

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

For

**CLC HONG KONG LIMITED**

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**FCC ID: 2AG4WZ517**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Compass LTE
<b>Report Number:</b>	RDG171228009-00D
<b>Report Date:</b>	2018-02-10
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**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).

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## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

<b>EUT Name:</b>		Compass LTE
<b>EUT Model:</b>		Z517
<b>FCC ID:</b>		2AG4WZ517
<b>Rated Input Voltage:</b>		DC3.8V from Battery or DC 5V from adapter
<b>Adapter Information</b>	<b>Model:</b>	PMC43
	<b>Input:</b>	AC100-240V~ 50/60Hz 0.2A
	<b>Output:</b>	5.0V , 1.0A
<b>External Dimension:</b>		Length (14.5 cm)*Width (7.1 cm)*High (0.9 cm)
<b>Serial Number:</b>		171228009
<b>EUT Received Date:</b>		2017.12.28

### Objective

This report is prepared on behalf of **CLC HONG KONG LIMITED** in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules. Part 2, Part 27 of the Federal Communication Commissions rules.

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

### Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AG4WZ517.  
 FCC Part 15C DSS submissions with FCC ID: 2AG4WZ517.  
 FCC Part 15B JBP submissions with FCC ID: 2AG4WZ517.

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

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

## SYSTEM TEST CONFIGURATION

### Justification

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

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

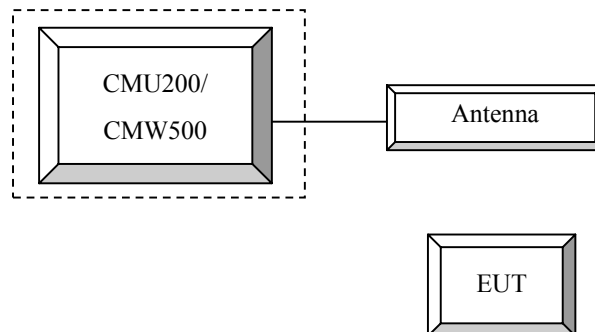
### Equipment Modifications

No modification was made to the EUT.

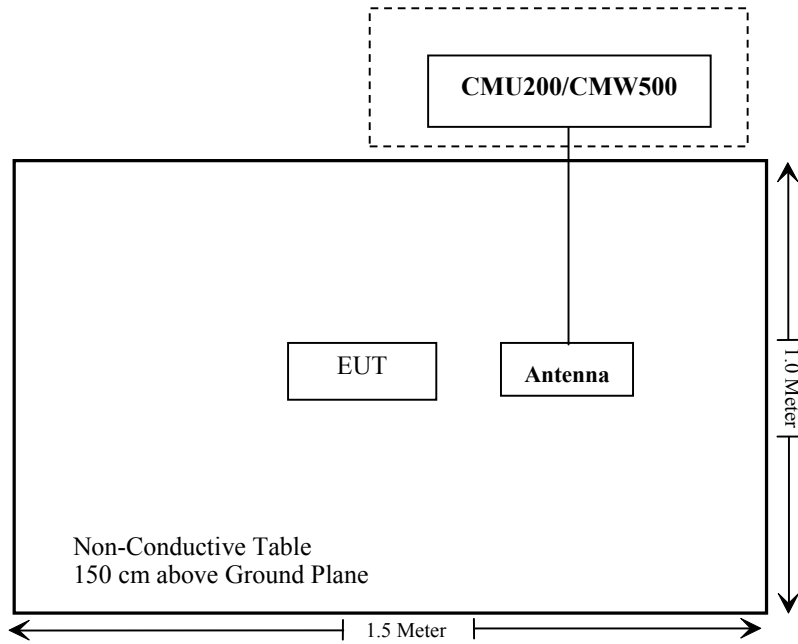
### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	109038
R&S	Wideband Radio Communication Tester	CMW500	147473
N/A	ANTENNA	N/A	N/A

### Configuration of Test Setup



**Block Diagram of Test Setup**



**SUMMARY OF TEST RESULTS**

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



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## **FCC §1.1310 & §2.1093- RF EXPOSURE**

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### **Applicable Standard**

FCC§1.1310 and §2.1093.

### **Test Result**

Compliant, please refer to the SAR report: RDG171228009-20.

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## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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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.

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

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**Applicable Standard**

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

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

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

According to §27.50

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

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

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

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

**Test Procedure**

**GSM/GPRS/EGPRS**

Function: Menu select > GSM Mobile Station > GSM 850/1900  
 Press Connection control to choose the different menus  
 Press RESET > choose all the reset all settings  
 Connection Press Signal Off to turn off the signal and change settings  
 Network Support > GSM + GPRS or GSM + EGSM  
 Main Service > Packet Data  
 Service selection > Test Mode A – Auto Slot Config. off  
 MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting  
     > Slot configuration > Uplink/Gamma  
     > 33 dBm for GPRS 850  
     > 30 dBm for GPRS 1900  
     > 27 dBm for EGPRS 850  
     > 26 dBm for EGPRS 1900  
 BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel  
 Frequency Offset > + 0 Hz  
 Mode > BCCH and TCH  
 BCCH Level > -85 dBm (May need to adjust if link is not stable)  
 BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]  
  
 Channel Type > Off  
 P0 > 4 dB  
 Slot Config > Unchanged (if already set under MS signal)  
 TCH > choose desired test channel  
 Hopping > Off  
 Main Timeslot > 3  
 Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)  
  
 Bit Stream > 2E9-1 PSR Bit Stream  
 AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input  
 Connection Press Signal on to turn on the signal and change settings

**WCDMA-Release 99**

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

<b>WCDMA General Settings</b>	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	<b>βc / βd</b>	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			
	$\beta_c$	2/15	12/15	15/15	15/15
	$\beta_d$	15/15	15/15	8/15	4/15
	$\beta_d$ (SF)	64			
	$\beta_c / \beta_d$	2/15	12/15	15/8	15/4
	$\beta_{hs}$	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
<b>WCDMA General Settings</b>	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	$\beta_c$	11/15	6/15	15/15	2/15	15/15
	$\beta_d$	15/15	15/15	9/15	15/15	0
	$\beta_{ec}$	209/225	12/15	30/15	2/15	5/15
	$\beta_c/\beta_d$	11/15	6/15	15/9	2/15	-
	$\beta_{hs}$	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	
<b>HSDPA Specific Settings</b>	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				
<b>HSUPA Specific Settings</b>	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	

**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	$\beta_c$ (Note3)	$\beta_d$	$\beta_{HS}$ (Note1)	$\beta_{ec}$	$\beta_{ed}$ (2xSF2) (Note 4)	$\beta_{ed}$ (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	$\beta_{ed1}$ : 30/15 $\beta_{ed2}$ : 30/15	$\beta_{ed3}$ : 24/15 $\beta_{ed4}$ : 24/15	3.5	2.5	14	105	105

- Note 1:  $\Delta_{ACK}, \Delta_{NACK}$  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  $\beta_c$  is set to 1 and  $\beta_d = 0$  by default.
- Note 4:  $\beta_{ed}$  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
<p>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.</p> <p>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.</p>		

**LTE (FDD):**

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

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

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

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

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

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS\_01".

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

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N <sub>RB</sub> )	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
NS_04	6.6.2.2.2	41	20	>10	≤ 1
			5	>6	≤ 1
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 <sup>1</sup>	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

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

*Radiated method:*

ANSI/TIA-603-D section 2.2.17



**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31

\* **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**

<b>Temperature:</b>	21.9°C
<b>Relative Humidity:</b>	38 %
<b>ATM Pressure:</b>	100.9 kPa

\* *The testing was performed by Blake Yang & Eric Xiao on 2018-01-02*

**Conducted Output Power**

**Cellular Band & PCS Band**

Band	Channel No.	Conducted Peak Output Power (dBm)								
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	32.00	32.04	31.20	29.47	28.35	26.38	25.51	23.67	22.81
	190	31.80	31.85	31.02	29.22	28.11	26.05	25.16	23.30	22.45
	251	31.70	31.73	30.90	29.09	28.01	25.61	24.76	22.98	22.01
PCS	512	29.30	29.54	28.66	26.97	25.97	25.47	24.19	22.07	20.80
	661	29.10	29.39	28.57	26.82	25.84	26.05	24.83	22.63	21.36
	810	28.80	28.99	28.22	26.42	25.45	26.25	25.07	22.75	21.49

**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	22.56	2.76	22.58	2.96	22.53	2.72
HSDPA	1	21.47	3.72	21.46	3.84	21.37	3.20
	2	21.27	3.53	21.28	3.77	21.32	3.29
	3	21.57	3.77	21.40	3.65	21.33	3.16
	4	21.55	3.74	21.28	3.65	21.35	3.15
HSUPA	1	21.38	3.36	21.43	4.20	21.37	4.16
	2	21.45	3.21	21.34	4.16	21.19	4.23
	3	21.44	3.37	21.29	4.09	21.34	4.06
	4	21.48	3.27	21.26	4.23	21.44	4.11
	5	21.18	3.20	21.53	4.12	21.44	4.00
DC-HSDPA	1	21.44	3.72	21.56	3.73	21.37	3.15
	2	21.48	3.81	21.34	3.90	21.23	3.21
	3	21.54	3.72	21.54	3.74	21.23	3.20
	4	21.48	3.60	21.28	3.77	21.27	3.16
HSPA+	1	21.28	3.59	21.53	3.64	21.21	3.15

## 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	22.68	2.44	22.58	2.60	22.51	2.28
HSDPA	1	21.61	3.24	21.54	4.00	21.51	3.40
	2	21.56	3.23	21.59	4.08	21.37	3.35
	3	21.56	3.16	21.42	3.87	21.49	3.30
	4	21.62	3.19	21.35	3.83	21.31	3.36
HSUPA	1	21.65	3.64	21.57	4.08	21.52	3.60
	2	21.52	3.47	21.57	3.95	21.61	3.60
	3	21.53	3.71	21.61	3.89	21.50	3.50
	4	21.74	3.65	21.47	4.08	21.39	3.41
	5	21.69	3.46	21.50	4.13	21.46	3.43
DC-HSDPA	1	21.63	3.2	21.37	3.92	21.52	3.44
	2	21.47	3.13	21.53	4.03	21.57	3.21
	3	21.71	3.26	21.41	3.88	21.49	3.30
	4	21.46	3.30	21.43	4.03	21.39	3.38
HSPA+	1	21.47	3.07	21.44	3.93	21.60	3.21

**LTE Band 2 (PART 24)**

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	21.89	21.89	21.35
		1#3	21.91	21.93	21.15
		1#5	22.13	21.87	21.19
		3#0	22.03	21.99	21.13
		3#3	22.08	21.95	21.15
		6#0	21.19	21.01	20.25
	16QAM	1#0	21.13	21.07	20.34
		1#3	21.16	21.15	20.24
		1#5	21.24	21.03	20.49
		3#0	20.98	20.88	20.26
		3#3	21.09	20.84	20.27
		6#0	20.28	20.03	19.28
3MHz	QPSK	1#0	21.53	21.26	21.36
		1#8	21.53	21.22	21.02
		1#14	21.55	21.20	20.78
		6#0	20.56	20.27	20.07
		6#7	20.62	20.26	19.91
		15#0	20.61	20.31	19.99
	16QAM	1#0	20.75	20.16	20.40
		1#8	20.78	20.13	20.11
		1#14	20.78	20.09	19.88
		6#0	19.70	19.28	19.24
		6#7	19.79	19.25	19.14
		15#0	19.59	19.29	19.11
5MHz	QPSK	1#0	21.95	21.45	21.66
		1#13	21.51	20.97	20.80
		1#24	21.82	21.32	20.82
		15#0	20.75	20.01	20.16
		15#10	20.84	19.97	19.18
		25#0	21.03	20.03	20.02
	16QAM	1#0	21.04	20.56	20.68
		1#13	20.66	20.01	19.82
		1#24	21.03	20.43	19.86
		15#0	19.53	19.09	19.14
		15#10	19.56	19.02	18.83
		25#0	19.53	19.14	19.02

10MHz	QPSK	1#0	21.04	20.67	20.74
		1#24	21.26	20.84	20.98
		1#49	20.87	20.48	20.06
		25#0	20.39	19.84	20.17
		25#25	20.21	19.75	19.82
	50#0	20.34	19.81	20.07	
	16QAM	1#0	20.28	19.61	19.98
		1#24	20.44	19.78	20.18
		1#49	20.06	19.45	19.27
		25#0	19.45	18.97	19.13
25#25		19.27	18.90	18.80	
50#0	19.36	18.92	19.03		
15MHz	QPSK	1#0	21.26	20.96	20.65
		1#38	21.16	20.76	20.80
		1#74	21.29	20.59	20.26
		36#0	20.53	19.81	19.88
		36#39	20.31	19.63	19.78
	75#0	20.55	19.75	19.85	
	16QAM	1#0	20.53	19.89	19.99
		1#38	20.34	19.68	20.16
		1#74	20.24	19.54	19.59
		36#0	19.43	18.89	18.93
36#39		19.25	18.78	18.80	
75#0	19.33	18.87	18.84		
20MHz	QPSK	1#0	21.27	20.86	20.87
		1#49	21.12	20.58	20.32
		1#99	20.65	20.35	20.80
		50#0	20.28	19.72	19.78
		50#50	19.94	19.51	19.80
	100#0	20.12	19.62	19.85	
	16QAM	1#0	20.45	20.08	19.83
		1#49	20.33	19.73	19.76
		1#99	19.87	19.53	19.32
		50#0	19.28	18.91	18.72
50#50		18.97	18.70	18.74	
100#0	19.18	18.75	18.73		

**LTE Band 4 (PART 27)**

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.19	22.53	22.24
		1#3	22.77	22.42	22.30
		1#5	22.85	22.55	22.48
		3#0	22.63	22.63	22.38
		3#3	22.74	22.60	22.50
	16QAM	6#0	21.75	21.81	21.59
		1#0	21.60	22.22	21.52
		1#3	21.65	22.16	21.58
		1#5	21.76	22.13	21.79
		3#0	21.62	21.74	21.38
3MHz	QPSK	3#3	21.65	21.78	21.52
		6#0	20.90	20.95	20.48
		1#0	22.40	21.97	22.18
		1#8	22.42	21.69	22.19
		1#14	22.52	21.67	22.30
	16QAM	6#7	21.65	20.88	21.51
		15#0	21.79	21.06	21.52
		1#0	22.23	21.44	21.63
		1#8	22.05	21.12	21.56
		1#14	21.97	20.94	21.61
5MHz	QPSK	6#0	20.94	20.27	20.62
		6#7	20.96	20.17	20.66
		15#0	20.84	20.13	20.59
		1#0	22.42	22.14	22.28
		1#13	22.03	21.40	21.93
	16QAM	1#24	22.45	21.84	22.37
		15#0	21.08	20.66	20.99
		15#10	21.09	20.31	21.02
		25#0	21.12	20.28	21.03
		1#0	21.70	21.26	21.74
		1#13	21.22	20.56	21.65
		1#24	21.63	20.89	21.25
		15#0	20.34	19.82	20.30
		15#10	20.31	19.62	20.28
		25#0	20.37	19.84	20.38

10MHz	QPSK	1#0	22.03	21.78	21.27
		1#24	22.25	21.50	21.64
		1#49	21.97	21.19	21.49
		25#0	21.50	20.87	20.67
		25#25	21.33	20.47	20.81
	16QAM	50#0	21.60	20.73	20.84
		1#0	21.23	20.73	20.55
		1#24	21.43	20.42	20.88
		1#49	21.10	20.08	20.63
		25#0	20.50	19.81	19.73
15MHz	QPSK	25#25	20.35	19.56	19.85
		50#0	20.44	19.48	19.78
		1#0	22.16	22.16	21.52
		1#38	22.15	21.23	21.64
		1#74	21.59	21.39	21.89
	16QAM	36#0	21.53	20.79	20.62
		36#39	21.22	20.36	20.86
		75#0	21.39	20.51	20.73
		1#0	21.57	21.15	20.85
		1#38	21.67	20.35	21.05
20MHz	QPSK	1#74	21.13	20.45	21.40
		36#0	20.65	20.02	20.03
		36#39	20.26	19.52	20.15
		75#0	20.60	19.98	20.09
		1#0	22.62	22.40	21.64
	16QAM	1#49	22.67	21.43	21.67
		1#99	21.87	21.51	22.03
		50#0	21.69	21.07	20.67
		50#50	21.08	20.56	20.88
		100#0	21.65	20.82	20.73
		1#0	21.95	21.62	20.87
		1#49	21.74	20.58	20.94
		1#99	20.94	20.60	21.13
		50#0	21.08	20.28	19.74
		50#50	20.44	19.82	19.89
		100#0	20.88	20.19	19.85

**LTE Band 5 (PART 22)**

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.32	22.35	22.32
		1#3	22.38	22.41	22.39
		1#5	22.37	22.33	22.32
		3#0	22.39	22.79	22.35
		3#3	22.37	22.39	22.38
		6#0	21.35	21.35	21.35
	16QAM	1#0	21.19	21.43	21.35
		1#3	21.33	21.54	21.45
		1#5	21.19	21.39	21.37
		3#0	21.19	21.27	21.21
3MHz	QPSK	1#0	22.30	22.35	22.33
		1#8	22.33	22.37	22.28
		1#14	22.29	22.31	22.23
		6#0	21.33	21.38	21.35
		6#9	21.34	21.40	21.33
		15#0	21.31	21.34	21.30
	16QAM	1#0	21.39	21.20	21.36
		1#8	21.41	21.27	21.37
		1#14	21.38	21.21	21.34
		6#0	20.40	20.31	20.38
5MHz	QPSK	1#0	22.41	22.41	22.40
		1#13	22.39	22.40	22.42
		1#24	22.37	22.36	22.36
		15#0	21.33	21.32	21.34
		15#0	21.34	21.31	21.32
		25#0	21.33	21.30	21.31
	16QAM	1#0	21.38	21.38	21.55
		1#13	21.35	21.38	21.54
		1#24	21.36	21.34	21.48
		15#0	20.30	20.33	20.35
10MHz	QPSK	1#0	22.37	22.32	22.33
		1#25	22.35	22.38	22.35
		1#49	22.40	22.36	22.38
		25#0	21.33	21.35	21.34
		25#25	21.39	21.33	21.39
		50#0	21.38	21.36	21.38
	16QAM	1#0	21.50	21.23	21.46
		1#25	21.53	21.27	21.47
		1#49	21.57	21.23	21.48
		25#0	20.40	20.36	20.33
		25#25	20.43	20.35	20.37
		50#0	20.41	20.34	20.35



**LTE Band 7 (PART 27)**

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.22	22.13	21.93
		1#13	22.20	22.09	21.92
		1#24	22.17	22.01	21.88
		15#0	21.11	21.09	20.88
		15#10	21.06	21.01	20.89
	25#0	21.10	21.03	20.87	
	16QAM	1#0	21.13	21.09	21.09
		1#13	21.16	21.04	21.08
		1#24	21.14	20.96	21.08
		15#0	20.08	19.93	19.84
15#10		20.06	19.89	19.87	
25#0	20.10	20.01	19.80		
10MHz	QPSK	1#0	22.09	21.78	21.86
		1#24	22.13	21.97	21.89
		1#49	22.12	22.05	21.92
		25#0	21.11	21.09	20.87
		25#25	21.12	21.05	20.93
	50#0	21.11	21.11	20.91	
	16QAM	1#0	21.26	20.91	21.05
		1#24	21.23	21.00	21.08
		1#49	21.27	20.93	21.07
		25#0	20.11	20.11	19.84
25#25		20.13	20.04	19.91	
50#0	20.12	20.08	19.89		
15MHz	QPSK	1#0	22.09	21.82	21.89
		1#37	22.07	21.85	21.79
		1#74	21.81	22.07	21.98
		36#0	21.18	20.91	20.96
		36#39	21.16	21.13	20.99
	75#0	21.17	21.04	20.97	
	16QAM	1#0	21.25	20.93	21.16
		1#37	21.21	20.96	21.06
		1#74	20.93	20.85	21.25
		36#0	20.10	20.06	20.03
36#39		20.13	20.01	20.05	
75#0	20.10	20.07	19.97		

20MHz	QPSK	1#0	22.24	21.38	22.02
		1#49	22.11	21.75	21.71
		1#99	20.88	21.96	22.09
		50#0	21.15	20.57	20.96
		50#50	20.49	21.03	20.92
		100#0	21.12	20.93	20.93
	16QAM	1#0	21.30	20.57	21.05
		1#49	21.32	20.98	20.79
		1#99	20.39	21.10	21.10
		50#0	20.16	20.13	19.97
		50#50	19.58	20.08	19.93
		100#0	20.13	20.09	19.95

**LTE Band 17(PART 27)**

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.96	22.97	22.92
		1#12	22.60	22.42	22.93
		1#24	22.71	22.62	22.91
		15#0	21.72	21.68	21.91
		15#10	21.51	21.48	21.89
		25#0	21.66	21.63	21.86
	16QAM	1#0	22.14	21.91	22.10
		1#12	21.86	21.48	22.11
		1#24	21.98	21.69	21.96
		15#0	20.86	20.63	20.96
15#10		20.66	20.48	20.95	
10MHz	QPSK	1#0	22.82	22.87	22.82
		1#24	22.57	22.86	22.88
		1#49	22.51	22.72	22.79
		25#0	21.91	21.89	21.91
		25#25	21.88	21.92	21.92
		50#0	21.94	21.95	21.94
	16QAM	1#0	22.04	21.76	21.96
		1#24	21.84	21.87	22.09
		1#49	21.87	21.85	21.94
		25#0	20.91	20.94	20.93
		25#25	20.73	20.97	20.93
		50#0	20.93	20.98	20.95

**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	4.13	5.67	4.46	13
	100 RB		6.44	6.44	6.35	13
16QAM	1 RB	20 MHz	4.94	6.70	5.13	13
	100 RB		7.08	7.12	7.05	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	4.55	4.74	4.94	13
	100 RB		6.44	6.25	6.38	13
16QAM	1 RB	20 MHz	5.58	5.58	6.03	13
	100 RB		7.21	7.02	7.18	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	3.94	4.49	4.13	13
	50 RB		5.35	5.58	5.26	13
16QAM	1 RB	10 MHz	4.62	5.26	4.94	13
	50 RB		6.22	6.44	6.19	13

**PAR, Band 7**

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.78	4.17	4.81	13
	100 RB		6.28	6.51	6.47	13
16QAM	1 RB	20 MHz	5.87	5.45	5.74	13
	100 RB		7.15	7.12	7.15	13

**PAR, Band 17**

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	2.95	3.11	3.53	13
	50 RB		5.16	5.32	5.29	13
16QAM	1 RB	10 MHz	3.81	4.10	4.42	13
	50 RB		6.09	6.19	6.22	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)			
<b>GSM 850 Middle Channel</b>								
836.600	H	91.56	23.7	0.0	0.5	23.2	38.45	15.3
836.600	V	100.11	35.2	0.0	0.5	34.7	38.45	3.8
<b>EDGE 850 Middle Channel</b>								
836.600	H	85.83	17.9	0.0	0.5	17.4	38.45	21.1
836.600	V	94.28	29.4	0.0	0.5	28.9	38.45	9.6
<b>WCDMA Band V Middle Channel</b>								
836.600	H	82.77	14.9	0.0	0.5	14.4	38.45	24.1
836.600	V	90.20	25.3	0.0	0.5	24.8	38.45	13.7

**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)			
<b>PCS 1900 Middle Channel</b>								
1880.000	H	91.25	18.3	11.1	1.6	27.8	33.00	5.2
1880.000	V	87.84	14.7	11.1	1.6	24.2	33.00	8.8
<b>EDGE 1900 Middle Channel</b>								
1880.000	H	89.64	16.7	11.1	1.6	26.2	33.00	6.8
1880.000	V	85.37	12.2	11.1	1.6	21.7	33.00	11.3
<b>WCDMA Band II Middle Channel</b>								
1880.000	H	86.32	13.4	11.1	1.6	22.9	33.00	10.1
1880.000	V	81.87	8.7	11.1	1.6	18.2	33.00	14.8

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)	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 1.4 MHz Middle Channel								
1880.000	H	85.02	12.1	11.1	1.6	21.6	33.00	11.4
1880.000	V	82.36	9.2	11.1	1.6	18.7	33.00	14.3
16QAM 1.4 MHz Middle Channel								
1880.000	H	85.15	12.2	11.1	1.6	21.7	33.00	11.3
1880.000	V	83.73	10.6	11.1	1.6	20.1	33.00	12.9
QPSK 3 MHz Middle Channel								
1880.000	H	84.67	11.7	11.1	1.6	21.2	33.00	11.8
1880.000	V	83.15	10	11.1	1.6	19.5	33.00	13.5
16QAM 3 MHz Middle Channel								
1880.000	H	85.18	12.2	11.1	1.6	21.7	33.00	11.3
1880.000	V	82.28	9.1	11.1	1.6	18.6	33.00	14.4
QPSK 5 MHz Middle Channel								
1880.000	H	83.98	11	11.1	1.6	20.5	33.00	12.5
1880.000	V	81.24	8.1	11.1	1.6	17.6	33.00	15.4
16QAM 5 MHz Middle Channel								
1880.000	H	85.09	12.1	11.1	1.6	21.6	33.00	11.4
1880.000	V	81.24	8.1	11.1	1.6	17.6	33.00	15.4
QPSK 10 MHz Middle Channel								
1880.000	H	84.50	11.5	11.1	1.6	21.0	33.00	12.0
1880.000	V	82.08	8.9	11.1	1.6	18.4	33.00	14.6
16QAM 10 MHz Middle Channel								
1880.000	H	84.51	11.6	11.1	1.6	21.1	33.00	11.9
1880.000	V	80.36	7.2	11.1	1.6	16.7	33.00	16.3
QPSK 15 MHz Middle Channel								
1880.000	H	85.16	12.2	11.1	1.6	21.7	33.00	11.3
1880.000	V	80.92	7.8	11.1	1.6	17.3	33.00	15.7
16QAM 15 MHz Middle Channel								
1880.000	H	85.03	12.1	11.1	1.6	21.6	33.00	11.4
1880.000	V	80.17	7	11.1	1.6	16.5	33.00	16.5
QPSK 20 MHz Middle Channel								
1880.000	H	83.97	11	11.1	1.6	20.5	33.00	12.5
1880.000	V	80.09	6.9	11.1	1.6	16.4	33.00	16.6
16QAM 20 MHz Middle Channel								
1880.000	H	84.32	11.4	11.1	1.6	20.9	33.00	12.1
1880.000	V	80.98	7.8	11.1	1.6	17.3	33.00	15.7

**LTE Band 4**

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 1.4 MHz Middle Channel								
1732.500	H	84.39	10.9	10.7	1.5	20.1	30.00	9.9
1732.500	V	83.18	9.4	10.7	1.5	18.6	30.00	11.4
16QAM 1.4 MHz Middle Channel								
1732.500	H	84.95	11.5	10.7	1.5	20.7	30.00	9.3
1732.500	V	83.52	9.7	10.7	1.5	18.9	30.00	11.1
QPSK 3 MHz Middle Channel								
1732.500	H	85.19	11.7	10.7	1.5	20.9	30.00	9.1
1732.500	V	83.15	9.4	10.7	1.5	18.6	30.00	11.4
16QAM 3 MHz Middle Channel								
1732.500	H	85.15	11.7	10.7	1.5	20.9	30.00	9.1
1732.500	V	83.09	9.3	10.7	1.5	18.5	30.00	11.5
QPSK 5 MHz Middle Channel								
1732.500	H	85.19	11.7	10.7	1.5	20.9	30.00	9.1
1732.500	V	82.15	8.4	10.7	1.5	17.6	30.00	12.4
16QAM 5 MHz Middle Channel								
1732.500	H	85.09	11.6	10.7	1.5	20.8	30.00	9.2
1732.500	V	82.18	8.4	10.7	1.5	17.6	30.00	12.4
QPSK 10 MHz Middle Channel								
1732.500	H	84.08	10.6	10.7	1.5	19.8	30.00	10.2
1732.500	V	81.58	7.8	10.7	1.5	17.0	30.00	13.0
16QAM 10 MHz Middle Channel								
1732.500	H	84.29	10.8	10.7	1.5	20.0	30.00	10.0
1732.500	V	81.57	7.8	10.7	1.5	17.0	30.00	13.0
QPSK 15 MHz Middle Channel								
1732.500	H	84.08	10.6	10.7	1.5	19.8	30.00	10.2
1732.500	V	80.39	6.6	10.7	1.5	15.8	30.00	14.2
16QAM 15 MHz Middle Channel								
1732.500	H	84.27	10.8	10.7	1.5	20.0	30.00	10.0
1732.500	V	80.39	6.6	10.7	1.5	15.8	30.00	14.2
QPSK 20 MHz Middle Channel								
1732.500	H	84.28	10.8	10.7	1.5	20.0	30.00	10.0
1732.500	V	80.15	6.4	10.7	1.5	15.6	30.00	14.4
16QAM 20 MHz Middle Channel								
1732.500	H	83.98	10.5	10.7	1.5	19.7	30.00	10.3
1732.500	V	80.51	6.7	10.7	1.5	15.9	30.00	14.1

**LTE Band 5**

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 1.4 MHz Middle Channel								
836.500	H	88.36	20.5	0.0	0.5	20.0	38.45	18.5
836.500	V	89.45	23.4	0.0	0.5	22.9	38.45	15.6
16QAM 1.4 MHz Middle Channel								
836.500	H	88.69	20.8	0.0	0.5	20.3	38.45	18.2
836.500	V	90.01	22.6	0.0	0.5	22.1	38.45	16.4
QPSK 3 MHz Middle Channel								
836.500	H	88.74	20.9	0.0	0.5	20.4	38.45	18.1
836.500	V	90.21	23.9	0.0	0.5	23.4	38.45	15.1
16QAM 3 MHz Middle Channel								
836.500	H	89.01	21.1	0.0	0.5	20.6	38.45	17.9
836.500	V	90.32	22.8	0.0	0.5	22.3	38.45	16.2
QPSK 5 MHz Middle Channel								
836.500	H	88.36	20.5	0.0	0.5	20.0	38.45	18.5
836.500	V	89.67	24.1	0.0	0.5	23.6	38.45	14.9
16QAM 5 MHz Middle Channel								
836.500	H	88.14	20.3	0.0	0.5	19.8	38.45	18.7
836.500	V	89.78	22.5	0.0	0.5	22.0	38.45	16.5
QPSK 10 MHz Middle Channel								
836.500	H	88.15	20.3	0.0	0.5	19.8	38.45	18.7
836.500	V	89.99	23.4	0.0	0.5	22.9	38.45	15.6
16QAM 10 MHz Middle Channel								
836.500	H	89.23	21.3	0.0	0.5	20.8	38.45	17.7
836.500	V	90.15	22.2	0.0	0.5	21.7	38.45	16.8



**LTE Band 7**

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 5 MHz Middle Channel								
2535.000	H	85.37	14.3	12.2	1.8	24.7	33.00	8.3
2535.000	V	83.09	11.7	12.2	1.8	22.1	33.00	10.9
16QAM 5 MHz Middle Channel								
2535.000	H	84.28	13.2	12.2	1.8	23.6	33.00	9.4
2535.000	V	83.09	11.7	12.2	1.8	22.1	33.00	10.9
QPSK 10 MHz Middle Channel								
2535.000	H	85.09	14	12.2	1.8	24.4	33.00	8.6
2535.000	V	83.13	11.8	12.2	1.8	22.2	33.00	10.8
16QAM 10 MHz Middle Channel								
2535.000	H	84.12	13.1	12.2	1.8	23.5	33.00	9.5
2535.000	V	81.28	9.9	12.2	1.8	20.3	33.00	12.7
QPSK 15 MHz Middle Channel								
2535.000	H	84.59	13.5	12.2	1.8	23.9	33.00	9.1
2535.000	V	81.27	9.9	12.2	1.8	20.3	33.00	12.7
16QAM 15 MHz Middle Channel								
2535.000	H	83.99	12.9	12.2	1.8	23.3	33.00	9.7
2535.000	V	80.69	9.3	12.2	1.8	19.7	33.00	13.3
QPSK 20 MHz Middle Channel								
2535.000	H	84.07	13	12.2	1.8	23.4	33.00	9.6
2535.000	V	82.01	10.7	12.2	1.8	21.1	33.00	11.9
16QAM 20 MHz Middle Channel								
2535.000	H	83.15	12.1	12.2	1.8	22.5	33.00	10.5
2535.000	V	80.25	8.9	12.2	1.8	19.3	33.00	13.7

**LTE Band 17**

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 5 MHz Middle Channel								
710.000	H	89.18	18.7	0.0	0.4	18.3	34.77	16.5
710.000	V	91.27	23.7	0.0	0.4	23.3	34.77	11.5
16QAM 5 MHz Middle Channel								
710.000	H	89.17	18.7	0.0	0.4	18.3	34.77	16.5
710.000	V	91.28	23.7	0.0	0.4	23.3	34.77	11.5
QPSK 10 MHz Middle Channel								
710.000	H	89.52	19	0.0	0.4	18.6	34.77	16.2
710.000	V	92.31	24.7	0.0	0.4	24.3	34.77	10.5
16QAM 10 MHz Middle Channel								
710.000	H	89.50	19	0.0	0.4	18.6	34.77	16.2
710.000	V	90.15	22.5	0.0	0.4	22.1	34.77	12.7

Note:

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

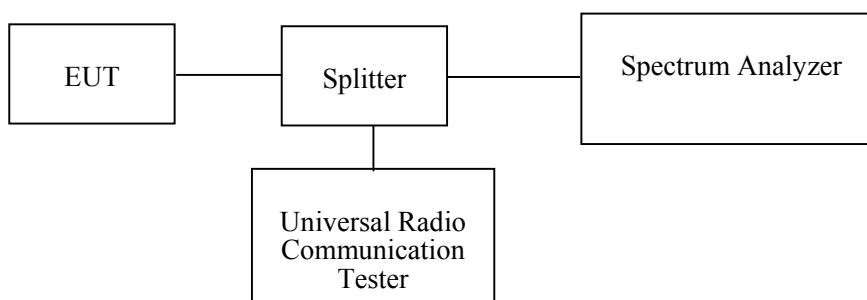
**FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH****Applicable Standard**

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

**Test Procedure**

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

The 26 dB & 99% bandwidth was recorded.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	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**

<b>Temperature:</b>	21.1~24.1°C
<b>Relative Humidity:</b>	39~42 %
<b>ATM Pressure:</b>	100.9~101 kPa

The testing was performed by Harry Yang on 2018-01-02 & 2018-01-30.

Test Mode: Transmitting

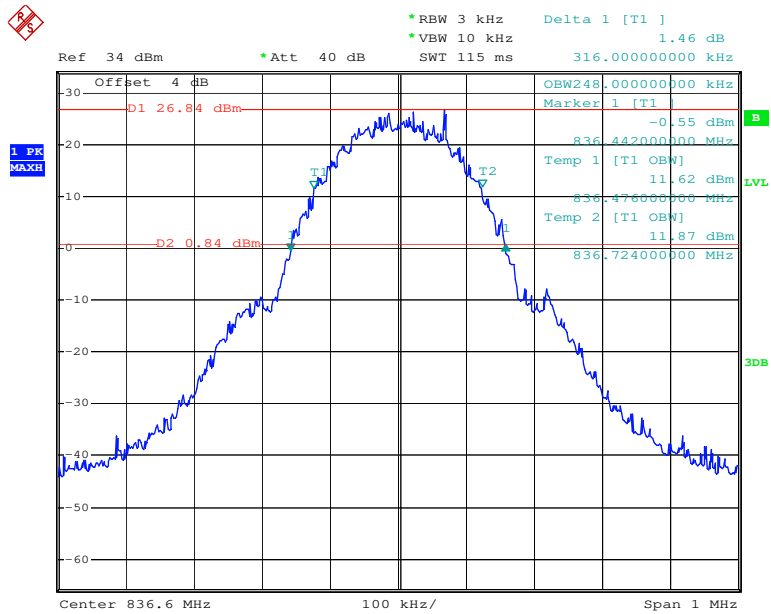
Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GSM	0.248	0.316
		EDGE	0.254	0.314
PCS		PCS	0.248	0.314
		EDGE	0.250	0.314
WCDMA Band II		Rel 99	4.22	4.88
		HSDPA	4.24	4.88
		HSUPA	4.24	4.9
WCDMA Band V		Rel 99	4.24	4.88
		HSDPA	4.24	4.88
		HSUPA	4.22	4.88

Band	Test Modulation	Test Bandwidth (MHz)	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
LTE Band 2	QPSK	1.4	M	1.101	1.284
		3		2.702	2.942
		5		4.503	4.997
		10		8.974	9.869
		15		13.510	14.856
		20		17.949	19.311
	16QAM	1.4	M	1.106	1.300
		3		2.702	2.929
		5		4.487	4.952
		10		8.942	9.824
		15		13.510	14.744
		20		18.013	19.359

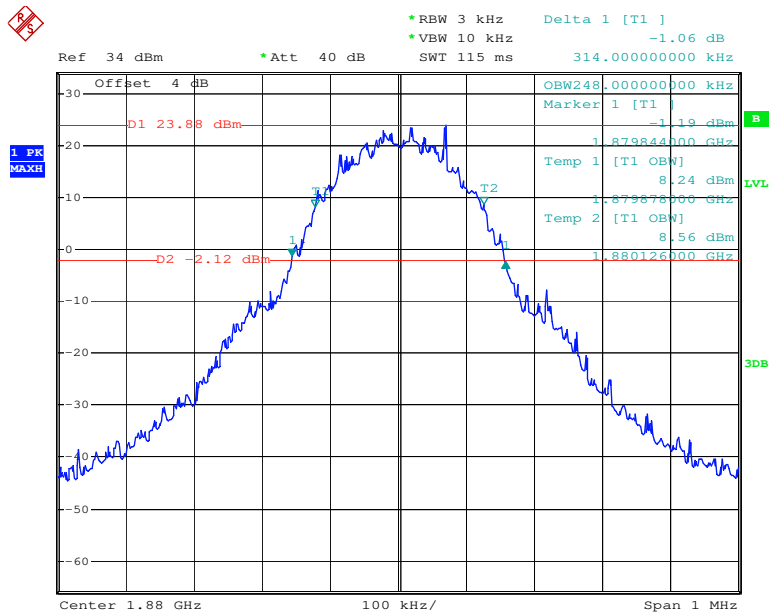
Band	Test Modulation	Test Bandwidth (MHz)	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
LTE Band 4	QPSK	1.4	M	1.101	1.287
		3		2.692	2.936
		5		4.503	4.984
		10		8.974	9.808
		15		13.462	14.760
		20		17.949	19.167
	16QAM	1.4	M	1.106	1.288
		3		2.692	2.937
		5		4.487	4.895
		10		8.942	9.783
		15		13.462	14.775
		20		17.885	19.246
LTE Band 5	QPSK	1.4	M	1.101	1.284
		3		2.692	2.933
		5		4.503	4.987
		10		9.006	9.795
	16QAM	1.4	M	1.101	1.285
		3		2.692	2.920
		5		4.487	4.936
		10		8.974	9.711
LTE Band 7	QPSK	5	M	4.503	4.990
		10		8.942	9.782
		15		13.462	14.718
		20		17.885	19.141
	16QAM	5	M	4.487	4.936
		10		8.942	9.663
		15		13.510	14.760
		20		17.885	19.135
LTE Band 17	QPSK	5	M	4.487	4.946
		10		8.974	9.836
	16QAM	5	M	4.503	4.946
		10		8.973	9.673

### GSM 850 Cellular Band



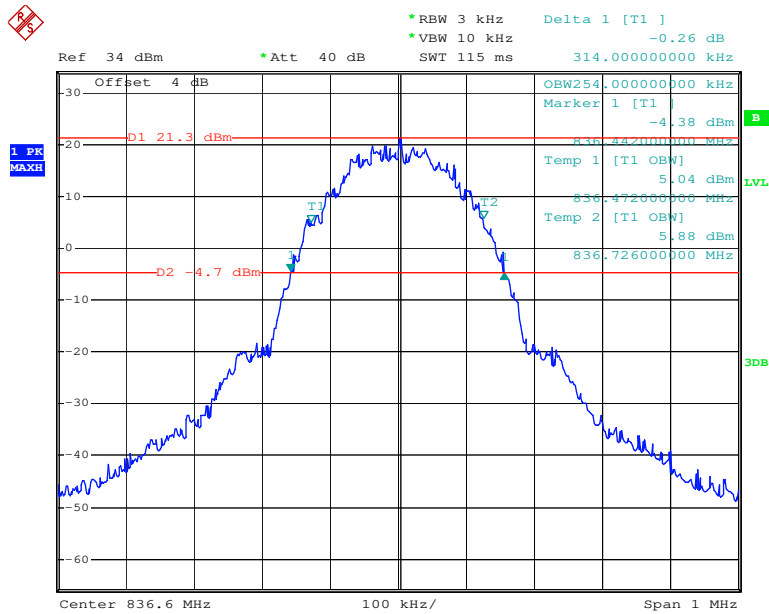
Date: 2.JAN.2018 21:47:25

### GSM PCS1900 Cellular Band



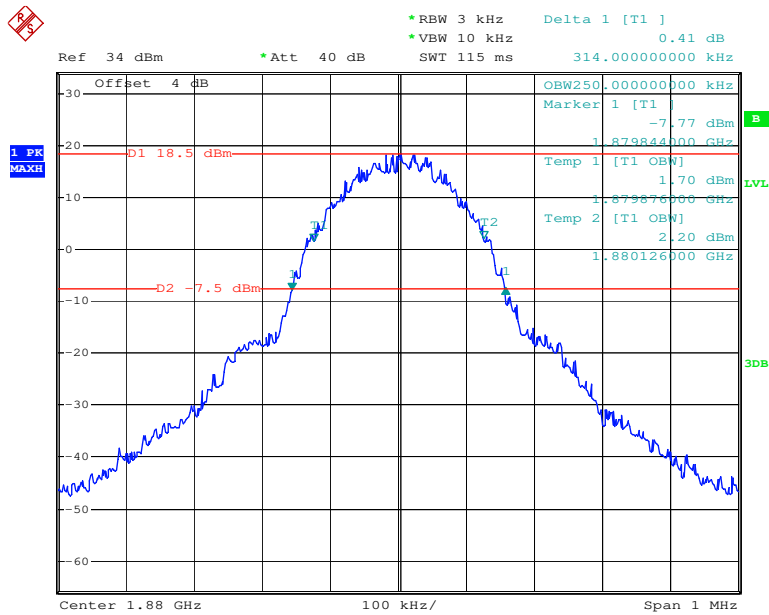
Date: 2.JAN.2018 22:02:39

### EDGE 850 Cellular Band



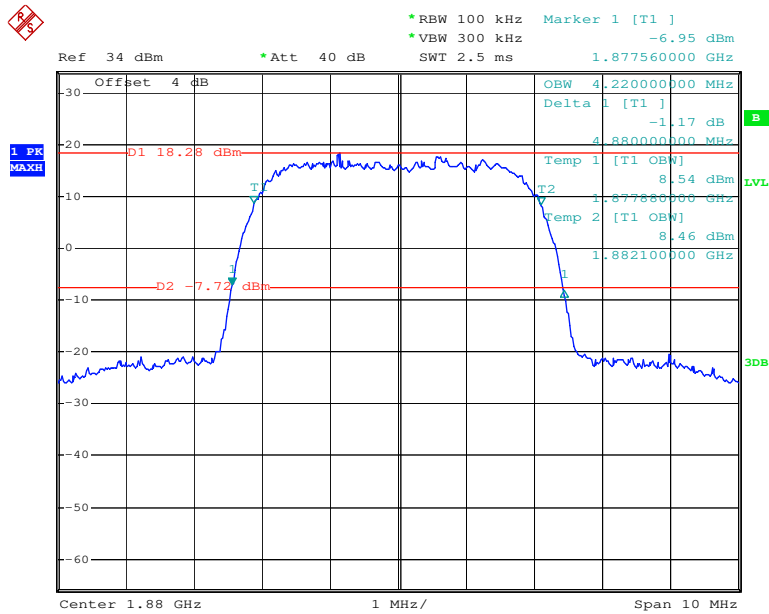
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### EDGE PCS1900 Cellular Band



