TESTING LABORATORY
CERTIFICATE #4820.01

FCC PART 22H, PART 24E

FCC PART 27

MEASUREMENT AND TEST REPORT

For

Whoop International Trading Limited

Flat-B 8/F Chong Gming Building 72 Cheung Sha Wan Road, Kowloon Hong Kong

FCC ID: 2AP7LVALOR

Report Type:	**Product Type:**
Original Report	Rugged smart phone

Report Number:	RDG190108004-00D
Report Date:	2019-02-13
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:		Rugged smart phone
EUT Model:		Rough-52
Multiple Models:		L971
Rated Input Voltage:		3.8VDC from battery and 5VDC from adapter
Adapter Information	**Model:**	APS-M005050100W-G
	Input:	100-240VAC, 50/60Hz 0.3A Max
	Output:	5VDC, 1.0A
External Dimension:		148mm(L)*77mm(W)*12mm(H)
Serial Number:		190108004
EUT Received Date:		2019-01-10

Note: The series product model L971 is electrically identical with model Rough-52, we selected Rough-52 for fully testing, the differences details was explained in the declaration letter.

Objective

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

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

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AP7LVALOR.
FCC Part 15C DSS submissions with FCC ID: 2AP7LVALOR.
FCC Part 15E NII submissions with FCC ID: 2AP7LVALOR.

Test Methodology

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

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

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

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

Measurement Uncertainty

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

Test Facility

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

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

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

SYSTEM TEST CONFIGURATION

Justification

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

The test items were performed with the EUT operating at testing mode. The device supports GSM/GPRS/ EDGE 850/1900 band,WCDMA/HSUPA/HPDPA Band 2/4/5, LTE band 2, 4, 5, 7,12 and 17.

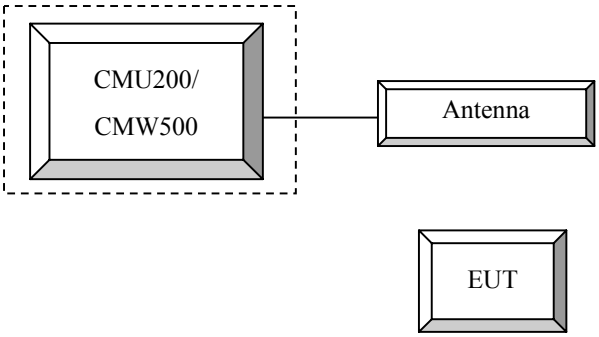
Equipment Modifications

No modification was made to the EUT.

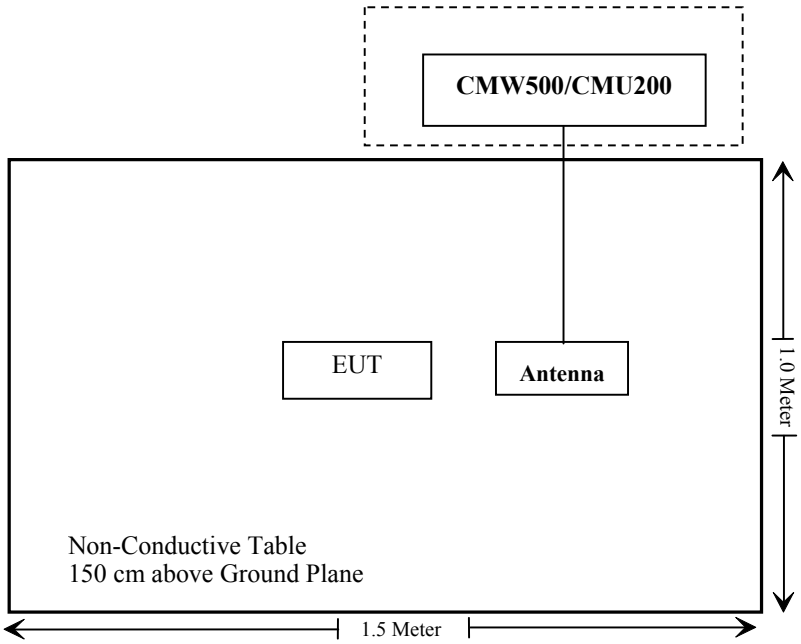
Support Equipment List and Details

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

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

FCC §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG190108004-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

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

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

Applicable Standard

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

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

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

According to §27.50

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

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

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

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

Test Procedure

GSM/GPRS/EGPRS

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

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

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

WCDMA-Release 99

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

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

WCDMA HSDPA

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

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

WCDMA HSUPA

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

	Mode	HSUPA	HSUPA	HSUPA	HSUPA	HSUPA
	Subset	**1**	**2**	**3**	**4**	**5**
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	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	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
R&S	Spectrum Analyzer	FSP 38	100478	2018-12-10	2019-12-10
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
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2018-02-24	2019-02-28
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
R&S	Universal Radio Communication Tester	CMU200	110 822	2018-12-14	2019-12-14
R&S	Wideband Radio Communication Tester	CMW500	110479	2018-12-10	2019-12-10

*** 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:	22.9~23.0°C
Relative Humidity:	34~45 %
ATM Pressure:	100.8~102.1 kPa

** The testing was performed by Tyler Pan, Vern Shen, Carrie He, Blake Yang on 2019-01-20~2019-01-21.*

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	31.4	31.45	30.71	29.18	28.14	26.27	24.89	22.38	21.15
	190	31.4	31.41	30.64	29.12	28.09	26.05	24.78	22.19	20.68
	251	31.3	31.38	30.65	29.09	28.05	25.84	24.26	22.08	20.45
PCS	512	28.3	28.24	27.84	25.97	24.92	24.18	23.08	20.87	19.67
	661	28.7	28.68	28.04	26.39	25.31	24.64	23.48	21.39	20.03
	810	29	28.93	28.21	26.89	25.75	25.39	24.34	22.28	20.98

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	21.55	3.00	21.76	2.96	22.31	3.08
HSDPA	1	20.58	4.24	20.72	3.44	21.17	3.84
	2	20.50	4.21	20.67	3.51	21.21	3.81
	3	20.59	4.16	20.76	3.37	21.16	3.79
	4	20.62	4.20	20.69	3.50	21.27	3.91
HSUPA	1	20.16	3.48	20.35	4.08	20.91	3.60
	2	20.16	3.50	20.32	4.01	20.95	3.60
	3	20.08	3.50	20.43	4.05	20.84	3.53
	4	20.25	3.40	20.26	4.10	20.97	3.57
	5	20.12	3.51	20.30	4.11	20.86	3.59
HSPA+ (16QAM)	1	20.15	3.49	20.42	4.13	20.91	3.50

WCDMA Band IV

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.25	3.64	22.02	3.56	21.71	3.96
HSDPA	1	21.24	3.16	20.98	4.24	20.39	3.72
	2	21.17	3.09	21.04	4.16	20.37	3.76
	3	21.16	3.18	21.03	4.16	20.44	3.79
	4	21.32	3.10	20.89	4.18	20.37	3.69
HSUPA	1	20.87	4.08	20.62	3.96	20.31	3.80
	2	20.81	4.14	20.71	4.01	20.36	3.81
	3	20.87	4.10	20.59	3.96	20.32	3.88
	4	20.89	4.09	20.61	3.89	20.23	3.83
	5	20.80	4.09	20.56	3.90	20.34	3.76
HSPA+ (16QAM)	1	20.96	4.03	20.65	4.03	20.28	3.87

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	22.91	2.56	22.98	2.92	23.04	2.72
HSDPA	1	21.86	3.52	21.96	3.84	22.04	3.20
	2	21.89	3.58	21.93	3.81	22.03	3.30
	3	21.86	3.46	21.87	3.92	22.12	3.29
	4	21.78	3.45	22.03	3.74	21.95	3.14
HSUPA	1	21.56	3.00	21.68	3.24	21.75	4.16
	2	21.55	2.97	21.75	3.28	21.76	4.14
	3	21.61	2.91	21.60	3.17	21.76	4.24
	4	21.49	2.93	21.66	3.32	21.71	4.13
	5	21.61	3.08	21.77	3.32	21.72	4.22
HSPA+ (16QAM)	1	21.56	3.07	21.74	3.24	21.79	4.20

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	22.27	22.36	22.57
		RB1#3	22.44	22.52	22.75
		RB1#5	22.32	22.35	22.57
		RB3#0	22.27	22.38	22.65
		RB3#3	22.34	22.38	22.64
		RB6#0	21.39	21.52	21.73
	16QAM	RB1#0	21.29	21.46	21.61
		RB1#3	21.46	21.64	21.80
		RB1#5	21.31	21.51	21.64
		RB3#0	22.31	22.40	22.61
		RB3#3	22.32	22.38	22.68
		RB6#0	20.35	20.45	20.60
3MHz	QPSK	RB1#0	22.36	22.45	22.60
		RB1#8	22.41	22.45	22.64
		RB1#14	22.37	22.42	22.64
		RB6#0	21.39	21.47	21.66
		RB6#9	21.44	21.49	21.67
		RB15#0	21.42	21.45	21.67
	16QAM	RB1#0	21.95	21.57	21.67
		RB1#8	21.97	21.54	21.66
		RB1#14	21.95	21.55	21.67
		RB6#0	20.43	20.43	20.58
		RB6#9	20.43	20.47	20.58
		RB15#0	20.42	20.34	20.67
5MHz	QPSK	RB1#0	22.26	22.42	22.50
		RB1#13	22.41	22.51	22.69
		RB1#24	22.38	22.41	22.62
		RB15#0	21.45	21.52	21.82
		RB15#10	21.48	21.47	21.56
		RB25#0	21.46	21.45	21.69
	16QAM	RB1#0	21.29	21.63	21.64
		RB1#13	21.42	21.75	21.82
		RB1#24	21.39	21.71	21.75
		RB15#0	21.47	21.51	21.82
		RB15#10	21.48	21.46	21.56
		RB25#0	20.47	20.38	20.56

10MHz	QPSK	RB1#0	22.31	22.42	22.51
		RB1#25	22.61	22.54	22.71
		RB1#49	22.36	22.42	22.64
		RB25#0	21.52	21.50	21.60
		RB25#25	21.59	21.44	21.43
		RB50#0	21.55	21.45	21.49
	16QAM	RB1#0	21.9	21.52	21.47
		RB1#25	22.14	21.73	21.70
		RB1#49	21.97	21.54	21.63
		RB25#0	21.54	21.47	21.61
		RB25#25	21.59	21.37	21.45
		RB50#0	20.56	20.41	20.50
15MHz	QPSK	RB1#0	22.27	22.37	22.42
		RB1#38	22.45	22.48	22.60
		RB1#74	22.33	22.36	22.55
		RB36#0	21.56	21.59	21.56
		RB36#39	21.60	21.50	21.54
		RB75#0	21.60	21.56	21.58
	16QAM	RB1#0	21.86	21.44	21.77
		RB1#38	22.06	21.56	21.88
		RB1#74	21.90	21.51	21.93
		RB36#0	21.58	21.60	21.54
		RB36#39	21.62	21.49	21.55
		RB75#0	20.56	20.46	20.47
20MHz	QPSK	RB1#0	22.15	22.23	22.23
		RB1#50	22.63	22.62	22.61
		RB1#99	22.17	22.26	22.37
		RB50#0	21.52	21.39	21.49
		RB50#50	21.61	21.38	21.39
		RB100#0	21.59	21.43	21.45
	16QAM	RB1#0	21.47	21.36	21.84
		RB1#50	21.96	21.75	22.10
		RB1#99	21.47	21.46	21.92
		RB50#0	21.50	21.40	21.48
		RB50#50	21.62	21.40	21.37
		RB100#0	20.56	20.36	20.43

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	24.03	21.46	21.66
		RB1#3	24.20	21.53	21.87
		RB1#5	23.81	21.17	21.52
		RB3#0	23.44	21.35	21.88
		RB3#3	23.39	21.30	21.77
		RB6#0	22.69	21.30	21.37
	16QAM	RB1#0	22.39	21.23	21.22
		RB1#3	22.60	21.50	21.40
		RB1#5	22.43	21.19	21.26
		RB3#0	23.48	21.27	21.95
		RB3#3	23.45	21.22	21.77
		RB6#0	21.54	21.26	20.23
3MHz	QPSK	RB1#0	23.56	21.40	21.96
		RB1#8	23.62	21.43	21.87
		RB1#14	23.61	20.98	21.24
		RB6#0	22.64	21.19	21.37
		RB6#9	22.65	21.08	21.31
		RB15#0	22.55	21.16	21.31
	16QAM	RB1#0	22.92	21.13	21.33
		RB1#8	22.98	21.36	21.29
		RB1#14	22.97	20.95	21.25
		RB6#0	21.53	21.10	20.20
		RB6#9	21.59	21.01	20.17
		RB15#0	21.49	21.03	20.25
5MHz	QPSK	RB1#0	23.48	21.44	22.38
		RB1#13	23.65	21.21	21.98
		RB1#24	23.52	21.13	21.49
		RB15#0	22.47	21.03	21.47
		RB15#10	22.65	21.01	21.24
		RB25#0	22.52	21.00	21.29
	16QAM	RB1#0	22.39	21.31	21.29
		RB1#13	22.55	21.29	21.40
		RB1#24	22.45	21.22	21.31
		RB15#0	22.49	20.95	21.45
		RB15#10	22.63	20.96	21.22
		RB25#0	21.49	20.88	20.18

10MHz	QPSK	RB1#0	23.59	21.90	22.47
		RB1#25	23.76	21.18	22.55
		RB1#49	23.52	21.50	21.65
		RB25#0	22.53	21.27	21.45
		RB25#25	22.49	21.19	21.15
		RB50#0	22.48	21.19	21.29
	16QAM	RB1#0	22.92	21.60	21.49
		RB1#25	23.18	21.12	21.46
		RB1#49	23.04	21.47	21.26
		RB25#0	22.53	21.17	21.42
		RB25#25	22.53	21.11	21.16
		RB50#0	21.46	21.13	20.22
15MHz	QPSK	RB1#0	23.48	22.17	21.86
		RB1#38	23.60	21.12	22.62
		RB1#74	22.50	21.72	21.71
		RB36#0	22.72	21.41	21.72
		RB36#39	22.50	21.34	21.47
		RB75#0	22.58	21.32	21.57
	16QAM	RB1#0	22.83	21.98	21.87
		RB1#38	23.05	21.12	21.68
		RB1#74	22.84	21.66	21.52
		RB36#0	22.72	21.33	21.75
		RB36#39	22.51	21.28	21.47
		RB75#0	21.53	21.29	20.36
20MHz	QPSK	RB1#0	23.30	22.52	21.20
		RB1#50	23.43	21.14	22.24
		RB1#99	21.46	21.93	21.58
		RB50#0	22.66	21.60	21.56
		RB50#50	22.21	21.42	21.30
		RB100#0	22.51	21.45	21.40
	16QAM	RB1#0	22.49	22.36	21.76
		RB1#50	22.96	21.20	22.03
		RB1#99	21.70	21.64	21.55
		RB50#0	22.64	21.56	21.54
		RB50#50	22.20	21.39	21.29
		RB100#0	21.47	21.17	20.27

LTE Band 5

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	21.11	21.59	21.32
		RB1#3	21.33	21.57	21.54
		RB1#5	21.09	21.29	21.30
		RB3#0	21.20	21.49	21.37
		RB3#3	21.16	21.57	21.43
		RB6#0	20.15	20.67	20.40
	16QAM	RB1#0	20.04	20.67	20.23
		RB1#3	20.18	20.91	20.45
		RB1#5	20.13	20.68	20.26
		RB3#0	21.22	21.66	21.35
		RB3#3	21.29	21.68	21.38
		RB6#0	19.98	19.72	19.87
3MHz	QPSK	RB1#0	21.66	21.67	21.47
		RB1#8	21.61	21.62	21.38
		RB1#14	21.63	21.60	21.37
		RB6#0	20.60	20.64	20.40
		RB6#9	20.64	20.56	20.33
		RB15#0	20.65	20.62	20.36
	16QAM	RB1#0	21.19	20.78	20.45
		RB1#8	21.19	20.69	20.33
		RB1#14	21.20	20.71	20.30
		RB6#0	19.71	19.68	19.68
		RB6#9	19.81	19.63	19.84
		RB15#0	19.77	19.77	19.82
5MHz	QPSK	RB1#0	21.61	21.63	21.46
		RB1#13	21.73	21.68	21.46
		RB1#24	21.64	21.56	21.34
		RB15#0	20.63	20.73	20.43
		RB15#10	20.73	20.58	20.33
		RB25#0	20.67	20.62	20.31
	16QAM	RB1#0	20.56	20.87	20.59
		RB1#13	20.67	20.96	20.50
		RB1#24	20.56	20.9	20.41
		RB15#0	20.62	20.74	20.44
		RB15#10	20.75	20.59	20.32
		RB25#0	19.85	19.80	19.78
10MHz	QPSK	RB1#0	21.61	21.66	21.57
		RB1#25	21.81	21.82	21.60
		RB1#49	21.63	21.54	21.41
		RB25#0	20.57	20.89	20.44
		RB25#25	20.63	20.66	20.42
		RB50#0	20.62	20.77	20.49
	16QAM	RB1#0	21.18	20.70	20.63
		RB1#25	21.29	20.96	20.56
		RB1#49	21.10	20.65	20.31
		RB25#0	20.57	20.88	20.46
		RB25#25	20.63	20.67	20.43
		RB50#0	19.88	19.85	19.90

LTE Band 7

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	23.46	22.44	21.70
		RB1#13	23.62	22.45	21.83
		RB1#24	22.97	22.25	21.71
		RB15#0	21.93	21.41	20.73
		RB15#10	22.01	21.41	20.71
		RB25#0	21.93	21.36	20.70
	16QAM	RB1#0	21.81	21.65	20.72
		RB1#13	21.90	21.62	20.82
		RB1#24	21.81	21.45	20.71
		RB15#0	21.97	21.41	20.74
		RB15#10	22.00	21.38	20.70
		RB25#0	20.97	20.26	19.99
10MHz	QPSK	RB1#0	23.02	22.57	21.81
		RB1#25	23.19	22.55	22.00
		RB1#49	23.07	22.22	21.80
		RB25#0	21.97	21.54	20.74
		RB25#25	22.08	21.41	20.77
		RB50#0	22.03	21.47	20.73
	16QAM	RB1#0	21.34	21.64	20.66
		RB1#25	21.51	21.56	20.84
		RB1#49	21.39	21.30	20.70
		RB25#0	21.98	21.52	20.70
		RB25#25	22.11	21.42	20.78
		RB50#0	20.97	20.47	20.11
15MHz	QPSK	RB1#0	22.99	22.64	21.77
		RB1#38	23.06	22.42	21.83
		RB1#74	22.96	22.09	21.72
		RB36#0	22.09	21.65	20.82
		RB36#39	22.18	21.42	20.86
		RB75#0	22.18	21.56	20.89
	16QAM	RB1#0	22.32	21.69	20.97
		RB1#38	22.39	21.50	21.03
		RB1#74	22.32	21.12	20.87
		RB36#0	22.12	21.67	20.85
		RB36#39	22.17	21.40	20.83
		RB75#0	21.09	20.48	19.89
20MHz	QPSK	RB1#0	22.84	22.56	21.66
		RB1#50	23.26	22.60	21.89
		RB1#99	22.74	21.92	21.52
		RB50#0	21.88	21.58	20.76
		RB50#50	21.98	21.29	20.82
		RB100#0	21.94	21.43	20.79
	16QAM	RB1#0	21.98	21.72	21.12
		RB1#50	22.37	21.65	21.33
		RB1#99	21.92	20.98	21.02
		RB50#0	21.89	21.56	20.73
		RB50#50	22.00	21.29	20.82
		RB100#0	20.92	20.39	20.00

LTE Band 12

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.56	24.02	23.57
		RB1#3	23.79	24.12	23.66
		RB1#5	23.64	23.81	23.42
		RB3#0	23.36	23.90	23.67
		RB3#3	23.36	23.83	23.60
		RB6#0	22.69	23.31	23.29
	16QAM	RB1#0	22.25	23.05	22.82
		RB1#3	22.52	23.22	22.98
		RB1#5	22.54	23.06	22.81
		RB3#0	23.55	23.99	23.69
		RB3#3	23.39	24.04	23.62
		RB6#0	21.90	22.12	21.84
3MHz	QPSK	RB1#0	23.93	24.24	23.85
		RB1#8	24.10	24.20	23.77
		RB1#14	23.99	23.69	23.46
		RB6#0	23.19	23.22	23.28
		RB6#9	23.28	23.23	23.26
		RB15#0	23.01	23.07	22.89
	16QAM	RB1#0	23.24	23.12	22.89
		RB1#8	23.27	23.09	22.87
		RB1#14	23.28	23.10	22.85
		RB6#0	21.93	22.00	21.85
		RB6#9	22.01	22.03	21.85
		RB15#0	21.85	21.90	21.67
5MHz	QPSK	RB1#0	24.10	24.25	23.96
		RB1#13	24.16	24.15	23.74
		RB1#24	24.27	23.94	23.56
		RB15#0	22.97	23.13	23.00
		RB15#10	23.13	23.15	22.94
		RB25#0	22.98	23.07	22.88
	16QAM	RB1#0	22.82	23.15	22.84
		RB1#13	23.00	23.24	22.89
		RB1#24	22.96	23.16	22.76
		RB15#0	22.97	23.14	22.98
		RB15#10	23.13	23.12	22.94
		RB25#0	21.85	21.93	21.62
10MHz	QPSK	RB1#0	24.12	24.31	24.31
		RB1#25	24.48	24.11	23.91
		RB1#49	23.92	23.86	23.60
		RB25#0	22.97	23.25	23.10
		RB25#25	23.07	23.16	23.01
		RB50#0	22.98	23.13	22.93
	16QAM	RB1#0	23.29	23.13	23.00
		RB1#25	23.50	23.29	23.07
		RB1#49	23.43	23.07	22.87
		RB25#0	22.98	23.24	23.06
		RB25#25	23.07	23.19	23.01
		RB50#0	21.89	22.06	21.84

LTE Band 17

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	24.38	24.31	24.07
		RB1#13	24.53	24.05	23.87
		RB1#24	24.03	24.08	23.69
		RB15#0	23.32	23.25	23.13
		RB15#10	23.28	23.26	23.12
		RB25#0	23.28	23.21	23.01
	16QAM	RB1#0	23.10	23.31	22.99
		RB1#13	23.20	23.31	23.07
		RB1#24	23.14	23.20	22.91
		RB15#0	23.31	23.23	23.15
		RB15#10	23.29	23.24	23.12
		RB25#0	22.20	22.00	21.78
10MHz	QPSK	RB1#0	24.43	24.41	24.44
		RB1#25	24.10	23.88	24.01
		RB1#49	23.93	23.76	23.75
		RB25#0	23.35	23.29	23.20
		RB25#25	23.28	23.23	23.17
		RB50#0	23.25	23.15	23.10
	16QAM	RB1#0	23.57	23.26	23.15
		RB1#25	23.72	23.31	23.24
		RB1#49	23.35	23.12	23.08
		RB25#0	23.31	23.26	23.19
		RB25#25	23.27	23.22	23.16
		RB50#0	22.13	22.06	22.00

PAR, Band 2

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.96	3.68	4.4	13
	100 RB		5.56	5.12	5.04	13
16QAM	1 RB	20 MHz	5.84	4.76	5.08	13
	100 RB		6.44	6.04	6.08	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	2.84	4.68	1.92	13
	100 RB		5.08	5.12	4.76	13
16QAM	1 RB	20 MHz	4.24	5.32	3.00	13
	100 RB		5.96	5.88	5.64	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	5.24	4.40	5.32	13
	50 RB		5.32	5.52	5.40	13
16QAM	1 RB	10 MHz	6.04	5.36	5.88	13
	50 RB		6.24	6.40	6.28	13

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

ERP & EIRP

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850 Middle Channel								
836.60	H	92.10	17.18	0.00	0.97	16.21	38.45	22.24
836.60	V	98.95	27.16	0.00	0.97	26.19	38.45	12.26
EDGE 850 Middle Channel								
836.60	H	89.88	14.96	0.00	0.97	13.99	38.45	24.46
836.60	V	95.82	24.03	0.00	0.97	23.06	38.45	15.39
WCDMA Band V Middle Channel								
836.60	H	87.82	12.90	0.00	0.97	11.93	38.45	26.52
836.60	V	93.68	21.89	0.00	0.97	20.92	38.45	17.53

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
PCS 1900 Middle Channel								
1880.00	H	93.52	18.75	11.14	1.56	28.33	33.00	4.67
1880.00	V	90.66	15.69	11.14	1.56	25.27	33.00	7.73
EDGE 1900 Middle Channel								
1880.00	H	89.74	14.96	11.14	1.56	24.54	33.00	8.46
1880.00	V	87.70	12.73	11.14	1.56	22.31	33.00	10.69
WCDMA Band II Middle Channel								
1880.00	H	87.00	12.22	11.14	1.56	21.80	33.00	11.20
1880.00	V	85.30	10.33	11.14	1.56	19.91	33.00	13.09

Part 27

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band IV Middle Channel								
1732.60	H	85.03	9.82	10.70	1.52	19.00	30.00	11.00
1732.60	V	83.17	7.66	10.70	1.52	16.84	30.00	13.16

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	82.83	8.05	11.14	1.56	17.63	33.00	15.37
1880.00			V	84.54	9.57	11.14	1.56	**19.15**	33.00	13.85
1880.00	3.00		H	81.30	6.52	11.14	1.56	16.10	33.00	16.90
1880.00			V	83.40	8.43	11.14	1.56	18.01	33.00	14.99
1880.00	5.00		H	82.83	8.05	11.14	1.56	17.63	33.00	15.37
1880.00			V	84.50	9.53	11.14	1.56	19.11	33.00	13.89
1880.00	10.00		H	82.73	7.95	11.14	1.56	17.53	33.00	15.47
1880.00			V	84.16	9.19	11.14	1.56	18.77	33.00	14.23
1880.00	15.00		H	82.53	7.75	11.14	1.56	17.33	33.00	15.67
1880.00			V	82.76	7.79	11.14	1.56	17.37	33.00	15.63
1880.00	20.00		H	83.22	8.44	11.14	1.56	18.02	33.00	14.98
1880.00			V	84.07	9.10	11.14	1.56	**18.68**	33.00	14.32
1880.00	1.40	16QAM	H	81.49	6.71	11.14	1.56	16.29	33.00	16.71
1880.00			V	83.95	8.98	11.14	1.56	**18.56**	33.00	14.44
1880.00	3.00		H	81.42	6.64	11.14	1.56	16.22	33.00	16.78
1880.00			V	83.60	8.62	11.14	1.56	18.20	33.00	14.80
1880.00	5.00		H	81.50	6.72	11.14	1.56	16.30	33.00	16.70
1880.00			V	82.92	7.95	11.14	1.56	17.53	33.00	15.47
1880.00	10.00		H	81.48	6.70	11.14	1.56	16.28	33.00	16.72
1880.00			V	82.48	7.51	11.14	1.56	17.09	33.00	15.91
1880.00	15.00		H	82.10	7.32	11.14	1.56	16.90	33.00	16.10
1880.00			V	82.42	7.45	11.14	1.56	17.03	33.00	15.97
1880.00	20.00		H	83.45	8.67	11.14	1.56	18.25	33.00	14.75
1880.00			V	84.62	9.65	11.14	1.56	**19.23**	33.00	13.77

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	86.20	10.99	10.70	1.52	20.17	30.00	9.83
1732.50			V	85.87	10.36	10.70	1.52	19.54	30.00	10.46
1732.50	3.00		H	85.68	10.47	10.70	1.52	19.65	30.00	10.35
1732.50			V	85.42	9.91	10.70	1.52	19.09	30.00	10.91
1732.50	5.00		H	84.53	9.32	10.70	1.52	18.50	30.00	11.50
1732.50			V	84.25	8.74	10.70	1.52	17.92	30.00	12.08
1732.50	10.00		H	84.50	9.29	10.70	1.52	18.47	30.00	11.53
1732.50			V	83.75	8.24	10.70	1.52	17.42	30.00	12.58
1732.50	15.00		H	86.05	10.84	10.70	1.52	20.02	30.00	9.98
1732.50			V	85.00	9.49	10.70	1.52	18.67	30.00	11.33
1732.50	20.00		H	87.37	12.16	10.70	1.52	**21.34**	30.00	8.66
1732.50			V	86.70	11.19	10.70	1.52	20.37	30.00	9.63
1732.50	1.40	16QAM	H	86.26	11.05	10.70	1.52	20.23	30.00	9.77
1732.50			V	85.97	10.46	10.70	1.52	19.64	30.00	10.36
1732.50	3.00		H	85.76	10.55	10.70	1.52	19.73	30.00	10.27
1732.50			V	85.30	9.79	10.70	1.52	18.97	30.00	11.03
1732.50	5.00		H	84.59	9.38	10.70	1.52	18.56	30.00	11.44
1732.50			V	84.30	8.79	10.70	1.52	17.97	30.00	12.03
1732.50	10.00		H	85.78	10.57	10.70	1.52	19.75	30.00	10.25
1732.50			V	84.61	9.10	10.70	1.52	18.28	30.00	11.72
1732.50	15.00		H	86.93	11.72	10.70	1.52	20.90	30.00	9.10
1732.50			V	84.81	9.30	10.70	1.52	18.48	30.00	11.52
1732.50	20.00		H	87.61	12.40	10.70	1.52	**21.58**	30.00	8.42
1732.50			V	86.66	11.15	10.70	1.52	20.33	30.00	9.67

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	84.90	9.97	0.00	0.97	9.00	38.45	29.45
836.50			V	91.34	19.55	0.00	0.97	**18.58**	38.45	19.87
836.50	3.00		H	84.77	9.84	0.00	0.97	8.87	38.45	29.58
836.50			V	91.18	19.39	0.00	0.97	18.42	38.45	20.03
836.50	5.00		H	84.70	9.77	0.00	0.97	8.80	38.45	29.65
836.50			V	91.07	19.28	0.00	0.97	18.31	38.45	20.14
836.50	10.00		H	84.13	9.20	0.00	0.97	8.23	38.45	30.22
836.50			V	90.32	18.53	0.00	0.97	**17.56**	38.45	20.89
836.50	1.40	16QAM	H	84.67	9.74	0.00	0.97	8.77	38.45	29.68
836.50			V	90.79	19.00	0.00	0.97	**18.03**	38.45	20.42
836.50	3.00		H	84.55	9.62	0.00	0.97	8.65	38.45	29.80
836.50			V	90.39	18.60	0.00	0.97	17.63	38.45	20.82
836.50	5.00		H	84.42	9.49	0.00	0.97	8.52	38.45	29.93
836.50			V	90.20	18.41	0.00	0.97	17.44	38.45	21.01
836.50	10.00		H	84.07	9.14	0.00	0.97	8.17	38.45	30.28
836.50			V	89.40	17.61	0.00	0.97	**16.64**	38.45	21.81

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	83.01	9.92	12.21	1.79	20.34	33.00	12.66
2535.00			V	83.38	10.00	12.21	1.79	20.42	33.00	12.58
2535.00	10.00		H	81.99	8.90	12.21	1.79	19.32	33.00	13.68
2535.00			V	83.94	10.56	12.21	1.79	20.98	33.00	12.02
2535.00	15.00		H	84.33	11.24	12.21	1.79	21.66	33.00	11.34
2535.00			V	84.68	11.30	12.21	1.79	21.72	33.00	11.28
2535.00	20.00		H	84.59	11.50	12.21	1.79	**21.92**	33.00	11.08
2535.00			V	84.64	11.26	12.21	1.79	21.68	33.00	11.32
2535.00	5.00	16QAM	H	83.64	10.55	12.21	1.79	20.97	33.00	12.03
2535.00			V	83.92	10.54	12.21	1.79	20.96	33.00	12.04
2535.00	10.00		H	81.54	8.45	12.21	1.79	18.87	33.00	14.13
2535.00			V	83.26	9.88	12.21	1.79	20.30	33.00	12.70
2535.00	15.00		H	84.20	11.11	12.21	1.79	21.53	33.00	11.47
2535.00			V	84.54	11.16	12.21	1.79	21.58	33.00	11.42
2535.00	20.00		H	84.31	11.22	12.21	1.79	**21.64**	33.00	11.36
2535.00			V	84.55	11.17	12.21	1.79	21.59	33.00	11.41

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	85.35	8.49	0.00	0.94	7.55	34.77	27.22
707.50			V	92.72	18.30	0.00	0.94	**17.36**	34.77	17.41
707.50	3.00		H	85.26	8.40	0.00	0.94	7.46	34.77	27.31
707.50			V	92.49	18.07	0.00	0.94	17.13	34.77	17.64
707.50	5.00		H	85.07	8.21	0.00	0.94	7.27	34.77	27.50
707.50			V	92.36	17.94	0.00	0.94	17.00	34.77	17.77
707.50	10.00		H	84.46	7.60	0.00	0.94	6.66	34.77	28.11
707.50			V	91.67	17.25	0.00	0.94	**16.31**	34.77	18.46
707.50	1.40	16QAM	H	84.21	7.35	0.00	0.94	6.41	34.77	28.36
707.50			V	91.84	17.42	0.00	0.94	**16.48**	34.77	18.29
707.50	3.00		H	84.06	7.20	0.00	0.94	6.26	34.77	28.51
707.50			V	91.59	17.17	0.00	0.94	16.23	34.77	18.54
707.50	5.00		H	83.96	7.10	0.00	0.94	6.16	34.77	28.61
707.50			V	91.41	16.99	0.00	0.94	16.05	34.77	18.72
707.50	10.00		H	83.33	6.47	0.00	0.94	5.53	34.77	29.24
707.50			V	90.61	16.19	0.00	0.94	**15.25**	34.77	19.52

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	84.16	7.35	0.00	0.94	6.41	34.77	28.36
710.00			V	92.53	18.17	0.00	0.94	**17.23**	34.77	17.54
710.00	10		H	83.84	7.03	0.00	0.94	6.09	34.77	28.68
710.00			V	91.81	17.45	0.00	0.94	**16.51**	34.77	18.26
710.00	5	16QAM	H	83.79	6.98	0.00	0.94	6.04	34.77	28.73
710.00			V	91.38	17.02	0.00	0.94	**16.08**	34.77	18.69
710.00	10		H	83.22	6.41	0.00	0.94	5.47	34.77	29.30
710.00			V	90.69	16.33	0.00	0.94	**15.39**	34.77	19.38

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

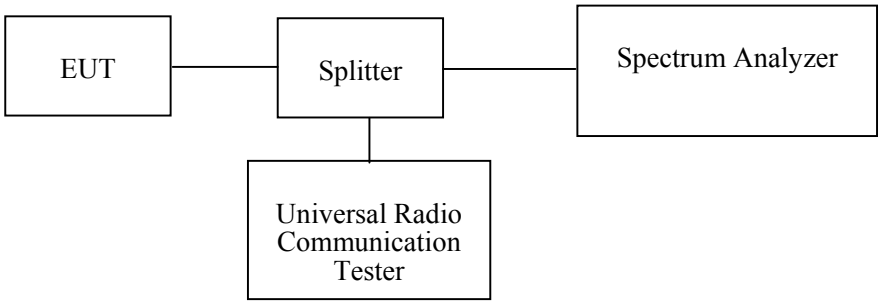
Applicable Standard

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	FSP 38	100478	2018-12-10	2019-12-10
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	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:	23.8~25.2°C
Relative Humidity:	39~50 %
ATM Pressure:	100.6~102.1 kPa

The testing was performed by Blake Yang, Carrie He on 2019-01-20~2019-02-13.

Test Mode: Transmitting

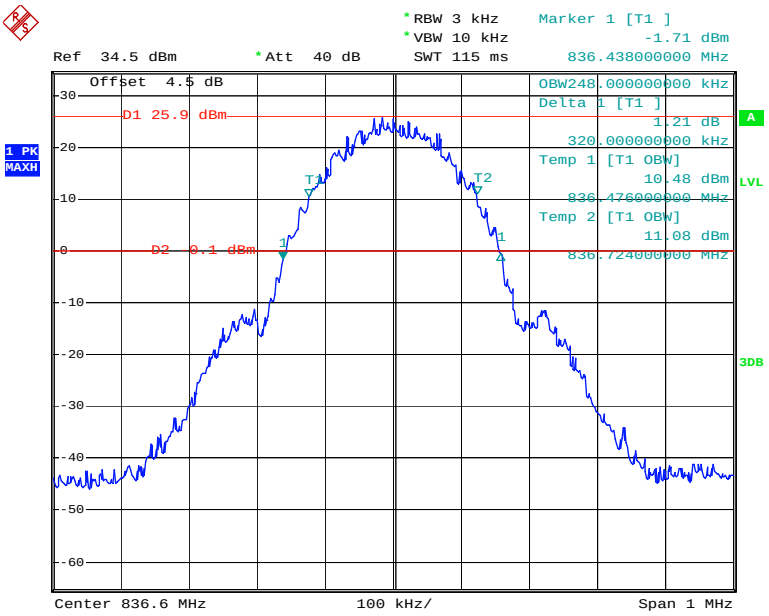
Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GSM	0.248	0.320
		EDGE	0.246	0.316
PCS		GSM	0.244	0.320
		EDGE	0.238	0.320
WCDMA Band II		Rel 99	4.180	4.740
		HSDPA	4.200	4.740
		HSUPA	4.180	4.760
WCDMA Band IV		Rel 99	4.180	4.780
		HSDPA	4.200	4.760
		HSUPA	4.200	4.720
WCDMA Band V		Rel 99	4.180	4.760
		HSDPA	4.240	4.960
		HSUPA	4.240	4.880

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.098	1.296
		16QAM	1.104	1.308
	3 MHz	QPSK	2.688	2.880
		16QAM	2.676	2.868
	5 MHz	QPSK	4.540	5.140
		16QAM	4.540	5.220
	10 MHz	QPSK	9.000	9.880
		16QAM	8.960	9.800
	15 MHz	QPSK	13.560	15.060
		16QAM	13.560	15.060
	20 MHz	QPSK	17.920	19.600
		16QAM	18.000	19.520
LTE Band 4	1.4 MHz	QPSK	1.104	1.350
		16QAM	1.110	1.326
	3 MHz	QPSK	2.688	2.868
		16QAM	2.688	2.892
	5 MHz	QPSK	4.540	5.260
		16QAM	4.540	5.240
	10 MHz	QPSK	9.000	10.160
		16QAM	9.000	9.920
	15 MHz	QPSK	13.680	15.180
		16QAM	13.680	15.300
	20 MHz	QPSK	18.080	20.080
		16QAM	18.080	22.880
LTE Band 5	1.4 MHz	QPSK	1.098	1.290
		16QAM	1.098	1.308
	3 MHz	QPSK	2.688	2.868
		16QAM	2.688	2.880
	5 MHz	QPSK	4.560	5.160
		16QAM	4.540	5.240
	10 MHz	QPSK	9.000	9.920
		16QAM	9.000	9.840

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 7	5 MHz	QPSK	4.560	5.200
		16QAM	4.540	5.200
	10 MHz	QPSK	9.000	9.960
		16QAM	9.000	9.760
	15 MHz	QPSK	13.620	15.300
		16QAM	13.560	15.240
	20 MHz	QPSK	18.000	19.680
		16QAM	18.080	19.760
LTE Band 12	1.4 MHz	QPSK	1.098	1.344
		16QAM	1.110	1.320
	3 MHz	QPSK	2.688	2.892
		16QAM	2.688	2.880
	5 MHz	QPSK	4.560	5.260
		16QAM	4.560	5.300
	10 MHz	QPSK	9.040	10.640
		16QAM	9.000	10.080
LTE Band 17	5 MHz	QPSK	4.560	5.620
		16QAM	4.560	5.640
	10 MHz	QPSK	9.040	11.240
		16QAM	9.000	9.920

GSM 850 Cellular Band



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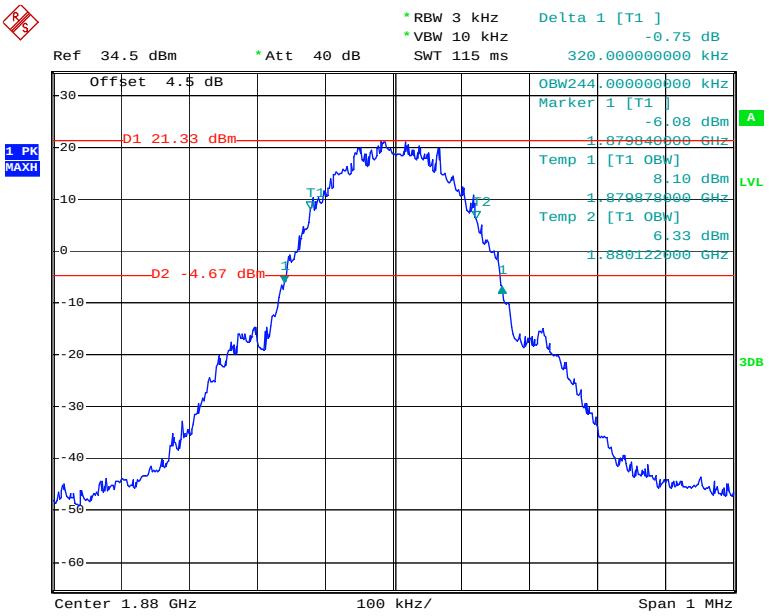
GSM PCS1900 Cellular Band



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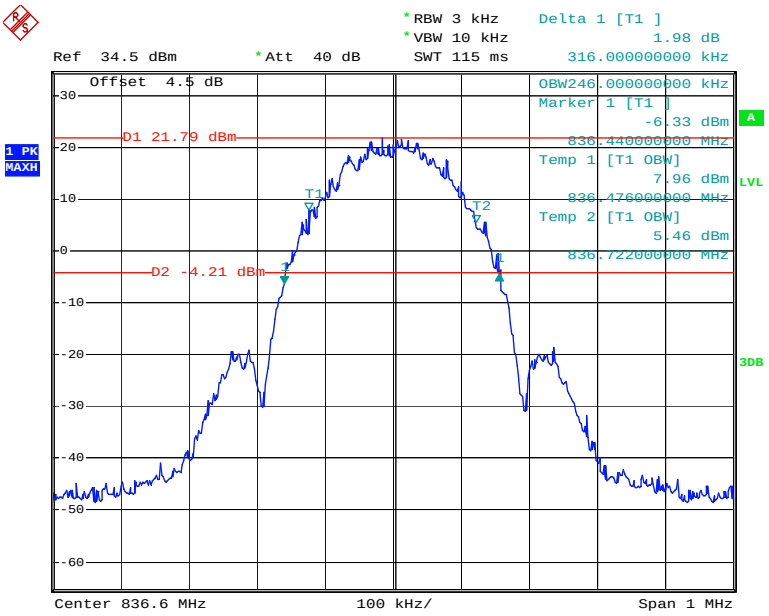
EDGE 850 Cellular Band



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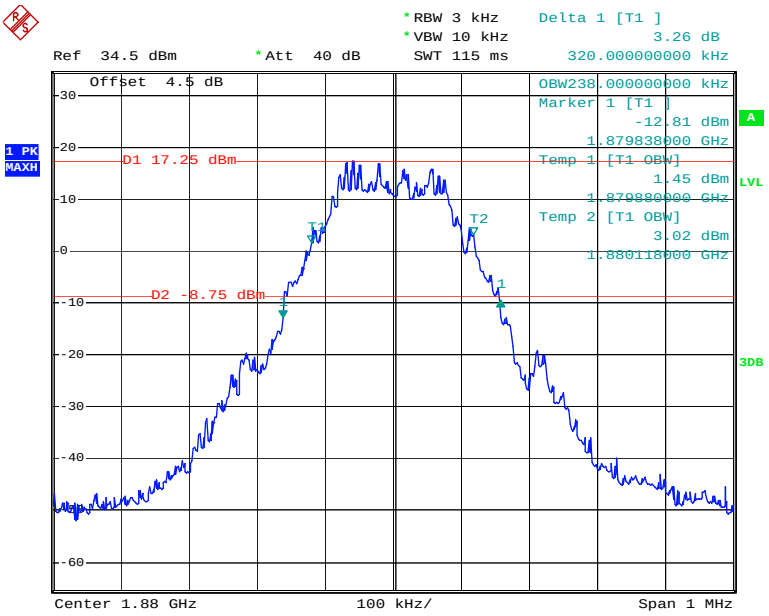
EDGE PCS1900 Cellular Band



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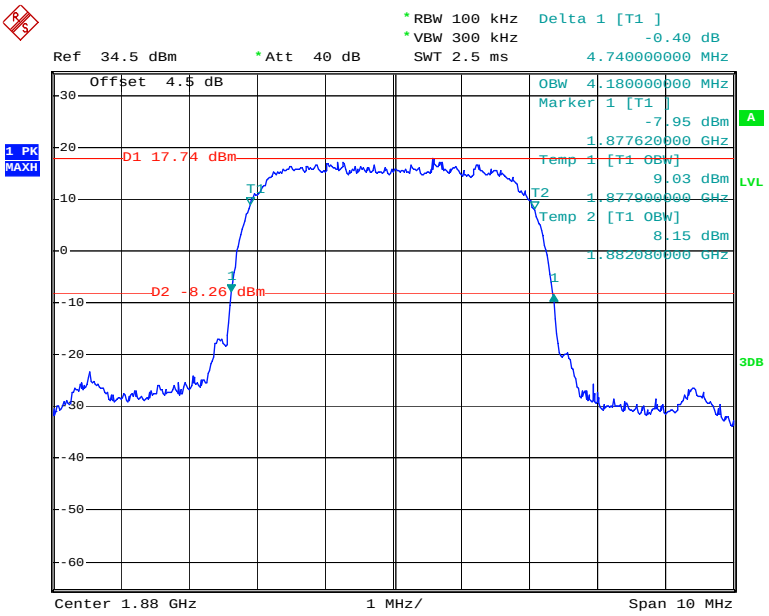
WCDMA Band II, Rel 99



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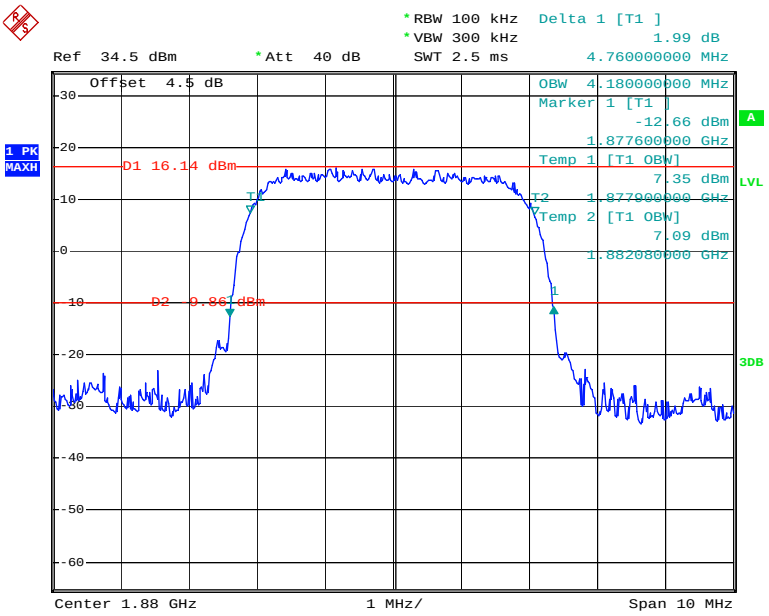
WCDMA Band II, HSUPA



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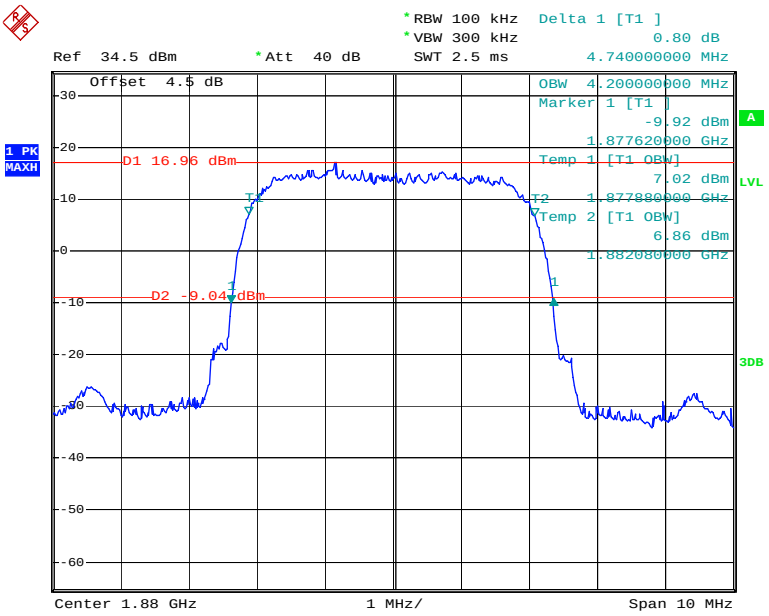

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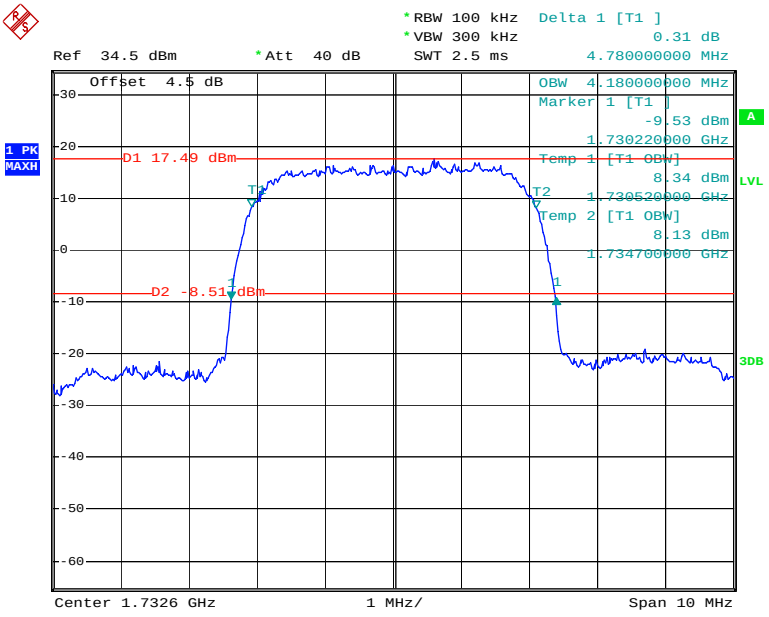
WCDMA Band IV, Rel 99



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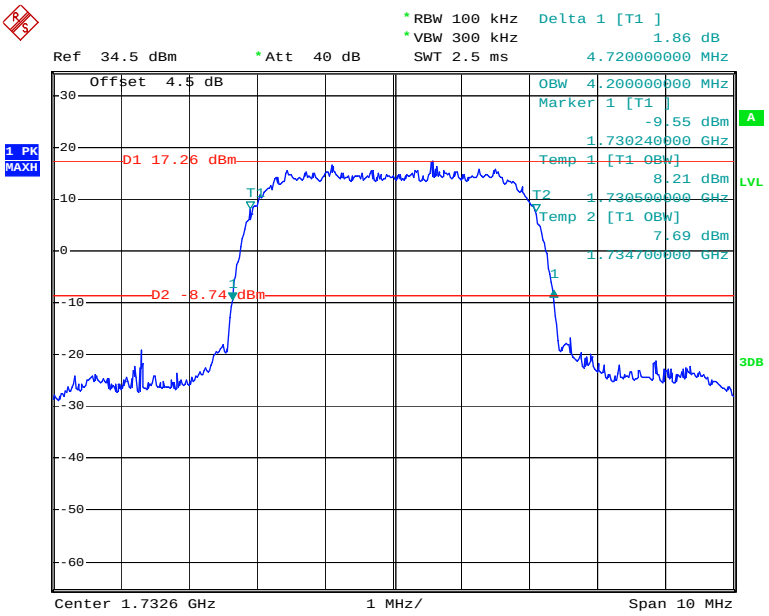

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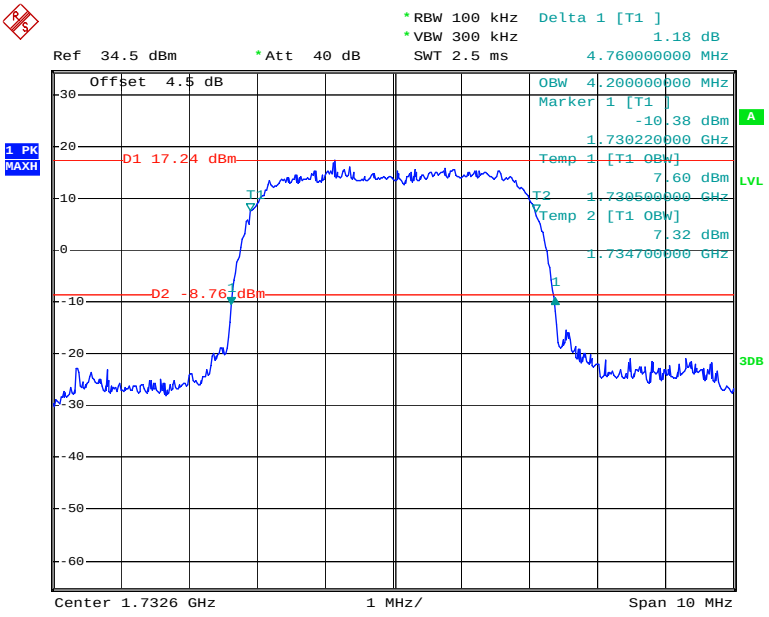

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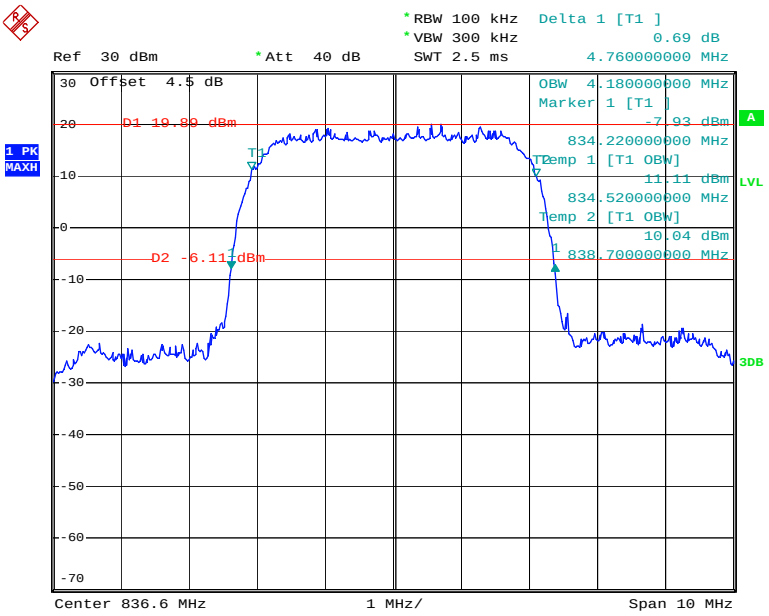
WCDMA Band V, Rel 99



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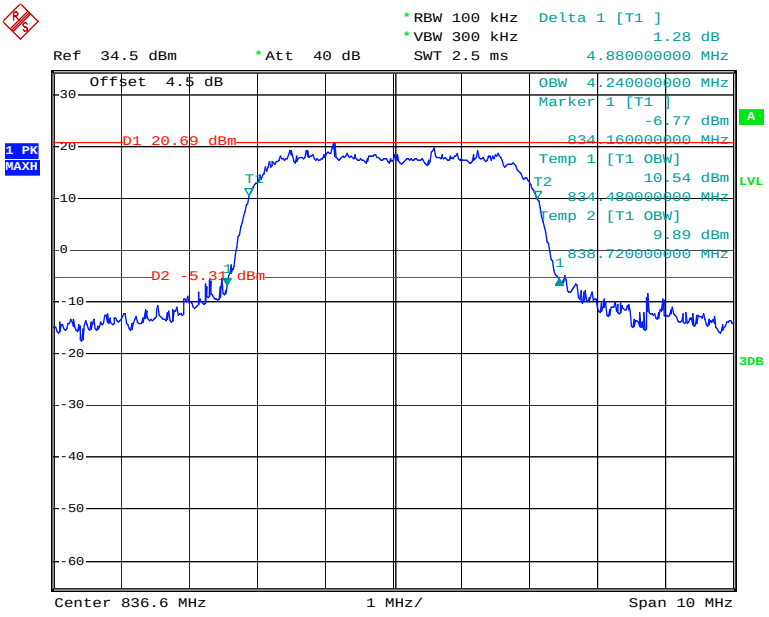

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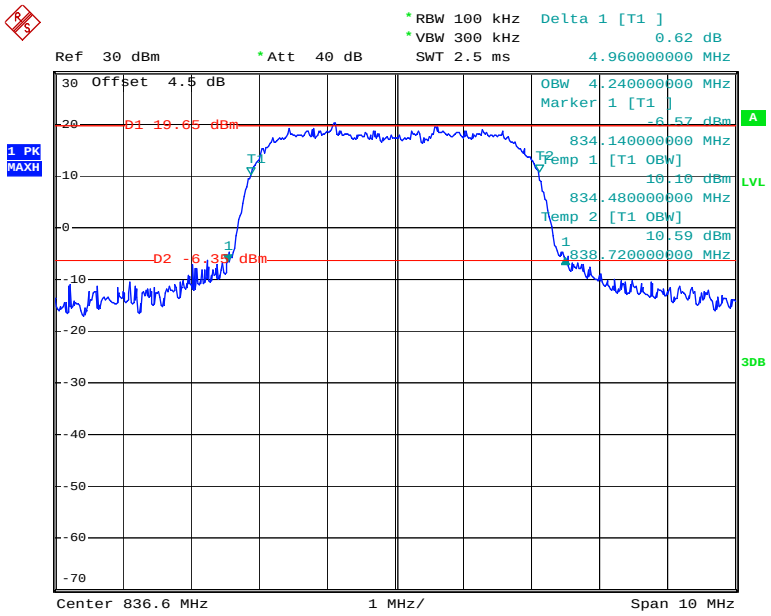

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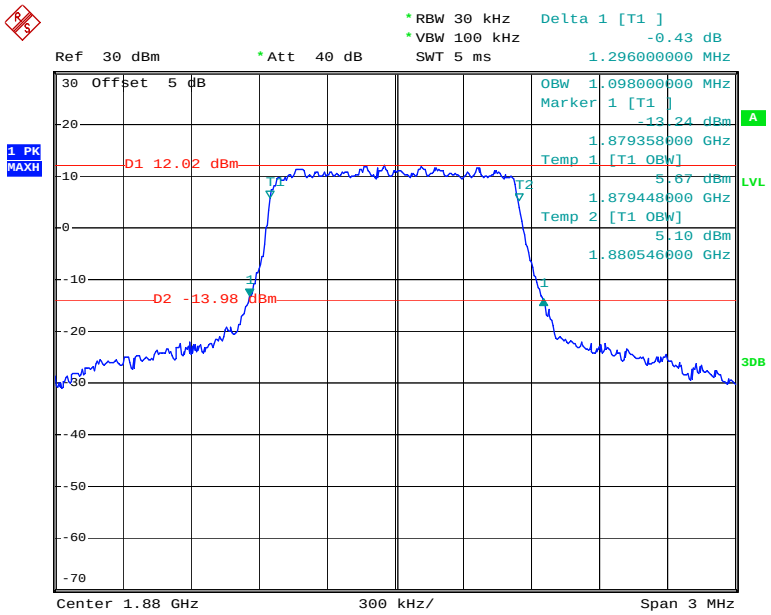
LTE Band 2

