15:47:47
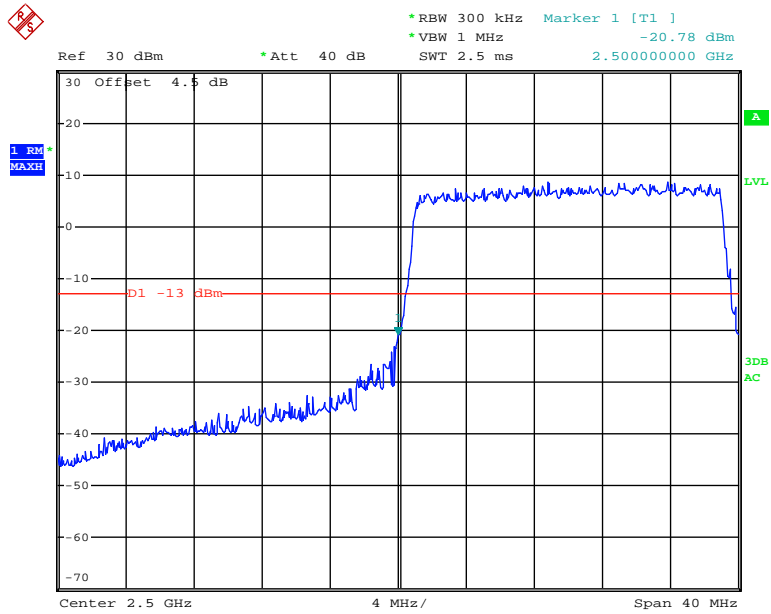
QPSK_15MHz_ 75 RB_ Left
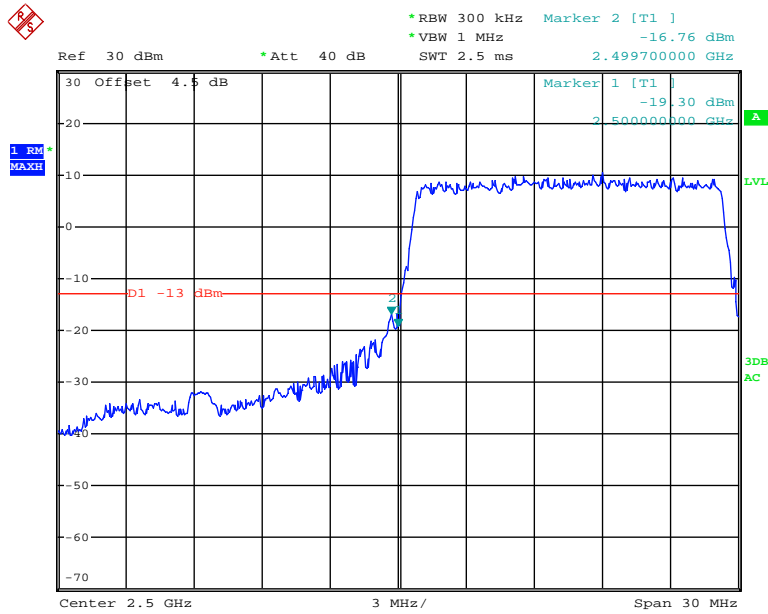
Date: 27.DEC.2018 15:53:41
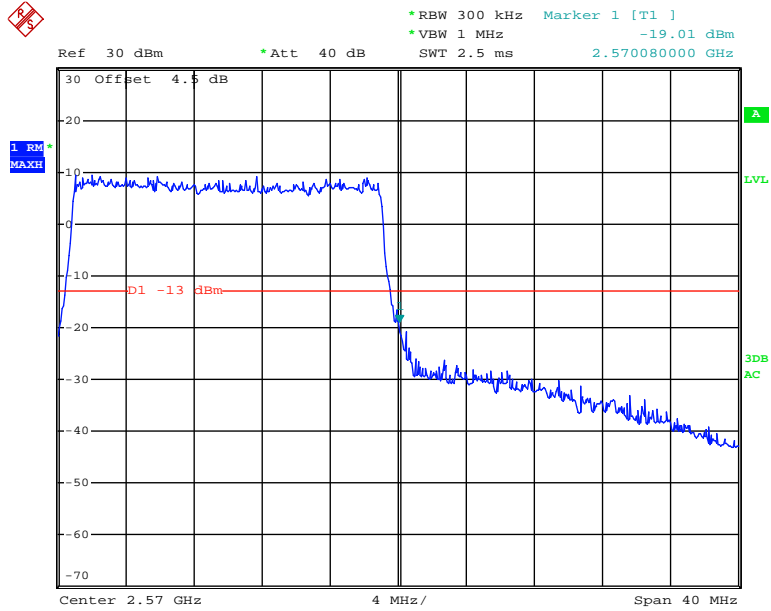
QPSK_15MHz_ 75 RB_ Right
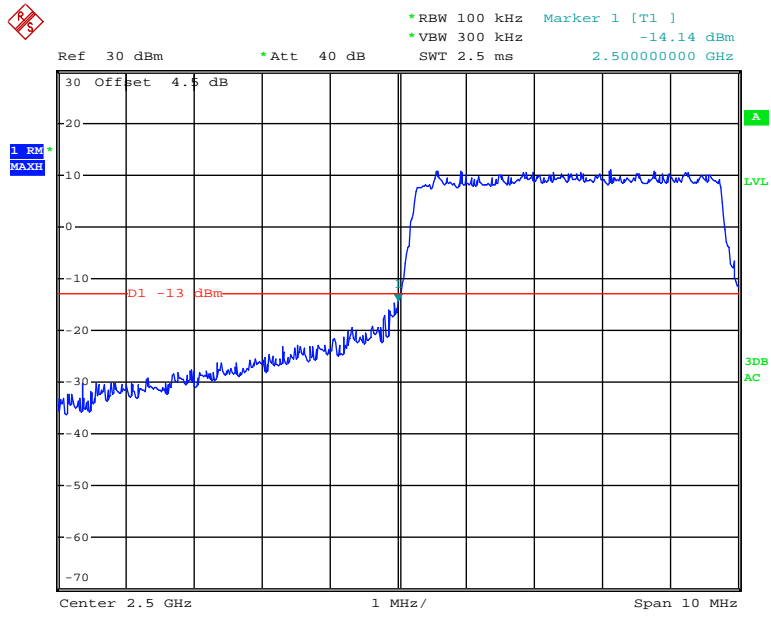

Date: 27.DEC.2018 15:51:44

QPSK_20MHz_ FULL RB_ Left

Date: 27.DEC.2018 16:06:22

QPSK_20MHz_ FULL RB_ Right

Date: 27.DEC.2018 15:56:05

16QAM_5MHz_ 25 RB_ Left

```
                                        *RBW 100 kHz   Marker 1 [T1 ]
                                        *VBW 300 kHz              -14.14 dBm
       Ref  30 dBm          *Att  40 dB  SWT 2.5 ms       2.500000000 GHz
