



TESTING LABORATORY  
CERTIFICATE #4820.01



FCC PART 22H, PART 24E,PART 27  
MEASUREMENT AND TEST REPORT  
For  
**Quanzhou Tesunho Electronics Co., Ltd**

2#, 5F E-19# Phase 2 Xunmei, Quanzhou, Fujian, China

**FCC ID: 2AKS9TH282**

<b>Report Type:</b> Original Report	<b>Product Type:</b> PoC Radio
<b>Report Number:</b>	RXM190410056-00B
<b>Report Date:</b>	2019-06-07
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## GENERAL INFORMATION

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

<b>EUT Name:</b>		PoC Radio
<b>EUT Model:</b>		TH-282
<b>Operation modes:</b>		WCDMA( R99 (Data), HSDPA/HSUPA/HSPA+/DC-HSDPA Data) FDD-LTE
<b>Operation Frequency:</b>		WCDMA Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) LTE Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) LTE Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 12: 699-716 MHz(TX); 729-746 MHz(RX) LTE Band 17: 704-716 MHz(TX); 734-746 MHz(RX)
<b>Maximum Output Power: (Conducted)</b>		WCDMA Band 2: 22.35 dBm; WCDMA Band 5: 22.49 dBm LTE Band 2:23.29 dBm; LTE Band 4: 22.48 dBm LTE Band 5: 24.23 dBm; LTE Band 12: 24.47 dBm; LTE Band 17: 23.67 dBm
<b>Modulation Type:</b>		QPSK, 16QAM
<b>Adapter Information</b>	<b>Model:</b>	ZM-01A1210
	<b>Input:</b>	AC 100-240V, 50/60Hz, 0.5A Max
	<b>Output:</b>	DC12V, 1000mA
<b>Rated Input Voltage:</b>		DC3.7V from Battery; DC5V from adapter; DC 12 V from base
<b>External Dimension:</b>		148mm(L)*57 mm(W)*57 mm(H)
<b>Serial Number:</b>		190410056
<b>EUT Received Date:</b>		2019-4-12

### Objective

This report is prepared on behalf of *Quanzhou Tesunho Electronics Co., Ltd* in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E Part 27 of the Federal Communication Commissions rules.

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

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

No related submittal.

## Test Methodology

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

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

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

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

## Measurement Uncertainty

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

## Test Facility

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

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

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

## SYSTEM TEST CONFIGURATION

### Justification

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

The test items were performed with the EUT operating at testing mode. The device operates on WCDMA Band 2/5, and LTE band 2/4/5/12/17, test was performed with channels as below table:

Frequency Bands	Bandwidth (MHz)	Test Frequency(MHz)		
		Low	Middle	High
WCDMA Band 2	4.2	1852.4	1880	1907.6
WCDMA Band 5	4.2	826.4	836.6	846.6
LTE Band 2	1.4	1850.7	1880	1909.3
	3	1851.5	1880	1908.5
	5	1852.5	1880	1907.5
	10	1855	1880	1905
	15	1857.5	1880	1902.5
	20	1860	1880	1900
LTE Band 4	1.4	1710.7	1732.5	1754.3
	3	1711.5	1732.5	1753.5
	5	1712.5	1732.5	1752.5
	10	1715	1732.5	1750
	15	1717.5	1732.5	1747.5
	20	1720	1732.5	1745
LTE Band 5	1.4	824.7	836.5	848.3
	3	825.5	836.5	847.5
	5	826.5	836.5	846.5
	10	829	836.5	844
LTE Band 12	1.4	699.7	707.5	715.3
	3	700.5	707.5	714.5
	5	701.5	707.5	713.5
	10	704	707.5	711
LTE Band 17	5	706.5	710	713.5
	10	709	710	711

For LTE band 2 and 4, 10/15/20MHz bandwidth only supports QPSK modulation, 16QAM was not enabled, For LTE band 5/12/17, 10MHz bandwidth only supports QPSK modulation, 16QAM was not enabled.

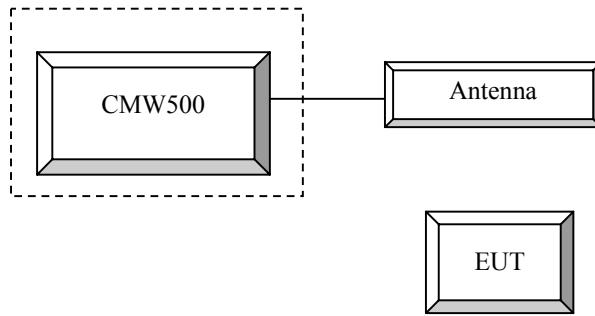
### Equipment Modifications

No modification was made to the EUT.

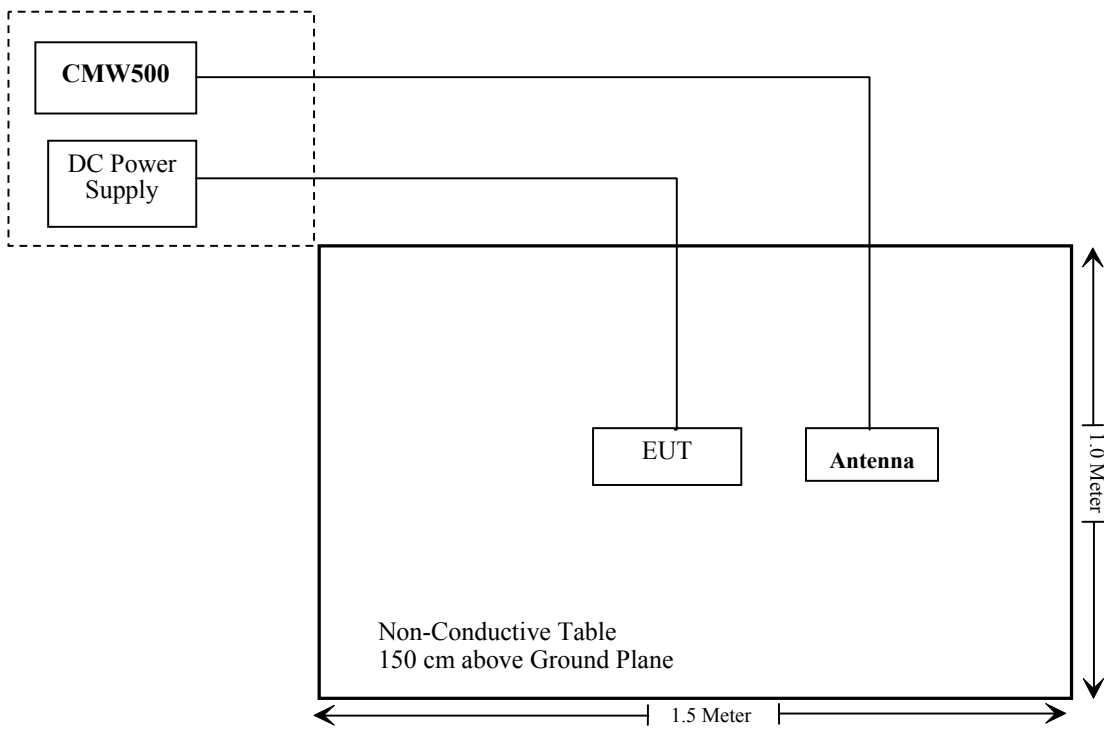
### Support Equipment List and Details

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

### Configuration of Test Setup



### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

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



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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**

Compliance, please refer to the SAR report: RXM190410056-20.

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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.

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

### **Applicable Standard**

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

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

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

According to §27.50

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

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

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

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

### **Test Procedure**

#### **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
	$\beta_c / \beta_d$	8/15

**WCDMA HSDPA**

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	$\beta_c$	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.

	<b>Mode</b>	<b>HSUPA</b>	<b>HSUPA</b>	<b>HSUPA</b>	<b>HSUPA</b>	<b>HSUPA</b>
	<b>Subset</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<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	2018-12-10	2019-12-10
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	Not Required	/
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2018-05-06	2019-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
R&S	Wideband Radio Communication Tester	CMW500	149216	2018-12-10	2019-12-10
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A

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

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	25.7~27.2°C
<b>Relative Humidity:</b>	59~60 %
<b>ATM Pressure:</b>	100.5~100.7kPa

\* *The testing was performed by Blake Yang from 2019-04-25 to 2019-04-28.*



**Conducted Output Power**

**WCDMA Band II**

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.35	2.52	21.82	3.00	20.87	2.80
HSDPA	1	21.13	3.40	20.51	3.60	19.83	3.16
	2	21.10	3.41	20.46	3.60	19.85	3.12
	3	21.14	3.39	20.54	3.59	19.87	3.19
	4	21.18	3.36	20.52	3.58	19.87	3.17
HSUPA	1	20.79	3.32	20.11	3.12	19.14	3.88
	2	20.76	3.36	20.14	3.10	19.09	3.90
	3	20.75	3.32	20.11	3.17	19.10	3.89
	4	20.81	3.34	20.11	3.16	19.10	3.91
	5	20.78	3.36	20.14	3.09	19.10	3.94
DC-HSDPA	1	20.71	3.31	20.11	3.18	19.08	3.91
	2	20.75	3.30	20.07	3.16	19.11	3.85
	3	20.75	3.34	20.18	3.11	19.11	3.92
	4	20.70	3.35	20.08	3.16	19.13	3.91
HSPA+ (16QAM)	1	20.84	3.29	20.10	3.14	19.14	3.85

**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	22.32	2.52	22.45	2.56	22.49	2.28
HSDPA	1	21.25	3.64	21.37	3.24	21.29	3.84
	2	21.21	3.65	21.40	3.29	21.26	3.87
	3	21.23	3.59	21.36	3.21	21.30	3.82
	4	21.29	3.64	21.35	3.24	21.29	3.88
HSUPA	1	20.67	3.88	20.72	3.48	20.68	3.40
	2	20.71	3.90	20.68	3.45	20.68	3.36
	3	20.64	3.86	20.75	3.53	20.69	3.42
	4	20.69	3.89	20.67	3.44	20.70	3.39
	5	20.64	3.87	20.69	3.52	20.65	3.42
DC-HSDPA	1	20.68	3.83	20.73	3.45	20.66	3.39
	2	20.68	3.94	20.73	3.45	20.67	3.37
	3	20.66	3.87	20.72	3.50	20.71	3.43
	4	20.74	3.94	20.63	3.46	20.70	3.41
HSPA+ (16QAM)	1	20.69	3.91	20.69	3.49	20.64	3.44

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	22.51	22.29	21.23
		RB1#3	22.91	22.42	21.40
		RB1#5	22.70	22.35	21.46
		RB3#0	22.57	22.13	21.46
		RB3#3	22.70	22.02	21.43
		RB6#0	21.75	21.08	20.27
	16QAM	RB1#0	21.45	21.24	20.45
		RB1#3	21.68	21.42	20.63
		RB1#5	21.68	21.27	20.35
		RB3#0	21.77	20.76	20.48
		RB3#3	21.76	20.78	20.40
		RB6#0	20.90	20.10	19.19
3MHz	QPSK	RB1#0	22.65	22.12	21.59
		RB1#8	22.66	22.10	21.33
		RB1#14	22.62	22.01	21.55
		RB6#0	21.76	21.18	20.32
		RB6#9	21.91	21.06	20.37
		RB15#0	21.83	21.12	20.33
	16QAM	RB1#0	22.15	21.28	20.98
		RB1#8	22.00	21.17	20.96
		RB1#14	21.99	21.32	20.99
		RB6#0	20.83	19.95	19.26
		RB6#9	21.00	20.00	19.25
		RB15#0	20.81	20.13	19.14
5MHz	QPSK	RB1#0	22.67	22.13	21.49
		RB1#13	22.51	22.22	21.21
		RB1#24	22.29	22.13	21.43
		RB15#0	21.93	21.14	20.50
		RB15#10	21.64	21.10	20.41
		RB25#0	21.90	21.17	20.47
	16QAM	RB1#0	21.16	21.71	20.18
		RB1#13	21.10	21.41	20.11
		RB1#24	20.87	21.36	20.31
		RB15#0	20.92	19.91	19.48
		RB15#10	20.94	20.03	19.35
		RB25#0	20.71	20.17	19.59

10MHz	QPSK	RB1#0	22.98	21.70	21.02
		RB1#25	22.77	21.67	20.74
		RB1#49	22.15	21.71	20.60
		RB25#0	21.75	20.71	19.92
		RB25#25	21.34	20.50	19.69
		RB50#0	21.55	20.67	19.89
15MHz	QPSK	RB1#0	22.28	22.79	22.67
		RB1#38	21.82	22.77	22.66
		RB1#74	21.97	22.66	22.39
		RB36#0	21.30	21.73	21.63
		RB36#39	21.03	21.69	21.46
		RB75#0	21.18	21.44	21.66
20MHz	QPSK	RB1#0	22.79	22.65	23.10
		RB1#50	22.79	22.73	<b>23.29</b>
		RB1#99	22.92	22.46	23.14
		RB50#0	21.75	21.76	22.07
		RB50#50	21.71	21.66	21.91
		RB100#0	21.71	21.55	22.09

LTE Band 4

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	22.07	21.58	21.33
		RB1#3	21.92	21.71	21.37
		RB1#5	21.85	21.65	21.25
		RB3#0	22.10	21.69	21.49
		RB3#3	22.14	21.72	21.48
		RB6#0	21.21	20.80	20.41
	16QAM	RB1#0	21.35	20.77	20.54
		RB1#3	21.39	20.99	20.73
		RB1#5	21.32	20.86	20.89
		RB3#0	21.59	20.74	20.36
3MHz	QPSK	RB1#0	22.31	21.66	20.98
		RB1#8	21.84	21.41	21.11
		RB1#14	21.99	21.58	21.48
		RB6#0	21.08	20.66	20.29
		RB6#9	20.87	20.65	20.48
		RB15#0	21.03	20.67	20.41
	16QAM	RB1#0	21.21	21.23	20.12
		RB1#8	21.23	21.21	19.86
		RB1#14	21.10	21.24	20.08
		RB6#0	20.19	20.00	18.98
5MHz	QPSK	RB6#9	19.91	20.12	19.39
		RB15#0	20.08	19.96	19.29
		RB1#0	22.12	21.88	21.34
		RB1#13	21.86	21.59	21.35
		RB1#24	21.79	21.63	21.67
		RB15#0	21.08	20.75	20.29
	16QAM	RB15#10	20.90	20.65	20.57
		RB25#0	21.05	20.76	20.39
		RB1#0	20.69	21.05	19.83
		RB1#13	20.11	20.52	19.67
16QAM	RB1#24	20.31	20.58	20.16	
	RB15#0	19.82	19.53	19.34	
	RB15#10	19.67	19.56	19.41	
	RB25#0	20.17	19.71	19.56	

10MHz	QPSK	RB1#0	22.21	21.59	21.26
		RB1#25	21.88	21.72	21.68
		RB1#49	21.92	21.41	21.40
		RB25#0	21.11	20.71	20.38
		RB25#25	21.02	20.68	20.42
		RB50#0	21.07	20.74	20.43
15MHz	QPSK	RB1#0	22.15	22.06	21.94
		RB1#38	21.97	22.00	21.74
		RB1#74	22.02	21.90	22.29
		RB36#0	21.19	21.24	21.01
		RB36#39	21.19	21.10	21.03
		RB75#0	21.43	21.09	21.09
20MHz	QPSK	RB1#0	22.01	21.99	22.30
		RB1#50	22.14	<b>22.48</b>	22.05
		RB1#99	22.35	21.71	22.19
		RB50#0	21.31	21.21	21.07
		RB50#50	21.36	21.14	21.11
		RB100#0	21.32	21.21	21.12

LTE Band 5

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.43	23.81	23.77
		RB1#3	23.27	24.07	24.01
		RB1#5	23.10	23.93	23.99
		RB3#0	23.39	23.94	23.87
		RB3#3	23.32	23.96	23.50
		RB6#0	22.29	23.02	22.63
	16QAM	RB1#0	22.39	22.58	22.53
		RB1#3	22.80	22.85	22.67
		RB1#5	22.52	22.42	22.81
		RB3#0	22.66	23.06	22.80
3MHz	QPSK	RB1#0	23.32	24.17	23.36
		RB1#8	23.37	<b>24.23</b>	23.55
		RB1#14	23.20	23.85	23.54
		RB6#0	22.28	23.19	22.53
		RB6#9	22.18	23.06	22.66
		RB15#0	22.30	23.10	22.55
	16QAM	RB1#0	22.57	23.88	23.08
		RB1#8	22.47	23.45	23.35
		RB1#14	22.41	22.93	23.45
		RB6#0	21.36	21.86	21.91
5MHz	QPSK	RB1#0	23.26	23.94	23.14
		RB1#13	23.28	23.87	23.34
		RB1#24	23.32	23.43	23.68
		RB15#0	22.30	23.07	22.23
		RB15#10	22.28	22.94	22.60
		RB25#0	22.23	22.90	22.35
	16QAM	RB1#0	21.77	23.43	21.79
		RB1#13	21.70	23.57	21.59
		RB1#24	21.66	23.04	22.19
		RB15#0	21.47	21.82	21.46
10MHz	QPSK	RB15#10	21.06	21.88	21.50
		RB25#0	21.26	21.83	21.27
		RB1#0	23.28	23.89	23.34
		RB1#25	23.61	24.14	23.11
		RB1#49	24.12	23.16	23.67
		RB25#0	22.38	23.22	22.03
		RB25#25	22.90	22.72	22.33
		RB50#0	22.66	22.81	22.18

**LTE Band 12**

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	24.20	24.07	23.96
		RB1#3	24.20	24.28	24.42
		RB1#5	24.32	24.18	24.22
		RB3#0	24.09	24.17	23.97
		RB3#3	23.98	24.25	24.12
	16QAM	RB6#0	23.09	23.23	22.95
		RB1#0	23.10	23.53	23.19
		RB1#3	23.20	23.80	23.40
		RB1#5	23.10	23.75	23.21
		RB3#0	23.15	23.15	22.80
3MHz	QPSK	RB3#3	23.18	23.09	23.28
		RB6#0	22.18	22.20	21.82
		RB1#0	23.89	24.34	23.97
		RB1#8	23.81	<b>24.47</b>	23.95
		RB1#14	23.91	24.29	24.16
	16QAM	RB6#0	23.18	23.17	23.15
		RB6#9	23.00	23.39	23.14
		RB15#0	23.24	23.23	22.99
		RB1#0	23.30	23.86	23.35
		RB1#8	23.21	23.66	23.62
5MHz	QPSK	RB1#14	23.33	23.52	23.68
		RB6#0	22.23	22.11	22.03
		RB6#9	22.06	22.23	22.24
		RB15#0	22.29	22.32	22.03
		RB1#0	23.95	23.93	23.97
	16QAM	RB1#13	24.04	24.18	23.92
		RB1#24	24.02	24.06	23.98
		RB15#0	23.25	23.15	23.10
		RB15#10	23.17	23.29	23.10
		RB25#0	23.04	23.17	23.08
10MHz	QPSK	RB1#0	22.82	22.50	23.39
		RB1#13	22.64	23.31	23.17
		RB1#24	22.75	23.18	23.48
		RB15#0	22.17	22.02	22.06
		RB15#10	22.15	22.10	21.78
QPSK	RB25#0	22.09	22.21	22.00	
	RB1#0	23.81	23.57	23.65	
	RB1#25	24.20	24.05	24.35	
	RB1#49	24.11	23.75	23.76	
	RB25#0	23.03	22.99	23.10	
QPSK	RB25#25	23.21	23.05	23.10	
	RB50#0	22.97	23.06	23.15	

**LTE Band 17**

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	23.51	23.25	23.57
		RB1#13	23.28	23.35	23.58
		RB1#24	23.57	23.38	23.56
		RB15#0	22.52	22.47	22.73
		RB15#10	22.55	22.48	22.54
		RB25#0	22.53	22.52	22.62
	16QAM	RB1#0	22.53	22.91	22.21
		RB1#13	22.13	22.50	21.68
		RB1#24	22.46	22.74	22.19
		RB15#0	21.47	21.73	21.69
		RB15#10	21.81	21.48	21.45
		RB25#0	21.46	21.70	21.66
10MHz	QPSK	RB1#0	23.58	23.44	23.63
		RB1#25	<b>23.67</b>	23.86	23.61
		RB1#49	23.33	23.40	23.44
		RB25#0	22.62	22.63	22.60
		RB25#25	22.63	22.72	22.63
		RB50#0	22.68	22.70	22.67



**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	2.60	2.72	2.52	13
	100 RB		6.48	6.44	6.40	13
16QAM	1 RB	5 MHz	1.88	2.88	4.20	13
	25 RB		5.16	4.92	4.60	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	3.88	3.44	4.76	13
	100 RB		6.48	6.48	6.48	13
16QAM	1 RB	5 MHz	3.80	4.12	4.28	13
	25 RB		4.72	4.60	4.84	13

**PAR, Band 5**

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	4.20	4.84	4.40	13
	50 RB		5.32	5.56	5.36	13
16QAM	1 RB	5 MHz	6.32	5.94	5.82	13
	25 RB		5.78	6.15	6.03	13

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

## ERP &amp; EIRP

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)			
<b>WCDMA Band V Middle Channel</b>								
836.60	H	96.87	21.95	0.00	0.97	20.98	38.45	17.47
836.60	V	100.15	28.36	0.00	0.97	27.39	38.45	11.06
<b>WCDMA Band II Middle Channel</b>								
1880.00	H	81.63	9.02	11.66	2.66	18.02	33.00	14.98
1880.00	V	85.40	12.93	11.66	2.66	21.93	33.00	11.07

## Note:

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

**LTE Band 2**

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)	
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)				
1880.00	1.40	QPSK	H	82.89	10.28	11.66	2.66	19.28	33.00	13.72	
1880.00			V	86.49	14.02	11.66	2.66	23.02	33.00	9.98	
1880.00	3.00		H	82.91	10.30	11.66	2.66	19.30	33.00	13.70	
1880.00			V	86.40	13.93	11.66	2.66	22.93	33.00	10.07	
1880.00	5.00		H	82.78	10.17	11.66	2.66	19.17	33.00	13.83	
1880.00			V	86.42	13.95	11.66	2.66	22.95	33.00	10.05	
1880.00	10.00		H	81.96	9.35	11.66	2.66	18.35	33.00	14.65	
1880.00			V	85.34	12.87	11.66	2.66	21.87	33.00	11.13	
1880.00	15.00		H	81.90	9.29	11.66	2.66	18.29	33.00	14.71	
1880.00			V	85.15	12.68	11.66	2.66	21.68	33.00	11.32	
1880.00	20.00		H	81.74	9.13	11.66	2.66	18.13	33.00	14.87	
1880.00			V	85.12	12.65	11.66	2.66	21.65	33.00	11.35	
1880.00	1.40		16QAM	H	82.21	9.60	11.66	2.66	18.60	33.00	14.40
1880.00				V	85.56	13.09	11.66	2.66	22.09	33.00	10.91
1880.00	3.00	H		82.16	9.55	11.66	2.66	18.55	33.00	14.45	
1880.00		V		85.63	13.16	11.66	2.66	22.16	33.00	10.84	
1880.00	5.00	H		82.06	9.45	11.66	2.66	18.45	33.00	14.55	
1880.00		V		85.47	13.00	11.66	2.66	22.00	33.00	11.00	

**LTE Band 4**

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)	
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)				
1732.50	1.40	QPSK	H	83.28	9.23	10.90	2.51	17.62	30.00	12.38	
1732.50			V	86.03	11.66	10.90	2.51	20.05	30.00	9.95	
1732.50	3.00		H	83.20	9.15	10.90	2.51	17.54	30.00	12.46	
1732.50			V	86.11	11.74	10.90	2.51	20.13	30.00	9.87	
1732.50	5.00		H	83.24	9.19	10.90	2.51	17.58	30.00	12.42	
1732.50			V	85.88	11.51	10.90	2.51	19.90	30.00	10.10	
1732.50	10.00		H	82.56	8.51	10.90	2.51	16.90	30.00	13.10	
1732.50			V	84.90	10.53	10.90	2.51	18.92	30.00	11.08	
1732.50	15.00		H	82.24	8.19	10.90	2.51	16.58	30.00	13.42	
1732.50			V	85.00	10.63	10.90	2.51	19.02	30.00	10.98	
1732.50	20.00		H	82.30	8.25	10.90	2.51	16.64	30.00	13.36	
1732.50			V	84.92	10.55	10.90	2.51	18.94	30.00	11.06	
1732.50	1.40		16QAM	H	82.13	8.08	10.90	2.51	16.47	30.00	13.53
1732.50				V	84.89	10.52	10.90	2.51	18.91	30.00	11.09
1732.50	3.00	H		82.24	8.19	10.90	2.51	16.58	30.00	13.42	
1732.50		V		84.90	10.53	10.90	2.51	18.92	30.00	11.08	
1732.50	5.00	H		82.17	8.12	10.90	2.51	16.51	30.00	13.49	
1732.50		V		84.76	10.39	10.90	2.51	18.78	30.00	11.22	

**LTE Band 5**

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)	
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)				
836.50	1.40	QPSK	H	90.44	15.51	0.00	0.97	14.54	38.45	23.91	
836.50			V	100.71	28.92	0.00	0.97	27.95	38.45	10.50	
836.50	3.00		H	87.69	12.76	0.00	0.97	11.79	38.45	26.66	
836.50			V	98.51	26.72	0.00	0.97	25.75	38.45	12.70	
836.50	5.00		H	89.01	14.08	0.00	0.97	13.11	38.45	25.34	
836.50			V	98.62	26.83	0.00	0.97	25.86	38.45	12.59	
836.50	10.00		H	87.09	12.16	0.00	0.97	11.19	38.45	27.26	
836.50			V	97.19	25.40	0.00	0.97	24.43	38.45	14.02	
836.50	1.40		16QAM	H	90.87	15.94	0.00	0.97	14.97	38.45	23.48
836.50				V	100.97	29.18	0.00	0.97	28.21	38.45	10.24
836.50	3.00	H		87.97	13.04	0.00	0.97	12.07	38.45	26.38	
836.50		V		99.20	27.41	0.00	0.97	26.44	38.45	12.01	
836.50	5.00	H		89.54	14.61	0.00	0.97	13.64	38.45	24.81	
836.50		V		98.87	27.08	0.00	0.97	26.11	38.45	12.34	

**LTE Band 12**

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)	
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)				
707.50	1.40	QPSK	H	82.13	5.27	0.00	0.94	4.33	34.77	30.44	
707.50			V	93.50	19.08	0.00	0.94	18.14	34.77	16.63	
707.50	3.00		H	80.58	3.72	0.00	0.94	2.78	34.77	31.99	
707.50			V	91.84	17.42	0.00	0.94	16.48	34.77	18.29	
707.50	5.00		H	81.45	4.59	0.00	0.94	3.65	34.77	31.12	
707.50			V	91.36	16.94	0.00	0.94	16.00	34.77	18.77	
707.50	10.00		H	81.17	4.31	0.00	0.94	3.37	34.77	31.40	
707.50			V	90.38	15.96	0.00	0.94	15.02	34.77	19.75	
707.50	1.40		16QAM	H	83.11	6.25	0.00	0.94	5.31	34.77	29.46
707.50				V	94.88	20.46	0.00	0.94	19.52	34.77	15.25
707.50	3.00	H		81.52	4.66	0.00	0.94	3.72	34.77	31.05	
707.50		V		92.57	18.15	0.00	0.94	17.21	34.77	17.56	
707.50	5.00	H		81.41	4.55	0.00	0.94	3.61	34.77	31.16	
707.50		V		92.54	18.12	0.00	0.94	17.18	34.77	17.59	

**LTE Band 17**

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
710.00	5	QPSK	H	81.50	4.69	0.00	0.94	3.75	34.77	31.02
710.00			V	92.69	18.33	0.00	0.94	17.39	34.77	17.38
710.00	10		H	80.47	3.66	0.00	0.94	2.72	34.77	32.05
710.00			V	91.50	17.14	0.00	0.94	16.20	34.77	18.57
710.00	5	16QAM	H	81.84	5.03	0.00	0.94	4.09	34.77	30.68
710.00			V	92.79	18.43	0.00	0.94	17.49	34.77	17.28

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**

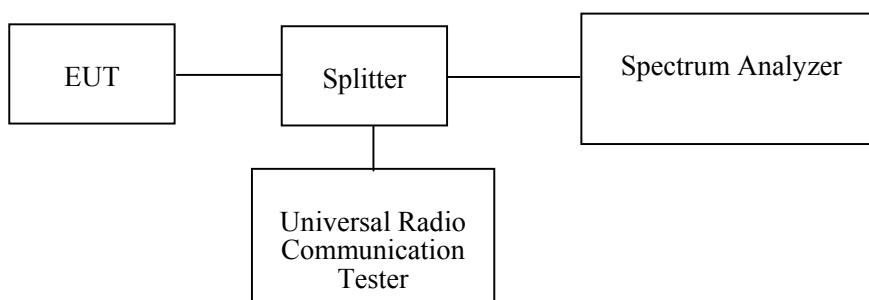
**Applicable Standard**

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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

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

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	25.7~27.2°C
<b>Relative Humidity:</b>	59~60 %
<b>ATM Pressure:</b>	100.5~100.7kPa

\* The testing was performed by Black Yang from 2019-04-25 to 2019-04-28.

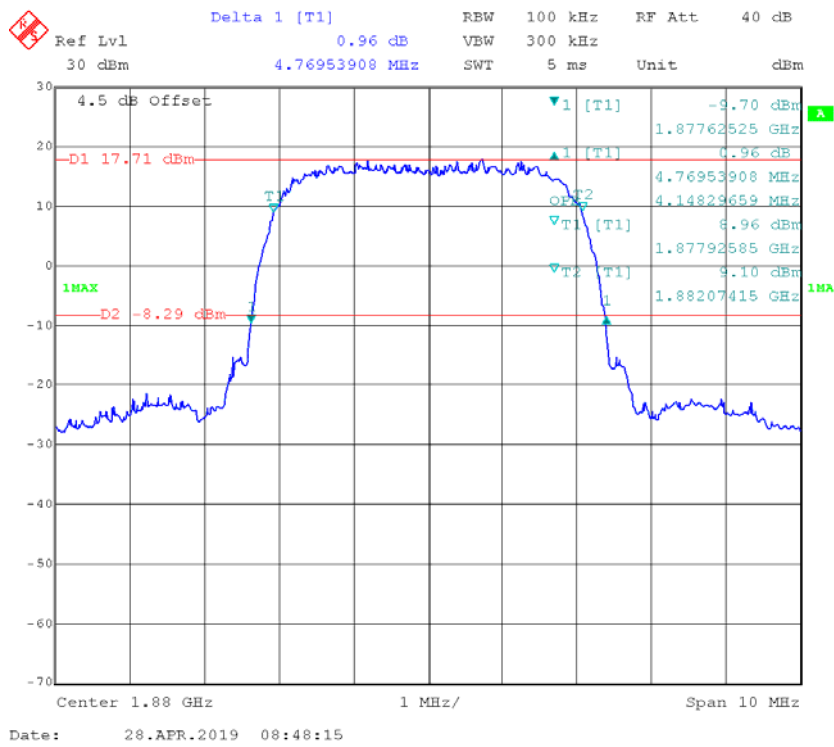
Test Mode: Transmitting

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

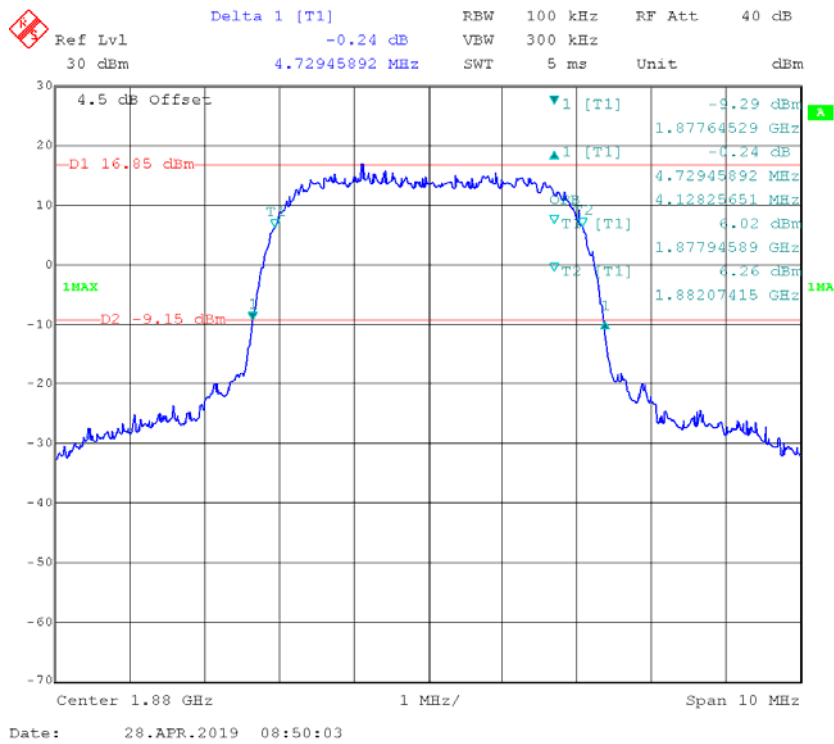
Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
WCDMA Band II	M	Rel 99	4.148	4.770
		HSDPA	4.148	4.770
		HSUPA	4.128	4.729
WCDMA Band V		Rel 99	4.128	4.729
		HSDPA	4.148	4.749
		HSUPA	4.148	4.729

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.100	1.335
		16QAM	1.100	1.299
	3 MHz	QPSK	2.705	2.946
		16QAM	2.705	2.982
	5 MHz	QPSK	4.529	5.030
		16QAM	4.529	5.050
	10 MHz	QPSK	8.978	9.860
15 MHz	QPSK	13.527	15.040	
20 MHz	QPSK	17.956	19.459	
LTE Band 4	1.4 MHz	QPSK	1.106	1.347
		16QAM	1.118	1.317
	3 MHz	QPSK	2.693	2.958
		16QAM	2.693	2.970
	5 MHz	QPSK	4.549	5.050
		16QAM	4.529	5.090
	10 MHz	QPSK	8.978	10.040
15 MHz	QPSK	13.527	14.880	
20 MHz	QPSK	17.876	19.479	
LTE Band 5	1.4 MHz	QPSK	1.106	1.311
		16QAM	1.106	1.305
	3 MHz	QPSK	2.705	2.970
		16QAM	2.705	2.970
	5 MHz	QPSK	4.549	5.070
		16QAM	4.529	5.010
10 MHz	QPSK	9.018	9.860	
LTE Band 12	1.4 MHz	QPSK	1.106	1.299
		16QAM	1.106	1.299
	3 MHz	QPSK	2.693	2.910
		16QAM	2.693	2.970
	5 MHz	QPSK	4.529	5.010
		16QAM	4.529	5.030
10 MHz	QPSK	8.938	9.860	
LTE Band 17	5 MHz	QPSK	4.509	4.990
		16QAM	4.549	5.050
	10 MHz	QPSK	8.978	9.684

