TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 22H, PART 24E,PART 27

MEASUREMENT AND TEST REPORT

For

Sun Cupid Technology (HK) Ltd.

16/F, CEO Tower, 77 Wing Hong St,Cheung Sha Wan, Kowloon,Hong Kong

FCC ID: 2ADINN5002L

Report Type:	**Product Type:**
Original Report	LTE Mobile Phone

Report Number:	RDG190125001-00D
Report Date:	2019-03-11
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:		LTE Mobile Phone
EUT Model:		N5002L
Multiple Model:		A7L
Operation modes:		GSM Voice, GPRS/EDGE Data, WCDMA(R99 (Voice+Data), HSDPA/HSUPA/HSPA+), FDD-LTE
Operation Frequency:		GSM 850: 824-849 MHz(TX); 869-894 MHz(RX) PCS 1900: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) WCDMA Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) LTE Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) LTE Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 7: 2500-2570 MHz(TX) ; 2620-2690 MHz(RX) LTE Band 12: 699-716 MHz(TX); 729-746 MHz(RX) LTE Band 17: 704-716 MHz(TX); 734-746 MHz(RX)
Maximum Output Power: (Conducted)		GSM 850 : 32.20 dBm; PCS 1900: 29.20 dBm WCDMA Band 2: 21.36 dBm; WCDMA Band 4: 21.48 dBm WCDMA Band 5: 22.81 dBm LTE Band 2: 21.45 dBm; LTE Band 4: 21.57 dBm LTE Band 5: 22.53 dBm; LTE Band 7: 23.04 dBm LTE Band 12: 24.47 dBm; LTE Band 17: 24.00 dBm
Modulation Type:		GMSK, 8PSK, QPSK, 16QAM
Rated Input Voltage:		DC3.8V from Battery or DC5V from adapter
Adapter Information	**Model:**	HJ-0501000E1-US
	Input:	AC 100-240V, 50/60Hz, 0.2A
	Output:	DC5V, 1000mA
External Dimension:		141.5mm(L)* 66.8mm(W)*9mm(H)
Serial Number:		190125001
EUT Received Date:		2019.01.28

Note: The series product model A7L is electrically identical with model N5002L, we selected N5002L for fully testing, the differences details was explained in the declaration letter.

Objective

This report is prepared on behalf of ***Sun Cupid Technology (HK) Ltd.*** 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: 2ADINN5002L.
FCC Part 15C DSS submissions with FCC ID: 2ADINN5002L.
FCC Part 15E NII submissions with FCC ID: 2ADINN5002L.

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.

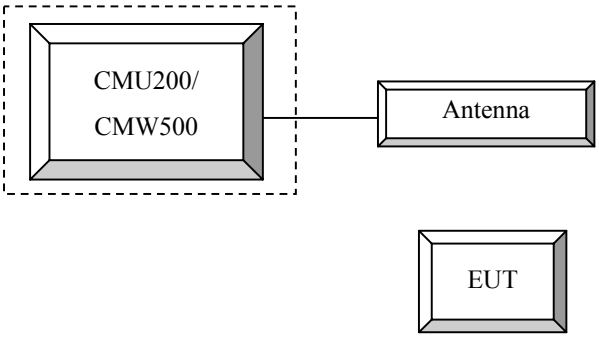
Equipment Modifications

No modification was made to the EUT.

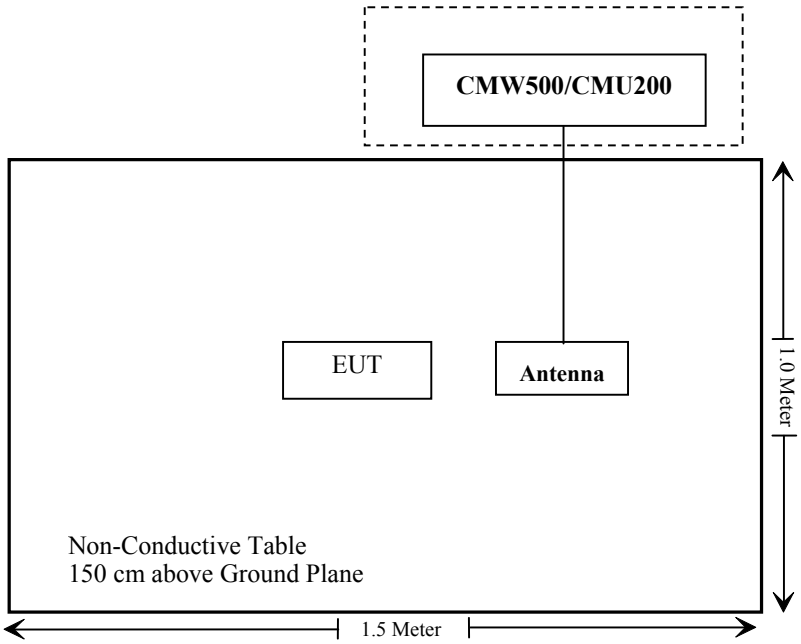
Support Equipment List and Details

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

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
FCC§1.1310, §2.1093	RF Exposure	Compliance
FCC§2.1046;§ 22.913 (a); § 24.232 (c);§27.50	RF Output Power	Compliance
FCC§ 2.1047	Modulation Characteristics	Not Applicable
FCC§ 2.1049; § 22.905 § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
FCC§ 2.1051, § 22.917 (a); § 24.238 (a); §27.53;	Spurious Emissions at Antenna Terminal	Compliance
FCC§ 2.1053 § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliance
FCC§ 22.917 (a); § 24.238 (a); §27.53;	Out of band emission, Band Edge	Compliance
FCC§ 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: RDG190125001-20A.

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

HSPA+

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

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

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

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

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

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

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

DC-HSDPA

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

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

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

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

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

LTE (FDD):

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

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

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

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

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

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

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

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

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

Radiated method:

ANSI/TIA-603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-10	2019-12-10
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	Not Required	/
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2018-05-06	2019-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
R&S	Spectrum Analyzer	FSP 38	100478	2018-12-10	2019-12-10
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
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

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

Test Data

Environmental Conditions

Temperature:	23.5~25.5°C
Relative Humidity:	40~62 %
ATM Pressure:	100.1~101.6 kPa

** The testing was performed by Neil Liao, Tyler Pan, Vern Shen, Elena Lei, Blake Yang on 2019-01-29~2019-03-07.*

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	32.1	32.09	31.09	28.97	27.76	25.61	24.49	22.35	20.98
	190	32.2	32.11	31.12	29.01	27.82	25.69	24.61	22.51	21.07
	251	32.1	32.07	31.05	28.94	27.73	25.74	24.66	22.56	21.11
PCS	512	29.1	29.13	28.17	26.16	25.18	25.04	23.97	21.81	20.53
	661	29.2	29.14	28.19	26.21	25.22	24.95	23.92	21.76	20.48
	810	29.1	29.12	28.15	26.17	25.17	24.72	23.89	21.68	20.24

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	21.34	3.11	21.36	2.95	21.31	2.85
HSDPA	1	18.74	3.56	18.82	4.21	18.51	3.65
	2	18.67	3.62	18.75	4.21	18.49	3.65
	3	18.83	3.54	18.91	4.22	18.59	3.72
	4	18.72	3.60	18.88	4.25	18.45	3.70
HSUPA	1	18.55	4.29	18.53	3.65	18.44	3.59
	2	18.65	4.26	18.43	3.58	18.53	3.67
	3	18.46	4.26	18.57	3.66	18.53	3.56
	4	18.60	4.28	18.47	3.63	18.50	3.65
	5	18.47	4.27	18.45	3.65	18.37	3.51
HSPA+ (16QAM)	1	18.48	4.35	18.60	3.69	18.53	3.54

WCDMA Band IV

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	21.45	3.04	21.48	3.11	21.37	3.21
HSDPA	1	18.72	3.78	18.78	4.29	18.56	4.07
	2	18.73	3.80	18.77	4.38	18.54	4.02
	3	18.66	3.84	18.82	4.20	18.64	4.16
	4	18.70	3.72	18.78	4.37	18.64	4.09
HSUPA	1	18.56	3.58	18.64	4.36	18.47	4.27
	2	18.50	3.57	18.70	4.35	18.50	4.26
	3	18.58	3.49	18.73	4.38	18.53	4.24
	4	18.59	3.61	18.60	4.29	18.38	4.37
	5	18.63	3.58	18.72	4.31	18.44	4.36
HSPA+ (16QAM)	1	18.59	3.67	18.55	4.40	18.51	4.23

WCDMA Band V

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.81	2.56	22.78	2.08	22.79	2.31
HSDPA	1	20.35	3.65	20.21	3.49	20.24	2.72
	2	20.35	3.6	20.25	3.5	20.23	2.77
	3	20.31	3.67	20.29	3.58	20.18	2.63
	4	20.28	3.58	20.18	3.4	20.3	2.79
HSUPA	1	20.44	3.82	20.32	3.14	20.38	3.04
	2	20.42	3.81	20.38	3.18	20.29	2.95
	3	20.5	3.84	20.26	3.12	20.43	3.07
	4	20.42	3.88	20.27	3.21	20.37	3.13
	5	20.51	3.76	20.27	3.17	20.35	3.1
HSPA+ (16QAM)	1	20.45	3.87	20.4	3.22	20.41	2.95

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	21.24	21.21	21.22
		RB1#3	21.40	21.44	21.37
		RB1#5	21.26	21.20	21.22
		RB3#0	21.34	21.34	21.32
		RB3#3	21.46	21.32	21.35
		RB6#0	20.24	20.28	20.26
	16QAM	RB1#0	20.23	20.20	20.33
		RB1#3	20.46	20.40	20.54
		RB1#5	20.32	20.23	20.29
		RB3#0	20.45	20.50	20.30
		RB3#3	20.47	20.54	20.33
		RB6#0	19.32	19.32	19.33
3MHz	QPSK	RB1#0	21.27	21.28	21.33
		RB1#8	21.27	21.28	21.26
		RB1#14	21.24	21.27	21.28
		RB6#0	20.22	20.23	20.16
		RB6#9	20.23	20.17	20.21
		RB15#0	20.29	20.24	20.26
	16QAM	RB1#0	20.78	20.36	20.23
		RB1#8	20.84	20.37	20.24
		RB1#14	20.82	20.37	20.23
		RB6#0	19.34	19.28	19.19
		RB6#9	19.34	19.24	19.18
		RB15#0	19.44	19.28	19.37
5MHz	QPSK	RB1#0	21.19	21.20	21.17
		RB1#13	21.31	21.30	21.29
		RB1#24	21.25	21.25	21.19
		RB15#0	20.35	20.31	20.40
		RB15#10	20.36	20.27	20.26
		RB25#0	20.30	20.30	20.27
	16QAM	RB1#0	20.06	20.44	20.15
		RB1#13	20.22	20.53	20.33
		RB1#24	20.15	20.53	20.23
		RB15#0	19.44	19.36	19.42
		RB15#10	19.48	19.34	19.32
		RB25#0	19.44	19.34	19.36

10MHz	QPSK	RB1#0	21.16	21.21	21.21
		RB1#25	21.45	21.41	21.42
		RB1#49	21.27	21.29	21.23
		RB25#0	20.37	20.39	20.27
		RB25#25	20.41	20.30	20.10
		RB50#0	20.38	20.82	20.21
	16QAM	RB1#0	20.79	20.65	20.25
		RB1#25	20.98	20.90	20.42
		RB1#49	20.77	20.83	20.33
		RB25#0	19.49	19.48	19.31
		RB25#25	19.57	19.39	19.20
		RB50#0	19.43	19.42	19.25
15MHz	QPSK	RB1#0	21.12	21.18	21.21
		RB1#38	21.28	21.27	21.31
		RB1#74	21.24	21.21	21.20
		RB36#0	20.32	20.43	20.37
		RB36#39	20.46	20.35	20.24
		RB75#0	20.44	20.44	20.31
	16QAM	RB1#0	20.72	20.21	20.50
		RB1#38	20.81	20.35	20.47
		RB1#74	20.64	20.35	20.53
		RB36#0	19.41	19.45	19.32
		RB36#39	19.48	19.37	19.23
		RB75#0	19.45	19.40	19.26
20MHz	QPSK	RB1#0	21.01	21.05	20.96
		RB1#50	21.44	21.43	21.41
		RB1#99	21.09	21.10	20.98
		RB50#0	20.28	20.32	20.17
		RB50#50	20.34	20.22	19.97
		RB100#0	20.32	20.33	20.07
	16QAM	RB1#0	20.28	20.08	20.48
		RB1#50	20.62	20.56	20.80
		RB1#99	20.22	20.29	20.53
		RB50#0	19.32	19.38	19.21
		RB50#50	19.35	19.29	19.03
		RB100#0	19.34	19.39	19.13

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	21.35	21.28	21.30
		RB1#3	21.50	21.44	21.48
		RB1#5	21.37	21.29	21.30
		RB3#0	21.46	21.39	21.45
		RB3#3	21.47	21.42	21.47
		RB6#0	20.38	20.37	20.35
	16QAM	RB1#0	20.29	20.40	20.33
		RB1#3	20.51	20.55	20.53
		RB1#5	20.32	20.39	20.38
		RB3#0	20.66	20.35	20.54
		RB3#3	20.67	20.39	20.55
		RB6#0	19.45	19.44	19.35
3MHz	QPSK	RB1#0	21.32	21.28	21.35
		RB1#8	21.32	21.27	21.34
		RB1#14	21.33	21.28	21.31
		RB6#0	20.33	20.25	20.23
		RB6#9	20.31	20.23	20.26
		RB15#0	20.36	20.28	20.32
	16QAM	RB1#0	20.93	20.41	20.37
		RB1#8	20.88	20.41	20.33
		RB1#14	20.89	20.38	20.33
		RB6#0	19.42	19.28	19.24
		RB6#9	19.38	19.32	19.27
		RB15#0	19.48	19.30	19.49
5MHz	QPSK	RB1#0	21.26	21.22	21.25
		RB1#13	21.34	21.32	21.34
		RB1#24	21.31	21.24	21.25
		RB15#0	20.42	20.28	20.41
		RB15#10	20.39	20.42	20.35
		RB25#0	20.36	20.33	20.33
	16QAM	RB1#0	20.11	20.54	20.30
		RB1#13	20.27	20.63	20.41
		RB1#24	20.64	20.53	20.28
		RB15#0	19.98	19.32	19.51
		RB15#10	19.44	19.40	19.46
		RB25#0	19.45	19.39	19.43

10MHz	QPSK	RB1#0	21.27	21.25	21.23
		RB1#25	21.48	21.48	21.49
		RB1#49	21.36	21.33	21.32
		RB25#0	20.43	20.29	20.38
		RB25#25	20.44	20.38	20.39
		RB50#0	20.44	20.37	20.42
	16QAM	RB1#0	20.88	20.41	20.20
		RB1#25	21.08	20.62	20.49
		RB1#49	20.98	20.42	20.32
		RB25#0	19.57	19.40	19.56
		RB25#25	19.58	19.46	19.52
		RB50#0	19.51	19.42	19.47
15MHz	QPSK	RB1#0	21.19	21.18	21.21
		RB1#38	21.28	21.30	21.31
		RB1#74	21.23	21.72	21.28
		RB36#0	20.42	20.27	20.42
		RB36#39	20.43	20.43	20.43
		RB75#0	20.46	20.40	20.44
	16QAM	RB1#0	20.75	20.81	20.35
		RB1#38	20.93	20.89	20.46
		RB1#74	20.87	20.82	20.46
		RB36#0	19.46	19.39	19.50
		RB36#39	19.52	19.45	19.47
		RB75#0	19.45	19.43	19.46
20MHz	QPSK	RB1#0	21.08	21.08	20.97
		RB1#50	21.57	21.50	21.43
		RB1#99	21.16	21.17	21.12
		RB50#0	20.38	20.20	20.42
		RB50#50	20.48	20.30	20.29
		RB100#0	20.42	20.28	20.35
	16QAM	RB1#0	20.39	20.30	20.54
		RB1#50	20.83	20.65	21.00
		RB1#99	20.43	20.38	20.72
		RB50#0	19.43	19.27	19.50
		RB50#50	19.53	19.41	19.39
		RB100#0	19.73	19.34	19.41

LTE Band 5

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	22.23	22.19	22.25
		RB1#3	22.39	22.34	22.53
		RB1#5	22.26	22.16	22.28
		RB3#0	22.29	22.22	22.12
		RB3#3	22.24	22.22	22.22
		RB6#0	21.37	21.37	21.43
	16QAM	RB1#0	21.27	21.30	21.18
		RB1#3	21.41	21.49	21.46
		RB1#5	21.32	21.30	21.28
		RB3#0	21.51	21.21	21.26
		RB3#3	21.56	21.23	21.31
		RB6#0	20.37	20.29	20.16
3MHz	QPSK	RB1#0	22.32	22.28	22.37
		RB1#8	22.31	22.22	22.37
		RB1#14	22.31	22.26	22.37
		RB6#0	21.32	21.27	21.36
		RB6#9	21.40	21.29	21.38
		RB15#0	21.36	21.29	21.33
	16QAM	RB1#0	21.85	21.37	21.27
		RB1#8	21.81	21.35	21.26
		RB1#14	21.81	21.38	21.27
		RB6#0	20.36	20.22	20.16
		RB6#9	20.38	20.30	20.20
		RB15#0	20.41	20.19	20.31
5MHz	QPSK	RB1#0	22.18	22.19	22.19
		RB1#13	22.33	22.25	22.32
		RB1#24	22.25	22.19	22.26
		RB15#0	21.40	21.29	21.39
		RB15#10	21.38	21.36	21.33
		RB25#0	21.35	21.27	21.25
	16QAM	RB1#0	21.11	21.46	21.23
		RB1#13	21.29	21.54	21.32
		RB1#24	21.17	21.45	21.27
		RB15#0	20.44	20.23	20.28
		RB15#10	20.42	20.29	20.27
		RB25#0	20.42	20.26	20.25
10MHz	QPSK	RB1#0	22.27	22.24	22.31
		RB1#25	22.48	22.39	22.52
		RB1#49	22.28	22.33	22.43
		RB25#0	21.38	21.29	21.39
		RB25#25	21.37	21.35	21.28
		RB50#0	21.40	21.32	21.31
	16QAM	RB1#0	21.79	21.34	21.24
		RB1#25	21.93	21.53	21.41
		RB1#49	21.78	21.44	21.30
		RB25#0	20.44	20.34	20.41
		RB25#25	20.42	20.35	20.33
		RB50#0	20.39	20.30	20.31

LTE Band 7

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	22.67	22.58	22.45
		RB1#13	22.73	22.67	22.29
		RB1#24	22.65	22.58	22.22
		RB15#0	21.77	21.64	21.58
		RB15#10	21.82	21.68	21.58
		RB25#0	21.74	21.62	21.56
	16QAM	RB1#0	21.69	21.86	21.54
		RB1#13	21.77	21.95	21.63
		RB1#24	21.66	21.87	21.52
		RB15#0	20.79	20.66	20.68
		RB15#10	20.85	20.69	20.62
		RB25#0	20.81	20.67	20.62
10MHz	QPSK	RB1#0	22.78	22.71	22.77
		RB1#25	22.94	22.92	22.33
		RB1#49	22.78	22.69	22.28
		RB25#0	21.78	21.80	21.80
		RB25#25	21.82	21.77	21.71
		RB50#0	21.82	21.74	21.76
	16QAM	RB1#0	22.21	21.82	21.67
		RB1#25	22.32	21.99	21.81
		RB1#49	22.13	21.77	21.66
		RB25#0	20.83	20.83	20.91
		RB25#25	20.93	20.84	20.84
		RB50#0	20.86	20.80	20.78
15MHz	QPSK	RB1#0	22.74	22.70	22.71
		RB1#38	22.95	22.83	22.44
		RB1#74	22.74	22.67	22.37
		RB36#0	21.95	21.88	21.92
		RB36#39	22.02	21.86	21.79
		RB75#0	22.00	21.90	21.87
	16QAM	RB1#0	22.19	21.83	21.89
		RB1#38	22.24	21.94	22.00
		RB1#74	22.11	21.74	21.89
		RB36#0	20.96	20.92	20.87
		RB36#39	20.97	20.89	20.73
		RB75#0	20.99	20.89	20.81
20MHz	QPSK	RB1#0	22.55	22.52	22.41
		RB1#50	22.99	23.04	22.72
		RB1#99	22.51	22.55	22.40
		RB50#0	21.73	21.77	21.77
		RB50#50	21.82	21.76	21.63
		RB100#0	21.76	21.75	21.69
	16QAM	RB1#0	21.83	21.69	21.86
		RB1#50	22.15	22.10	22.24
		RB1#99	21.76	21.69	21.88
		RB50#0	20.73	20.82	20.77
		RB50#50	20.80	20.79	20.64
		RB100#0	20.81	20.81	20.71

LTE Band 12

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	24.26	24.32	24.15
		RB1#3	24.42	24.43	24.41
		RB1#5	24.26	24.24	24.20
		RB3#0	24.34	24.41	24.28
		RB3#3	24.40	24.39	24.28
		RB6#0	23.30	23.30	23.23
	16QAM	RB1#0	23.31	23.43	23.18
		RB1#3	23.37	23.51	23.40
		RB1#5	23.33	23.46	23.21
		RB3#0	23.56	23.39	23.40
		RB3#3	23.65	23.44	23.40
		RB6#0	22.36	22.34	22.17
3MHz	QPSK	RB1#0	24.34	24.34	24.24
		RB1#8	24.29	24.29	24.23
		RB1#14	24.27	24.31	24.28
		RB6#0	23.32	23.23	23.16
		RB6#9	23.29	23.27	23.23
		RB15#0	23.36	23.33	23.26
	16QAM	RB1#0	23.87	23.49	23.31
		RB1#8	23.85	23.49	23.22
		RB1#14	23.86	23.43	23.20
		RB6#0	22.34	22.28	22.14
		RB6#9	22.35	22.34	22.17
		RB15#0	22.43	22.31	22.33
5MHz	QPSK	RB1#0	24.25	24.26	24.13
		RB1#13	24.36	24.34	24.24
		RB1#24	24.27	24.26	24.17
		RB15#0	23.41	23.29	23.37
		RB15#10	23.32	23.34	23.30
		RB25#0	23.30	23.33	23.28
	16QAM	RB1#0	23.14	23.58	23.21
		RB1#13	23.28	23.66	23.32
		RB1#24	23.20	23.55	23.25
		RB15#0	22.50	22.30	22.42
		RB15#10	22.41	22.34	22.33
		RB25#0	22.40	22.36	22.33
10MHz	QPSK	RB1#0	24.29	24.25	24.28
		RB1#25	24.47	24.47	24.42
		RB1#49	24.31	24.29	24.33
		RB25#0	23.47	23.45	23.37
		RB25#25	23.52	23.45	23.29
		RB50#0	23.50	23.45	23.35
	16QAM	RB1#0	23.80	23.46	23.30
		RB1#25	24.03	23.54	23.44
		RB1#49	23.90	23.45	23.32
		RB25#0	22.55	22.50	22.50
		RB25#25	22.57	22.49	22.43
		RB50#0	22.51	22.46	22.40

LTE Band 17

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	23.86	23.83	23.74
		RB1#13	23.53	23.82	23.81
		RB1#24	23.97	23.78	23.72
		RB15#0	22.89	22.83	22.99
		RB15#10	22.66	22.83	22.88
		RB25#0	22.88	22.89	22.87
	16QAM	RB1#0	22.67	23.13	22.86
		RB1#13	22.72	23.13	22.96
		RB1#24	22.72	23.18	22.83
		RB15#0	22.06	21.83	22.25
		RB15#10	22.44	21.87	21.76
		RB25#0	21.97	21.88	21.95
10MHz	QPSK	RB1#0	23.78	23.76	23.76
		RB1#25	23.98	23.96	24.00
		RB1#49	23.86	23.87	23.88
		RB25#0	22.85	22.87	22.90
		RB25#25	22.86	22.84	22.83
		RB50#0	22.91	22.84	22.86
	16QAM	RB1#0	23.47	22.98	22.88
		RB1#25	23.58	23.67	22.98
		RB1#49	23.56	22.96	22.88
		RB25#0	22.45	22.35	22.58
		RB25#25	22.22	21.97	22.05
		RB50#0	22.00	21.95	22.07

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	5.22	4.49	3.91	13
	100 RB		5.51	5.61	5.48	13
16QAM	1 RB	20 MHz	6.41	5.32	4.94	13
	100 RB		6.44	6.51	6.35	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	5.26	5.74	5.1	13
	100 RB		5.74	5.67	5.74	13
16QAM	1 RB	20 MHz	6.15	6.92	5.77	13
	100 RB		6.6	6.6	6.63	13

PAR, Band 5

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.23	4.52	3.46	13
	50 RB		5.38	5.16	5.26	13
16QAM	1 RB	10 MHz	5.26	5.26	4.46	13
	50 RB		6.35	6.06	6.12	13

PAR, Band 7

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	3.08	3.24	3.04	13
	100 RB		5.08	5.20	5.12	13
16QAM	1 RB	20 MHz	4.20	3.96	4.28	13
	100 RB		6.04	6.00	6.00	13

PAR, Band 12

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.48	4.36	3.88	13
	50 RB		5.44	5.52	5.40	13
16QAM	1 RB	10 MHz	5.64	5.08	5.08	13
	50 RB		6.44	6.52	6.36	13

PAR, Band 17

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	5.00	4.76	4.68	13
	50 RB		5.72	5.68	5.68	13
16QAM	1 RB	10 MHz	5.64	6.24	5.72	13
	50 RB		6.76	6.72	6.60	13

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

ERP & EIRP

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850 Middle Channel								
836.60	H	96.52	21.60	0.00	0.97	20.63	38.45	17.82
836.60	V	102.17	30.38	0.00	0.97	29.41	38.45	9.04
EDGE 850 Middle Channel								
836.60	H	91.43	16.51	0.00	0.97	15.54	38.45	22.91
836.60	V	97.47	25.68	0.00	0.97	24.71	38.45	13.74
WCDMA Band V Middle Channel								
836.60	H	84.12	9.20	0.00	0.97	8.23	38.45	30.22
836.60	V	92.43	20.64	0.00	0.97	19.67	38.45	18.78
GSM 1900 Middle Channel								
1880.00	H	91.64	19.03	11.66	2.66	28.03	33.00	4.97
1880.00	V	90.36	17.89	11.66	2.66	26.89	33.00	6.11
EDGE 1900 Middle Channel								
1880.00	H	91.57	18.96	11.66	2.66	27.96	33.00	5.04
1880.00	V	88.58	16.11	11.66	2.66	25.11	33.00	7.89
WCDMA Band II Middle Channel								
1880.00	H	86.99	14.38	11.66	2.66	23.38	33.00	9.62
1880.00	V	84.37	11.90	11.66	2.66	20.90	33.00	12.10
WCDMA Band IV Middle Channel								
1732.60	H	87.69	13.64	10.90	2.51	22.03	30.00	7.97
1732.60	V	81.50	7.13	10.90	2.51	15.52	30.00	14.48

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	84.01	11.40	11.66	2.66	**20.40**	33.00	12.60
1880.00			V	83.80	11.33	11.66	2.66	20.33	33.00	12.67
1880.00	3.00		H	83.67	11.06	11.66	2.66	20.06	33.00	12.94
1880.00			V	83.42	10.95	11.66	2.66	19.95	33.00	13.05
1880.00	5.00		H	83.61	11.00	11.66	2.66	20.00	33.00	13.00
1880.00			V	83.36	10.89	11.66	2.66	19.89	33.00	13.11
1880.00	10.00		H	82.61	10.00	11.66	2.66	19.00	33.00	14.00
1880.00			V	82.52	10.05	11.66	2.66	19.05	33.00	13.95
1880.00	15.00		H	82.69	10.08	11.66	2.66	19.08	33.00	13.92
1880.00			V	82.43	9.96	11.66	2.66	18.96	33.00	14.04
1880.00	20.00		H	82.78	10.17	11.66	2.66	19.17	33.00	13.83
1880.00			V	82.55	10.08	11.66	2.66	19.08	33.00	13.92
1880.00	1.40	16QAM	H	82.96	10.35	11.66	2.66	**19.35**	33.00	13.65
1880.00			V	82.75	10.28	11.66	2.66	19.28	33.00	13.72
1880.00	3.00		H	82.83	10.22	11.66	2.66	19.22	33.00	13.78
1880.00			V	82.73	10.26	11.66	2.66	19.26	33.00	13.74
1880.00	5.00		H	82.88	10.27	11.66	2.66	19.27	33.00	13.73
1880.00			V	82.71	10.24	11.66	2.66	19.24	33.00	13.76
1880.00	10.00		H	81.41	8.80	11.66	2.66	17.80	33.00	15.20
1880.00			V	81.36	8.89	11.66	2.66	17.89	33.00	15.11
1880.00	15.00		H	81.89	9.28	11.66	2.66	18.28	33.00	14.72
1880.00			V	81.78	9.31	11.66	2.66	18.31	33.00	14.69
1880.00	20.00		H	82.15	9.54	11.66	2.66	18.54	33.00	14.46
1880.00			V	81.30	8.83	11.66	2.66	17.83	33.00	15.17

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	85.11	11.06	10.90	2.51	**19.45**	30.00	10.55
1732.50			V	80.96	6.59	10.90	2.51	14.98	30.00	15.02
1732.50	3.00		H	84.42	10.37	10.90	2.51	18.76	30.00	11.24
1732.50			V	80.36	5.99	10.90	2.51	14.38	30.00	15.62
1732.50	5.00		H	84.36	10.31	10.90	2.51	18.70	30.00	11.30
1732.50			V	80.79	6.42	10.90	2.51	14.81	30.00	15.19
1732.50	10.00		H	84.63	10.58	10.90	2.51	18.97	30.00	11.03
1732.50			V	81.26	6.89	10.90	2.51	15.28	30.00	14.72
1732.50	15.00		H	84.83	10.78	10.90	2.51	19.17	30.00	10.83
1732.50			V	81.52	7.15	10.90	2.51	15.54	30.00	14.46
1732.50	20.00		H	85.13	11.08	10.90	2.51	**19.47**	30.00	10.53
1732.50			V	81.69	7.32	10.90	2.51	15.71	30.00	14.29
1732.50	1.40	16QAM	H	84.47	10.42	10.90	2.51	**18.81**	30.00	11.19
1732.50			V	82.47	8.10	10.90	2.51	16.49	30.00	13.51
1732.50	3.00		H	83.83	9.78	10.90	2.51	18.17	30.00	11.83
1732.50			V	82.23	7.86	10.90	2.51	16.25	30.00	13.75
1732.50	5.00		H	83.24	9.19	10.90	2.51	17.58	30.00	12.42
1732.50			V	82.32	7.95	10.90	2.51	16.34	30.00	13.66
1732.50	10.00		H	83.41	9.36	10.90	2.51	17.75	30.00	12.25
1732.50			V	78.79	4.42	10.90	2.51	12.81	30.00	17.19
1732.50	15.00		H	83.36	9.31	10.90	2.51	17.70	30.00	12.30
1732.50			V	79.93	5.56	10.90	2.51	13.95	30.00	16.05
1732.50	20.00		H	83.98	9.93	10.90	2.51	**18.32**	30.00	11.68
1732.50			V	80.57	6.20	10.90	2.51	14.59	30.00	15.41

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	85.51	10.58	0.00	0.97	9.61	38.45	28.84
836.50			V	92.42	20.63	0.00	0.97	**19.66**	38.45	18.79
836.50	3.00		H	85.33	10.40	0.00	0.97	9.43	38.45	29.02
836.50			V	92.31	20.52	0.00	0.97	19.55	38.45	18.90
836.50	5.00		H	85.32	10.39	0.00	0.97	9.42	38.45	29.03
836.50			V	92.15	20.36	0.00	0.97	19.39	38.45	19.06
836.50	10.00		H	84.85	9.92	0.00	0.97	8.95	38.45	29.50
836.50			V	91.36	19.57	0.00	0.97	**18.60**	38.45	19.85
836.50	1.40	16QAM	H	85.36	10.43	0.00	0.97	9.46	38.45	28.99
836.50			V	91.46	19.67	0.00	0.97	18.70	38.45	19.75
836.50	3.00		H	85.24	10.31	0.00	0.97	9.34	38.45	29.11
836.50			V	91.23	19.44	0.00	0.97	18.47	38.45	19.98
836.50	5.00		H	85.17	10.24	0.00	0.97	9.27	38.45	29.18
836.50			V	91.04	19.25	0.00	0.97	18.28	38.45	20.17
836.50	10.00		H	84.65	9.72	0.00	0.97	8.75	38.45	29.70
836.50			V	90.24	18.45	0.00	0.97	**17.48**	38.45	20.97

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	80.16	7.55	13.14	3.10	**17.59**	33.00	15.41
2535.00			V	77.09	5.94	13.14	3.10	15.98	33.00	17.02
2535.00	10.00		H	79.30	6.69	13.14	3.10	16.73	33.00	16.27
2535.00			V	76.81	5.66	13.14	3.10	15.70	33.00	17.30
2535.00	15.00		H	79.09	6.48	13.14	3.10	16.52	33.00	16.48
2535.00			V	75.62	4.47	13.14	3.10	14.51	33.00	18.49
2535.00	20.00		H	79.58	6.97	13.14	3.10	**17.01**	33.00	15.99
2535.00			V	75.54	4.39	13.14	3.10	14.43	33.00	18.57
2535.00	5.00	16QAM	H	79.47	6.86	13.14	3.10	**16.90**	33.00	16.10
2535.00			V	76.34	5.19	13.14	3.10	15.23	33.00	17.77
2535.00	10.00		H	78.79	6.18	13.14	3.10	16.22	33.00	16.78
2535.00			V	76.23	5.08	13.14	3.10	15.12	33.00	17.88
2535.00	15.00		H	78.69	6.08	13.14	3.10	16.12	33.00	16.88
2535.00			V	74.43	3.28	13.14	3.10	13.32	33.00	19.68
2535.00	20.00		H	78.76	6.15	13.14	3.10	**16.19**	33.00	16.81
2535.00			V	75.21	4.06	13.14	3.10	14.10	33.00	18.90

LTE Band 12

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
707.50	1.40	QPSK	H	88.67	11.81	0.00	0.94	10.87	34.77	23.90
707.50			V	93.42	19.00	0.00	0.94	**18.06**	34.77	16.71
707.50	3.00		H	88.03	11.17	0.00	0.94	10.23	34.77	24.54
707.50			V	93.07	18.65	0.00	0.94	17.71	34.77	17.06
707.50	5.00		H	87.68	10.82	0.00	0.94	9.88	34.77	24.89
707.50			V	92.69	18.27	0.00	0.94	17.33	34.77	17.44
707.50	10.00		H	87.23	10.37	0.00	0.94	9.43	34.77	25.34
707.50			V	92.54	18.12	0.00	0.94	**17.18**	34.77	17.59
707.50	1.40	16QAM	H	87.31	10.45	0.00	0.94	9.51	34.77	25.26
707.50			V	93.55	19.13	0.00	0.94	**18.19**	34.77	16.58
707.50	3.00		H	86.68	9.82	0.00	0.94	8.88	34.77	25.89
707.50			V	93.06	18.64	0.00	0.94	17.70	34.77	17.07
707.50	5.00		H	86.11	9.25	0.00	0.94	8.31	34.77	26.46
707.50			V	93.48	19.06	0.00	0.94	18.12	34.77	16.65
707.50	10.00		H	85.67	8.81	0.00	0.94	7.87	34.77	26.90
707.50			V	93.34	18.92	0.00	0.94	**17.98**	34.77	16.79

LTE Band 17

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
710.00	5	QPSK	H	82.47	5.66	0.00	0.94	4.72	34.77	30.05
710.00			V	92.22	17.86	0.00	0.94	16.92	34.77	17.85
710.00	10		H	83.89	7.08	0.00	0.94	6.14	34.77	28.63
710.00			V	91.87	17.51	0.00	0.94	16.57	34.77	18.20
710.00	5	16QAM	H	82.04	5.23	0.00	0.94	4.29	34.77	30.48
710.00			V	91.47	17.11	0.00	0.94	16.17	34.77	18.60
710.00	10		H	81.51	4.70	0.00	0.94	3.76	34.77	31.01
710.00			V	91.81	17.45	0.00	0.94	16.51	34.77	18.26

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

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

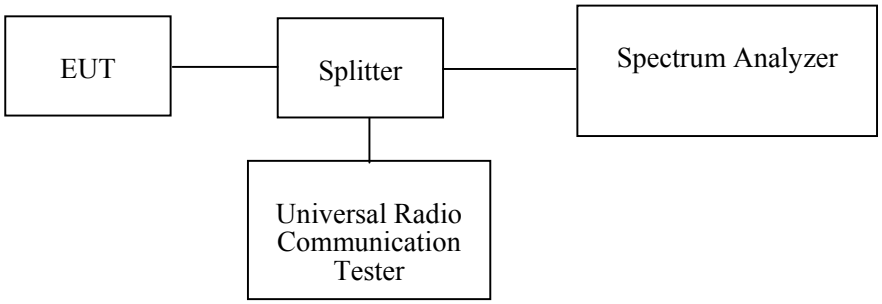
Applicable Standard

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

Test Procedure

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

The 26 dB & 99% bandwidth was recorded.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way 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:	25.4°C
Relative Humidity:	40~55 %
ATM Pressure:	100.6~100.8 kPa

The testing was performed by Elena Lei & Blake Yang on 2019-01-29 and 2019-03-07.

Test Mode: Transmitting

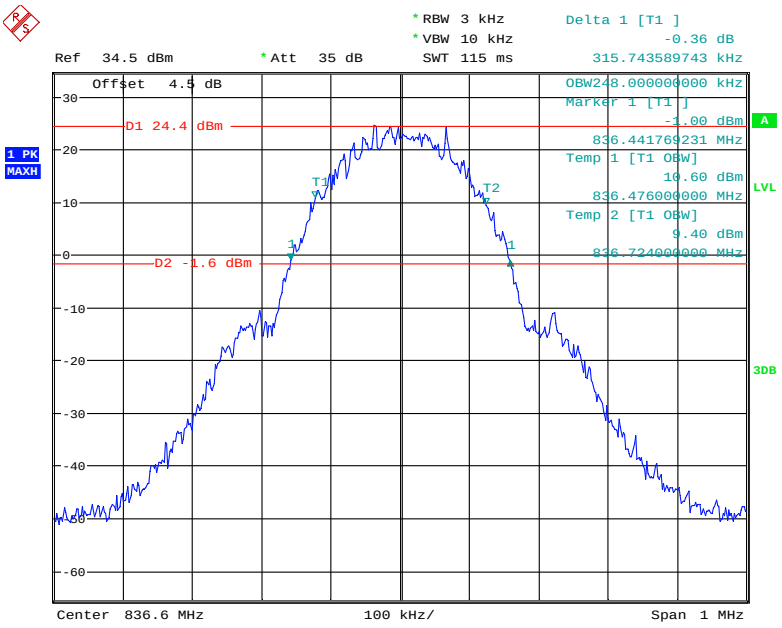
Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GSM	0.248	0.316
		EDGE	0.248	0.320
PCS		GSM	0.244	0.314
		EDGE	0.248	0.319
WCDMA Band II		Rel 99	4.180	4.736
		HSDPA	4.220	5.176
		HSUPA	4.220	5.288
WCDMA Band IV		Rel 99	4.180	5.760
		HSDPA	4.200	5.128
		HSUPA	4.220	5.144
WCDMA Band V		Rel 99	4.200	4.805
		HSDPA	4.220	4.779
		HSUPA	4.220	4.808

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.098	1.287
		16QAM	1.104	1.305
	3 MHz	QPSK	2.688	2.862
		16QAM	2.688	2.862
	5 MHz	QPSK	4.560	5.170
		16QAM	4.540	5.110
	10 MHz	QPSK	9.000	10.100
		16QAM	8.960	9.699
	15 MHz	QPSK	13.620	18.361
		16QAM	13.620	15.090
	20 MHz	QPSK	18.000	19.479
		16QAM	18.080	19.639
LTE Band 4	1.4 MHz	QPSK	1.104	1.299
		16QAM	1.110	1.305
	3 MHz	QPSK	2.688	2.886
		16QAM	2.688	2.910
	5 MHz	QPSK	4.540	5.150
		16QAM	4.540	5.110
	10 MHz	QPSK	9.000	9.820
		16QAM	8.960	9.699
	15 MHz	QPSK	13.560	15.090
		16QAM	13.500	14.970
	20 MHz	QPSK	18.000	19.479
		16QAM	18.000	19.559
LTE Band 5	1.4 MHz	QPSK	1.110	1.293
		16QAM	1.110	1.305
	3 MHz	QPSK	2.688	2.850
		16QAM	2.688	2.901
	5 MHz	QPSK	4.540	5.190
		16QAM	4.540	5.170
	10 MHz	QPSK	9.000	9.900
		16QAM	9.000	9.699

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 7	5 MHz	QPSK	4.529	5.190
		16QAM	4.569	5.170
	10 MHz	QPSK	8.978	10.020
		16QAM	8.978	9.860
	15 MHz	QPSK	13.527	15.030
		16QAM	13.587	15.150
	20 MHz	QPSK	17.956	19.639
		16QAM	18.036	19.639
LTE Band 12	1.4 MHz	QPSK	1.106	1.293
		16QAM	1.112	1.317
	3 MHz	QPSK	2.681	2.874
		16QAM	2.681	2.874
	5 MHz	QPSK	4.549	5.210
		16QAM	4.529	5.190
	10 MHz	QPSK	8.978	9.940
		16QAM	8.938	9.780
LTE Band 17	5 MHz	QPSK	4.549	5.130
		16QAM	4.529	5.170
	10 MHz	QPSK	8.978	9.820
		16QAM	8.978	9.780

GSM 850 Cellular Band



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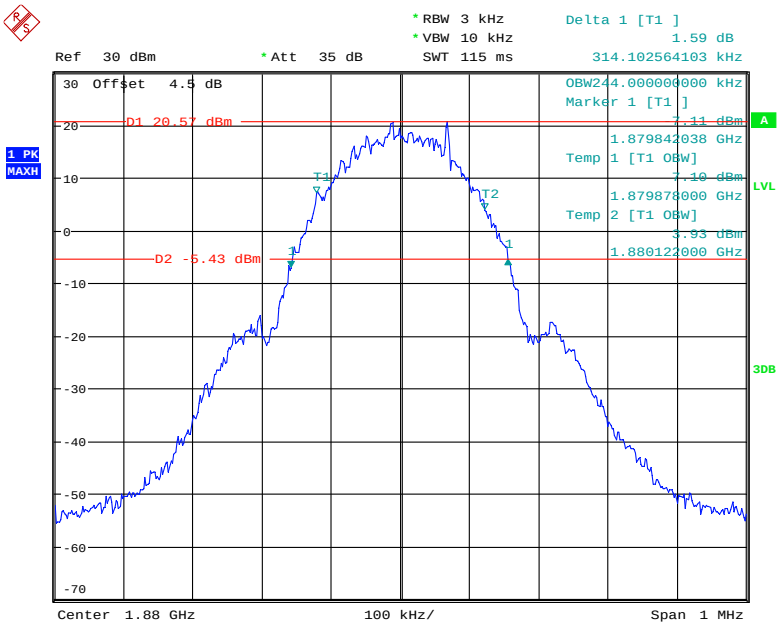
GSM PCS1900 Cellular Band



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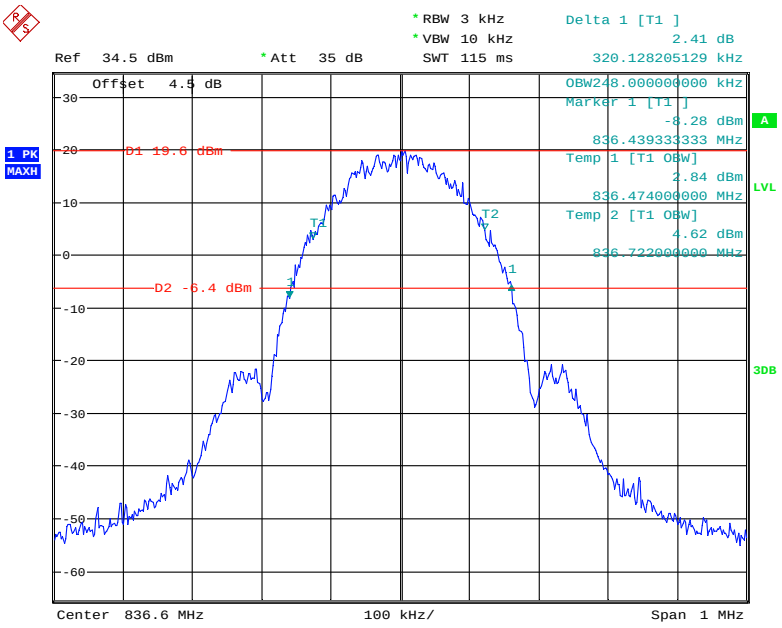
EDGE 850 Cellular Band



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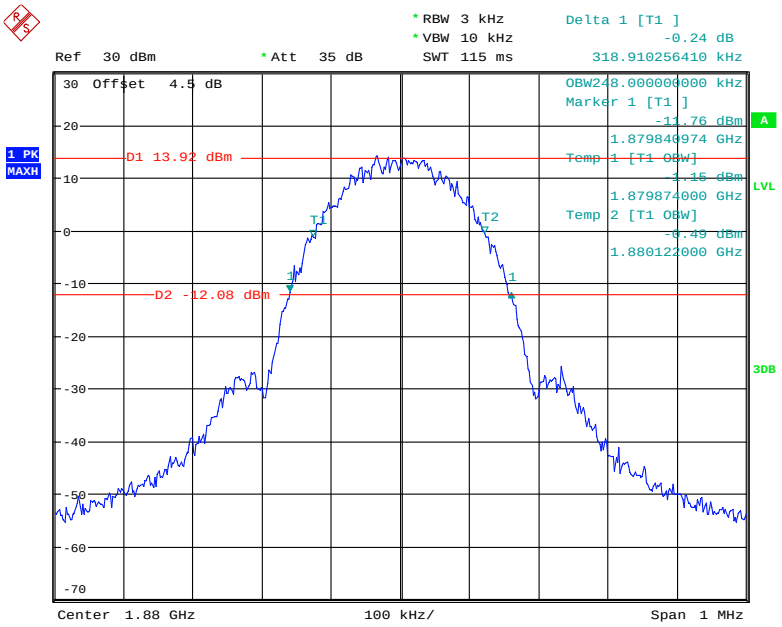
EDGE PCS1900 Cellular Band



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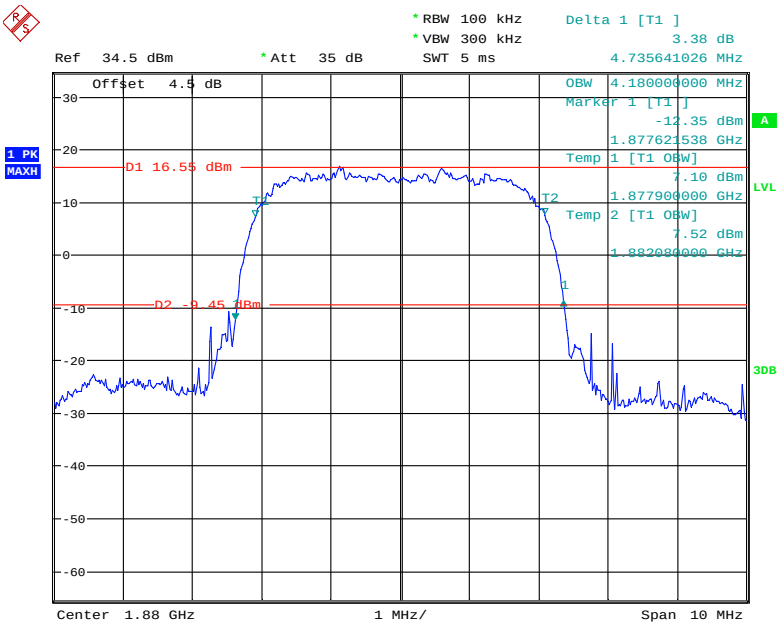
WCDMA Band II, Rel 99



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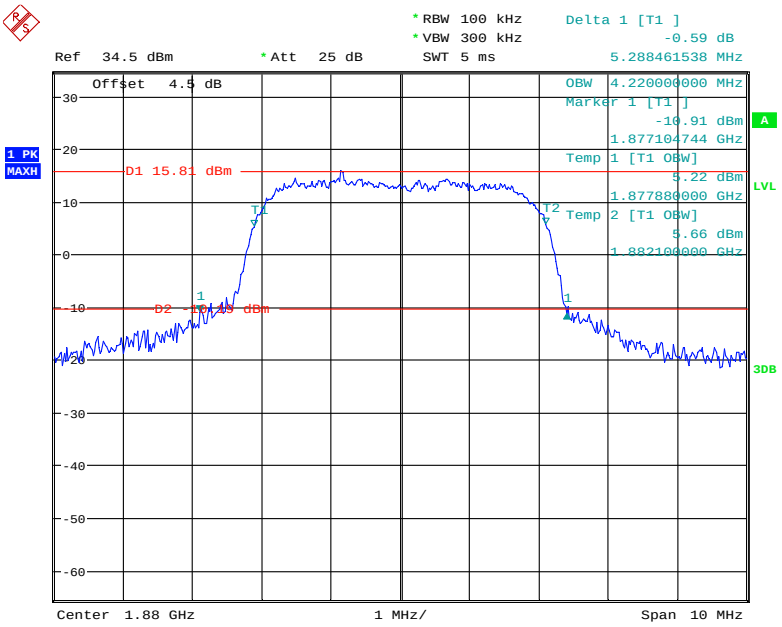
WCDMA Band II, HSUPA



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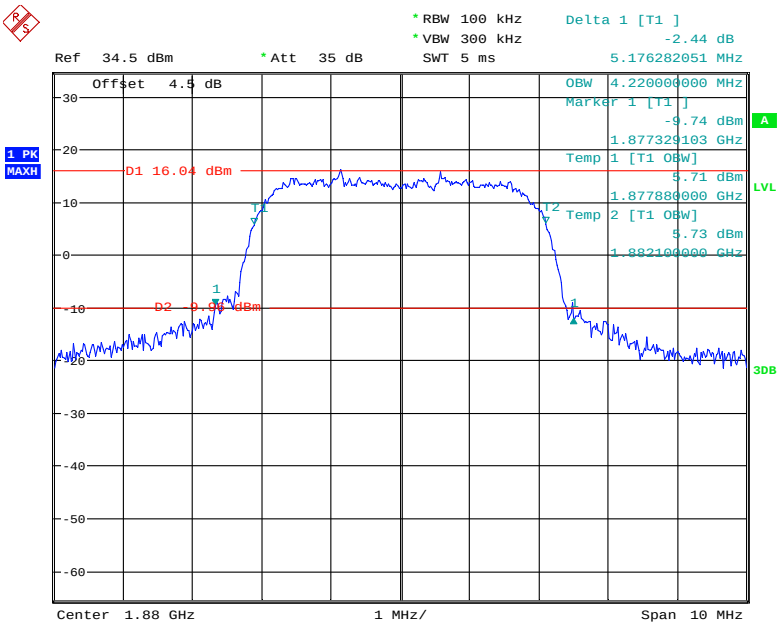
WCDMA Band II, HSDPA



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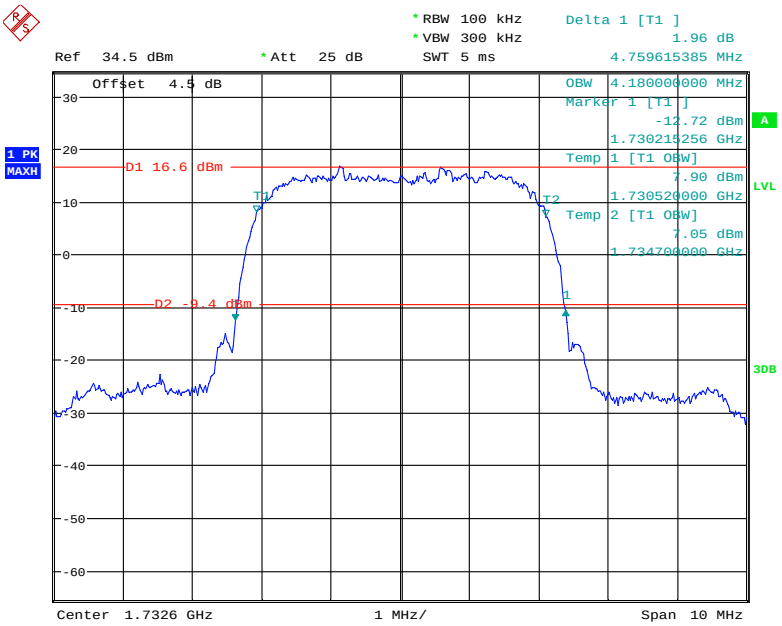

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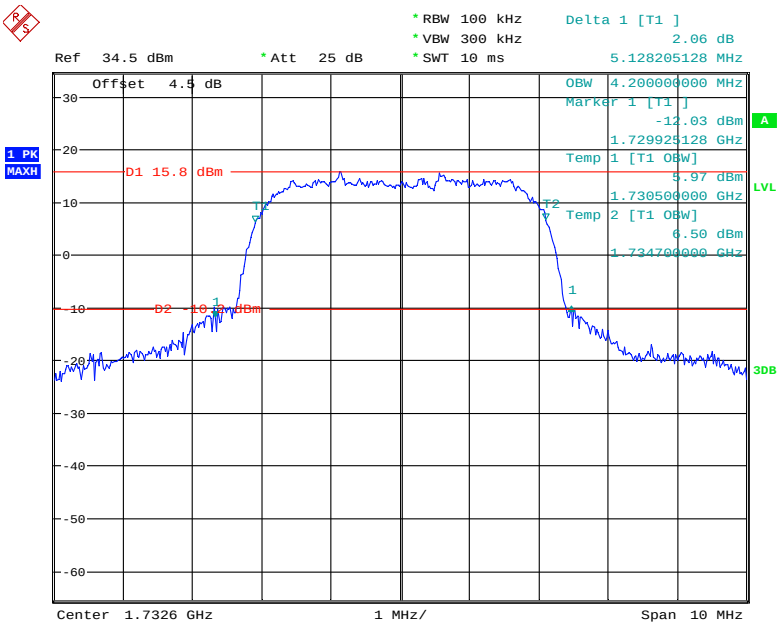
WCDMA Band IV, HSDPA



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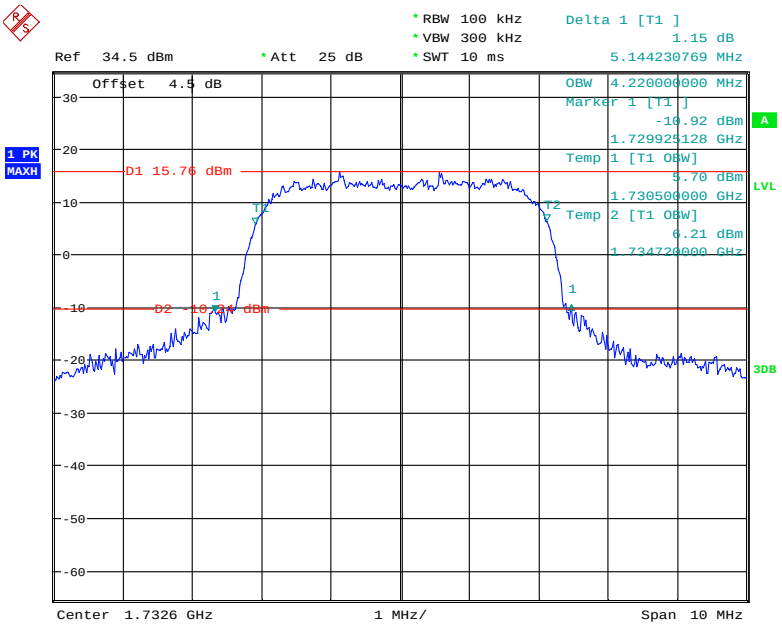

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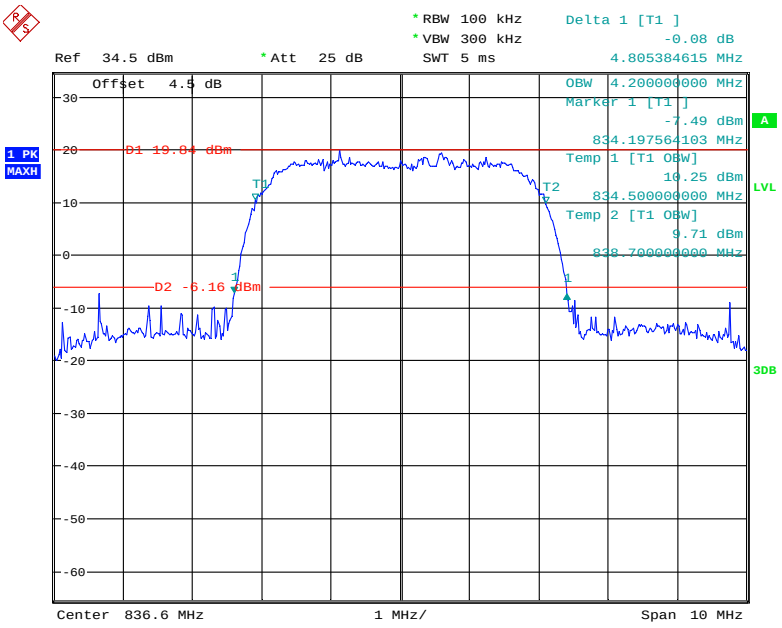

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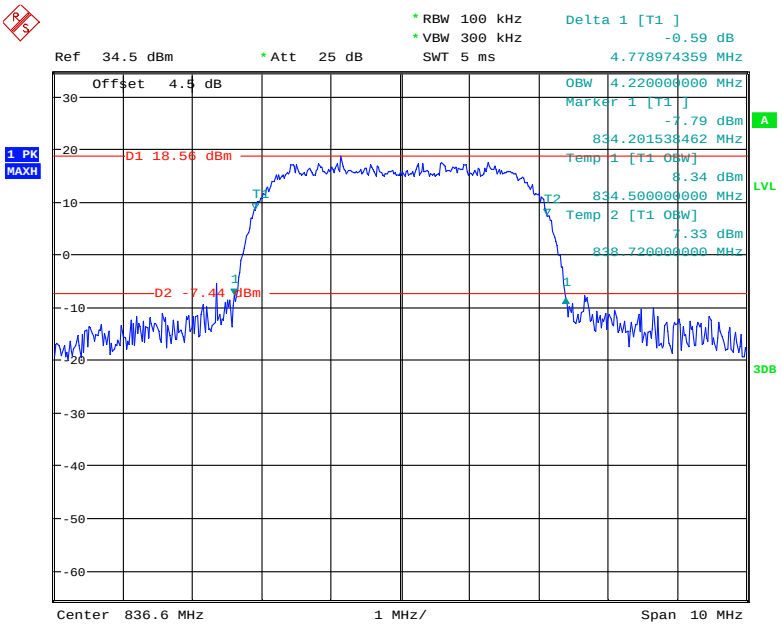
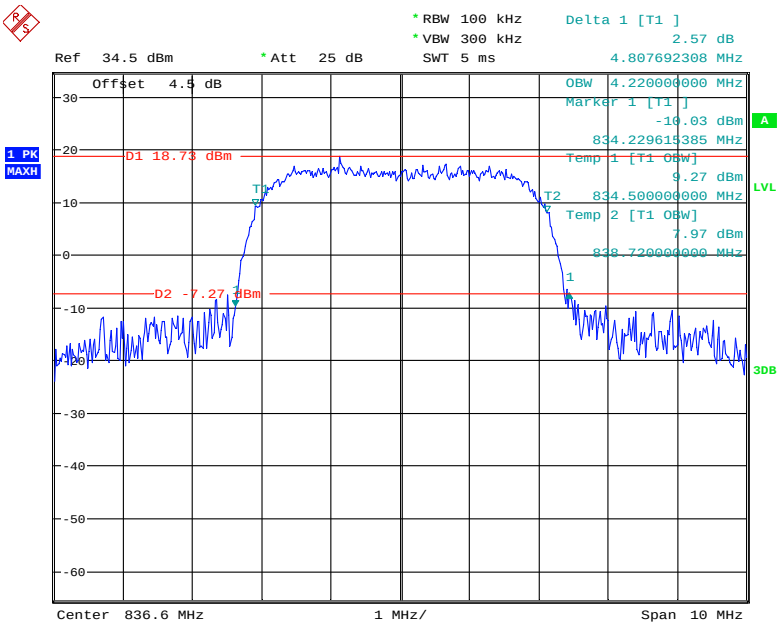
WCDMA Band V, HSDPA