QPSK_1.4 MHz



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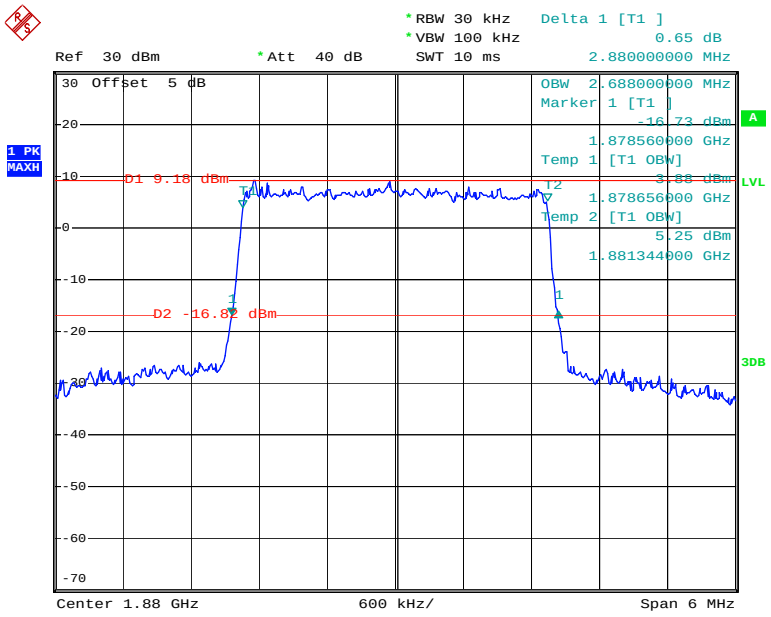
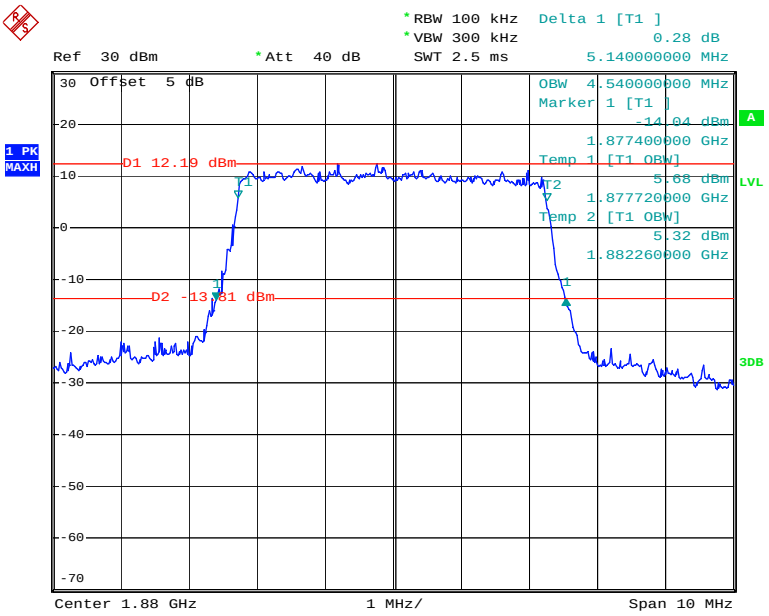
QPSK_3 MHz



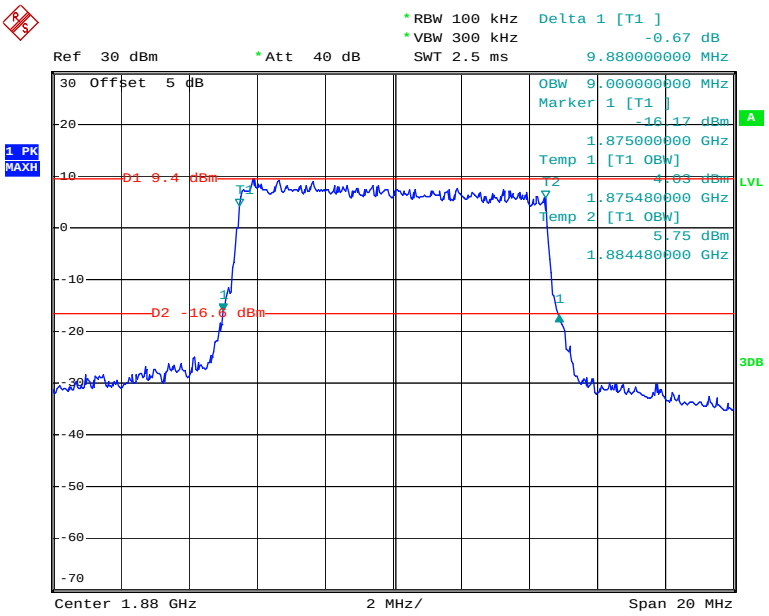
Date: 21.JAN.2019 21:50:23

QPSK_5 MHz



Date: 21.JAN.2019 21:51:44

QPSK_10 MHz



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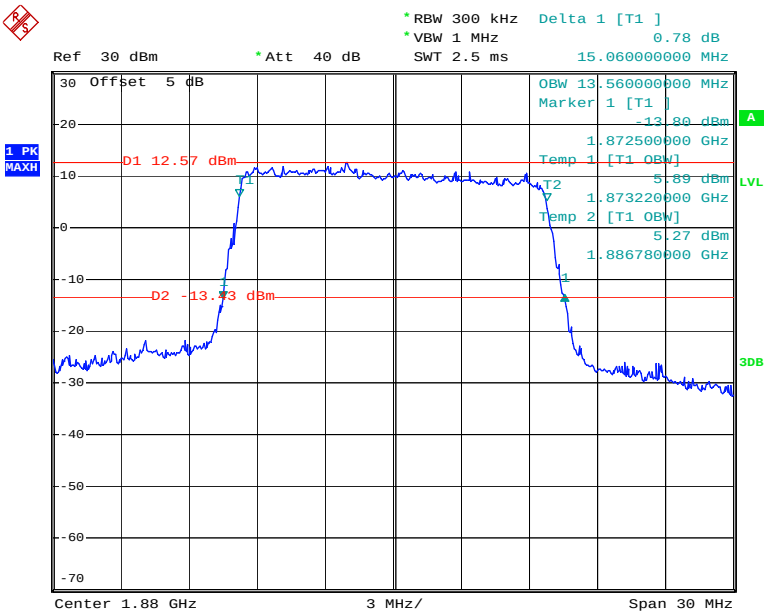
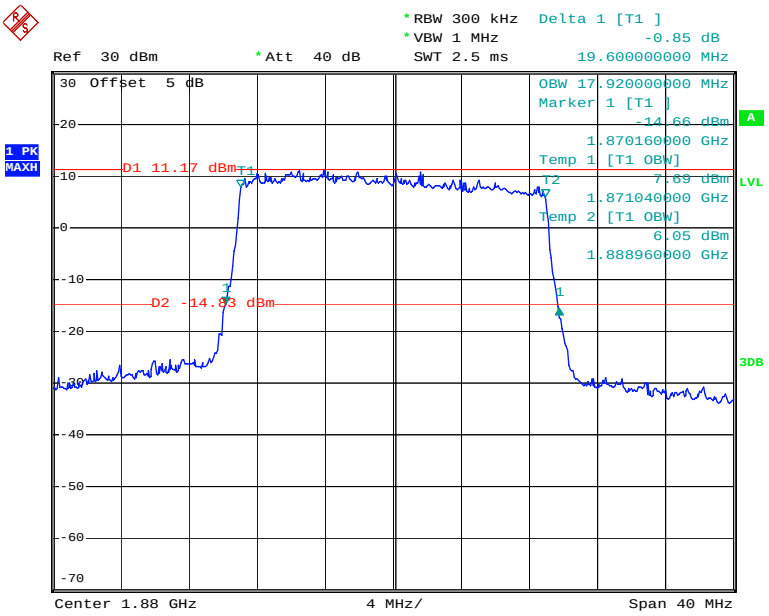
QPSK_15 MHz



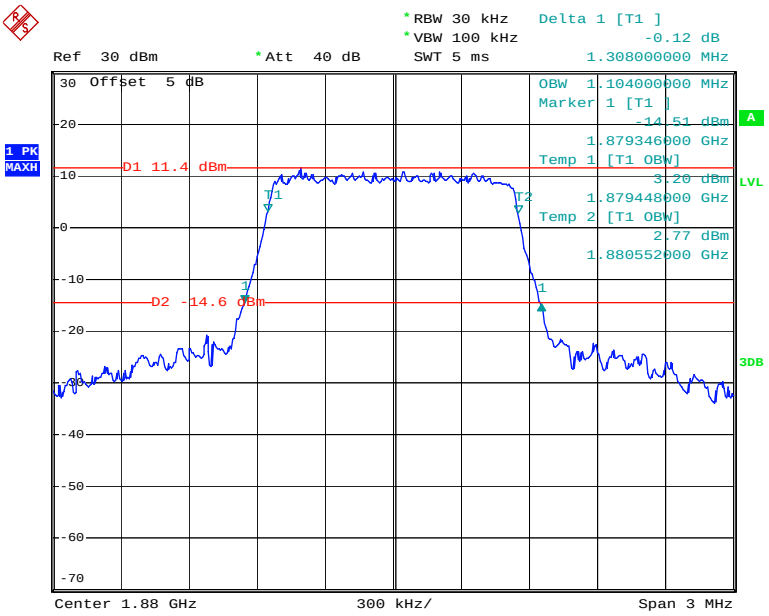
Date: 21.JAN.2019 21:54:20

QPSK_20 MHz



Date: 21.JAN.2019 21:55:37

16QAM_1.4 MHz



Date: 21.JAN.2019 21:49:54

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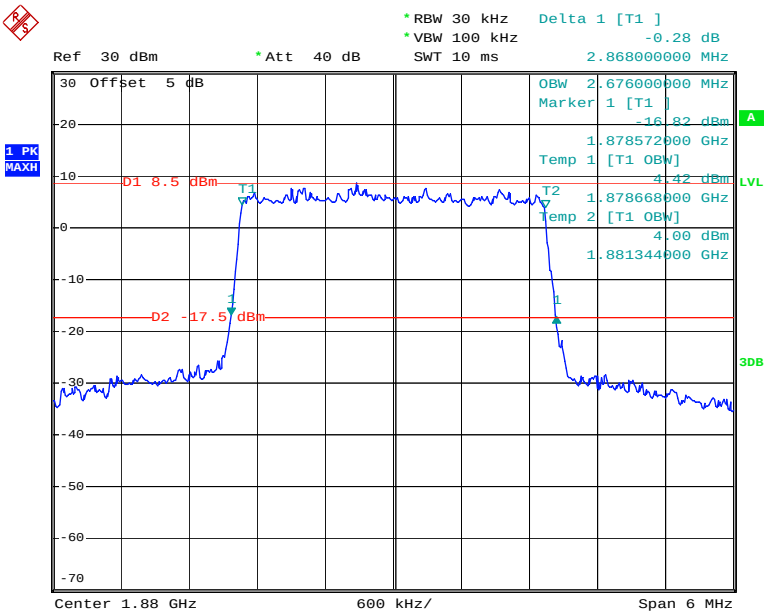

Date: 21.JAN.2019 21:51:02

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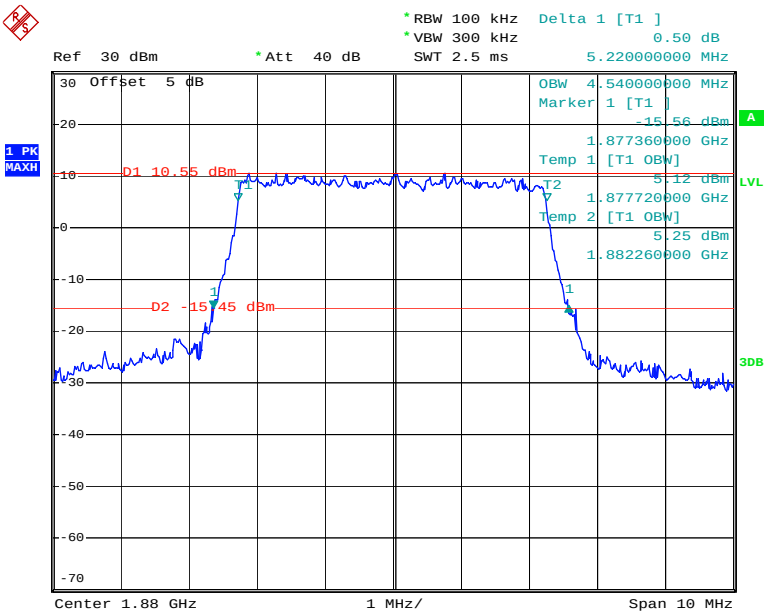

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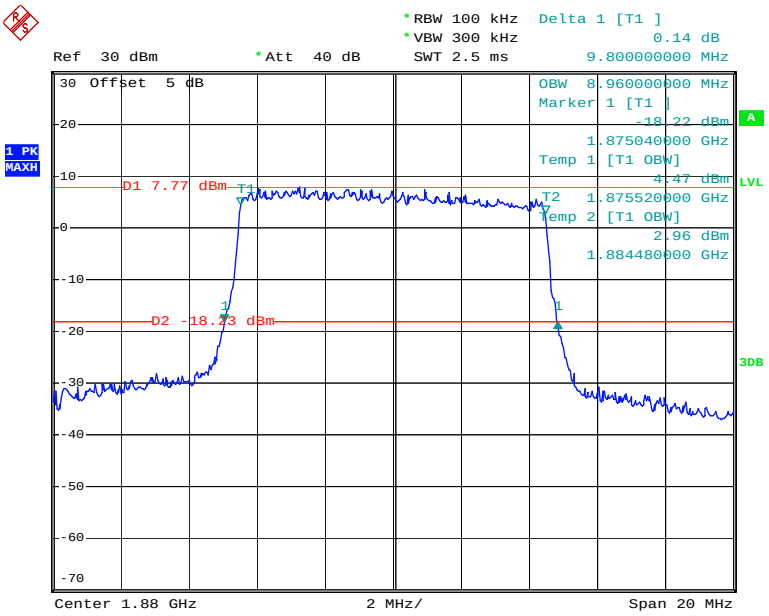

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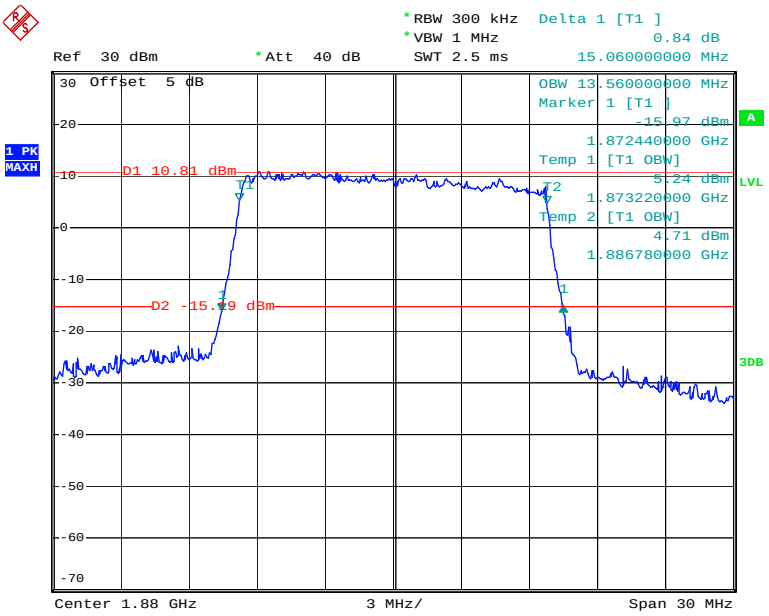

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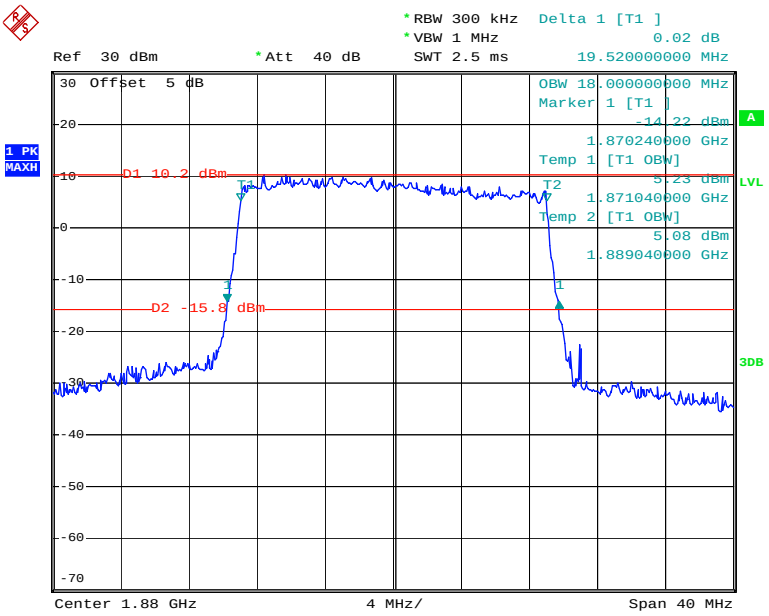

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LTE Band 4

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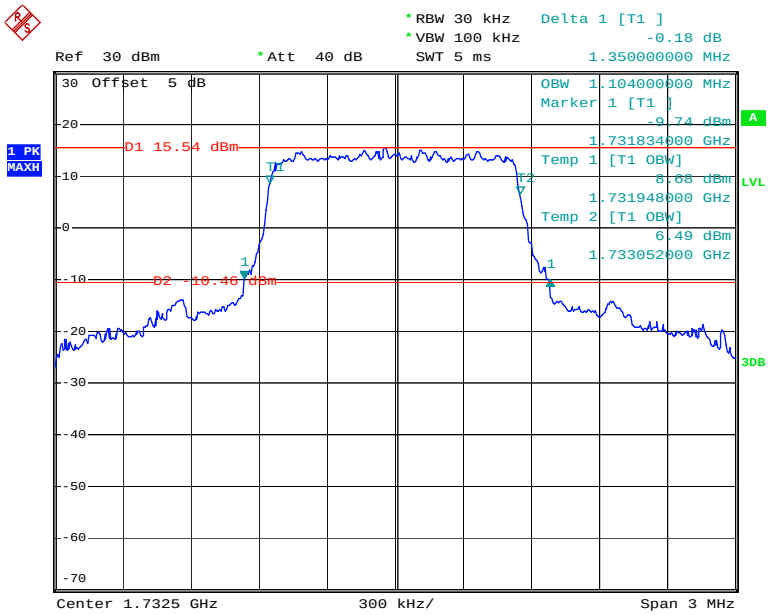

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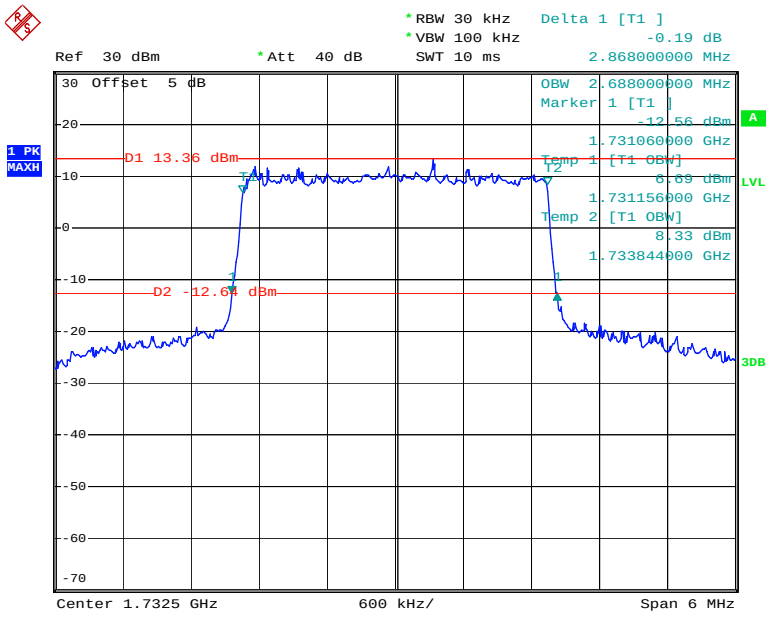

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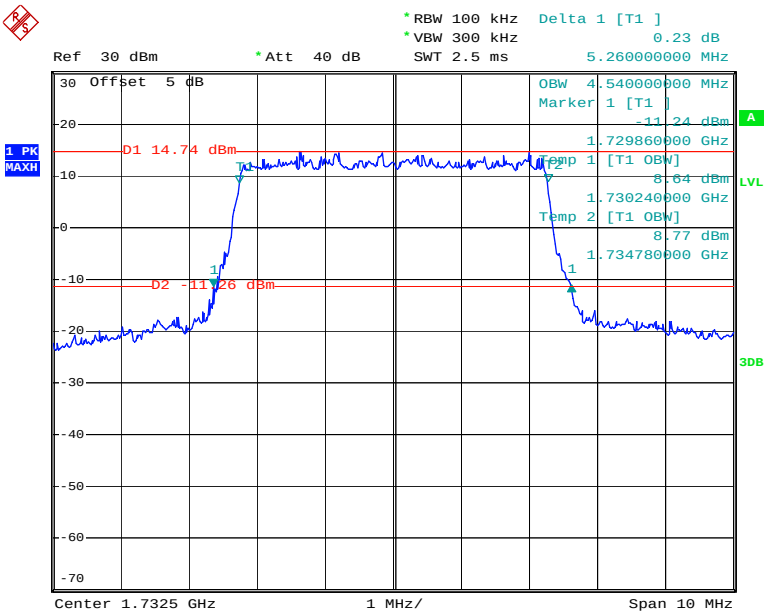
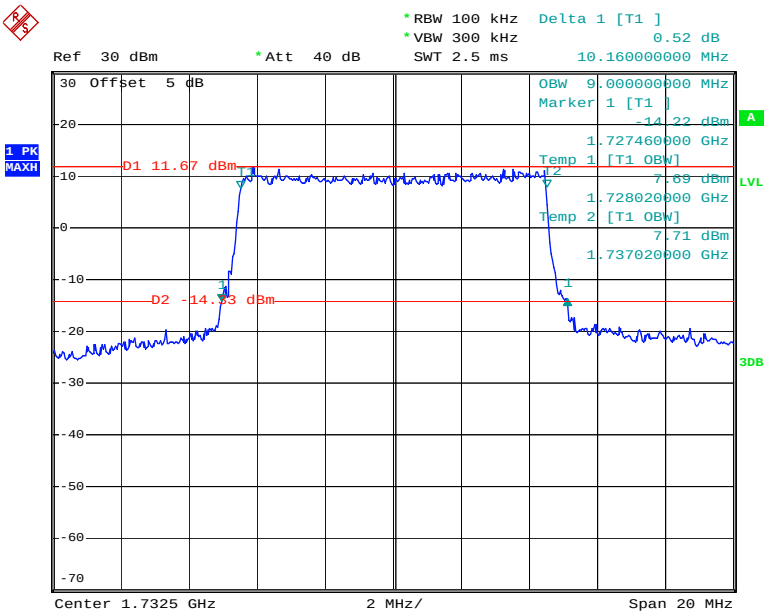
QPSK_5 MHz



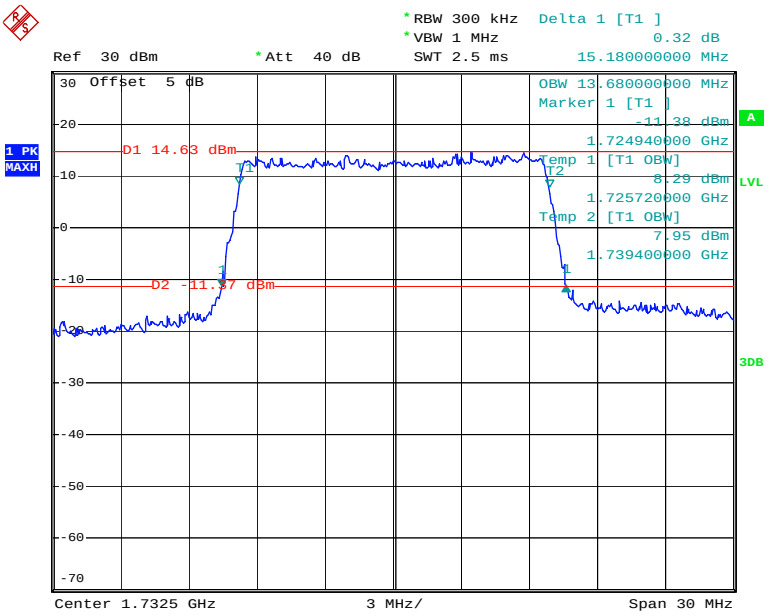
Date: 21.JAN.2019 11:29:04

QPSK_10 MHz



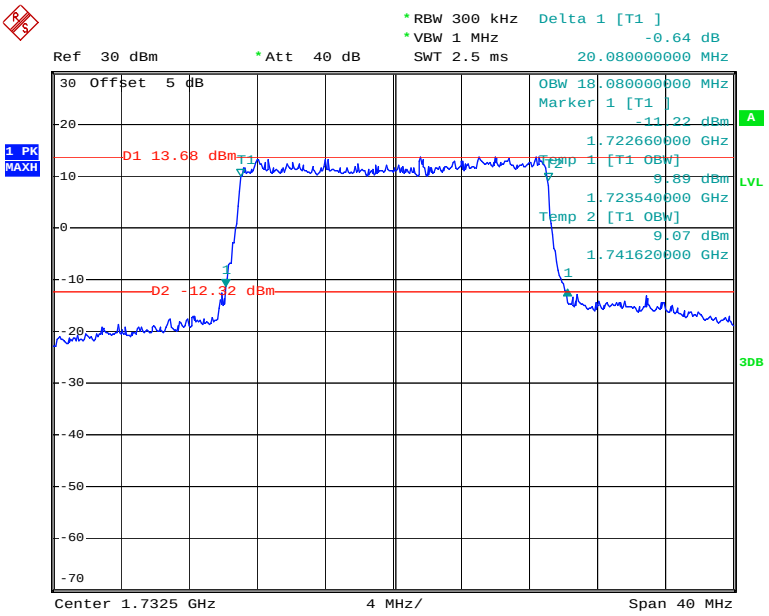
Date: 21.JAN.2019 11:30:07

QPSK_15 MHz



Date: 21.JAN.2019 11:31:09

QPSK_20 MHz



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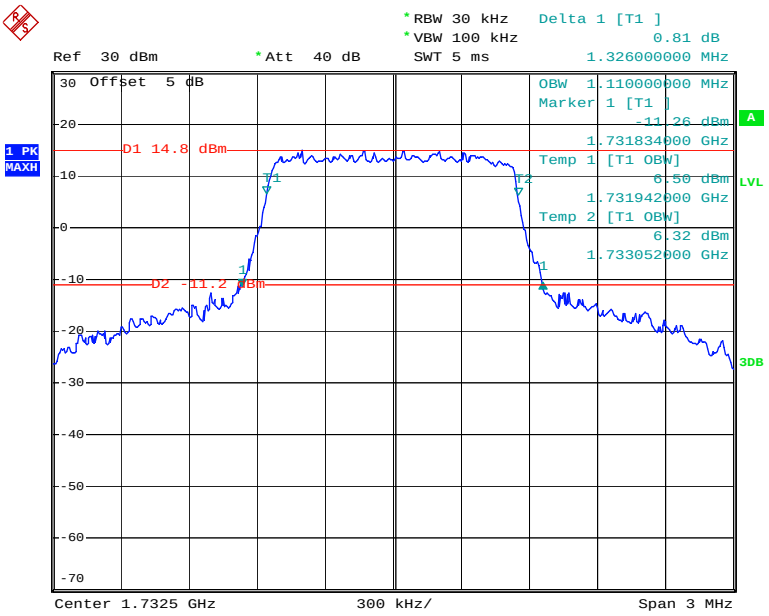
16QAM_1.4 MHz



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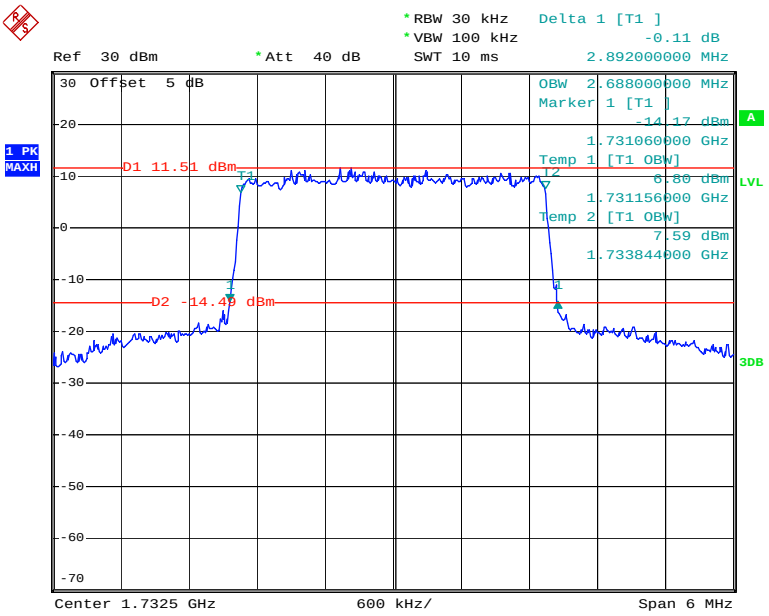
16QAM_3 MHz



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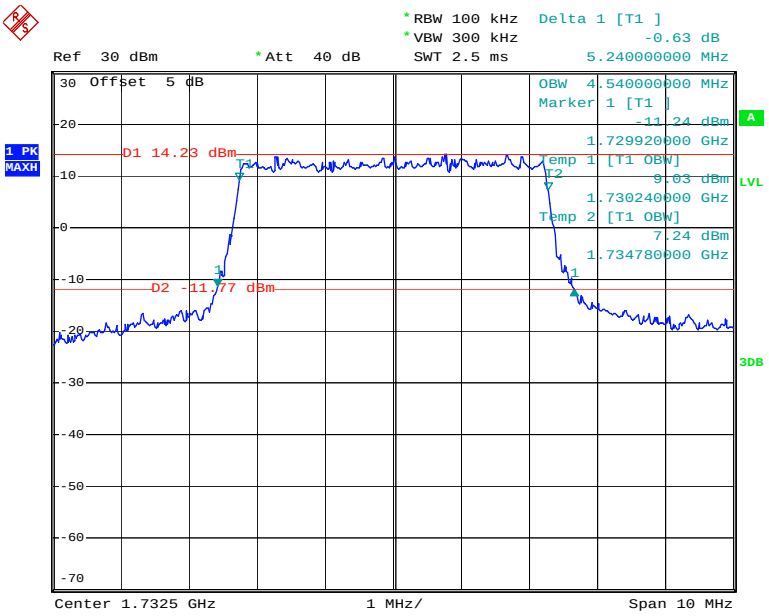
16QAM_5 MHz



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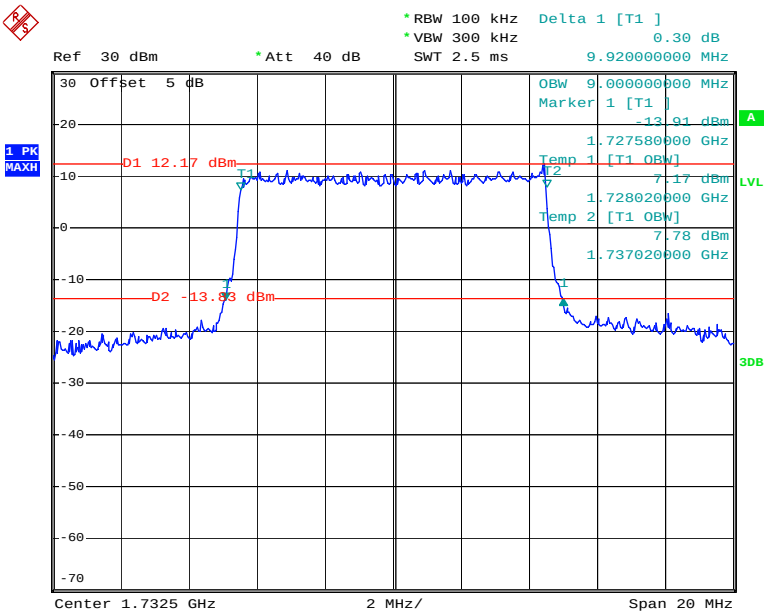
16QAM_10 MHz



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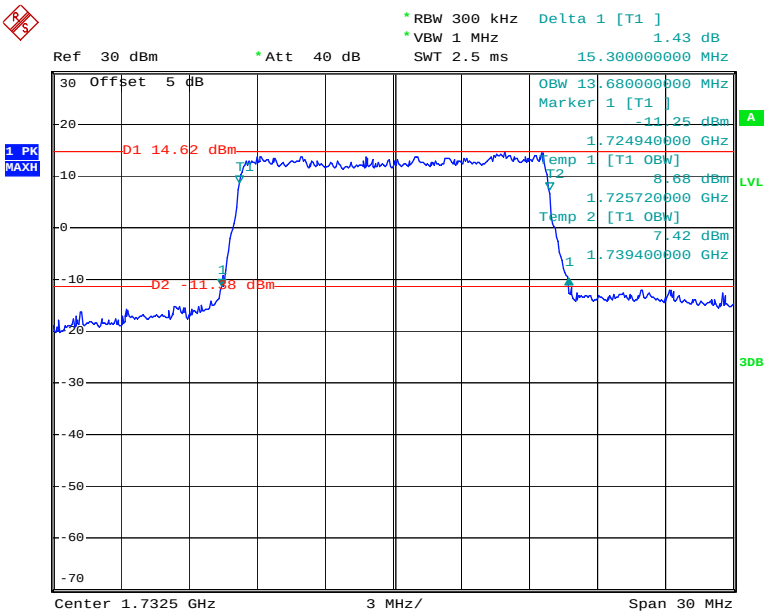
16QAM_15 MHz



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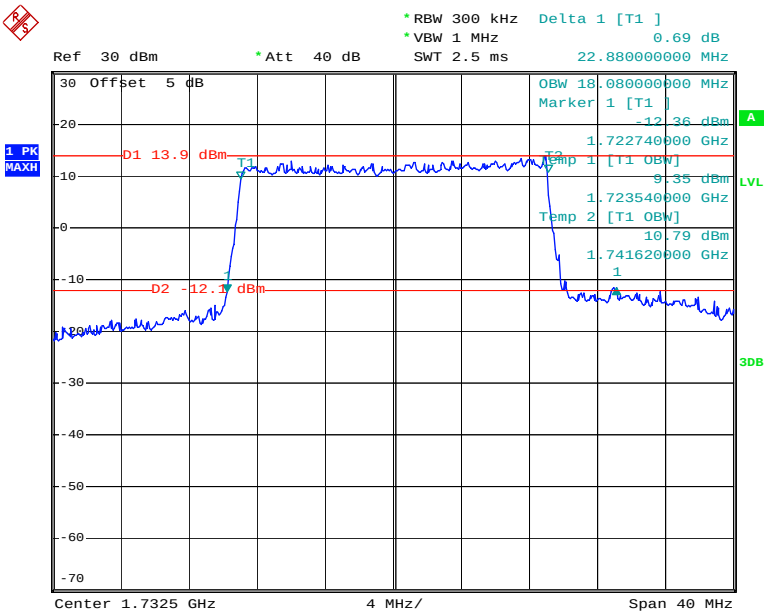
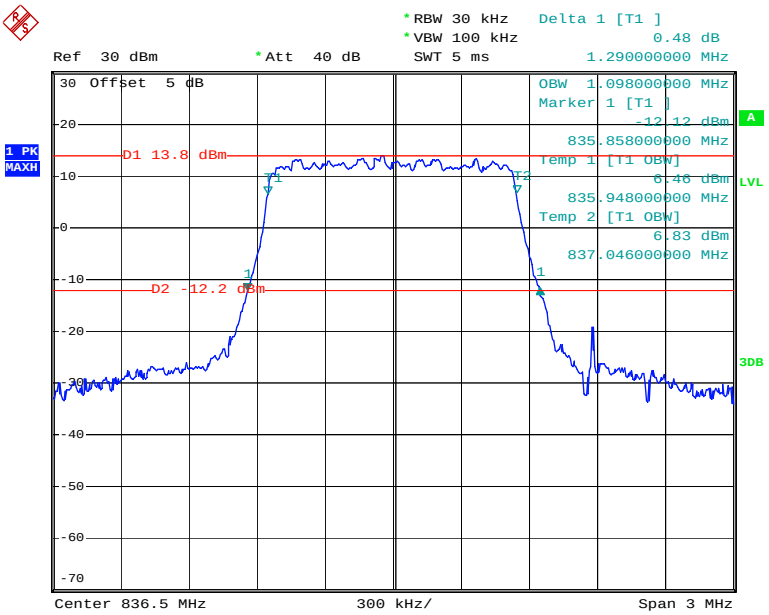
16QAM_20 MHz



Date: 21.JAN.2019 11:33:02

LTE Band 5:

QPSK_1.4 MHz



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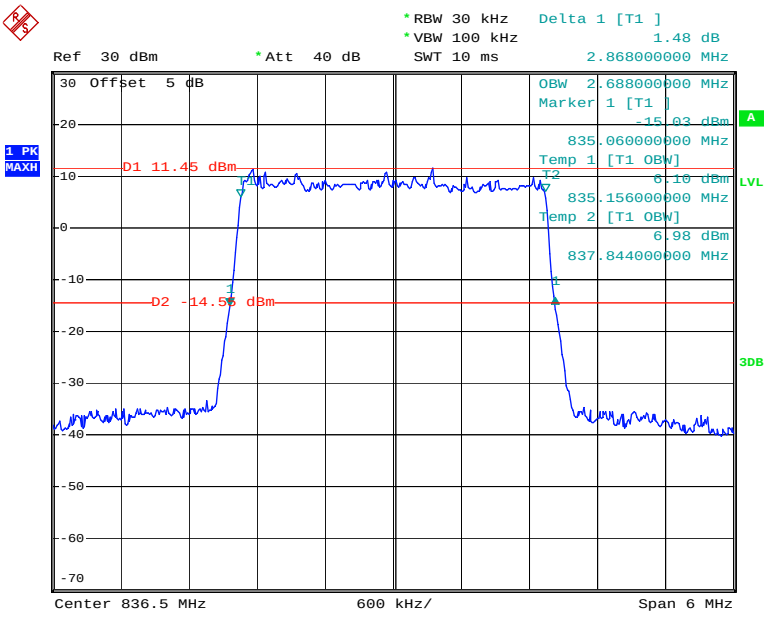
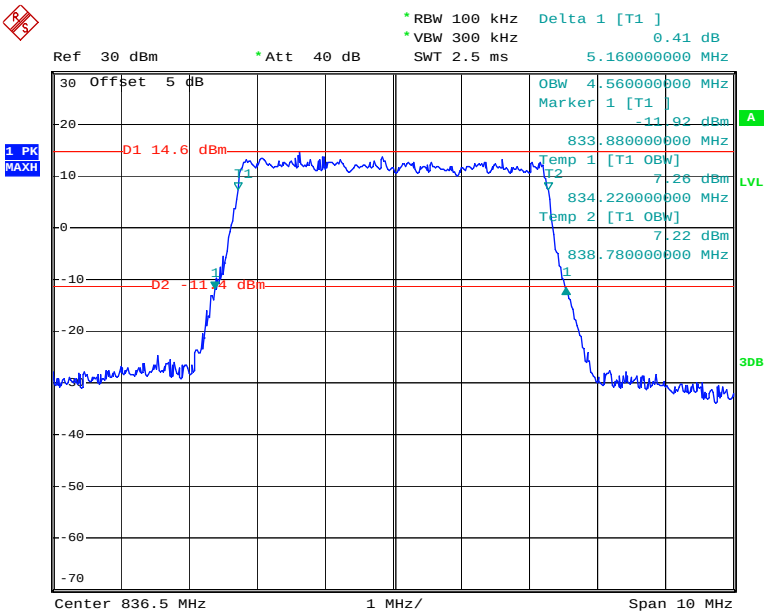
QPSK_3 MHz



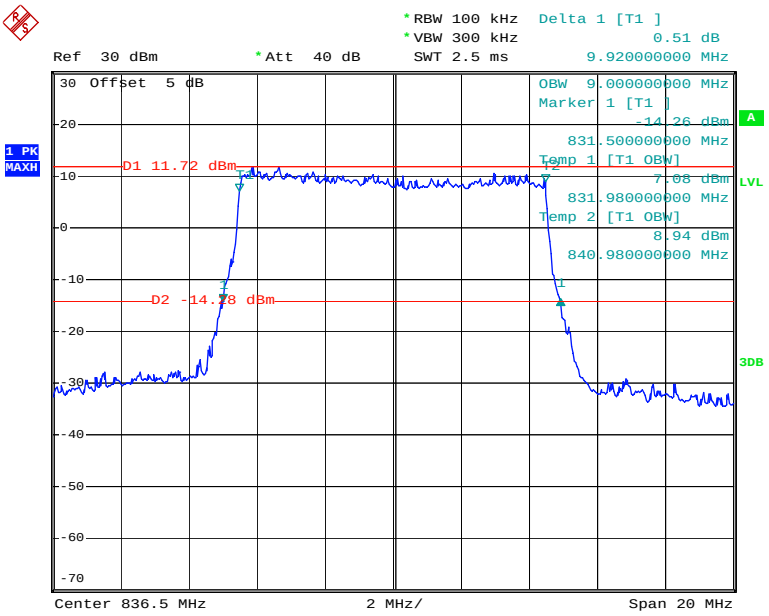
Date: 21.JAN.2019 11:34:49

QPSK_5 MHz



Date: 21.JAN.2019 11:36:10

QPSK_10 MHz



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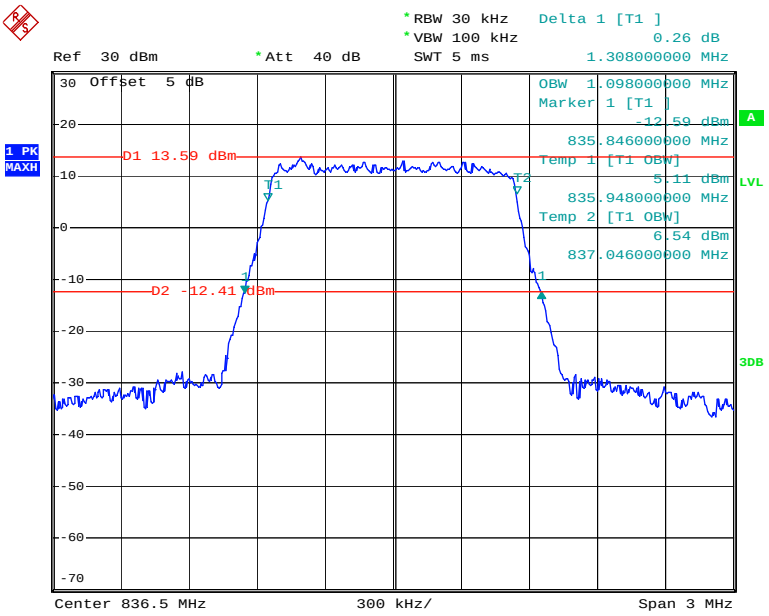
16QAM_1.4 MHz



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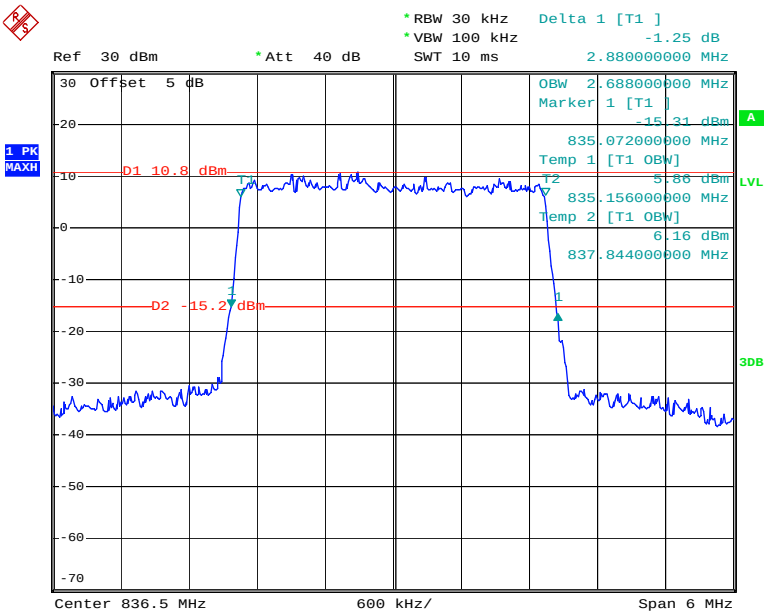
16QAM_3 MHz



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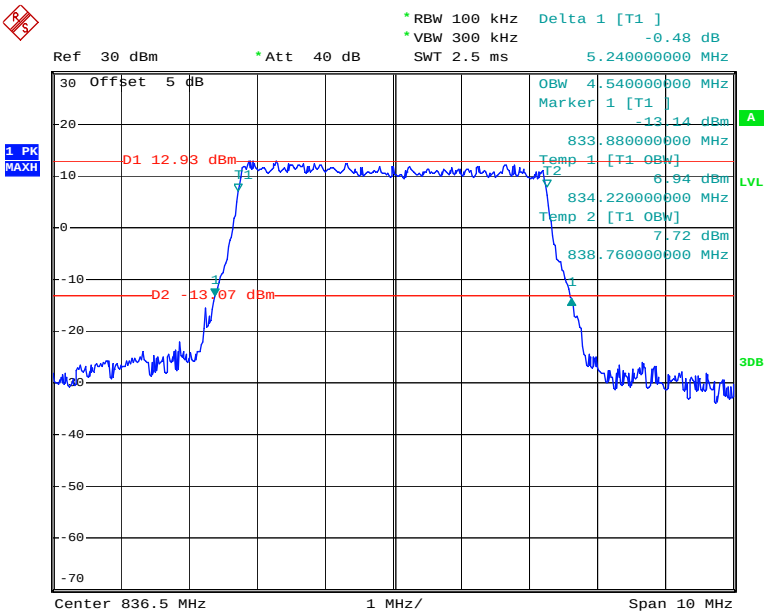
16QAM_5 MHz



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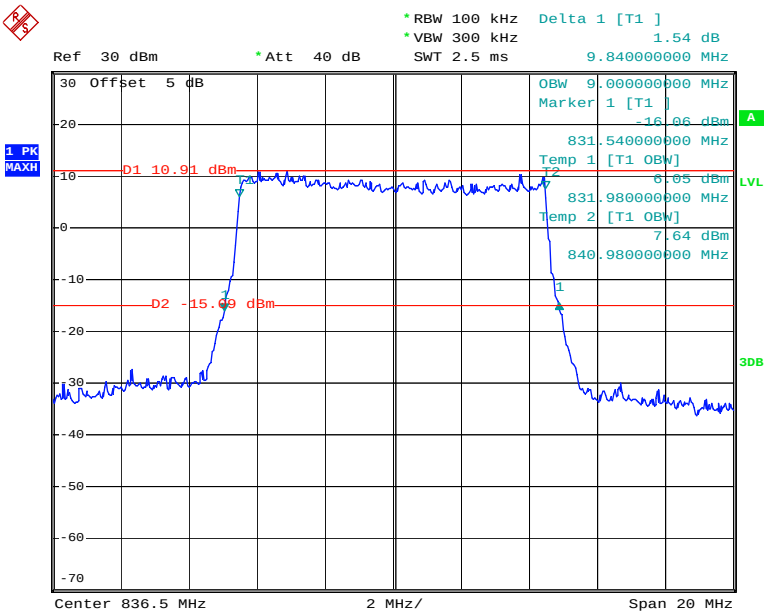
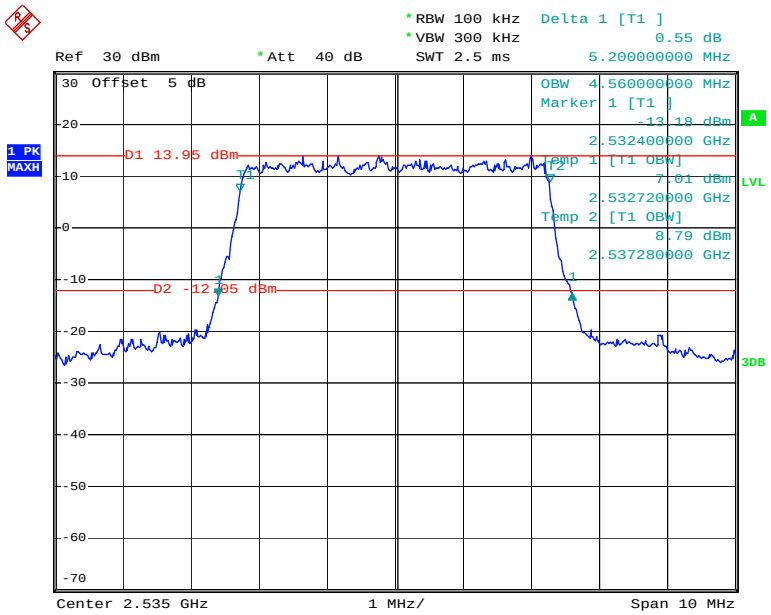
16QAM_10 MHz



Date: 21.JAN.2019 11:38:04

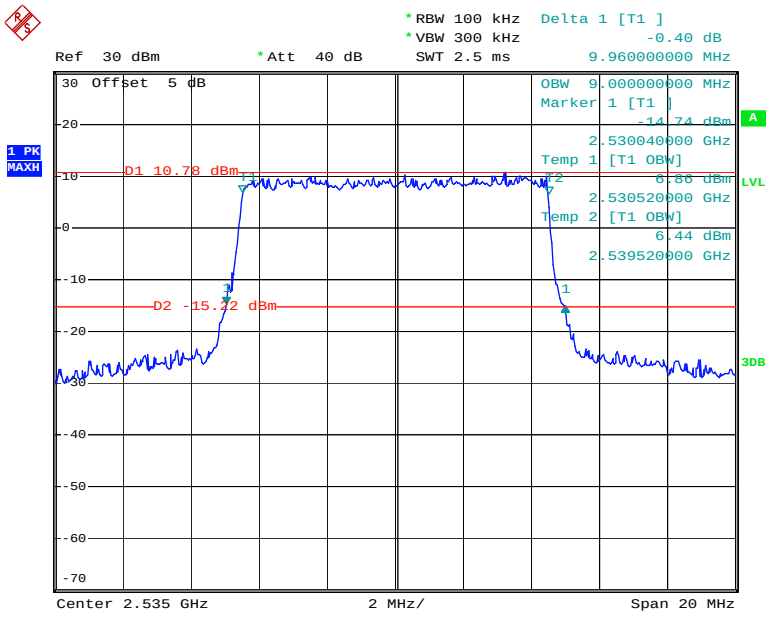
LTE Band 7:

QPSK_5 MHz



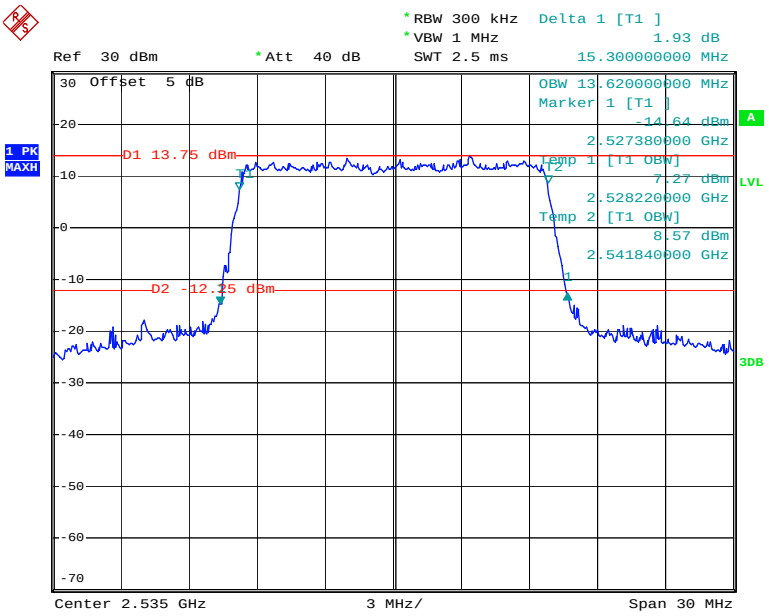
Date: 21.JAN.2019 11:38:53

QPSK_10 MHz



Date: 21.JAN.2019 11:40:04

QPSK_15 MHz



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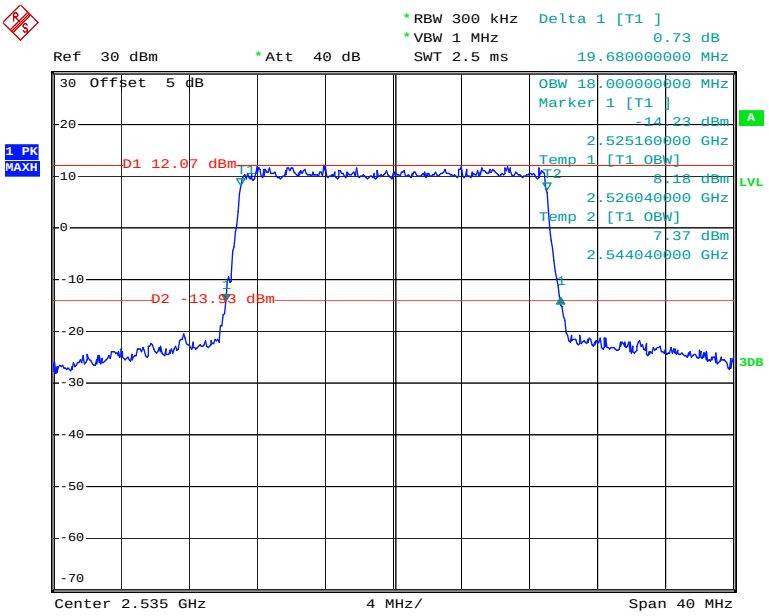
QPSK_20 MHz



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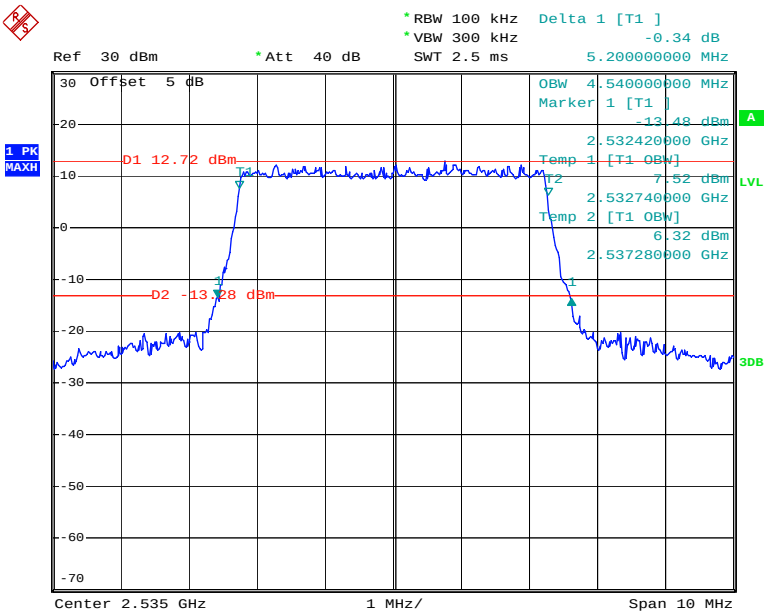
16QAM_5 MHz



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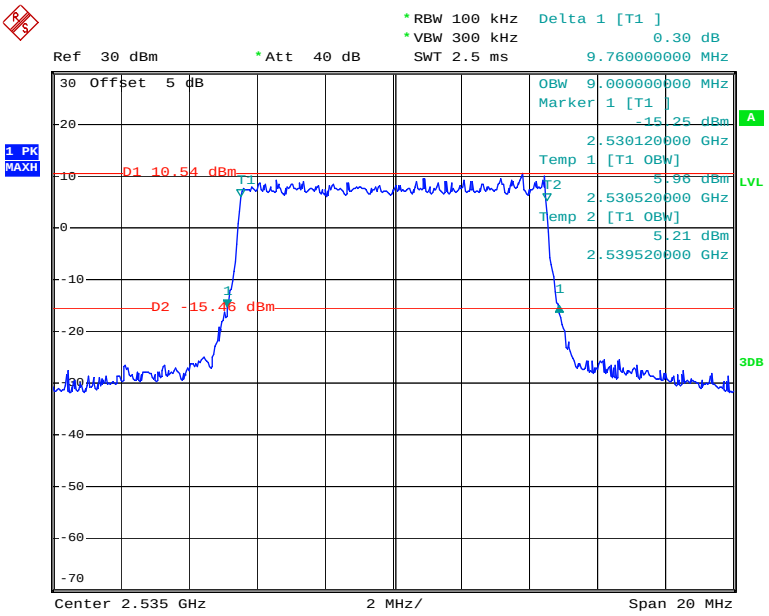
16QAM_10 MHz



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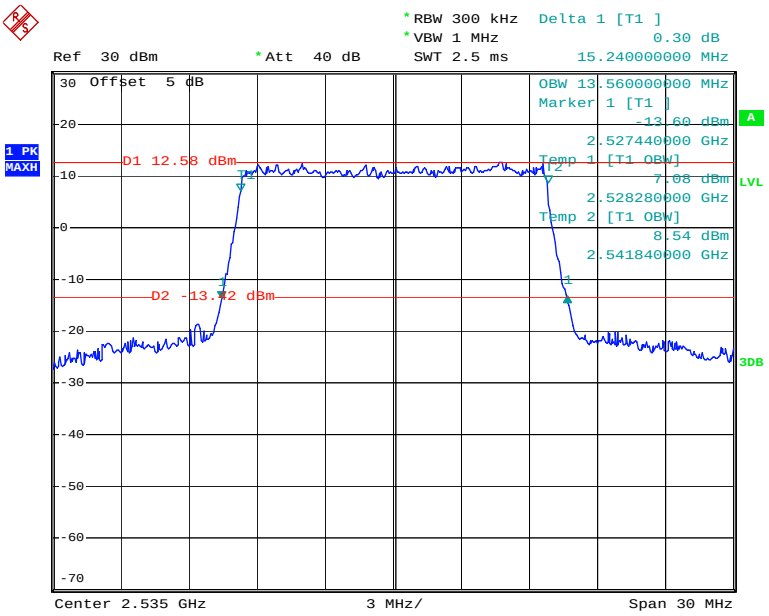
16QAM_15 MHz



