



TESTING LABORATORY  
CERTIFICATE #4820.01



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

For

## VinSmart Research and Manufacture Joint Stock Company

Lot CN1-06B-1&2 Hi-tech 1 Industrial Park Hoa Lac Hi-tech Park Hanoi, Ha Bang, Thach That  
Hanoi Vietnam

**FCC ID: 2AVD3-V330L**

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## GENERAL INFORMATION

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

<b>EUT Name:</b>	Smart Phone
<b>EUT Model:</b>	V330L
<b>Operation modes:</b>	GSM Voice, GPRS/EDGE Data, WCDMA( R99 (Voice+Data), HSDPA/HSUPA) FDD-LTE
<b>Operation Frequency:</b>	GSM 850: 824-849 MHz(TX); 869-894 MHz(RX) PCS 1900: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 2:1850-1910 MHz(TX), 1930-1990 MHz(RX) LTE Band 5:824-849 MHz(TX), 869-894 MHz(RX) LTE Band 7: 2500-2570 MHz(TX); 2620-2690 MHz(RX)
<b>Modulation Type:</b>	GMSK, 8PSK, BPSK, QPSK, 16QAM
<b>Rated Input Voltage:</b>	DC 5V for adapter DC 3.85V from battery
<b>Serial Number:</b>	PDG191203003-1B
<b>EUT Received Date:</b>	2019-12-03
<b>EUT Status:</b>	Good

### Objective

This report is prepared on behalf of *VinSmart Research and Manufacture Joint Stock Company* in accordance with: Part 2-Subpart J, Part 22-Subpart H, Part 24-Subpart E, Part 27 of the Federal Communications Commission's rules.

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

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

FCC Part 15C DSS submissions with FCC ID: 2AVD3-V330L  
FCC Part 15C DTS submissions with FCC ID: 2AVD3-V330L

### 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%

*Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.*

## 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.

## Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “△”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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## SYSTEM TEST CONFIGURATION

### Justification

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

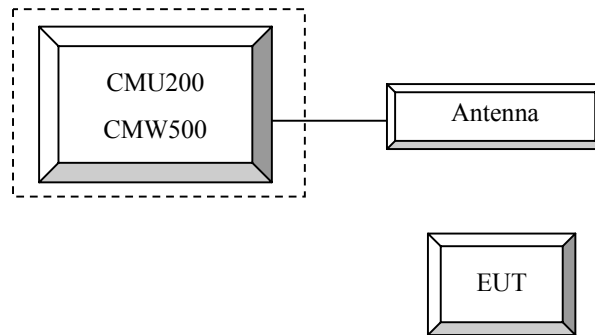
### Equipment Modifications

No modification was made to the EUT.

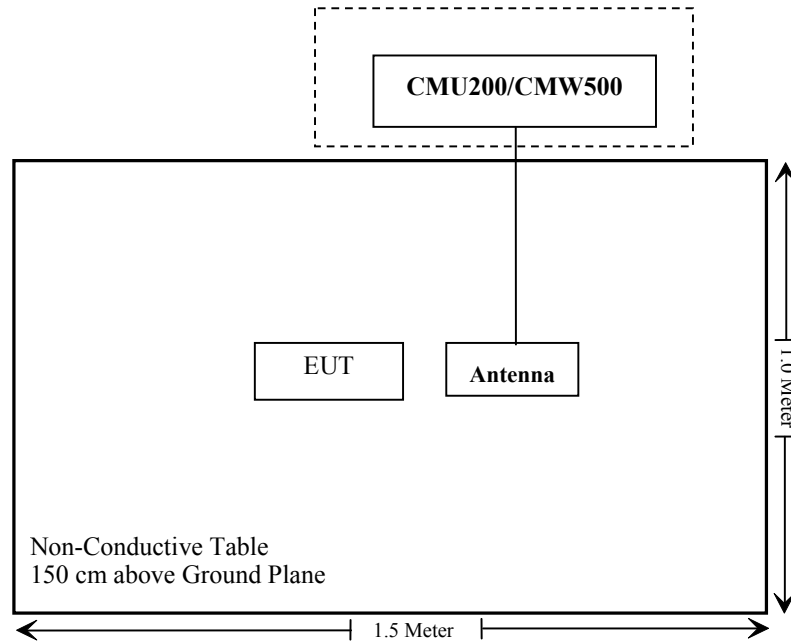
### Support Equipment List and Details

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

### Configuration of Test Setup



**Block Diagram of Test Setup**



**SUMMARY OF TEST RESULTS**

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



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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: RDG200211005-SA.

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

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

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

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**Applicable Standard**

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

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

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

According to §27.50

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

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

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

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

**Test Procedure**

**GSM/GPRS/EGPRS**

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

**WCDMA-Release 99**

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

<b>WCDMA General Settings</b>	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	<b><math>\beta_c</math> / <math>\beta_d</math></b>	8/15

**WCDMA HSDPA**

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

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

**WCDMA HSUPA**

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

	<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 ( $N_{RB}$ )	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
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	ESR3	102453	2019-06-26	2020-06-26
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	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
Agilent	Signal Generator	E8247C	MY43321350	2019-12-10	2020-12-10
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
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	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
R&S	Universal Radio Communication Tester	CMU200	106 891	2019-09-12	2020-09-12
R&S	Wideband Radio Communication Tester	CMW500	147473	2019-08-03	2020-08-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	/

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

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

Test Items:	Radiation Below 1GHz	Radiation Above 1GHz	Conducted Output Power
<b>Temperature:</b>	25 °C	23.6°C	22.3°C~ 25.1 °C
<b>Relative Humidity:</b>	39%	46 %	26%~30 %
<b>ATM Pressure:</b>	101.6 kPa	102.3kPa	100.6kPa ~102.5kPa
<b>Tester:</b>	Vern Shen	Lucy Lu	Black Yang
<b>Test Date:</b>	2019-12-27	2019-12-13	2019-12-05~2019-12-07

*Test Result: Compliance*

**Conducted Output Power**

**Cellular Band & PCS Band**

**GSM&GPRS mode**

Band	Channel No.	Conducted Peak Output Power (dBm)				
		GSM	GPRS 1 uplink slot	GPRS 2 uplink slot	GPRS 3 uplink slot	GPRS 4 uplink slot
Cellular	128	31.8	31.78	31.47	30.94	30.48
	190	31.9	31.83	31.55	31.09	30.72
	251	31.9	31.88	31.61	31.18	30.81
PCS	512	29.5	29.48	29.21	29.05	28.84
	661	29.3	29.34	29.15	28.94	28.79
	810	29.3	29.32	29.13	28.92	28.75

**EGPRS mode**

Band	Channel No.	Conducted Peak Output Power (dBm)			
		EGPRS 1 uplink slot	EGPRS 2 uplink slot	EGPRS 3 uplink slot	EGPRS 4 uplink slot
Cellular	128	25.95	25.65	25.42	24.91
	190	25.97	25.68	25.46	24.96
	251	26.03	25.78	25.53	25.11
PCS	512	24.62	24.47	24.29	24.11
	661	24.59	24.41	24.23	24.08
	810	24.68	24.49	24.31	24.15

**WCDMA Band 2**

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	22.75	3.00	22.79	3.32	22.95	3.08
HSDPA	1	21.69	4.28	21.66	4.08	21.93	4.28
	2	21.62	4.32	21.64	4.04	21.85	4.22
	3	21.64	4.22	21.74	4.08	21.87	4.35
	4	21.66	4.19	21.59	4.16	22.00	4.25
HSUPA	1	21.12	4.08	21.17	4.32	21.26	4.20
	2	21.07	4.13	21.17	4.25	21.25	4.26
	3	21.07	4.13	21.16	4.42	21.24	4.13
	4	21.04	4.02	21.25	4.36	21.22	4.18
	5	21.19	4.02	21.20	4.40	21.17	4.10

**WCDMA Band 5**

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	22.55	3.08	22.71	3.12	22.53	3.16
HSDPA	1	21.31	4.16	21.42	4.12	21.28	4.44
	2	21.33	4.19	21.39	4.22	21.26	4.38
	3	21.39	4.17	21.40	4.12	21.28	4.49
	4	21.31	4.09	21.35	4.05	21.19	4.44
HSUPA	1	20.75	4.24	20.96	4.16	20.79	3.68
	2	20.81	4.27	20.92	4.14	20.75	3.70
	3	20.73	4.20	21.03	4.24	20.78	3.61
	4	20.80	4.19	20.90	4.15	20.86	3.74
	5	20.77	4.22	20.89	4.22	20.81	3.59

LTE Band 2

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	20.44	21.10	20.67
		RB1#3	20.76	21.23	20.77
		RB1#5	20.88	21.21	20.55
		RB3#0	20.59	20.97	20.75
		RB3#3	20.72	20.97	20.69
		RB6#0	19.90	20.02	19.79
	16QAM	RB1#0	19.80	20.18	20.15
		RB1#3	19.68	20.35	20.68
		RB1#5	19.75	20.25	20.27
		RB3#0	19.96	20.04	19.71
3MHz	QPSK	RB1#0	20.59	20.82	20.78
		RB1#8	20.65	20.94	20.76
		RB1#14	20.45	20.93	20.75
		RB6#0	19.77	20.07	19.91
		RB6#9	19.71	20.07	19.78
		RB15#0	19.73	20.05	19.83
	16QAM	RB1#0	20.12	20.56	19.62
		RB1#8	19.95	20.34	19.78
		RB1#14	19.94	20.52	19.86
		RB6#0	18.89	19.32	18.77
		RB6#9	18.95	19.09	18.76
		RB15#0	18.82	18.91	18.91
5MHz	QPSK	RB1#0	20.60	20.69	20.82
		RB1#13	20.74	20.88	20.83
		RB1#24	20.40	20.80	20.82
		RB15#0	19.78	20.09	19.93
		RB15#10	19.75	20.10	19.86
		RB25#0	19.77	20.07	19.89
	16QAM	RB1#0	19.31	20.11	19.70
		RB1#13	19.35	20.35	19.62
		RB1#24	19.07	20.27	19.70
		RB15#0	18.68	18.85	18.83
		RB15#10	18.85	18.95	18.81
		RB25#0	18.83	18.96	18.93

10MHz	QPSK	RB1#0	20.70	20.70	20.90
		RB1#25	20.78	21.17	21.11
		RB1#49	20.65	20.99	20.72
		RB25#0	19.88	19.98	20.14
		RB25#25	19.52	20.07	19.97
	RB50#0	19.65	20.08	19.96	
	16QAM	RB1#0	20.08	20.58	19.98
		RB1#25	19.92	20.94	20.07
		RB1#49	19.73	20.55	19.97
		RB25#0	18.90	19.06	19.16
RB25#25		18.64	19.19	19.18	
RB50#0	18.67	19.36	19.09		
15MHz	QPSK	RB1#0	20.63	20.91	22.58
		RB1#38	20.76	21.00	22.63
		RB1#74	20.57	20.84	22.19
		RB36#0	19.76	19.88	21.82
		RB36#39	19.52	20.00	21.59
		RB75#0	19.62	20.05	21.58
	16QAM	RB1#0	20.11	20.64	21.93
		RB1#38	19.88	21.14	21.70
		RB1#74	19.95	20.87	21.53
		RB36#0	18.75	19.04	20.80
		RB36#39	18.60	19.09	20.58
		RB75#0	18.62	20.67	20.67
20MHz	QPSK	RB1#0	22.27	22.55	22.67
		RB1#50	22.68	23.37	22.94
		RB1#99	22.31	23.11	22.44
		RB50#0	21.62	21.72	21.85
		RB50#50	21.50	21.86	21.71
		RB100#0	21.57	21.77	21.73
	16QAM	RB1#0	21.95	21.42	22.40
		RB1#50	22.37	22.03	22.68
		RB1#99	21.54	22.07	22.10
		RB50#0	20.74	20.78	20.84
		RB50#50	20.56	20.93	20.69
		RB100#0	20.75	20.75	20.83

**LTE Band 5**

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	RB1#0	23.55	23.23	23.36
		RB1#3	23.27	23.31	23.36
		RB1#5	23.67	23.27	23.13
		RB3#0	23.30	23.51	23.14
		RB3#3	23.36	23.50	23.05
		RB6#0	22.36	22.46	22.19
	16QAM	RB1#0	22.07	23.02	22.22
		RB1#3	22.83	22.88	22.22
		RB1#5	22.75	22.74	22.15
		RB3#0	22.33	22.76	22.44
		RB3#3	22.29	22.97	22.41
		RB6#0	21.55	21.63	21.08
3MHz	QPSK	RB1#0	23.14	23.41	23.29
		RB1#8	23.25	23.25	23.10
		RB1#14	23.43	23.39	23.07
		RB6#0	22.34	22.52	22.33
		RB6#9	22.48	22.51	22.31
		RB15#0	22.40	22.52	22.28
	16QAM	RB1#0	22.67	22.93	22.33
		RB1#8	22.54	22.65	22.10
		RB1#14	22.44	22.68	22.18
		RB6#0	21.74	21.39	21.28
		RB6#9	21.45	21.53	21.08
		RB15#0	21.58	21.38	21.22
5MHz	QPSK	RB1#0	23.15	23.25	23.15
		RB1#13	23.24	23.31	23.09
		RB1#24	23.40	23.25	22.94
		RB15#0	22.46	22.54	22.41
		RB15#10	22.28	22.44	22.34
		RB25#0	22.25	22.53	22.26
	16QAM	RB1#0	22.16	21.99	22.56
		RB1#13	22.03	22.08	22.95
		RB1#24	22.29	22.09	22.50
		RB15#0	21.54	21.41	21.25
		RB15#10	21.32	21.33	21.20
		RB25#0	21.32	21.60	21.19
10MHz	QPSK	RB1#0	23.16	23.36	23.46
		RB1#25	23.43	23.55	23.52
		RB1#49	23.43	23.20	23.27
		RB25#0	22.50	22.57	22.49
		RB25#25	22.48	22.47	22.42
		RB50#0	22.44	22.49	22.42
	16QAM	RB1#0	22.57	22.77	22.33
		RB1#25	22.79	23.30	21.99
		RB1#49	22.61	23.05	22.57
		RB25#0	21.37	21.54	21.67
		RB25#25	21.58	21.58	21.27
		RB50#0	21.48	21.63	21.36

LTE Band 7

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	RB1#0	21.89	21.62	21.75
		RB1#13	21.80	21.67	21.53
		RB1#24	21.88	21.74	21.52
		RB15#0	20.89	20.79	20.74
		RB15#10	20.89	20.82	20.68
		RB25#0	21.00	20.94	20.81
	16QAM	RB1#0	20.59	20.97	20.92
		RB1#13	20.54	21.13	20.55
		RB1#24	20.59	21.11	20.61
		RB15#0	19.90	19.75	19.77
		RB15#10	19.87	19.81	19.76
		RB25#0	20.74	19.74	19.71
10MHz	QPSK	RB1#0	21.77	21.80	21.54
		RB1#25	21.91	21.75	21.57
		RB1#49	21.71	21.81	21.81
		RB25#0	20.95	20.82	20.83
		RB25#25	20.94	20.85	20.71
		RB50#0	20.91	20.82	20.77
	16QAM	RB1#0	21.29	21.37	20.41
		RB1#25	21.29	21.16	20.32
		RB1#49	21.12	21.11	20.25
		RB25#0	19.90	19.88	19.92
		RB25#25	19.82	19.81	19.75
		RB50#0	20.02	19.78	19.76
15MHz	QPSK	RB1#0	21.87	21.68	21.59
		RB1#38	21.87	21.57	21.51
		RB1#74	21.90	21.68	21.46
		RB36#0	20.91	20.88	20.84
		RB36#39	20.92	20.90	20.89
		RB75#0	20.80	20.87	20.73
	16QAM	RB1#0	21.41	21.55	20.93
		RB1#38	21.32	21.53	20.65
		RB1#74	21.18	21.84	20.70
		RB36#0	19.90	19.98	19.79
		RB36#39	19.91	20.01	19.70
		RB75#0	19.89	20.00	19.79
20MHz	QPSK	RB1#0	21.69	21.92	21.60
		RB1#50	21.83	21.97	21.90
		RB1#99	21.66	22.05	21.61
		RB50#0	20.89	20.85	20.75
		RB50#50	20.96	20.98	20.83
		RB100#0	20.88	20.95	20.75
	16QAM	RB1#0	21.36	20.99	21.56
		RB1#50	21.59	20.94	21.57
		RB1#99	21.44	20.72	21.76
		RB50#0	19.99	19.89	19.71
		RB50#50	20.01	20.02	19.81
		RB100#0	19.85	19.92	19.81

**PAR, Band 2**

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	3.48	3.72	3.56	13
	100 RB		4.84	5.00	4.96	13
16QAM	1 RB	20 MHz	4.24	4.52	4.52	13
	100 RB		5.68	5.84	5.80	13

**PAR, Band 5**

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	3.44	4.44	4.44	13
	50 RB		4.68	5.20	4.96	13
16QAM	1 RB	10 MHz	4.24	4.96	5.36	13
	50 RB		5.32	6.08	5.88	13

**PAR, Band 7**

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	3.41	4.43	4.24	13
	100 RB		4.62	5.20	4.91	13
16QAM	1 RB	20 MHz	4.23	4.90	5.30	13
	100 RB		5.34	6.02	5.81	13

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



ERP & EIRP

**Part 22H**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
<b>GSM 850 Middle Channel</b>								
836.60	H	86.33	11.41	0.00	0.97	10.44	38.45	28.01
836.60	V	98.34	26.55	0.00	0.97	25.58	38.45	12.87
<b>EGPRS850 Middle Channel</b>								
836.60	H	93.71	18.79	0.00	0.97	17.82	38.45	20.63
836.60	V	86.84	15.05	0.00	0.97	14.08	38.45	24.37
<b>WCDMA R99 Band 5 middle channel</b>								
836.60	H	80.00	5.08	0.00	0.97	4.11	38.45	34.34
836.60	V	90.86	19.07	0.00	0.97	18.10	38.45	20.35

**Part 24E**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
<b>PCS 1900 Middle Channel</b>								
1880.00	H	85.86	13.25	11.66	2.66	22.25	33.00	10.75
1880.00	V	90.51	18.04	11.66	2.66	27.04	33.00	5.96
<b>EGPRS1900 Middle Channel</b>								
1880.00	H	85.26	12.65	11.66	2.66	21.65	33.00	11.35
1880.00	V	89.22	16.75	11.66	2.66	25.75	33.00	7.25
<b>WCDMA R99 Band 2 middle channel</b>								
1880.00	H	84.10	11.49	11.66	2.66	20.49	33.00	12.51
1880.00	V	83.30	10.83	11.66	2.66	19.83	33.00	13.17

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	87.07	14.46	11.66	2.66	23.46	33.00	9.54	
1880.00			V	87.27	14.80	11.66	2.66	23.80	33.00	9.20	
1880.00	3.00		H	86.20	13.59	11.66	2.66	22.59	33.00	10.41	
1880.00			V	86.87	14.40	11.66	2.66	23.40	33.00	9.60	
1880.00	5.00		H	85.67	13.06	11.66	2.66	22.06	33.00	10.94	
1880.00			V	85.97	13.50	11.66	2.66	22.50	33.00	10.50	
1880.00	10.00		H	83.74	11.13	11.66	2.66	20.13	33.00	12.87	
1880.00			V	84.05	11.58	11.66	2.66	20.58	33.00	12.42	
1880.00	15.00		H	85.67	13.06	11.66	2.66	22.06	33.00	10.94	
1880.00			V	85.78	13.31	11.66	2.66	22.31	33.00	10.69	
1880.00	20.00		H	86.81	14.20	11.66	2.66	23.20	33.00	9.80	
1880.00			V	87.22	14.75	11.66	2.66	23.75	33.00	9.25	
1880.00	1.40		16QAM	H	87.27	14.66	11.66	2.66	23.66	33.00	9.34
1880.00				V	87.48	15.01	11.66	2.66	24.01	33.00	8.99
1880.00	3.00			H	86.74	14.13	11.66	2.66	23.13	33.00	9.87
1880.00				V	86.97	14.50	11.66	2.66	23.50	33.00	9.50
1880.00	5.00	H		85.77	13.16	11.66	2.66	22.16	33.00	10.84	
1880.00		V		85.81	13.34	11.66	2.66	22.34	33.00	10.66	
1880.00	10.00	H		83.87	11.26	11.66	2.66	20.26	33.00	12.74	
1880.00		V		84.20	11.73	11.66	2.66	20.73	33.00	12.27	
1880.00	15.00	H		85.68	13.07	11.66	2.66	22.07	33.00	10.93	
1880.00		V		85.74	13.27	11.66	2.66	22.27	33.00	10.73	
1880.00	20.00	H		86.97	14.36	11.66	2.66	23.36	33.00	9.64	
1880.00		V		87.35	14.88	11.66	2.66	23.88	33.00	9.12	

**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	81.33	6.40	0.00	0.97	5.43	38.45	33.02
836.50			V	88.34	16.55	0.00	0.97	15.58	38.45	22.87
836.50	3.00		H	81.48	6.55	0.00	0.97	5.58	38.45	32.87
836.50			V	88.34	16.55	0.00	0.97	15.58	38.45	22.87
836.50	5.00		H	81.30	6.37	0.00	0.97	5.40	38.45	33.05
836.50			V	88.22	16.43	0.00	0.97	15.46	38.45	22.99
836.50	10.00		H	80.83	5.90	0.00	0.97	4.93	38.45	33.52
836.50			V	87.65	15.86	0.00	0.97	14.89	38.45	23.56
836.50	1.40	16QAM	H	81.26	6.33	0.00	0.97	5.36	38.45	33.09
836.50			V	87.36	15.57	0.00	0.97	14.60	38.45	23.85
836.50	3.00		H	80.78	5.85	0.00	0.97	4.88	38.45	33.57
836.50			V	87.24	15.45	0.00	0.97	14.48	38.45	23.97
836.50	5.00		H	81.11	6.18	0.00	0.97	5.21	38.45	33.24
836.50			V	87.13	15.34	0.00	0.97	14.37	38.45	24.08
836.50	10.00		H	80.15	5.22	0.00	0.97	4.25	38.45	34.20
836.50			V	86.83	15.04	0.00	0.97	14.07	38.45	24.38

**LTE Band 7**

Frequency (MHz)	BW (MHz)	Modulation	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
					Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
2535.00	5.00	QPSK	H	79.62	7.01	13.14	3.10	17.05	33.00	15.95
2535.00			V	76.82	5.67	13.14	3.10	15.71	33.00	17.29
2535.00	10.00		H	79.21	6.60	13.14	3.10	16.64	33.00	16.36
2535.00			V	76.45	5.30	13.14	3.10	15.34	33.00	17.66
2535.00	15.00		H	78.86	6.25	13.14	3.10	16.29	33.00	16.71
2535.00			V	76.30	5.15	13.14	3.10	15.19	33.00	17.81
2535.00	20.00		H	78.60	5.99	13.14	3.10	16.03	33.00	16.97
2535.00			V	76.70	5.55	13.14	3.10	15.59	33.00	17.41
2535.00	5.00	16QAM	H	79.87	7.26	13.14	3.10	17.30	33.00	15.70
2535.00			V	79.61	8.46	13.14	3.10	18.50	33.00	14.50
2535.00	10.00		H	78.87	6.26	13.14	3.10	16.30	33.00	16.70
2535.00			V	76.57	5.42	13.14	3.10	15.46	33.00	17.54
2535.00	15.00		H	78.94	6.33	13.14	3.10	16.37	33.00	16.63
2535.00			V	76.48	5.33	13.14	3.10	15.37	33.00	17.63
2535.00	20.00		H	78.72	6.11	13.14	3.10	16.15	33.00	16.85
2535.00			V	76.84	5.69	13.14	3.10	15.73	33.00	17.27

Note:

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

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

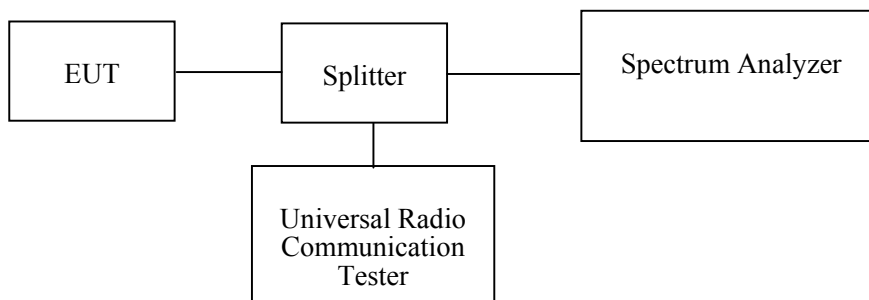
**Applicable Standard**

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

**Test Procedure**

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

The 26 dB & 99% bandwidth was recorded.



**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2019-12-10	2020-12-10
R&S	Spectrum Analyzer	FSU 26	200256	2019-05-09	2020-05-09
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010013	Each time	/
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	/

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

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	22.3°C~ 25.1 °C
<b>Relative Humidity:</b>	26%~30 %
<b>ATM Pressure:</b>	100.6kPa ~102.5kPa
<b>Tester:</b>	Black Yang
<b>Test Date:</b>	2019-12-05~2019-12-07

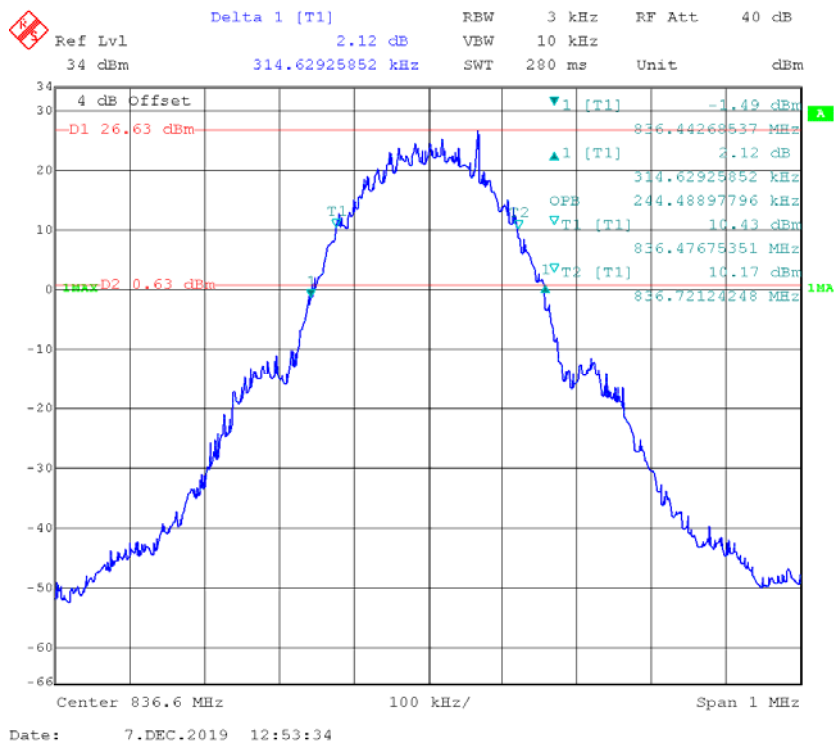
Test Mode: Transmitting

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

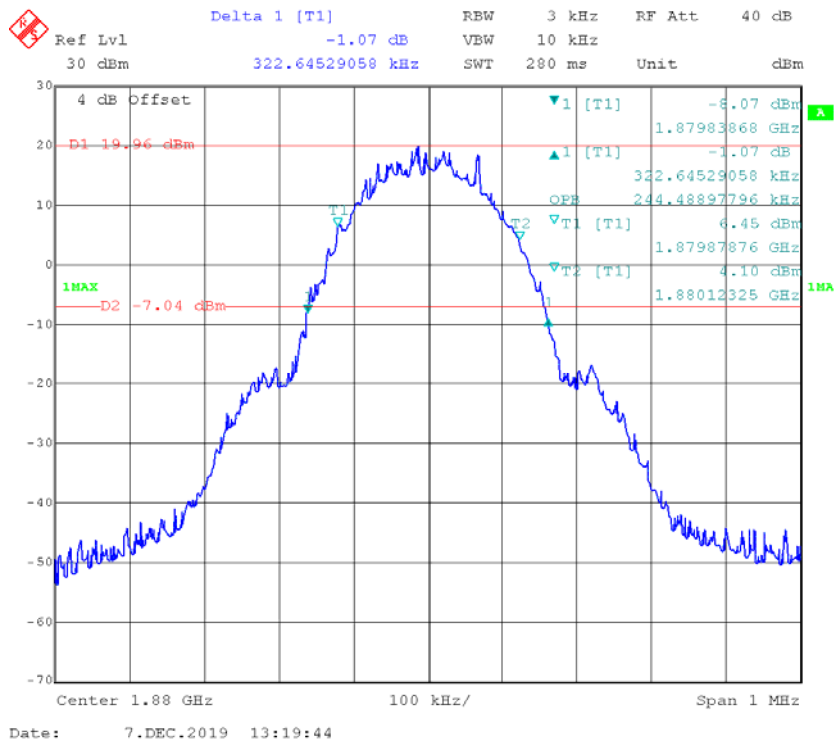
Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	Middle	GSM	0.244	0.315
		EGPRS	0.244	0.317
PCS		GSM	0.244	0.323
		EGPRS	0.244	0.317
WCDMA Band 2		Rel 99	4.148	4.770
		HSDPA	4.148	4.749
		HSUPA	4.168	4.729
WCDMA Band 5		Rel 99	4.148	4.770
		HSDPA	4.148	4.770
		HSUPA	4.168	4.770

Band	Bandwidth	Modulation	99% occupied bandwidth (MHz)	26 dB bandwidth (MHz)
LTE Band 2	1.4 MHz	QPSK	1.106	1.293
		16QAM	1.100	1.305
	3 MHz	QPSK	2.693	2.934
		16QAM	2.693	2.970
	5 MHz	QPSK	4.549	5.050
		16QAM	4.529	5.010
	10 MHz	QPSK	8.938	9.779
		16QAM	8.978	9.619
	15 MHz	QPSK	13.467	14.729
		16QAM	13.467	14.729
LTE Band 5	1.4 MHz	QPSK	1.094	1.293
		16QAM	1.106	1.305
	3 MHz	QPSK	2.693	2.958
		16QAM	2.693	2.958
	5 MHz	QPSK	4.549	5.010
		16QAM	4.549	5.070
	10 MHz	QPSK	8.978	9.820
		16QAM	8.938	9.820
LTE Band 7	5 MHz	QPSK	4.529	5.030
		16QAM	4.529	5.010
	10 MHz	QPSK	8.978	9.779
		16QAM	8.938	9.619
	15 MHz	QPSK	13.527	14.790
		16QAM	13.527	14.790
	20 MHz	QPSK	17.956	19.479
		16QAM	18.036	19.399

