



RF TEST REPORT

Report No.: SET2015-18386

Product: LTE/WCDMA/GSM(GPRS) Mutil-Mode Digital Mobile Phone

FCC ID: SRQ-BLADEA452

Model No.: ZTE Blade A452, Blade A452, BGH Joy X3

Applicant: ZTE Corporation

Address: ZTE Plaza, Keji Road South, Shenzhen, China

Dates of Testing: 12/01/2015 — 12/10/2015

Issued by: CCIC-SET

Lab Location: Electronic Testing Building, Shahe Road, Xili, Nanshan District,
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Test Report

Product : LTE/WCDMA/GSM(GPRS) Mutil-Mode Digital Mobile Phone

Brand Name..... : ZTE

Trade Name : ZTE

Applicant : ZTE Corporation

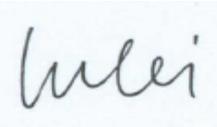
Applicant Address : ZTE Plaza, Keji Road South, Shenzhen, China

Manufacturer : ZTE Corporation

Manufacturer Address..... : ZTE Plaza, Keji Road South, Shenzhen, China

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

Test Result..... : PASS

Tested by :  2015.12.10

Lu Lei, Test Engineer

Reviewed by..... :  2015.12.10

Zhu Qi, Senior EGINEER

Approved by..... :  2015.12.10

Wu Li'an, Manager



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Change History		
Issue	Date	Reason for change
1.0	2015-12-10	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	LTE/WCDMA/GSM(GPRS) Mutil-Mode Digital Mobile Phone
Hardware Version	WXKMA1A1-1
Software Version	DIS_LAR_P635F33V1.0.0B01
EUT supports Radios application	GSM/GPRS/EDGE/WCDMA/HSPA/LTE WLAN2.4GHz 802.11b/g/n (HT20) Bluetooth V3.0+EDR / Bluetooth V4.0LE
Frequency Range	LTE Band 4 Tx: 1710.7MHz~1754.3MHz Rx: 2110.7MHz~2154.3MHz
Maximum Output Power to Antenna	LTE Band 4: 22.92dBm
Bandwidth	LTE Band 4: 1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz
Modulation Type	QPSK/16QAM
Antenna Type	Internal Antenna

Note: The EUT is a Mobile Phone, it contains three models, they are ZTE Blade A452, Blade A452, and BGH Joy X3. They have the same size, appearance and internal structure, and the only difference is the model number.



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	—	0.069
Part 27	LTE Band 4	16QAM	1.4	1M10W7D	—	0.047
Part 27	LTE Band 4	QPSK	3	2M75G7D	—	0.069
Part 27	LTE Band 4	16QAM	3	2M75W7D	—	0.048
Part 27	LTE Band 4	QPSK	5	4M54G7D	—	0.068
Part 27	LTE Band 4	16QAM	5	4M52W7D	—	0.048
Part 27	LTE Band 4	QPSK	10	8M96G7D	0.03	0.069
Part 27	LTE Band 4	16QAM	10	8M96W7D	0.03	0.047
Part 27	LTE Band 4	QPSK	15	13M5G7D	—	0.069
Part 27	LTE Band 4	16QAM	15	13M5W7D	—	0.048
Part 27	LTE Band 4	QPSK	20	18M7G7D	—	0.070
Part 27	LTE Band 4	16QAM	20	18M6W7D	—	0.049



1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 27 for the EUT FCC ID Certification:

1.47 CFR Part 2, 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(d)	Effective Radiated Power(Band 4)	EIRP < 1Watt	PASS
4	2.1049 27.53(g)	Occupied Bandwidth	Reporting Only	PASS
5	2.1051 27.53(h)	Conducted Band Edge(Band 2/4/5)	< 43+10log10(P[watt])	PASS
6	2.1051 27.53(h)	Conducted Spurious Emission (Band 4)	< 43+10log10(P[watt])	PASS
7	2.1053 27.53(h)	Radiated Spurious Emission (Band 4)	< 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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Peak-to-Average Ratio	4						✓		✓	✓		✓	✓	✓	✓
26dB and 99% Bandwidth	4	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	
Conducted Band Edge	4	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
Conducted Spurious Emission	4	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Frequency Stability	4				✓			✓	✓			✓		✓	
ERP/EIRP	4	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Radiated Spurious Emission	4	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓
Note	<p>1. The mark “ ✓ ” means that this configuration is chosen for testing.</p> <p>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.</p> <p>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.</p>														



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

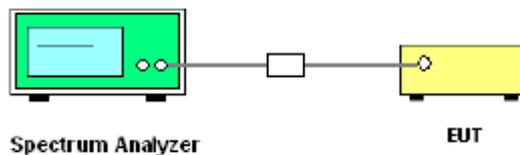
2.1.1 Requirement

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

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	22.29	22.31	22.26
20	QPSK	1	49	22.11	22.16	22.17
20	QPSK	1	99	22.11	22.19	22.05
20	QPSK	50	0	21.58	21.63	21.56
20	QPSK	50	24	21.78	21.65	21.72
20	QPSK	50	49	21.59	21.61	21.55
20	QPSK	100	0	21.53	21.43	21.53
20	16QAM	1	0	21.85	21.76	21.62
20	16QAM	1	49	21.83	21.81	21.73
20	16QAM	1	99	21.65	21.71	21.75
20	16QAM	50	0	20.63	20.72	20.63
20	16QAM	50	24	20.25	20.41	20.48
20	16QAM	50	49	20.52	20.53	20.52
20	16QAM	100	0	20.65	20.53	20.61
Channel				20025	20175	20325
Frequency(MHz)				1717.5	1732.5	1747.5
15	QPSK	1	0	22.21	22.25	22.13
15	QPSK	1	37	22.25	22.22	22.22
15	QPSK	1	74	22.12	22.14	22.16
15	QPSK	36	0	21.51	21.52	21.45
15	QPSK	36	18	21.52	21.53	21.50
15	QPSK	36	37	21.43	21.48	21.45
15	QPSK	75	0	21.65	21.58	21.59
15	16QAM	1	0	21.42	21.38	21.34
15	16QAM	1	37	21.36	21.31	21.44
15	16QAM	1	74	21.58	21.44	21.43
15	16QAM	36	0	20.63	20.72	20.75
15	16QAM	36	18	20.57	20.63	20.63
15	16QAM	36	37	20.63	20.75	20.61
15	16QAM	75	0	20.71	20.75	20.74



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	22.25	22.22	22.21
10	QPSK	1	24	22.05	22.13	22.15
10	QPSK	1	49	22.01	22.13	22.25
10	QPSK	25	0	21.49	21.48	21.53
10	QPSK	25	12	21.45	21.34	21.33
10	QPSK	25	24	21.39	21.48	21.35
10	QPSK	50	0	21.44	21.44	21.46
10	16QAM	1	0	21.49	21.41	21.42
10	16QAM	1	24	21.25	21.34	21.35
10	16QAM	1	49	21.33	21.41	21.47
10	16QAM	25	0	20.70	20.78	20.83
10	16QAM	25	12	20.61	20.75	20.78
10	16QAM	25	24	20.63	20.64	20.51
10	16QAM	50	0	20.84	20.73	20.75
Channel				19975	20175	20375
Frequency(MHz)				1712.5	1732.5	1752.5
5	QPSK	1	0	22.11	22.25	22.23
5	QPSK	1	12	22.15	22.14	22.12
5	QPSK	1	24	22.02	22.15	22.05
5	QPSK	12	0	21.63	21.52	21.61
5	QPSK	12	6	21.47	21.53	21.58
5	QPSK	12	11	21.50	21.52	21.65
5	QPSK	25	0	21.45	21.42	21.57
5	16QAM	1	0	21.42	21.35	21.31
5	16QAM	1	12	21.55	21.43	21.31
5	16QAM	1	24	21.21	21.35	21.35
5	16QAM	12	0	20.43	20.51	20.41
5	16QAM	12	6	20.45	20.41	20.52
5	16QAM	12	11	20.43	20.51	20.45
5	16QAM	25	0	20.63	20.71	20.72



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	22.11	22.23	22.15
3	QPSK	1	7	22.13	22.14	22.15
3	QPSK	1	14	22.11	22.10	22.08
3	QPSK	8	0	21.59	21.63	21.55
3	QPSK	8	4	21.65	21.52	21.43
3	QPSK	8	7	21.53	21.51	21.55
3	QPSK	15	0	21.34	21.47	21.42
3	16QAM	1	0	21.52	21.51	21.45
3	16QAM	1	7	21.53	21.41	21.52
3	16QAM	1	14	21.52	21.53	21.59
3	16QAM	8	0	20.55	20.62	20.68
3	16QAM	8	4	20.66	20.65	20.73
3	16QAM	8	7	20.52	20.51	20.53
3	16QAM	15	0	20.73	20.65	20.75
Channel				19957	20175	20393
Frequency(MHz)				1710.7	1732.5	1754.3
1.4	QPSK	1	0	22.22	22.23	22.11
1.4	QPSK	1	2	22.24	22.14	22.15
1.4	QPSK	1	5	22.13	22.05	22.11
1.4	QPSK	3	0	21.63	21.54	21.50
1.4	QPSK	3	1	21.52	21.51	21.42
1.4	QPSK	3	2	21.49	21.58	21.54
1.4	QPSK	6	0	21.57	21.43	21.52
1.4	16QAM	1	0	21.35	21.34	21.33
1.4	16QAM	1	2	21.41	21.35	21.42
1.4	16QAM	1	5	21.33	21.45	21.31
1.4	16QAM	3	0	20.78	20.73	20.71
1.4	16QAM	3	1	20.55	20.67	20.63
1.4	16QAM	3	2	20.51	20.53	20.55
1.4	16QAM	6	0	20.65	20.77	20.65

2.2 Peak to Average Ratio

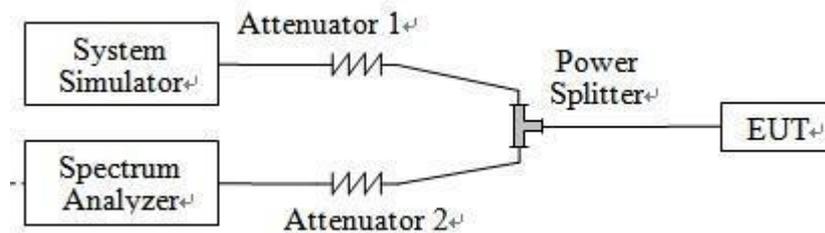
2.2.1 Definition

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 Description



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.



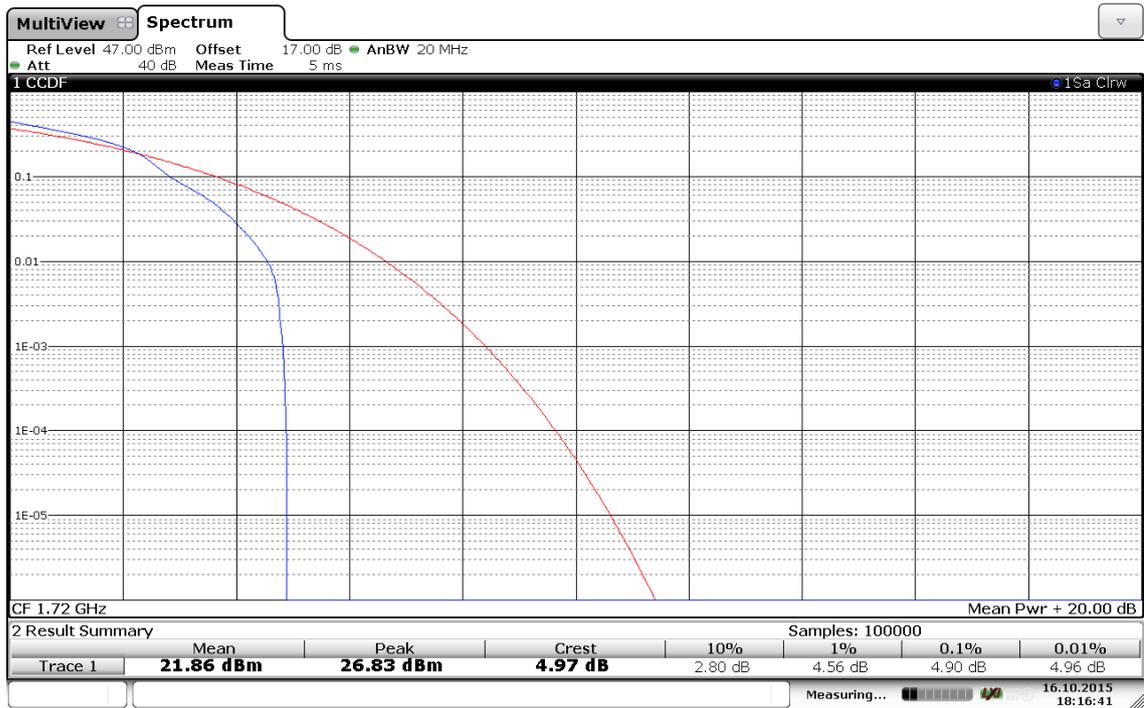
2.2.5 Test Results of Peak-to-Average Ratio

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

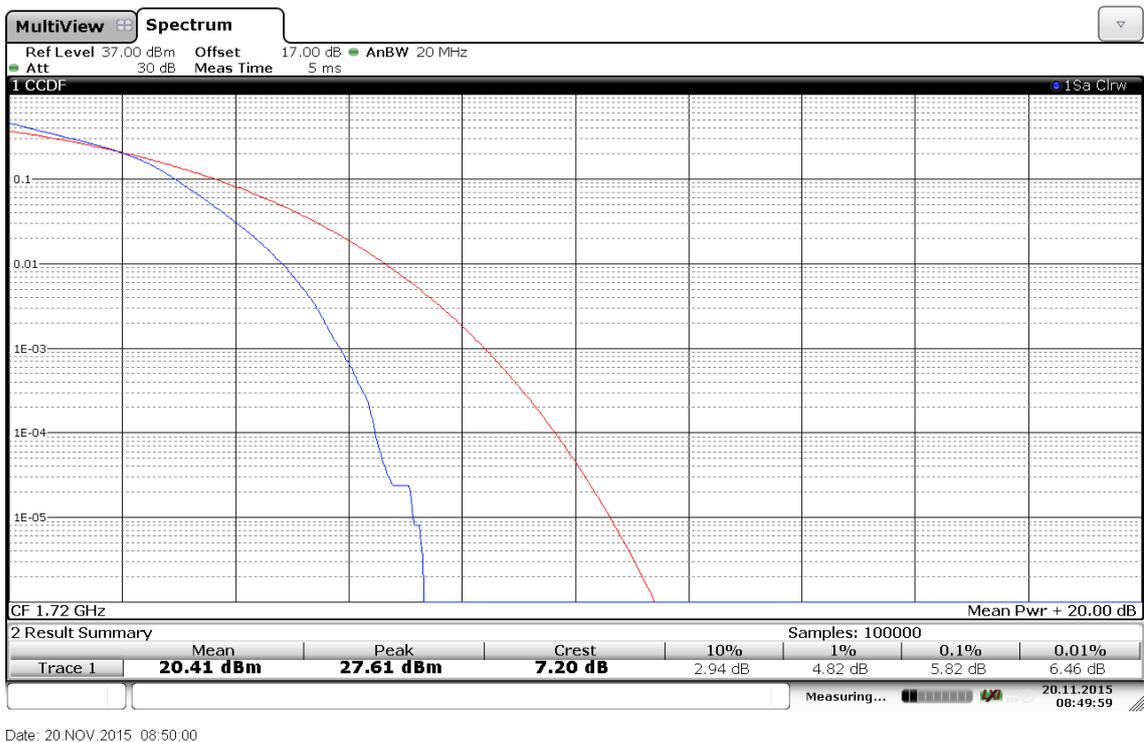
BW (MHz)	Modulation	Channel	Frequency (MHz)	RB Size	RB Offset	Peak to Average ratio		Limit	Verdict
						dB	Refer to Plot	dB	
20	16QAM	20050	1720	1	0	4.90	Plot B1 to B6	13	PASS
				100	0	5.82			
	16QAM	20175	1732.5	1	0	4.54			PASS
				100	0	6.08			
	16QAM	20300	1745	1	0	4.88			PASS
				100	0	6.06			

Note: All of the modulations were tested, found 16QAM was the worst case mode, and the worst test results were reported.

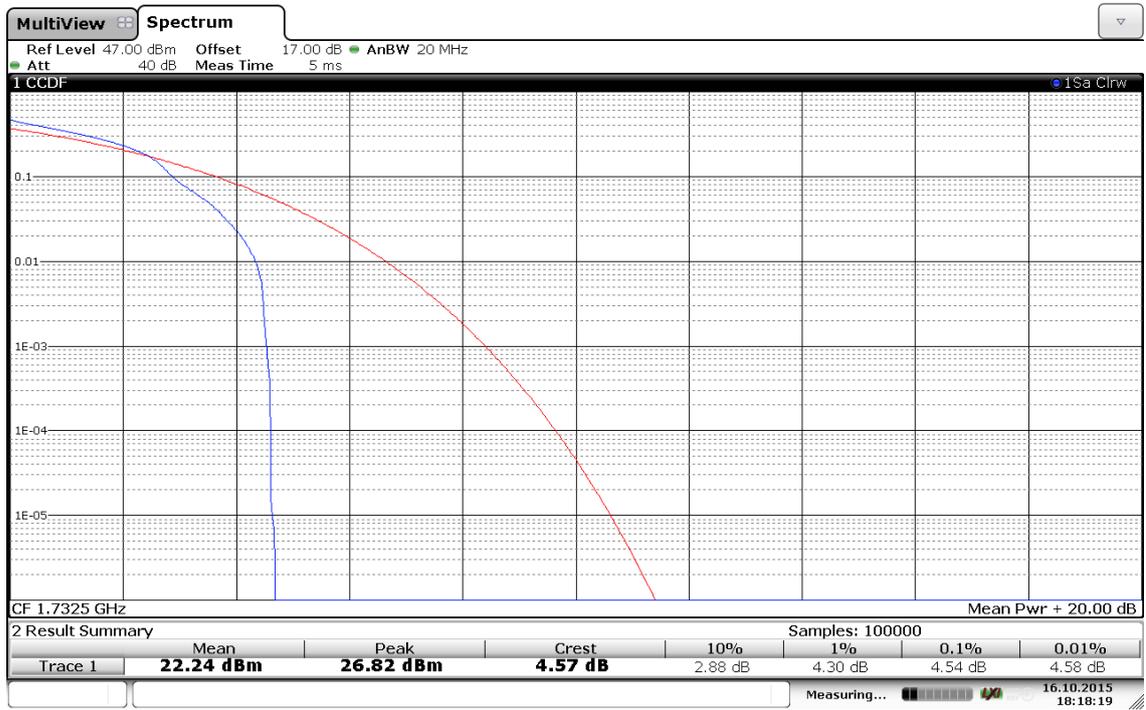
2.2.6 Test Results (Plots) of Peak-to-Average Ratio



(Plot B1: Band 4/20MHz/16QAM in Ch.20050 1RB Size)

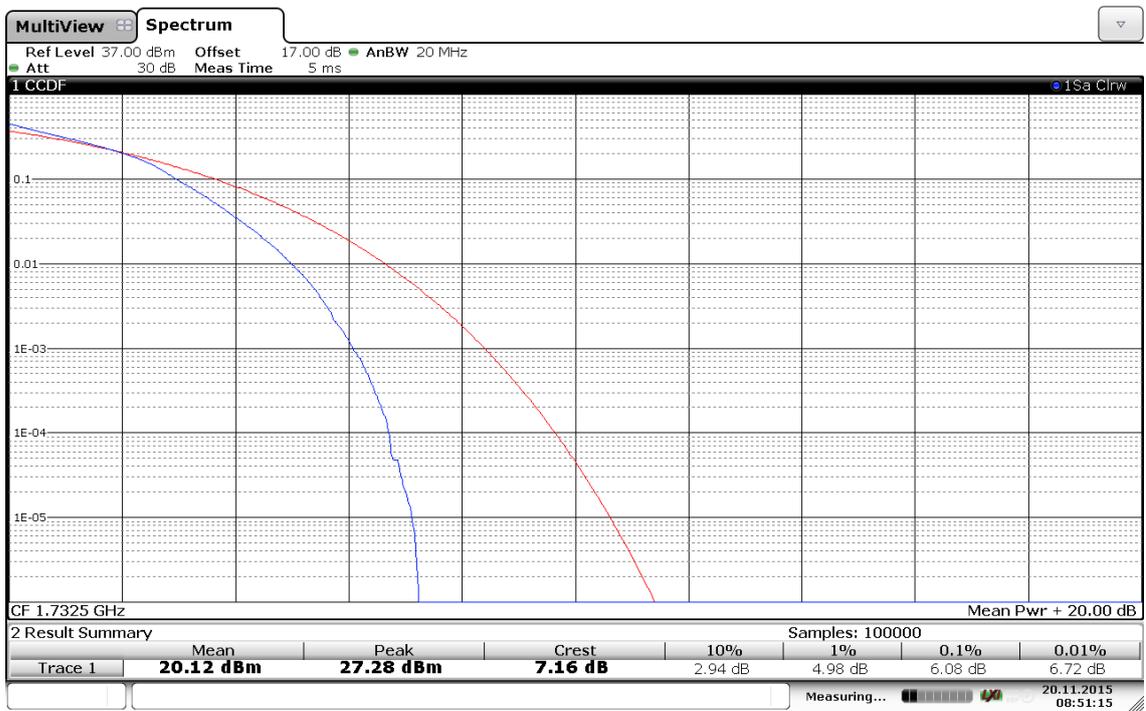


(Plot B2: Band 4/20MHz/16QAM in Ch.20050 100RB Size)



