RF TEST REPORT

Report No.: SET2015-08522

Product: EYE1

FCC ID: 2AE44EYE1

Model No.: EYE1

Applicant: Sioeye LLC

Address: 4265 San Felipe #1100 Houston TX 77027 USA

Dates of Testing: 06/02/2015 — 06/19/2015

Issued by: CCIC-SET

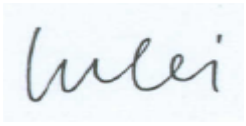
Lab Location: Electronic Testing Building, Shahe Road，Xili, Nanshan District, Shenzh China

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

Test Report

Product..... :	EYE1
Brand Name ..... :	Sioeye
Trade Name ..... :	Sioeye
Applicant ..... :	Sioeye LLC
Applicant Address ..... :	4265 San Felipe #1100 Houston TX 77027 USA
Manufacturer..... :	CK Telecom Limited
Manufacturer Address ..... :	Technology Road.High-Tech Development Zone. Heyuan, Guangdong,P.R.China.
Test Standards..... :	47 CFR Part 2 Frequency Allocations and Radio Treaty Matters; General Rules and Regulations 47 CFR Part 27(H) Miscellaneous wireless communications services
Test Result .....:	PASS

Tested by ..... :



2015.06.19

Lu Lei，Test Engineer

Reviewed by ..... :

2015.06.19

Zhu Qi, Senior Egineer

Approved by……:

2015.06.19

Wu Li'an，Manager

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Change History		
Issue	Date	Reason for change
1.0	2015-06-19	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	EYE1
Hardware Version	HICAM-V2.0
Software Version	HICAM01A-S10A_Sioeye_L2EN_140_150618
EUT supports Radios application	WCDMA/HSPA/HSPA+/LTE WLAN2.4GHz 802.11b/g/n (HT20/HT40) Bluetooth v3.0+EDR Bluetooth v4.0 LE
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 - 891.6MHz
Maximum Output Power to Antenna	LTE Band 4: 23.63dBm LTE Band 17: 23.58dBm
Bandwidth	LTE Band 2: 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	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP (w)
Part 27	LTE Band 4	QPSK	1.4	1M10G7D	0.03	0.022
Part 27	LTE Band 4	16QAM	1.4	1M10W7D		0.016
Part 27	LTE Band 4	QPSK	3	2M74G7D		0.023
Part 27	LTE Band 4	16QAM	3	2M72W7D		0.016

Part 27	LTE Band 4	QPSK	5	4M54G7D		0.023
Part 27	LTE Band 4	16QAM	5	4M52W7D		0.016
Part 27	LTE Band 4	QPSK	10	9M12G7D		0.023
Part 27	LTE Band 4	16QAM	10	9M12W7D		0.015
Part 27	LTE Band 4	QPSK	15	13M6G7D		0.023
Part 27	LTE Band 4	16QAM	15	13M5W7D		0.015
Part 27	LTE Band 4	QPSK	20	18M8G7D		0.025
Part 27	LTE Band 4	16QAM	20	18M8W7D		0.016
Part 27	LTE Band 17	QPSK	5MHz	4M52G7D	0.05	0.0025
Part 27	LTE Band 17	16QAM	5MHz	4M52W7D		0.0016
Part 27	LTE Band 17	QPSK	10MHz	9M00G7D		0.0023
Part 27	LTE Band 17	16QAM	10MHz	8M96W7D		0.0015

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)

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.5)	Peak to Average Radio	＜13dB	PASS
3	27.50(d)	Effective Radiated Power	ERP＜1Watt	PASS
4	2.1049 27.53(g)	Occupied Bandwidth	Reporting Only	PASS
5	2.1051 27.53(h)	Band Edge	＜43+10log10(P[watt])	PASS
6	2.1051	Conducted Spurious Emission	＜43+10log10(P[watt])	PASS

	27.53(h)			
7	2.1053 27.53(h)	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

1.4.1 Test Mode

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 mark "-" means that is not chosen for testing.														

	3. 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. **4. 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:

Offset (dB) = RF cable loss(dB) + attenuator factor(dB).
= 7 + 10 = 17 (dB)

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

2. 47 CFR PART 2, PART 27H REQUIREMENTS

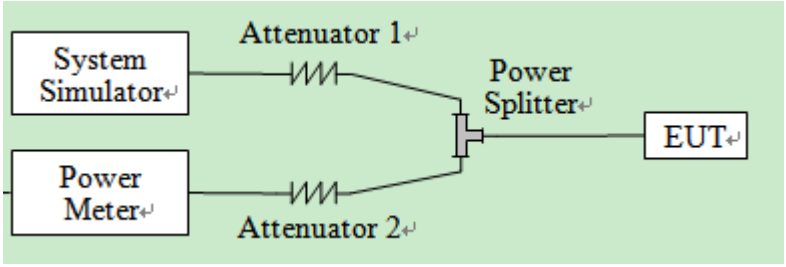
2.1 Conducted RF Output Power

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 Test Description

1. Test Setup:



The EUT, which is powered by 3.8V DC power, is coupled to the Power Meter and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

2. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
System Simulator	R&S	CMW500	149333	2014.07.21	2015.07.20
Power Meter	R&S	NRV2	1020.1809.02	2015.06.02	2016.06.02
Power Sensor	R&S	NRV-Z4	823.3618.03	2015.06.02	2016.06.02
Attenuator 1	Resent	10dB	(n.a.)	2015.06.02	2016.06.02
Attenuator 2	Resent	3dB	(n.a.)	2015.06.02	2016.06.02

2.1.3 Test Results

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT.

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	23.52	**23.56**	23.55
20	QPSK	1	49	23.49	23.53	23.51
20	QPSK	1	99	23.51	23.49	23.53
20	QPSK	50	0	22.75	22.81	22.85
20	QPSK	50	24	22.84	22.79	22.81
20	QPSK	50	49	22.73	22.75	22.80
20	QPSK	100	0	22.73	22.72	22.82
20	16QAM	1	0	22.63	22.67	22.64
20	16QAM	1	49	22.53	22.48	22.55
20	16QAM	1	99	22.49	22.51	22.54
20	16QAM	50	0	21.87	21.79	21.82
20	16QAM	50	24	21.79	21.77	21.80
20	16QAM	50	49	21.81	21.78	21.83
20	16QAM	100	0	21.74	21.76	21.81
Channel				20025	20175	20325
Frequency(MHz)				1717.5	1732.5	1747.5
15	QPSK	1	0	23.57	**23.61**	23.58
15	QPSK	1	37	23.53	23.51	23.54
15	QPSK	1	74	23.54	23.52	23.51
15	QPSK	36	0	22.86	22.79	22.88
15	QPSK	36	18	22.87	22.78	22.81
15	QPSK	36	37	22.79	22.75	22.78
15	QPSK	75	0	22.76	22.75	22.82
15	16QAM	1	0	22.56	22.51	22.53
15	16QAM	1	37	22.50	22.54	22.53
15	16QAM	1	74	22.59	22.62	22.58
15	16QAM	36	0	21.86	21.83	21.81
15	16QAM	36	18	21.79	21.76	21.78
15	16QAM	36	37	21.82	21.75	21.83
15	16QAM	75	0	21.78	21.75	21.81

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	23.57	23.60	23.58
10	QPSK	1	24	23.59	**23.63**	23.61
10	QPSK	1	49	23.58	23.57	23.53
10	QPSK	25	0	22.94	22.87	22.85
10	QPSK	25	12	22.82	22.89	22.83
10	QPSK	25	24	22.78	22.80	22.85
10	QPSK	50	0	22.86	22.82	22.91
10	16QAM	1	0	22.67	22.65	22.69
10	16QAM	1	24	22.61	22.58	22.64
10	16QAM	1	49	22.61	22.62	22.56
10	16QAM	25	0	21.81	21.83	21.88
10	16QAM	25	12	21.82	21.78	21.82
10	16QAM	25	24	21.85	21.77	21.83
10	16QAM	50	0	21.80	21.74	21.79
Channel				19975	20175	20375
Frequency(MHz)				1712.5	1732.5	1752.5
5	QPSK	1	0	23.57	23.59	23.55
5	QPSK	1	12	23.55	23.58	23.60
5	QPSK	1	24	23.58	**23.60**	23.58
5	QPSK	12	0	22.81	22.87	22.82
5	QPSK	12	6	22.85	22.82	22.78
5	QPSK	12	11	22.83	22.73	22.77
5	QPSK	25	0	22.85	22.78	22.75
5	16QAM	1	0	22.67	22.66	22.63
5	16QAM	1	12	22.50	22.49	22.49
5	16QAM	1	24	22.54	22.58	22.51
5	16QAM	12	0	21.75	21.77	21.69
5	16QAM	12	6	21.67	21.65	21.64
5	16QAM	12	11	21.72	21.75	21.76
5	16QAM	25	0	21.78	21.72	21.75

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	23.54	23.58
3	QPSK	1	7	23.53	**23.59**	23.50
3	QPSK	1	14	23.52	23.52	23.58
3	QPSK	8	0	22.77	22.71	22.76
3	QPSK	8	4	22.75	22.75	22.78
3	QPSK	8	7	22.69	22.70	22.70
3	QPSK	15	0	22.67	22.67	22.68
3	16QAM	1	0	22.31	22.45	22.49
3	16QAM	1	7	22.47	22.45	22.43
3	16QAM	1	14	22.38	22.30	22.36
3	16QAM	8	0	21.63	21.80	21.82
3	16QAM	8	4	21.64	21.68	21.68
3	16QAM	8	7	21.63	21.62	21.65
3	16QAM	15	0	21.52	21.56	21.58
Channel				19957	20175	20393
Frequency(MHz)				1710.7	1732.5	1754.3
1.4	QPSK	1	0	23.55	**23.61**	23.59
1.4	QPSK	1	2	23.54	23.52	23.58
1.4	QPSK	1	5	23.49	23.47	23.45
1.4	QPSK	3	0	22.73	22.68	22.72
1.4	QPSK	3	1	22.57	22.47	22.52
1.4	QPSK	3	2	22.66	22.57	22.61
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	22.73	22.81	22.75
1.4	16QAM	1	5	22.81	22.91	22.84
1.4	16QAM	3	0	22.79	22.74	22.85
1.4	16QAM	3	1	22.62	22.73	22.67
1.4	16QAM	3	2	22.70	22.59	22.67
1.4	16QAM	6	0	22.59	22.55	22.66

2. LTE Band 17 Conducted Power Test Verdict:

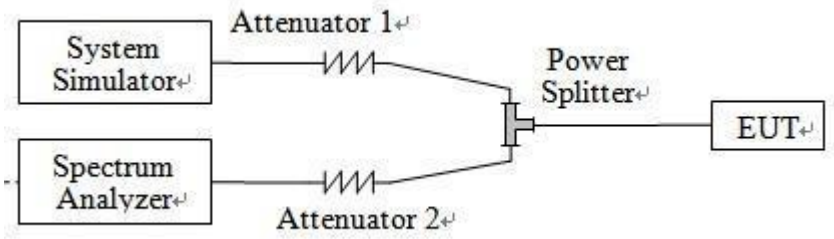
BW(MHz)	Modulation	RB Size	RB Offset	Power(dBm) Low Ch./Freq.	Power(dBm) Middle Ch./Freq.	Power(dBm) High Ch./Freq.
Channel				23780	23790	23800
Frequency(MHz)				709	710	711
10	QPSK	1	0	23.21	23.25	23.34
10	QPSK	1	24	23.12	23.29	23.49
10	QPSK	1	49	**23.58**	23.43	23.51
10	QPSK	25	0	22.65	22.79	22.77
10	QPSK	25	12	22.76	22.87	22.72
10	QPSK	25	24	22.85	22.73	22.75
10	QPSK	50	0	22.83	22.77	22.80
10	16QAM	1	0	22.43	22.34	22.41
10	16QAM	1	24	22.30	22.24	22.33
10	16QAM	1	49	21.83	21.73	21.70
10	16QAM	25	0	21.86	21.71	21.77
10	16QAM	25	12	21.69	21.67	21.57
10	16QAM	25	24	21.55	21.57	21.63
10	16QAM	50	0	21.61	21.59	21.56
Channel				23755	23790	23825
Frequency(MHz)				706.5	710	713.5
5	QPSK	1	0	23.13	23.24	23.19
5	QPSK	1	12	23.11	23.17	23.24
5	QPSK	1	24	23.35	23.31	23.35
5	QPSK	12	0	22.74	22.63	22.79
5	QPSK	12	6	22.82	22.78	22.69
5	QPSK	12	11	22.64	22.72	22.75
5	QPSK	25	0	22.80	22.75	22.71
5	16QAM	1	0	22.14	22.20	22.21
5	16QAM	1	12	22.25	22.19	22.34
5	16QAM	1	24	22.35	22.48	22.39
5	16QAM	12	0	21.74	21.73	21.77
5	16QAM	12	6	21.69	21.58	21.71
5	16QAM	12	11	21.72	21.82	21.79
5	16QAM	25	0	21.63	21.60	21.74

2.2 Peak to Average Radio

2.2.1 Definition

According to FCC section 2.1049 and FCC 27.50(d), the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

2.2.2 Test Description



Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
System Simulator	R&S	CMW500	149333	2014.07.21	2015.07.20
Spectrum Analyzer	R&S	FSP40	100341	2014.07.07	2015.07.06
Attenuator 1	Resent	10dB	(n.a.)	2015.06.02	2015.06.02
Attenuator 2	Resent	3dB	(n.a.)	2015.06.02	2015.06.02

2.2.3 Test Verdict

Here the lowest, middle and highest channels are selected to perform testing to verify the peak-to-average ratio.

Test procedures:

For LTE operating mode:

a. The EUT was connected to spectrum and system simulator via a power divider.

b. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.

c. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1%.

d. Record the deviation as Peak to Average Ratio.

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

BW(MHz)	Frequency (MHz)	Mode	Modulation	Conducted Power(dBm)		Peak-Average Ratio(PAR)
				Peak	Average	
1.4	1732.5	RB 1/0	QPSK	23.59	18.52	5.07
			16QAM	23.39	18.36	5.03
3	1732.5	RB 1/0	QPSK	23.58	18.48	5.10
			16QAM	23.42	18.33	5.09
5	1732.5	RB 1/0	QPSK	23.59	18.48	5.11
			16QAM	23.28	18.22	5.06
10	1732.5	RB 1/0	QPSK	23.54	18.49	5.05
			16QAM	23.30	18.29	5.01
15	1732.5	RB 1/0	QPSK	23.57	18.48	5.09
			16QAM	23.25	18.22	5.03
20	1732.5	RB 1/0	QPSK	23.59	18.57	5.02
			16QAM	23.28	18.23	5.05

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

BW(MHz)	Frequency (MHz)	Mode	Modulation	Conducted Power(dBm)		Peak-Average Ratio(PAR)
				Peak	Average	
5	710	RB 1/0	QPSK	23.54	18.45	5.09
			16QAM	23.34	18.33	5.01
10	710	RB 1/0	QPSK	23.51	18.44	5.07
			16QAM	23.31	18.28	5.03

2.3 99% Occupied Bandwidth and 26dB Bandwidth

2.3.1 Definition

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 Test Description

See section 2.1.2 of this report.

2.3.3 Test Verdict

Here the middle channels are selected to perform testing to verify the 99% occupied bandwidth and 26dB Bandwidth.

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.

1. 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	1.30	Plot A1 to A2
			16QAM	1.10	1.28	Plot A3 to A4
3	20175	1732.5	QPSK	2.74	3.06	Plot B1 to B2
			16QAM	2.72	3.04	Plot B3 to B4
5	20175	1732.5	QPSK	4.54	5.06	Plot C1 to C2
			16QAM	4.52	5.06	Plot C3 to C4
10	20175	1732.5	QPSK	9.12	10.32	Plot D1 to D2
			16QAM	9.12	10.32	Plot D3 to D4

15	20175	1732.5	QPSK	13.56	15.06	Plot E1 to E2
			16QAM	13.50	14.88	Plot E3 to E4
20	20175	1732.5	QPSK	18.80	21.60	Plot F1 to F2
			16QAM	18.80	21.60	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	4.52	5.10	Plot G1 to G2
			16QAM	4.52	5.06	Plot G1 to G2
10	23790	710	QPSK	9.00	9.68	Plot H1 to H2
			16QAM	8.96	9.72	Plot H1 to H2

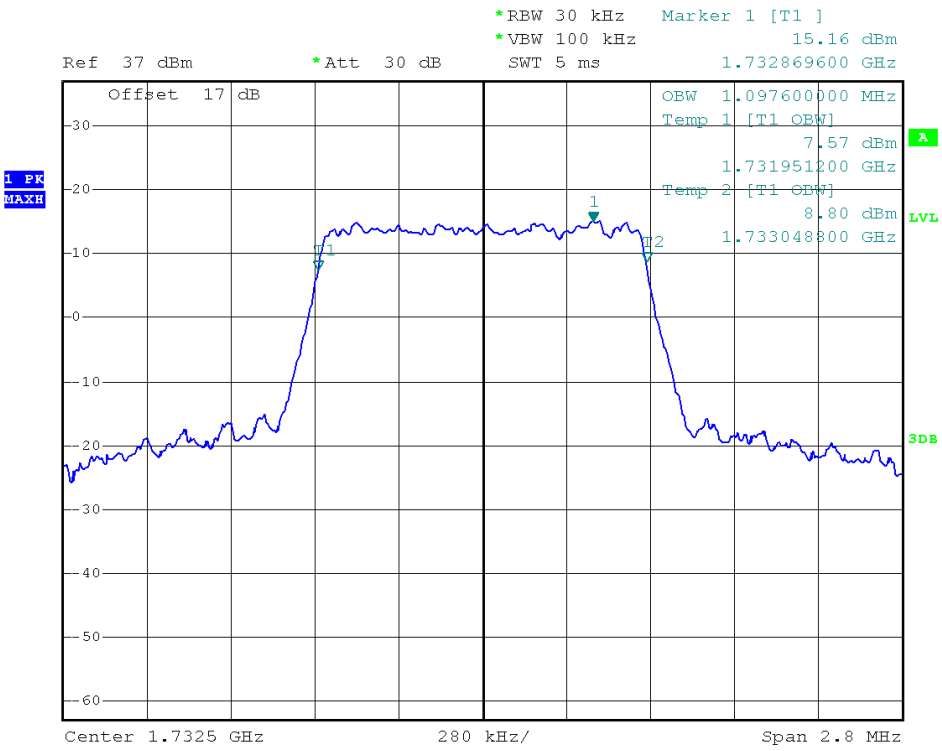
Note: The maximum RB configurations of the 99% Occupied Bandwidth and 26dB Bandwidth summary as below:

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

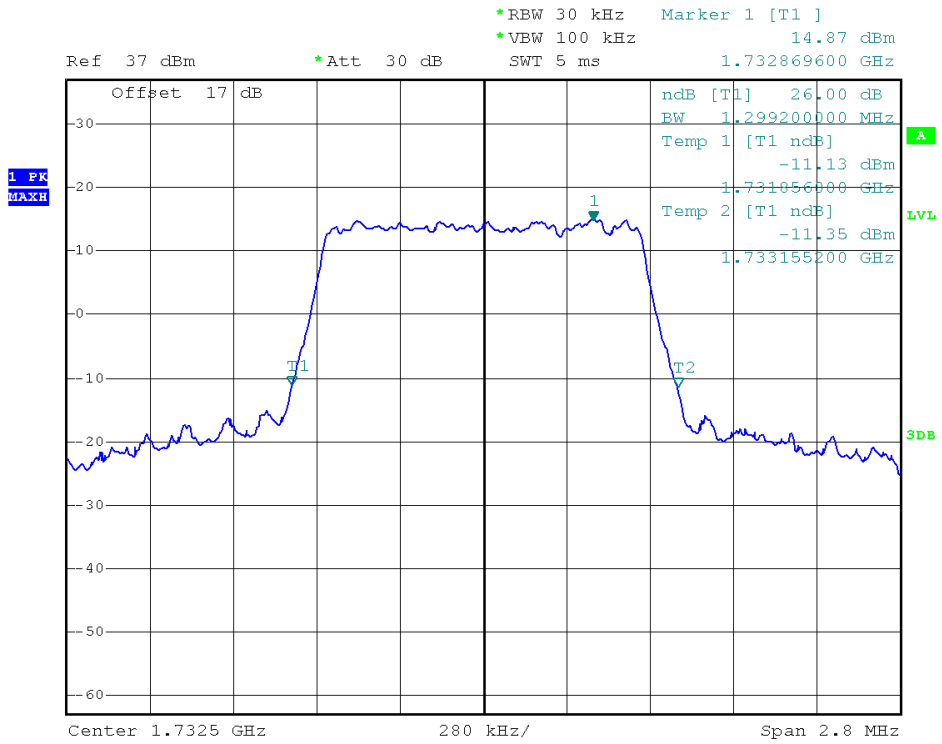
BW5MHz RB setting: RB Size 25,RB Offset 0 BW10MHz RB setting: RB Size 50,RB Offset 0

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

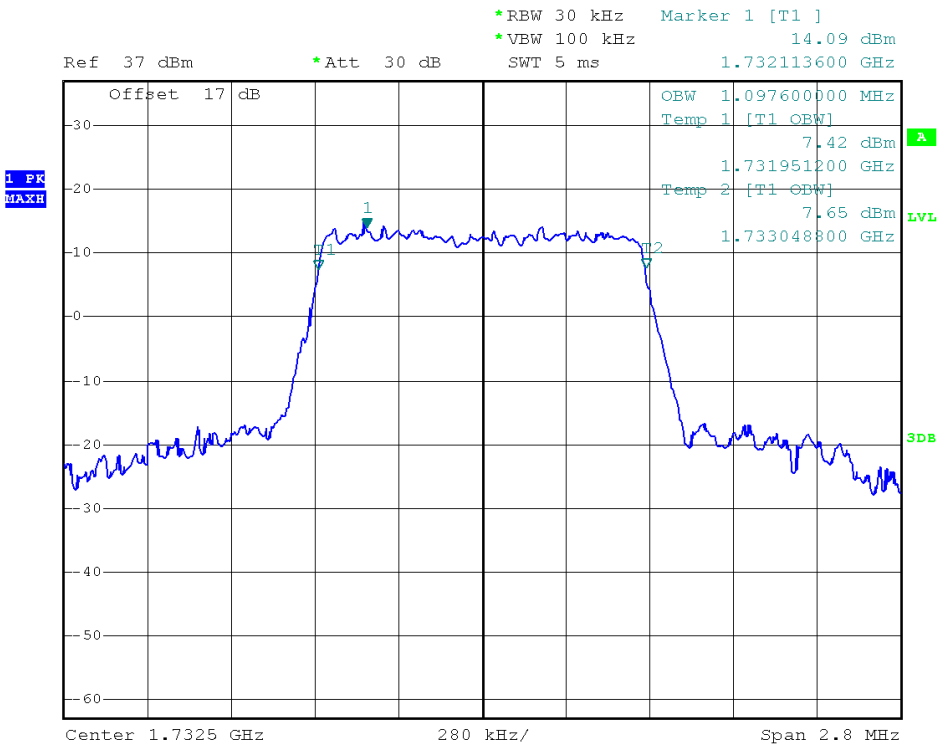
2. Test Plots:



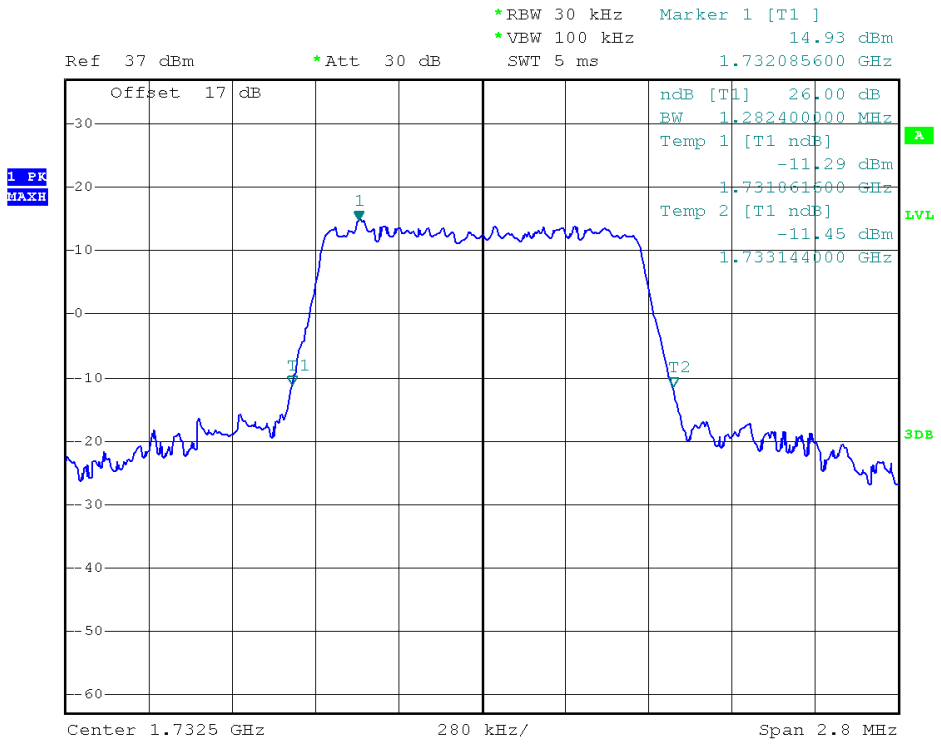
(Plot A1: 99% Occupied Bandwidth LTE Band 4/1.4MHz/QPSK)



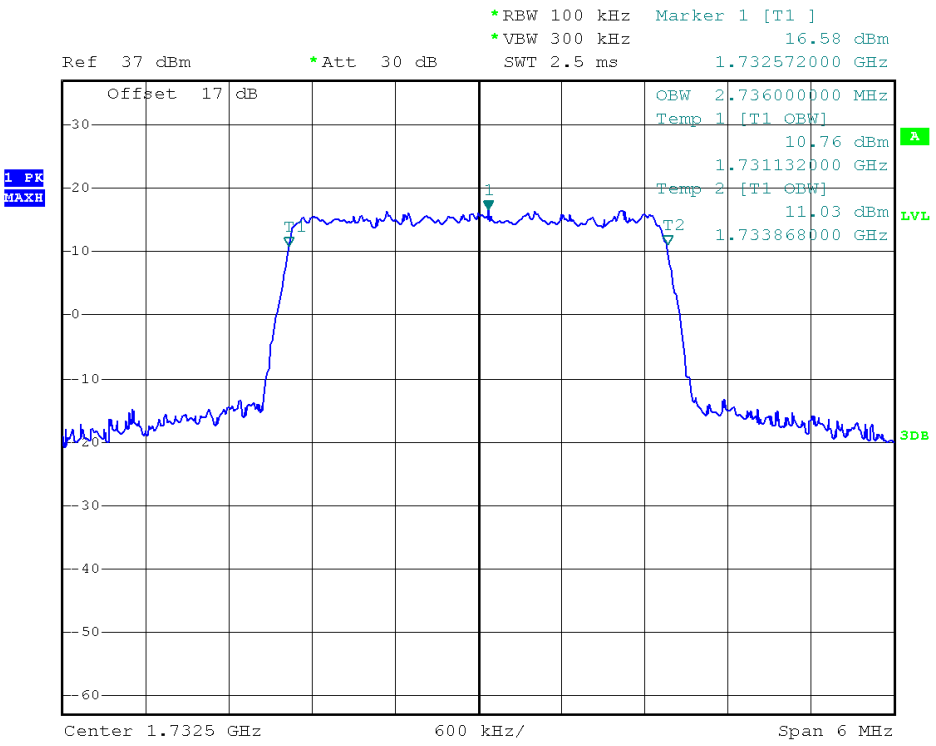
(Plot A2: 26dB Bandwidth LTE Band 4/1.4MHz/QPSK)



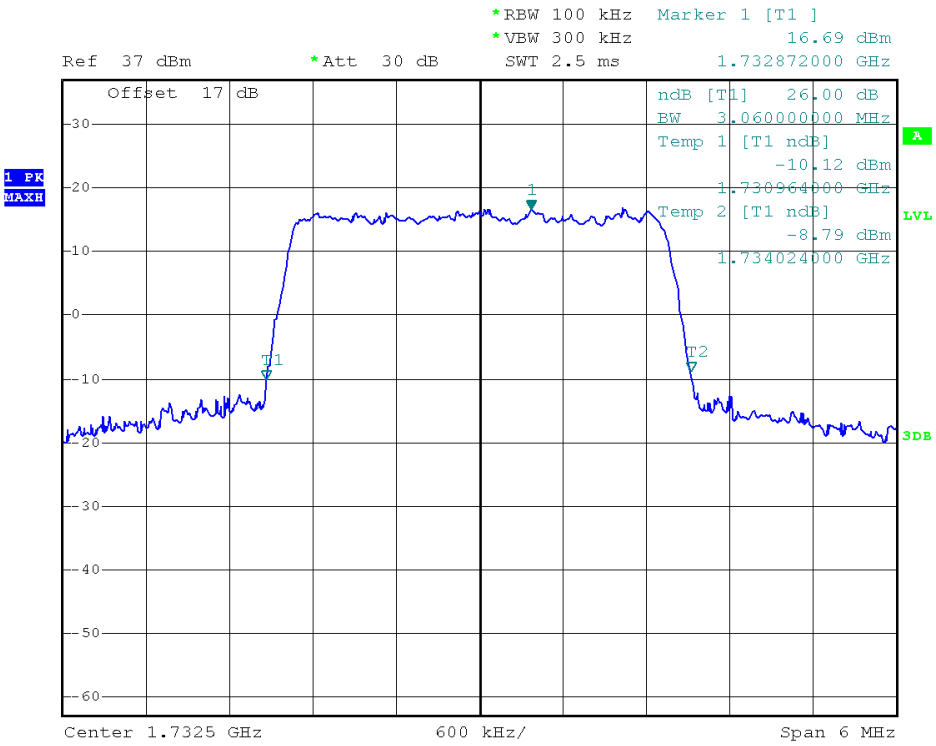
(Plot A3: 99% Occupied Bandwidth LTE Band 4/1.4MHz/16QAM)



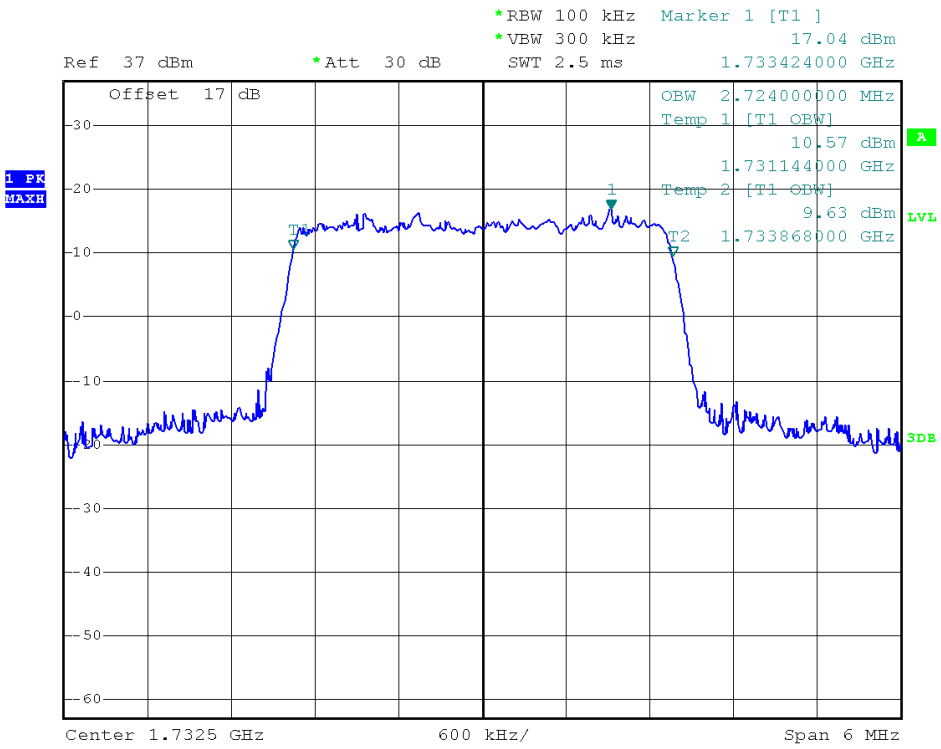
(Plot A4: 26dB Bandwidth LTE Band 4/1.4MHz/16QAM)



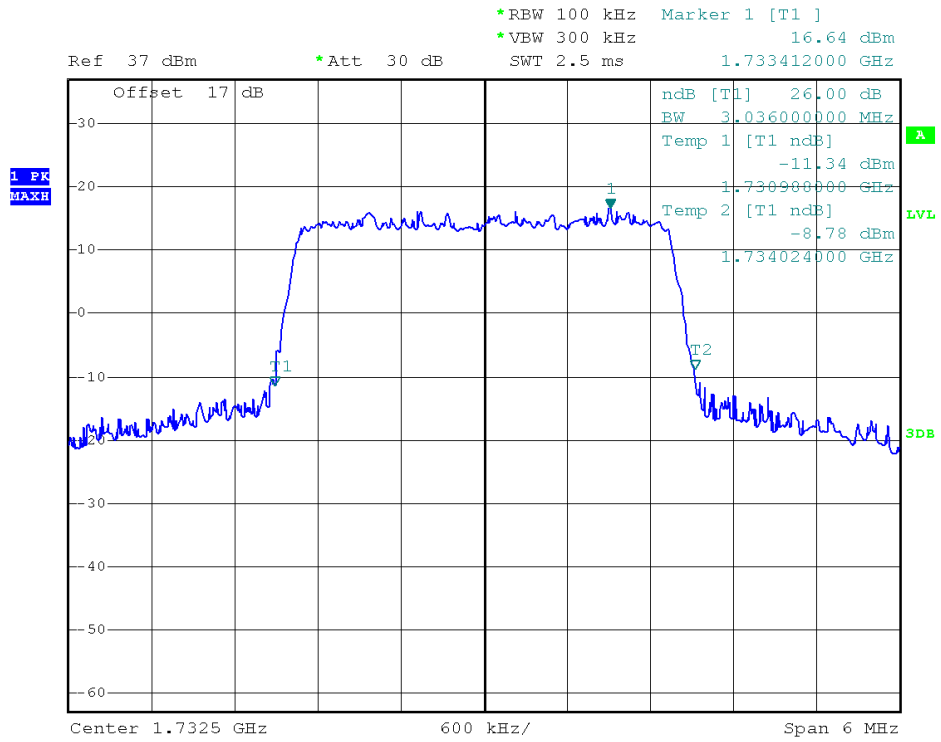
(Plot B1: 99% Occupied Bandwidth LTE Band 4/3MHz/QPSK)



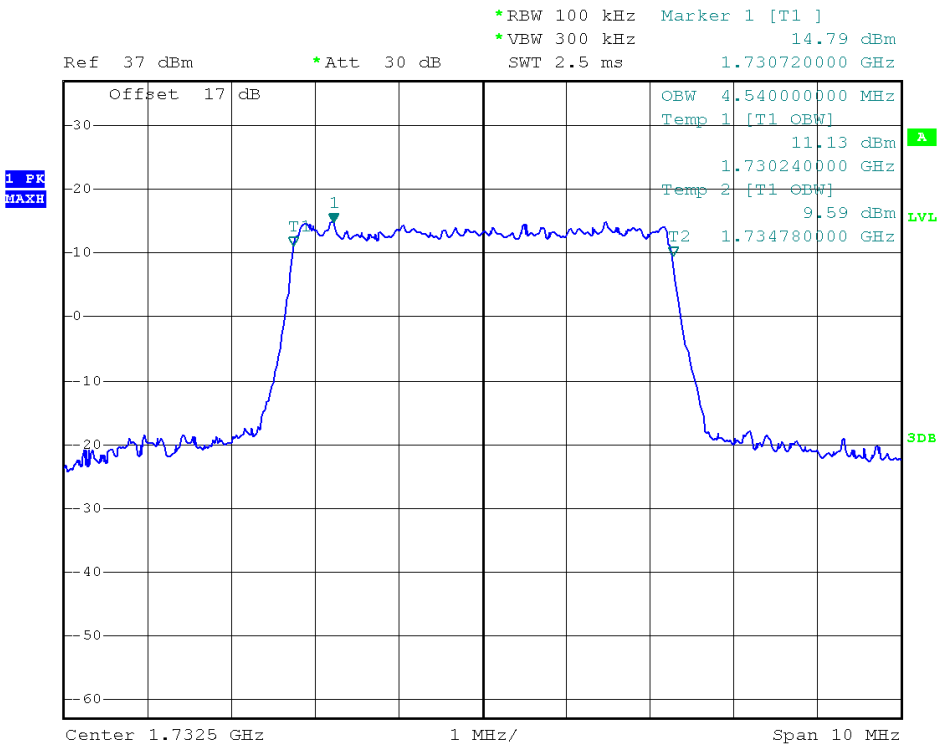
(Plot B2: 26dB Bandwidth LTE Band 4/3MHz/QPSK)



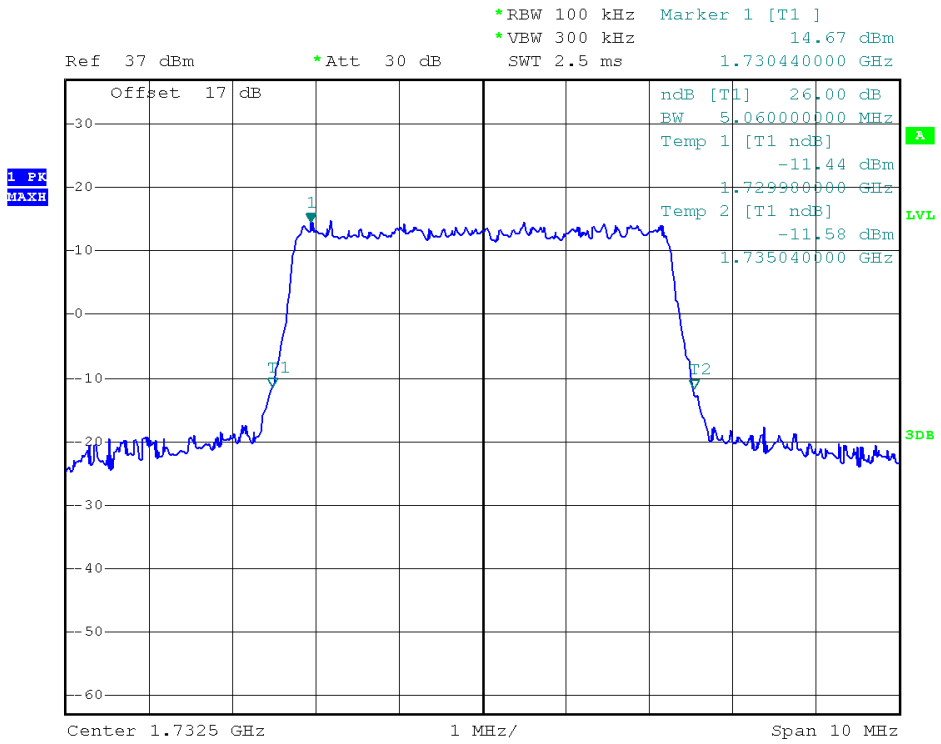
(Plot B3: 99% Occupied Bandwidth LTE Band 4/3MHz/16QAM)



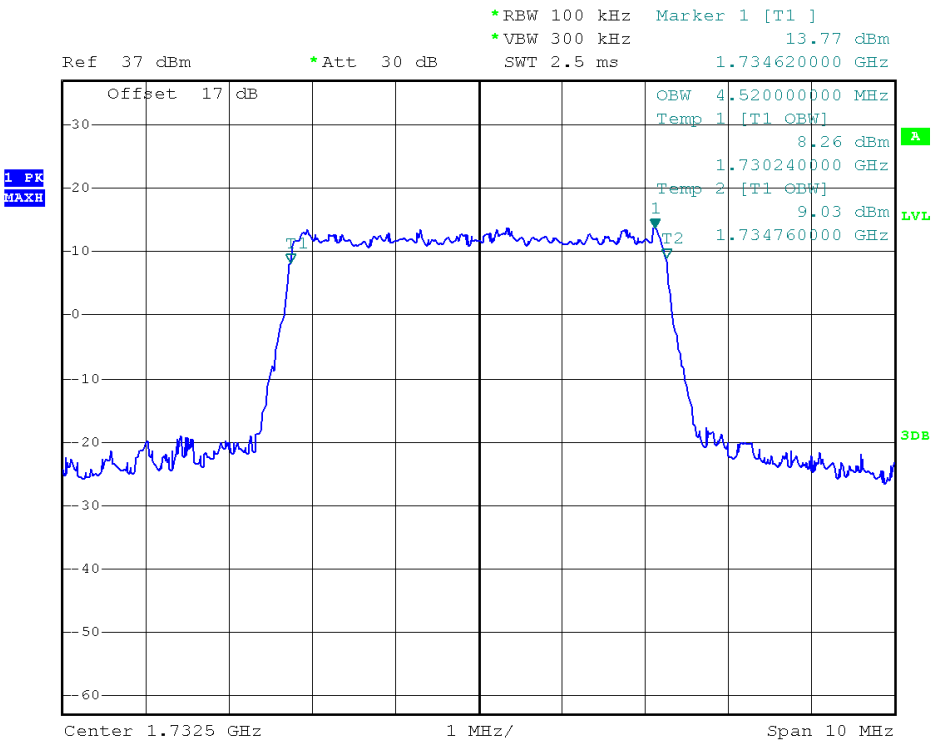
(Plot B4: 26dB Bandwidth LTE Band 4/3MHz/16QAM)



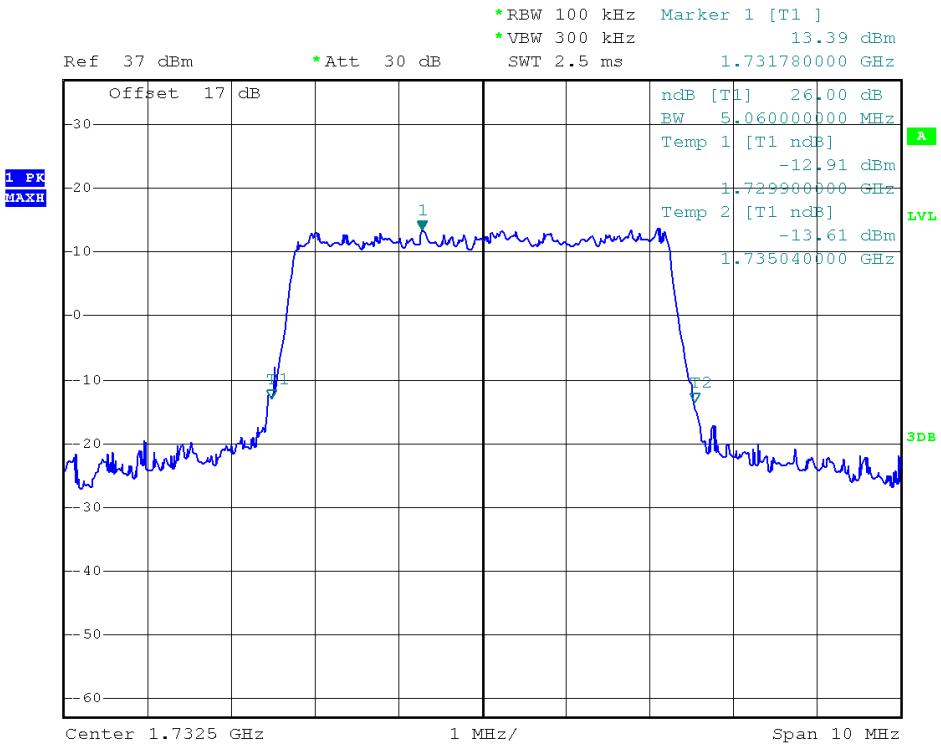
(Plot C1: 99% Occupied Bandwidth LTE Band 4/5MHz/QPSK)



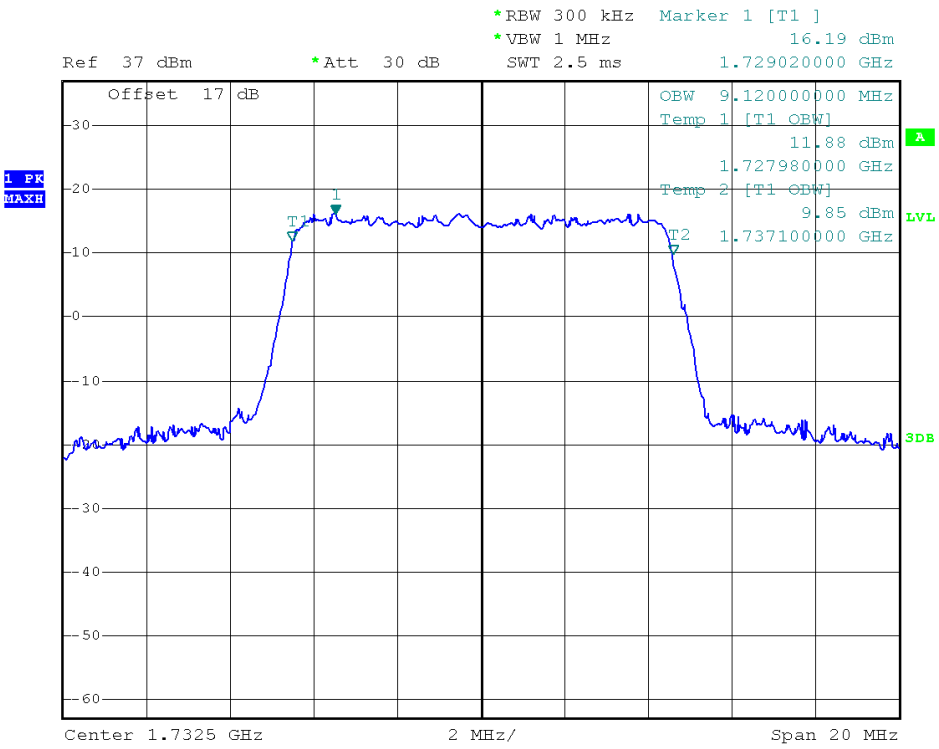
(Plot C2: 26dB Bandwidth LTE Band 4/5MHz/QPSK)