### WCDMA Band II, Rel 99

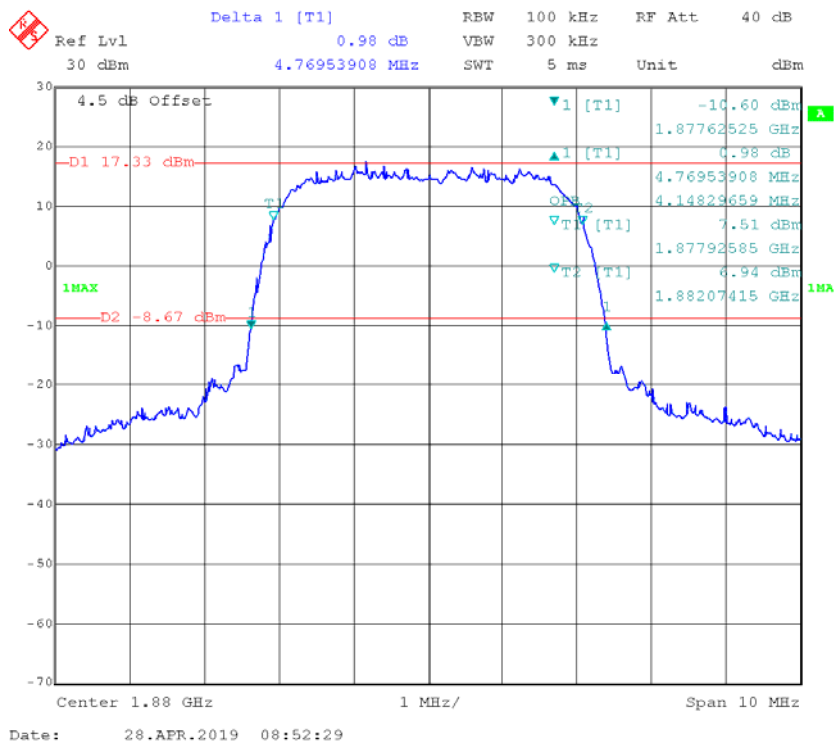


### WCDMA Band II, HSUPA

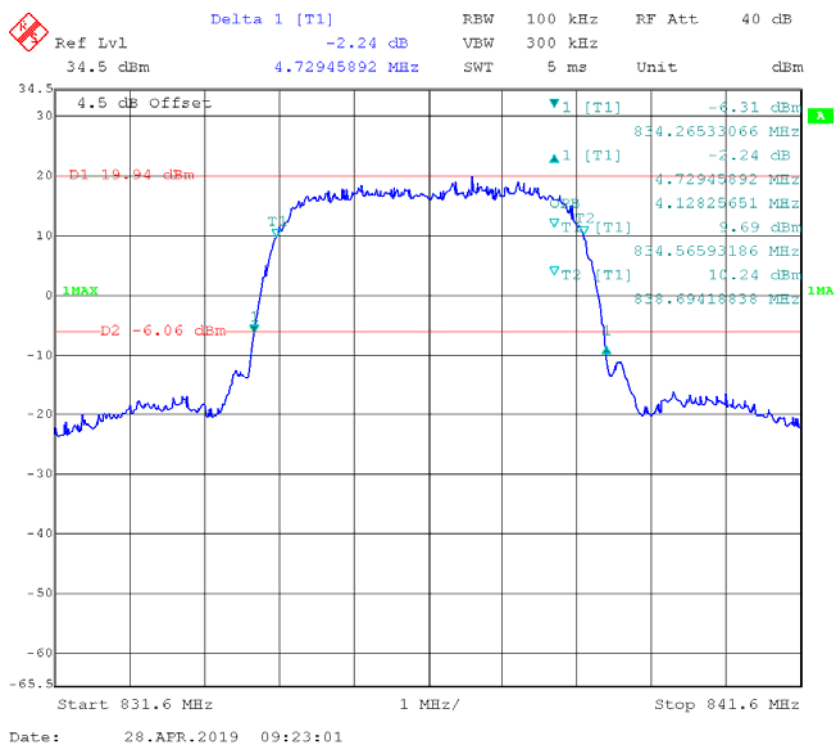




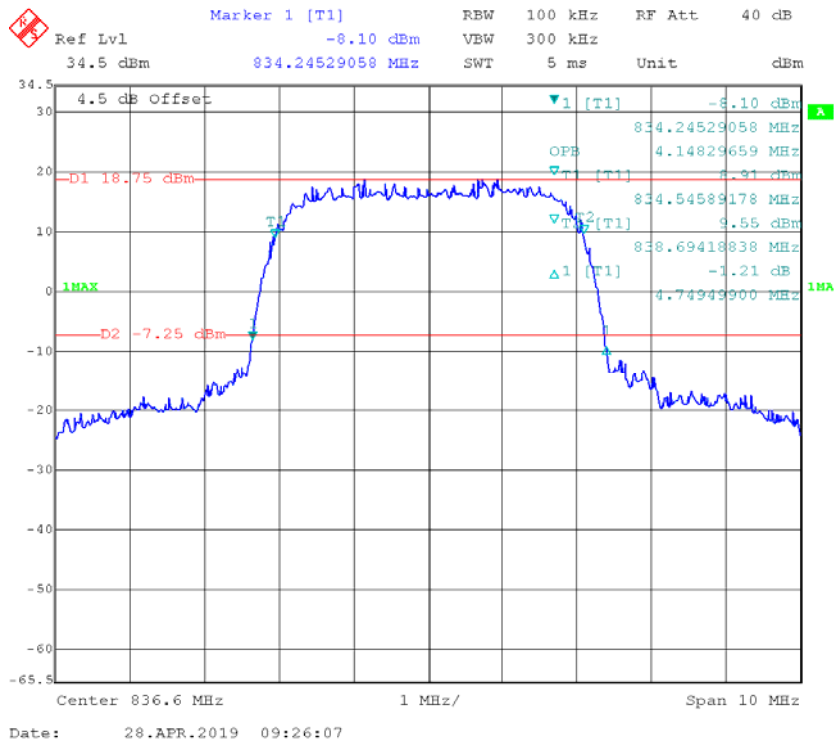
### WCDMA Band II, HSDPA



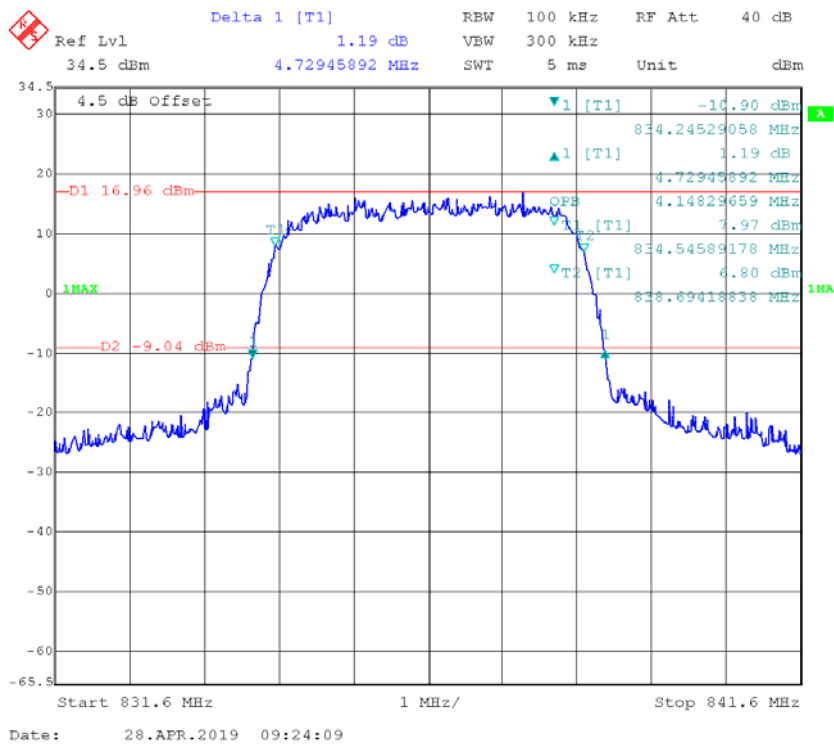
### WCDMA Band V, Rel 99



**WCDMA Band V, HSDPA**

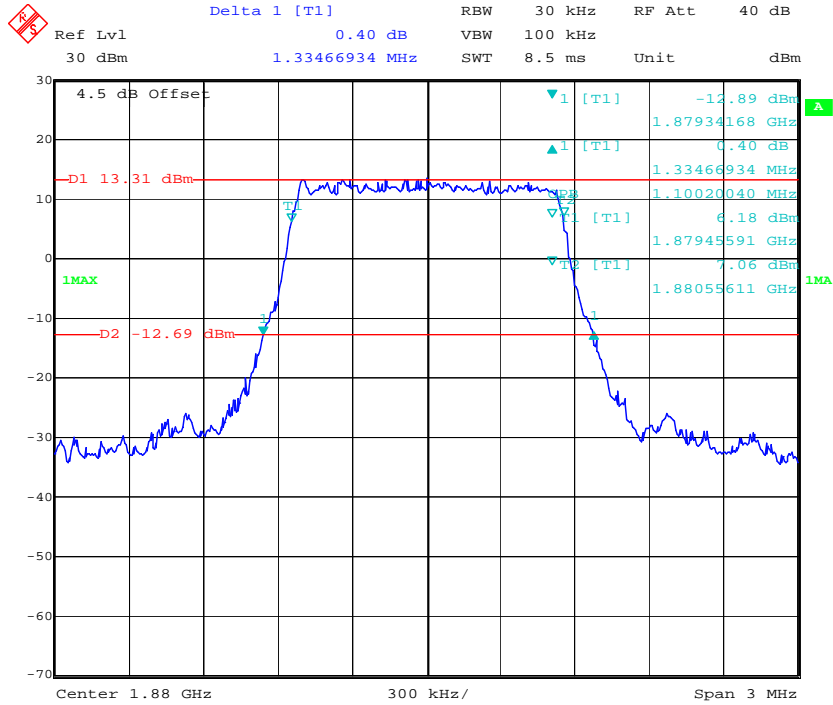


**WCDMA Band V, HSUPA**



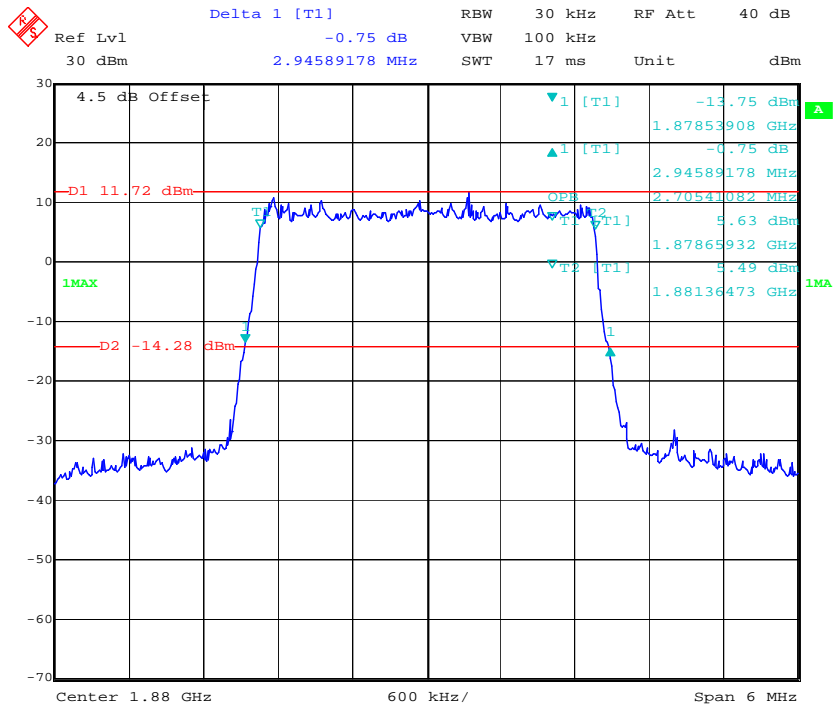
LTE Band 2

QPSK\_1.4 MHz



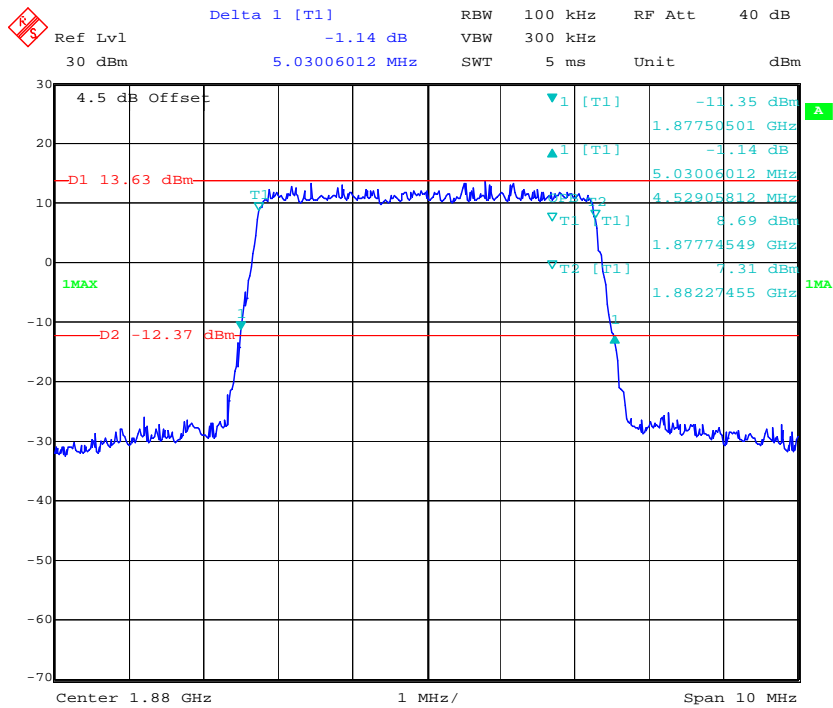
Date: 25.APR.2019 15:06:23

QPSK\_3 MHz



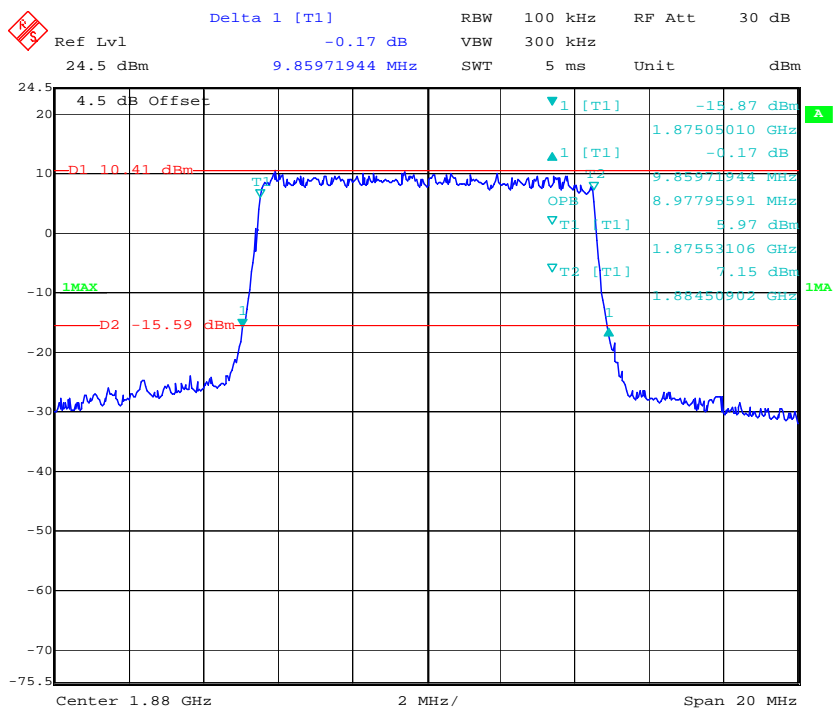
Date: 25.APR.2019 15:08:16

### QPSK\_5 MHz



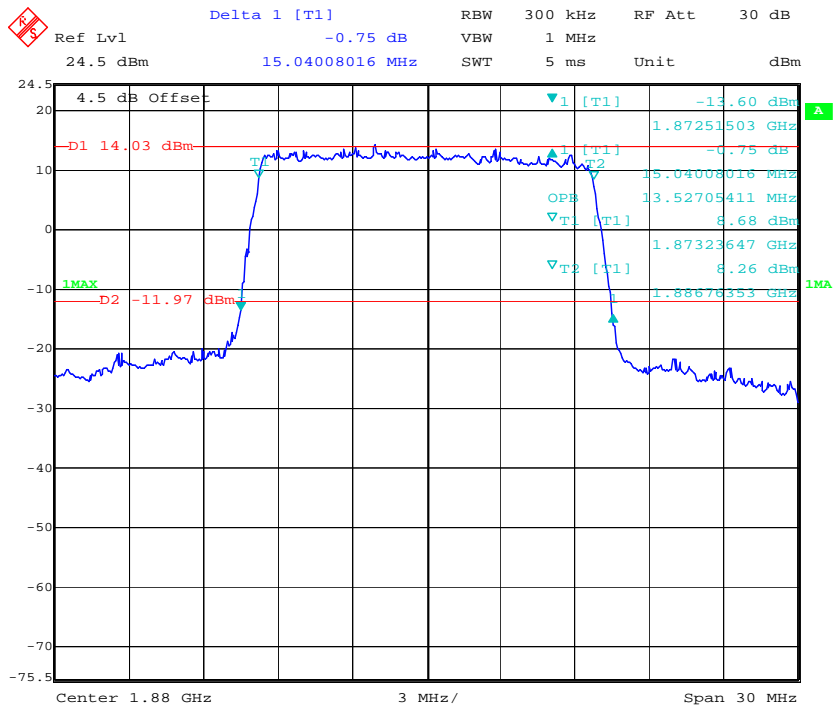
Date: 25.APR.2019 15:09:33

### QPSK\_10 MHz

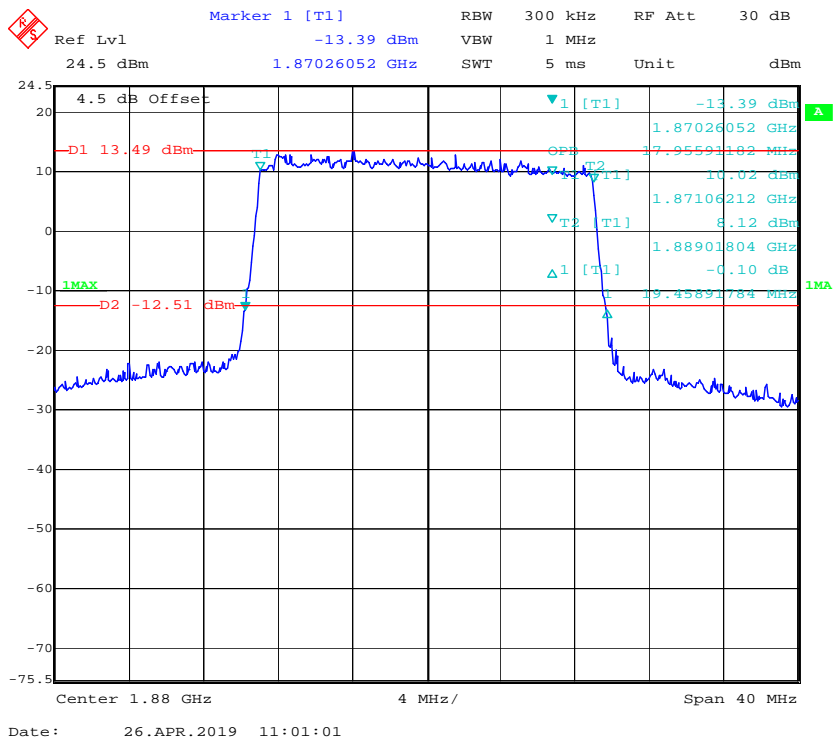


Date: 26.APR.2019 10:56:47

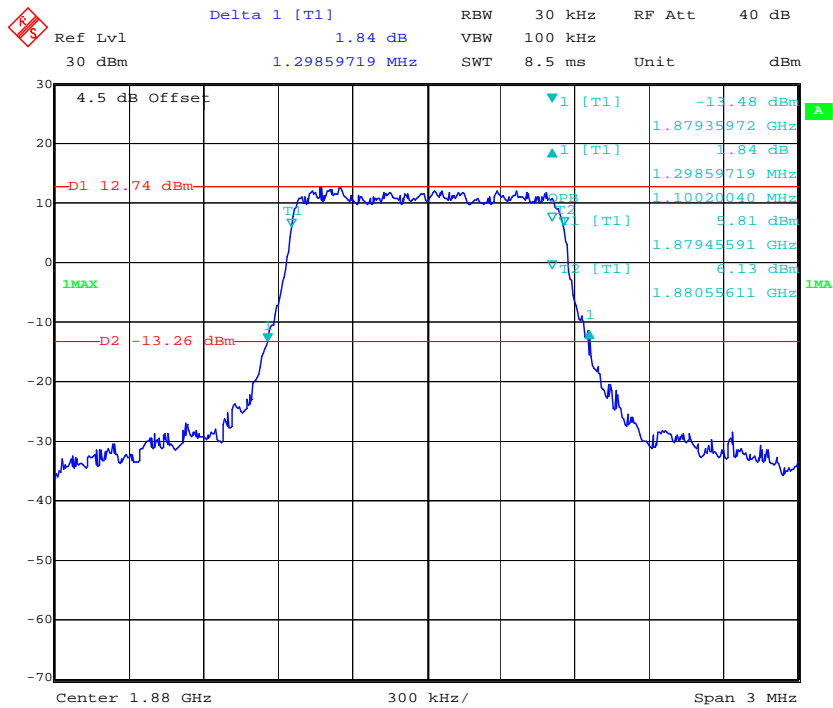
### QPSK\_15 MHz



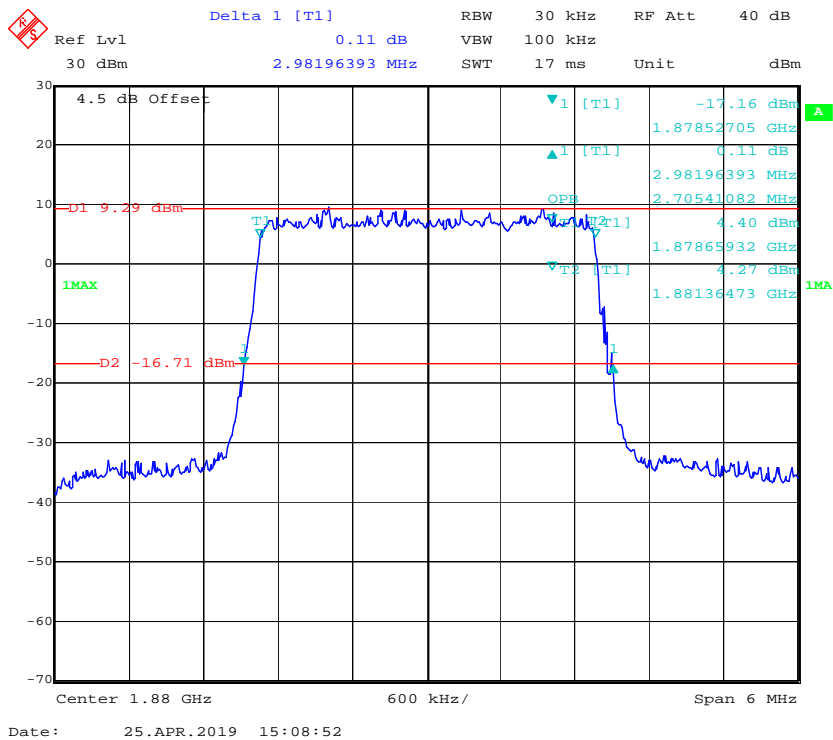
### QPSK\_20 MHz



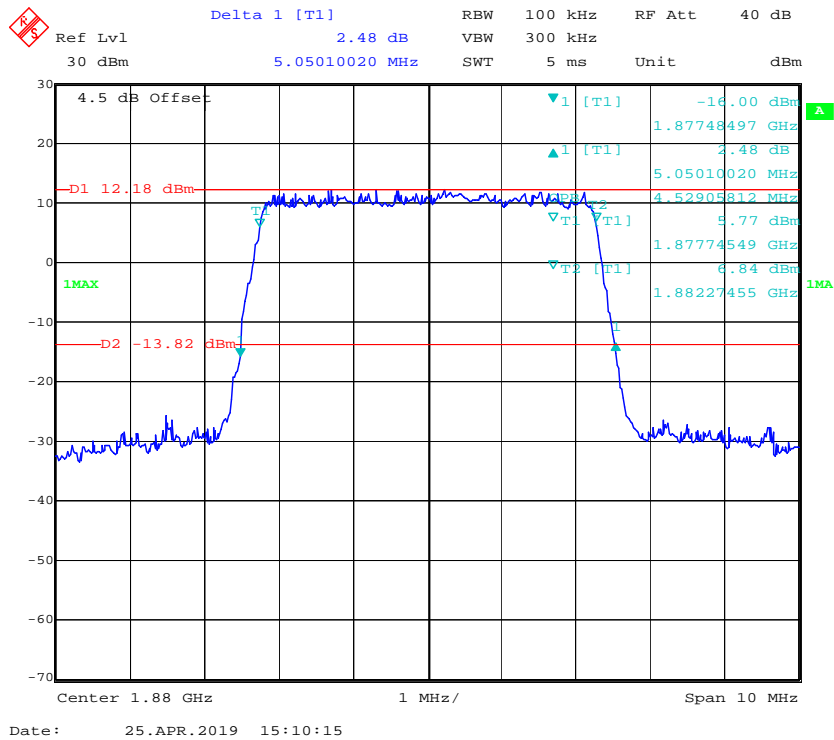
### 16QAM\_1.4 MHz



### 16QAM\_3 MHz

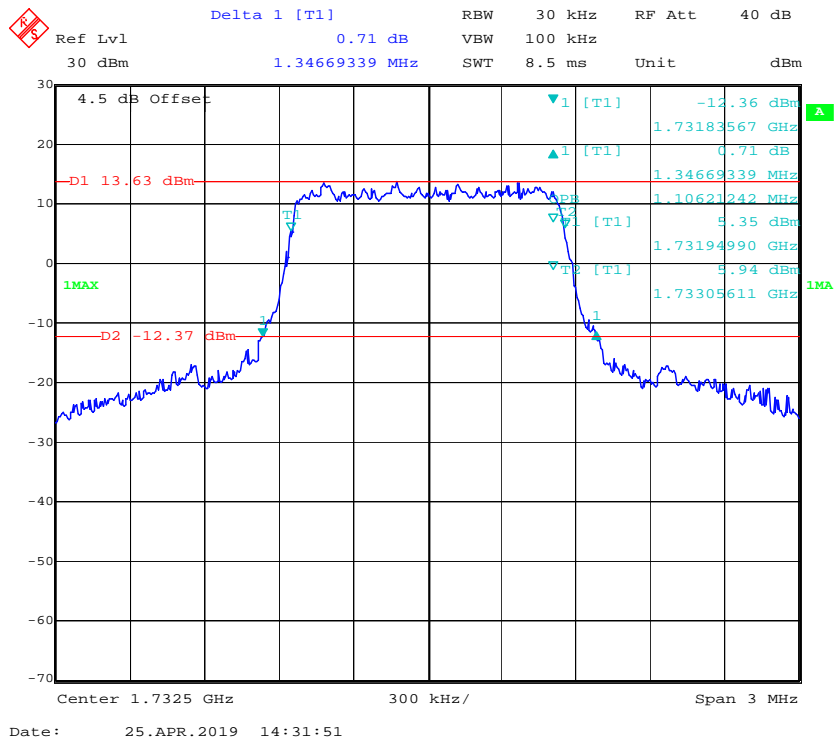


### 16QAM\_5 MHz

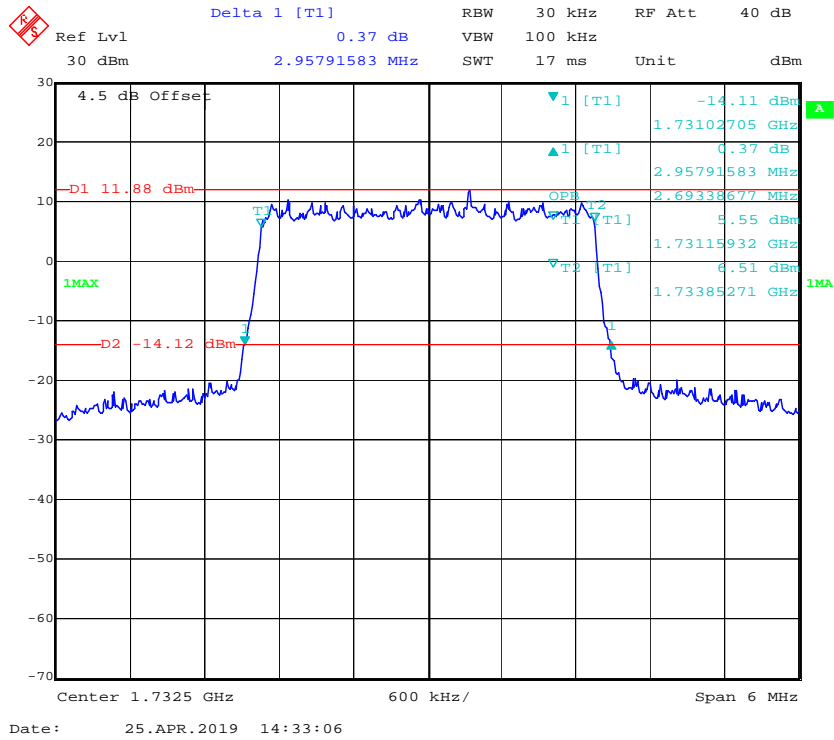


### LTE Band 4

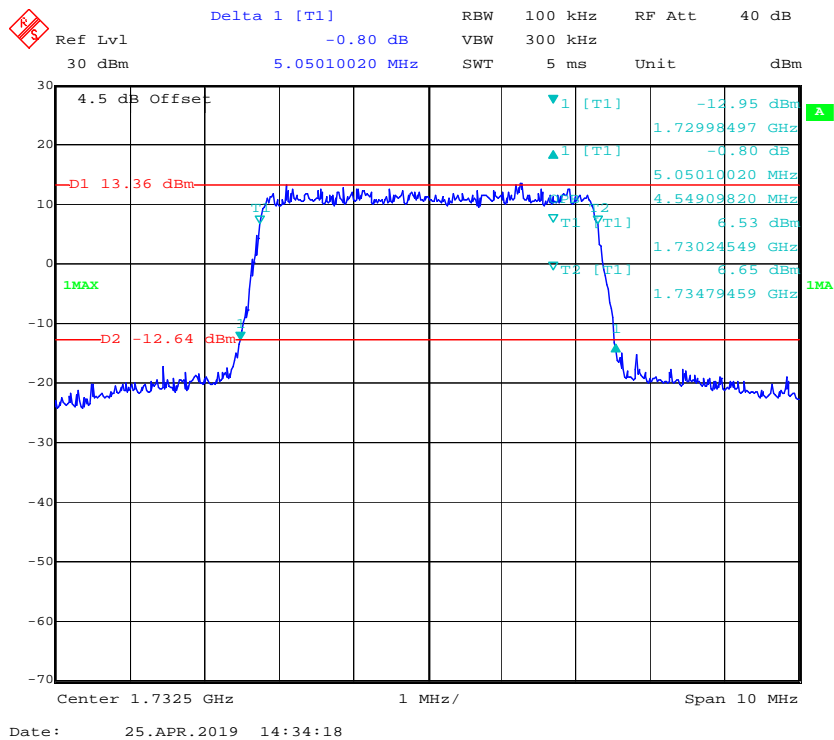
### QPSK\_1.4 MHz



### QPSK\_3 MHz

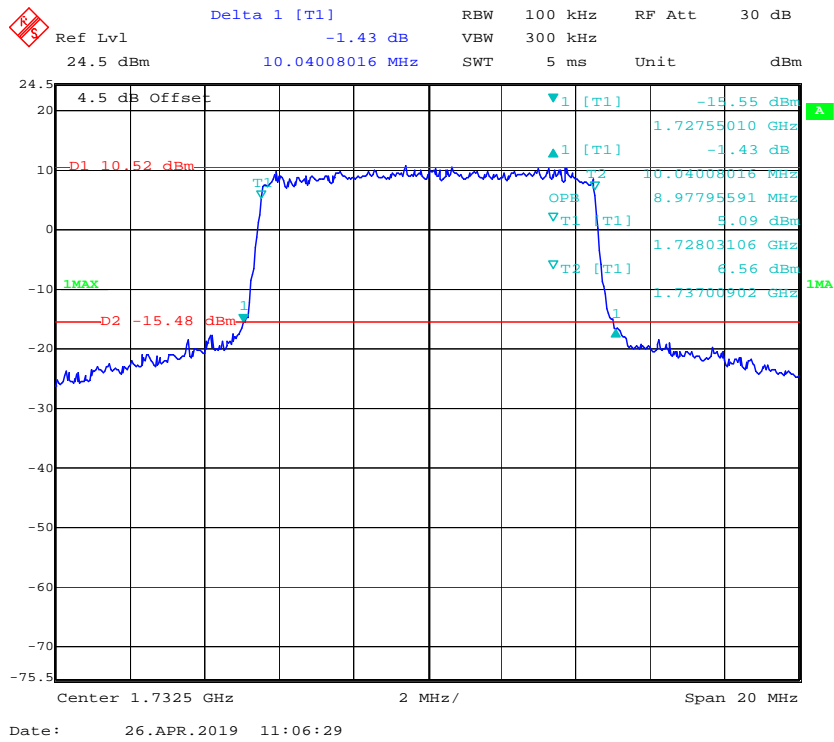


### QPSK\_5 MHz

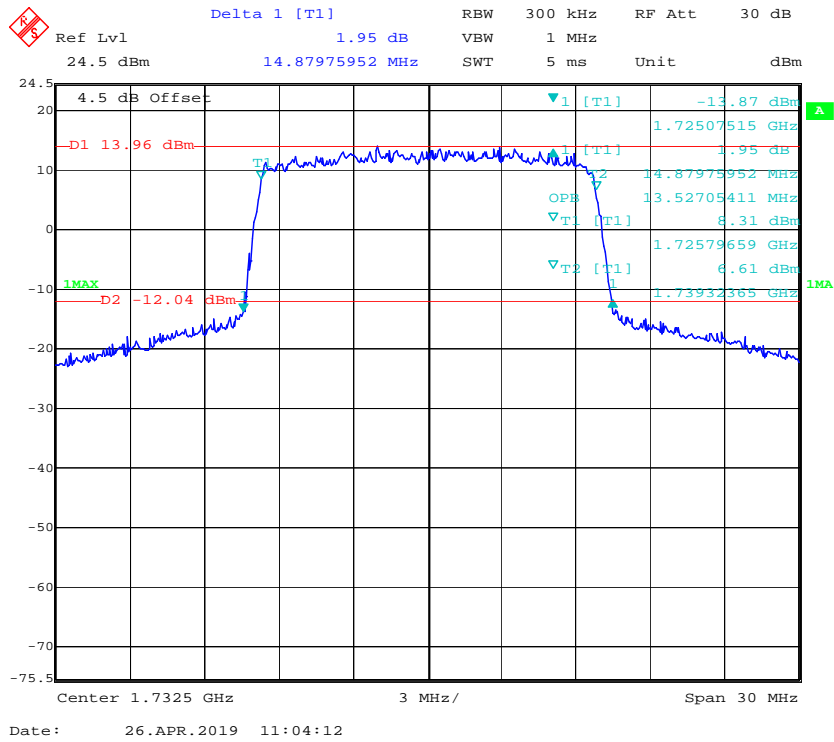




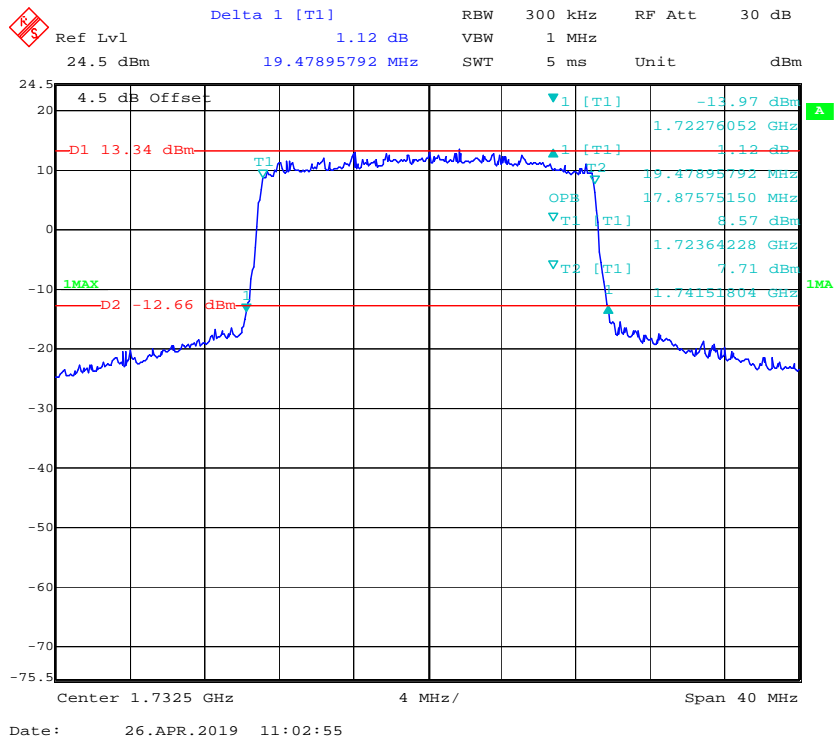
### QPSK\_10 MHz



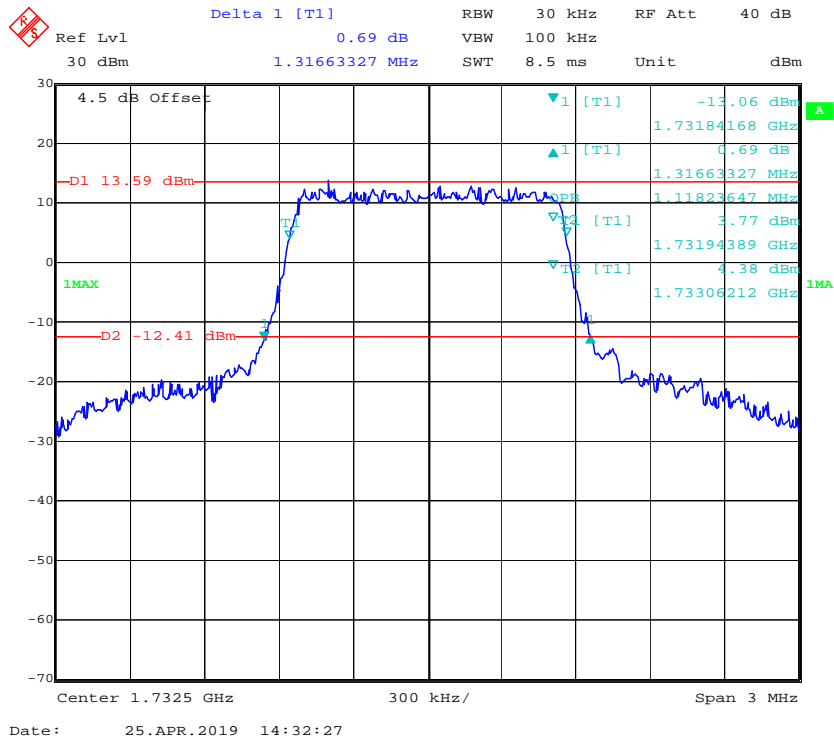
### QPSK\_15 MHz



### QPSK\_20 MHz



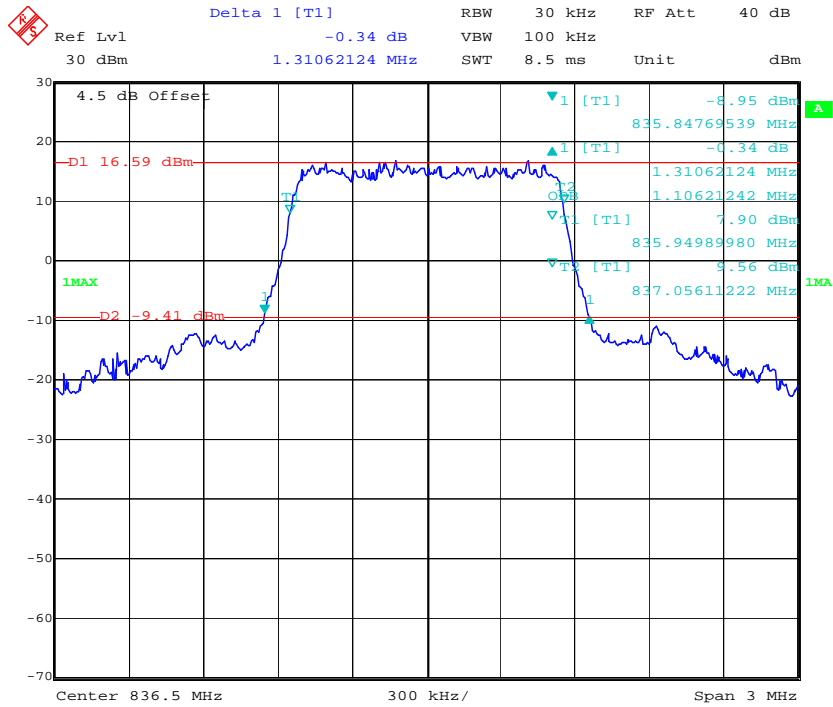
### 16QAM\_1.4 MHz





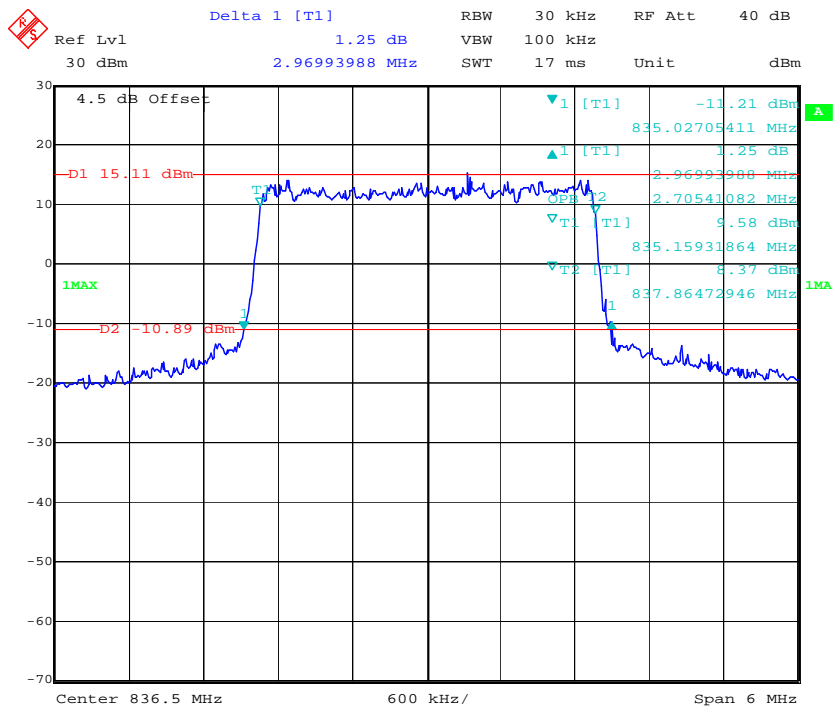
**LTE Band 5:**

**QPSK\_1.4 MHz**



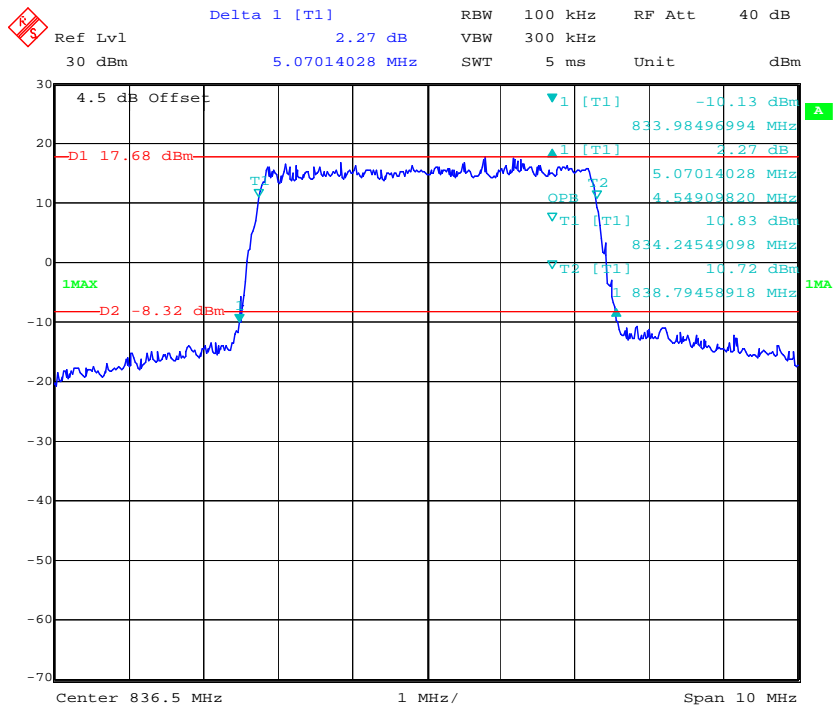
Date: 25.APR.2019 15:11:18

**QPSK\_3 MHz**



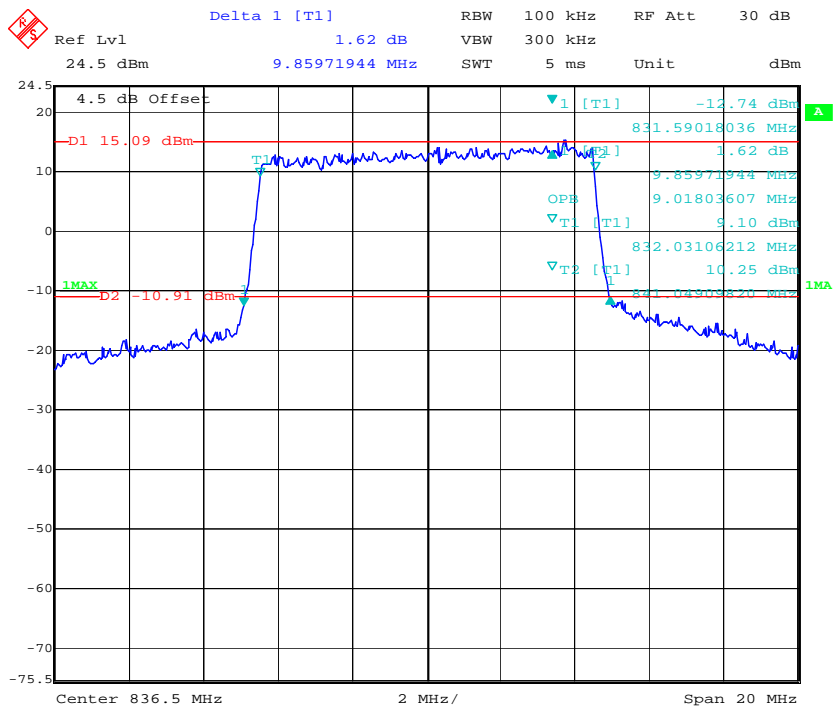
Date: 25.APR.2019 15:12:50

### QPSK\_5 MHz



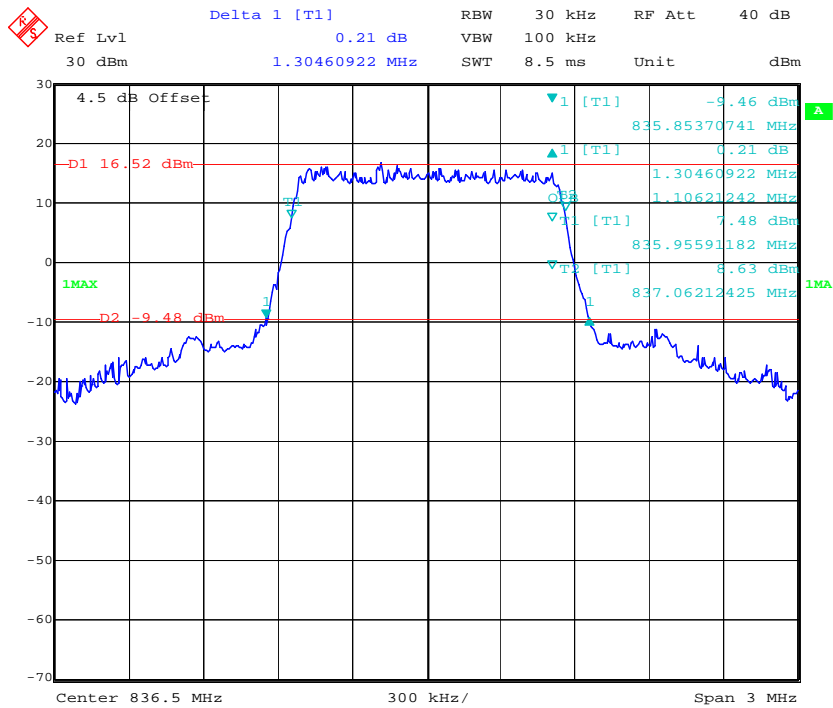
Date: 25.APR.2019 15:14:10

### QPSK\_10 MHz



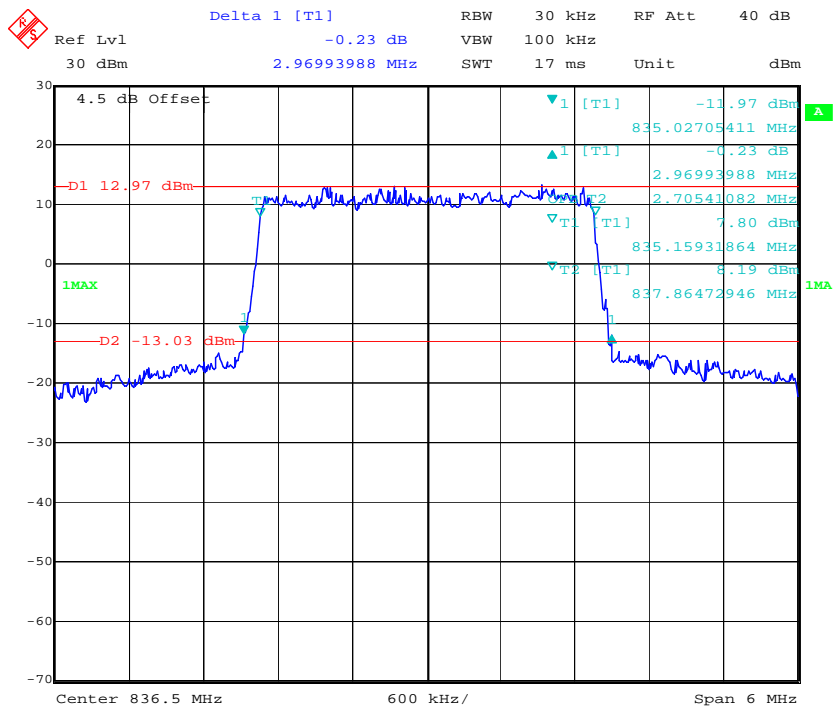
Date: 26.APR.2019 11:09:02

### 16QAM\_1.4 MHz



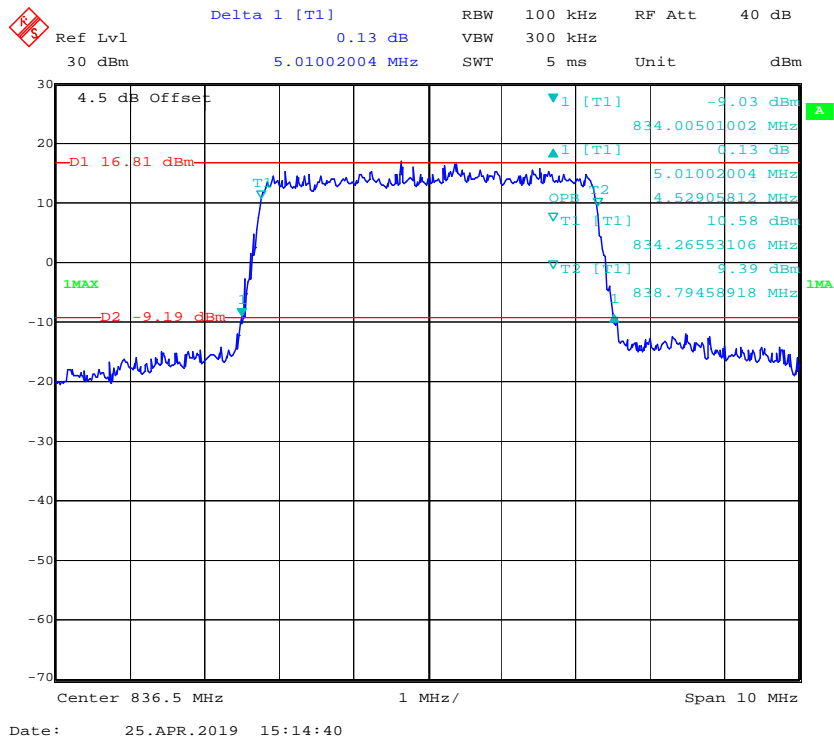
Date: 25.APR.2019 15:11:47

### 16QAM\_3 MHz



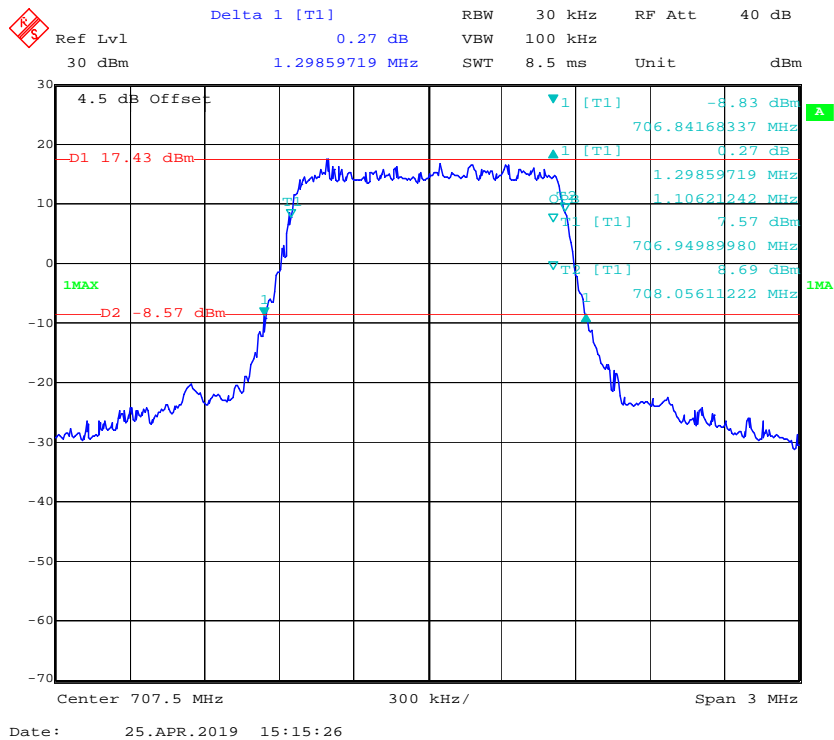
Date: 25.APR.2019 15:13:19

### 16QAM\_5 MHz

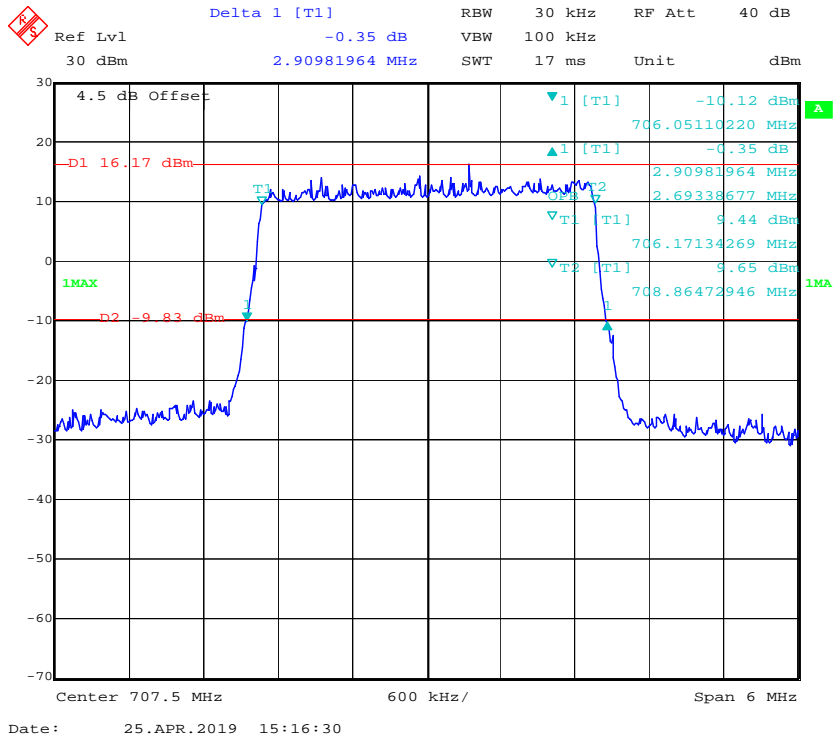