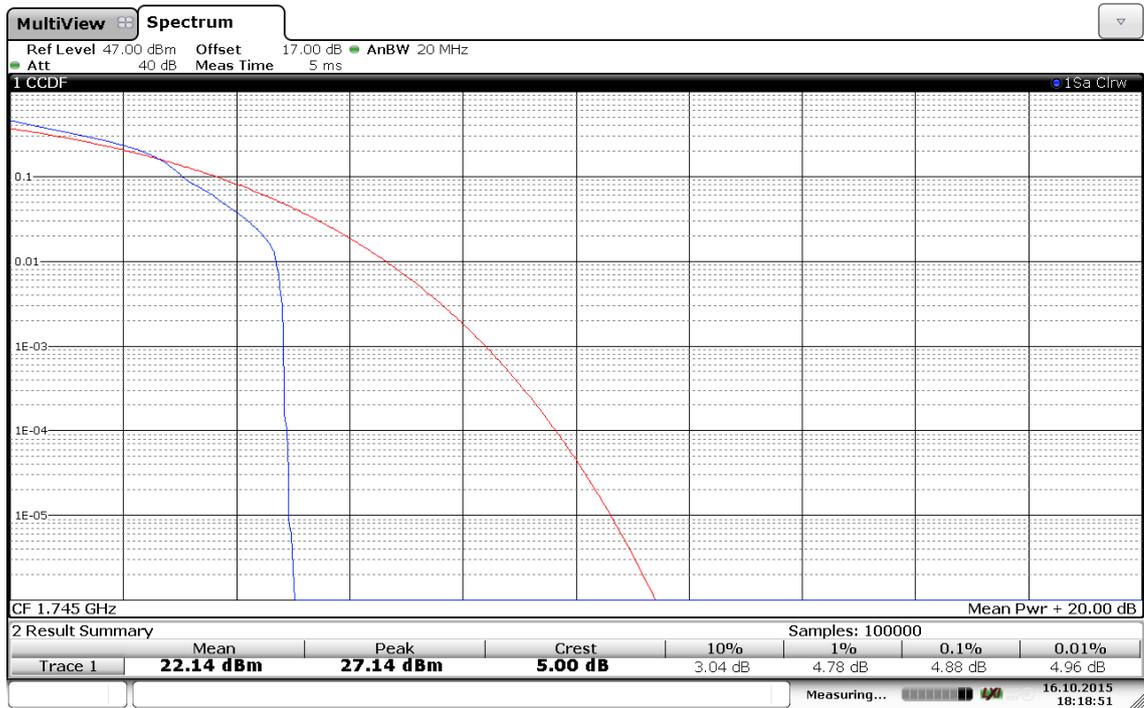
Date: 16.OCT.2015 18:18:19

(Plot B3: Band 4/20MHz/16QAM in Ch.20175 1RB Size)

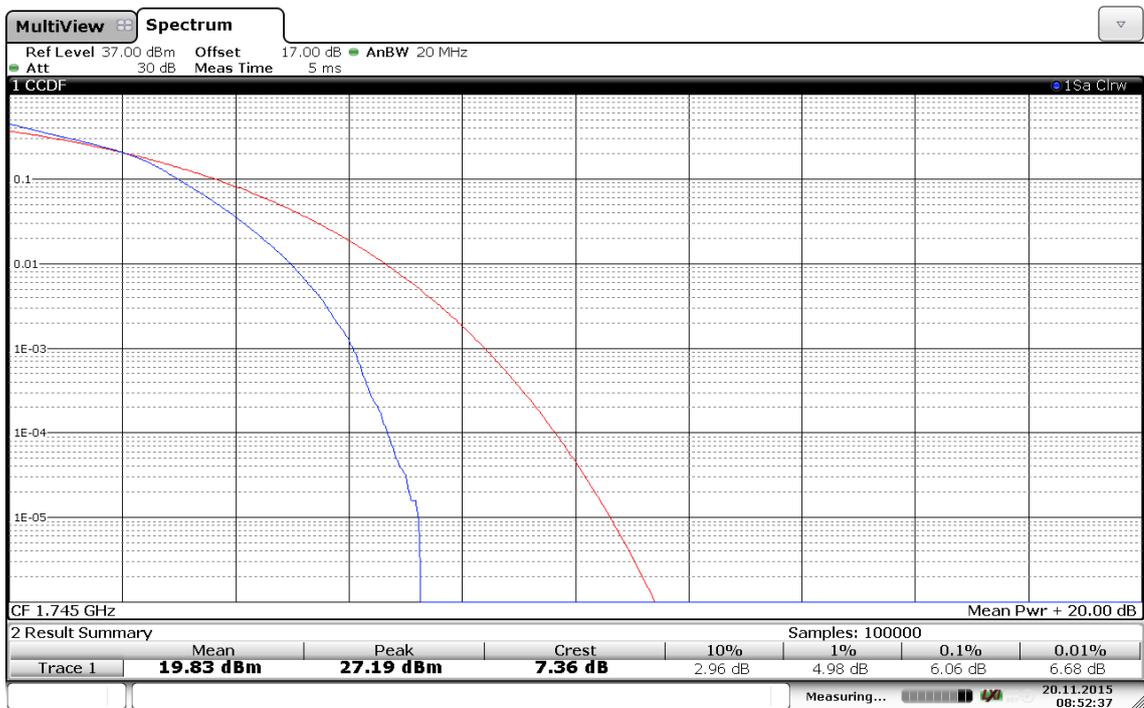


Date: 20.NOV.2015 08:51:15

(Plot B4: Band 4/20MHz/16QAM in Ch.20175 100RB Size)



(Plot B5: Band 4/20MHz/16QAM in Ch.20300 1RB Size)



(Plot B6: Band 4/20MHz/16QAM in Ch.20300 100RB Size)

2.3 99% Occupied Bandwidth and 26dB Bandwidth

2.3.1 Definition

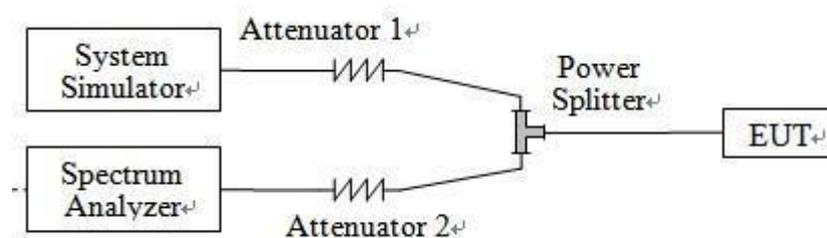
According to FCC section 2.1049, the occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

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 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	1.28	Plot A1 to A2
			16QAM	1.10	1.30	Plot A3 to A4
3	20175	1732.5	QPSK	2.75	3.05	Plot B1 to B2
			16QAM	2.75	3.02	Plot B3 to B4
5	20175	1732.5	QPSK	4.54	5.02	Plot C1 to C2
			16QAM	4.52	5.02	Plot C3 to C4
10	20175	1732.5	QPSK	8.96	9.84	Plot D1 to D2
			16QAM	8.96	9.68	Plot D3 to D4
15	20175	1732.5	QPSK	13.50	15.00	Plot E1 to E2
			16QAM	13.50	15.00	Plot E3 to E4
20	20175	1732.5	QPSK	18.72	21.44	Plot F1 to F2
			16QAM	18.64	21.28	Plot F3 to F4

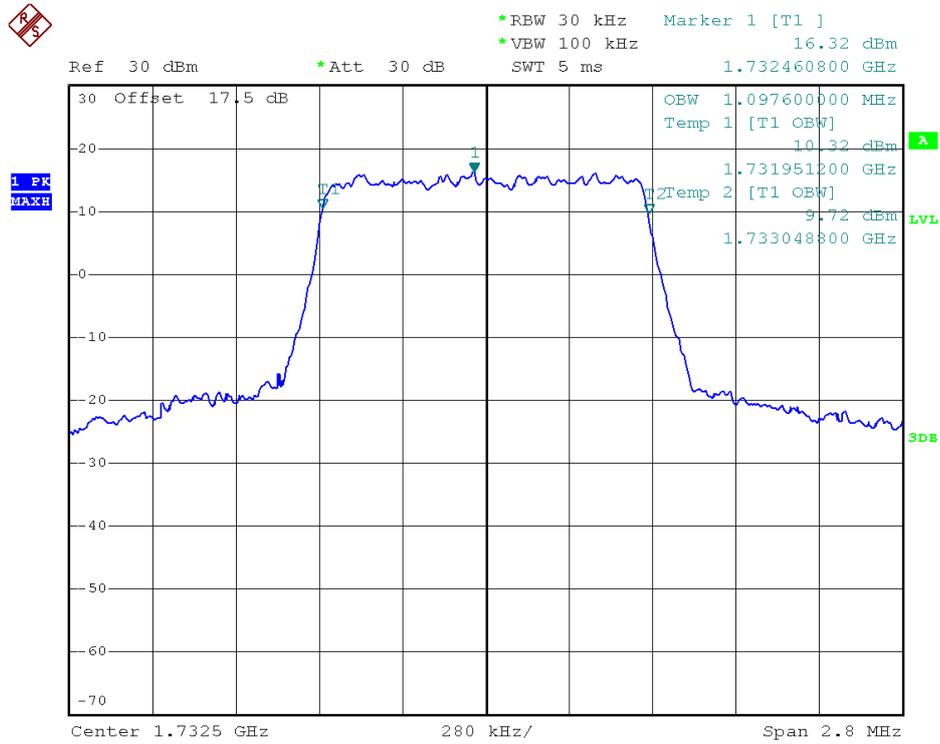
Note: The maximum RB configurations of the 99% Occupied Bandwidth and 26dB Bandwidth summary as below:

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

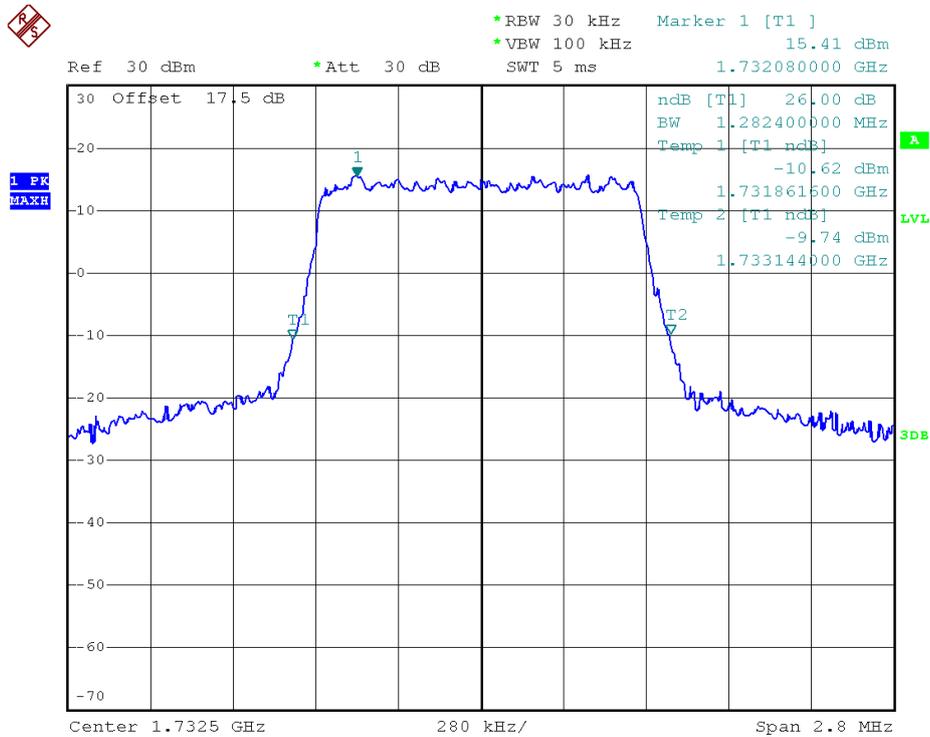
BW5MHz RB setting: RB Size 25,RB Offset 0 BW10MHz RB setting: RB Size 50,RB Offset 0

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

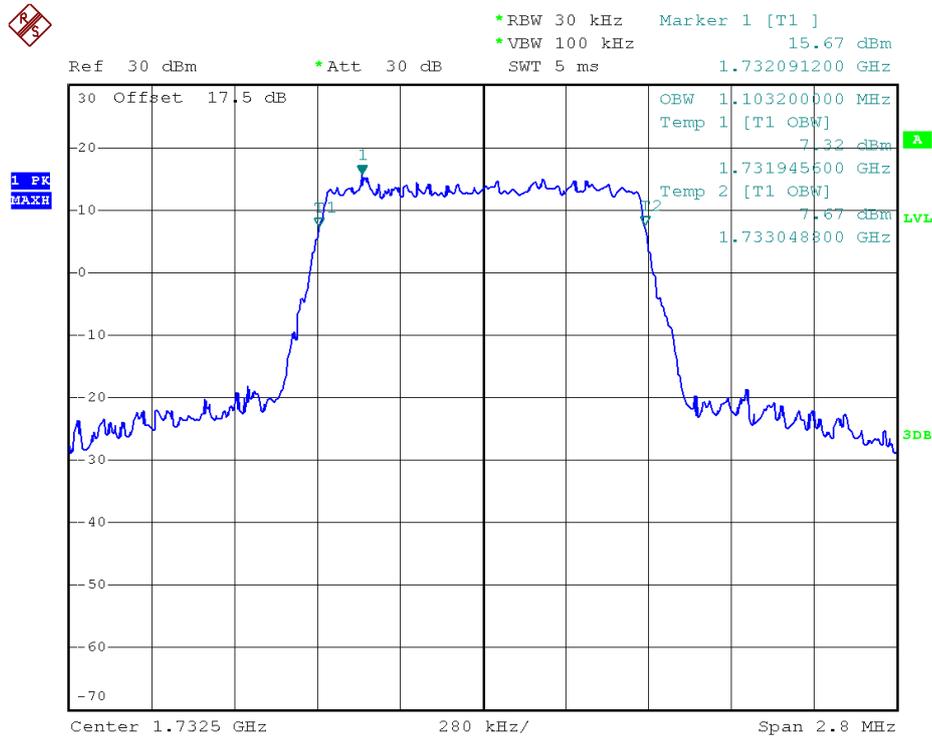
2.3.6 Test Result (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth



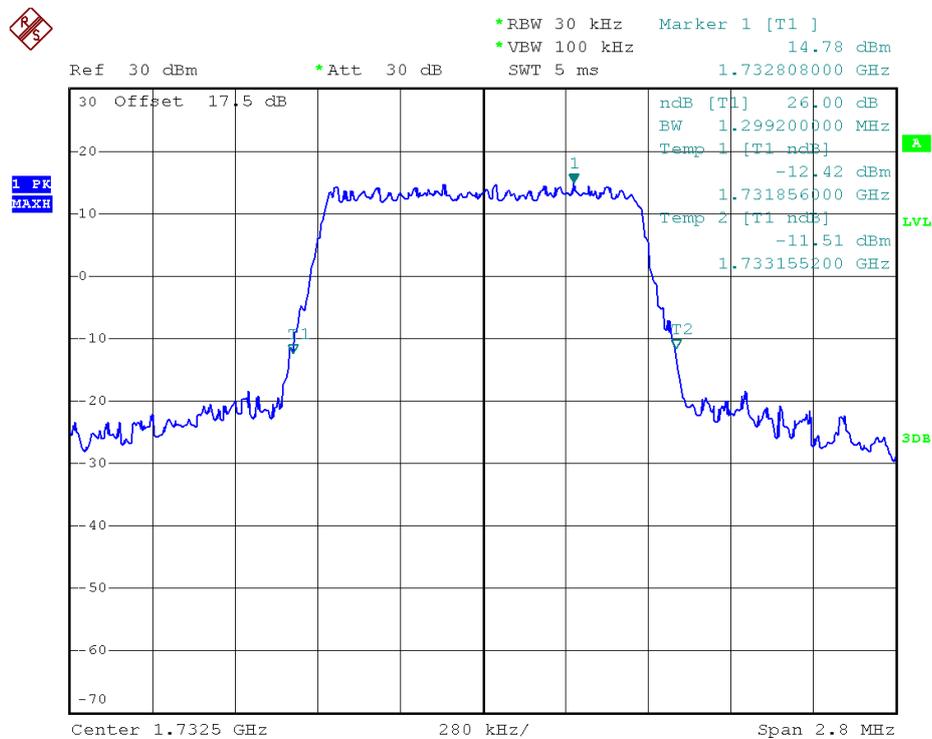
(Plot A1: 99% Occupied Bandwidth LTE Band 4 / 1.4MHz / QPSK)



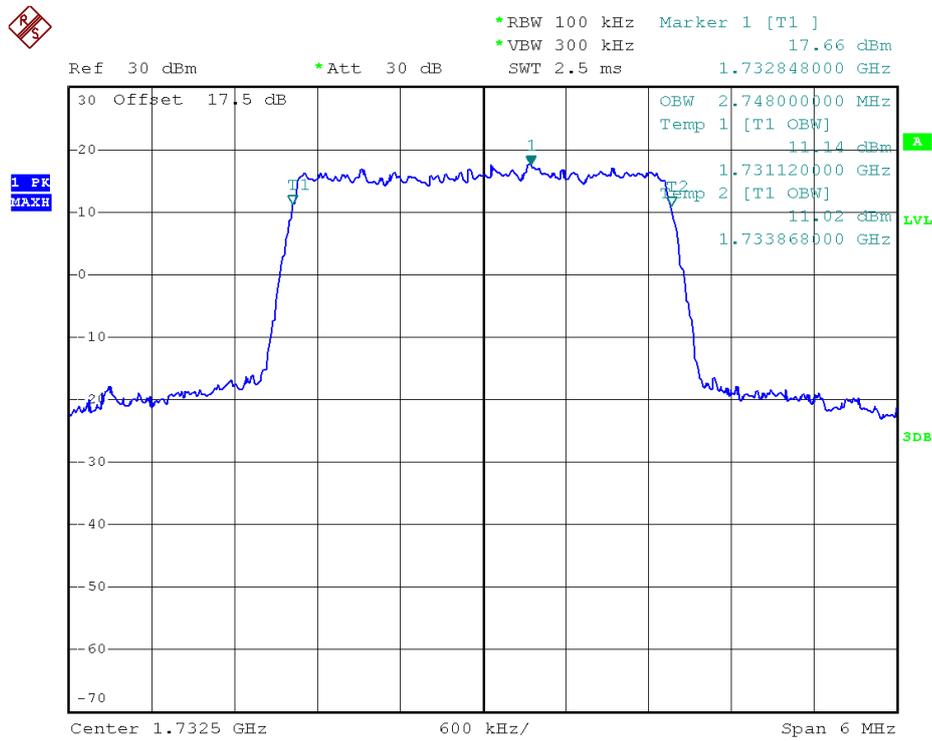
(Plot A2: 26dB Bandwidth LTE Band 4 / 1.4MHz / QPSK)



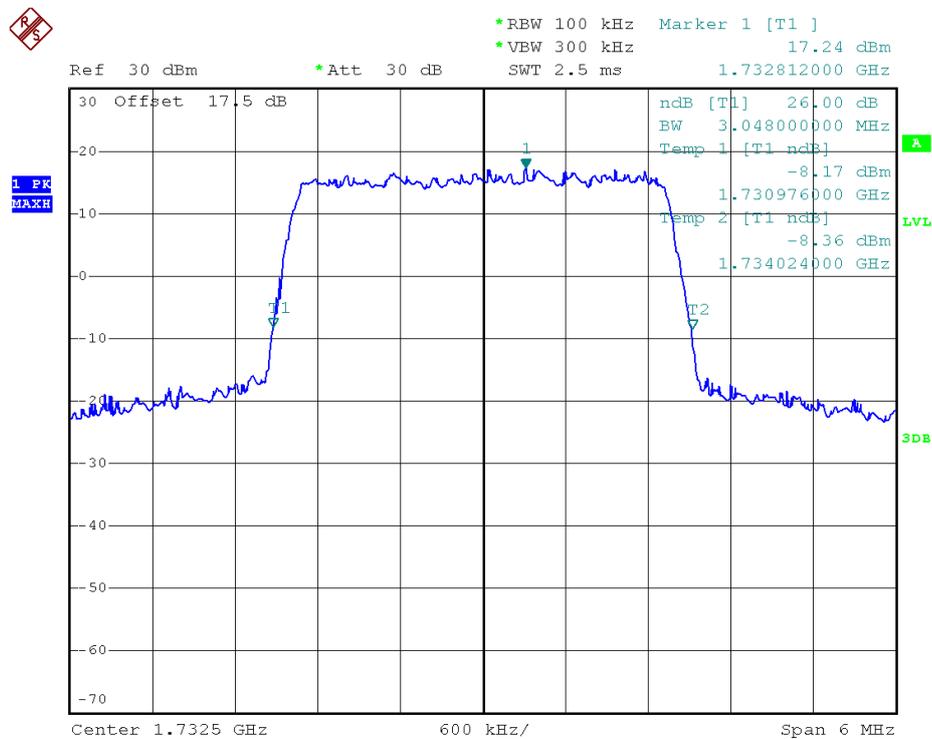
(Plot A3: 99% Occupied Bandwidth LTE Band 4 / 1.4MHz / 16QAM)