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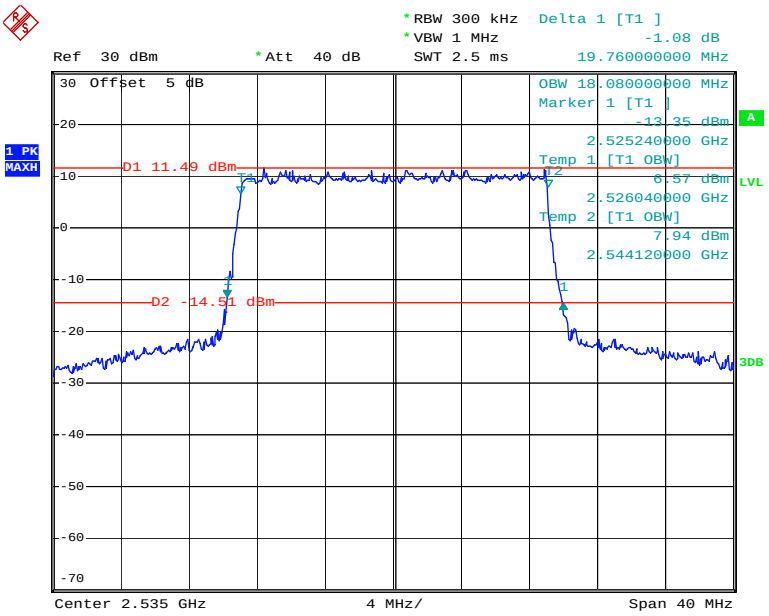
16QAM_20 MHz



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LTE Band 12:

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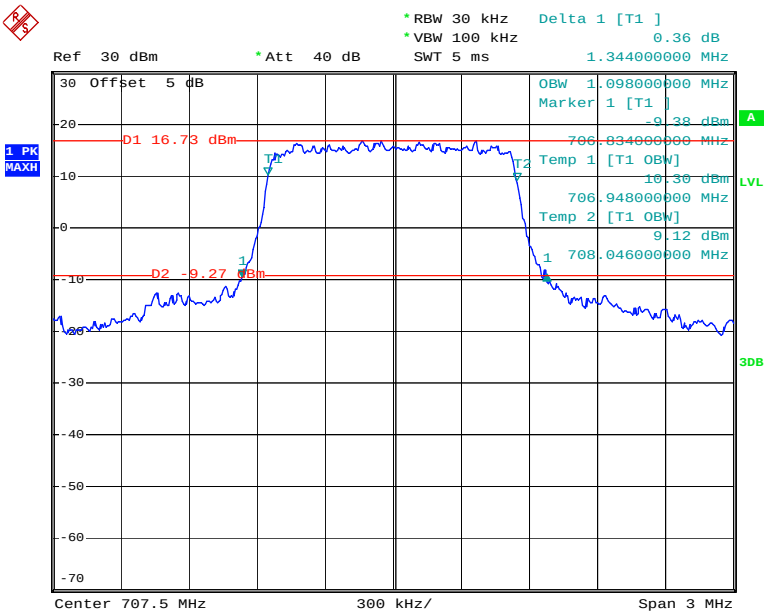

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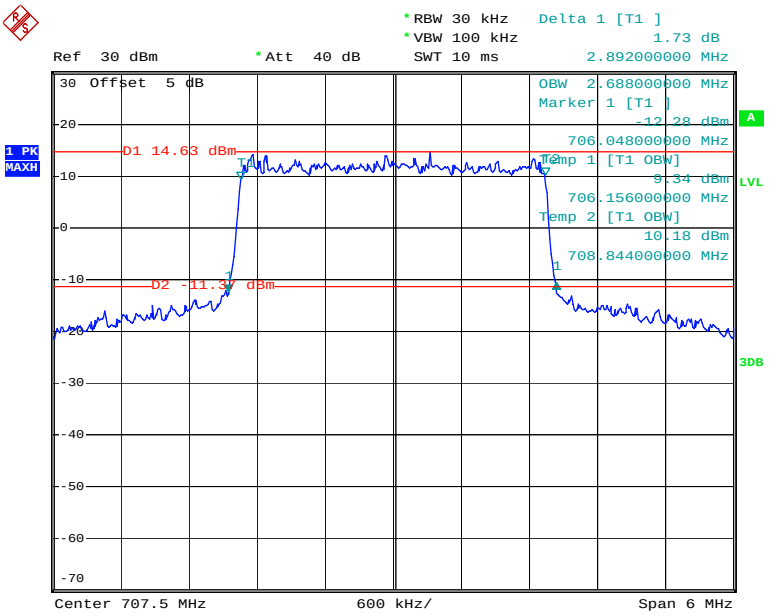
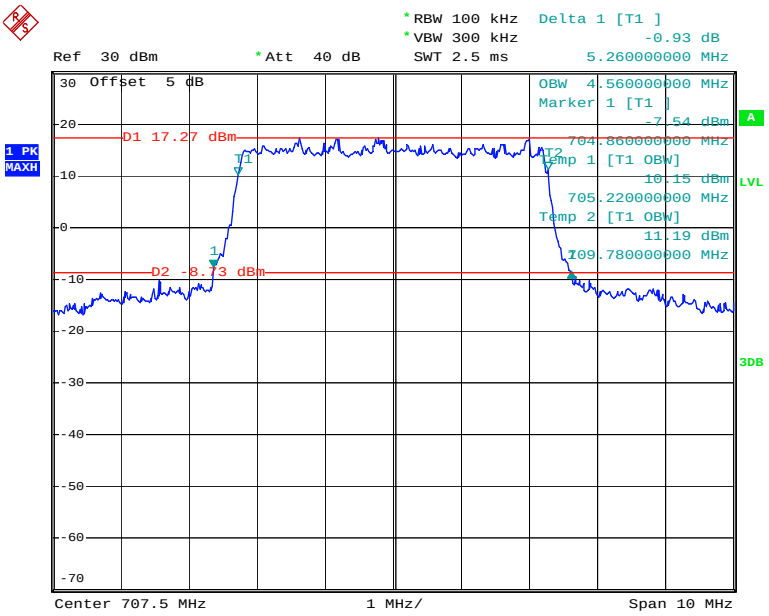
QPSK_3 MHz



Date: 21.JAN.2019 11:44:57

QPSK_5 MHz



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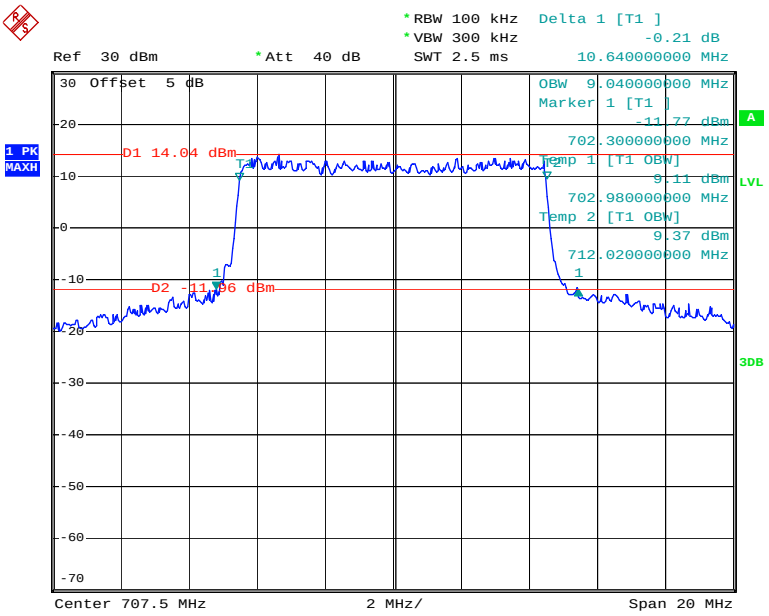
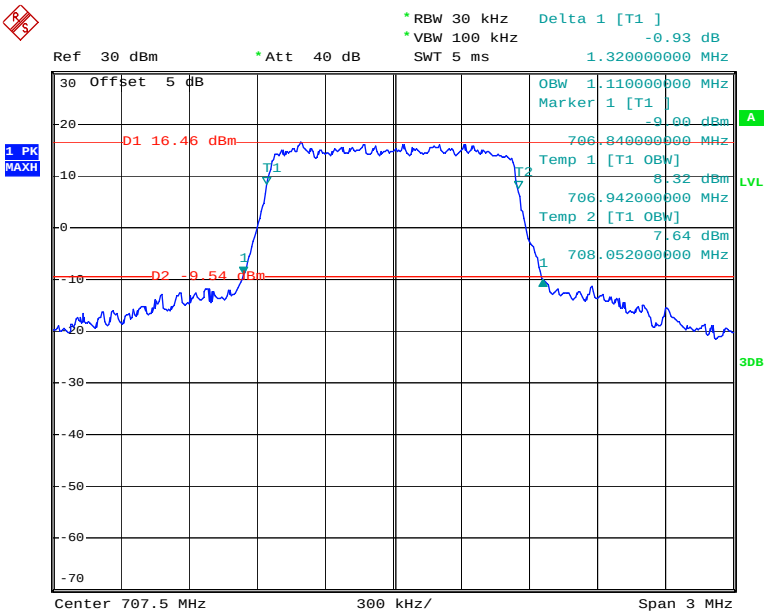
QPSK_10 MHz



Date: 21.JAN.2019 11:47:30

16QAM_1.4 MHz



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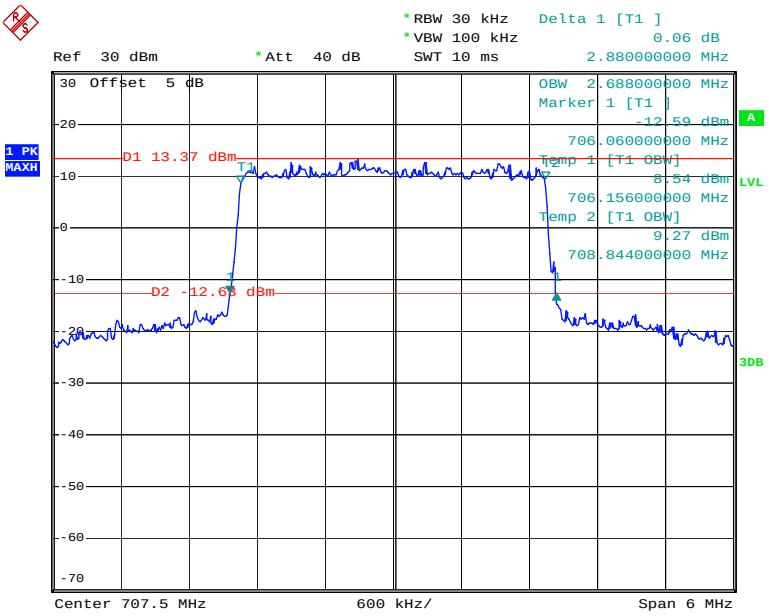
16QAM_3 MHz



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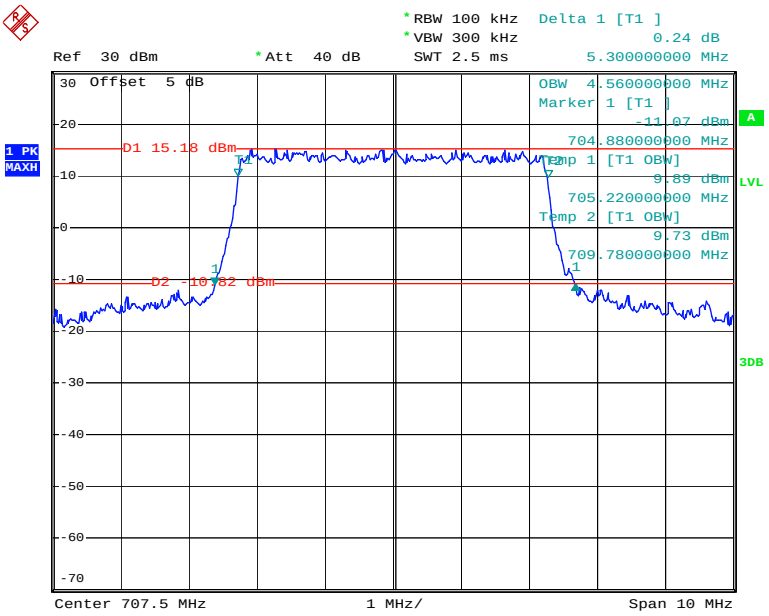
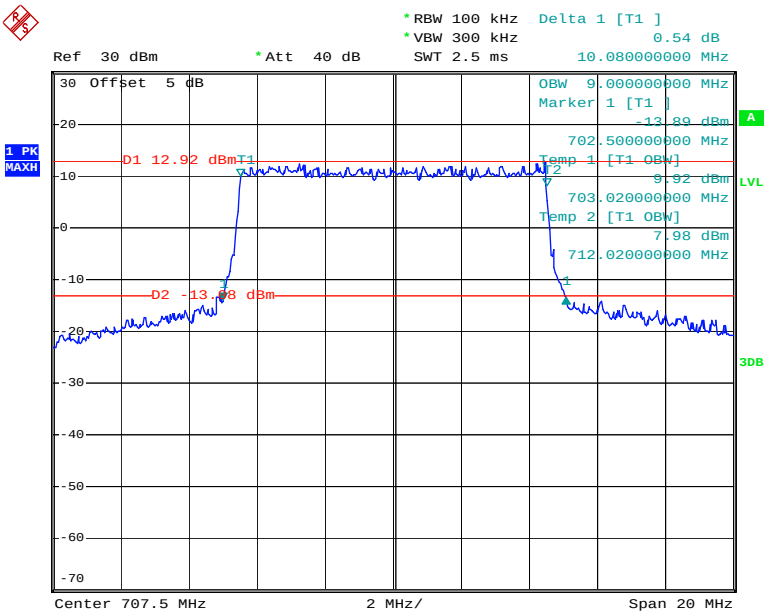
16QAM_5 MHz



Date: 21.JAN.2019 11:46:56

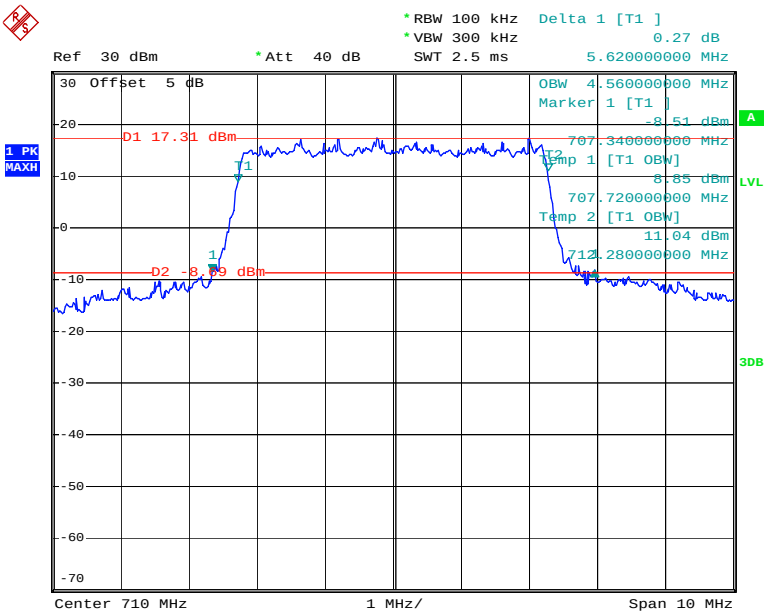
16QAM_10 MHz



Date: 21.JAN.2019 11:48:01

LTE Band 17:

QPSK_5 MHz



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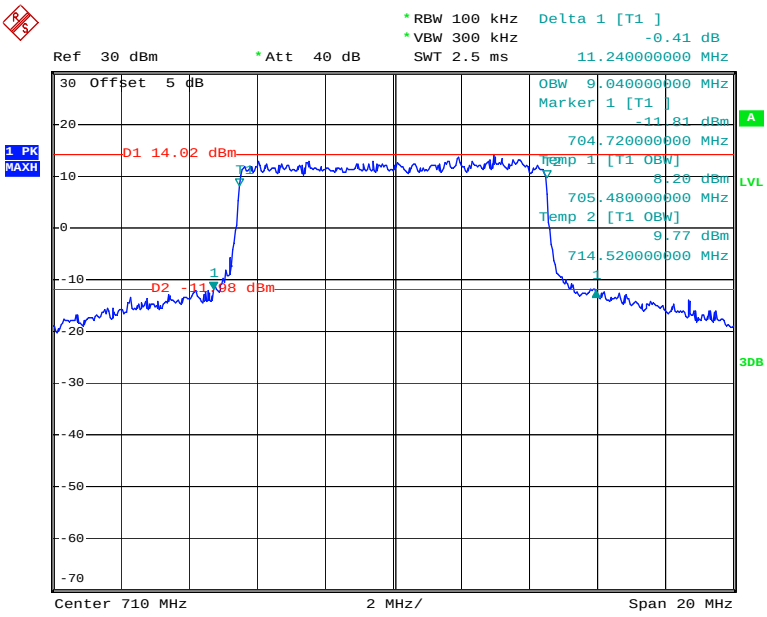
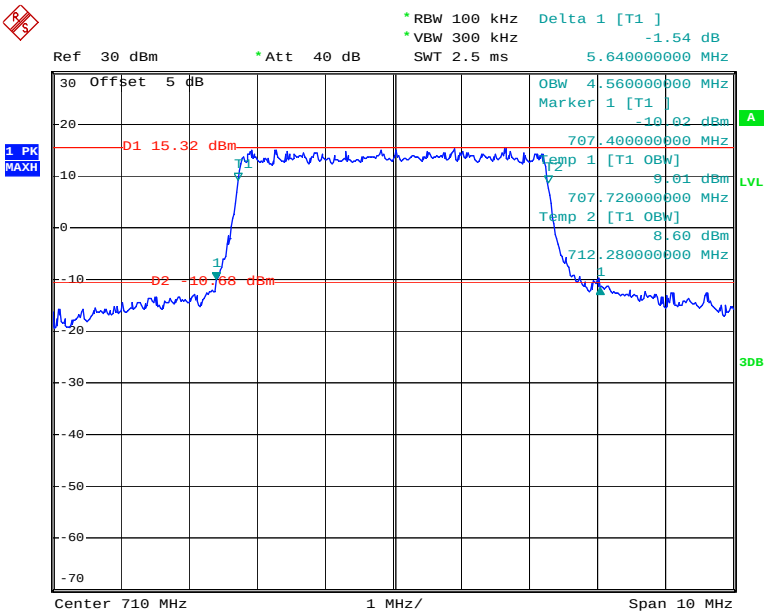
QPSK_10 MHz



Date: 21.JAN.2019 11:49:53

16QAM_5 MHz



Date: 21.JAN.2019 11:49:20

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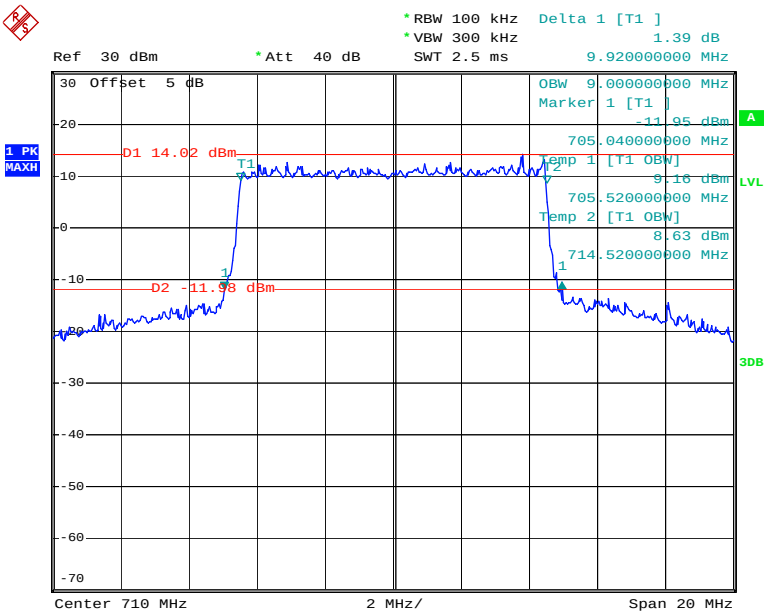


Date: 21.JAN.2019 11:50:24

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

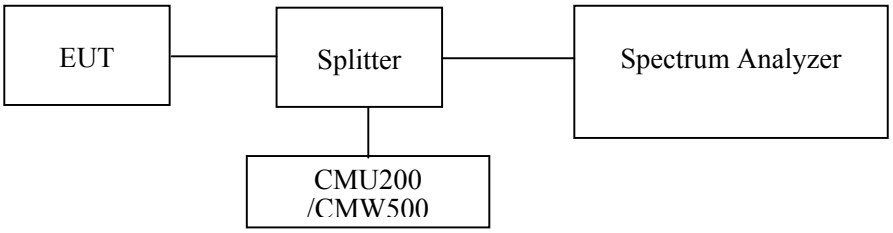
Applicable Standard

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	FSP 38	100478	2018-12-10	2019-12-10
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each time	N/A

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

Test Data

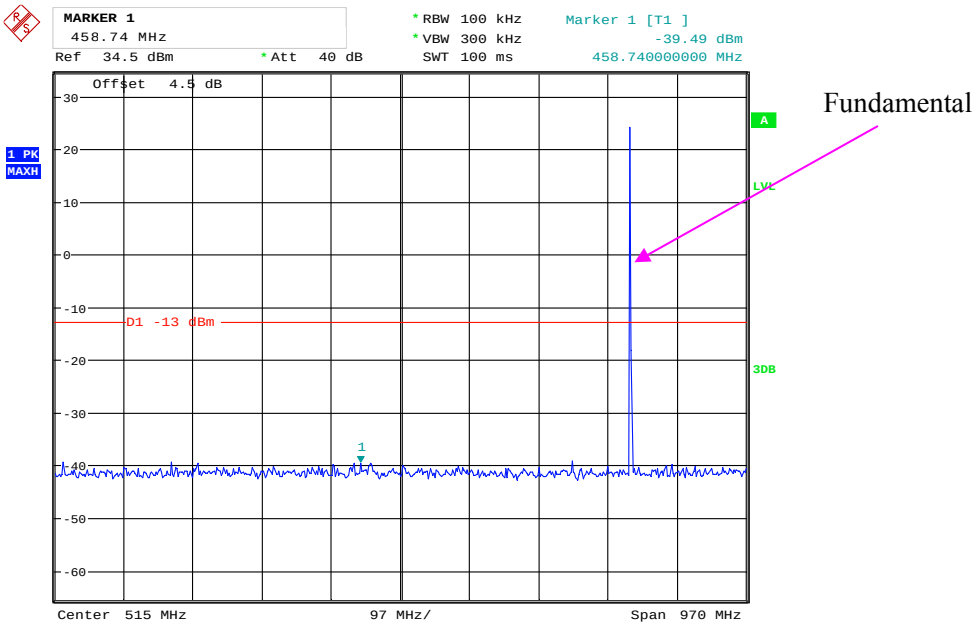
Environmental Conditions

Temperature:	24.9~25.5°C
Relative Humidity:	35~45 %
ATM Pressure:	100.6~100.9 kPa

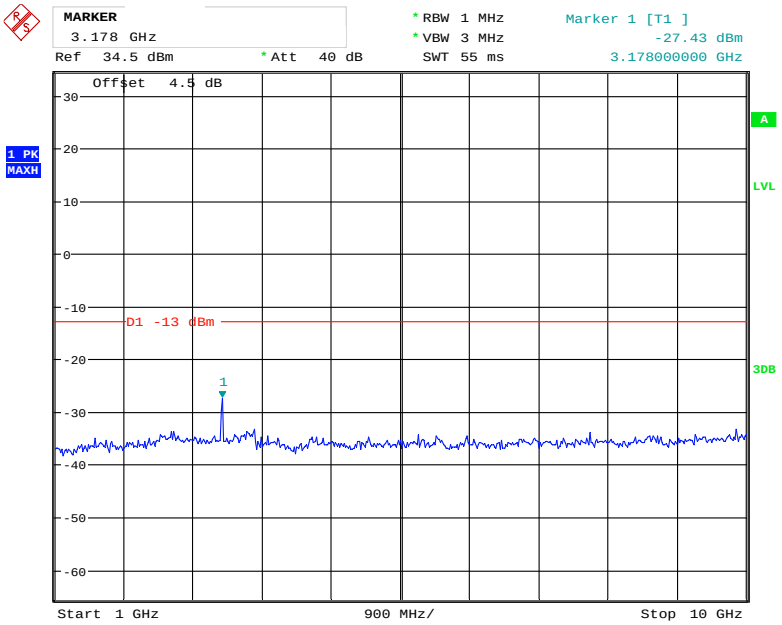
The testing was performed by Blake Yang, Carrie He on 2019-01-28~2019-01-31.

Please refer to the following plots.

GSM850_Middle Channel

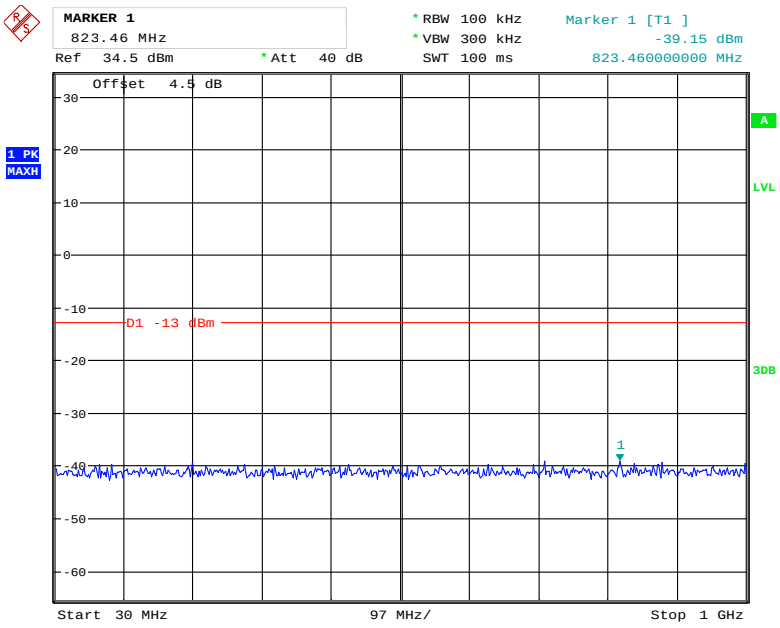


Date: 31.JAN.2019 11:19:02



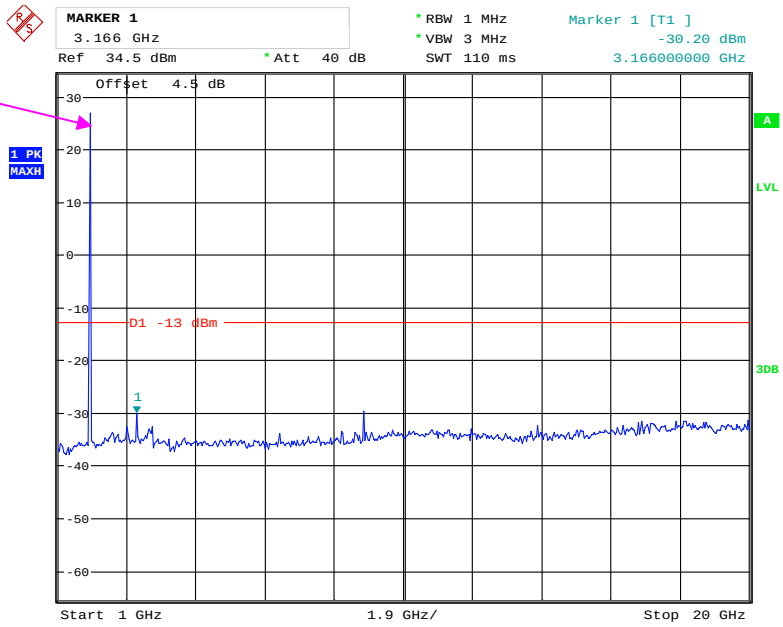
Date: 31.JAN.2019 11:20:07

PCS 1900_ Middle Channel



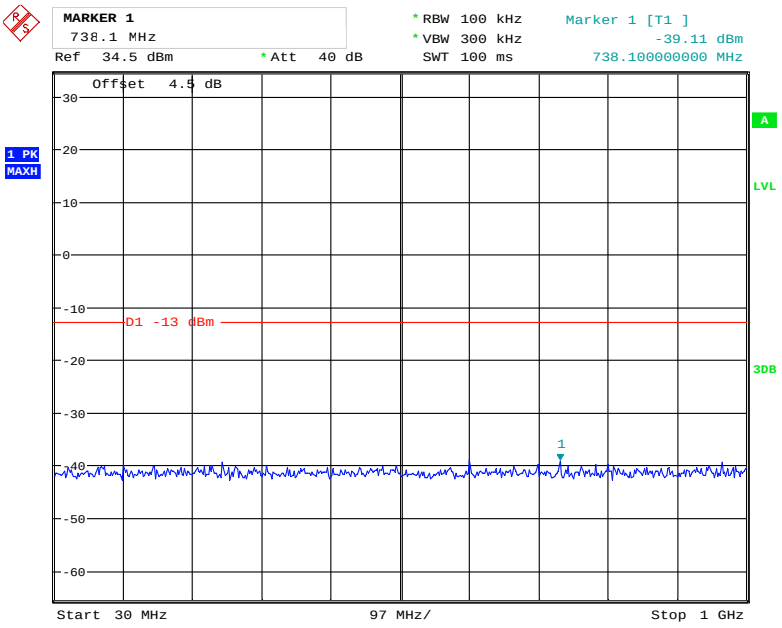
Date: 31.JAN.2019 11:23:31

Fundamental

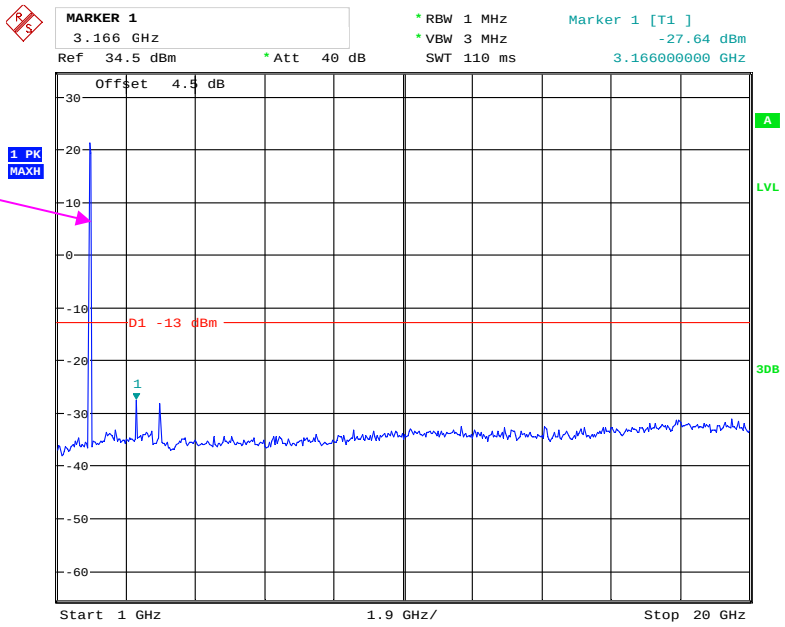


Date: 31.JAN.2019 11:22:37

WCDMA Band II,Rel99



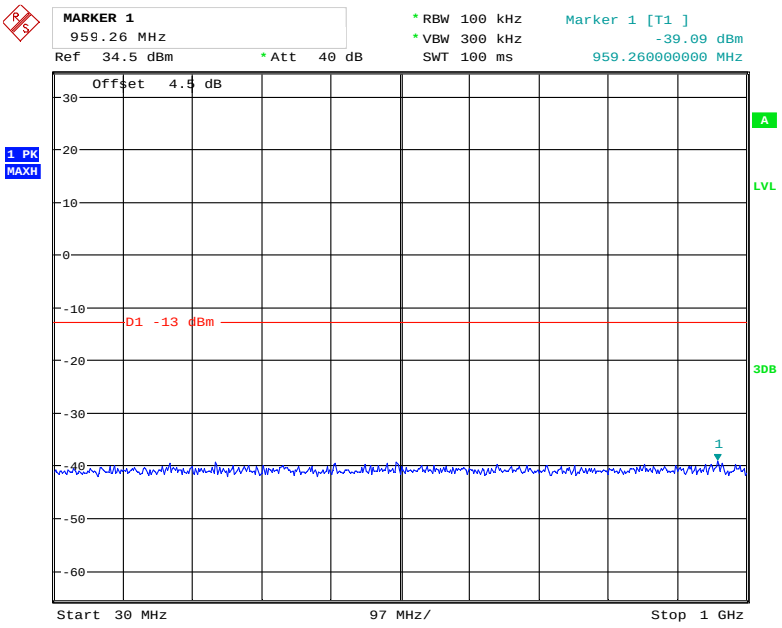
Date: 31.JAN.2019 11:26:24



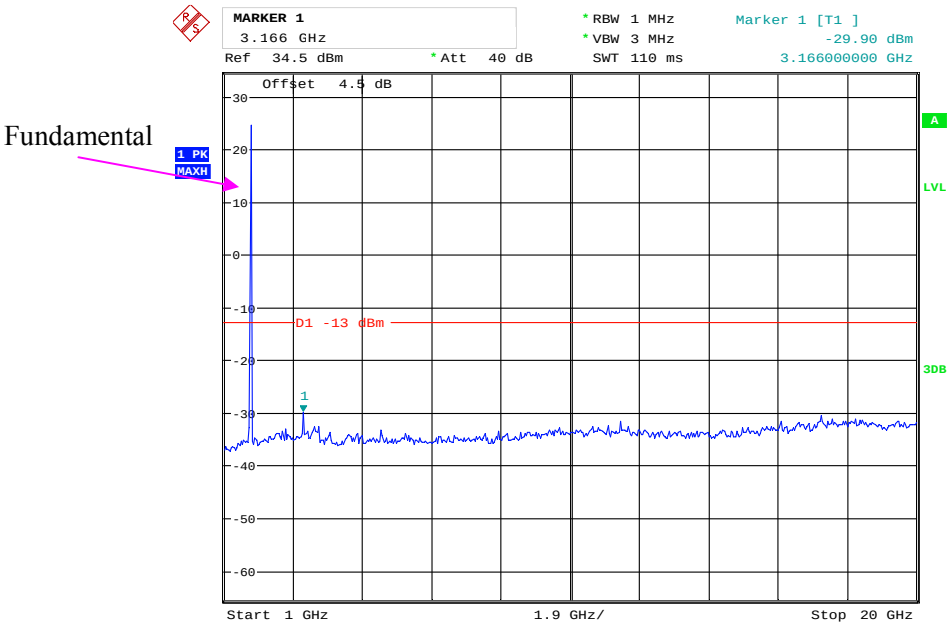
Fundamental

Date: 31.JAN.2019 11:28:02

WCDMA Band IV,Rel99

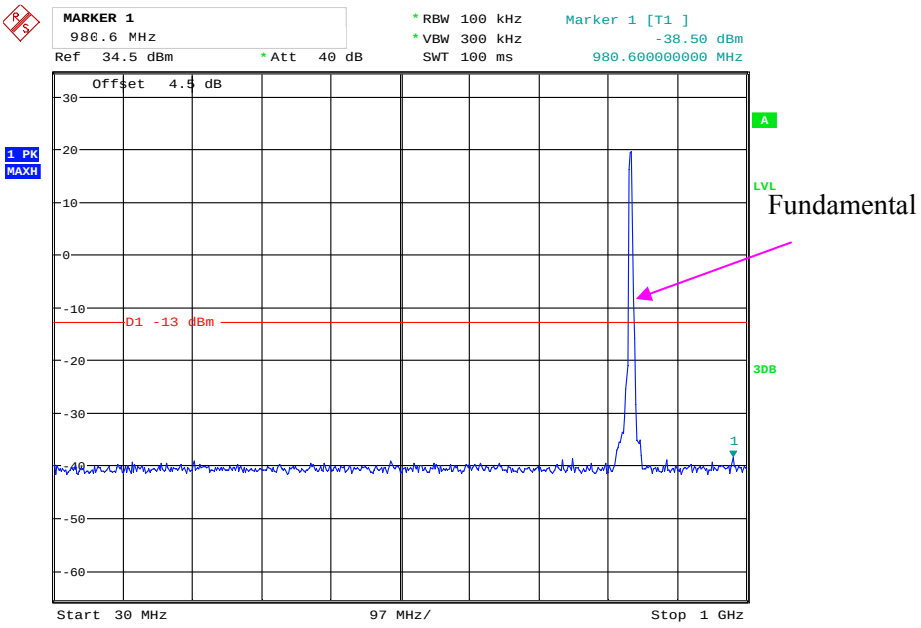


Date: 31.JAN.2019 11:31:57

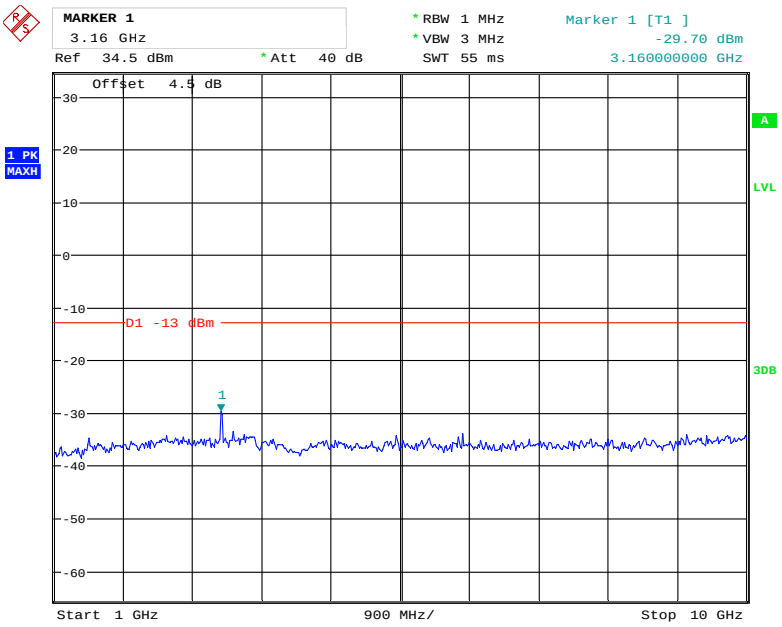


Date: 31.JAN.2019 11:31:00

WCDMA Band V,Rel99



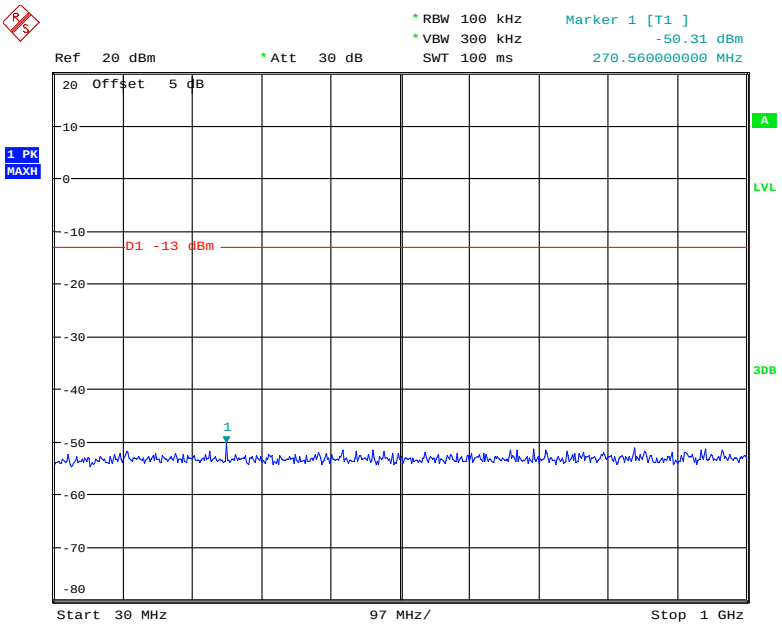
Date: 31.JAN.2019 11:33:32



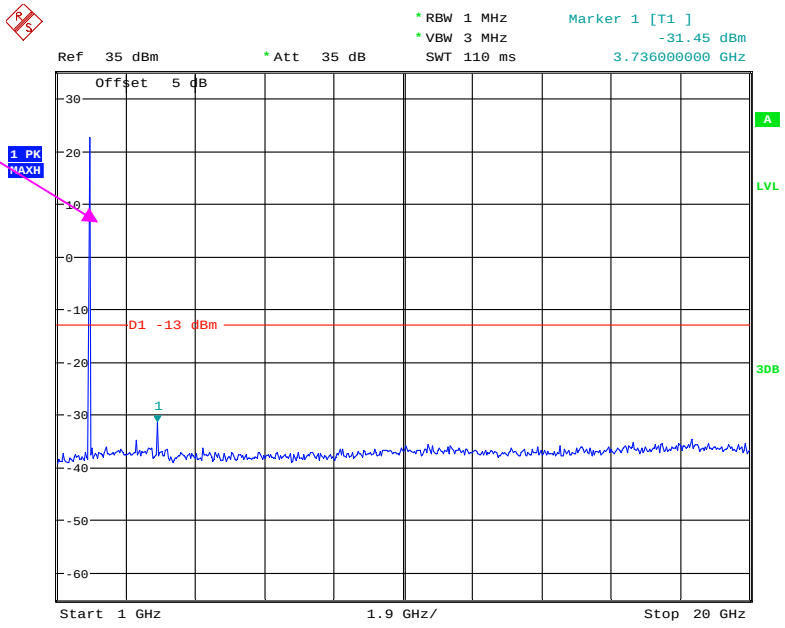
Date: 31.JAN.2019 11:33:56

LTE Band 2 (Middle Channel)

QPSK_1.4 MHz

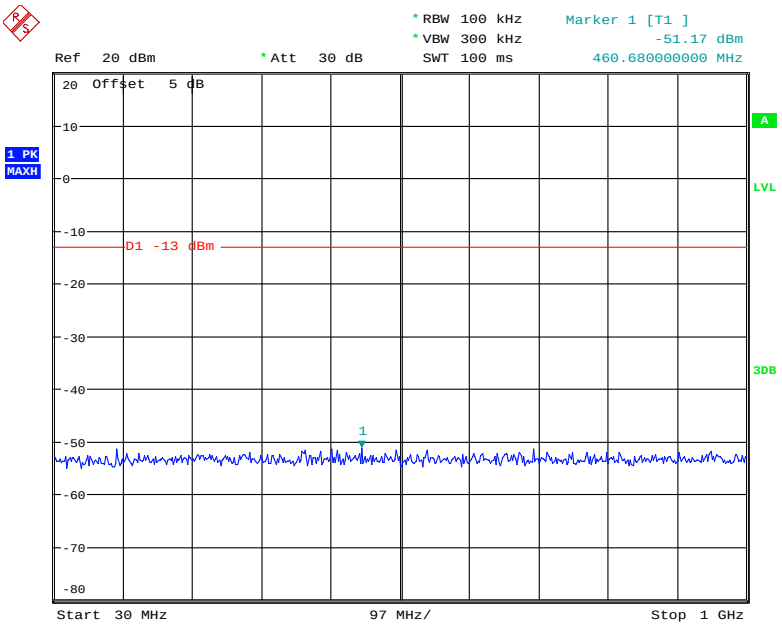


Date: 28.JAN.2019 15:29:32

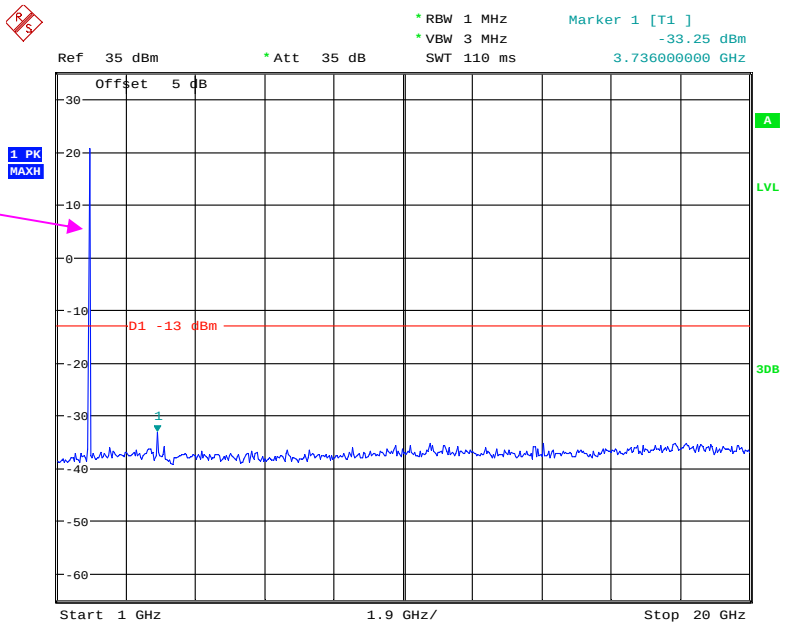


Date: 28.JAN.2019 15:29:42

QPSK_3 MHz



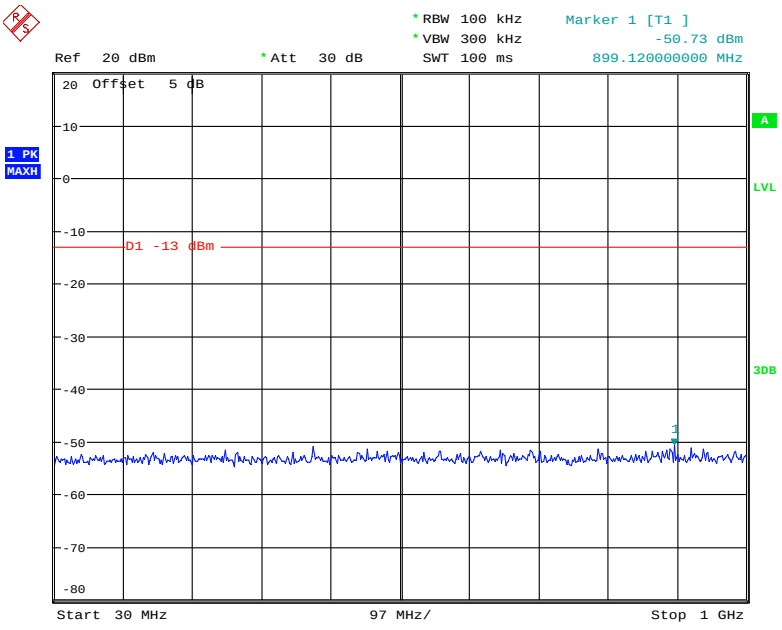
Date: 28.JAN.2019 15:29:59



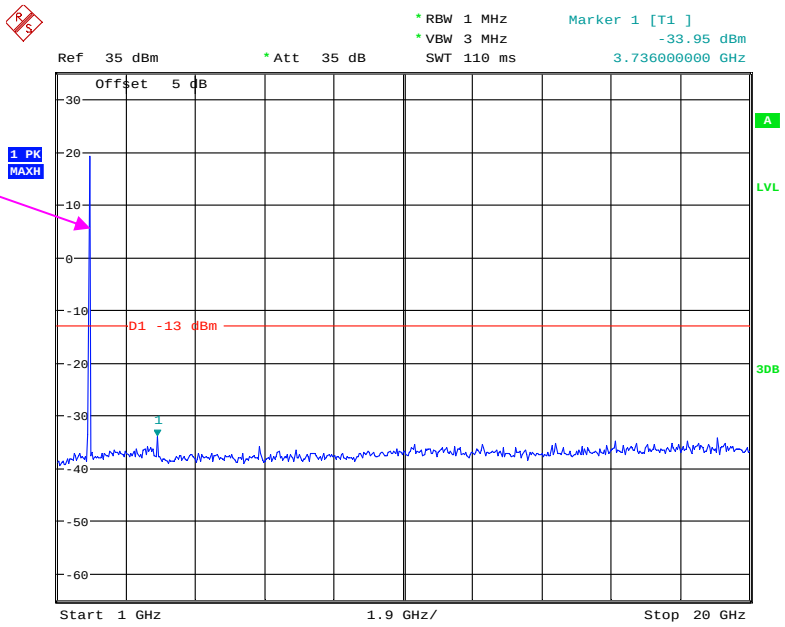
Fundamental

Date: 28.JAN.2019 15:30:10

QPSK_5 MHz



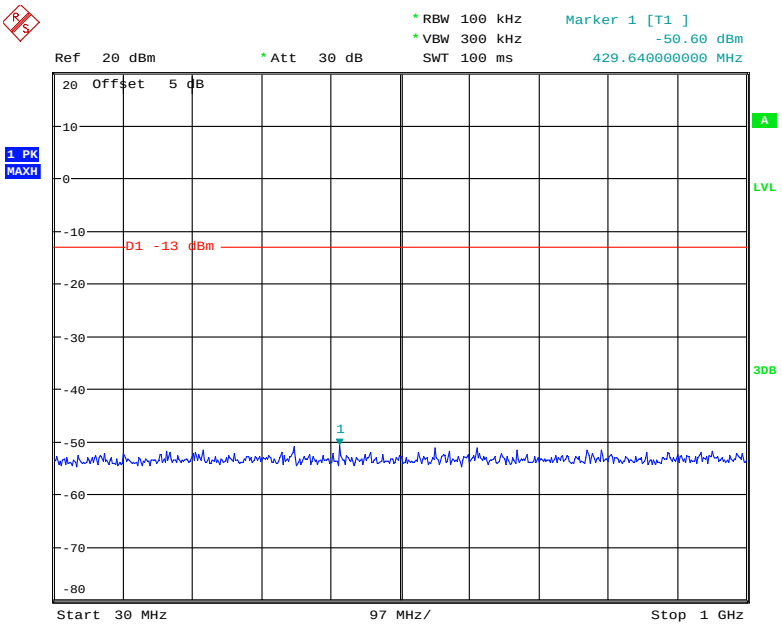
Date: 28.JAN.2019 15:30:30



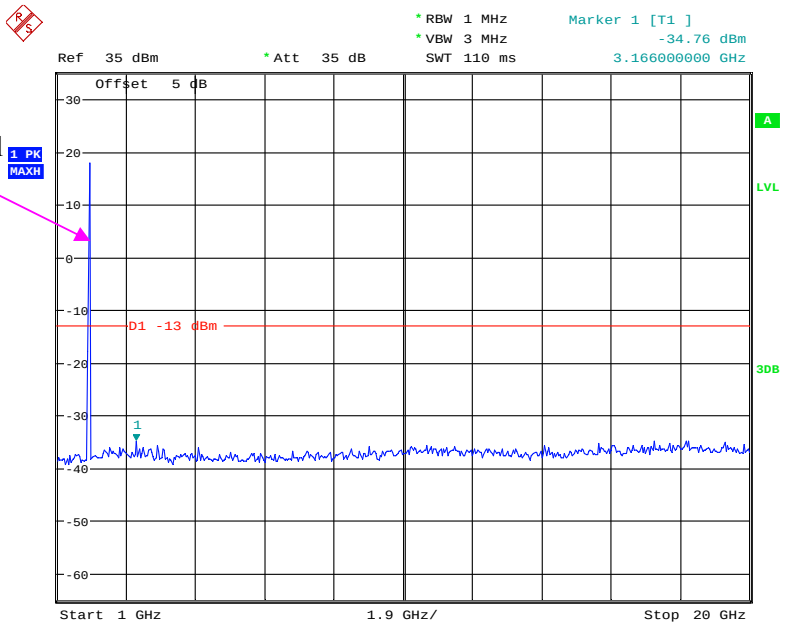
Fundamental

Date: 28.JAN.2019 15:30:41

QPSK_10 MHz

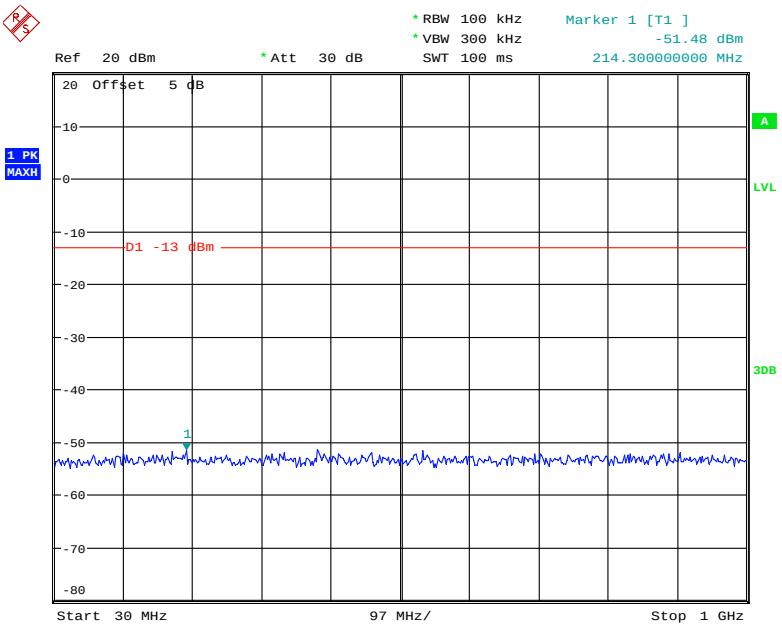


Date: 28.JAN.2019 15:30:59

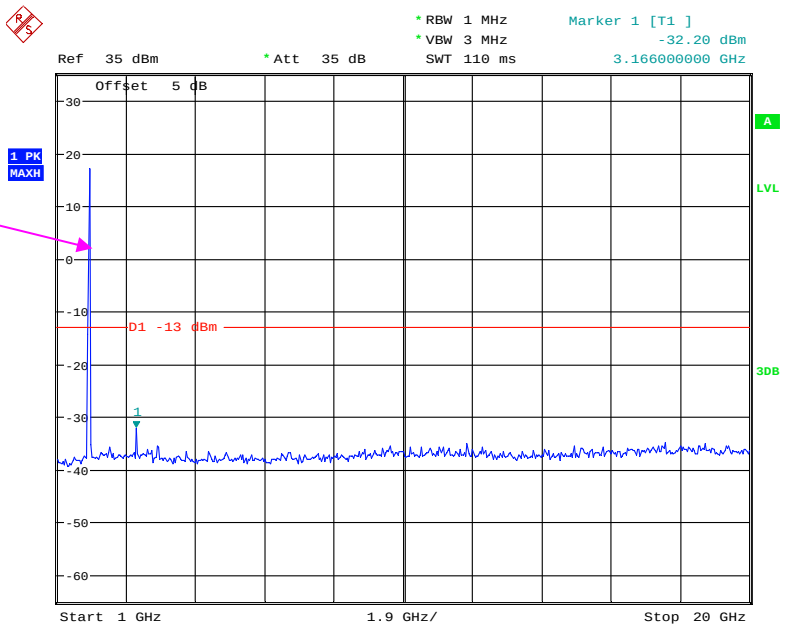


Date: 28.JAN.2019 15:31:10

QPSK_15 MHz



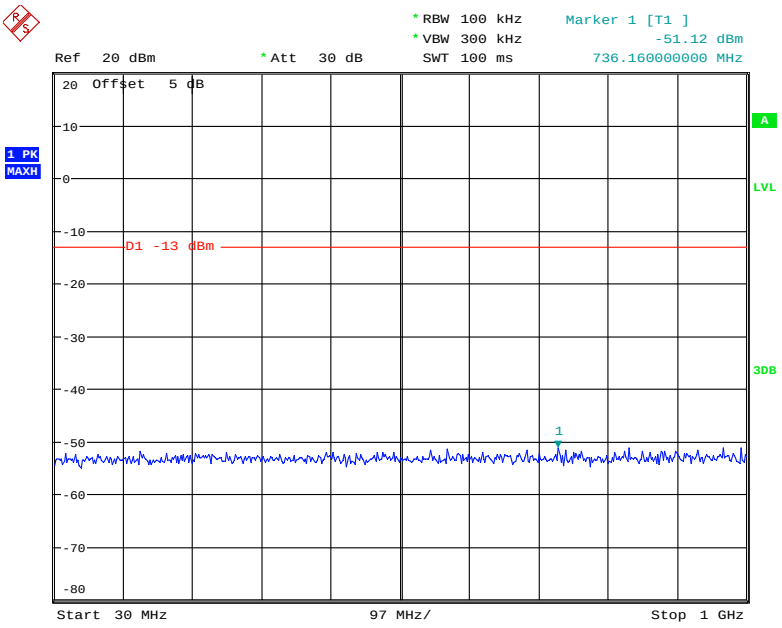
Date: 28.JAN.2019 15:31:30



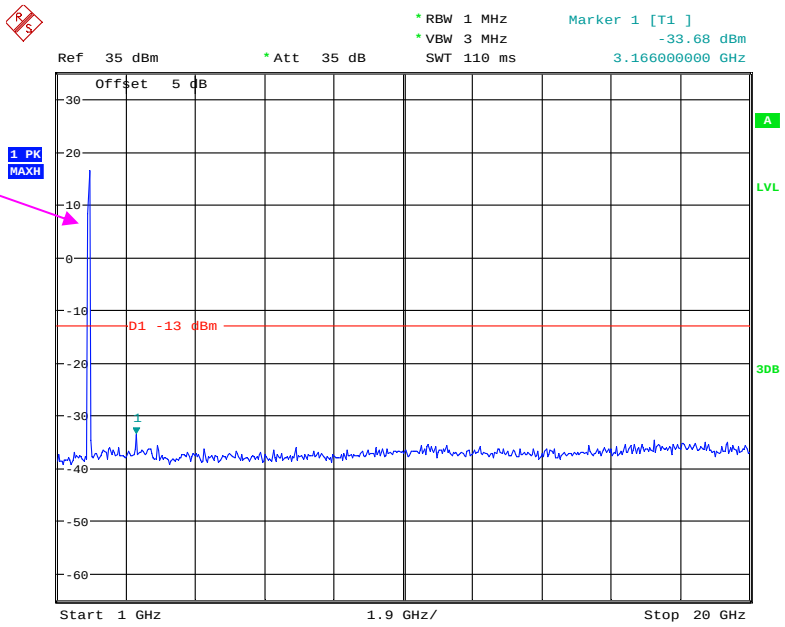
Fundamental

Date: 28.JAN.2019 15:31:40

QPSK_20 MHz



Date: 28.JAN.2019 15:32:05

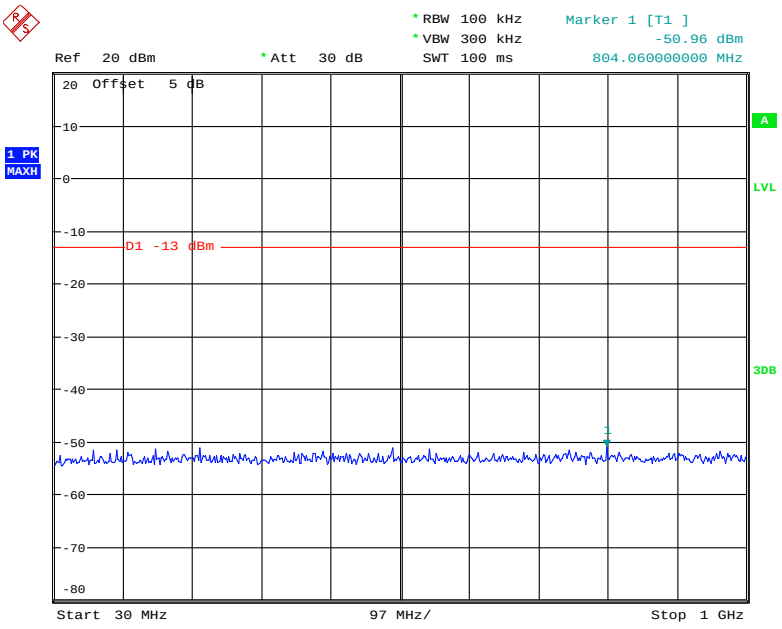


Fundamental

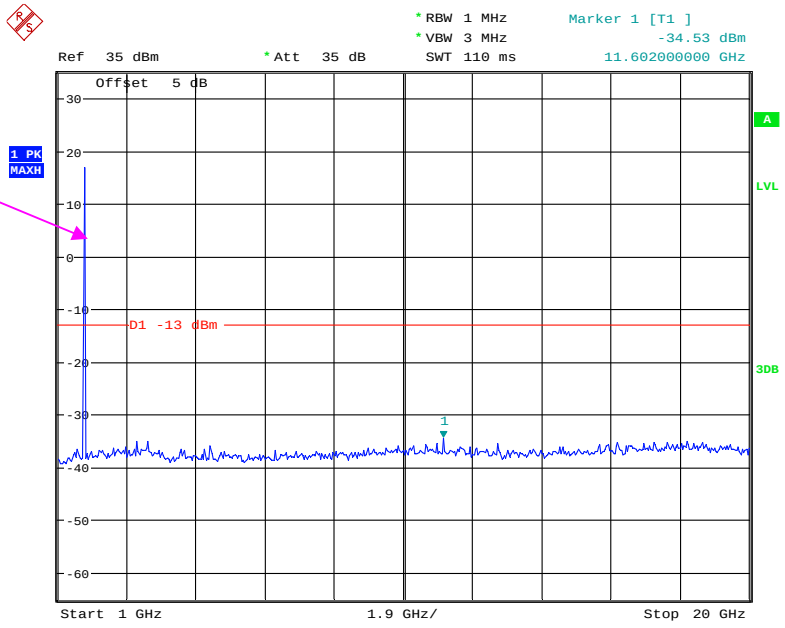
Date: 28.JAN.2019 15:32:15

LTE Band 4 (Middle Channel)