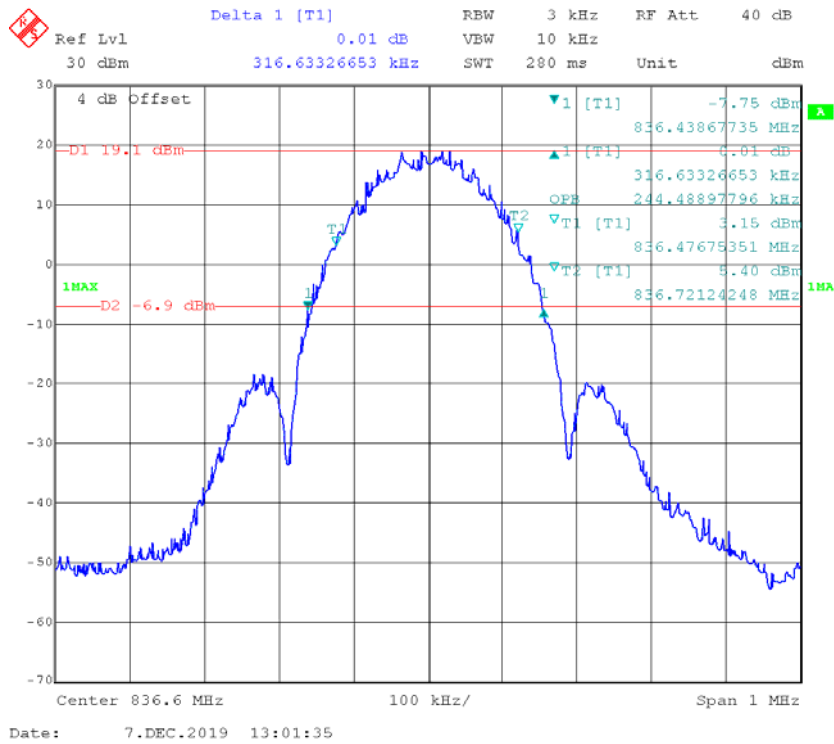
### GSM Cellular 850



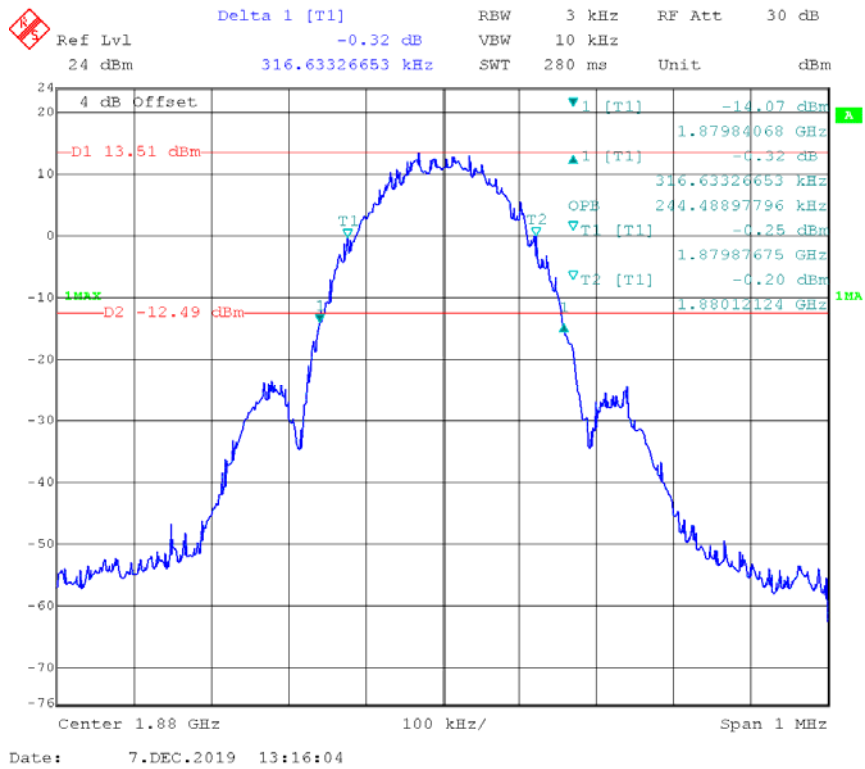
### GSM PCS 1900



**EDGE Cellular 850**

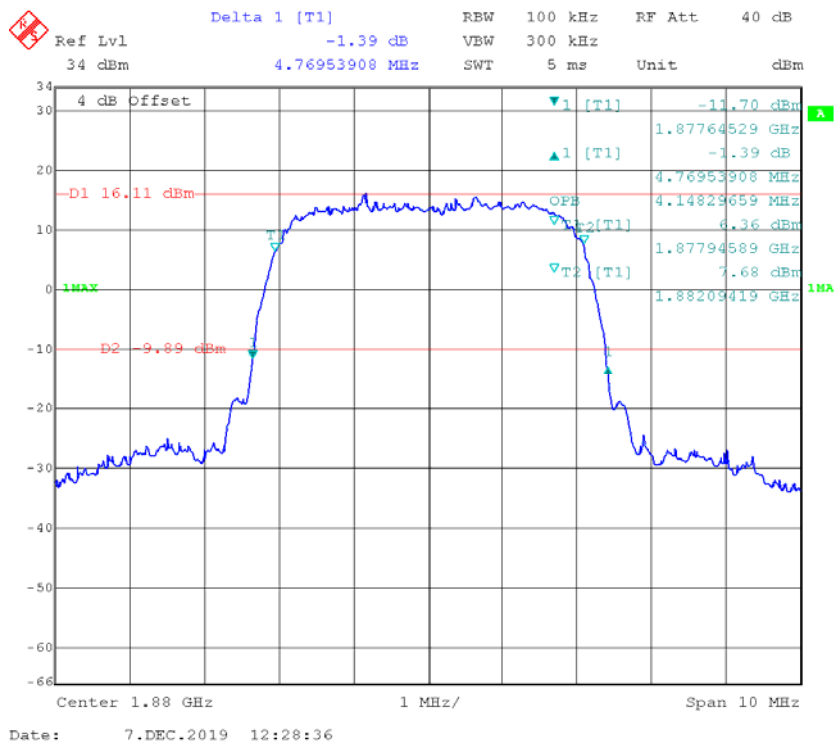


**EDGE PCS 1900**

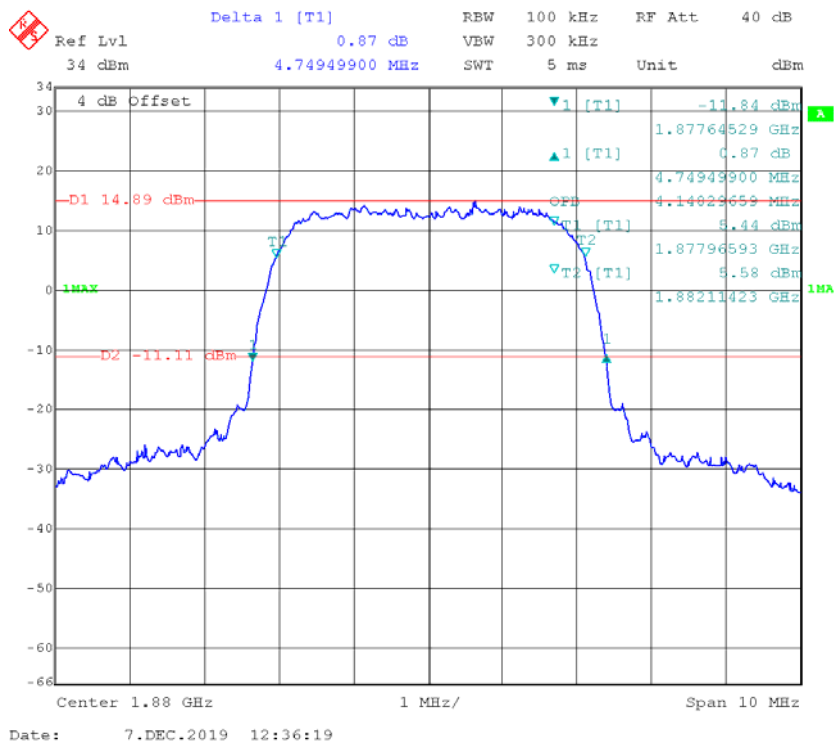




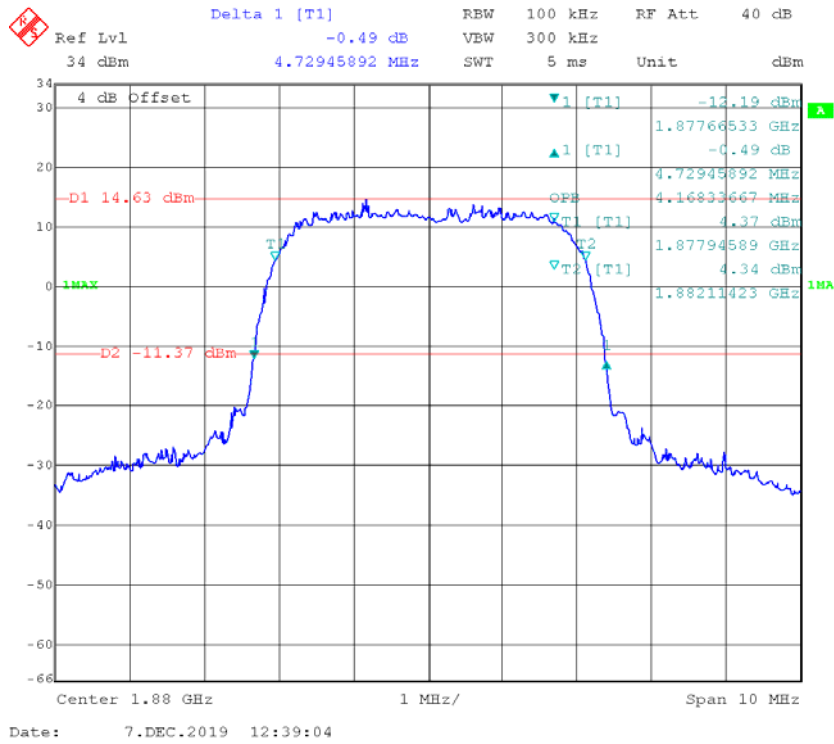
### WCDMA Band 2 Rel 99



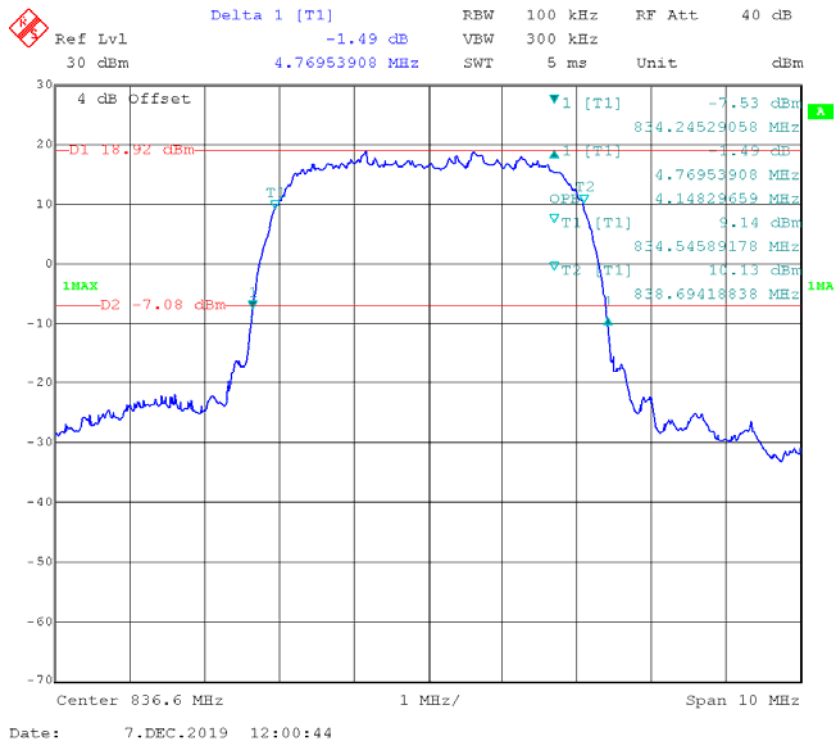
### WCDMA Band 2 HSDPA



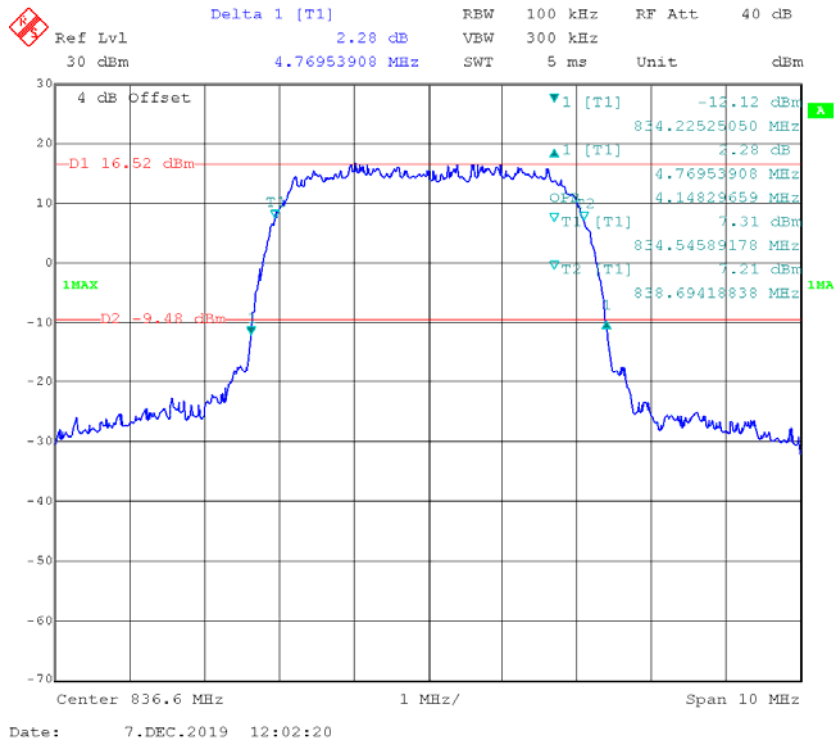
### WCDMA Band 2 HSUPA



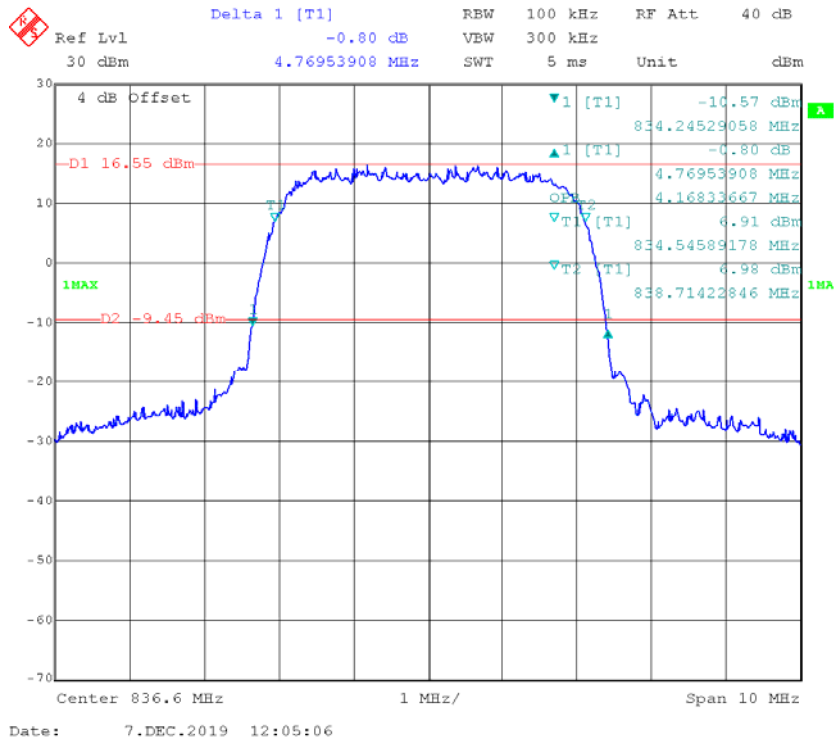
### WCDMA Band 5 Rel 99



### WCDMA Band 5 HSDPA

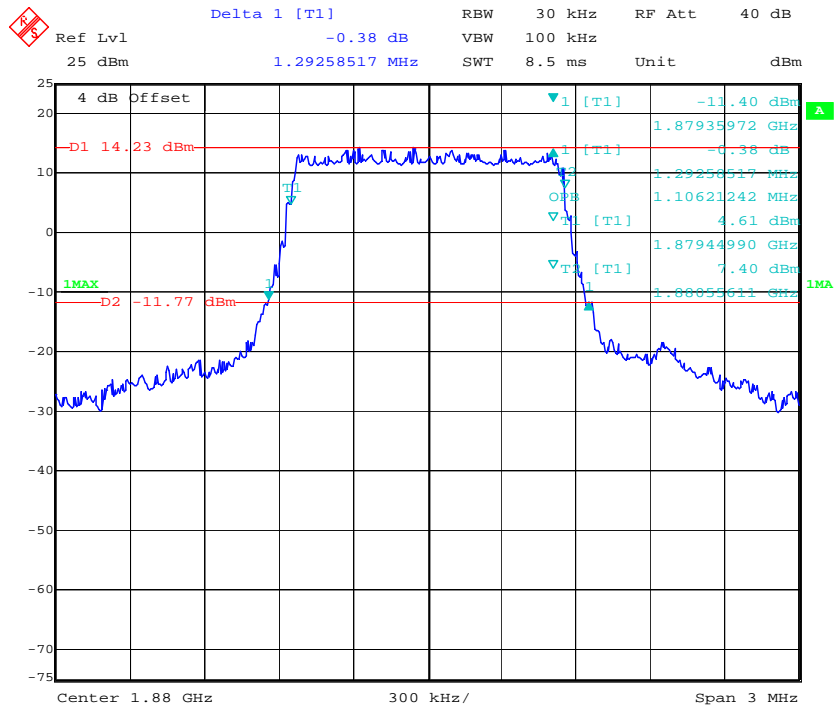


### WCDMA Band 5 HSUPA

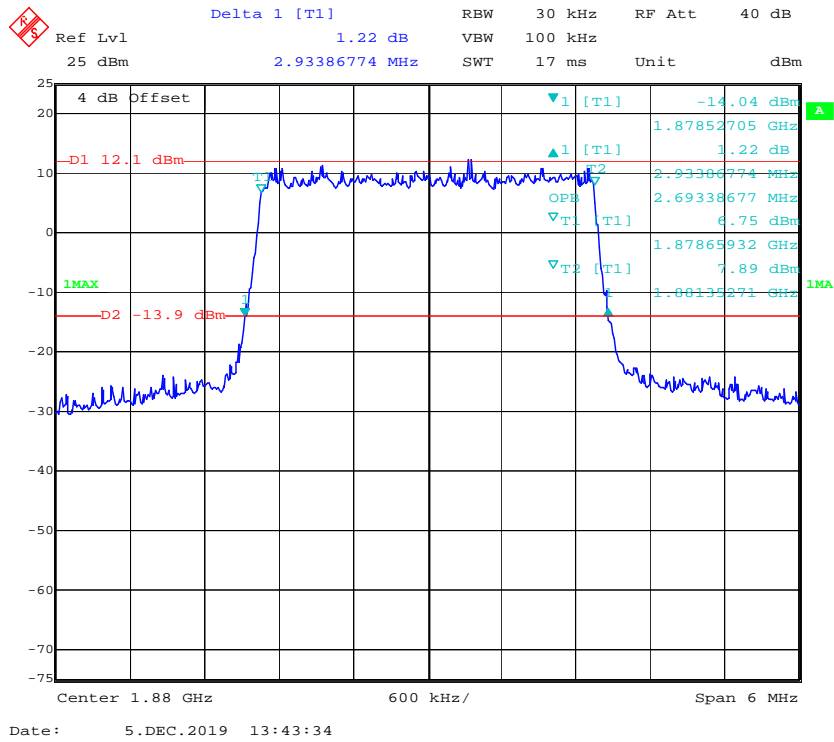


LTE Band 2

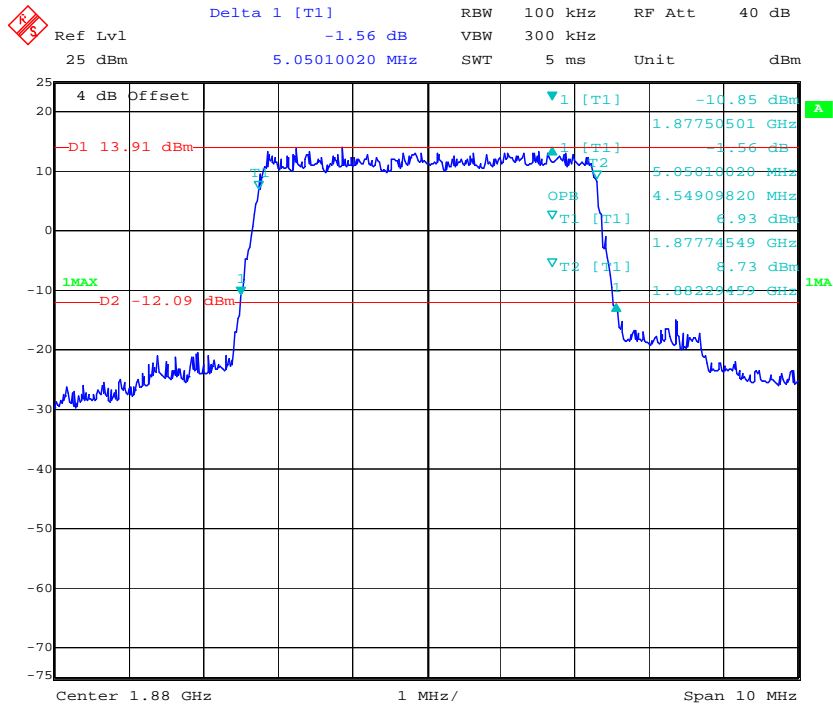
QPSK\_1.4 MHz



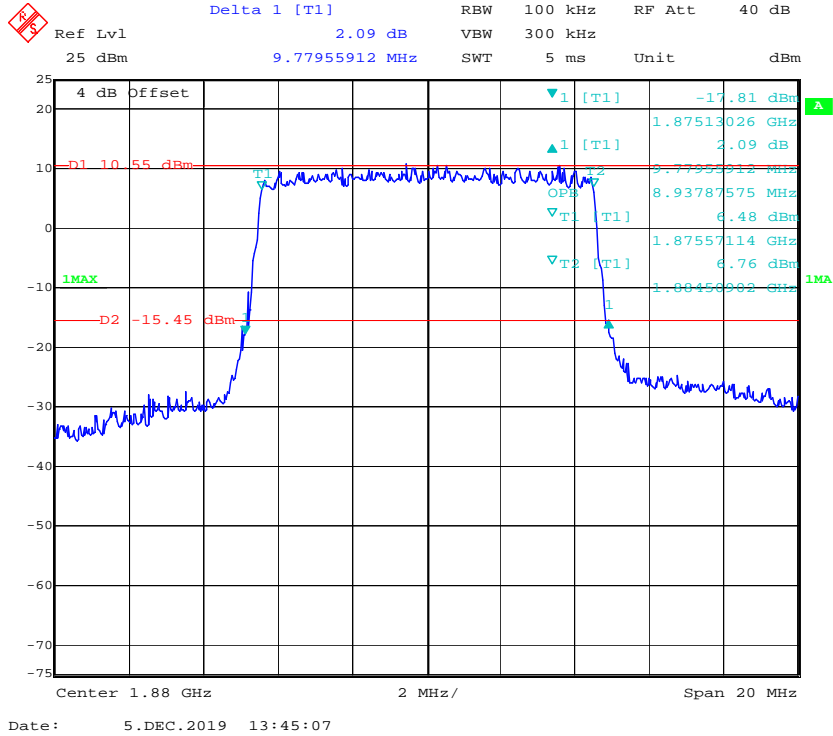
QPSK\_3 MHz



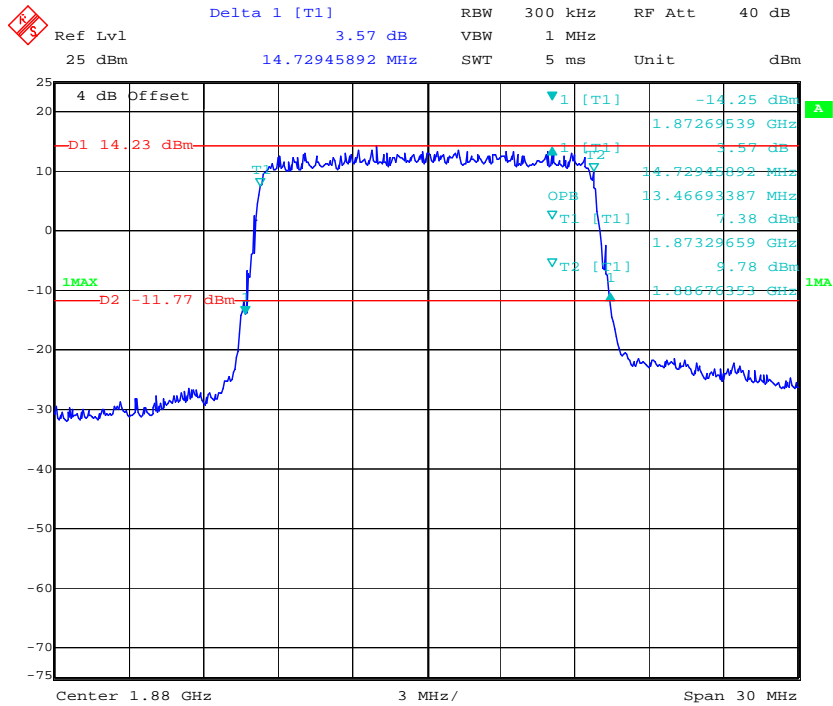
### QPSK\_5 MHz



### QPSK\_10 MHz

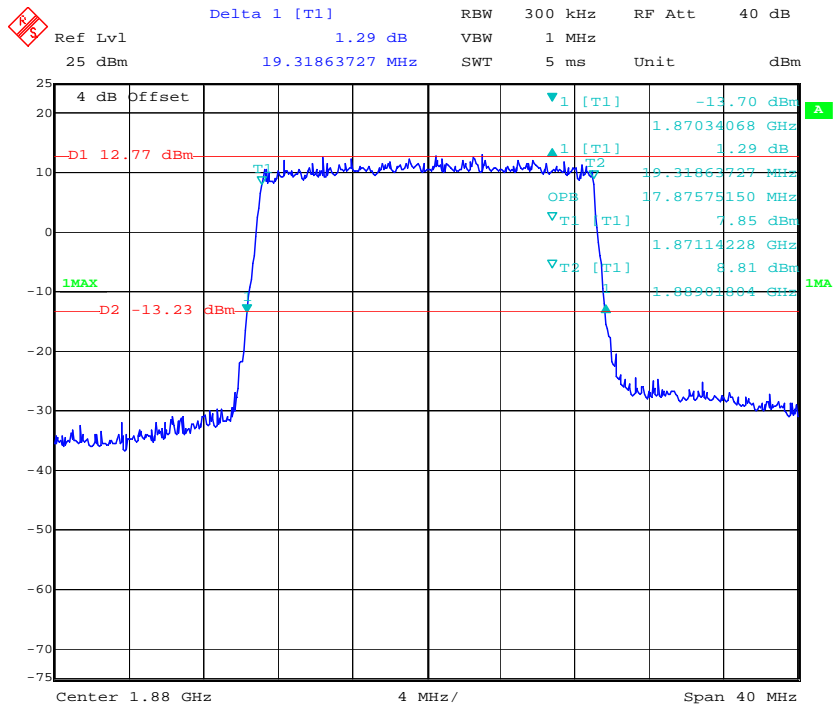


### QPSK\_15 MHz



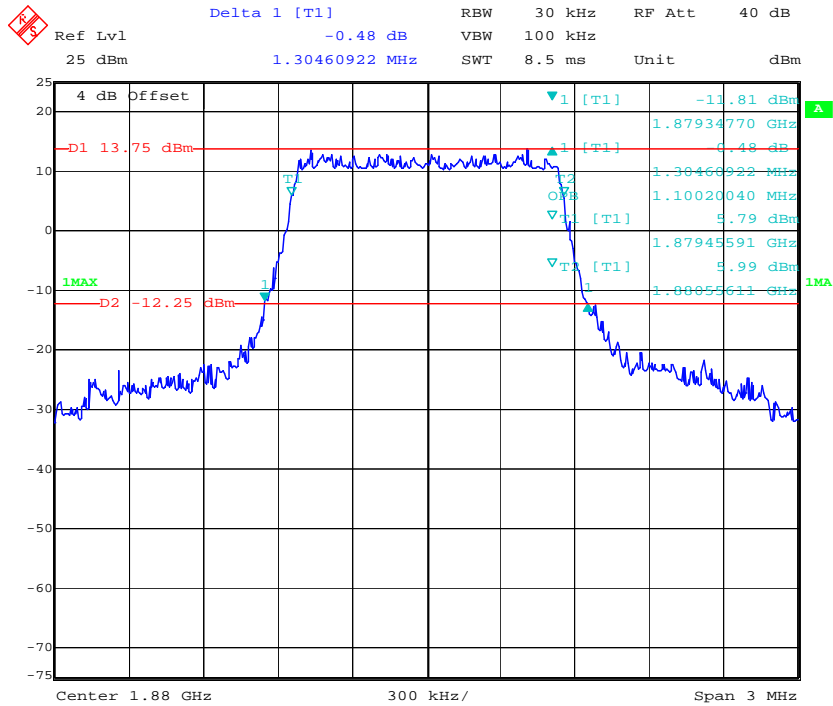
Date: 5.DEC.2019 13:45:56

### QPSK\_20 MHz

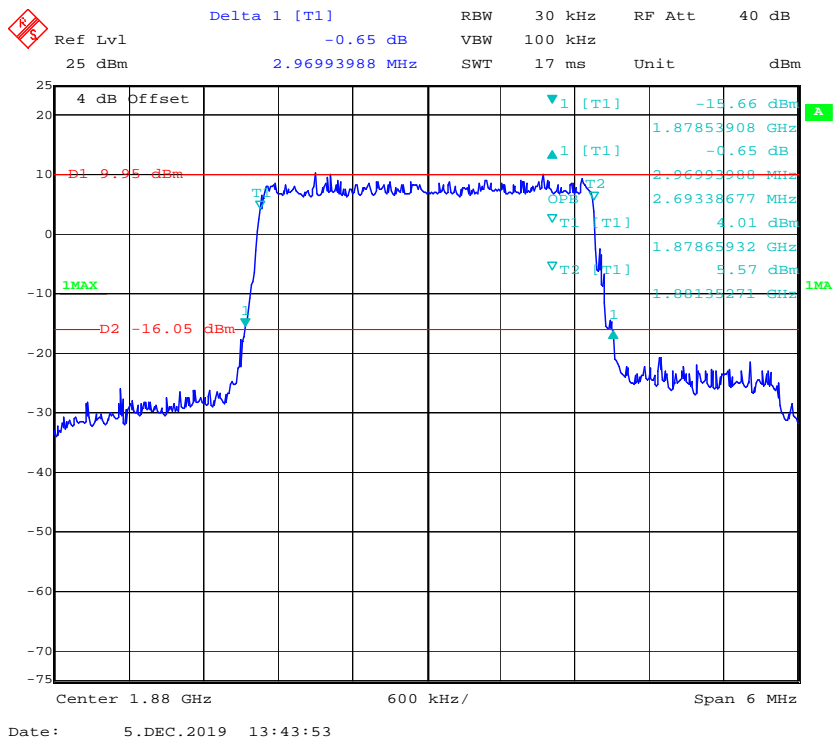


Date: 5.DEC.2019 13:46:43

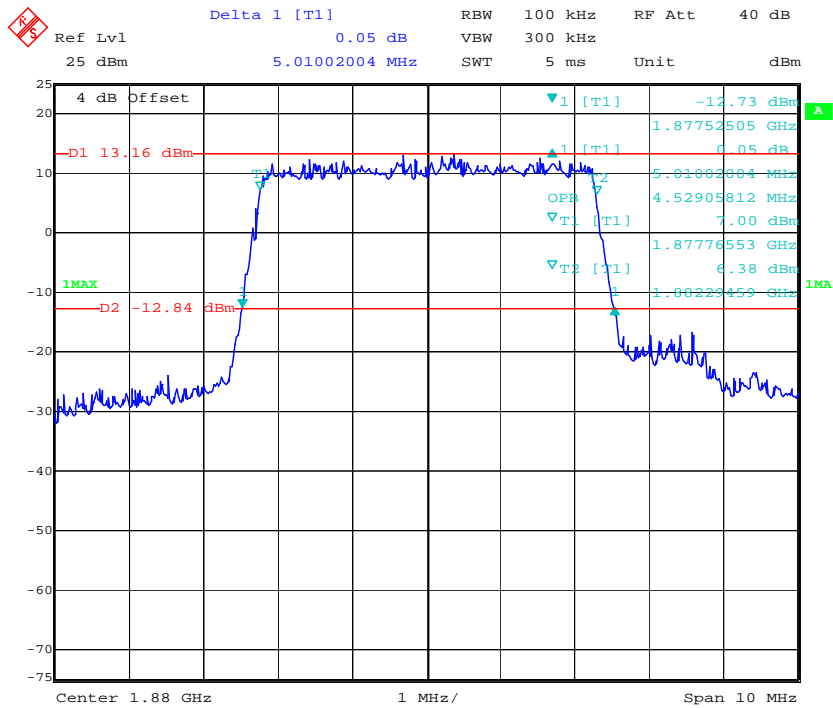
### 16QAM\_1.4 MHz



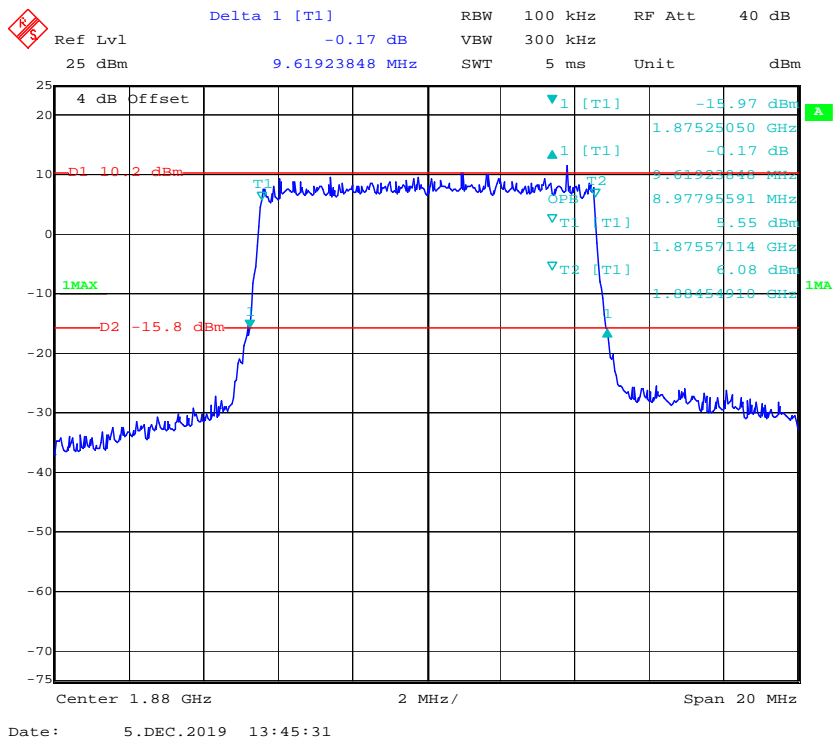
### 16QAM\_3 MHz



### 16QAM\_5 MHz

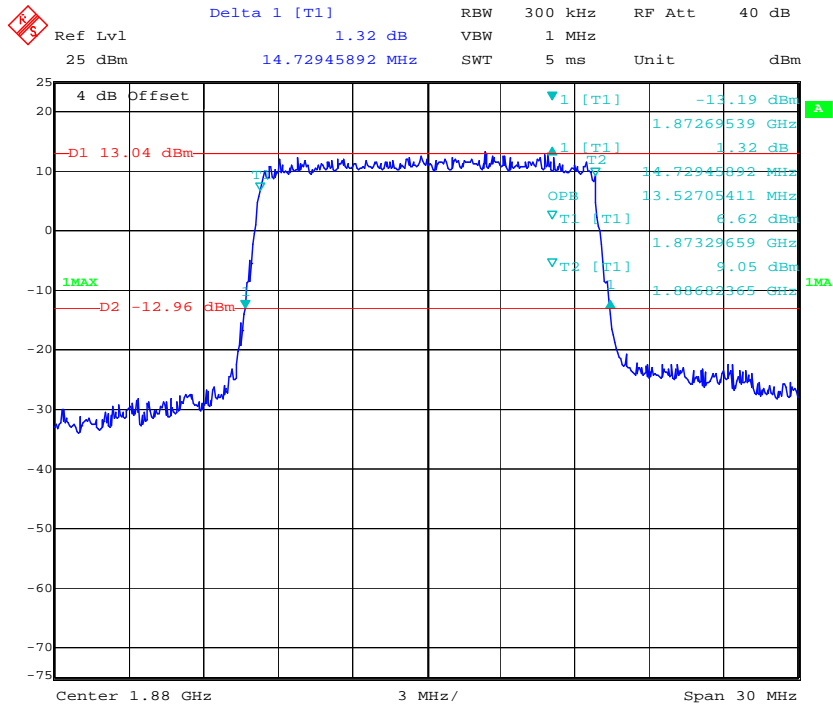


### 16QAM\_10 MHz



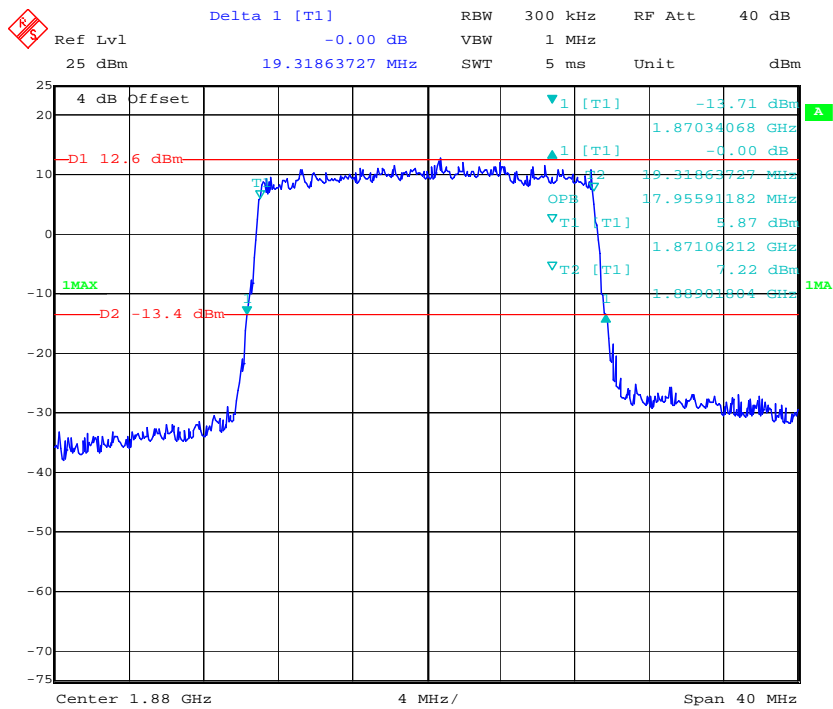


### 16QAM\_15 MHz



Date: 5.DEC.2019 13:46:18

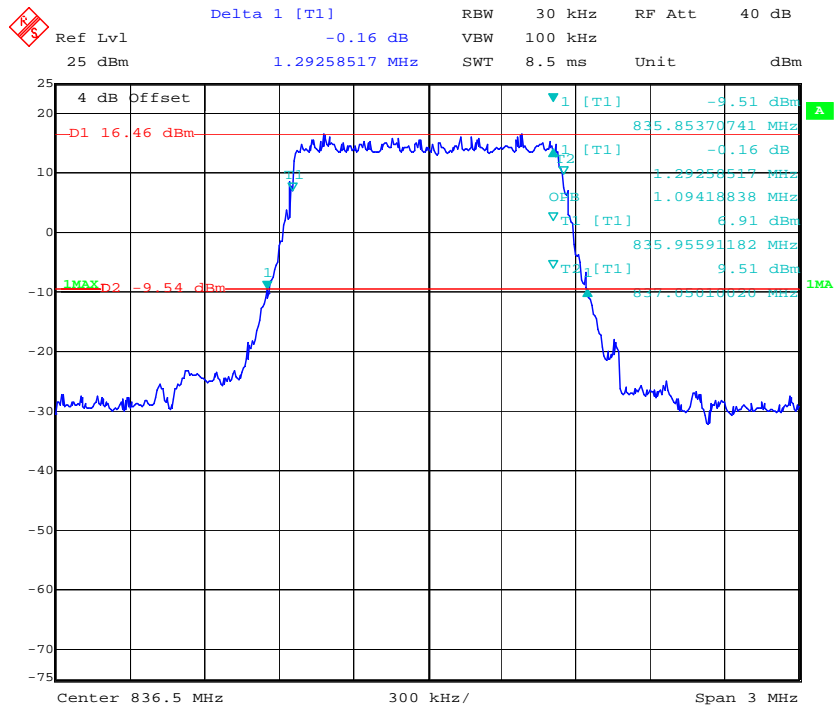
### 16QAM\_20 MHz



Date: 5.DEC.2019 13:47:05

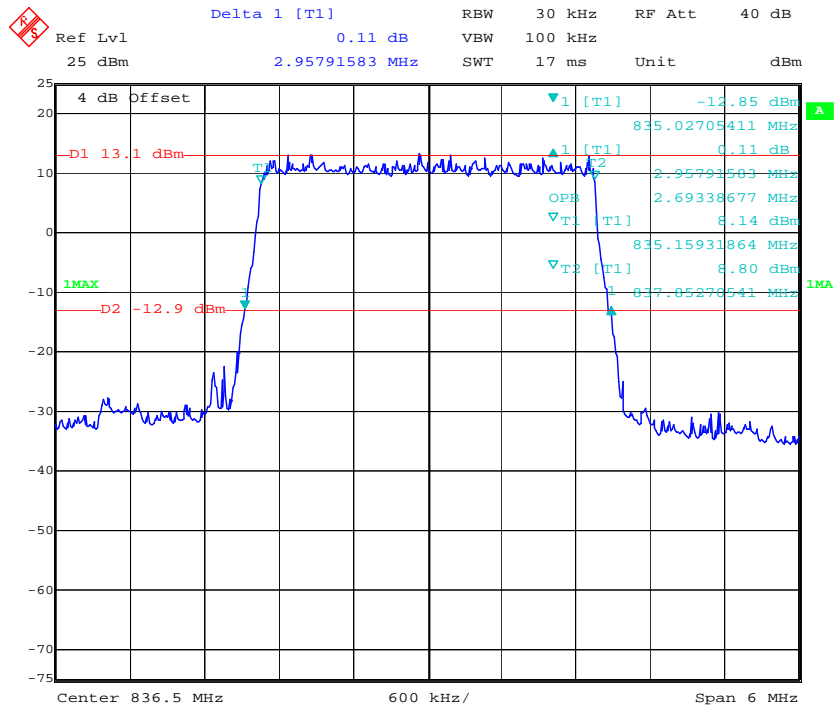
**LTE Band 5:**

**QPSK\_1.4 MHz**



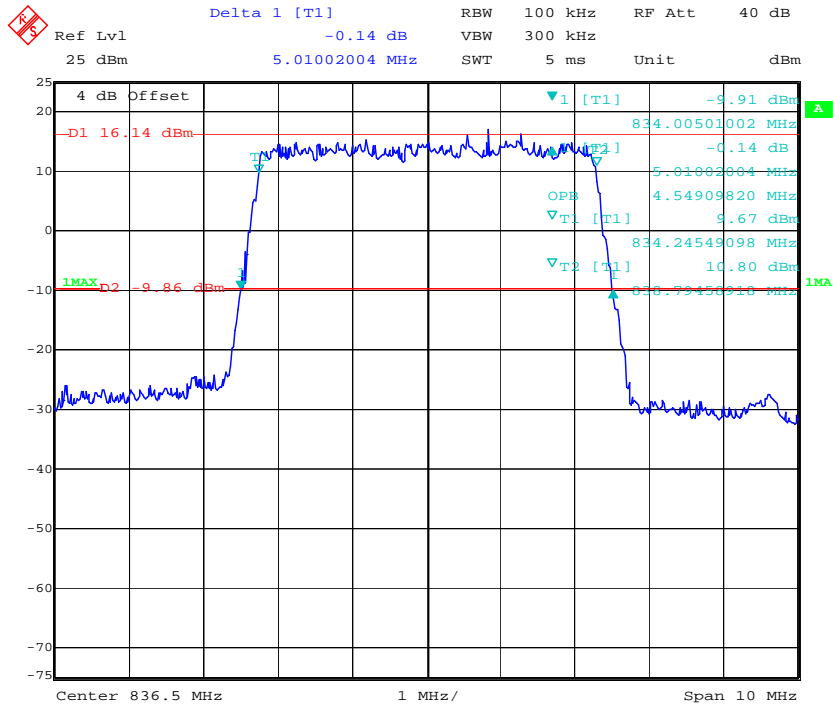
Date: 5.DEC.2019 13:52:09

**QPSK\_3 MHz**

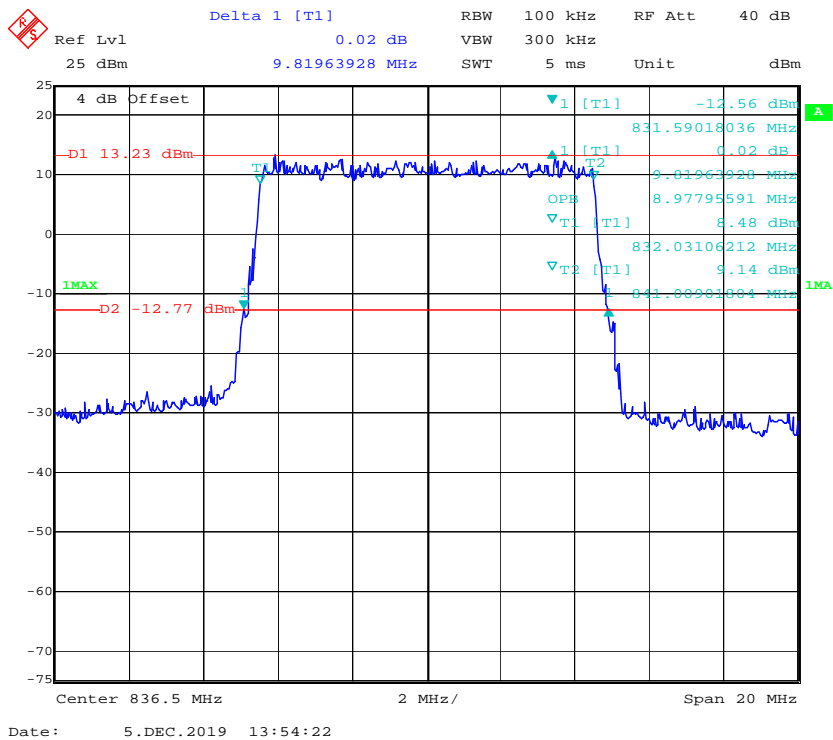


Date: 5.DEC.2019 13:52:52

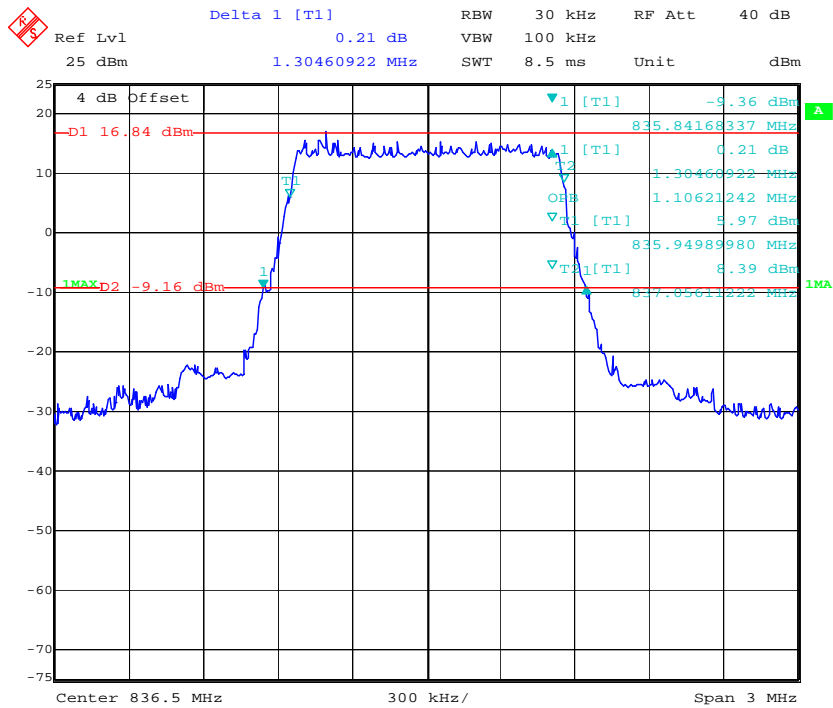
### QPSK\_5 MHz



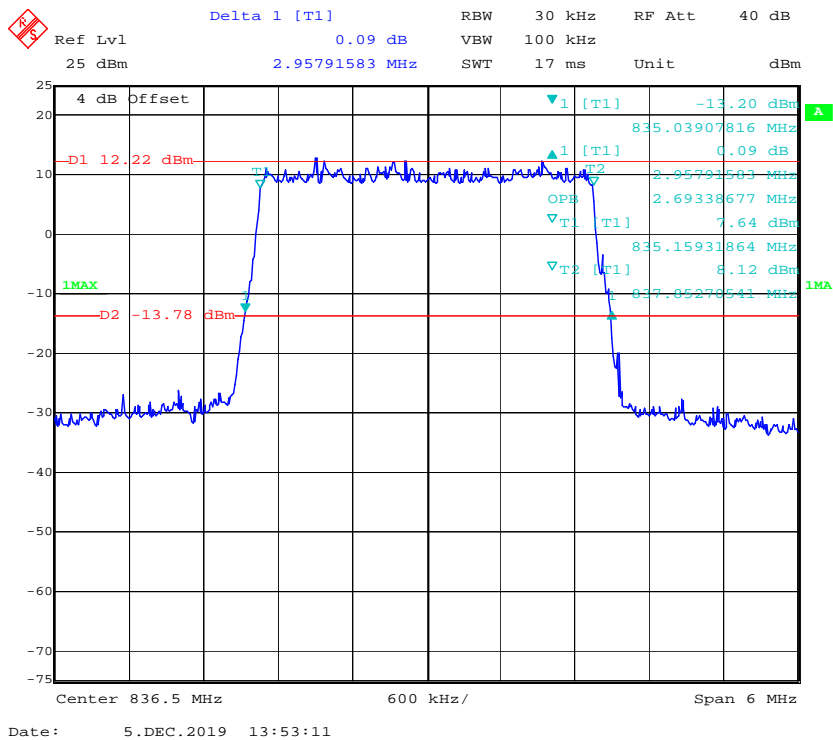
### QPSK\_10 MHz



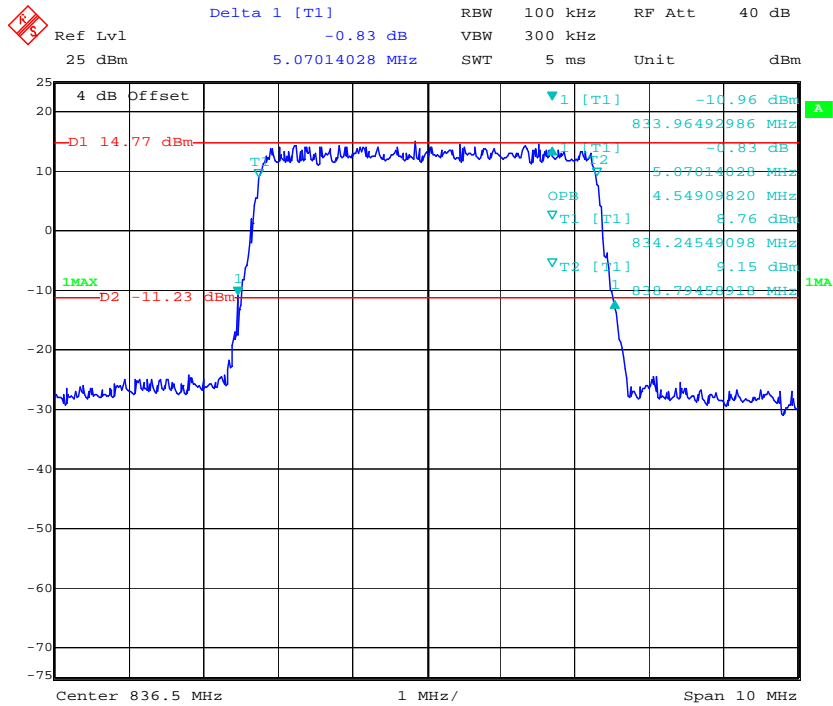
### 16QAM\_1.4 MHz



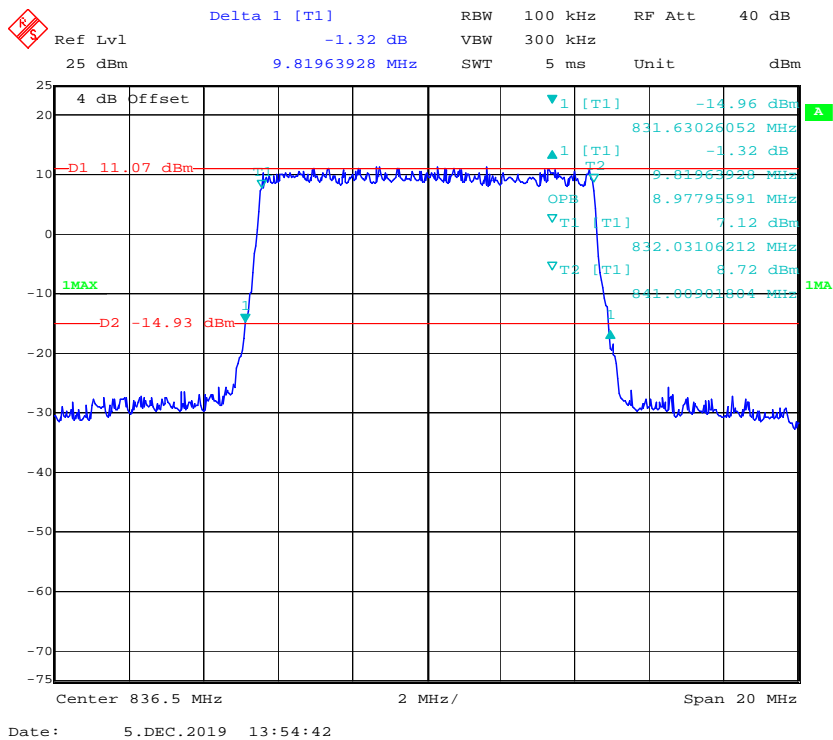
### 16QAM\_3 MHz



### 16QAM\_5 MHz

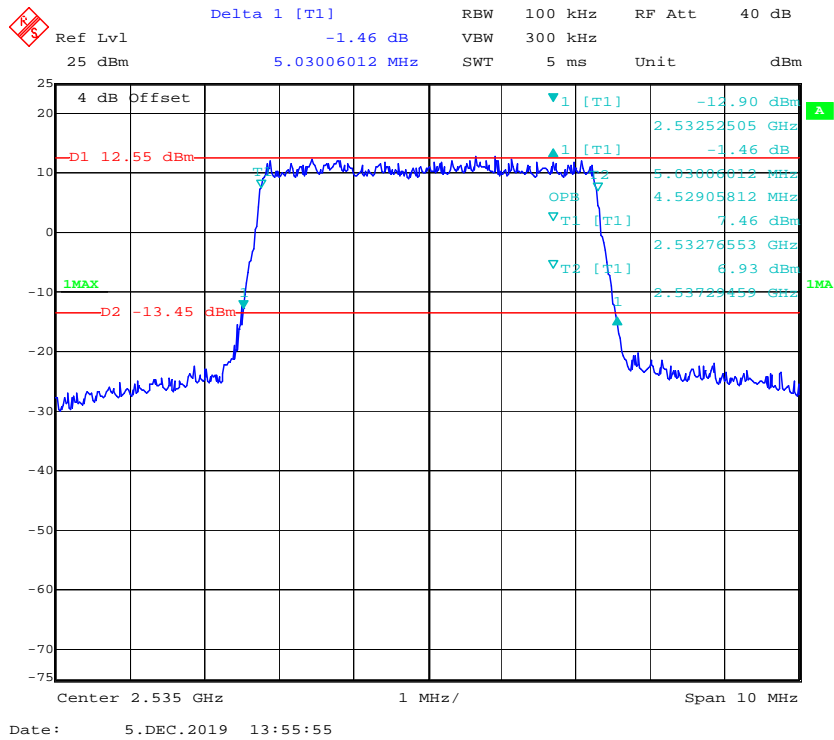


### 16QAM\_10 MHz

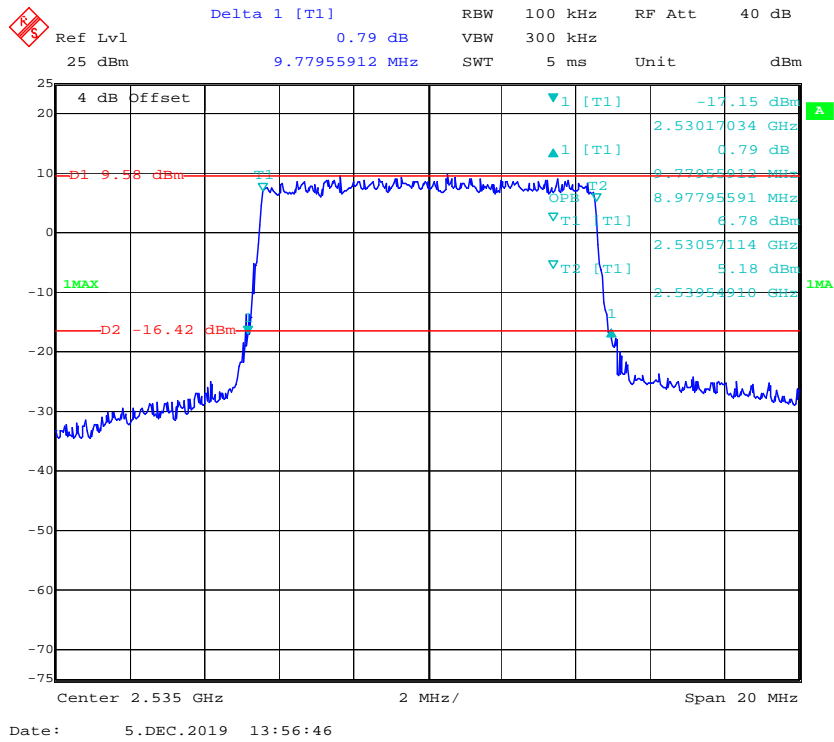


LTE Band 7:

