



TESTING LABORATORY
CERTIFICATE #4820.01



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

For

MFOURTEL MEXICO S.A. DE C.V.

Av. Ejercito Nacional 436 Piso 3 Chapultepec, Morales Miguel Hidalgo D.F 11570, Mexico

FCC ID: CLNM4WILINK5

Report Type: Original Report	Product Type: M4 WiLink 5
Report Number: RDG190227007-00D	
Report Date: 2019-03-13	
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	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan). This report must not be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government. * This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “*”.

TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	5
MEASUREMENT UNCERTAINTY	5
TEST FACILITY	5
SYSTEM TEST CONFIGURATION.....	6
JUSTIFICATION	6
EQUIPMENT MODIFICATIONS	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
CONFIGURATION OF TEST SETUP	6
BLOCK DIAGRAM OF TEST SETUP	7
SUMMARY OF TEST RESULTS	8
§1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)	9
APPLICABLE STANDARD	9
FCC §2.1047 - MODULATION CHARACTERISTIC	11
FCC § 2.1046, § 22.913 (A) & § 24.232 (C) & § 27.50 - RF OUTPUT POWER.....	12
APPLICABLE STANDARD	12
TEST PROCEDURE	13
TEST EQUIPMENT LIST AND DETAILS.....	18
TEST DATA	18
FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH.....	34
APPLICABLE STANDARD	34
TEST PROCEDURE	34
TEST EQUIPMENT LIST AND DETAILS.....	34
TEST DATA	35
FCC §2.1051, §22.917(A) & §24.238(A) & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS ..	66
APPLICABLE STANDARD	66
TEST PROCEDURE	66
TEST EQUIPMENT LIST AND DETAILS.....	66
TEST DATA	66
FCC §2.1053, §22.917 & §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS	95
APPLICABLE STANDARD	95
TEST PROCEDURE	95
TEST EQUIPMENT LIST AND DETAILS.....	96
TEST DATA	96
FCC §22.917(A) & §24.238(A) & §27.53 - BAND EDGES.....	100
APPLICABLE STANDARD	100
TEST PROCEDURE	100
TEST EQUIPMENT LIST AND DETAILS.....	100
TEST DATA	100

FCC §2.1055, §22.355 & §24.235 & §27.54 - FREQUENCY STABILITY.....	159
APPLICABLE STANDARD	159
TEST PROCEDURE	159
TEST EQUIPMENT LIST AND DETAILS.....	160
TEST DATA	160

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		M4 WiLink 5
EUT Model:		M4 WiLink 5
Operation modes:		WCDMA(R99 (Voice+Data), HSDPA/HSUPA/HSPA+), FDD-LTE
Operation Frequency:		WCDMA Band 2:1850-1910 MHz(TX), 1920-1990 MHz(RX) WCDMA Band 5:824-849 MHz(TX), 869-894 MHz(RX) LTE Band 2:1850-1910 MHz(TX), 1920-1990 MHz(RX) LTE Band 4:1710-1755 MHz(TX), 2110-2155 MHz(RX) LTE Band 5:824-849 MHz(TX), 869-894 MHz(RX) LTE Band 7:2500-2570 MHz(TX), 2620-2690 MHz(RX) LTE Band 66:1710-1780 MHz(TX), 2110-2180 MHz(RX)
Maximum Output Power: (Conducted)		WCDMA band 2/5: 23 dBm LTE band 2/5/66: 23 dBm LTE band 4: 24dBm LTE band 7: 22 dBm
Modulation Type:		QPSK, 16QAM
Rated Input Voltage:		DC12V from adapter
Adapter Information	Model:	ZL-A012W1201000
	Input:	100-240V, 50/60Hz, 0.5A
	Output:	DC12V _{CC} , 1A
External Dimension:		190mm(L)*158mm(W)*40mm(H)
Serial Number:		190227007
EUT Received Date:		2019/2/28

Objective

This report is prepared on behalf of **MFOURTEL MEXICO S.A. DE C.V.** 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: CLNM4WILINK5.
FCC Part 15C NII submissions with FCC ID: CLNM4WILINK5.

Test Methodology

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

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

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

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

Measurement Uncertainty

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

Test Facility

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

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

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

SYSTEM TEST CONFIGURATION

Justification

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

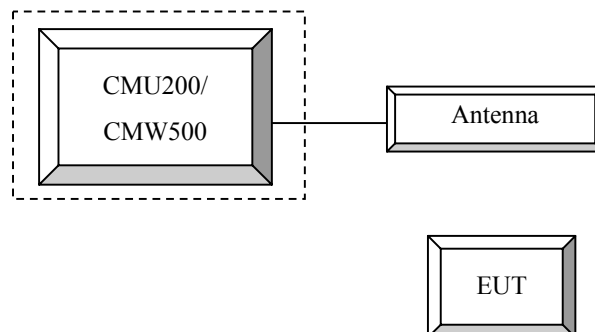
Equipment Modifications

No modification was made to the EUT.

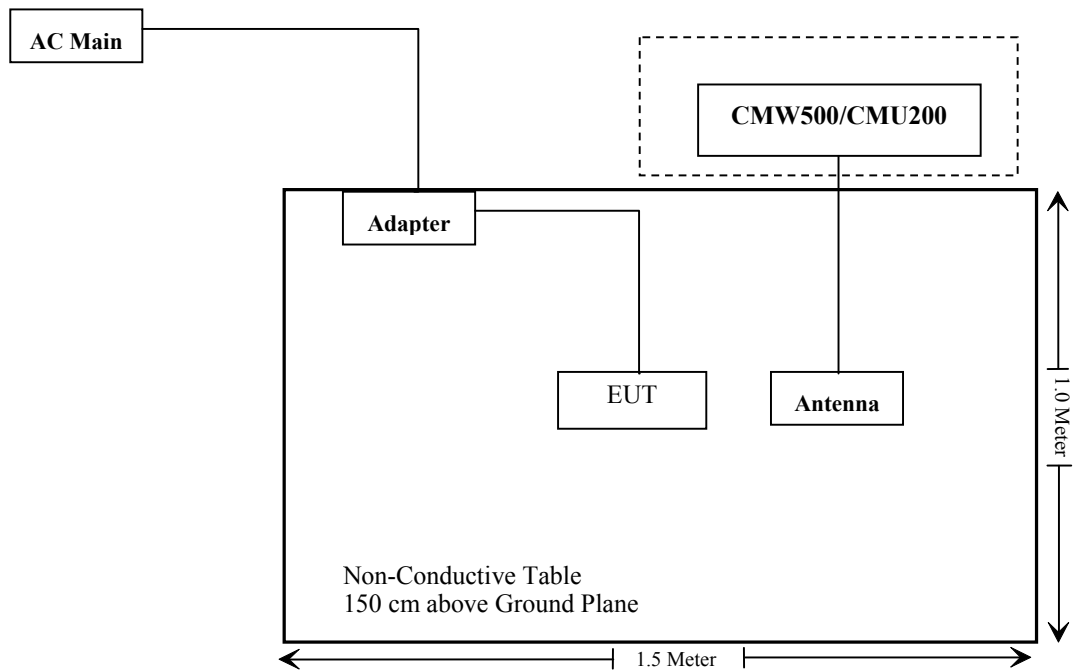
Support Equipment List and Details

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

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1091	Maximum Permissible 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

§1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Mode	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
WLAN	2412-2462	4.5	2.82	25	316.23	20.00	0.18	1.0
WLAN	5150-5250	4.5	2.82	14	25.12	20.00	0.01	1.0
WLAN	5725-5850	4.5	2.82	18	63.10	20.00	0.04	1.0
WCDMA band 2	1850-1910	4.8	3.02	23	199.53	20.00	0.12	1.0
WCDMA Band 5	824-849	2.7	1.86	23	199.53	20.00	0.07	0.55
LTE Band 2	1850-1910	4.8	3.02	23	199.53	20.00	0.12	1.0
LTE band 4	1710-1755	4.8	3.02	24	251.19	20.00	0.15	1.0
LTE Band 5	824-849	2.7	1.86	23	199.53	20.00	0.07	0.55
LTE Band 7	2500-2570	4.8	3.02	22	158.49	20.00	0.10	1.0
LTE Band 66	1710-1780	4.8	3.02	23	199.53	20.00	0.12	1.0

The WLAN and WWAN can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$=S_{WLAN}/S_{limit-WLAN} + S_{WWAN}/S_{limit-WWAN}$$

$$=0.18/1+0.07/0.55$$

$$=0.31$$

$$< 1.0$$

Result: The device meet FCC MPE at 20 cm distance

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) (9) Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788 MHz and 805-806 MHz bands are limited to **30** watts ERP.

(c) (9) Control and mobile stations in the 698-746 MHz band are limited to **30** watts ERP.

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

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

Test Procedure

GSM/GPRS/EGPRS

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

Press Connection control to choose the different menus

Press RESET > choose all the reset all settings

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

Network Support > GSM + GPRS or GSM + EGSM

Main Service > Packet Data

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

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

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850

> 30 dBm for GPRS 1900

> 27 dBm for EGPRS 850

> 26 dBm for EGPRS 1900

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

Frequency Offset > + 0 Hz

Mode > BCCH and TCH

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

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

Channel Type > Off

P0 > 4 dB

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

TCH > choose desired test channel

Hopping > Off

Main Timeslot > 3

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

Bit Stream > 2E9-1 PSR Bit Stream

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

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

WCDMA-Release 99

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

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

WCDMA HSDPA

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c / β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	$A_{hs} = \beta_{hs} / \beta_c$	30/15			

WCDMA HSUPA

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

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

HSPA+

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

Sub-test	β_c (Note 3)	β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105
Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0). Note 3: DPDCH is not configured, therefore the β_c is set to 1 and $\beta_d = 0$ by default. Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value. Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.											

DC-HSDPA

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

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

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

LTE (FDD):

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

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

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

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

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

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

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

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

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

Radiated method:

ANSI/TIA-603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2018-08-03	2019-08-03
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
R&S	Spectrum Analyzer	FSP 38	100478	2018-12-10	2019-12-10
TDK RF	Horn Antenna	HRN-0118	130 084	2019-01-05	2022-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2019-01-05	2019-01-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2022-09-05
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2019-02-24	2020-02-28
R&S	Universal Radio Communication Tester	CMU200	106 891	2018-12-14	2019-12-14
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

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

Test Data**Environmental Conditions**

Temperature:	25.8°C
Relative Humidity:	45 %
ATM Pressure:	100.5 kPa

* The testing was performed by Neil Liao from 2019-03-01 to 2019-03-04.

Conducted Output Power**WCDMA Band II**

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.24	3.3	22.34	3.4	22.38	3.4
HSDPA	1	21.36	4.01	21.45	3.88	21.52	3.69
	2	20.34	4.04	20.44	3.91	20.48	3.66
	3	20.38	3.99	20.49	3.85	20.51	3.71
	4	20.38	3.97	20.49	3.92	20.49	3.64
HSUPA	1	20.21	3.65	20.28	3.97	20.31	3.78
	2	20.23	3.63	20.32	3.97	20.3	3.81
	3	20.23	3.61	20.23	4	20.31	3.8
	4	20.25	3.67	20.28	3.97	20.32	3.81
	5	20.21	3.67	20.31	4.01	20.35	3.77
HSPA+ (16QAM)	1	20.22	3.64	20.26	3.94	20.26	3.83

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	22.36	3.11	22.46	3.11	22.51	3.01
HSDPA	1	21.34	4.17	21.37	4.39	21.48	3.37
	2	20.36	4.16	20.4	4.4	20.45	3.38
	3	20.32	4.16	20.39	4.39	20.45	3.4
	4	20.3	4.17	20.39	4.35	20.43	3.36
HSUPA	1	20.19	4.23	20.24	4.1	20.28	4.26
	2	20.23	4.27	20.21	4.14	20.32	4.21
	3	20.21	4.21	20.24	4.06	20.32	4.31
	4	20.18	4.19	20.21	4.14	20.26	4.24
	5	20.24	4.24	20.27	4.07	20.27	4.29
HSPA+ (16QAM)	1	20.21	4.28	20.21	4.05	20.32	4.31

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.68	22.38	22.54
		1#3	22.66	22.48	22.51
		1#5	22.72	22.44	22.66
		3#0	22.81	22.43	22.17
		3#3	22.82	22.63	22.25
		6#0	21.75	21.58	21.11
	16QAM	1#0	22.28	21.59	21.74
		1#3	22.48	21.15	21.88
		1#5	22.10	20.97	21.70
		3#0	21.69	21.34	21.59
		3#3	21.72	21.33	21.28
		6#0	20.98	20.20	20.52
3MHz	QPSK	1#0	22.56	22.62	22.40
		1#8	22.49	22.72	22.55
		1#14	22.51	22.53	22.55
		10#0	21.77	21.51	21.44
		10#5	21.71	21.60	21.61
		15#0	21.67	21.48	21.45
	16QAM	1#0	21.79	21.71	21.34
		1#8	21.82	22.00	21.59
		1#14	21.75	21.78	21.72
		10#0	20.39	20.70	20.37
		10#5	20.45	20.71	20.30
		15#0	20.41	20.64	20.48
5MHz	QPSK	1#0	22.44	22.43	22.22
		1#13	22.55	22.50	22.46
		1#24	22.31	22.35	22.54
		10#0	21.61	21.41	21.49
		10#15	21.61	21.52	21.49
		25#0	21.58	21.38	21.50
	16QAM	1#0	21.02	21.79	21.21
		1#13	20.85	22.04	21.27
		1#24	20.72	21.56	21.33
		10#0	20.33	20.10	20.46
		10#15	20.44	20.46	20.40
		25#0	20.52	20.34	20.40

10MHz	QPSK	1#0	22.64	22.51	22.24
		1#25	22.48	22.92	22.27
		1#49	22.52	22.50	22.57
		25#0	21.55	21.36	21.46
		25#25	21.43	21.44	21.59
		50#0	21.45	21.43	21.46
	16QAM	1#0	21.91	22.04	21.08
		1#25	22.41	22.66	21.43
		1#49	21.39	22.00	21.00
		25#0	20.51	20.34	20.50
		25#25	20.50	20.58	20.68
		50#0	20.56	20.28	20.33
15MHz	QPSK	1#0	22.53	22.66	22.27
		1#38	22.52	22.60	22.22
		1#74	22.54	22.43	22.23
		36#0	21.51	21.43	21.46
		36#39	21.60	21.55	21.35
		75#0	21.57	21.34	21.44
	16QAM	1#0	21.93	22.01	21.43
		1#38	22.69	22.10	21.26
		1#74	21.86	21.96	20.88
		36#0	20.42	20.17	20.19
		36#39	20.46	20.39	20.16
		75#0	20.52	20.32	20.29
20MHz	QPSK	1#0	22.26	22.37	22.48
		1#50	22.76	22.29	22.48
		1#99	22.38	22.58	22.22
		50#0	21.54	21.39	21.54
		50#50	21.56	21.54	21.29
		100#0	21.50	21.36	21.50
	16QAM	1#0	21.86	21.60	22.12
		1#50	22.09	21.37	22.43
		1#99	21.28	21.53	22.11
		50#0	20.43	20.37	20.45
		50#50	20.46	20.49	20.13
		100#0	20.53	20.32	20.44

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	20.90	23.39	23.01
		RB1#3	23.47	23.47	23.10
		RB1#5	23.60	23.44	23.07
		RB3#0	23.30	23.21	23.17
		RB3#3	23.21	23.33	23.05
		RB6#0	22.32	22.22	22.05
	16QAM	RB1#0	22.26	22.39	22.09
		RB1#3	21.97	22.69	22.58
		RB1#5	21.91	22.22	22.52
		RB3#0	22.28	22.34	22.06
		RB3#3	22.20	21.87	22.05
		RB6#0	21.10	20.99	21.23
3MHz	QPSK	RB1#0	20.83	22.53	21.78
		RB1#8	22.12	22.15	21.91
		RB1#14	22.07	22.10	22.09
		RB6#0	21.15	21.37	21.04
		RB6#9	21.09	21.21	21.07
		RB15#0	20.94	21.38	21.11
	16QAM	RB1#0	21.40	21.39	20.80
		RB1#8	21.09	22.08	20.58
		RB1#14	20.90	21.89	20.74
		RB6#0	19.92	20.44	19.85
		RB6#9	19.91	20.52	20.03
		RB15#0	20.01	20.28	20.25
5MHz	QPSK	RB1#0	22.02	22.19	21.82
		RB1#13	22.28	22.25	22.10
		RB1#24	22.13	22.11	22.30
		RB15#0	21.26	21.34	21.12
		RB15#10	21.20	21.30	20.93
		RB25#0	21.14	21.24	20.72
	16QAM	RB1#0	20.57	21.61	20.53
		RB1#13	20.56	21.77	20.65
		RB1#24	20.49	21.67	20.65
		RB15#0	20.19	20.22	19.60
		RB15#10	20.10	20.12	19.80
		RB25#0	20.19	20.18	19.74

10MHz	QPSK	RB1#0	22.10	22.39	22.10
		RB1#25	22.24	22.32	22.42
		RB1#49	22.00	22.02	22.28
		RB25#0	21.29	21.09	21.14
		RB25#25	21.16	21.16	21.15
		RB50#0	21.23	21.18	21.15
	16QAM	RB1#0	21.59	21.39	20.91
		RB1#25	22.27	21.40	20.85
		RB1#49	21.25	21.20	20.97
		RB25#0	20.30	19.63	20.25
		RB25#25	20.19	19.45	20.19
		RB50#0	20.20	19.38	20.07
15MHz	QPSK	RB1#0	22.29	22.21	22.07
		RB1#38	22.34	22.39	21.89
		RB1#74	22.41	22.14	22.10
		RB36#0	21.36	21.36	21.13
		RB36#39	21.29	21.35	21.17
		RB75#0	21.32	21.29	21.21
	16QAM	RB1#0	21.82	21.94	21.38
		RB1#38	21.67	22.50	20.99
		RB1#74	21.76	21.70	20.82
		RB36#0	20.37	20.20	20.12
		RB36#39	20.41	20.31	20.05
		RB75#0	20.21	20.28	20.19
20MHz	QPSK	RB1#0	19.40	22.50	22.24
		RB1#50	22.45	22.34	22.27
		RB1#99	22.53	21.99	22.05
		RB50#0	21.31	21.31	21.35
		RB50#50	21.49	21.30	21.17
		RB100#0	21.39	21.21	21.29
	16QAM	RB1#0	21.36	22.07	21.96
		RB1#50	21.07	22.59	21.91
		RB1#99	20.78	21.95	21.82
		RB50#0	20.03	20.05	20.31
		RB50#50	20.22	20.17	20.09
		RB100#0	20.15	20.09	20.11

LTE Band 5

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	22.79	22.90	22.80
		RB1#3	22.91	22.89	22.82
		RB1#5	22.87	22.74	22.71
		RB3#0	22.59	22.75	22.77
		RB3#3	22.65	22.90	22.75
		RB6#0	21.57	21.81	21.79
	16QAM	RB1#0	21.75	22.42	21.53
		RB1#3	22.05	22.25	21.69
		RB1#5	21.75	22.19	21.61
		RB3#0	21.77	22.19	21.91
		RB3#3	21.88	22.06	21.85
3MHz	QPSK	RB1#0	22.87	22.45	22.68
		RB1#8	22.84	22.63	22.78
		RB1#14	22.76	22.57	22.64
		RB6#0	21.69	21.72	21.87
		RB6#9	21.73	21.85	21.73
		RB15#0	21.74	21.79	21.84
	16QAM	RB1#0	21.83	21.59	22.15
		RB1#8	22.29	21.75	21.96
		RB1#14	22.50	21.83	21.92
		RB6#0	21.02	20.60	20.82
		RB6#9	21.18	20.65	20.71
5MHz	QPSK	RB1#0	22.61	22.49	22.74
		RB1#13	22.89	22.76	22.93
		RB1#24	22.64	22.44	22.57
		RB15#0	21.73	21.82	21.90
		RB15#10	21.77	21.80	21.82
		RB25#0	21.66	21.81	21.83
	16QAM	RB1#0	21.70	21.20	21.95
		RB1#13	21.68	21.36	22.15
		RB1#24	21.32	21.19	22.06
		RB15#0	20.65	20.57	20.83
		RB15#10	20.71	20.57	20.83
10MHz	QPSK	RB25#0	20.59	20.72	20.74
		RB1#0	22.72	22.48	22.50
		RB1#25	22.86	22.09	22.11
		RB1#49	22.75	22.73	22.99
		RB25#0	21.79	21.82	21.80
	16QAM	RB25#25	21.85	21.97	21.98
		RB50#0	21.77	21.84	21.86
		RB1#0	22.10	21.48	22.08
		RB1#25	22.89	21.70	22.68
		RB1#49	22.38	21.38	22.10
	16QAM	RB25#0	20.86	20.84	20.82
		RB25#25	20.71	21.08	20.95
		RB50#0	20.76	20.70	20.76

LTE Band 7

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	21.14	21.01	21.53
		RB1#13	21.13	21.18	21.55
		RB1#24	21.17	21.07	21.31
		RB15#0	20.31	20.30	20.42
		RB15#10	20.35	20.37	20.51
		RB25#0	20.29	20.33	20.51
	16QAM	RB1#0	19.63	20.54	20.21
		RB1#13	19.49	20.71	20.40
		RB1#24	19.41	20.58	20.29
		RB15#0	19.25	19.32	19.33
		RB15#10	19.27	19.38	19.54
		RB25#0	19.26	19.29	19.53
10MHz	QPSK	RB1#0	21.07	21.28	21.27
		RB1#25	21.20	21.60	21.26
		RB1#49	20.99	21.50	21.43
		RB25#0	20.19	20.22	20.46
		RB25#25	20.34	20.41	20.52
		RB50#0	20.27	20.32	20.50
	16QAM	RB1#0	20.49	20.45	20.29
		RB1#25	20.75	21.32	20.40
		RB1#49	20.42	21.06	20.39
		RB25#0	19.24	19.39	19.59
		RB25#25	19.43	19.45	19.82
		RB50#0	19.29	19.48	19.43
15MHz	QPSK	RB1#0	21.12	21.06	21.29
		RB1#38	21.15	21.26	21.11
		RB1#74	20.95	21.26	21.44
		RB36#0	20.22	20.14	20.48
		RB36#39	20.18	20.48	20.51
		RB75#0	20.10	20.28	20.48
	16QAM	RB1#0	20.57	20.71	20.09
		RB1#38	20.46	20.69	20.37
		RB1#74	20.38	20.90	20.40
		RB36#0	19.31	19.40	19.46
		RB36#39	19.24	19.52	19.53
		RB75#0	19.36	19.35	19.50
20MHz	QPSK	RB1#0	21.15	21.13	21.09
		RB1#50	21.46	21.47	21.60
		RB1#99	21.06	21.33	21.25
		RB50#0	20.23	20.23	20.40
		RB50#50	20.34	20.51	20.48
		RB100#0	20.12	20.35	20.42
	16QAM	RB1#0	20.14	20.83	20.53
		RB1#50	20.25	21.06	21.11
		RB1#99	19.58	21.09	21.04
		RB50#0	19.15	19.23	19.42
		RB50#50	19.31	19.51	19.63
		RB100#0	19.21	19.38	20.43

LTE Band 66

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	22.91	22.97	22.26
		RB1#3	21.94	22.01	21.34
		RB1#5	21.96	21.61	21.29
		RB3#0	21.84	21.68	21.43
		RB3#3	21.80	21.69	21.24
		RB6#0	20.90	20.79	20.32
	16QAM	RB1#0	20.99	20.93	19.97
		RB1#3	21.23	21.05	20.16
		RB1#5	21.09	20.95	19.99
		RB3#0	21.00	20.90	20.39
		RB3#3	21.05	20.89	20.38
3MHz	QPSK	RB1#0	21.53	21.72	21.65
		RB1#8	21.49	21.57	21.56
		RB1#14	21.51	21.74	21.68
		RB6#0	20.40	20.98	20.80
		RB6#9	20.26	20.84	20.66
		RB15#0	20.27	20.92	20.82
	16QAM	RB1#0	20.60	21.06	21.03
		RB1#8	20.55	21.35	20.50
		RB1#14	20.57	21.26	20.26
		RB6#0	19.17	20.27	19.90
		RB6#9	19.73	20.23	19.67
5MHz	QPSK	RB1#0	21.77	21.72	21.90
		RB1#13	21.72	21.59	21.67
		RB1#24	21.64	21.58	21.70
		RB15#0	20.89	20.86	20.81
		RB15#10	20.91	20.83	20.68
		RB25#0	20.87	20.89	20.83
	16QAM	RB1#0	20.25	21.27	20.69
		RB1#13	20.13	21.31	20.36
		RB1#24	20.10	21.18	20.34
		RB15#0	19.69	19.96	19.76
		RB15#10	19.71	19.90	19.76
10MHz	QPSK	RB25#0	19.78	19.86	19.89
		RB1#0	21.80	22.24	21.79
		RB1#25	21.89	22.14	21.98
		RB1#49	21.77	21.63	21.63
		RB25#0	20.99	21.02	20.85
		RB25#25	20.90	20.87	20.69
	16QAM	RB50#0	20.89	20.99	20.85
		RB1#0	21.33	21.68	20.26
		RB1#25	21.92	21.97	21.18
		RB1#49	21.13	21.43	20.32
		RB25#0	19.92	20.07	20.04
	QPSK	RB25#25	19.94	19.88	19.81
		RB50#0	19.87	19.99	19.83

15MHz	QPSK	RB1#0	21.80	21.86	21.69
		RB1#38	21.82	21.64	21.92
		RB1#74	21.94	21.71	21.62
		RB36#0	20.92	21.12	20.97
		RB36#39	20.96	20.80	20.82
		RB75#0	20.93	20.90	20.90
	16QAM	RB1#0	21.43	21.41	20.95
		RB1#38	21.30	21.63	20.85
		RB1#74	20.64	21.50	20.60
		RB36#0	19.82	19.99	19.91
		RB36#39	19.85	19.80	19.69
		RB75#0	19.83	19.91	19.76
20MHz	QPSK	RB1#0	21.55	21.97	21.61
		RB1#50	22.06	22.03	22.12
		RB1#99	21.69	22.10	21.78
		RB50#0	20.81	21.03	20.93
		RB50#50	20.90	20.84	20.94
		RB100#0	20.85	20.95	20.87
	16QAM	RB1#0	21.30	21.15	21.58
		RB1#50	21.55	20.76	22.12
		RB1#99	21.40	20.34	21.54
		RB50#0	19.86	20.01	19.87
		RB50#50	19.97	19.86	19.81
		RB100#0	19.84	19.96	19.81

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	4.32	5.43	4.11	13
	100 RB		5.45	5.51	5.45	13
16QAM	1 RB	20 MHz	5.53	6.64	5.12	13
	100 RB		6.3	6.45	6.22	13

PAR, Band 4

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.81	5.13	4.71	13
	100 RB		5.45	5.51	5.45	13
16QAM	1 RB	20 MHz	5.83	6.15	5.83	13
	100 RB		6.47	6.54	6.44	13

PAR, Band 5

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.34	5.55	4.12	13
	50 RB		5.43	5.66	5.42	13
16QAM	1 RB	10 MHz	5.31	6.12	5.51	13
	50 RB		6.32	6.43	6.11	13

PAR, Band 66

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.94	4.78	5.00	13
	100 RB		5.45	5.35	5.35	13
16QAM	1 RB	20 MHz	5.87	5.90	5.90	13
	100 RB		6.47	6.44	6.38	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)			
WCDMA Band V Middle Channel								
836.60	H	90.62	15.70	0.00	0.97	14.73	38.45	23.72
836.60	V	94.71	22.92	0.00	0.97	21.95	38.45	16.50

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)			
WCDMA Band II Middle Channel								
1880.00	H	85.95	11.17	11.14	1.56	20.75	33.00	12.25
1880.00	V	88.79	13.82	11.14	1.56	23.40	33.00	9.60

Note:

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

LTE Band 2

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1880.00	1.40	QPSK	H	84.48	9.70	11.14	1.56	19.28	33.00	13.72
1880.00			V	85.41	10.44	11.14	1.56	20.02	33.00	12.98
1880.00	3.00		H	84.71	9.93	11.14	1.56	19.51	33.00	13.49
1880.00			V	85.30	10.33	11.14	1.56	19.91	33.00	13.09
1880.00	5.00		H	83.48	8.70	11.14	1.56	18.28	33.00	14.72
1880.00			V	85.12	10.15	11.14	1.56	19.73	33.00	13.27
1880.00	10.00		H	82.90	8.12	11.14	1.56	17.70	33.00	15.30
1880.00			V	84.46	9.49	11.14	1.56	19.07	33.00	13.93
1880.00	15.00		H	83.72	8.94	11.14	1.56	18.52	33.00	14.48
1880.00			V	85.55	10.58	11.14	1.56	20.16	33.00	12.84
1880.00	20.00		H	83.97	9.19	11.14	1.56	18.77	33.00	14.23
1880.00			V	85.68	10.71	11.14	1.56	20.29	33.00	12.71
1880.00	1.40	16QAM	H	83.21	8.43	11.14	1.56	18.01	33.00	14.99
1880.00			V	84.25	9.28	11.14	1.56	18.86	33.00	14.14
1880.00	3.00		H	83.68	8.90	11.14	1.56	18.48	33.00	14.52
1880.00			V	84.52	9.55	11.14	1.56	19.13	33.00	13.87
1880.00	5.00		H	82.73	7.95	11.14	1.56	17.53	33.00	15.47
1880.00			V	83.94	8.97	11.14	1.56	18.55	33.00	14.45
1880.00	10.00		H	82.50	7.72	11.14	1.56	17.30	33.00	15.70
1880.00			V	83.54	8.57	11.14	1.56	18.15	33.00	14.85
1880.00	15.00		H	82.45	7.67	11.14	1.56	17.25	33.00	15.75
1880.00			V	84.35	9.38	11.14	1.56	18.96	33.00	14.04
1880.00	20.00		H	82.54	7.76	11.14	1.56	17.34	33.00	15.66
1880.00			V	84.71	9.74	11.14	1.56	19.32	33.00	13.68

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	81.20	5.99	10.70	1.52	15.17	30.00	14.83
1732.50			V	86.45	10.94	10.70	1.52	20.12	30.00	9.88
1732.50	3.00		H	80.76	5.55	10.70	1.52	14.73	30.00	15.27
1732.50			V	86.35	10.84	10.70	1.52	20.02	30.00	9.98
1732.50	5.00		H	80.39	5.18	10.70	1.52	14.36	30.00	15.64
1732.50			V	86.69	11.18	10.70	1.52	20.36	30.00	9.64
1732.50	10.00		H	79.99	4.78	10.70	1.52	13.96	30.00	16.04
1732.50			V	86.57	11.06	10.70	1.52	20.24	30.00	9.76
1732.50	15.00		H	80.80	5.59	10.70	1.52	14.77	30.00	15.23
1732.50			V	86.17	10.66	10.70	1.52	19.84	30.00	10.16
1732.50	20.00		H	81.57	6.36	10.70	1.52	15.54	30.00	14.46
1732.50			V	86.82	11.31	10.70	1.52	20.49	30.00	9.51
1732.50	1.40	16QAM	H	80.83	5.62	10.70	1.52	14.80	30.00	15.20
1732.50			V	86.07	10.56	10.70	1.52	19.74	30.00	10.26
1732.50	3.00		H	80.25	5.04	10.70	1.52	14.22	30.00	15.78
1732.50			V	85.79	10.28	10.70	1.52	19.46	30.00	10.54
1732.50	5.00		H	79.75	4.54	10.70	1.52	13.72	30.00	16.28
1732.50			V	86.04	10.53	10.70	1.52	19.71	30.00	10.29
1732.50	10.00		H	79.10	3.89	10.70	1.52	13.07	30.00	16.93
1732.50			V	85.96	10.45	10.70	1.52	19.63	30.00	10.37
1732.50	15.00		H	80.01	4.80	10.70	1.52	13.98	30.00	16.02
1732.50			V	85.44	9.93	10.70	1.52	19.11	30.00	10.89
1732.50	20.00		H	80.86	5.65	10.70	1.52	14.83	30.00	15.17
1732.50			V	86.20	10.69	10.70	1.52	19.87	30.00	10.13

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	87.06	12.13	0.00	0.97	11.16	38.45	27.29
836.50			V	93.09	21.30	0.00	0.97	20.33	38.45	18.12
836.50	3.00		H	86.43	11.50	0.00	0.97	10.53	38.45	27.92
836.50			V	92.59	20.80	0.00	0.97	19.83	38.45	18.62
836.50	5.00		H	86.35	11.42	0.00	0.97	10.45	38.45	28.00
836.50			V	91.77	19.98	0.00	0.97	19.01	38.45	19.44
836.50	10.00		H	86.41	11.48	0.00	0.97	10.51	38.45	27.94
836.50			V	91.54	19.75	0.00	0.97	18.78	38.45	19.67
836.50	1.40	16QAM	H	86.49	11.56	0.00	0.97	10.59	38.45	27.86
836.50			V	92.12	20.33	0.00	0.97	19.36	38.45	19.09
836.50	3.00		H	86.55	11.62	0.00	0.97	10.65	38.45	27.80
836.50			V	92.03	20.24	0.00	0.97	19.27	38.45	19.18
836.50	5.00		H	86.33	11.40	0.00	0.97	10.43	38.45	28.02
836.50			V	91.88	20.09	0.00	0.97	19.12	38.45	19.33
836.50	10.00		H	86.65	11.72	0.00	0.97	10.75	38.45	27.70
836.50			V	91.28	19.49	0.00	0.97	18.52	38.45	19.93

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	82.02	8.93	12.21	1.79	19.35	33.00	13.65
2535.00			V	83.71	10.33	12.21	1.79	20.75	33.00	12.25
2535.00	10.00		H	81.58	8.49	12.21	1.79	18.91	33.00	14.09
2535.00			V	82.64	9.26	12.21	1.79	19.68	33.00	13.32
2535.00	15.00		H	81.93	8.84	12.21	1.79	19.26	33.00	13.74
2535.00			V	83.17	9.79	12.21	1.79	20.21	33.00	12.79
2535.00	20.00		H	82.06	8.97	12.21	1.79	19.39	33.00	13.61
2535.00			V	83.93	10.55	12.21	1.79	20.97	33.00	12.03
2535.00	5.00	16QAM	H	81.41	8.32	12.21	1.79	18.74	33.00	14.26
2535.00			V	83.29	9.91	12.21	1.79	20.33	33.00	12.67
2535.00	10.00		H	80.93	7.84	12.21	1.79	18.26	33.00	14.74
2535.00			V	81.95	8.57	12.21	1.79	18.99	33.00	14.01
2535.00	15.00		H	81.14	8.05	12.21	1.79	18.47	33.00	14.53
2535.00			V	82.75	9.37	12.21	1.79	19.79	33.00	13.21
2535.00	20.00		H	81.44	8.35	12.21	1.79	18.77	33.00	14.23
2535.00			V	83.41	10.03	12.21	1.79	20.45	33.00	12.55

LTE Band 66

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)			
1745.00	1.40	QPSK	H	80.97	5.80	10.74	1.52	15.02	30.00	14.98
1745.00			V	86.13	10.67	10.74	1.52	19.89	30.00	10.11
1745.00	3.00		H	81.27	6.10	10.74	1.52	15.32	30.00	14.68
1745.00			V	85.60	10.14	10.74	1.52	19.36	30.00	10.64
1745.00	5.00		H	81.02	5.85	10.74	1.52	15.07	30.00	14.93
1745.00			V	85.43	9.97	10.74	1.52	19.19	30.00	10.81
1745.00	10.00		H	81.24	6.07	10.74	1.52	15.29	30.00	14.71
1745.00			V	85.63	10.17	10.74	1.52	19.39	30.00	10.61
1745.00	15.00		H	81.76	6.59	10.74	1.52	15.81	30.00	14.19
1745.00			V	86.12	10.66	10.74	1.52	19.88	30.00	10.12
1745.00	20.00		H	82.51	7.34	10.74	1.52	16.56	30.00	13.44
1745.00			V	86.29	10.83	10.74	1.52	20.05	30.00	9.95
1745.00	1.40	16QAM	H	80.03	4.86	10.74	1.52	14.08	30.00	15.92
1745.00			V	85.76	10.30	10.74	1.52	19.52	30.00	10.48
1745.00	3.00		H	80.69	5.52	10.74	1.52	14.74	30.00	15.26
1745.00			V	85.01	9.55	10.74	1.52	18.77	30.00	11.23
1745.00	5.00		H	80.20	5.03	10.74	1.52	14.25	30.00	15.75
1745.00			V	84.76	9.30	10.74	1.52	18.52	30.00	11.48
1745.00	10.00		H	80.44	5.27	10.74	1.52	14.49	30.00	15.51
1745.00			V	84.85	9.39	10.74	1.52	18.61	30.00	11.39
1745.00	15.00		H	81.14	5.97	10.74	1.52	15.19	30.00	14.81
1745.00			V	85.72	10.26	10.74	1.52	19.48	30.00	10.52
1745.00	20.00		H	80.69	5.52	10.74	1.52	14.74	30.00	15.26
1745.00			V	86.02	10.56	10.74	1.52	19.78	30.00	10.22

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

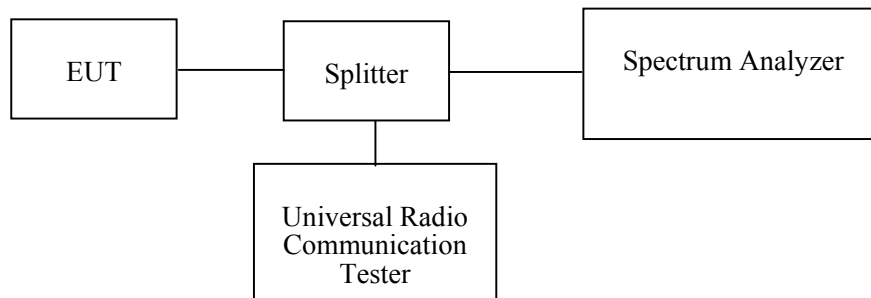
FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH**Applicable Standard**

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	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	/

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

Test Data**Environmental Conditions**

Temperature:	24.9~25.9 °C
Relative Humidity:	47~53 %
ATM Pressure:	100.6~100.8 kPa

The testing was performed by Elena Lei and Blake Yang from 2019-03-01 to 2019-03-04.

Test Mode: Transmitting

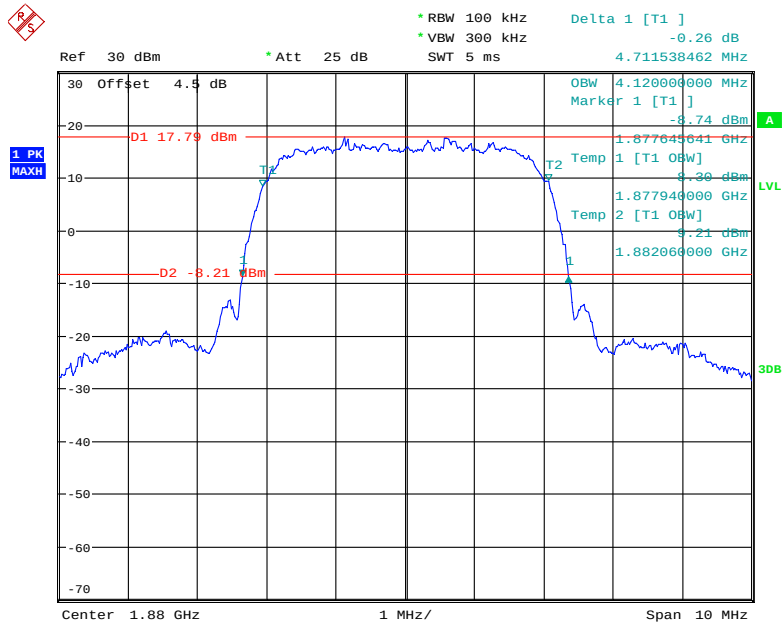
Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
WCDMA Band II	M	Rel 99	4.120	4.712
		HSDPA	4.120	4.712
		HSUPA	4.140	4.728
WCDMA Band V		Rel 99	4.120	4.712
		HSDPA	4.140	4.728
		HSUPA	4.120	4.712

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.110	1.317
		16QAM	1.104	1.299
	3 MHz	QPSK	2.700	2.922
		16QAM	2.700	2.946
	5 MHz	QPSK	4.540	4.990
		16QAM	4.520	4.970
	10 MHz	QPSK	8.960	9.659
		16QAM	8.920	9.579
	15 MHz	QPSK	13.500	14.790
		16QAM	13.560	14.729
	20 MHz	QPSK	17.920	19.238
		16QAM	18.000	19.238

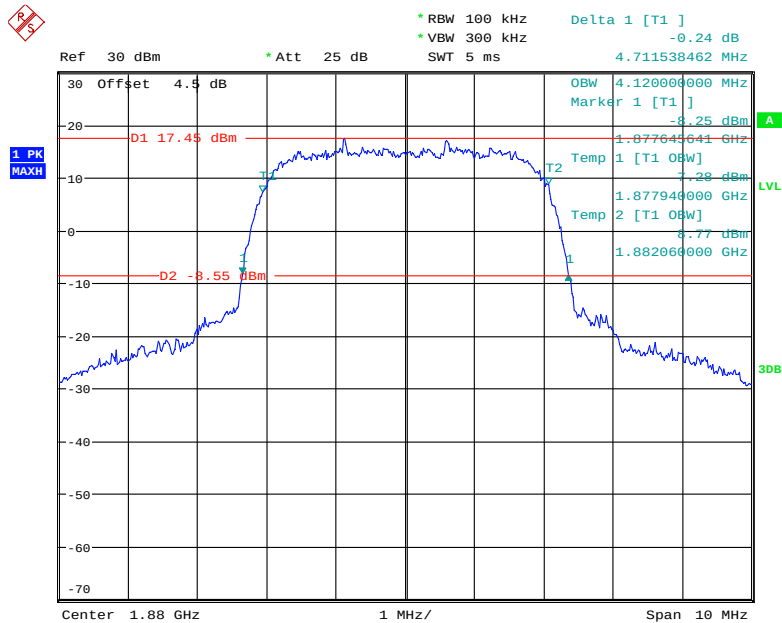
Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 4	1.4 MHz	QPSK	1.110	1.305
		16QAM	1.110	1.311
	3 MHz	QPSK	2.700	2.934
		16QAM	2.700	2.946
	5 MHz	QPSK	4.540	4.970
		16QAM	4.520	4.990
	10 MHz	QPSK	8.960	9.739
		16QAM	8.960	9.579
	15 MHz	QPSK	13.560	14.850
		16QAM	13.500	14.729
	20 MHz	QPSK	18.000	19.319
		16QAM	18.000	19.319
LTE Band 5	1.4 MHz	QPSK	1.110	1.305
		16QAM	1.110	1.311
	3 MHz	QPSK	2.688	2.934
		16QAM	2.688	2.958
	5 MHz	QPSK	4.520	4.970
		16QAM	4.520	4.950
	10 MHz	QPSK	8.960	9.780
		16QAM	8.960	9.539
LTE Band 7	5 MHz	QPSK	4.520	4.970
		16QAM	4.520	4.950
	10 MHz	QPSK	8.960	9.739
		16QAM	8.960	9.699
	15 MHz	QPSK	13.560	14.790
		16QAM	13.500	14.790
	20 MHz	QPSK	18.000	19.319
		16QAM	18.000	19.319
LTE Band 66	1.4 MHz	QPSK	1.104	1.293
		16QAM	1.104	1.299
	3 MHz	QPSK	2.688	2.922
		16QAM	2.688	2.946
	5 MHz	QPSK	4.520	5.030
		16QAM	4.520	4.970
	10 MHz	QPSK	8.960	9.659
		16QAM	8.960	9.699
	15 MHz	QPSK	13.500	14.609
		16QAM	13.500	14.790
	20 MHz	QPSK	17.920	19.078
		16QAM	17.920	19.238