QPSK_1.4 MHz



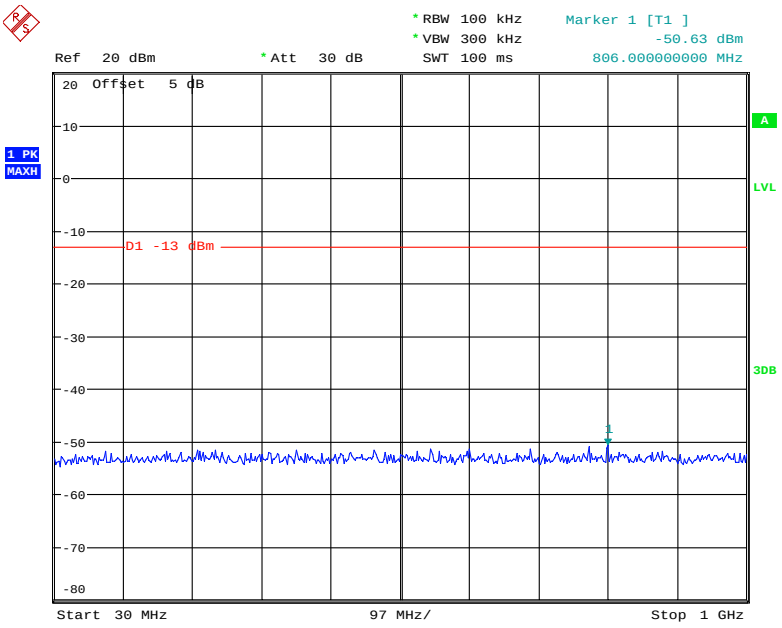
Date: 28.JAN.2019 15:32:37



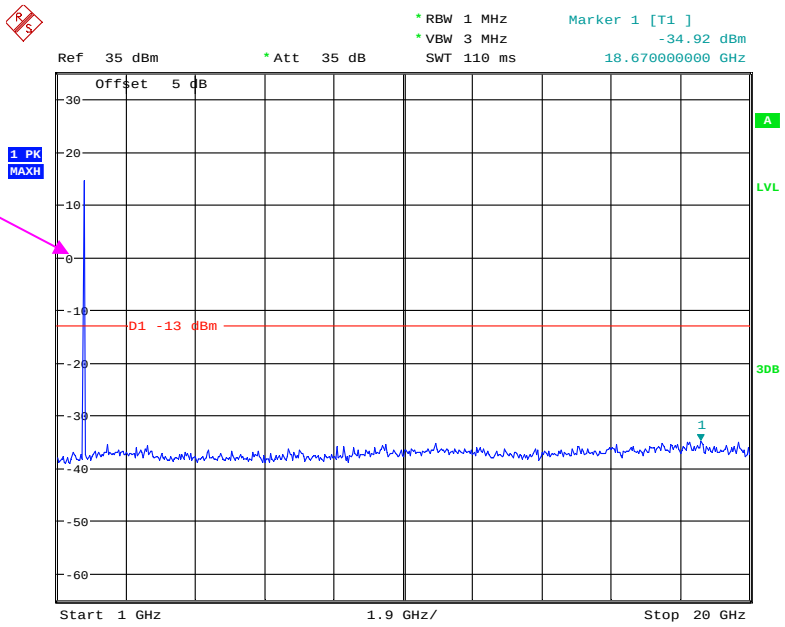
Fundamental

Date: 28.JAN.2019 15:32:48

QPSK_3 MHz



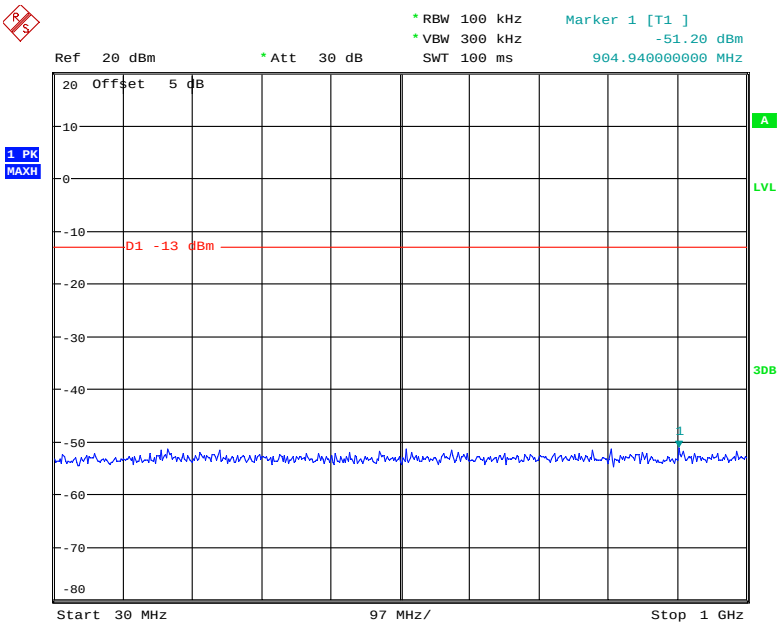
Date: 28.JAN.2019 15:33:08



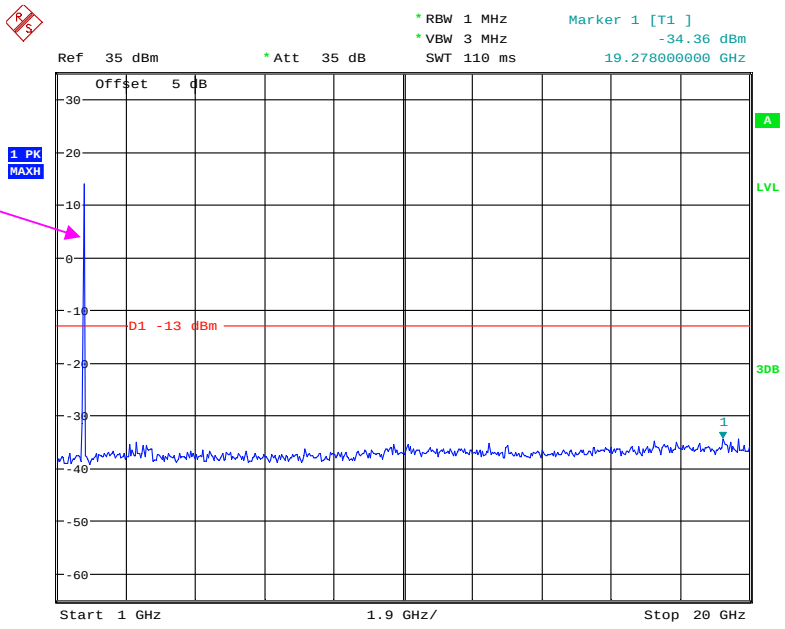
Fundamental

Date: 28.JAN.2019 15:33:19

QPSK_5 MHz



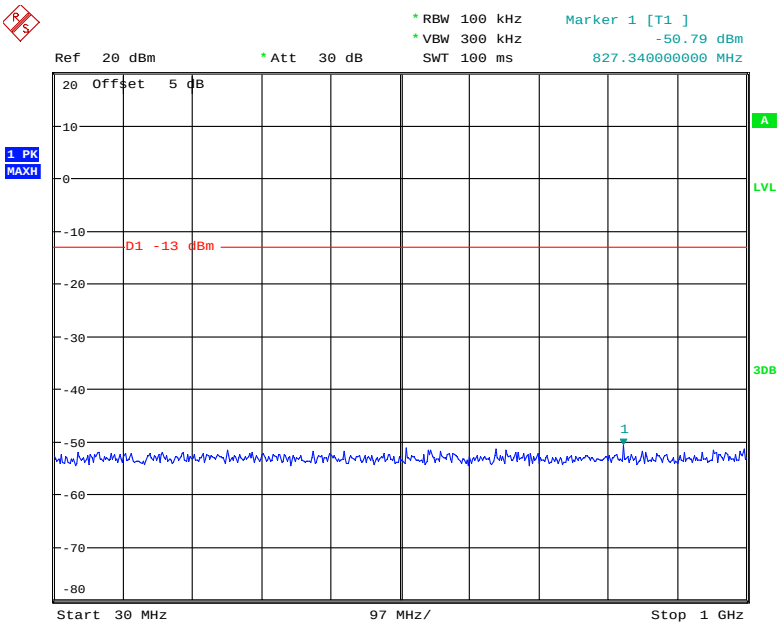
Date: 28.JAN.2019 15:33:39



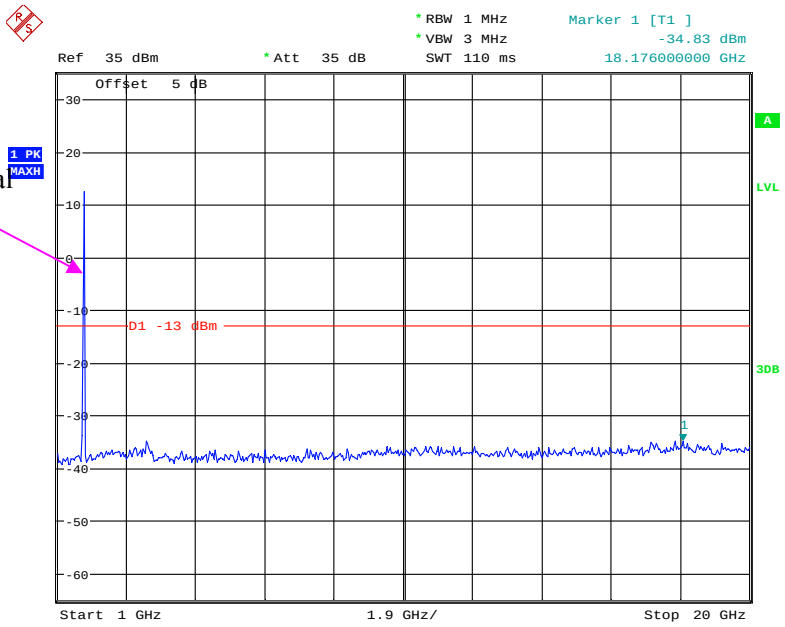
Fundamental

Date: 28.JAN.2019 15:33:50

QPSK_10 MHz



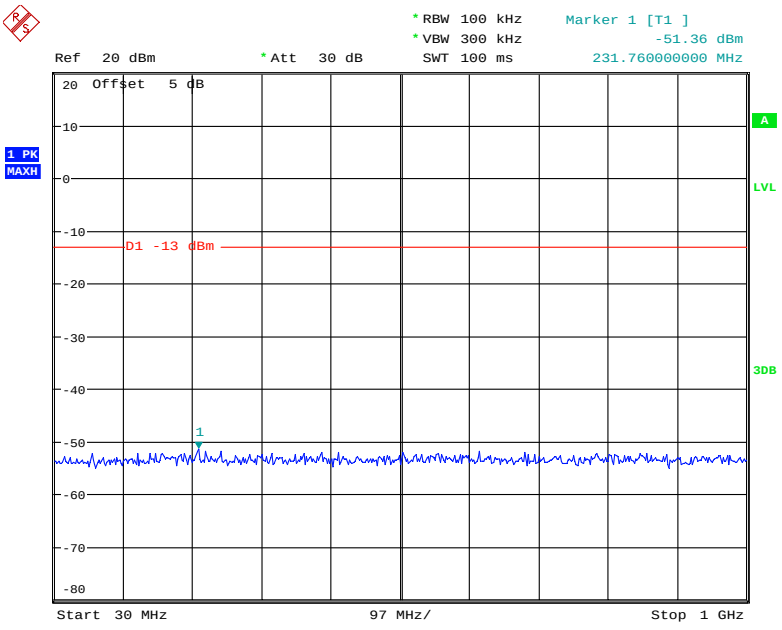
Date: 28.JAN.2019 15:35:39



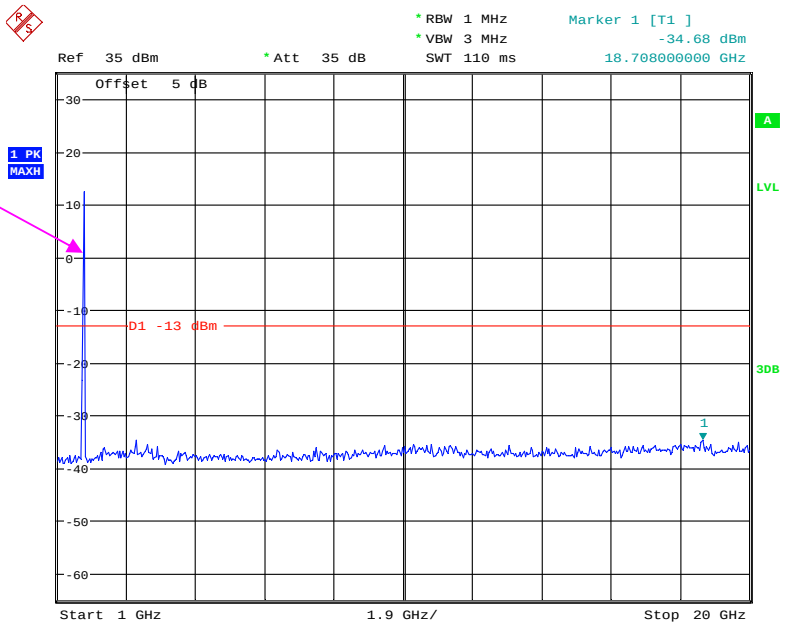
Fundamental

Date: 28.JAN.2019 15:35:50

QPSK_15 MHz



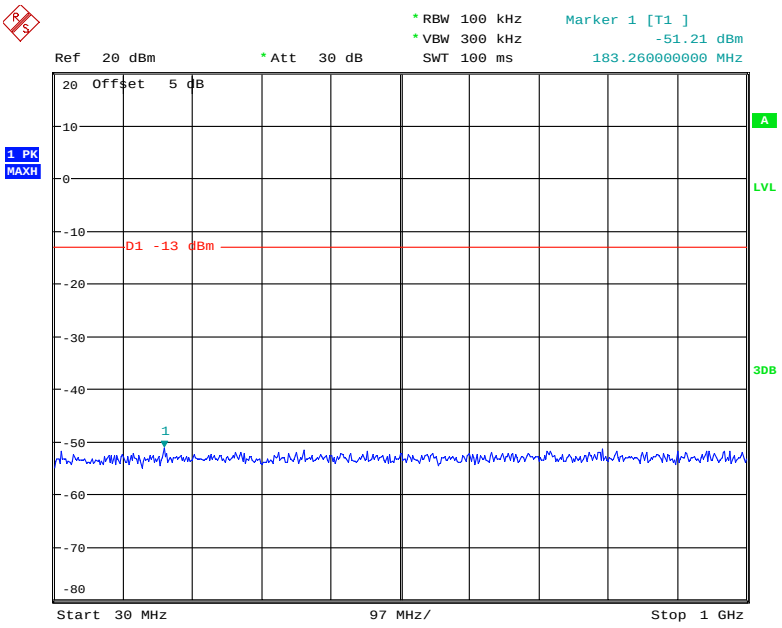
Date: 28.JAN.2019 15:36:10



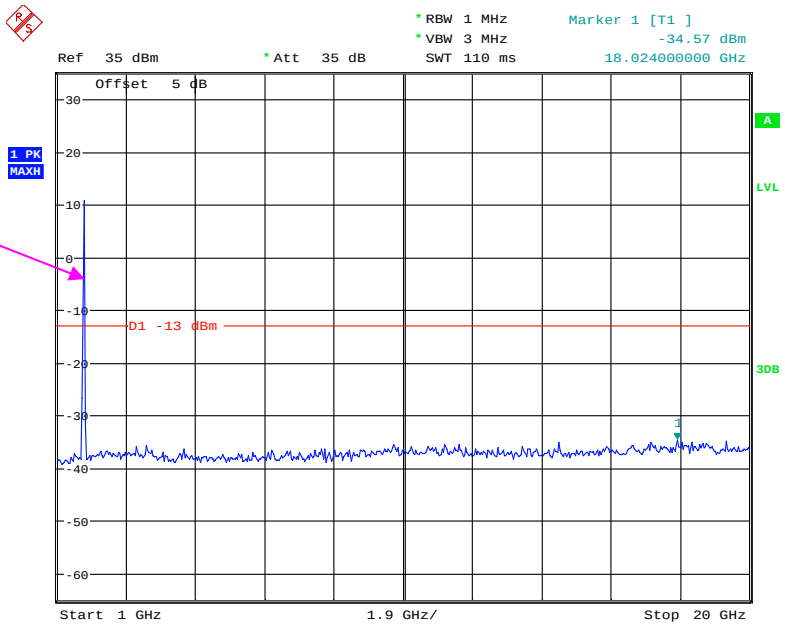
Fundamental

Date: 28.JAN.2019 15:36:21

QPSK_20 MHz



Date: 28.JAN.2019 15:36:45

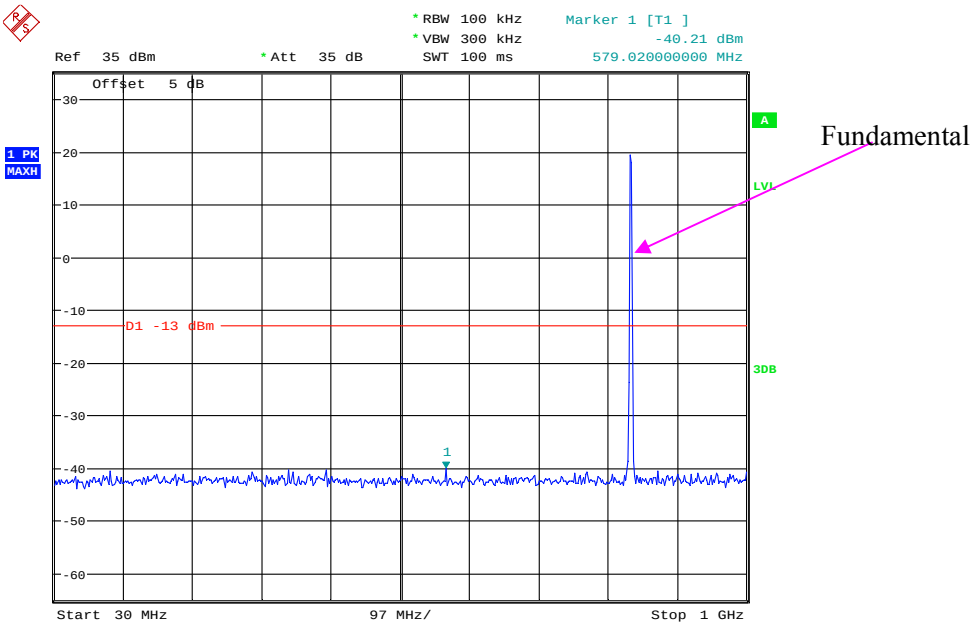


Fundamental

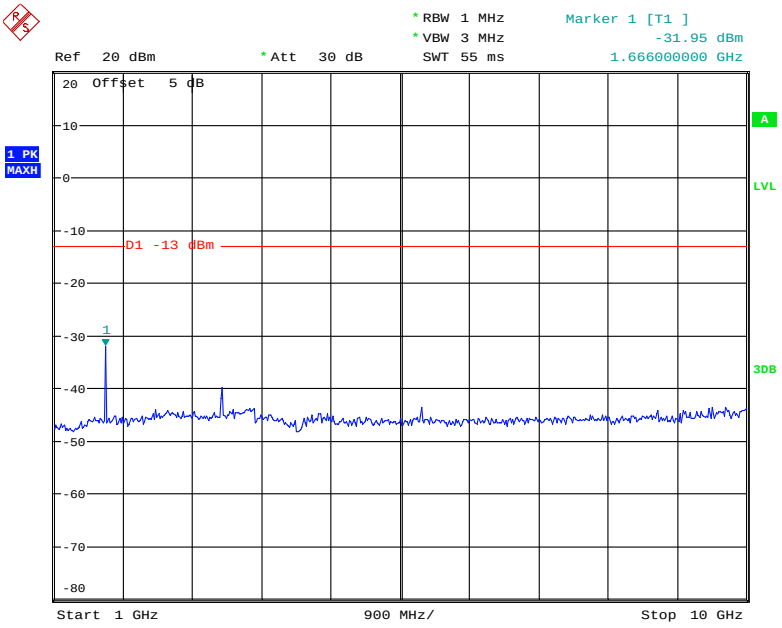
Date: 28.JAN.2019 15:36:55

LTE Band 5 (Middle Channel)

QPSK_1.4 MHz

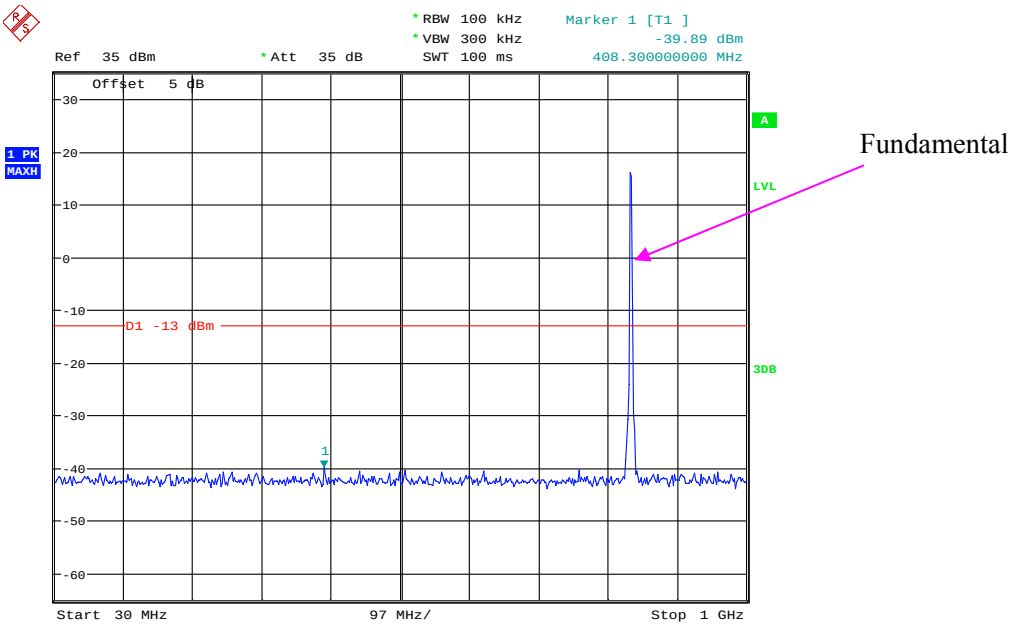


Date: 28.JAN.2019 15:37:16

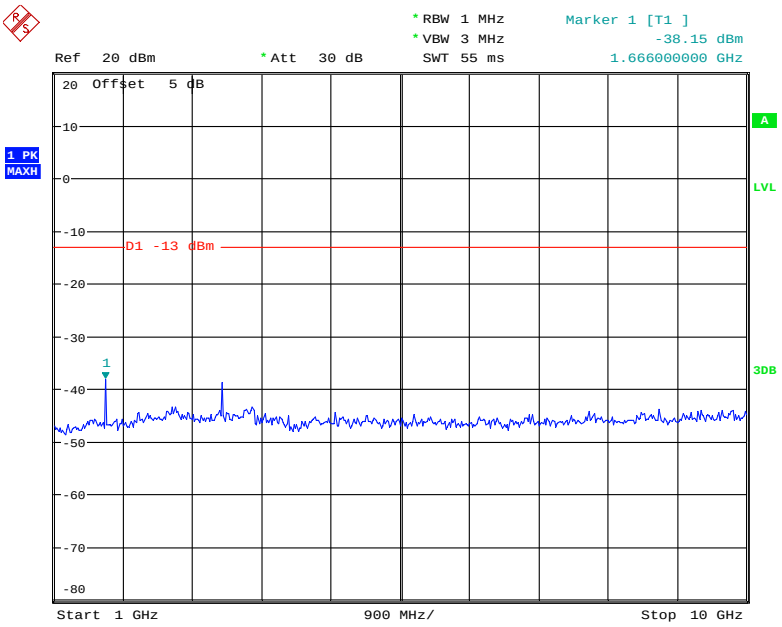


Date: 28.JAN.2019 15:37:31

QPSK_3 MHz

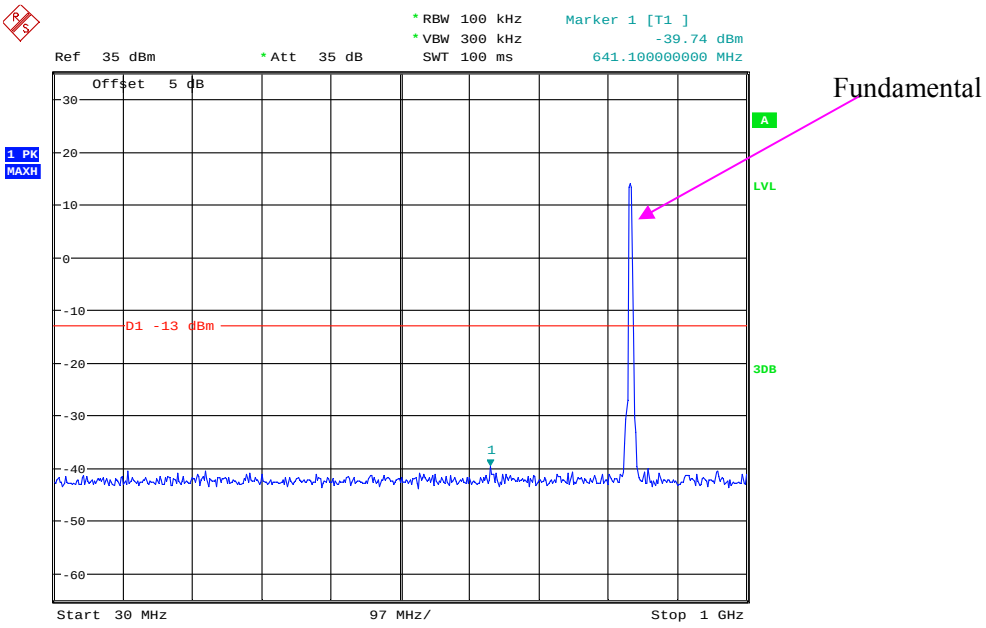


Date: 28.JAN.2019 15:37:51

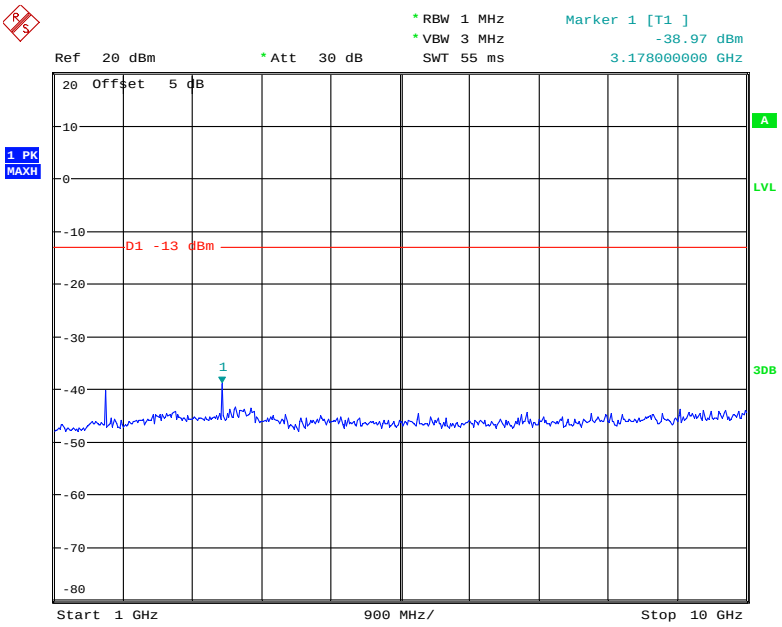


Date: 28.JAN.2019 15:38:02

QPSK_5 MHz

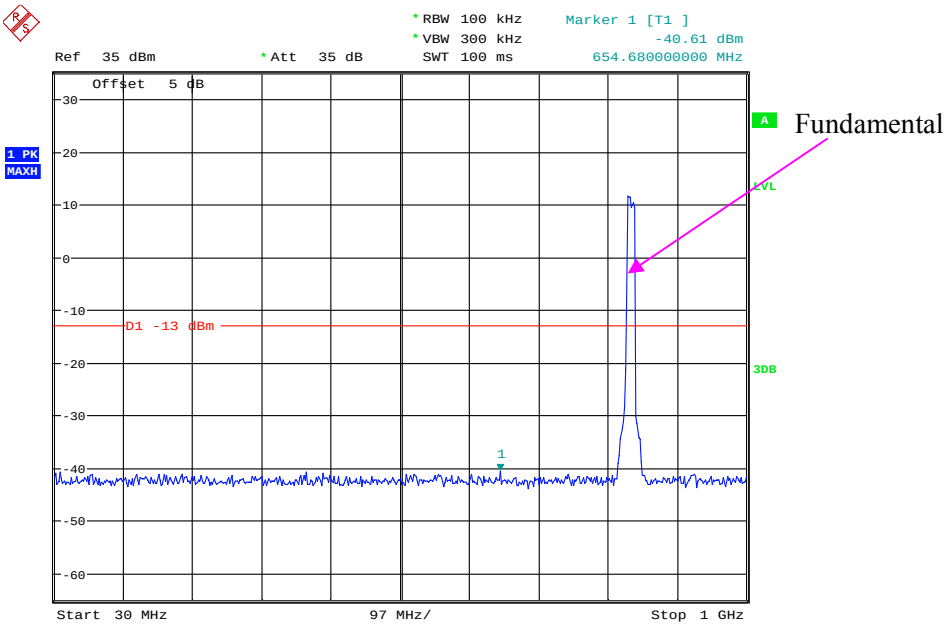


Date: 28.JAN.2019 15:38:23

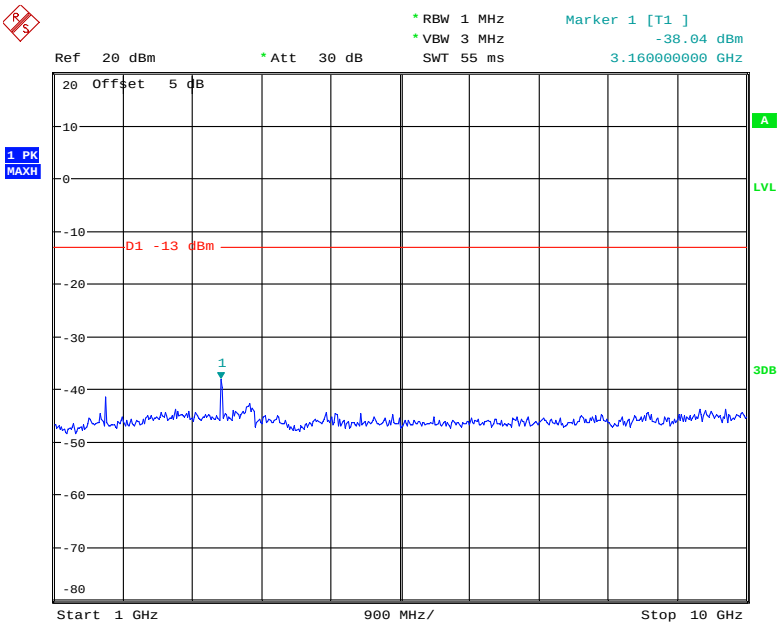


Date: 28.JAN.2019 15:38:33

QPSK_10 MHz



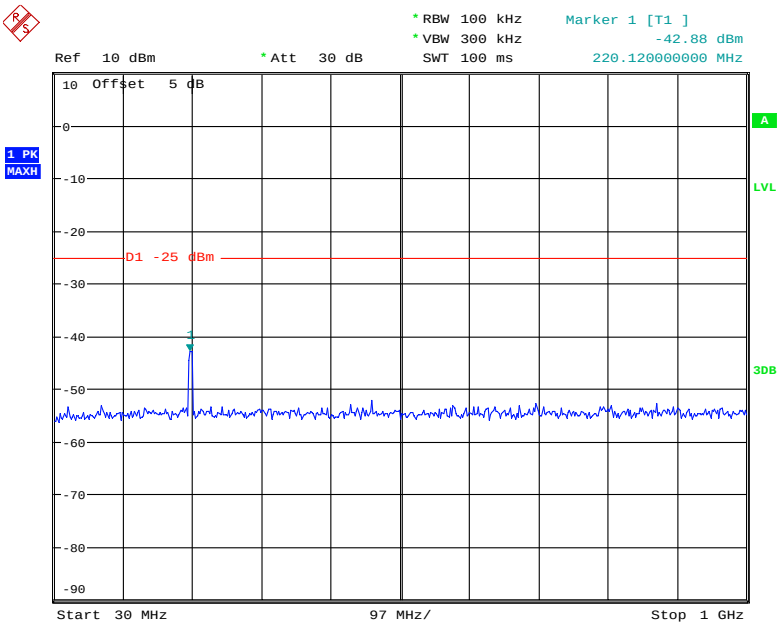
Date: 28.JAN.2019 15:38:55



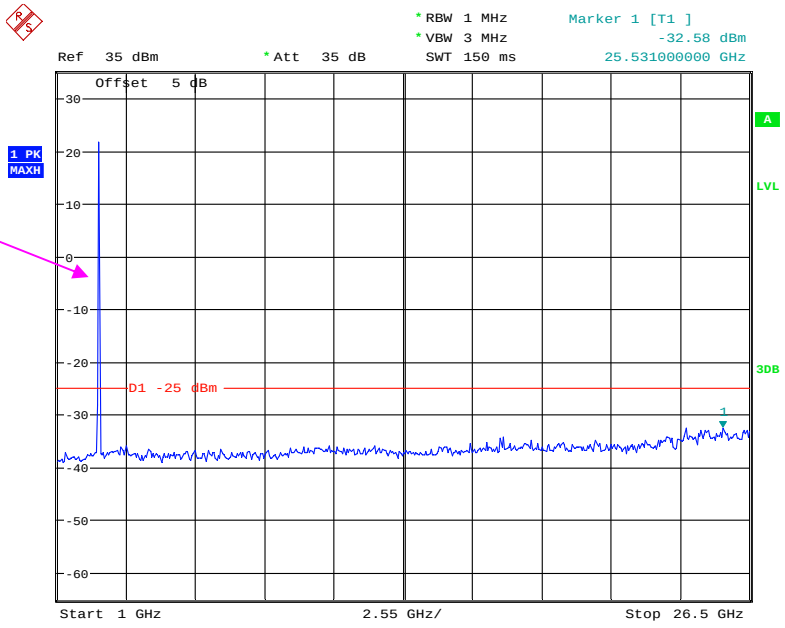
Date: 28.JAN.2019 15:39:06

LTE Band 7 (Middle Channel)

QPSK_5 MHz



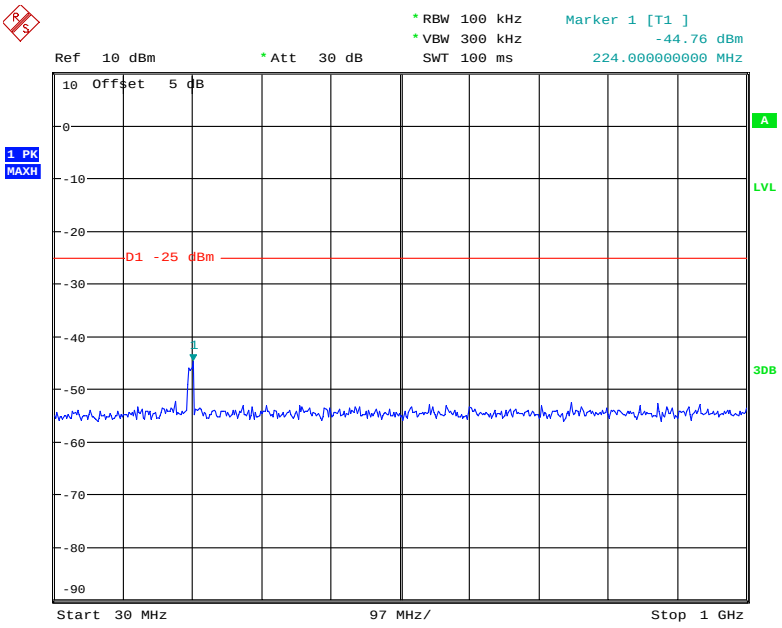
Date: 28.JAN.2019 15:39:27



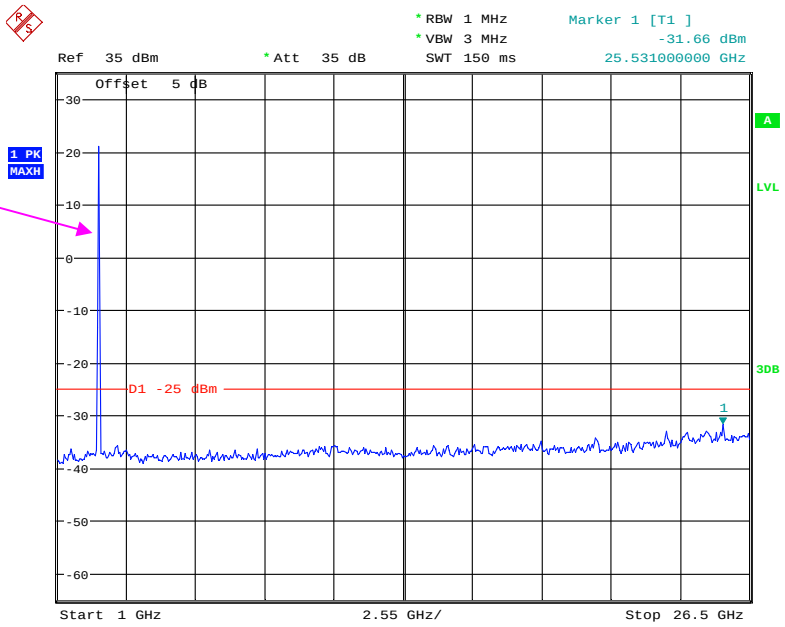
Fundamental

Date: 28.JAN.2019 15:39:38

QPSK_10 MHz



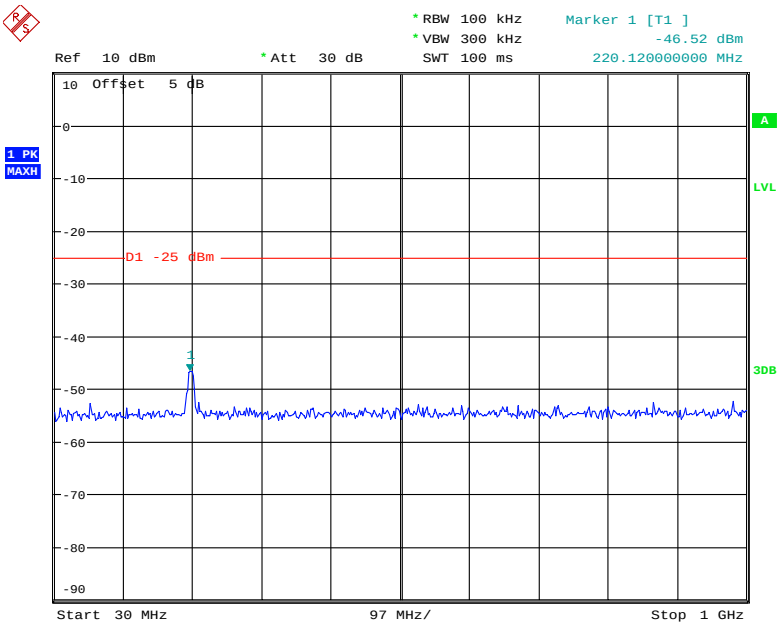
Date: 28.JAN.2019 15:40:00



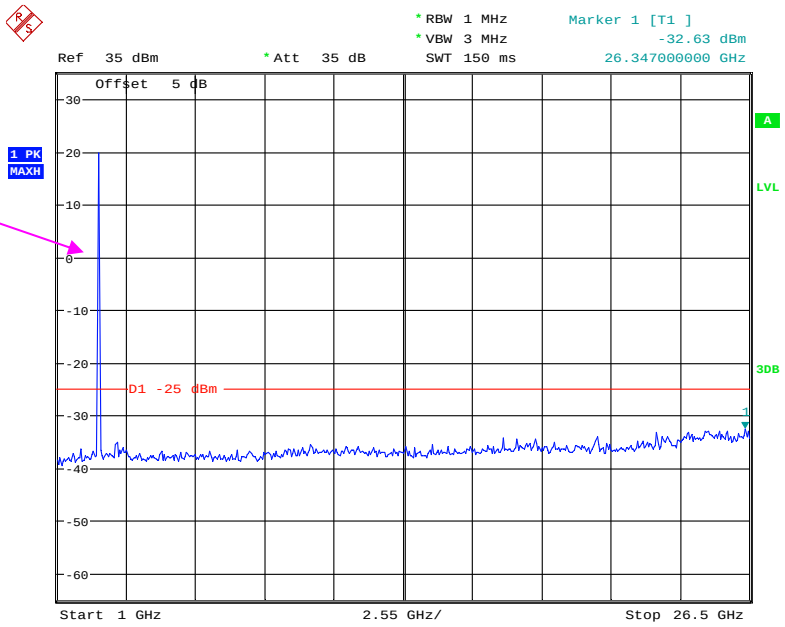
Fundamental

Date: 28.JAN.2019 15:40:10

QPSK_15 MHz



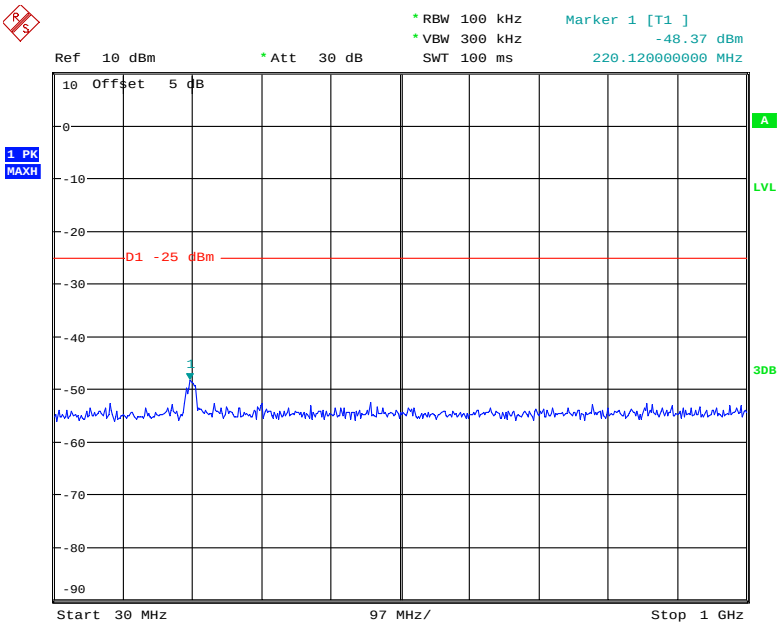
Date: 28.JAN.2019 15:40:34



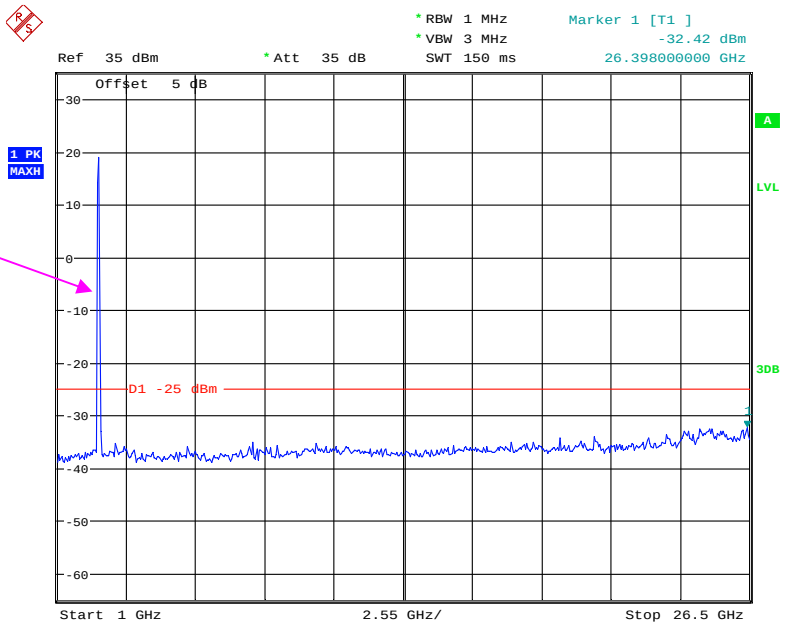
Fundamental

Date: 28.JAN.2019 15:40:45

QPSK_20 MHz



Date: 28.JAN.2019 15:41:09

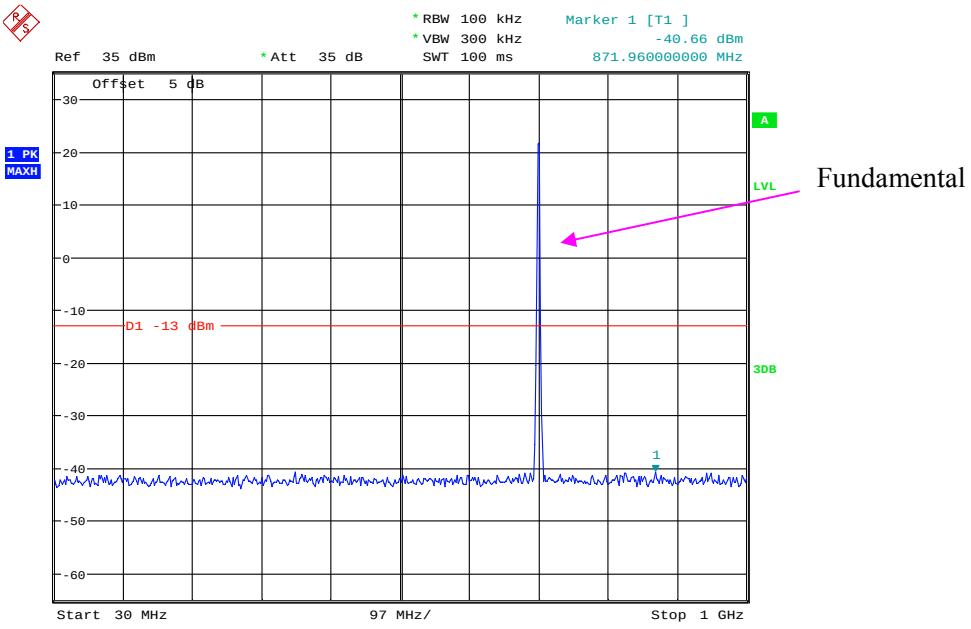


Fundamental

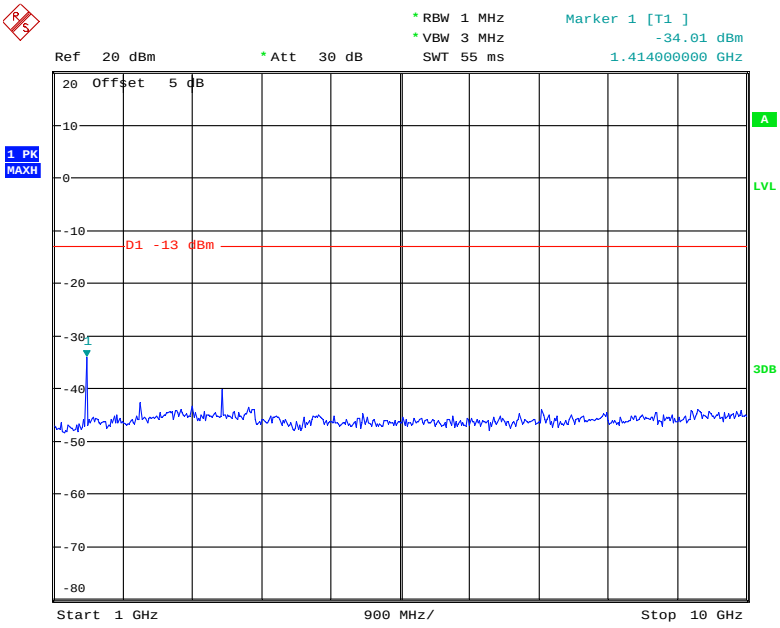
Date: 28.JAN.2019 15:41:23

LTE Band 12 (Middle Channel)

QPSK_1.4 MHz

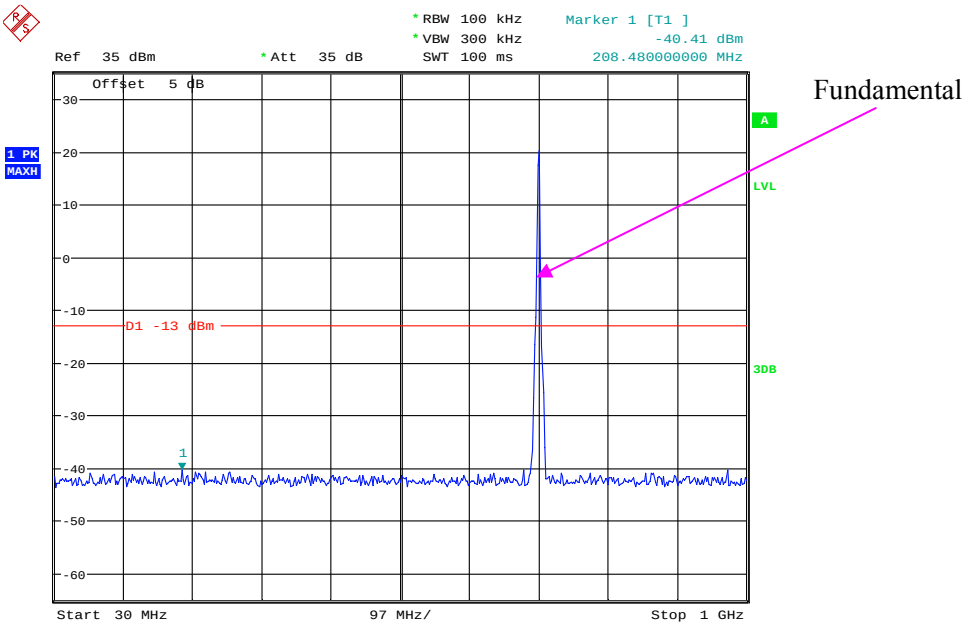


Date: 28.JAN.2019 15:41:45

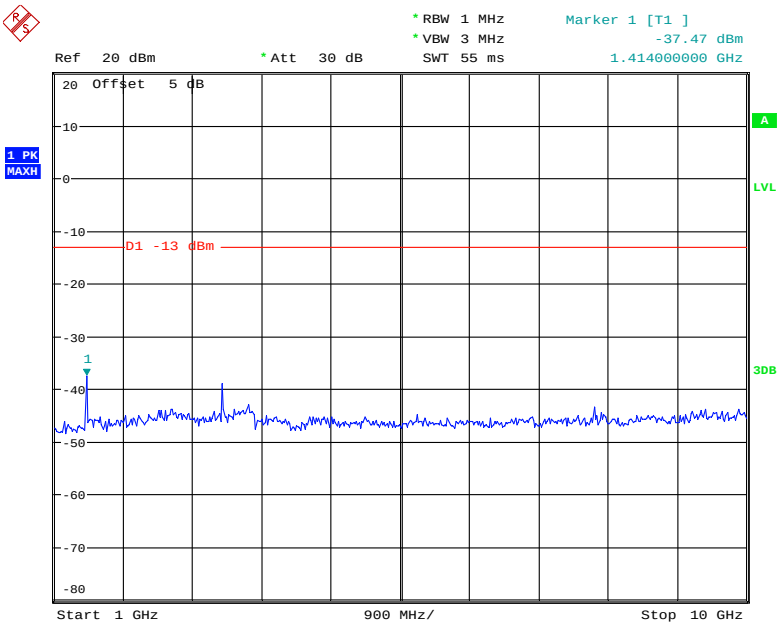


Date: 28.JAN.2019 15:41:55

QPSK_3 MHz

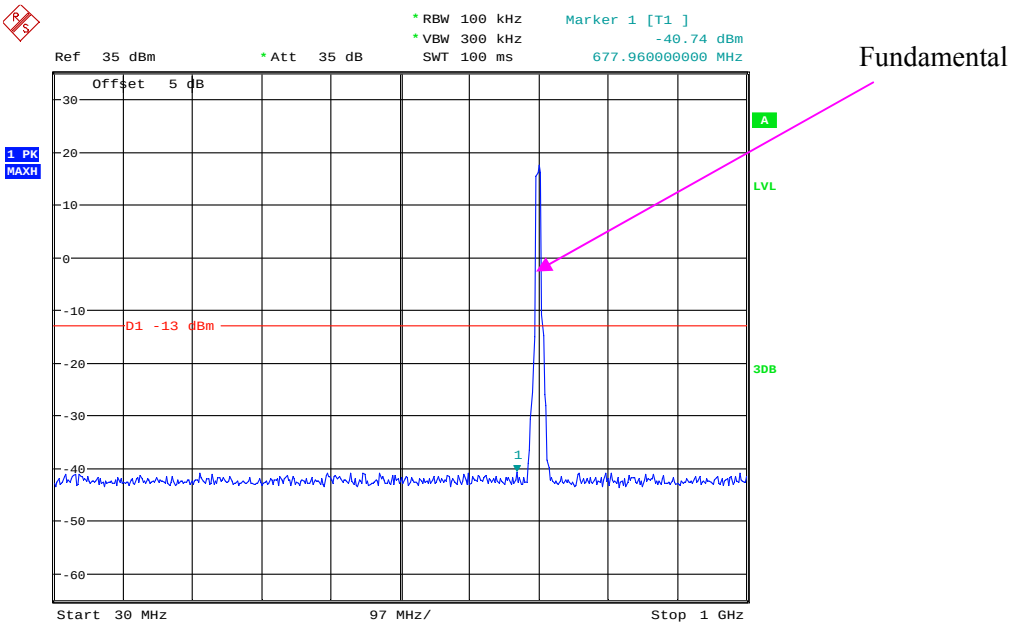


Date: 28.JAN.2019 15:42:16



Date: 28.JAN.2019 15:42:26

QPSK_5 MHz



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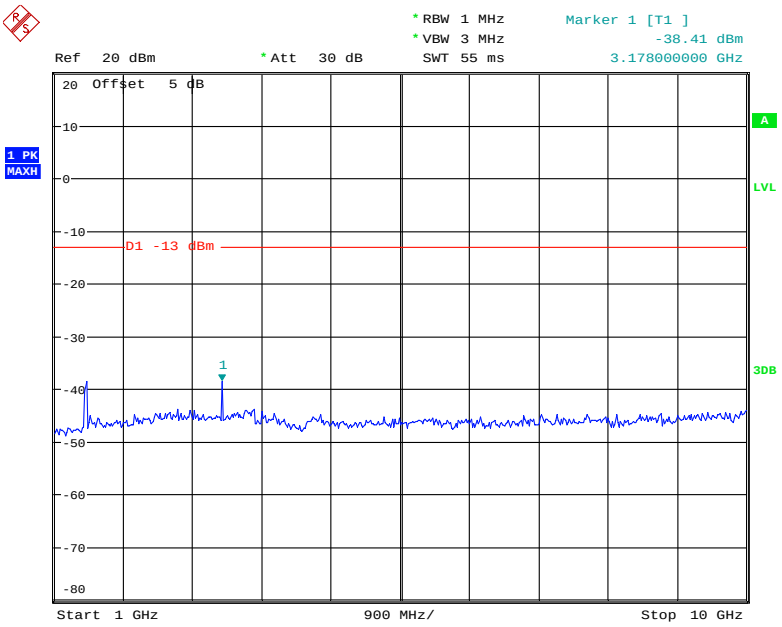