Date: 29.JAN.2019 21:01:10

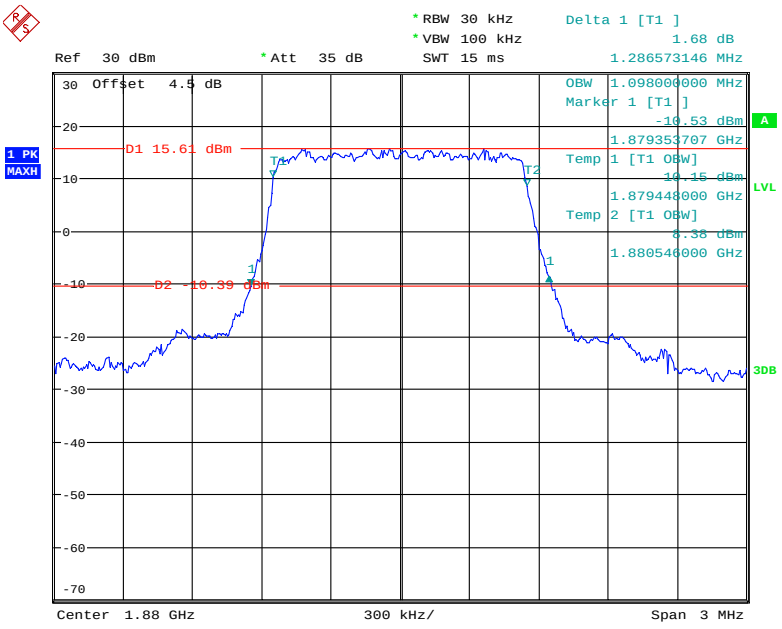
WCDMA Band V, HSUPA



Date: 29.JAN.2019 20:59:43

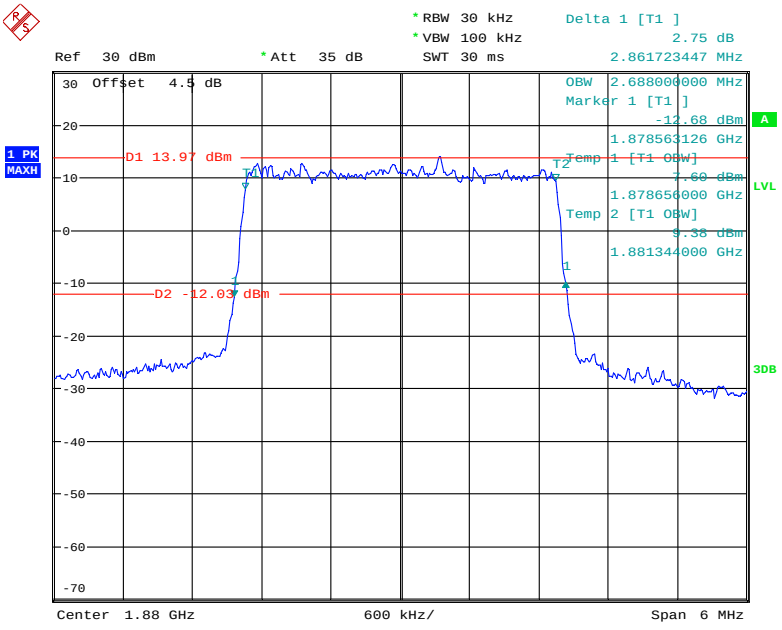
LTE Band 2

QPSK_1.4 MHz



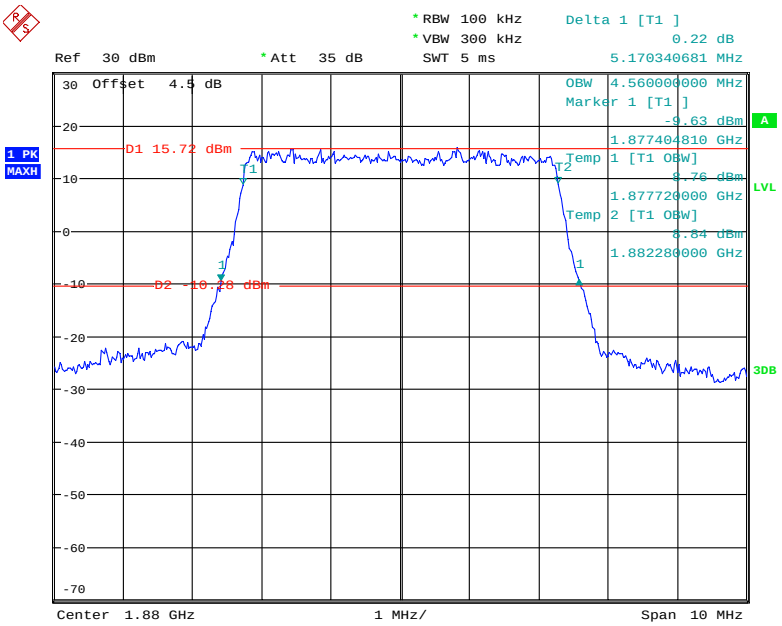
Date: 29.JAN.2019 14:07:53

QPSK_3 MHz



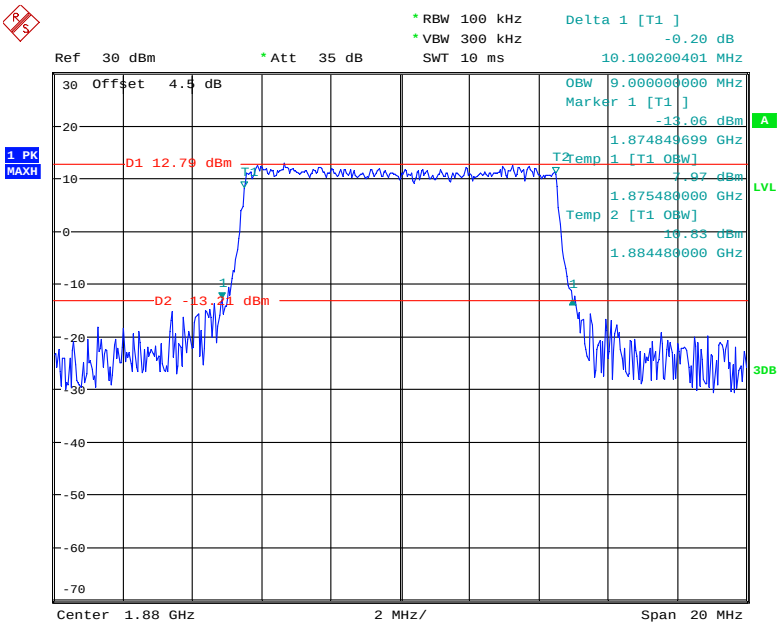
Date: 29.JAN.2019 14:08:54

QPSK_5 MHz



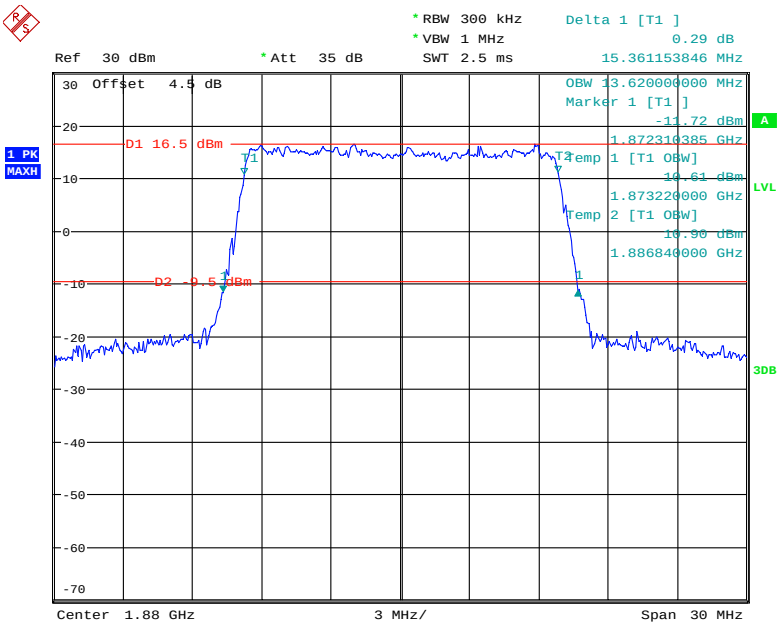
Date: 29.JAN.2019 14:09:52

QPSK_10 MHz



Date: 29.JAN.2019 14:11:13

QPSK_15 MHz



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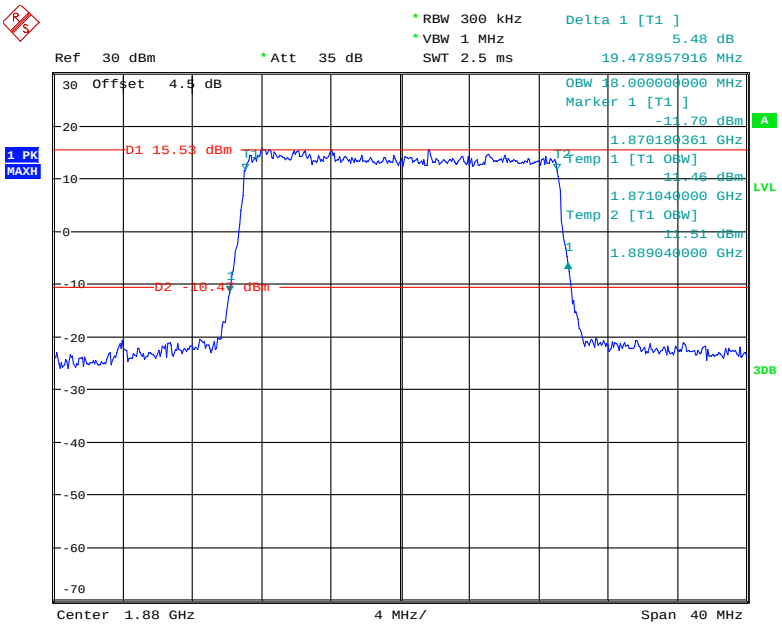
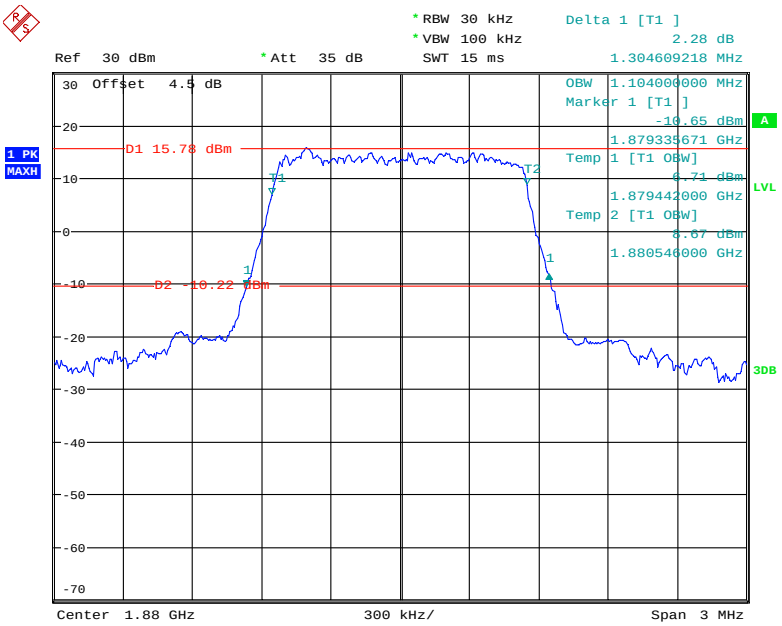
QPSK_20 MHz



Date: 29.JAN.2019 14:14:17

16QAM_1.4 MHz



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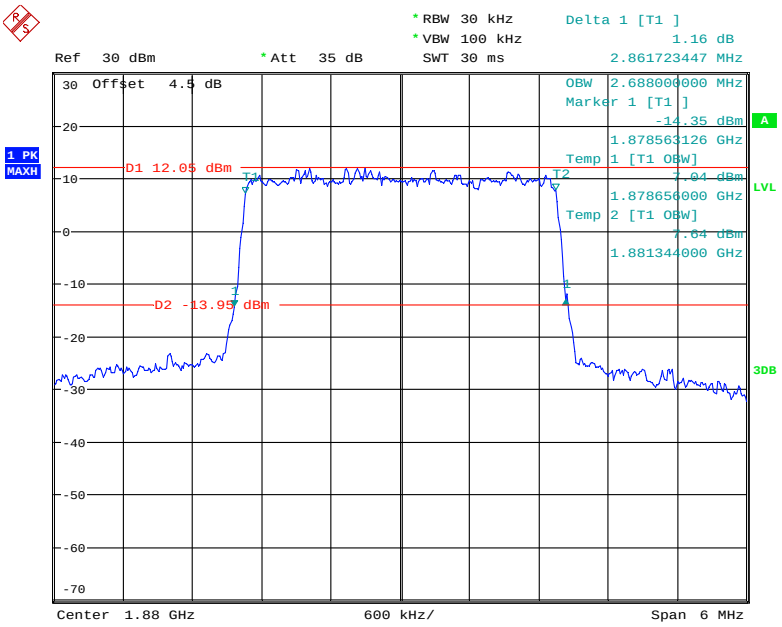

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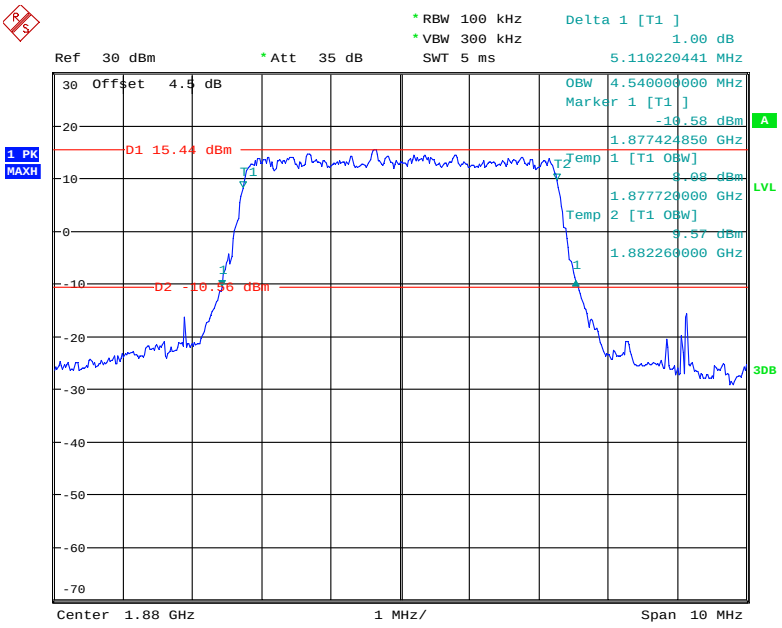
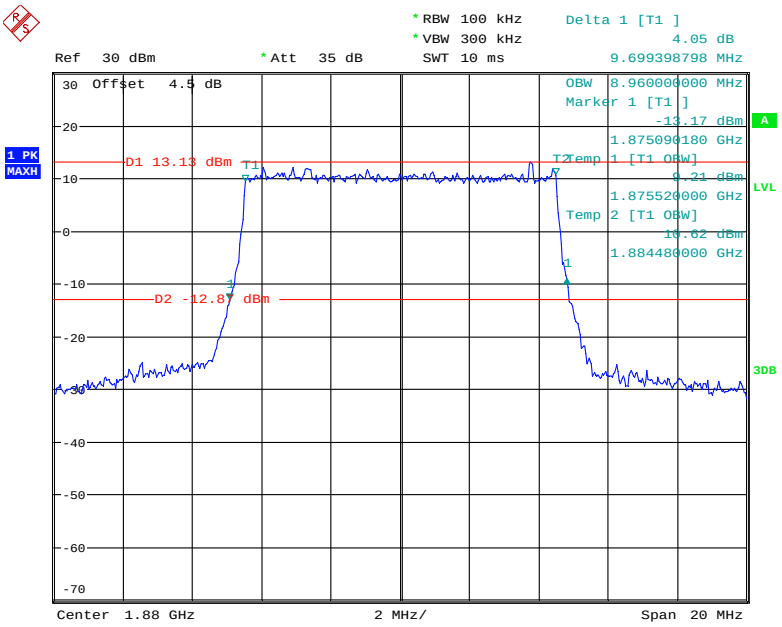
16QAM_5 MHz



Date: 29.JAN.2019 14:10:35

16QAM_10 MHz



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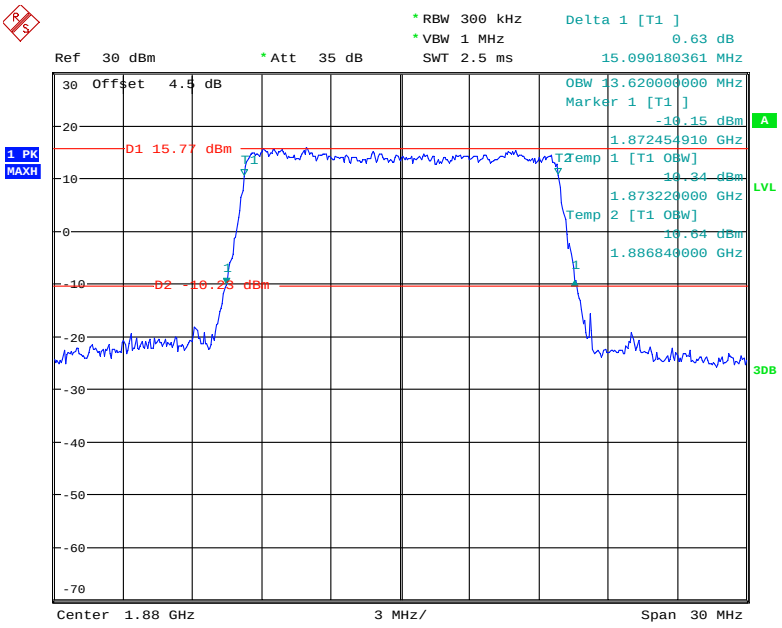
16QAM_15 MHz



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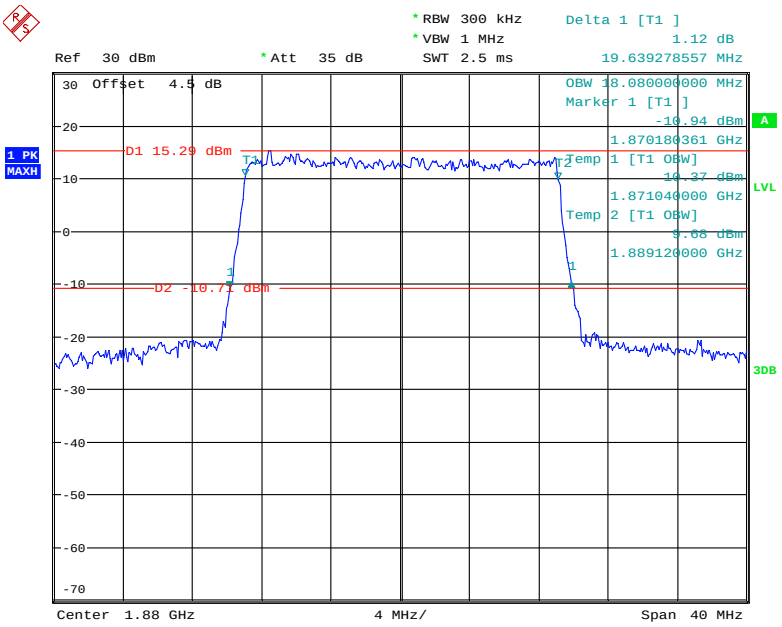

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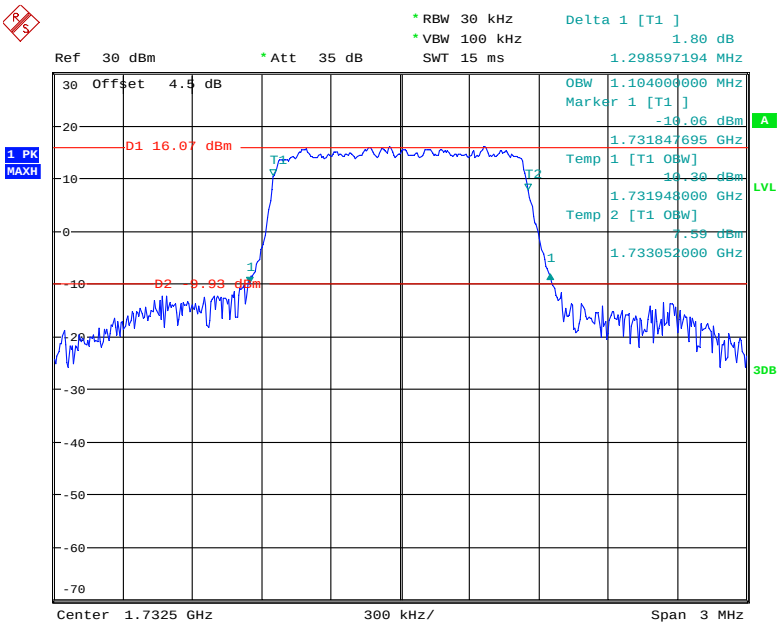
LTE Band 4

QPSK_1.4 MHz



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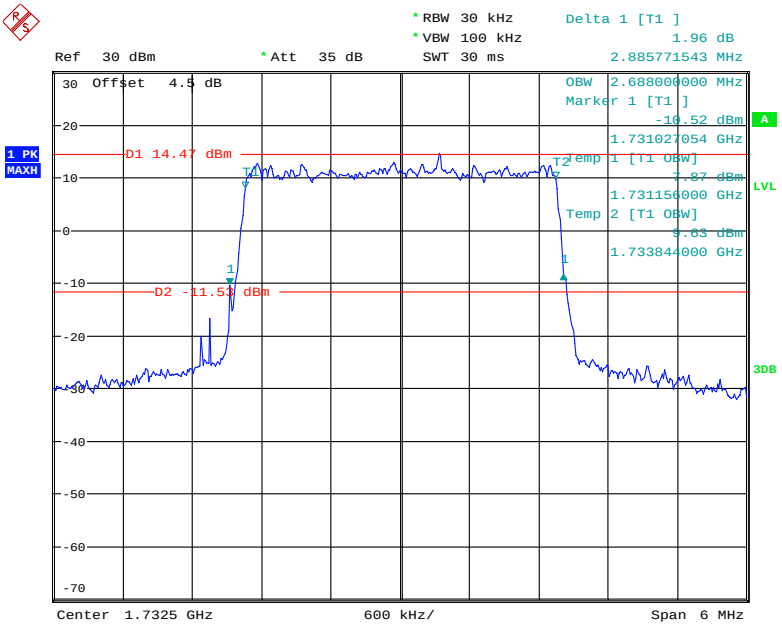
QPSK_3 MHz



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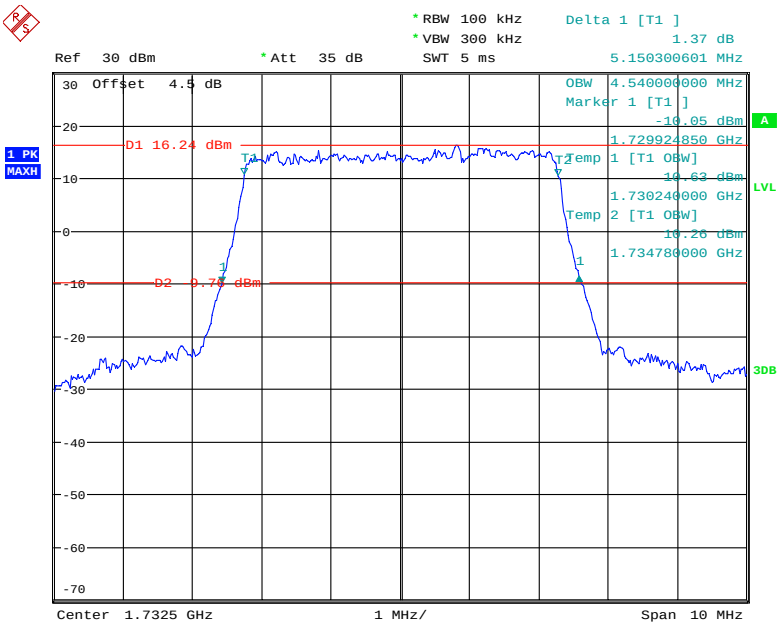
QPSK_5 MHz



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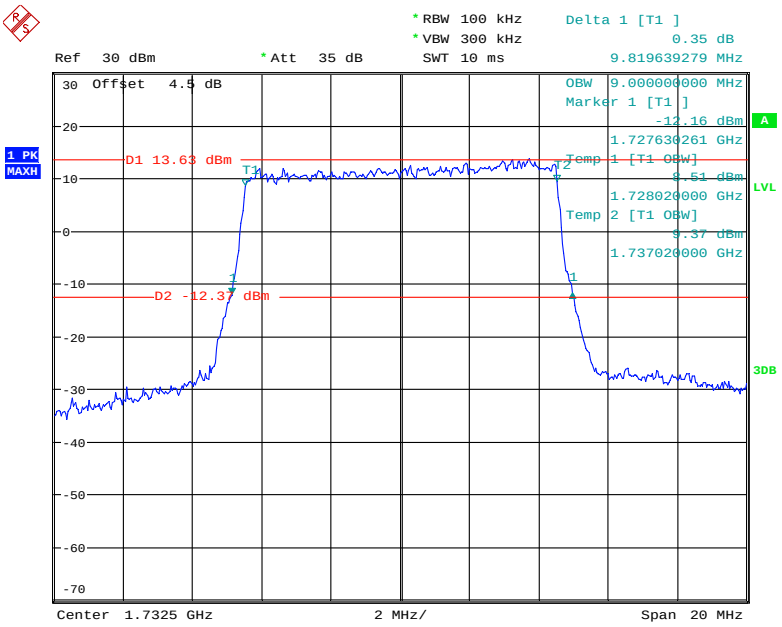
QPSK_10 MHz



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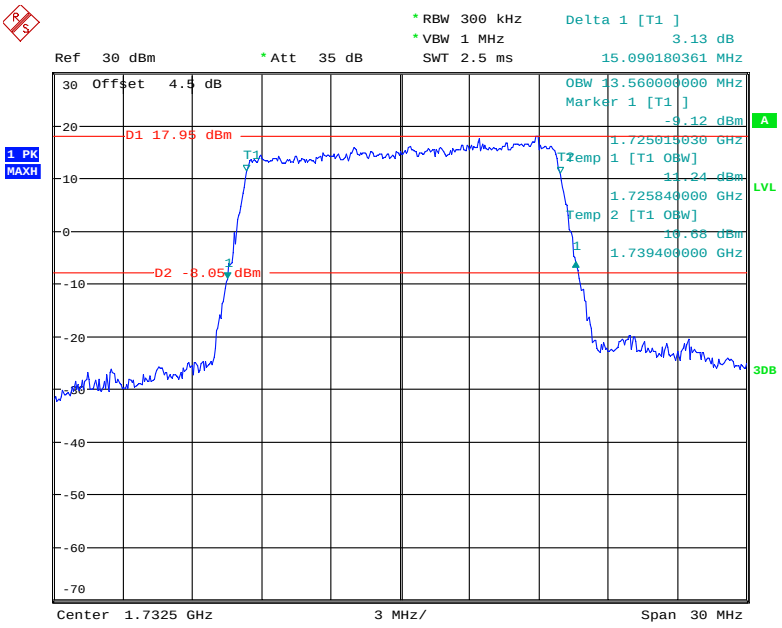

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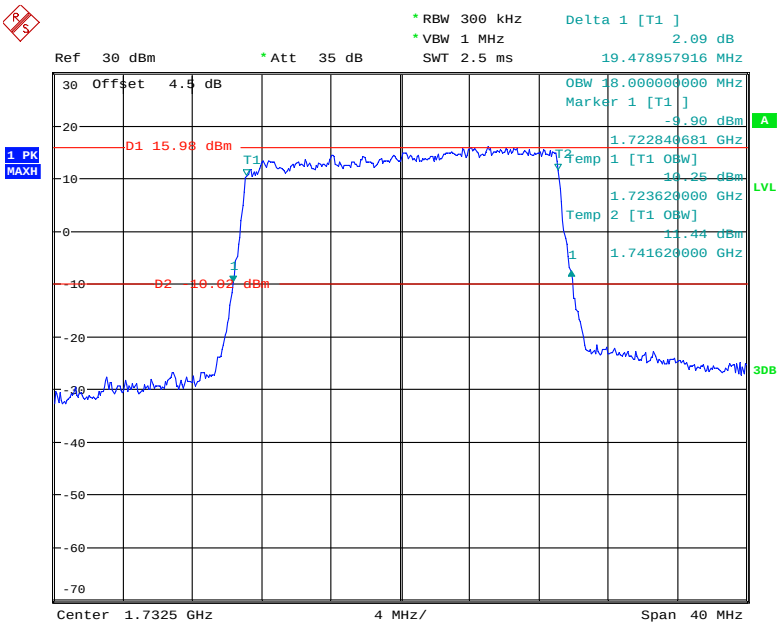

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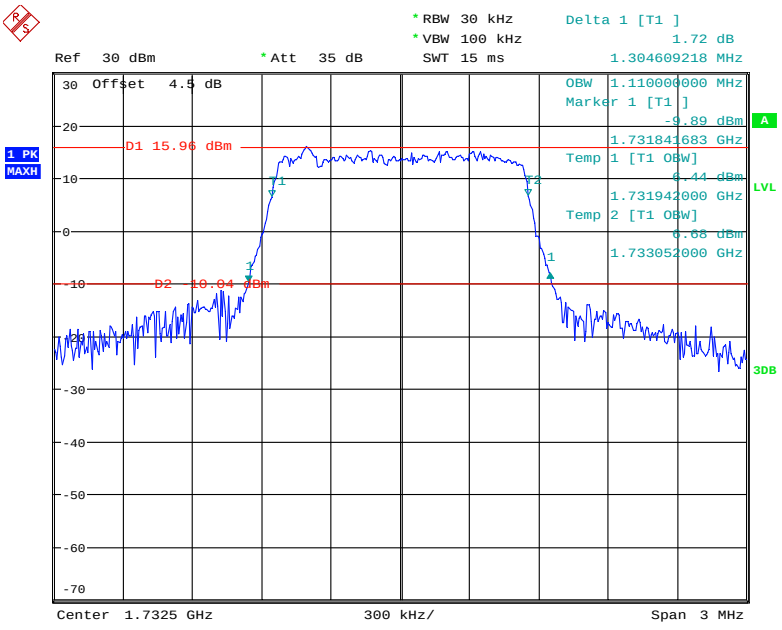
16QAM_1.4 MHz



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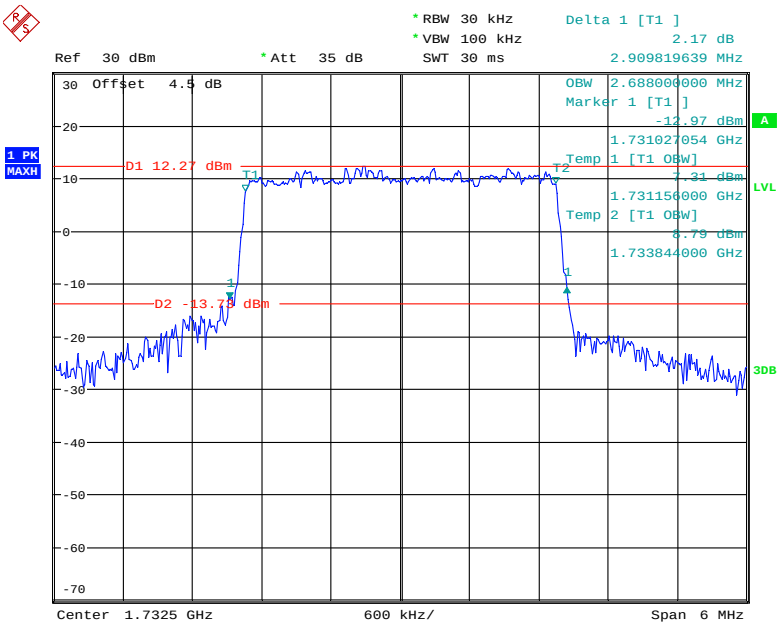

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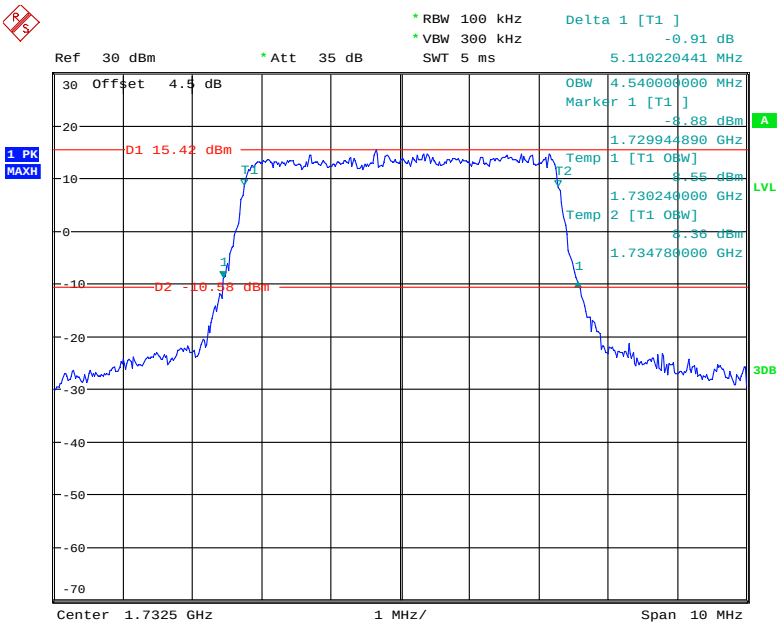
16QAM_5 MHz



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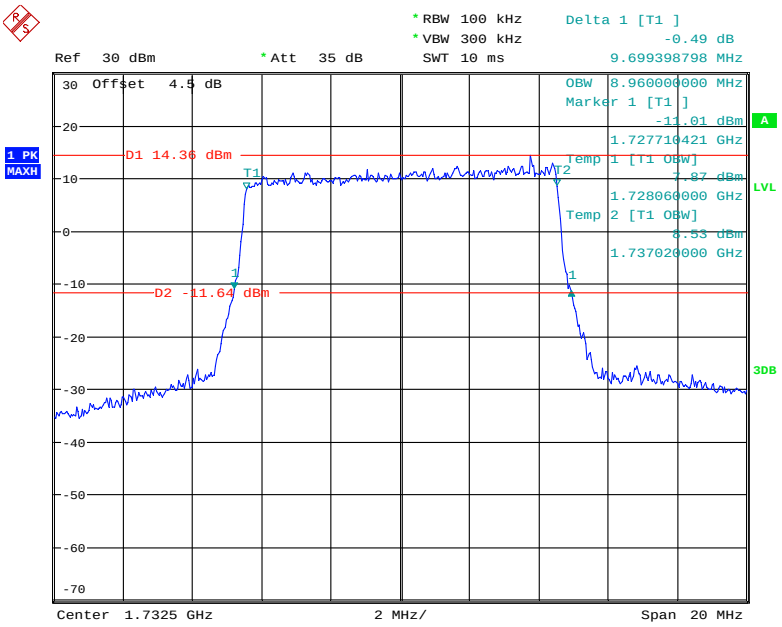
16QAM_10 MHz



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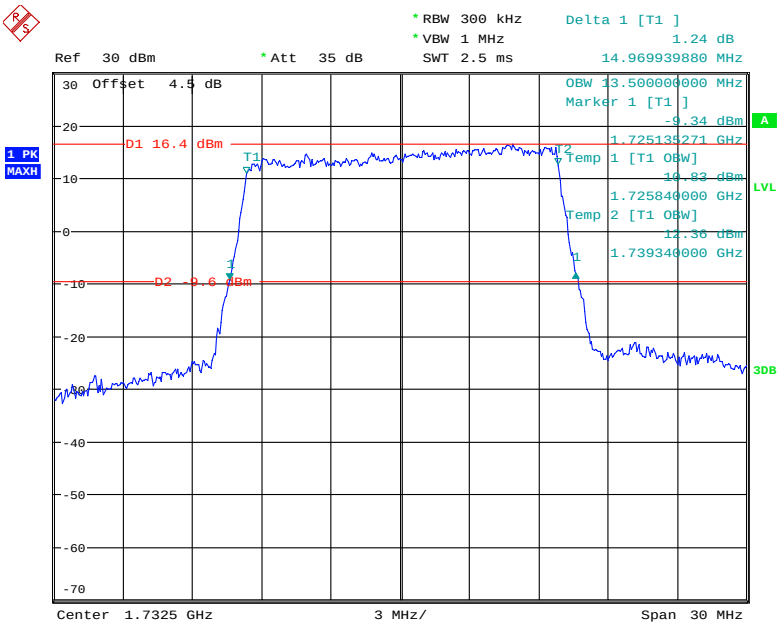

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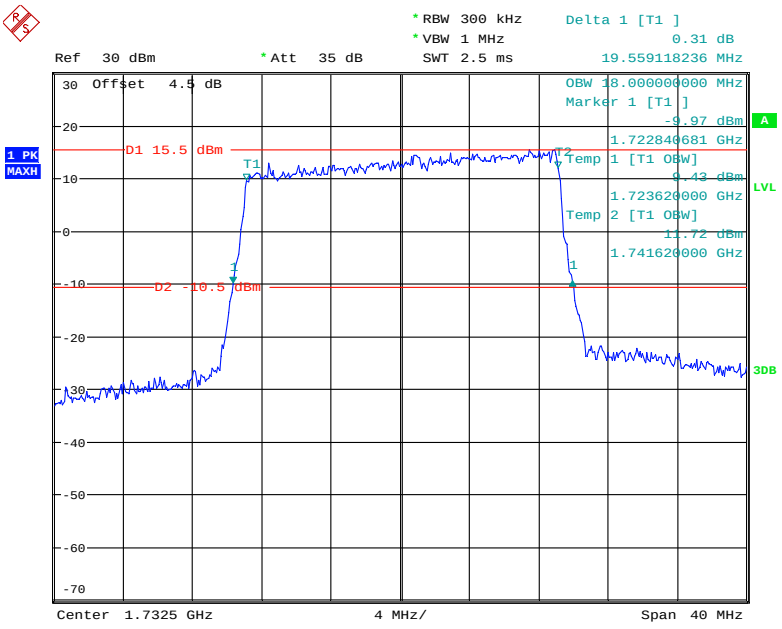
16QAM_20 MHz



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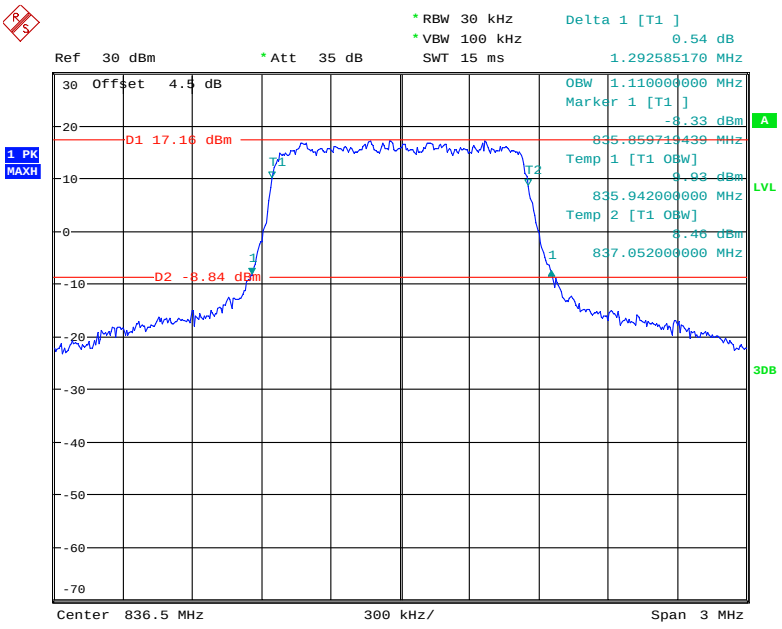
LTE Band 5:

QPSK_1.4 MHz



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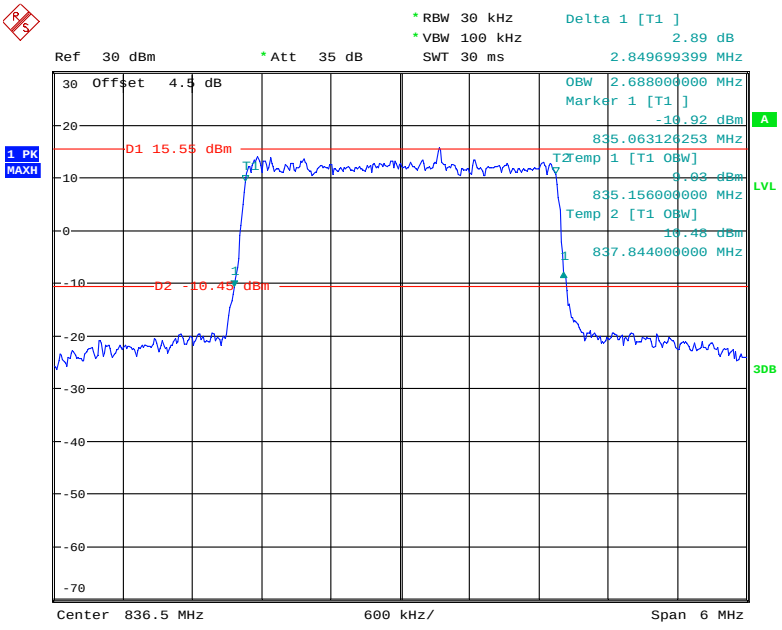
QPSK_3 MHz



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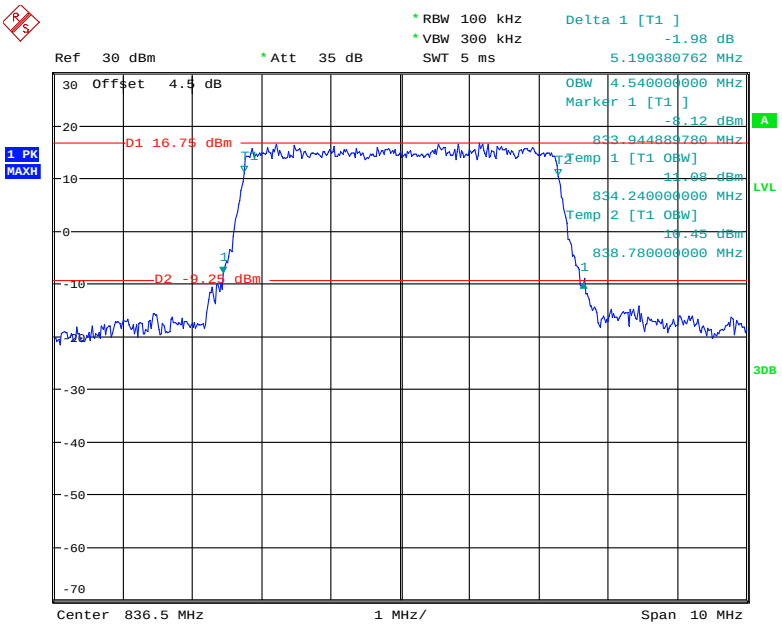
QPSK_5 MHz



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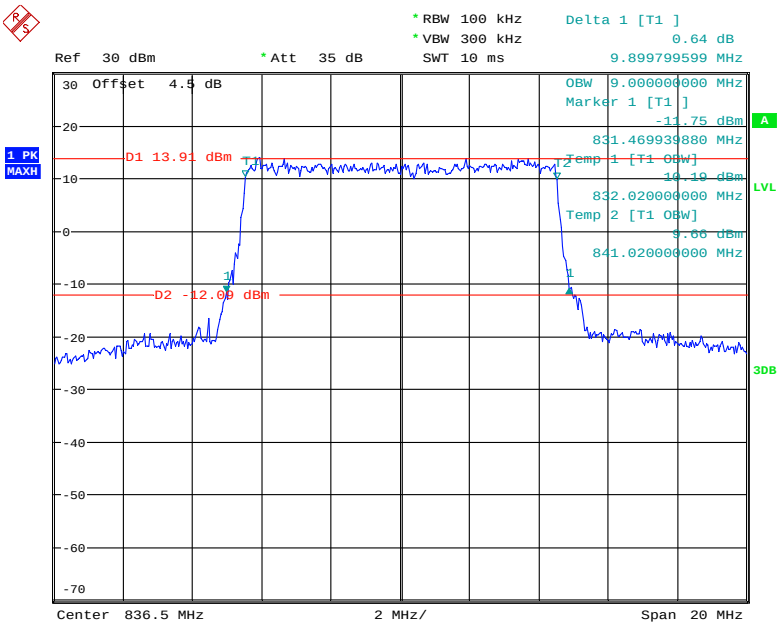
QPSK_10 MHz



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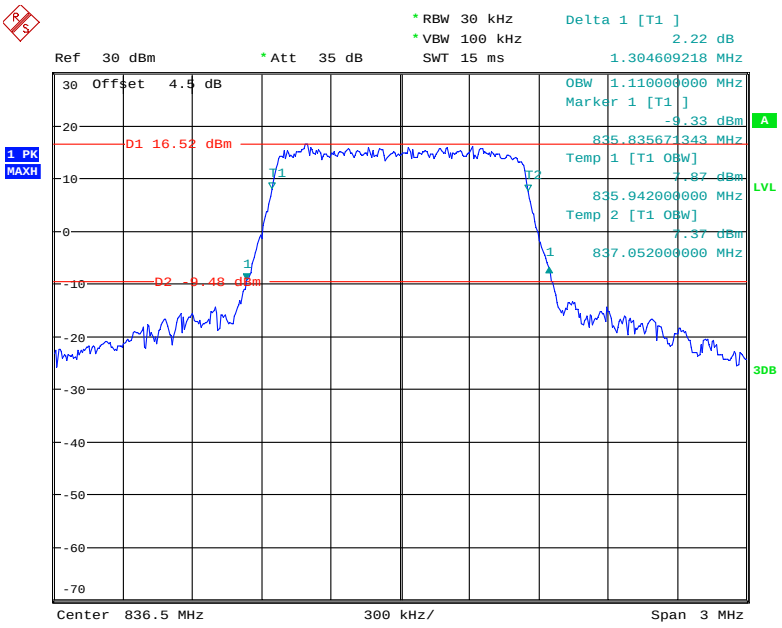
16QAM_1.4 MHz



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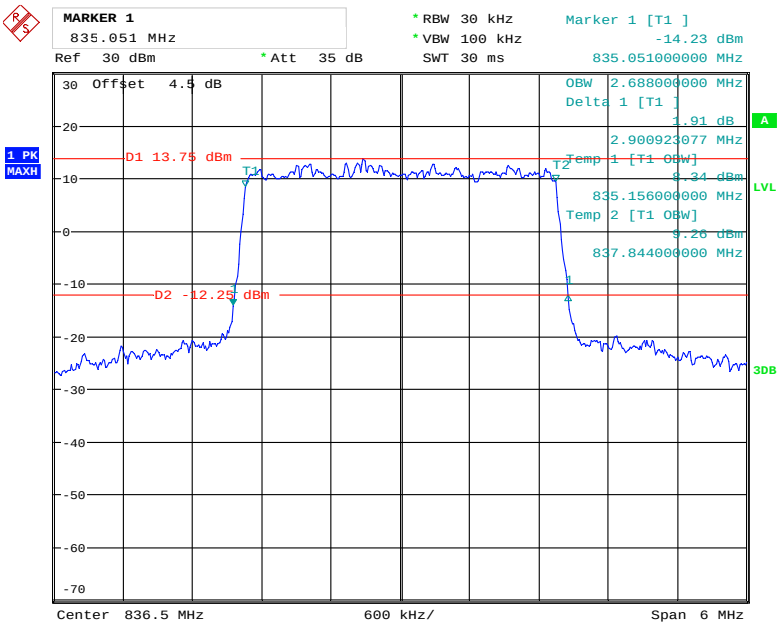
16QAM_3 MHz



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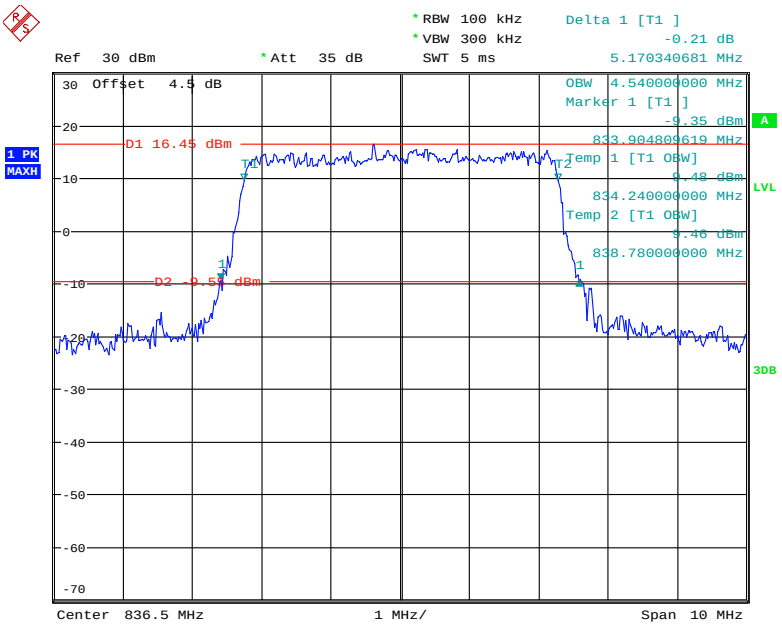
16QAM_5 MHz



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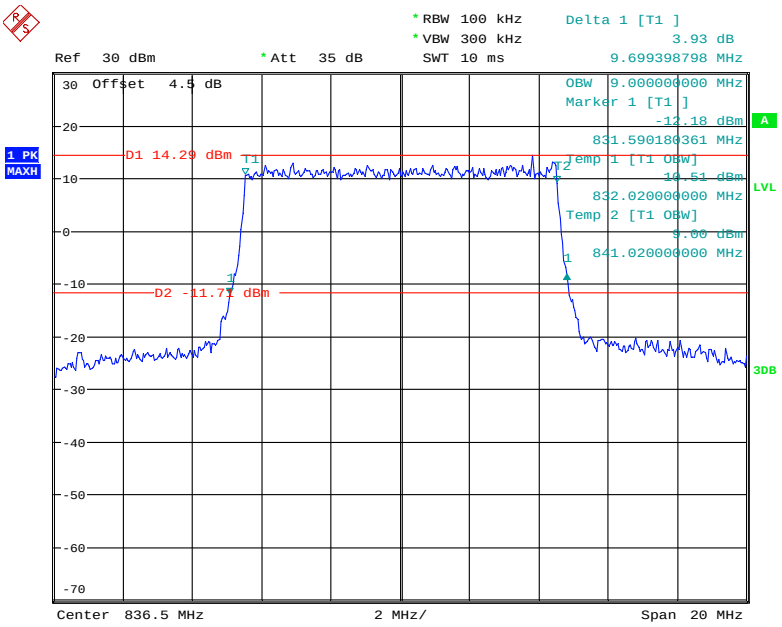
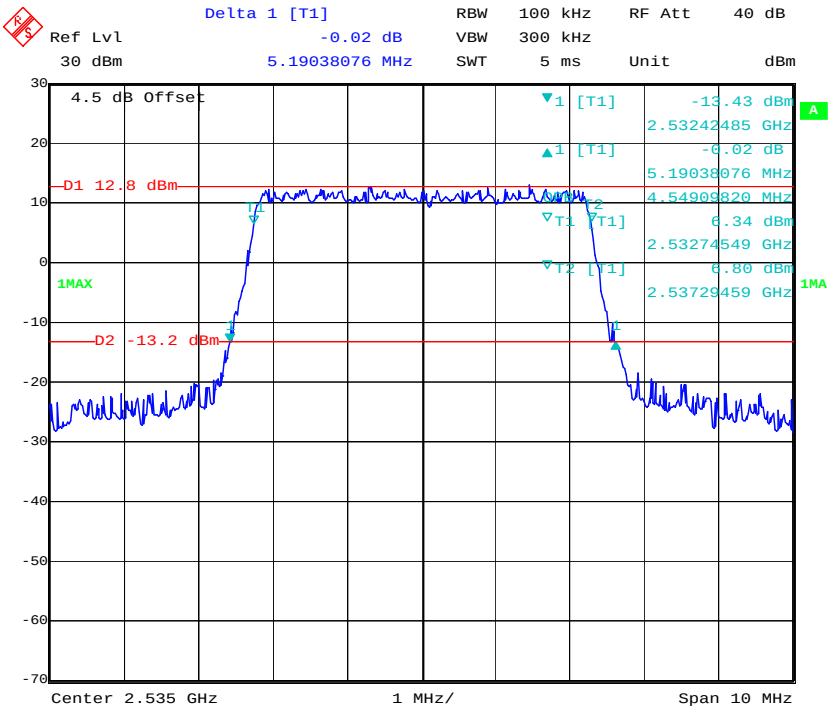


Date: 29.JAN.2019 14:28:17

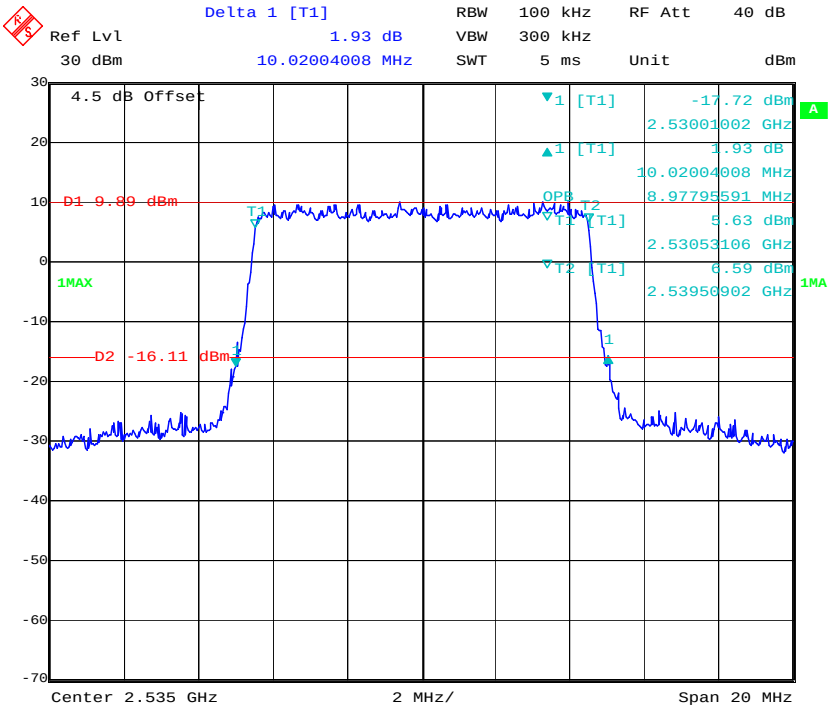
LTE Band 7:

QPSK_5 MHz



Date: 7.MAR.2019 11:27:19

QPSK_10 MHz



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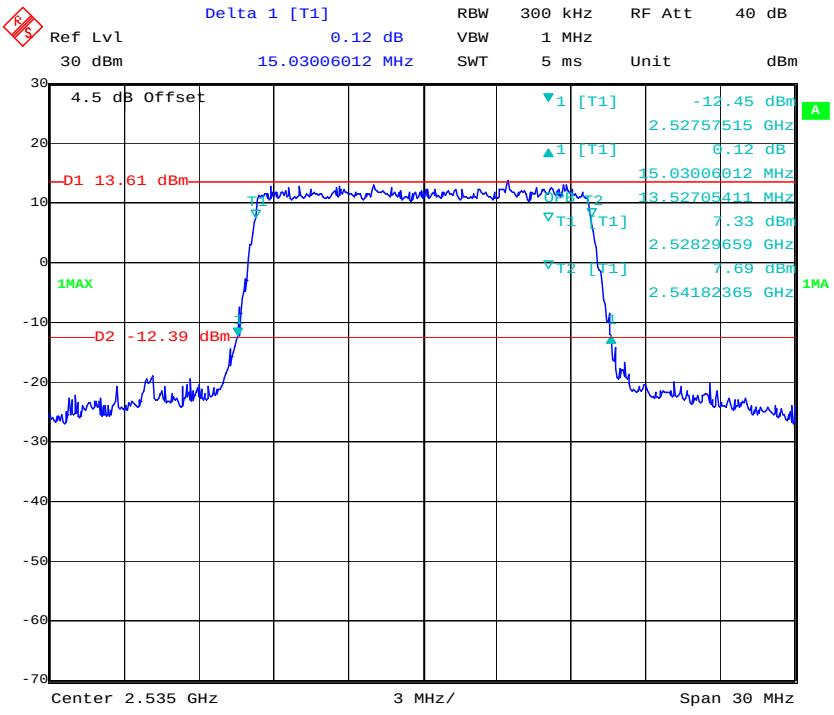
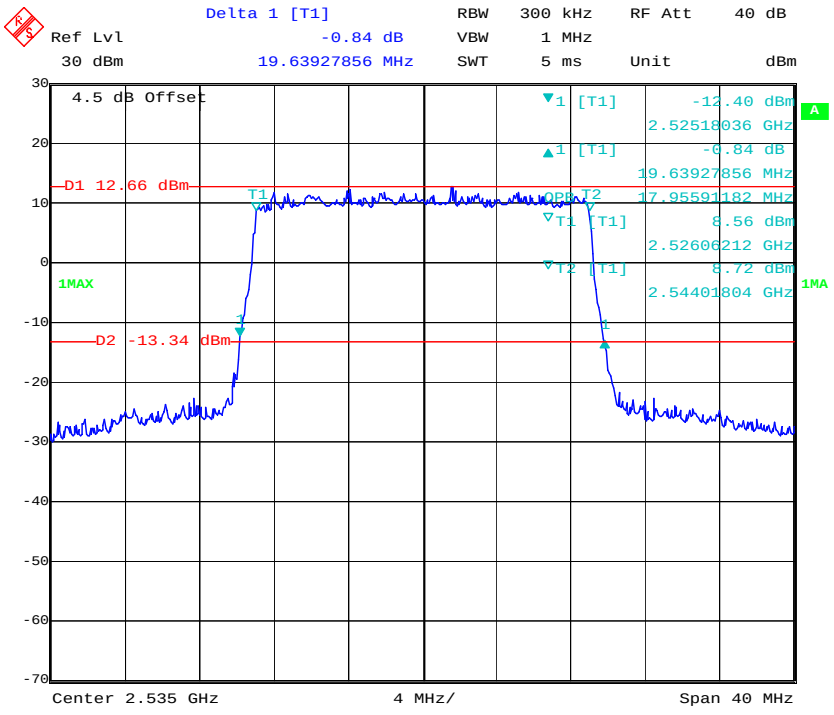


QPSK_20 MHz



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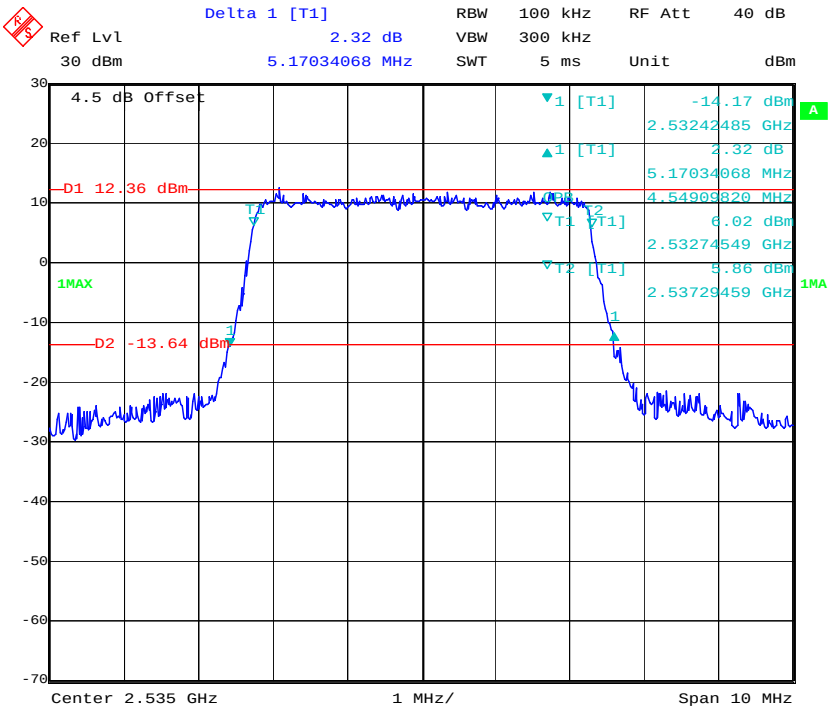

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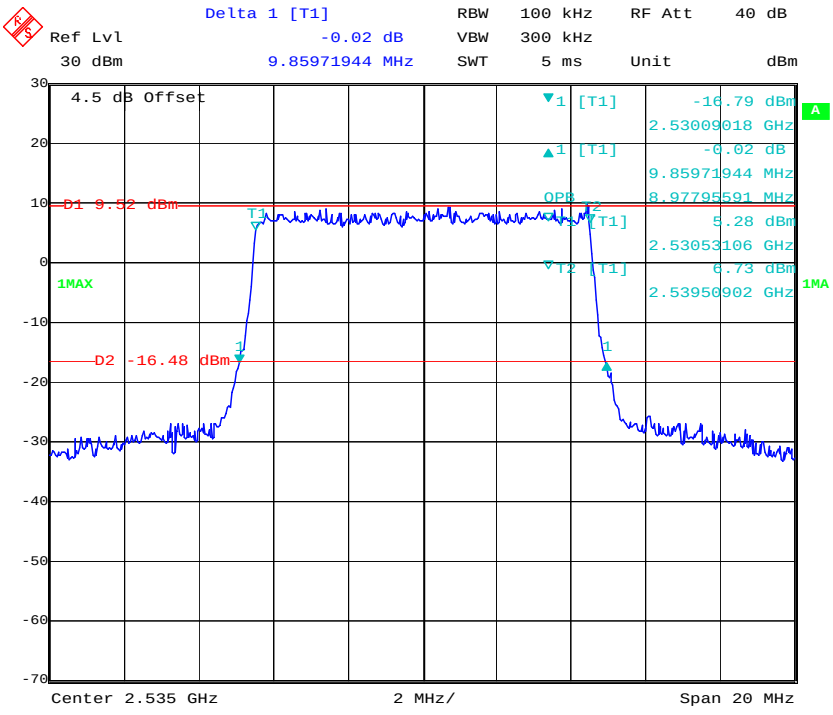

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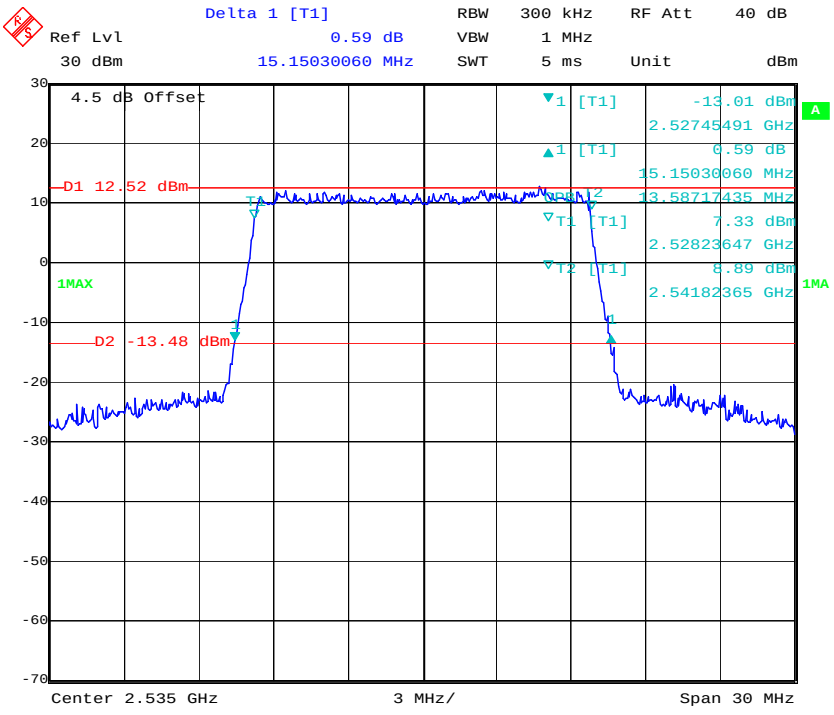

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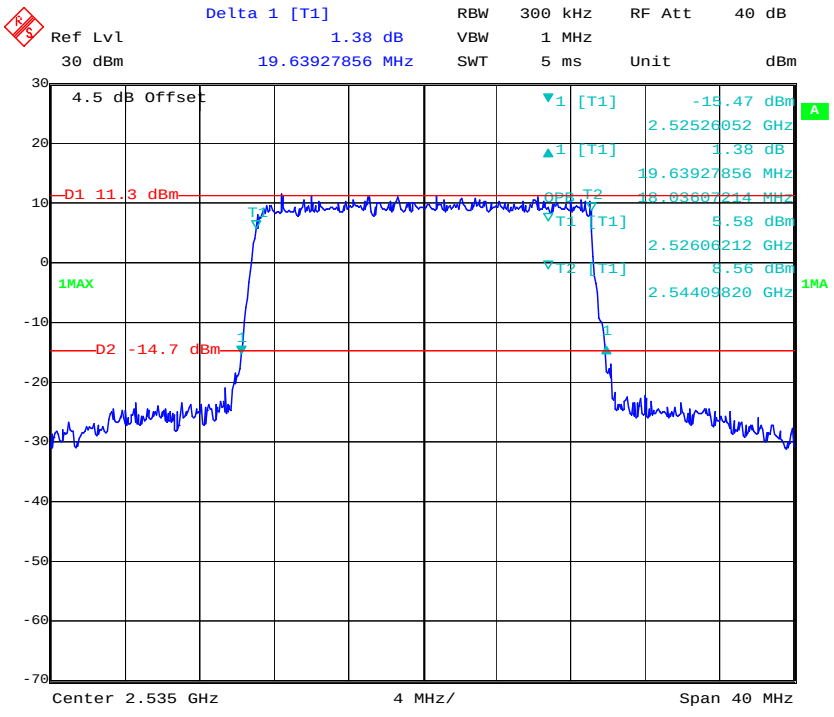

LTE Band 12:

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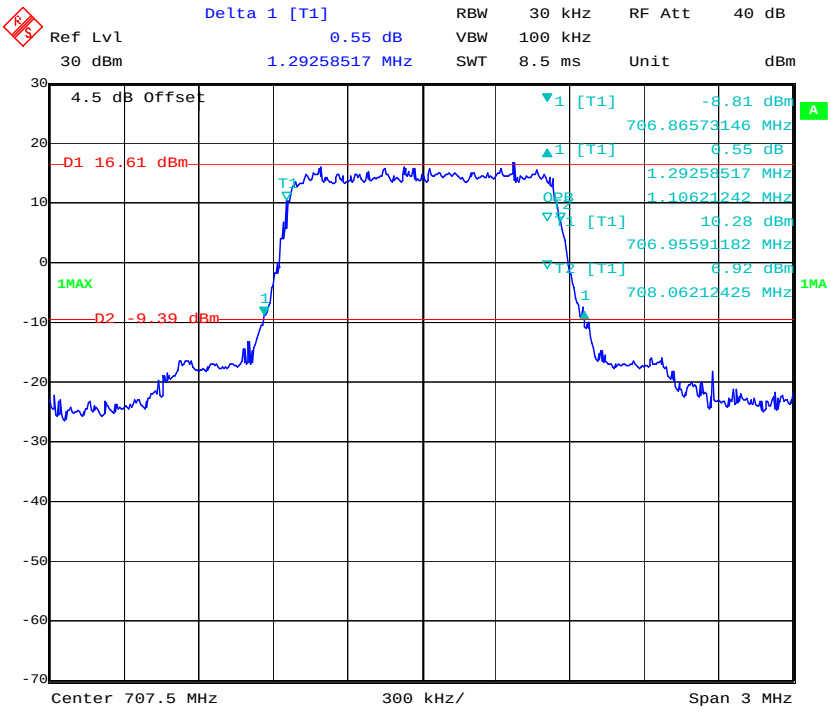
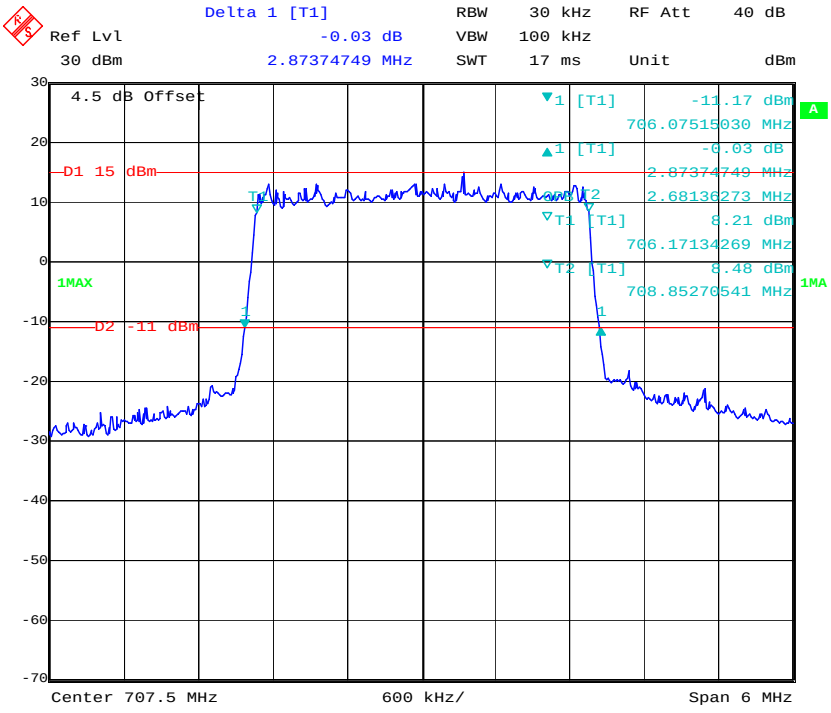


QPSK_3 MHz



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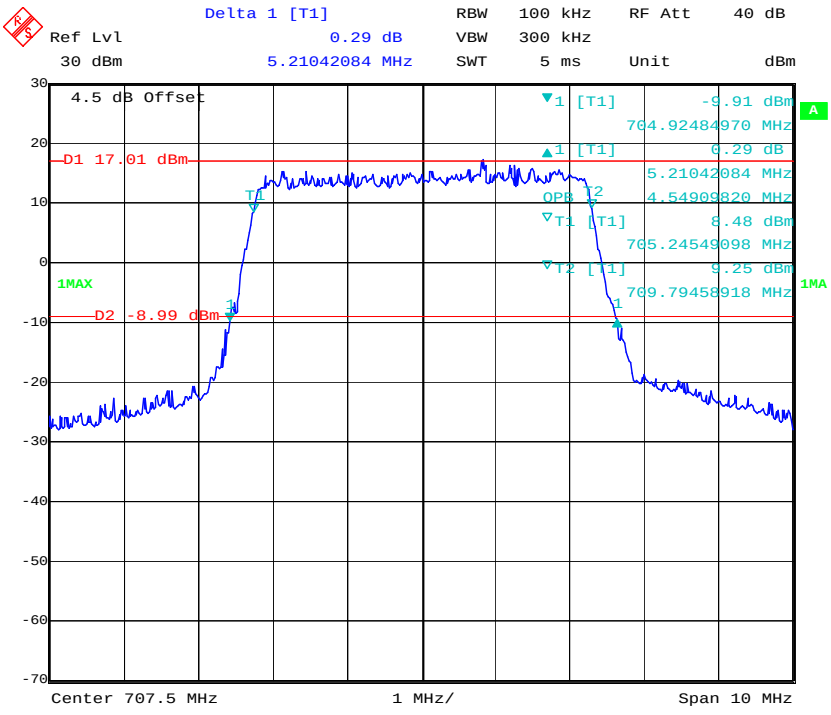

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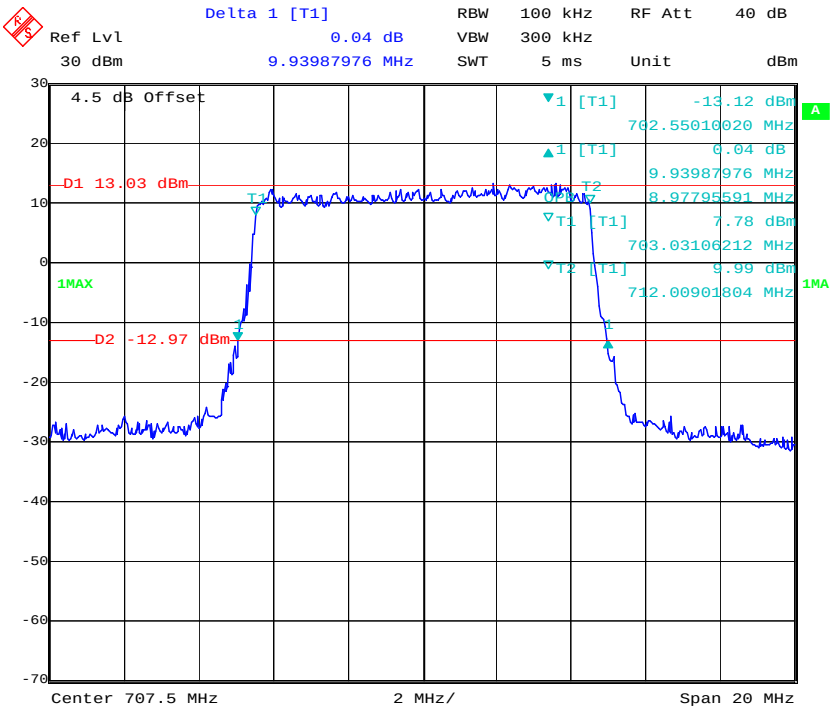

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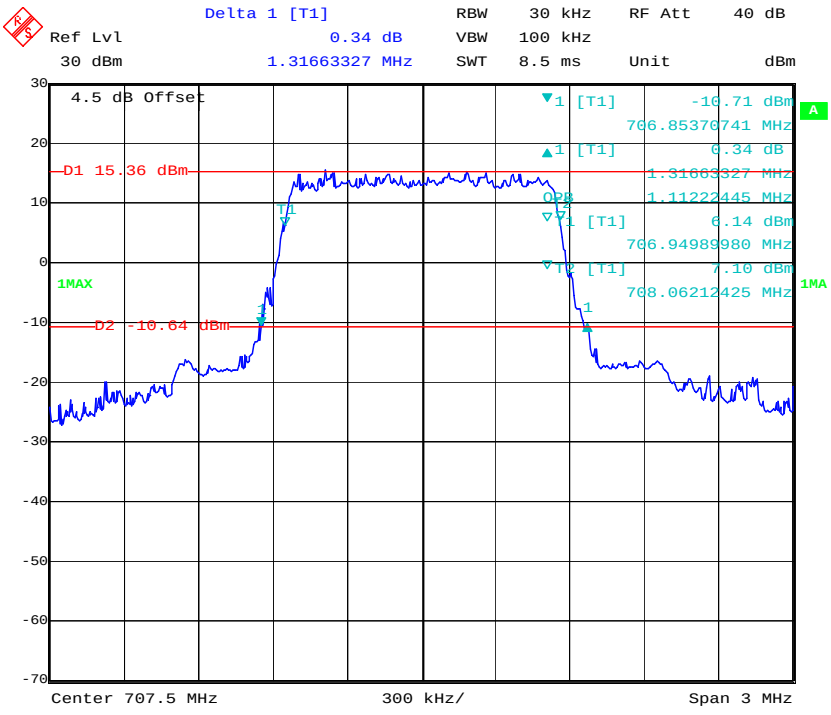
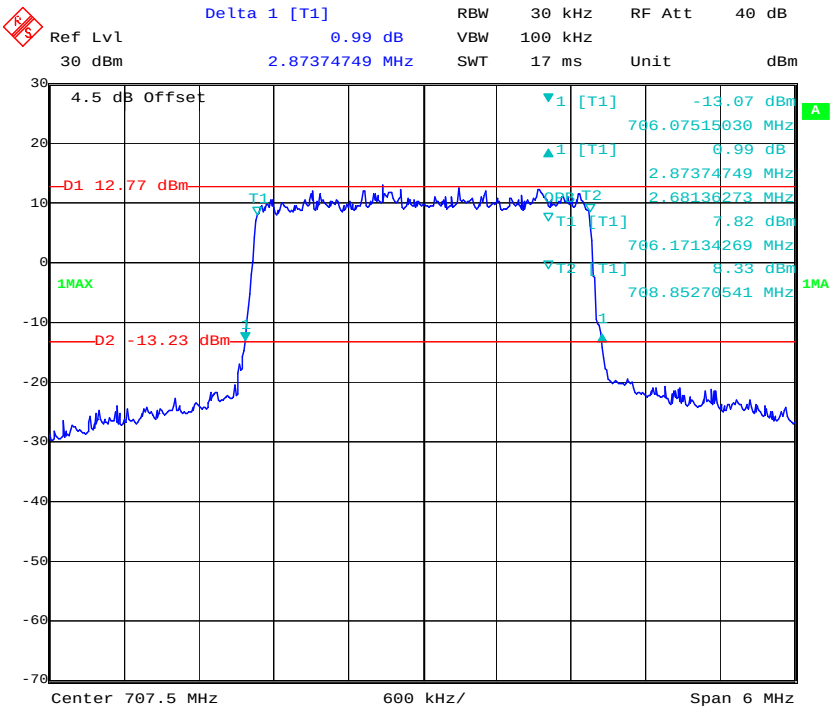


Date: 7.MAR.2019 11:33:11

16QAM_3 MHz



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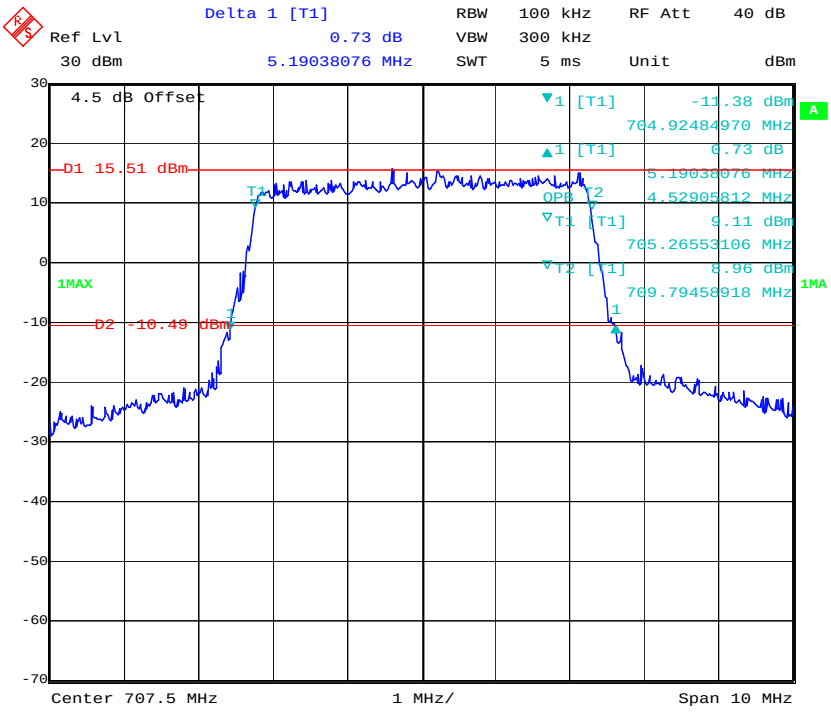
16QAM_5 MHz



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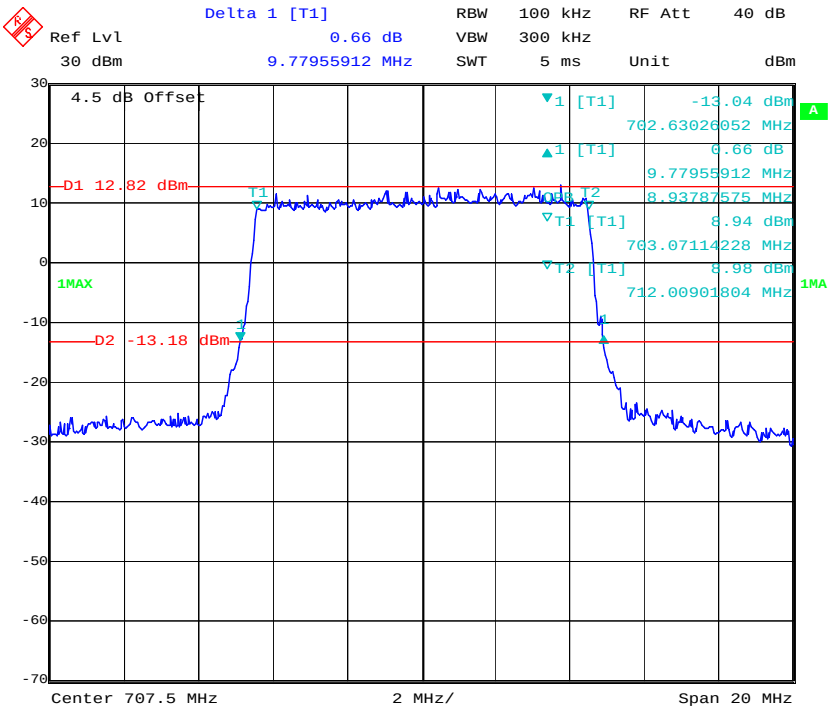

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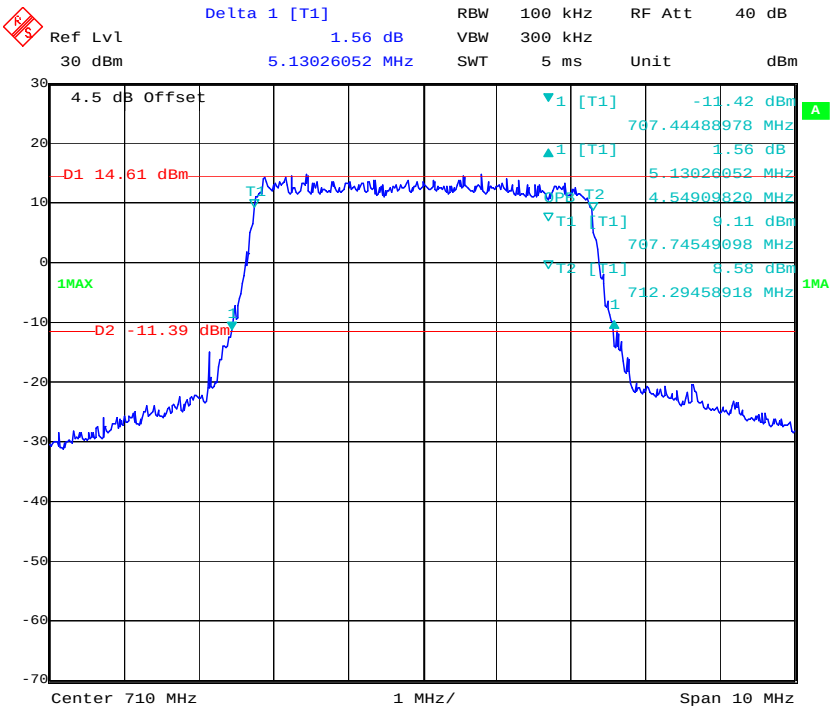
LTE Band 17:

QPSK_5 MHz



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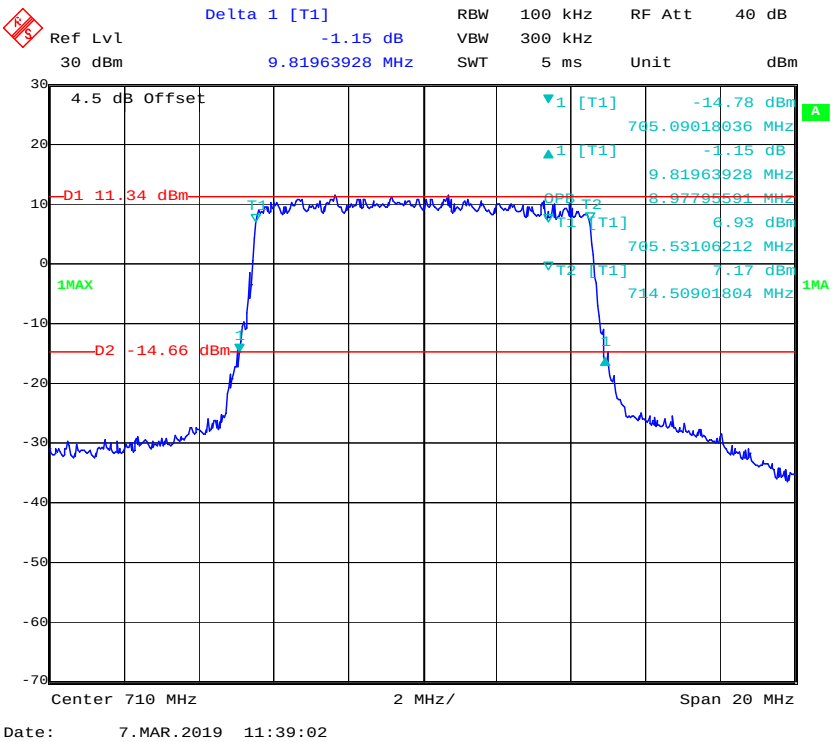

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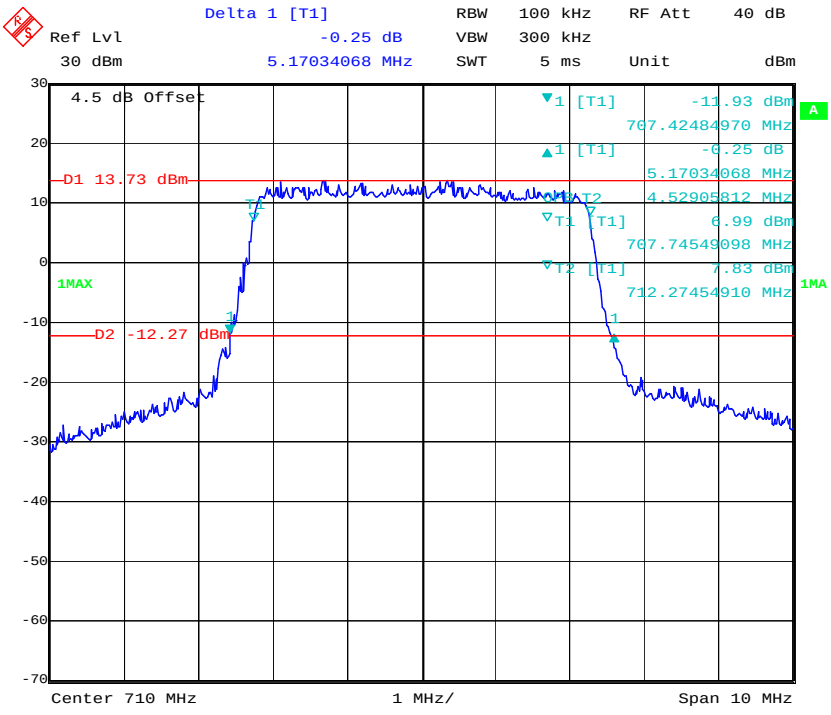
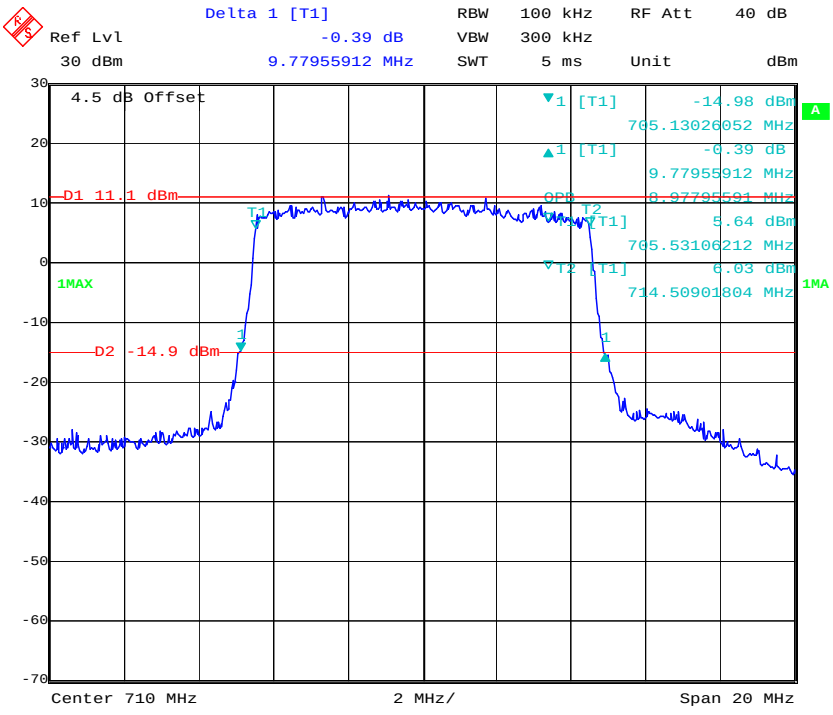


Date: 7.MAR.2019 11:38:19

16QAM_10 MHz



Date: 7.MAR.2019 11:39:42

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

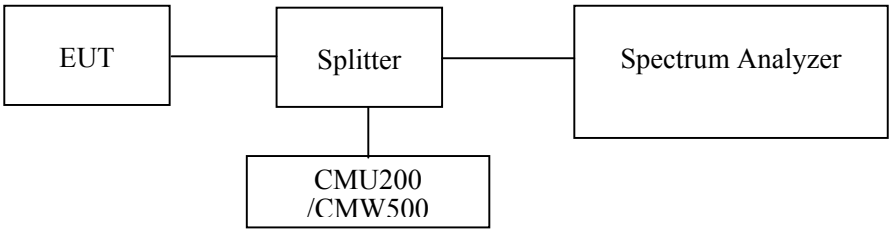
Applicable Standard

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

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

Test Procedure

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way 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

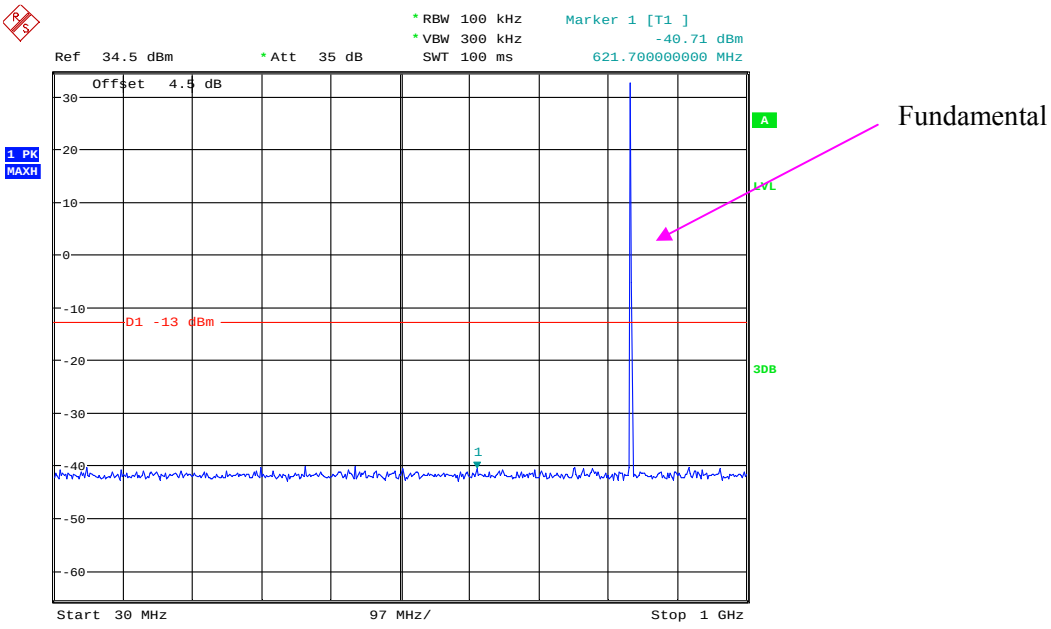
Environmental Conditions

Temperature:	25.4°C
Relative Humidity:	40~55 %
ATM Pressure:	100.6~100.8 kPa

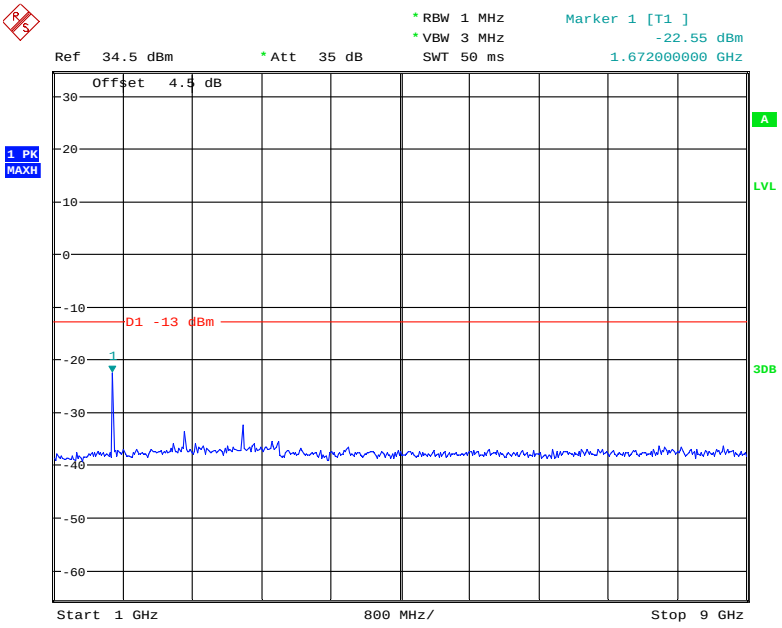
The testing was performed by Elena Lei & Blake Yang on 2019-01-29 and 2019-03-07.

Please refer to the following plots.

GSM850_Middle Channel

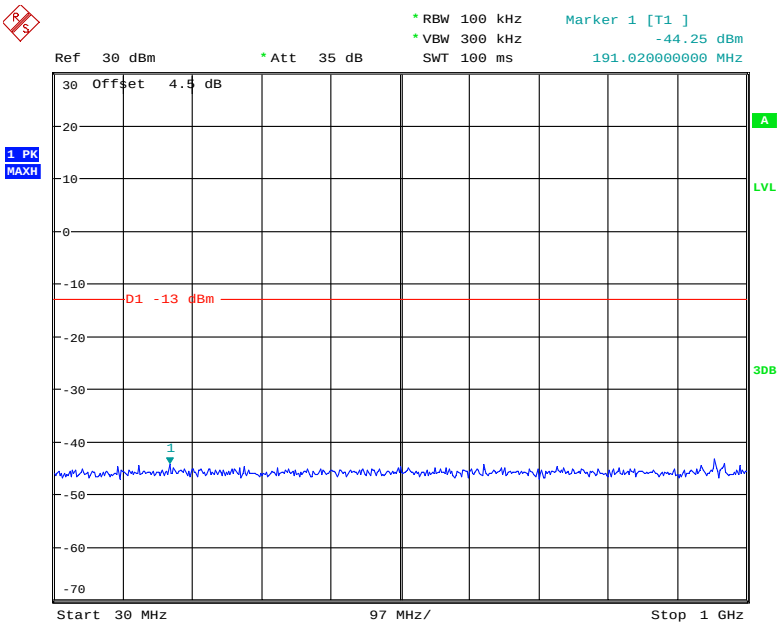


Date: 29.JAN.2019 17:43:02



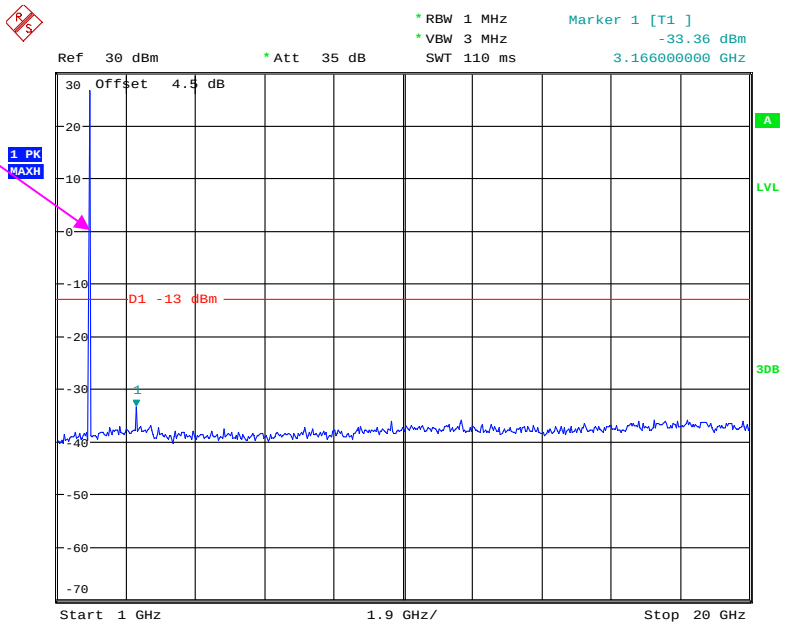
Date: 29.JAN.2019 17:45:01

PCS 1900_ Middle Channel



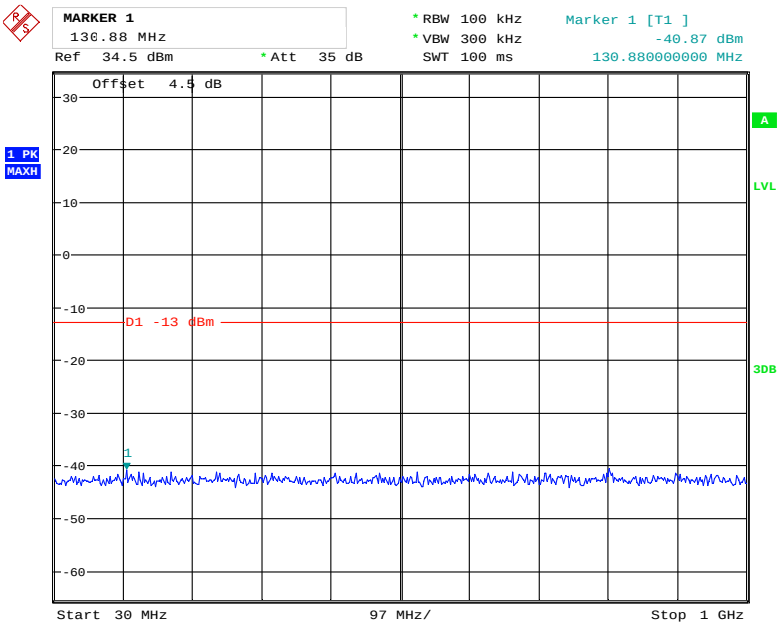
Date: 29.JAN.2019 17:23:41

Fundamental

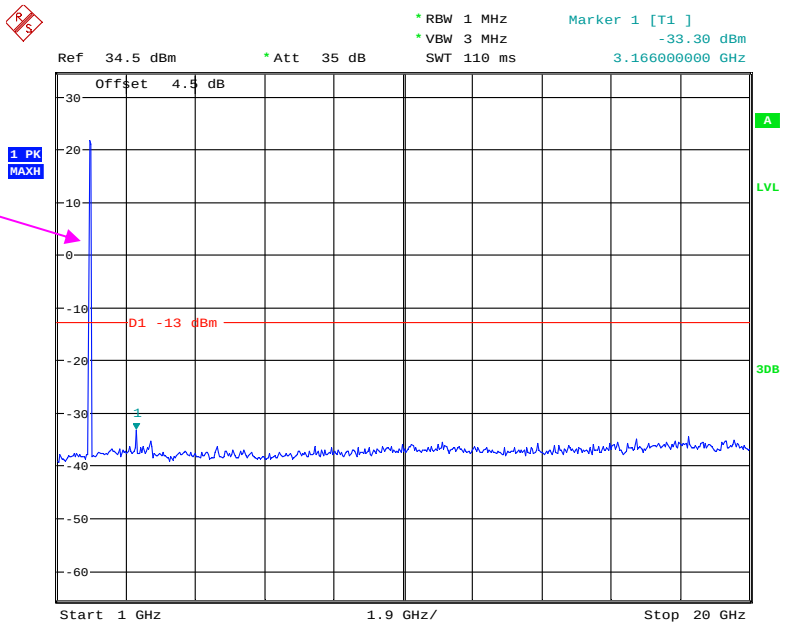


Date: 29.JAN.2019 17:24:35

WCDMA Band II,Rel99



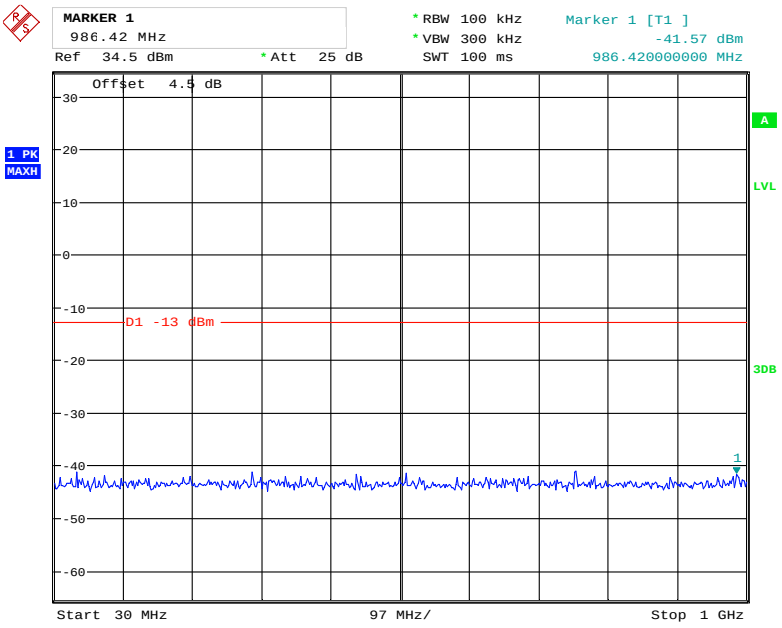
Date: 29.JAN.2019 20:18:46



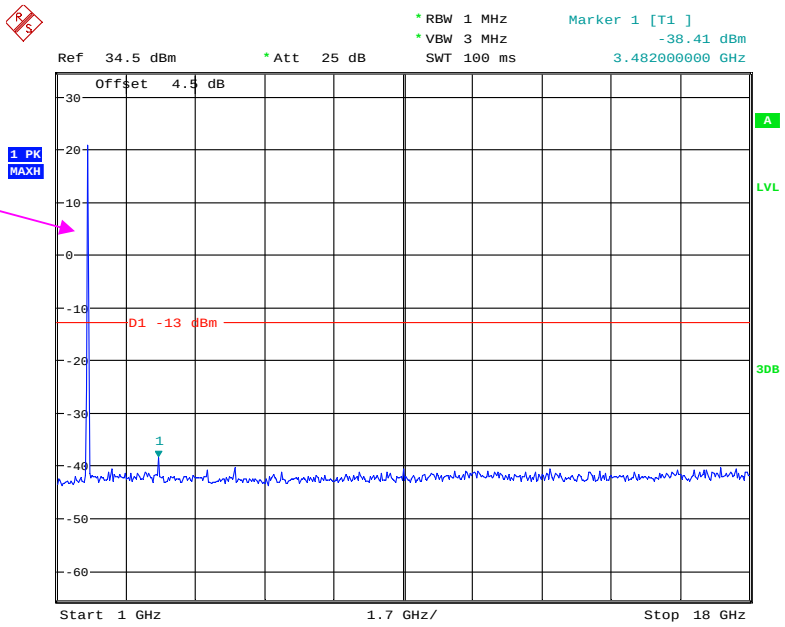
Fundamental

Date: 29.JAN.2019 20:19:24

WCDMA Band IV,Rel99



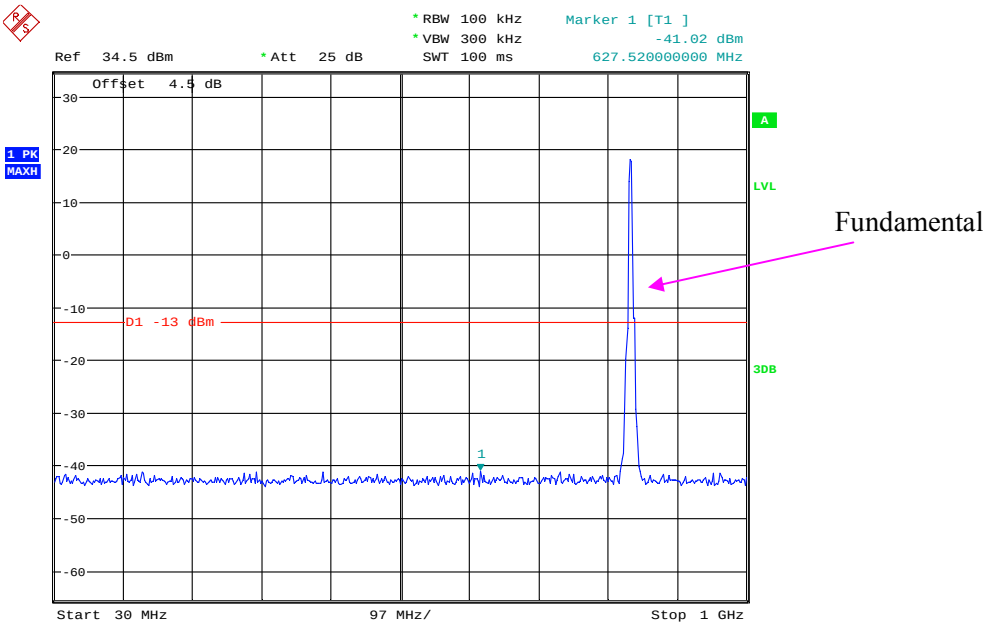
Date: 29.JAN.2019 21:09:31



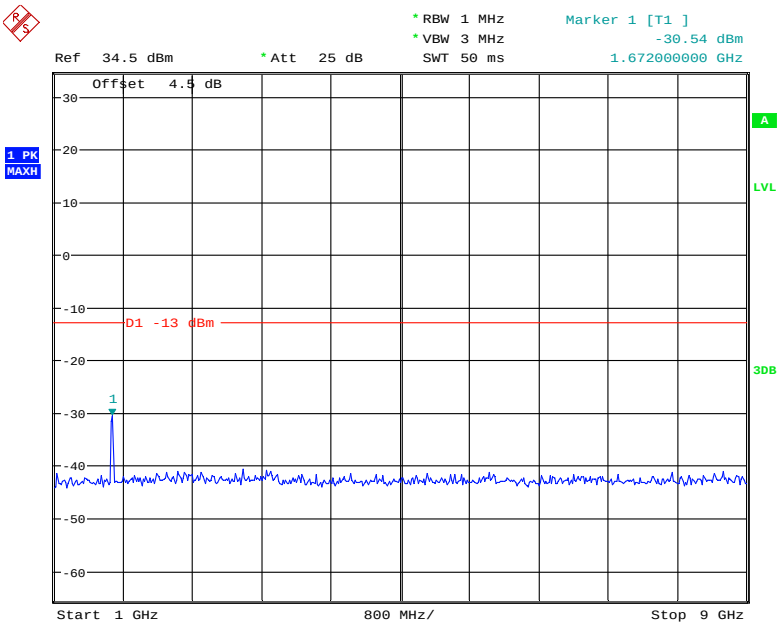
Fundamental

Date: 29.JAN.2019 21:10:38

WCDMA Band V,Rel99



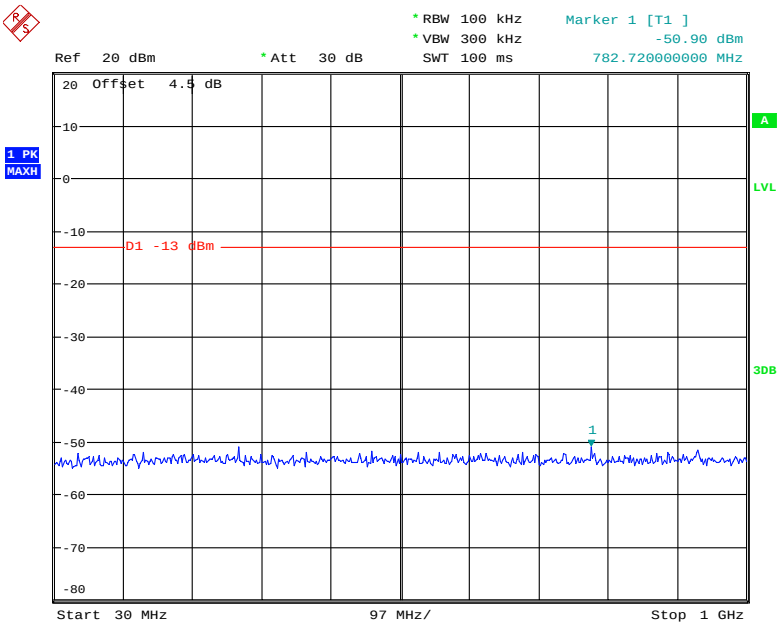
Date: 29.JAN.2019 20:41:23



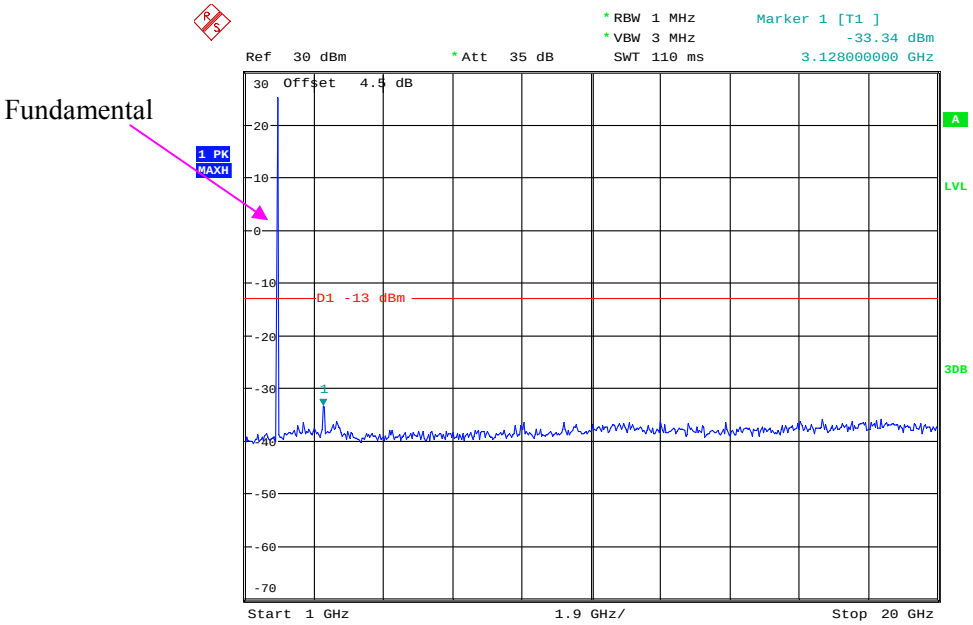
Date: 29.JAN.2019 20:41:54

LTE Band 2 (Middle Channel)

QPSK_1.4 MHz

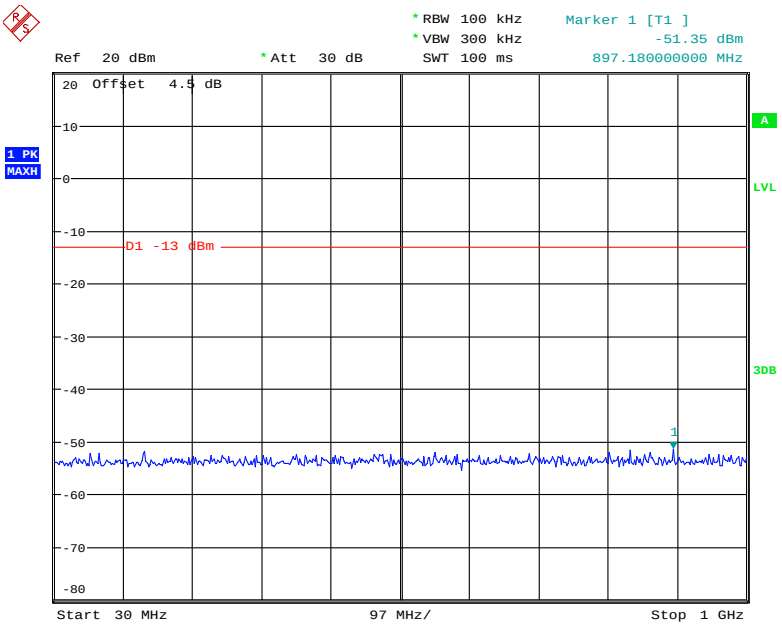


Date: 29.JAN.2019 11:45:57

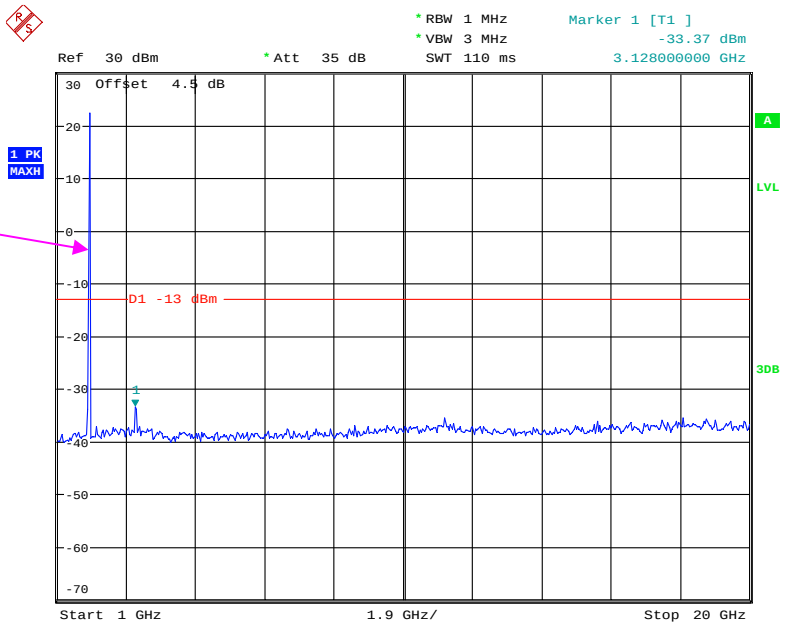


Date: 29.JAN.2019 11:46:08

QPSK_3 MHz



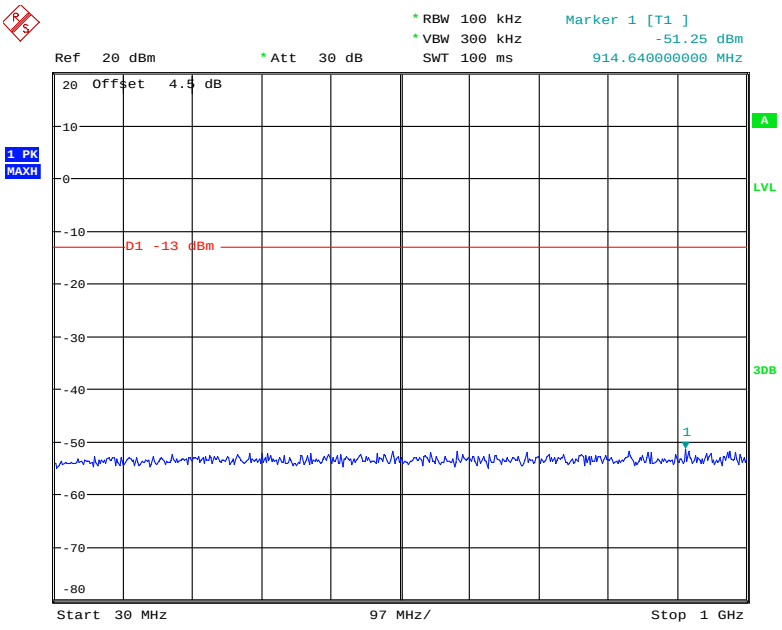
Date: 29.JAN.2019 11:46:24



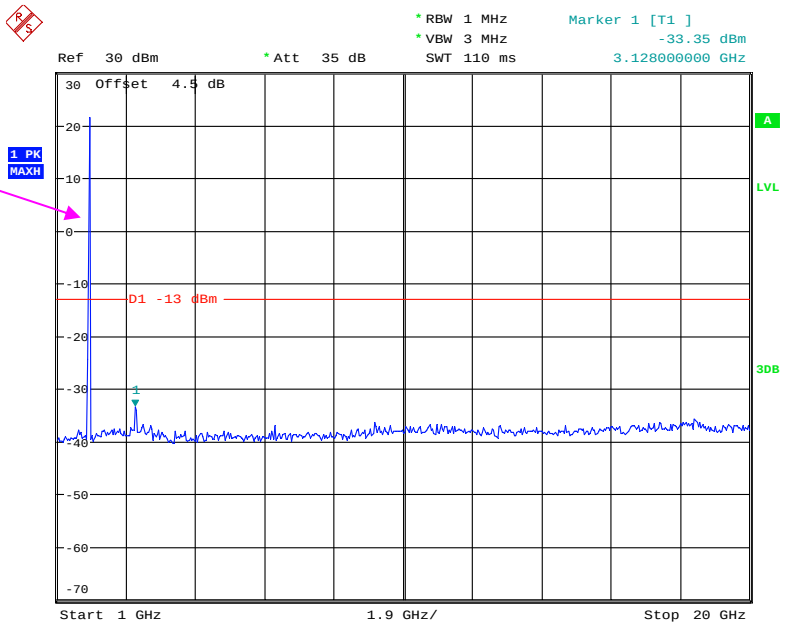
Fundamental

Date: 29.JAN.2019 11:46:39

QPSK_5 MHz



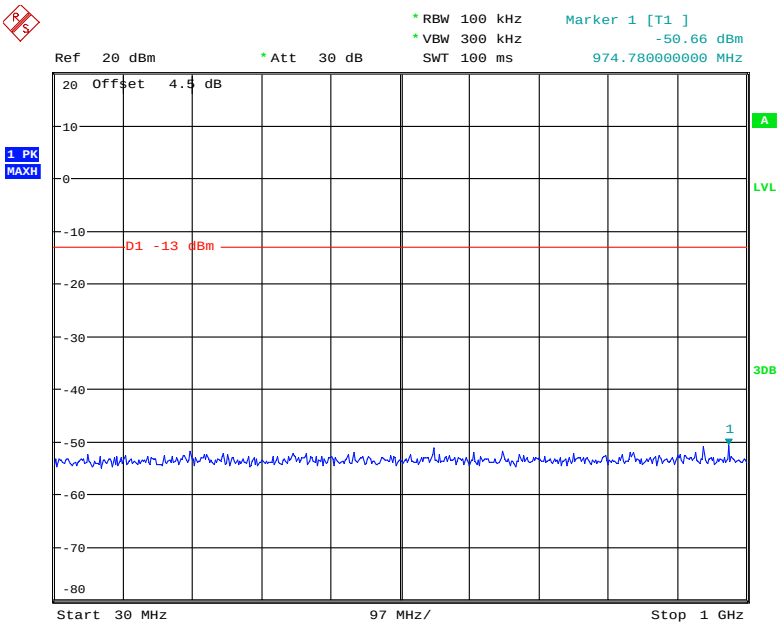
Date: 29.JAN.2019 11:47:00



Fundamental

Date: 29.JAN.2019 11:47:11

QPSK_10 MHz



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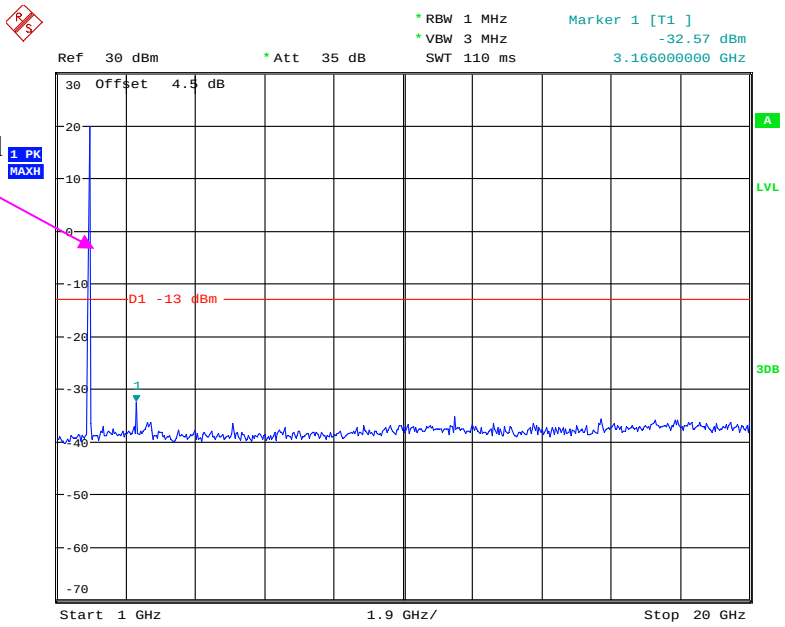
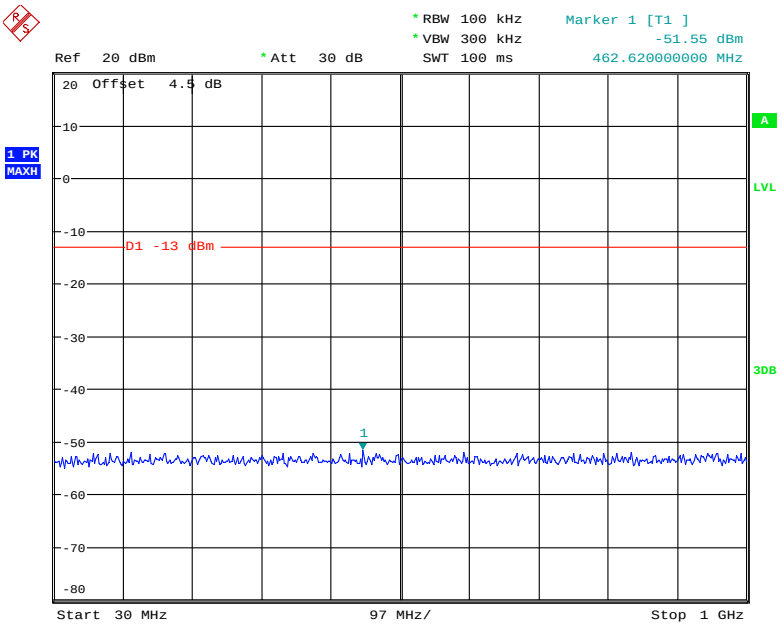


Date: 29.JAN.2019 11:47:46

QPSK_15 MHz



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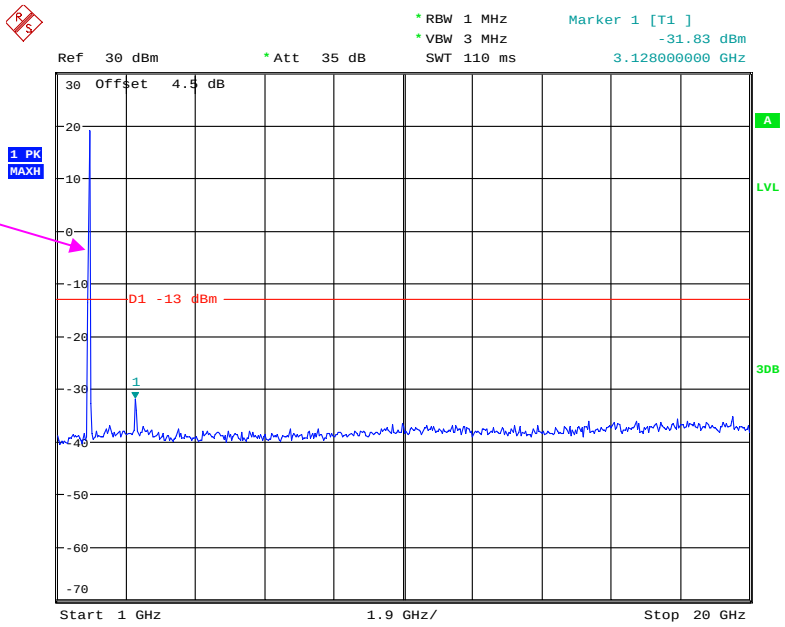
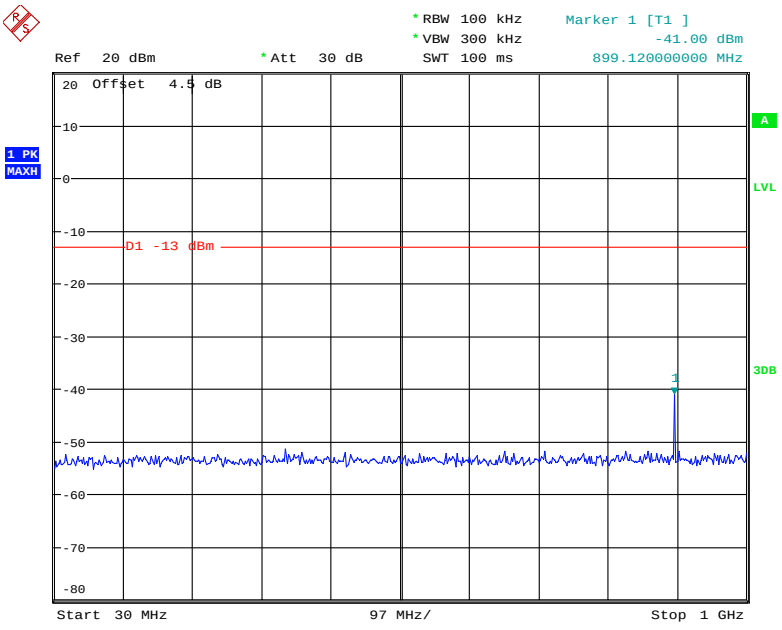


Fundamental

Date: 29.JAN.2019 11:48:22

QPSK_20 MHz



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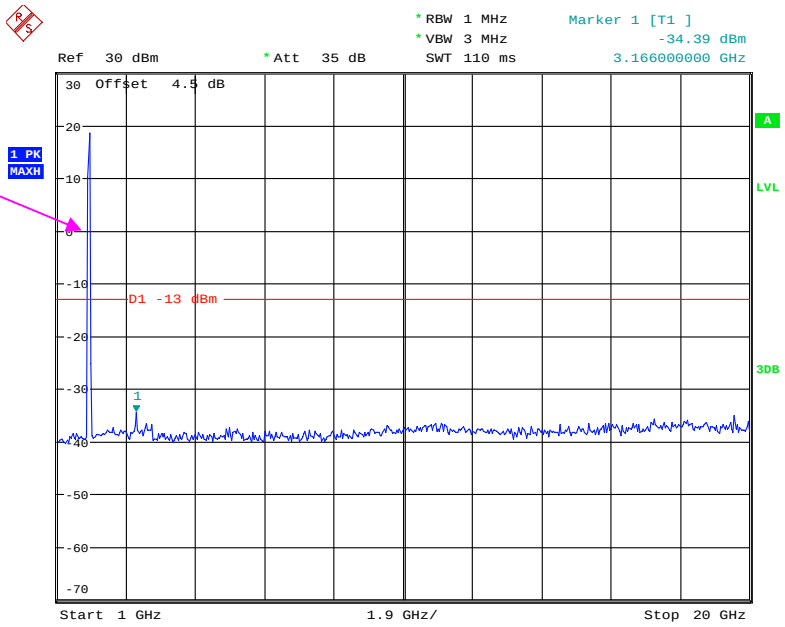
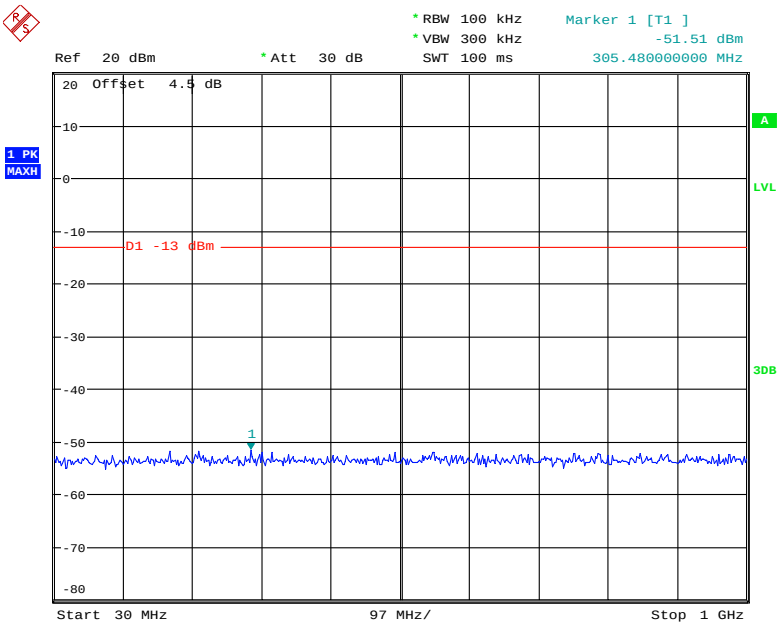


Fundamental

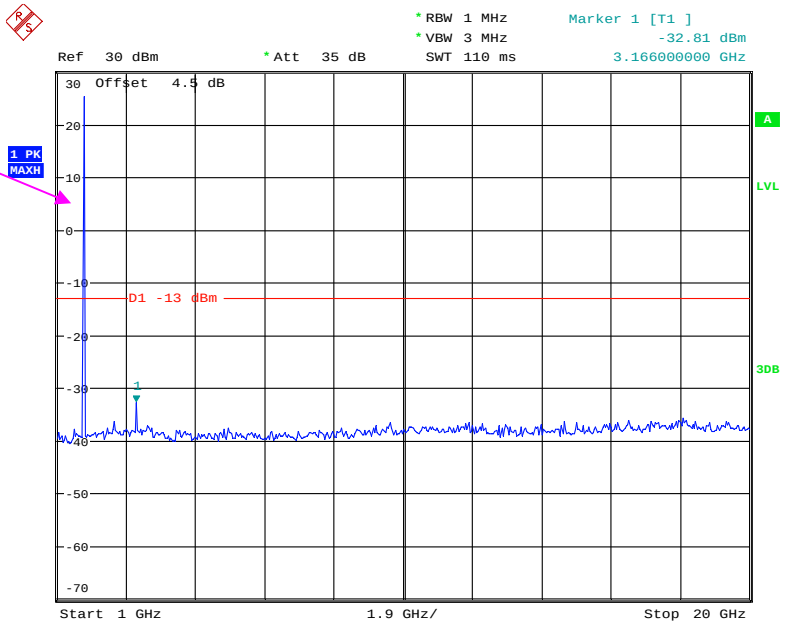
Date: 29.JAN.2019 11:48:58

LTE Band 4 (Middle Channel)