WCDMA Band II, Rel 99



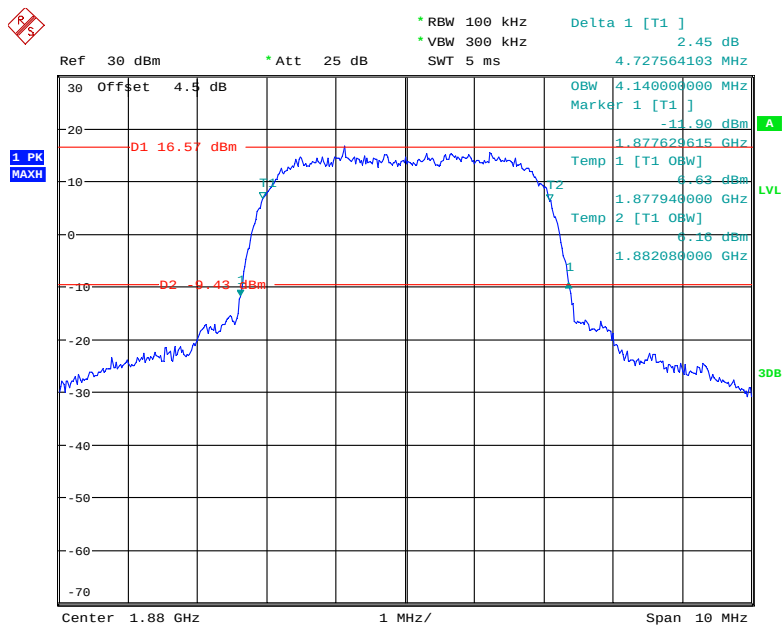
Date: 1.MAR.2019 19:28:40

WCDMA Band II, HSDPA



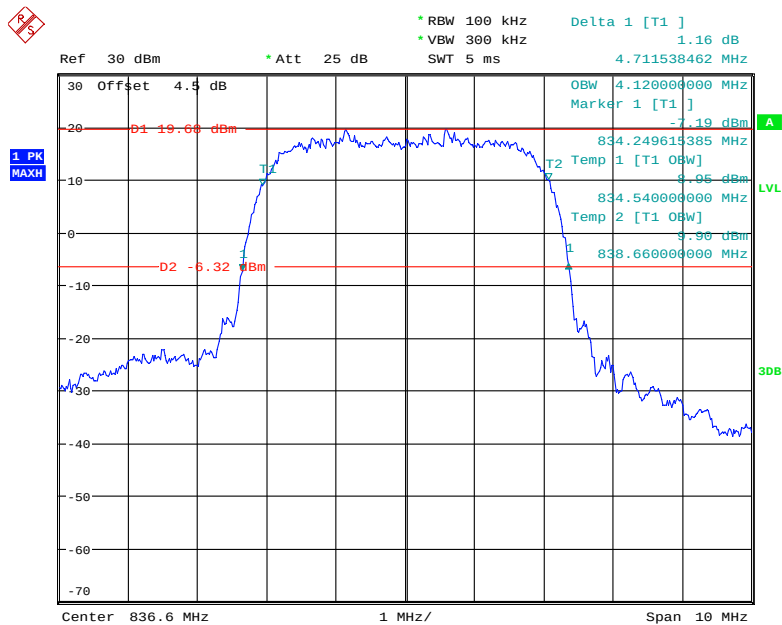
Date: 1.MAR.2019 19:30:33

WCDMA Band II, HSUPA



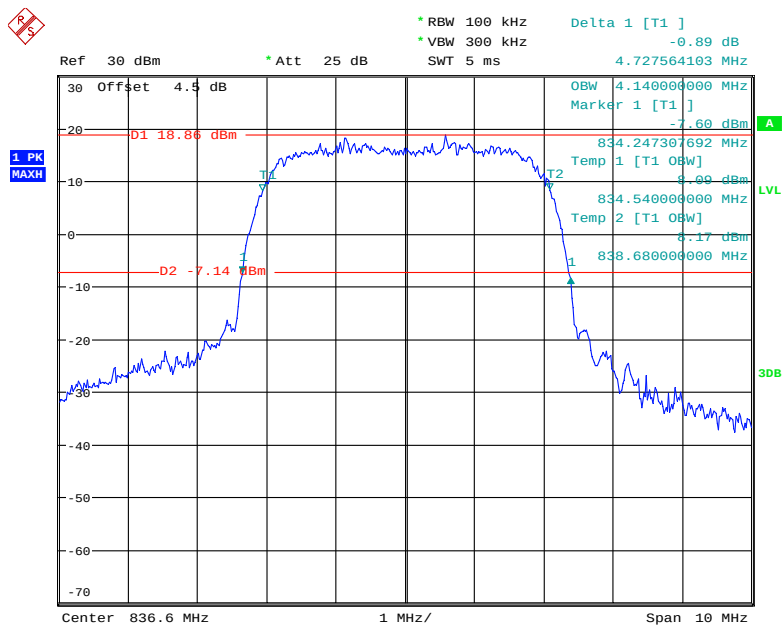
Date: 1.MAR.2019 19:32:17

WCDMA Band V, Rel 99



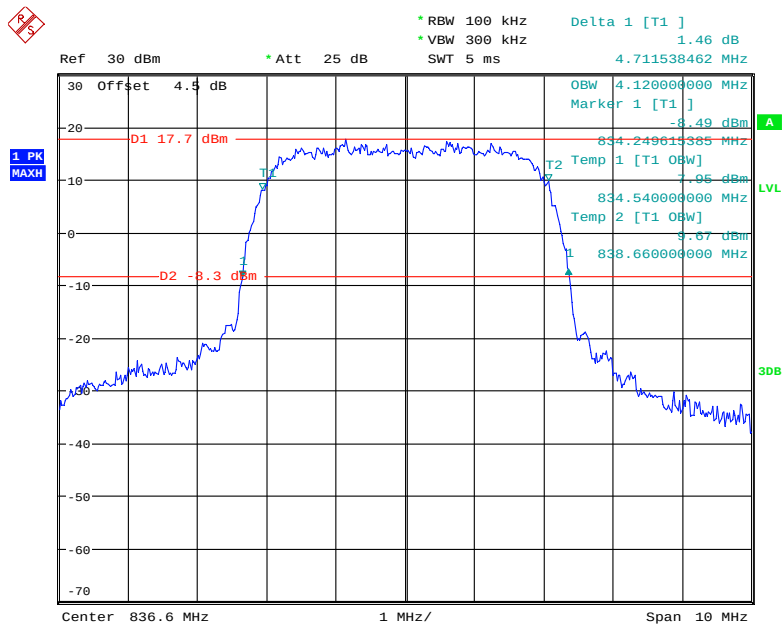
Date: 1.MAR.2019 20:04:30

WCDMA Band V, HSDPA



Date: 1.MAR.2019 20:06:07

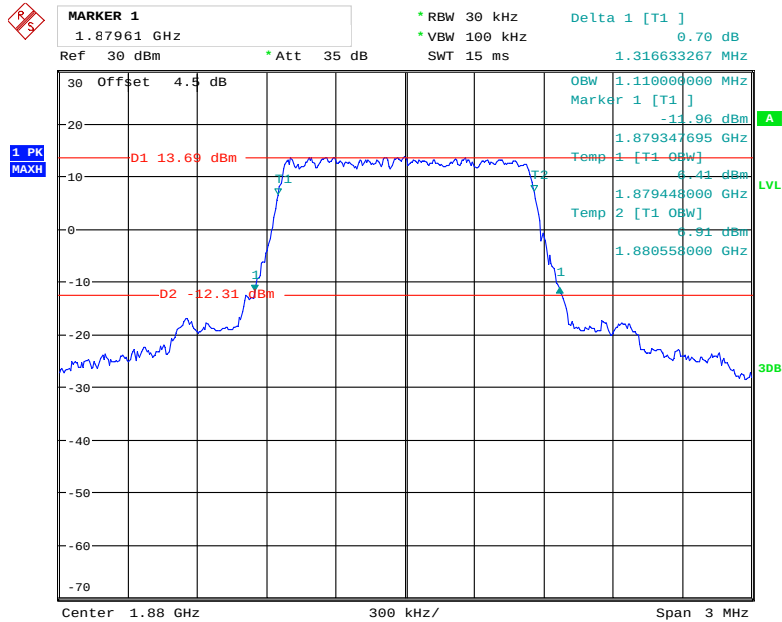
WCDMA Band V, HSUPA



Date: 1.MAR.2019 20:02:24

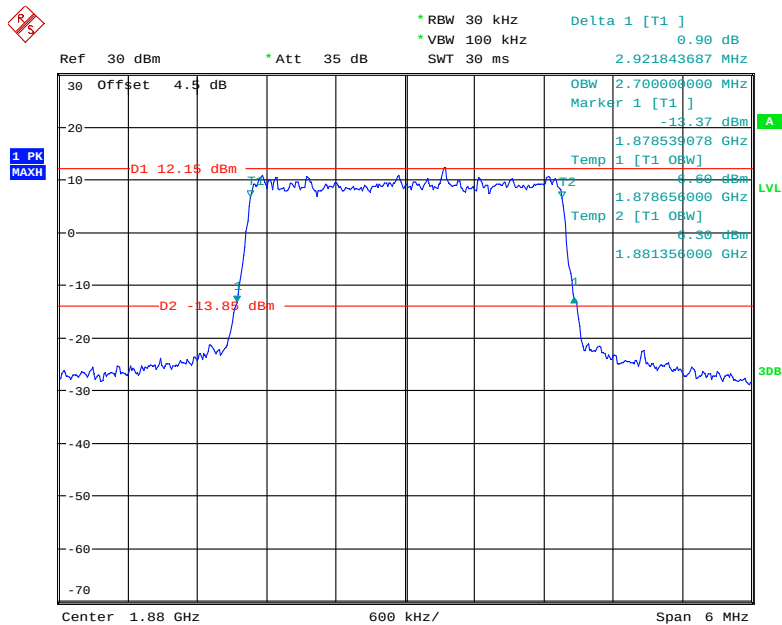
LTE Band 2

QPSK_1.4 MHz



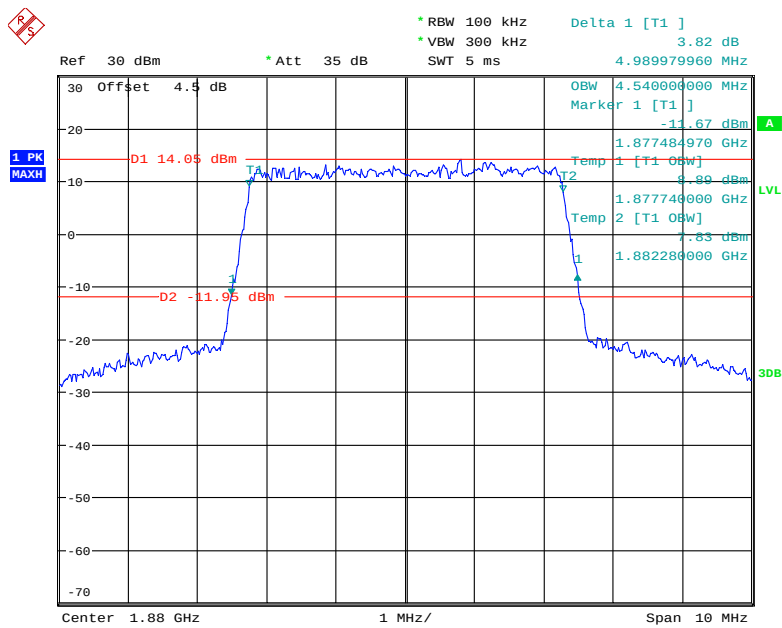
Date: 4.MAR.2019 09:52:16

QPSK_3 MHz



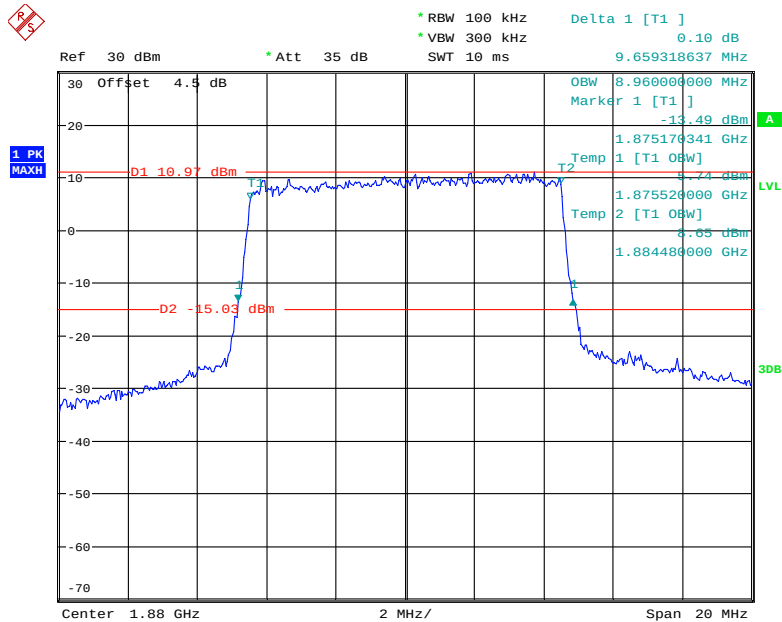
Date: 4.MAR.2019 09:53:29

QPSK_5 MHz



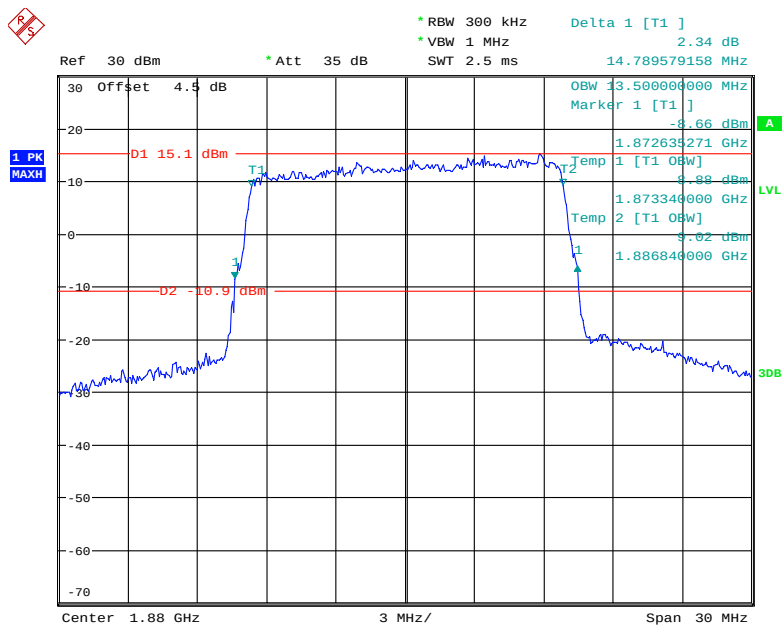
Date: 4.MAR.2019 09:54:27

QPSK_10 MHz



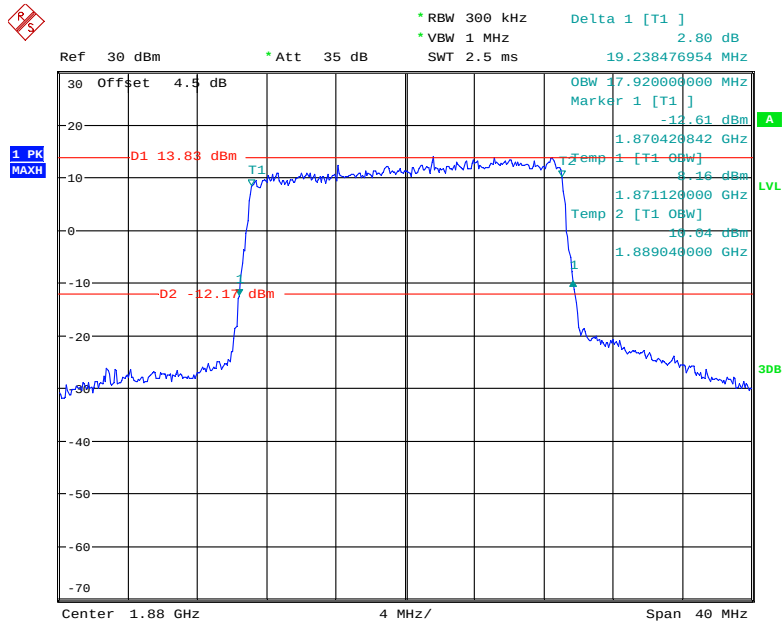
Date: 4.MAR.2019 09:55:38

QPSK_15 MHz



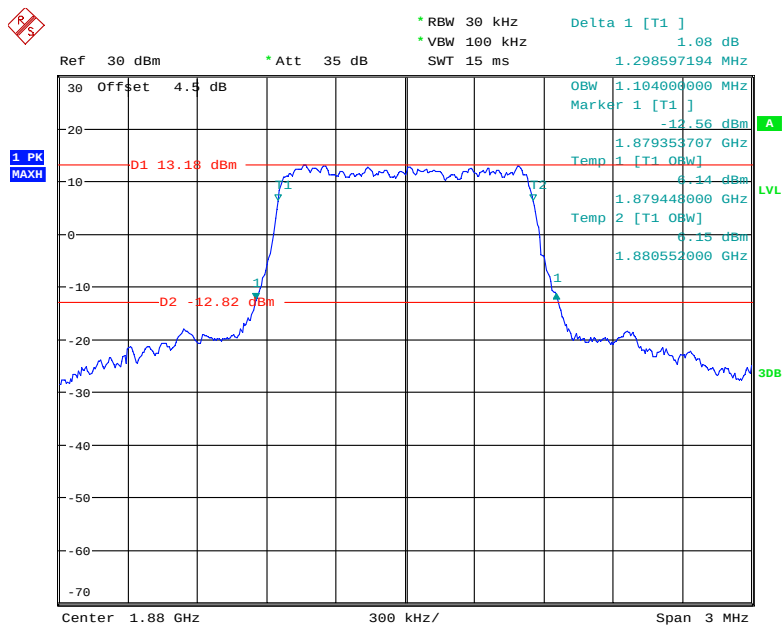
Date: 4.MAR.2019 09:56:50

QPSK_20 MHz



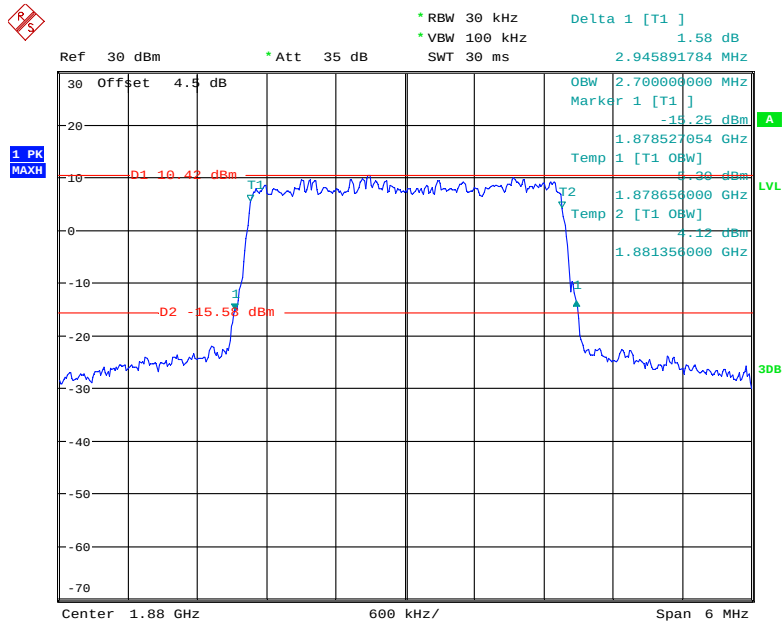
Date: 4.MAR.2019 09:58:19

16QAM_1.4 MHz



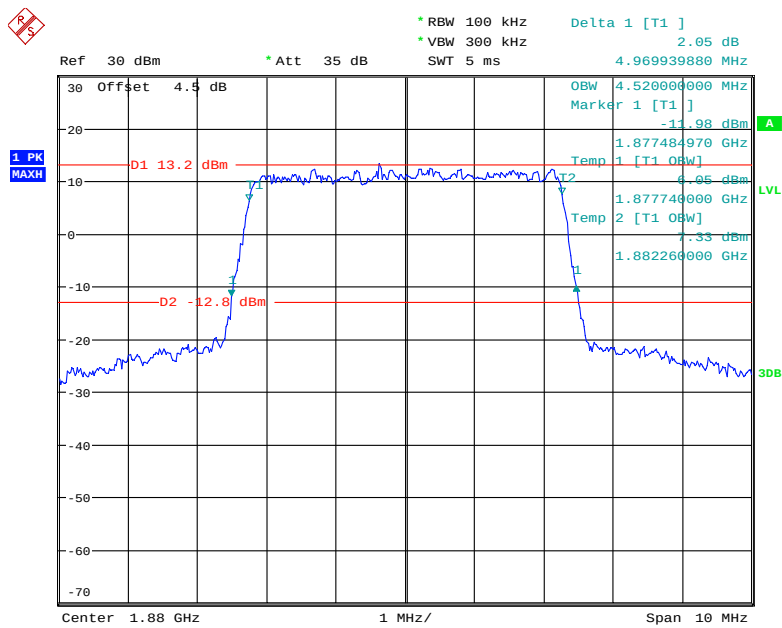
Date: 4.MAR.2019 09:52:55

16QAM_3 MHz



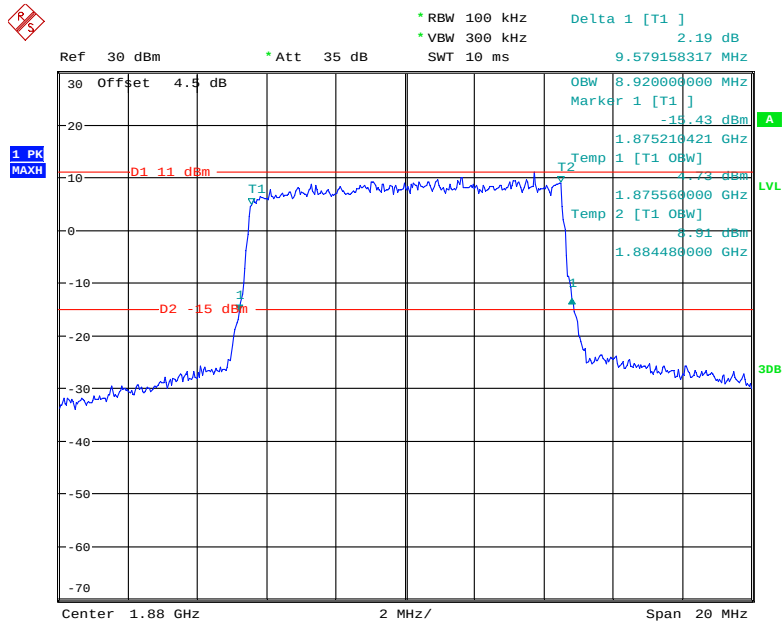
Date: 4.MAR.2019 09:53:56

16QAM_5 MHz



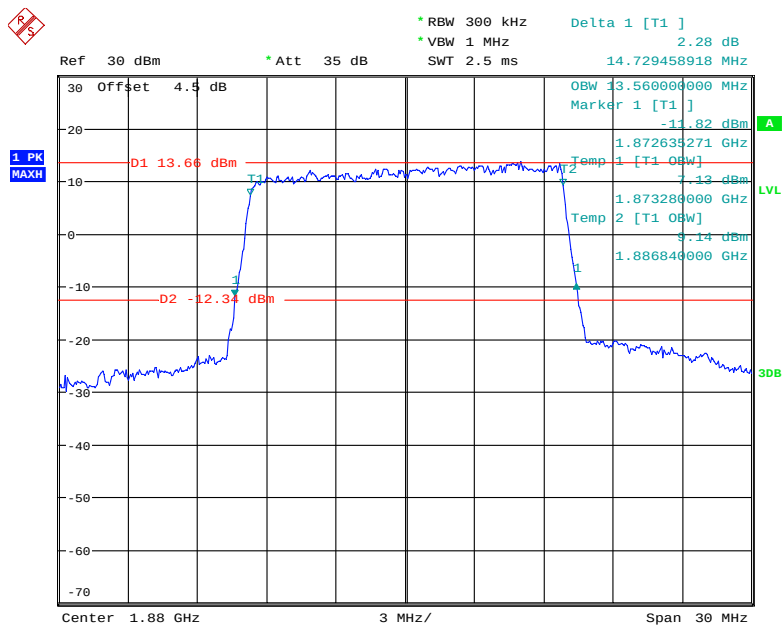
Date: 4.MAR.2019 09:55:03

16QAM_10 MHz



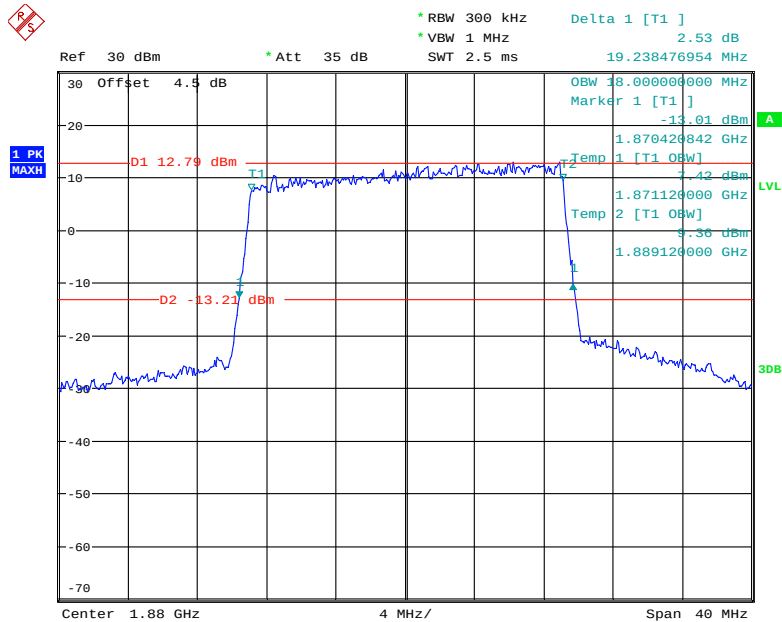
Date: 4.MAR.2019 09:56:11

16QAM_15 MHz



Date: 4.MAR.2019 09:57:36

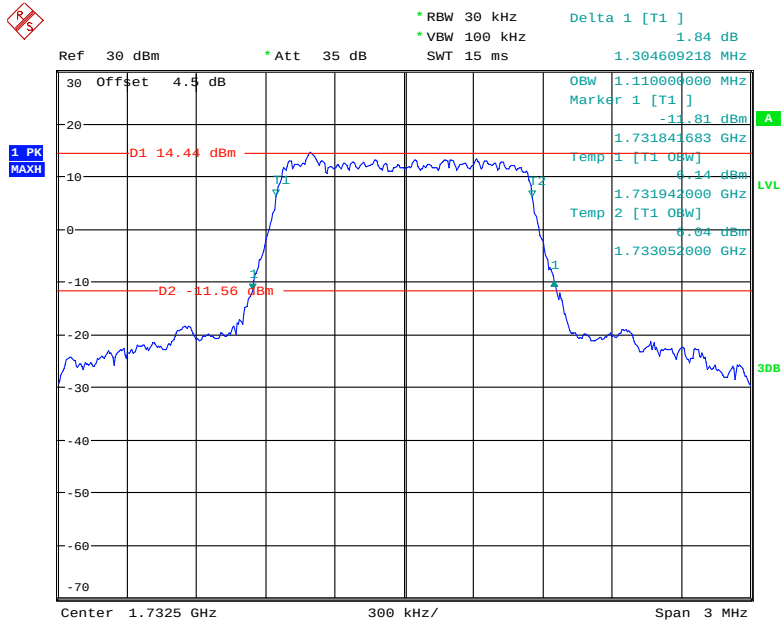
16QAM_20 MHz



Date: 4.MAR.2019 09:58:55

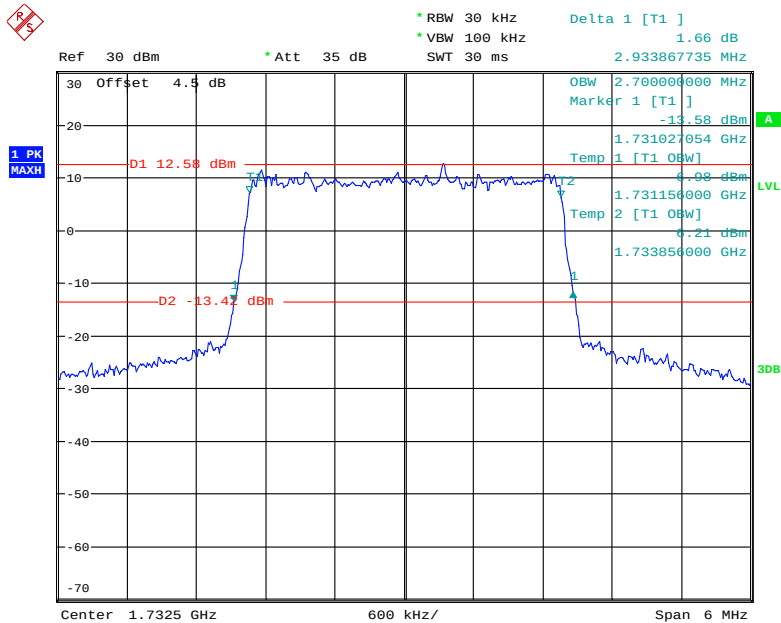
LTE Band 4

QPSK_1.4 MHz



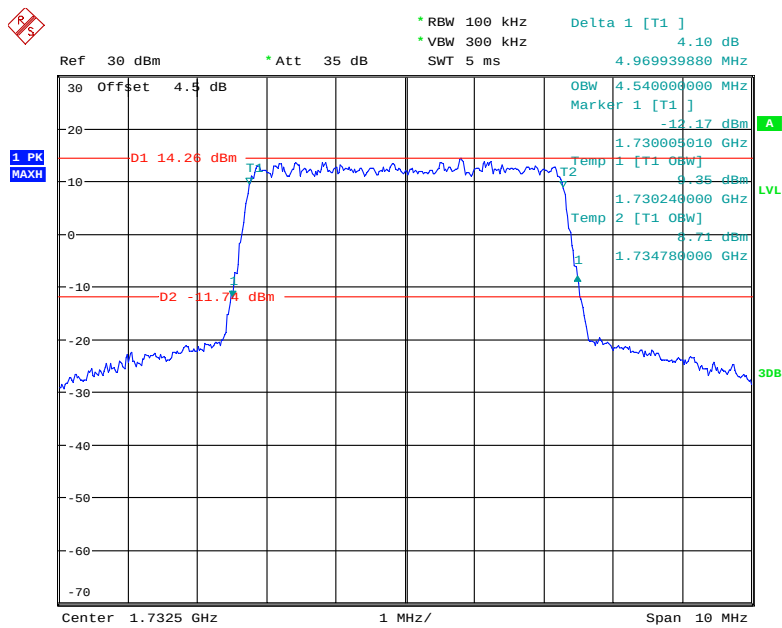
Date: 4.MAR.2019 09:59:37

QPSK_3 MHz



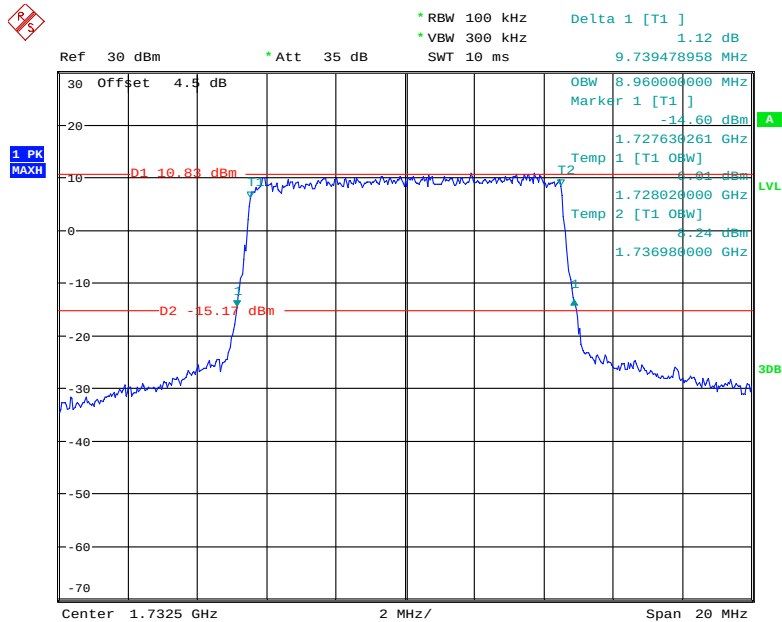
Date: 4.MAR.2019 10:00:41

QPSK_5 MHz



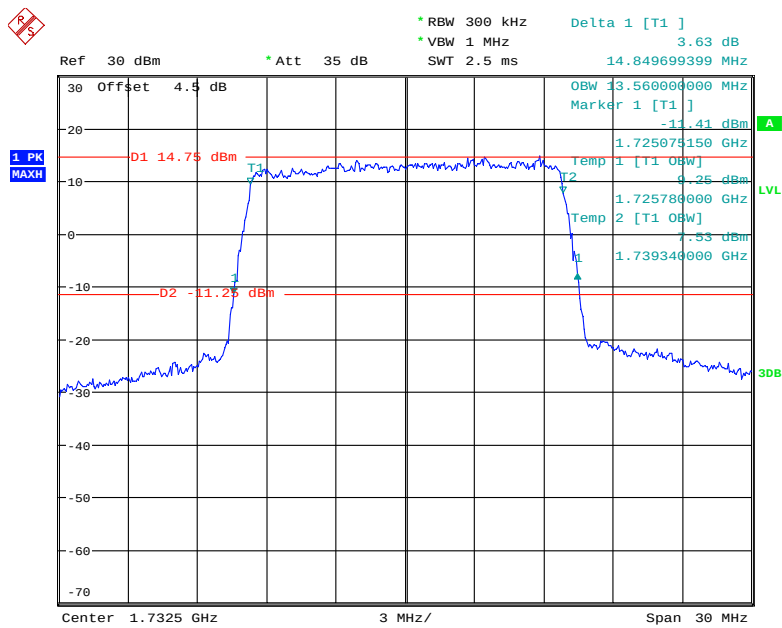
Date: 4.MAR.2019 10:01:48

QPSK_10 MHz



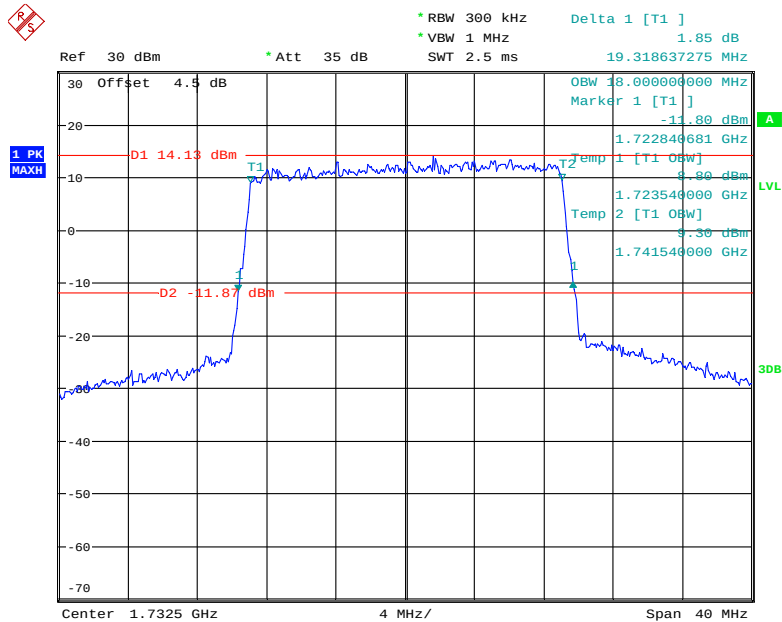
Date: 4.MAR.2019 10:03:05

QPSK_15 MHz



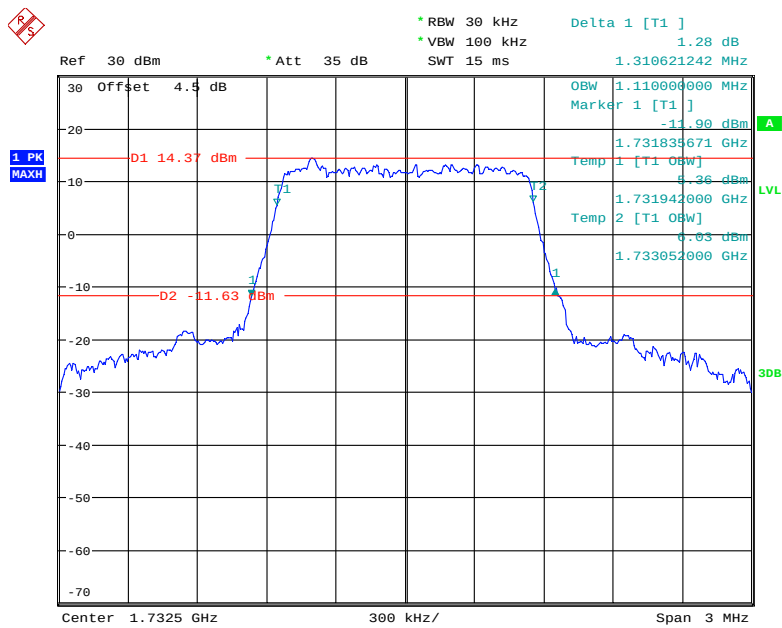
Date: 4.MAR.2019 10:04:27

QPSK_20 MHz



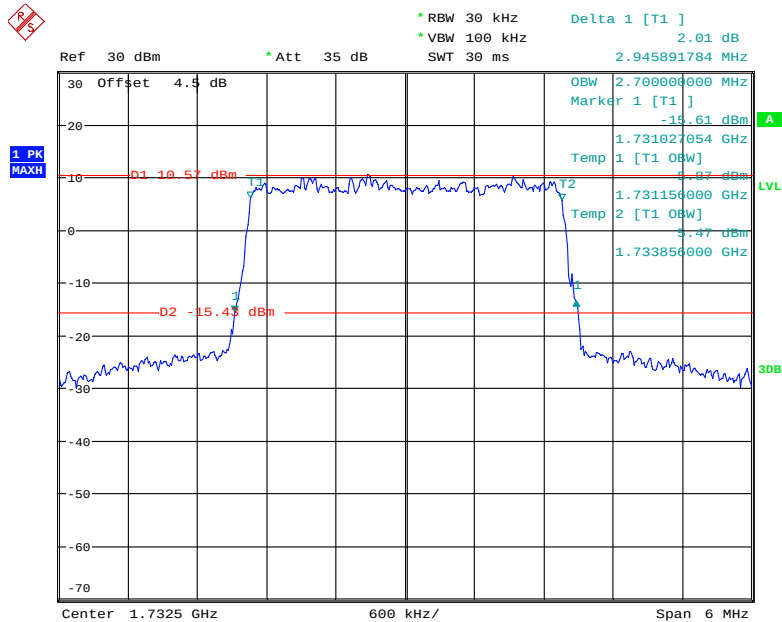
Date: 4.MAR.2019 10:05:45

16QAM_1.4 MHz



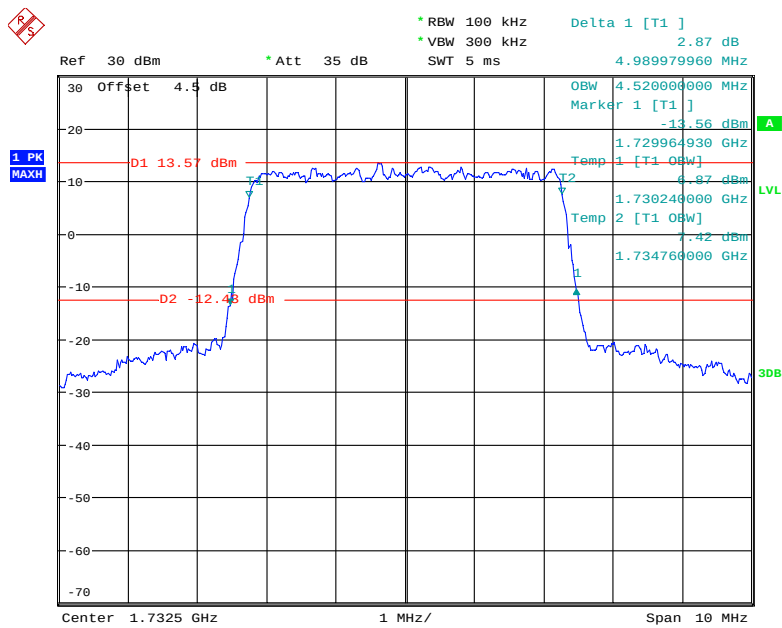
Date: 4.MAR.2019 10:00:08

16QAM_3 MHz



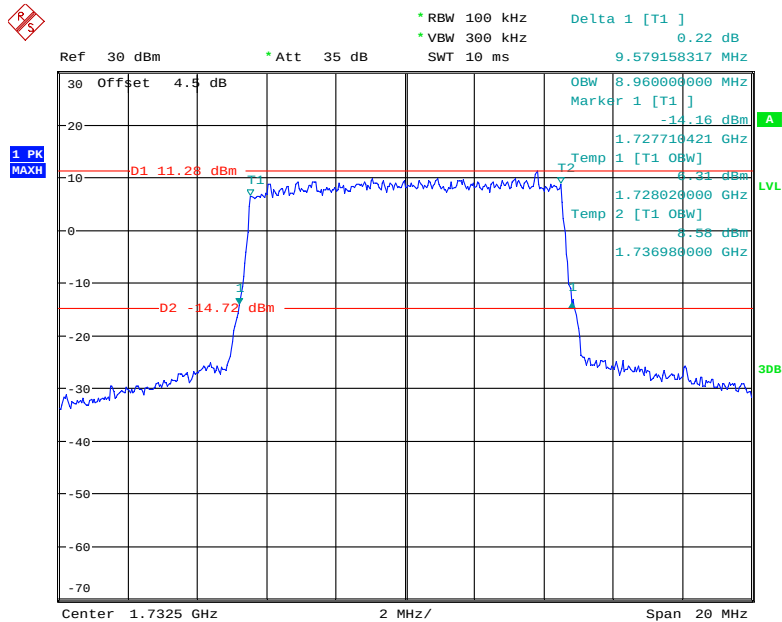
Date: 4.MAR.2019 10:01:09

16QAM_5 MHz



Date: 4.MAR.2019 10:02:28

16QAM_10 MHz



Date: 4.MAR.2019 10:03:41

The screenshot displays a spectrum analyzer interface with a blue trace showing a signal. Two points are marked on the trace: T1 at approximately 1.725139271 GHz and T2 at approximately 1.725780000 GHz. The signal level at T1 is 13.37 dBm, and at T2 it is -12.63 dBm. The background is a grid. Various measurement parameters are visible at the top and bottom of the screen.

Top Panel Parameters:

- Ref: 30 dBm
- Att: 35 dB
- RBW: 300 kHz
- VBW: 1 MHz
- SWT: 2.5 ms
- Delta 1 [T1]: 0.94 dB
- 14.729458918 MHz

Left Panel:

- 1 PK
- MAXH

Right Panel:

- OBW: 13.500000000 MHz
- Marker 1 [T1]: -11.31 dBm
- Temp 1 [T1 OBW]: 1.725139271 GHz
- Temp 2 [T1 OBW]: 1.725780000 GHz
- Temp 2 [T1 OBW]: 1.739280000 GHz
- 3DB

Bottom Panel:

- Center: 1.7325 GHz
- 3 MHz/
- Span: 30 MHz

1 PK
MAXH

Ref 30 dBm Att 35 dB

* RBW 300 kHz
* VBW 1 MHz
SWT 2.5 ms

Delta 1 [T1]
3.92 dB
19.318637275 MHz

30 Offset 4.5 dB

OBW 18.00000000 MHz
Marker 1 [T1]
-14.33 dBm
1.722840681 GHz
T1 [T1 OBW]
-50 dBm
1.723540000 GHz
Temp 2 [T1 OBW]
-10.17 dBm
1.741540000 GHz

D1 12.41 dBm
D2 -13.59 dBm

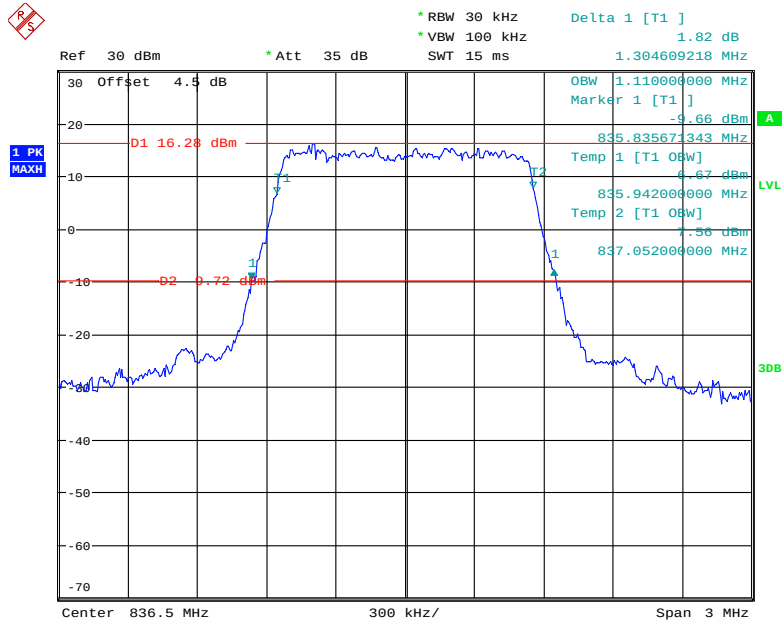
30
20
10
0
-10
-20
-30
-40
-50
-60
-70

Center 1.7325 GHz 4 MHz/ Span 40 MHz

Page 51 of 166

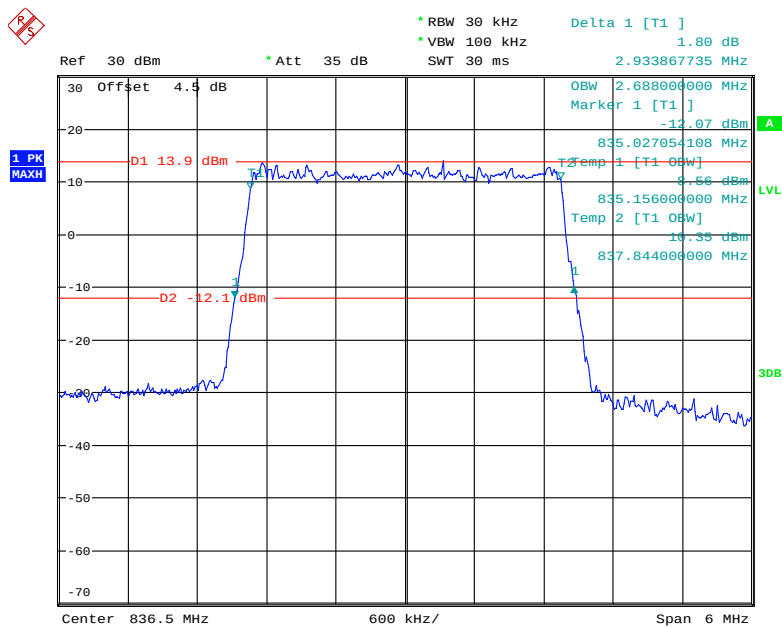
LTE Band 5:

QPSK_1.4 MHz



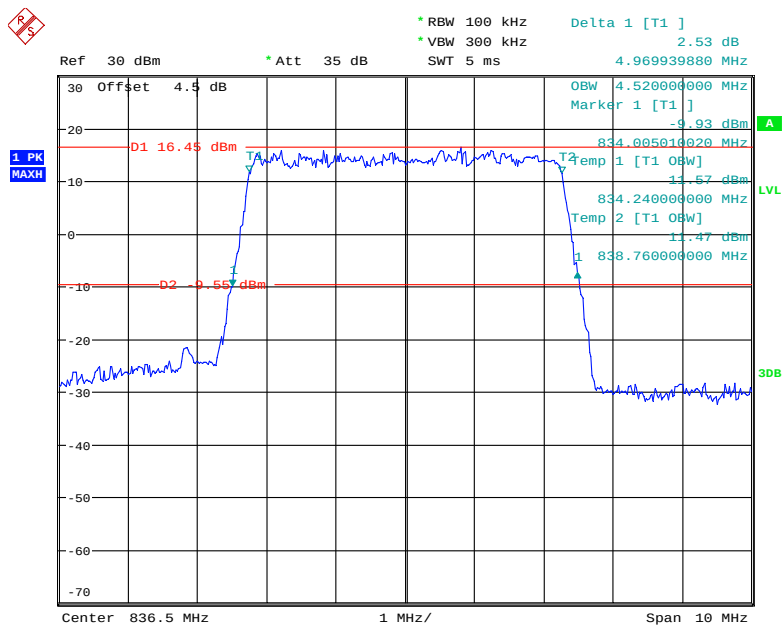
Date: 4.MAR.2019 10:07:17

QPSK_3 MHz



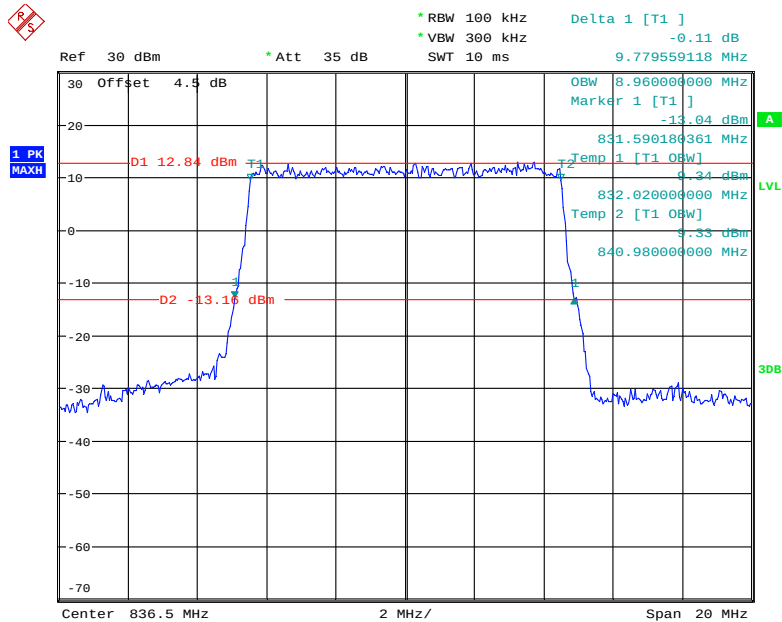
Date: 4.MAR.2019 10:08:30

QPSK_5 MHz



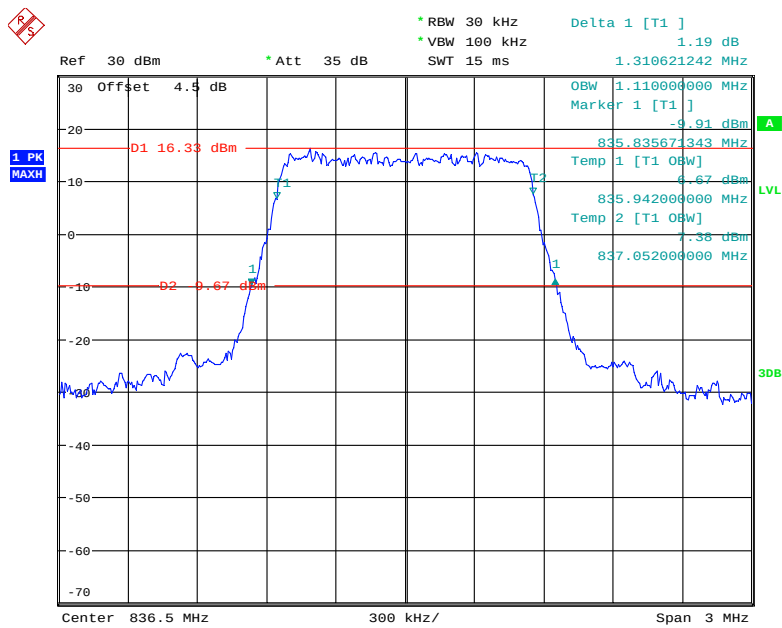
Date: 4.MAR.2019 10:09:54

QPSK_10 MHz



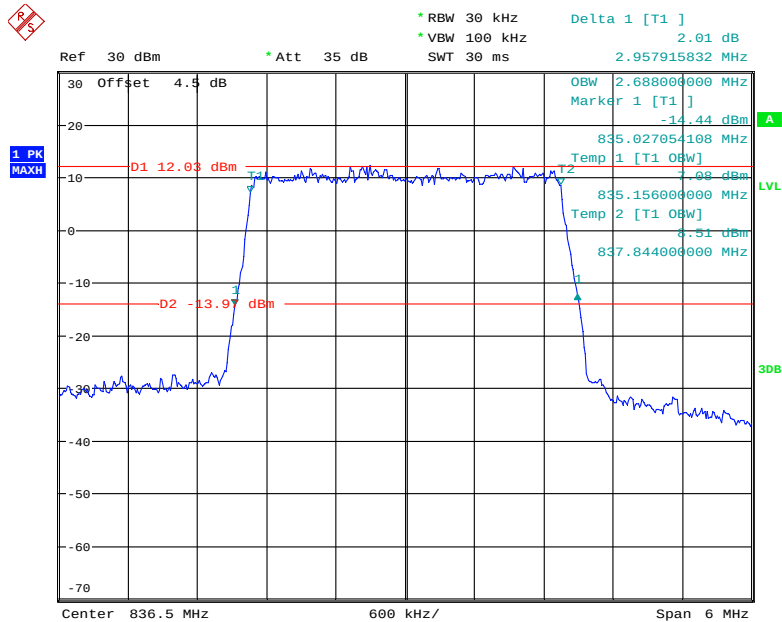
Date: 4.MAR.2019 10:11:30

16QAM_1.4 MHz



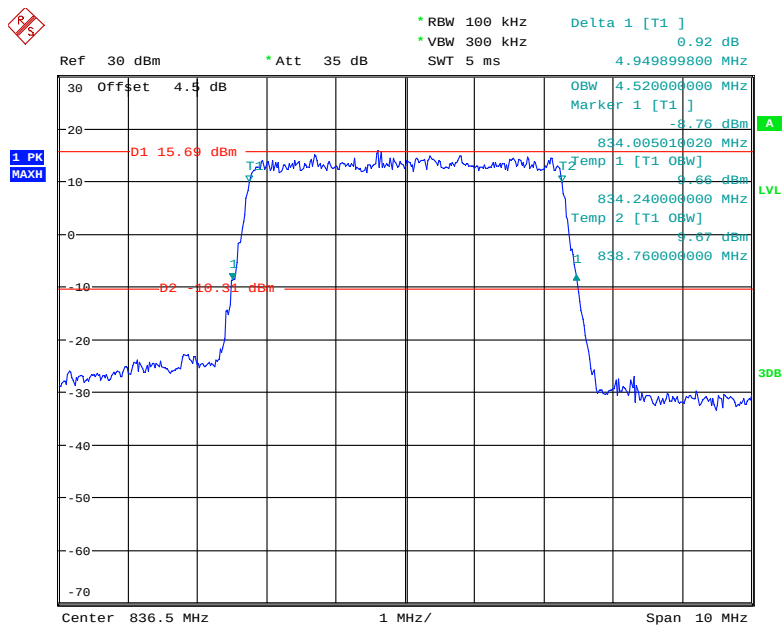
Date: 4.MAR.2019 10:07:52

16QAM_3 MHz



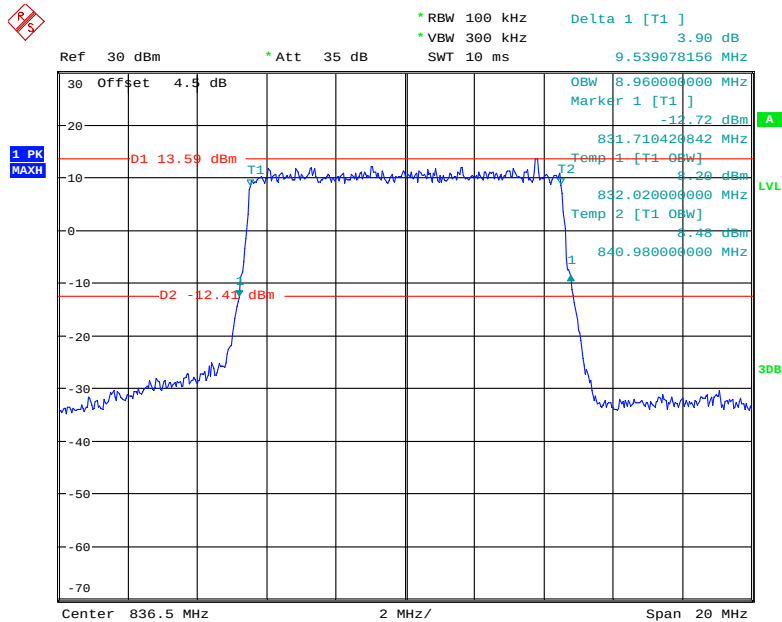
Date: 4.MAR.2019 10:09:00

16QAM_5 MHz

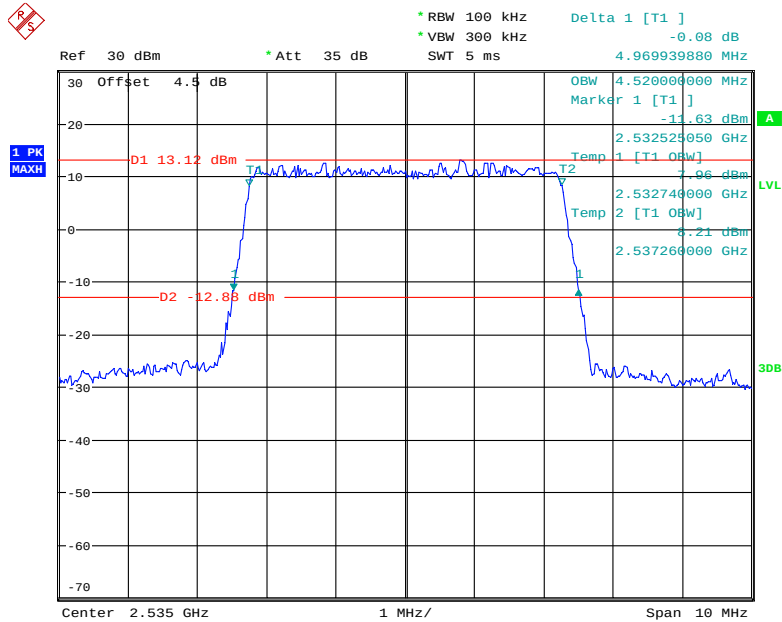


Date: 4.MAR.2019 10:10:41

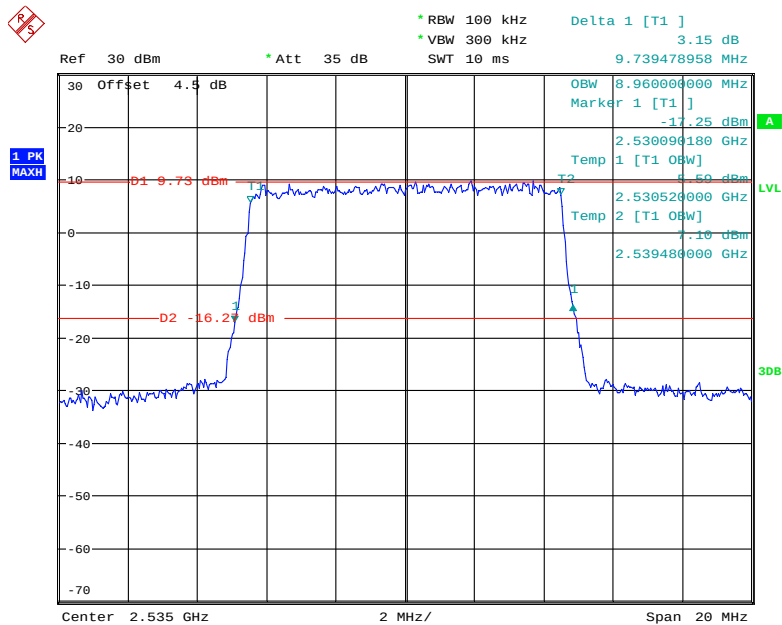
16QAM_10 MHz



Date: 4.MAR.2019 10:12:06

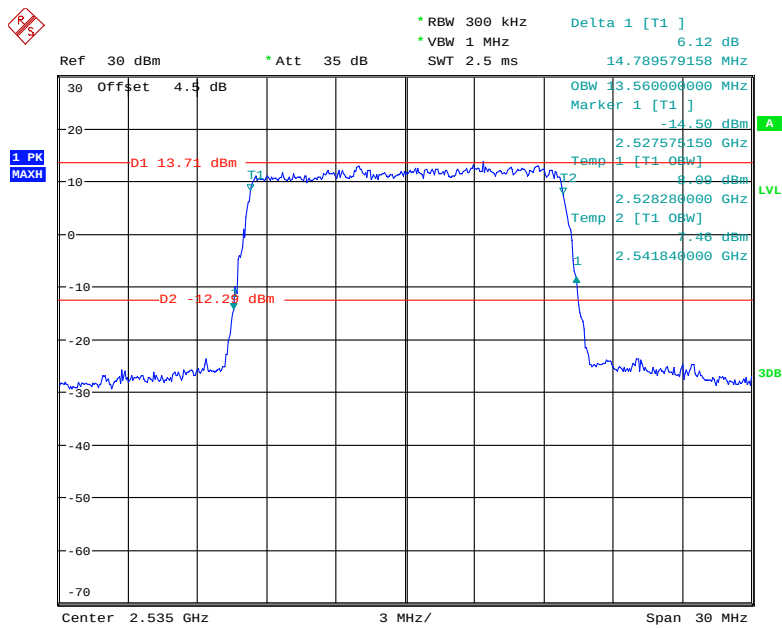
LTE Band 7:**QPSK_5 MHz**

Date: 4.MAR.2019 10:12:48

QPSK_10 MHz

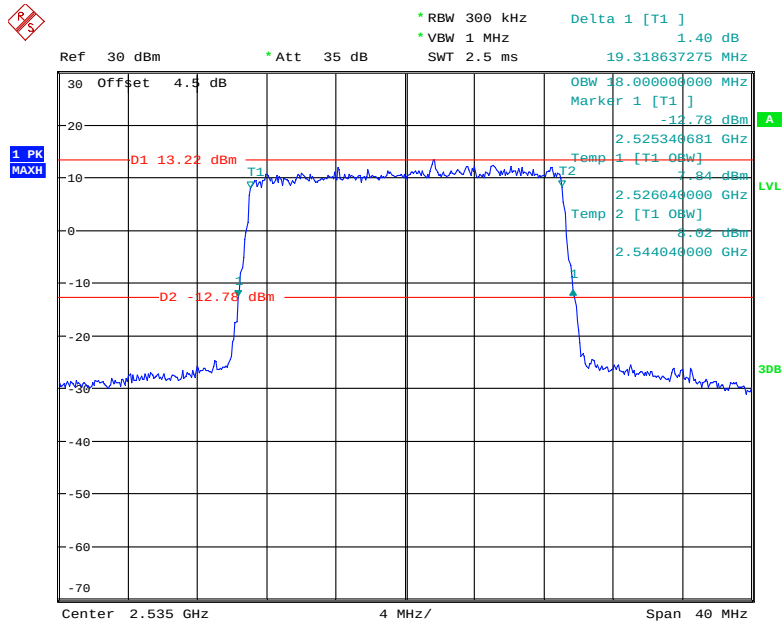
Date: 4.MAR.2019 10:14:06

QPSK_15 MHz



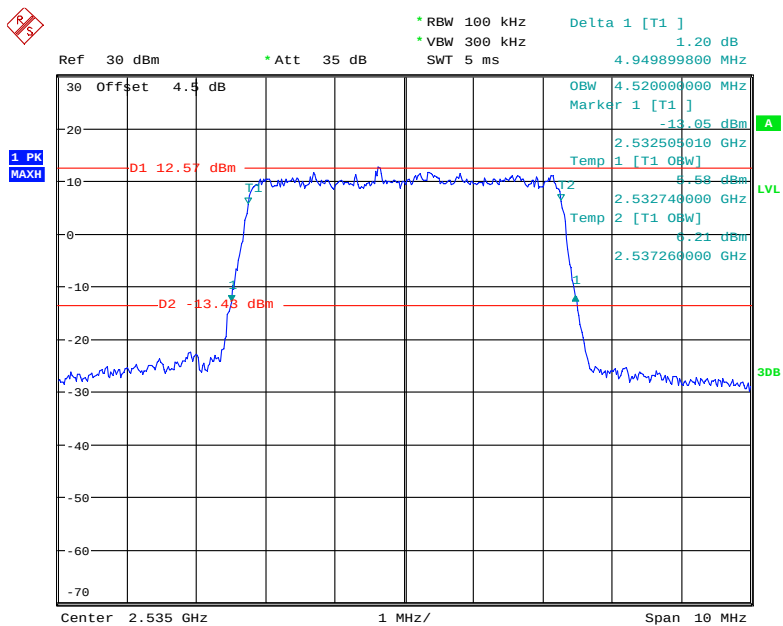
Date: 4.MAR.2019 10:15:16

QPSK_20 MHz



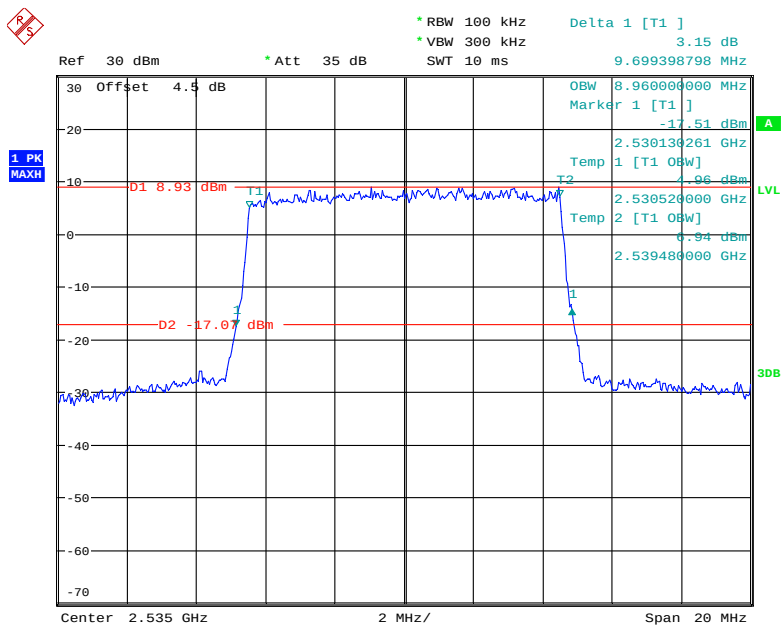
Date: 4.MAR.2019 10:16:48

16QAM_5 MHz



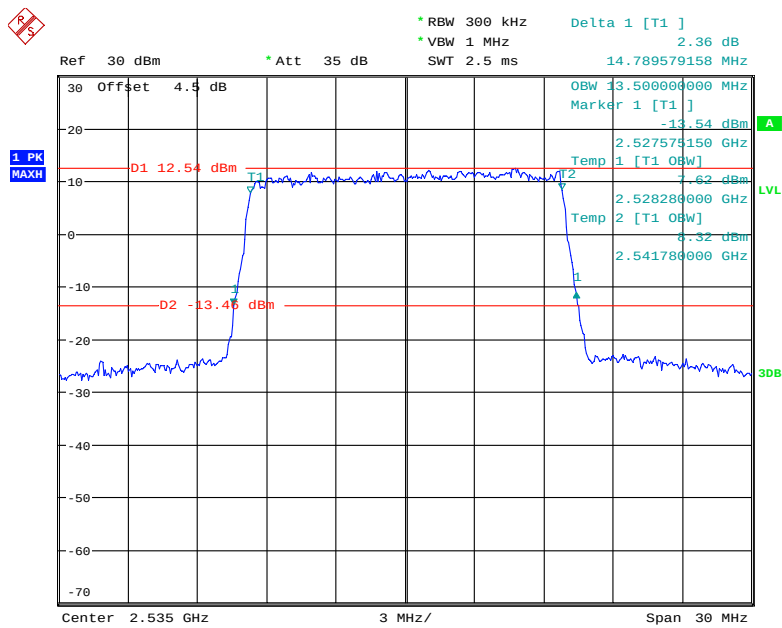
Date: 4.MAR.2019 10:13:24

16QAM_10 MHz



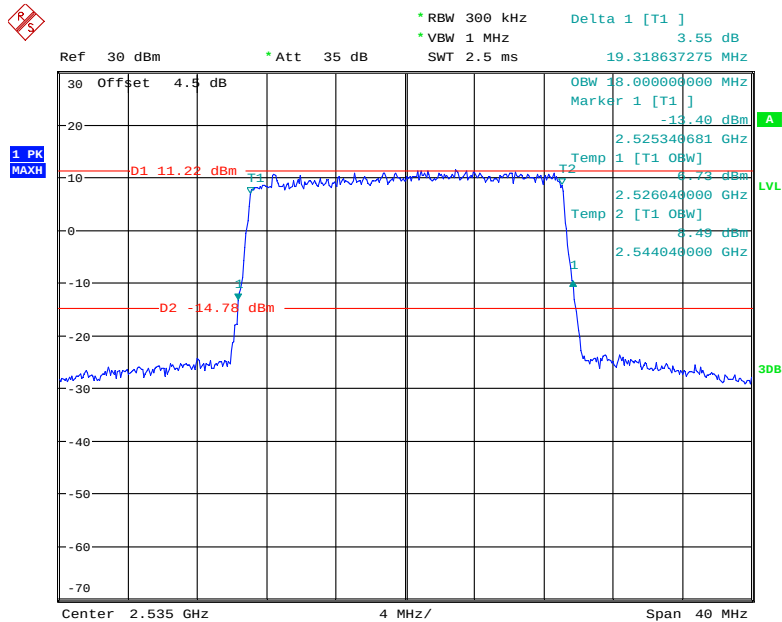
Date: 4.MAR.2019 10:14:38

16QAM_15 MHz

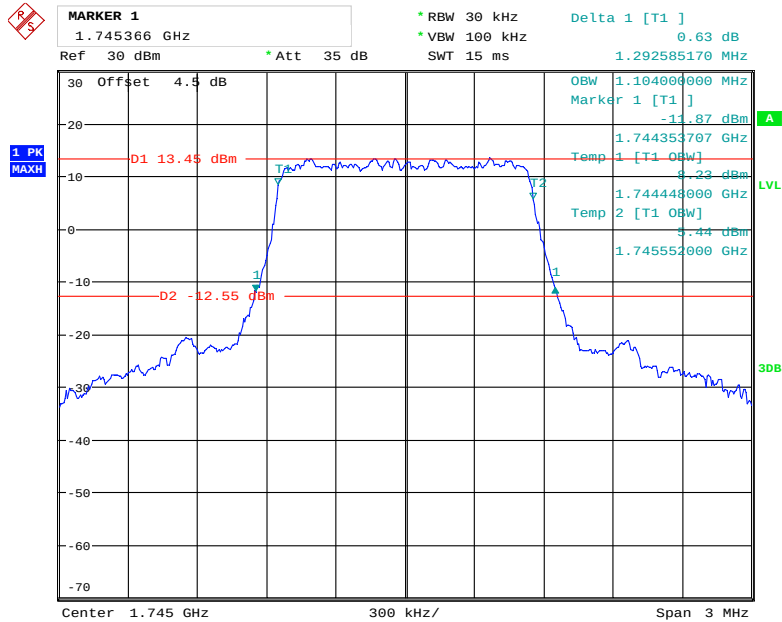


Date: 4.MAR.2019 10:16:03

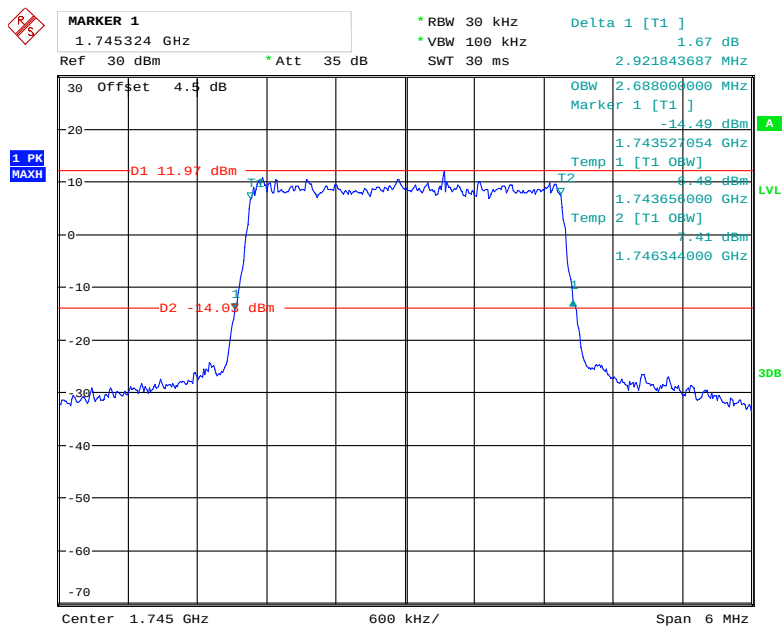
16QAM_20 MHz



Date: 4.MAR.2019 10:17:27

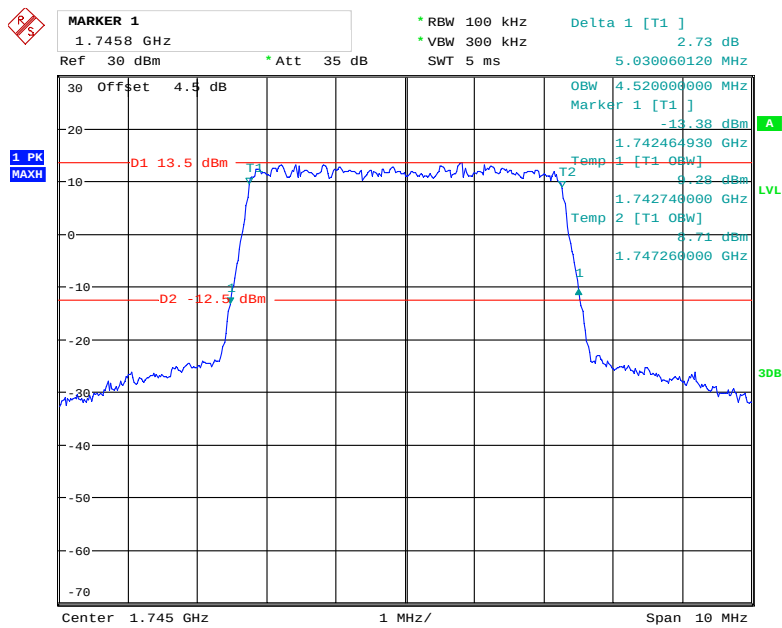
LTE Band 66:**QPSK_1.4 MHz**

Date: 4.MAR.2019 10:26:44

QPSK_3 MHz

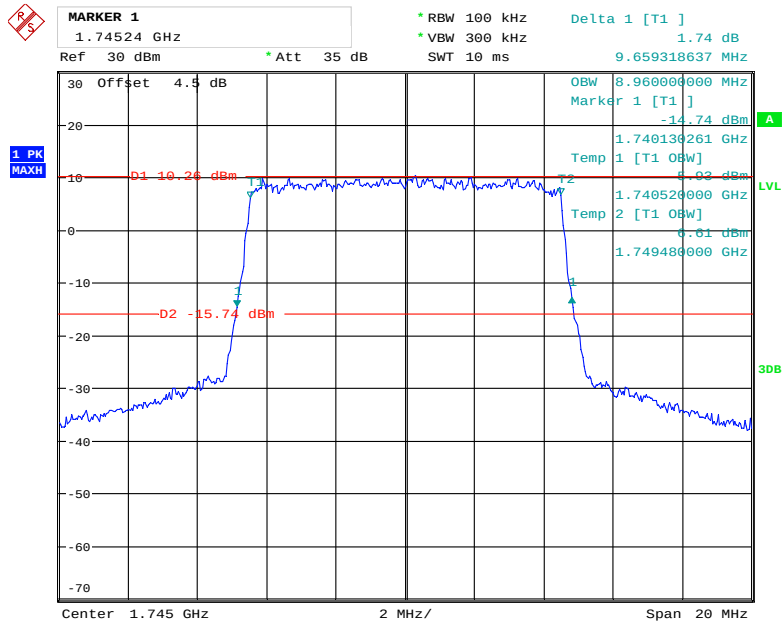
Date: 4.MAR.2019 10:30:20

QPSK_5 MHz



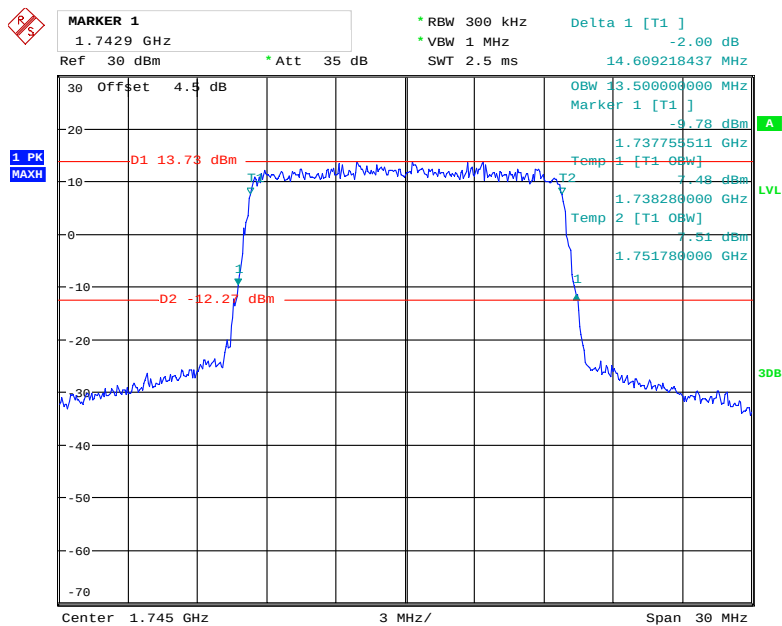
Date: 4.MAR.2019 10:35:36

QPSK_10 MHz



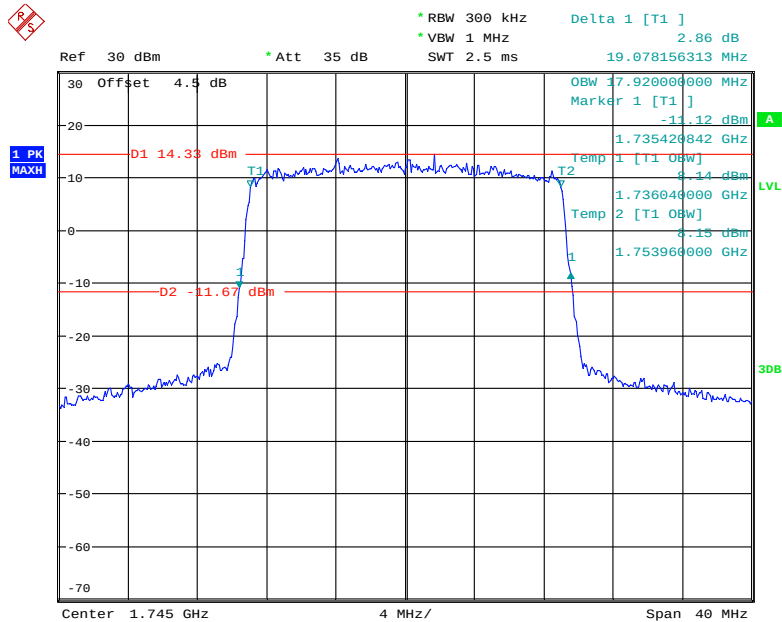
Date: 4.MAR.2019 10:37:53

QPSK_15 MHz



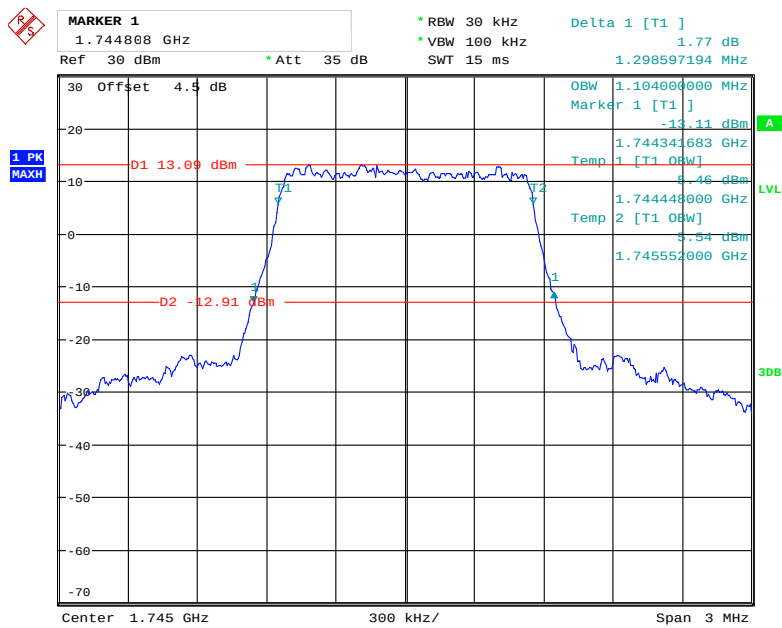
Date: 4.MAR.2019 10:40:31

QPSK_20 MHz



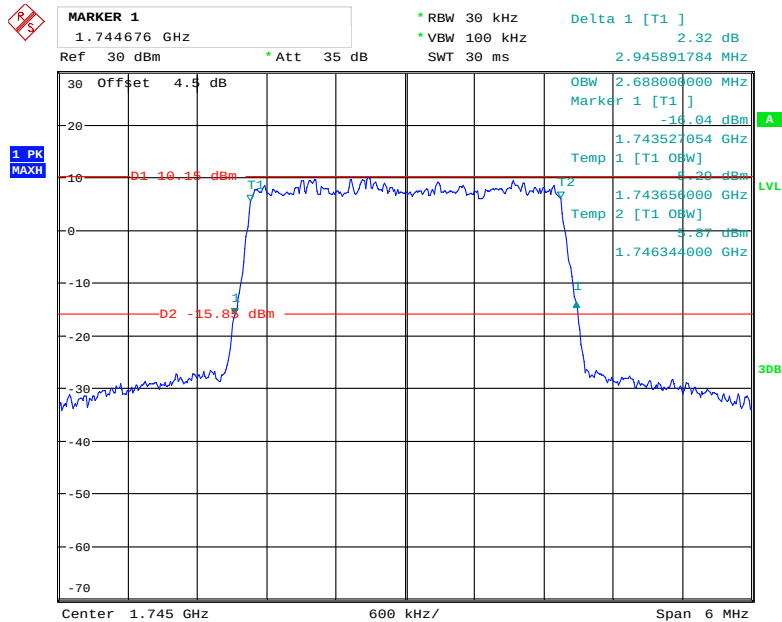
Date: 4.MAR.2019 10:42:44

16QAM_1.4 MHz



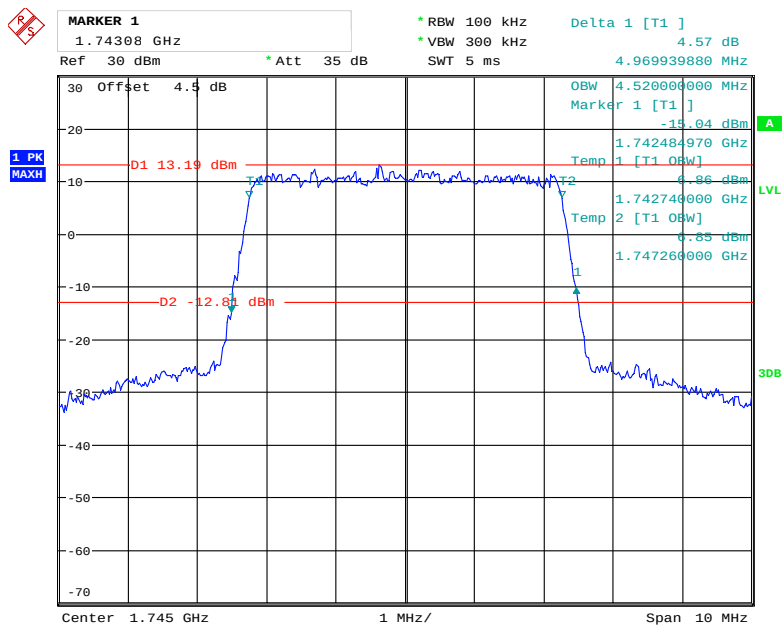
Date: 4.MAR.2019 10:29:02

16QAM_3 MHz



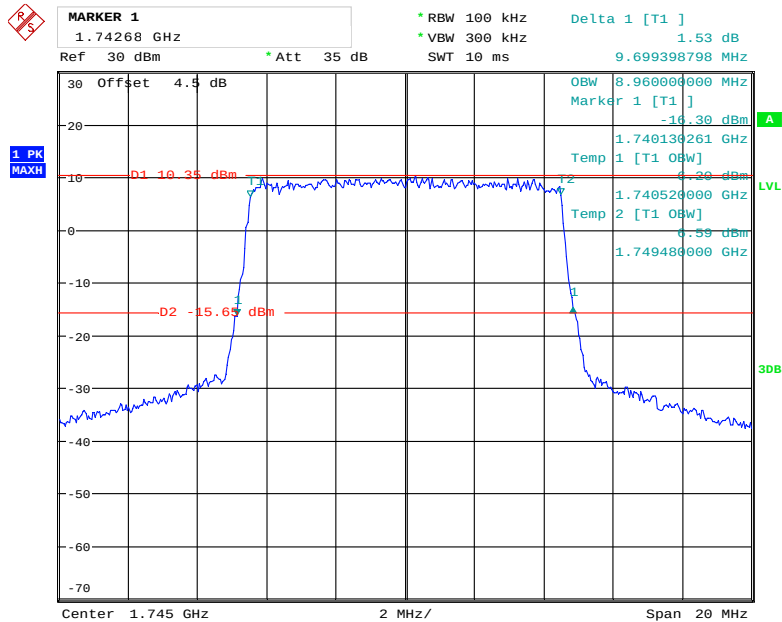
Date: 4.MAR.2019 10:32:13

16QAM_5 MHz



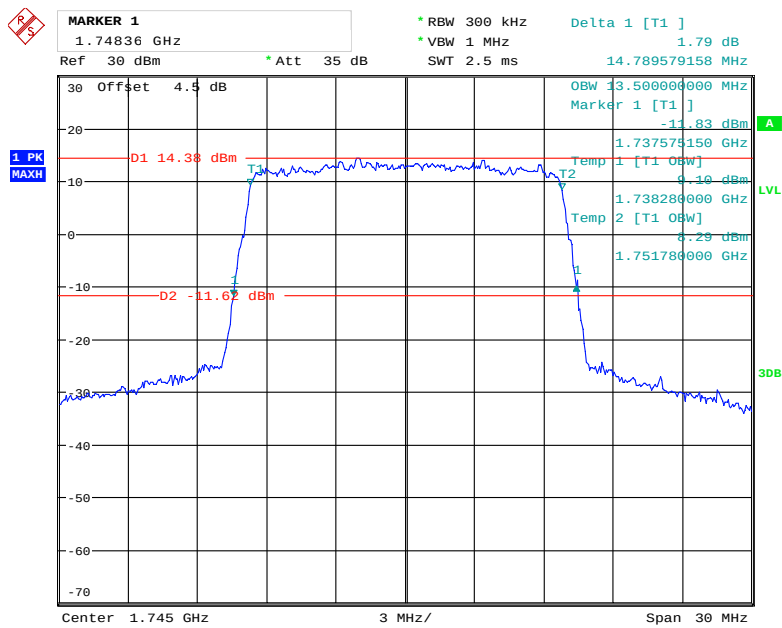
Date: 4.MAR.2019 10:36:43

16QAM_10 MHz



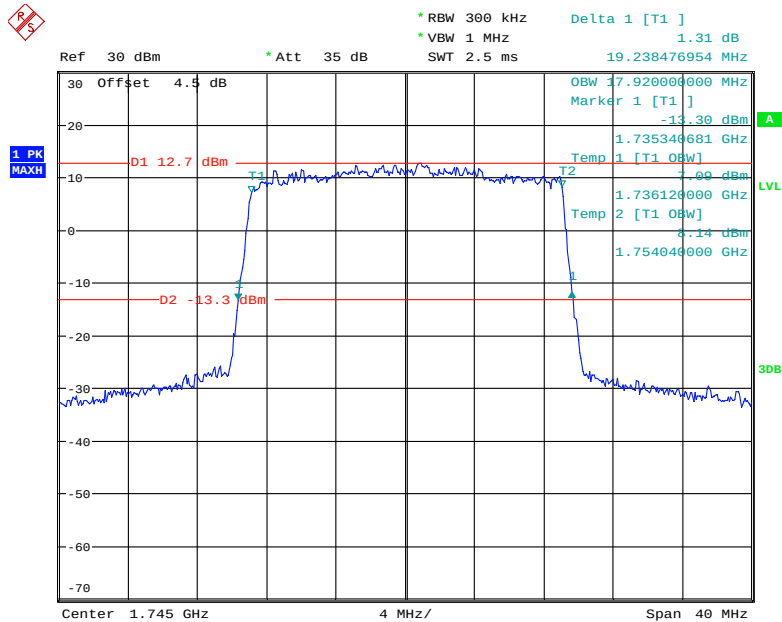
Date: 4.MAR.2019 10:38:56

16QAM_15 MHz



Date: 4.MAR.2019 10:42:01

16QAM_20 MHz



Date: 4.MAR.2019 10:43:24

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

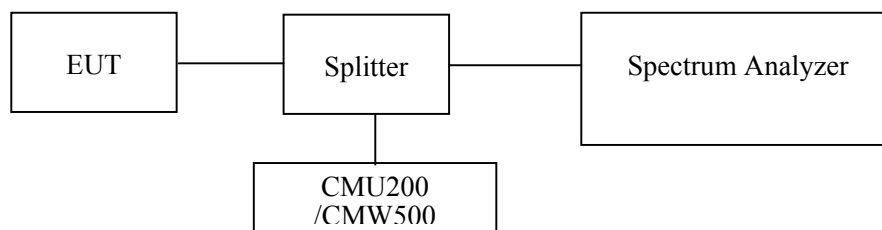
Applicable Standard

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
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	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

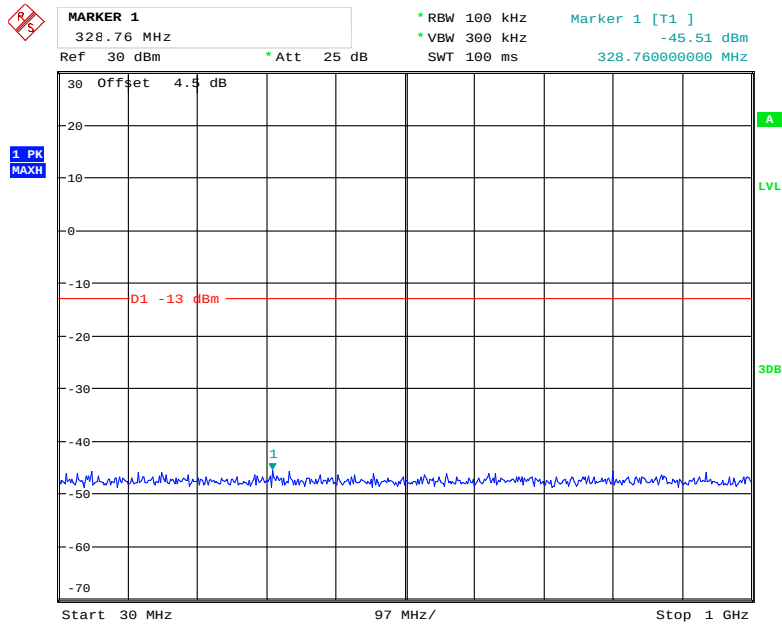
Temperature:	24.9~26.3°C
Relative Humidity:	46 ~ 55 %
ATM Pressure:	100.2~101.3 kPa

The testing was performed by Elena Lei and Blake Yang from 2019-03-01 to 2019-03-05.

Test Mode: Transmitting

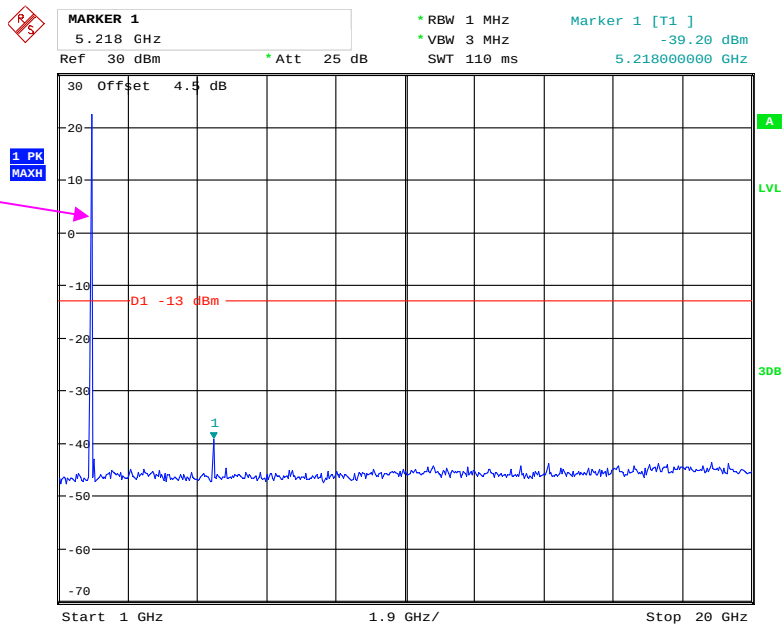
Test Result: Compliance(Middle Channel was the worst), Please refer to the following plots.

WCDMA Band II, Rel99



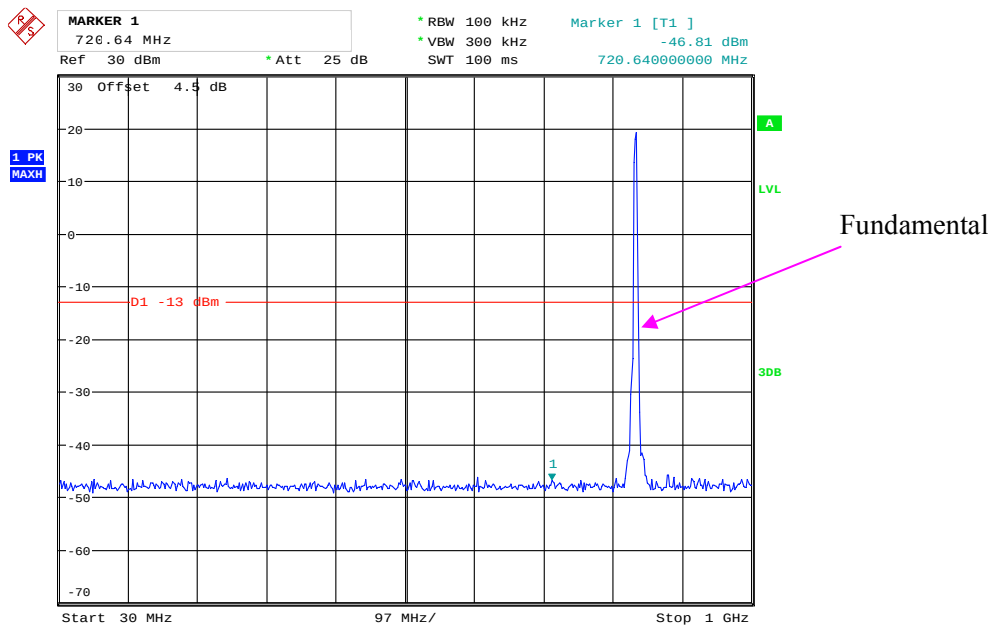
Date: 1.MAR.2019 19:38:55

Fundamental

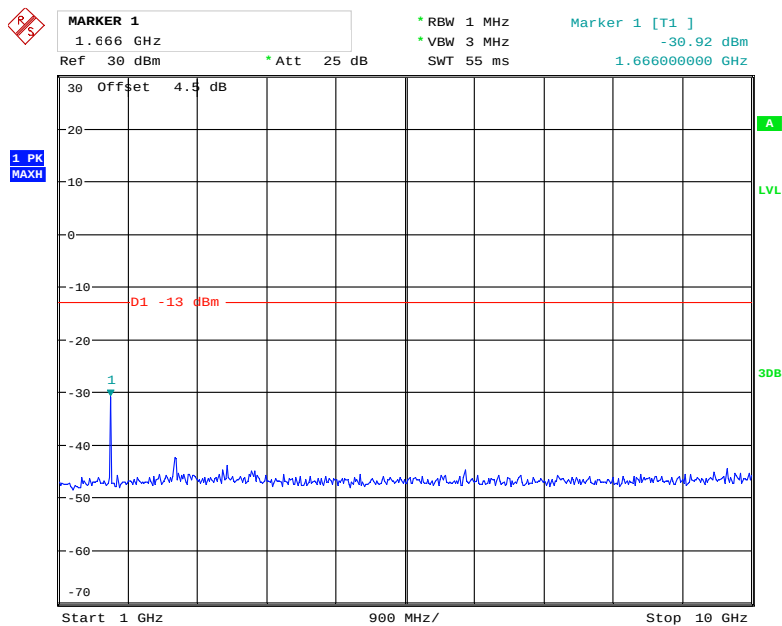


Date: 1.MAR.2019 19:40:17

WCDMA Band V, Rel99



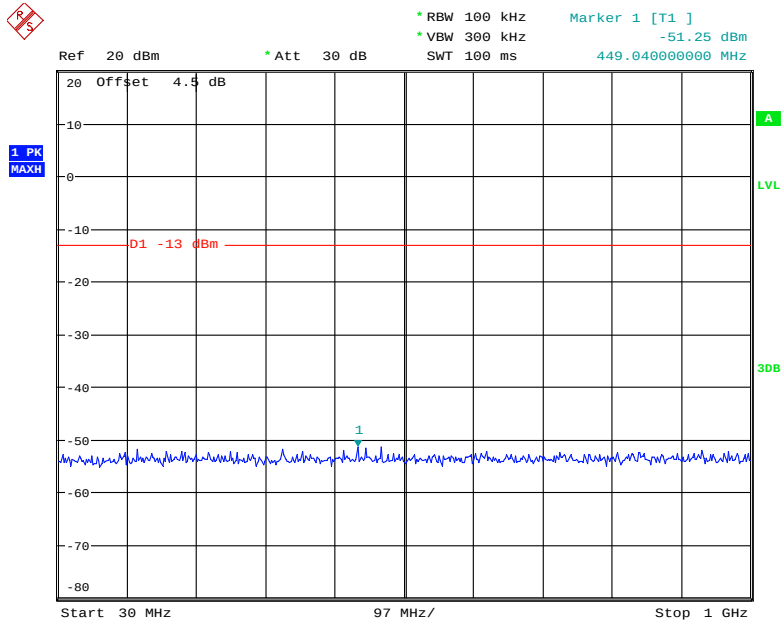
Date: 1.MAR.2019 19:52:35



Date: 1.MAR.2019 19:52:04

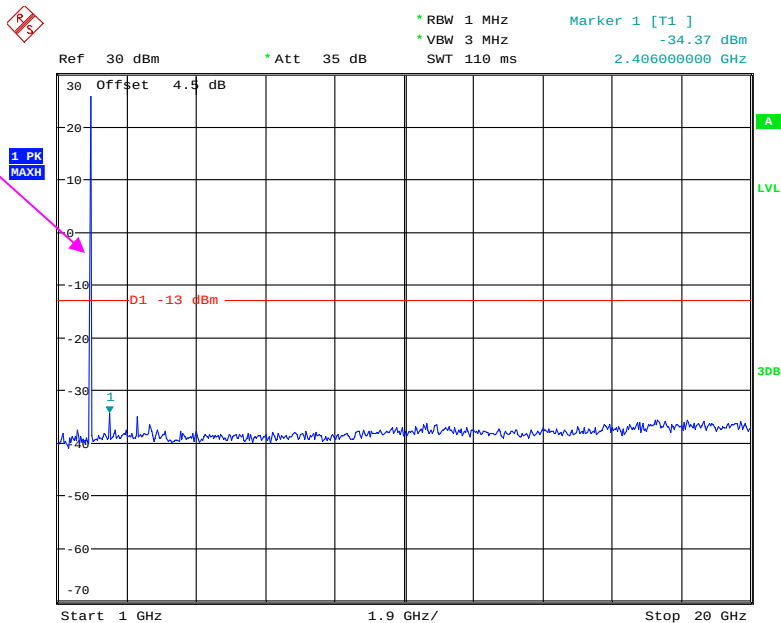
LTE Band 2 (Middle Channel)

QPSK_1.4 MHz



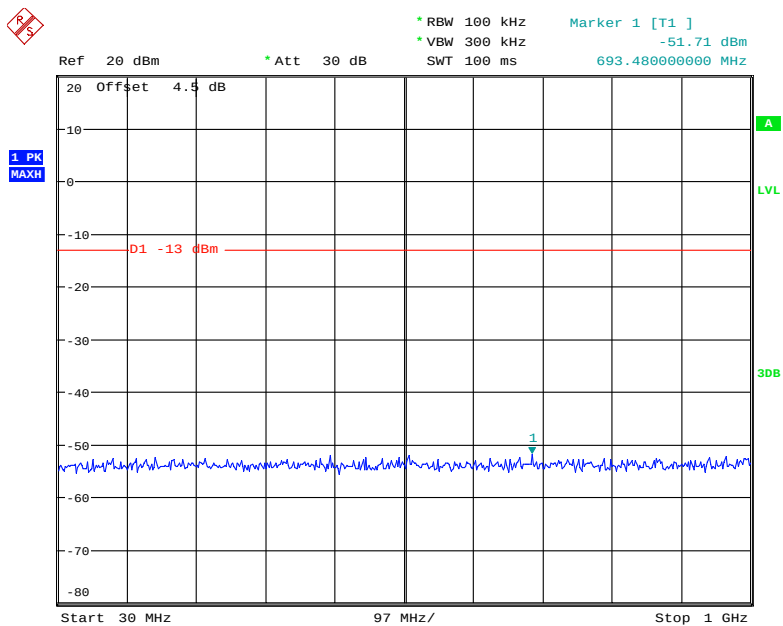
Date: 4.MAR.2019 13:21:25

Fundamental

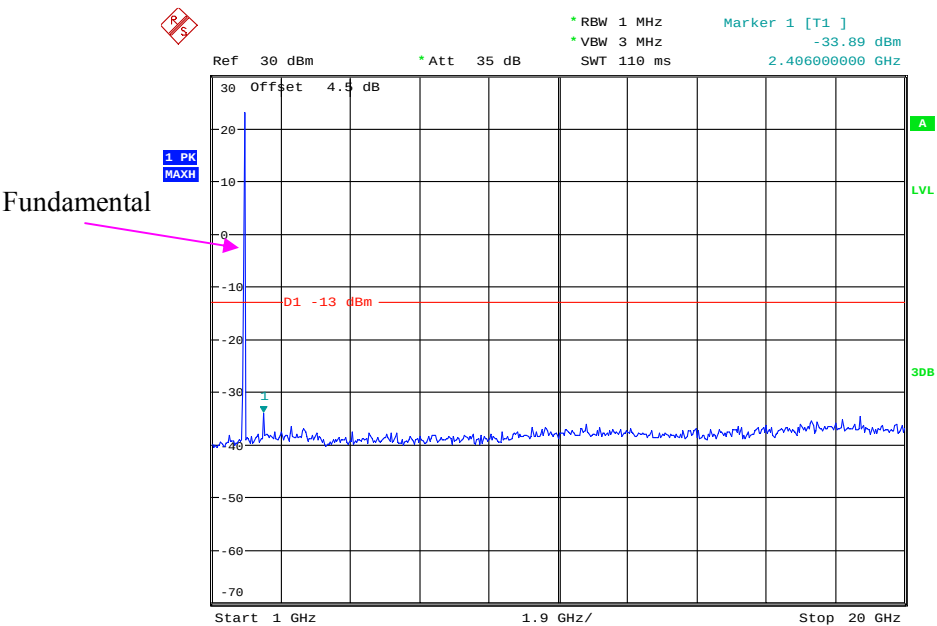


Date: 4.MAR.2019 13:21:37

QPSK_3 MHz

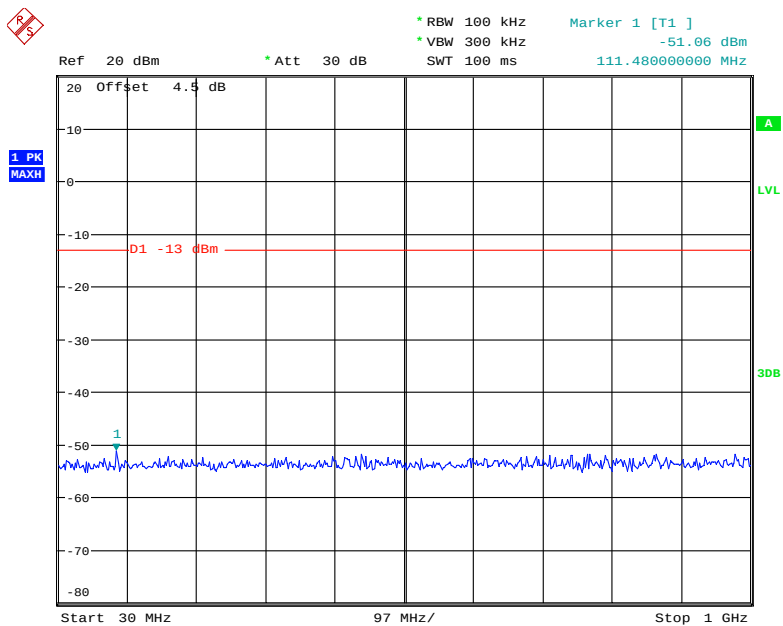


Date: 4.MAR.2019 13:21:54



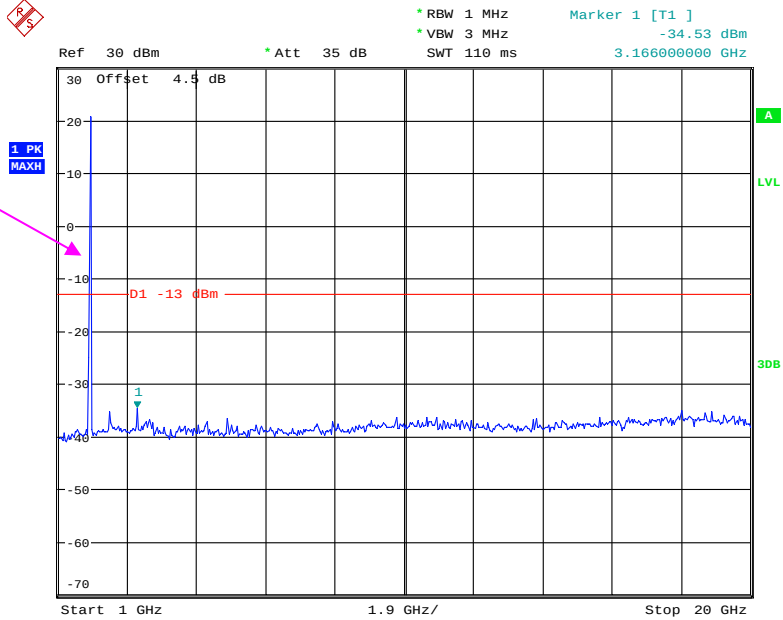
Date: 4.MAR.2019 13:22:05

QPSK_5 MHz



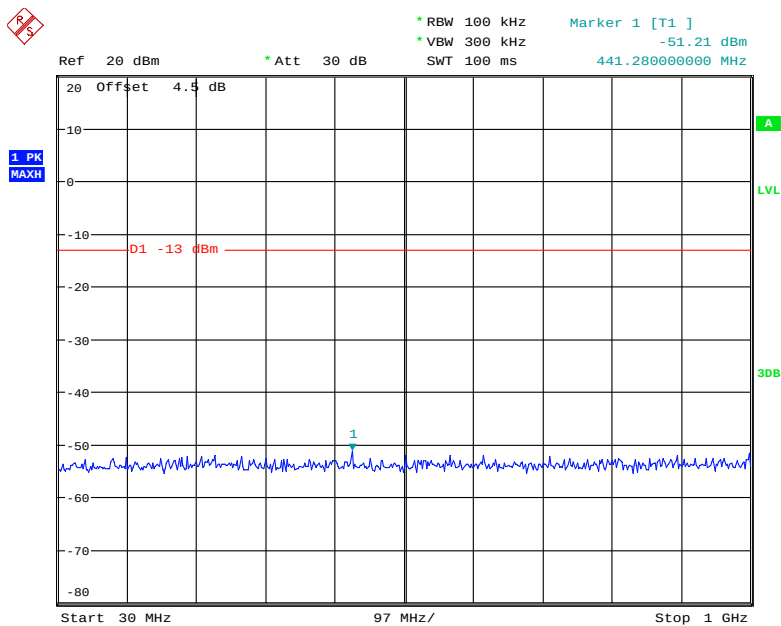
Date: 4.MAR.2019 13:22:26

Fundamental

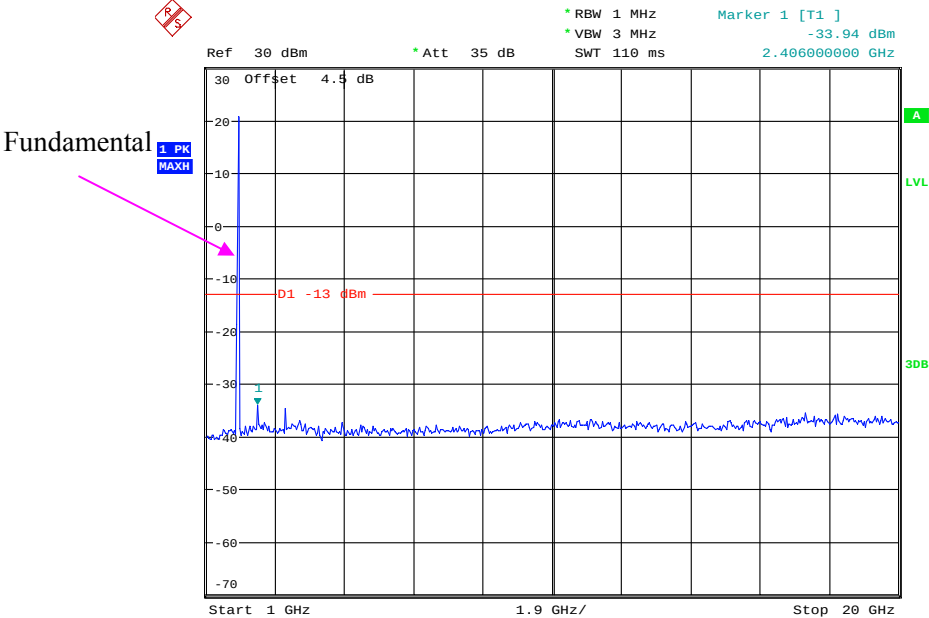


Date: 4.MAR.2019 13:22:37

QPSK_10 MHz

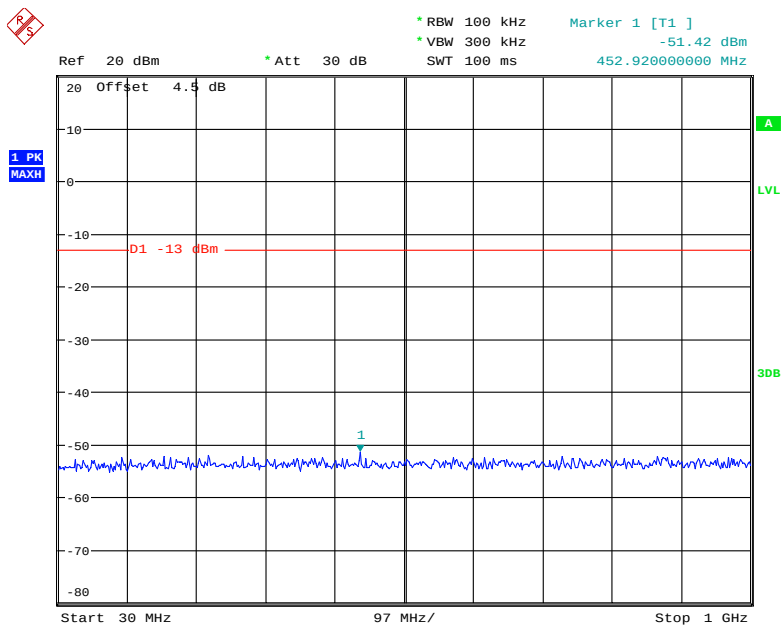


Date: 4.MAR.2019 13:22:55

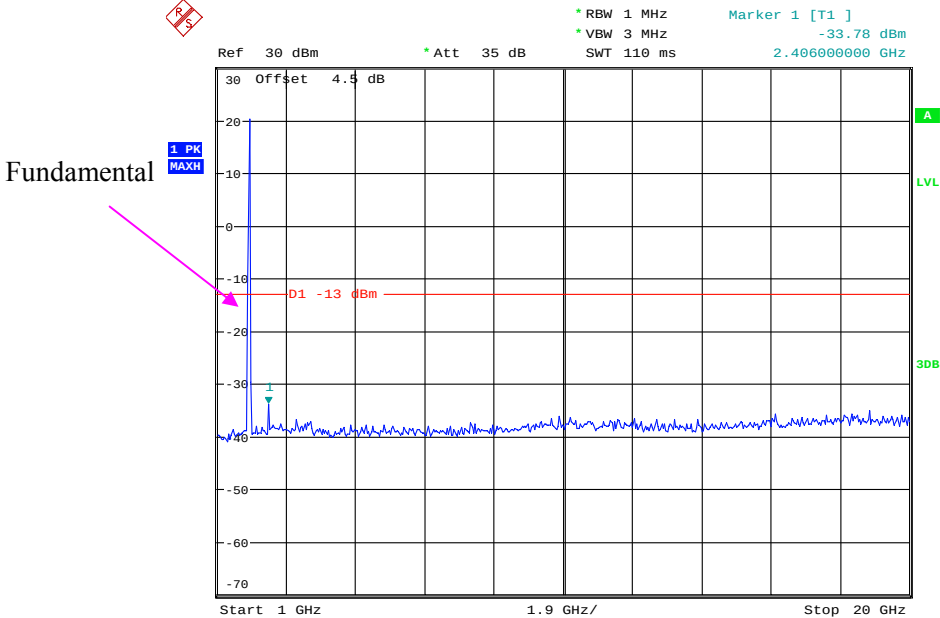


Date: 4.MAR.2019 13:23:06

QPSK_15 MHz

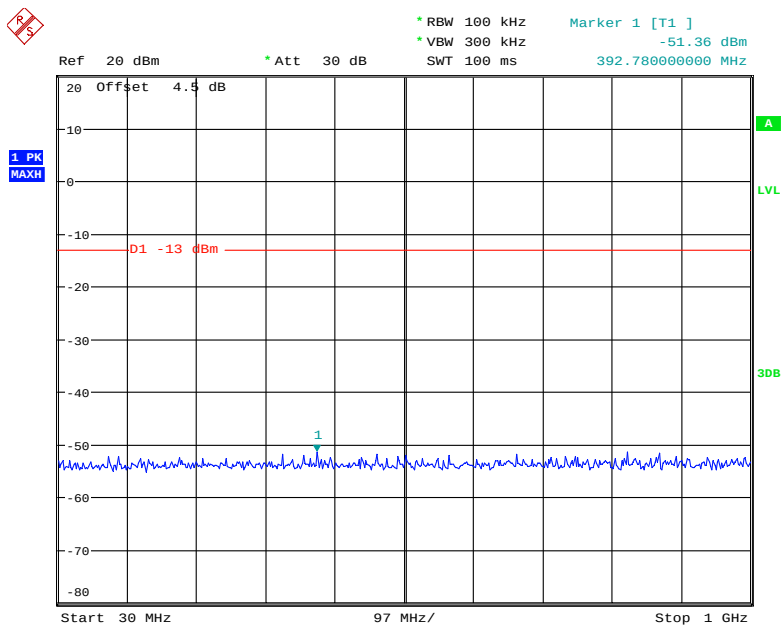


Date: 4.MAR.2019 13:23:32



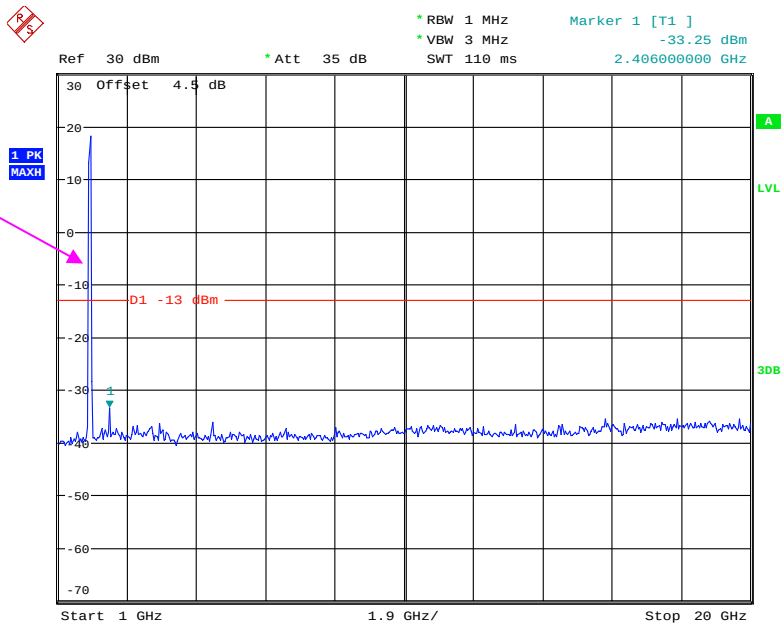
Date: 4.MAR.2019 13:23:42

QPSK_20 MHz



Date: 4.MAR.2019 13:24:08

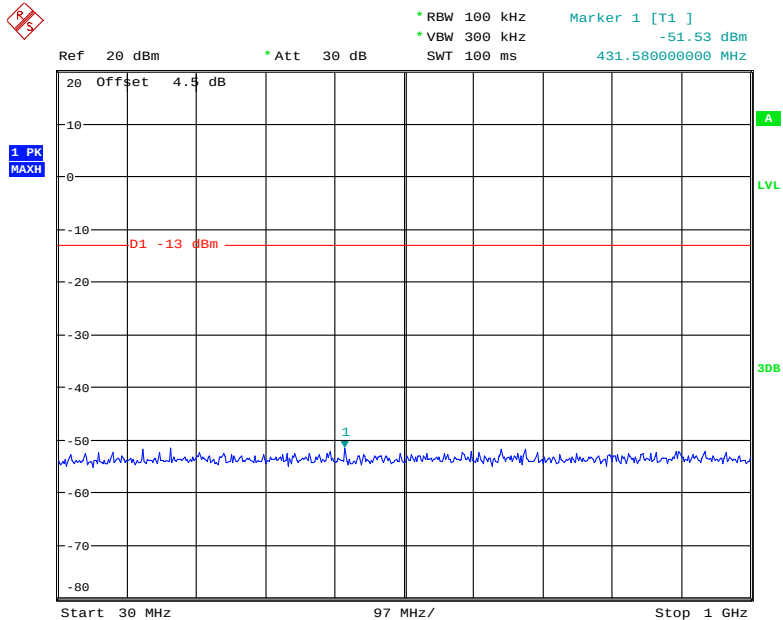
Fundamental



Date: 4.MAR.2019 13:24:18

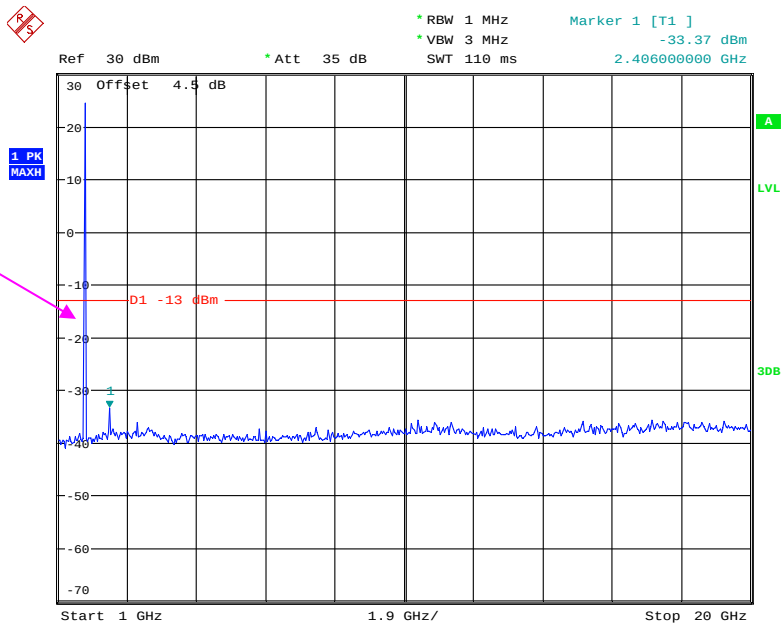
LTE Band 4 (Middle Channel)