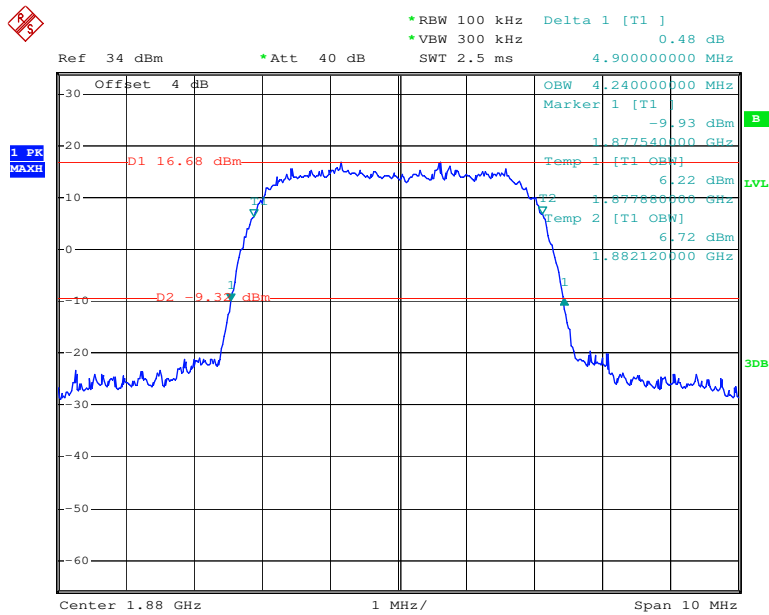
Date: 2.JAN.2018 21:53:51

### WCDMA Band II, Rel 99



Date: 2.JAN.2018 21:22:23

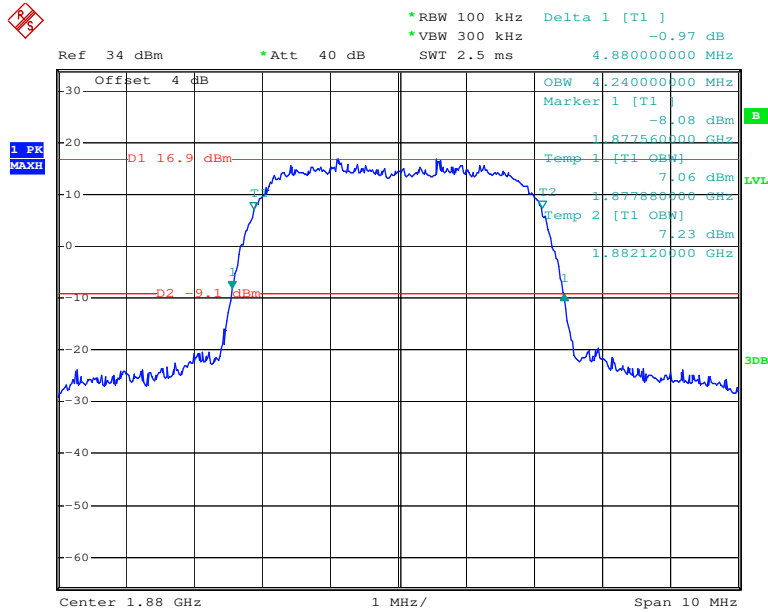
### WCDMA Band II, HSUPA



Date: 2.JAN.2018 21:25:27

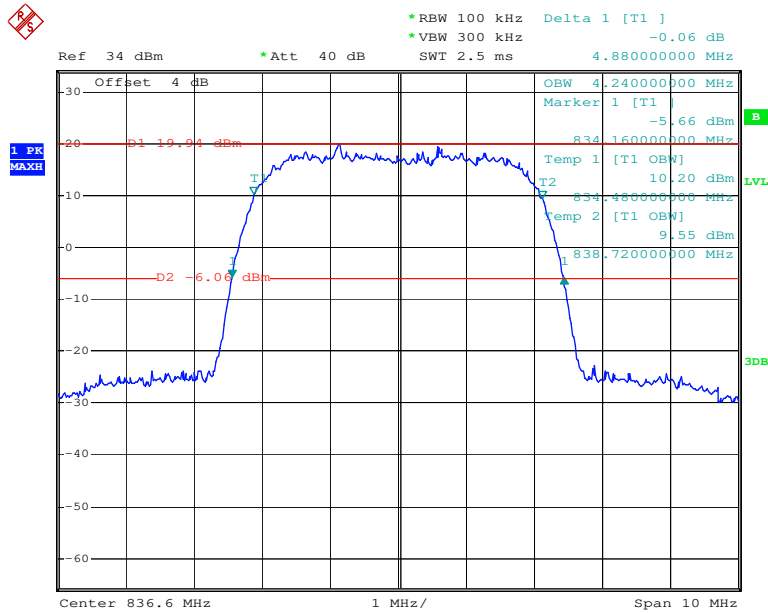


### WCDMA Band II, HSDPA



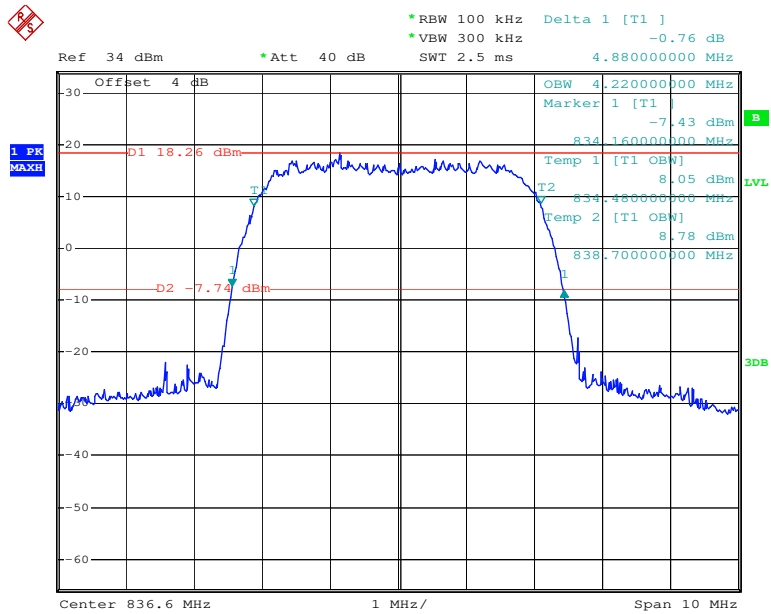
Date: 2.JAN.2018 21:24:02

### WCDMA Band V, Rel 99



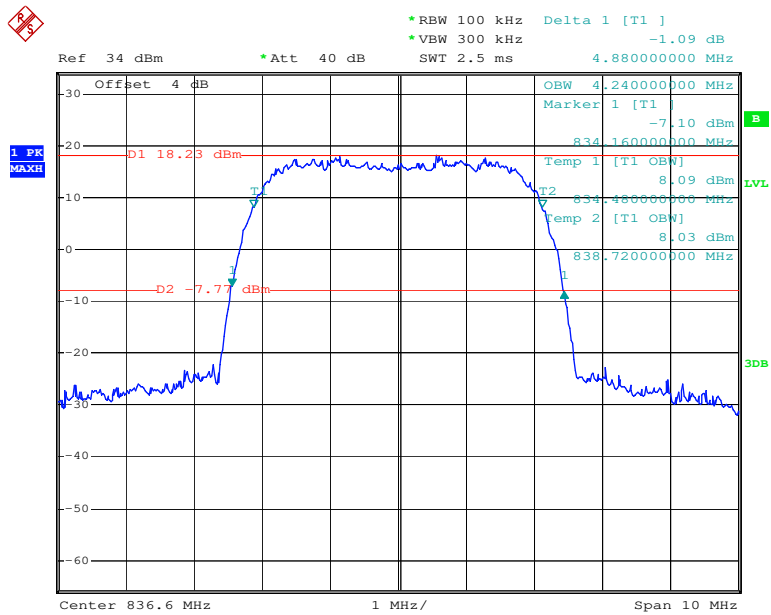
Date: 2.JAN.2018 21:27:26

### WCDMA Band V, HSUPA



Date: 2.JAN.2018 20:29:07

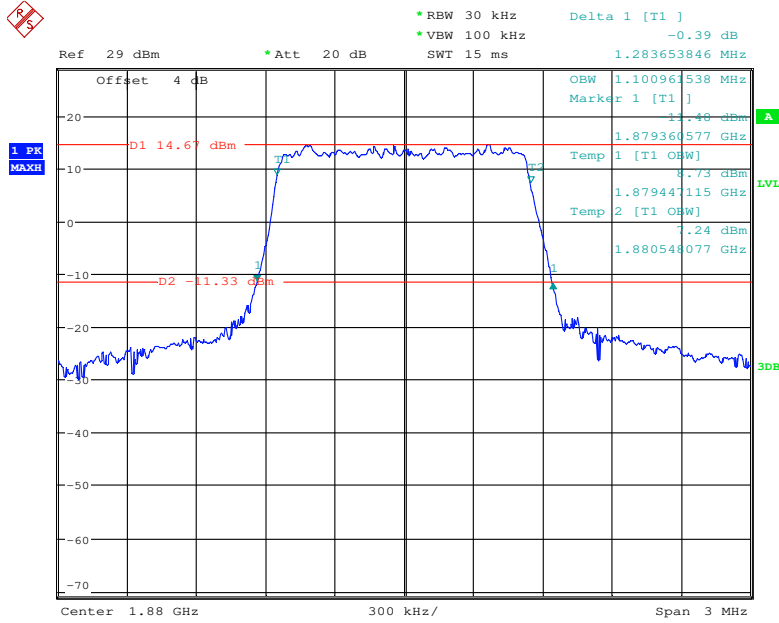
### WCDMA Band V, HSDPA



Date: 2.JAN.2018 21:29:19

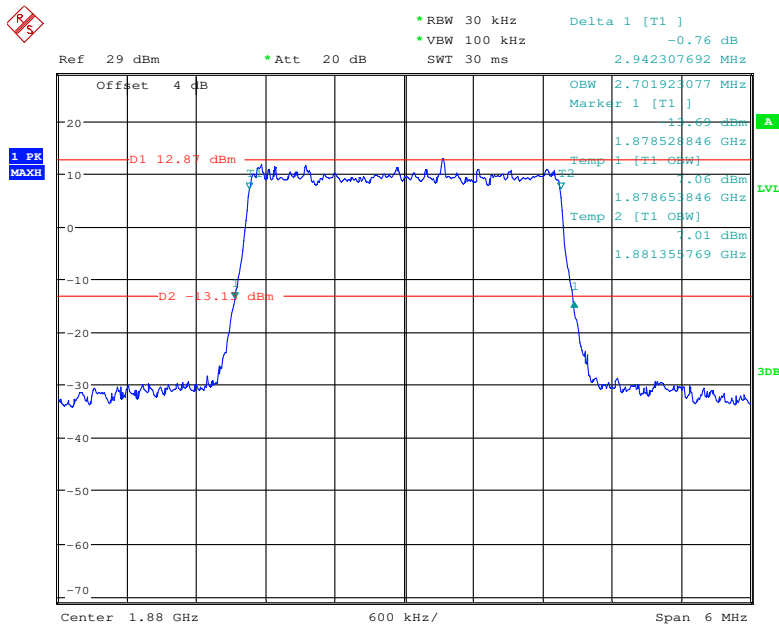
LTE Band 2

QPSK\_1.4 MHz



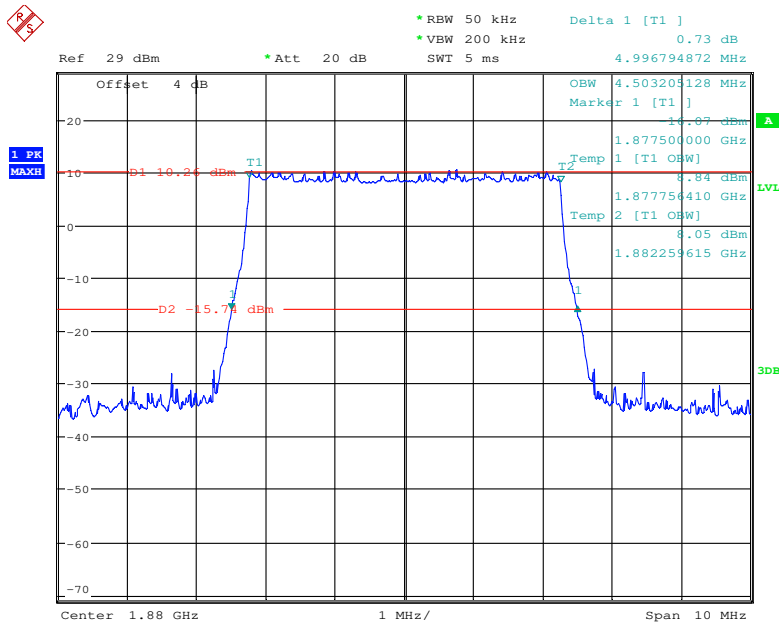
Date: 30.JAN.2018 20:40:57

QPSK\_3 MHz



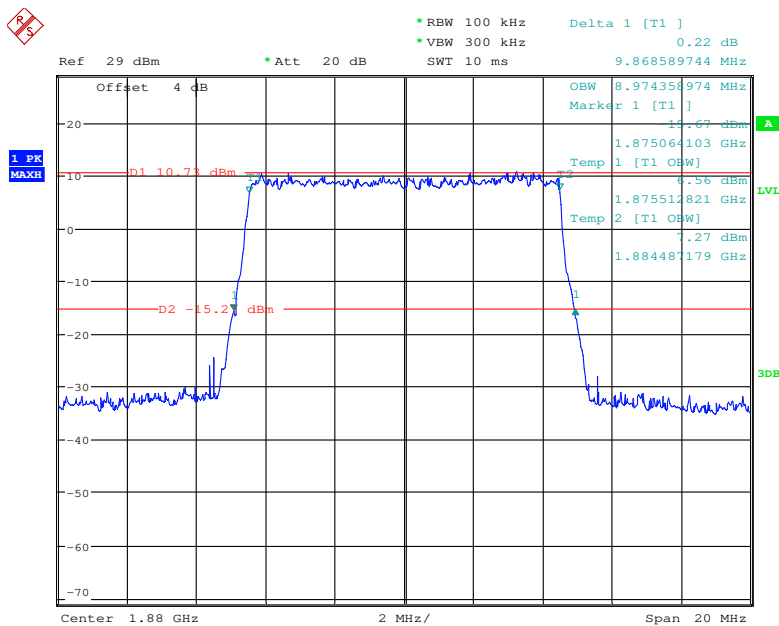
Date: 30.JAN.2018 20:41:57

### QPSK\_5 MHz



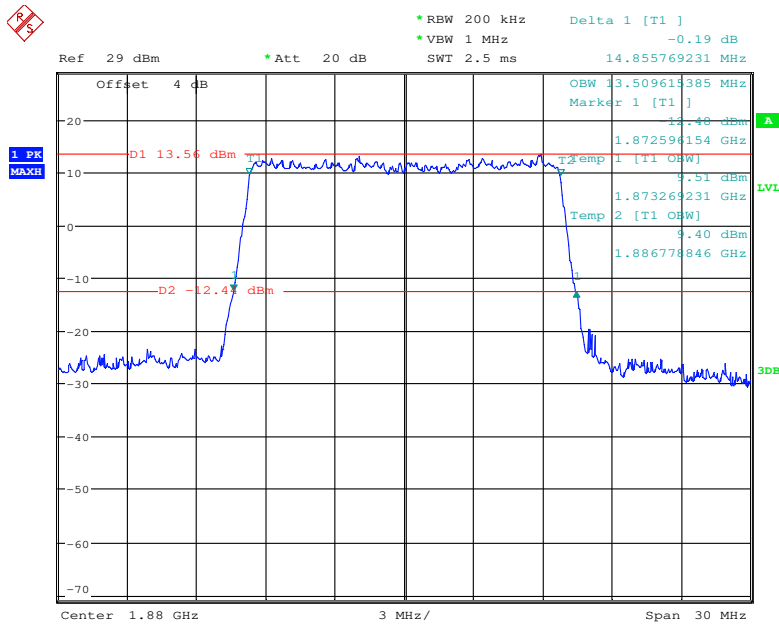
Date: 30.JAN.2018 20:43:04

### QPSK\_10 MHz



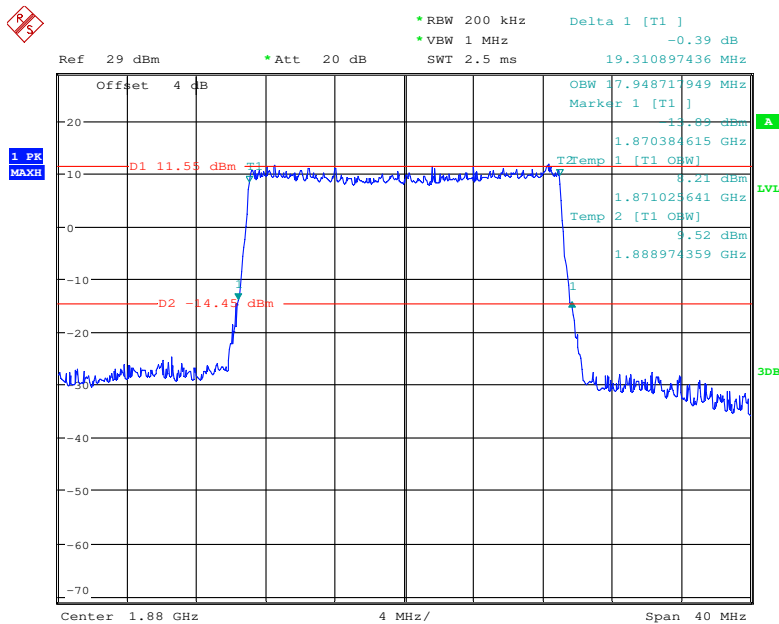
Date: 30.JAN.2018 20:44:01

### QPSK\_15 MHz



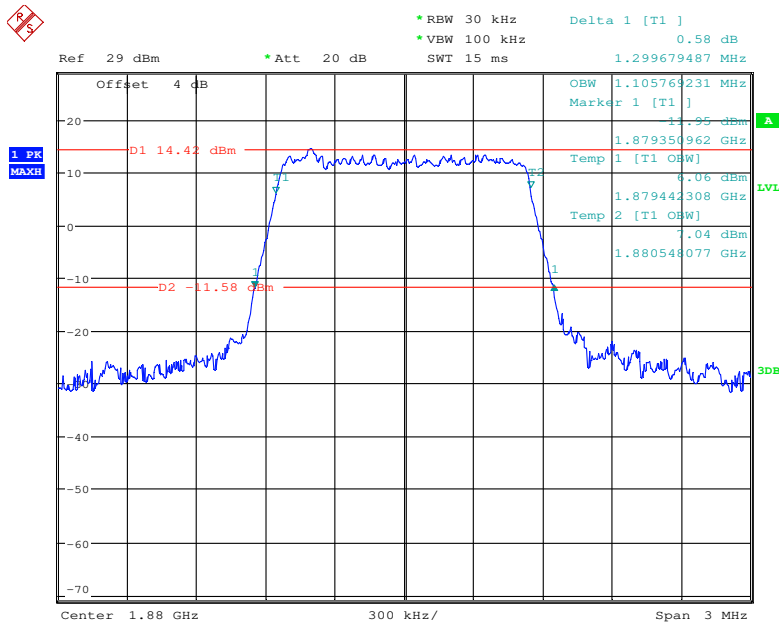
Date: 30.JAN.2018 20:47:53

### QPSK\_20 MHz



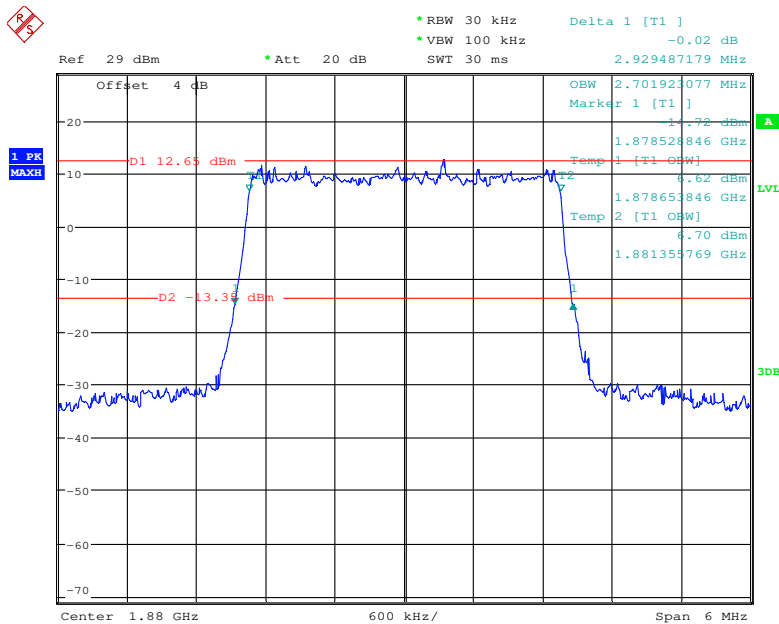
Date: 30.JAN.2018 20:49:05

### 16QAM\_1.4 MHz



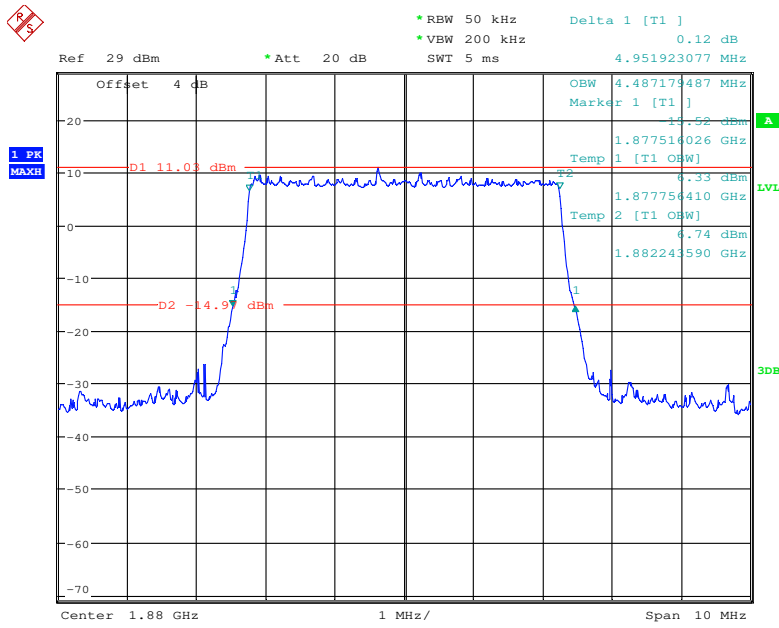
Date: 30.JAN.2018 21:41:47

### 16QAM\_3 MHz



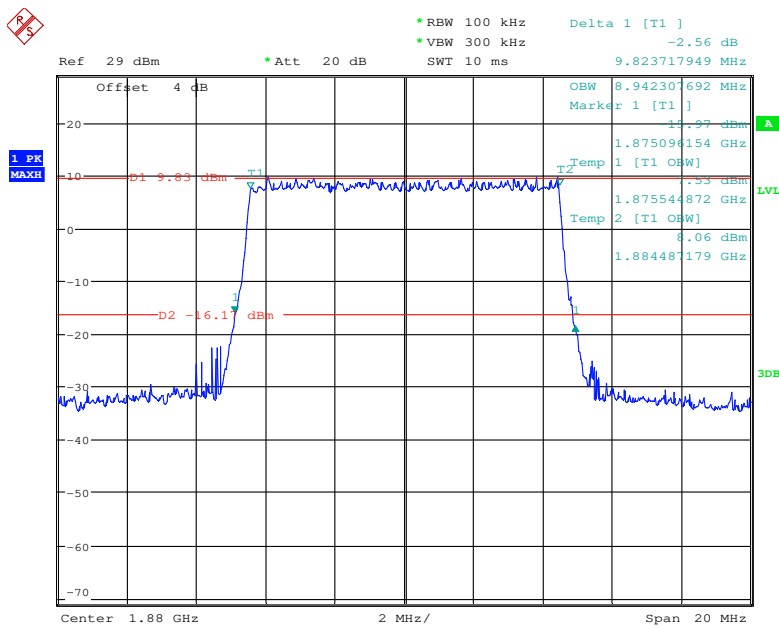
Date: 30.JAN.2018 21:41:16

### 16QAM\_5 MHz



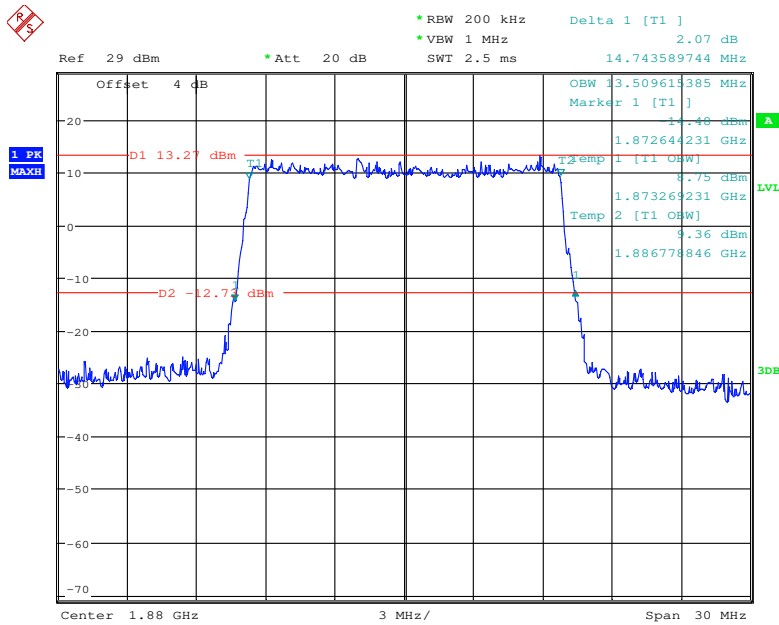
Date: 30.JAN.2018 21:40:44

### 16QAM\_10 MHz



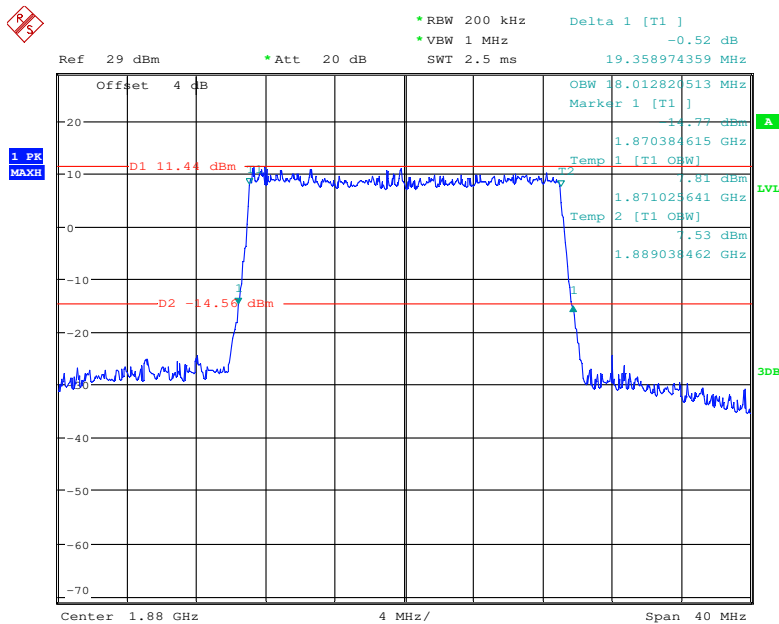
Date: 30.JAN.2018 21:39:19

### 16QAM\_15 MHz



Date: 30.JAN.2018 21:38:39

### 16QAM\_20 MHz

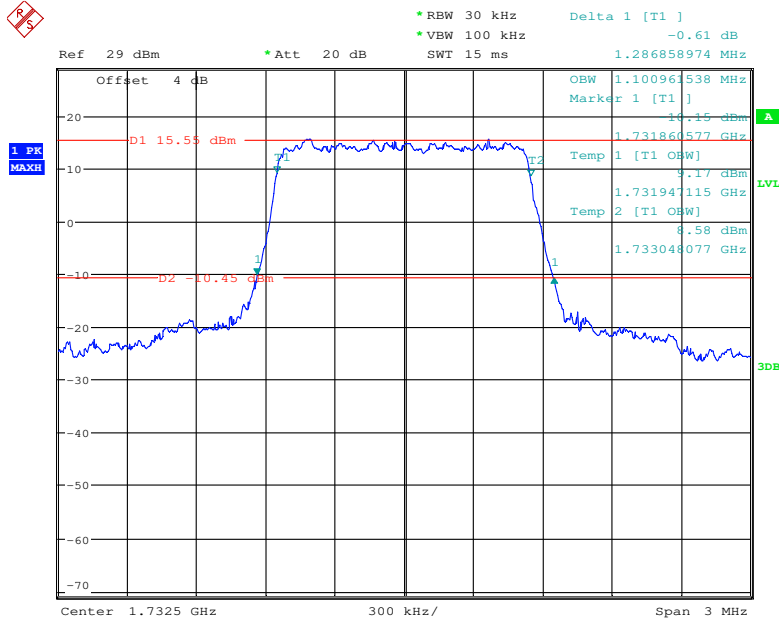


Date: 30.JAN.2018 21:38:05



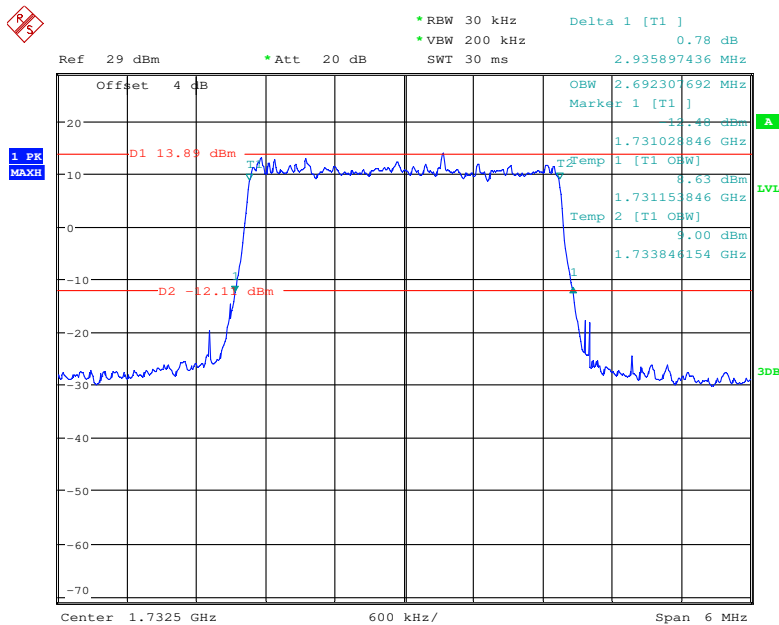
**LTE Band 4:**

**QPSK\_1.4 MHz**



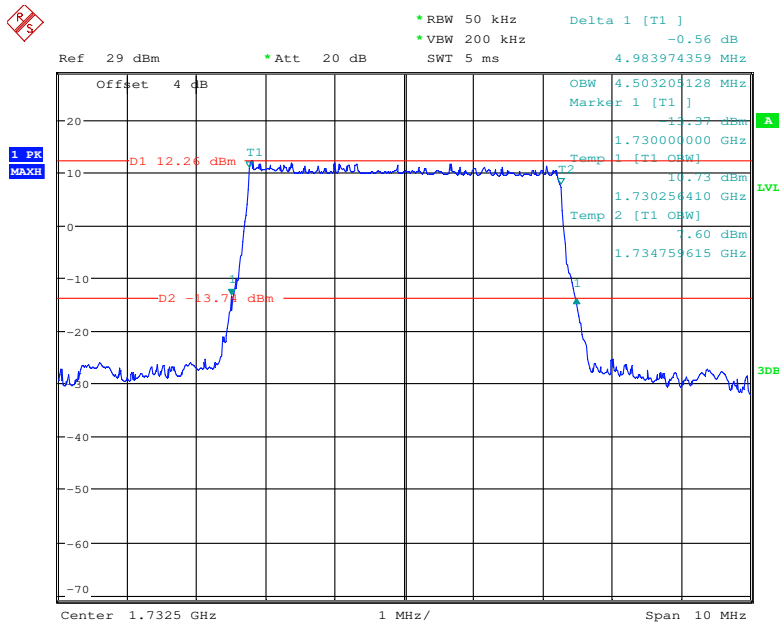
Date: 30.JAN.2018 21:00:34

**QPSK\_3 MHz**



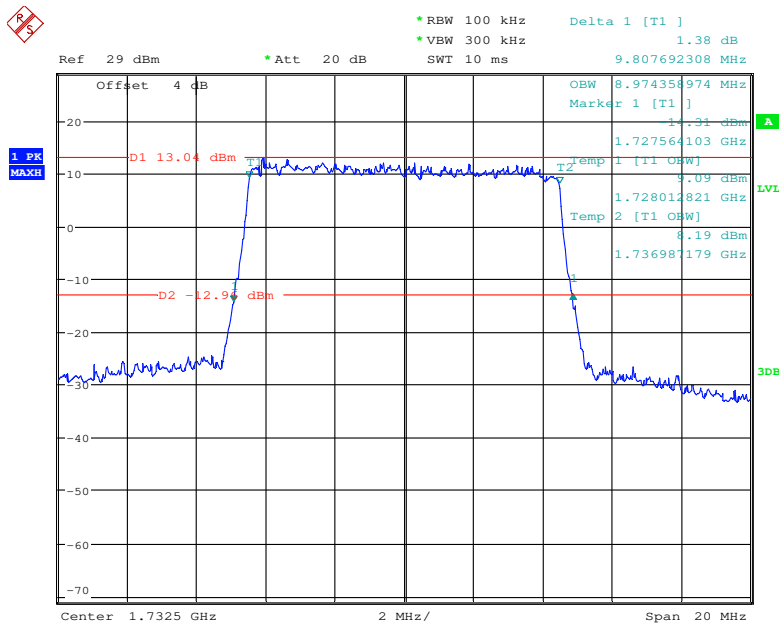
Date: 30.JAN.2018 20:59:46

### QPSK\_5 MHz



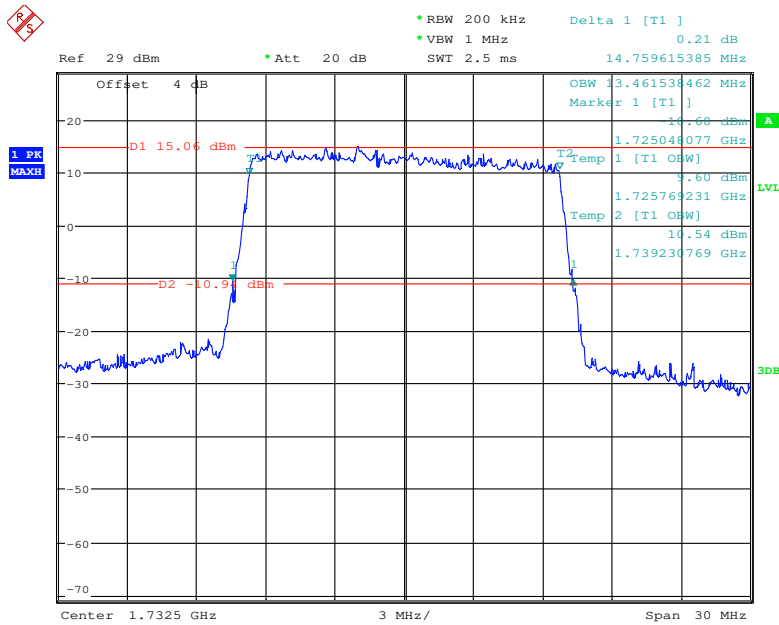
Date: 30.JAN.2018 20:58:08

### QPSK\_10 MHz



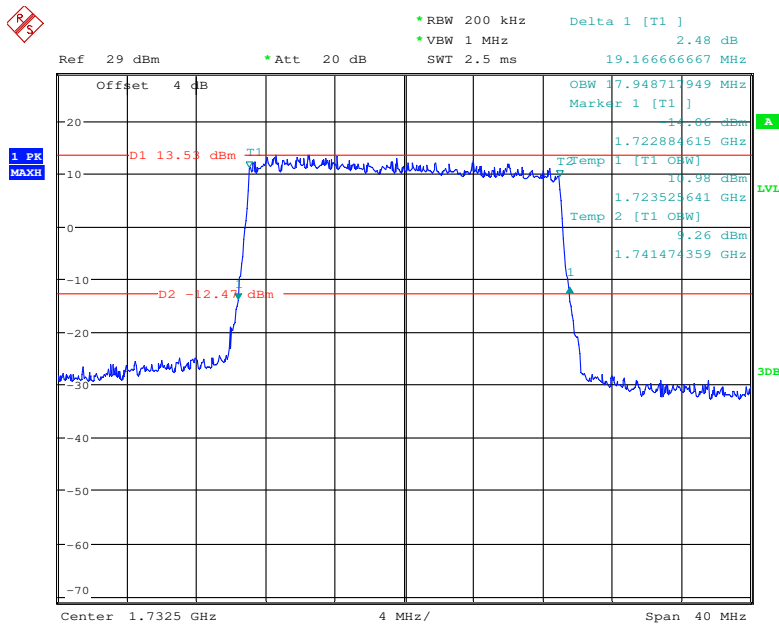
Date: 30.JAN.2018 20:57:21

### QPSK\_15 MHz



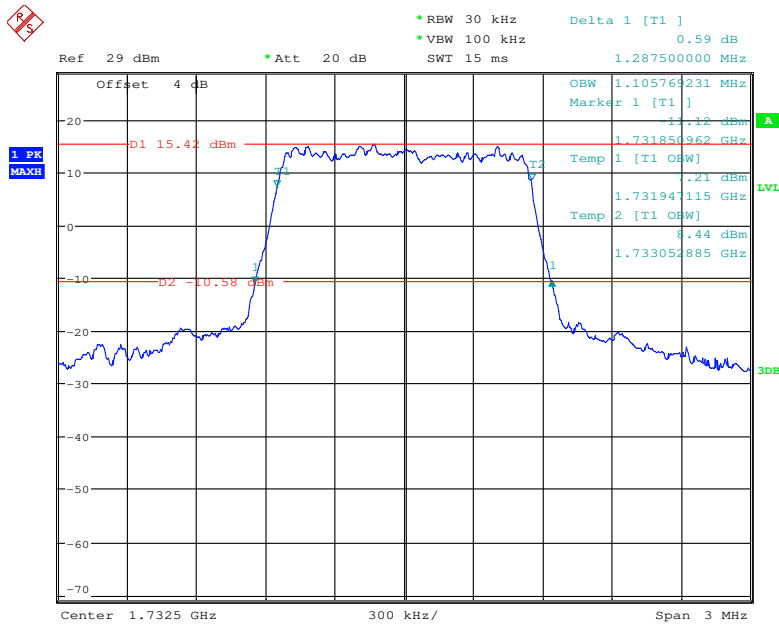
Date: 30.JAN.2018 20:56:30

### QPSK\_20 MHz



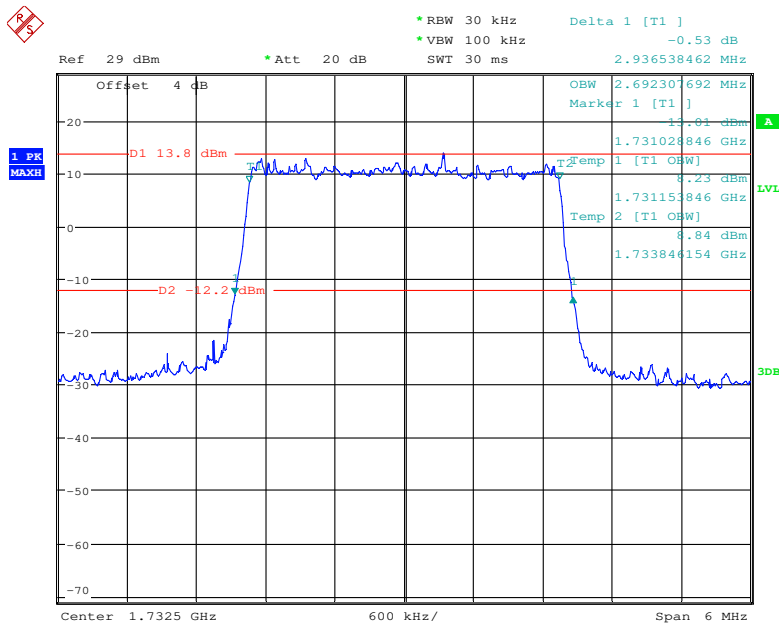
Date: 30.JAN.2018 20:53:17

### 16QAM\_1.4 MHz



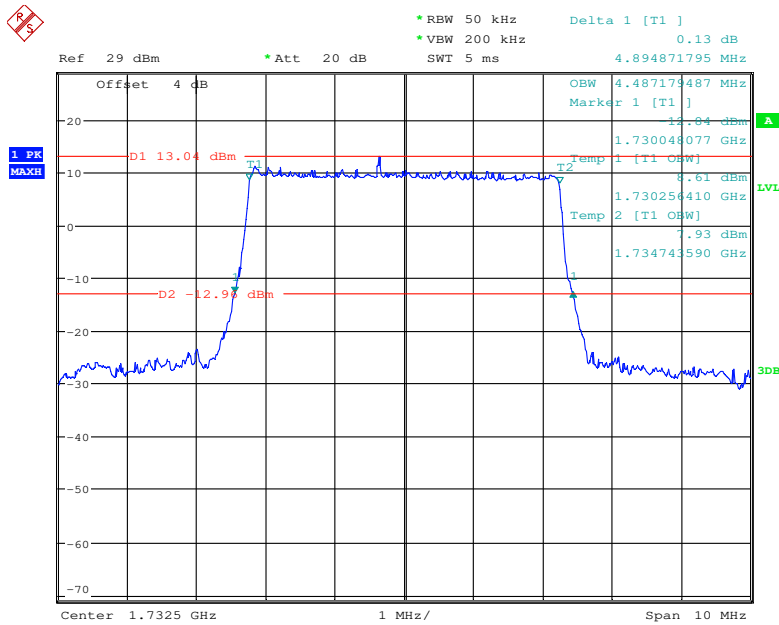
Date: 30.JAN.2018 21:30:39

### 16QAM\_3 MHz



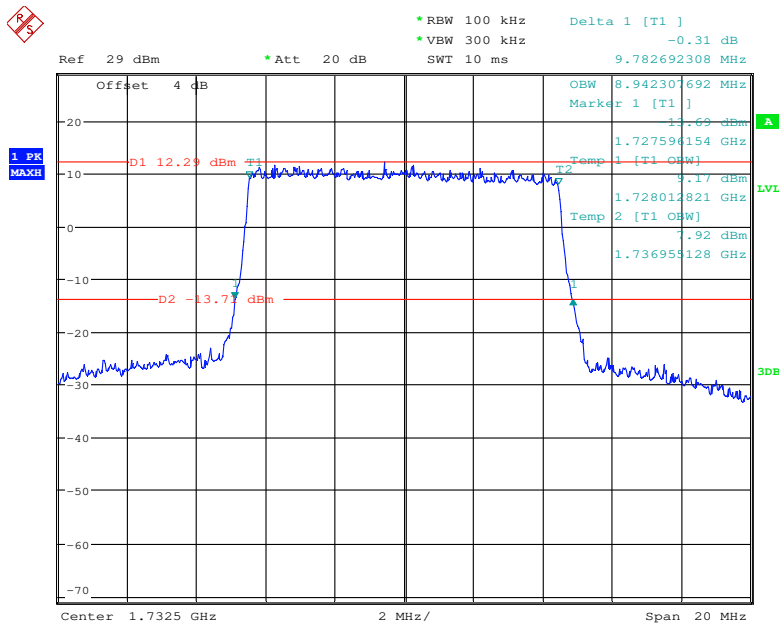
Date: 30.JAN.2018 21:31:12

### 16QAM\_5 MHz



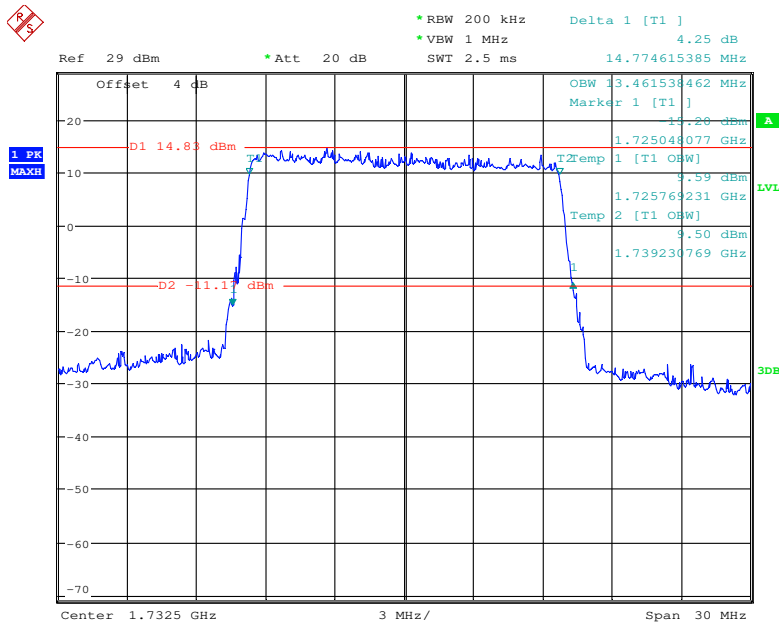
Date: 30.JAN.2018 21:31:51

### 16QAM\_10 MHz



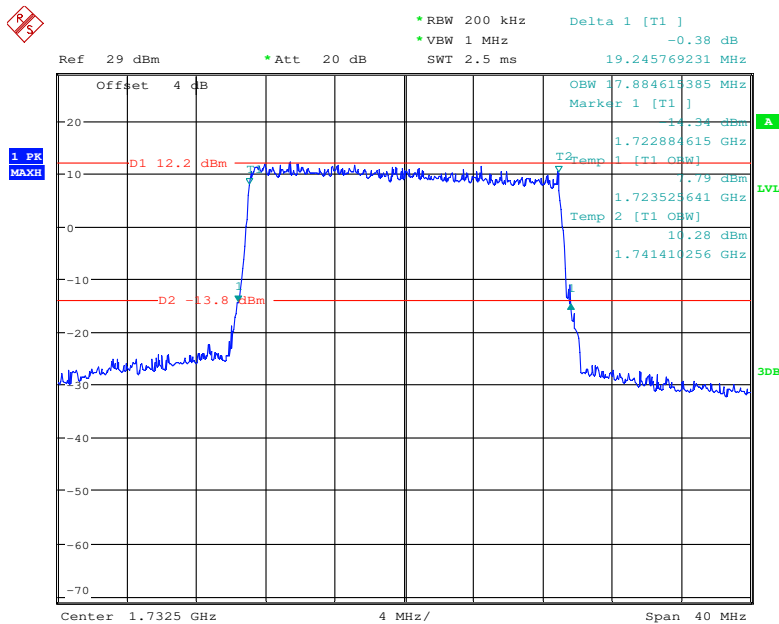
Date: 30.JAN.2018 21:34:44

### 16QAM\_15 MHz



Date: 30.JAN.2018 21:35:36

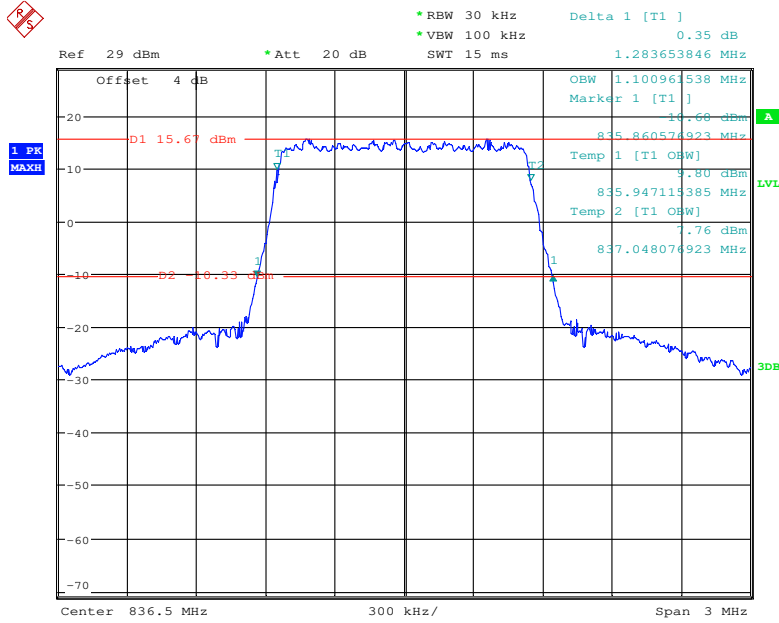
### 16QAM\_20 MHz



Date: 30.JAN.2018 21:36:16

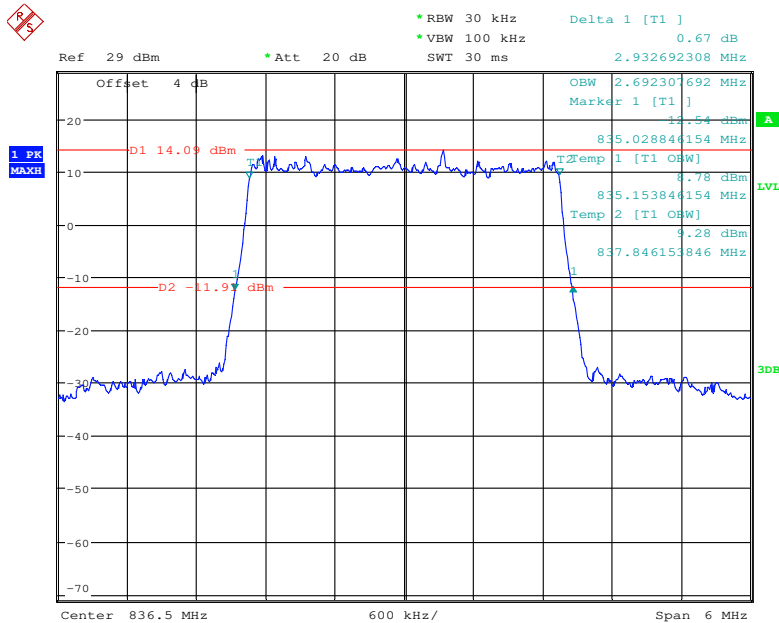
**LTE Band 5:**

**QPSK\_1.4 MHz**



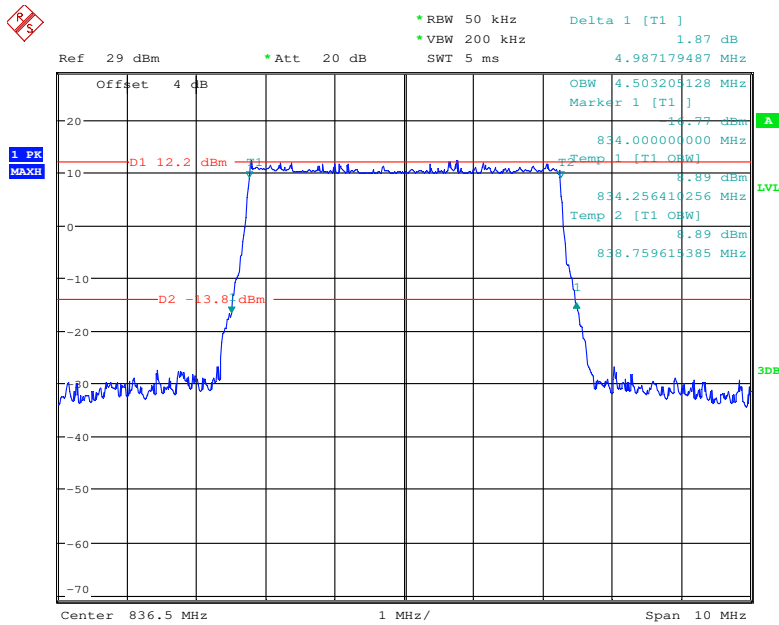
Date: 30.JAN.2018 21:02:44

**QPSK\_3 MHz**



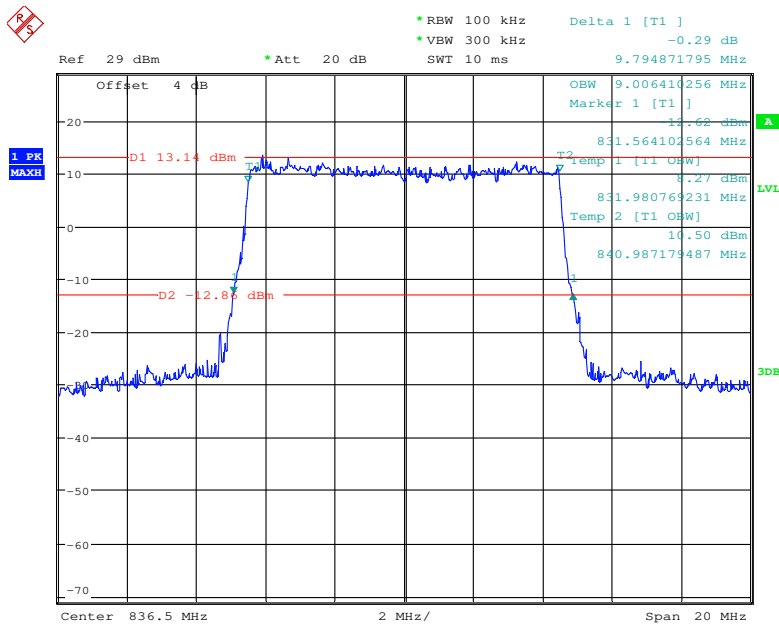
Date: 30.JAN.2018 21:03:55