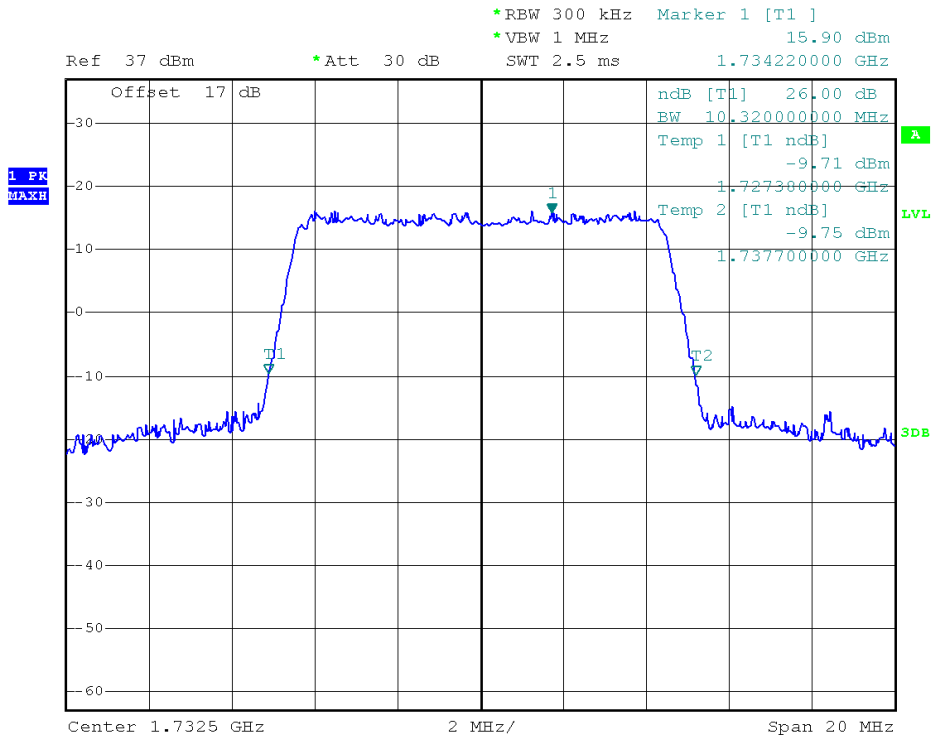
(Plot C3: 99% Occupied Bandwidth LTE Band 4/5MHz/16QAM)



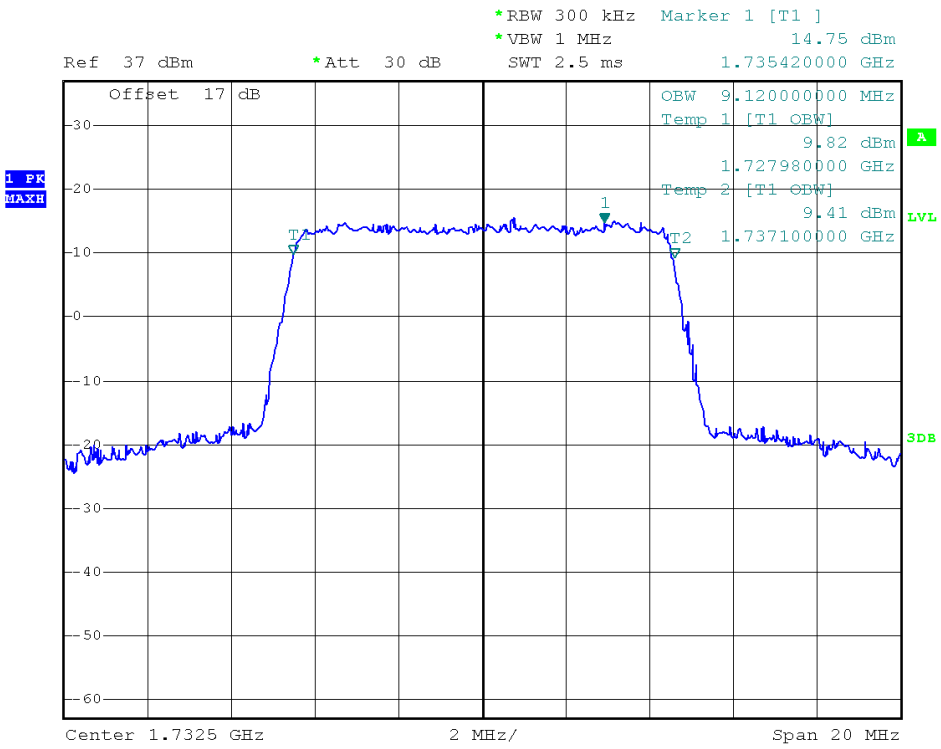
(Plot C4: 26dB Bandwidth LTE Band 4/5MHz/16QAM)



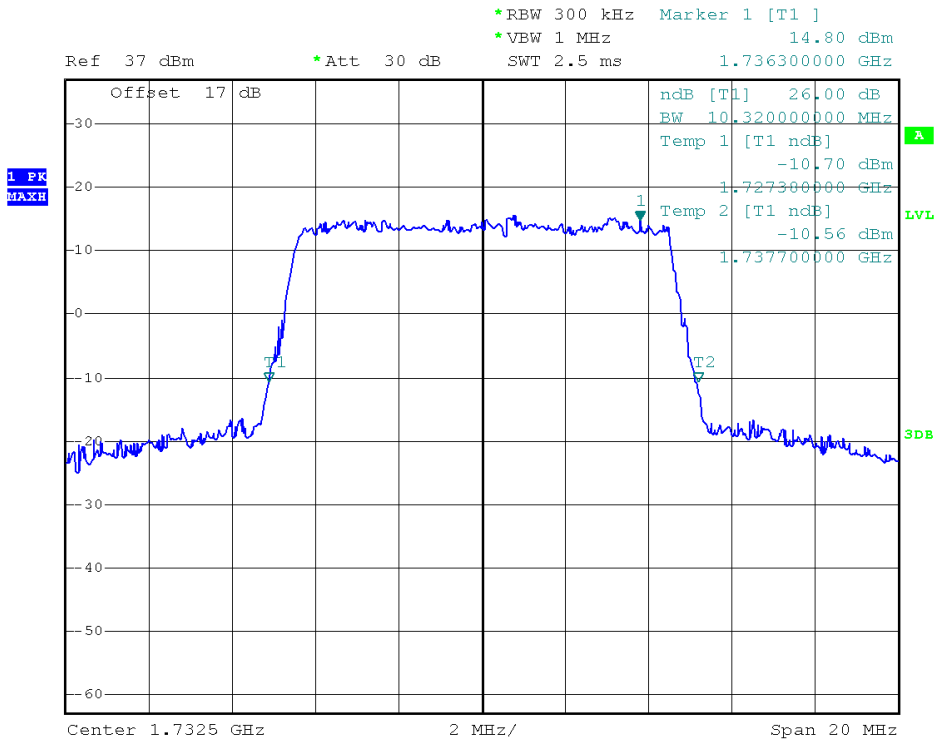
(Plot D1: 99% Occupied Bandwidth LTE Band 4/10MHz/QPSK)



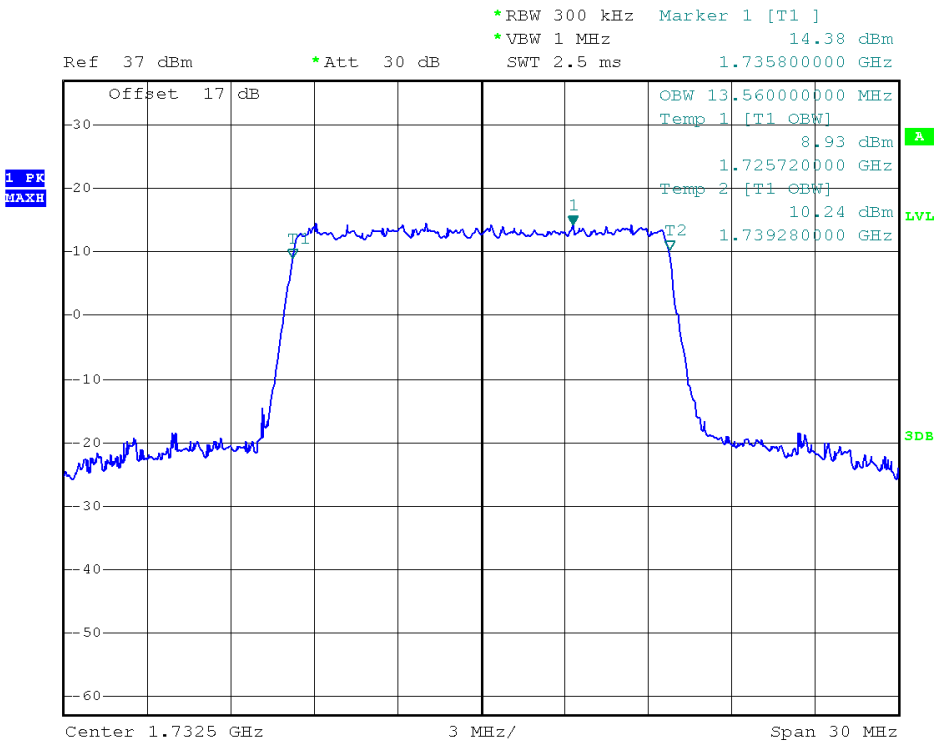
(Plot D2: 26dB Bandwidth LTE Band 4/10MHz/QPSK)



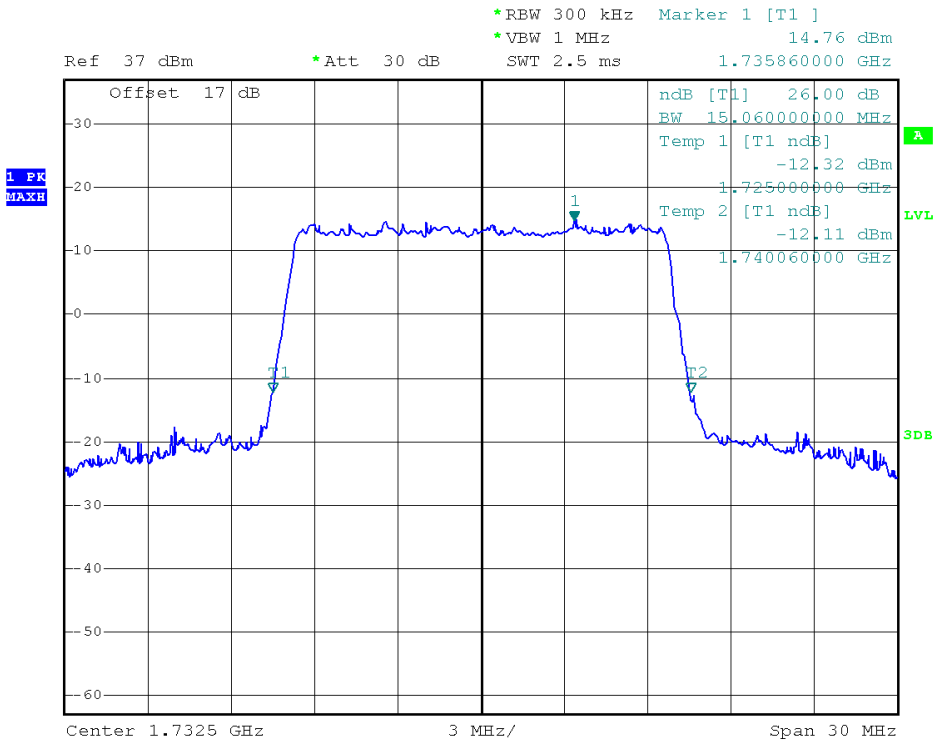
(Plot D3: 99% Occupied Bandwidth LTE Band 4/10MHz/16QAM)



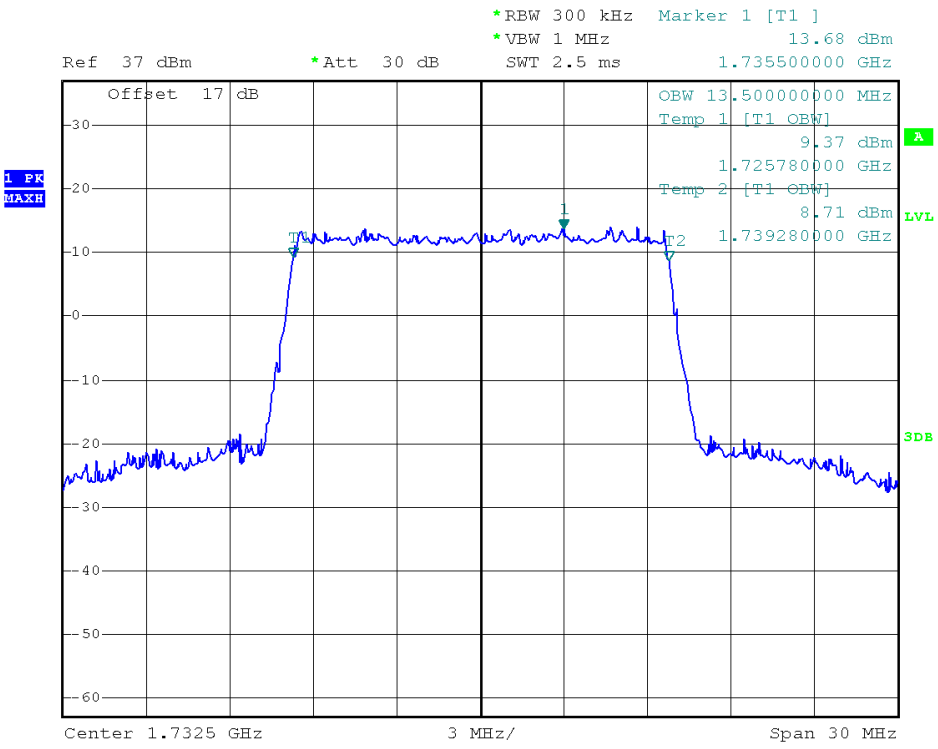
(Plot D4: 26dB Bandwidth LTE Band 4/10MHz/16QAM)



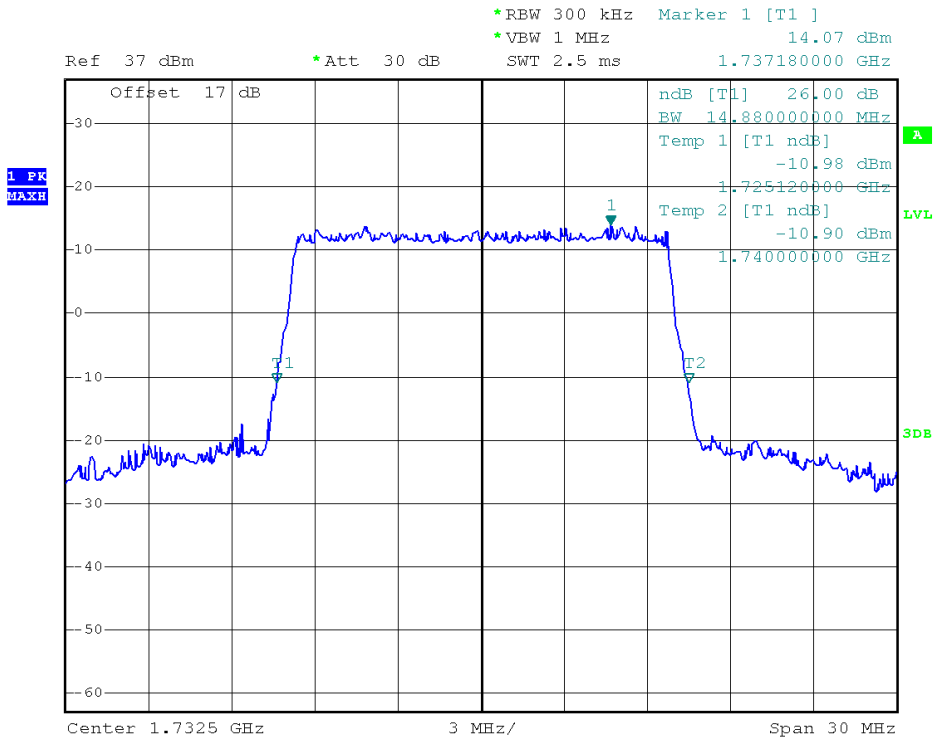
(Plot E1: 99% Occupied Bandwidth LTE Band 4/15MHz/QPSK)



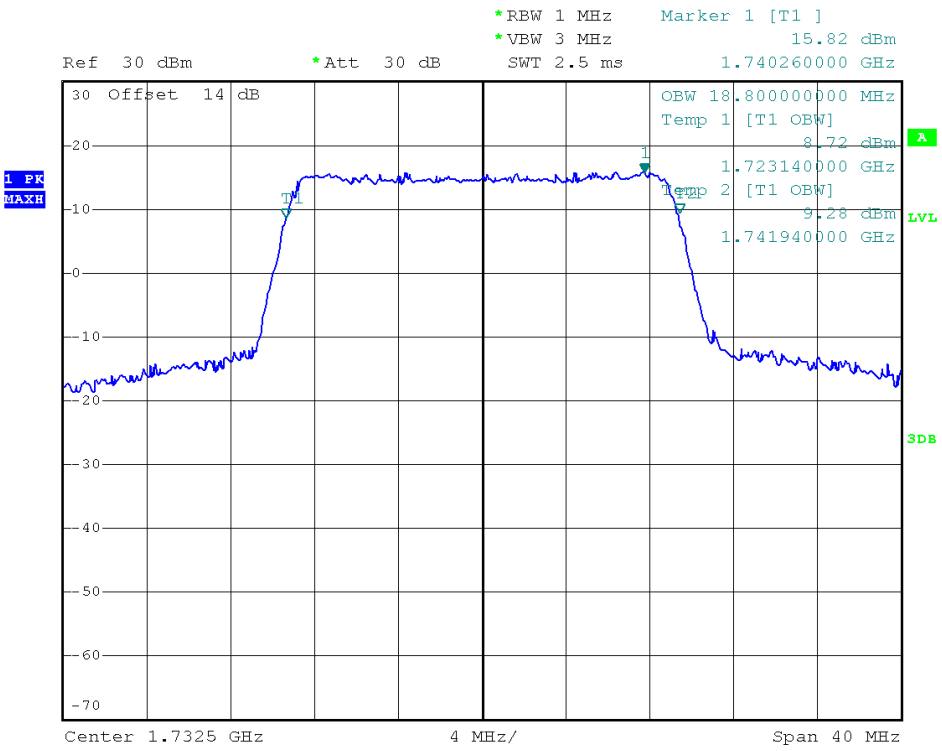
(Plot E2: 26dB Bandwidth LTE Band 4/15MHz/QPSK)



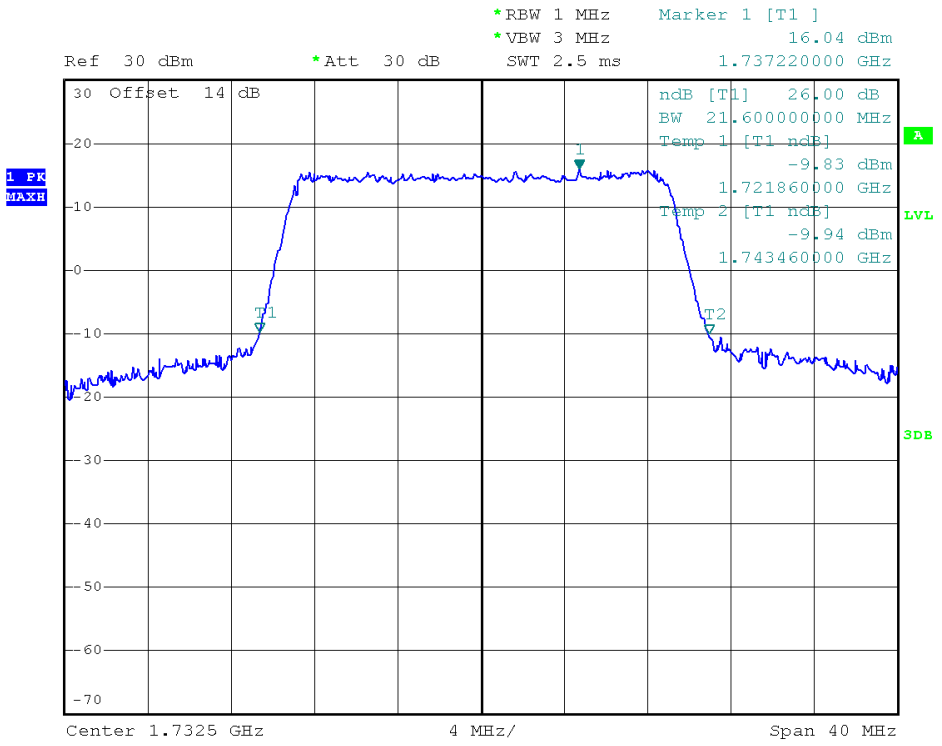
(Plot E3: 99% Occupied Bandwidth LTE Band 4/15MHz/16QAM)



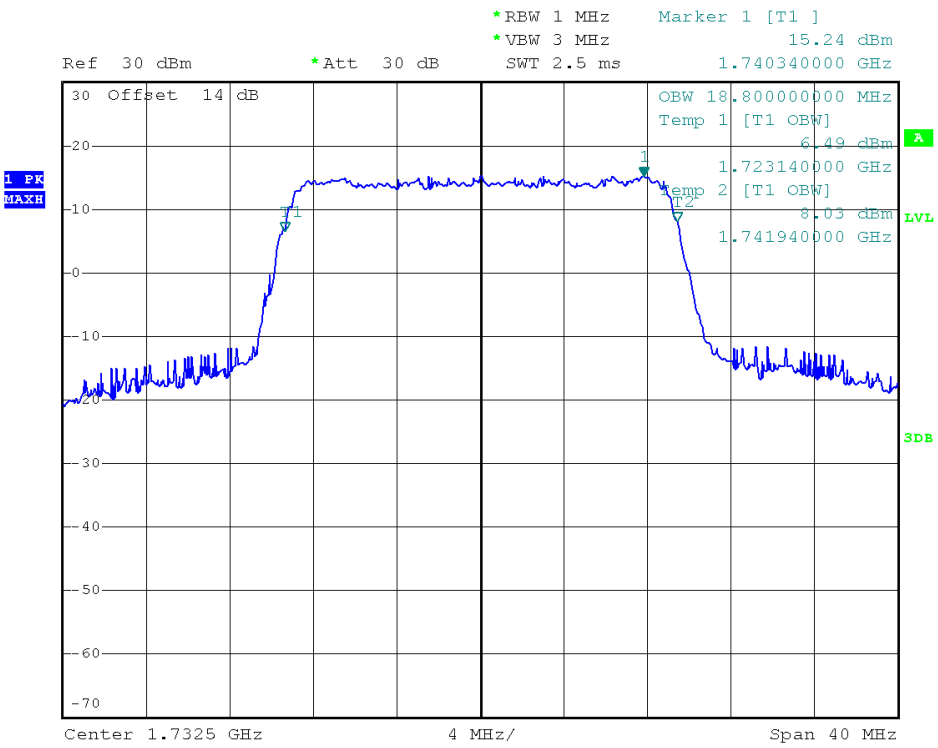
(Plot E4: 26dB Bandwidth LTE Band 4/15MHz/16QAM)



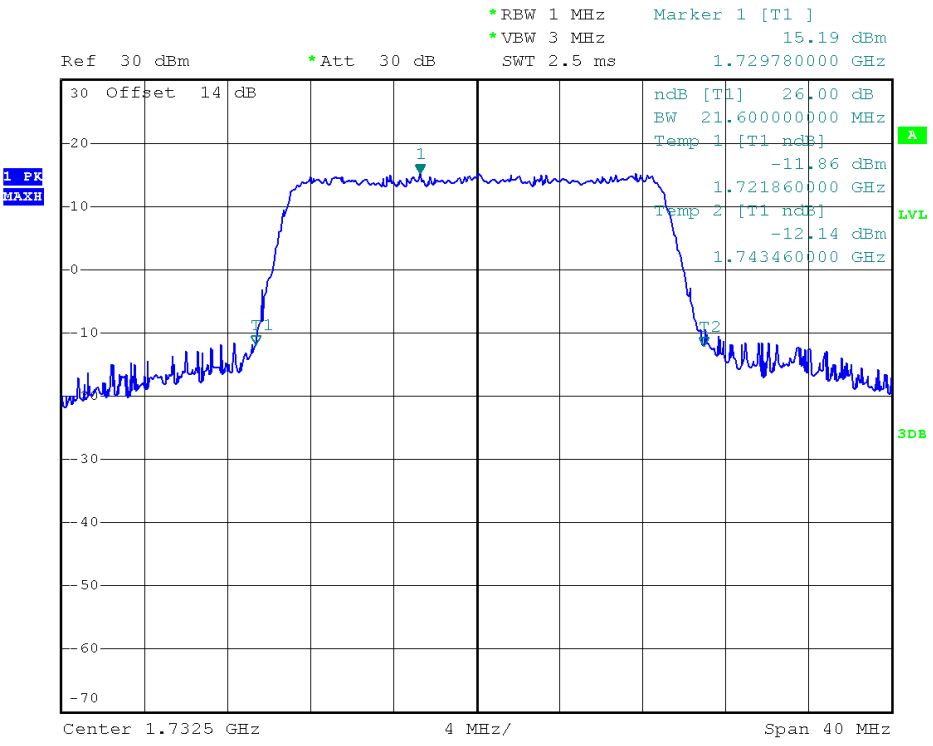
(Plot F1: 99% Occupied Bandwidth LTE Band 4/20MHz/QPSK)



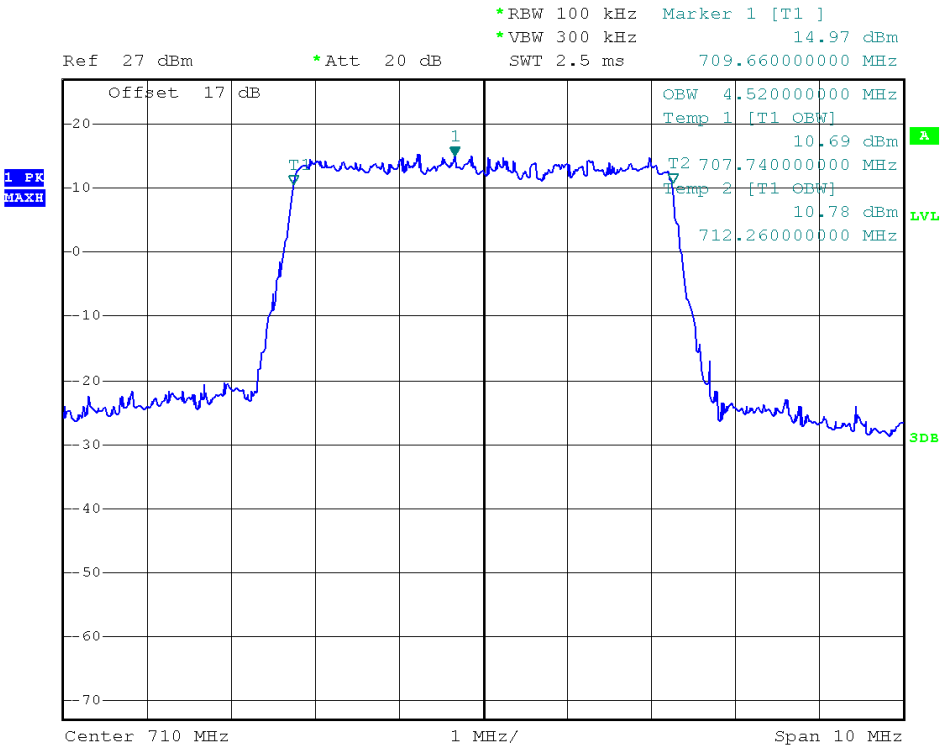
(Plot F2: 26dB Bandwidth LTE Band 4/20MHz/QPSK)



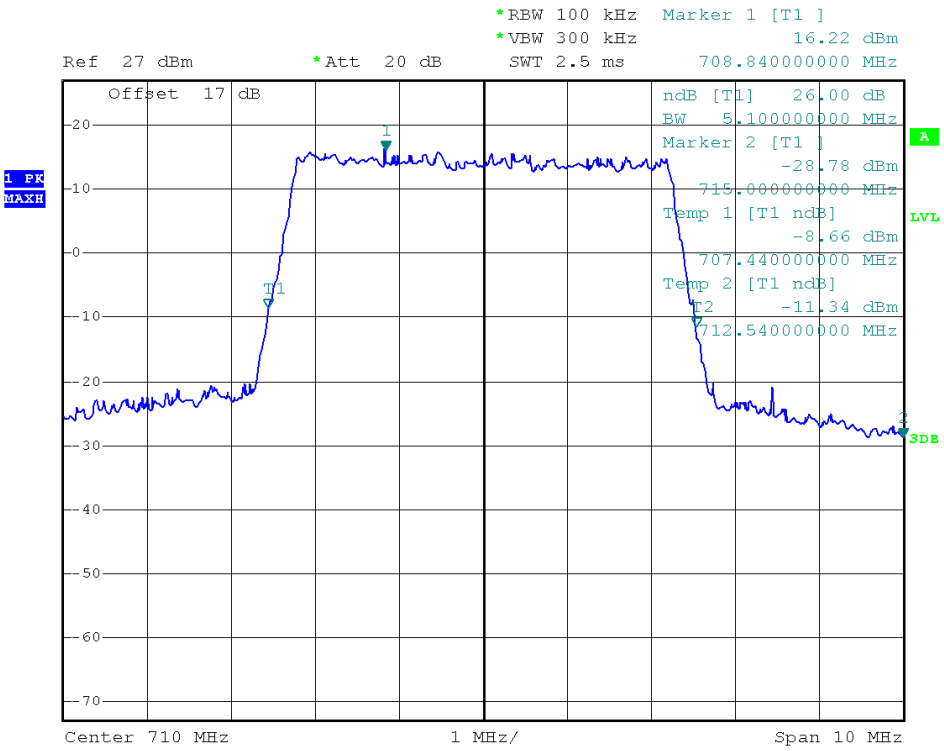
(Plot F3: 99% Occupied Bandwidth LTE Band 4/20MHz/16QAM)



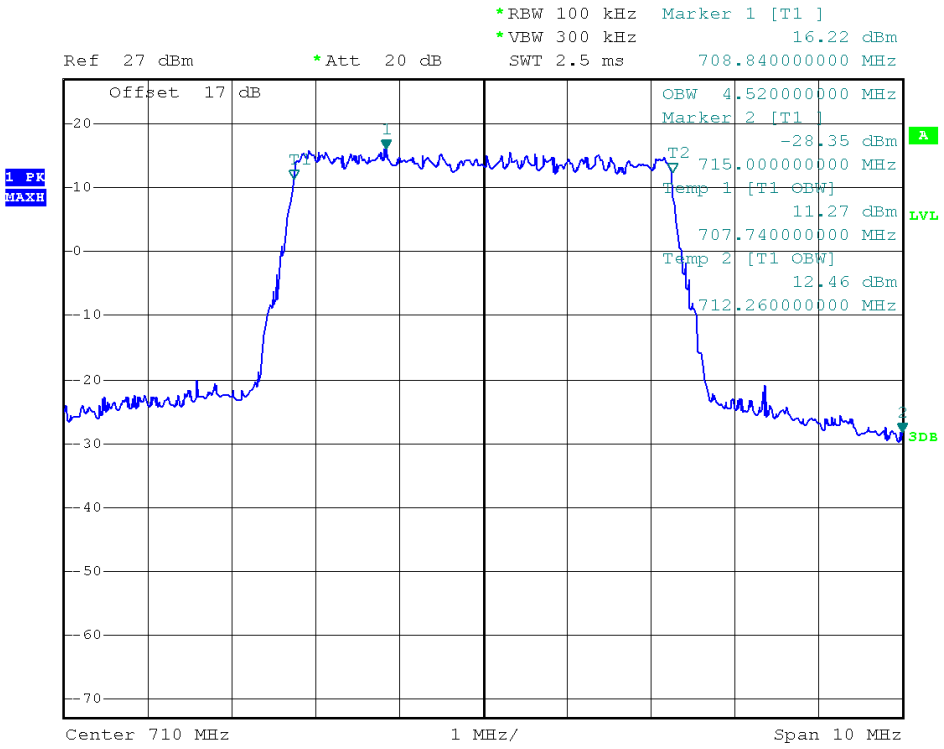
(Plot F4: 26dB Bandwidth LTE Band 4/20MHz/16QAM)



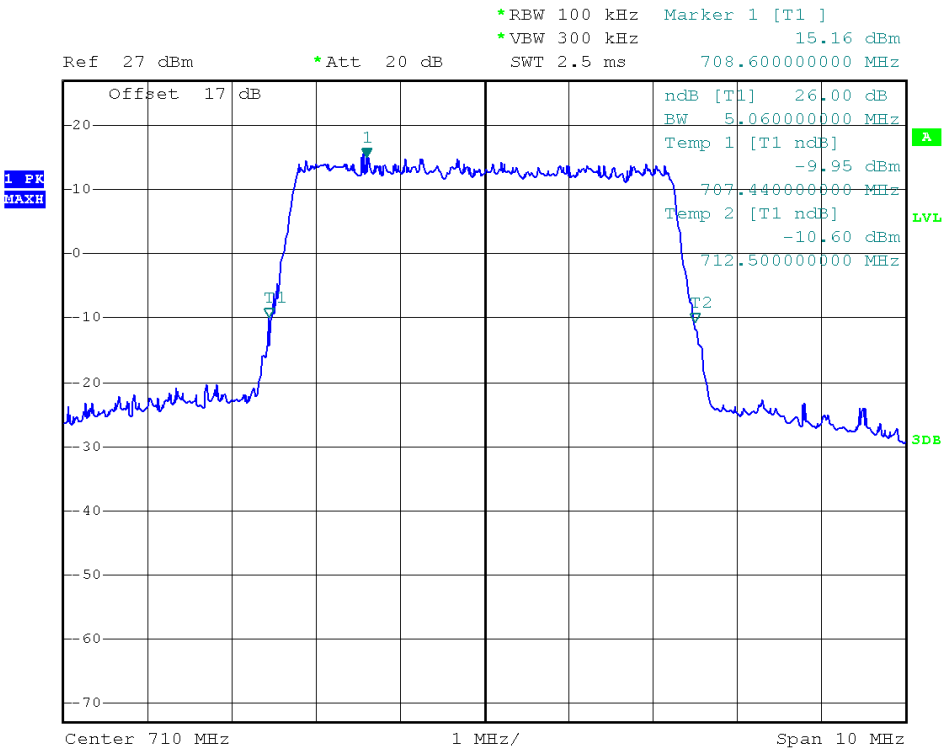
(Plot G1: 99% Occupied Bandwidth LTE Band 17/5MHz/QPSK)



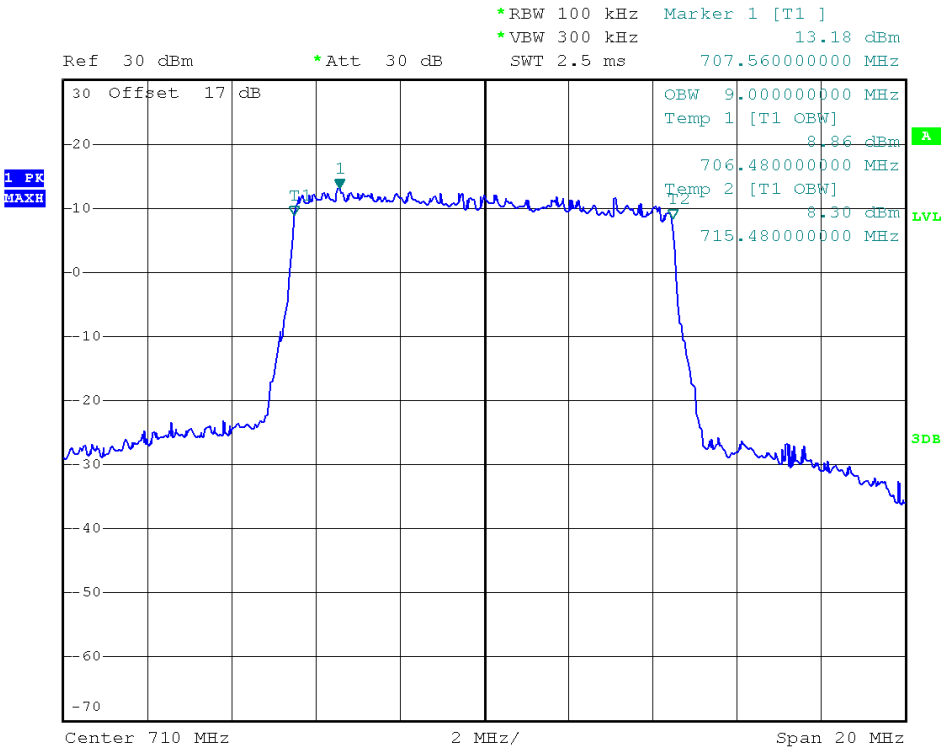
(Plot G2: 26dB Bandwidth LTE Band 17/5MHz/QPSK)



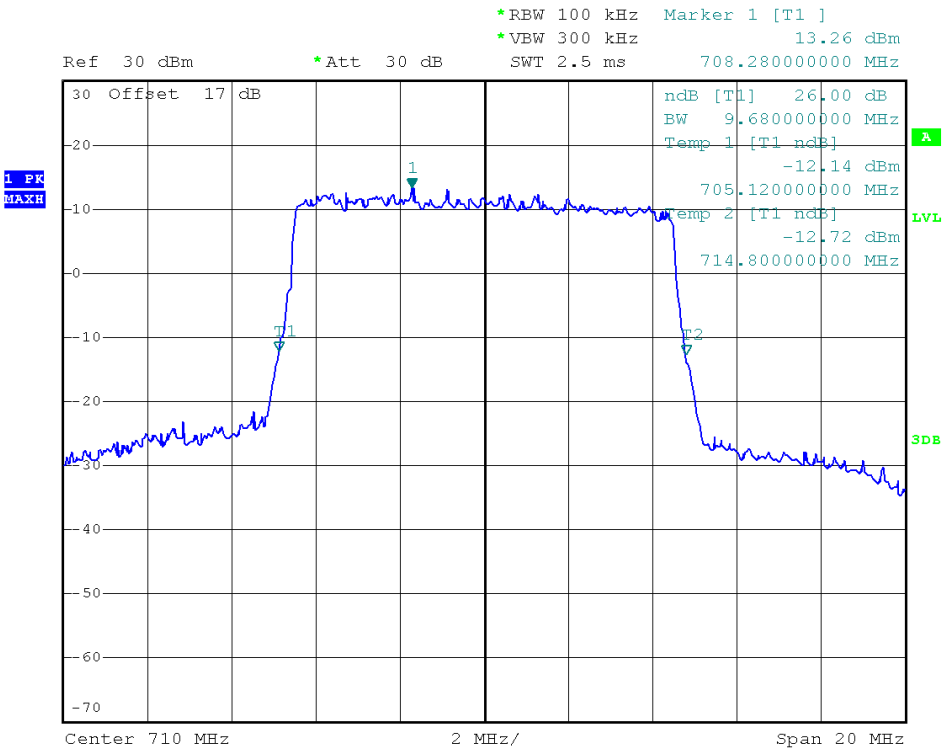
(Plot G3: 99% Occupied Bandwidth 5MHz/16QAM Channel = 23790)



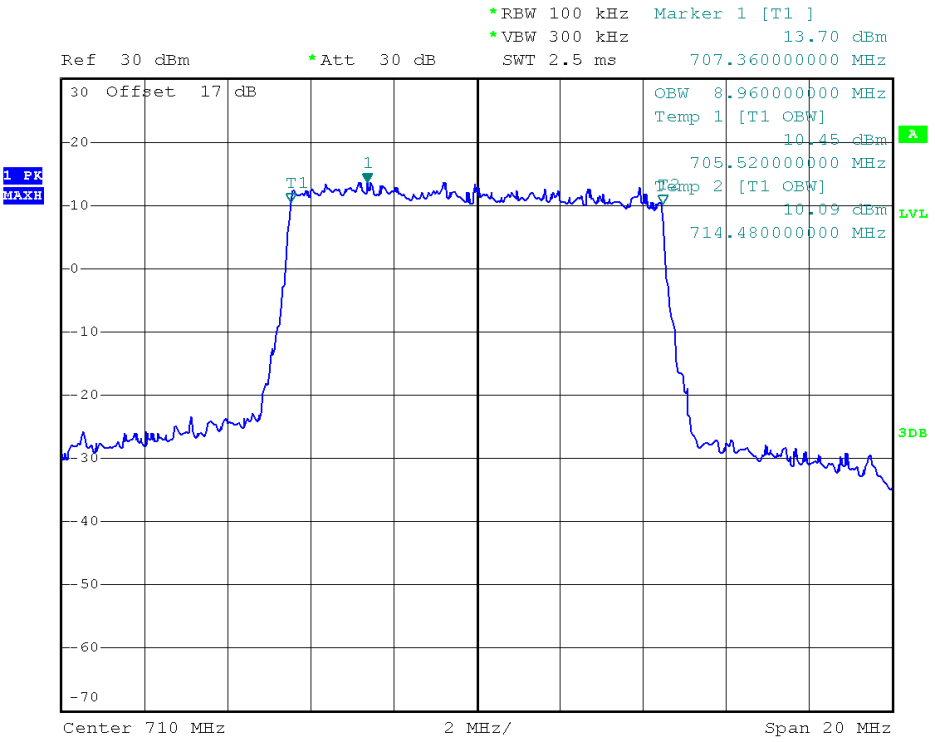
(Plot G4: 26dB Bandwidth 5MHz/16QAM Channel = 23790)



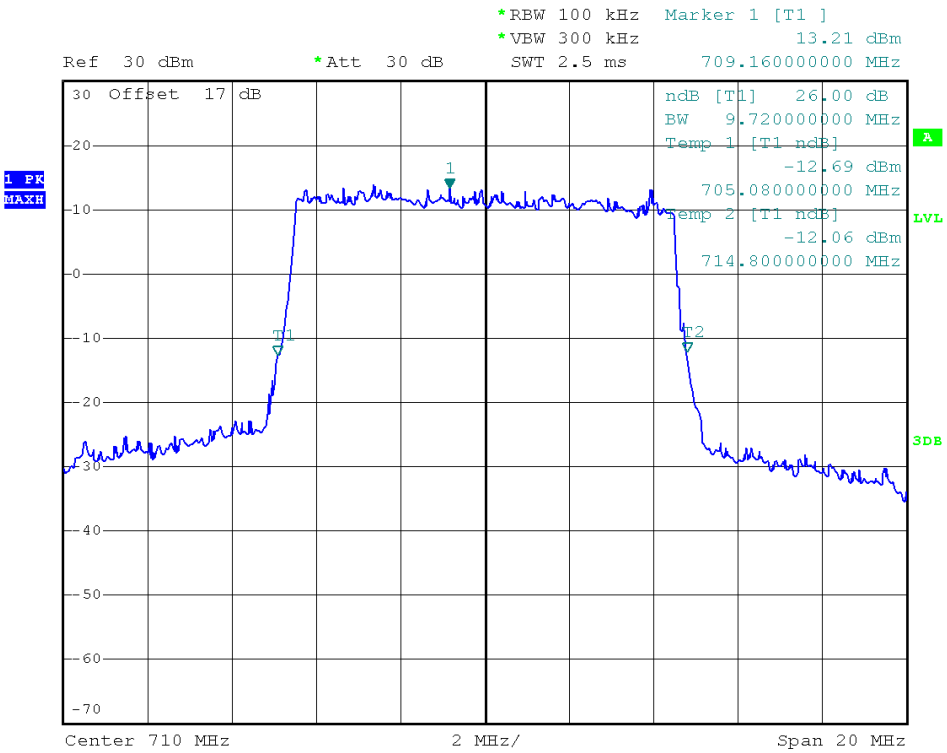
(Plot H1: 99% Occupied Bandwidth 10MHz/QPSK Channel = 23790)



(Plot C2: 26dB Bandwidth 10MHz/QPSK Channel = 23790)



(Plot D1: 99% Occupied Bandwidth 10MHz/16QAM Channel = 23790)



(Plot D2: 26dB Bandwidth 10MHz/16QAM Channel = 23790)

2.4 Frequency Stability

2.4.1 Requirement

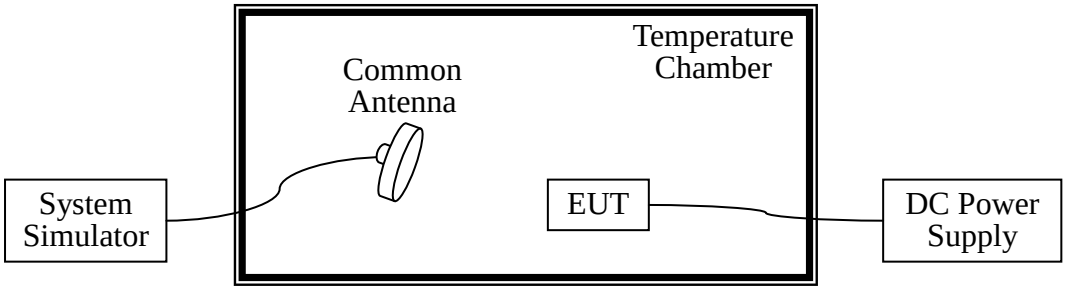
According to FCC section 27.54, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental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

(a) The temperature is varied from -30℃ to +50℃ at intervals of not more than 10℃.