QPSK_1.4 MHz



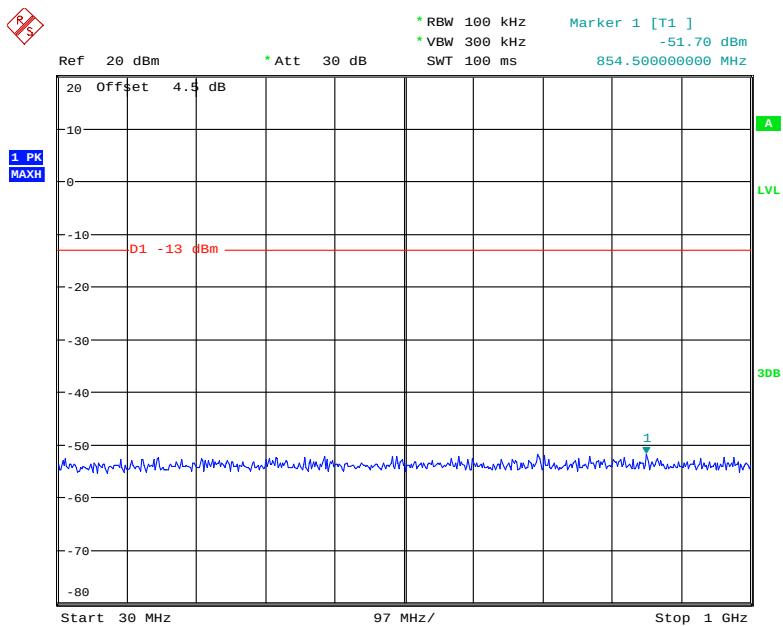
Date: 4.MAR.2019 13:24:39

Fundamental



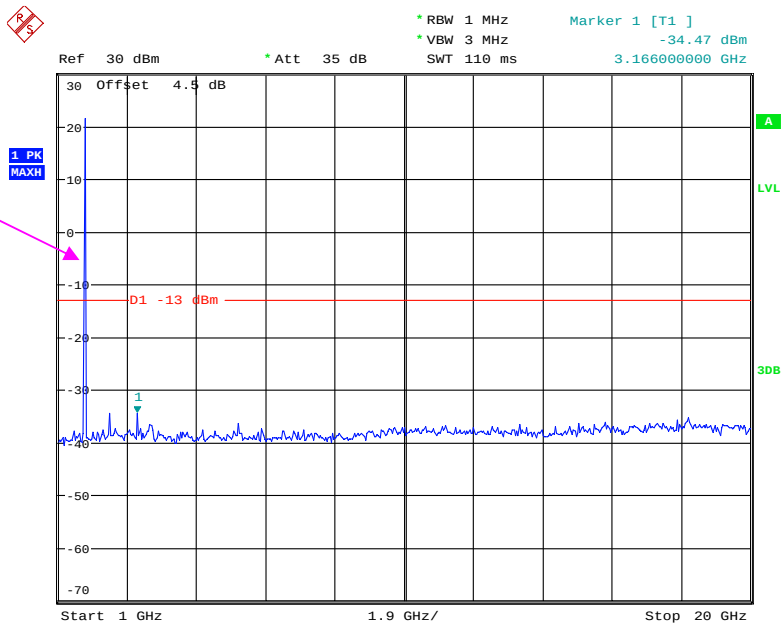
Date: 4.MAR.2019 13:24:49

QPSK_3 MHz



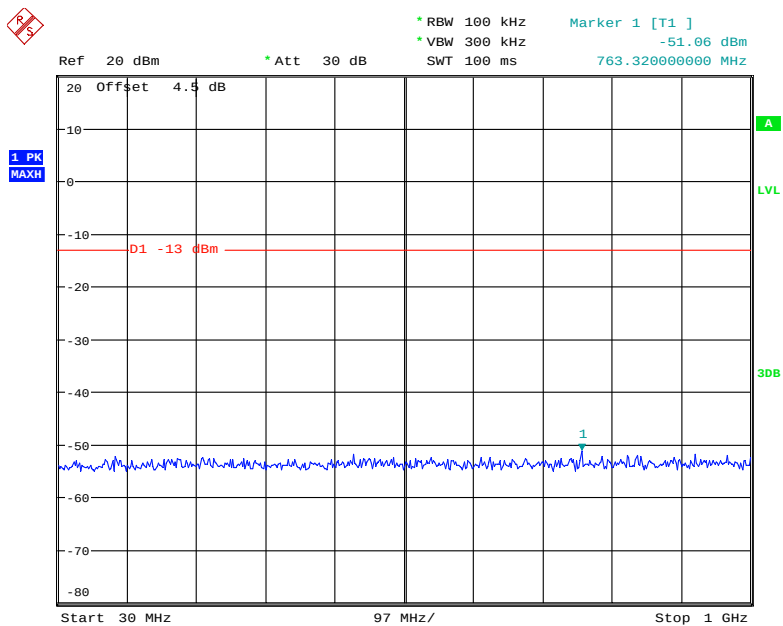
Date: 4.MAR.2019 13:25:06

Fundamental



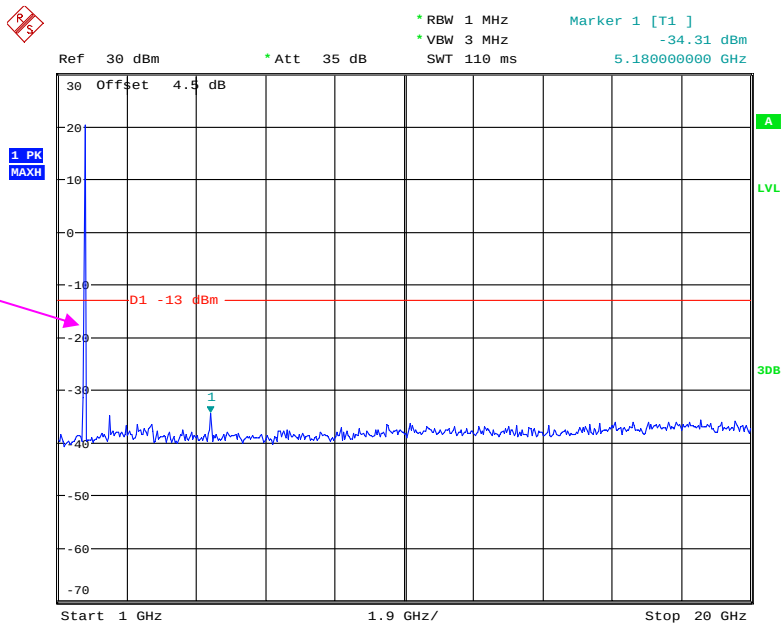
Date: 4.MAR.2019 13:25:17

QPSK_5 MHz



Date: 4.MAR.2019 13:25:38

Fundamental



Date: 4.MAR.2019 13:25:49

RBW 100 kHz
VBW 300 kHz
SWT 100 ms

Marker 1 [T1]
-51.37 dBm
899.12000000 MHz

Ref 20 dBm
Att 30 dB

20 Offset 4.5 dB

1 PK
MAXH

D1 -13 dBm

Start 30 MHz
97 MHz/
Stop 1 GHz

Ref 30 dBm * Att 35 dB * RBW 1 MHz VBW 3 MHz SWT 110 ms Marker 1 [T1] -34.77 dBm 3.166000000 GHz

30 Offset 4.5 dB

1 PK MAXH

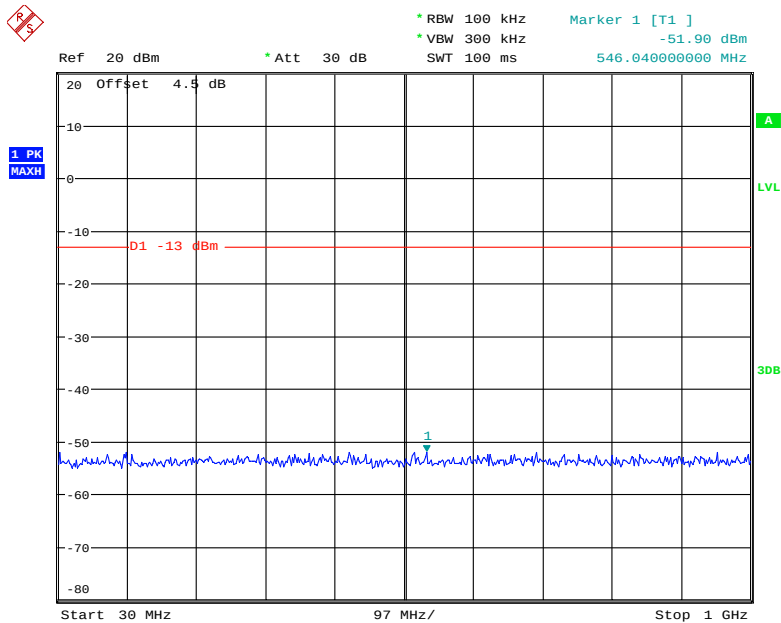
D1 -13 dBm

1

Start 1 GHz 1.9 GHz/ Stop 20 GHz

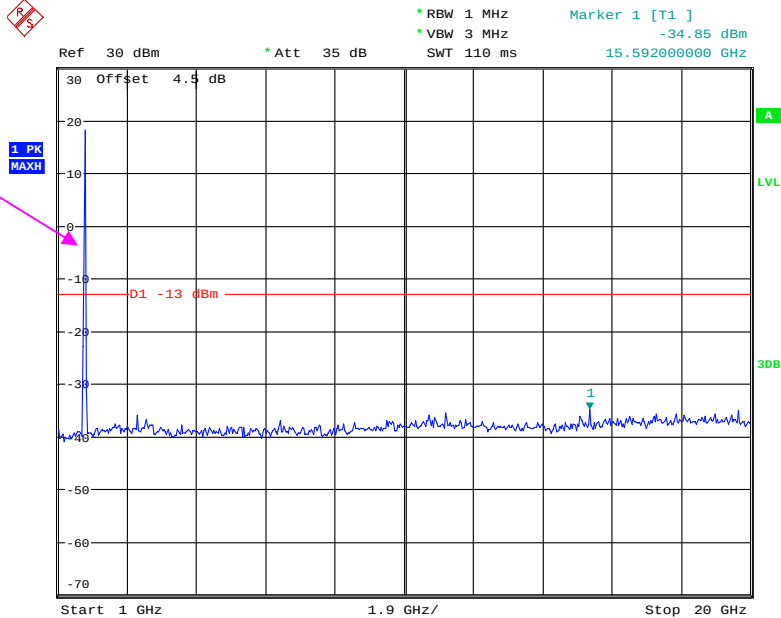
Page 78 of 166

QPSK_15 MHz



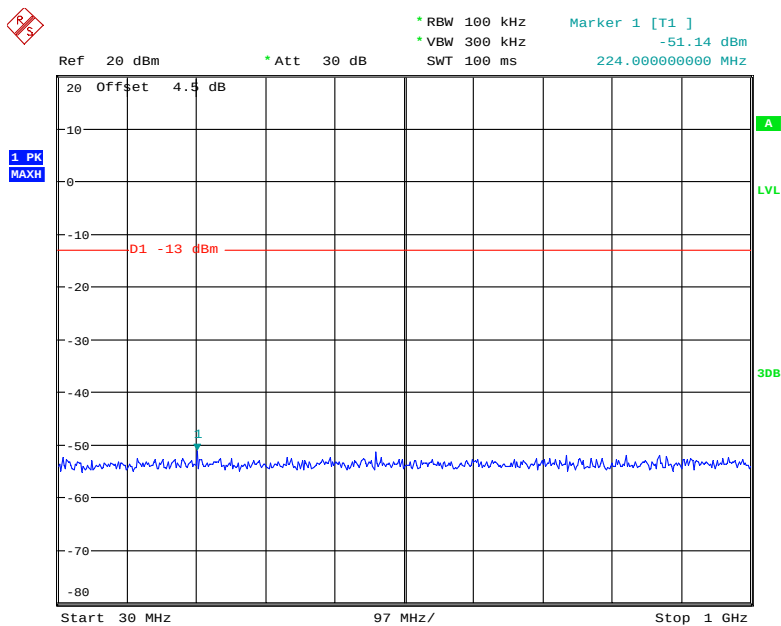
Date: 4.MAR.2019 13:26:42

Fundamental



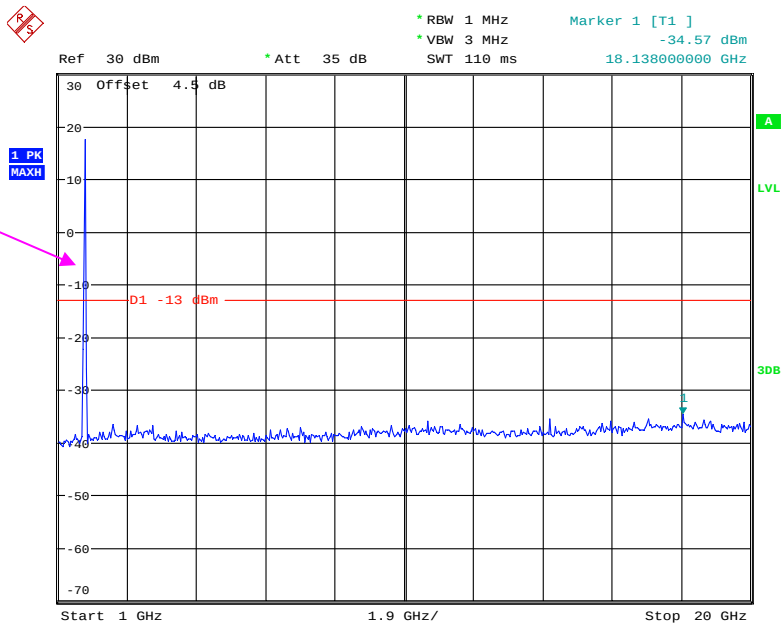
Date: 4.MAR.2019 13:26:53

QPSK_20 MHz



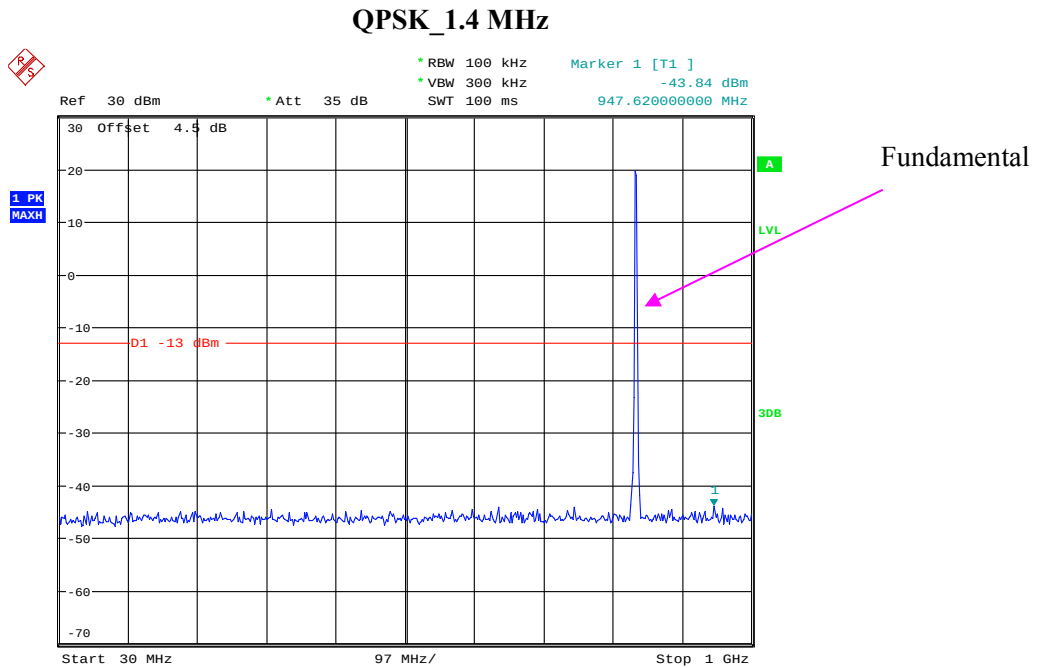
Date: 4.MAR.2019 13:27:18

Fundamental

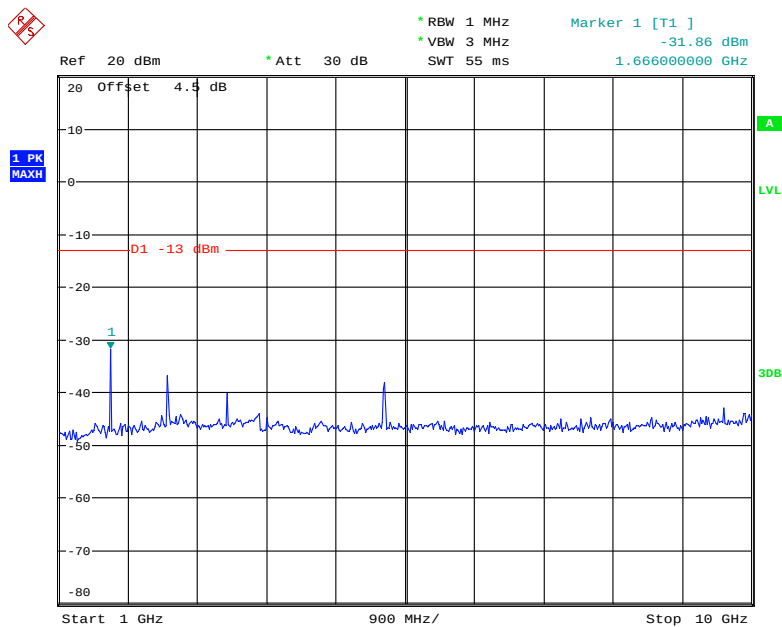


Date: 4.MAR.2019 13:27:29

LTE Band 5 (Middle Channel)

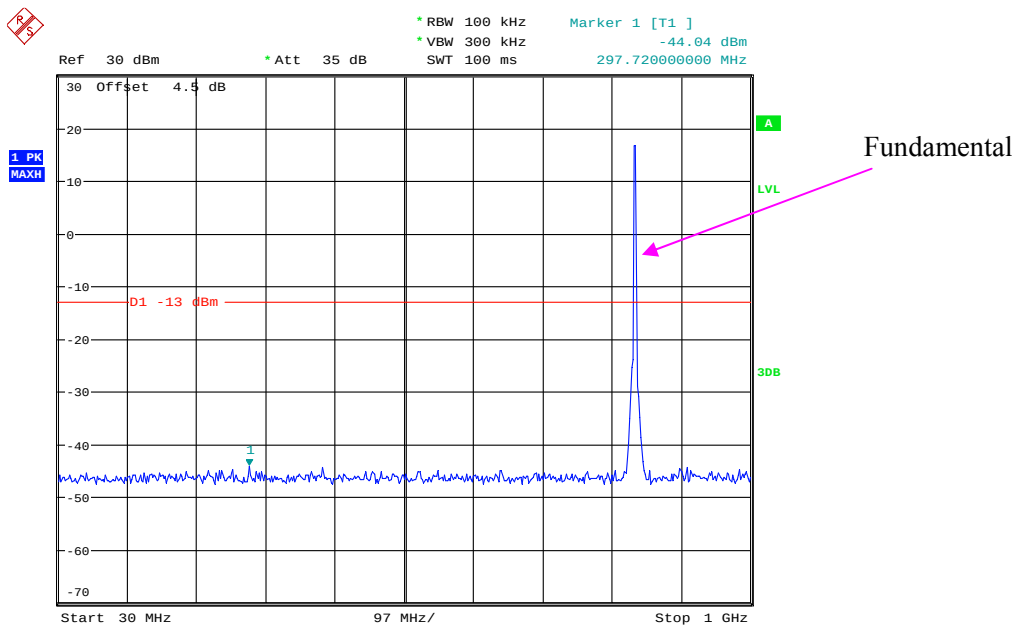


Date: 4.MAR.2019 13:27:53

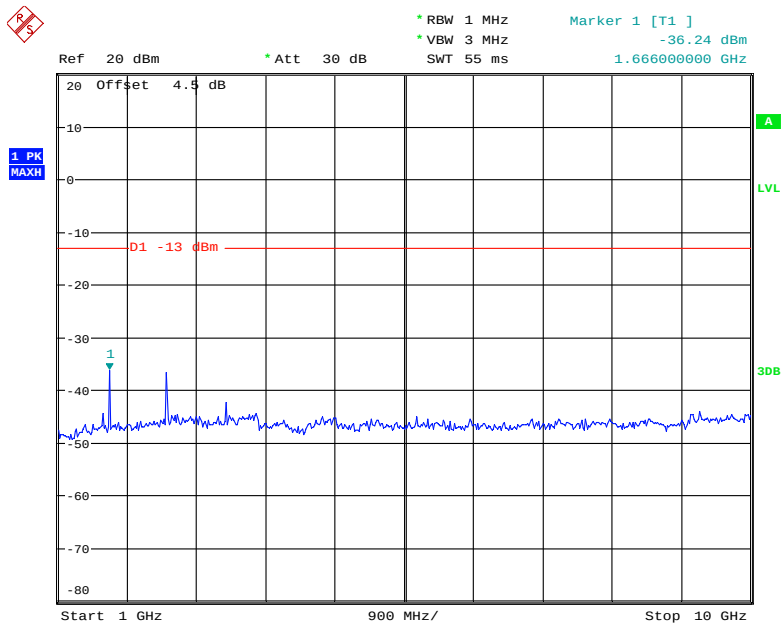


Date: 4.MAR.2019 13:28:03

QPSK_3 MHz

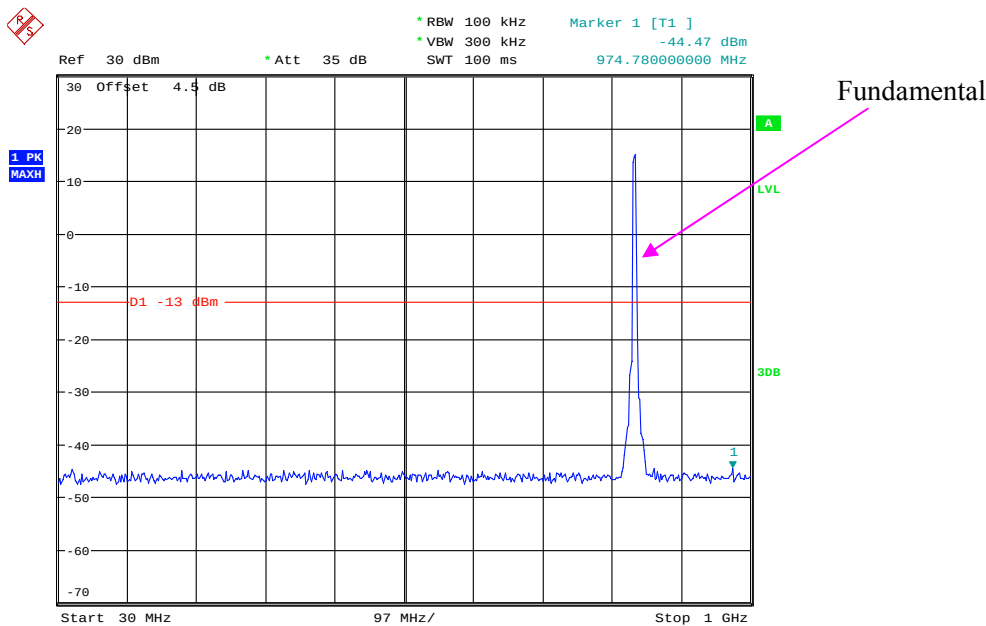


Date: 4.MAR.2019 13:28:24

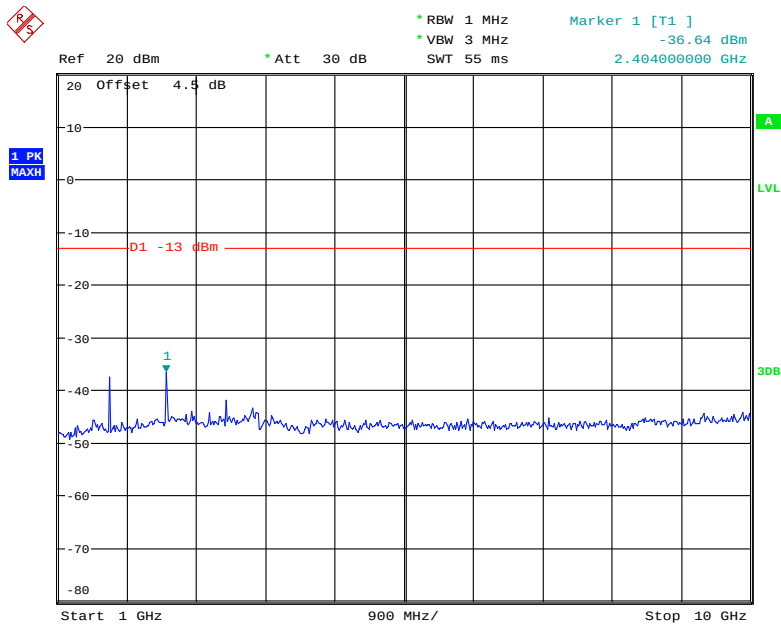


Date: 4.MAR.2019 13:28:35

QPSK_5 MHz

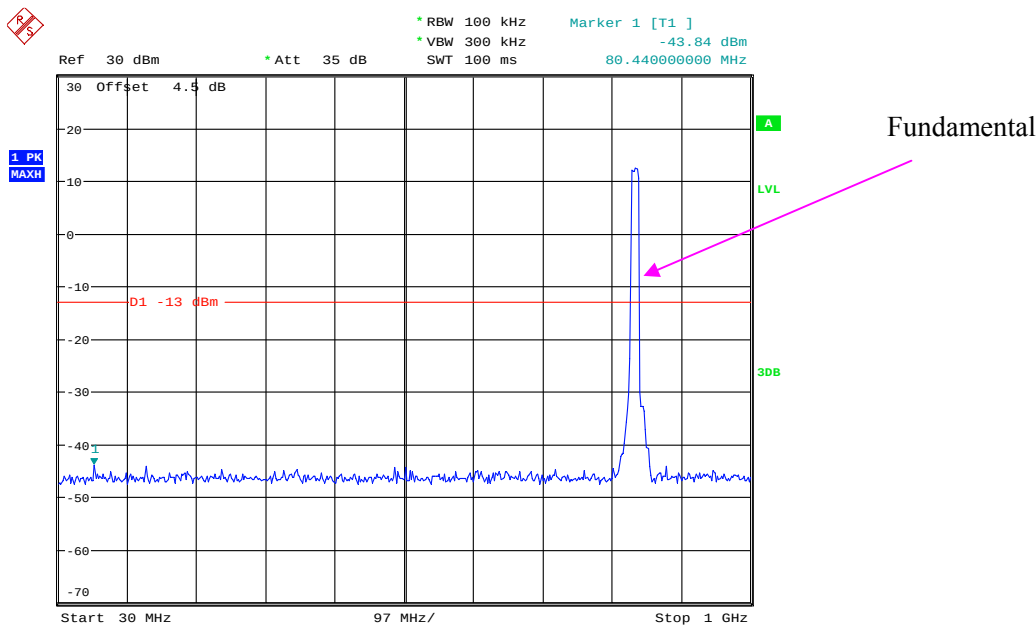


Date: 4.MAR.2019 13:28:58

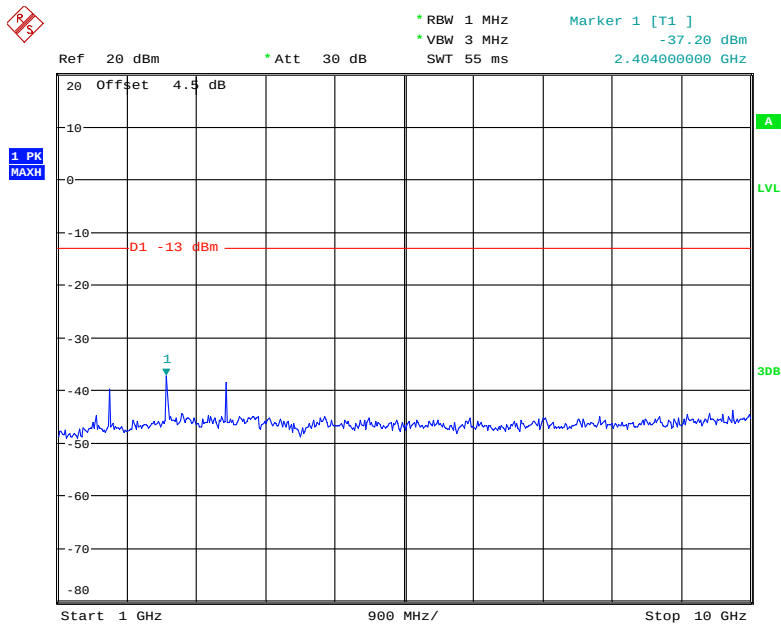


Date: 4.MAR.2019 13:29:08

QPSK_10 MHz



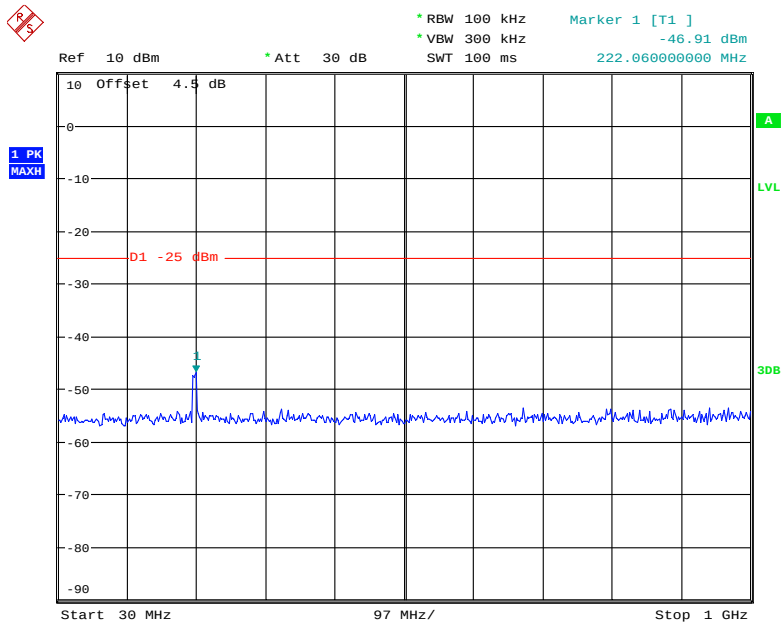
Date: 4.MAR.2019 13:29:29



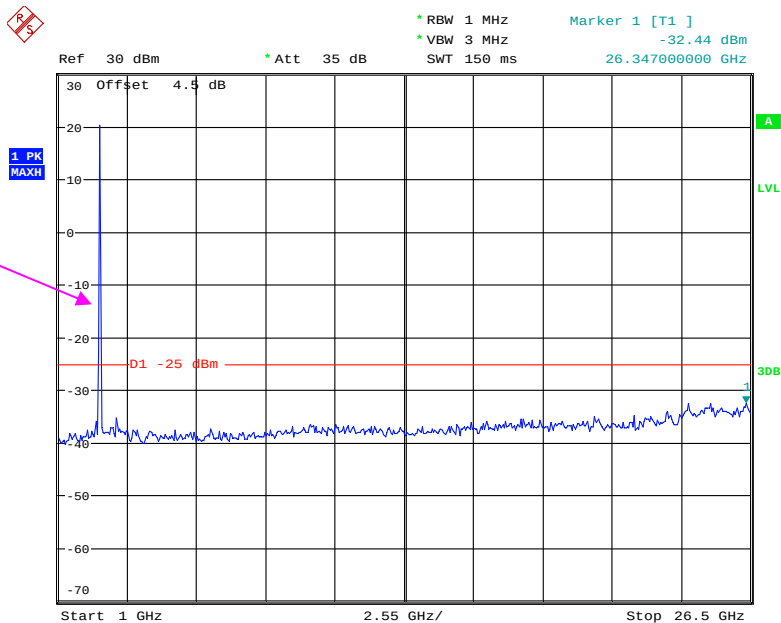
Date: 4.MAR.2019 13:29:40

LTE Band 7 (Middle Channel)

QPSK_5 MHz



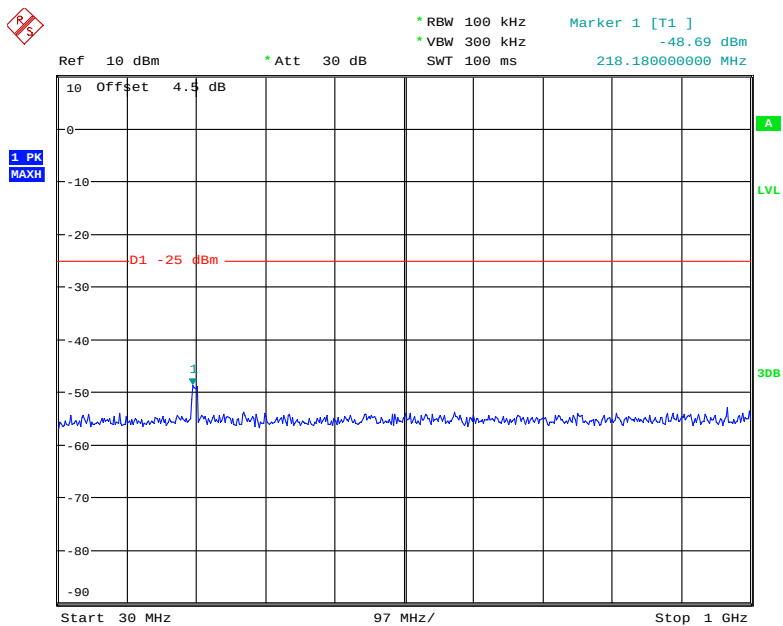
Date: 4.MAR.2019 13:30:04



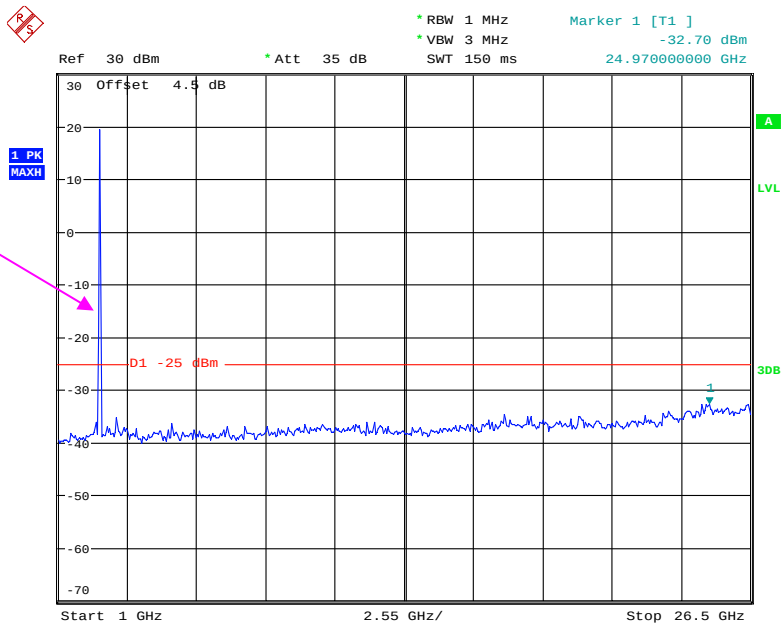
Fundamental

Date: 4.MAR.2019 13:30:18

QPSK_10 MHz

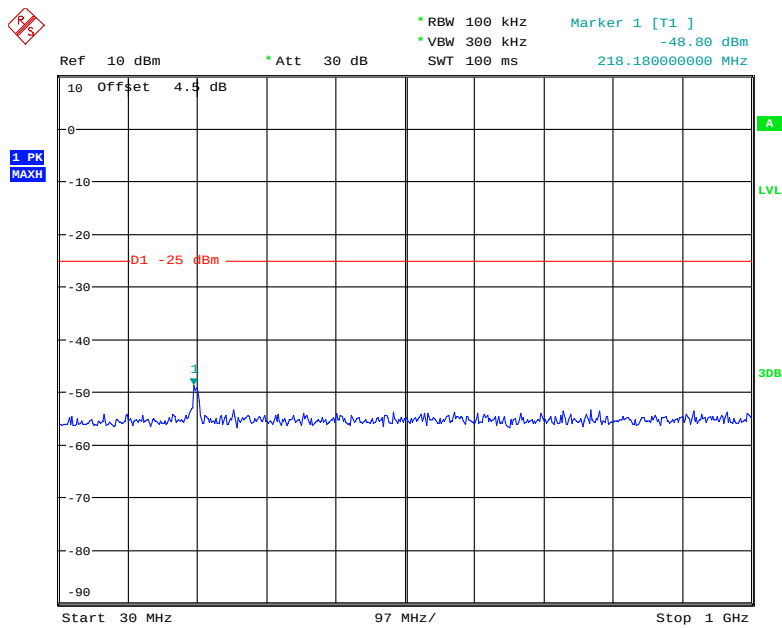


Date: 4.MAR.2019 13:30:40



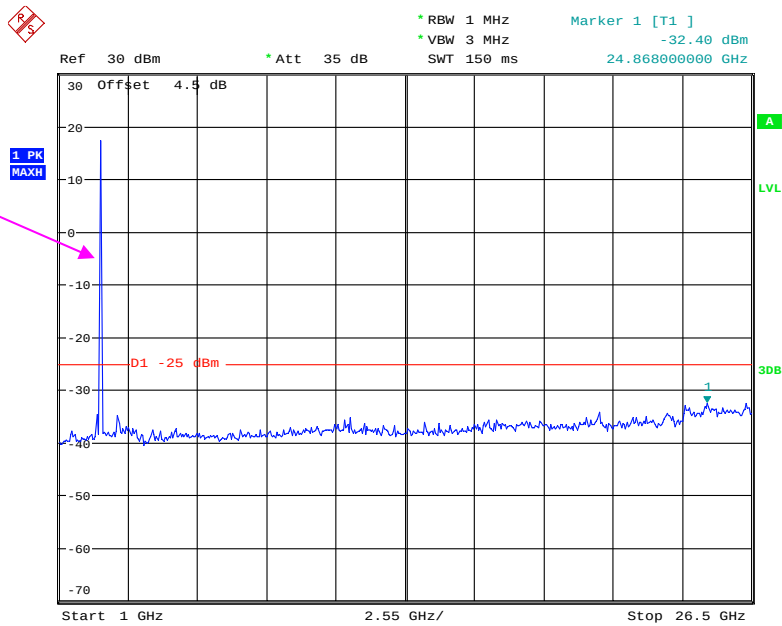
Date: 4.MAR.2019 13:30:57

QPSK_15 MHz



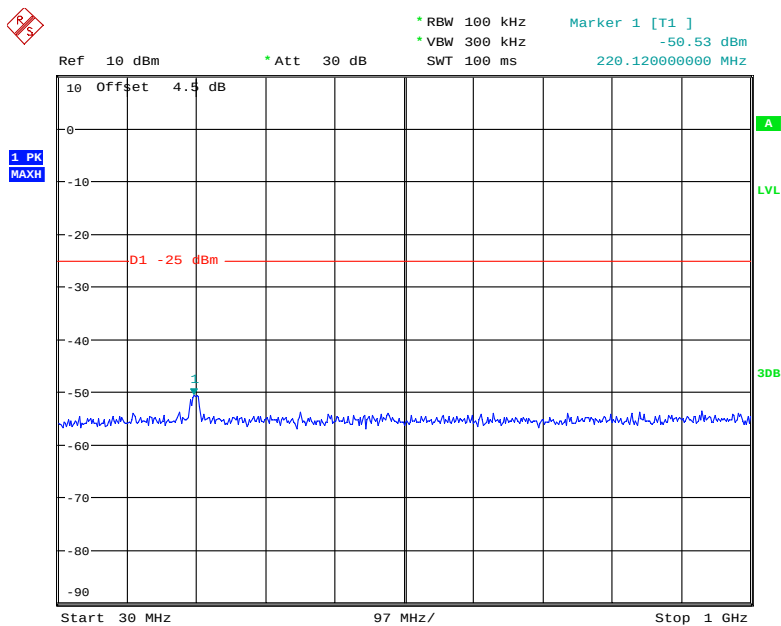
Date: 4.MAR.2019 13:31:23

Fundamental



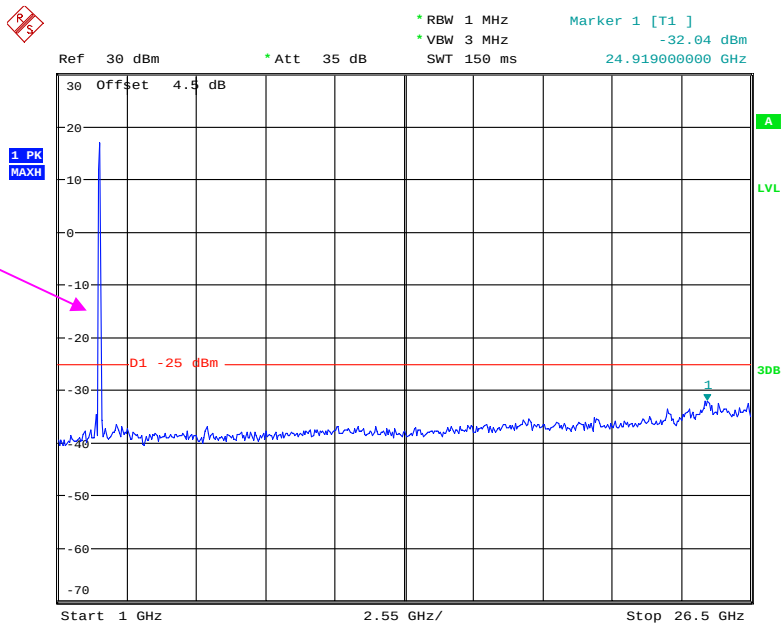
Date: 4.MAR.2019 13:31:37

QPSK_20 MHz



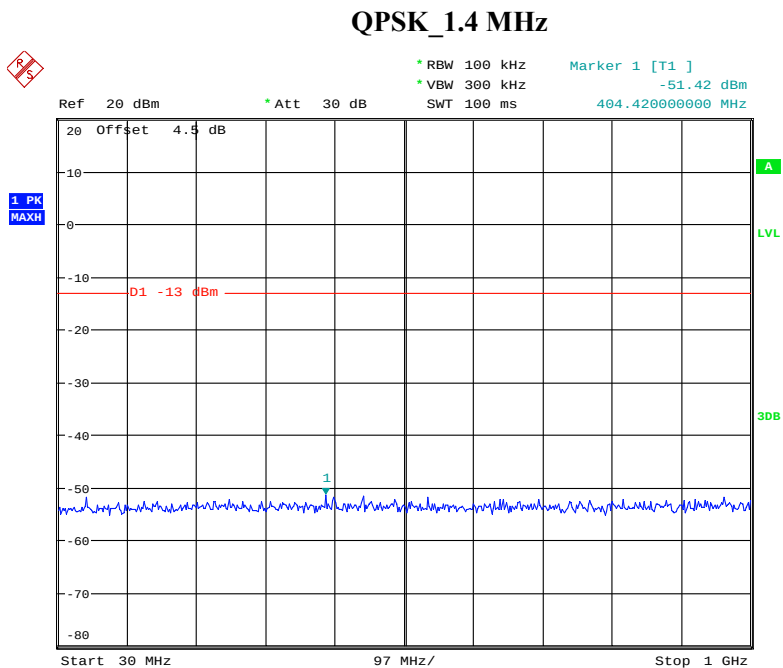
Date: 4.MAR.2019 13:32:03

Fundamental

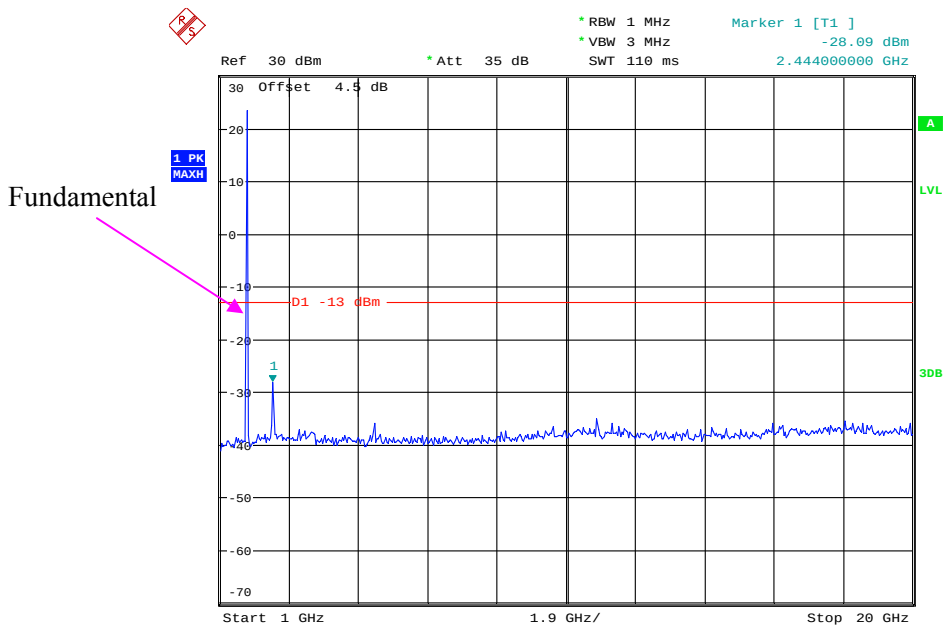


Date: 4.MAR.2019 13:32:13

LTE Band 66 (Middle Channel)