### QPSK\_5 MHz



Date: 30.JAN.2018 21:04:53

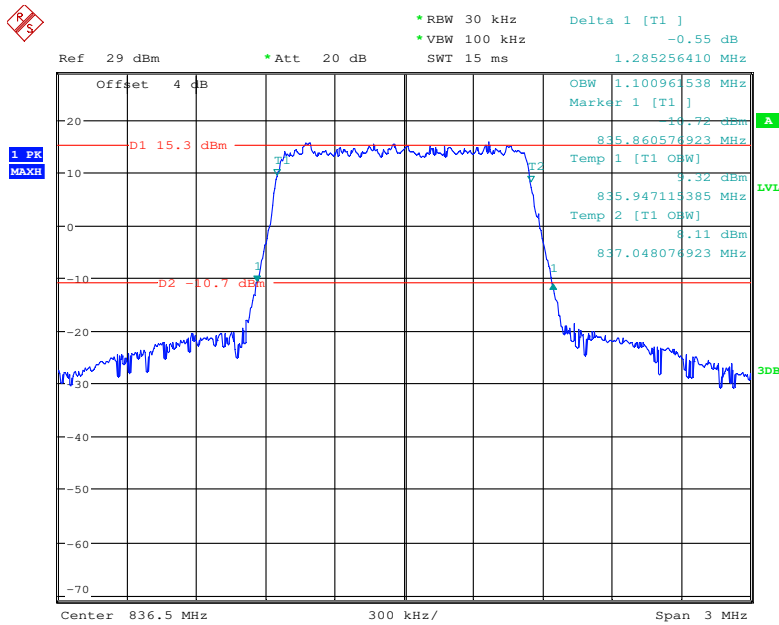
### QPSK\_10 MHz



Date: 30.JAN.2018 21:08:41

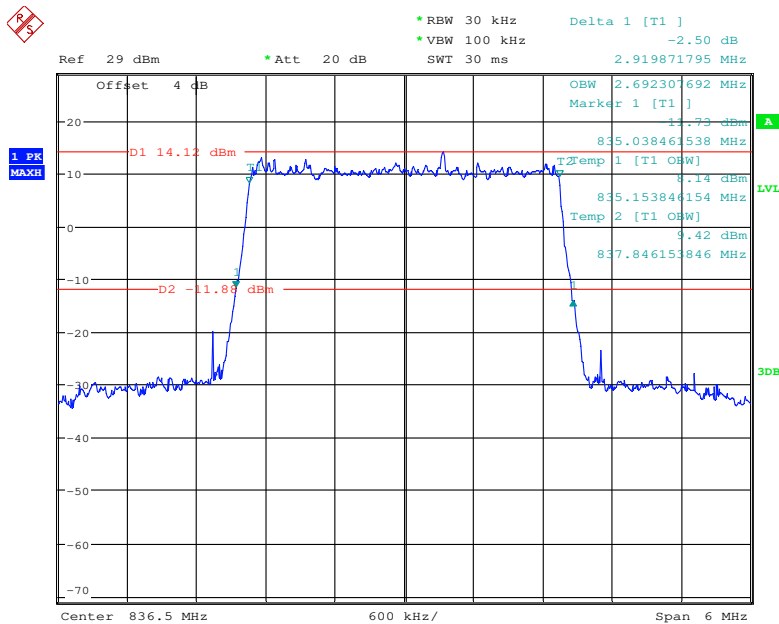


### 16QAM\_1.4 MHz



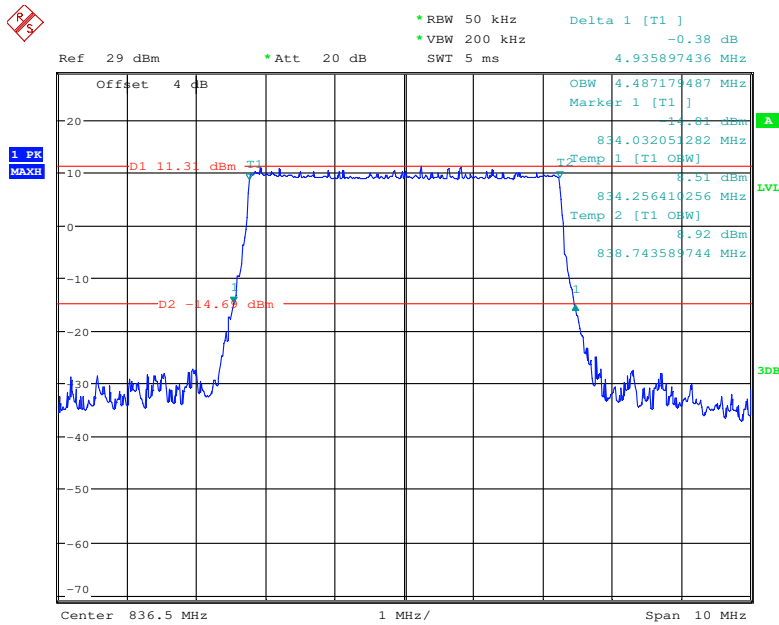
Date: 30.JAN.2018 21:28:33

### 16QAM\_3 MHz



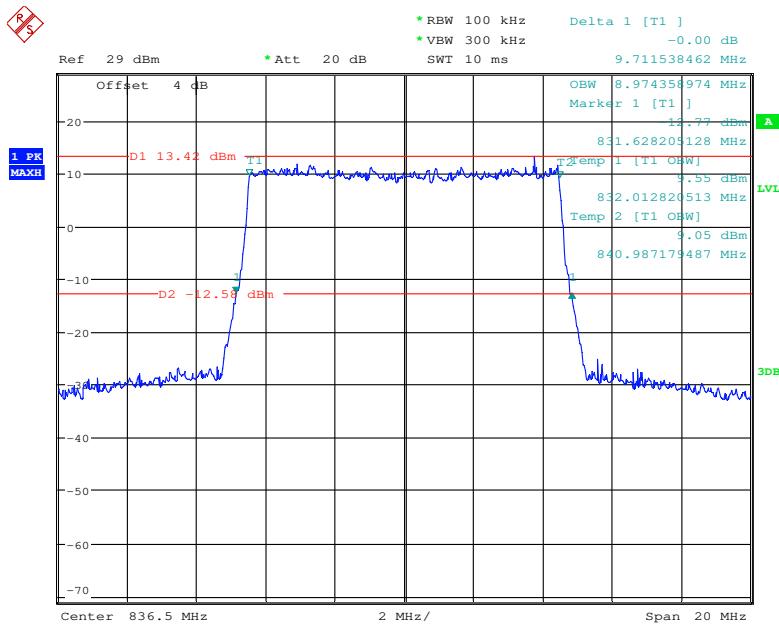
Date: 30.JAN.2018 21:28:00

### 16QAM\_5 MHz



Date: 30.JAN.2018 21:27:24

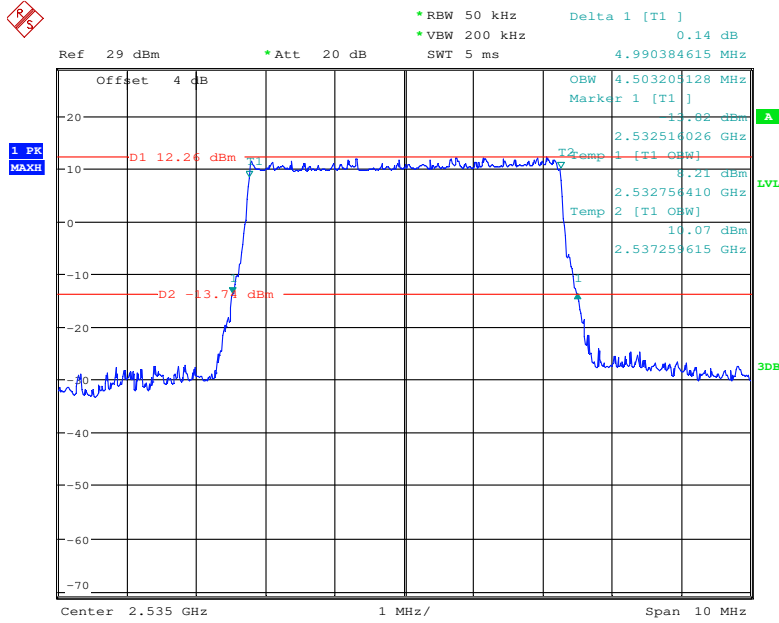
### 16QAM\_10 MHz



Date: 30.JAN.2018 21:26:45

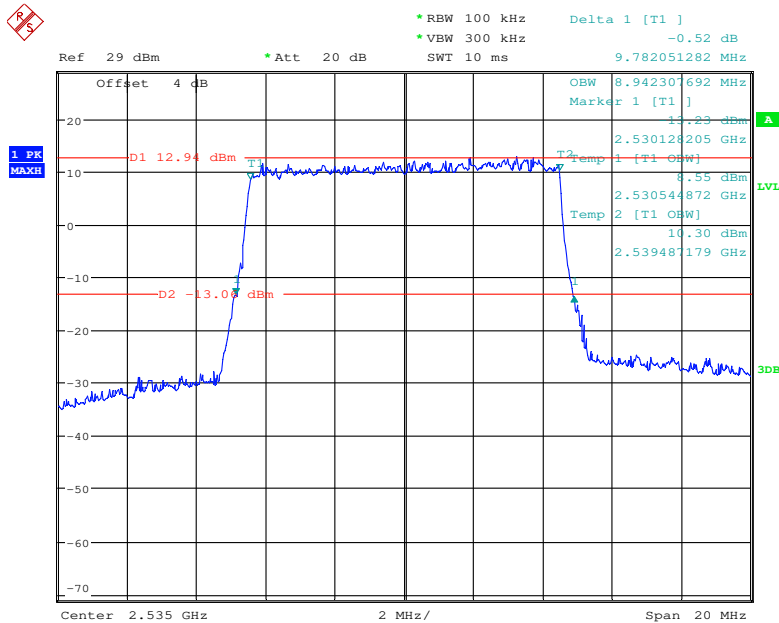
**LTE Band 7:**

**QPSK\_5 MHz**



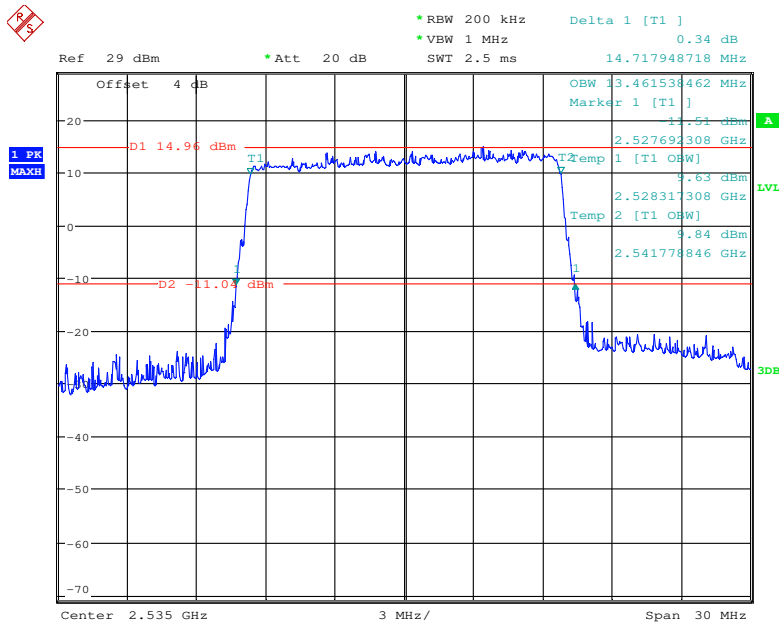
Date: 30.JAN.2018 21:11:01

**QPSK\_10 MHz**



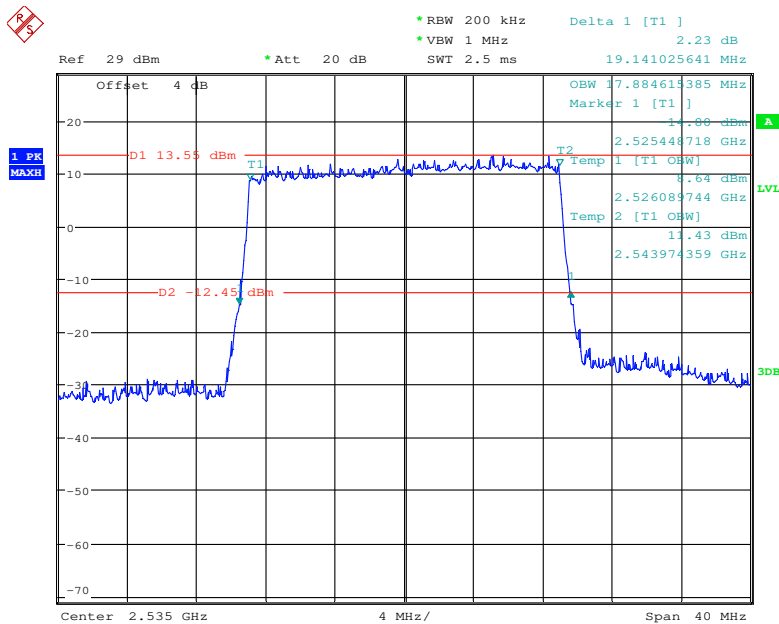
Date: 30.JAN.2018 21:11:48

### QPSK\_15 MHz



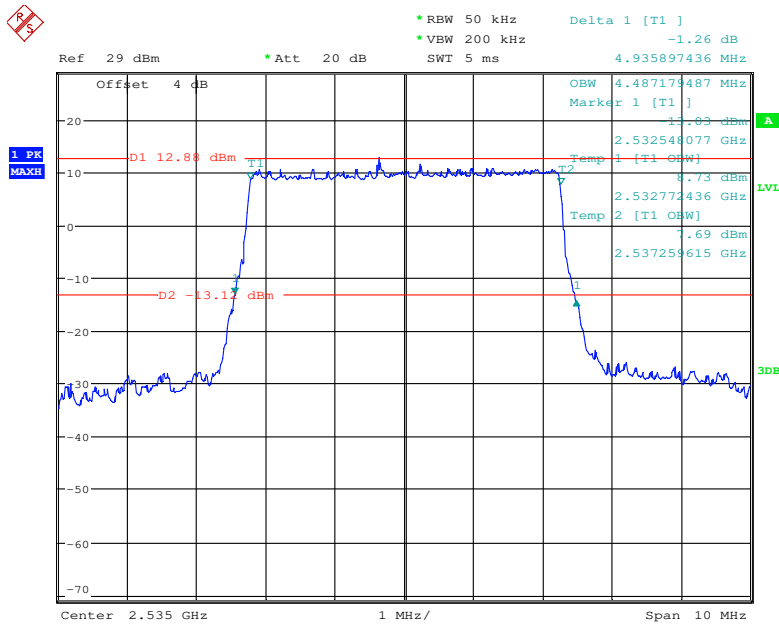
Date: 30.JAN.2018 21:12:47

### QPSK\_20 MHz



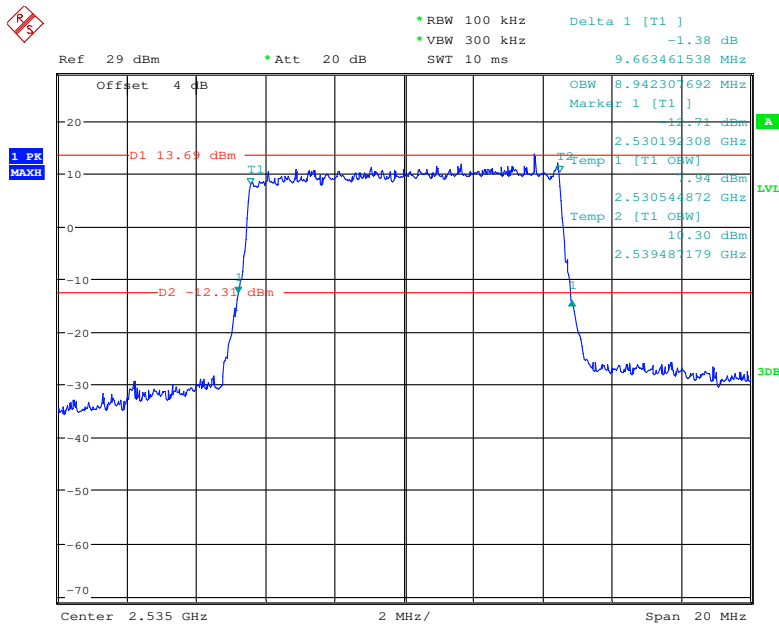
Date: 30.JAN.2018 21:13:43

### 16QAM\_5 MHz



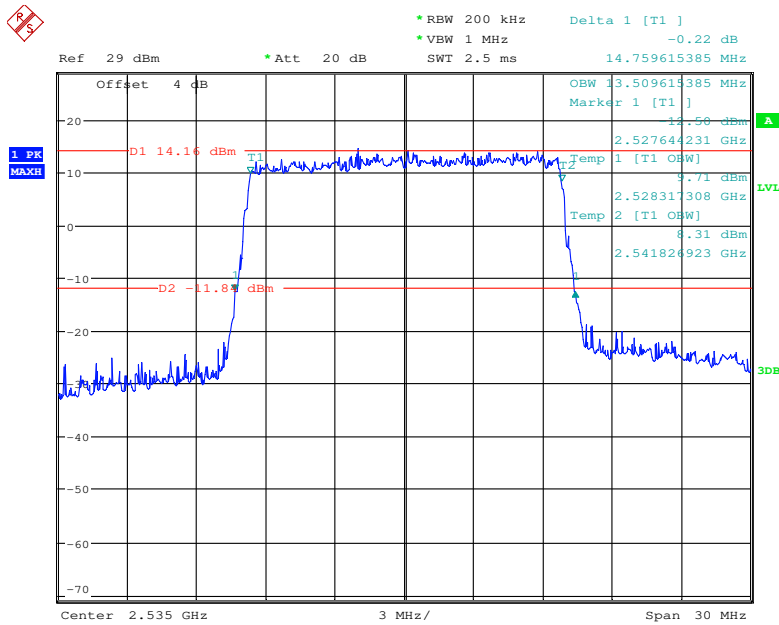
Date: 30.JAN.2018 21:22:02

### 16QAM\_10 MHz



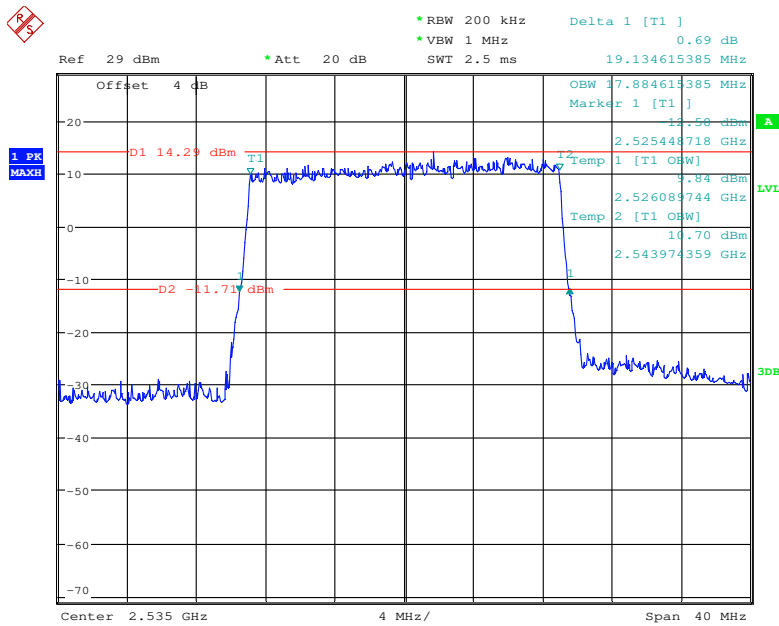
Date: 30.JAN.2018 21:22:52

### 16QAM\_15 MHz



Date: 30.JAN.2018 21:23:28

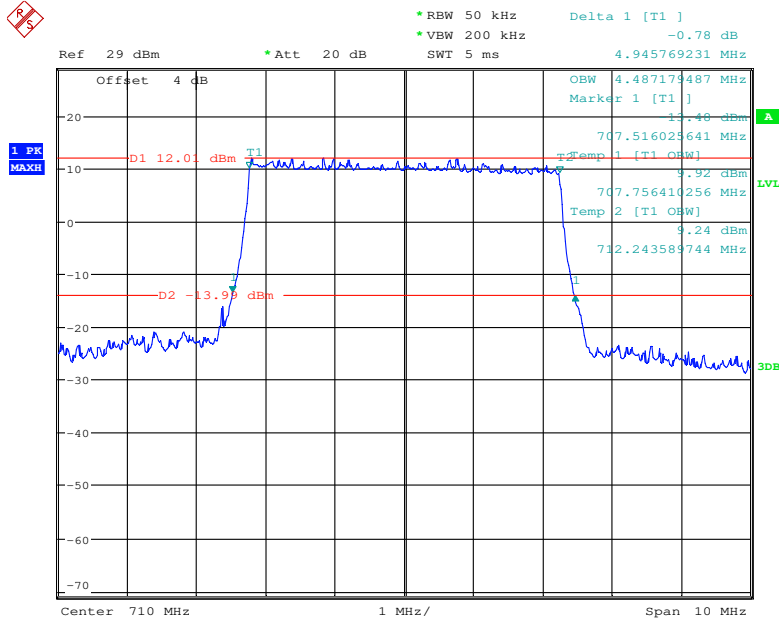
### 16QAM\_20 MHz



Date: 30.JAN.2018 21:24:06

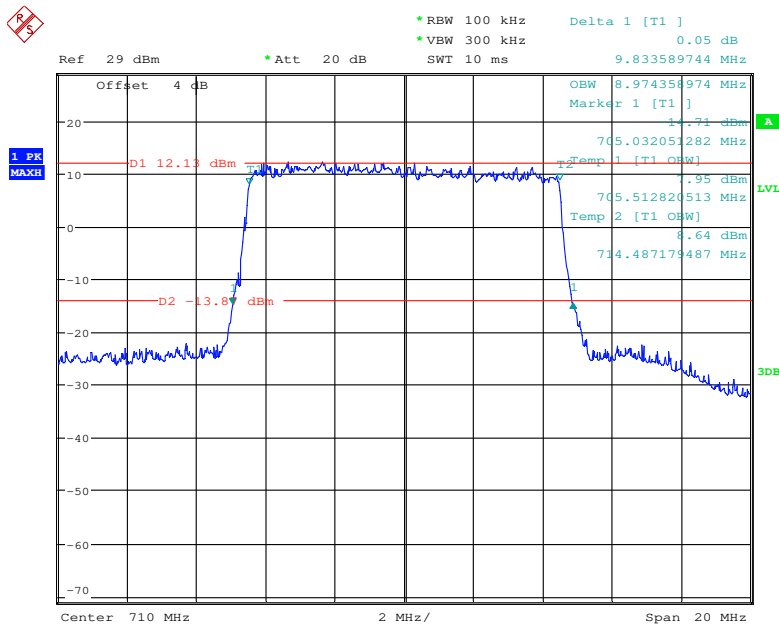
**LTE Band 17:**

**QPSK\_5 MHz**



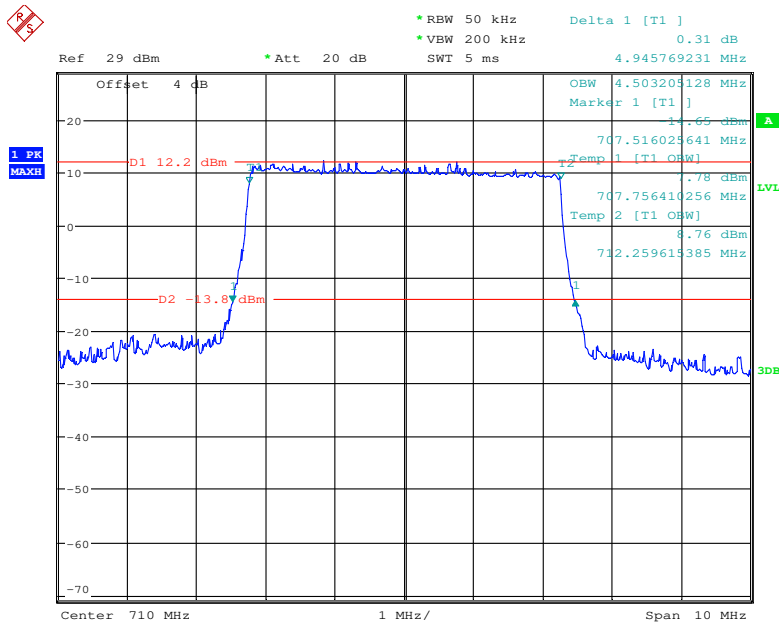
Date: 30.JAN.2018 21:16:07

**QPSK\_10 MHz**



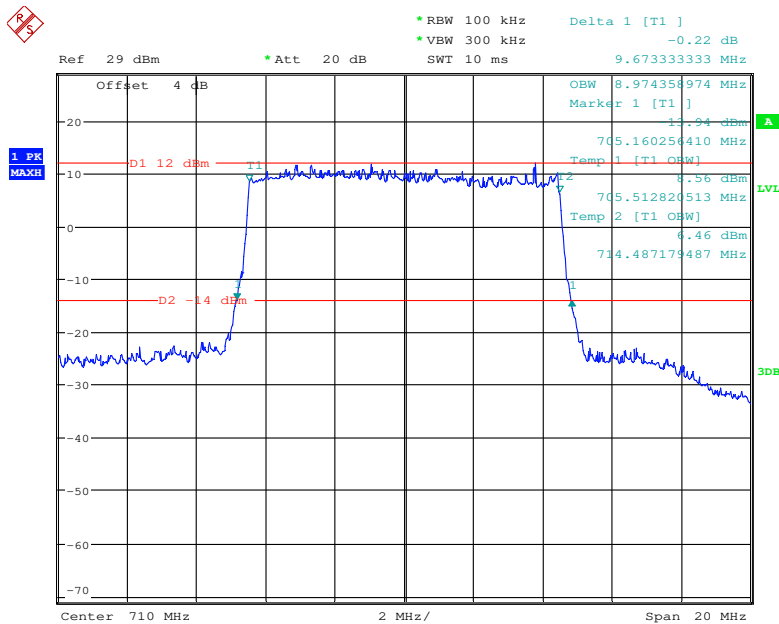
Date: 30.JAN.2018 21:16:57

### 16QAM\_5 MHz



Date: 30.JAN.2018 21:19:18

### 16QAM\_10 MHz



Date: 30.JAN.2018 21:18:39



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

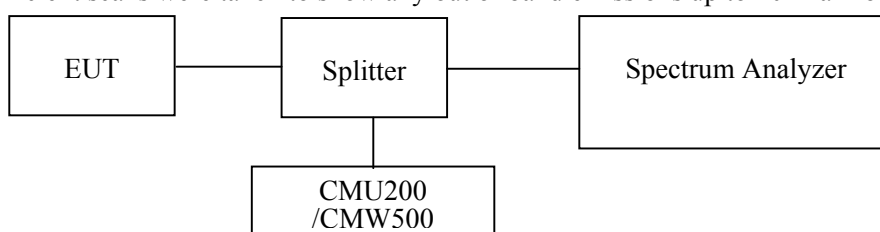
### Applicable Standard

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 10<sup>th</sup> harmonic.



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04

\* **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

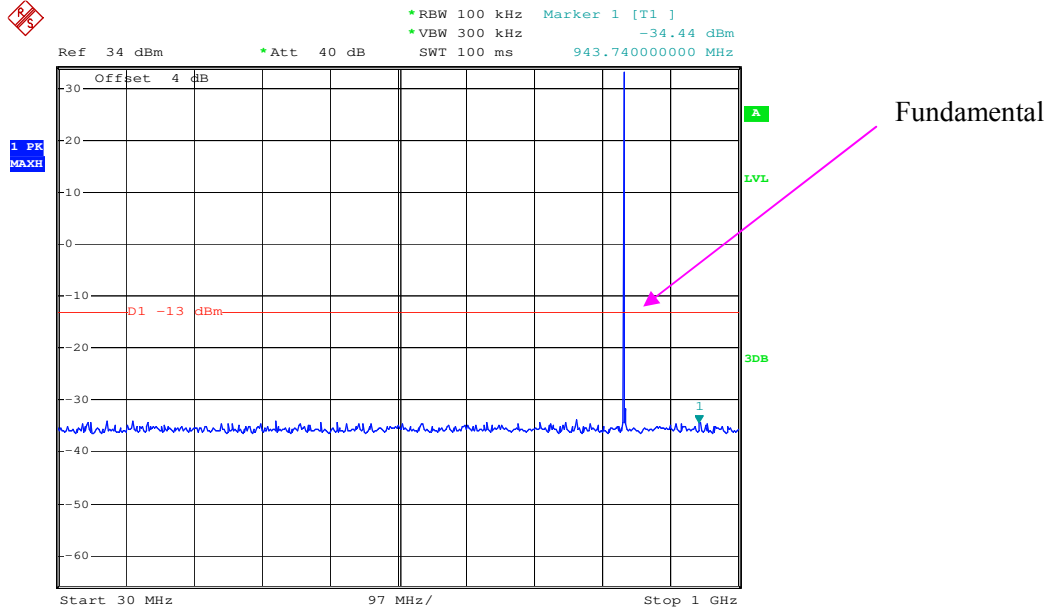
#### Environmental Conditions

<b>Temperature:</b>	22.4~24.1°C
<b>Relative Humidity:</b>	30~42 %
<b>ATM Pressure:</b>	100.9~101.5 kPa

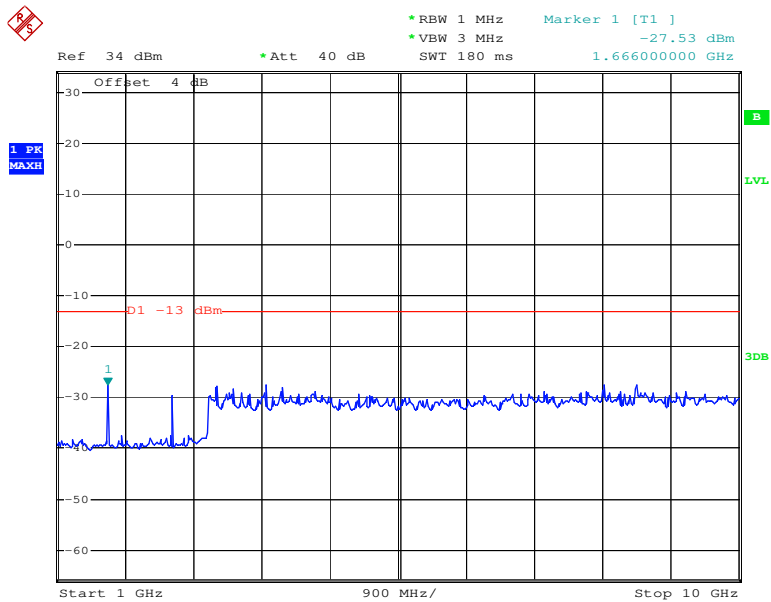
*The testing was performed by Harry Yang from 2018-01-02 to 2018-02-08.*

Please refer to the following plots.

### GSM850\_Middle Channel

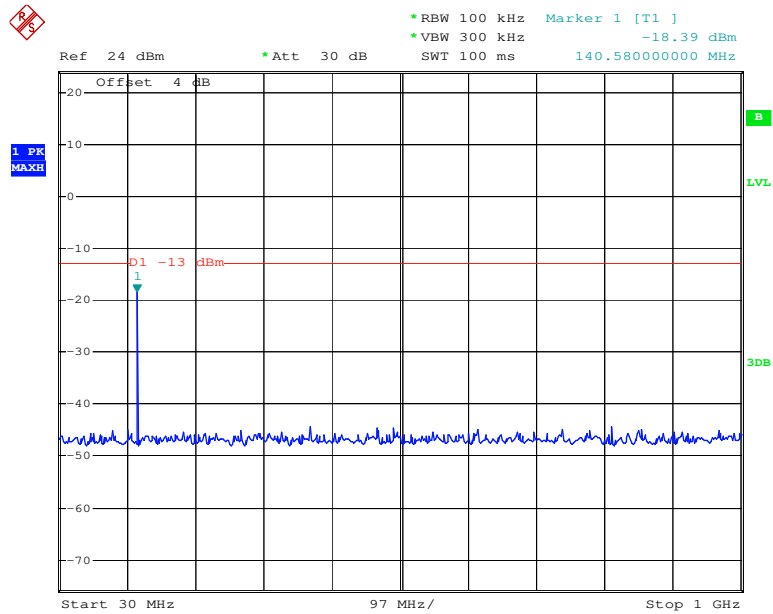


Date: 8.FEB.2018 16:59:12

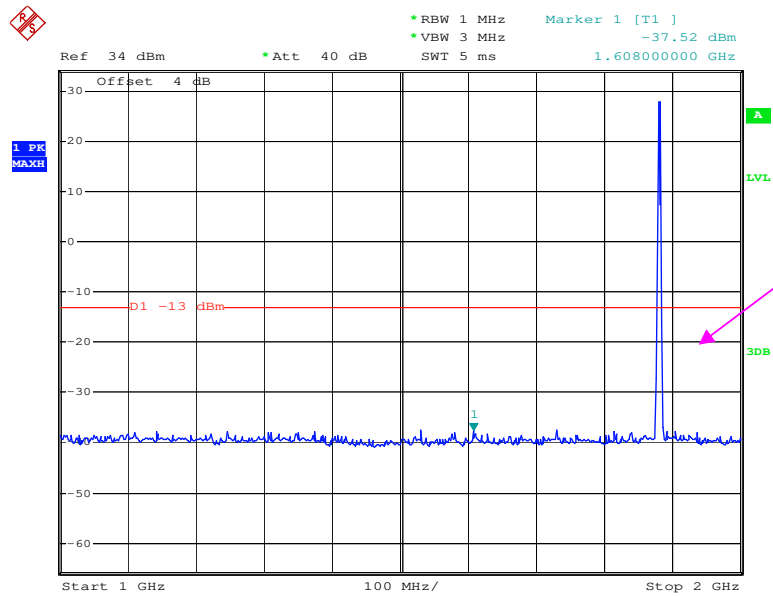


Date: 2.JAN.2018 21:49:32

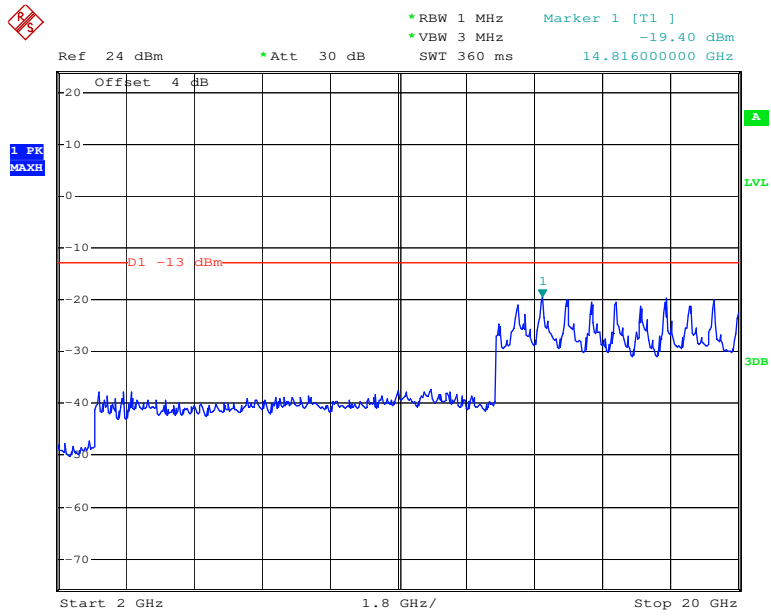
### PCS 1900\_ Middle Channel



Date: 2.JAN.2018 22:00:19

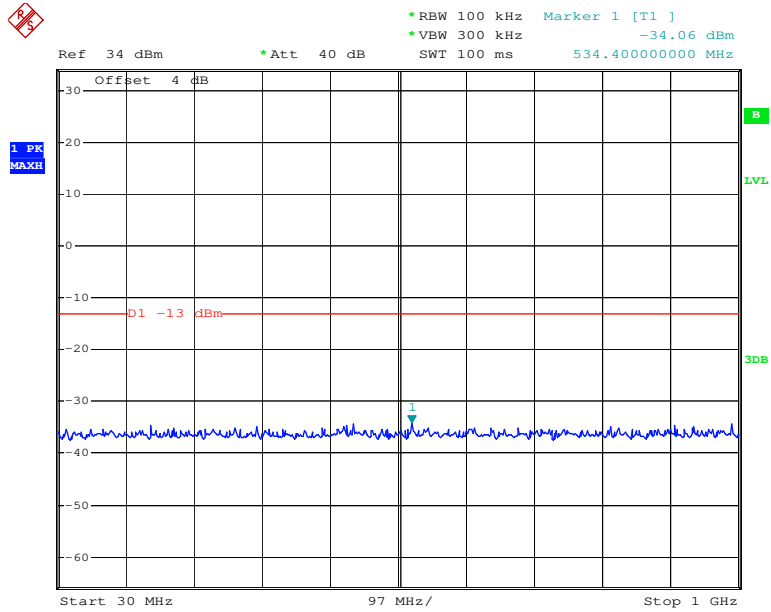


Date: 8.FEB.2018 17:09:38



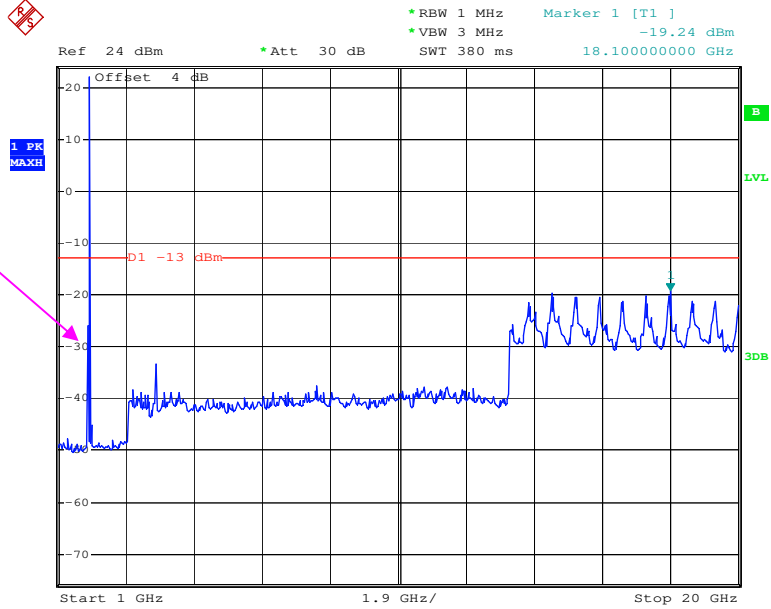
Date: 8.FEB.2018 17:10:09

### WCDMA Band II, Rel99



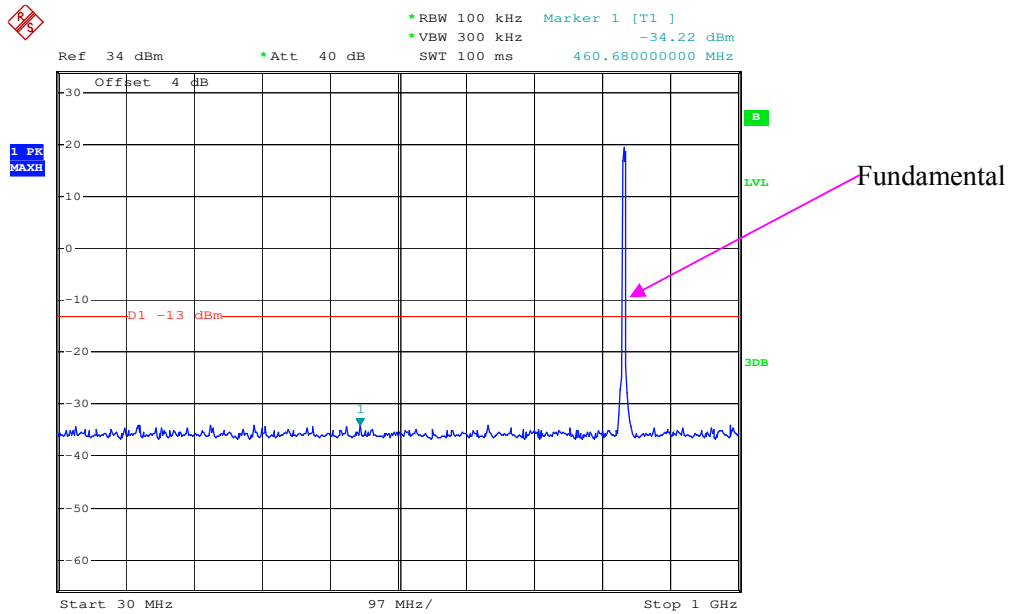
Date: 2.JAN.2018 21:31:23

Fundamental

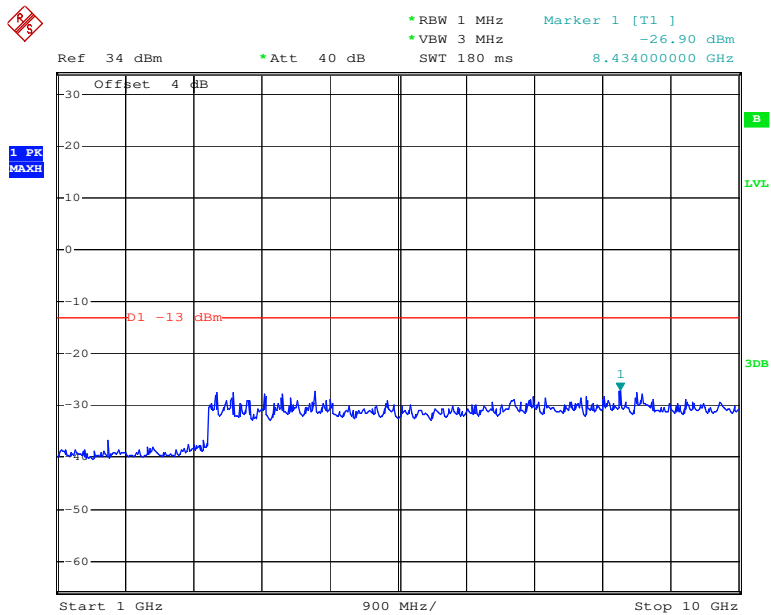


Date: 2.JAN.2018 21:32:02

### WCDMA Band V,Rel99



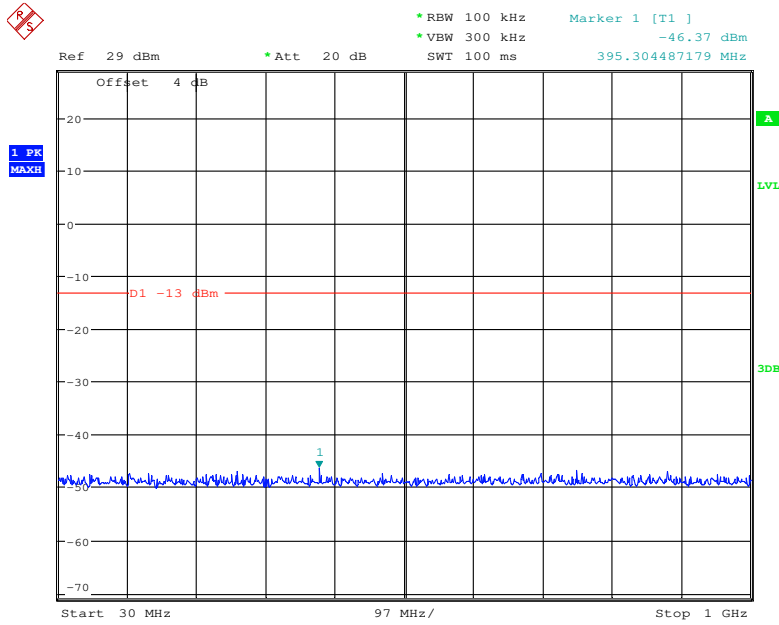
Date: 2.JAN.2018 20:57:10



Date: 2.JAN.2018 20:57:50

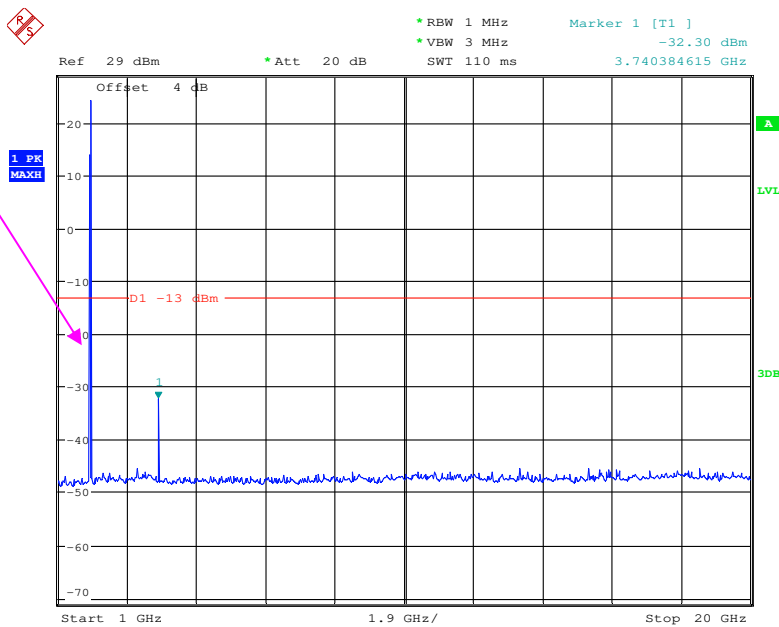
### LTE Band 2 (Middle Channel)