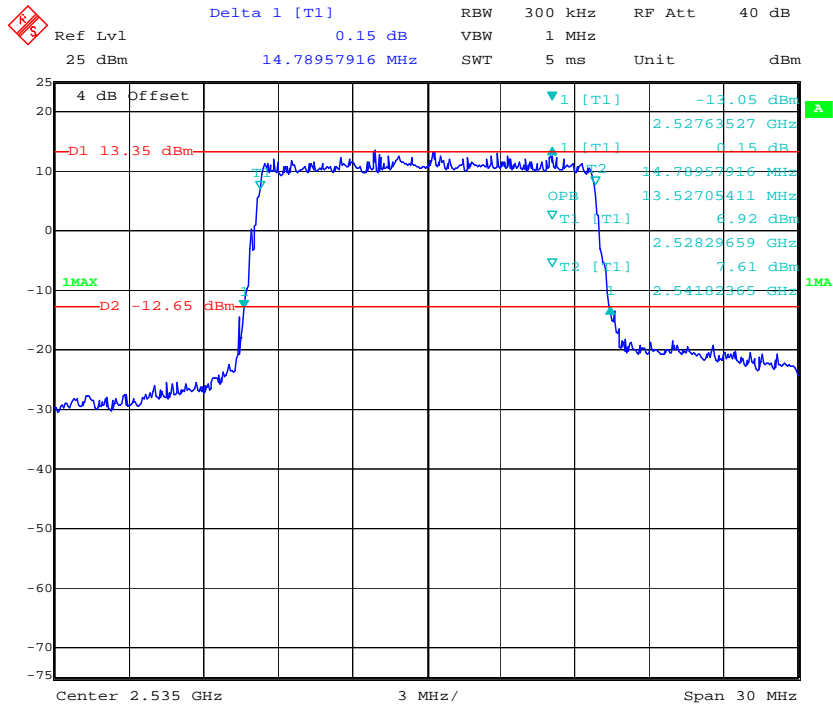
QPSK\_5 MHz



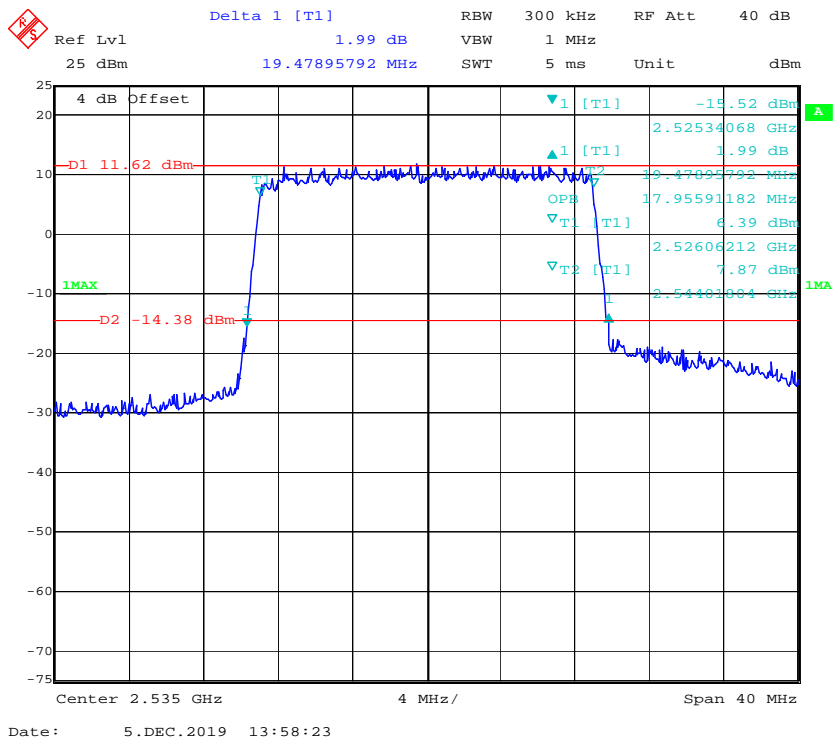
QPSK\_10 MHz



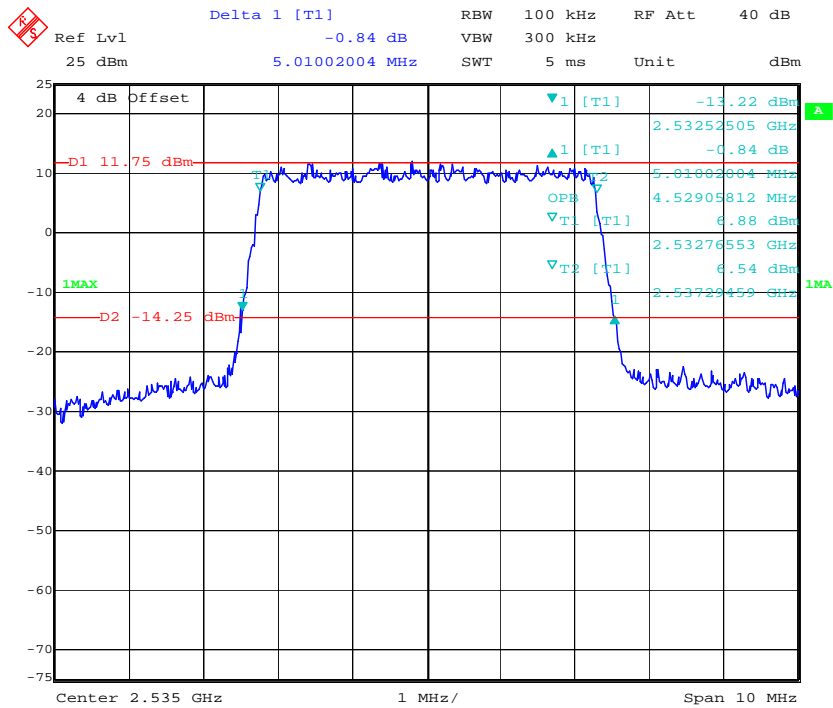
### QPSK\_15 MHz



### QPSK\_20 MHz

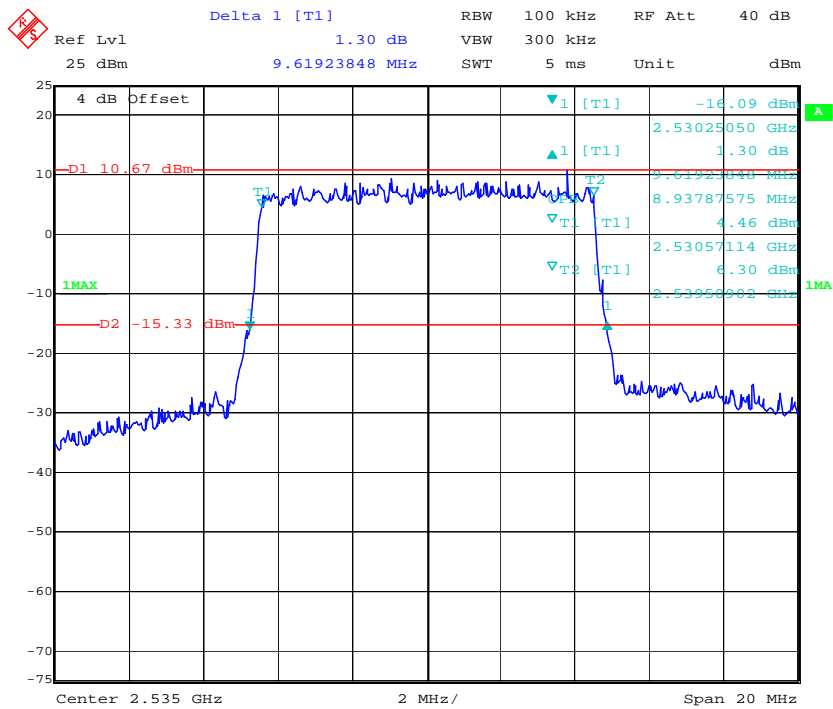


### 16QAM\_5 MHz



Date: 5.DEC.2019 13:56:17

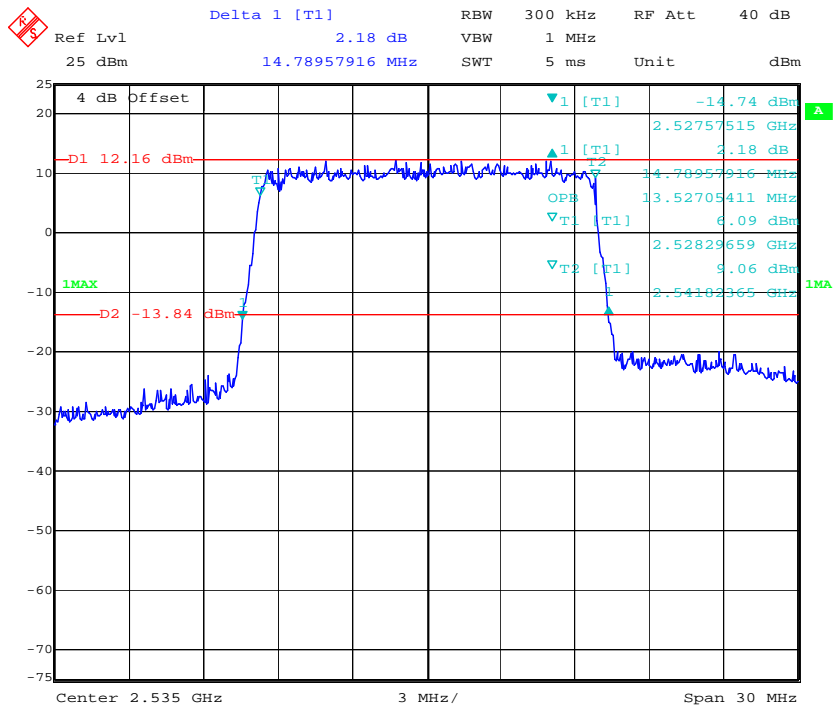
### 16QAM\_10 MHz



Date: 5.DEC.2019 13:57:10

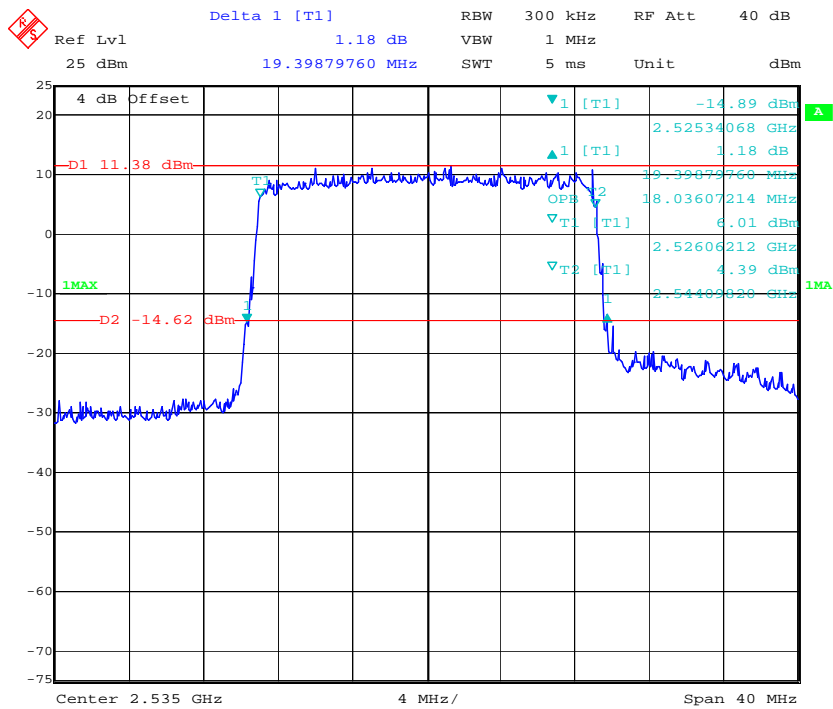


### 16QAM\_15 MHz



Date: 5.DEC.2019 13:57:58

### 16QAM\_20 MHz



Date: 5.DEC.2019 13:58:45

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

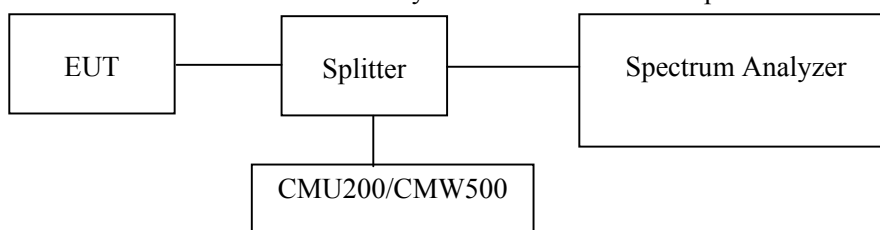
### Applicable Standard

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

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

### Test Procedure

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



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2019-12-10	2020-12-10
R&S	Spectrum Analyzer	FSU 26	200256	2019-05-09	2020-05-09
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2019-08-03	2020-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010013	Each time	/
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	/

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

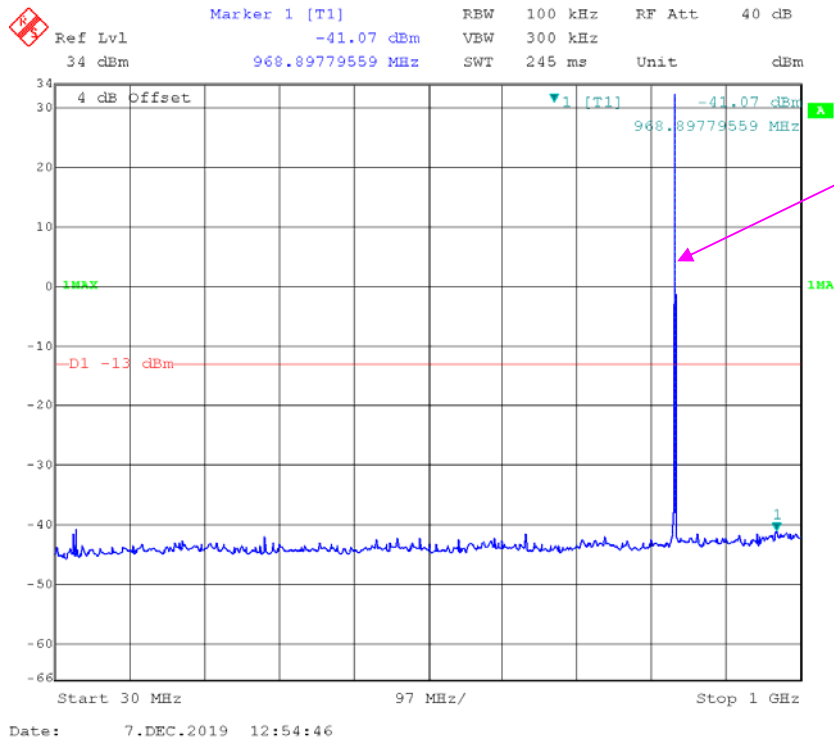
### Test Data

#### Environmental Conditions

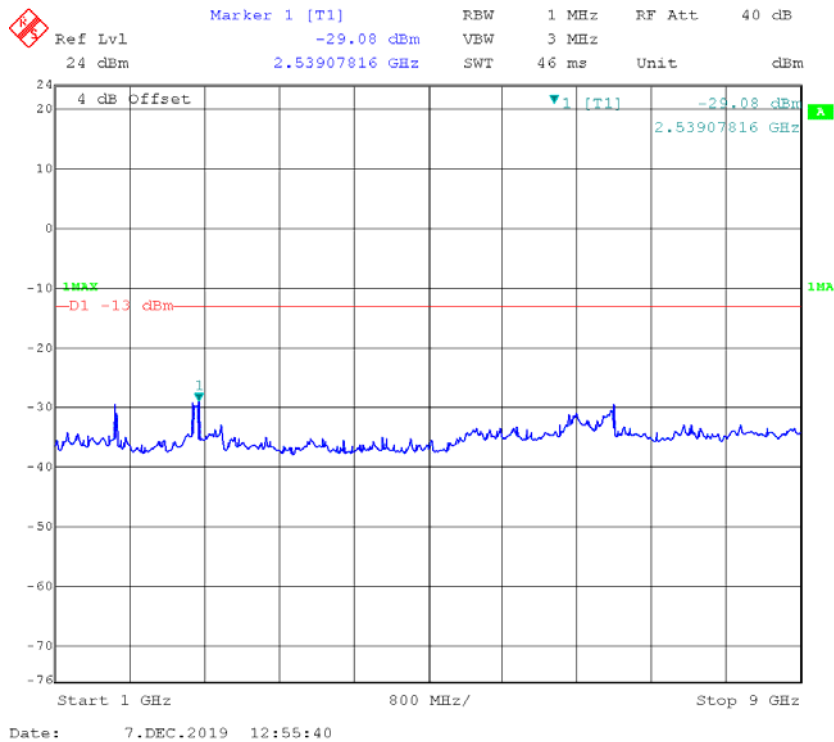
<b>Temperature:</b>	22.3°C~ 25.1 °C
<b>Relative Humidity:</b>	26%~30 %
<b>ATM Pressure:</b>	100.6kPa ~102.5kPa
<b>Tester:</b>	Black Yang
<b>Test Date:</b>	2019-12-05~2019-12-07

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

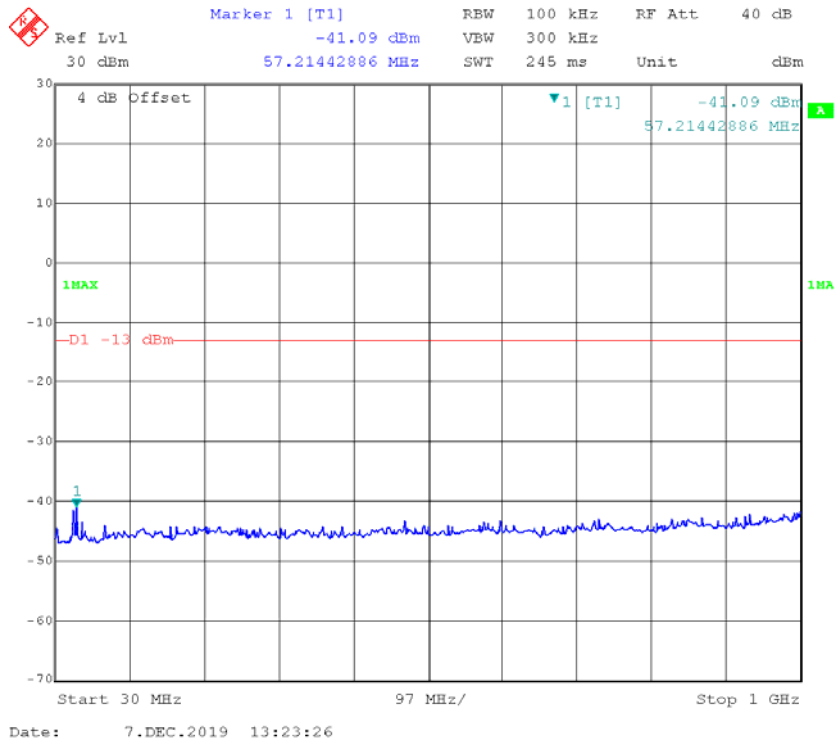
**GSM850 Middle Channel**



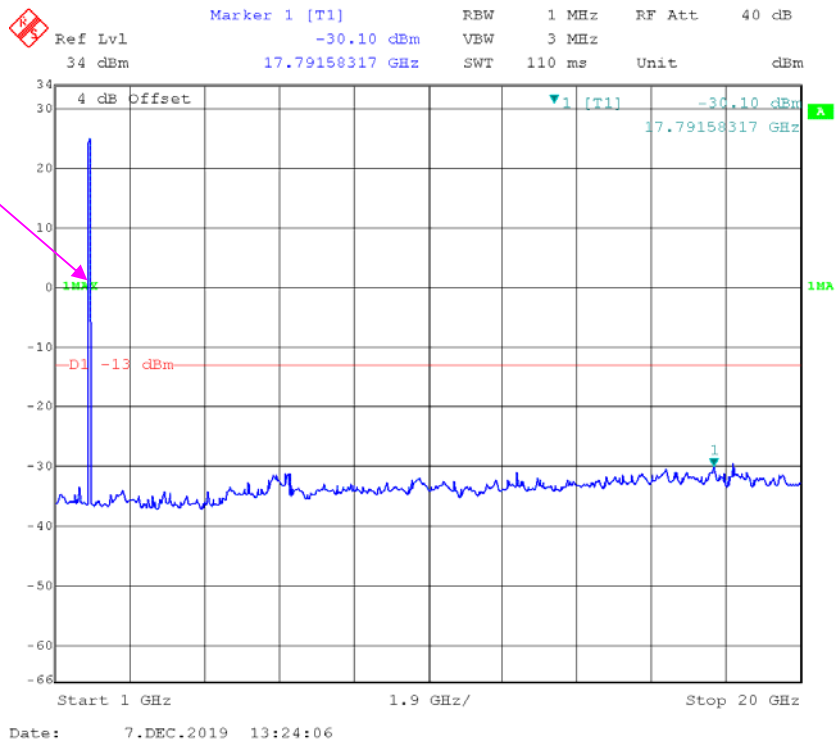
Fundamental



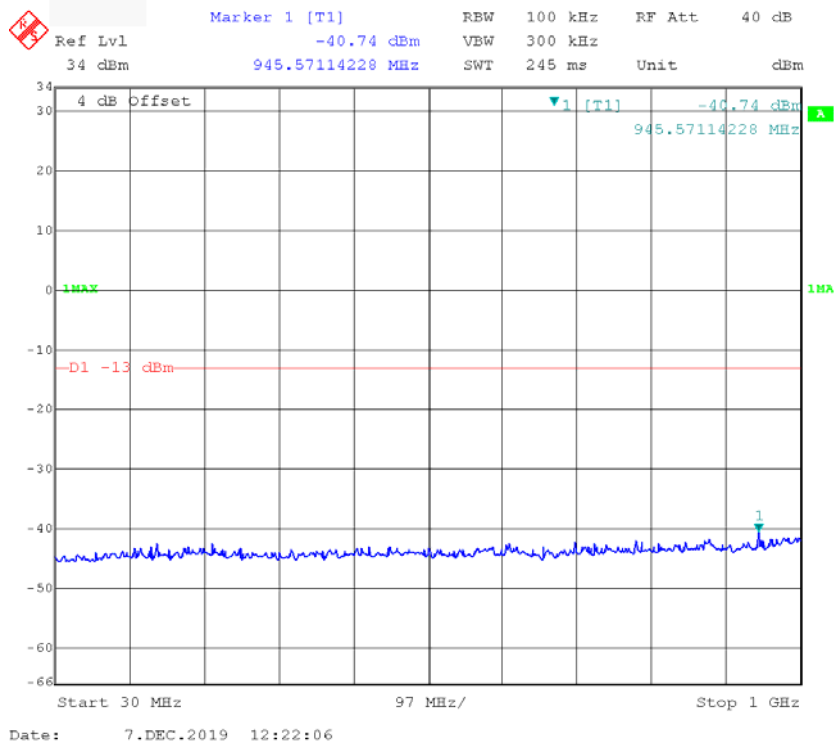
### PCS 1900 Middle Channel



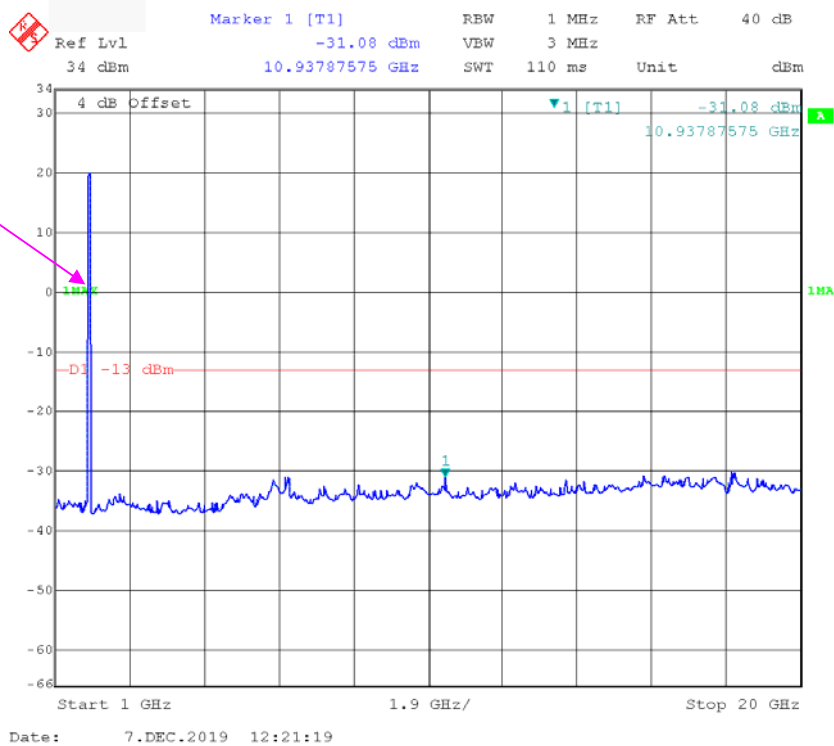
Fundamental



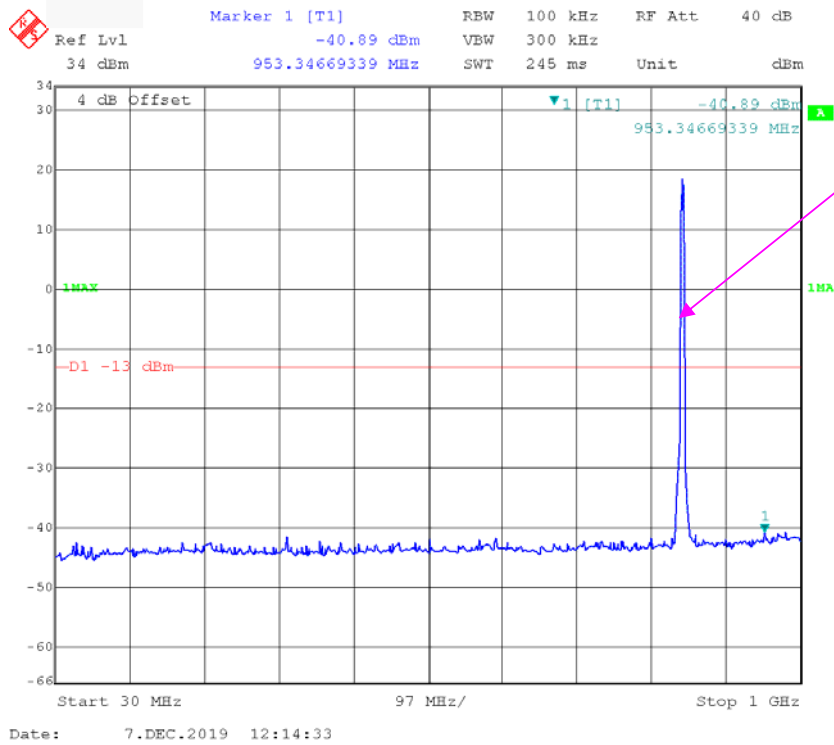
### WCDMA Band 2 Rel 99 Middle Channel



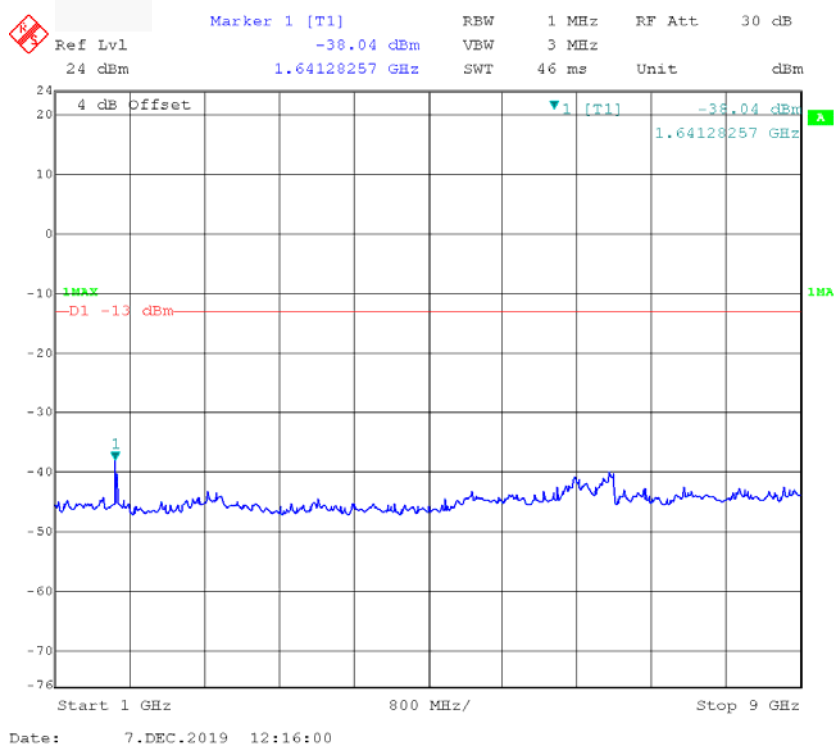
Fundamental



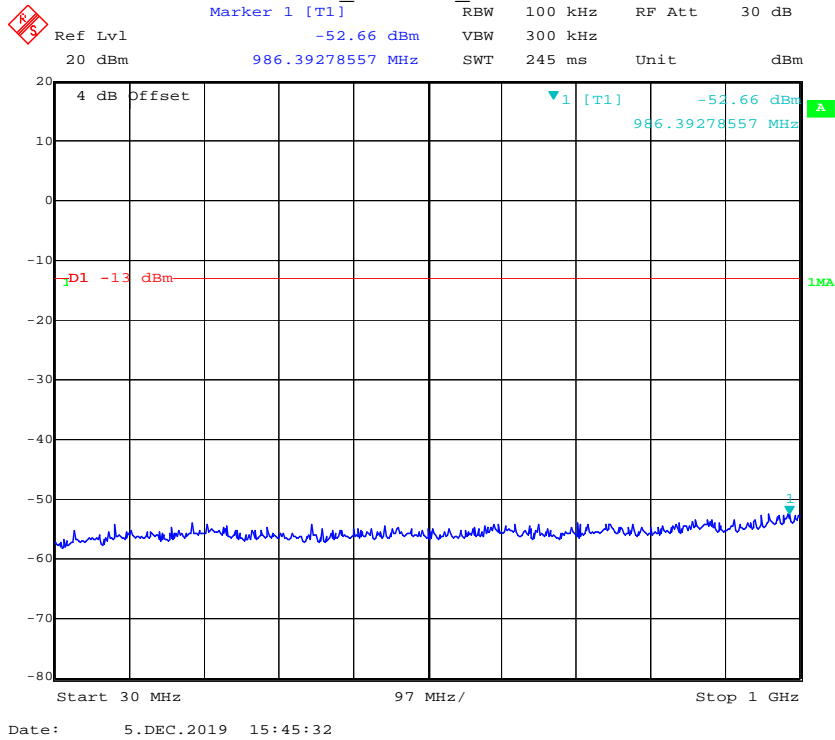
WCDMA Band 5 Rel 99 Middle Channel



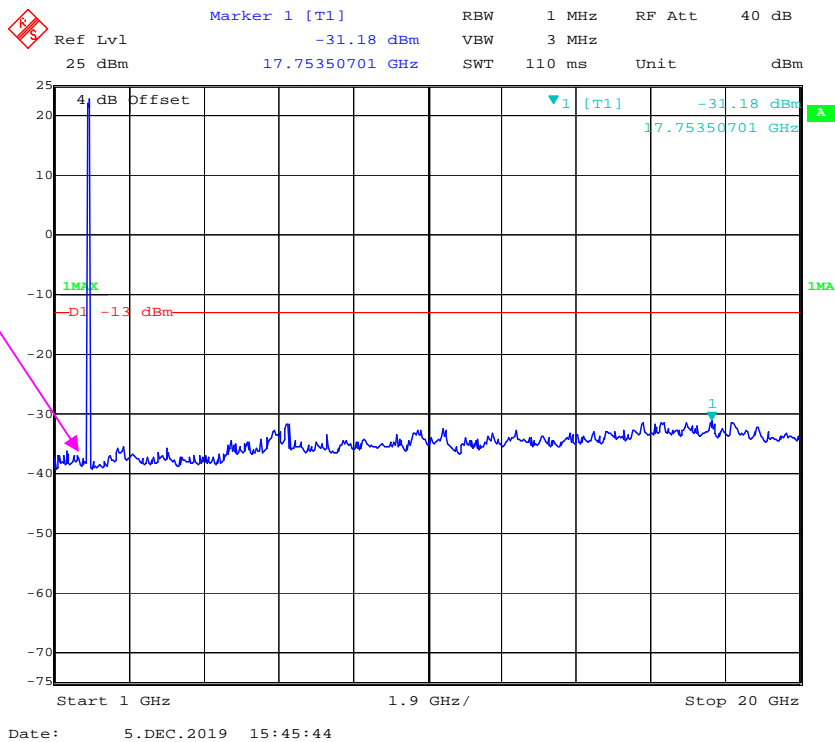
Fundamental



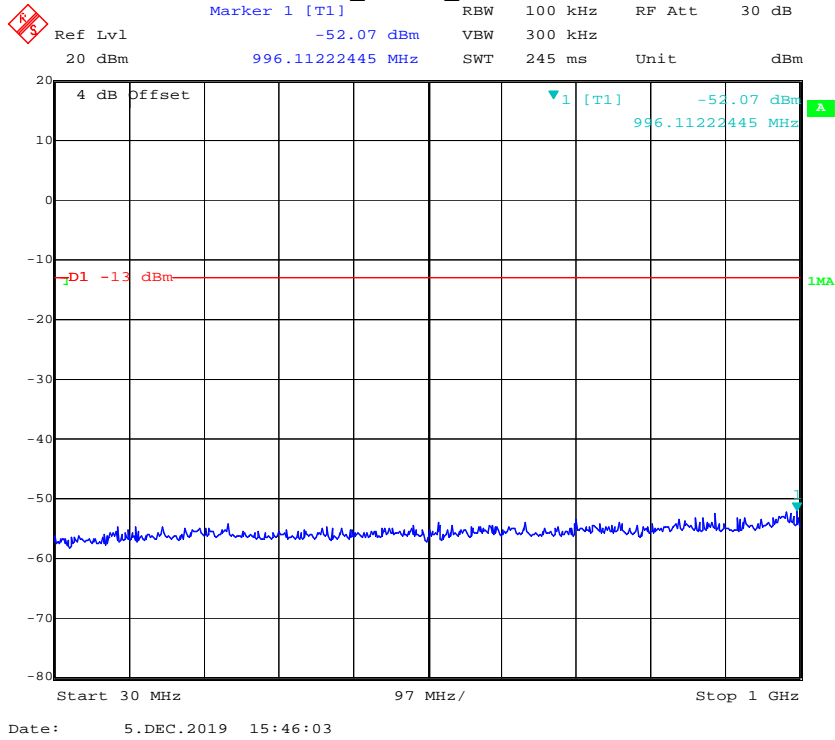
### LTE Band 2\_1.4 MHz\_Middle Channel



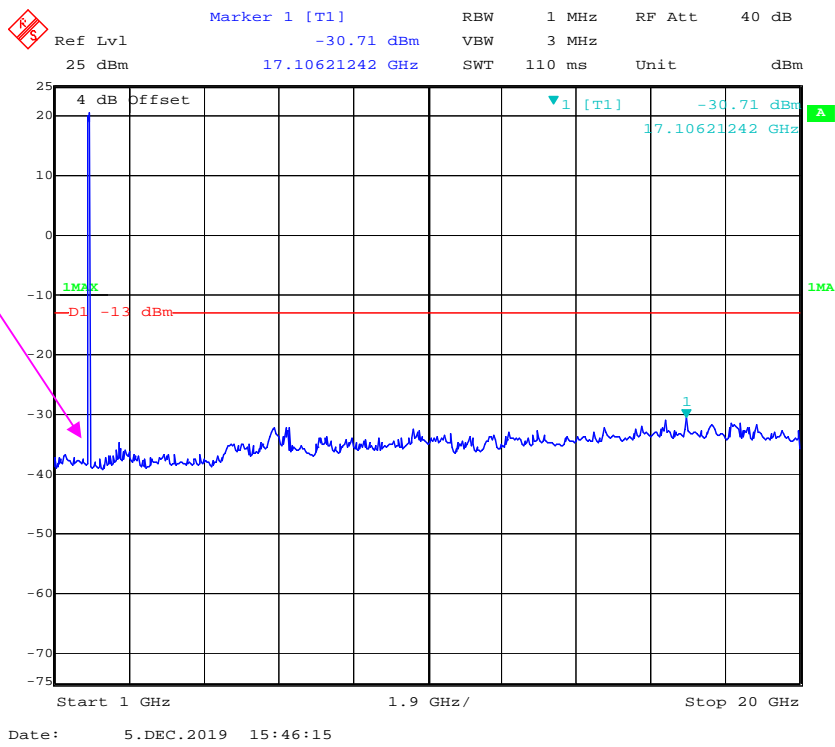
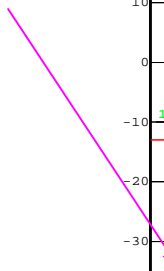
Fundamental