       30 Offset  4.5 dB                                                    A
```

Date: 27.DEC.2018 15:41:47

16QAM_5MHz_ 25 RB_ Right

```
                                        *RBW 100 kHz   Marker 1 [T1 ]
                                        *VBW 300 kHz              -21.90 dBm
       Ref  30 dBm          *Att  40 dB  *SWT 100 ms      2.570000000 GHz
       30 Offset  4.5 dB                                                    A
```
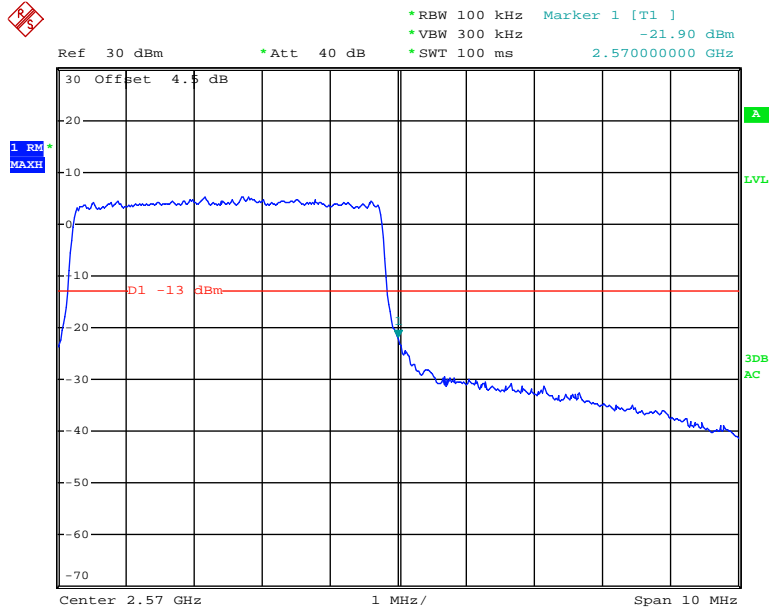
Date: 27.DEC.2018 15:39:52

16QAM_10MHz_ 50 RB_ Left

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz           -19.93 dBm
        Ref  30 dBm      *Att  40 dB   SWT 2.5 ms      2.500000000 GHz