#### QPSK\_1.4 MHz



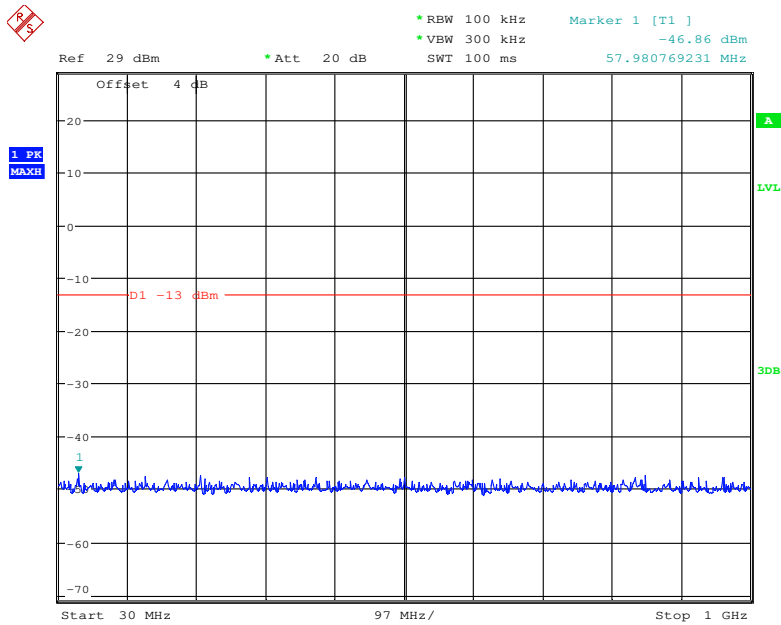
Date: 30.JAN.2018 21:43:33

Fundamental

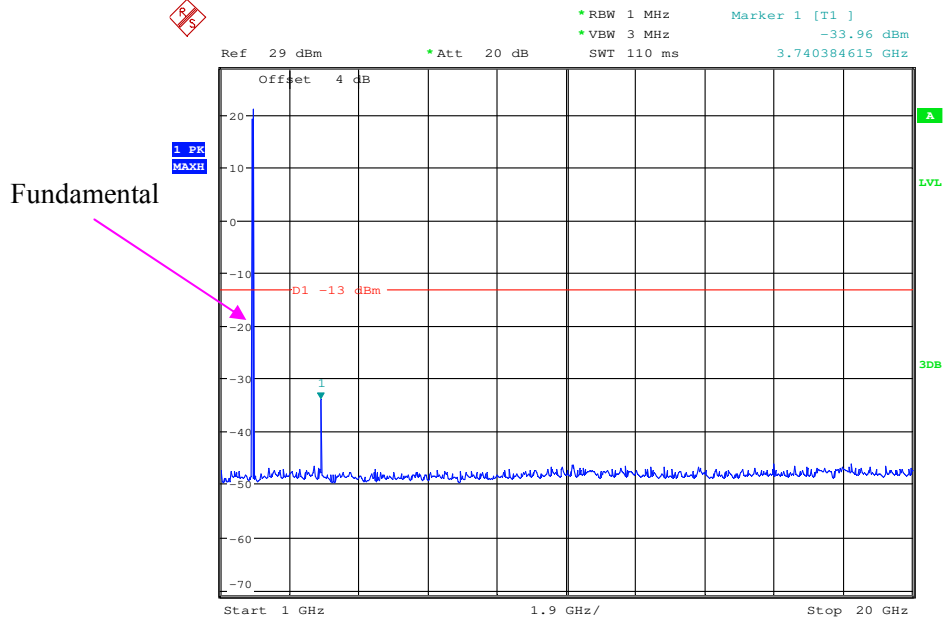


Date: 30.JAN.2018 21:44:25

### QPSK\_3 MHz



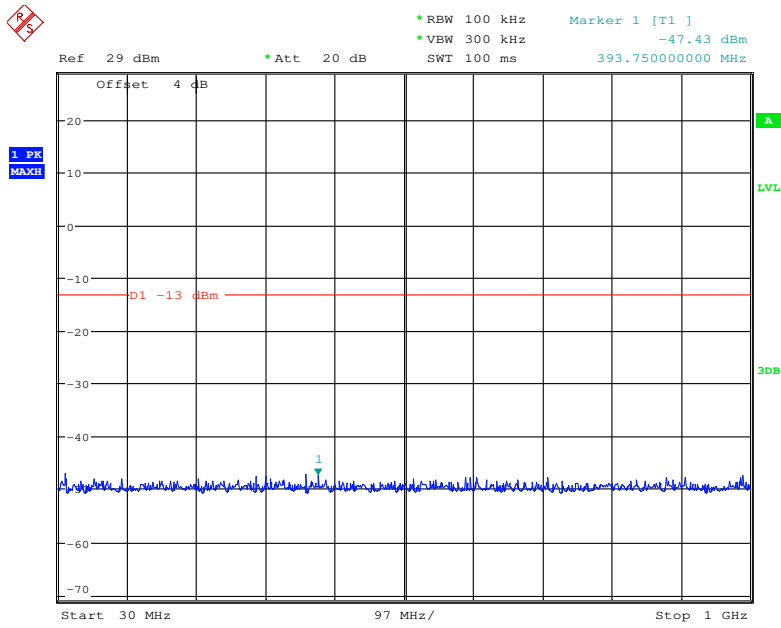
Date: 30.JAN.2018 21:44:53



Date: 30.JAN.2018 21:44:41

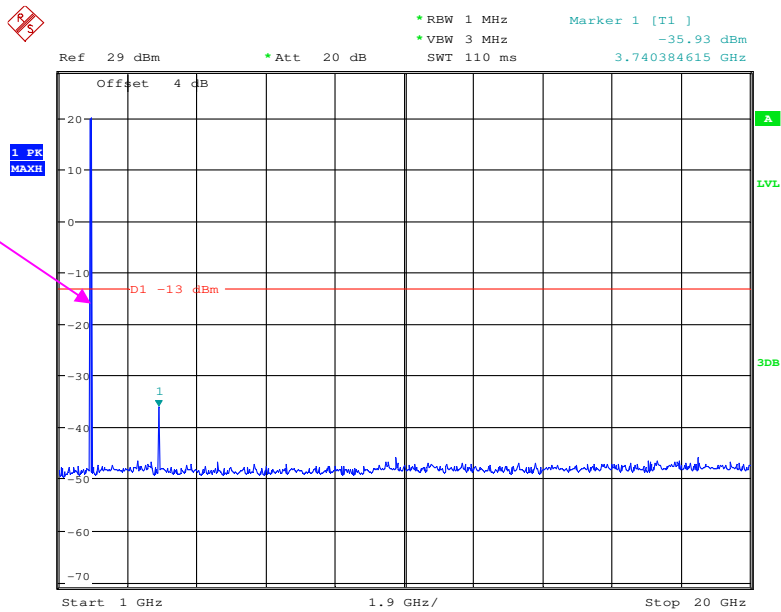


### QPSK\_5 MHz



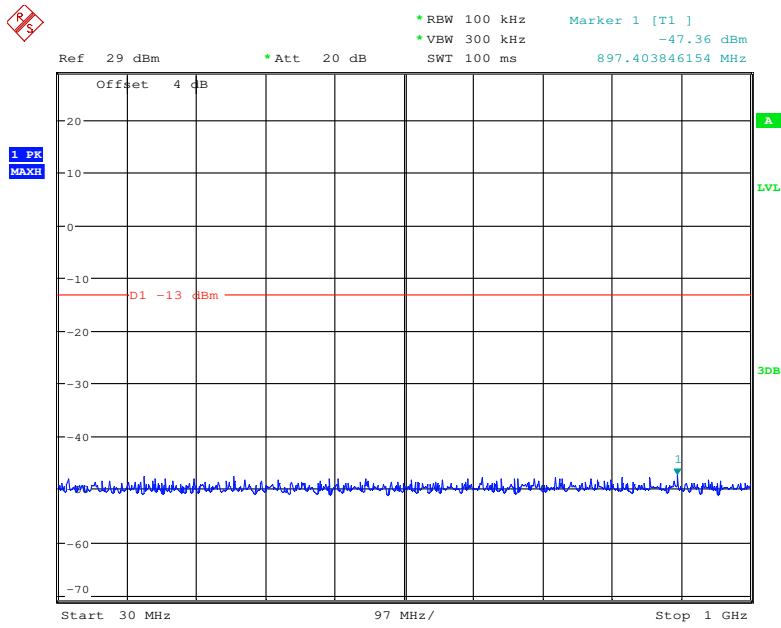
Date: 30.JAN.2018 21:45:06

Fundamental



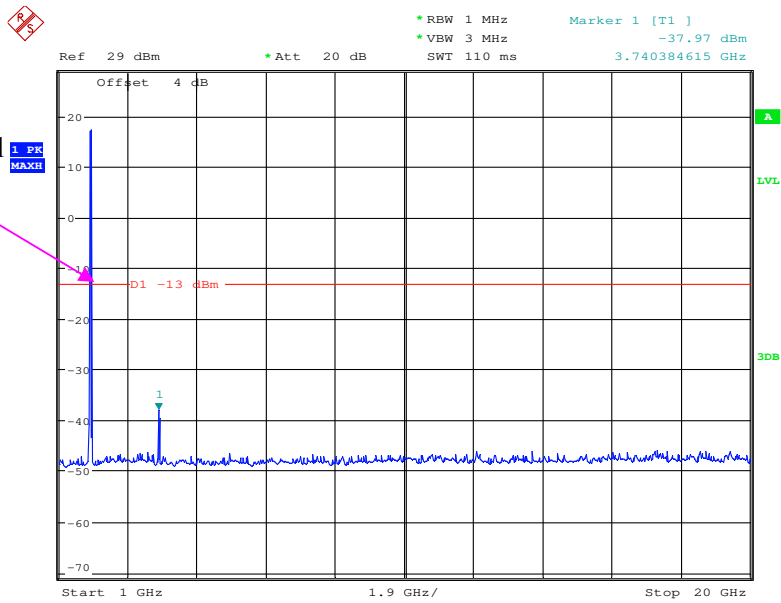
Date: 30.JAN.2018 21:45:20

### QPSK\_10 MHz



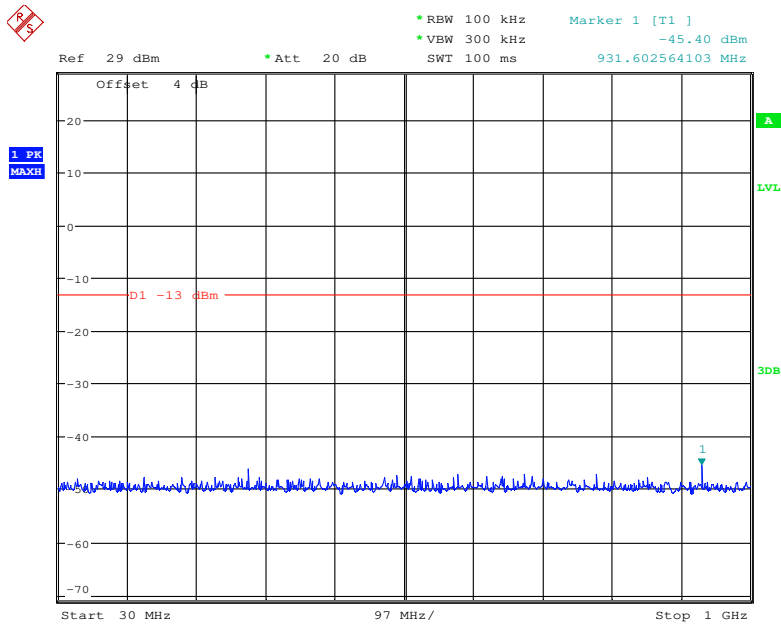
Date: 30.JAN.2018 21:45:57

Fundamental

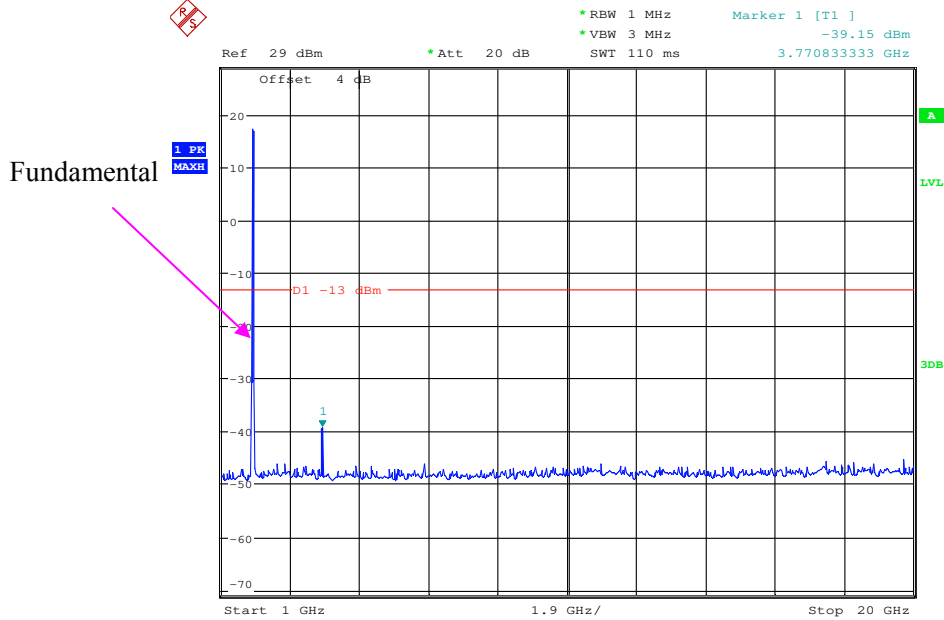


Date: 30.JAN.2018 21:45:43

### QPSK\_15 MHz

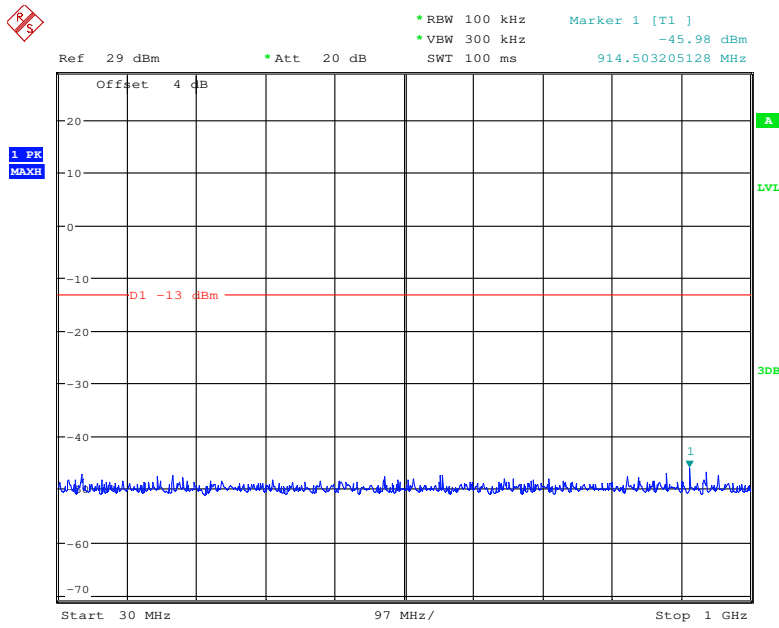


Date: 30.JAN.2018 21:46:10



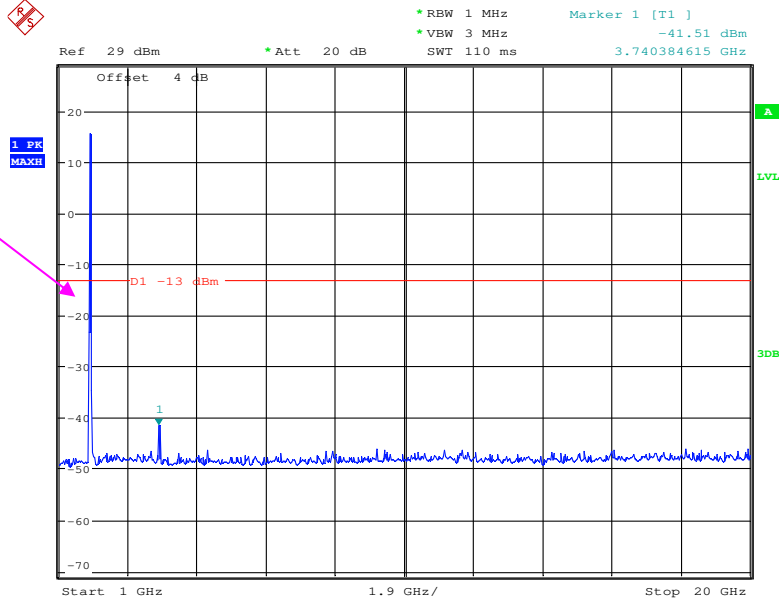
Date: 30.JAN.2018 21:46:27

### QPSK\_20 MHz



Date: 30.JAN.2018 21:46:54

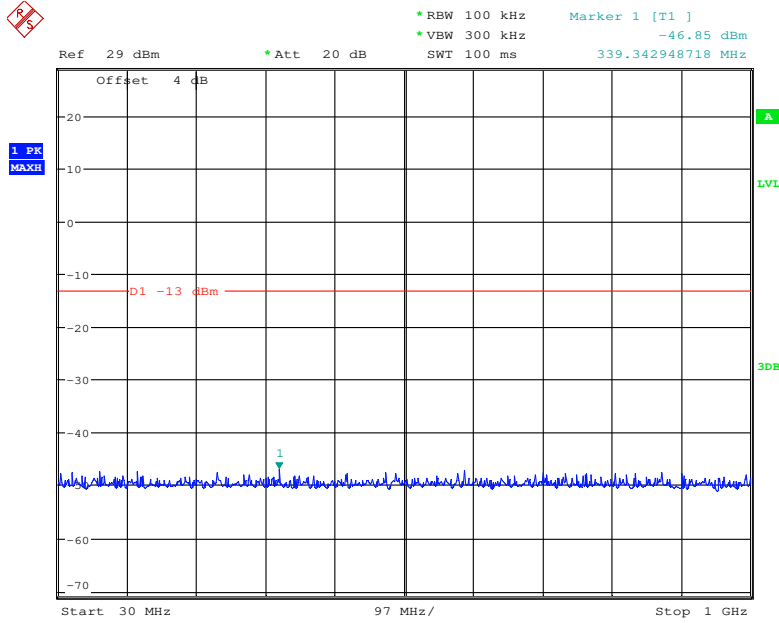
Fundamental



Date: 30.JAN.2018 21:46:42

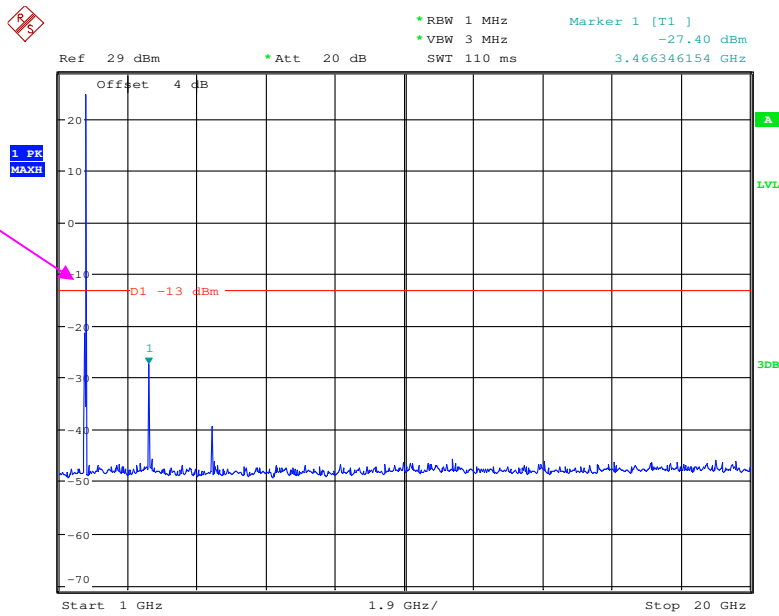
### LTE Band 4 (Middle Channel)

#### QPSK\_1.4 MHz



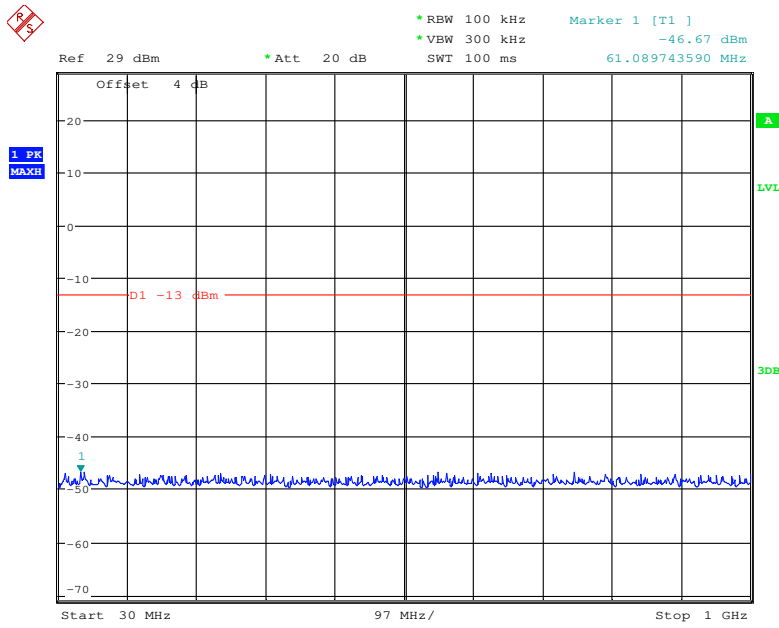
Date: 30.JAN.2018 21:49:23

Fundamental

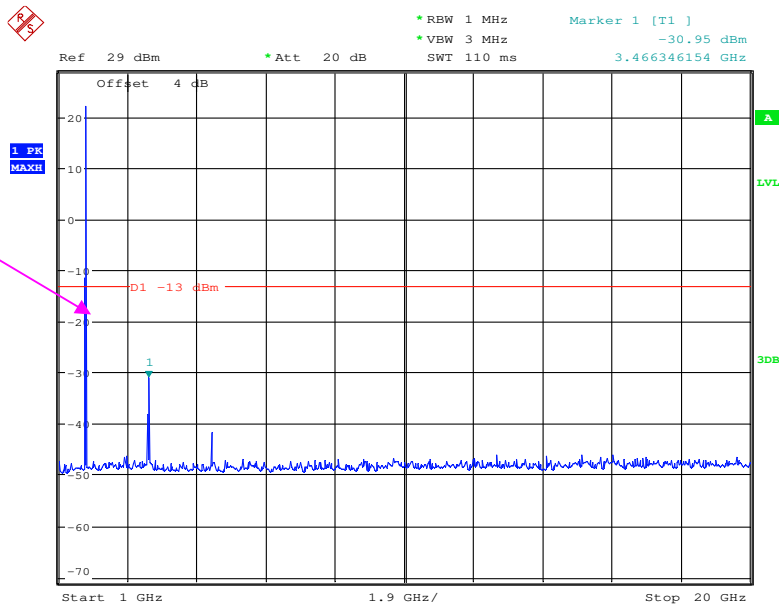


Date: 30.JAN.2018 21:49:42

### QPSK\_3 MHz

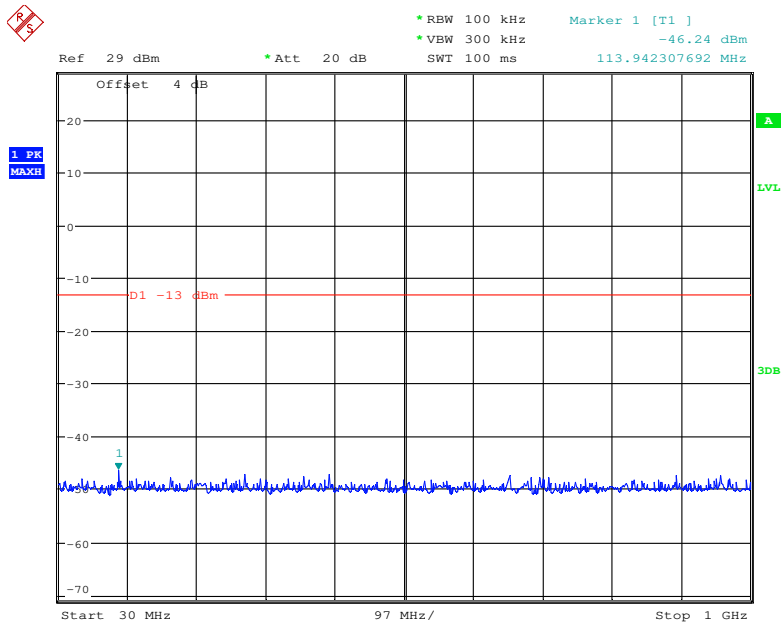


Date: 30.JAN.2018 21:50:56



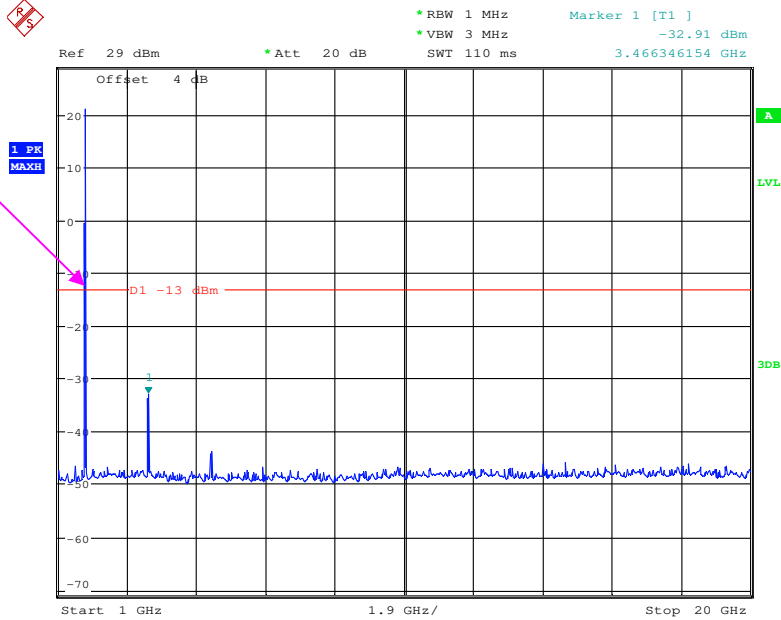
Date: 30.JAN.2018 21:49:55

### QPSK\_5 MHz



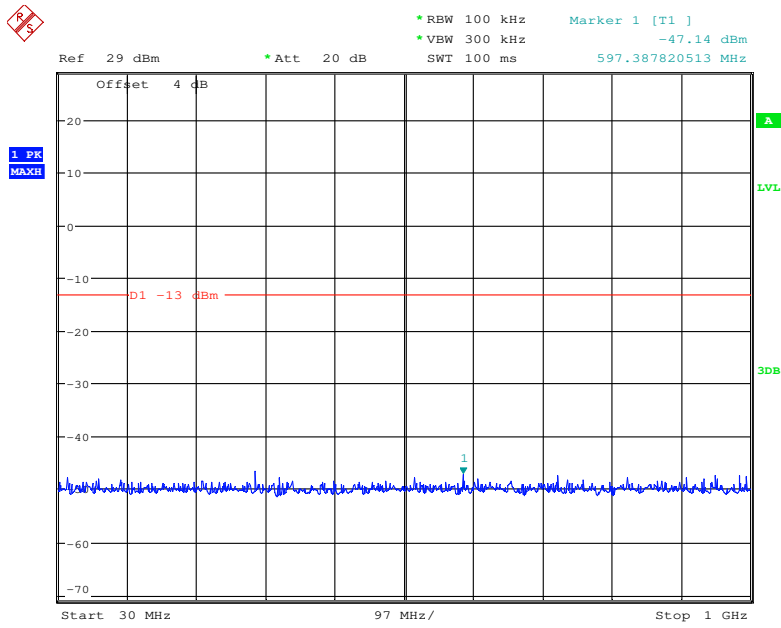
Date: 30.JAN.2018 21:51:06

Fundamental



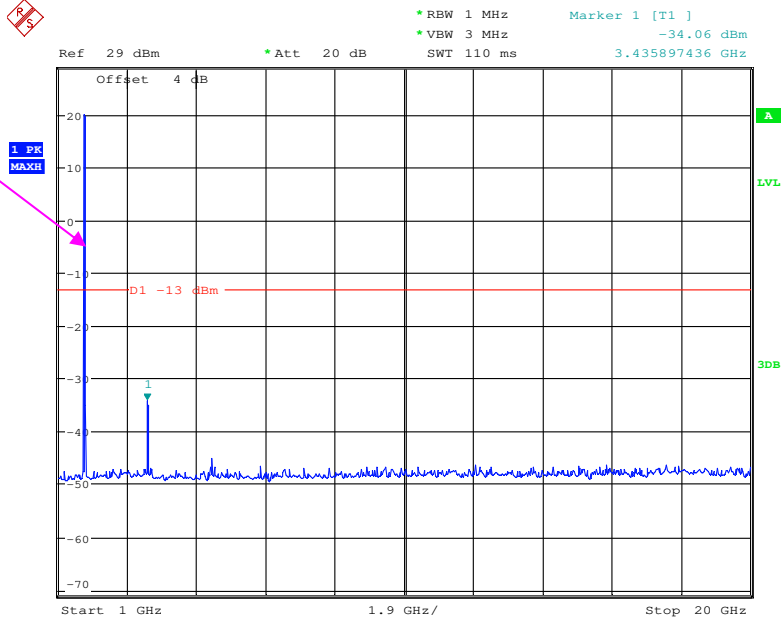
Date: 30.JAN.2018 21:51:18

### QPSK\_10 MHz



Date: 30.JAN.2018 21:51:44

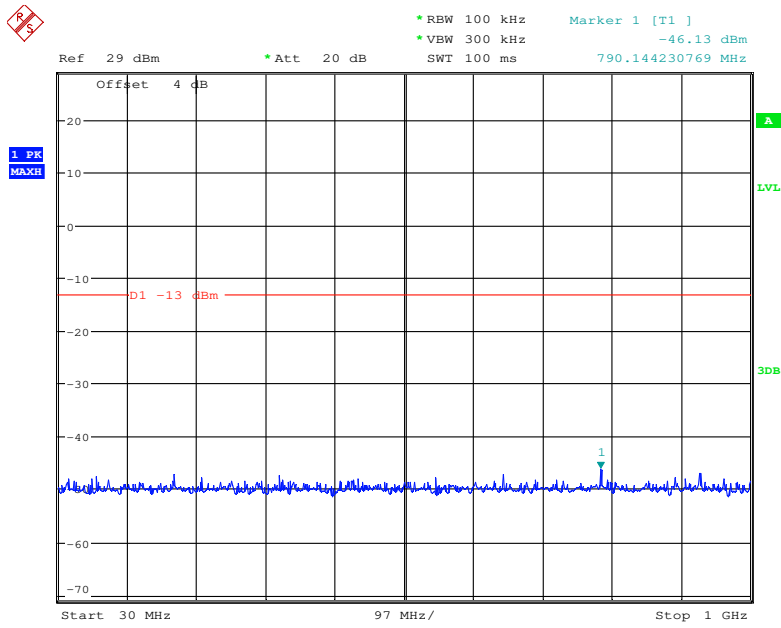
Fundamental



Date: 30.JAN.2018 21:51:33

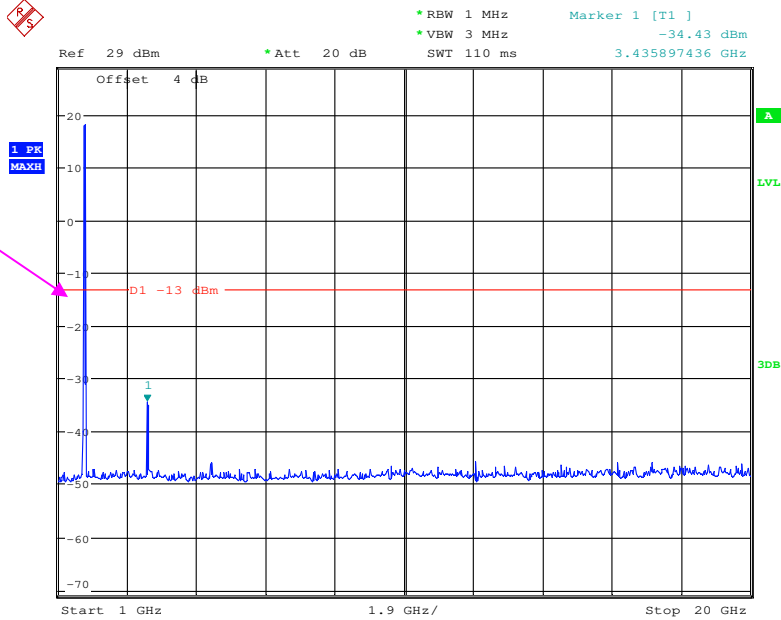


### QPSK\_15 MHz



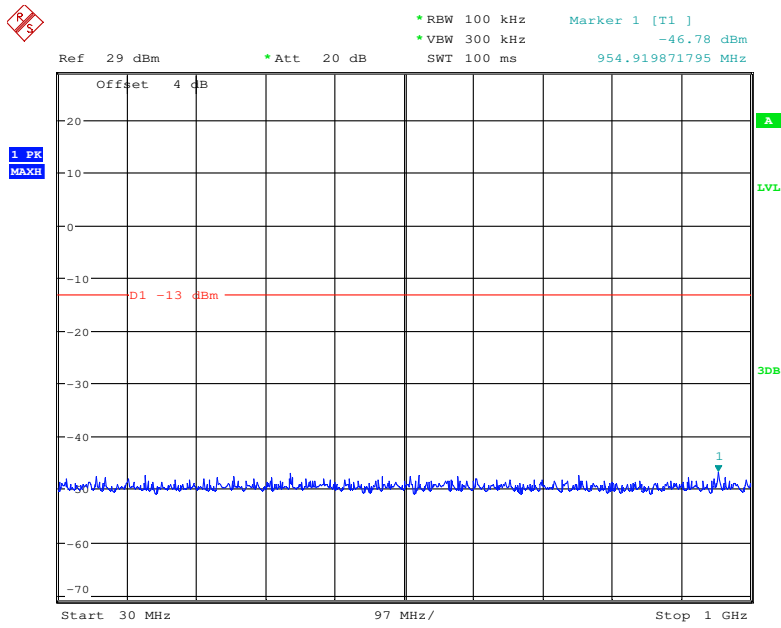
Date: 30.JAN.2018 21:51:53

Fundamental



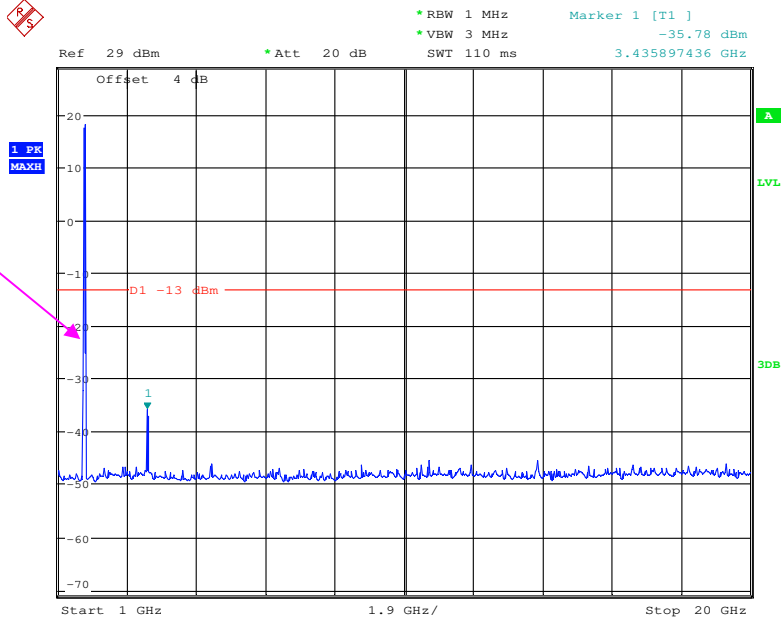
Date: 30.JAN.2018 21:52:53

### QPSK\_20 MHz



Date: 30.JAN.2018 21:53:29

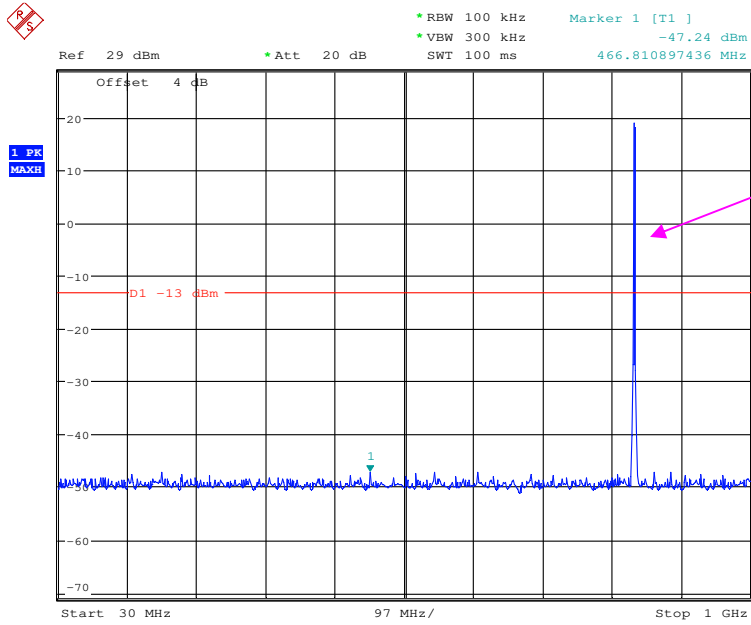
Fundamental



Date: 30.JAN.2018 21:53:15

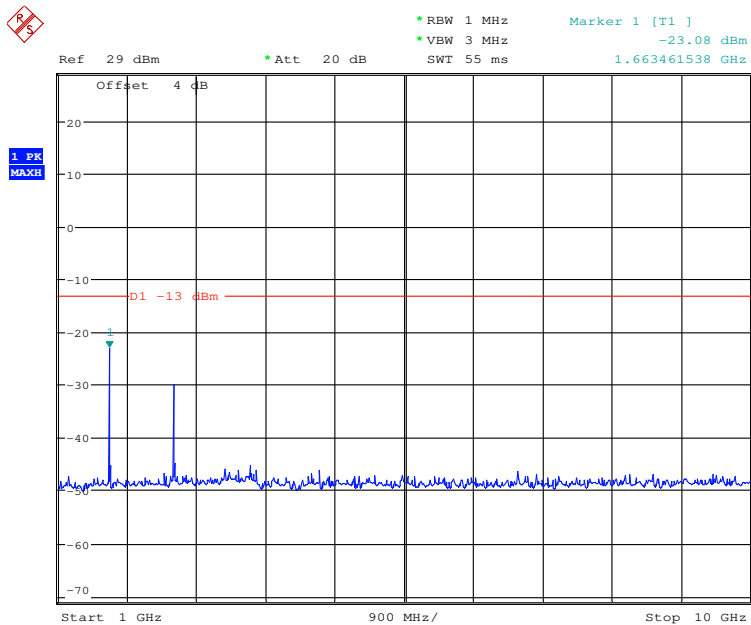
LTE Band 5 (Middle Channel)

QPSK\_1.4 MHz



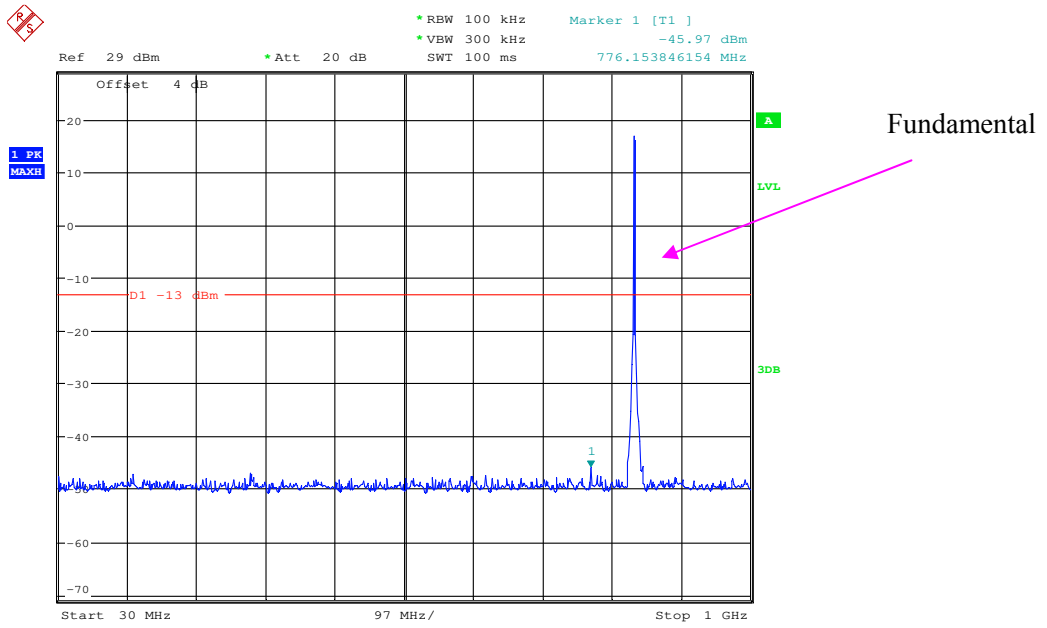
Fundamental

Date: 30.JAN.2018 21:58:46

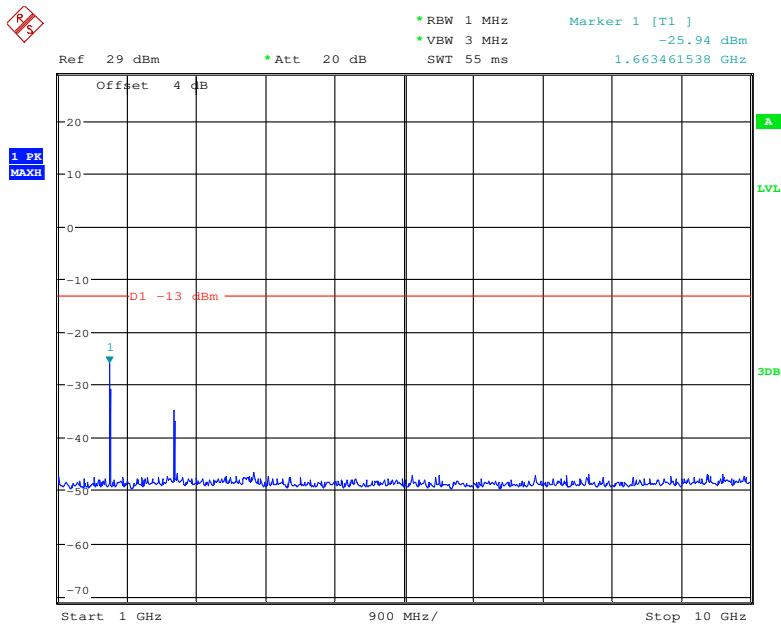


Date: 30.JAN.2018 21:58:29

### QPSK\_3 MHz

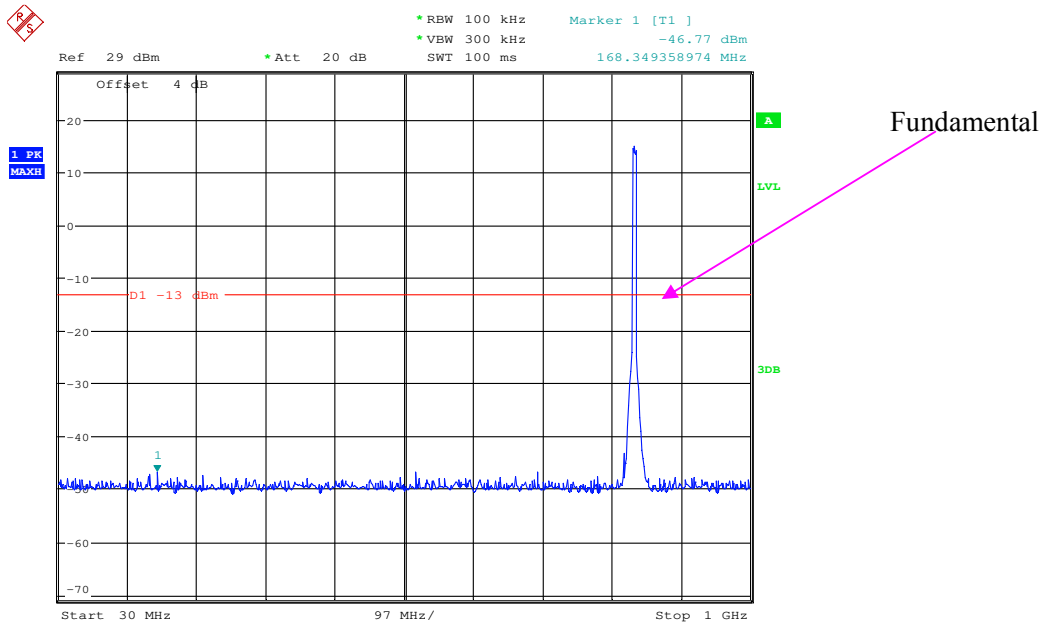


Date: 30.JAN.2018 21:58:00

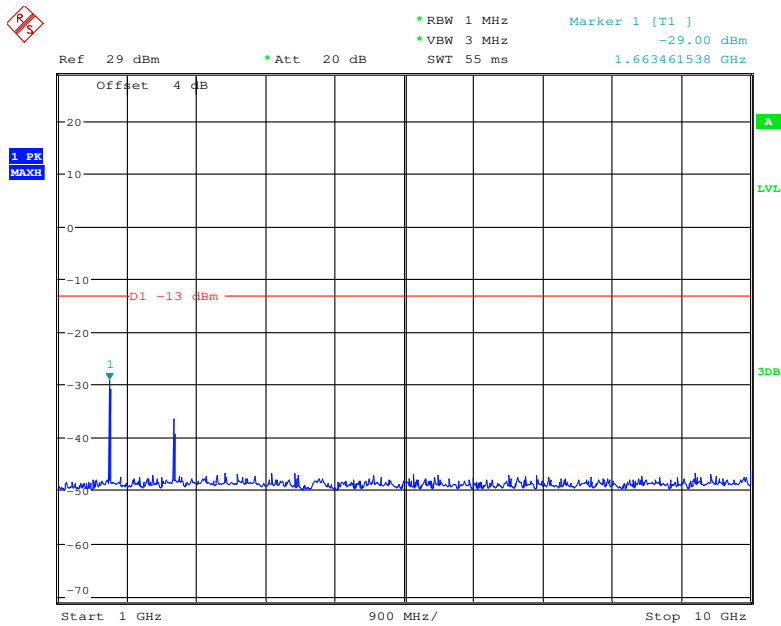


Date: 30.JAN.2018 21:58:13

### QPSK\_5 MHz

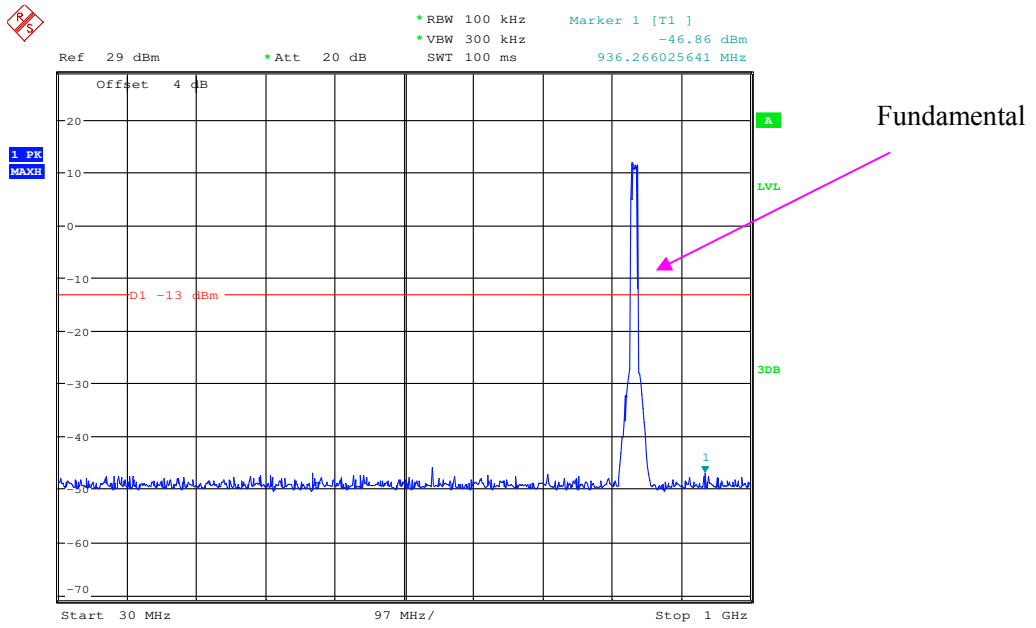


Date: 30.JAN.2018 21:57:38

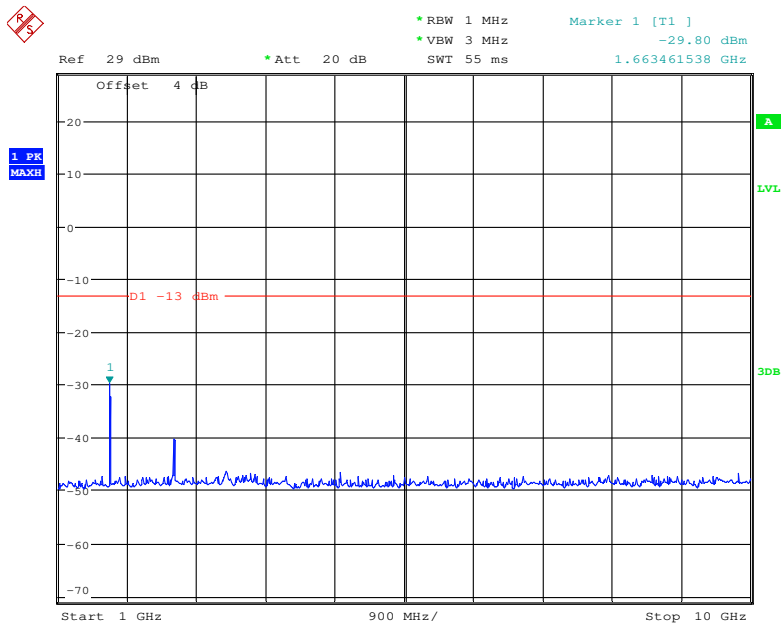


Date: 30.JAN.2018 21:57:21

### QPSK\_10 MHz



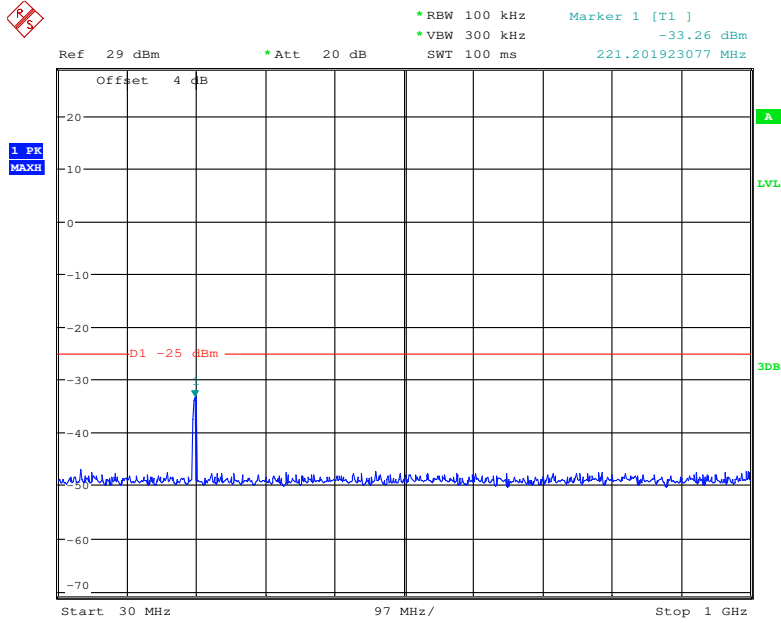
Date: 30.JAN.2018 21:56:39



Date: 30.JAN.2018 21:56:55

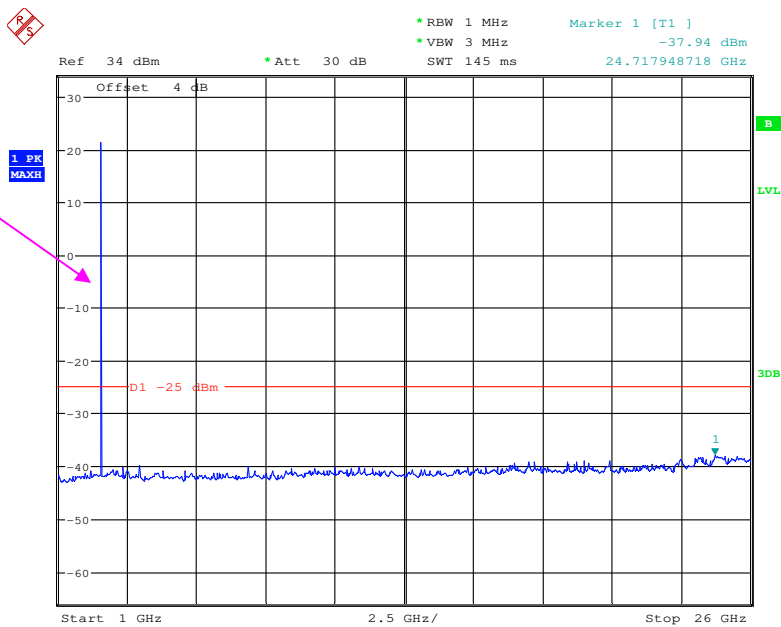
LTE Band 7

QPSK\_5 MHz



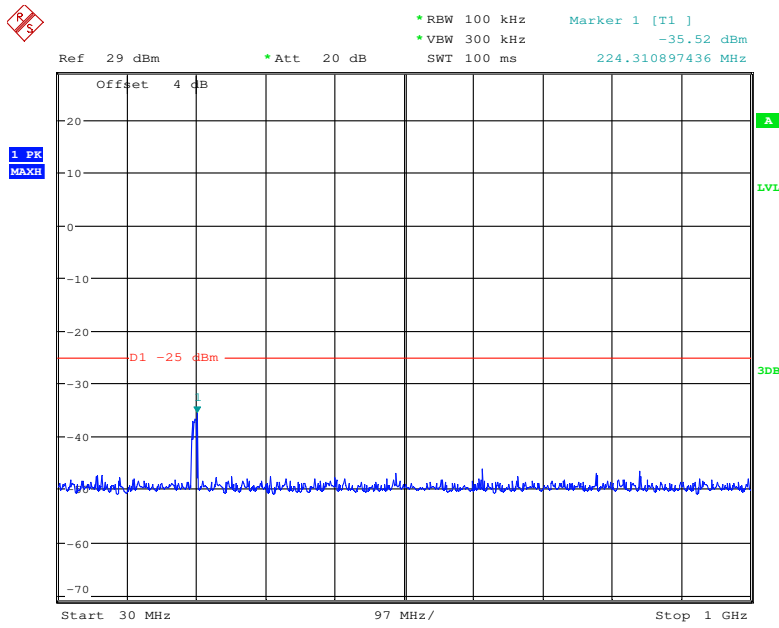
Date: 30.JAN.2018 22:01:59

Fundamental



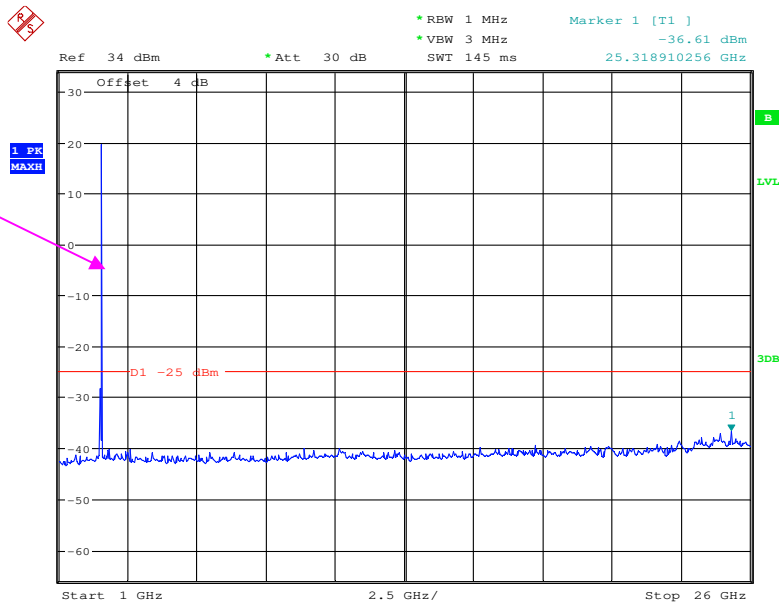
Date: 8.FEB.2018 17:30:51

### QPSK\_10 MHz



Date: 30.JAN.2018 22:02:58

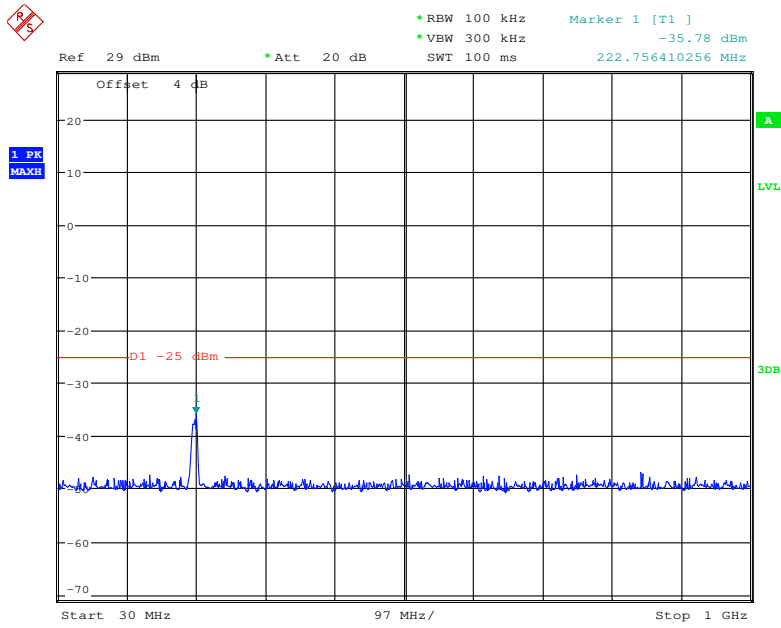
Fundamental



Date: 8.FEB.2018 17:31:42

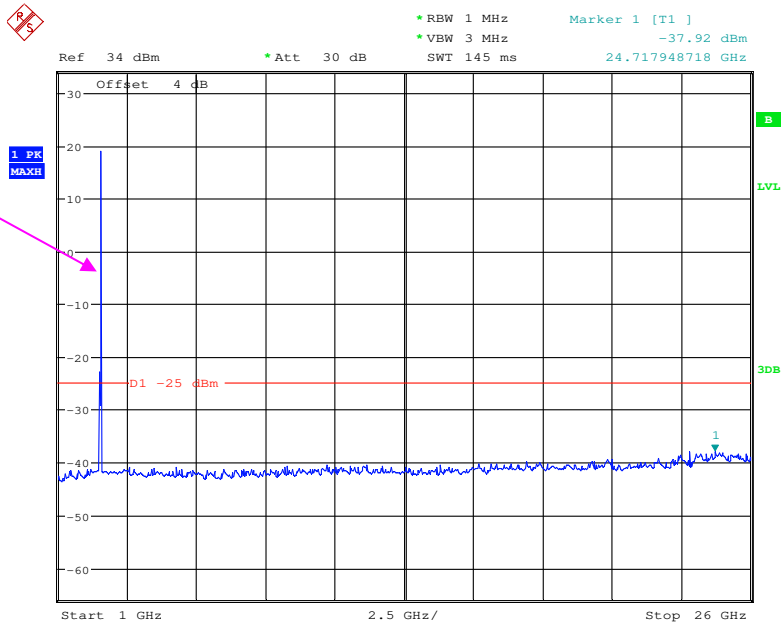


### QPSK\_15 MHz



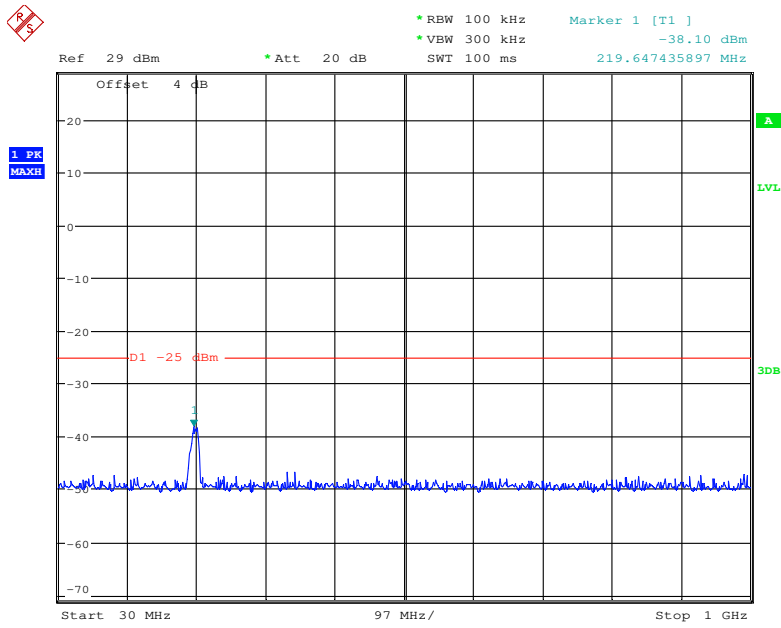
Date: 30.JAN.2018 22:04:24

Fundamental



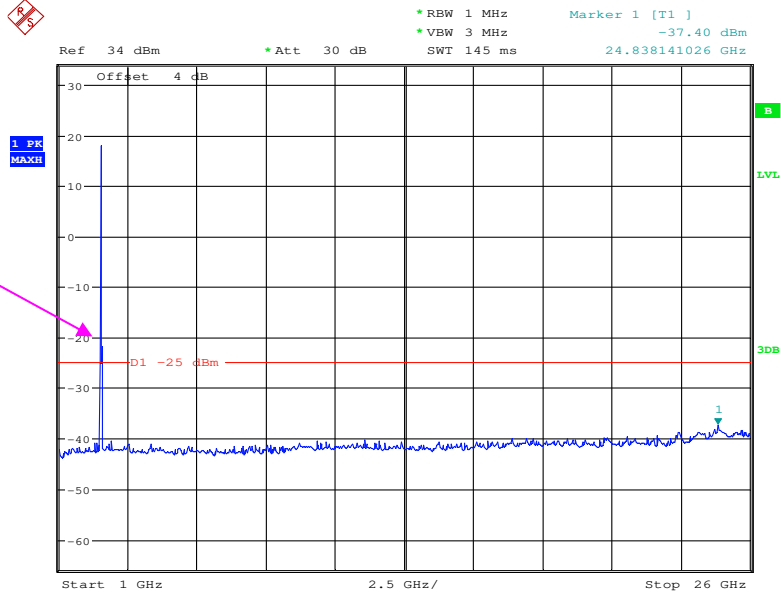
Date: 8.FEB.2018 17:32:38

### QPSK\_20 MHz



Date: 30.JAN.2018 22:05:42

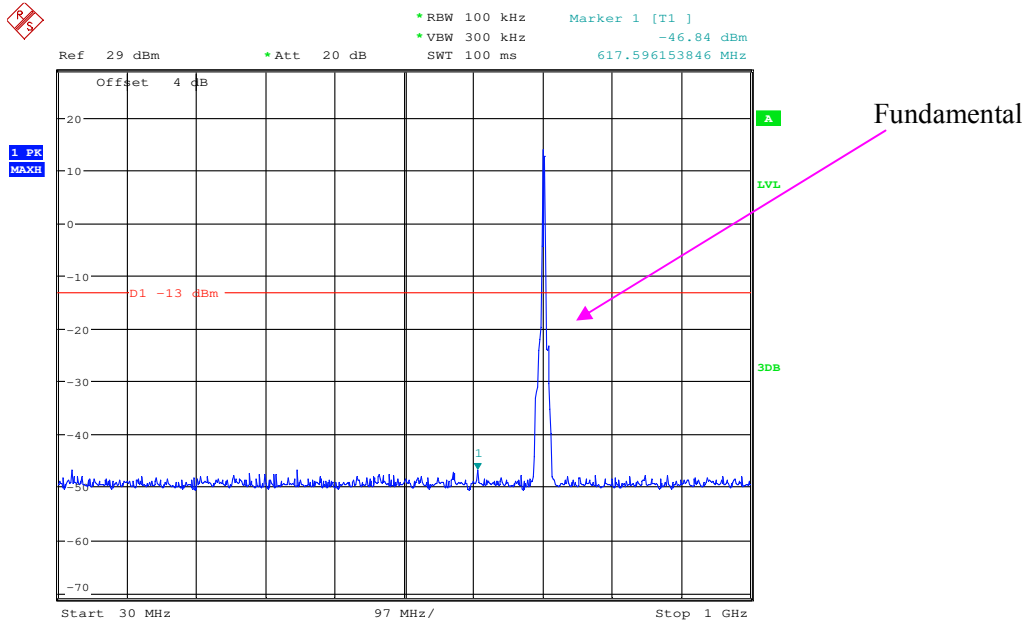
Fundamental



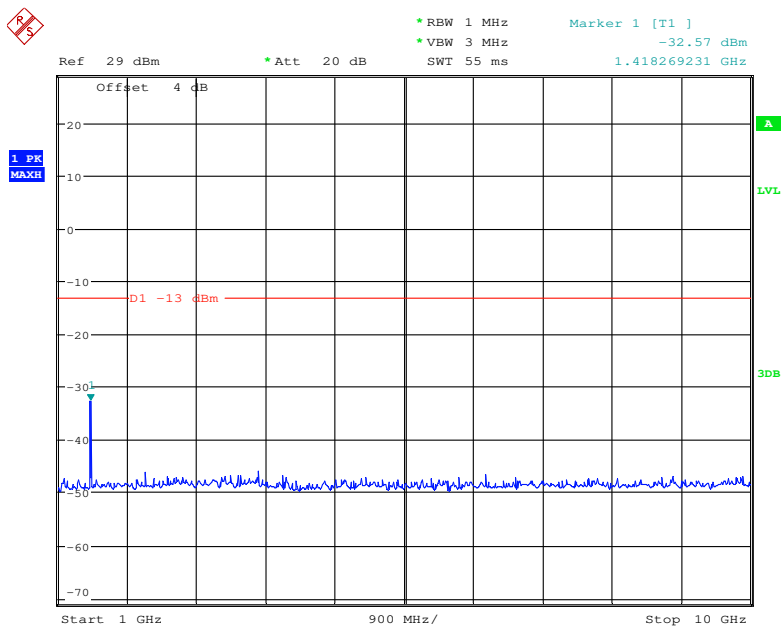
Date: 8.FEB.2018 17:33:21

LTE Band 17 (Middle Channel)