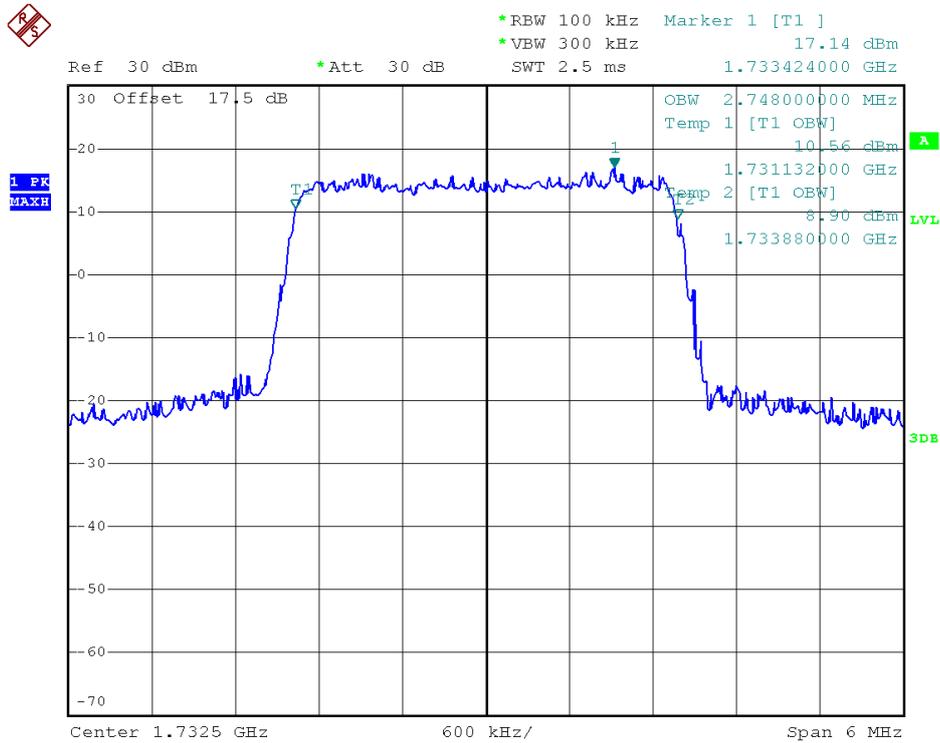
(Plot A4: 26dB Bandwidth LTE Band 4 / 1.4MHz / 16QAM)



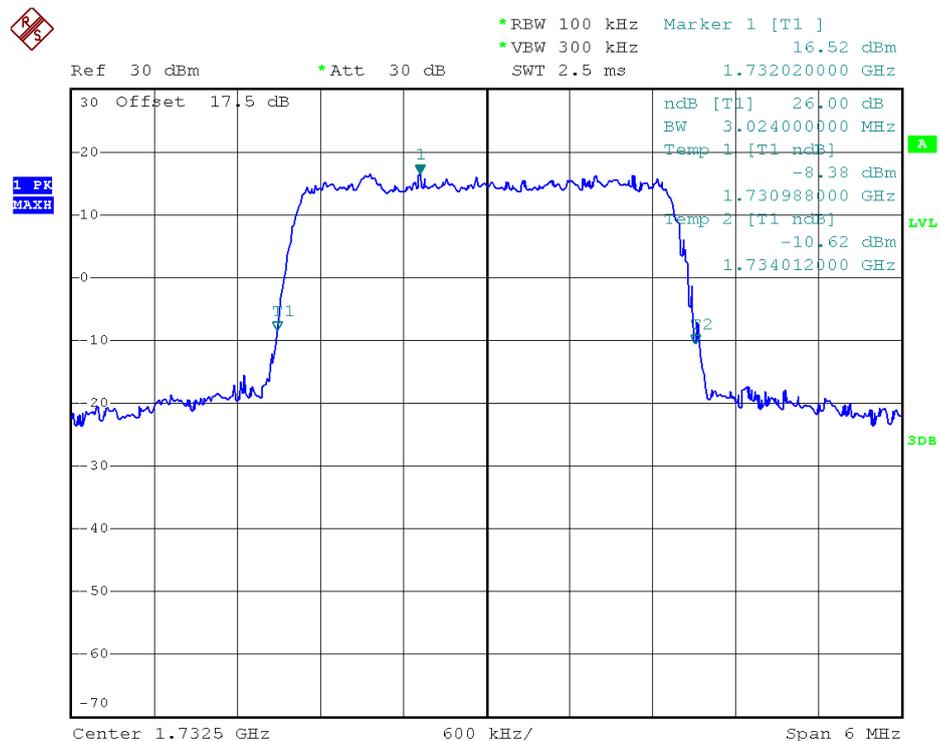
(Plot B1: 99% Occupied Bandwidth LTE Band 4 / 3MHz / QPSK)



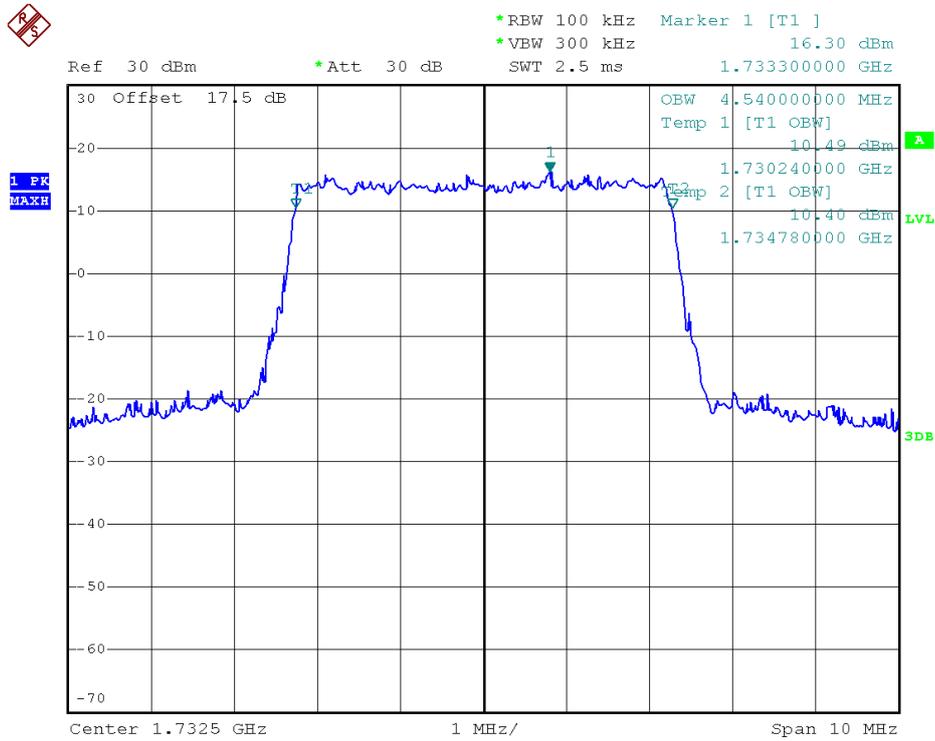
(Plot B2: 26dB Bandwidth LTE Band 4 / 3MHz / QPSK)



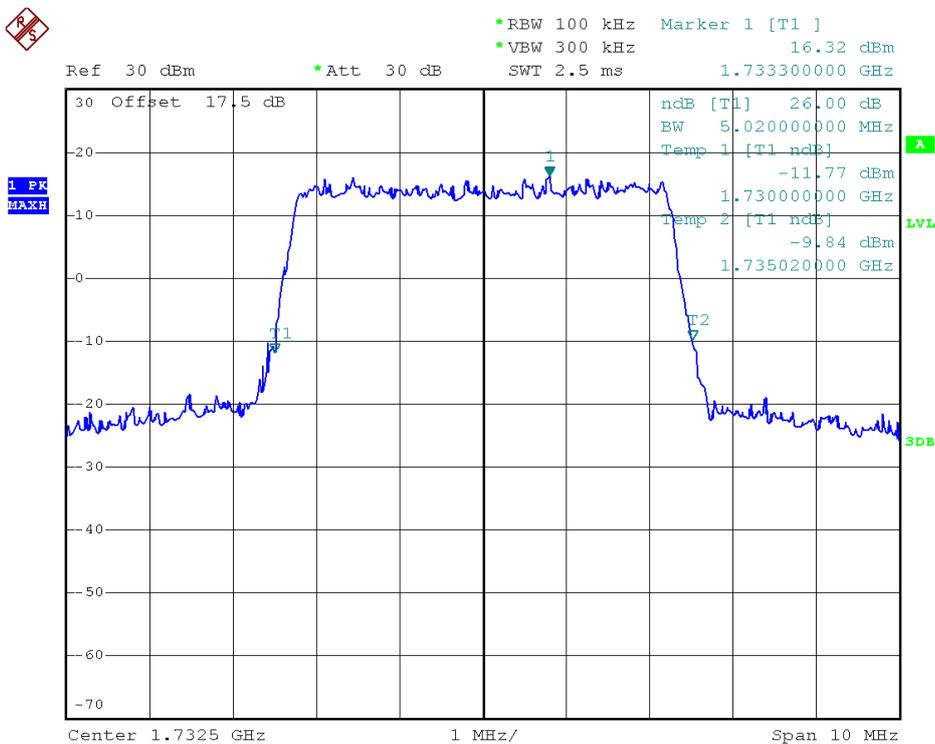
(Plot B3: 99% Occupied Bandwidth LTE Band 4 / 3MHz / 16QAM)



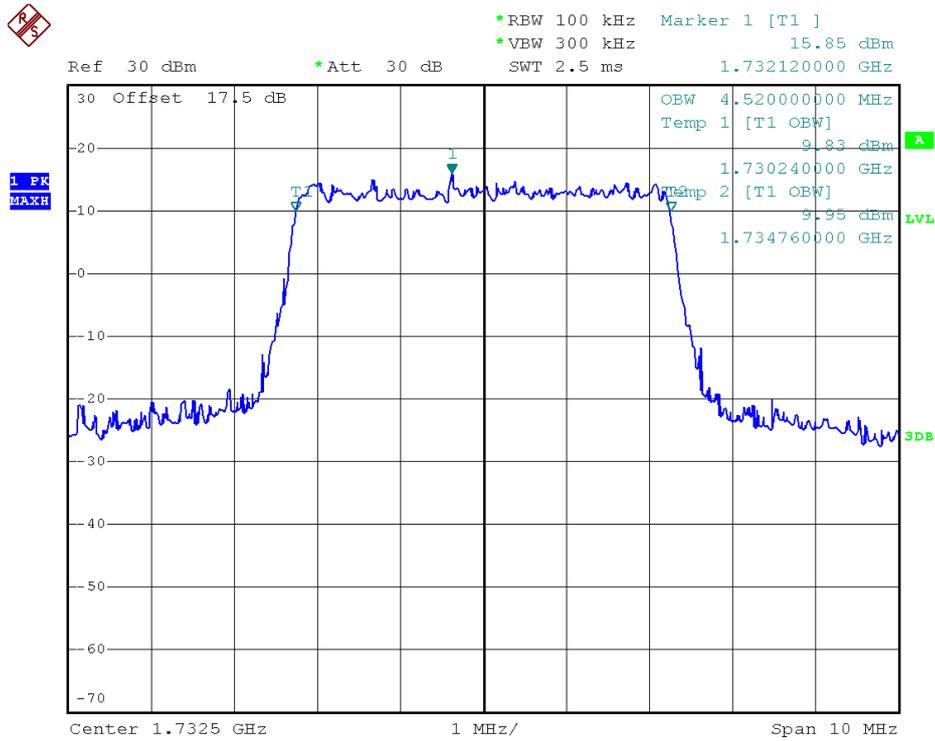
(Plot B4: 26dB Bandwidth LTE Band 4 / 3MHz / 16QAM)



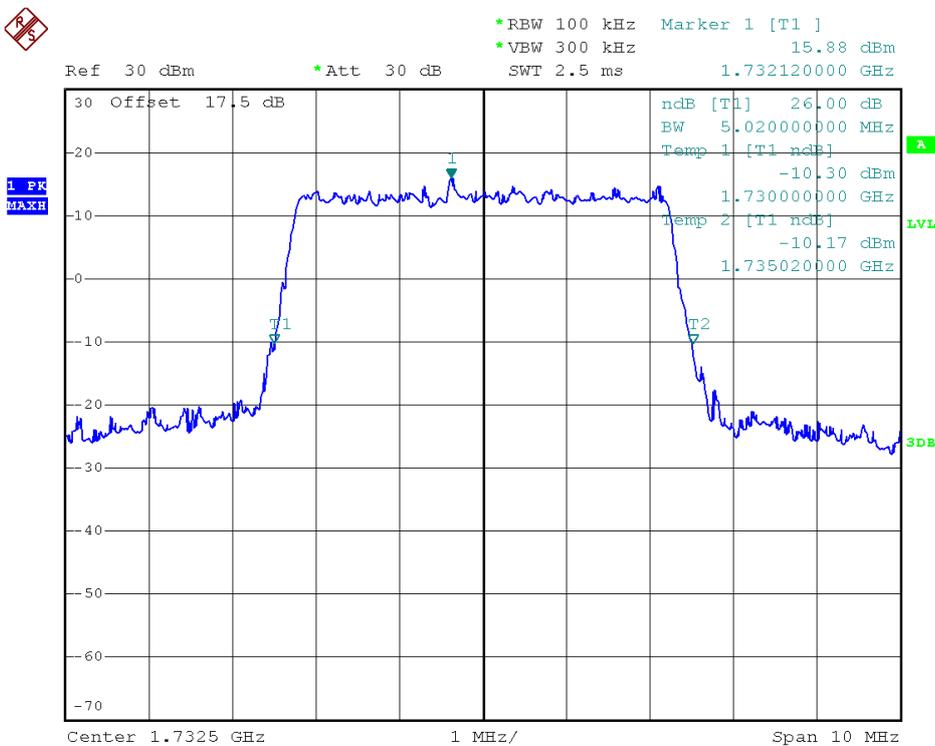
(Plot C1: 99% Occupied Bandwidth LTE Band 4 / 5MHz / QPSK)



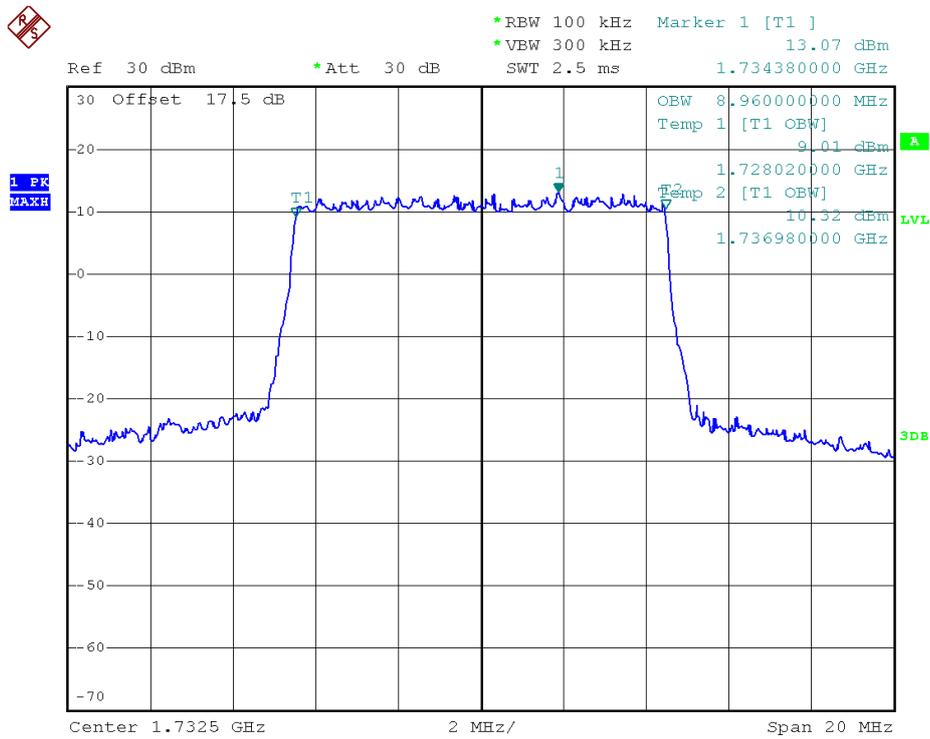
(Plot C2: 26dB Bandwidth LTE Band 4 / 5MHz / QPSK)



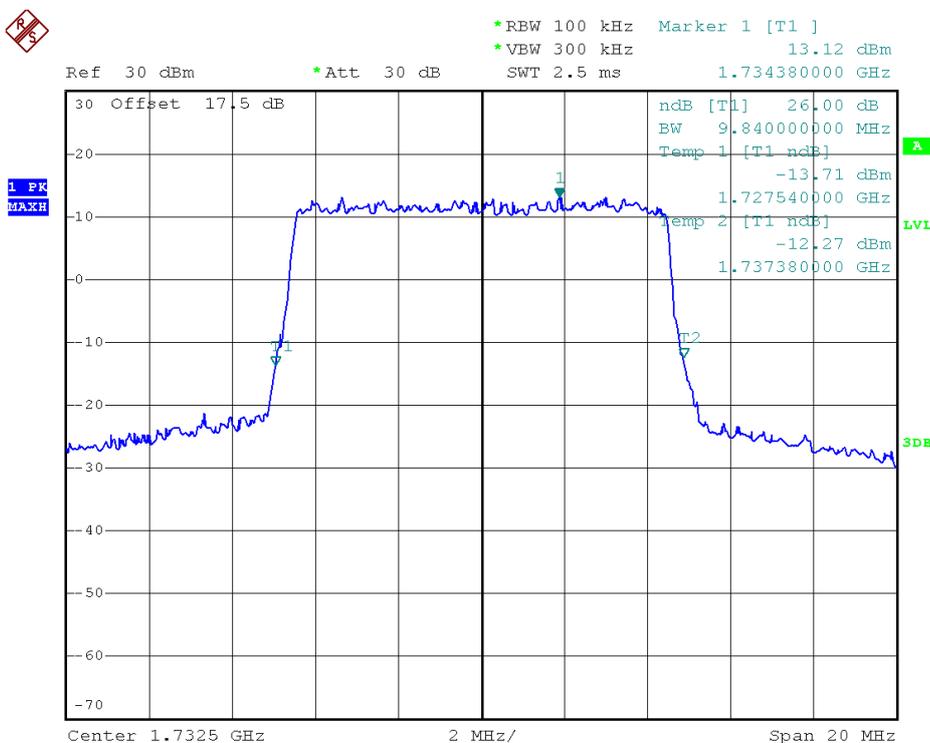
(Plot C3: 99% Occupied Bandwidth LTE Band 4 / 5MHz / 16QAM)



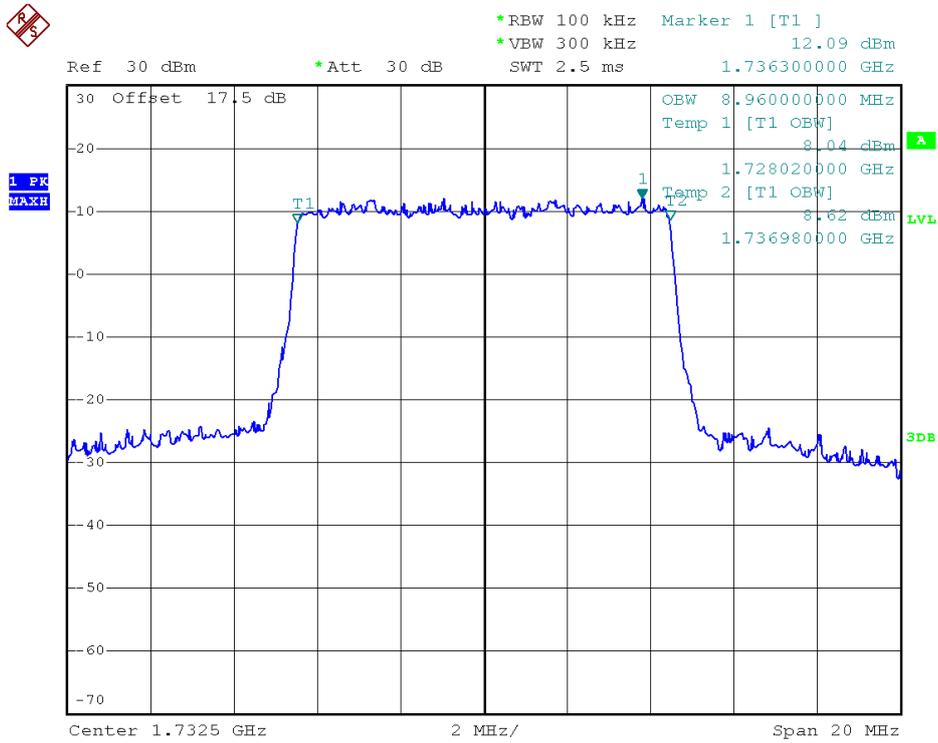
(Plot C4: 26dB Bandwidth LTE Band 4 / 5MHz / 16QAM)