### LTE Band 2\_3 MHz\_Middle Channel

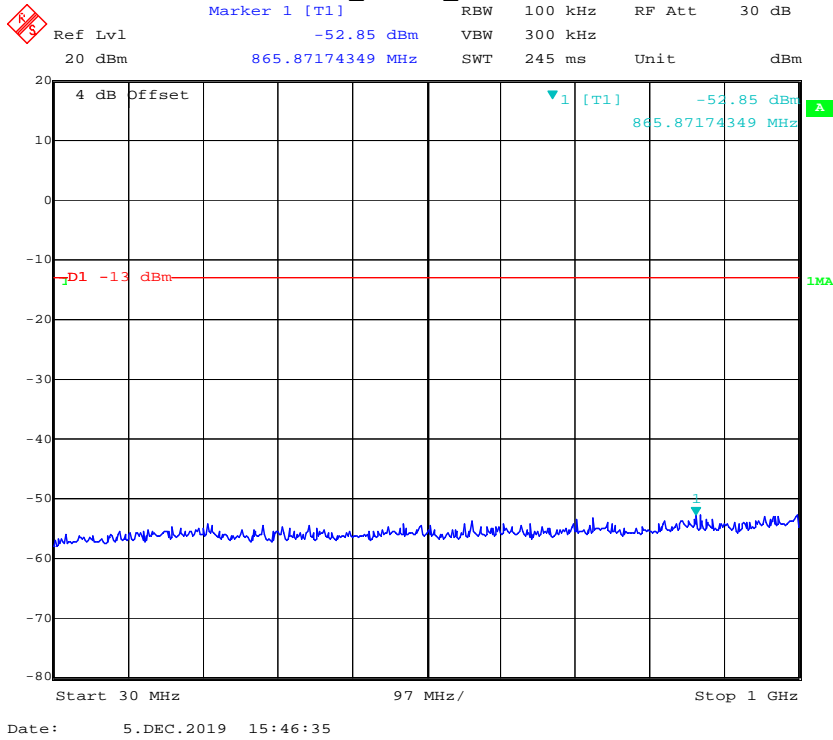


Fundamental

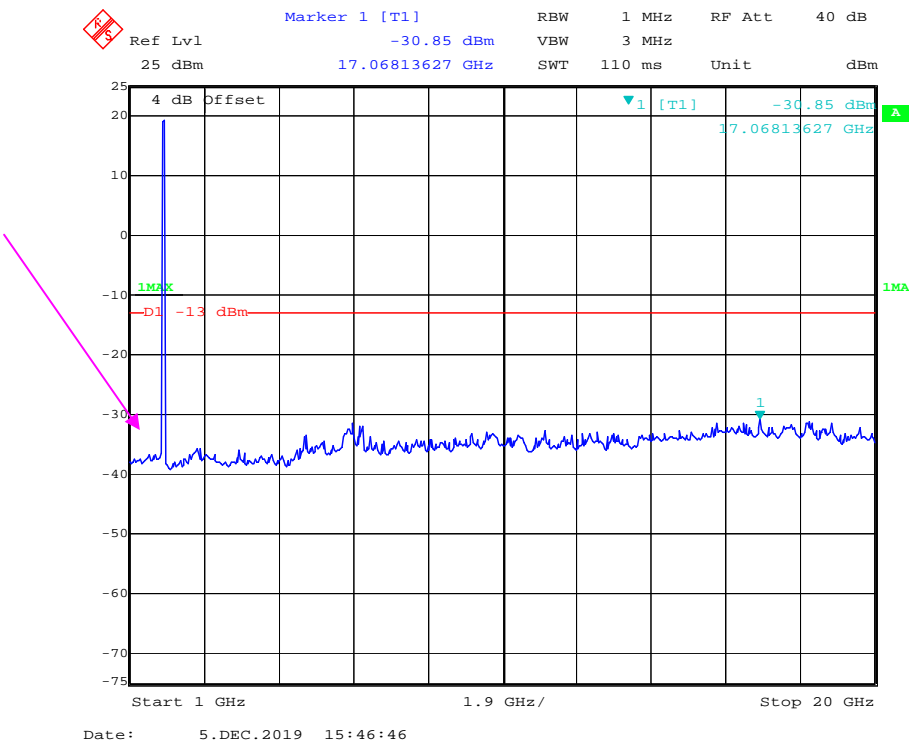




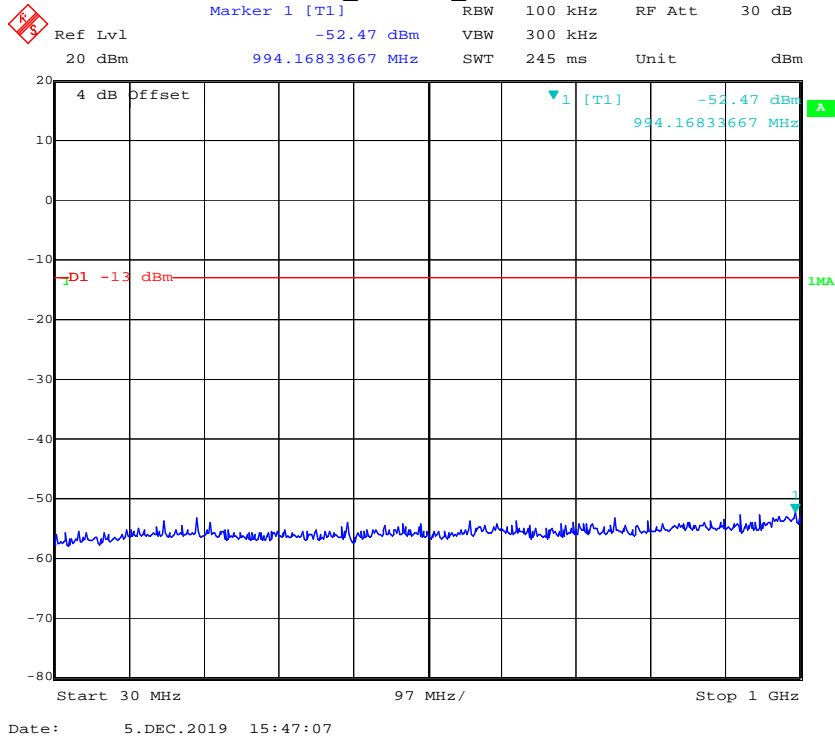
### LTE Band 2\_5 MHz\_Middle Channel



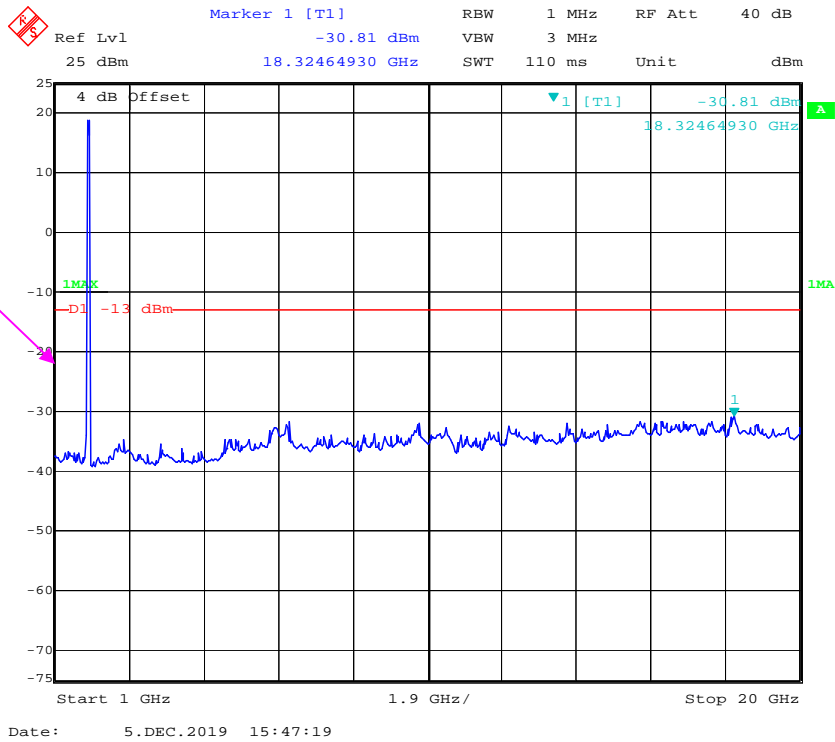
Fundamental



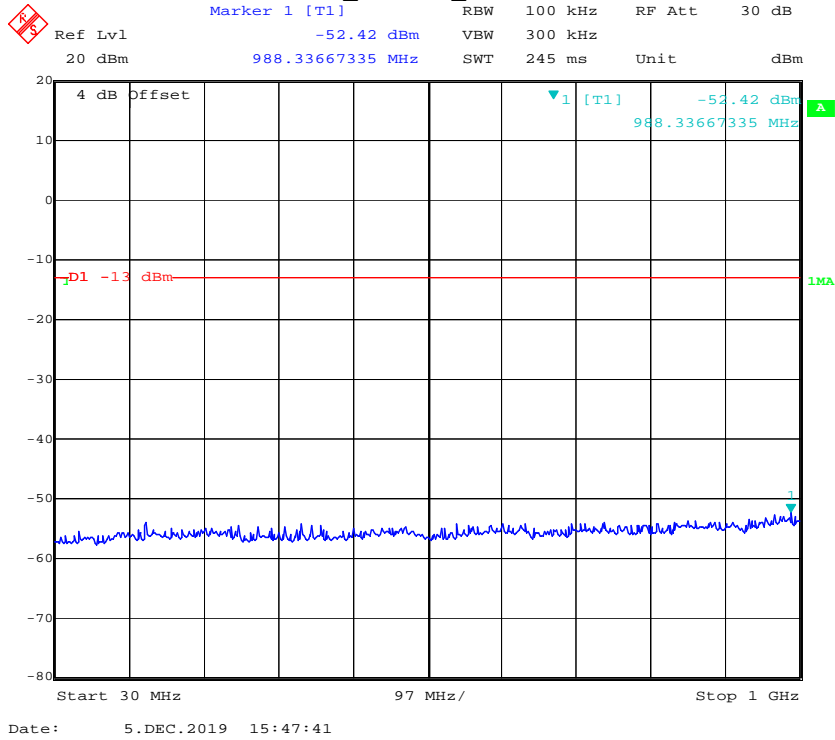
### LTE Band 2\_10 MHz\_Middle Channel



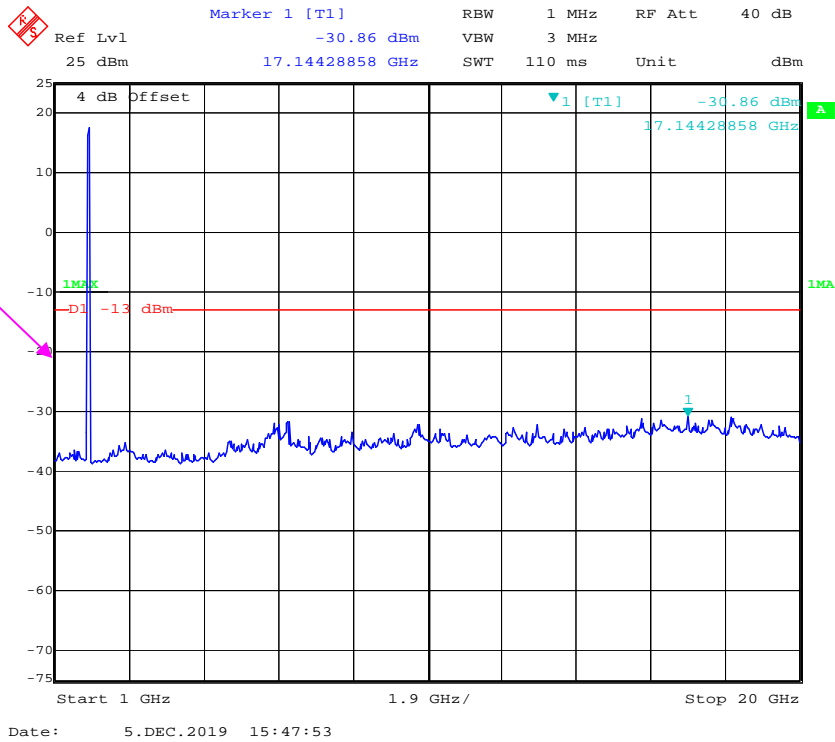
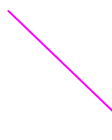
Fundamental



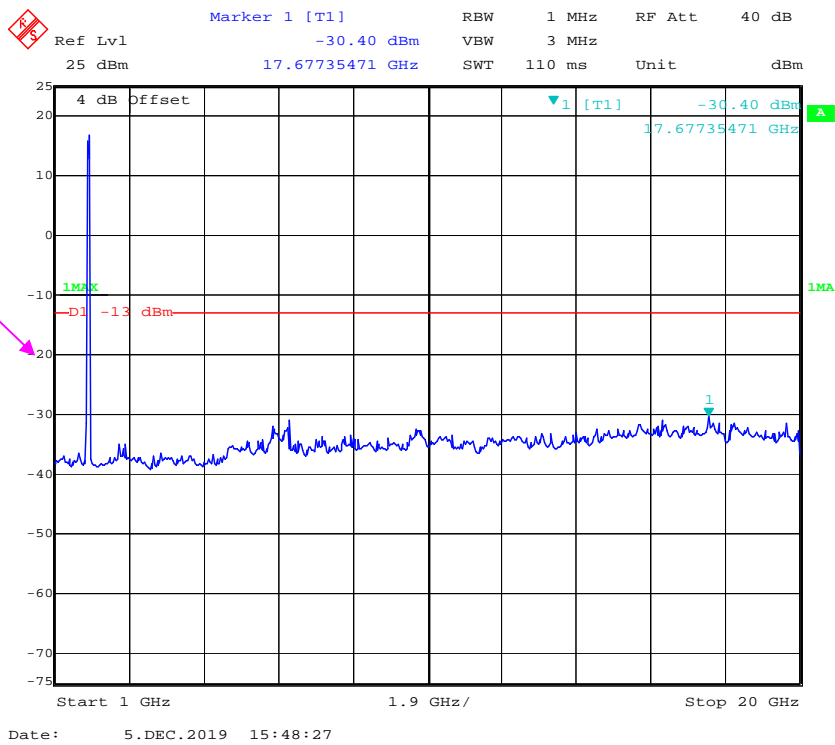
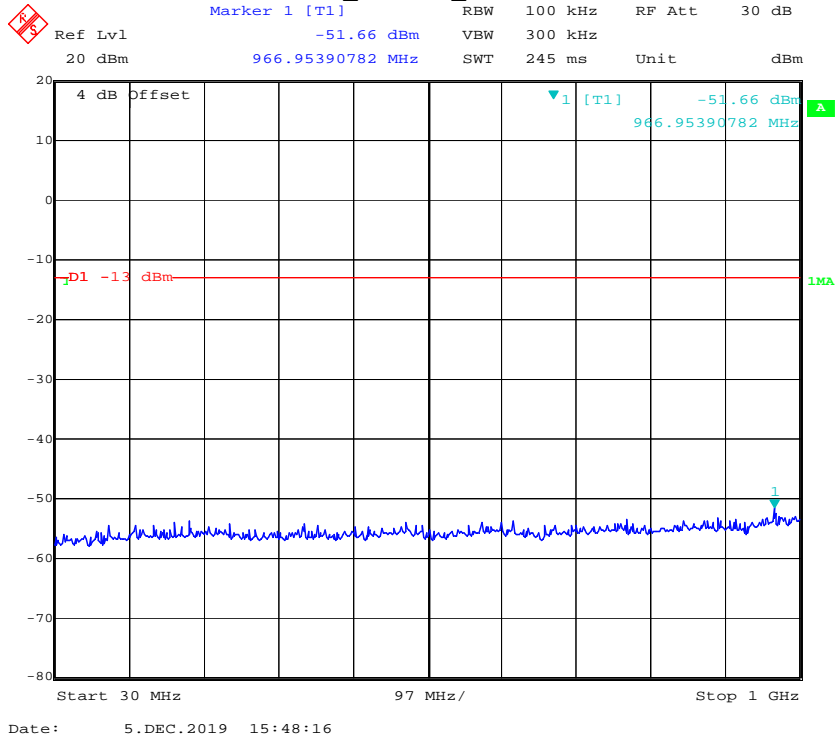
### LTE Band 2\_15 MHz\_Middle Channel



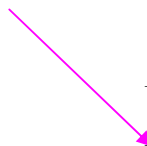
Fundamental



### LTE Band 2\_20 MHz\_Middle Channel

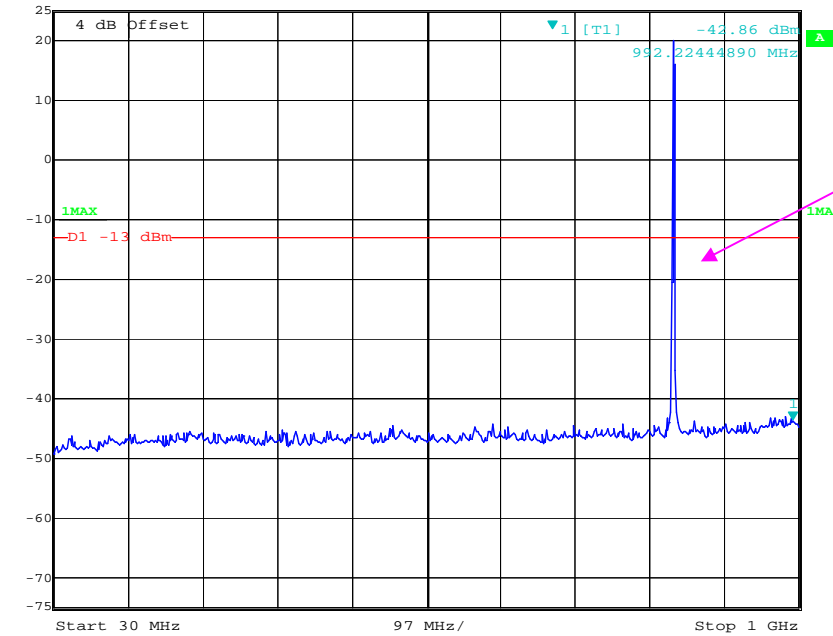


Fundamental



### LTE Band 5\_1.4 MHz\_Middle Channel

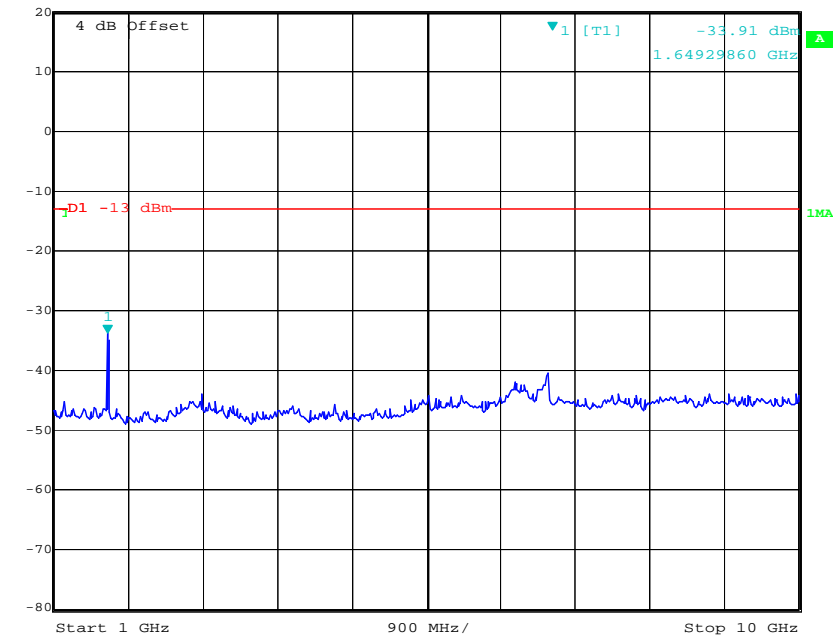
Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -42.86 dBm VBW 300 kHz  
25 dBm 992.22444890 MHz SWT 245 ms Unit dBm



Fundamental

Date: 5.DEC.2019 15:52:16

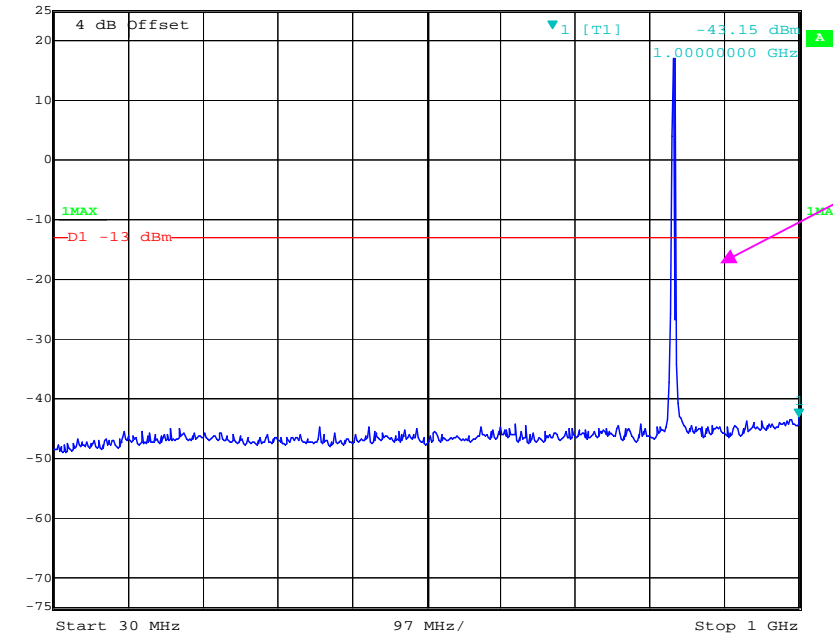
Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -33.91 dBm VBW 3 MHz  
20 dBm 1.64929860 GHz SWT 52 ms Unit dBm



Date: 5.DEC.2019 15:52:27

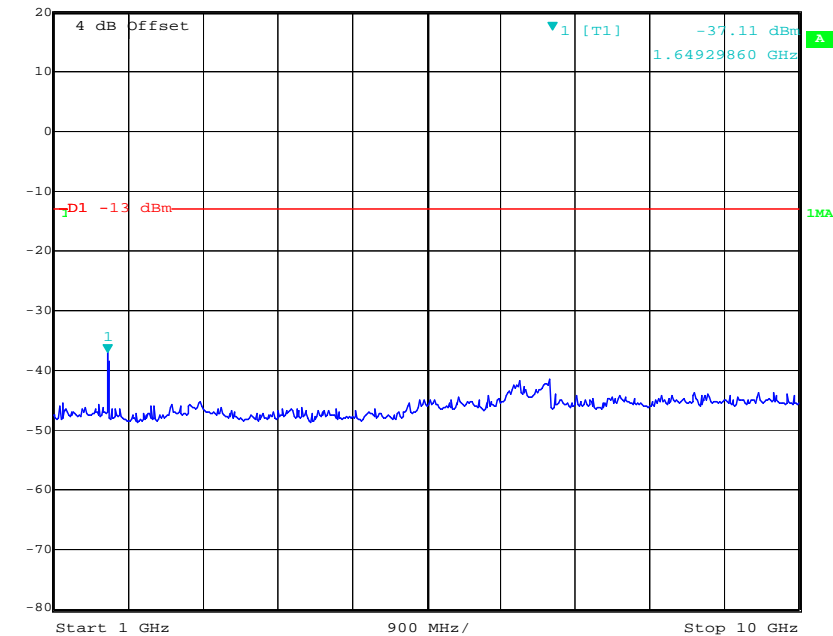
### LTE Band 5\_3 MHz\_Middle Channel

Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -43.15 dBm VBW 300 kHz  
25 dBm 1.00000000 GHz SWT 245 ms Unit dBm



Date: 5.DEC.2019 15:52:46

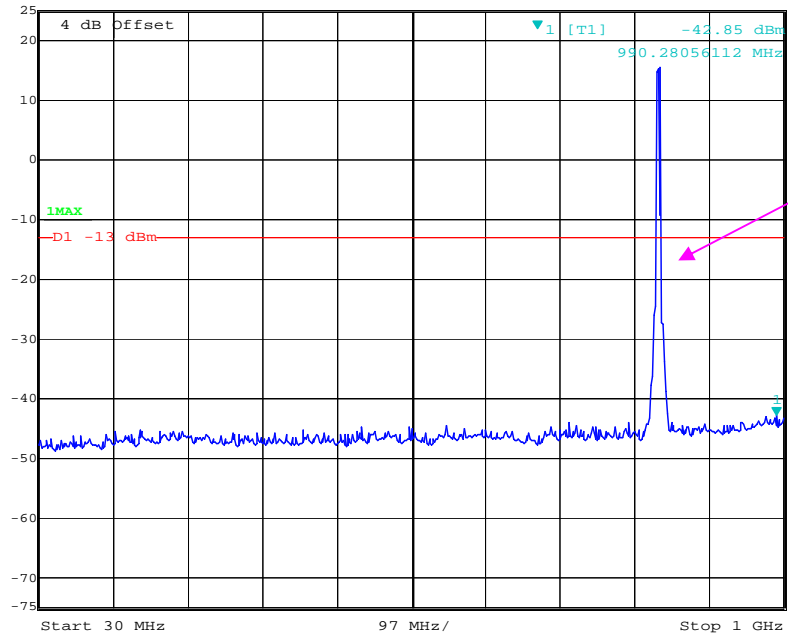
Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -37.11 dBm VBW 3 MHz  
20 dBm 1.64929860 GHz SWT 52 ms Unit dBm



Date: 5.DEC.2019 15:52:57

### LTE Band 5\_5 MHz\_Middle Channel

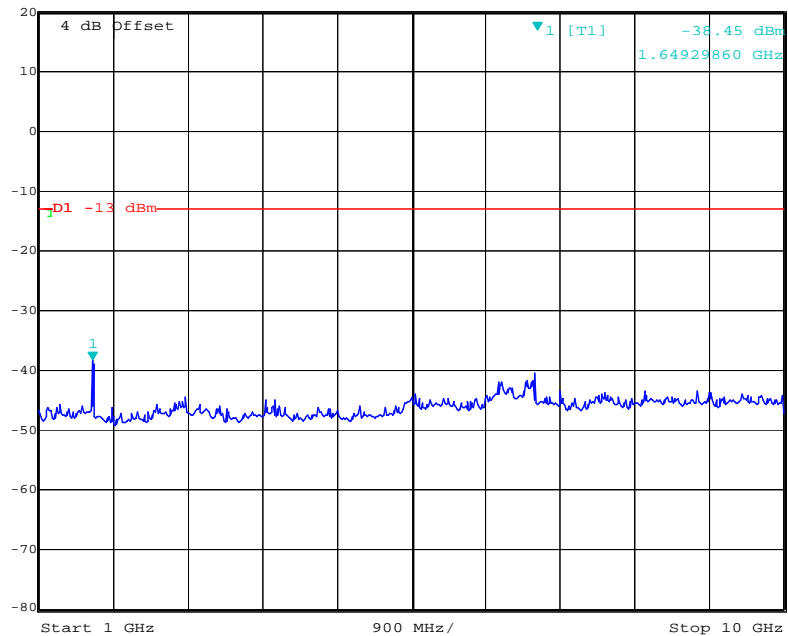
Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -42.85 dBm VBW 300 kHz  
25 dBm 990.28056112 MHz SWT 245 ms Unit dBm



Fundamental

Date: 5.DEC.2019 15:53:16

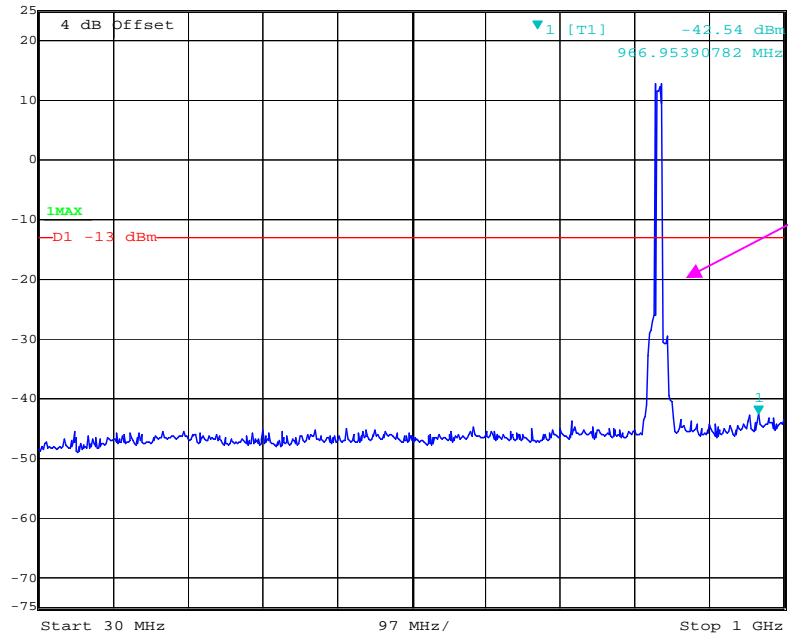
Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -38.45 dBm VBW 3 MHz  
20 dBm 1.64929860 GHz SWT 52 ms Unit dBm



Date: 5.DEC.2019 15:53:27

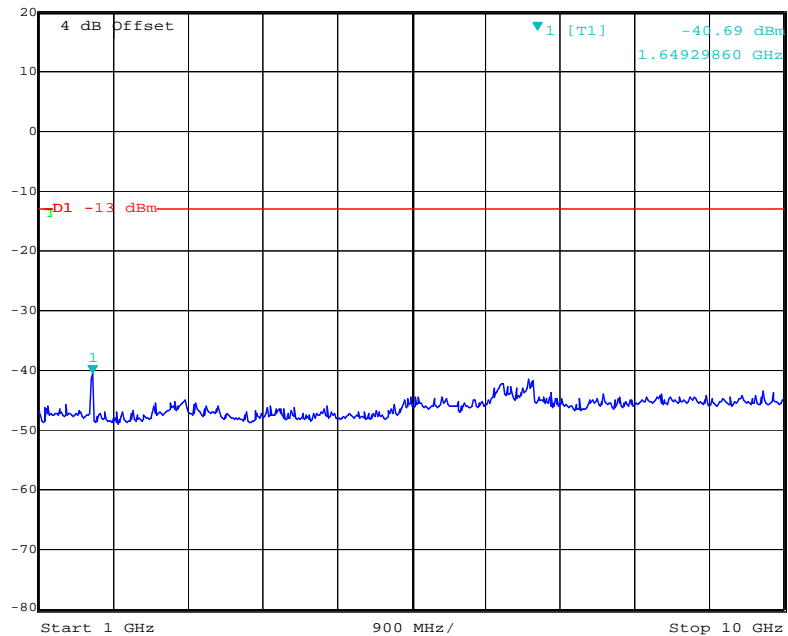
LTE Band 5\_10 MHz\_Middle Channel

Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -42.54 dBm VBW 300 kHz  
25 dBm 966.95390782 MHz SWT 245 ms Unit dBm



Date: 5.DEC.2019 15:53:47

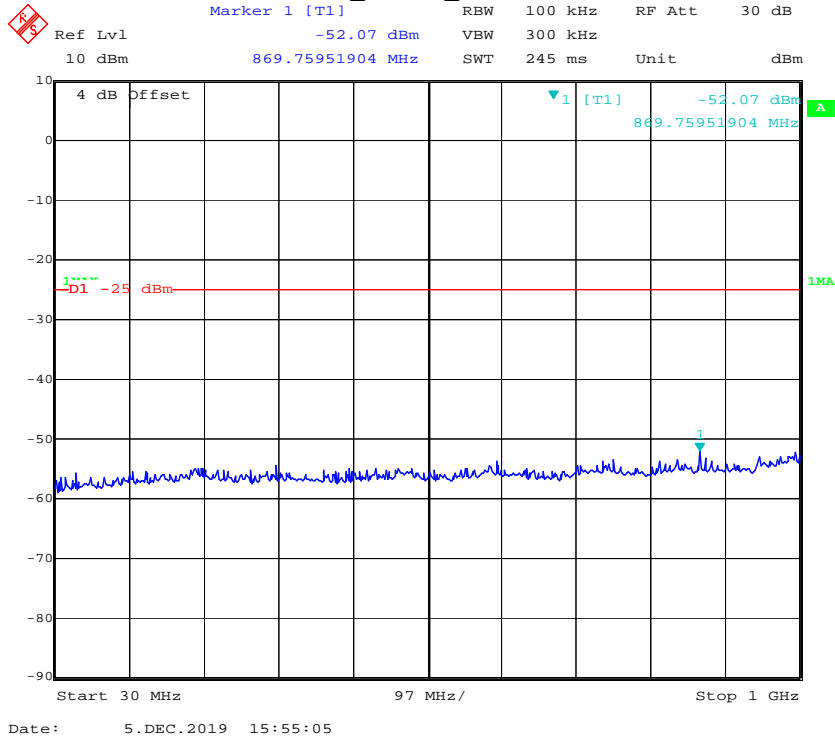
Marker 1 [T1] RBW 1 MHz RF Att 30 dB  
Ref Lvl -40.69 dBm VBW 3 MHz  
20 dBm 1.64929860 GHz SWT 52 ms Unit dBm