QPSK\_5 MHz

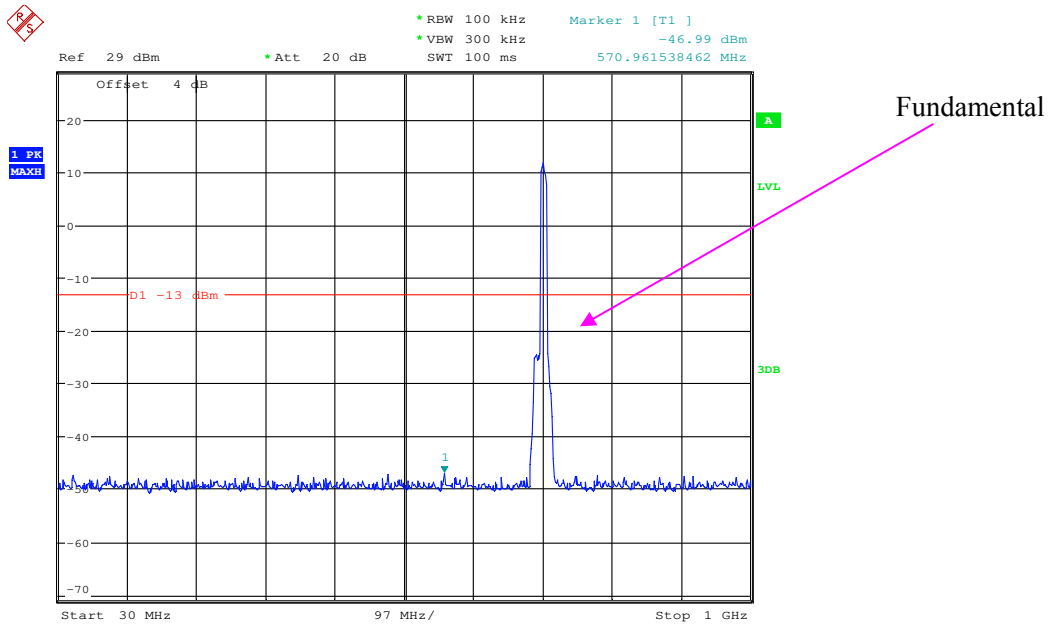


Date: 30.JAN.2018 22:27:34

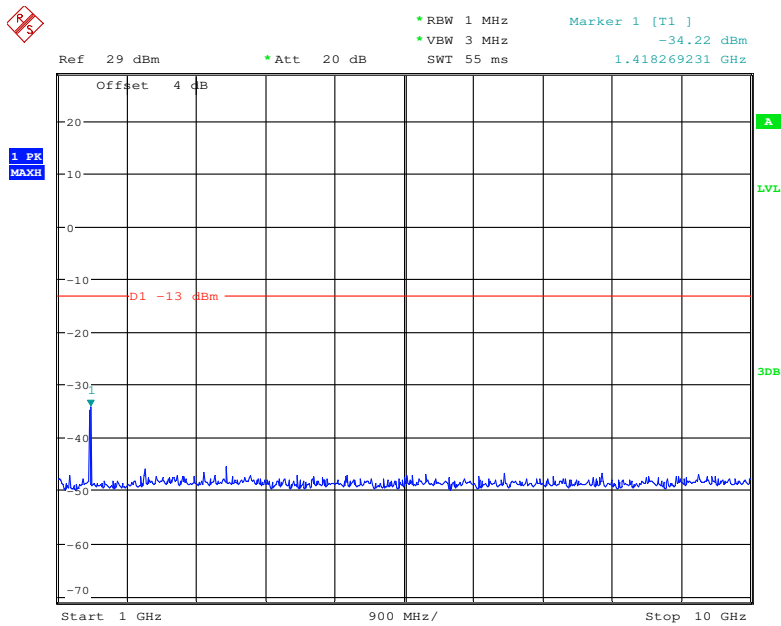


Date: 30.JAN.2018 22:27:52

### QPSK\_10 MHz



Date: 30.JAN.2018 22:29:13



Date: 30.JAN.2018 22:28:55

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

### Applicable Standard

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

### Test Procedure

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

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

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

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

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

Spurious attenuation limit in dB = 43 + 10 Log<sub>10</sub> (power out in Watts)

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2017-08-04	2018-08-04
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
HP	Amplifier	8447F	2443A01912	2017-09-05	2018-09-05
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
ETS LINDGREN	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Mini-Circuit	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05

\* **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**

<b>Temperature:</b>	21.9°C
<b>Relative Humidity:</b>	38 %
<b>ATM Pressure:</b>	100.9 kPa

\* The testing was performed by Blake Yang & Eric Xiao on 2018-01-02

EUT Operation Mode: Transmitting

**Cellular Band (PART 22H)**

**30 MHz-10 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM850, Frequency:836.600 MHz								
1673.200	H	55.48	-47.2	10.5	1.3	-38.0	-13.0	25.0
1673.200	V	52.33	-50.3	10.5	1.3	-41.1	-13.0	28.1
2509.800	H	57.36	-43.4	12.2	1.2	-32.4	-13.0	19.4
2509.800	V	56.40	-45.7	12.2	1.2	-34.7	-13.0	21.7
3346.400	H	50.75	-48.2	12.3	1.6	-37.5	-13.0	24.5
3346.400	V	48.51	-49.4	12.3	1.6	-38.7	-13.0	25.7
198.780	H	46.48	-62.2	0.0	0.5	-62.7	-13.0	49.7
62.980	V	46.21	-63.1	-8.7	0.2	-72.0	-13.0	59.0

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	40.06	-62.6	10.5	1.3	-53.4	-13.0	40.4
1673.200	V	39.11	-63.5	10.5	1.3	-54.3	-13.0	41.3
2509.800	H	38.24	-62.5	12.2	1.2	-51.5	-13.0	38.5
2509.800	V	39.44	-62.7	12.2	1.2	-51.7	-13.0	38.7
3346.400	H	37.34	-61.6	12.3	1.6	-50.9	-13.0	37.9
3346.400	V	36.13	-61.8	12.3	1.6	-51.1	-13.0	38.1
198.780	H	45.53	-63.2	0.0	0.5	-63.7	-13.0	50.7
62.980	V	46.38	-62.9	-8.7	0.2	-71.8	-13.0	58.8

**PCS Band (PART 24E)**

**30 MHz-20 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM1900, Frequency:1880.000 MHz								
3760.000	H	51.89	-45.8	12.3	1.5	-35.0	-13.0	22.0
3760.000	V	50.67	-46.7	12.3	1.5	-35.9	-13.0	22.9
5640.000	H	43.37	-49	13.0	1.3	-37.3	-13.0	24.3
5640.000	V	47.69	-45	13.0	1.3	-33.3	-13.0	20.3
198.780	H	46.12	-62.6	0.0	0.5	-63.1	-13.0	50.1
62.980	V	45.90	-63.4	-8.7	0.2	-72.3	-13.0	59.3
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	51.23	-46.5	12.3	1.5	-35.7	-13.0	22.7
3760.000	V	47.95	-49.5	12.3	1.5	-38.7	-13.0	25.7
5640.000	H	37.31	-55.1	13.0	1.3	-43.4	-13.0	30.4
5640.000	V	35.42	-57.3	13.0	1.3	-45.6	-13.0	32.6
198.780	H	45.80	-62.9	0.0	0.5	-63.4	-13.0	50.4
62.980	V	46.82	-62.5	-8.7	0.2	-71.4	-13.0	58.4

**LTE Band 2 (30MHz-20GHz):**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 1880.000 MHz								
3760.000	H	51.57	-46.1	12.3	1.5	-35.3	-13.0	22.3
3760.000	V	47.83	-49.6	12.3	1.5	-38.8	-13.0	25.8
5640.000	H	44.46	-47.9	13.0	1.3	-36.2	-13.0	23.2
5640.000	V	43.39	-49.3	13.0	1.3	-37.6	-13.0	24.6
299.660	H	42.52	-66.1	0.0	0.5	-66.6	-13.0	53.6
299.660	V	44.41	-65.6	0.0	0.5	-66.1	-13.0	53.1

**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								
3465.000	H	49.68	-49	12.2	1.6	-38.4	-13.0	25.4
3465.000	V	47.53	-49.8	12.2	1.6	-39.2	-13.0	26.2
5197.500	H	45.21	-48	12.9	1.4	-36.5	-13.0	23.5
5197.500	V	43.36	-49.8	12.9	1.4	-38.3	-13.0	25.3
299.660	H	42.16	-66.5	0.0	0.5	-67.0	-13.0	54.0
299.660	V	43.80	-66.2	0.0	0.5	-66.7	-13.0	53.7

**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								
1673.000	H	48.57	-54.1	10.5	1.3	-44.9	-13.0	31.9
1673.000	V	46.24	-56.4	10.5	1.3	-47.2	-13.0	34.2
2509.500	H	50.24	-50.5	12.2	1.2	-39.5	-13.0	26.5
2509.500	V	49.16	-53	12.2	1.2	-42.0	-13.0	29.0
3346.000	H	45.21	-53.7	12.3	1.6	-43.0	-13.0	30.0
3346.000	V	43.05	-54.8	12.3	1.6	-44.1	-13.0	31.1
299.660	H	44.51	-64.1	0.0	0.5	-64.6	-13.0	51.6
299.660	V	43.25	-66.7	0.0	0.5	-67.2	-13.0	54.2



**LTE Band 7 (30MHz-26GHz)**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB $\mu$ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 2535.000 MHz								
5070.000	H	48.24	-45.1	13.0	1.4	-33.5	-25.0	8.5
5070.000	V	46.38	-46.7	13.0	1.4	-35.1	-25.0	10.1
7605.000	H	45.37	-42.7	12.8	1.4	-31.3	-25.0	6.3
7605.000	V	43.20	-45.5	12.8	1.4	-34.1	-25.0	9.1
299.660	H	44.56	-64.1	0.0	0.5	-64.6	-25.0	39.6
299.660	V	43.10	-66.9	0.0	0.5	-67.4	-25.0	42.4

**LTE Band 17 (30MHz-10GHz)**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dB $\mu$ V)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 710.000 MHz								
1420.000	H	46.73	-56.2	9.7	1.3	-47.8	-13.0	34.8
1420.000	V	45.66	-57.3	9.7	1.3	-48.9	-13.0	35.9
2130.000	H	48.83	-53	11.7	1.2	-42.5	-13.0	29.5
2130.000	V	46.62	-55.5	11.7	1.2	-45.0	-13.0	32.0
2840.000	H	44.36	-55.7	12.3	1.4	-44.8	-13.0	31.8
2840.000	V	43.21	-57.2	12.3	1.4	-46.3	-13.0	33.3
299.660	H	45.32	-63.3	0.0	0.5	-63.8	-13.0	50.8
299.660	V	44.31	-65.7	0.0	0.5	-66.2	-13.0	53.2

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**

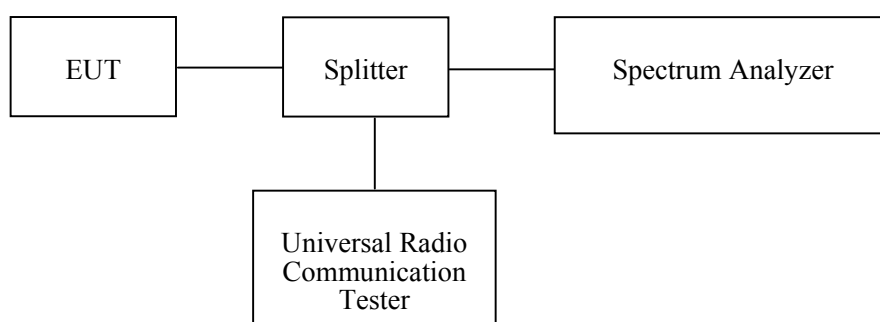
**Applicable Standard**

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	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04

\* **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**

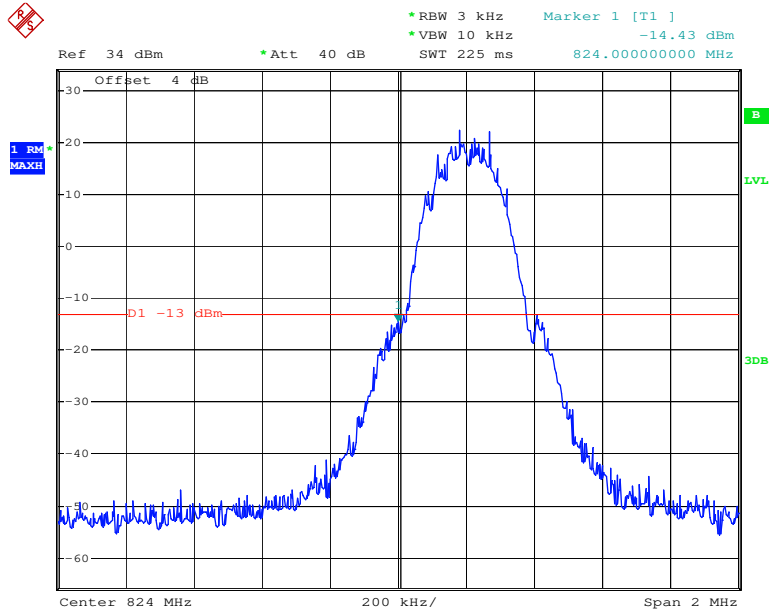
<b>Temperature:</b>	22.4~24.1°C
<b>Relative Humidity:</b>	30~42 %
<b>ATM Pressure:</b>	100.9~101.5 kPa

*The testing was performed by Harry Yang from 2018-01-02 to 2018-02-08.*

*Test Mode: Transmitting*

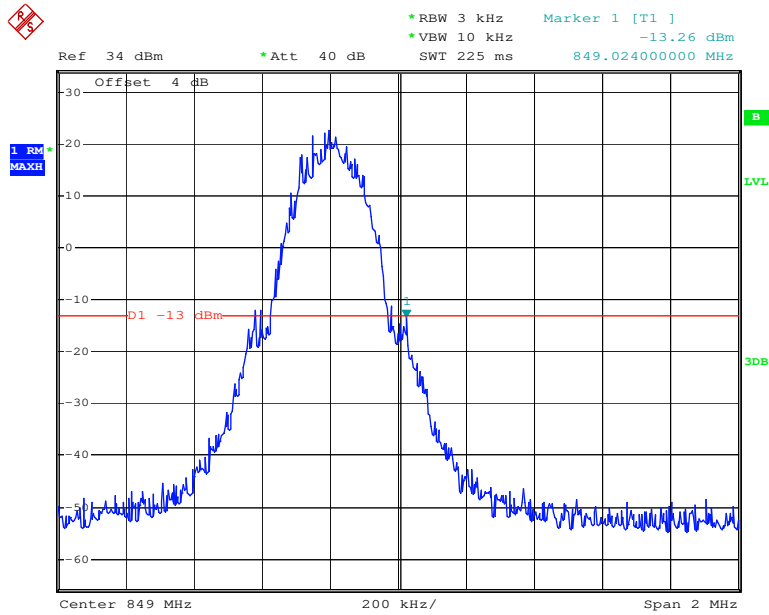
*Test Result: Compliant. Please refer to the following plots.*

### GSM 850, Left Band Edge



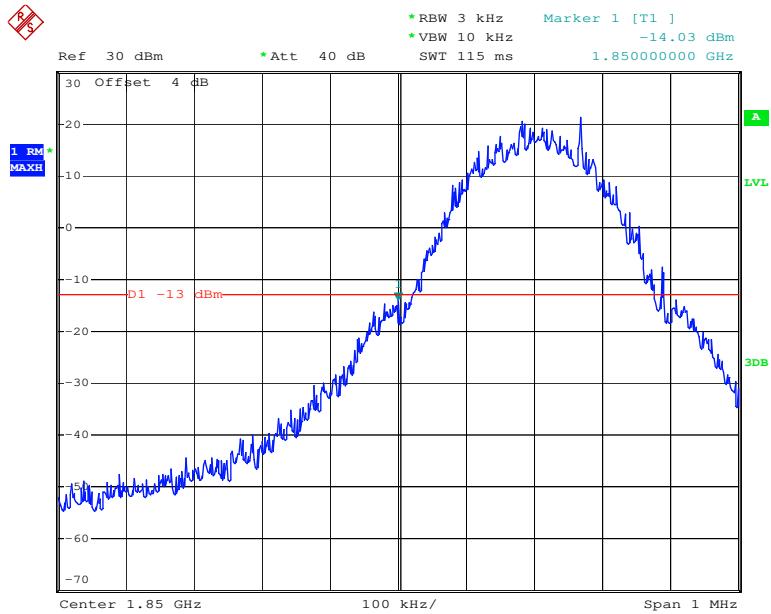
Date: 2.JAN.2018 21:44:25

### GSM 850, Right Band Edge



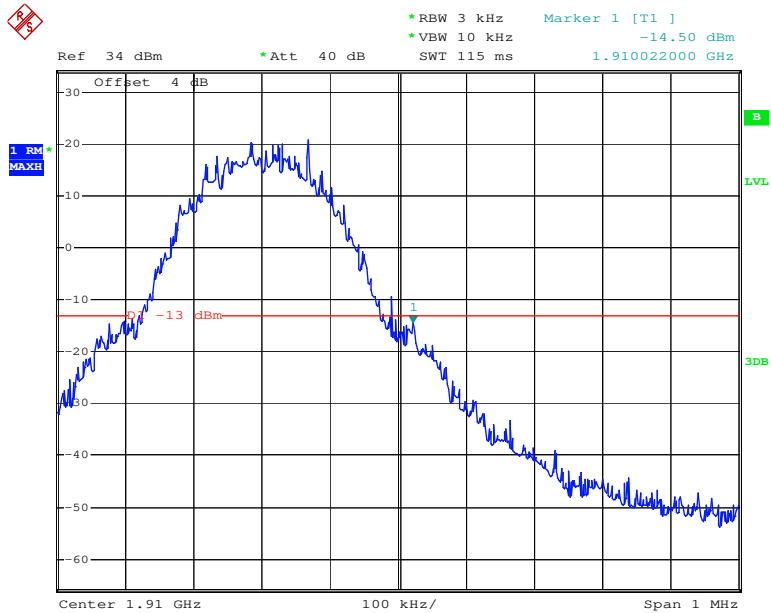
Date: 2.JAN.2018 21:45:02

### GSM 1900, Left Band Edge



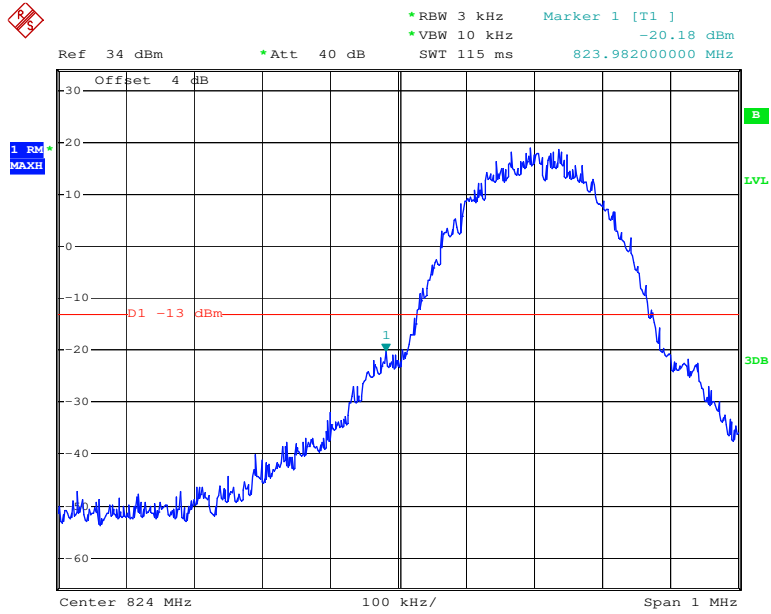
Date: 8.FEB.2018 17:12:14

### GSM 1900, Right Band Edge



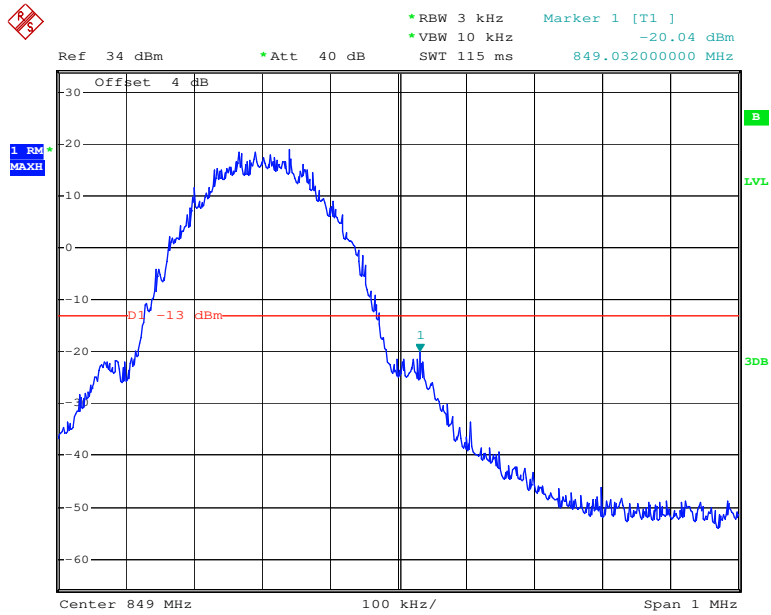
Date: 2.JAN.2018 22:04:31

### EDGE 850, Left Band Edge



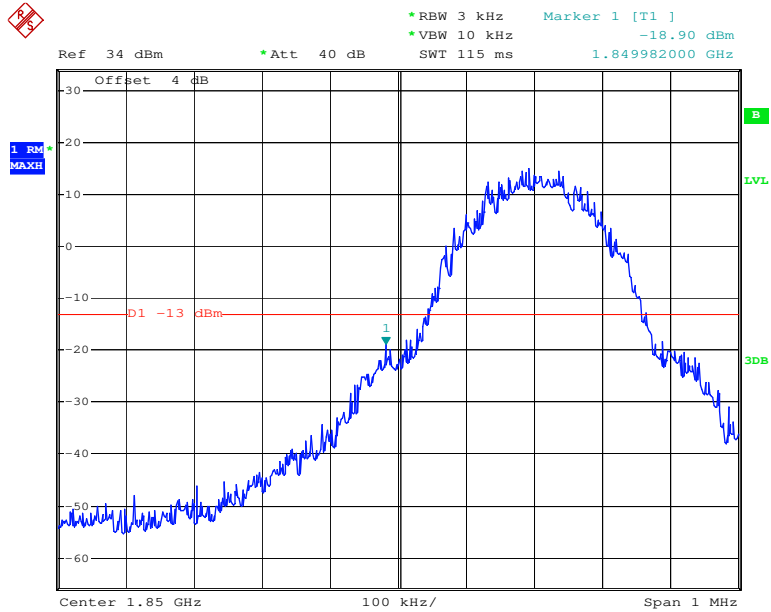
Date: 2.JAN.2018 21:41:51

### EDGE 850, Right Band Edge



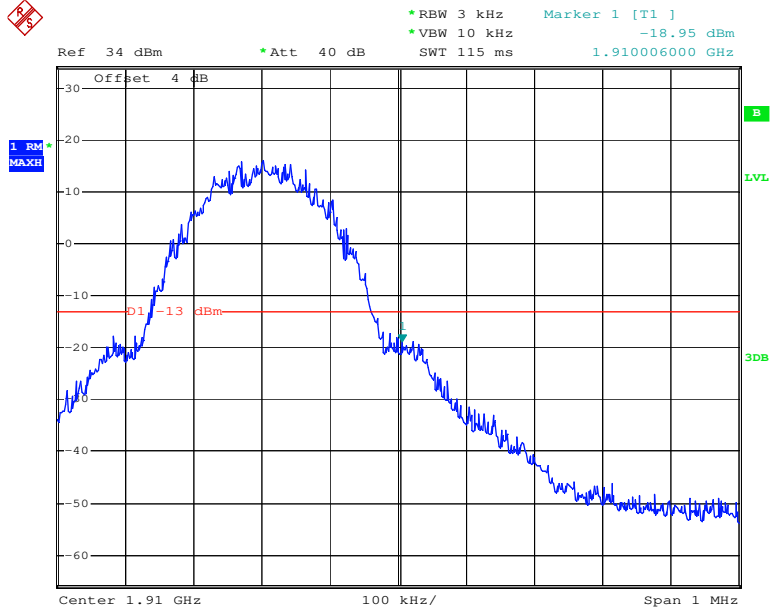
Date: 2.JAN.2018 21:41:09

### EDGE 1900, Left Band Edge



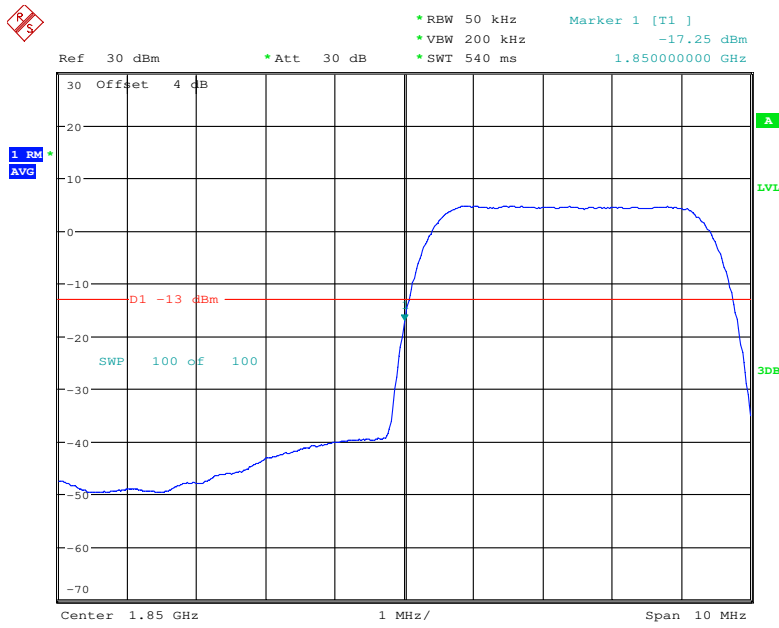
Date: 2.JAN.2018 21:55:56

### EDGE 1900, Right Band Edge



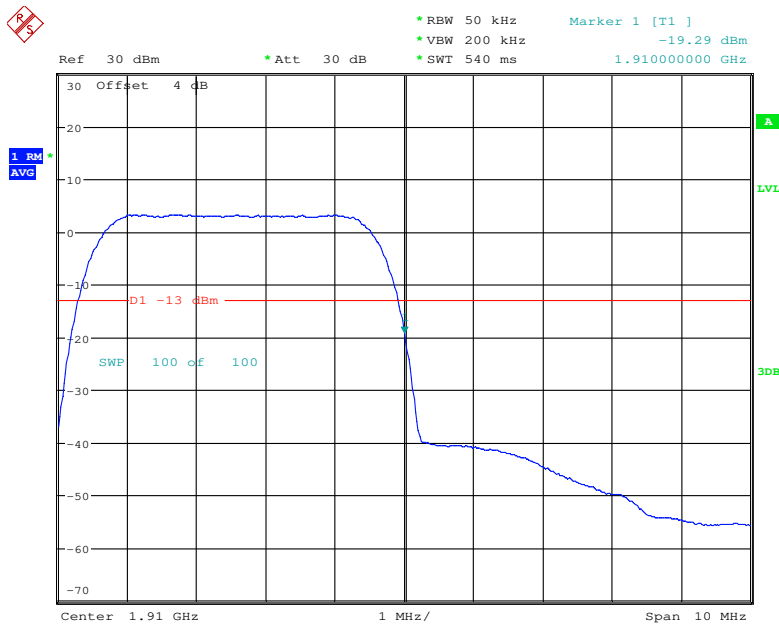
Date: 2.JAN.2018 21:55:18

### WCDMA Band II Rel 99, Left Band Edge



Date: 6.FEB.2018 18:46:25

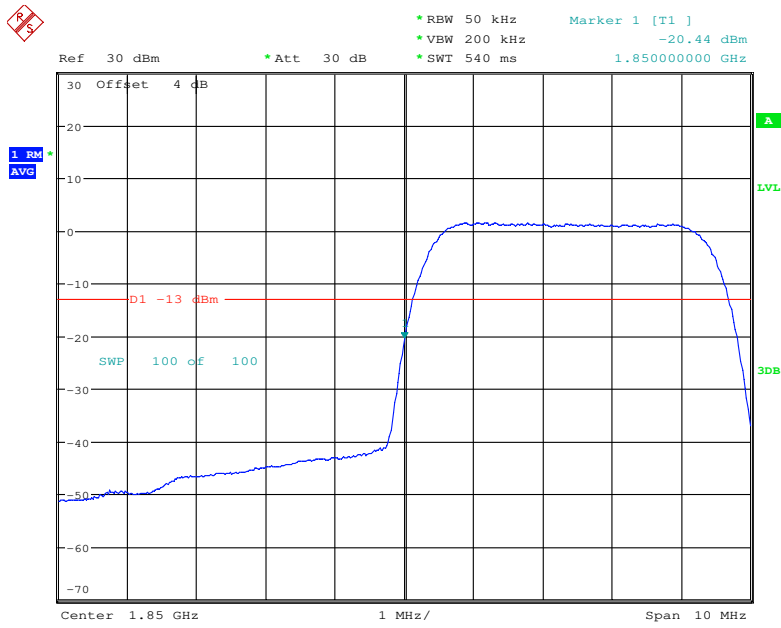
### WCDMA Band II Rel 99, Right Band Edge



