



RF TEST REPORT

Report No.: SET2015-09617

Product: 4G LTE Smart Phone

FCC ID: 2AB8PM5023

Model No.: N501

Applicant: Maysun Info Technology Co., Ltd

Address: 10th floor,B10 Building,Lilang Industrial Zone,Buji Town,Longgang District,Shenzhen

Dates of Testing: 06/26/2015 — 07/12/2015

Issued by: CCIC-SET

Lab Location: Building 28/29, Shigudong, Xili Industrial Area, Xili Street, Nanshan District, Shenzhen, Guangdong,China

Tel: 86 755 26627338 **Fax:** 86 755 26627238

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Test Report

Product..... : 4G LTE Smart Phone

Brand Name : NOBLEX

Trade Name..... : NOBLEX

Applicant..... : Maysun Info Technology Co., Ltd

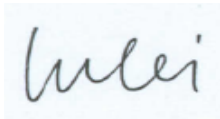
Applicant Address..... : 10th floor,B10 Building,Lilang Industrial Zone,Buji Town,
Longgang District,Shenzhen

Manufacturer..... : Maysun Info Technology Co., Ltd

Manufacturer Address : 10th floor,B10 Building,Lilang Industrial Zone,Buji Town,
Longgang District,Shenzhen

Test Standards..... : 47 CFR Part 2 Frequency Allocations and Radio Treaty
Matters; General Rules and Regulations
47 CFR Part 27(H) 27(L)Miscellaneous wireless
communications services

Test Result : PASS

Tested by : 
2015.07.12
Lu Lei, Test Engineer

Reviewed by : 
2015.07.12
Zhu Qi, Senior Engineer

Approved by..... : 
2015.07.12
Wu Li'an, Manager



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Change History		
Issue	Date	Reason for change
1.0	2015-07-12	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	4G LTE Smart Phone
Hardware Version	B501 MB P2
Software Version	ALPS.L1.MP3.V2_GIONEE6735.65C.L1_P15
EUT supports Radios application	GSM/GPRS/WCDMA/HSPA/LTE WLAN2.4GHz 802.11b/g/n (HT20/HT40) Bluetooth V3.0+EDR / Bluetooth V4.0LE
Frequency Range	LTE Band 4 Tx: 1710.7MHz ~ 1754.3MHz Rx: 2110.7MHz ~ 2154.3MHz LTE Band 17 Tx: 706.5MHz ~ 713.5MHz; Rx: 736.5MHz ~ 743.5MHz
Maximum Output Power to Antenna	LTE Band 4: 23.71dBm LTE Band 17: 23.57dBm
Bandwidth	LTE Band 4: 1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz LTE Band17: 5MHz/10MHz
Modulation Type	QPSK/16QAM
Antenna Type	PIFA Antenna

**1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission****Designator**

FCC Rule	System	Type of Modulation	BW (MHz)	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)
Part 27	LTE Band 4	QPSK	1.4	1M10G7D	0.04	0.194
Part 27	LTE Band 4	16QAM	1.4	1M10W7D		0.148
Part 27	LTE Band 4	QPSK	3	2M74G7D		0.188
Part 27	LTE Band 4	16QAM	3	2M75W7D		0.149
Part 27	LTE Band 4	QPSK	5	4M56G7D		0.190
Part 27	LTE Band 4	16QAM	5	4M56W7D		0.150
Part 27	LTE Band 4	QPSK	10	9M12G7D		0.187
Part 27	LTE Band 4	16QAM	10	9M12W7D		0.153
Part 27	LTE Band 4	QPSK	15	13M6G7D		0.188
Part 27	LTE Band 4	16QAM	15	13M5W7D		0.153
Part 27	LTE Band 4	QPSK	20	18M6G7D		0.189
Part 27	LTE Band 4	16QAM	20	18M6W7D		0.155
Part 27	LTE Band 17	QPSK	5	4M56G7D	0.06	0.084
Part 27	LTE Band 17	16QAM	5	4M56W7D		0.060
Part 27	LTE Band 17	QPSK	10	9M04G7D		0.084
Part 27	LTE Band 17	16QAM	10	9M04W7D		0.062

1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part27 for the EUT FCC ID Certification:

1. 47 CFR Part 2, 27(H) 27(L)
2. ANSI/TIA/EIA-603-D-2010
3. FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Limit	Result
1	2.1046	Conducted RF Output Power	Reporting Only	PASS
2	27.50(d)	Peak to Average Ratio	<13dB	PASS
3	27.50(c)	Effective Radiated Power(Band 17)	ERP<3Watt	PASS
	27.50(d)	Effective Radiated Power(Band 4)	EIRP<1Watt	PASS
4	2.1049 27.53	Occupied Bandwidth	Reporting Only	PASS
5	2.1051 27.53	Band Edge	<43+10log10(P[watt])	PASS
6	2.1051 27.53	Conducted Spurious Emission	<43+10log10(P[watt])	PASS
7	2.1053 27.53	Radiated Spurious Emission	<43+10log10(P[watt])	PASS
8	2.1055 27.54	Frequency Stability	<2.5ppm	PASS

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



1.4 Test Configuration of Equipment Under Test

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth(MHz)						Modulation		RB#			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	17			✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
Peak-to-Average Ratio	4	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	17			✓	✓				✓	✓		✓	✓	✓	✓
26dB and 99% Bandwidth	4	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	
	17			✓	✓			✓	✓			✓		✓	
Conducted Band Edge	4	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
	17			✓	✓			✓	✓	✓		✓	✓		✓
Conducted Spurious Emission	4	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
	17			✓	✓			✓	✓	✓			✓	✓	✓
Frequency Stability	4	✓	✓	✓	✓	✓	✓	✓				✓		✓	
	17			✓	✓			✓				✓		✓	
ERP/EIRP	4	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
	17			✓	✓			✓	✓	✓			✓	✓	✓
Radiated Spurious Emission	4	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓
	17			✓	✓			✓		✓			✓	✓	✓
Note	1. The mark “✓” means that this configuration is chosen for testing. 2. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 3. For E.R.P/E.I.R.P. measurement, the widest bandwidth and the bandwidth with the highest conducted power of each band is chosen for testing. Besides, the lowest bandwidth of each band is also measured for reporting only.														

1.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 7.5dB and 10dB attenuator.

Example:

$$\begin{aligned}\text{Offset (dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 7 + 10 = 17 \text{ (dB)}\end{aligned}$$

1.6 Facilities and Accreditations

1.6.1 Test Facilities

CNAS-Lab Code: L1659

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8*6.8*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

IC-Registration No.: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

1.6.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15°C - 35°C
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa

2. 47 CFR PART 2, PART 27H REQUIREMENTS

2.1 Conducted RF Output Power

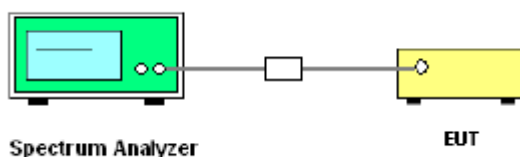
2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.1.3 Test Setup



2.1.4 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.



2.1.5 Test Results of Conducted Output Power

1. LTE Band 4 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20050	20175	20300
Frequency(MHz)				1720	1732.5	1745
20	QPSK	1	0	23.71	23.68	23.65
20	QPSK	1	49	23.64	23.59	23.57
20	QPSK	1	99	23.51	23.57	23.59
20	QPSK	50	0	22.86	22.77	22.83
20	QPSK	50	24	22.74	22.71	22.79
20	QPSK	50	49	22.78	22.75	22.80
20	QPSK	100	0	22.61	22.55	22.64
20	16QAM	1	0	22.28	22.33	22.31
20	16QAM	1	49	22.37	22.30	22.35
20	16QAM	1	99	22.29	22.34	22.27
20	16QAM	50	0	21.87	21.79	21.75
20	16QAM	50	24	21.69	21.61	21.72
20	16QAM	50	49	21.71	21.77	21.69
20	16QAM	100	0	21.57	21.64	21.61
Channel				20025	20175	20325
Frequency(MHz)				1717.5	1732.5	1747.5
15	QPSK	1	0	23.66	23.64	23.59
15	QPSK	1	37	23.48	23.51	23.54
15	QPSK	1	74	23.41	23.45	23.51
15	QPSK	36	0	22.82	22.91	22.92
15	QPSK	36	18	22.82	22.84	22.75
15	QPSK	36	37	22.82	22.88	22.83
15	QPSK	75	0	22.71	22.75	22.67
15	16QAM	1	0	22.46	22.39	22.38
15	16QAM	1	37	22.18	22.21	22.27
15	16QAM	1	74	22.14	22.21	22.18
15	16QAM	36	0	21.70	21.73	21.64
15	16QAM	36	18	21.69	21.73	21.67
15	16QAM	36	37	21.72	21.78	21.83
15	16QAM	75	0	21.68	21.71	21.77



BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				20000	20175	20350
Frequency(MHz)				1715	1732.5	1750
10	QPSK	1	0	23.67	23.58	23.62
10	QPSK	1	24	23.49	23.52	23.48
10	QPSK	1	49	23.35	23.39	23.40
10	QPSK	25	0	22.74	22.71	22.80
10	QPSK	25	12	22.82	22.69	22.75
10	QPSK	25	24	22.71	22.83	22.77
10	QPSK	50	0	22.76	22.82	22.71
10	16QAM	1	0	22.47	22.45	22.41
10	16QAM	1	24	22.41	22.38	22.35
10	16QAM	1	49	22.38	22.41	22.29
10	16QAM	25	0	21.89	21.93	21.92
10	16QAM	25	12	21.81	21.85	21.76
10	16QAM	25	24	21.72	21.81	21.74
10	16QAM	50	0	21.78	21.74	21.75
Channel				19975	20175	20375
Frequency(MHz)				1712.5	1732.5	1752.5
5	QPSK	1	0	23.57	23.55	23.52
5	QPSK	1	12	23.45	23.48	23.42
5	QPSK	1	24	23.45	23.43	23.48
5	QPSK	12	0	22.79	22.77	22.82
5	QPSK	12	6	22.71	22.80	22.78
5	QPSK	12	11	22.77	22.73	22.77
5	QPSK	25	0	22.65	22.72	22.68
5	16QAM	1	0	22.47	22.39	22.40
5	16QAM	1	12	22.31	22.27	22.29
5	16QAM	1	24	22.29	22.31	22.25
5	16QAM	12	0	21.81	21.78	21.86
5	16QAM	12	6	21.76	21.72	21.69
5	16QAM	12	11	21.64	21.75	21.72
5	16QAM	25	0	21.63	21.59	21.60



BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				19965	20175	20385
Frequency(MHz)				1711.5	1732.5	1753.5
3	QPSK	1	0	23.56	23.52	23.55
3	QPSK	1	7	23.53	23.60	23.54
3	QPSK	1	14	23.52	23.56	23.58
3	QPSK	8	0	22.70	22.65	22.72
3	QPSK	8	4	22.65	22.72	22.68
3	QPSK	8	7	22.69	22.74	22.75
3	QPSK	15	0	22.67	22.70	22.68
3	16QAM	1	0	22.38	22.45	22.44
3	16QAM	1	7	22.41	22.48	22.43
3	16QAM	1	14	22.38	22.30	22.36
3	16QAM	8	0	21.68	21.70	21.75
3	16QAM	8	4	21.64	21.61	21.65
3	16QAM	8	7	21.69	21.72	21.65
3	16QAM	15	0	21.52	21.56	21.51
Channel				19957	20175	20393
Frequency(MHz)				1710.7	1732.5	1754.3
1.4	QPSK	1	0	23.55	23.54	23.49
1.4	QPSK	1	2	23.59	23.52	23.51
1.4	QPSK	1	5	23.42	23.47	23.45
1.4	QPSK	3	0	22.78	22.67	22.72
1.4	QPSK	3	1	22.67	22.77	22.72
1.4	QPSK	3	2	22.56	22.67	22.71
1.4	QPSK	6	0	22.57	22.46	22.53
1.4	16QAM	1	0	22.72	22.77	22.61
1.4	16QAM	1	2	22.63	22.74	22.71
1.4	16QAM	1	5	22.85	22.91	22.94
1.4	16QAM	3	0	22.79	22.74	22.85
1.4	16QAM	3	1	22.32	22.35	22.41
1.4	16QAM	3	2	22.50	22.55	22.47
1.4	16QAM	6	0	22.49	22.55	22.56



2. LTE Band 17 Conducted Power Test Verdict:

BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				23780	23790	23800
Frequency(MHz)				709	710	711
10	QPSK	1	0	23.50	23.48	23.51
10	QPSK	1	24	23.49	23.40	23.45
10	QPSK	1	49	23.53	23.57	23.54
10	QPSK	25	0	22.71	22.76	22.72
10	QPSK	25	12	22.67	22.61	22.64
10	QPSK	25	24	22.61	22.65	22.62
10	QPSK	50	0	22.70	22.69	22.67
10	16QAM	1	0	22.35	22.30	22.27
10	16QAM	1	24	22.22	22.11	22.13
10	16QAM	1	49	22.08	22.11	22.05
10	16QAM	25	0	21.41	21.46	21.48
10	16QAM	25	12	21.64	21.75	21.61
10	16QAM	25	24	21.51	21.54	21.56
10	16QAM	50	0	21.53	21.46	21.51
Channel				23755	23790	23825
Frequency(MHz)				706.5	710	713.5
5	QPSK	1	0	23.42	23.54	23.47
5	QPSK	1	12	23.29	23.33	23.36
5	QPSK	1	24	23.28	23.20	23.31
5	QPSK	12	0	22.60	22.63	22.67
5	QPSK	12	6	22.56	22.52	22.50
5	QPSK	12	11	22.56	22.51	22.59
5	QPSK	25	0	22.56	22.53	22.52
5	16QAM	1	0	22.54	22.49	22.44
5	16QAM	1	12	22.25	22.18	22.26
5	16QAM	1	24	22.33	22.42	22.37
5	16QAM	12	0	21.40	21.45	21.48
5	16QAM	12	6	21.62	21.55	21.49
5	16QAM	12	11	21.51	21.54	21.48
5	16QAM	25	0	21.41	21.40	21.44

2.2 Peak to Average Ratio

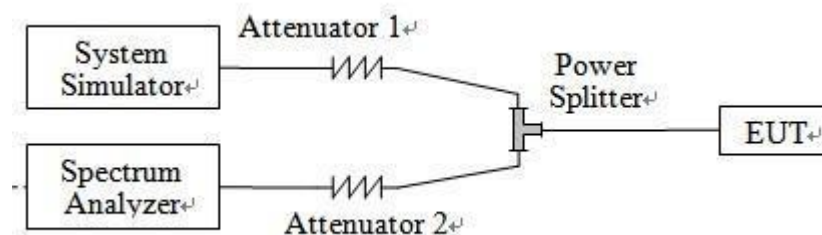
2.2.1 Definition

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. 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.

2.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.2.3 Test Setup



2.2.4 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

2.2.5 Test Results of Peak-to-Average Ratio

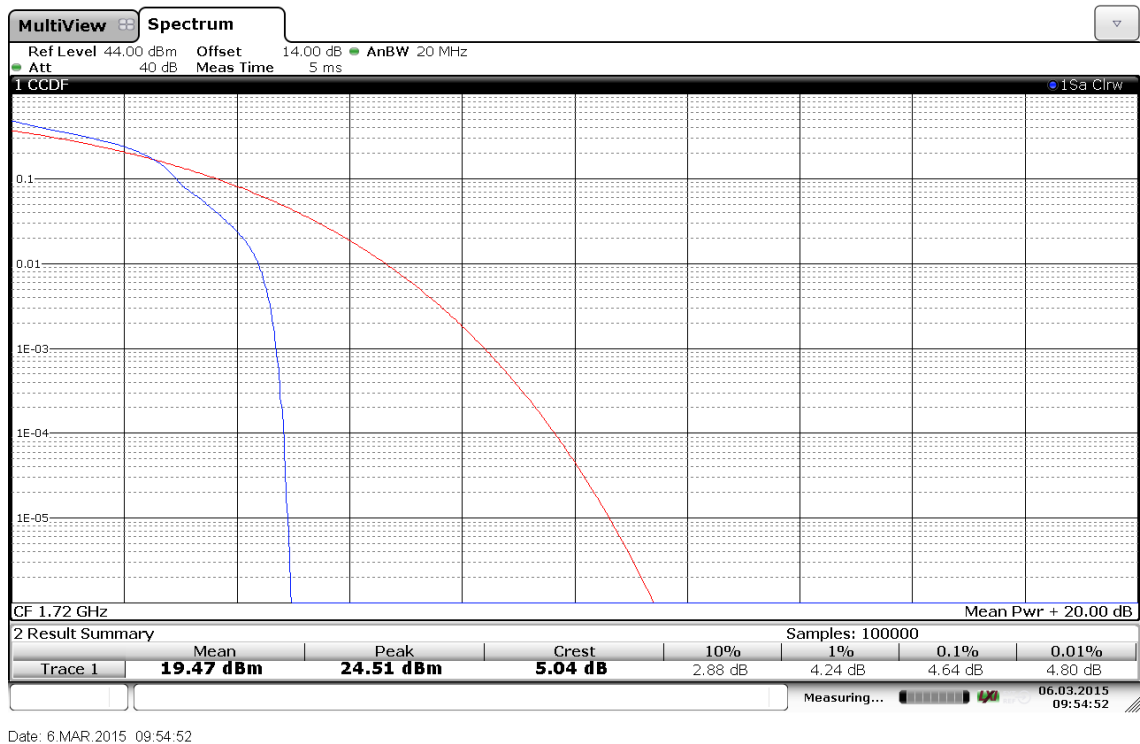
1. Test Result of LTE Band 4 Peak-to-Average Ratio:

BW (MHz)	Modulation	Channel	Frequency (MHz)	RB Size	RB Offset	Peak to Average radio		Limit	Verdict
						dB	Refer to Plot	dB	
20	16QAM	20050	1720	1	0	4.64	Plot A1 to A6	13	PASS
				100	0	5.94			
	16QAM	20175	1732.5	1	0	4.36			PASS
				100	0	6.08			
	16QAM	20300	1745	1	0	4.88			PASS
				100	0	6.04			

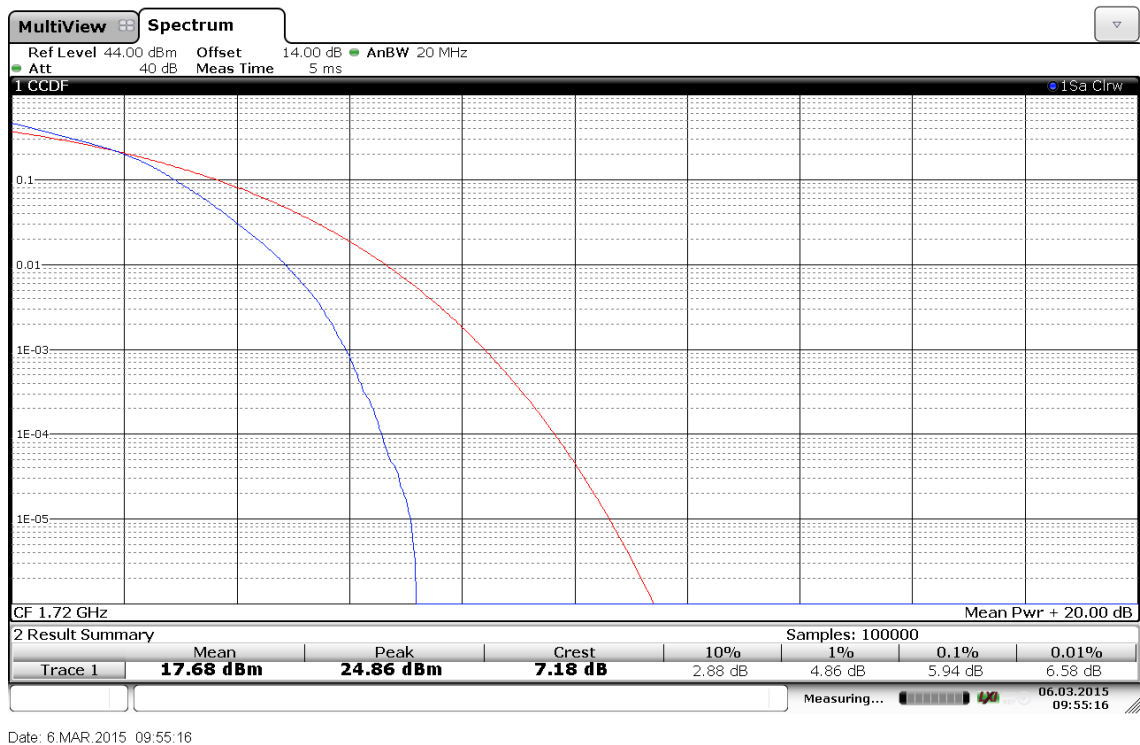
2. Test Result of LTE Band 17 Peak-to-Average Ratio:

BW (MHz)	Modulation	Channel	Frequency (MHz)	RB Size	RB Offset	Peak to Average radio		Limit	Verdict
						dB	Refer to Plot	dB	
10	16QAM	23780	709	1	0	4.84	Plot B1 to B6	13	PASS
				50	0	6.52			
	16QAM	23790	710	1	0	4.60			PASS
				50	0	6.60			
	16QAM	23800	711	1	0	4.80			PASS
				50	0	6.56			

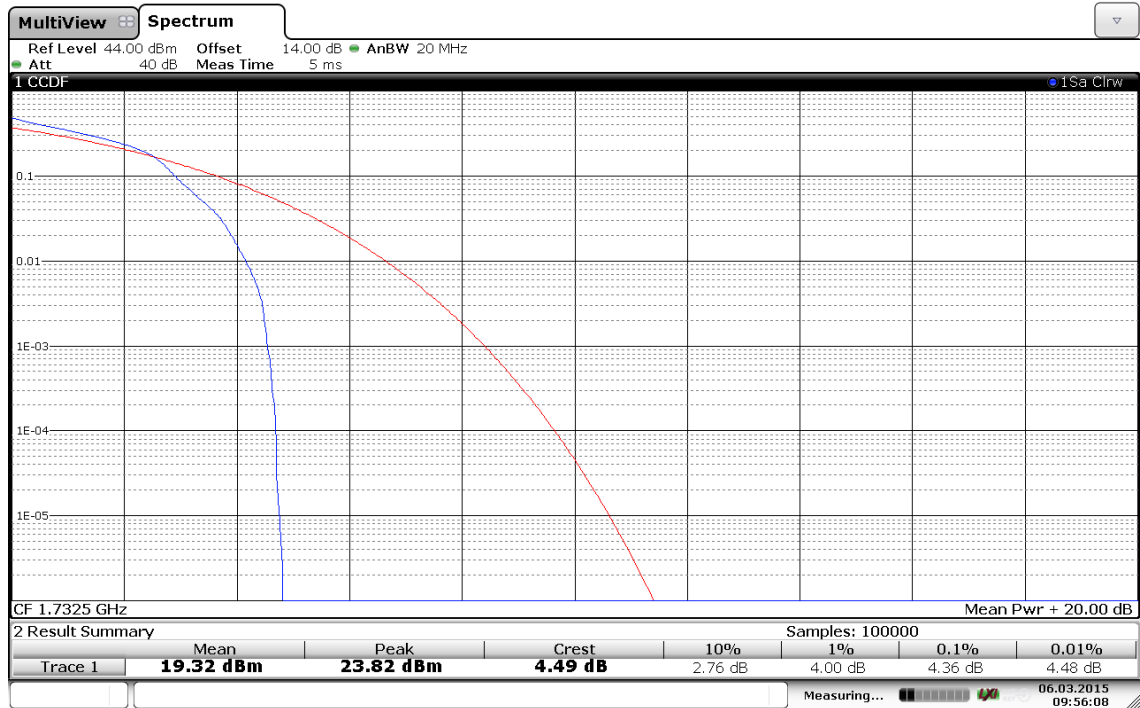
2.2.6 Test Results (Plots) of Peak-to-Average Ratio



(Plot A1: Band 4/20MHz/16QAM in Ch.20050 1RB Size)

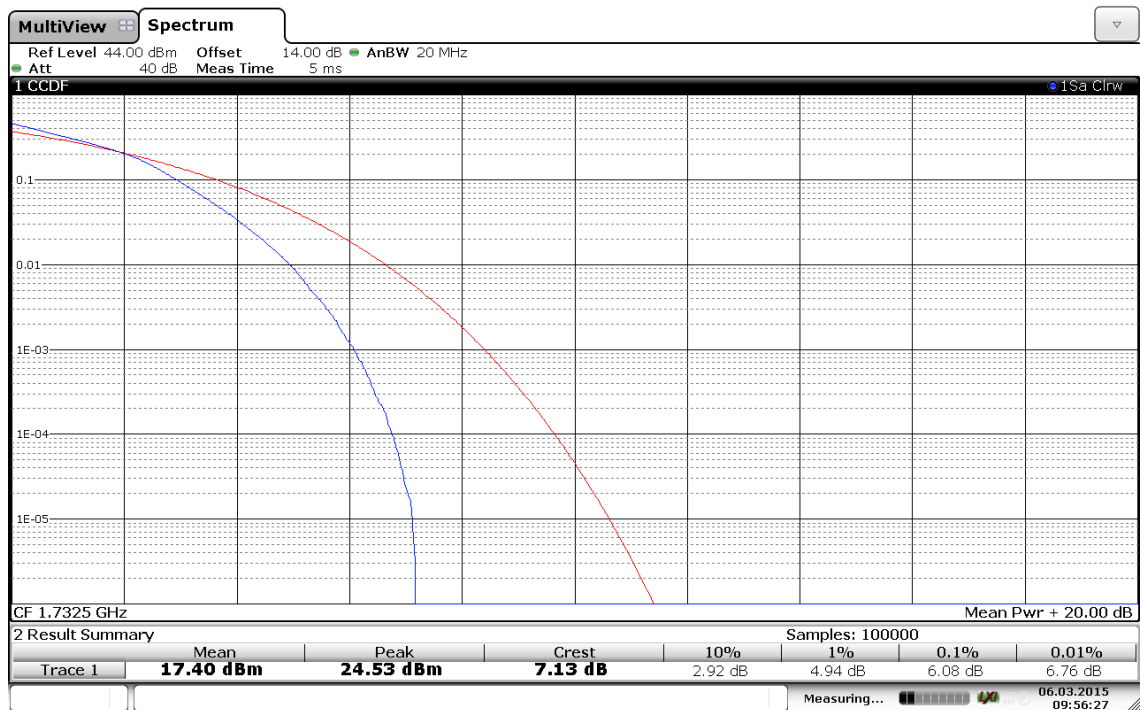


(Plot A2: Band 4/20MHz/16QAM in Ch.20050 100RB Size)



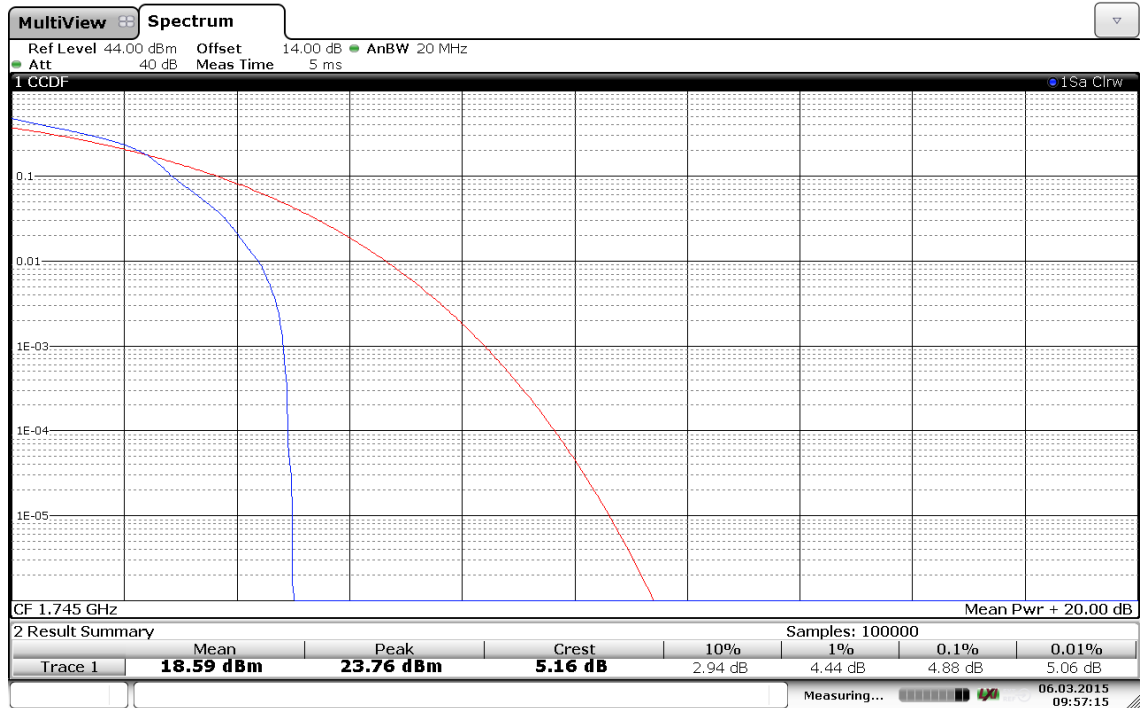
Date: 6 MAR. 2015 09:56:07

(Plot A3: Band 4/20MHz/16QAM in Ch.20175 1RB Size)



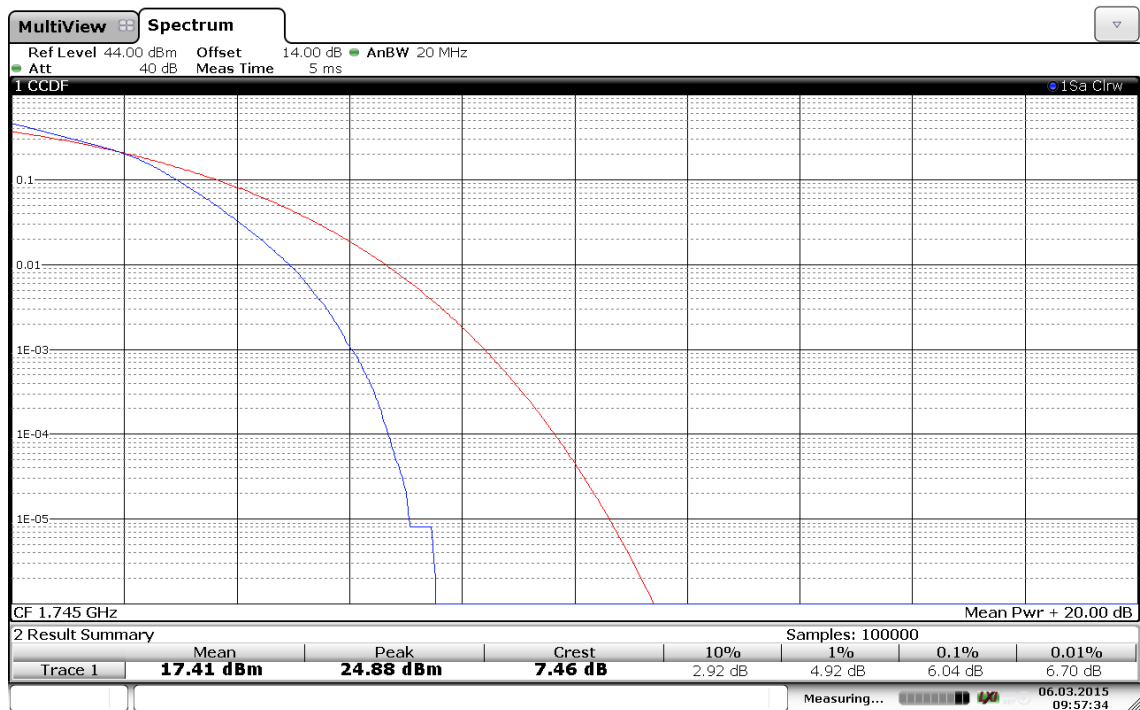
Date: 6 MAR. 2015 09:56:27

(Plot A4: Band 4/20MHz/16QAM in Ch.20175 100RB Size)



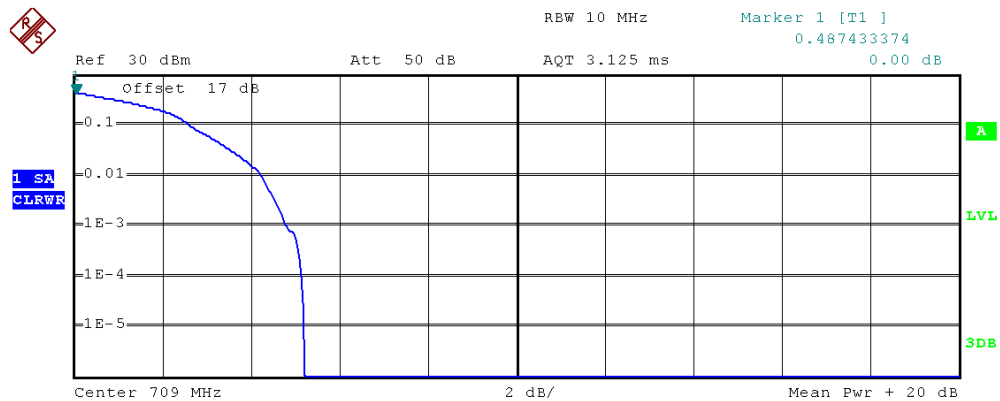
Date: 6 MAR. 2015 09:57:15

(Plot A5: Band 4/20MHz/16QAM in Ch.20300 1RB Size)



Date: 6 MAR. 2015 09:57:34

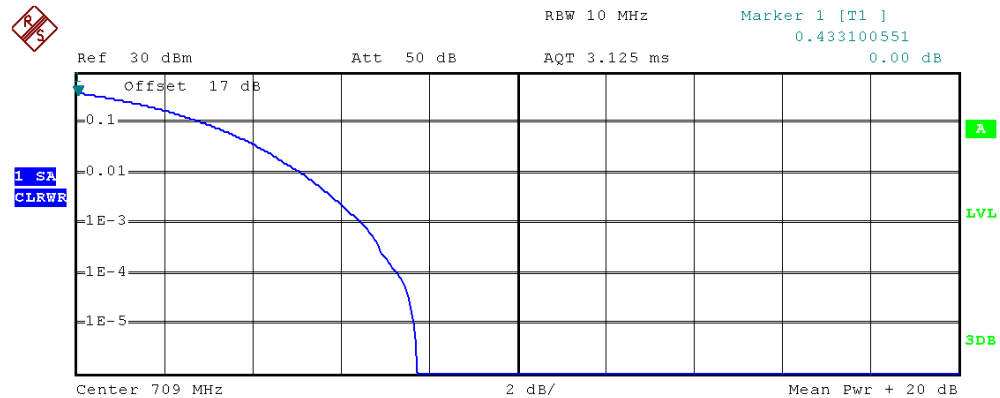
(Plot A6: Band 4/20MHz/16QAM in Ch.20300 100RB Size)



Mean 20.41 dBm
Peak 25.62 dBm
Crest 5.21 dB

10 % 2.68 dB
1 % 4.28 dB
.1 % 4.84 dB
.01 % 5.16 dB

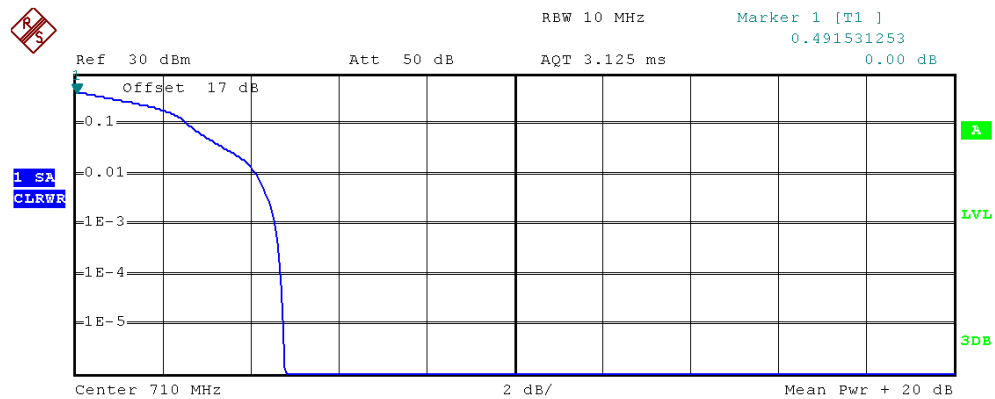
(Plot B1: Band 17/10MHz/16QAM in Ch.23780 1RB Size)



Mean 20.98 dBm
Peak 28.72 dBm
Crest 7.74 dB

10 % 3.00 dB
1 % 5.16 dB
.1 % 6.52 dB
.01 % 7.32 dB

(Plot B2: Band 17/10MHz/16QAM in Ch.23780 50RB Size)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 20.40 dBm

Peak 25.20 dBm

Crest 4.80 dB

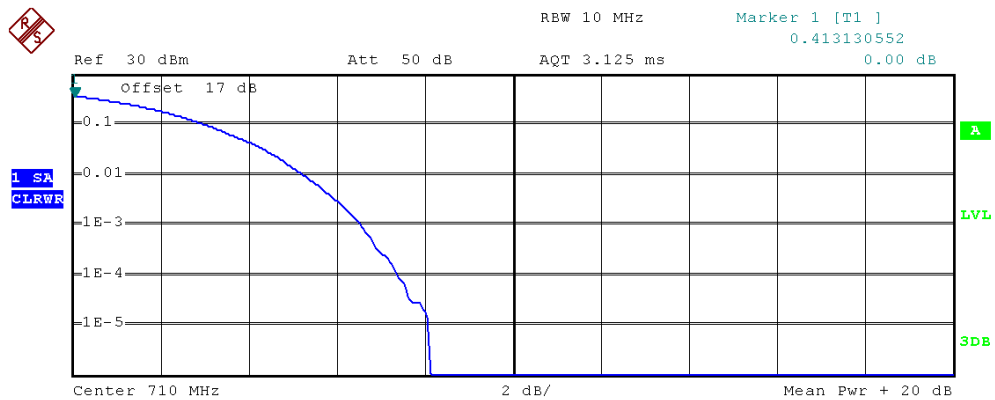
10 % 2.64 dB

1 % 4.16 dB

.1 % 4.60 dB

.01 % 4.72 dB

(Plot B3: Band 17/10MHz/16QAM in Ch.23790 1RB Size)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 20.96 dBm

Peak 29.08 dBm

Crest 8.12 dB

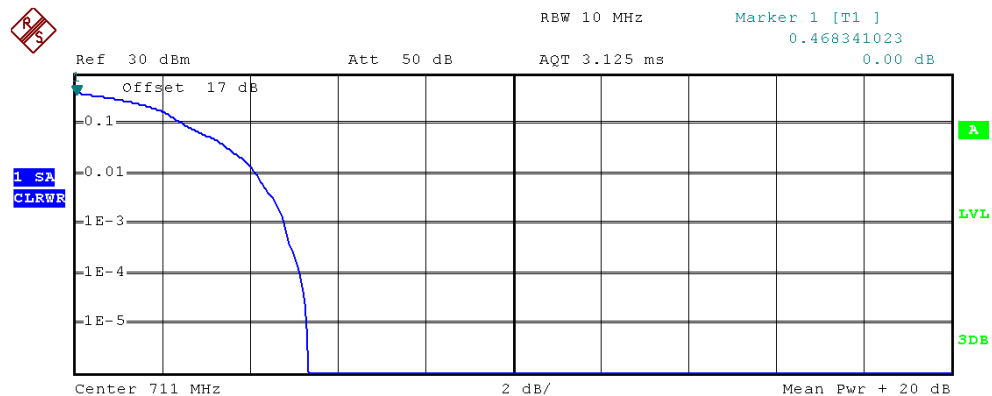
10 % 3.12 dB

1 % 5.28 dB

.1 % 6.60 dB

.01 % 7.40 dB

(Plot B4: Band 17/10MHz/16QAM in Ch.23790 50RB Size)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 20.71 dBm

Peak 26.04 dBm

Crest 5.33 dB

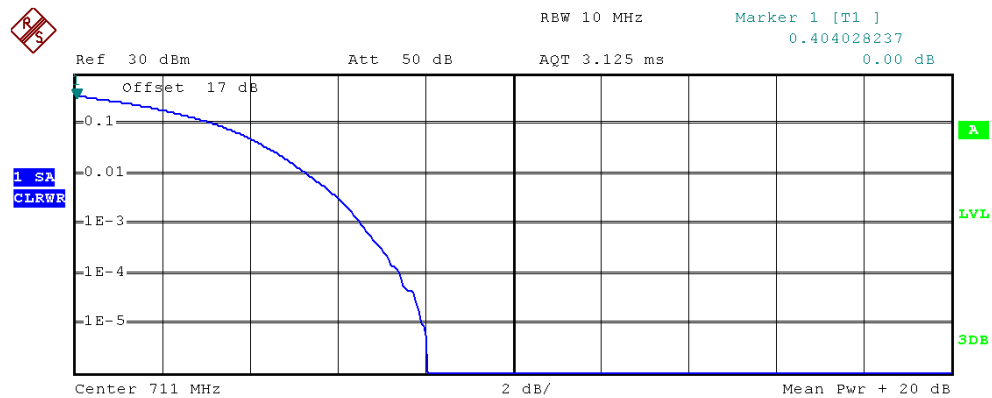
10 % 2.56 dB

1 % 4.16 dB

.1 % 4.80 dB

.01 % 5.16 dB

(Plot B5: Band 17/10MHz/16QAM in Ch.23800 1RB Size)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 21.01 dBm

Peak 29.08 dBm

Crest 8.07 dB

10 % 3.32 dB

1 % 5.36 dB

.1 % 6.56 dB

.01 % 7.44 dB

(Plot B6: Band 17/10MHz/16QAM in Ch.23800 50RB Size)

2.3 99% Occupied Bandwidth and 26dB Bandwidth

2.3.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

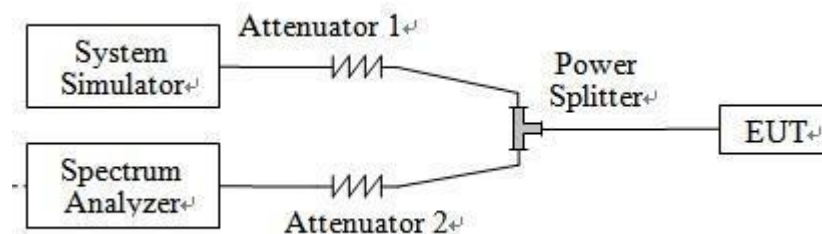
According to FCC section 2.1049, the occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

2.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.3.3 Test Setup



2.3.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

**2.3.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth**

LTE Band 4						
BW (MHz)	Channel	Frequency (MHz)	Mode	99% Occupied Bandwidth(MHz)	26dBBandwidth (MHz)	Refer to Plot
1.4	20175	1732.5	QPSK	1.10	1.29	Plot A1 to A2
			16QAM	1.10	1.26	Plot A3 to A4
3	20175	1732.5	QPSK	2.74	3.06	Plot B1 to B2
			16QAM	2.75	3.07	Plot B3 to B4
5	20175	1732.5	QPSK	4.56	5.10	Plot C1 to C2
			16QAM	4.56	5.10	Plot C3 to C4
10	20175	1732.5	QPSK	9.12	10.36	Plot D1 to D2
			16QAM	9.12	10.28	Plot D3 to D4
15	20175	1732.5	QPSK	13.62	15.06	Plot E1 to E2
			16QAM	13.50	15.06	Plot E3 to E4
20	20175	1732.5	QPSK	18.56	21.44	Plot F1 to F2
			16QAM	18.56	21.28	Plot F3 to F4

LTE Band 17						
BW (MHz)	Channel	Frequency (MHz)	Mode	99% Occupied Bandwidth(MHz)	26dBBandwidth (MHz)	Refer to Plot
5	23790	710	QPSK	4.56	5.08	Plot G1 to G2
			16QAM	4.56	5.14	Plot G3 to G4
10	23790	710	QPSK	9.04	9.96	Plot H1 to H2
			16QAM	9.04	9.84	Plot H3 to H4

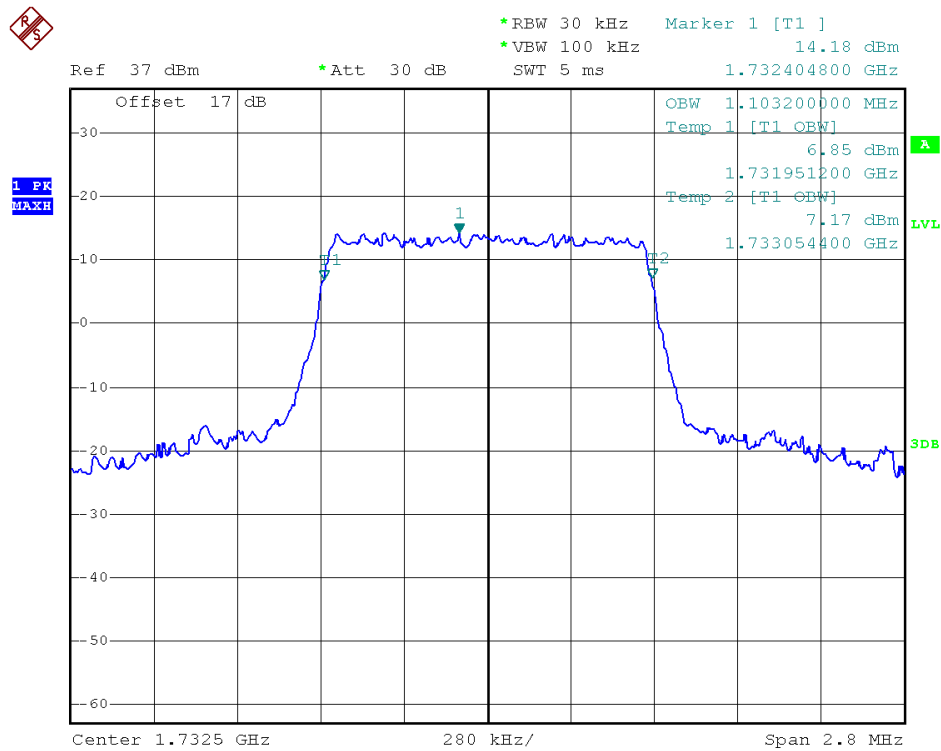
Note: The maximum RB configurations of the 99% Occupied Bandwidth and 26dB Bandwidth summary as below:

BW1.4MHz RB setting: RB Size 6,RB Offset 0 BW3MHz RB setting: RB Size 15,RB Offset 0

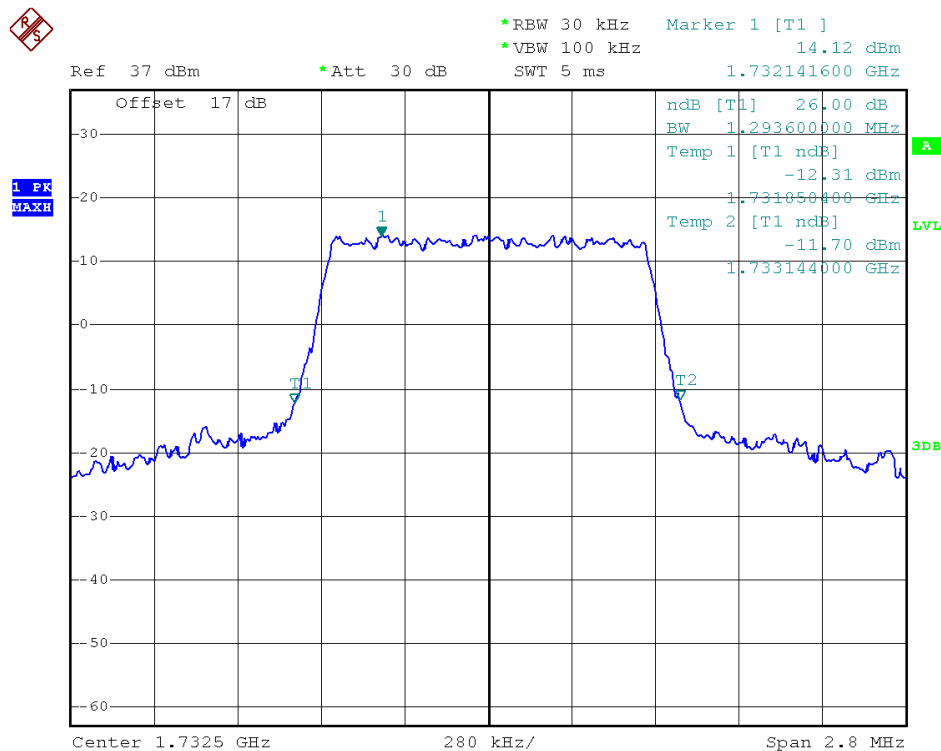
BW5MHz RB setting: RB Size 25,RB Offset 0 BW10MHz RB setting: RB Size 50,RB Offset 0

BW15MHz RB setting: RB Size 75,RB Offset 0 BW20MHz RB setting: RB Size 100,RB Offset 0

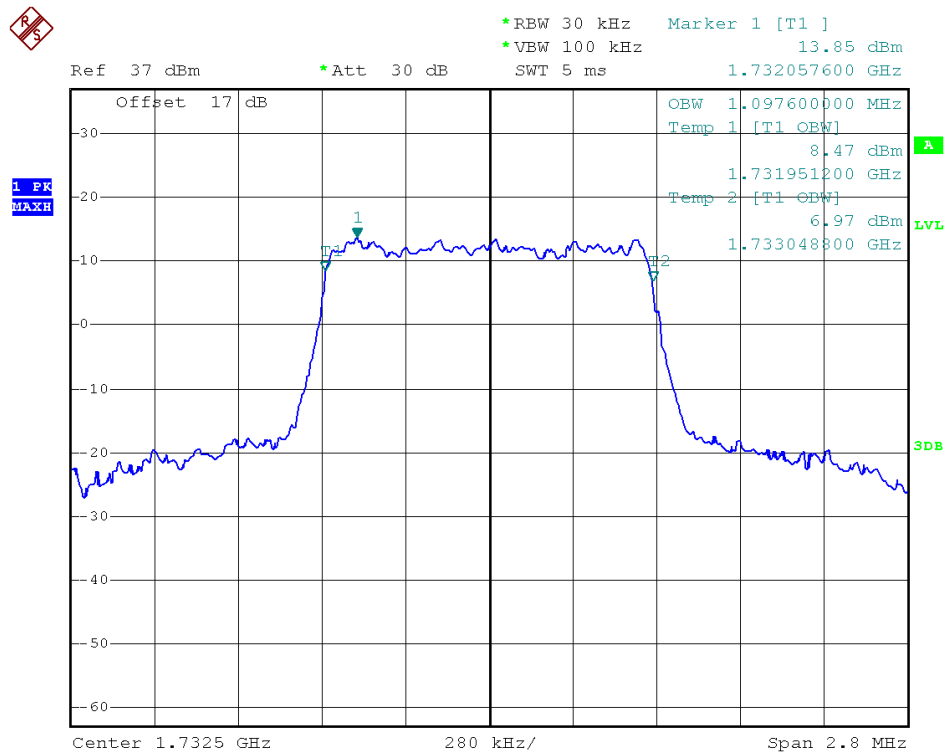
2.3.6 Test Result (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth



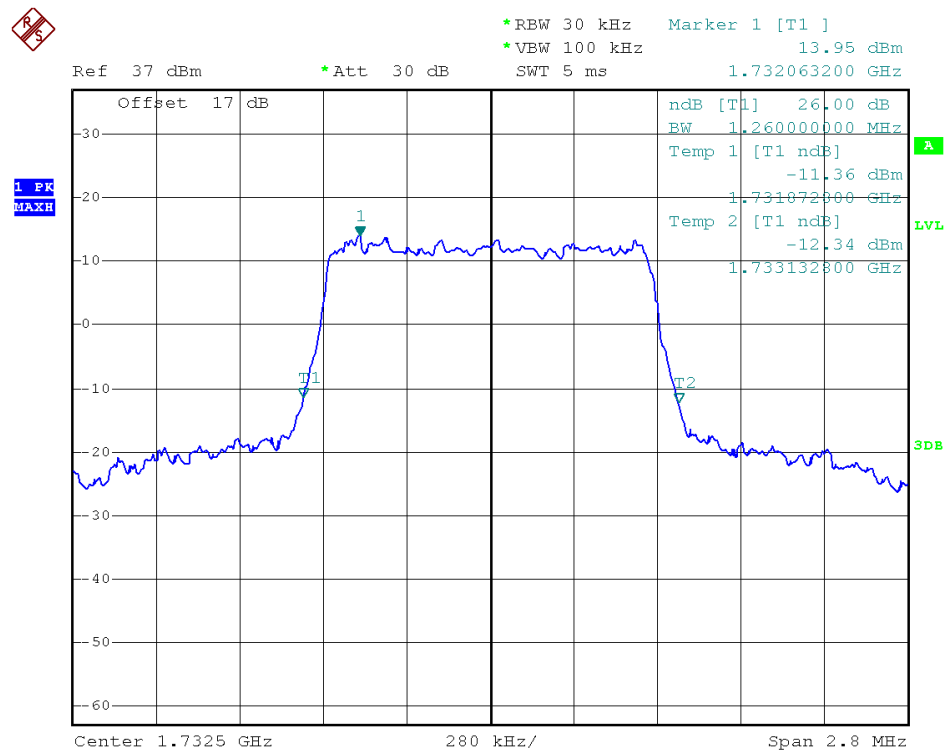
(Plot A1: 99% Occupied Bandwidth LTE Band 4/1.4MHz/QPSK)



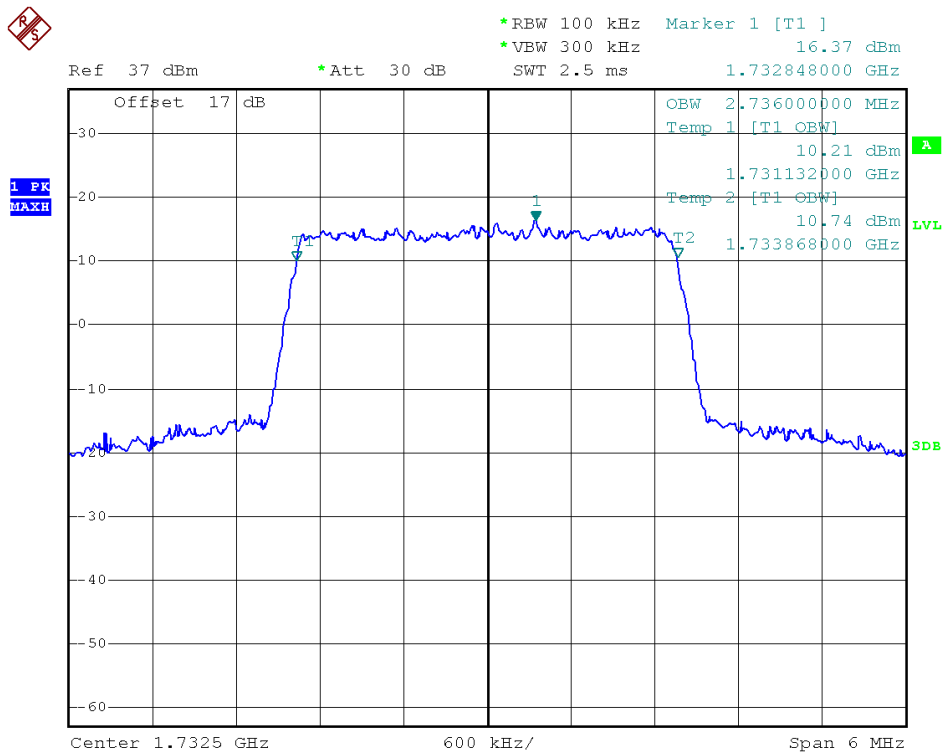
(Plot A2: 26dB Bandwidth LTE Band 4/1.4MHz/QPSK)