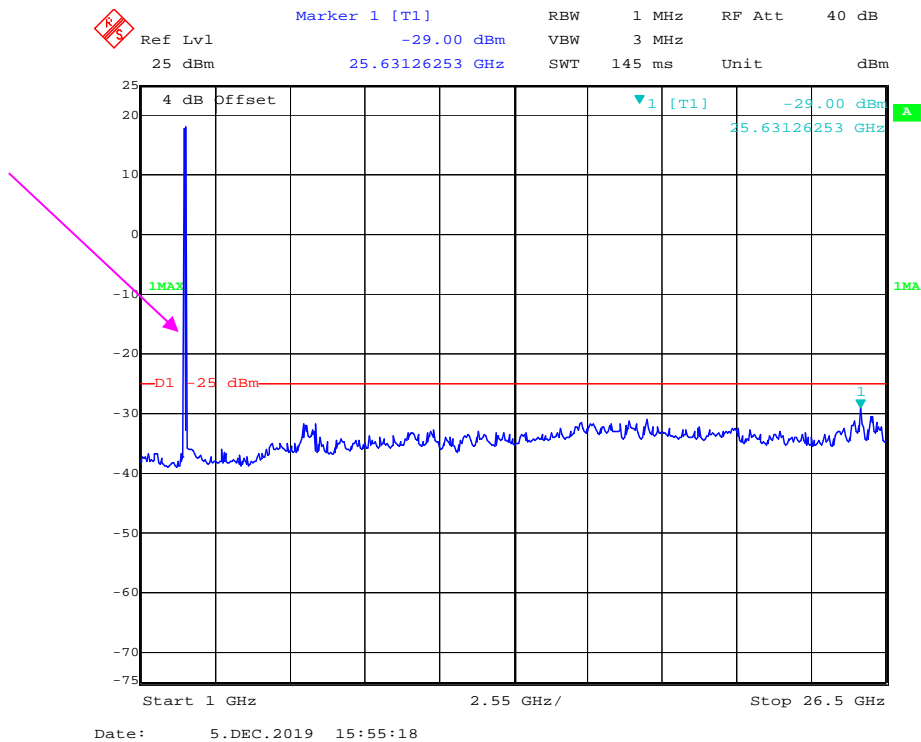
Date: 5.DEC.2019 15:53:59



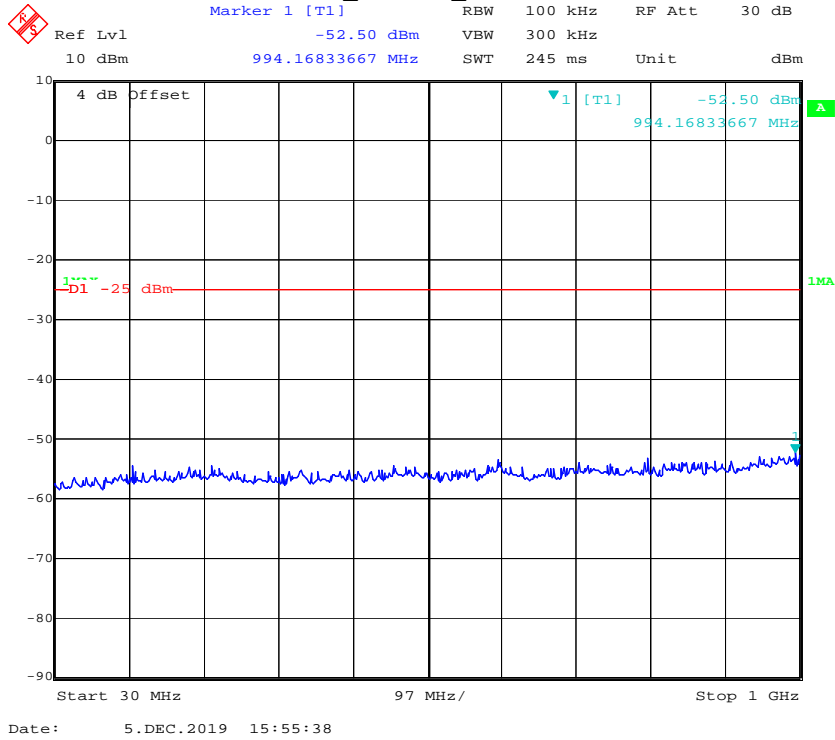
### LTE Band 7\_5 MHz\_Middle Channel



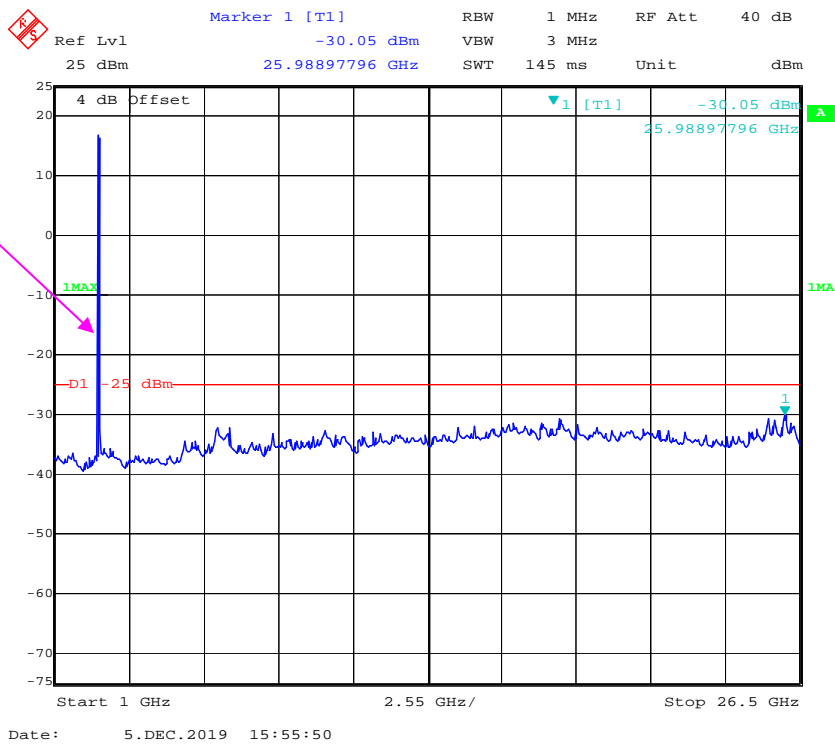
Fundamental



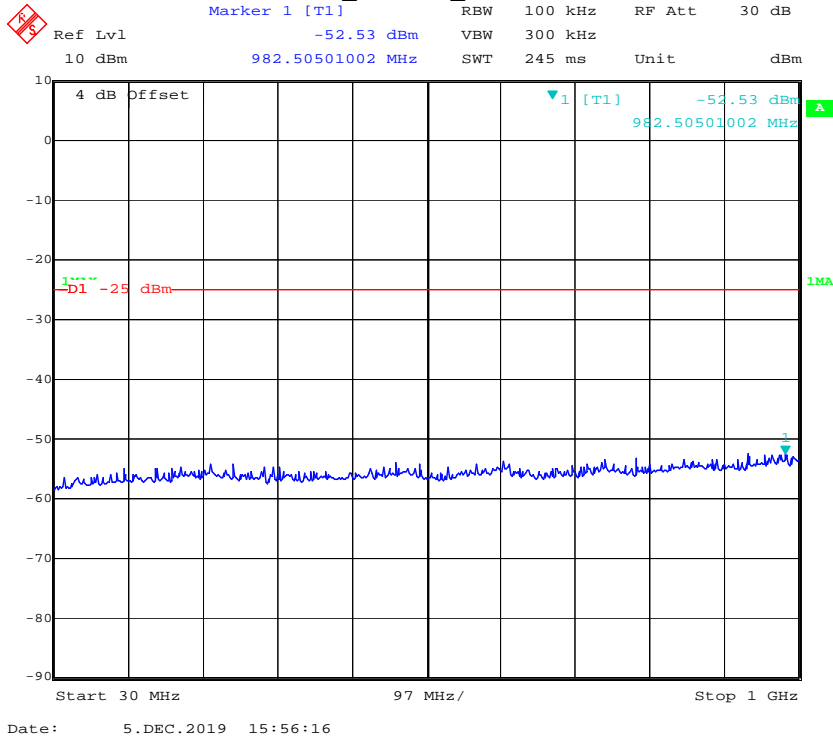
LTE Band 7\_10 MHz\_Middle Channel



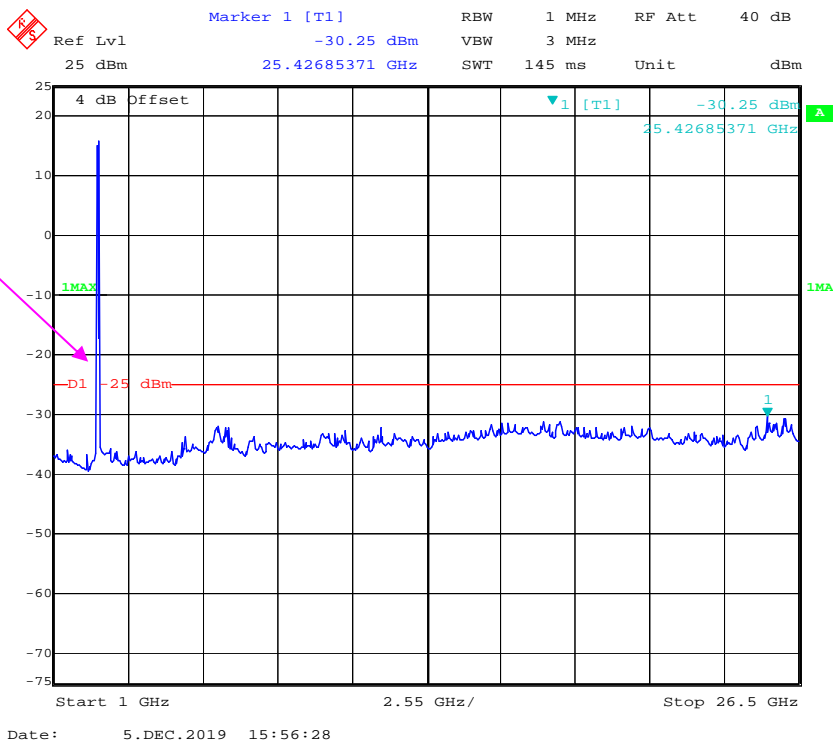
Fundamental



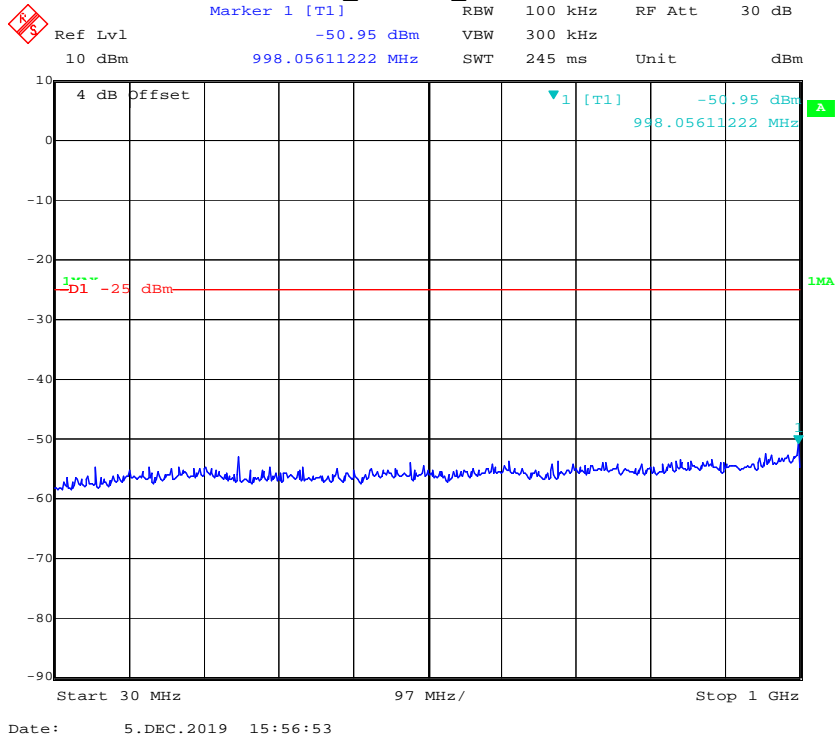
### LTE Band 7\_15 MHz\_Middle Channel



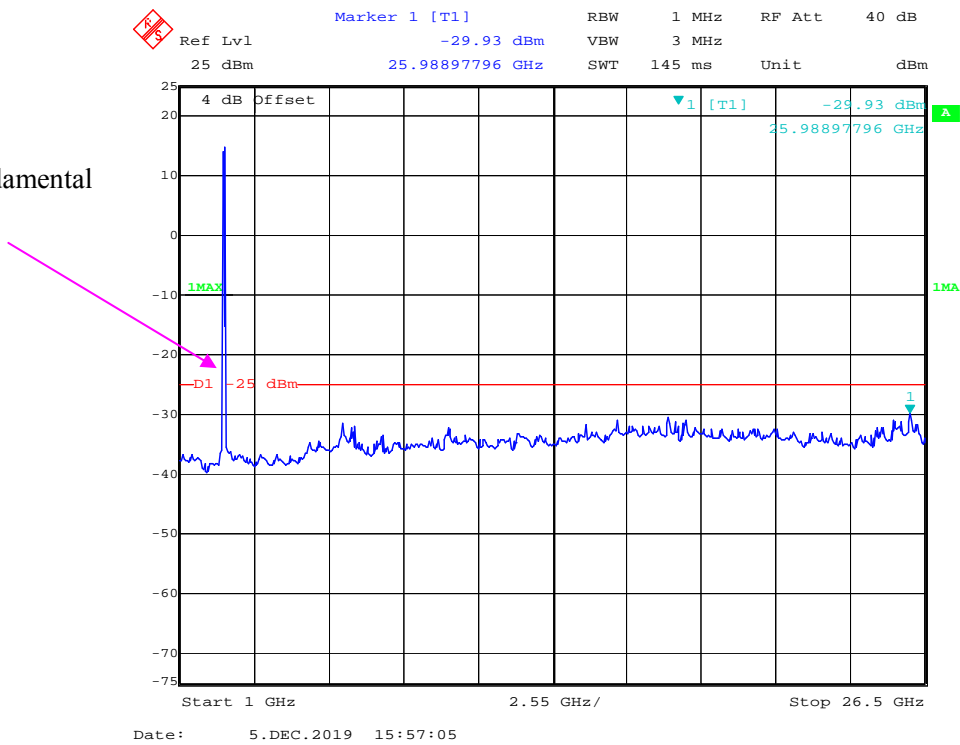
Fundamental



LTE Band 7\_20 MHz\_Middle Channel



Fundamental



## **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	ESR3	102453	2019-06-26	2020-06-26
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	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2019-05-06	2020-05-06
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
HP	Amplifier	8447D	2727A05902	2019-09-05	2020-09-05
Sinoscite	Band-stop filter	BSF824-862MS-1438-001	1438001	2019-06-16	2020-06-16
Agilent	Signal Generator	E8247C	MY43321350	2019-12-10	2020-12-10
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-05-09	2020-05-09
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	2019-09-05	2020-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2019-09-05	2020-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2019-09-05	2020-09-05
Sinoscite	Band-stop filter	BSF1710-1785MN-0383-003	0383003	2019-06-16	2020-06-16
Sinoscite	Band-stop filter	BSF1850-1910MS-0935V2	0935V2	2019-06-16	2020-06-16
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2017-12-06	2020-12-05
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-12-06	2020-12-05
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2019-06-27	2020-06-27

\* **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**

Test Items	Radiation Below 1GHz	Radiation Above 1GHz
Temperature:	25 °C	23.6°C
Relative Humidity:	39%	46 %
ATM Pressure:	101.6 kPa	102.3kPa
Tester:	Vern Shen	Lucy Lu
Test Date:	2019-12-27	2019-12-13

Test Result: Compliance.

*EUT Operation Mode: Transmitting***Cellular Band (PART 22H)****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)			
GSM850, Frequency:836.600 MHz								
1673.200	H	43.31	-60.63	10.6	0.73	-50.8	-13.0	37.8
1673.200	V	41.82	-62.72	10.6	0.73	-52.8	-13.0	39.8
2509.800	H	52.35	-50.56	13.1	1.25	-38.7	-13.0	25.7
2509.800	V	51.15	-51.79	13.1	1.25	-39.9	-13.0	26.9
3346.400	H	45.75	-53.93	13.8	1.61	-41.7	-13.0	28.7
3346.400	V	43.22	-56.5	13.8	1.61	-44.3	-13.0	31.3
551.500	H	36.33	-66.82	0.0	0.74	-67.6	-13.0	54.6
666.600	V	37.24	-67.16	0.0	0.88	-68.0	-13.0	55.0
WCDMA Band V, Frequency:836.600 MHz								
1673.200	H	49.87	-54.07	10.6	0.73	-44.2	-13.0	31.2
1673.200	V	45.87	-58.67	10.6	0.73	-48.8	-13.0	35.8
2509.800	H	41.50	-61.41	13.1	1.25	-49.6	-13.0	36.6
2509.800	V	43.86	-59.08	13.1	1.25	-47.2	-13.0	34.2
3346.400	H	38.77	-60.91	13.8	1.61	-48.7	-13.0	35.7
3346.400	V	39.60	-60.12	13.8	1.61	-47.9	-13.0	34.9
566.900	H	37.13	-65.7	0.0	0.74	-66.4	-13.0	53.4
750.800	V	36.58	-66.56	0.0	0.93	-67.5	-13.0	54.5

**PCS Band (PART 24E)****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)			
GSM1900, Frequency:1880.000 MHz								
3760.000	H	48.52	-49.12	13.8	1.63	-37.0	-13.0	24.0
3760.000	V	46.01	-51.49	13.8	1.63	-39.4	-13.0	26.4
5640.000	H	40.50	-53.09	14.0	1.31	-40.4	-13.0	27.4
5640.000	V	45.55	-47.93	14.0	1.31	-35.2	-13.0	22.2
830.000	H	37.69	-60.51	0.0	0.97	-61.5	-13.0	48.5
735.400	V	35.56	-67.81	0.0	0.94	-68.8	-13.0	55.8
WCDMA Band II, Frequency:1880.000 MHz								
3760.000	H	40.50	-57.14	13.8	1.63	-45.0	-13.0	32.0
3760.000	V	44.90	-52.6	13.8	1.63	-40.5	-13.0	27.5
5640.000	H	39.60	-53.99	14.0	1.31	-41.3	-13.0	28.3
5640.000	V	38.03	-55.45	14.0	1.31	-42.7	-13.0	29.7
826.600	H	38.45	-59.8	0.0	0.96	-60.8	-13.0	47.8
735.400	V	35.44	-67.93	0.0	0.94	-68.9	-13.0	55.9

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

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:1880.000 MHz								
3760.00	H	44.35	-53.29	13.76	1.63	-41.16	-13.00	28.16
3760.00	V	44.73	-52.77	13.76	1.63	-40.64	-13.00	27.64
5640.00	H	43.80	-49.79	14.02	1.31	-37.08	-13.00	24.08
5640.00	V	42.60	-50.88	14.02	1.31	-38.17	-13.00	25.17
574.00	H	34.26	-68.42	0.00	0.75	-69.17	-13.00	56.17
752.20	V	35.68	-67.44	0.00	0.93	-68.37	-13.00	55.37

**LTE Band 5(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: 836.500 MHz								
1673.00	H	46.34	-57.60	10.61	0.73	-47.72	-13.00	34.72
1673.00	V	42.68	-61.86	10.61	0.73	-51.98	-13.00	38.98
2509.50	H	41.35	-61.56	13.11	1.25	-49.70	-13.00	36.70
2509.50	V	42.60	-60.34	13.11	1.25	-48.48	-13.00	35.48
3346.00	H	37.40	-62.28	13.83	1.61	-50.06	-13.00	37.06
3346.00	V	37.30	-62.42	13.83	1.61	-50.20	-13.00	37.20
517.80	H	35.84	-68.02	0.00	0.72	-68.74	-13.00	55.74
465.90	V	35.87	-71.70	0.00	0.68	-72.38	-13.00	59.38



**LTE Band 7 (30MHz-26.5GHz):**

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								
5070.00	H	47.54	-47.57	13.93	1.34	-34.98	-25.00	9.98
5070.00	V	43.50	-51.42	13.93	1.34	-38.83	-25.00	13.83
7605.00	H	37.50	-51.38	13.21	1.40	-39.57	-25.00	14.57
7605.00	V	37.50	-51.78	13.21	1.40	-39.97	-25.00	14.97
590.80	H	34.36	-67.96	0.00	0.76	-68.72	-25.00	43.72
880.00	V	37.56	-62.24	0.00	1.03	-63.27	-25.00	38.27

Note:

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

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

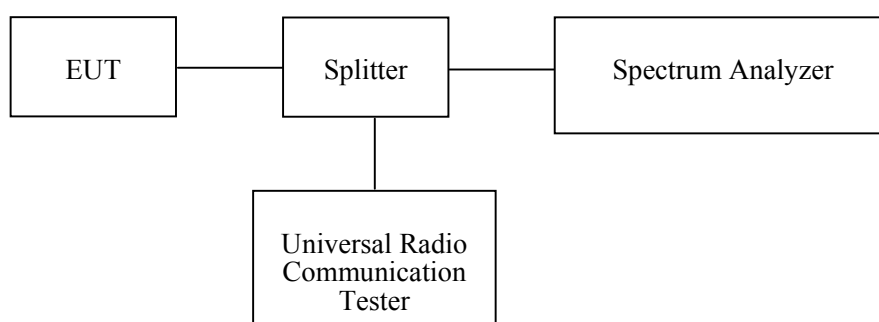
### Applicable Standard

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

### Test Procedure

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

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



### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2019-12-10	2020-12-10
R&S	Spectrum Analyzer	FSU 26	200256	2019-05-09	2020-05-09
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2019-08-03	2020-08-03
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010013	Each time	/
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	Each time	/
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	/
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each time	/

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

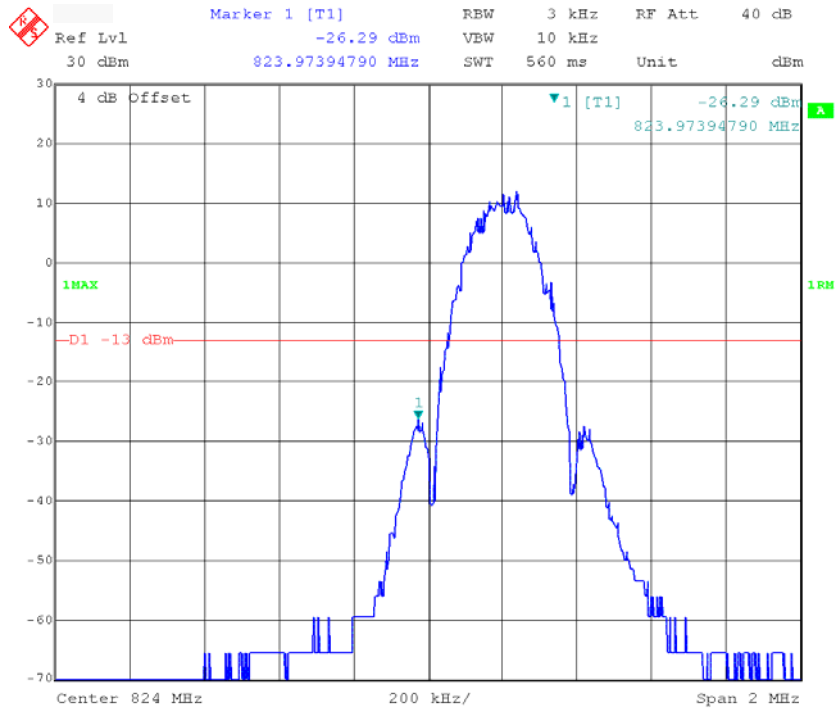
### Test Data

#### Environmental Conditions

<b>Temperature:</b>	22.3°C~ 25.1 °C
<b>Relative Humidity:</b>	26%~30 %
<b>ATM Pressure:</b>	100.6kPa ~102.5kPa
<b>Tester:</b>	Black Yang
<b>Test Date:</b>	2019-12-05~2019-12-07

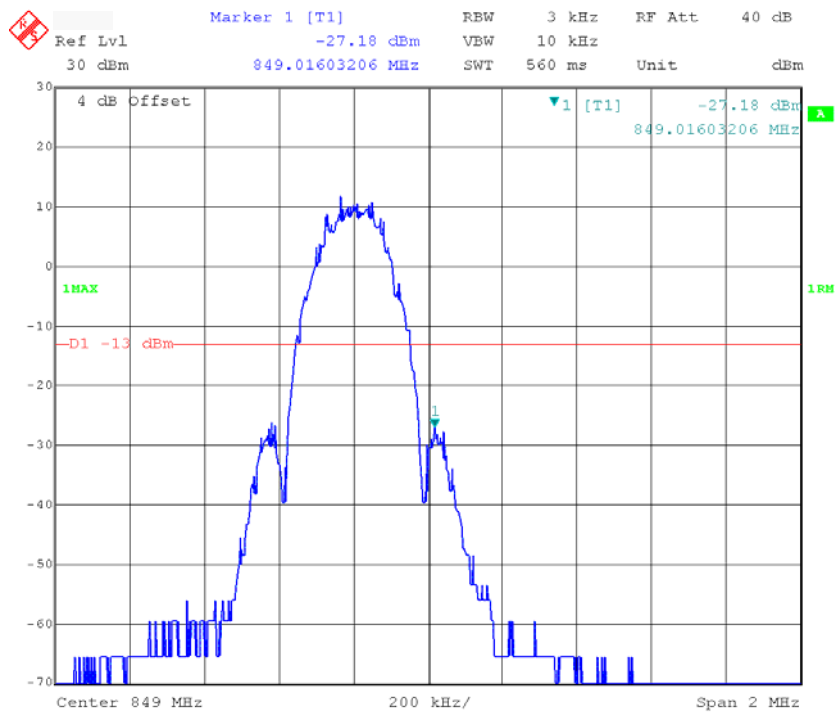
Test Mode: Transmitting  
 Test Result: Compliance. Please refer to the following plots.

**GSM 850, Left Band Edge**



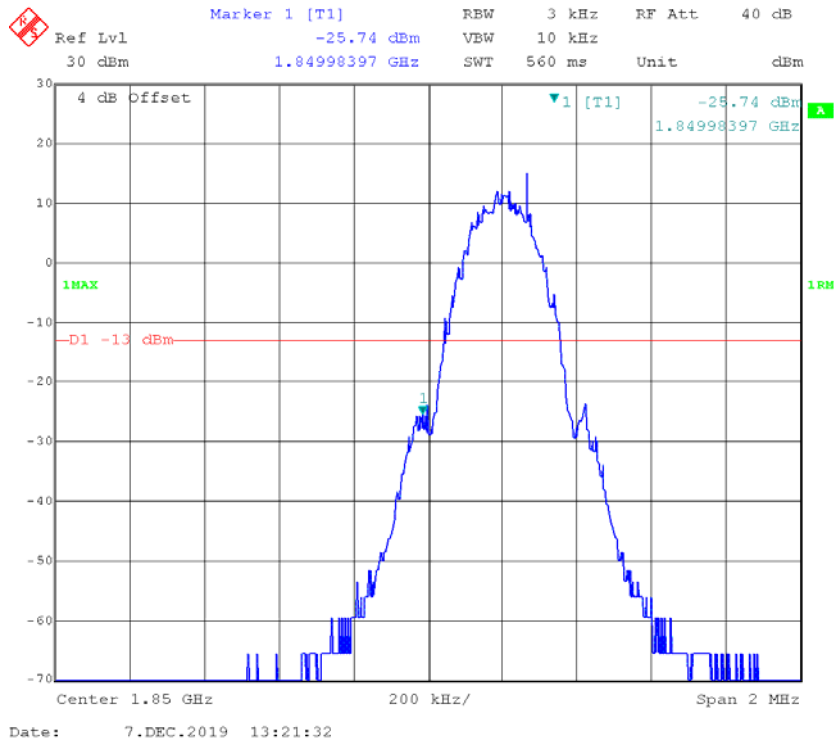
Date: 7.DEC.2019 13:04:06

**GSM 850, Right Band Edge**

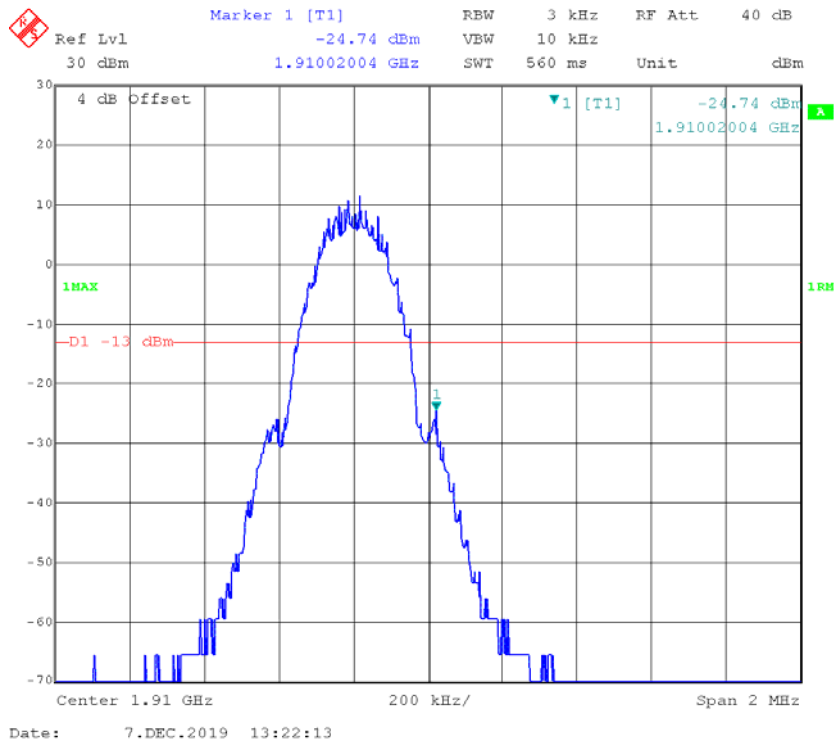


Date: 7.DEC.2019 13:04:46

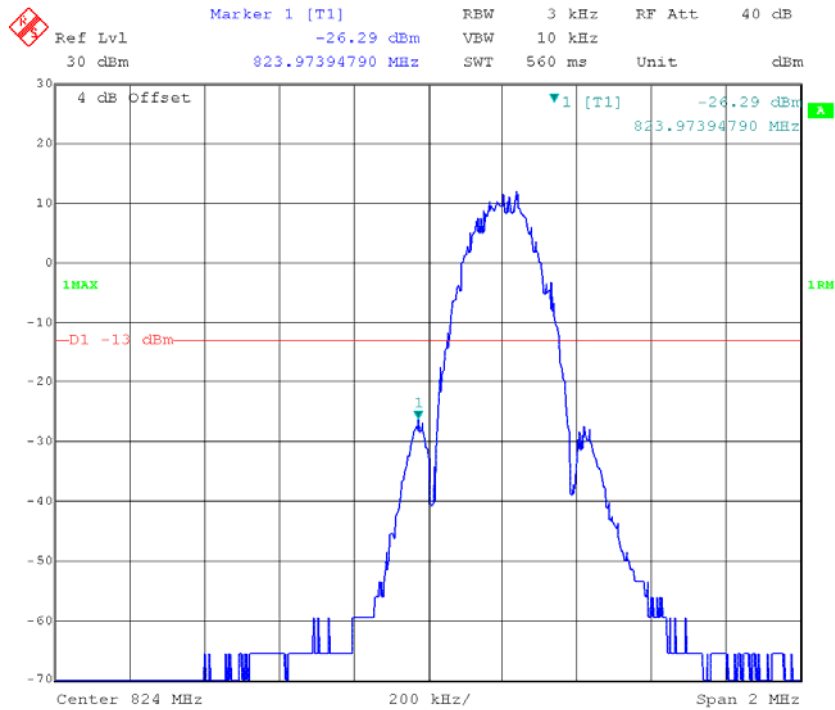
**GSM 1900, Left Band Edge**



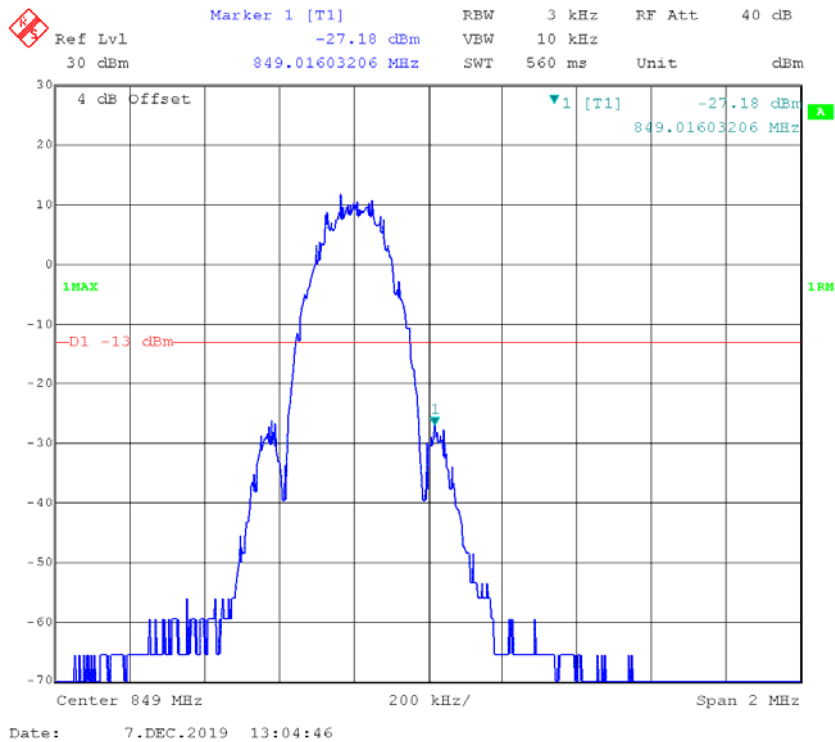
**GSM 1900, Right Band Edge**



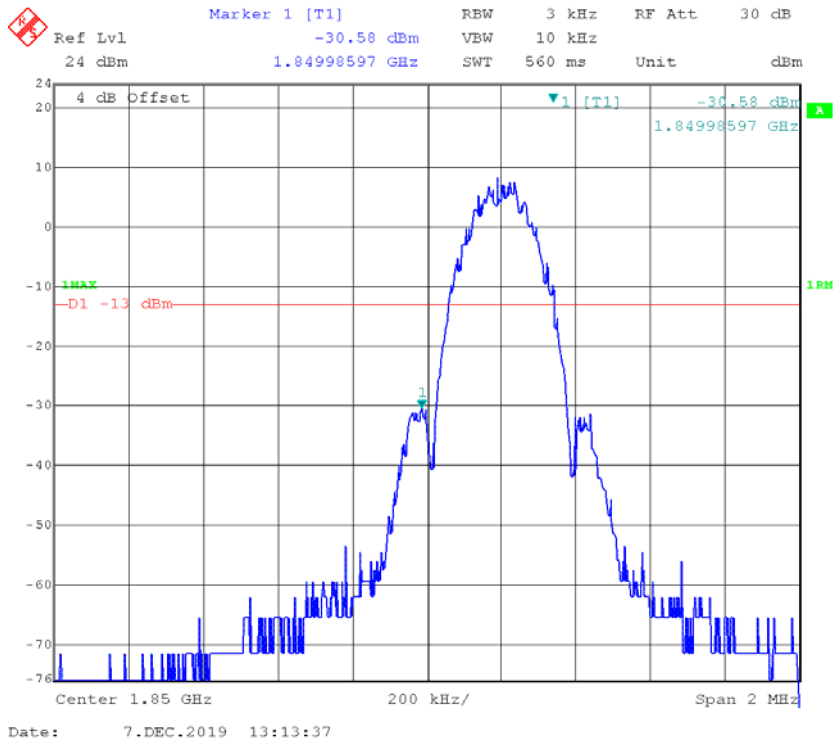
### EDGE 850, Left Band Edge



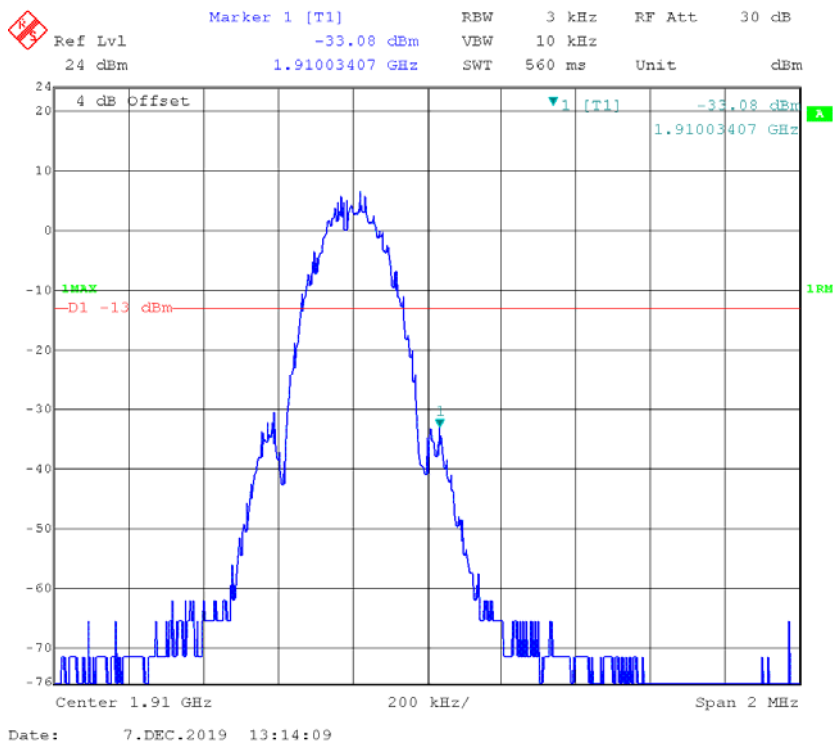
### EDGE 850, Right Band Edge



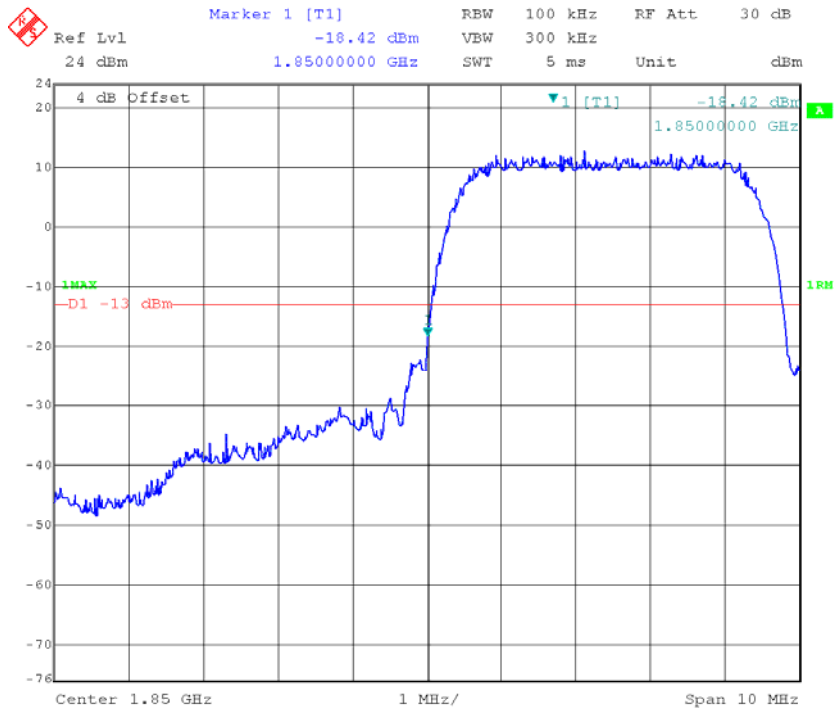
**EDGE 1900, Left Band Edge**



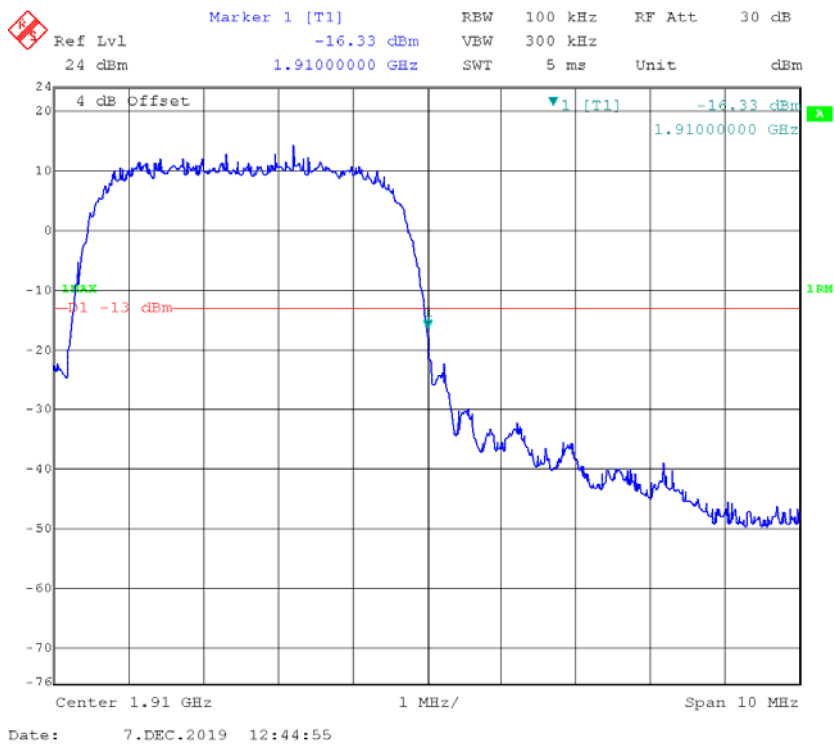
**EDGE 1900, Right Band Edge**



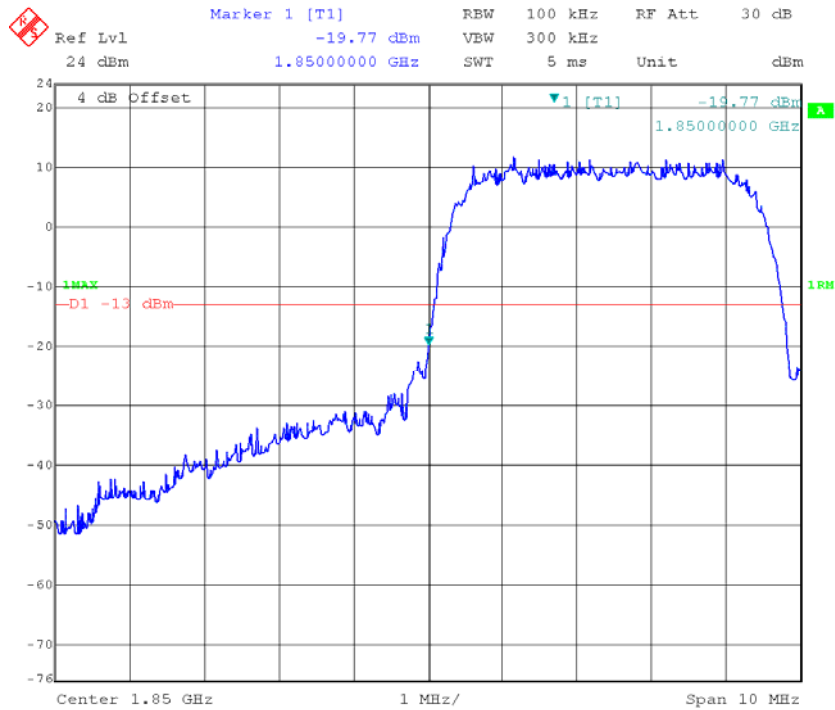
**WCDMA Band 2 Rel 99, Left Band Edge**



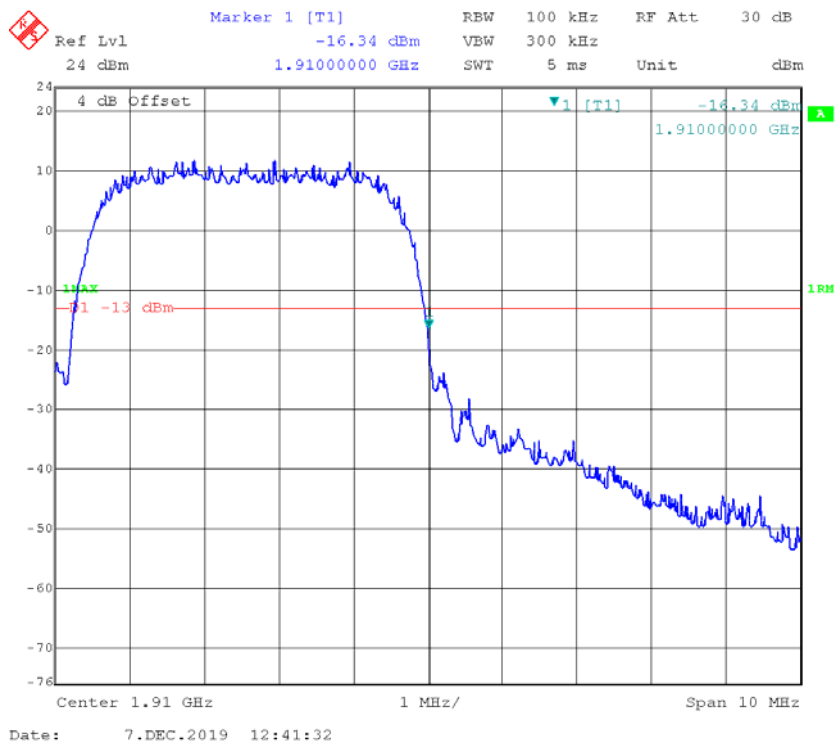
**WCDMA Band 2 Rel 99, Right Band Edge**