(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 Test Description

1. Test Setup:



2. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Data	Cal. Due Data
System Simulator	R&S	CMW500	149333	2014.07.21	2015.07.20
DC Power Supply	Good Will	GPS-3030DD	EF920938	2015.06.02	2016.06.02
Temperature Chamber	YinHe Experimental Equip.	HL4003T	(n.a.)	2015.06.02	2016.06.02
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.02	2016.06.02

2.4.3 Test Verdict

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℃.

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℃ 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℃ step up to 50℃. 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 variation in frequency was measured for the worst case.

2.4.4 Test Result of Frequency Stability

1. LTE Band 4

Test Conditions		Frequency Deviation Middle Channel 1732.5MHz		
Power (VDC)	Temperature (℃)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	46.97	0.03	2.5
	-20	28.65	0.02	
	-10	-4.84	0	
	0	36.51	0.02	
	+10	13.56	0.01	
	+20	12.56	0.01	
	+30	23.87	0.01	
	+40	13.68	0.01	
	+55	47.69	0.03	
4.2	+25	52.74	0.03	
3.6	+25	3.58	0	

2. LTE Band 17

Test Conditions		Frequency Deviation Middle Channel 710MHz		
Power (VDC)	Temperature (℃)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.8	-30	29.51	0.04	2.5
	-20	-24.25	0.04	
	-10	36.32	0.05	
	0	-14.52	0.02	
	+10	-8.75	0	
	+20	-15.52	0.02	
	+30	21.41	0.03	
	+40	-2.37	0	
	+55	8.59	0	
4.2	+25	38.34	0.05	
3.6	+25	36.51	0.05	

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.

2.5.2 Test Description

See section 2.1.2 of this report.

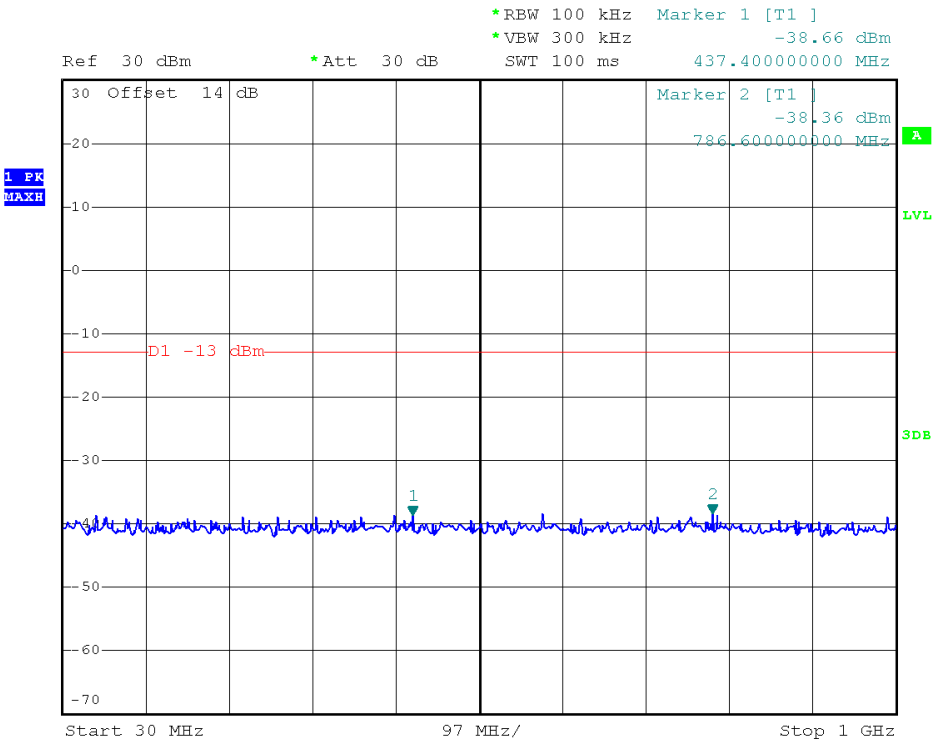
2.5.3 Test Procedures

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 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

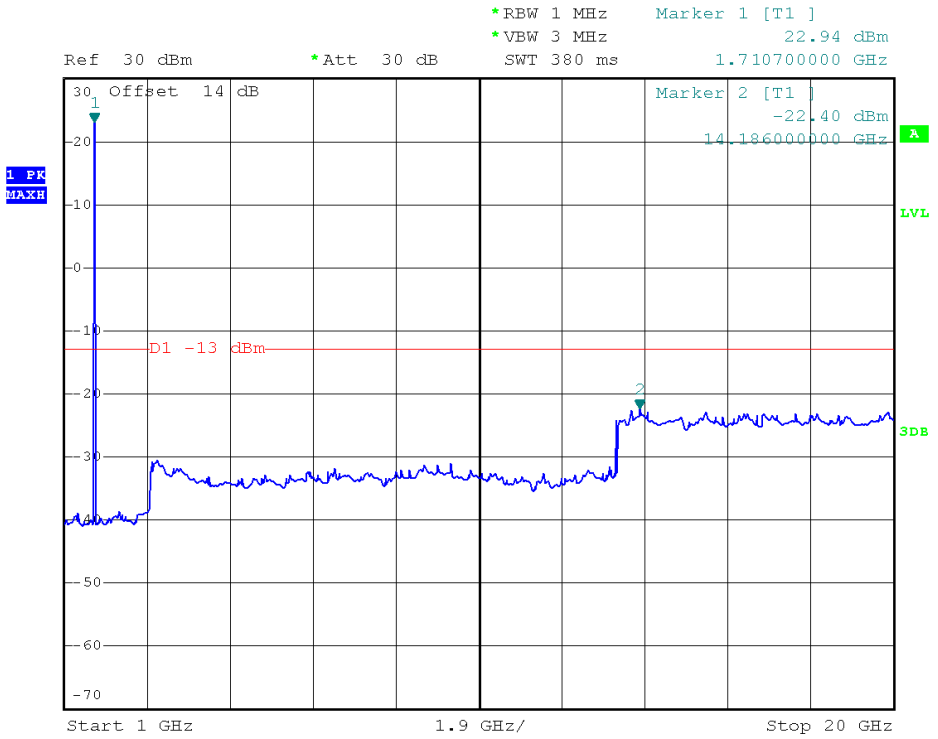
2.5.4 Test Result of Conducted Spurious Emission

The measurement frequency range is from 30MHz to the 10^{th} harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