Date: 5.MAR.2019 14:10:42



Att 35 dB

Start 1 GHz

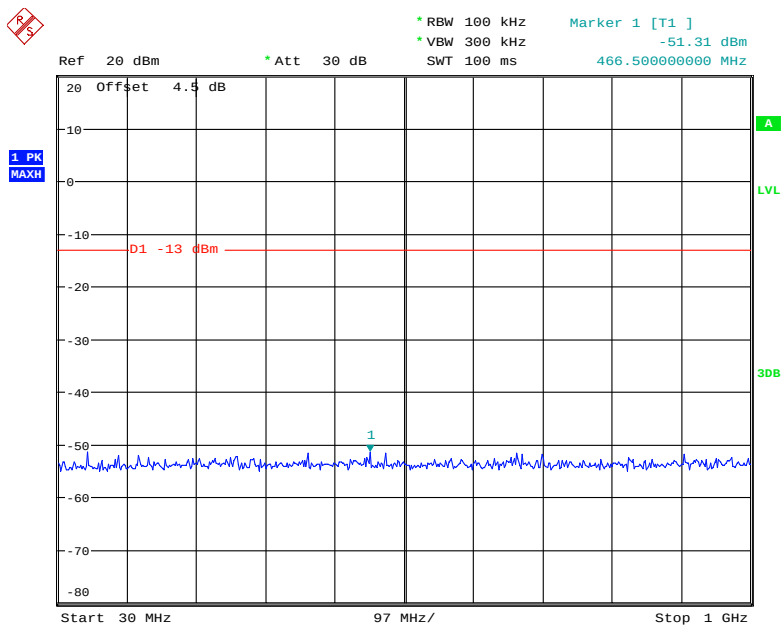
1.9 GHz/

Stop 20 GHz

Fundamental

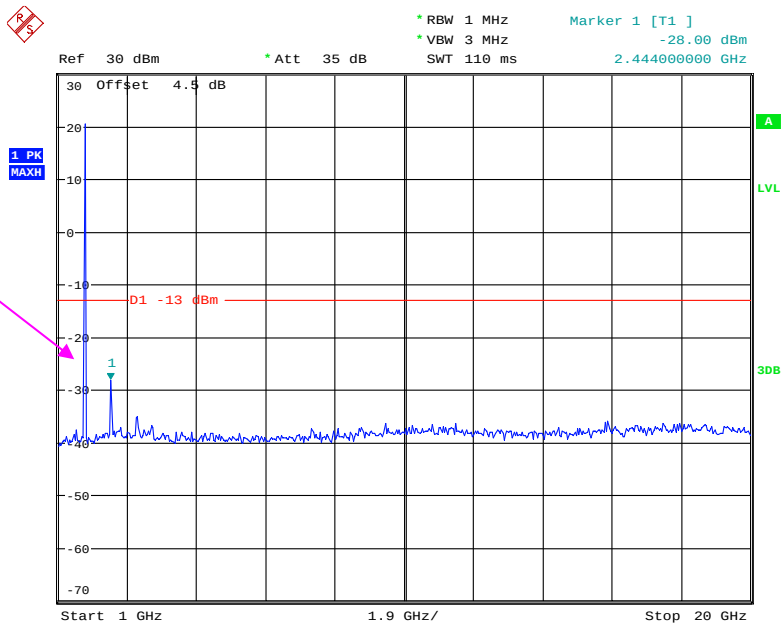
Date: 5.MAR.2019 14:11:05

QPSK_3 MHz



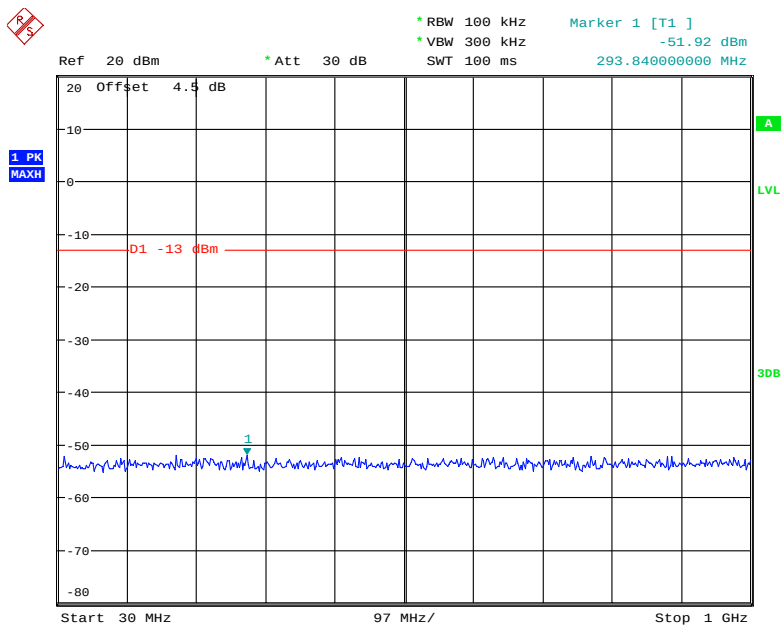
Date: 5.MAR.2019 14:11:26

Fundamental



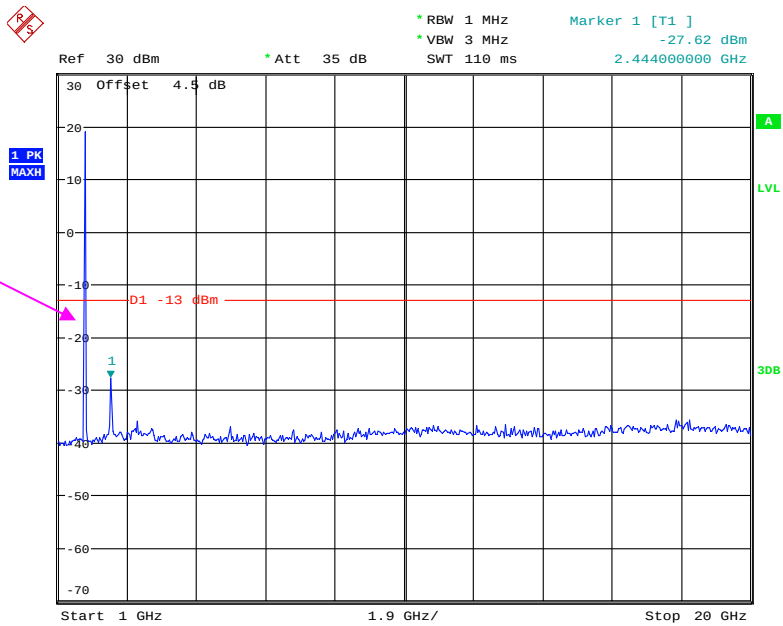
Date: 5.MAR.2019 14:11:37

QPSK_5 MHz



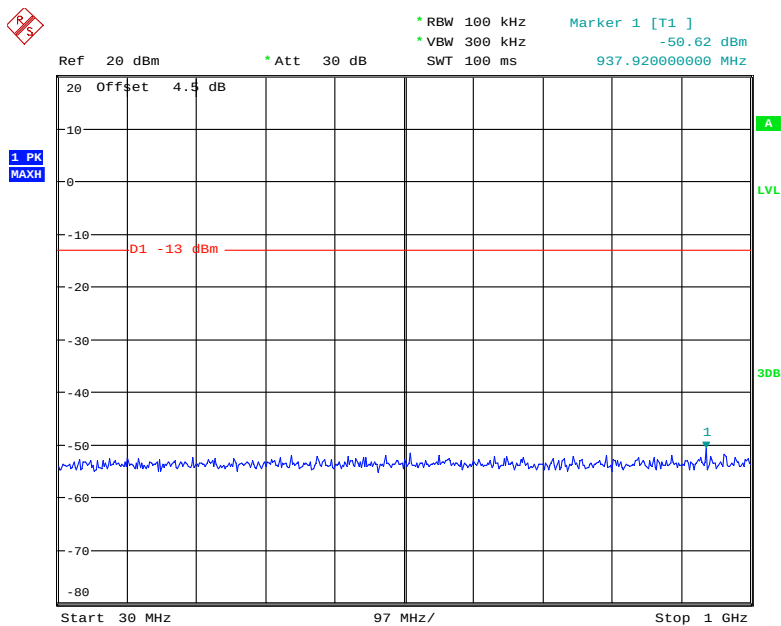
Date: 5.MAR.2019 14:11:58

Fundamental



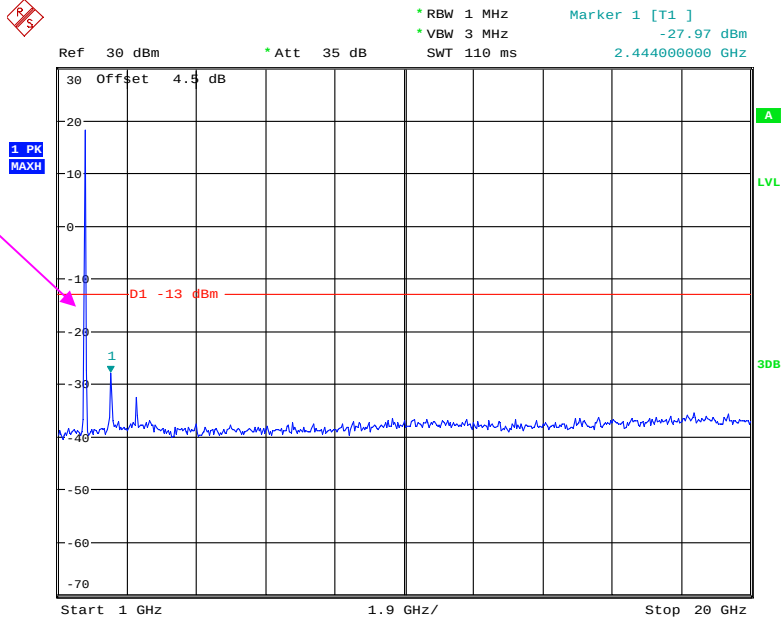
Date: 5.MAR.2019 14:12:09

QPSK_10 MHz



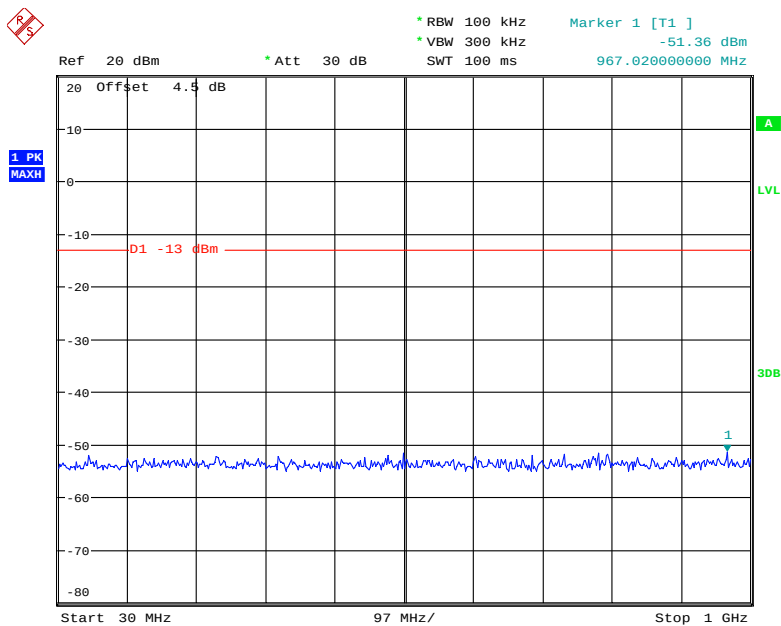
Date: 5.MAR.2019 14:12:31

Fundamental



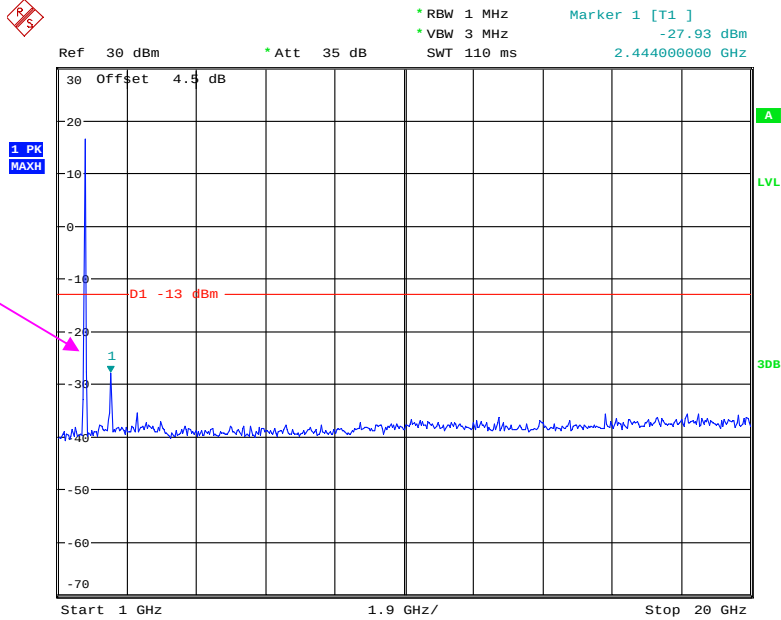
Date: 5.MAR.2019 14:12:52

QPSK_15 MHz



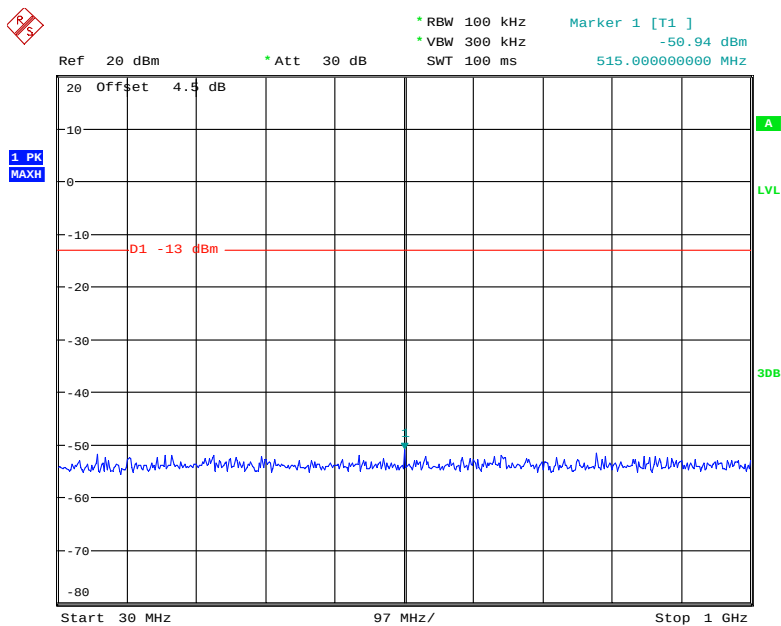
Date: 5.MAR.2019 14:13:16

Fundamental



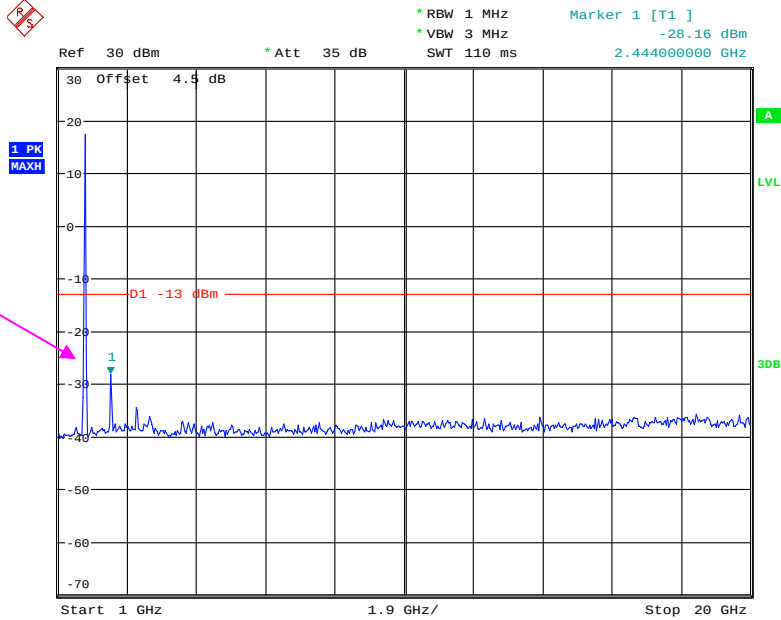
Date: 5.MAR.2019 14:13:27

QPSK_20 MHz



Date: 5.MAR.2019 14:13:48

Fundamental



Date: 5.MAR.2019 14:14:03

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 = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
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
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2018-06-16	2019-06-16
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
R&S	Spectrum Analyzer	FSP 38	100478	2018-12-10	2019-12-10
TDK RF	Horn Antenna	HRN-0118	130 084	2019-01-05	2022-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2019-01-05	2022-01-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
MICRO-COAX	Coaxial Cable	UFA147-1-2362-100100	64639 231029-001	2019-02-24	2020-02-28
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-09-05	2019-09-05
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	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

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

Test Data**Environmental Conditions**

Temperature:	21.1 °C
Relative Humidity:	31 %
ATM Pressure:	99.7 kPa

* The testing was performed by Vern Shen and Vito Chen on 2019-03-02.

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)			
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	37.44	-66.94	10.5	1.27	-57.7	-13.0	44.7
1673.200	V	39.06	-65.25	10.5	1.27	-56.0	-13.0	43.0
2509.800	H	42.55	-60.22	12.2	1.25	-49.3	-13.0	36.3
2509.800	V	39.65	-64.51	12.2	1.25	-53.6	-13.0	40.6
3346.400	H	42.83	-58.36	12.3	1.58	-47.7	-13.0	34.7
3346.400	V	39.06	-61.06	12.3	1.58	-50.4	-13.0	37.4
148.34	H	47.93	-58.46	0.0	0.37	-58.8	-13.0	45.8
41.64	V	52.81	-36.26	-24.2	0.21	-60.7	-13.0	47.7

30 MHz-20 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band II R99,Frequency: 1880.000 MHz								
3760.000	H	41.07	-59.14	12.3	1.53	-48.4	-13.0	35.4
3760.000	V	40.64	-59.27	12.3	1.53	-48.6	-13.0	35.6
5640.000	H	37.09	-58.21	13.0	1.28	-46.5	-13.0	33.5
5640.000	V	37.37	-58.24	13.0	1.28	-46.5	-13.0	33.5
148.34	H	47.69	-58.7	0.0	0.37	-59.1	-13.0	46.1
41.64	V	52.64	-36.43	-24.2	0.21	-60.9	-13.0	47.9

LTE Band 2 (30MHz-20GHz):

LTE Band 2 (50MHz-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	40.33	-59.88	12.25	1.53	-49.16	-13.00	36.16
3760.00	V	41.42	-58.49	12.25	1.53	-47.77	-13.00	34.77
5640.00	H	38.40	-56.90	13.00	1.28	-45.18	-13.00	32.18
5640.00	V	37.91	-57.70	13.00	1.28	-45.98	-13.00	32.98
148.34	H	47.46	-58.93	0.00	0.37	-59.30	-13.00	46.30
41.64	V	54.19	-34.88	-24.24	0.21	-59.33	-13.00	46.33

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	39.63	-61.34	12.21	1.60	-50.73	-13.00	37.73
3465.00	V	39.15	-60.41	12.21	1.60	-49.80	-13.00	36.80
5197.50	H	46.36	-49.72	12.92	1.36	-38.16	-13.00	25.16
5197.50	V	45.40	-50.65	12.92	1.36	-39.09	-13.00	26.09
148.34	H	47.41	-58.98	0.00	0.37	-59.35	-13.00	46.35
41.64	V	52.75	-36.32	-24.24	0.21	-60.77	-13.00	47.77

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	37.93	-66.45	10.52	1.27	-57.20	-13.00	44.20
1673.00	V	37.40	-66.91	10.52	1.27	-57.66	-13.00	44.66
2509.50	H	38.74	-64.03	12.20	1.24	-53.07	-13.00	40.07
2509.50	V	39.10	-65.06	12.20	1.24	-54.10	-13.00	41.10
3346.00	H	38.56	-62.63	12.26	1.58	-51.95	-13.00	38.95
3346.00	V	38.38	-61.74	12.26	1.58	-51.06	-13.00	38.06
148.34	H	47.63	-58.76	0.00	0.37	-59.13	-13.00	46.13
41.64	V	55.15	-33.92	-24.24	0.21	-58.37	-13.00	45.37

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	38.75	-57.56	12.97	1.41	-46.00	-25.00	21.00
5070.00	V	41.76	-54.32	12.97	1.41	-42.76	-25.00	17.76
7605.00	H	38.74	-52.64	12.84	1.40	-41.20	-25.00	16.20
7605.00	V	36.90	-55.15	12.84	1.40	-43.71	-25.00	18.71
148.34	H	47.60	-58.79	0.00	0.37	-59.16	-25.00	34.16
41.64	V	53.26	-35.81	-24.24	0.21	-60.26	-25.00	35.26

LTE Band 66 (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:1745.000 MHz								
3490.00	H	39.00	-61.92	12.20	1.61	-51.33	-13.00	38.33
3490.00	V	40.15	-59.30	12.20	1.61	-48.71	-13.00	35.71
5235.00	H	49.45	-46.57	12.91	1.35	-35.01	-13.00	22.01
5235.00	V	50.12	-45.93	12.91	1.35	-34.37	-13.00	21.37
6980.00	H	37.41	-54.42	13.43	1.82	-42.81	-13.00	29.81
6980.00	V	37.59	-54.43	13.43	1.82	-42.82	-13.00	29.82
148.34	H	47.63	-58.76	0.00	0.37	-59.13	-13.00	46.13
41.64	V	54.19	-34.88	-24.24	0.21	-59.33	-13.00	46.33

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

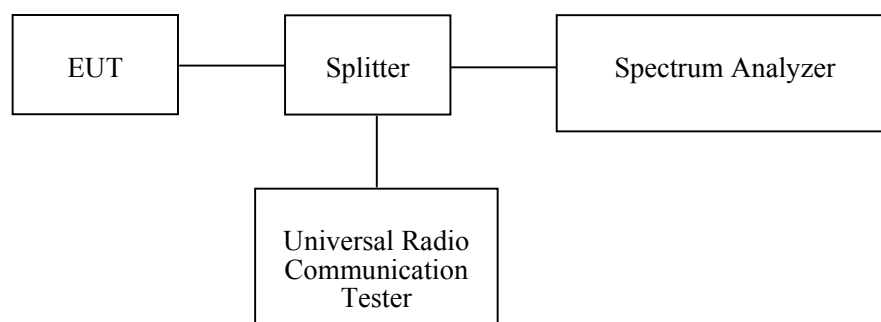
Applicable Standard

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	41010012	Each time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	/

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

Test Data

Environmental Conditions

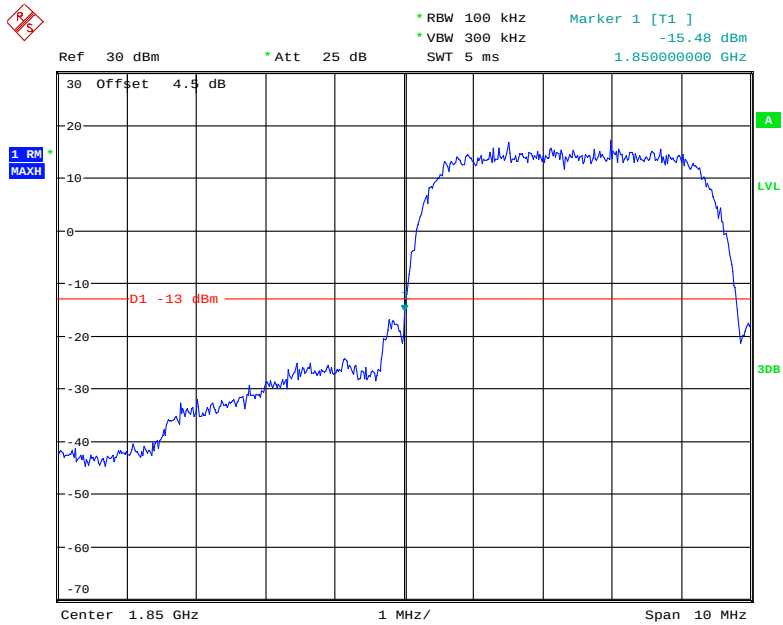
Temperature:	24.9~25.9 °C
Relative Humidity:	47~53 %
ATM Pressure:	100.6~100.5 kPa

The testing was performed by Elena Lei and Blake Yang from 2019-03-01 to 2019-03-04.

Test Mode: Transmitting

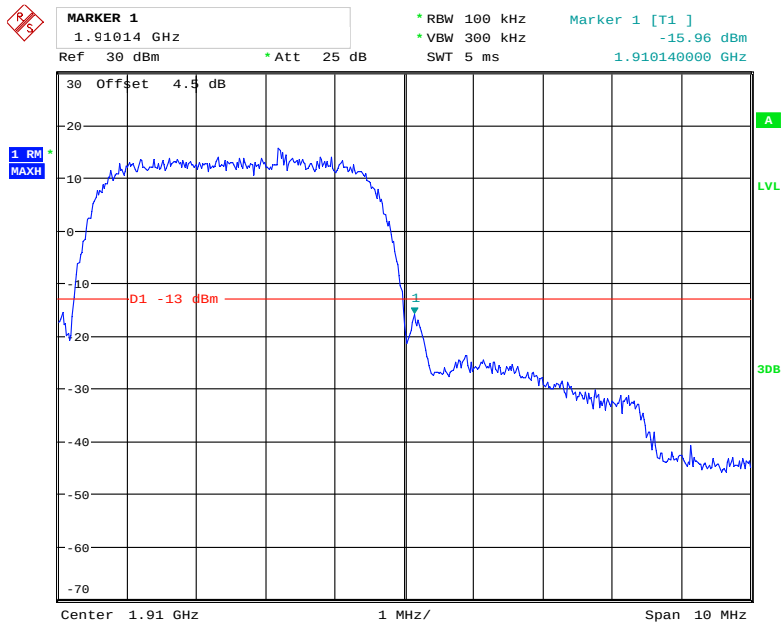
Test Result: Compliant. Please refer to the following plots.

WCDMA Band II Rel 99, Left Band Edge



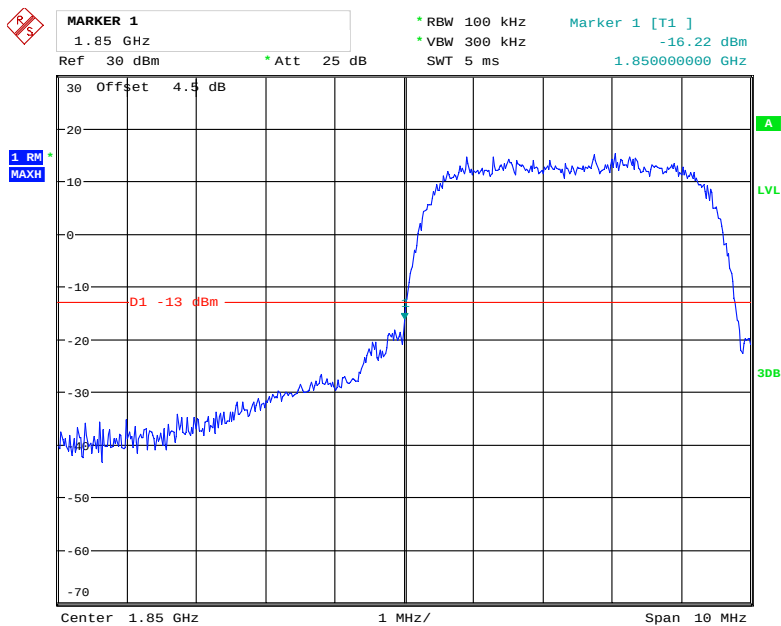
Date: 1.MAR.2019 19:37:02

WCDMA Band II Rel 99, Right Band Edge



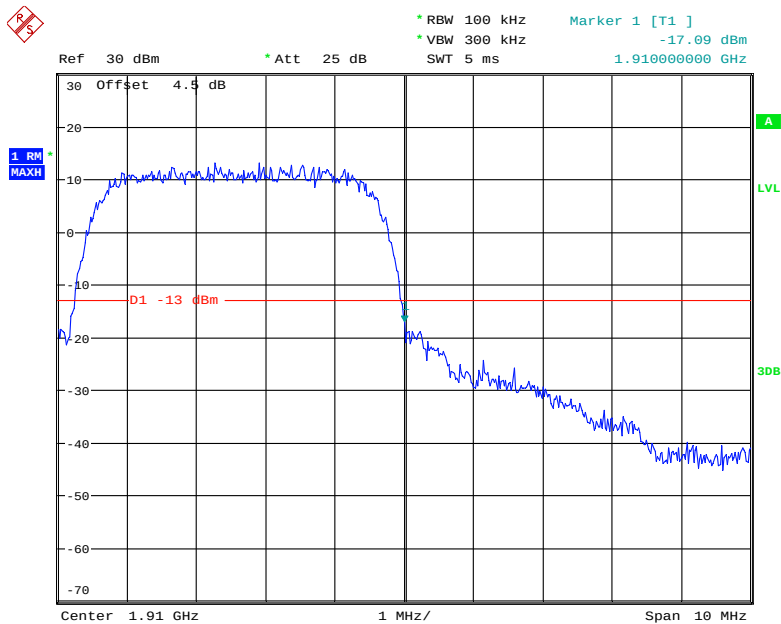
Date: 1.MAR.2019 19:37:38

WCDMA Band II HSDPA, Left Band Edge



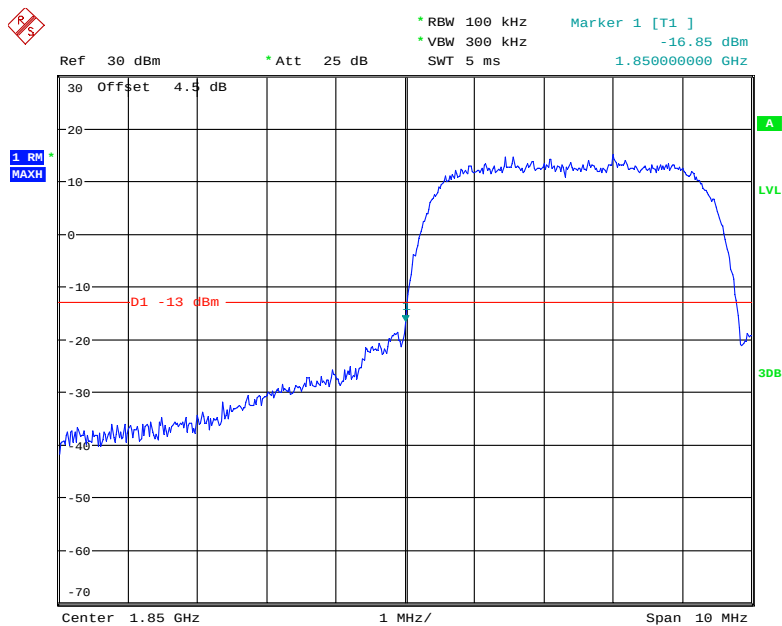
Date: 1.MAR.2019 19:36:26

WCDMA Band II HSDPA, Right Band Edge



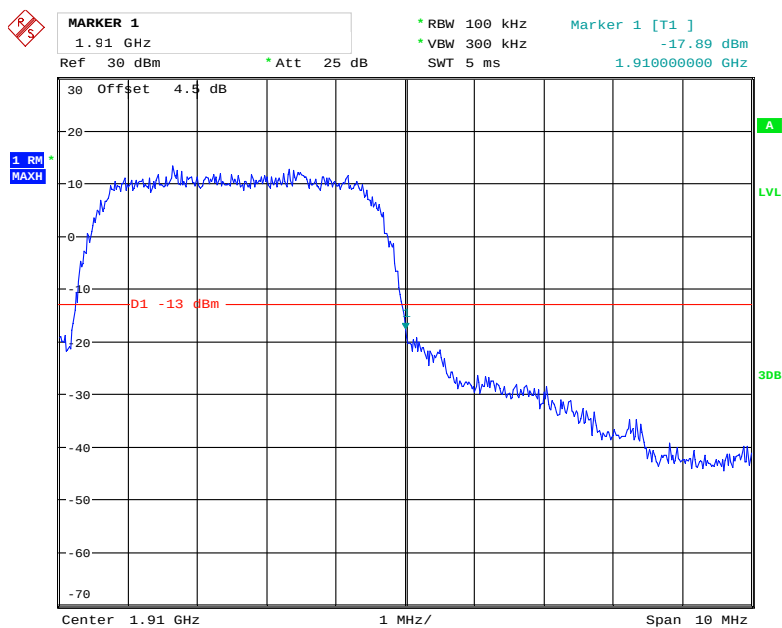
Date: 1.MAR.2019 19:36:03

WCDMA Band II HSUPA, Left Band Edge



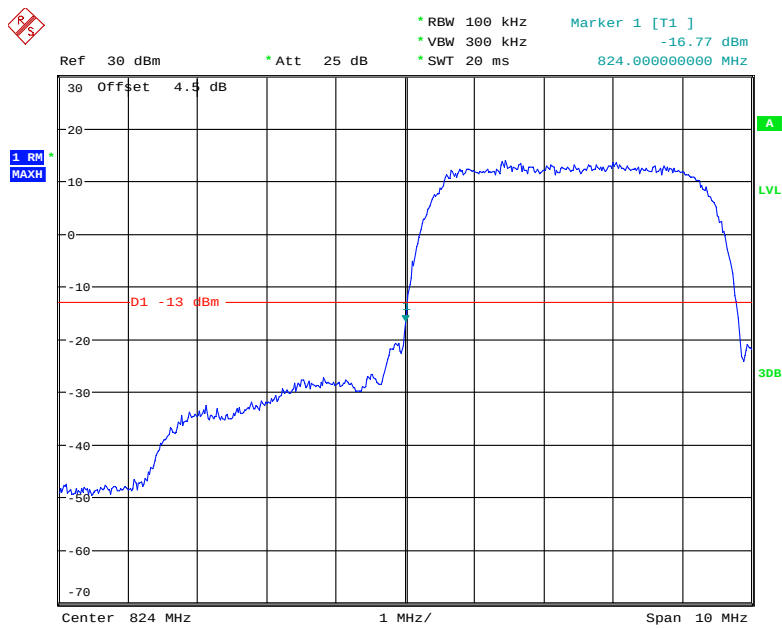
Date: 1.MAR.2019 19:34:52

WCDMA Band II HSUPA, Right Band Edge



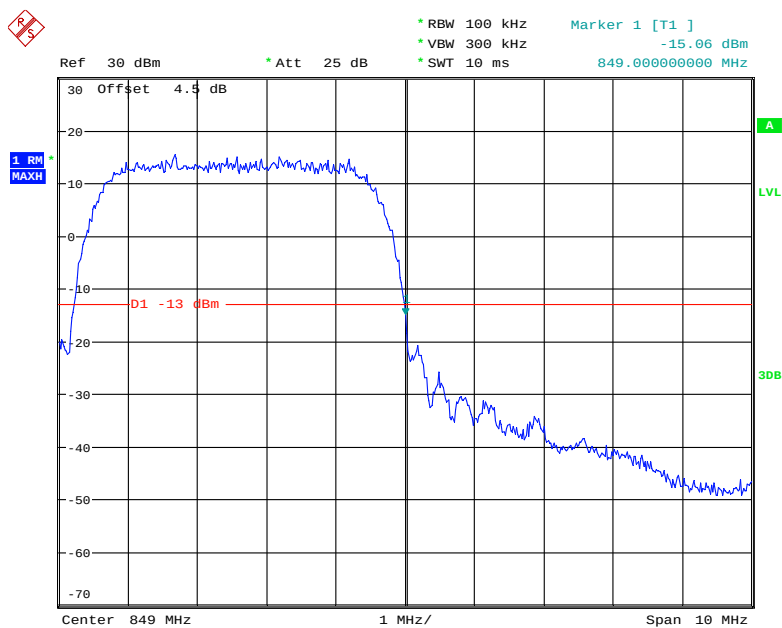
Date: 1.MAR.2019 19:35:23

WCDMA Band V Rel 99, Left Band Edge



Date: 1.MAR.2019 19:54:50

WCDMA Band V Rel 99, Right Band Edge



Date: 1.MAR.2019 19:55:36

Ref 30 dBm Att 25 dB RBW 100 kHz VBW 300 kHz SWT 15 ms Marker 1 [T1] -15.30 dBm 824.000000000 MHz