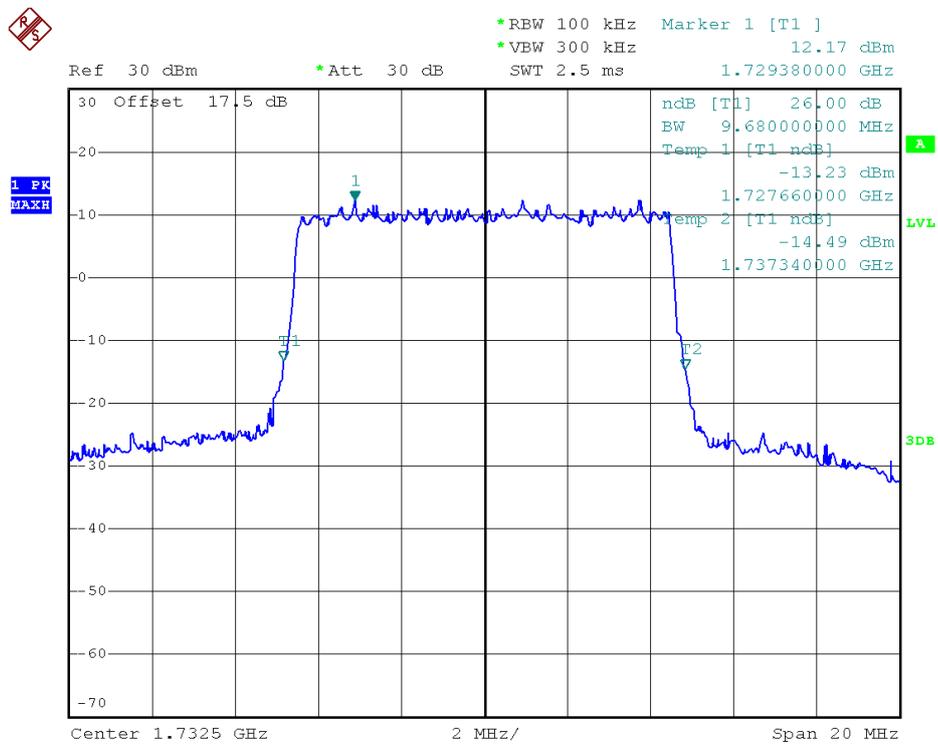
(Plot D1: 99% Occupied Bandwidth LTE Band 4 / 10MHz / QPSK)



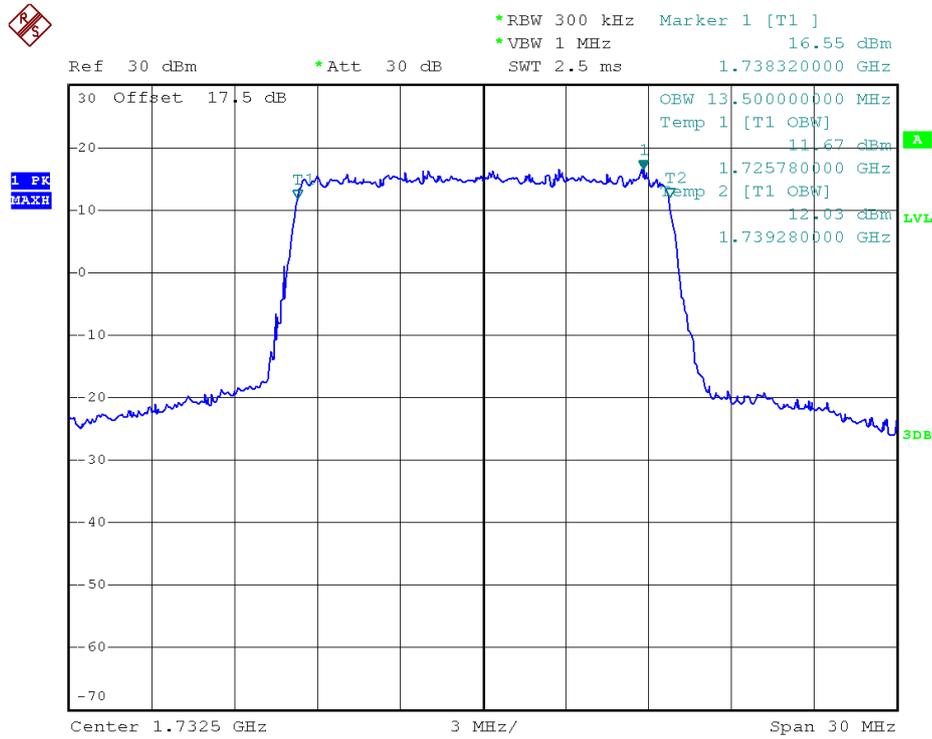
(Plot D2: 26dB Bandwidth LTE Band 4 / 10MHz / QPSK)



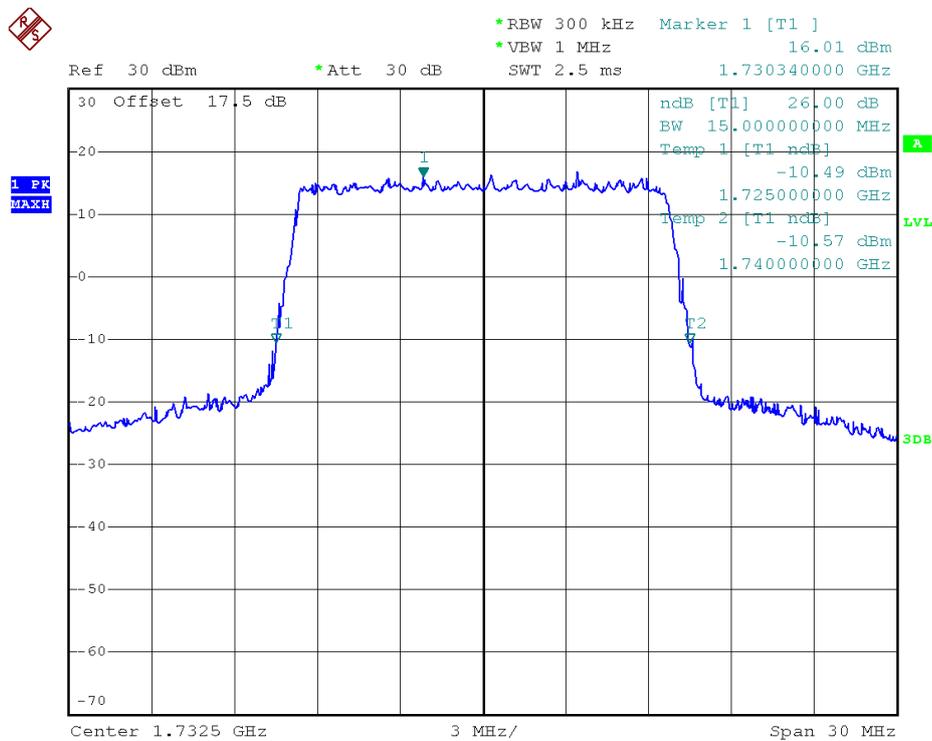
(Plot D3: 99% Occupied Bandwidth LTE Band 4 / 10MHz / 16QAM)



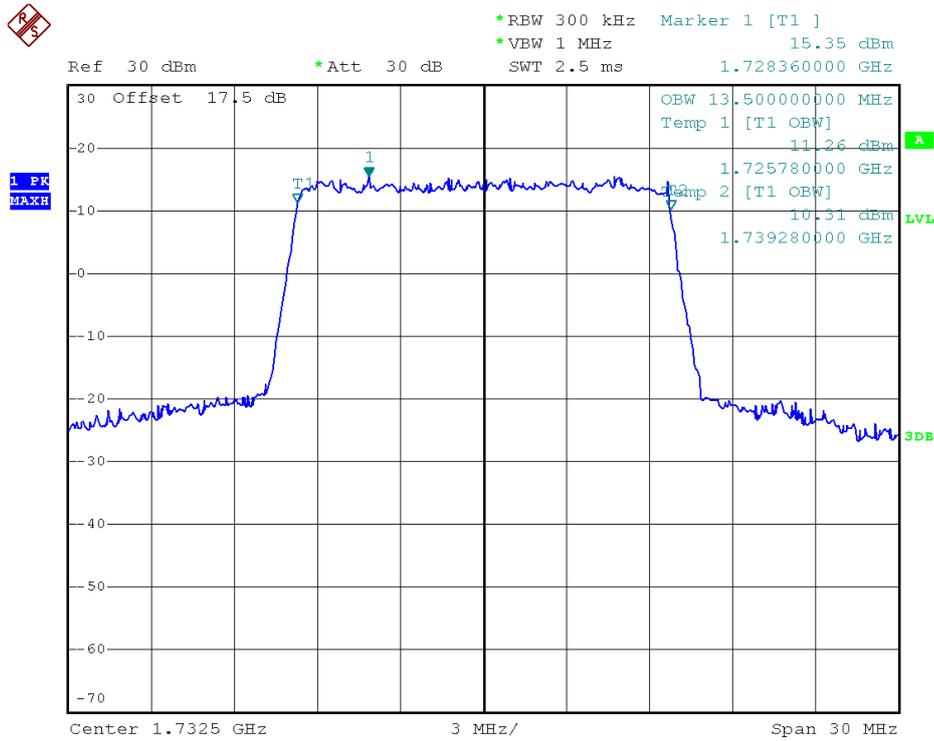
(Plot D4: 26dB Bandwidth LTE Band 4 / 10MHz / 16QAM)



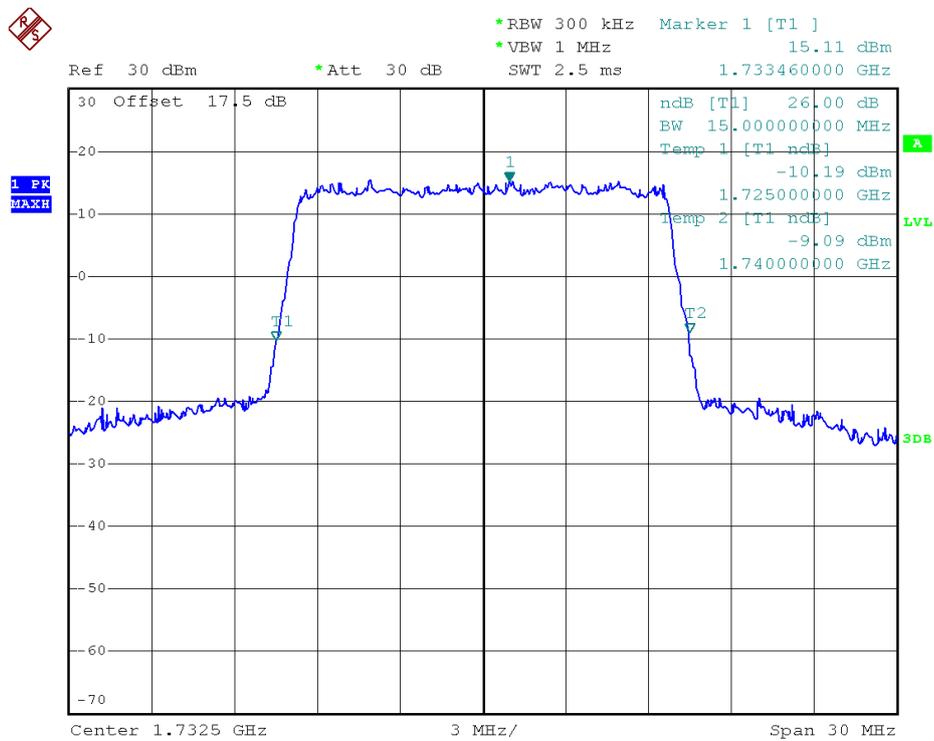
(Plot E1: 99% Occupied Bandwidth LTE Band 4 / 15MHz / QPSK)



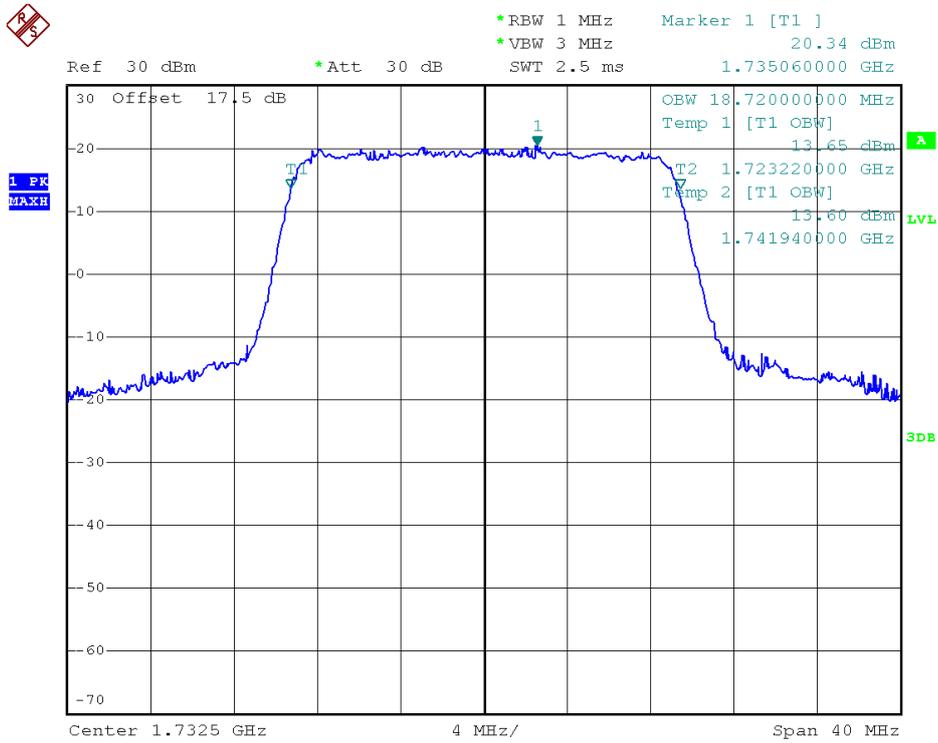
(Plot E2: 26dB Bandwidth LTE Band 4 / 15MHz / QPSK)



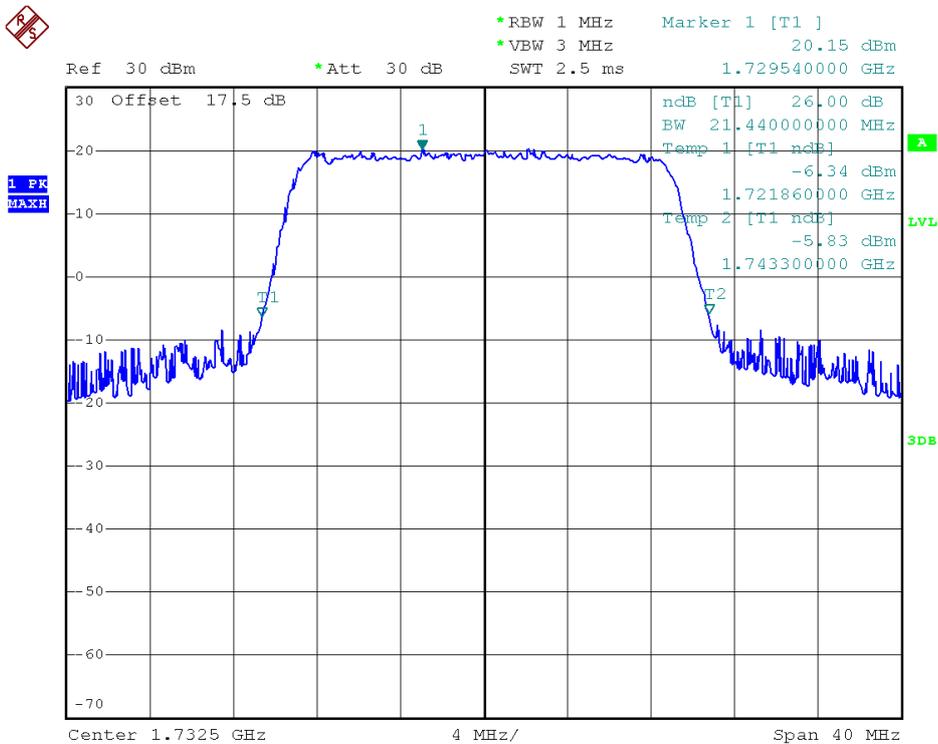
(Plot E3: 99% Occupied Bandwidth LTE Band 4 / 15MHz / 16QAM)



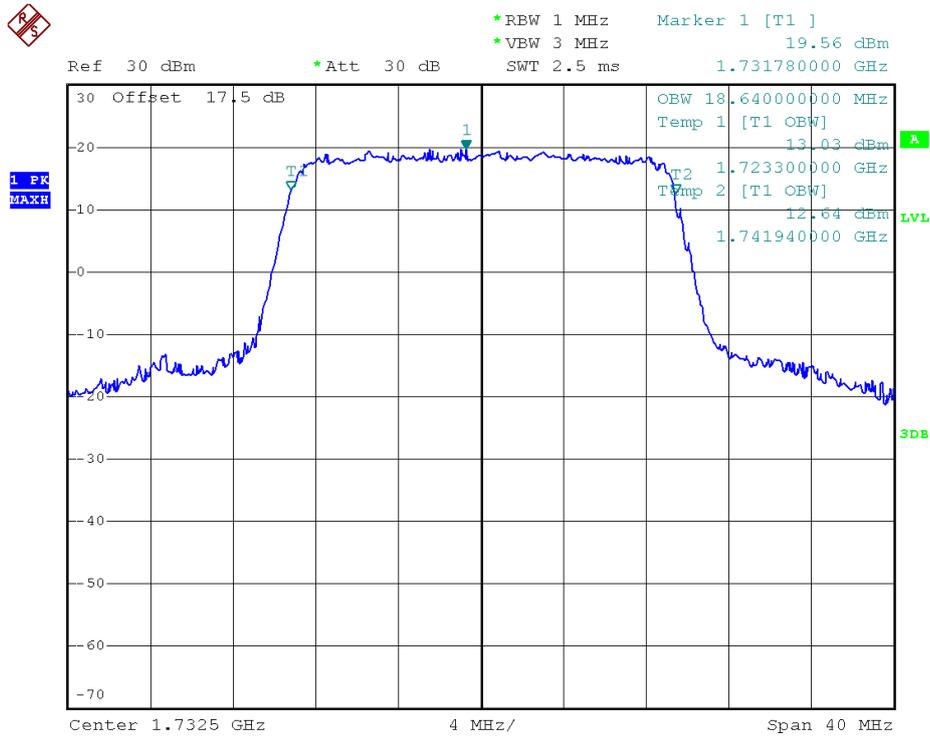
(Plot E4: 26dB Bandwidth LTE Band 4 / 15MHz / 16QAM)



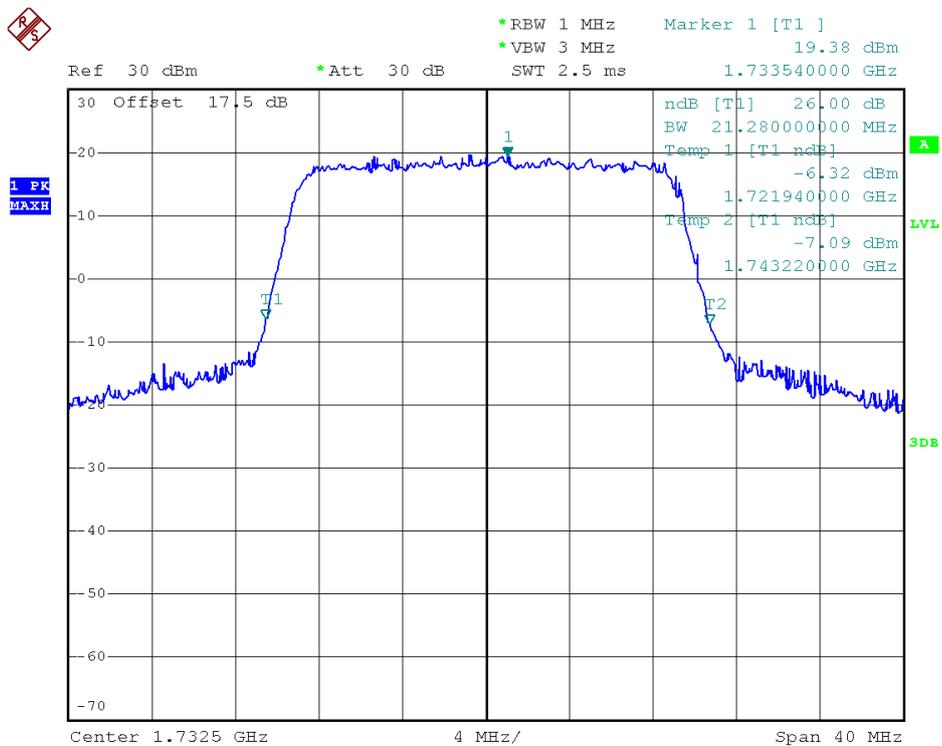
(Plot F1: 99% Occupied Bandwidth LTE Band 4 / 20MHz / QPSK)



(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)

2.4 Frequency Stability

2.4.1 Requirement

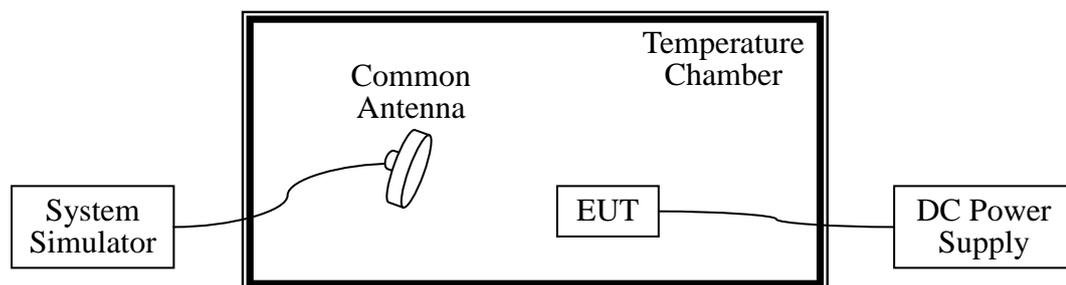
According to FCC section 27.54, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental 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 ,BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 1732.5MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.7	-30	29	0.02	2.5
	-20	48	0.03	
	-10	19	0.01	
	0	36	0.02	
	+10	18	0.01	
	+20	19	0.01	
	+30	21	0.01	
	+40	53	0.03	
+55	34	0.02		
4.2	+25	51	0.03	
3.5	+25	49	0.03	

2. LTE Band 4, 16QAM ,BW 10MHz

Test Conditions		Frequency Deviation BW 10MHz Middle Channel 1732.5MHz		
Power (VDC)	Temperature (°C)	Frequency Error	Frequency Error	Limit
		Hz	ppm	ppm
3.7	-30	18	0.01	2.5
	-20	55	0.03	
	-10	34	0.02	
	0	29	0.02	
	+10	33	0.02	
	+20	17	0.01	
	+30	33	0.02	
	+40	23	0.01	
	+55	17	0.01	
4.2	+25	57	0.03	
3.5	+25	33	0.02	

2.5 Conducted Out of Band Emissions

2.5.1 Requirement

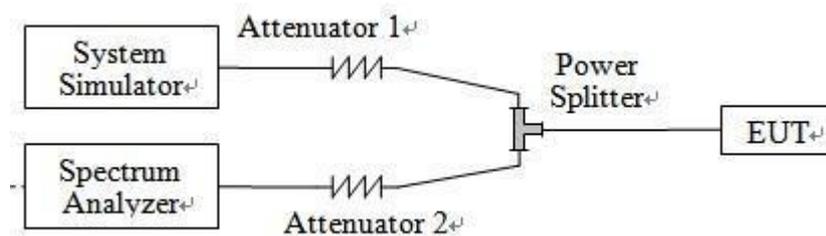
According to FCC section 27.53(h), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43+10*\log(P)$ dB. This calculated to be -13dBm.