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

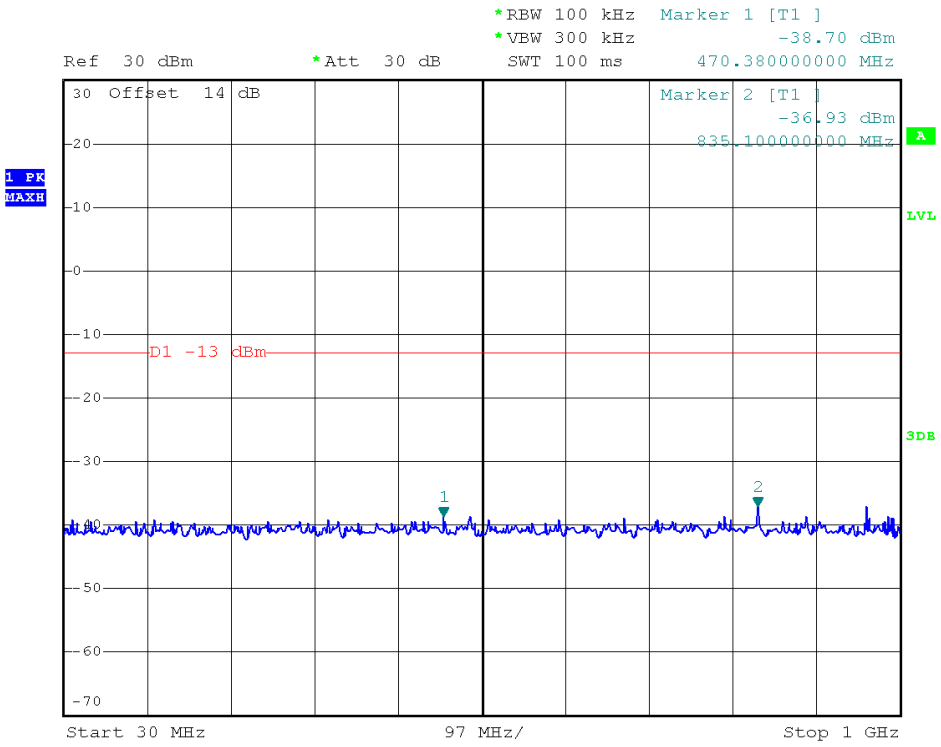


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

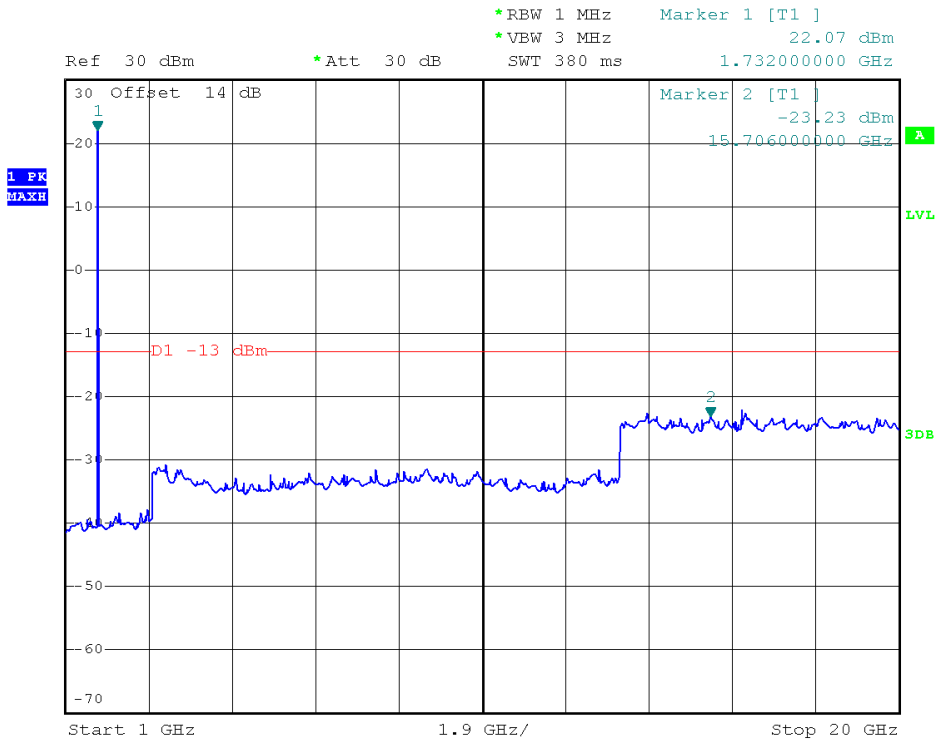


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

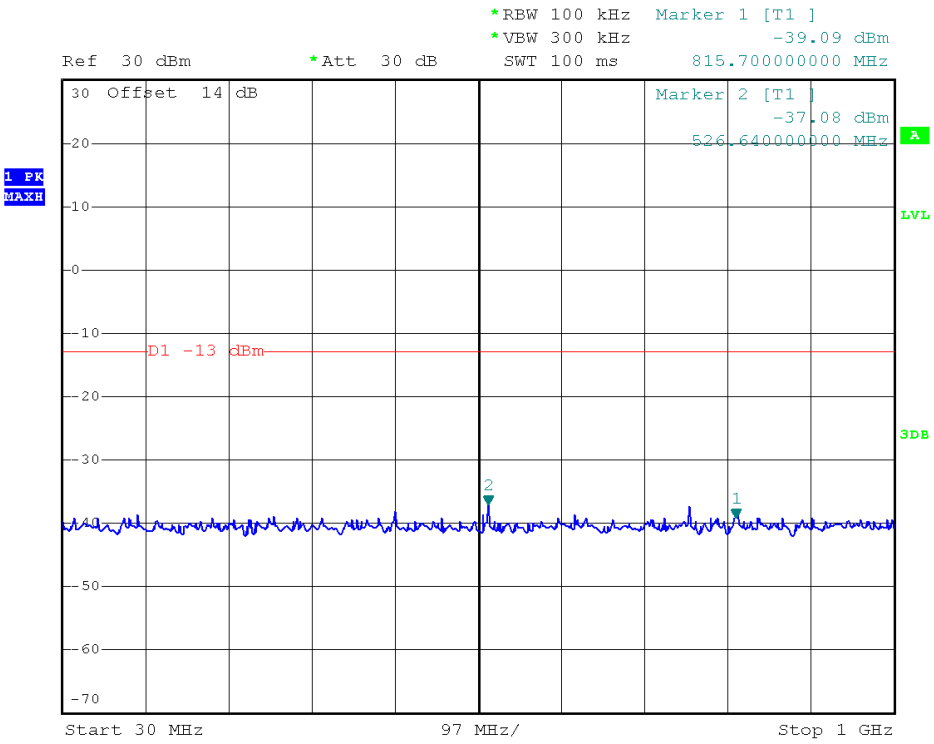


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

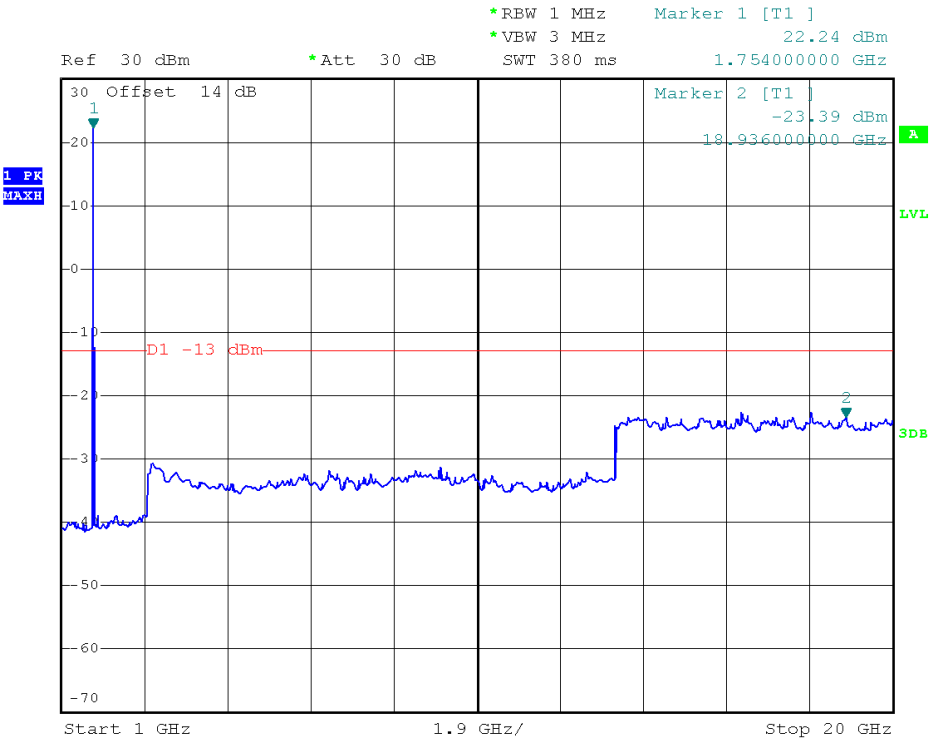


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

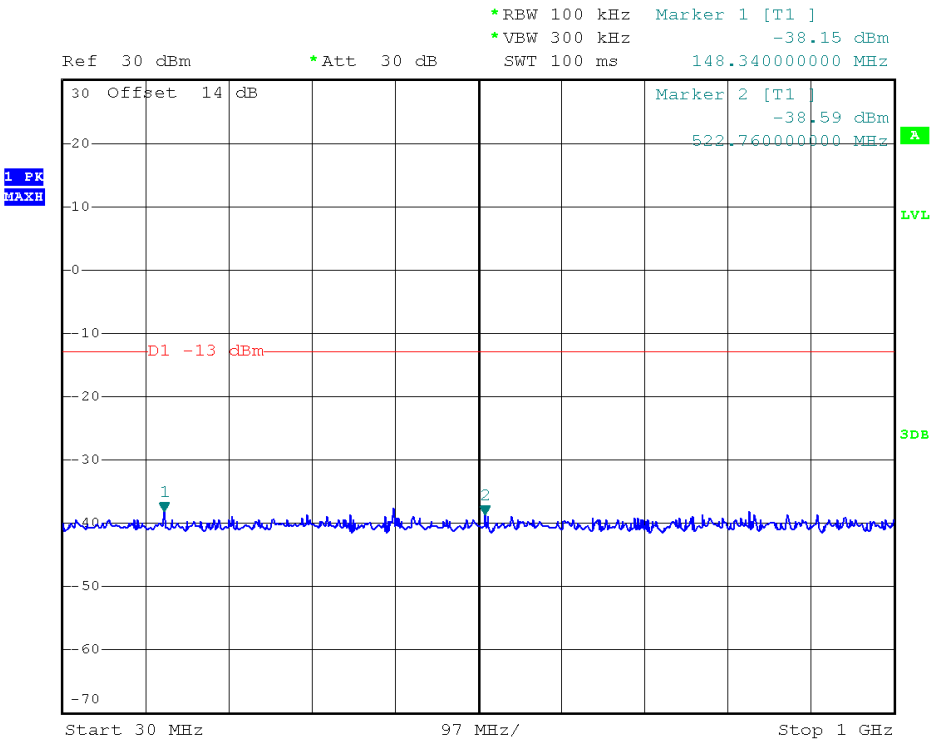


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

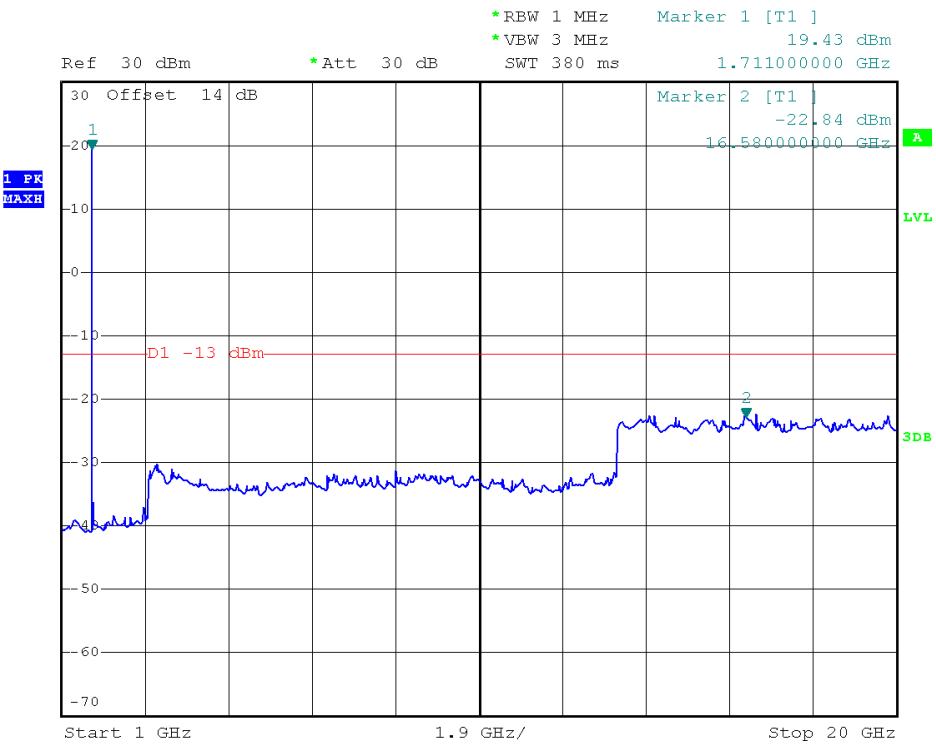


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

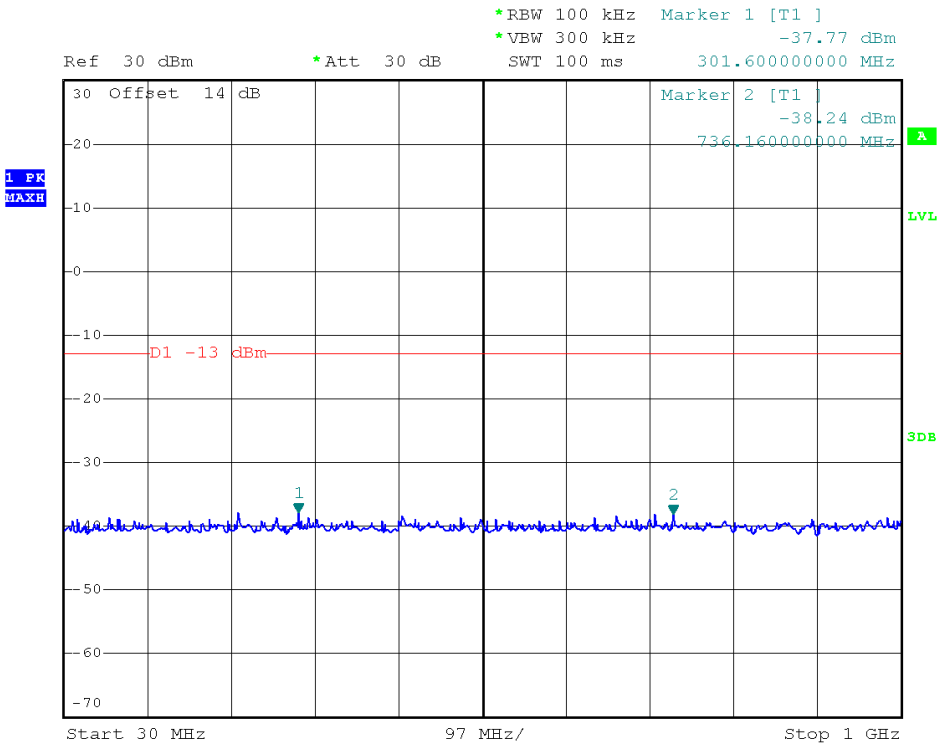


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

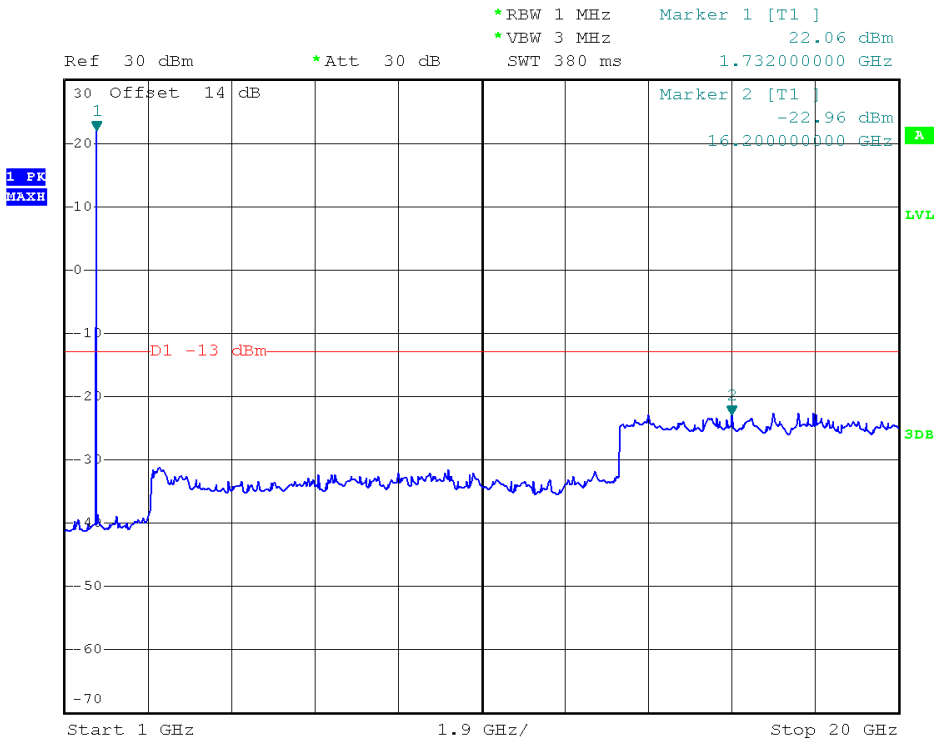


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

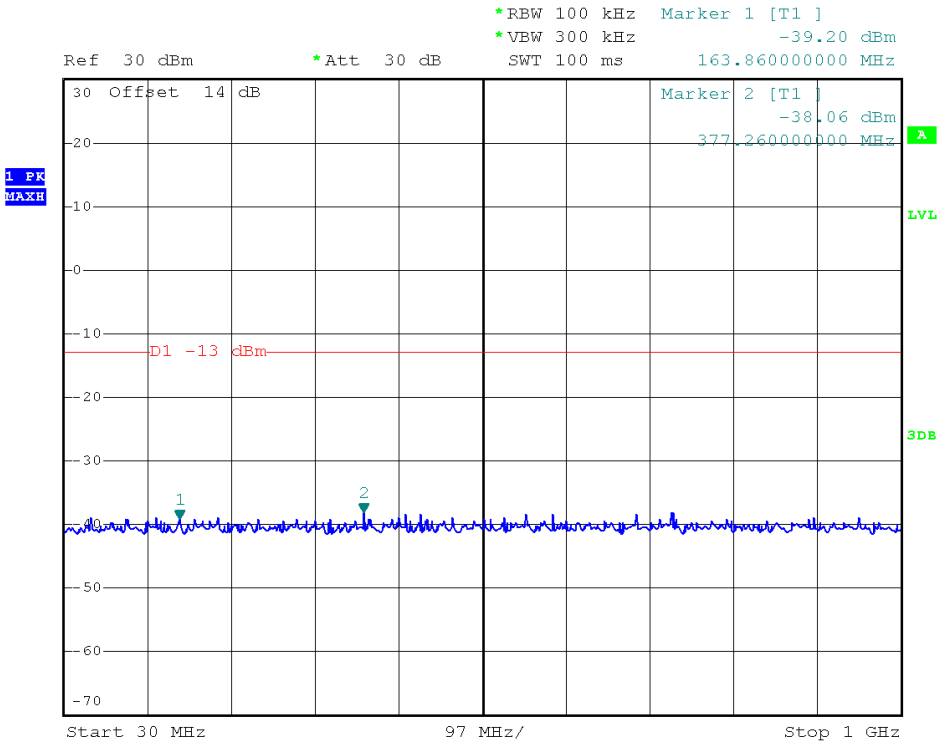


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

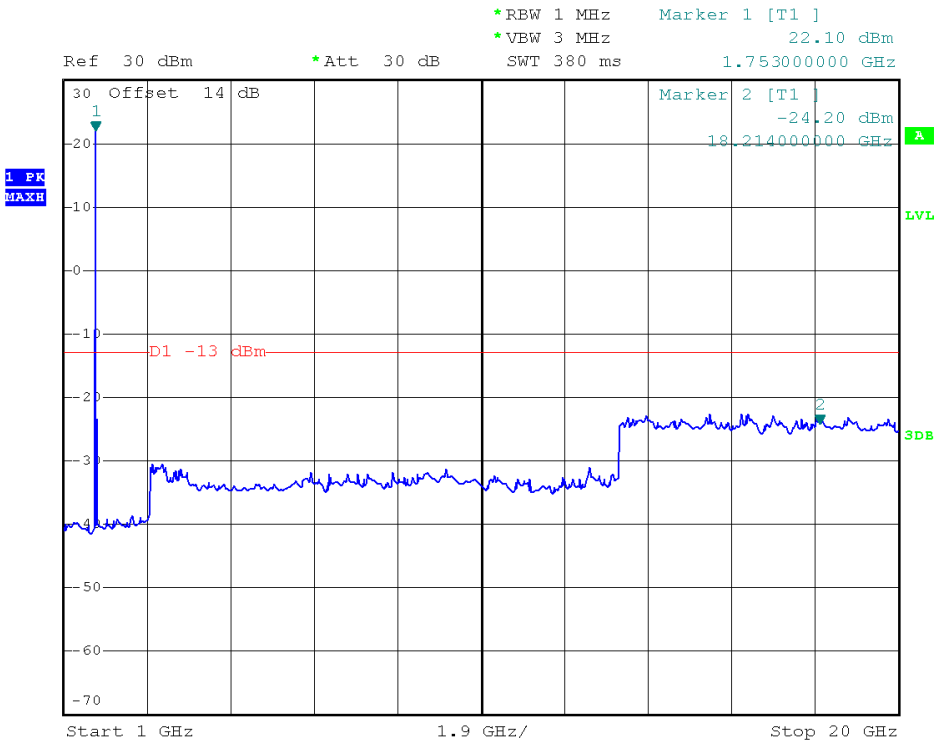


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

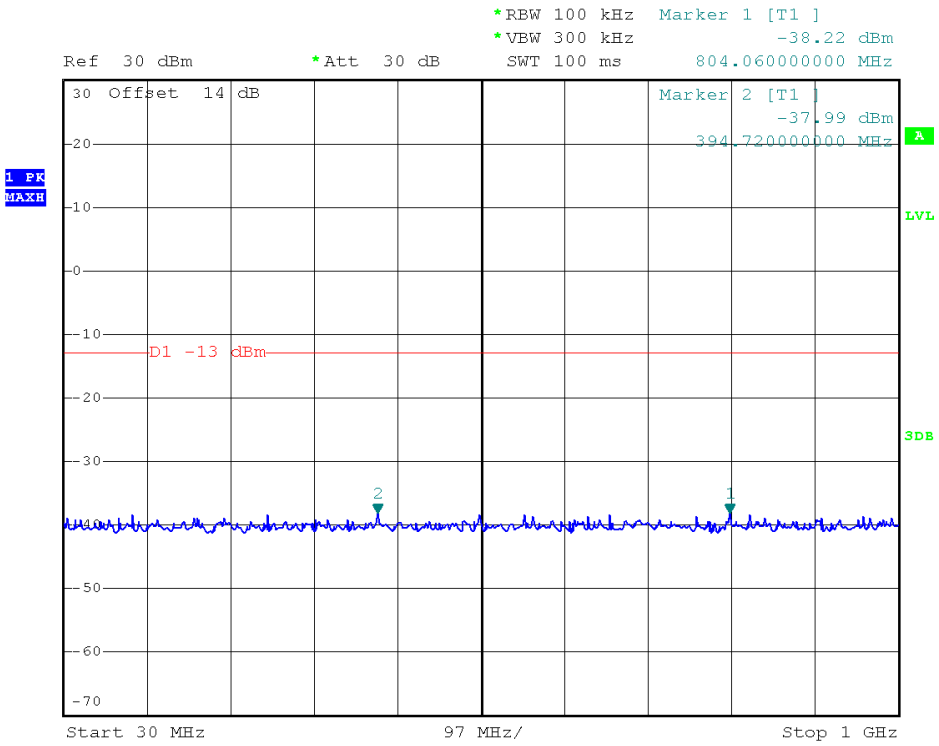


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

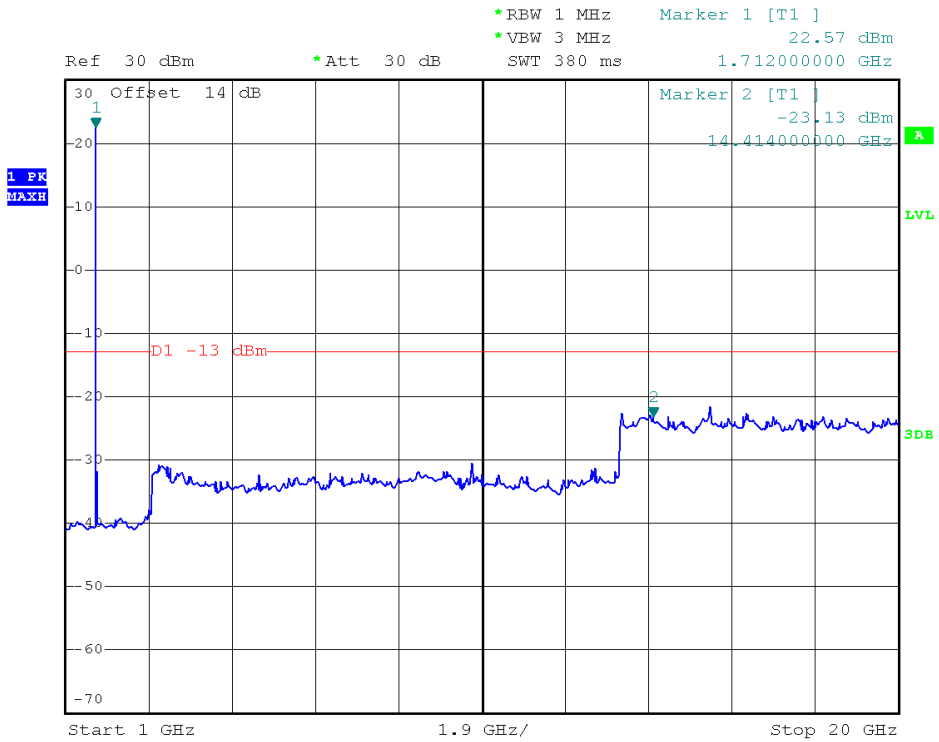


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

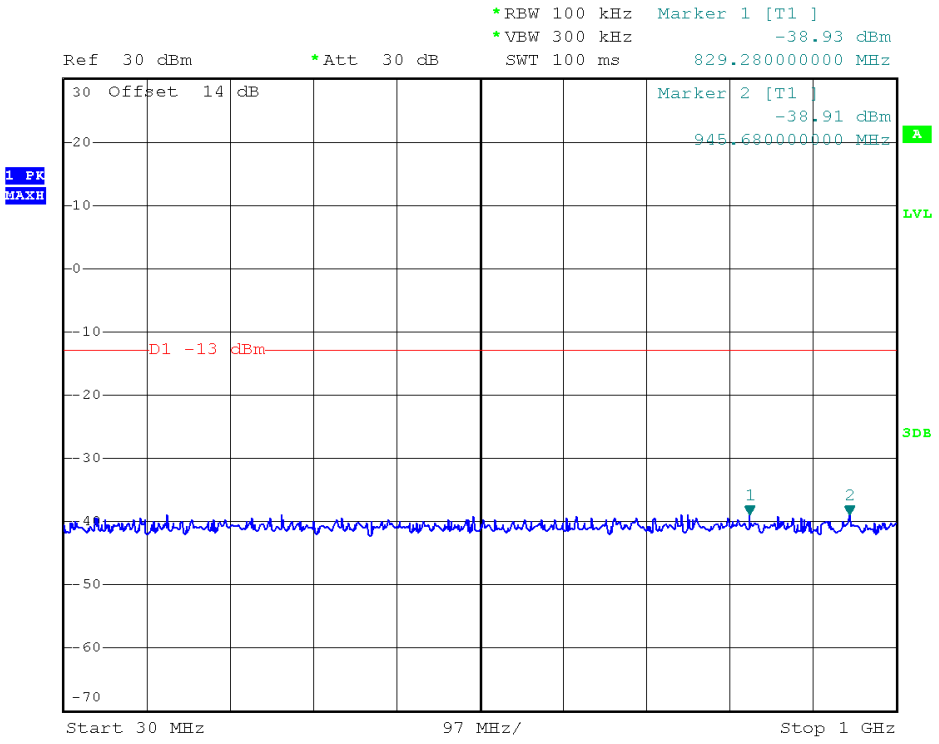


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

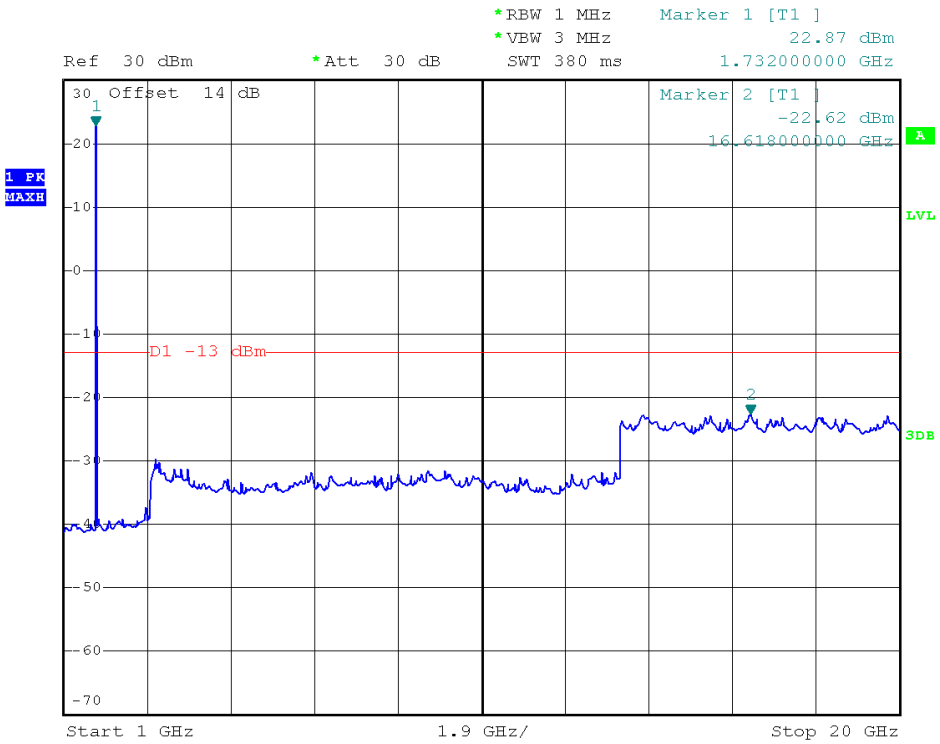


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

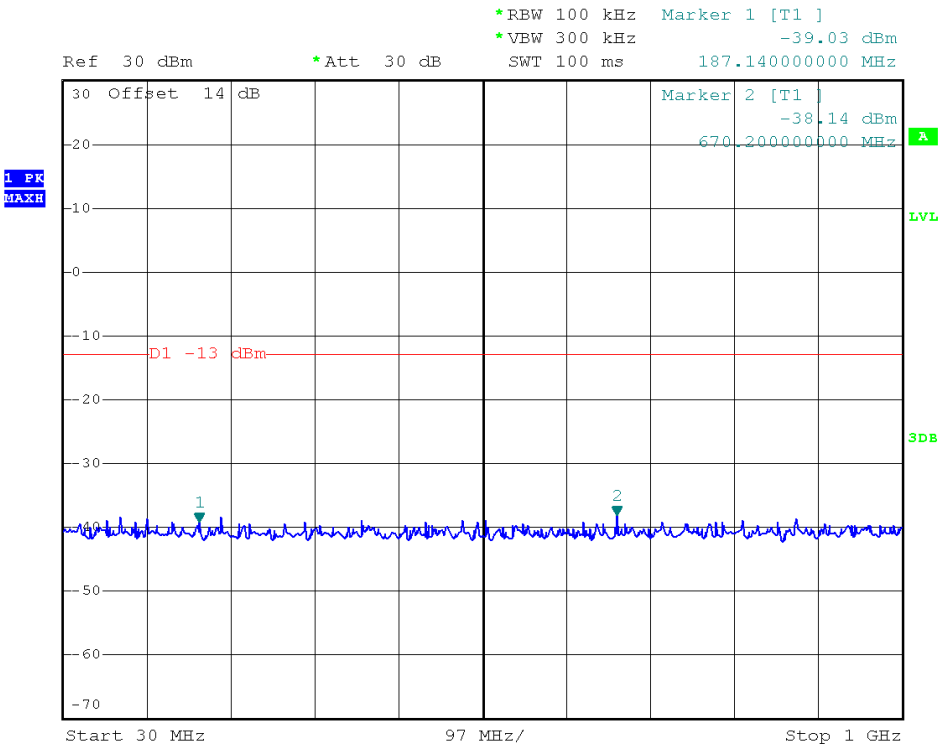


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

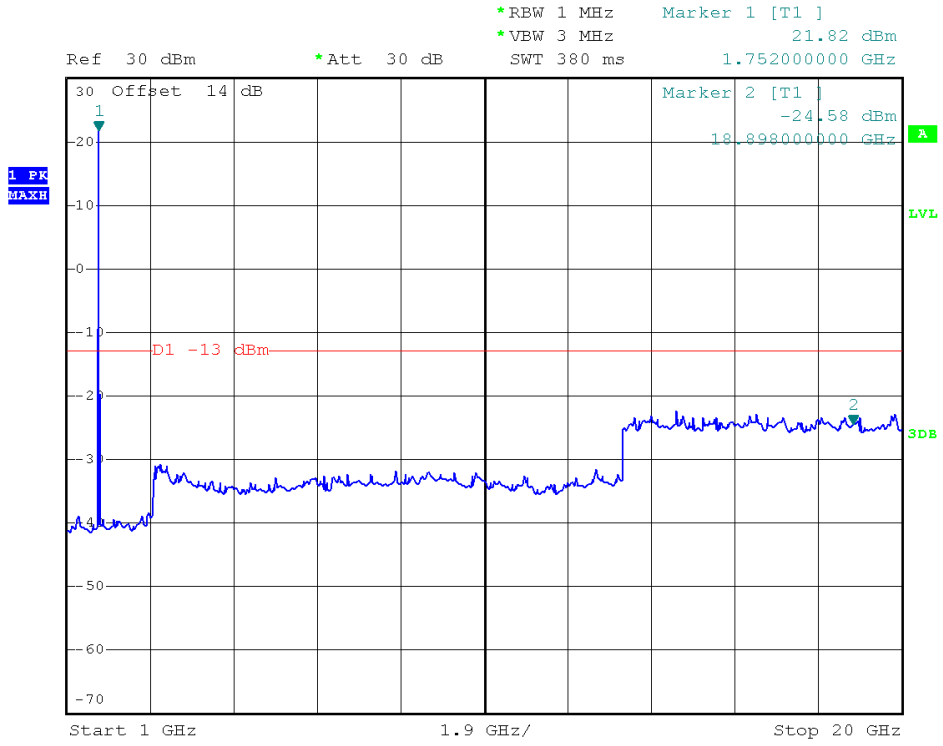


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

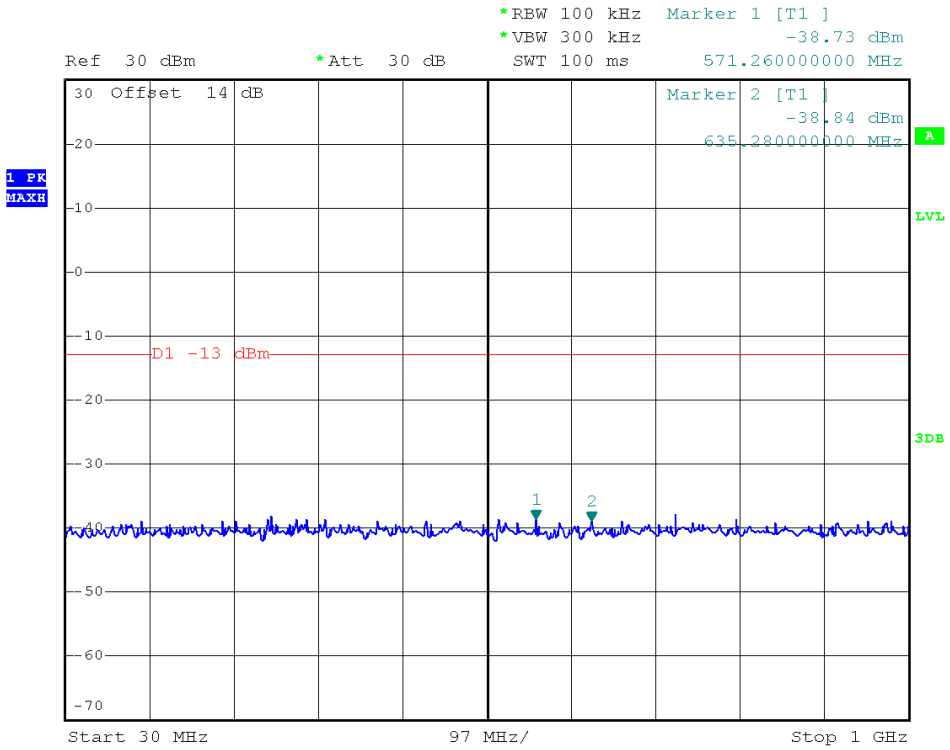


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

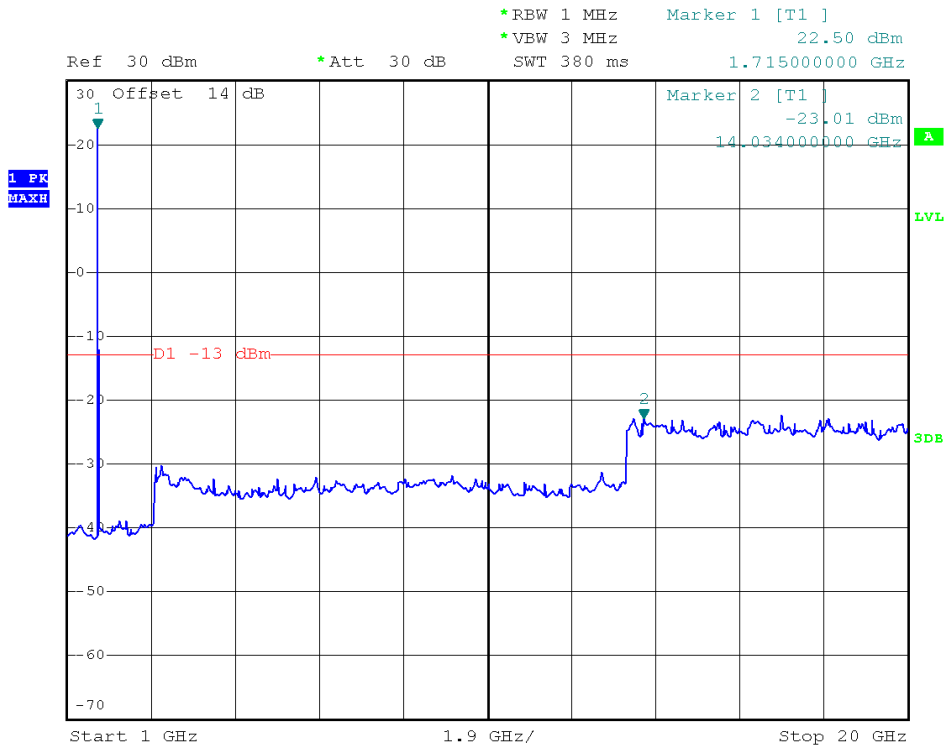


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

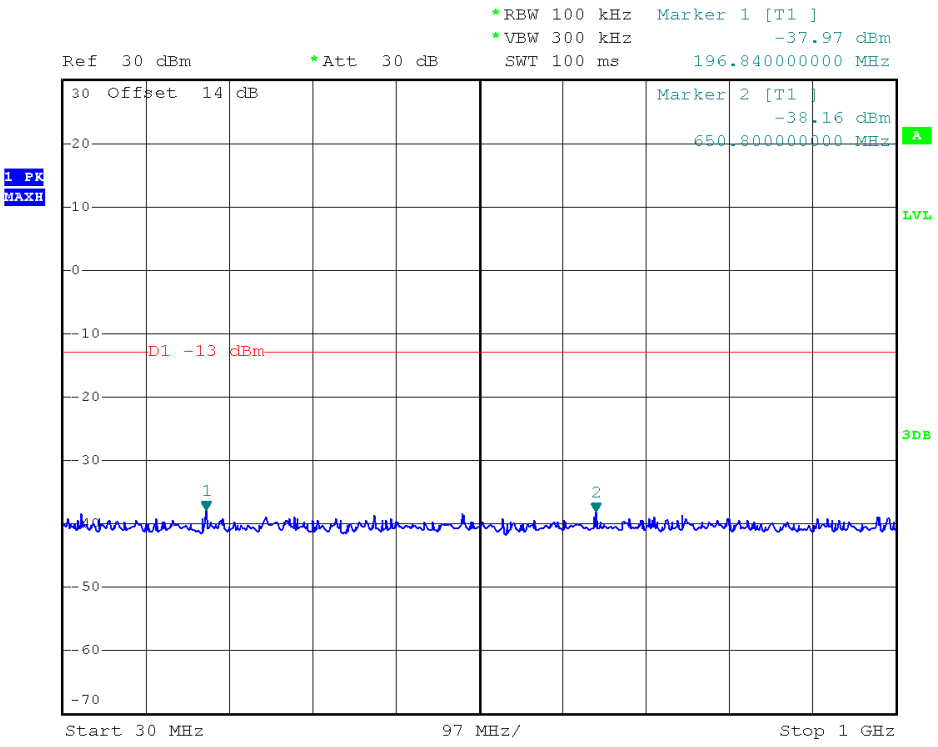


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

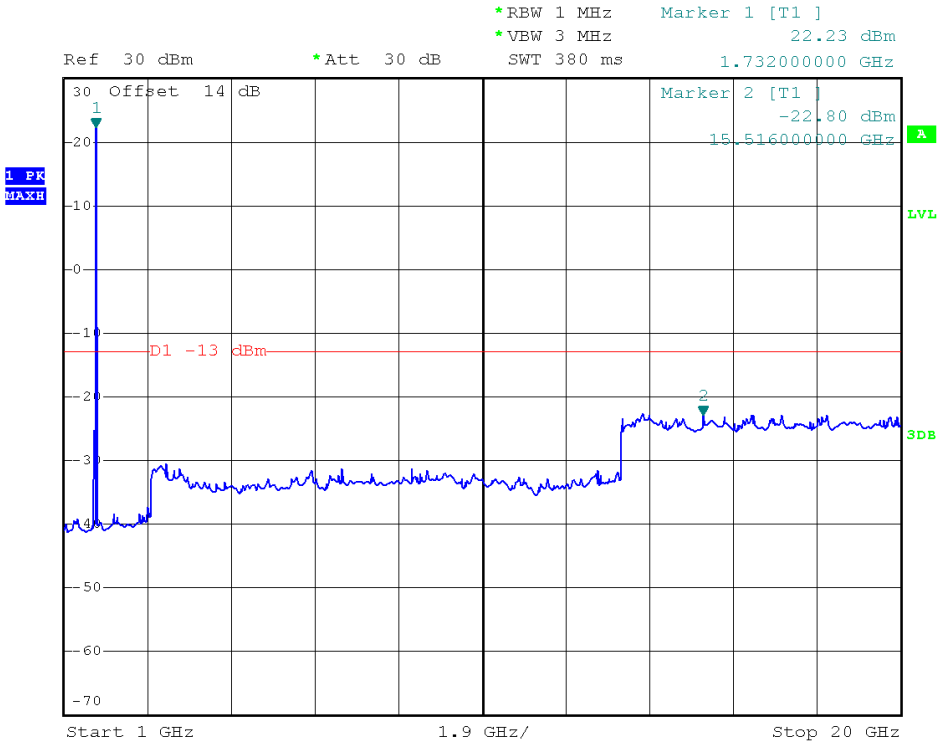


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

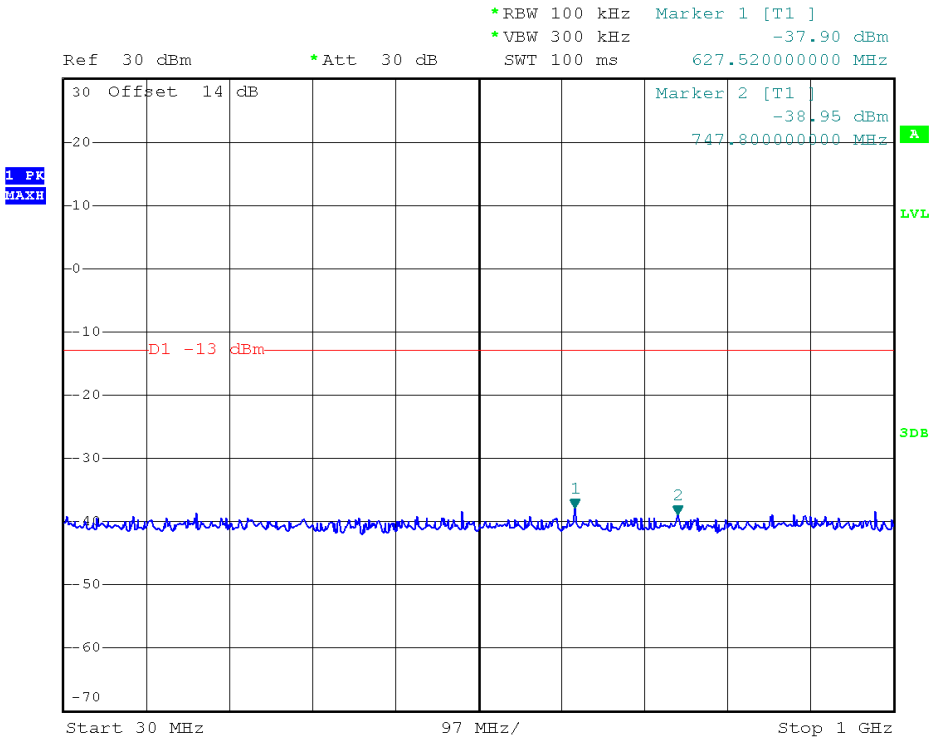


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

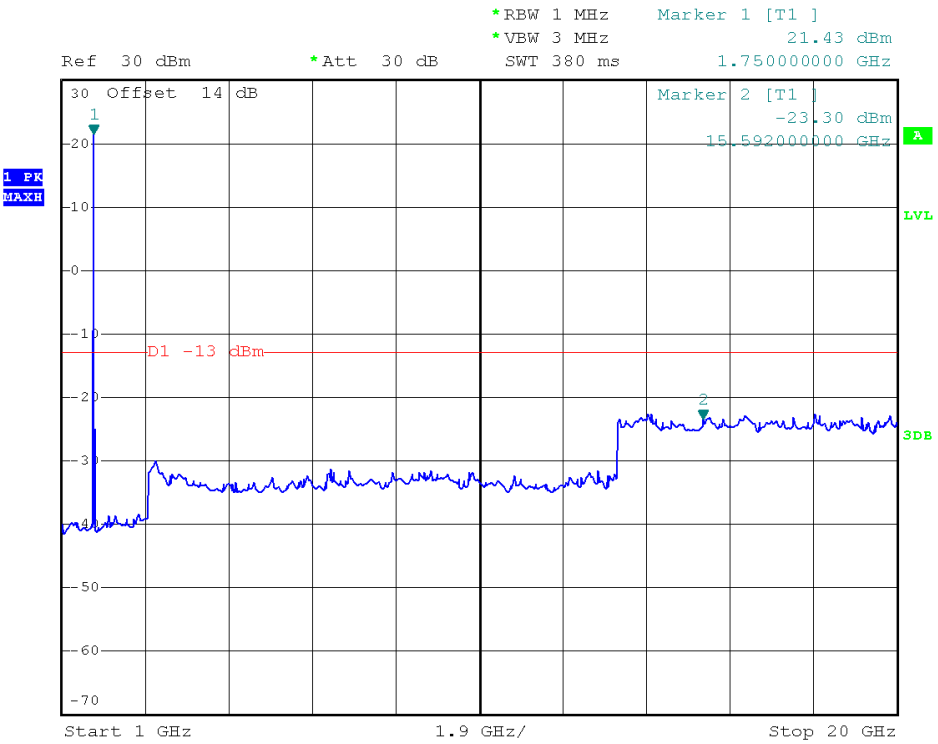


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

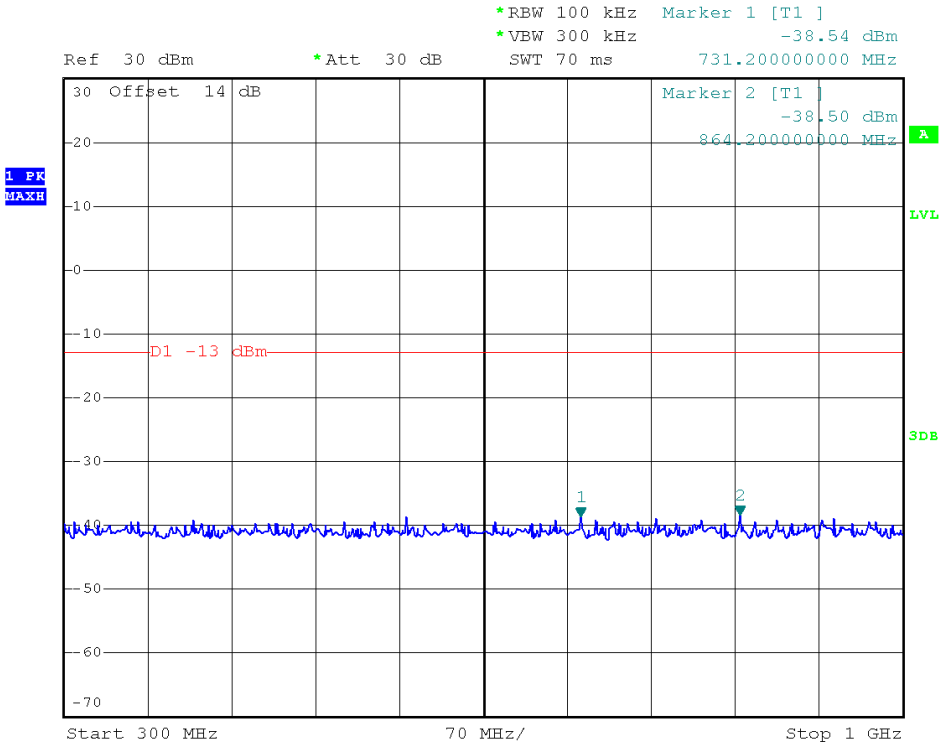


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

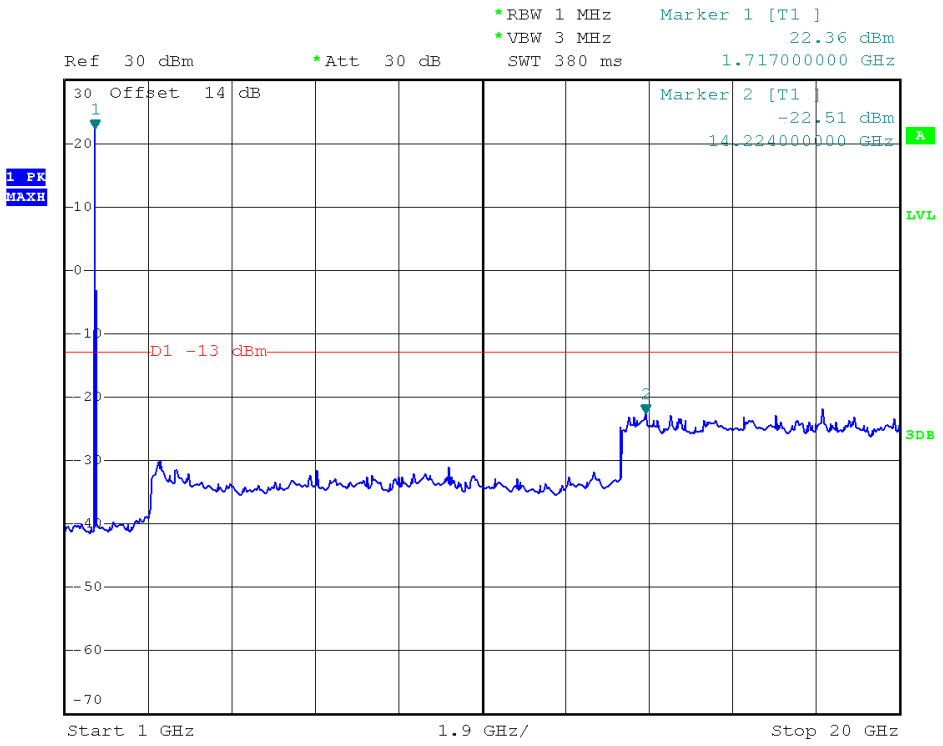


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

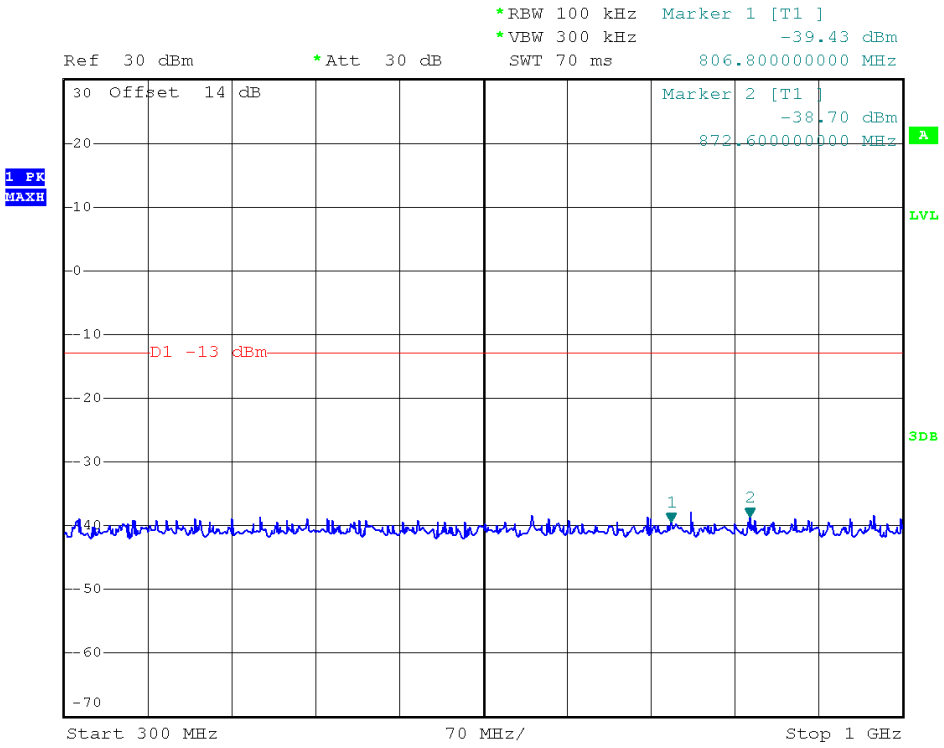


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

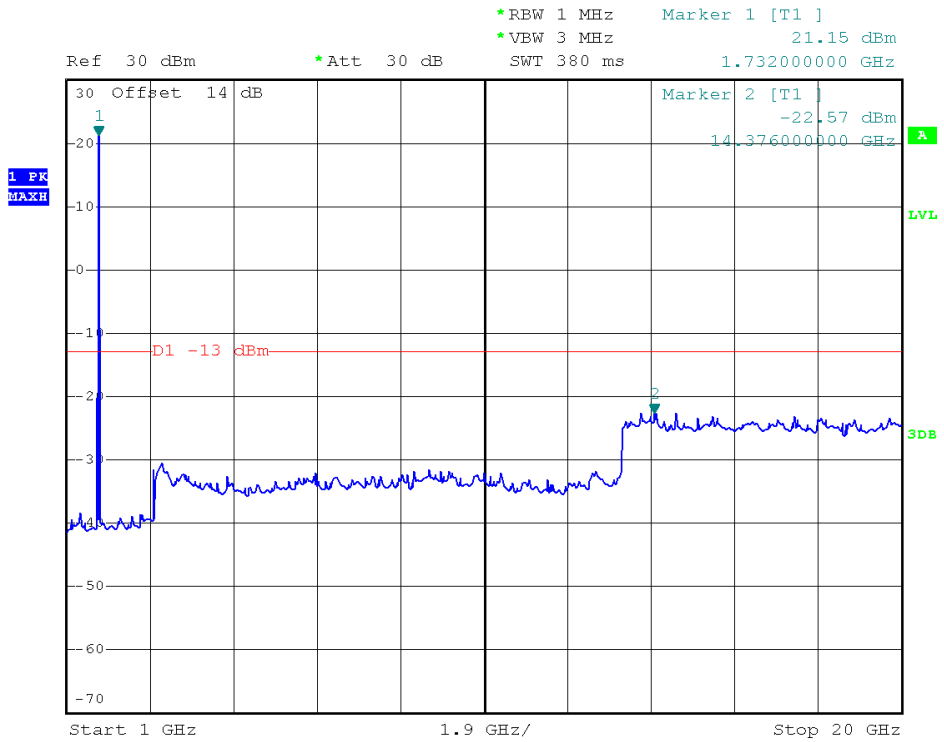


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

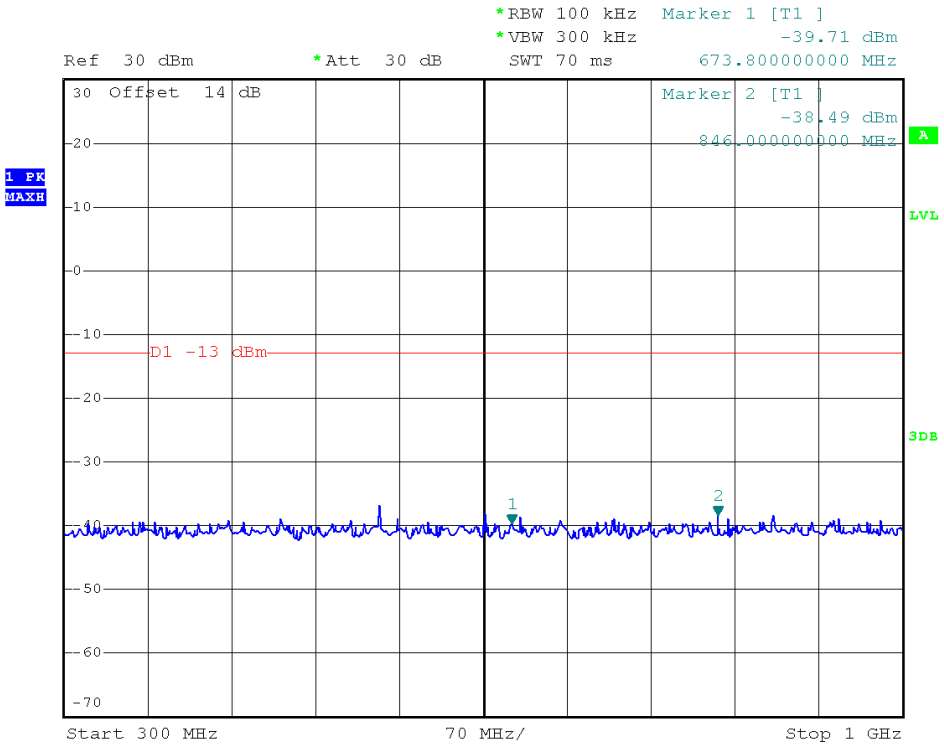


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

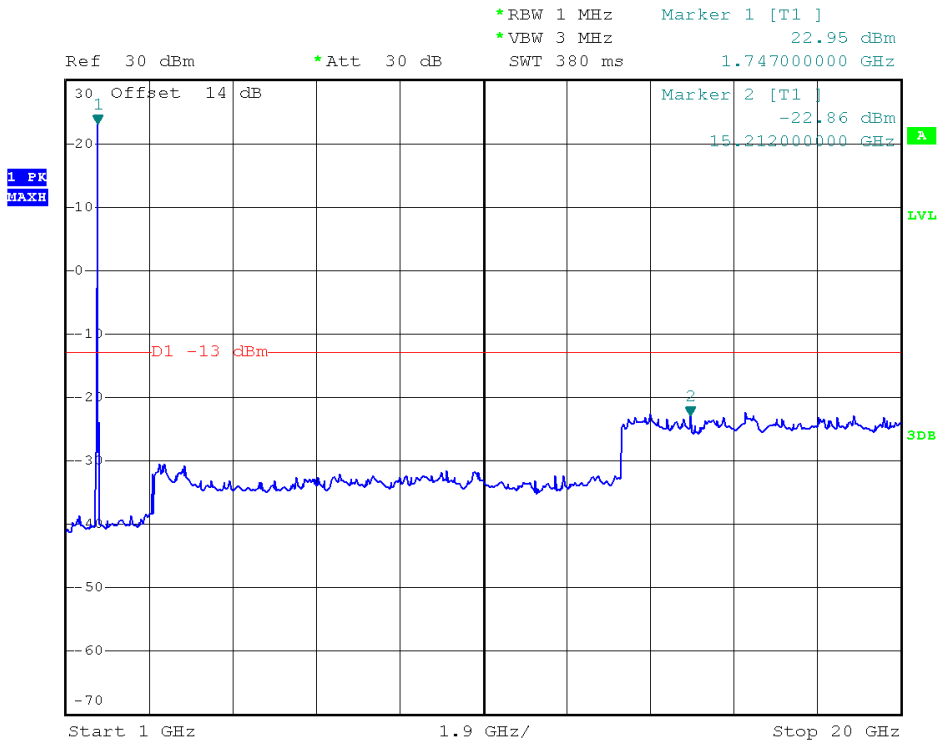


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

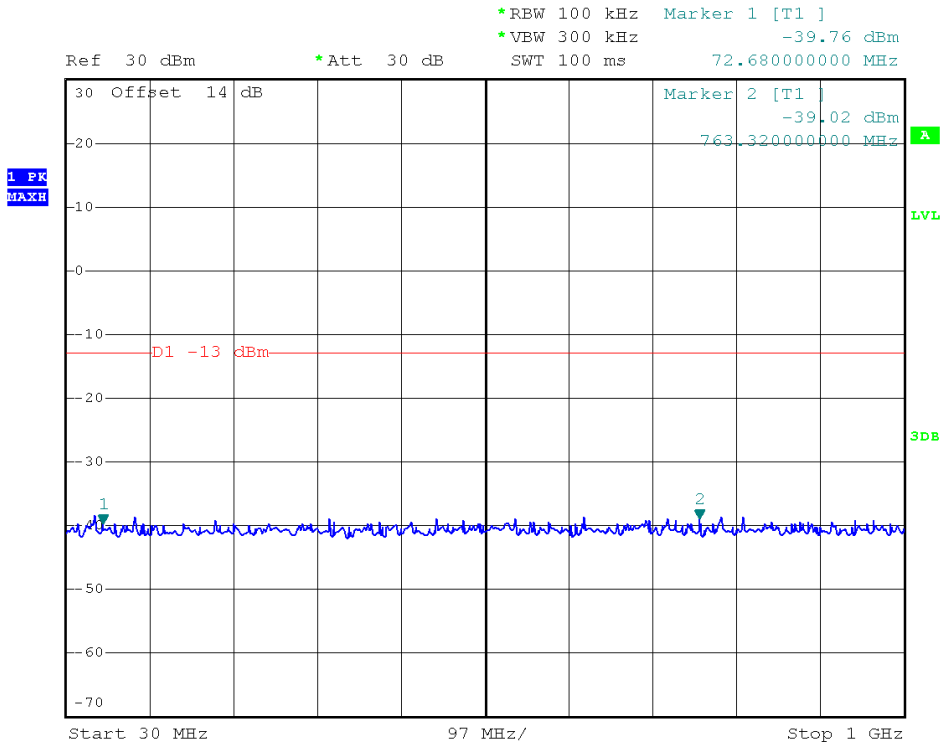


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

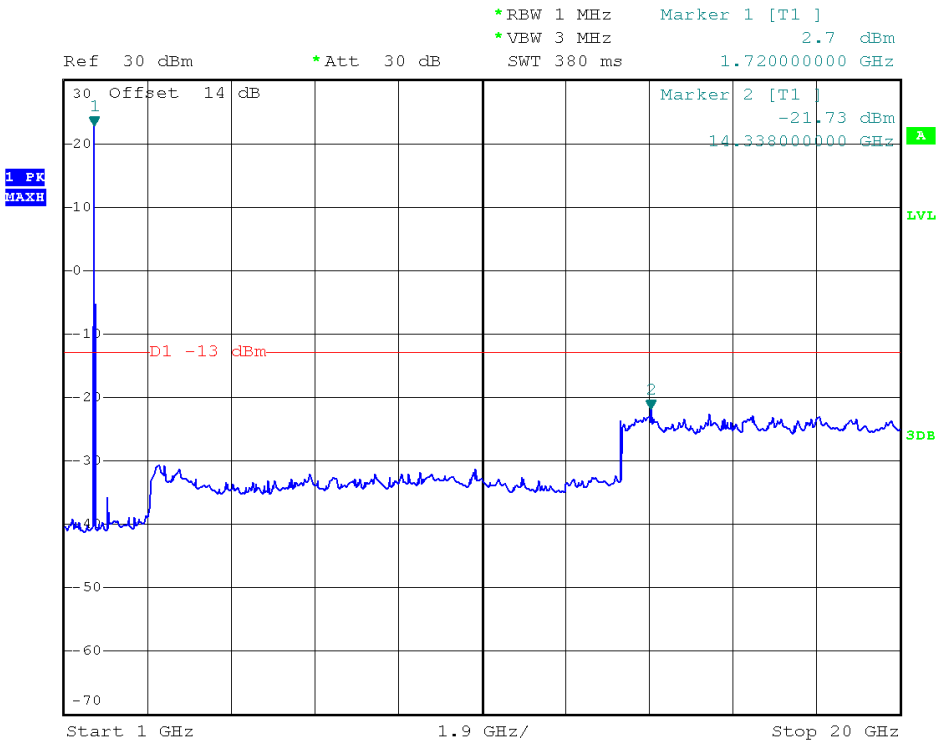


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

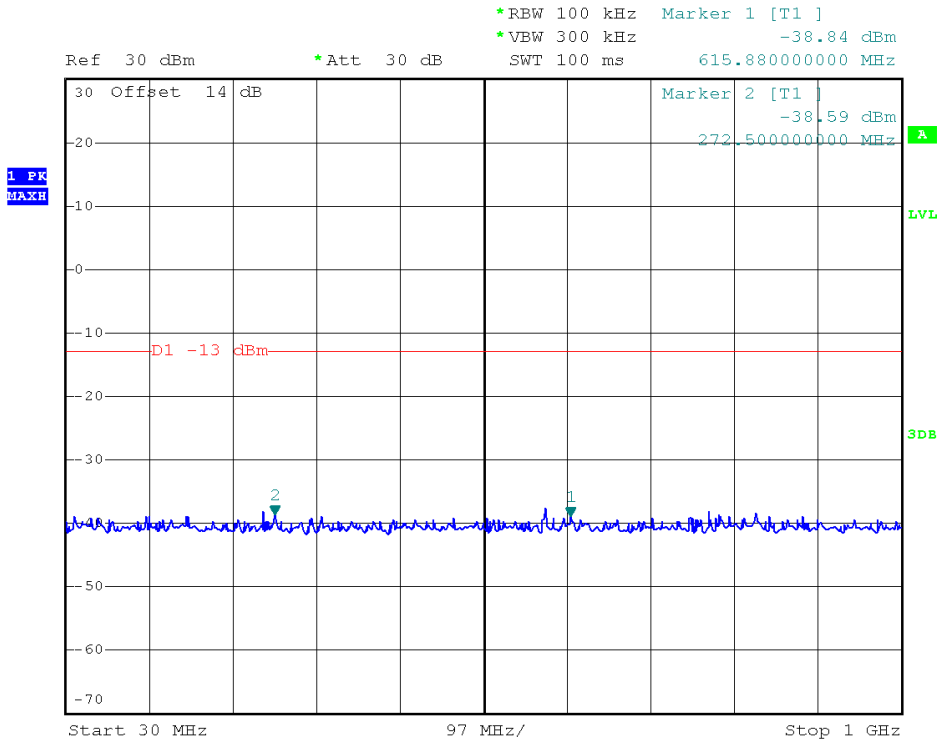


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

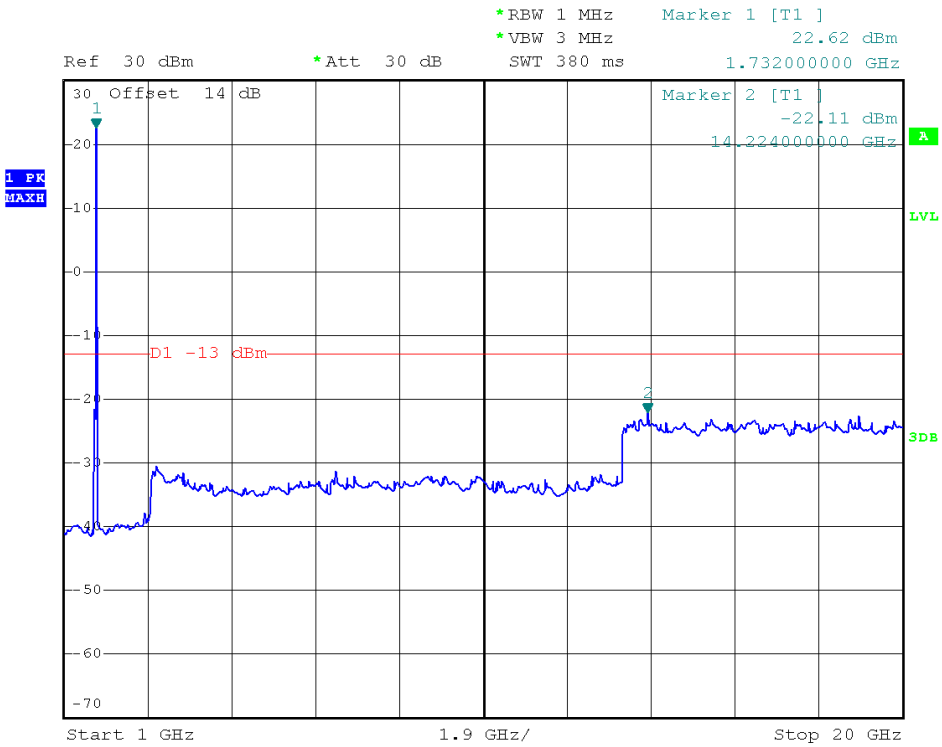


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

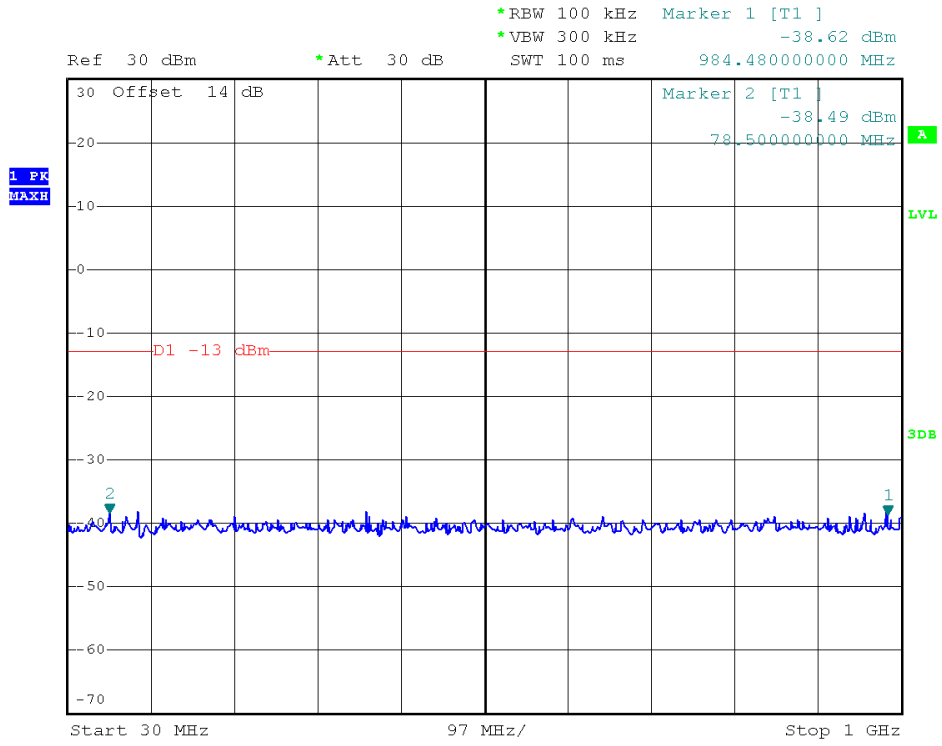


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

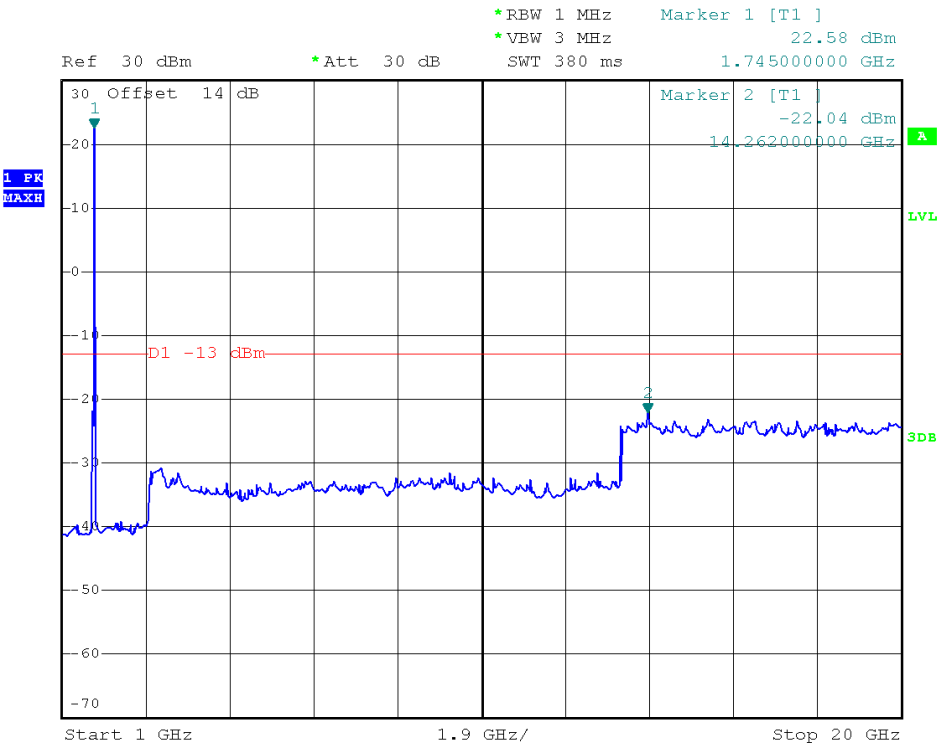


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

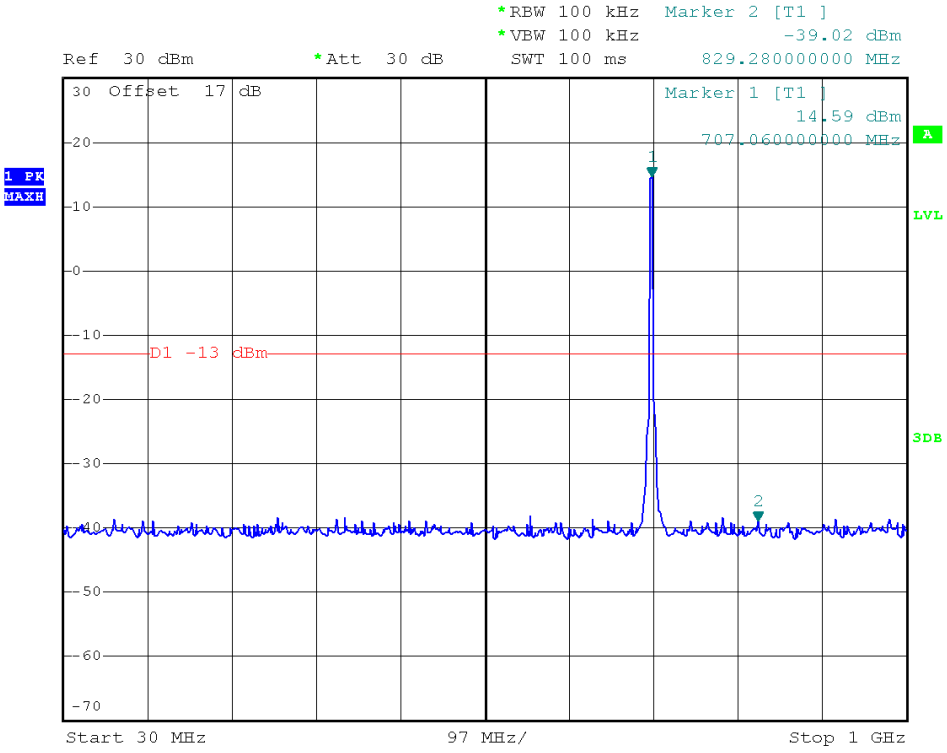


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

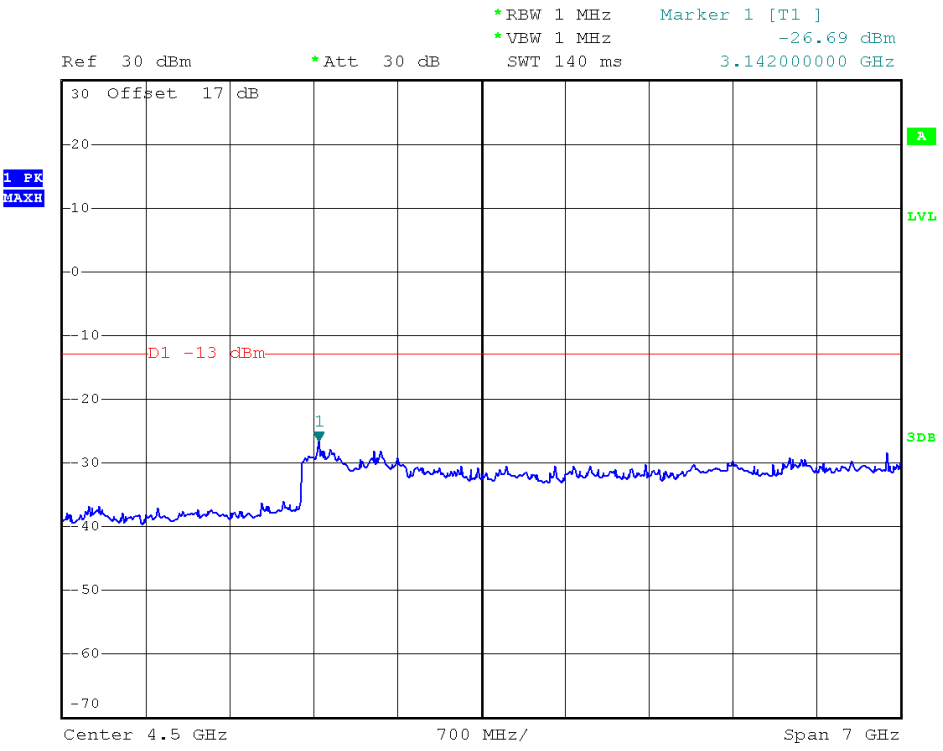


QPSK, (RB Size 1, RB Offset 0 1GHz to 18GHz)

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

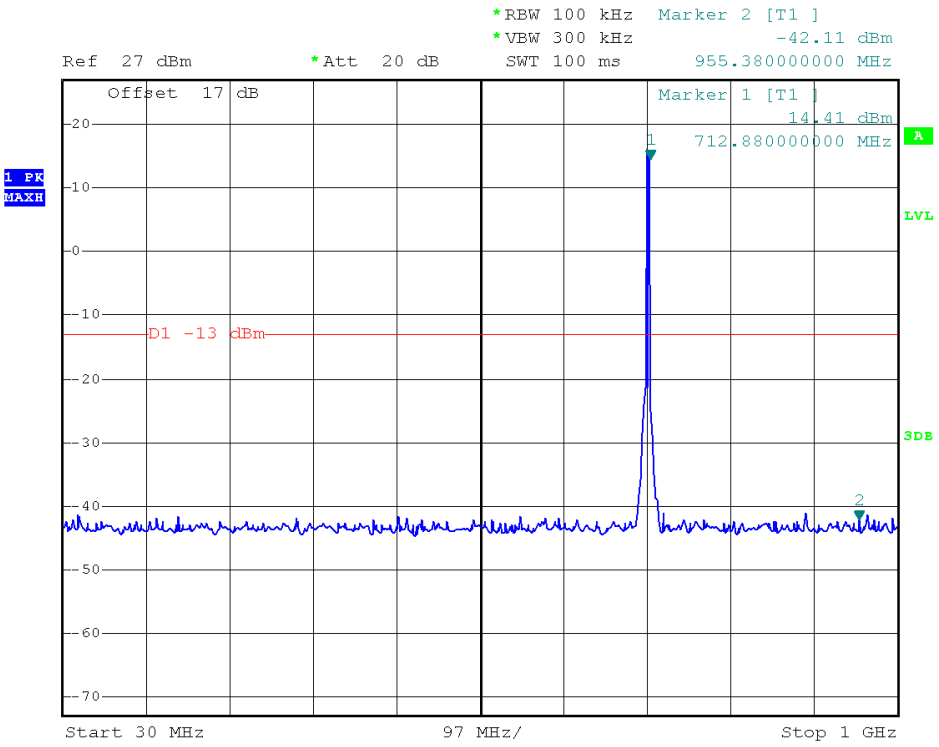


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

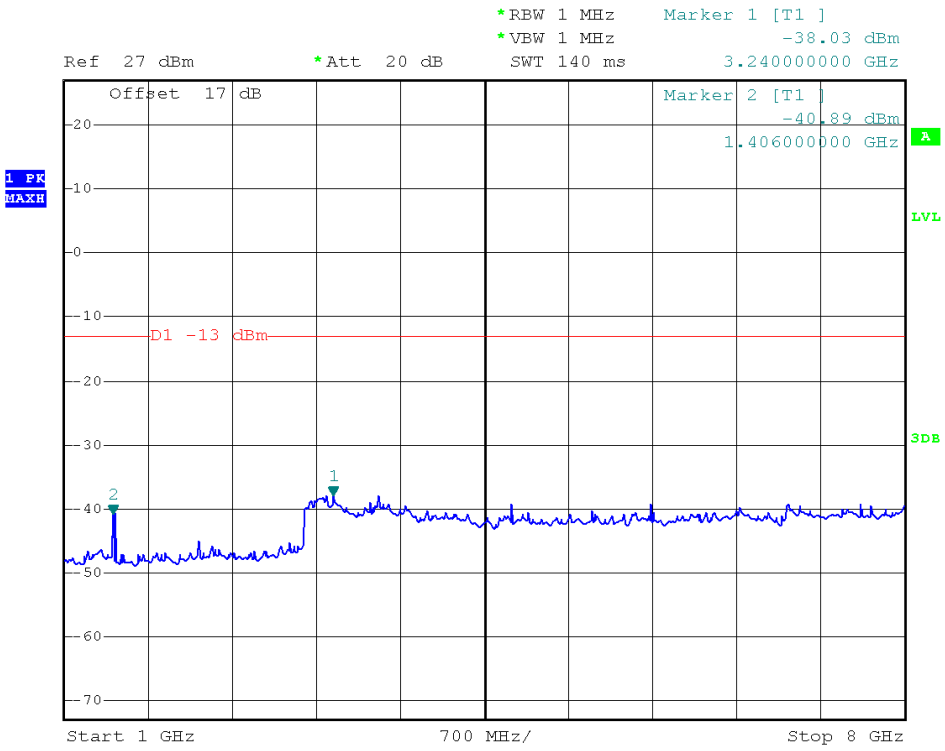


QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)