Date: 6.FEB.2018 18:48:06

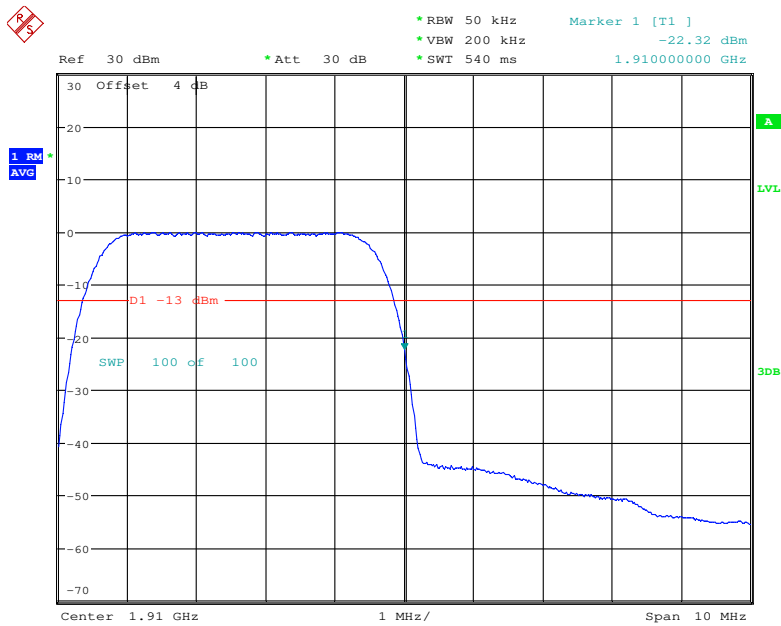


### WCDMA Band II HSUPA, Left Band Edge



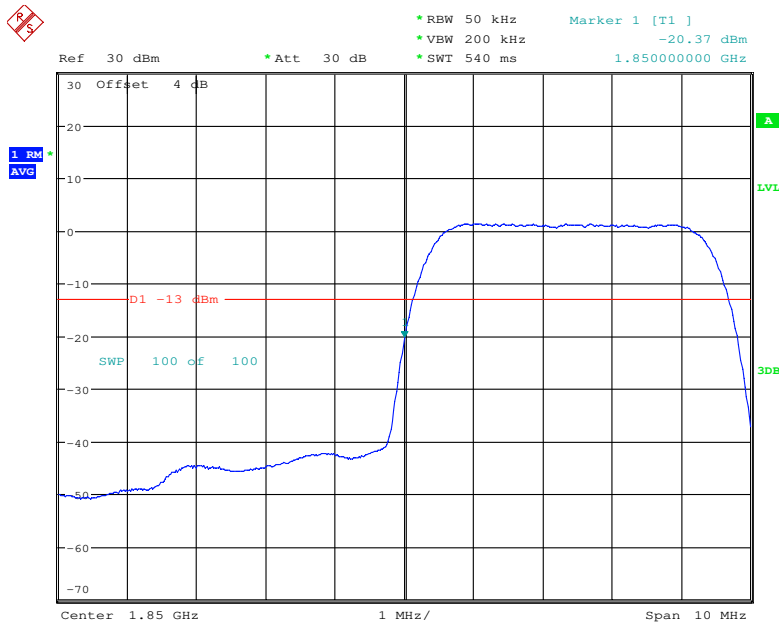
Date: 6.FEB.2018 19:27:49

### WCDMA Band II HSUPA, Right Band Edge



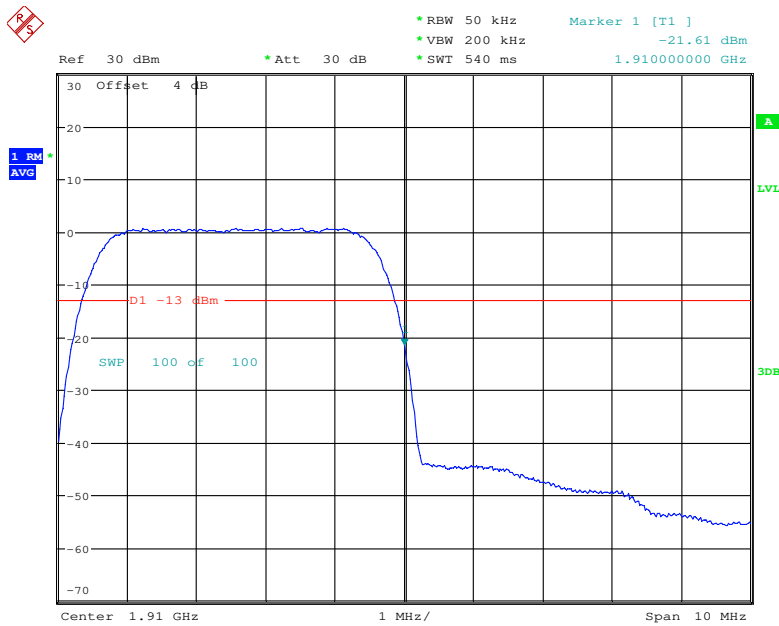
Date: 6.FEB.2018 19:34:05

### WCDMA Band II HSDPA, Left Band Edge



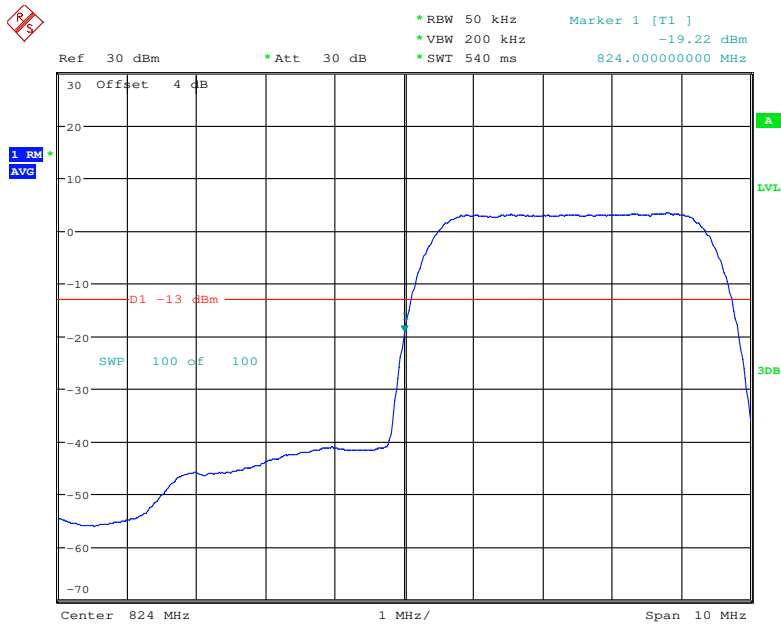
Date: 6.FEB.2018 18:58:30

### WCDMA Band II HSDPA, Right Band Edge



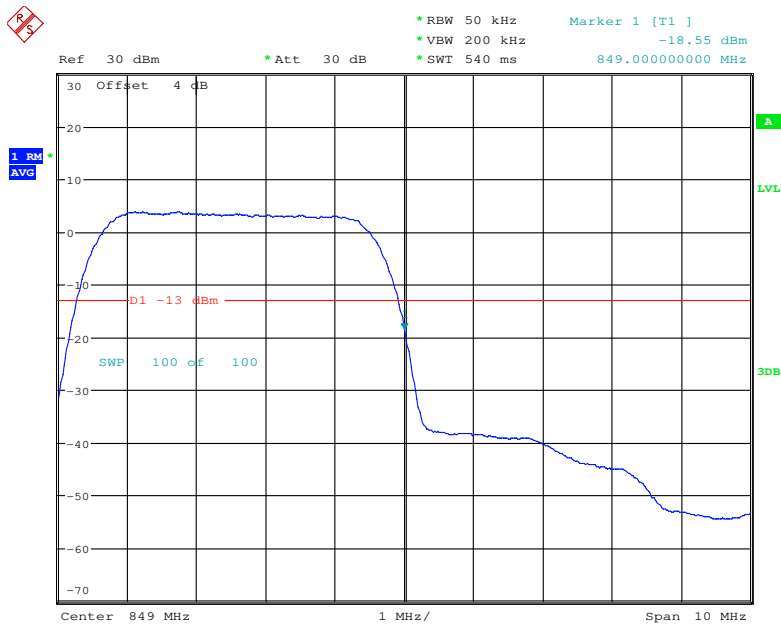
Date: 6.FEB.2018 18:54:59

### WCDMA Band V Rel 99, Left Band Edge



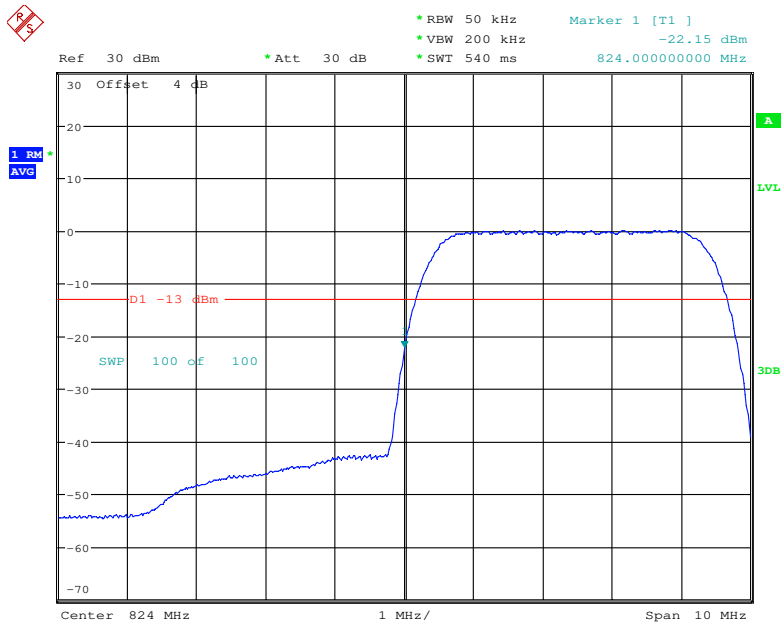
Date: 6.FEB.2018 19:46:31

### WCDMA Band V Rel 99, Right Band Edge



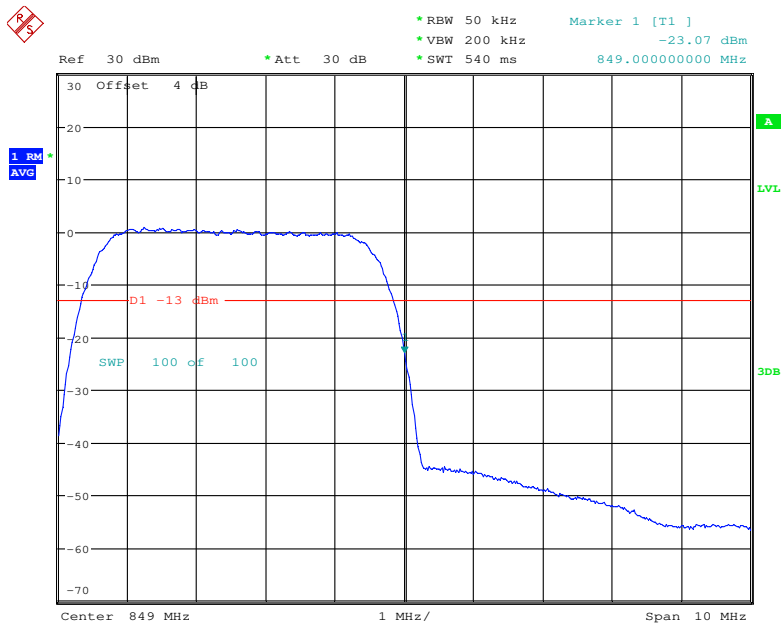
Date: 6.FEB.2018 19:47:51

### WCDMA Band V HSUPA, Left Band Edge



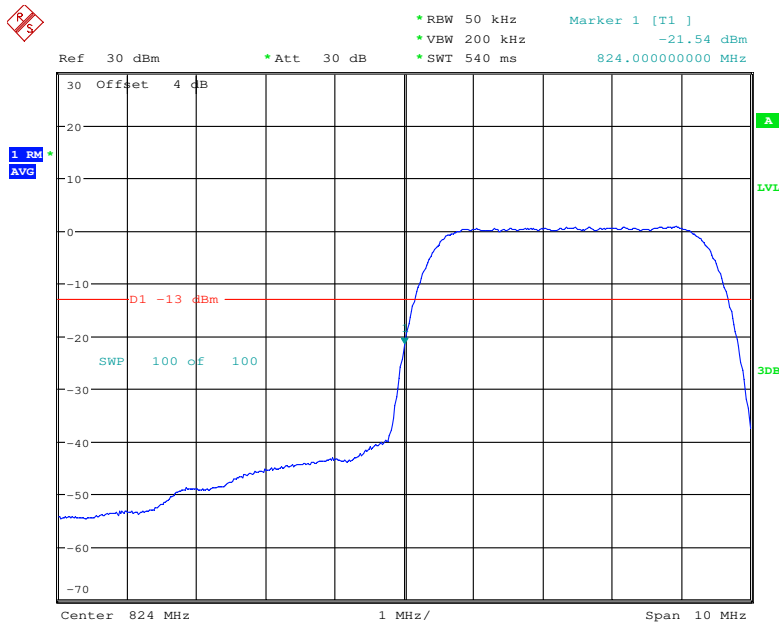
Date: 6.FEB.2018 19:36:50

### WCDMA Band V HSUPA, Right Band Edge



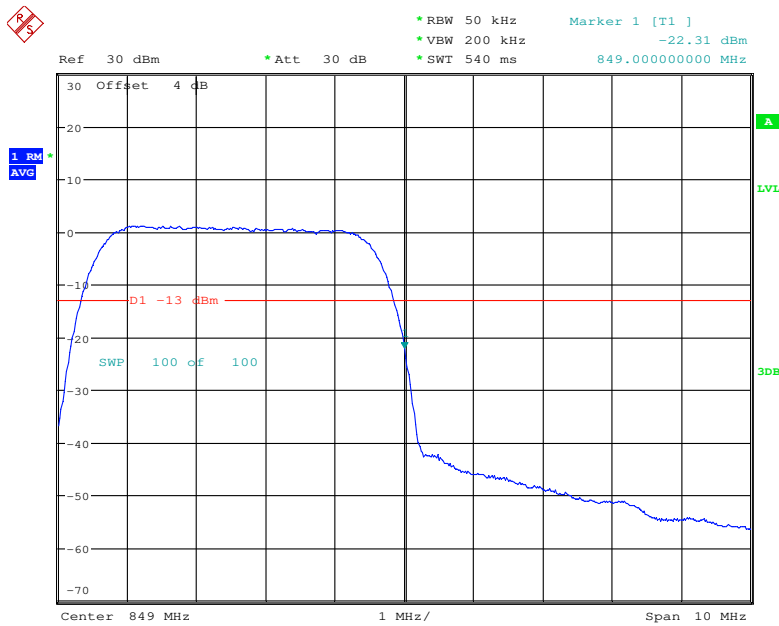
Date: 6.FEB.2018 19:41:24

### WCDMA Band V HSDPA, Left Band Edge



Date: 6.FEB.2018 19:44:53

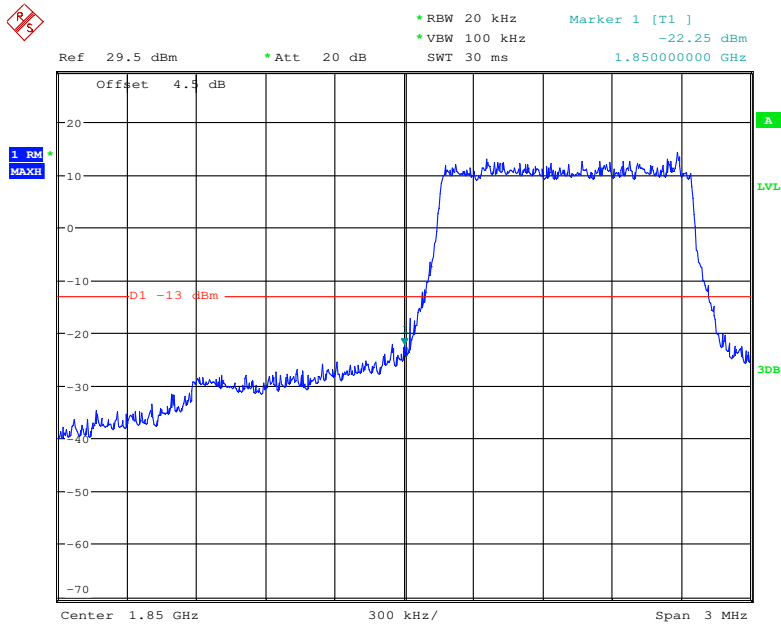
### WCDMA Band V HSDPA, Right Band Edge



Date: 6.FEB.2018 19:43:23

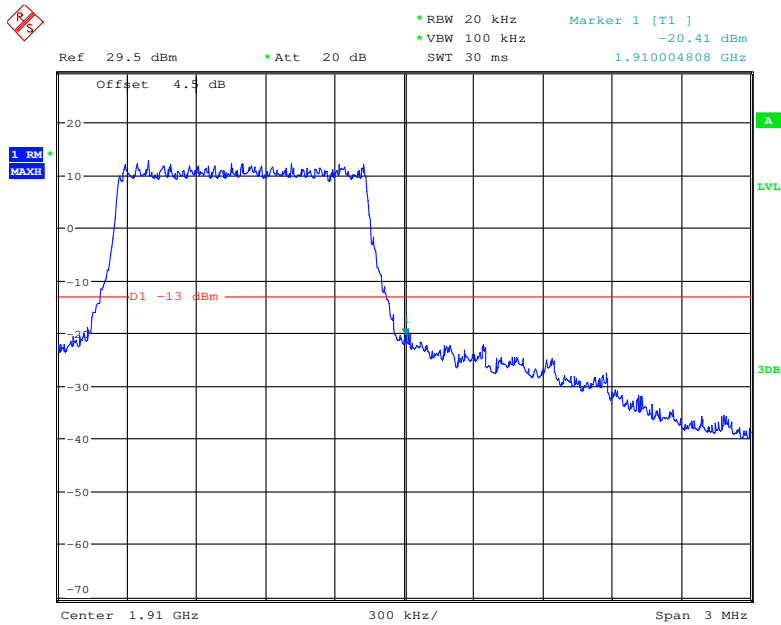
LTE Band II

QPSK\_1.4MHz\_6 RB\_Left



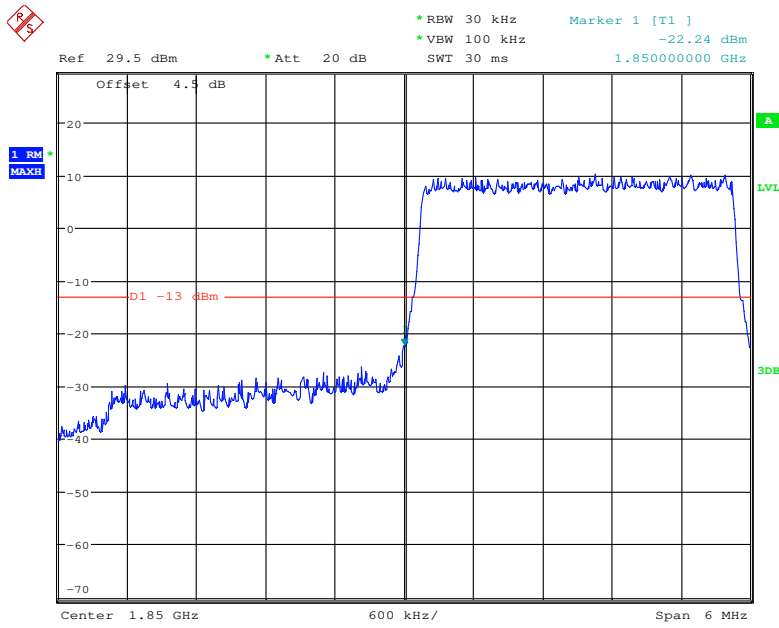
Date: 26.JAN.2018 21:52:00

QPSK\_1.4MHz\_6 RB\_Right



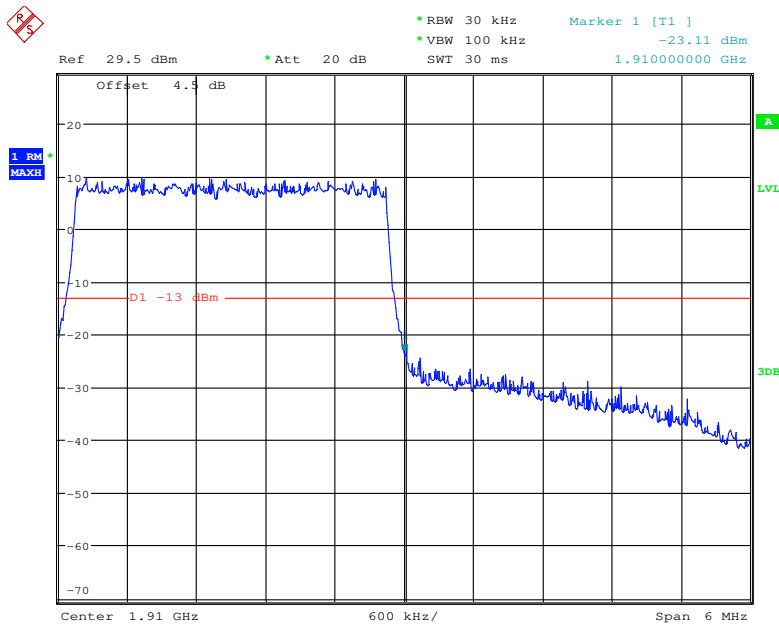
Date: 26.JAN.2018 21:50:09

### QPSK\_3MHz\_15 RB\_Left



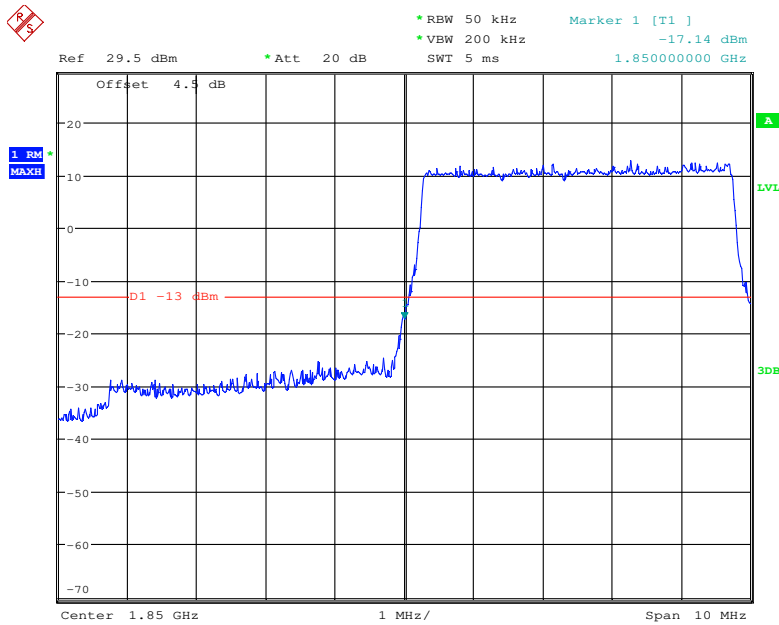
Date: 26.JAN.2018 21:47:15

### QPSK\_3MHz\_15 RB\_Right



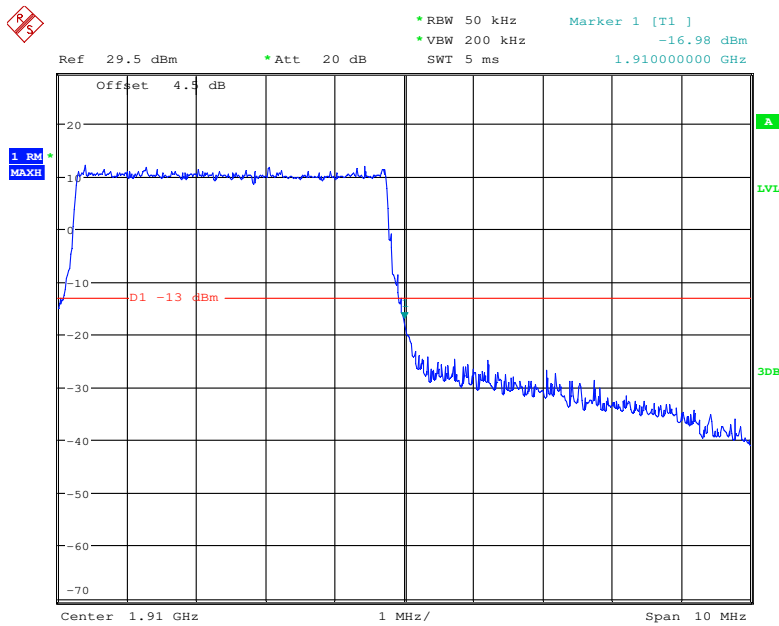
Date: 26.JAN.2018 21:48:57

### QPSK\_5MHz\_25 RB\_Left



Date: 26.JAN.2018 21:46:21

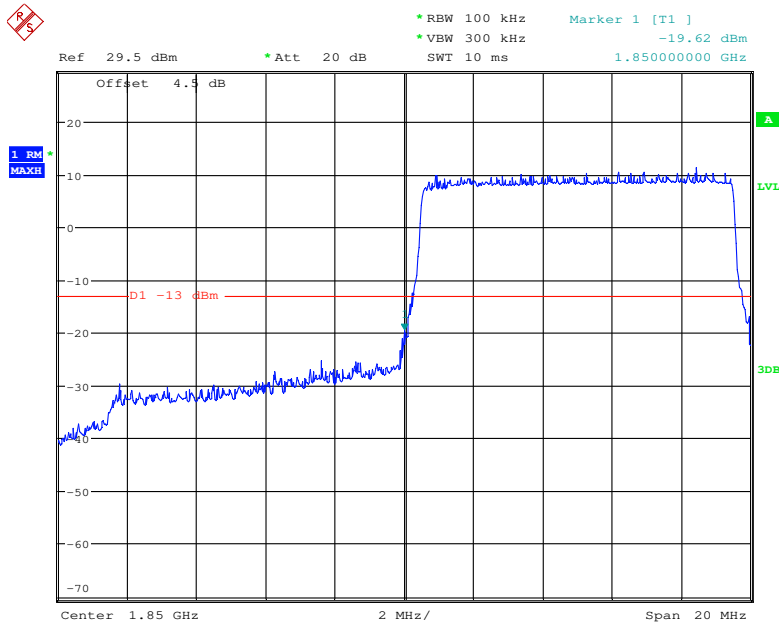
### QPSK\_5MHz\_25 RB\_Right



Date: 26.JAN.2018 21:44:10

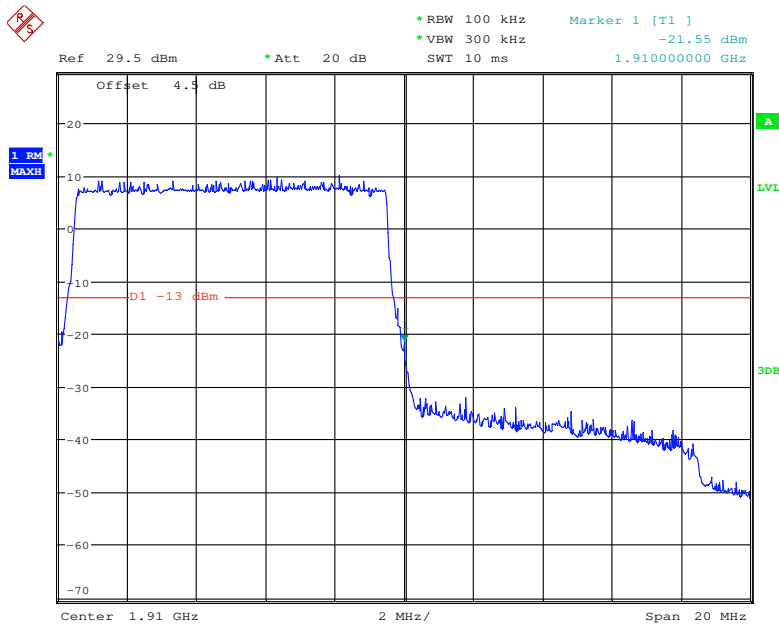


### QPSK\_10MHz\_50 RB\_Left



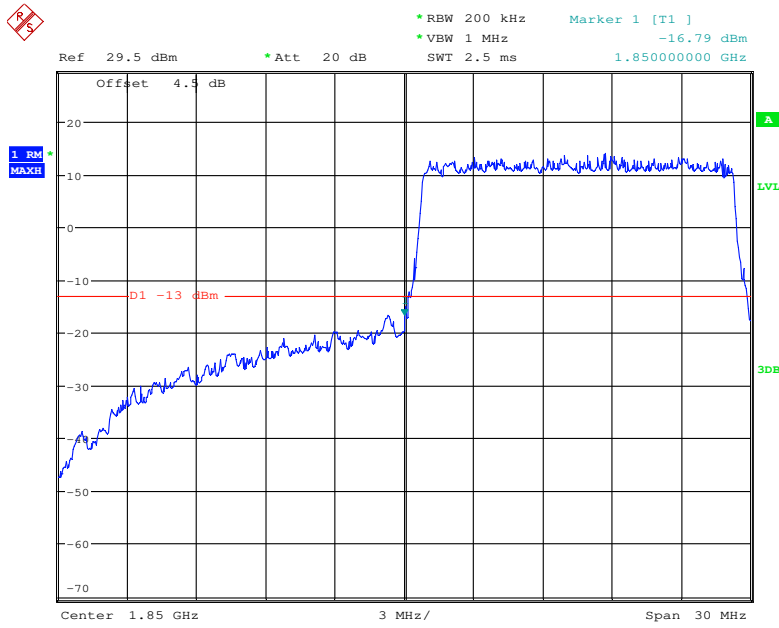
Date: 26.JAN.2018 21:25:01

### QPSK\_10MHz\_50 RB\_Right



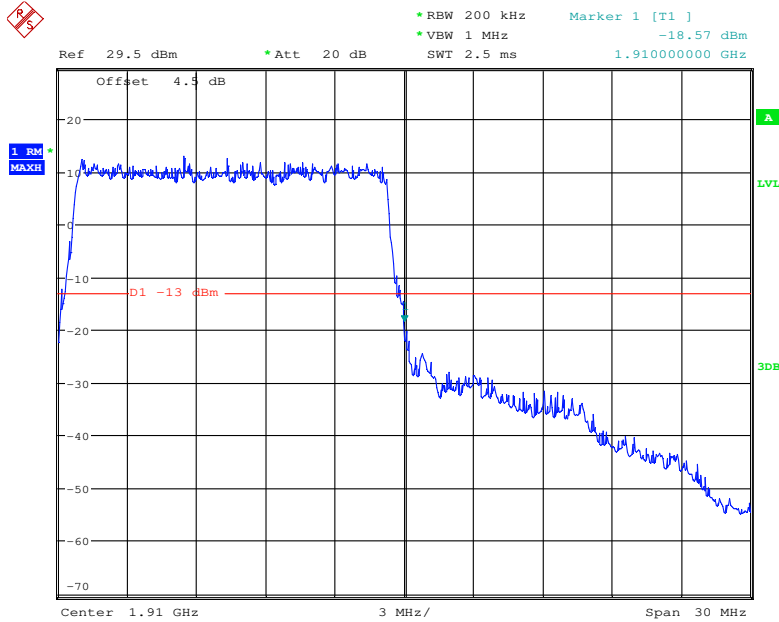
Date: 26.JAN.2018 21:23:58

### QPSK\_15MHz\_75 RB\_Left



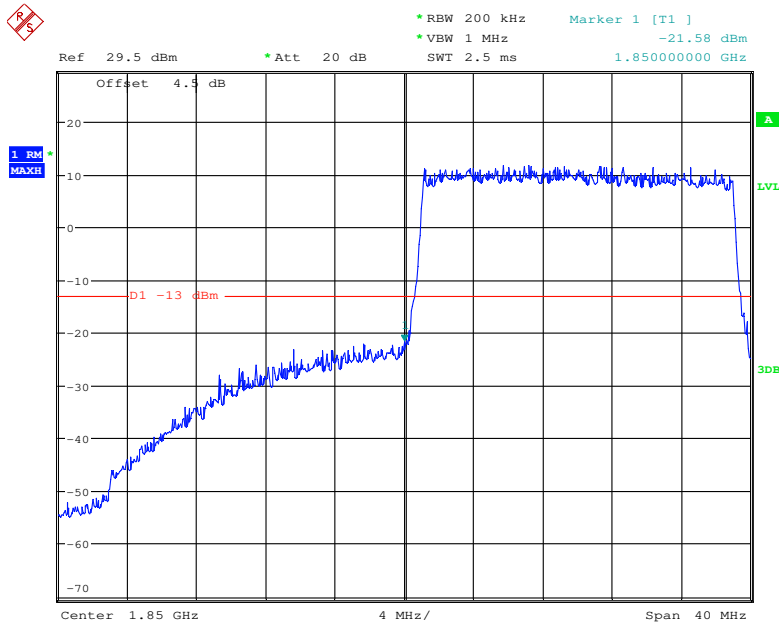
Date: 26.JAN.2018 21:38:10

### QPSK\_15MHz\_75 RB\_Right



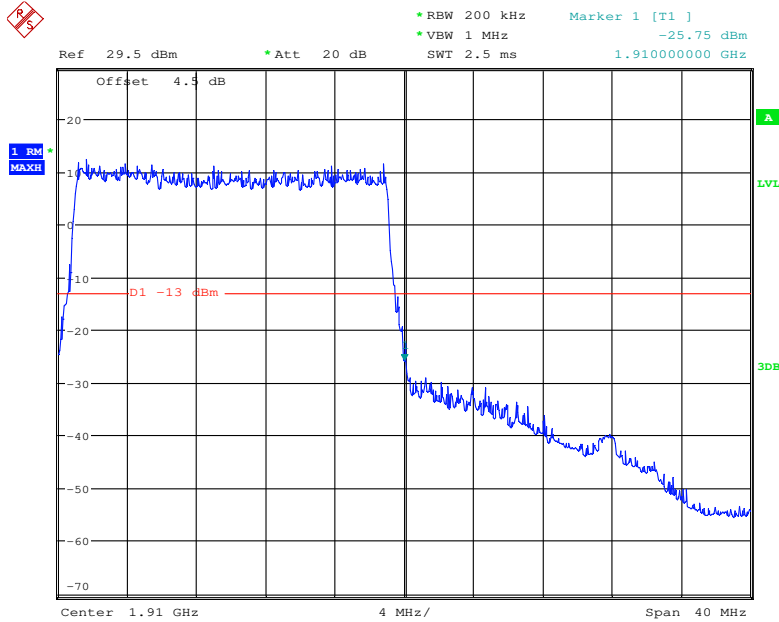
Date: 26.JAN.2018 21:35:34

### QPSK\_20MHz\_FULL RB\_Left



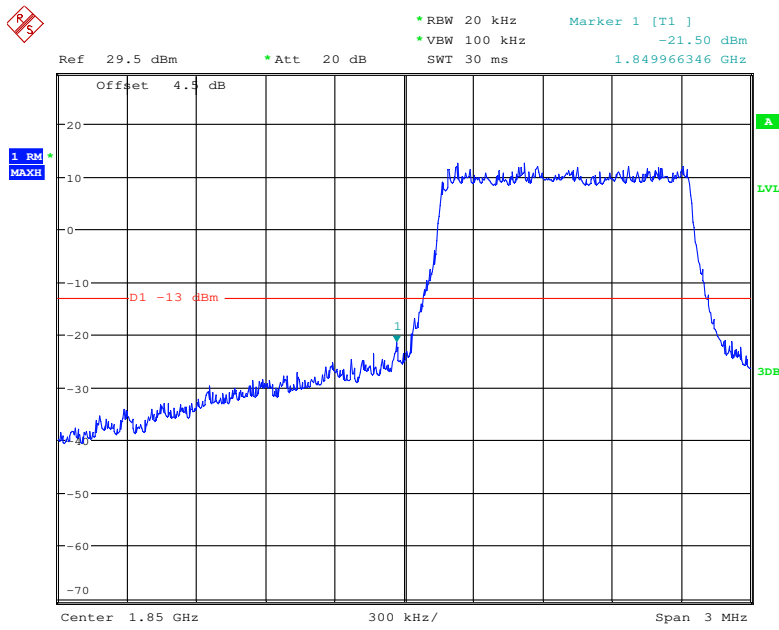
Date: 26.JAN.2018 21:40:49

### QPSK\_20MHz\_FULL RB\_Right



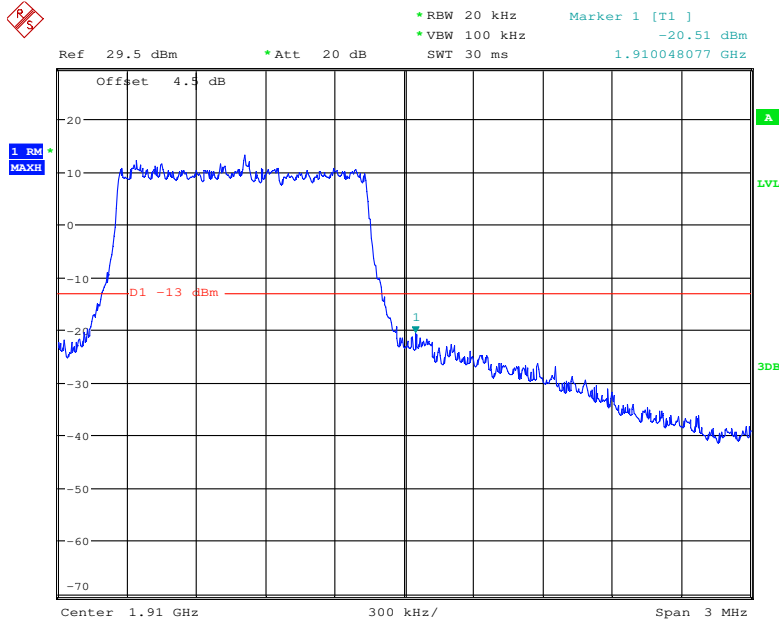
Date: 26.JAN.2018 21:43:03

### 16QAM\_1.4MHz\_6 RB\_Left



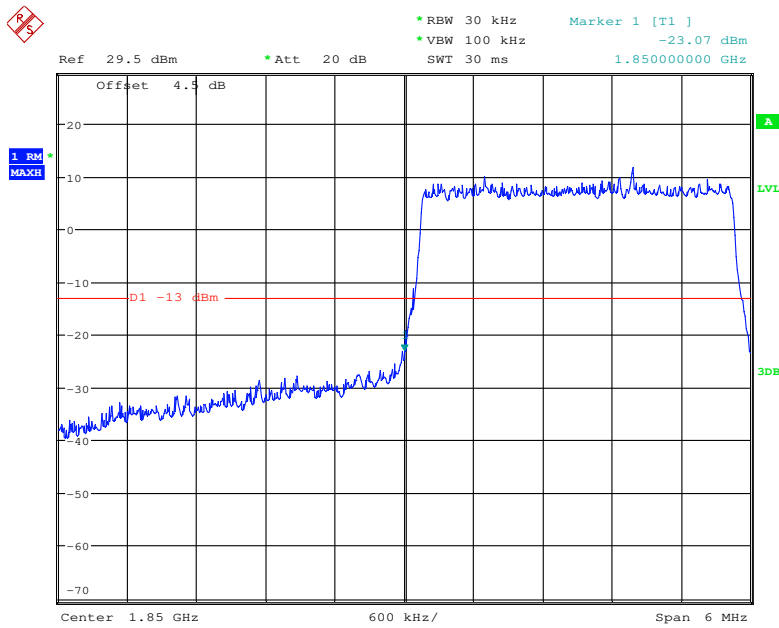
Date: 26.JAN.2018 21:51:38

### 16QAM\_1.4MHz\_6 RB\_Right



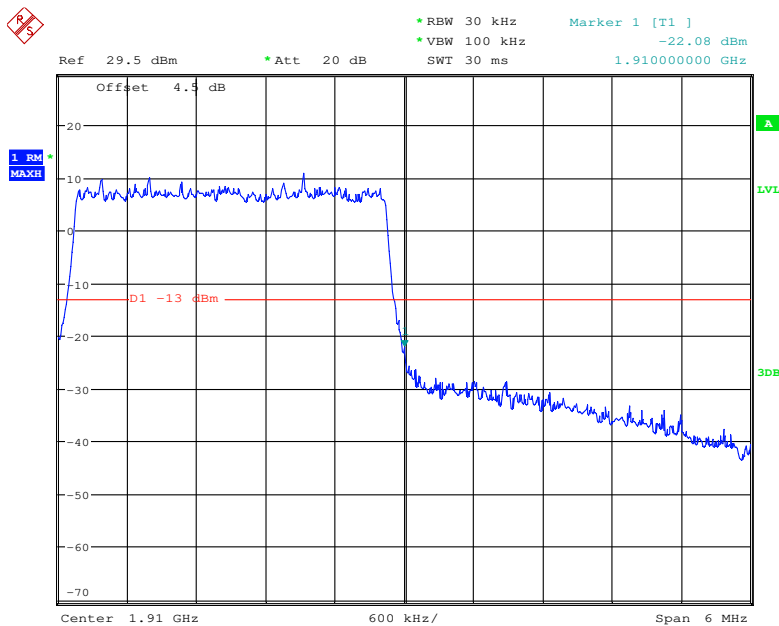
Date: 26.JAN.2018 21:50:45

### 16QAM\_3MHz\_15 RB\_Left



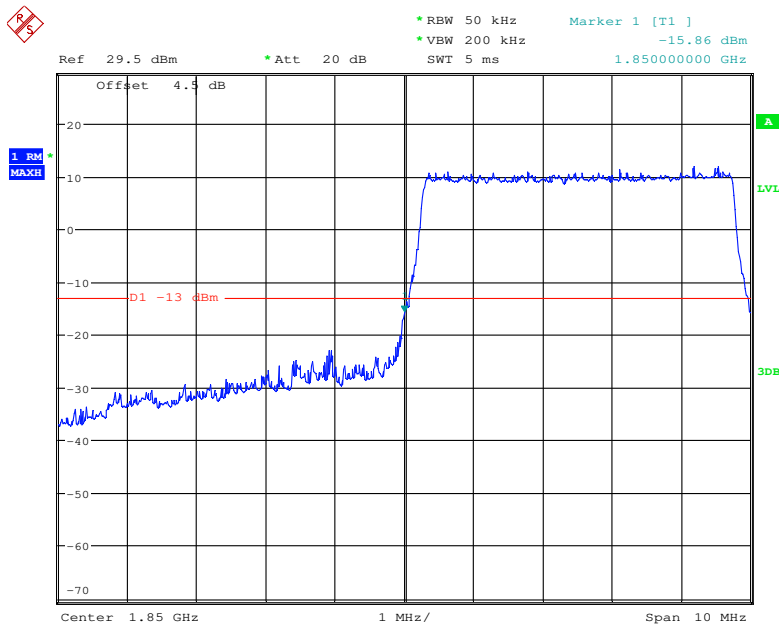
Date: 26.JAN.2018 21:47:52

### 16QAM\_3MHz\_15 RB\_Right



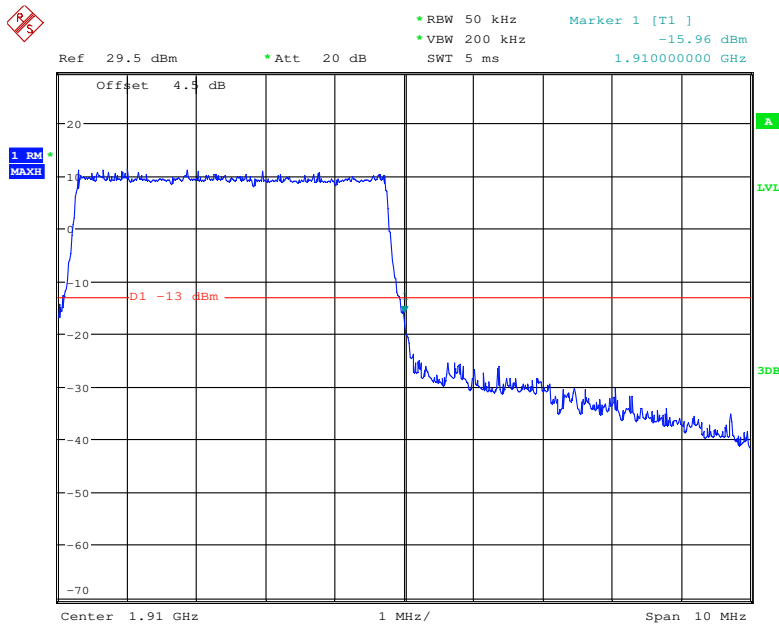
Date: 26.JAN.2018 21:48:34

### 16QAM\_5MHz\_25 RB\_Left



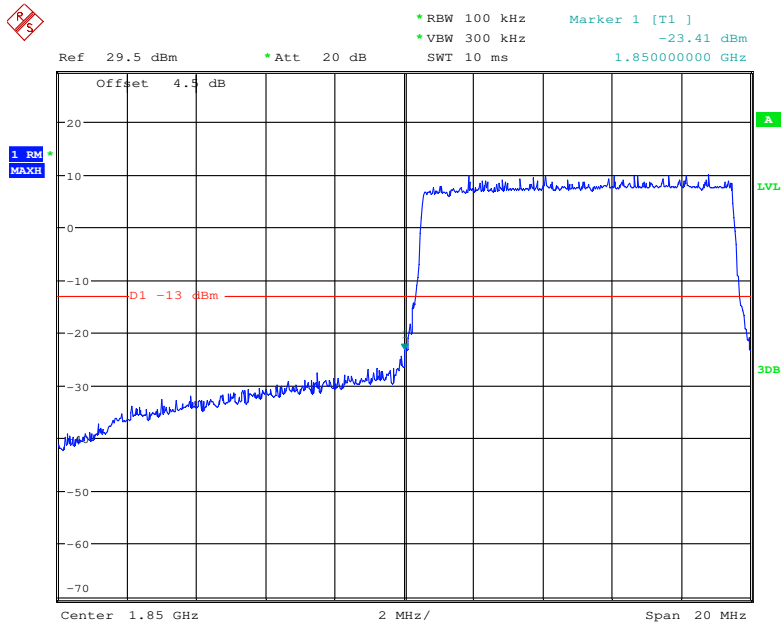
Date: 26.JAN.2018 21:45:46

### 16QAM\_5MHz\_25 RB\_Right



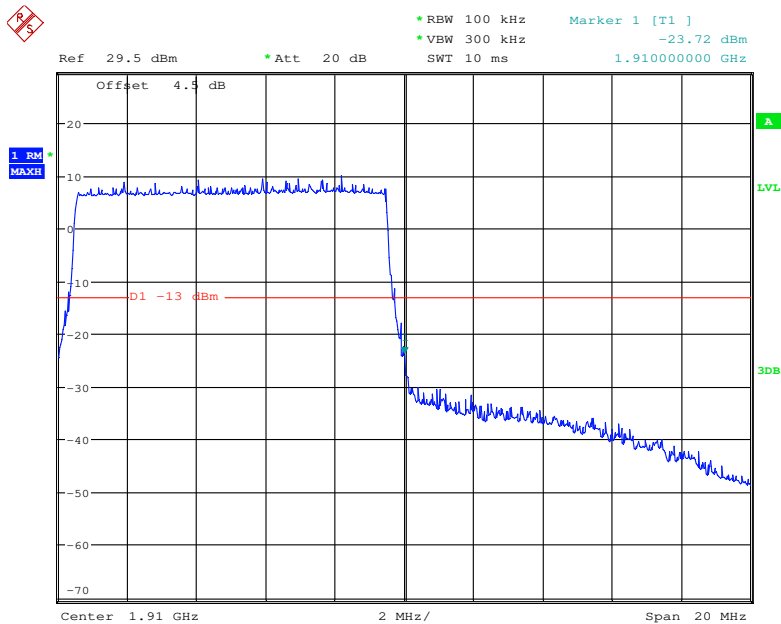
Date: 26.JAN.2018 21:44:59

### 16QAM\_10MHz\_50 RB\_Left



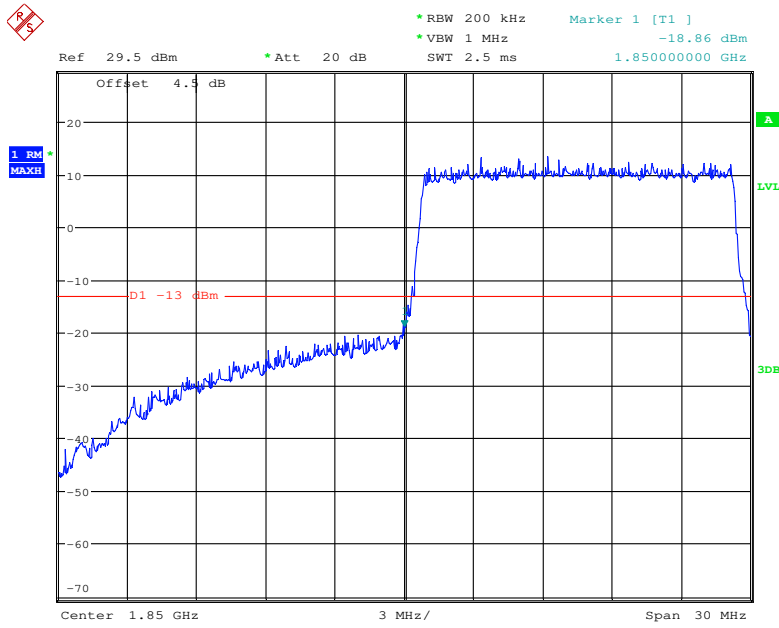
Date: 26.JAN.2018 21:28:17

### 16QAM\_10MHz\_50 RB\_Right



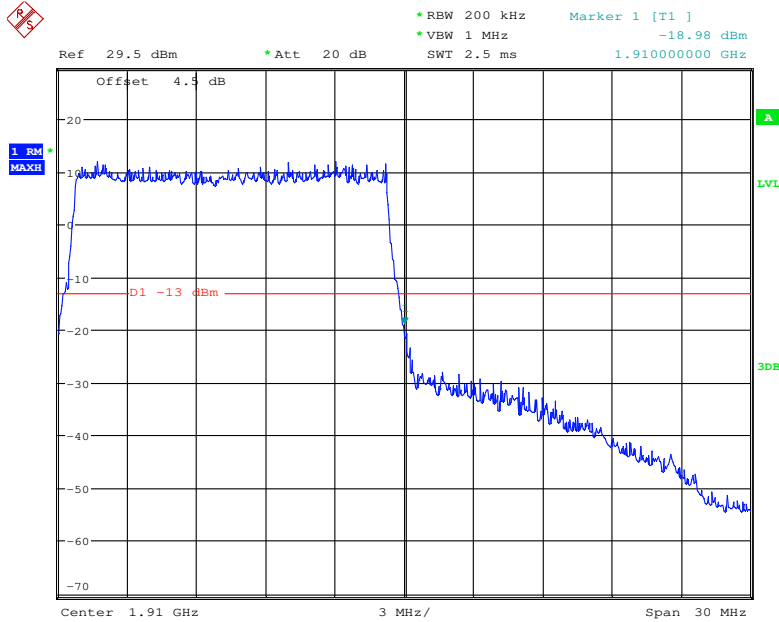
Date: 26.JAN.2018 21:33:41

### 16QAM\_15MHz\_75 RB\_Left



Date: 26.JAN.2018 21:37:11

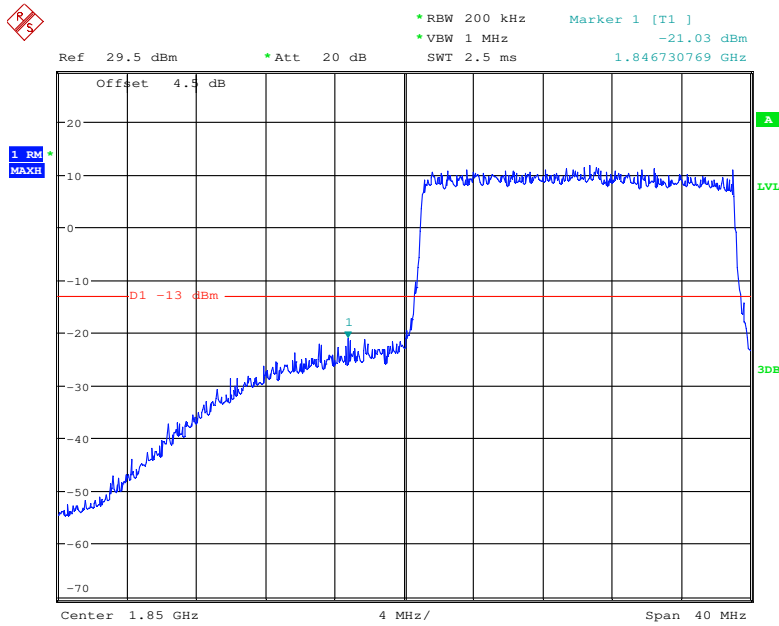
### 16QAM\_15MHz\_75 RB\_Right



Date: 26.JAN.2018 21:36:18

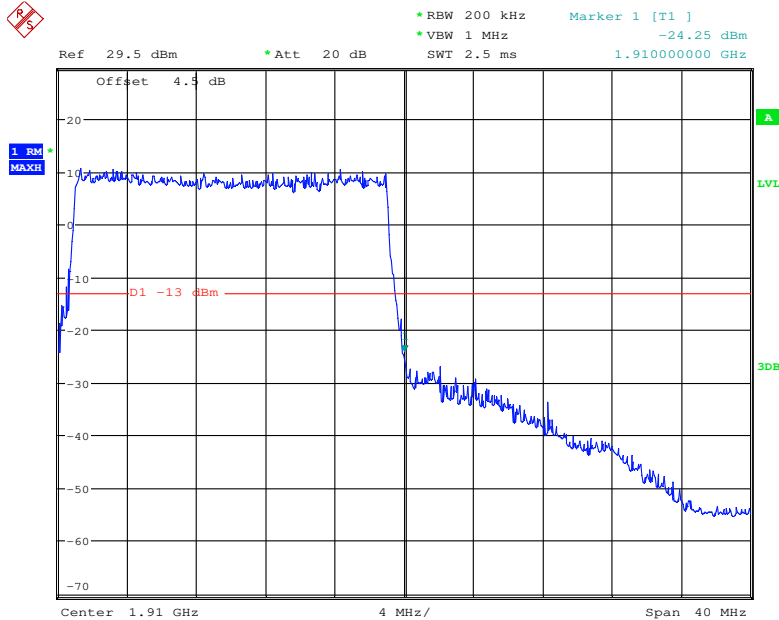


### 16QAM\_20MHz\_FULL RB\_Left



Date: 26.JAN.2018 21:41:39

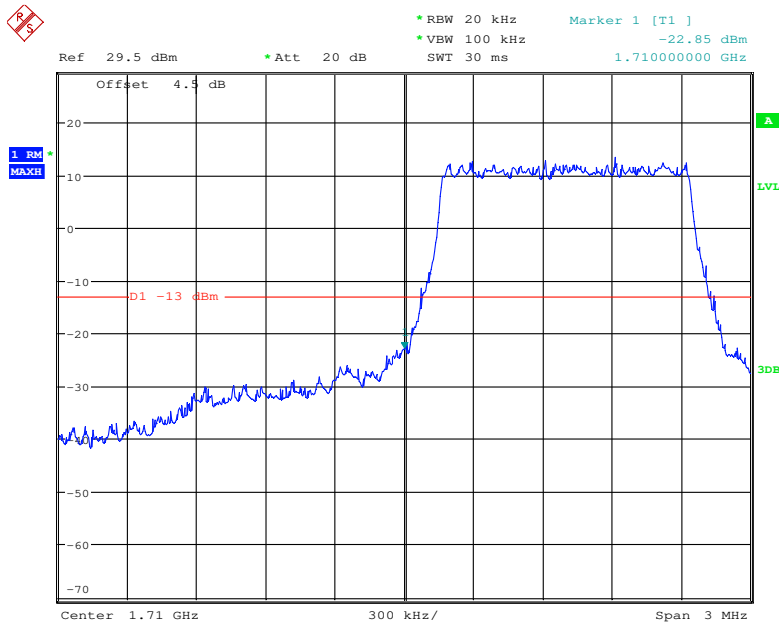
### 16QAM\_20MHz\_FULL RB\_Right



Date: 26.JAN.2018 21:42:32

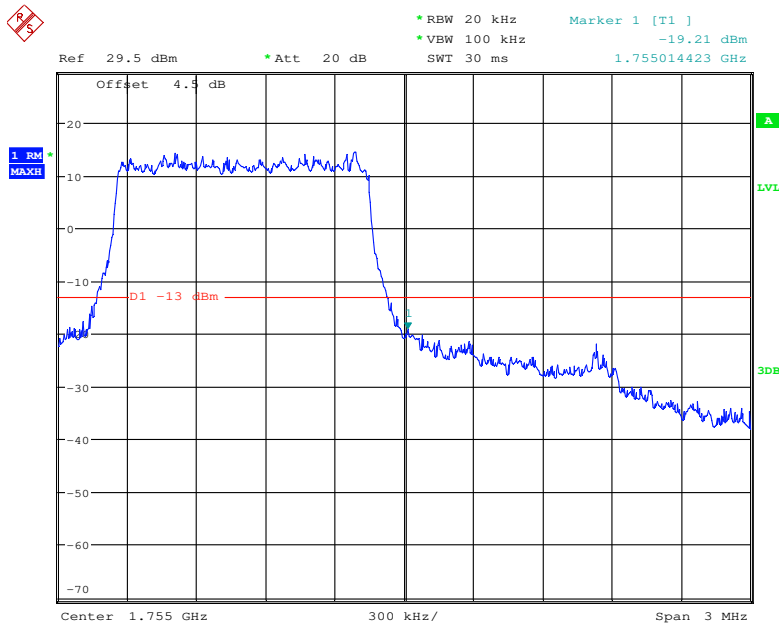
LTE Band IV

QPSK\_1.4MHz\_6 RB\_ Left



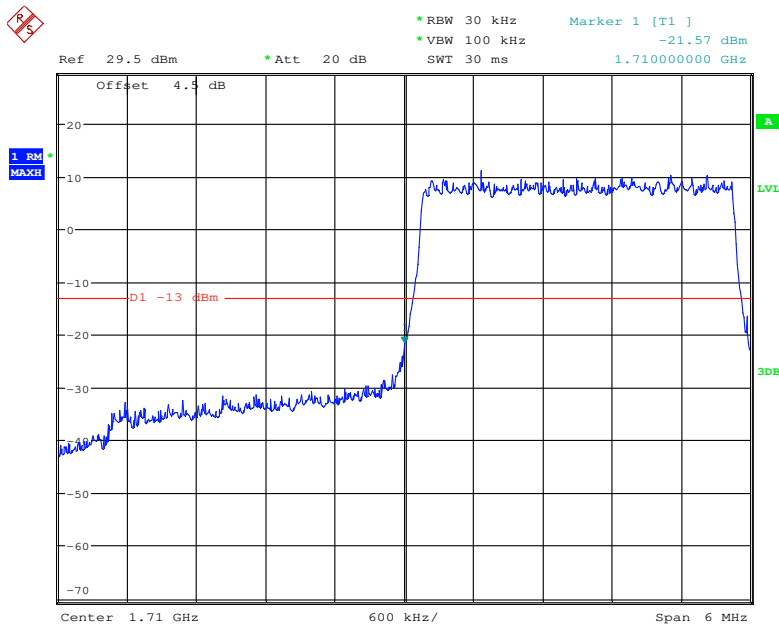
Date: 26.JAN.2018 21:55:10

QPSK\_1.4MHz\_6 RB\_ Right



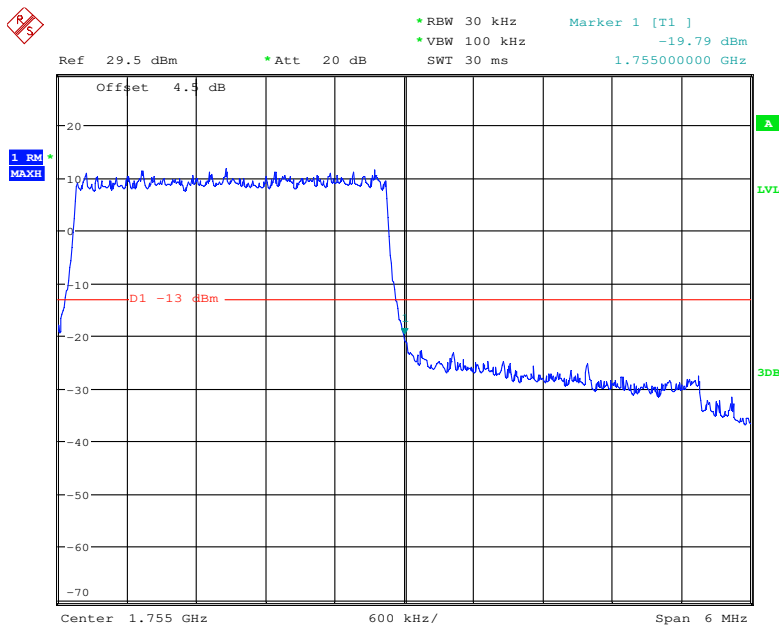
Date: 26.JAN.2018 21:57:13

### QPSK\_3MHz\_15 RB\_Left



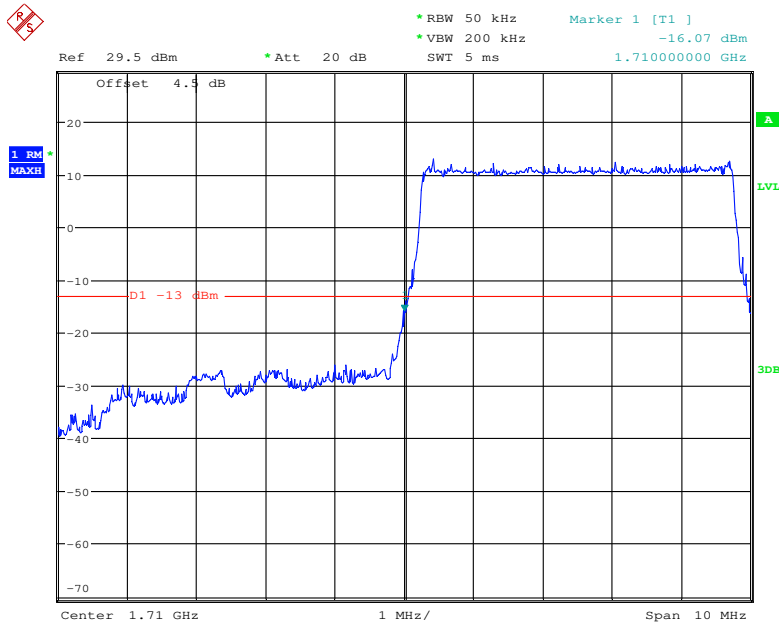
Date: 26.JAN.2018 22:00:48

### QPSK\_3MHz\_15 RB\_Right



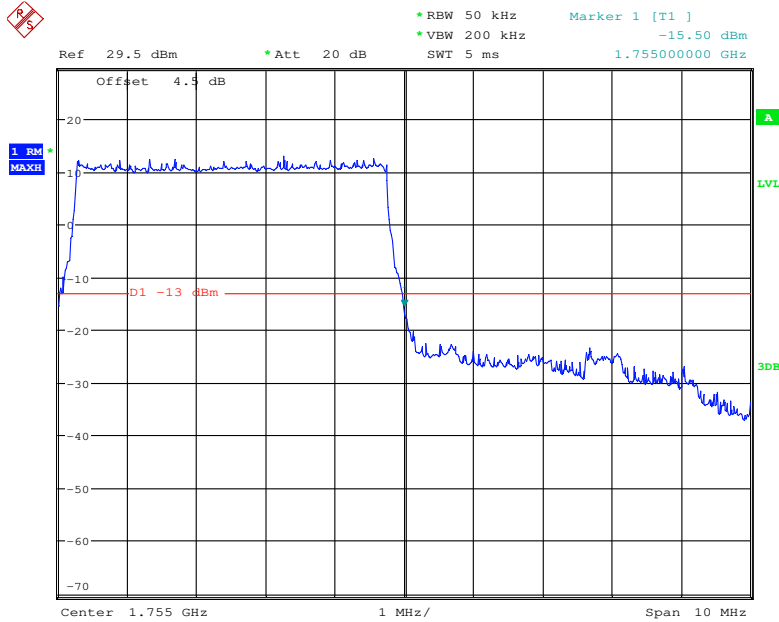
Date: 26.JAN.2018 22:02:55

### QPSK\_5MHz\_25 RB\_Left



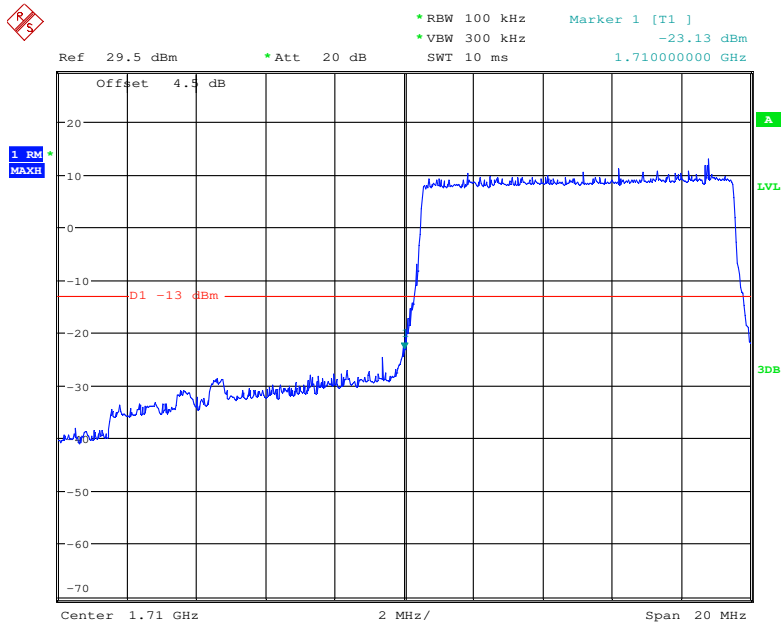
Date: 26.JAN.2018 22:05:21

### QPSK\_5MHz\_25 RB\_Right



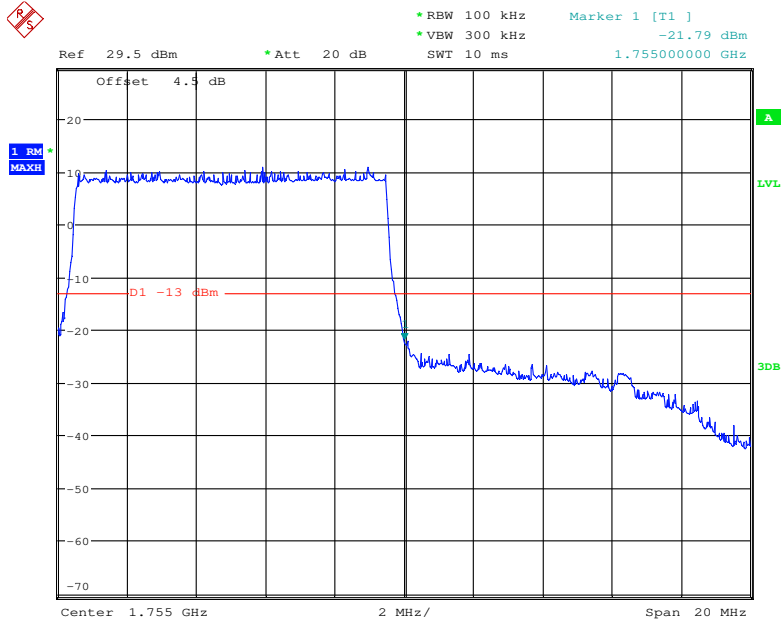
Date: 26.JAN.2018 22:03:42

### QPSK\_10MHz\_50 RB\_Left



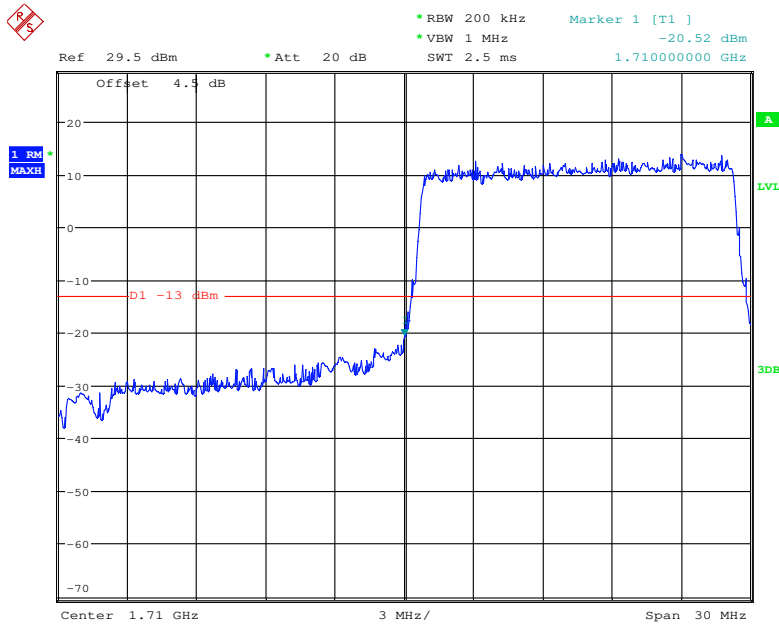
Date: 26.JAN.2018 22:06:56

### QPSK\_10MHz\_50 RB\_Right



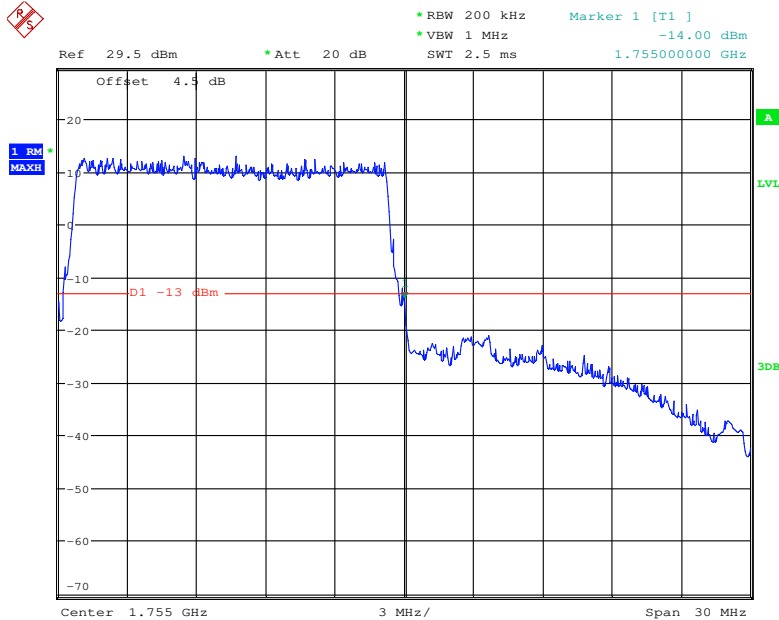
Date: 26.JAN.2018 22:09:04

### QPSK\_15MHz\_75 RB\_Left



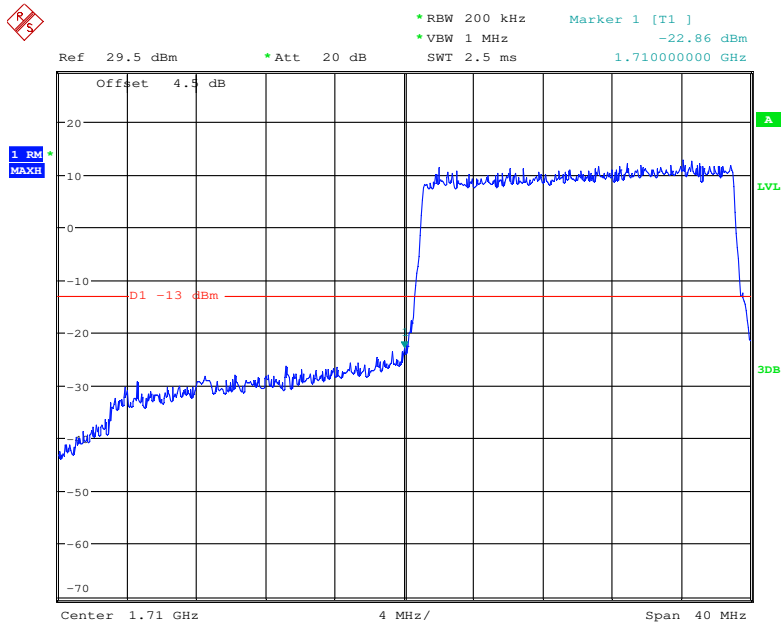
Date: 26.JAN.2018 22:11:48

### QPSK\_15MHz\_75 RB\_Right



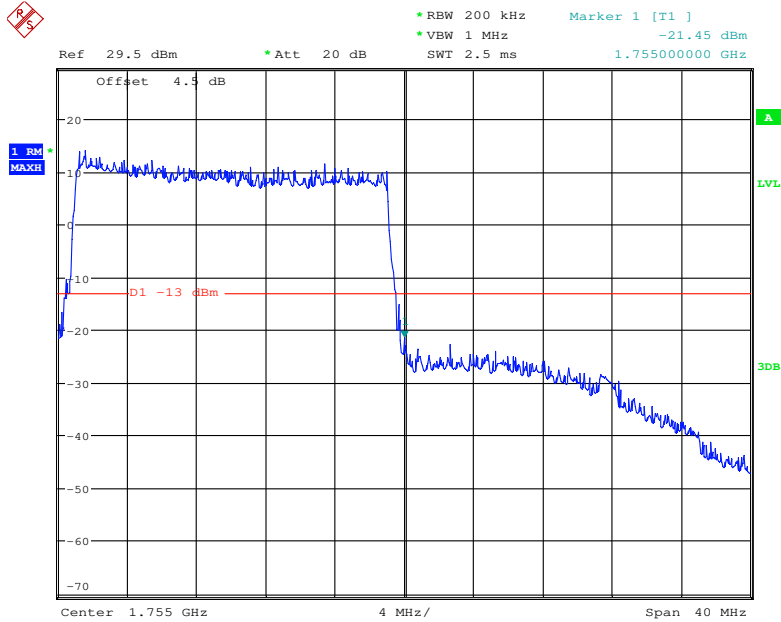
Date: 26.JAN.2018 22:10:06

### QPSK\_20MHz\_FULL RB\_Left



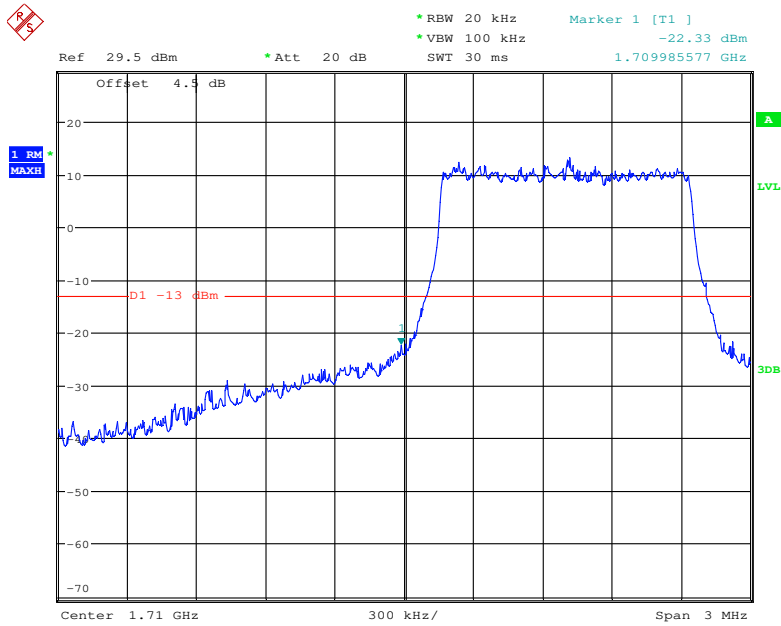
Date: 26.JAN.2018 22:12:33

### QPSK\_20MHz\_FULL RB\_Right



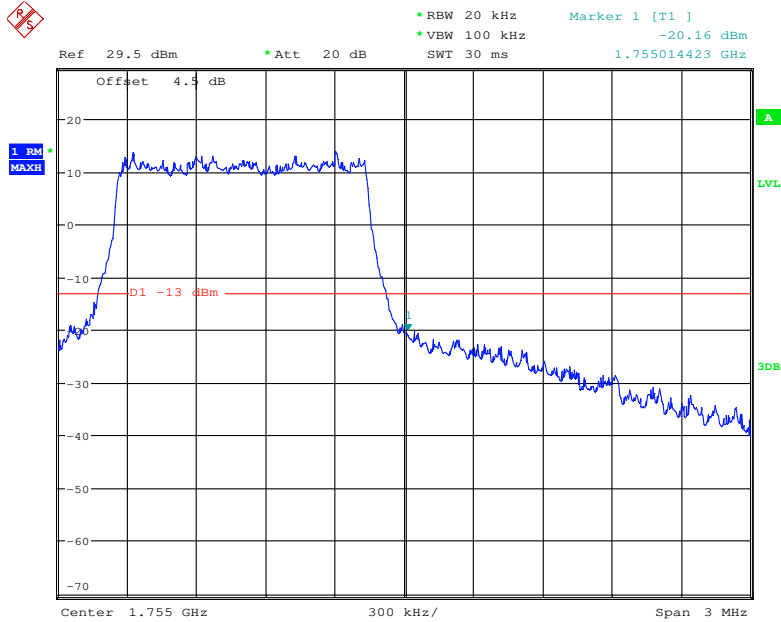
Date: 26.JAN.2018 22:14:26

### 16QAM\_1.4MHz\_6 RB\_Left



Date: 26.JAN.2018 21:55:49

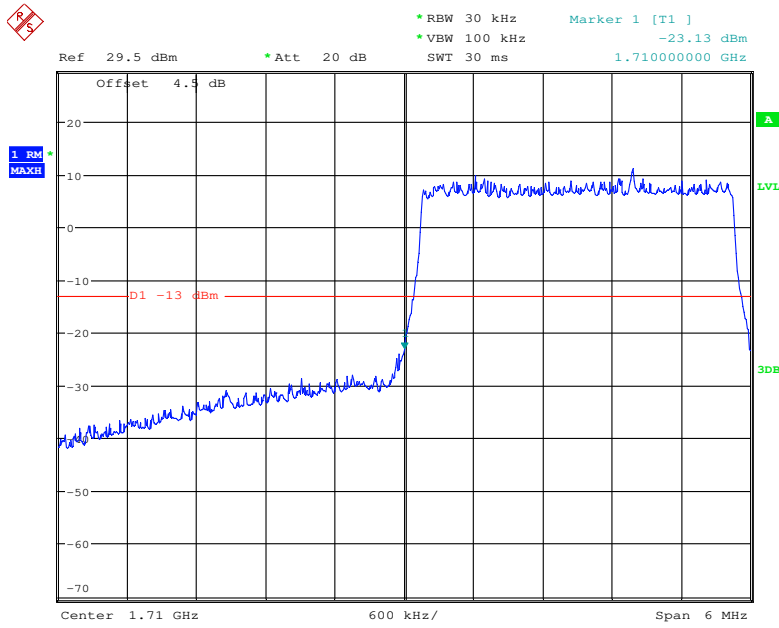
### 16QAM\_1.4MHz\_6 RB\_Right



Date: 26.JAN.2018 21:56:39

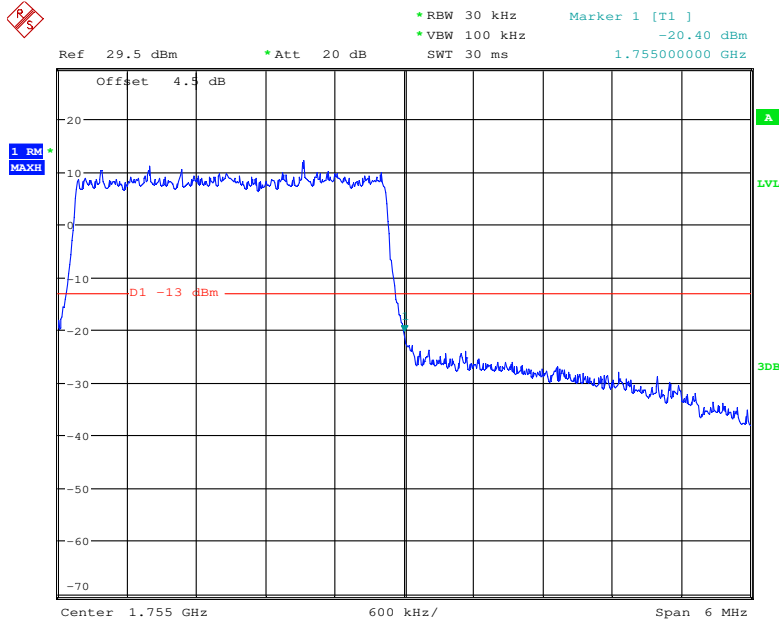


### 16QAM\_3MHz\_15 RB\_Left



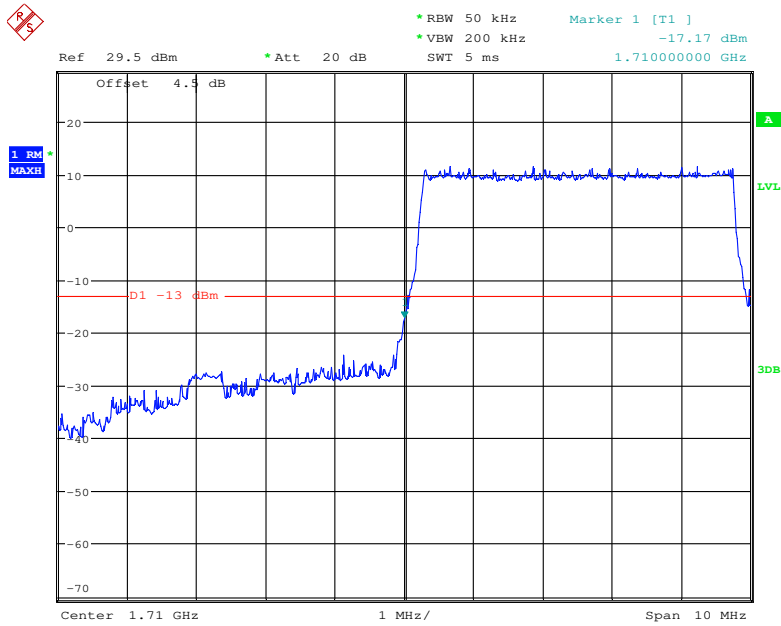
Date: 26.JAN.2018 22:01:20

### 16QAM\_3MHz\_15 RB\_Right



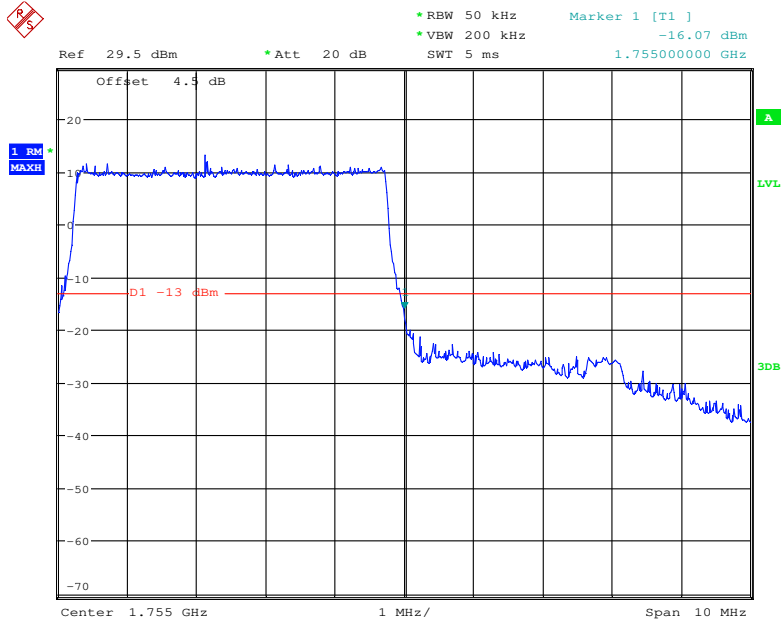
Date: 26.JAN.2018 22:02:16

### 16QAM\_5MHz\_25 RB\_Left



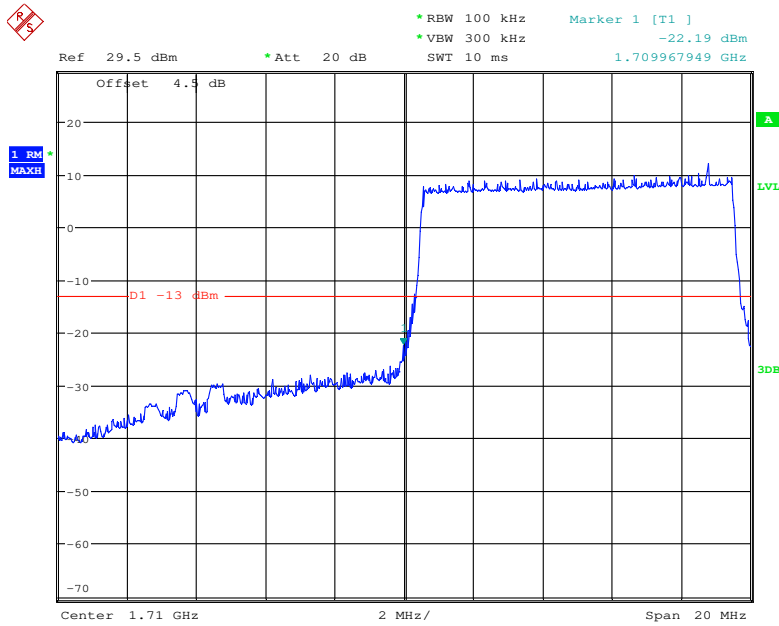
Date: 26.JAN.2018 22:04:46

### 16QAM\_5MHz\_25 RB\_Right



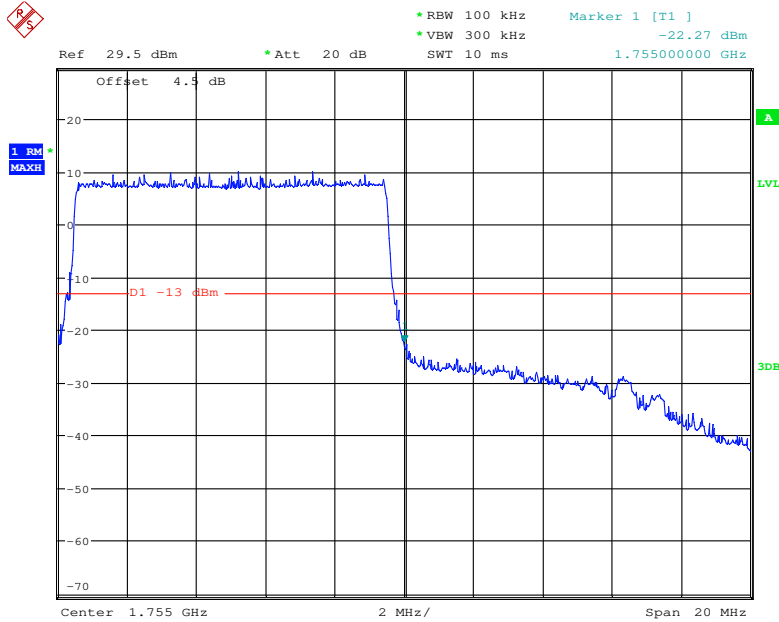
Date: 26.JAN.2018 22:04:08

### 16QAM\_10MHz\_50 RB\_Left



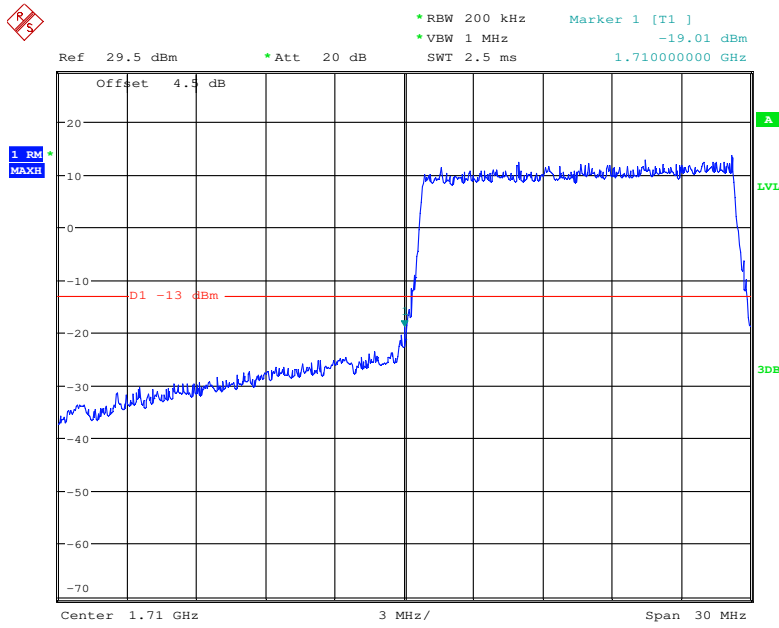
Date: 26.JAN.2018 22:07:37

### 16QAM\_10MHz\_50 RB\_Right



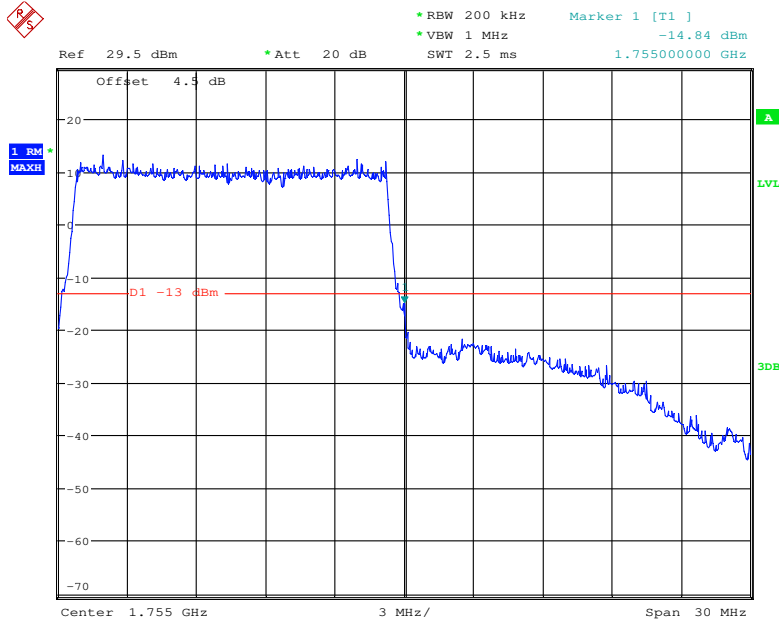
Date: 26.JAN.2018 22:08:13

### 16QAM\_15MHz\_75 RB\_Left



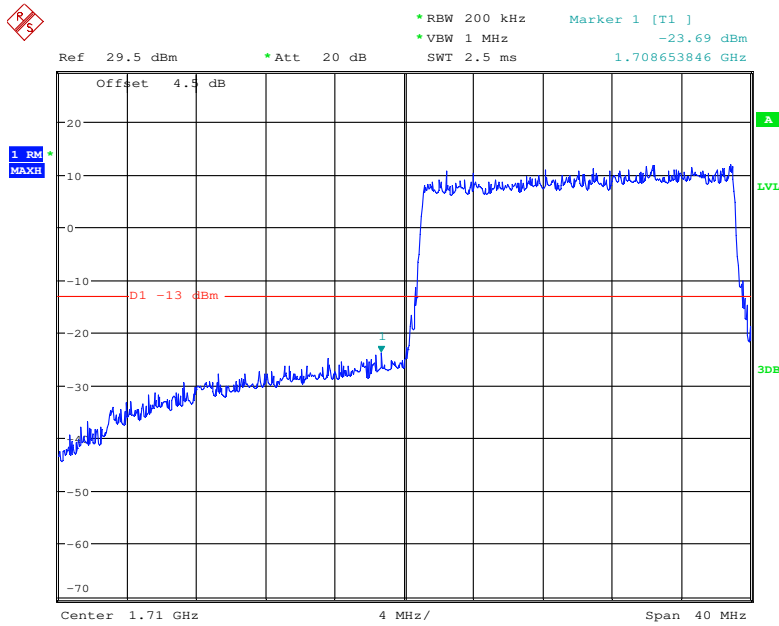