```
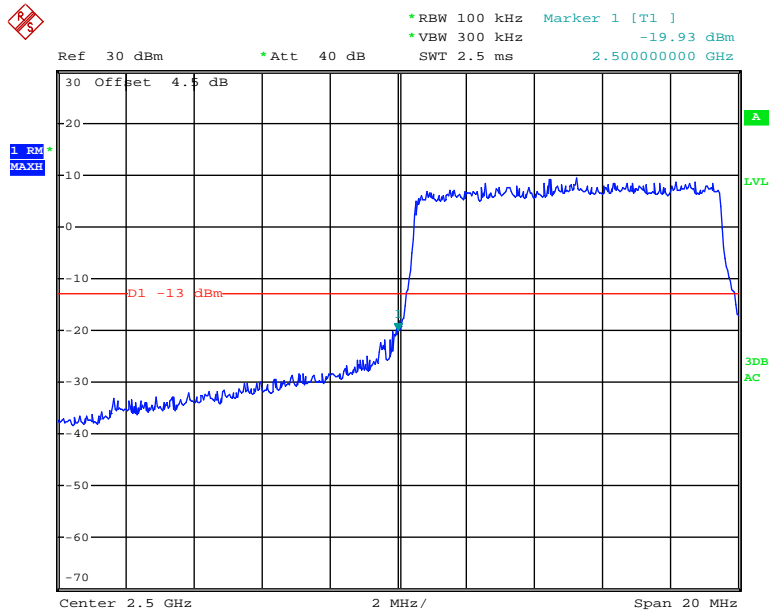
Date: 27.DEC.2018 15:49:17

16QAM_10MHz_ 50 RB_ Right

```
                                    *RBW 100 kHz   Marker 2 [T1 ]
                                    *VBW 300 kHz           -17.48 dBm
        Ref  30 dBm      *Att  40 dB   SWT 2.5 ms      2.570040000 GHz
                                                   Marker 1 [T1 ]
                                                          -19.12 dBm
                                                   2.570000000 GHz
```
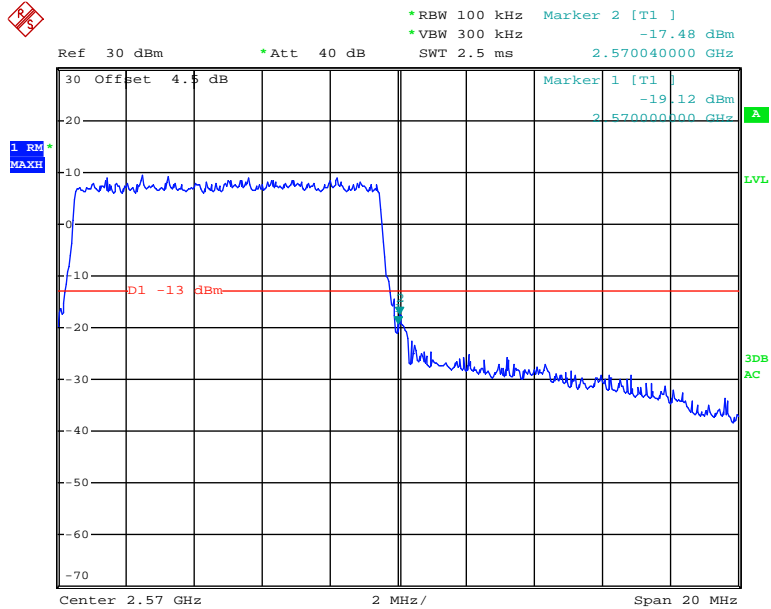
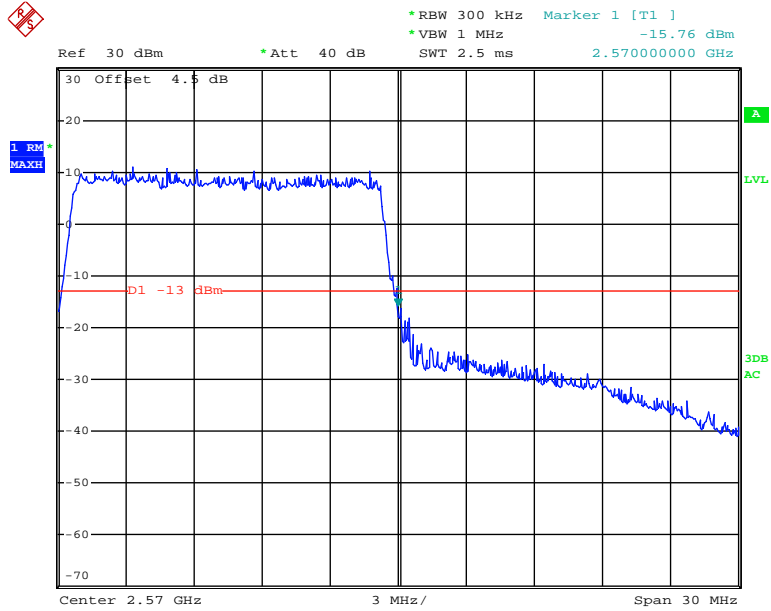Date: 27.DEC.2018 15:44:39