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

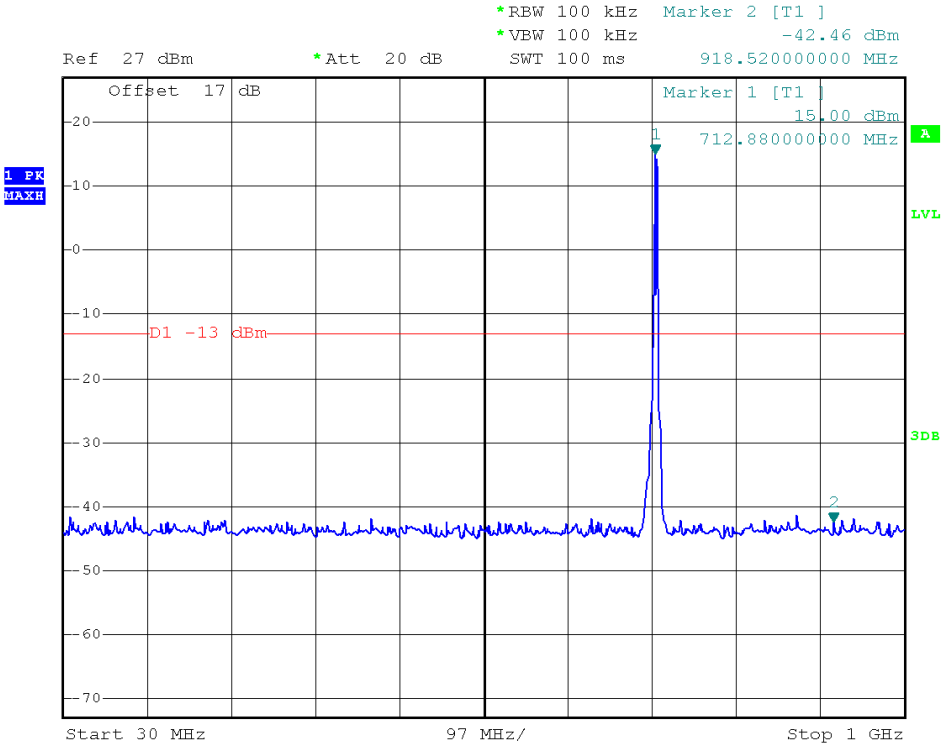


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

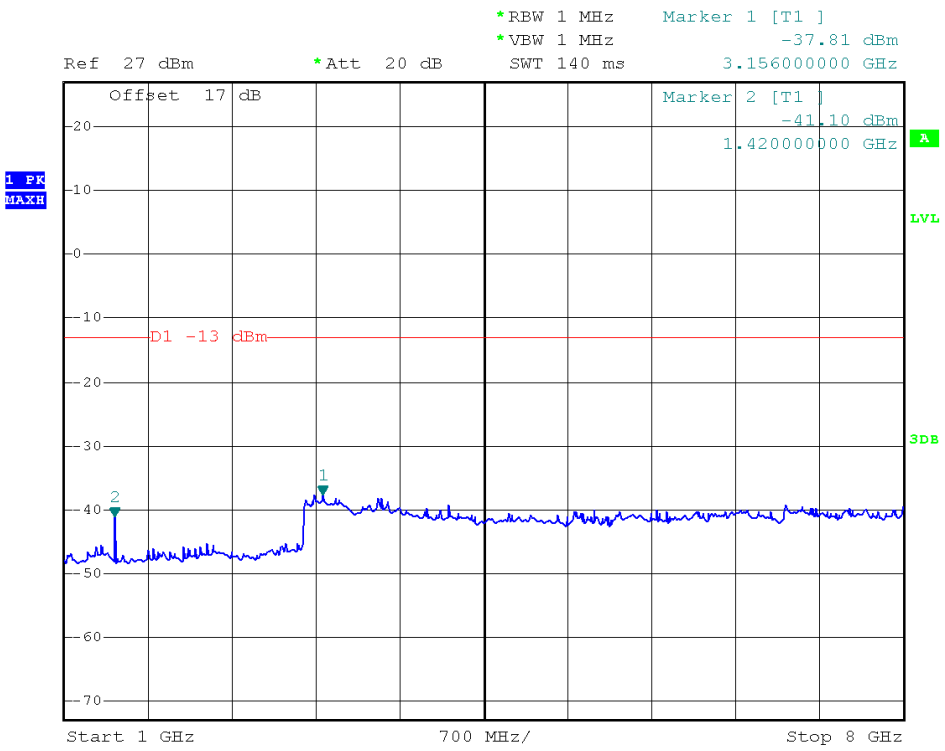


QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)

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

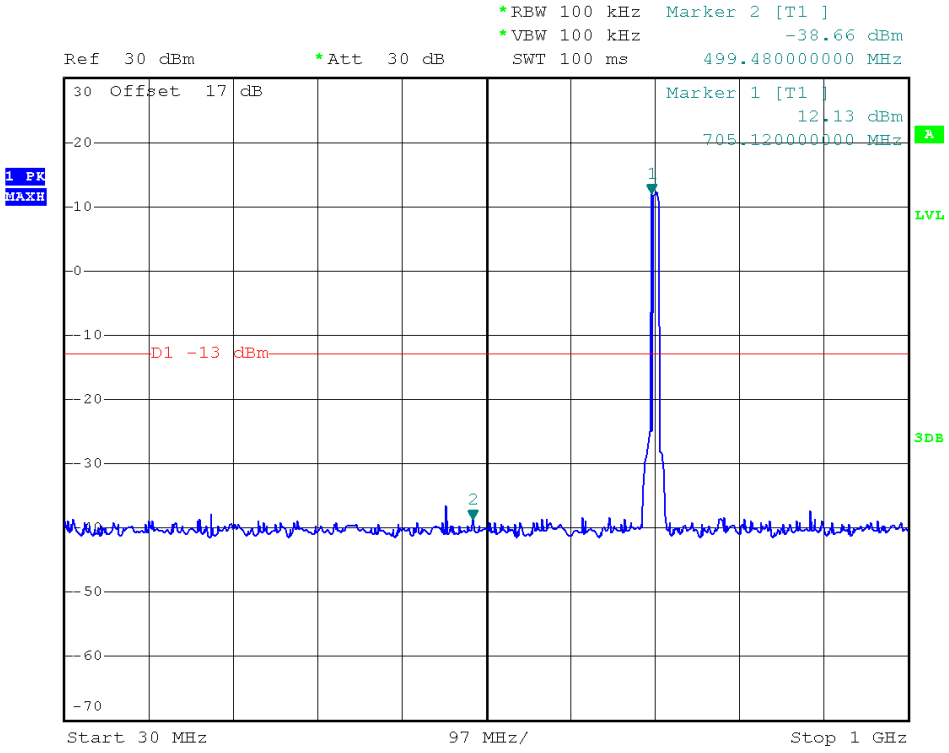


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

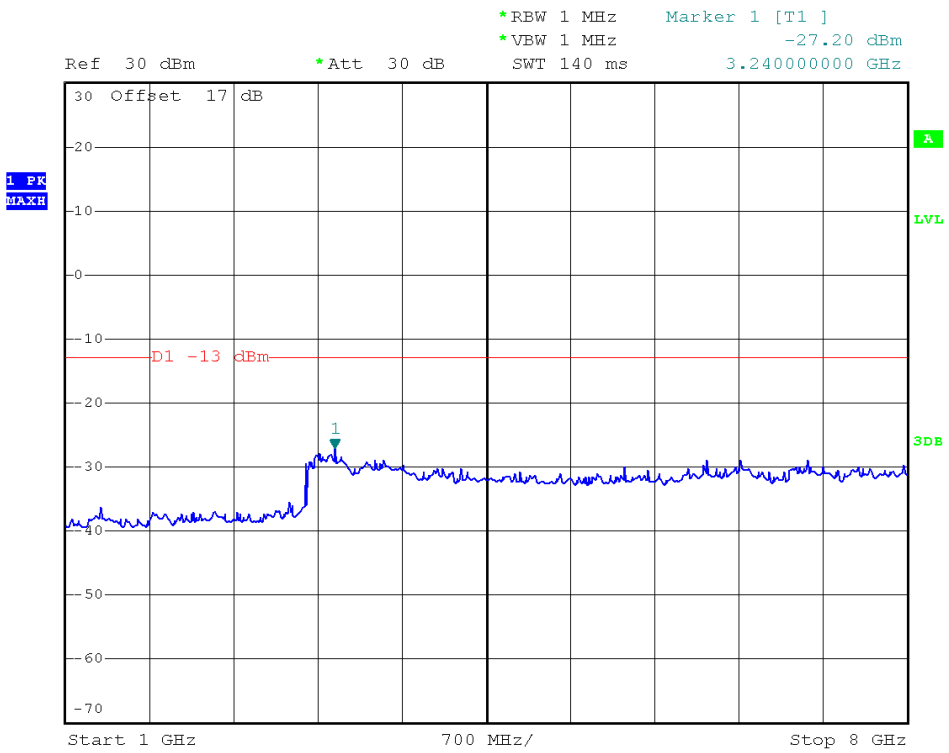


QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)

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

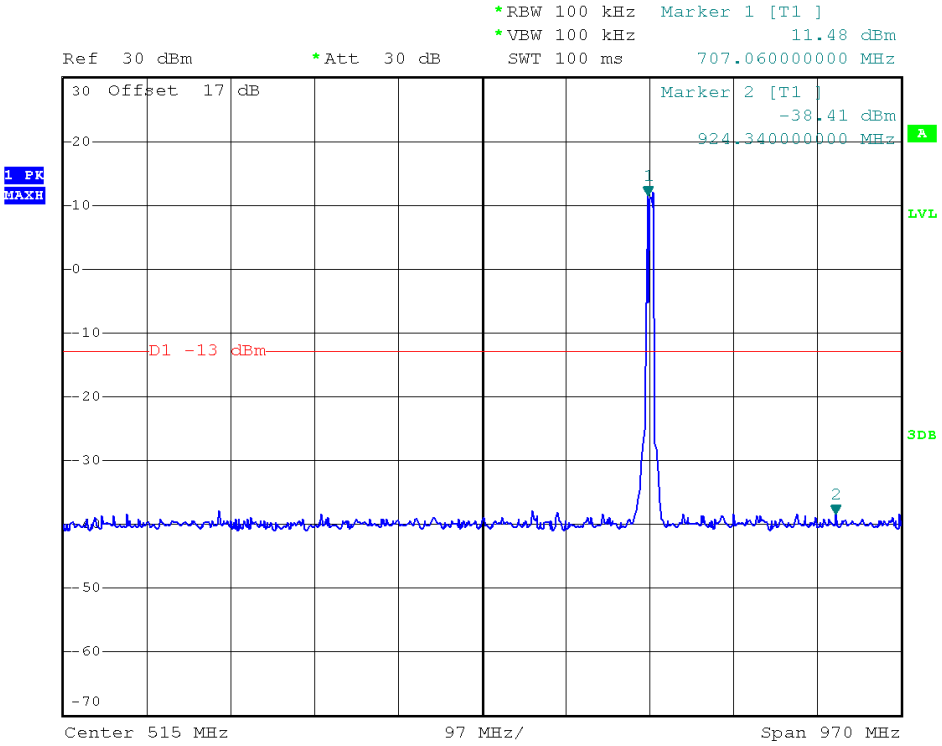


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

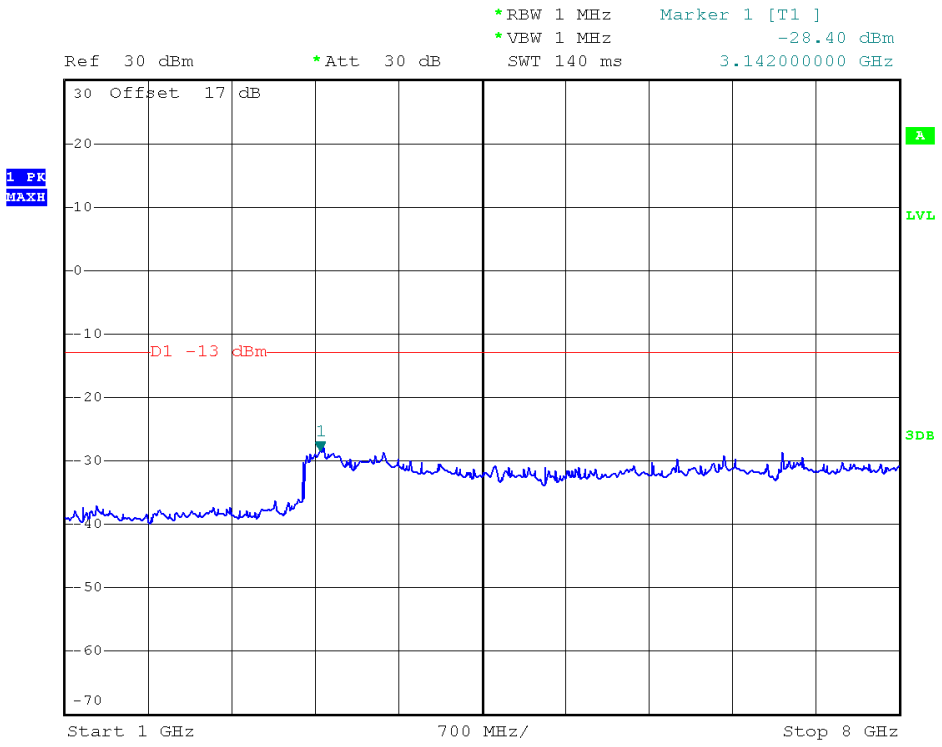


QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)

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

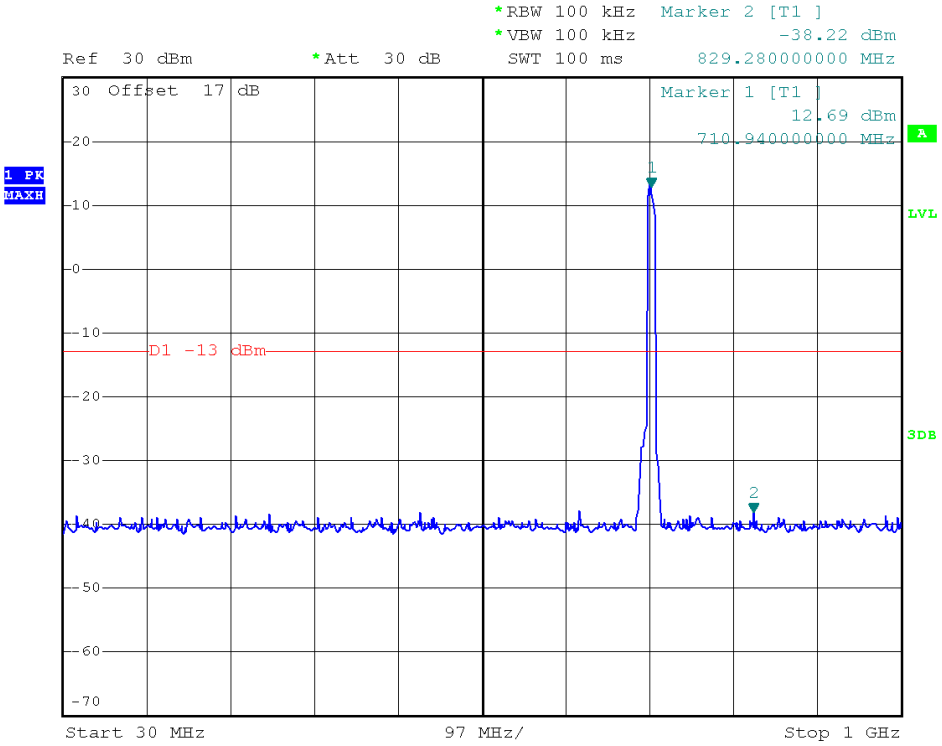


QPSK, (RB Size 1, RB Offset 0 30MHz to 1GHz)

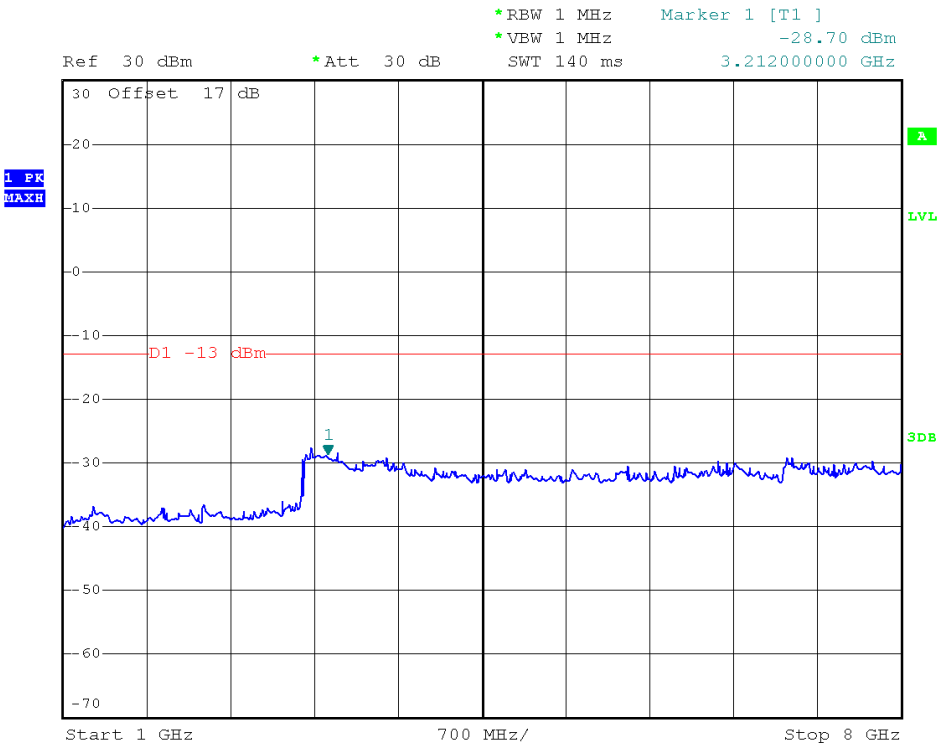


QPSK, (RB Size 1, RB Offset 0 1GHz to 8GHz)

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 Requirement

For operations in the 698 -746 MHz band, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(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.

2.6.2 Test Description

See section 2.1.2 of this report.

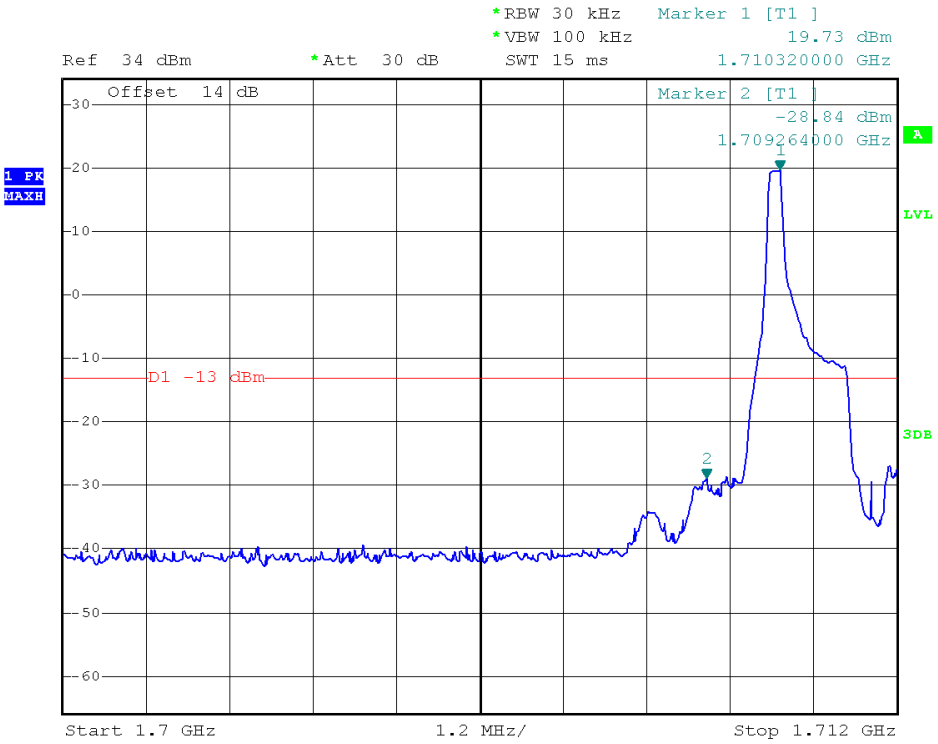
2.6.3 Test Procedures

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 >= 1% 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 + 10log(P)dB below the transmitter power P(Watts)
   = P(W)- [43 + 10log(P)] (dB)
   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
   = -13dBm.

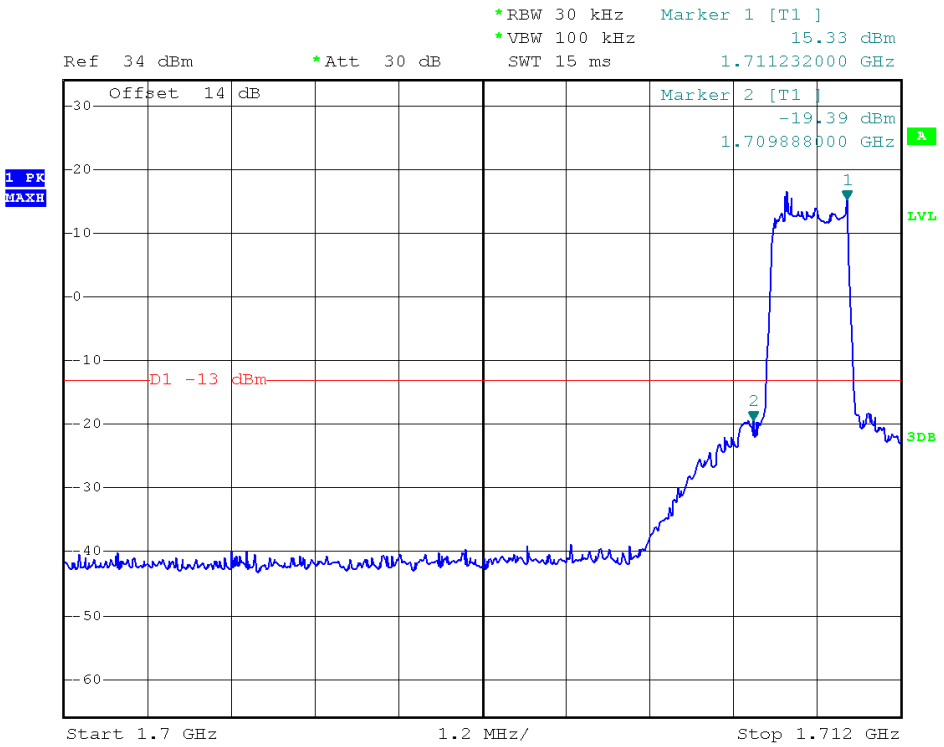
2.6.4 Test Result of Conducted Band Edge

The lowest and highest channels are tested to verify the band edge emissions.

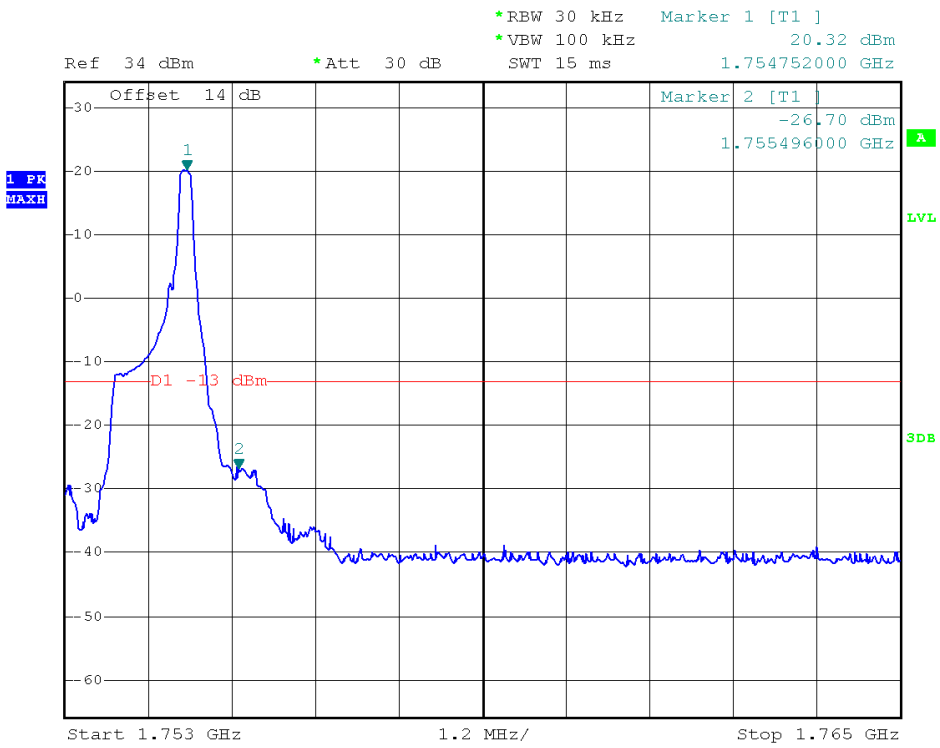
Band	LTE Band 4	Modulation	QPSK
Bandwidth	1.4MHz		



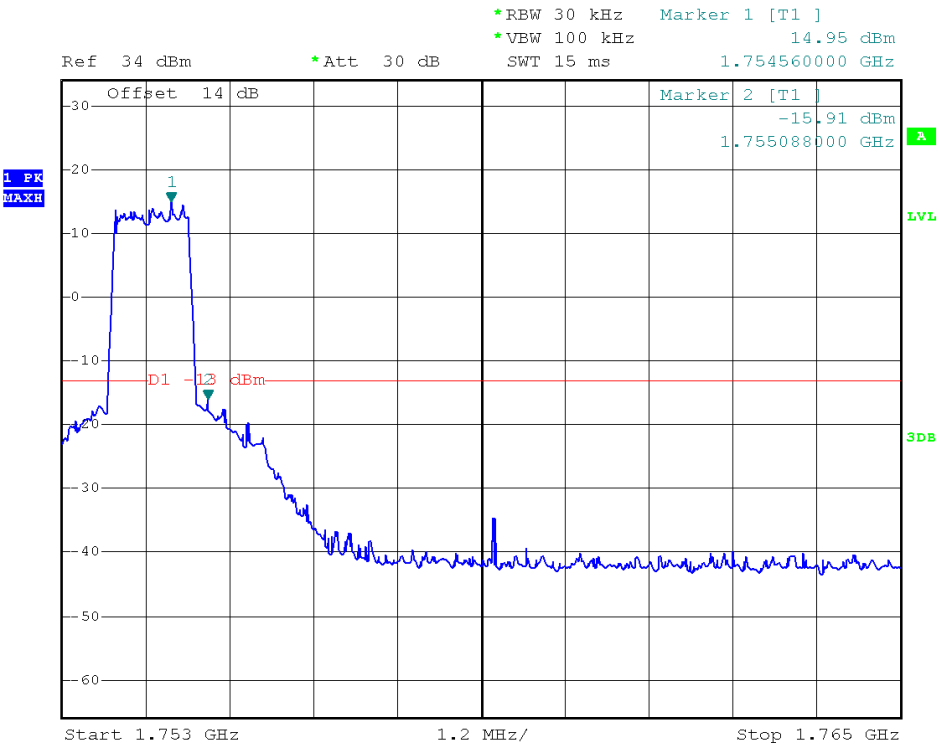
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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

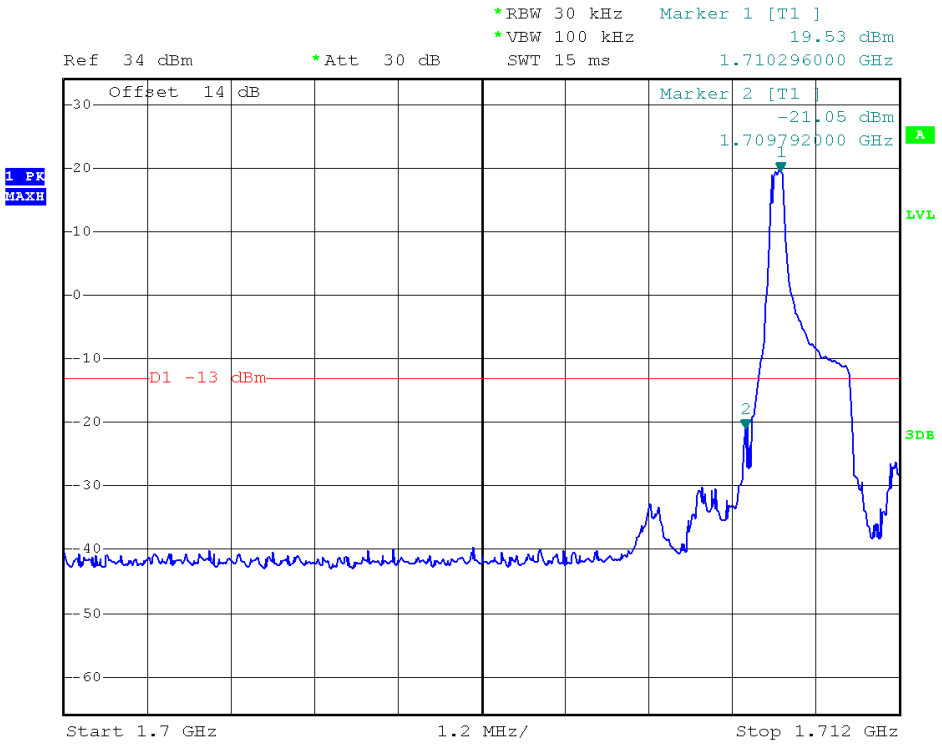


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 5

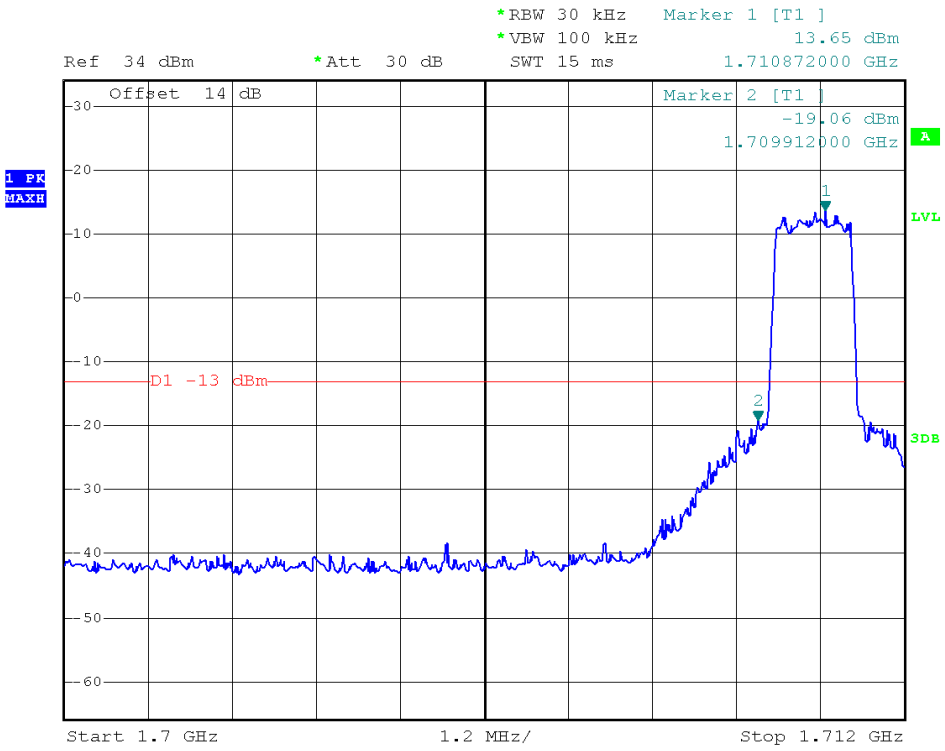


Higher Band Edge Plot for QPSK-RB Size 6, RB Offset 0

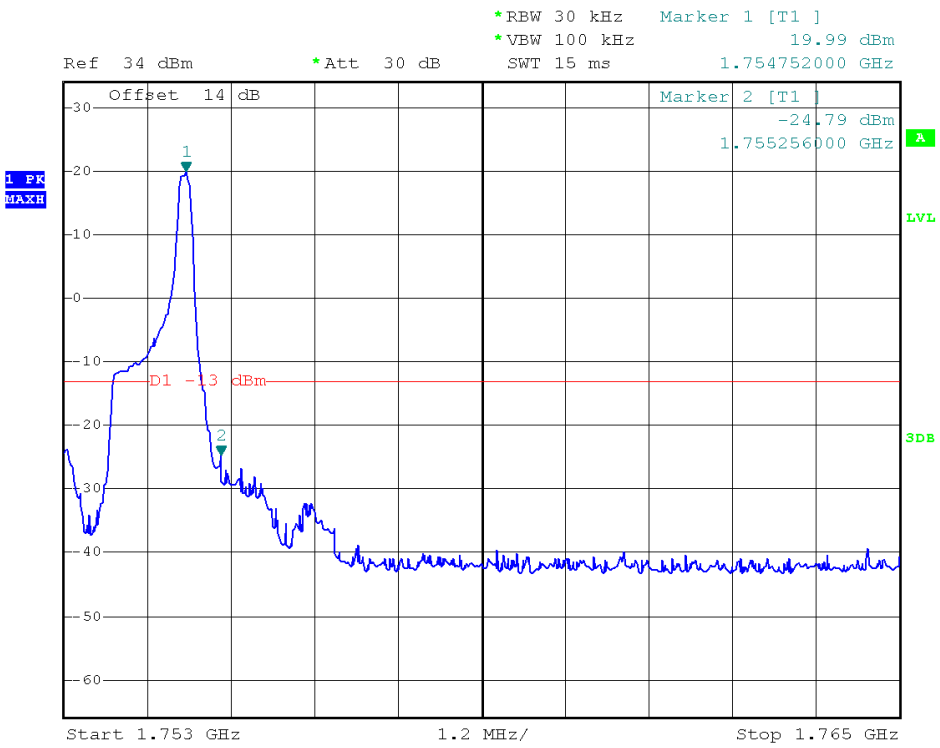
Band	LTE Band 4	Modulation	16QAM
Bandwidth	1.4MHz		



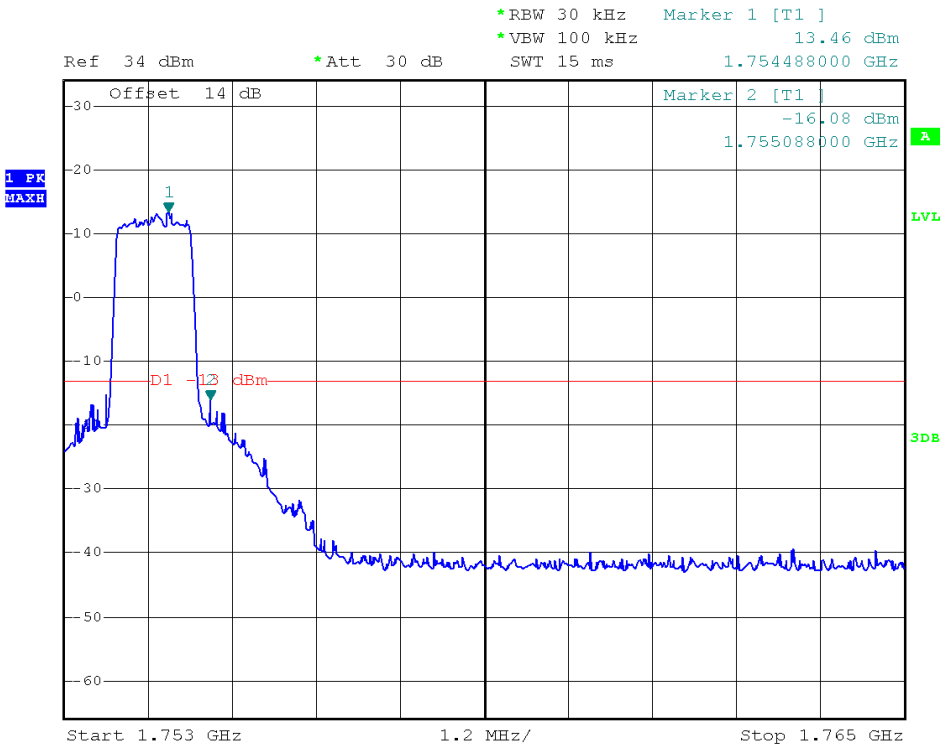
Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



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

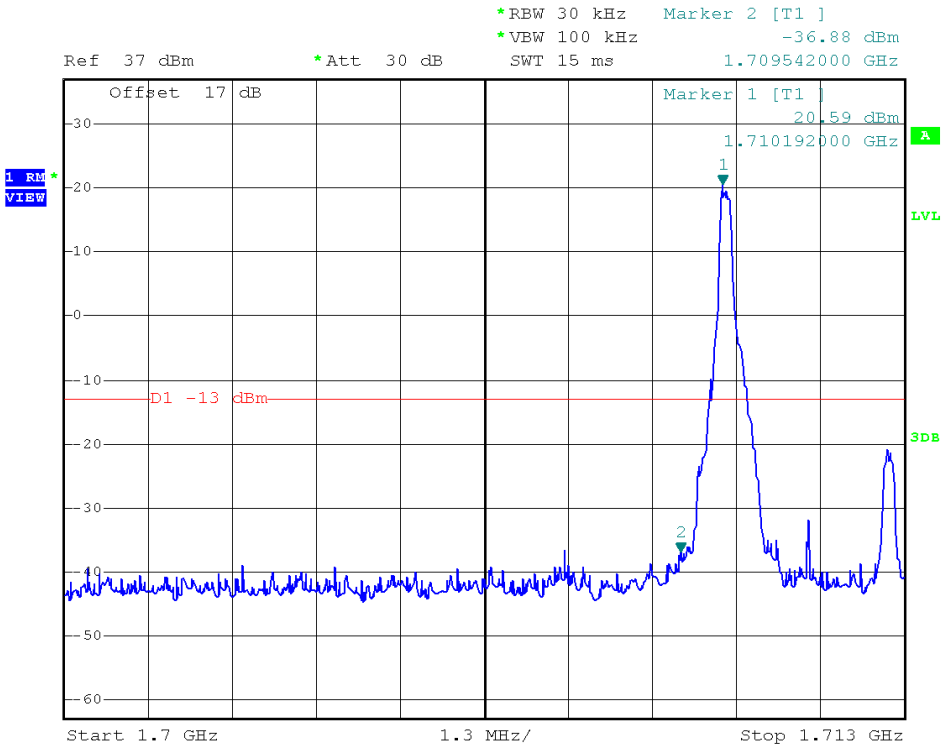


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 5

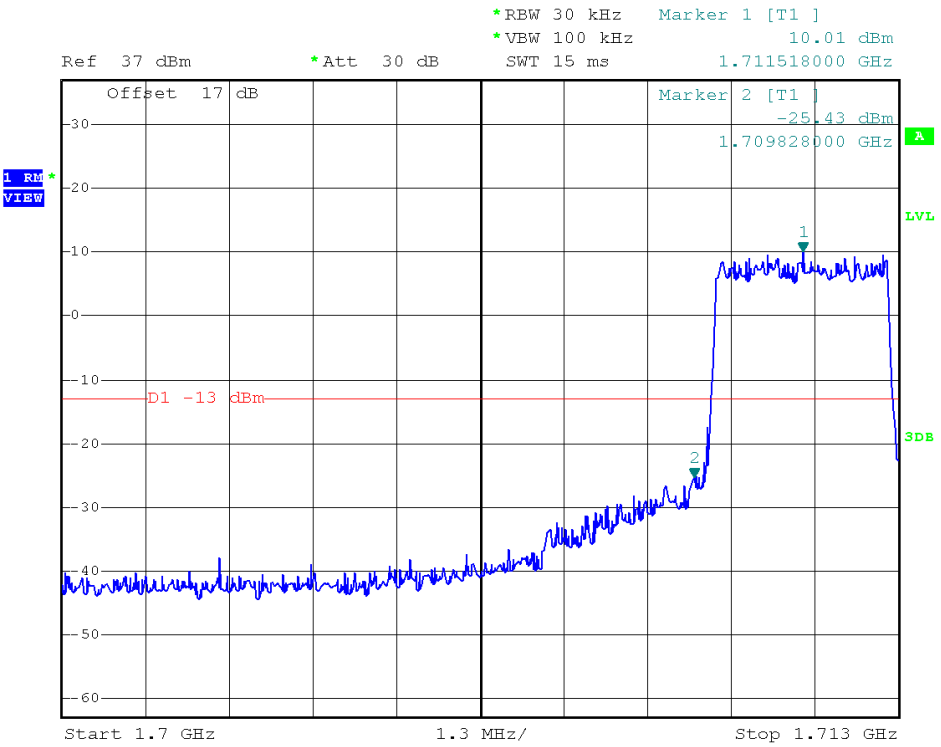


Higher Band Edge Plot for 16QAM -RB Size 6, RB Offset 0

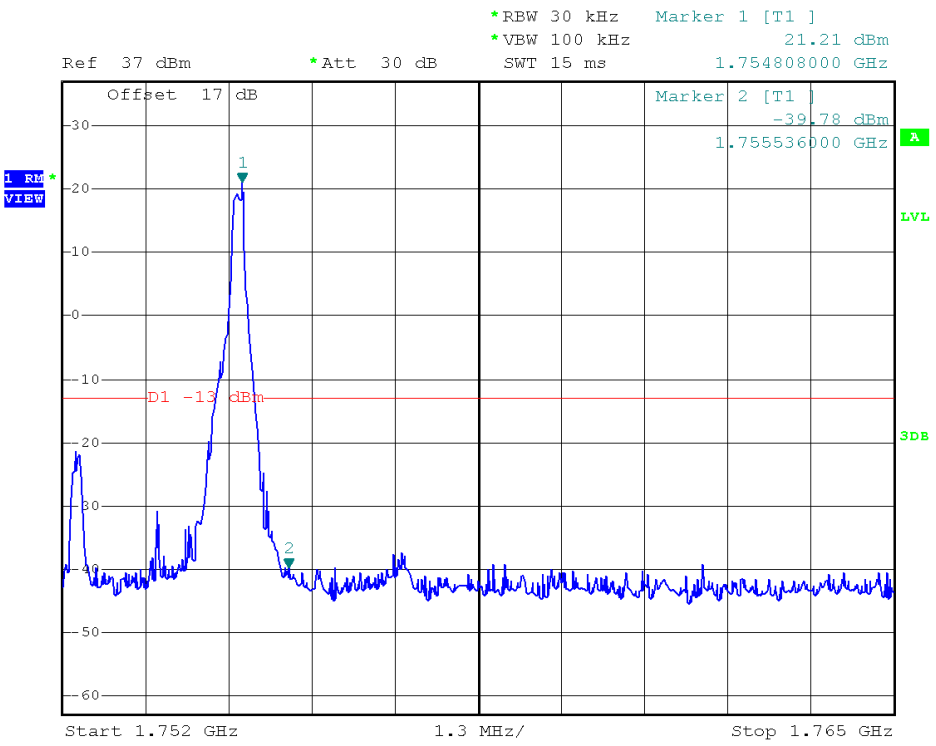
Band	LTE Band 4	Modulation	QPSK
Bandwidth	3MHz		



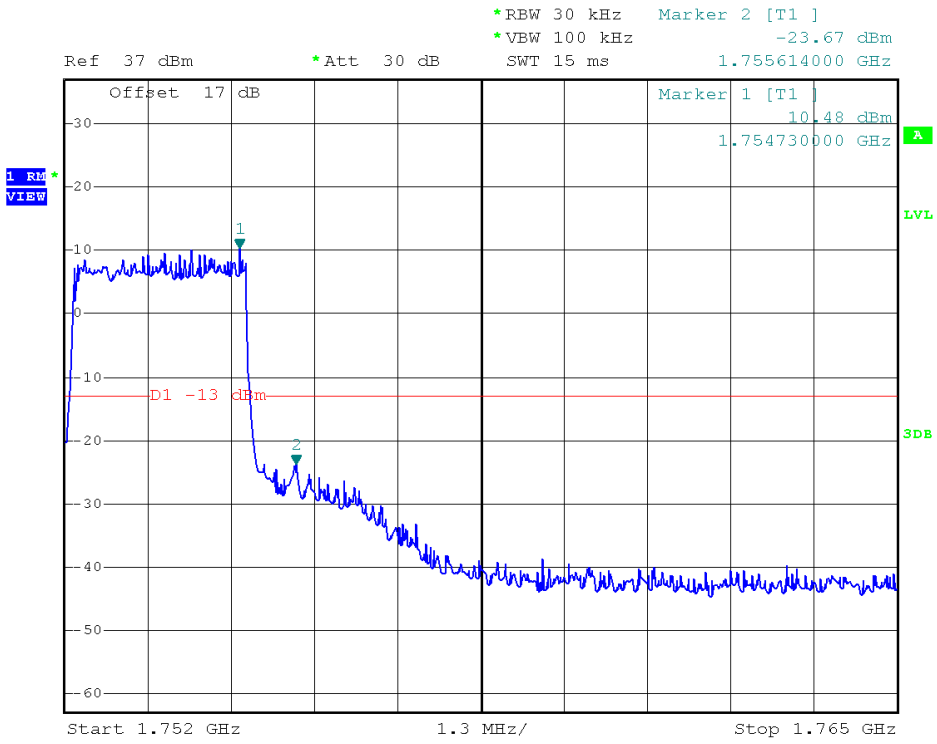
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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