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

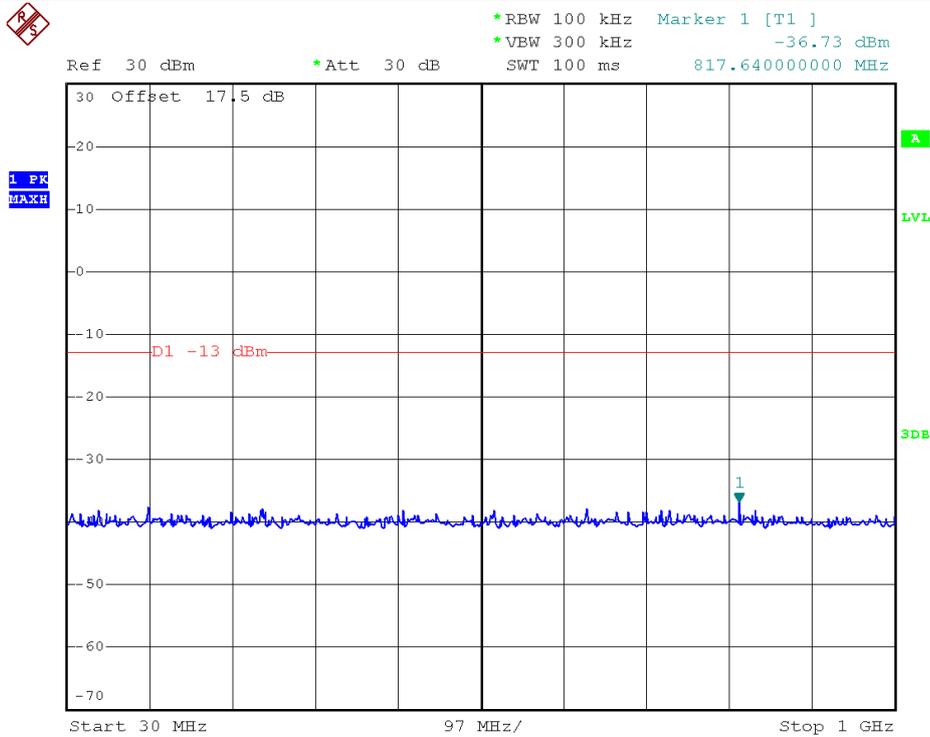
1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the 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.



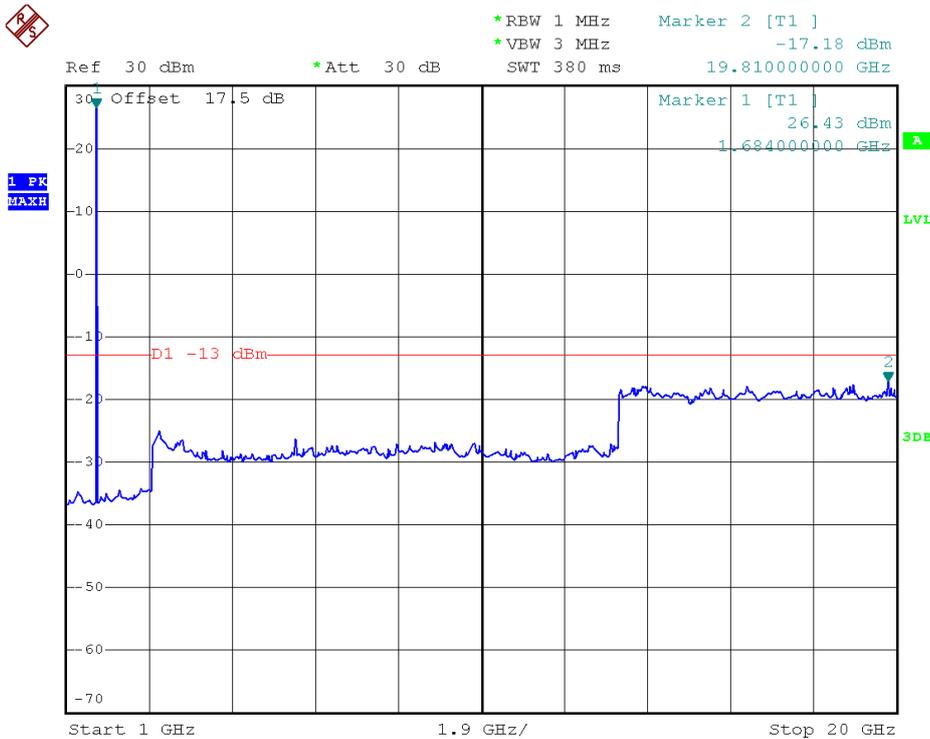
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13$ dBm.
8. For 9 KHz to 30MHz: the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2.5.5 Test Result of Conducted Spurious Emission

Band	LTE Band 4	Channel	Low
Bandwidth	1.4MHz	Modulation	QPSK



RB Size 1, RB Offset 0 30MHz to 1GHz



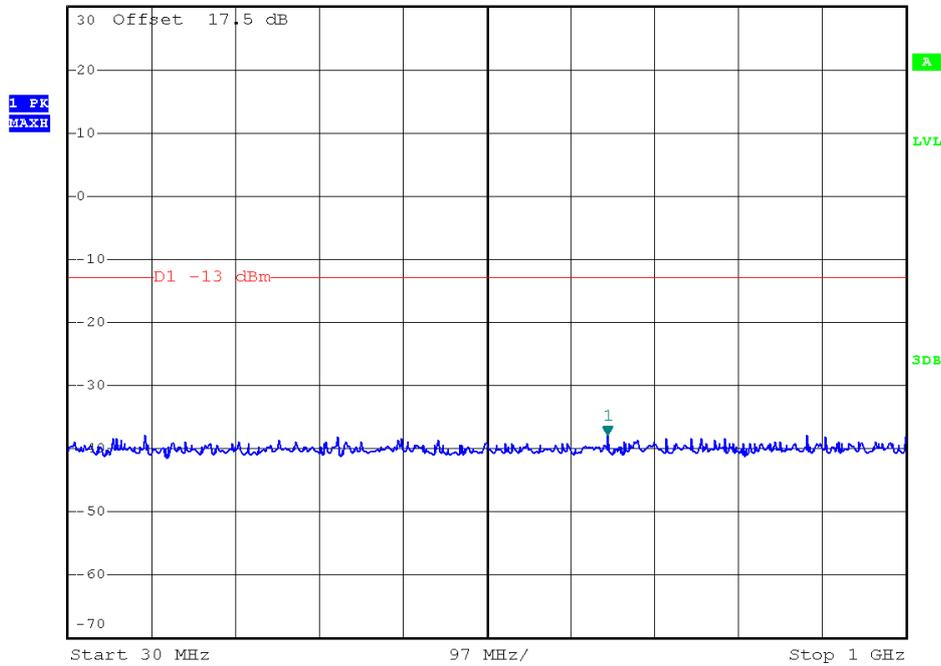
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Middle
Bandwidth	1.4MHz	Modulation	QPSK



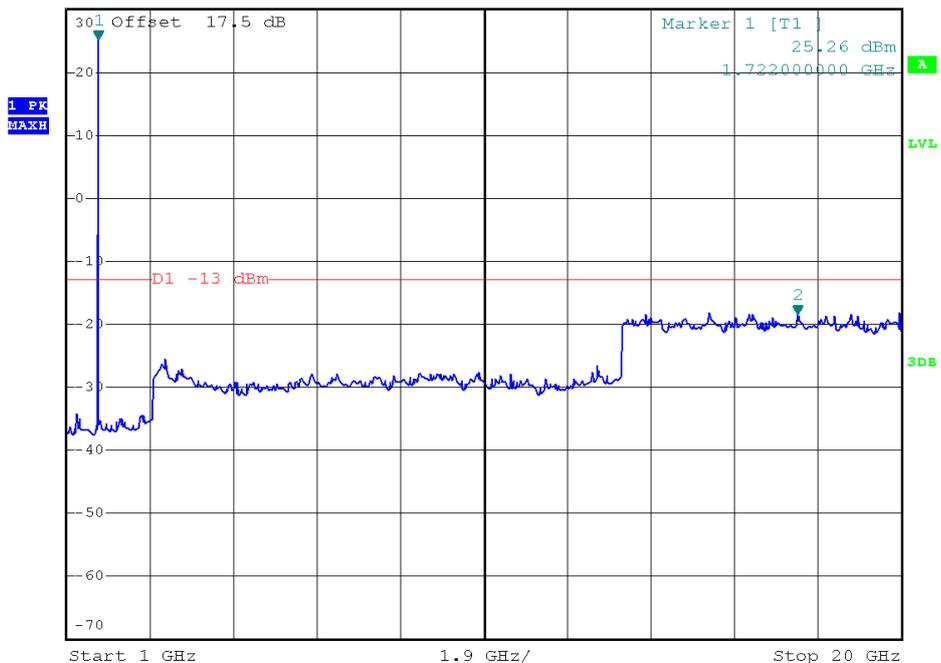
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -37.81 dBm
 SWT 100 ms 654.680000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1]
 *VBW 3 MHz -18.33 dBm
 SWT 380 ms 17.644000000 GHz



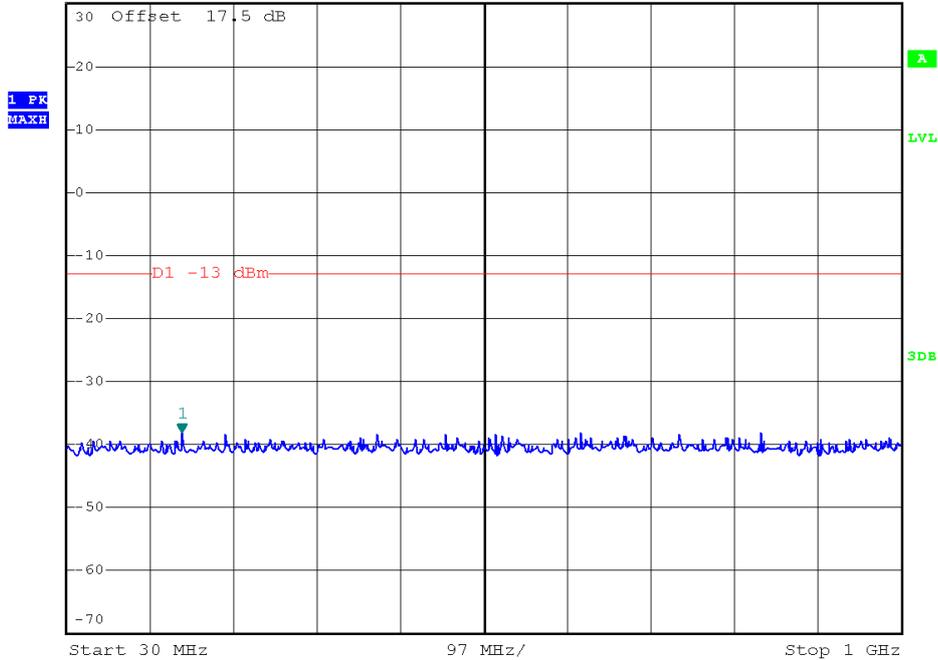
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	High
Bandwidth	1.4MHz	Modulation	QPSK



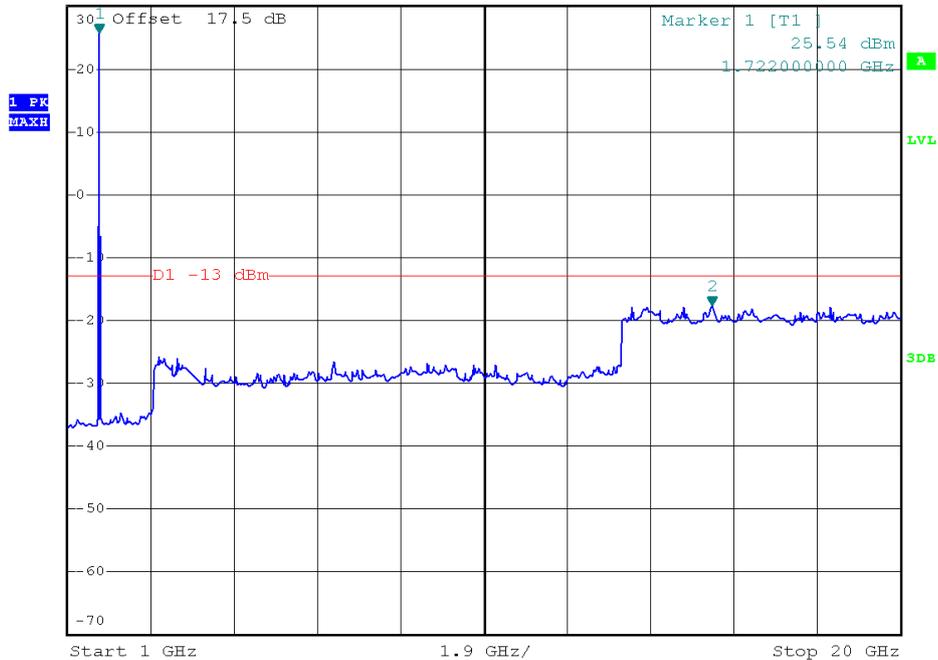
*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -38.00 dBm
 Ref 30 dBm *Att 30 dB SWT 100 ms 163.860000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



*RBW 1 MHz Marker 2 [T1]
 *VBW 3 MHz -17.66 dBm
 Ref 30 dBm *Att 30 dB SWT 380 ms 15.706000000 GHz



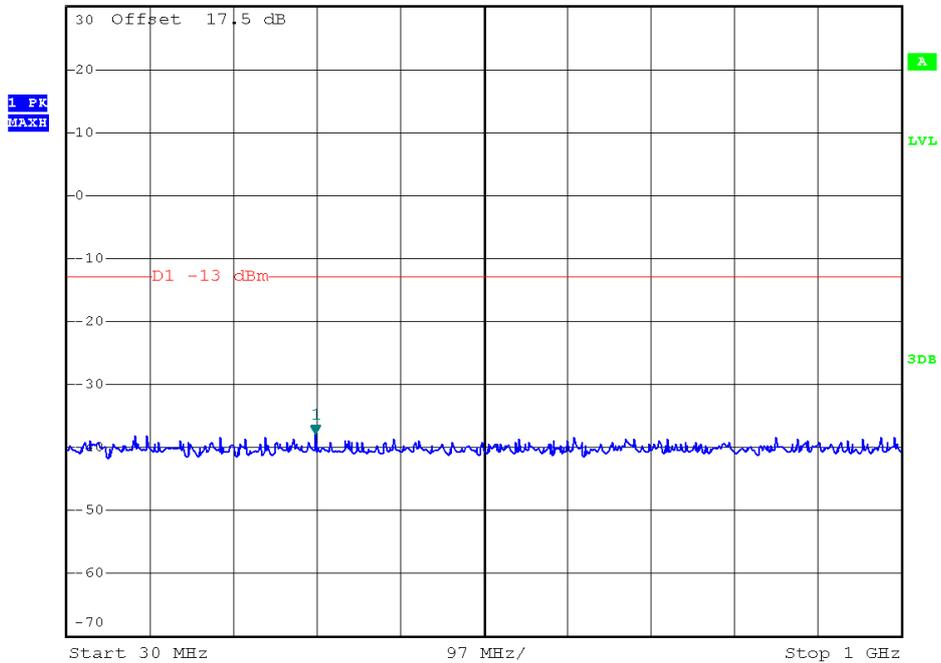
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Low
Bandwidth	3MHz	Modulation	QPSK



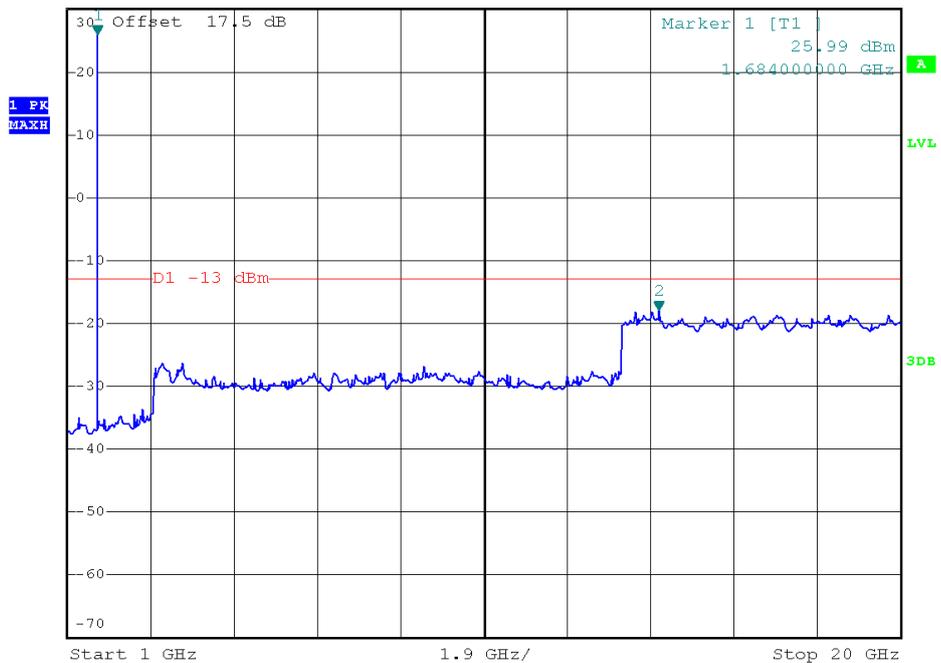
*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -37.92 dBm
 Ref 30 dBm *Att 30 dB SWT 100 ms 319.060000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



*RBW 1 MHz Marker 2 [T1]
 *VBW 3 MHz -18.00 dBm
 Ref 30 dBm *Att 30 dB SWT 380 ms 14.490000000 GHz



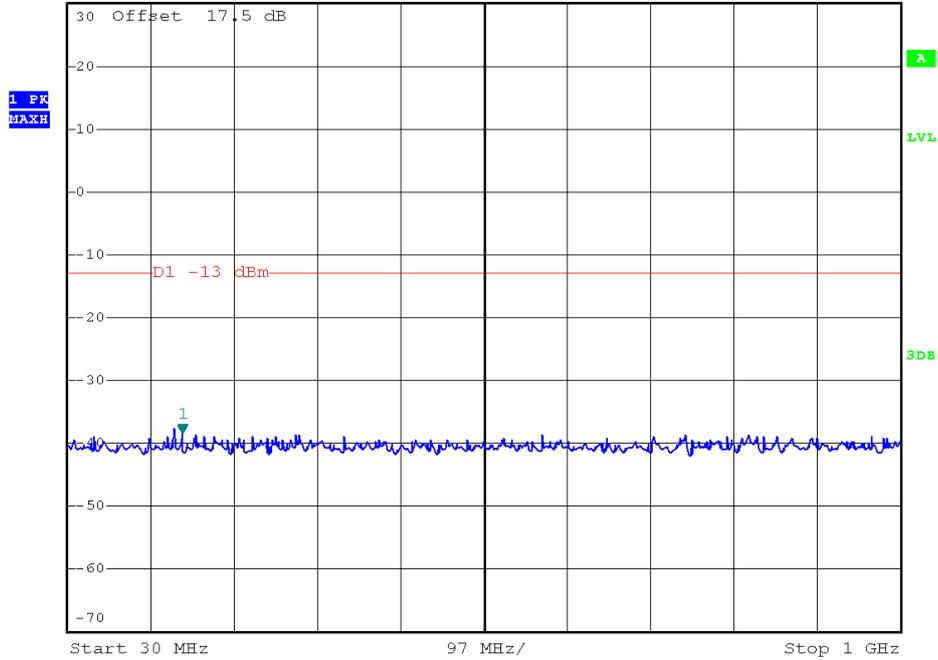
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Middle
Bandwidth	3MHz	Modulation	QPSK