QPSK_1.4 MHz



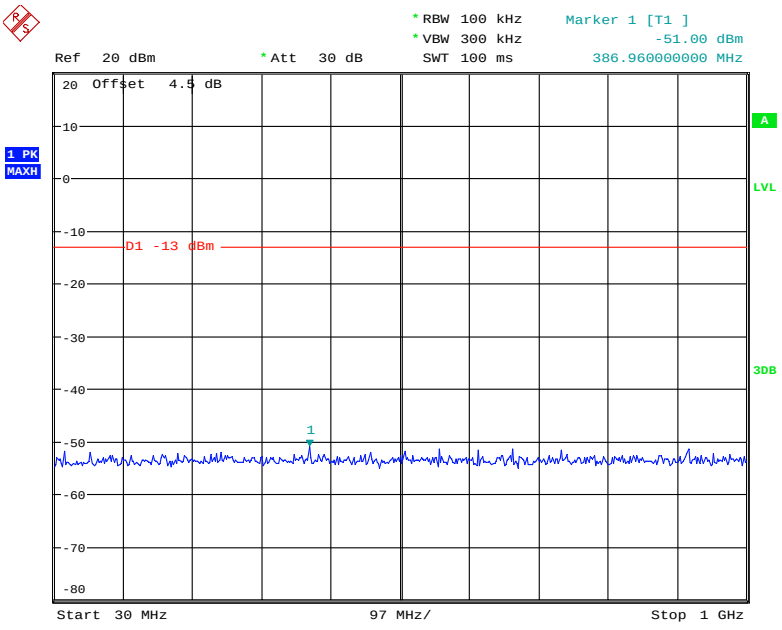
Date: 29.JAN.2019 11:49:19



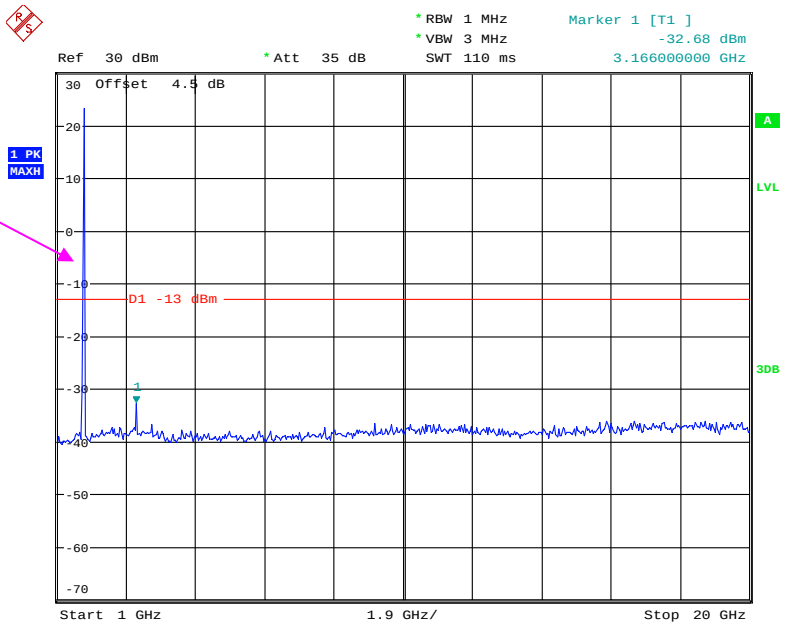
Fundamental

Date: 29.JAN.2019 11:49:29

QPSK_3 MHz



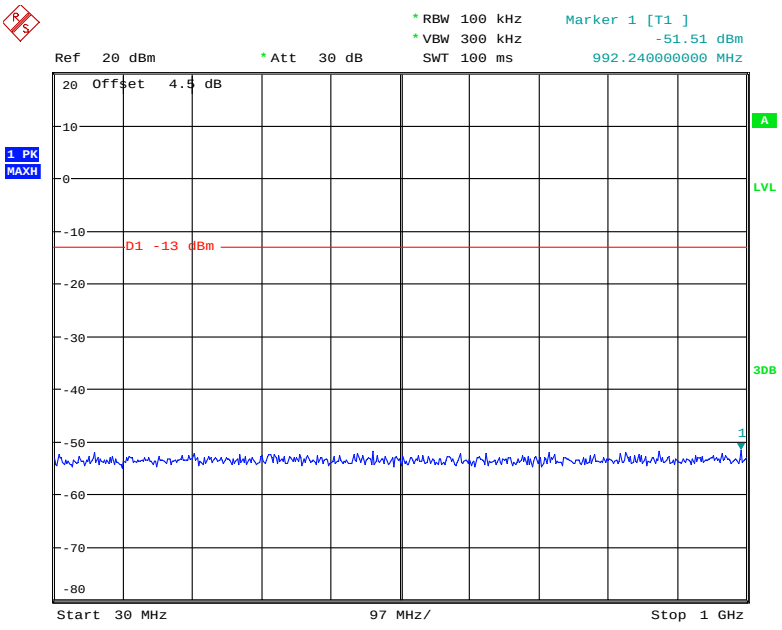
Date: 29.JAN.2019 11:49:50



Fundamental

Date: 29.JAN.2019 11:50:00

QPSK_5 MHz



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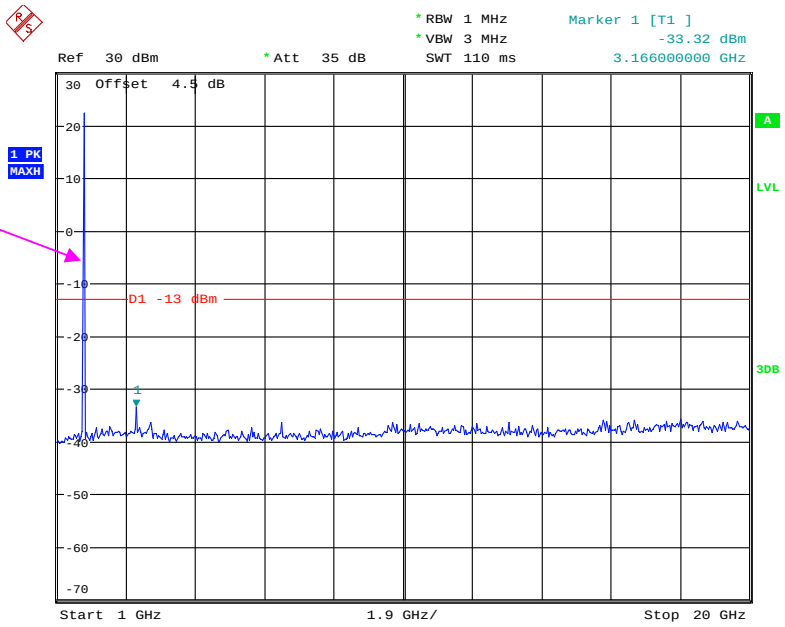
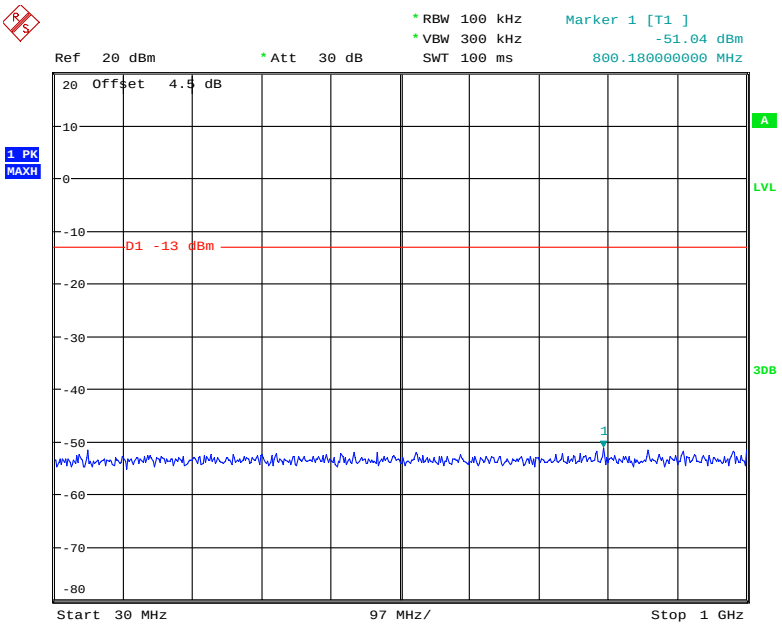


Fundamental

Date: 29.JAN.2019 11:50:32

QPSK_10 MHz



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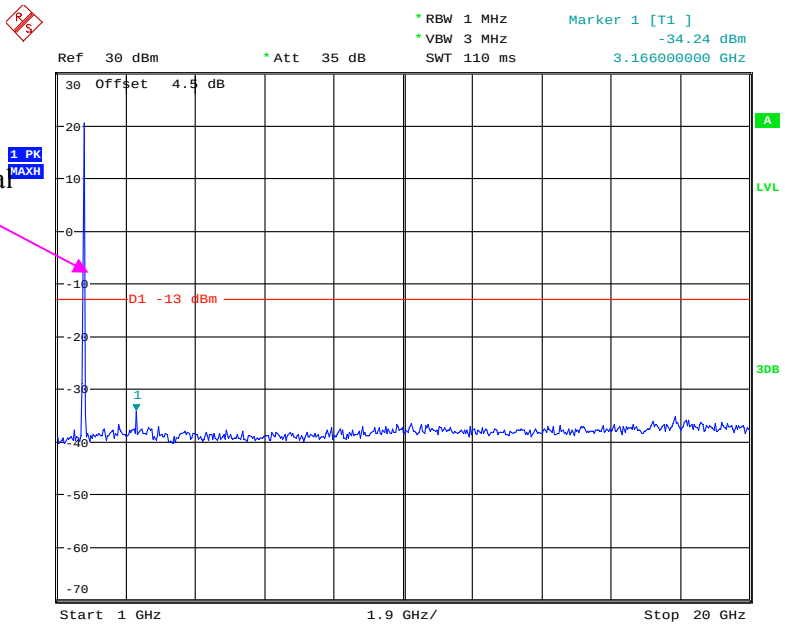
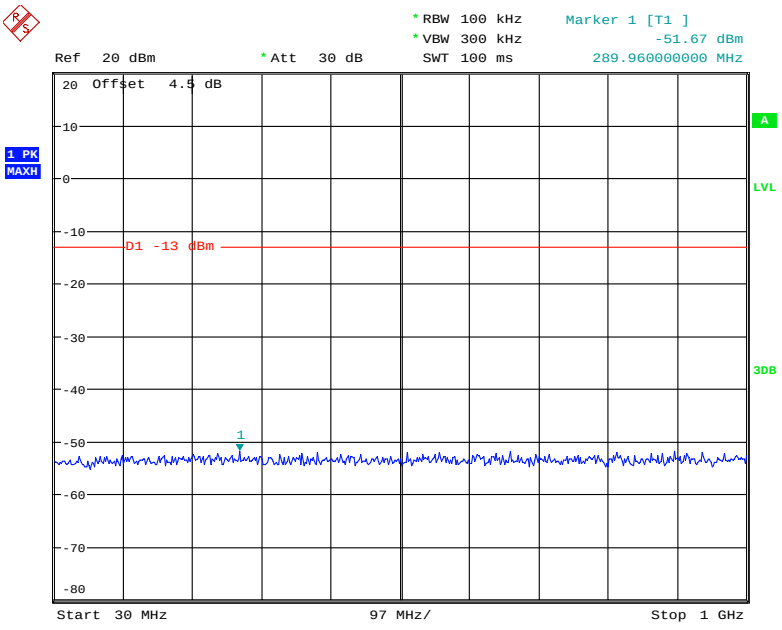


Fundamental

Date: 29.JAN.2019 11:51:04

QPSK_15 MHz



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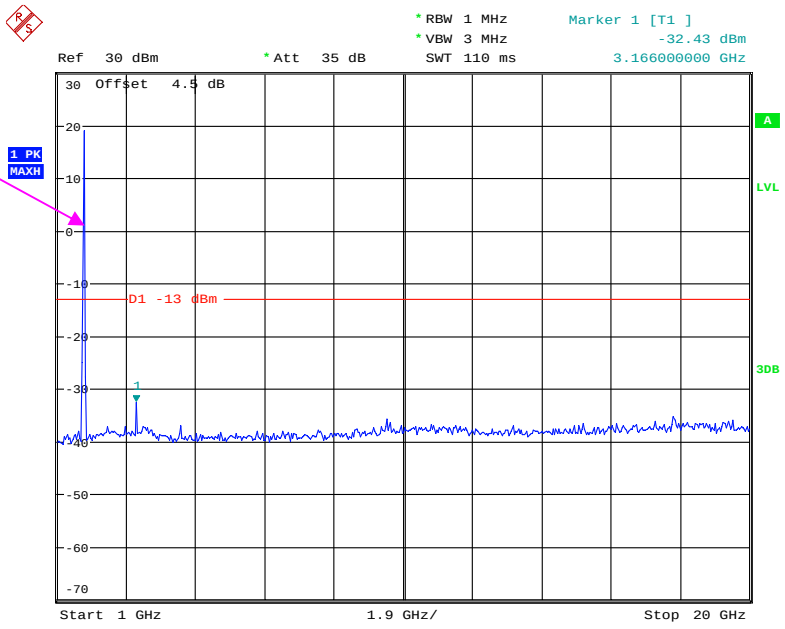
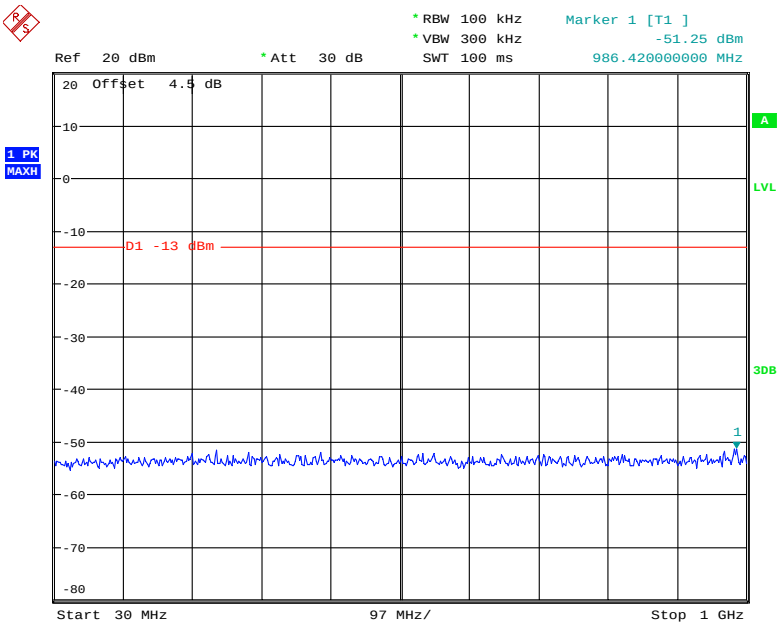


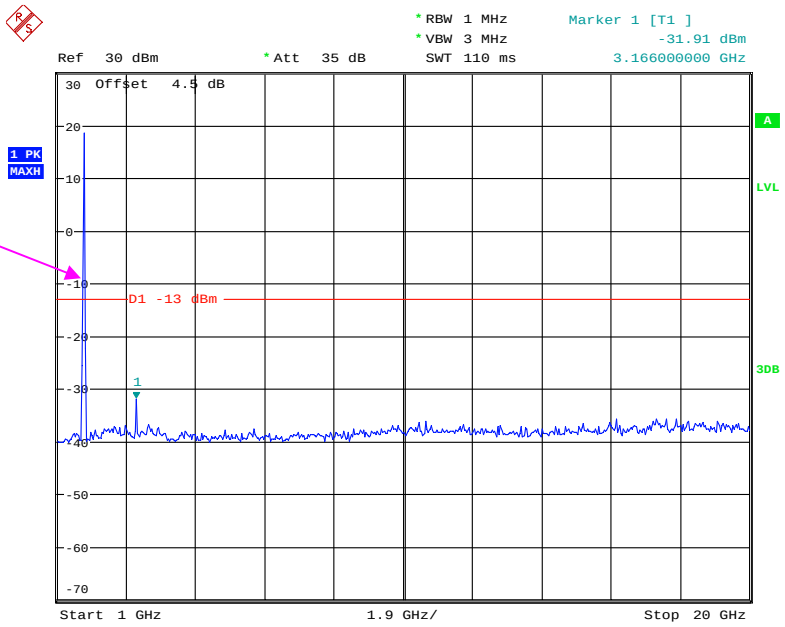
Fundamental

Date: 29.JAN.2019 11:51:39

QPSK_20 MHz



Date: 29.JAN.2019 11:52:01

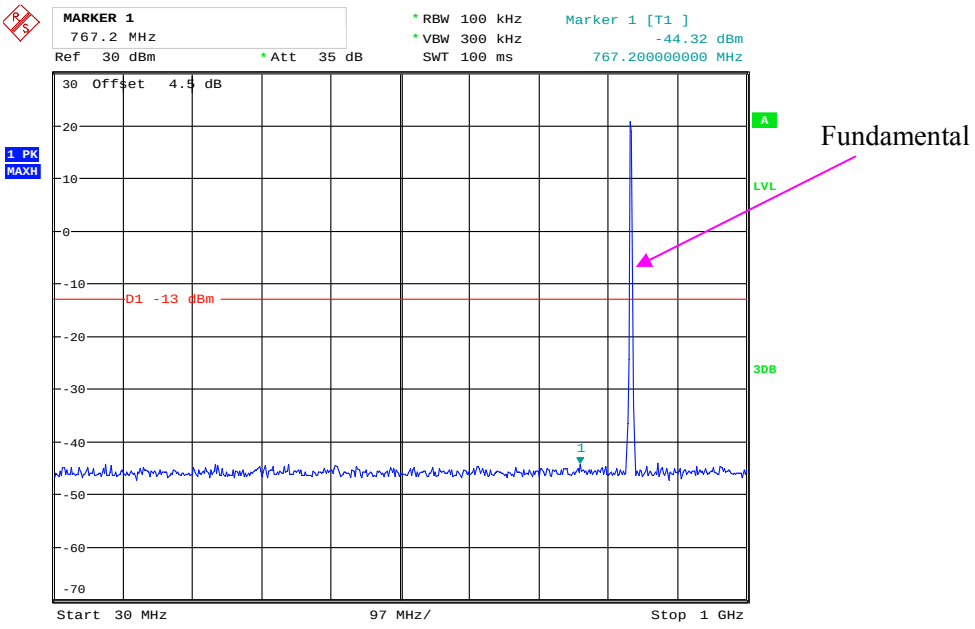


Fundamental

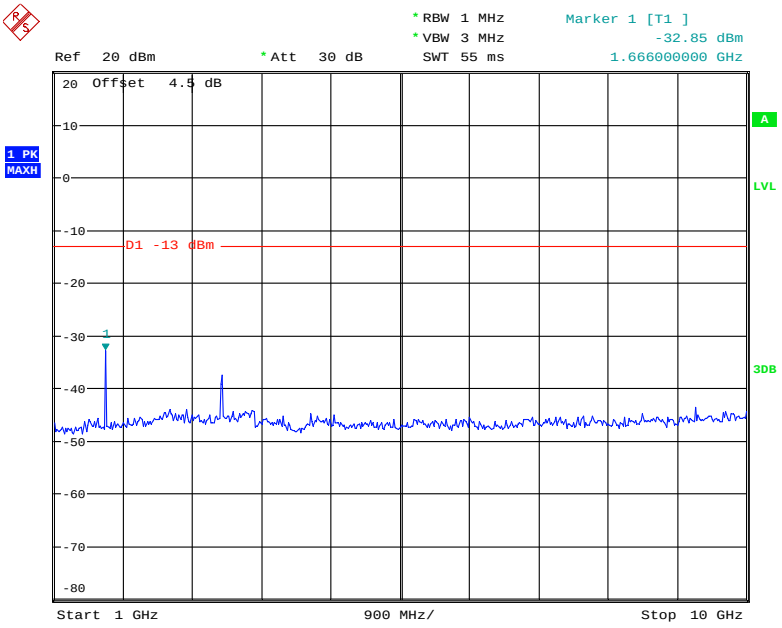
Date: 29.JAN.2019 11:52:11

LTE Band 5 (Middle Channel)

QPSK_1.4 MHz

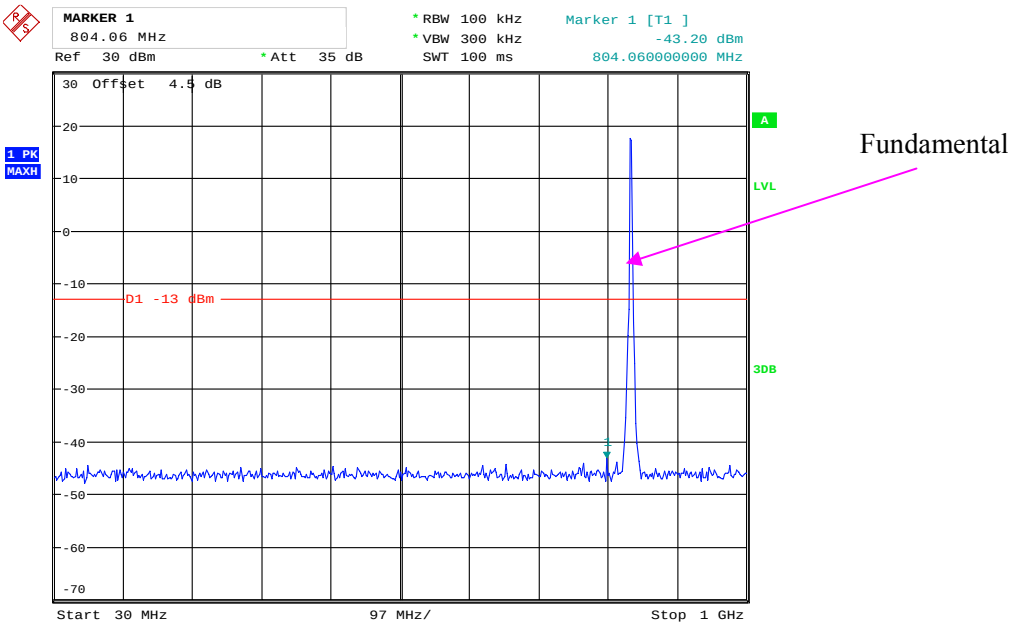


Date: 29.JAN.2019 14:38:42

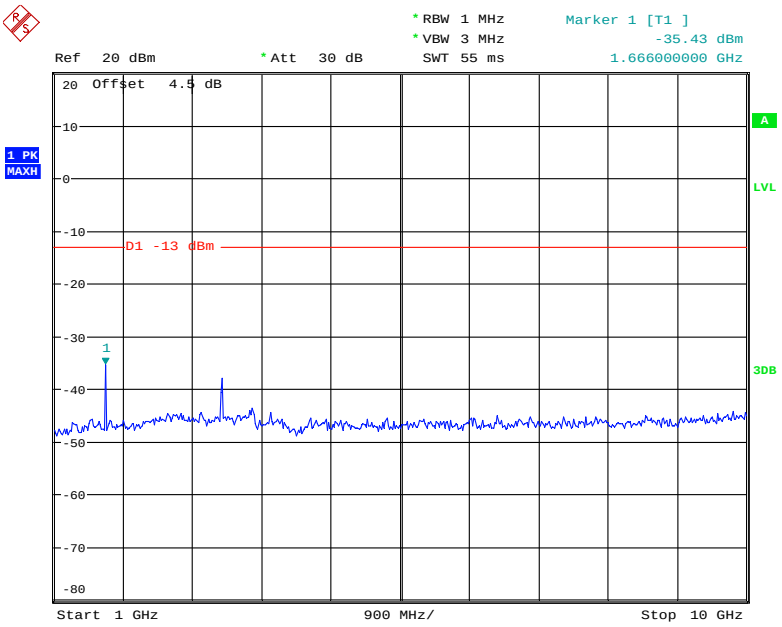


Date: 29.JAN.2019 11:52:42

QPSK_3 MHz

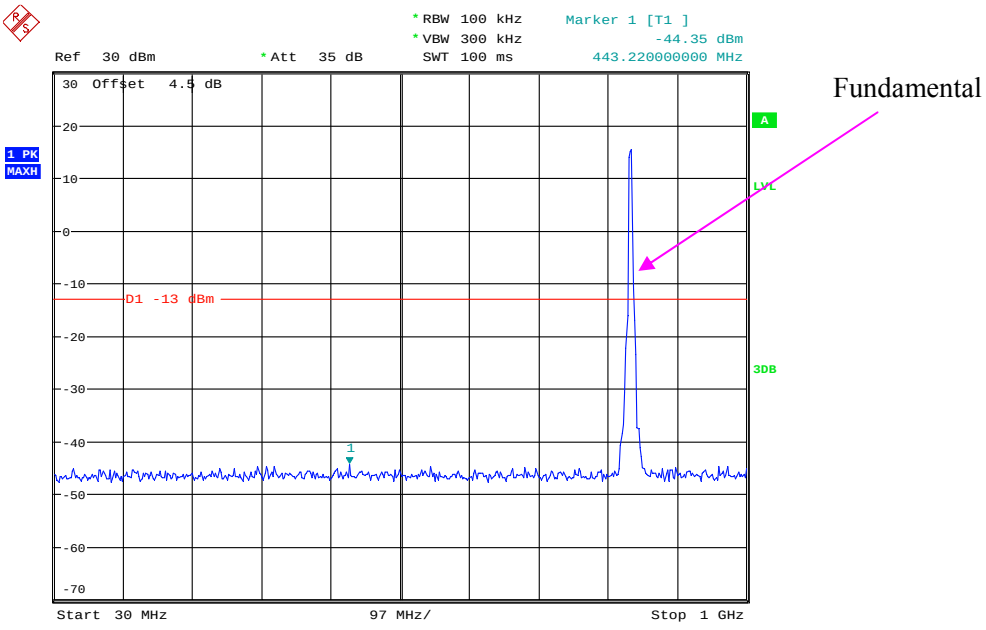


Date: 29.JAN.2019 14:37:55



Date: 29.JAN.2019 11:53:09

QPSK_5 MHz



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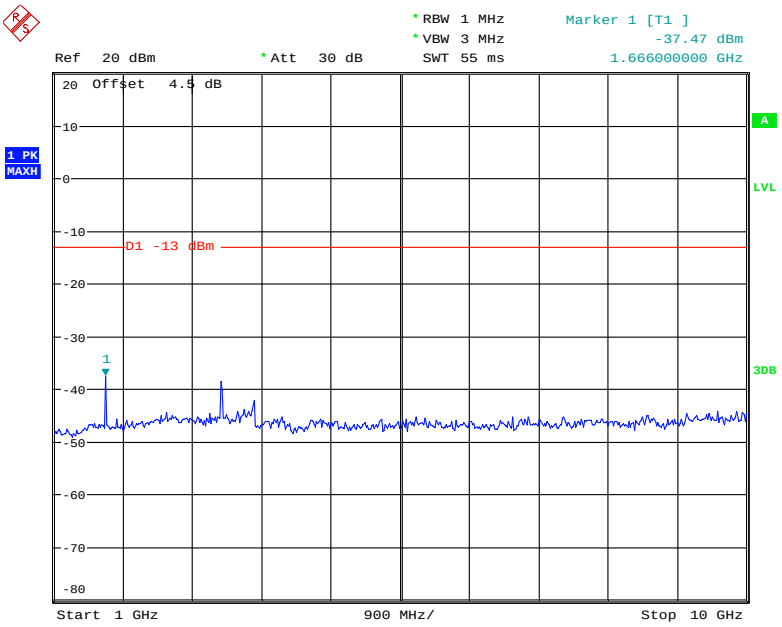
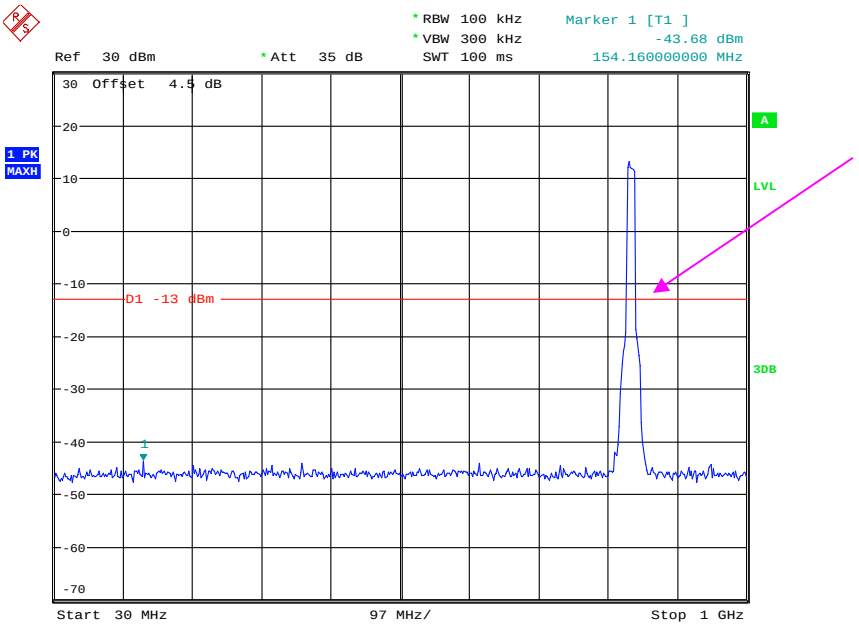


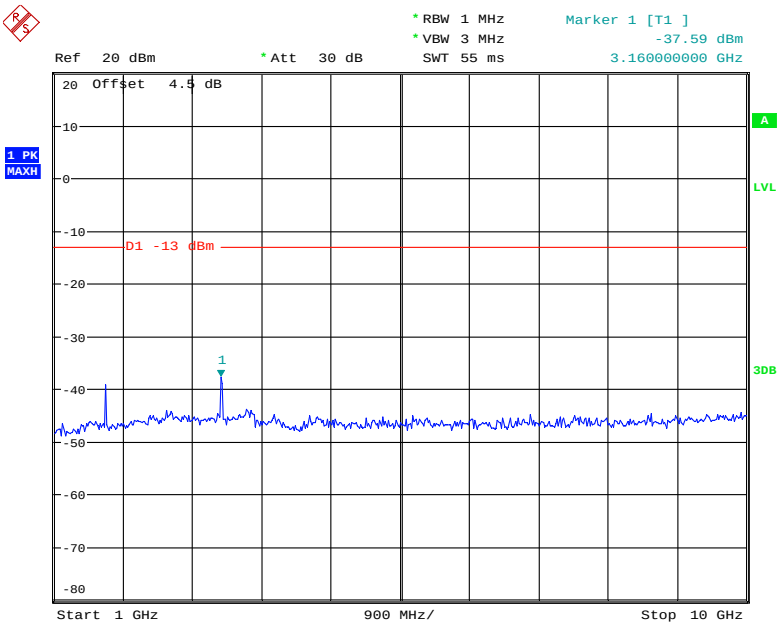
Date: 29.JAN.2019 11:53:38

QPSK_10 MHz



Fundamental

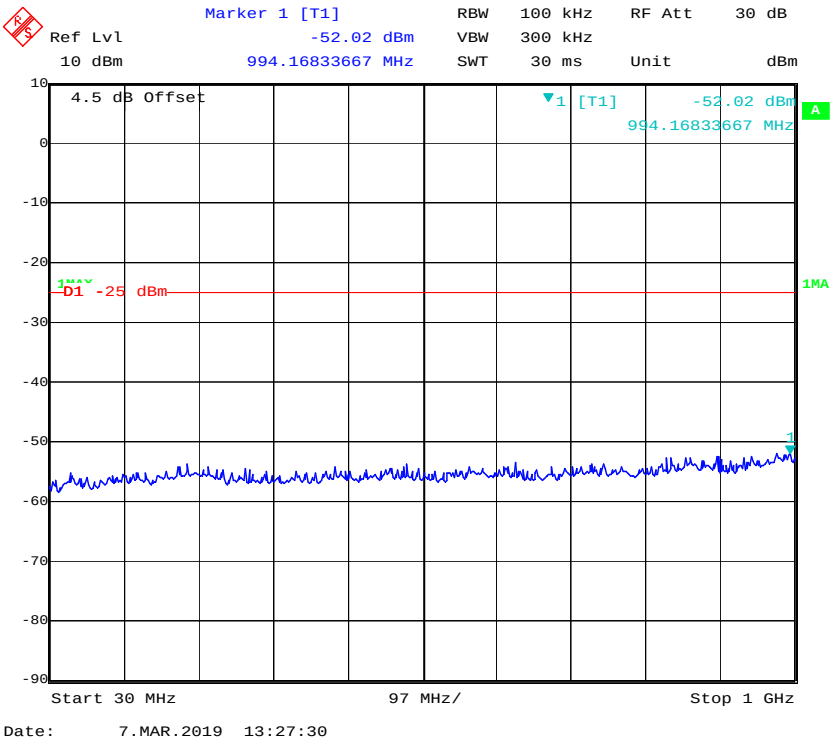
Date: 29.JAN.2019 11:53:59

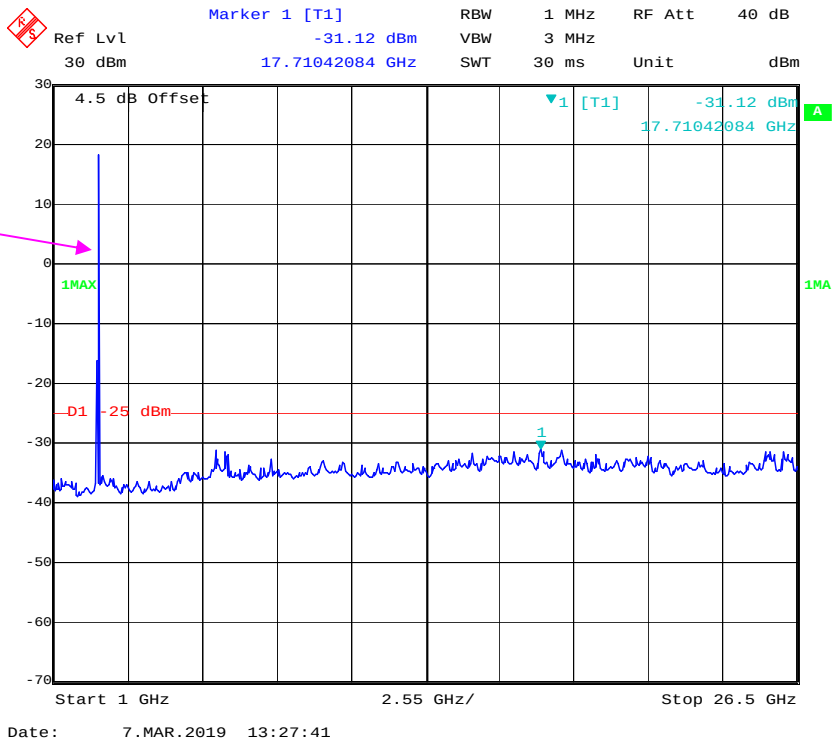


Date: 29.JAN.2019 11:54:13

LTE Band 7 (Middle Channel)

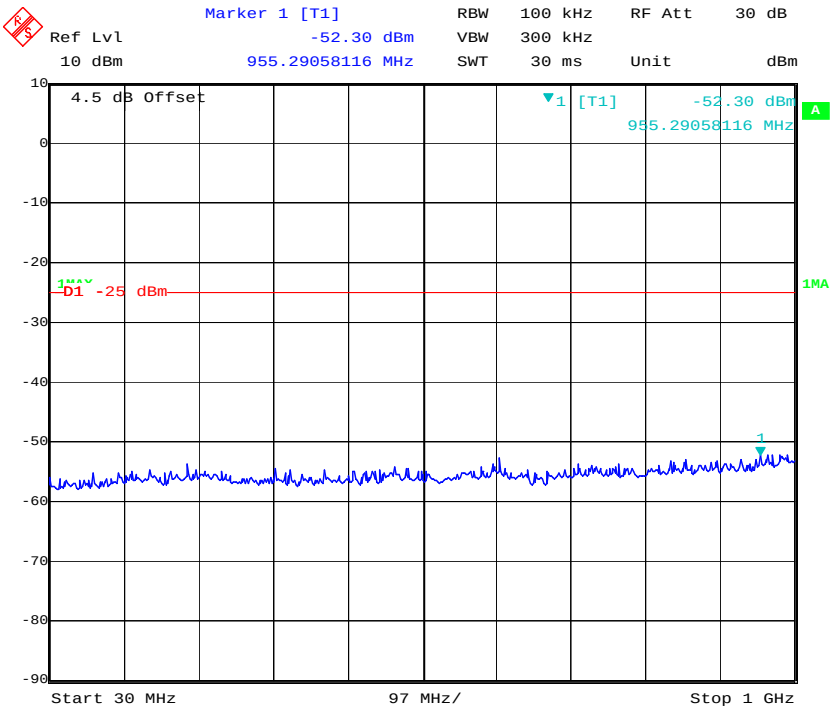
QPSK_5 MHz

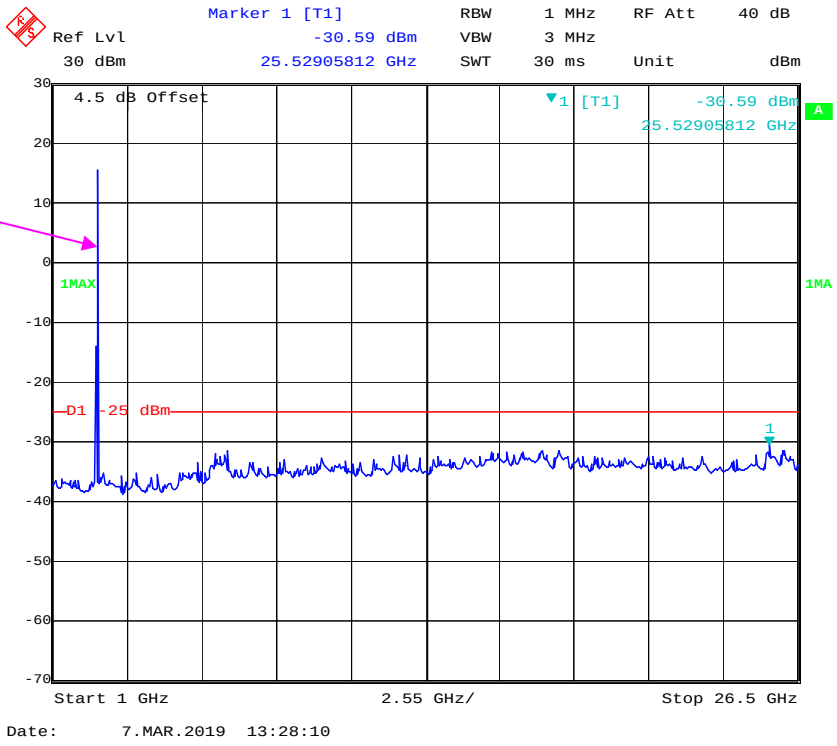




Fundamental

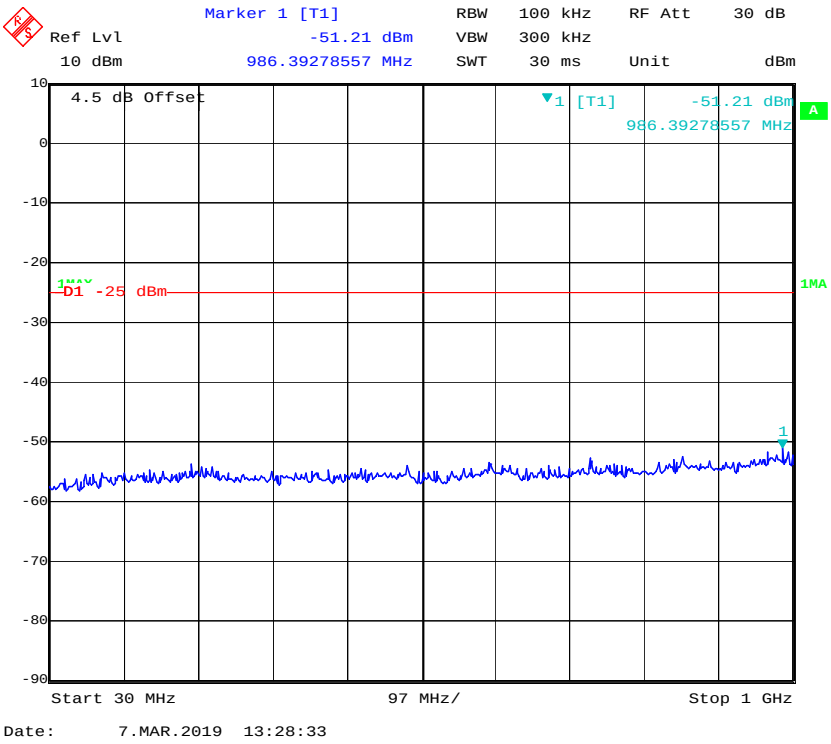
QPSK_10 MHz

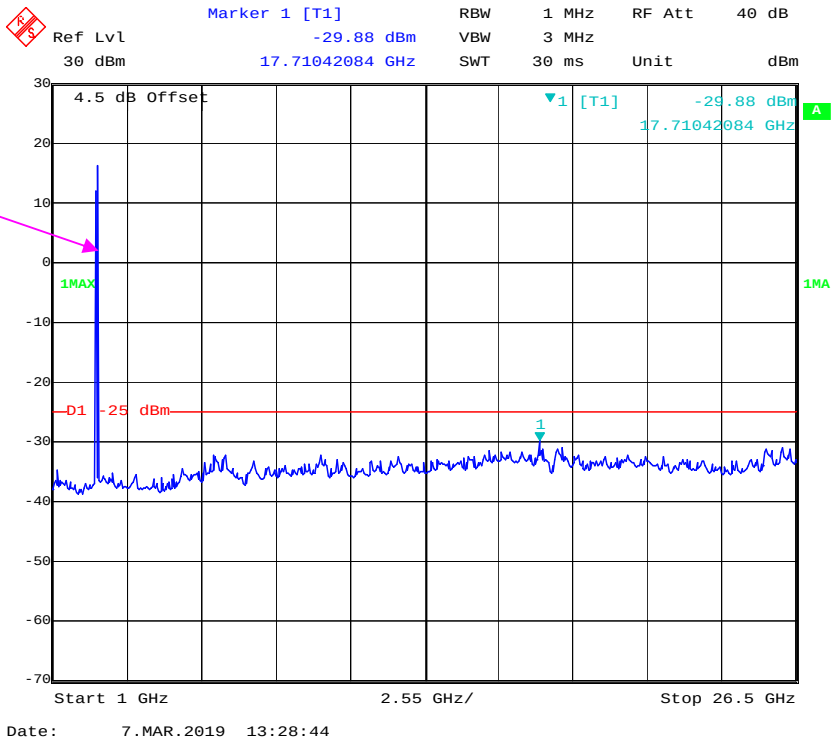




Fundamental

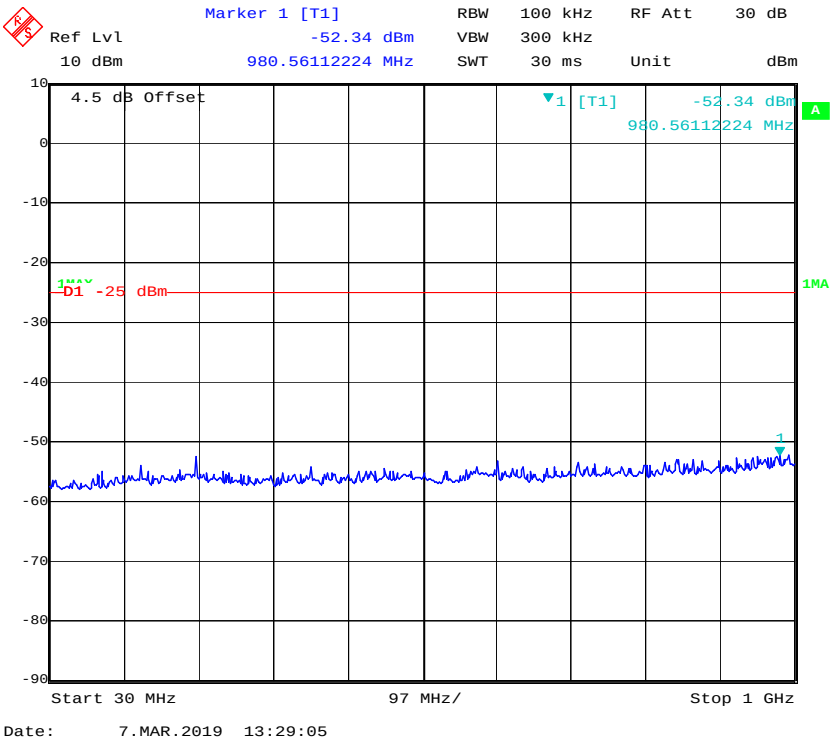
QPSK_15 MHz

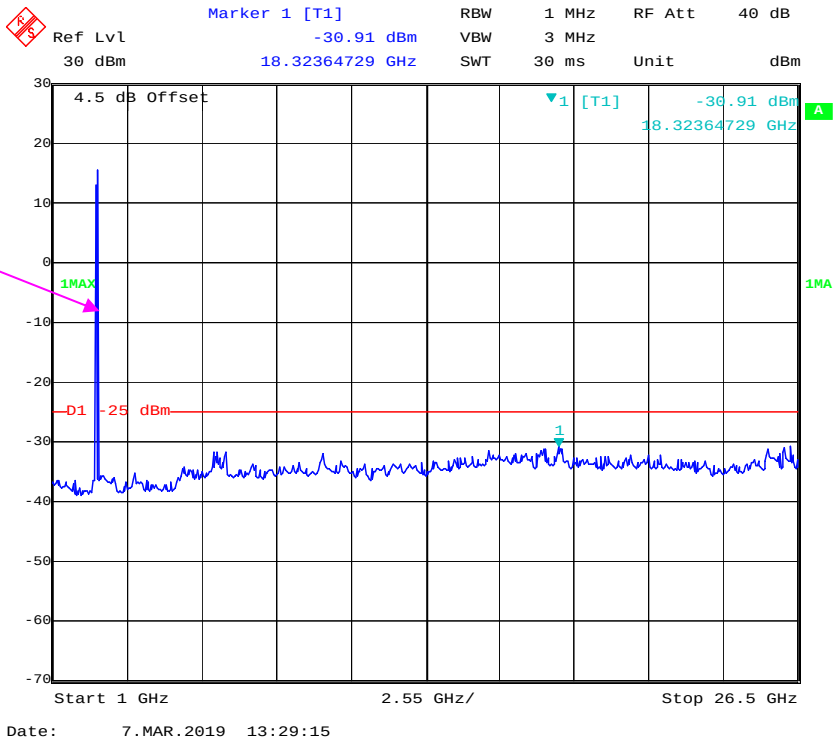




Fundamental

QPSK_20 MHz

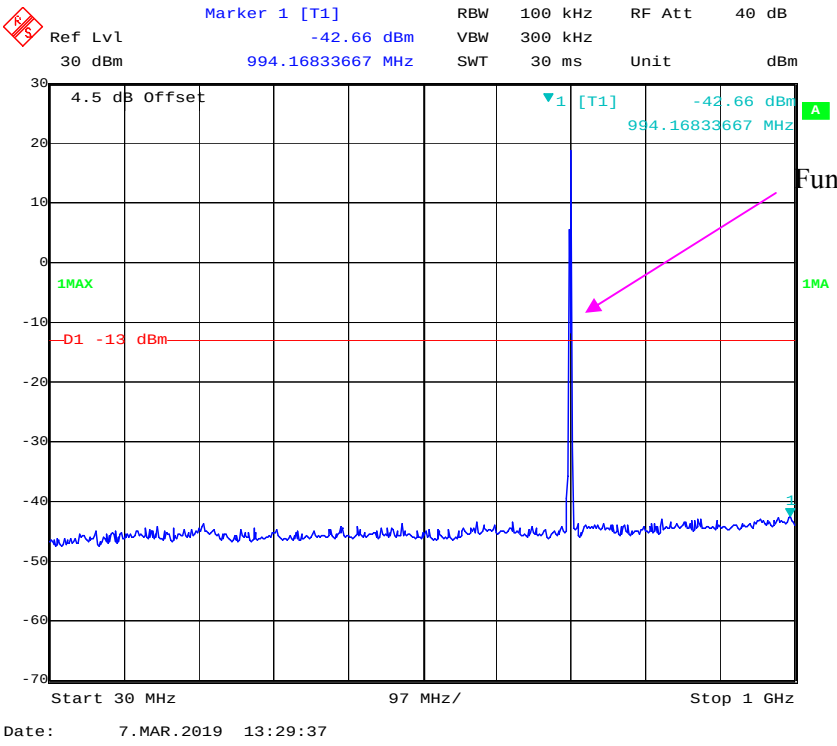




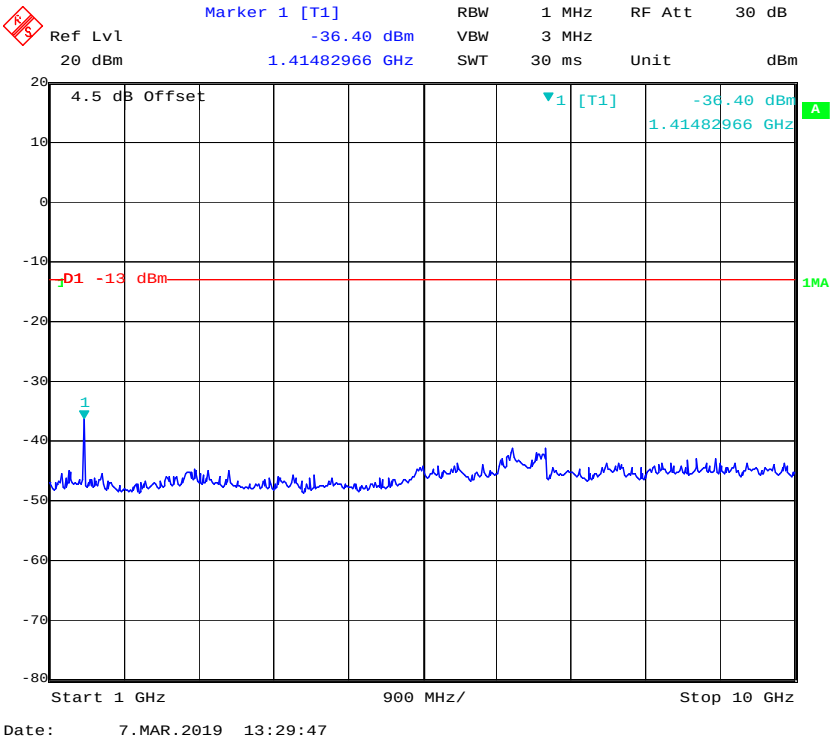
Fundamental

LTE Band 12 (Middle Channel)

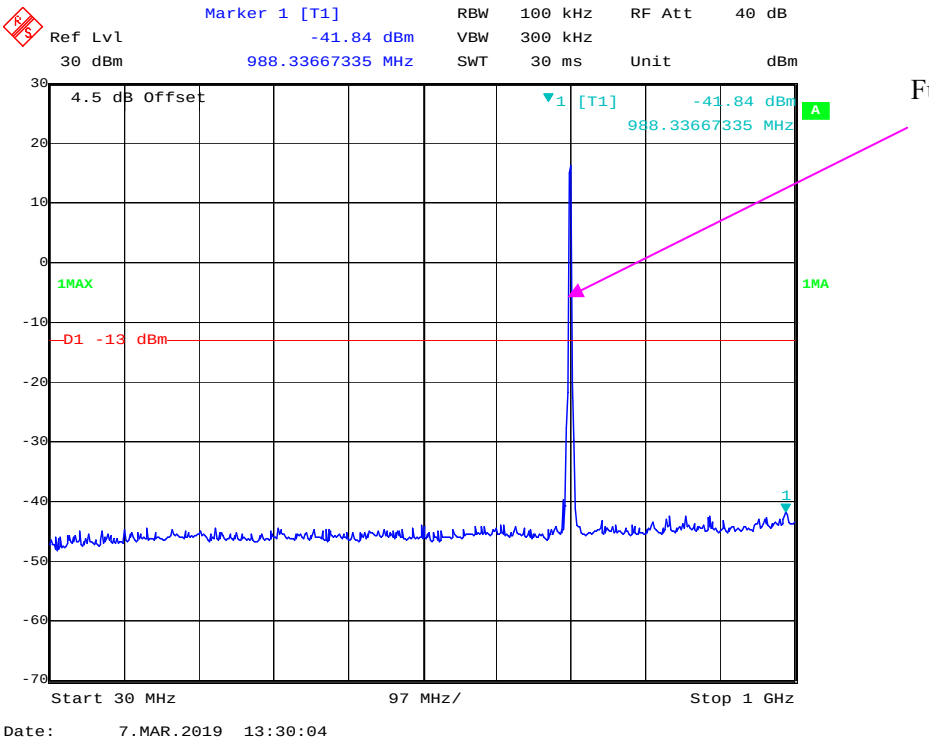
QPSK_1.4 MHz



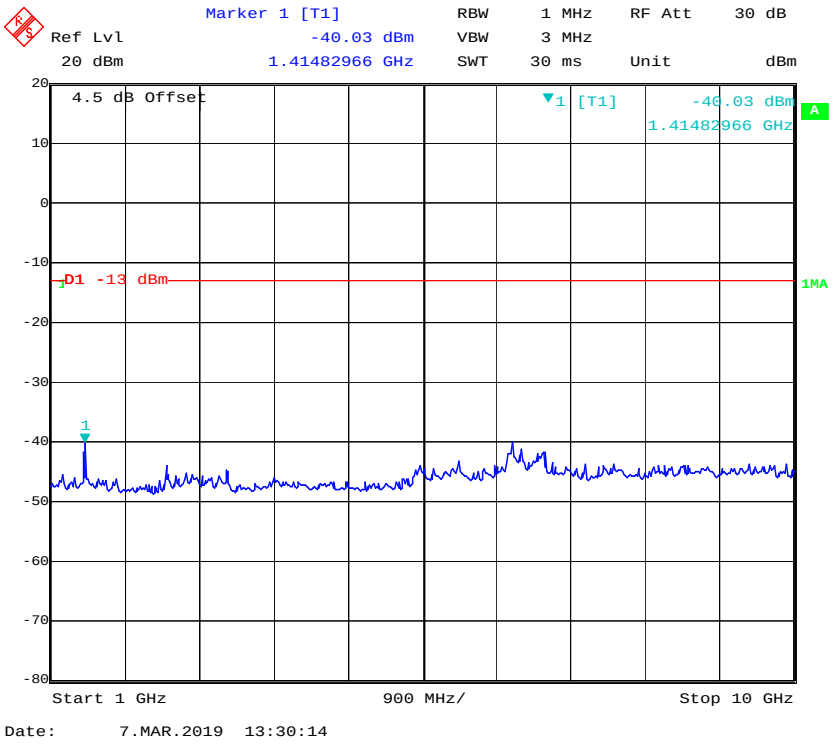
Fundamental



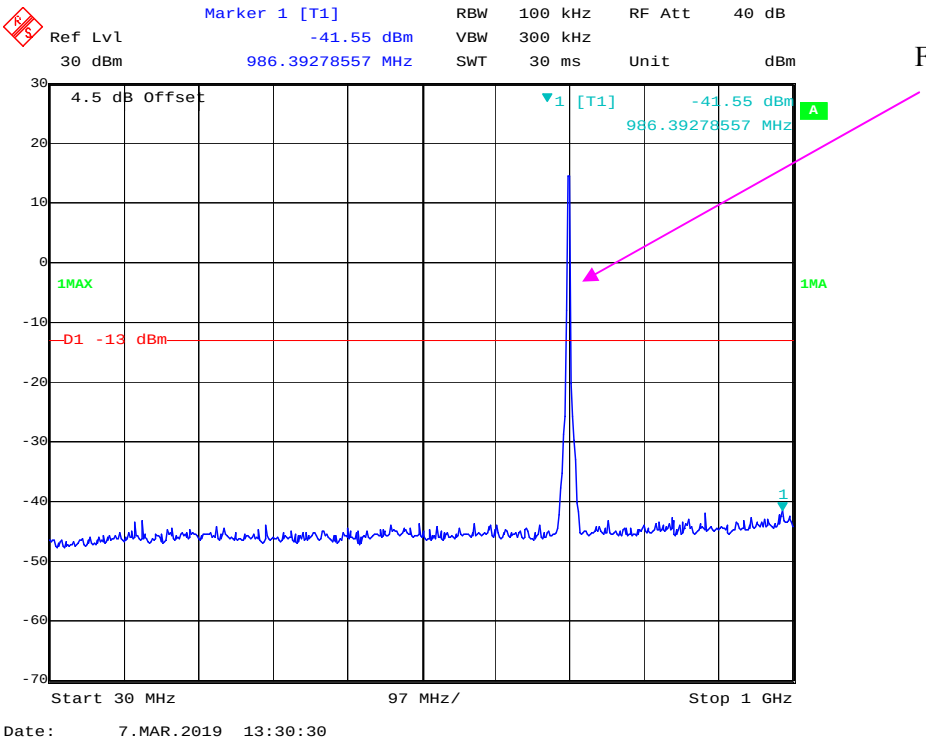
QPSK_3 MHz



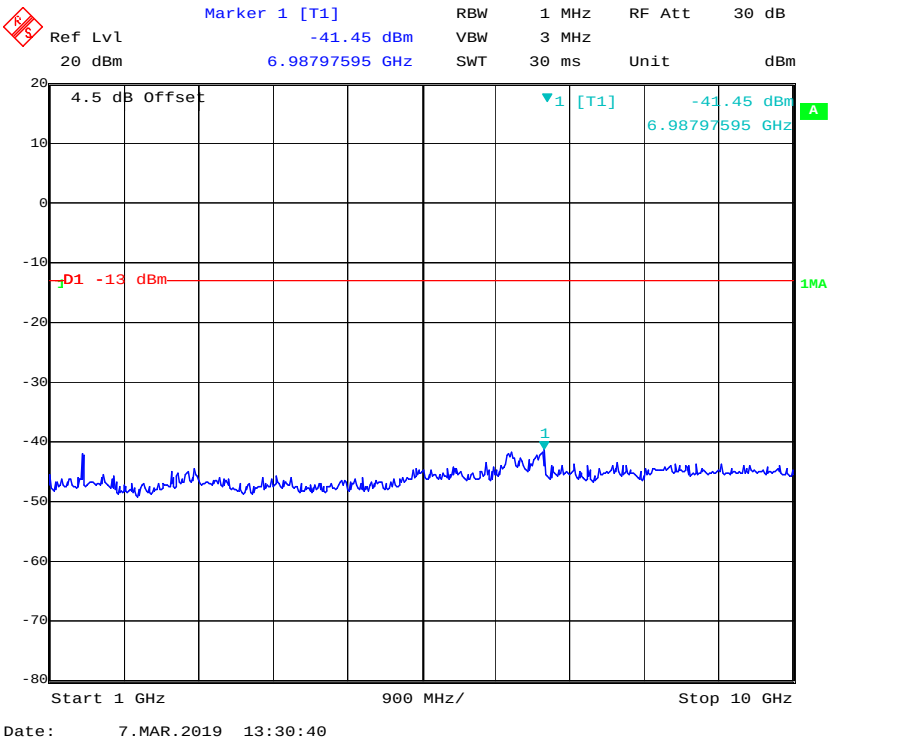
Fundamental



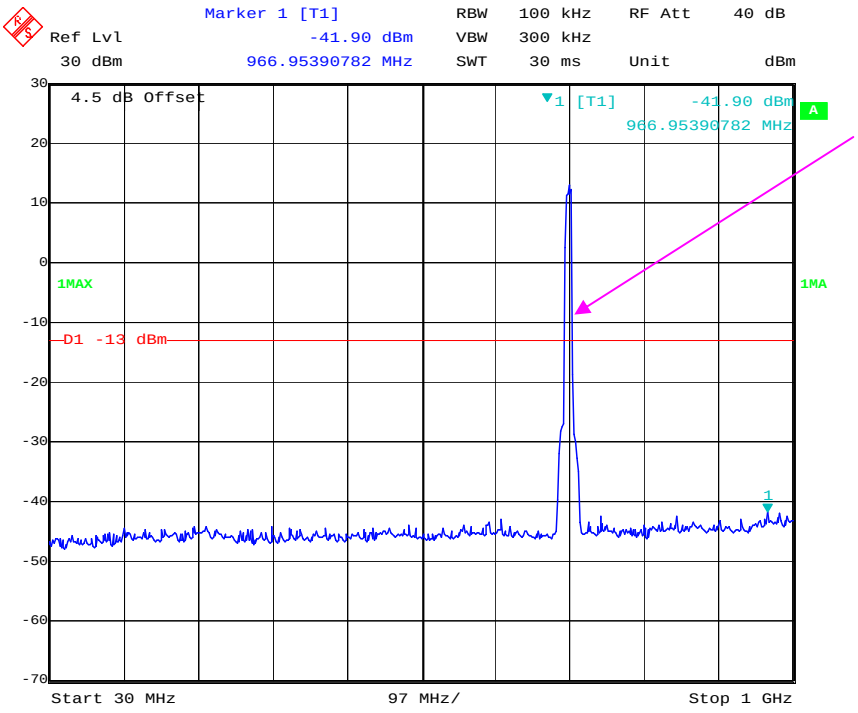
QPSK_5 MHz



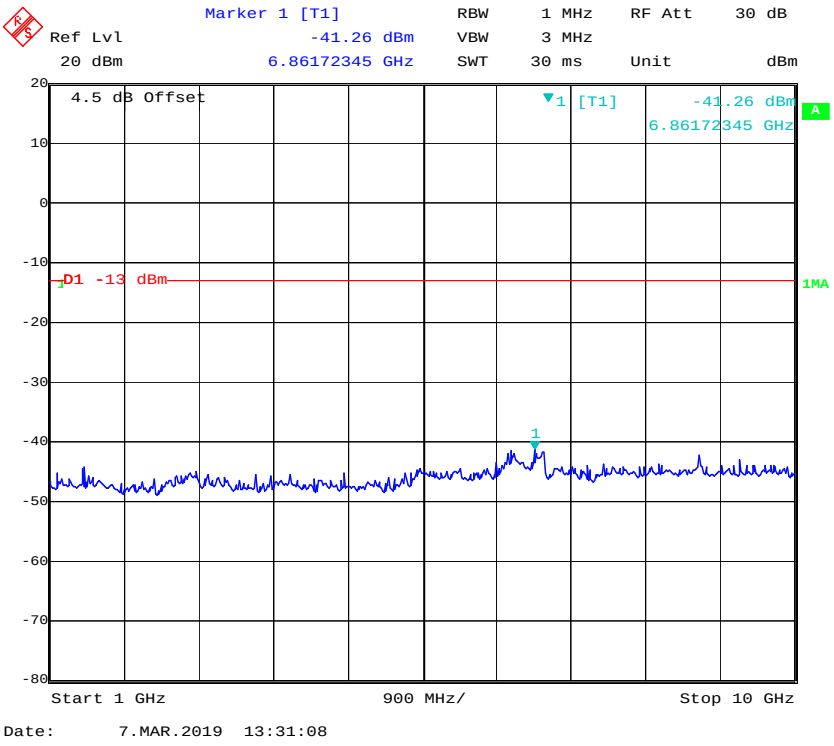
Fundamental



QPSK_10 MHz

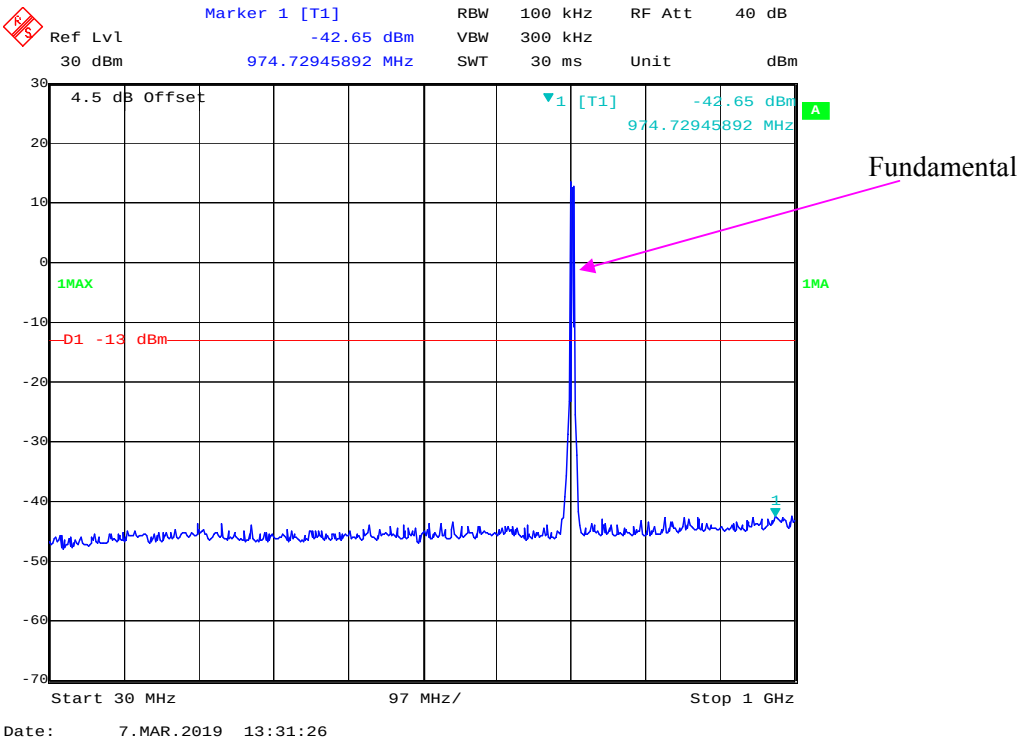


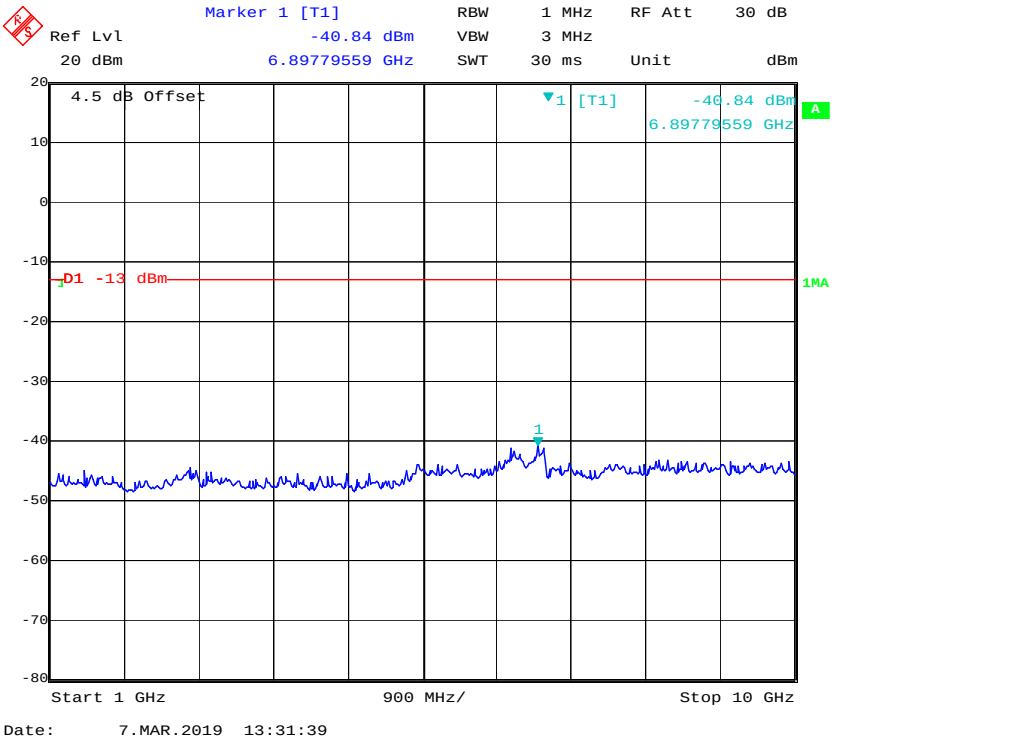
Fundamental



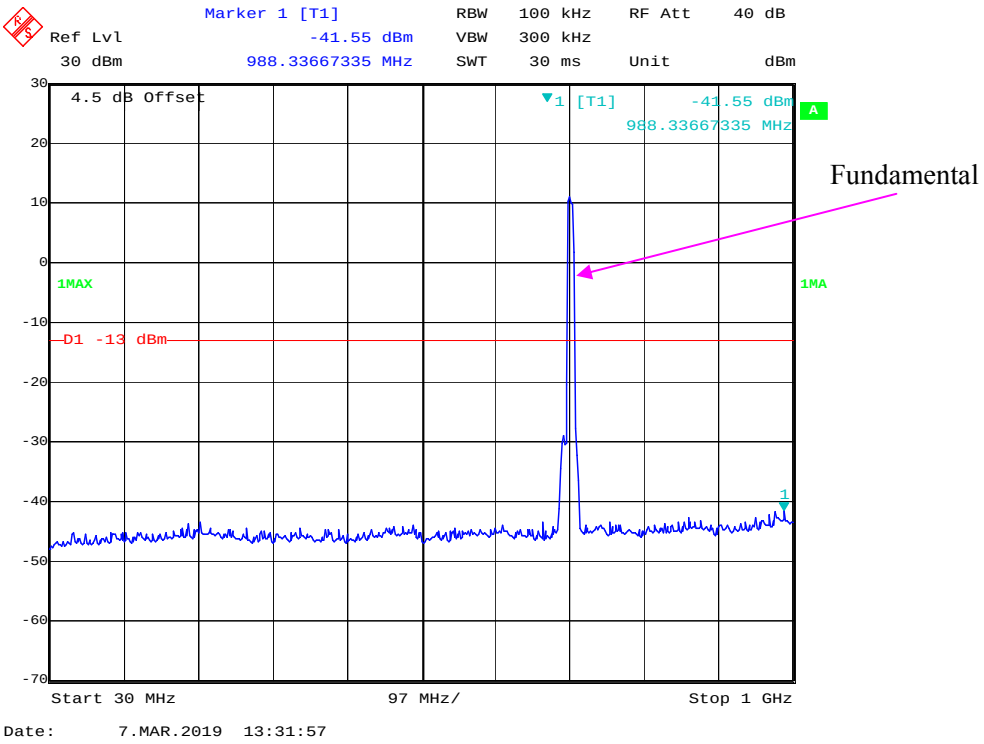
LTE Band 17 (Middle Channel)