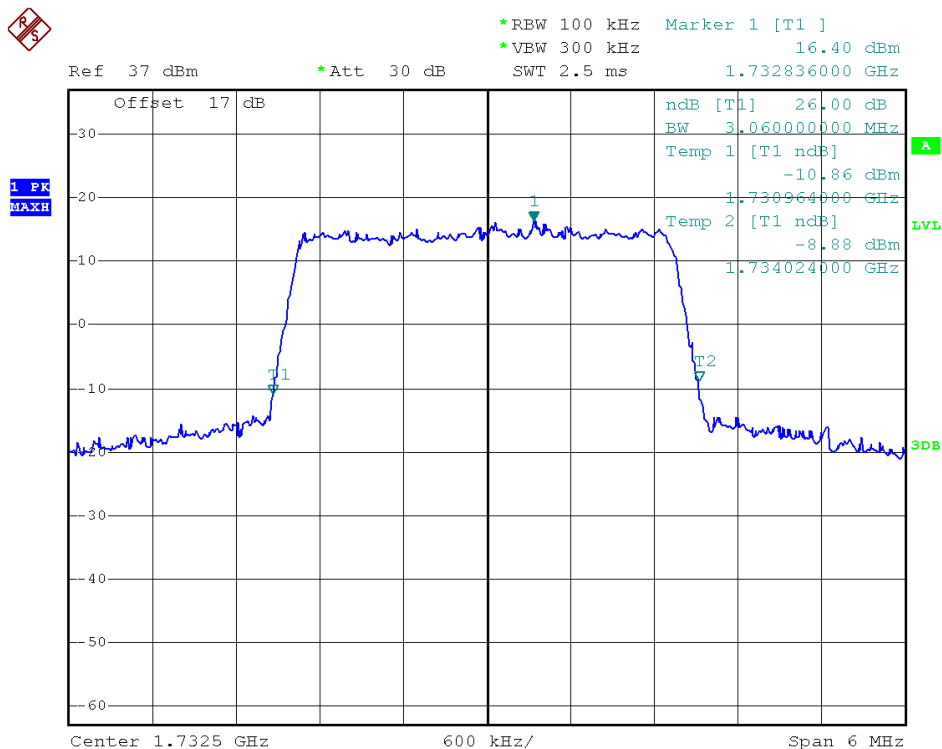
(Plot A3: 99% Occupied Bandwidth LTE Band 4/1.4MHz/16QAM)



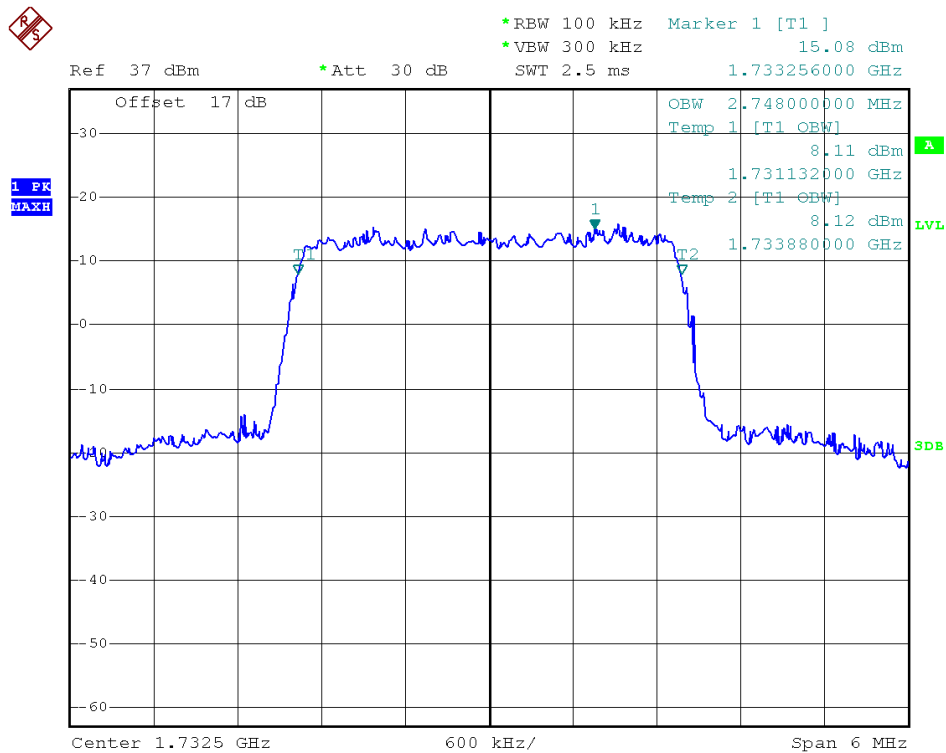
(Plot A4: 26dB Bandwidth LTE Band 4/1.4MHz/16QAM)



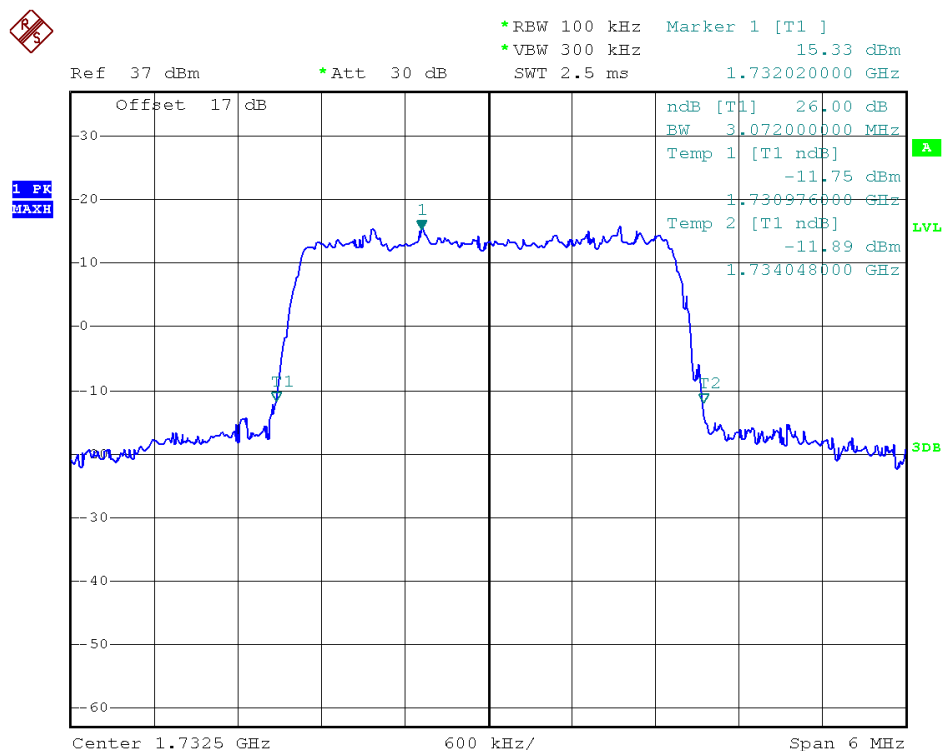
(Plot B1: 99% Occupied Bandwidth LTE Band 4/3MHz/QPSK)



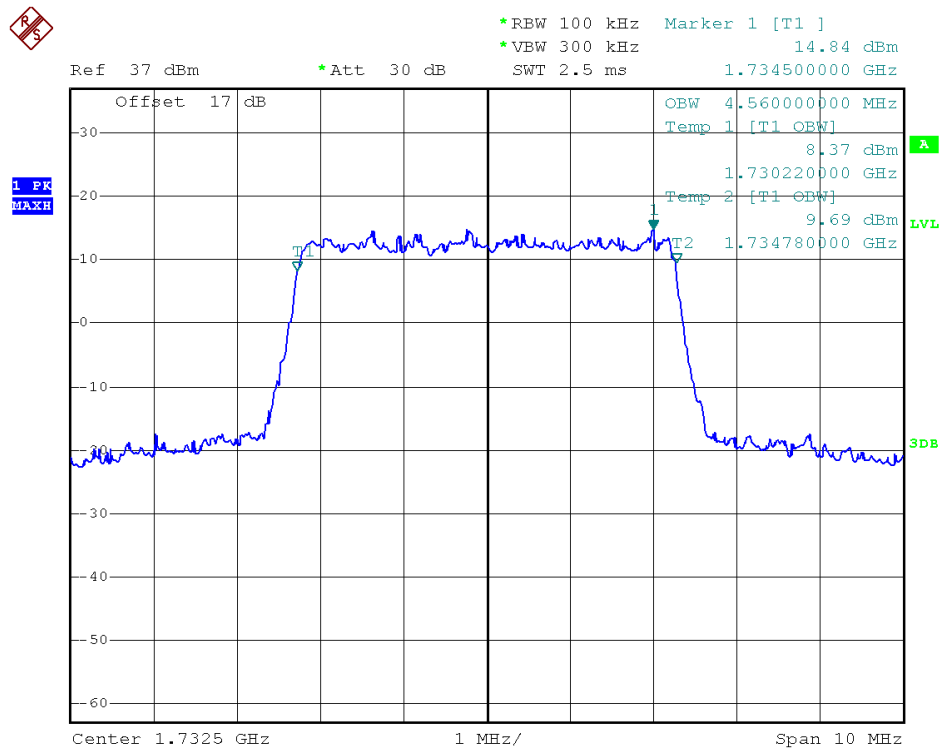
(Plot B2: 26dB Bandwidth LTE Band 4/3MHz/QPSK)



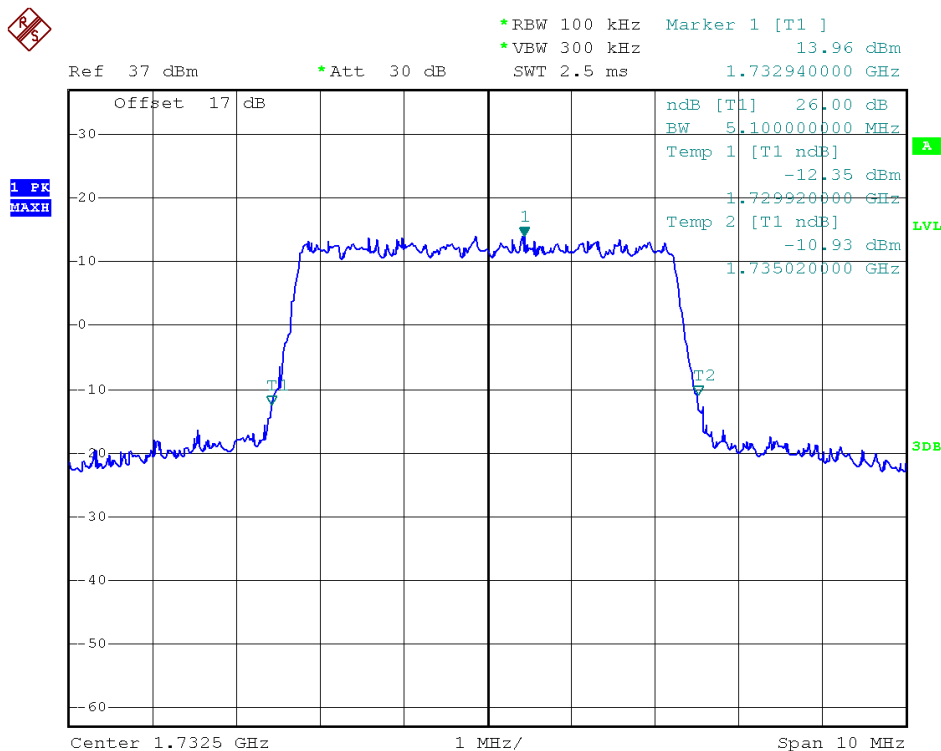
(Plot B3: 99% Occupied Bandwidth LTE Band 4/3MHz/16QAM)



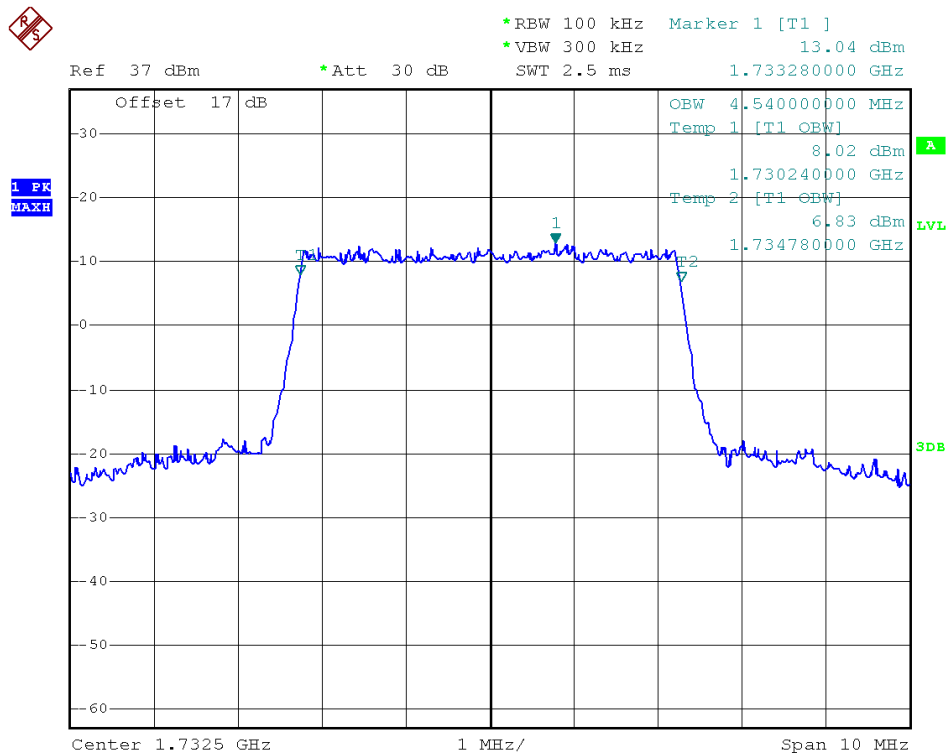
(Plot B4: 26dB Bandwidth LTE Band 4/3MHz/16QAM)



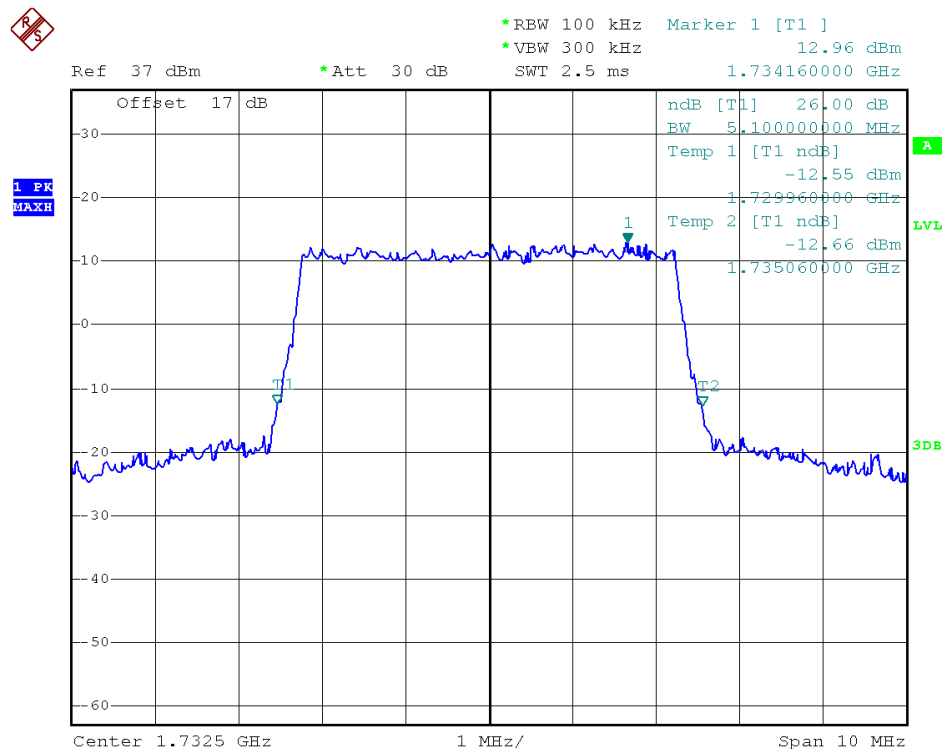
(Plot C1: 99% Occupied Bandwidth LTE Band 4/5MHz/QPSK)



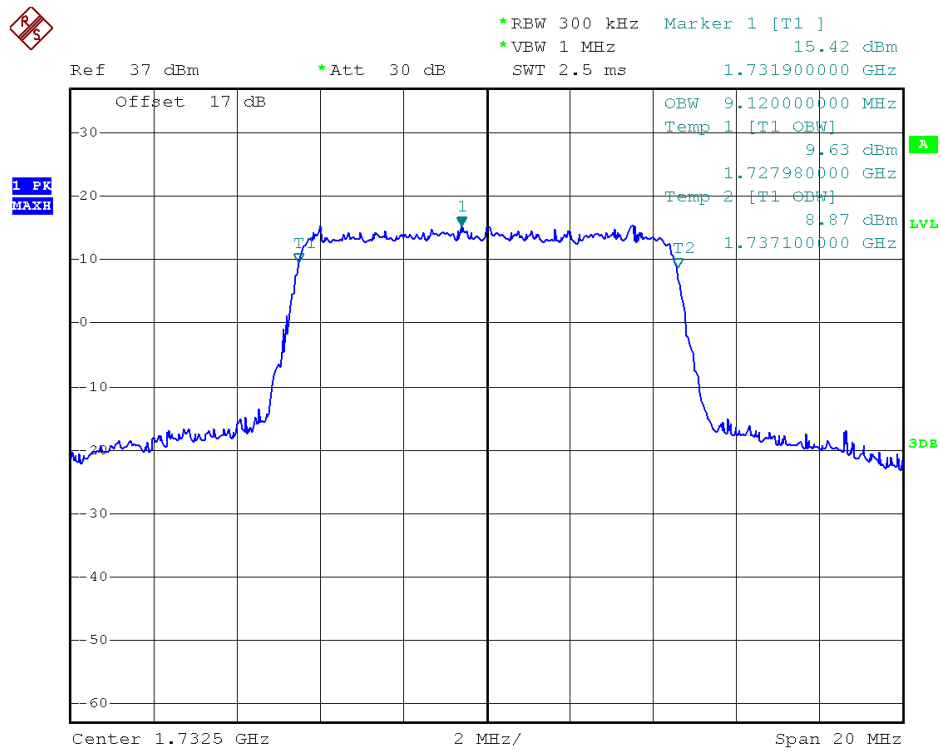
(Plot C2: 26dB Bandwidth LTE Band 4/5MHz/QPSK)



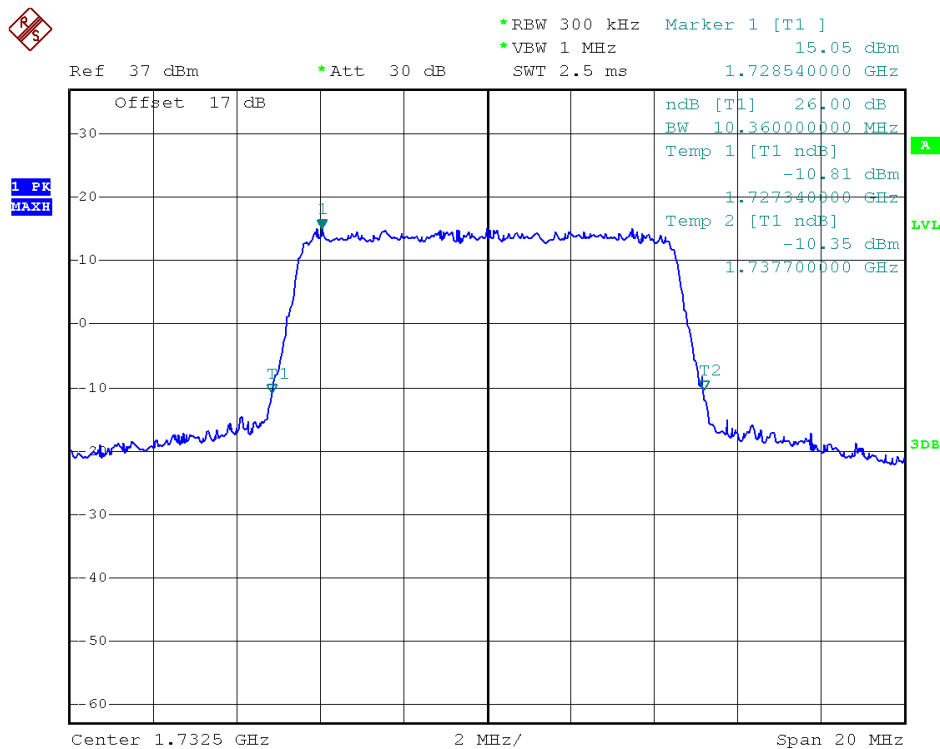
(Plot C3: 99% Occupied Bandwidth LTE Band 4/5MHz/16QAM)



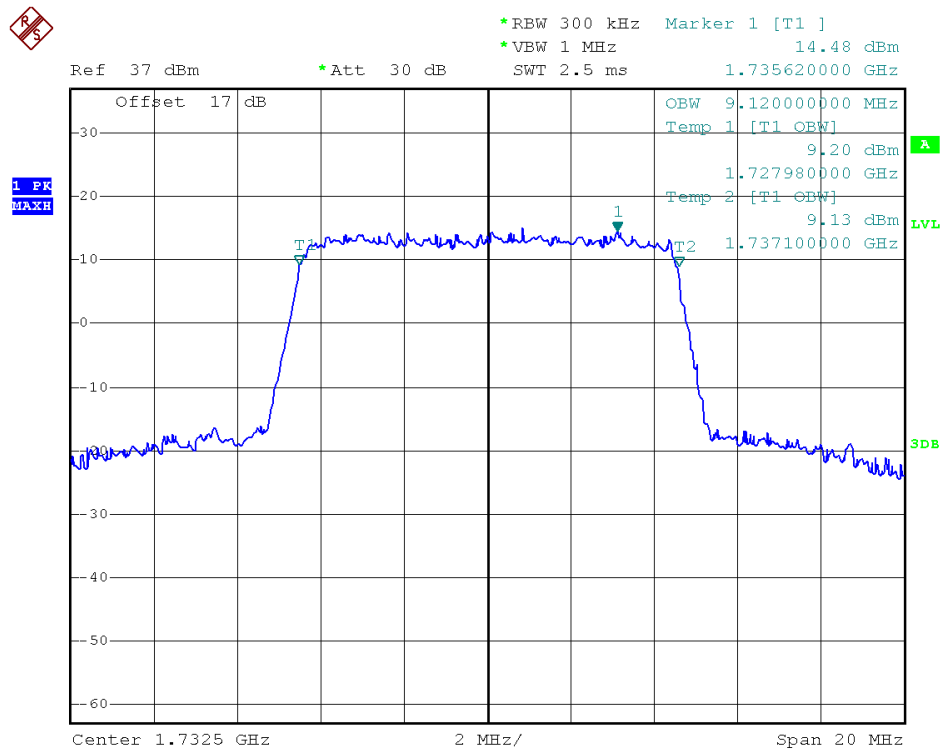
(Plot C4: 26dB Bandwidth LTE Band 4/5MHz/16QAM)



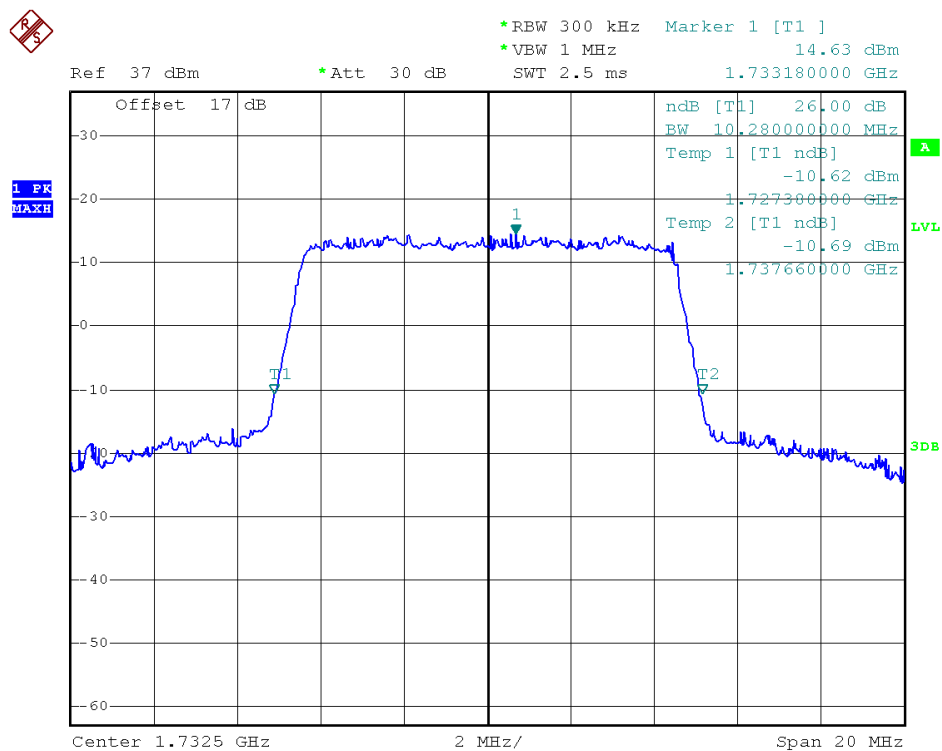
(Plot D1: 99% Occupied Bandwidth LTE Band 4/10MHz/QPSK)



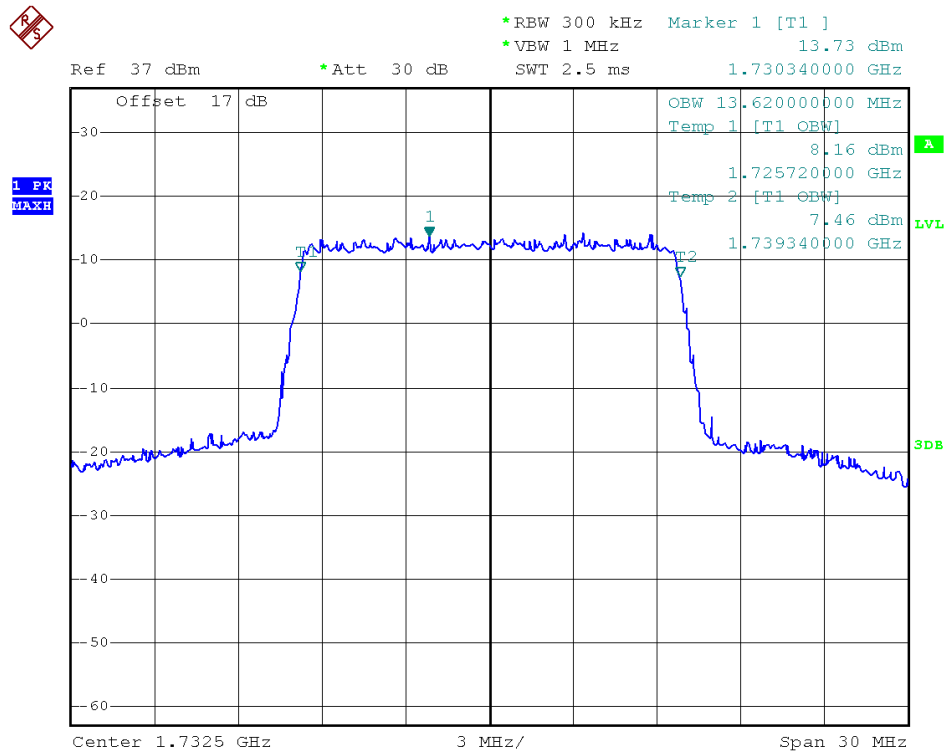
(Plot D2: 26dB Bandwidth LTE Band 4/10MHz/QPSK)



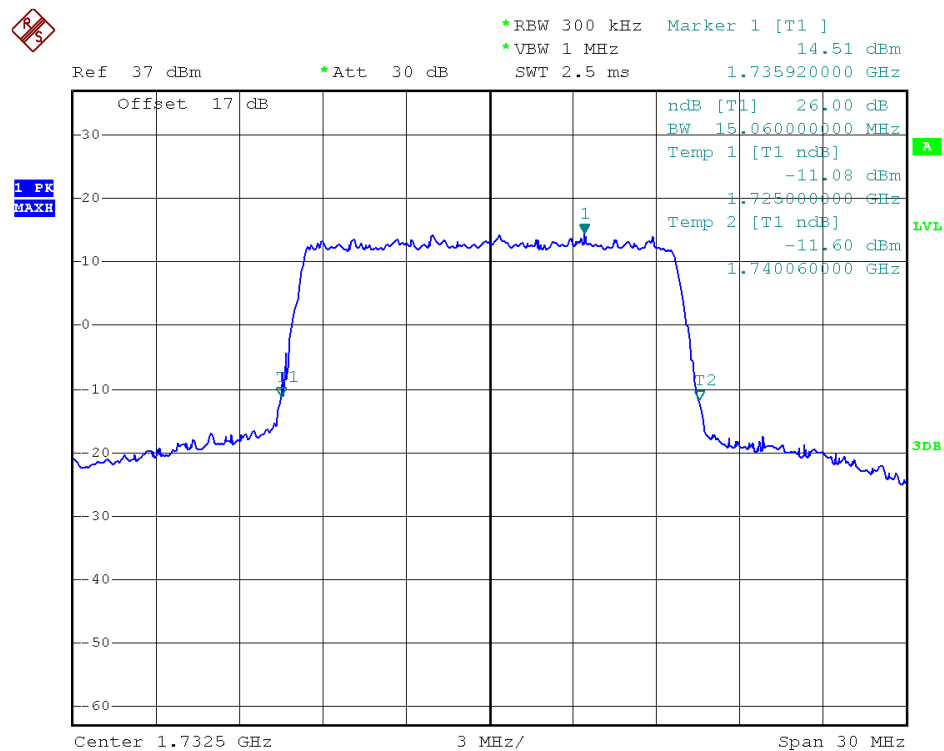
(Plot D3: 99% Occupied Bandwidth LTE Band 4/10MHz/16QAM)



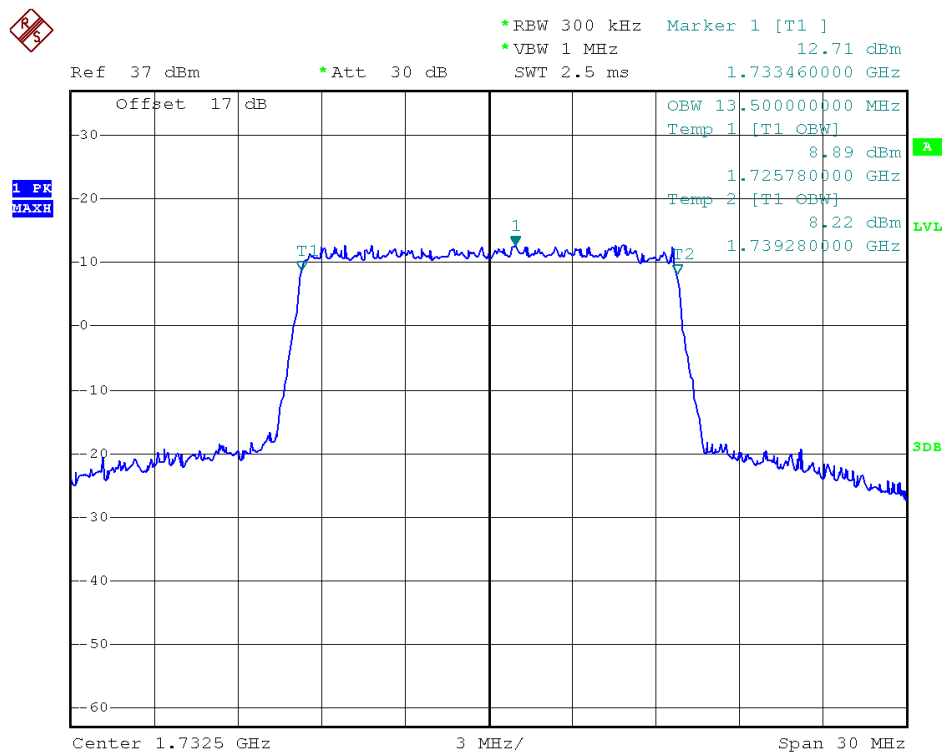
(Plot D4: 26dB Bandwidth LTE Band 4/10MHz/16QAM)



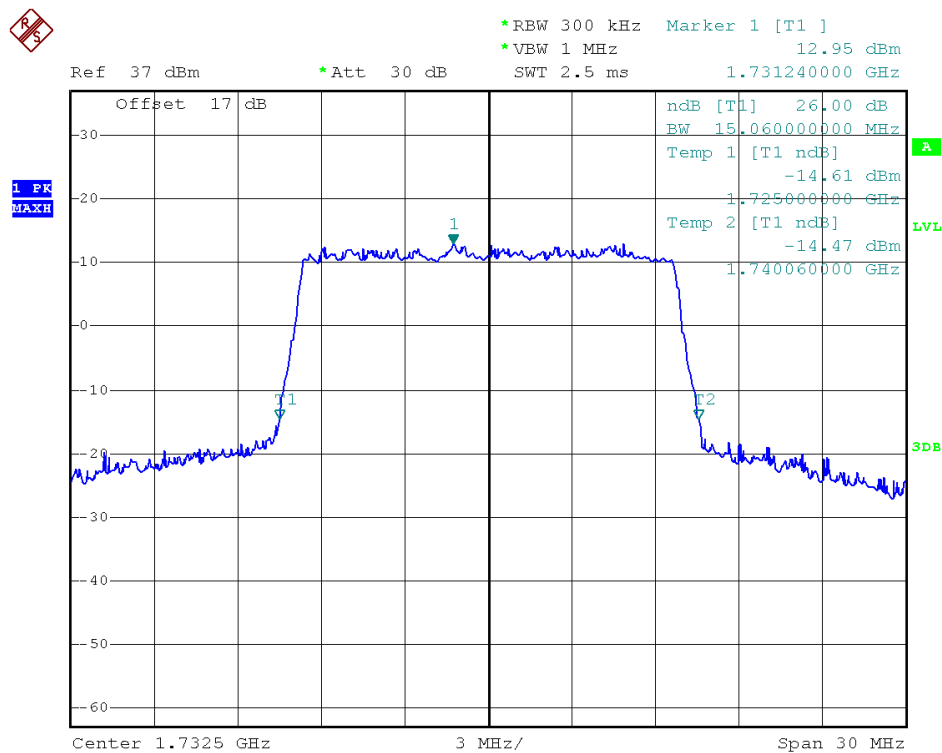
(Plot E1: 99% Occupied Bandwidth LTE Band 4/15MHz/QPSK)



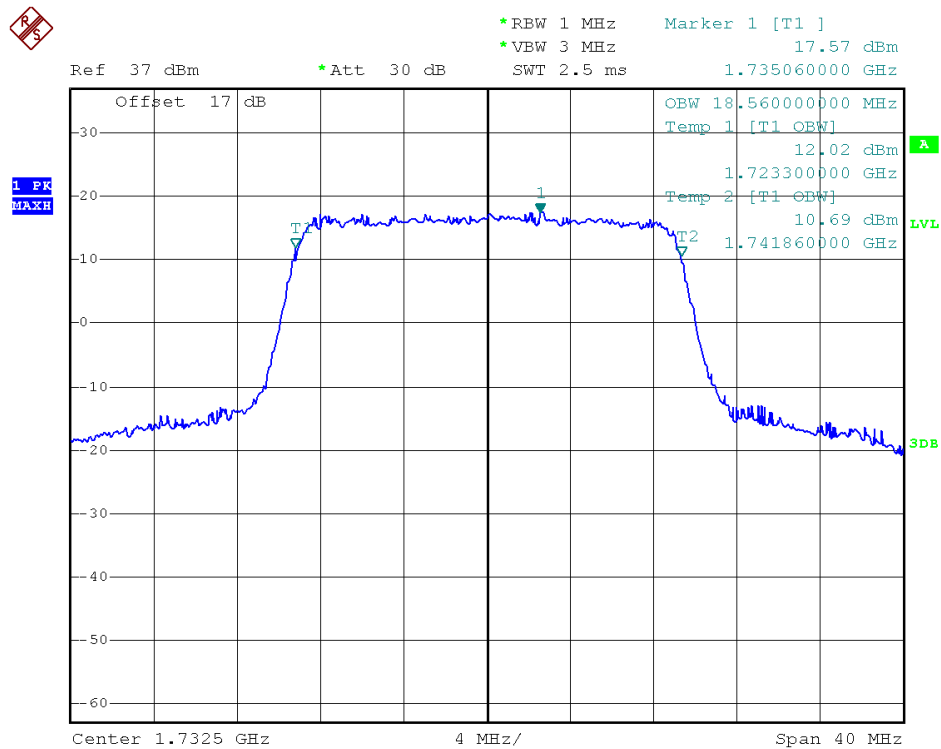
(Plot E2: 26dB Bandwidth LTE Band 4/15MHz/QPSK)



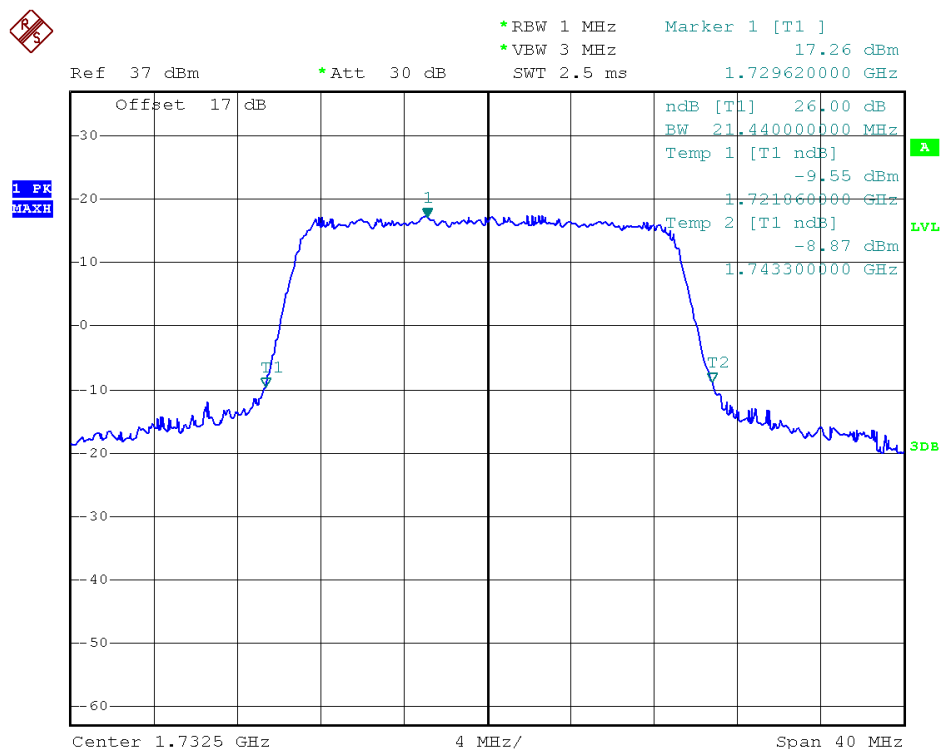
(Plot E3: 99% Occupied Bandwidth LTE Band 4/15MHz/16QAM)



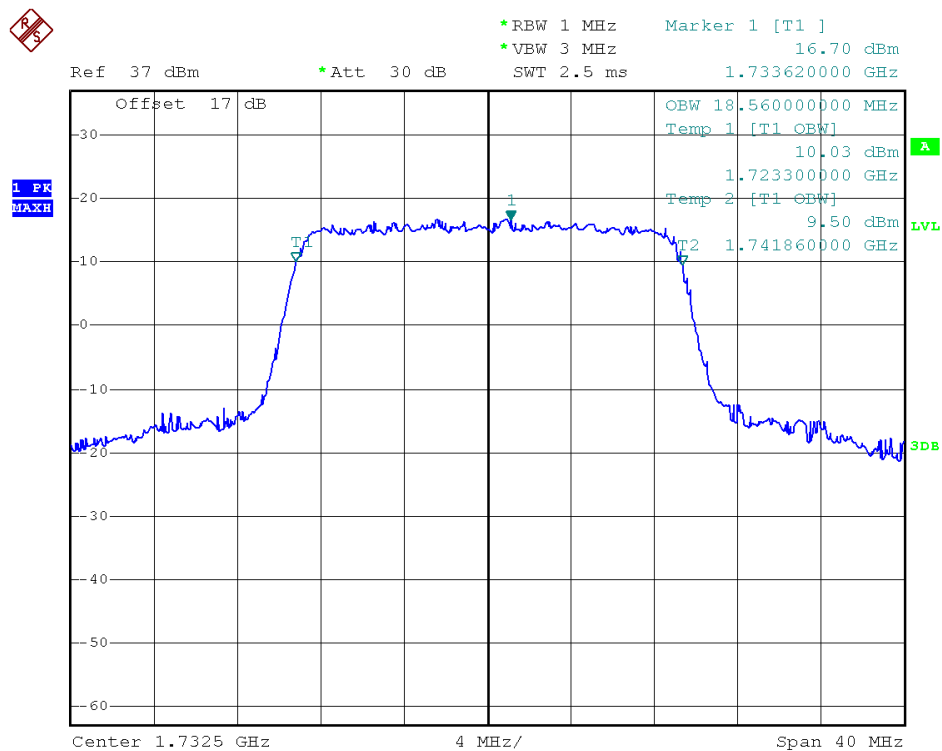
(Plot E4: 26dB Bandwidth LTE Band 4/15MHz/16QAM)



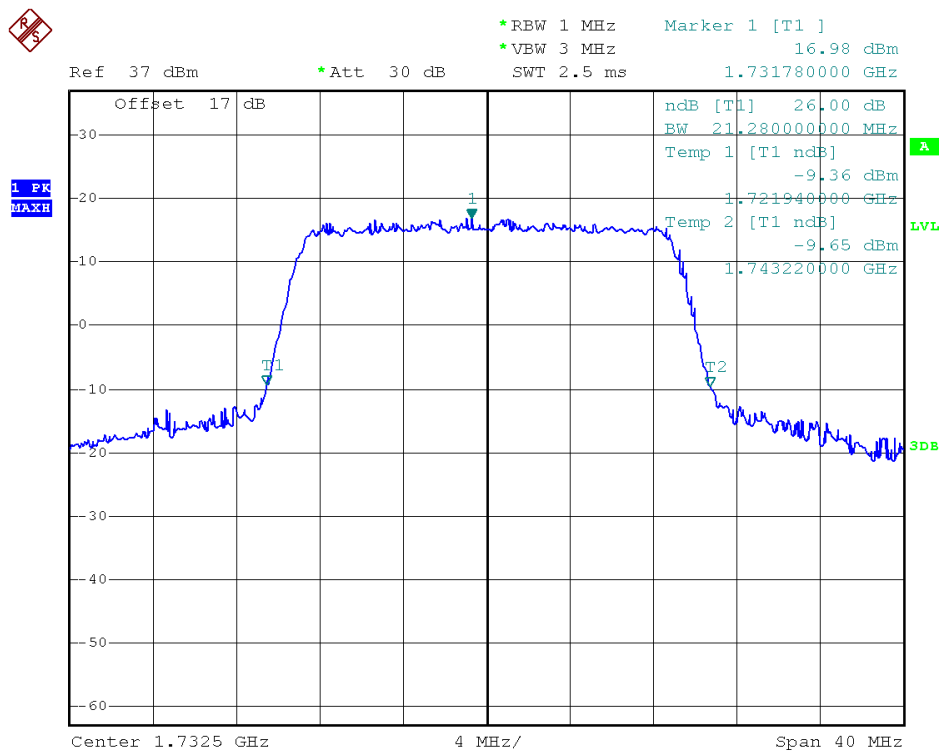
(Plot F1: 99% Occupied Bandwidth LTE Band 4/20MHz/QPSK)



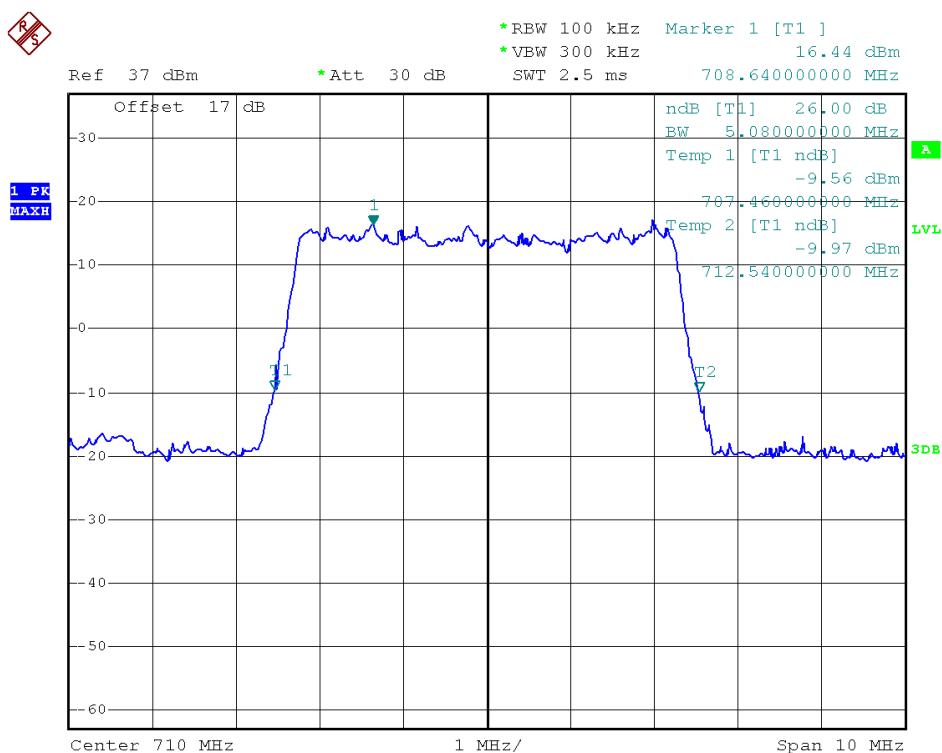
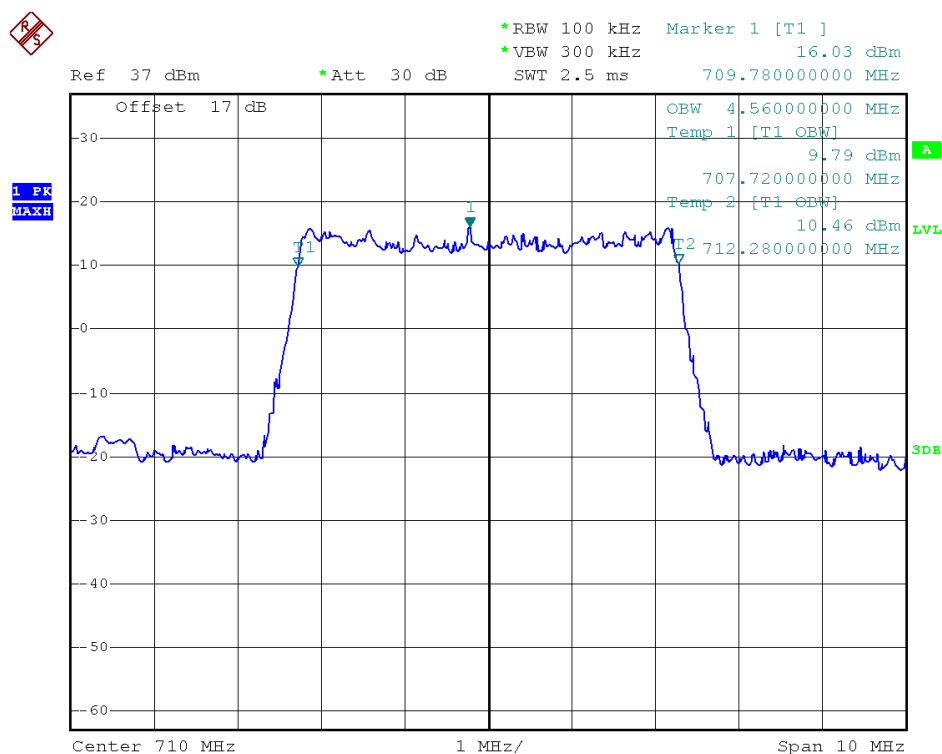
(Plot F2: 26dB Bandwidth LTE Band 4/20MHz/QPSK)

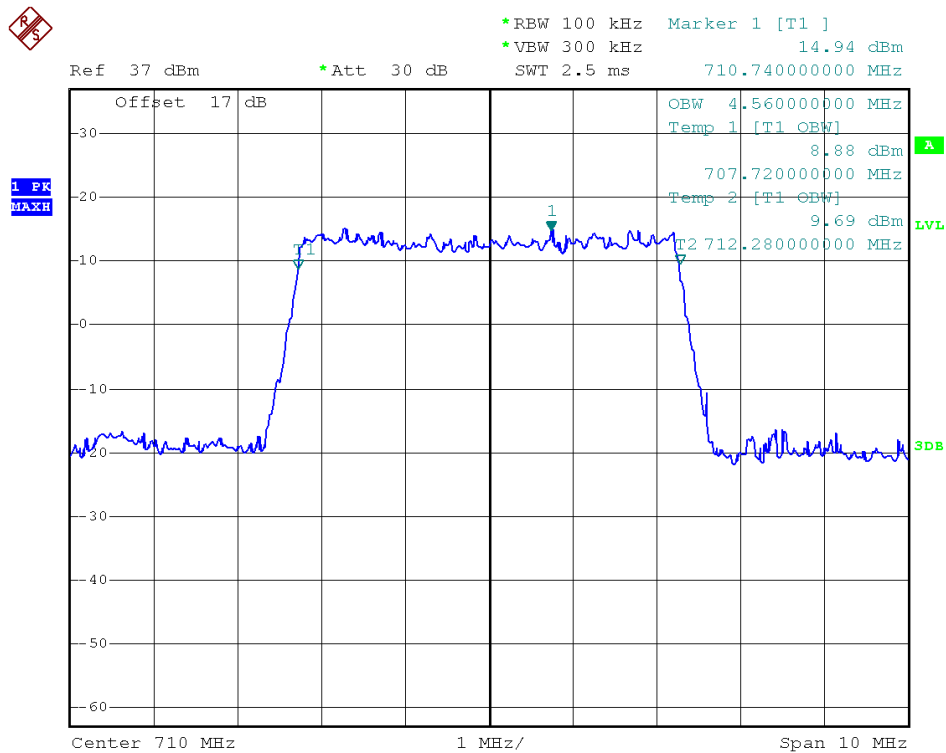


(Plot F3: 99% Occupied Bandwidth LTE Band 4/20MHz/16QAM)

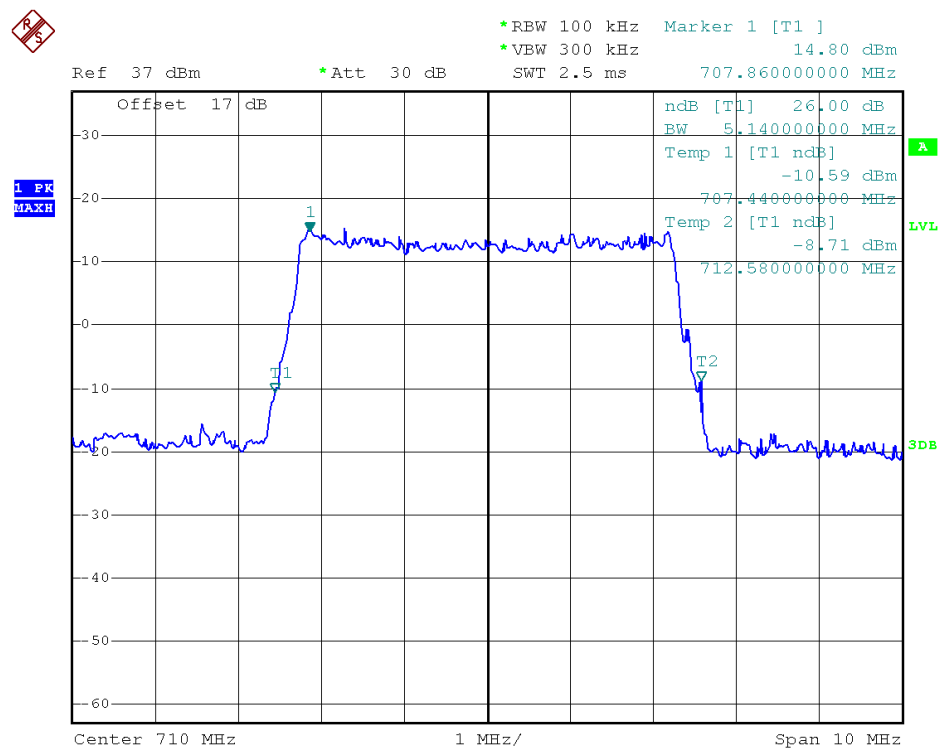


(Plot F4: 26dB Bandwidth LTE Band 4/20MHz/16QAM)