### WCDMA Band 2 HSDPA, Left Band Edge

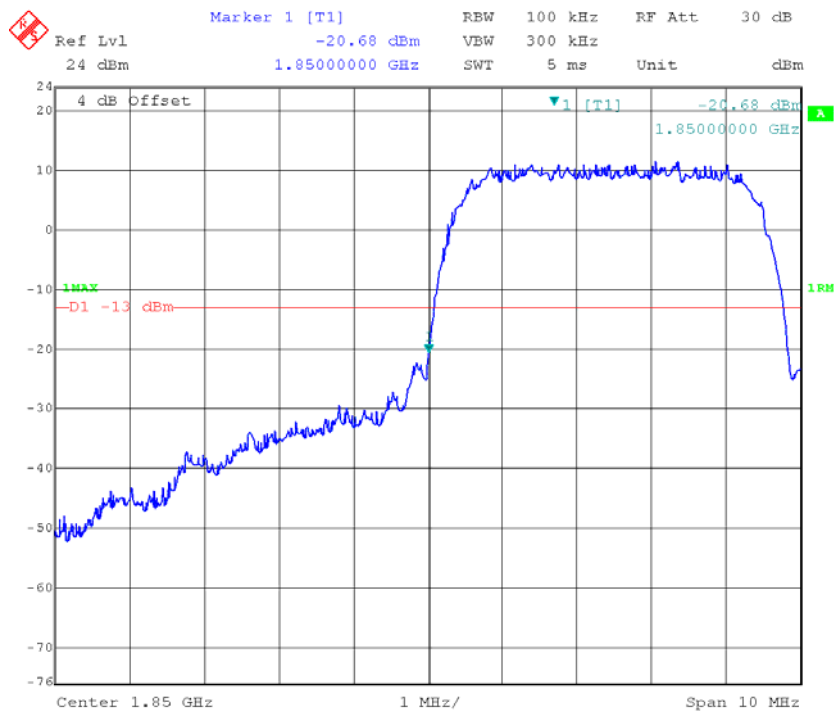


### WCDMA Band 2 HSDPA, Right Band Edge





**WCDMA Band 2 HSUPA, Left Band Edge**



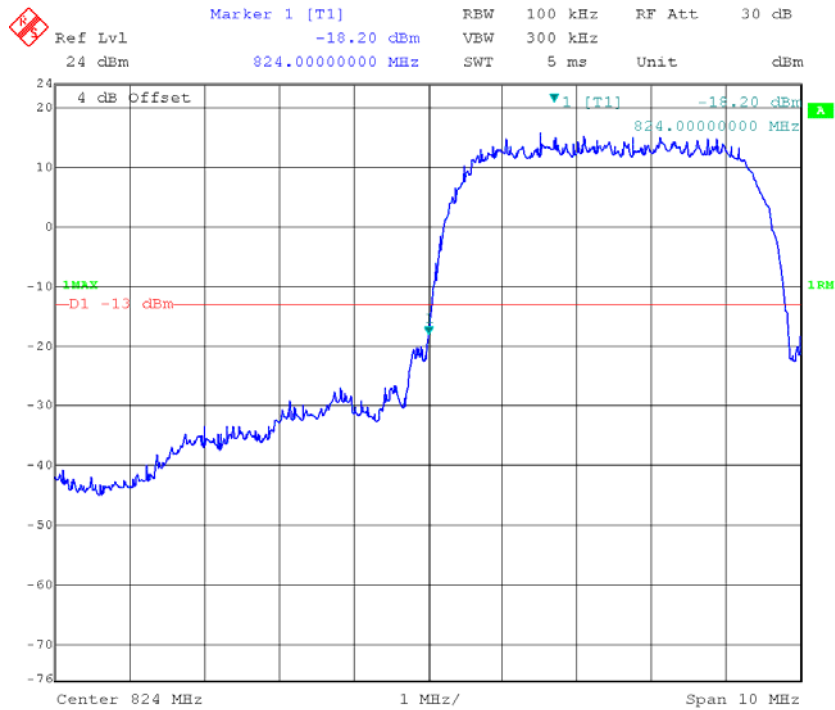
Date: 7.DEC.2019 12:40:19

**WCDMA Band 2 HSUPA, Right Band Edge**



Date: 7.DEC.2019 12:40:57

**WCDMA Band 5 Rel 99, Left Band Edge**



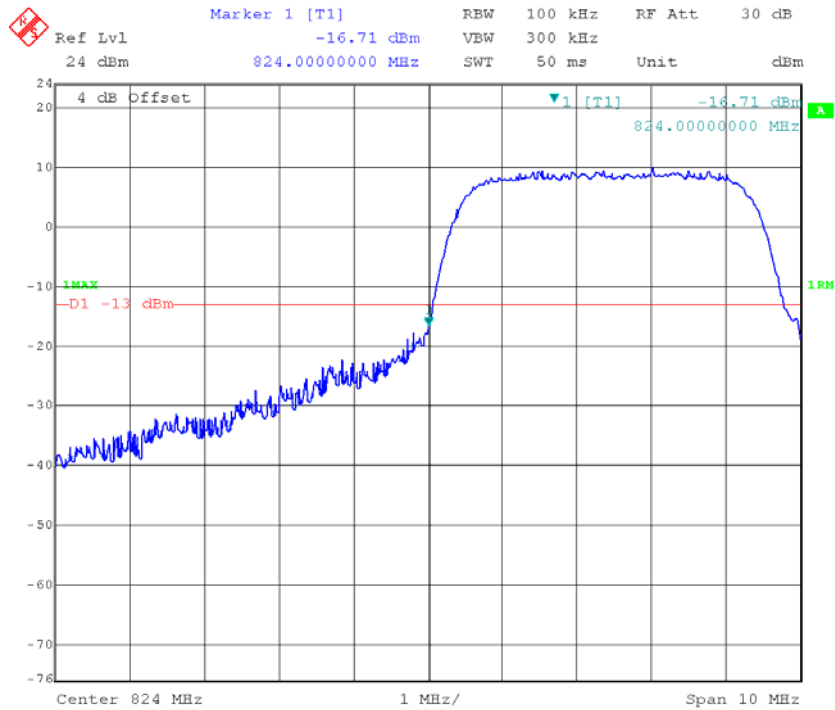
Date: 7.DEC.2019 12:12:22

**WCDMA Band 5 Rel 99, Right Band Edge**



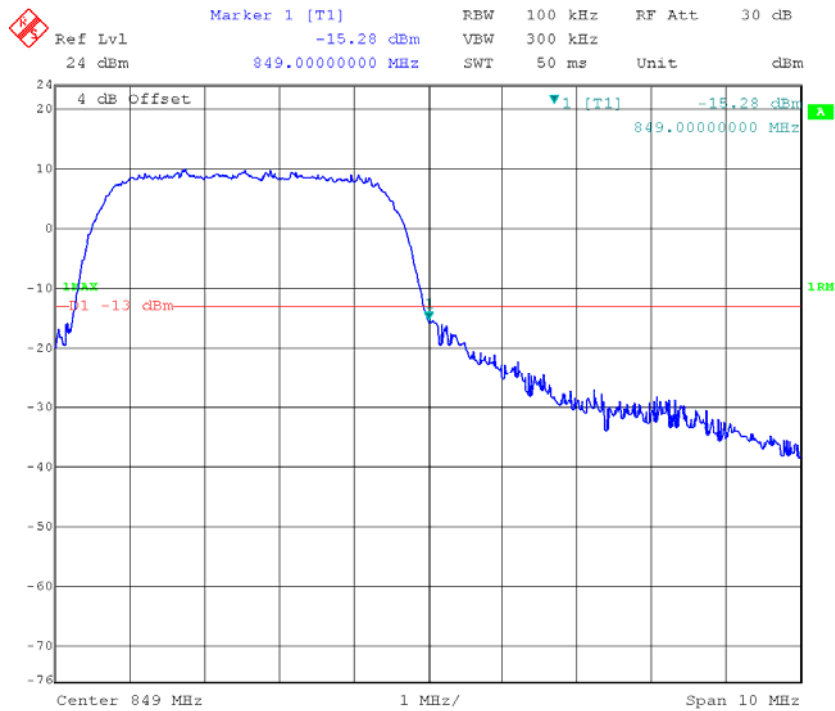
Date: 7.DEC.2019 12:13:06

**WCDMA Band 5 HSDPA, Left Band Edge**



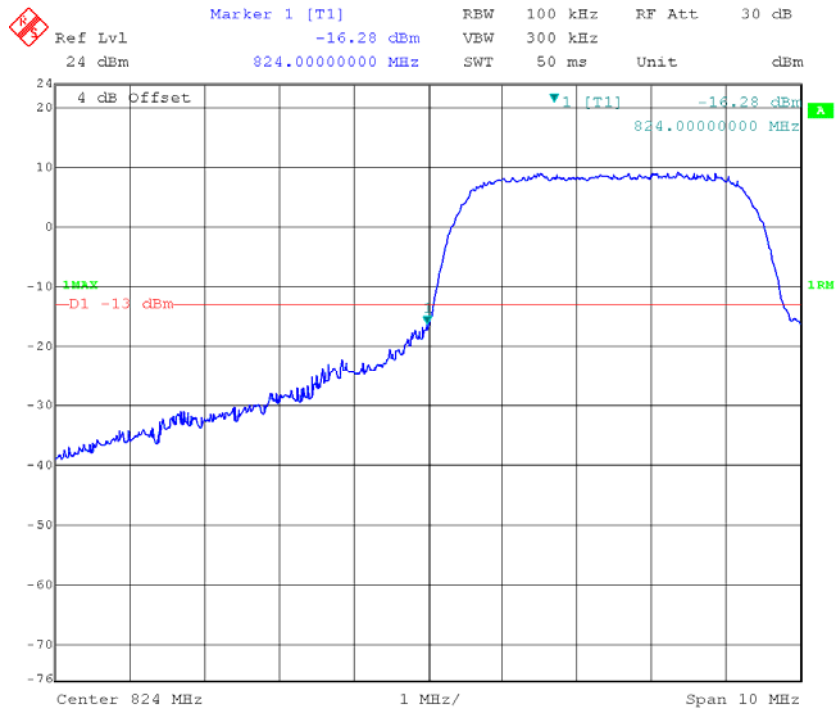
Date: 7.DEC.2019 12:11:36

**WCDMA Band 5 HSDPA, Right Band Edge**

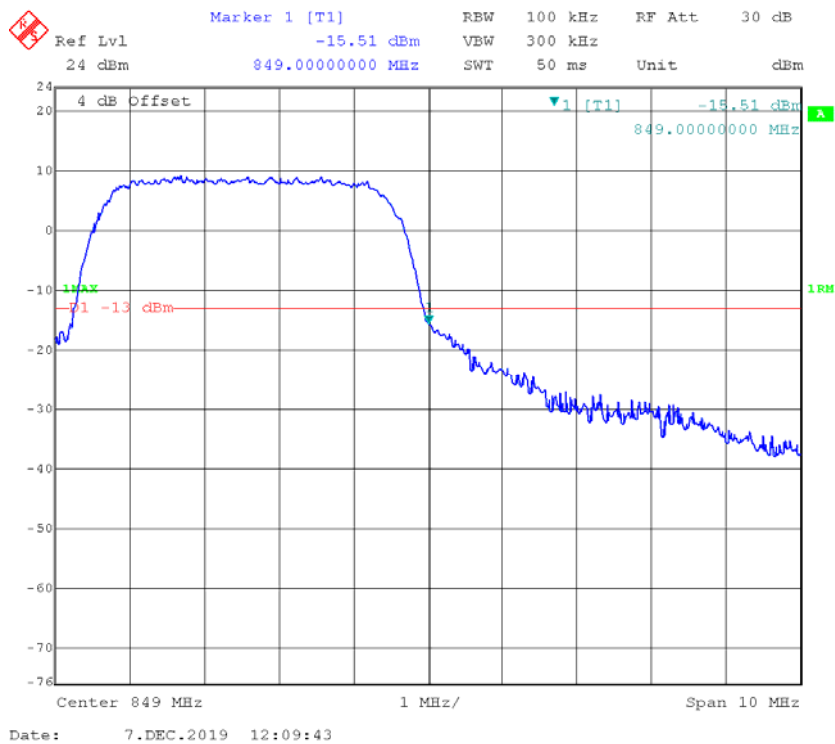


Date: 7.DEC.2019 12:10:47

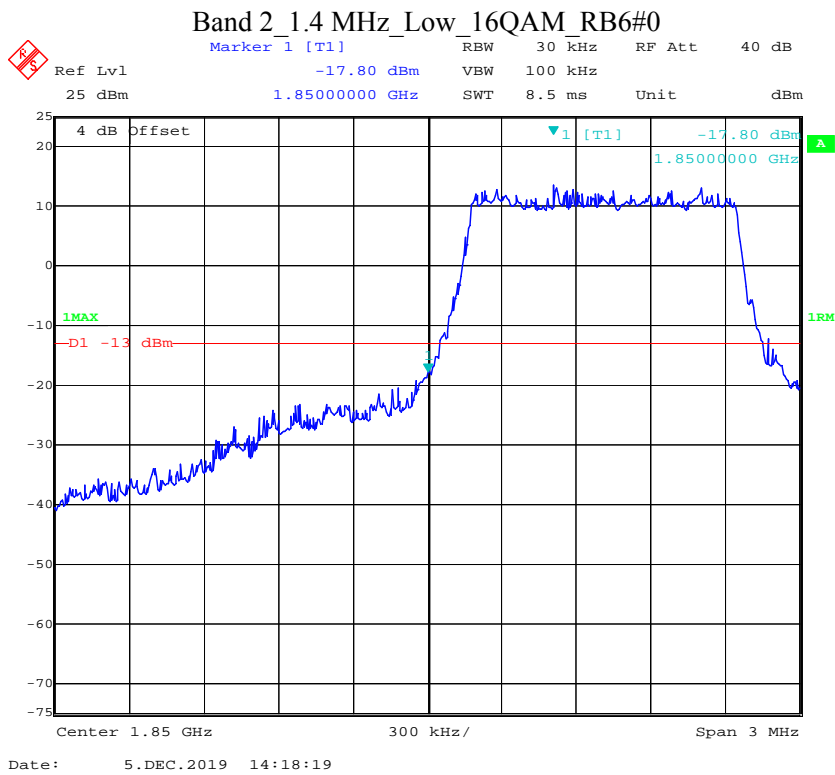
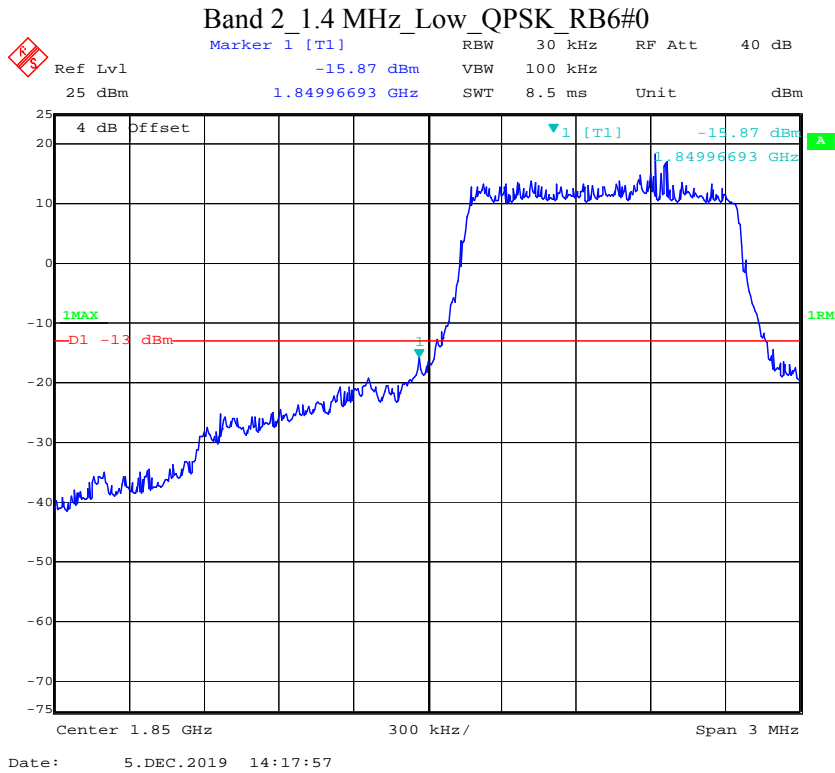
### WCDMA Band 5 HSUPA, Left Band Edge