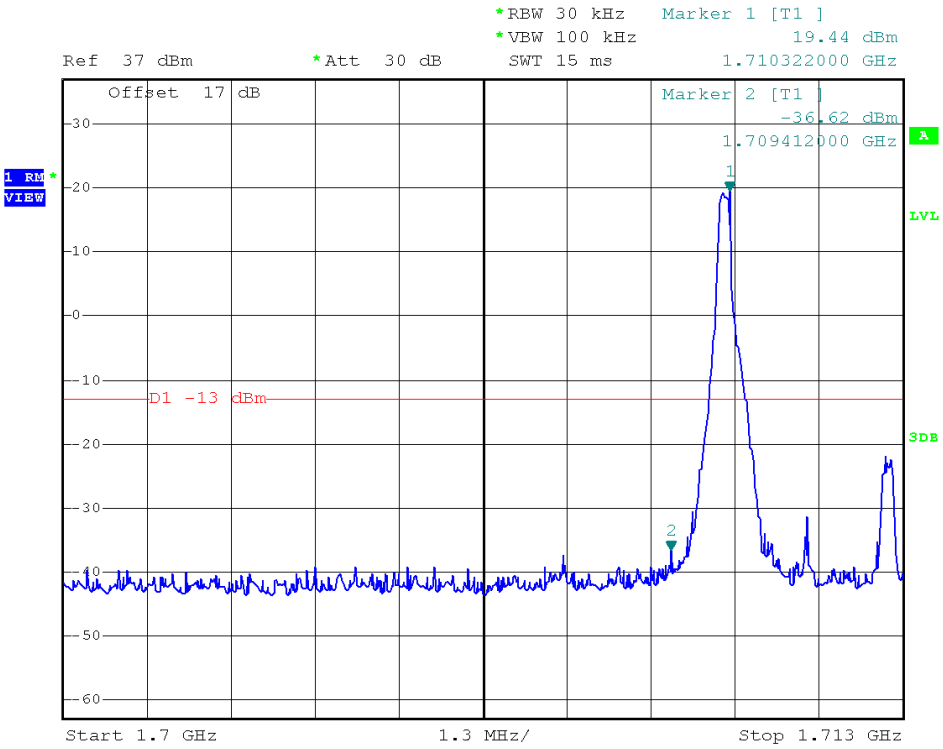


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 14

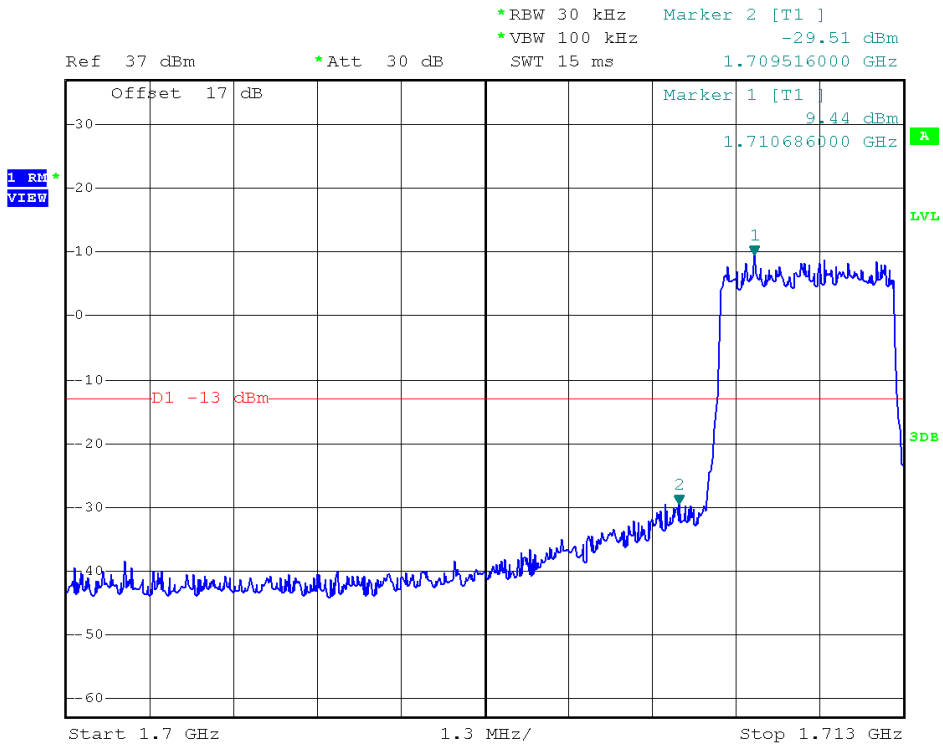


Higher Band Edge Plot for QPSK-RB Size 15, RB Offset 0

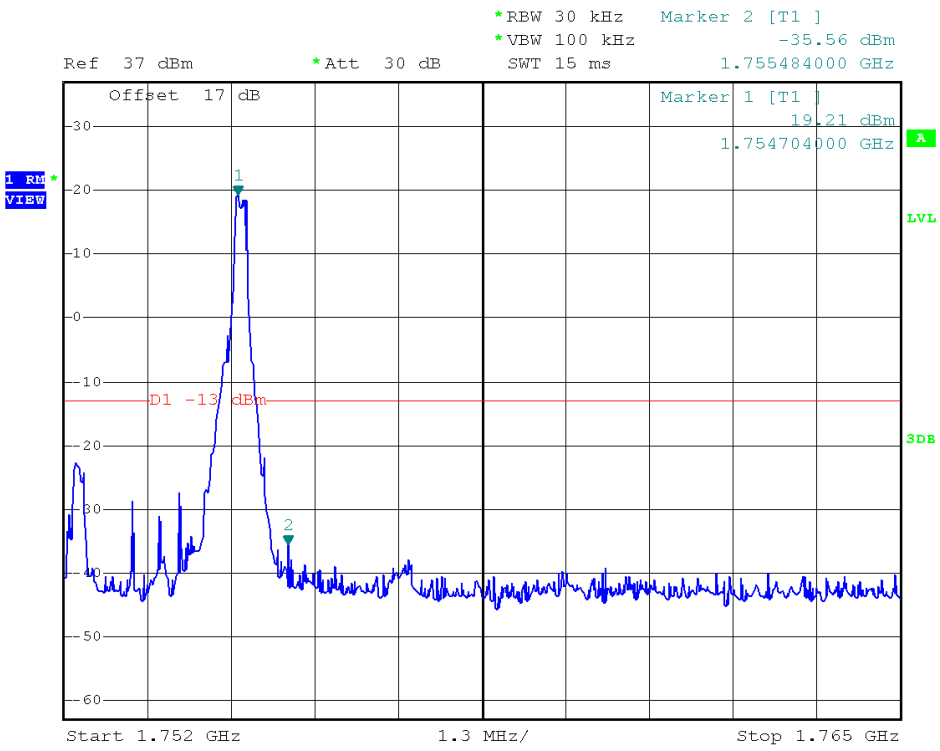
Band	LTE Band 4	Modulation	16QAM
Bandwidth	3MHz		



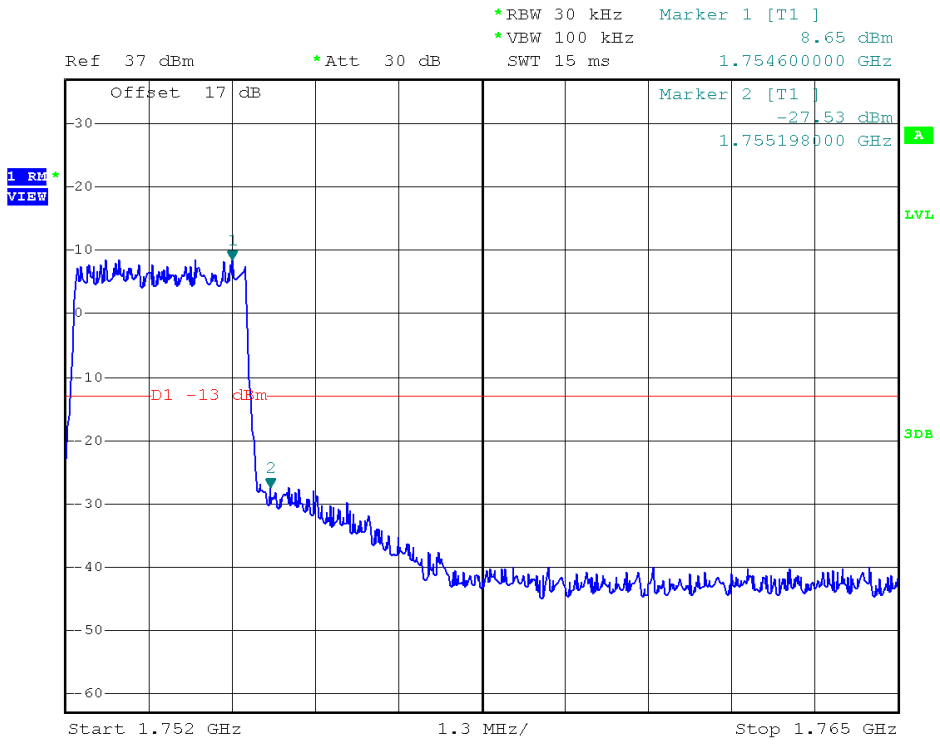
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

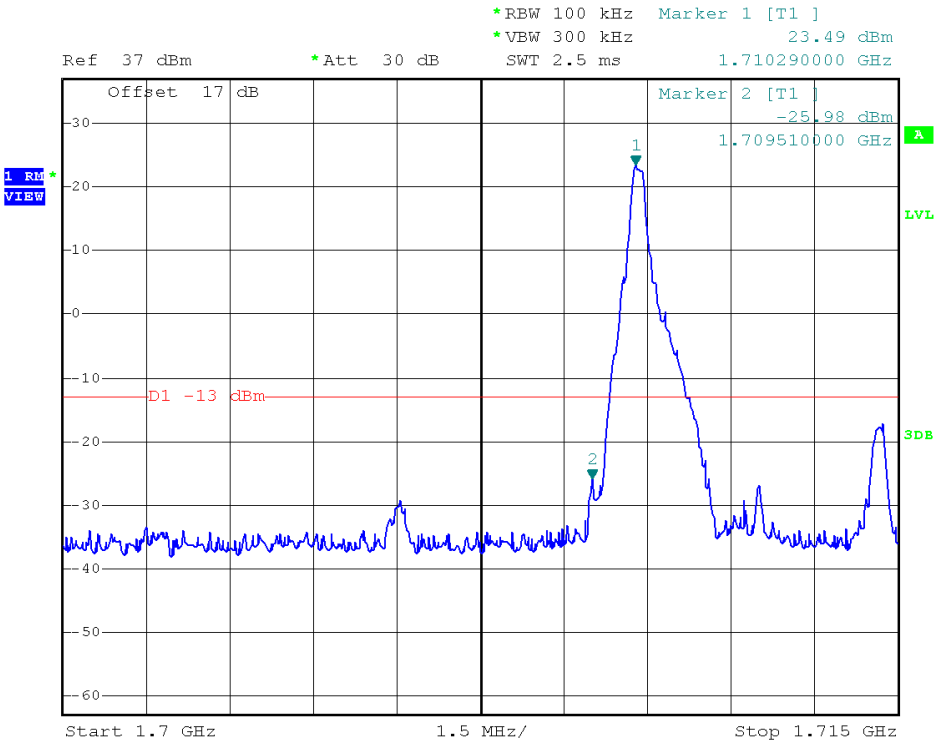


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 14

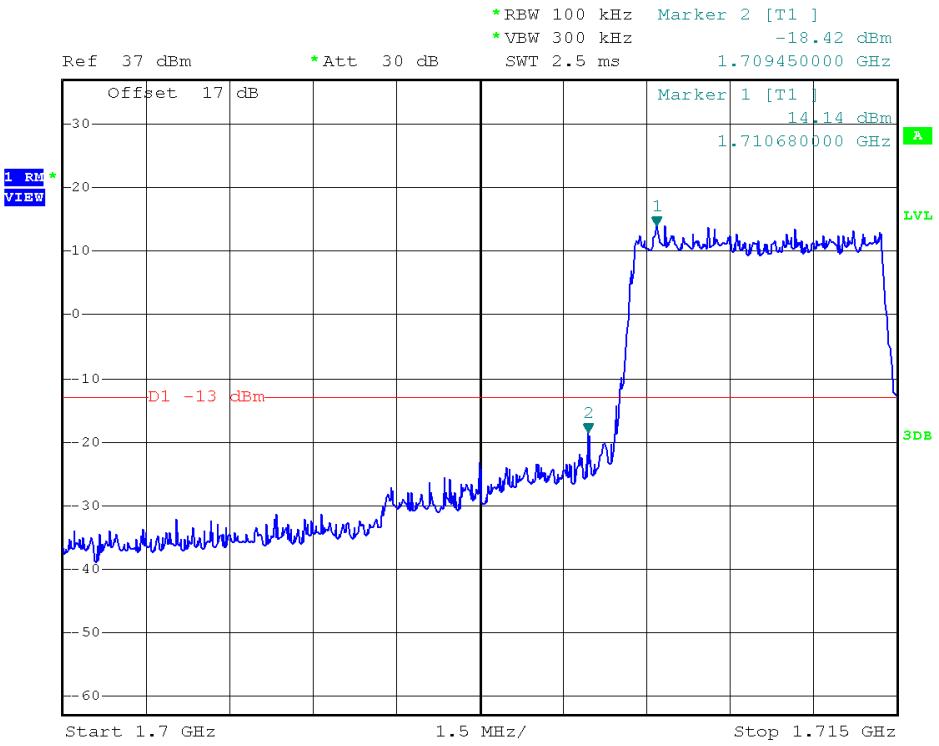


Higher Band Edge Plot for 16QAM -RB Size 15, RB Offset 0

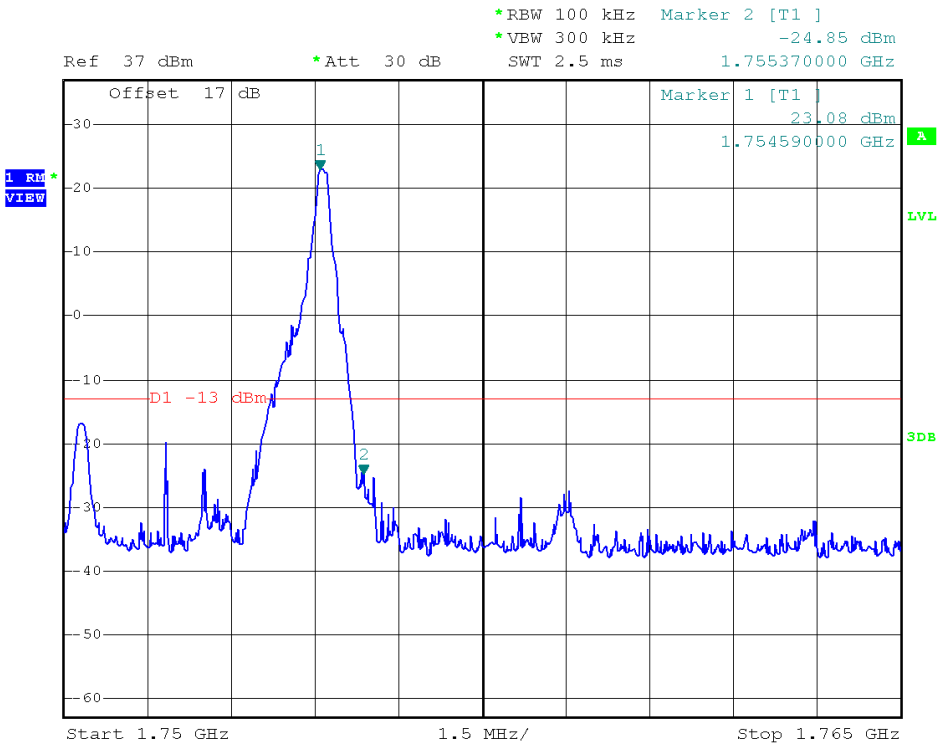
Band	LTE Band 4	Modulation	QPSK
Bandwidth	5MHz		



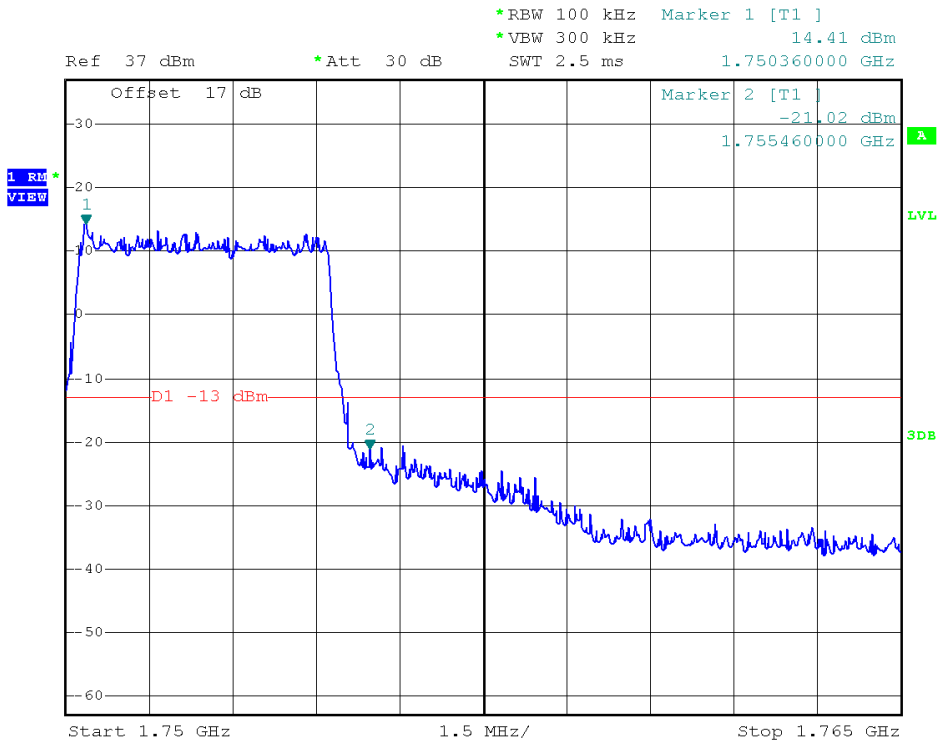
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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

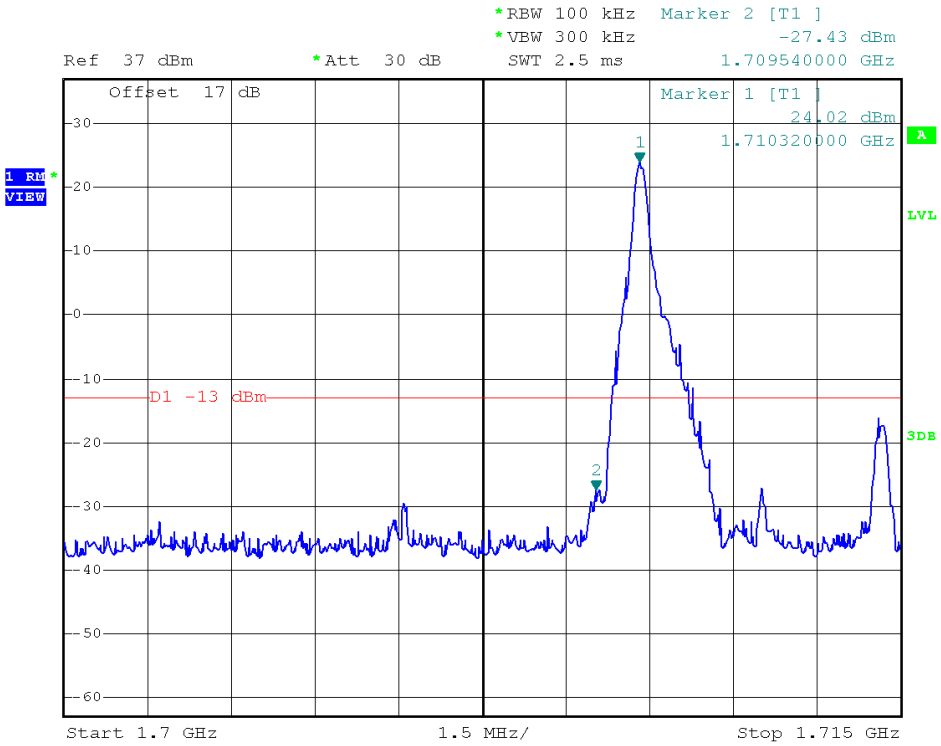


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 24

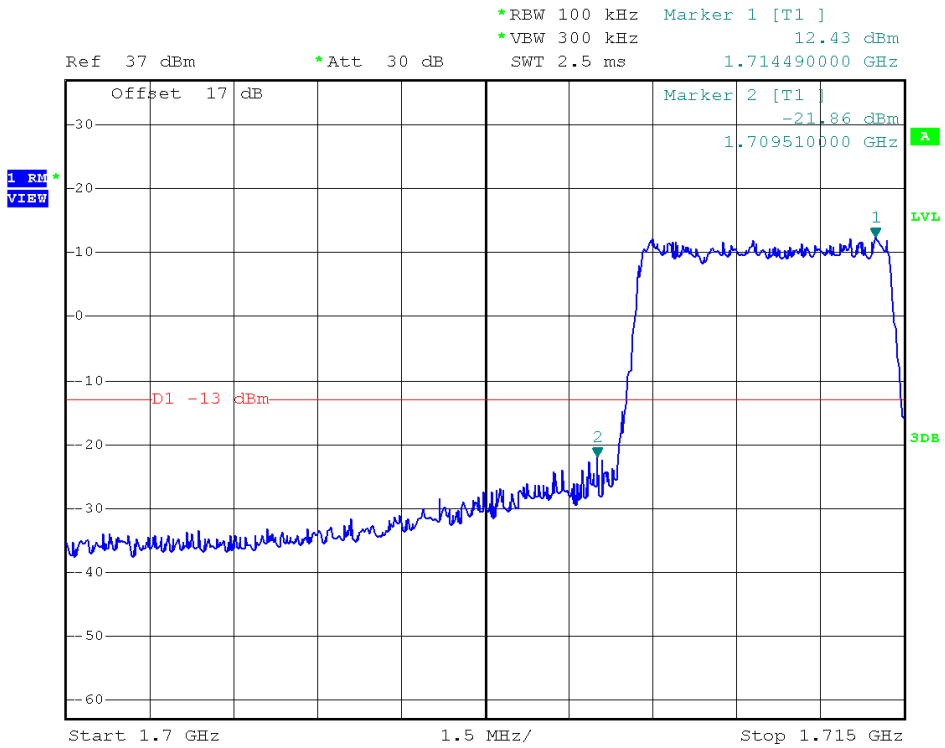


Higher Band Edge Plot for QPSK-RB Size 25, RB Offset 0

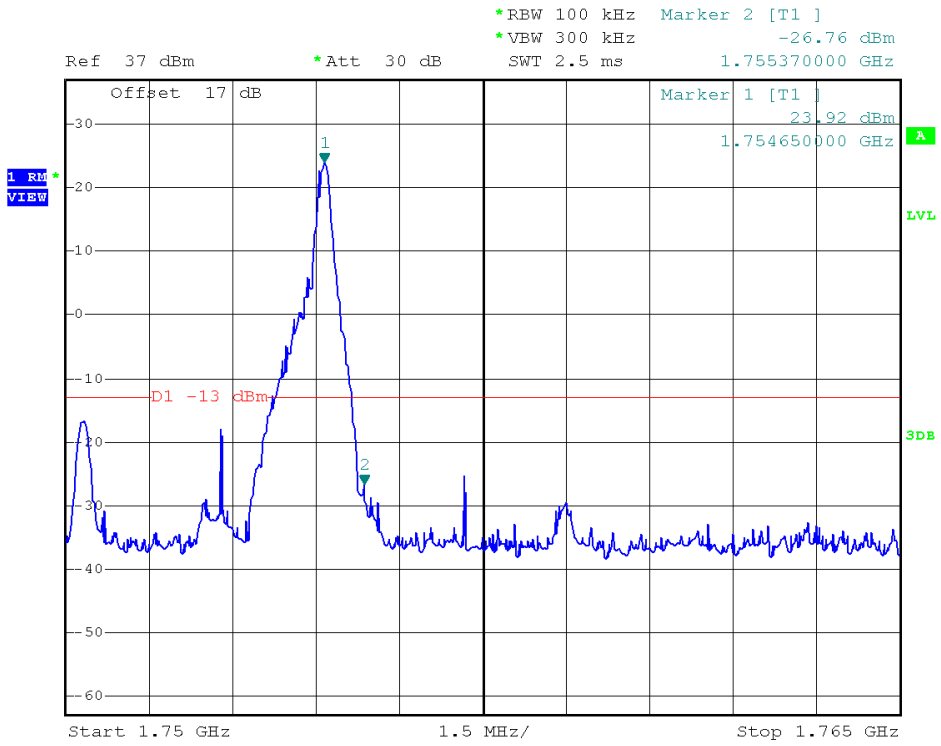
Band	LTE Band 4	Modulation	16QAM
Bandwidth	5MHz		



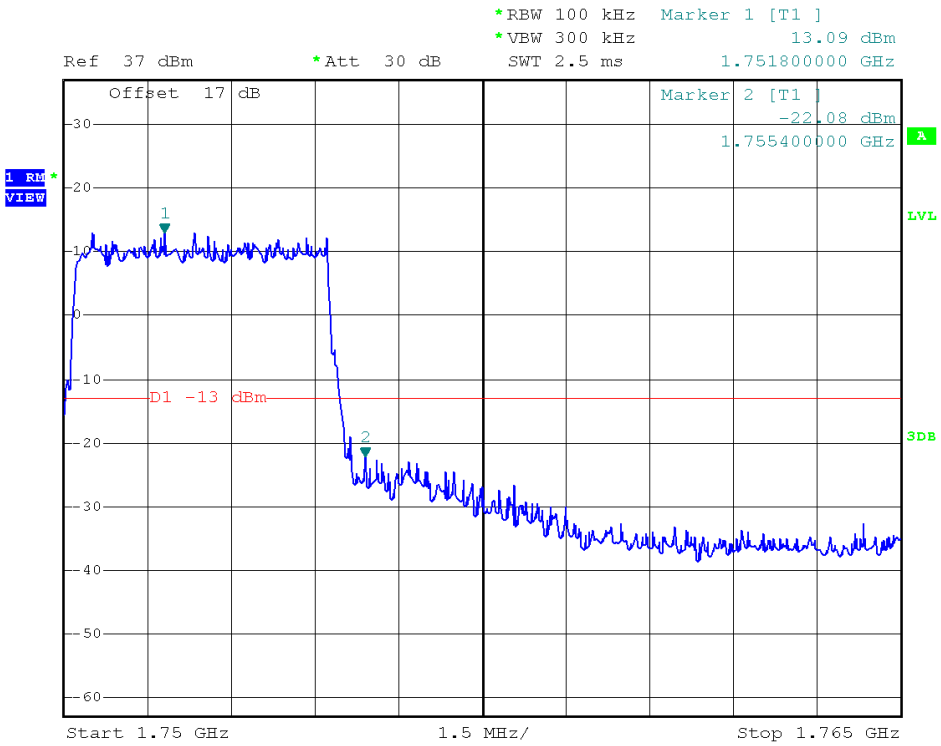
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

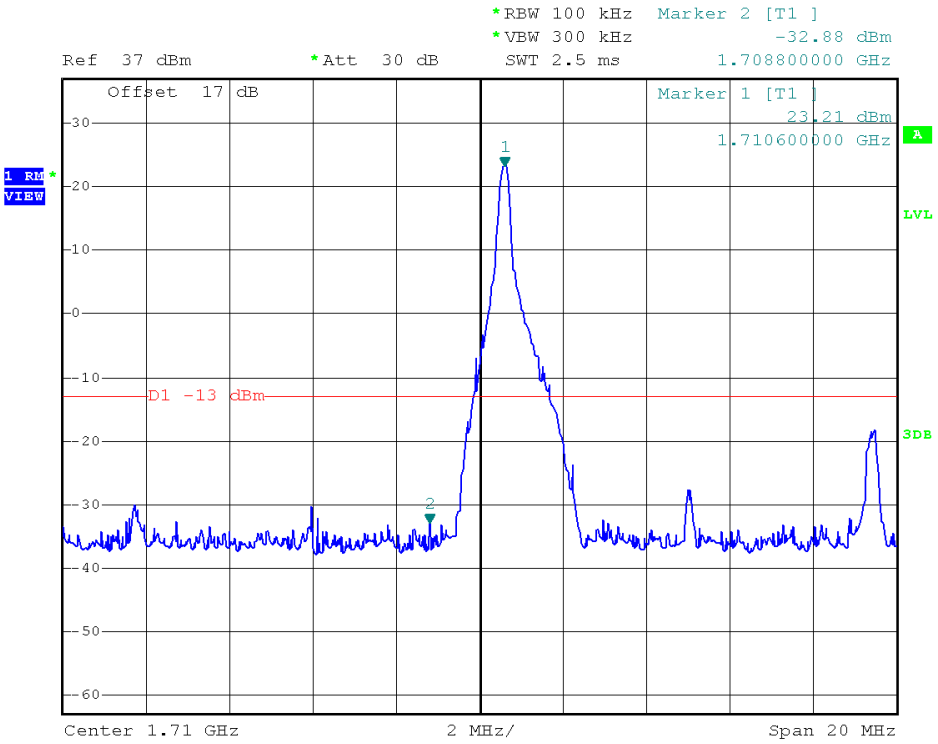


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 24

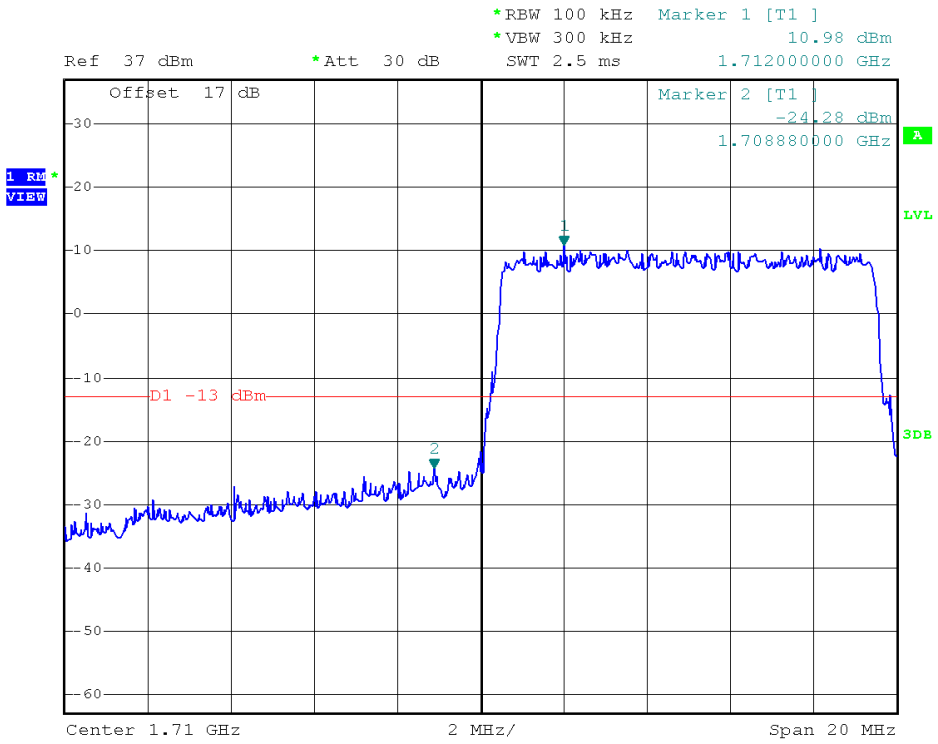


Higher Band Edge Plot for 16QAM -RB Size 25, RB Offset 0

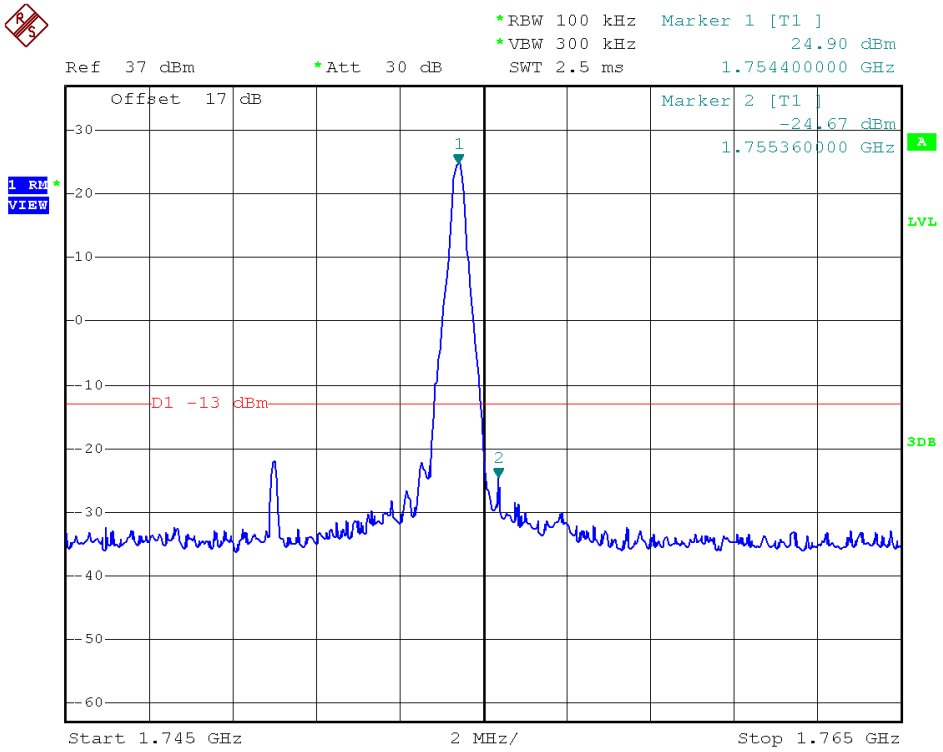
Band	LTE Band 4	Modulation	QPSK
Bandwidth	10MHz		



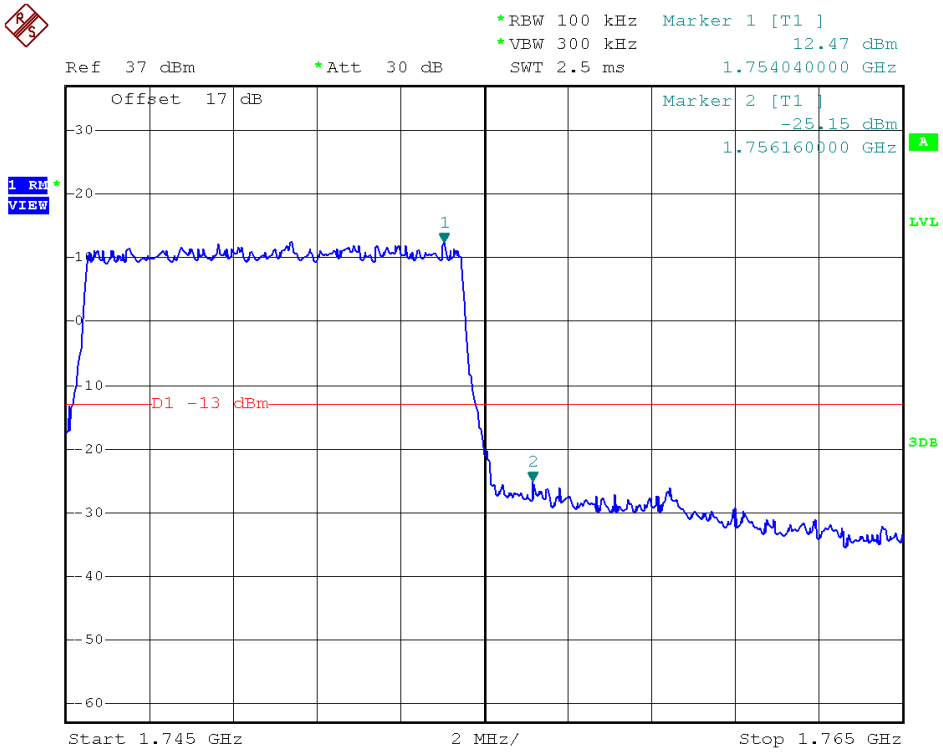
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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

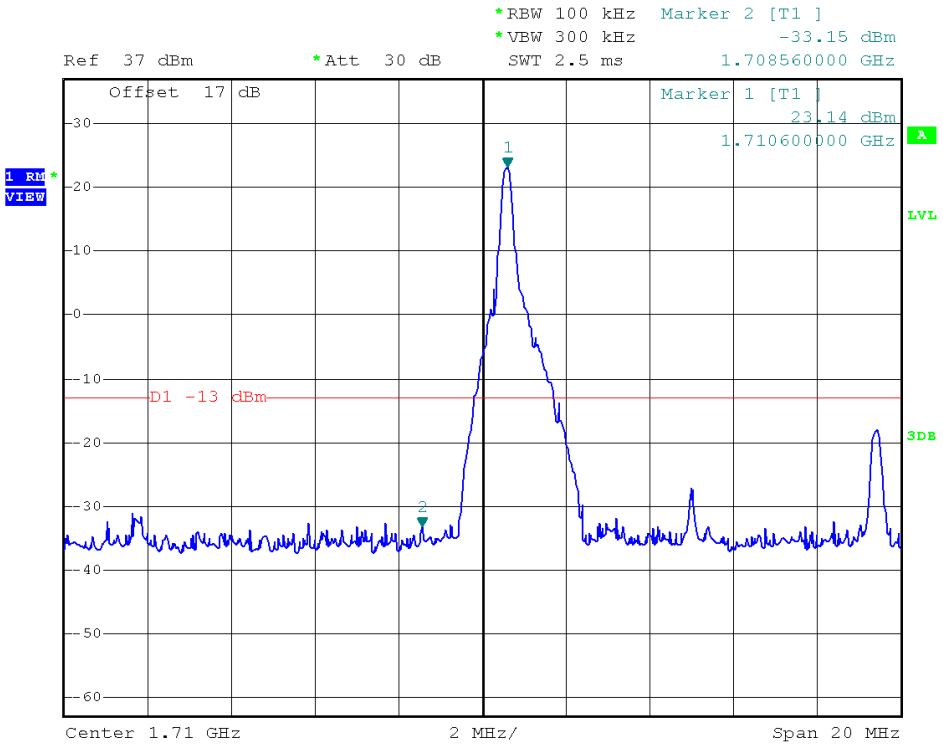


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 49

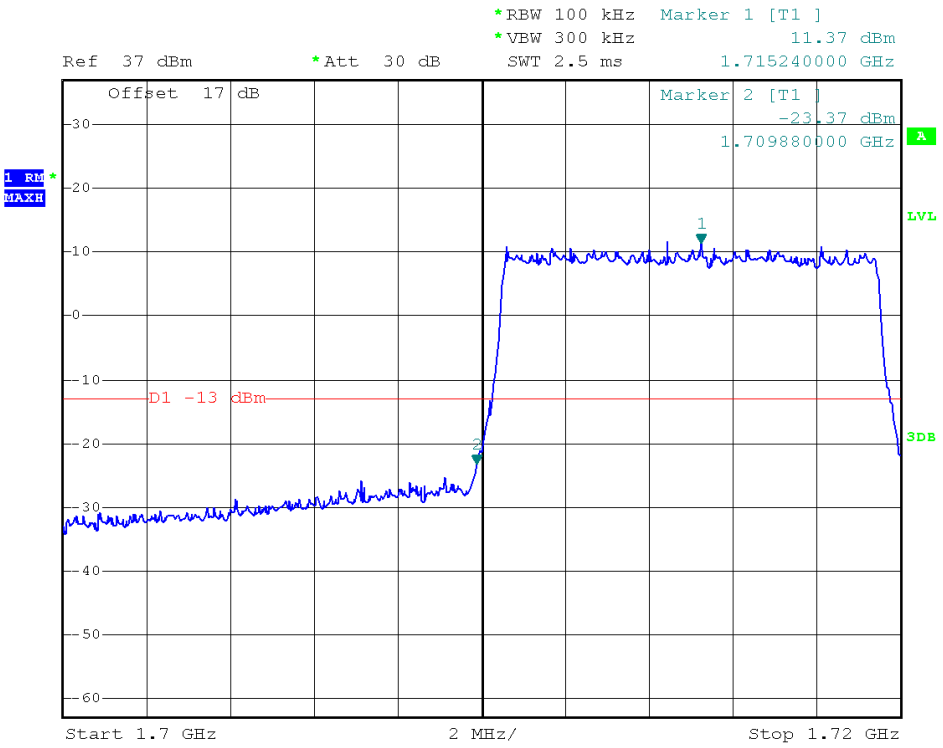


Higher Band Edge Plot for QPSK-RB Size 50, RB Offset 0

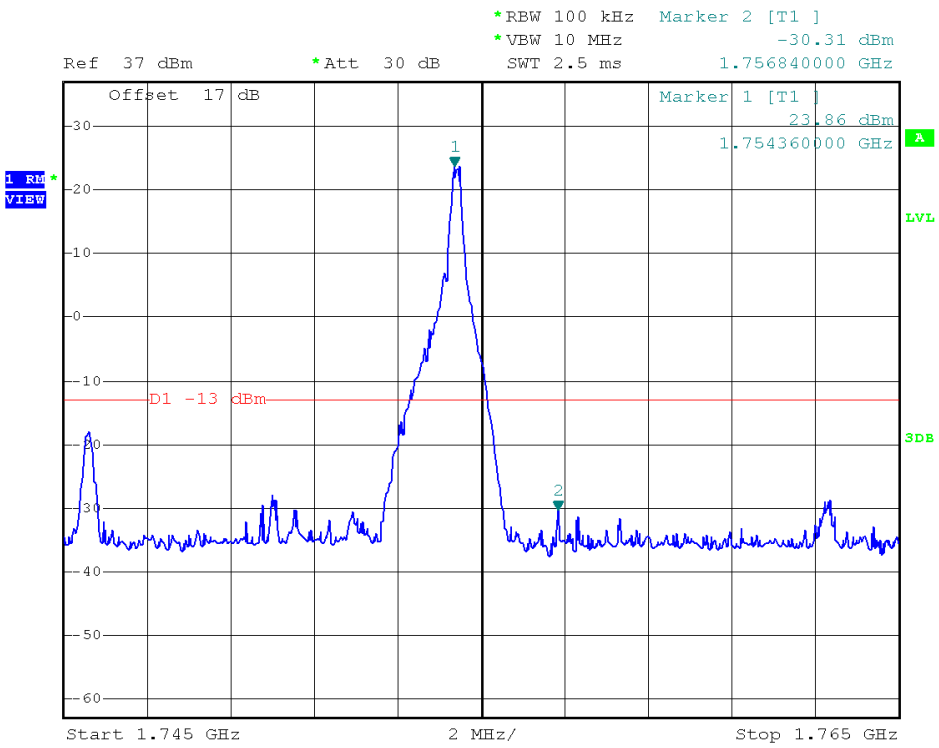
Band	LTE Band 4	Modulation	16QAM
Bandwidth	10MHz		



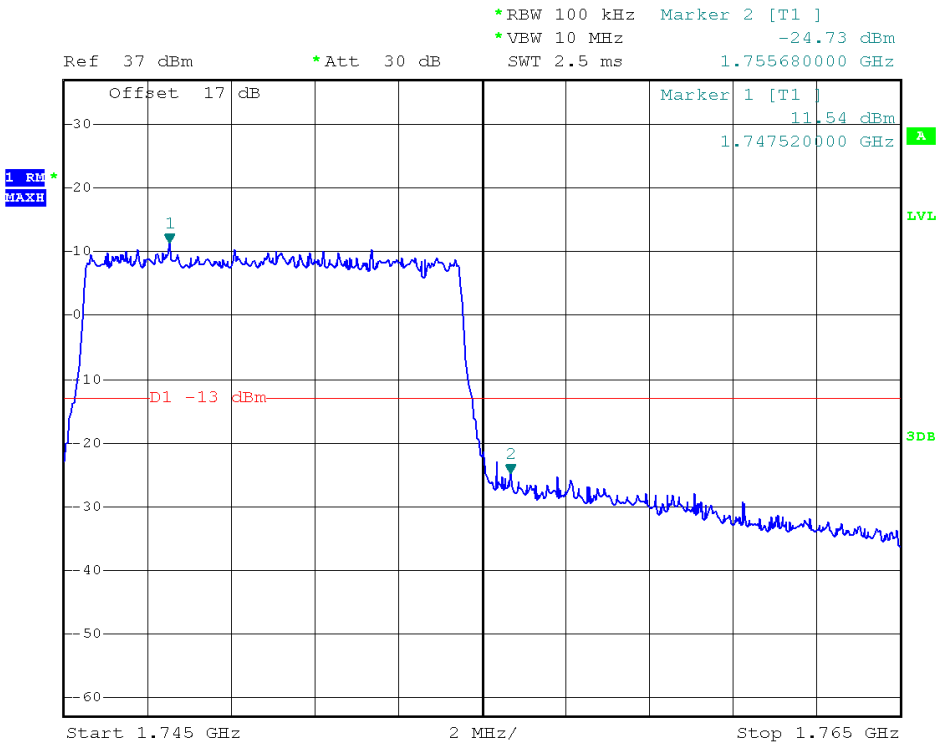
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