### LTE Band 12:

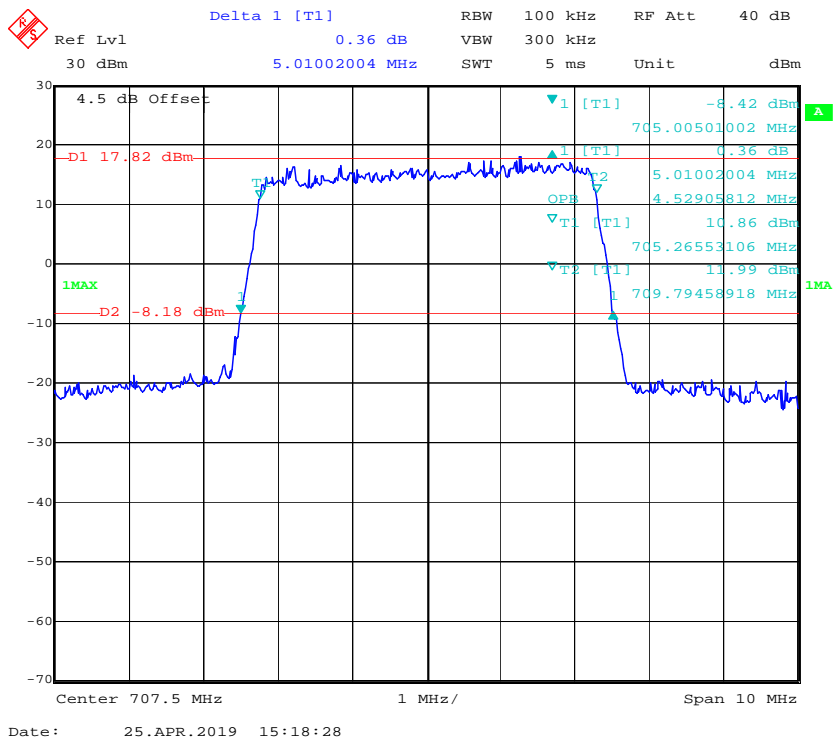
### QPSK\_1.4 MHz



### QPSK\_3 MHz

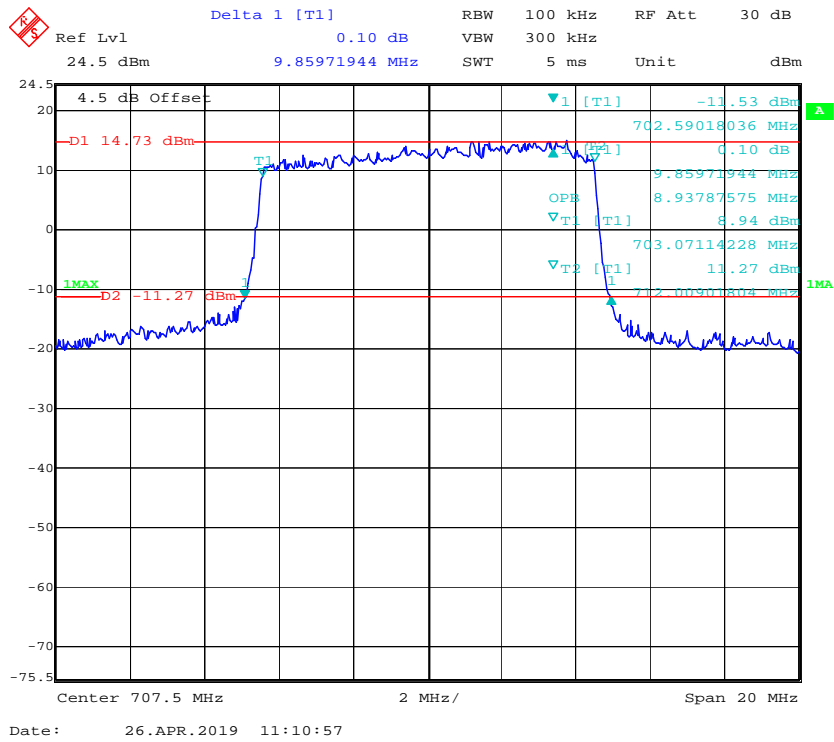


### QPSK\_5 MHz

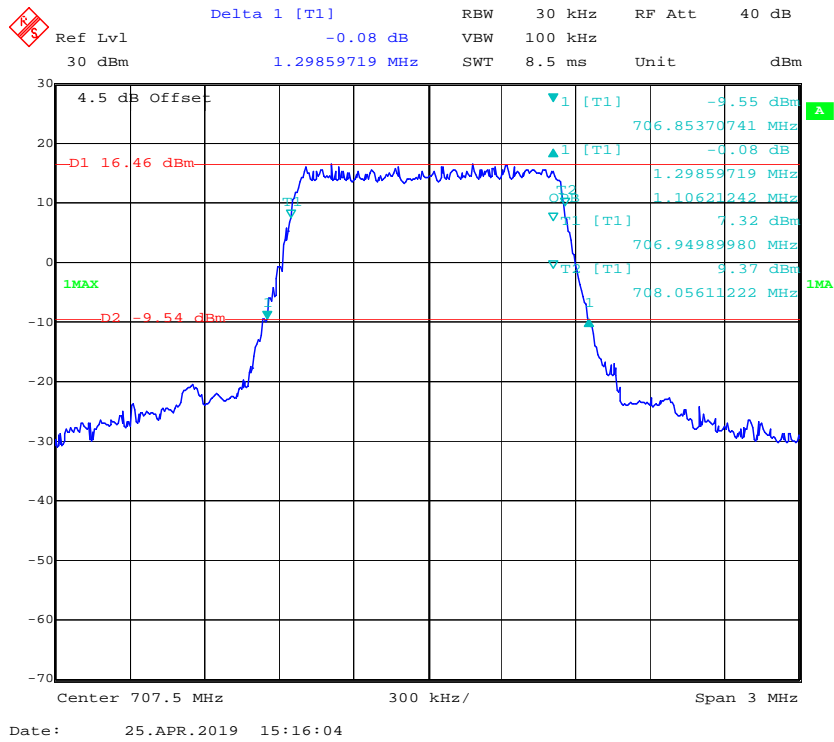




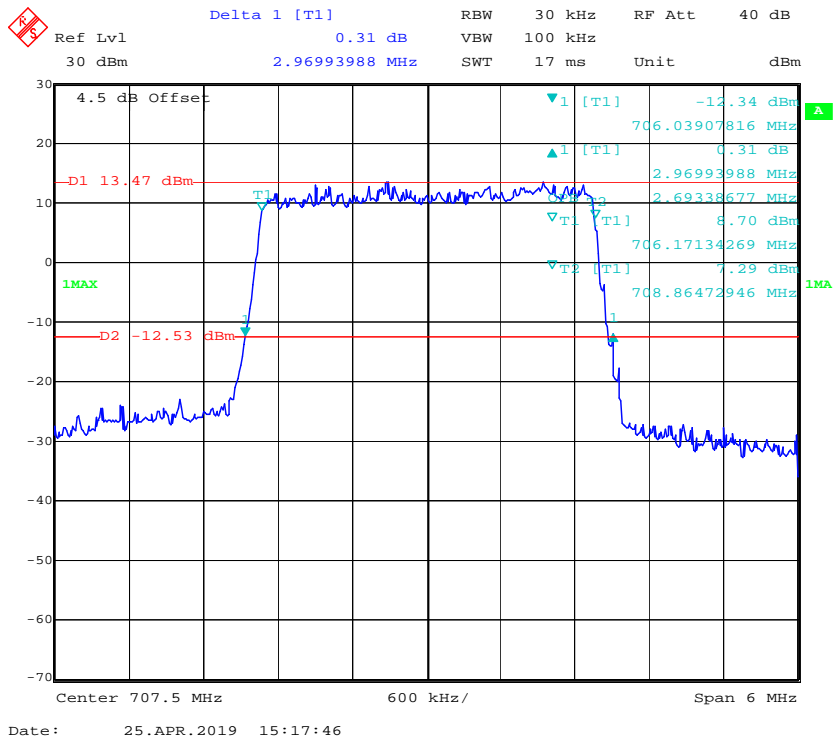
### QPSK\_10 MHz



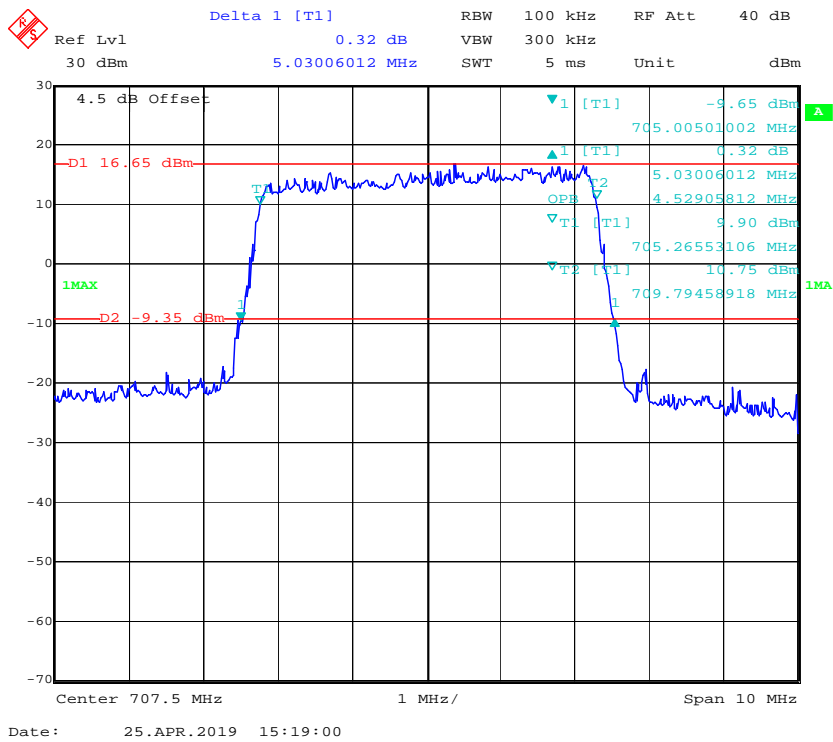
### 16QAM\_1.4 MHz



### 16QAM\_3 MHz

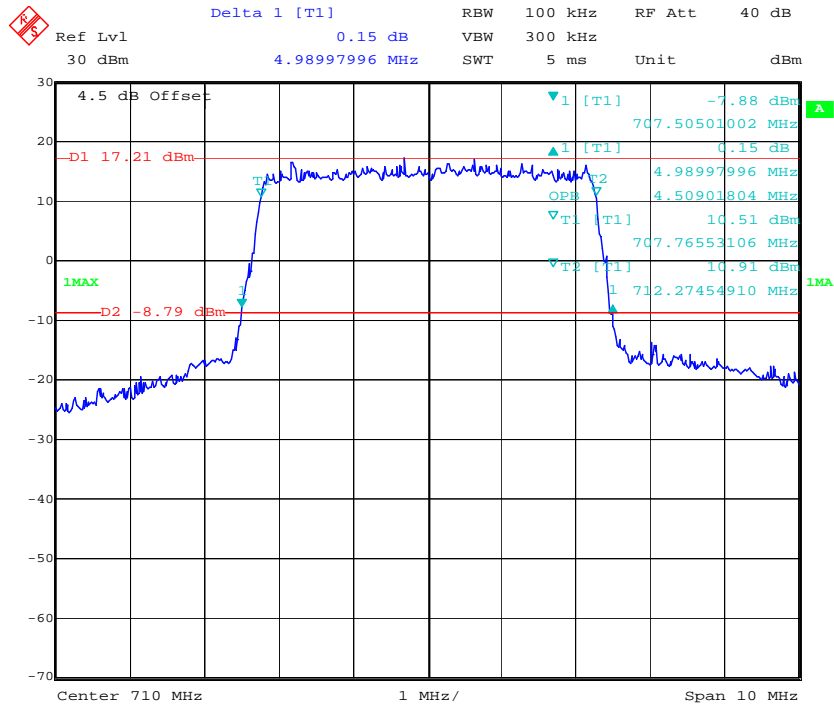


### 16QAM\_5 MHz



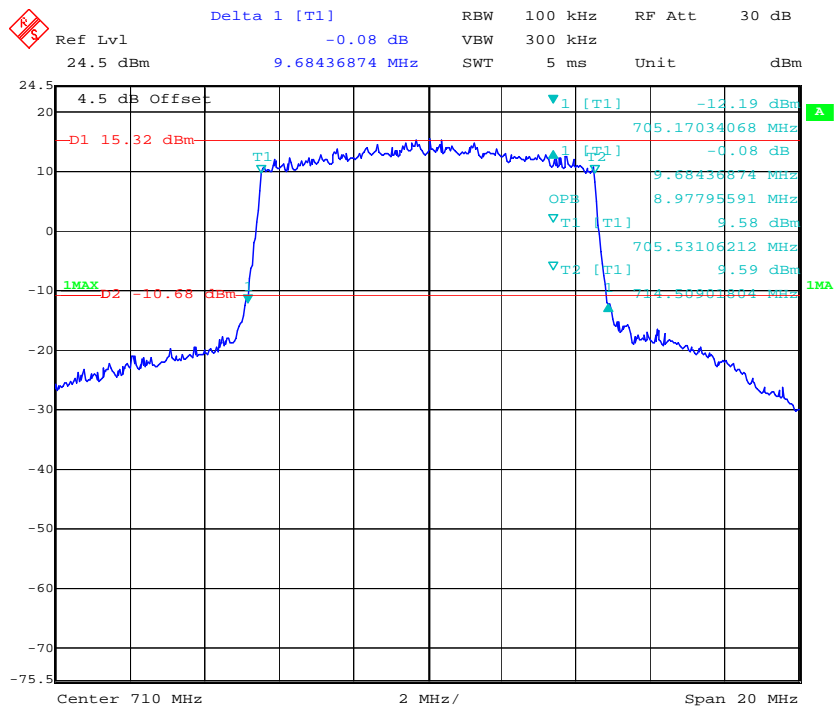
**LTE Band 17:**

**QPSK\_5 MHz**



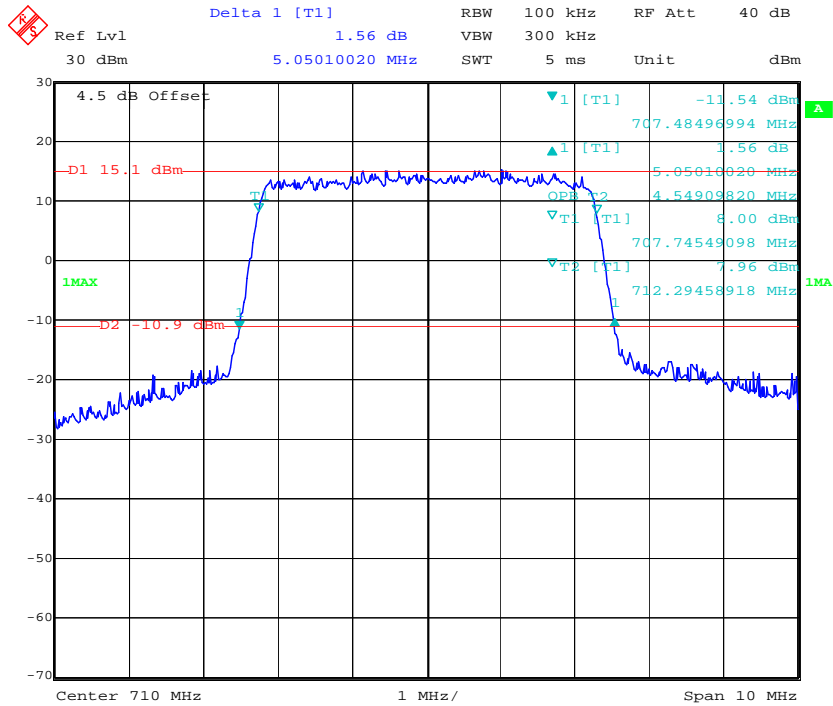
Date: 25.APR.2019 15:19:36

**QPSK\_10 MHz**



Date: 26.APR.2019 11:15:30

16QAM\_5 MHz



Date: 25.APR.2019 15:20:08

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

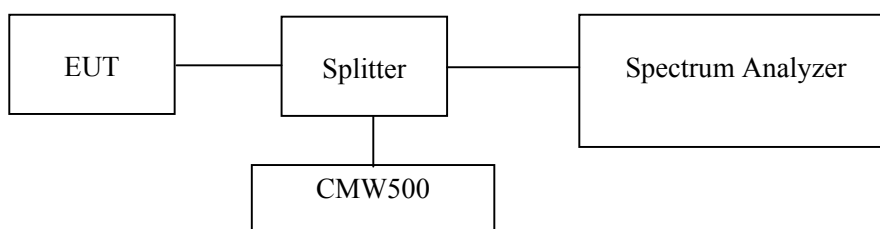
### Applicable Standard

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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
R&S	Spectrum Analyzer	FSP 38	100478	2019/5/9	2020/5/9
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

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

### Test Data

#### Environmental Conditions

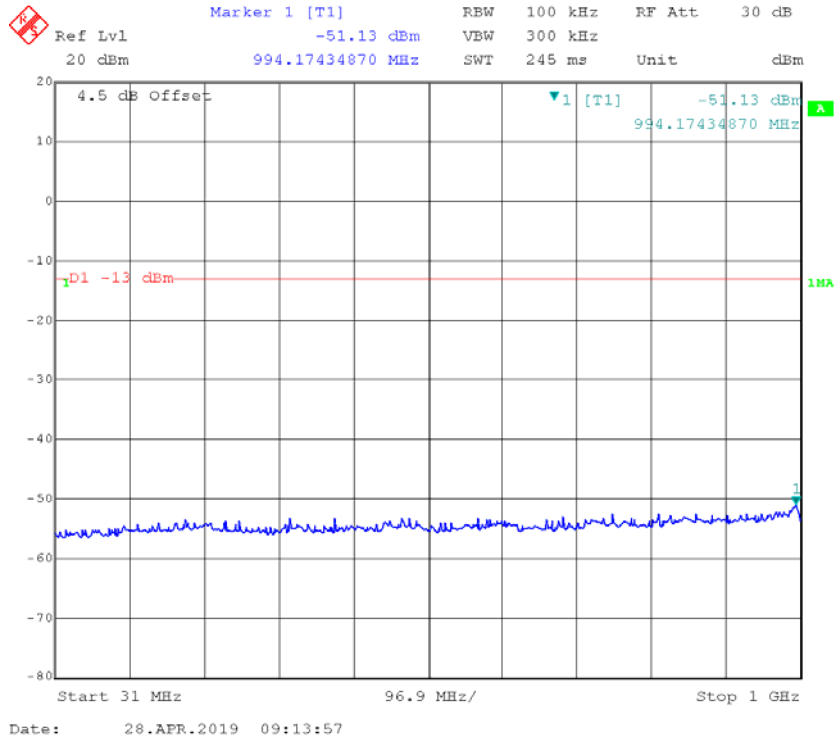
Temperature:	25.7~27.2°C
Relative Humidity:	59~60 %
ATM Pressure:	100.5~100.7kPa

\* The testing was performed by Blake Yang from 2019-04-25 to 2019-06-07.

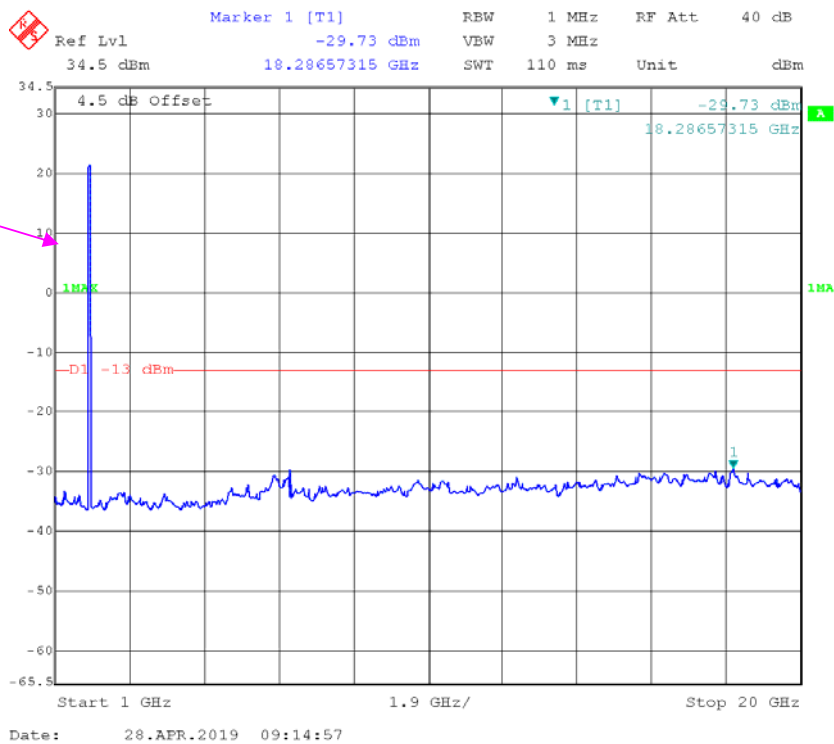
Test mode: Transmitting (Middle Channel)

Test Result: Compliance, Please refer to the following plots.

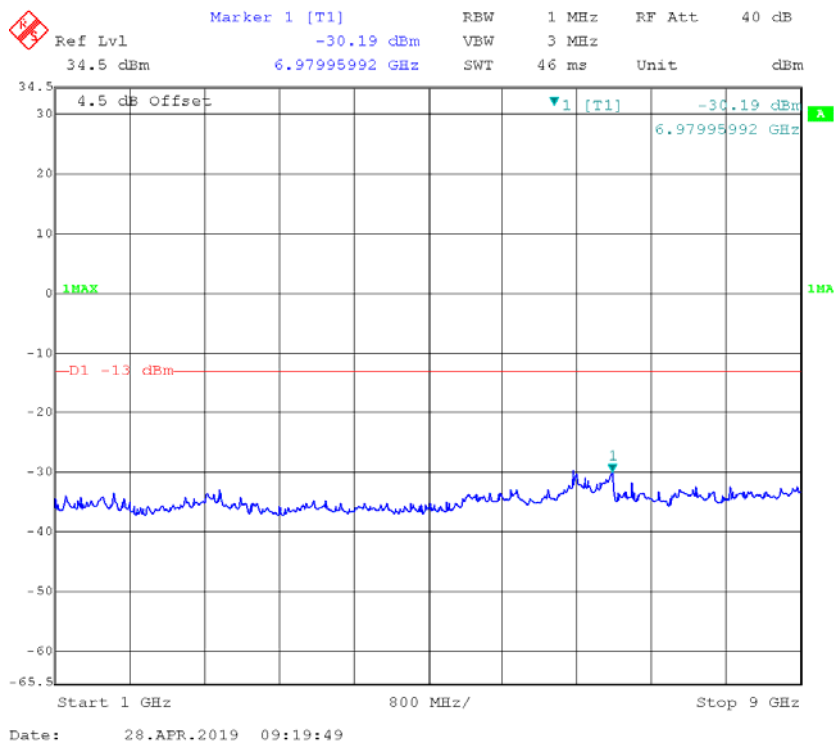
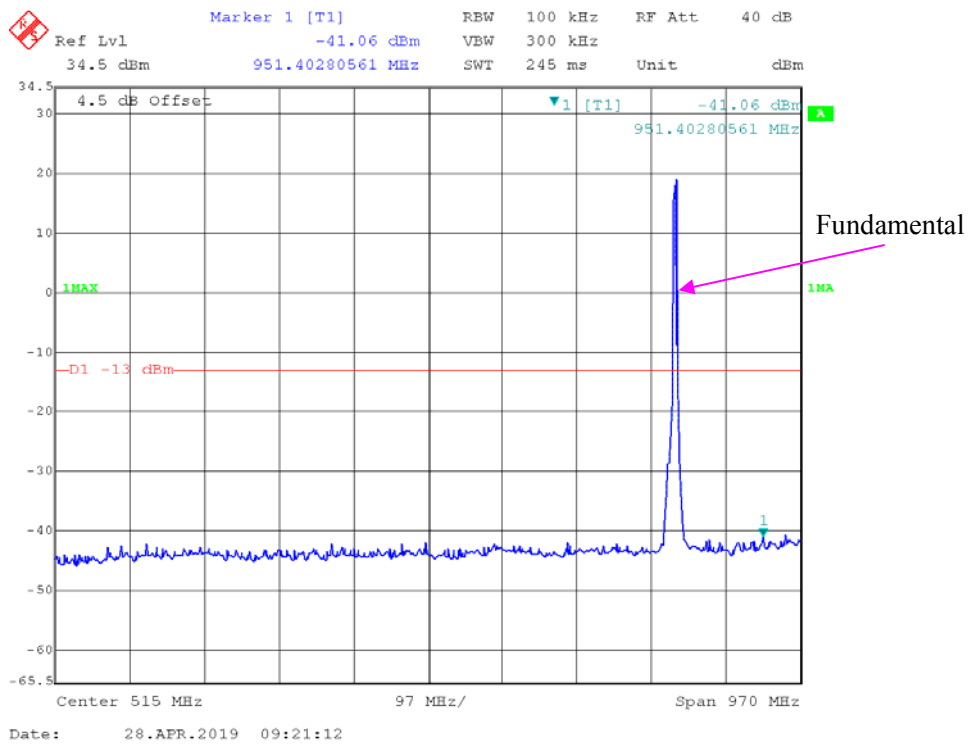
**WCDMA Band II, Rel99**



Fundamental



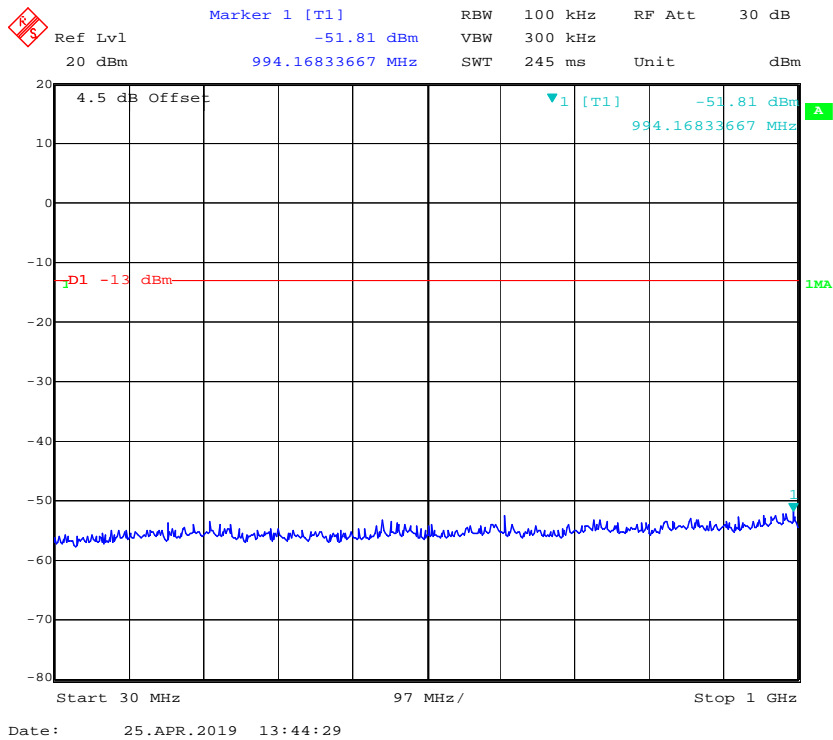
### WCDMA Band V,Rel99



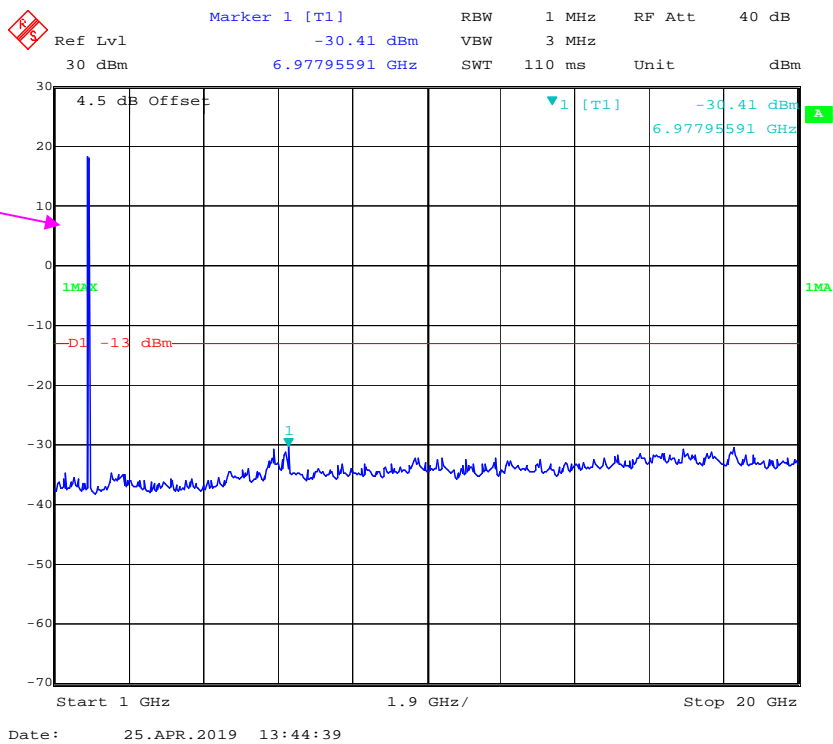




### QPSK\_3 MHz



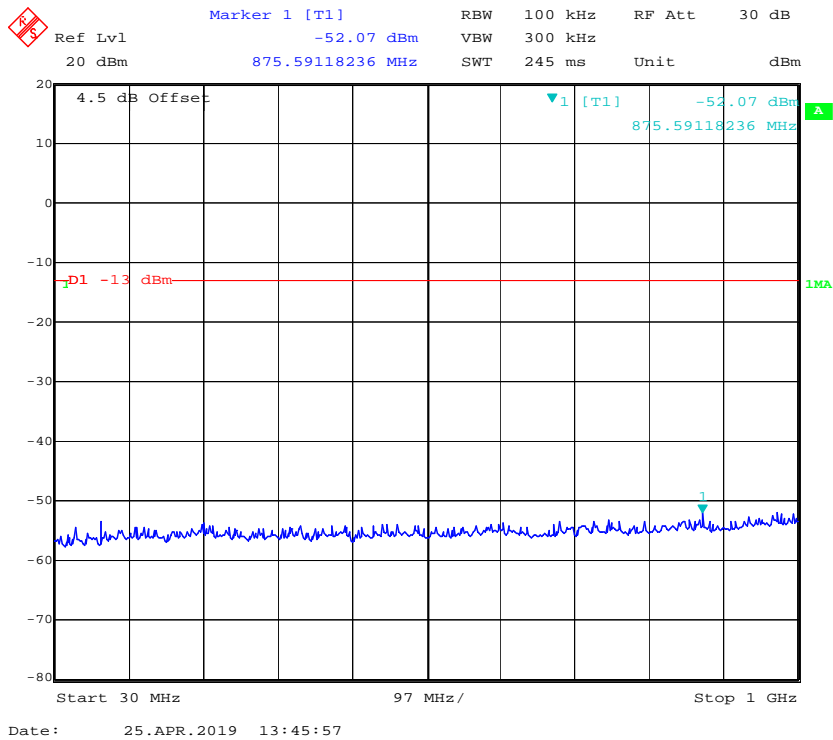
Fundamental



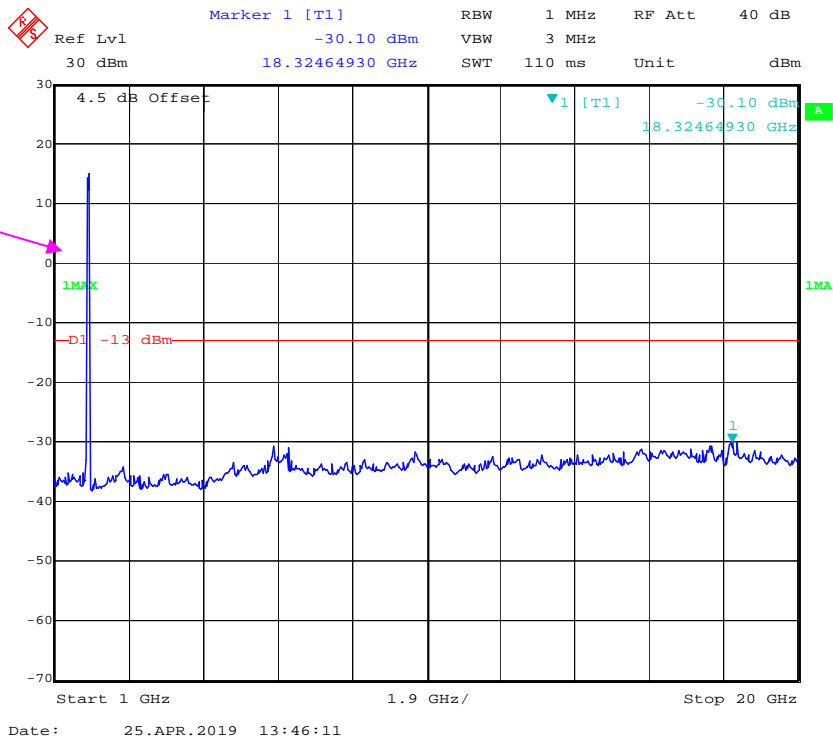




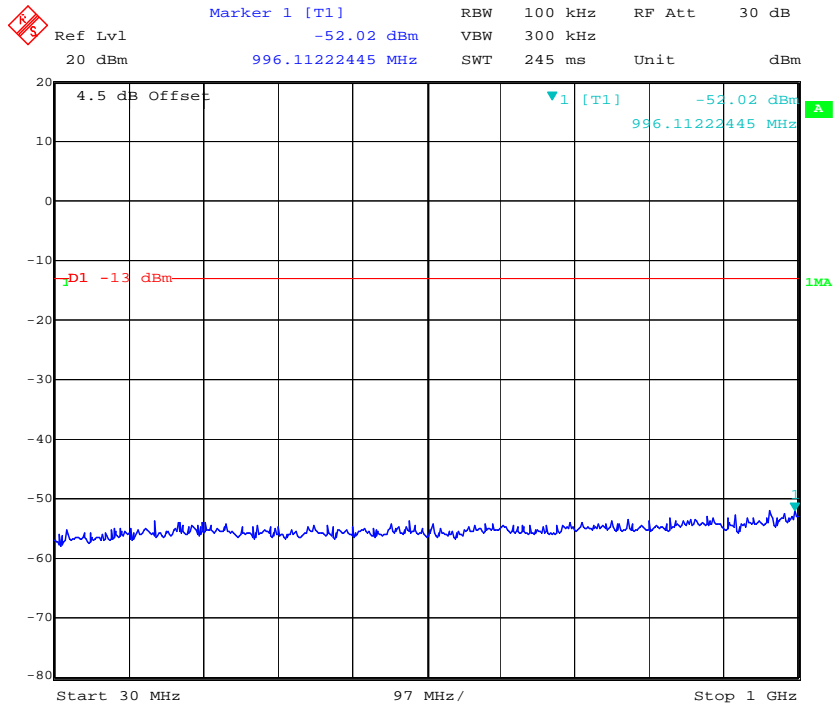
### QPSK\_15 MHz



Fundamental

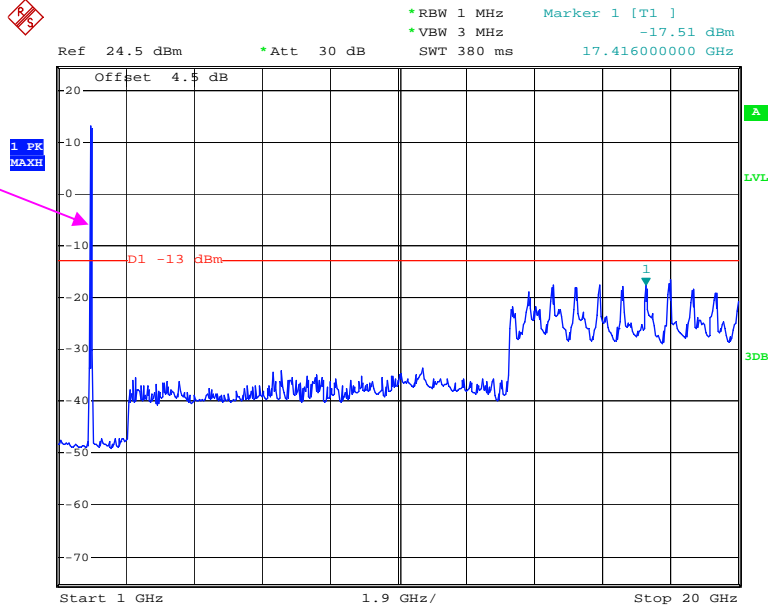


**QPSK\_20 MHz**



Date: 25.APR.2019 13:46:31

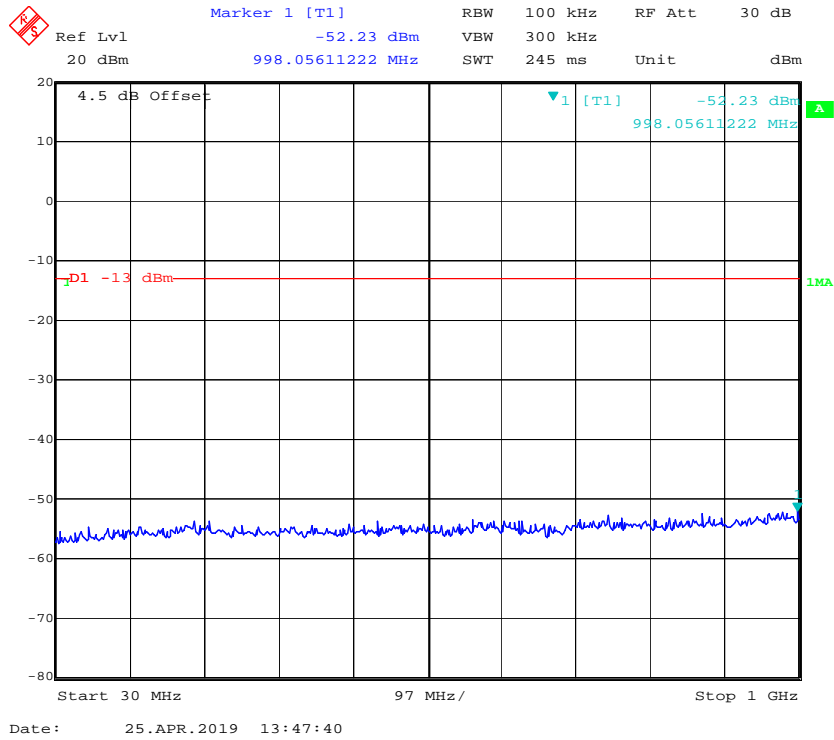
Fundamental



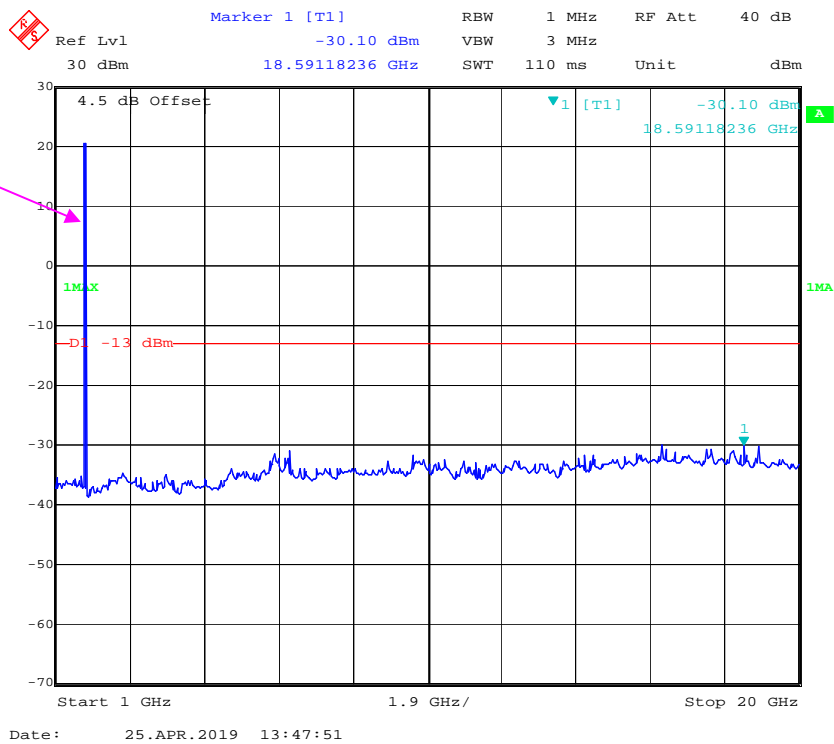
Date: 7.JUN.2019 14:10:39

LTE Band 4 (Middle Channel)