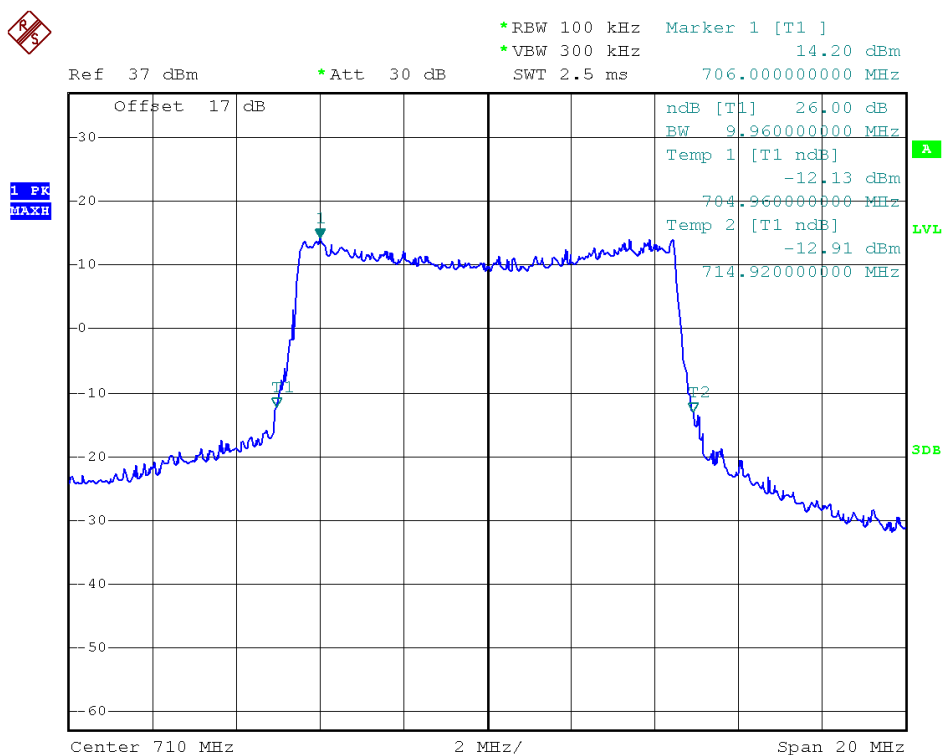
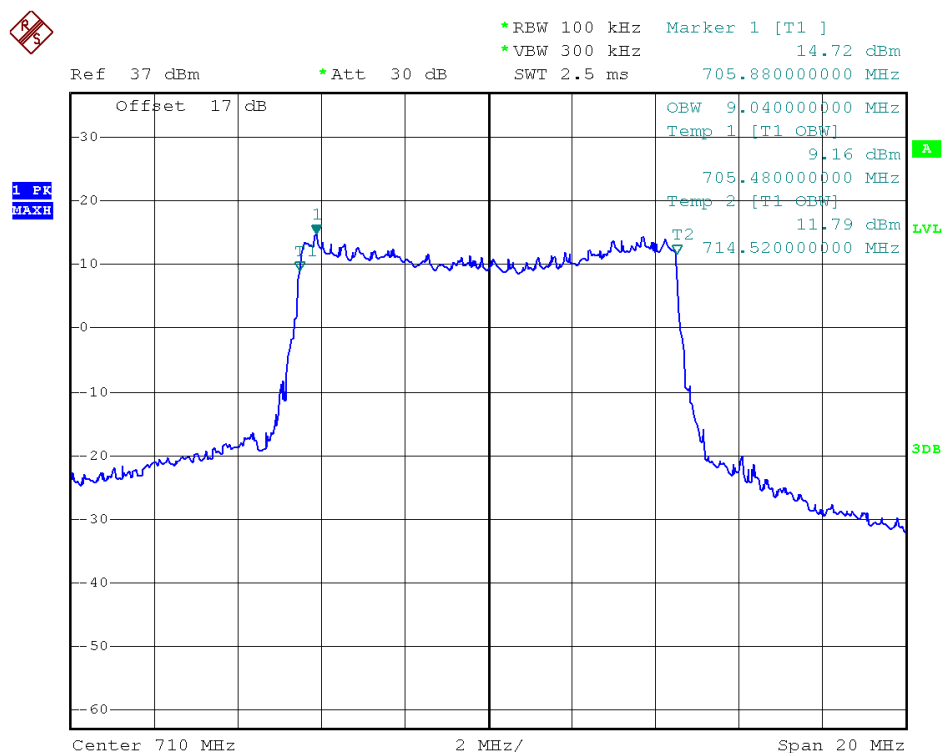


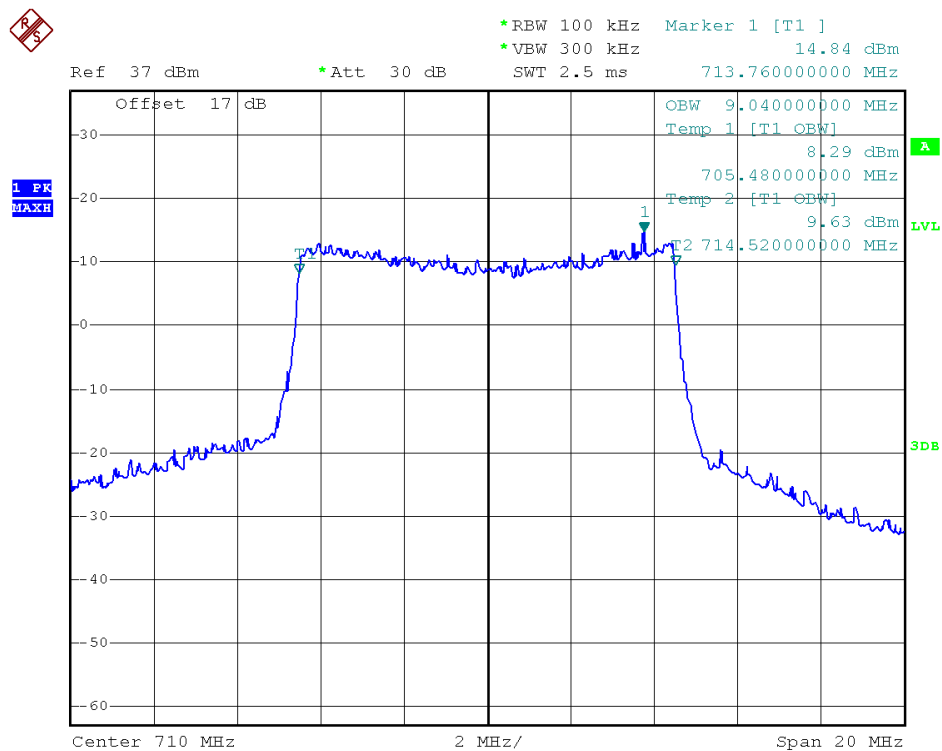


(Plot G3: 99% Occupied Bandwidth LTE Band 17/5MHz/16QAM)

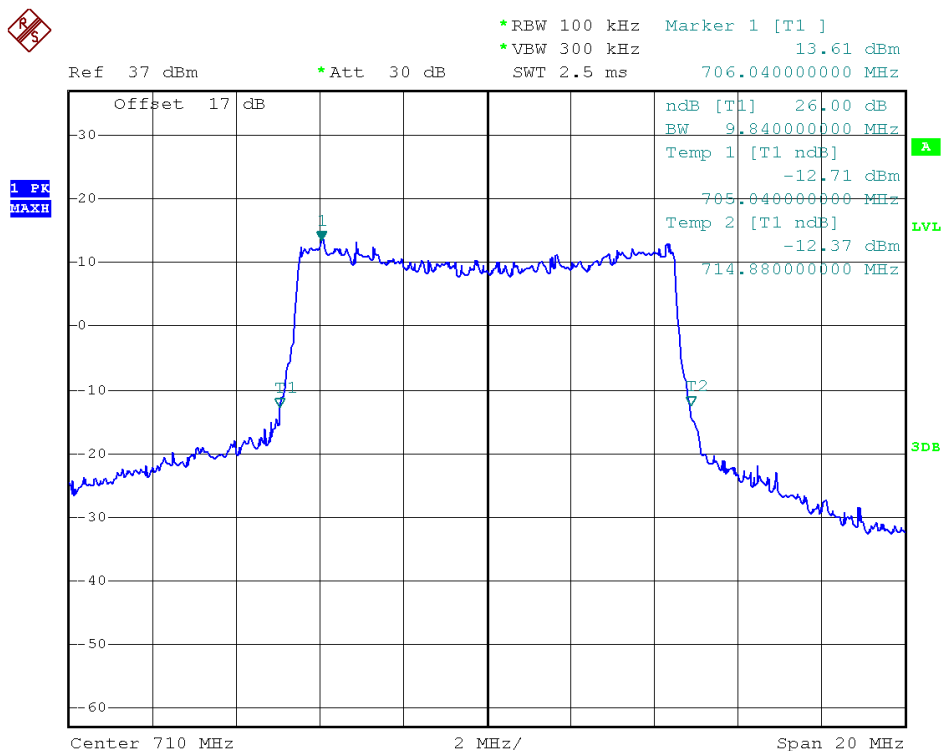


(Plot G4: 26dB Bandwidth LTE Band 17/5MHz/16QAM)





(Plot H3: 99% Occupied Bandwidth LTE Band 17/10MHz/16QAM)



(Plot H4: 26dB Bandwidth LTE Band 17/10MHz/16QAM)

2.4 Frequency Stability

2.4.1 Requirement

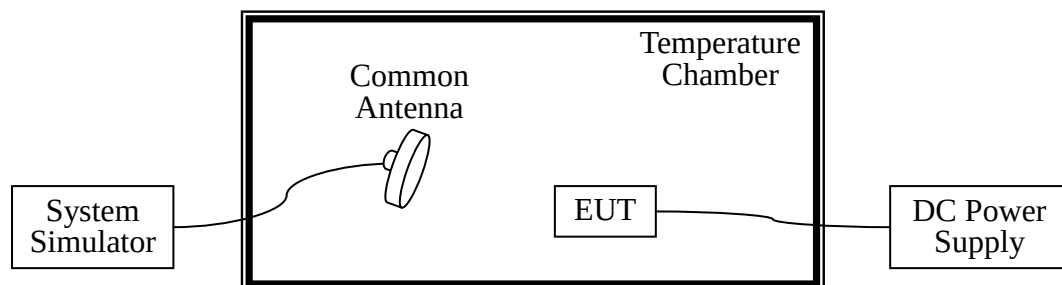
According to FCC section 27.54, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from -30°C to $+50^{\circ}\text{C}$ at intervals of not more than 10°C .
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

2.4.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3 Test Setup



2.4.4 Test Procedures

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. The nominal, highest and lowest extreme voltages are separately 3.8VDC, 4.2VDC and 3.6VDC, which are specified by the applicant; the normal temperature here used is 25°C .
5. The variation in frequency was measured for the worst case.

2.4.5 Test Result of Frequency Stability

1. LTE Band 4(QPSK)

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 1732.5MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	46.68	0.03	2.5
	-20	28.10	0.02	
	-10	-24.27	0.02	
	0	36.69	0.02	
	+10	13.61	0.01	
	+20	12.15	0.01	
	+30	23.94	0.01	
	+40	13.56	0.01	
	+55	47.64	0.03	
4.2	+25	62.86	0.04	2.5
3.6	+25	3.68	0	

2. LTE Band 4(16QAM)

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 1732.5MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	26.52	0.02	2.5
	-20	58.24	0.03	
	-10	-34.34	0.02	
	0	26.51	0.02	
	+10	23.28	0.01	
	+20	32.41	0.02	
	+30	33.36	0.02	
	+40	23.42	0.01	
	+55	17.35	0.01	
4.2	+25	48.71	0.03	2.5
3.6	+25	33.35	0.02	

3. LTE Band 17(QPSK)

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 710MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	29.67	0.04	2.5
	-20	-24.35	0.04	
	-10	42.13	0.06	
	0	-14.70	0.02	
	+10	-8.71	0	
	+20	-15.98	0.02	
	+30	21.63	0.03	
	+40	-2.73	0	
	+55	8.69	0	
4.2	+25	38.24	0.05	2.5
3.6	+25	36.41	0.05	

4. LTE Band 17(16QAM)

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 710MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	15.25	0.02	2.5
	-20	9.75	0.01	
	-10	22.35	0.03	
	0	-34.47	0.05	
	+10	-18.81	0.03	
	+20	-35.54	0.05	
	+30	41.24	0.06	
	+40	-12.54	0.02	
	+55	8.81	0.01	
4.2	+25	28.67	0.04	2.5
3.6	+25	16.78	0.02	

2.5 Conducted Out of Band Emissions

2.5.1 Requirement

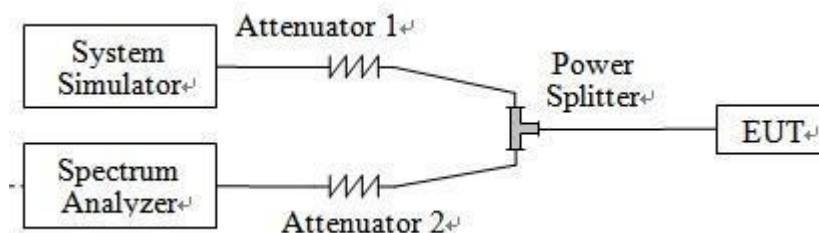
According to FCC section 27.53(h), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43+10*\log(P)$ dB. This calculated to be -13dBm.

It is measured by means of a calibrated spectrum analyzer and scanned from 30MHz up to a frequency including its 10th harmonic.

2.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.5.3 Test Setup



2.5.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. The RF fundamental frequency should be excluded against the limit line in the operating

frequency band.

7. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P (Watts)

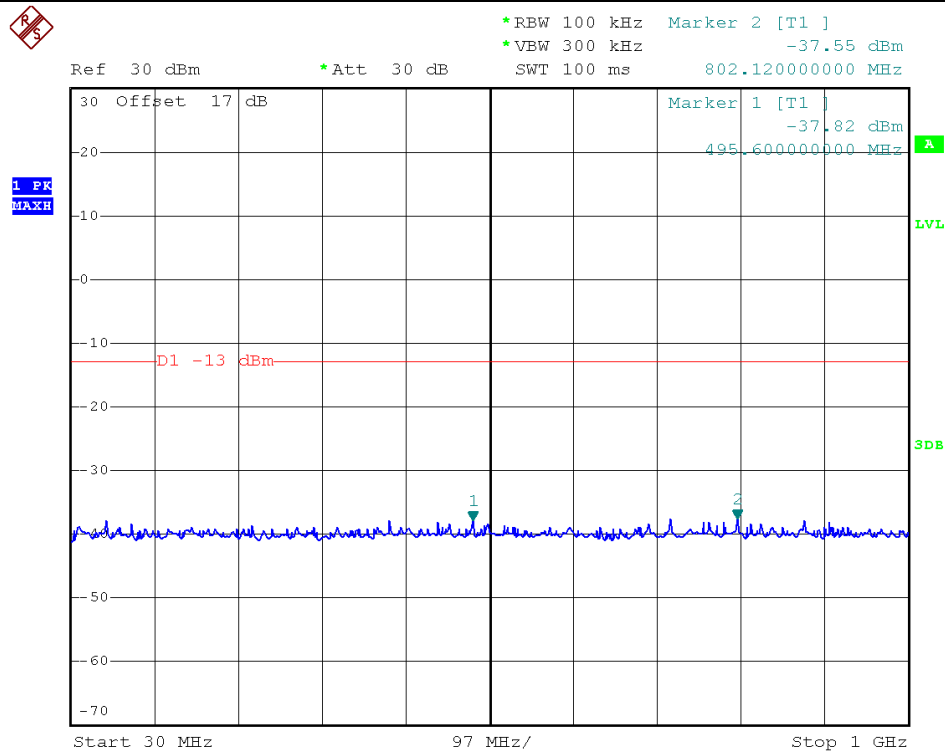
$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$

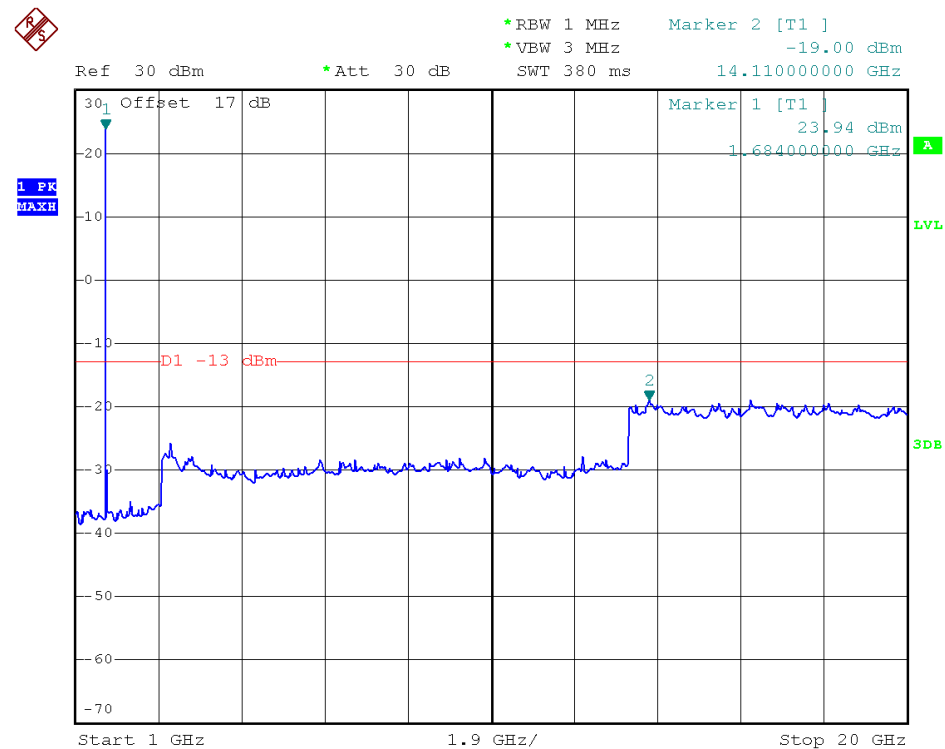
$$= -13\text{dBm}.$$

2.5.5 Test Result (Plots) of Conducted Spurious Emission

Band	LTE Band 4	Channel	Ch 19957(Low)
Bandwidth	1.4MHz	Modulation	QPSK



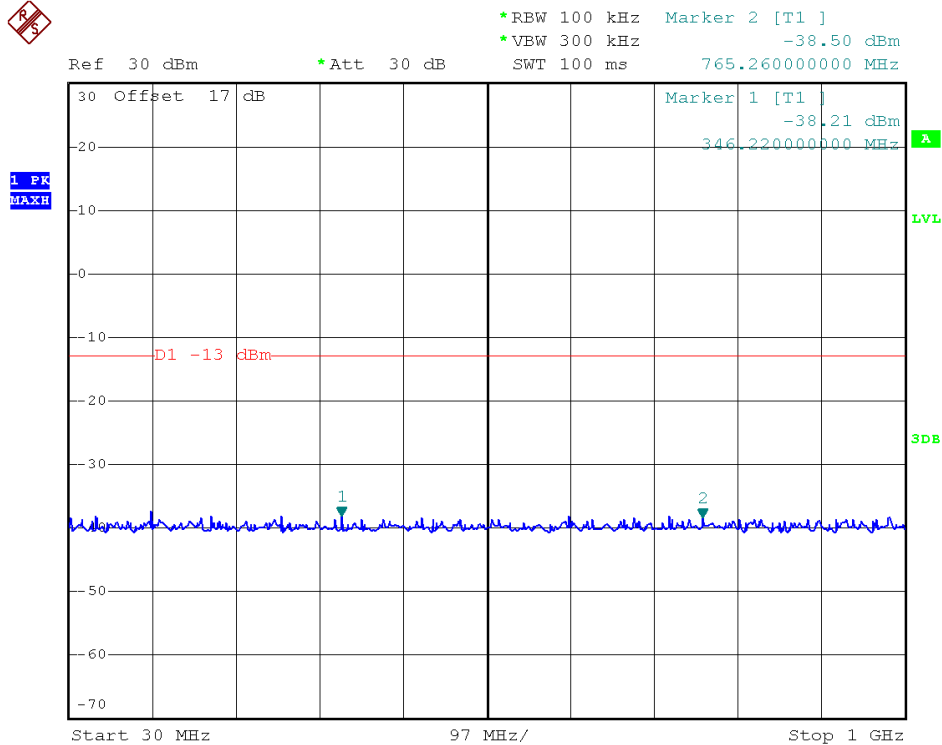
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



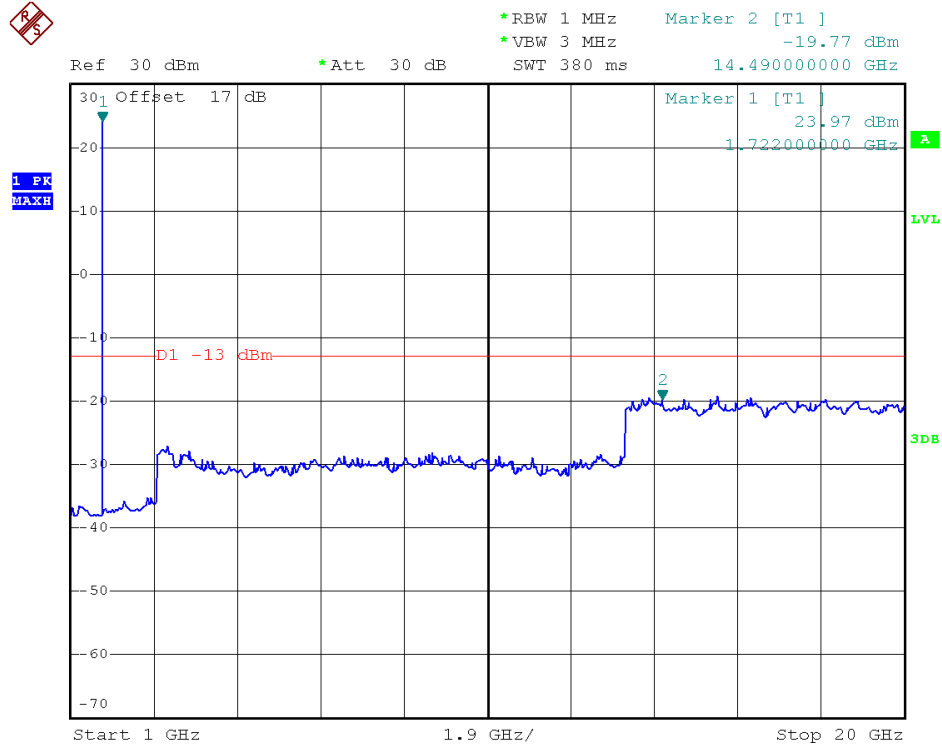
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 20175(Middle)
Bandwidth	1.4MHz	Modulation	QPSK



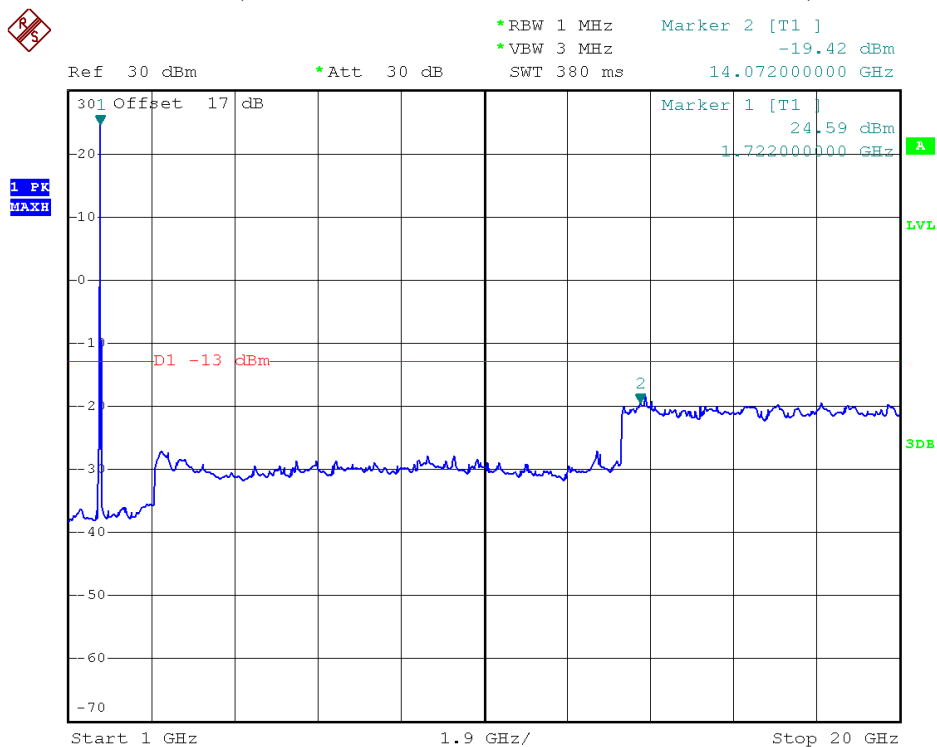
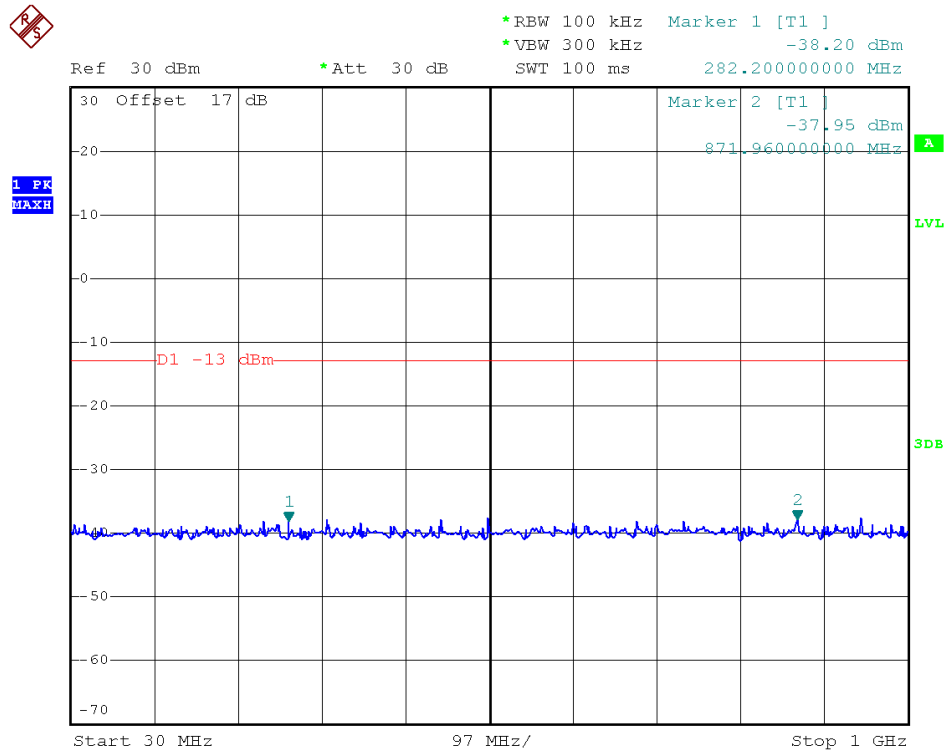
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

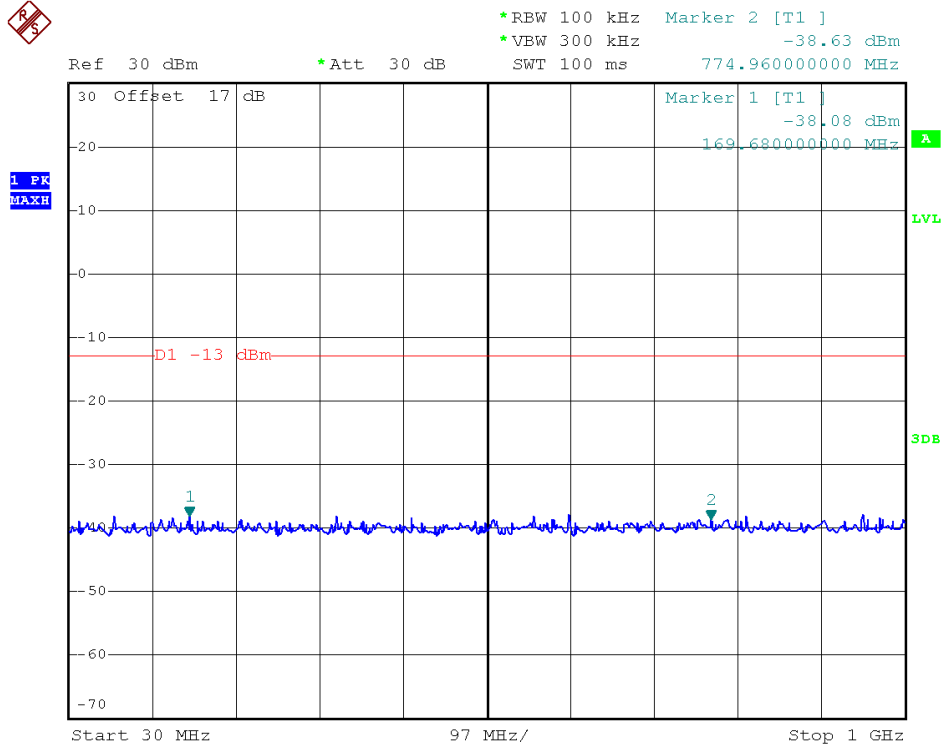


Band	LTE Band 4	Channel	Ch 20393(High)
Bandwidth	1.4MHz	Modulation	QPSK

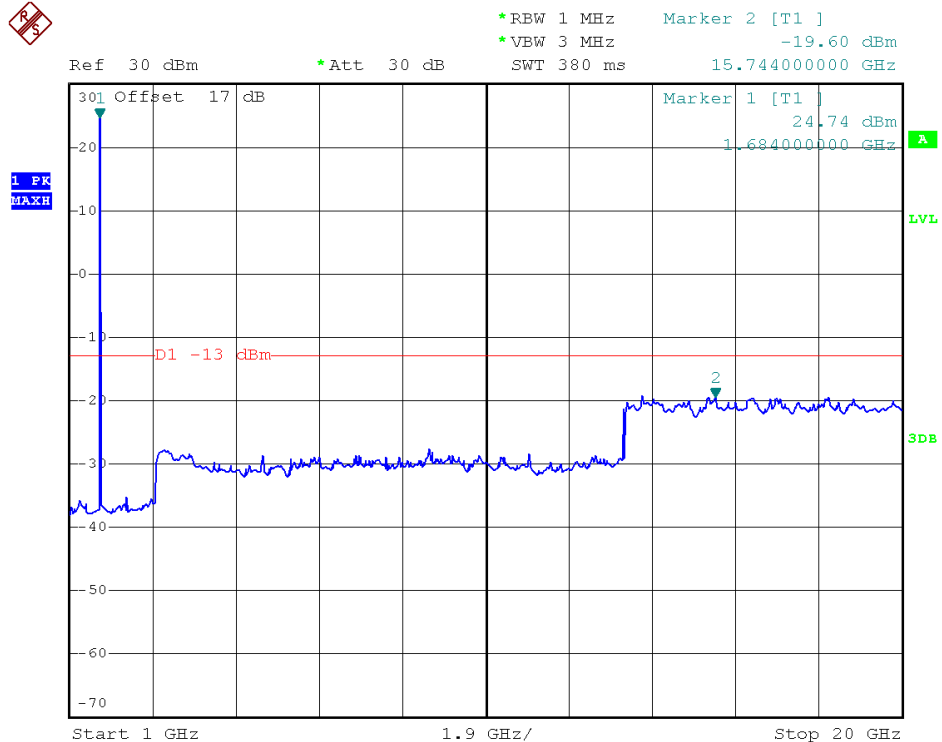




Band	LTE Band 4	Channel	Ch 19965(Low)
Bandwidth	3MHz	Modulation	QPSK

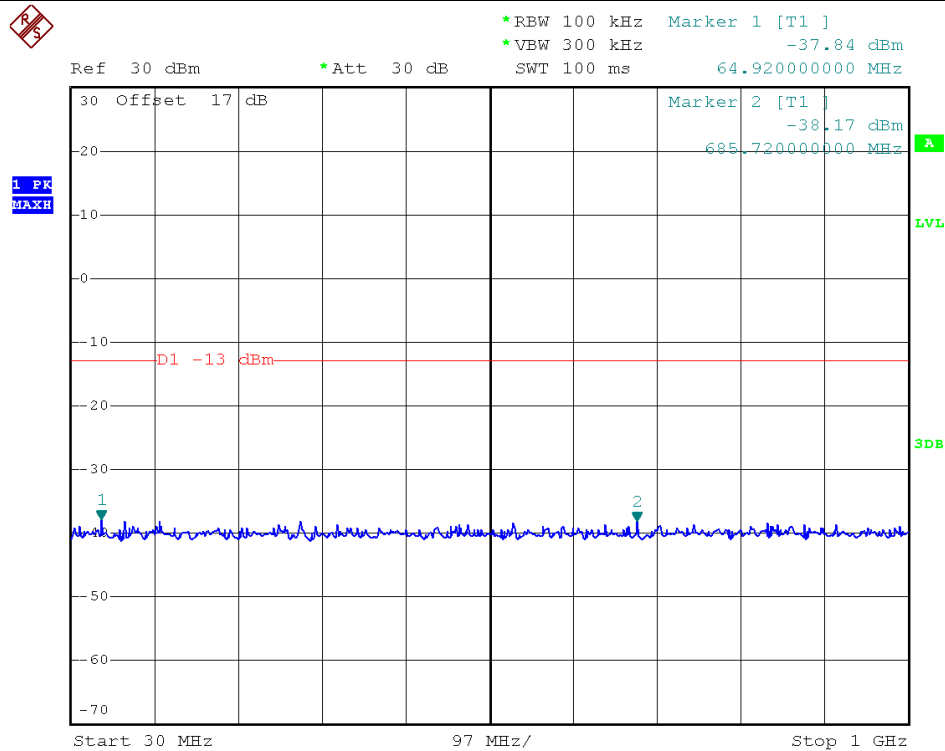


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

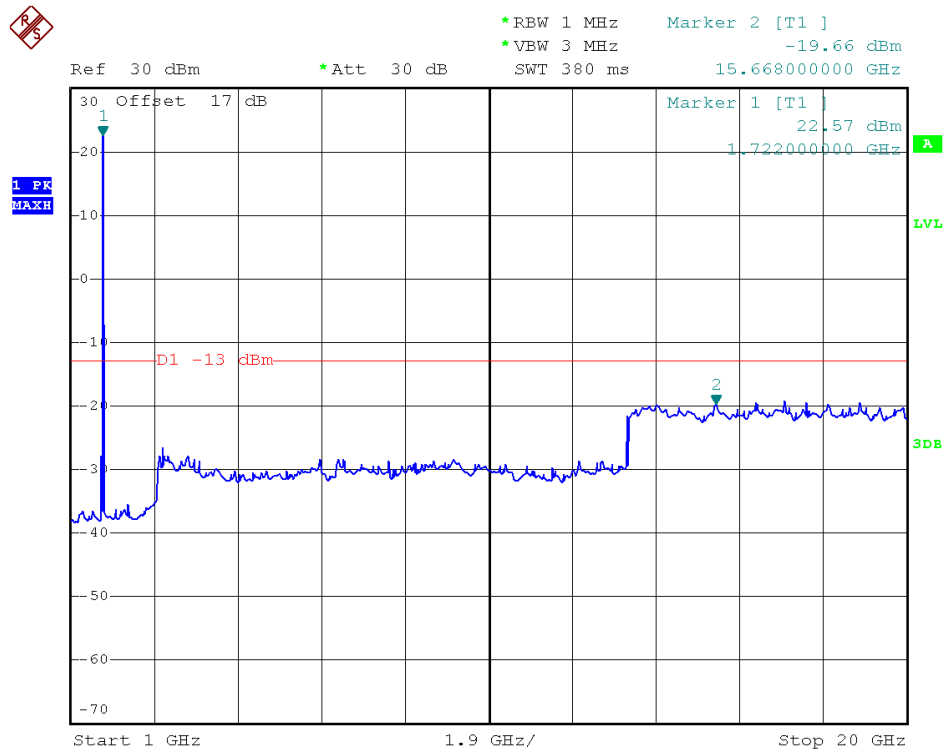


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

Band	LTE Band 4	Channel	Ch 20175(Middle)
Bandwidth	3MHz	Modulation	QPSK



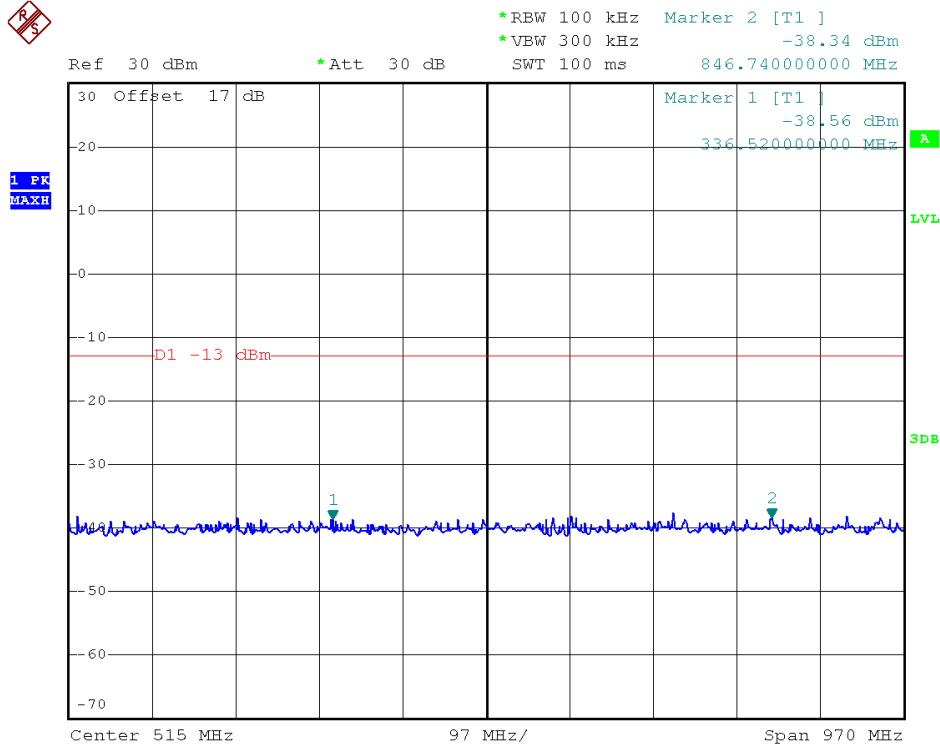
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



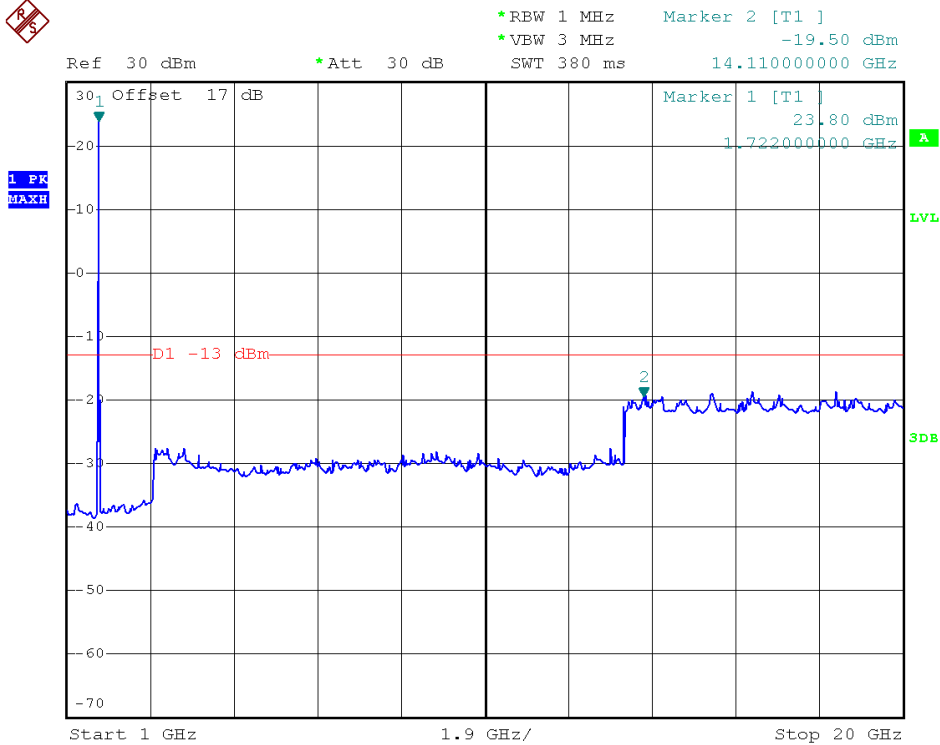
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 20385(High)
Bandwidth	3MHz	Modulation	QPSK



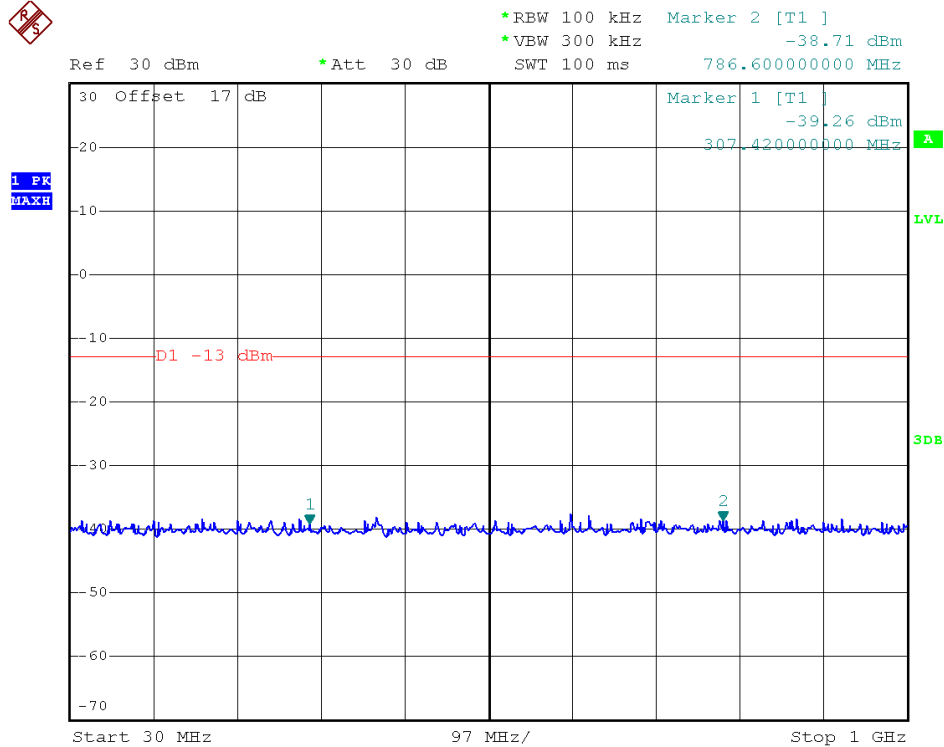
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



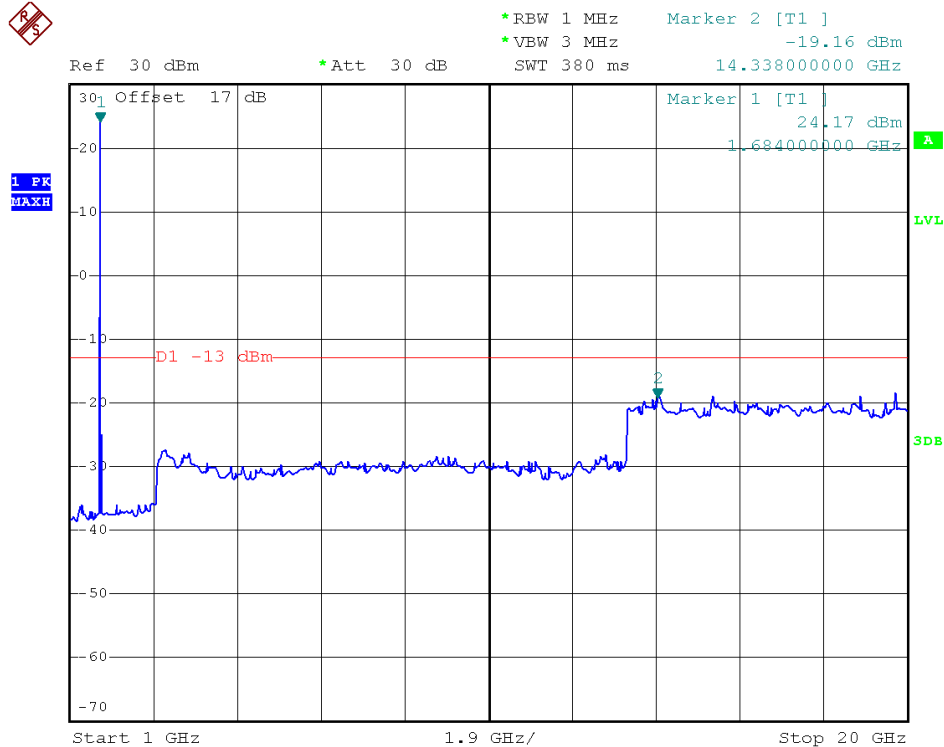
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 19975(Low)
Bandwidth	5MHz	Modulation	QPSK

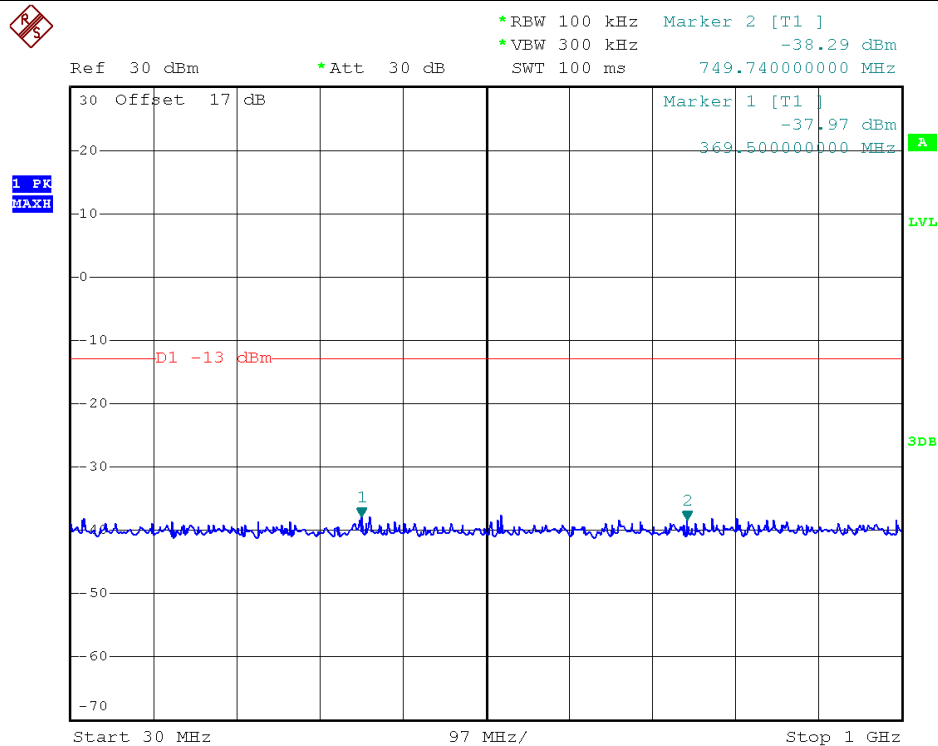


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

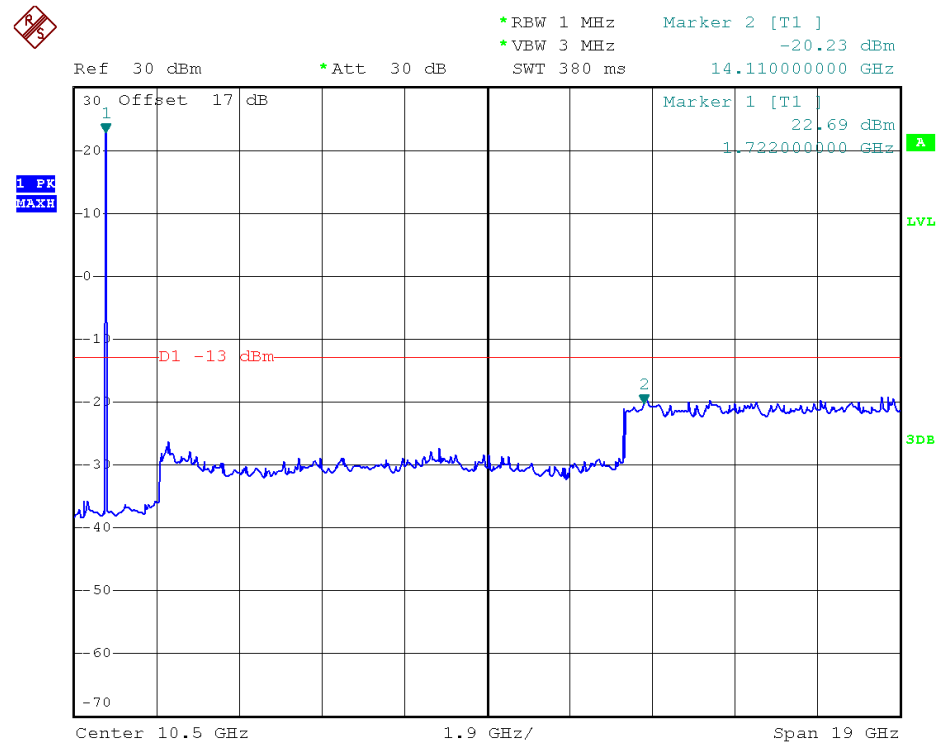


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

Band	LTE Band 4	Channel	Ch 20175(Middle)
Bandwidth	5MHz	Modulation	QPSK



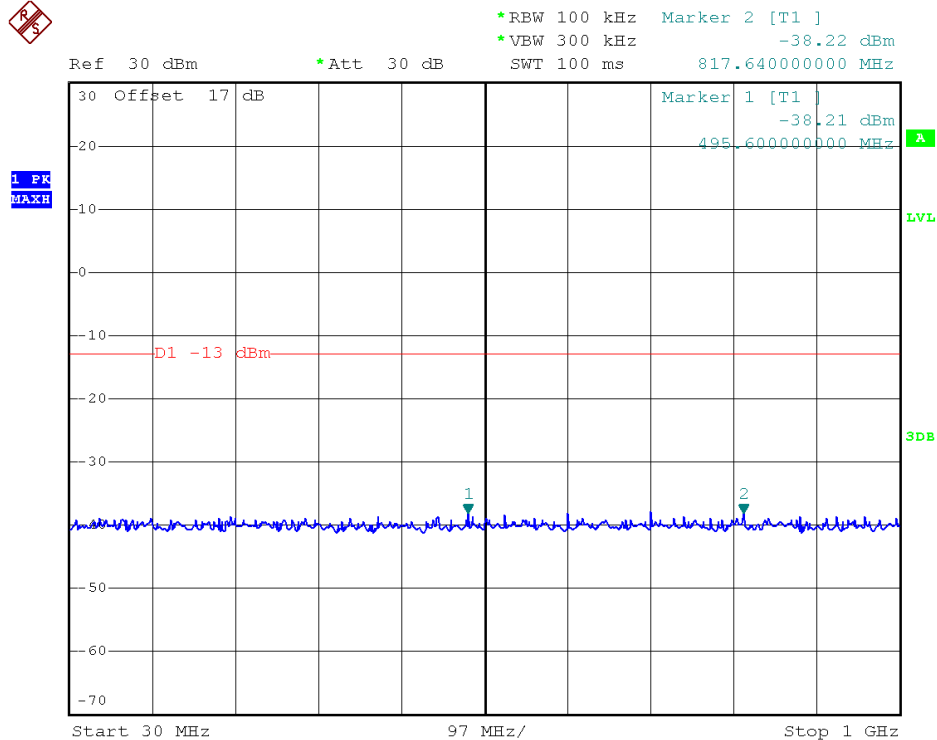
QPSK, (RB Size 1, RB Offset 0) 30MHz to 1GHz



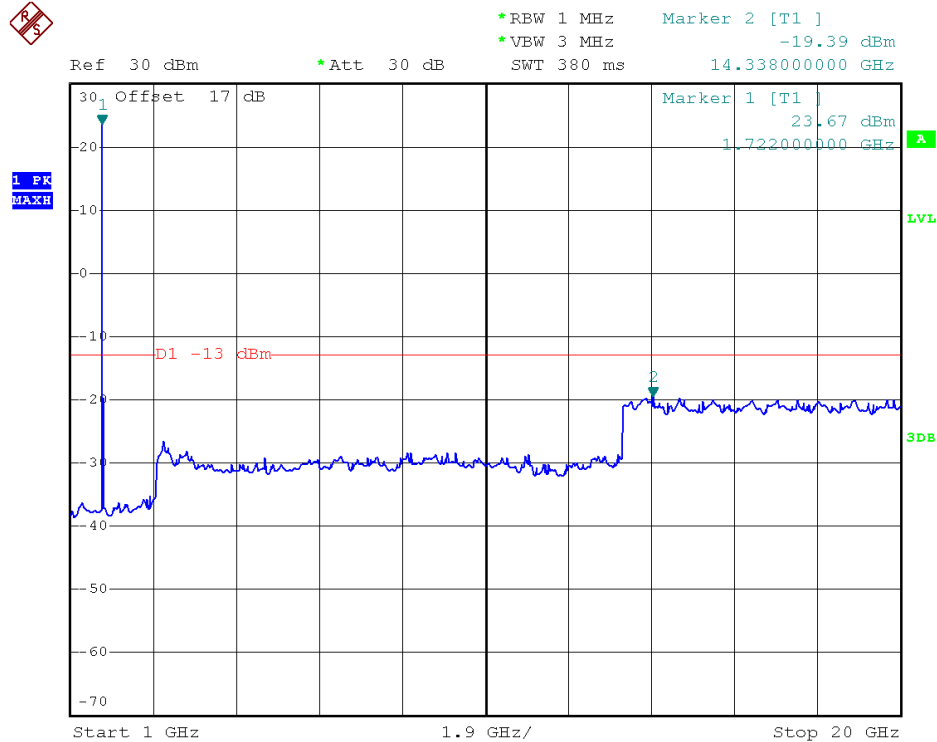
QPSK, (RB Size 1, RB Offset 0) 1GHz to 18GHz



Band	LTE Band 4	Channel	Ch 20375(High)
Bandwidth	5MHz	Modulation	QPSK



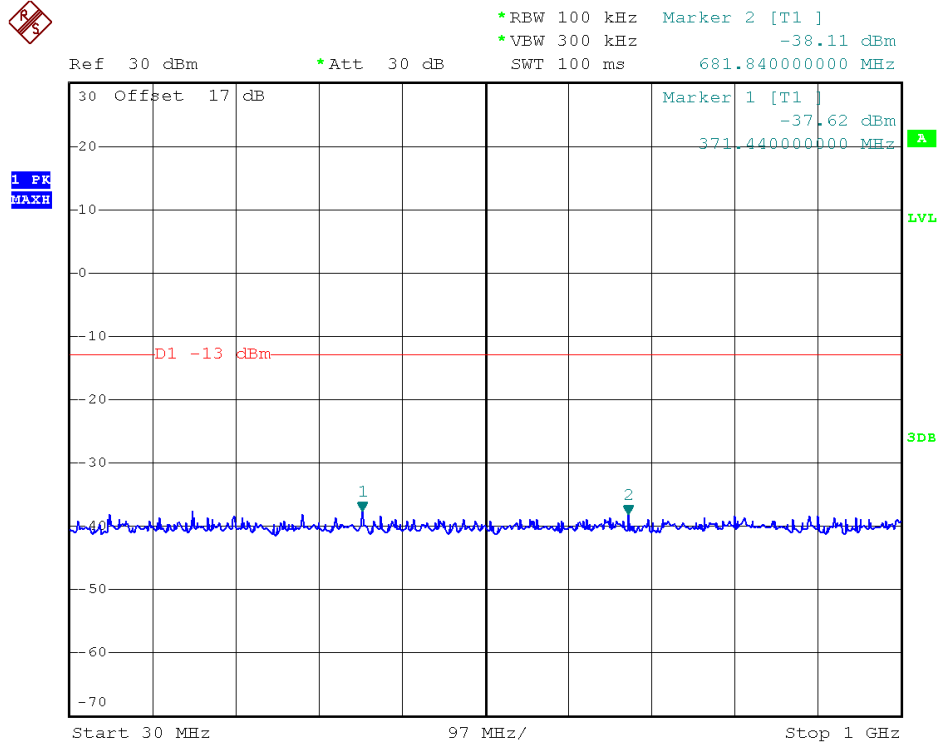
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