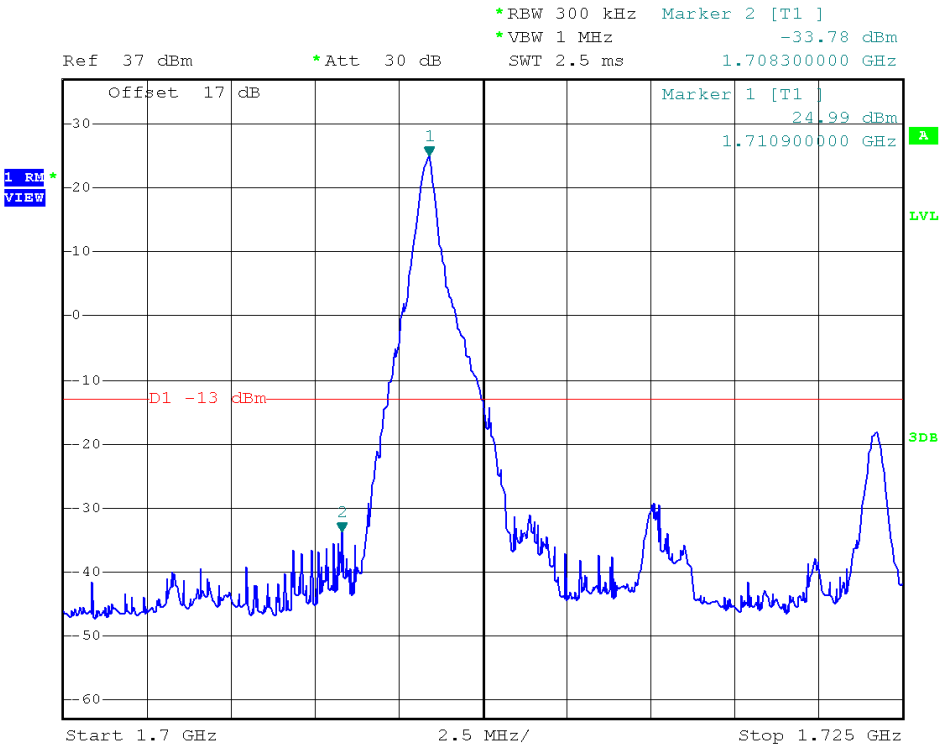


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 49

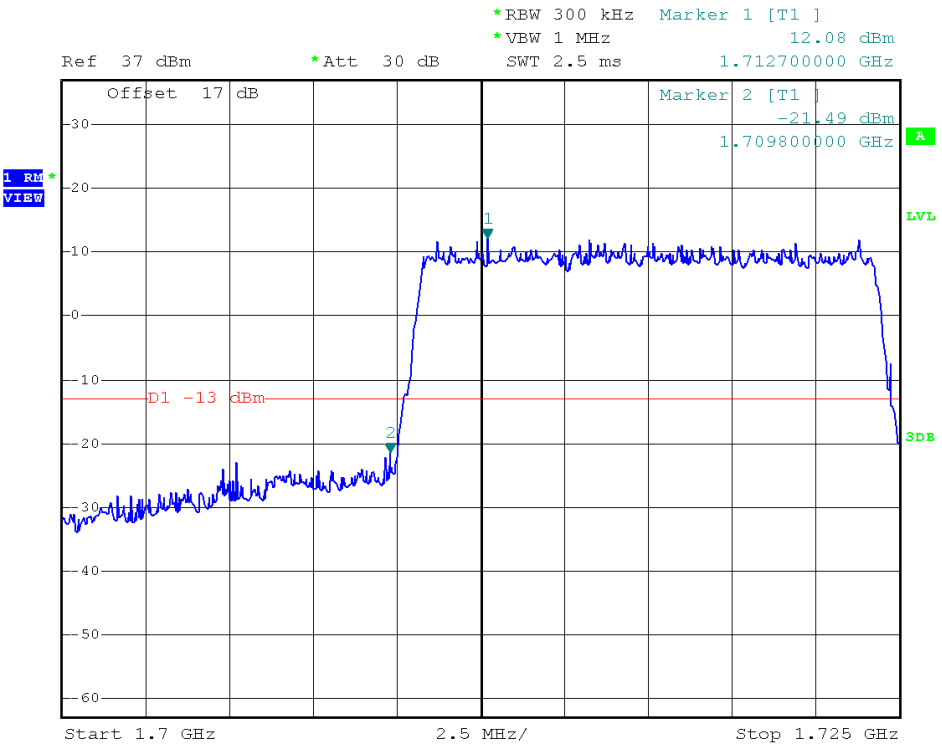


Higher Band Edge Plot for 16QAM -RB Size 50, RB Offset 0

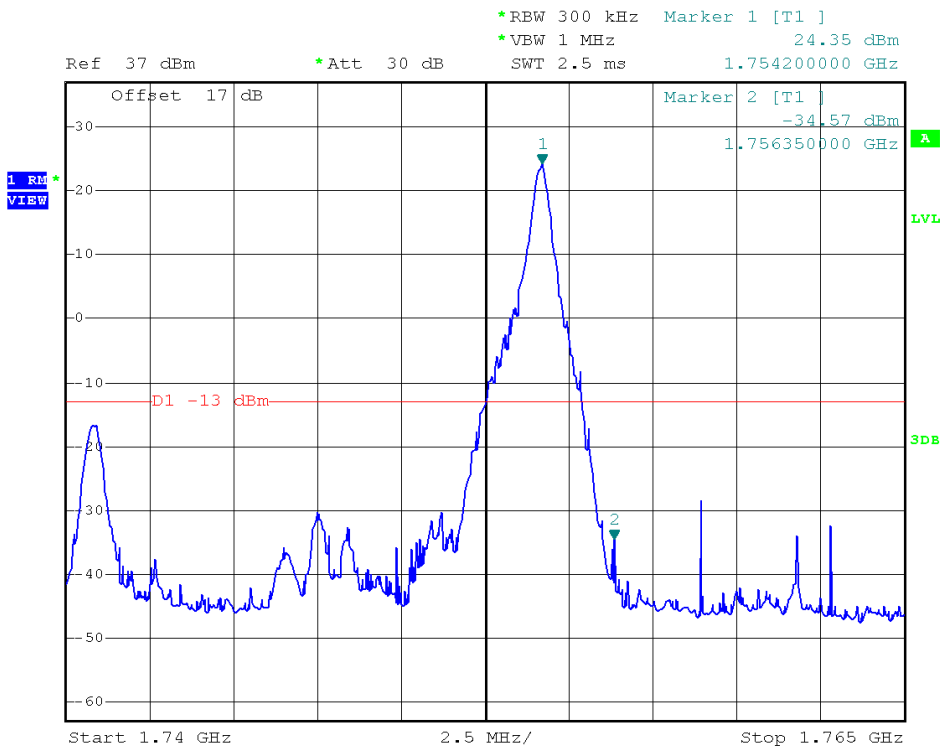
Band	LTE Band 4	Modulation	QPSK
Bandwidth	15MHz		



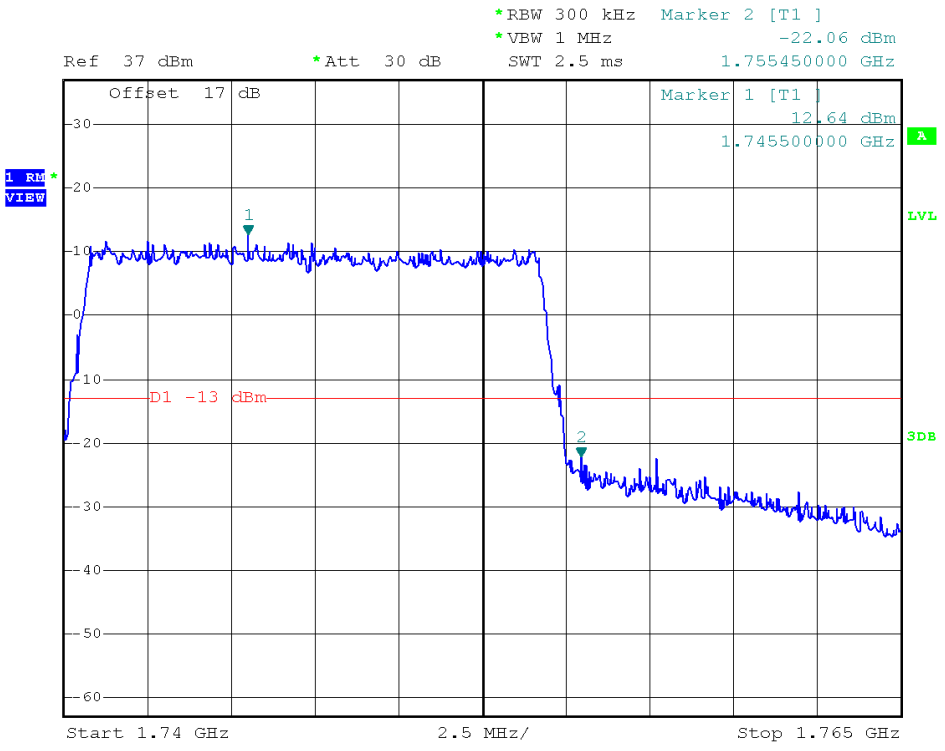
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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

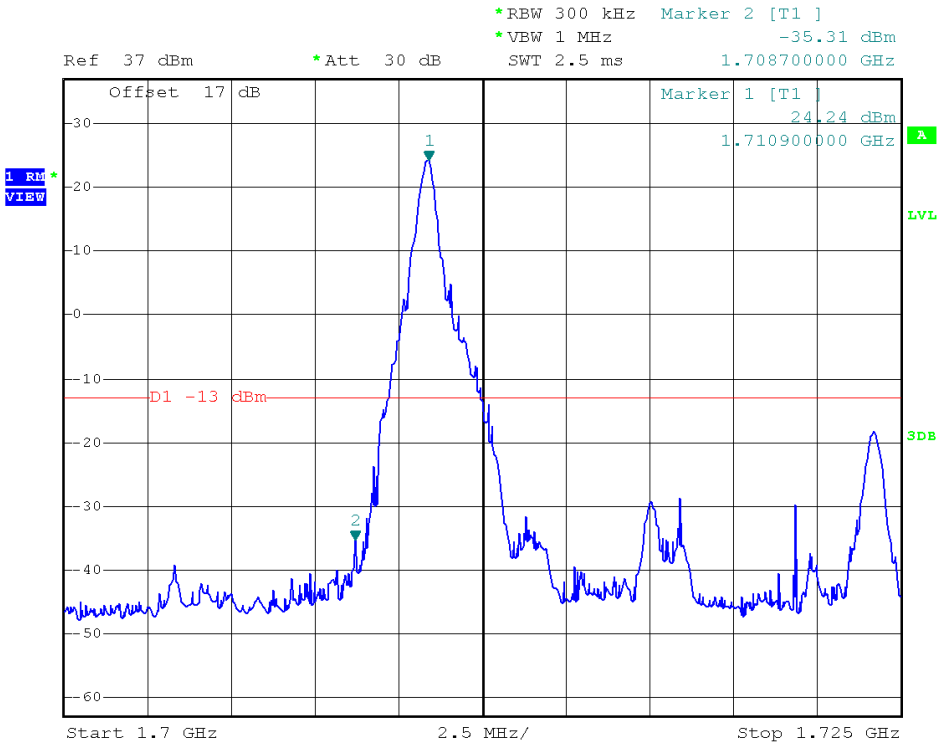


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 74

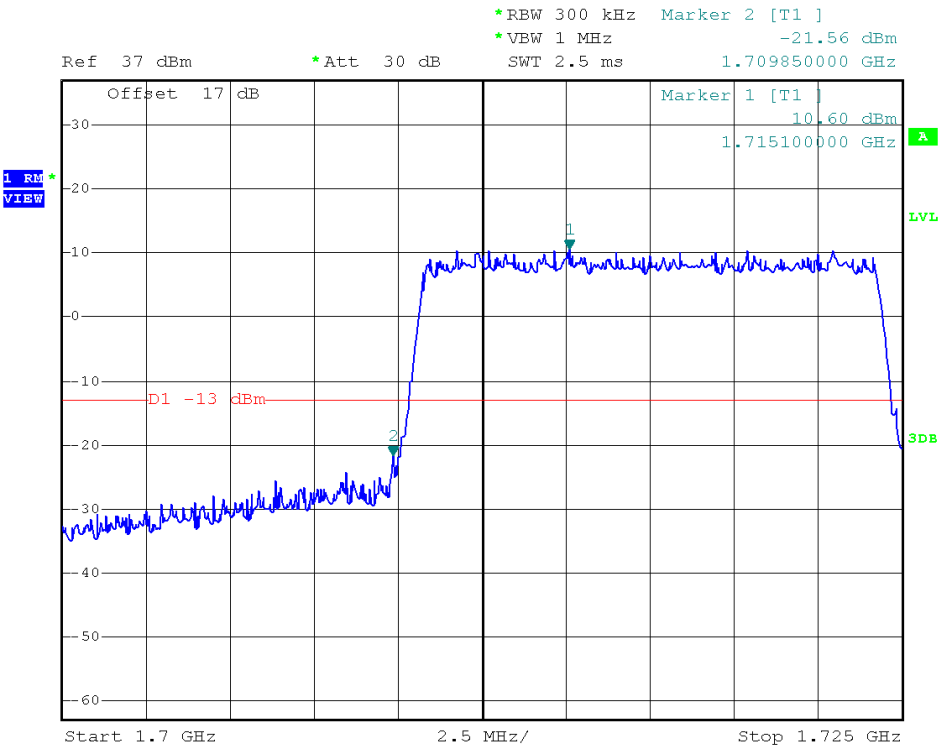


Higher Band Edge Plot for QPSK-RB Size 75, RB Offset 0

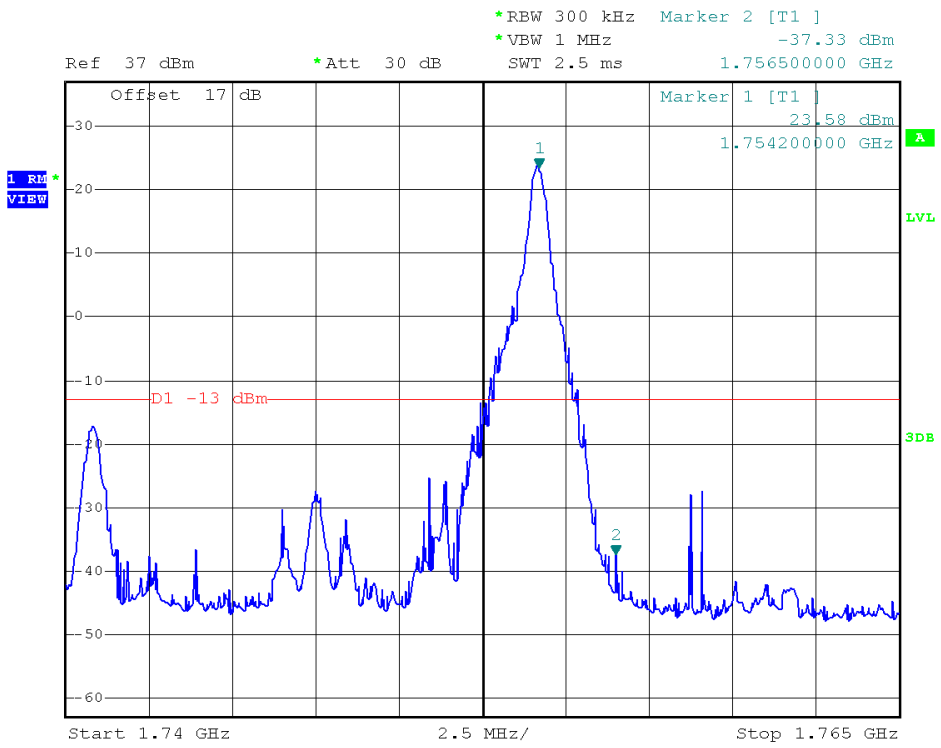
Band	LTE Band 4	Modulation	16QAM
Bandwidth	15MHz		



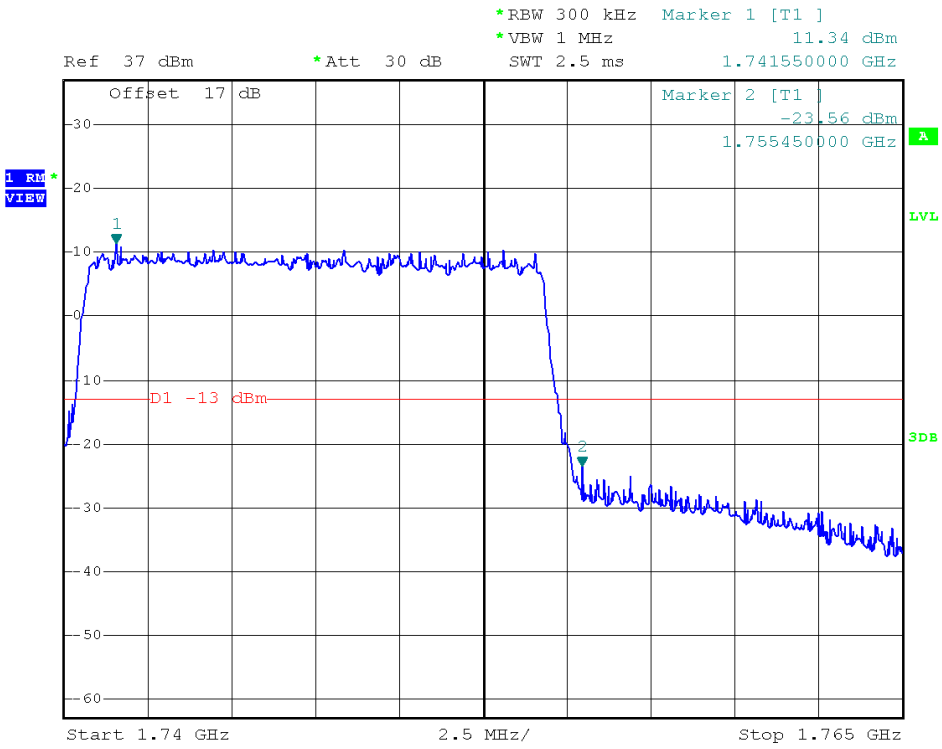
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

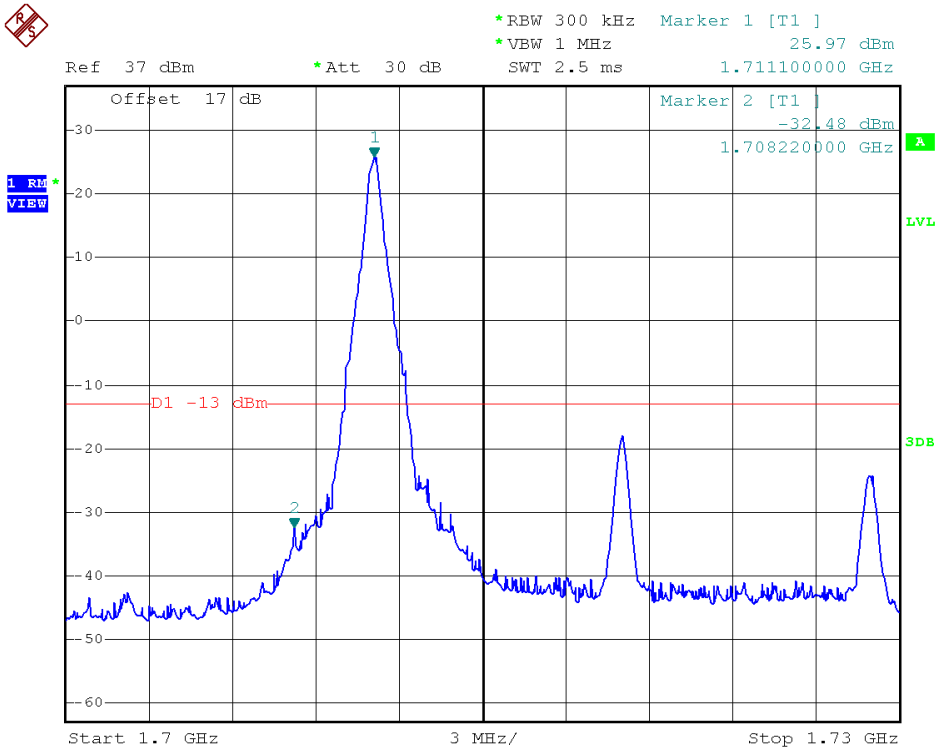


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 74

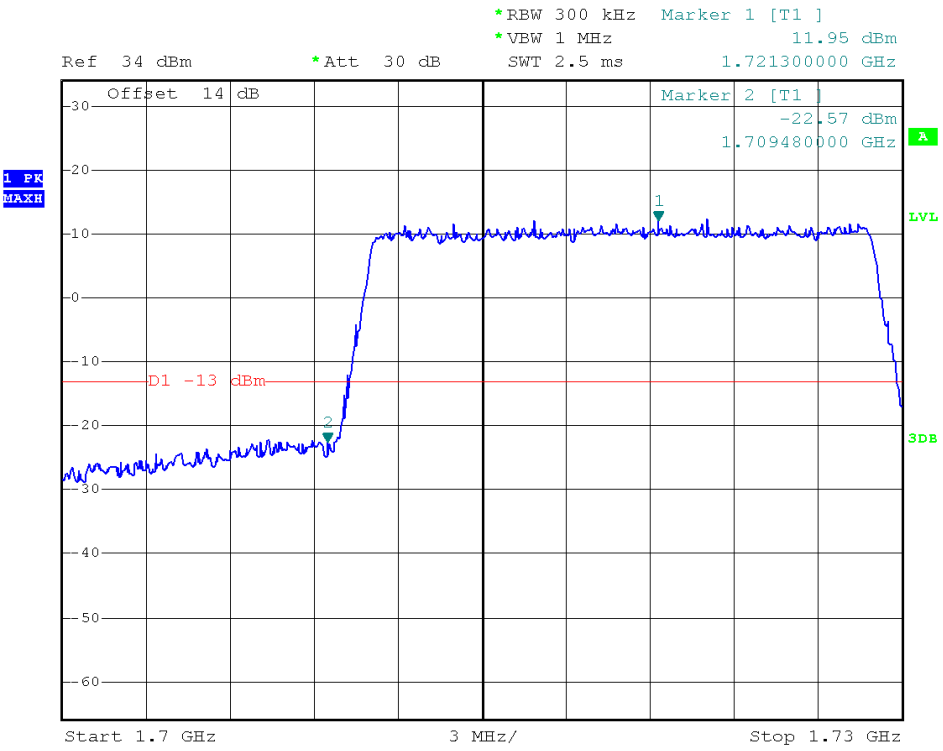


Higher Band Edge Plot for 16QAM -RB Size 75, RB Offset 0

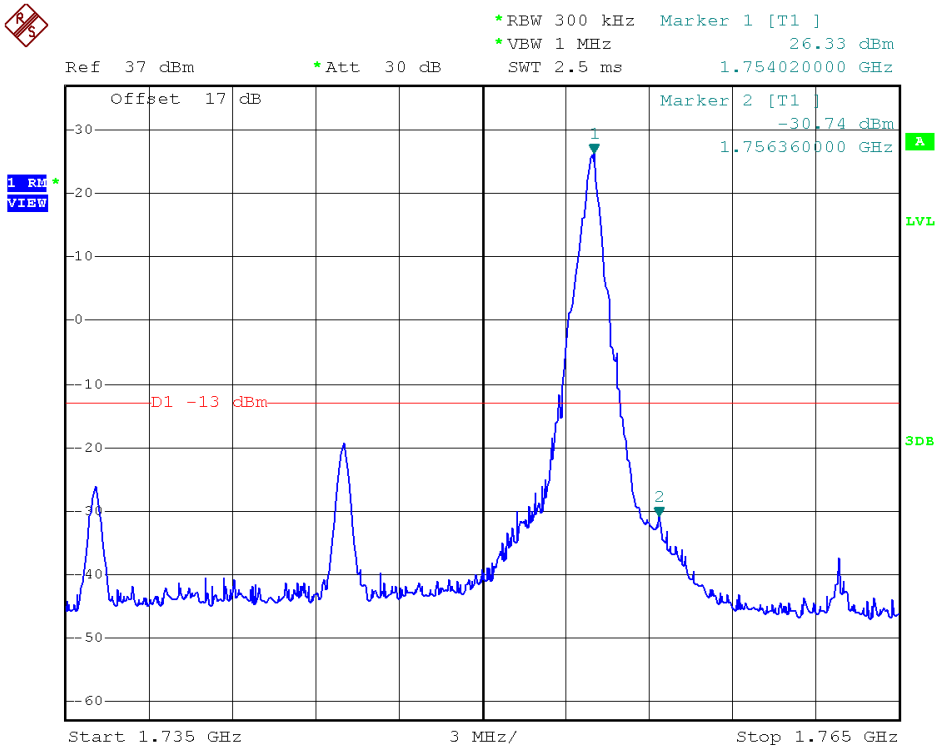
Band	LTE Band 4	Modulation	QPSK
Bandwidth	20MHz		



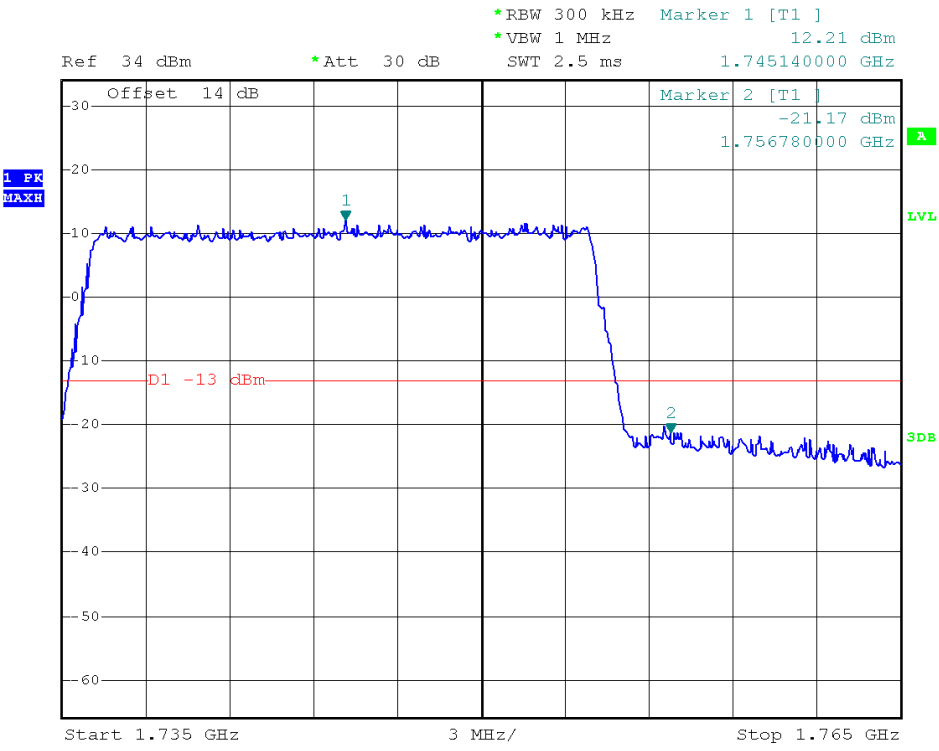
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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

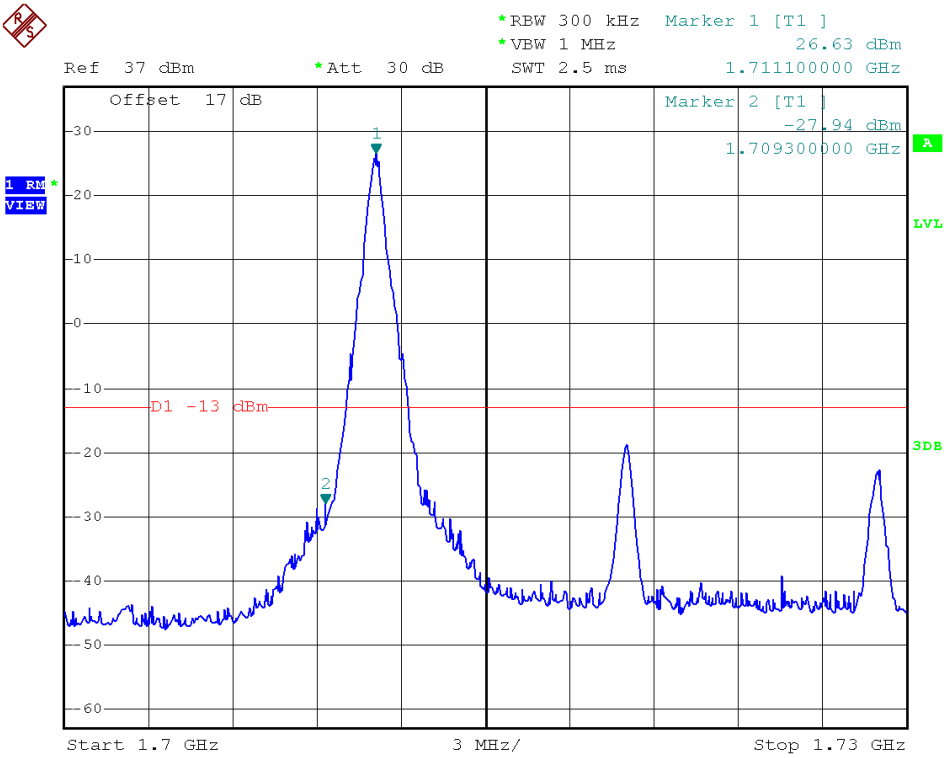


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 99

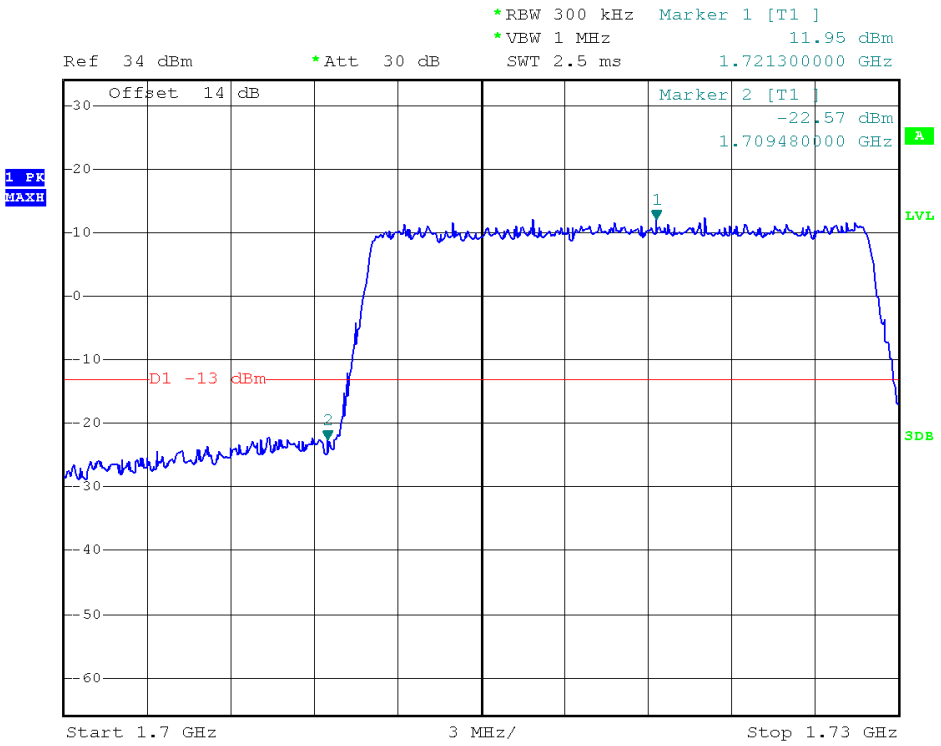


Higher Band Edge Plot for QPSK-RB Size 100, RB Offset 0

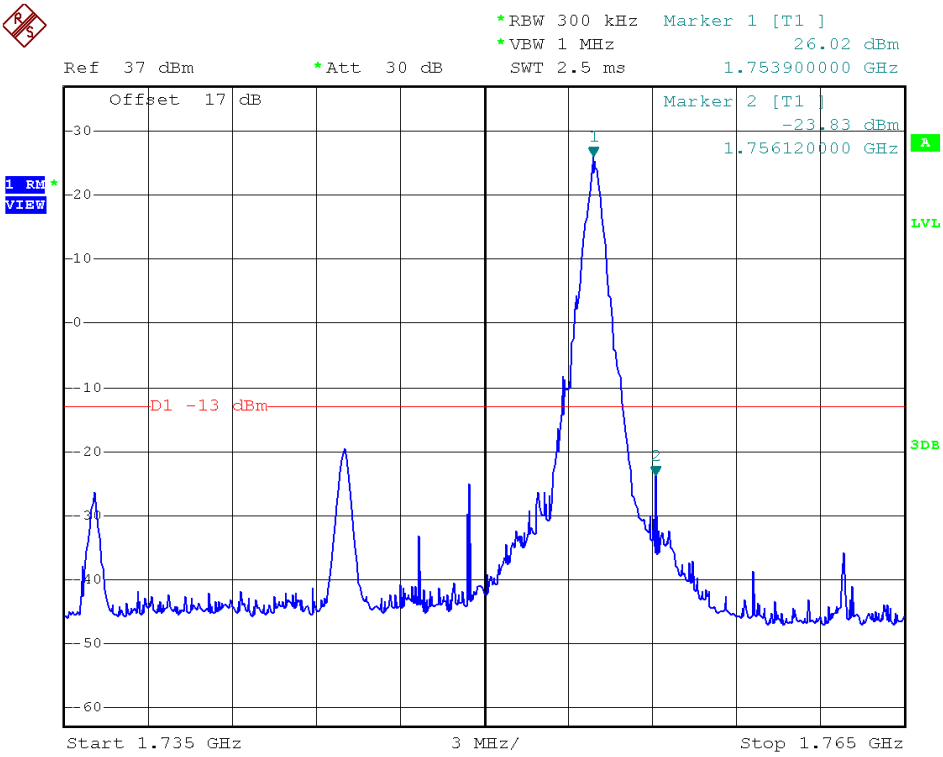
Band	LTE Band 4	Modulation	16QAM
Bandwidth	20MHz		



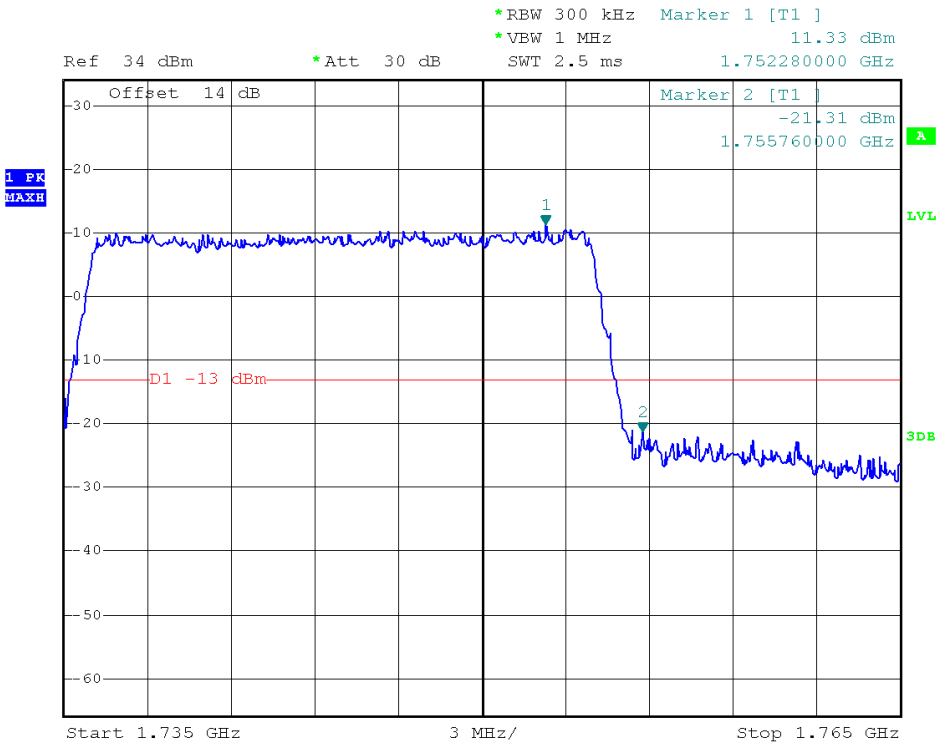
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

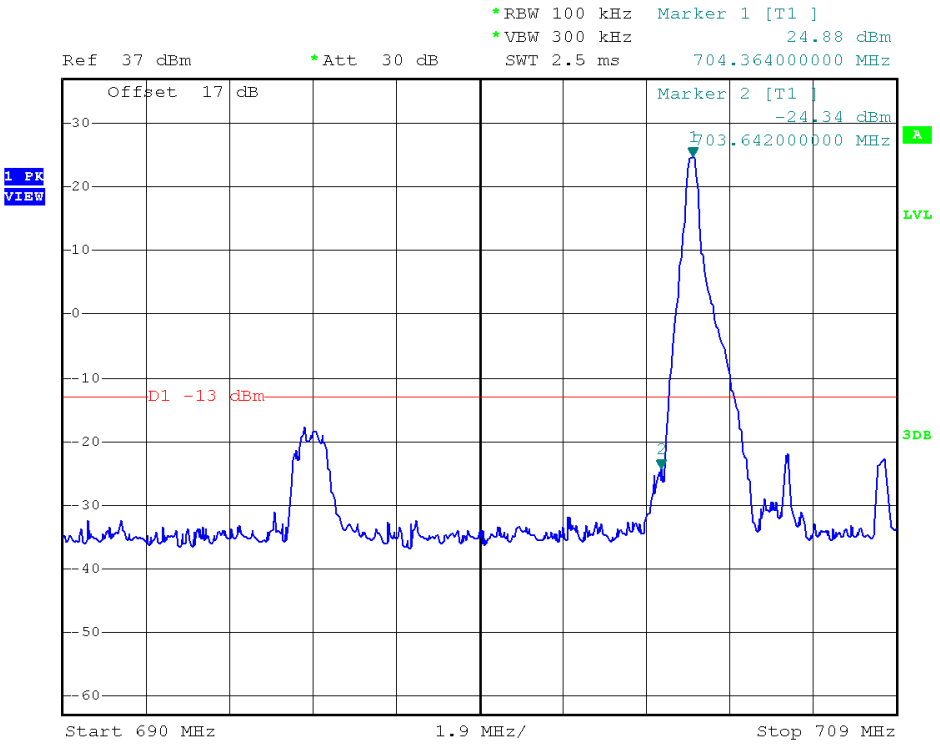


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 99

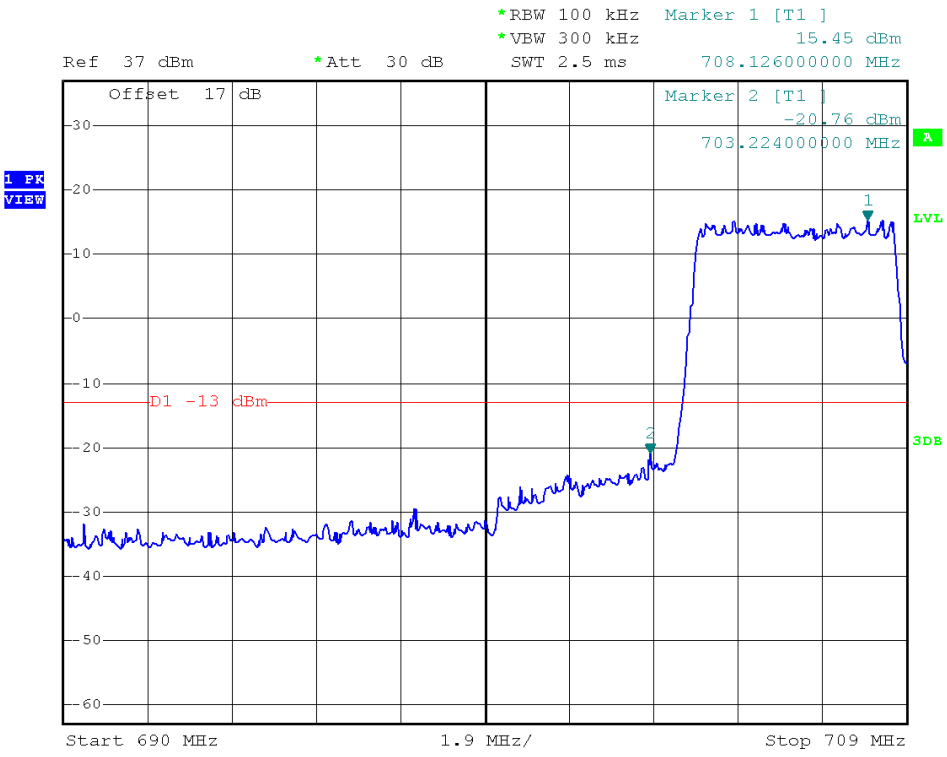


Higher Band Edge Plot for 16QAM -RB Size 100, RB Offset 0

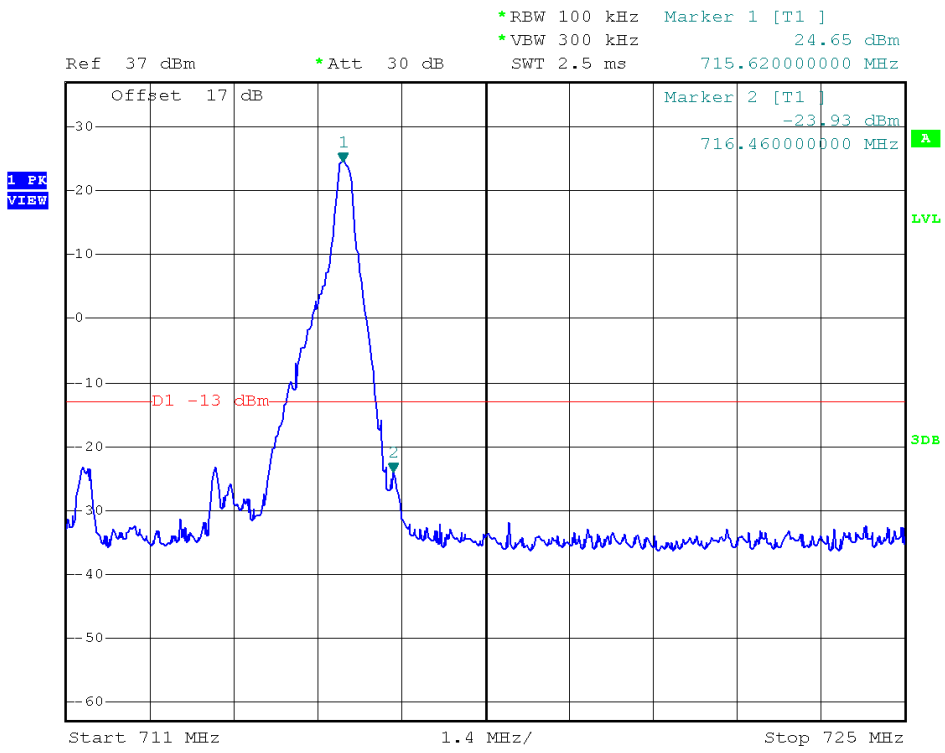
Band	LTE Band 17	Modulation	QPSK
Bandwidth	5MHz		



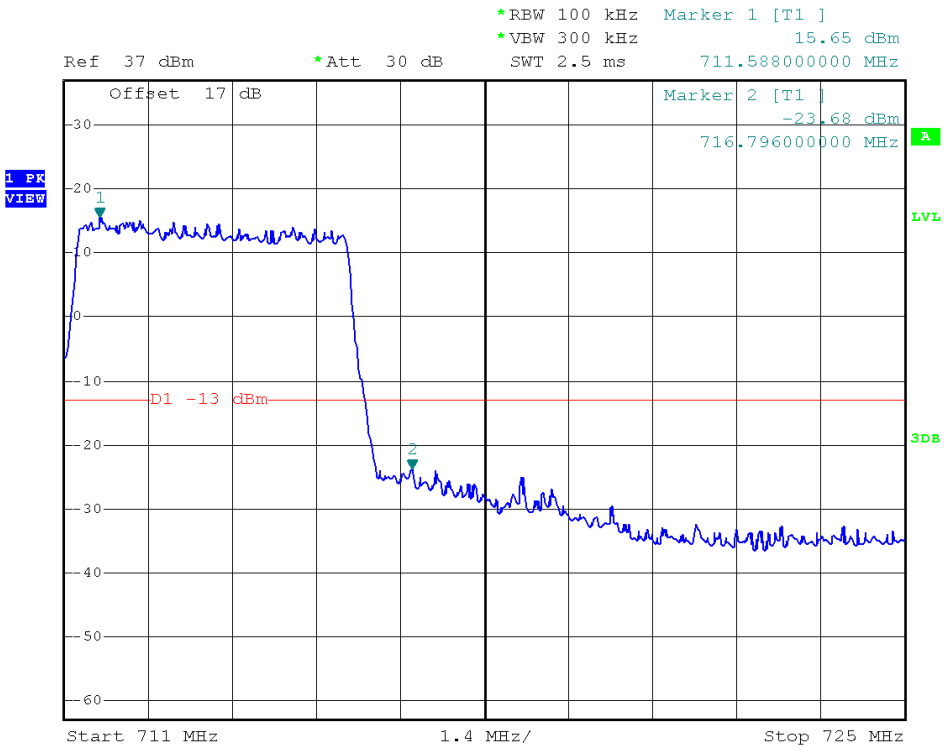
Lower Plot for 5MHz QPSK-RB Size 1, RB Offset 0