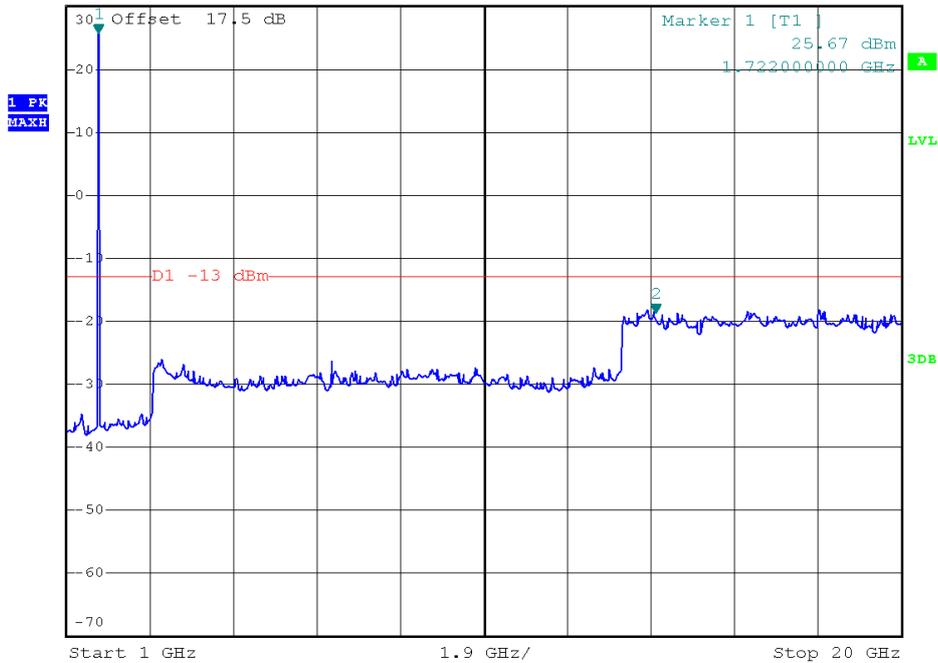
*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -38.49 dBm
 Ref 30 dBm *Att 30 dB SWT 100 ms 163.860000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



*RBW 1 MHz Marker 2 [T1]
 *VBW 3 MHz -18.59 dBm
 Ref 30 dBm *Att 30 dB SWT 380 ms 14.414000000 GHz



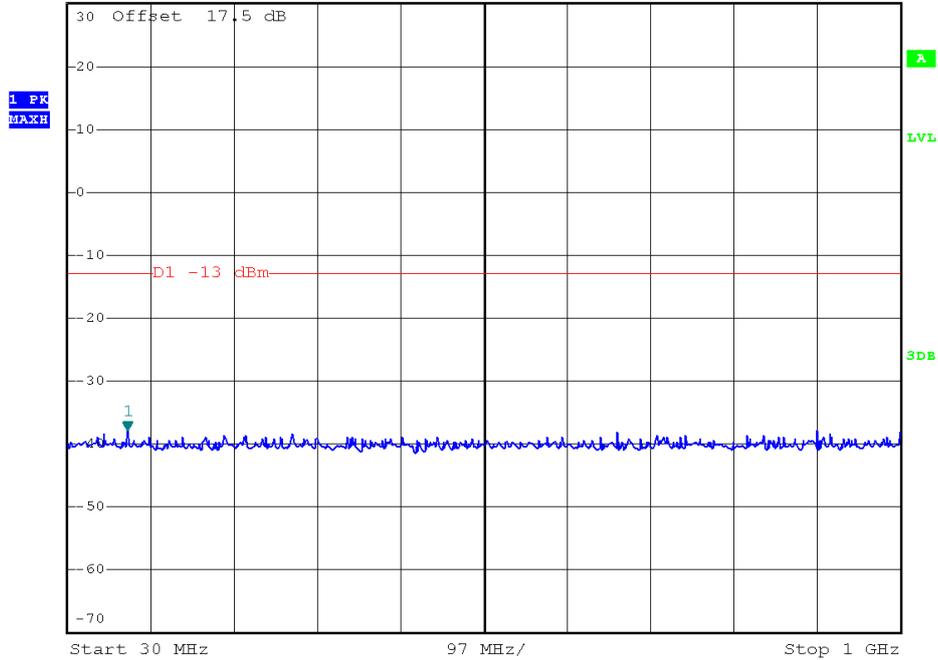
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	High
Bandwidth	3MHz	Modulation	QPSK



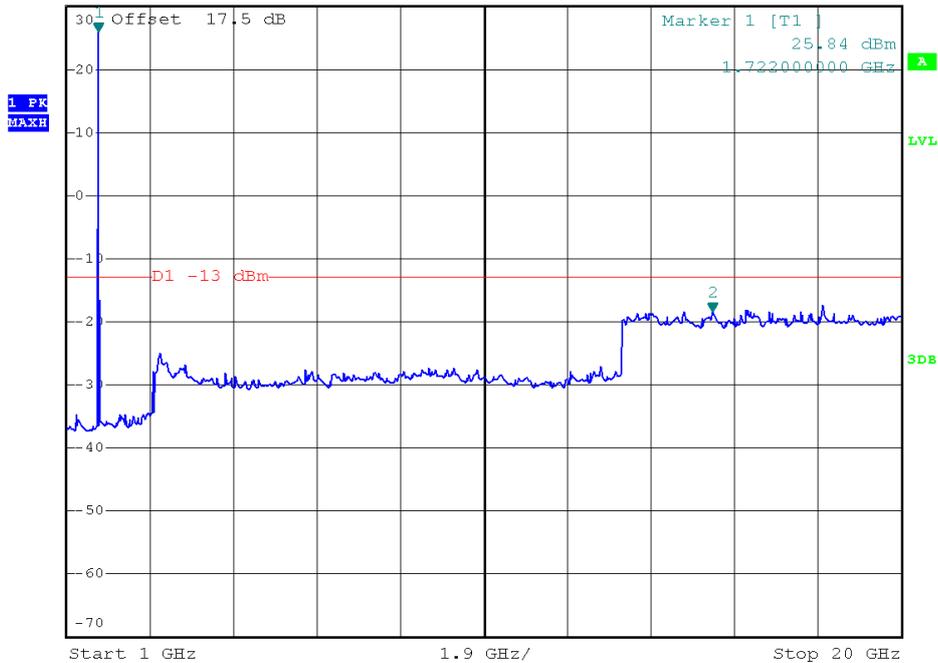
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz -37.79 dBm
SWT 100 ms 99.840000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1]
*VBW 3 MHz -18.33 dBm
SWT 380 ms 15.706000000 GHz



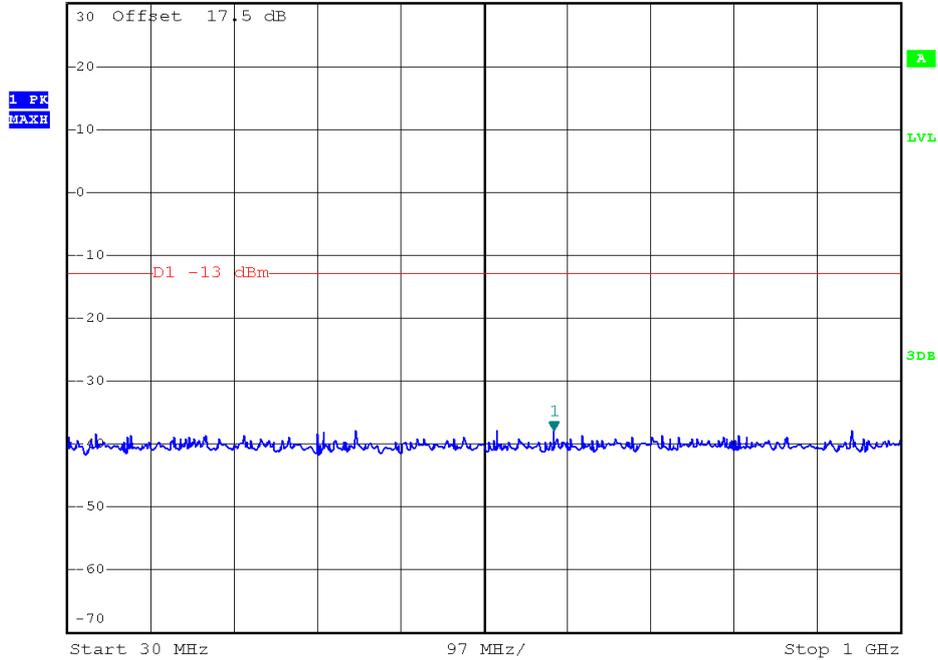
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Low
Bandwidth	5MHz	Modulation	QPSK



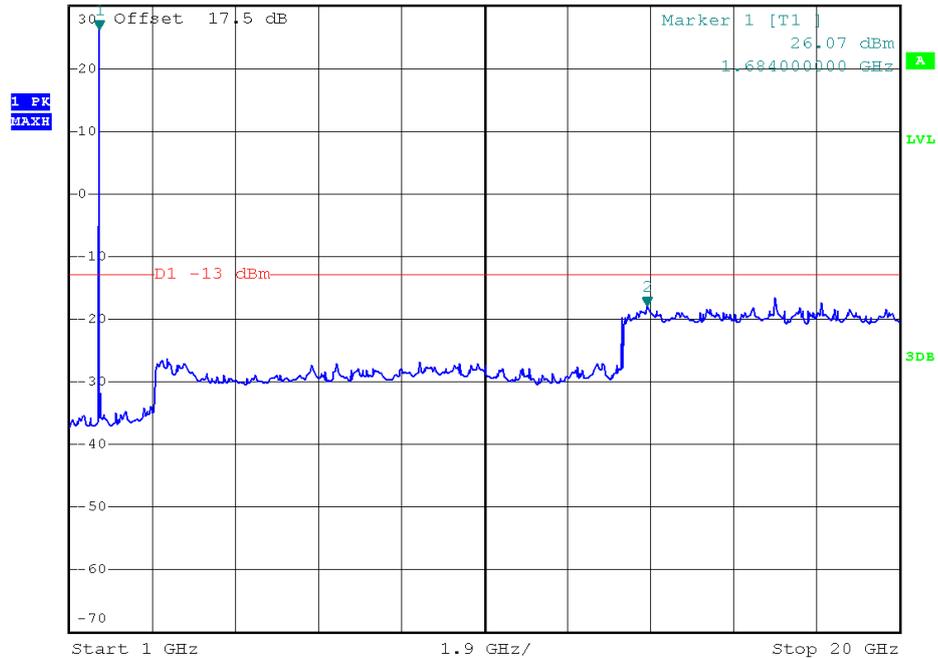
*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -37.92 dBm
 Ref 30 dBm *Att 30 dB SWT 100 ms 596.48000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



*RBW 1 MHz Marker 2 [T1]
 *VBW 3 MHz -17.96 dBm
 Ref 30 dBm *Att 30 dB SWT 380 ms 14.224000000 GHz



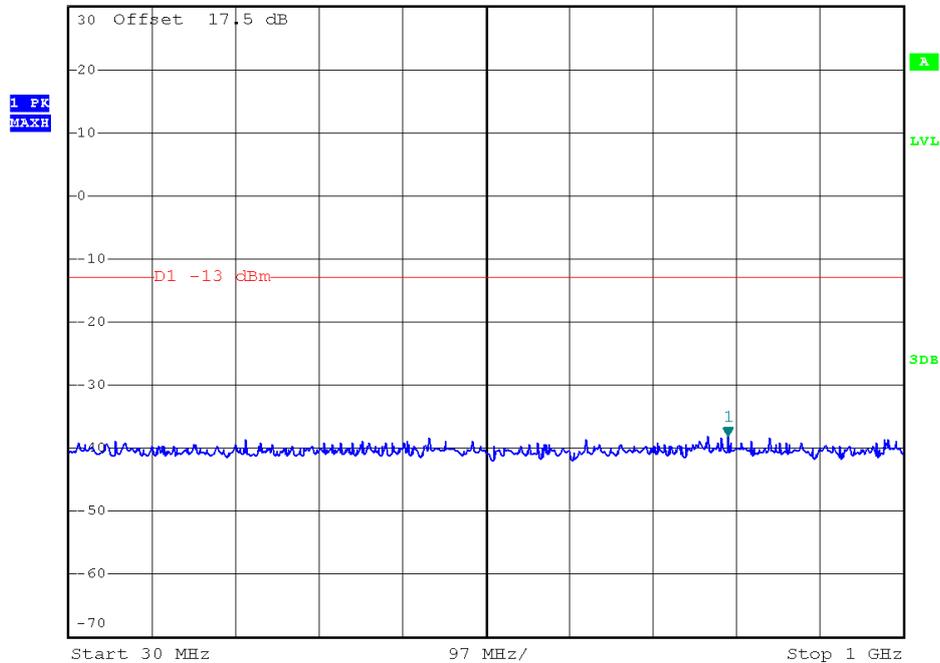
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Middle
Bandwidth	5MHz	Modulation	QPSK



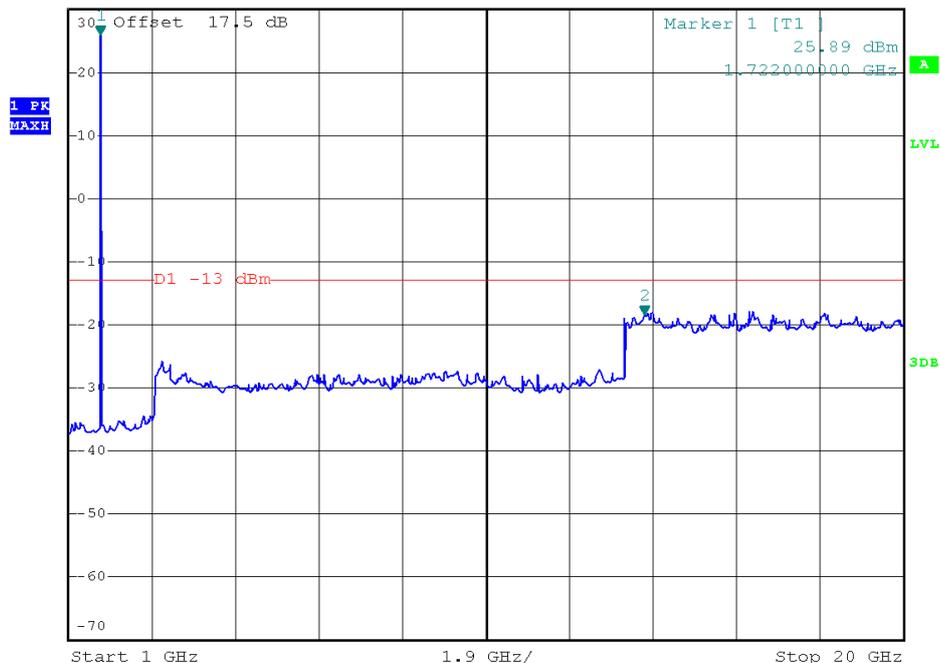
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1] -38.16 dBm
*VBW 300 kHz 796.300000000 MHz
SWT 100 ms



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1] -18.34 dBm
*VBW 3 MHz 14.110000000 GHz
SWT 380 ms



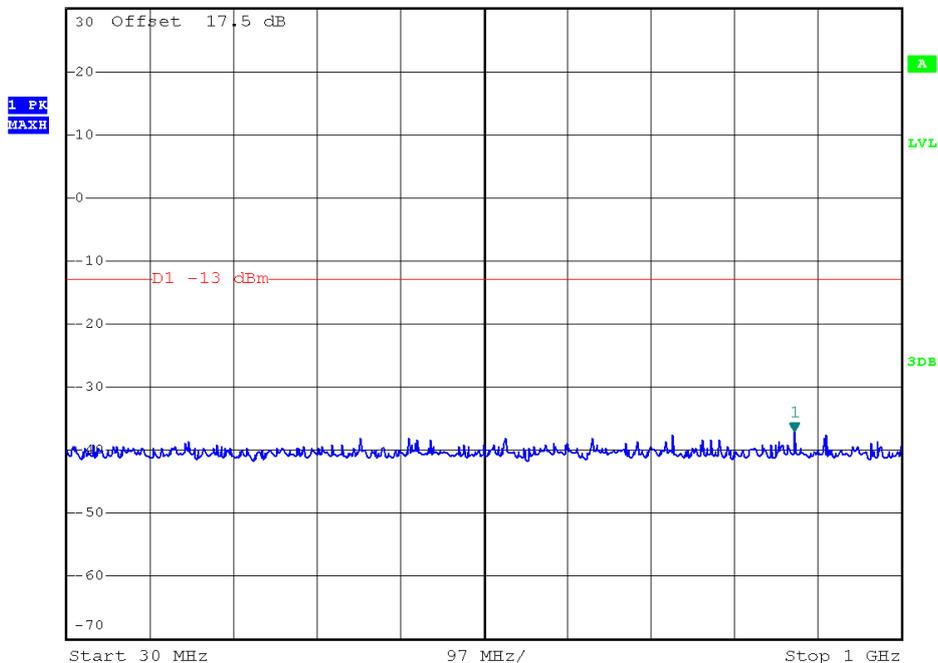
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	High
Bandwidth	5MHz	Modulation	QPSK



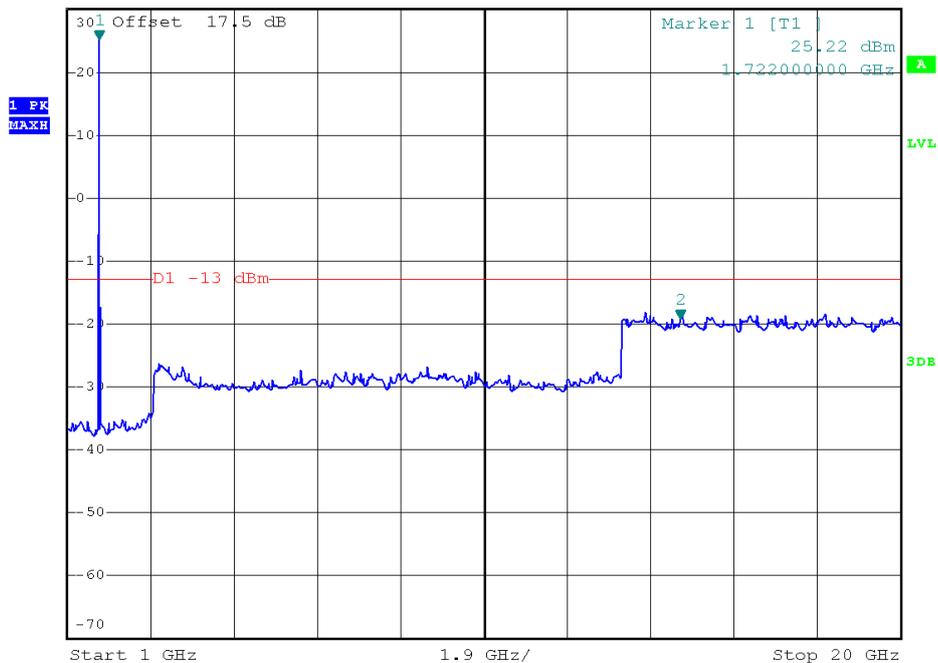
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz -37.10 dBm
SWT 100 ms 875.840000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1]
*VBW 3 MHz -19.28 dBm
SWT 380 ms 14.984000000 GHz



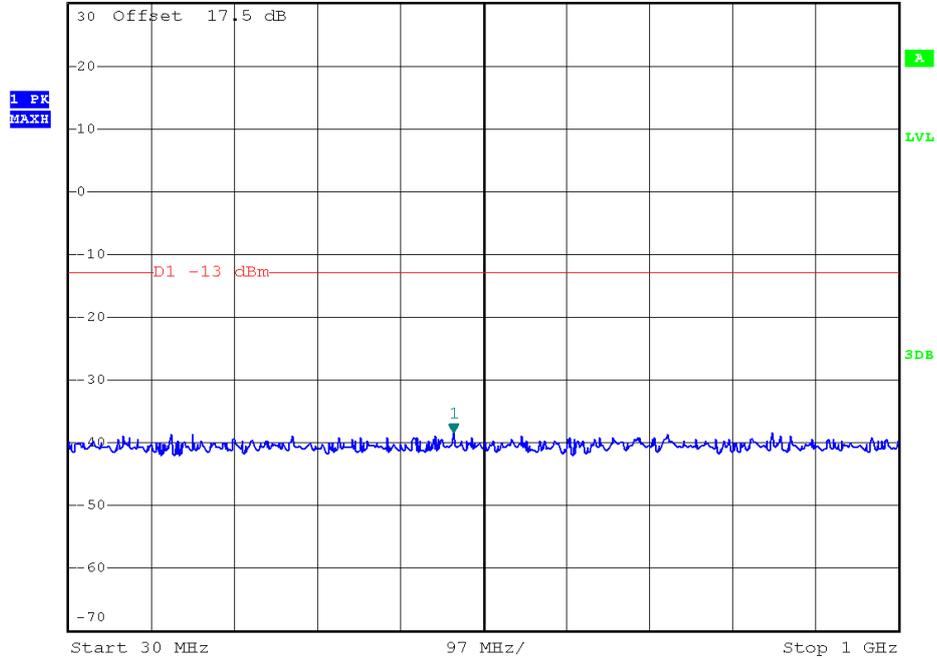
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Low
Bandwidth	10MHz	Modulation	QPSK



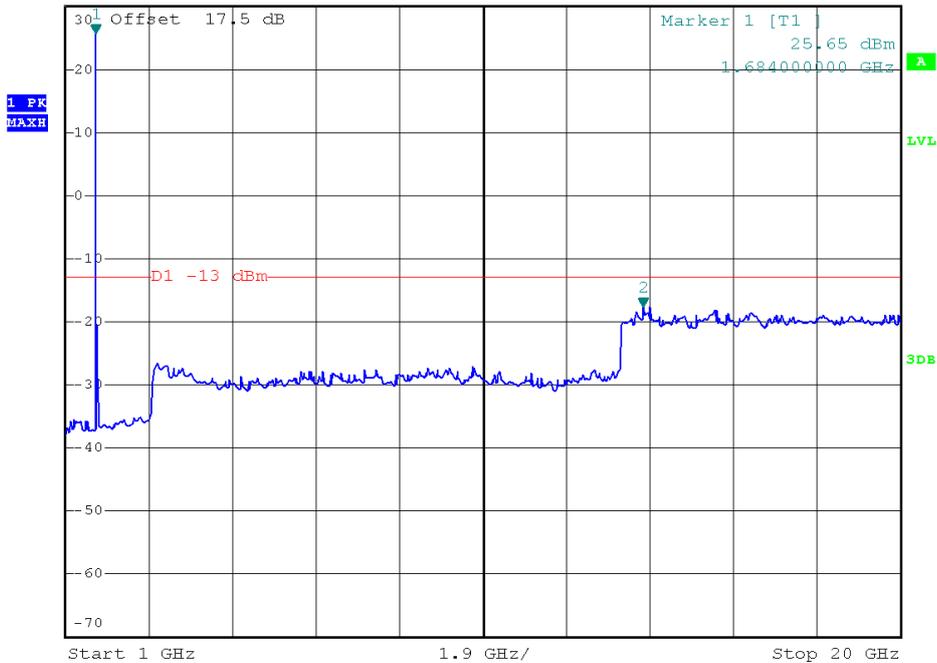
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz -38.30 dBm
SWT 100 ms 480.08000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1]
*VBW 3 MHz -17.72 dBm
SWT 380 ms 14.148000000 GHz