Date: 26.JAN.2018 22:11:17

### 16QAM\_15MHz\_75 RB\_Right



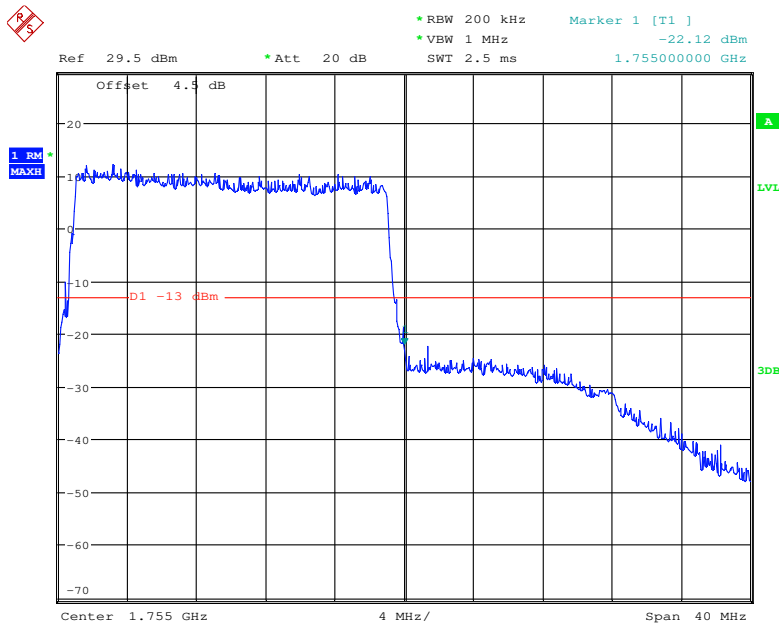
Date: 26.JAN.2018 22:10:36

### 16QAM\_20MHz\_FULL RB\_Left



Date: 26.JAN.2018 22:13:09

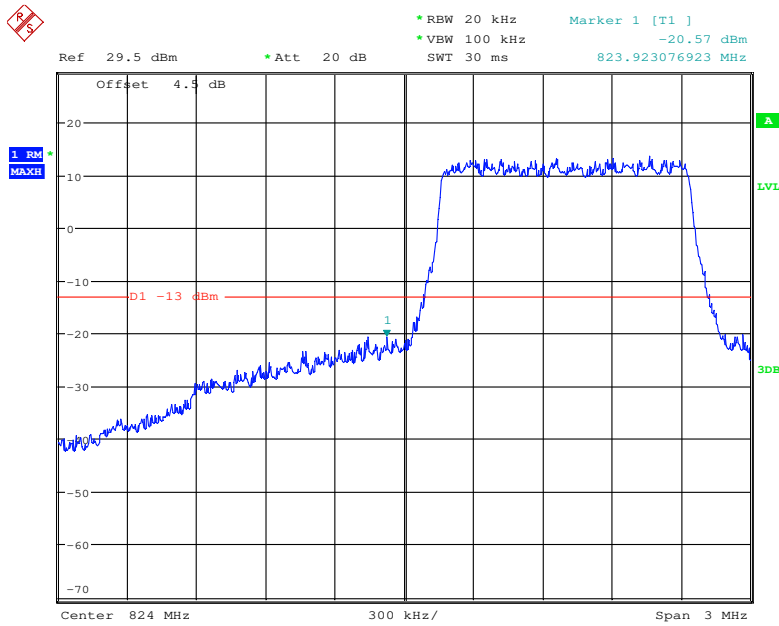
### 16QAM\_20MHz\_FULL RB\_Right



Date: 26.JAN.2018 22:13:57

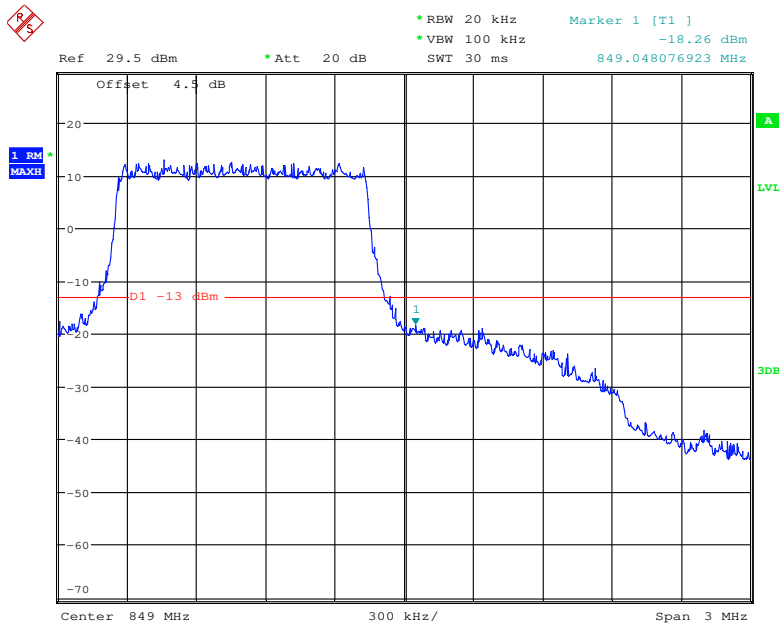
LTE Band V

QPSK\_1.4MHz\_6 RB\_ Left



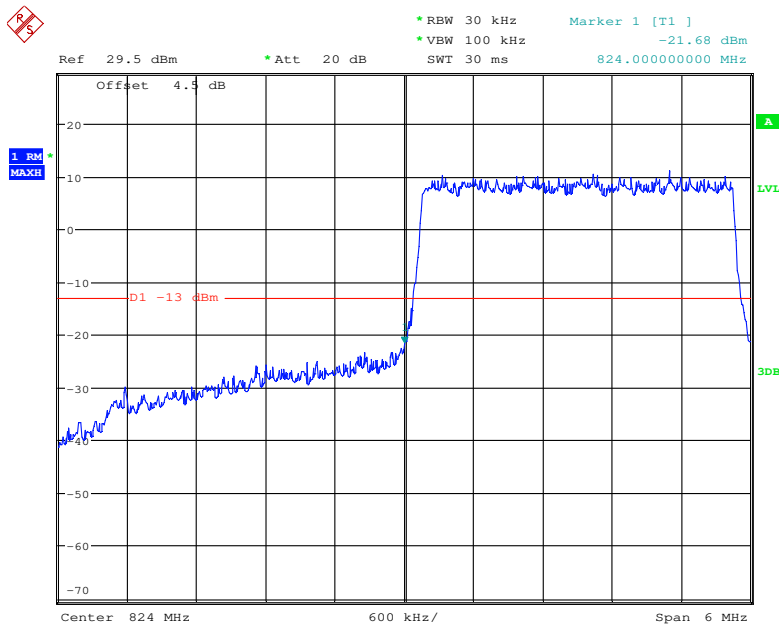
Date: 26.JAN.2018 22:16:34

QPSK\_1.4MHz\_6 RB\_ Right



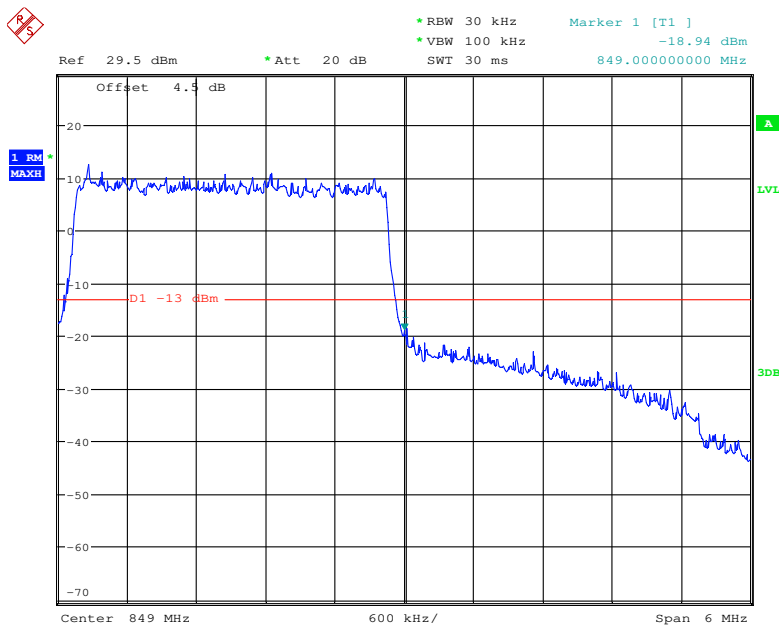
Date: 26.JAN.2018 22:18:19

### QPSK\_3MHz\_15 RB\_Left



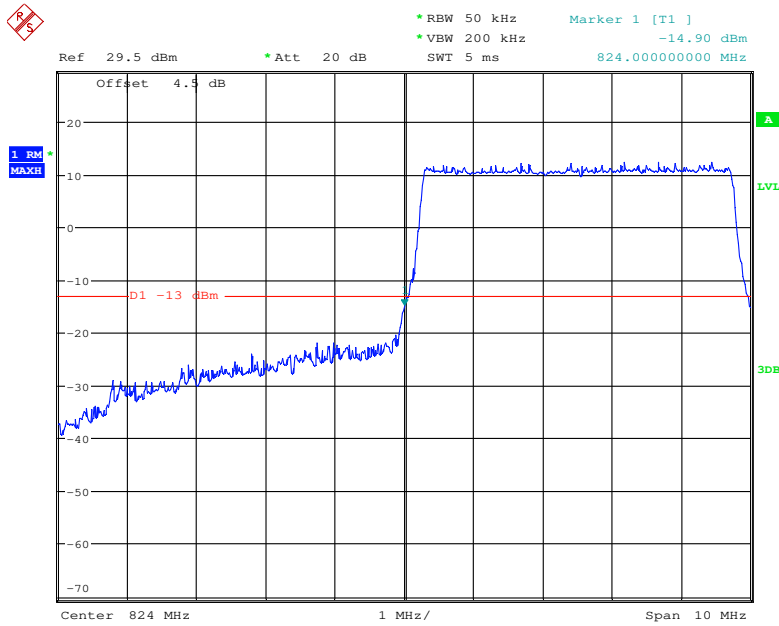
Date: 26.JAN.2018 22:20:54

### QPSK\_3MHz\_15 RB\_Right



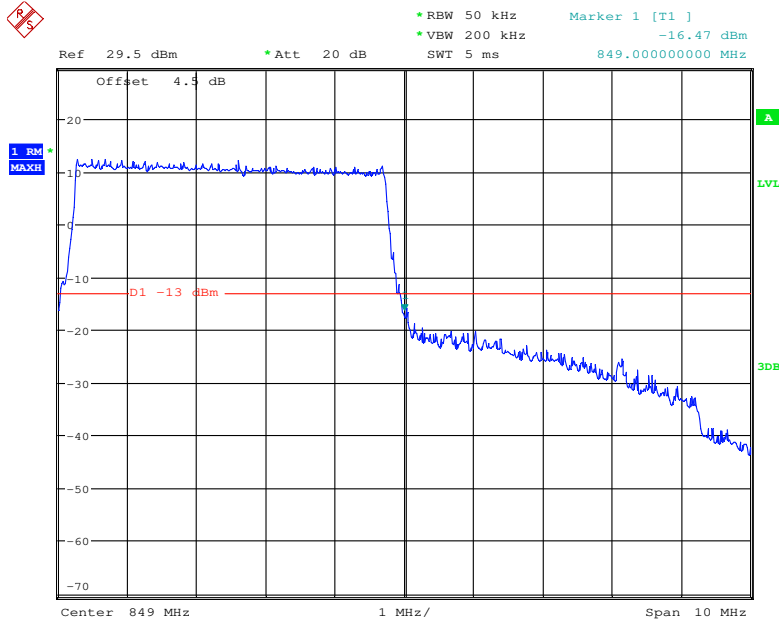
Date: 26.JAN.2018 22:19:16

### QPSK\_5MHz\_25 RB\_Left



Date: 26.JAN.2018 22:21:46

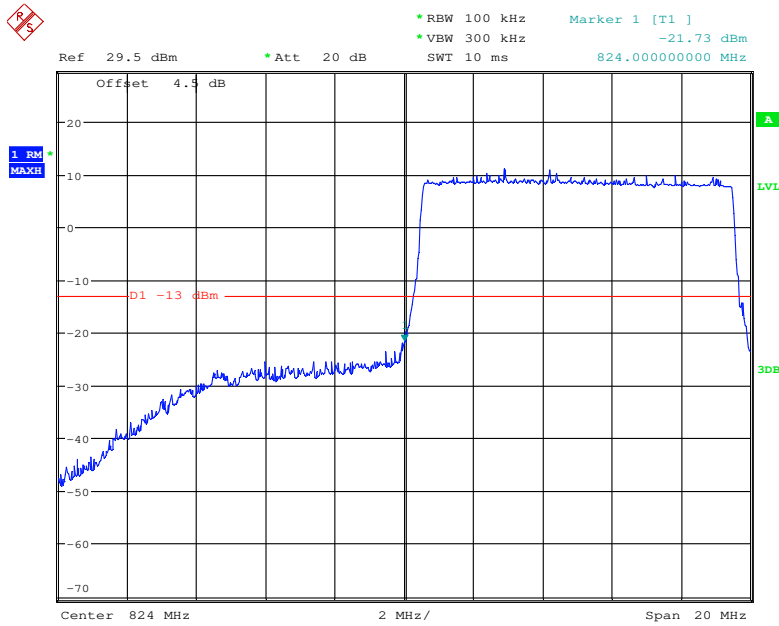
### QPSK\_5MHz\_25 RB\_Right



Date: 26.JAN.2018 22:23:16

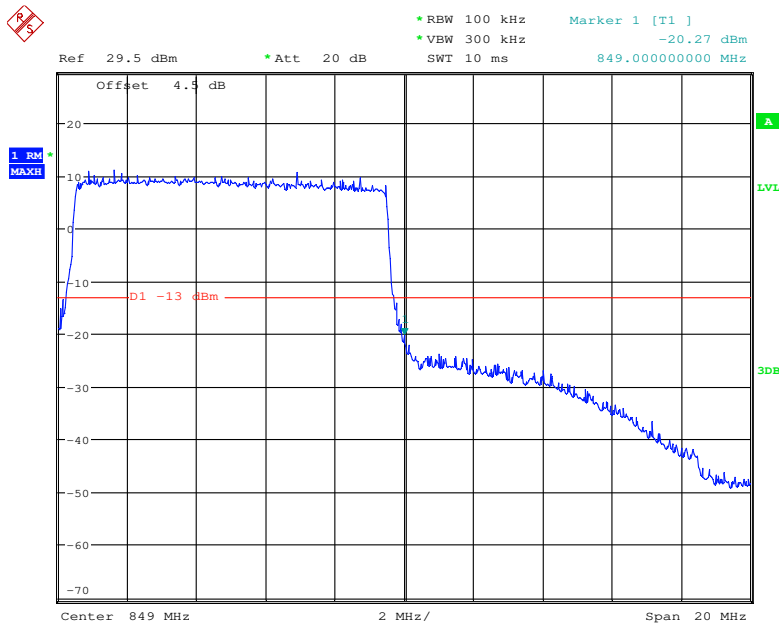


### QPSK\_10MHz\_50 RB\_Left



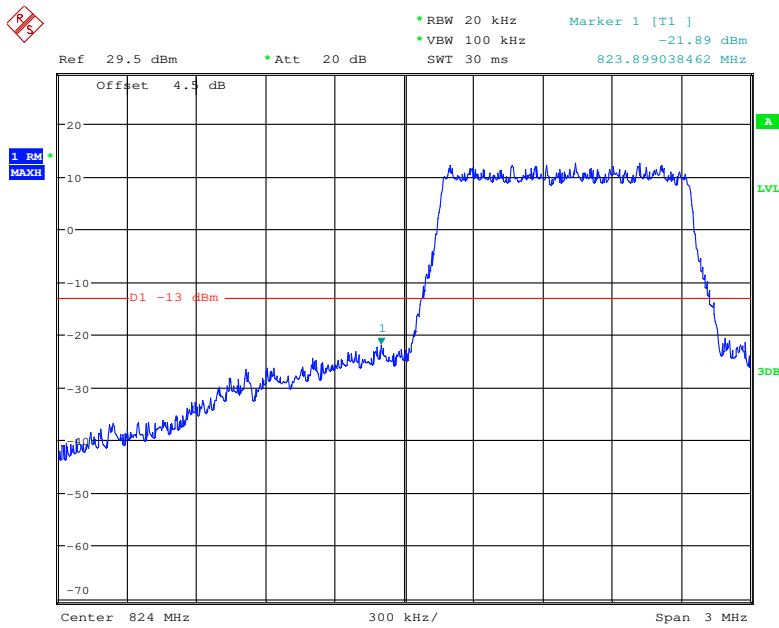
Date: 26.JAN.2018 22:25:43

### QPSK\_10MHz\_50 RB\_Right



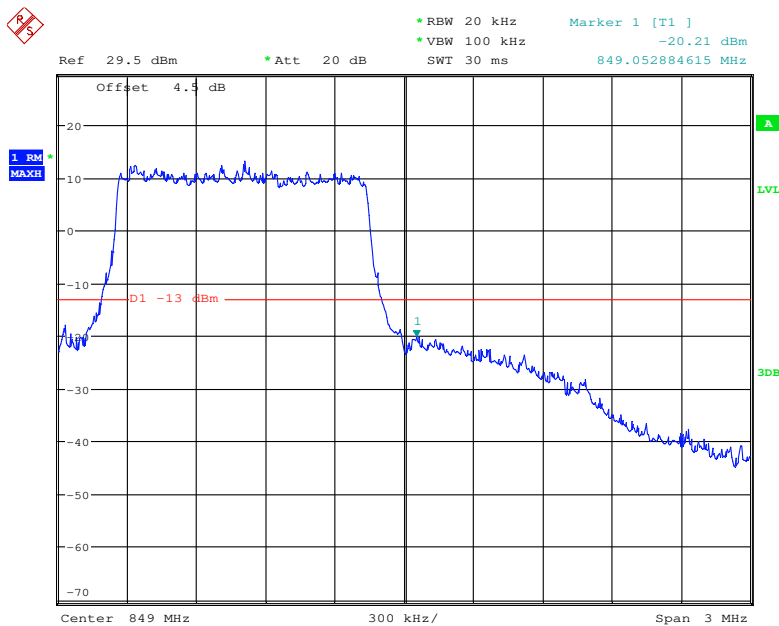
Date: 26.JAN.2018 22:24:08

### 16QAM\_1.4MHz\_6 RB\_Left



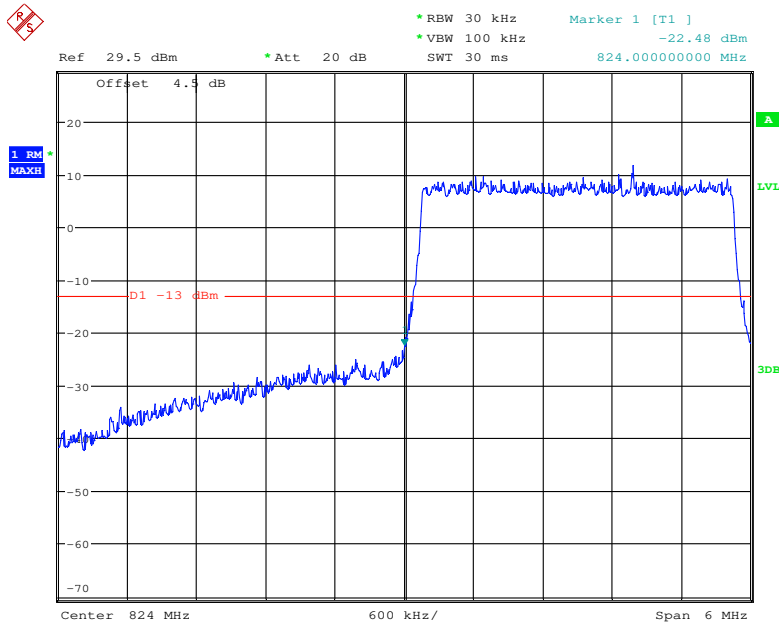
Date: 26.JAN.2018 22:17:07

### 16QAM\_1.4MHz\_6 RB\_Right



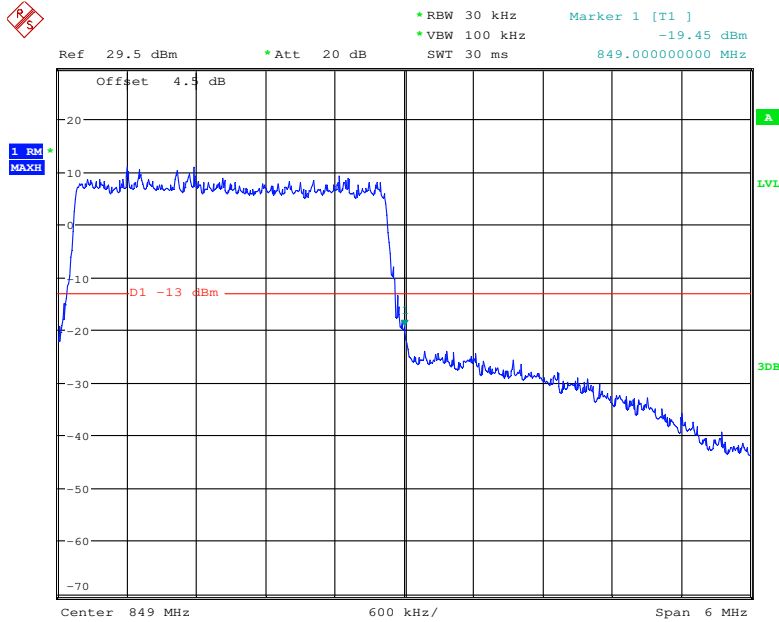
Date: 26.JAN.2018 22:17:53

### 16QAM\_3MHz\_15 RB\_Left



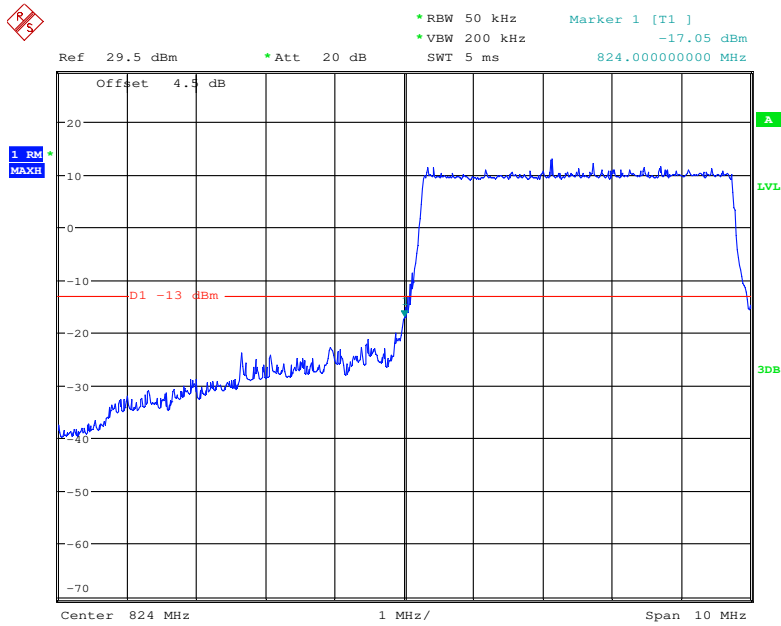
Date: 26.JAN.2018 22:20:30

### 16QAM\_3MHz\_15 RB\_Right



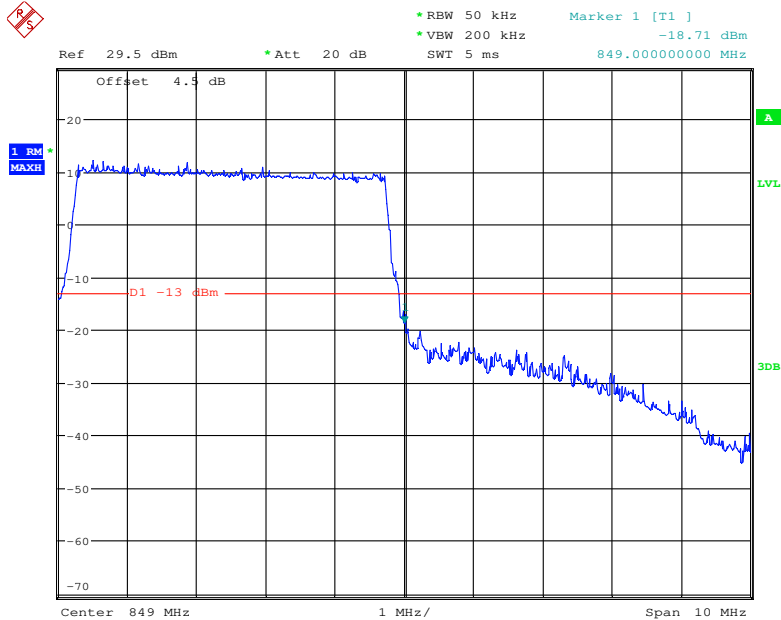
Date: 26.JAN.2018 22:19:52

### 16QAM\_5MHz\_25 RB\_Left



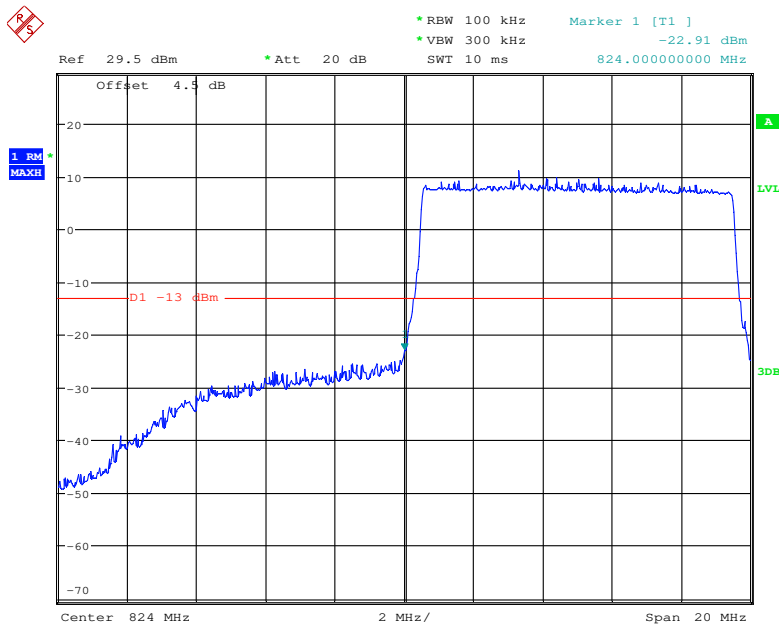
Date: 26.JAN.2018 22:22:15

### 16QAM\_5MHz\_25 RB\_Right



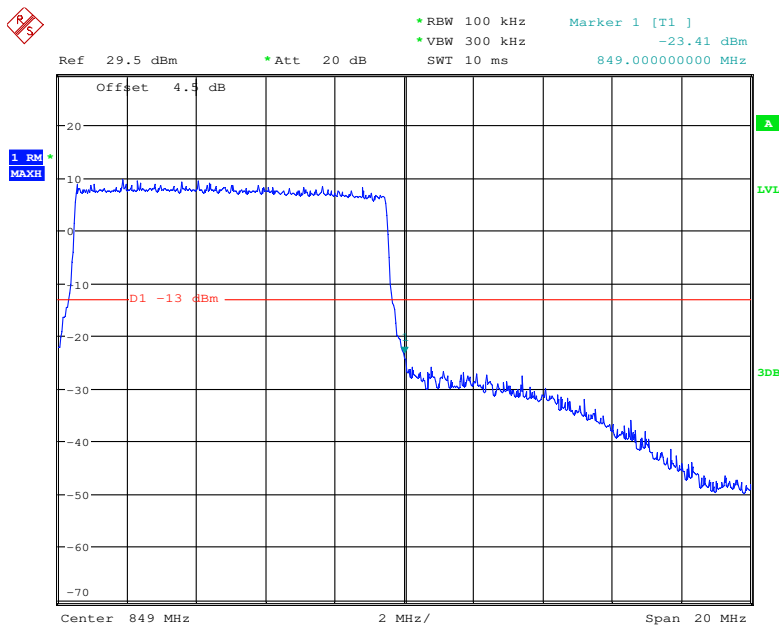
Date: 26.JAN.2018 22:22:49

### 16QAM\_10MHz\_50 RB\_Left



Date: 26.JAN.2018 22:25:22

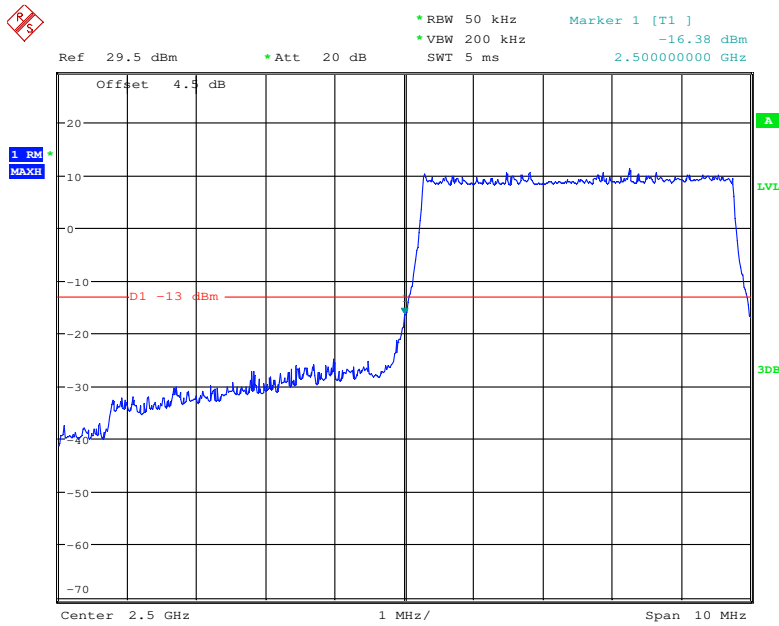
### 16QAM\_10MHz\_50 RB\_Right



Date: 26.JAN.2018 22:24:40

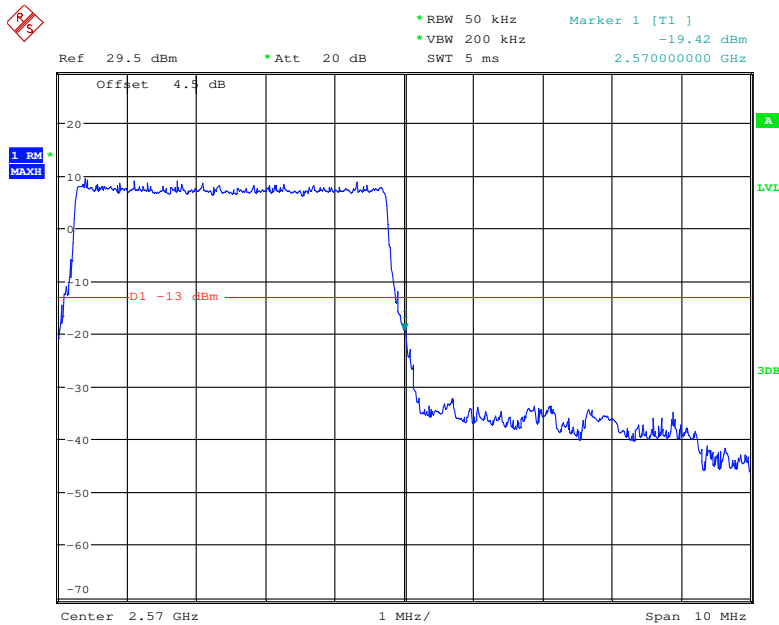
LTE Band VII

QPSK\_5MHz\_25 RB\_Left



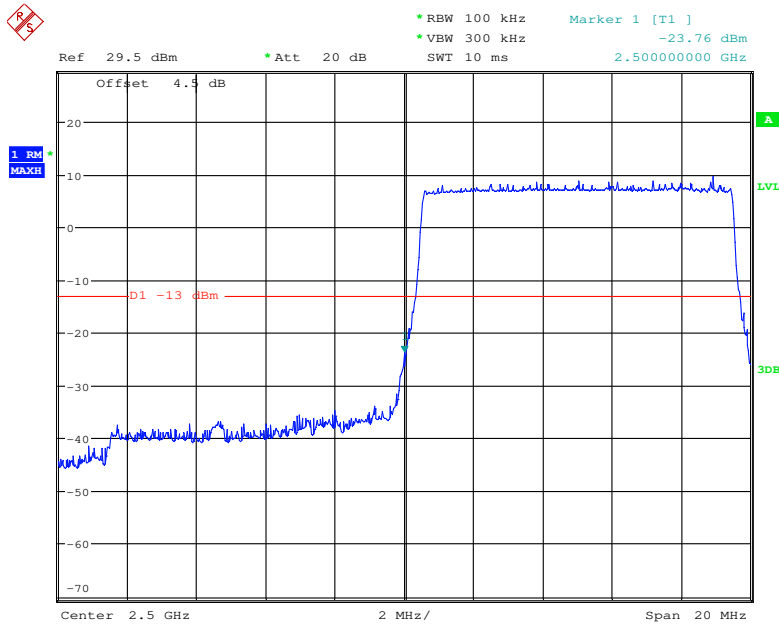
Date: 26.JAN.2018 22:30:24

QPSK\_5MHz\_25 RB\_Right



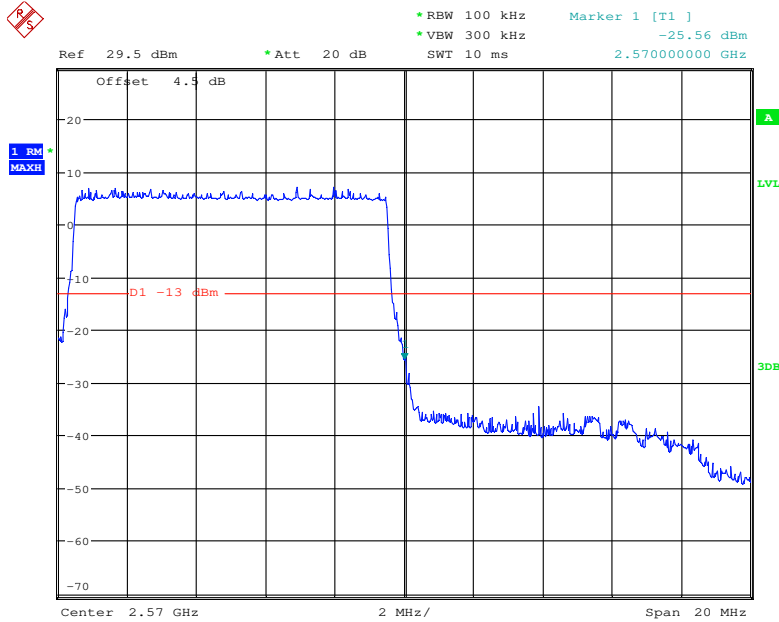
Date: 26.JAN.2018 23:21:49

### QPSK\_10MHz\_50 RB\_Left



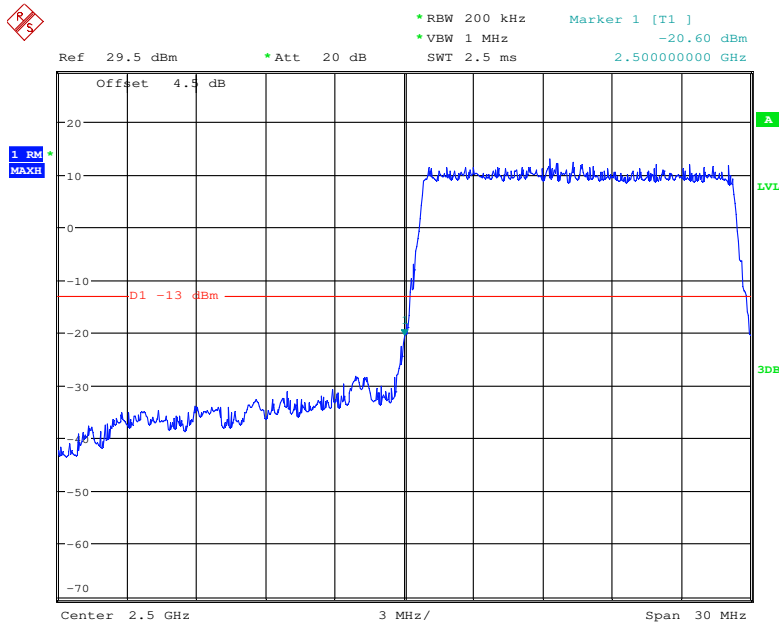
Date: 26.JAN.2018 23:26:15

### QPSK\_10MHz\_50 RB\_Right



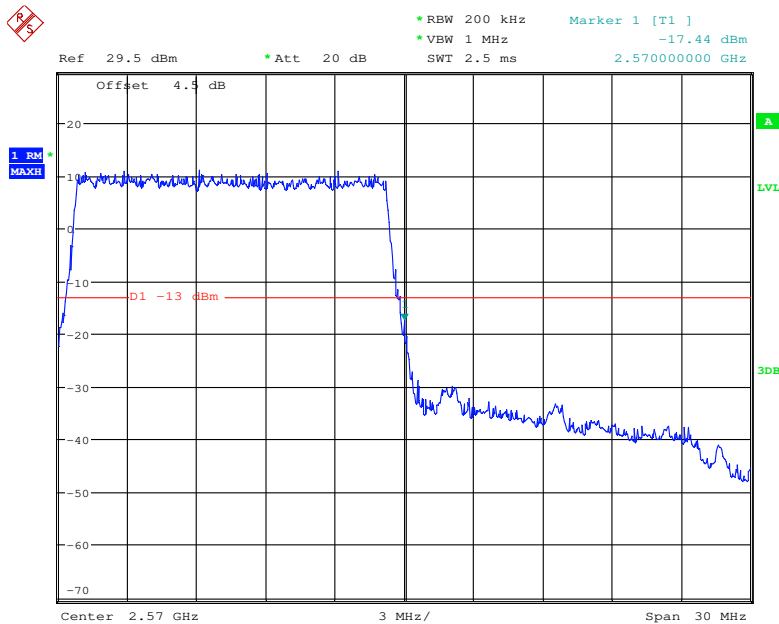
Date: 26.JAN.2018 23:23:36

### QPSK\_15MHz\_75 RB\_Left



Date: 26.JAN.2018 23:27:13

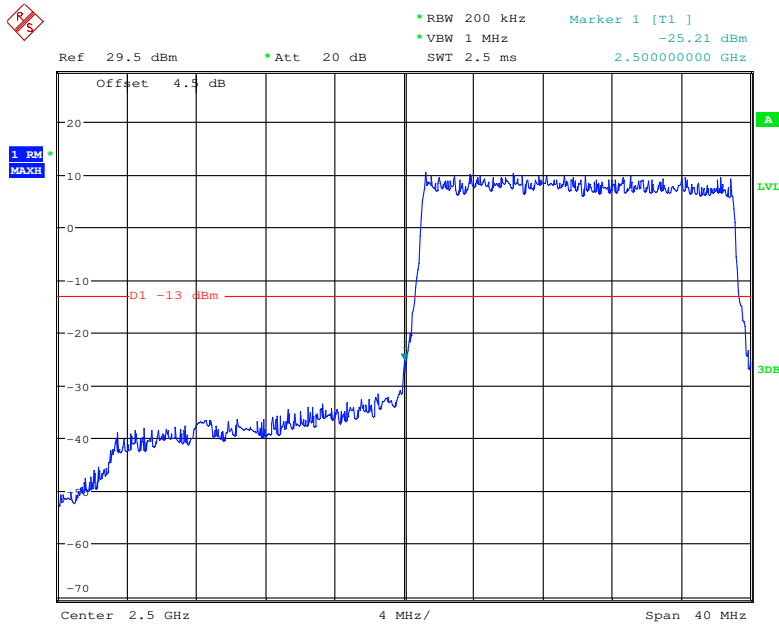
### QPSK\_15MHz\_75 RB\_Right



Date: 26.JAN.2018 23:29:43

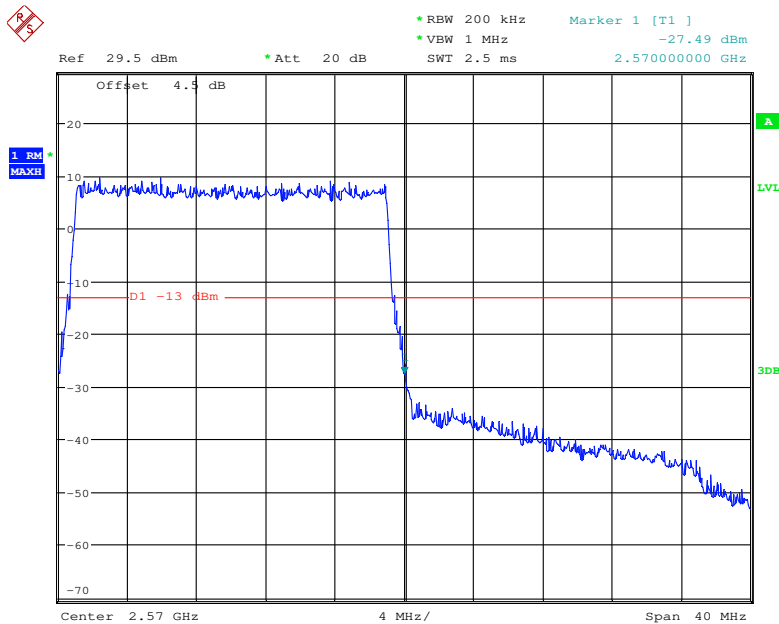


### QPSK\_20MHz\_FULL RB\_Left



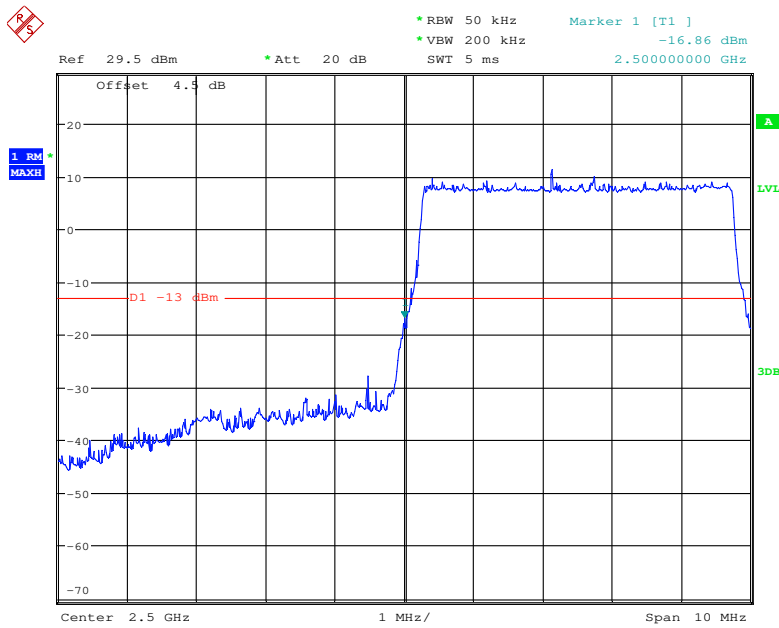
Date: 26.JAN.2018 23:32:39

### QPSK\_20MHz\_FULL RB\_Right



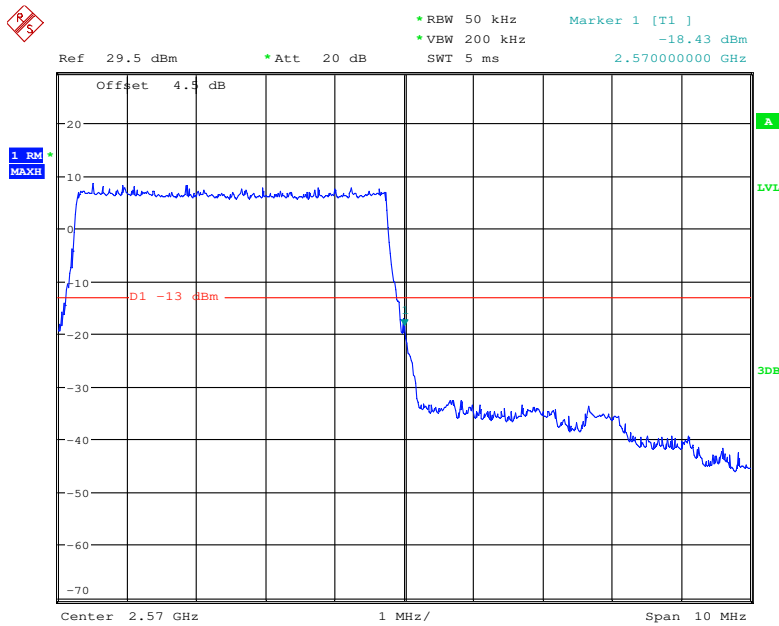
Date: 26.JAN.2018 23:30:33

### 16QAM\_5MHz\_25 RB\_Left



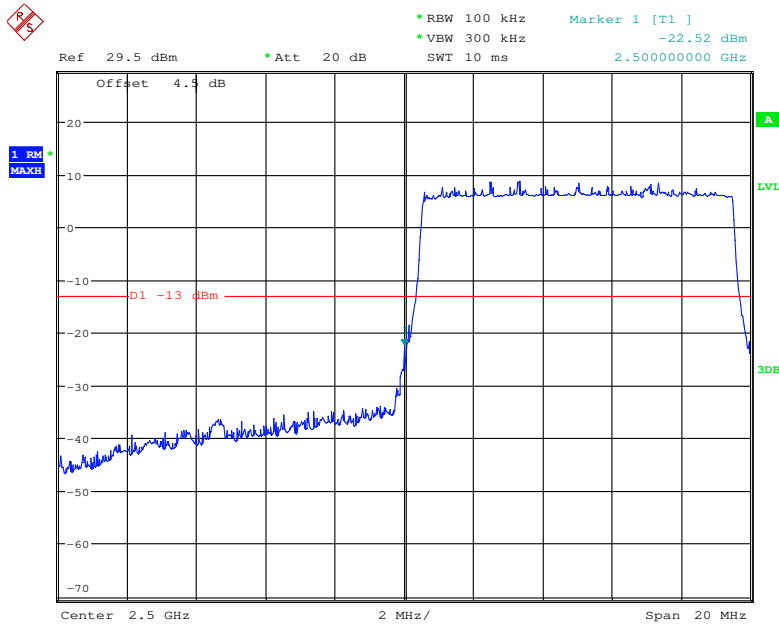
Date: 26.JAN.2018 23:20:21

### 16QAM\_5MHz\_25 RB\_Right



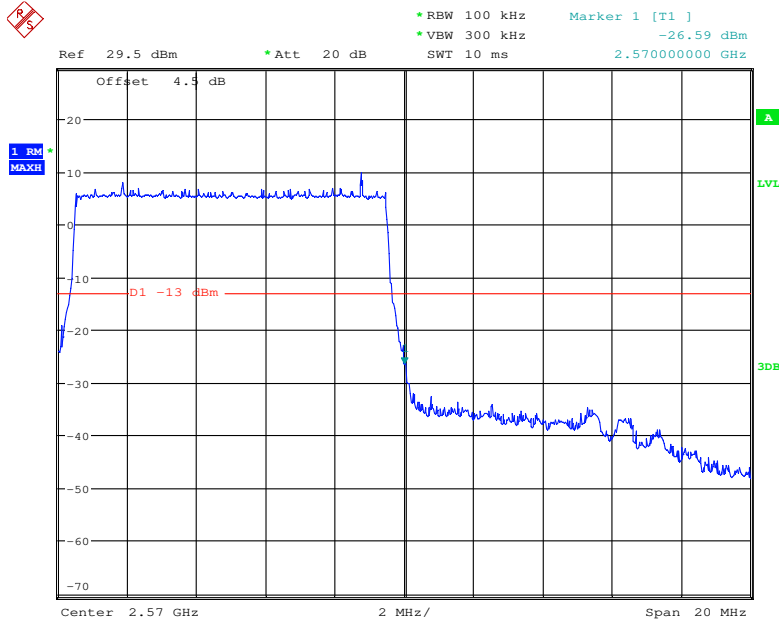
Date: 26.JAN.2018 23:21:19

### 16QAM\_10MHz\_50 RB\_Left



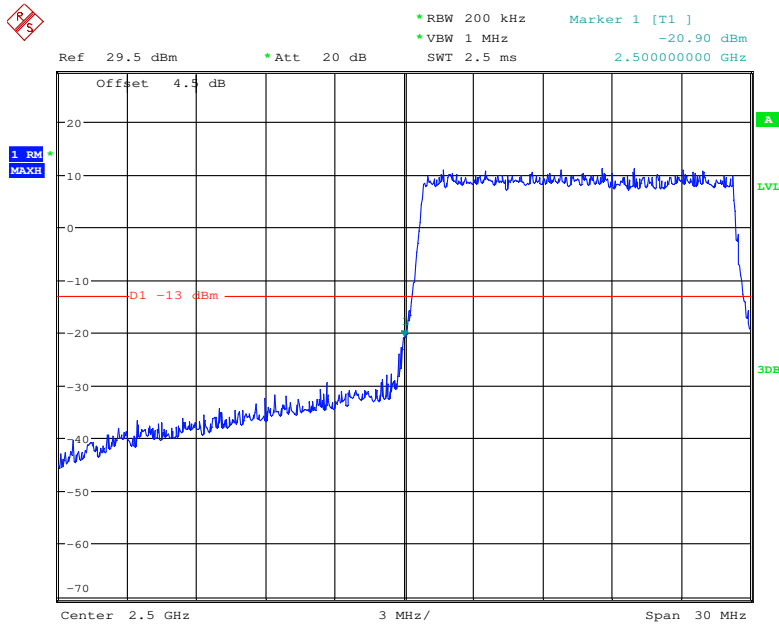
Date: 26.JAN.2018 23:25:44

### 16QAM\_10MHz\_50 RB\_Right



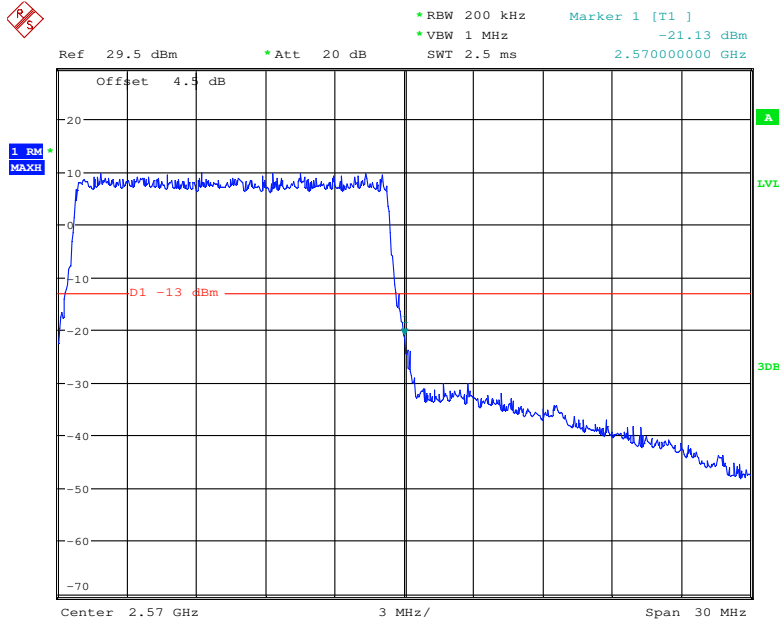
Date: 26.JAN.2018 23:24:46

### 16QAM\_15MHz\_75 RB\_Left



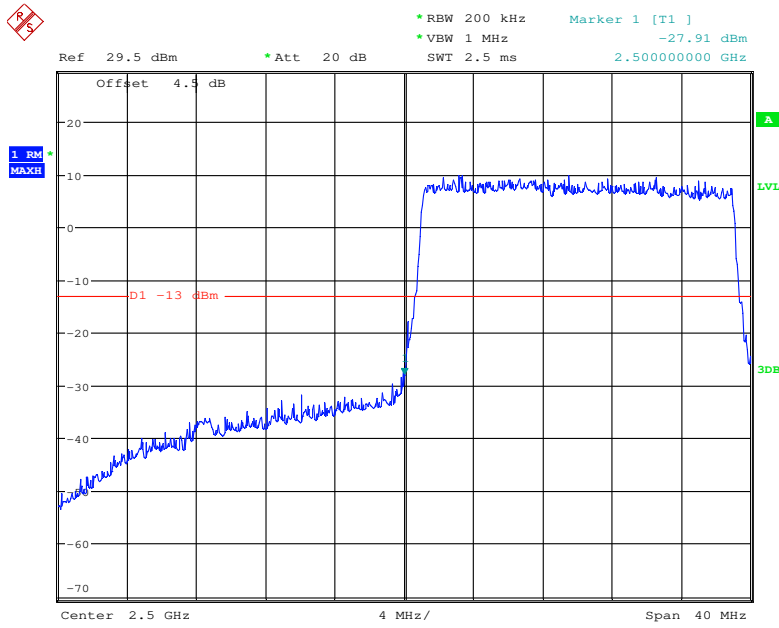
Date: 26.JAN.2018 23:27:53

### 16QAM\_15MHz\_75 RB\_Right



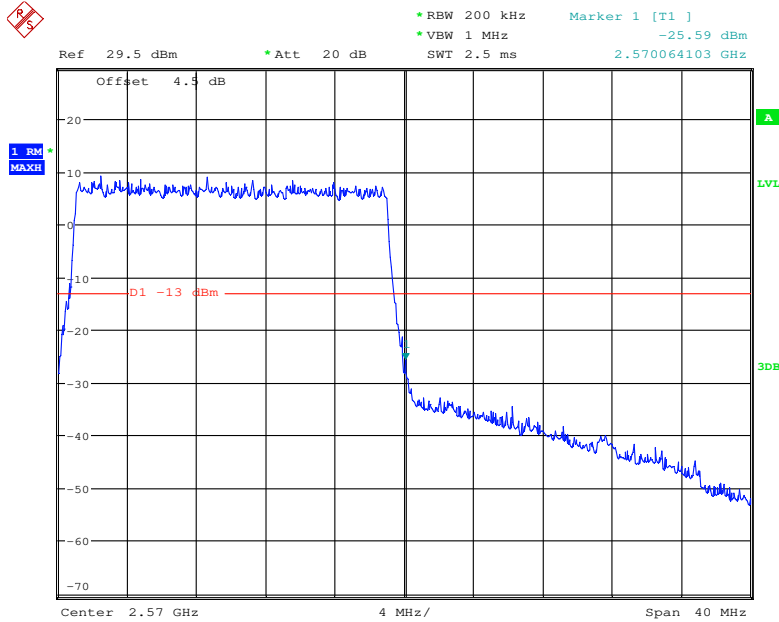
Date: 26.JAN.2018 23:28:52

### 16QAM\_20MHz\_FULL RB\_Left



Date: 26.JAN.2018 23:32:17

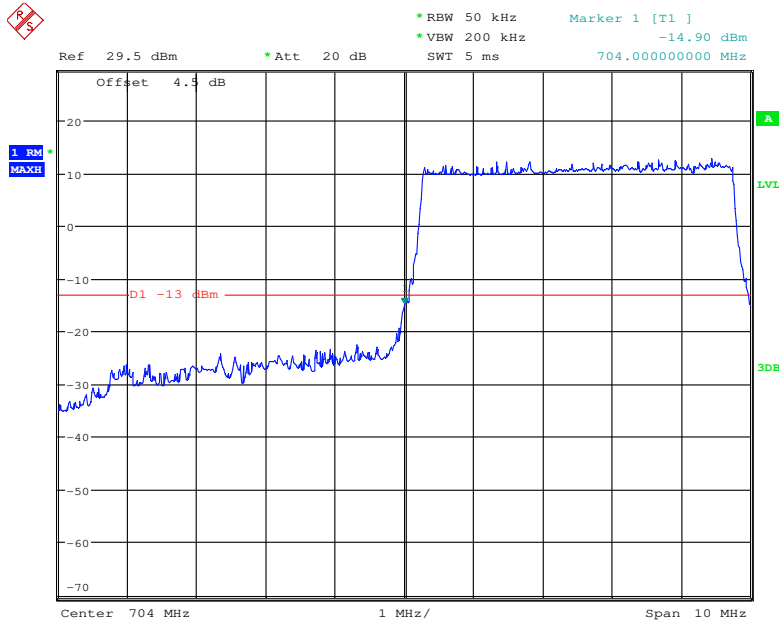
### 16QAM\_20MHz\_FULL RB\_Right



Date: 26.JAN.2018 23:31:22

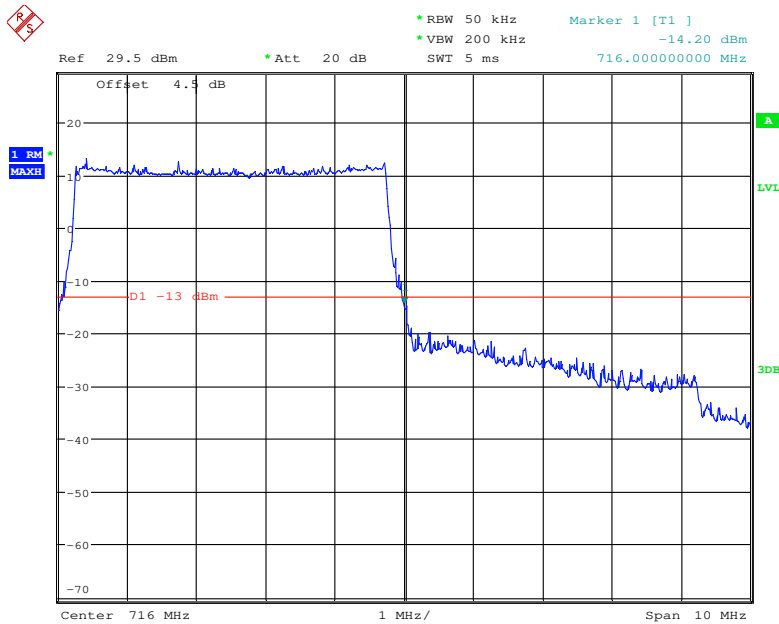
LTE Band XVII

QPSK\_5MHz\_25 RB\_Left



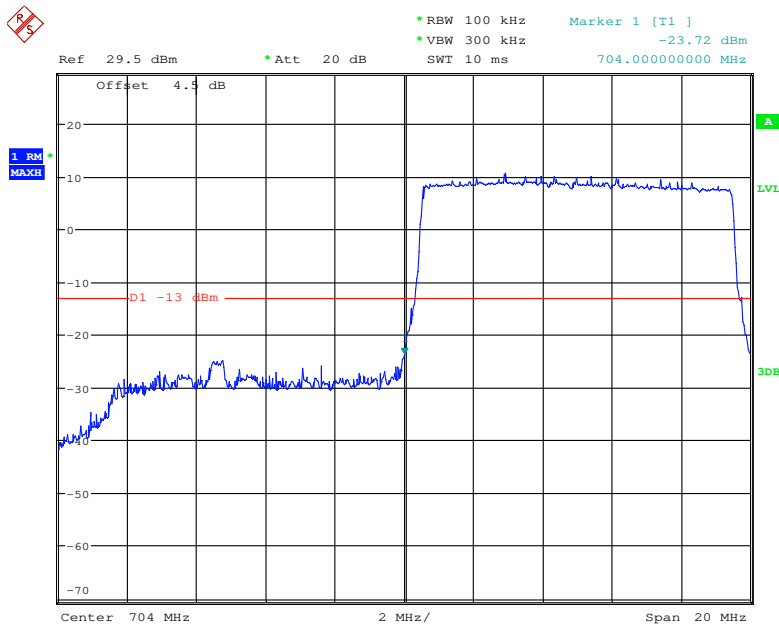
Date: 26.JAN.2018 23:35:04

QPSK\_5MHz\_25 RB\_Right



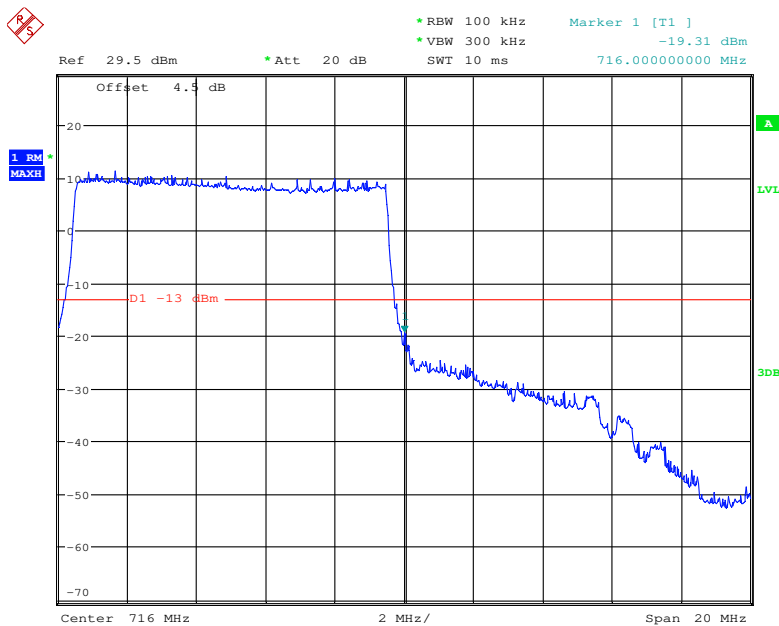
Date: 26.JAN.2018 23:36:52

### QPSK\_10MHz\_50 RB\_ Left



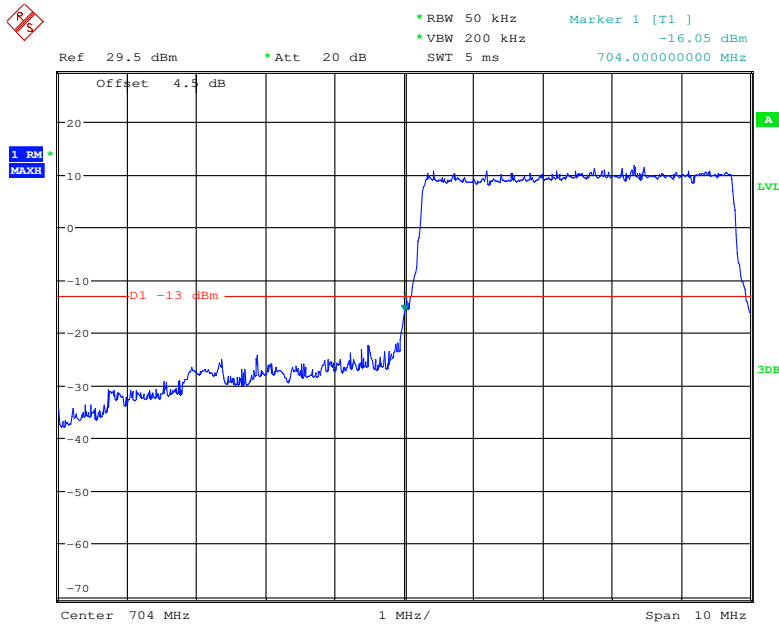
Date: 26.JAN.2018 23:39:59

### QPSK\_10MHz\_50 RB\_ Right



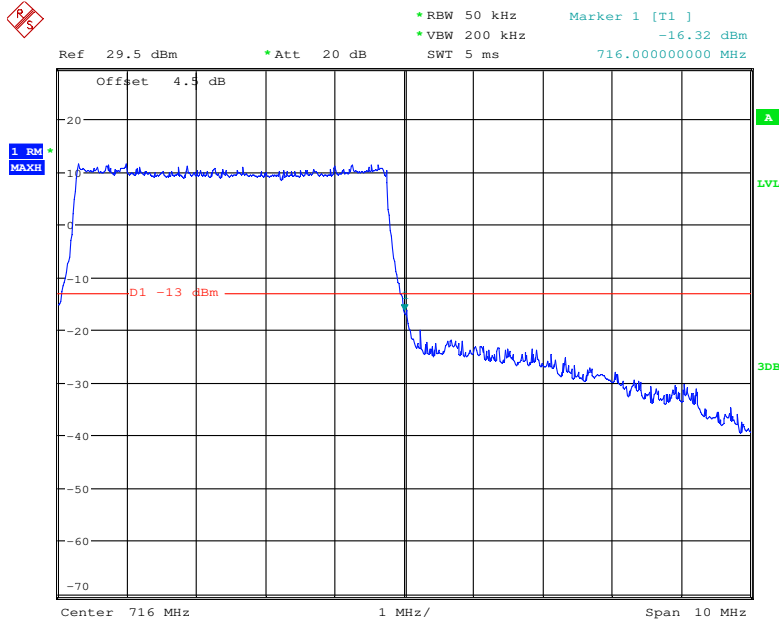
Date: 26.JAN.2018 23:37:56

### 16QAM\_5MHz\_25 RB\_Left



Date: 26.JAN.2018 23:35:41

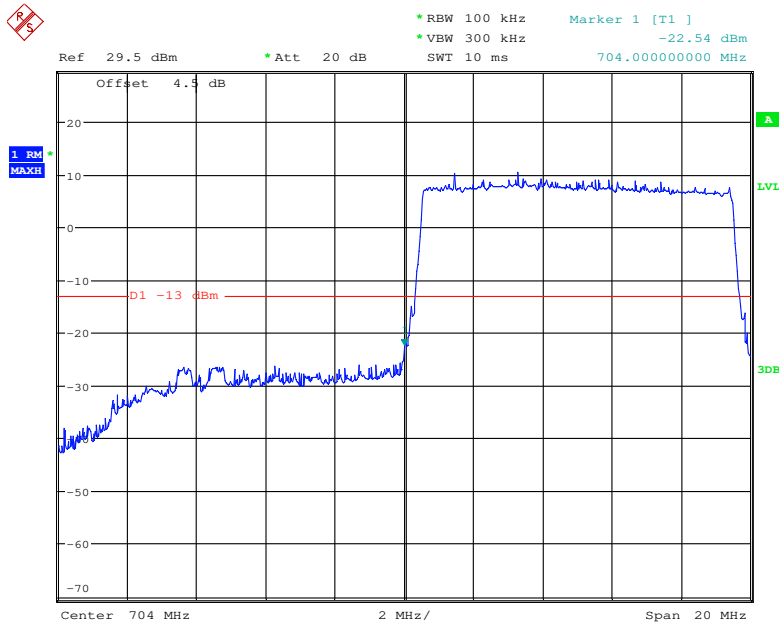
### 16QAM\_5MHz\_25 RB\_Right



Date: 26.JAN.2018 23:36:20

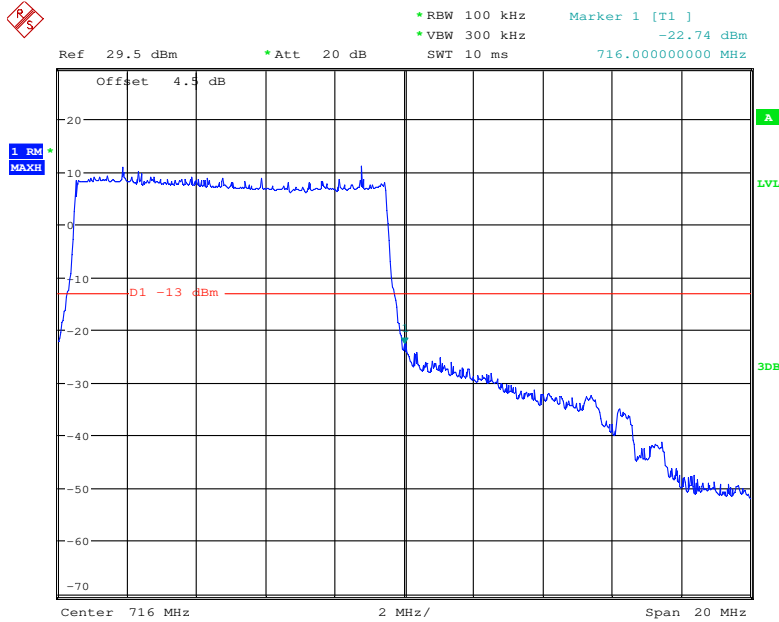


### 16QAM\_10MHz\_50 RB\_Left



Date: 26.JAN.2018 23:39:25

### 16QAM\_10MHz\_50 RB\_Right



Date: 26.JAN.2018 23:38:37

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

**Applicable Standard**

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

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

Frequency Tolerance for Transmitters in the Public Mobile Services

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

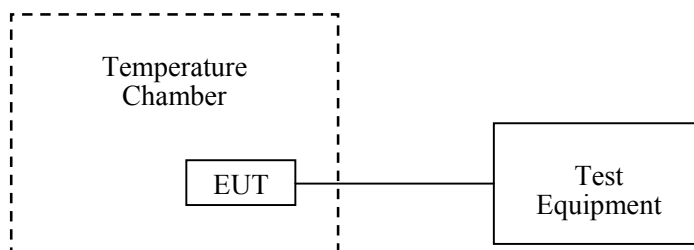
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

**Test Procedure**

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

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

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



**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
UNI-T	Multimeter	UT39A	M130199938	2017-04-02	2018-04-02
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A

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

**Test Data****Environmental Conditions**

<b>Temperature:</b>	24.1 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	100.9 kPa

*The testing was performed by Harry Yang on 2018-01-02.*

**Cellular Band (Part 22H)**

<b>GMSK, Middle Channel, <math>f_c = 836.6</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Limit</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	<b>ppm</b>
-30	3.8	1	0.001	2.5
-20		3	0.004	
-10		4	0.005	
0		3	0.004	
10		0	0.000	
20		2	0.002	
30		3	0.004	
40		1	0.001	
50		2	0.002	
25		3.6	4	
25	4.35	3	0.004	