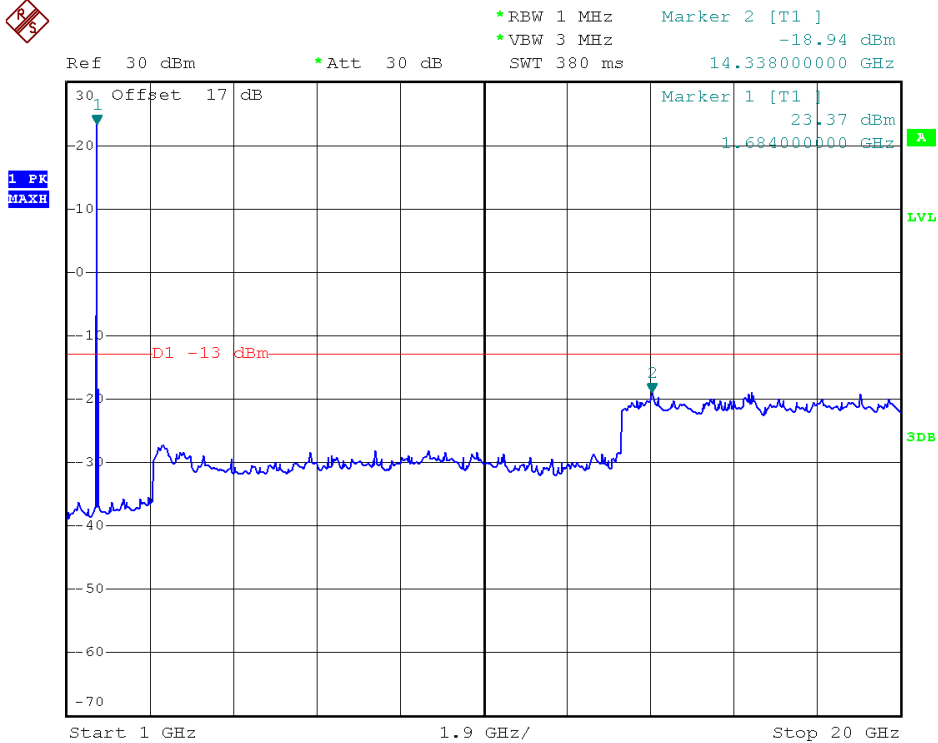
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 20000(Low)
Bandwidth	10MHz	Modulation	QPSK

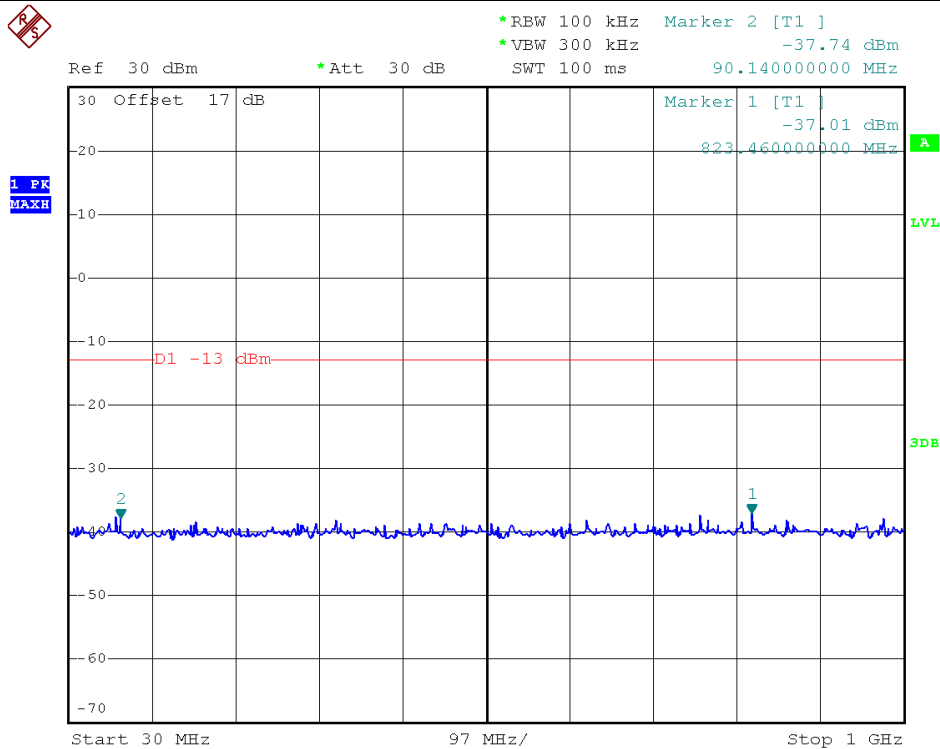


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

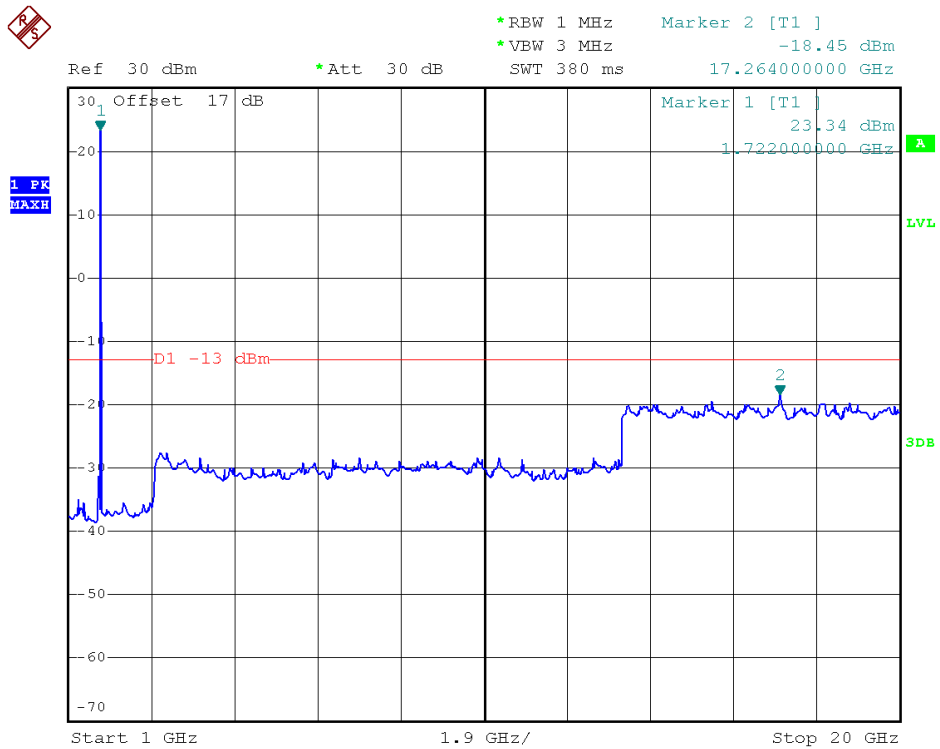


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

Band	LTE Band 4	Channel	Ch 20175(Middle)
Bandwidth	10MHz	Modulation	QPSK



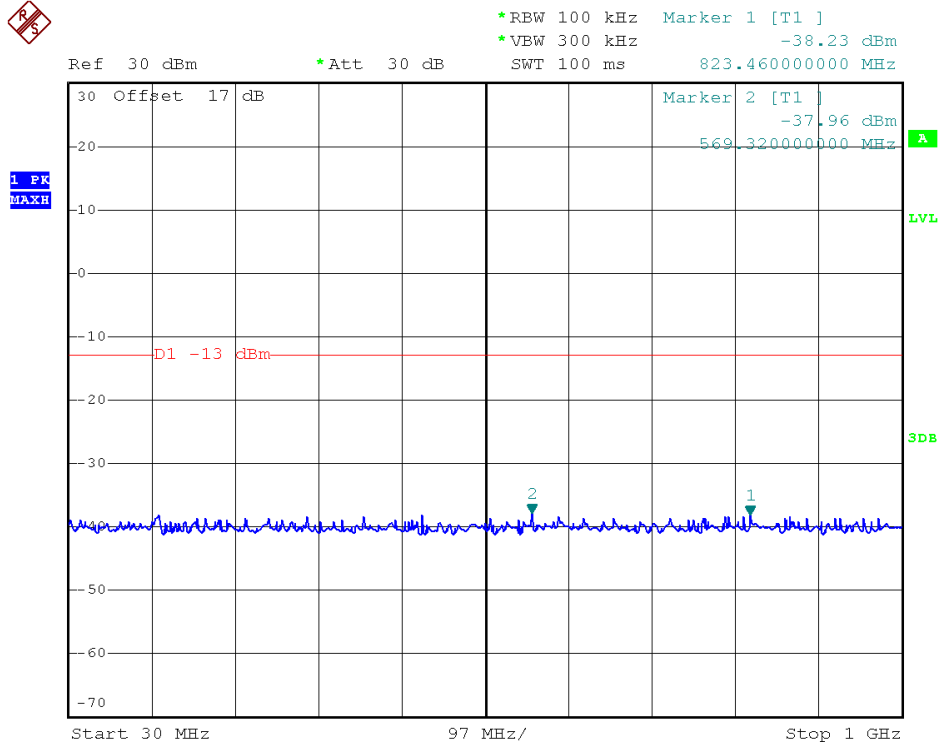
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



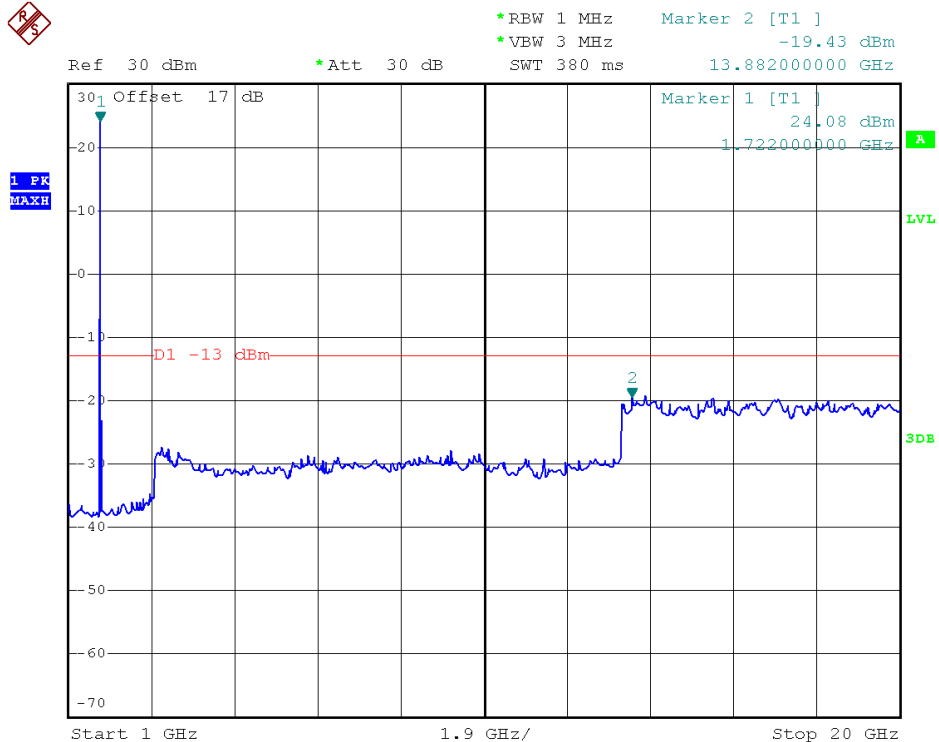
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 20350(High)
Bandwidth	10MHz	Modulation	QPSK



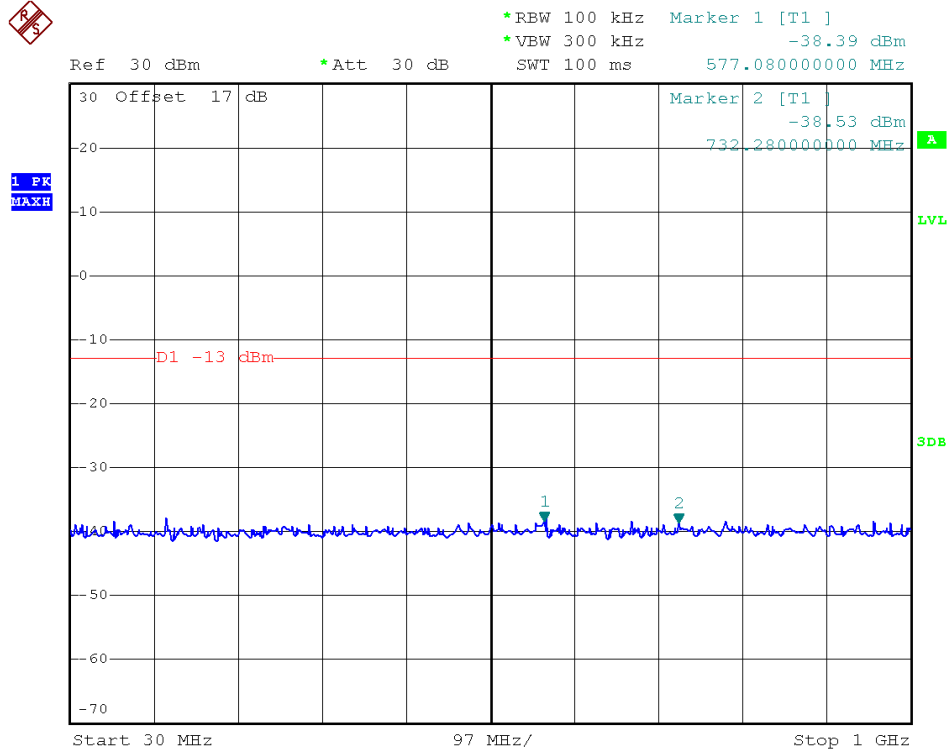
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



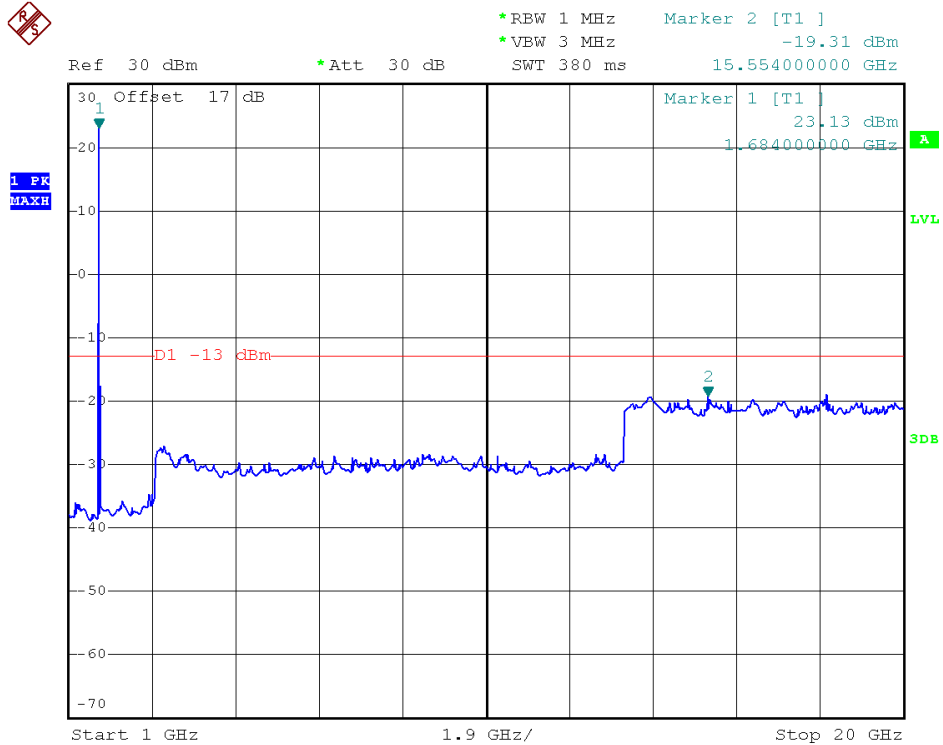
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 20025(Low)
Bandwidth	15MHz	Modulation	QPSK



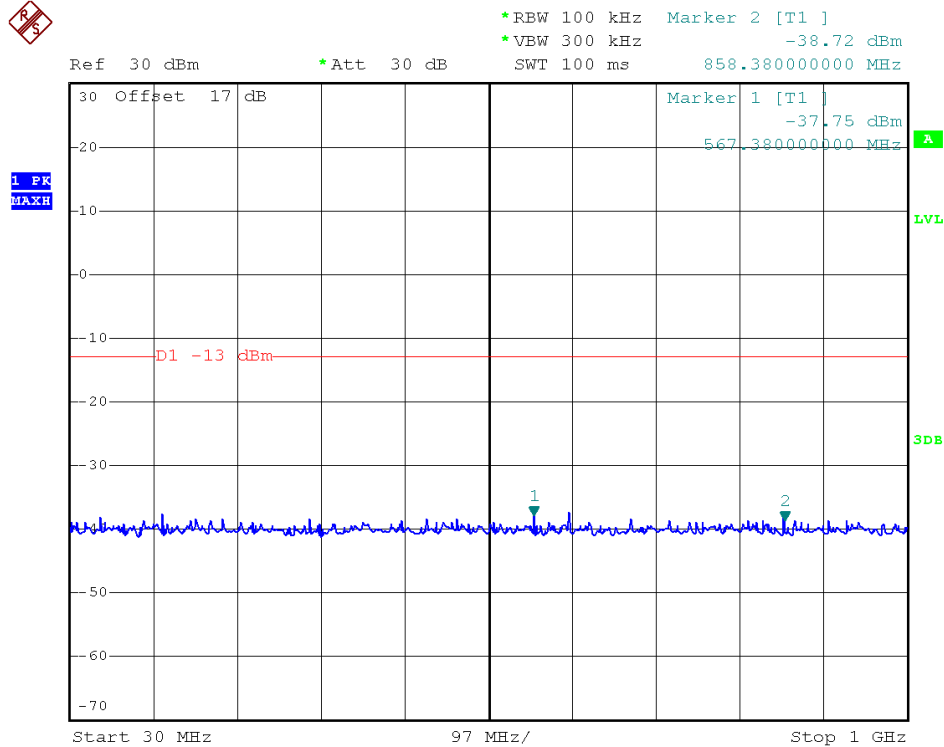
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



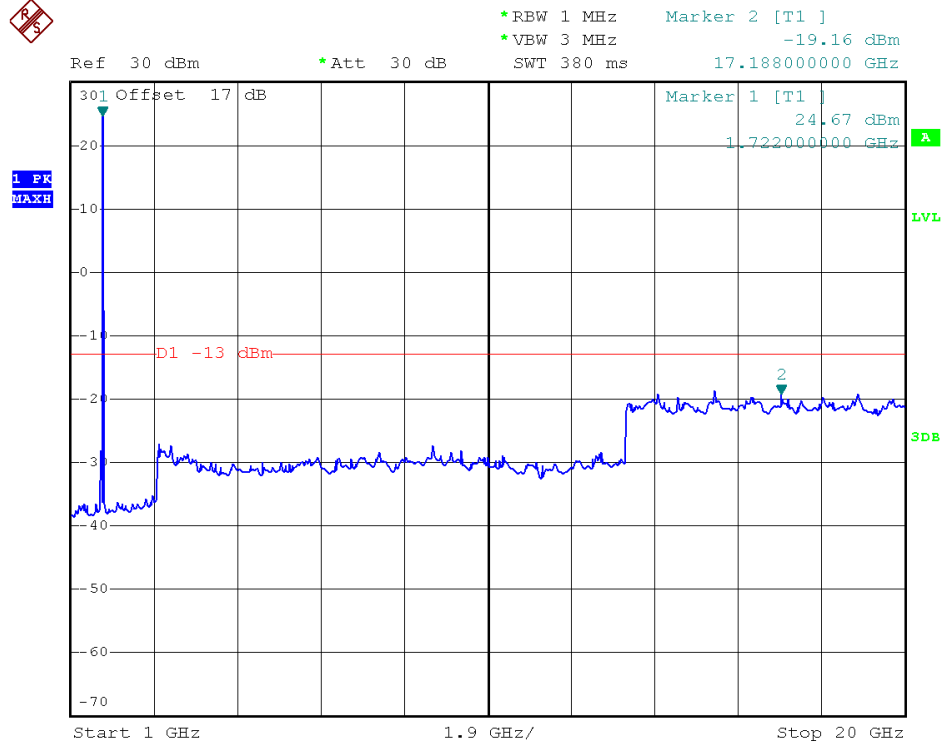
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 20175(Middle)
Bandwidth	15MHz	Modulation	QPSK

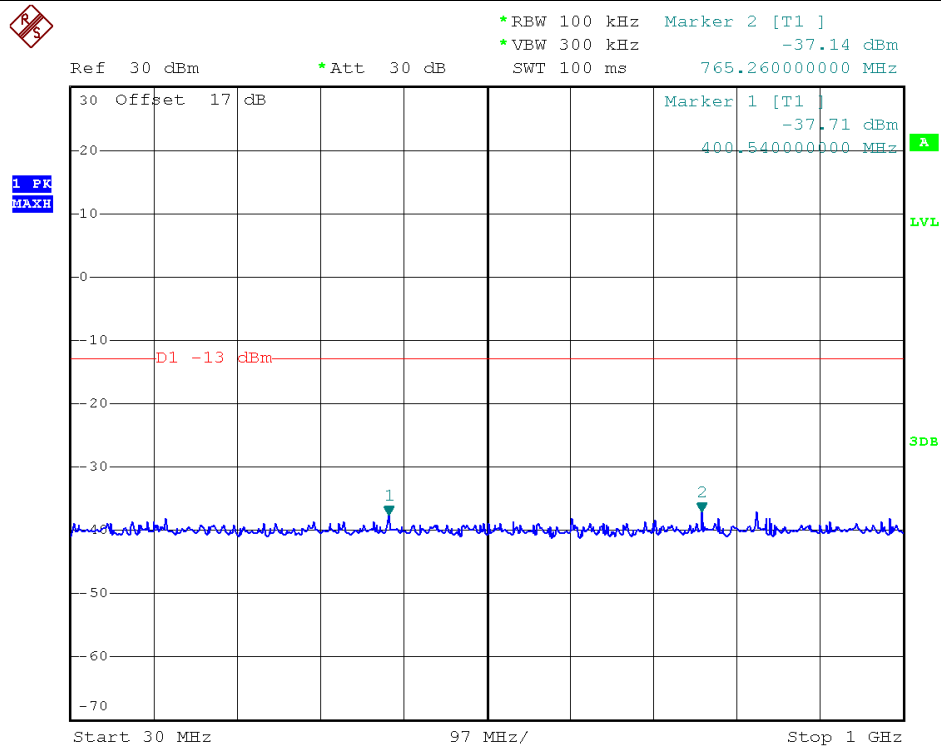


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

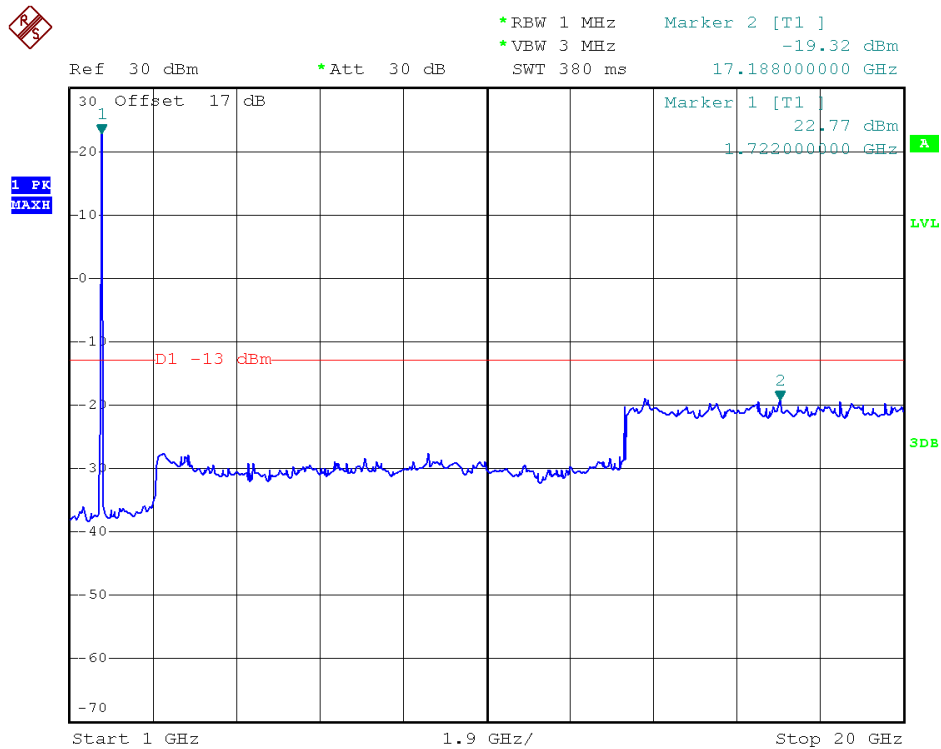


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

Band	LTE Band 4	Channel	Ch 20325(High)
Bandwidth	15MHz	Modulation	QPSK

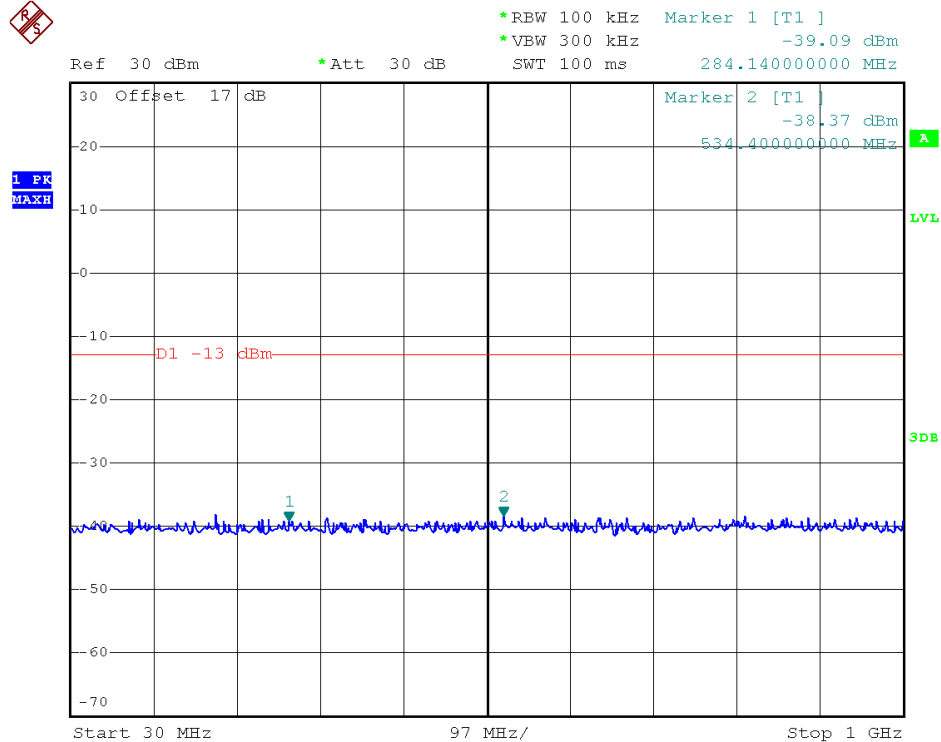


QPSK, (RB Size 1, RB Offset 0) 30MHz to 1GHz

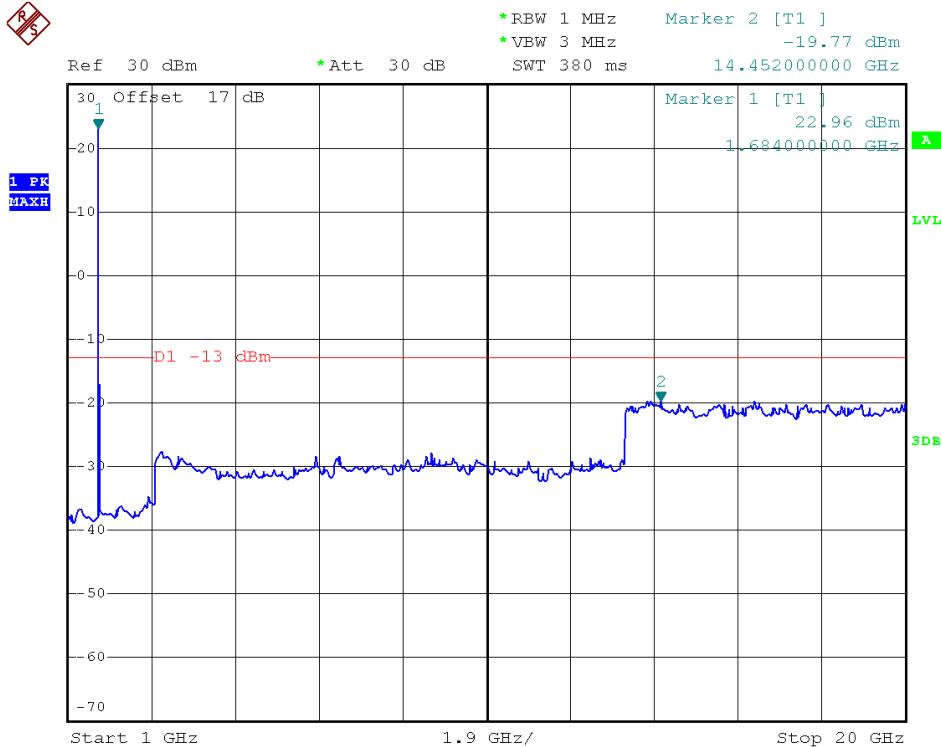


QPSK, (RB Size 1, RB Offset 0) 1GHz to 18GHz

Band	LTE Band 4	Channel	Ch 20050(Low)
Bandwidth	20MHz	Modulation	QPSK



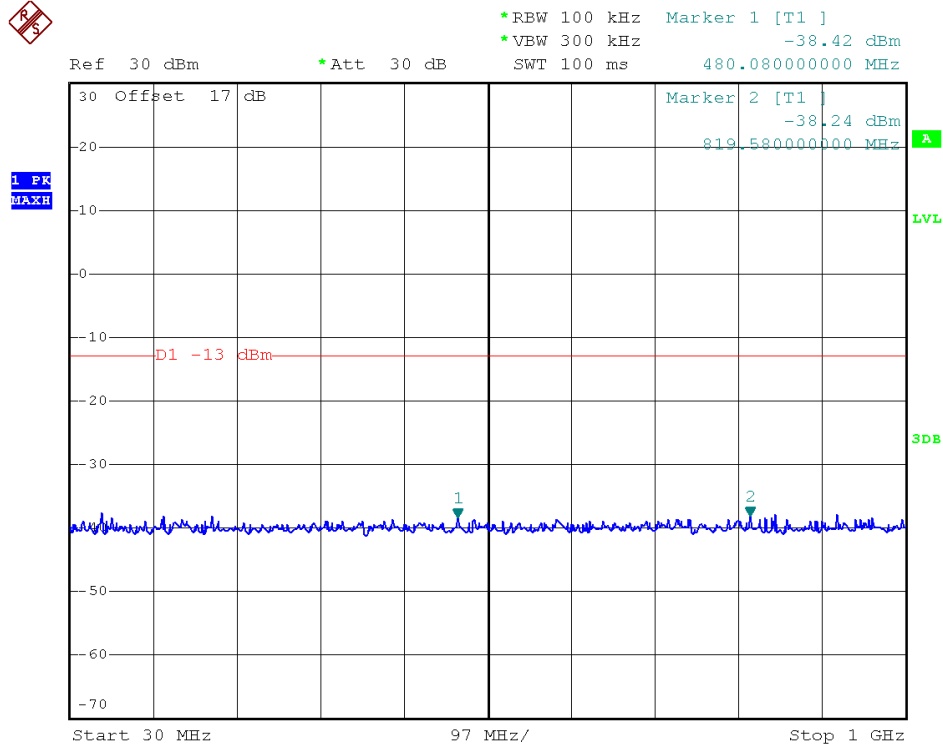
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



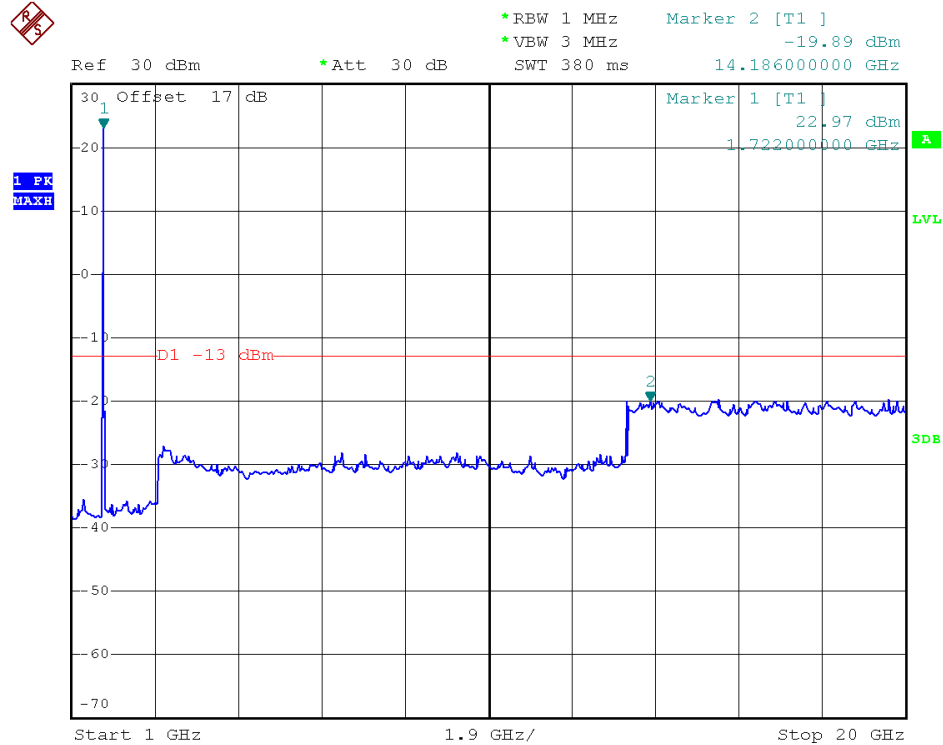
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 20175(Middle)
Bandwidth	20MHz	Modulation	QPSK



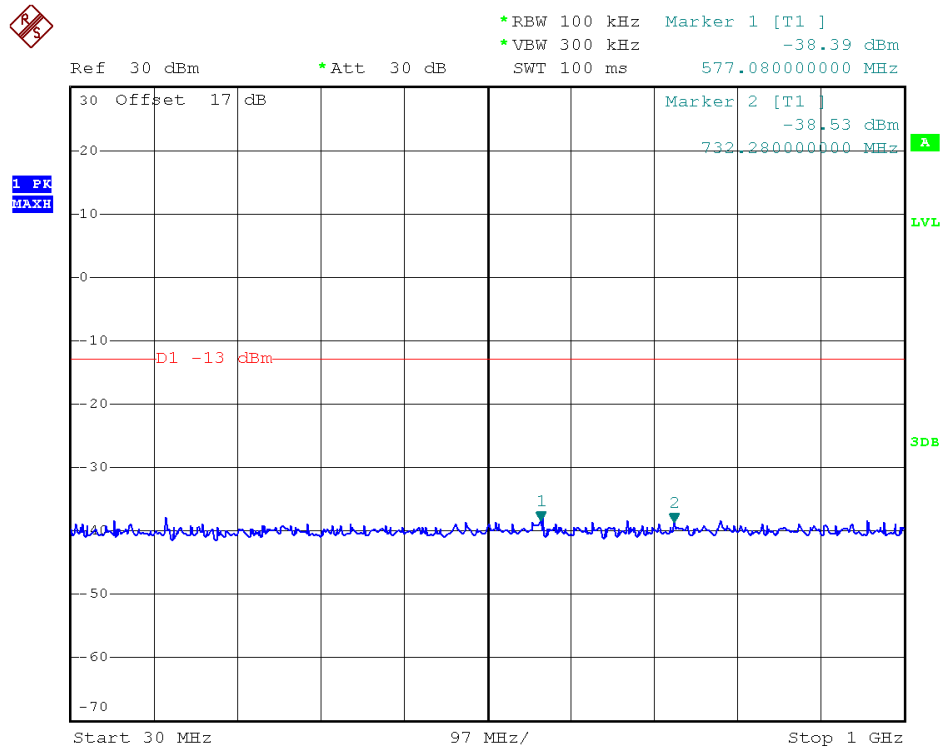
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



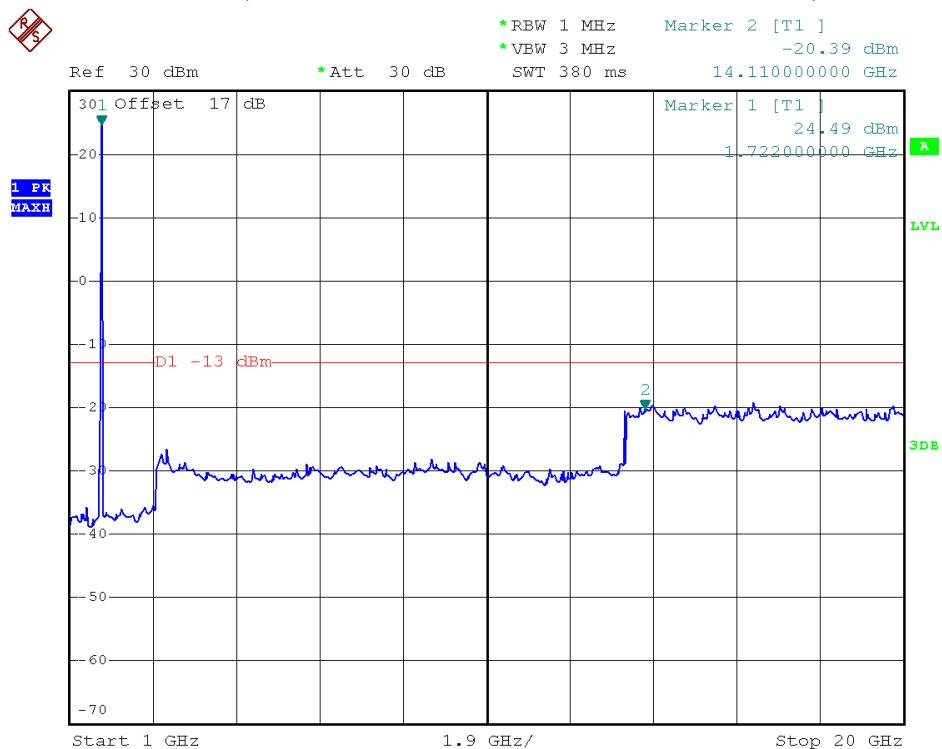
QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)



Band	LTE Band 4	Channel	Ch 20300(High)
Bandwidth	20MHz	Modulation	QPSK



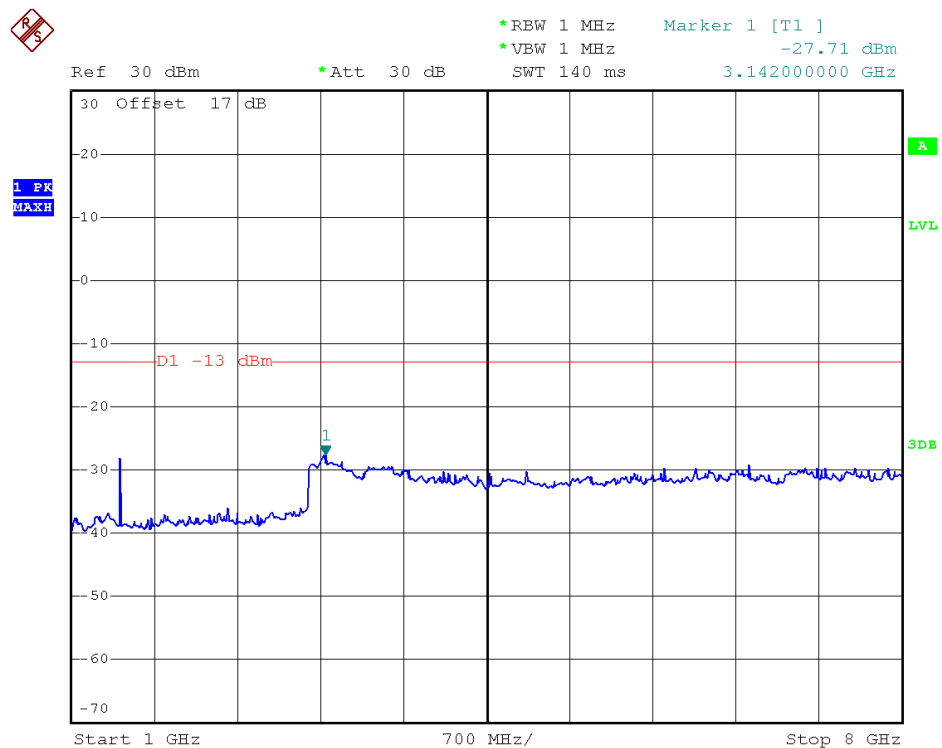
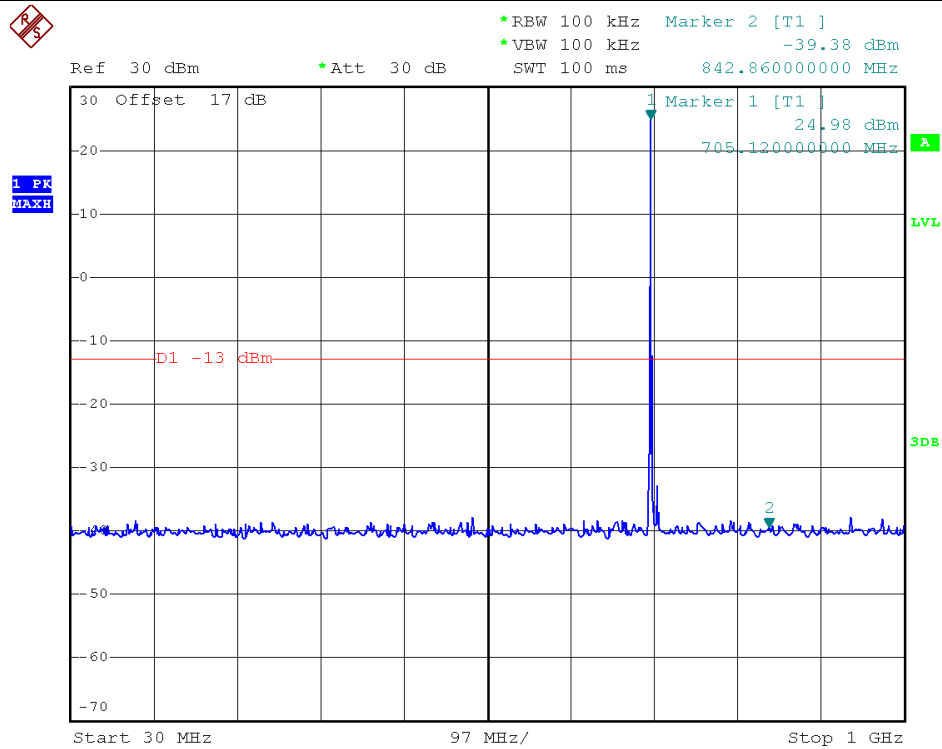
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

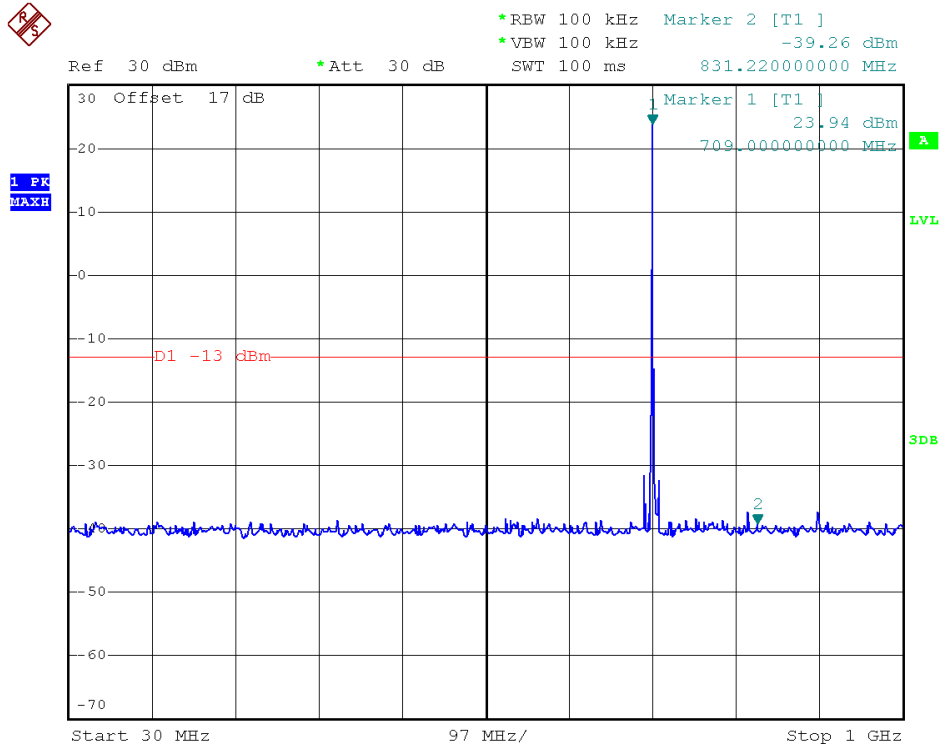


Band	LTE Band 17	Channel	Ch 23755(Low)
Bandwidth	5MHz	Modulation	QPSK

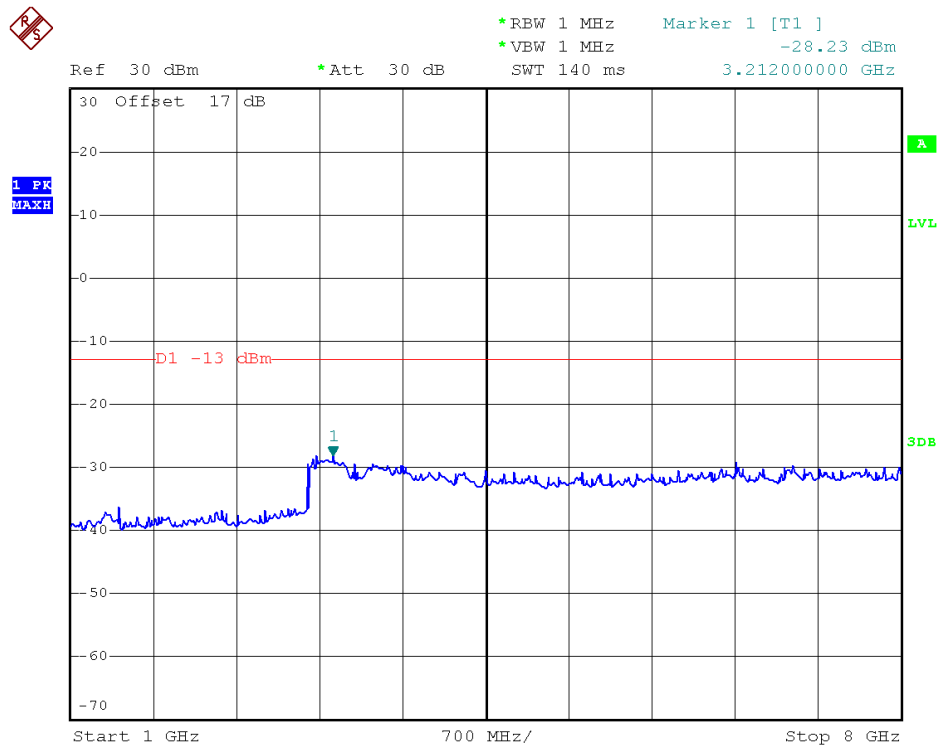




Band	LTE Band 17	Channel:	Ch 23790(Middle)
Bandwidth	5MHz	Modulation	QPSK



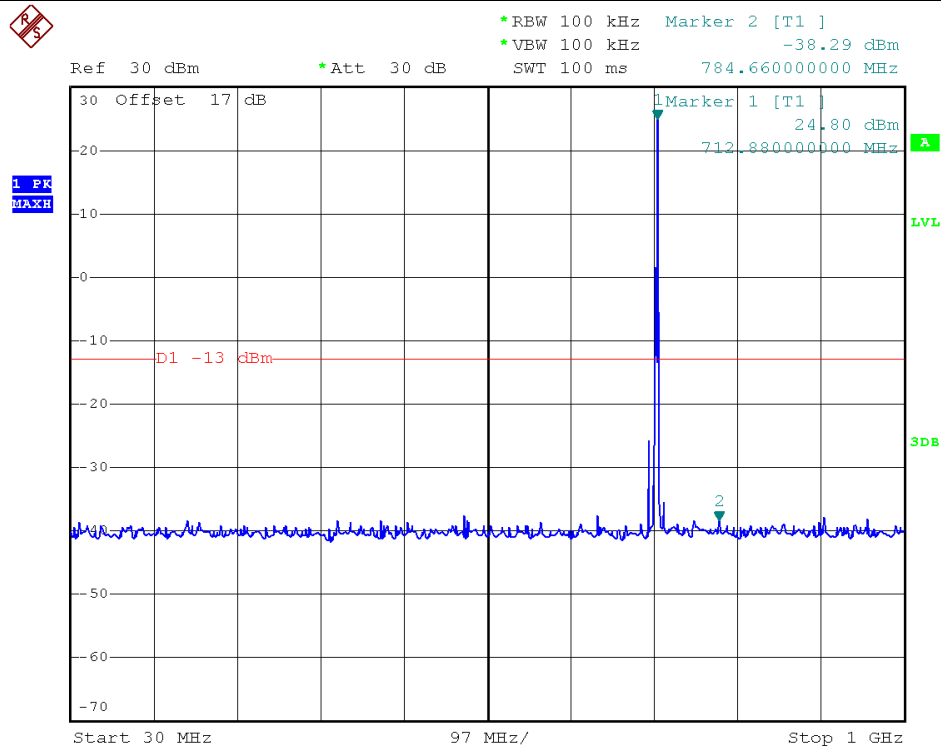
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



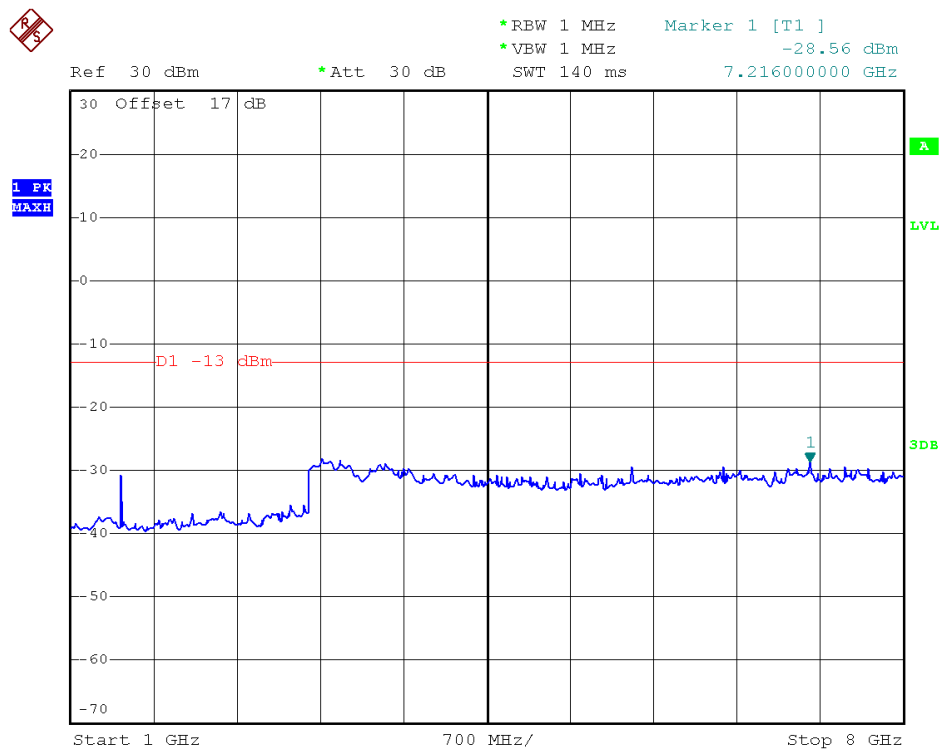
QPSK, (RB Size 1, RB Offset 0 1GHz to 9GHz)



Band	LTE Band 17	Channel:	Ch 23825(High)
Bandwidth	5MHz	Modulation	QPSK

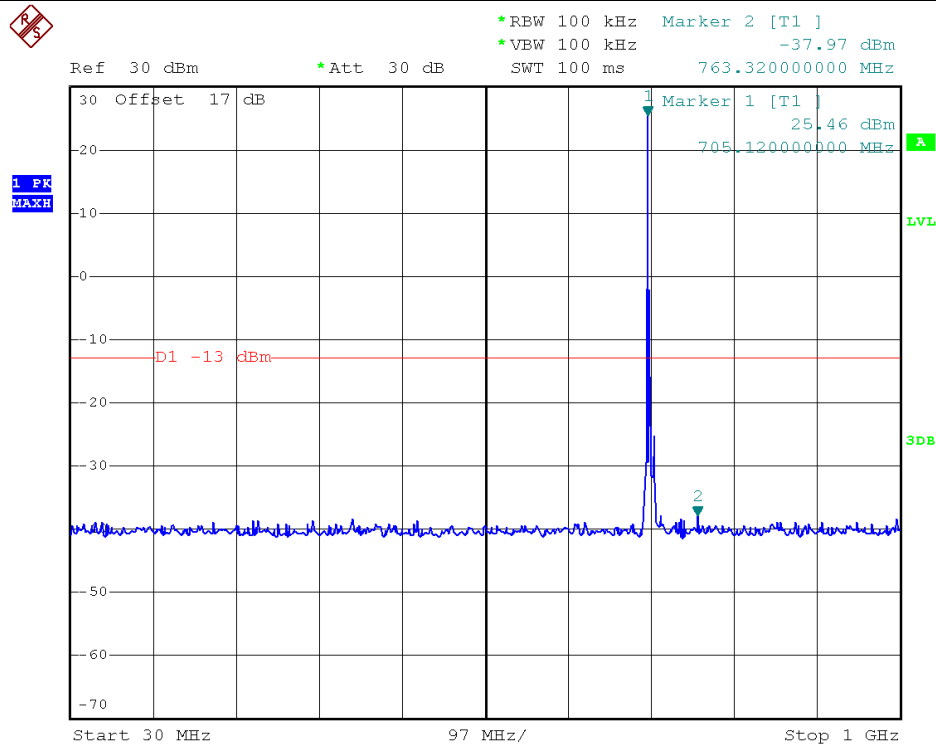


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

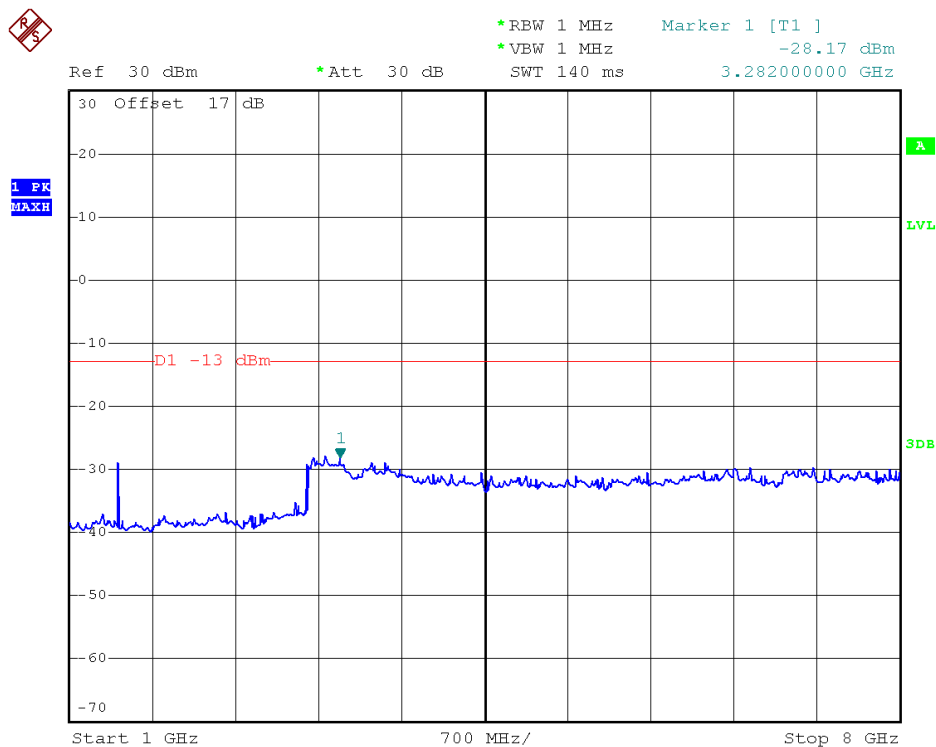


QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)