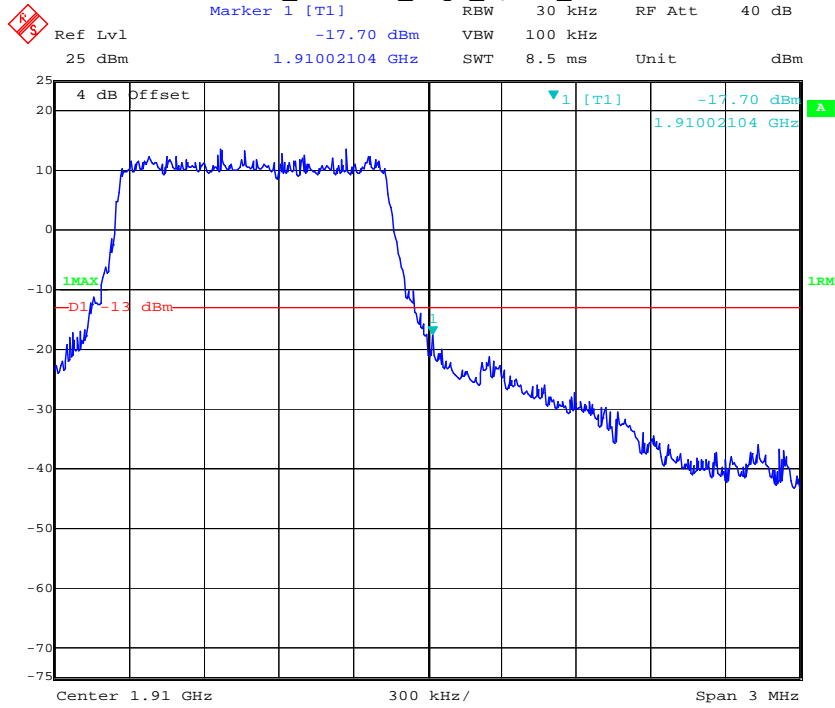
### WCDMA Band 5 HSUPA, Right Band Edge



LTE Band 2

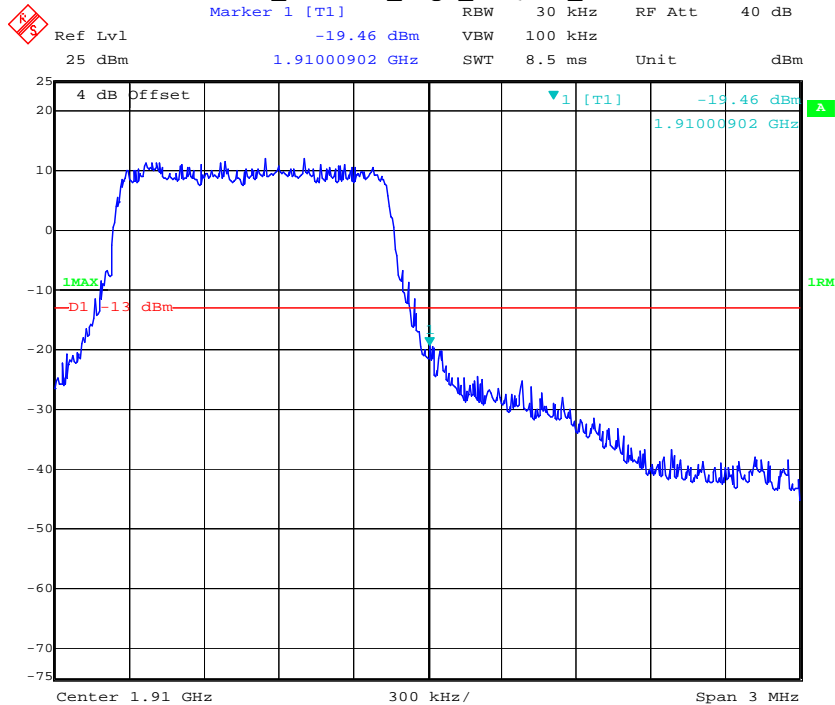


### Band 2\_1.4 MHz\_High\_QPSK\_RB6#0



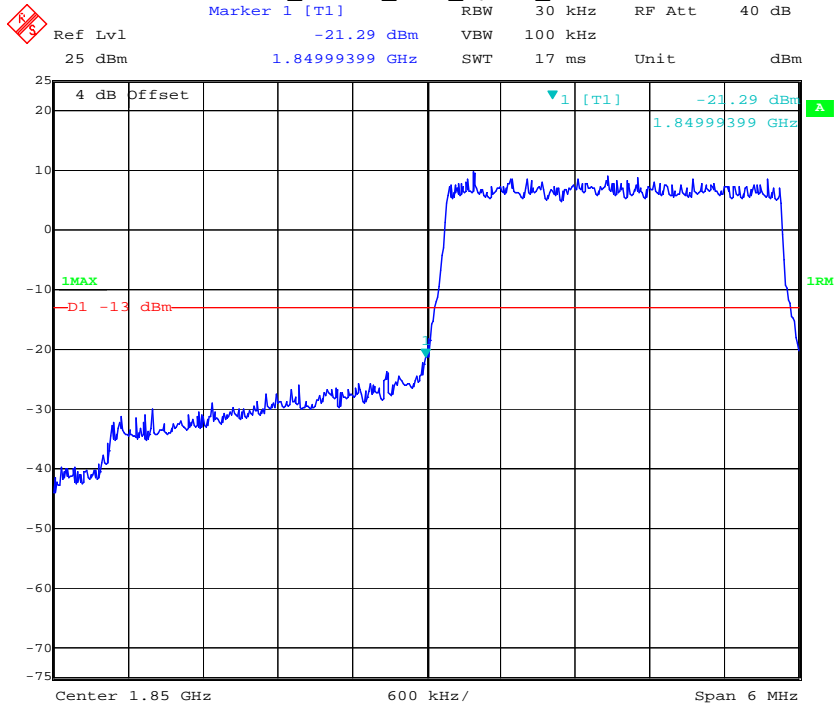
Date: 5.DEC.2019 14:18:39

### Band 2\_1.4 MHz\_High\_16QAM\_RB6#0



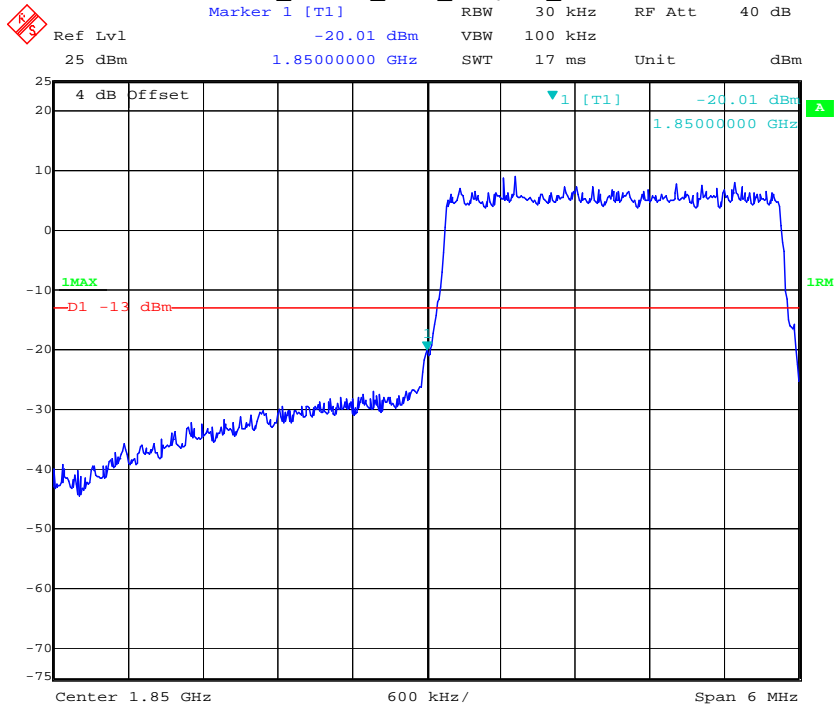
Date: 5.DEC.2019 14:18:56

Band 2\_3 MHz\_Low\_QPSK\_RB15#0



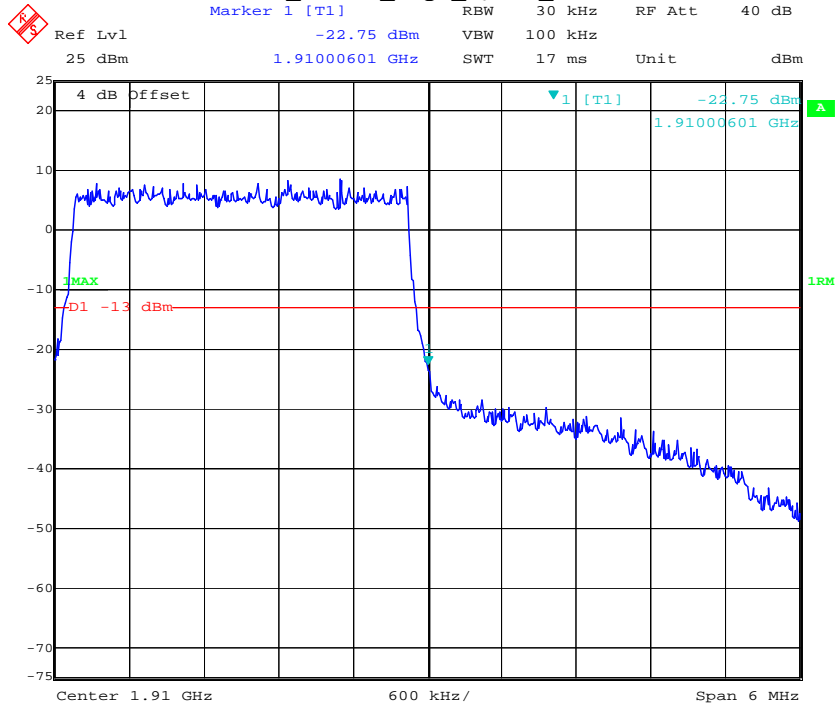
Date: 5.DEC.2019 14:19:27

Band 2\_3 MHz\_Low\_16QAM\_RB15#0



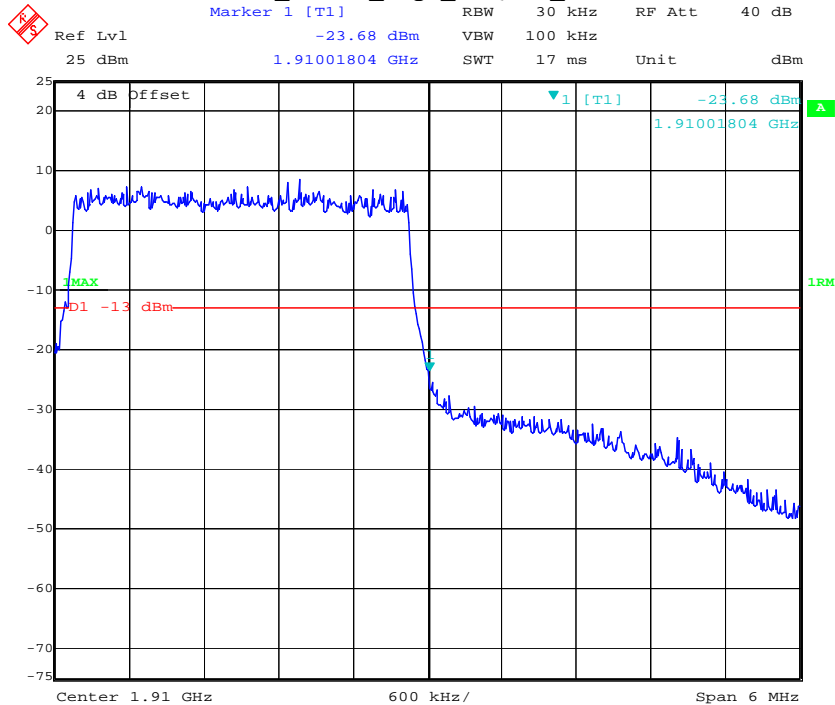
Date: 5.DEC.2019 14:19:47

### Band 2\_3 MHz\_High\_QPSK\_RB15#0



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

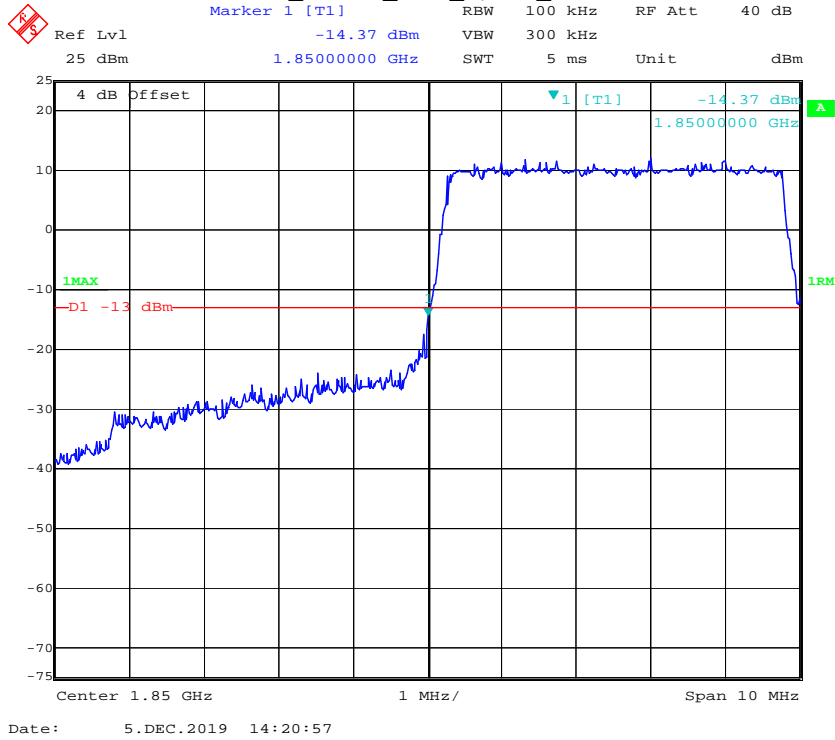
### Band 2\_3 MHz\_High\_16QAM\_RB15#0



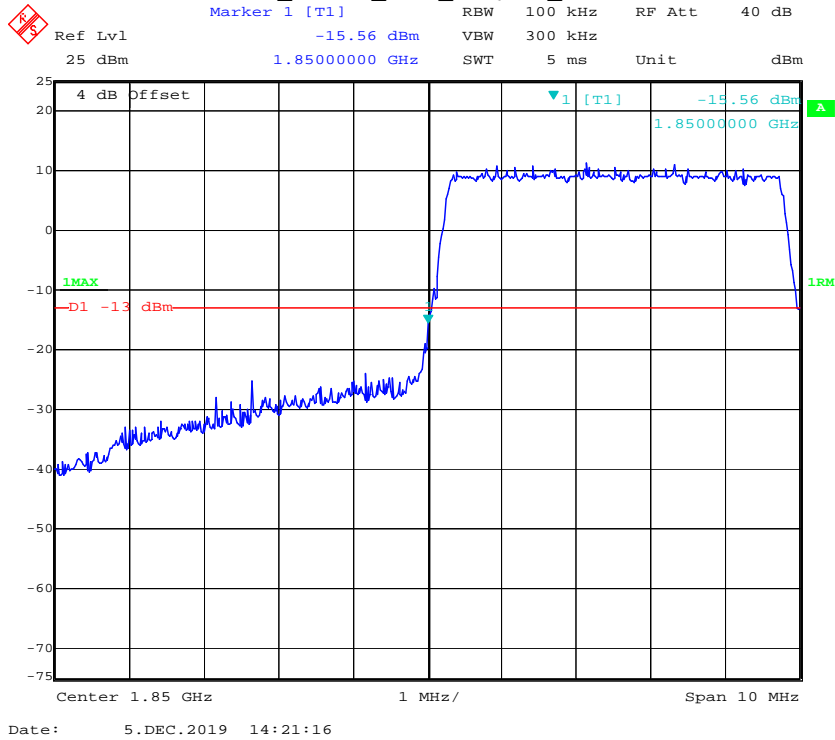
Date: 5.DEC.2019 14:20:26



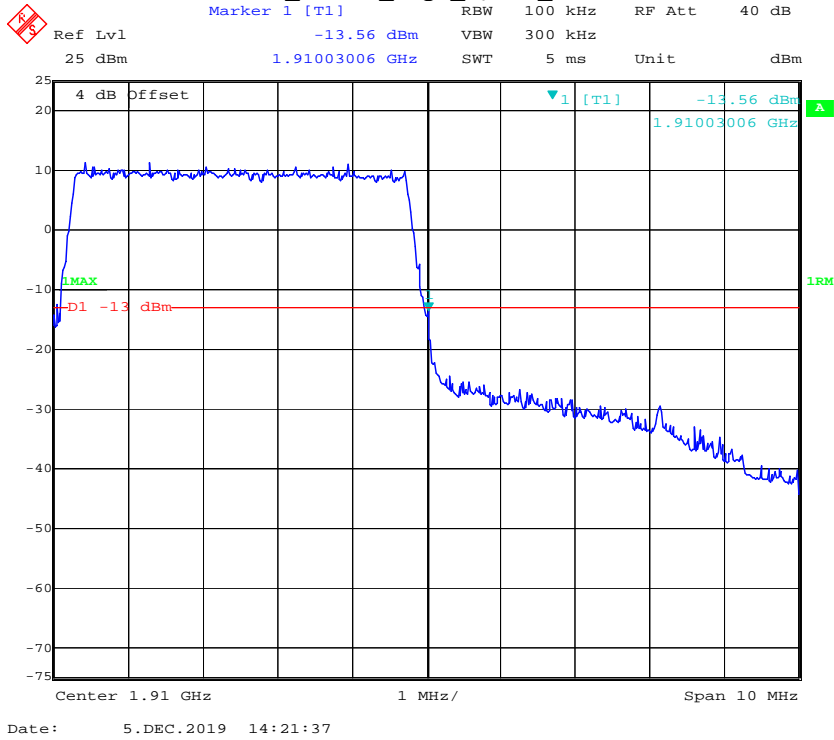
Band 2\_5 MHz\_Low\_QPSK\_RB25#0



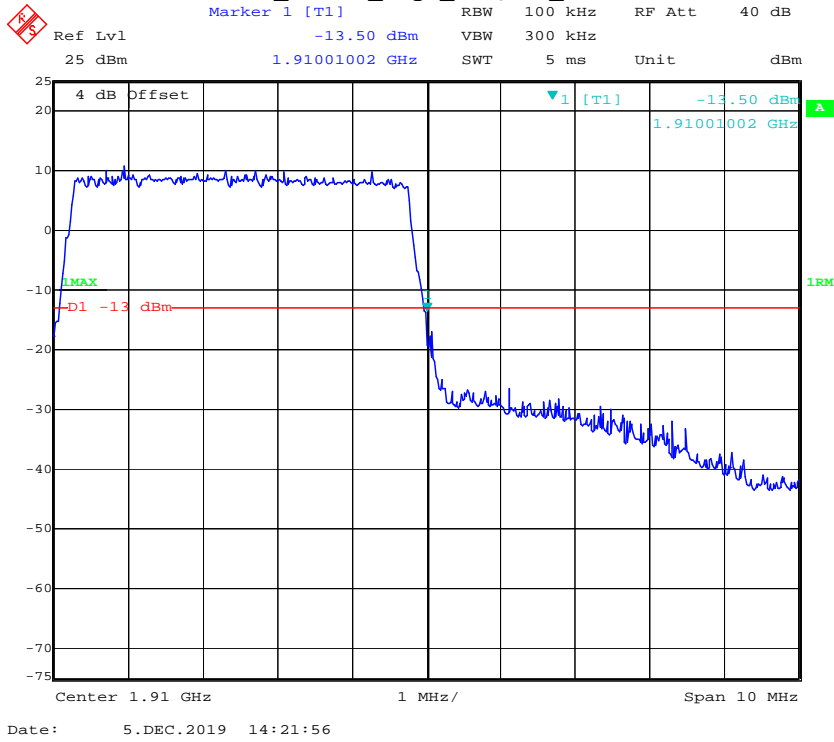
Band 2\_5 MHz\_Low\_16QAM\_RB25#0



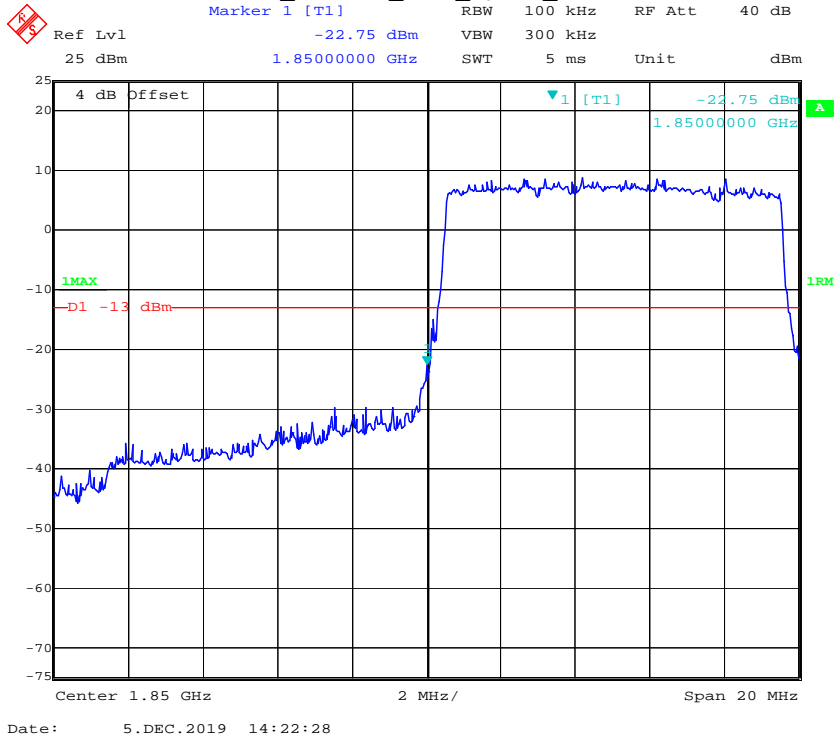
### Band 2\_5 MHz\_High\_QPSK\_RB25#0



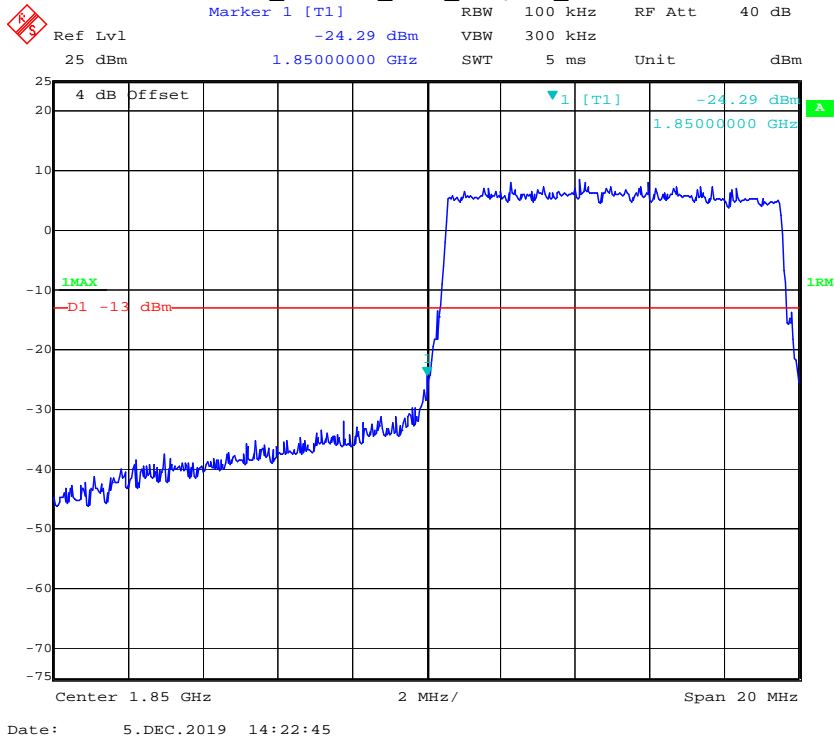
### Band 2\_5 MHz\_High\_16QAM\_RB25#0



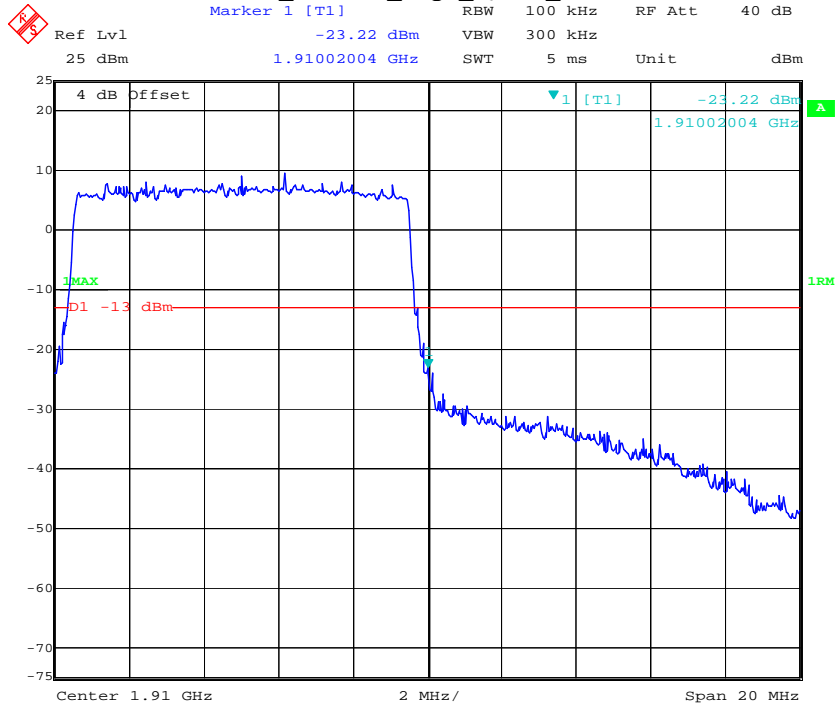
Band 2\_10 MHz\_Low\_QPSK\_RB50#0



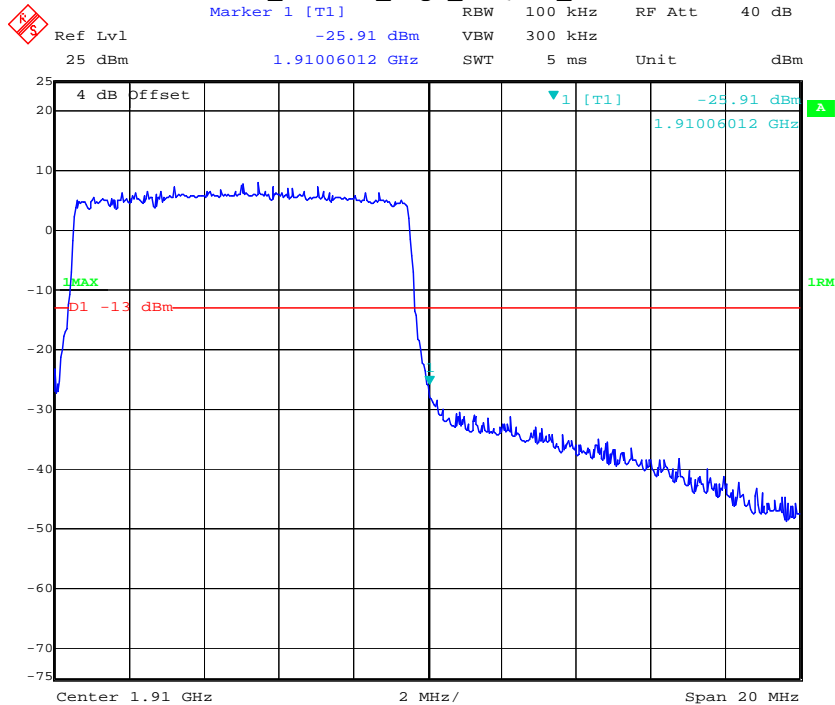
Band 2\_10 MHz\_Low\_16QAM\_RB50#0



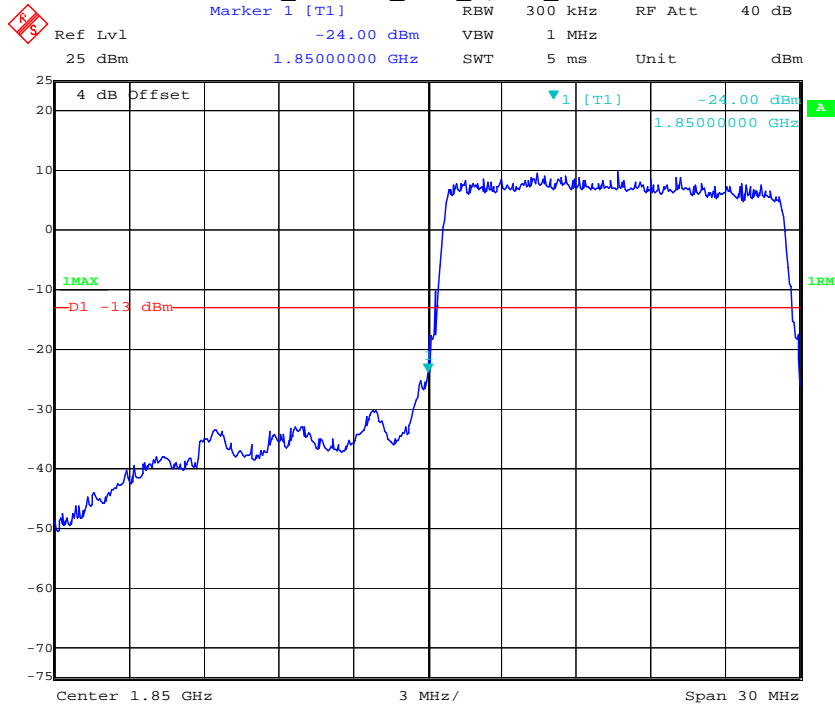
### Band 2\_10 MHz\_High\_QPSK\_RB50#0



### Band 2\_10 MHz\_High\_16QAM\_RB50#0

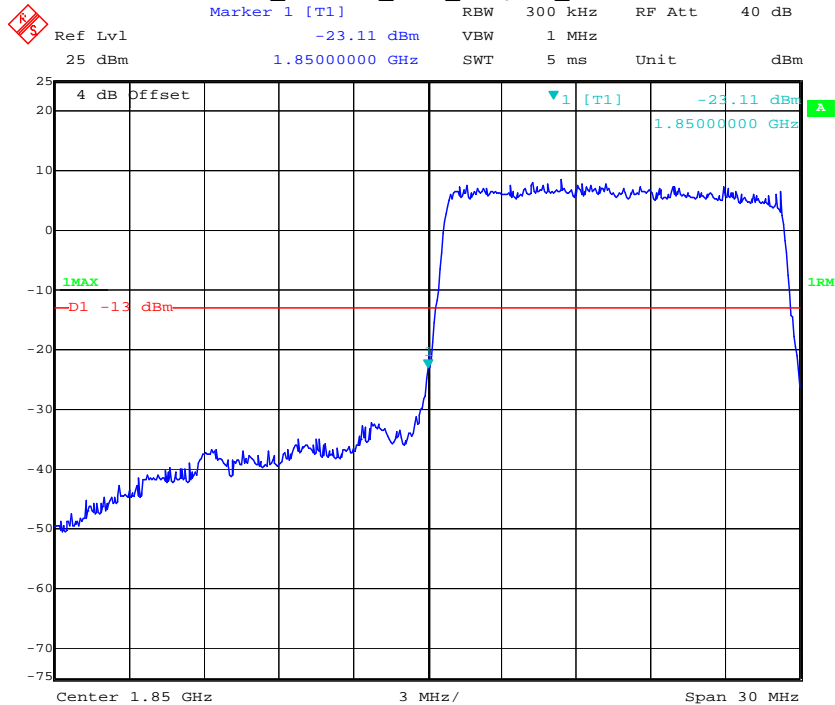


Band 2\_15 MHz\_Low\_QPSK\_RB75#0



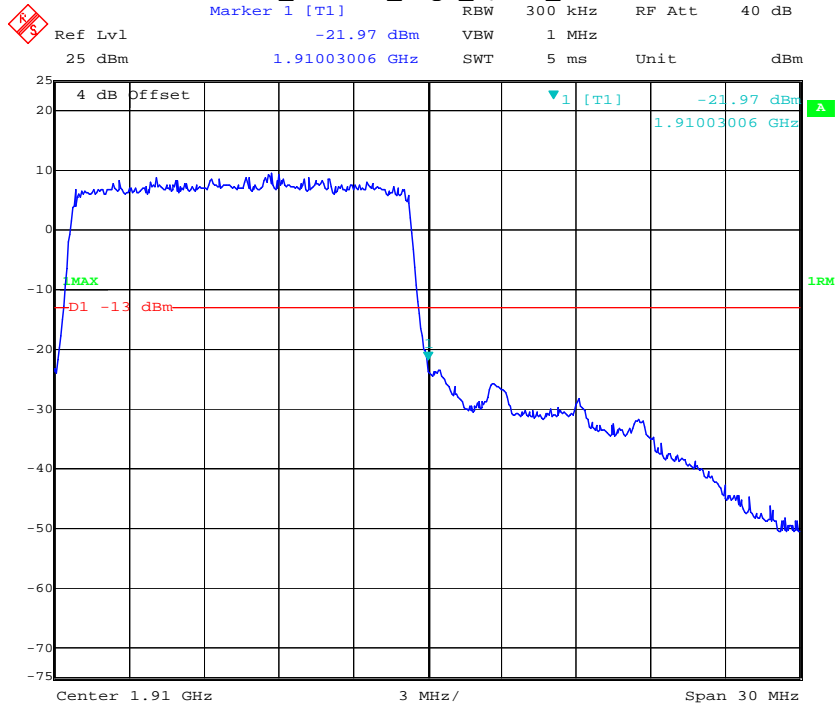
Date: 5.DEC.2019 14:24:02

Band 2\_15 MHz\_Low\_16QAM\_RB75#0

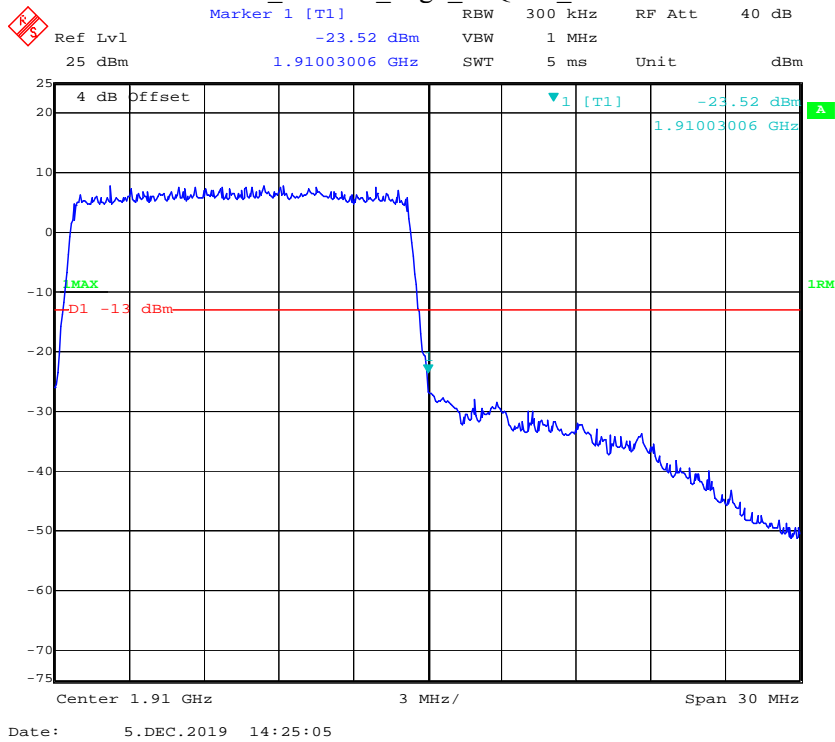


Date: 5.DEC.2019 14:24:22

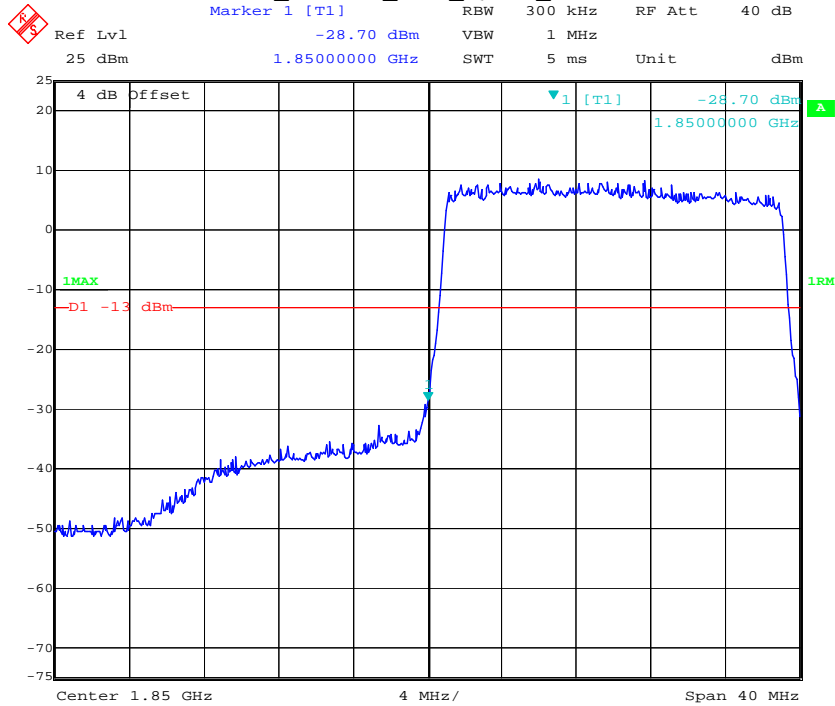
Band 2\_15 MHz\_High\_QPSK\_RB75#0



Band 2\_15 MHz\_High\_16QAM\_RB75#0

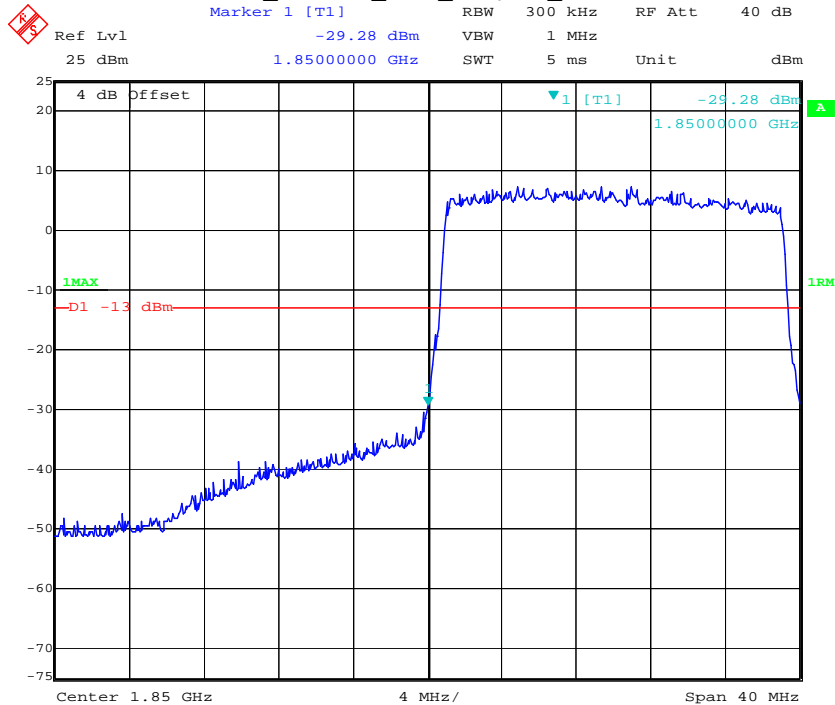


Band 2\_20 MHz\_Low\_QPSK\_RB100#0



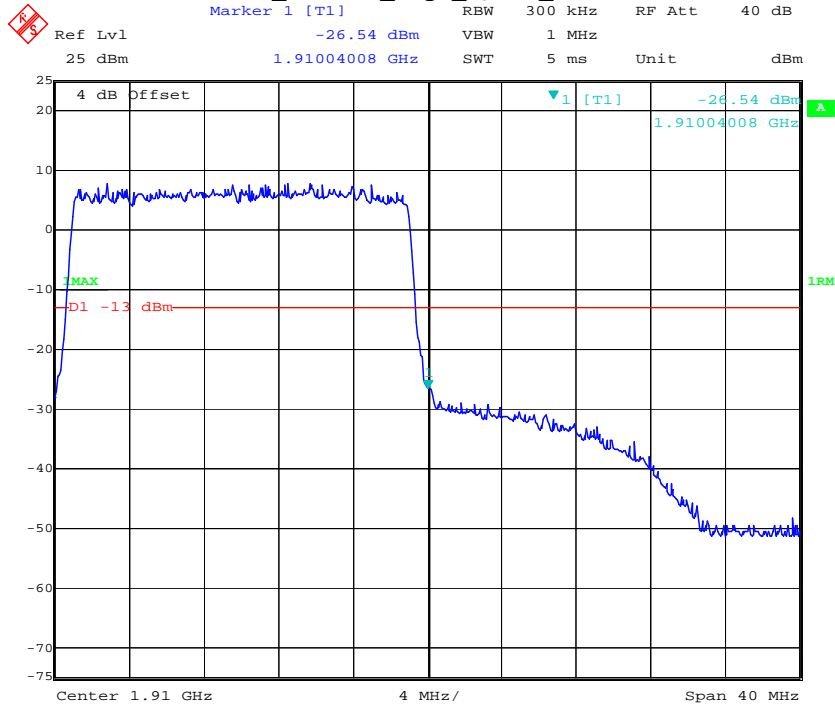
Date: 5.DEC.2019 14:25:37

Band 2\_20 MHz\_Low\_16QAM\_RB100#0



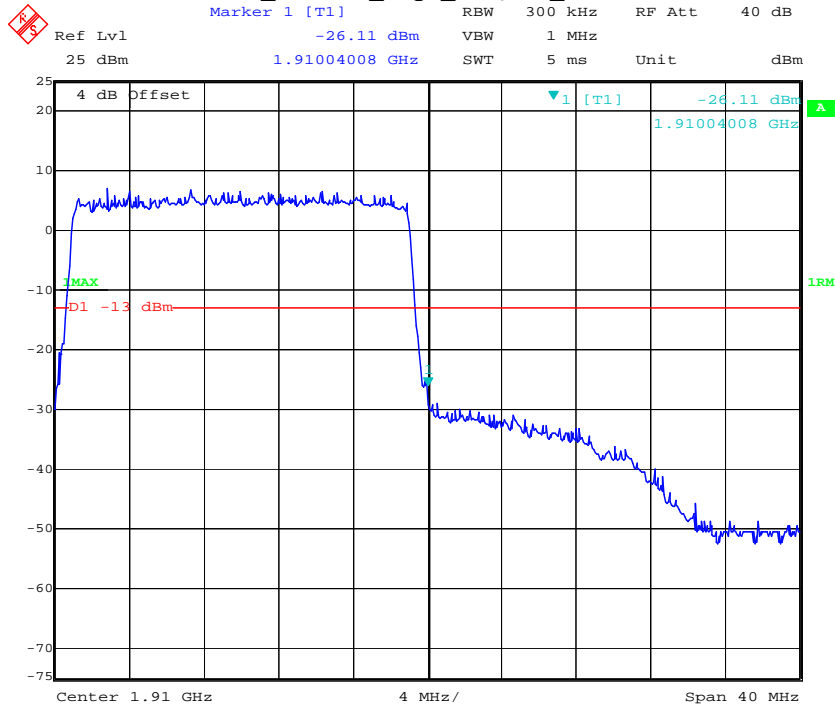
Date: 5.DEC.2019 14:25:57

Band 2\_20 MHz\_High\_QPSK\_RB100#0



Date: 5.DEC.2019 14:26:17

Band 2\_20 MHz\_High\_16QAM\_RB100#0

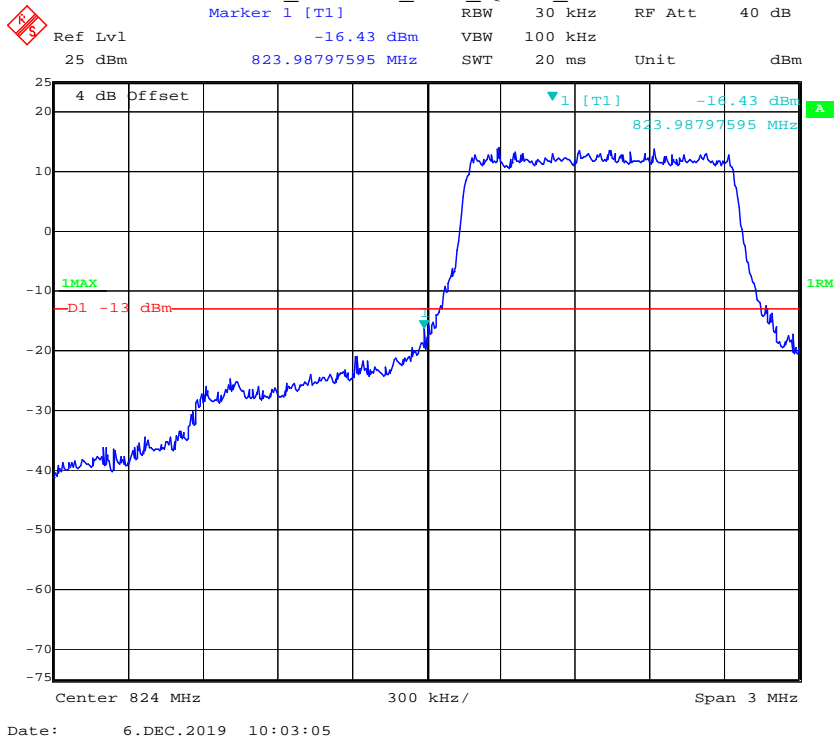


Date: 5.DEC.2019 14:26:36

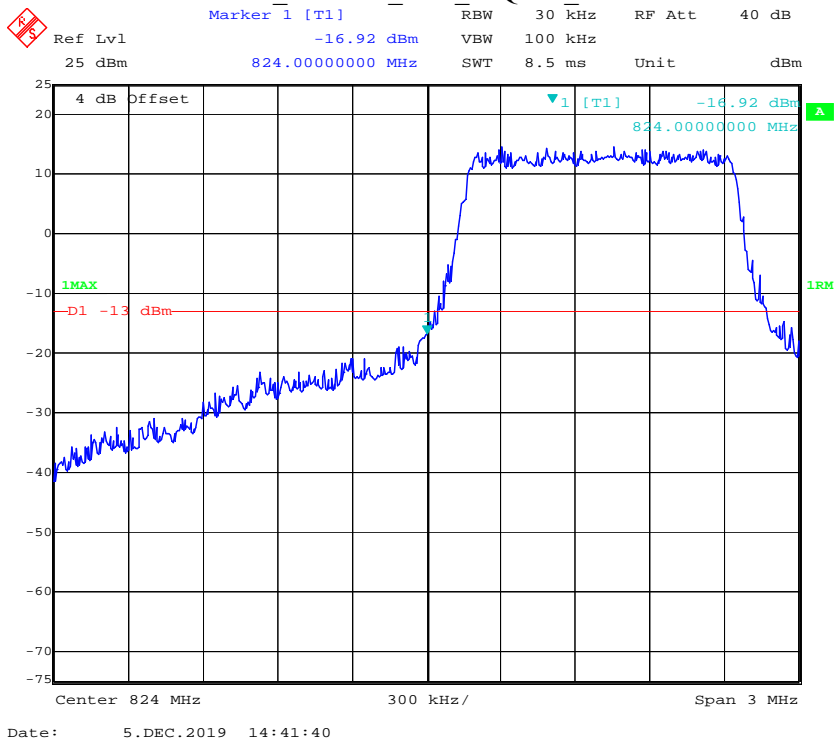


LTE Band 5

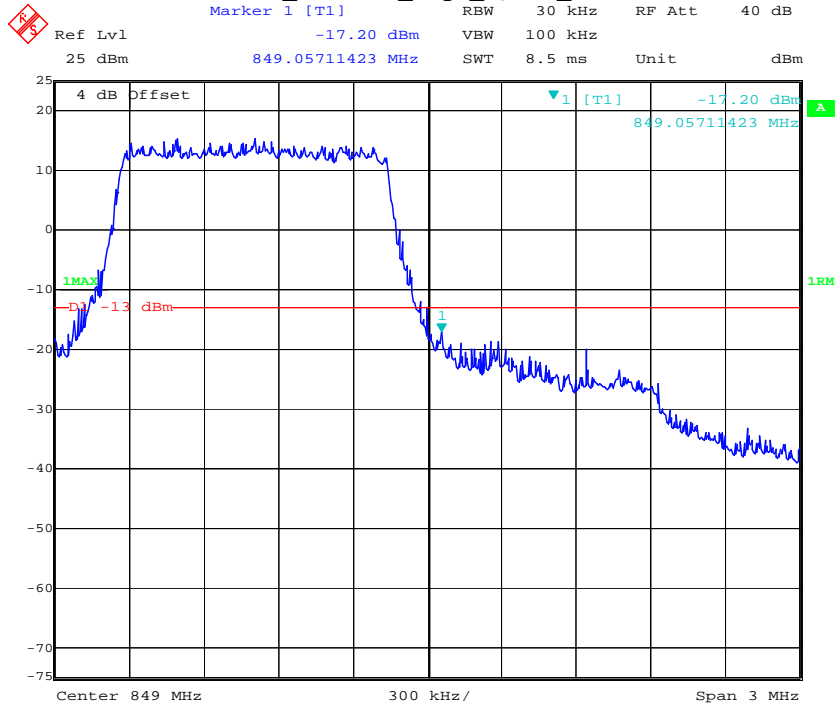
Band 5\_1.4 MHz\_Low\_QPSK\_RB6#0



Band 5\_1.4 MHz\_Low\_16QAM\_RB6#0

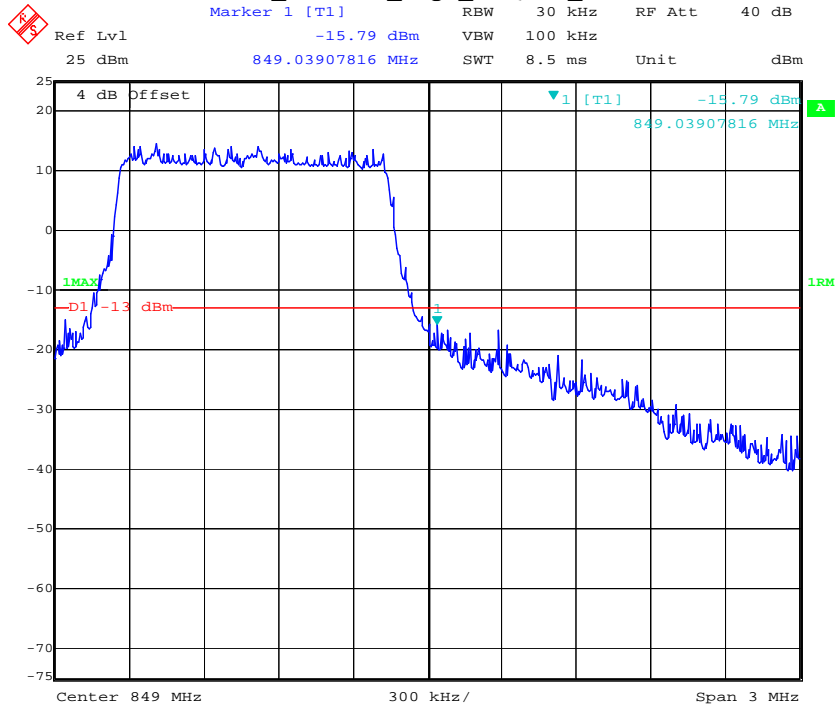


### Band 5\_1.4 MHz\_High\_QPSK\_RB6#0



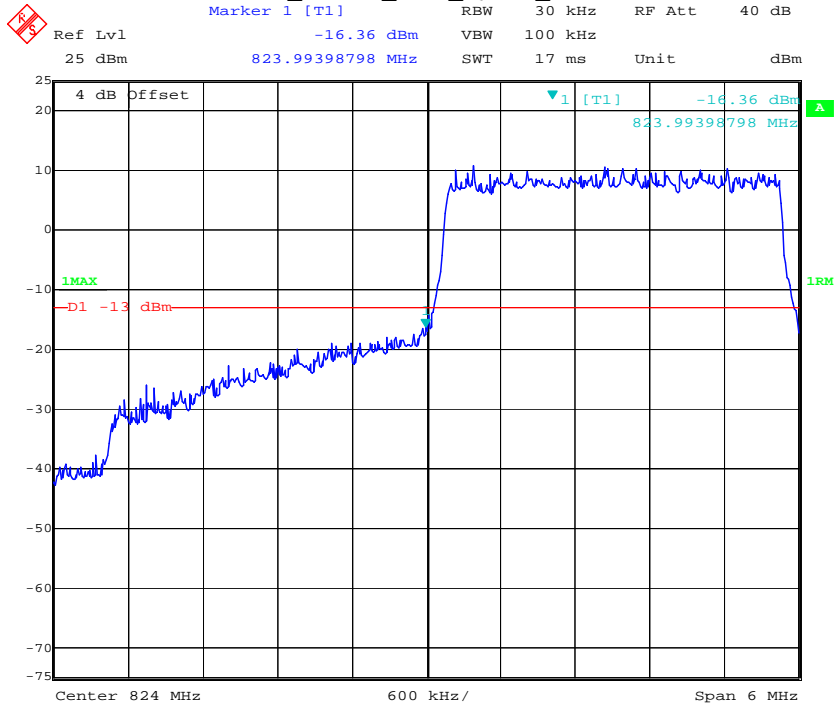
Date: 5.DEC.2019 14:42:00

### Band 5\_1.4 MHz\_High\_16QAM\_RB6#0

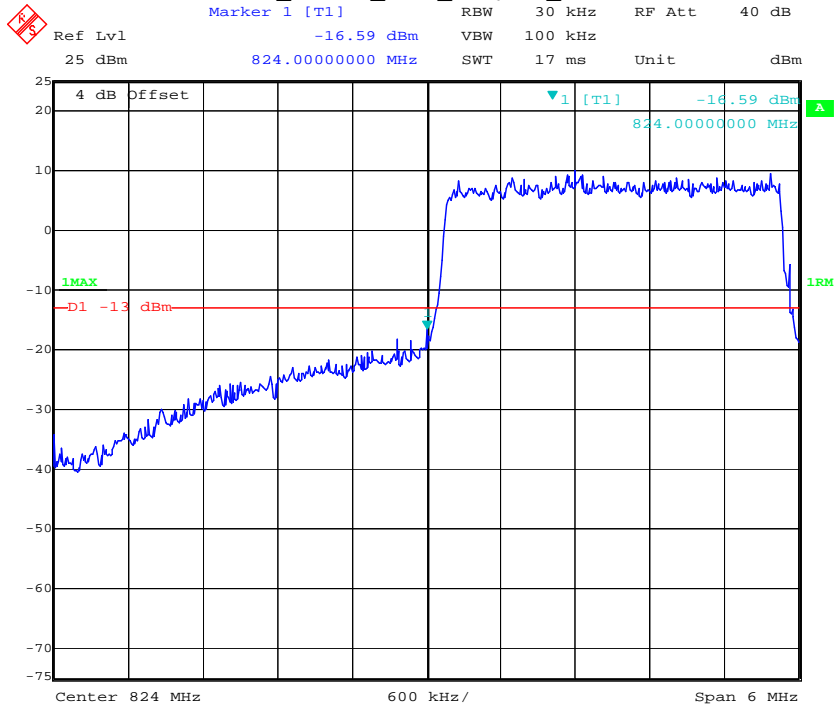


Date: 5.DEC.2019 14:42:16

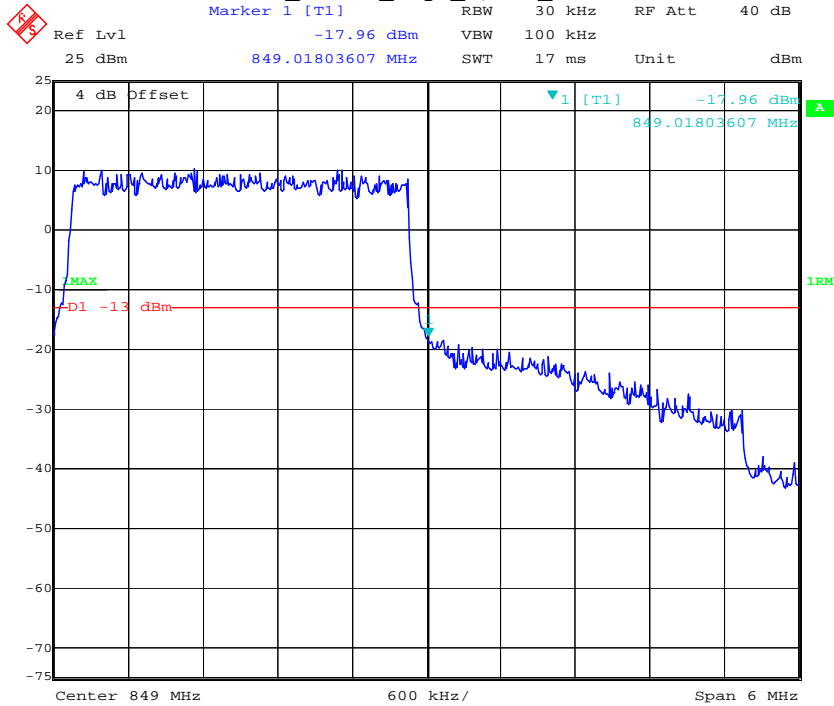
Band 5\_3 MHz\_Low\_QPSK\_RB15#0



Band 5\_3 MHz\_Low\_16QAM\_RB15#0

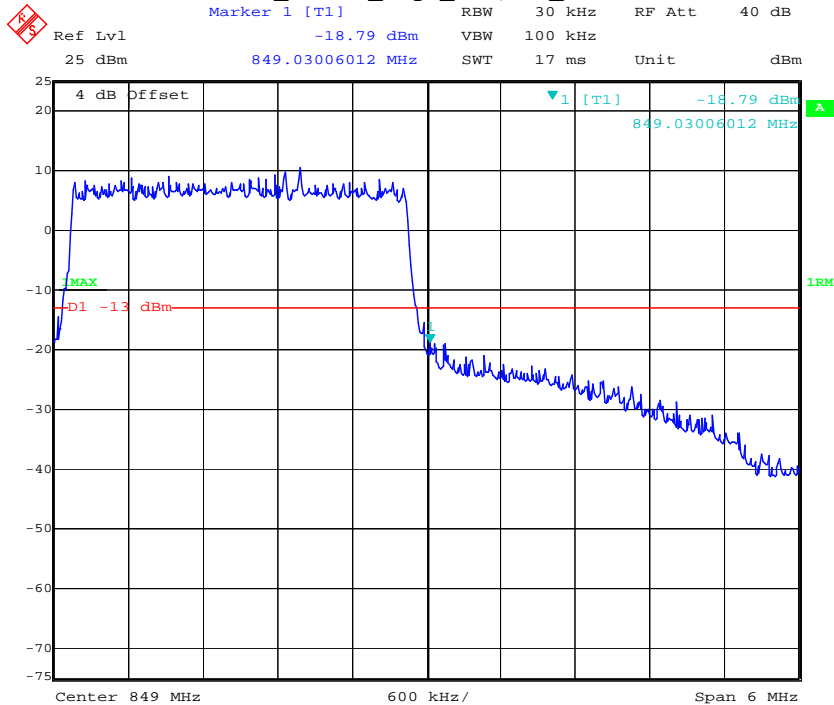


Band 5\_3 MHz\_High\_QPSK\_RB15#0



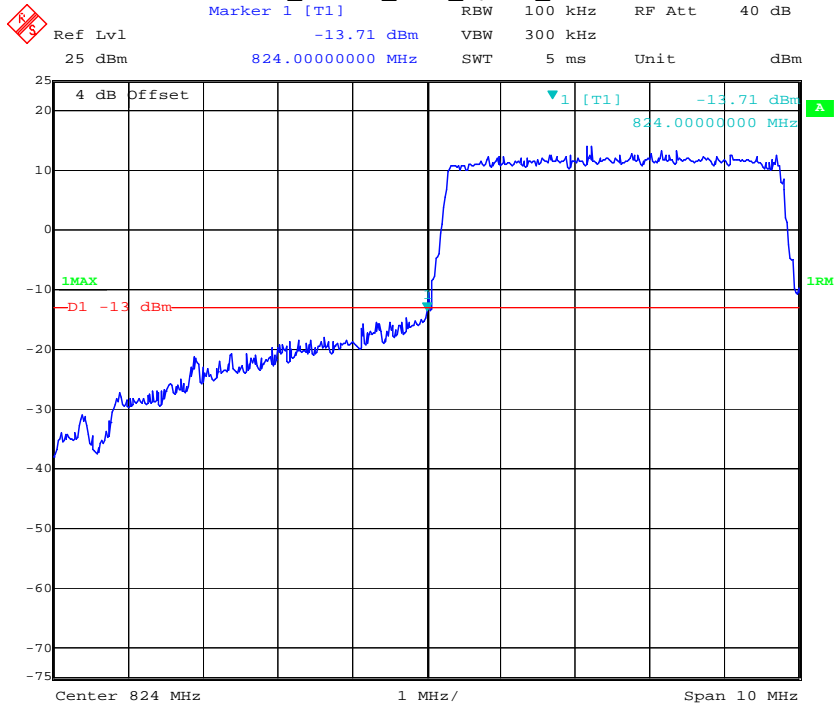
Date: 5.DEC.2019 14:43:25

Band 5\_3 MHz\_High\_16QAM\_RB15#0



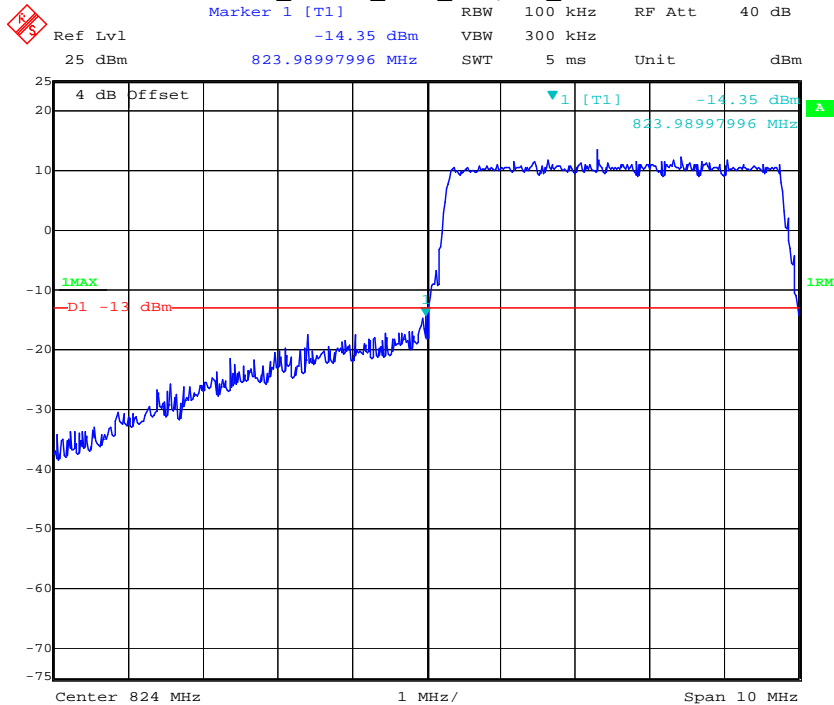
Date: 5.DEC.2019 14:43:41

Band 5\_5 MHz\_Low\_QPSK\_RB25#0



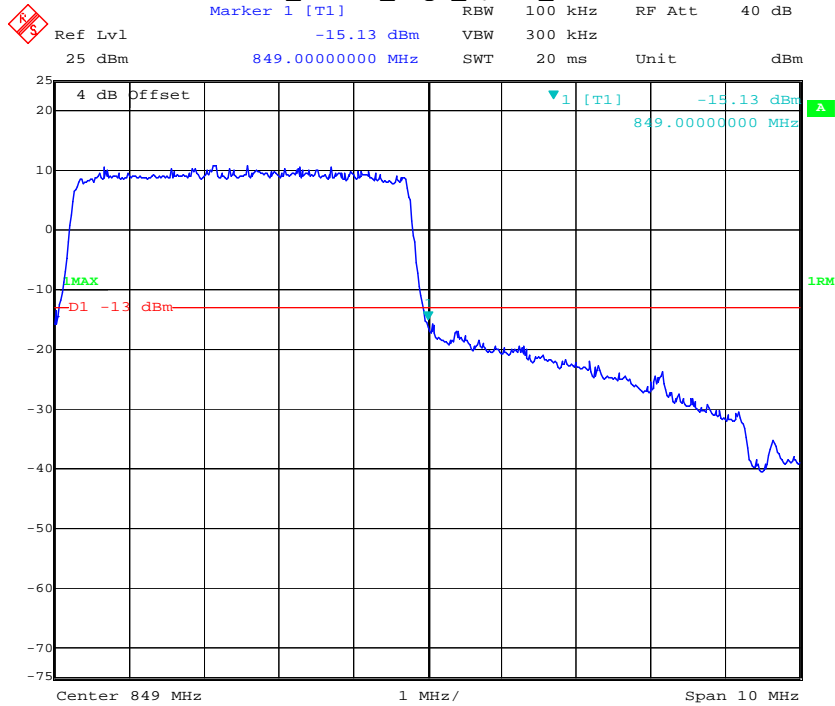
Date: 5.DEC.2019 14:48:49

Band 5\_5 MHz\_Low\_16QAM\_RB25#0



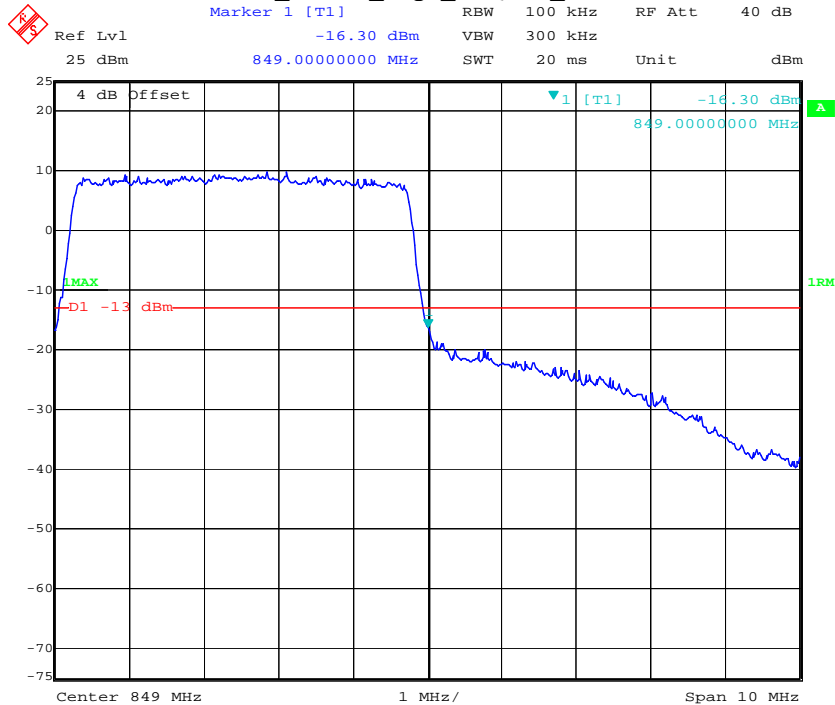
Date: 5.DEC.2019 14:49:05

### Band 5\_5 MHz\_High\_QPSK\_RB25#0



Date: 6.DEC.2019 10:01:08

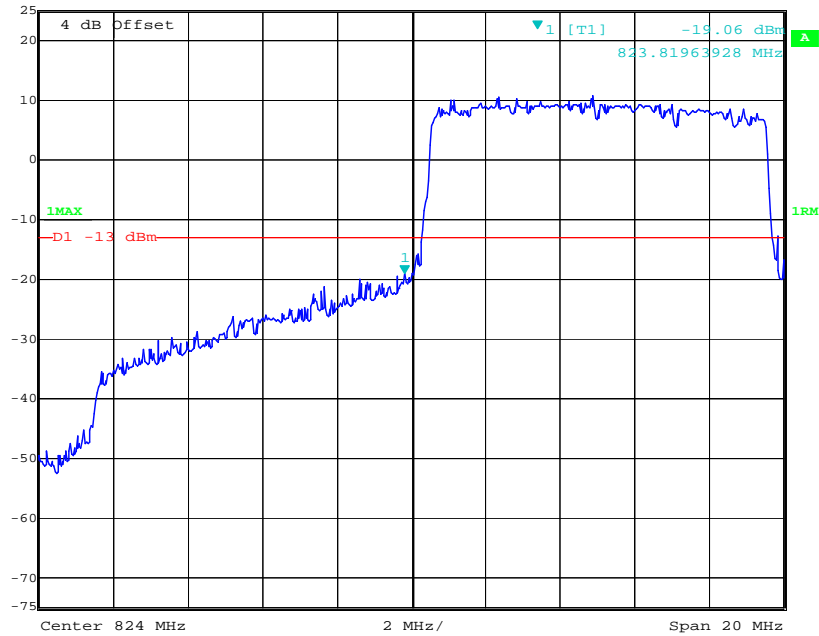
### Band 5\_5 MHz\_High\_16QAM\_RB25#0



Date: 6.DEC.2019 09:59:31

Band 5\_10 MHz\_Low\_QPSK\_RB50#0

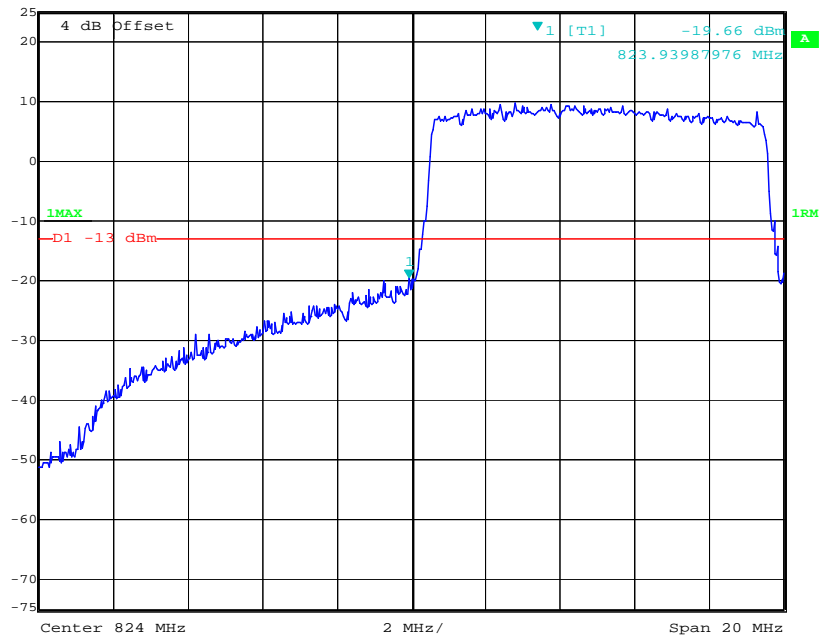
Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -19.06 dBm VBW 300 kHz  
25 dBm 823.81963928 MHz SWT 5 ms Unit dBm



Date: 5.DEC.2019 14:55:17

Band 5\_10 MHz\_Low\_16QAM\_RB50#0

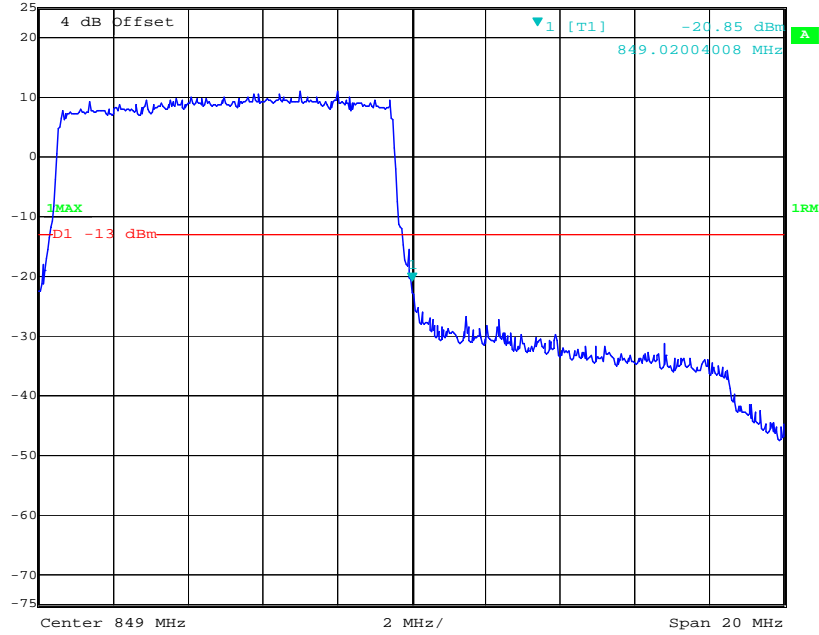
Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -19.66 dBm VBW 300 kHz  
25 dBm 823.93987976 MHz SWT 5 ms Unit dBm