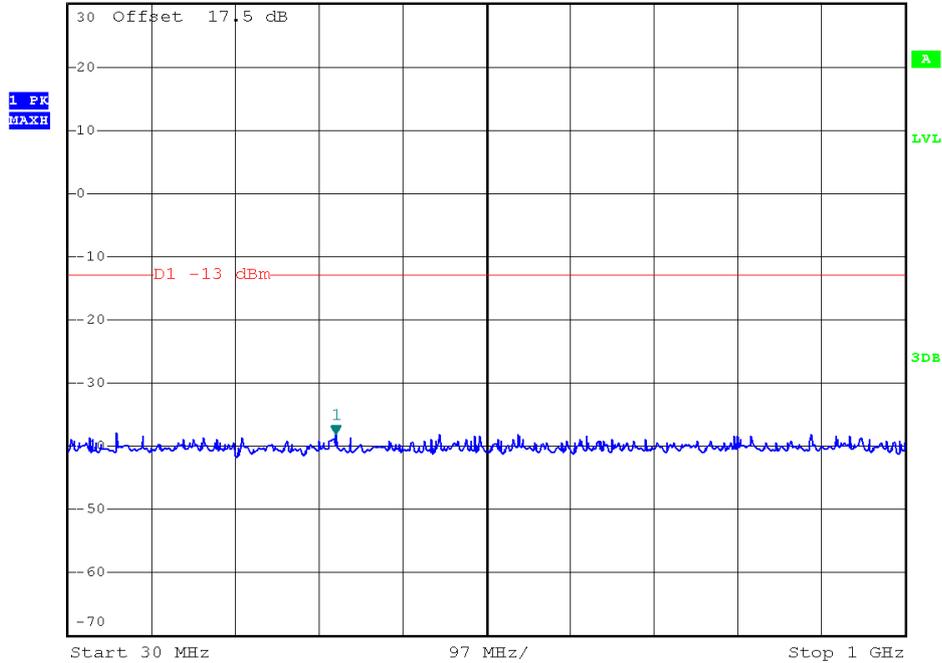
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Middle
Bandwidth	10MHz	Modulation	QPSK



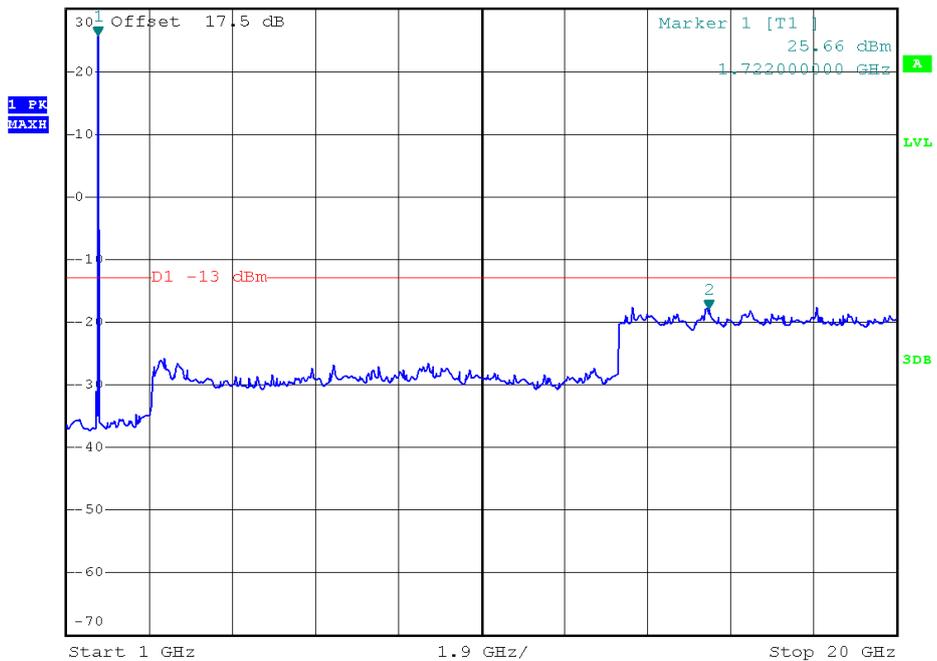
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
-38.08 dBm
*VBW 300 kHz
SWT 100 ms 340.400000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1]
-17.81 dBm
*VBW 3 MHz
SWT 380 ms 15.706000000 GHz



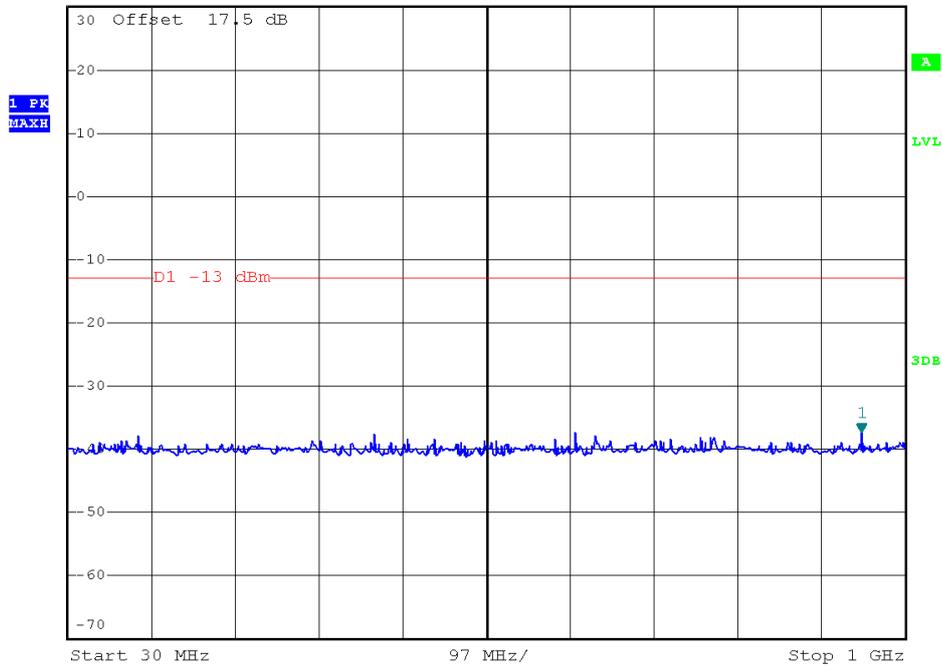
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	High
Bandwidth	10MHz	Modulation	QPSK



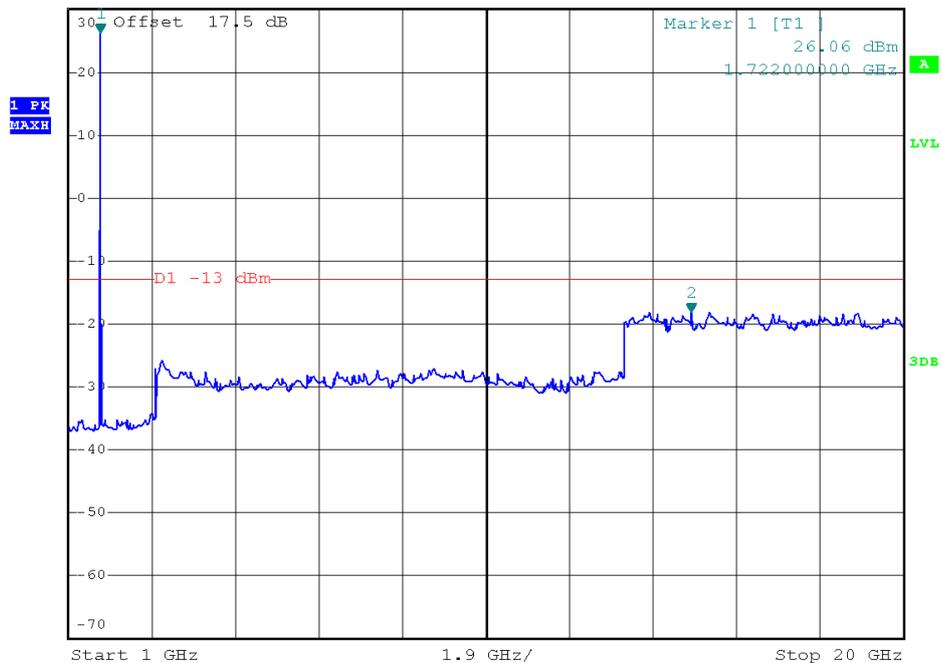
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
-37.45 dBm
SWT 100 ms 949.560000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1]
-18.25 dBm
SWT 380 ms 15.174000000 GHz



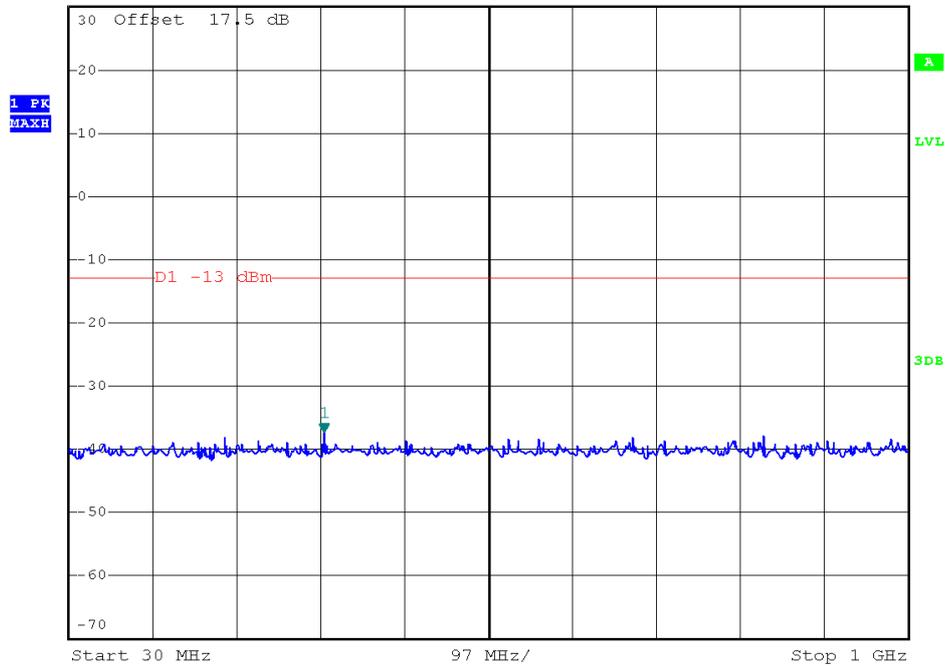
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Low
Bandwidth	15MHz	Modulation	QPSK



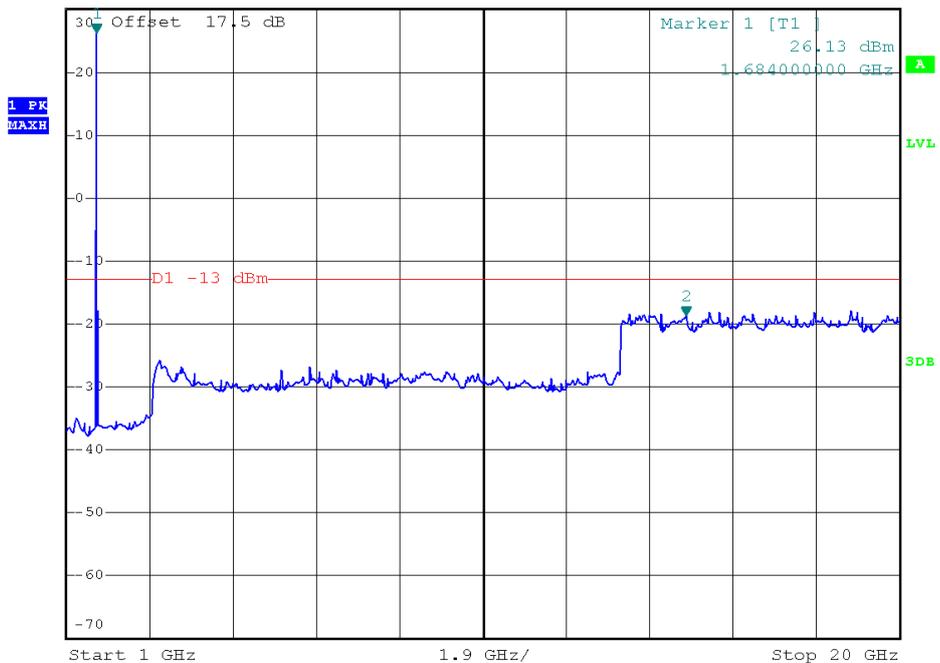
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1] -37.37 dBm
*VBW 300 kHz 324.880000000 MHz
SWT 100 ms



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1] -18.71 dBm
*VBW 3 MHz 15.136000000 GHz
SWT 380 ms



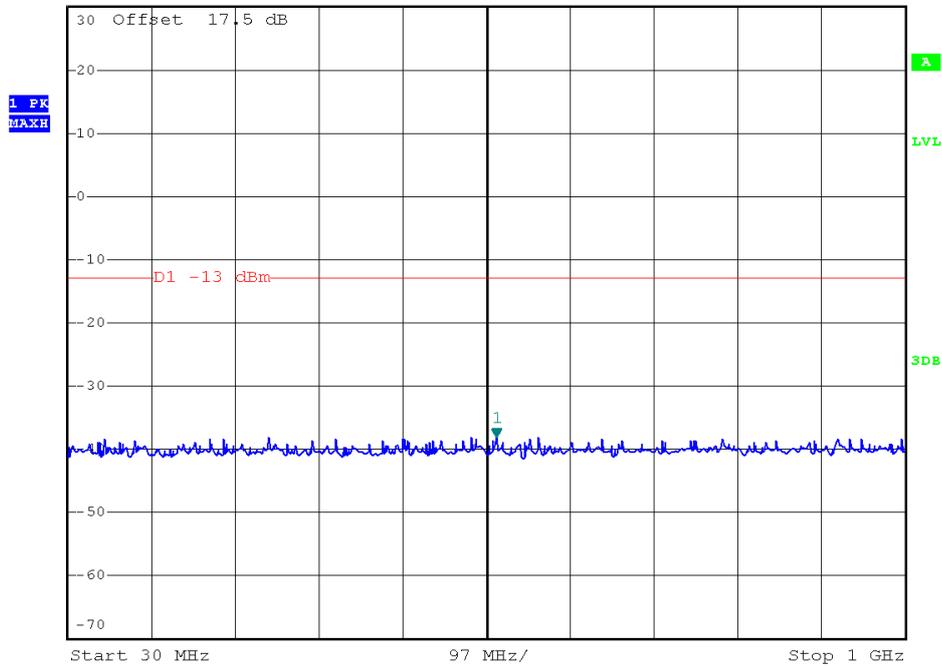
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Middle
Bandwidth	15MHz	Modulation	QPSK



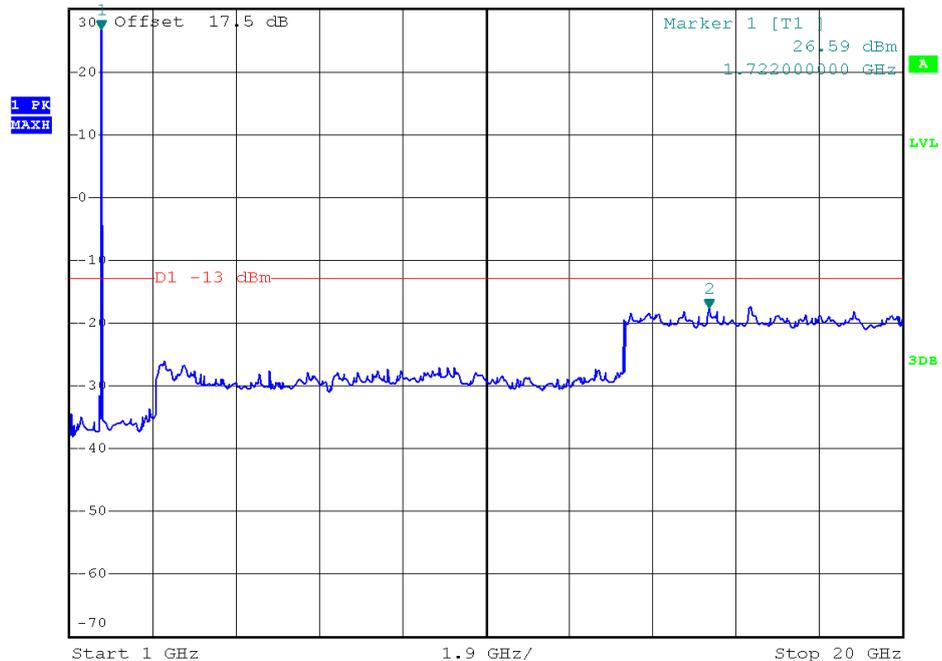
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1] -38.21 dBm
*VBW 300 kHz 526.64000000 MHz
SWT 100 ms



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1] -17.59 dBm
*VBW 3 MHz 15.59200000 GHz
SWT 380 ms



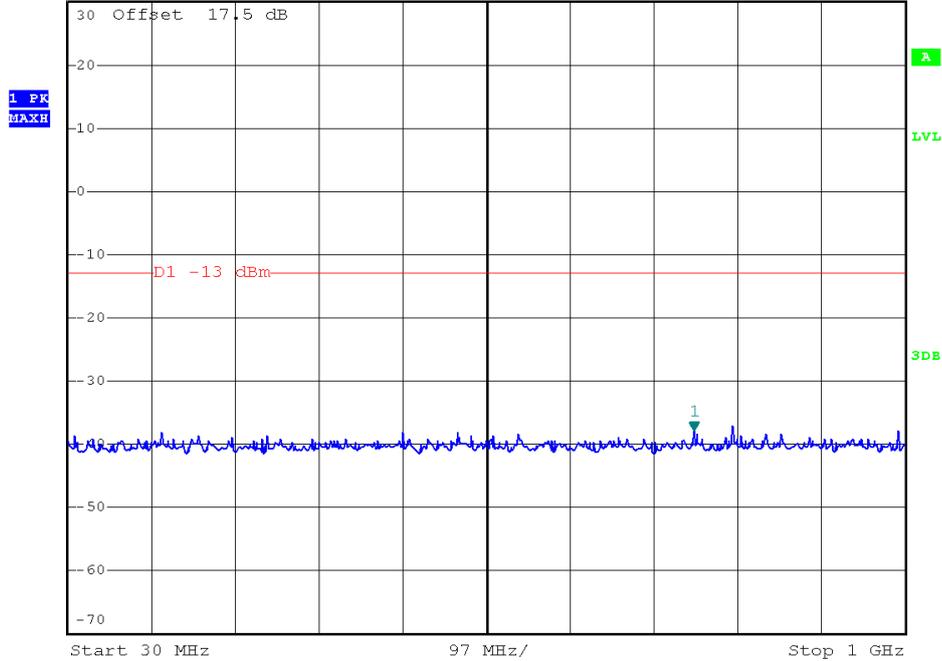
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	High
Bandwidth	15MHz	Modulation	QPSK



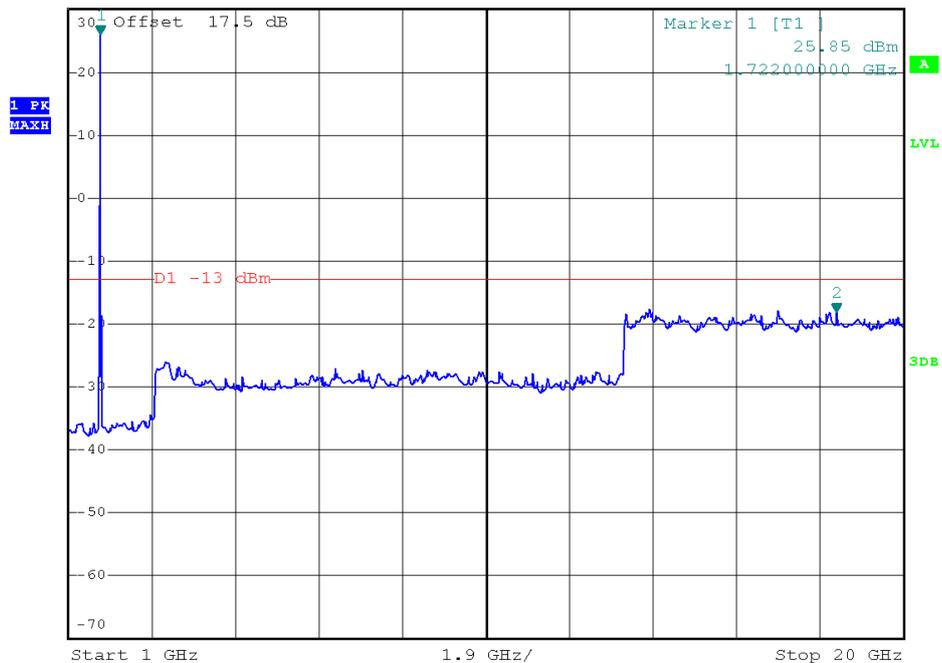
*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -37.83 dBm
 Ref 30 dBm *Att 30 dB SWT 100 ms 755.560000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