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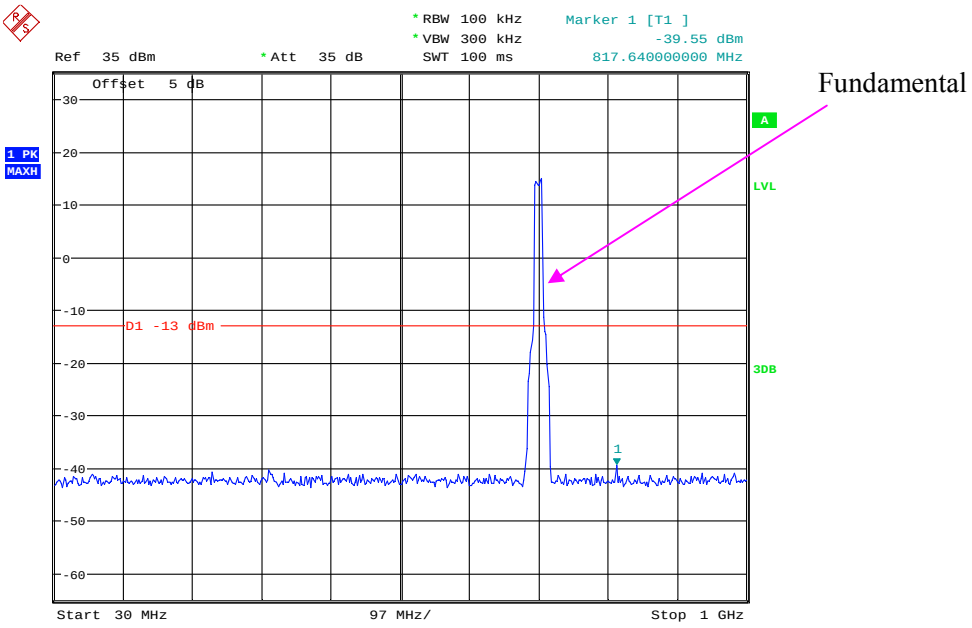
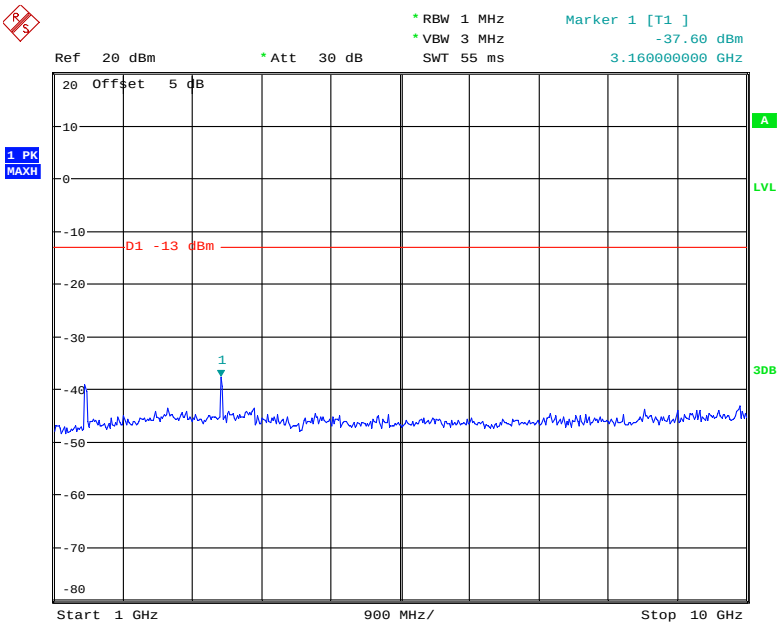
QPSK_10 MHz



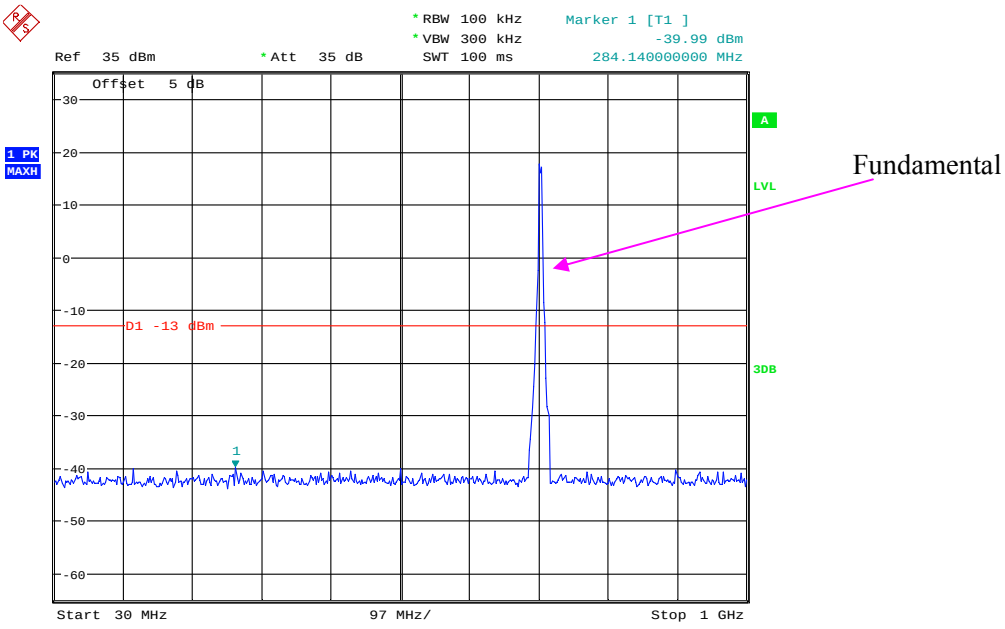
Date: 28.JAN.2019 15:43:21



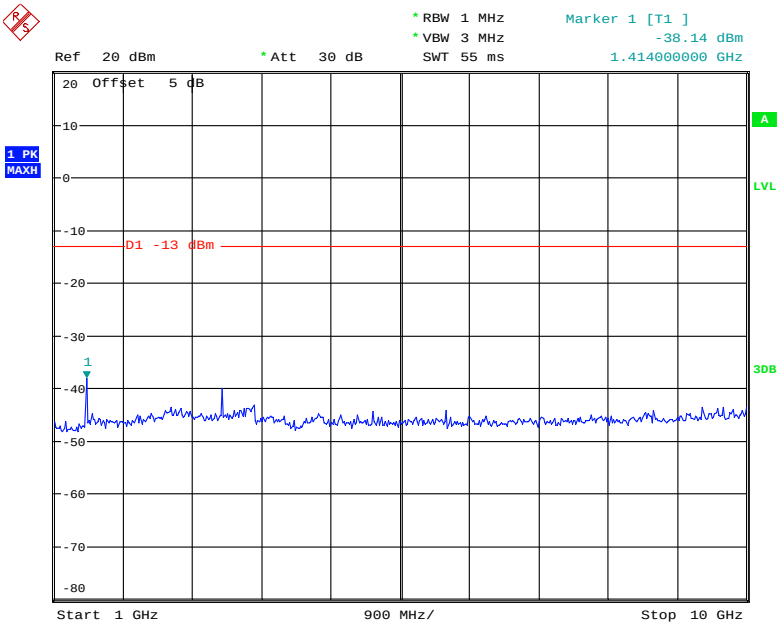
Date: 28.JAN.2019 15:43:31

LTE Band 17 (Middle Channel)

QPSK_5 MHz

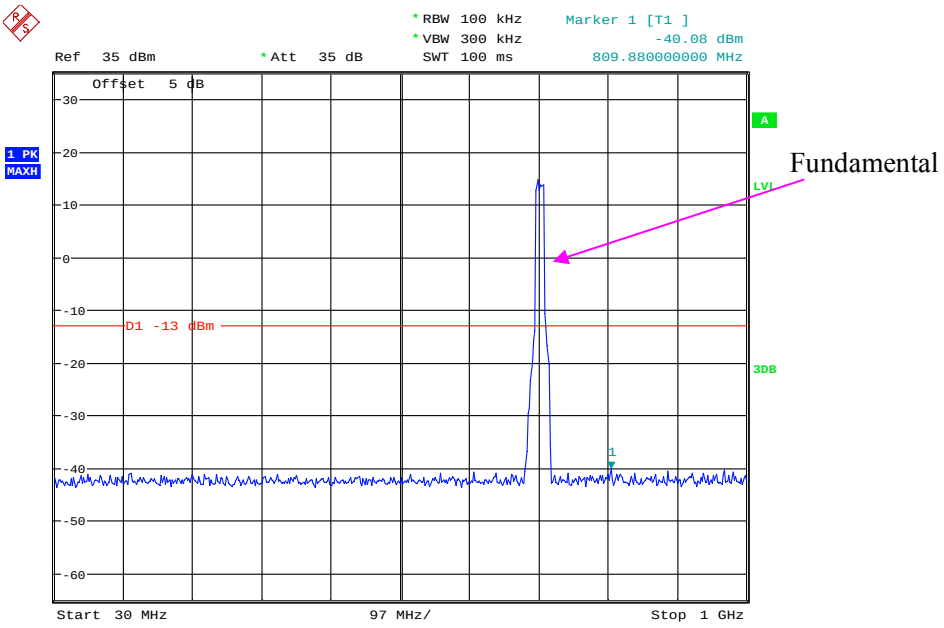


Date: 28.JAN.2019 15:43:53



Date: 28.JAN.2019 15:44:03

QPSK_10 MHz



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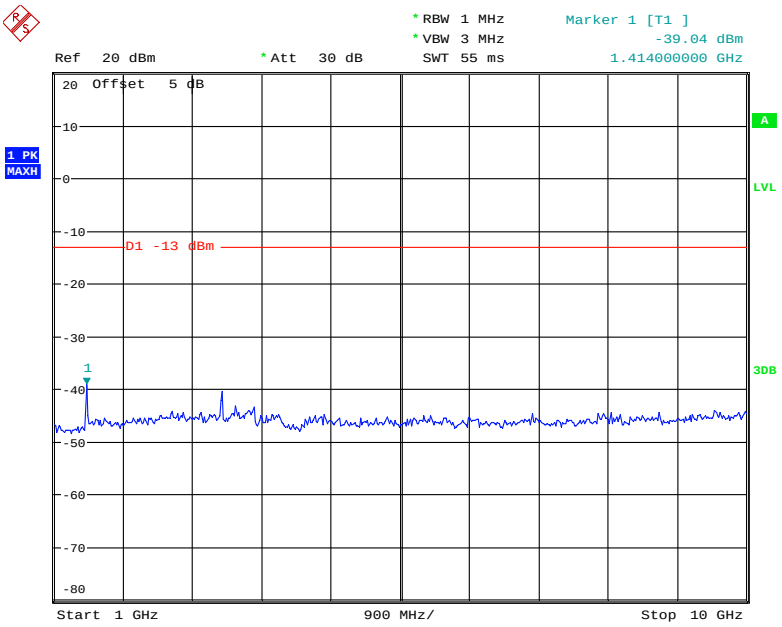


Date: 28.JAN.2019 15:44:36

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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
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
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2018-02-24	2019-02-28
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-09-05	2019-09-05
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
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
Sinoscite	Band-stop filter	BSF2500-2750MS-1439-001	1437001	2018-06-16	2019-06-16
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10

*** 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:	22.9°C
Relative Humidity:	34 %
ATM Pressure:	100.8 kPa

** The testing was performed by Tyler Pan, Vern Shen on 2019-01-21.*

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	45.97	-58.41	10.5	1.27	-49.2	-13.0	36.2
1673.200	V	46.44	-57.87	10.5	1.27	-48.6	-13.0	35.6
2509.800	H	51.80	-50.97	12.2	1.25	-40.0	-13.0	27.0
2509.800	V	54.33	-49.83	12.2	1.25	-38.9	-13.0	25.9
3346.400	H	41.00	-60.19	12.3	1.58	-49.5	-13.0	36.5
3346.400	V	43.50	-56.62	12.3	1.58	-45.9	-13.0	32.9
783.690	H	39.06	-60.04	0.0	0.93	-61.0	-13.0	48.0
581.930	V	47.31	-58.42	0.0	0.75	-59.2	-13.0	46.2
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	48.58	-55.8	10.5	1.27	-46.6	-13.0	33.6
1673.200	V	43.20	-61.11	10.5	1.27	-51.9	-13.0	38.9
2509.800	H	40.69	-62.08	12.2	1.25	-51.1	-13.0	38.1
2509.800	V	39.35	-64.81	12.2	1.25	-53.9	-13.0	40.9
3346.400	H	38.00	-63.19	12.3	1.58	-52.5	-13.0	39.5
3346.400	V	36.85	-63.27	12.3	1.58	-52.6	-13.0	39.6
299.600	H	36.23	-72.41	0.0	0.52	-72.9	-13.0	59.9
500.000	V	36.82	-70.44	0.0	0.71	-71.2	-13.0	58.2

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	43.23	-56.98	12.3	1.53	-46.3	-13.0	33.3
3760.000	V	43.50	-56.41	12.3	1.53	-45.7	-13.0	32.7
5640.000	H	42.65	-52.65	13.0	1.28	-40.9	-13.0	27.9
5640.000	V	40.67	-54.94	13.0	1.28	-43.2	-13.0	30.2
198.780	H	38.63	-70.08	0.0	0.49	-70.6	-13.0	57.6
198.780	V	36.64	-73.93	0.0	0.49	-74.4	-13.0	61.4
WCDMA Band II R99,Frequency: 1880.000 MHz								
3760.000	H	45.31	-54.9	12.3	1.53	-44.2	-13.0	31.2
3760.000	V	43.64	-56.27	12.3	1.53	-45.6	-13.0	32.6
5640.000	H	39.22	-56.08	13.0	1.28	-44.4	-13.0	31.4
5640.000	V	38.40	-57.21	13.0	1.28	-45.5	-13.0	32.5
713.550	H	36.54	-64.51	0.0	0.94	-65.5	-13.0	52.5
701.000	V	36.74	-67.14	0.0	0.94	-68.1	-13.0	55.1
WCDMA Band IV R99,Frequency: 1732.600 MHz								
3465.200	H	42.11	-58.86	12.2	1.6	-48.3	-13.0	35.3
3465.200	V	41.53	-58.03	12.2	1.6	-47.4	-13.0	34.4
5197.800	H	42.50	-53.58	12.9	1.36	-42.0	-13.0	29.0
5197.800	V	40.00	-56.05	12.9	1.36	-44.5	-13.0	31.5
250.000	H	37.10	-72.14	0.0	0.51	-72.7	-13.0	59.7
625.580	V	36.66	-68.35	0.0	0.81	-69.2	-13.0	56.2

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	47.00	-53.21	12.25	1.53	-42.49	-13.00	29.49
3760.00	V	49.23	-50.68	12.25	1.53	-39.96	-13.00	26.96
5640.00	H	40.42	-54.88	13.00	1.28	-43.16	-13.00	30.16
5640.00	V	42.84	-52.77	13.00	1.28	-41.05	-13.00	28.05
749.74	H	37.40	-62.65	0.00	0.94	-63.59	-13.00	50.59
282.20	V	36.32	-74.61	0.00	0.51	-75.12	-13.00	62.12

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	47.86	-53.11	12.21	1.60	-42.50	-13.00	29.50
3465.00	V	46.94	-52.62	12.21	1.60	-42.01	-13.00	29.01
5197.50	H	50.66	-45.42	12.92	1.36	-33.86	-13.00	20.86
5197.50	V	46.23	-49.82	12.92	1.36	-38.26	-13.00	25.26
689.60	H	36.08	-65.42	0.00	0.92	-66.34	-13.00	53.34
132.82	V	37.10	-74.82	0.00	0.34	-75.16	-13.00	62.16

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	56.32	-48.06	10.52	1.27	-38.81	-13.00	25.81
1673.00	V	53.37	-50.94	10.52	1.27	-41.69	-13.00	28.69
2509.50	H	58.00	-44.77	12.20	1.24	-33.81	-13.00	20.81
2509.50	V	57.76	-46.40	12.20	1.24	-35.44	-13.00	22.44
3346.00	H	43.14	-58.05	12.26	1.58	-47.37	-13.00	34.37
3346.00	V	44.10	-56.02	12.26	1.58	-45.34	-13.00	32.34
311.30	H	38.21	-70.00	0.00	0.53	-70.53	-13.00	57.53
701.24	V	36.45	-67.43	0.00	0.94	-68.37	-13.00	55.37

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	45.22	-51.09	12.97	1.41	-39.53	-25.00	14.53
5070.00	V	46.17	-49.91	12.97	1.41	-38.35	-25.00	13.35
7605.00	H	40.80	-50.58	12.84	1.40	-39.14	-25.00	14.14
7605.00	V	41.60	-50.45	12.84	1.40	-39.01	-25.00	14.01
687.66	H	36.45	-65.07	0.00	0.92	-65.99	-25.00	40.99
625.58	V	39.19	-65.82	0.00	0.81	-66.63	-25.00	41.63

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	43.23	-60.66	9.64	1.25	-52.27	-13.00	39.27
1415.00	V	44.83	-59.12	9.64	1.25	-50.73	-13.00	37.73
2122.50	H	39.61	-64.12	11.67	1.16	-53.61	-13.00	40.61
2122.50	V	40.50	-63.54	11.67	1.16	-53.03	-13.00	40.03
2830.00	H	38.27	-63.89	12.33	1.41	-52.97	-13.00	39.97
2830.00	V	38.74	-63.83	12.33	1.41	-52.91	-13.00	39.91
813.76	H	36.19	-62.25	0.00	0.95	-63.20	-13.00	50.20
734.22	V	36.90	-66.49	0.00	0.94	-67.43	-13.00	54.43

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	44.00	-59.93	9.66	1.25	-51.52	-13.00	38.52
1420.00	V	44.17	-59.82	9.66	1.25	-51.41	-13.00	38.41
2130.00	H	39.13	-64.59	11.68	1.16	-54.07	-13.00	41.07
2130.00	V	38.93	-65.11	11.68	1.16	-54.59	-13.00	41.59
2840.00	H	37.82	-64.32	12.34	1.42	-53.40	-13.00	40.40
2840.00	V	38.40	-64.12	12.34	1.42	-53.20	-13.00	40.20
332.64	H	38.76	-68.63	0.00	0.55	-69.18	-13.00	56.18
666.32	V	36.56	-67.84	0.00	0.88	-68.72	-13.00	55.72

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

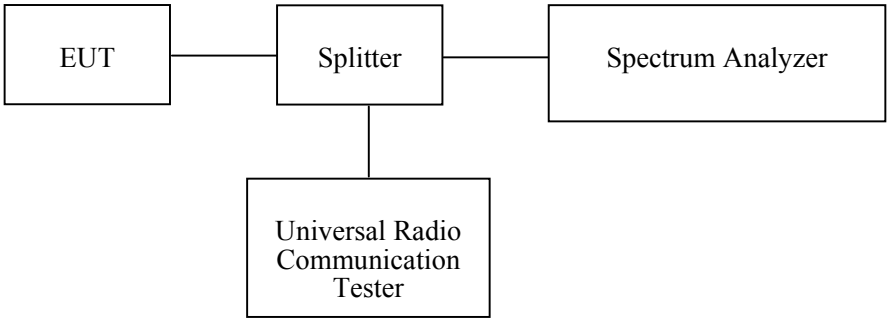
Applicable Standard

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	FSP 38	100478	2018-12-10	2019-12-10
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each time	N/A

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

Test Data

Environmental Conditions

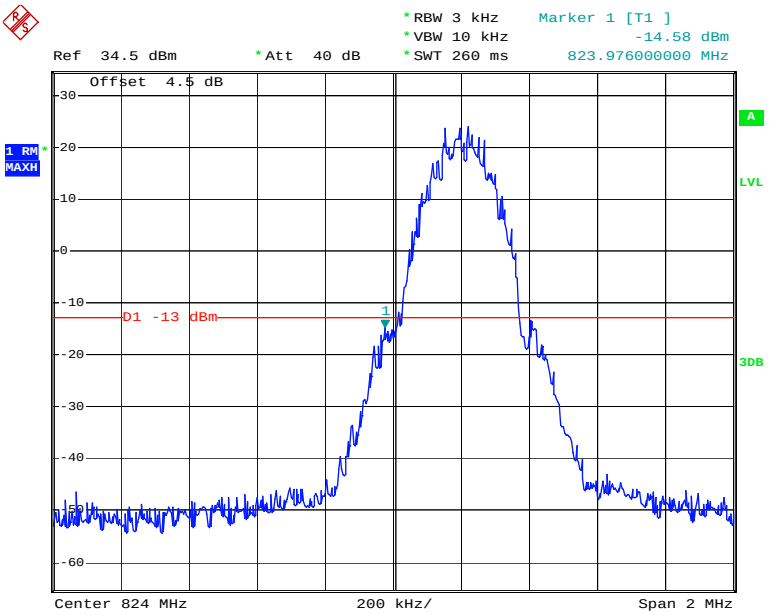
Temperature:	24.5~25.2°C
Relative Humidity:	39~42 %
ATM Pressure:	100.8~102.1 kPa

The testing was performed by Blake Yang, Carrie He on 2019-01-20~2019-01-21.

Test Mode: Transmitting

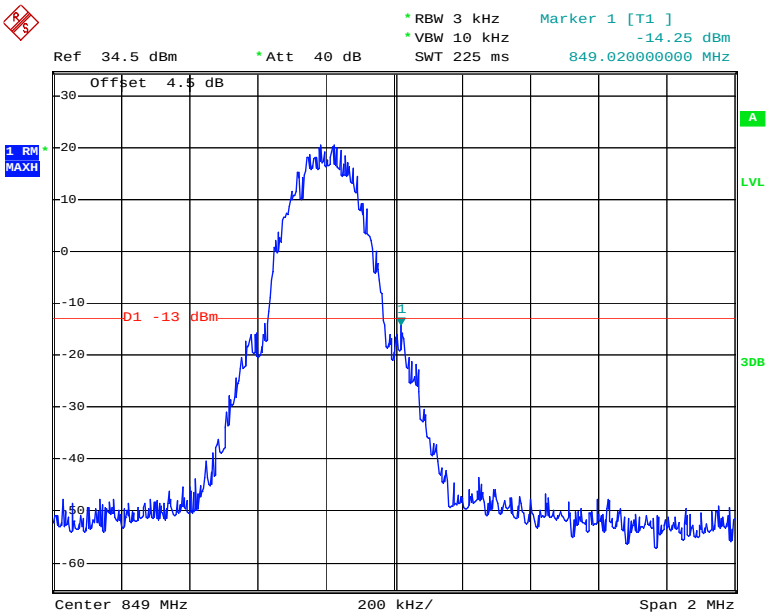
Test Result: Compliant. Please refer to the following plots.