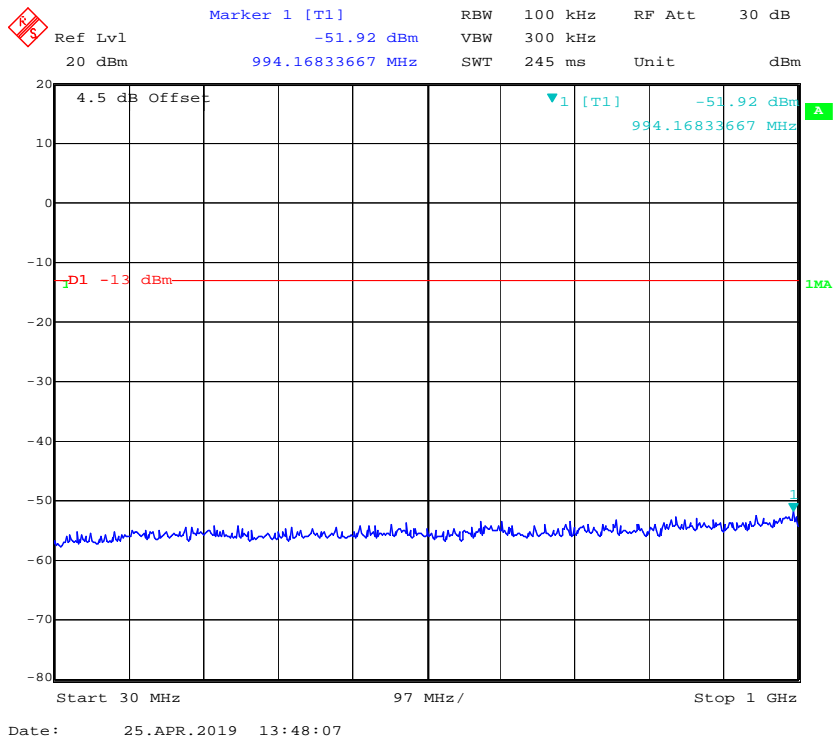
QPSK\_1.4 MHz



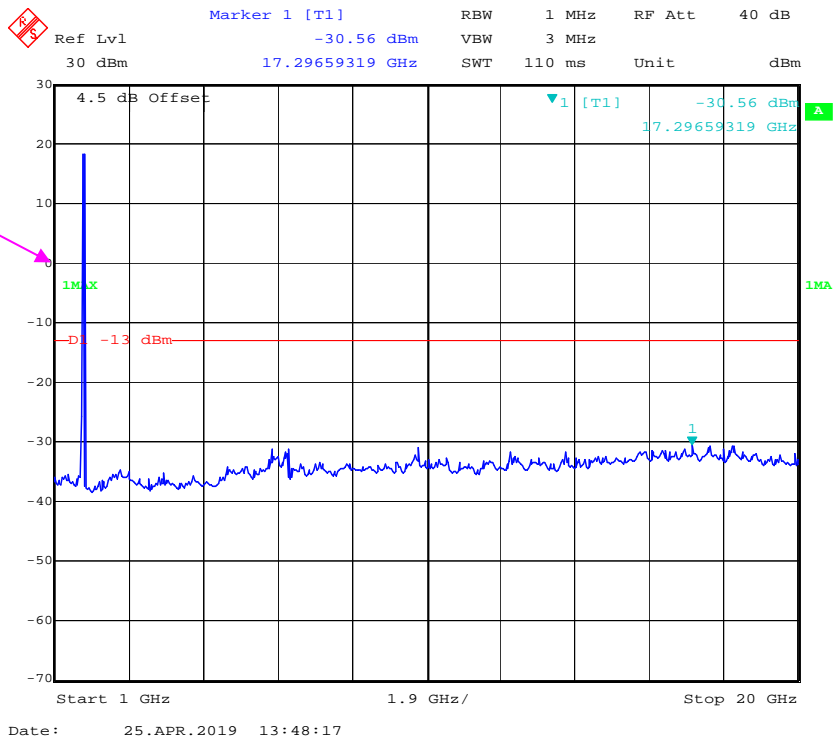
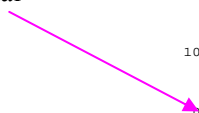
Fundamental



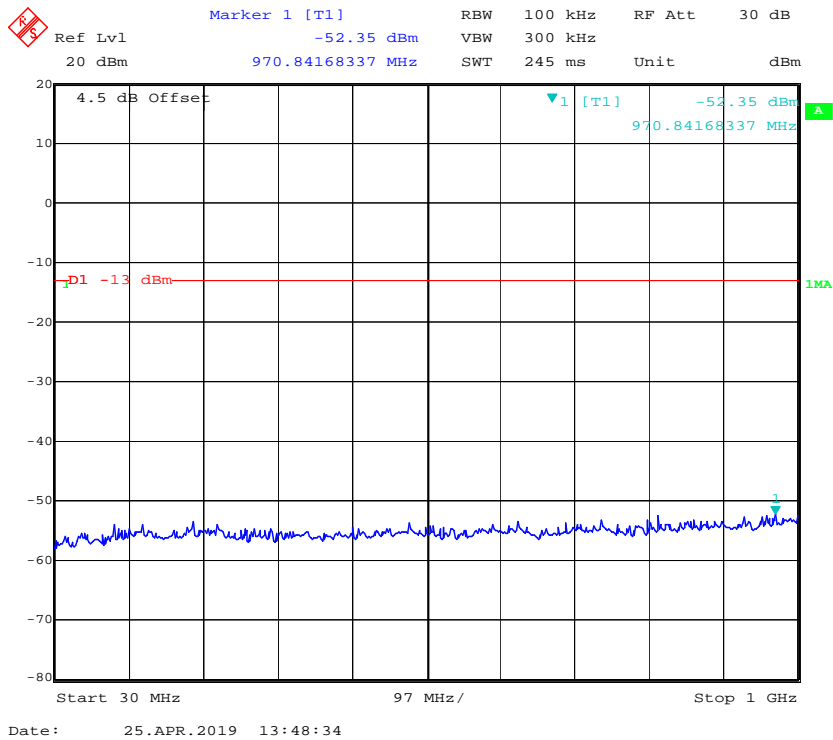
### QPSK\_3 MHz



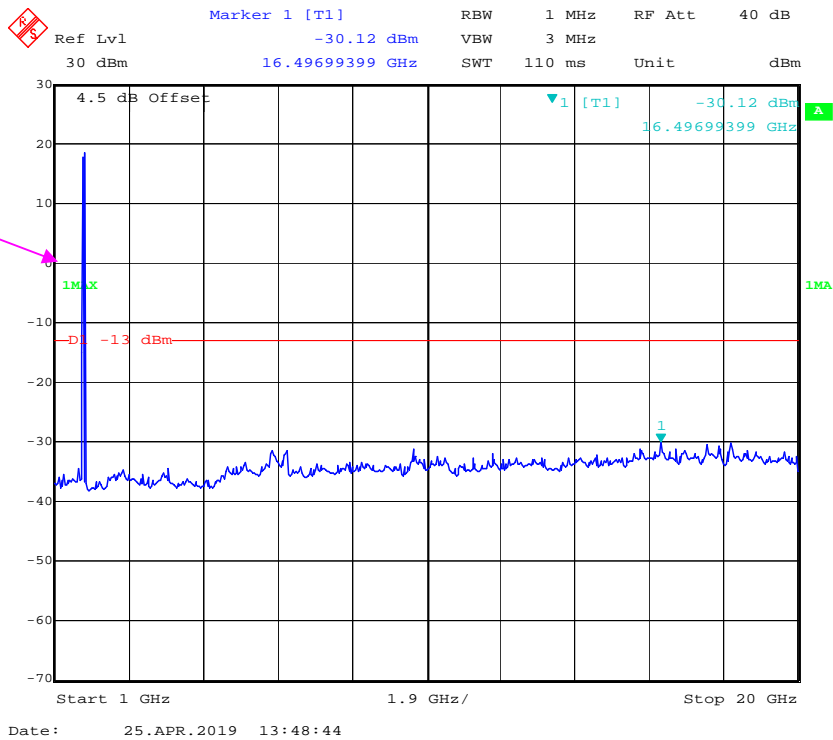
Fundamental



**QPSK\_5 MHz**



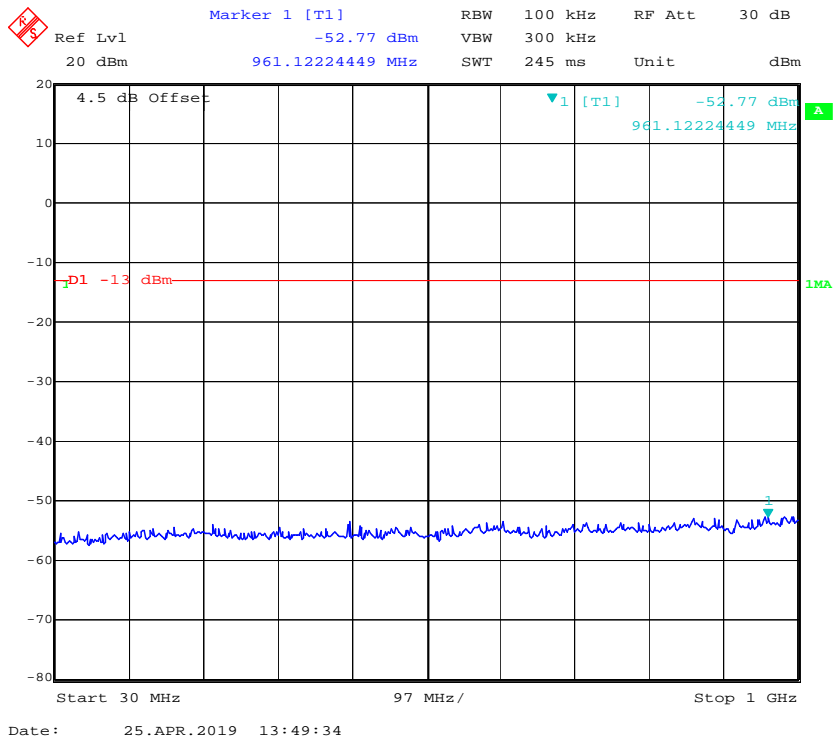
Fundamental



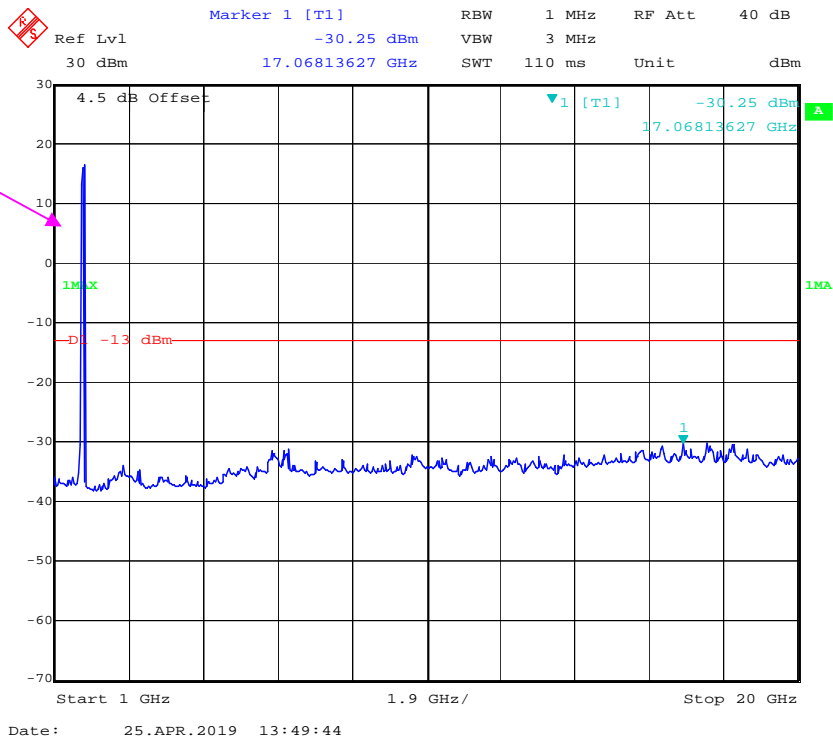




### QPSK\_15 MHz



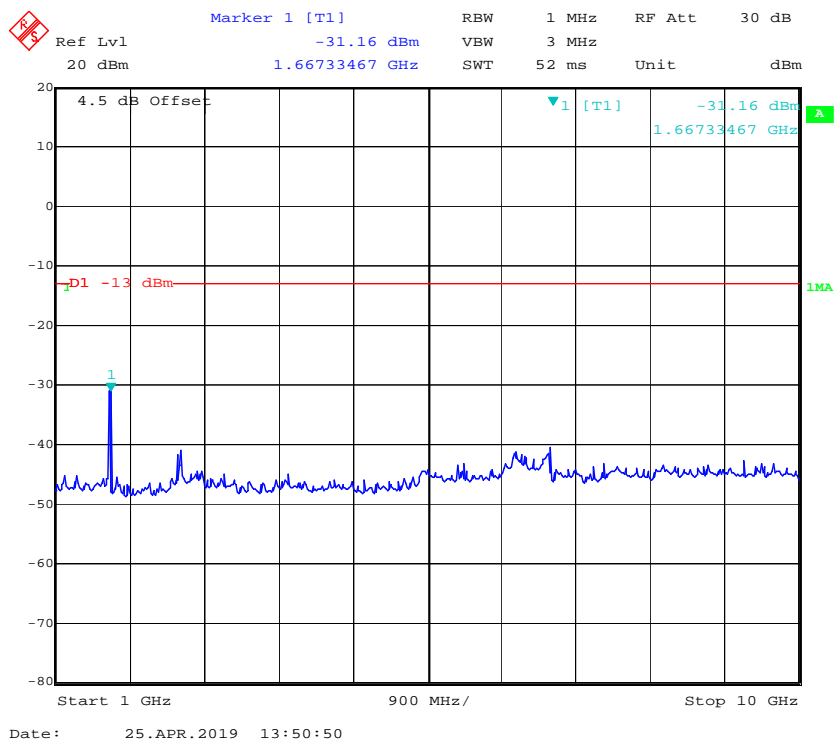
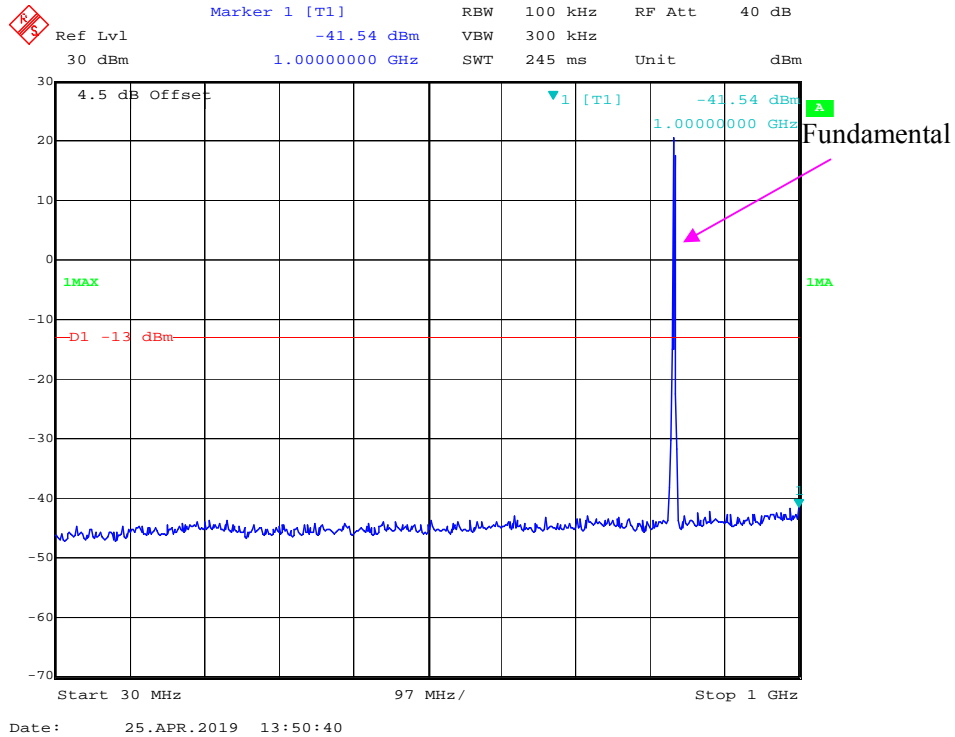
Fundamental





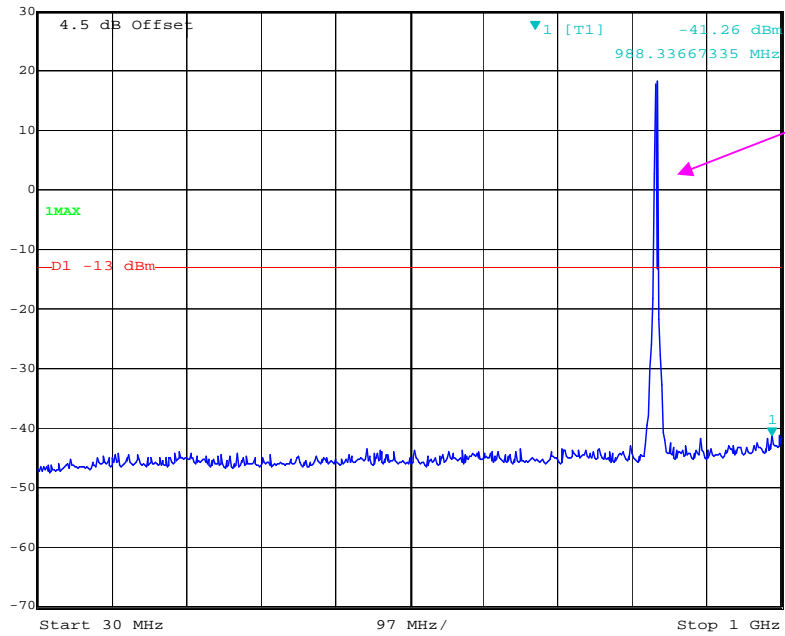
LTE Band 5 (Middle Channel)

QPSK\_1.4 MHz



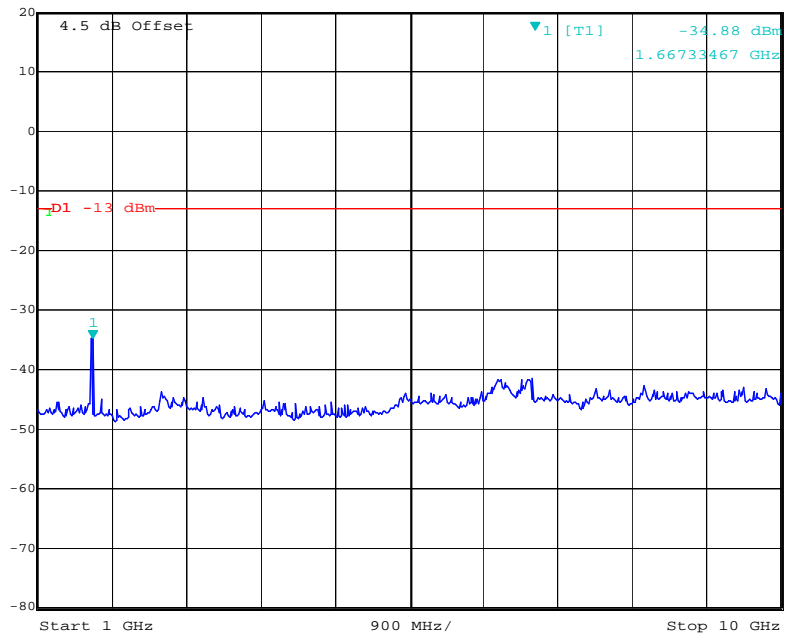
### QPSK\_3 MHz

	Marker 1 [T1]	RBW	100 kHz	RF Att	40 dB
	Ref Lvl	-41.26 dBm	VBW	300 kHz	
	30 dBm	988.33667335 MHz	SWT	245 ms	Unit dBm



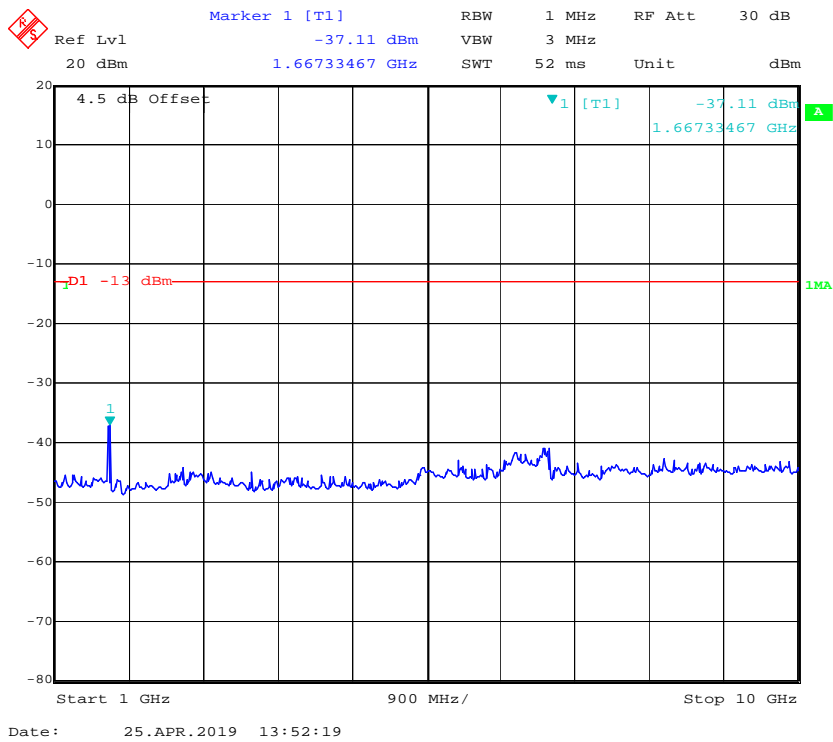
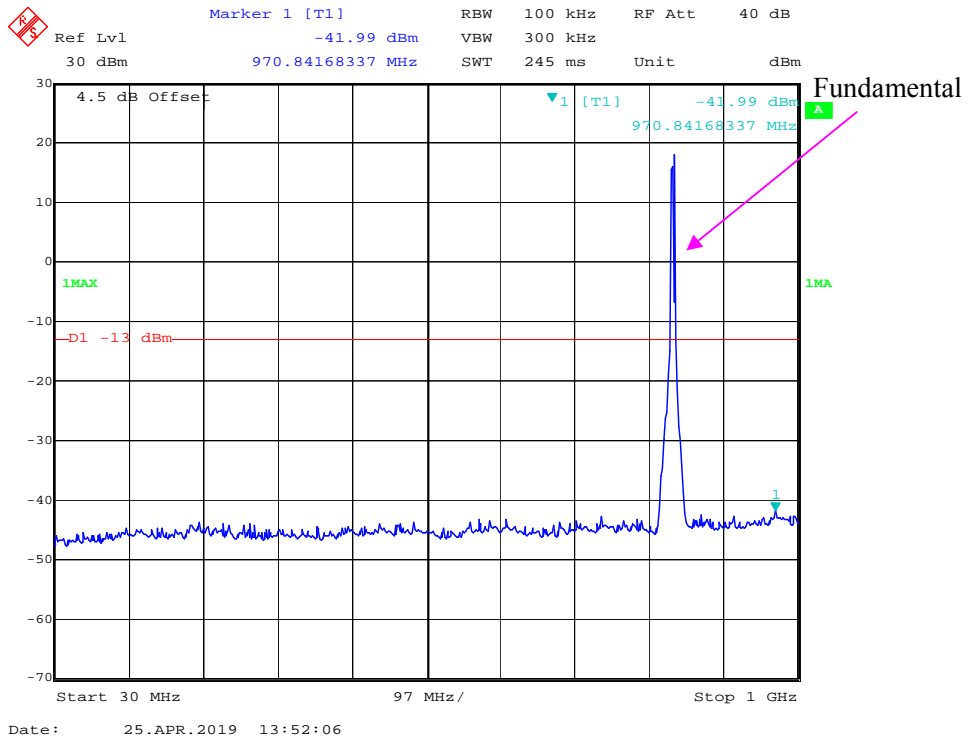
Date: 25.APR.2019 13:51:07

	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
	Ref Lvl	-34.88 dBm	VBW	3 MHz	
	20 dBm	1.66733467 GHz	SWT	52 ms	Unit dBm

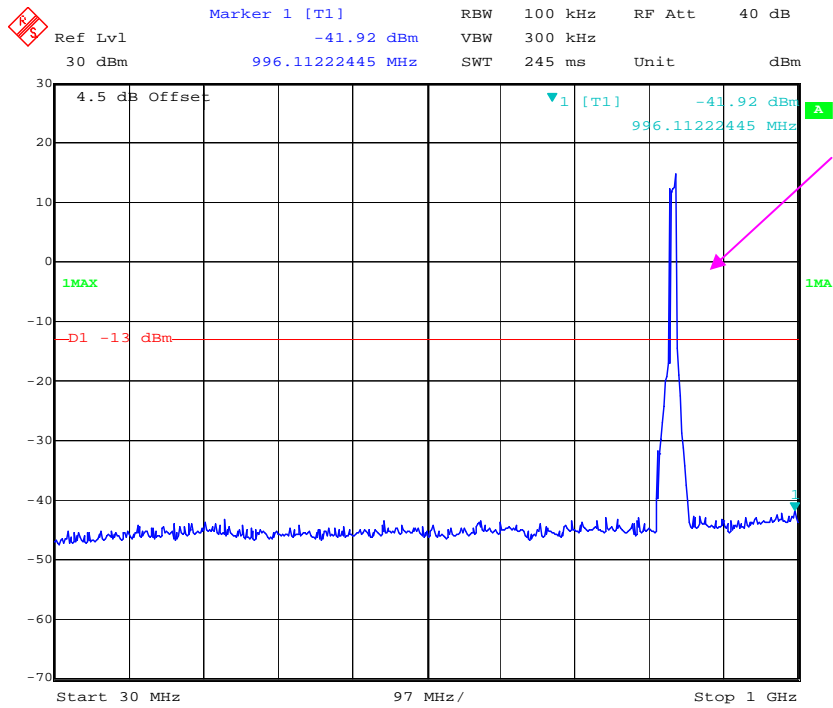


Date: 25.APR.2019 13:51:16

### QPSK\_5 MHz

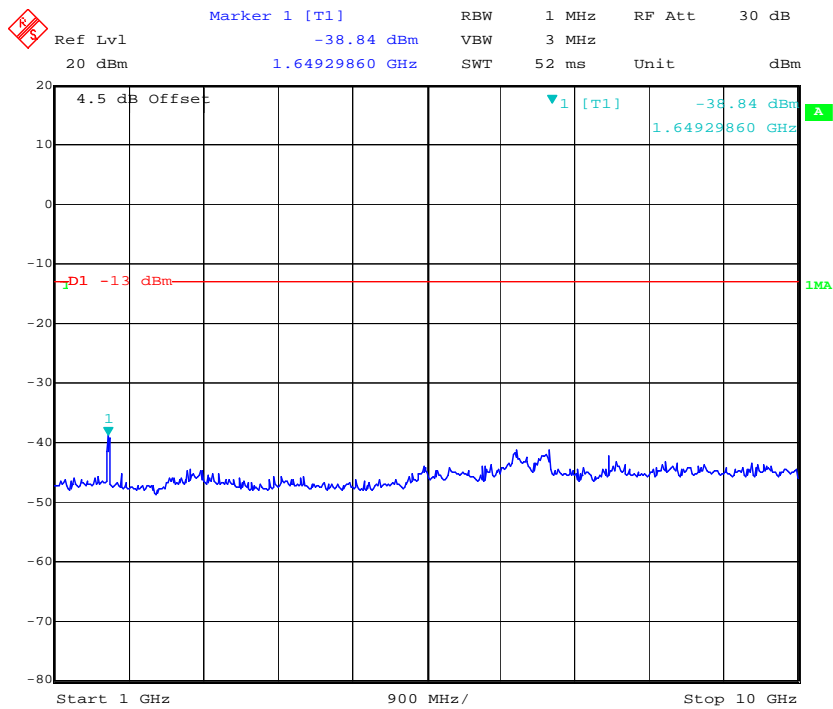


### QPSK\_10 MHz



Fundamental

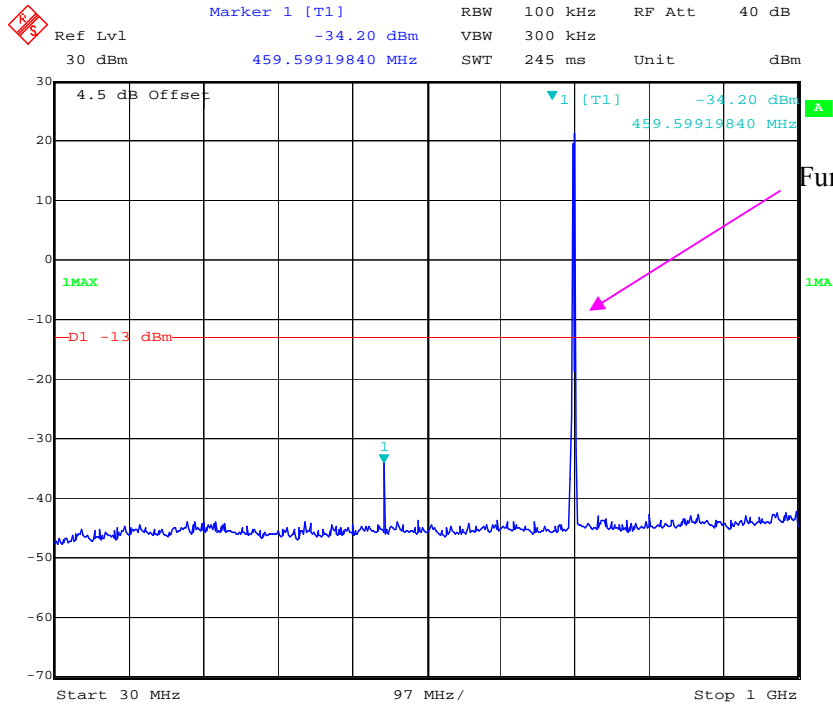
Date: 25.APR.2019 13:52:37



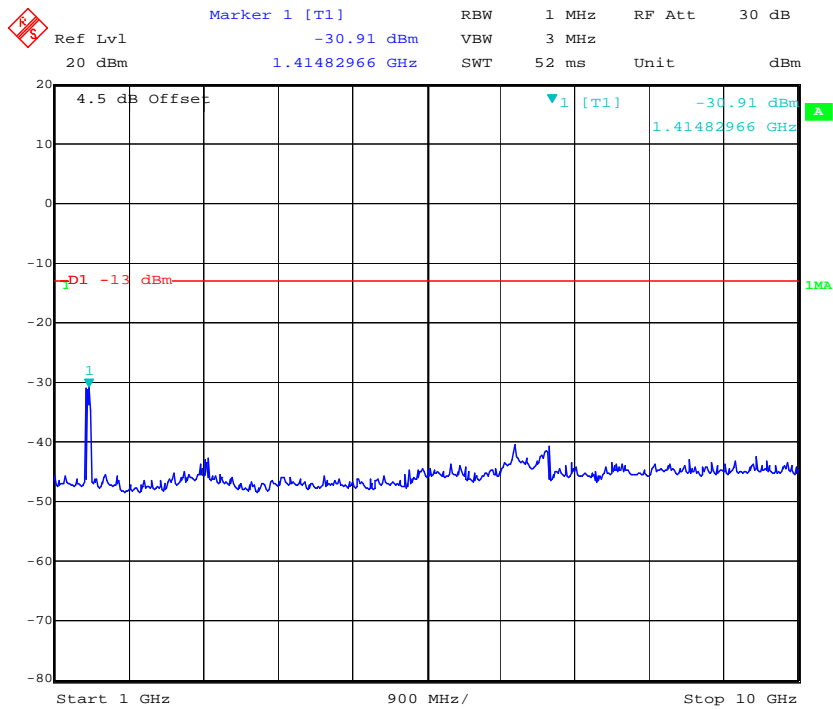
Date: 25.APR.2019 13:52:46

LTE Band 12 (Middle Channel)

QPSK\_1.4 MHz



Date: 25.APR.2019 13:53:03

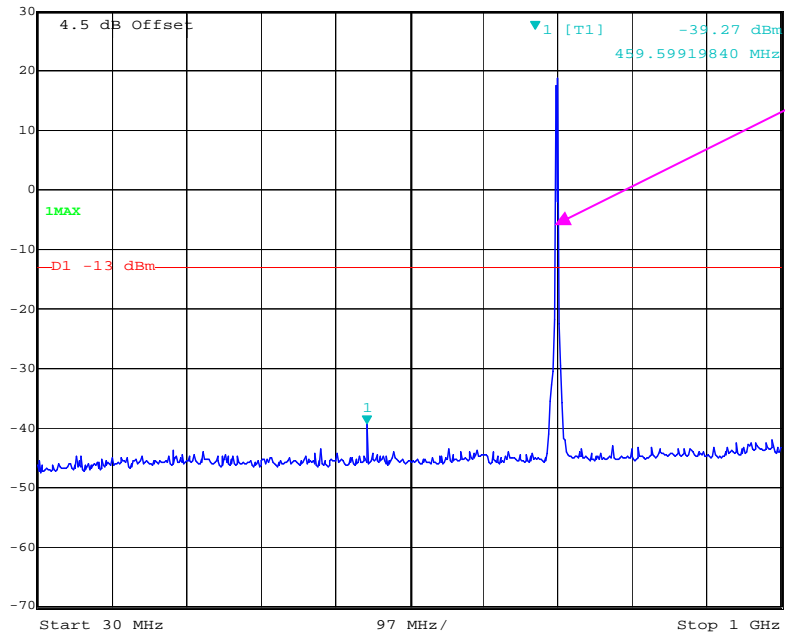


Date: 25.APR.2019 13:53:13



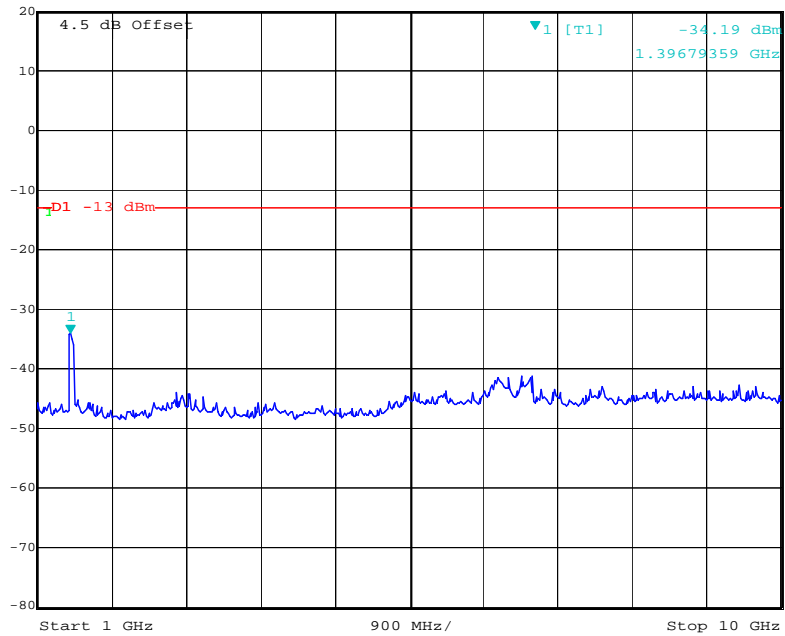
**QPSK\_3 MHz**

	Marker 1 [T1]	RBW	100 kHz	RF Att	40 dB
	Ref Lvl	-39.27 dBm	VBW	300 kHz	
	30 dBm	459.59919840 MHz	SWT	245 ms	Unit dBm



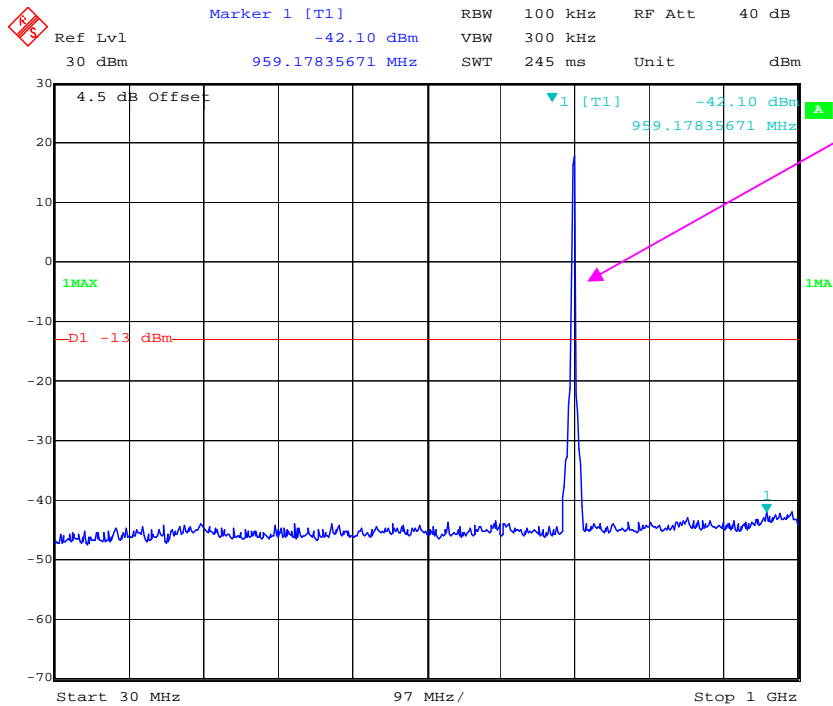
Date: 25.APR.2019 13:53:30

	Marker 1 [T1]	RBW	1 MHz	RF Att	30 dB
	Ref Lvl	-34.19 dBm	VBW	3 MHz	
	20 dBm	1.39679359 GHz	SWT	52 ms	Unit dBm



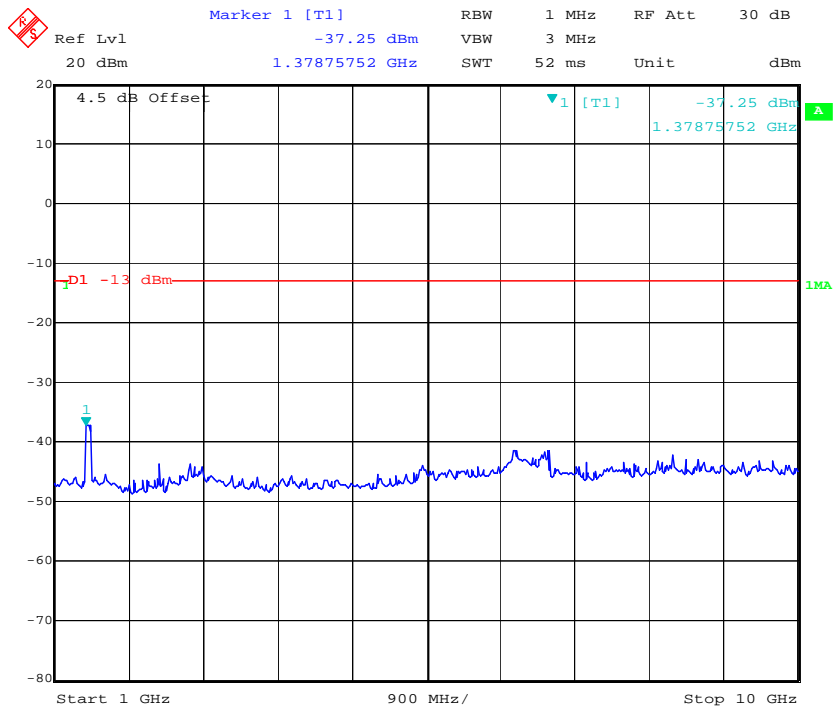
Date: 25.APR.2019 13:53:39

### QPSK\_5 MHz




Fundamental

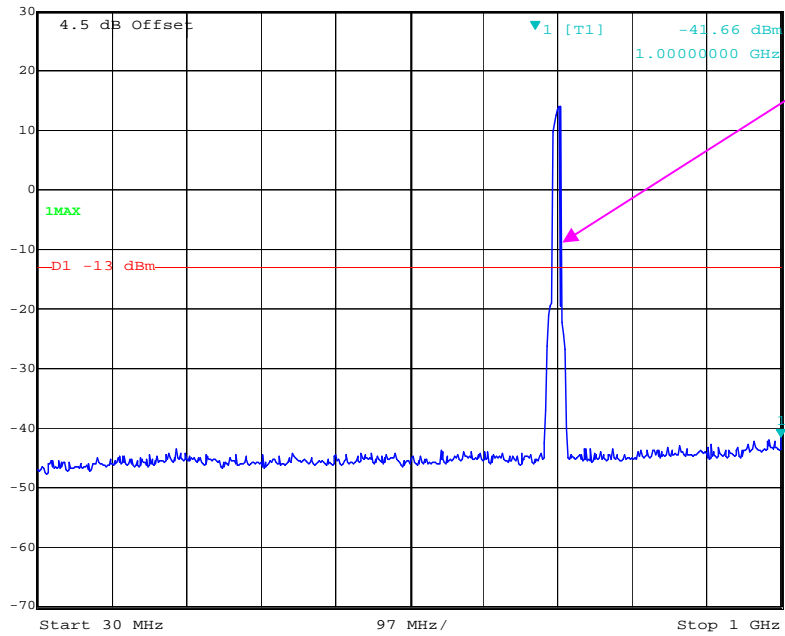
Date: 25.APR.2019 13:53:56




Date: 25.APR.2019 13:54:06

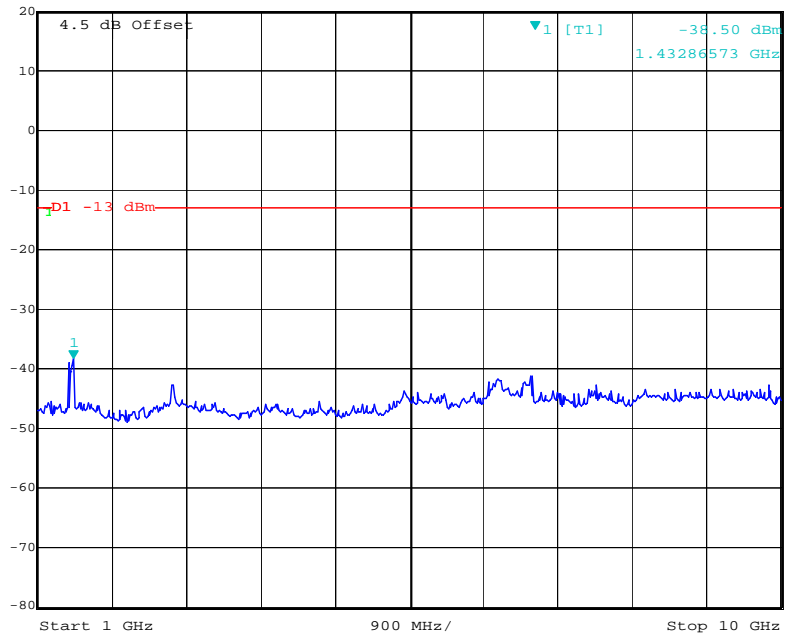
### QPSK\_10 MHz

 Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -41.66 dBm VBW 300 kHz  
30 dBm 1.00000000 GHz SWT 245 ms Unit dBm



Date: 25.APR.2019 13:54:24

 Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -38.50 dBm VBW 3 MHz  
20 dBm 1.43286573 GHz SWT 52 ms Unit dBm