Offset 4.5 dB

1 RM MAXH

D1 -13 dBm

Center 824 MHz 1 MHz/ Span 10 MHz

Ref 30 dBm Att 25 dB

* RBW 100 kHz VBW 300 kHz SWT 5 ms

Marker 1 [T1] -16.43 dBm

849.000000000 MHz

30 Offset 4.5 dB

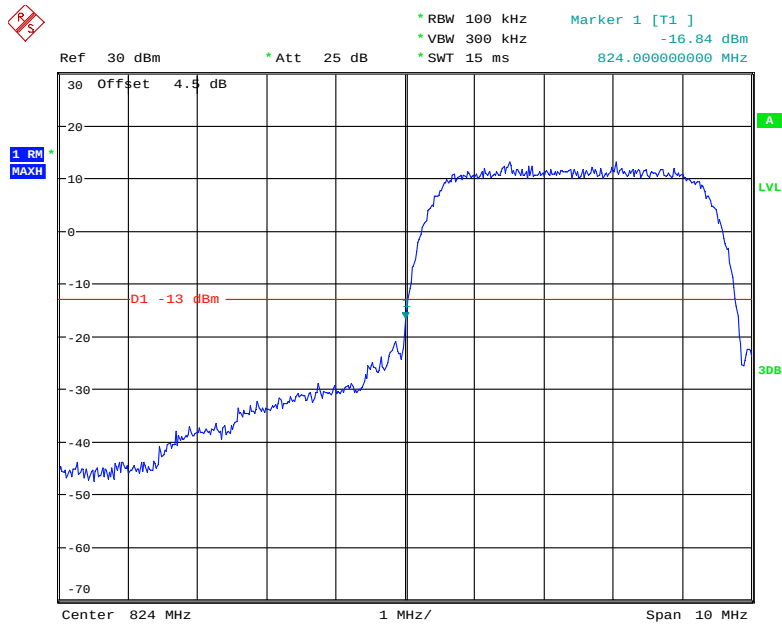
1 RM MAXH

D1 -13 dBm

Center 849 MHz 1 MHz/ Span 10 MHz

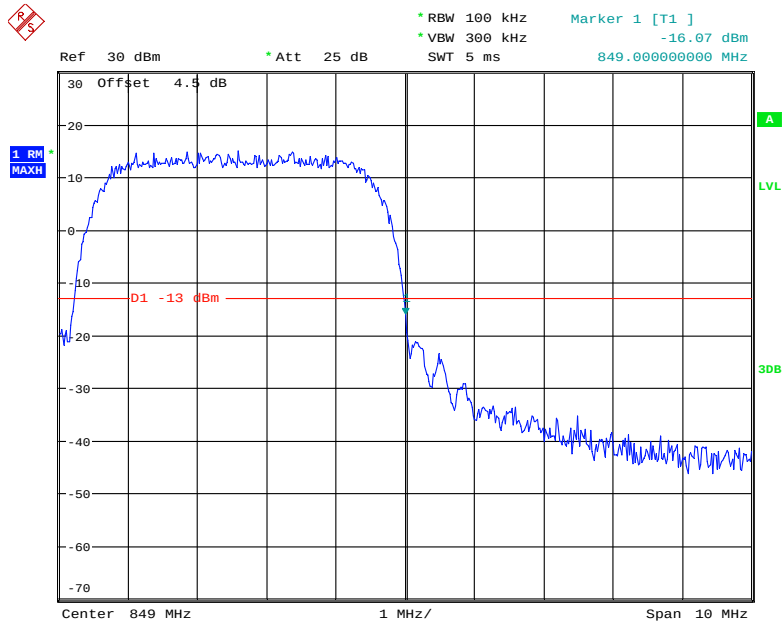
Page 105 of 166

WCDMA Band V HSUPA, Left Band Edge



Date: 1.MAR.2019 19:57:38

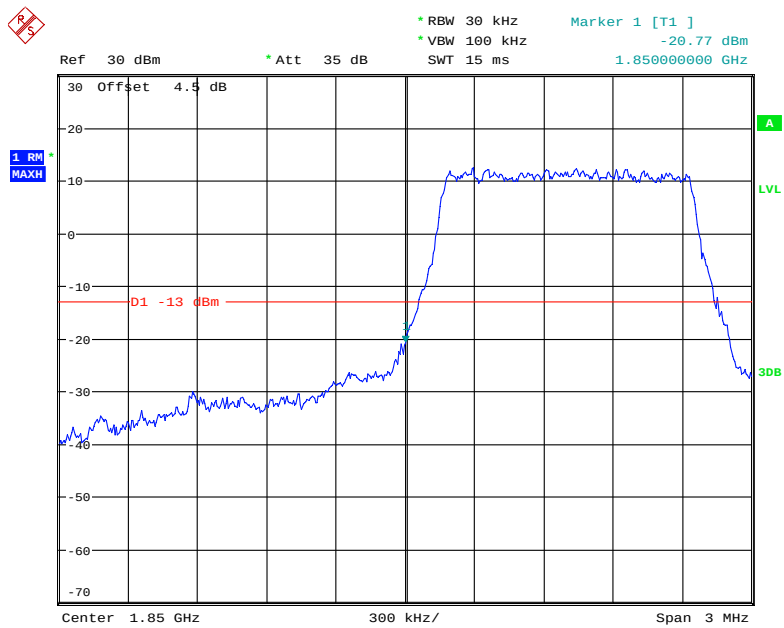
WCDMA Band V HSUPA, Right Band Edge



Date: 1.MAR.2019 19:58:13

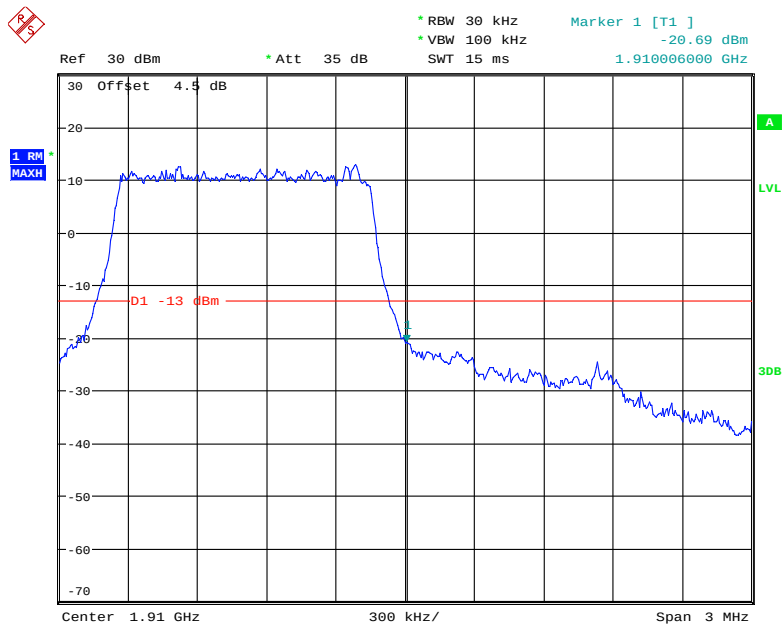
LTE Band 2

QPSK_1.4MHz_6 RB_ Left



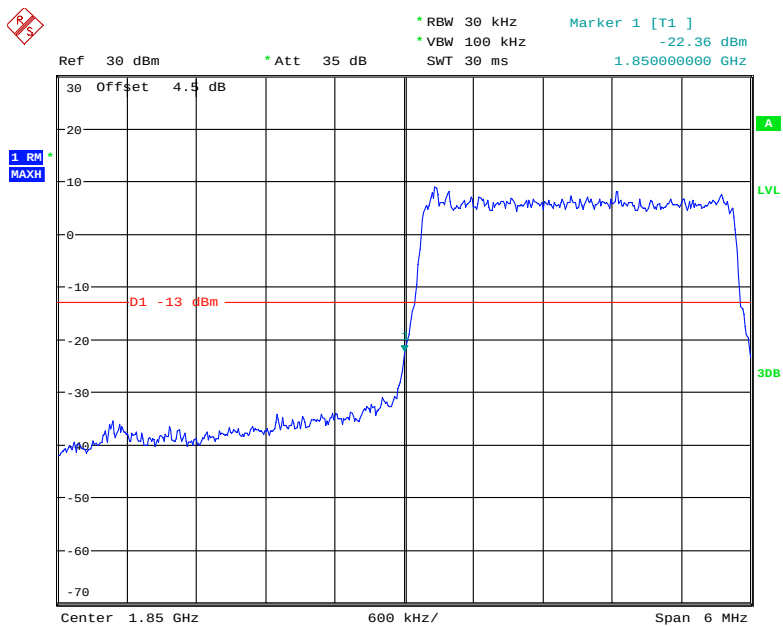
Date: 4.MAR.2019 10:44:30

QPSK_1.4MHz_6 RB_ Right



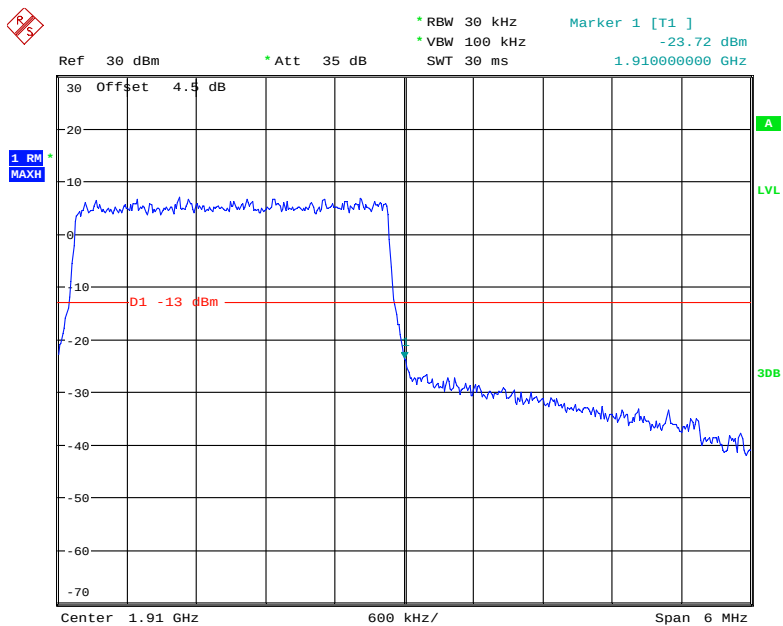
Date: 4.MAR.2019 10:45:55

QPSK_3MHz_15 RB_Left



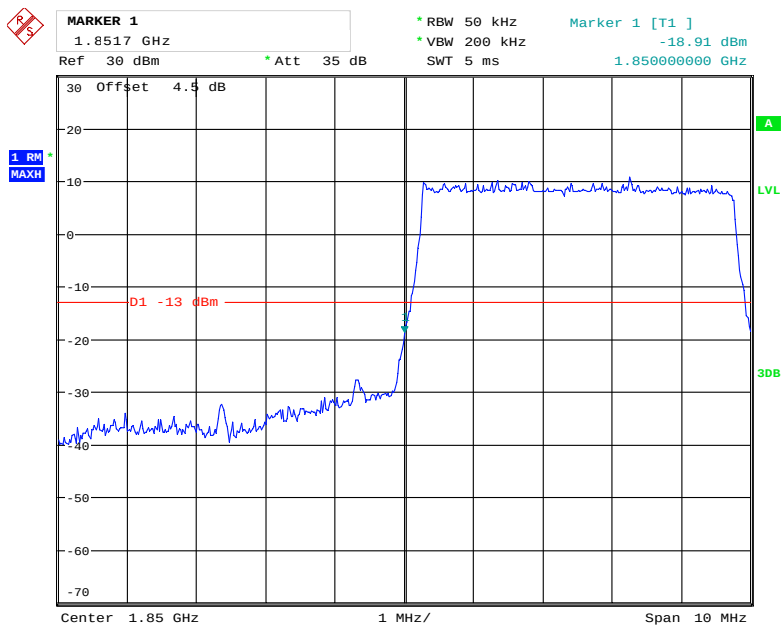
Date: 4.MAR.2019 10:47:05

QPSK_3MHz_15 RB_Right



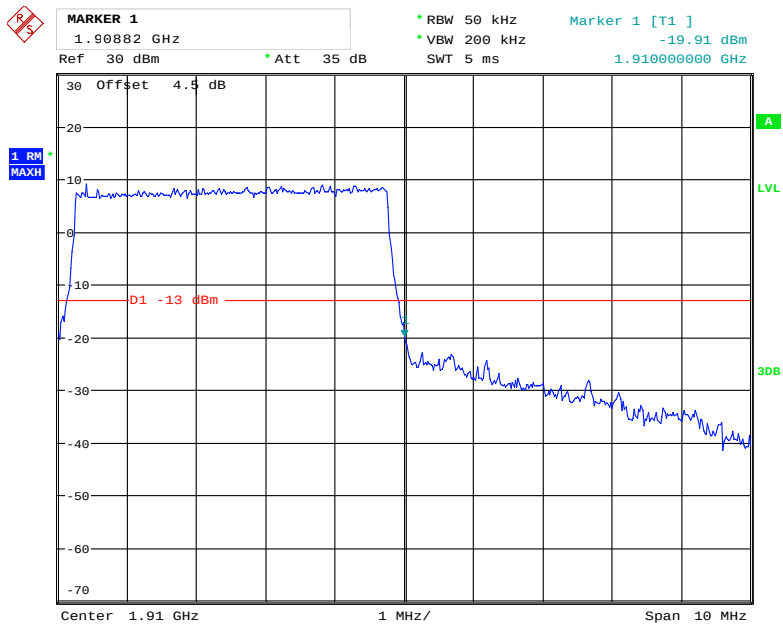
Date: 4.MAR.2019 10:48:16

QPSK_5MHz_25 RB_Left



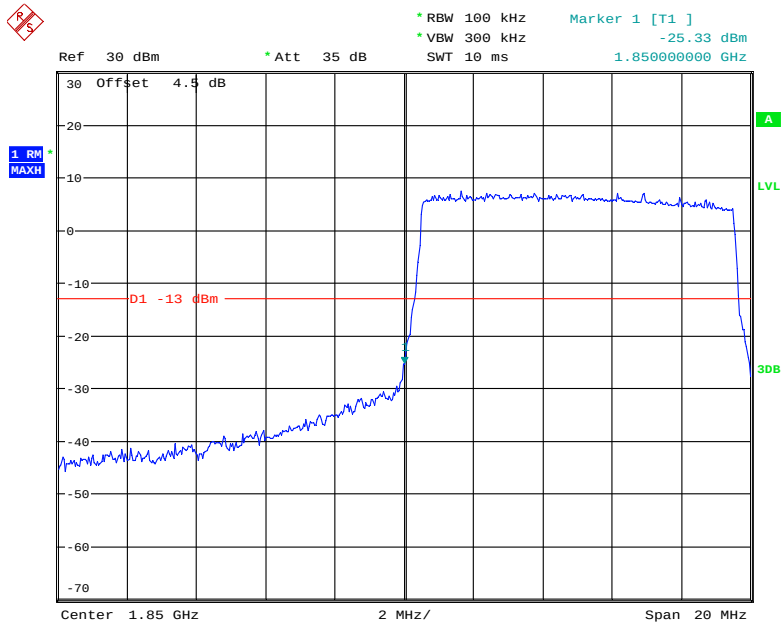
Date: 4.MAR.2019 10:49:49

QPSK_5MHz_25 RB_Right



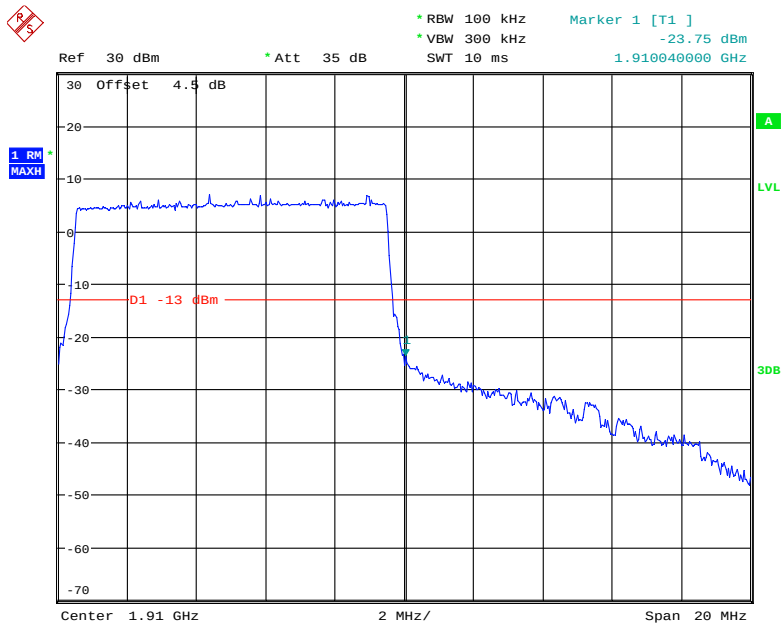
Date: 4.MAR.2019 10:51:31

QPSK_10MHz_50 RB_ Left



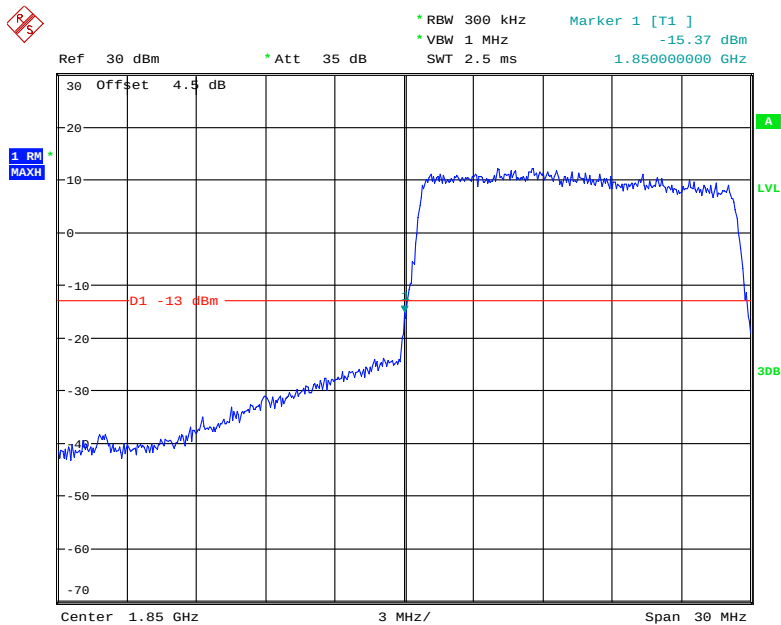
Date: 4.MAR.2019 10:52:45

QPSK_10MHz_50 RB_ Right



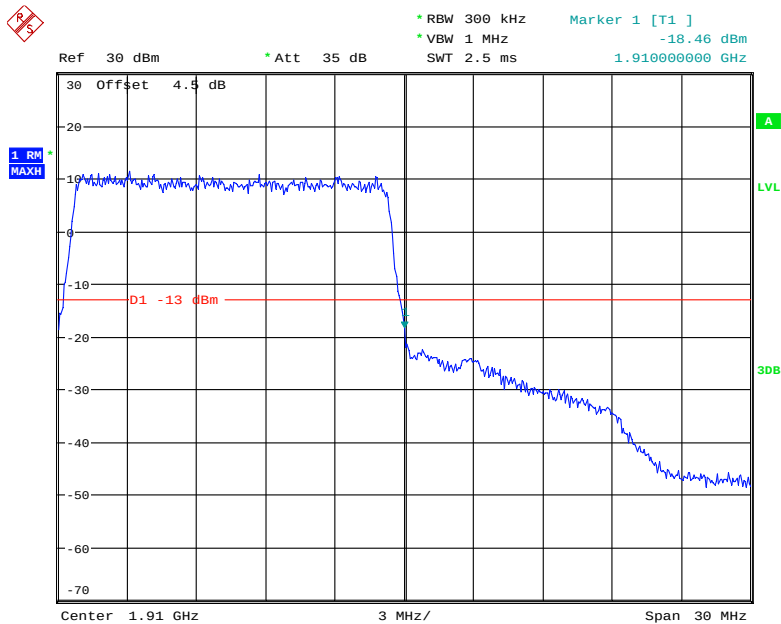
Date: 4.MAR.2019 10:53:47

QPSK_15MHz_ 75 RB_ Left



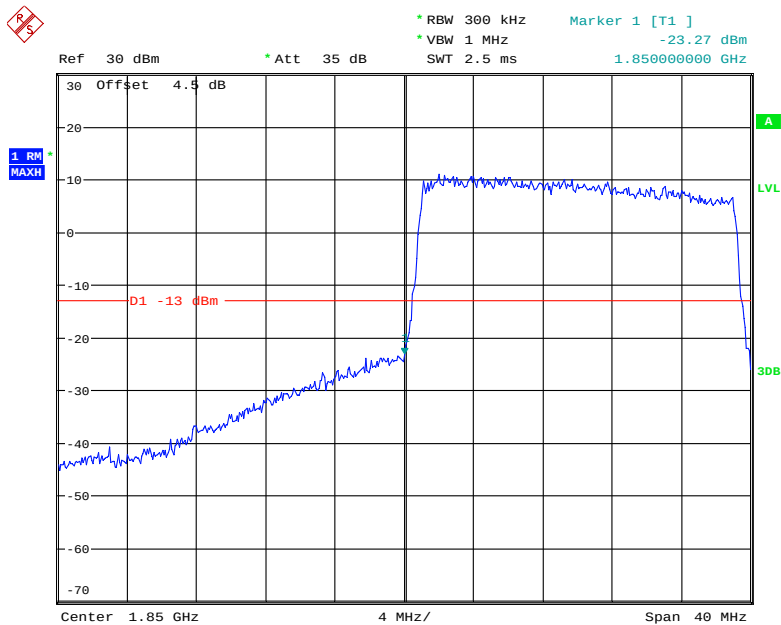
Date: 4.MAR.2019 10:55:10

QPSK_15MHz_ 75 RB_ Right



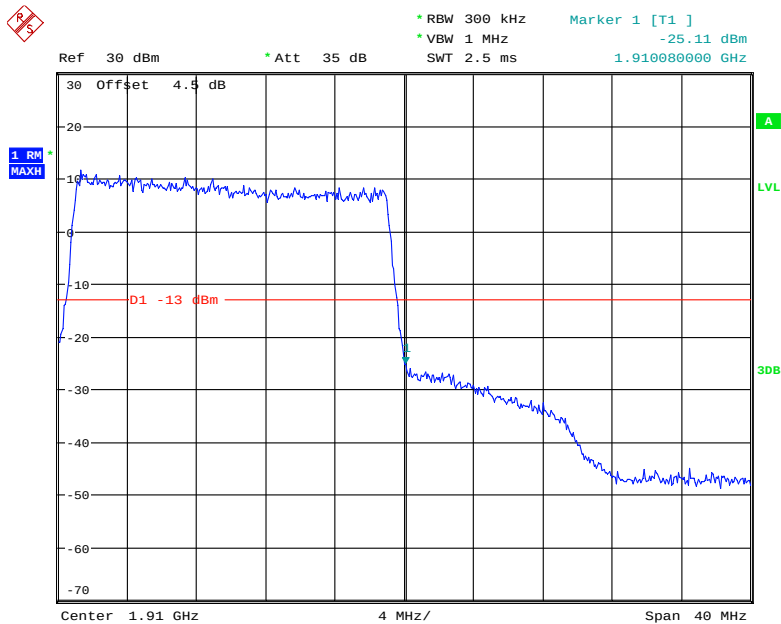
Date: 4.MAR.2019 10:56:26

QPSK_20MHz_FULL RB_Left

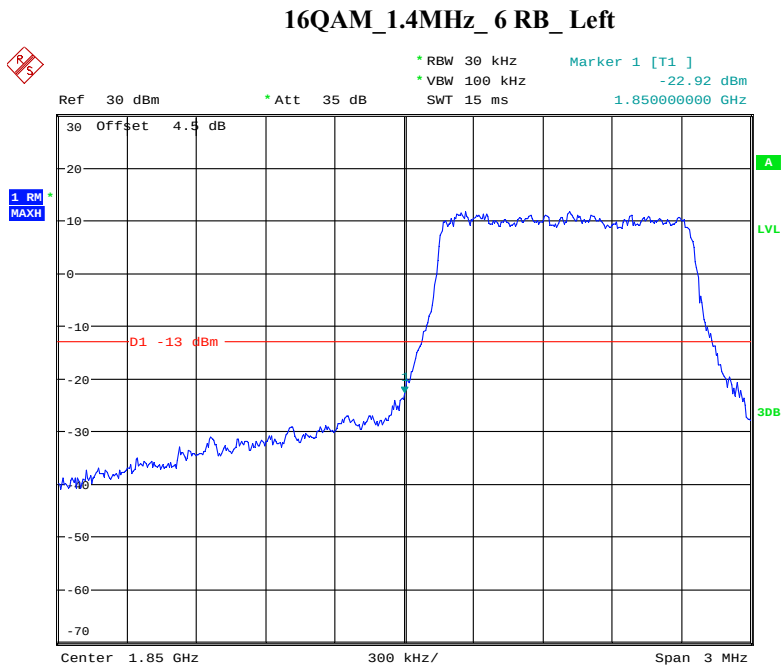


Date: 4.MAR.2019 10:57:56

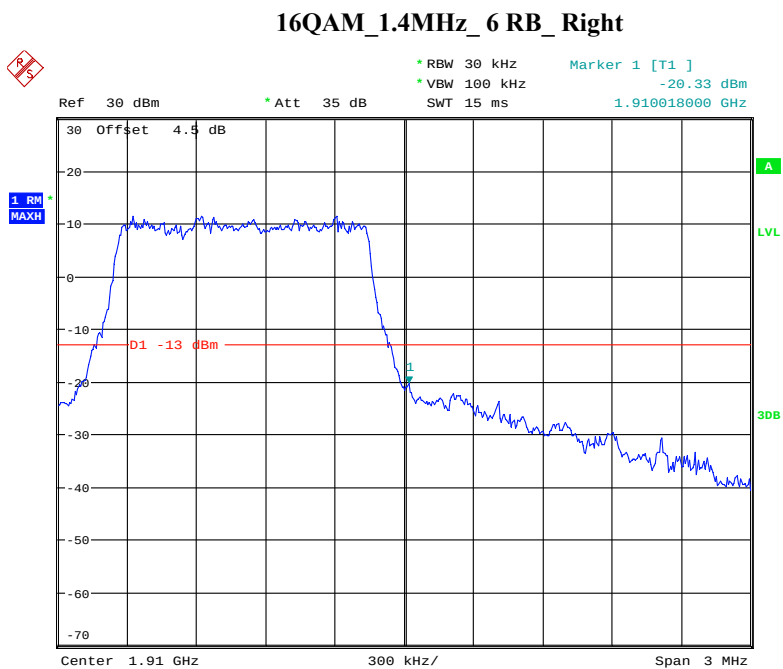
QPSK_20MHz_FULL RB_Right



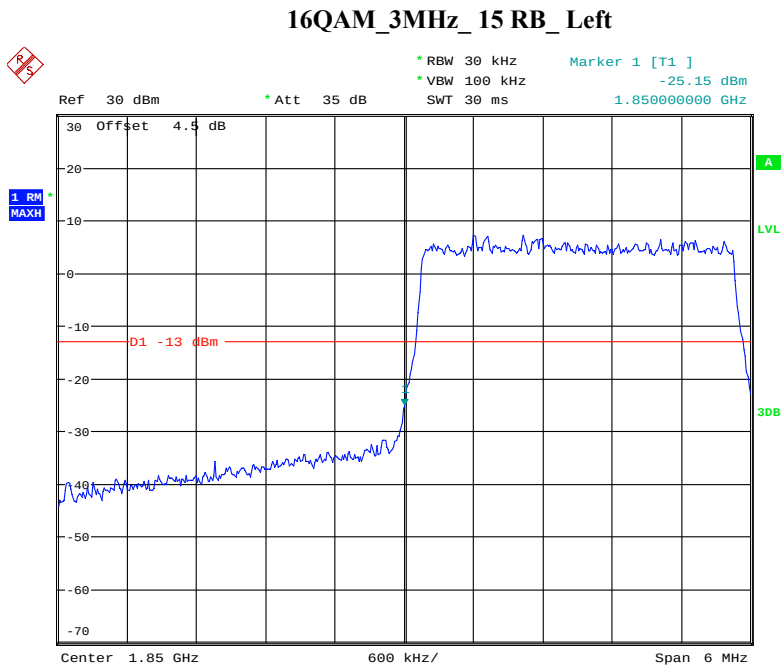
Date: 4.MAR.2019 10:59:18



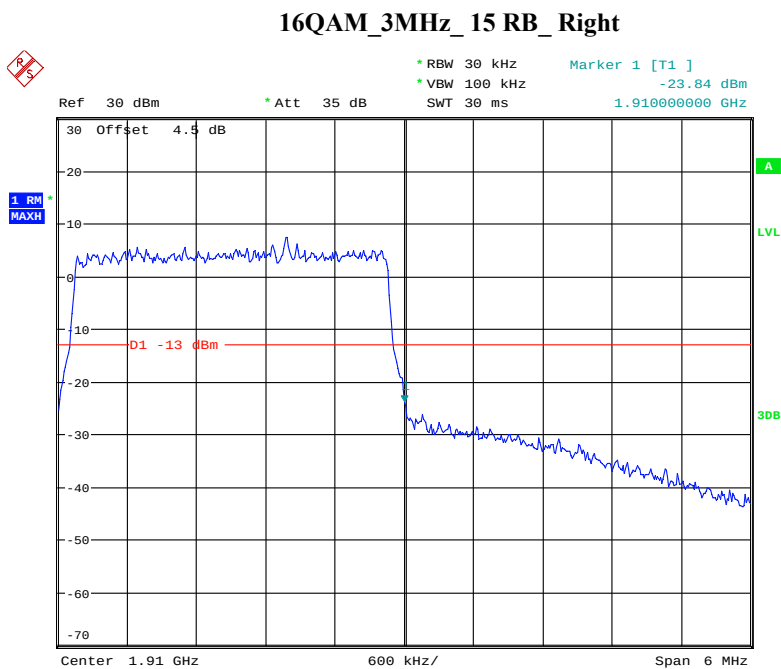
Date: 4.MAR.2019 10:45:10



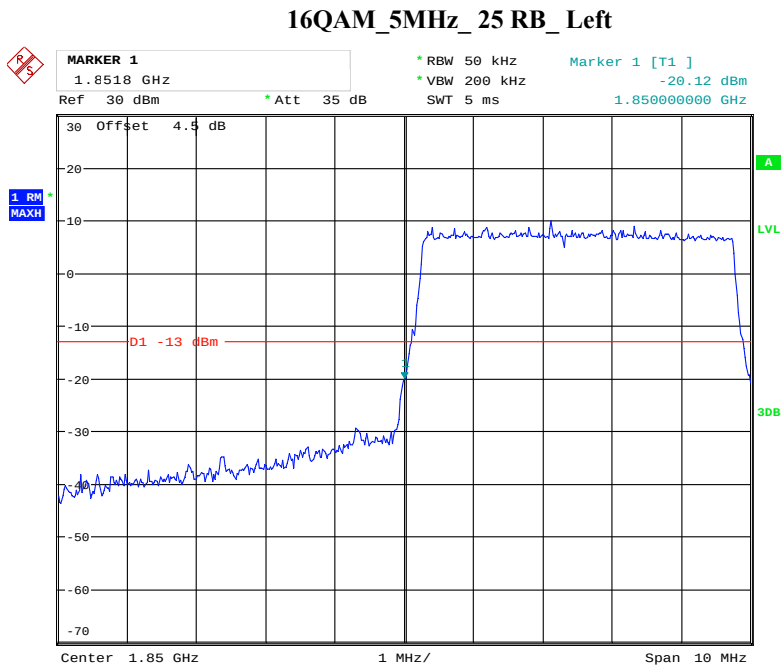
Date: 4.MAR.2019 10:46:28



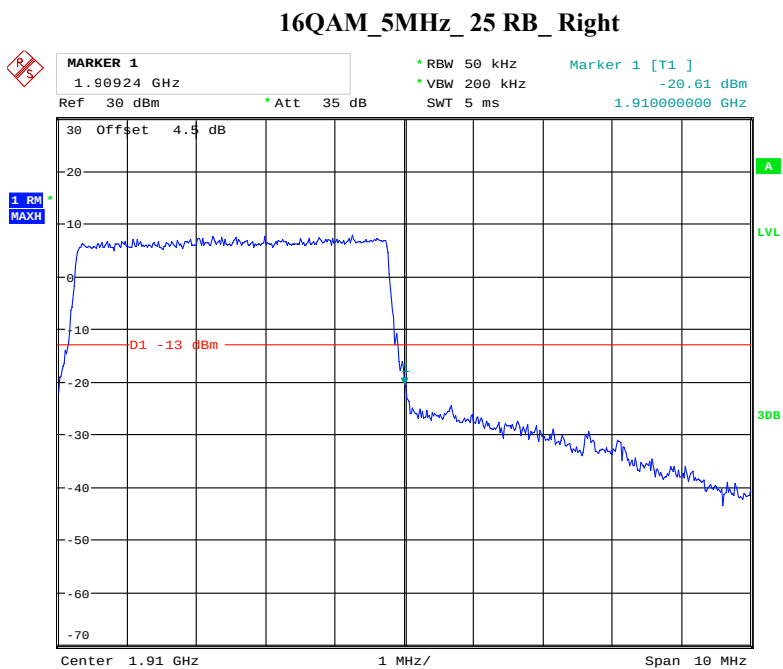
Date: 4.MAR.2019 10:47:42



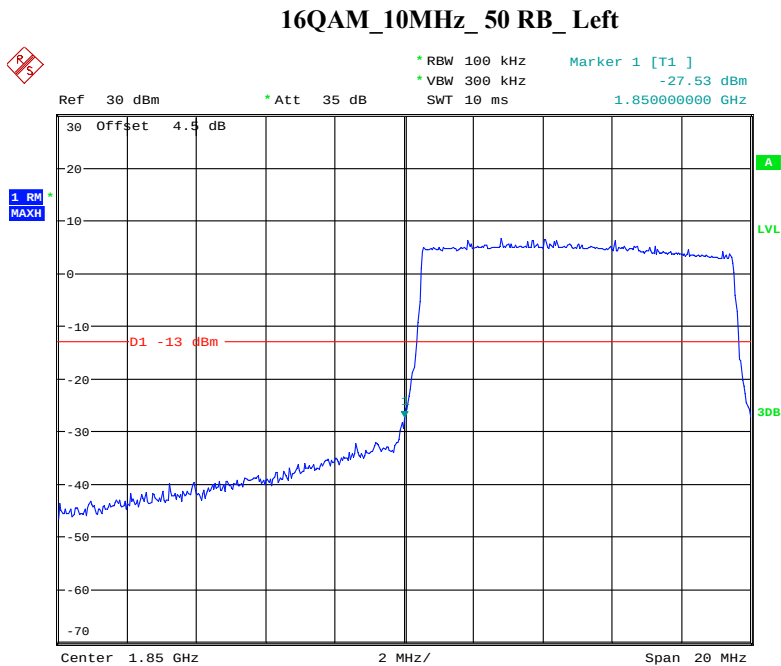
Date: 4.MAR.2019 10:48:49



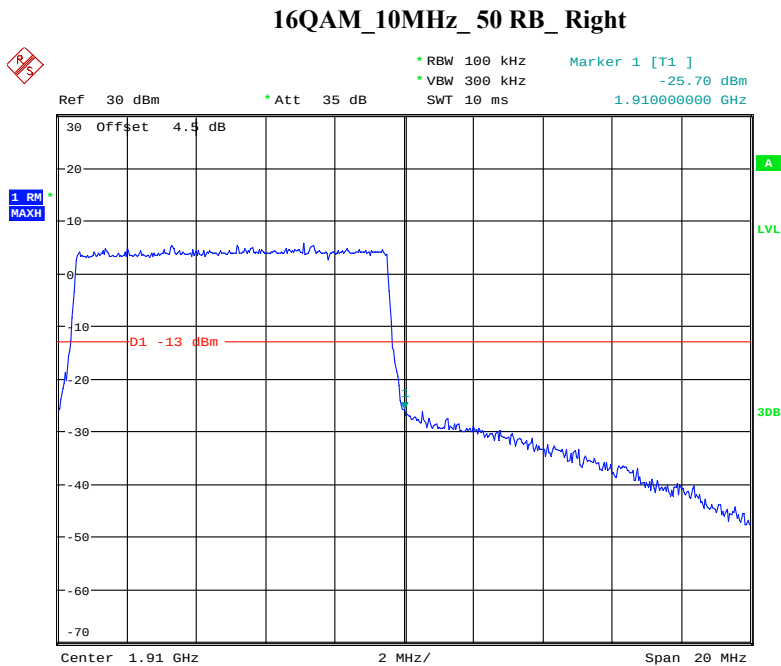
Date: 4.MAR.2019 10:50:38



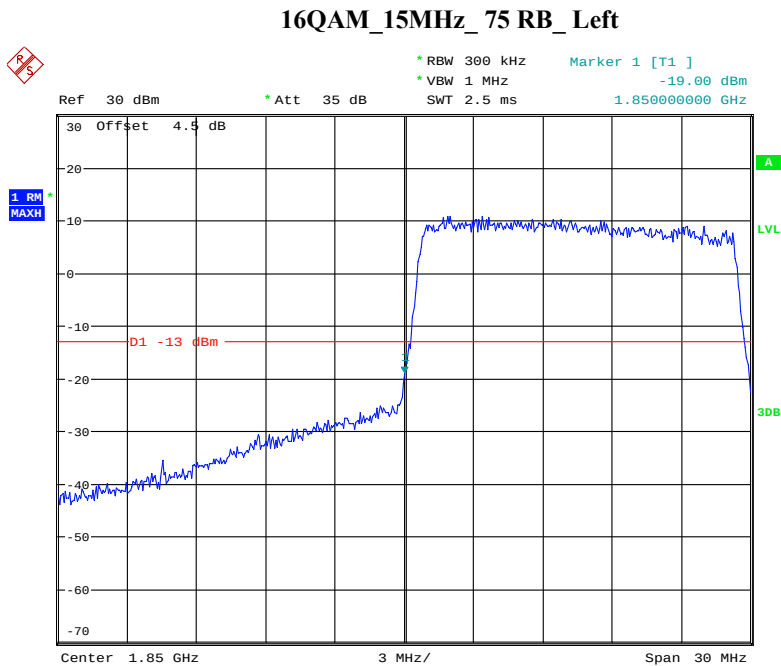
Date: 4.MAR.2019 10:52:10



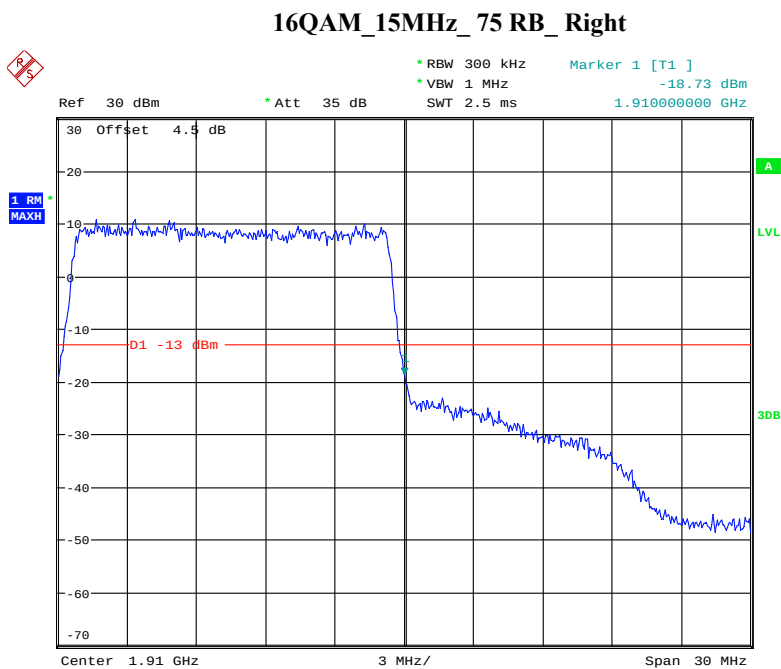
Date: 4.MAR.2019 10:53:15



Date: 4.MAR.2019 10:54:21

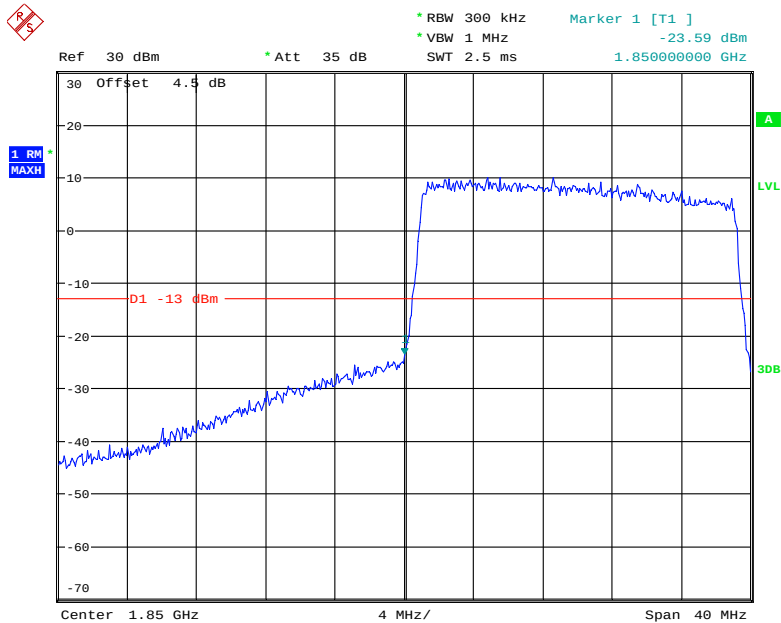


Date: 4.MAR.2019 10:55:47



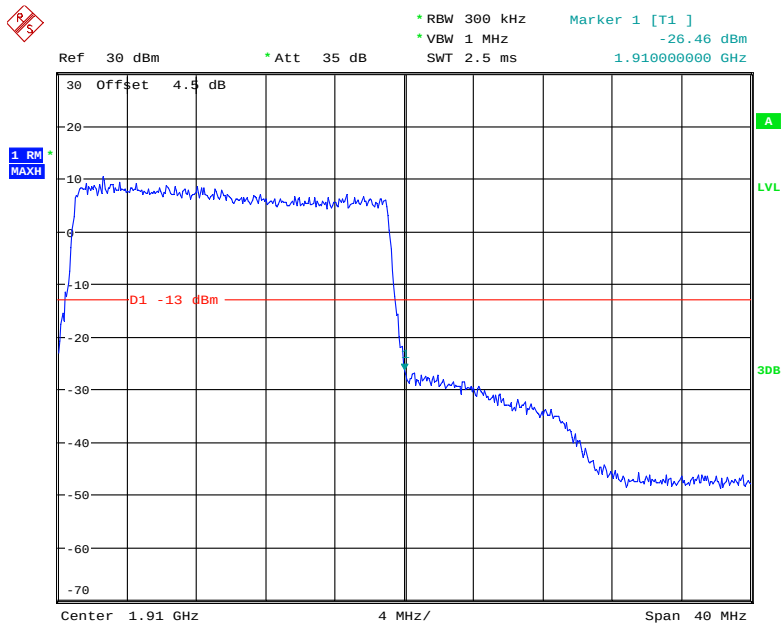
Date: 4.MAR.2019 10:57:06

16QAM_20MHz_ FULL RB_ Left



Date: 4.MAR.2019 10:58:37

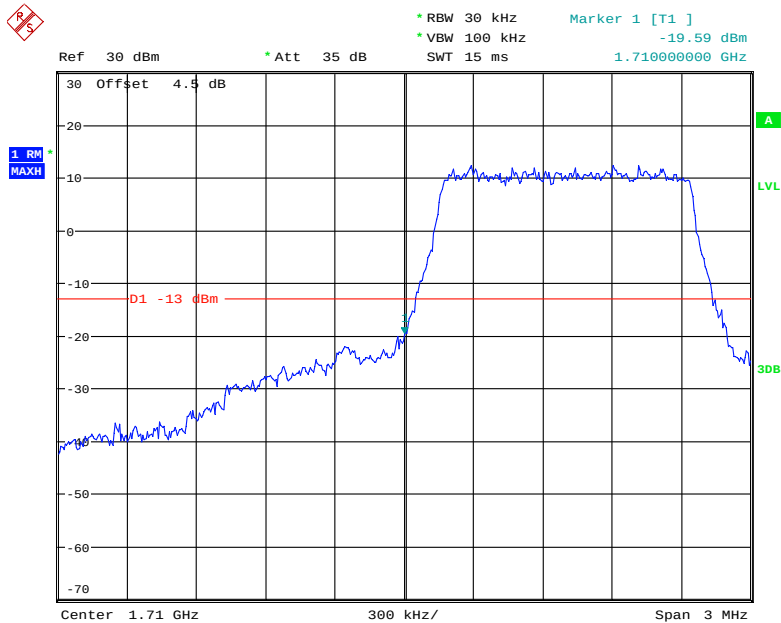
16QAM_20MHz_ FULL RB_ Right



Date: 4.MAR.2019 10:59:52

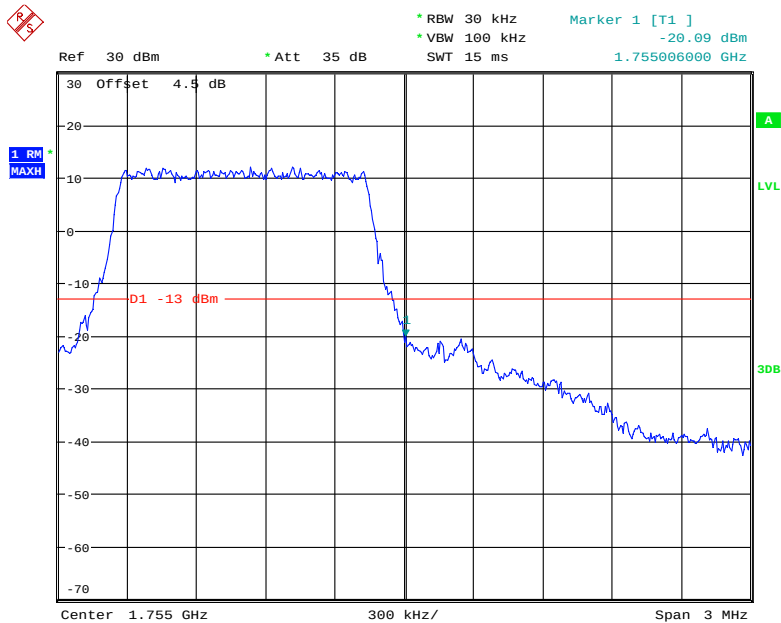
LTE Band 4

QPSK_1.4MHz_6 RB_ Left



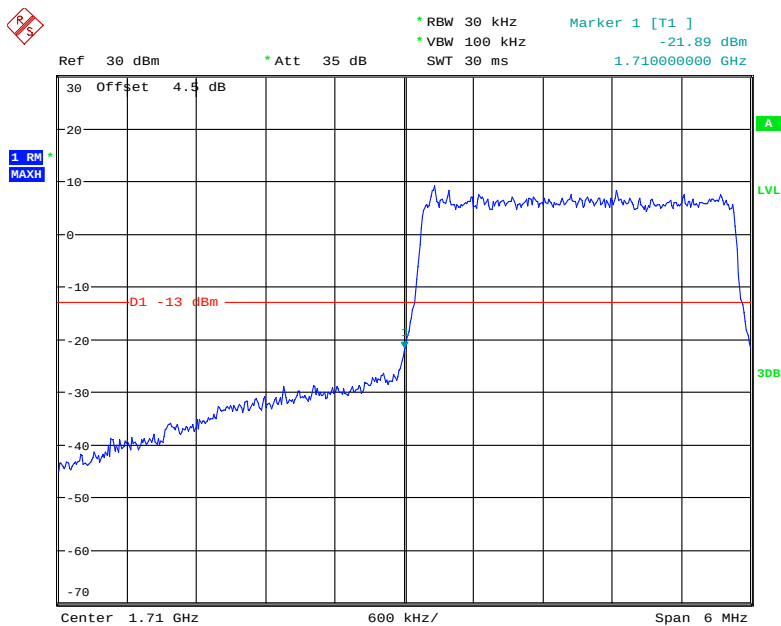
Date: 4.MAR.2019 11:00:43

QPSK_1.4MHz_6 RB_ Right



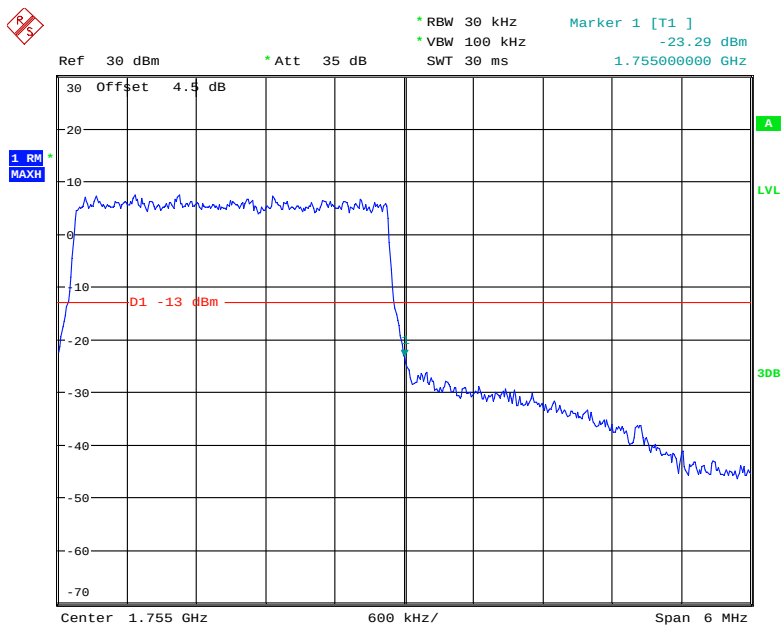
Date: 4.MAR.2019 11:01:50

QPSK_3MHz_15 RB_ Left



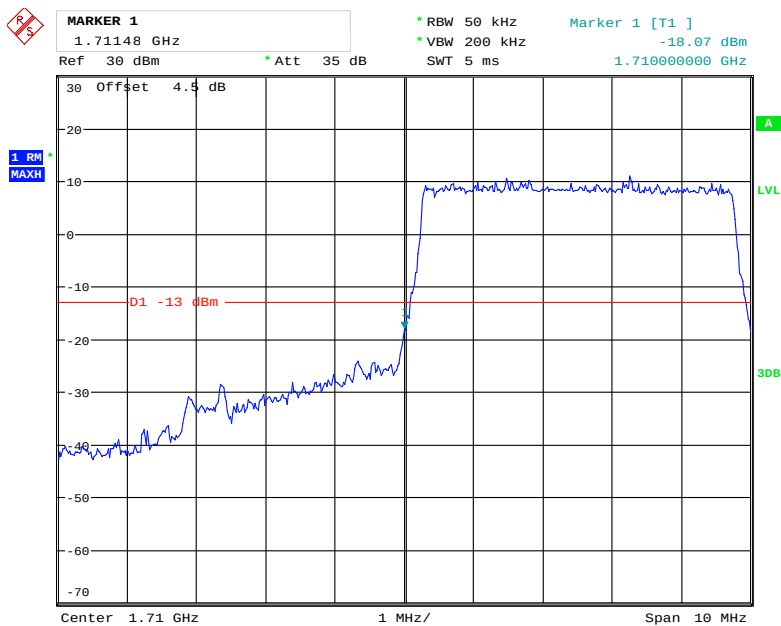
Date: 4.MAR.2019 11:03:04

QPSK_3MHz_15 RB_ Right



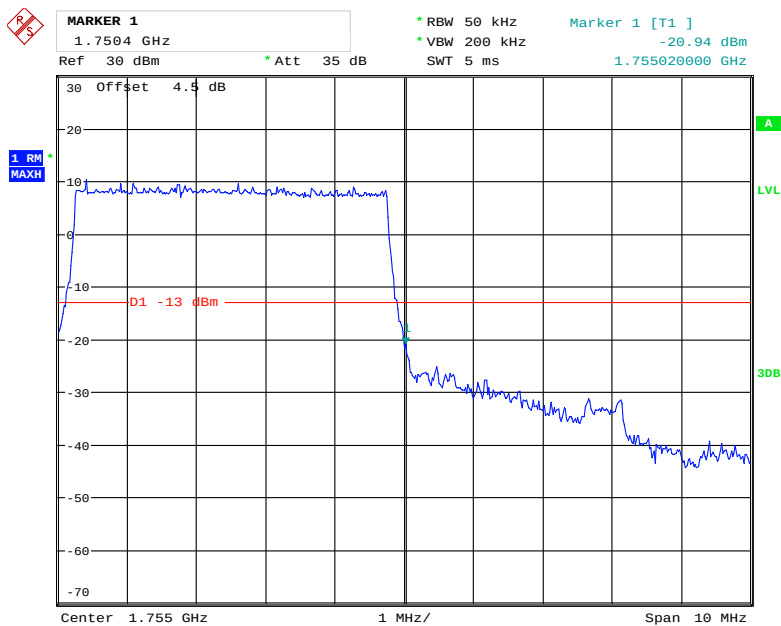
Date: 4.MAR.2019 11:04:04

QPSK_5MHz_25 RB_ Left



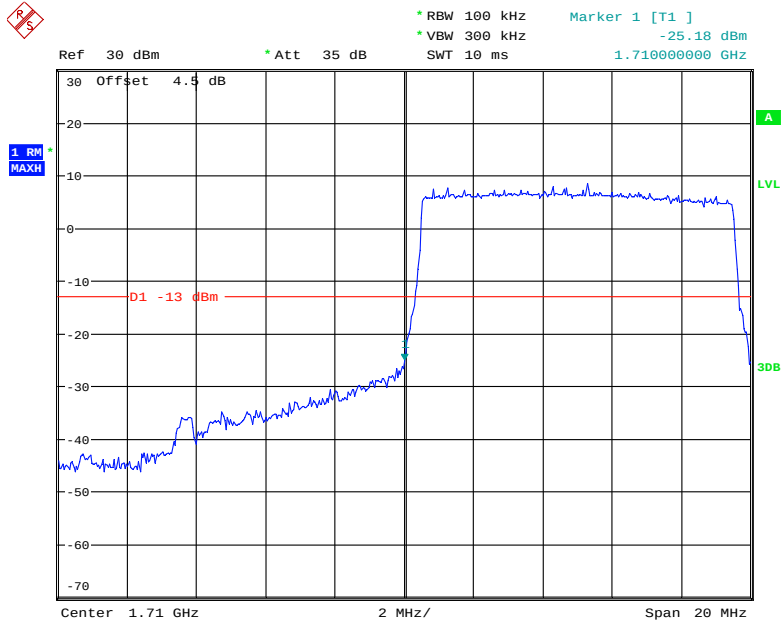
Date: 4.MAR.2019 11:05:23

QPSK_5MHz_25 RB_ Right



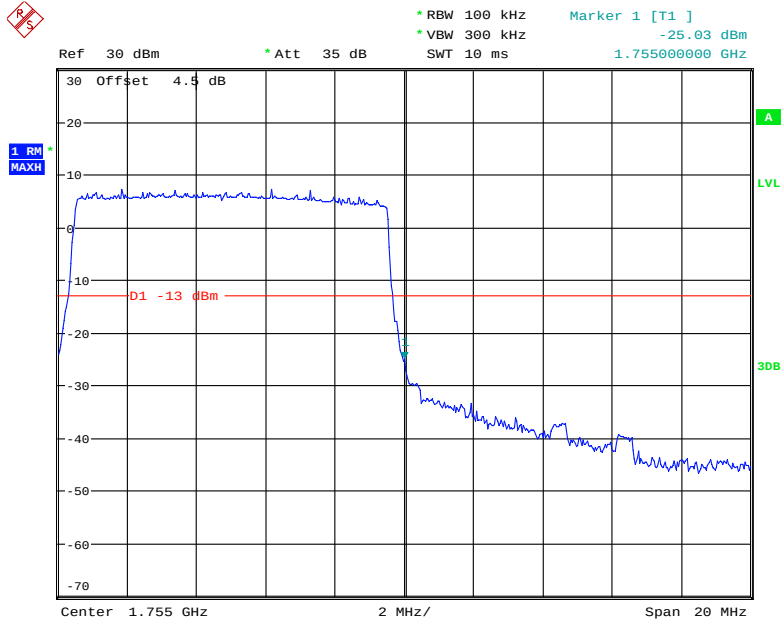
Date: 4.MAR.2019 11:08:39

QPSK_10MHz_50 RB_ Left



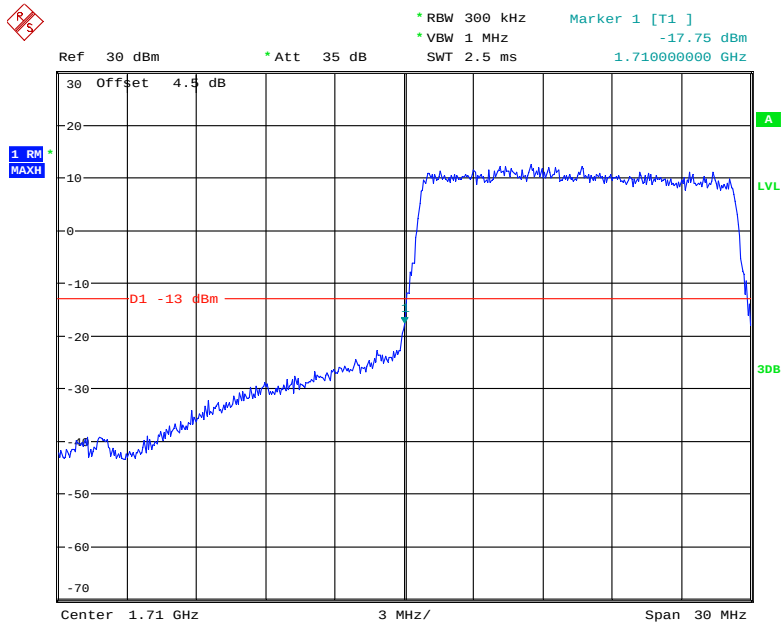
Date: 4.MAR.2019 11:12:28

QPSK_10MHz_50 RB_ Right



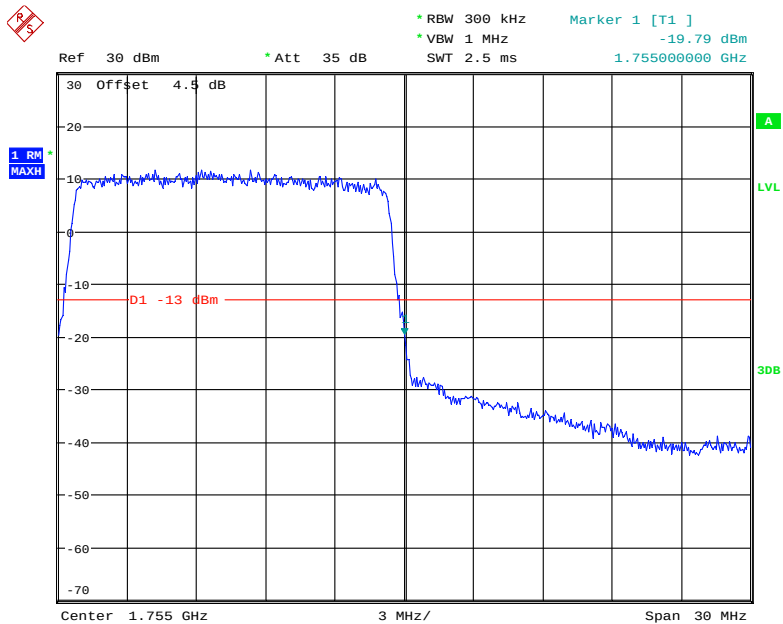
Date: 4.MAR.2019 11:13:37

QPSK_15MHz_75 RB_ Left



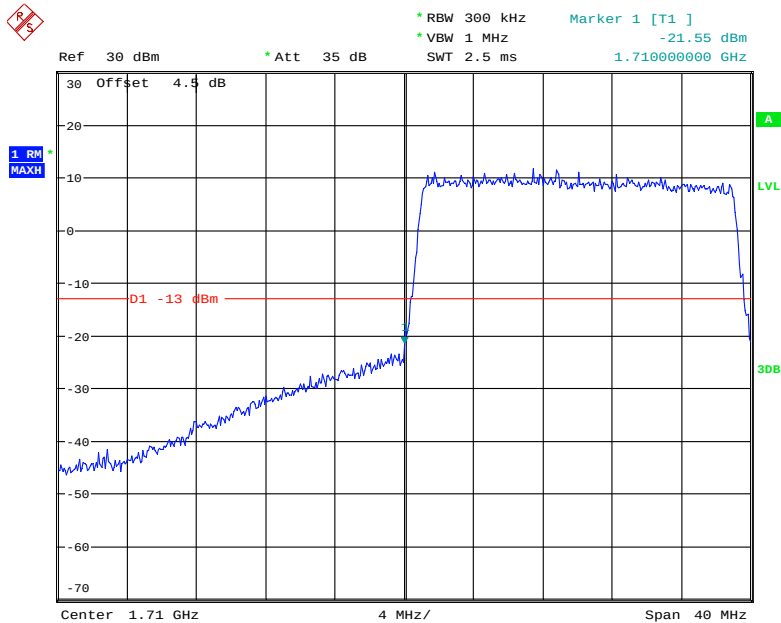
Date: 4.MAR.2019 11:14:55

QPSK_15MHz_75 RB_ Right



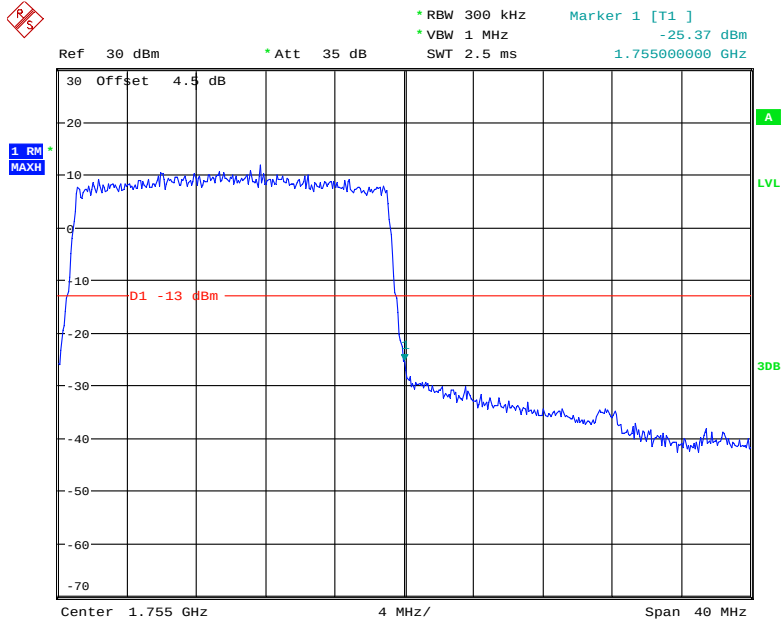
Date: 4.MAR.2019 11:16:16

QPSK_20MHz_FULL RB_Left

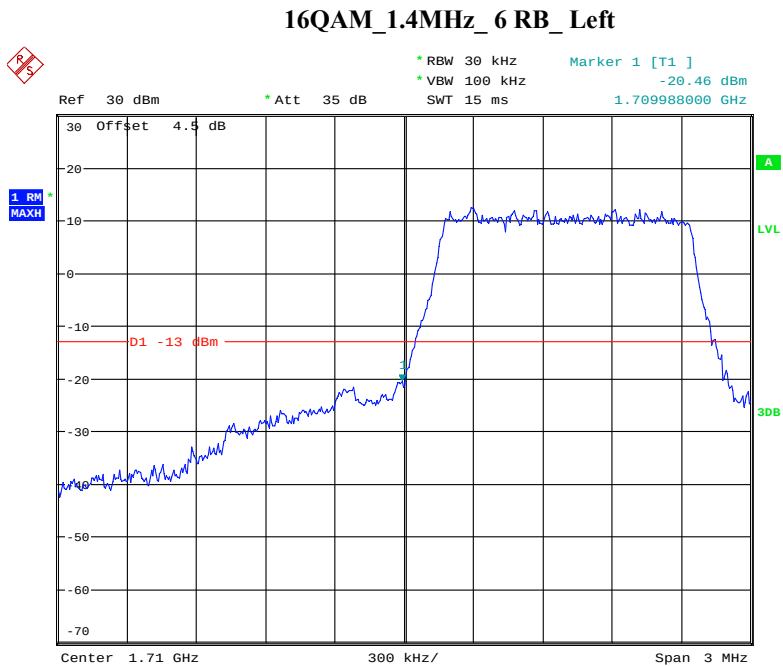


Date: 4.MAR.2019 11:24:15

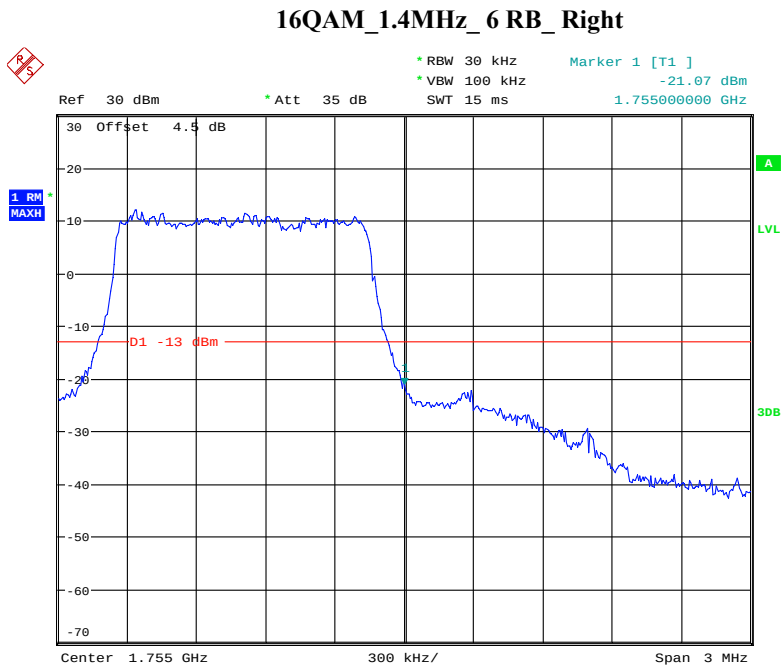
QPSK_20MHz_FULL RB_Right



Date: 4.MAR.2019 11:26:22

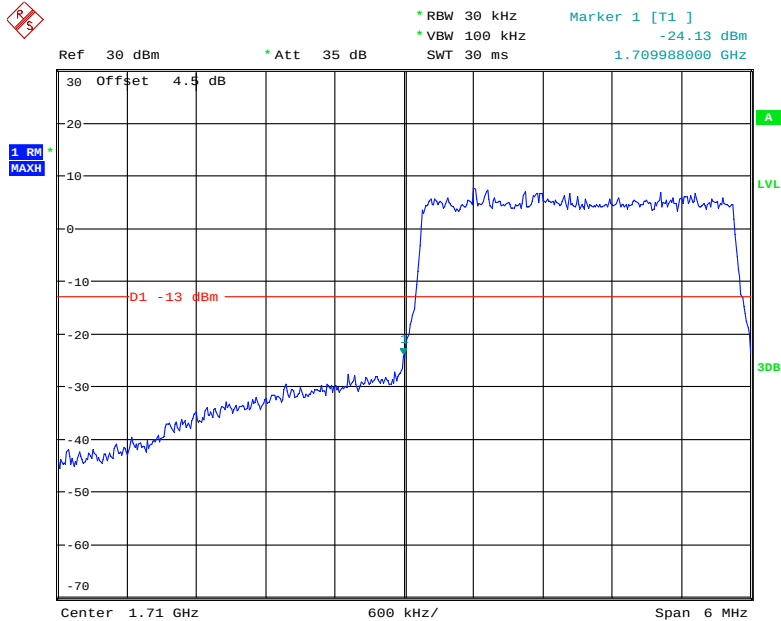


Date: 4.MAR.2019 11:01:20



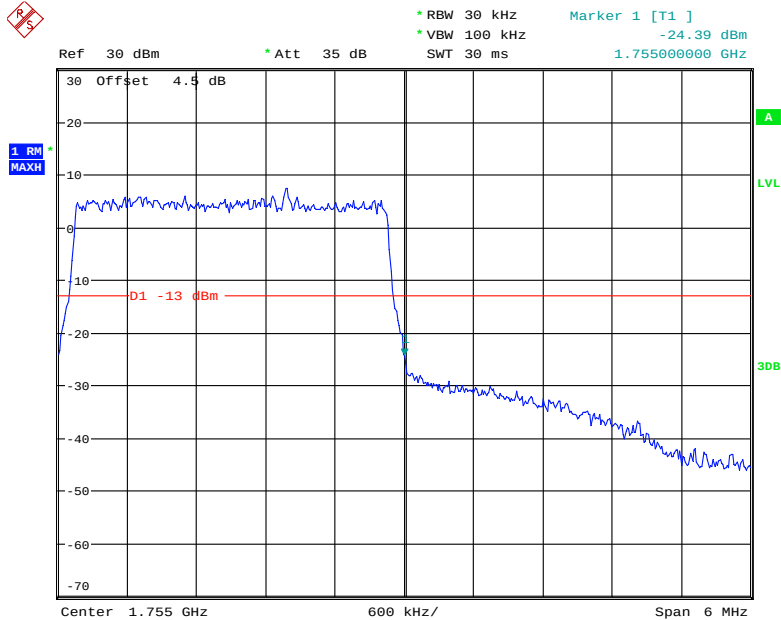
Date: 4.MAR.2019 11:02:27

16QAM_3MHz_15 RB_ Left



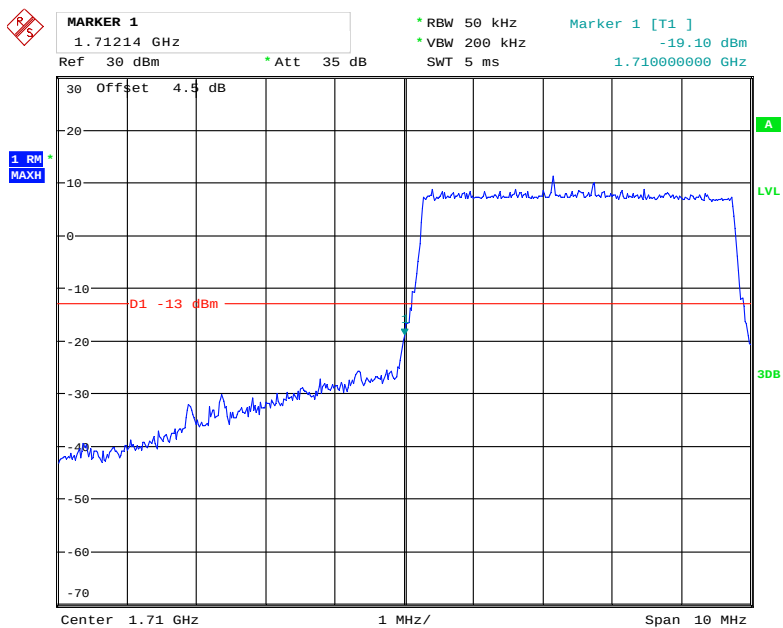
Date: 4.MAR.2019 11:03:30

16QAM_3MHz_15 RB_ Right



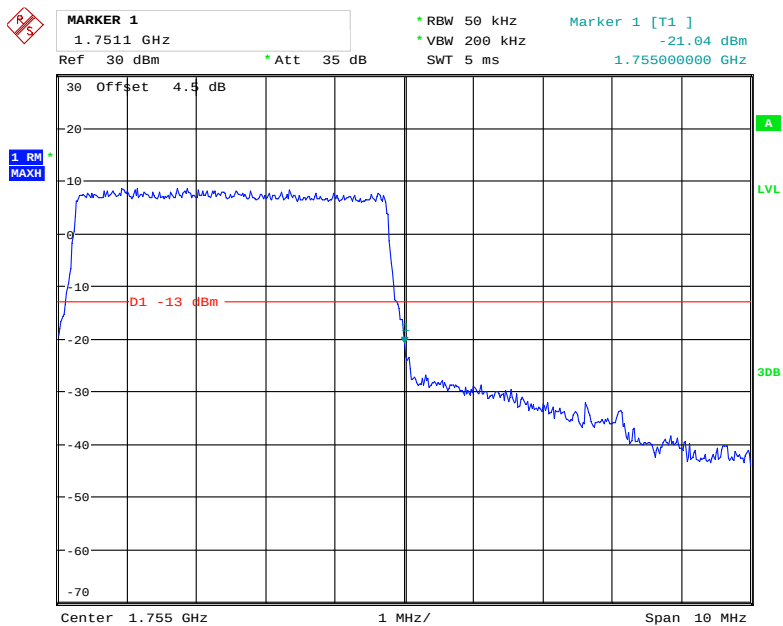
Date: 4.MAR.2019 11:04:30

16QAM_5MHz_25 RB_ Left

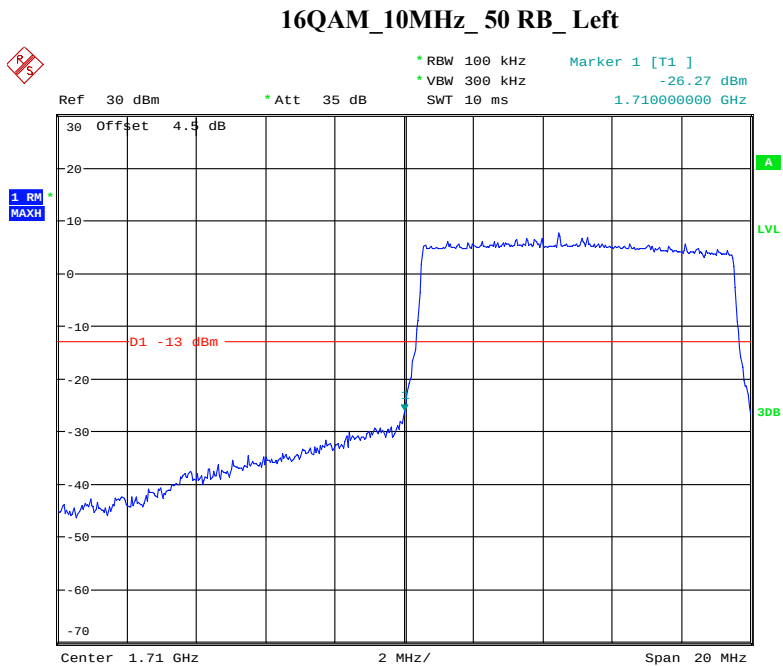


Date: 4.MAR.2019 11:07:51

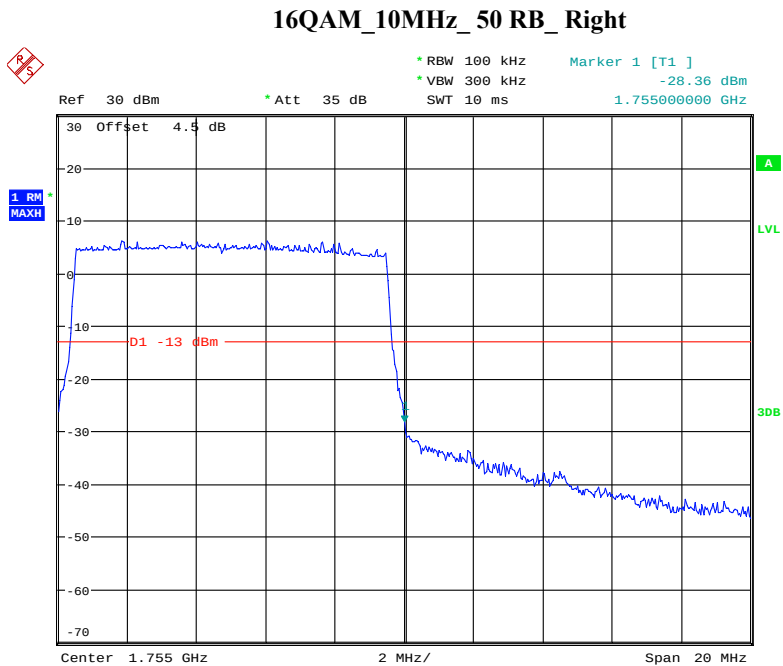
16QAM_5MHz_25 RB_ Right



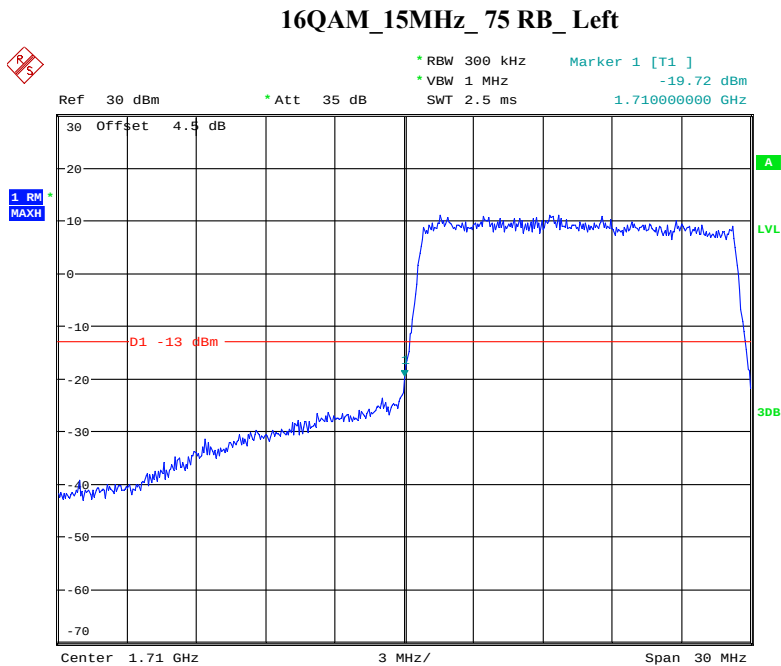
Date: 4.MAR.2019 11:09:36



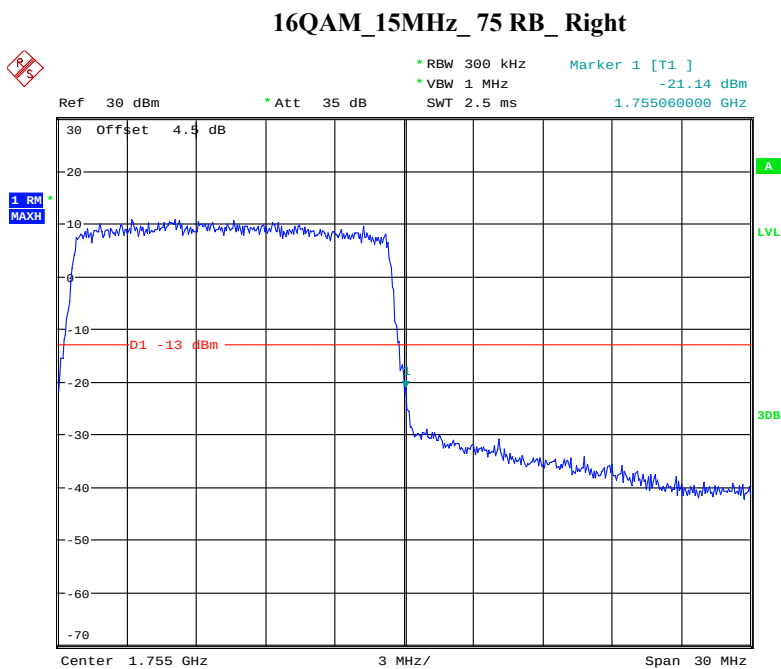
Date: 4.MAR.2019 11:13:02



Date: 4.MAR.2019 11:14:11

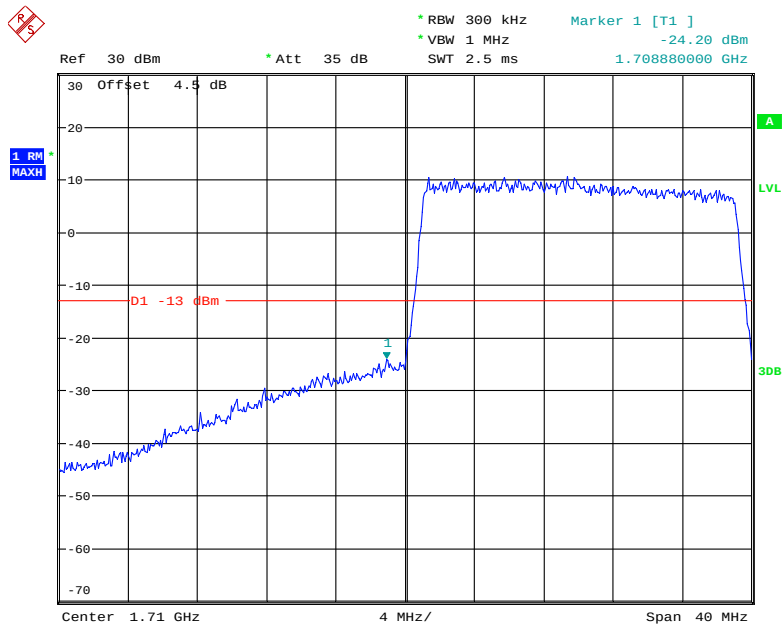


Date: 4.MAR.2019 11:15:32



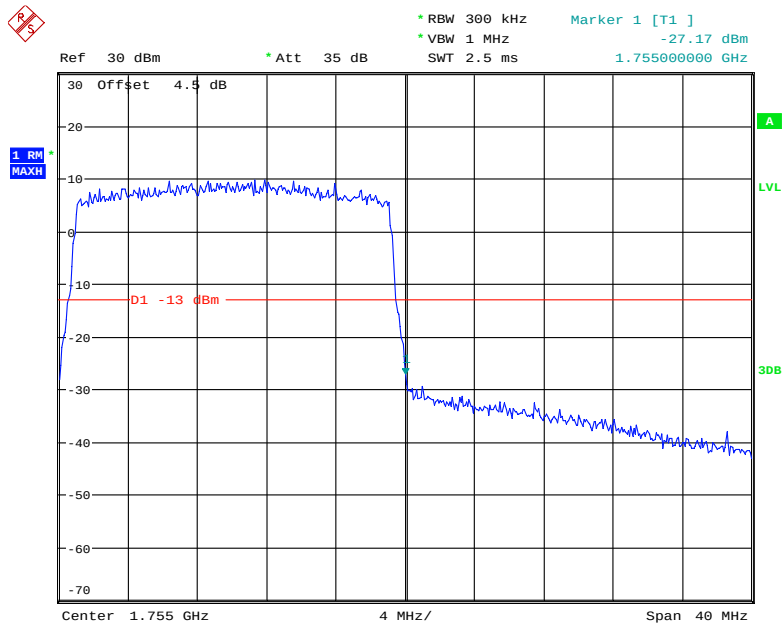
Date: 4.MAR.2019 11:16:56

16QAM_20MHz_FULL RB_Left



Date: 4.MAR.2019 11:25:45

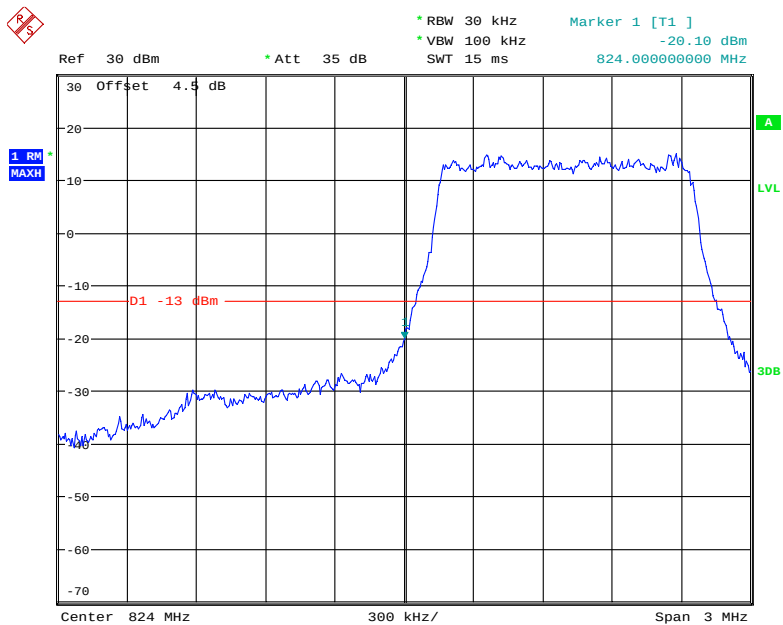
16QAM_20MHz_FULL RB_Right



Date: 4.MAR.2019 11:26:59

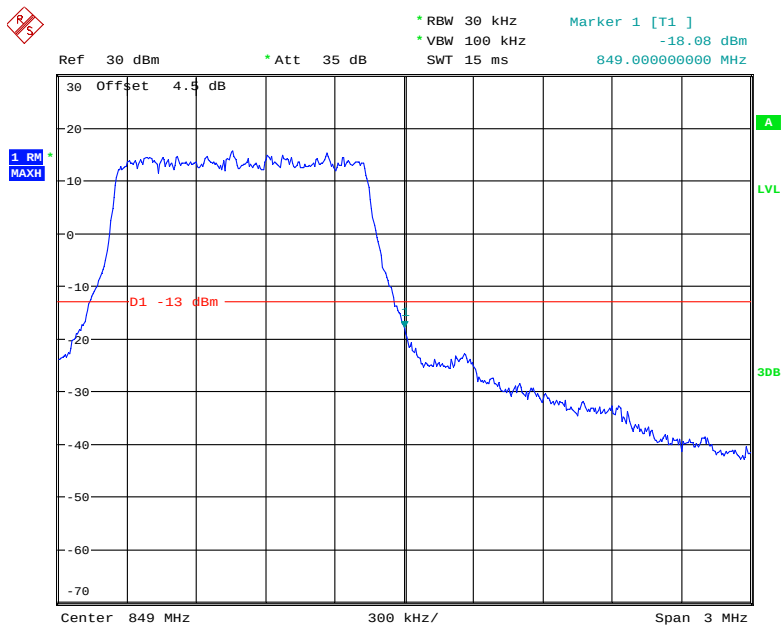
LTE Band 5

QPSK_1.4MHz_6 RB_ Left



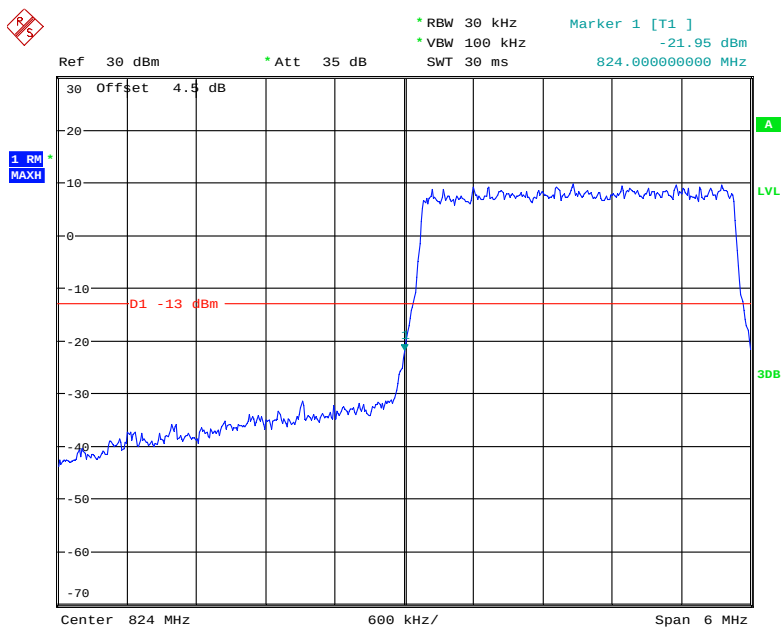
Date: 4.MAR.2019 11:31:37

QPSK_1.4MHz_6 RB_ Right



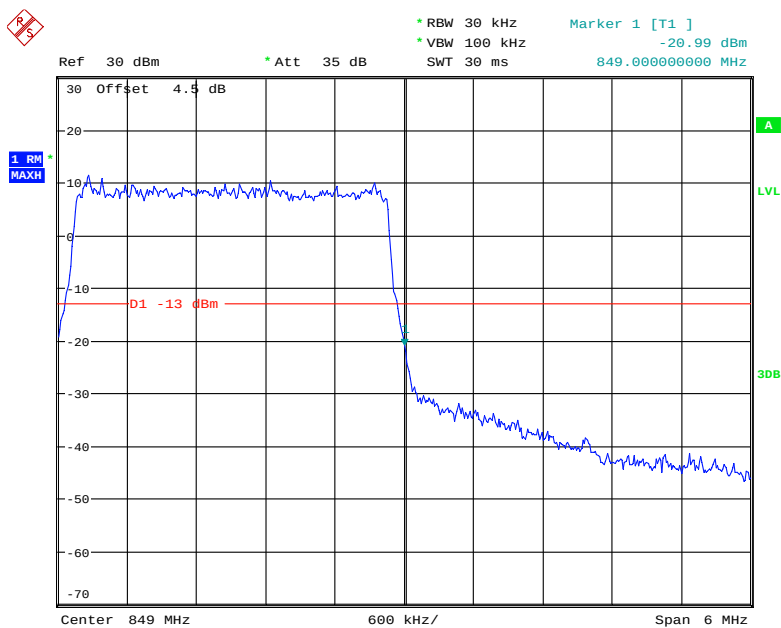
Date: 4.MAR.2019 11:32:50

QPSK_3MHz_15 RB_ Left