Date: 5.DEC.2019 14:55:37

Band 5\_10 MHz\_High\_QPSK\_RB50#0

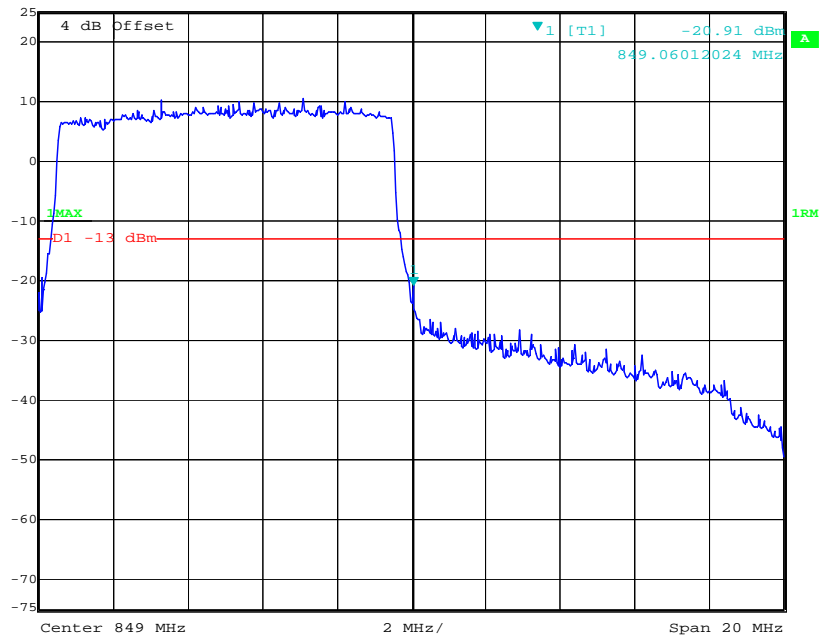
Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -20.85 dBm VBW 300 kHz  
25 dBm 849.02004008 MHz SWT 5 ms Unit dBm



Date: 5.DEC.2019 14:55:59

Band 5\_10 MHz\_High\_16QAM\_RB50#0

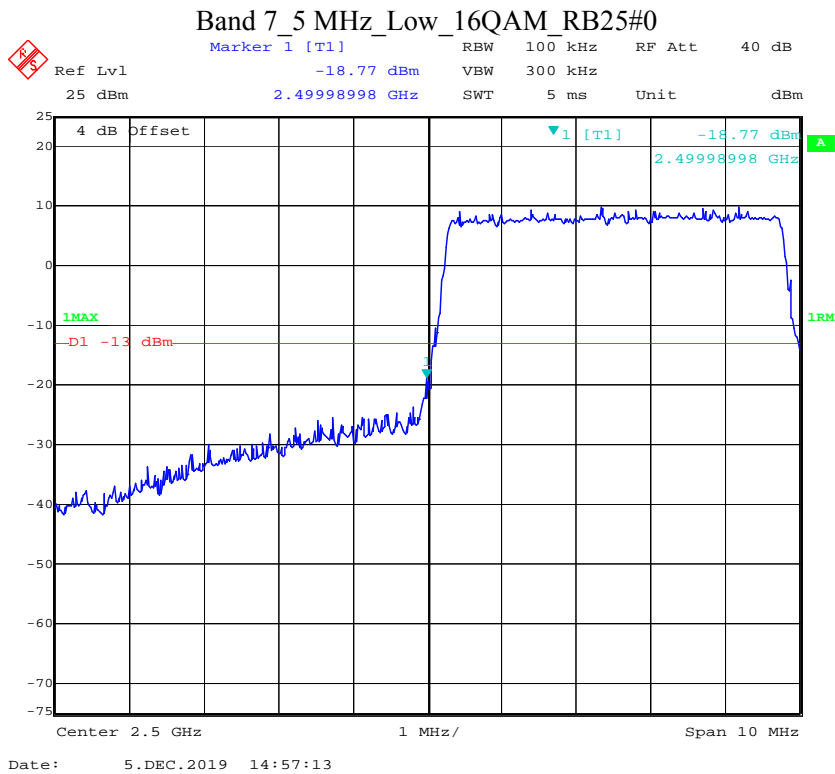
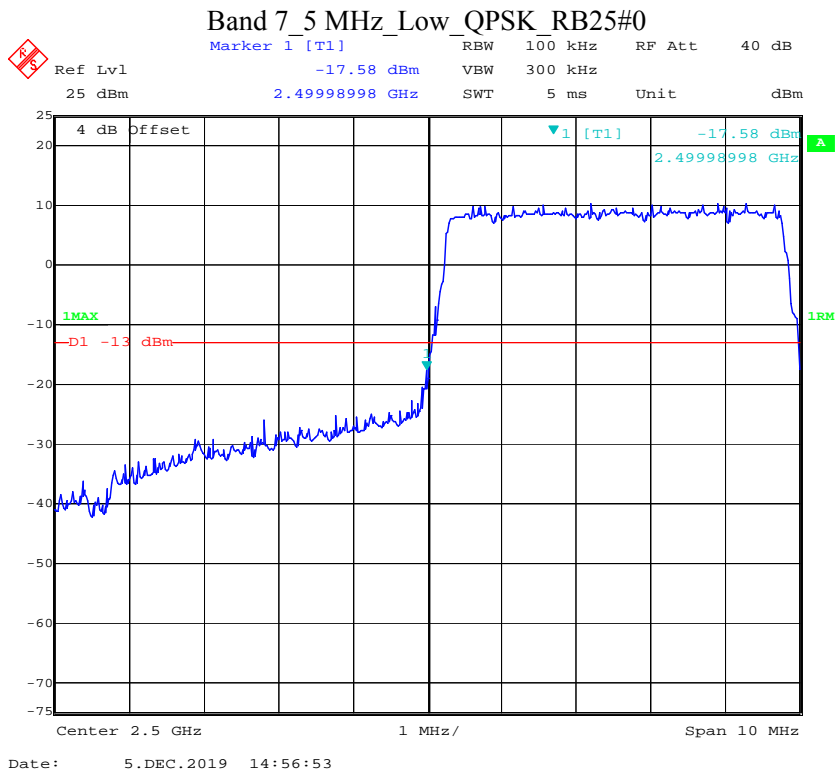
Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -20.91 dBm VBW 300 kHz  
25 dBm 849.06012024 MHz SWT 5 ms Unit dBm



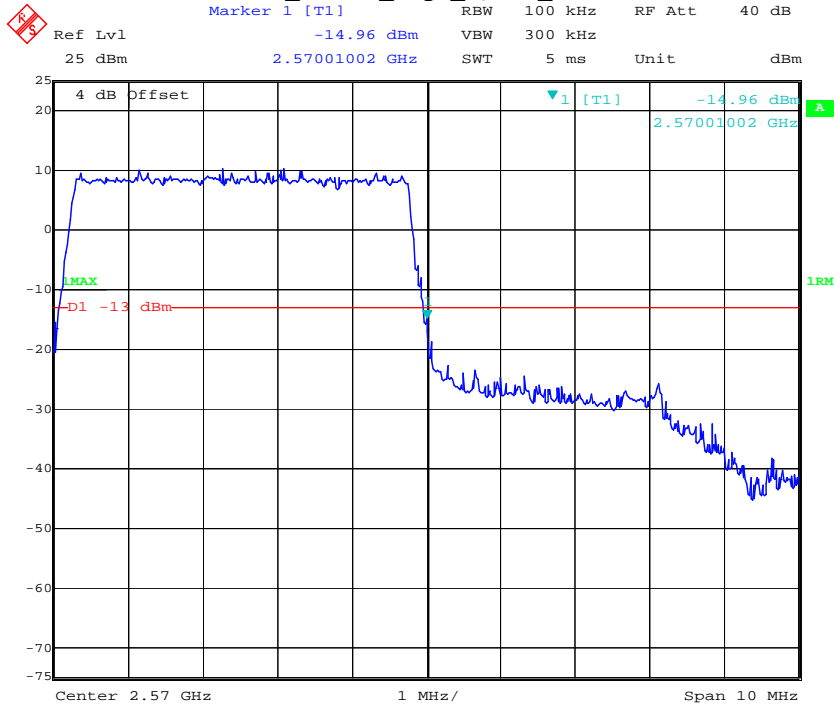
Date: 5.DEC.2019 14:56:19



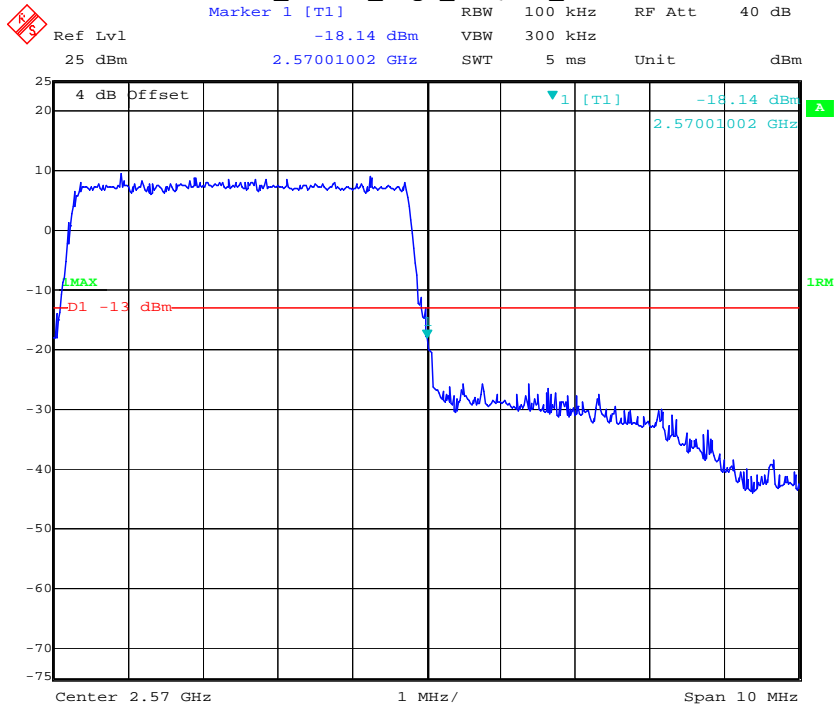
LTE Band 7



### Band 7\_5 MHz\_High\_QPSK\_RB25#0

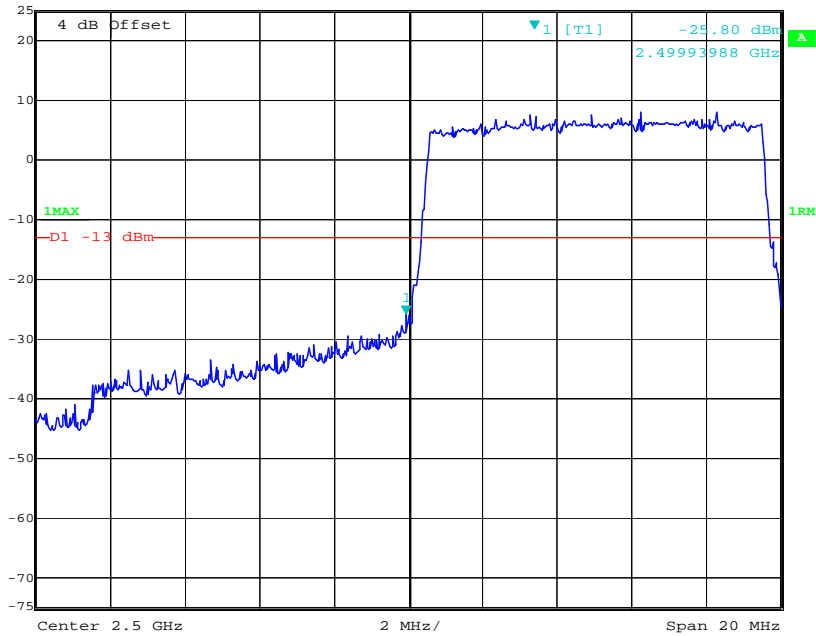


### Band 7\_5 MHz\_High\_16QAM\_RB25#0



### Band 7\_10 MHz\_Low\_QPSK\_RB50#0

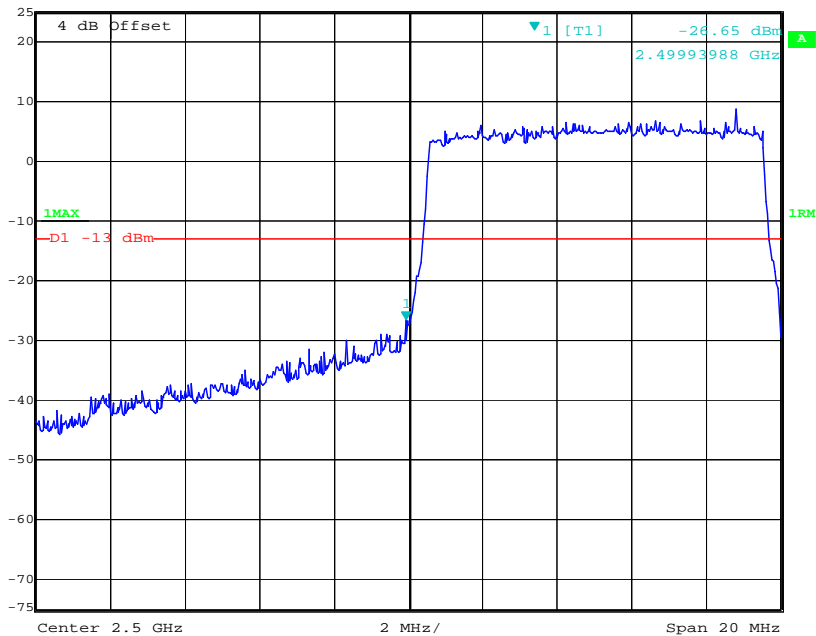
Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -25.80 dBm VBW 300 kHz  
25 dBm 2.49993988 GHz SWT 5 ms Unit dBm



Date: 5.DEC.2019 14:58:26

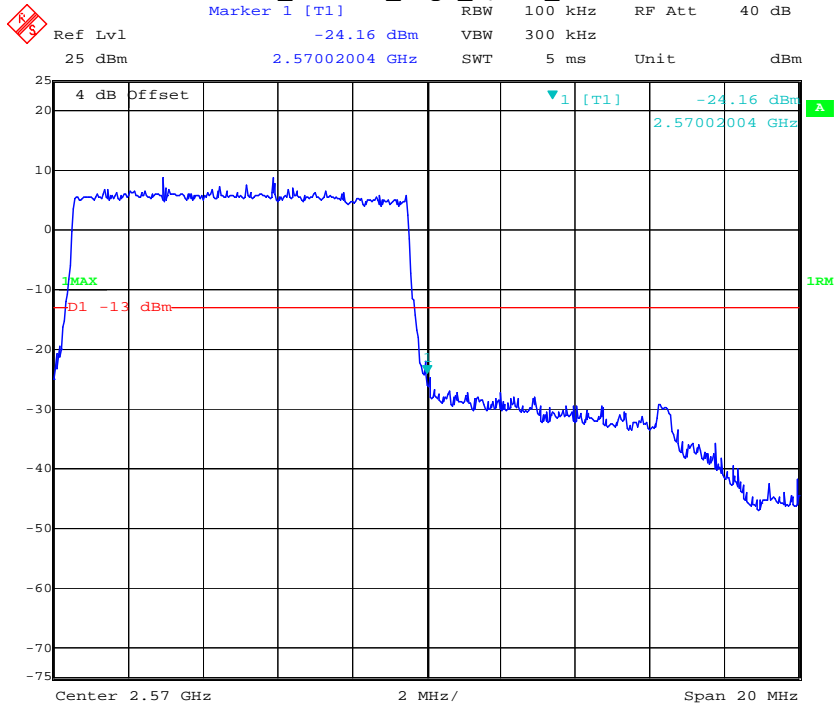
### Band 7\_10 MHz\_Low\_16QAM\_RB50#0

Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl -26.65 dBm VBW 300 kHz  
25 dBm 2.49993988 GHz SWT 5 ms Unit dBm



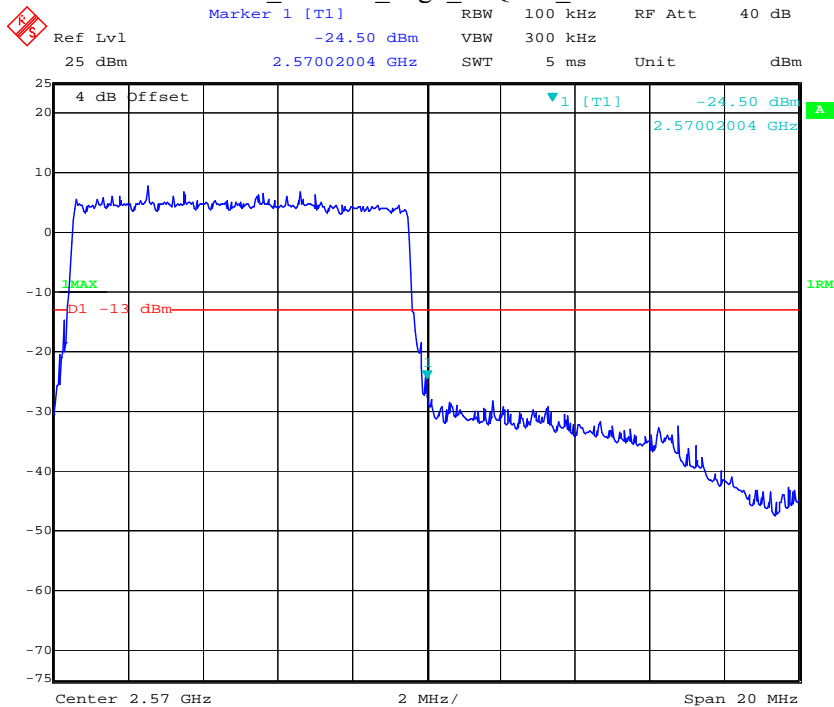
Date: 5.DEC.2019 14:58:47

### Band 7\_10 MHz\_High\_QPSK\_RB50#0



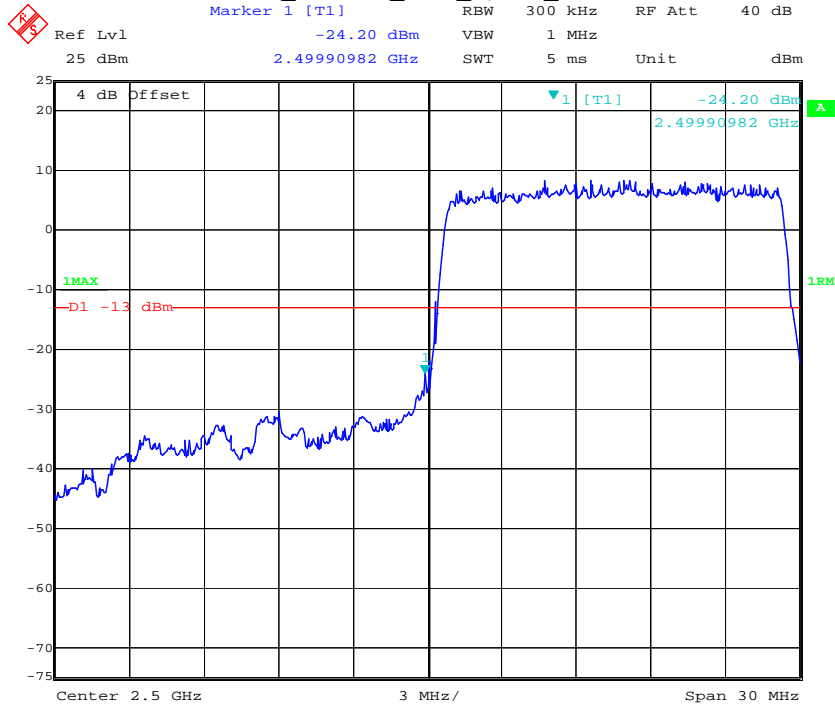
Date: 5.DEC.2019 14:59:09

### Band 7\_10 MHz\_High\_16QAM\_RB50#0



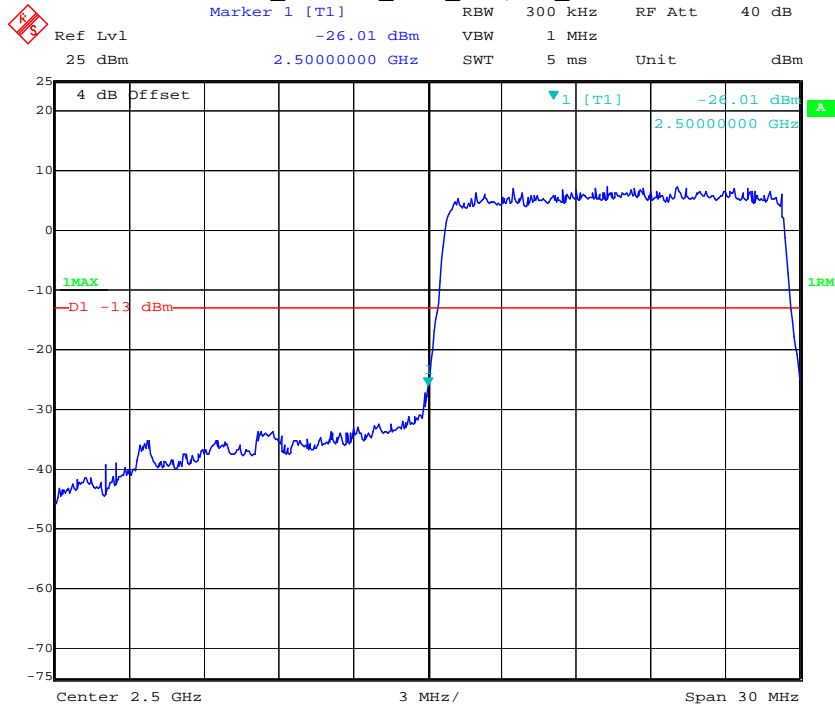
Date: 5.DEC.2019 14:59:26

Band 7\_15 MHz\_Low\_QPSK\_RB75#0



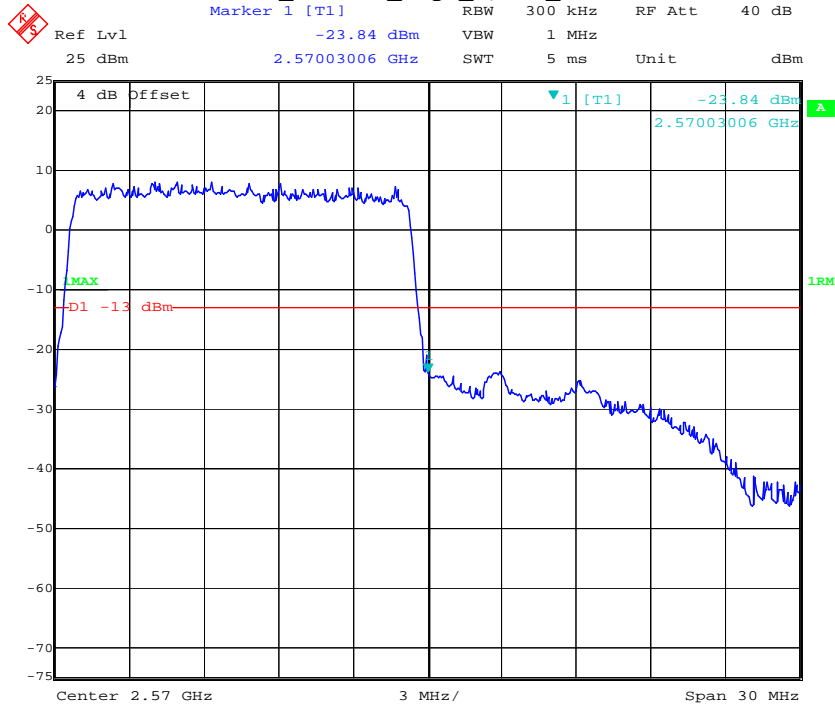
Date: 5.DEC.2019 15:00:01

Band 7\_15 MHz\_Low\_16QAM\_RB75#0



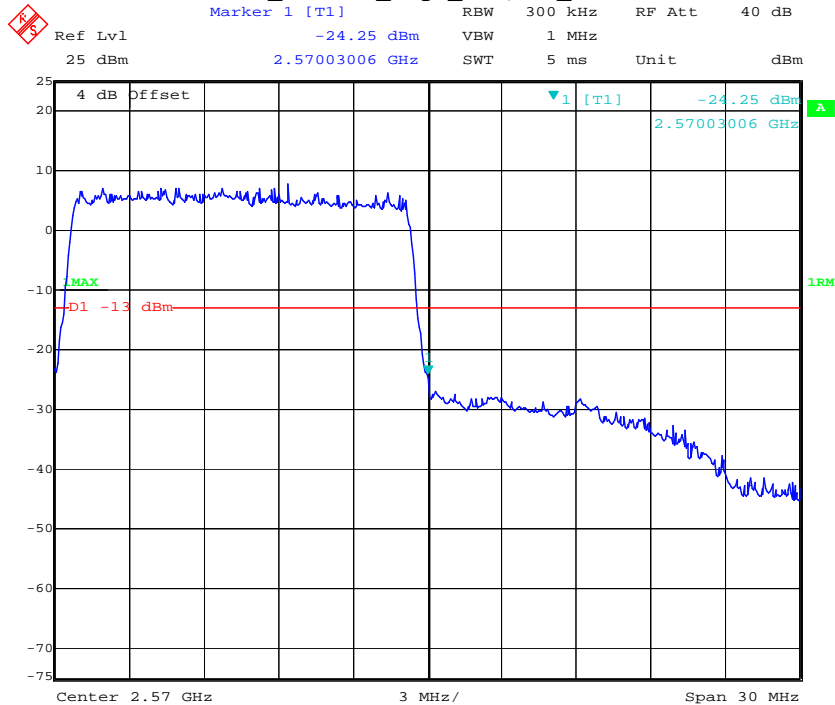
Date: 5.DEC.2019 15:00:23

### Band 7\_15 MHz\_High\_QPSK\_RB75#0



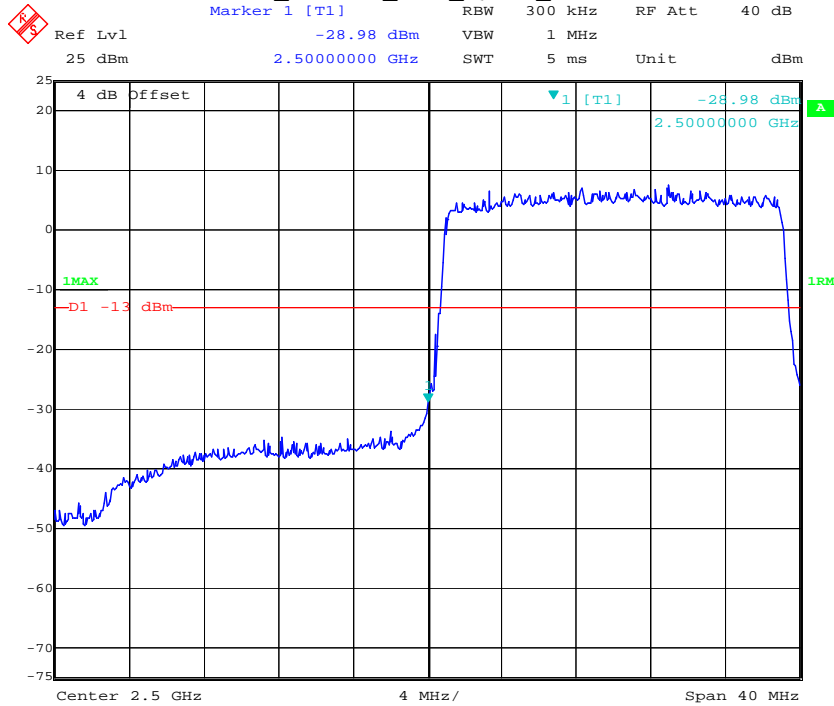
Date: 5.DEC.2019 15:00:44

### Band 7\_15 MHz\_High\_16QAM\_RB75#0



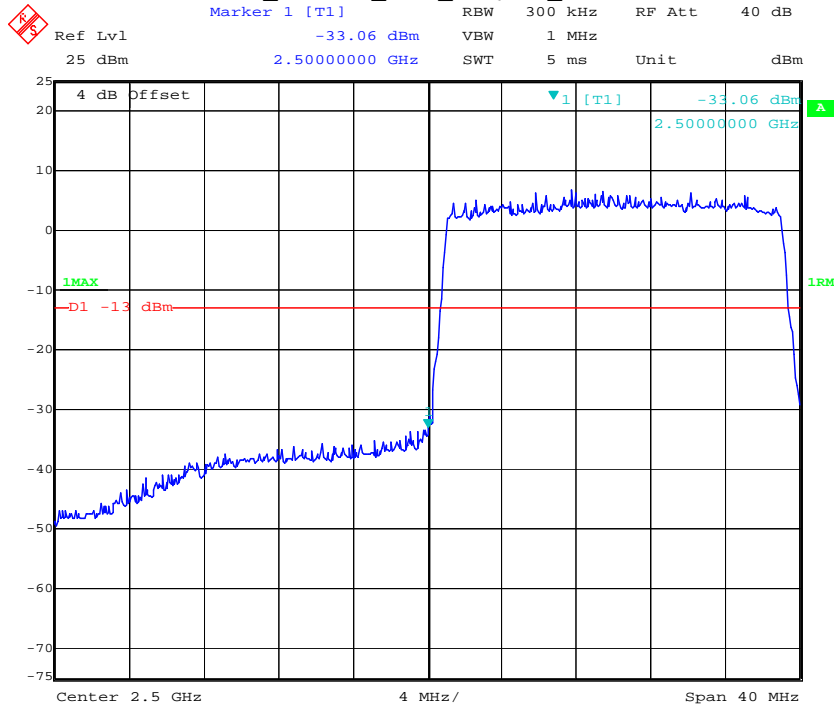
Date: 5.DEC.2019 15:01:03

Band 7\_20 MHz\_Low\_QPSK\_RB100#0



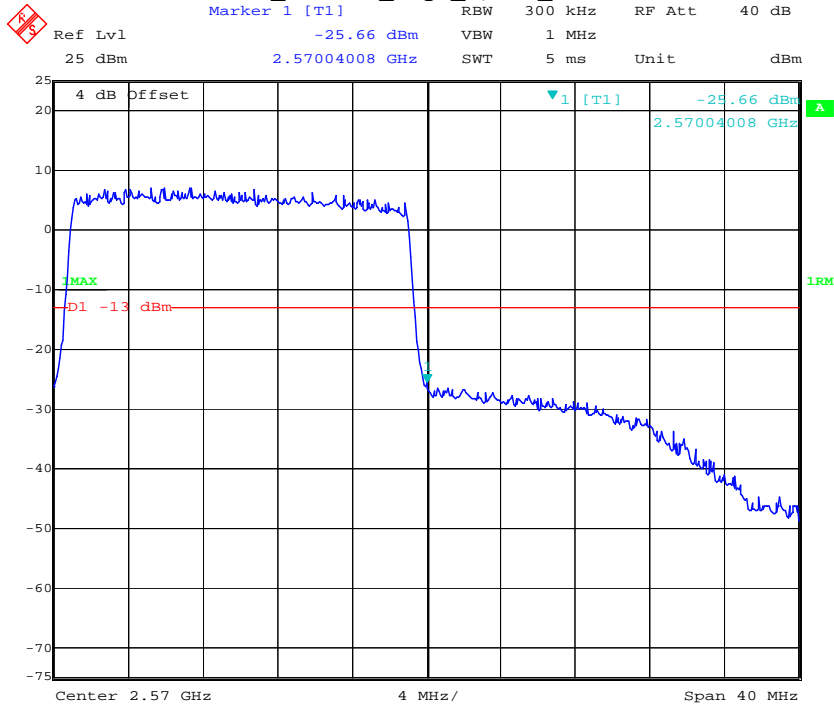
Date: 5.DEC.2019 15:01:36

Band 7\_20 MHz\_Low\_16QAM\_RB100#0



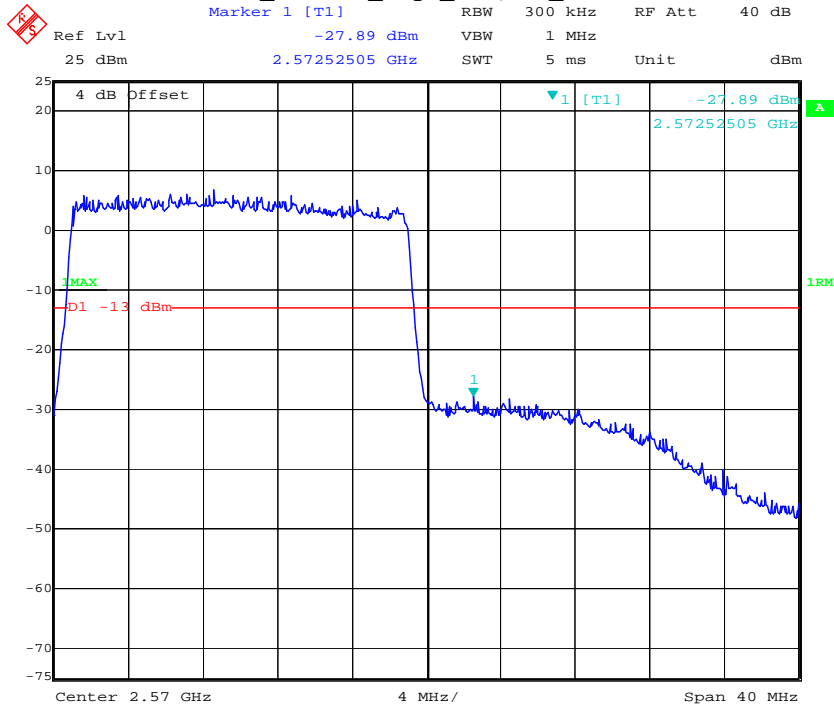
Date: 5.DEC.2019 15:01:55

Band 7\_20 MHz\_High\_QPSK\_RB100#0



Date: 5.DEC.2019 15:02:19

Band 7\_20 MHz\_High\_16QAM\_RB100#0



Date: 5.DEC.2019 15:02:38



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

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**Applicable Standard**

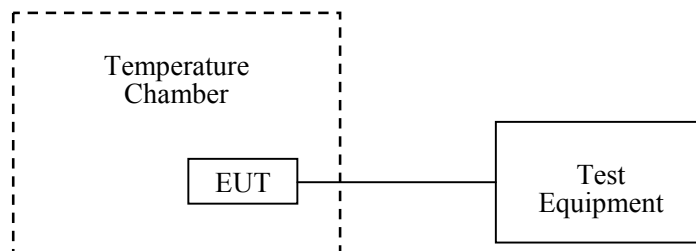
FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235, §27.54

**Test Procedure**

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

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

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



**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2019-09-19	2020-09-19
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2019-09-12	2020-09-12
R&S	Spectrum Analyzer	FSU 26	200256	2019-05-09	2020-05-09
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005011	2018-09-05	2020-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41010013	Each time	N/A
Unknown	Coaxial Cable	C-SJ00-0010	C0010/03	Each time	N/A
E-Microwave	Blocking Control	EMDCB-00036	OE01203218	Each time	N/A
E-Microwave	Coaxial Attenuators	EMCA10-5RN-6	OE01203239	Each time	N/A
R&S	Universal Radio Communication Tester	CMU200	110 822	2019-09-12	2020-09-12
R&S	Wideband Radio Communication Tester	CMW500	149216	2019-09-12	2020-09-12
ESPEC	Constant temperature and humidity Tester	ESX-4CA	018 463	2019-03-26	2020-03-26
UNI-T	Multimeter	UT39A	M130199938	2019-07-24	2020-07-24
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>	24.7 °C
<b>Relative Humidity:</b>	42 %
<b>ATM Pressure:</b>	102.3kPa
<b>Tester:</b>	Black Yang
<b>Test Date:</b>	2019-12-14

*Test Result: Compliance.*

**Cellular Band**

<b>GMSK, Middle Channel, <math>f_c = 836.6</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V <sub>DC</sub>	Hz	ppm	ppm
-30	3.85	15	0.01793	2.5
-20		14	0.01673	
-10		13	0.01554	
0		18	0.02152	
10		12	0.01434	
20		19	0.02271	
30		12	0.01434	
40		14	0.01673	
50		13	0.01554	
20		3.6	10	
20	4.4	8	0.00956	

<b>EGPRS, Middle Channel, <math>f_c = 836.6</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V <sub>DC</sub>	Hz	ppm	ppm
-30	3.85	11	0.01315	2.5
-20		10	0.01195	
-10		14	0.01673	
0		9	0.01076	
10		11	0.01315	
20		15	0.01793	
30		13	0.01554	
40		15	0.01793	
50		14	0.01673	
20		3.6	8	
20	4.4	13	0.01554	

**PCS Band**

<b>GMSK, Middle Channel, <math>f_c = 1880.0</math> MHz</b>				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.85	-5	-0.00266	Pass
-20		-6	-0.00319	
-10		-3	-0.00160	
0		-4	-0.00213	
10		-1	-0.00053	
20		-8	-0.00426	
30		6	0.00319	
40		-7	-0.00372	
50		-1	-0.00053	
20		3.6	-3	
20	4.4	-5	-0.00266	

EGPRS, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
°C	V <sub>DC</sub>	Hz	ppm	
-30	3.85	4	0.00213	Pass
-20		3	0.00160	
-10		2	0.00106	
0		5	0.00266	
10		6	0.00319	
20		8	0.00426	
30		1	0.00053	
40		7	0.00372	
50		6	0.00319	
20		3.6	4	
20	4.4	3	0.00160	

**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	3.85	4	0.00213	Pass
-20		3	0.00160	
-10		5	0.00266	
0		2	0.00106	
10		4	0.00213	
20		6	0.00319	
30		3	0.00160	
40		2	0.00106	
50		5	0.00266	
20		3.6	2	
20	4.4	1	0.00053	

**WCDMA Band V: R99**

Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
°C	V <sub>DC</sub>	Hz	ppm	ppm
-30	3.85	-3	-0.00359	2.5
-20		-2	-0.00239	
-10		-1	-0.00120	
0		-4	-0.00478	
10		-3	-0.00359	
20		-6	-0.00717	
30		-2	-0.00239	
40		-1	-0.00120	
50		-3	-0.00359	
20		3.6	-5	
20	4.4	-4	-0.00478	

**LTE Band 2:**

<b>QPSK, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 1880</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Result</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	
-30	3.85	-9	-0.0048	Pass
-20		-7	-0.0037	
-10		-4	-0.0021	
0		-5	-0.0027	
10		-9	-0.0048	
20		-5	-0.0027	
30		-8	-0.0043	
40		-8	-0.0043	
50		-10	-0.0053	
20		3.6	-6	
20	4.4	-6	-0.0032	

<b>16QAM, Channel Bandwidth:10MHz Middle Channel, <math>f_c = 1880</math> MHz</b>				
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Result</b>
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	
-30	3.85	-5	-0.0027	Pass
-20		-4	-0.0021	
-10		-12	-0.0064	
0		-10	-0.0053	
10		-8	-0.0043	
20		-10	-0.0053	
30		-6	-0.0032	
40		-6	-0.0032	
50		-9	-0.0048	
20		3.6	-4	
20	4.4	-11	-0.0059	

**LTE Band 5**

<b>QPSK, Channel Bandwidth:10MHz</b>					
<b>Middle Channel, <math>f_c = 836.5</math> MHz</b>					
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Limit</b>	
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	<b>ppm</b>	
-30	3.85	16	0.0191	2.5	
-20		11	0.0132		
-10		13	0.0155		
0		8	0.0096		
10		10	0.012		
20		10	0.012		
30		16	0.0191		
40		8	0.0096		
50		10	0.012		
20		3.6	15		0.0179
20		4.4	16		0.0191

<b>16QAM, Channel Bandwidth:10MHz</b>					
<b>Middle Channel, <math>f_c = 836.5</math> MHz</b>					
<b>Temperature</b>	<b>Voltage</b>	<b>Frequency Error</b>	<b>Frequency Error</b>	<b>Limit</b>	
<b>°C</b>	<b>V<sub>DC</sub></b>	<b>Hz</b>	<b>ppm</b>	<b>ppm</b>	
-30	3.85	13	0.0155	2.5	
-20		15	0.0179		
-10		8	0.0096		
0		15	0.0179		
10		8	0.0096		
20		17	0.0203		
30		12	0.0143		
40		8	0.0096		
50		9	0.0108		
20		3.6	9		0.0108
20		4.4	14		0.0167

**LTE Band 7**

<b>QPSK, Channel Bandwidth:10MHz</b>					
<b>Power Supplied</b>	<b>Temperature</b>	<b>F<sub>L</sub></b>	<b>Limit</b>	<b>F<sub>H</sub></b>	<b>Limit</b>
<b>Vdc</b>	<b>°C</b>	<b>MHz</b>	<b>MHz</b>	<b>MHz</b>	<b>MHz</b>
3.85	-30	2500.571297	2500	2569.509401	2570
	-20	2500.571568		2569.509235	
	-10	2500.571447		2569.509366	
	0	2500.570740		2569.508917	
	10	2500.571279		2569.509143	
	20	2500.571140		2569.509020	
	30	2500.571415		2569.508684	
	40	2500.571210		2569.508601	
	50	2500.571633		2569.508966	
3.6	20	2500.570997		2569.509150	
4.4	20	2500.570980		2569.508966	

<b>16QAM, Channel Bandwidth:10MHz</b>					
<b>Power Supplied</b>	<b>Temperature</b>	<b>F<sub>L</sub></b>	<b>Limit</b>	<b>F<sub>H</sub></b>	<b>Limit</b>
<b>Vdc</b>	<b>°C</b>	<b>MHz</b>	<b>MHz</b>	<b>MHz</b>	<b>MHz</b>
3.85	-30	2500.571454	2500	2569.508869	2570
	-20	2500.571109		2569.509032	
	-10	2500.571381		2569.508769	
	0	2500.570716		2569.508940	
	10	2500.571084		2569.508925	
	20	2500.571140		2569.509020	
	30	2500.571309		2569.508804	
	40	2500.571290		2569.509026	
	50	2500.571316		2569.509172	
3.6	20	2500.570712		2569.509321	
4.4	20	2500.571168		2569.508562	

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