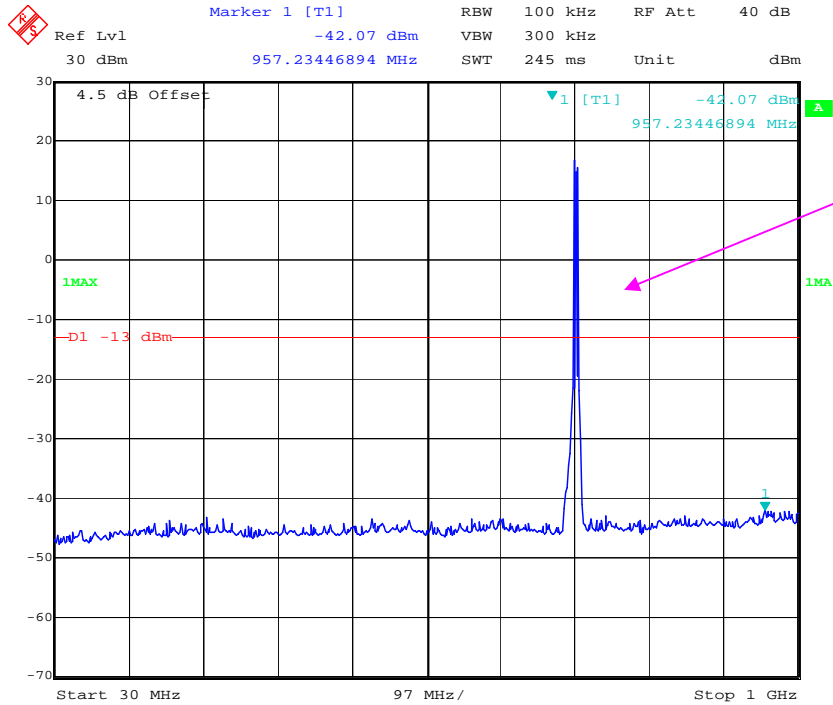


Date: 25.APR.2019 13:54:34

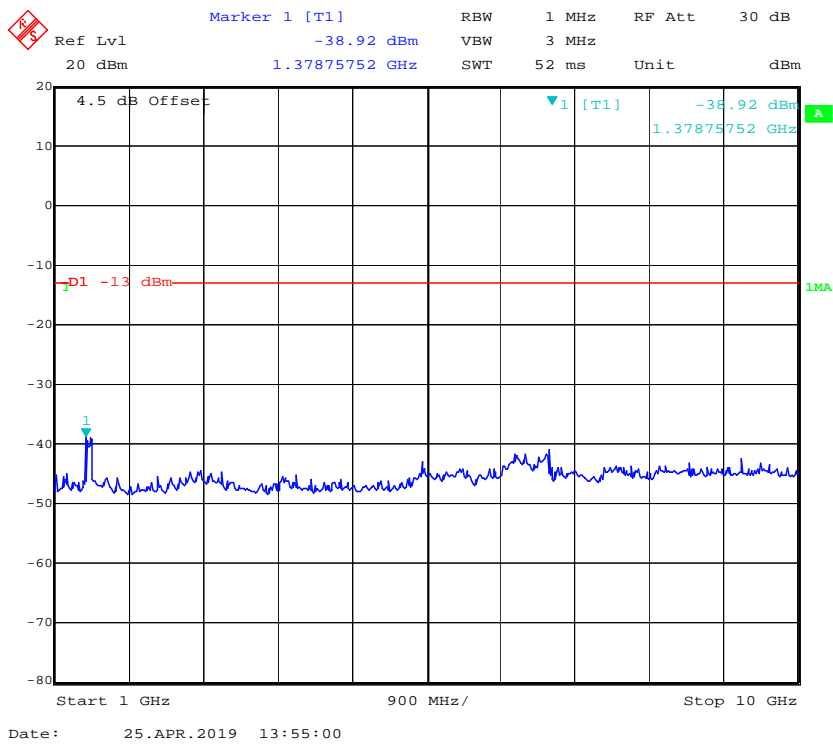
Fundamental

LTE Band 17 (Middle Channel)

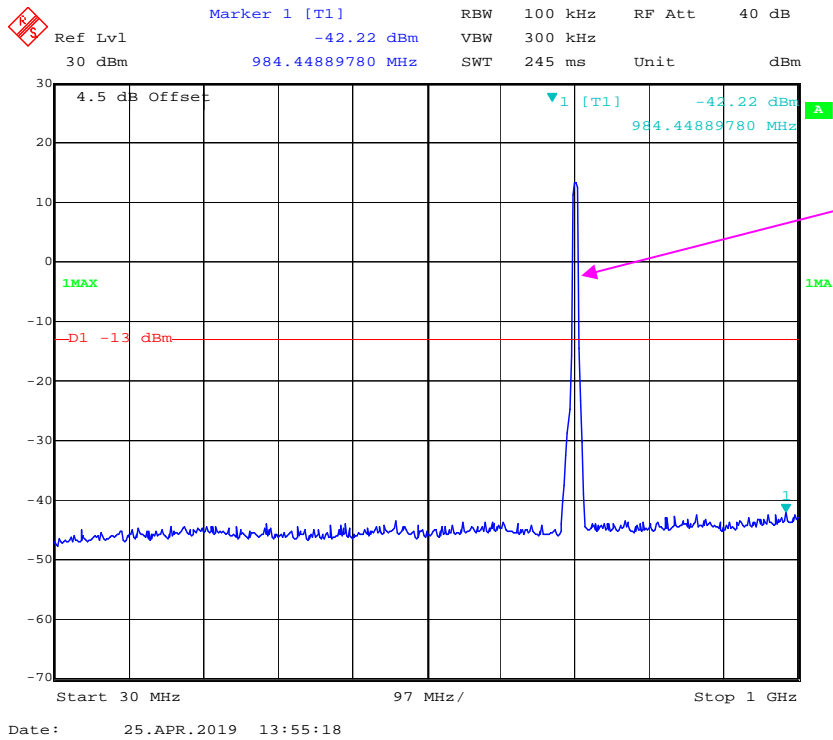
QPSK\_5 MHz



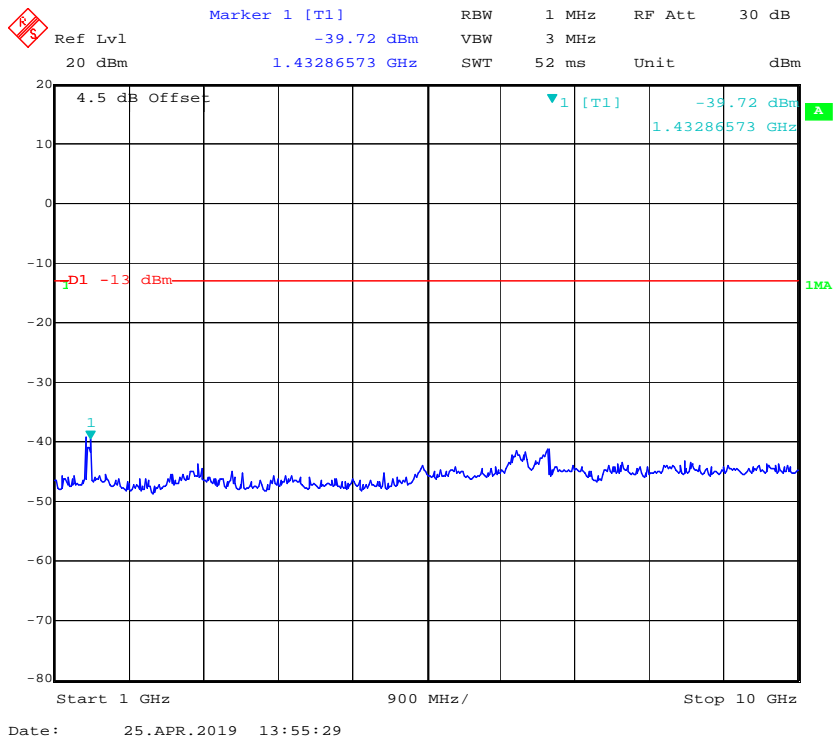
Fundamental



**QPSK\_10 MHz**



Fundamental



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

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### **Applicable Standard**

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

### **Test Procedure**

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

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

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

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

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

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

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2018-12-10	2019-12-10
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2018-05-06	2019-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2018-09-05	2019-09-05
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2018-10-12	2021-10-12
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2018-06-27	2019-06-27
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2016-11-18	2019-11-18
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2018-06-27	2019-06-27
Agilent	Signal Generator	E8247C	MY43321350	2018-12-10	2019-12-10
Micro-tronics	High Pass Filter	HPM50111	S/N-G217	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2018-06-16	2019-06-16
Sinoscite	Band-stop filter	BSF1850-1910MS-0935V2	0935V2	2018-06-16	2019-06-16

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

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

<b>Relative Humidity:</b>	43~52 %
<b>Temperature:</b>	23.8~25.1°C
<b>ATM Pressure:</b>	100.4~101.2 kPa

\* The testing was performed by Tyler Pan, Vern Shen, Neil Liao on 2019-04-21.

Operation Mode: Transmitting

Test Result: Compliance, please refer to the below tables.

**30 MHz-10 GHz:**

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)			
WCDMA Band V R99, Frequency: 836.600 MHz								
1673.200	H	51.26	-62.95	10.6	0.73	-53.1	-13.0	40.1
1673.200	V	54.93	-59.88	10.6	0.73	-50.0	-13.0	37.0
2509.800	H	46.98	-66.04	13.1	1.25	-54.2	-13.0	41.2
2509.800	V	48.77	-64.28	13.1	1.25	-52.4	-13.0	39.4
3346.400	H	46.37	-64.29	13.8	1.61	-52.1	-13.0	39.1
3346.400	V	46.28	-64.43	13.8	1.61	-52.2	-13.0	39.2
354.000	H	49.37	-57.21	0.0	0.57	-57.8	-13.0	44.8
41.640	V	46.75	-42.32	-24.2	0.21	-66.8	-13.0	53.8

**30 MHz-20 GHz:**

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)			
WCDMA Band II R99, Frequency: 1880.000 MHz								
3760.000	H	48.25	-60.55	13.8	1.63	-48.4	-13.0	35.4
3760.000	V	48.57	-60.1	13.8	1.63	-48.0	-13.0	35.0
5640.000	H	45.96	-60.07	14.0	1.31	-47.4	-13.0	34.4
5640.000	V	46.23	-59.68	14.0	1.31	-47.0	-13.0	34.0
113.420	H	48.87	-55.53	0.0	0.29	-55.8	-13.0	42.8
113.420	V	51.12	-60.2	0.0	0.29	-60.5	-13.0	47.5



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

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 1880.000 MHz								
3760.00	H	50.98	-57.82	13.76	1.63	-45.69	-13.00	32.69
3760.00	V	51.81	-56.86	13.76	1.63	-44.73	-13.00	31.73
5640.00	H	46.24	-59.79	14.02	1.31	-47.08	-13.00	34.08
5640.00	V	45.79	-60.12	14.02	1.31	-47.41	-13.00	34.41
144.40	H	38.70	-67.45	0.00	0.36	-67.81	-13.00	54.81
104.58	V	46.37	-66.05	0.00	0.27	-66.32	-13.00	53.32

**LTE Band 4 (30MHz-20GHz):**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 1732.500 MHz								
3465.00	H	50.29	-59.95	13.91	1.62	-47.66	-13.00	34.66
3465.00	V	50.97	-59.31	13.91	1.62	-47.02	-13.00	34.02
5197.50	H	46.77	-59.65	14.00	1.52	-47.17	-13.00	34.17
5197.50	V	46.42	-60.07	14.00	1.52	-47.59	-13.00	34.59
99.87	H	39.40	-67.01	0.00	0.26	-67.27	-13.00	54.27
40.54	V	47.70	-40.02	-25.69	0.21	-65.92	-13.00	52.92

**LTE Band 5 (30MHz-10GHz):**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK, Frequency: 836.500 MHz								
1673.00	H	54.13	-60.09	10.61	0.73	-50.21	-13.00	37.21
1673.00	V	58.21	-56.61	10.61	0.73	-46.73	-13.00	33.73
2509.50	H	52.08	-60.94	13.11	1.25	-49.08	-13.00	36.08
2509.50	V	53.94	-59.11	13.11	1.25	-47.25	-13.00	34.25
3346.00	H	46.67	-63.99	13.83	1.61	-51.77	-13.00	38.77
3346.00	V	46.83	-63.88	13.83	1.61	-51.66	-13.00	38.66
159.98	H	36.00	-71.10	0.00	0.40	-71.50	-13.00	58.50
39.70	V	47.57	-39.10	-26.26	0.21	-65.57	-13.00	52.57

**LTE Band 12 (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: 707.500 MHz								
1415.00	H	58.42	-55.08	9.08	1.22	-47.22	-13.00	34.22
1415.00	V	61.37	-52.66	9.08	1.22	-44.80	-13.00	31.80
2122.50	H	53.95	-58.84	11.27	1.11	-48.68	-13.00	35.68
2122.50	V	55.53	-57.24	11.27	1.11	-47.08	-13.00	34.08
2830.00	H	53.82	-58.26	13.34	1.36	-46.28	-13.00	33.28
2830.00	V	53.94	-58.37	13.34	1.36	-46.39	-13.00	33.39
3537.50	H	46.73	-63.41	13.91	1.57	-51.07	-13.00	38.07
3537.50	V	47.13	-63.01	13.91	1.57	-50.67	-13.00	37.67
439.34	H	38.77	-65.81	0.00	0.65	-66.46	-13.00	53.46
45.87	V	48.70	-45.91	-18.95	0.21	-65.07	-13.00	52.07

**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								
1420.00	H	53.94	-59.66	9.10	1.23	-51.79	-13.00	38.79
1420.00	V	56.37	-57.73	9.10	1.23	-49.86	-13.00	36.86
2130.00	H	50.62	-62.13	11.22	1.11	-52.02	-13.00	39.02
2130.00	V	49.73	-62.99	11.22	1.11	-52.88	-13.00	39.88
2840.00	H	46.94	-65.10	13.42	1.36	-53.04	-13.00	40.04
2840.00	V	47.69	-64.59	13.42	1.36	-52.53	-13.00	39.53
387.36	H	35.70	-69.59	0.00	0.60	-70.19	-13.00	57.19
42.50	V	47.50	-42.62	-23.10	0.21	-65.93	-13.00	52.93

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**

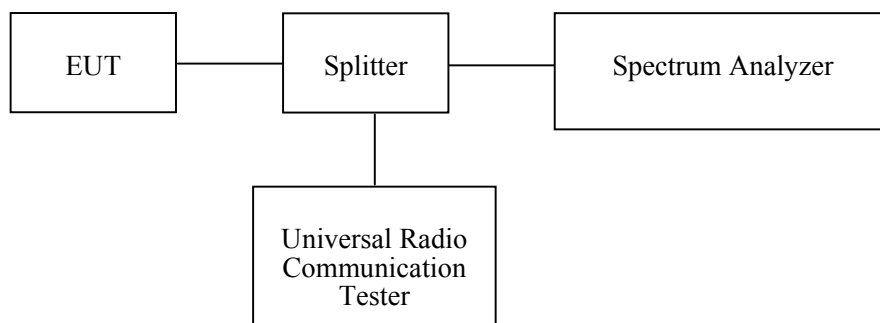
**Applicable Standard**

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
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2018-08-03	2019-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	N/A

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

**Test Data**

**Environmental Conditions**

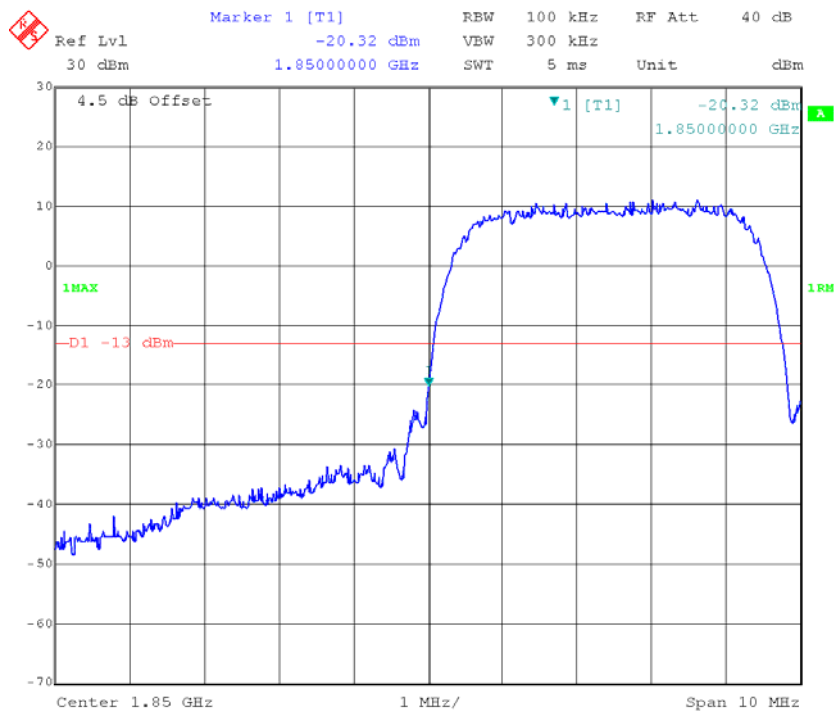
<b>Temperature:</b>	23.8~25.1°C
<b>Relative Humidity:</b>	43~52 %
<b>ATM Pressure:</b>	100.4~101.2 kPa

*The testing was performed by Elena Lei & Blake Yang on 2019-04-25~2019-04-28.*

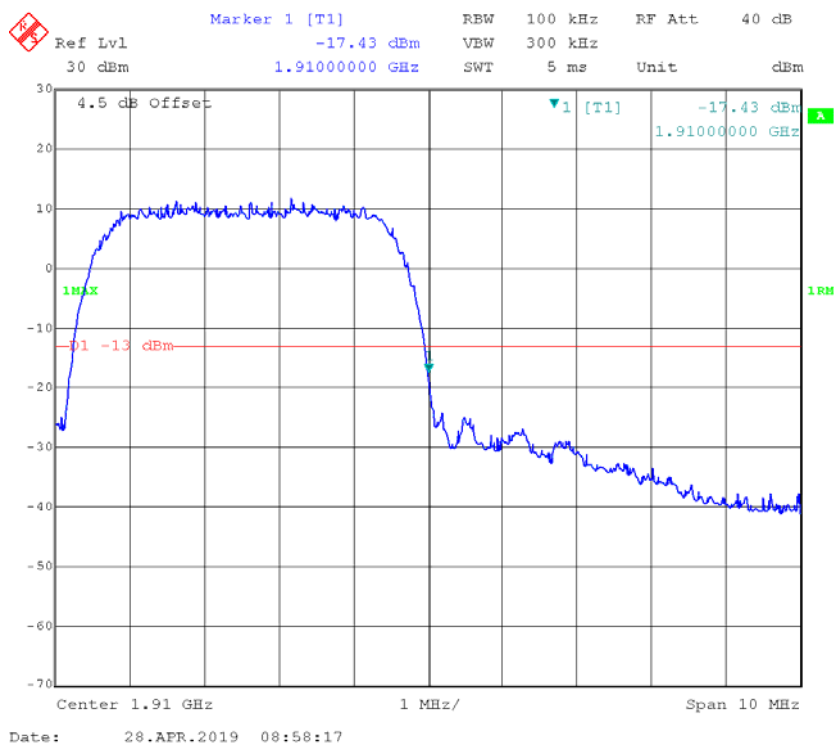
*Test Mode: Transmitting*

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

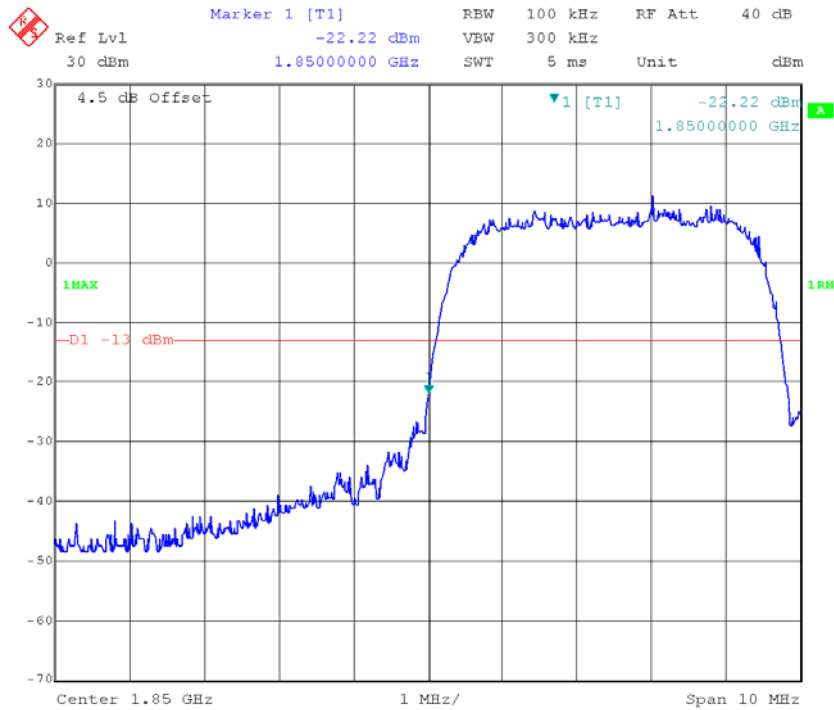
### WCDMA Band II Rel 99, Left Band Edge