Band	LTE Band 17	Channel:	Ch 23780(Low)
Bandwidth	10MHz	Modulation	QPSK



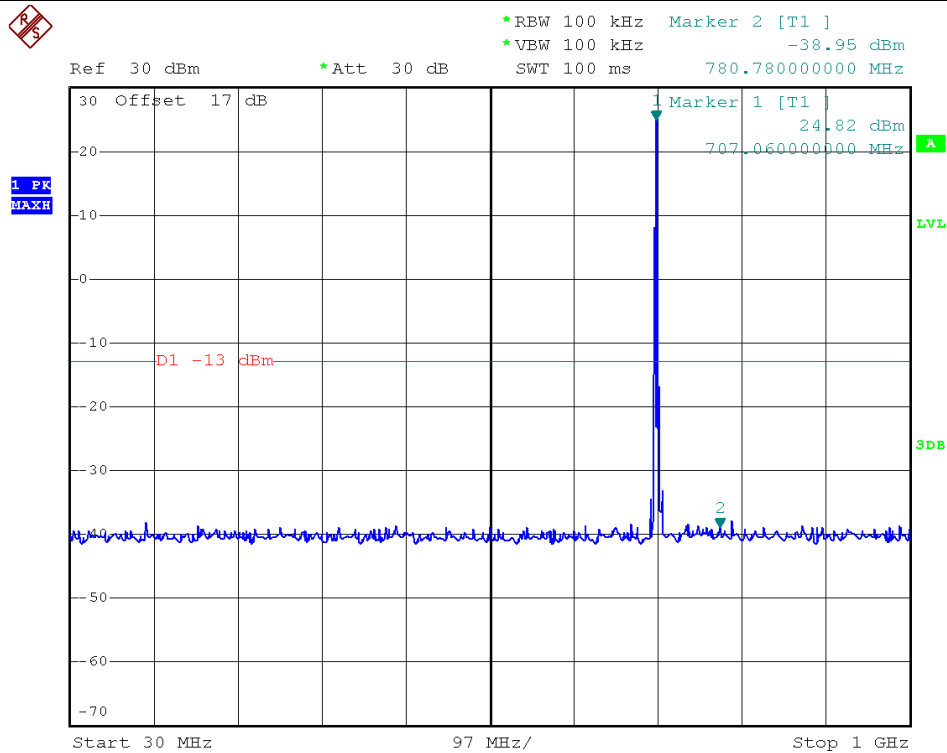
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



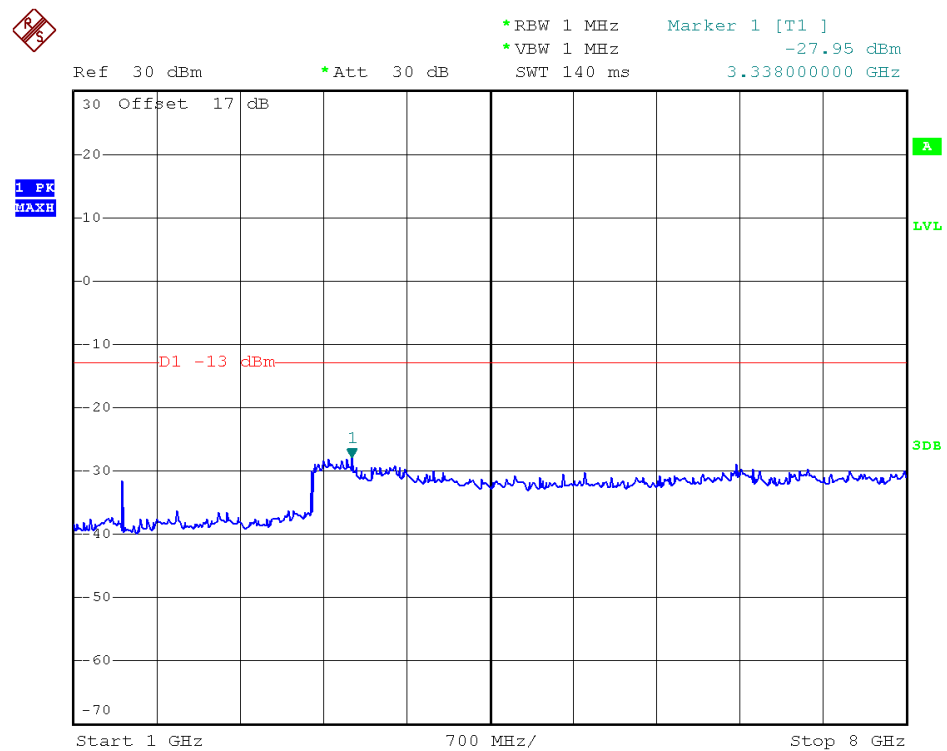
QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)



Band	LTE Band 17	Channel	Ch 23790(Middle)
Bandwidth	10MHz	Modulation	QPSK



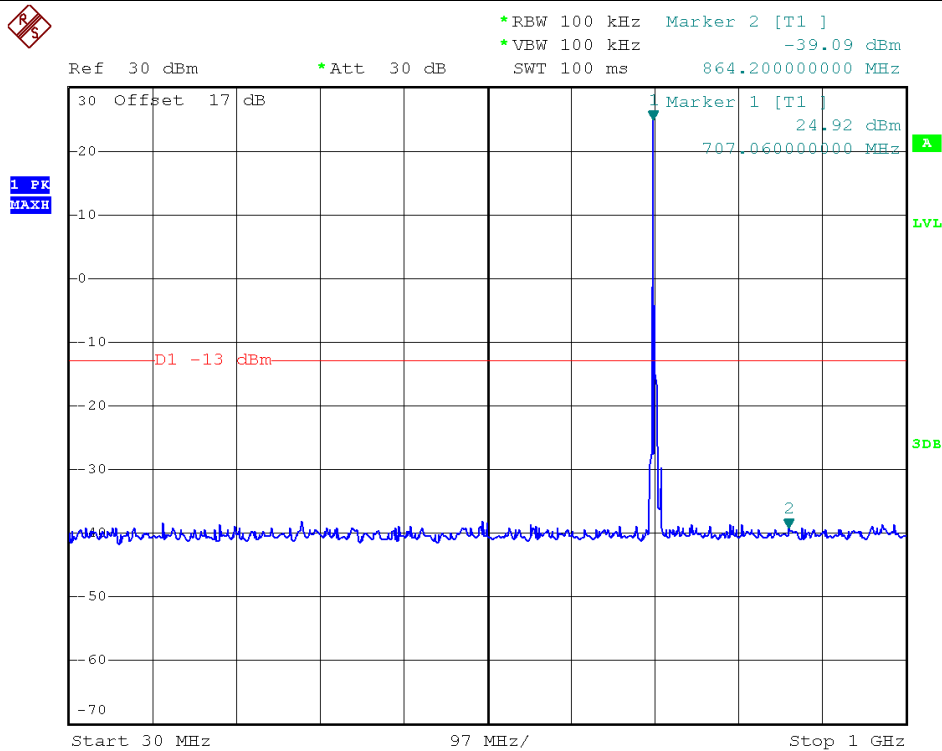
QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



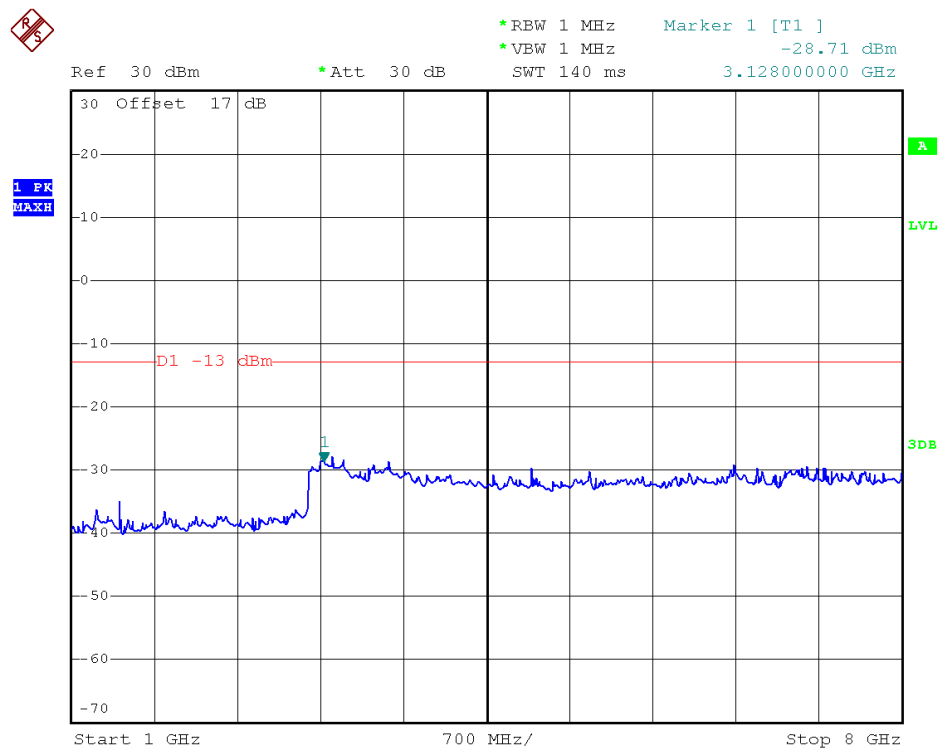
QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)



Band	LTE Band 17	Channel	Ch 23800(High)
Bandwidth	10MHz	Modulation	QPSK



QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)



QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)

2.6 Conducted Band Edge

2.6.1 Description of Conducted Band Edge Measurement

27.53(g) for Band 17

For operations in the 698 -746 MHz band, the FCC limit is $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power $P(\text{Watts})$ in a 100 kHz bandwidth. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

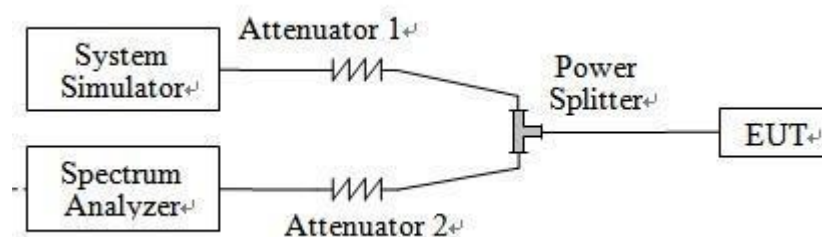
27.53(h) for Band 4

For operations in the 1710 – 1755 MHz band, the FCC limit is $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power $P(\text{Watts})$ in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

2.6.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.6.3 Test Setup



2.6.4 Test Procedures

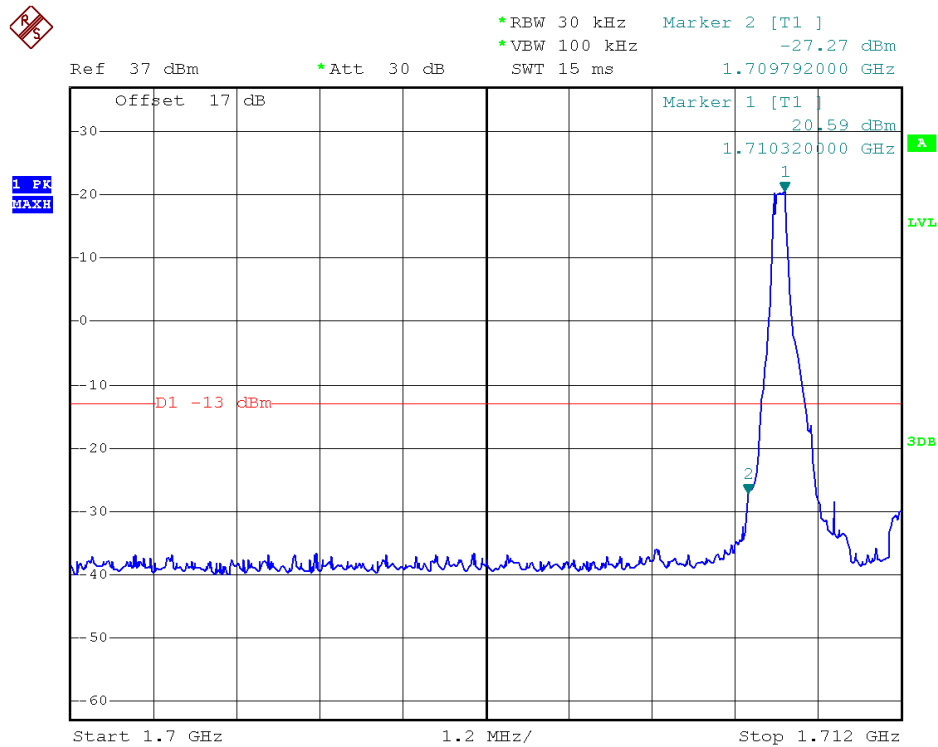
1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Set $RBW \geq 1\% \text{ EBW}$ in the 1MHz band immediately outside and adjacent to the band edge.
3. Set spectrum analyzer with RMS detector.
4. The RF fundamental frequency should be excluded against the limit line in the operating

frequency band.

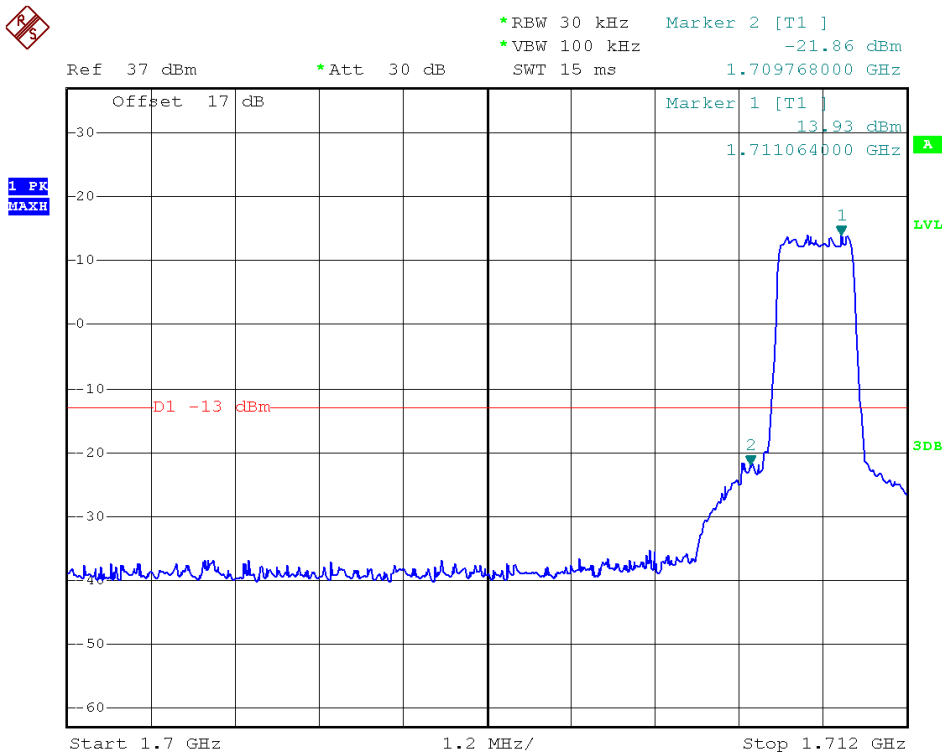
5. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P (Watts)
- $$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$
- $$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$
- $$= -13\text{dBm}.$$

2.6.5 Test Result (Plots) of Conducted Band Edge

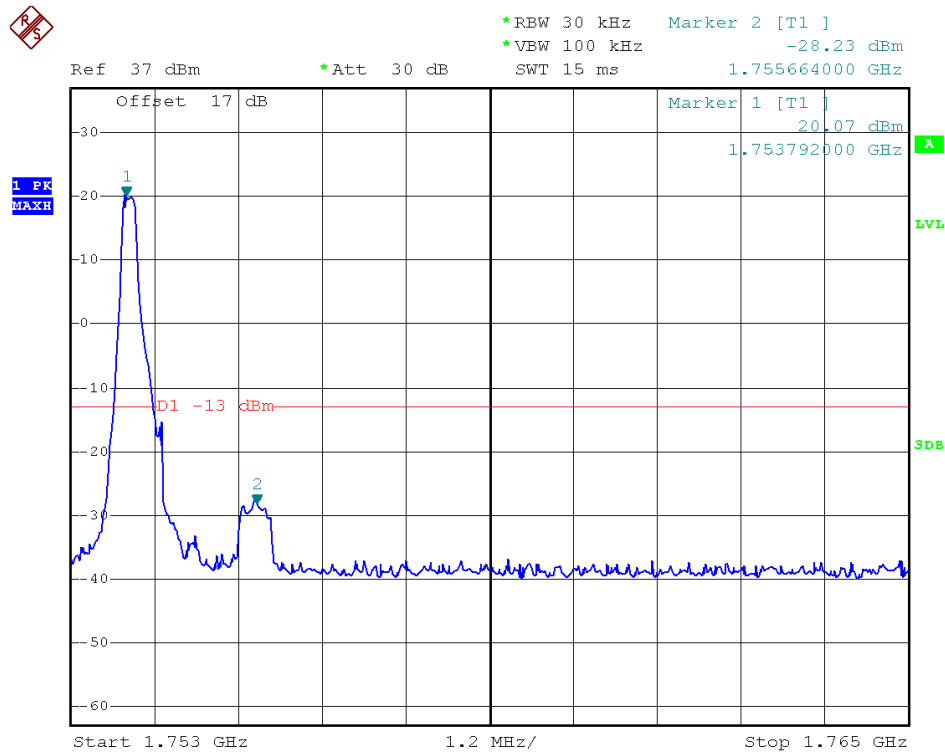
Band	LTE Band 4	Modulation	QPSK
Bandwidth	1.4MHz		



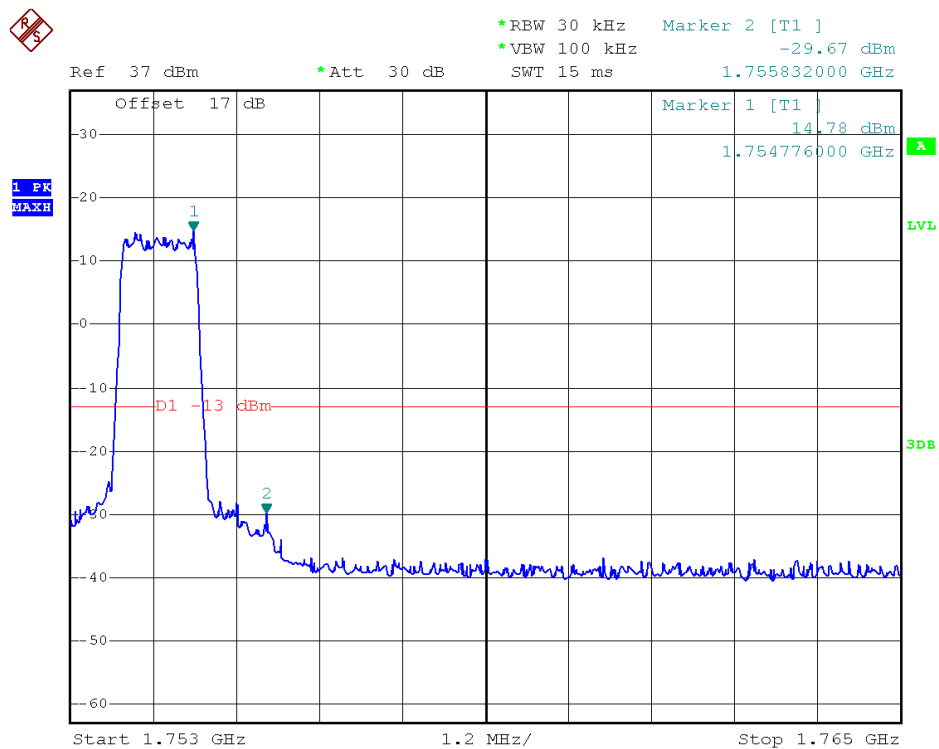
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 6, RB Offset 0



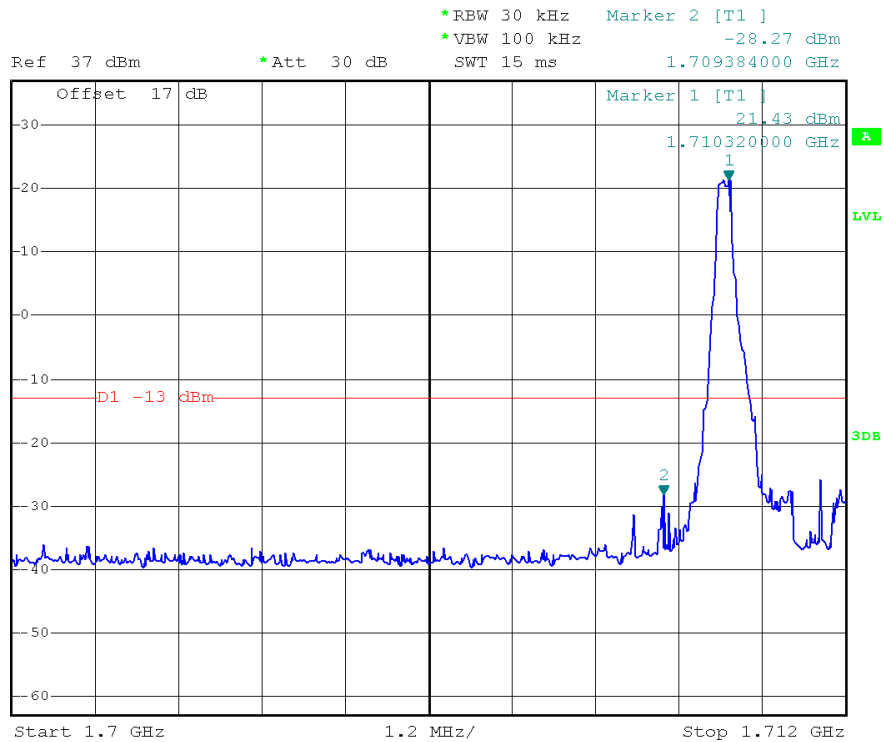
Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 5



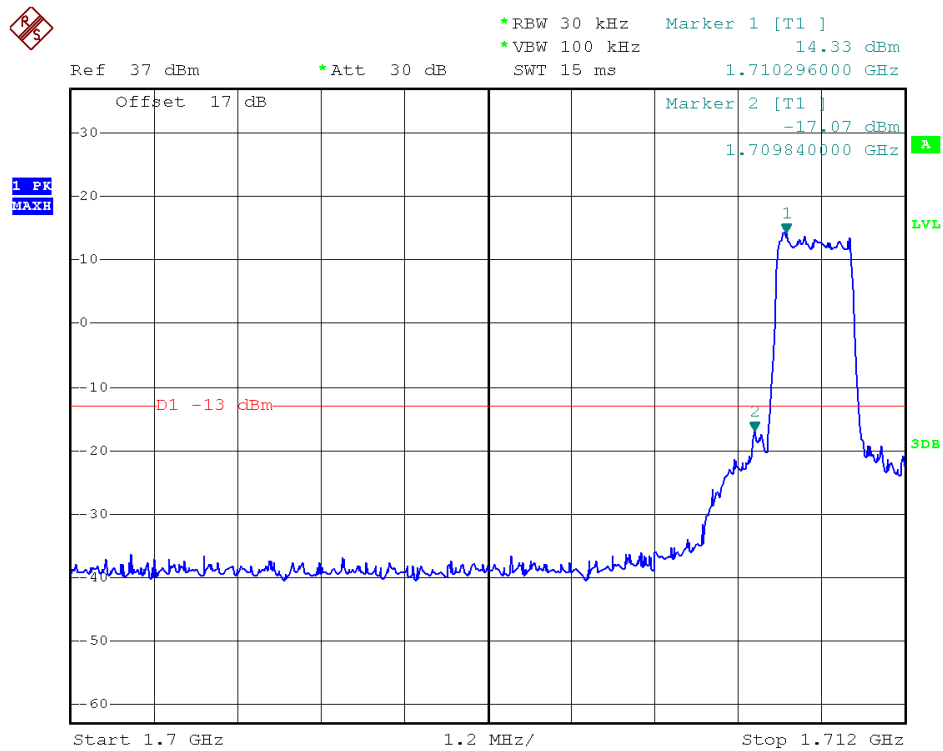
Higher Band Edge Plot for QPSK-RB Size 6, RB Offset 0



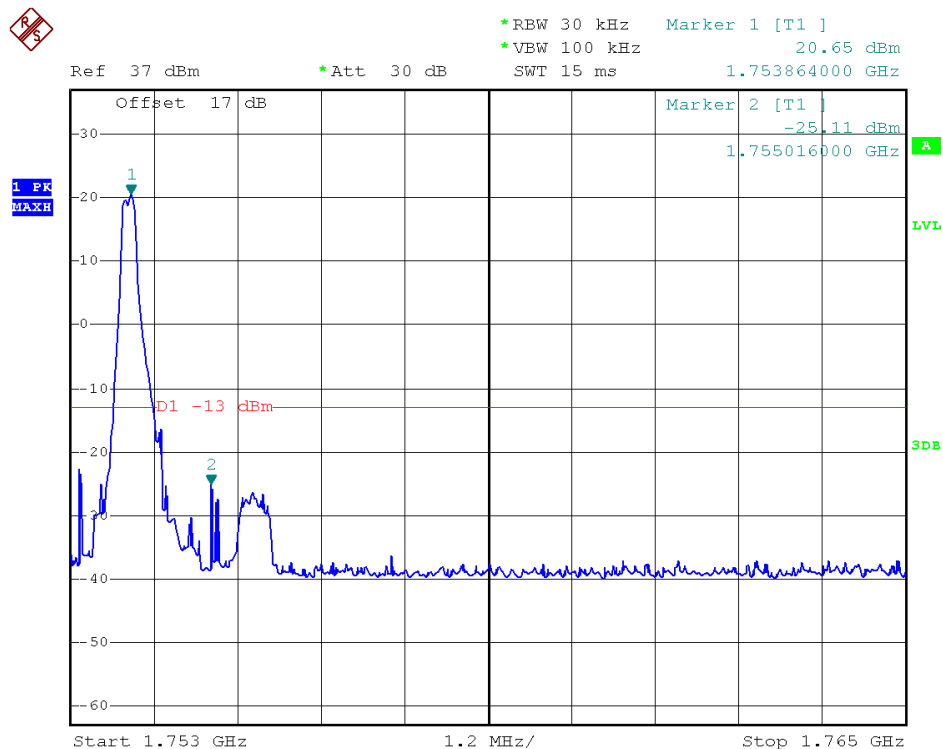
Band	LTE Band 4	Modulation	16QAM
Bandwidth	1.4MHz		

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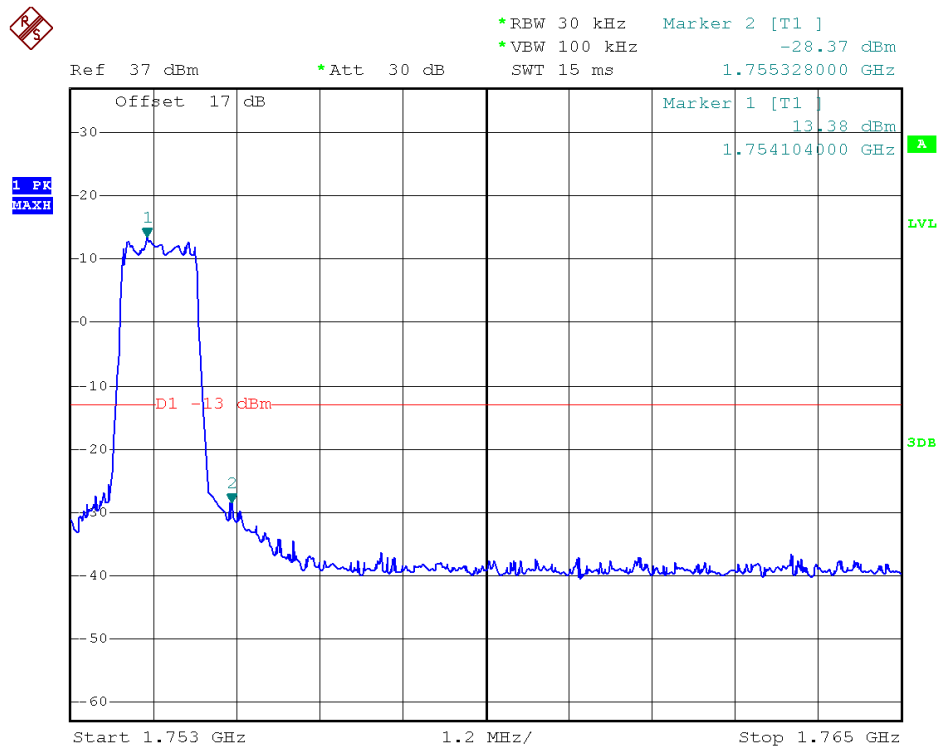
Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 6, RB Offset 0

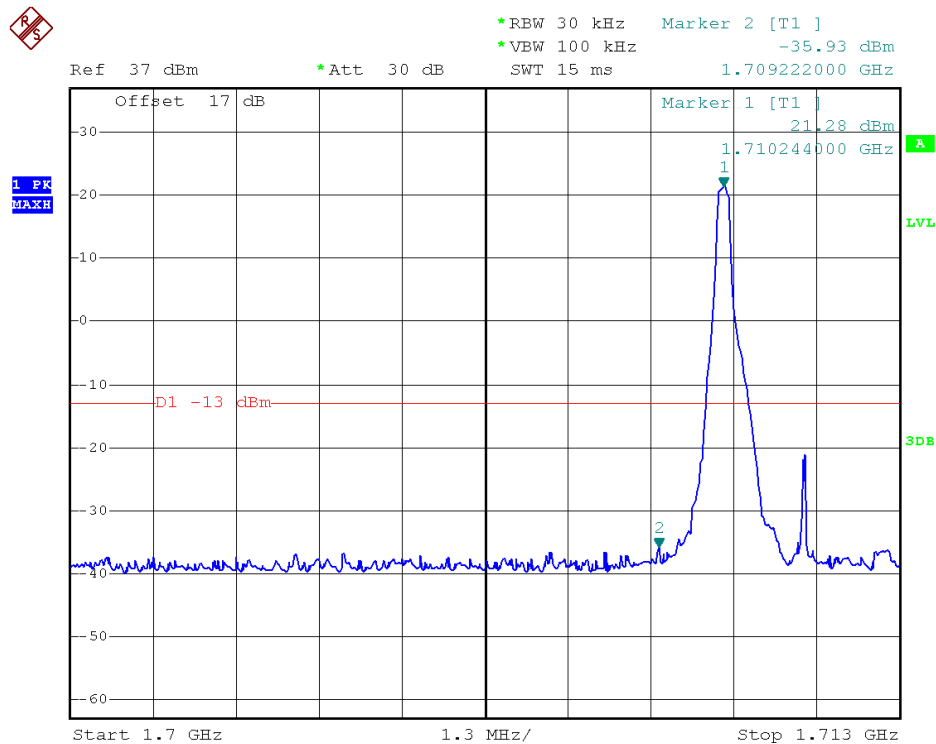


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 5

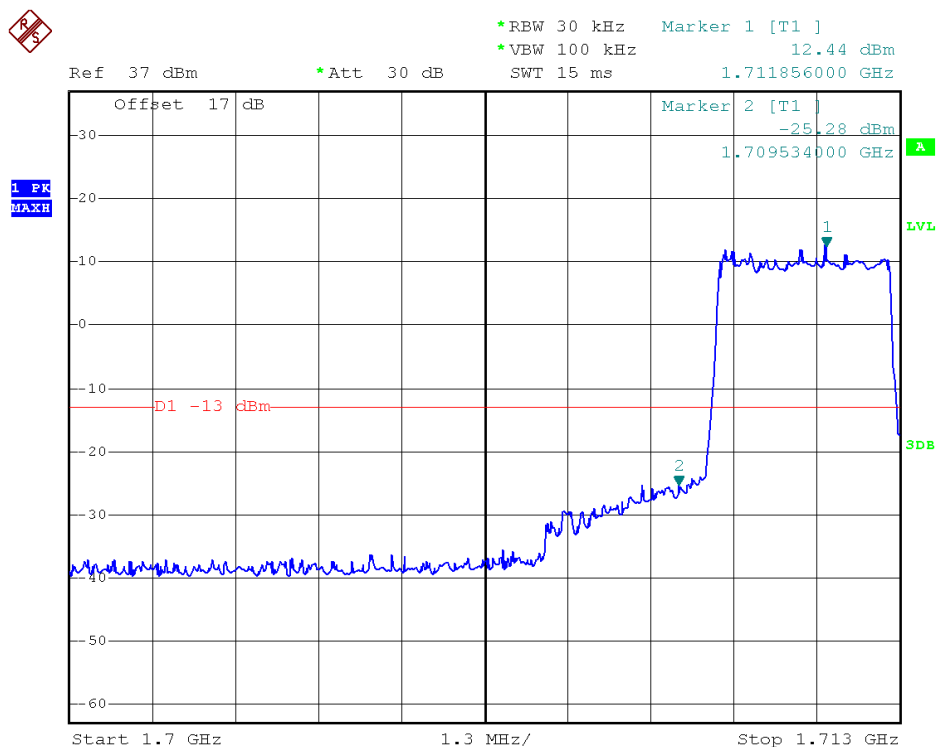


Higher Band Edge Plot for 16QAM -RB Size 6, RB Offset 0

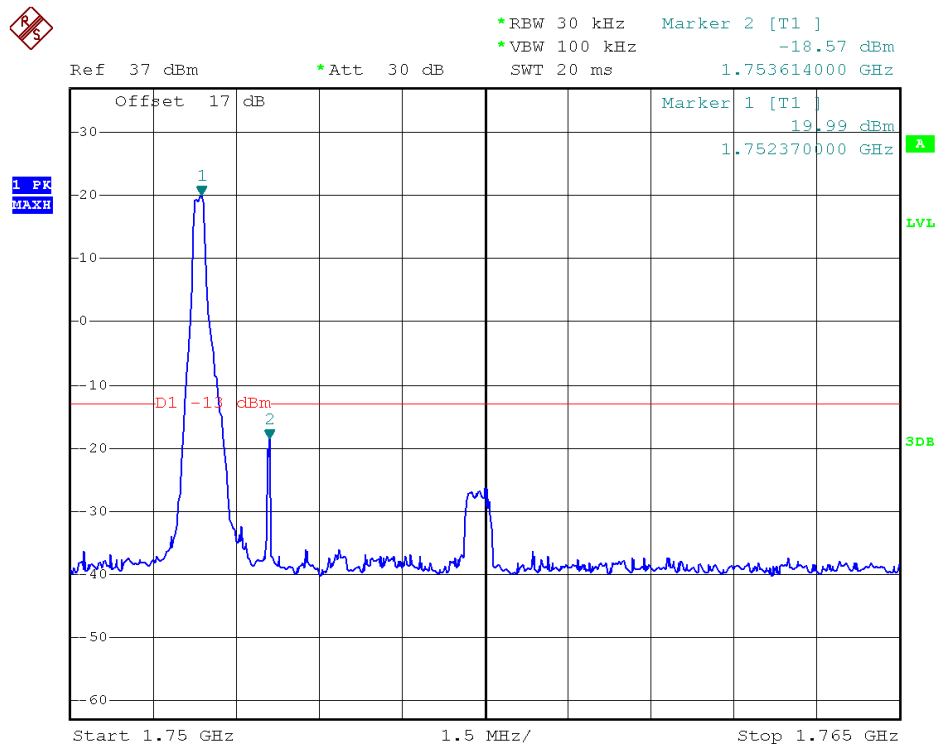
Band	LTE Band 4	Modulation	QPSK
Bandwidth	3MHz		



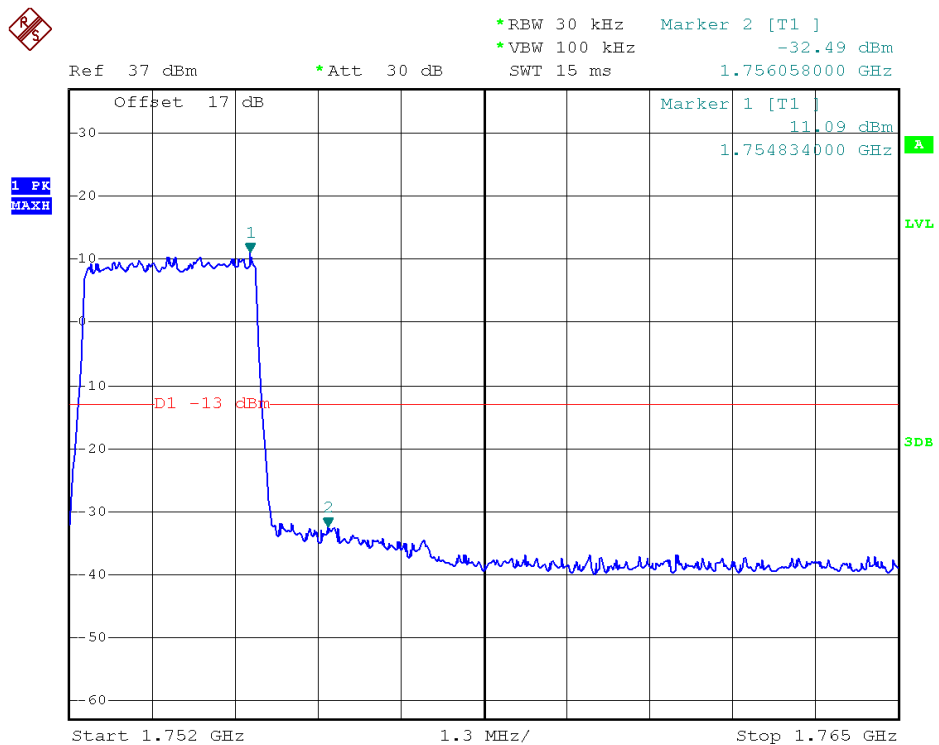
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 15, RB Offset 0

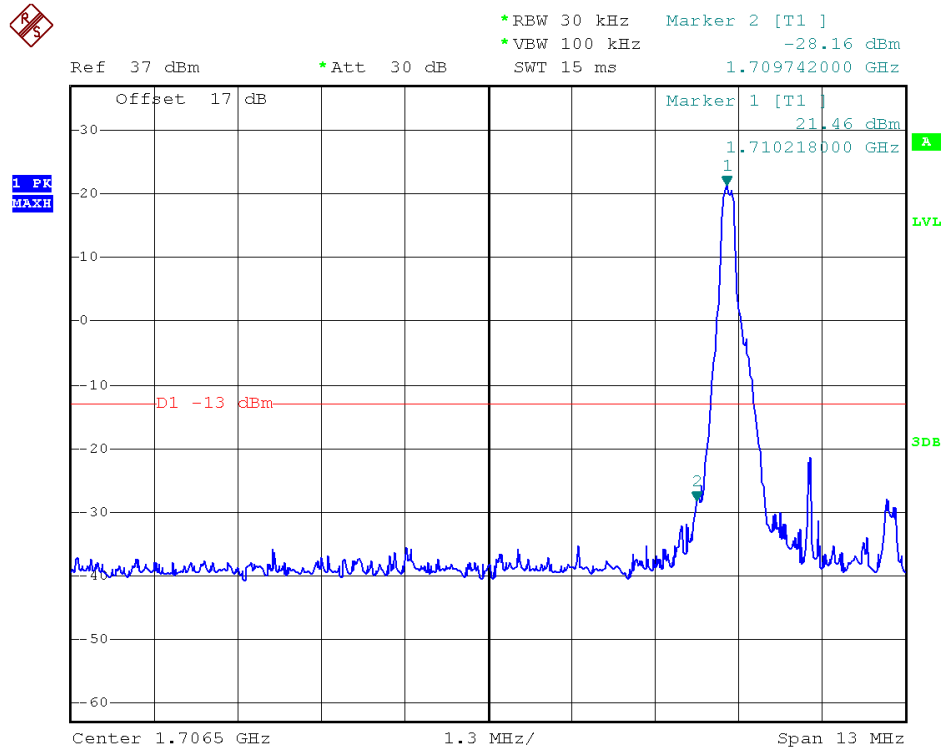


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 14

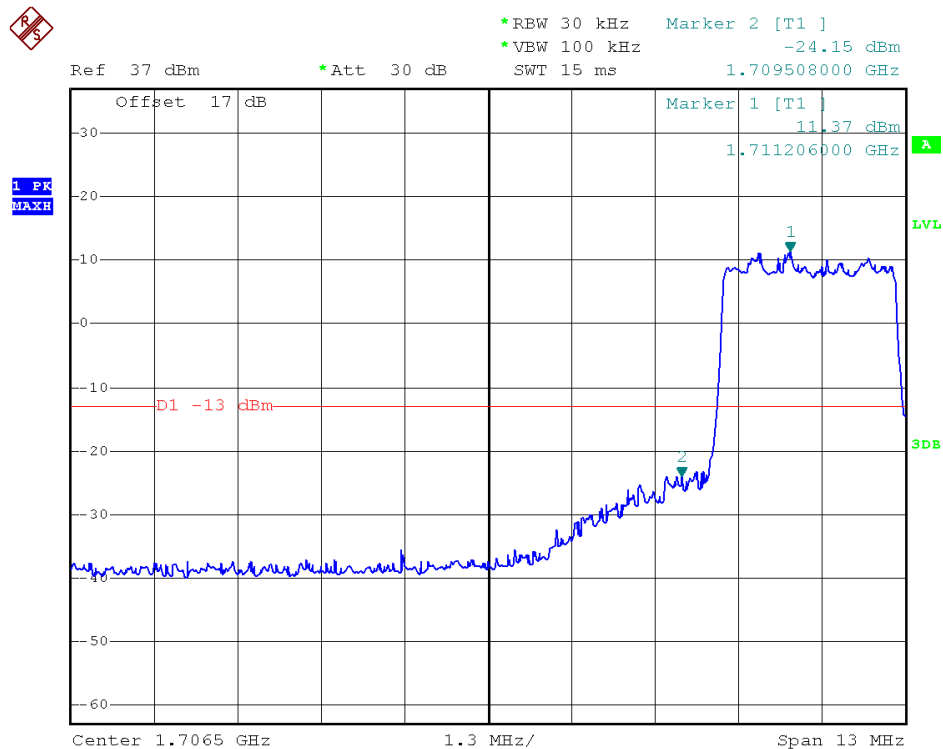


Higher Band Edge Plot for QPSK-RB Size 15, RB Offset 0

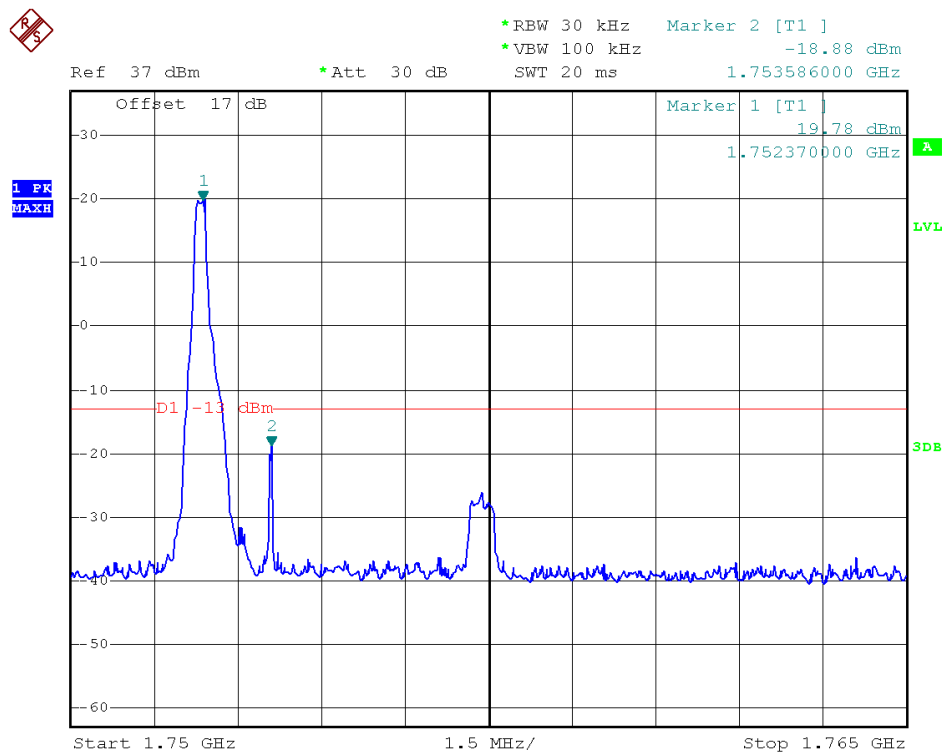
Band	LTE Band 4	Modulation	16QAM
Bandwidth	3MHz		



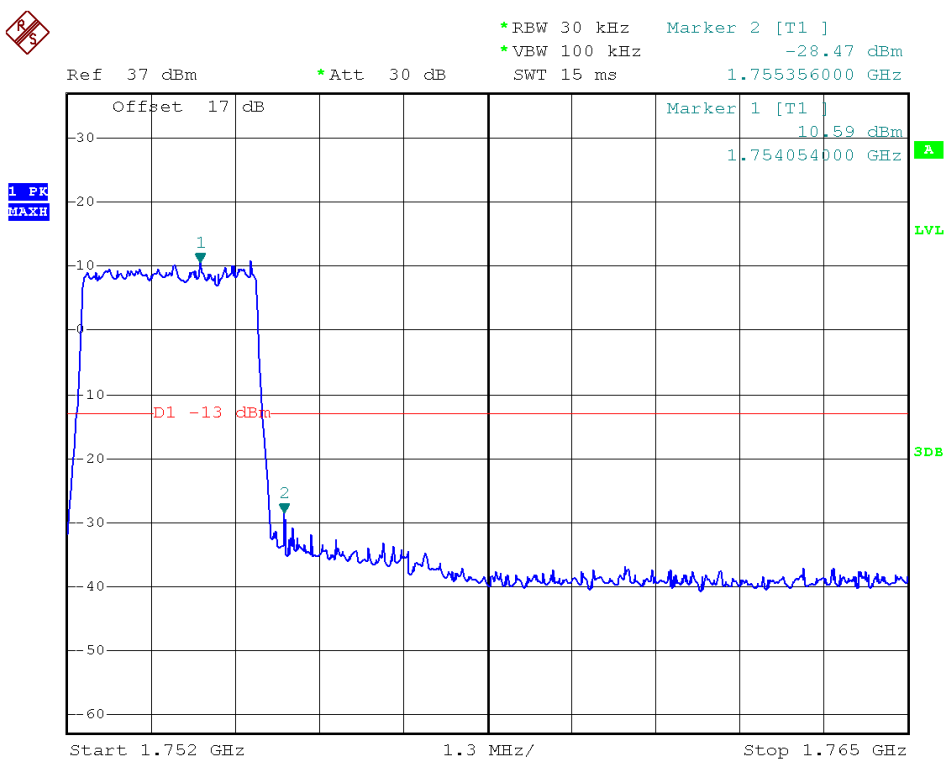
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 15, RB Offset 0

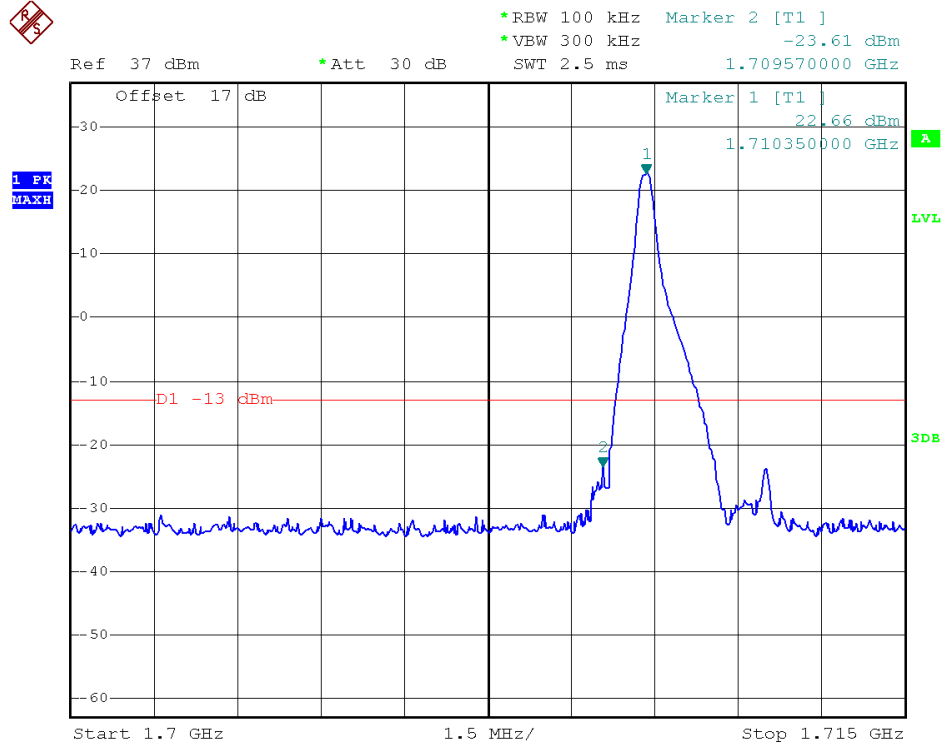


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 14

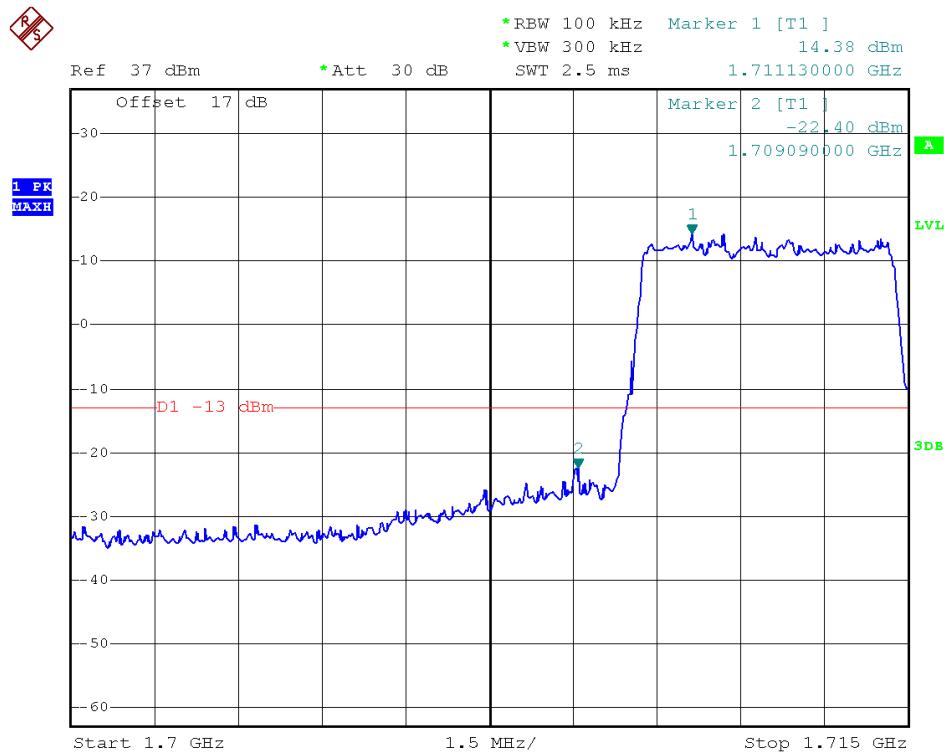


Higher Band Edge Plot for 16QAM -RB Size 15, RB Offset 0

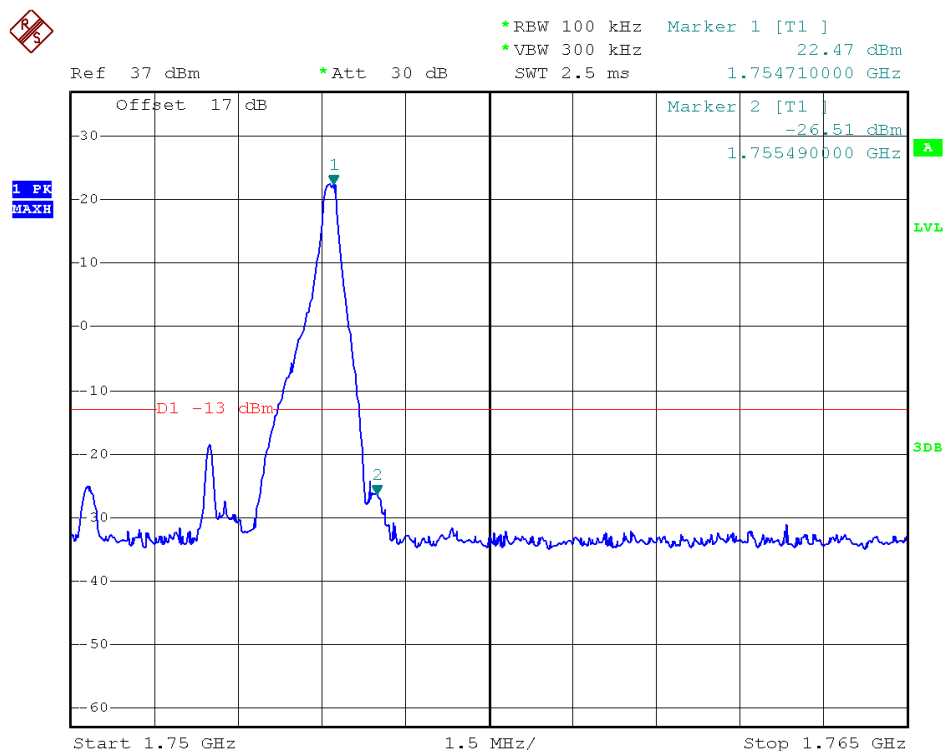
Band	LTE Band 4	Modulation	QPSK
Bandwidth	5MHz		