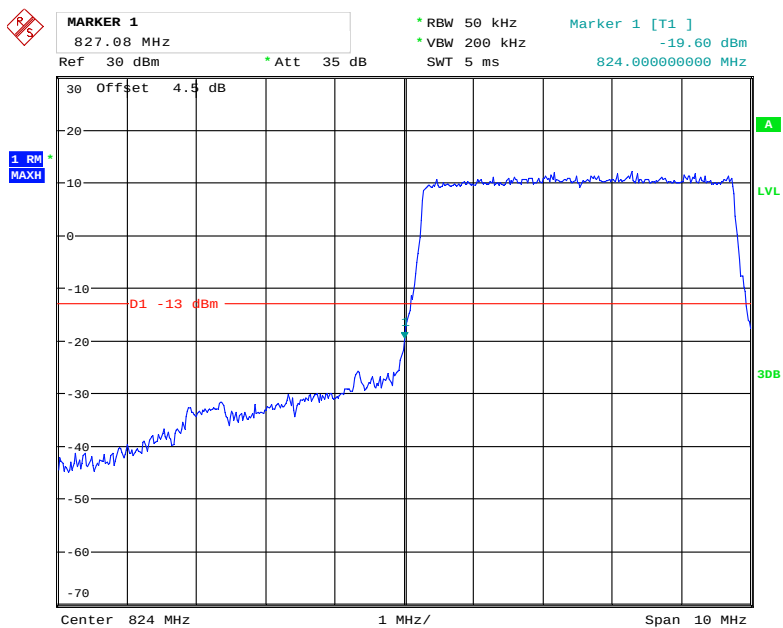
Date: 4.MAR.2019 11:43:54

QPSK_3MHz_15 RB_ Right



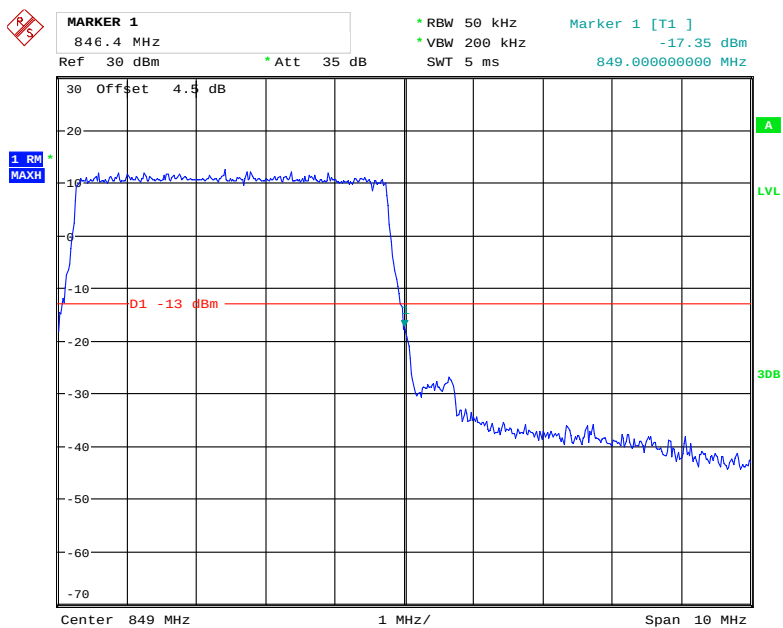
Date: 4.MAR.2019 11:44:54

QPSK_5MHz_25 RB_ Left



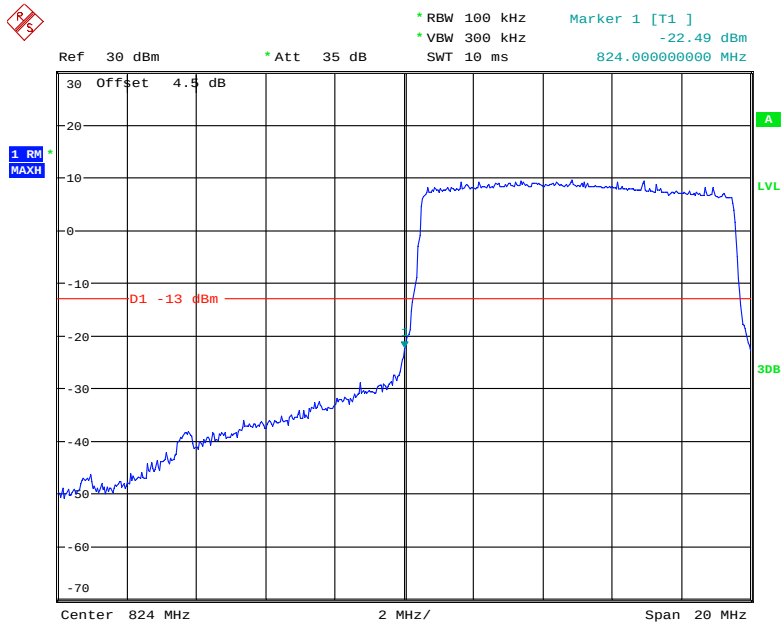
Date: 4.MAR.2019 11:47:19

QPSK_5MHz_25 RB_ Right



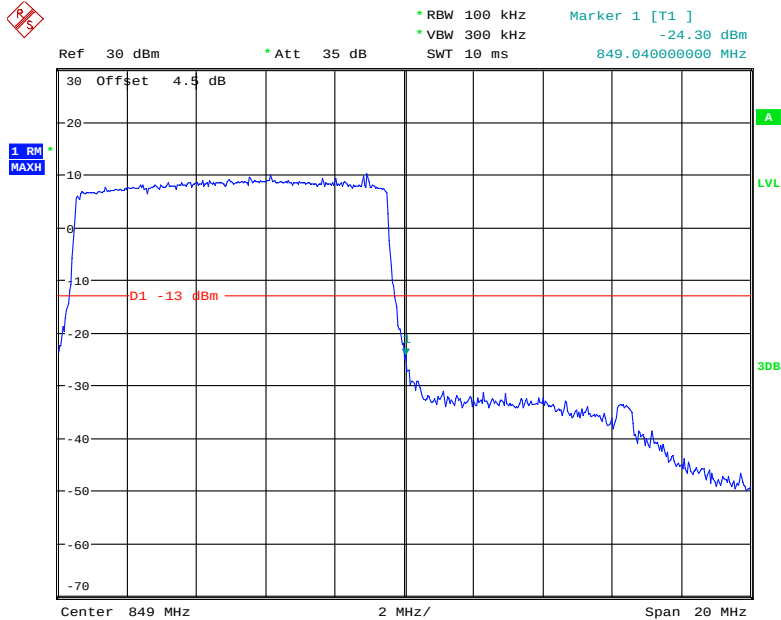
Date: 4.MAR.2019 11:48:50

QPSK_10MHz_50 RB_ Left

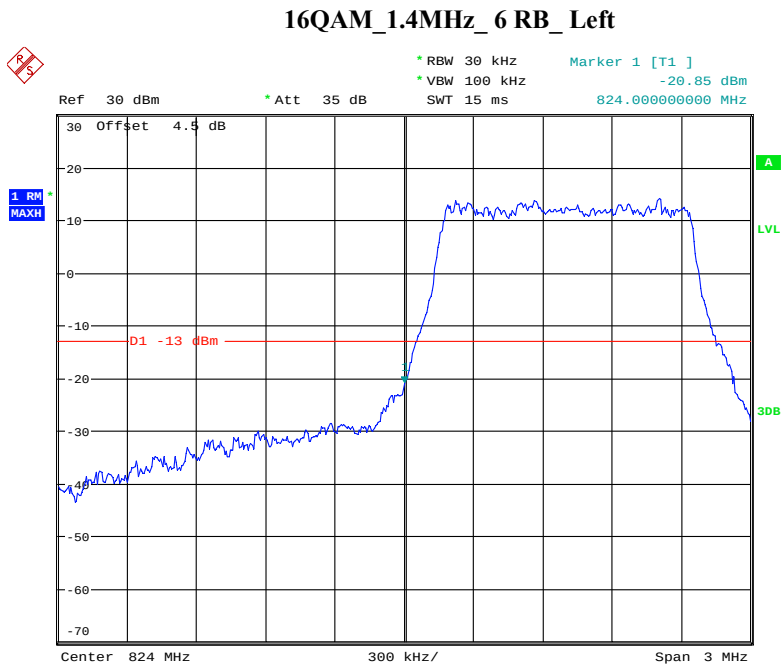


Date: 4.MAR.2019 11:51:41

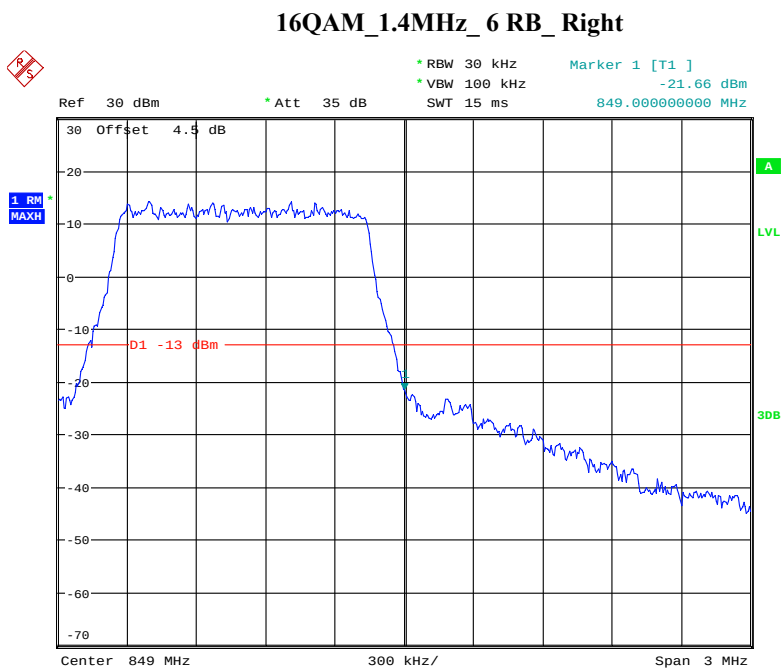
QPSK_10MHz_50 RB_ Right



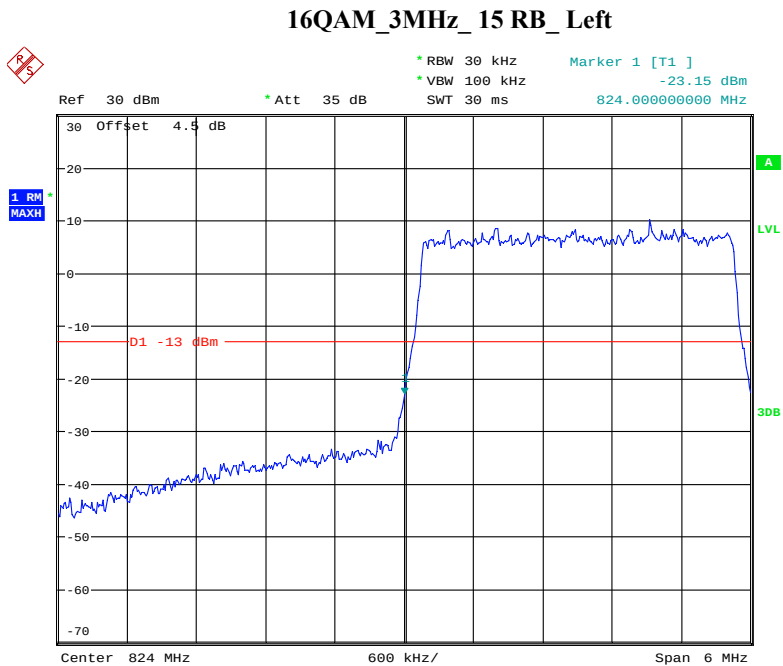
Date: 4.MAR.2019 11:52:40



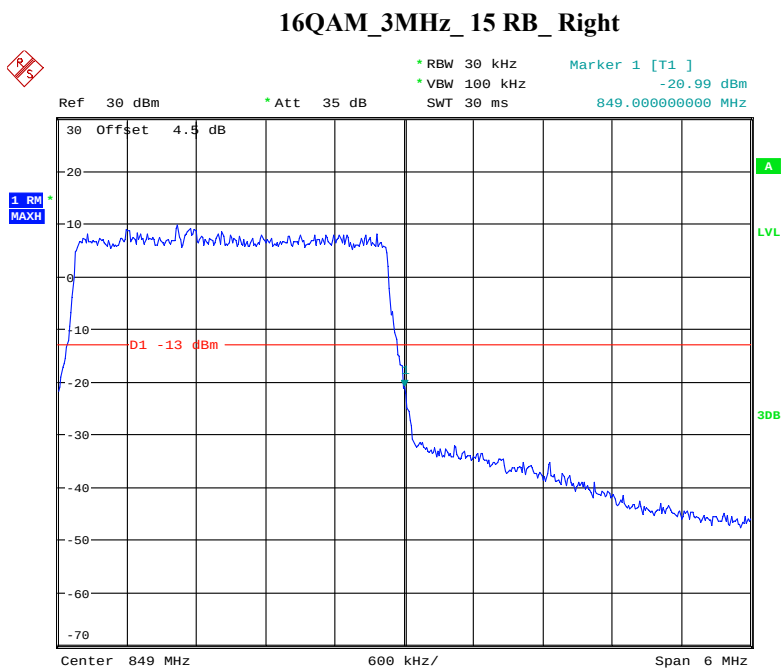
Date: 4.MAR.2019 11:32:15



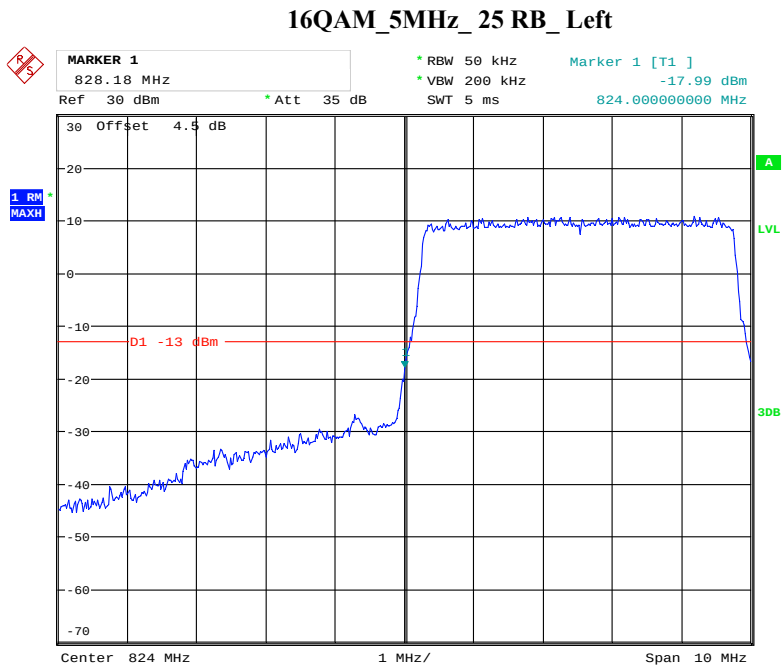
Date: 4.MAR.2019 11:33:19



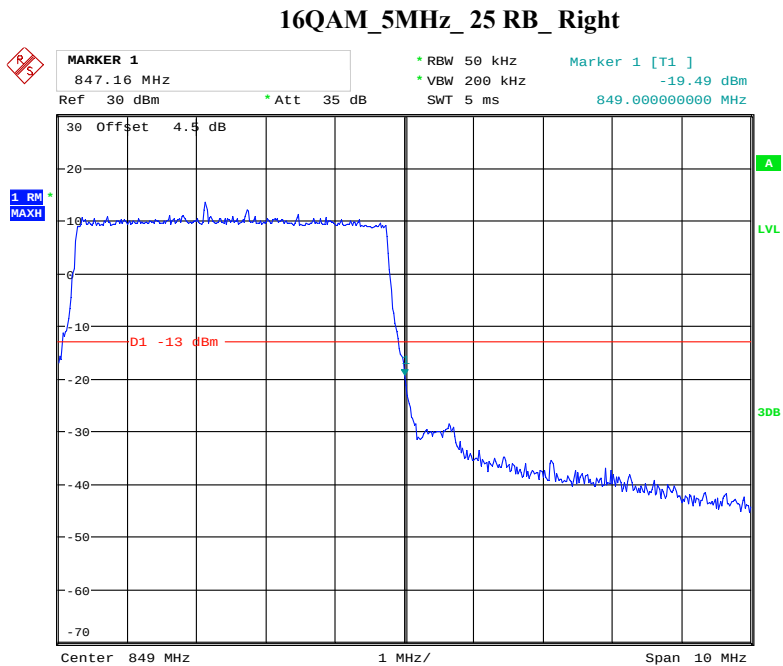
Date: 4.MAR.2019 11:44:20



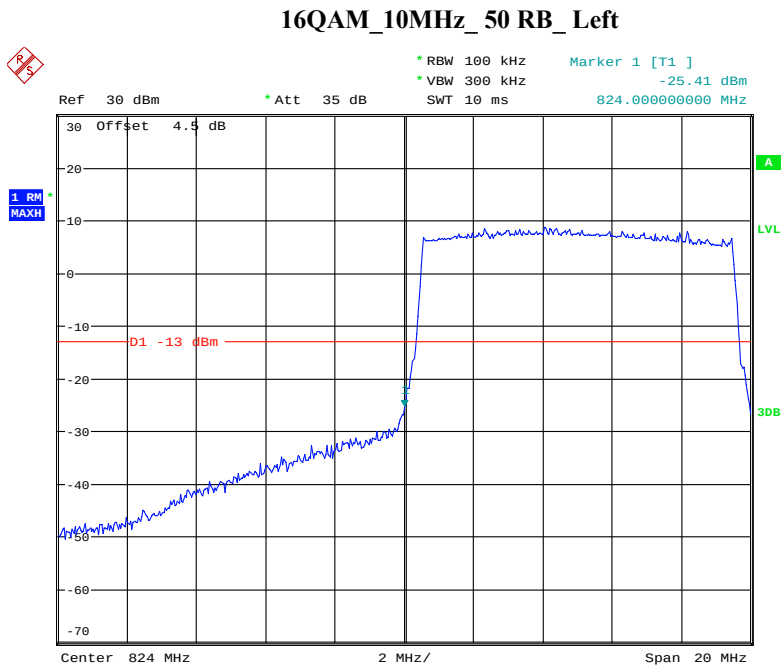
Date: 4.MAR.2019 11:45:20



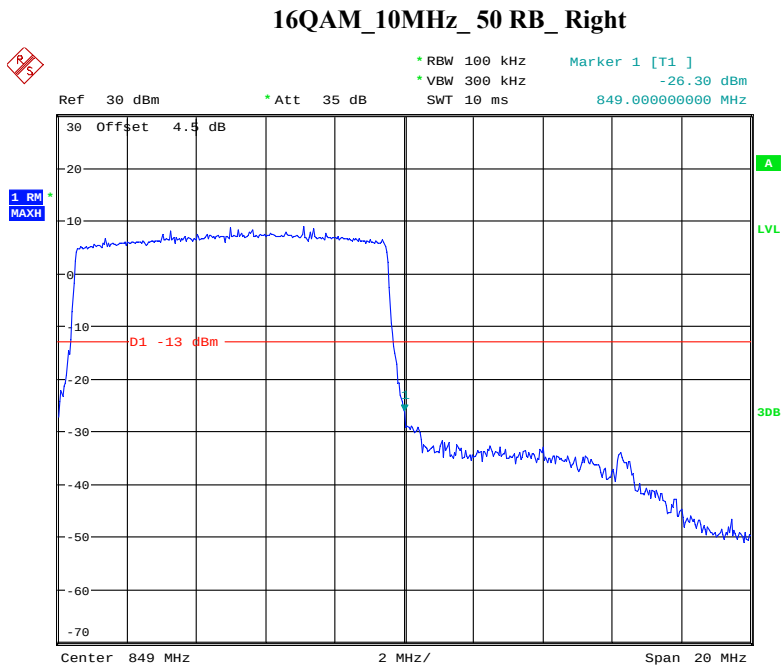
Date: 4.MAR.2019 11:48:07



Date: 4.MAR.2019 11:49:27



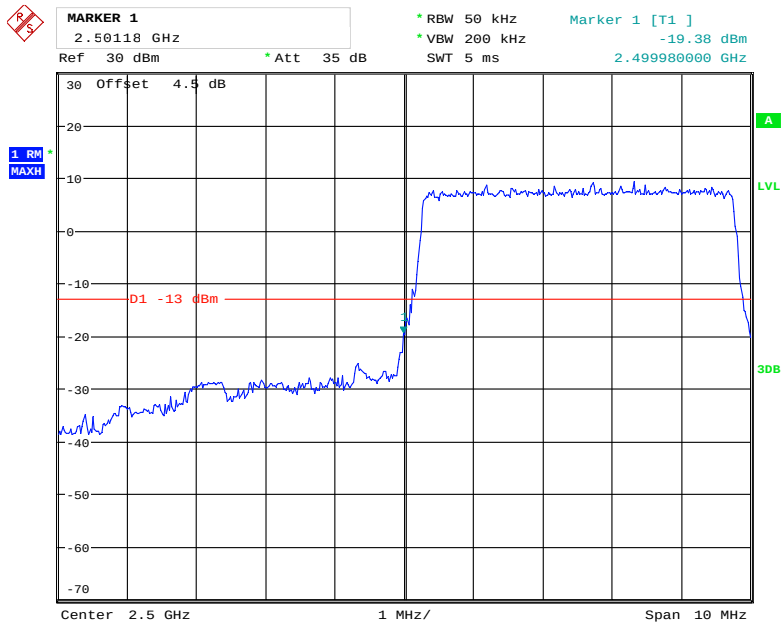
Date: 4.MAR.2019 11:52:12



Date: 4.MAR.2019 11:53:03

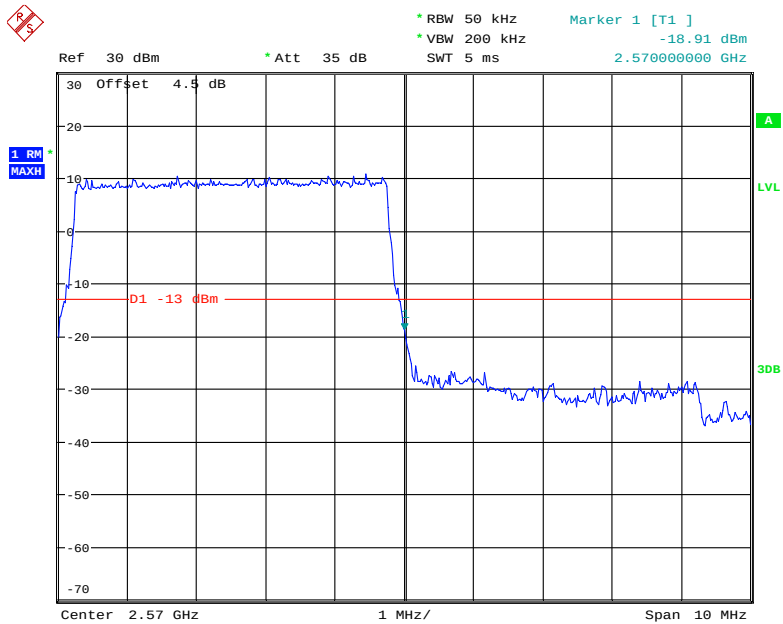
LTE Band 7

QPSK_5MHz_25 RB_ Left



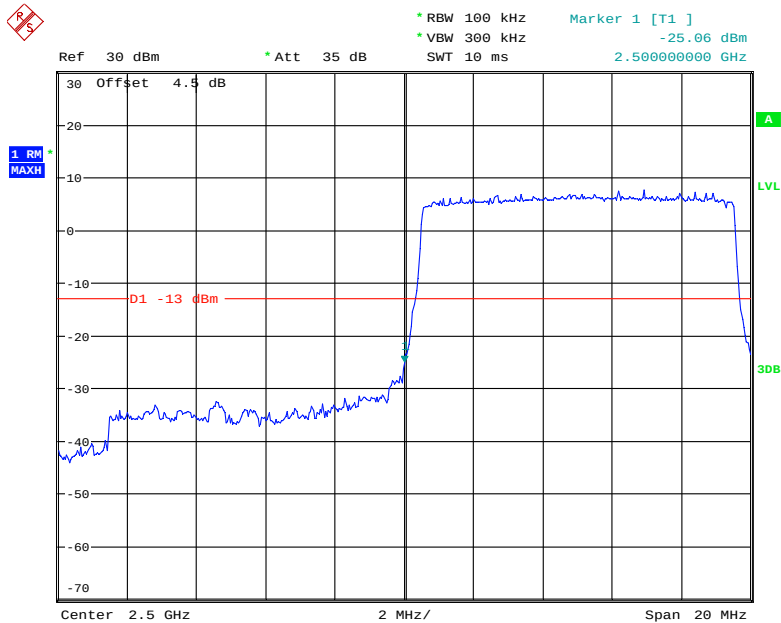
Date: 4.MAR.2019 11:53:50

QPSK_5MHz_25 RB_ Right



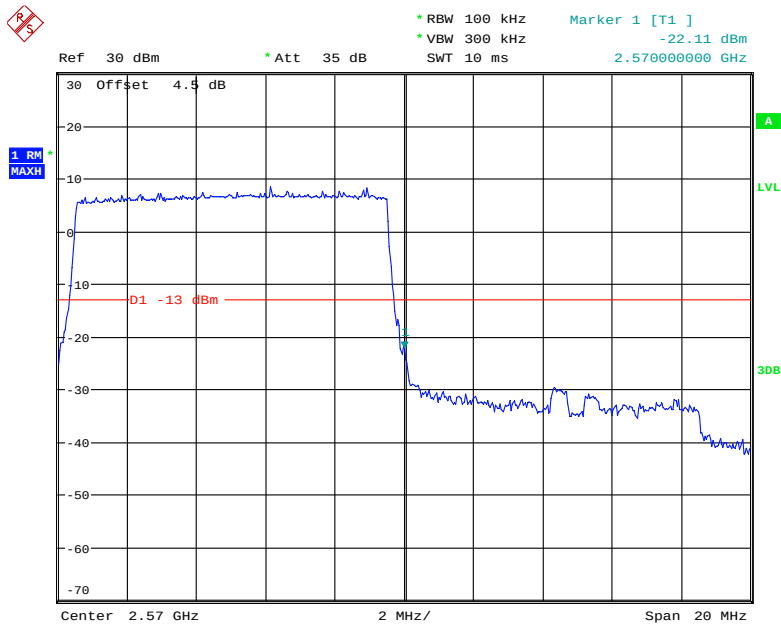
Date: 4.MAR.2019 14:04:37

QPSK_10MHz_50 RB_ Left



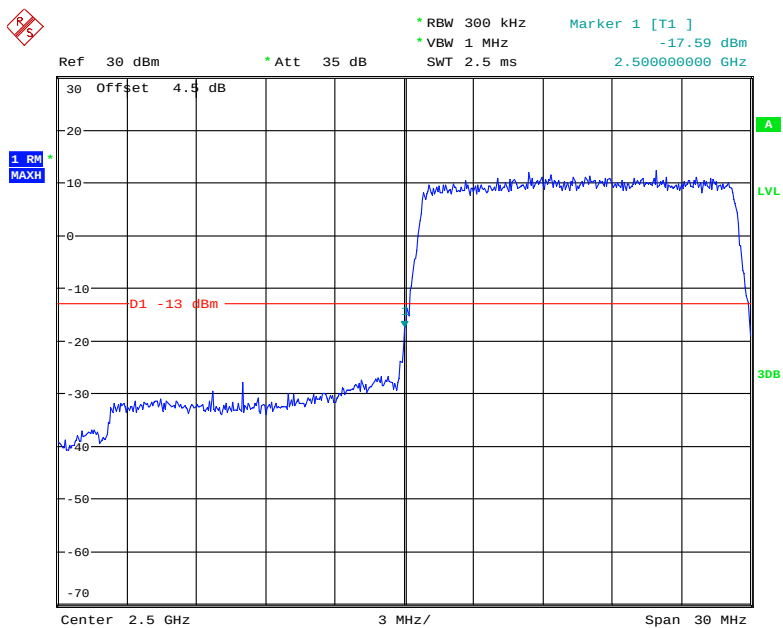
Date: 4.MAR.2019 11:57:08

QPSK_10MHz_50 RB_ Right



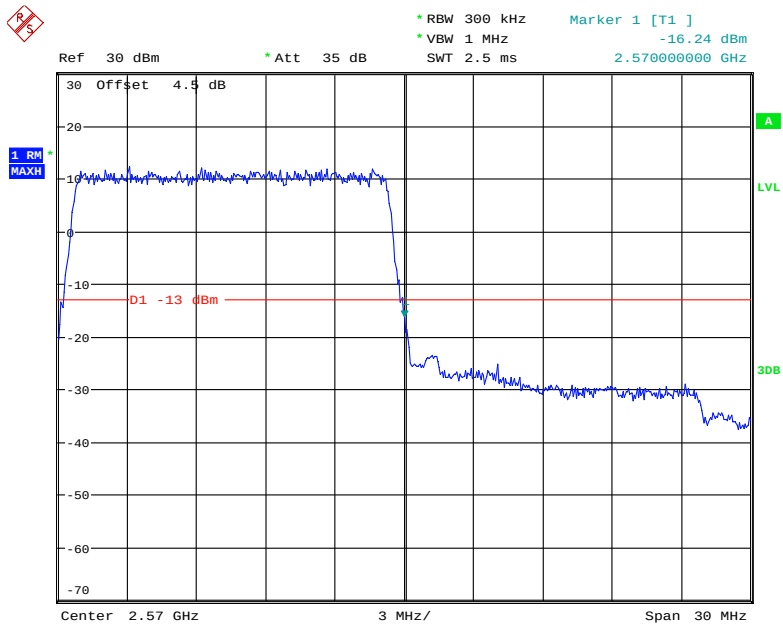
Date: 4.MAR.2019 11:58:14

QPSK_15MHz_75 RB_Left



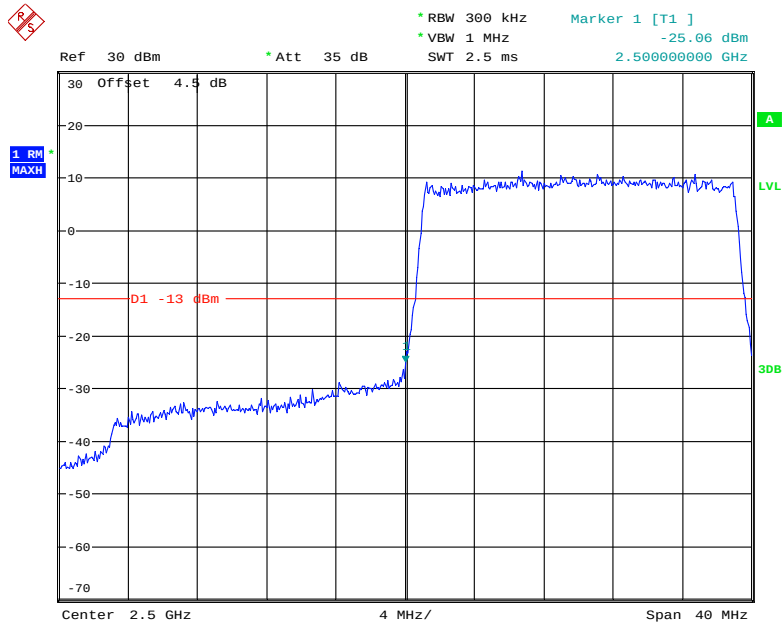
Date: 4.MAR.2019 11:59:32

QPSK_15MHz_75 RB_Right



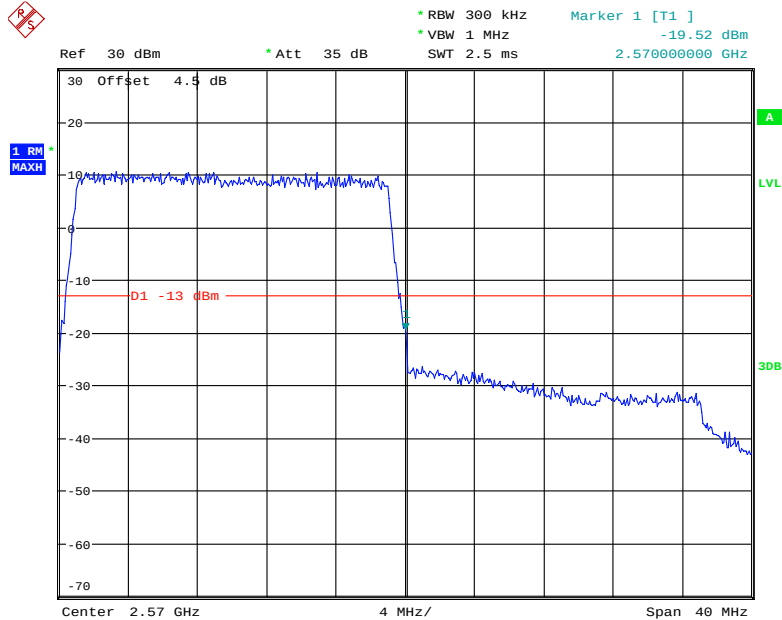
Date: 4.MAR.2019 12:00:50

QPSK_20MHz_FULL RB_Left

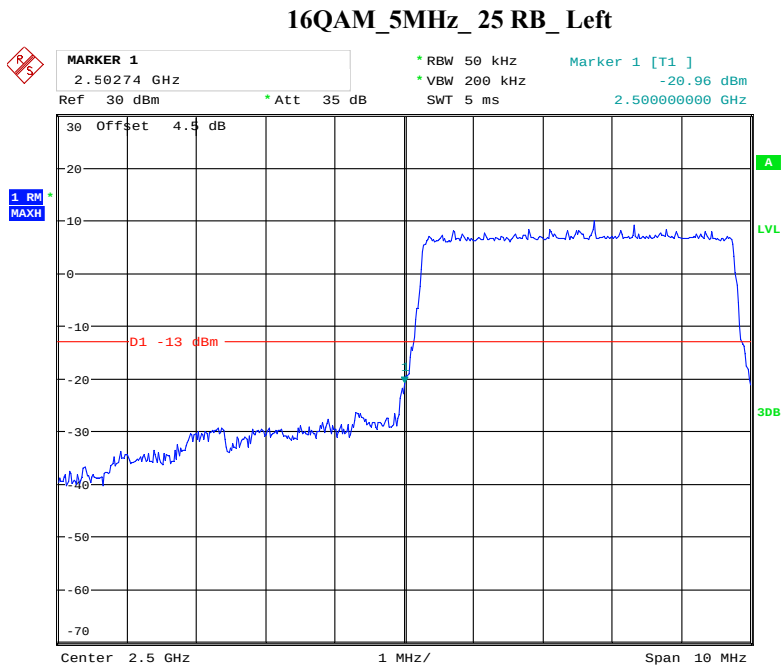


Date: 4.MAR.2019 12:10:49

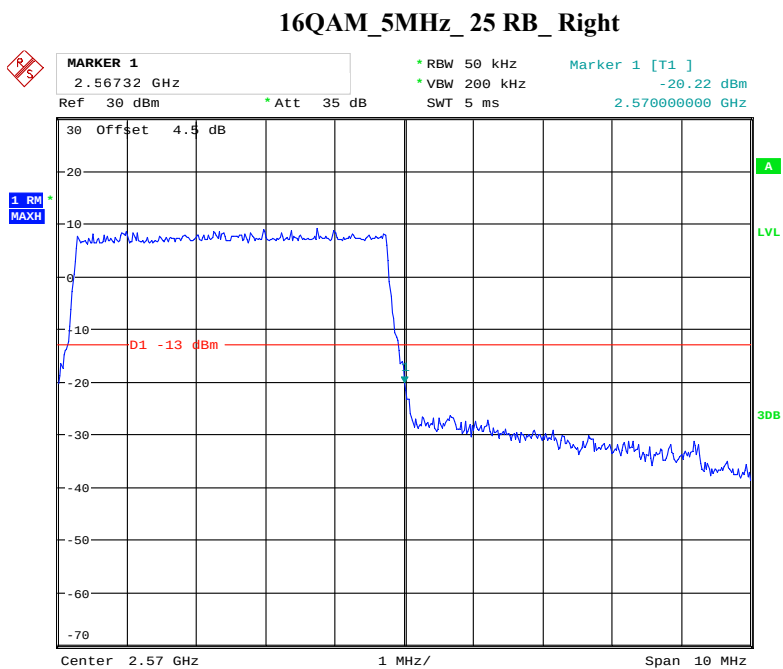
QPSK_20MHz_FULL RB_Right



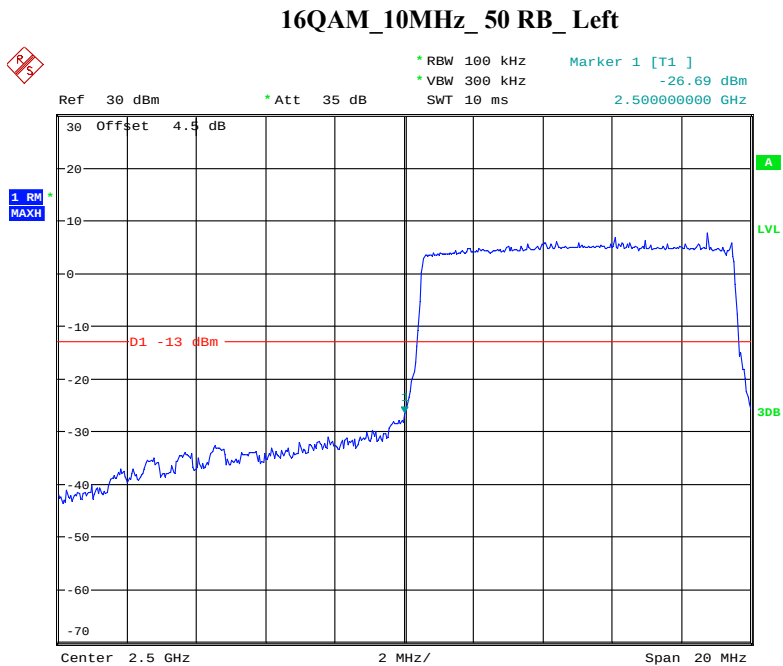
Date: 4.MAR.2019 12:12:07



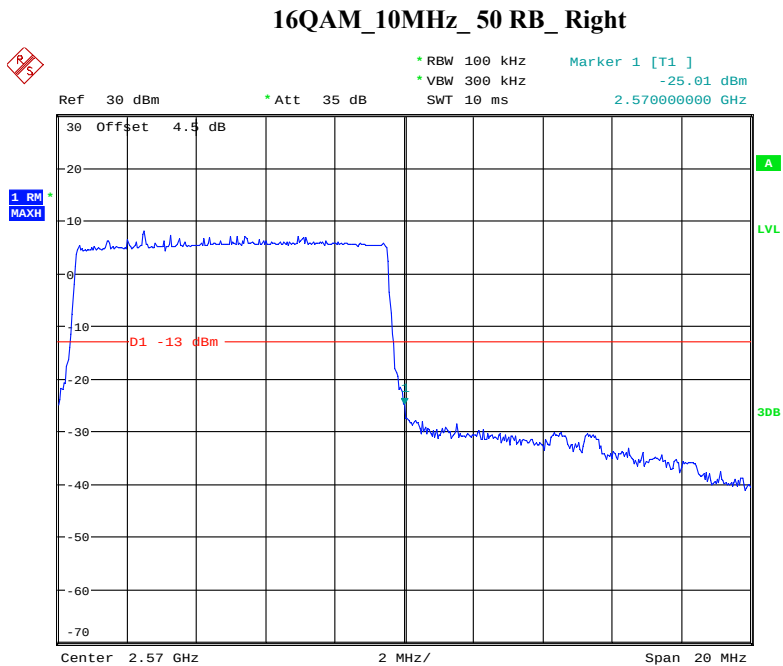
Date: 4.MAR.2019 11:54:42



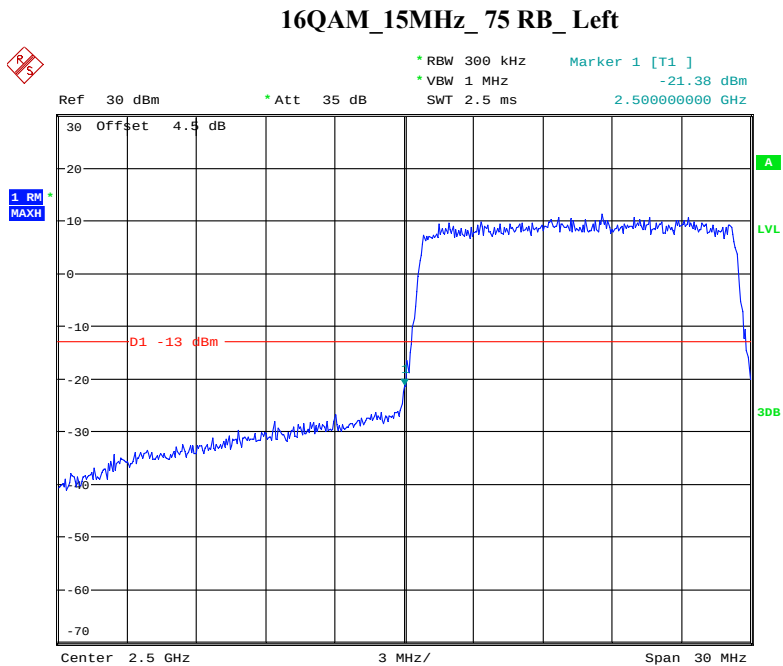
Date: 4.MAR.2019 11:56:33



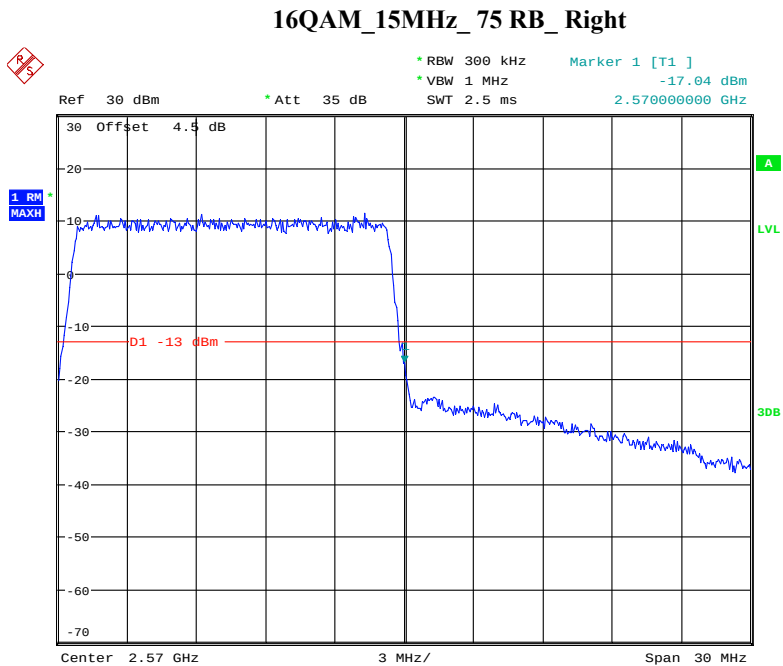
Date: 4.MAR.2019 11:57:35



Date: 4.MAR.2019 11:58:48

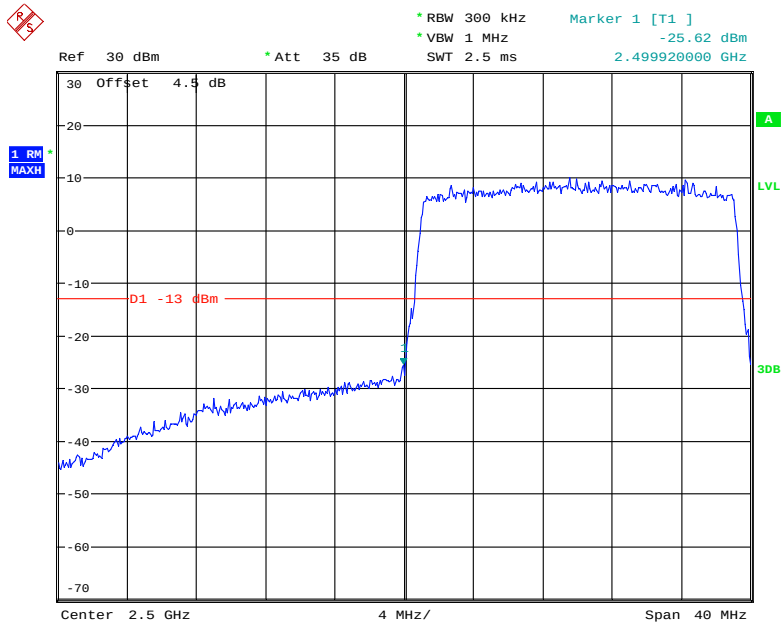


Date: 4.MAR.2019 12:00:09



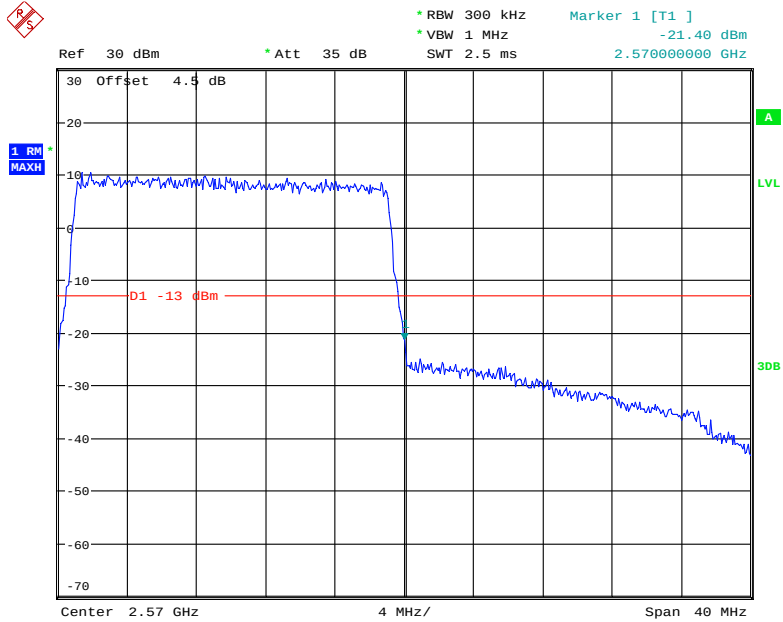
Date: 4.MAR.2019 12:01:27

16QAM_20MHz_FULL RB_Left



Date: 4.MAR.2019 12:11:26

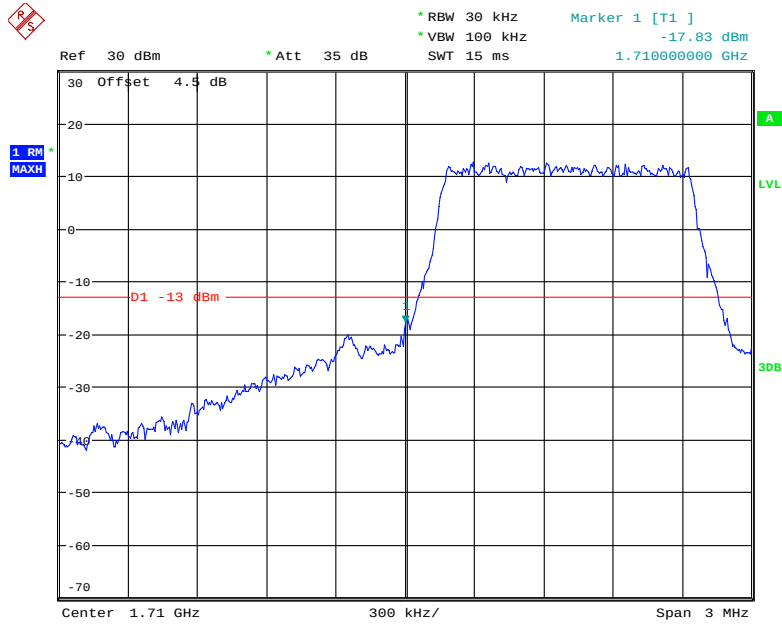
16QAM_20MHz_FULL RB_Right



Date: 4.MAR.2019 12:12:43

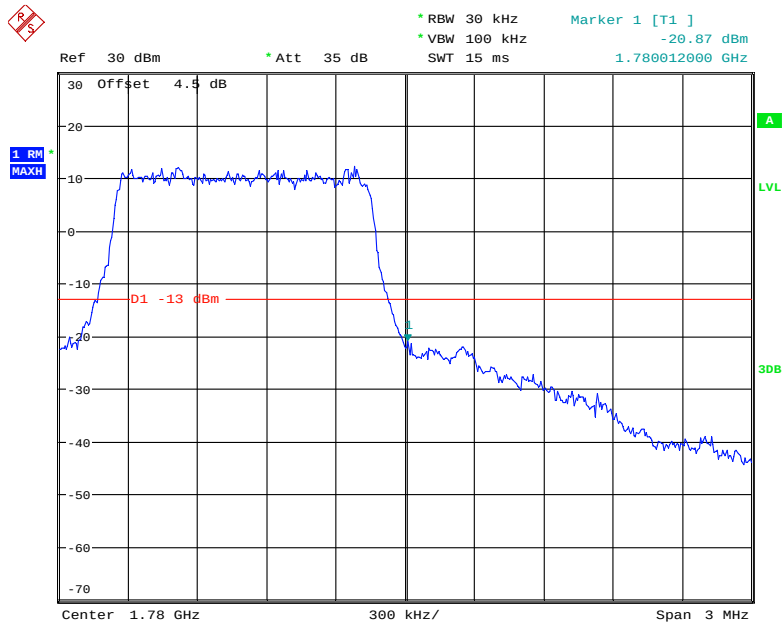
LTE Band 66

QPSK_1.4MHz_6 RB_ Left



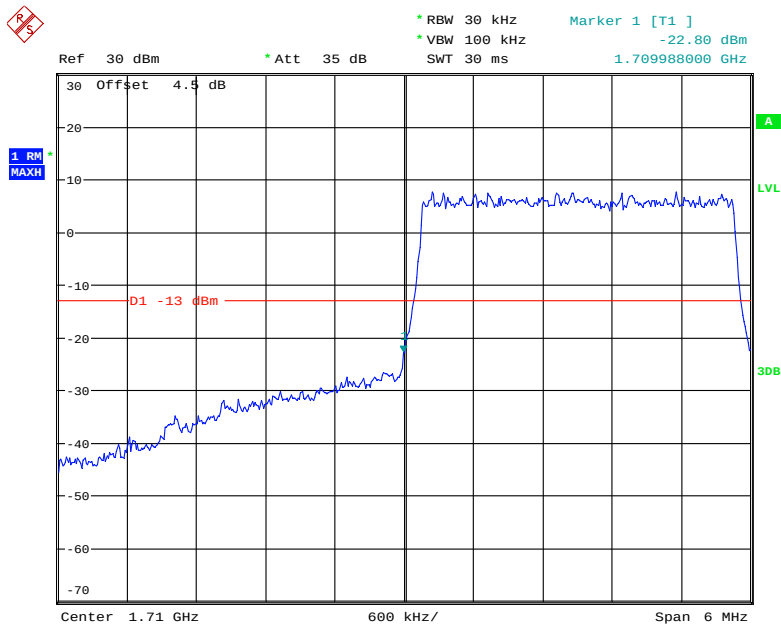
Date: 5.MAR.2019 13:37:08

QPSK_1.4MHz_6 RB_ Right



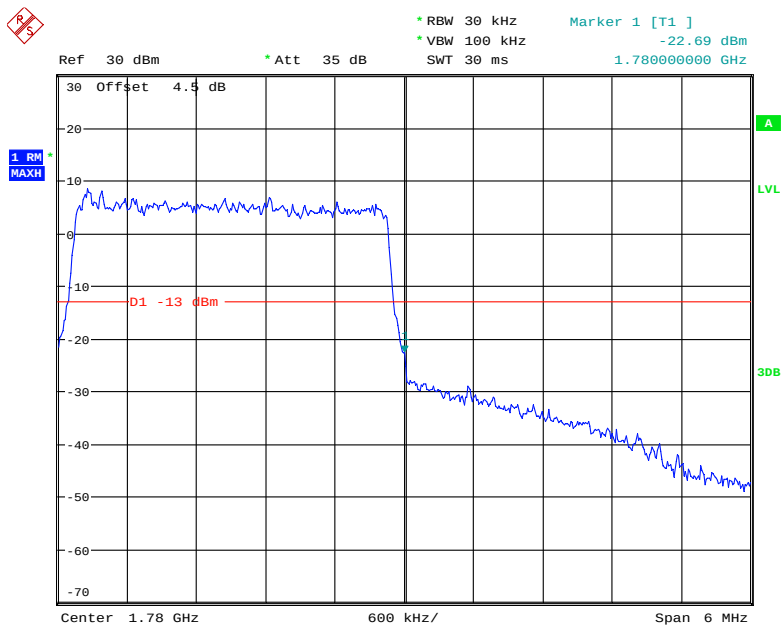
Date: 5.MAR.2019 13:38:09

QPSK_3MHz_15 RB_ Left



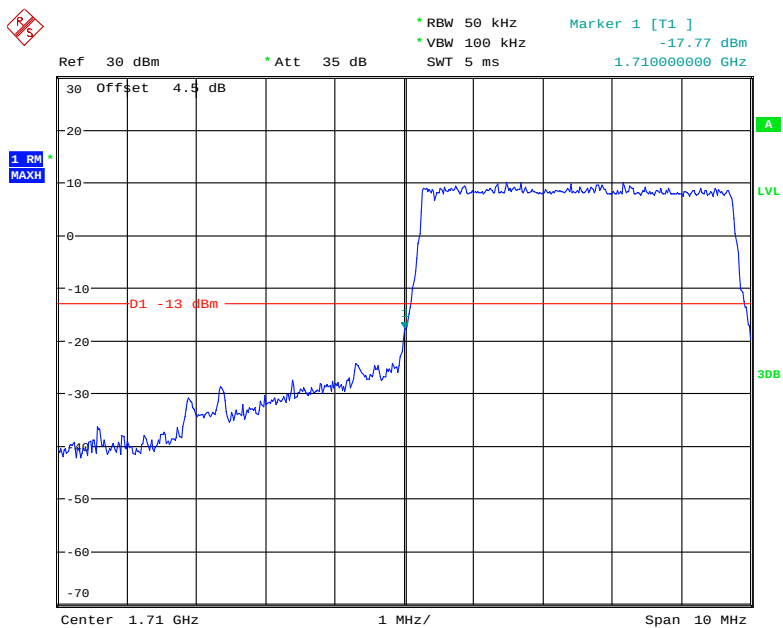
Date: 5.MAR.2019 13:43:14

QPSK_3MHz_15 RB_ Right



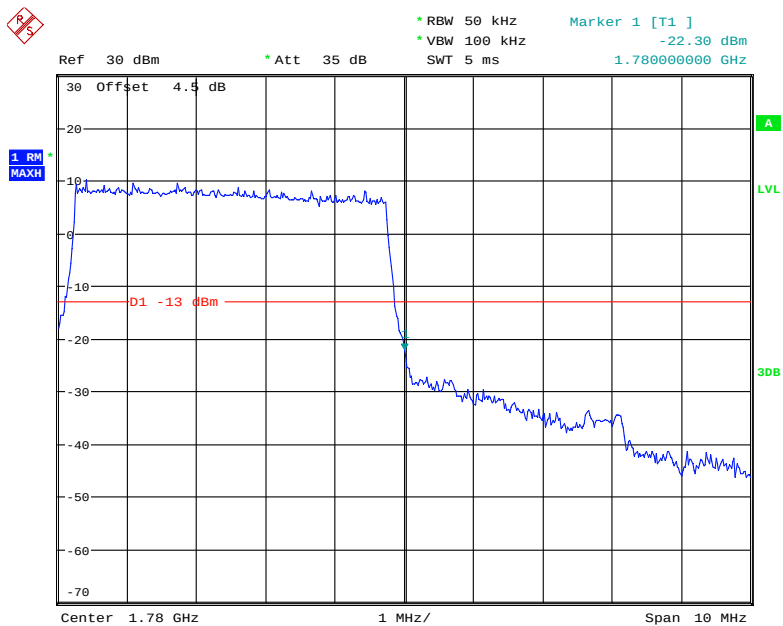
Date: 5.MAR.2019 13:44:31

QPSK_5MHz_25 RB_Left



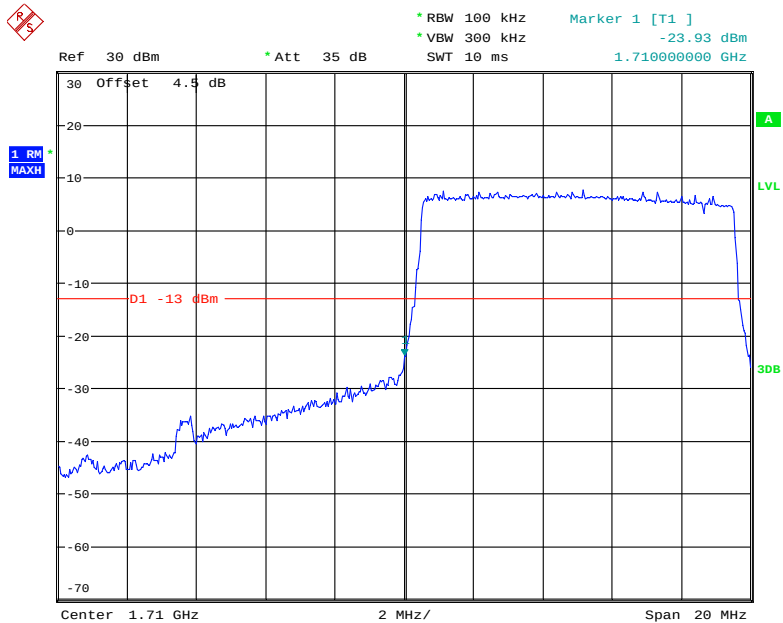
Date: 5.MAR.2019 13:45:56

QPSK_5MHz_25 RB_Right



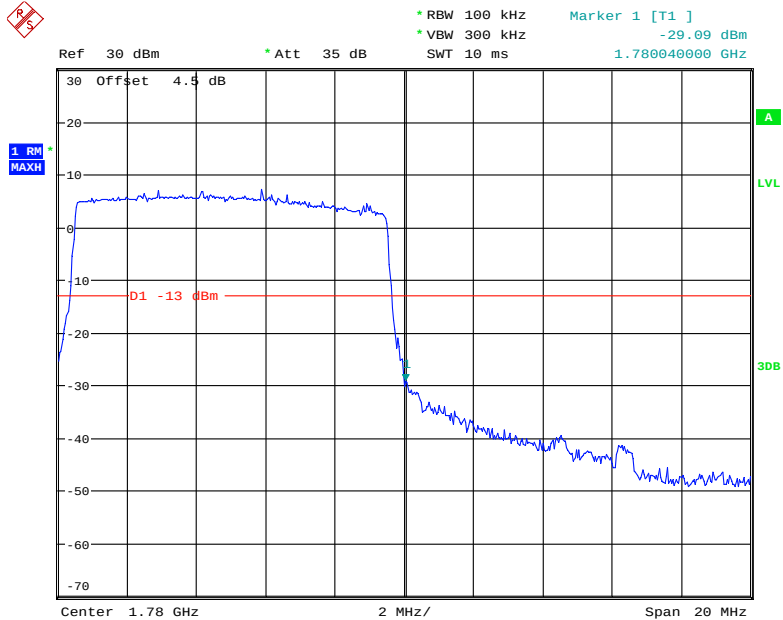
Date: 5.MAR.2019 13:47:35

QPSK_10MHz_50 RB_ Left



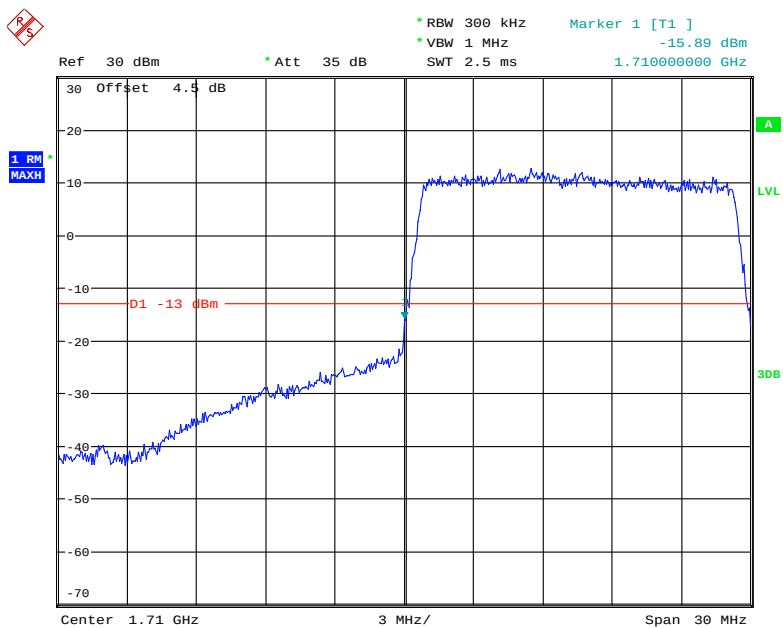
Date: 5.MAR.2019 13:48:56

QPSK_10MHz_50 RB_ Right



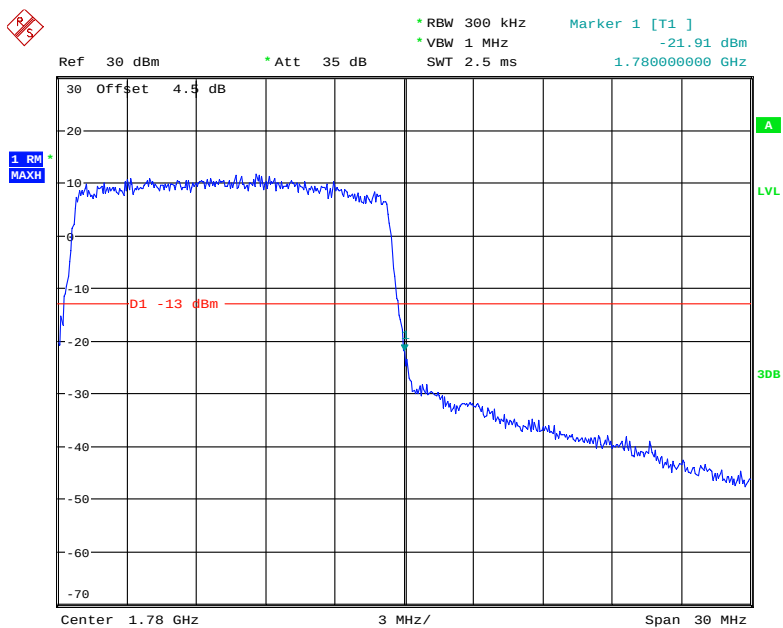
Date: 5.MAR.2019 13:49:58

QPSK_15MHz_75 RB_ Left



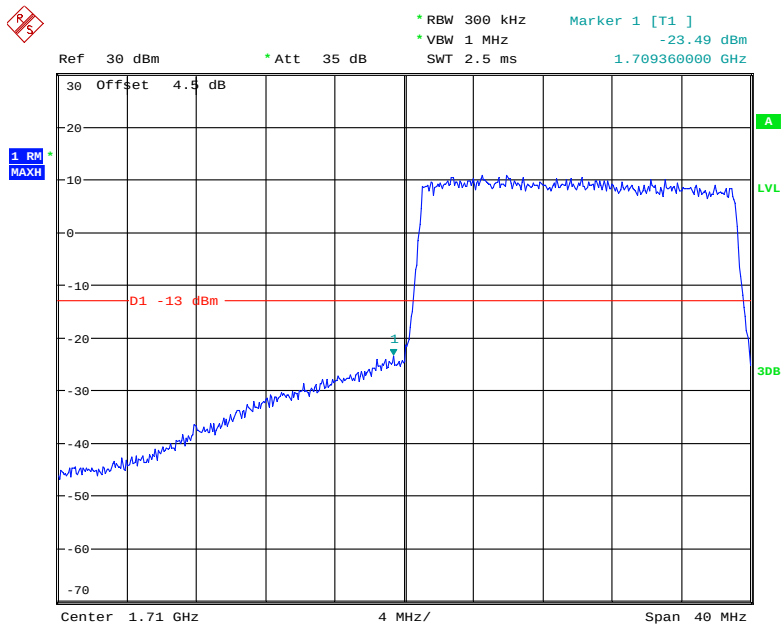
Date: 5.MAR.2019 13:56:53

QPSK_15MHz_75 RB_ Right



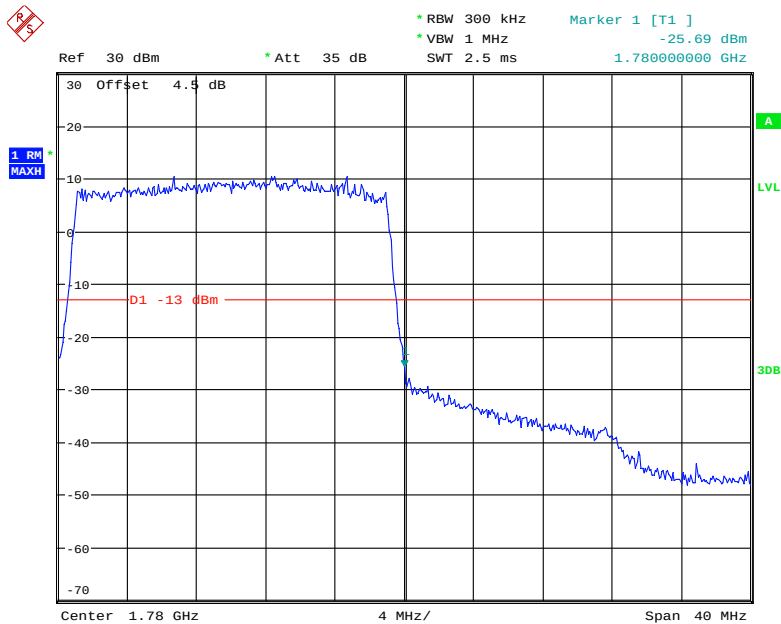
Date: 5.MAR.2019 13:58:11

QPSK_20MHz_FULL RB_Left

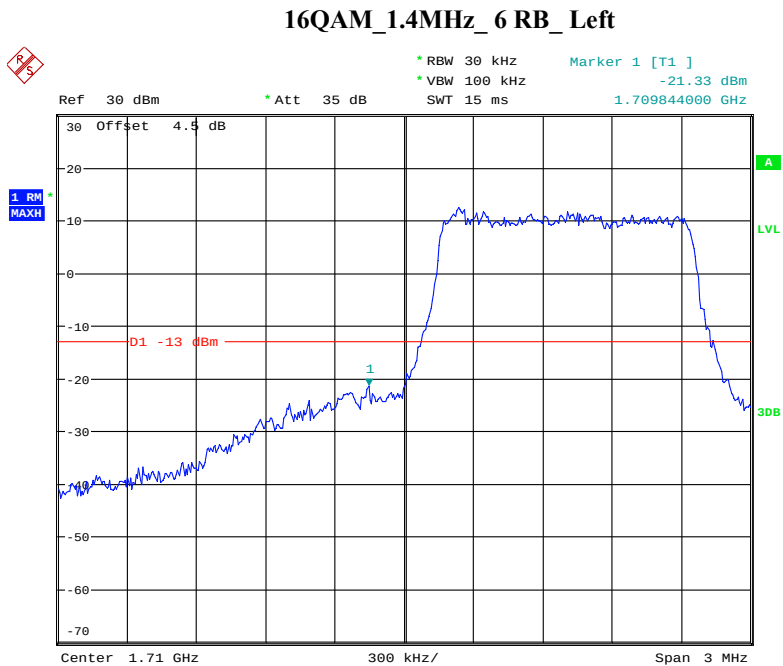


Date: 5.MAR.2019 14:05:16

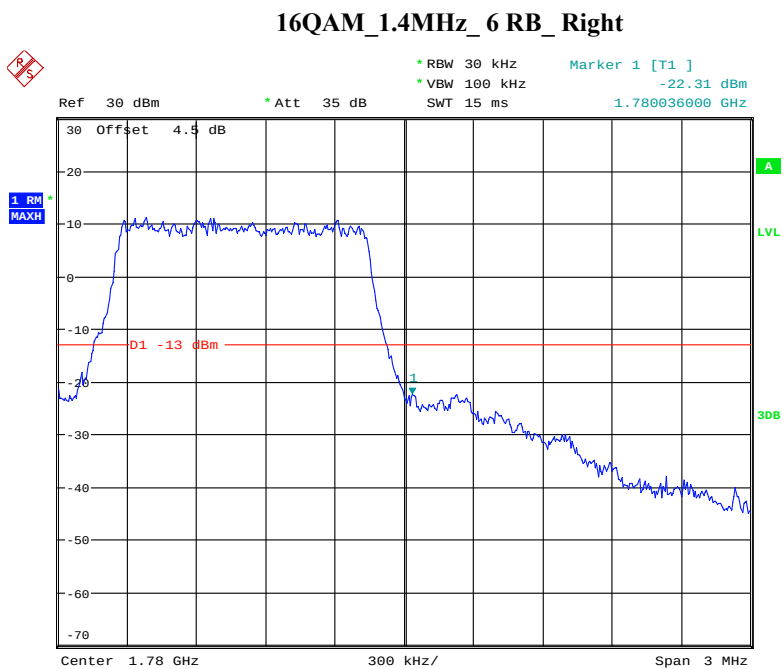
QPSK_20MHz_FULL RB_Right



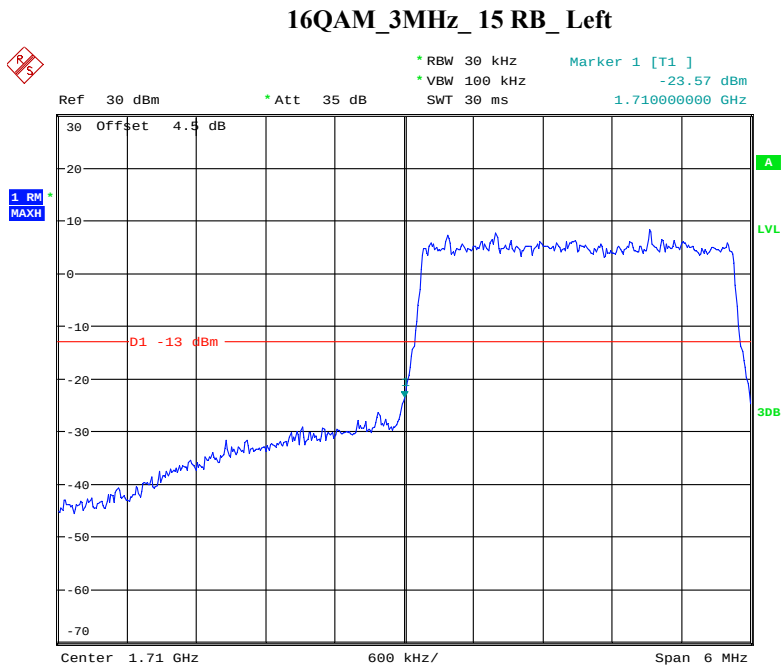
Date: 5.MAR.2019 14:06:44



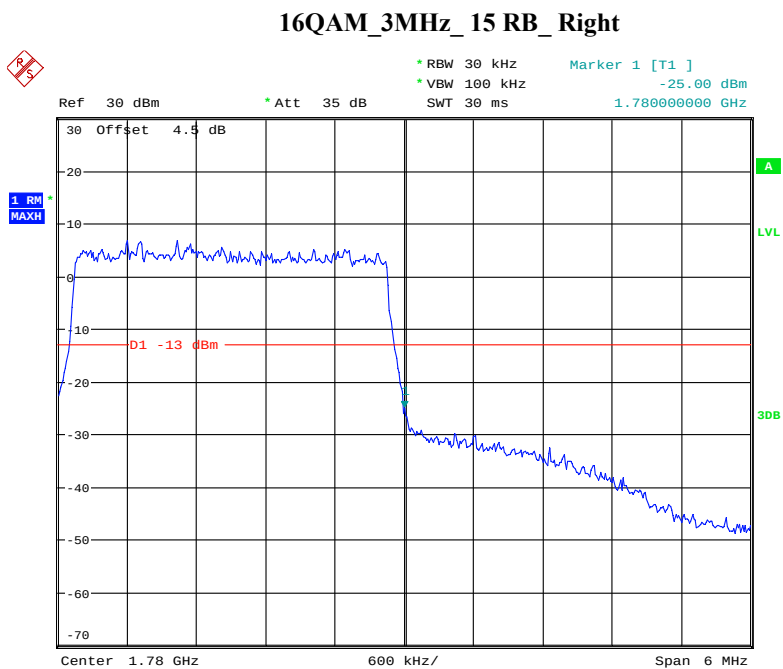
Date: 5.MAR.2019 13:37:41



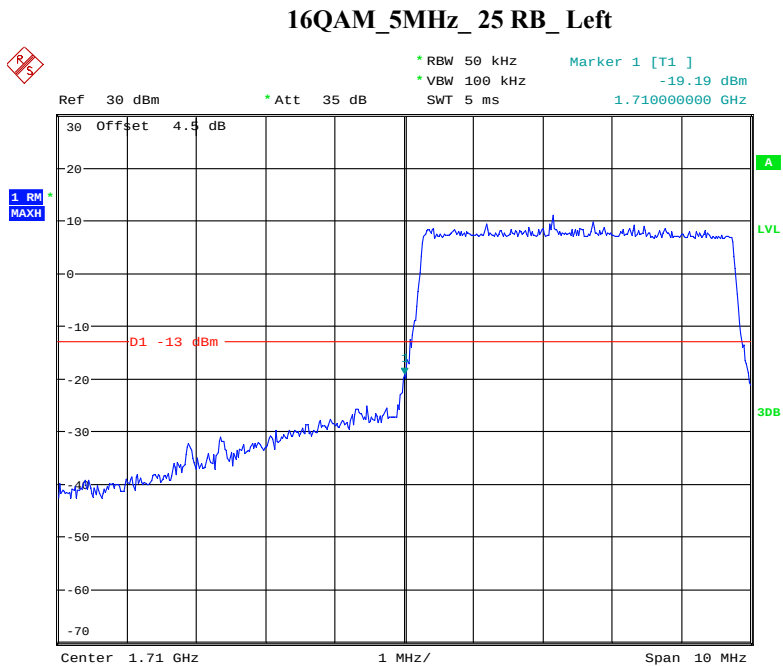
Date: 5.MAR.2019 13:38:39



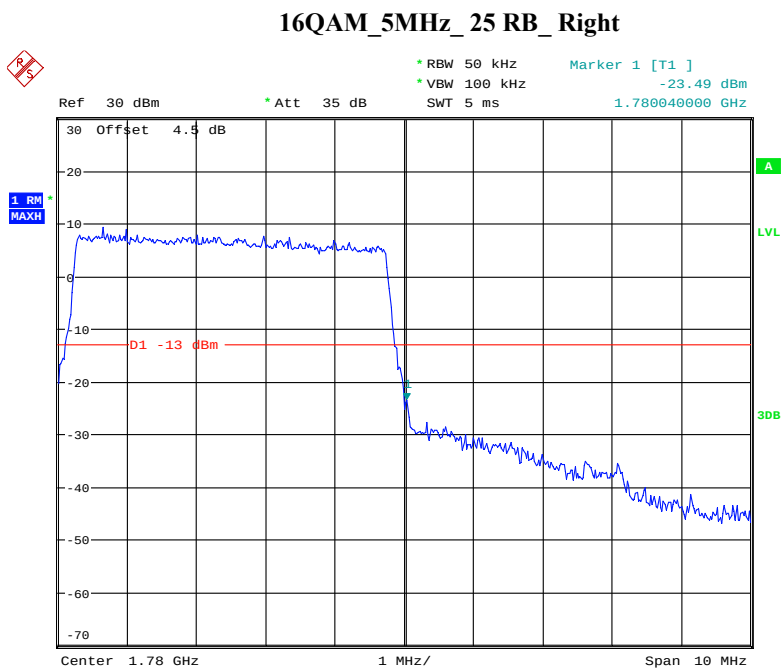
Date: 5.MAR.2019 13:43:47



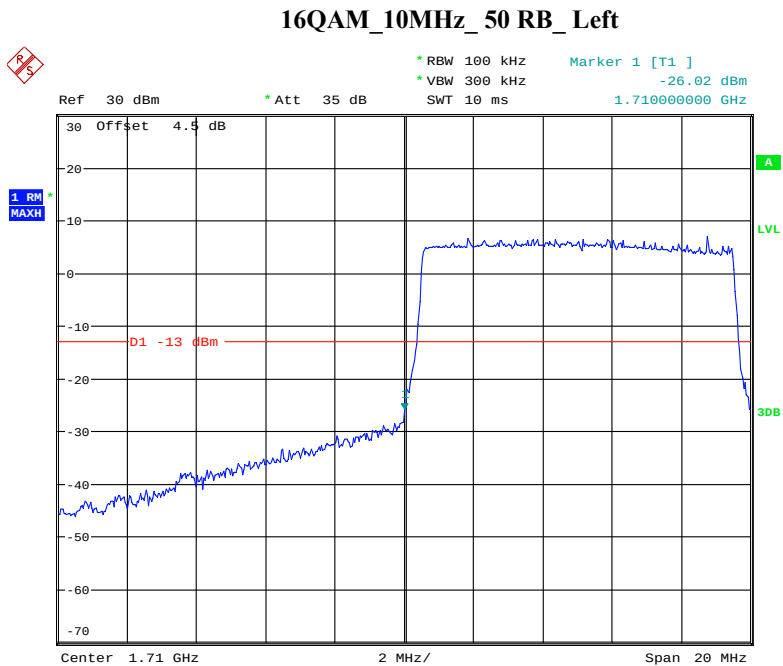
Date: 5.MAR.2019 13:45:01



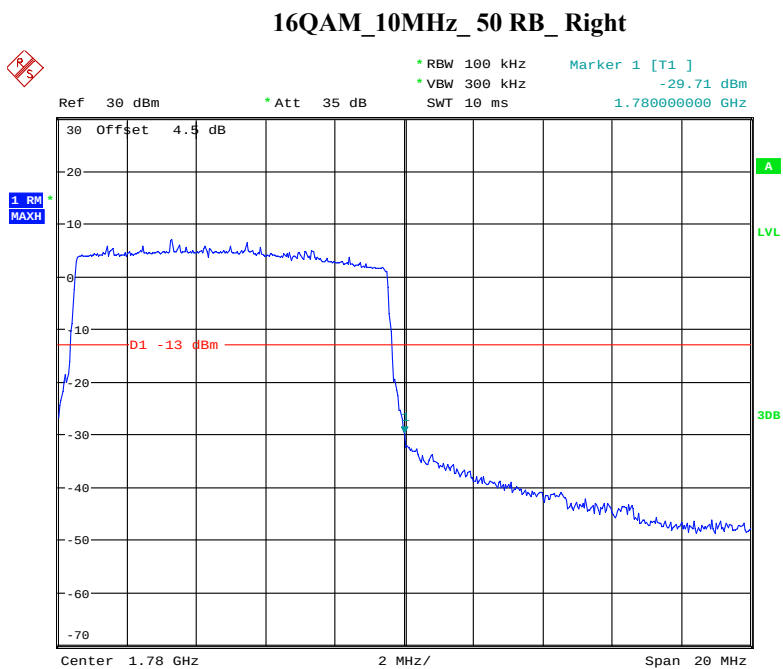
Date: 5.MAR.2019 13:46:47



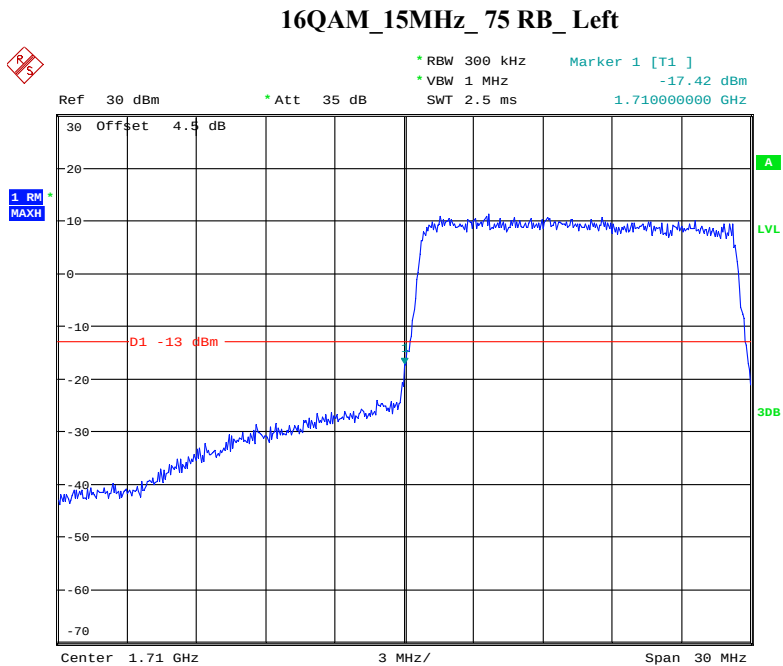
Date: 5.MAR.2019 13:48:19



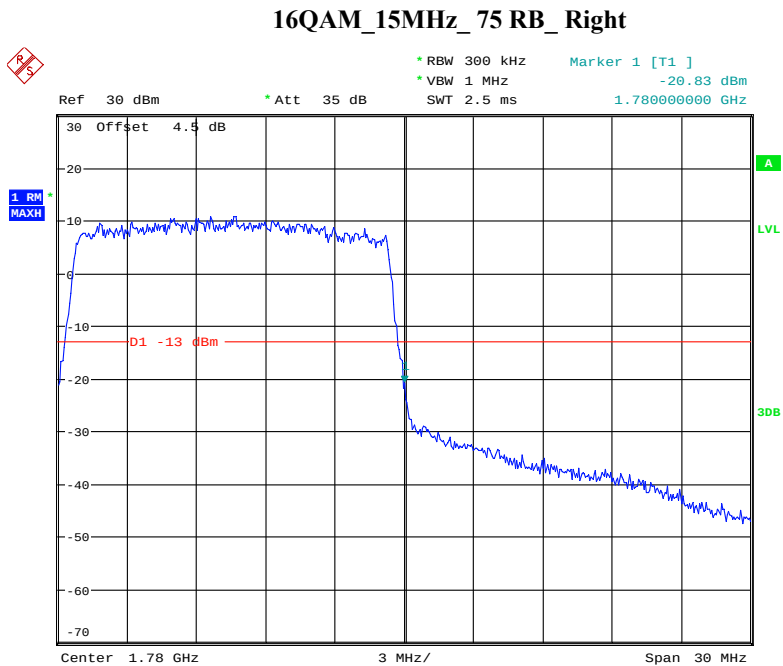
Date: 5.MAR.2019 13:49:27



Date: 5.MAR.2019 13:50:36

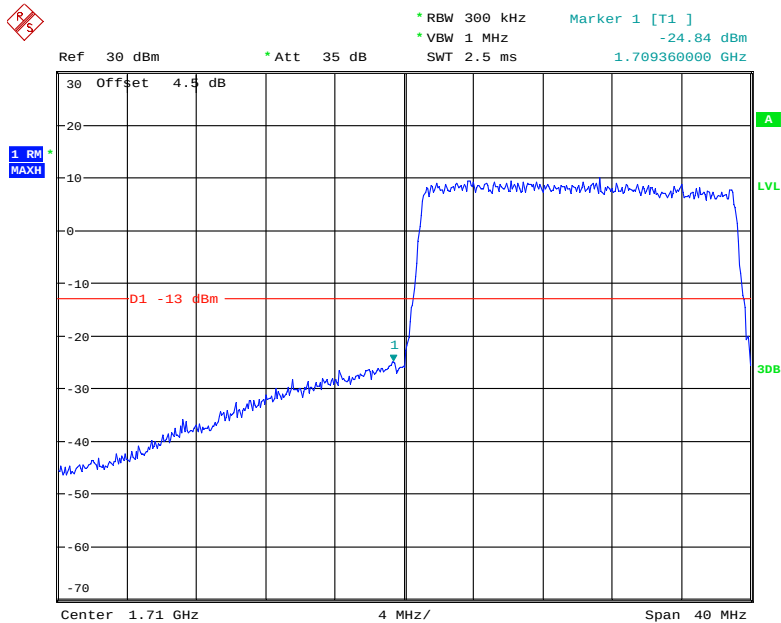


Date: 5.MAR.2019 13:57:33



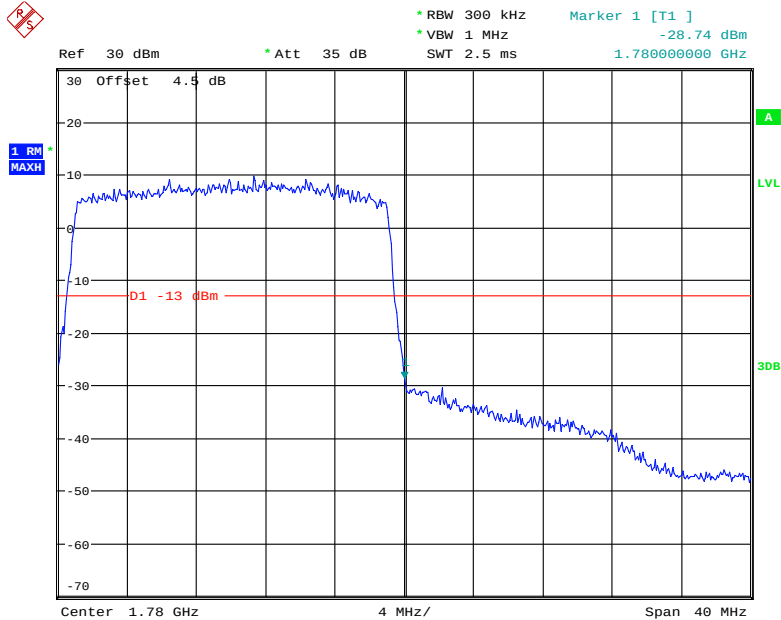
Date: 5.MAR.2019 13:58:58

16QAM_20MHz_FULL RB_Left



Date: 5.MAR.2019 14:06:00

16QAM_20MHz_FULL RB_Right



Date: 5.MAR.2019 14:07:20

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

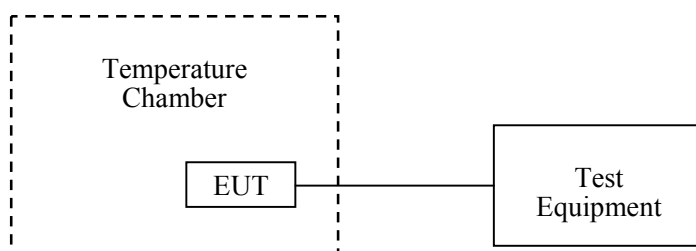
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external 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 power 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 C power supply was connected to the terminals of the equipment under test. The voltage was set of the nominal value and was then decreased until the transmitter light no longer illuminated. The output frequency was recorded for each battery voltage.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	106 891	2018-12-14	2019-12-14