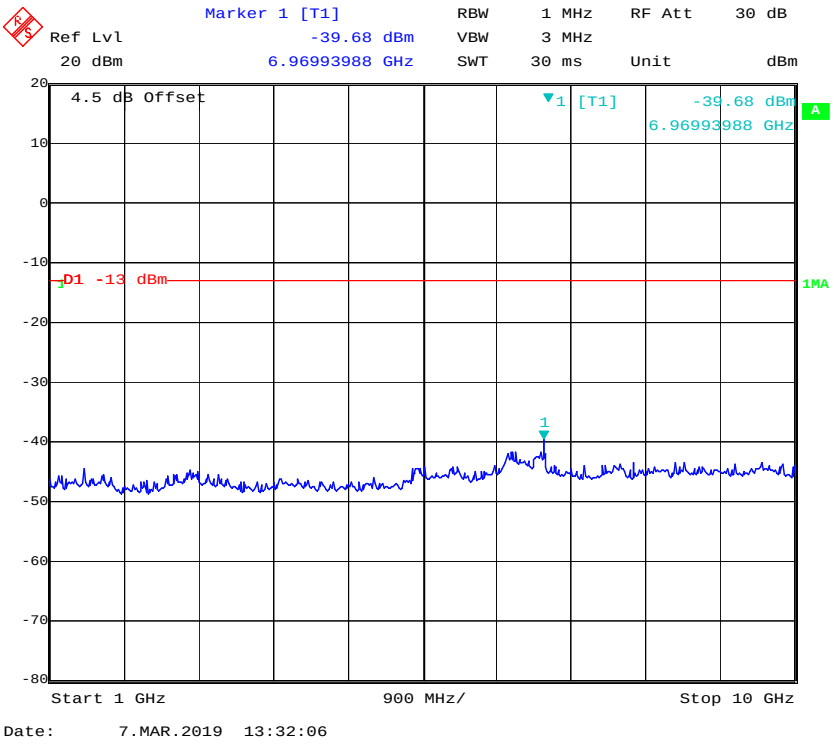
QPSK_5 MHz





QPSK_10 MHz


Marker 1 [T1]
Ref Lvl
30 dBm
-41.55 dBm
988.33667335 MHz
RBW 100 kHz
VBW 300 kHz
SWT 30 ms
RF Att 40 dB
Unit dBm
4.5 dB Offset
1 [T1] -41.55 dBm
988.33667335 MHz
A
1MAX
1MA
D1 -13 dBm
Fundamental
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 7.MAR.2019 13:31:57


Marker 1 [T1]
Ref Lvl
20 dBm
-39.68 dBm
6.96993988 GHz
RBW 1 MHz
VBW 3 MHz
SWT 30 ms
RF Att 30 dB
Unit dBm
4.5 dB Offset
1 [T1] -39.68 dBm
6.96993988 GHz
A
1MA
D1 -13 dBm
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 7.MAR.2019 13:32:06

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

Applicable Standard

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

Test Procedure

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

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

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

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

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-10	2019-12-10
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2018-05-06	2019-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2018-06-27	2019-06-27
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
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
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	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	BSF1850-1910MS-0935V2	0935V2	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:	22.8~23.8°C
Relative Humidity:	31~61 %
ATM Pressure:	100.5~100.8 kPa

** The testing was performed by Tyler Pan, Vern Shen, Neil Liao on 2019-01-29~2019-03-07.*

EUT Operation Mode: Transmitting

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	45.87	-68.34	10.6	0.73	-58.5	-13.0	45.5
1673.200	V	50.77	-64.04	10.6	0.73	-54.2	-13.0	41.2
2509.800	H	65.81	-47.21	13.1	1.25	-35.4	-13.0	22.4
2509.800	V	68.25	-44.8	13.1	1.25	-32.9	-13.0	19.9
3346.400	H	49.36	-61.3	13.8	1.61	-49.1	-13.0	36.1
3346.400	V	52.22	-58.49	13.8	1.61	-46.3	-13.0	33.3
414.120	H	39.24	-65.49	0.0	0.62	-66.1	-13.0	53.1
416.060	V	44.53	-63.49	0.0	0.63	-64.1	-13.0	51.1
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	48.36	-65.85	10.6	0.73	-56.0	-13.0	43.0
1673.200	V	44.86	-69.95	10.6	0.73	-60.1	-13.0	47.1
2509.800	H	55.93	-57.09	13.1	1.25	-45.2	-13.0	32.2
2509.800	V	60.79	-52.26	13.1	1.25	-40.4	-13.0	27.4
3346.400	H	45.69	-64.97	13.8	1.61	-52.8	-13.0	39.8
3346.400	V	46.31	-64.4	13.8	1.61	-52.2	-13.0	39.2
299.660	H	55.40	-53.24	0.0	0.52	-53.8	-13.0	40.8
299.660	V	50.40	-59.6	0.0	0.52	-60.1	-13.0	47.1

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	50.12	-58.68	13.8	1.63	-46.6	-13.0	33.6
3760.000	V	50.68	-57.99	13.8	1.63	-45.9	-13.0	32.9
5640.000	H	52.51	-53.52	14.0	1.31	-40.8	-13.0	27.8
5640.000	V	54.61	-51.3	14.0	1.31	-38.6	-13.0	25.6
400.540	H	40.40	-64.41	0.0	0.61	-65.0	-13.0	52.0
416.060	V	45.20	-62.82	0.0	0.63	-63.5	-13.0	50.5
WCDMA Band II R99,Frequency: 1880.000 MHz								
3760.000	H	47.71	-61.09	13.8	1.63	-49.0	-13.0	36.0
3760.000	V	48.58	-60.09	13.8	1.63	-48.0	-13.0	35.0
5640.000	H	55.14	-50.89	14.0	1.31	-38.2	-13.0	25.2
5640.000	V	54.39	-51.52	14.0	1.31	-38.8	-13.0	25.8
299.660	H	55.44	-53.2	0.0	0.52	-53.7	-13.0	40.7
499.480	V	47.60	-59.66	0.0	0.71	-60.4	-13.0	47.4
WCDMA Band IV R99,Frequency: 1732.600 MHz								
3465.200	H	46.56	-63.68	13.9	1.62	-51.4	-13.0	38.4
3465.200	V	47.52	-62.75	13.9	1.62	-50.5	-13.0	37.5
5197.800	H	54.50	-51.92	14.0	1.52	-39.4	-13.0	26.4
5197.800	V	49.48	-57.01	14.0	1.52	-44.5	-13.0	31.5
299.660	H	54.70	-53.94	0.0	0.52	-54.5	-13.0	41.5
400.540	V	47.97	-60.2	0.0	0.61	-60.8	-13.0	47.8

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	48.32	-60.48	13.76	1.63	-48.35	-13.00	35.35
3760.00	V	49.67	-59.00	13.76	1.63	-46.87	-13.00	33.87
5640.00	H	60.42	-45.61	14.02	1.31	-32.90	-13.00	19.90
5640.00	V	57.63	-48.28	14.02	1.31	-35.57	-13.00	22.57
299.66	H	54.09	-54.55	0.00	0.52	-55.07	-13.00	42.07
299.66	V	54.57	-55.43	0.00	0.52	-55.95	-13.00	42.95

LTE Band 4 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1732.500 MHz								
3465.00	H	47.52	-62.72	13.91	1.62	-50.43	-13.00	37.43
3465.00	V	46.53	-63.75	13.91	1.62	-51.46	-13.00	38.46
5197.50	H	60.78	-45.64	14.00	1.52	-33.16	-13.00	20.16
5197.50	V	57.97	-48.52	14.00	1.52	-36.04	-13.00	23.04
299.66	H	57.66	-50.98	0.00	0.52	-51.50	-13.00	38.50
299.66	V	54.49	-55.51	0.00	0.52	-56.03	-13.00	43.03

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	48.43	-65.79	10.61	0.73	-55.91	-13.00	42.91
1673.00	V	48.35	-66.47	10.61	0.73	-56.59	-13.00	43.59
2509.50	H	61.30	-51.72	13.11	1.25	-39.86	-13.00	26.86
2509.50	V	67.43	-45.62	13.11	1.25	-33.76	-13.00	20.76
3346.00	H	46.36	-64.30	13.83	1.61	-52.08	-13.00	39.08
3346.00	V	46.29	-64.42	13.83	1.61	-52.20	-13.00	39.20
375.32	H	50.28	-55.48	0.00	0.59	-56.07	-13.00	43.07
299.66	V	54.11	-55.89	0.00	0.52	-56.41	-13.00	43.41

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	46.72	-60.08	13.93	1.34	-47.49	-25.00	22.49
5070.00	V	47.10	-59.51	13.93	1.34	-46.92	-25.00	21.92
7605.00	H	45.55	-54.81	13.21	1.40	-43.00	-25.00	18.00
7605.00	V	44.98	-55.78	13.21	1.40	-43.97	-25.00	18.97
482.00	H	46.66	-57.67	0.00	0.69	-58.36	-25.00	33.36
482.00	V	47.83	-59.59	0.00	0.69	-60.28	-25.00	35.28

LTE Band 12 (30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:707.500 MHz								
1415.00	H	46.23	-67.27	9.08	1.22	-59.41	-13.00	46.41
1415.00	V	46.89	-67.14	9.08	1.22	-59.28	-13.00	46.28
2122.50	H	61.37	-51.42	11.27	1.11	-41.26	-13.00	28.26
2122.50	V	56.65	-56.12	11.27	1.11	-45.96	-13.00	32.96
2830.00	H	45.57	-66.51	13.34	1.36	-54.53	-13.00	41.53
2830.00	V	44.95	-67.36	13.34	1.36	-55.38	-13.00	42.38
382.00	H	45.88	-59.62	0.00	0.59	-60.21	-13.00	47.21
382.00	V	49.75	-58.75	0.00	0.59	-59.34	-13.00	46.34

LTE Band 17 (30MHz-10GHz)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:710.000 MHz								
1420.00	H	53.84	-59.76	9.10	1.23	-51.89	-13.00	38.89
1420.00	V	53.22	-60.88	9.10	1.23	-53.01	-13.00	40.01
2130.00	H	61.54	-51.21	11.22	1.11	-41.10	-13.00	28.10
2130.00	V	57.36	-55.36	11.22	1.11	-45.25	-13.00	32.25
2840.00	H	46.00	-66.04	13.42	1.36	-53.98	-13.00	40.98
2840.00	V	45.27	-67.01	13.42	1.36	-54.95	-13.00	41.95
537.00	H	45.63	-57.82	0.00	0.73	-58.55	-13.00	45.55
537.00	V	48.71	-57.86	0.00	0.73	-58.59	-13.00	45.59

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

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

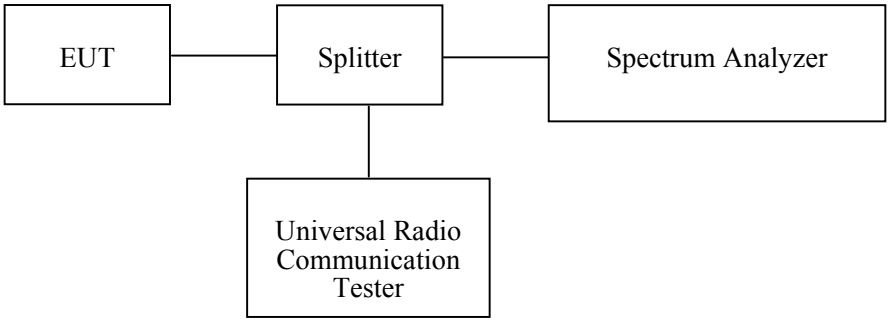
Applicable Standard

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

Test Procedure

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

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way 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

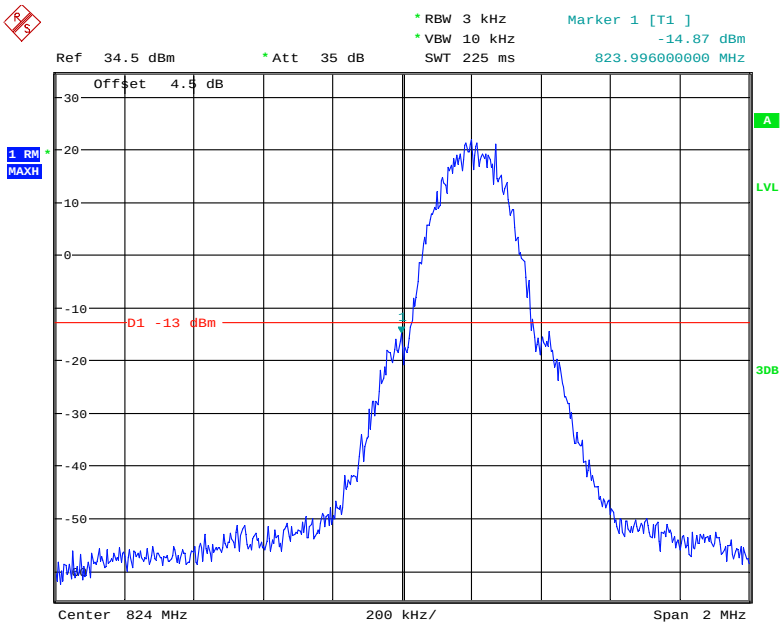
Temperature:	25.4°C
Relative Humidity:	40~55 %
ATM Pressure:	100.6~100.8 kPa

The testing was performed by Elena Lei & Blake Yang on 2019-01-29~2019-03-07.

Test Mode: Transmitting

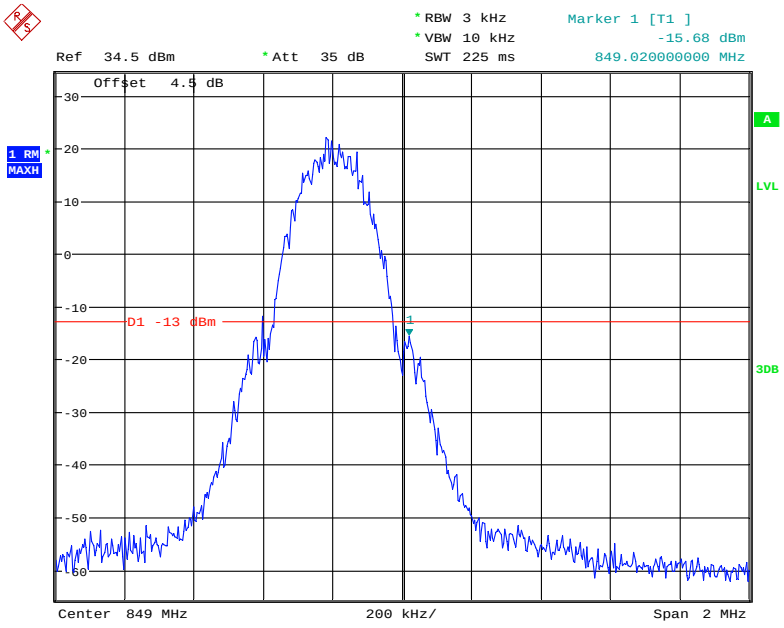
Test Result: Compliant. Please refer to the following plots.