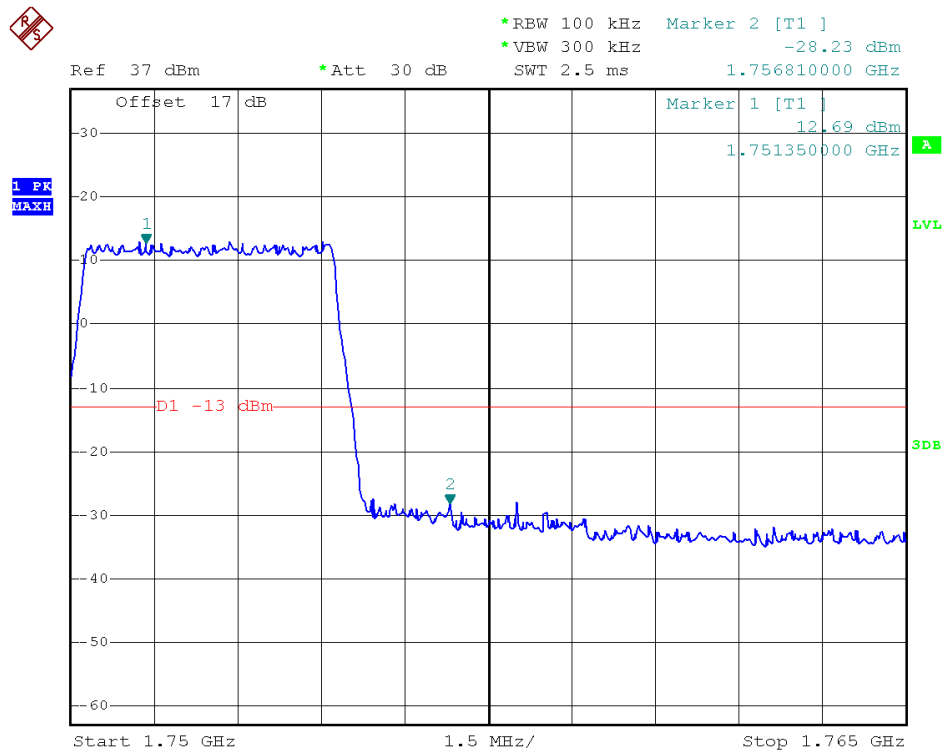
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 25, RB Offset 0

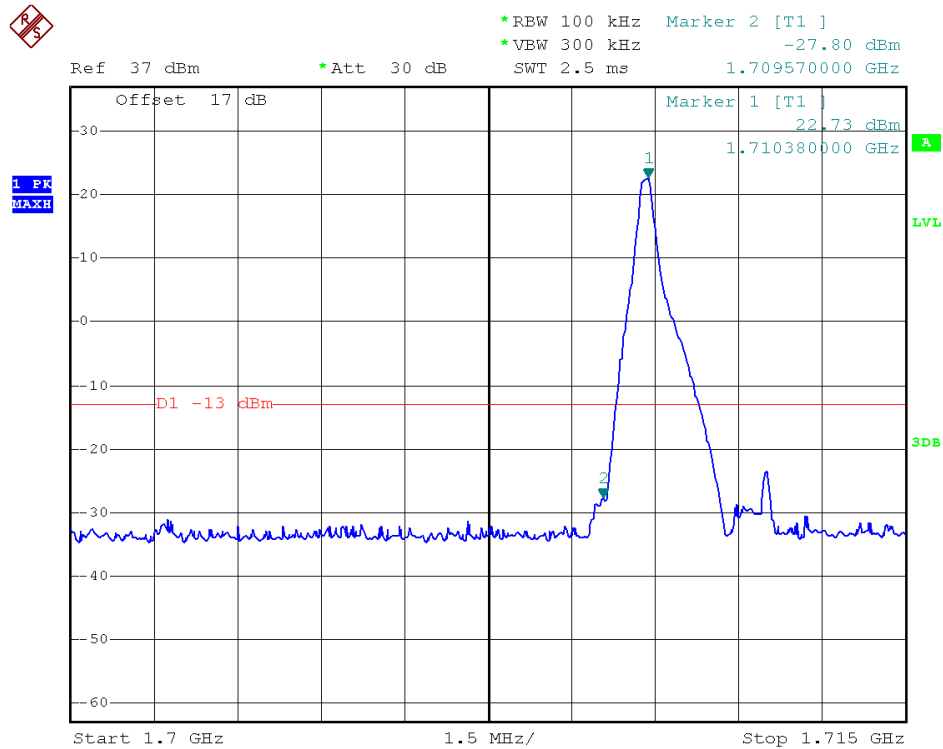


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 24

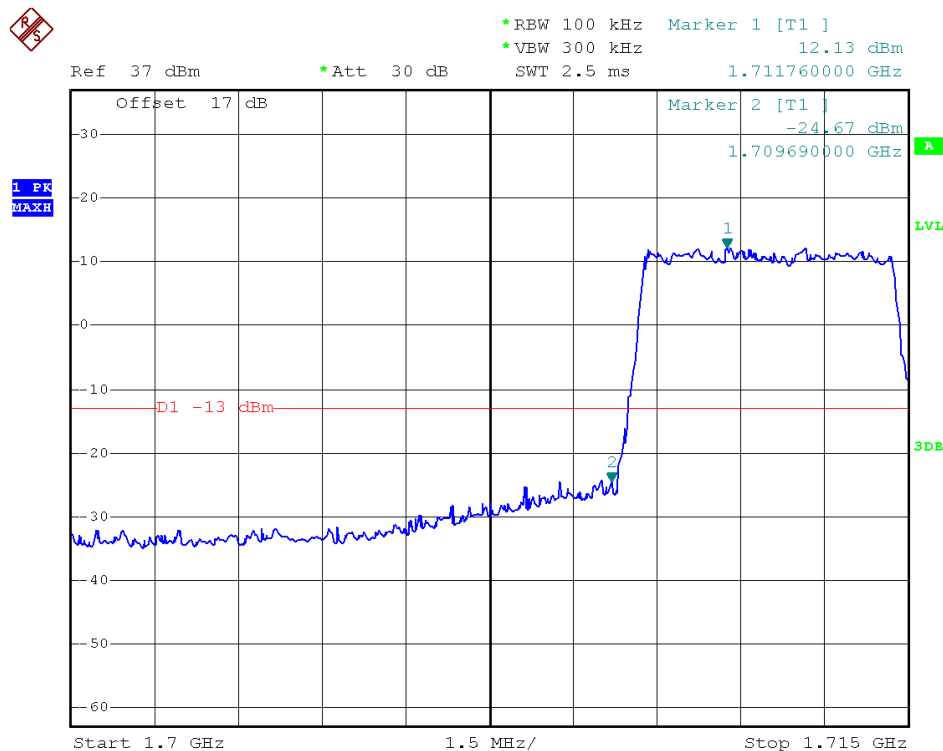


Higher Band Edge Plot for QPSK-RB Size 25, RB Offset 0

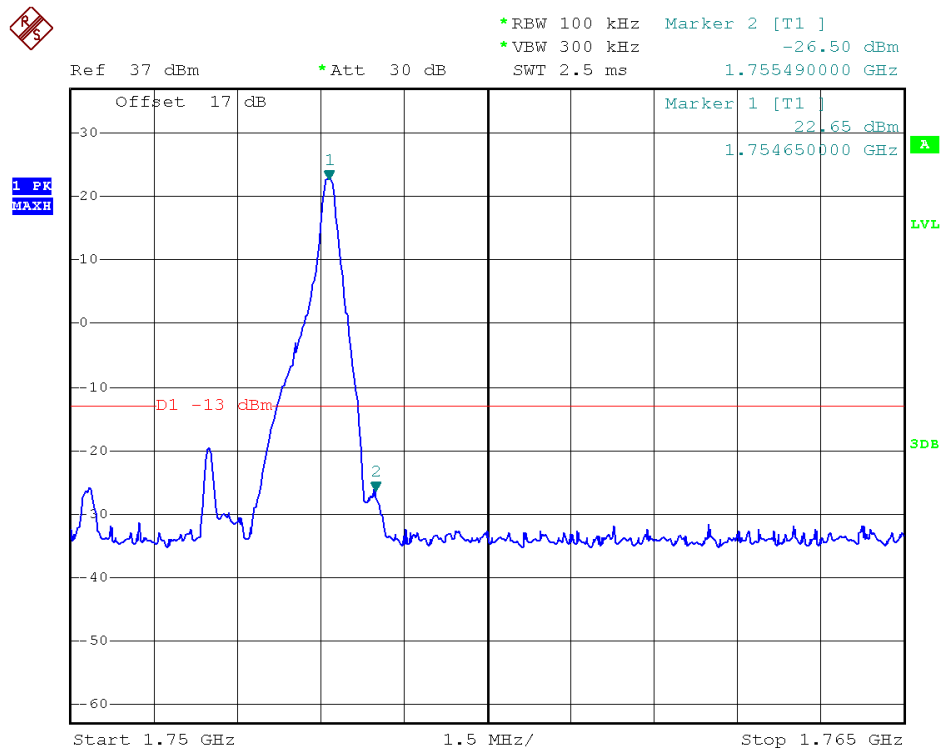
Band	LTE Band 4	Modulation	16QAM
Bandwidth	5MHz		



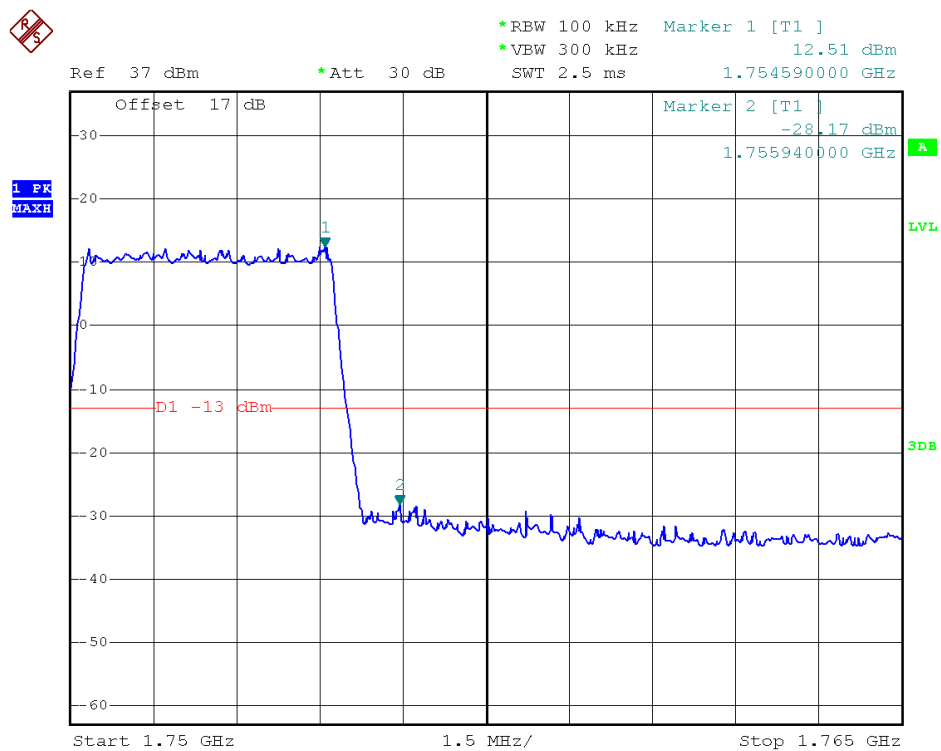
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 25, RB Offset 0



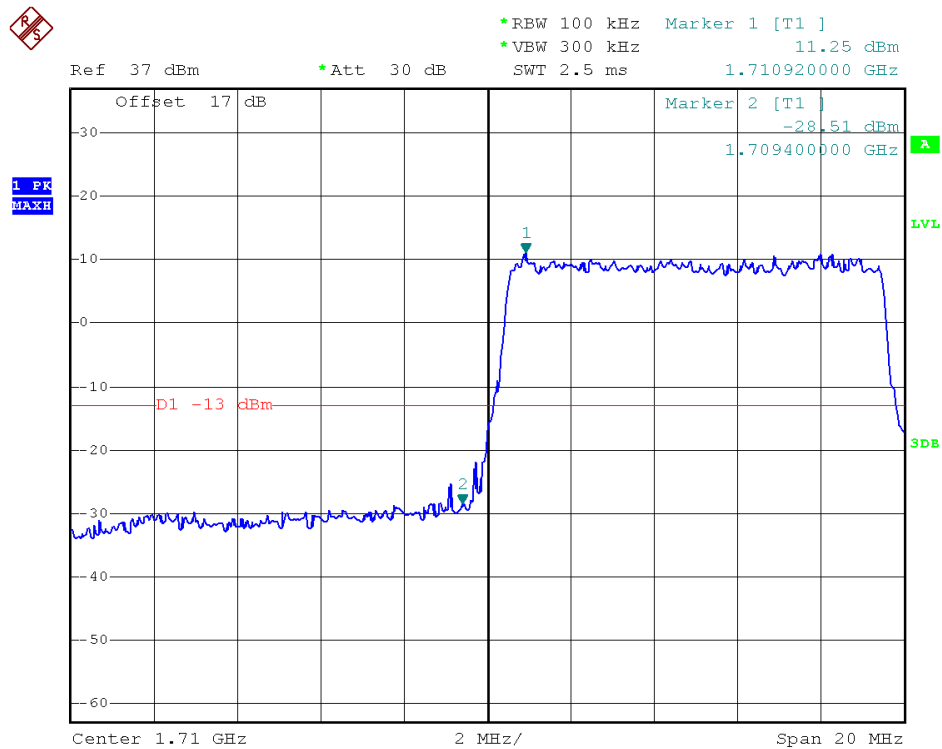
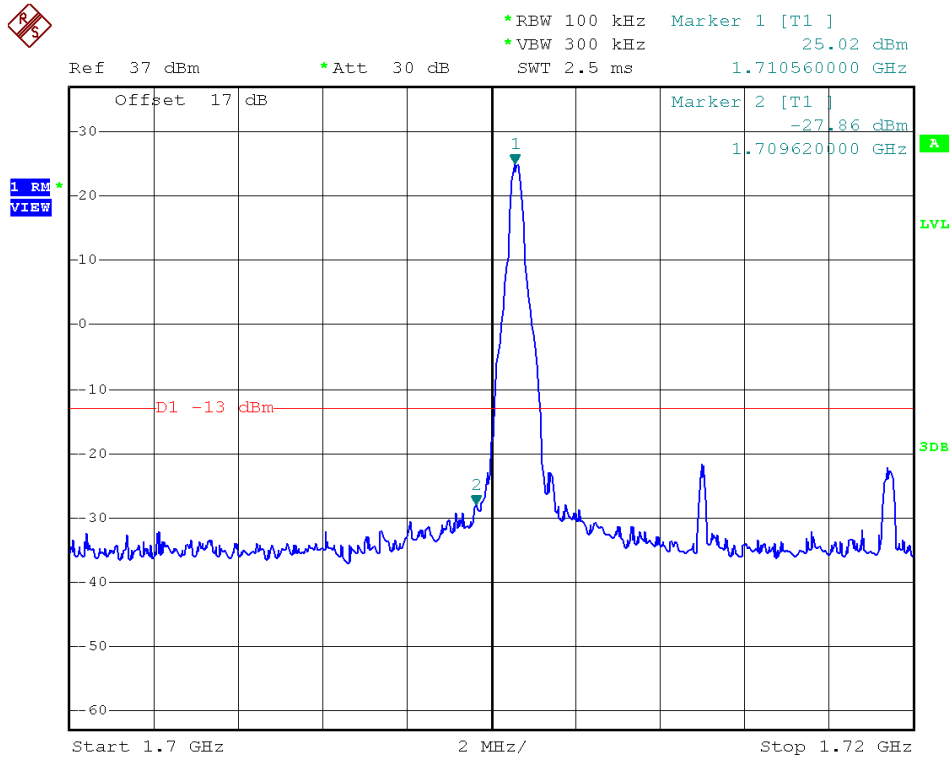
Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 24



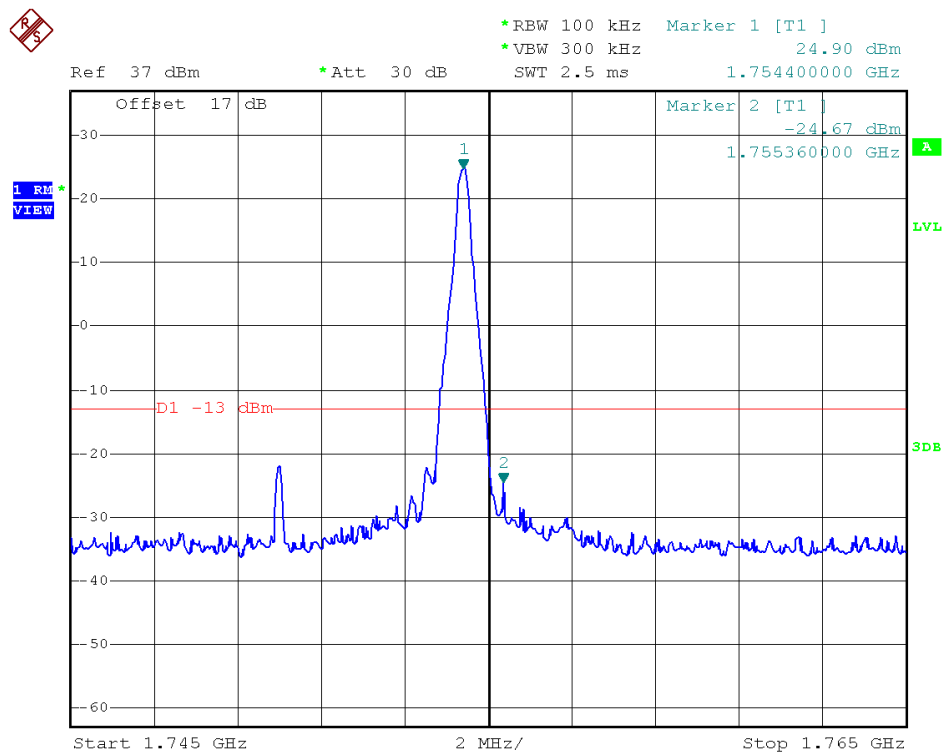
Higher Band Edge Plot for 16QAM -RB Size 25, RB Offset 0



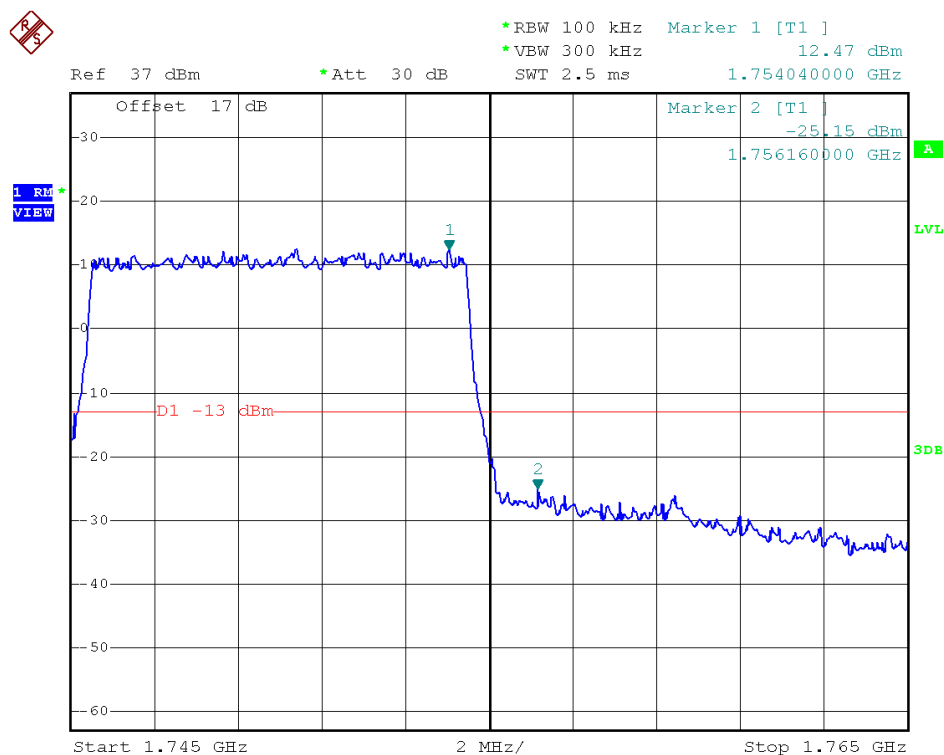
Band	LTE Band 4	Modulation	QPSK
Bandwidth	10MHz		



Lower Band Edge Plot for QPSK-RB Size 50, RB Offset 0

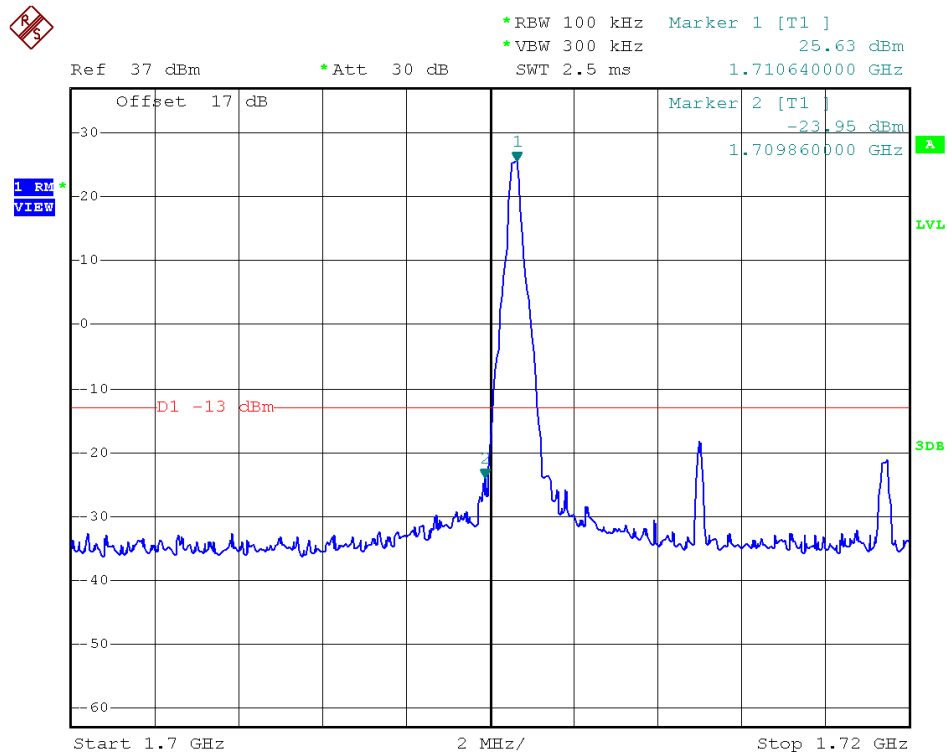


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 49

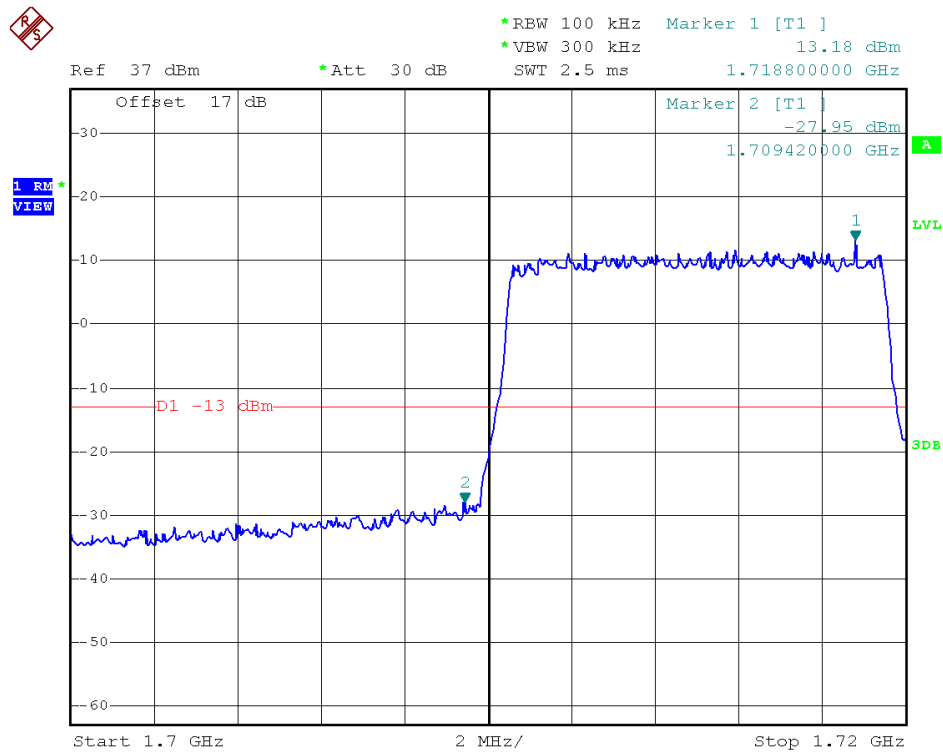


Higher Band Edge Plot for QPSK-RB Size 50, RB Offset 0

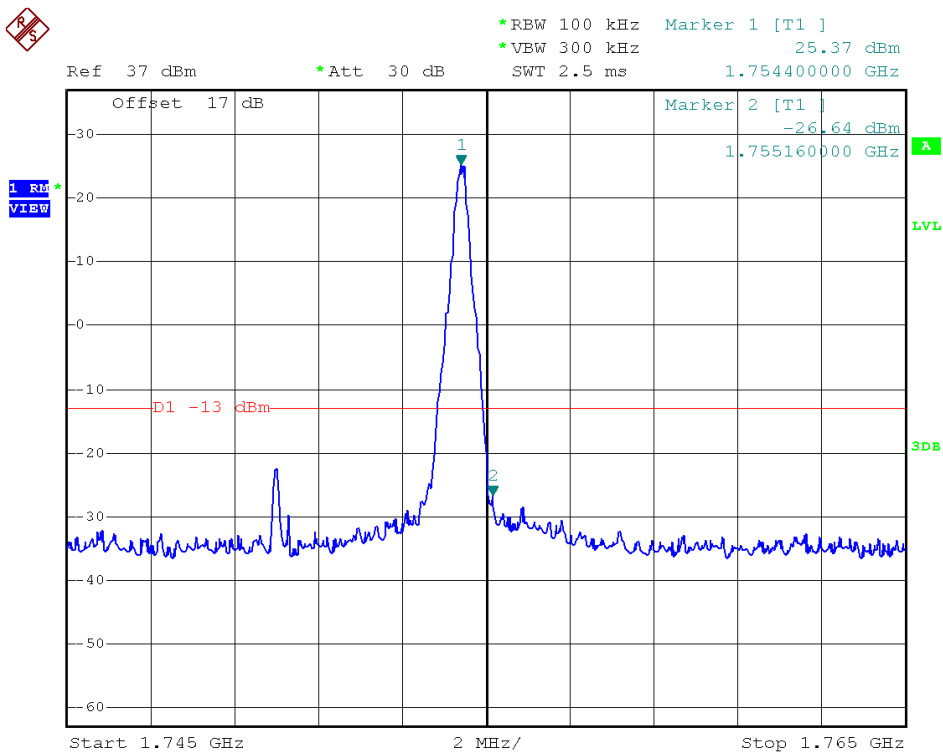
Band	LTE Band 4	Modulation	16QAM
Bandwidth	10MHz		



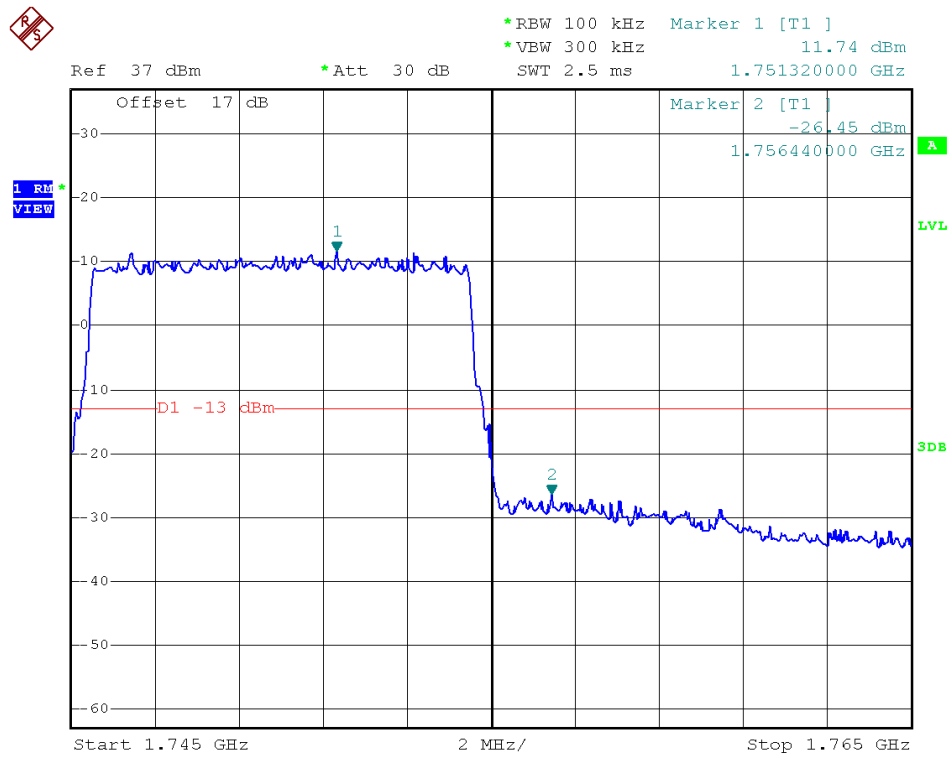
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 50, RB Offset 0

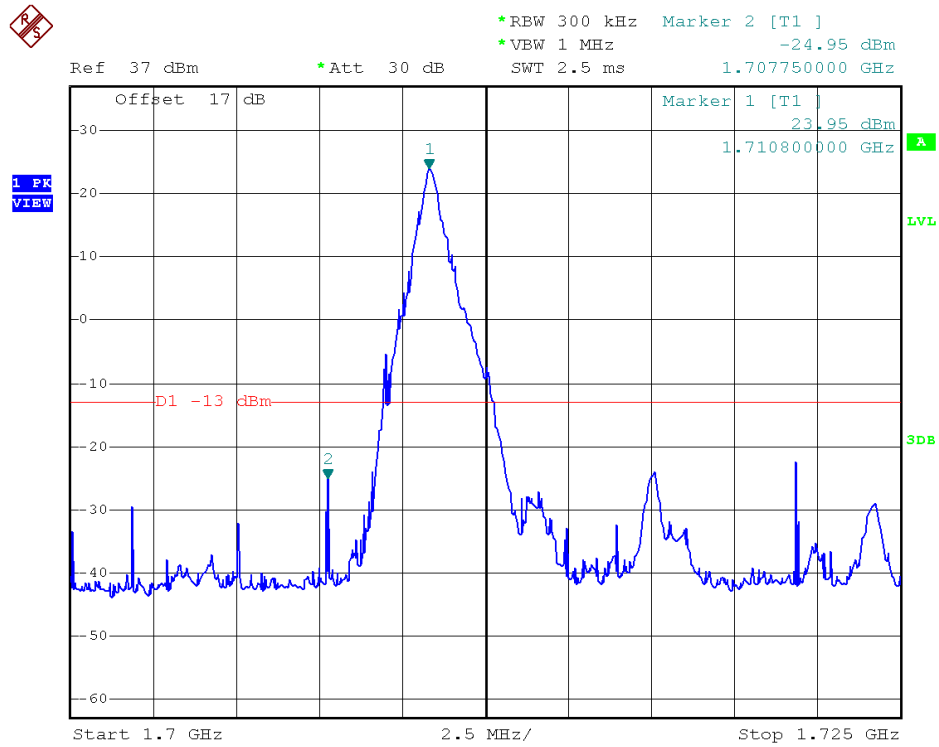


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 49

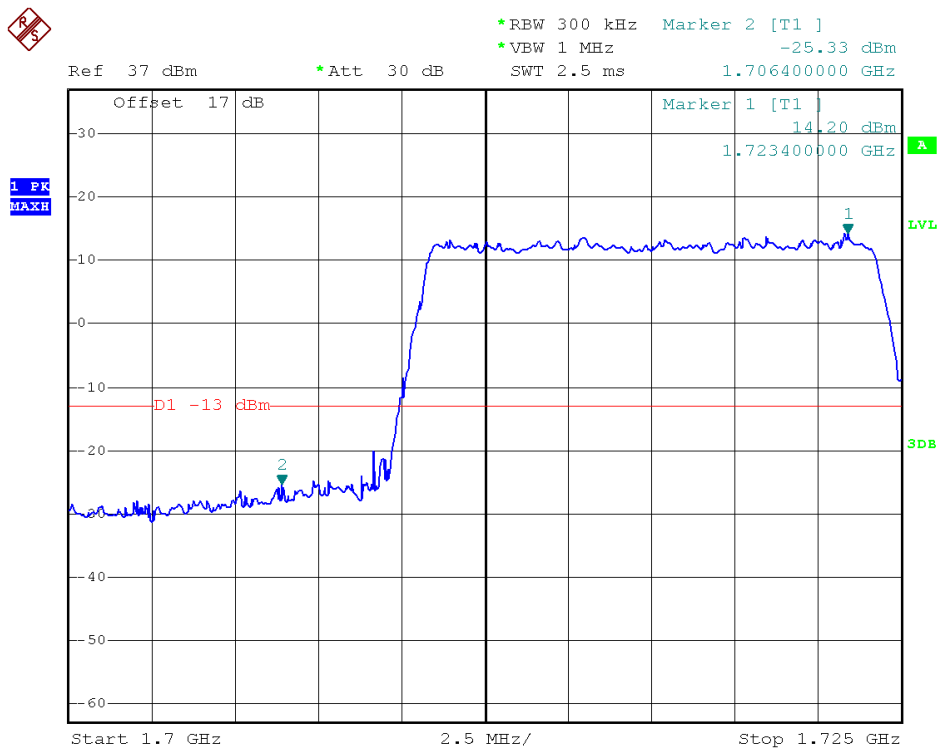


Higher Band Edge Plot for 16QAM -RB Size 50, RB Offset 0

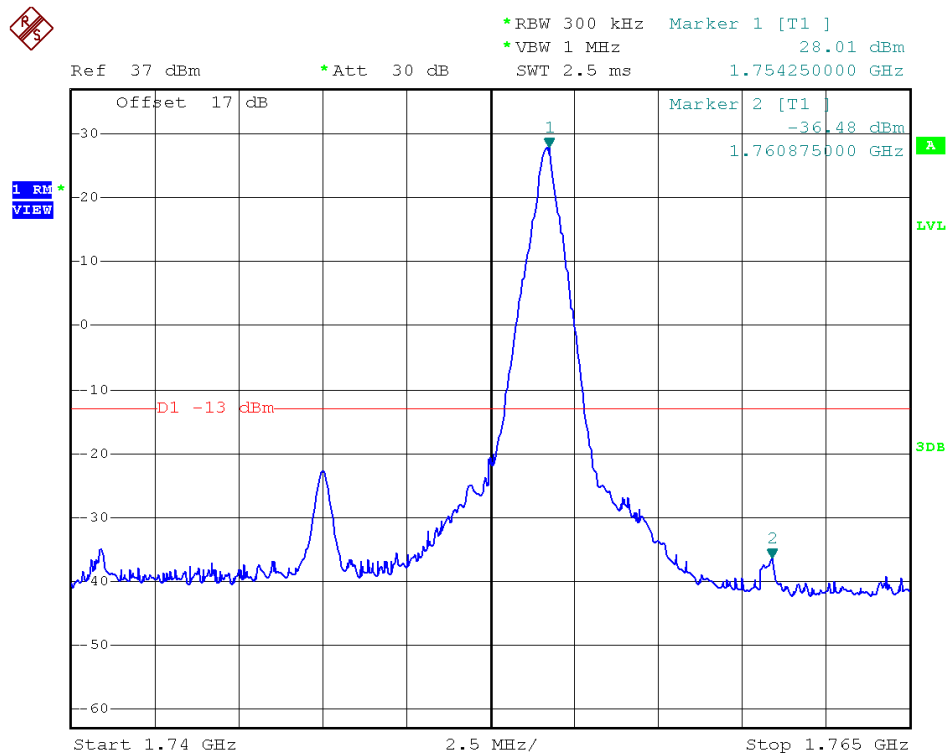
Band	LTE Band 4	Modulation	QPSK
Bandwidth	15MHz		



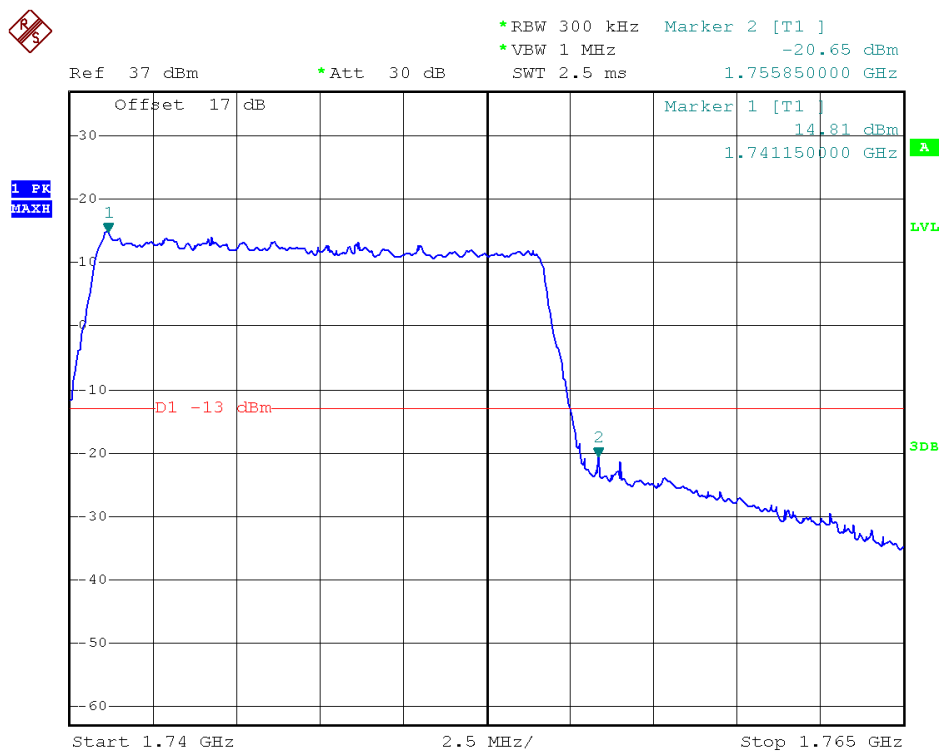
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 75, RB Offset 0

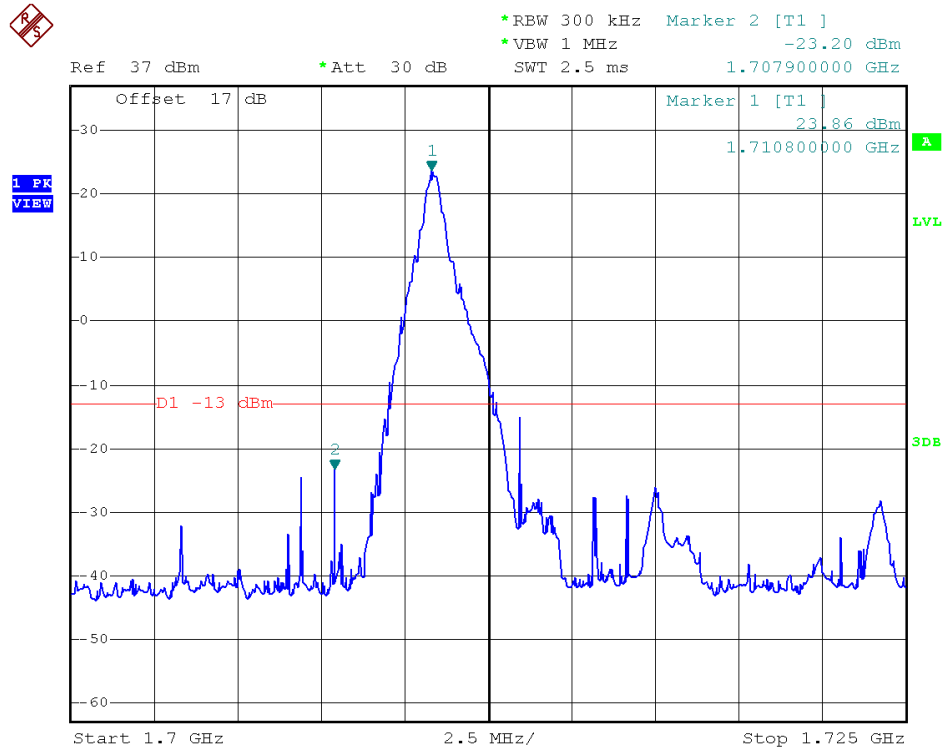


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 74

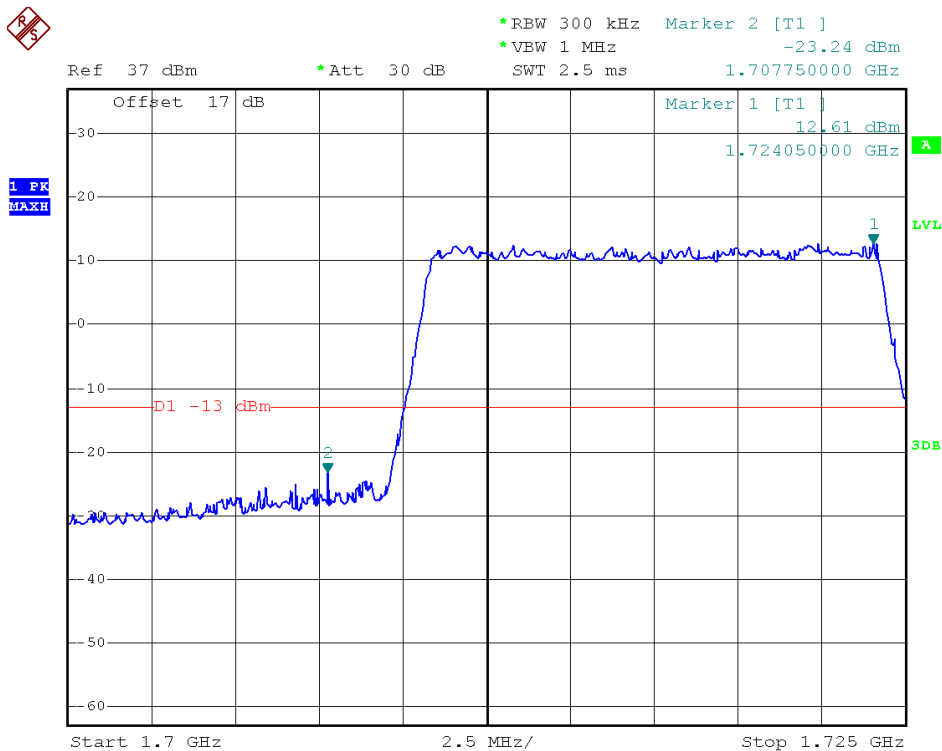


Higher Band Edge Plot for QPSK-RB Size 75, RB Offset 0

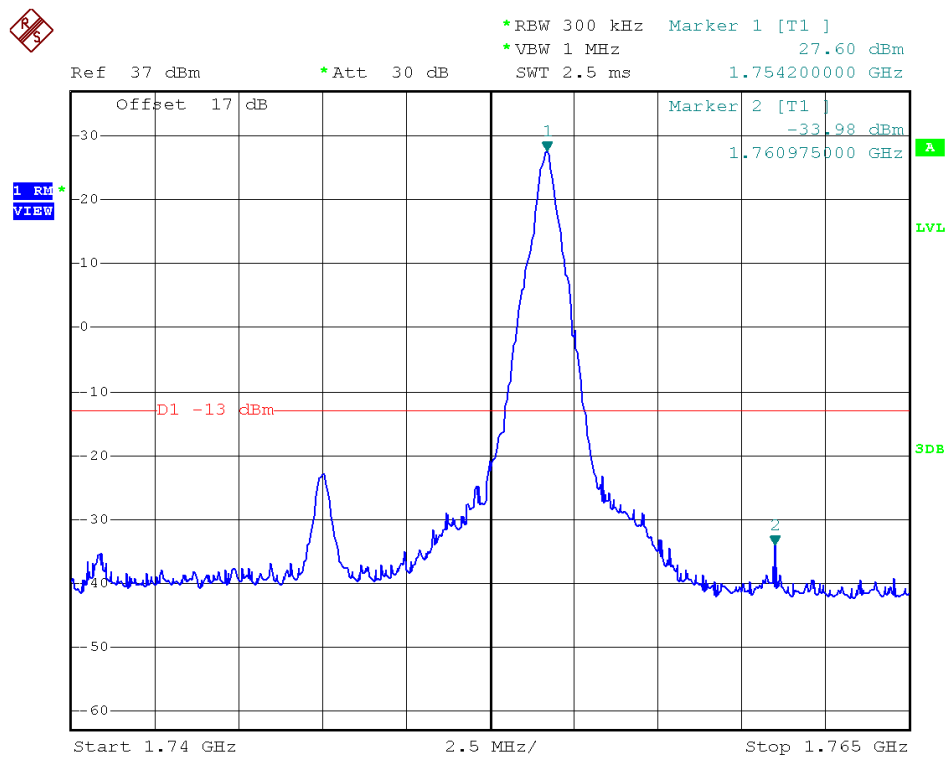
Band	LTE Band 4	Modulation	16QAM
Bandwidth	15MHz		



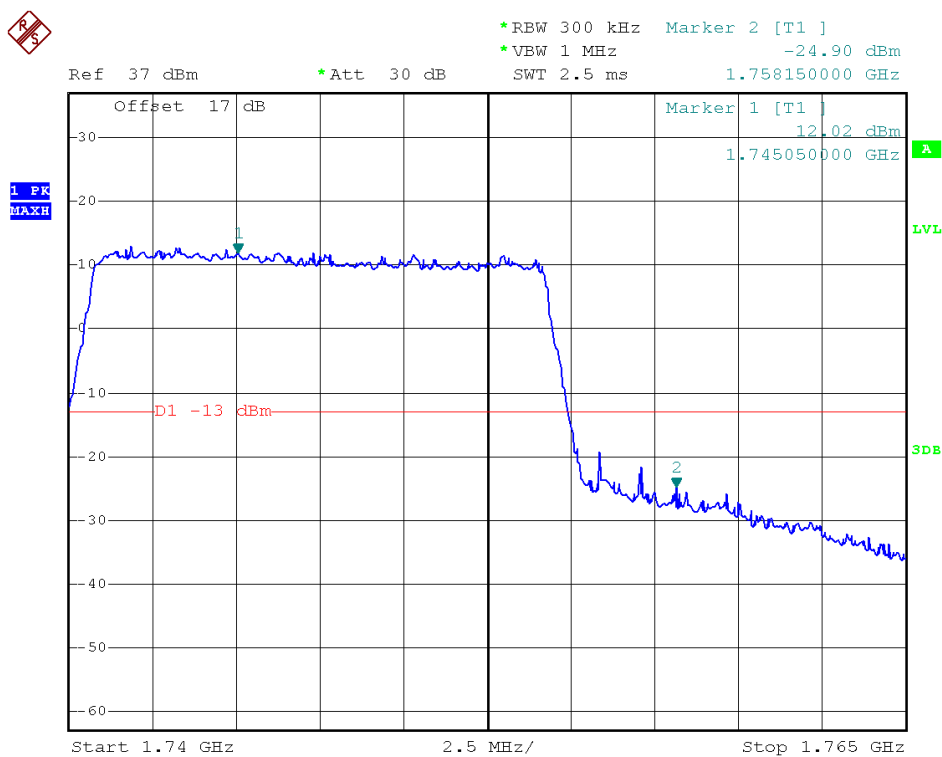
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 75, RB Offset 0



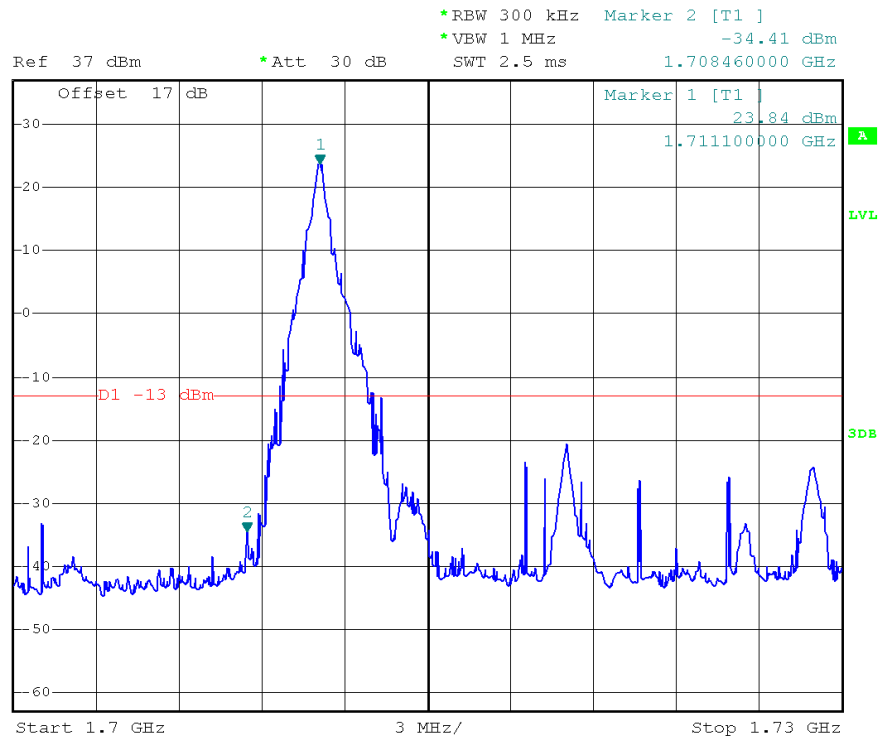
Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 74



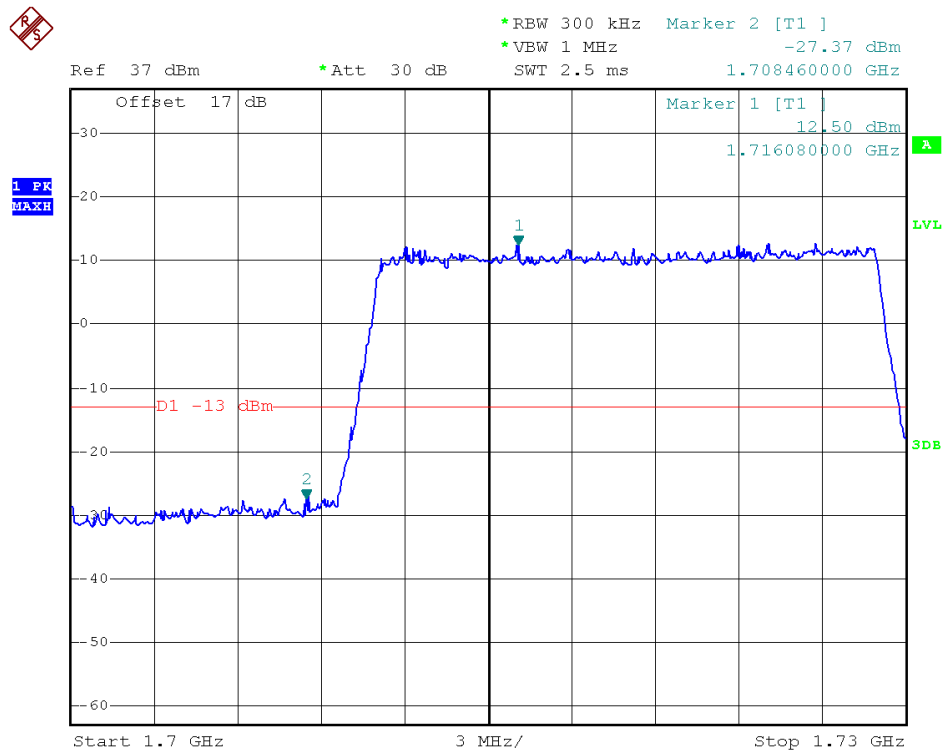
Higher Band Edge Plot for 16QAM -RB Size 75, RB Offset 0



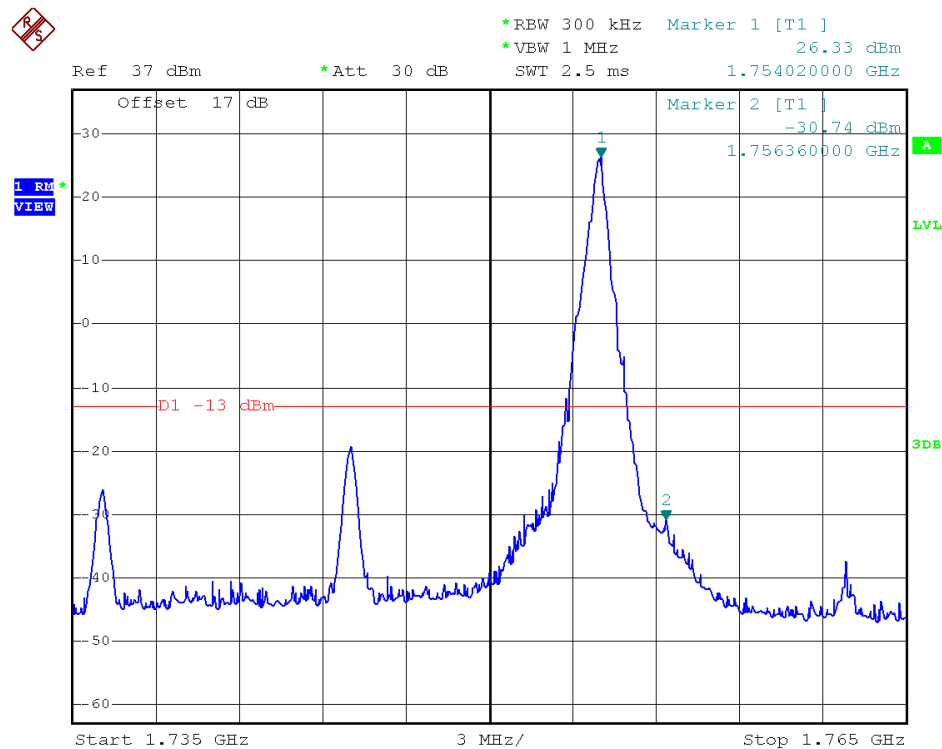
Band	LTE Band 4	Modulation	QPSK
Bandwidth	20MHz		