R&S	Wideband Radio Communication Tester	CMW500	110479	2018-12-10	2019-12-10
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2018-03-26	2019-03-26
UNI-T	Multimeter	UT39A	M130199938	2018-07-24	2019-07-24
R&S	Spectrum Analyzer	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	C0010/01	Each time	N/A

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

Test Data**Environmental Conditions**

Temperature:	24.9 °C
Relative Humidity:	47 %
ATM Pressure:	100.6 kPa

The testing was performed by Elena Lei and Blake Yang on 2019-03-04.

WCDMA Band II: R99

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V _{AC}	Hz	ppm	
-30	120	-2	-0.00106	Pass
-20		-1	-0.00053	
-10		1	0.00053	
0		2	0.00106	
10		4	0.00213	
20		-3	-0.00160	
30		-2	-0.00106	
40		1	0.00053	
50		3	0.00160	
20	102	2	0.00106	
20	138	-1	-0.00053	

WCDMA Band V: R99

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{AC}	Hz	ppm	ppm
-30	120	-2	-0.00239	2.5
-20		-1	-0.00120	
-10		-4	-0.00478	
0		-3	-0.00359	
10		1	0.00120	
20		-5	-0.00598	
30		2	0.00239	
40		1	0.00120	
50		-2	-0.00239	
20	102	-3	-0.00359	
20	138	1	0.00120	

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{AC}	Hz	ppm	
-30	120	8	0.0043	Pass
-20		6	0.0032	
-10		5	0.0027	
0		7	0.0037	
10		12	0.0064	
20		10	0.0053	
30		6	0.0032	
40		7	0.0037	
50		6	0.0032	
20	102	5	0.0027	
20	138	4	0.0021	

16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c = 1880$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V_{AC}	Hz	ppm	
-30	120	11	0.0059	Pass
-20		12	0.0064	
-10		5	0.0027	
0		4	0.0021	
10		8	0.0043	
20		4	0.0021	
30		8	0.0043	
40		4	0.0021	
50		6	0.0032	
20	102	7	0.0037	
20	138	9	0.0048	

LTE Band 4:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{AC}	F_L	F_H	F_L	F_H
-30	120	1710.47	1754.49	1710	1755
-20		1710.49	1754.52	1710	1755
-10		1710.50	1754.48	1710	1755
0		1710.50	1754.49	1710	1755
10		1710.54	1754.46	1710	1755
20		1710.52	1754.48	1710	1755
30		1710.53	1754.49	1710	1755
40		1710.48	1754.44	1710	1755
50		1710.47	1754.45	1710	1755
20	102	1710.53	1754.43	1710	1755
20	138	1710.57	1754.46	1710	1755

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
℃	V_{AC}	F_L	F_H	F_L	F_H
-30	120	1710.52	1754.49	1710	1755
-20		1710.49	1754.43	1710	1755
-10		1710.57	1754.48	1710	1755
0		1710.54	1754.47	1710	1755
10		1710.50	1754.53	1710	1755
20		1710.52	1754.48	1710	1755
30		1710.51	1754.45	1710	1755
40		1710.50	1754.47	1710	1755
50		1710.55	1754.50	1710	1755
20	102	1710.55	1754.45	1710	1755
20	138	1710.48	1754.44	1710	1755

LTE Band 5:

Middle Channel, $f_c = 836.5$ MHz, Channel Bandwidth:10MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{AC}	Hz	ppm	ppm
-30	120	11	0.0132	2.5
-20		14	0.0167	
-10		15	0.0179	
0		8	0.0096	
10		9	0.0108	
20		13	0.0155	
30		11	0.0132	
40		17	0.0203	
50		10	0.012	
20	102	15	0.0179	
20	138	14	0.0167	

Middle Channel, $f_c = 836.5$ MHz, Channel Bandwidth:10MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V _{AC}	Hz	ppm	ppm
-30	120	13	0.0155	2.5
-20		10	0.012	
-10		8	0.0096	
0		6	0.0072	
10		7	0.0084	
20		9	0.0108	
30		12	0.0143	
40		14	0.0167	
50		18	0.0215	
20	102	16	0.0191	
20	138	14	0.0167	

LTE Band 7:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{AC}	F_L	F_H	F_L	F_H
-30	120	2500.53	2569.45	2500	2570
-20		2500.52	2569.50	2500	2570
-10		2500.48	2569.50	2500	2570
0		2500.53	2569.46	2500	2570
10		2500.51	2569.53	2500	2570
20		2500.52	2569.48	2500	2570
30		2500.51	2569.49	2500	2570
40		2500.54	2569.47	2500	2570
50		2500.51	2569.52	2500	2570
20	102	2500.54	2569.48	2500	2570
20	138	2500.49	2569.48	2500	2570

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{AC}	F_L	F_H	F_L	F_H
-30	120	2500.55	2569.46	2500	2570
-20		2500.53	2569.49	2500	2570
-10		2500.48	2569.47	2500	2570
0		2500.51	2569.45	2500	2570
10		2500.54	2569.50	2500	2570
20		2500.52	2569.48	2500	2570
30		2500.48	2569.45	2500	2570
40		2500.48	2569.51	2500	2570
50		2500.51	2569.47	2500	2570
20	102	2500.54	2569.53	2500	2570
20	138	2500.54	2569.48	2500	2570

LTE Band 66:

QPSK, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{AC}	F_L	F_H	F_L	F_H
-30	120	1710.50	1779.40	1710	1780
-20		1710.57	1779.40	1710	1780
-10		1710.55	1779.46	1710	1780
0		1710.57	1779.49	1710	1780
10		1710.49	1779.46	1710	1780
20		1710.52	1779.44	1710	1780
30		1710.49	1779.47	1710	1780
40		1710.50	1779.40	1710	1780
50		1710.53	1779.48	1710	1780
20	102	1710.53	1779.45	1710	1780
20	138	1710.48	1779.45	1710	1780

16QAM, Channel Bandwidth:10MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V_{AC}	F_L	F_H	F_L	F_H
-30	120	1710.50	1779.47	1710	1780
-20		1710.56	1779.47	1710	1780
-10		1710.55	1779.41	1710	1780
0		1710.54	1779.46	1710	1780
10		1710.49	1779.45	1710	1780
20		1710.52	1779.44	1710	1780
30		1710.54	1779.41	1710	1780
40		1710.53	1779.46	1710	1780
50		1710.56	1779.40	1710	1780
20	102	1710.50	1779.43	1710	1780
20	138	1710.56	1779.44	1710	1780

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 *******