GSM 850, Left Band Edge



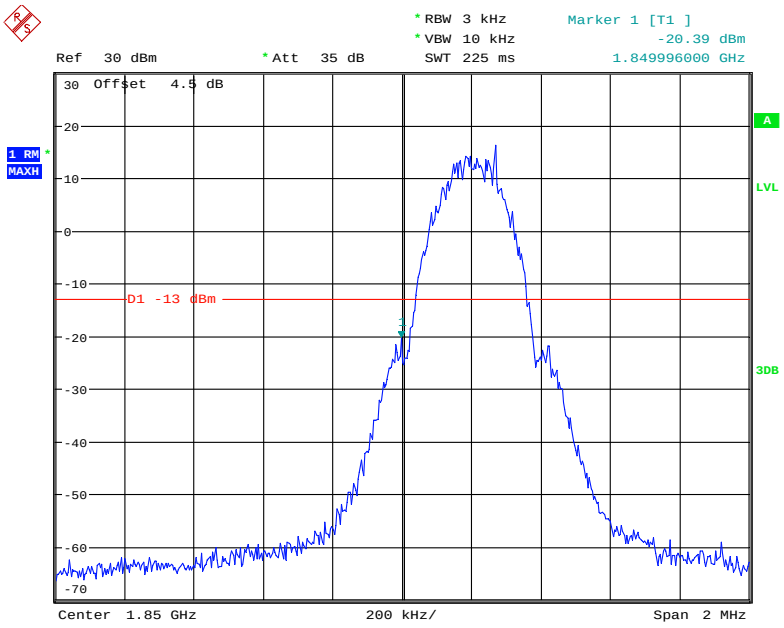
Date: 29.JAN.2019 17:49:02

GSM 850, Right Band Edge



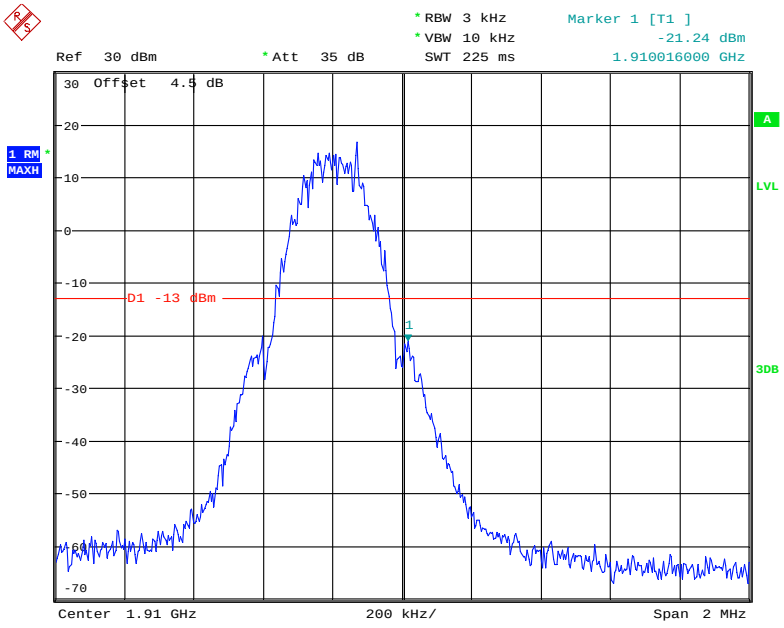
Date: 29.JAN.2019 17:50:14

GSM 1900, Left Band Edge



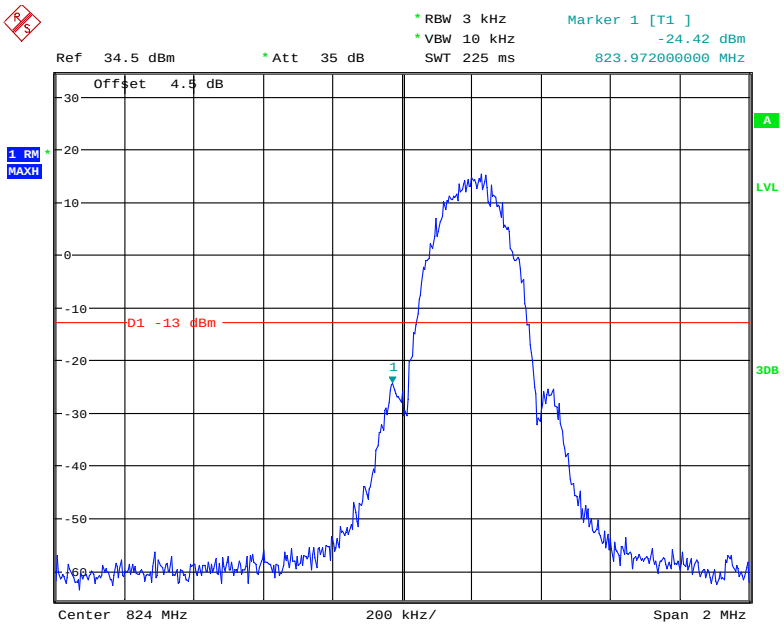
Date: 29.JAN.2019 17:16:34

GSM 1900, Right Band Edge



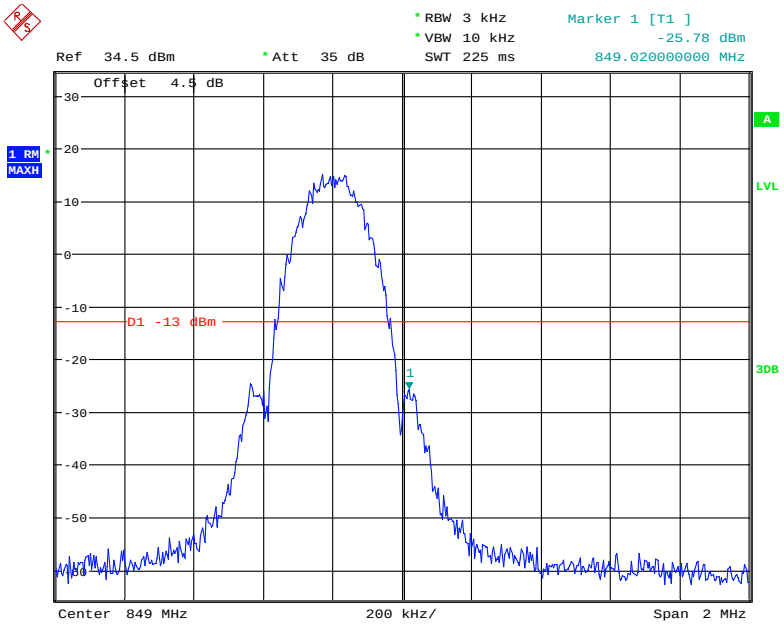
Date: 29.JAN.2019 17:18:58

EDGE 850, Left Band Edge



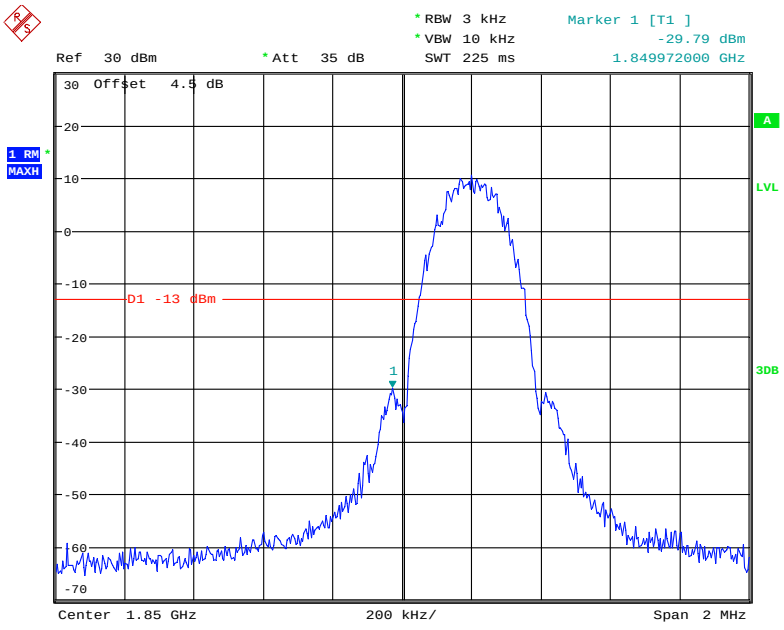
Date: 29.JAN.2019 17:52:36

EDGE 850, Right Band Edge



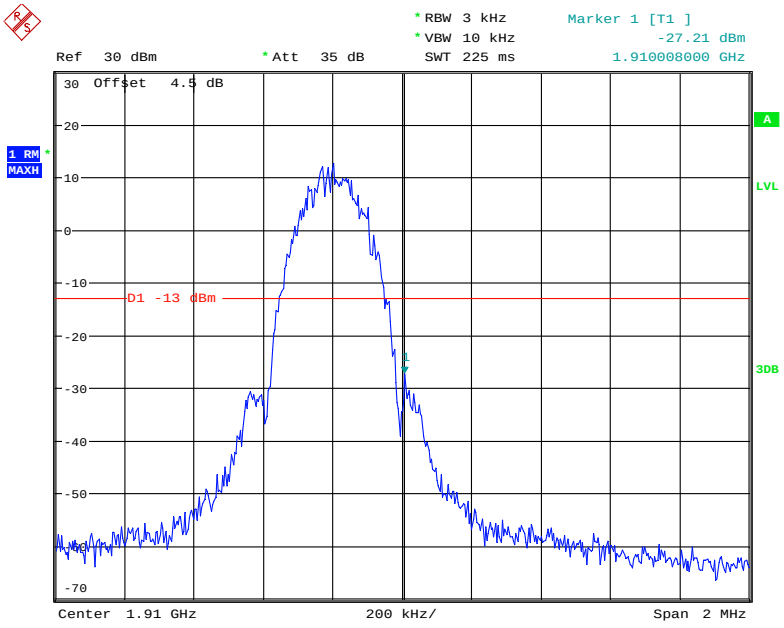
Date: 29.JAN.2019 17:51:55

EDGE 1900, Left Band Edge



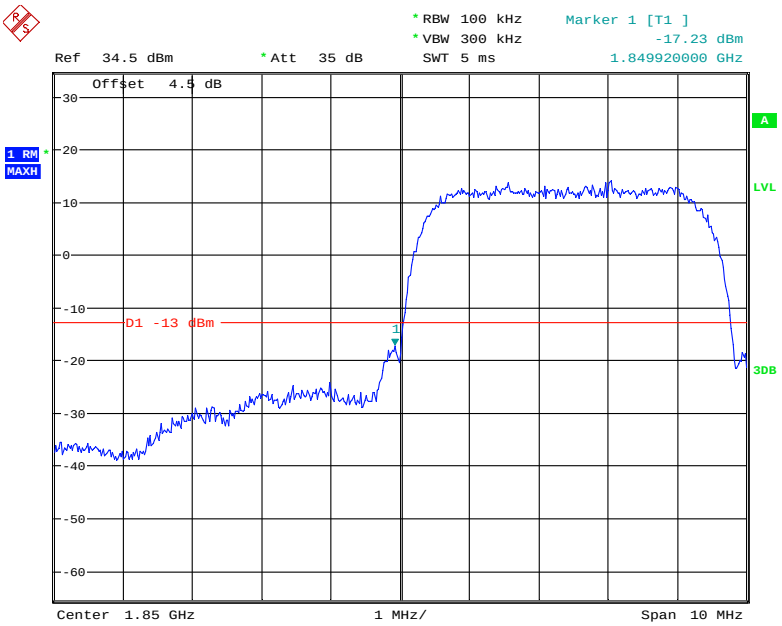
Date: 29.JAN.2019 17:32:37

EDGE 1900, Right Band Edge



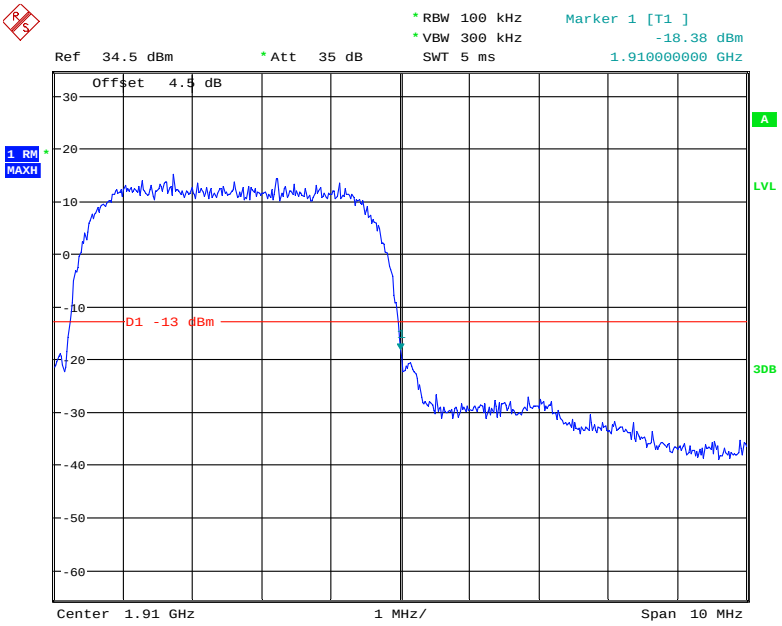
Date: 29.JAN.2019 17:33:28

WCDMA Band II Rel 99, Left Band Edge



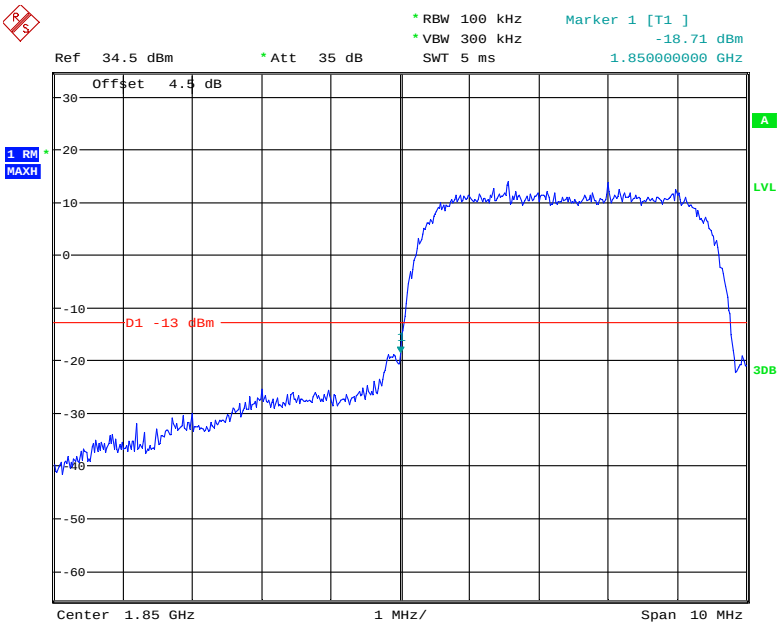
Date: 29.JAN.2019 20:17:30

WCDMA Band II Rel 99, Right Band Edge



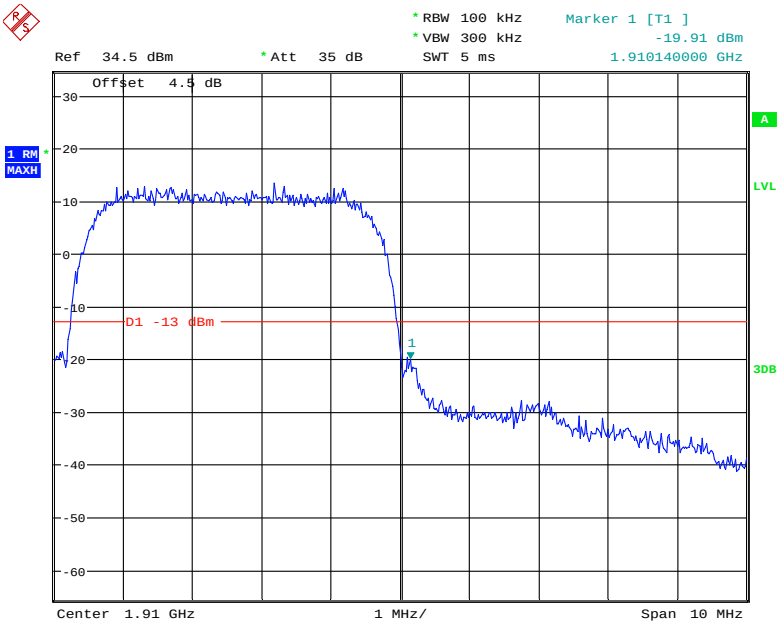
Date: 29.JAN.2019 20:17:58

WCDMA Band II HSDPA, Left Band Edge



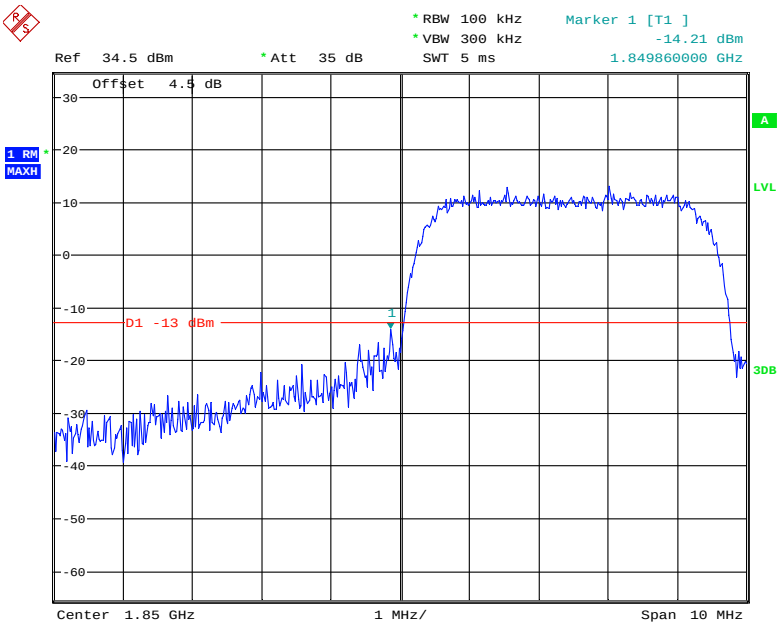
Date: 29.JAN.2019 20:27:03

WCDMA Band II HSDPA, Right Band Edge



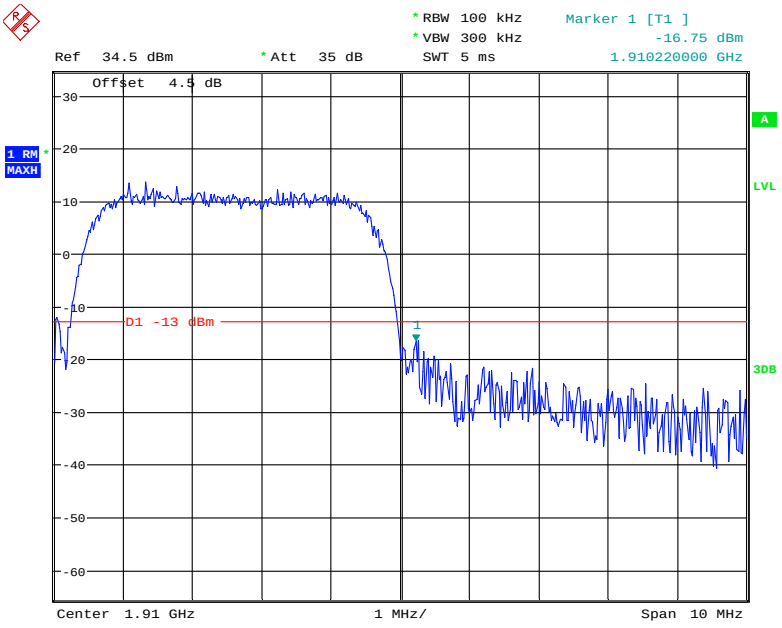
Date: 29.JAN.2019 20:27:33

WCDMA Band II HSUPA, Left Band Edge



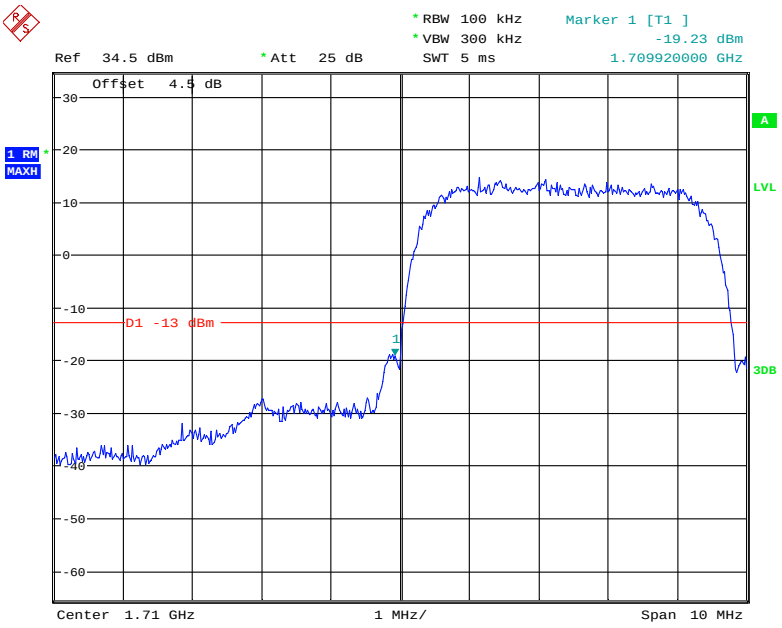
Date: 29.JAN.2019 20:30:37

WCDMA Band II HSUPA, Right Band Edge



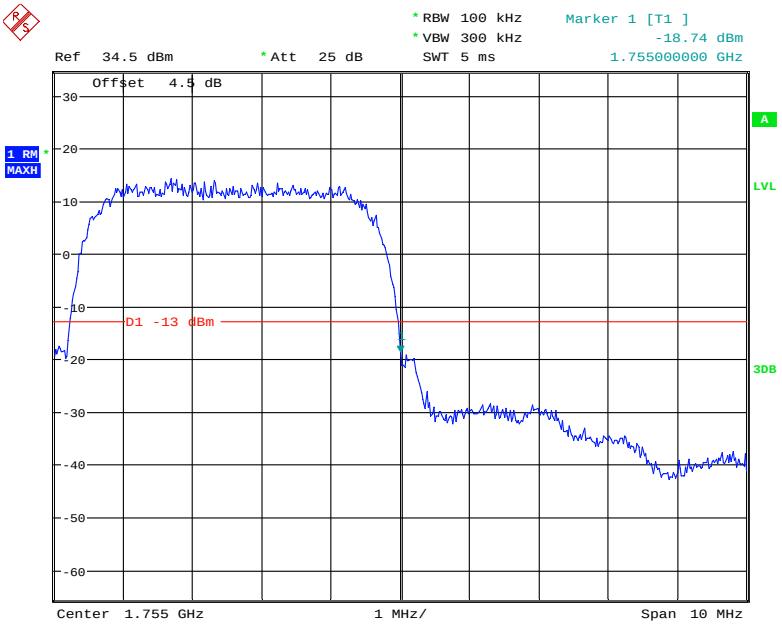
Date: 29.JAN.2019 20:30:00

WCDMA Band IV Rel 99, Left Band Edge



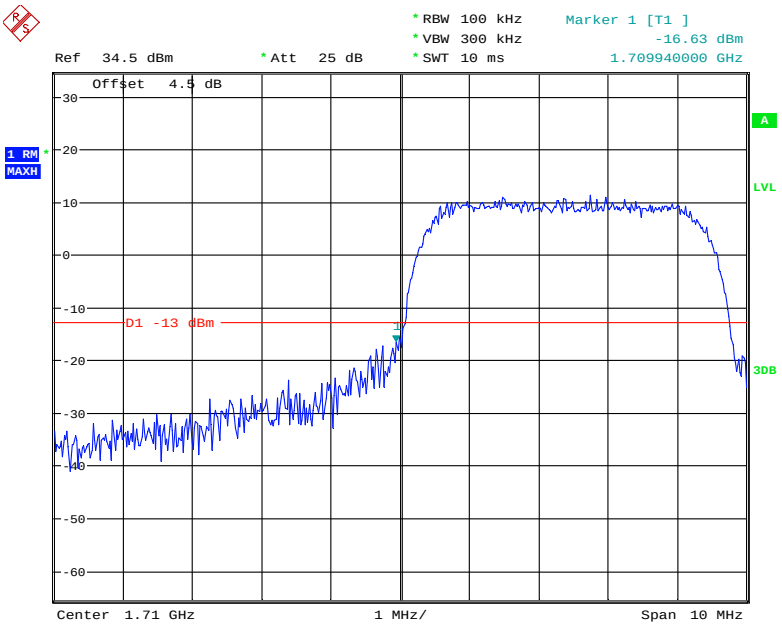
Date: 29.JAN.2019 21:08:14

WCDMA Band IV Rel 99, Right Band Edge



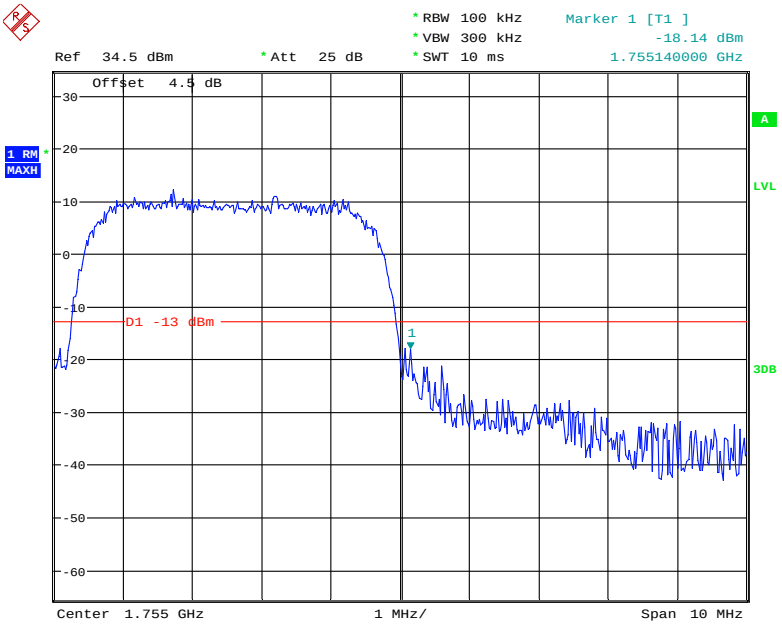
Date: 29.JAN.2019 21:09:04

WCDMA Band IV HSDPA, Left Band Edge



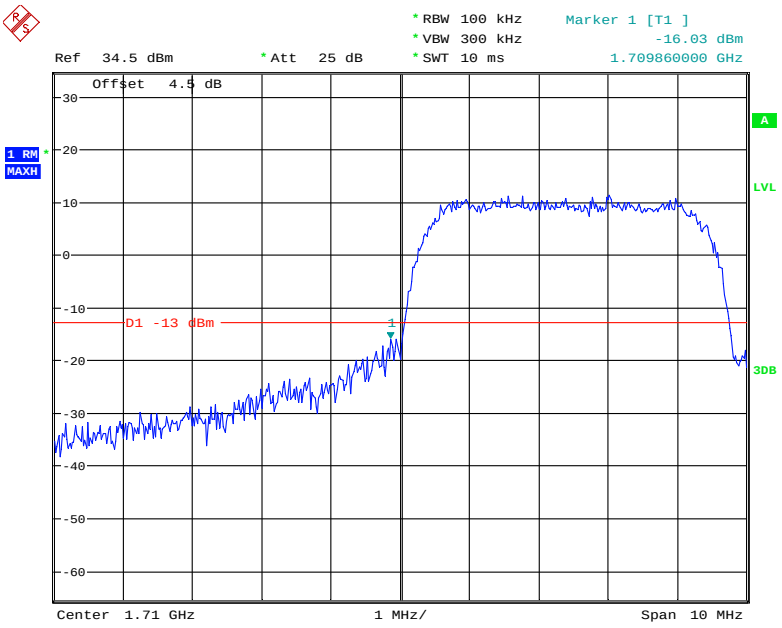
Date: 29.JAN.2019 21:18:08

WCDMA Band IV HSDPA, Right Band Edge



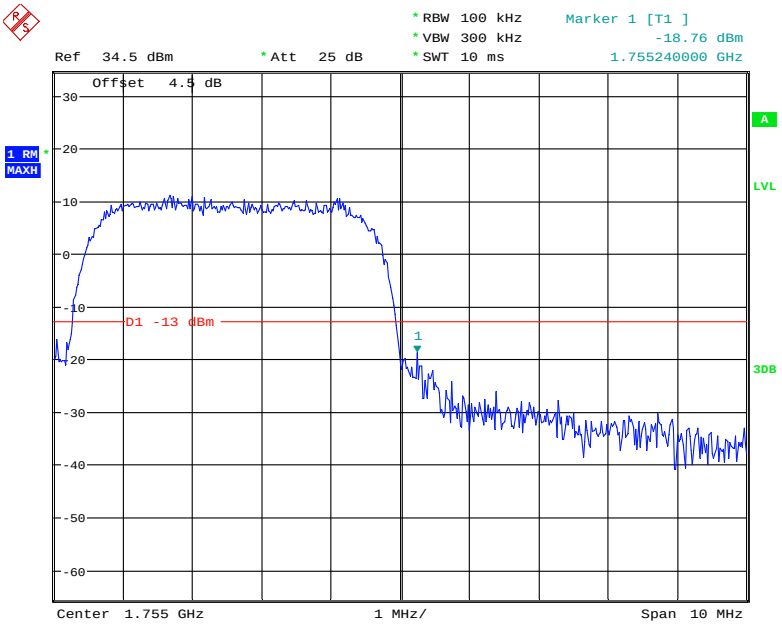
Date: 29.JAN.2019 21:17:45

WCDMA Band IV HSUPA, Left Band Edge



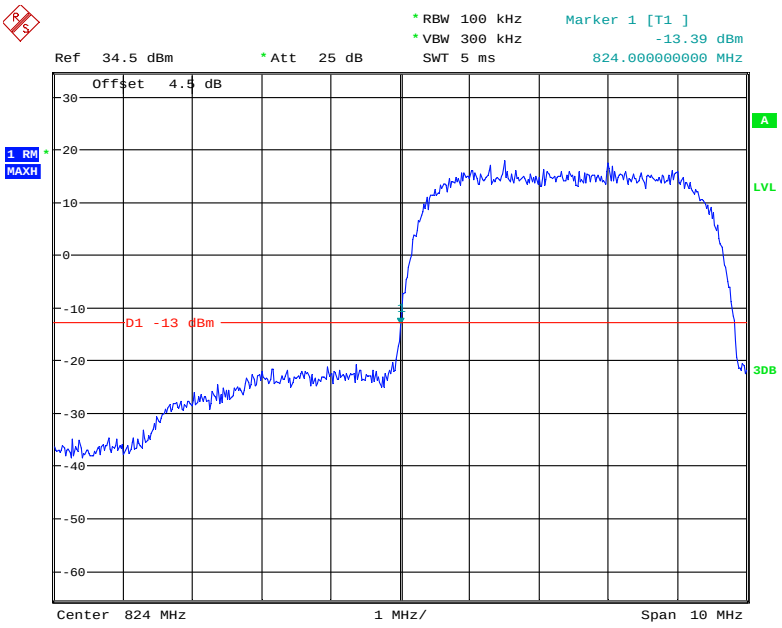
Date: 29.JAN.2019 21:16:11

WCDMA Band IV HSUPA, Right Band Edge



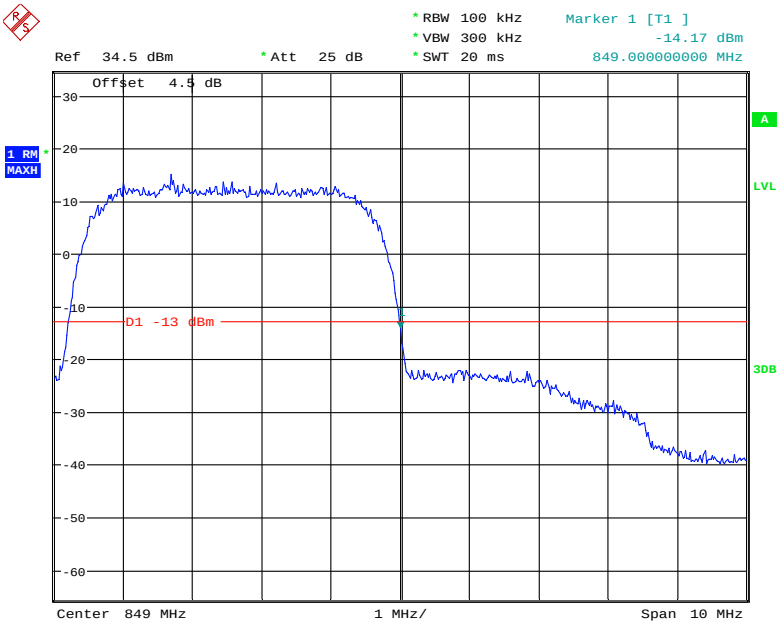
Date: 29.JAN.2019 21:17:02

WCDMA Band V Rel 99, Left Band Edge



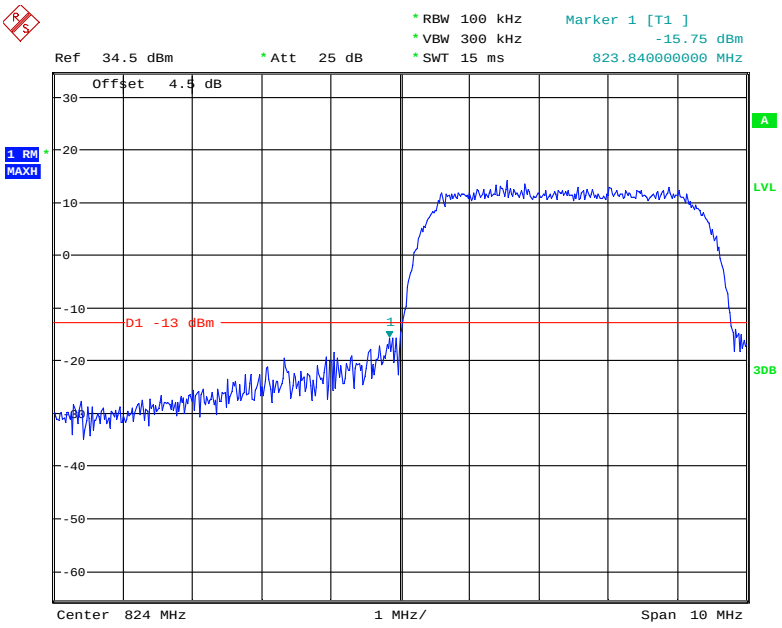
Date: 29.JAN.2019 20:43:25

WCDMA Band V Rel 99, Right Band Edge



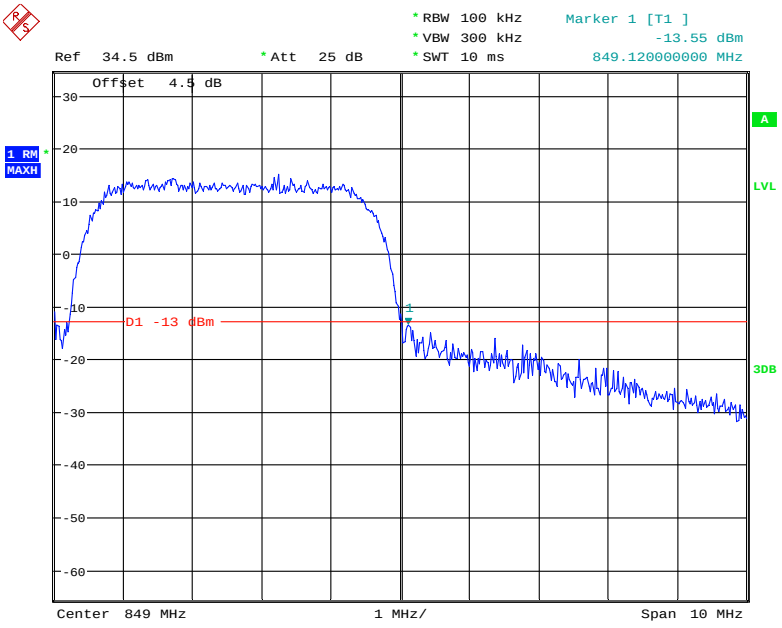
Date: 29.JAN.2019 20:44:54

WCDMA Band V HSDPA, Left Band Edge



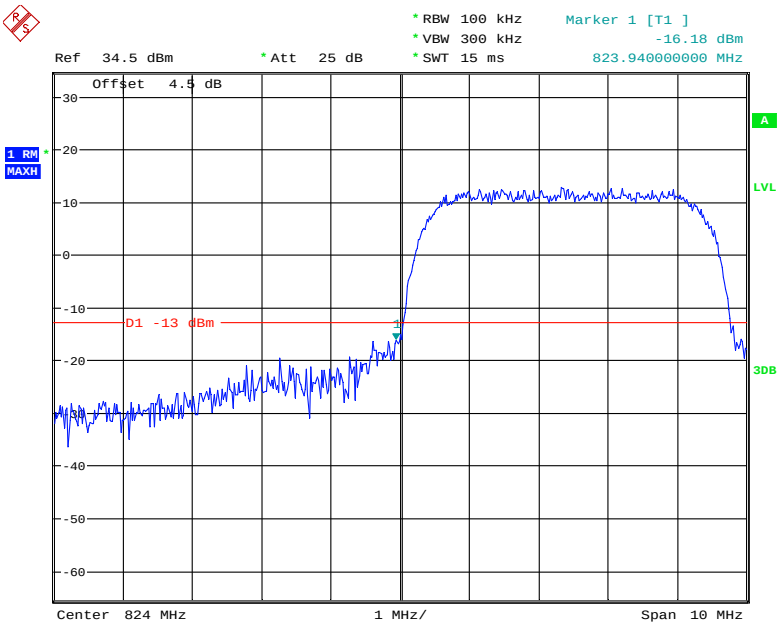
Date: 29.JAN.2019 20:56:59

WCDMA Band V HSDPA, Right Band Edge



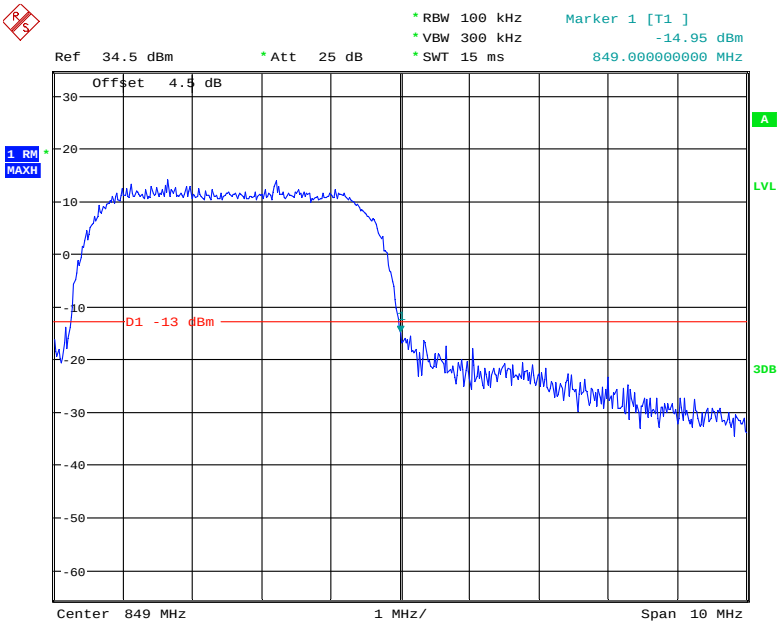
Date: 29.JAN.2019 20:55:40

WCDMA Band V HSUPA, Left Band Edge



Date: 29.JAN.2019 20:57:46

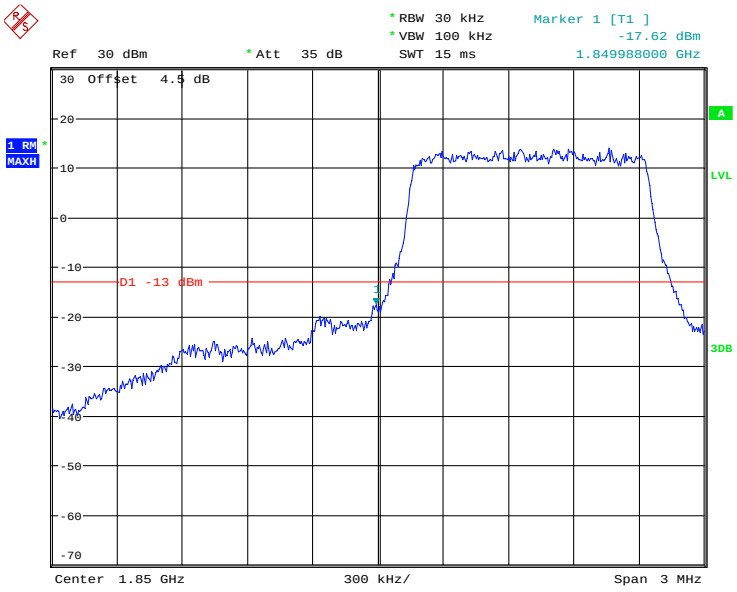
WCDMA Band V HSUPA, Right Band Edge



Date: 29.JAN.2019 20:58:19

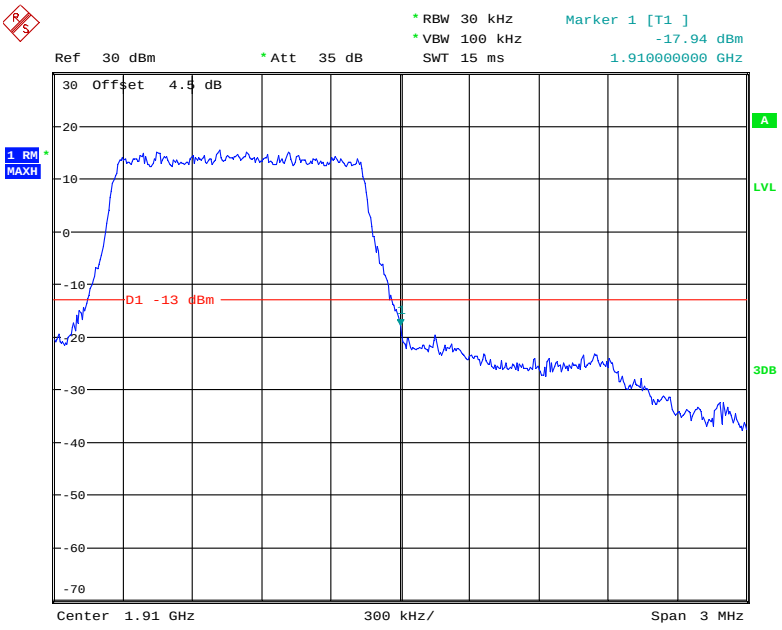
LTE Band 2

QPSK_1.4MHz_ 6 RB_ Left



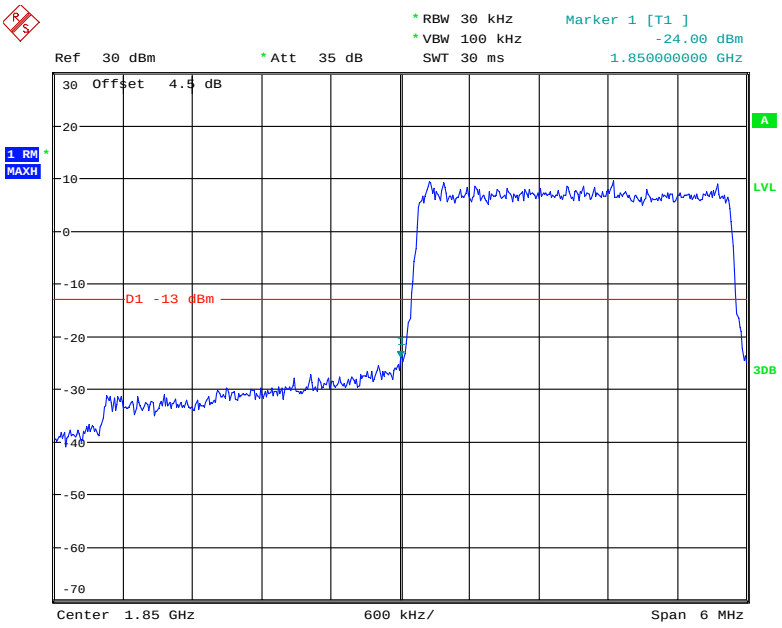
Date: 29.JAN.2019 12:59:58

QPSK_1.4MHz_ 6 RB_ Right



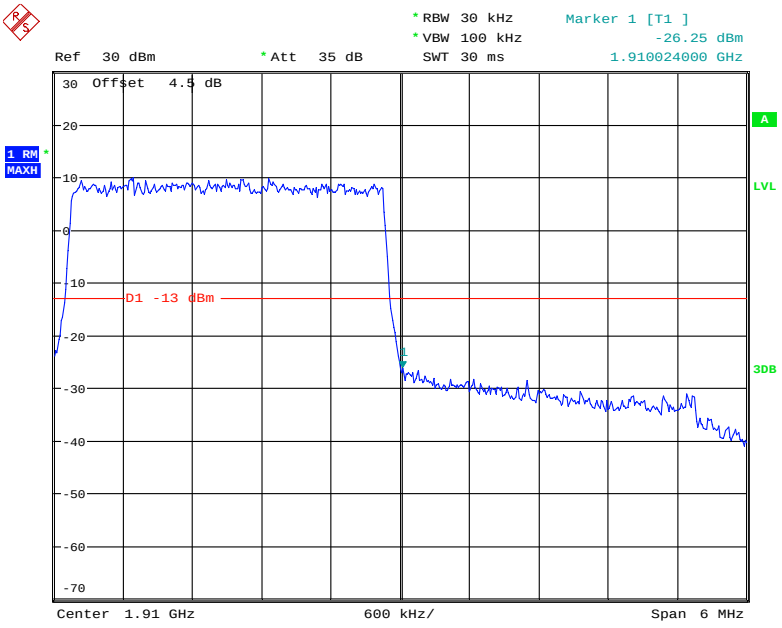
Date: 29.JAN.2019 13:01:16

QPSK_3MHz_ 15 RB_ Left



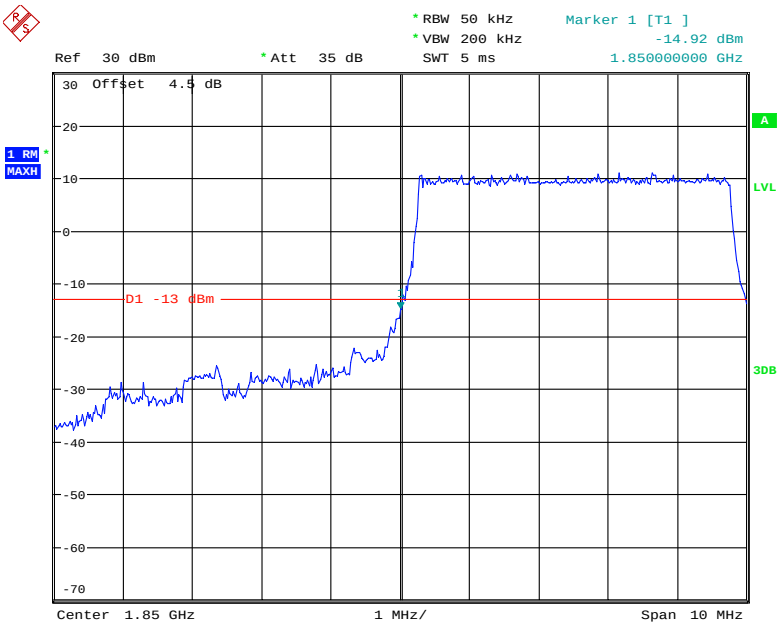
Date: 29.JAN.2019 13:02:25

QPSK_3MHz_ 15 RB_ Right



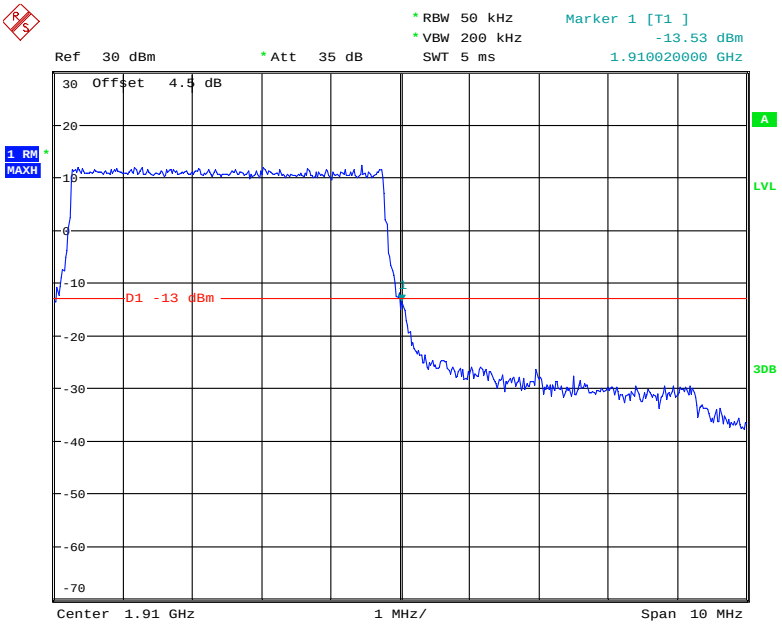
Date: 29.JAN.2019 13:03:28

QPSK_5MHz_ 25 RB_ Left



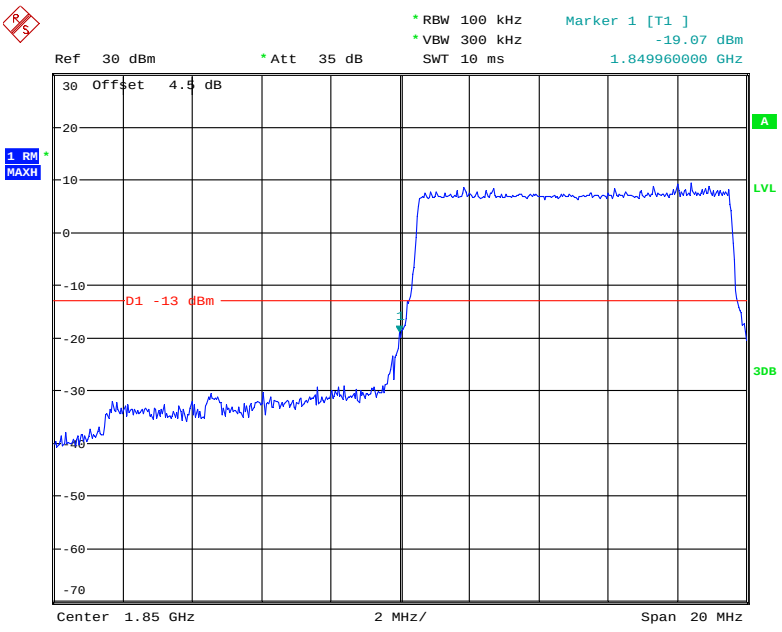
Date: 29.JAN.2019 13:05:08

QPSK_5MHz_ 25 RB_ Right



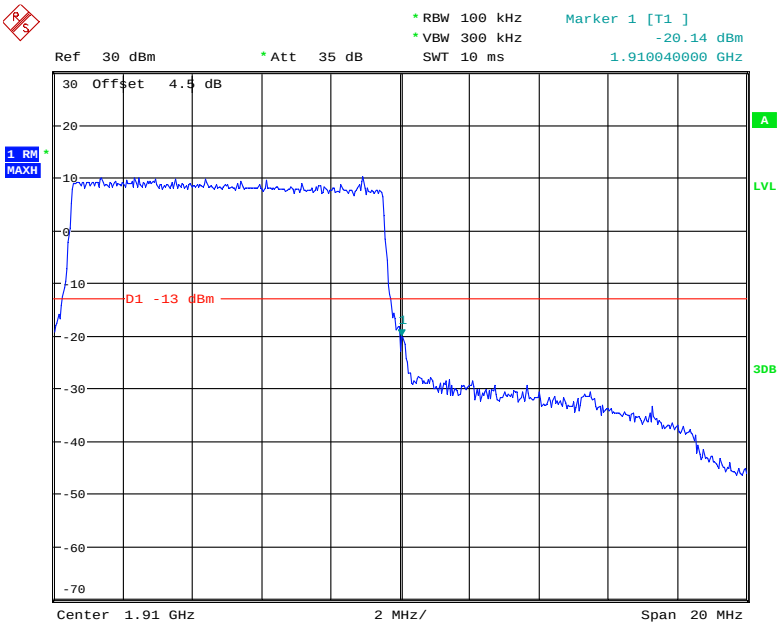
Date: 29.JAN.2019 13:07:11

QPSK_10MHz_ 50 RB_ Left



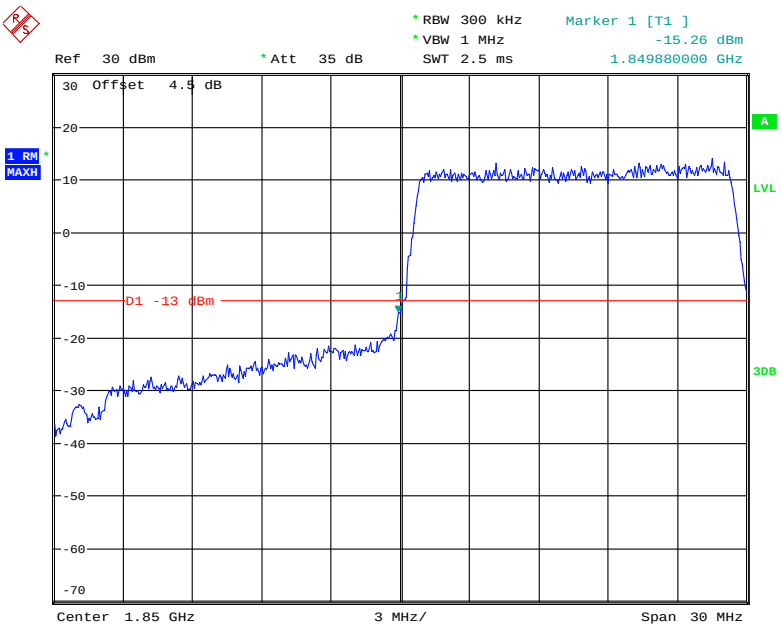
Date: 29.JAN.2019 13:08:52

QPSK_10MHz_ 50 RB_ Right



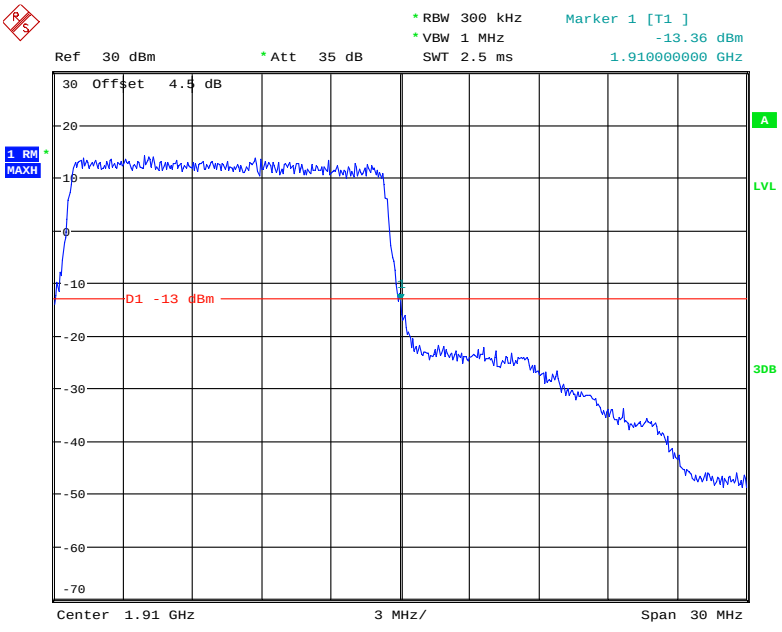
Date: 29.JAN.2019 13:09:57

QPSK_15MHz_ 75 RB_ Left



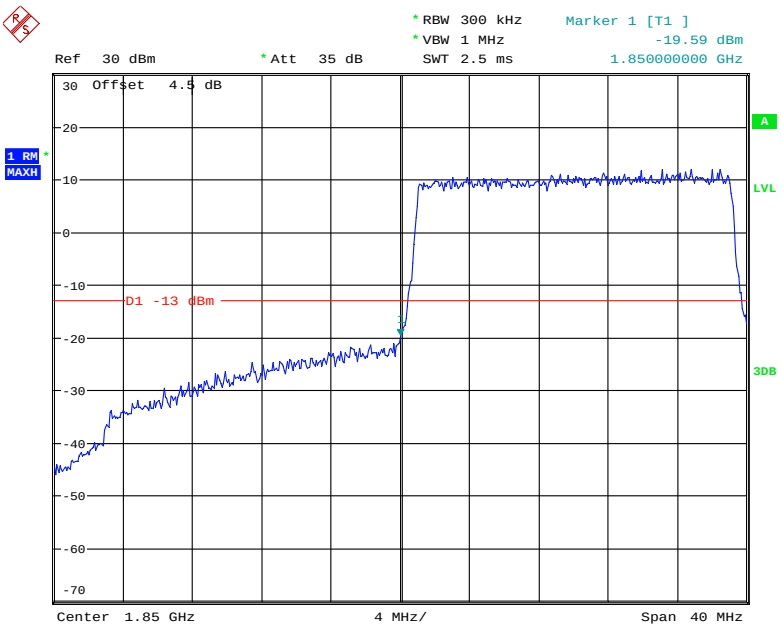