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



**WCDMA Band II HSDPA, Left Band Edge**



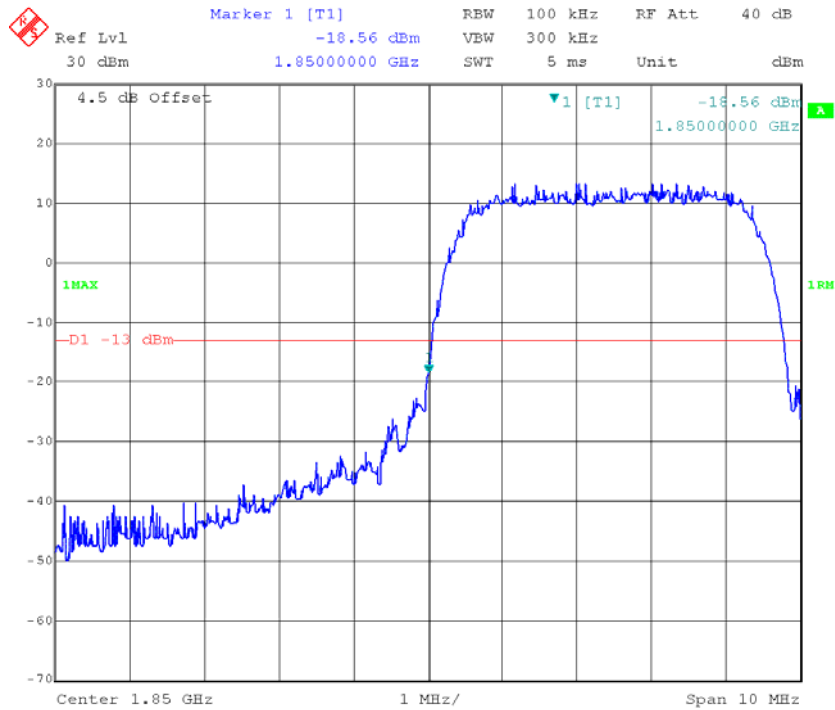
Date: 28.APR.2019 09:00:30

**WCDMA Band II HSDPA, Right Band Edge**



Date: 28.APR.2019 08:59:13

**WCDMA Band II HSUPA, Left Band Edge**



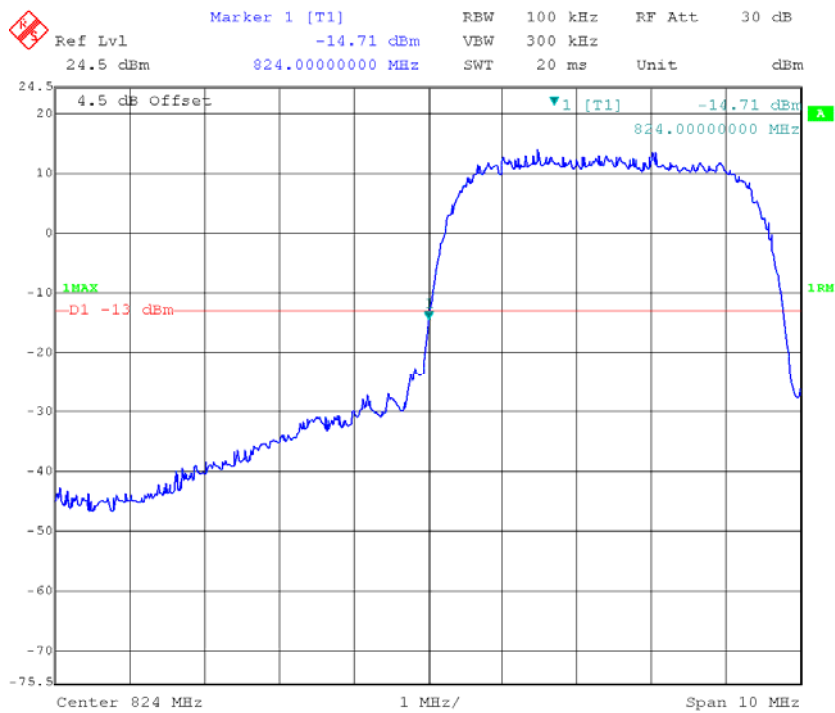
Date: 28.APR.2019 09:01:31

**WCDMA Band II HSUPA, Right Band Edge**



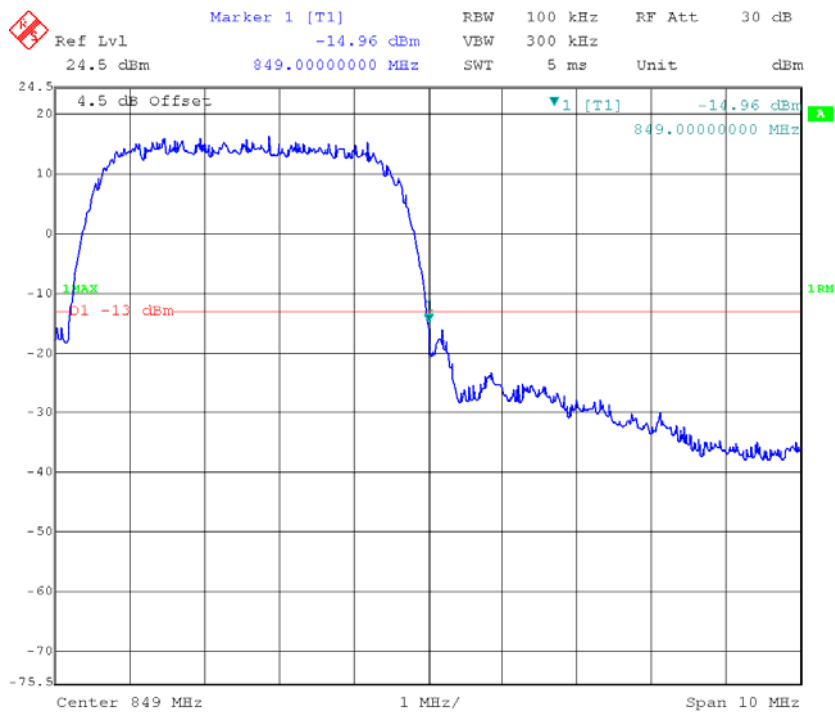
Date: 28.APR.2019 09:02:23

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



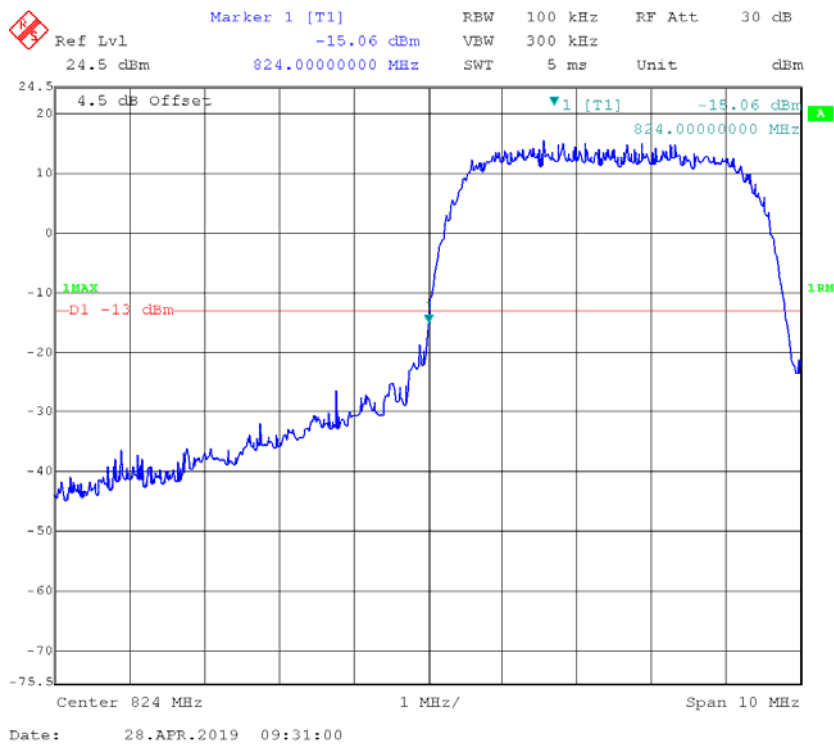
Date: 28.APR.2019 09:28:14

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

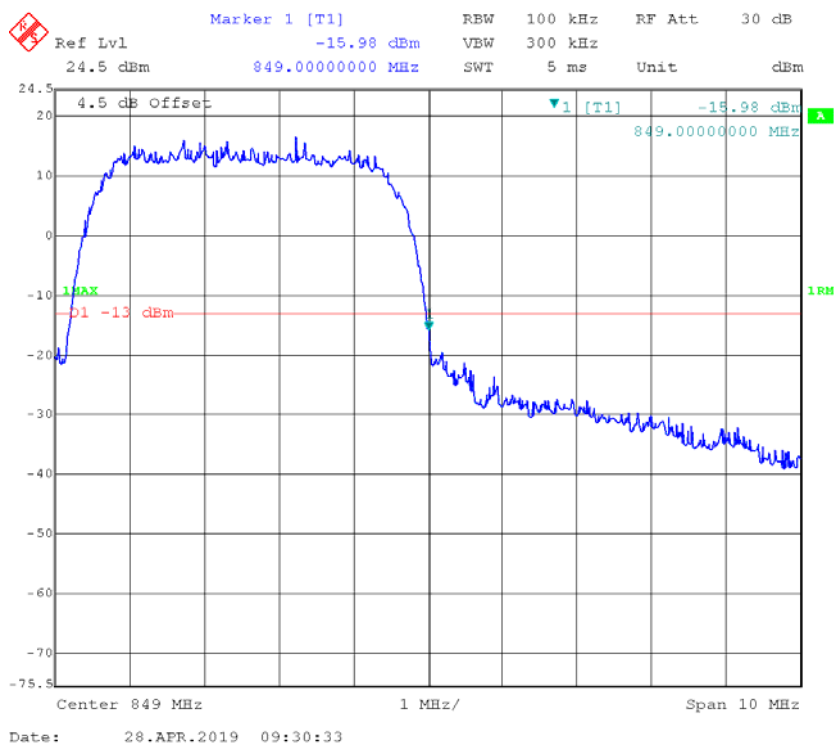


Date: 28.APR.2019 09:29:47

**WCDMA Band V HSDPA, Left Band Edge**

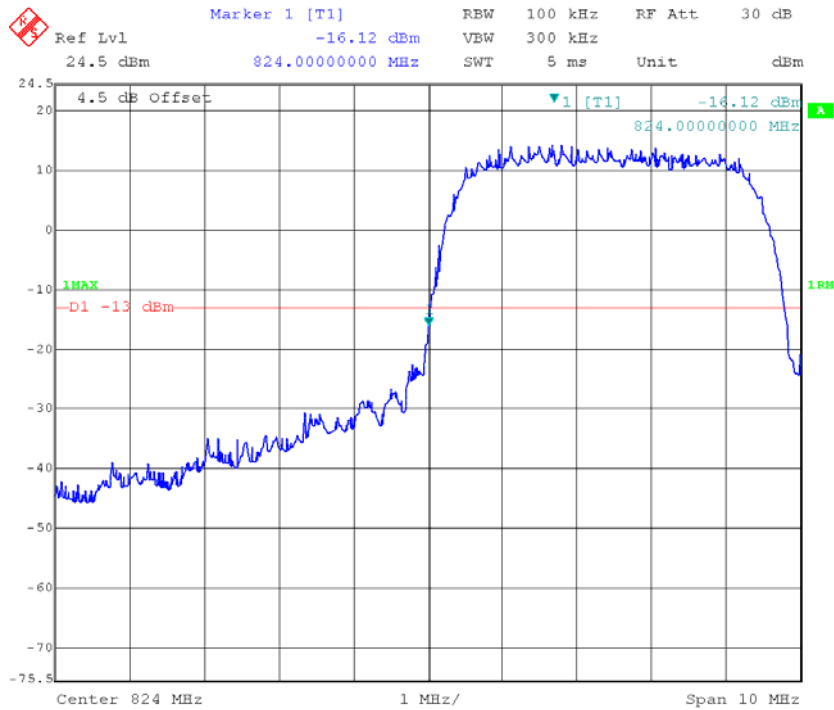


**WCDMA Band V HSDPA, Right Band Edge**

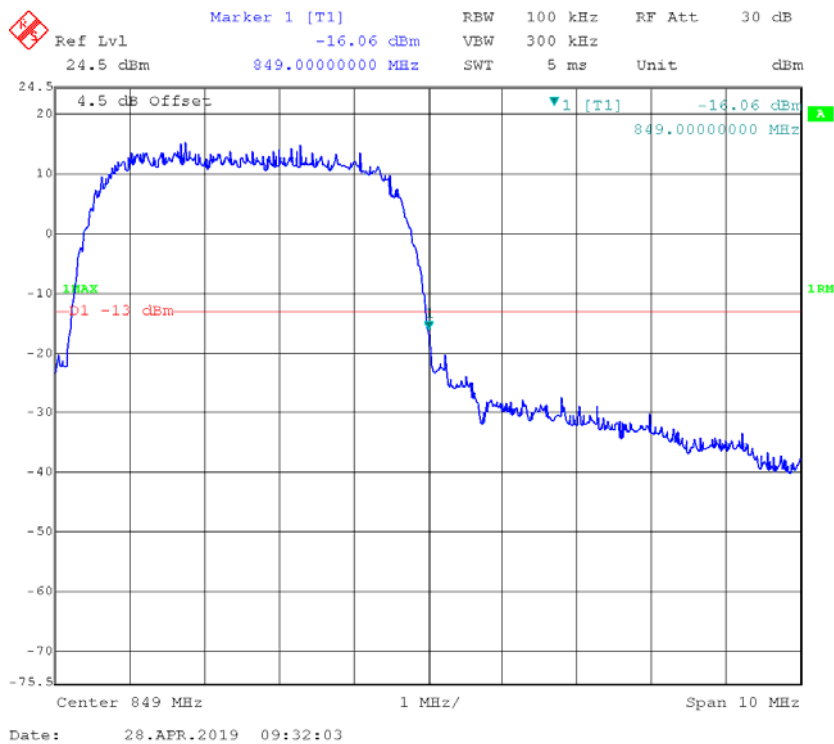




**WCDMA Band V HSUPA, Left Band Edge**

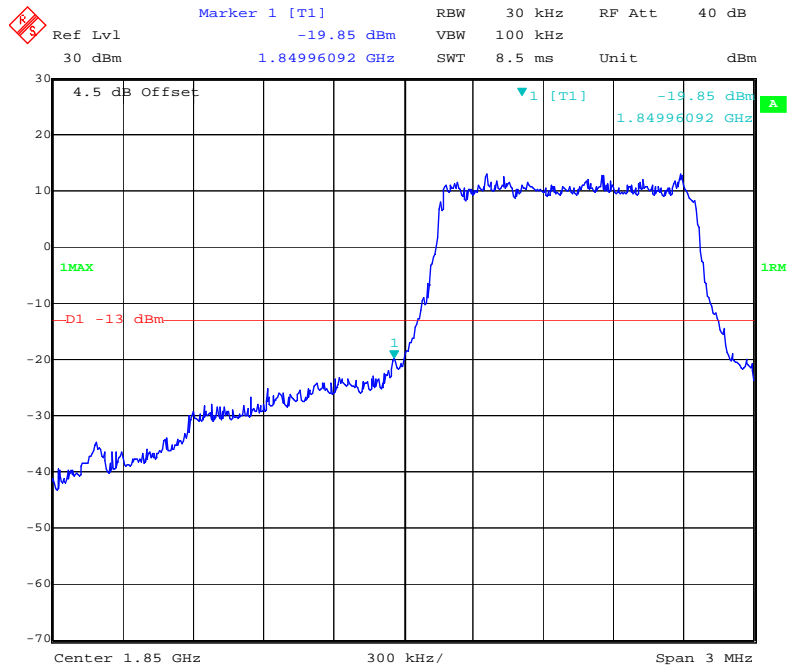


**WCDMA Band V HSUPA, Right Band Edge**



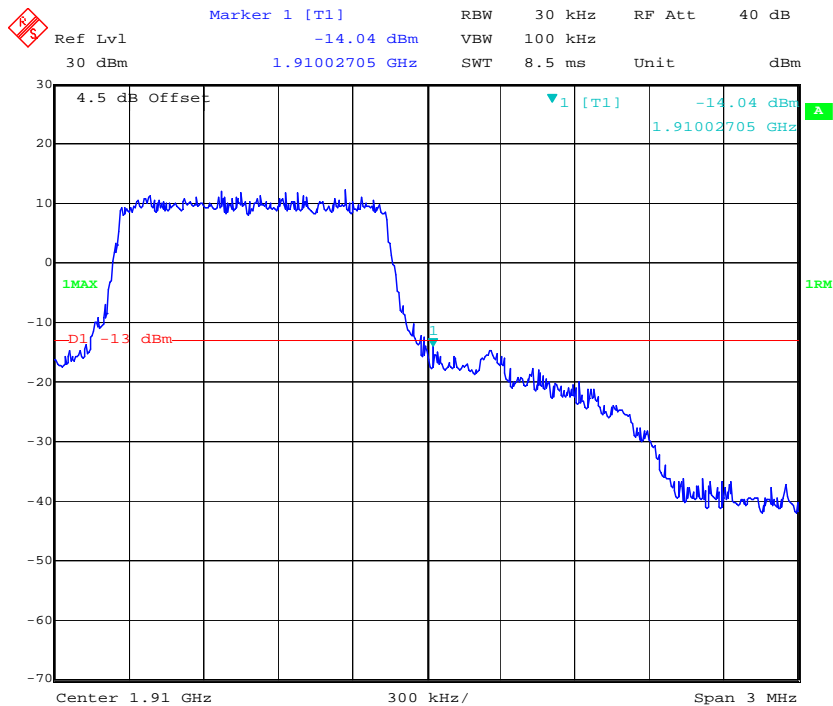
LTE Band 2

QPSK\_1.4MHz\_6 RB\_Left



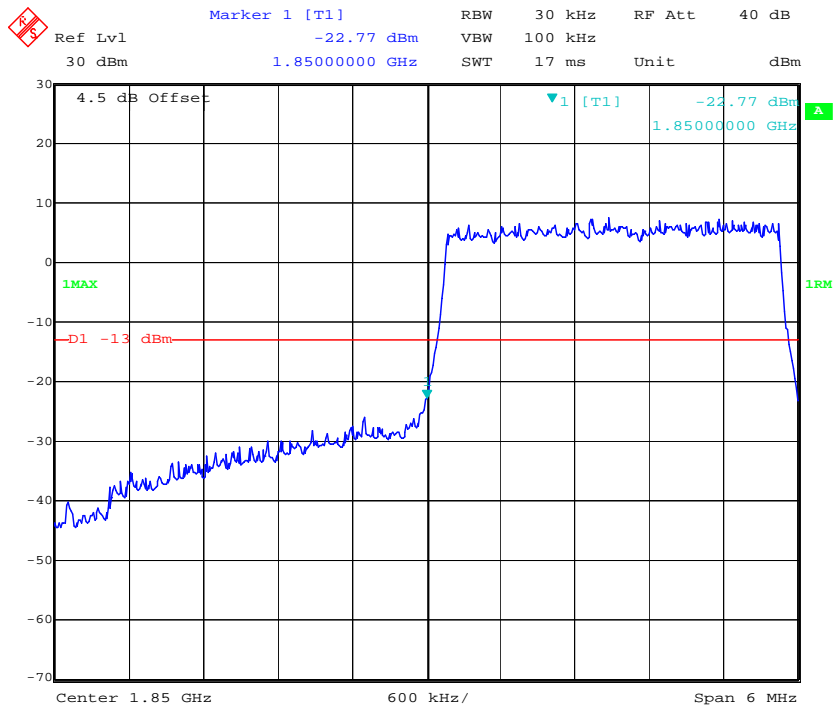
Date: 25.APR.2019 15:24:53

QPSK\_1.4MHz\_6 RB\_Right

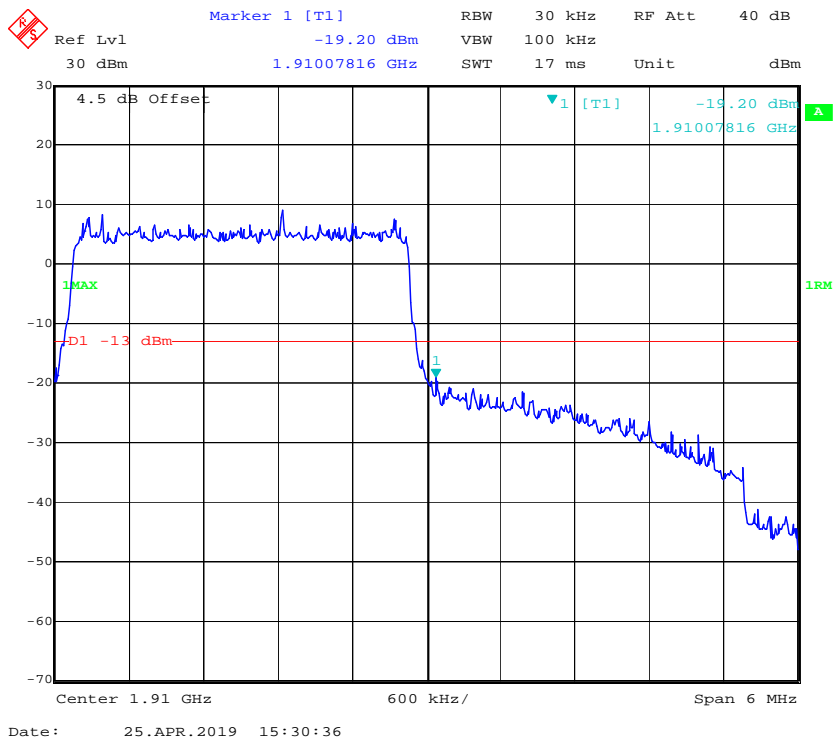


Date: 25.APR.2019 15:25:53

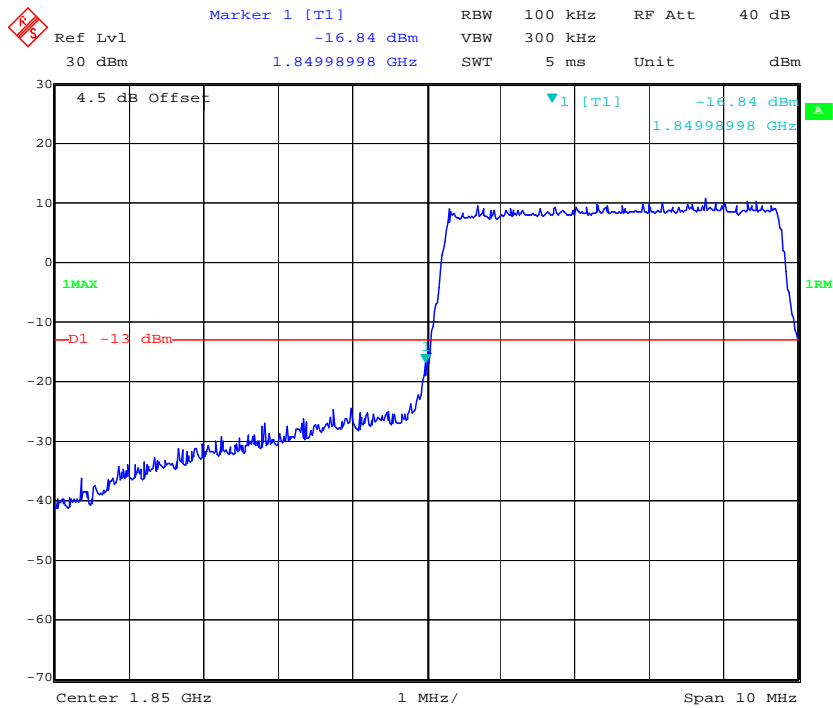
### QPSK\_3MHz\_15 RB\_Left



### QPSK\_3MHz\_15 RB\_Right



**QPSK\_5MHz\_25 RB\_Left**



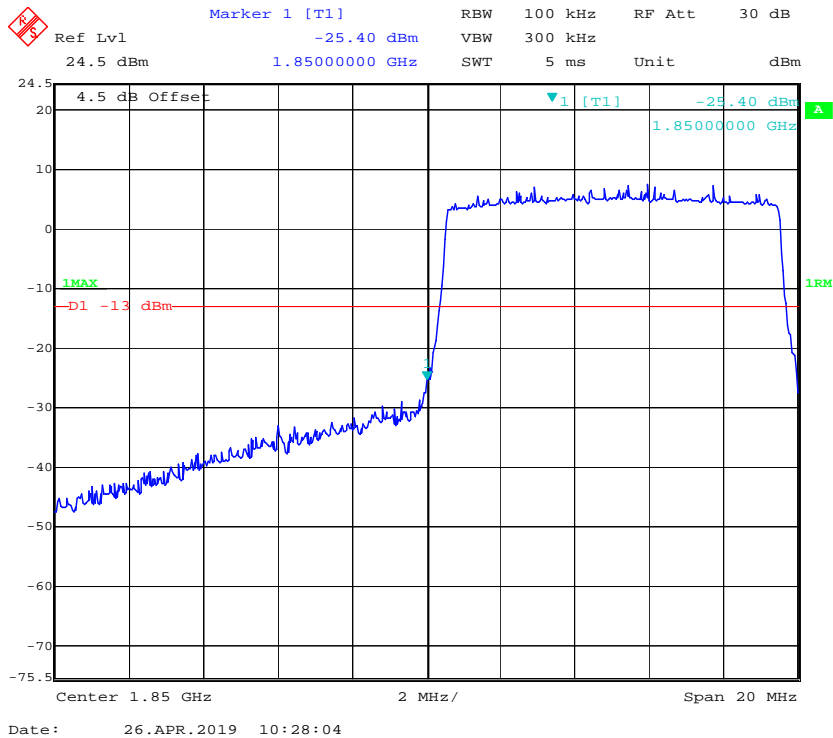
Date: 25.APR.2019 15:32:28

**QPSK\_5MHz\_25 RB\_Right**

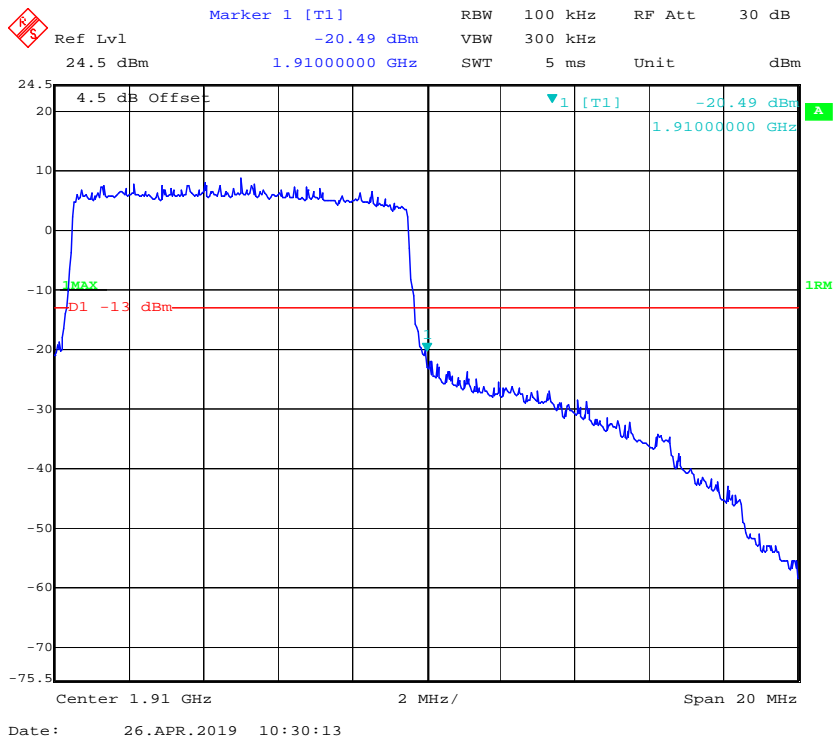


Date: 25.APR.2019 15:33:28

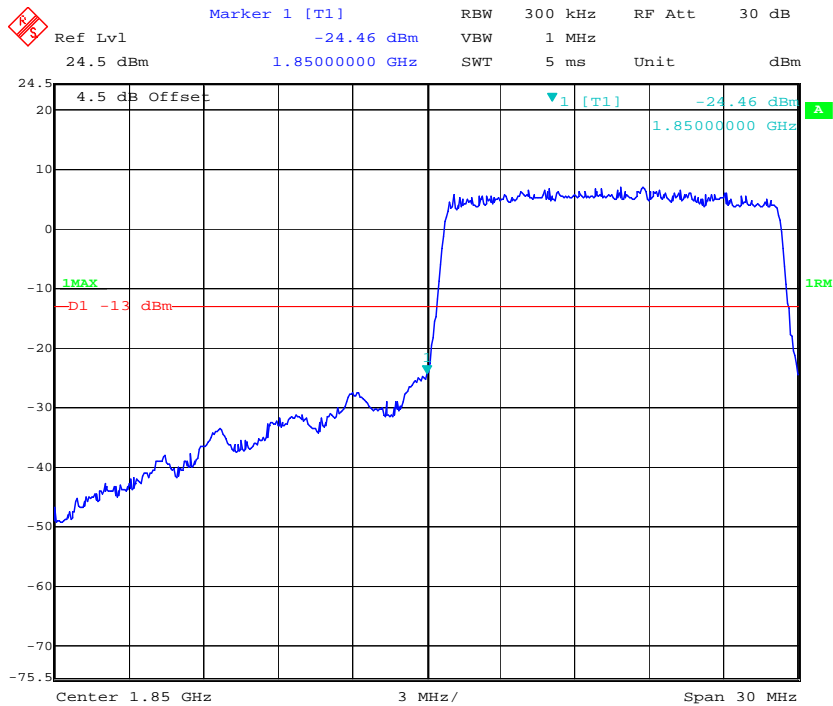
### QPSK\_10MHz\_50 RB\_Left



### QPSK\_10MHz\_50 RB\_Right



### QPSK\_15MHz\_75 RB\_Left



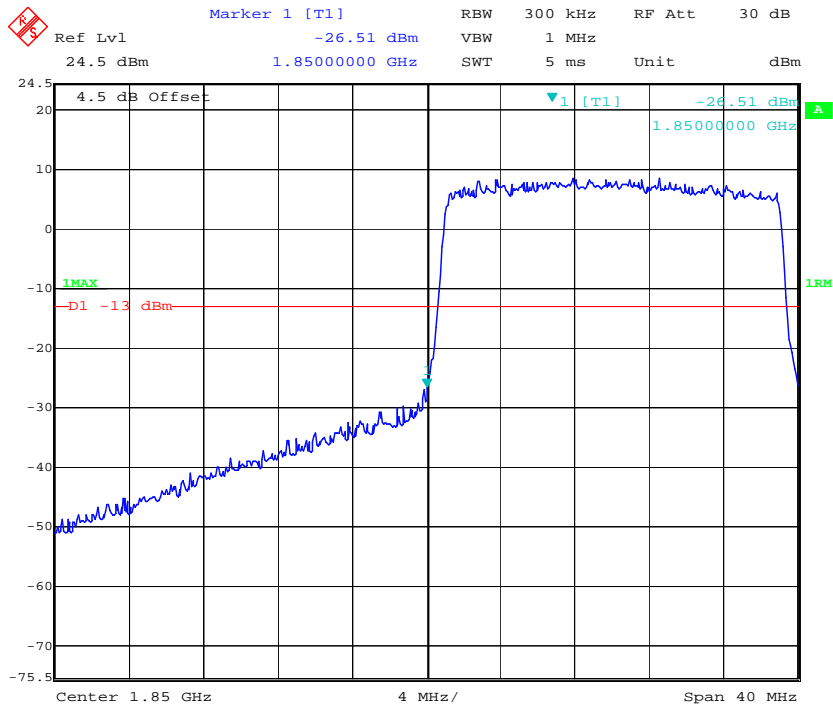
Date: 26.APR.2019 10:31:55

### QPSK\_15MHz\_75 RB\_Right

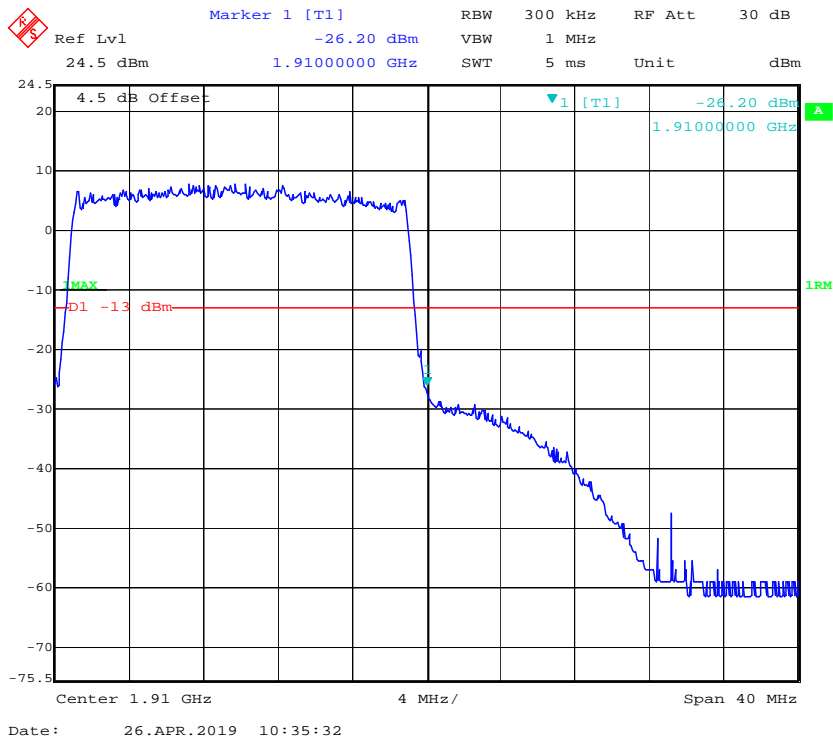


Date: 26.APR.2019 10:31:24

### QPSK\_20MHz\_FULL RB\_Left

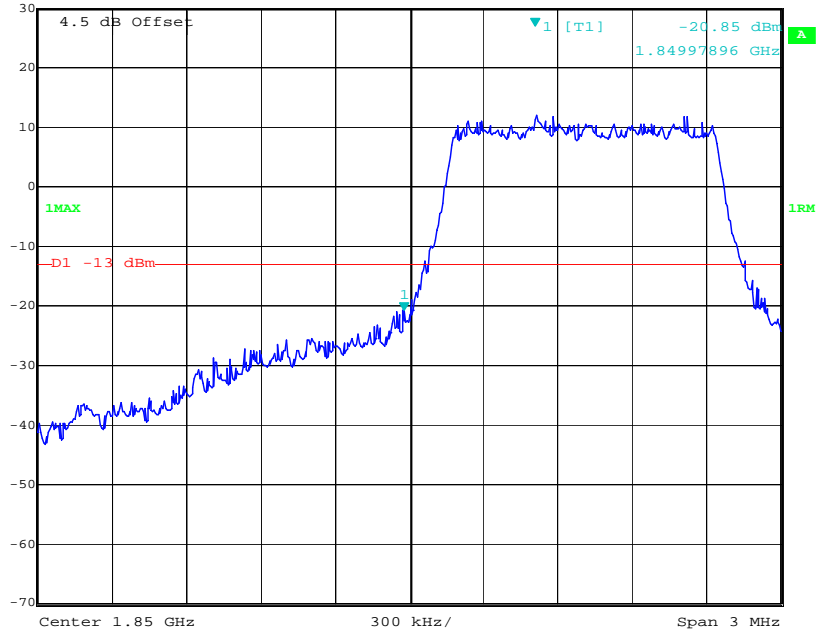


### QPSK\_20MHz\_FULL RB\_Right



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

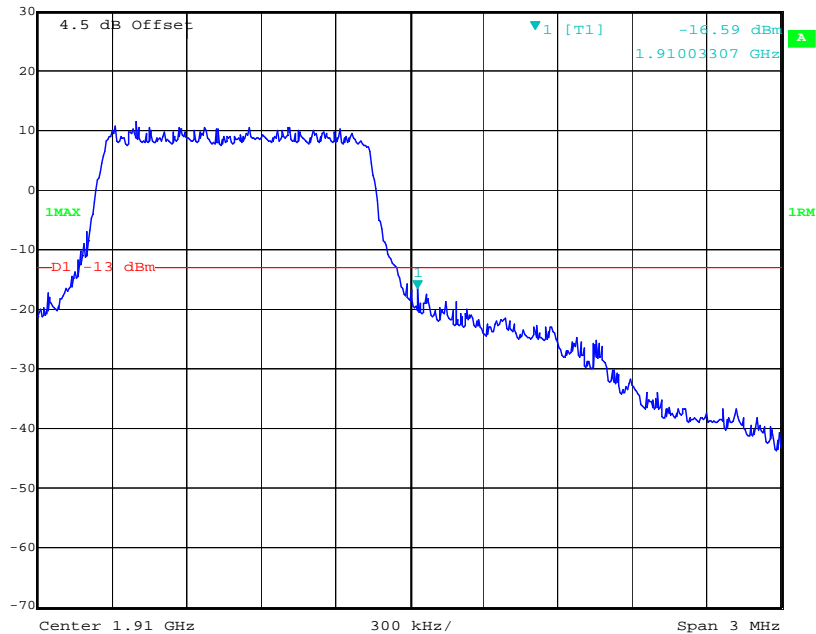
Marker 1 [T1] RBW 30 kHz RF Att 40 dB  
Ref Lvl -20.85 dBm VBW 100 kHz  
30 dBm 1.84997896 GHz SWT 8.5 ms Unit dBm



Date: 25.APR.2019 15:25:25

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

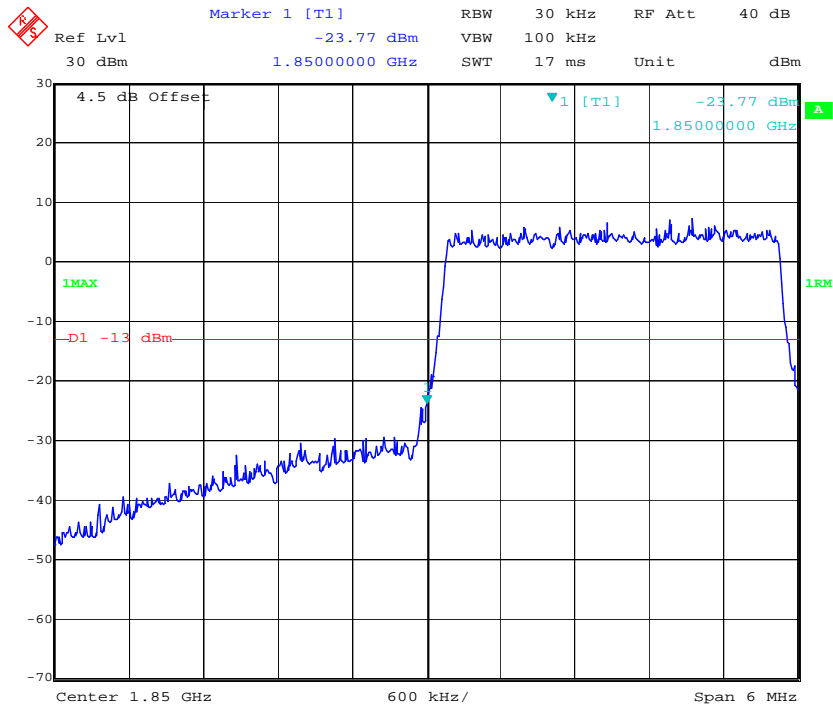
Marker 1 [T1] RBW 30 kHz RF Att 40 dB  
Ref Lvl -16.59 dBm VBW 100 kHz  
30 dBm 1.91003307 GHz SWT 8.5 ms Unit dBm