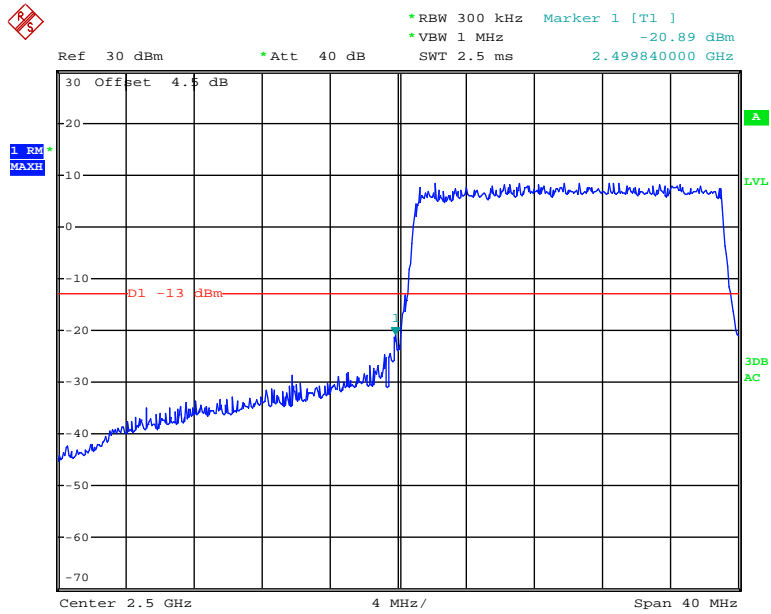
16QAM_15MHz_ 75 RB_ Left
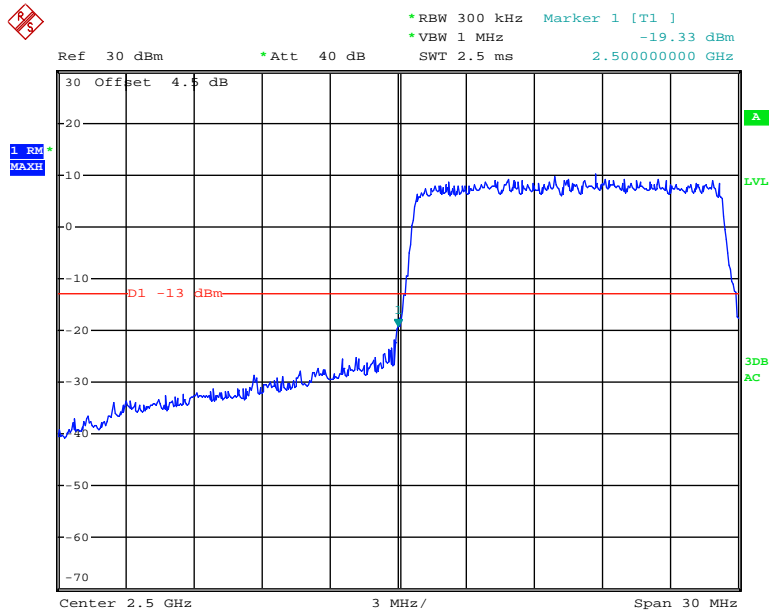
Date: 27.DEC.2018 15:52:44
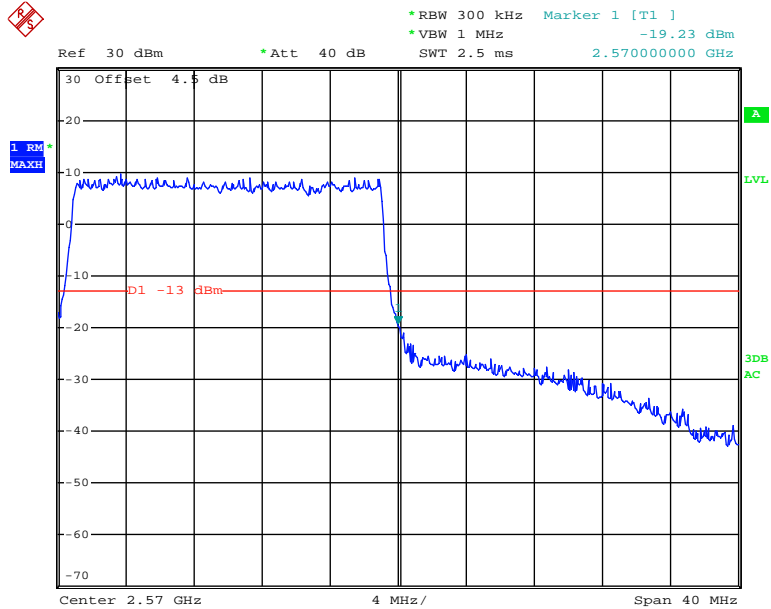
16QAM_15MHz_ 75 RB_ Right

Date: 27.DEC.2018 15:51:00

16QAM_20MHz_ FULL RB_ Left

Date: 27.DEC.2018 15:56:59

16QAM_20MHz_ FULL RB_ Right

Date: 27.DEC.2018 15:55:17

FCC §2.1055, §22.355 & §24.235 & §27.54 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235, §27.54

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

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

Test Procedure

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

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

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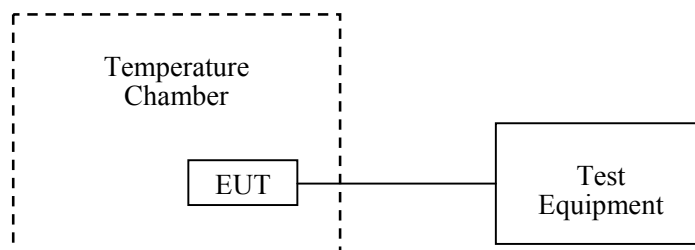
Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	110479	2018-12-10	2019-12-10
R&S	Universal Radio Communication Tester	CMU200	106 891	2018-12-14	2019-12-14
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2018-03-26	2019-03-26
UNI-T	Multimeter	UT39A	M130199938	2018-07-24	2019-07-24
R&S	EMI Test Receiver	ESCI	101121	2018-03-23	2019-03-23
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:	24.9~25.4°C
Relative Humidity:	38~47 %
ATM Pressure:	100.2~100.9 kPa

The testing was performed by Carrie He from 2018-12-27 to 2018-12-28.