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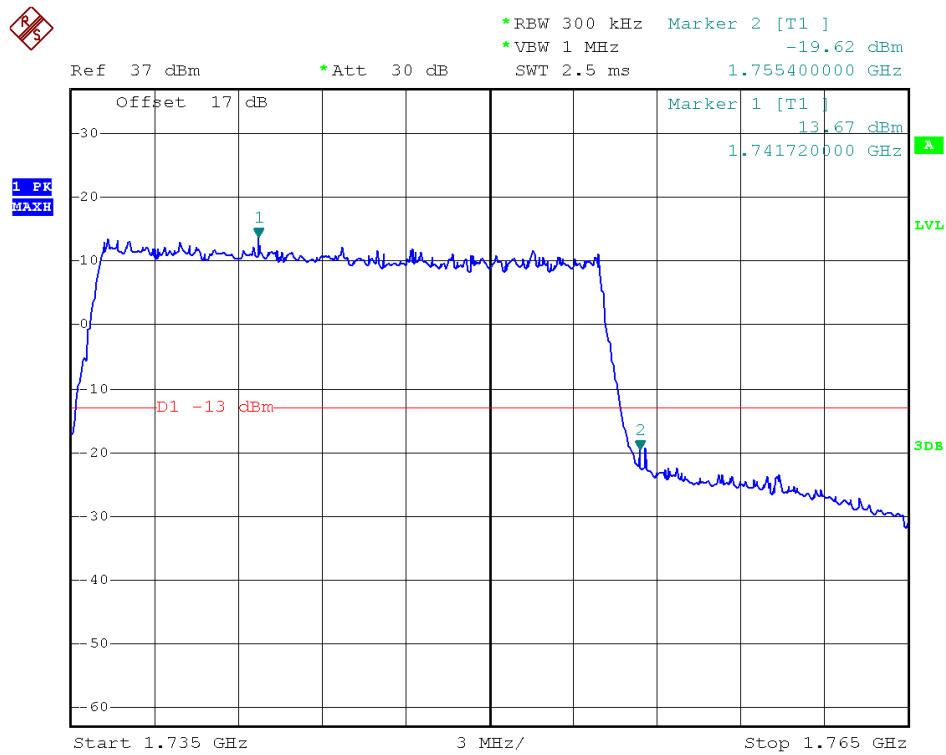
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 100, RB Offset 0

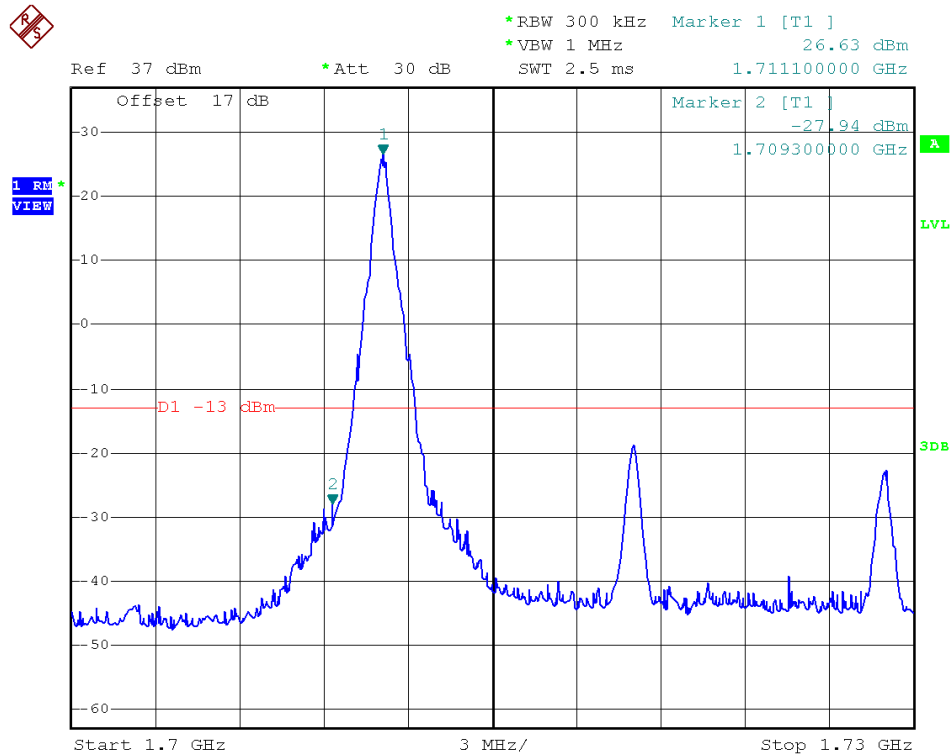


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 99

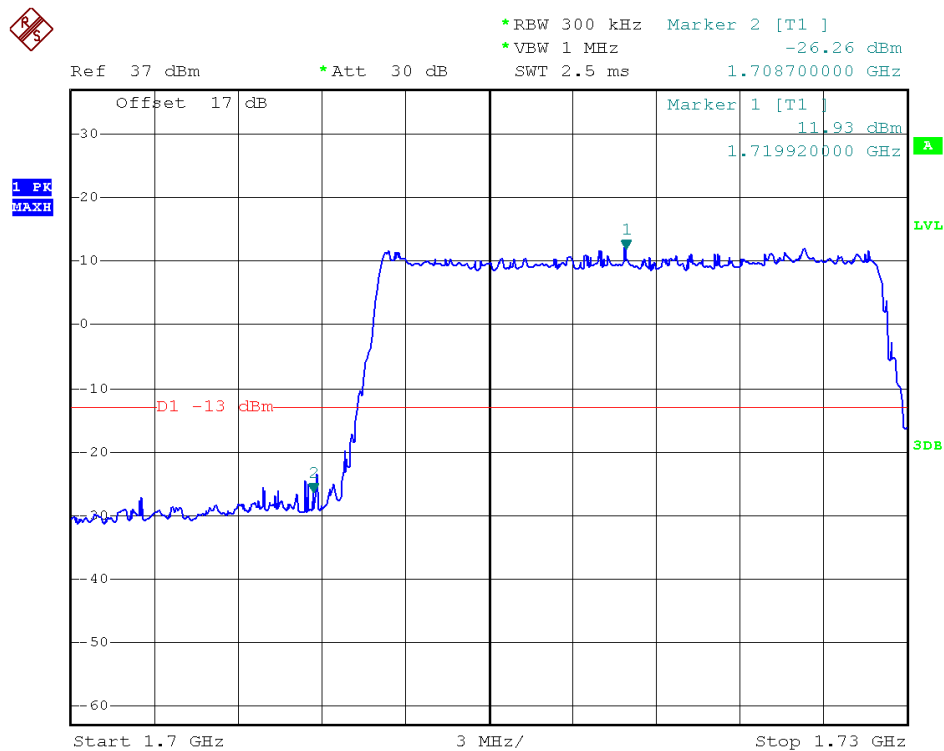


Higher Band Edge Plot for QPSK-RB Size 100, RB Offset 0

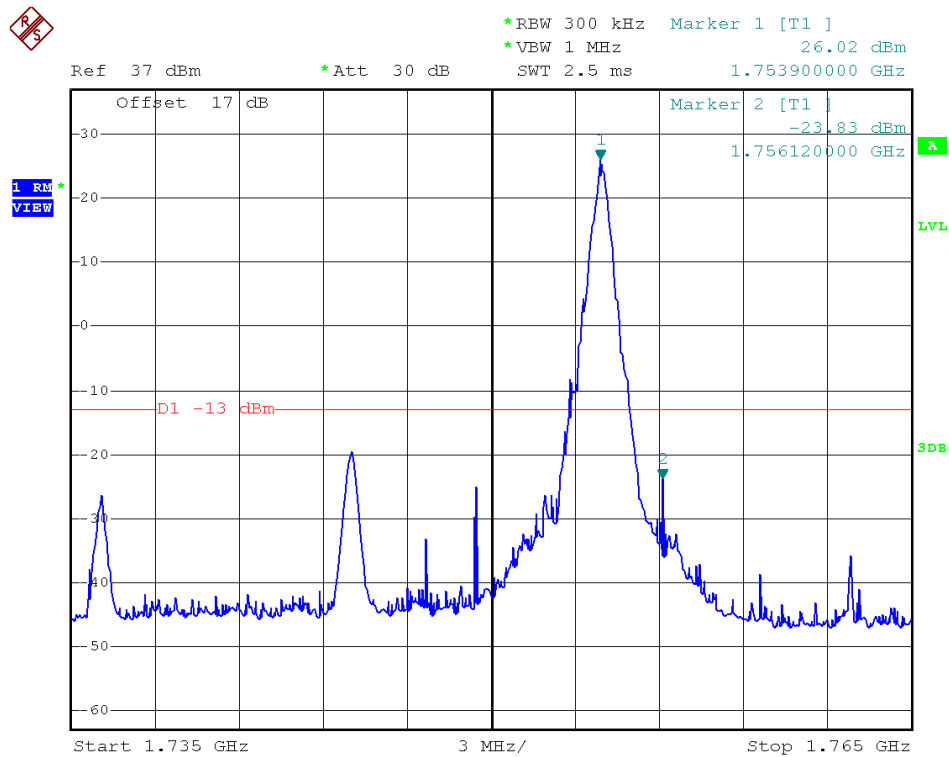
Band	LTE Band 4	Modulation	16QAM
Bandwidth	20MHz		



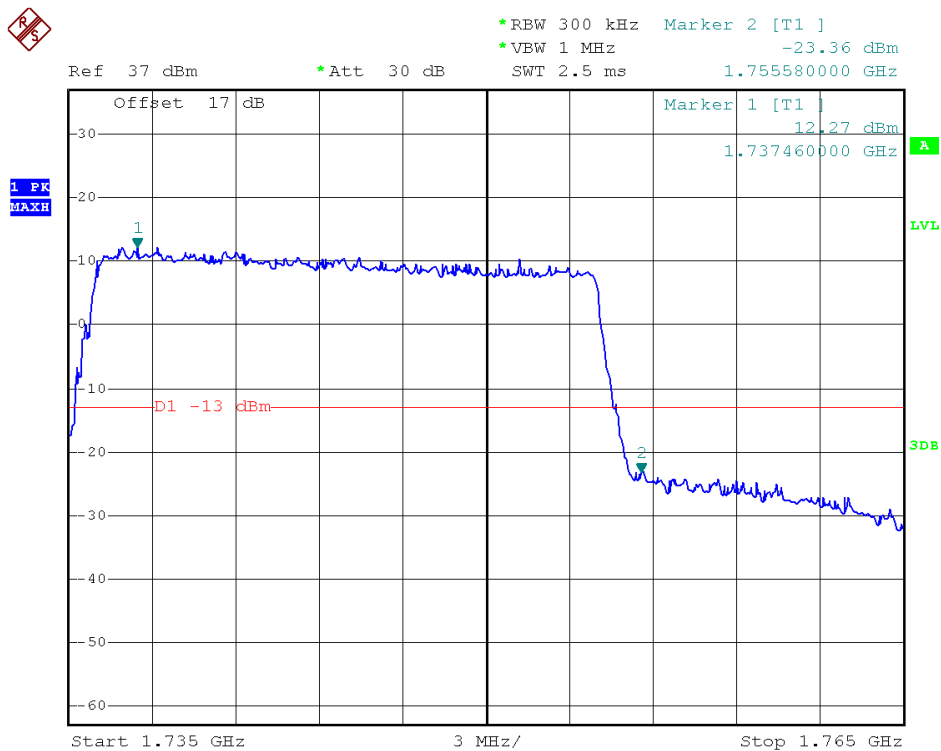
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 100, RB Offset 0



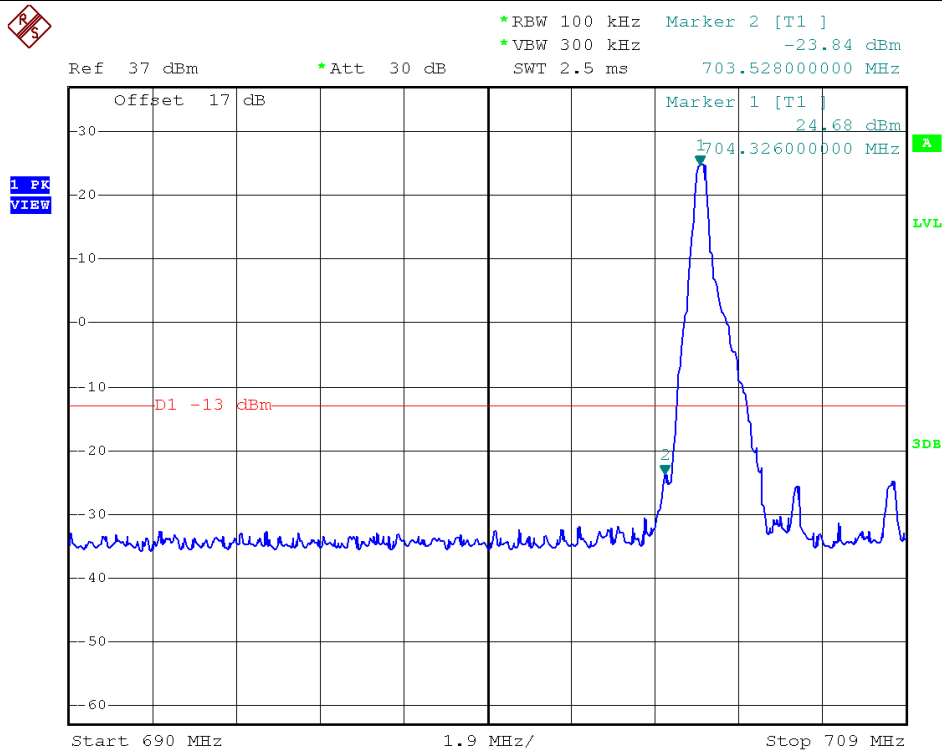
Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 99



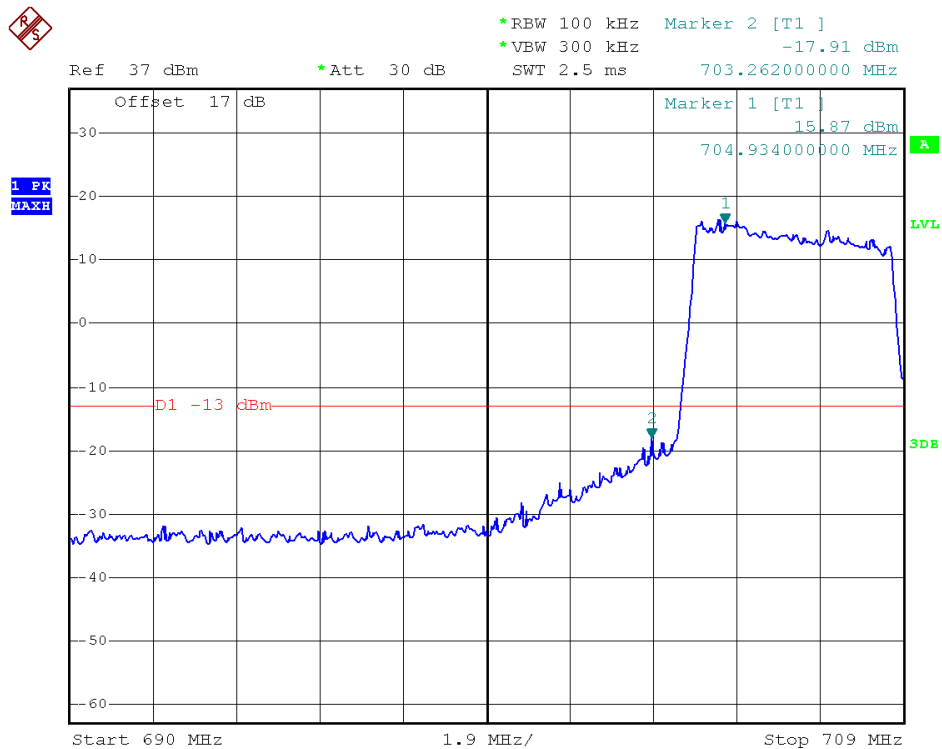
Higher Band Edge Plot for 16QAM -RB Size 100, RB Offset 0



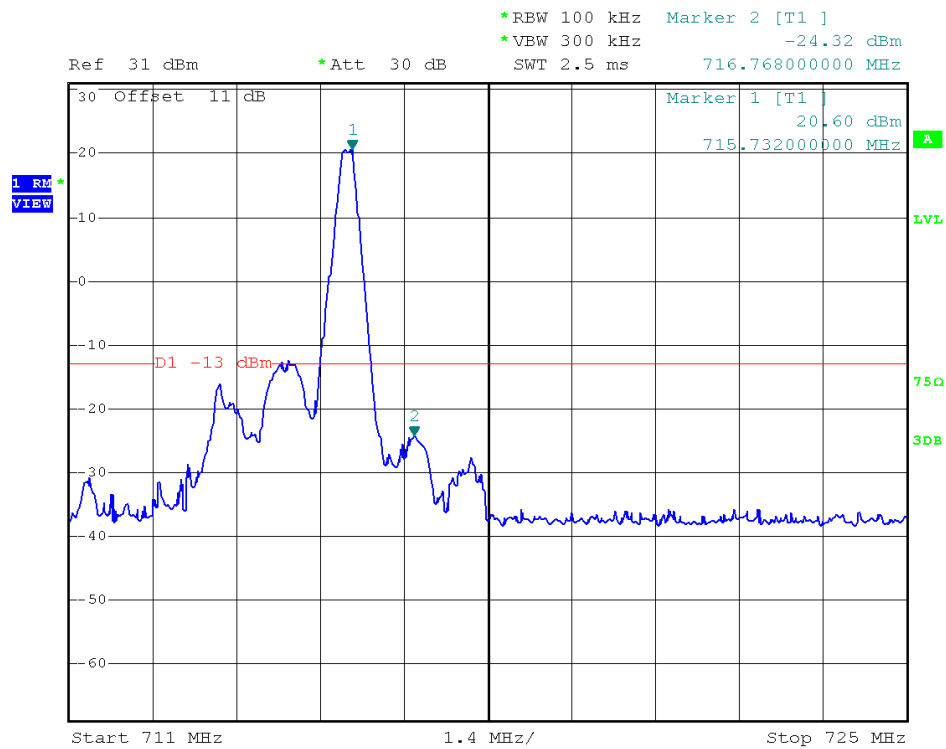
Band	LTE Band 17	Modulation	QPSK
Bandwidth	5MHz		



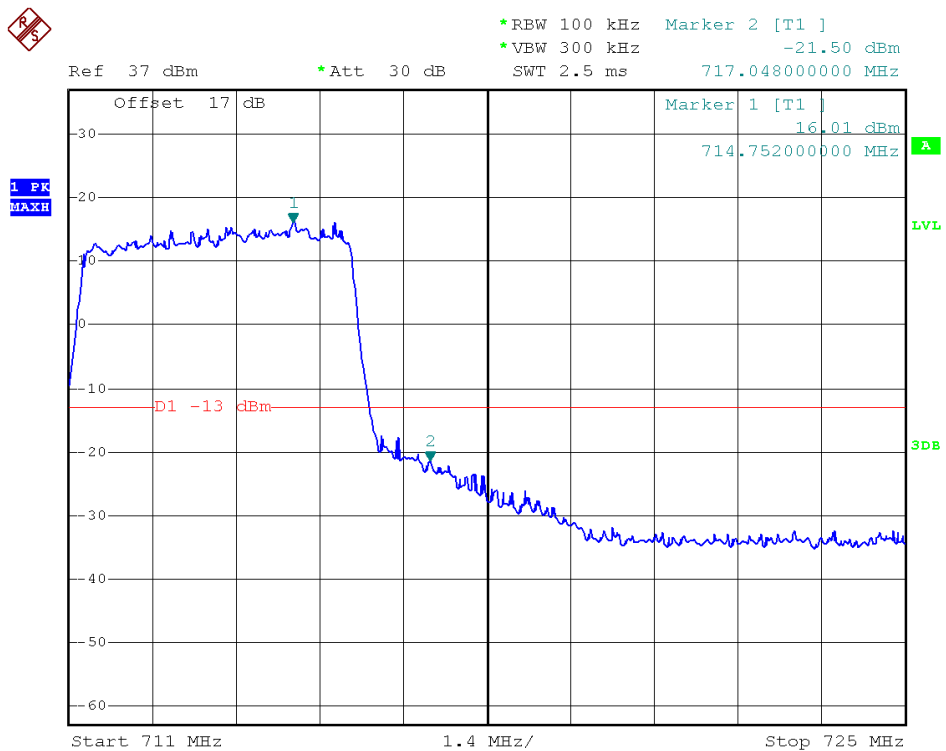
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 25, RB Offset 0

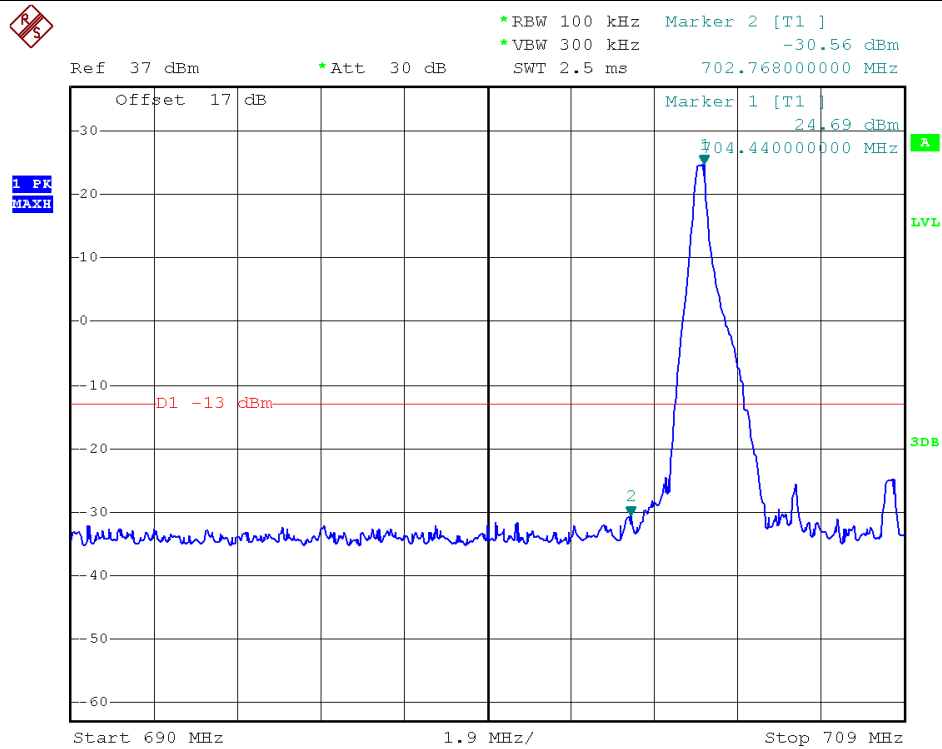


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 24

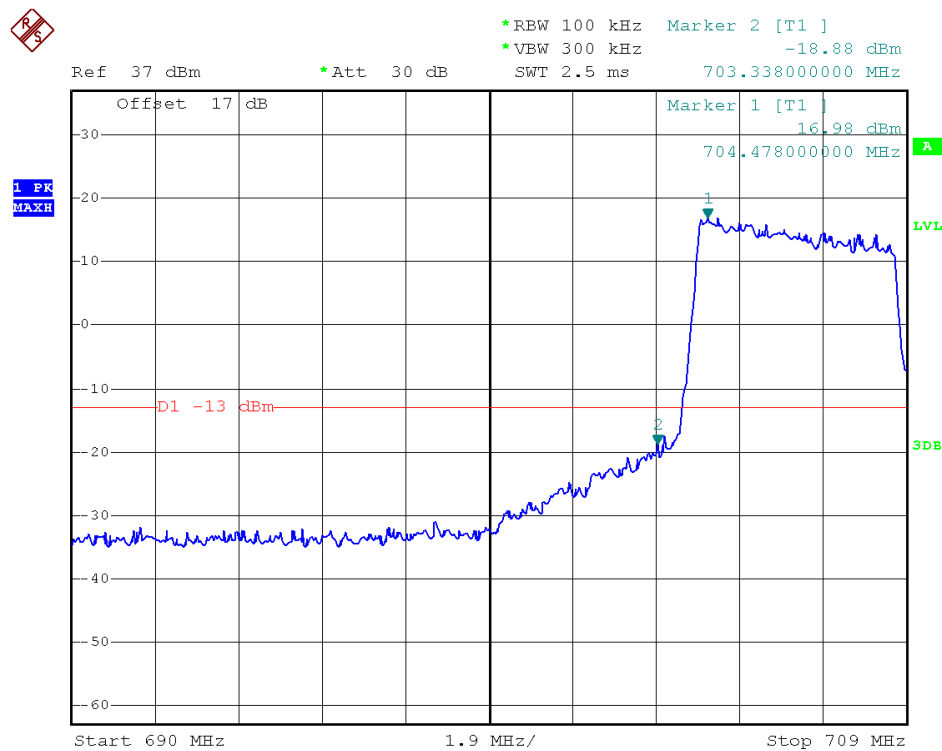


Higher Band Edge Plot for QPSK-RB Size 25, RB Offset 0

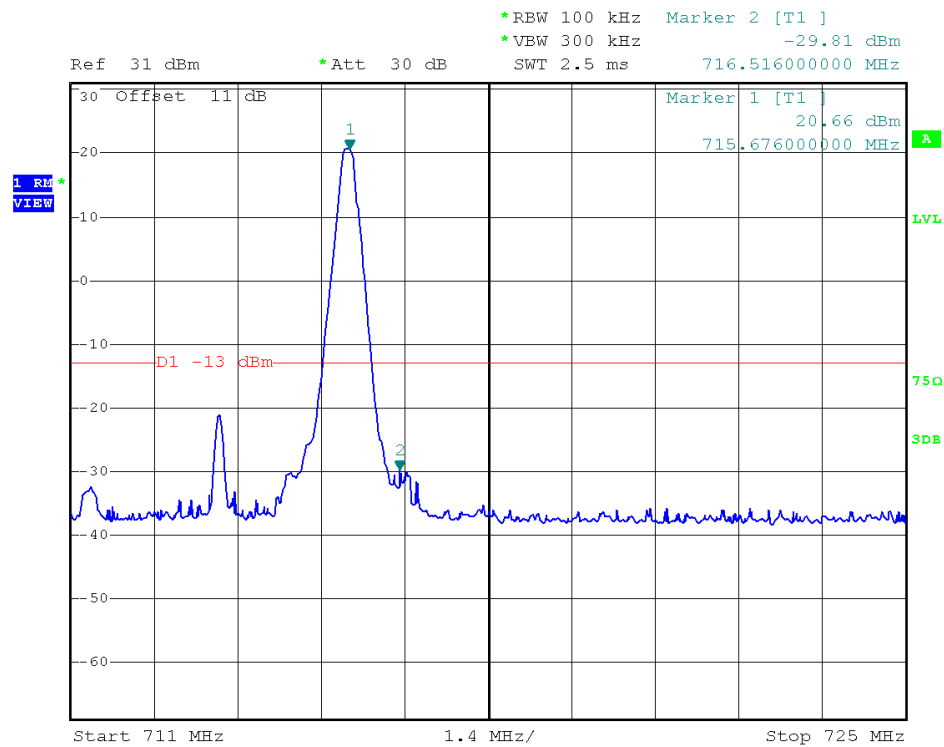
Band	LTE Band 17	Modulation	16QAM
Bandwidth	5MHz		



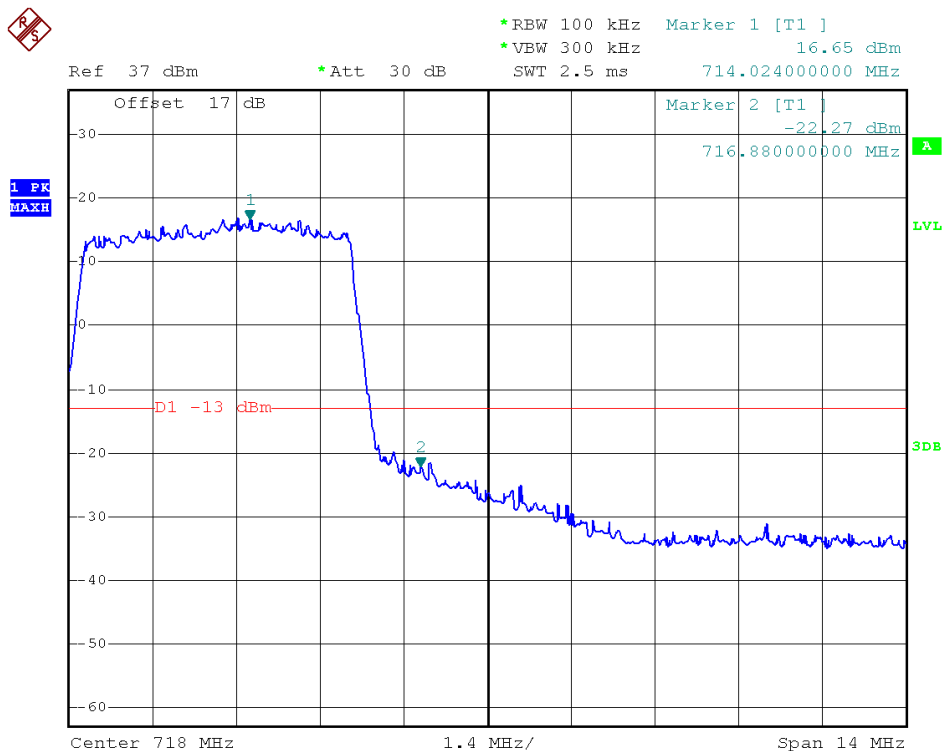
Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 25, RB Offset 0

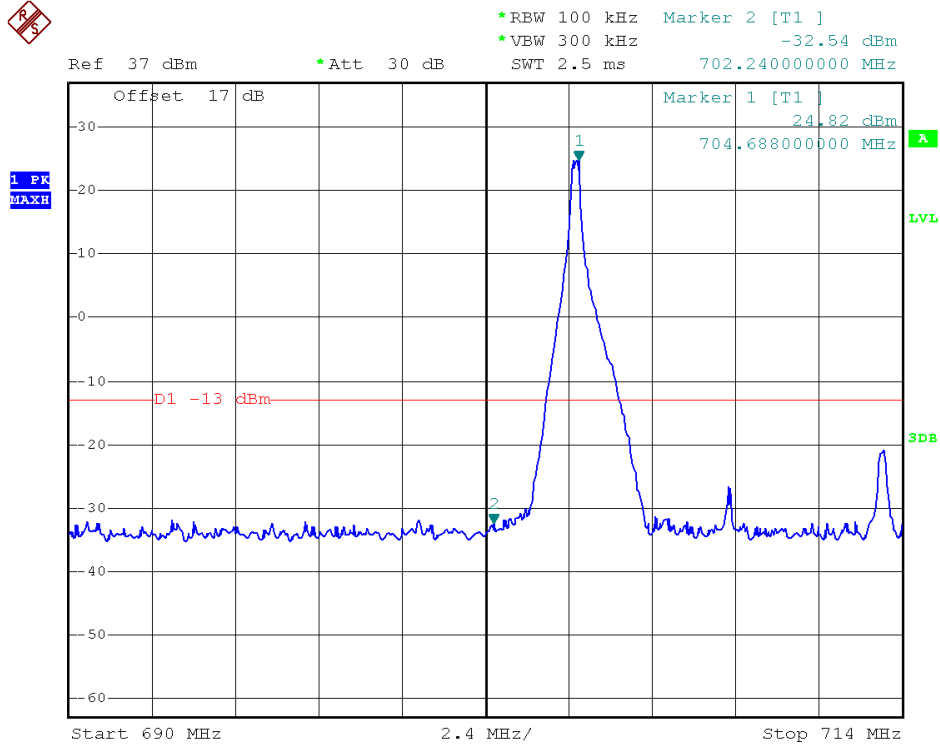


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 24

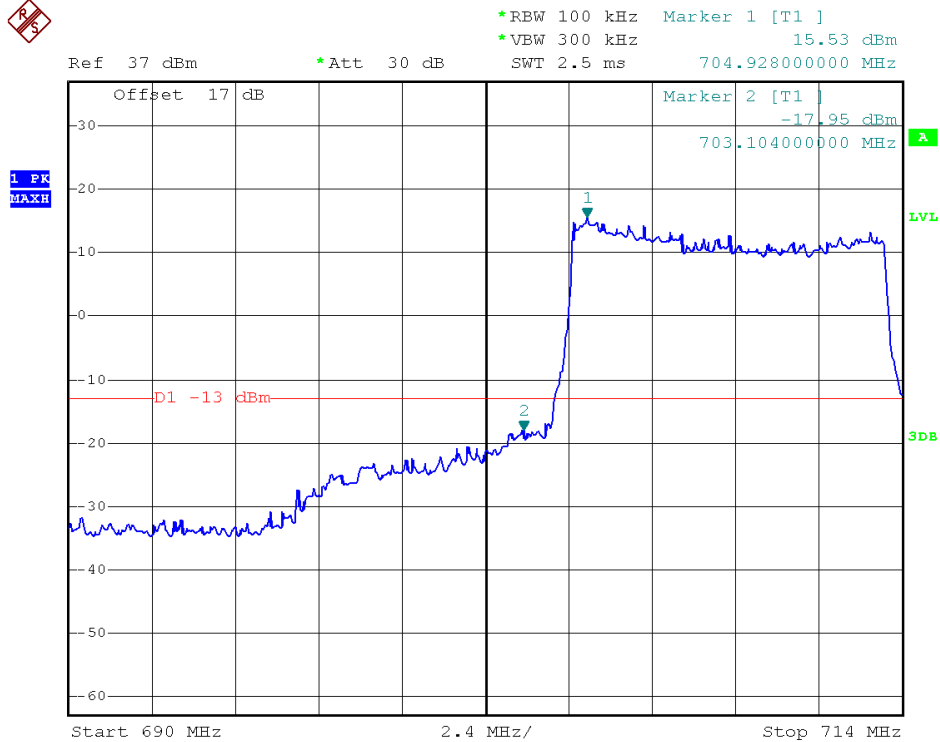


Higher Band Edge Plot for 16QAM -RB Size 25, RB Offset 0

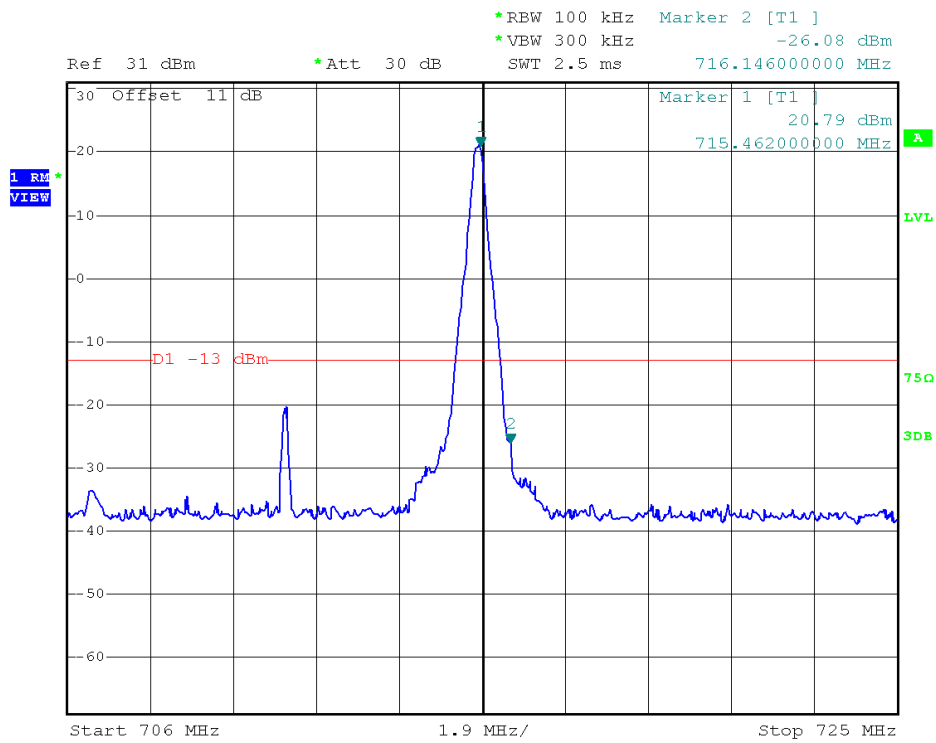
Band	LTE Band 17	Modulation	QPSK
Bandwidth	10MHz		



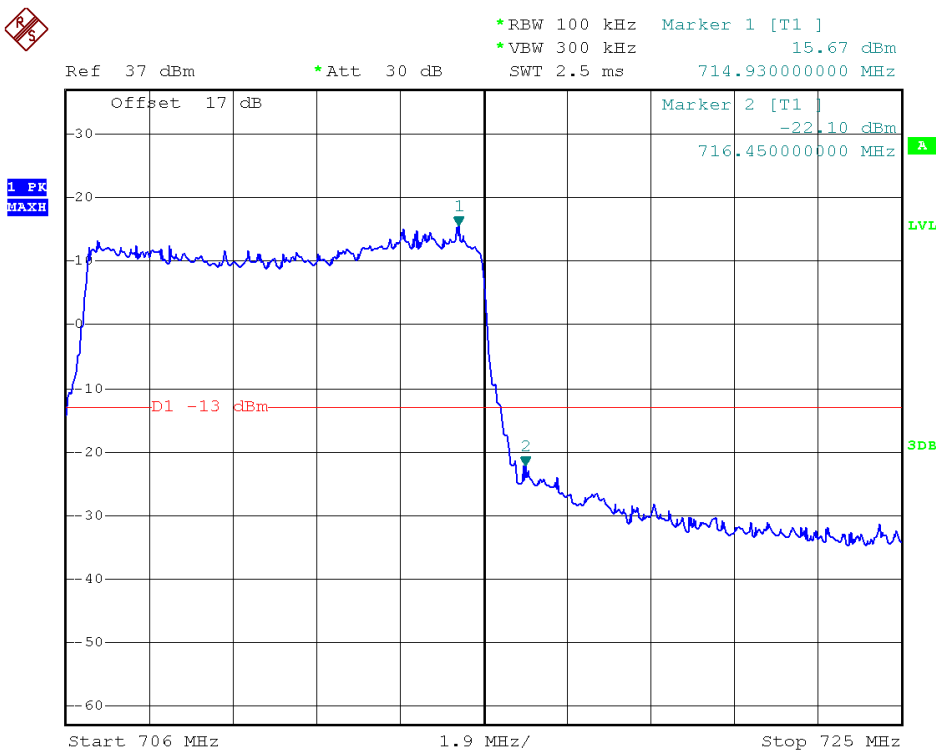
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 50, RB Offset 0

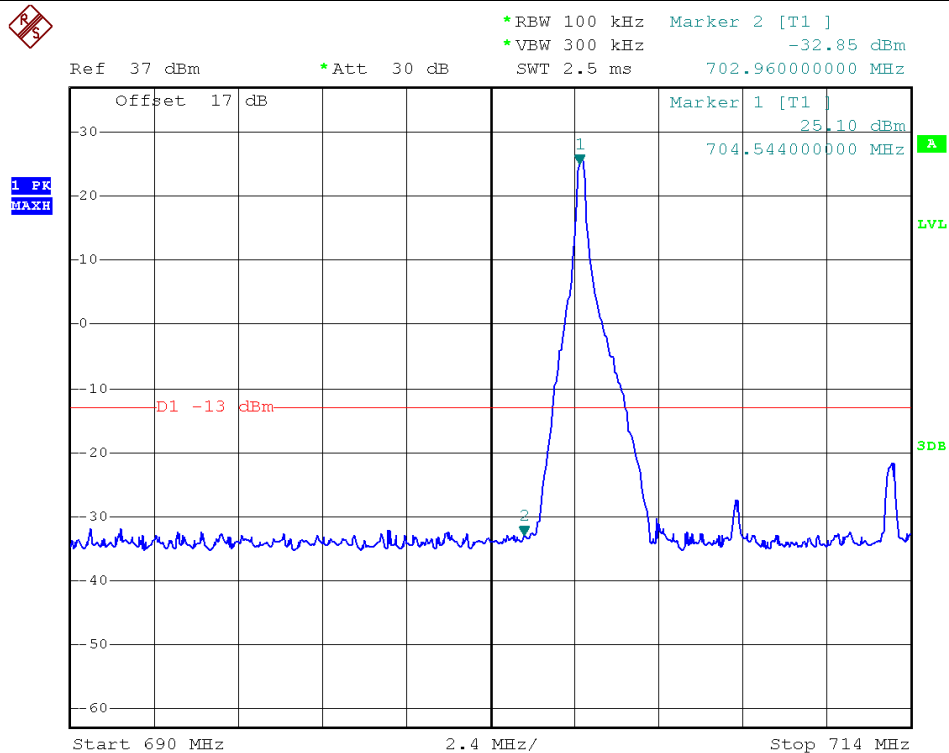


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 49

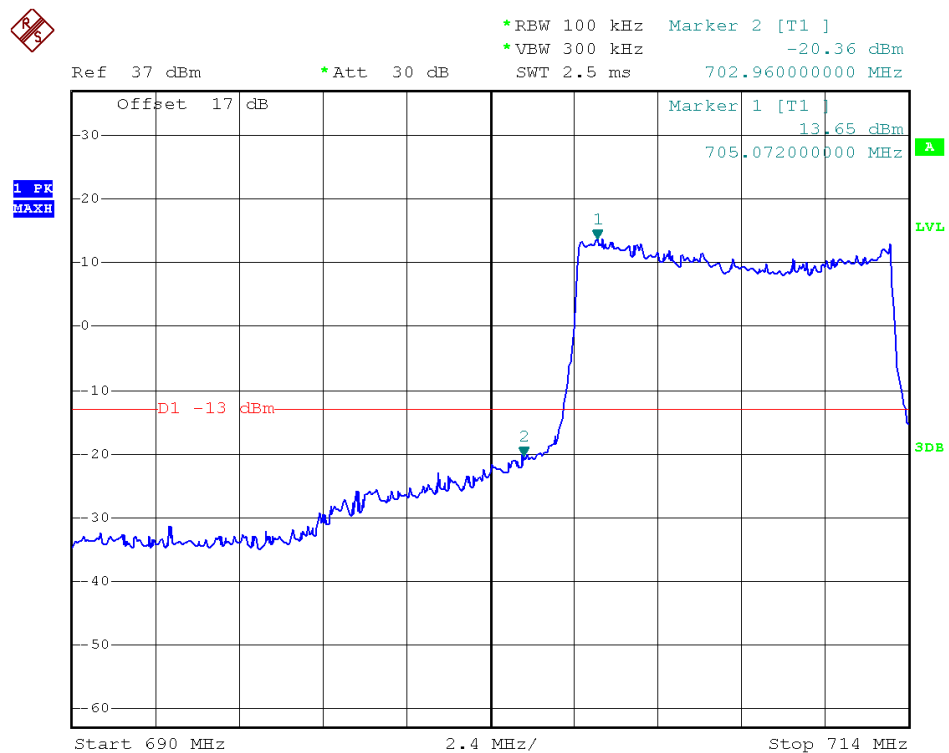


Higher Band Edge Plot for QPSK-RB Size 50, RB Offset 0

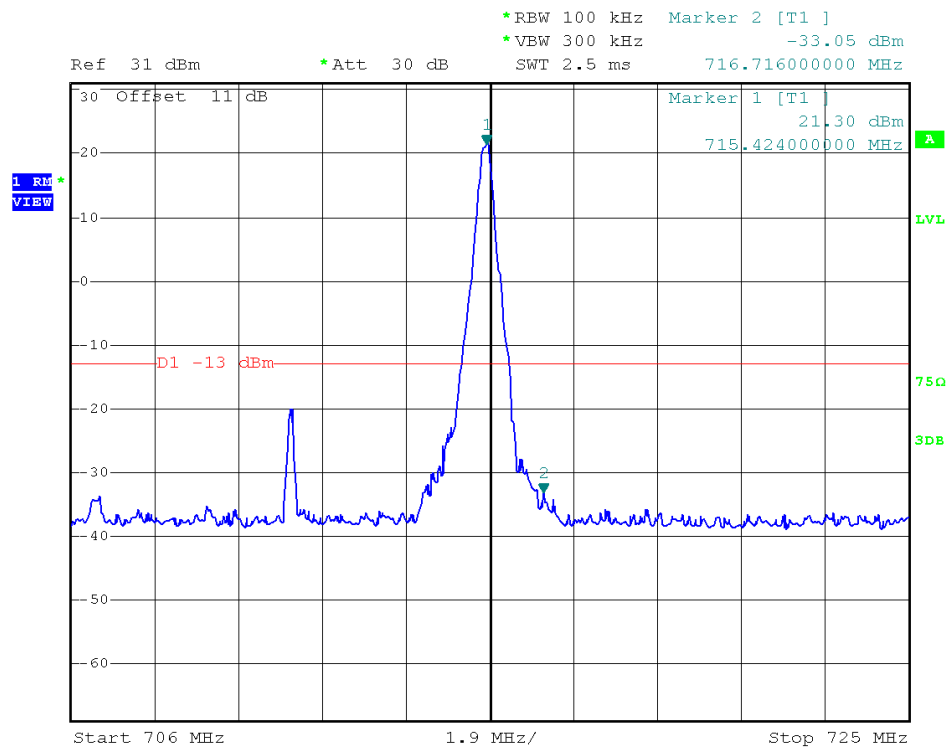
Band	LTE Band 17	Modulation	16QAM
Bandwidth	10MHz		



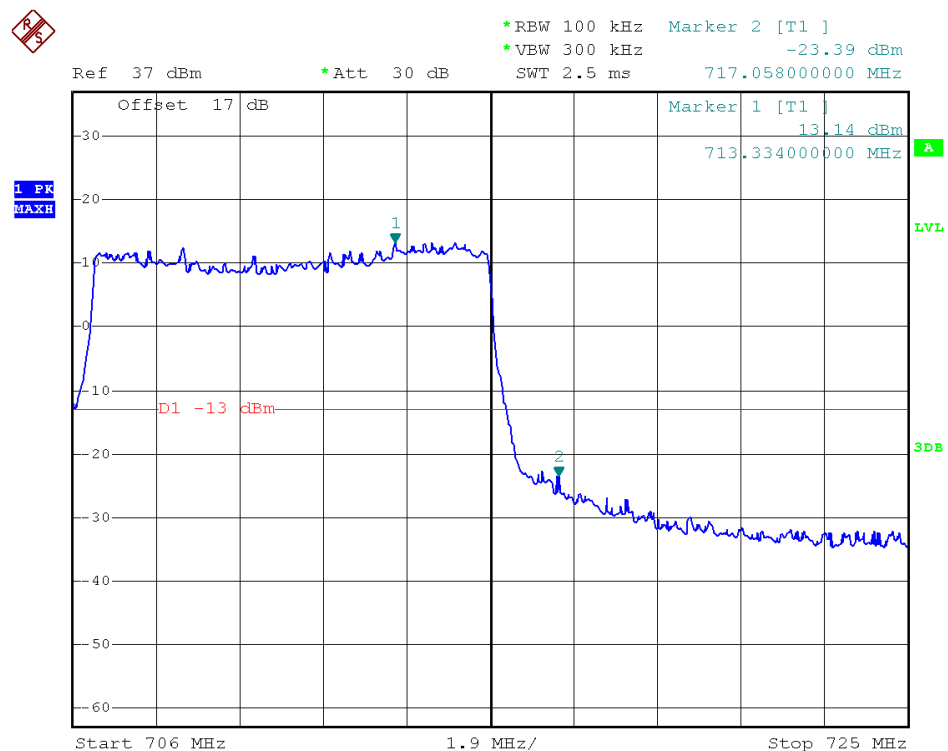
Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 50, RB Offset 0



Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 49



Higher Band Edge Plot for 16QAM -RB Size 50, RB Offset 0

2.7 Transmitter Radiated Power (EIRP/ERP)

2.7.1 Requirement

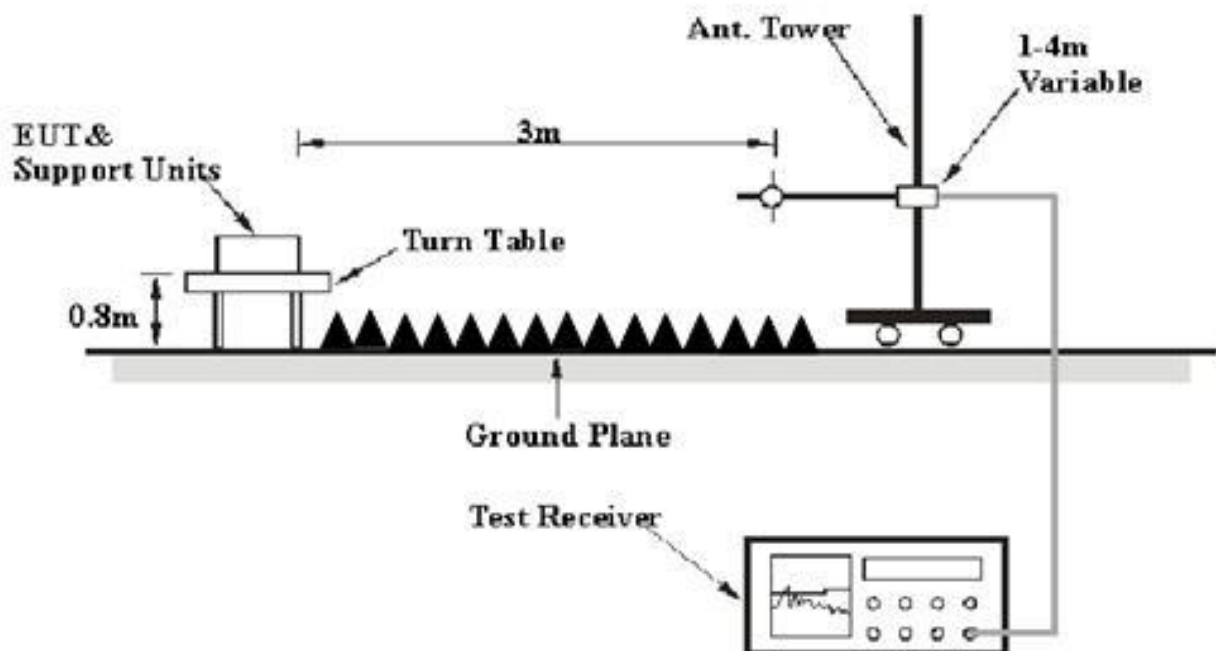
Effective radiated power output measurements by substitution method according to ANSI / TIA /EIA-603-D-2010, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. Mobile and portable (hand-held) stations operating are limited to average ERP of 3 watts with LTE band 17.

Effective radiated power output measurements by substitution method according to ANSI / TIA /EIA-603-D-2010, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. Mobile and portable (hand-held) stations operating are limited to average EIRP of 1 watt with LTE band 4.

2.7.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.7.3 Test Setup



2.7.4 Test Procedures

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer which used a channel power option across EUT's signal bandwidth per section 4.0 of KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10. $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

P_s (dBm): Input power to substitution antenna.

G_s (dBi or dBd): Substitution antenna Gain.

$E_t = R_t + AF$

$E_s = R_s + AF$

AF (dB/m): Receive antenna factor

R_t : The highest received signal in spectrum analyzer for EUT.

R_s : The highest received signal in spectrum analyzer for substitution antenna.