Lower Plot for 5MHz QPSK-RB Size 25, RB Offset 0

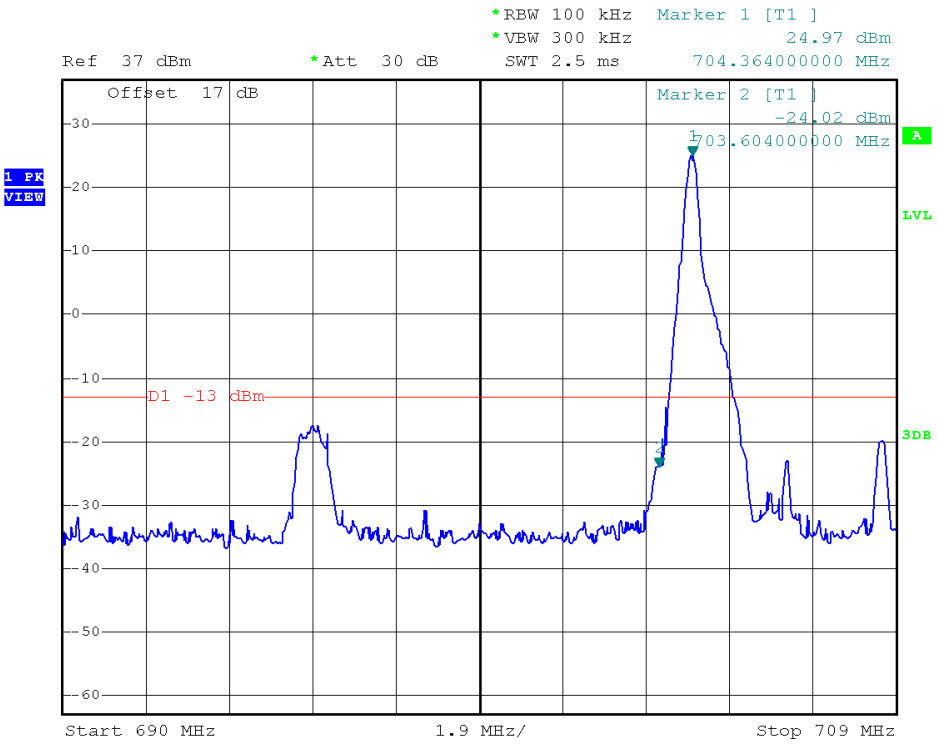


Higher Plot for QPSK-RB Size 1, RB Offset 24

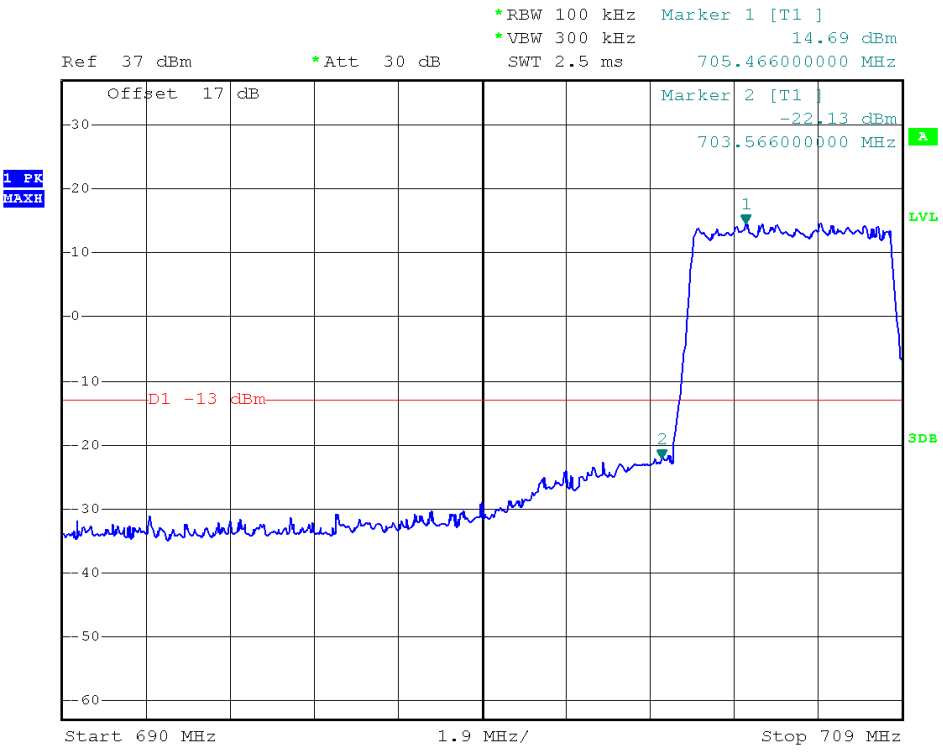


Higher Plot for 5MHz QPSK-RB Size 25, RB Offset 0

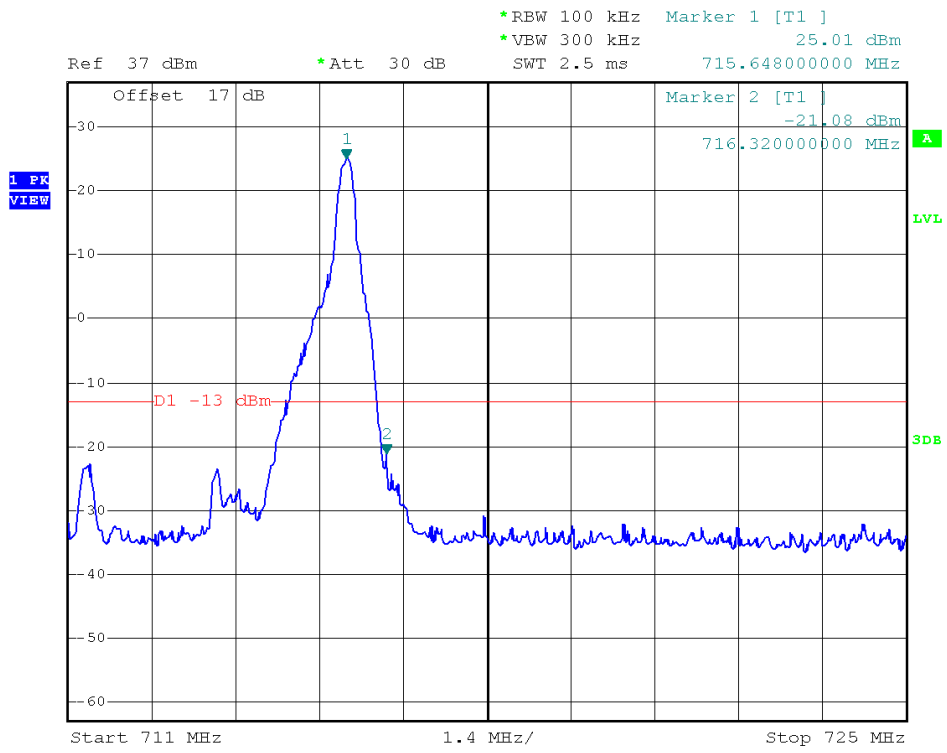
Band	LTE Band 17	Modulation	16QAM
Bandwidth	5MHz		



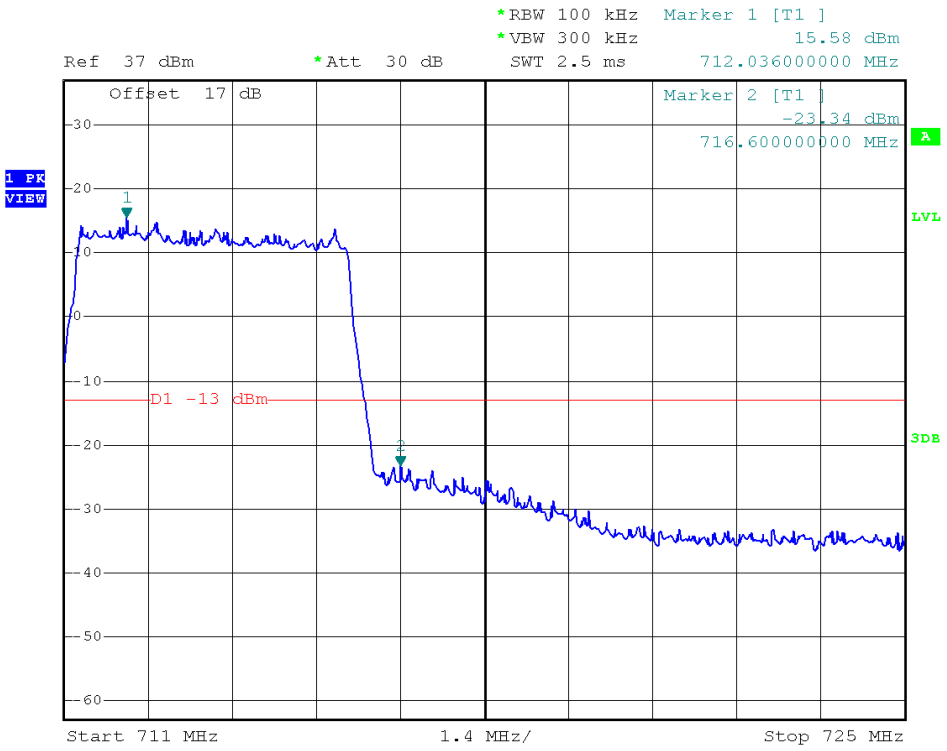
Lower Plot for 5MHz 16QAM-RB Size 1, RB Offset 0



Lower Plot for 5MHz 16QAM -RB Size 25, RB Offset 0

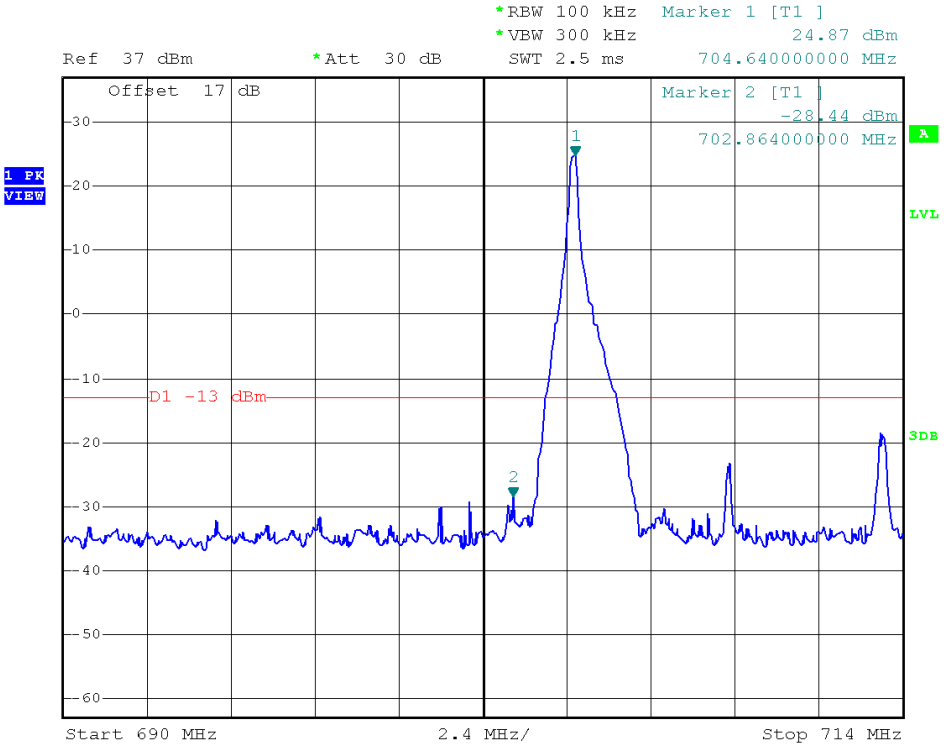


Higher Plot for 5MHz 16QAM -RB Size 1, RB Offset 24

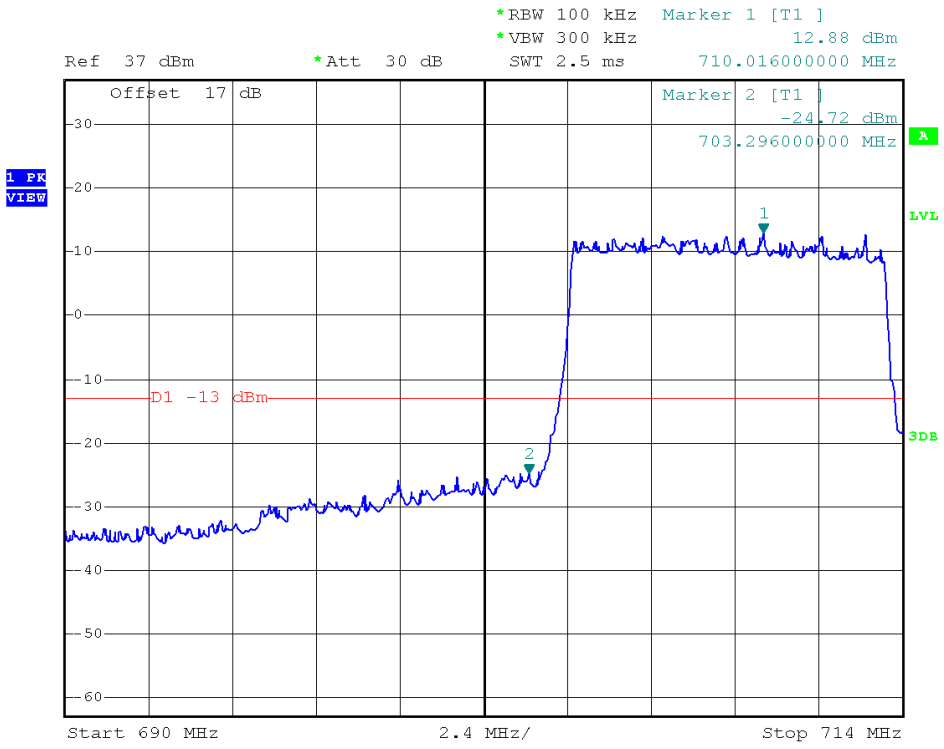


Higher Plot for 5MHz 16QAM -RB Size 25, RB Offset 0

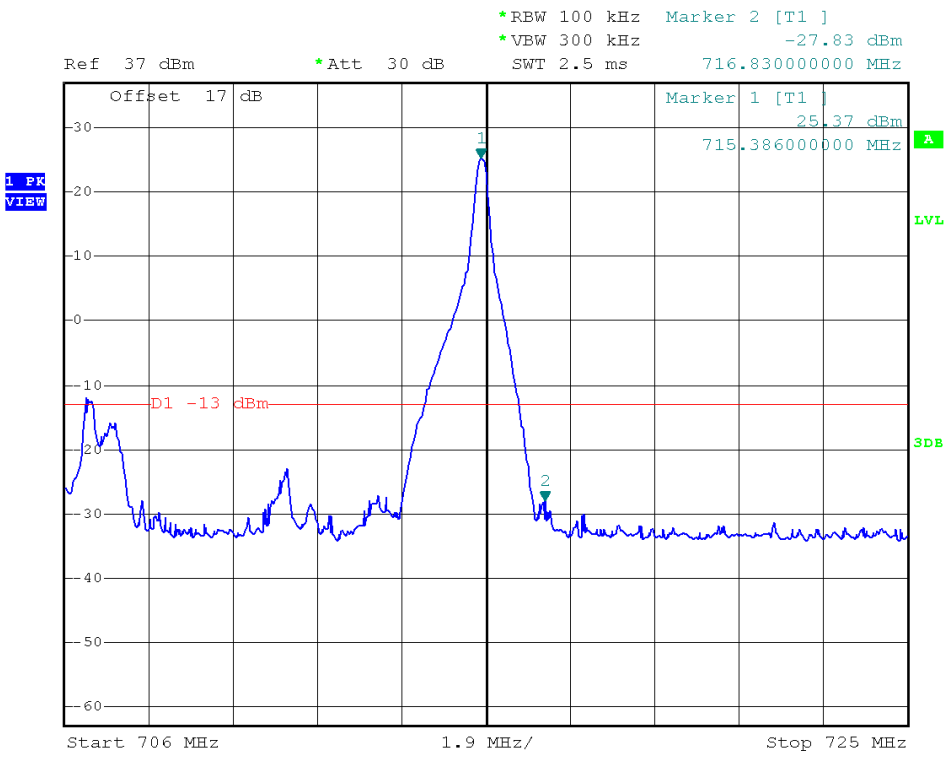
Band	LTE Band 17	Modulation	QPSK
Bandwidth	10MHz		



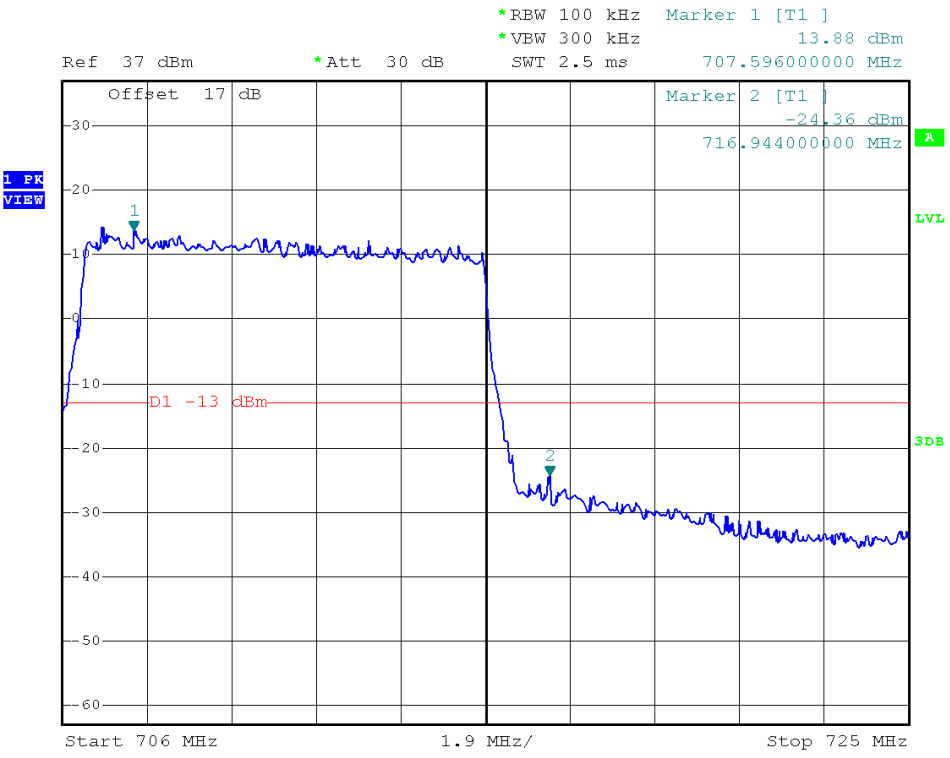
Lower Plot for 10MHz QPSK-RB Size 1, RB Offset 0



Lower Plot for 10MHz QPSK-RB Size 50, RB Offset 0

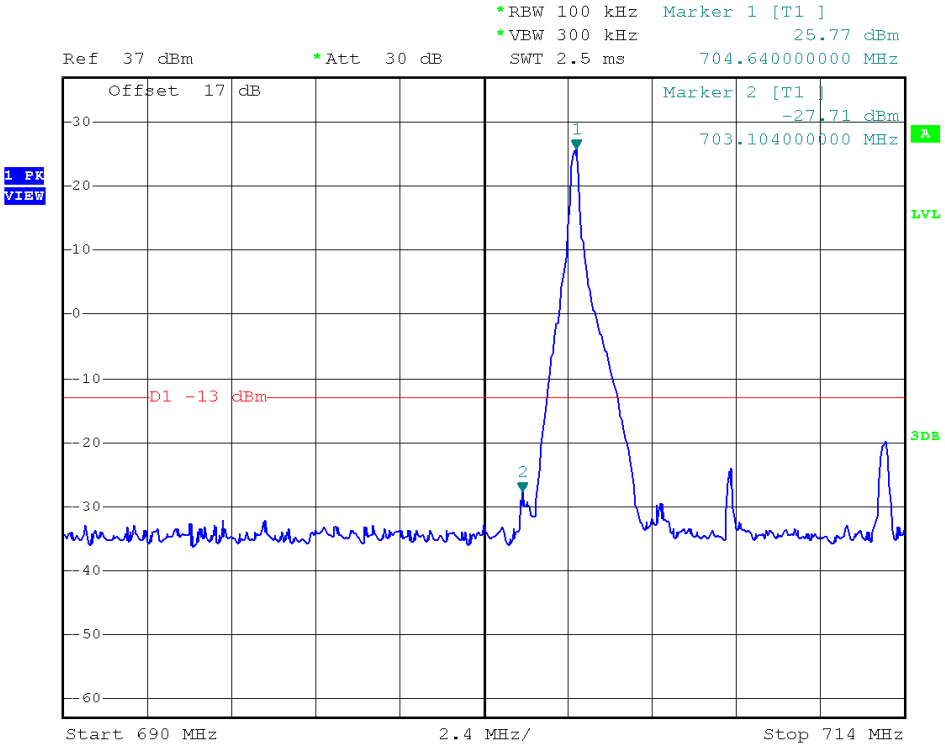


Higher Plot for QPSK-RB Size 1, RB Offset 49

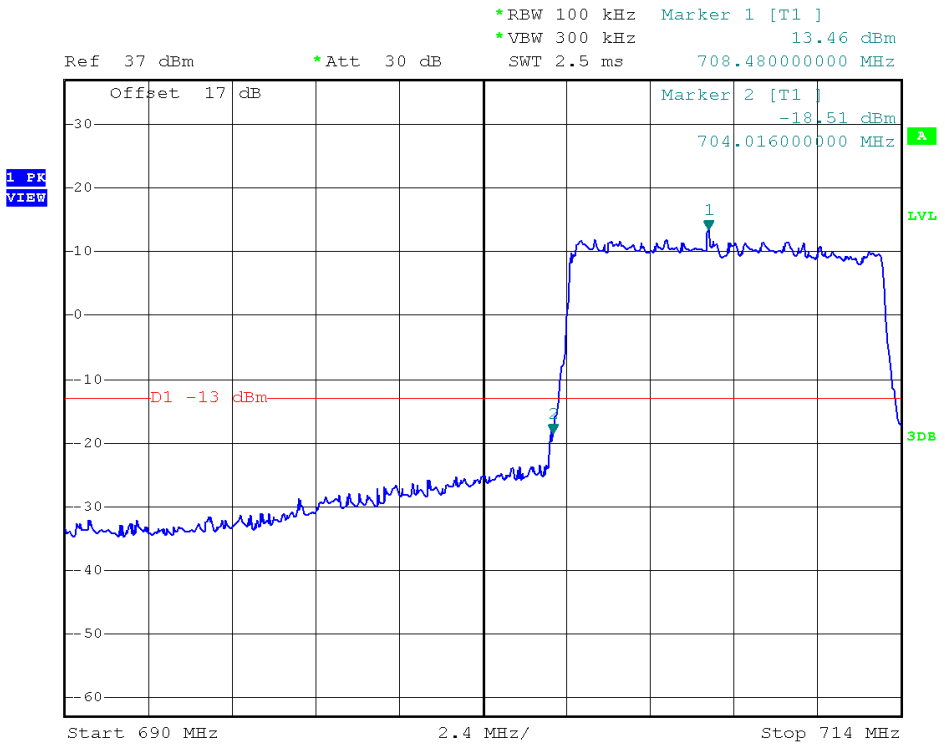


Higher Plot for QPSK-RB Size 50, RB Offset 0

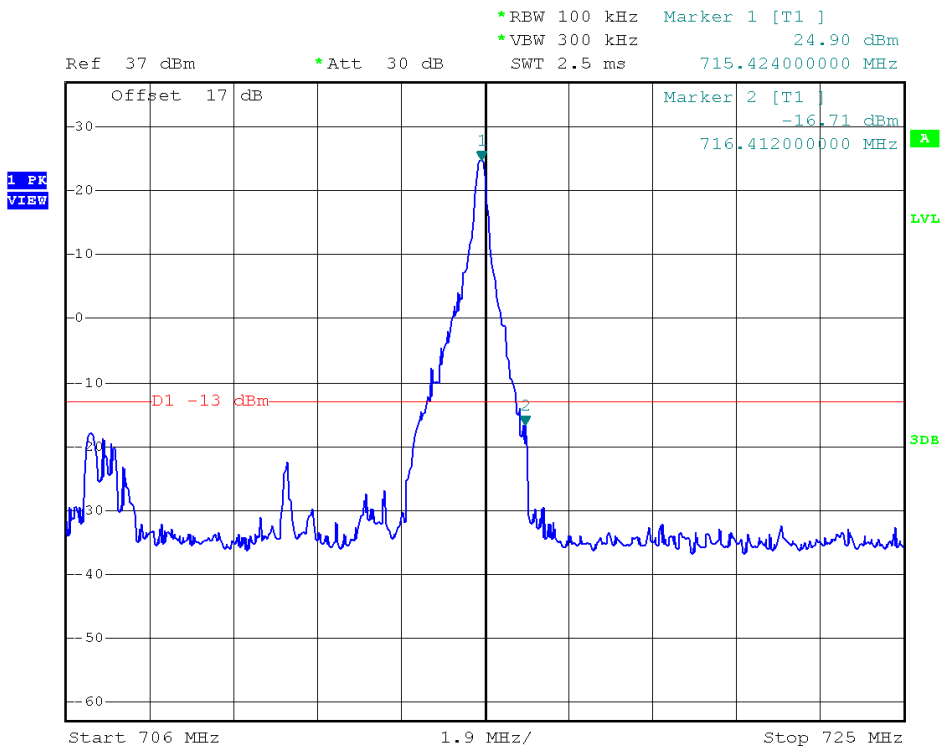
Band	LTE Band 17	Modulation	16QAM
Bandwidth	10MHz		



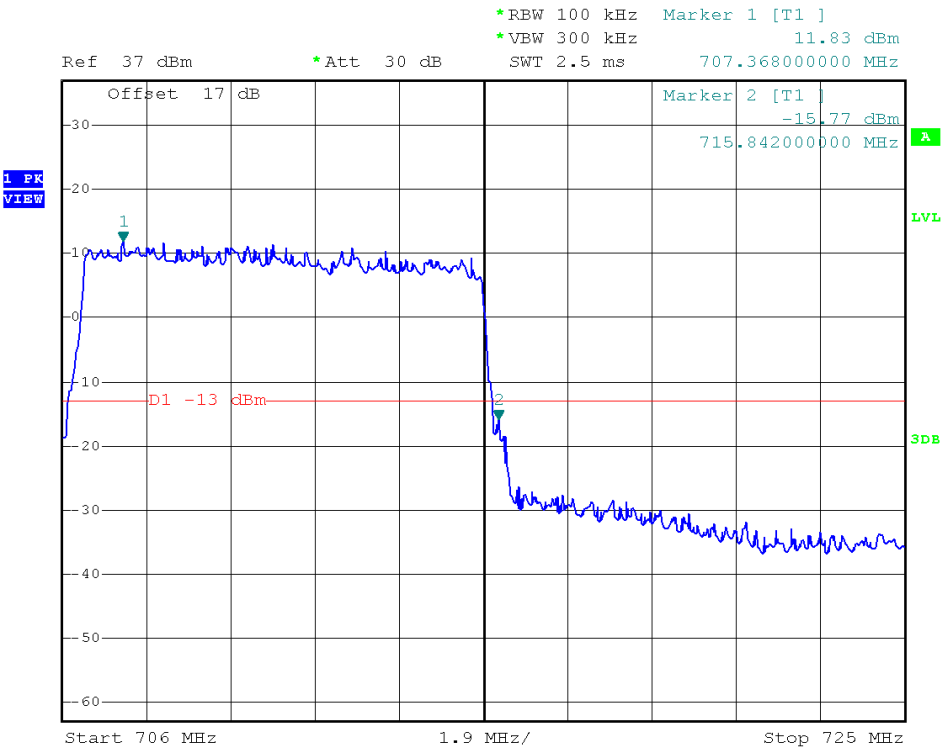
Lower Plot for 10MHz 16QAM-RB Size 1, RB Offset 0



Lower Plot for 10MHz 16QAM -RB Size 50, RB Offset 0



Higher Plot for 10MHz 16QAM -RB Size 1, RB Offset 49



Higher Plot for 10MHz 16QAM -RB Size 50, RB Offset 0

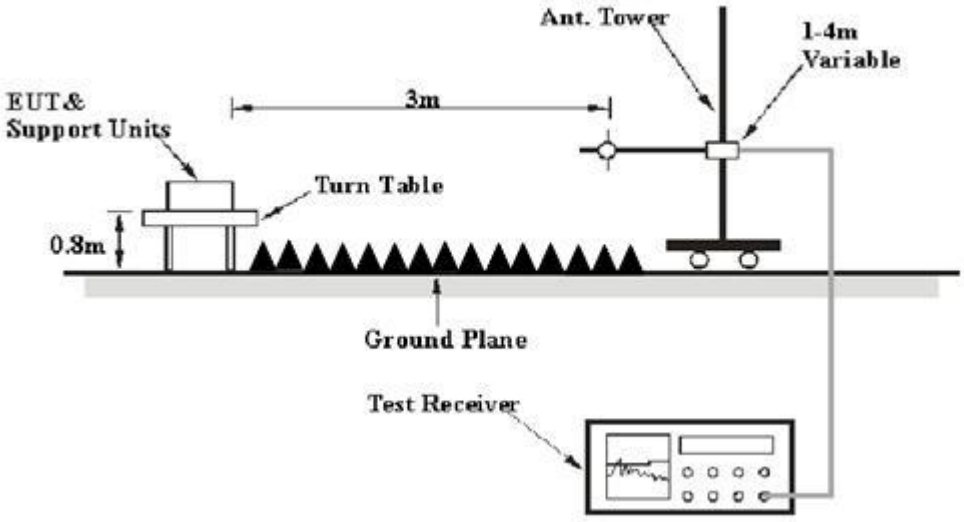
2.7 Transmitter Radiated Power (EIRP/ERP)

2.7.1 Requirement

Effective radiated power output measurements by substitution method according to ANSI / TIA /EIA-603-C-2004, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r01. Mobile and portable (hand-held) stations operating are limited to average ERP of 3 watts with LTE band 17.

2.7.2 Test Description

1. Test Setup:



The EUT, which is powered by the DC 3.8V Power Supply directly, is located in a 3m Full-Anechoic Chamber; the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power, and only the test result of the maximum output power was recorded.

2. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
System Simulator	R&S	CMW500	149333	2014.07.21	2015.07.20
EMI Test Receiver	R&S	ESIB26	100130	2014.07.07	2015.07.06
Full-Anechoic Chamber	Albatross～Projects	12.8m*6.8m*6.4m	A0412372	2015.01.05	2016.01.04
Double ridge horn antenna(1GHz~18GHz)	R&S	HF906	100150	2015.06.02	2016.06.02
Broadband antenna (30MHz~1GHz)	R&S	HL562	101341	2015.06.02	2016.06.02
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.02	2016.06.02
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.02	2016.06.02

2.7.3 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 = Ps + Et – Es + Gs = Ps + Rt – Rs + Gs

Ps (dBm)：Input power to substitution antenna.
Gs (dBi or dBd)：Substitution antenna Gain.
Et = Rt + AF
Es = Rs + AF
AF (dB/m)：Receive antenna factor
Rt：The highest received signal in spectrum analyzer for EUT.
Rs：The highest received signal in spectrum analyzer for substitution antenna.

2.7.4 Test Result of ERP/EIRP

Note：This unit was tested with its standard and new battery during the measurement.

1. LTE Band 4 Test Verdict:

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	ERP (dBm)	H/V	Verdict
			RB Size	RB Offset				
4	1.4	QPSK	1	2	1710.7	13.45	H	PASS
4	1.4	QPSK	1	2	1732.5	13.48	H	PASS
4	1.4	QPSK	1	2	1754.3	**13.51**	H	PASS
4	1.4	QPSK	1	2	1710.7	12.86	V	PASS
4	1.4	QPSK	1	2	1732.5	12.95	V	PASS
4	1.4	QPSK	1	2	1754.3	12.47	V	PASS
4	1.4	16QAM	1	5	1710.7	11.87	H	PASS
4	1.4	16QAM	1	0	1732.5	11.88	H	PASS
4	1.4	16QAM	1	0	1754.3	**11.92**	H	PASS
4	1.4	16QAM	1	5	1710.7	11.49	V	PASS
4	1.4	16QAM	1	0	1732.5	11.56	V	PASS
4	1.4	16QAM	1	0	1754.3	11.55	V	PASS
4	3	QPSK	1	7	1711.5	**13.65**	H	PASS
4	3	QPSK	1	7	1732.5	13.57	H	PASS
4	3	QPSK	1	7	1753.5	13.54	H	PASS
4	3	QPSK	1	7	1711.5	12.75	V	PASS
4	3	QPSK	1	7	1732.5	12.84	V	PASS
4	3	QPSK	1	7	1753.5	12.56	V	PASS
4	3	16QAM	1	14	1711.5	11.97	H	PASS
4	3	16QAM	1	0	1732.5	**12.01**	H	PASS
4	3	16QAM	1	0	1753.5	11.90	H	PASS
4	3	16QAM	1	14	1711.5	11.52	V	PASS
4	3	16QAM	1	0	1732.5	11.54	V	PASS
4	3	16QAM	1	0	1753.5	11.57	V	PASS
4	5	QPSK	1	12	1712.5	**13.62**	H	PASS
4	5	QPSK	1	12	1732.5	13.52	H	PASS
4	5	QPSK	1	12	1752.5	13.49	H	PASS
4	5	QPSK	1	12	1712.5	12.86	V	PASS
4	5	QPSK	1	12	1732.5	12.80	V	PASS
4	5	QPSK	1	12	1752.5	12.76	V	PASS
4	5	16QAM	1	24	1712.5	11.92	H	PASS
4	5	16QAM	1	0	1732.5	**11.95**	H	PASS
4	5	16QAM	1	0	1752.5	11.80	H	PASS
4	5	16QAM	1	24	1712.5	11.68	V	PASS
4	5	16QAM	1	0	1732.5	11.58	V	PASS
4	5	16QAM	1	0	1752.5	11.66	V	PASS

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	ERP (dBm)	H/V	Verdict
			RB Size	RB Offset				
4	10	QPSK	1	24	1715	13.57	H	PASS
4	10	QPSK	1	24	1732.5	**13.69**	H	PASS
4	10	QPSK	1	24	1750	13.61	H	PASS
4	10	QPSK	1	24	1715	12.77	V	PASS
4	10	QPSK	1	24	1732.5	12.82	V	PASS
4	10	QPSK	1	24	1750	12.73	V	PASS
4	10	16QAM	1	49	1715	11.82	H	PASS
4	10	16QAM	1	0	1732.5	**11.85**	H	PASS
4	10	16QAM	1	0	1750	11.83	H	PASS
4	10	16QAM	1	49	1715	11.59	V	PASS
4	10	16QAM	1	0	1732.5	11.55	V	PASS
4	10	16QAM	1	0	1750	11.63	V	PASS
4	15	QPSK	1	37	1717.5	13.54	H	PASS
4	15	QPSK	1	37	1732.5	**13.58**	H	PASS
4	15	QPSK	1	37	1747.5	13.57	H	PASS
4	15	QPSK	1	37	1717.5	12.73	V	PASS
4	15	QPSK	1	37	1732.5	12.85	V	PASS
4	15	QPSK	1	37	1747.5	12.79	V	PASS
4	15	16QAM	1	74	1717.5	11.76	H	PASS
4	15	16QAM	1	0	1732.5	11.71	H	PASS
4	15	16QAM	1	0	1747.5	**11.79**	H	PASS
4	15	16QAM	1	74	1717.5	11.54	V	PASS
4	15	16QAM	1	0	1732.5	11.52	V	PASS
4	15	16QAM	1	0	1747.5	11.61	V	PASS
4	20	QPSK	1	49	1720	13.93	H	PASS
4	20	QPSK	1	49	1732.5	**13.95**	H	PASS
4	20	QPSK	1	49	1745	13.82	H	PASS
4	20	QPSK	1	49	1720	13.59	V	PASS
4	20	QPSK	1	49	1732.5	13.64	V	PASS
4	20	QPSK	1	49	1745	13.58	V	PASS
4	20	16QAM	1	99	1720	12.13	H	PASS
4	20	16QAM	1	0	1732.5	12.06	H	PASS
4	20	16QAM	1	0	1745	**12.14**	H	PASS
4	20	16QAM	1	99	1720	11.83	V	PASS
4	20	16QAM	1	0	1732.5	11.79	V	PASS
4	20	16QAM	1	0	1745	11.91	V	PASS

2. LTE Band 17 Test Verdict:

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	ERP (dBm)	H/V	Verdict
			RB Size	RB Offset				
17	5	QPSK	1	24	706.5	13.95	H	PASS
17	5	QPSK	1	24	710	13.98	H	PASS
17	5	QPSK	1	12	713.5	**14.03**	H	PASS
17	5	QPSK	1	24	706.5	12.86	V	PASS
17	5	QPSK	1	24	710	12.95	V	PASS
17	5	QPSK	1	12	713.5	12.77	V	PASS
17	5	16QAM	1	24	706.5	11.89	H	PASS
17	5	16QAM	1	24	710	**11.96**	H	PASS
17	5	16QAM	1	12	713.5	11.85	H	PASS
17	5	16QAM	1	24	706.5	11.67	V	PASS
17	5	16QAM	1	24	710	11.68	V	PASS
17	5	16QAM	1	12	713.5	11.62	V	PASS
17	10	QPSK	1	49	709	13.63	H	PASS
17	10	QPSK	1	49	710	13.51	H	PASS
17	10	QPSK	1	49	711	**13.70**	H	PASS
17	10	QPSK	1	49	709	13.59	V	PASS
17	10	QPSK	1	49	710	13.44	V	PASS
17	10	QPSK	1	49	711	13.58	V	PASS
17	10	16QAM	1	24	709	11.83	H	PASS
17	10	16QAM	1	49	710	11.86	H	PASS
17	10	16QAM	1	24	711	**11.89**	H	PASS
17	10	16QAM	1	24	709	11.53	V	PASS
17	10	16QAM	1	49	710	11.56	V	PASS
17	10	16QAM	1	24	711	11.44	V	PASS

2.8 Radiated Out of Band Emissions

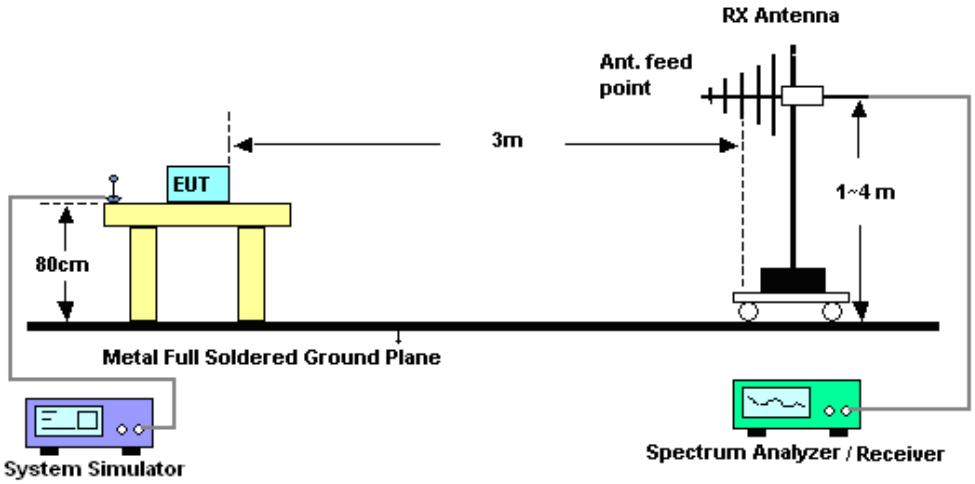
2.8.1 Requirement

The radiated spurious emission was measured by substitution method according to ANSI / TIA /EIA-603-C-2004. 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.

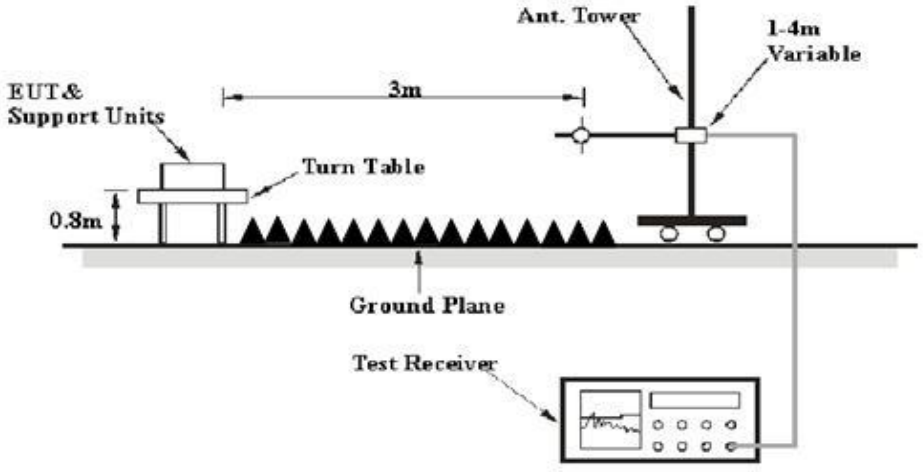
For LTE Band 17
For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

2.8.2 Test Description

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due Date
System Simulator	R&S	CMW500	149333	2014.07.21	2015.07.20
EMI Test Receiver	R&S	ESIB26	100130	2014.07.07	2015.07.06
Full-Anechoic Chamber	Albatross～Projects	12.8m*6.8m*6.4m	A0412372	2015.01.05	2016.01.04
Double ridge horn antenna(1GHz~18GHz)	R&S	HF906	100150	2015.06.02	2016.06.02
Broadband antenna (30MHz~1GHz)	R&S	HL562	101341	2015.06.02	2016.06.02
Horn antenna (18GHz~26.5GHz)	R&S	HM118	101286	2015.06.02	2016.06.02
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.02	2016.06.02
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.02	2016.06.02

2.8.3 Test Procedures

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.

2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.

3. Radiated Emissions Measurement Uncertainty

   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 1GHz – 40GH is ±6.0dB (for EUTs < 0.5m X 0.5m X 0.5m).

4. Environmental Conditions Temperature 23℃

   Relative Humidity 49%

   Atmospheric Pressure 1010mbar

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

6. 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.

7. 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.

8. Sample Calculation:

   EUT Field Strength (dBm) = Reading (Signal generator) + Antenna Gain (substitution antenna) - Cable loss (From Signal Generator to substitution antenna)

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

   = P(W) - [43 + 10log(P)] (dB)

   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

   = -13dBm.

2.8.4 Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. Both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. 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.

1. Test Verdict:

LTE Band 4 (Low Channel)							
Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	Antenna Gain(dBi)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Result
3440	-46.54	H	8.62	2.39	-40.31	-13	Pass
3440	-46.67	V	8.62	2.39	-40.44	-13	Pass
257.4	-54.33	H	3.15	0.50	-51.68	-13	Pass
640.2	-52.87	V	3.40	0.66	-50.13	-13	Pass

LTE Band 4 (Middle Channel)							
Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	Antenna Gain(dBi)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Result
3465	-45.17	H	8.62	2.39	-38.94	-13	Pass
3465	-46.25	V	8.62	2.39	-40.02	-13	Pass
256.8	-54.16	H	3.15	0.50	-51.51	-13	Pass
639.7	-52.92	V	3.40	0.66	-50.18	-13	Pass

LTE Band 4 (High Channel)							
Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	Antenna Gain(dBi)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Result
3490	-46.47	H	8.62	2.39	-40.24	-13	Pass
3490	-46.51	V	8.62	2.39	-40.28	-13	Pass
254.1	-54.27	H	3.15	0.50	-51.62	-13	Pass
639.4	-53.24	V	3.40	0.66	-50.50	-13	Pass

LTE Band 17 (Low Channel)							
Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	Antenna Gain(dBi)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Result
1418	-45.24	H	6.24	1.16	-40.16	-13	Pass
1418	-44.39	V	6.24	1.16	-39.31	-13	Pass
256.3	-53.95	H	3.15	0.50	-51.30	-13	Pass
638.7	-52.63	V	3.40	0.66	-49.89	-13	Pass

LTE Band 17 (Middle Channel)							
Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	Antenna Gain(dBi)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Result
1420	-44.32	H	6.24	1.16	-39.24	-13	Pass
1420	-43.89	V	6.24	1.16	-38.81	-13	Pass
256.5	-54.11	H	3.15	0.50	-51.46	-13	Pass
636.4	-53.41	V	3.40	0.66	-50.67	-13	Pass

LTE Band 17 (High Channel)							
Frequency (MHz)	Substituted level(dBm)	Polarity (H/V)	Antenna Gain(dBi)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Result
1422	-43.67	H	6.24	1.16	-38.59	-13	Pass
1422	-43.73	V	6.24	1.16	-38.65	-13	Pass
256.4	-54.31	H	3.15	0.50	-51.66	-13	Pass
636.4	-53.77	V	3.40	0.66	-51.03	-13	Pass

** END OF REPORT **