Cellular Band (Part 22H)

GMSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	Hz	ppm	ppm
-30		-6	-0.00717	
-20		-7	-0.00837	
-10		-5	-0.00598	
0		1	0.00120	
10	3.7	0	0.00000	
20		-5	-0.00598	2.5
30		-1	-0.00120	
40		-1	-0.00120	
50		5	0.00598	
20	3.5	1	0.00120	
20	4.2	-5	-0.00598	

8PSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	Hz	ppm	ppm
-30		-3	-0.00359	
-20		-2	-0.00239	
-10		-3	-0.00359	
0		-1	-0.00120	
10	3.7	-4	-0.00478	
20		-1	-0.00120	2.5
30		-2	-0.00239	
40		-4	-0.00478	
50		-3	-0.00359	
20	3.5	-4	-0.00478	
20	4.2	-5	-0.00598	

PCS Band (Part 24E)

GMSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
℃	V_{DC}	Hz	ppm	
-30		-5	-0.00266	
-20		1	0.00053	
-10		-9	-0.00479	
0		-4	-0.00213	
10	3.7	-9	-0.00479	
20		-5	-0.00266	Pass
30		-11	-0.00585	
40		-8	-0.00426	
50		-7	-0.00372	
20	3.5	-2	-0.00106	
20	4.2	-1	-0.00053	

8PSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
℃	V_{DC}	Hz	ppm	
-30		-20	-0.01064	
-20		-11	-0.00585	
-10		-11	-0.00585	
0		-23	-0.01223	
10	3.7	-18	-0.00957	
20		-10	-0.00532	Pass
30		-19	-0.01011	
40		-17	-0.00904	
50		-19	-0.01011	
20	3.5	-20	-0.01064	
20	4.2	-10	-0.00532	

WCDMA Band II: R99

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	V_{DC}	Hz	ppm	
-30		1	0.00053	
-20		-3	-0.00160	
-10		-10	-0.00532	
0		-4	-0.00213	
10	3.7	0	0.00000	
20		3	0.00160	Pass
30		-2	-0.00106	
40		2	0.00106	
50		1	0.00053	
20	3.5	-1	-0.00053	
20	4.2	-2	-0.00106	

WCDMA Band Ⅴ: R99

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V_{DC}	Hz	ppm	ppm
-30		0	0.00000	
-20		-3	-0.00359	
-10		1	0.00120	
0		3	0.00359	
10	3.7	-2	-0.00239	
20		4	0.00478	2.5
30		1	0.00120	
40		-3	-0.00359	
50		-1	-0.00120	
20	3.5	0	0.00000	
20	4.2	-4	-0.00478	

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		18.31	0.0097	
-20		18.29	0.0097	
-10		17.89	0.0095	
0		17.65	0.0094	
10	3.7	18.40	0.0098	
20		18.29	0.0097	Pass
30		18.14	0.0096	
40		18.22	0.0097	
50		18.41	0.0098	
20	3.5	18.35	0.0098	
20	4.2	18.27	0.0097	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30		-32.36	-0.0172	
-20		-32.31	-0.0172	
-10		-32.29	-0.0172	
0		-32.27	-0.0172	
10	3.7	-32.33	-0.0172	
20		-32.38	-0.0172	Pass
30		-32.11	-0.0171	
40		-32.22	-0.0171	
50		-32.41	-0.0172	
20	3.5	-32.41	-0.0172	
20	4.2	-32.24	-0.0171	

LTE Band 4:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30		1710.519457	1754.5224010	1710	1755
-20		1710.519891	1754.5213130	1710	1755
-10		1710.519211	1754.5192140	1710	1755
0		1710.521331	1754.5245610	1710	1755