2.7.5 Test Result of ERP/EIRP

1. LTE Band 4 Test Verdict:

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	EIRP (dBm)	H/V
			RB Size	RB Offset			
4	1.4	QPSK	1	0	1710.7	22.77	H
4	1.4	QPSK	1	0	1732.5	22.70	H
4	1.4	QPSK	1	0	1754.3	22.87	H
4	1.4	QPSK	1	0	1710.7	22.59	V
4	1.4	QPSK	1	0	1732.5	22.65	V
4	1.4	QPSK	1	0	1754.3	22.81	V
4	1.4	16QAM	1	5	1710.7	21.71	H
4	1.4	16QAM	1	0	1732.5	21.66	H
4	1.4	16QAM	1	0	1754.3	21.55	H
4	1.4	16QAM	1	5	1710.7	21.62	V
4	1.4	16QAM	1	0	1732.5	21.38	V
4	1.4	16QAM	1	0	1754.3	21.42	V
4	3	QPSK	1	0	1711.5	22.75	H
4	3	QPSK	1	0	1732.5	22.67	H
4	3	QPSK	1	0	1753.5	22.70	H
4	3	QPSK	1	0	1711.5	22.65	V
4	3	QPSK	1	0	1732.5	22.54	V
4	3	QPSK	1	0	1753.5	22.56	V
4	3	16QAM	1	14	1711.5	21.72	H
4	3	16QAM	1	0	1732.5	21.64	H
4	3	16QAM	1	0	1753.5	21.67	H
4	3	16QAM	1	14	1711.5	21.47	V
4	3	16QAM	1	0	1732.5	21.52	V
4	3	16QAM	1	0	1753.5	21.40	V
4	5	QPSK	1	0	1712.5	22.72	H
4	5	QPSK	1	0	1732.5	22.78	H
4	5	QPSK	1	0	1752.5	22.69	H
4	5	QPSK	1	0	1712.5	22.46	V
4	5	QPSK	1	0	1732.5	22.50	V
4	5	QPSK	1	0	1752.5	22.56	V
4	5	16QAM	1	24	1712.5	21.75	H
4	5	16QAM	1	0	1732.5	21.68	H
4	5	16QAM	1	0	1752.5	21.76	H
4	5	16QAM	1	24	1712.5	21.52	V



LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	EIRP (dBm)	H/V
			RB Size	RB Offset			
4	5	16QAM	1	0	1732.5	21.45	V
4	5	16QAM	1	0	1752.5	21.42	V
4	10	QPSK	1	0	1715	22.67	H
4	10	QPSK	1	0	1732.5	22.69	H
4	10	QPSK	1	0	1750	22.71	H
4	10	QPSK	1	0	1715	22.57	V
4	10	QPSK	1	0	1732.5	22.62	V
4	10	QPSK	1	0	1750	22.53	V
4	10	16QAM	1	49	1715	21.79	H
4	10	16QAM	1	0	1732.5	21.85	H
4	10	16QAM	1	0	1750	21.73	H
4	10	16QAM	1	49	1715	21.82	V
4	10	16QAM	1	0	1732.5	21.55	V
4	10	16QAM	1	0	1750	21.43	V
4	15	QPSK	1	0	1717.5	22.74	H
4	15	QPSK	1	0	1732.5	22.71	H
4	15	QPSK	1	0	1747.5	22.67	H
4	15	QPSK	1	0	1717.5	22.53	V
4	15	QPSK	1	0	1732.5	22.55	V
4	15	QPSK	1	0	1747.5	22.49	V
4	15	16QAM	1	74	1717.5	21.84	H
4	15	16QAM	1	0	1732.5	21.72	H
4	15	16QAM	1	0	1747.5	21.81	H
4	15	16QAM	1	74	1717.5	21.56	V
4	15	16QAM	1	0	1732.5	21.41	V
4	15	16QAM	1	0	1747.5	21.49	V
4	20	QPSK	1	0	1720	22.73	H
4	20	QPSK	1	0	1732.5	22.77	H
4	20	QPSK	1	0	1745	22.69	H
4	20	QPSK	1	0	1720	22.49	V
4	20	QPSK	1	0	1732.5	22.44	V
4	20	QPSK	1	0	1745	22.51	V
4	20	16QAM	1	99	1720	21.83	H
4	20	16QAM	1	0	1732.5	21.76	H
4	20	16QAM	1	0	1745	21.91	H
4	20	16QAM	1	99	1720	21.33	V
4	20	16QAM	1	0	1732.5	21.46	V
4	20	16QAM	1	0	1745	21.34	V

2. LTE Band 17 Test Verdict:

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	EIRP (dBm)	H/V
			RB Size	RB Offset			
17	5	QPSK	1	0	706.5	19.15	H
17	5	QPSK	1	0	710	19.10	H
17	5	QPSK	1	0	713.5	19.23	H
17	5	QPSK	1	0	706.5	18.86	V
17	5	QPSK	1	0	710	18.75	V
17	5	QPSK	1	0	713.5	18.79	V
17	5	16QAM	1	24	706.5	17.69	H
17	5	16QAM	1	0	710	17.76	H
17	5	16QAM	1	0	713.5	17.65	H
17	5	16QAM	1	24	706.5	17.47	V
17	5	16QAM	1	0	710	17.48	V
17	5	16QAM	1	0	713.5	17.32	V
17	10	QPSK	1	0	709	19.23	H
17	10	QPSK	1	0	710	19.11	H
17	10	QPSK	1	0	711	19.25	H
17	10	QPSK	1	0	709	18.79	V
17	10	QPSK	1	0	710	18.68	V
17	10	QPSK	1	0	711	18.75	V
17	10	16QAM	1	49	709	17.83	H
17	10	16QAM	1	0	710	17.86	H
17	10	16QAM	1	0	711	17.91	H
17	10	16QAM	1	49	709	17.53	V
17	10	16QAM	1	0	710	17.46	V
17	10	16QAM	1	0	711	17.58	V

2.8 Radiated Spurious Emissions

2.8.1 Requirement

The radiated spurious emission was measured by substitution method according to ANSI / TIA /EIA-603-D-2010. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

For LTE Band 17

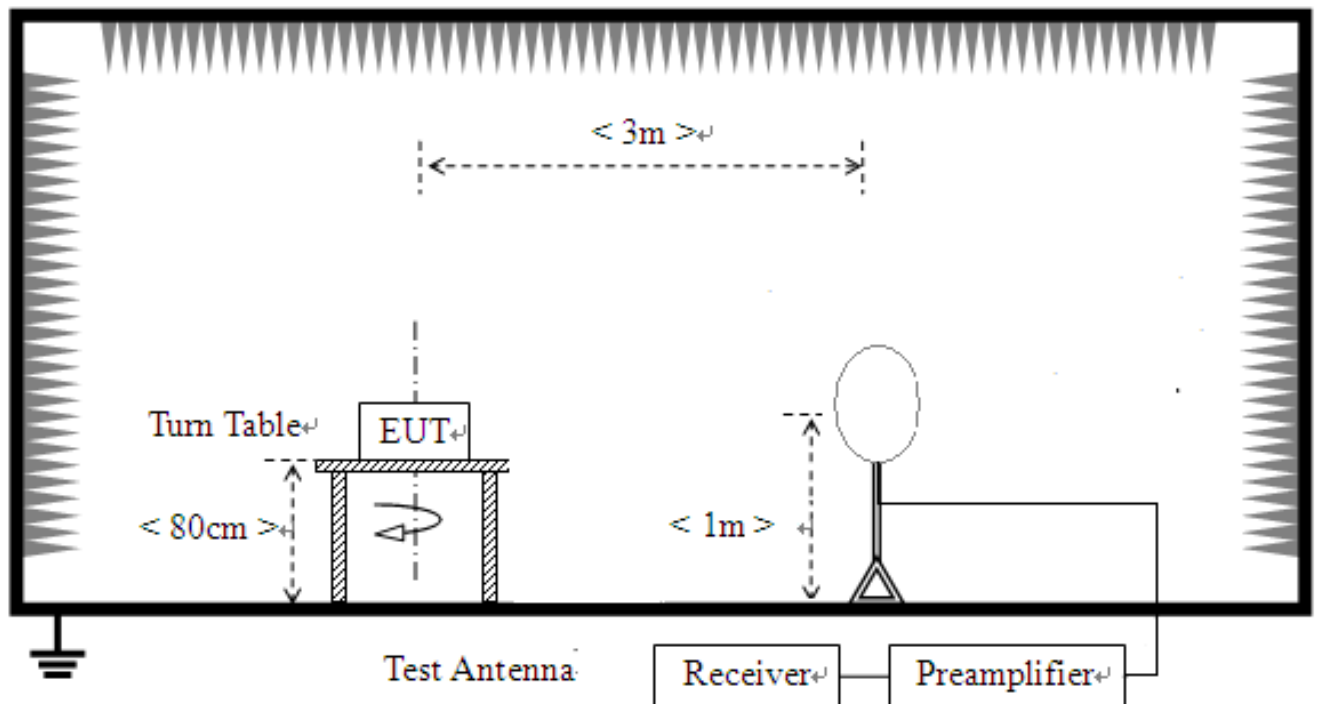
For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

2.8.2 Measuring Instruments

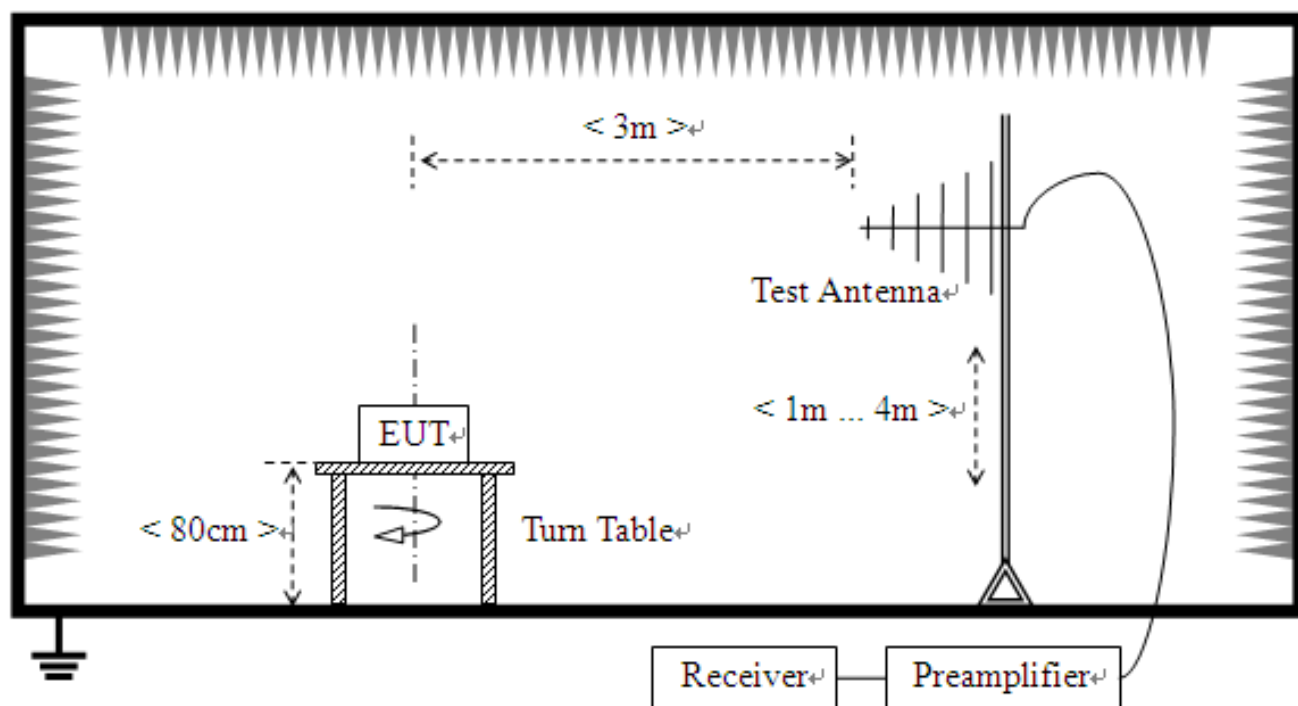
The measuring equipment is listed in the section 3 of this test report.

2.8.3 Test Description

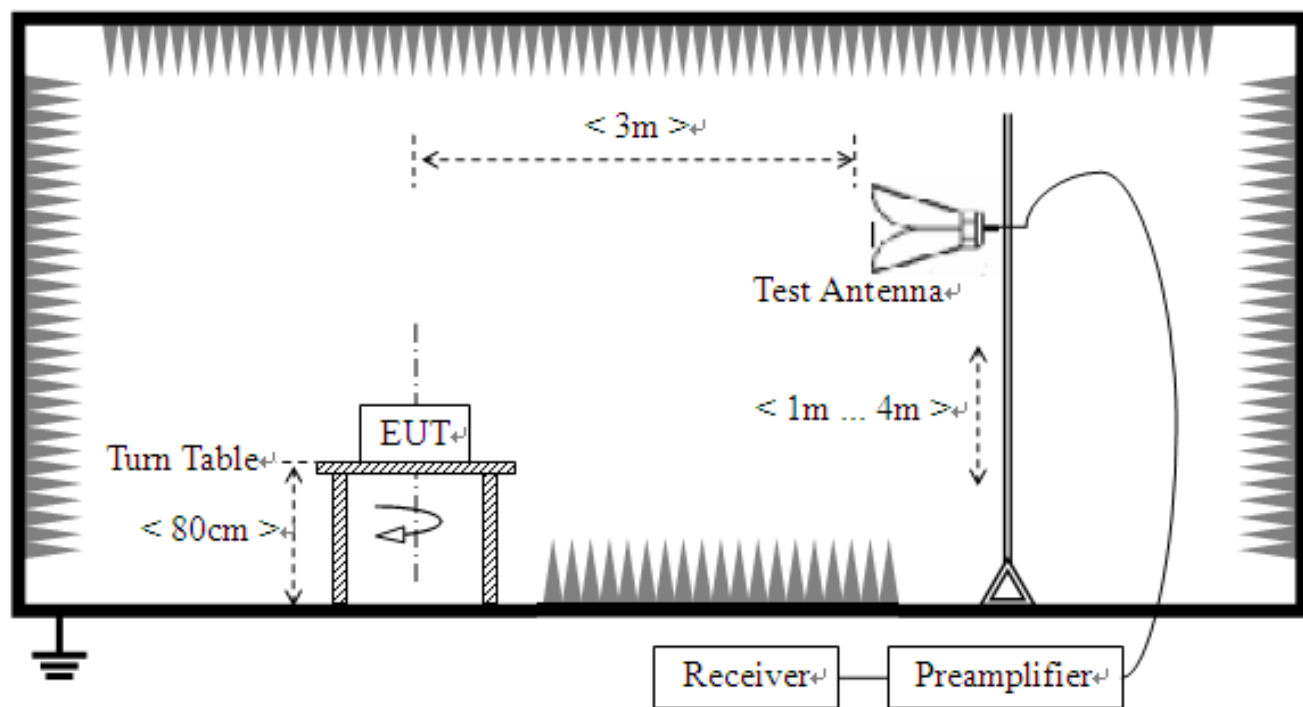
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to 1GHz



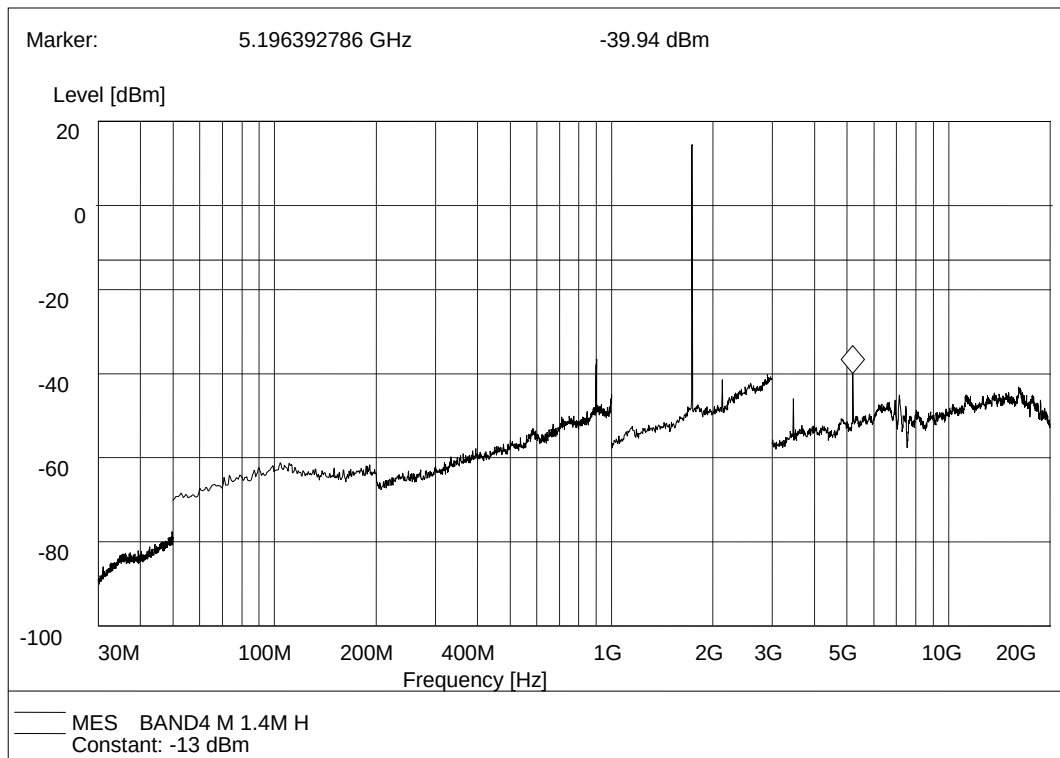
For radiated emissions above 1GHz



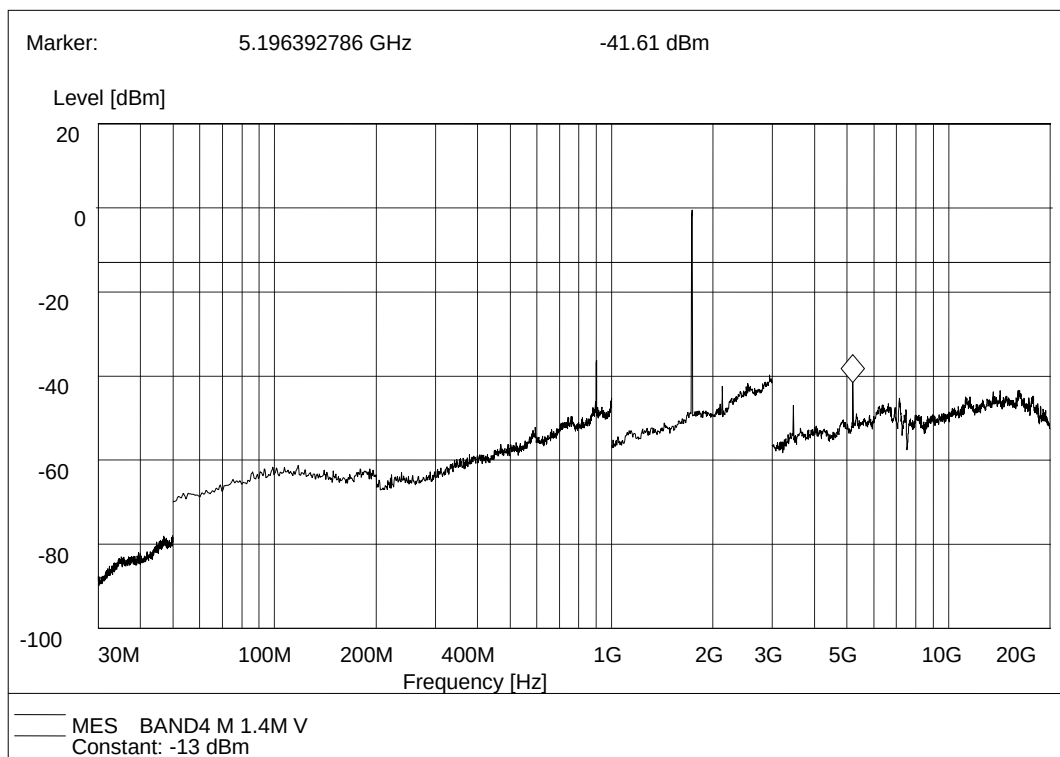
2.8.4 Test Procedures

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
The limit line is derived from $43 + 10\log(P)\text{dB}$ below the transmitter power $P(\text{Watts})$
 $= P(\text{W}) - [43 + 10\log(P)] (\text{dB})$
 $= [30 + 10\log(P)] (\text{dBm}) - [43 + 10\log(P)] (\text{dB})$
 $= -13\text{dBm}.$
11. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
12. The spectrum is measured from 9 KHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
13. For 9KHz to 30MHz: the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
14. The maximum RB configurations of the Radiated Spurious Emissions as RB Size 1, RB Offset 0

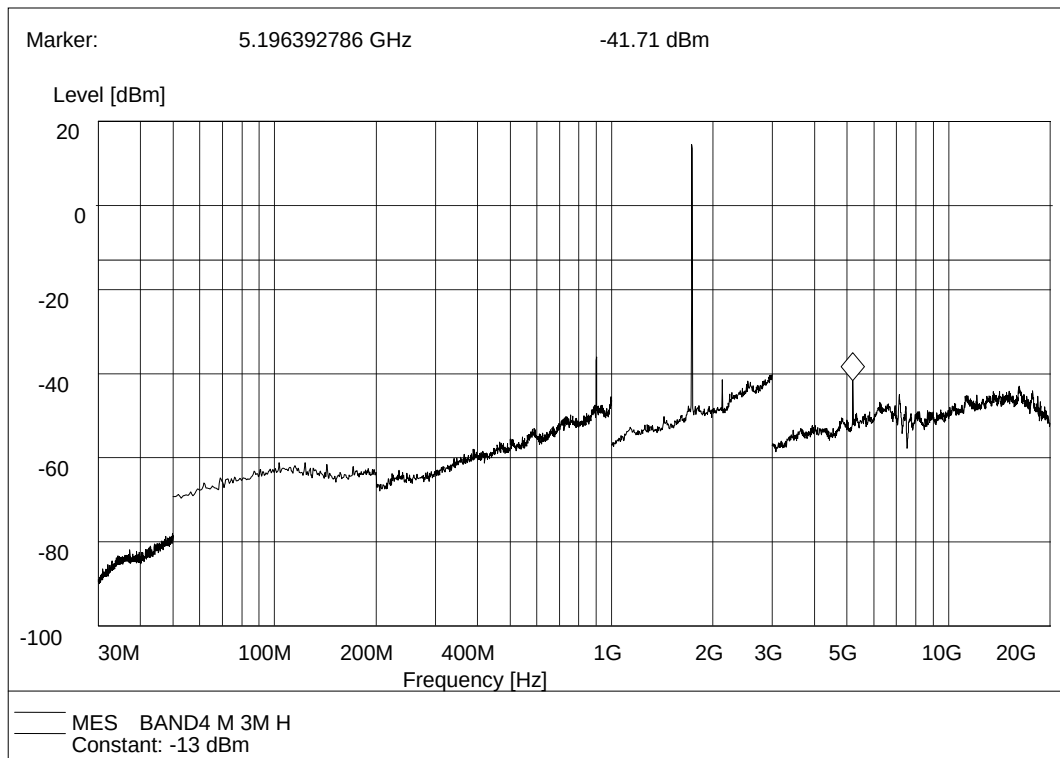
2.8.5 Test Result (Plots) of Radiated Spurious Emission



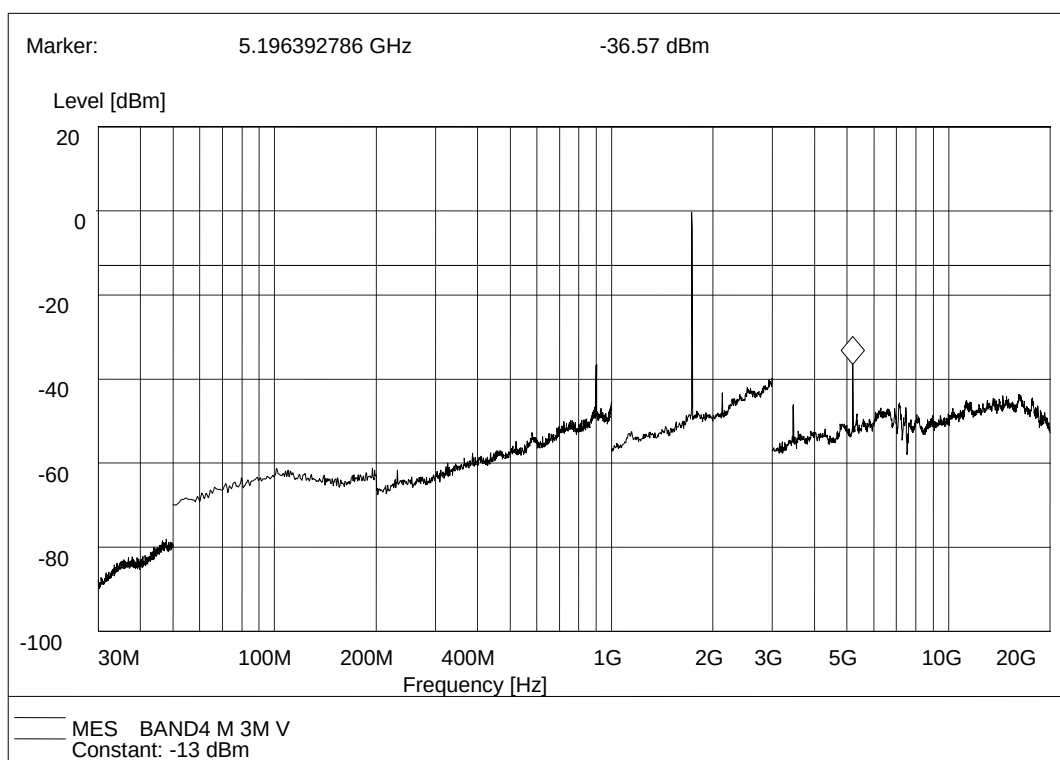
LTE Band 4 QPSK 1.4MHz BW Test Antenna Horizontal



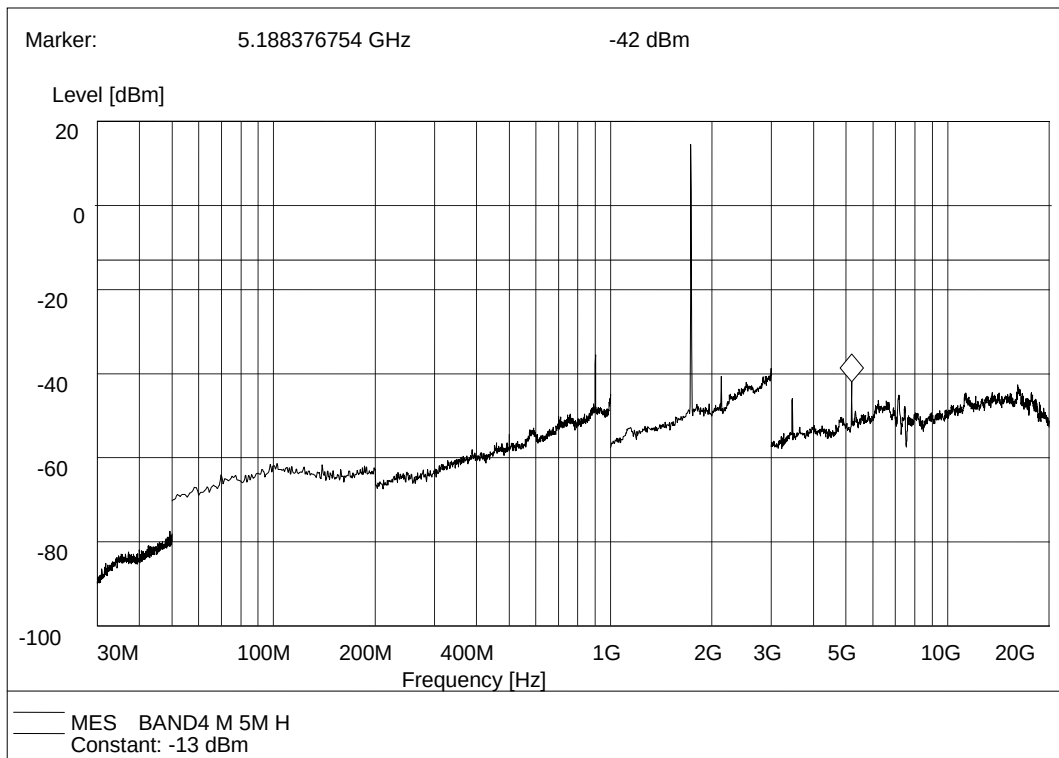
LTE Band 4 QPSK 1.4MHz BW Test Antenna Vertical



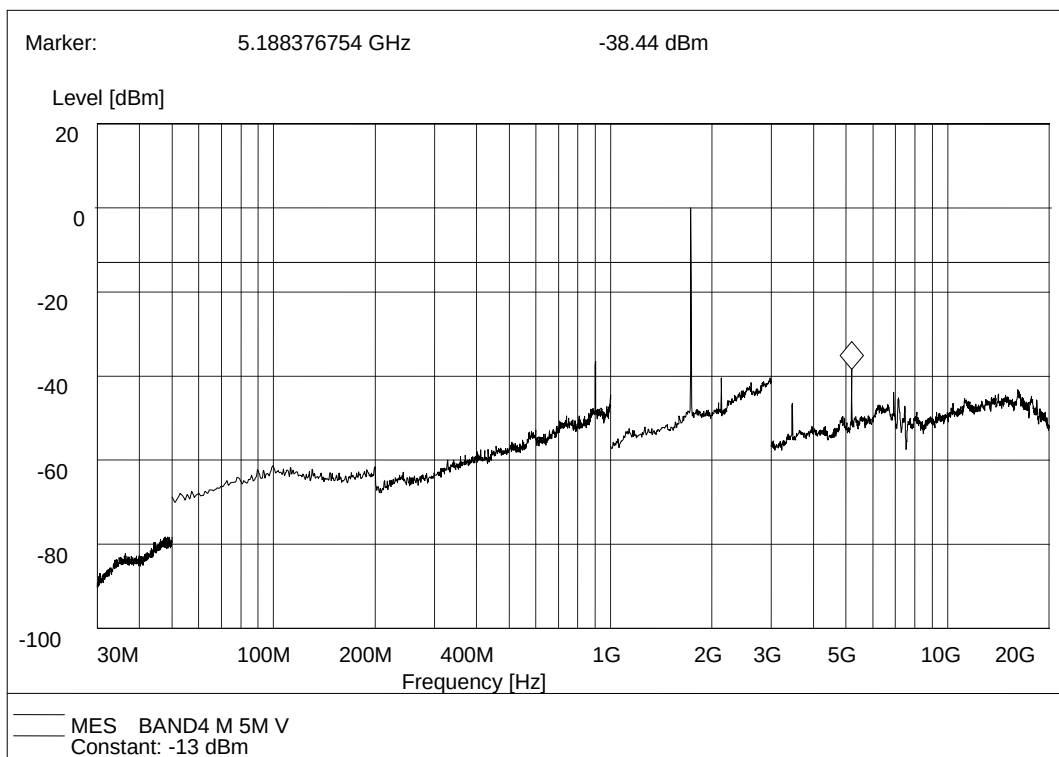
LTE Band 4 QPSK 3MHz BW Test Antenna Horizontal



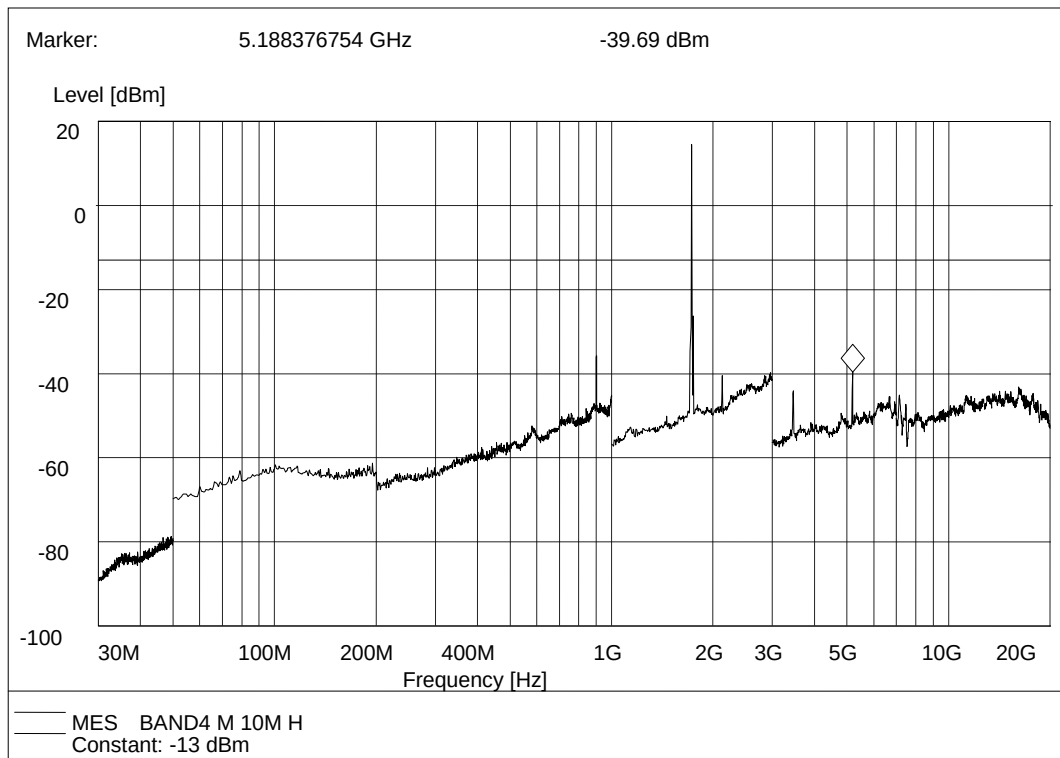
LTE Band 4 QPSK 3MHz BW Test Antenna Vertical



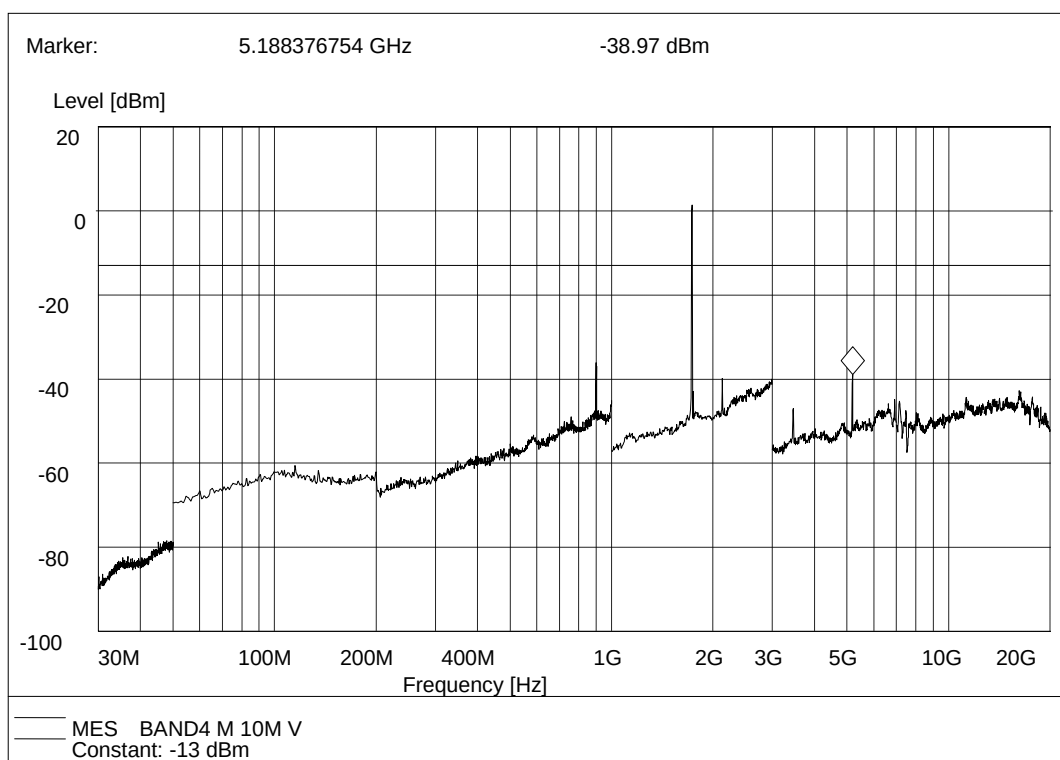
LTE Band 4 QPSK 5MHz BW Test Antenna Horizontal



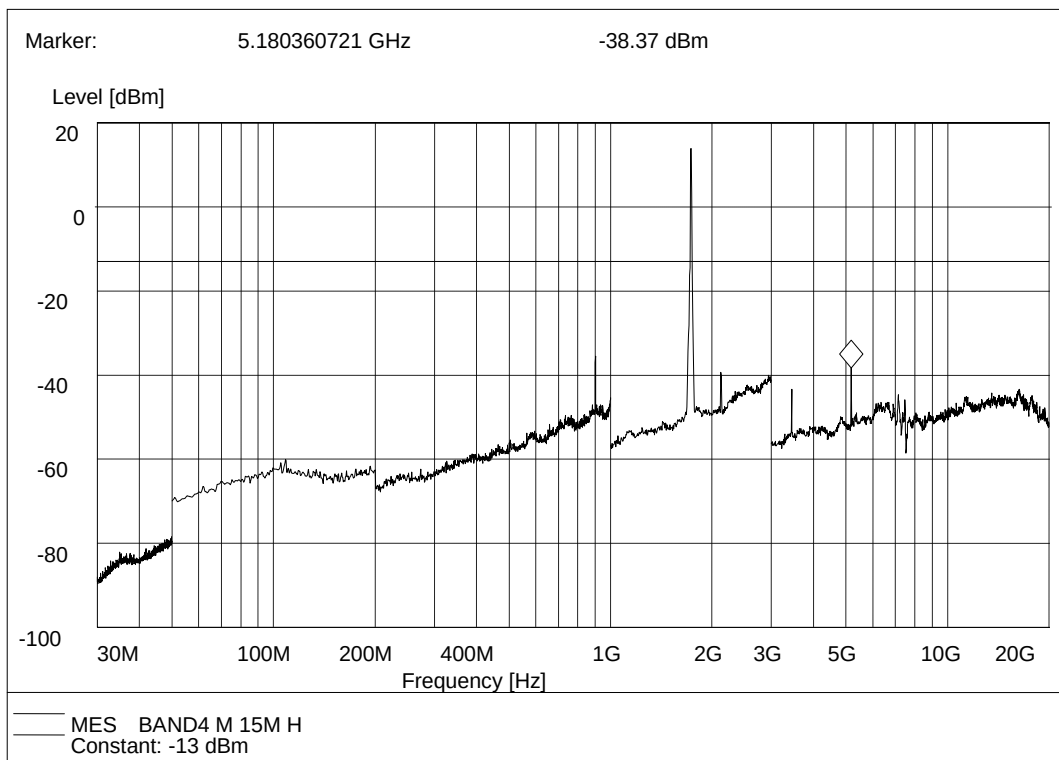
LTE Band 4 QPSK 5MHz BW Test Antenna Vertical



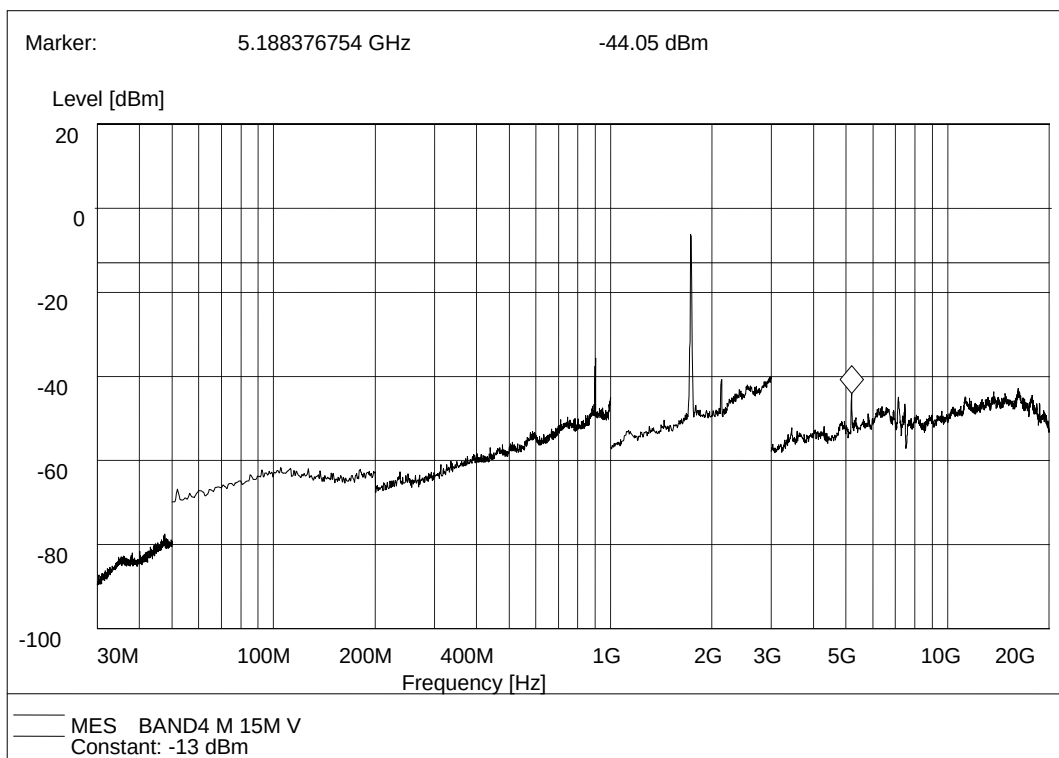
LTE Band 4 QPSK 10MHz BW Test Antenna Horizontal



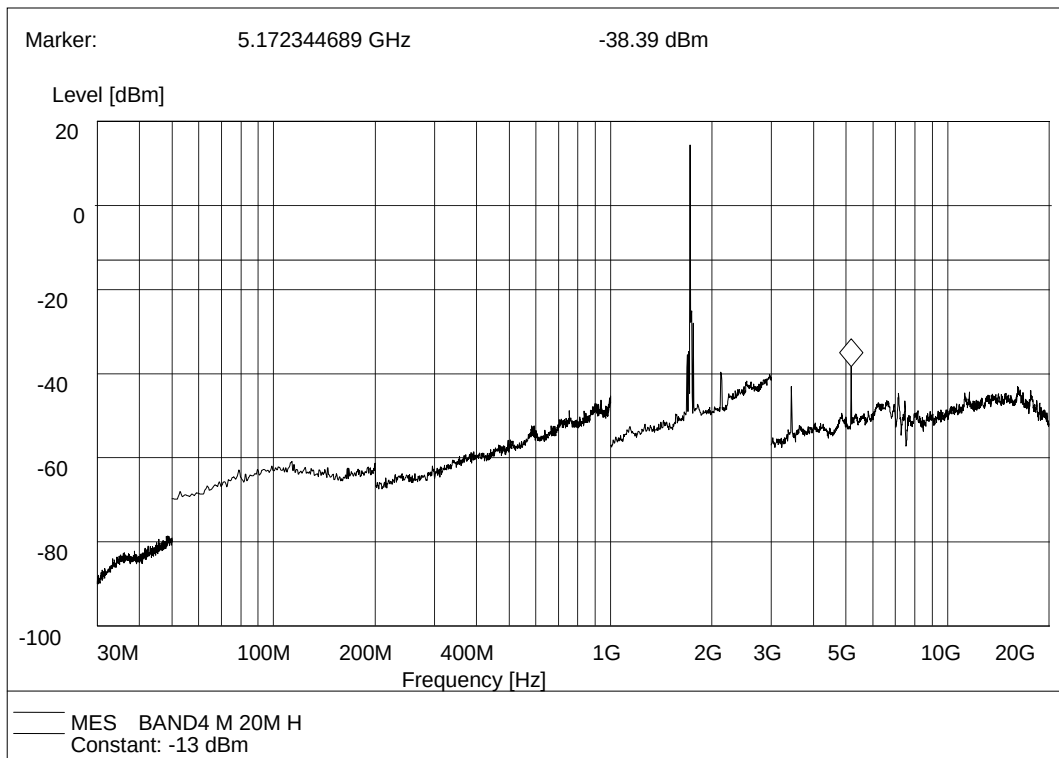
LTE Band 4 QPSK 10MHz BW Test Antenna Vertical



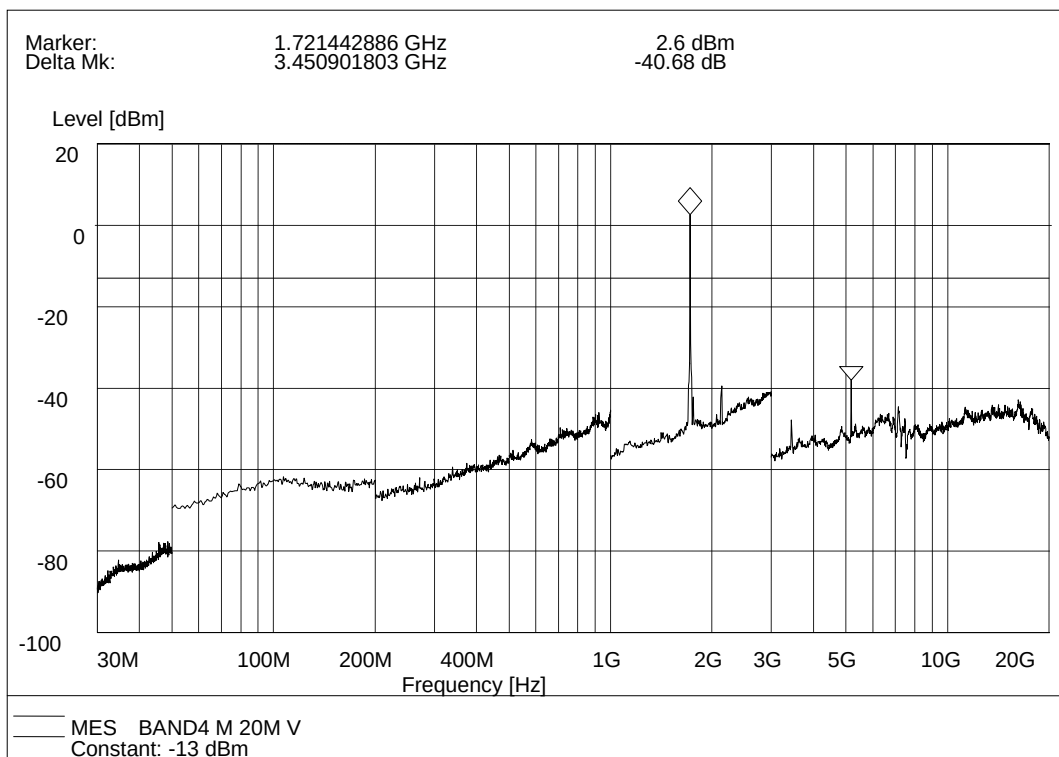
LTE Band 4 QPSK 15MHz BW Test Antenna Horizontal



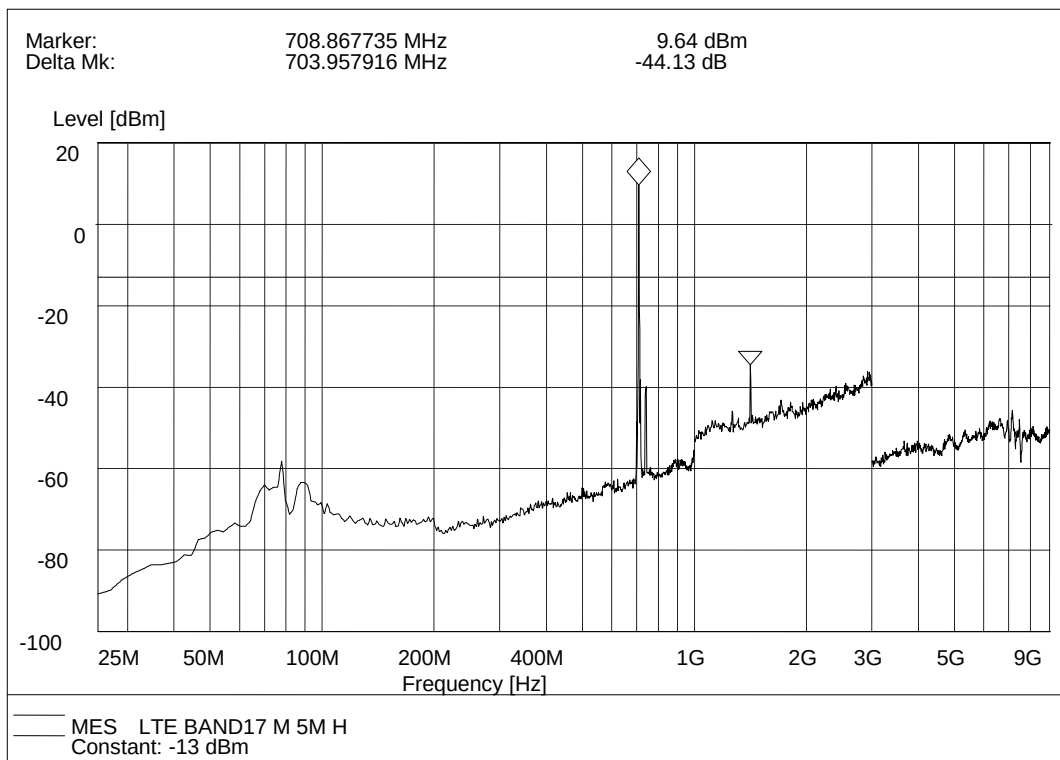
LTE Band 4 QPSK 15MHz BW Test Antenna Vertical



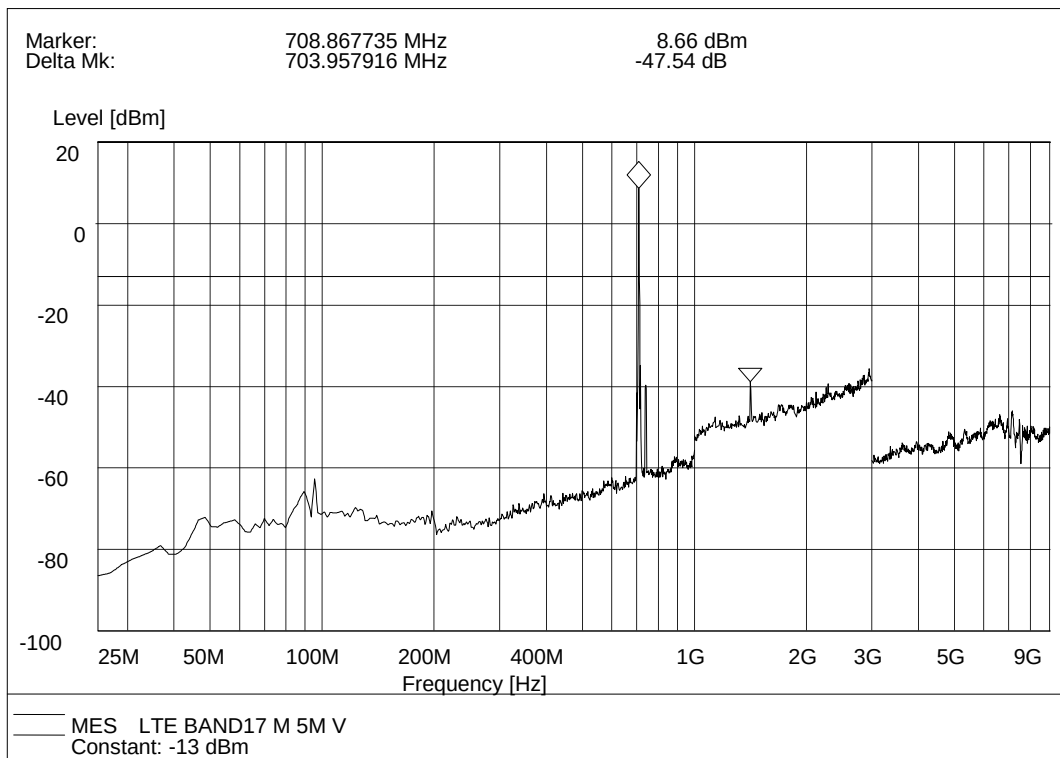
LTE Band 4 QPSK 20MHz BW Test Antenna Horizontal



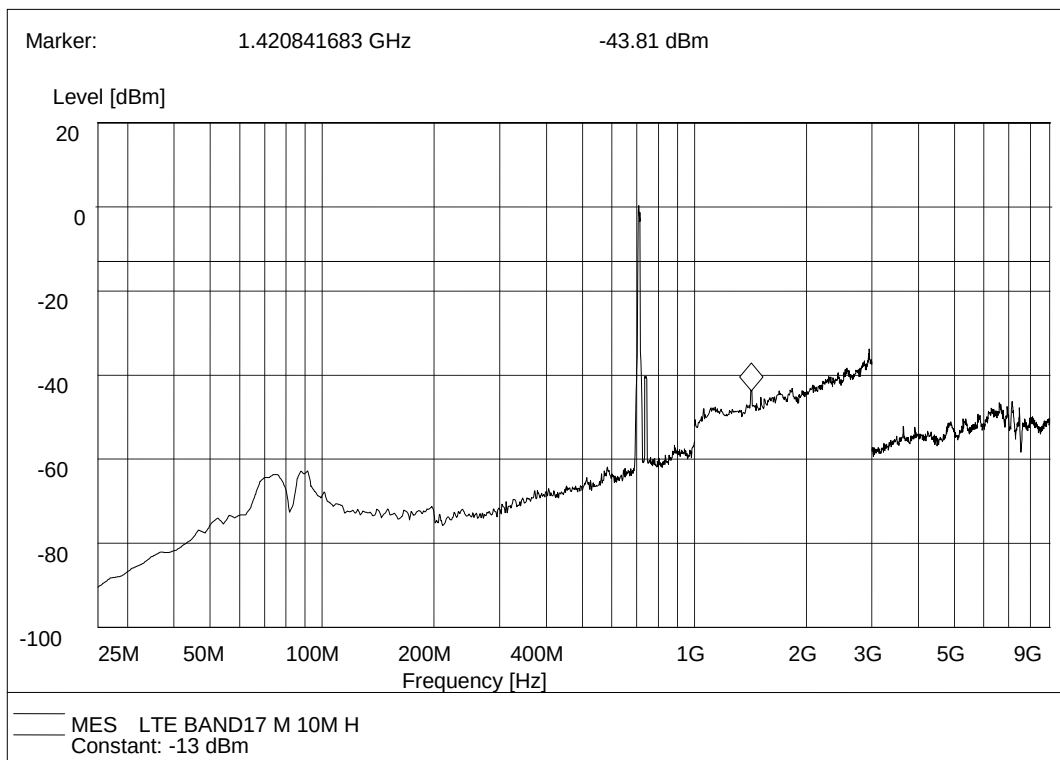
LTE Band 4 QPSK 20MHz BW Test Antenna Vertical



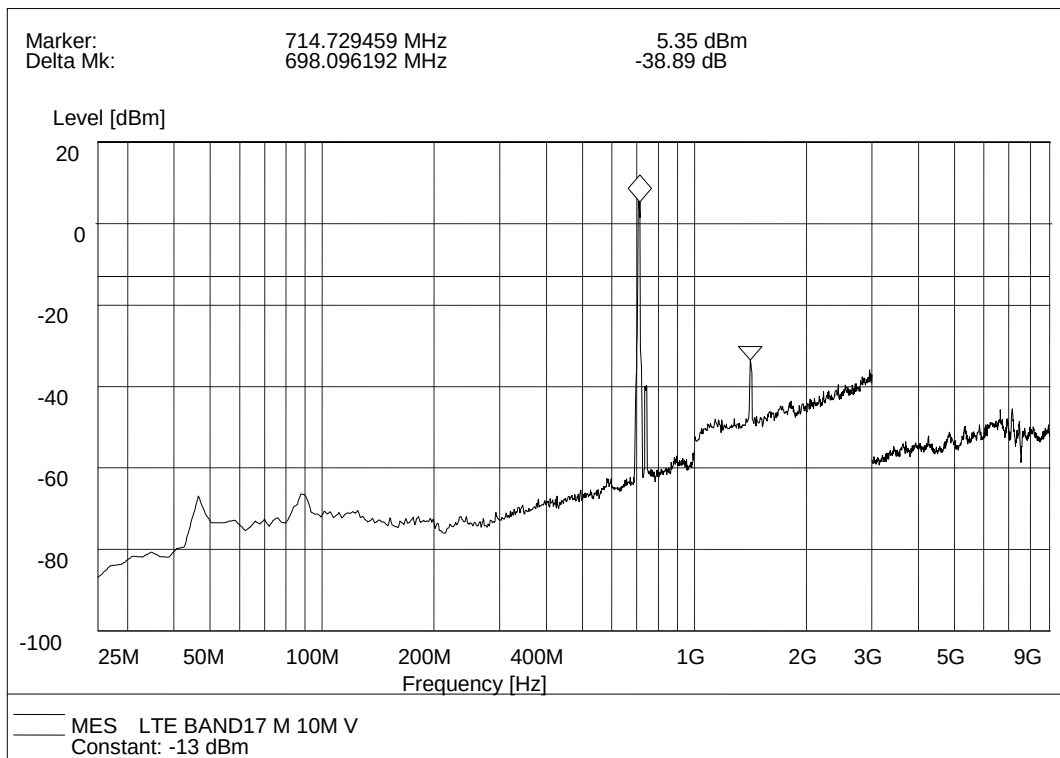
LTE Band 17 QPSK 5MHz BW Test Antenna Horizontal



LTE Band 17 QPSK 5MHz BW Test Antenna Vertical



LTE Band 17 QPSK 10MHz BW Test Antenna Horizontal



LTE Band 17 QPSK 10MHz BW Test Antenna Vertical



3. LIST OF MEASURING EQUIPMENT

Description	Manufacturer	Model	Serial No.	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESIB26	A0304218	2015.06.02	2016.06.02	Radiation
Full-Anechoic Chamber	Albatross	12.8m*6.8m* 6.4m	A0412372	2015.01.05	2016.01.04	Radiation
Loop Antenna	Schwarz beck	HFH2-Z2	100047	2015.06.02	2016.06.02	Radiation
Bilog Antenna	Schwarzbeck	VULB 9163	9163-274	2015.06.02	2016.06.02	Radiation
Double ridge horn antenna	R&S	HF960	100150	2015.06.02	2016.06.02	Radiation
Ultra-wideband antenna	R&S	HL562	100089	2015.06.02	2016.06.02	Radiation
Test Antenna – Horn (18-25GHz)	ETS	UG-596A/U	A0902607	2015.06.02	2016.06.02	Radiation
Amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.02	2016.06.02	Radiation
Ampilier 1G~18GHz	R&S	MITEQ AFS42-00101 800	25-S-42	2015.06.02	2016.06.02	Radiation
Ampilier 18G~40GHz	R&S	JS42-180026 00-28-5A	12111.0980.0 0	2015.06.02	2016.06.02	Radiation
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2015.07.07	2016.07.06	Conducte d
Power Meter	R&S	NRVS	1020.1809.02	2015.06.02	2016.06.02	Conducte d
Power Sensor	R&S	NRV-Z4	823.3618.03	2015.06.02	2016.06.02	Conducte d
LISN	ROHDE&SCH WARZ	ESH2-Z5	A0304221	2015.06.02	2016.06.02	Conducte d
Test Receiver	R&S	ESCS30	A0304260	2015.06.02	2016.06.02	Conducte d
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.02	2016.06.02	Radiation
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.02	2016.06.02	Radiation

**** END OF REPORT ****