Date: 29.JAN.2019 13:11:16

QPSK_15MHz_ 75 RB_ Right



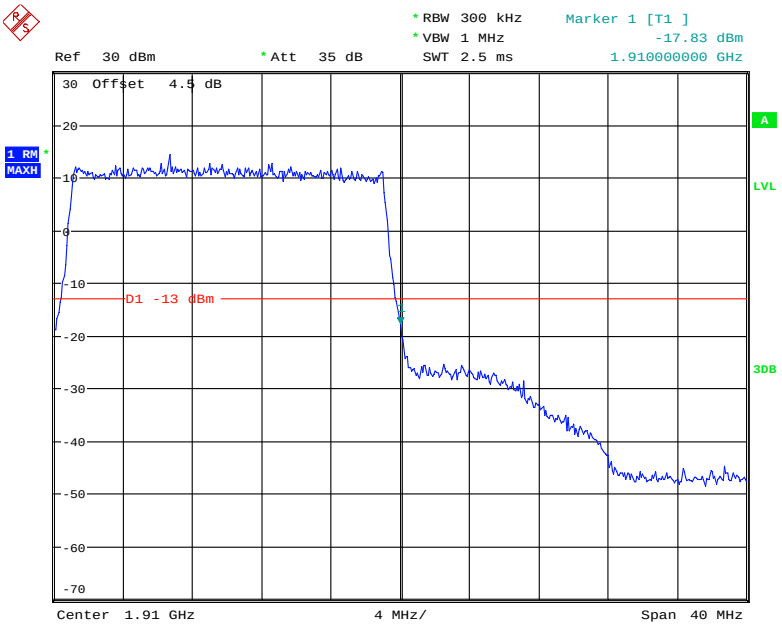
Date: 29.JAN.2019 14:46:55

QPSK_20MHz_ FULL RB_ Left



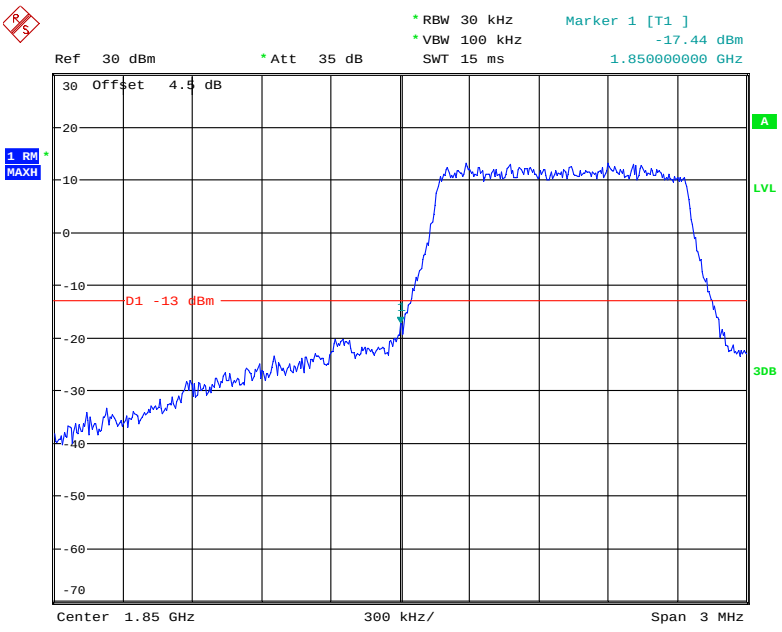
Date: 29.JAN.2019 13:14:05

QPSK_20MHz_ FULL RB_ Right



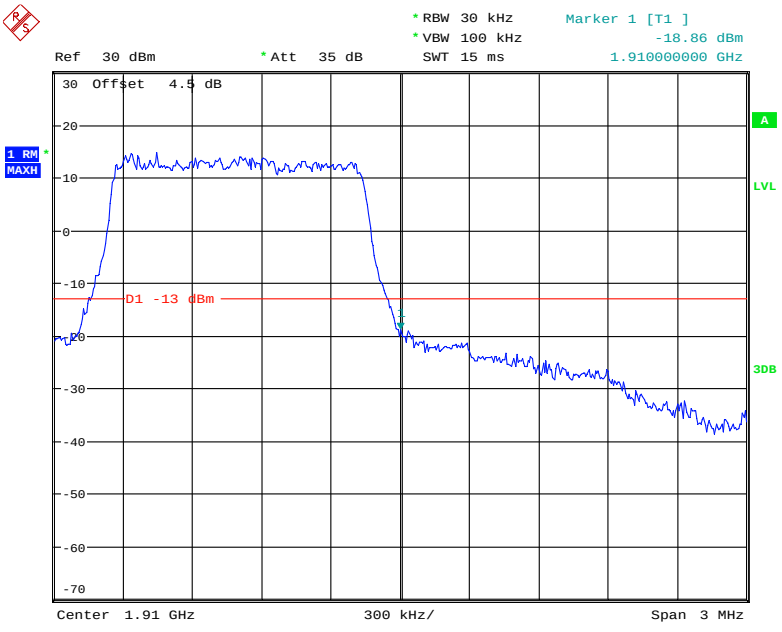
Date: 29.JAN.2019 13:15:14

16QAM_1.4MHz_ 6 RB_ Left



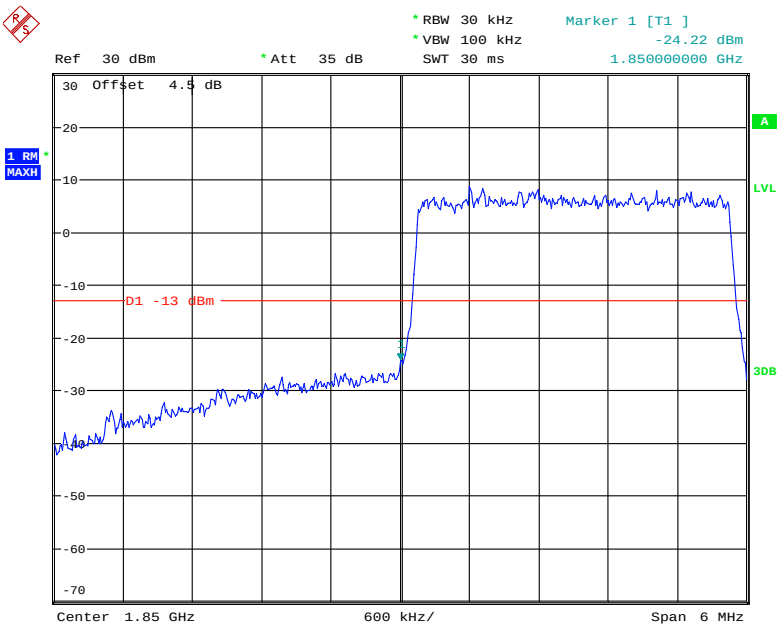
Date: 29.JAN.2019 13:00:31

16QAM_1.4MHz_ 6 RB_ Right



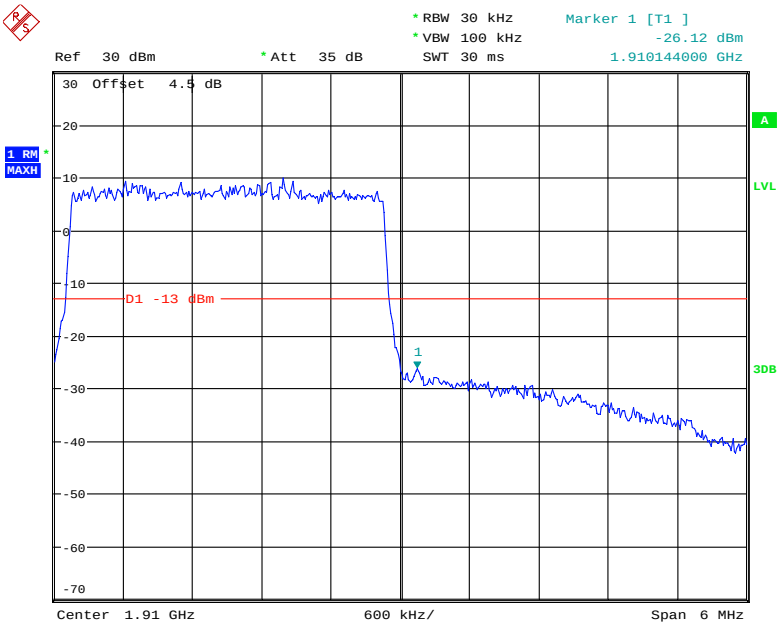
Date: 29.JAN.2019 13:01:53

16QAM_3MHz_ 15 RB_ Left



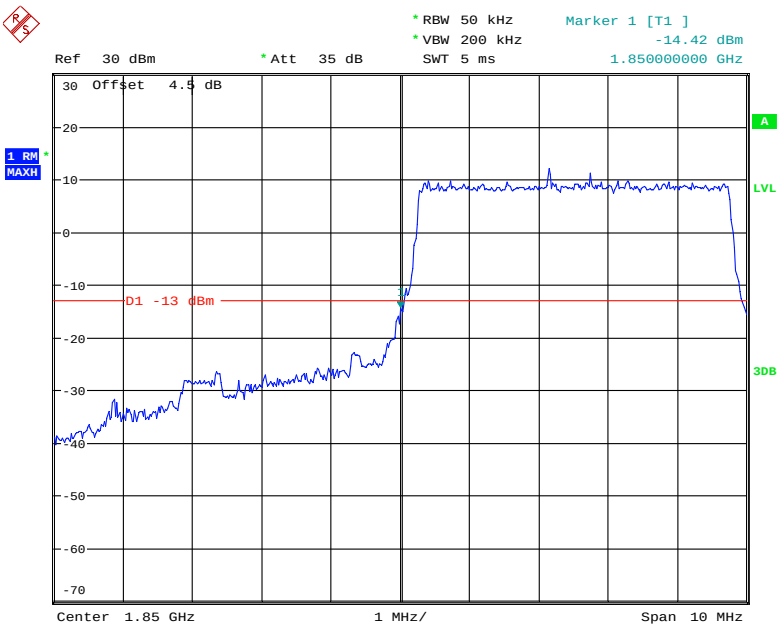
Date: 29.JAN.2019 13:02:58

16QAM_3MHz_ 15 RB_ Right



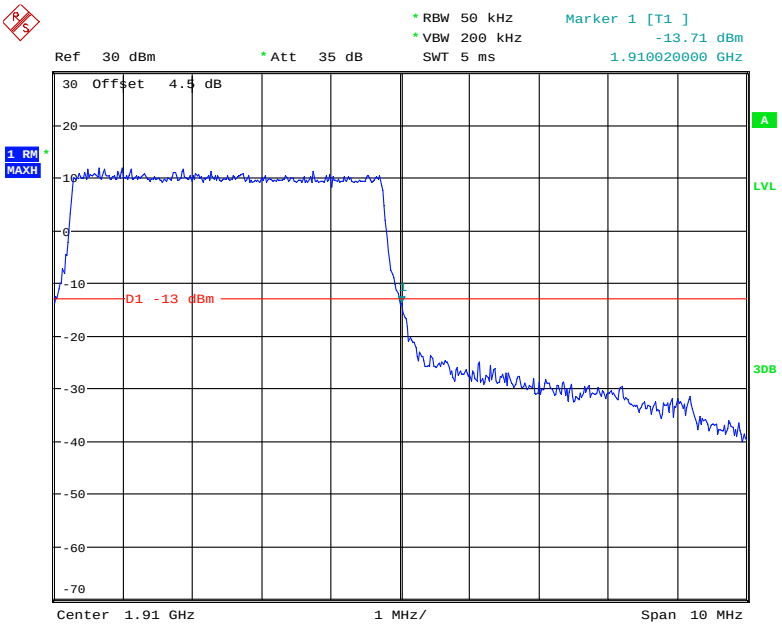
Date: 29.JAN.2019 13:03:58

16QAM_5MHz_ 25 RB_ Left



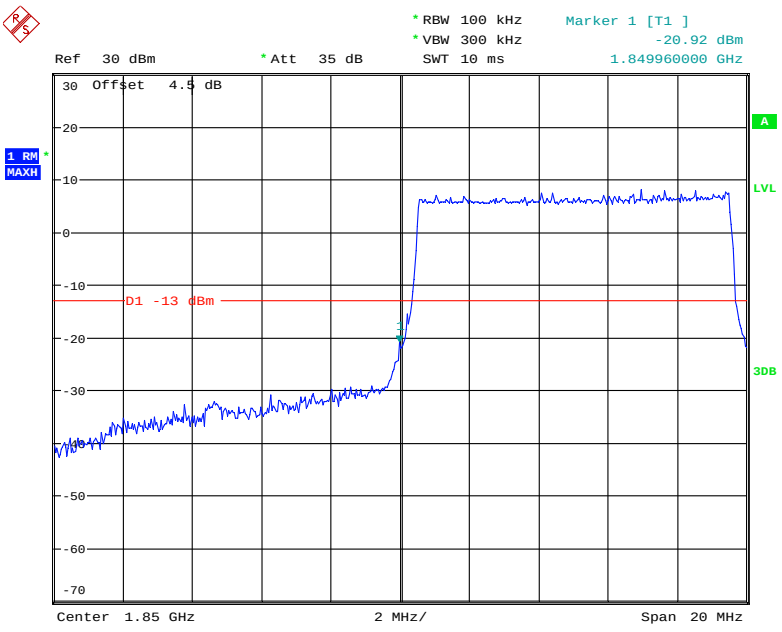
Date: 29.JAN.2019 13:05:58

16QAM_5MHz_ 25 RB_ Right



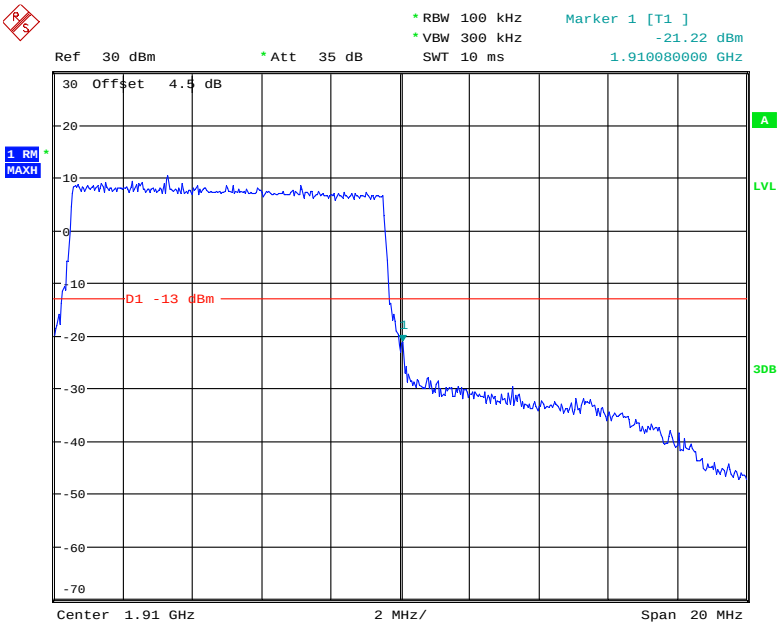
Date: 29.JAN.2019 13:08:15

16QAM_10MHz_ 50 RB_ Left



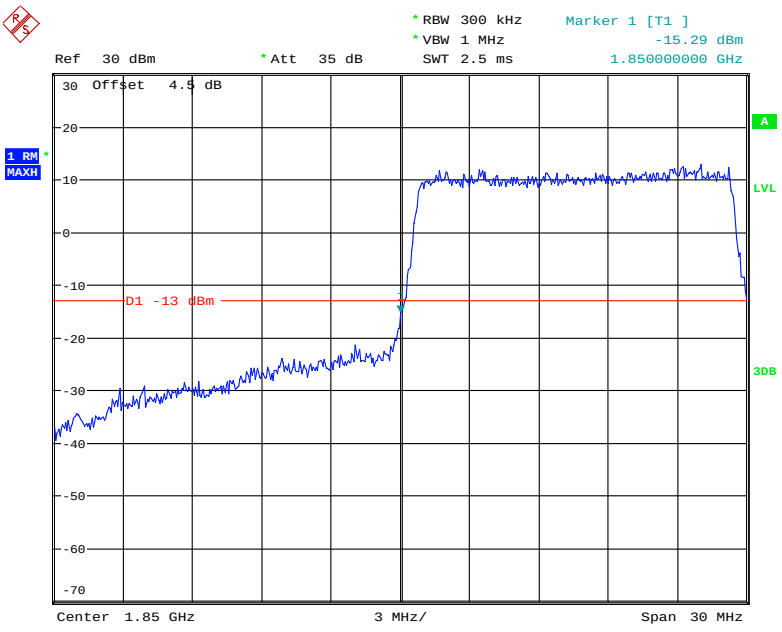
Date: 29.JAN.2019 13:09:23

16QAM_10MHz_ 50 RB_ Right



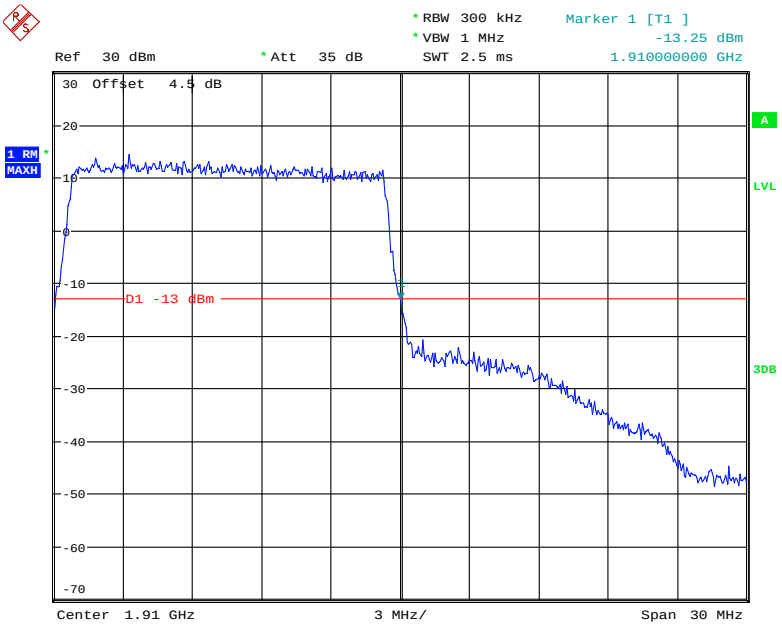
Date: 29.JAN.2019 13:10:35

16QAM_15MHz_ 75 RB_ Left



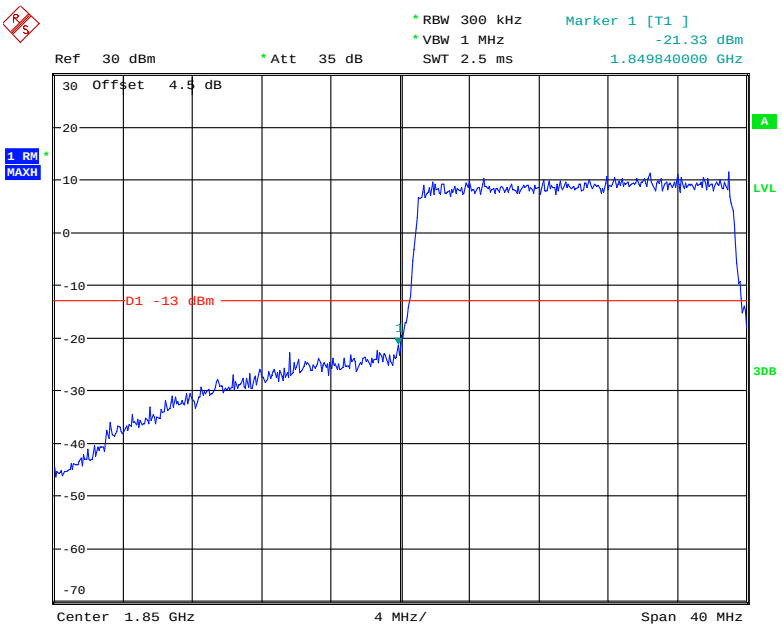
Date: 29.JAN.2019 13:12:04

16QAM_15MHz_ 75 RB_ Right



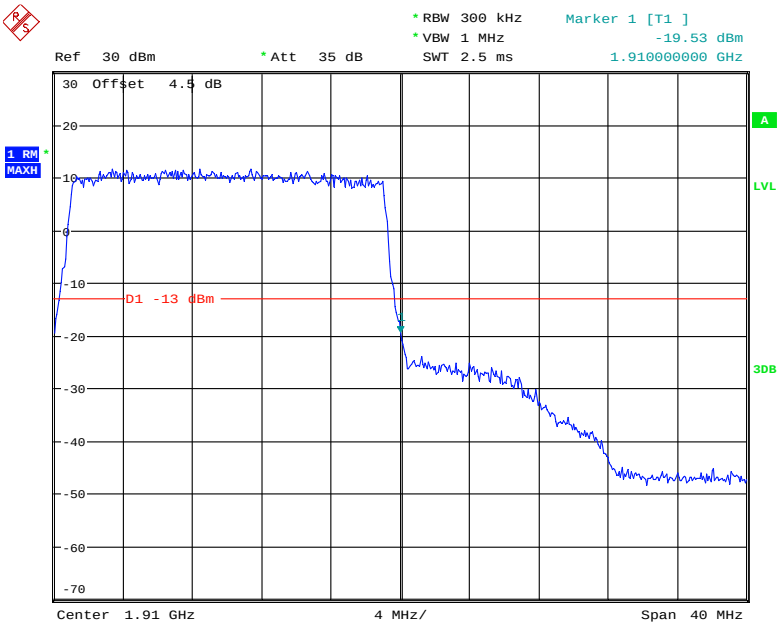
Date: 29.JAN.2019 13:13:24

16QAM_20MHz_ FULL RB_ Left



Date: 29.JAN.2019 13:14:36

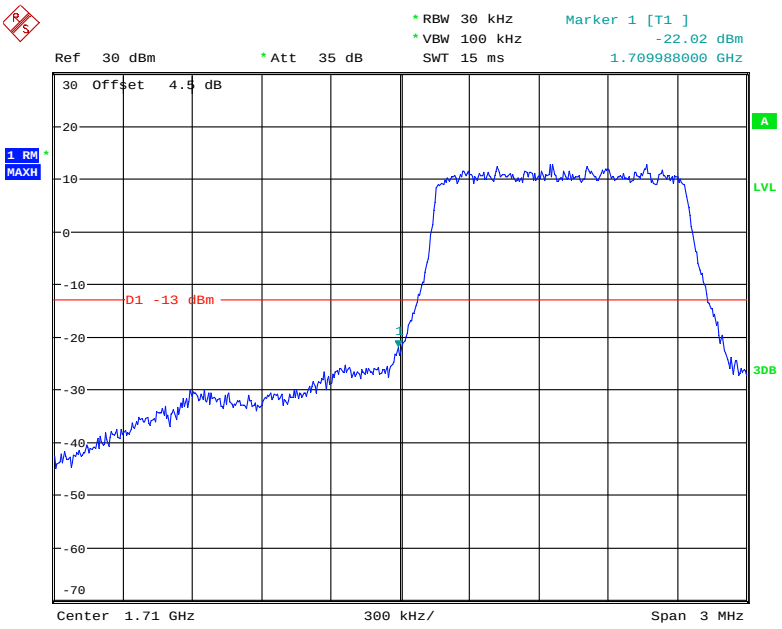
16QAM_20MHz_ FULL RB_ Right



Date: 29.JAN.2019 13:16:03

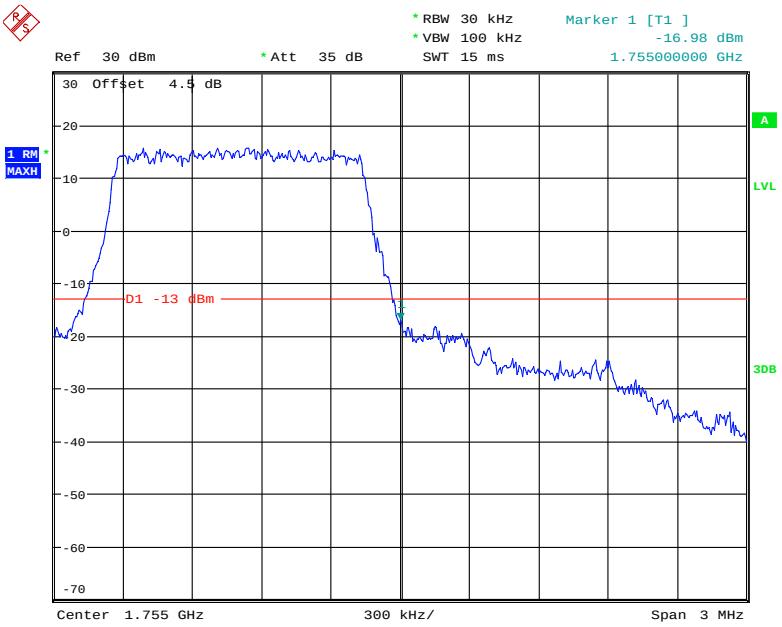
LTE Band 4

QPSK_1.4MHz_ 6 RB_ Left



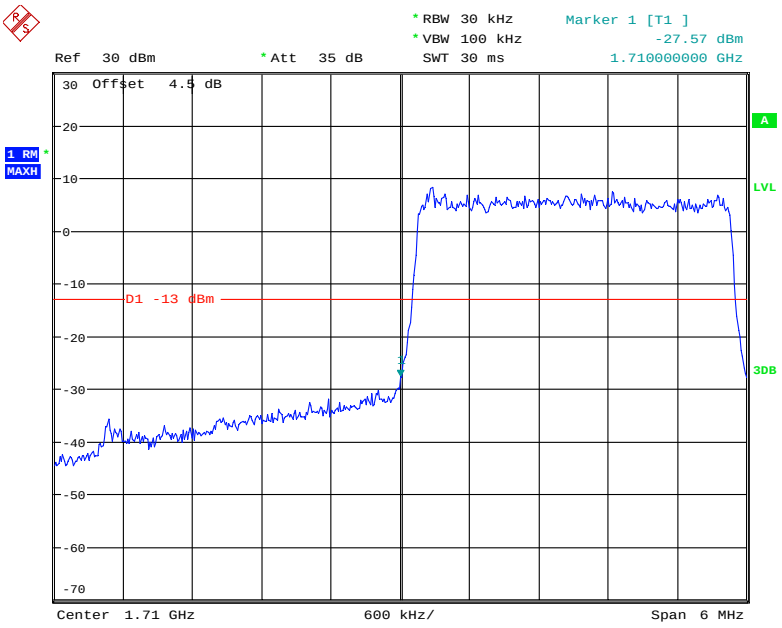
Date: 29.JAN.2019 13:16:38

QPSK_1.4MHz_ 6 RB_ Right



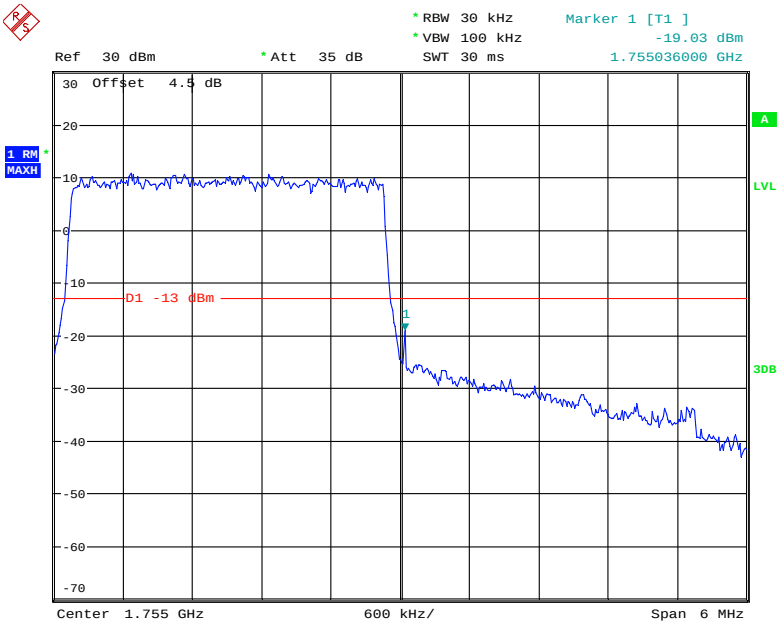
Date: 29.JAN.2019 13:17:49

QPSK_3MHz_ 15 RB_ Left



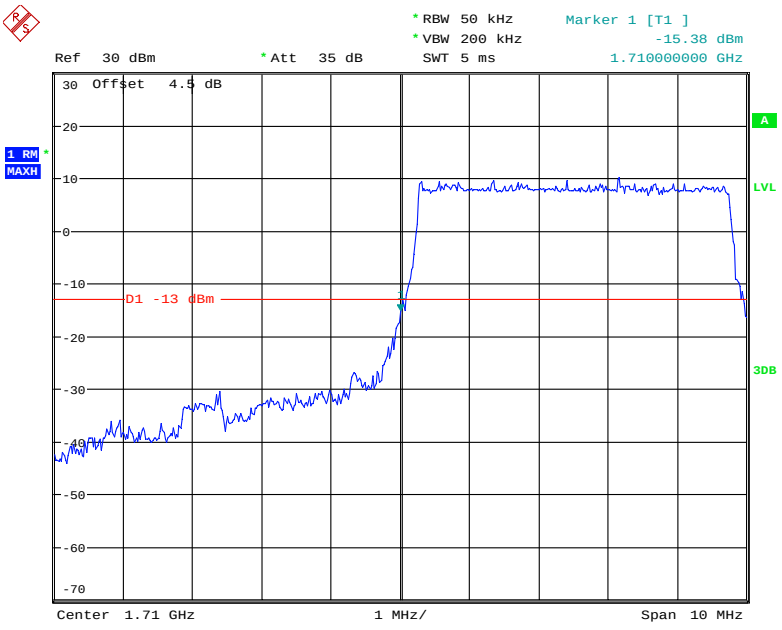
Date: 29.JAN.2019 13:18:54

QPSK_3MHz_ 15 RB_ Right



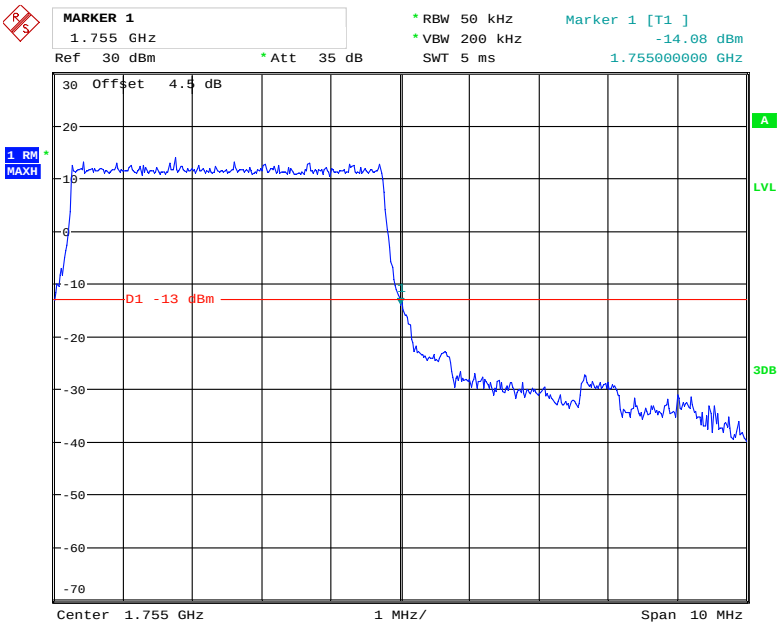
Date: 29.JAN.2019 13:20:04

QPSK_5MHz_ 25 RB_ Left



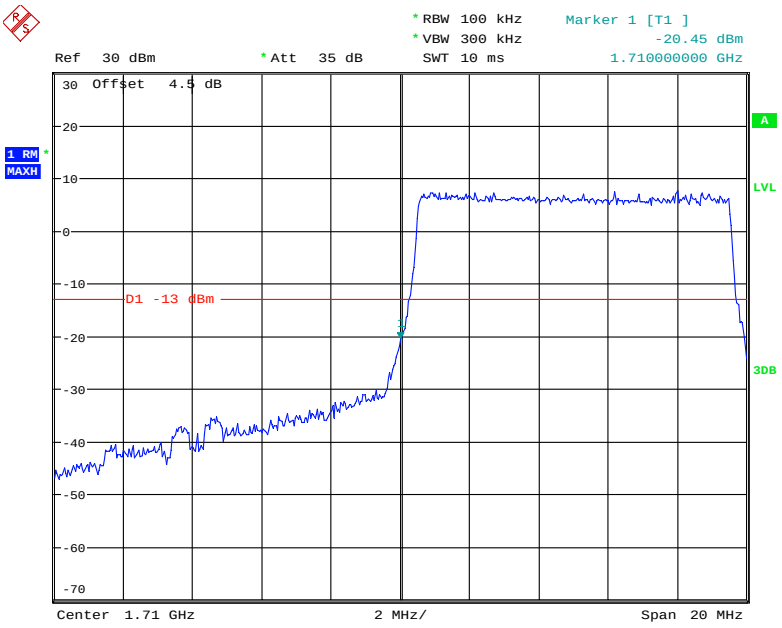
Date: 29.JAN.2019 13:21:24

QPSK_5MHz_ 25 RB_ Right



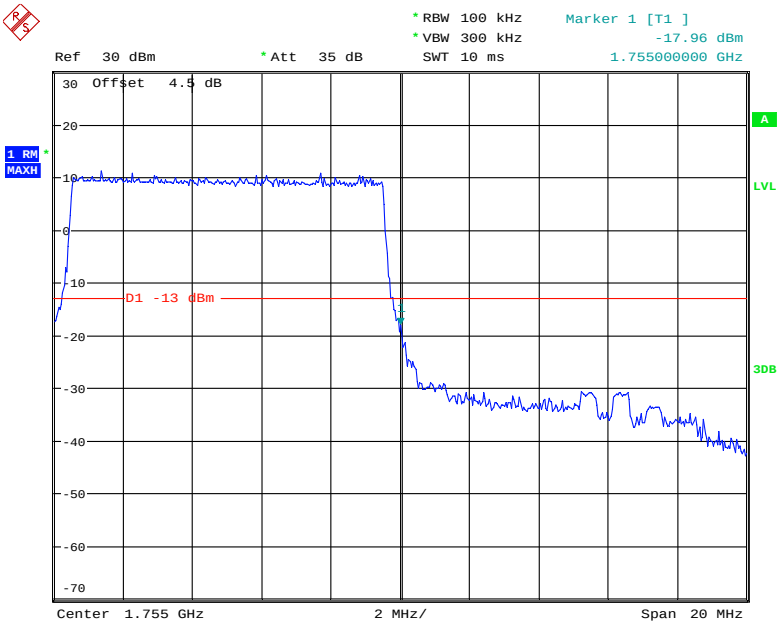
Date: 29.JAN.2019 14:48:28

QPSK_10MHz_ 50 RB_ Left



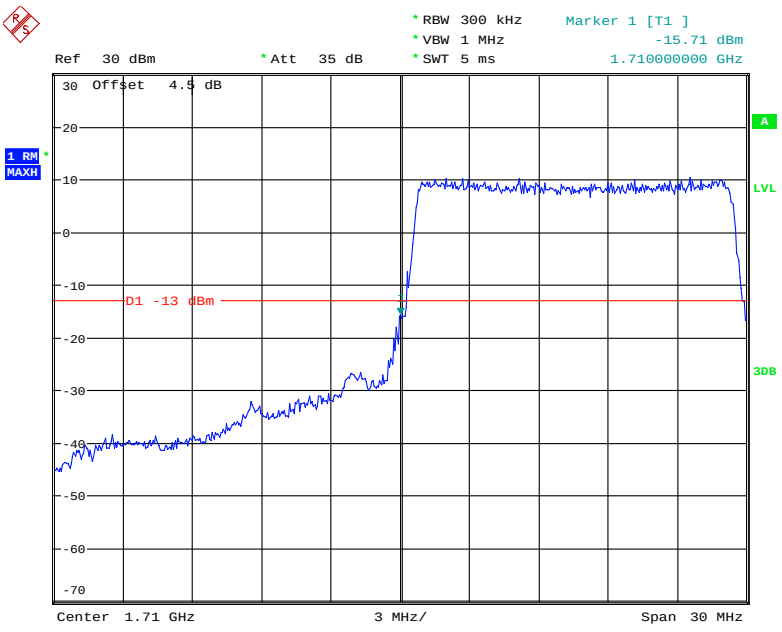
Date: 29.JAN.2019 13:24:22

QPSK_10MHz_ 50 RB_ Right



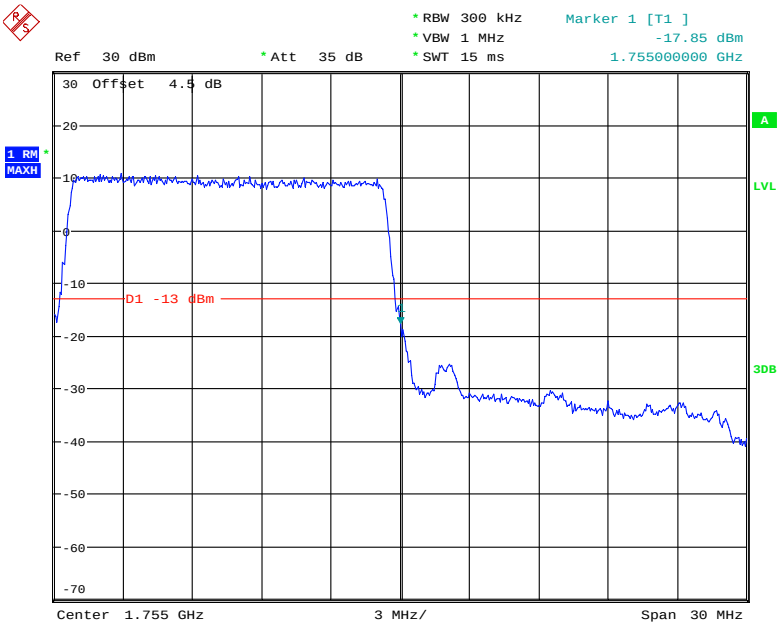
Date: 29.JAN.2019 13:25:34

QPSK_15MHz_ 75 RB_ Left



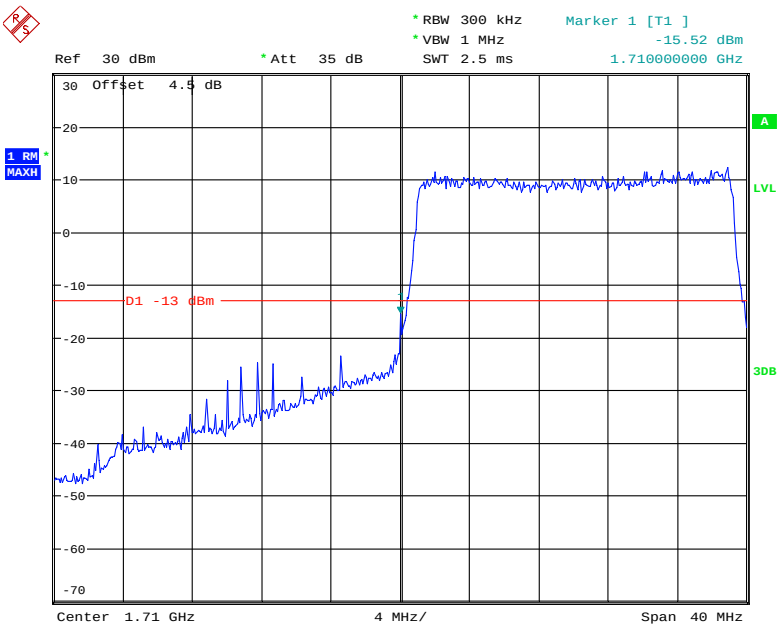
Date: 29.JAN.2019 14:51:29

QPSK_15MHz_ 75 RB_ Right



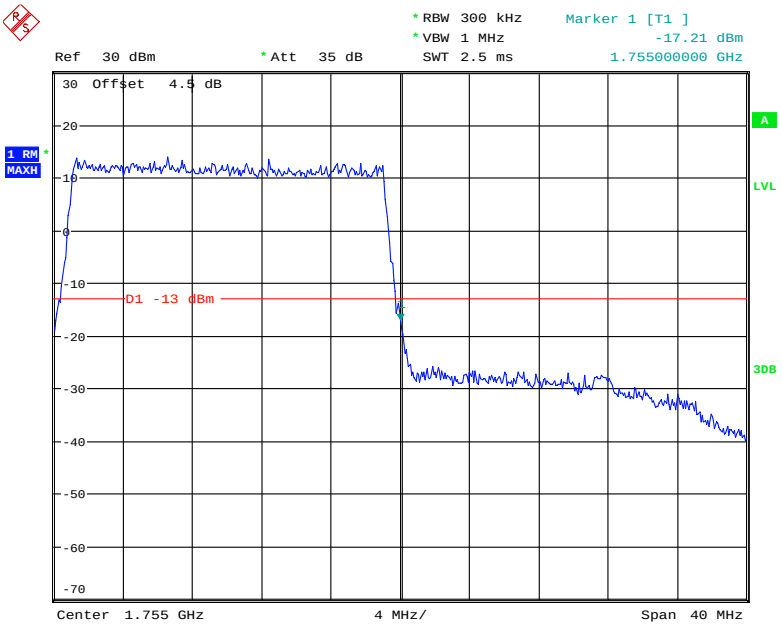
Date: 29.JAN.2019 14:52:27

QPSK_20MHz_ FULL RB_ Left



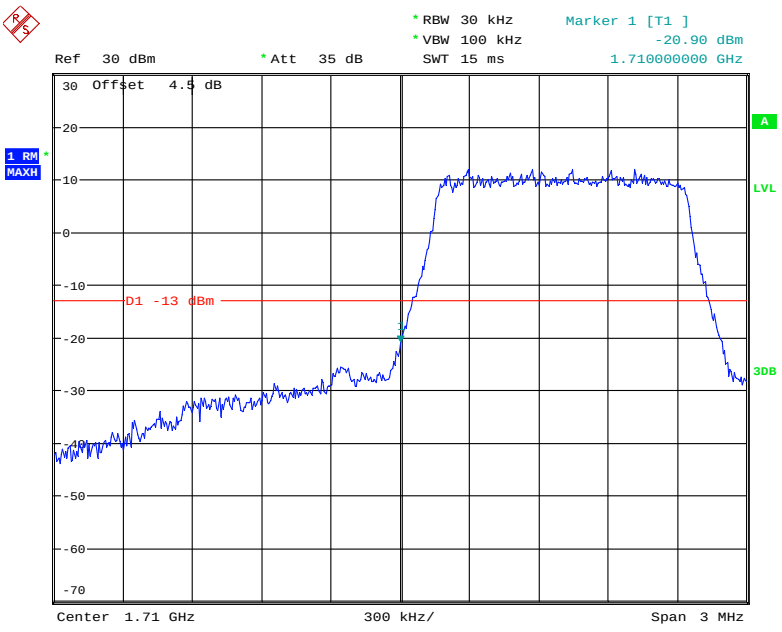
Date: 29.JAN.2019 13:30:02

QPSK_20MHz_ FULL RB_ Right



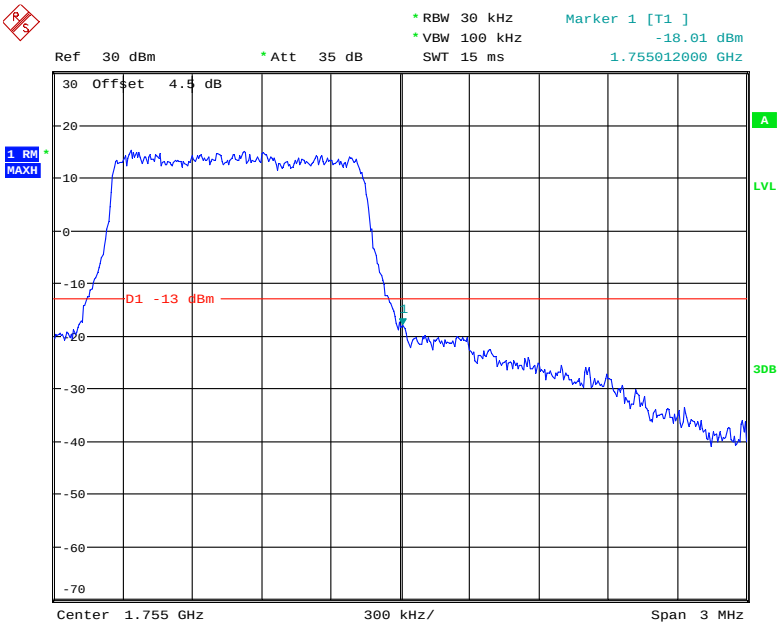
Date: 29.JAN.2019 13:31:23

16QAM_1.4MHz_ 6 RB_ Left



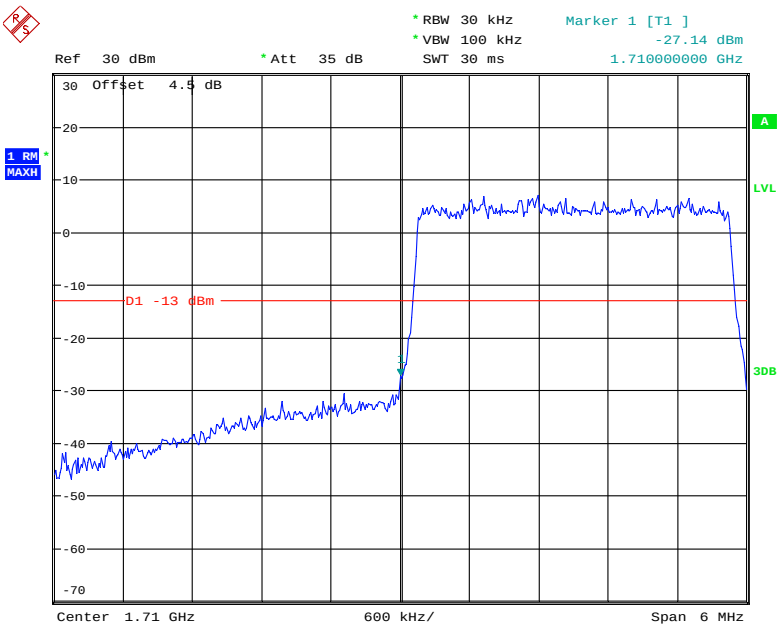
Date: 29.JAN.2019 13:17:18

16QAM_1.4MHz_ 6 RB_ Right



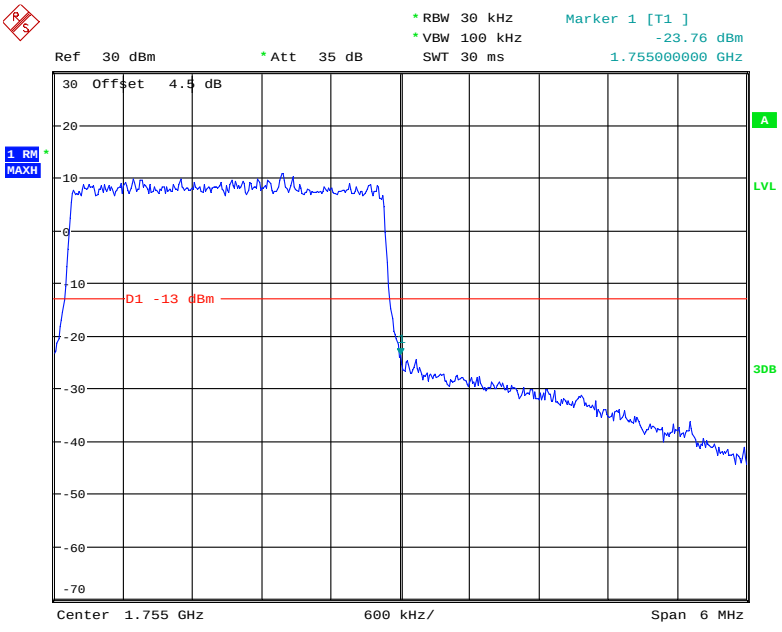
Date: 29.JAN.2019 13:18:22

16QAM_3MHz_ 15 RB_ Left



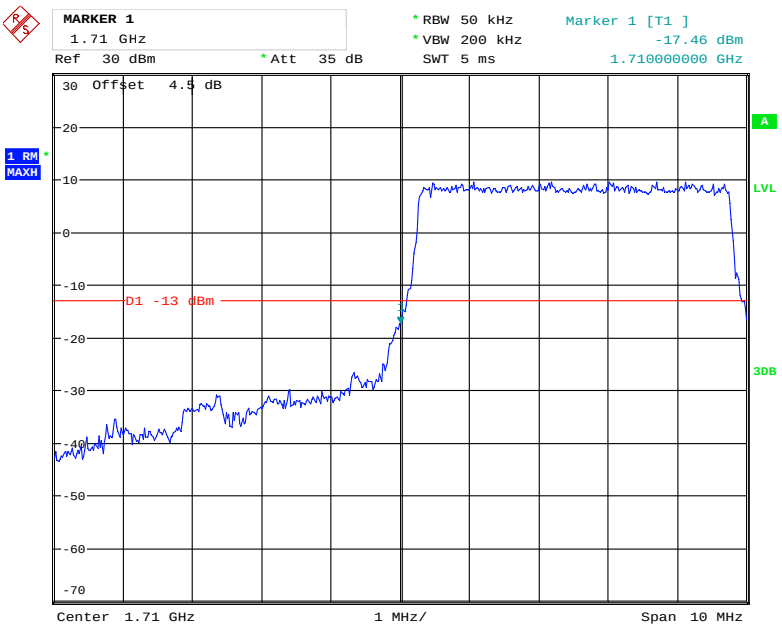
Date: 29.JAN.2019 13:19:30

16QAM_3MHz_ 15 RB_ Right



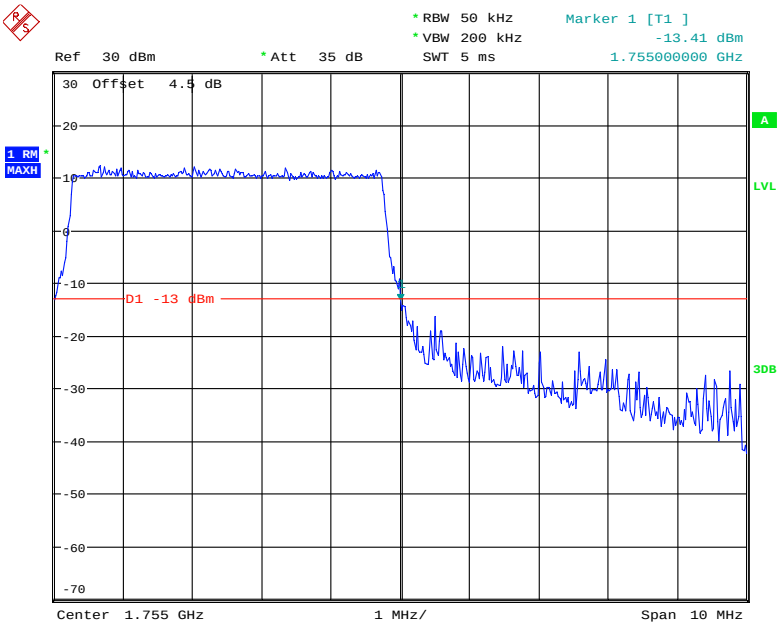
Date: 29.JAN.2019 13:20:33

16QAM_5MHz_ 25 RB_ Left



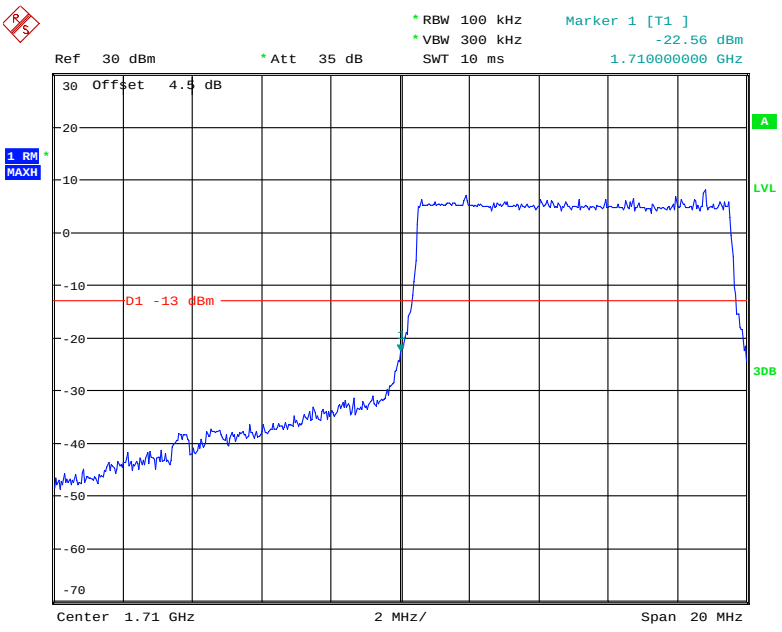
Date: 29.JAN.2019 14:49:40

16QAM_5MHz_ 25 RB_ Right



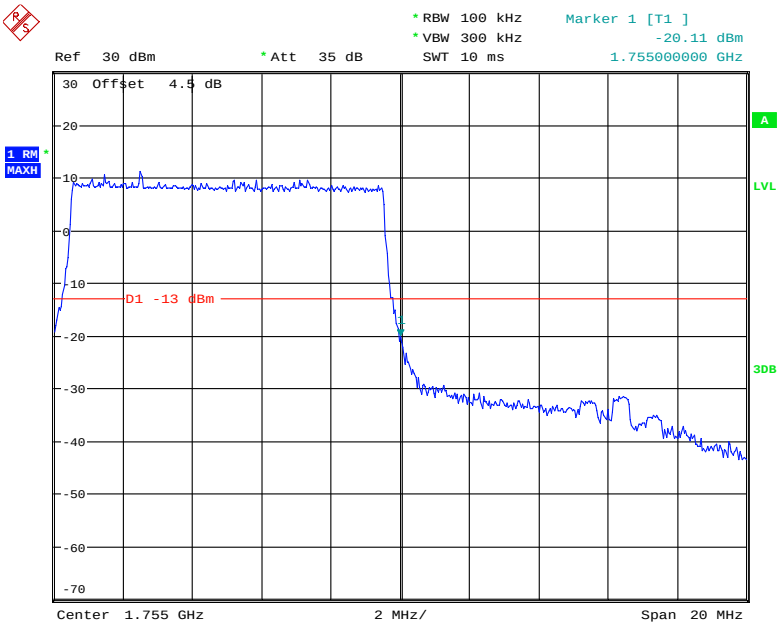
Date: 29.JAN.2019 13:23:41

16QAM_10MHz_ 50 RB_ Left



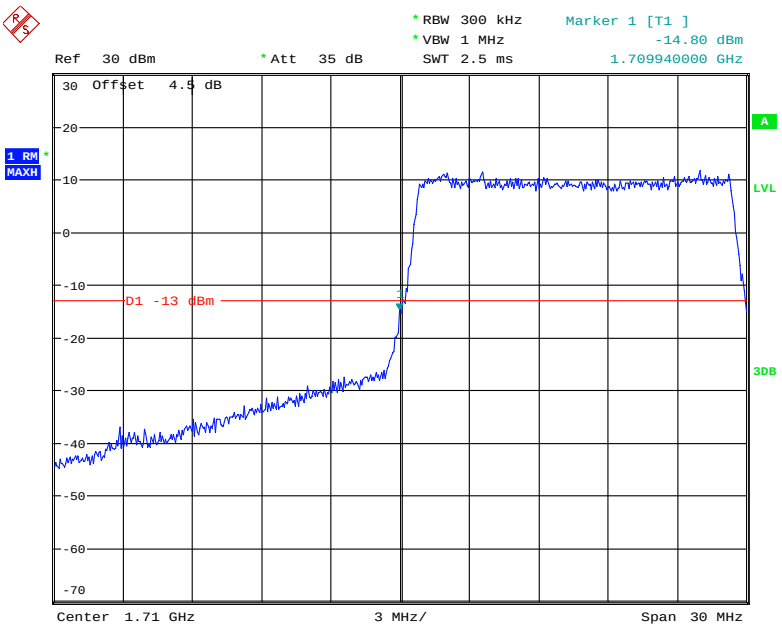
Date: 29.JAN.2019 13:24:59

16QAM_10MHz_ 50 RB_ Right



Date: 29.JAN.2019 13:26:15

16QAM_15MHz_ 75 RB_ Left



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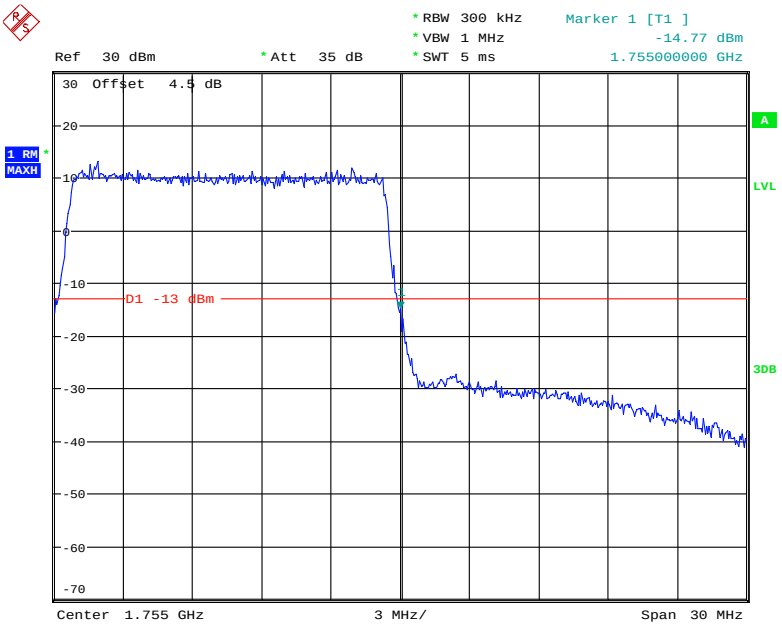
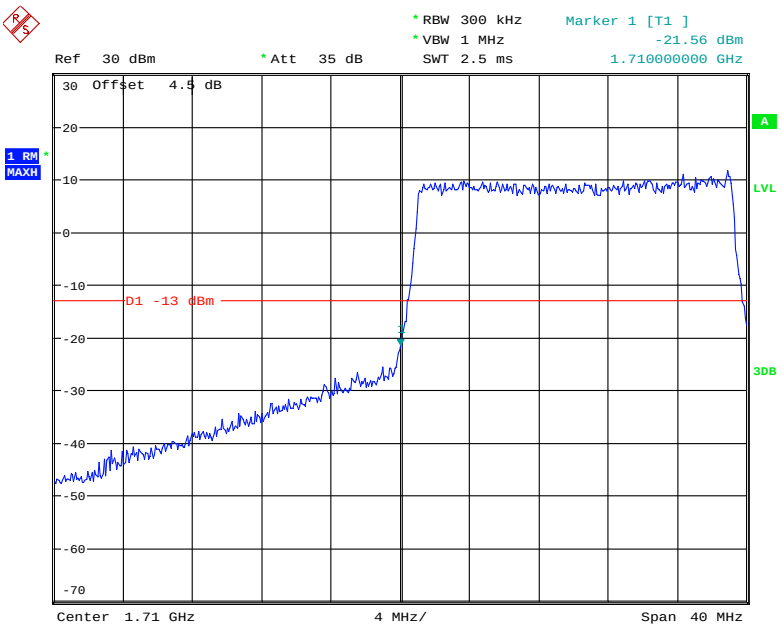
16QAM_15MHz_ 75 RB_ Right