10	3.7	1710.521345	1754.5223500	1710	1755
20		1710.520000	1754.4800000	1710	1755
30		1710.520110	1754.5213454	1710	1755
40		1710.519211	1754.5213825	1710	1755
50		1710.520312	1754.5215346	1710	1755
20	3.5	1710.521242	1754.5220810	1710	1755
20	4.2	1710.521212	1754.5201244	1710	1755

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30		1710.510131	1754.475801	1710	1755
-20		1710.510453	1754.501832	1710	1755
-10		1710.520211	1754.490454	1710	1755
0		1710.507900	1754.485361	1710	1755
10	3.7	1710.519854	1754.484280	1710	1755
20		1710.520000	1754.480000	1710	1755
30		1710.518902	1754.491234	1710	1755
40		1710.519942	1754.486020	1710	1755
50		1710.510242	1754.498026	1710	1755
20	3.5	1710.525301	1754.476901	1710	1755
20	4.2	1710.519411	1754.493434	1710	1755

LTE Band 5:

Middle Channel, f_c = 836.5 MHz, Channel Bandwidth:10MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30		27.52	0.0329	
-20		27.44	0.0328	
-10		27.38	0.0327	
0		27.59	0.0330	
10	3.7	27.28	0.0326	
20		27.64	0.0330	2.5
30		27.12	0.0324	
40		27.71	0.0331	
50		27.01	0.0323	
20	3.5	27.74	0.0332	
20	4.2	27.43	0.0328	

Middle Channel, f_c = 836.5 MHz, Channel Bandwidth:10MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30		31.54	0.0377	
-20		31.01	0.0371	
-10		31.48	0.0376	
0		31.38	0.0375	
10	3.7	31.24	0.0373	
20		31.81	0.0380	2.5
30		31.56	0.0377	
40		31.29	0.0374	
50		31.27	0.0374	
20	3.5	31.71	0.0379	
20	4.2	31.14	0.0372	

LTE Band 7:

QPSK, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_DC	F_L	F_H	F_L	F_H
-30		2500.506922	2569.486251	2500	2570
-20		2500.511922	2569.485221	2500	2570
-10		2500.497922	2569.496421	2500	2570
0		2500.504922	2569.490042	2500	2570
10	3.7	2500.499422	2569.498834	2500	2570
20		2500.520000	2569.480000	2500	2570
30		2500.512922	2569.498742	2500	2570
40		2500.498922	2569.481743	2500	2570
50		2500.511922	2569.484004	2500	2570
20	3.5	2500.514422	2569.482835	2500	2570
20	4.2	2500.512922	2569.490401	2500	2570

16QAM, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	V_DC	F_L	F_H	F_L	F_H
-30		2500.506933	2569.542301	2500	2570
-20		2500.511933	2569.521521	2500	2570
-10		2500.497933	2569.515896	2500	2570
0		2500.504933	2569.518241	2500	2570
10	3.7	2500.499433	2569.519803	2500	2570
20		2500.520000	2569.520000	2500	2570
30		2500.520244	2569.518501	2500	2570
40		2500.521425	2569.530041	2500	2570
50		2500.519901	2569.525810	2500	2570
20	3.5	2500.519973	2569.520432	2500	2570
20	4.2	2500.520102	2569.519791	2500	2570

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 *****