GSM 850, Left Band Edge



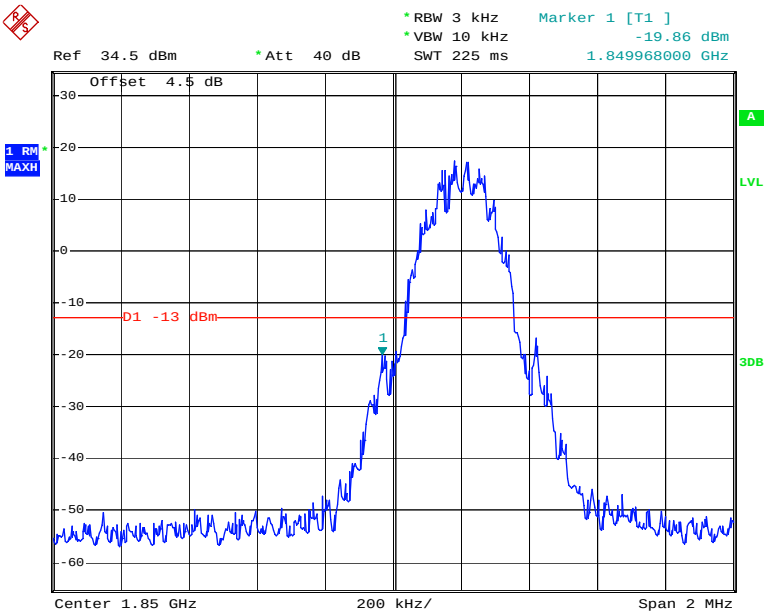
Date: 20.JAN.2019 17:42:28

GSM 850, Right Band Edge



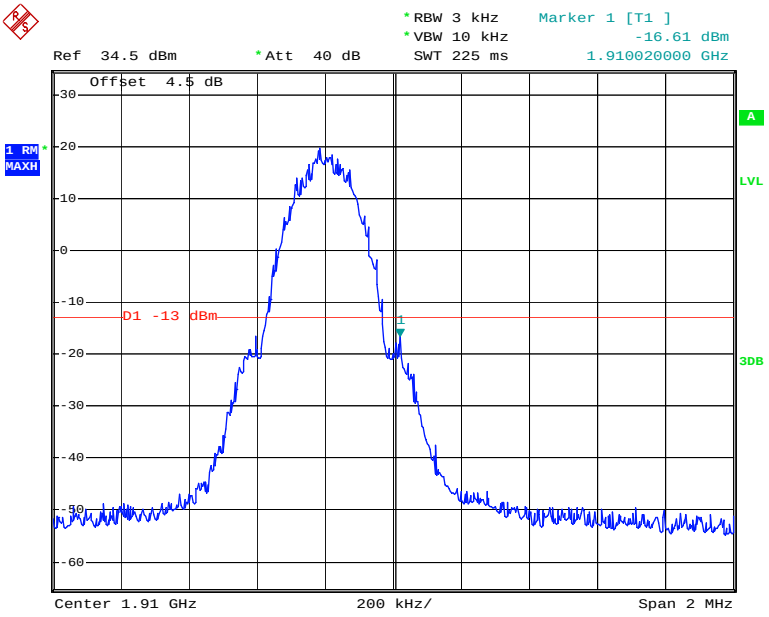
Date: 20.JAN.2019 17:43:02

GSM 1900, Left Band Edge



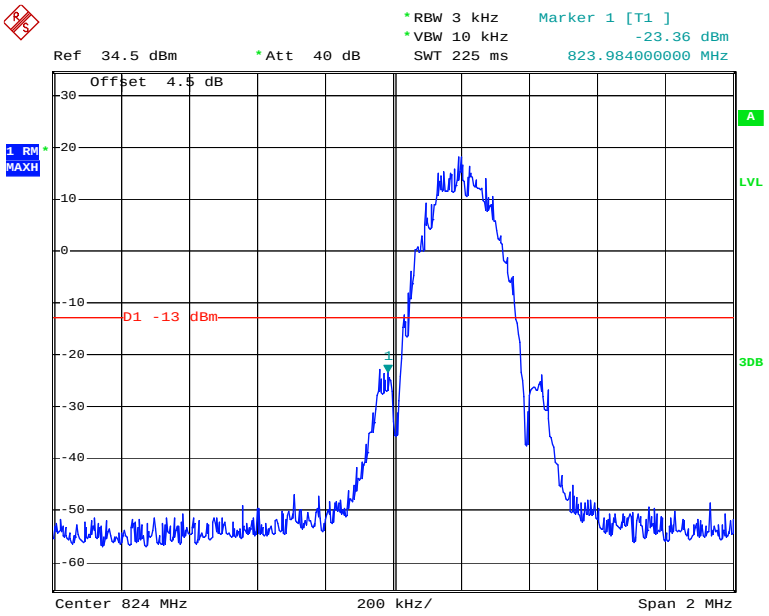
Date: 20.JAN.2019 18:22:17

GSM 1900, Right Band Edge



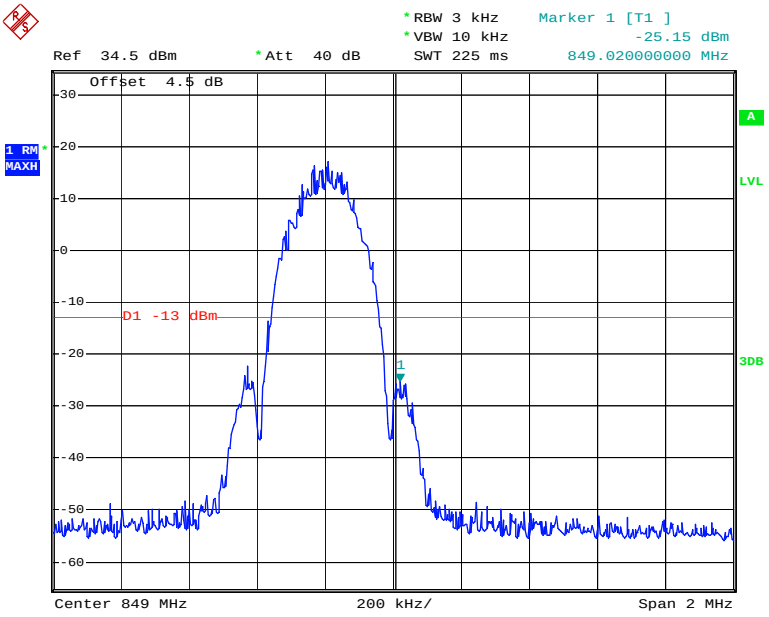
Date: 20.JAN.2019 18:21:41

EDGE 850, Left Band Edge



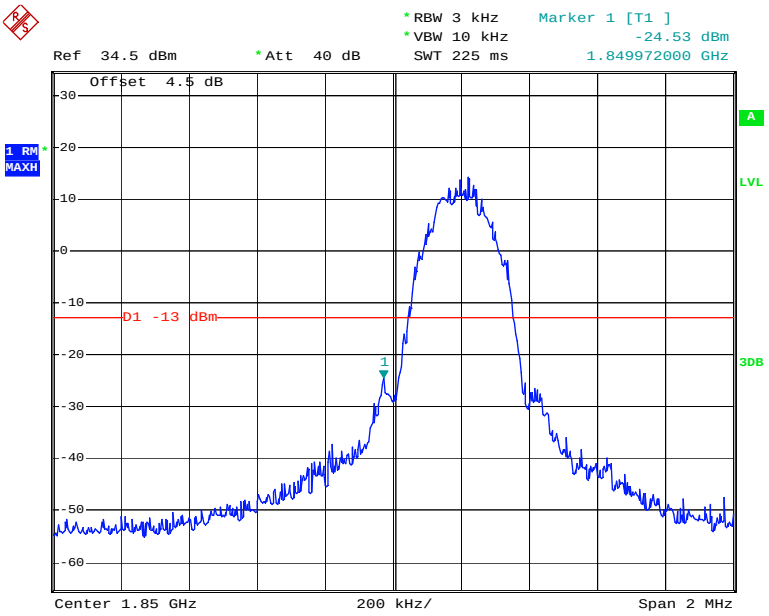
Date: 20.JAN.2019 18:00:56

EDGE 850, Right Band Edge



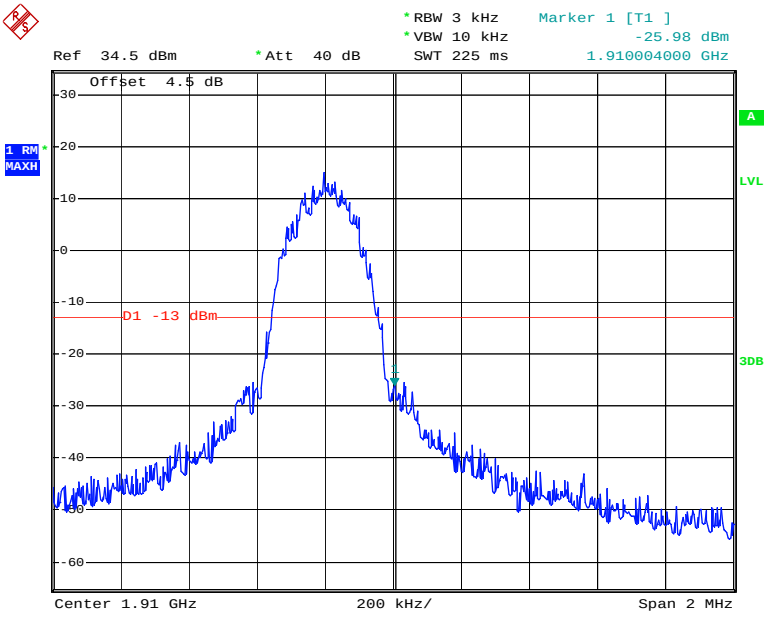
Date: 20.JAN.2019 18:00:31

EDGE 1900, Left Band Edge



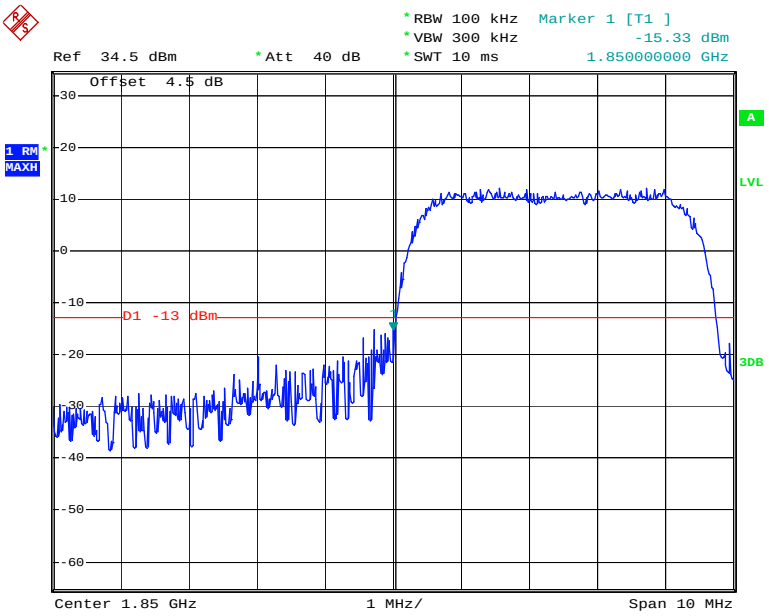
Date: 20.JAN.2019 18:36:13

EDGE 1900, Right Band Edge



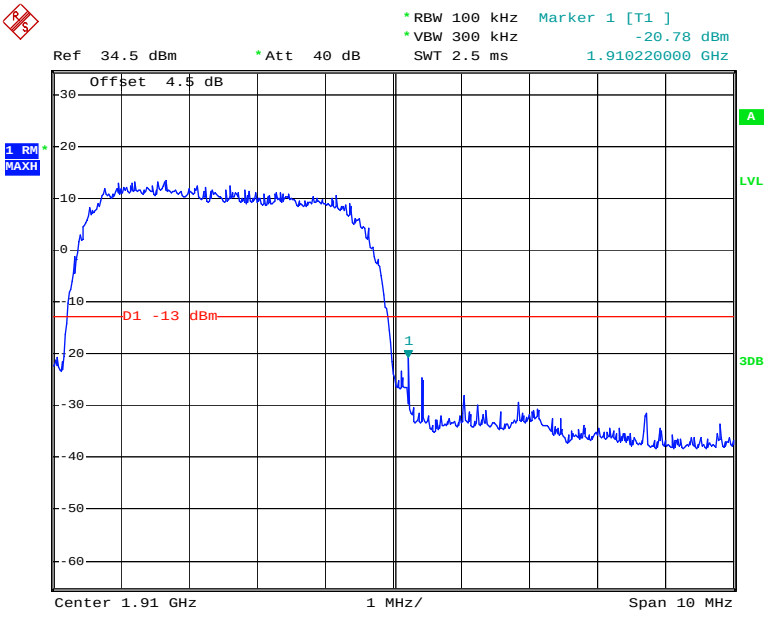
Date: 20.JAN.2019 18:36:46

WCDMA Band II Rel 99, Left Band Edge



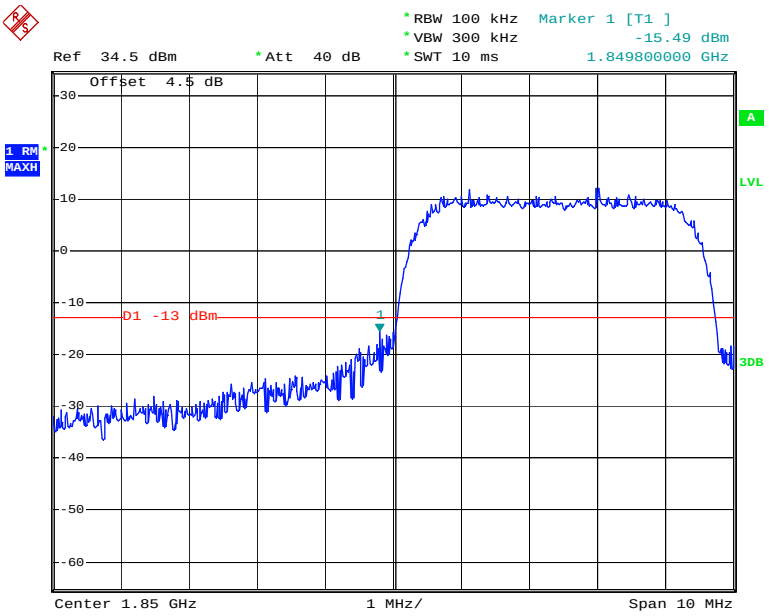
Date: 20.JAN.2019 16:36:52

WCDMA Band II Rel 99, Right Band Edge



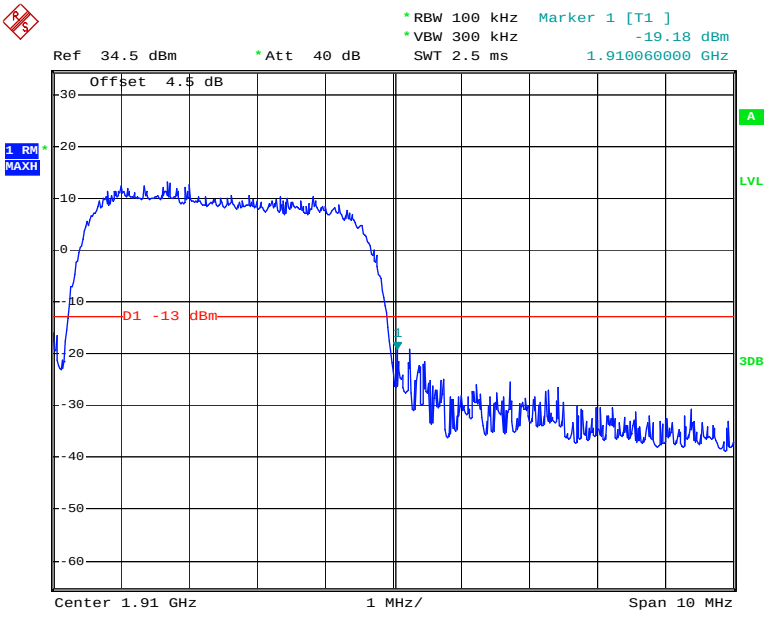
Date: 20.JAN.2019 16:36:13

WCDMA Band II HSDPA, Left Band Edge



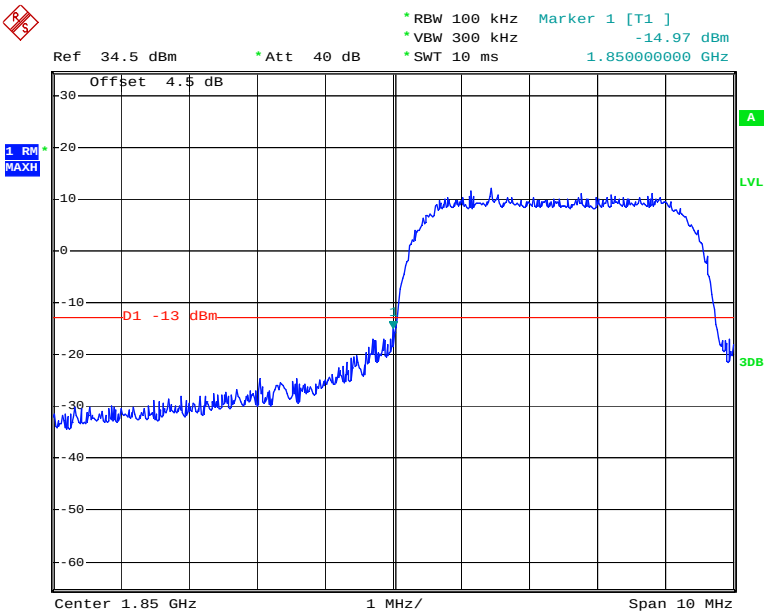
Date: 20.JAN.2019 16:35:03

WCDMA Band II HSDPA, Right Band Edge



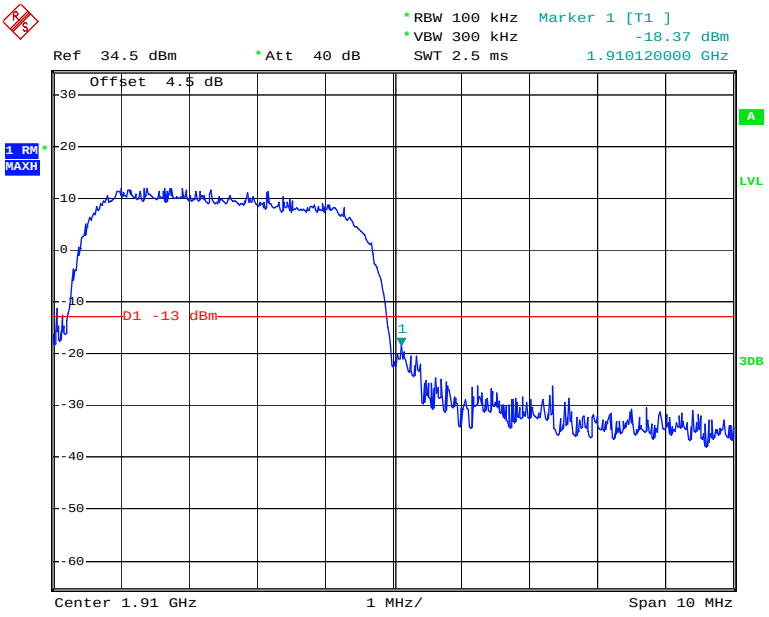
Date: 20.JAN.2019 16:35:35

WCDMA Band II HSUPA, Left Band Edge



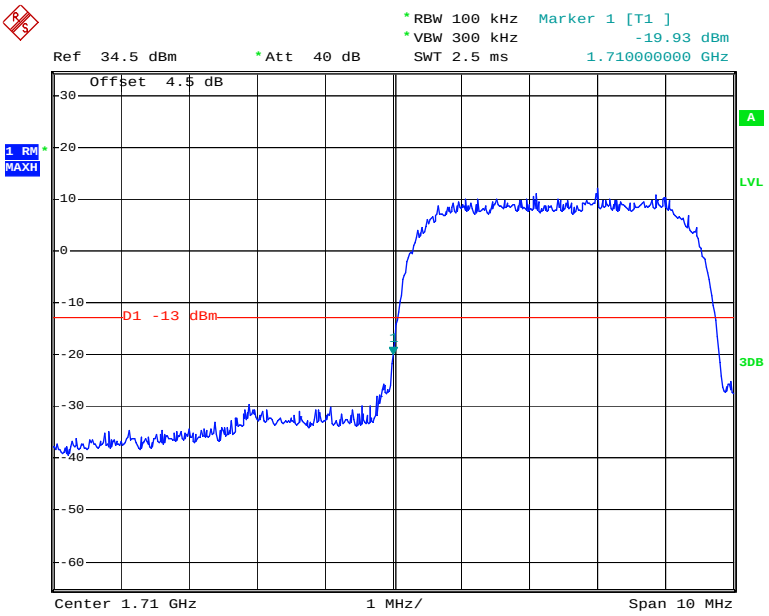
Date: 20.JAN.2019 16:34:22

WCDMA Band II HSUPA, Right Band Edge



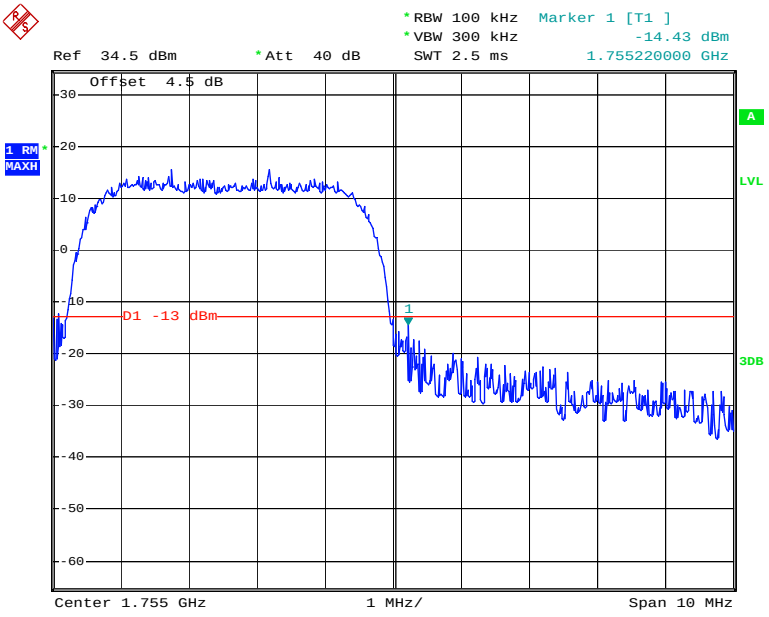
Date: 20.JAN.2019 16:32:56

WCDMA Band IV Rel 99, Left Band Edge



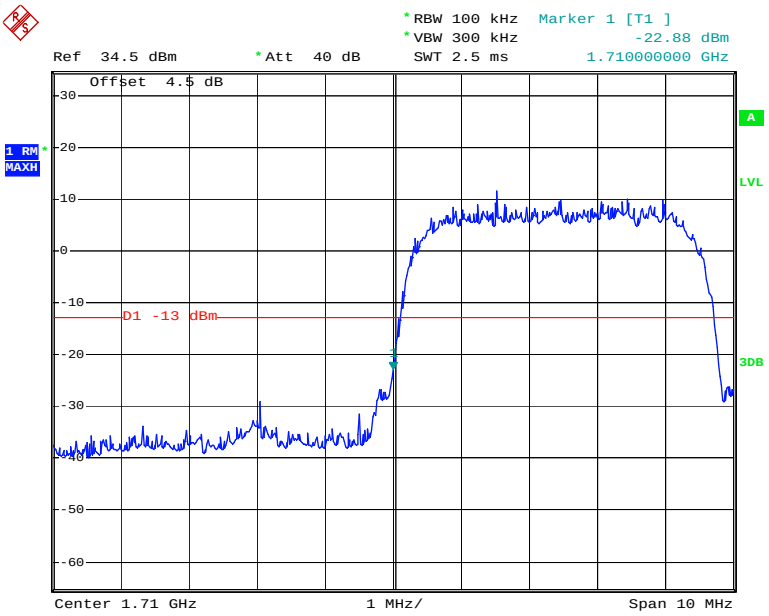
Date: 20.JAN.2019 17:00:17

WCDMA Band IV Rel 99, Right Band Edge



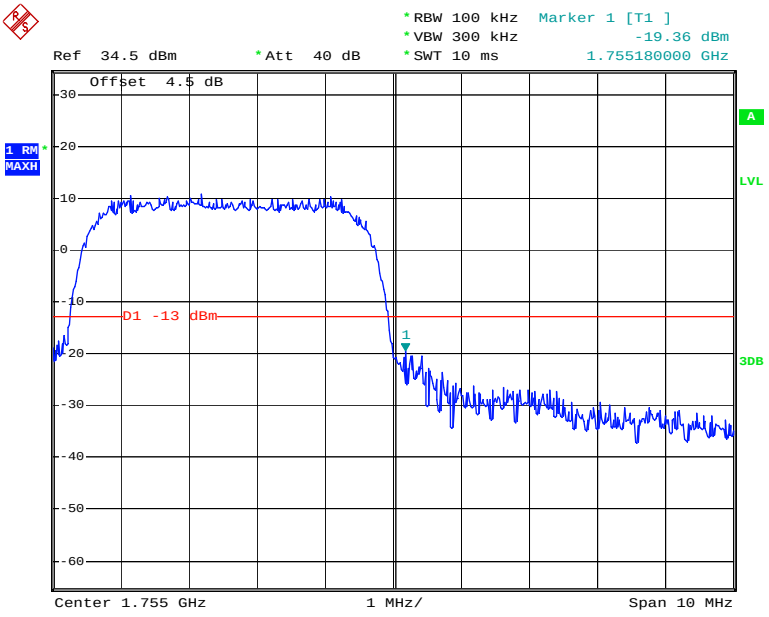
Date: 20.JAN.2019 16:59:36

WCDMA Band IV HSDPA, Left Band Edge



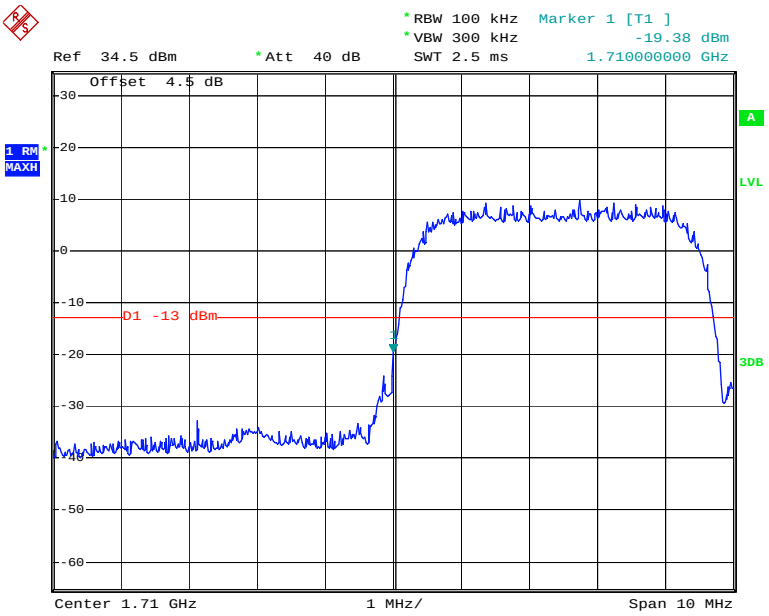
Date: 20.JAN.2019 17:03:53

WCDMA Band IV HSDPA, Right Band Edge



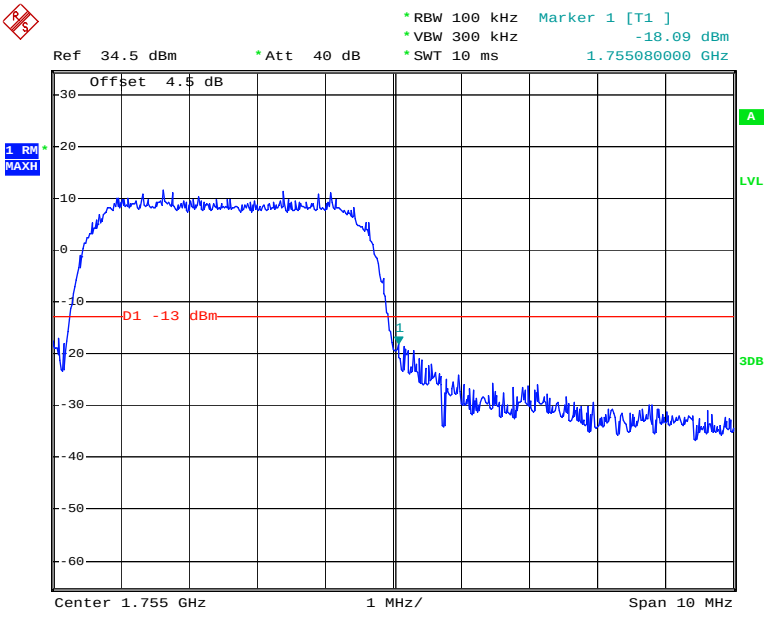
Date: 20.JAN.2019 17:02:39

WCDMA Band IV HSUPA, Left Band Edge



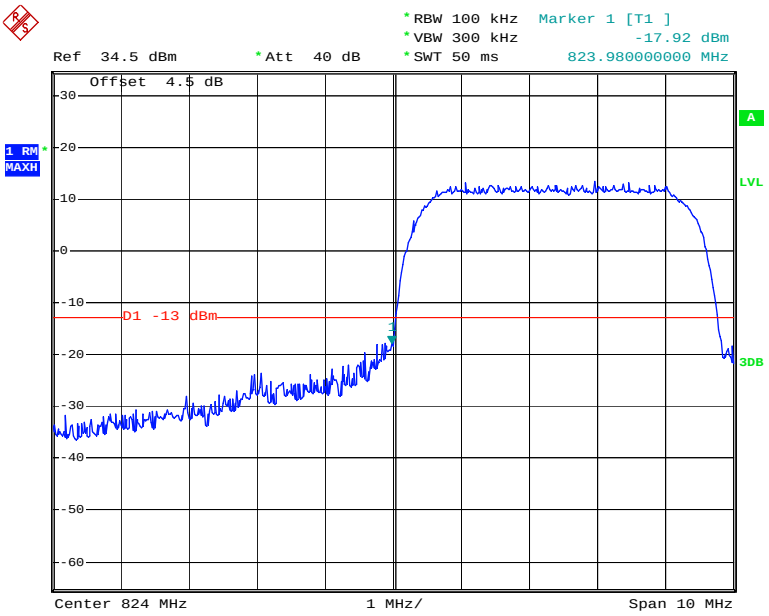
Date: 20.JAN.2019 17:01:17

WCDMA Band IV HSUPA, Right Band Edge



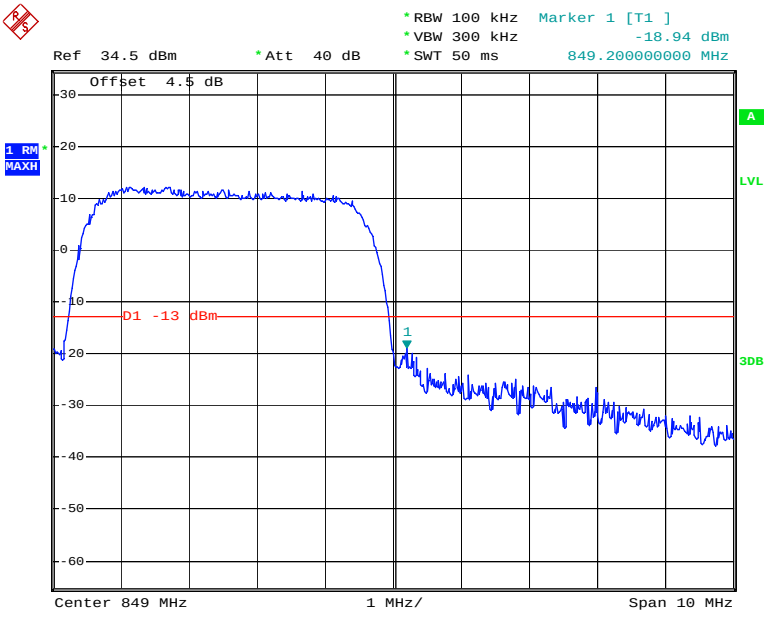
Date: 20.JAN.2019 17:03:13

WCDMA Band V Rel 99, Left Band Edge



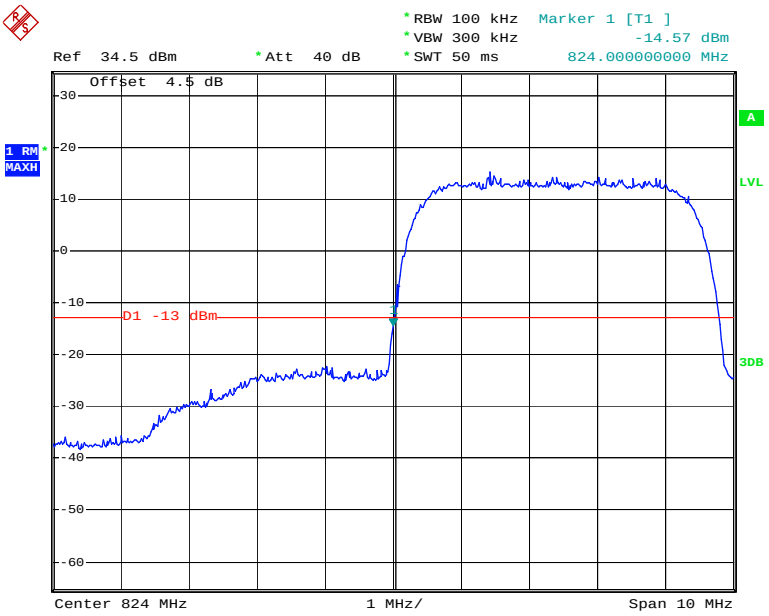
Date: 20.JAN.2019 17:28:18

WCDMA Band V Rel 99, Right Band Edge



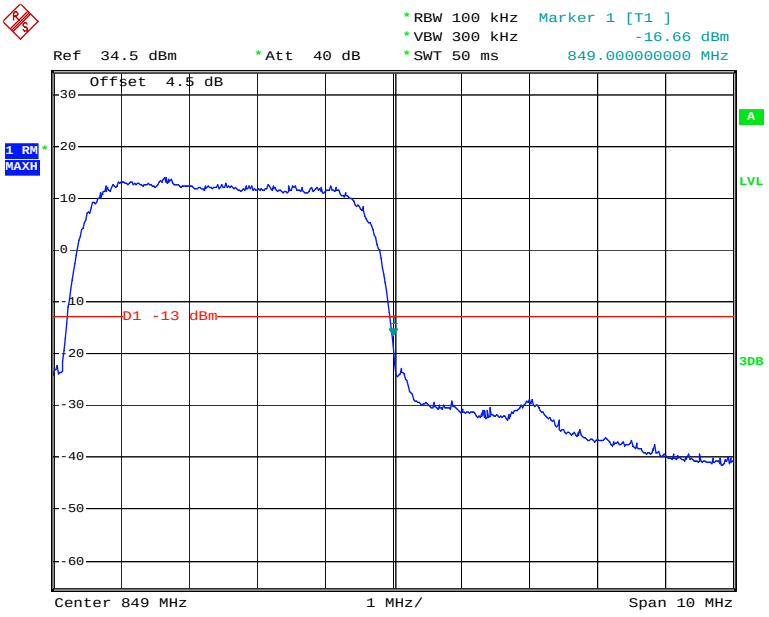
Date: 20.JAN.2019 17:26:15

WCDMA Band V HSDPA, Left Band Edge



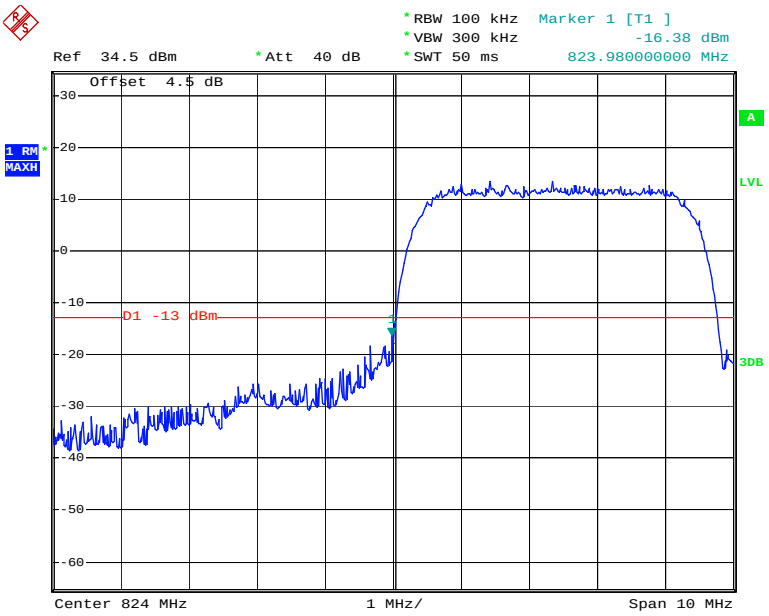
Date: 20.JAN.2019 17:24:29

WCDMA Band V HSDPA, Right Band Edge



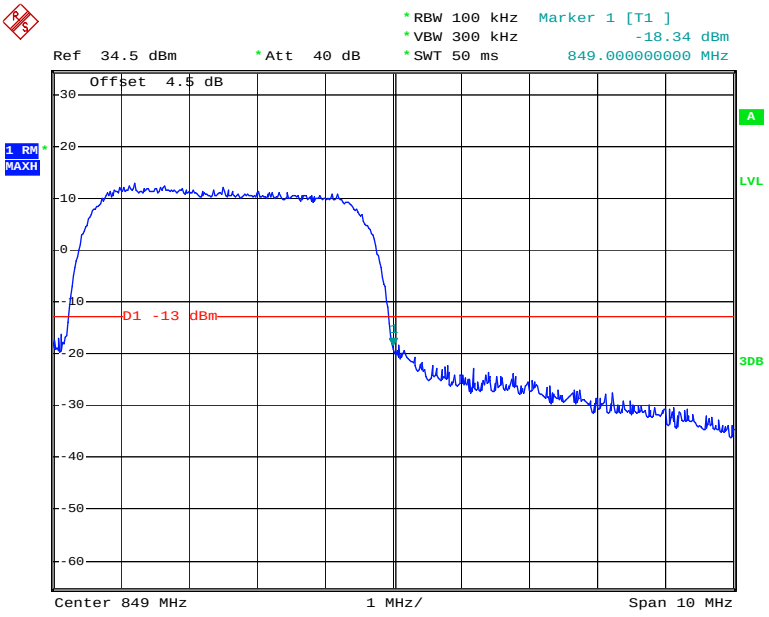
Date: 20.JAN.2019 17:25:16

WCDMA Band V HSUPA, Left Band Edge



Date: 20.JAN.2019 17:28:36

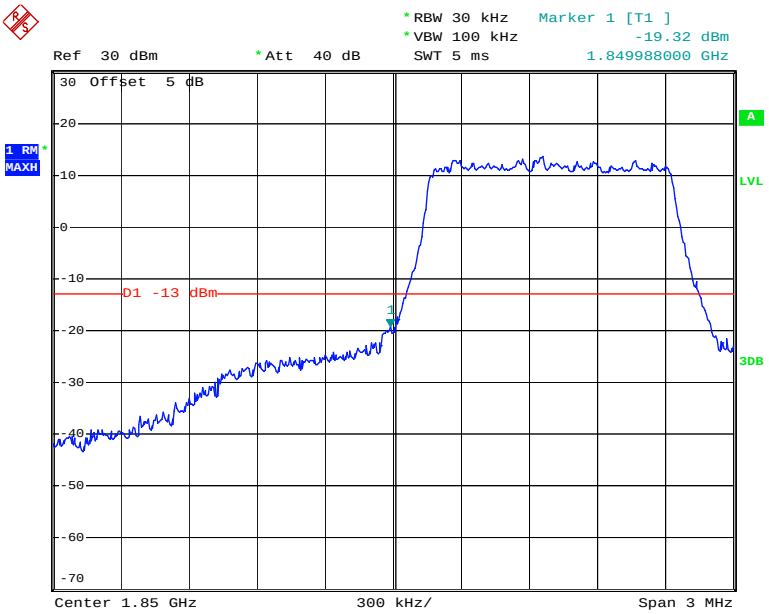
WCDMA Band V HSUPA, Right Band Edge



Date: 20.JAN.2019 17:29:11

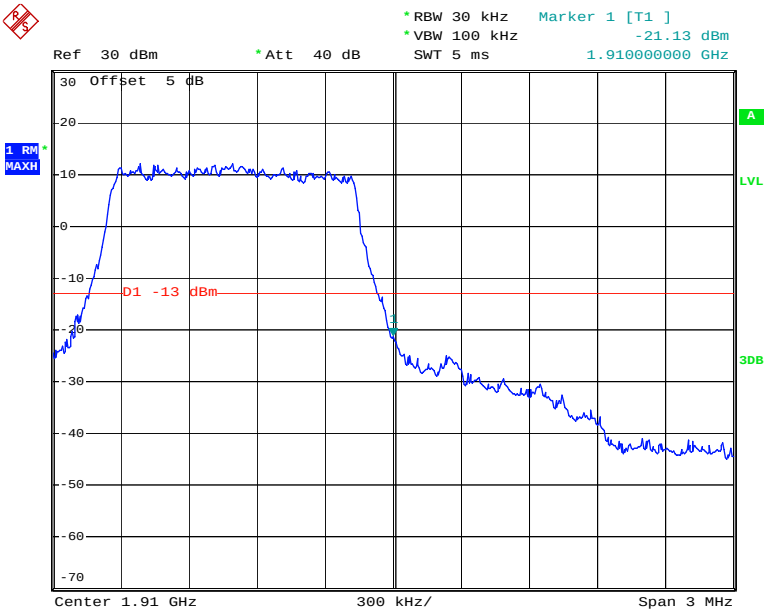
LTE Band 2

QPSK_1.4MHz_ 6 RB_ Left



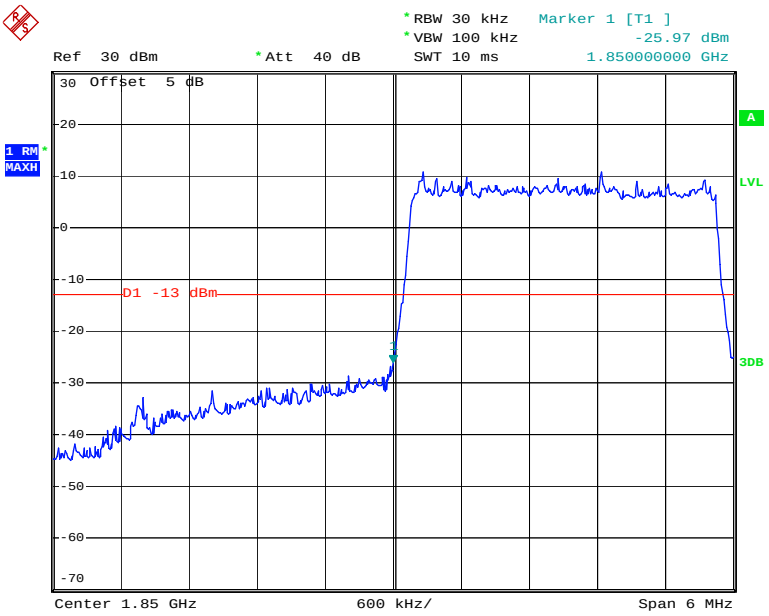
Date: 21.JAN.2019 22:04:56

QPSK_1.4MHz_ 6 RB_ Right



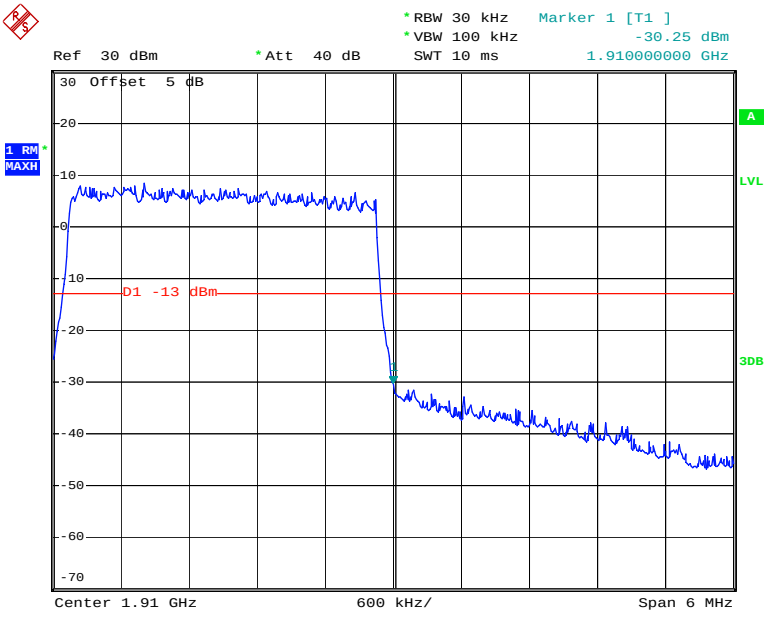
Date: 21.JAN.2019 22:05:51

QPSK_3MHz_ 15 RB_ Left



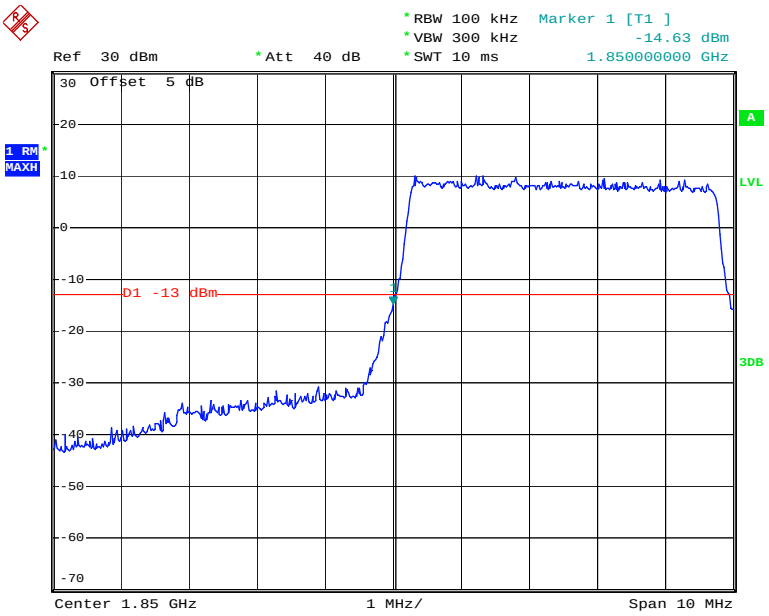
Date: 21.JAN.2019 22:06:52

QPSK_3MHz_ 15 RB_ Right



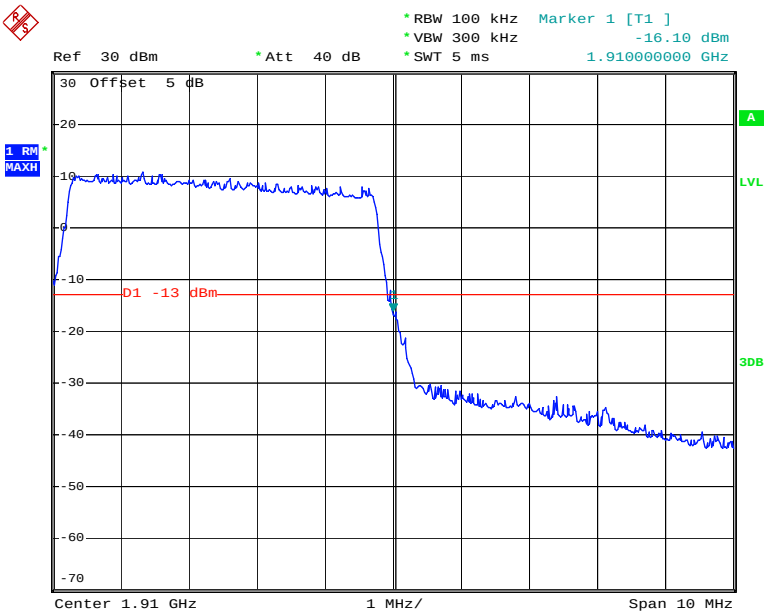
Date: 21.JAN.2019 22:07:50

QPSK_5MHz_ 25 RB_ Left



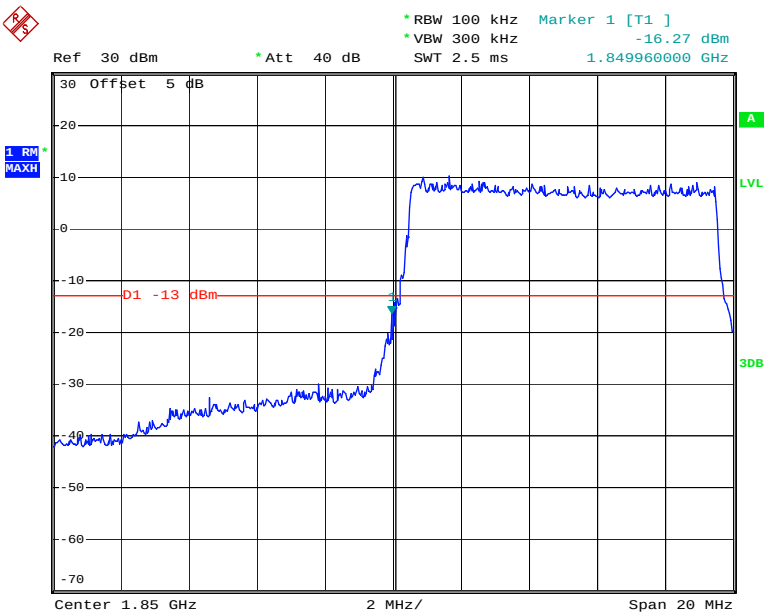
Date: 21.JAN.2019 22:32:58

QPSK_5MHz_ 25 RB_ Right



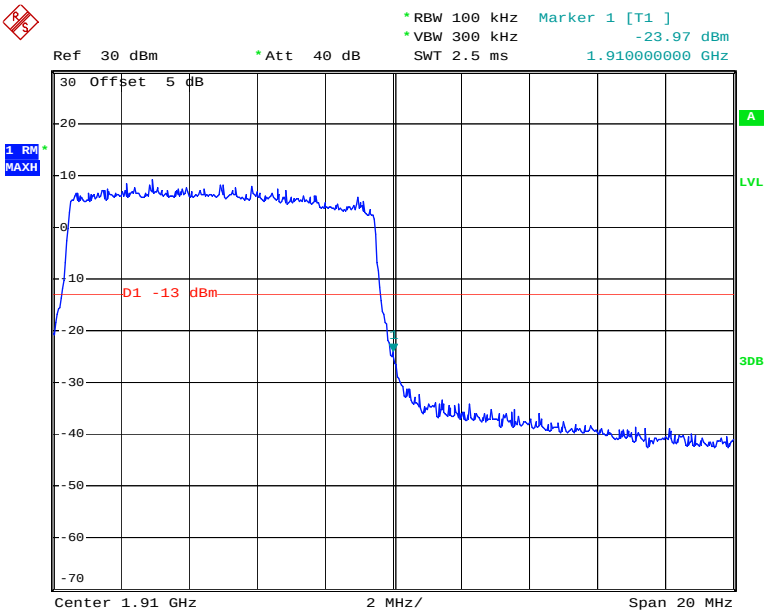
Date: 21.JAN.2019 22:31:37

QPSK_10MHz_ 50 RB_ Left



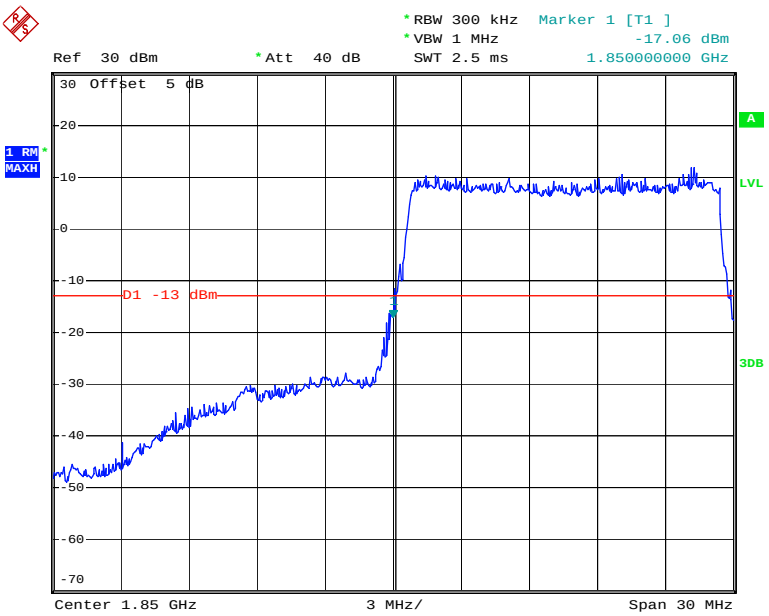
Date: 21.JAN.2019 22:11:39

QPSK_10MHz_ 50 RB_ Right



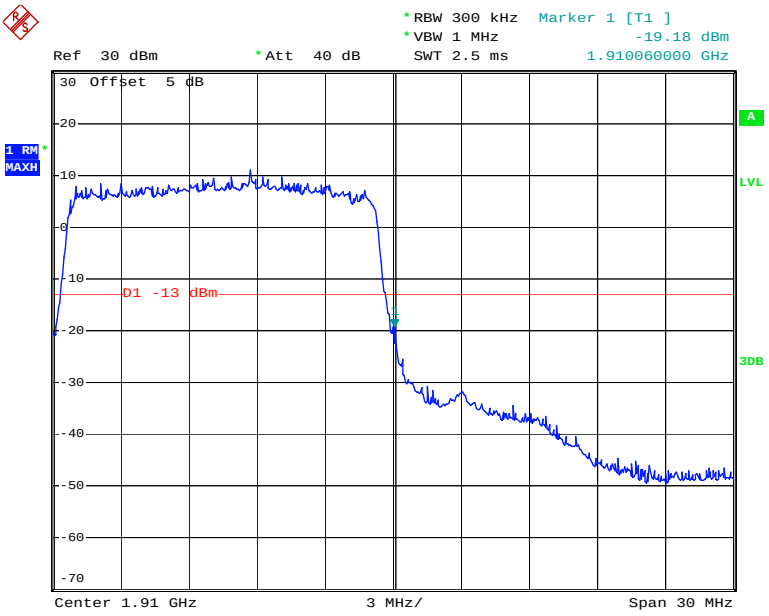
Date: 21.JAN.2019 22:12:31

QPSK_15MHz_ 75 RB_ Left



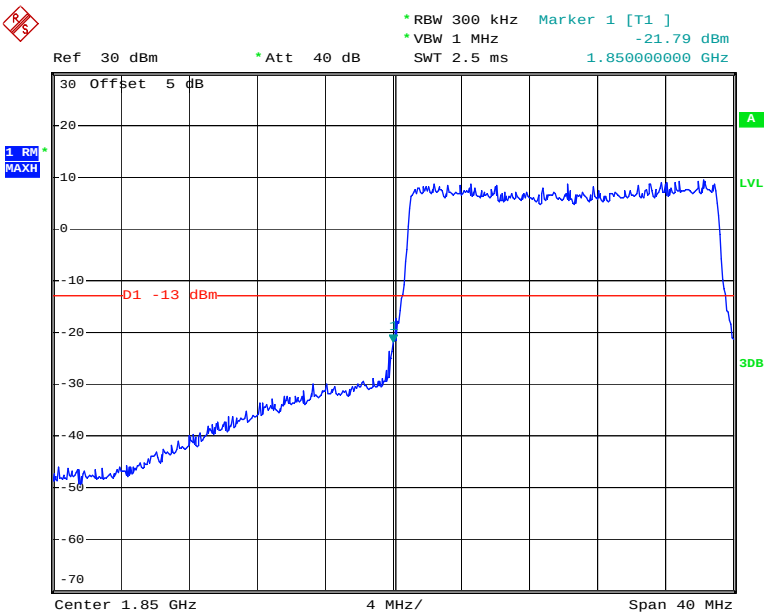
Date: 22.JAN.2019 09:41:30

QPSK_15MHz_ 75 RB_ Right



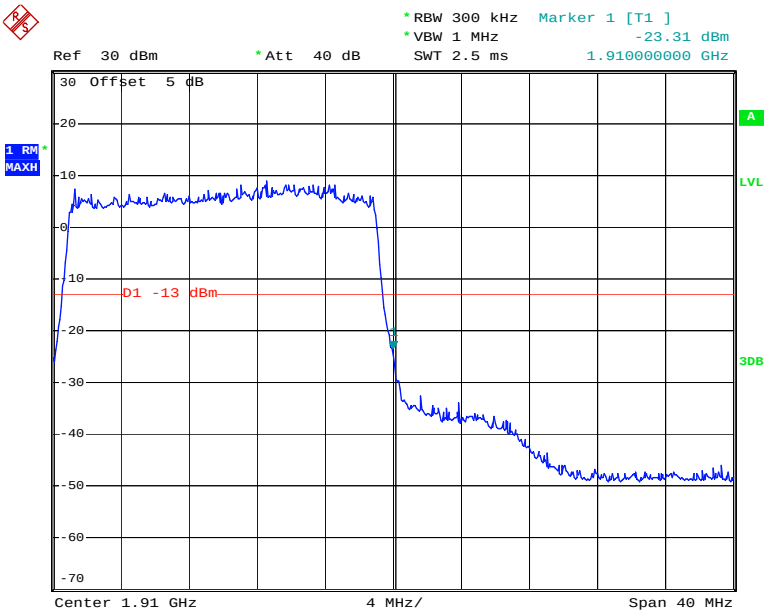
Date: 21.JAN.2019 22:14:46

QPSK_20MHz_ FULL RB_ Left



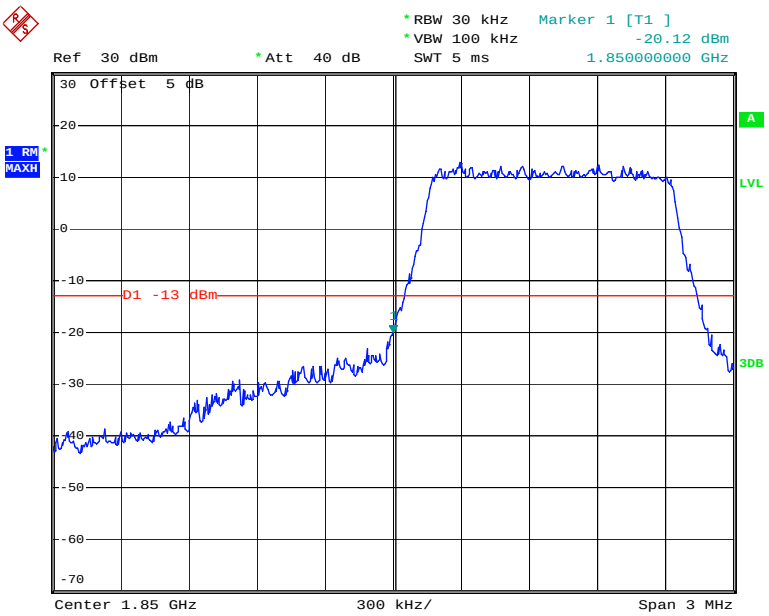
Date: 21.JAN.2019 22:15:51

QPSK_20MHz_ FULL RB_ Right



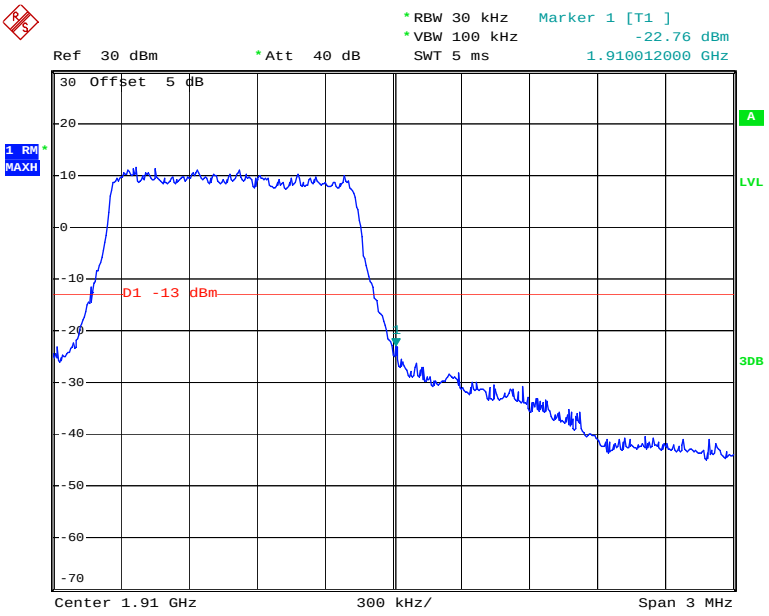
Date: 21.JAN.2019 22:16:54

16QAM_1.4MHz_ 6 RB_ Left



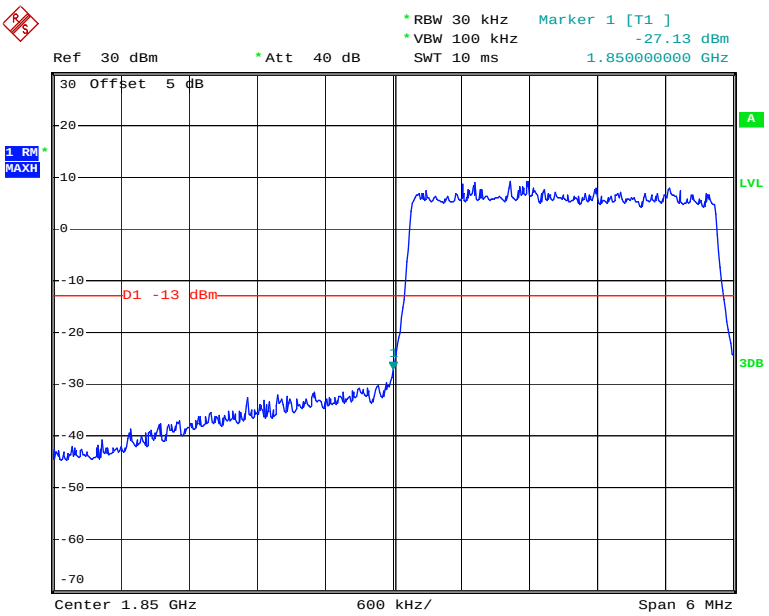
Date: 21.JAN.2019 22:05:25

16QAM_1.4MHz_ 6 RB_ Right



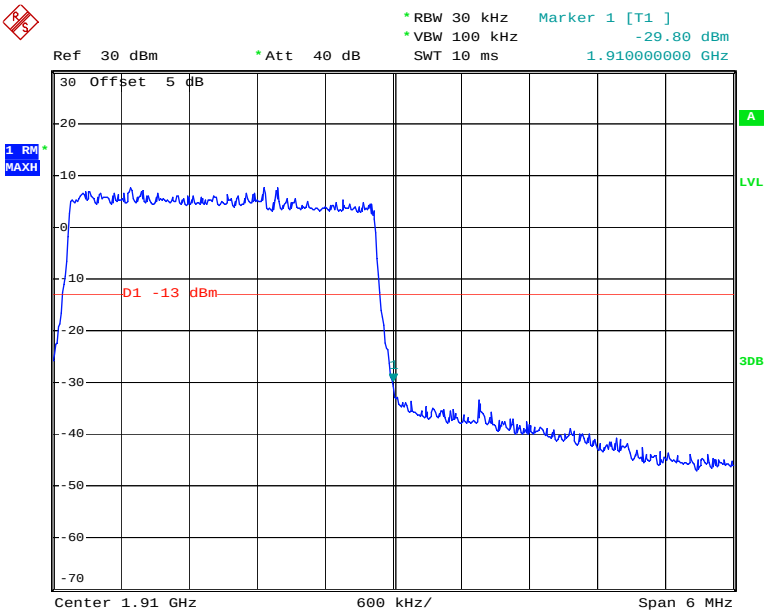
Date: 21.JAN.2019 22:06:20

16QAM_3MHz_ 15 RB_ Left



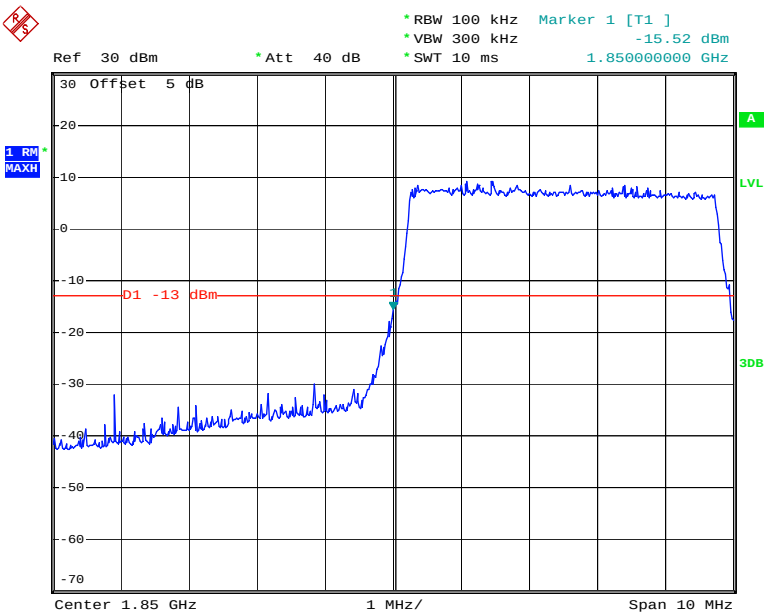
Date: 21.JAN.2019 22:07:25

16QAM_3MHz_ 15 RB_ Right



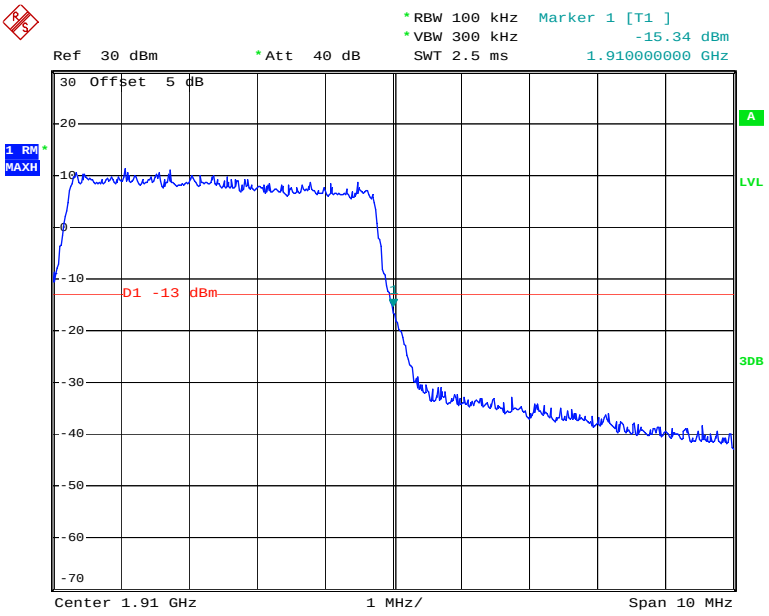
Date: 21.JAN.2019 22:08:25

16QAM_5MHz_ 25 RB_ Left



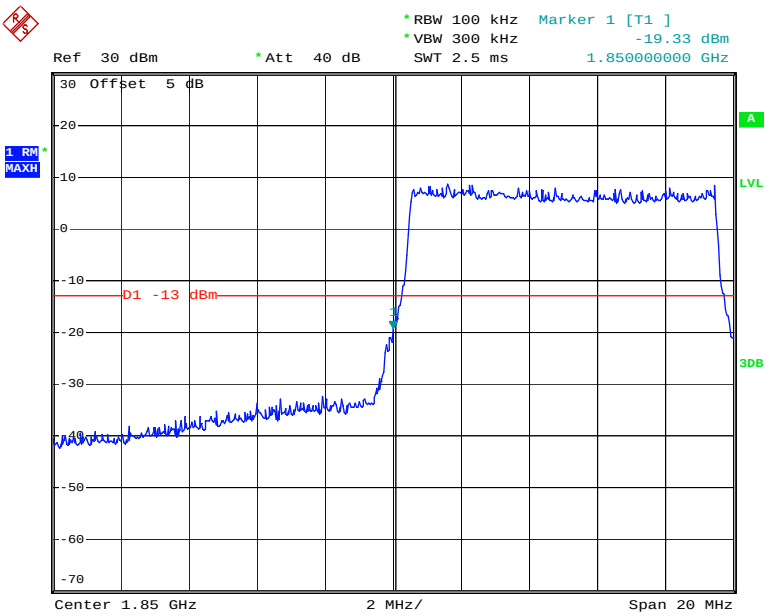
Date: 21.JAN.2019 22:34:13

16QAM_5MHz_ 25 RB_ Right



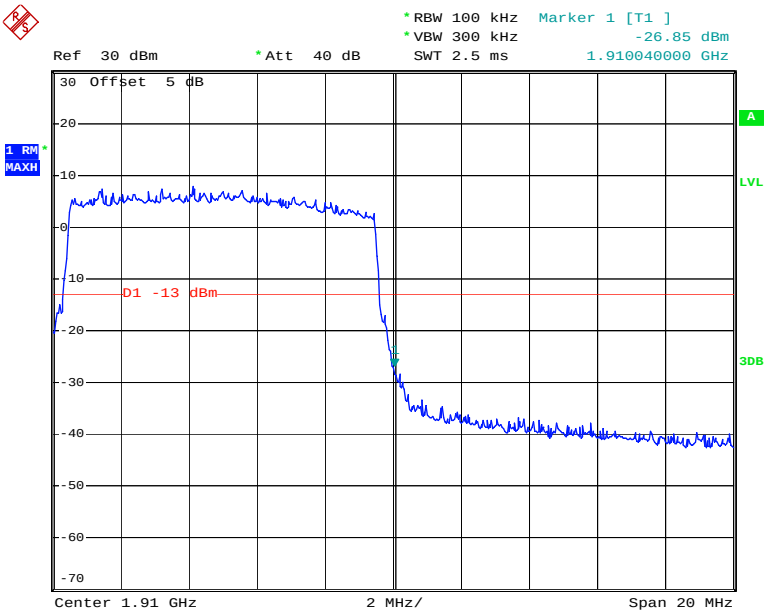
Date: 21.JAN.2019 22:11:07

16QAM_10MHz_ 50 RB_ Left



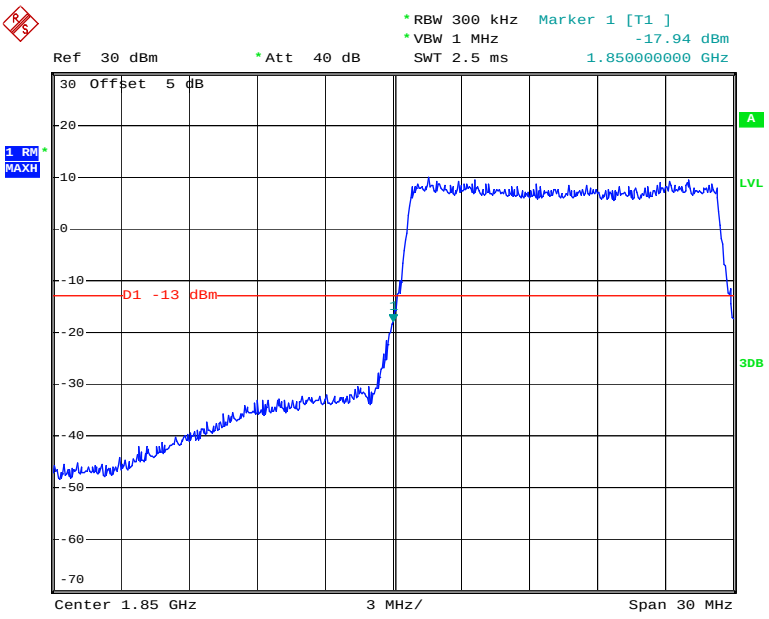
Date: 21.JAN.2019 22:12:05

16QAM_10MHz_ 50 RB_ Right



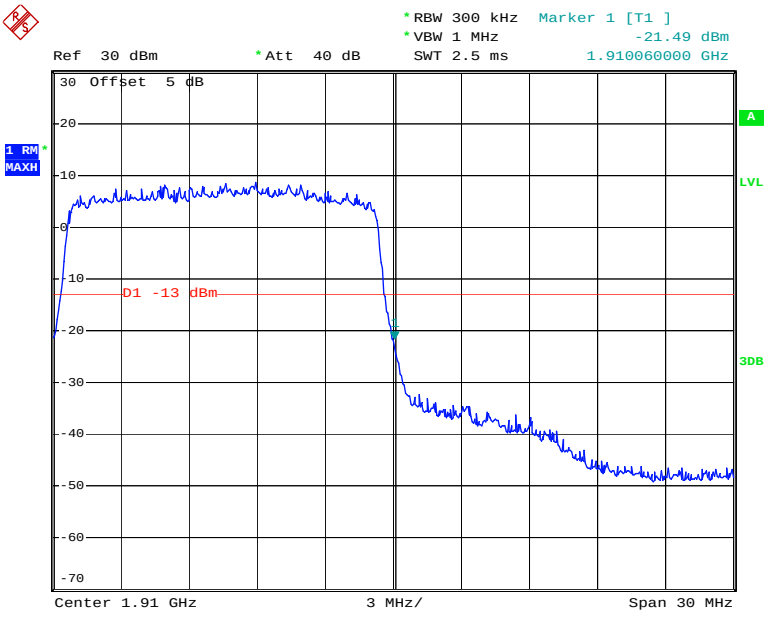
Date: 21.JAN.2019 22:13:03

16QAM_15MHz_ 75 RB_ Left



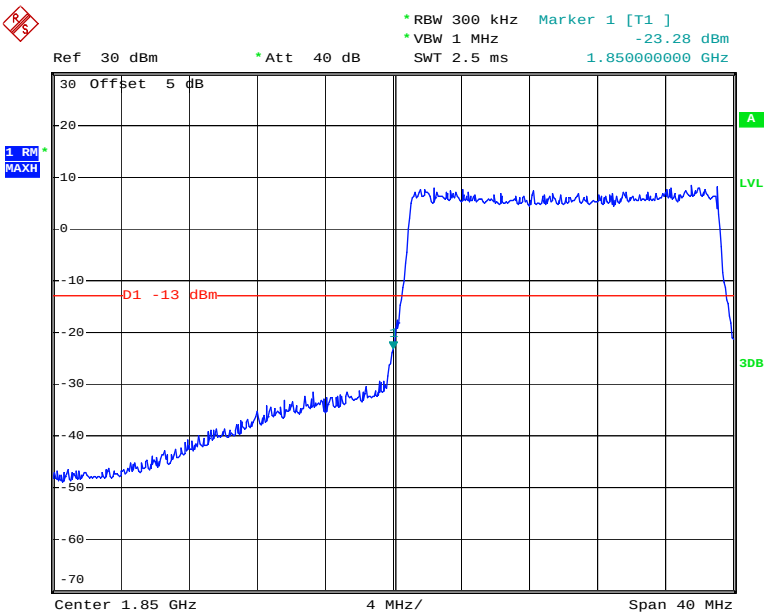
Date: 21.JAN.2019 22:14:15

16QAM_15MHz_ 75 RB_ Right



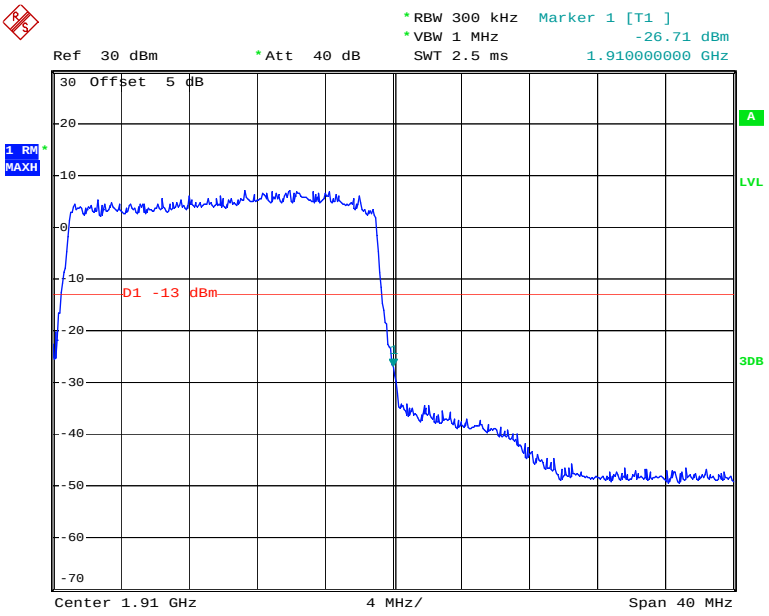
Date: 21.JAN.2019 22:15:19

16QAM_20MHz_ FULL RB_ Left



Date: 21.JAN.2019 22:16:25

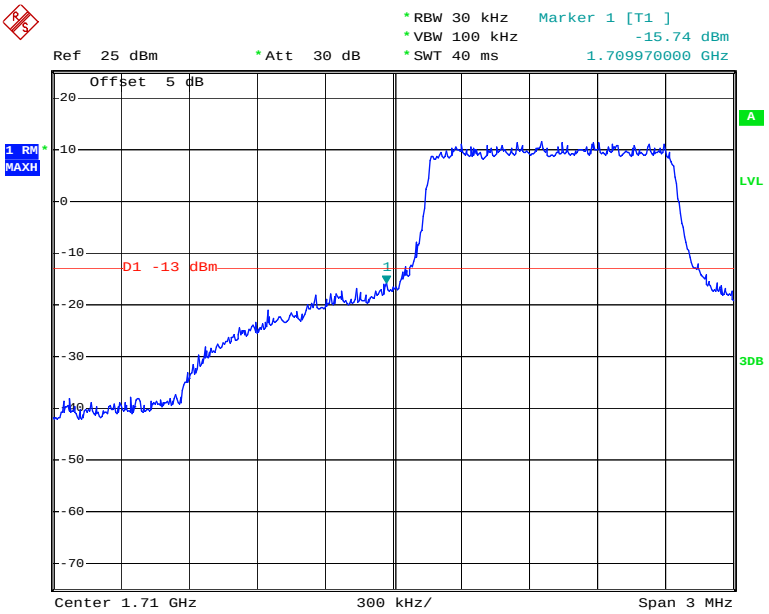
16QAM_20MHz_ FULL RB_ Right



Date: 21.JAN.2019 22:17:22

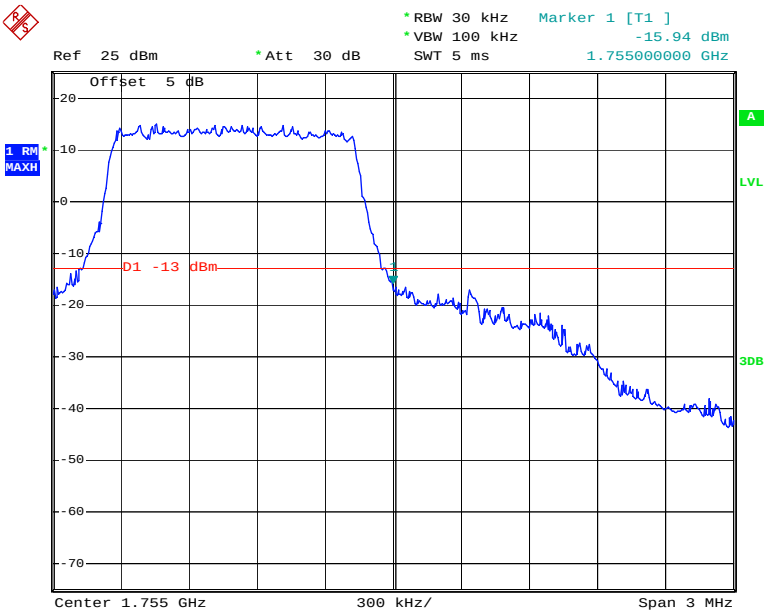
LTE Band 4

QPSK_1.4MHz_ 6 RB_ Left



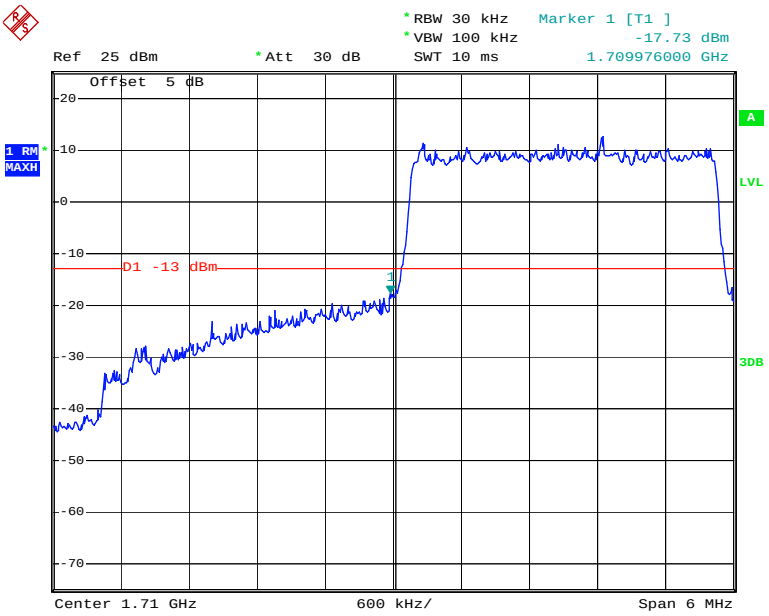
Date: 21.JAN.2019 17:18:31

QPSK_1.4MHz_ 6 RB_ Right



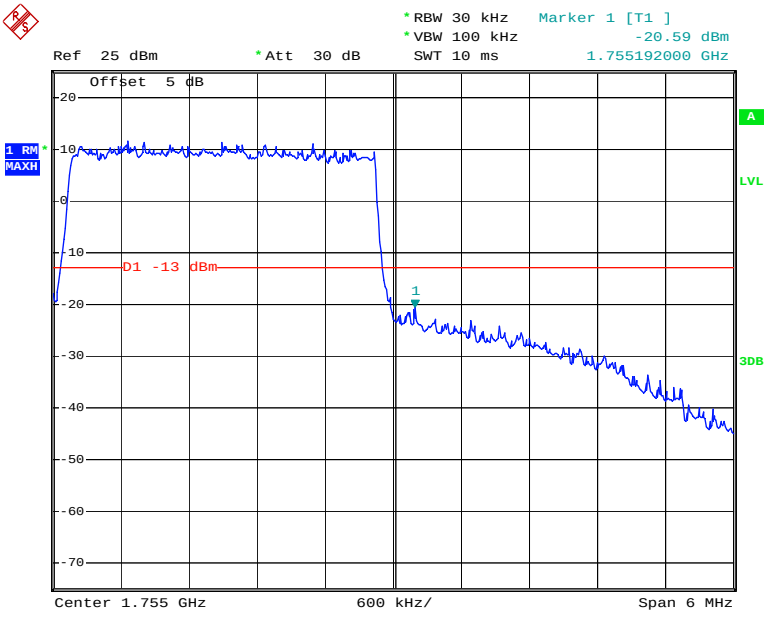
Date: 21.JAN.2019 14:25:26

QPSK_3MHz_ 15 RB_ Left



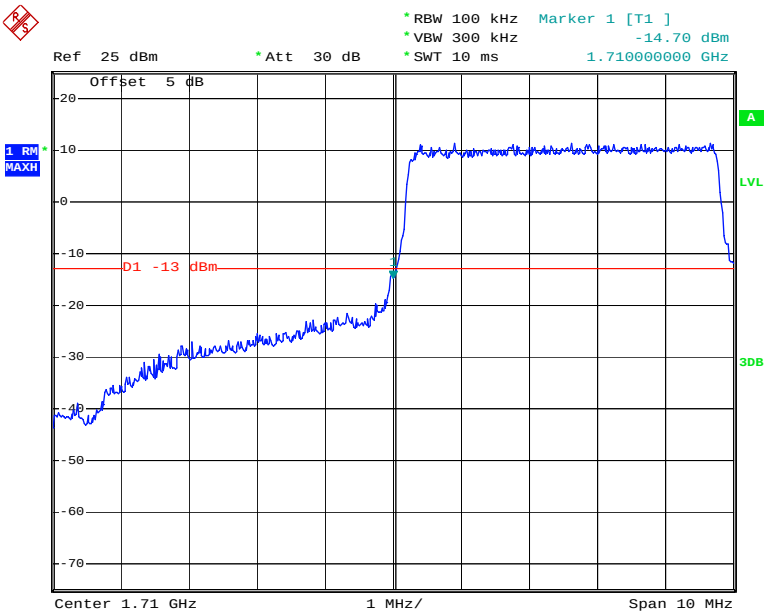
Date: 21.JAN.2019 14:26:32

QPSK_3MHz_ 15 RB_ Right



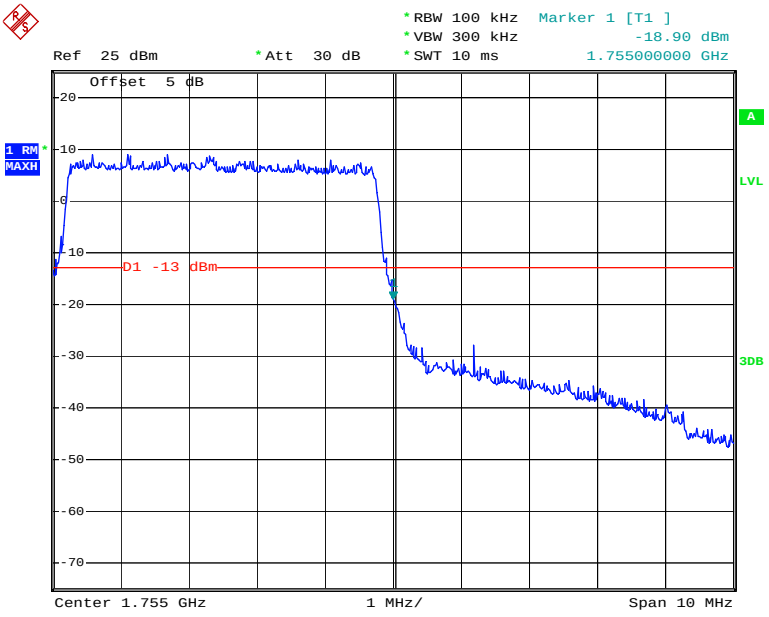
Date: 21.JAN.2019 14:27:42

QPSK_5MHz_ 25 RB_ Left



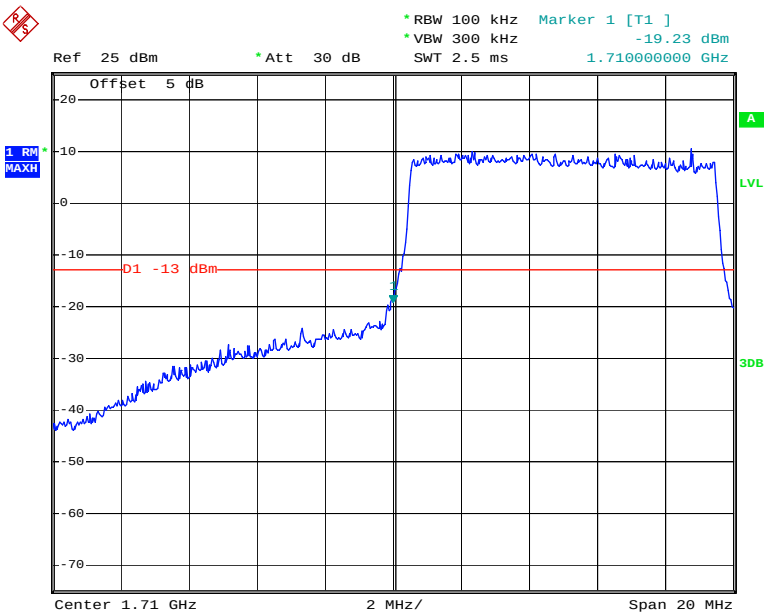
Date: 22.JAN.2019 10:07:41

QPSK_5MHz_ 25 RB_ Right



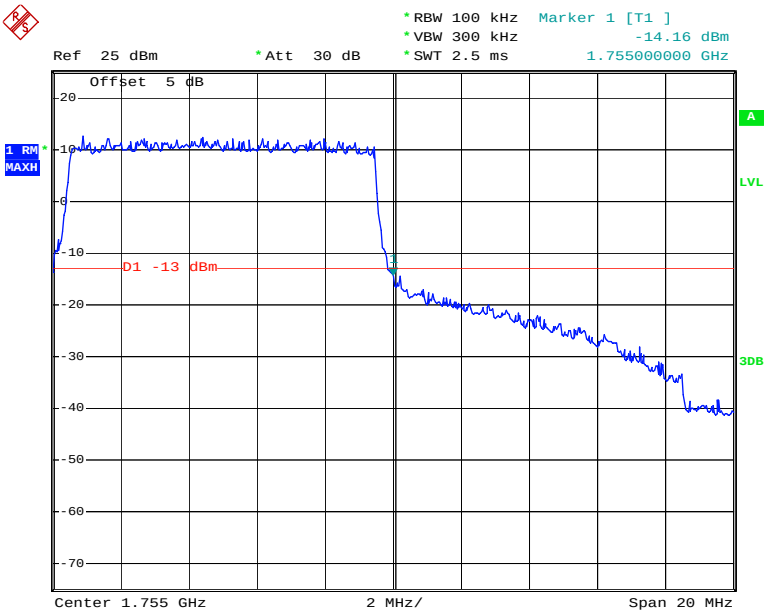
Date: 21.JAN.2019 17:23:18

QPSK_10MHz_ 50 RB_ Left



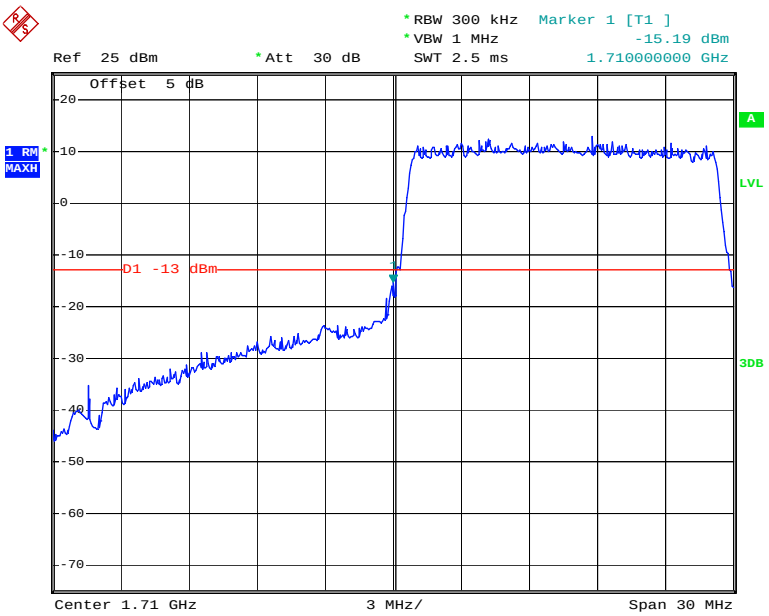
Date: 21.JAN.2019 17:29:43

QPSK_10MHz_ 50 RB_ Right



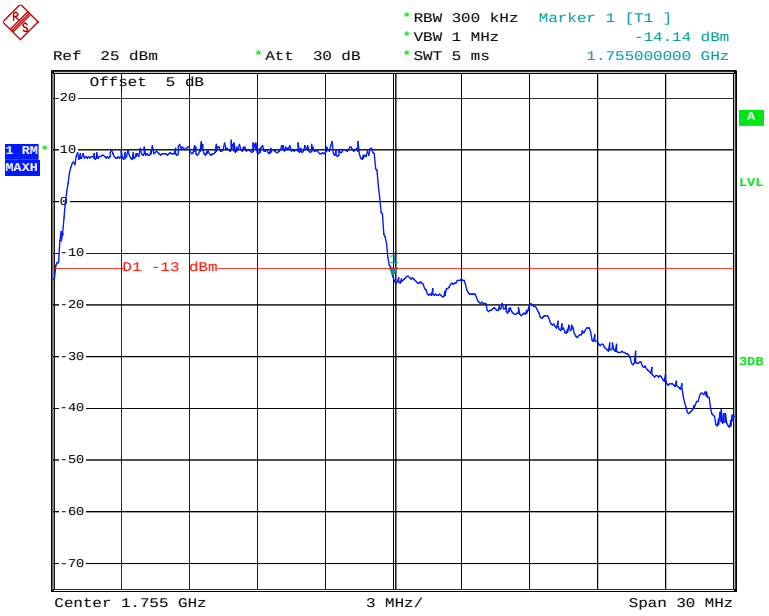
Date: 22.JAN.2019 09:47:53

QPSK_15MHz_ 75 RB_ Left



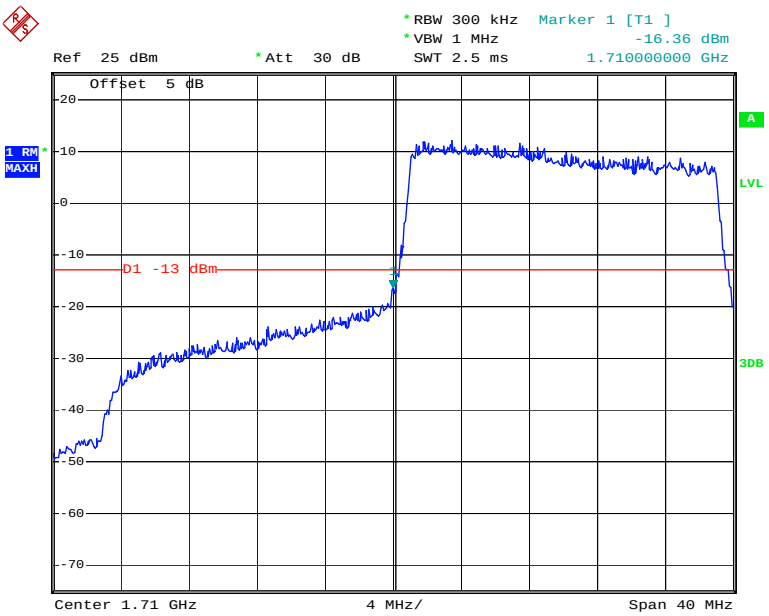
Date: 22.JAN.2019 09:51:39

QPSK_15MHz_ 75 RB_ Right



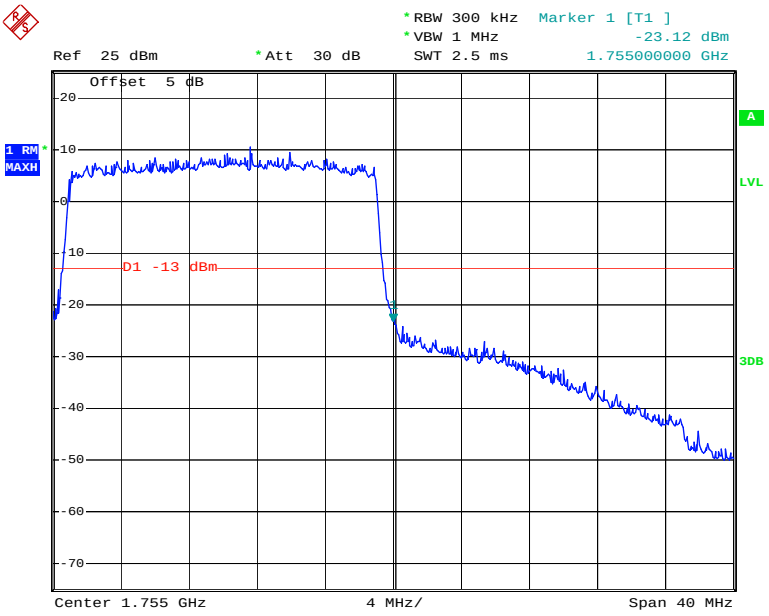
Date: 22.JAN.2019 09:50:17

QPSK_20MHz_ FULL RB_ Left



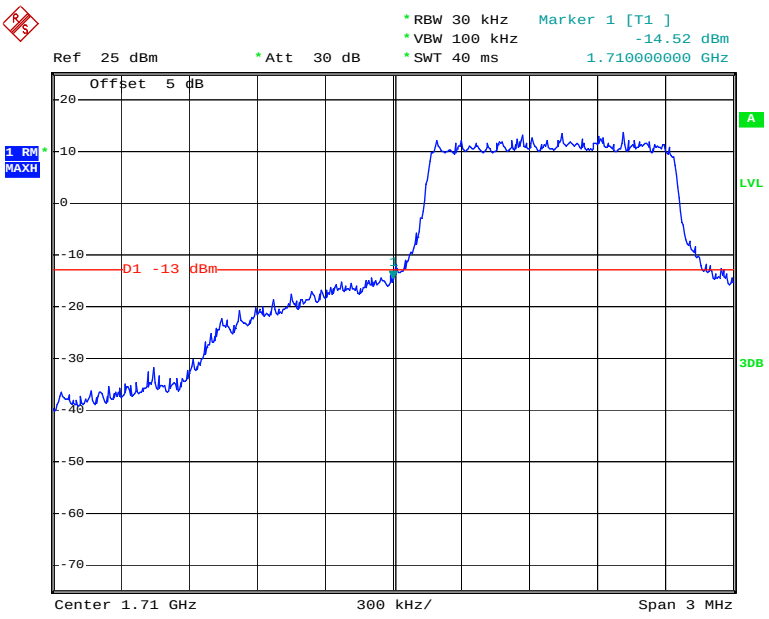
Date: 21.JAN.2019 17:34:09

QPSK_20MHz_ FULL RB_ Right



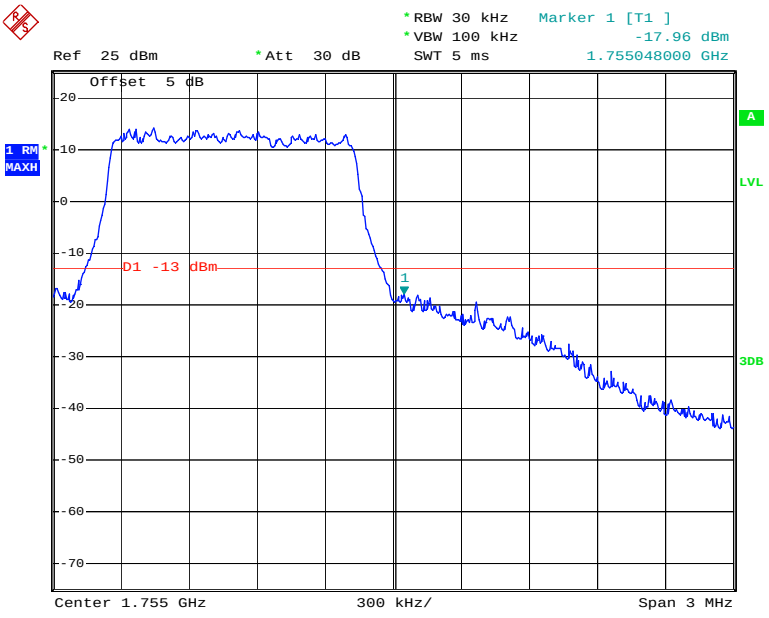
Date: 21.JAN.2019 17:32:23

16QAM_1.4MHz_ 6 RB_ Left



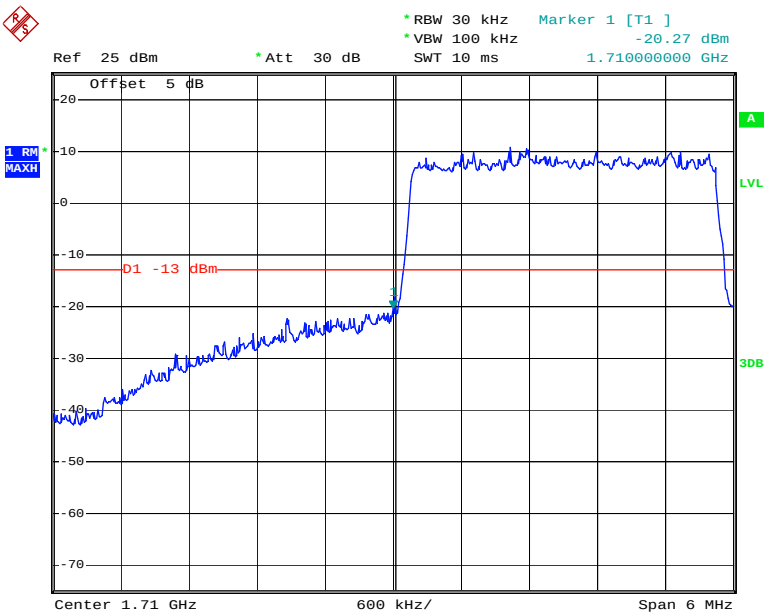
Date: 21.JAN.2019 16:59:34

16QAM_1.4MHz_ 6 RB_ Right



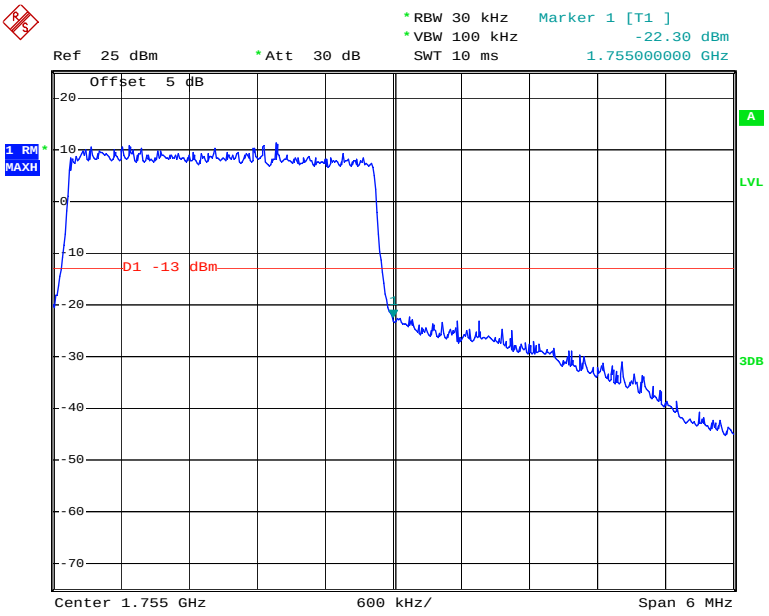
Date: 21.JAN.2019 14:25:59

16QAM_3MHz_ 15 RB_ Left



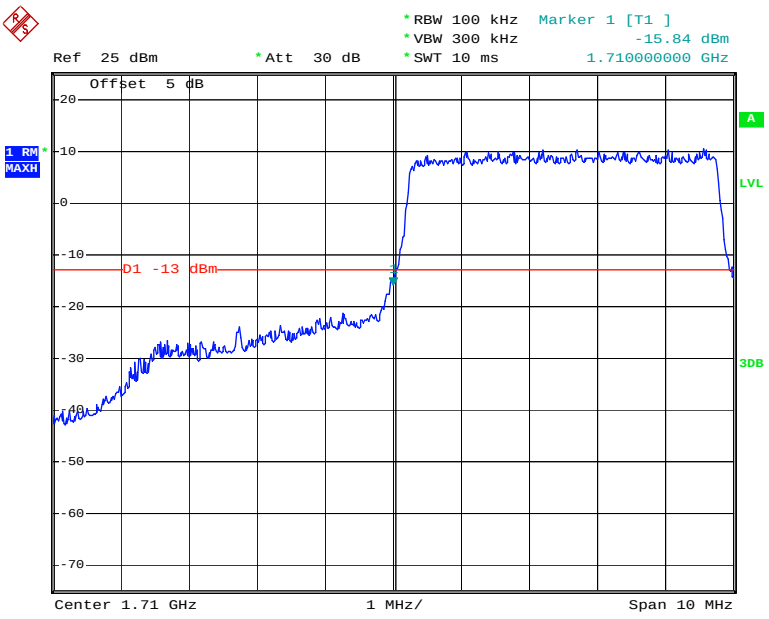
Date: 21.JAN.2019 14:27:08

16QAM_3MHz_ 15 RB_ Right



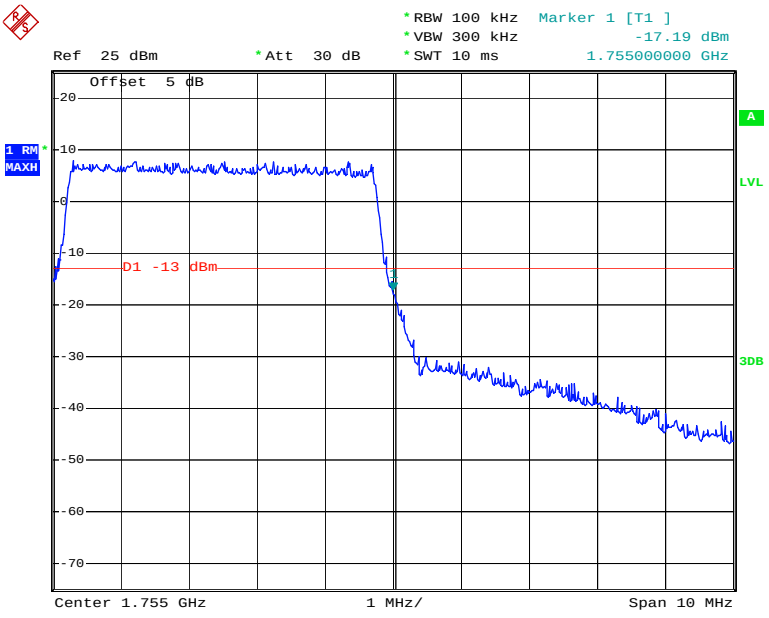
Date: 21.JAN.2019 14:28:18

16QAM_5MHz_ 25 RB_ Left



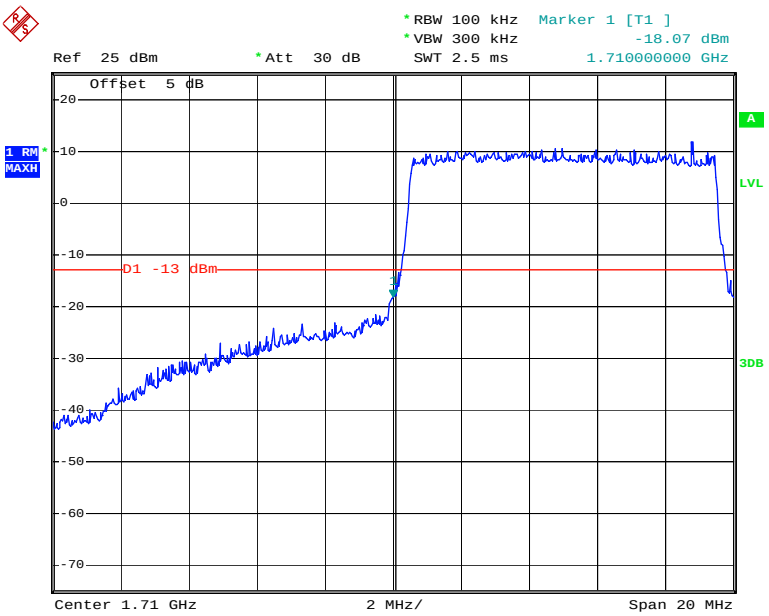
Date: 21.JAN.2019 17:25:33