<b>8PSK, Middle Channel, <math>f_c = 836.6</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Limit</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	<b>ppm</b>
-30	3.8	3	0.004	2.5
-20		5	0.006	
-10		4	0.005	
0		4	0.005	
10		3	0.004	
20		4	0.005	
30		5	0.006	
40		4	0.005	
50		2	0.002	
25		3.6	3	
25	4.35	4	0.005	

**PCS Band (Part 24E)**

<b>GMSK, Middle Channel, <math>f_c = 1880.0</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Results</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	
-30	3.8	-6	-0.003	Pass
-20		-7	-0.004	
-10		-9	-0.005	
0		-7	-0.004	
10		-8	-0.004	
20		-4	-0.002	
30		-5	-0.003	
40		-6	-0.003	
50		-3	-0.002	
25		3.6	-4	
25	4.35	-8	-0.004	

<b>8PSK, Middle Channel, <math>f_c = 1880.0</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Results</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	
-30	3.8	-13	-0.007	Pass
-20		-11	-0.006	
-10		-12	-0.006	
0		-13	-0.007	
10		-15	-0.008	
20		-15	-0.008	
30		-11	-0.006	
40		-14	-0.007	
50		-12	-0.006	
25		3.6	-7	
25	4.35	-8	-0.004	

**WCDMA Band II: R99**

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.8	-9	-0.005	Pass
-20		-4	-0.002	
-10		-3	-0.002	
0		-3	-0.002	
10		-2	-0.001	
20		0	0.000	
30		-1	-0.001	
40		1	0.001	
50		-1	-0.001	
25		3.6	3	
25	4.35	2	0.001	

**WCDMA Band V: R99**

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V <sub>DC</sub>	Hz	ppm	ppm
-30	3.8	-9	-0.011	2.5
-20		-8	-0.010	
-10		-11	-0.013	
0		-5	-0.006	
10		-6	-0.007	
20		-6	-0.007	
30		-5	-0.006	
40		-5	-0.006	
50		-4	-0.005	
25		3.6	-4	
25	4.35	-3	-0.004	

**LTE Band 2:**

<b>QPSK, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 1880</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Result</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	
-30	3.8	-2.13	-0.0011	Pass
-20		-1.56	-0.0008	Pass
-10		-1.87	-0.0010	Pass
0		-0.74	-0.0004	Pass
10		0.86	0.0005	Pass
20		1.25	0.0007	Pass
30		1.36	0.0007	Pass
40		3.52	0.0019	Pass
50		-1.52	-0.0008	Pass
25	3.6	-1.37	-0.0007	Pass
25	4.35	-0.54	-0.0003	Pass

<b>16QAM, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 1880</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Result</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	
-30	3.8	-0.52	-0.0003	Pass
-20		0.47	0.0003	Pass
-10		0.44	0.0002	Pass
0		0.15	0.0001	Pass
10		0.23	0.0001	Pass
20		-0.08	0.0000	Pass
30		-0.16	-0.0001	Pass
40		-0.47	-0.0003	Pass
50		0.39	0.0002	Pass
25	3.6	0.11	0.0001	Pass
25	4.35	-0.18	-0.0001	Pass

**LTE Band 4:**

<b>QPSK, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 1732.5</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.8	-4.75	-0.0027	Pass
-20		-5.21	-0.0030	Pass
-10		-6.52	-0.0038	Pass
0		-4.37	-0.0025	Pass
10		-2.54	-0.0015	Pass
20		-1.37	-0.0008	Pass
30		-4.67	-0.0027	Pass
40		0.15	0.0001	Pass
50		-1.34	-0.0008	Pass
25	3.6	-2.74	-0.0016	Pass
25	4.35	-5.66	-0.0033	Pass

<b>16QAM, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 1732.5</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.8	0.54	0.0003	Pass
-20		1.35	0.0008	Pass
-10		2.47	0.0014	Pass
0		3.35	0.0019	Pass
10		2.68	0.0015	Pass
20		1.36	0.0008	Pass
30		2.41	0.0014	Pass
40		1.16	0.0007	Pass
50		-0.76	-0.0004	Pass
25	3.6	-1.17	-0.0007	Pass
25	4.35	-2.16	-0.0012	Pass



**LTE Band 5:**

<b>QPSK, Channel Bandwidth:10MHz Middle Channel, f<sub>c</sub> = 836.5 MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Limit</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	<b>ppm</b>
-30	3.8	0.21	0.0003	2.5
-20		0.54	0.0006	
-10		0.73	0.0009	
0		0.51	0.0006	
10		1.23	0.0015	
20		1.27	0.0015	
30		1.72	0.0021	
40		1.54	0.0018	
50		1.71	0.0020	
25		3.6	0.59	
25	4.35	0.33	0.0004	

<b>16QAM, Channel Bandwidth:10MHz Middle Channel, f<sub>c</sub> =836.5 MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Limit</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	<b>ppm</b>
-30	3.8	1.15	0.0014	2.5
-20		0.83	0.0010	
-10		1.34	0.0016	
0		0.98	0.0012	
10		0.54	0.0006	
20		-0.63	-0.0008	
30		-0.42	-0.0005	
40		0.16	0.0002	
50		-0.18	-0.0002	
25		3.6	0.85	
25	4.35	0.94	0.0011	

**LTE Band 7:**

<b>QPSK, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 2535</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Result</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	
-30	3.8	5.61	0.0022	Pass
-20		7.62	0.0030	Pass
-10		8.14	0.0032	Pass
0		9.33	0.0037	Pass
10		2.15	0.0008	Pass
20		4.86	0.0019	Pass
30		-0.15	-0.0001	Pass
40		1.34	0.0005	Pass
50		2.59	0.0010	Pass
25	3.6	8.74	0.0034	Pass
25	4.35	11.12	0.0044	Pass

<b>16QAM, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 2535</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Result</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	
-30	3.8	2.48	0.0010	Pass
-20		4.48	0.0018	Pass
-10		3.75	0.0015	Pass
0		-2.13	-0.0008	Pass
10		-2.56	-0.0010	Pass
20		-1.47	-0.0006	Pass
30		4.33	0.0017	Pass
40		-2.45	-0.0010	Pass
50		1.37	0.0005	Pass
25	3.6	2.57	0.0010	Pass
25	4.35	-1.19	-0.0005	Pass

**LTE Band 17:**

<b>QPSK, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 710</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.8	0.21	0.0003	Pass
-20		0.06	0.0001	Pass
-10		-1.37	-0.0019	Pass
0		-1.15	-0.0016	Pass
10		-1.65	-0.0023	Pass
20		-2.25	-0.0032	Pass
30		-2.17	-0.0031	Pass
40		-0.73	-0.0010	Pass
50		-0.24	-0.0003	Pass
25	3.6	0.31	0.0004	Pass
25	4.35	0.15	0.0002	Pass

<b>16QAM, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 710</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.8	0.26	0.0004	Pass
-20		0.13	0.0002	Pass
-10		0.07	0.0001	Pass
0		0.15	0.0002	Pass
10		-0.53	-0.0007	Pass
20		-0.16	-0.0002	Pass
30		-1.27	-0.0018	Pass
40		-0.85	-0.0012	Pass
50		-0.62	-0.0009	Pass
25	3.6	-0.57	-0.0008	Pass
25	4.35	-0.46	-0.0006	Pass

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 \*\*\*\*\***