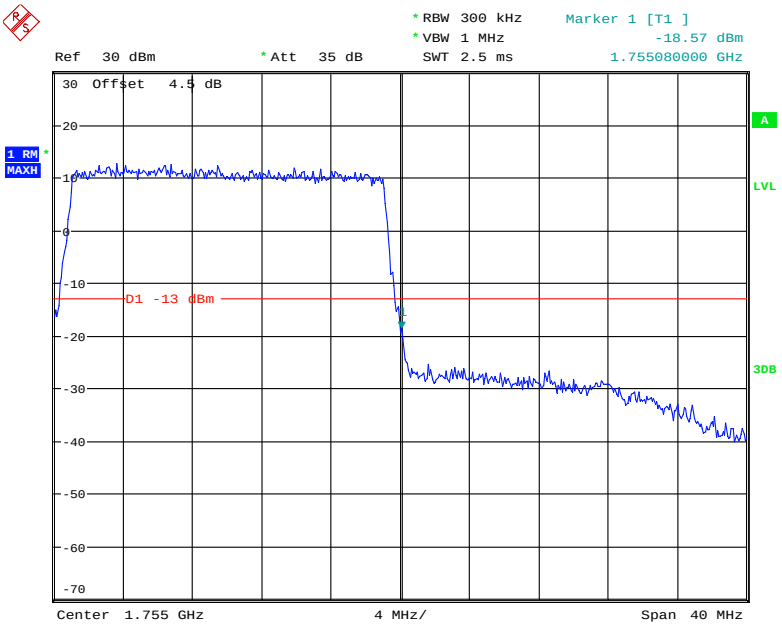
Date: 29.JAN.2019 14:53:12

16QAM_20MHz_ FULL RB_ Left



Date: 29.JAN.2019 13:30:48

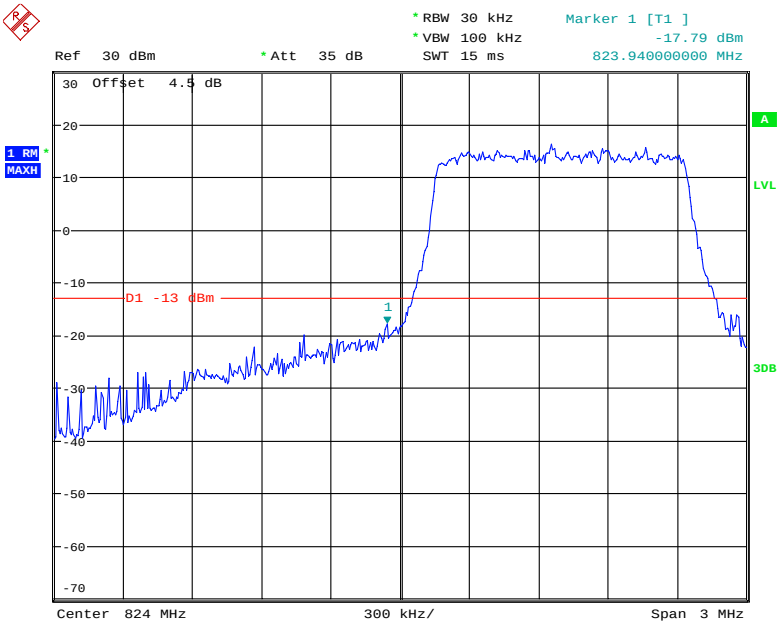
16QAM_20MHz_ FULL RB_ Right



Date: 29.JAN.2019 13:32:08

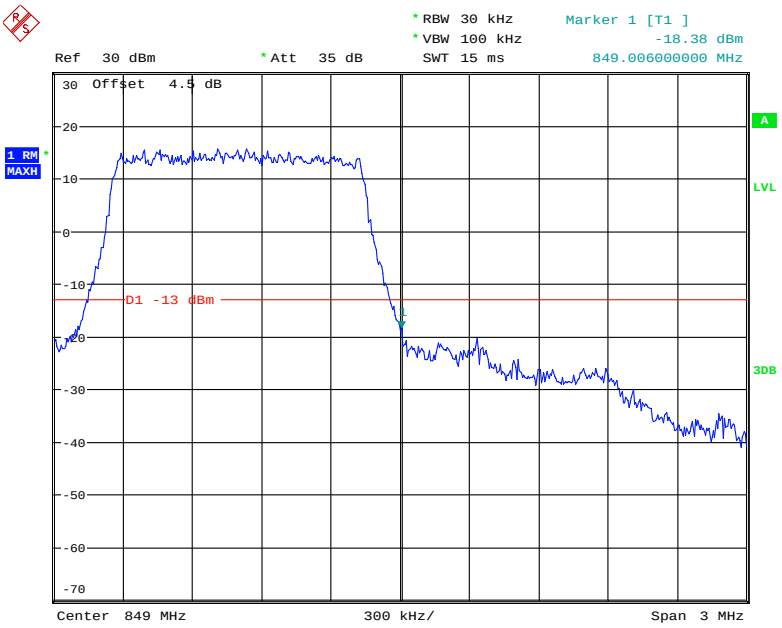
LTE Band 5

QPSK_1.4MHz_ 6 RB_ Left



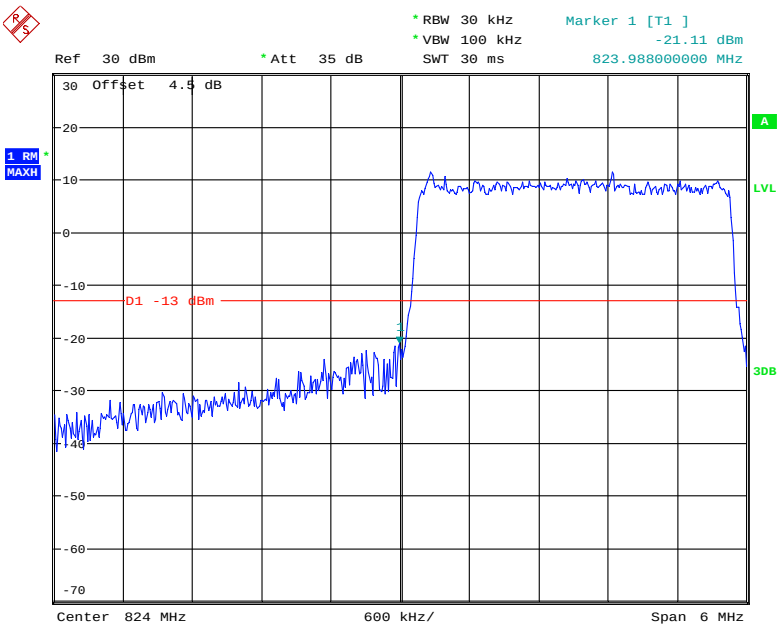
Date: 29.JAN.2019 13:40:12

QPSK_1.4MHz_ 6 RB_ Right



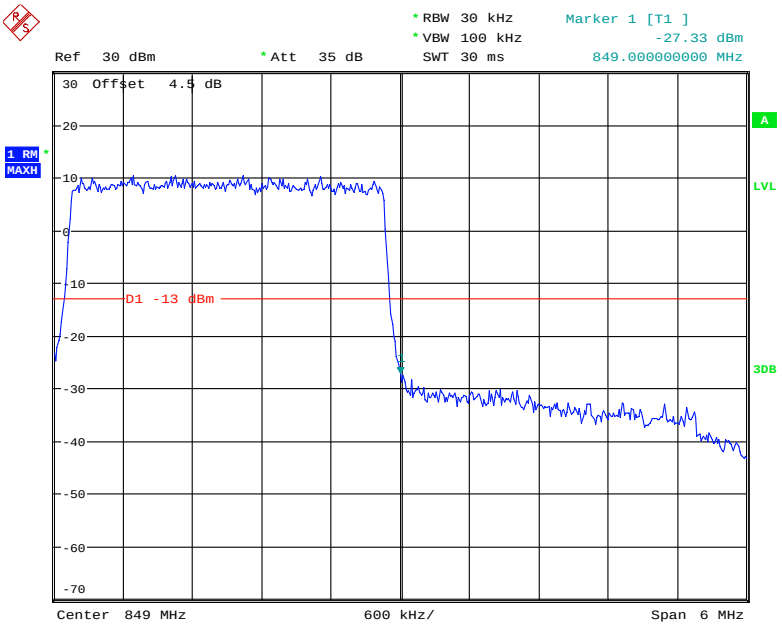
Date: 29.JAN.2019 13:43:49

QPSK_3MHz_ 15 RB_ Left



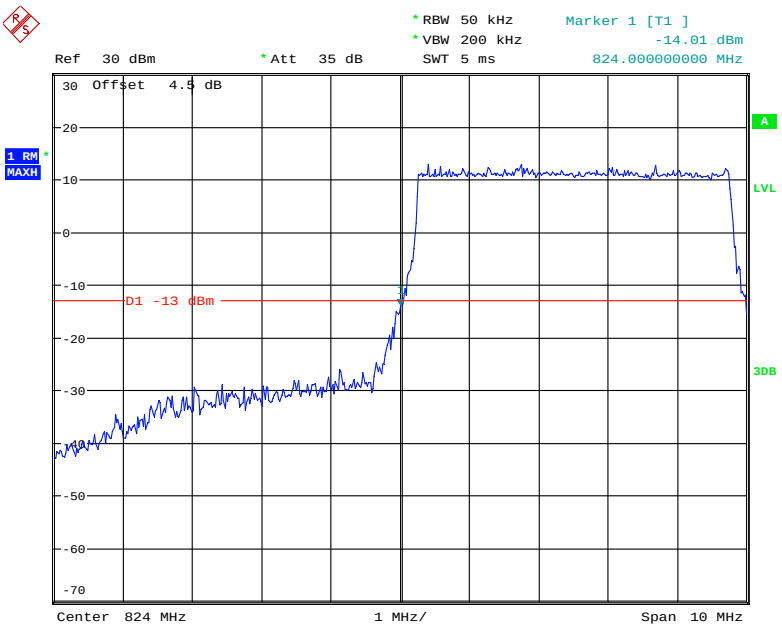
Date: 29.JAN.2019 13:44:58

QPSK_3MHz_ 15 RB_ Right



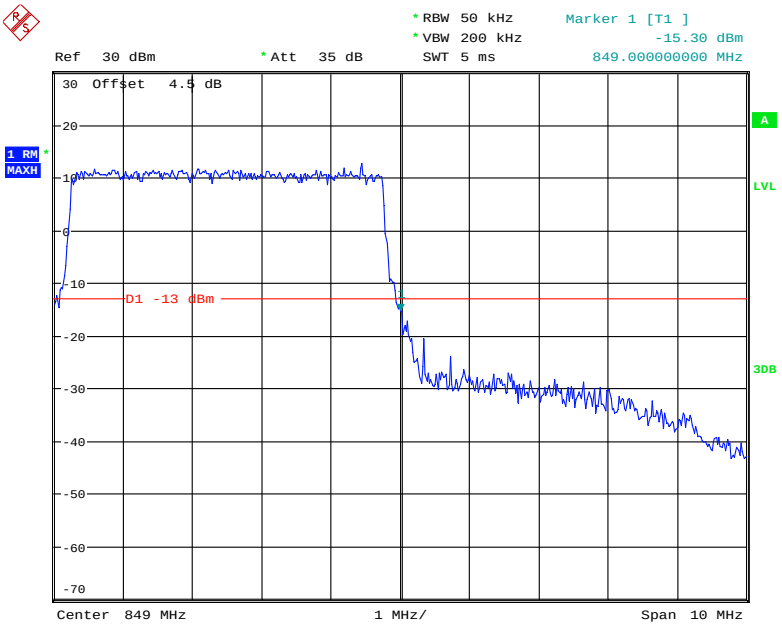
Date: 29.JAN.2019 13:46:05

QPSK_5MHz_ 25 RB_ Left



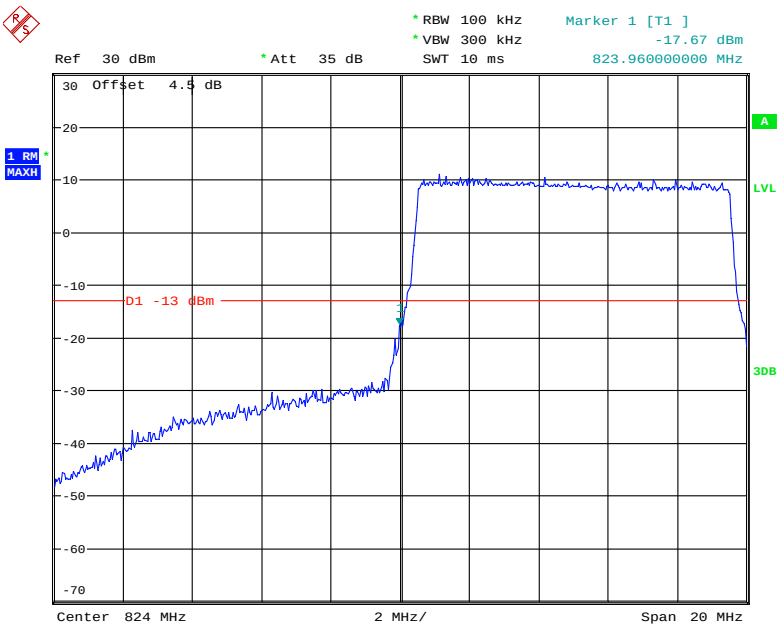
Date: 29.JAN.2019 14:56:22

QPSK_5MHz_ 25 RB_ Right



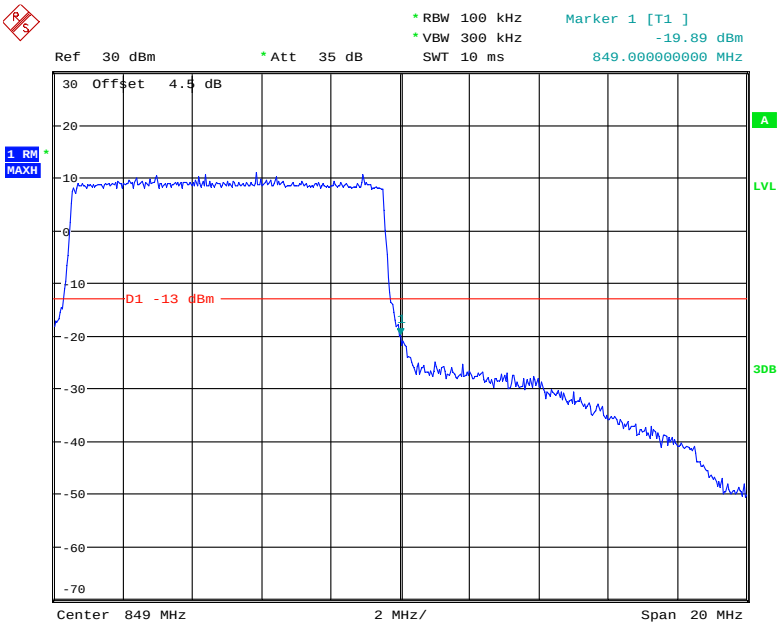
Date: 29.JAN.2019 13:50:41

QPSK_10MHz_ 50 RB_ Left



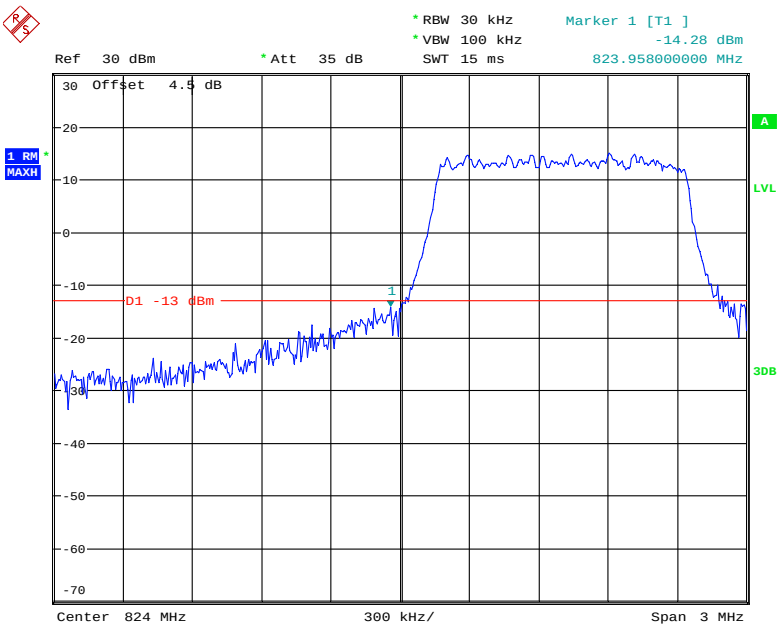
Date: 29.JAN.2019 13:51:56

QPSK_10MHz_ 50 RB_ Right



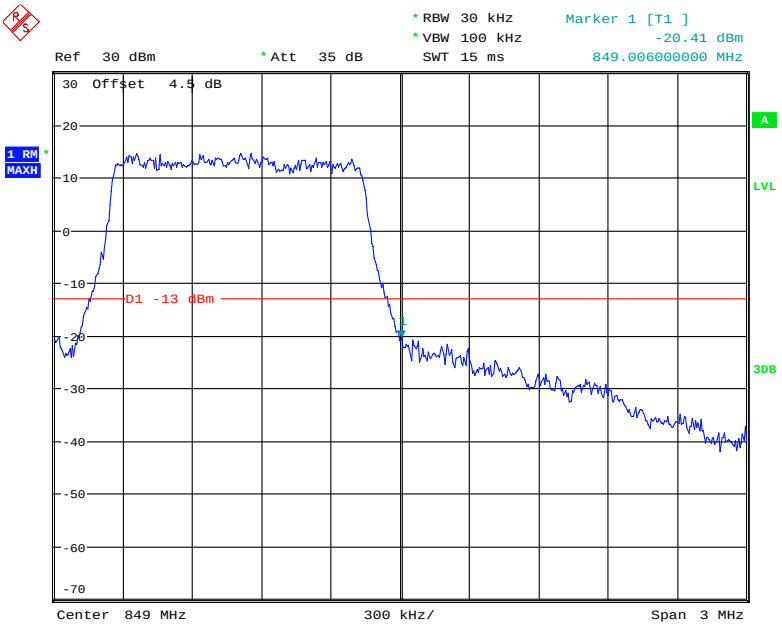
Date: 29.JAN.2019 13:52:57

16QAM_1.4MHz_ 6 RB_ Left



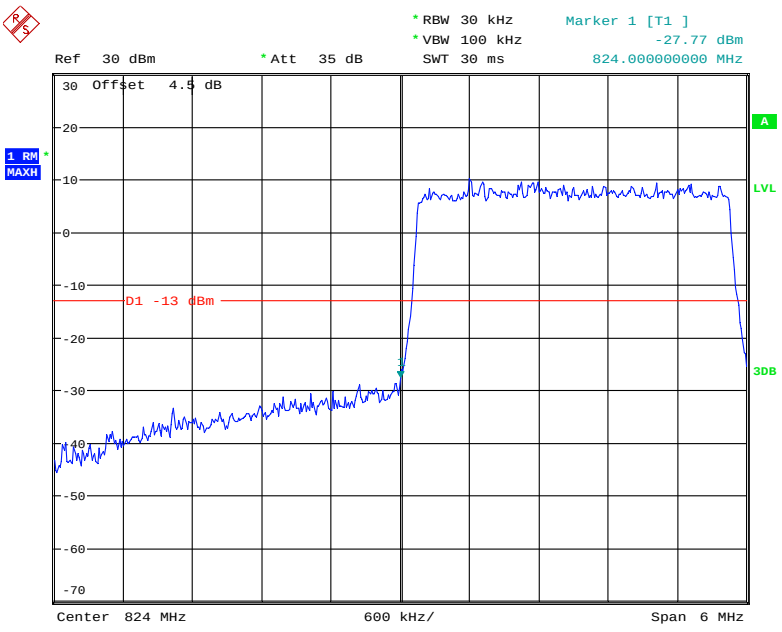
Date: 29.JAN.2019 13:43:15

16QAM_1.4MHz_ 6 RB_ Right



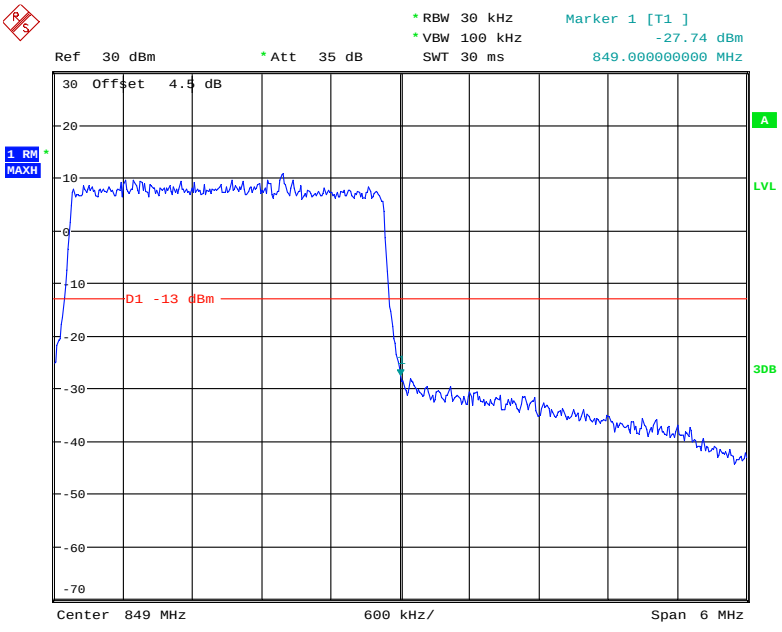
Date: 29.JAN.2019 13:44:19

16QAM_3MHz_ 15 RB_ Left



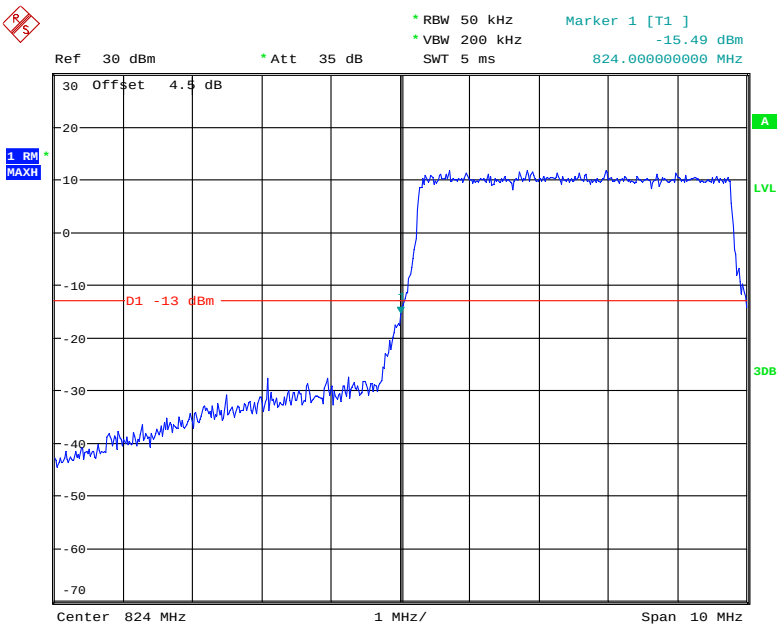
Date: 29.JAN.2019 13:45:31

16QAM_3MHz_ 15 RB_ Right



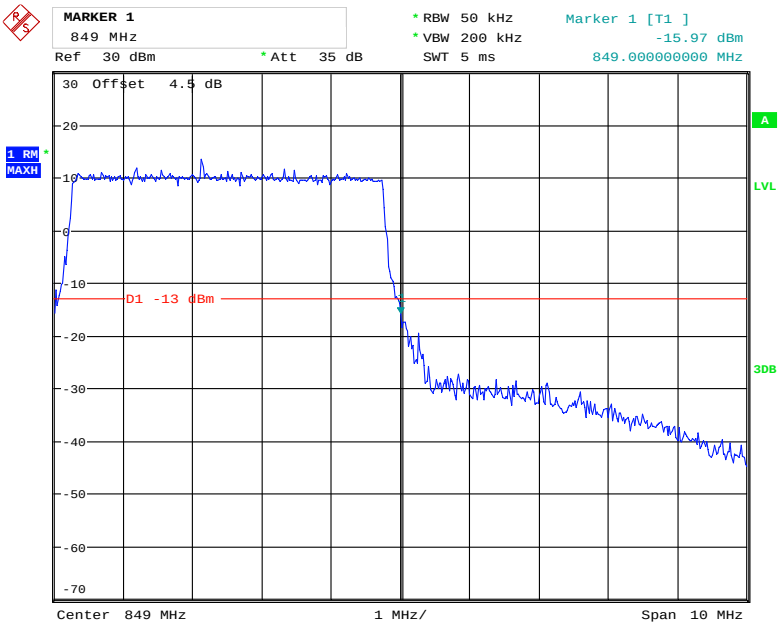
Date: 29.JAN.2019 13:47:32

16QAM_5MHz_ 25 RB_ Left



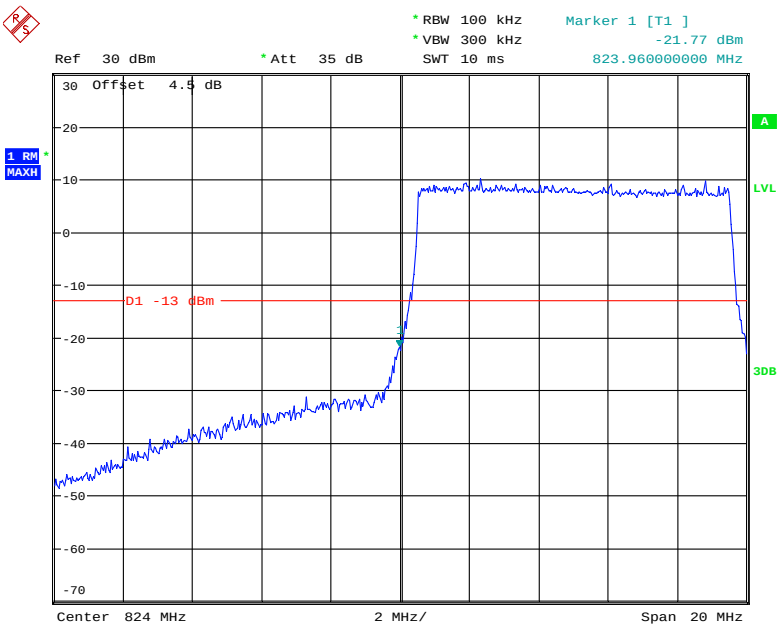
Date: 29.JAN.2019 14:55:37

16QAM_5MHz_ 25 RB_ Right



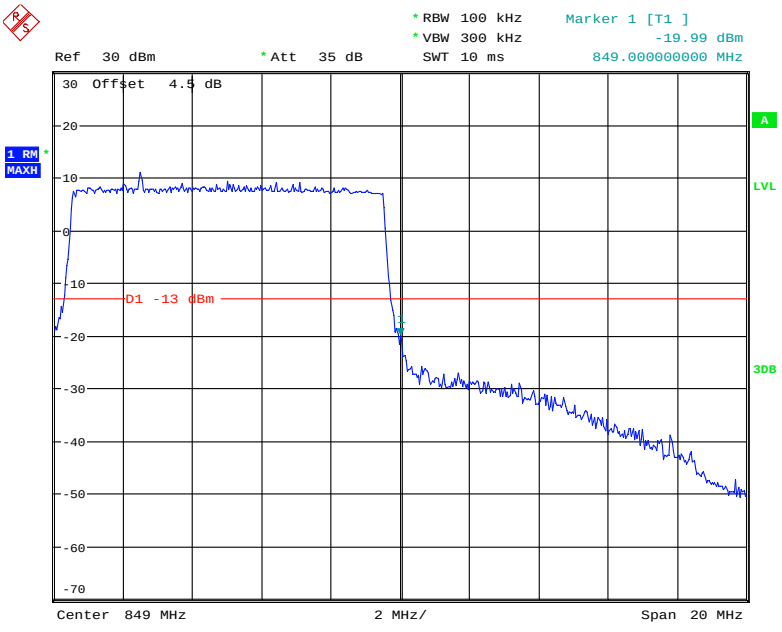
Date: 29.JAN.2019 14:54:55

16QAM_10MHz_ 50 RB_ Left



Date: 29.JAN.2019 13:52:23

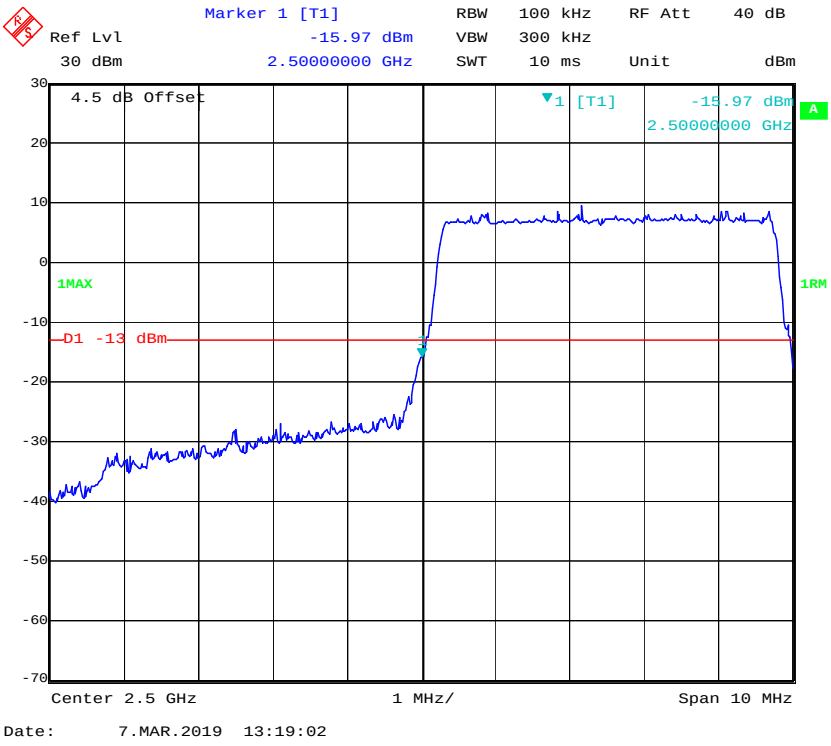
16QAM_10MHz_ 50 RB_ Right



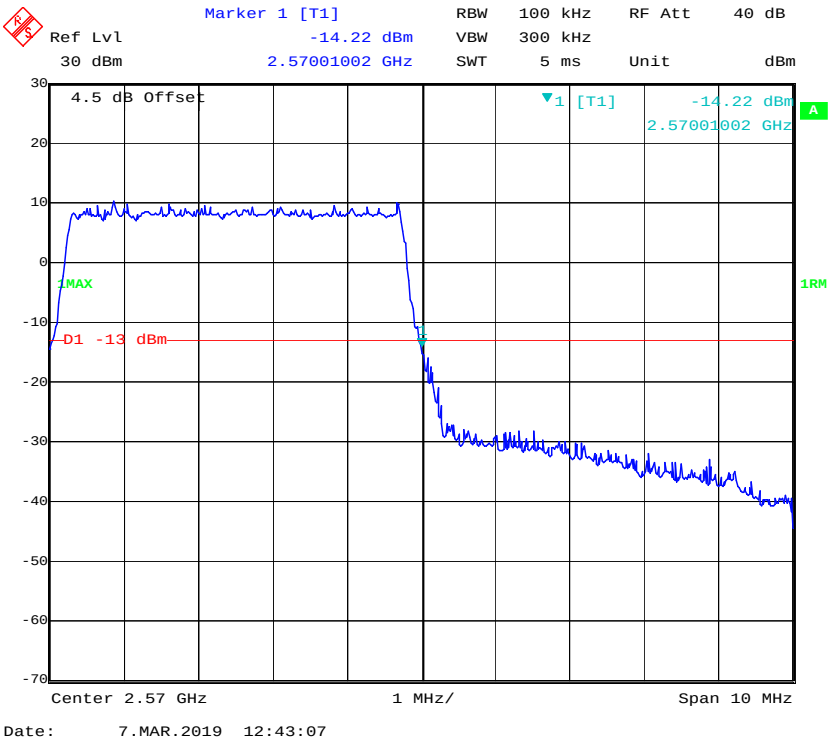
Date: 29.JAN.2019 13:53:39

LTE Band 7

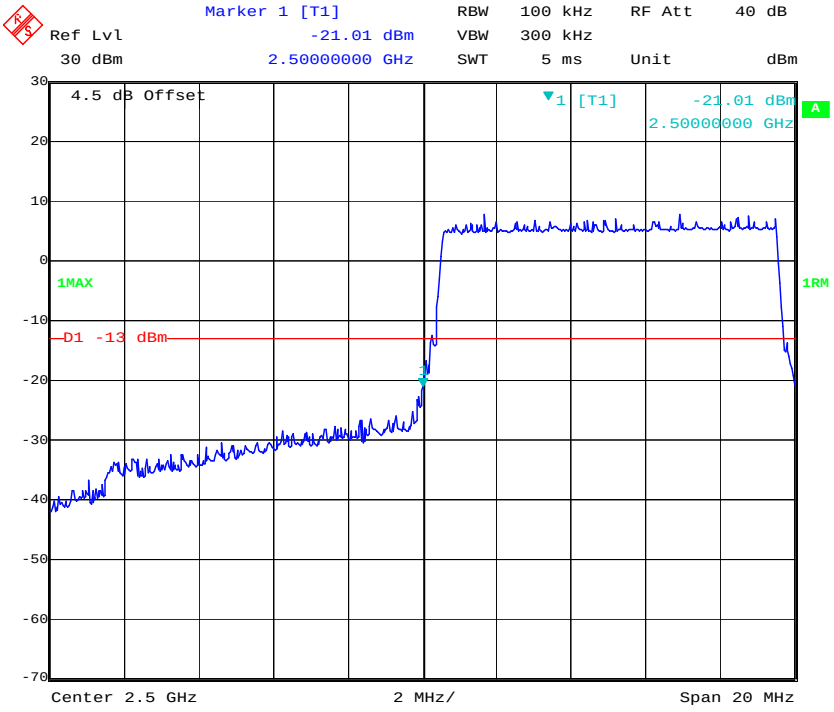
QPSK_5MHz_ 25 RB_ Left



QPSK_5MHz_ 25 RB_ Right

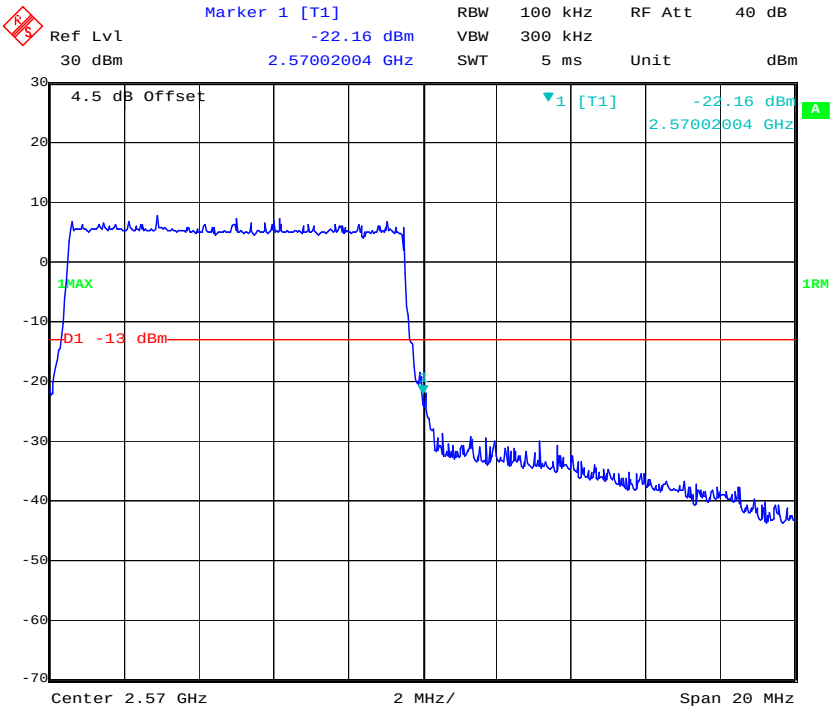


QPSK_10MHz_ 50 RB_ Left



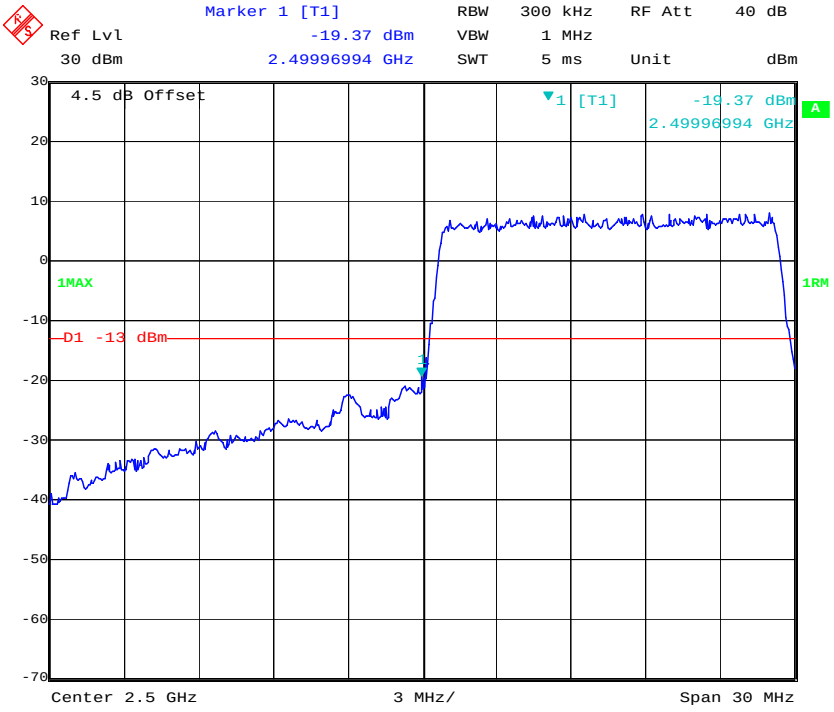
Date: 7.MAR.2019 12:45:27

QPSK_10MHz_ 50 RB_ Right



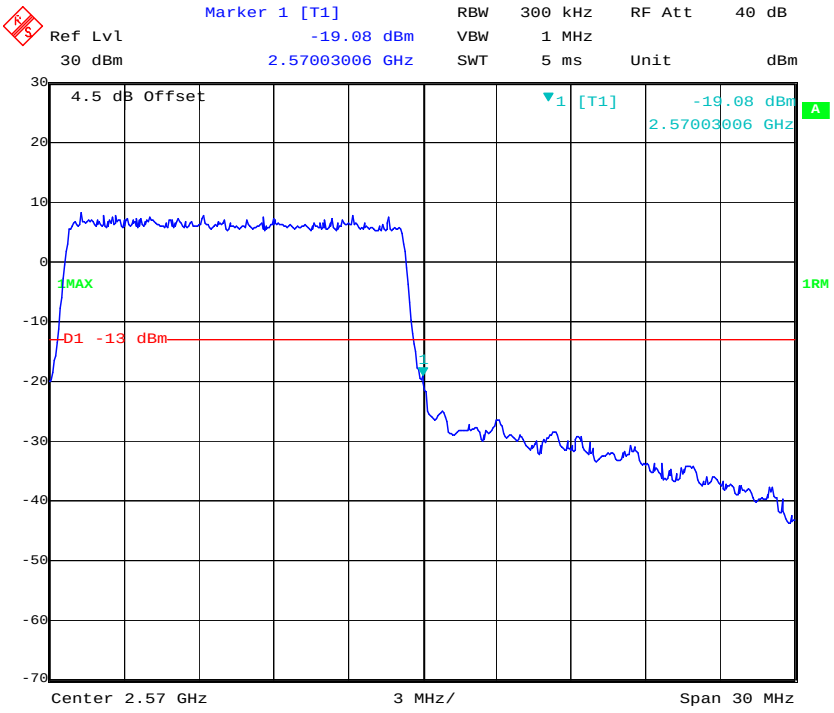
Date: 7.MAR.2019 12:46:35

QPSK_15MHz_ 75 RB_ Left



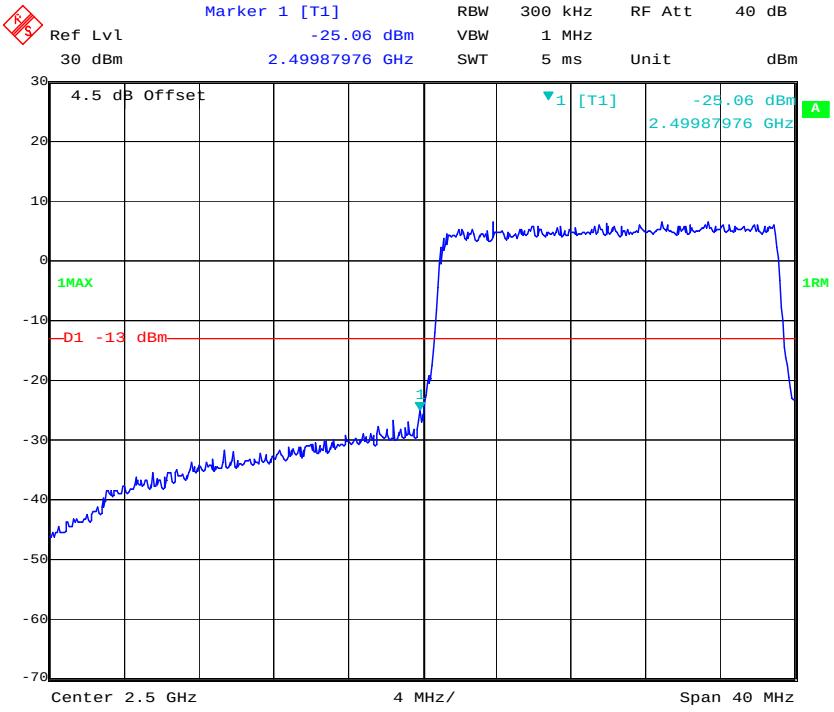
Date: 7.MAR.2019 12:47:49

QPSK_15MHz_ 75 RB_ Right

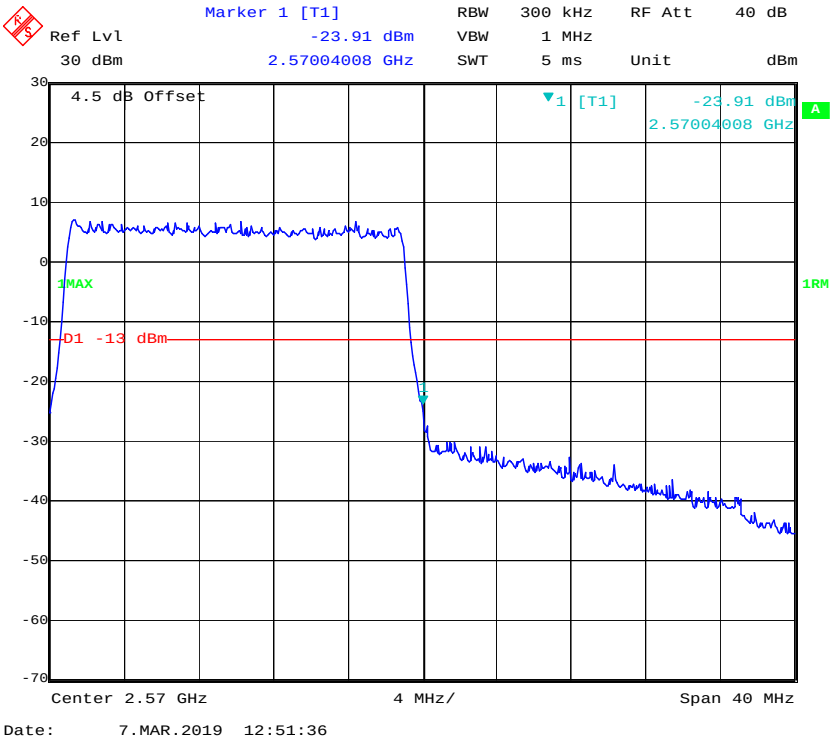


Date: 7.MAR.2019 12:48:56

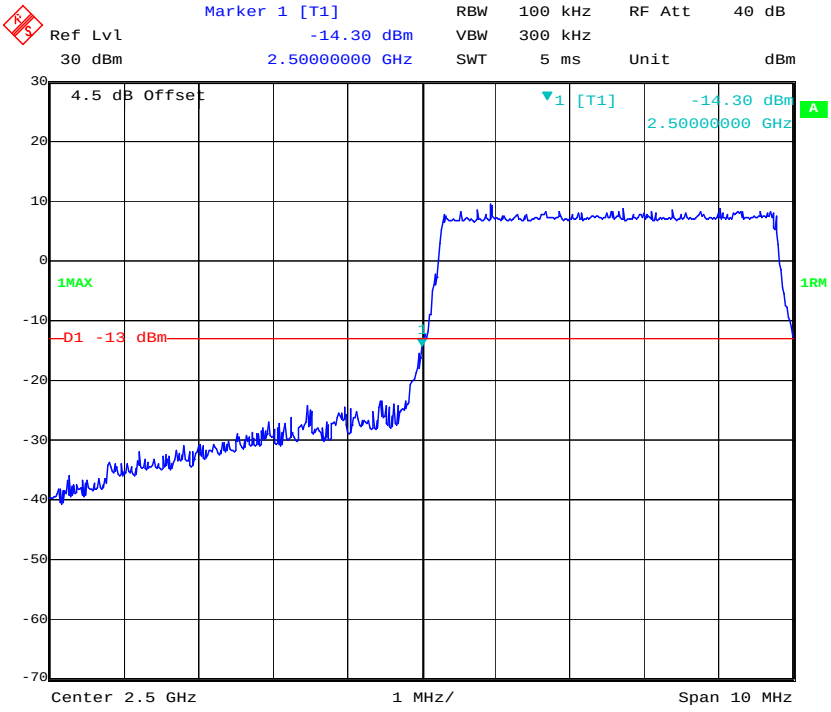
QPSK_20MHz_ FULL RB_ Left



QPSK_20MHz_ FULL RB_ Right

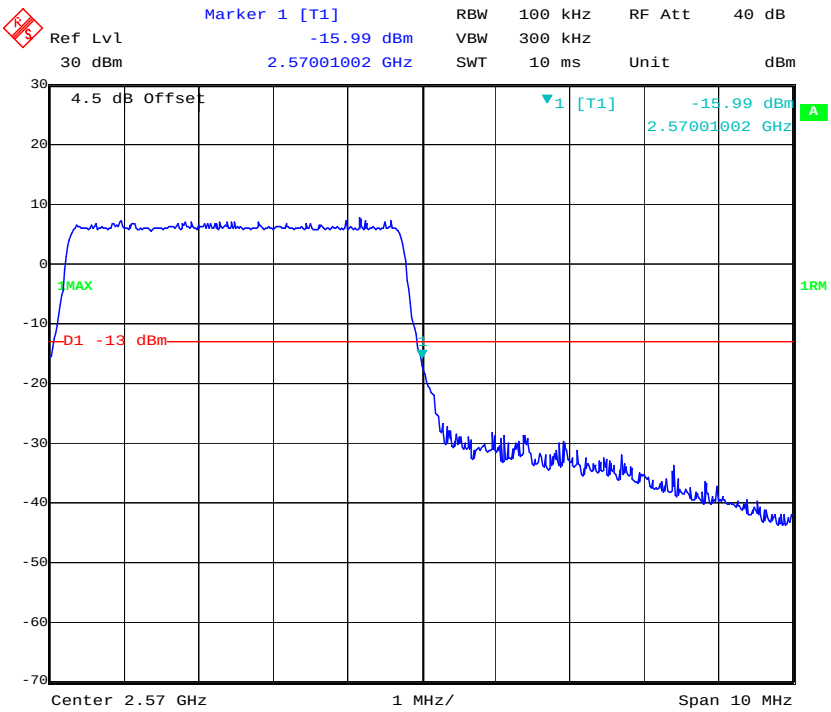


16QAM_5MHz_ 25 RB_ Left



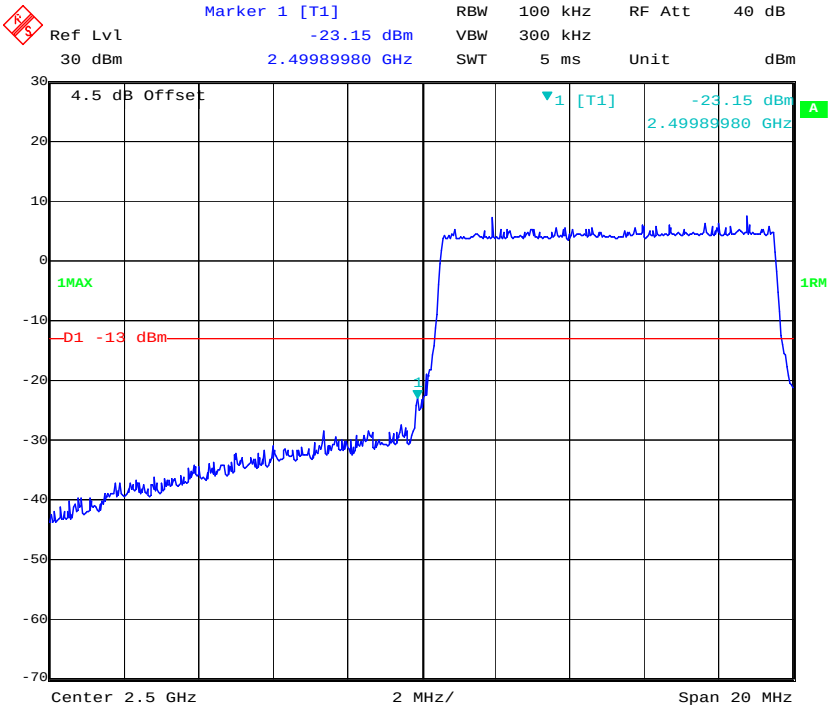
Date: 7.MAR.2019 12:42:40

16QAM_5MHz_ 25 RB_ Right



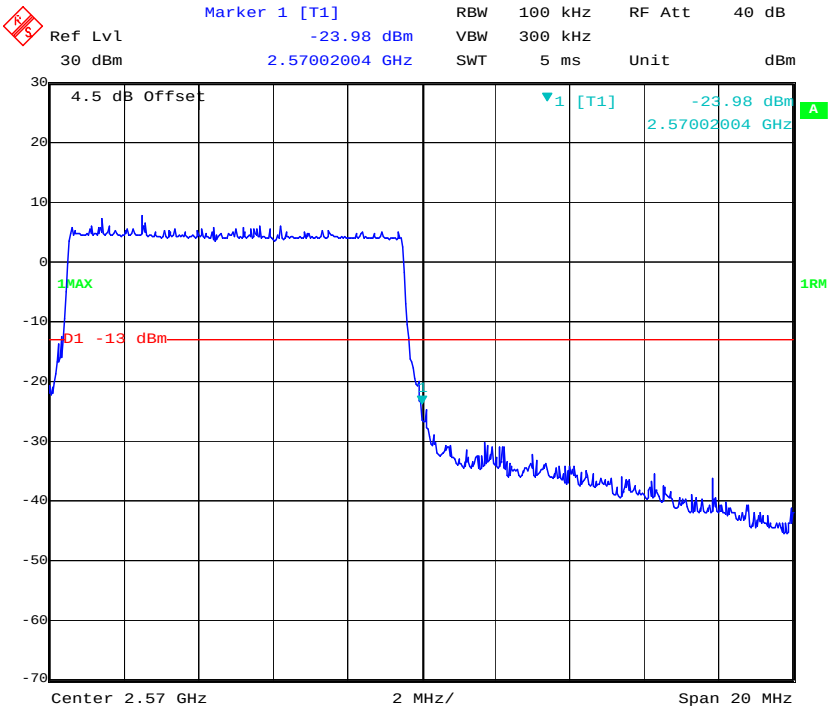
Date: 7.MAR.2019 12:44:40

16QAM_10MHz_ 50 RB_ Left



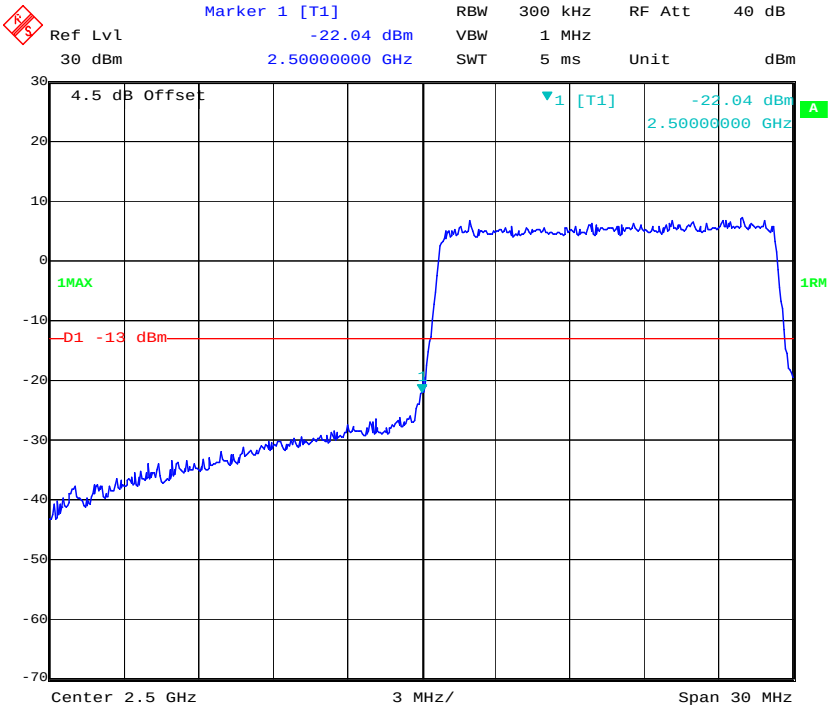
Date: 7.MAR.2019 12:46:03

16QAM_10MHz_ 50 RB_ Right



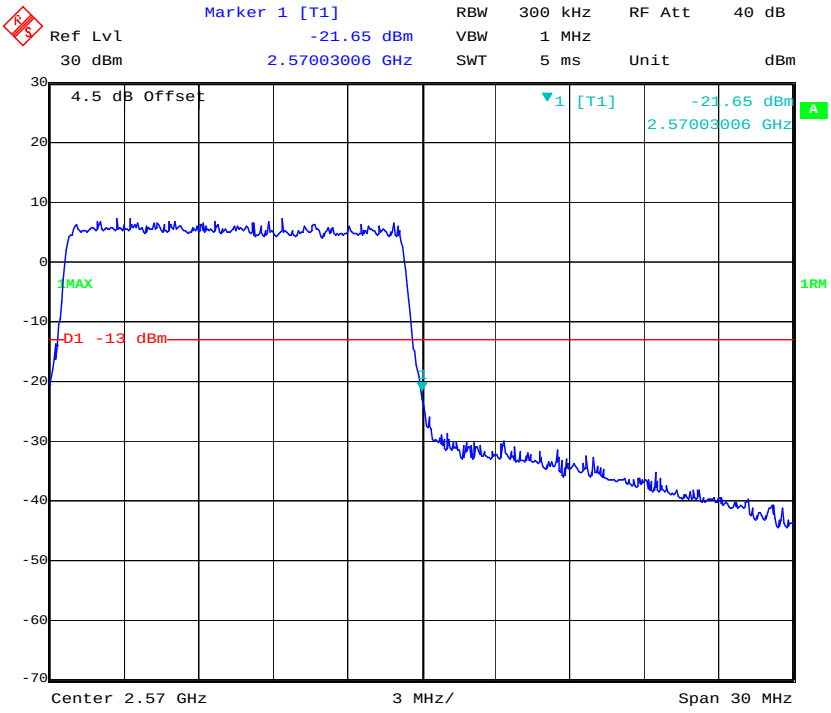
Date: 7.MAR.2019 12:47:09

16QAM_15MHz_ 75 RB_ Left



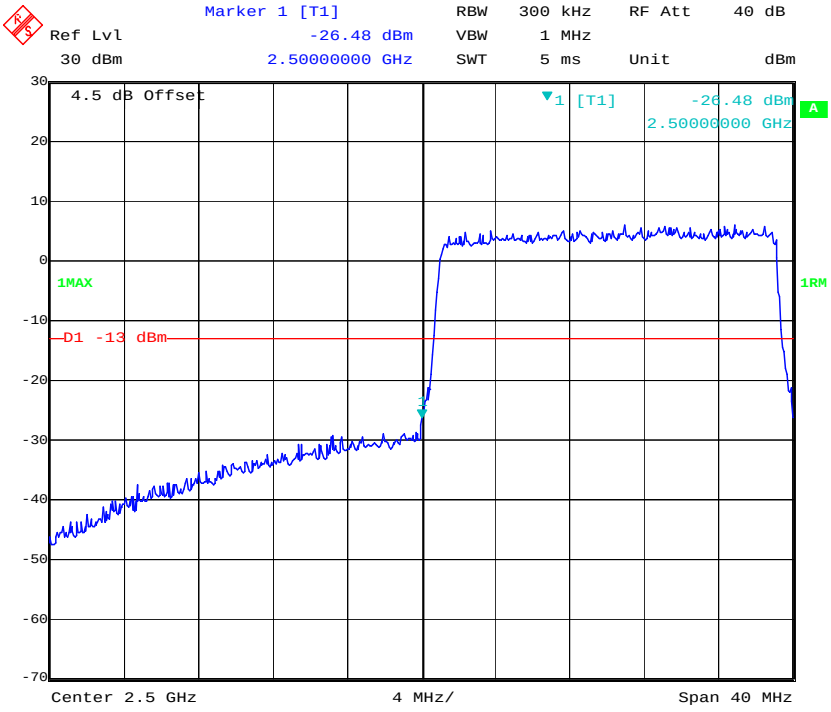
Date: 7.MAR.2019 12:48:25

16QAM_15MHz_ 75 RB_ Right



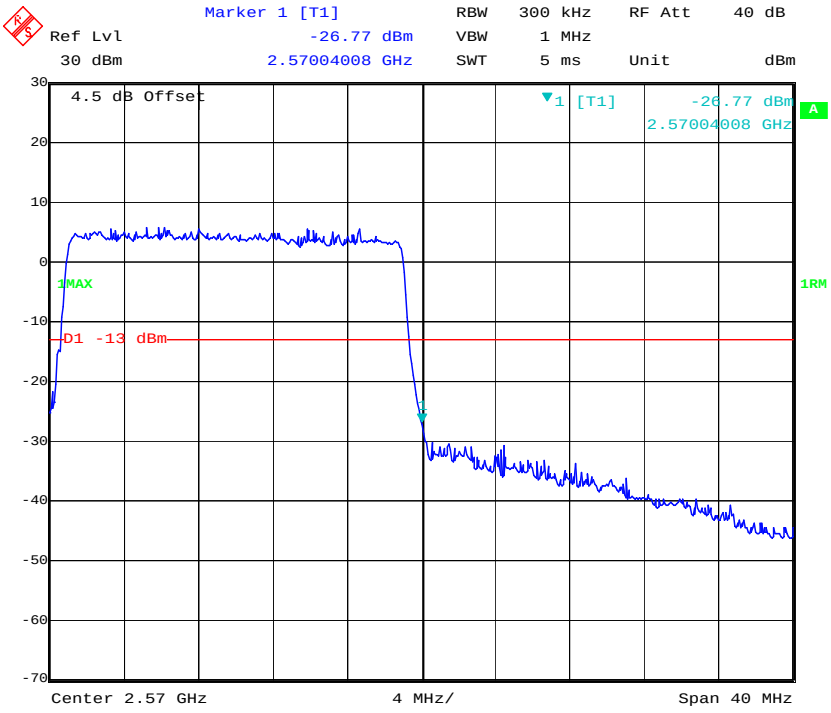
Date: 7.MAR.2019 12:49:32

16QAM_20MHz_ FULL RB_ Left



Date: 7.MAR.2019 12:50:53

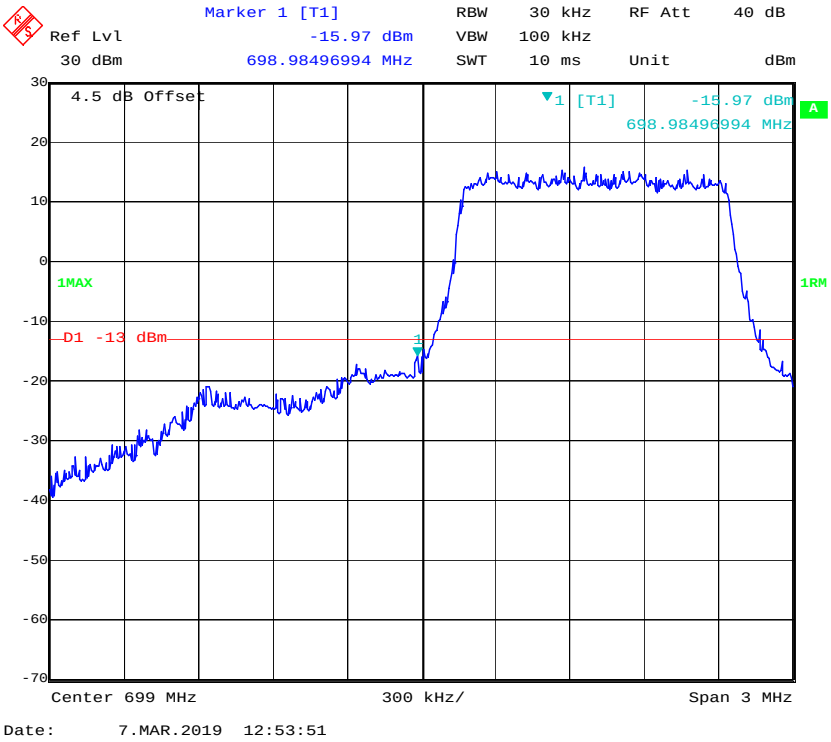
16QAM_20MHz_ FULL RB_ Right



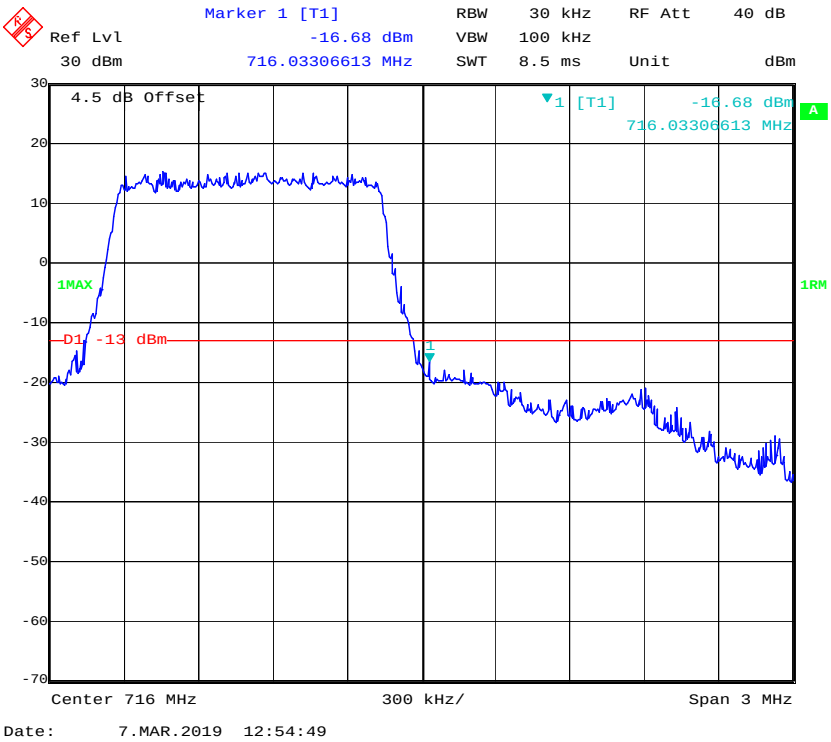
Date: 7.MAR.2019 12:52:12

LTE Band 12

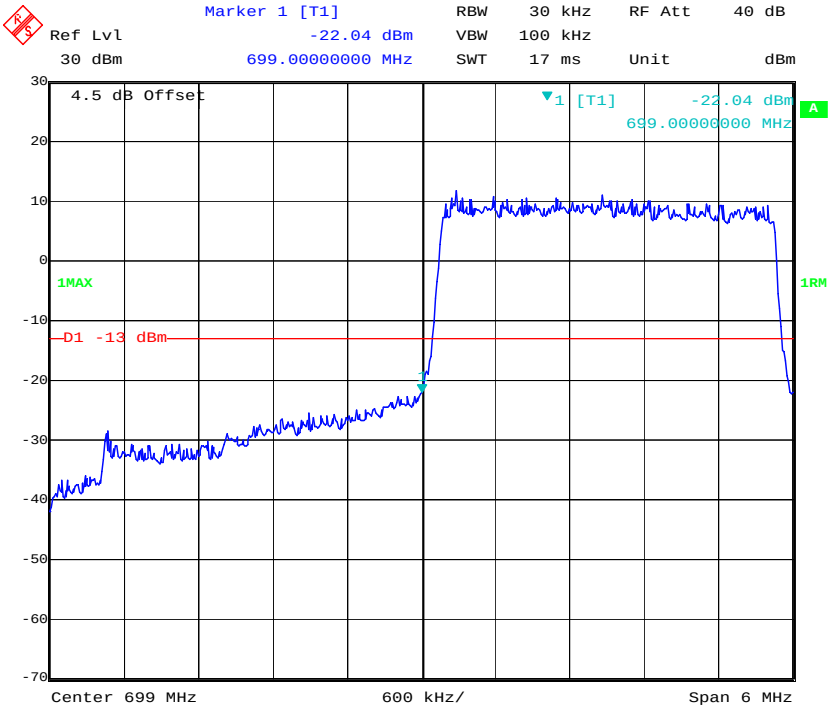
QPSK_1.4MHz_ 6 RB_ Left



QPSK_1.4MHz_ 6 RB_ Right

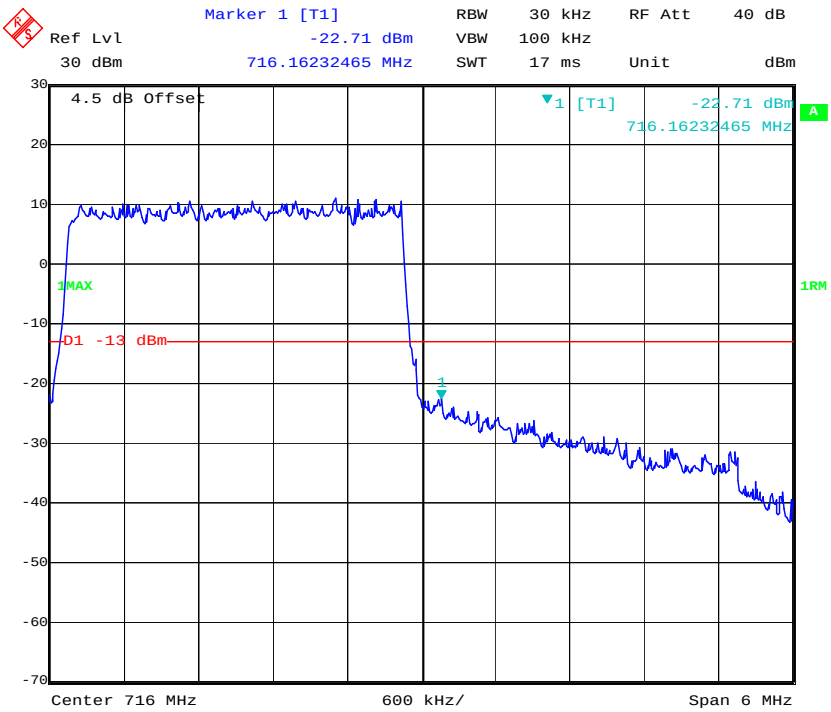


QPSK_3MHz_ 15 RB_ Left



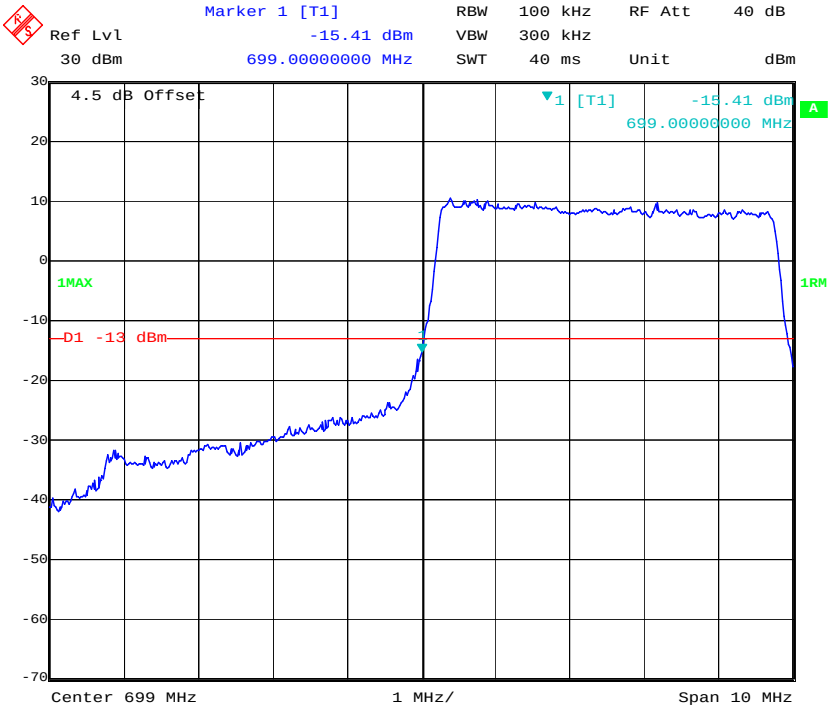
Date: 7.MAR.2019 12:56:07

QPSK_3MHz_ 15 RB_ Right



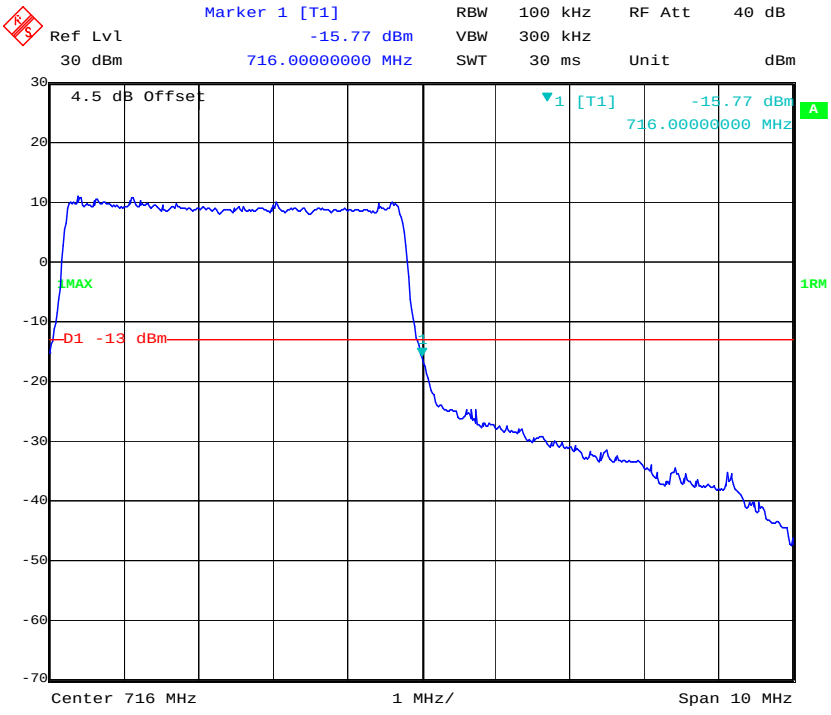
Date: 7.MAR.2019 12:57:32

QPSK_5MHz_ 25 RB_ Left



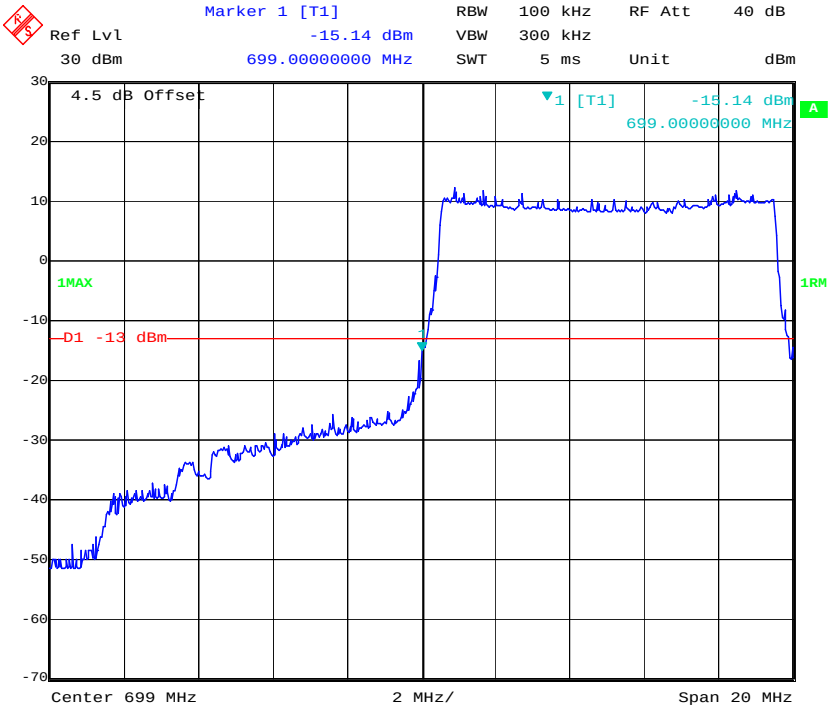
Date: 7.MAR.2019 13:22:41

QPSK_5MHz_ 25 RB_ Right

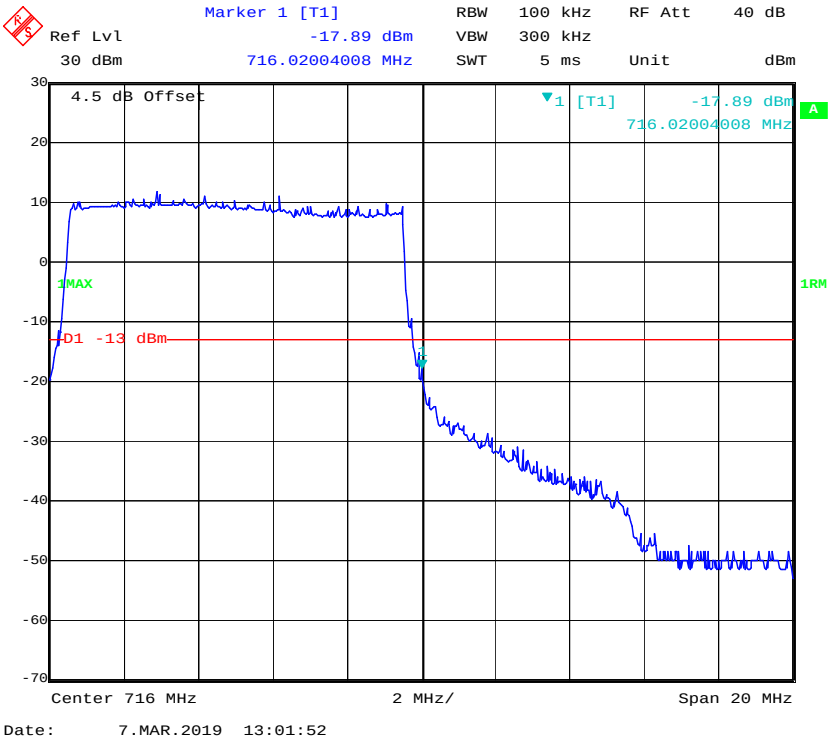


Date: 7.MAR.2019 13:26:13

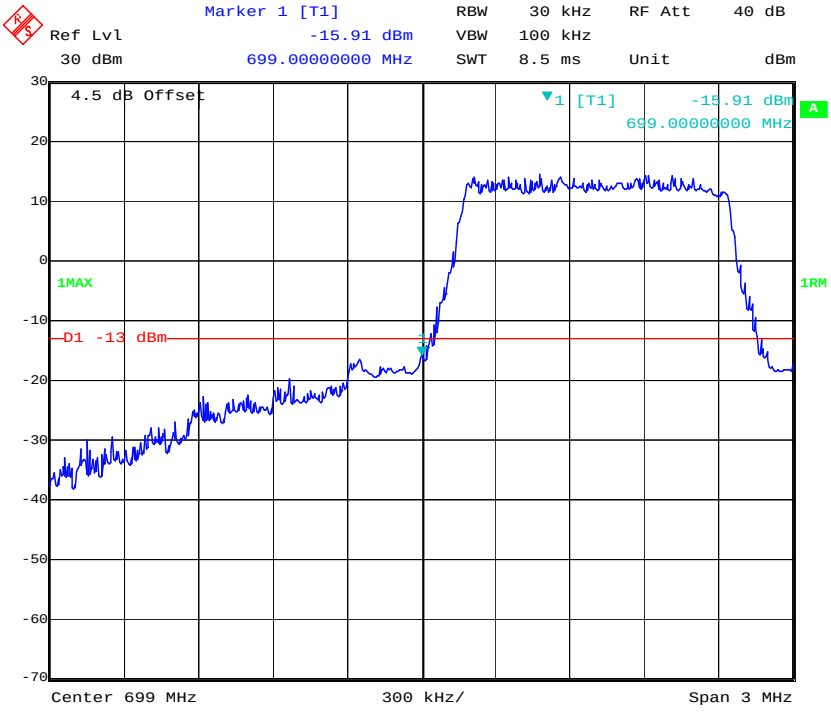
QPSK_10MHz_ 50 RB_ Left



QPSK_10MHz_ 50 RB_ Right

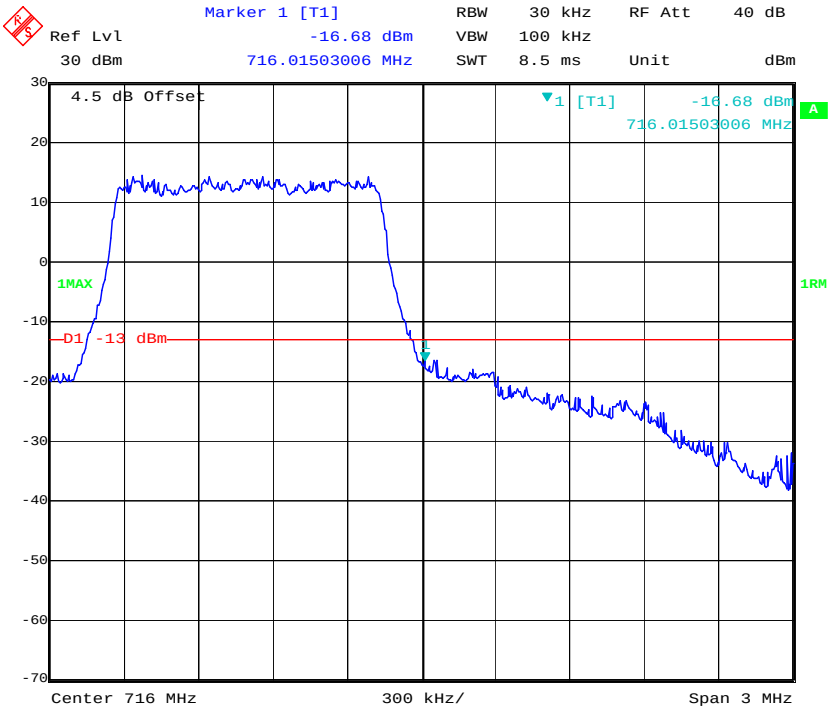


16QAM_1.4MHz_ 6 RB_ Left



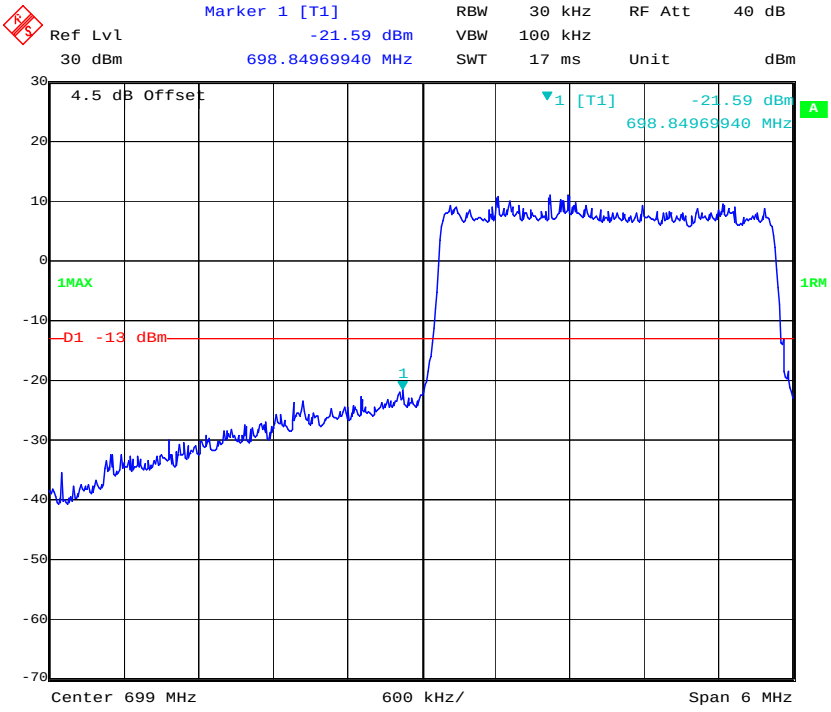
Date: 7.MAR.2019 12:54:18

16QAM_1.4MHz_ 6 RB_ Right



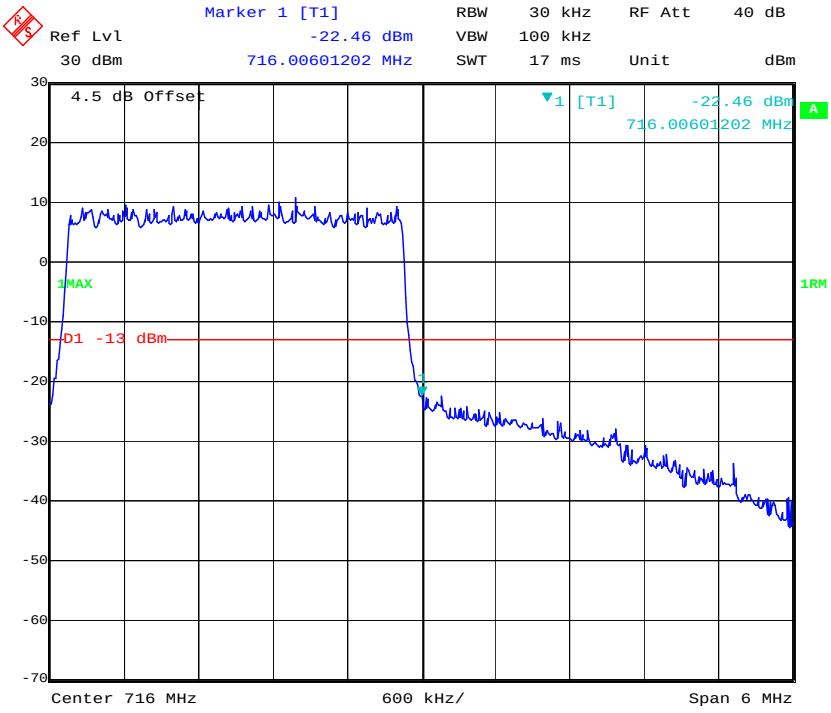
Date: 7.MAR.2019 12:55:33

16QAM_3MHz_ 15 RB_ Left



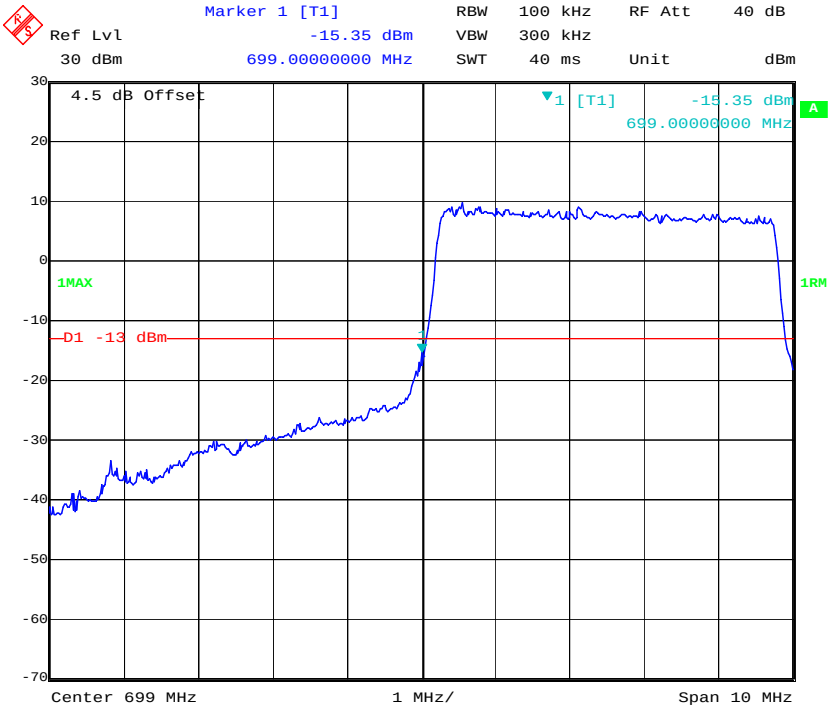
Date: 7.MAR.2019 12:56:52

16QAM_3MHz_ 15 RB_ Right



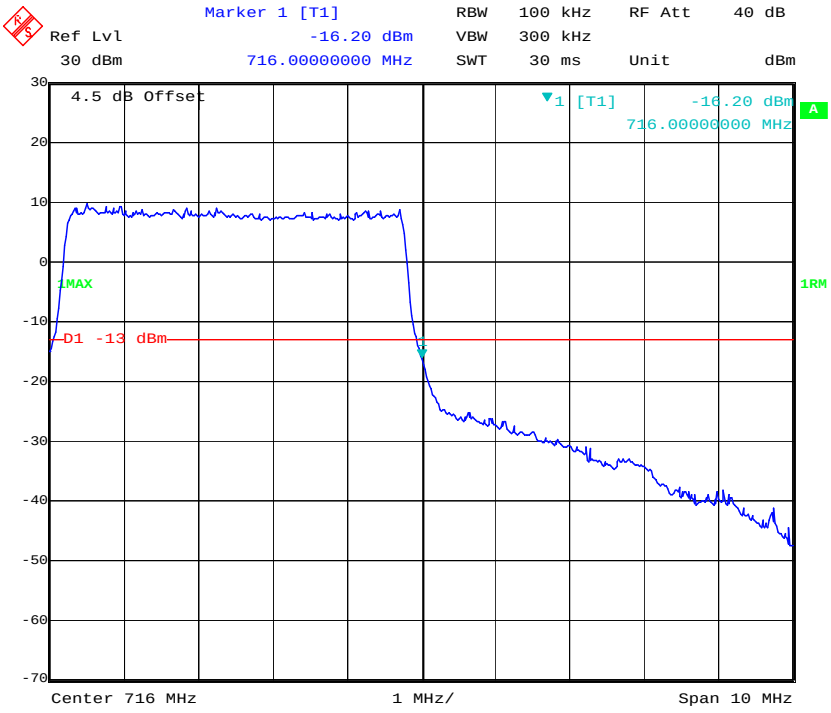
Date: 7.MAR.2019 12:58:05

16QAM_5MHz_ 25 RB_ Left



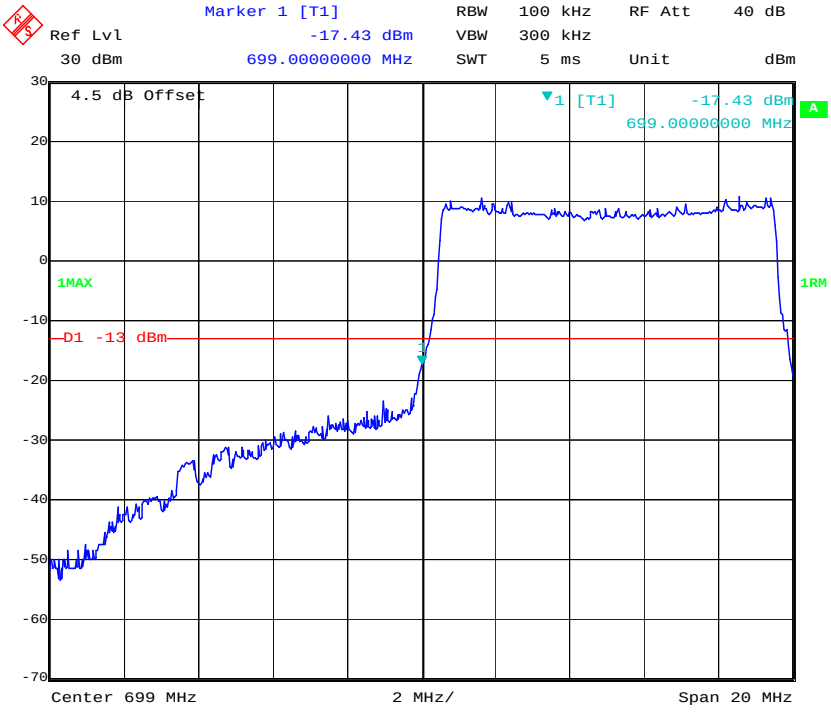
Date: 7.MAR.2019 13:23:44

16QAM_5MHz_ 25 RB_ Right



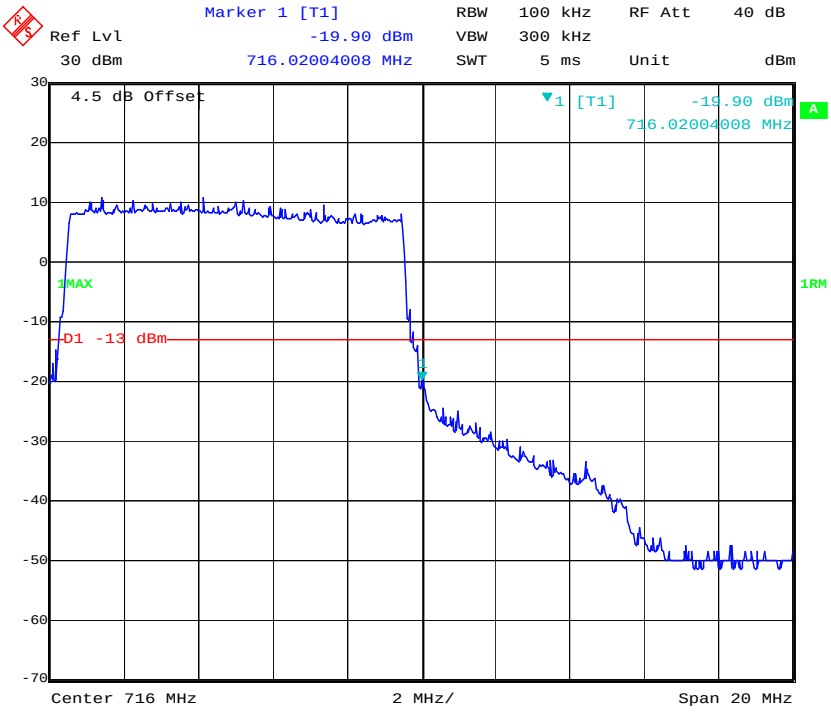
Date: 7.MAR.2019 13:25:08

16QAM_10MHz_ 50 RB_ Left



Date: 7.MAR.2019 13:01:20

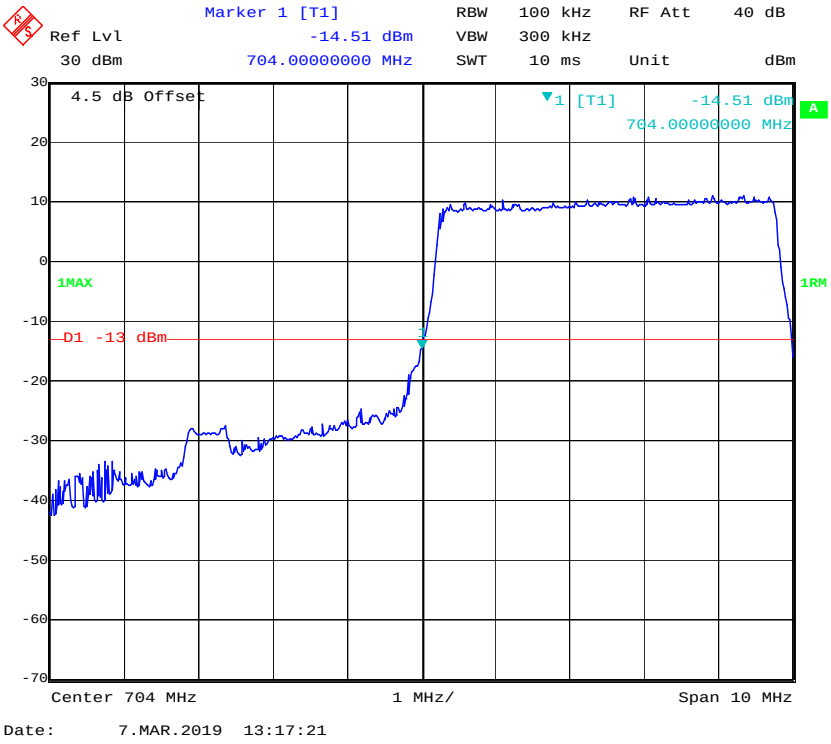
16QAM_10MHz_ 50 RB_ Right



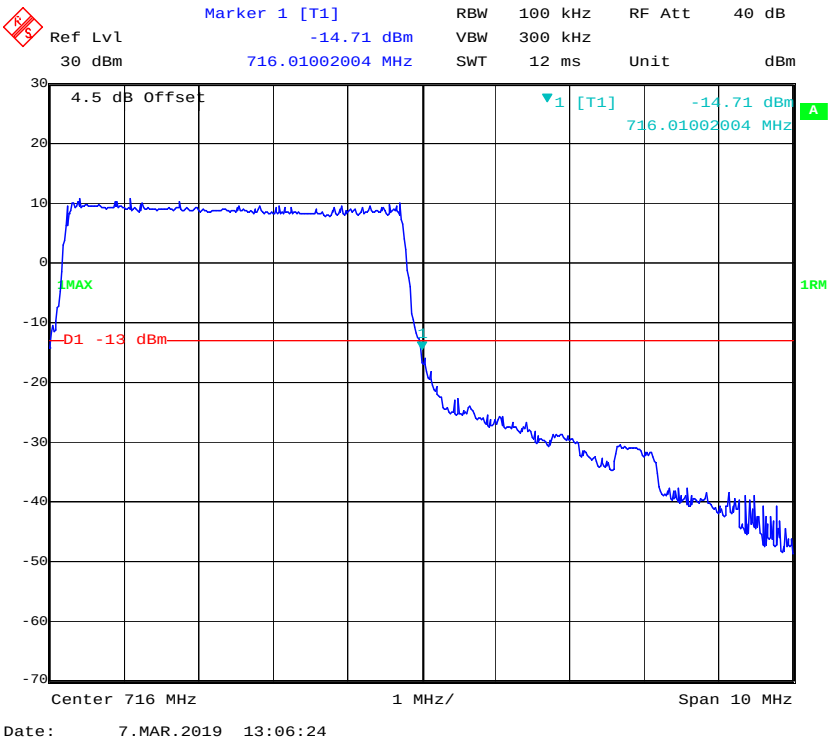
Date: 7.MAR.2019 13:02:32

LTE Band 17

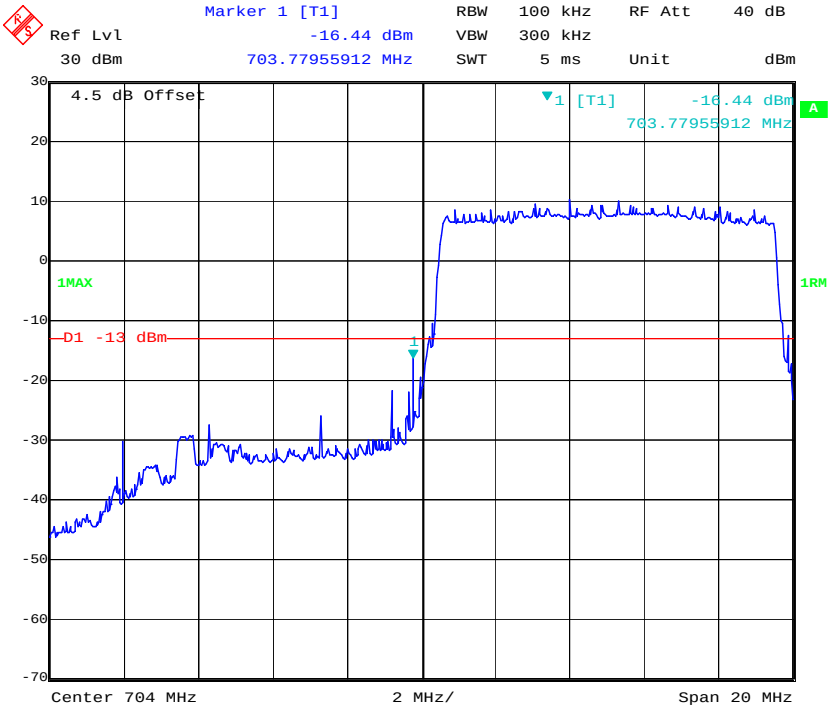
QPSK_5MHz_ 25 RB_ Left



QPSK_5MHz_ 25 RB_ Right

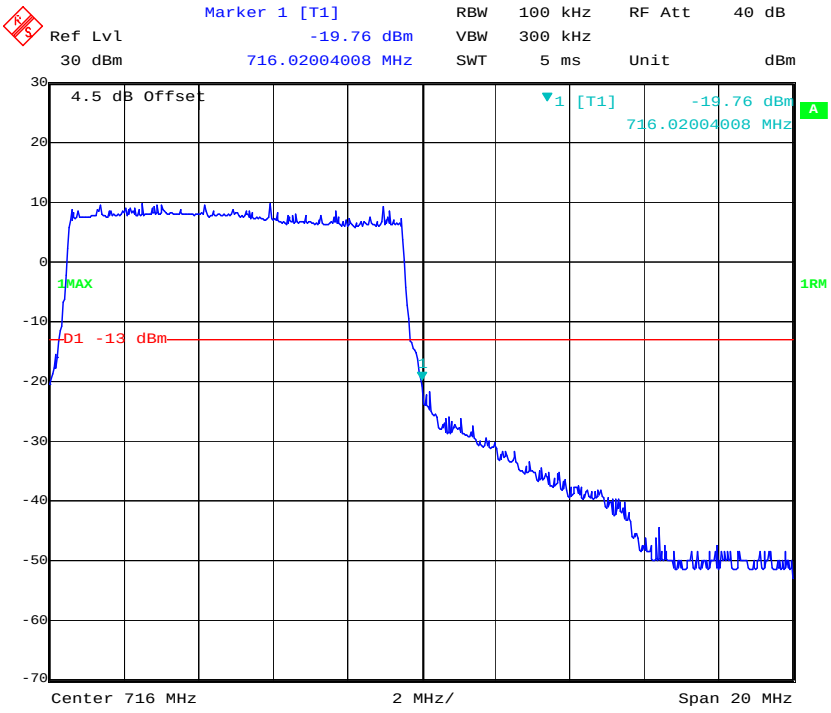


QPSK_10MHz_ 50 RB_ Left



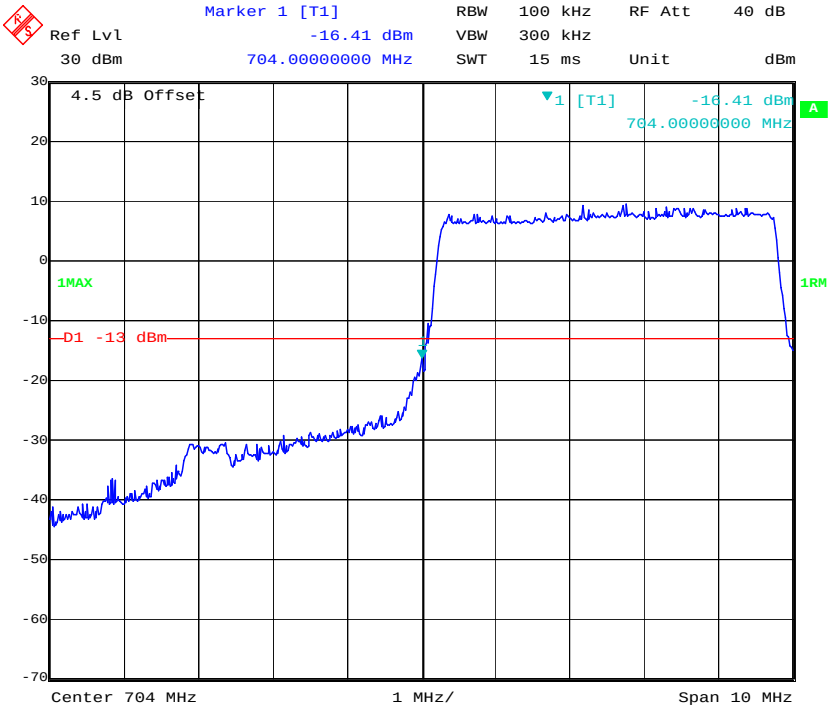
Date: 7.MAR.2019 13:08:19

QPSK_10MHz_ 50 RB_ Right



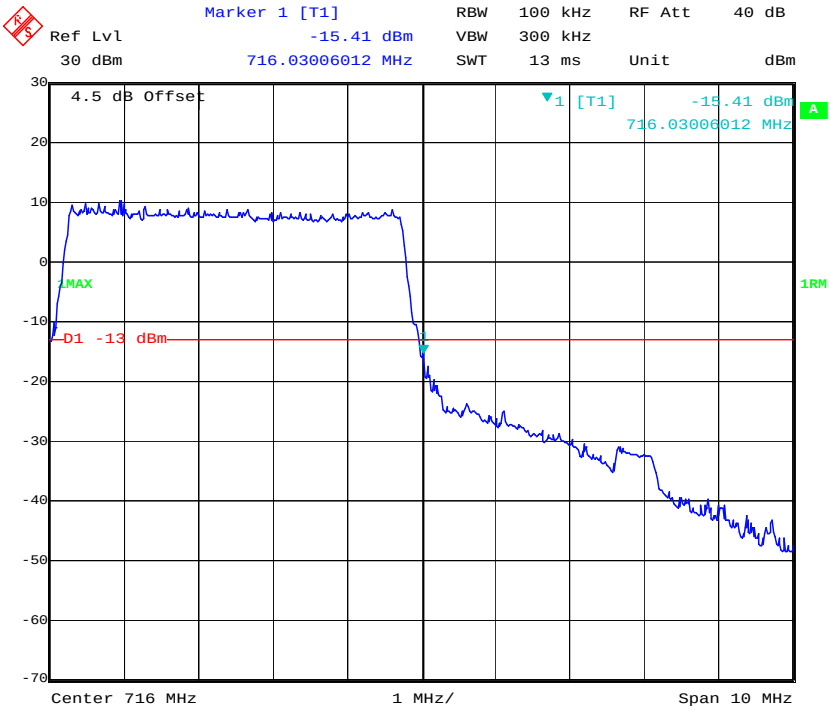
Date: 7.MAR.2019 13:09:25

16QAM_5MHz_ 25 RB_ Left



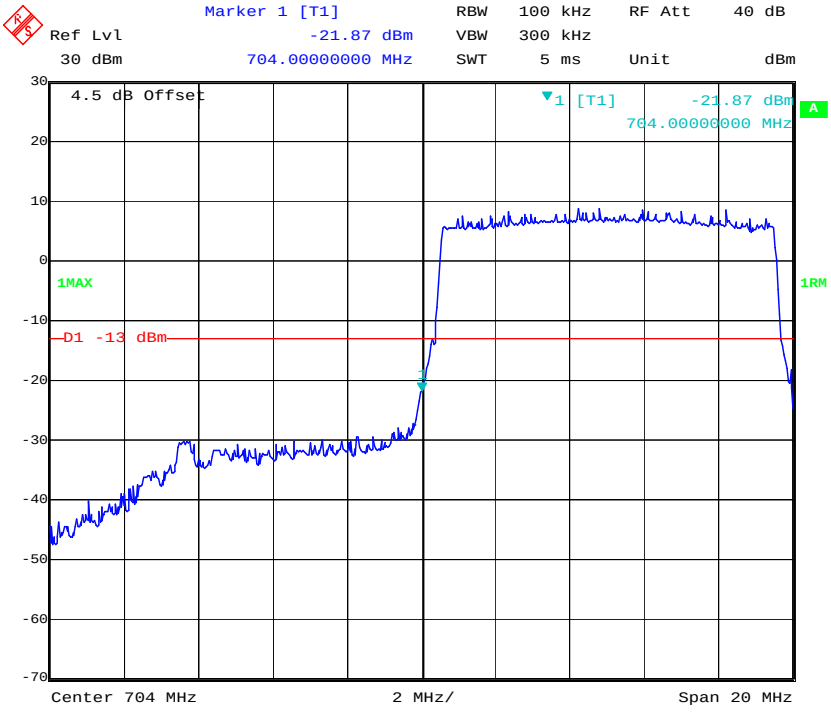
Date: 7.MAR.2019 13:05:00

16QAM_5MHz_ 25 RB_ Right



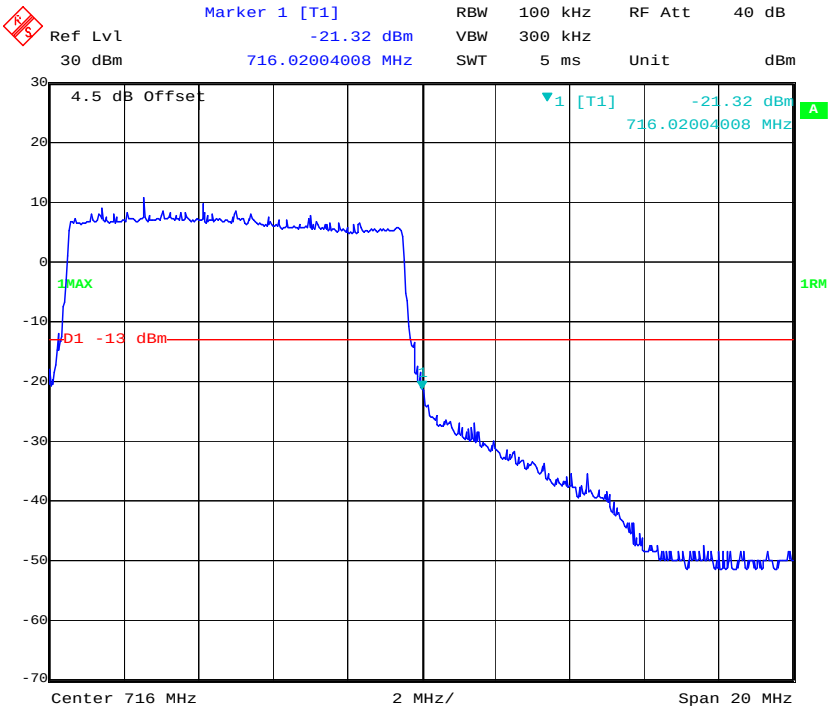
Date: 7.MAR.2019 13:07:41

16QAM_10MHz_ 50 RB_ Left



Date: 7.MAR.2019 13:08:54

16QAM_10MHz_ 50 RB_ Right



Date: 7.MAR.2019 13:09:57

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

Applicable Standard

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

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

Frequency Tolerance for Transmitters in the Public Mobile Services

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

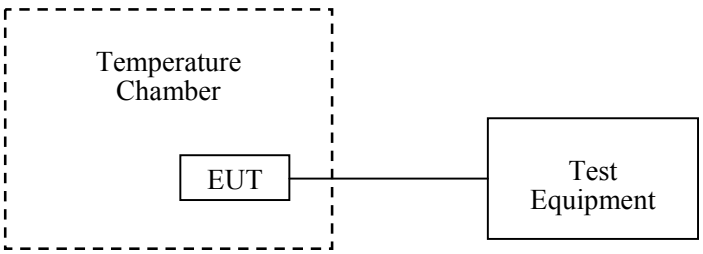
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

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

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

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



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
R&S	Universal Radio Communication Tester	CMU200	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	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
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:	25.4~25.9 °C
Relative Humidity:	40~64 %
ATM Pressure:	100.5~100.6 kPa

The testing was performed by Elena Lei & Blake Yang on 2019-01-29 and 2019-03-06.

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	3.8	17	0.02032	2.5
-20		16	0.01913	
-10		12	0.01434	
0		18	0.02152	
10		16	0.01913	
20		19	0.02271	
30		21	0.02510	
40		18	0.02152	
50		15	0.01793	
20	3.6	14	0.01673	
20	4.3	13	0.01554	

8PSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.8	31	0.03705	2.5
-20		30	0.03586	
-10		29	0.03466	
0		28	0.03347	
10		34	0.04064	
20		36	0.04303	
30		31	0.03705	
40		35	0.04184	
50		31	0.03705	
20	3.6	28	0.03347	
20	4.3	29	0.03466	

PCS Band (Part 24E)

GMSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	19	0.01011	Pass
-20		21	0.01117	
-10		18	0.00957	
0		17	0.00904	
10		15	0.00798	
20		21	0.01117	
30		16	0.00851	
40		17	0.00904	
50		18	0.00957	
20	3.6	20	0.01064	
20	4.3	16	0.00851	

8PSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	52	0.02766	Pass
-20		53	0.02819	
-10		56	0.02979	
0		51	0.02713	
10		52	0.02766	
20		57	0.03032	
30		53	0.02819	
40		54	0.02872	
50		55	0.02926	
20	3.6	56	0.02979	
20	4.3	51	0.02713	

WCDMA Band II: R99

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	24	0.01277	Pass
-20		22	0.01170	
-10		21	0.01117	
0		27	0.01436	
10		24	0.01277	
20		29	0.01543	
30		23	0.01223	
40		25	0.01330	
50		21	0.01117	
20	3.6	24	0.01277	
20	4.3	26	0.01383	

WCDMA Band Ⅴ: R99

Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.8	31	0.03705	2.5
-20		35	0.04184	
-10		32	0.03825	
0		34	0.04064	
10		33	0.03945	
20		36	0.04303	
30		28	0.03347	
40		29	0.03466	
50		32	0.03825	
20	3.6	34	0.04064	
20	4.3	31	0.03705	

WCDMA Band Ⅳ: R99

Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	1710.502	1754.480	1710	1755
-20		1710.581	1754.547	1710	1755
-10		1710.572	1754.482	1710	1755
0		1710.512	1754.471	1710	1755
10		1710.524	1754.543	1710	1755
20		1710.585	1754.699	1710	1755
30		1710.536	1754.568	1710	1755
40		1710.541	1754.469	1710	1755
50		1710.600	1754.444	1710	1755
20	3.6	1710.593	1754.472	1710	1755
20	4.3	1710.520	1754.473	1710	1755

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30	3.8	-4.76	-0.0025	Pass
-20		-4.92	-0.0026	
-10		-5.08	-0.0027	
0		-4.76	-0.0025	
10		-4.84	-0.0026	
20		-4.75	-0.0025	
30		-4.92	-0.0026	
40		-4.96	-0.0026	
50		-5.00	-0.0027	
20	3.6	-4.64	-0.0025	
20	4.3	-4.76	-0.0025	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	-5.79	-0.0031	Pass
-20		-5.47	-0.0029	
-10		-5.47	-0.0029	
0		-5.83	-0.0031	
10		-5.67	-0.003	
20		-5.64	-0.003	
30		-5.43	-0.0029	
40		-5.79	-0.0031	
50		-5.59	-0.003	
20	3.6	-5.91	-0.0031	
20	4.3	-5.83	-0.0031	

LTE Band 4:

QPSK, Channel Bandwidth:10MHz					
Temperature	**Voltage**	**Test Result (MHz)**		**Limit (MHz)**	
℃	**V_{DC}**	**F_L**	**F_H**	**F_L**	**F_H**
-30	3.8	1710.52	1754.48	1710	1755
-20		1710.48	1754.68	1710	1755
-10		1710.51	1754.52	1710	1755
0		1710.52	1754.68	1710	1755
10		1710.58	1754.30	1710	1755
20		1710.52	1754.48	1710	1755
30		1710.72	1754.56	1710	1755
40		1710.48	1754.56	1710	1755
50		1710.56	1754.51	1710	1755
20	3.6	1710.42	1754.53	1710	1755
20	4.3	1710.58	1754.60	1710	1755

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	1710.52	1754.64	1710	1755
-20		1710.48	1754.40	1710	1755
-10		1710.55	1754.52	1710	1755
0		1710.57	1754.43	1710	1755
10		1710.64	1754.54	1710	1755
20		1710.52	1754.48	1710	1755
30		1710.64	1754.56	1710	1755
40		1710.68	1754.44	1710	1755
50		1710.53	1754.50	1710	1755
20	3.6	1710.37	1754.58	1710	1755
20	4.3	1710.58	1754.60	1710	1755

LTE Band 5:

Middle Channel, f_c = 836.5 MHz, QPSK Channel Bandwidth:10MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30	3.8	-6.48	-0.0077	2.5
-20		-6.68	-0.008	
-10		-6.40	-0.0077	
0		-6.64	-0.0079	
10		-6.48	-0.0077	
20		-6.17	-0.0074	
30		-6.68	-0.008	
40		-6.40	-0.0077	
50		-6.52	-0.0078	
20	3.6	-6.80	-0.0081	
20	4.3	-6.88	-0.0082	

Middle Channel, f_c = 836.5 MHz, 16QAM, Channel Bandwidth:10MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.8	-4.38	-0.0052	2.5
-20		-4.18	-0.005	
-10		-4.22	-0.005	
0		-4.34	-0.0052	
10		-4.30	-0.0051	
20		-4.26	-0.0051	
30		-4.22	-0.005	
40		-4.46	-0.0053	
50		-4.54	-0.0054	
20	3.6	-4.10	-0.0049	
20	4.3	-4.14	-0.0049	

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	3.8	2500.54078	2569.51010	2500	2570
-20		2500.49591	2569.42933	2500	2570
-10		2500.52460	2569.44031	2500	2570
0		2500.53658	2569.51621	2500	2570
10		2500.57760	2569.42096	2500	2570
20		2500.53106	2569.46894	2500	2570
30		2500.55521	2569.48387	2500	2570
40		2500.52636	2569.47910	2500	2570
50		2500.49191	2569.46723	2500	2570
20	3.6	2500.56730	2569.49229	2500	2570
20	4.3	2500.51804	2569.44133	2500	2570

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	2500.52731	2569.45957	2500	2570
-20		2500.56626	2569.55510	2500	2570
-10		2500.51157	2569.50943	2500	2570
0		2500.54102	2569.54794	2500	2570
10		2500.48334	2569.54752	2500	2570
20		2500.53106	2569.50902	2500	2570
30		2500.57453	2569.49401	2500	2570
40		2500.52342	2569.54861	2500	2570
50		2500.53948	2569.52906	2500	2570
20	3.6	2500.54100	2569.46385	2500	2570
20	4.3	2500.56439	2569.47748	2500	2570

LTE Band 12:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	699.52206	715.47109	699	716
-20		699.51939	715.54147	699	716
-10		699.44942	715.49242	699	716
0		699.50868	715.48920	699	716
10		699.47612	715.47623	699	716
20		699.49098	715.50902	699	716
30		699.44797	715.46375	699	716
40		699.48766	715.53400	699	716
50		699.50774	715.50648	699	716
20	3.6	699.50426	715.54822	699	716
20	4.3	699.46310	715.48086	699	716

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	699.47147	715.44765	699	716
-20		699.46034	715.51004	699	716
-10		699.49511	715.44135	699	716
0		699.49275	715.43570	699	716
10		699.51592	715.47312	699	716
20		699.49098	715.46894	699	716
30		699.46993	715.48932	699	716
40		699.50471	715.51412	699	716
50		699.46924	715.46067	699	716
20	3.6	699.50672	715.48449	699	716
20	4.3	699.49350	715.46793	699	716

LTE Band 17:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	704.52585	715.43463	704	716
-20		704.57167	715.43711	704	716
-10		704.56748	715.50755	704	716
0		704.53500	715.42024	704	716
10		704.48771	715.51374	704	716
20		704.53106	715.46894	704	716
30		704.55150	715.48185	704	716
40		704.49393	715.48070	704	716
50		704.54412	715.43169	704	716
20	3.6	704.58010	715.45662	704	716
20	4.3	704.55954	715.47282	704	716

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	704.53047	715.43778	704	716
-20		704.51544	715.45267	704	716
-10		704.56352	715.49846	704	716
0		704.49560	715.43153	704	716
10		704.55346	715.46323	704	716
20		704.53106	715.46894	704	716
30		704.56073	715.50557	704	716
40		704.53005	715.50244	704	716
50		704.54251	715.49628	704	716
20	3.6	704.49119	715.44288	704	716
20	4.3	704.54302	715.43333	704	716

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

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