16QAM_5MHz_ 25 RB_ Right



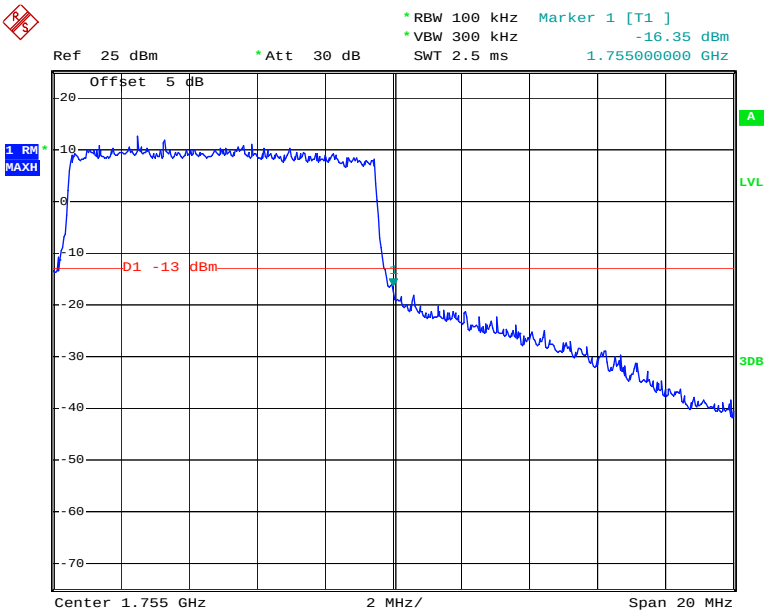
Date: 21.JAN.2019 17:24:14

16QAM_10MHz_ 50 RB_ Left



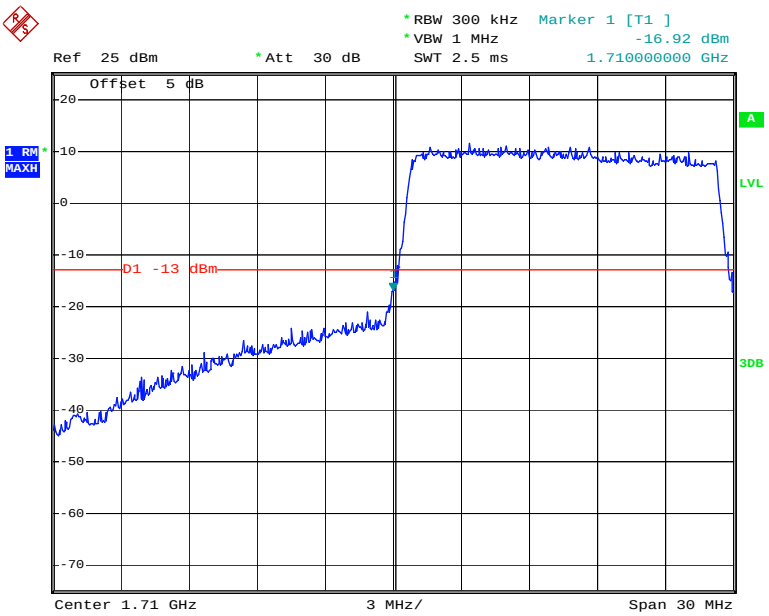
Date: 21.JAN.2019 14:32:10

16QAM_10MHz_ 50 RB_ Right



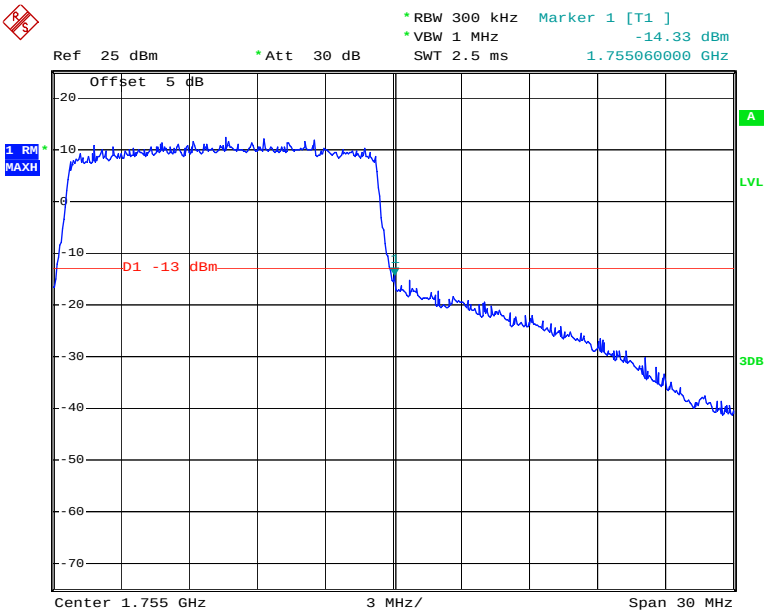
Date: 21.JAN.2019 14:33:33

16QAM_15MHz_ 75 RB_ Left



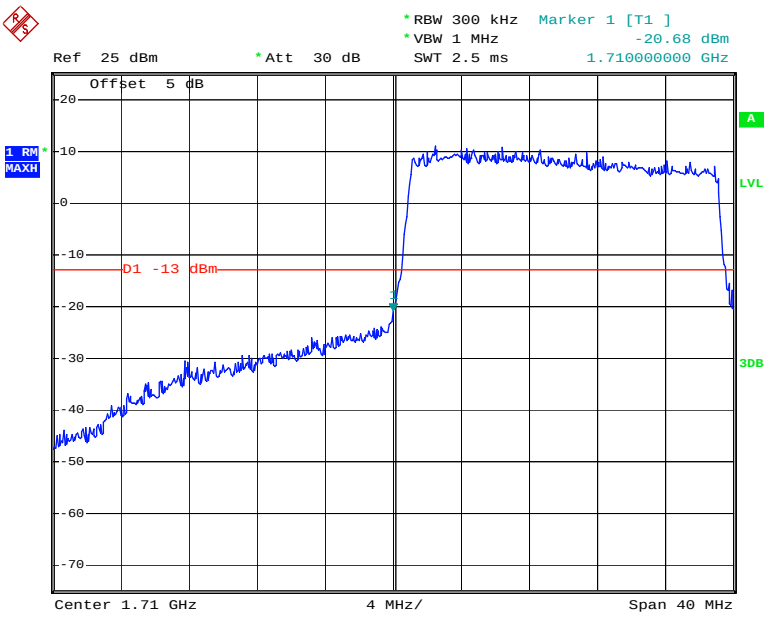
Date: 21.JAN.2019 14:34:29

16QAM_15MHz_ 75 RB_ Right



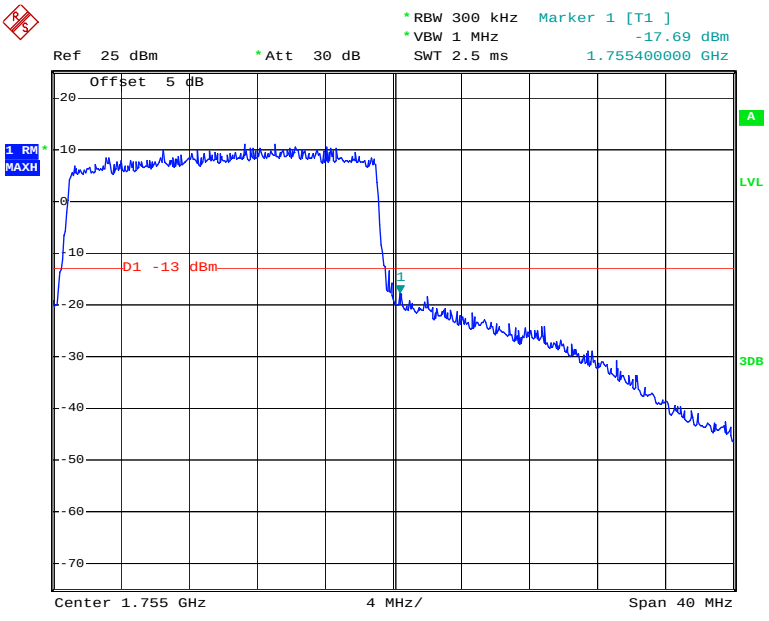
Date: 21.JAN.2019 14:35:33

16QAM_20MHz_ FULL RB_ Left



Date: 21.JAN.2019 14:36:42

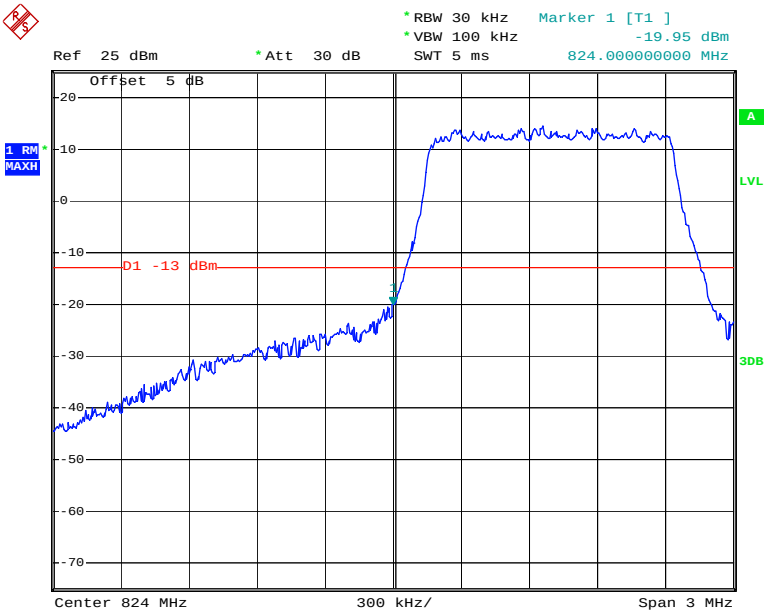
16QAM_20MHz_ FULL RB_ Right



Date: 21.JAN.2019 14:37:56

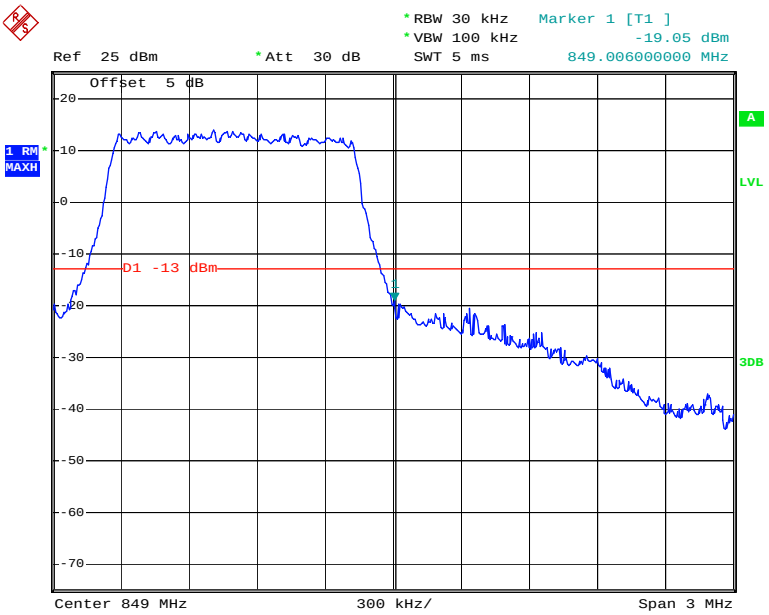
LTE Band 5

QPSK_1.4MHz_ 6 RB_ Left



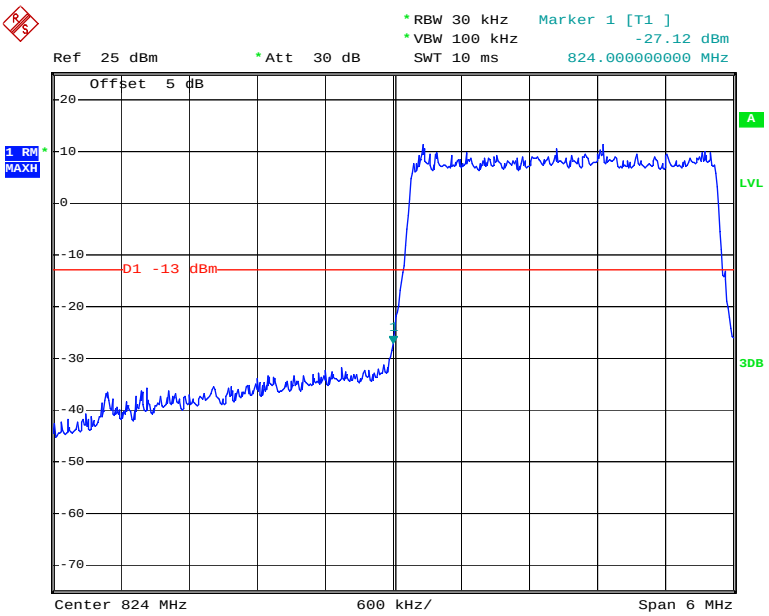
Date: 21.JAN.2019 14:38:35

QPSK_1.4MHz_ 6 RB_ Right



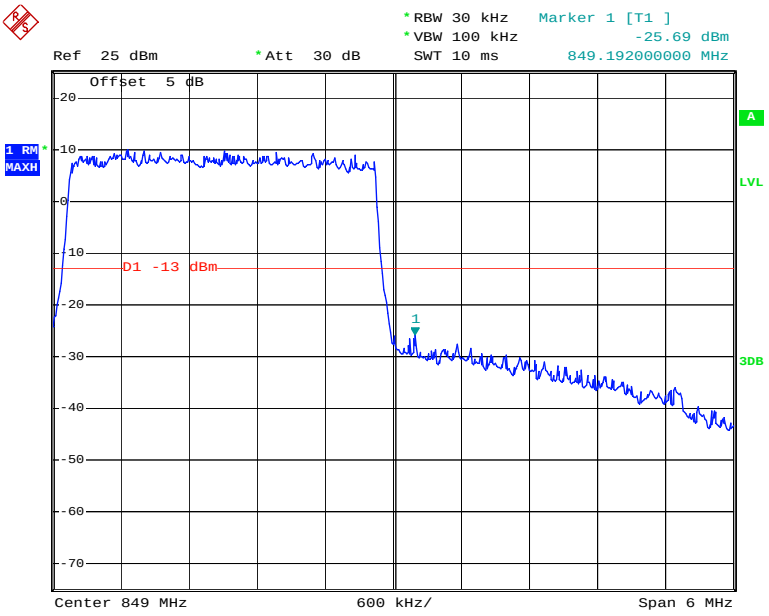
Date: 21.JAN.2019 14:39:36

QPSK_3MHz_ 15 RB_ Left



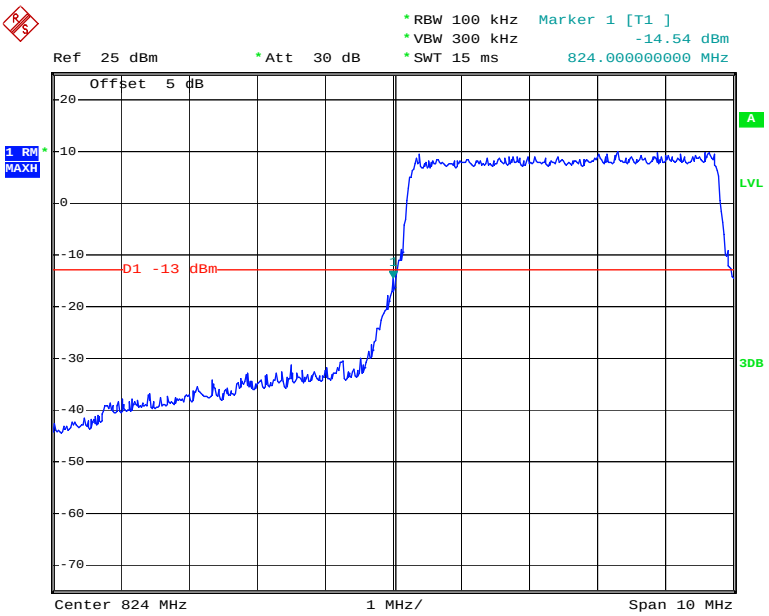
Date: 21.JAN.2019 14:40:41

QPSK_3MHz_ 15 RB_ Right



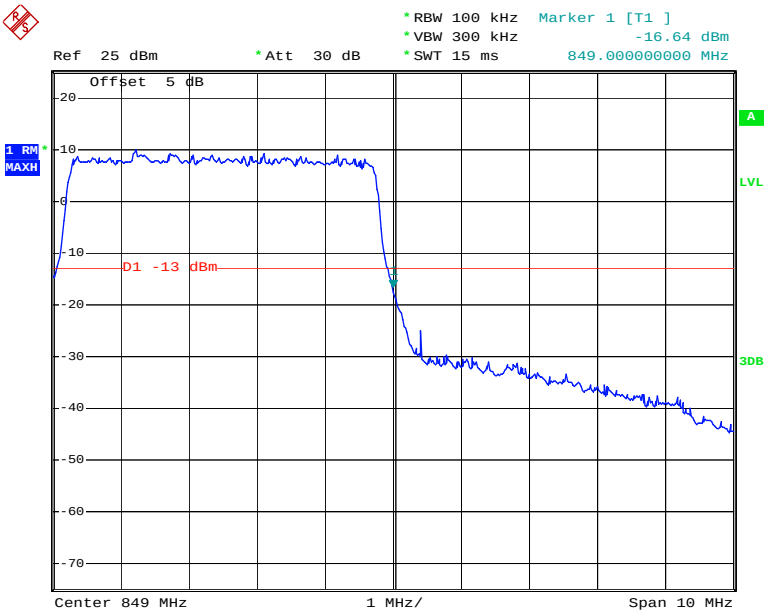
Date: 21.JAN.2019 14:41:54

QPSK_5MHz_ 25 RB_ Left



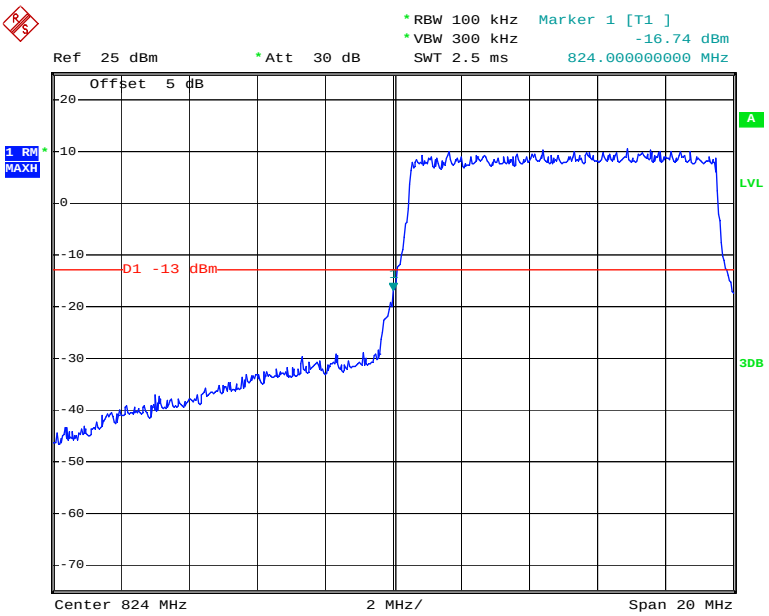
Date: 21.JAN.2019 17:37:48

QPSK_5MHz_ 25 RB_ Right



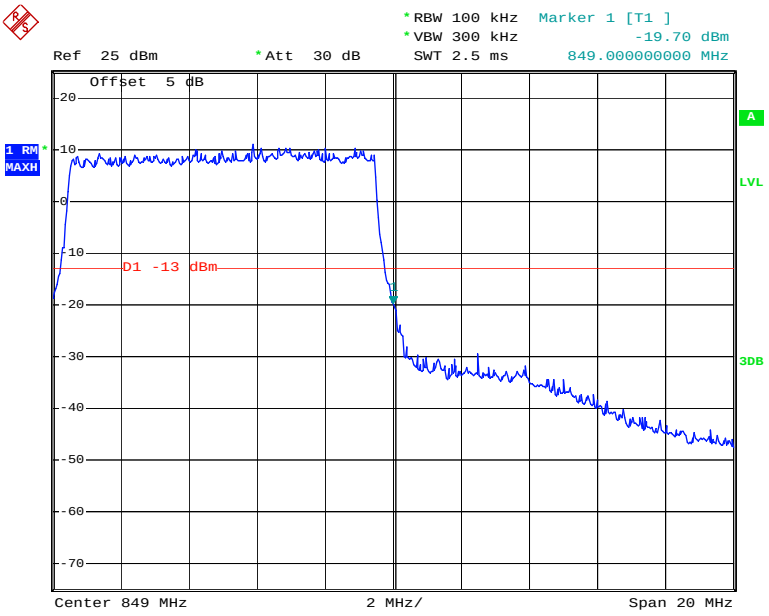
Date: 21.JAN.2019 17:40:59

QPSK_10MHz_ 50 RB_ Left



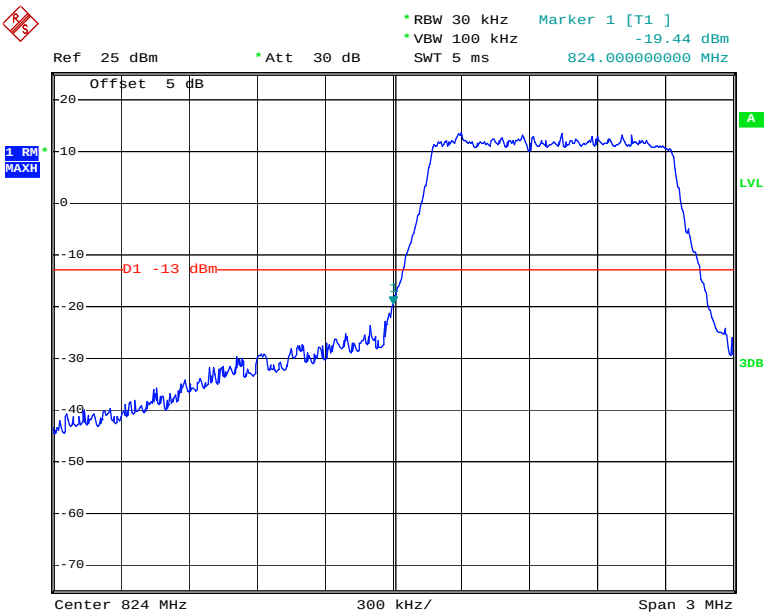
Date: 21.JAN.2019 14:47:44

QPSK_10MHz_ 50 RB_ Right



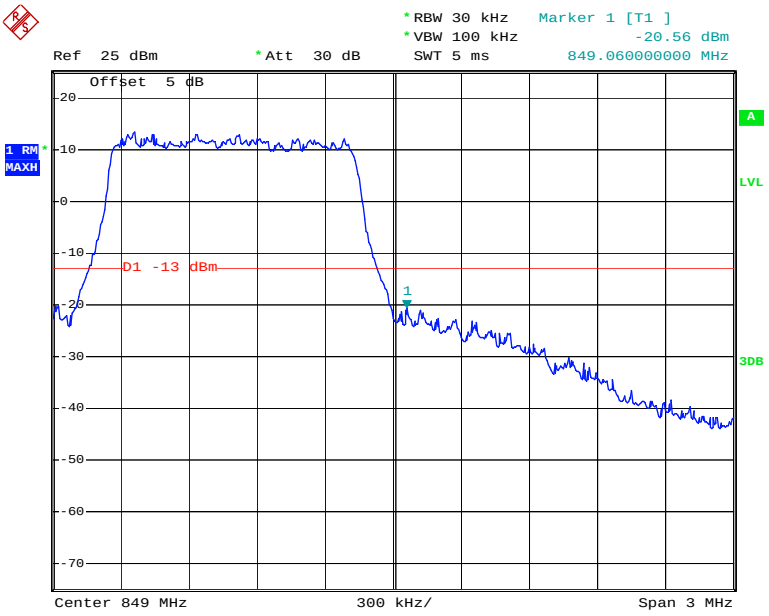
Date: 21.JAN.2019 14:48:57

16QAM_1.4MHz_ 6 RB_ Left



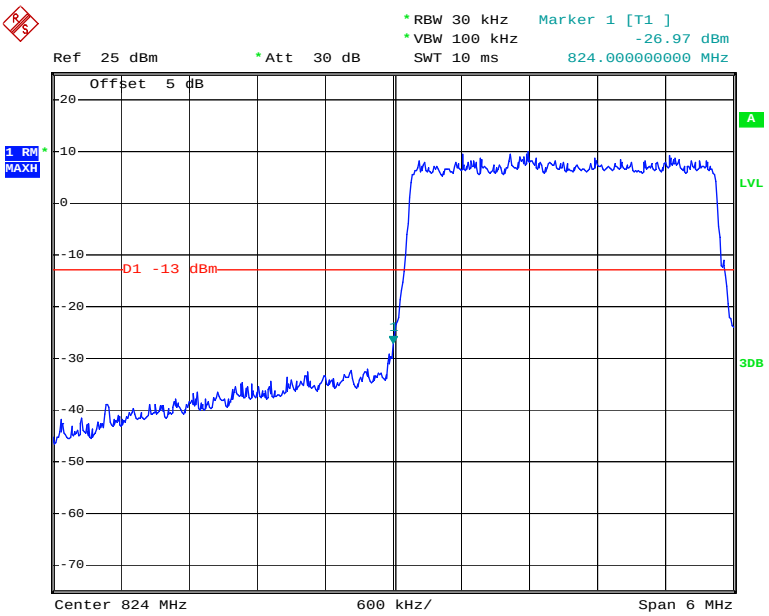
Date: 21.JAN.2019 14:39:05

16QAM_1.4MHz_ 6 RB_ Right



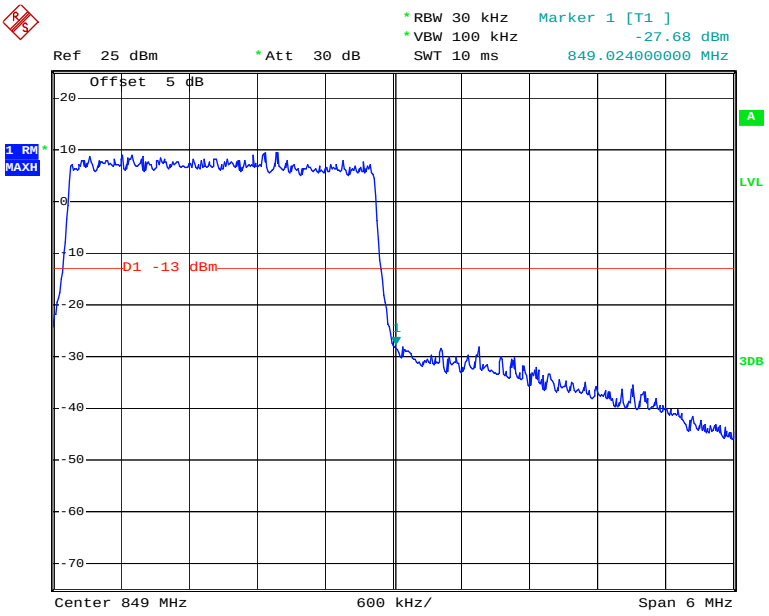
Date: 21.JAN.2019 14:40:09

16QAM_3MHz_ 15 RB_ Left



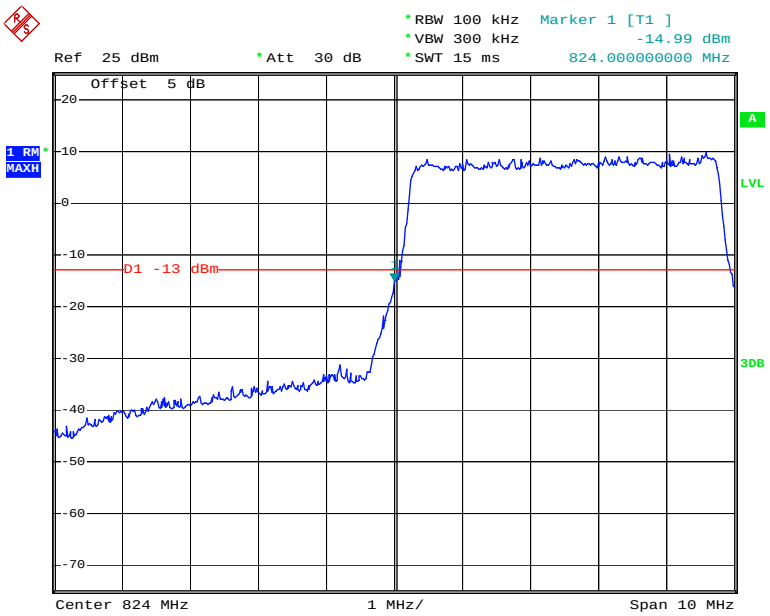
Date: 21.JAN.2019 14:41:17

16QAM_3MHz_ 15 RB_ Right



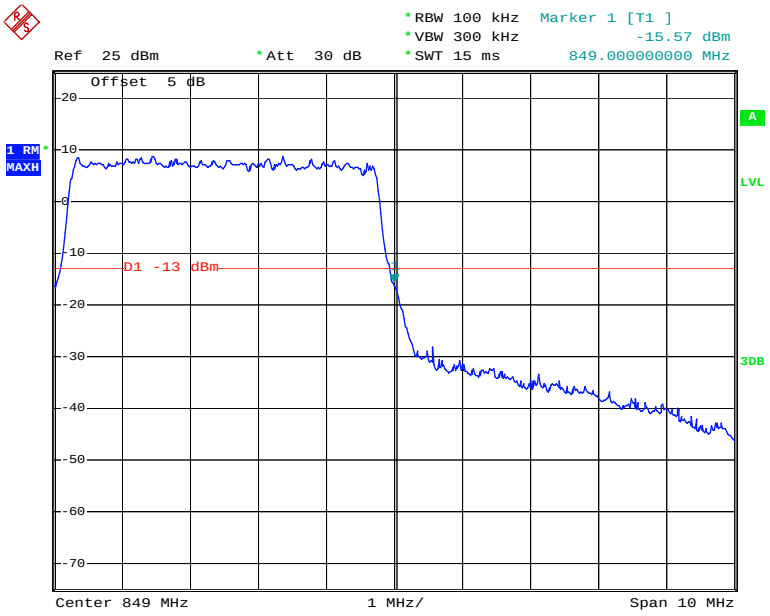
Date: 21.JAN.2019 14:43:51

16QAM_5MHz_ 25 RB_ Left



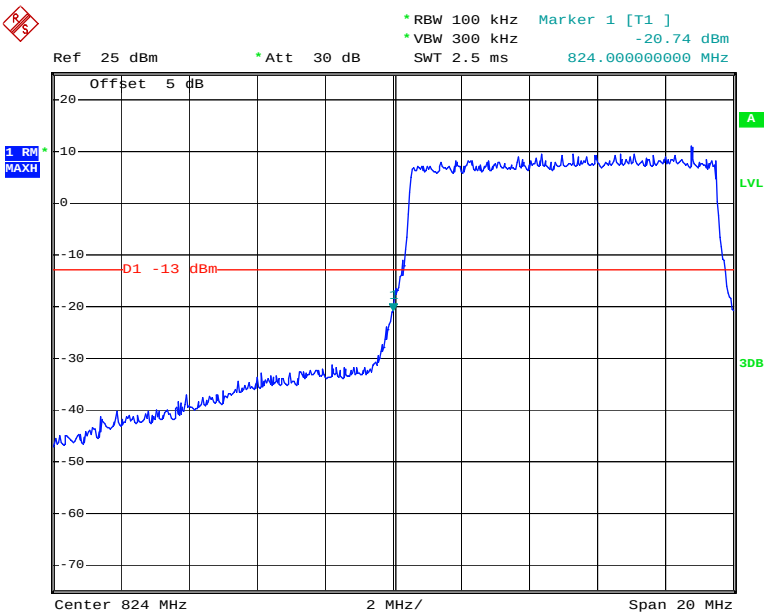
Date: 21.JAN.2019 17:38:54

16QAM_5MHz_ 25 RB_ Right



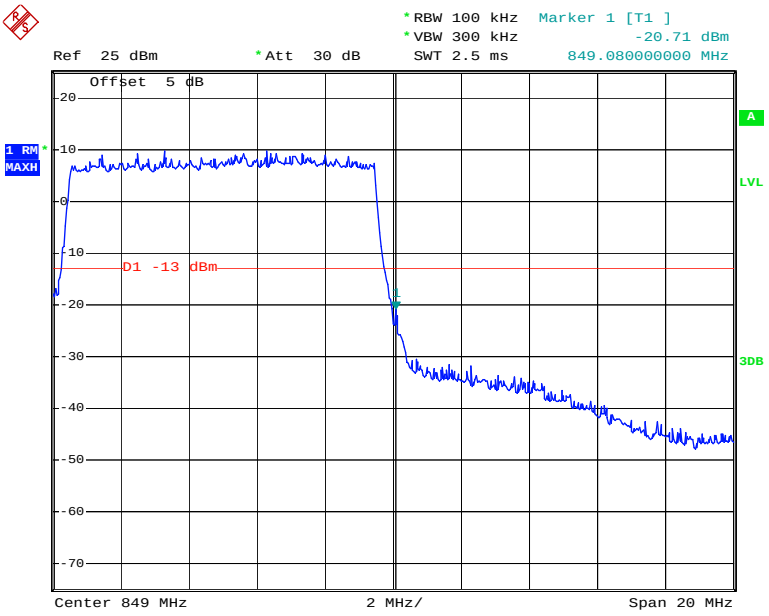
Date: 21.JAN.2019 17:40:17

16QAM_10MHz_ 50 RB_ Left



Date: 21.JAN.2019 14:48:17

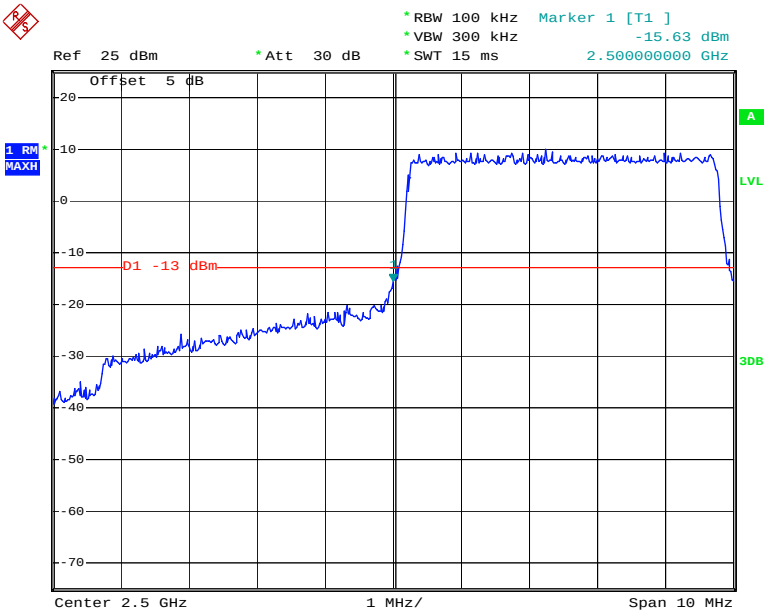
16QAM_10MHz_ 50 RB_ Right



Date: 21.JAN.2019 14:49:26

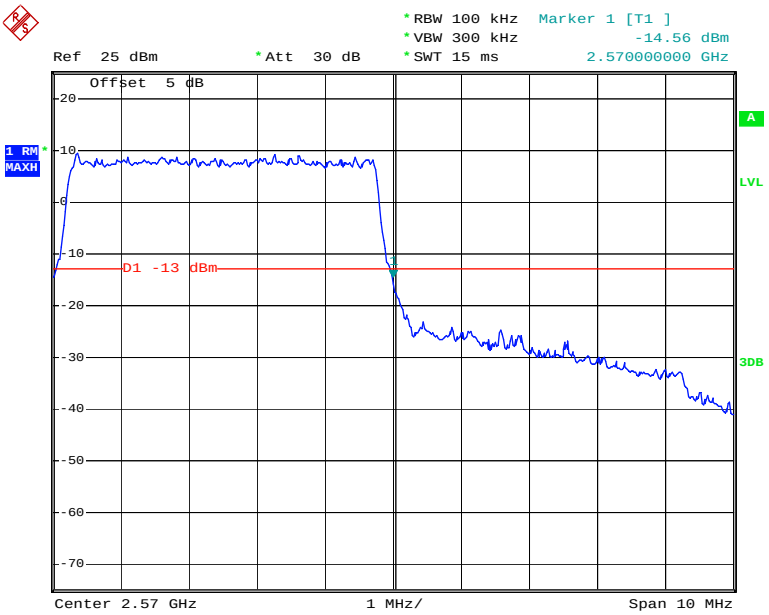
LTE Band 7

QPSK_5MHz_ 25 RB_ Left



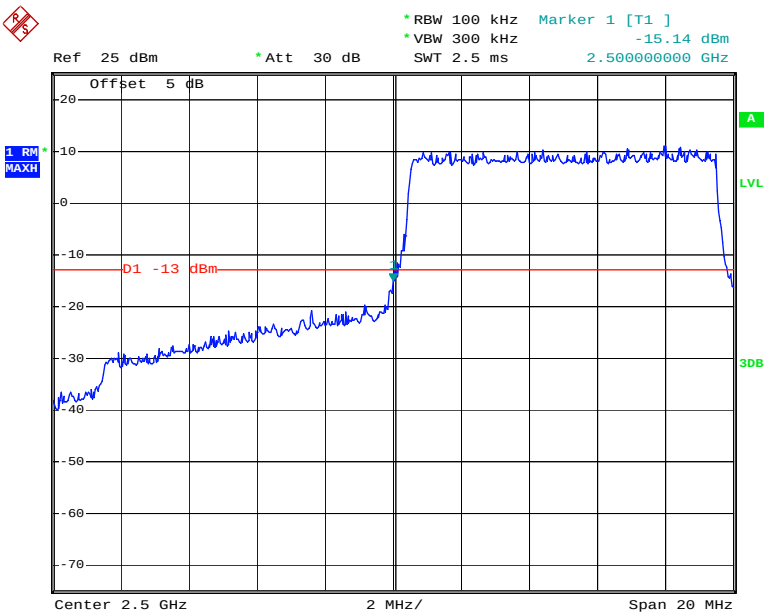
Date: 22.JAN.2019 10:09:37

QPSK_5MHz_ 25 RB_ Right



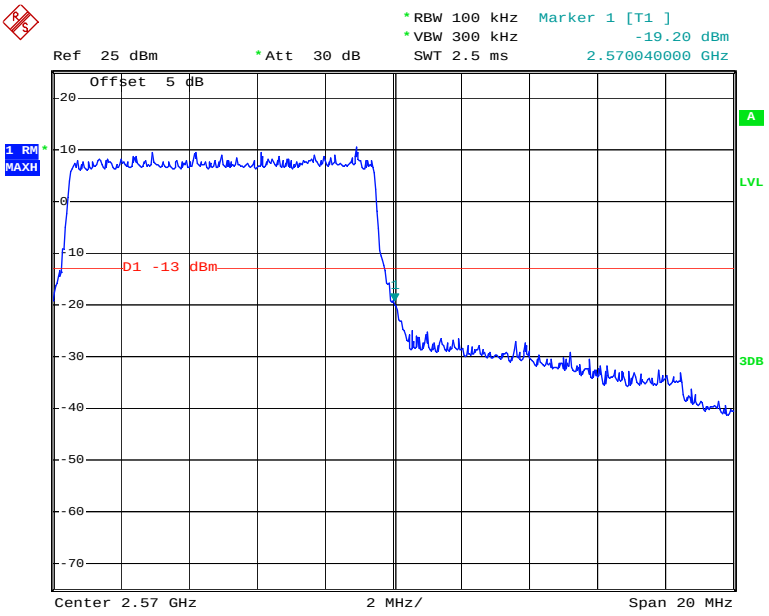
Date: 21.JAN.2019 17:45:12

QPSK_10MHz_ 50 RB_ Left



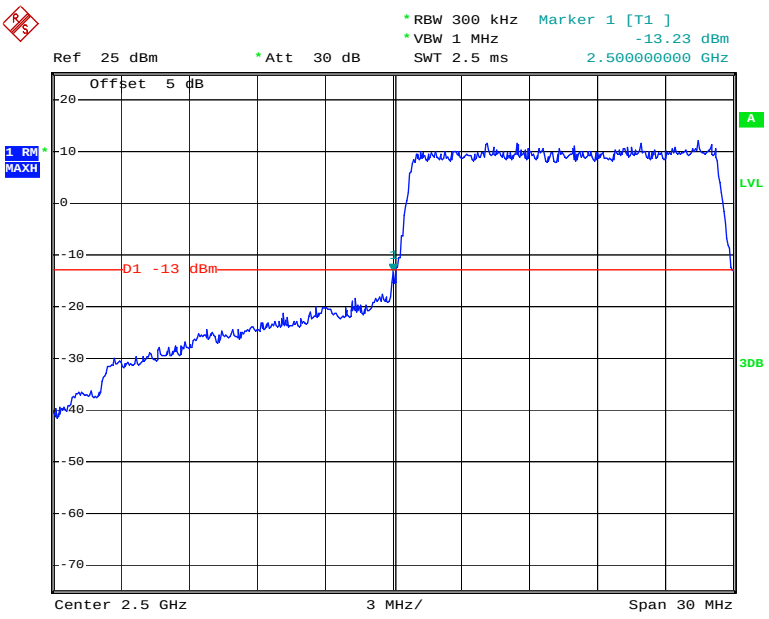
Date: 21.JAN.2019 14:53:56

QPSK_10MHz_ 50 RB_ Right



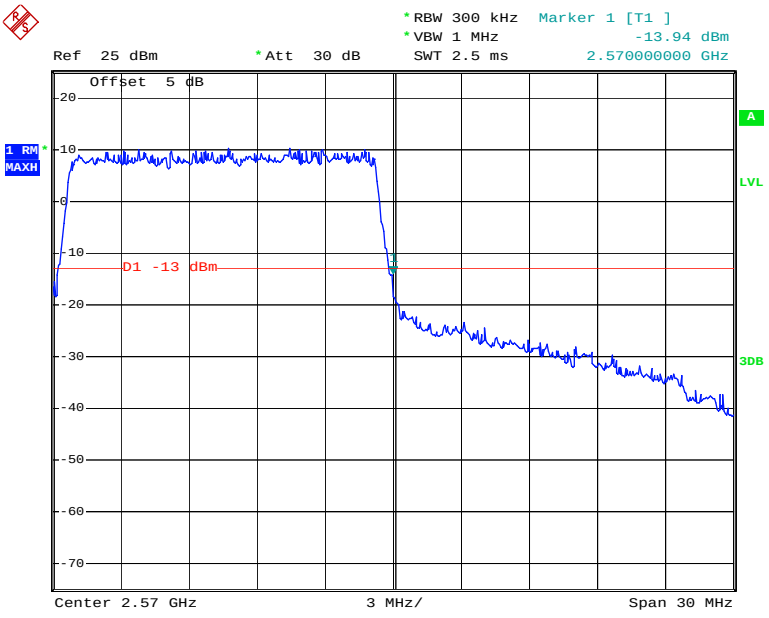
Date: 21.JAN.2019 14:55:04

QPSK_15MHz_ 75 RB_ Left



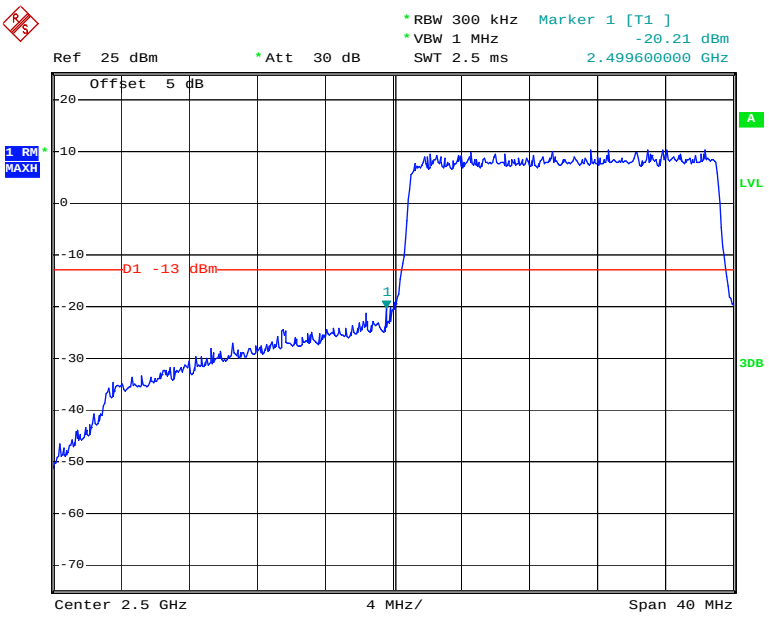
Date: 21.JAN.2019 14:56:13

QPSK_15MHz_ 75 RB_ Right



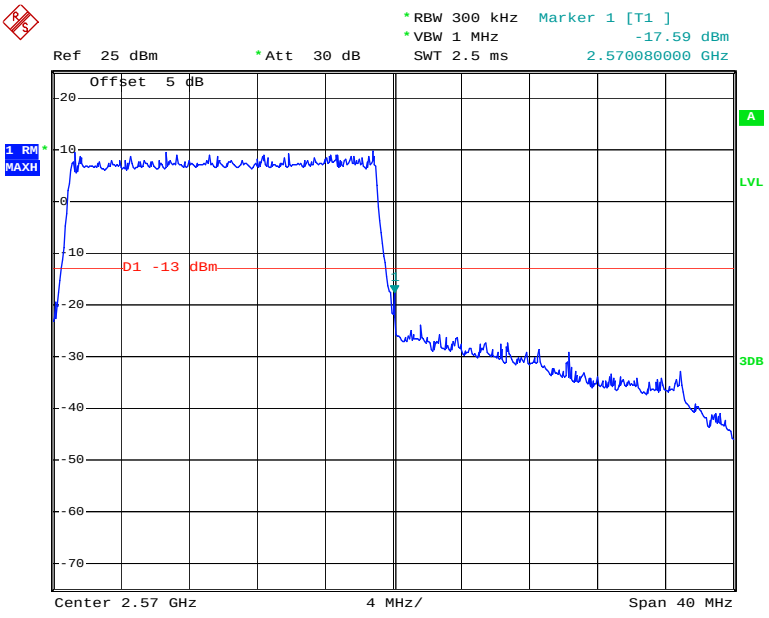
Date: 21.JAN.2019 14:57:23

QPSK_20MHz_ FULL RB_ Left



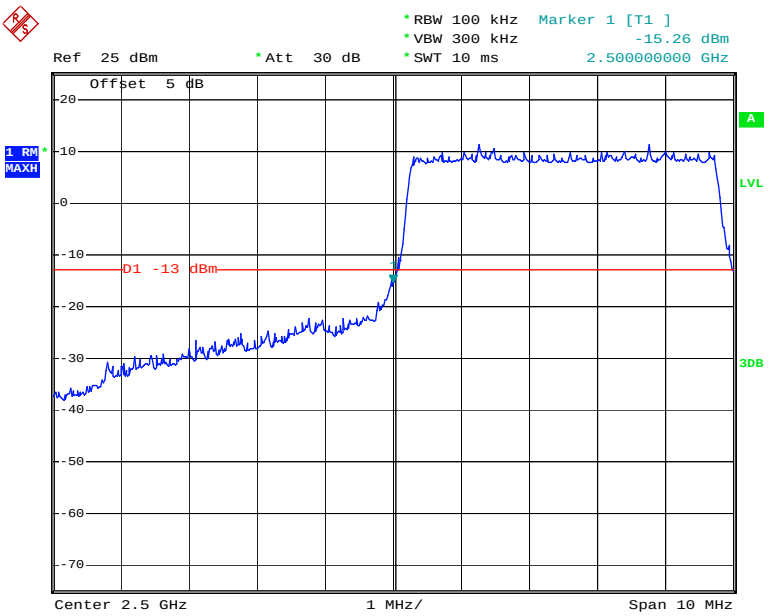
Date: 21.JAN.2019 14:58:44

QPSK_20MHz_ FULL RB_ Right



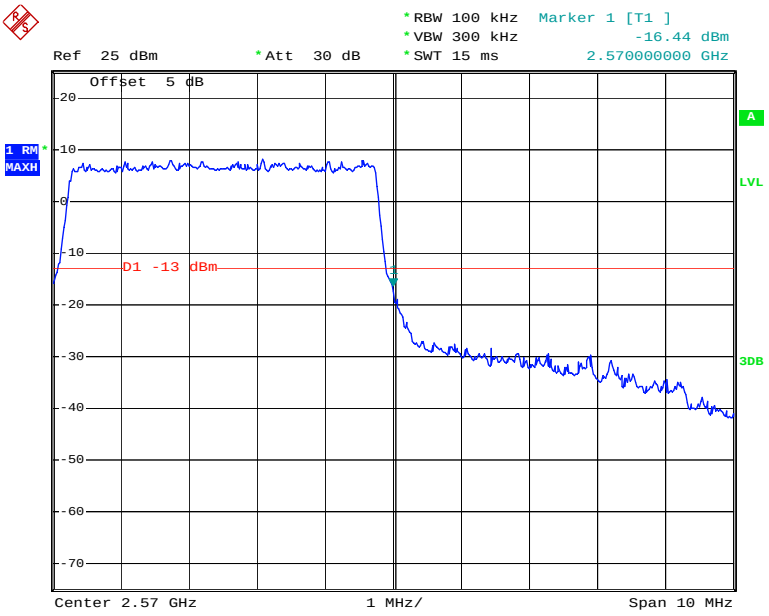
Date: 21.JAN.2019 14:59:59

16QAM_5MHz_ 25 RB_ Left



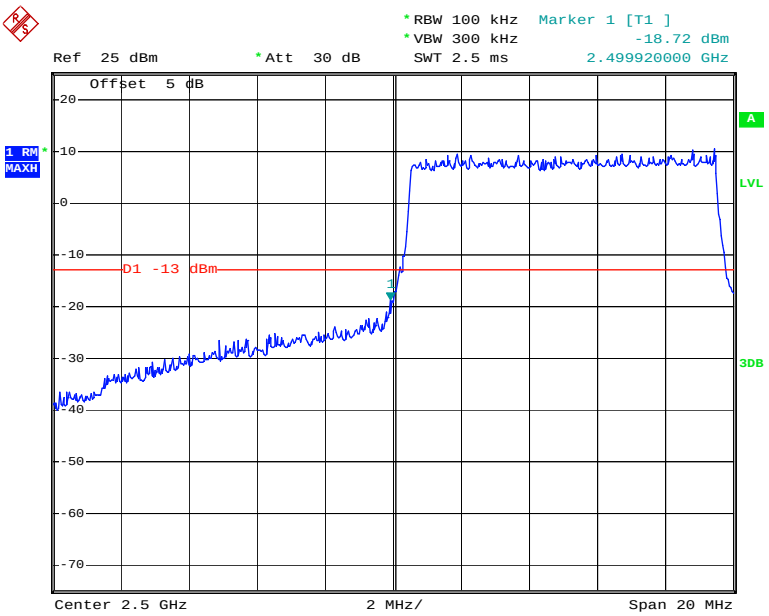
Date: 21.JAN.2019 17:48:03

16QAM_5MHz_ 25 RB_ Right



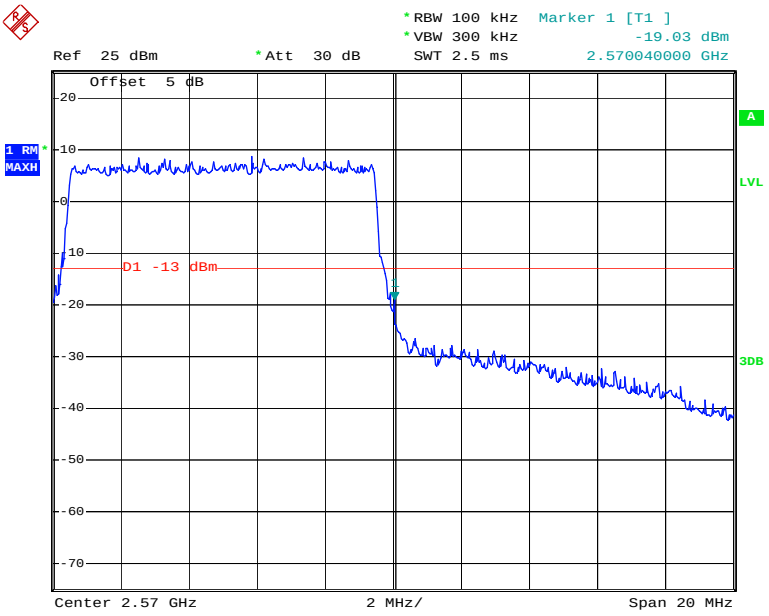
Date: 21.JAN.2019 17:46:11

16QAM_10MHz_ 50 RB_ Left



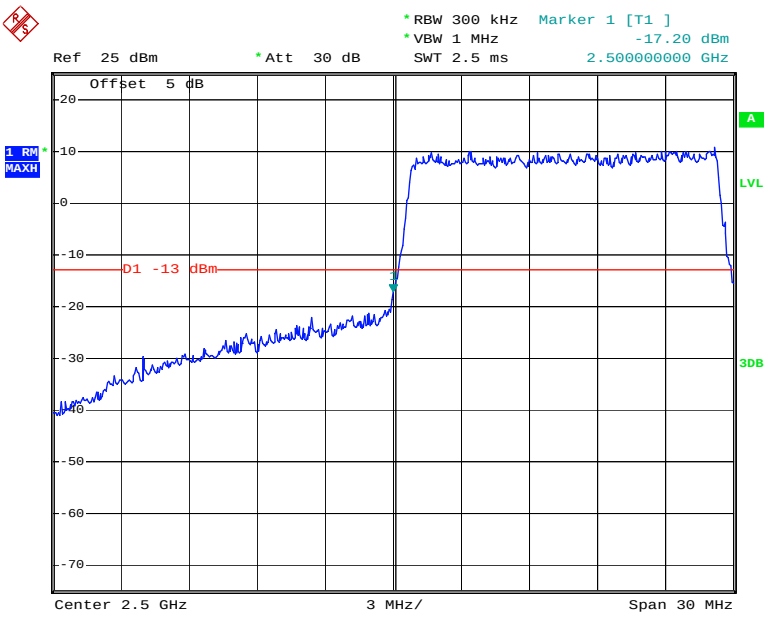
Date: 21.JAN.2019 14:54:29

16QAM_10MHz_ 50 RB_ Right



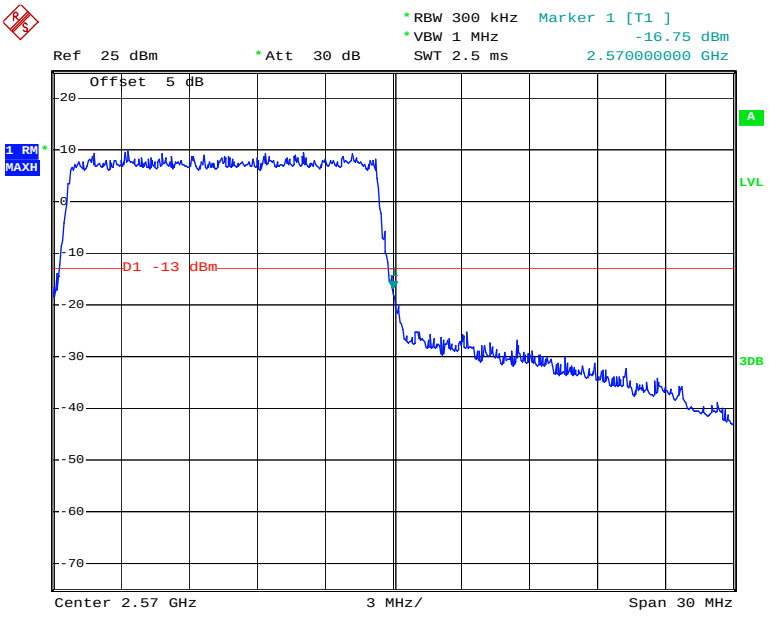
Date: 21.JAN.2019 14:55:41

16QAM_15MHz_ 75 RB_ Left



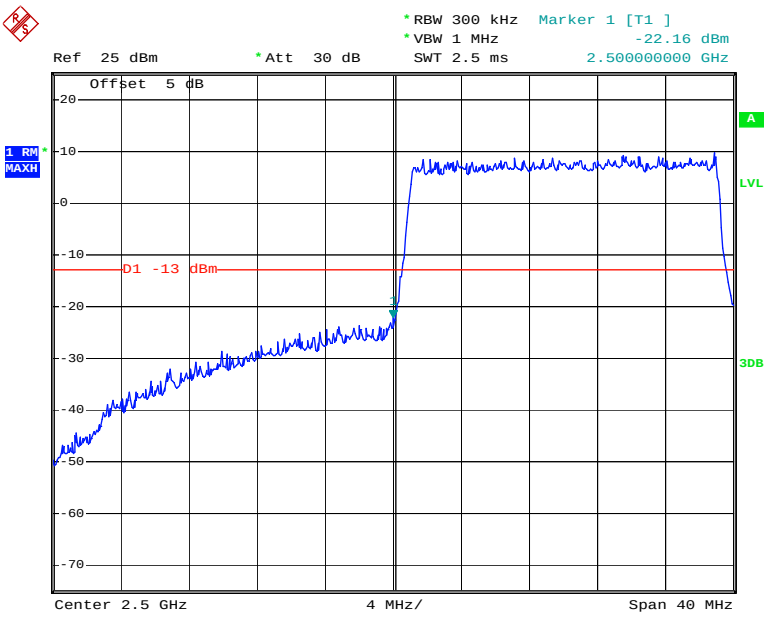
Date: 21.JAN.2019 14:56:48

16QAM_15MHz_ 75 RB_ Right



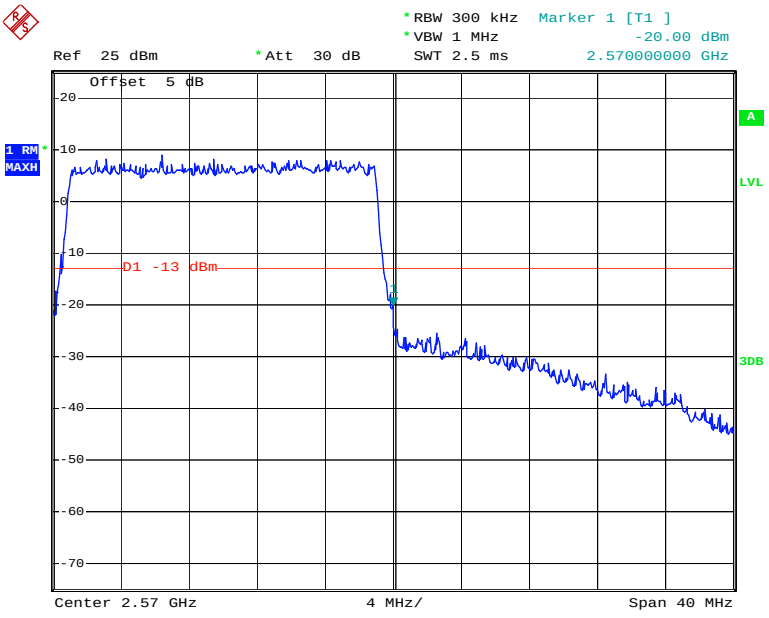
Date: 21.JAN.2019 14:58:05

16QAM_20MHz_ FULL RB_ Left



Date: 21.JAN.2019 14:59:20

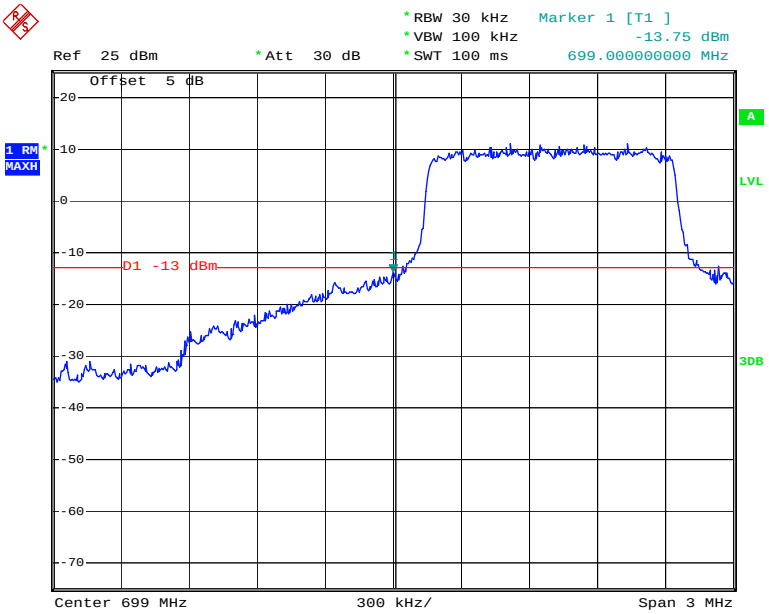
16QAM_20MHz_ FULL RB_ Right



Date: 21.JAN.2019 15:00:40

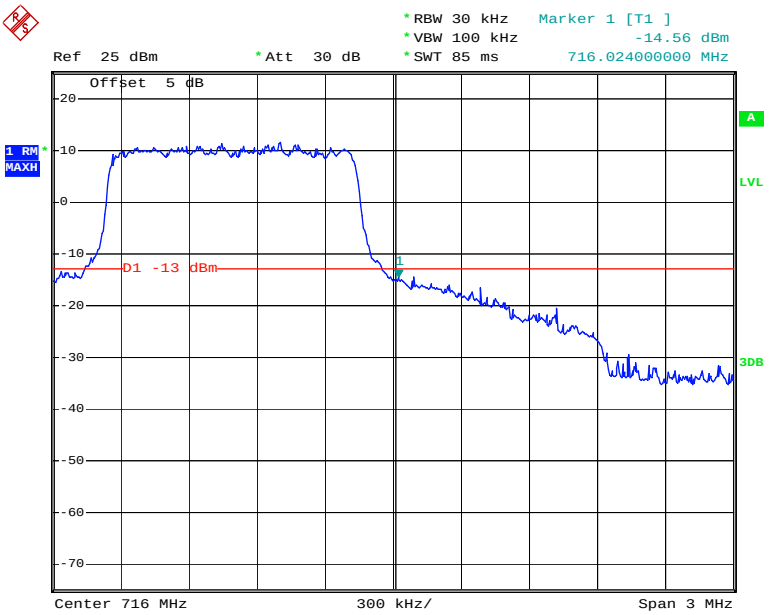
LTE Band 12

QPSK_1.4MHz_ 6 RB_ Left



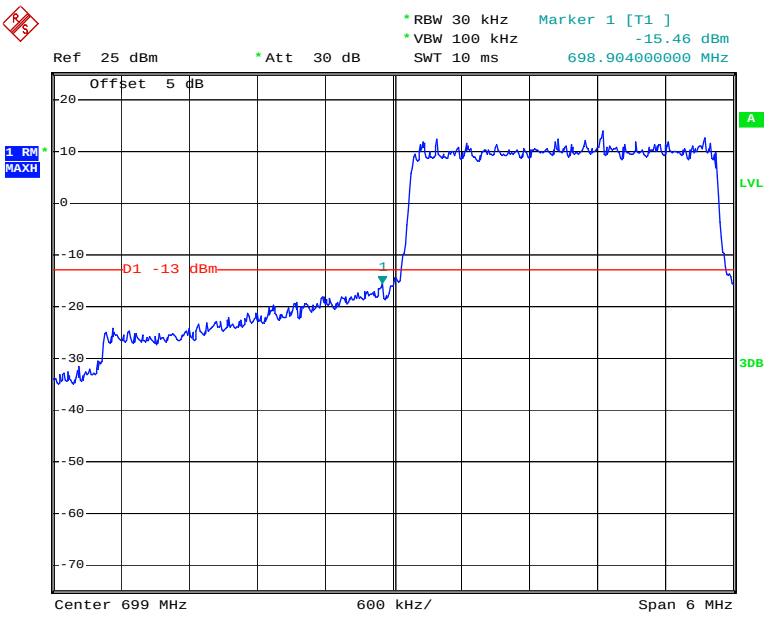
Date: 22.JAN.2019 09:56:30

QPSK_1.4MHz_ 6 RB_ Right



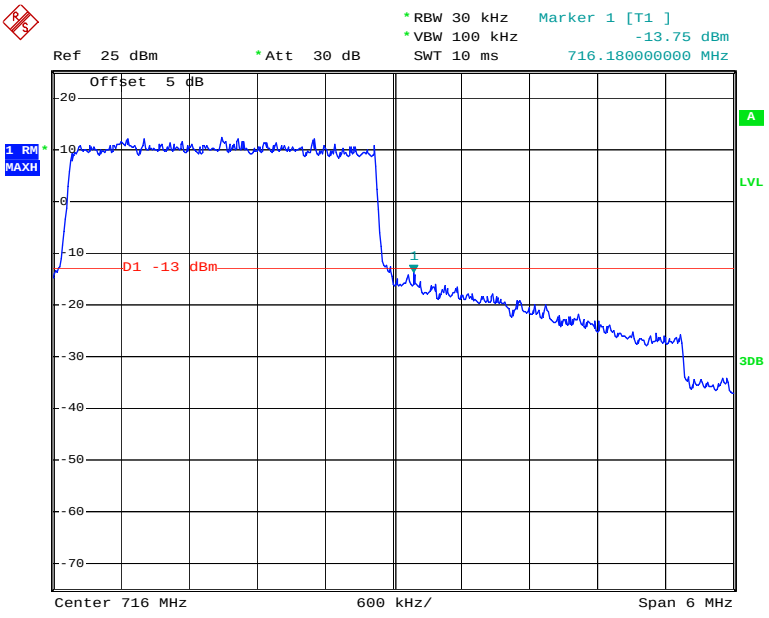
Date: 21.JAN.2019 18:39:43

QPSK_3MHz_ 15 RB_ Left



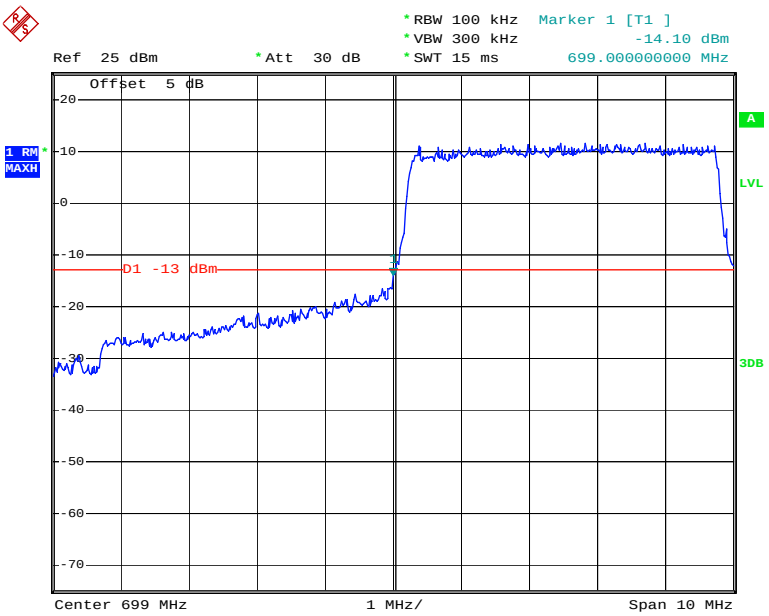
Date: 21.JAN.2019 19:30:51

QPSK_3MHz_ 15 RB_ Right



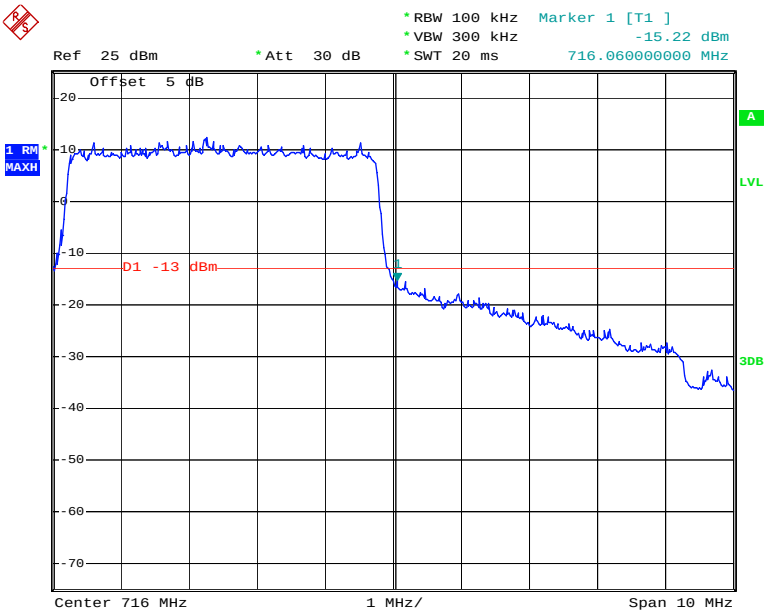
Date: 21.JAN.2019 19:38:04

QPSK_5MHz_ 25 RB_ Left



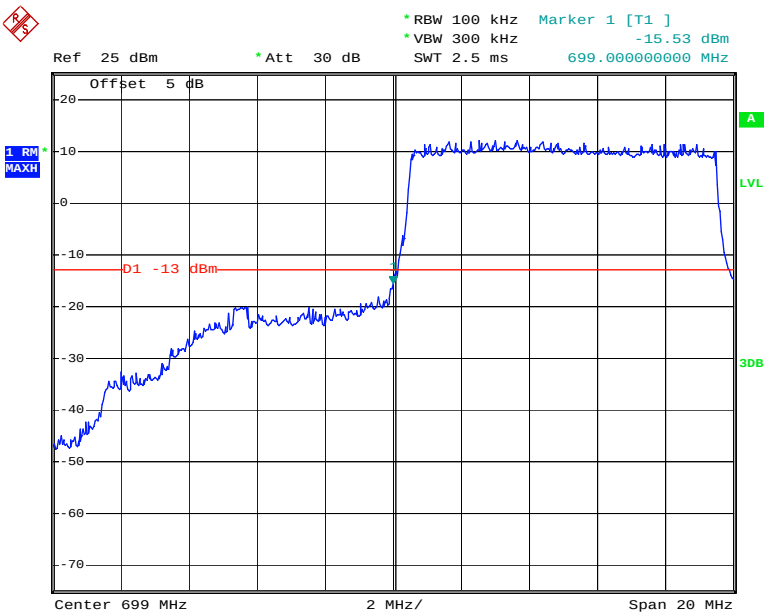
Date: 21.JAN.2019 19:42:40

QPSK_5MHz_ 25 RB_ Right



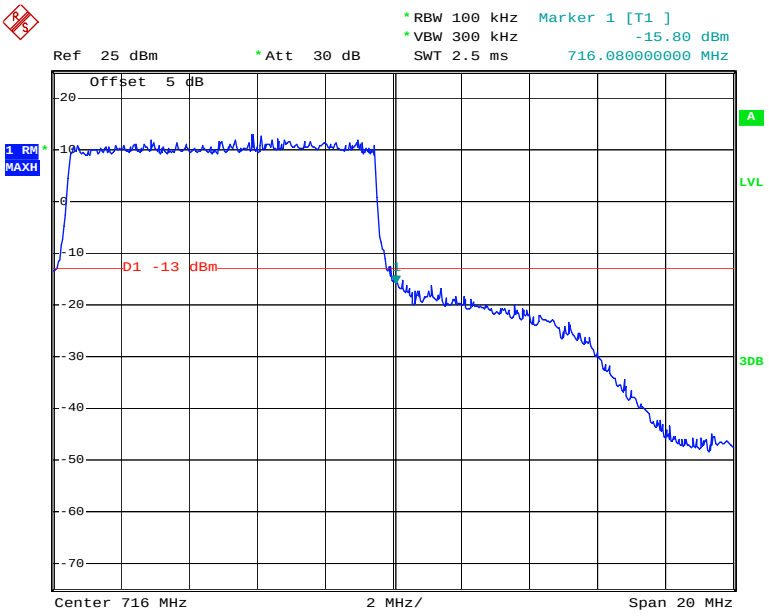
Date: 21.JAN.2019 19:41:48

QPSK_10MHz_ 50 RB_ Left



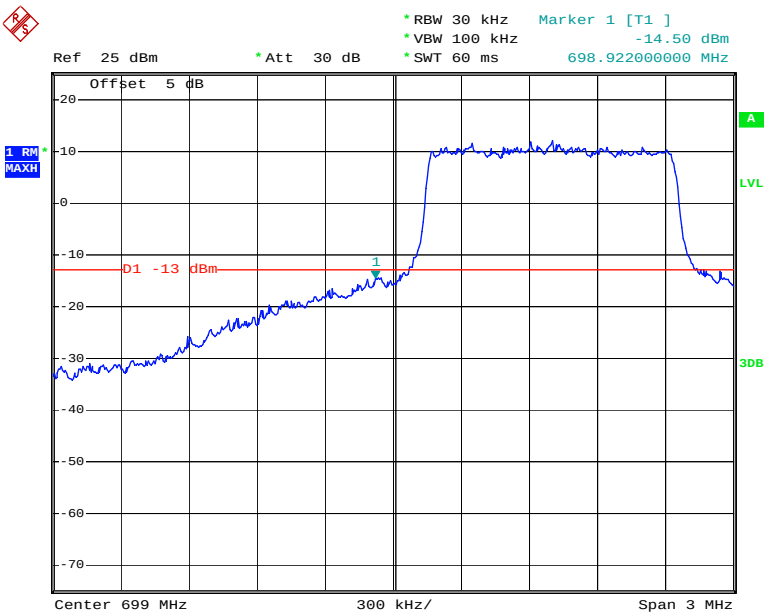
Date: 21.JAN.2019 19:45:38

QPSK_10MHz_ 50 RB_ Right



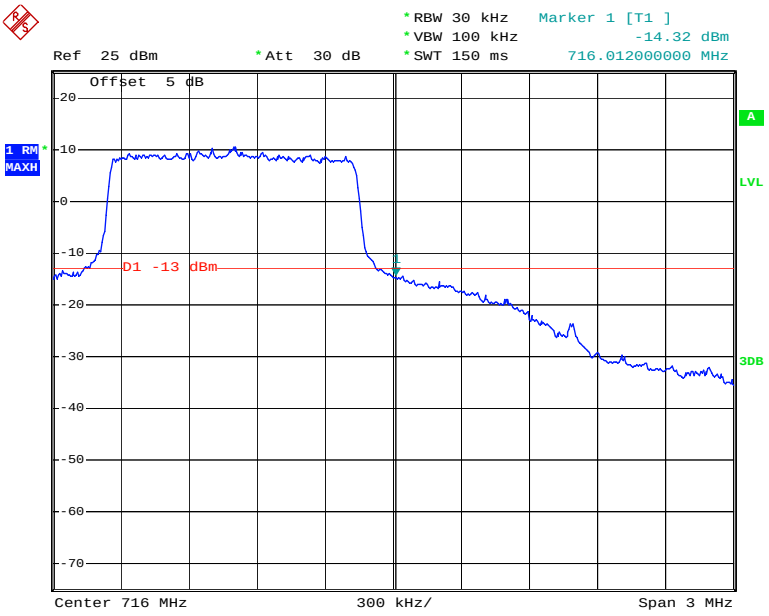
Date: 21.JAN.2019 19:46:32

16QAM_1.4MHz_ 6 RB_ Left



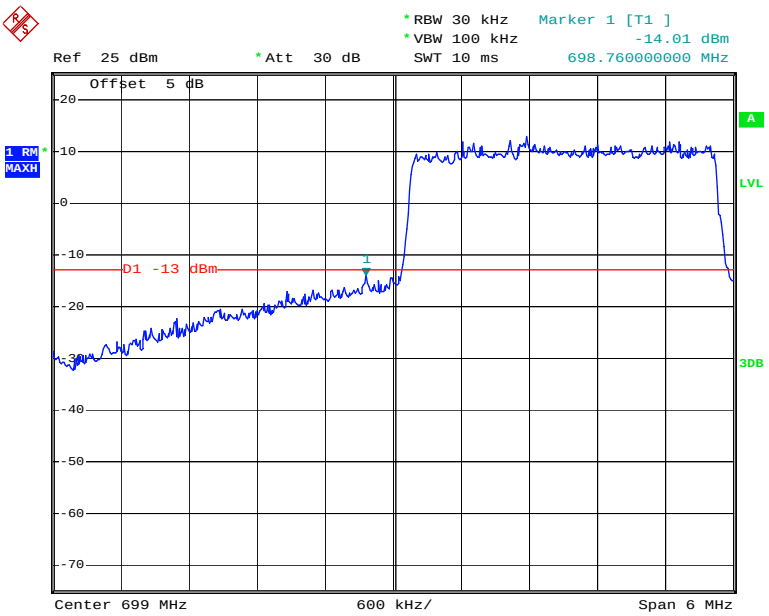
Date: 21.JAN.2019 18:44:34

16QAM_1.4MHz_ 6 RB_ Right



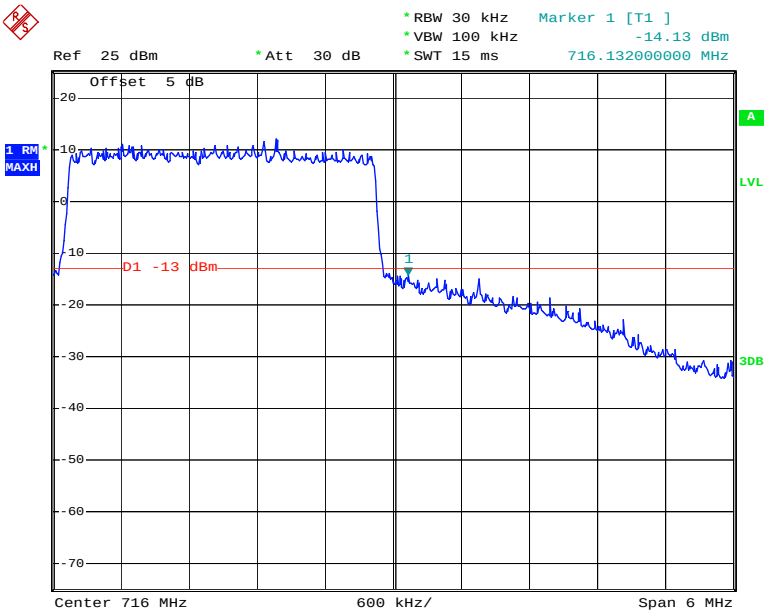
Date: 21.JAN.2019 17:57:15

16QAM_3MHz_ 15 RB_ Left



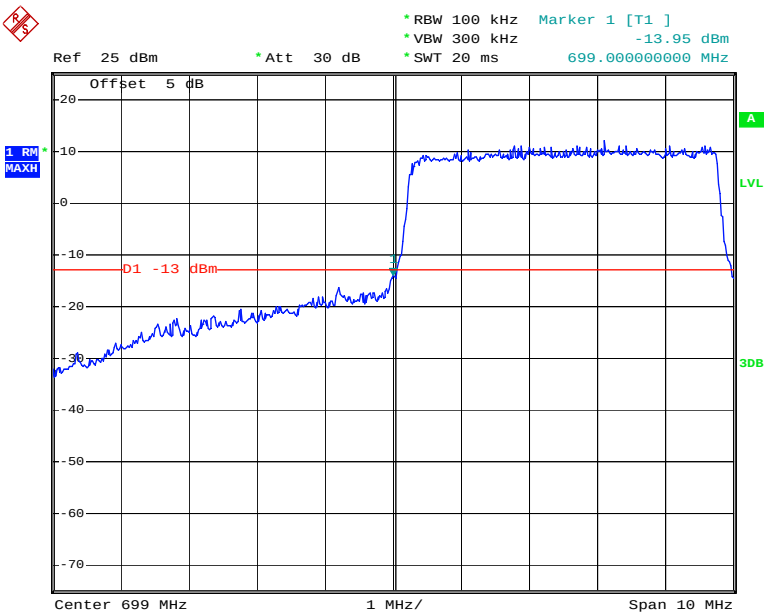
Date: 21.JAN.2019 19:27:58

16QAM_3MHz_ 15 RB_ Right



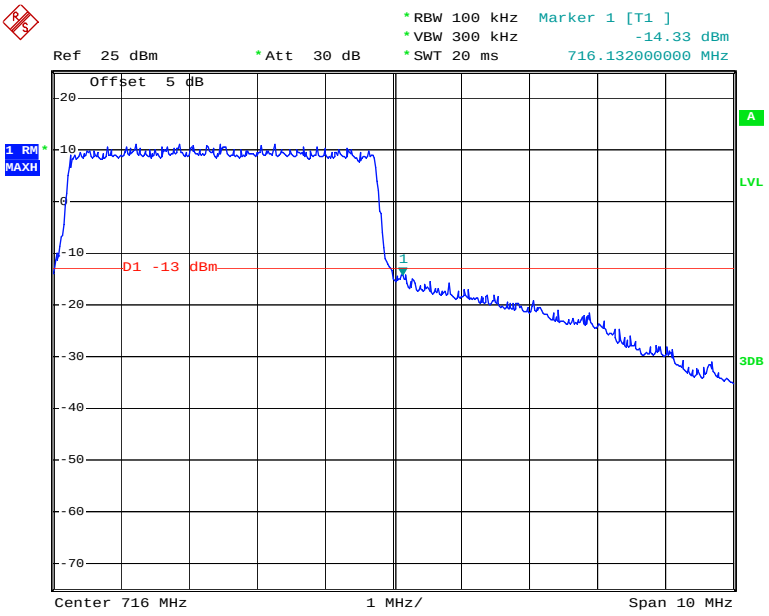
Date: 21.JAN.2019 19:39:07

16QAM_5MHz_ 25 RB_ Left



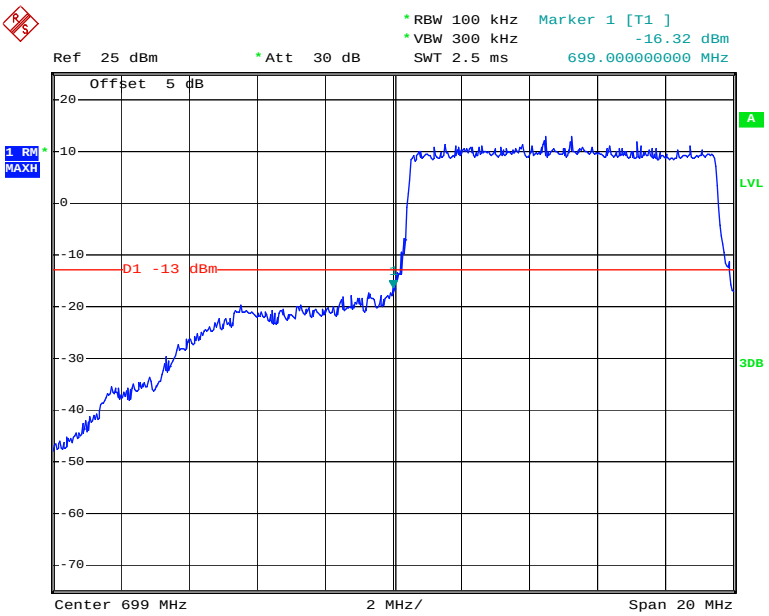
Date: 21.JAN.2019 19:43:38

16QAM_5MHz_ 25 RB_ Right



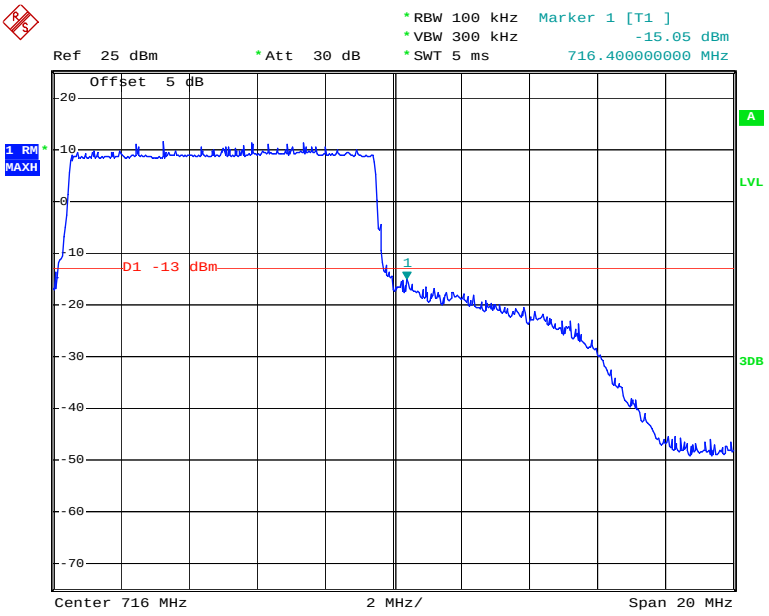
Date: 21.JAN.2019 19:40:37

16QAM_10MHz_ 50 RB_ Left



Date: 22.JAN.2019 10:00:29

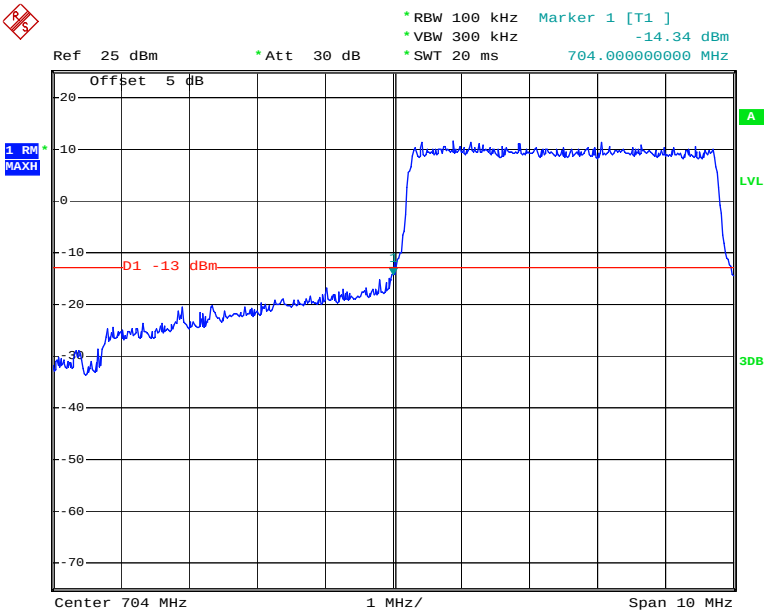
16QAM_10MHz_ 50 RB_ Right



Date: 21.JAN.2019 19:47:39

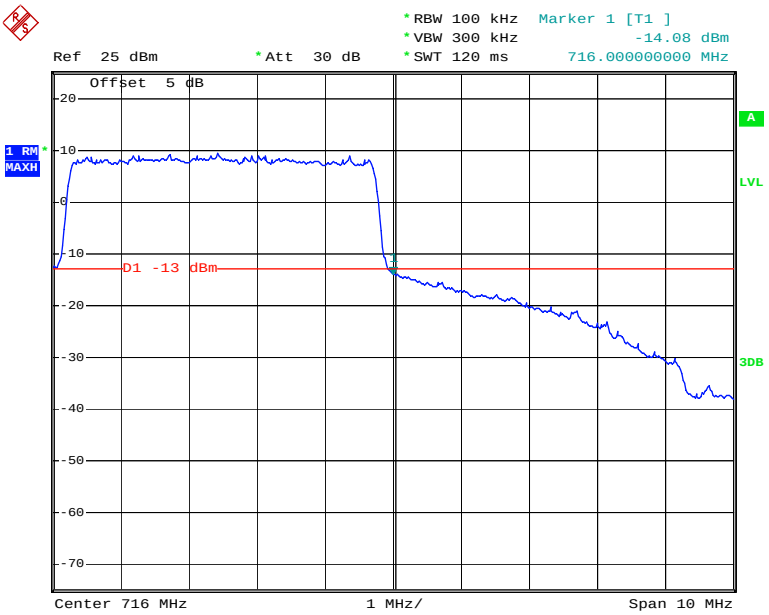
LTE Band 17

QPSK_5MHz_ 25 RB_ Left



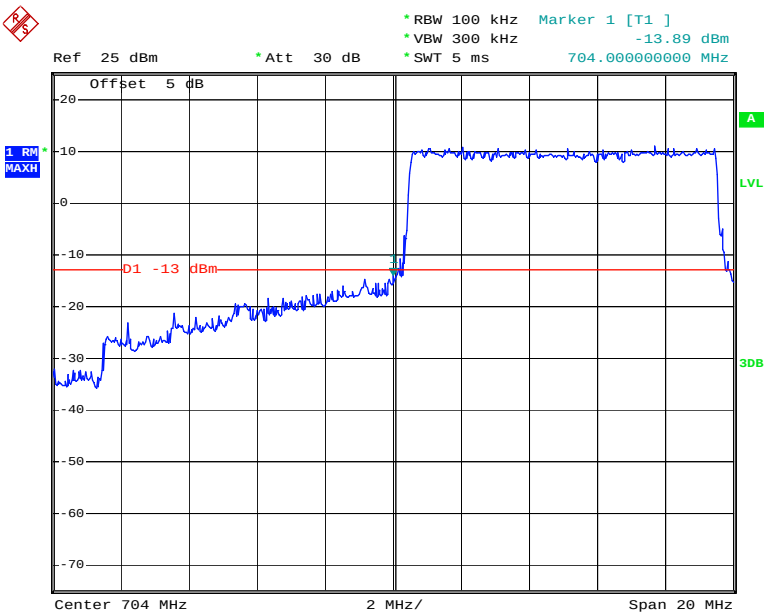
Date: 22.JAN.2019 10:03:00

QPSK_5MHz_ 25 RB_ Right



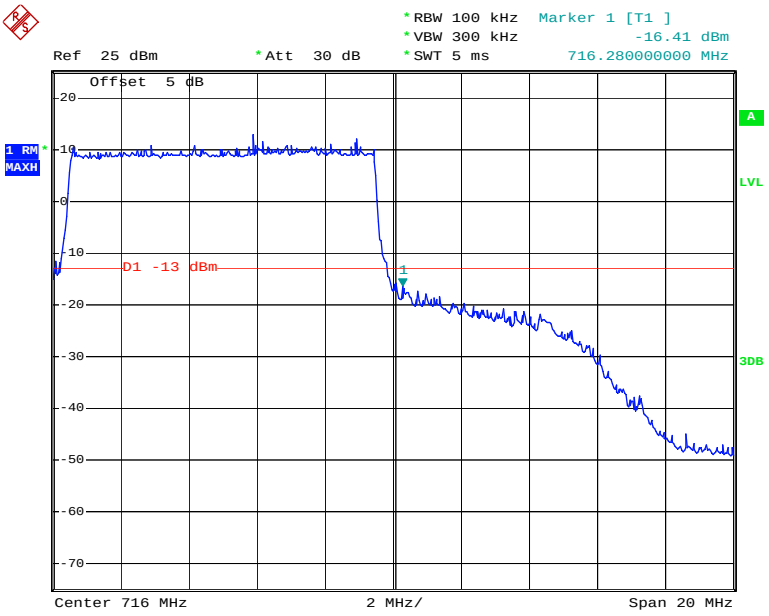
Date: 21.JAN.2019 19:58:02

QPSK_10MHz_ 50 RB_ Left



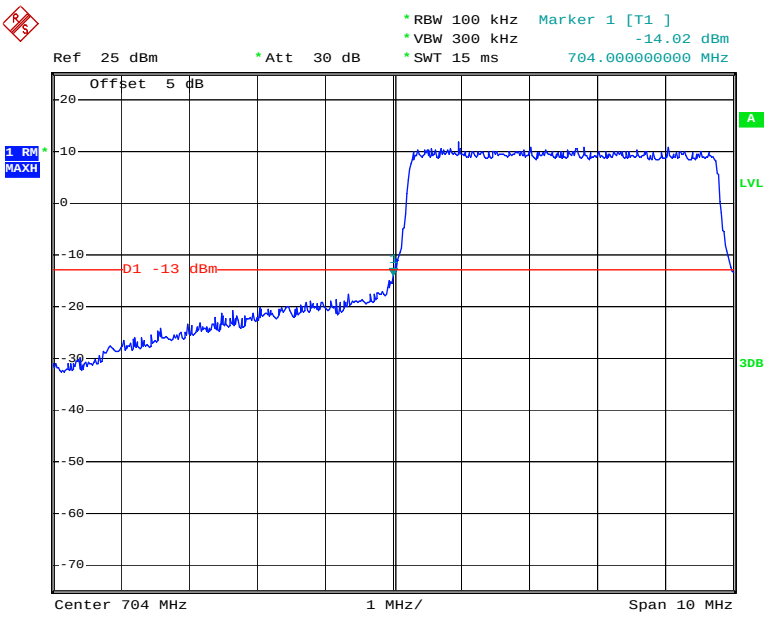
Date: 22.JAN.2019 10:04:53

QPSK_10MHz_ 50 RB_ Right



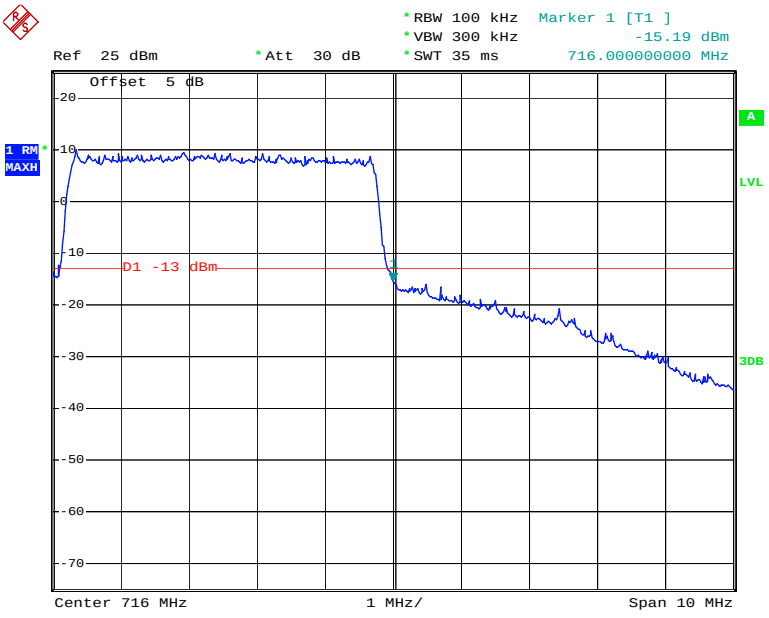
Date: 21.JAN.2019 19:50:55

16QAM_5MHz_ 25 RB_ Left



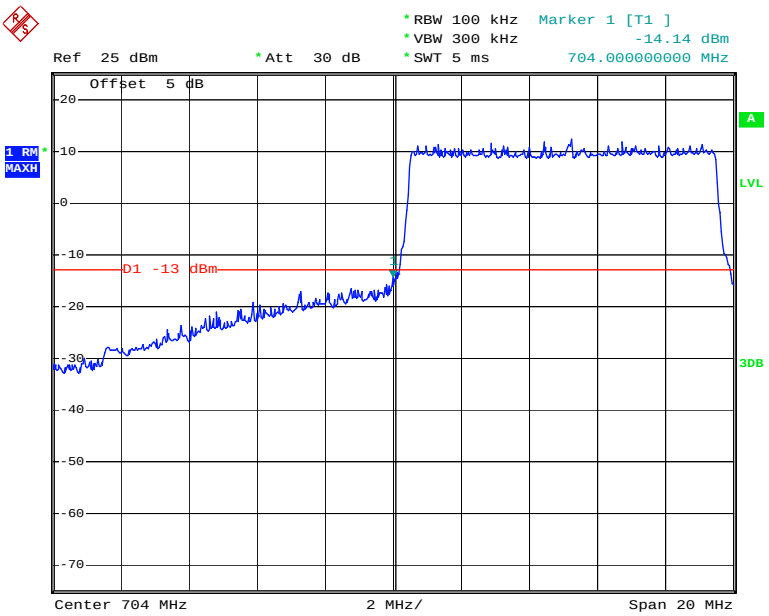
Date: 22.JAN.2019 10:02:06

16QAM_5MHz_ 25 RB_ Right



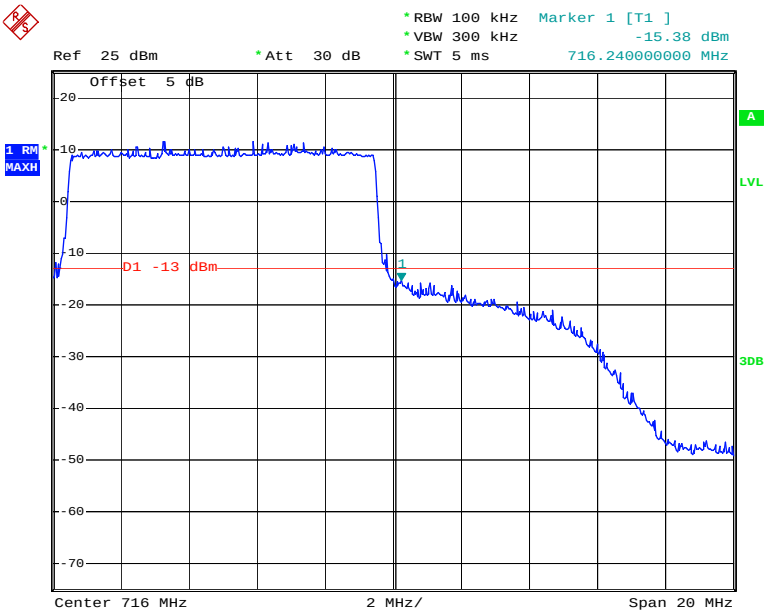
Date: 21.JAN.2019 19:59:08

16QAM_10MHz_ 50 RB_ Left



Date: 21.JAN.2019 19:52:53

16QAM_10MHz_ 50 RB_ Right



Date: 21.JAN.2019 19:50:18

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

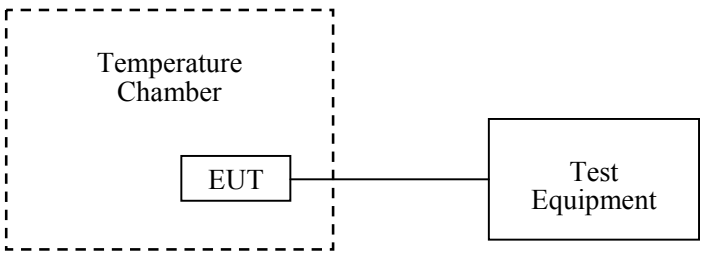
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	2018-09-05	2019-09-05
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
R&S	Universal Radio Communication Tester	CMU200	110 822	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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

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

Test Data

Environmental Conditions

Temperature:	24.5~25.2°C
Relative Humidity:	39~42 %
ATM Pressure:	100.8~102.1 kPa

The testing was performed by Blake Yang, Carrie He on 2019-01-20~2019-01-21.