Date: 25.APR.2019 15:27:11

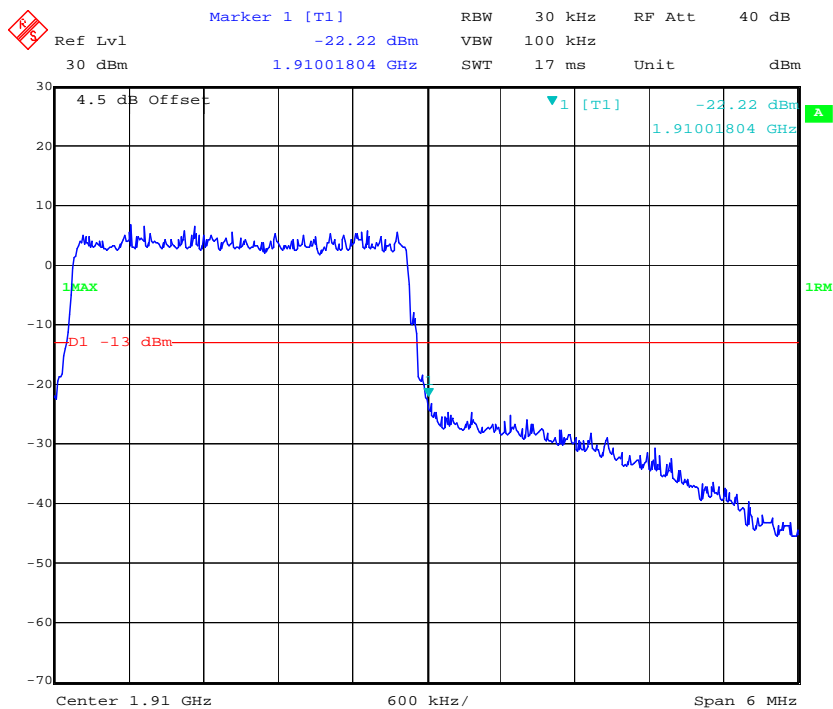


**16QAM\_3MHz\_15 RB\_ Left**



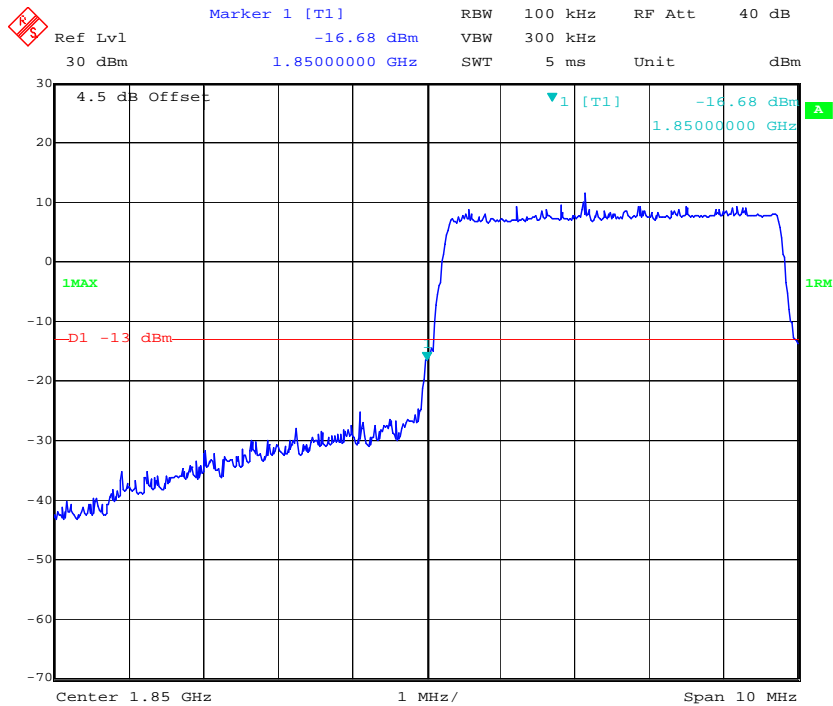
Date: 25.APR.2019 15:30:02

**16QAM\_3MHz\_15 RB\_ Right**

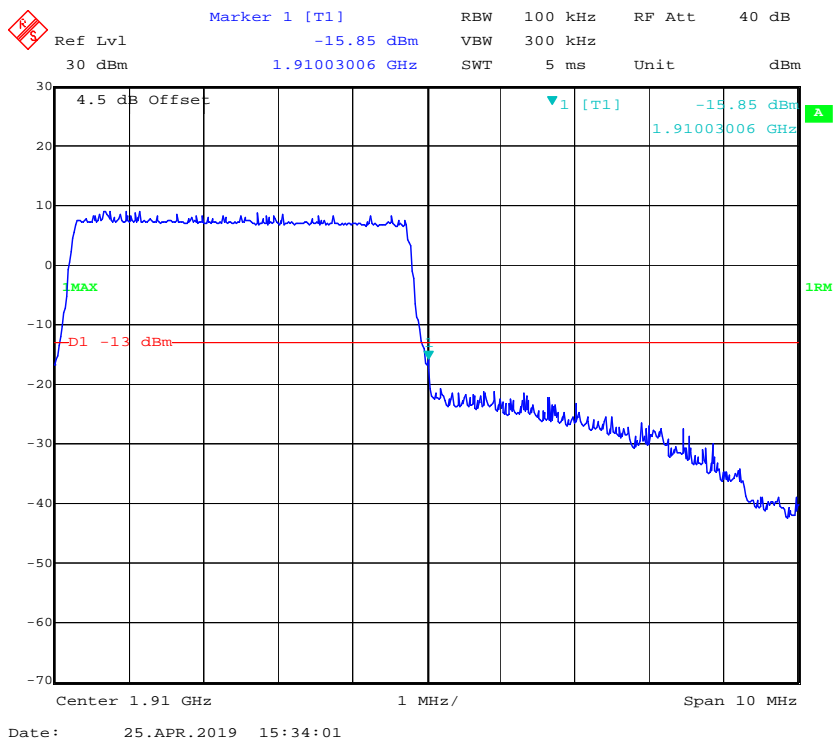


Date: 25.APR.2019 15:31:50

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

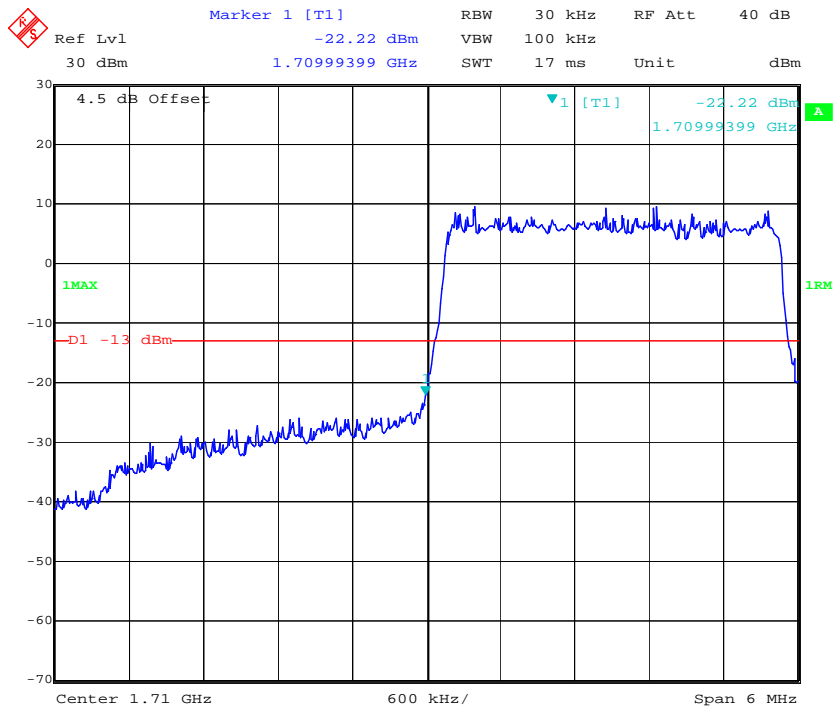


### 16QAM\_5MHz\_25 RB\_Right

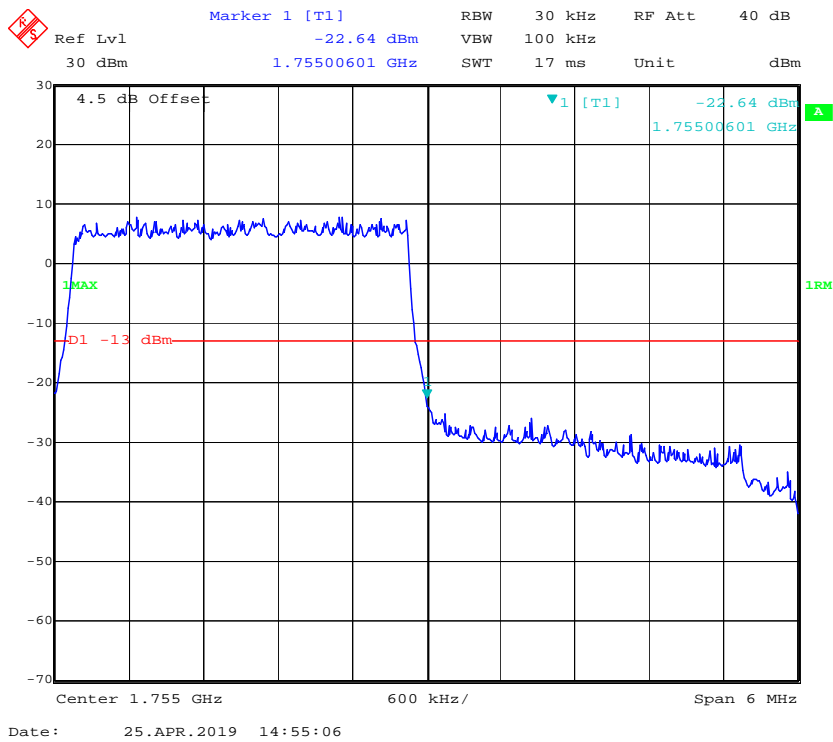


LTE Band 4

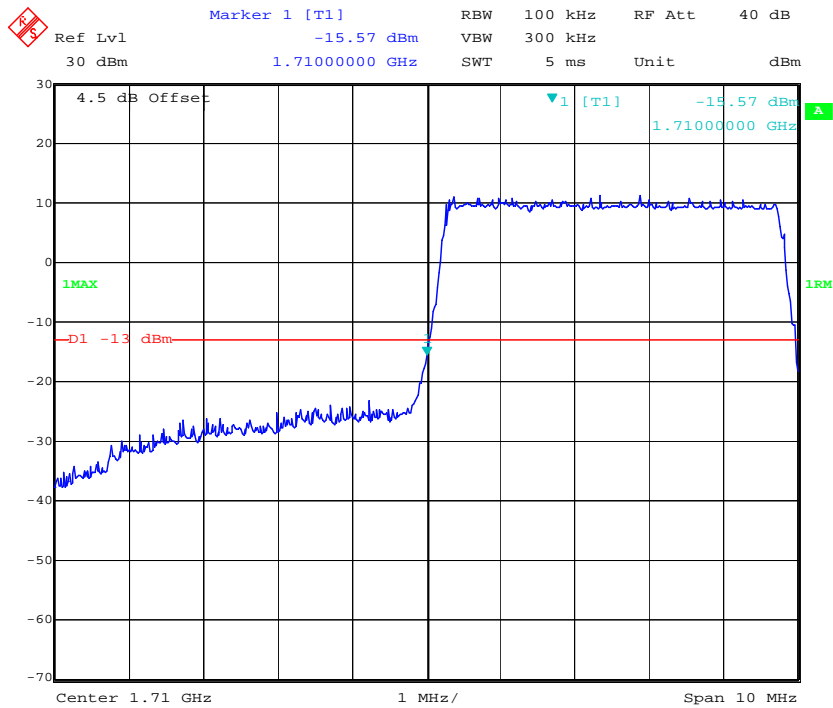
QPSK\_1.4MHz\_6 RB\_ Left



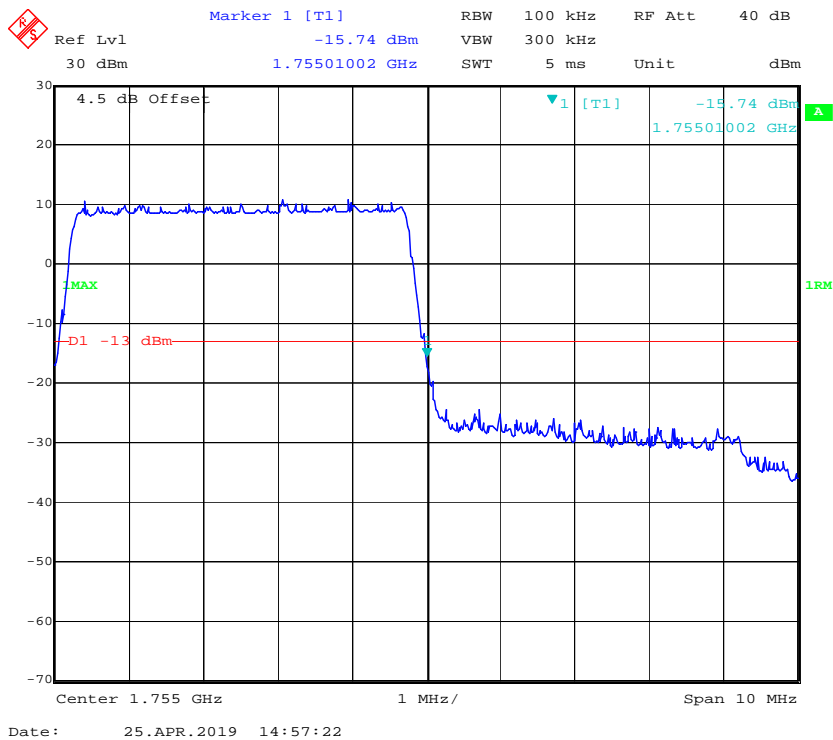
QPSK\_1.4MHz\_6 RB\_ Right



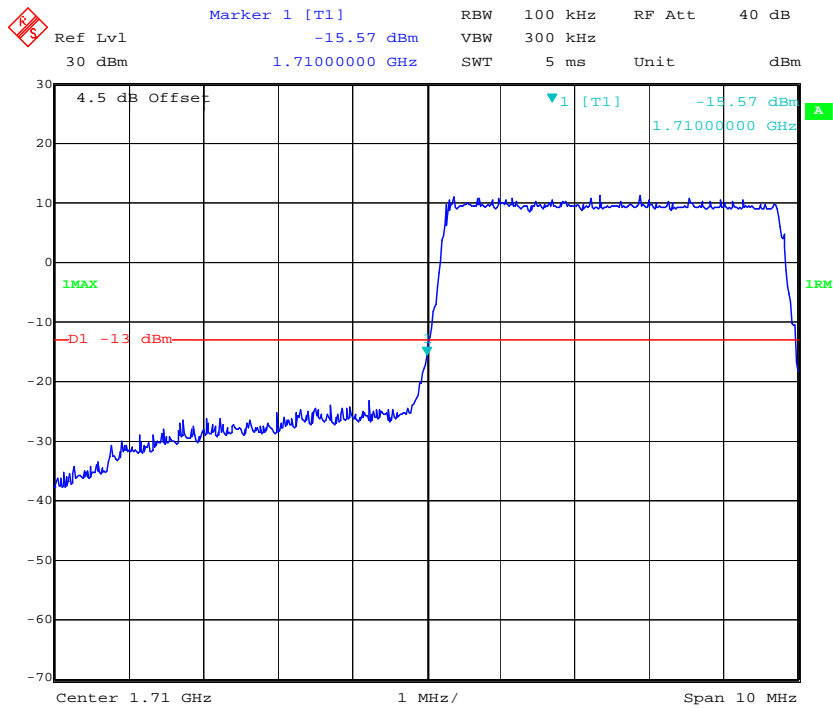
### QPSK\_3MHz\_15 RB\_Left



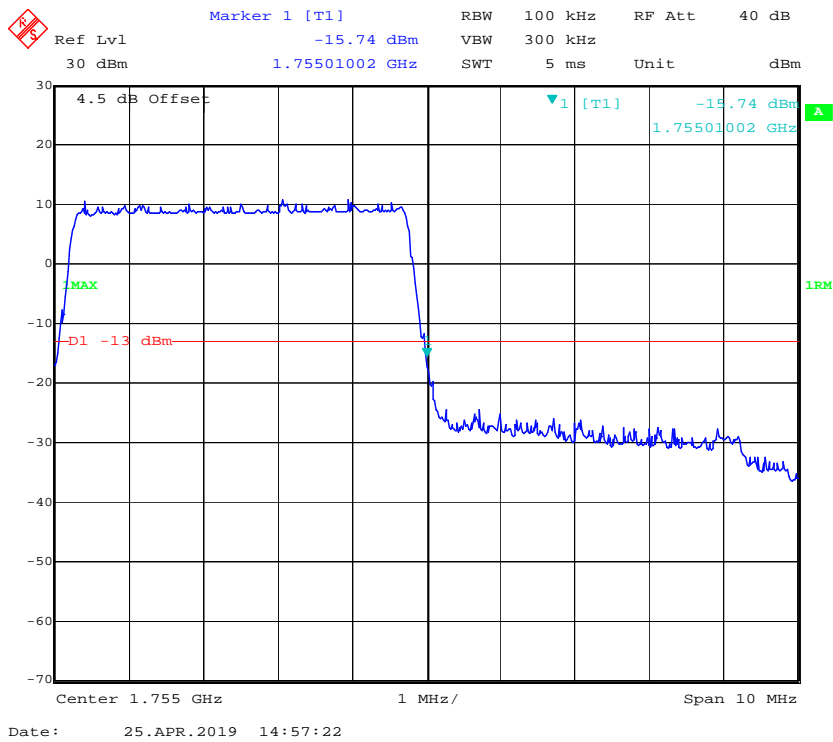
### QPSK\_3MHz\_15 RB\_Right



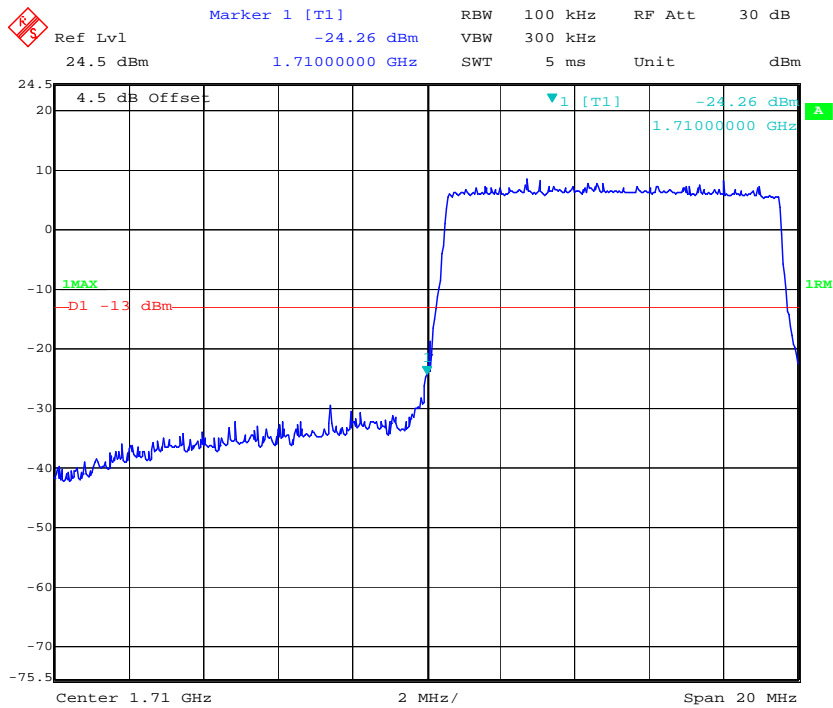
### QPSK\_5MHz\_25 RB\_Left



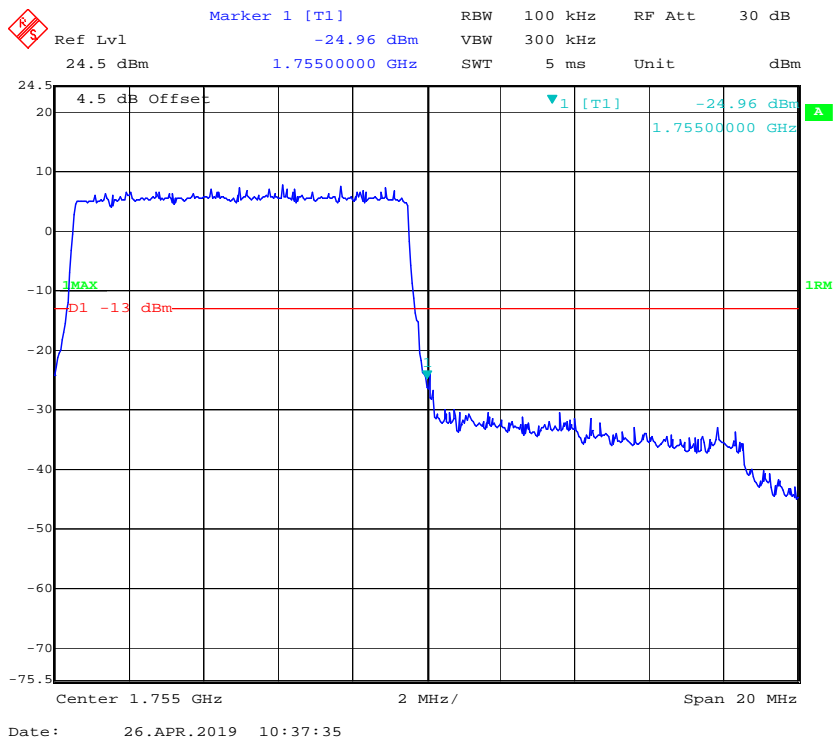
### QPSK\_5MHz\_25 RB\_Right



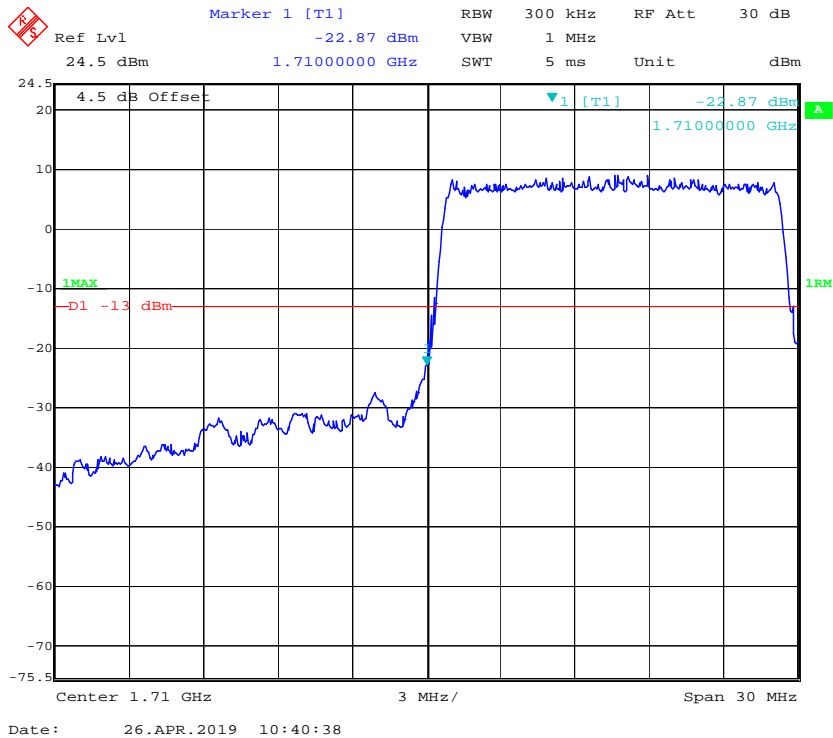
**QPSK\_10MHz\_50 RB\_Left**



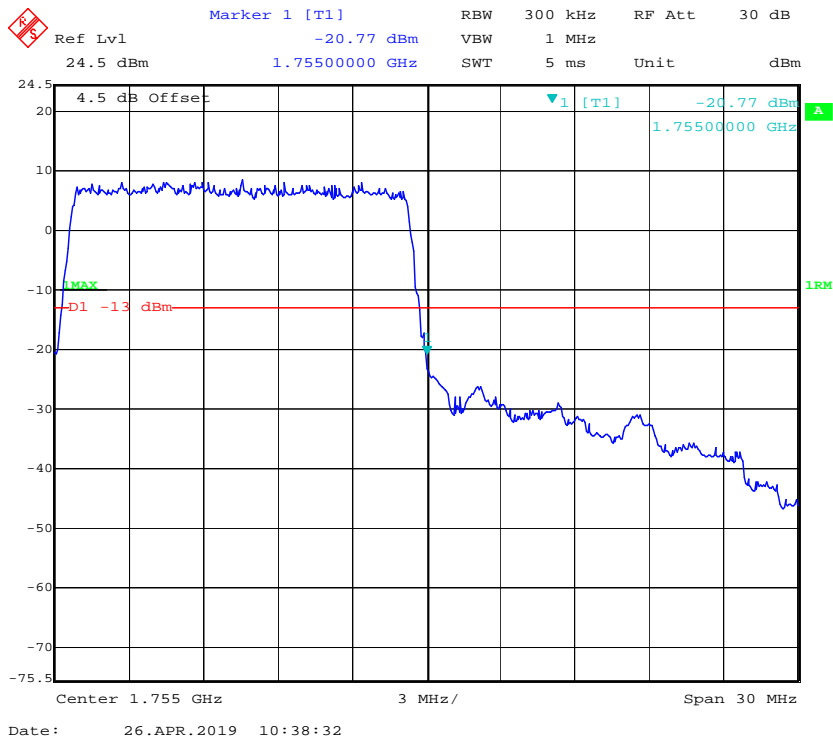
**QPSK\_10MHz\_50 RB\_Right**



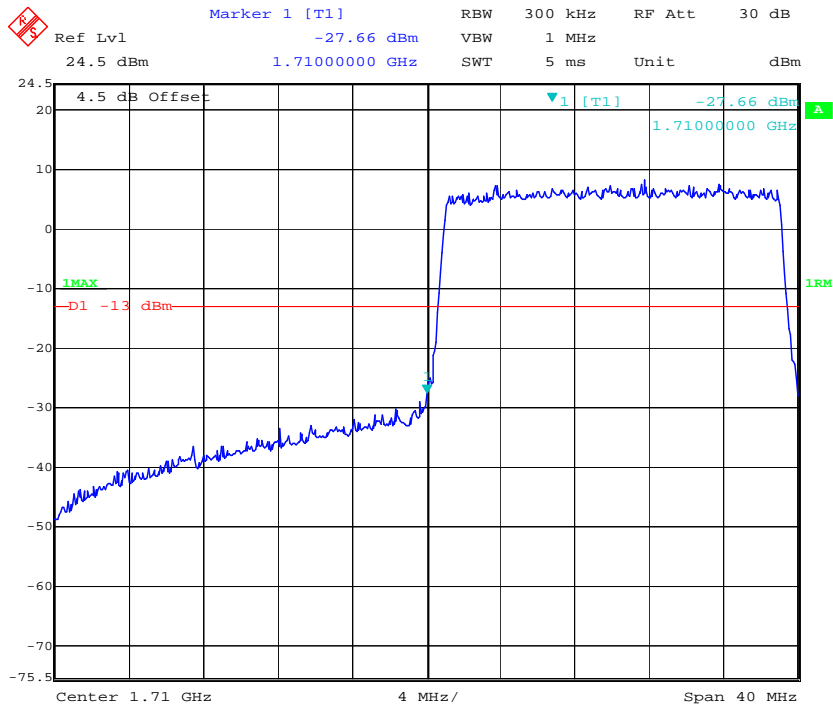
### QPSK\_15MHz\_75 RB\_Left



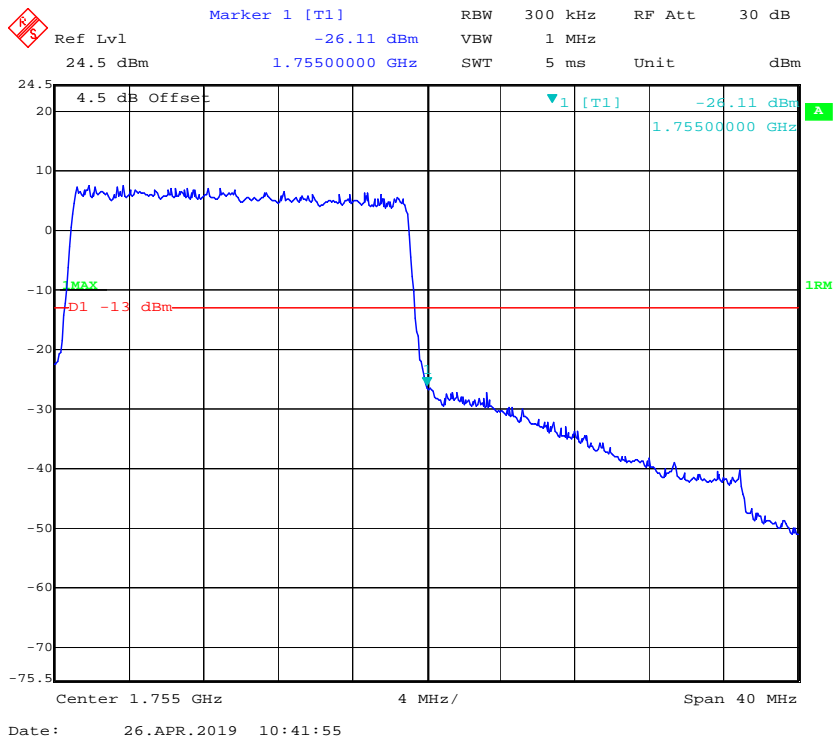
### QPSK\_15MHz\_75 RB\_Right



### QPSK\_20MHz\_FULL RB\_Left

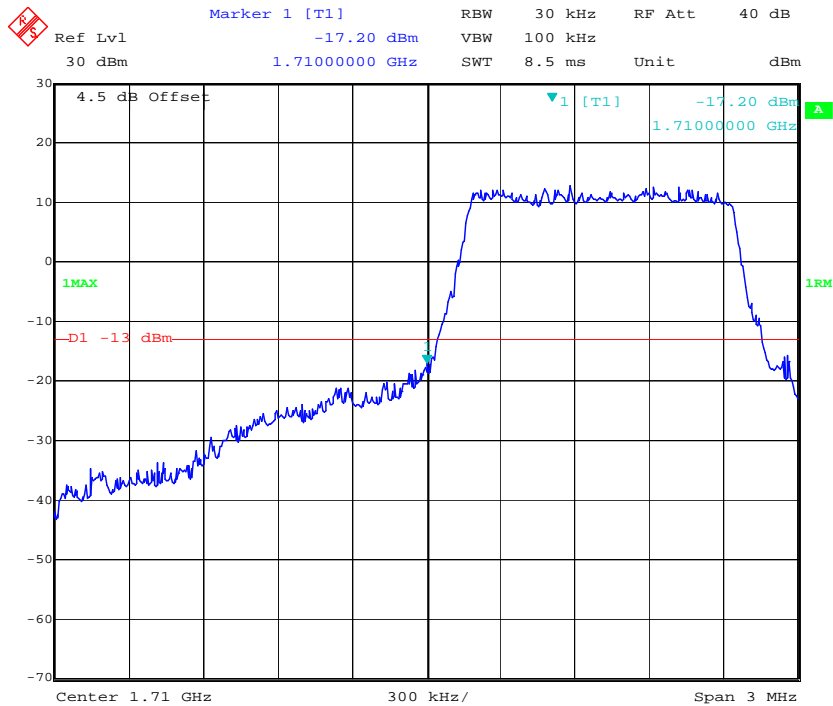


### QPSK\_20MHz\_FULL RB\_Right

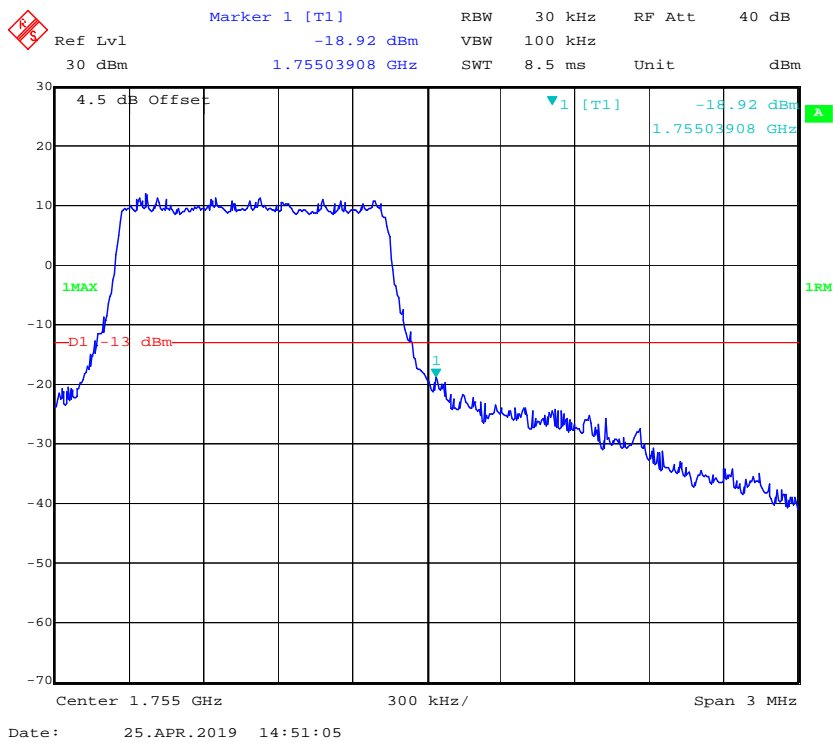




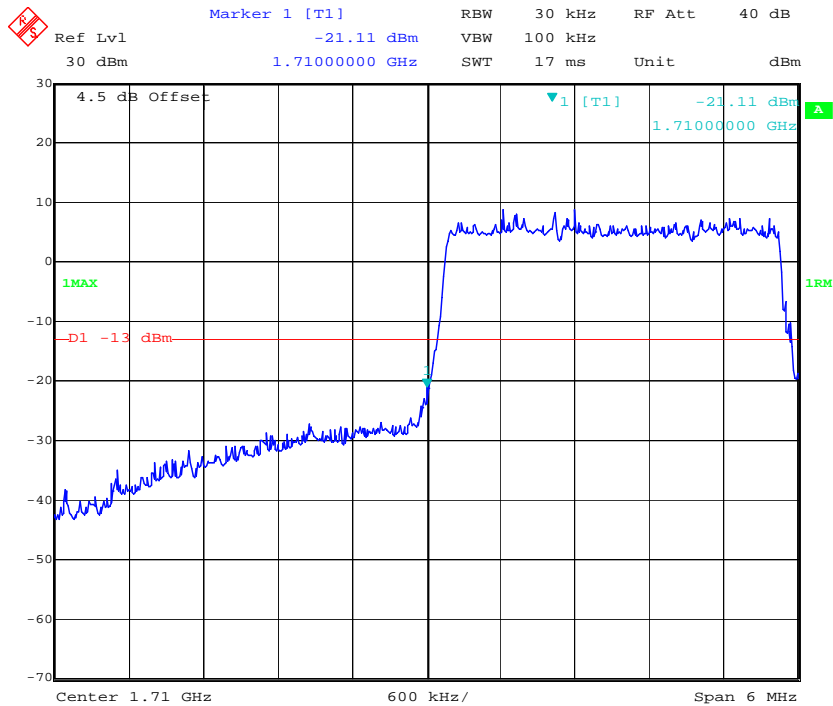
### 16QAM\_1.4MHz\_6 RB\_Left



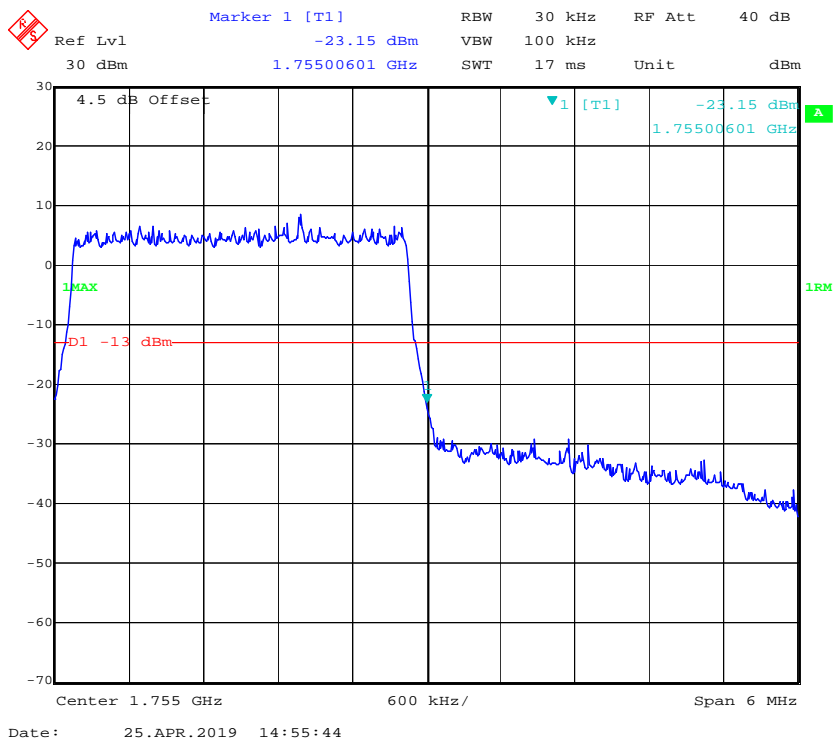
### 16QAM\_1.4MHz\_6 RB\_Right



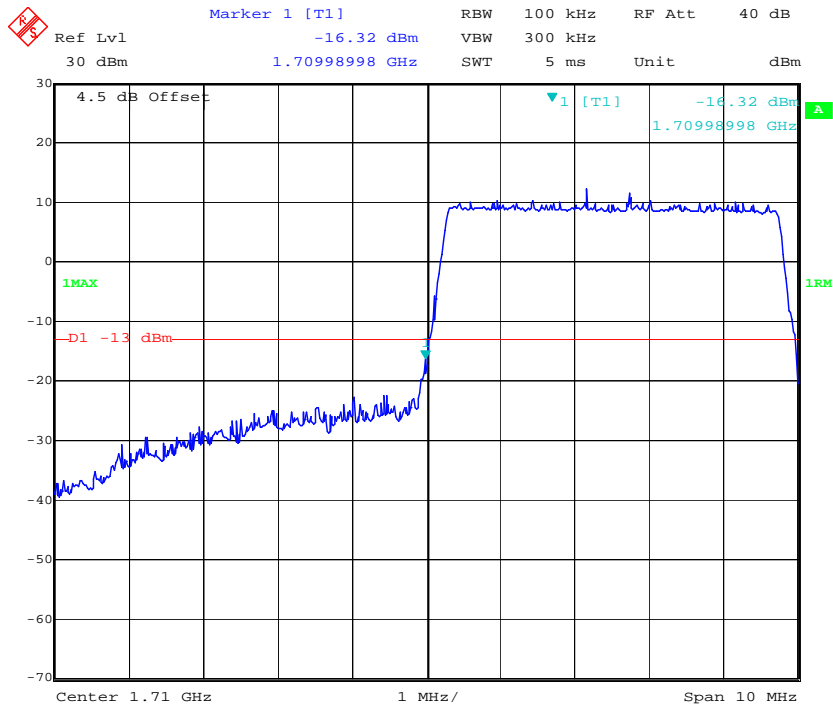
**16QAM\_3MHz\_15 RB\_Left**



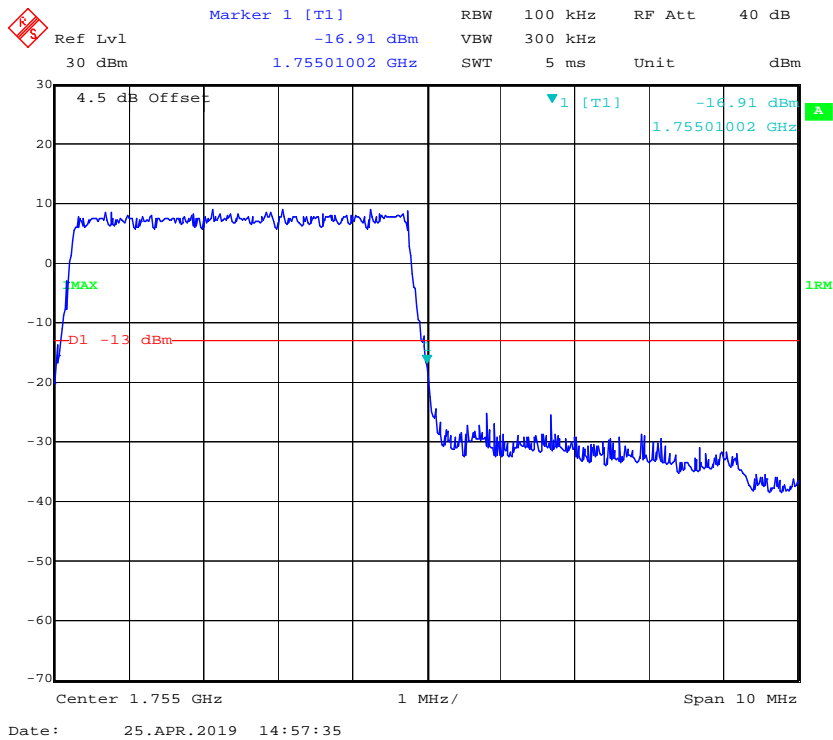
**16QAM\_3MHz\_15 RB\_Right**



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

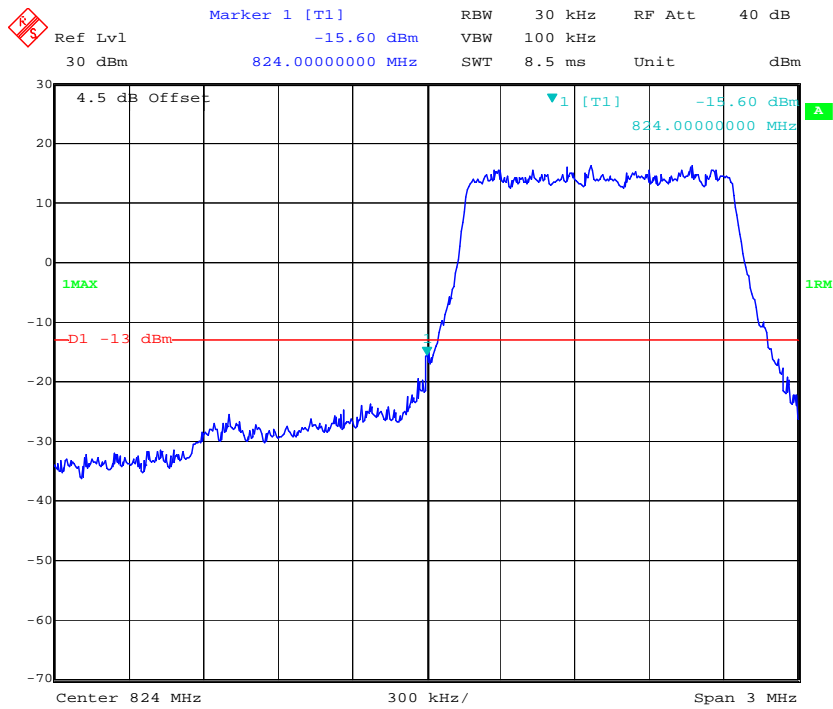


### 16QAM\_5MHz\_25 RB\_Right

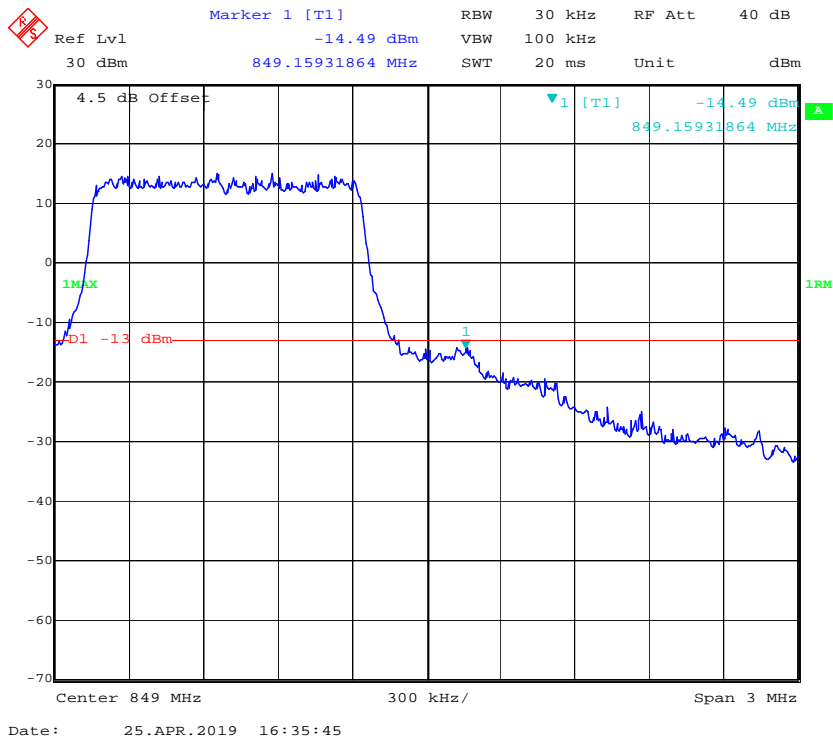


LTE Band 5

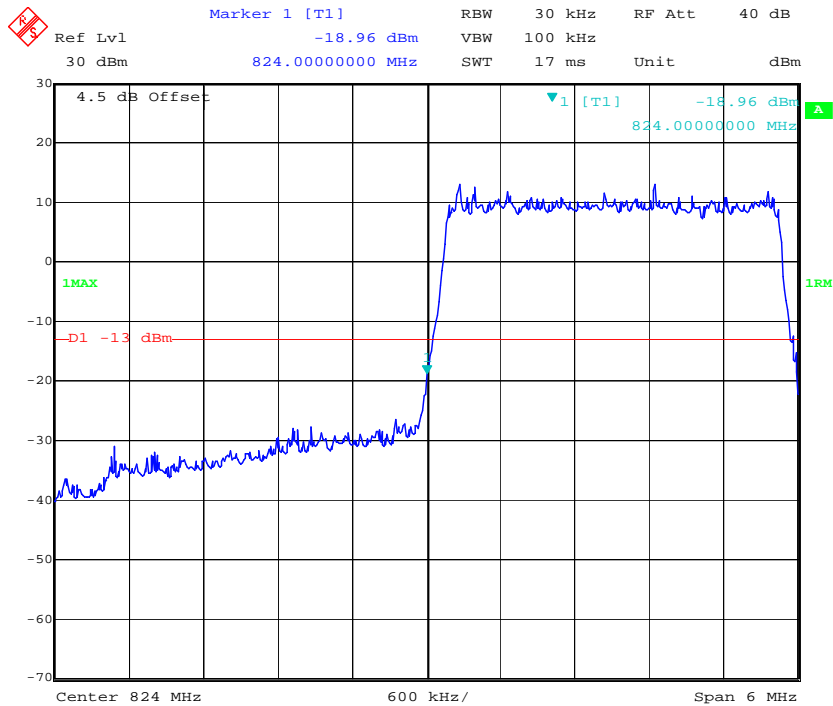
QPSK\_1.4MHz\_6 RB\_ Left



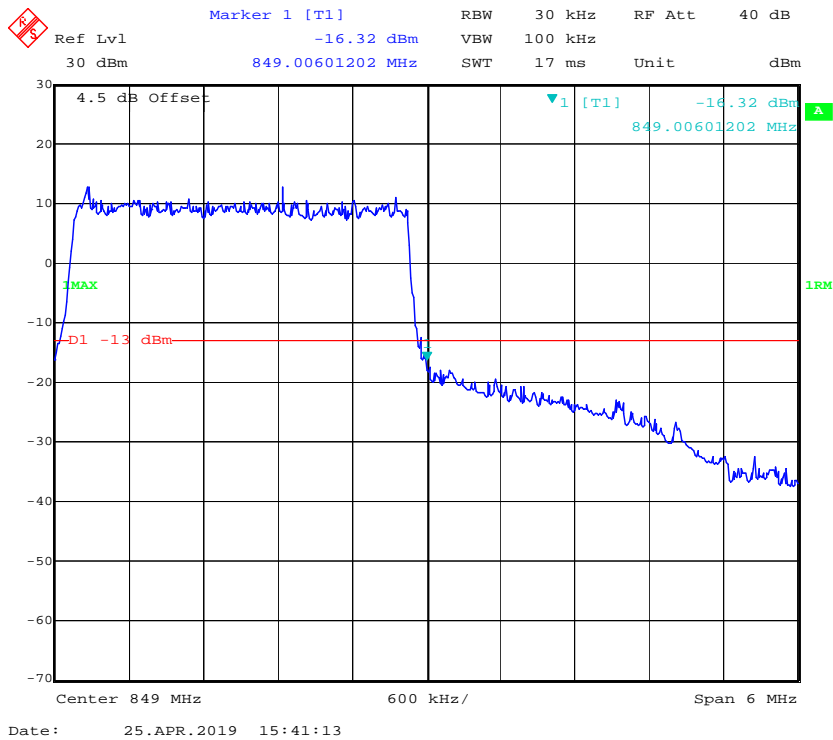
QPSK\_1.4MHz\_6 RB\_ Right



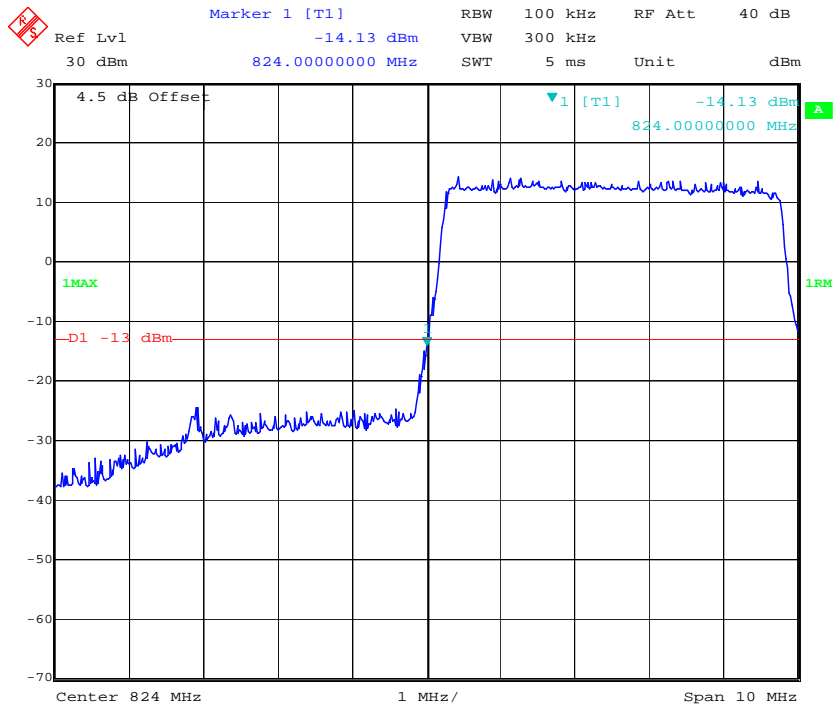
### QPSK\_3MHz\_15 RB\_Left



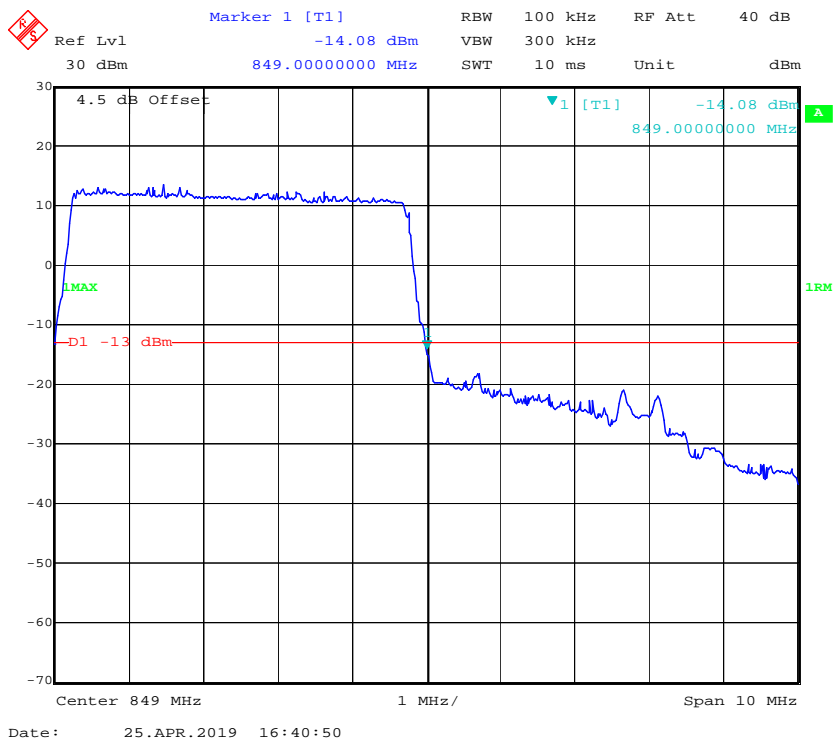
### QPSK\_3MHz\_15 RB\_Right



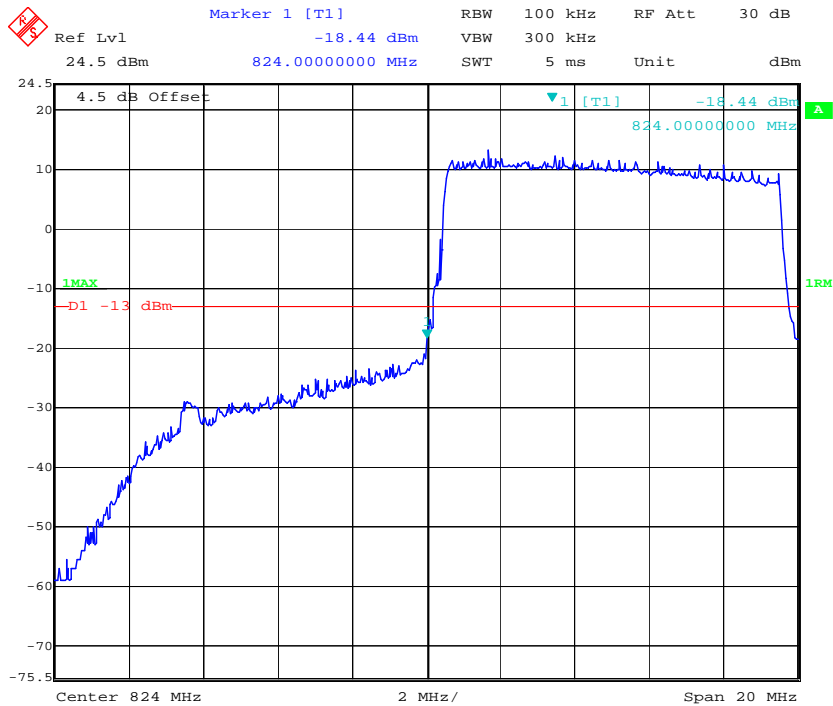
### QPSK\_5MHz\_25 RB\_Left



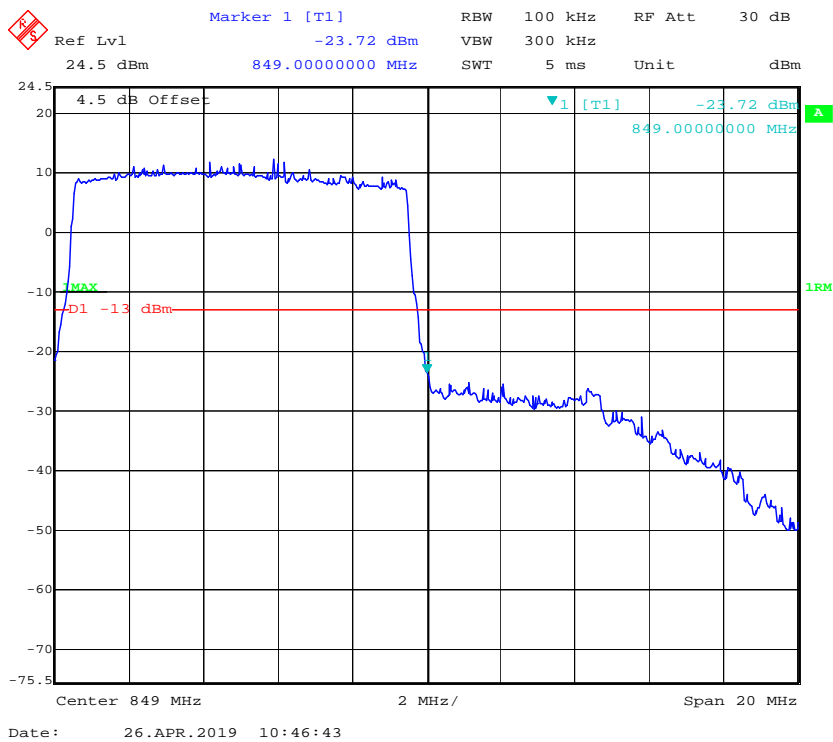
### QPSK\_5MHz\_25 RB\_Right



### QPSK\_10MHz\_50 RB\_Left

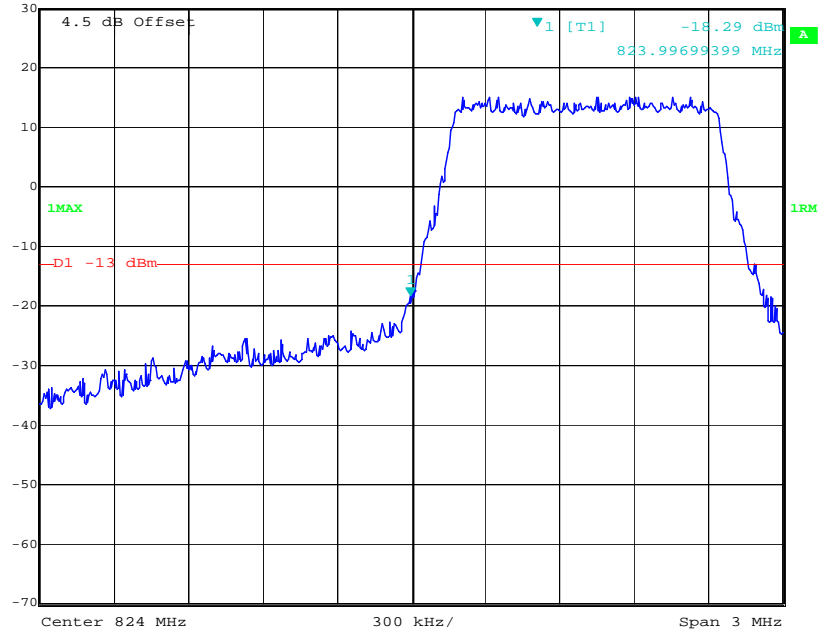


### QPSK\_10MHz\_50 RB\_Right



**16QAM\_1.4MHz\_6 RB\_ Left**

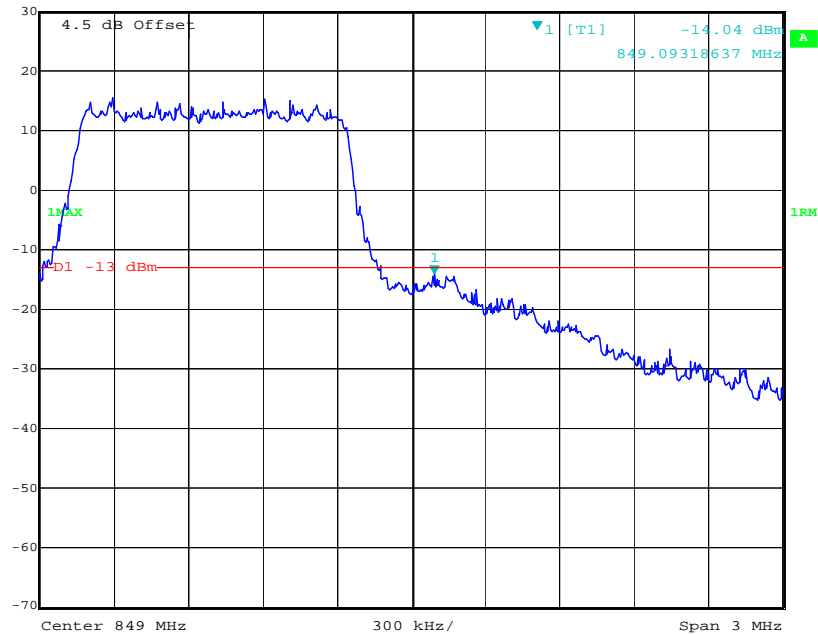
⚠
Marker 1 [T1]
RBW 30 kHz
RF Att 40 dB  
Ref Lvl -18.29 dBm
VBW 100 kHz  
30 dBm
823.99699399 MHz
SWT 8.5 ms
Unit dBm



Date: 25.APR.2019 15:37:21

**16QAM\_1.4MHz\_6 RB\_ Right**


⚠
Marker 1 [T1]
RBW 30 kHz
RF Att 40 dB  
Ref Lvl -14.04 dBm
VBW 100 kHz  
30 dBm
849.09318637 MHz
SWT 15 ms
Unit dBm

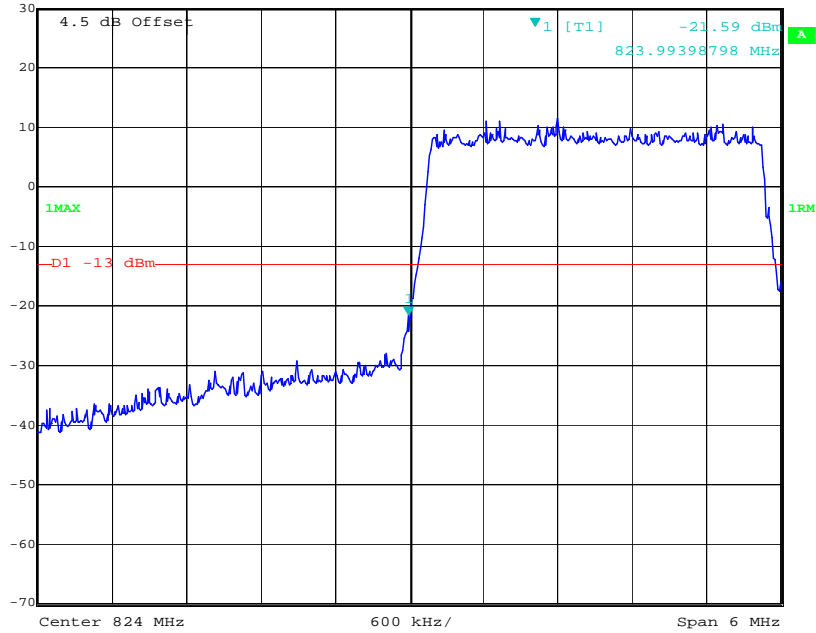


Date: 25.APR.2019 16:34:38




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

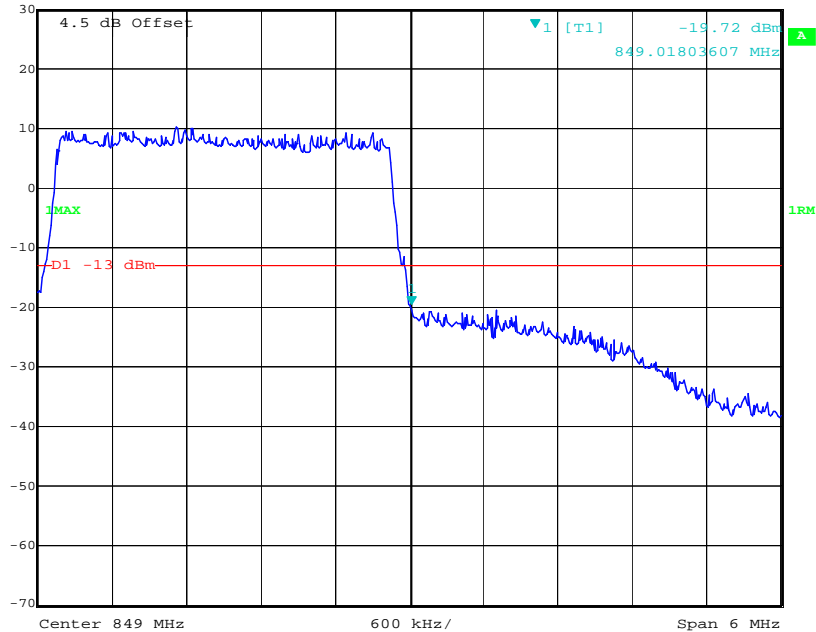
 Marker 1 [T1] RBW 30 kHz RF Att 40 dB  
Ref Lvl -21.59 dBm VBW 100 kHz  
30 dBm 823.99398798 MHz SWT 17 ms Unit dBm



Date: 25.APR.2019 15:40:01

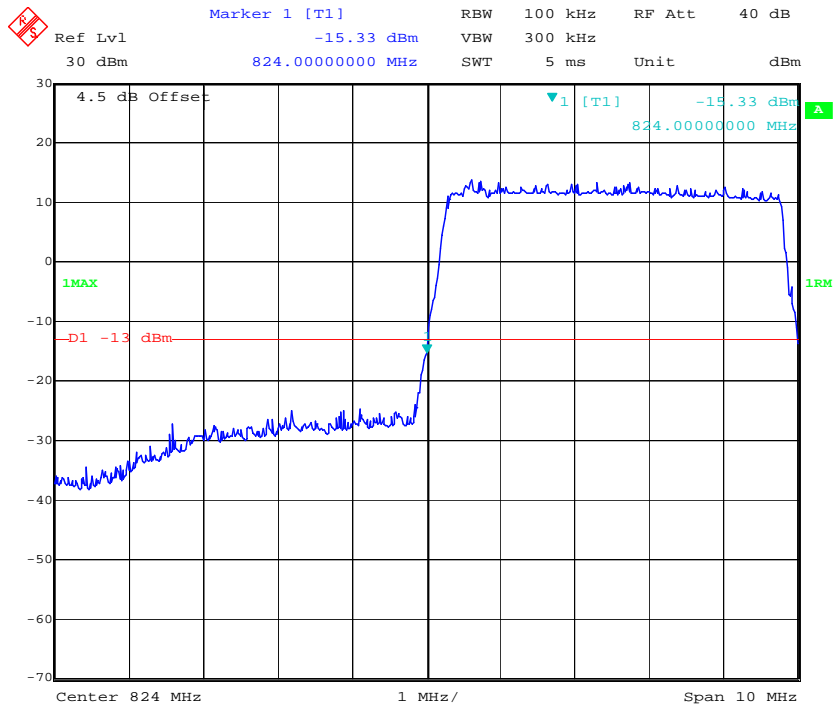
### 16QAM\_3MHz\_15 RB\_Right

 Marker 1 [T1] RBW 30 kHz RF Att 40 dB  
Ref Lvl -19.72 dBm VBW 100 kHz  
30 dBm 849.01803607 MHz SWT 17 ms Unit dBm