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	7	0.00837	2.5
-20		8	0.00956	
-10		5	0.00598	
0		5	0.00598	
10		9	0.01076	
20		9	0.01076	
30		8	0.00956	
40		4	0.00478	
50		7	0.00837	
20	3.6	6	0.00717	
20	4.3	8	0.00956	

8PSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30	3.8	23	0.02749	2.5
-20		24	0.02869	
-10		25	0.02988	
0		23	0.02749	
10		26	0.03108	
20		27	0.03227	
30		22	0.02630	
40		23	0.02749	
50		24	0.02869	
20	3.6	21	0.02510	
20	4.3	23	0.02749	

PCS Band (Part 24E)

GMSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	31	0.01649	Pass
-20		30	0.01596	
-10		29	0.01543	
0		28	0.01489	
10		31	0.01649	
20		32	0.01702	
30		30	0.01596	
40		29	0.01543	
50		28	0.01489	
20	3.6	25	0.01330	
20	4.3	28	0.01489	

8PSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	46	0.02447	Pass
-20		45	0.02394	
-10		46	0.02447	
0		47	0.02500	
10		42	0.02234	
20		48	0.02553	
30		46	0.02447	
40		45	0.02394	
50		42	0.02234	
20	3.6	42	0.02234	
20	4.3	46	0.02447	

WCDMA Band II: R99

Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	-2	-0.00106	Pass
-20		-5	-0.00266	
-10		-4	-0.00213	
0		-3	-0.00160	
10		-8	-0.00426	
20		-5	-0.00266	
30		-2	-0.00106	
40		-4	-0.00213	
50		-6	-0.00319	
20	3.6	-3	-0.00160	
20	4.3	-5	-0.00266	

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	-5	-0.00598	2.5
-20		-8	-0.00956	
-10		-6	-0.00717	
0		-4	-0.00478	
10		-6	-0.00717	
20		-2	-0.00239	
30		-4	-0.00478	
40		-6	-0.00717	
50		-5	-0.00598	
20	3.6	-6	-0.00717	
20	4.3	-6	-0.00717	

WCDMA Band Ⅳ: R99

Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{DC}	F_L	F_H	F_L	F_H
-30	3.8	1710.22	1754.59	1710	1755
-20		1710.29	1754.66	1710	1755
-10		1710.41	1754.60	1710	1755
0		1710.38	1754.64	1710	1755
10		1710.26	1754.77	1710	1755
20		1710.32	1754.68	1710	1755
30		1710.27	1754.77	1710	1755
40		1710.31	1754.69	1710	1755
50		1710.35	1754.66	1710	1755
20	3.6	1710.29	1754.61	1710	1755
20	4.3	1710.39	1754.59	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	-47.65	-0.0253	Pass
-20		-25.12	-0.0134	
-10		-19.20	-0.0102	
0		-9.97	-0.0053	
10		-6.13	-0.0033	
20		6.17	0.0033	
30		7.92	0.0042	
40		6.46	0.0034	
50		-6.52	-0.0035	
20	3.6	7.18	0.0038	
20	4.3	-9.70	-0.0052	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	**V_{DC}**	**Hz**	**ppm**	
-30	3.8	-47.65	-0.0253	Pass
-20		-25.12	-0.0134	
-10		-19.20	-0.0102	
0		-6.68	-0.0036	
10		9.77	0.0052	
20		-7.62	-0.0041	
30		-9.91	-0.0053	
40		-9.82	-0.0052	
50		-6.68	-0.0036	
20	3.6	-8.86	-0.0047	
20	4.3	5.67	0.0030	

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	1710.520000	1754.470000	1710	1755
-20		1710.510000	1754.470000	1710	1755
-10		1710.510000	1754.480000	1710	1755
0		1710.500000	1754.460000	1710	1755
10		1710.510000	1754.450000	1710	1755
20		1710.520000	1754.480000	1710	1755
30		1710.490000	1754.480000	1710	1755
40		1710.500000	1754.470000	1710	1755
50		1710.490000	1754.470000	1710	1755
20	3.6	1710.510000	1754.470000	1710	1755
20	4.3	1710.500000	1754.460000	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	1710.500000	1754.470000	1710	1755
-20		1710.500000	1754.470000	1710	1755
-10		1710.490000	1754.470000	1710	1755
0		1710.520000	1754.470000	1710	1755
10		1710.500000	1754.480000	1710	1755
20		1710.520000	1754.480000	1710	1755
30		1710.500000	1754.460000	1710	1755
40		1710.510000	1754.480000	1710	1755
50		1710.510000	1754.460000	1710	1755
20	3.6	1710.510000	1754.450000	1710	1755
20	4.3	1710.510000	1754.470000	1710	1755

LTE Band 5:

Middle Channel, f_c = 836.5 MHz, Channel Bandwidth:10MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30	3.8	9.00	0.0108	2.5
-20		9.92	0.0119	
-10		9.12	0.0109	
0		8.51	0.0102	
10		-7.15	-0.0085	
20		-5.29	-0.0063	
30		7.24	0.0087	
40		-5.81	-0.0069	
50		5.59	0.0067	
20	3.6	6.87	0.0082	
20	4.3	9.94	0.0119	

Middle Channel, f_c = 836.5 MHz, Channel Bandwidth:10MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30	3.8	9.00	0.0108	2.5
-20		9.92	0.0119	
-10		6.80	0.0081	
0		-9.53	-0.0114	
10		-8.15	-0.0097	
20		-8.88	-0.0106	
30		-9.82	-0.0117	
40		8.38	0.0100	
50		6.75	0.0081	
20	3.6	-5.89	-0.0070	
20	4.3	8.98	0.0107	

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	2500.510000	2569.470000	2500	2570
-20		2500.510000	2569.480000	2500	2570
-10		2500.500000	2569.470000	2500	2570
0		2500.490000	2569.470000	2500	2570
10		2500.500000	2569.470000	2500	2570
20		2500.520000	2569.480000	2500	2570
30		2500.500000	2569.470000	2500	2570
40		2500.520000	2569.450000	2500	2570
50		2500.490000	2569.480000	2500	2570
20	3.6	2500.510000	2569.450000	2500	2570
20	4.3	2500.510000	2569.480000	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	2500.500000	2569.470000	2500	2570
-20		2500.520000	2569.460000	2500	2570
-10		2500.500000	2569.480000	2500	2570
0		2500.490000	2569.460000	2500	2570
10		2500.510000	2569.450000	2500	2570
20		2500.520000	2569.480000	2500	2570
30		2500.500000	2569.480000	2500	2570
40		2500.510000	2569.470000	2500	2570
50		2500.490000	2569.450000	2500	2570
20	3.6	2500.510000	2569.460000	2500	2570
20	4.3	2500.510000	2569.470000	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	699.510000	715.510000	699	716
-20		699.490000	715.510000	699	716
-10		699.480000	715.510000	699	716
0		699.520000	715.520000	699	716
10		699.510000	715.510000	699	716
20		699.520000	715.520000	699	716
30		699.490000	715.520000	699	716
40		699.480000	715.500000	699	716
50		699.490000	715.490000	699	716
20	3.6	699.528000	715.510000	699	716
20	4.3	699.500000	715.500000	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	699.510000	715.490000	699	716
-20		699.510000	715.500000	699	716
-10		699.490000	715.500000	699	716
0		699.520000	715.500000	699	716
10		699.510000	715.500000	699	716
20		699.520000	715.520000	699	716
30		699.500000	715.500000	699	716
40		699.510000	715.490000	699	716
50		699.520000	715.510000	699	716
20	3.6	699.490000	715.510000	699	716
20	4.3	699.490000	715.520000	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	704.470000	715.520000	704	716
-20		704.460000	715.500000	704	716
-10		704.470000	715.510000	704	716
0		704.470000	715.510000	704	716
10		704.460000	715.510000	704	716
20		704.480000	715.520000	704	716
30		704.480000	715.490000	704	716
40		704.470000	715.490000	704	716
50		704.460000	715.500000	704	716
20	3.6	704.460000	715.520000	704	716
20	4.3	704.470000	715.510000	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	704.460000	715.500000	704	716
-20		704.460000	715.510000	704	716
-10		704.480000	715.520000	704	716
0		704.470000	715.510000	704	716
10		704.470000	715.510000	704	716
20		704.480000	715.520000	704	716
30		704.470000	715.500000	704	716
40		704.460000	715.500000	704	716
50		704.480000	715.490000	704	716
20	3.6	704.470000	715.490000	704	716
20	4.3	704.460000	715.520000	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 *******