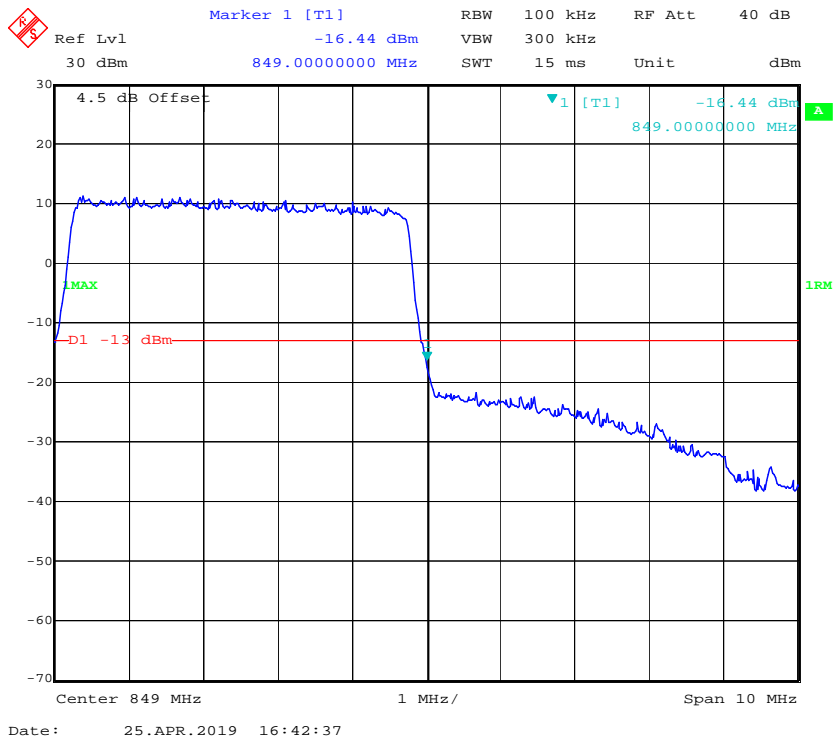


Date: 25.APR.2019 15:41:46

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

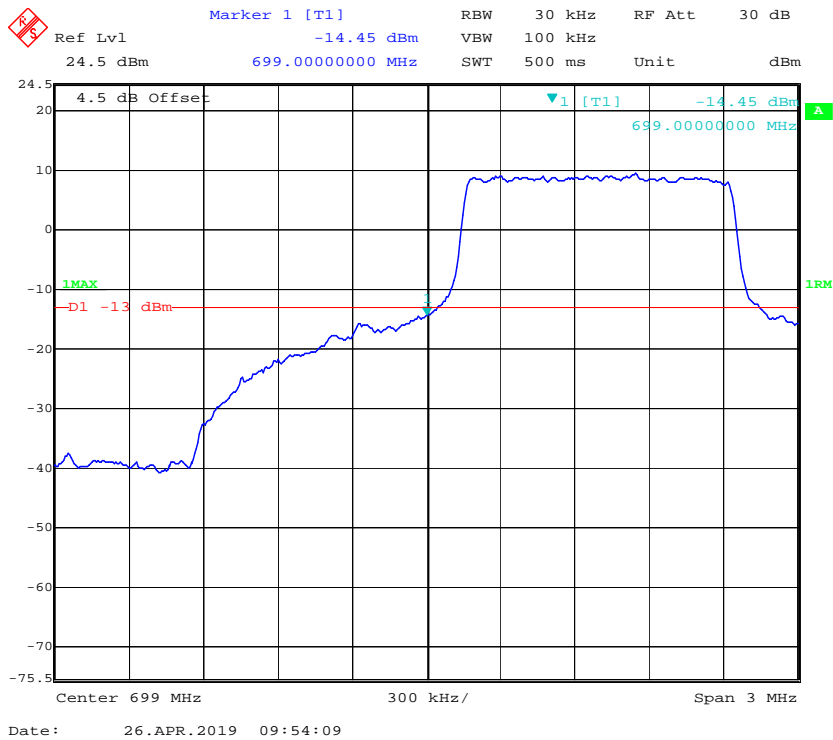


### 16QAM\_5MHz\_25 RB\_Right

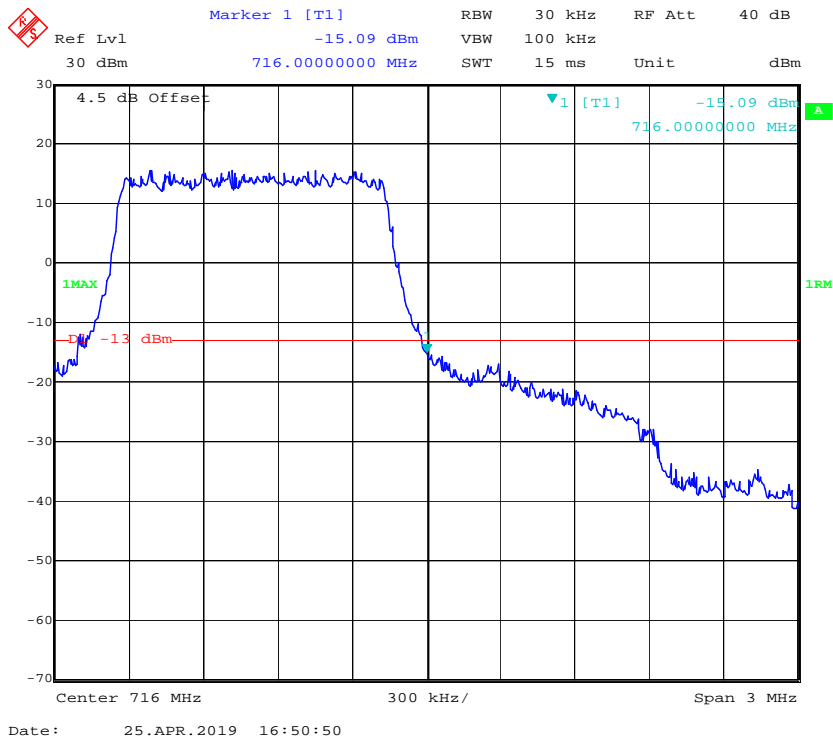


LTE Band 12

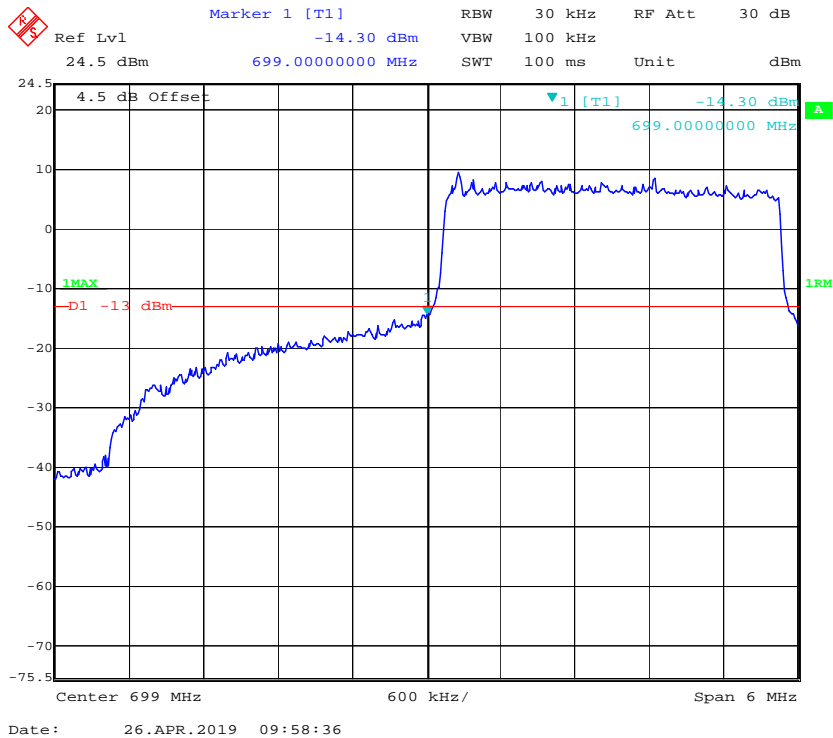
QPSK\_1.4MHz\_6 RB\_ Left



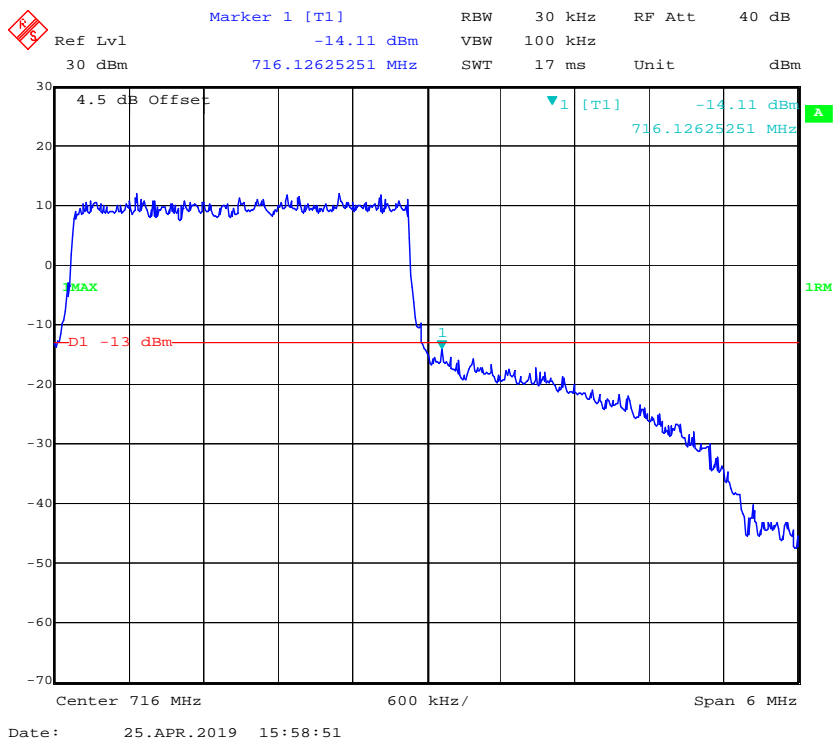
QPSK\_1.4MHz\_6 RB\_ Right



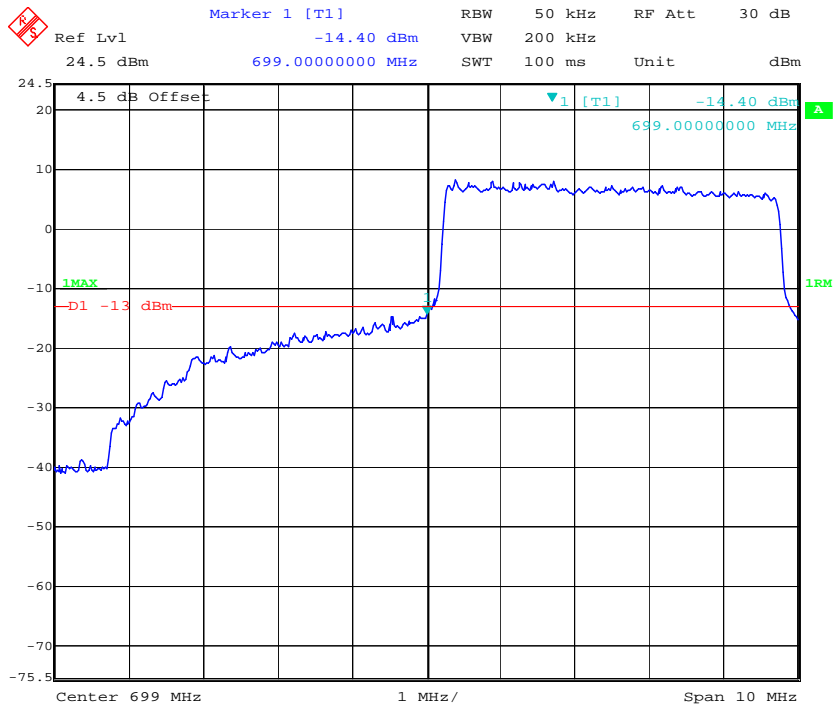
**QPSK\_3MHz\_15 RB\_Left**



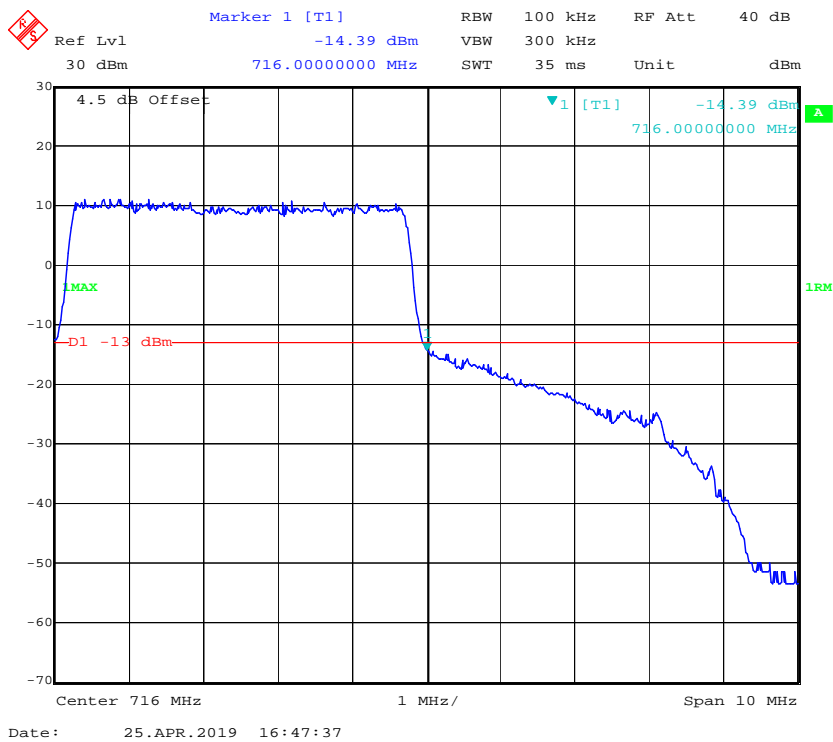
**QPSK\_3MHz\_15 RB\_Right**



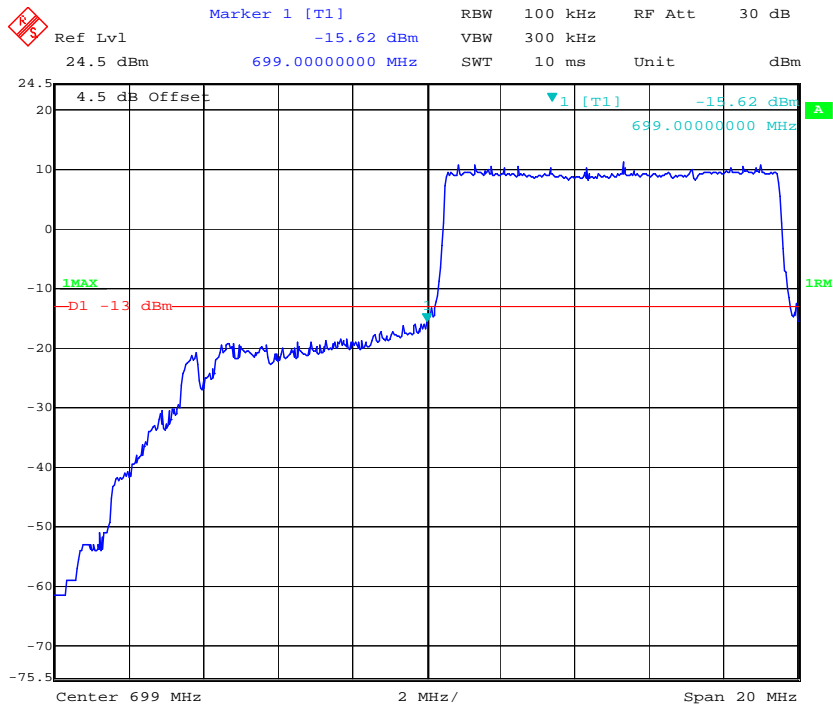
**QPSK\_5MHz\_25 RB\_Left**



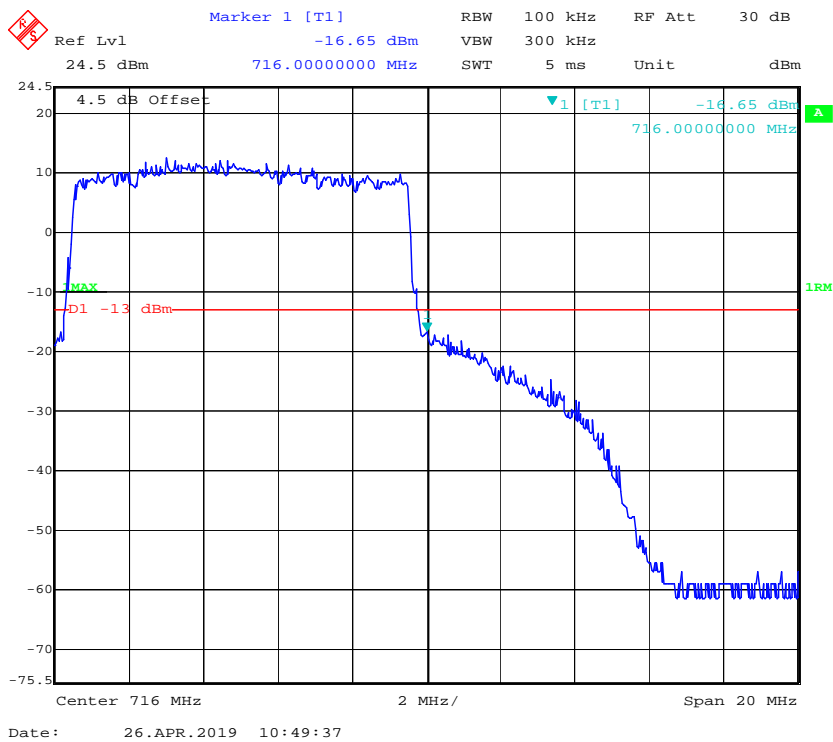
**QPSK\_5MHz\_25 RB\_Right**



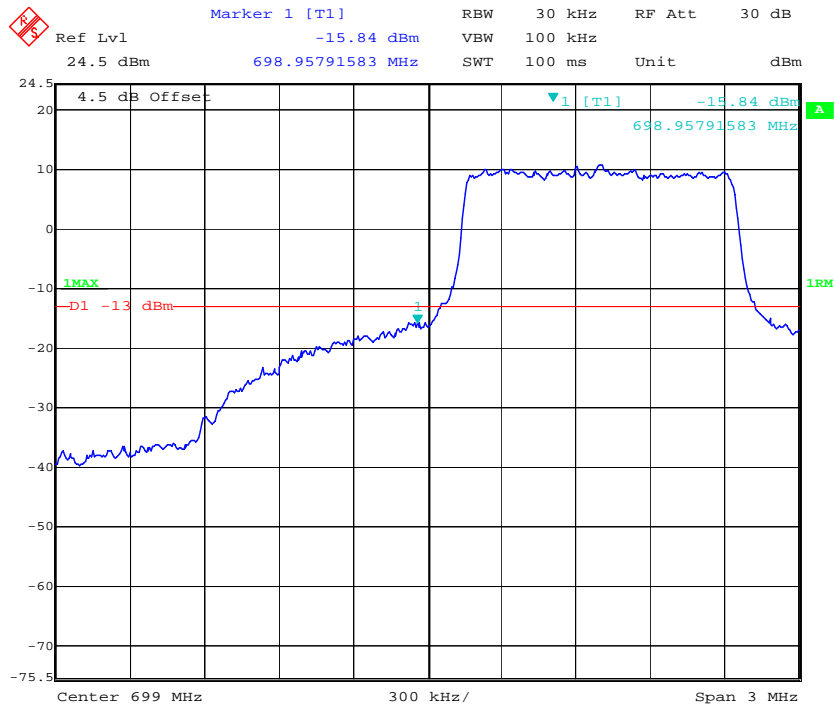
**QPSK\_10MHz\_50 RB\_Left**



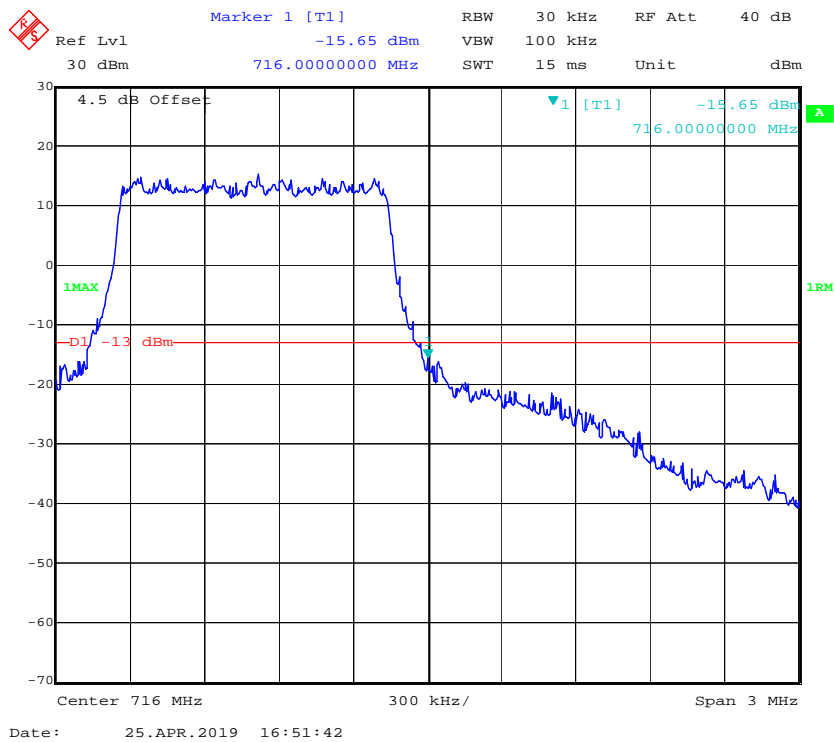
**QPSK\_10MHz\_50 RB\_Right**



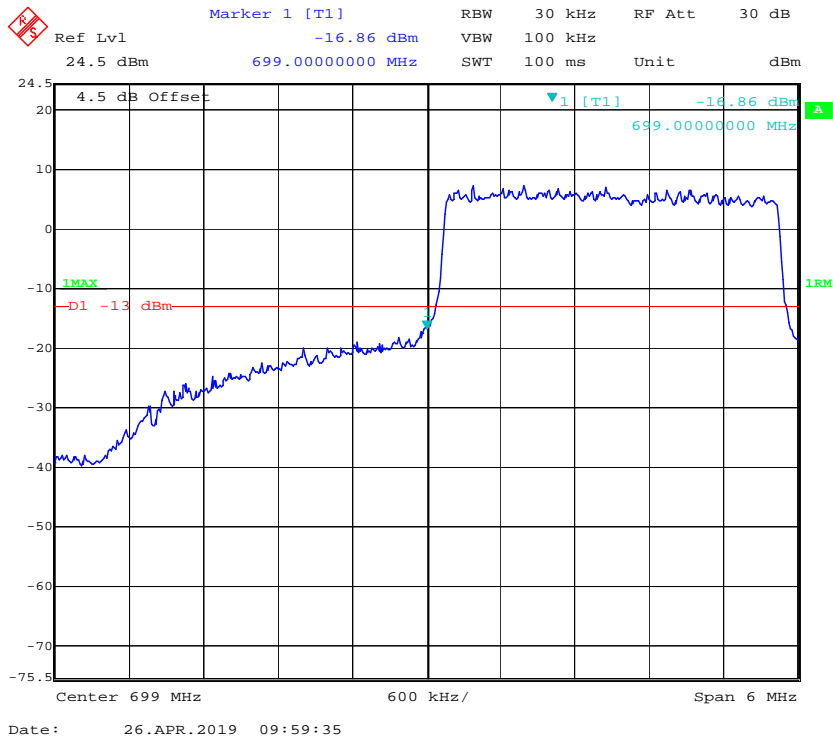
**16QAM\_1.4MHz\_6 RB\_ Left**



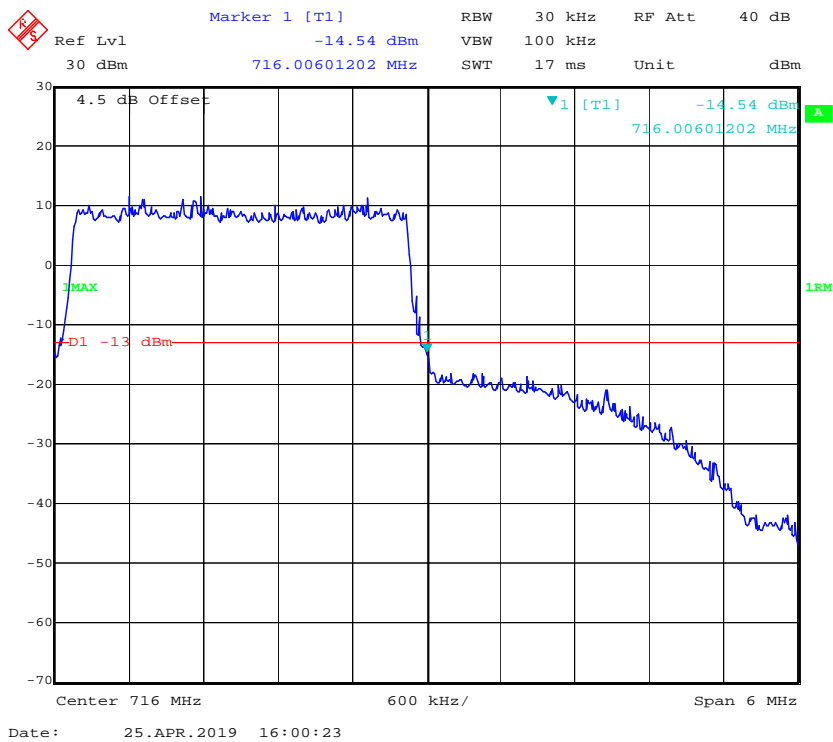
**16QAM\_1.4MHz\_6 RB\_ Right**



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

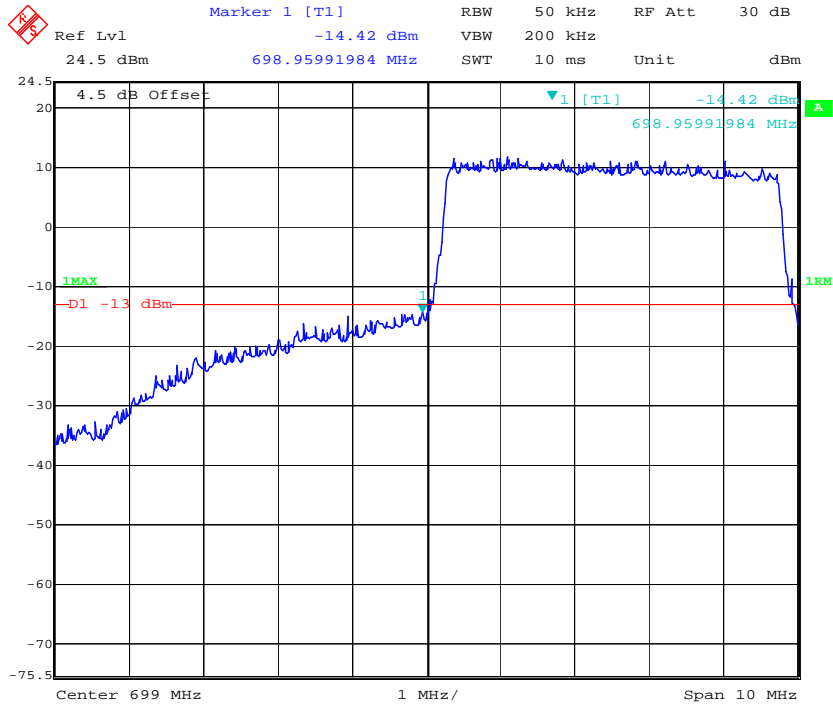


### 16QAM\_3MHz\_15 RB\_Right

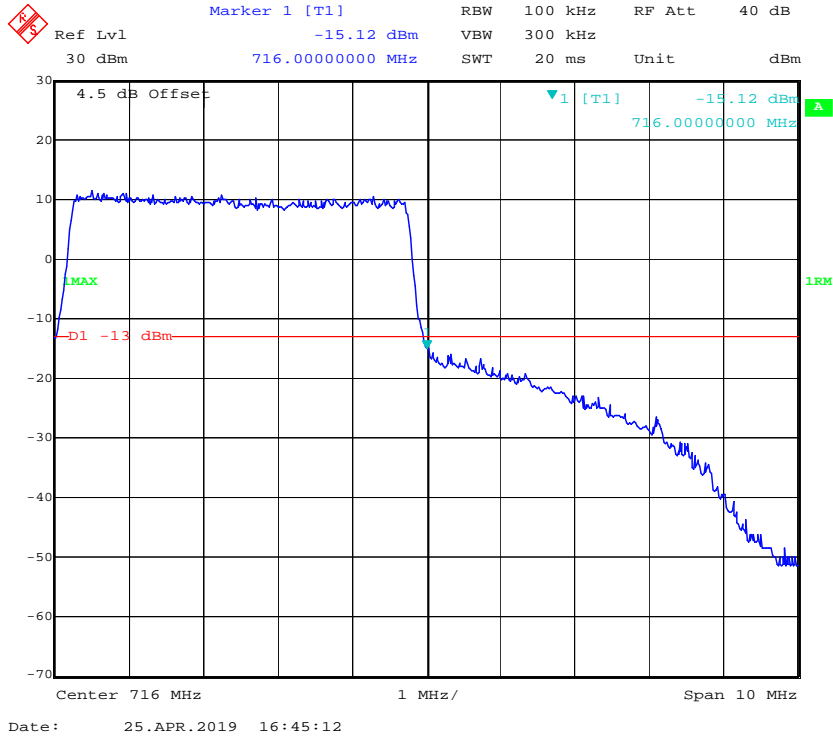




### 16QAM\_5MHz\_25 RB\_Left

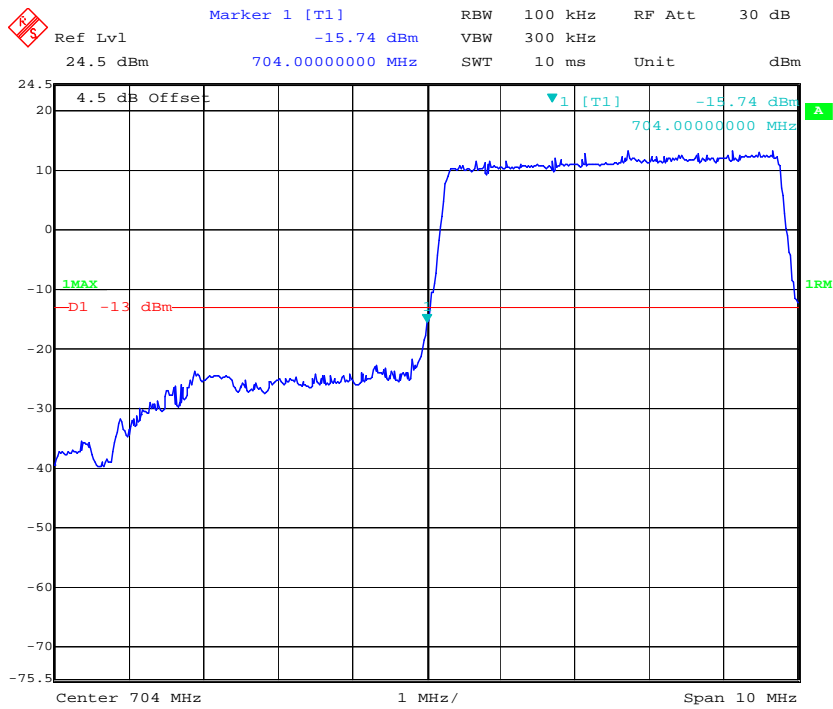


### 16QAM\_5MHz\_25 RB\_Right

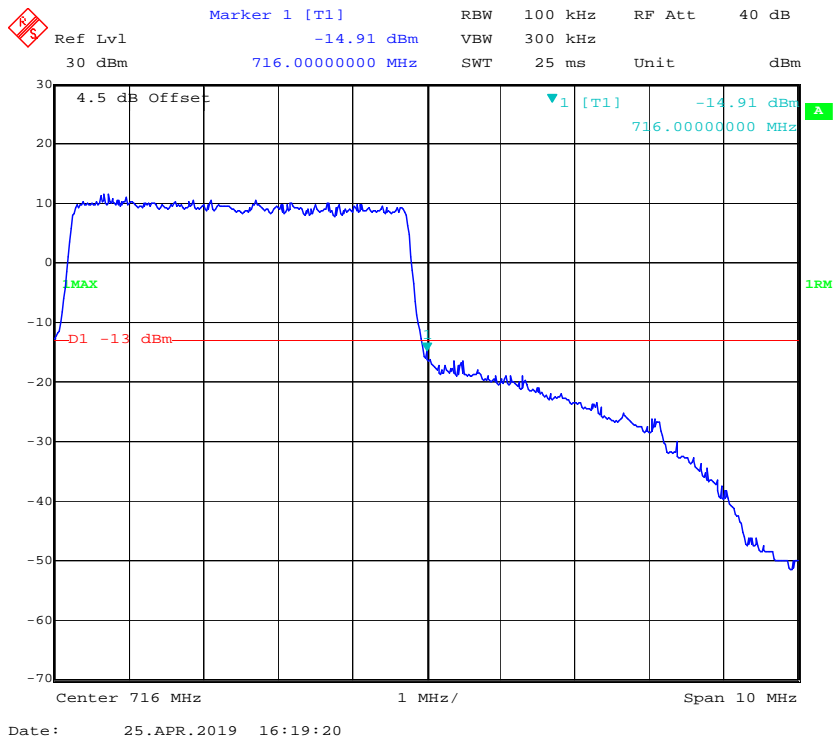


LTE Band 17

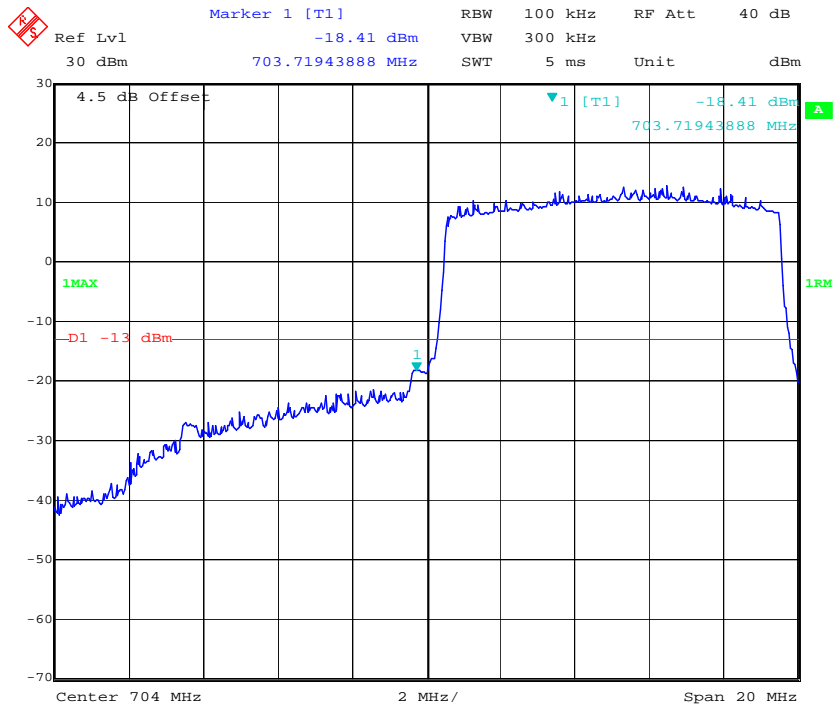
QPSK\_5MHz\_25 RB\_Left



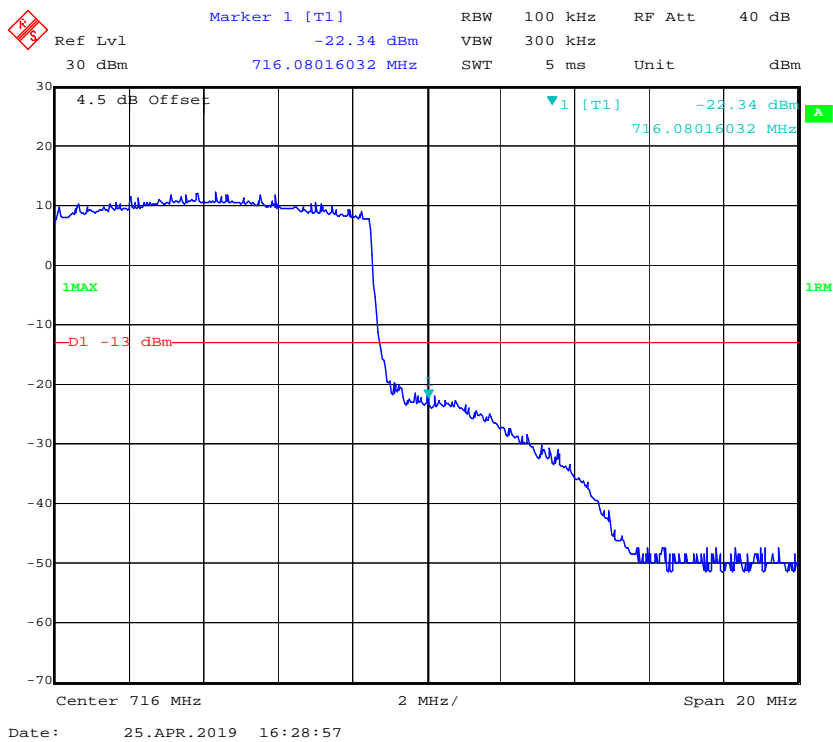
QPSK\_5MHz\_25 RB\_Right



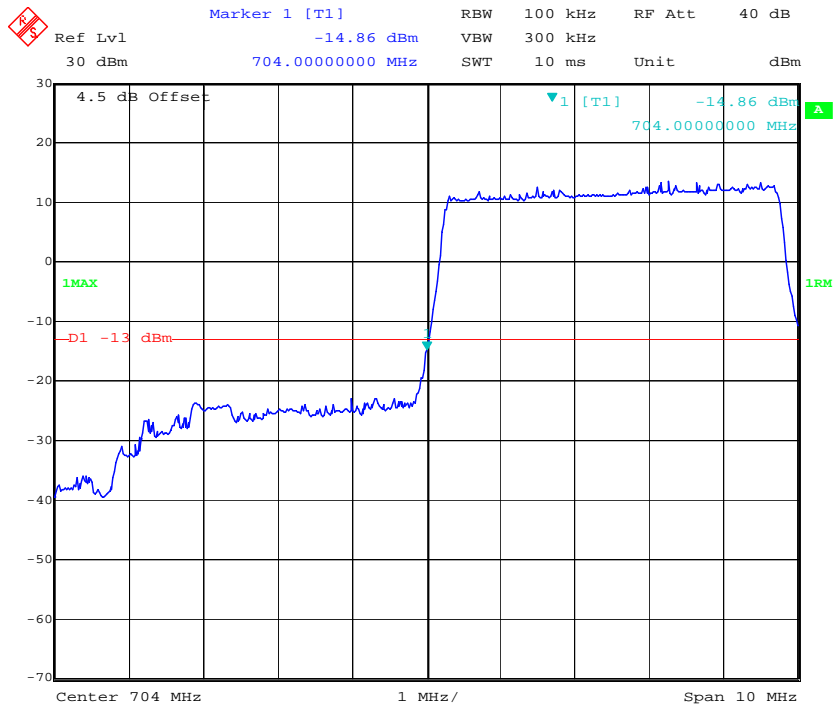
### QPSK\_10MHz\_50 RB\_Left



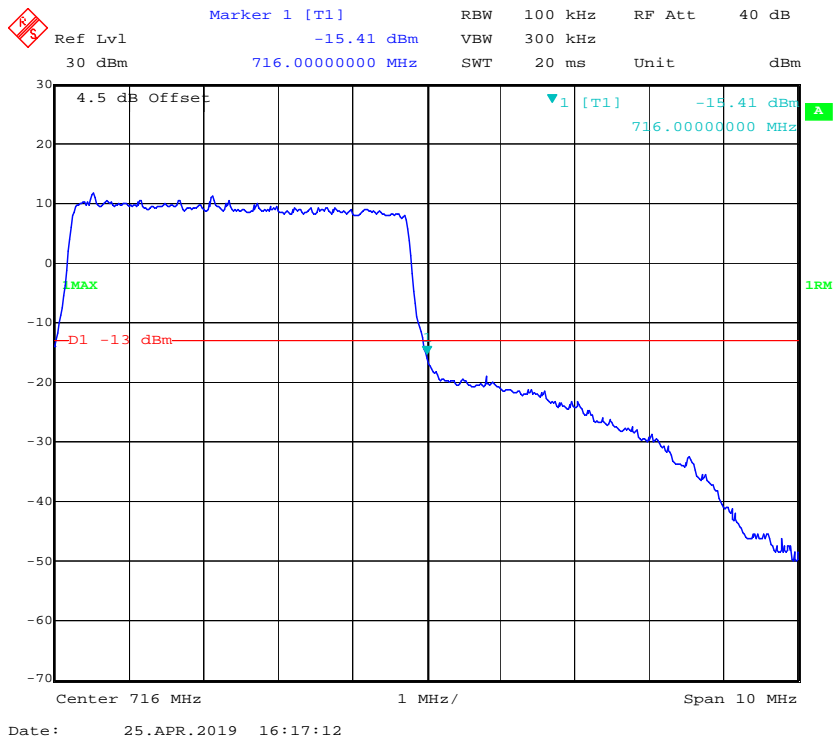
### QPSK\_10MHz\_50 RB\_Right



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



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



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

**Applicable Standard**

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

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

Frequency Tolerance for Transmitters in the Public Mobile Services

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

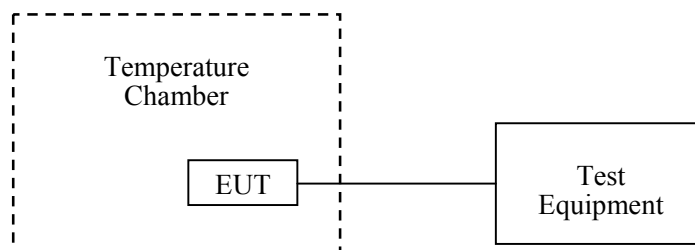
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

**Test Procedure**

Frequency Stability vs. Temperature: The equipment under test was connected to an external power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The 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 power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	2018-09-05	2019-09-05
R&S	Wideband Radio Communication Tester	CMW500	147473	2018-08-03	2019-08-03
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2019-03-26	2020-03-26
UNI-T	Multimeter	UT39A	M130199938	2018-07-24	2019-07-24
R&S	Spectrum Analyzer	FSU 26	200256	2019-01-04	2020-01-04
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

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

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

<b>Temperature:</b>	25.7~27.2°C
<b>Relative Humidity:</b>	59~60 %
<b>ATM Pressure:</b>	100.5~100.7kPa

\* The testing was performed by Blake Yang from 2019-04-25 to 2019-04-28.

**WCDMA Band II: R99**

Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.7	-4	-0.00213	Pass
-20		-1	-0.00053	
-10		-4	-0.00213	
0		-3	-0.00160	
10		-2	-0.00106	
20		-7	-0.00372	
30		-3	-0.00160	
40		-5	-0.00266	
50		-4	-0.00213	
20		3.5	-6	
20	4.25	-2	-0.00106	

**WCDMA Band V: R99**

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limits
°C	V <sub>DC</sub>	Hz	ppm	ppm
-30	3.7	-1	-0.00120	2.5
-20		-2	-0.00239	
-10		-4	-0.00478	
0		-3	-0.00359	
10		-2	-0.00239	
20		-5	-0.00598	
30		-6	-0.00717	
40		-3	-0.00359	
50		-1	-0.00120	
20		3.5	-2	
20	4.25	-3	-0.00359	

**LTE Band 2:**

<b>QPSK, Channel Bandwidth:1.4MHz Middle Channel, <math>f_c = 1880</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.7	5	0.0027	Pass
-20		6	0.0032	
-10		3	0.0016	
0		7	0.0037	
10		6	0.0032	
20		2	0.0011	
30		1	0.0005	
40		8	0.0043	
50		4	0.0021	
20		3.5	5	
20	4.25	6	0.0032	

<b>16QAM, Channel Bandwidth:1.4MHz Middle Channel, <math>f_c = 1880</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Result
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.7	6	0.0032	Pass
-20		7	0.0037	
-10		2	0.0011	
0		5	0.0027	
10		5	0.0027	
20		4	0.0021	
30		5	0.0027	
40		3	0.0016	
50		2	0.0011	
20		3.5	6	
20	4.25	5	0.0027	



**LTE Band4:**

<b>QPSK, Channel Bandwidth:1.4MHz</b>					
<b>Temperature</b>	<b>Voltage</b>	<b>Test Result (MHz)</b>		<b>Limit (MHz)</b>	
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>F<sub>L</sub></b>	<b>F<sub>H</sub></b>	<b>F<sub>L</sub></b>	<b>F<sub>H</sub></b>
-30	3.7	1710.52	1754.42	1710	1755
-20		1710.52	1754.41	1710	1755
-10		1710.53	1754.45	1710	1755
0		1710.49	1754.43	1710	1755
10		1710.54	1754.39	1710	1755
20		1710.56	1754.45	1710	1755
30		1710.53	1754.51	1710	1755
40		1710.44	1754.45	1710	1755
50		1710.55	1754.43	1710	1755
20		3.5	1710.54	1754.52	1710
20	4.25	1710.56	1754.51	1710	1755

<b>16QAM, Channel Bandwidth:1.4MHz</b>					
<b>Temperature</b>	<b>Voltage</b>	<b>Test Result (MHz)</b>		<b>Limit (MHz)</b>	
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>F<sub>L</sub></b>	<b>F<sub>H</sub></b>	<b>F<sub>L</sub></b>	<b>F<sub>H</sub></b>
-30	3.7	1710.52	1754.44	1710	1755
-20		1710.52	1754.51	1710	1755
-10		1710.55	1754.45	1710	1755
0		1710.53	1754.45	1710	1755
10		1710.52	1754.51	1710	1755
20		1710.54	1754.45	1710	1755
30		1710.52	1754.55	1710	1755
40		1710.48	1754.41	1710	1755
50		1710.51	1754.38	1710	1755
20		3.5	1710.48	1754.42	1710
20	4.25	1710.53	1754.49	1710	1755

**LTE Band 5:**

<b>QPSK, Middle Channel, <math>f_c = 836.5</math> MHz, Channel Bandwidth:1.4MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V <sub>DC</sub>	Hz	ppm	ppm
-30	3.7	-12	-0.0143	2.5
-20		-10	-0.012	
-10		-8	-0.0096	
0		-14	-0.0167	
10		-7	-0.0084	
20		-6	-0.0072	
30		-13	-0.0155	
40		-11	-0.0132	
50		-8	-0.0096	
20		3.5	-9	
20	4.25	-7	-0.0084	

<b>16QAM, Middle Channel, <math>f_c = 836.5</math> MHz, Channel Bandwidth:1.4MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V <sub>DC</sub>	Hz	ppm	ppm
-30	3.7	-13	-0.0155	2.5
-20		-12	-0.0143	
-10		-10	-0.012	
0		-15	-0.0179	
10		-9	-0.0108	
20		-7	-0.0084	
30		-16	-0.0191	
40		-12	-0.0143	
50		-9	-0.0108	
20		3.5	-11	
20	4.25	-8	-0.0096	

**LTE Band 12:**

QPSK, Channel Bandwidth:1.4MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V <sub>DC</sub>	F <sub>L</sub>	F <sub>H</sub>	F <sub>L</sub>	F <sub>H</sub>
-30	3.7	699.55	715.52	699	716
-20		699.49	715.51	699	716
-10		699.56	715.55	699	716
0		699.56	715.53	699	716
10		699.51	715.49	699	716
20		699.53	715.51	699	716
30		699.49	715.48	699	716
40		699.49	715.56	699	716
50		699.54	715.50	699	716
20		3.5	699.52	715.52	699
20	4.25	699.56	715.49	699	716

16QAM, Channel Bandwidth:1.4MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V <sub>DC</sub>	F <sub>L</sub>	F <sub>H</sub>	F <sub>L</sub>	F <sub>H</sub>
-30	3.7	699.53	715.49	699	716
-20		699.54	715.45	699	716
-10		699.54	715.46	699	716
0		699.55	715.45	699	716
10		699.48	715.41	699	716
20		699.53	715.45	699	716
30		699.51	715.44	699	716
40		699.42	715.42	699	716
50		699.55	715.41	699	716
20		3.5	699.51	715.45	699
20	4.25	699.55	715.50	699	716

**LTE Band 17(704-716 MHz):**

QPSK, Channel Bandwidth:5MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V <sub>DC</sub>	F <sub>L</sub>	F <sub>H</sub>	F <sub>L</sub>	F <sub>H</sub>
-30	3.7	704.61	715.53	704	716
-20		704.64	715.55	704	716
-10		704.58	715.53	704	716
0		704.66	715.48	704	716
10		704.59	715.51	704	716
20		704.61	715.51	704	716
30		704.63	715.54	704	716
40		704.57	715.54	704	716
50		704.61	715.50	704	716
20		3.5	704.56	715.55	704
20	4.25	704.64	715.53	704	716

16QAM, Channel Bandwidth:5MHz					
Temperature	Voltage	Test Result (MHz)		Limit (MHz)	
°C	V <sub>DC</sub>	F <sub>L</sub>	F <sub>H</sub>	F <sub>L</sub>	F <sub>H</sub>
-30	3.7	704.49	715.51	704	716
-20		704.52	715.46	704	716
-10		704.58	715.55	704	716
0		704.53	715.53	704	716
10		704.55	715.45	704	716
20		704.53	715.55	704	716
30		704.46	715.43	704	716
40		704.48	715.53	704	716
50		704.52	715.49	704	716
20		3.5	704.55	715.45	704
20	4.25	704.55	715.51	704	716

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

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