*RBW 1 MHz Marker 2 [T1]
 *VBW 3 MHz -18.28 dBm
 Ref 30 dBm *Att 30 dB SWT 380 ms 18.480000000 GHz



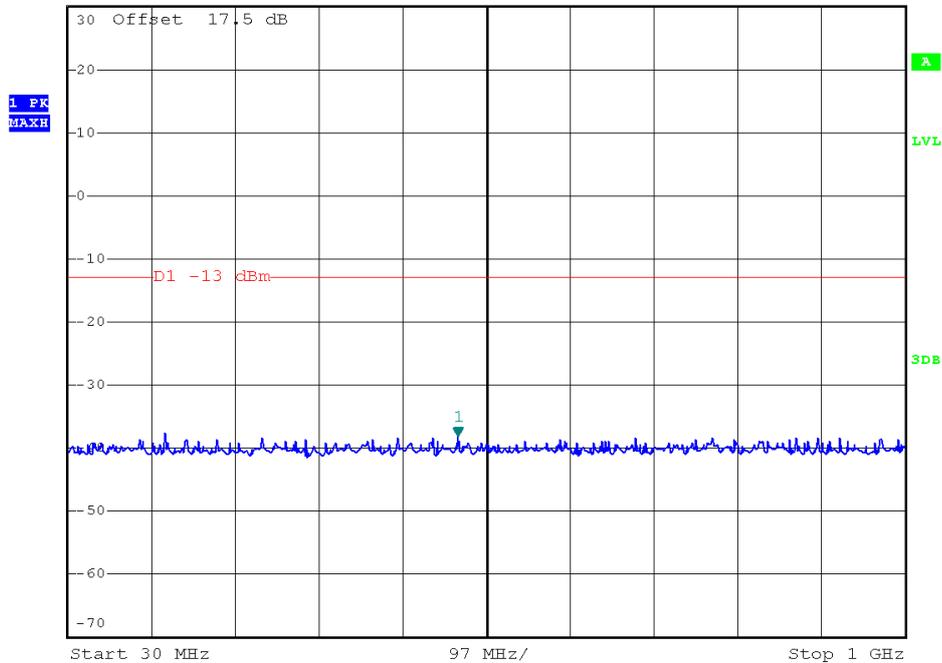
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Low
Bandwidth	20MHz	Modulation	QPSK



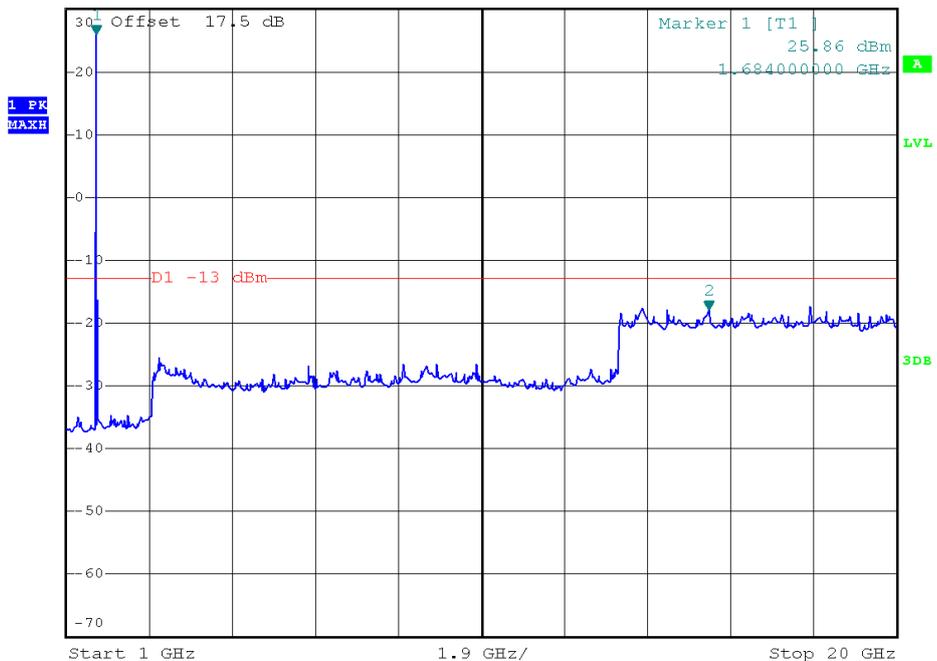
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz -37.98 dBm
SWT 100 ms 482.02000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1]
*VBW 3 MHz -17.95 dBm
SWT 380 ms 15.706000000 GHz



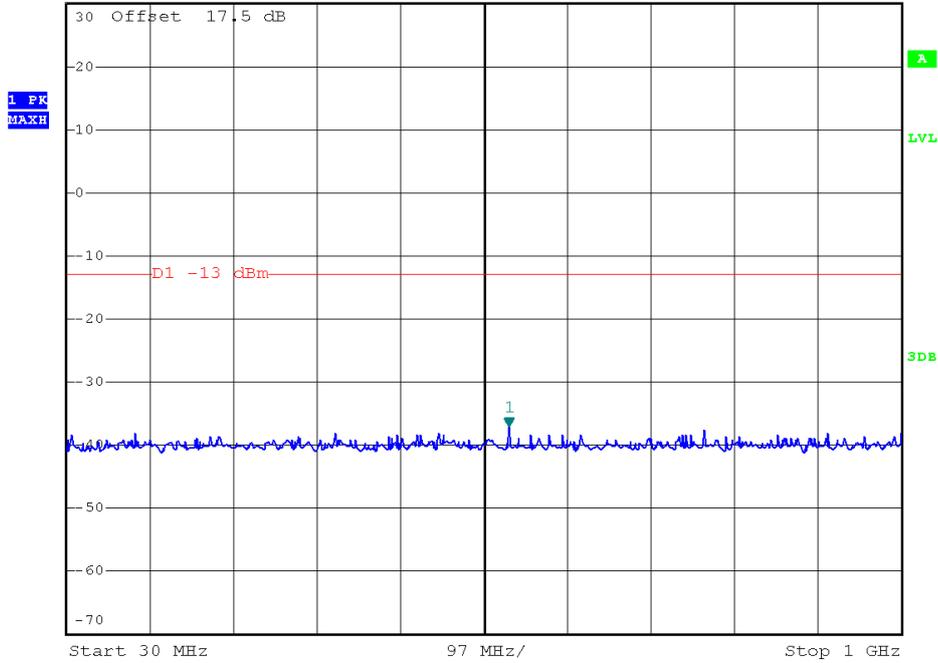
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	Middle
Bandwidth	20MHz	Modulation	QPSK



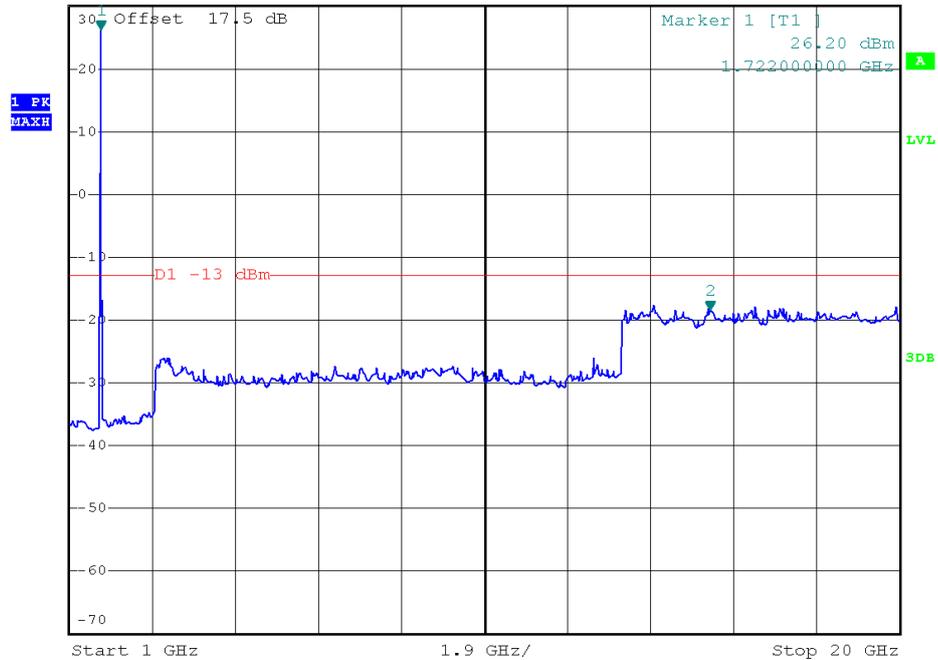
*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -37.17 dBm
 Ref 30 dBm *Att 30 dB SWT 100 ms 544.100000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



*RBW 1 MHz Marker 2 [T1]
 *VBW 3 MHz -18.32 dBm
 Ref 30 dBm *Att 30 dB SWT 380 ms 15.668000000 GHz



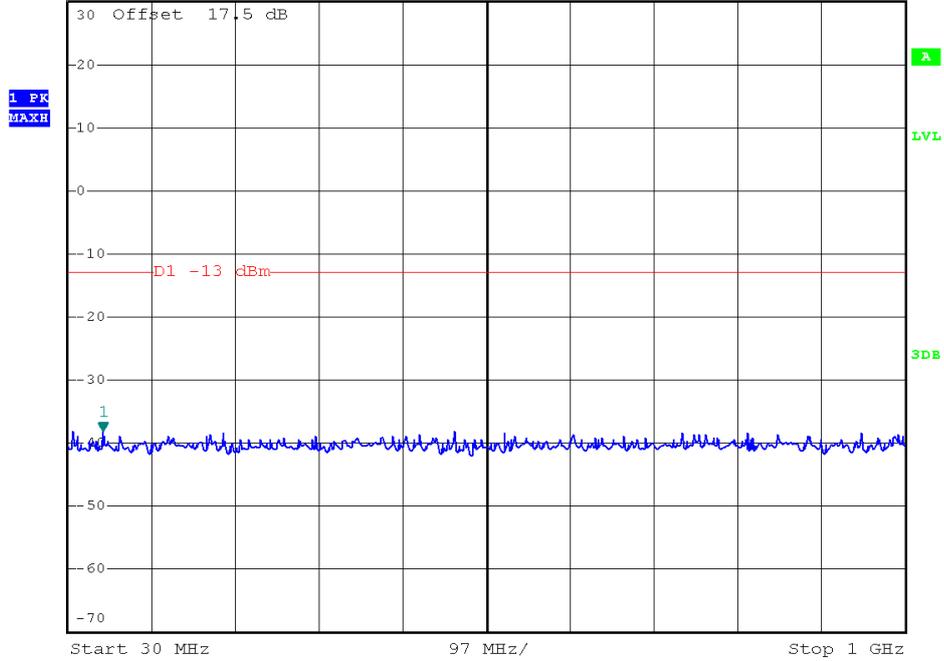
RB Size 1, RB Offset 0 1GHz to 20GHz



Band	LTE Band 4	Channel	High
Bandwidth	20MHz	Modulation	QPSK



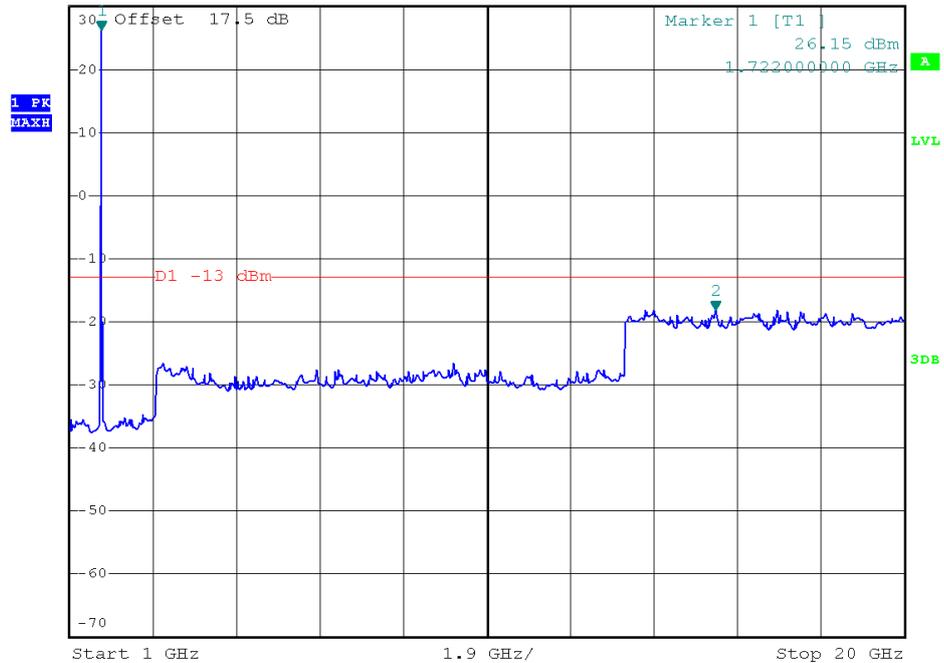
Ref 30 dBm *Att 30 dB *RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -38.14 dBm
 SWT 100 ms 70.74000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz



Ref 30 dBm *Att 30 dB *RBW 1 MHz Marker 2 [T1]
 *VBW 3 MHz -18.23 dBm
 SWT 380 ms 15.706000000 GHz



RB Size 1, RB Offset 0 1GHz to 20GHz

2.6 Conducted Band Edge

2.6.1 Description of Conducted Band Edge Measurement

24.238(a) for Band 2

For operations in the 1850 -1910 MHz band, the FCC limit is $43 + 10\log_{10}(P[\text{Watts}])$ dB below the transmitter power $P(\text{Watts})$ in a 1MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to a 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.

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.

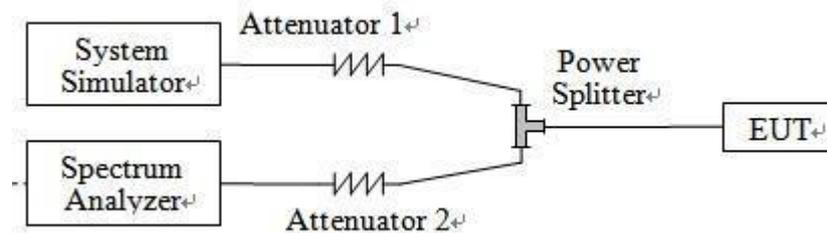
27.53 (m)(4) for Band 7

For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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 $RBW \geq 1\% EBW$ 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)

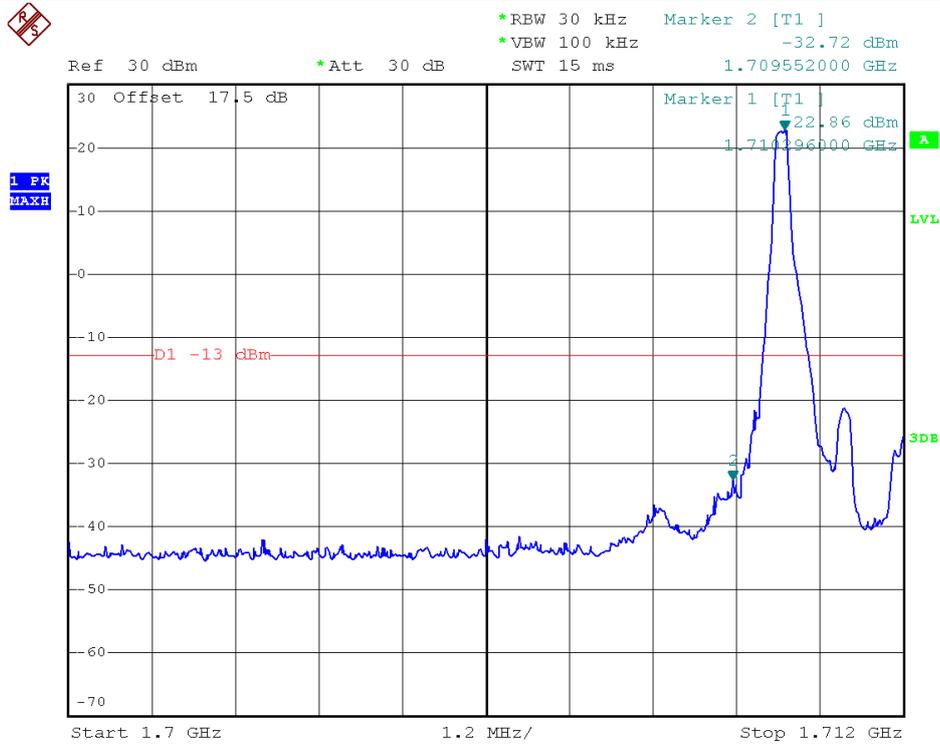
$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$

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

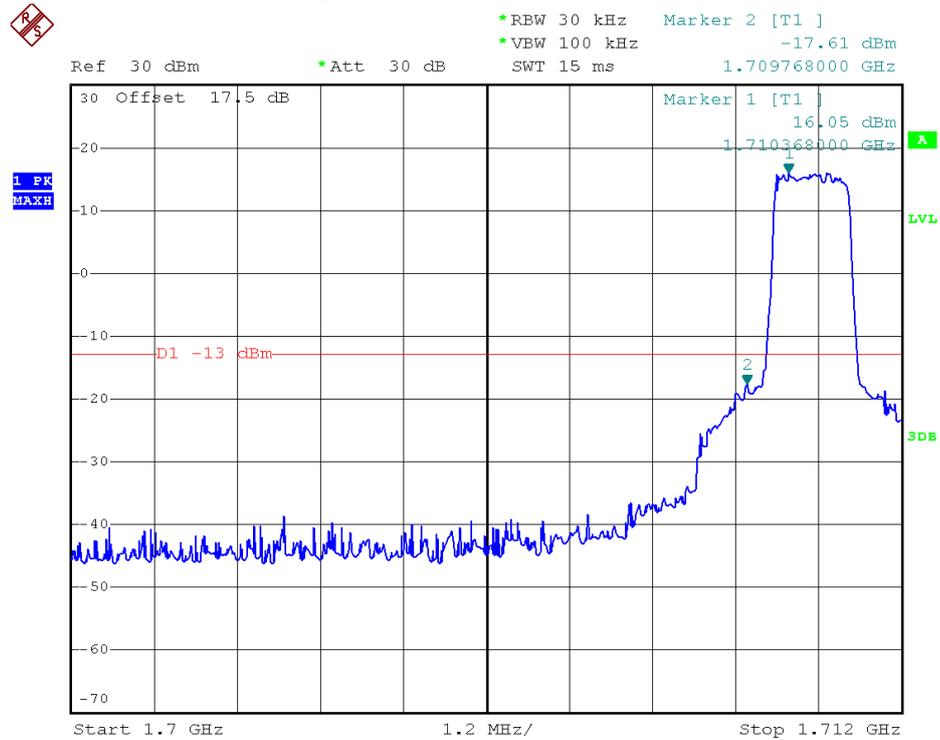
$$= -13\text{dBm}.$$

2.6.5 Test Result of Conducted Band Edge

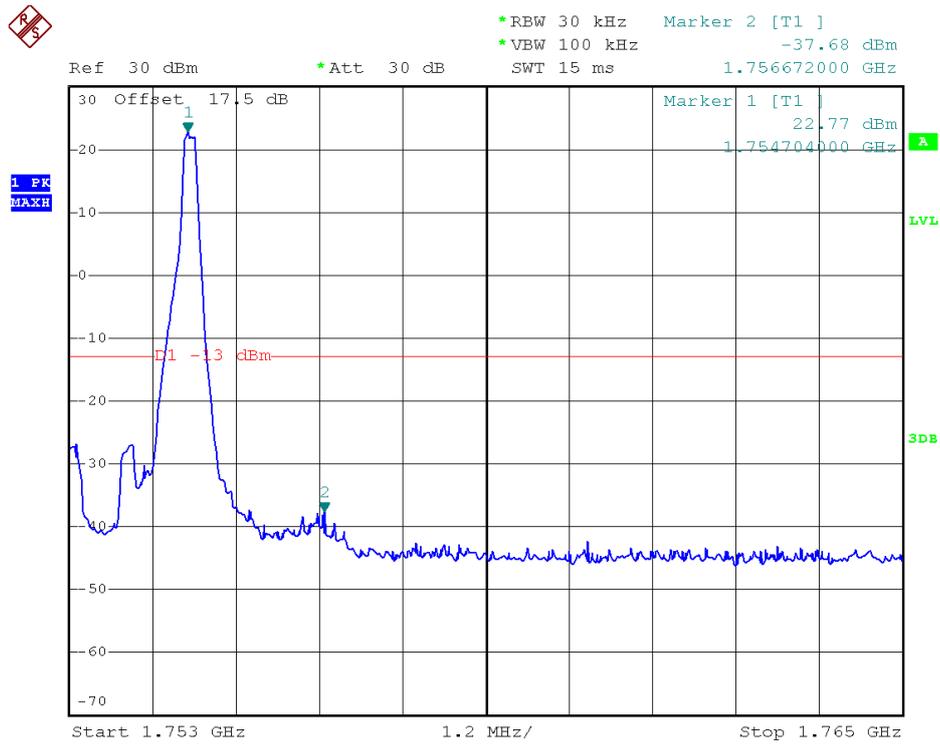
Band	LTE Band 4	Modulation	QPSK
Bandwidth	1.4MHz		



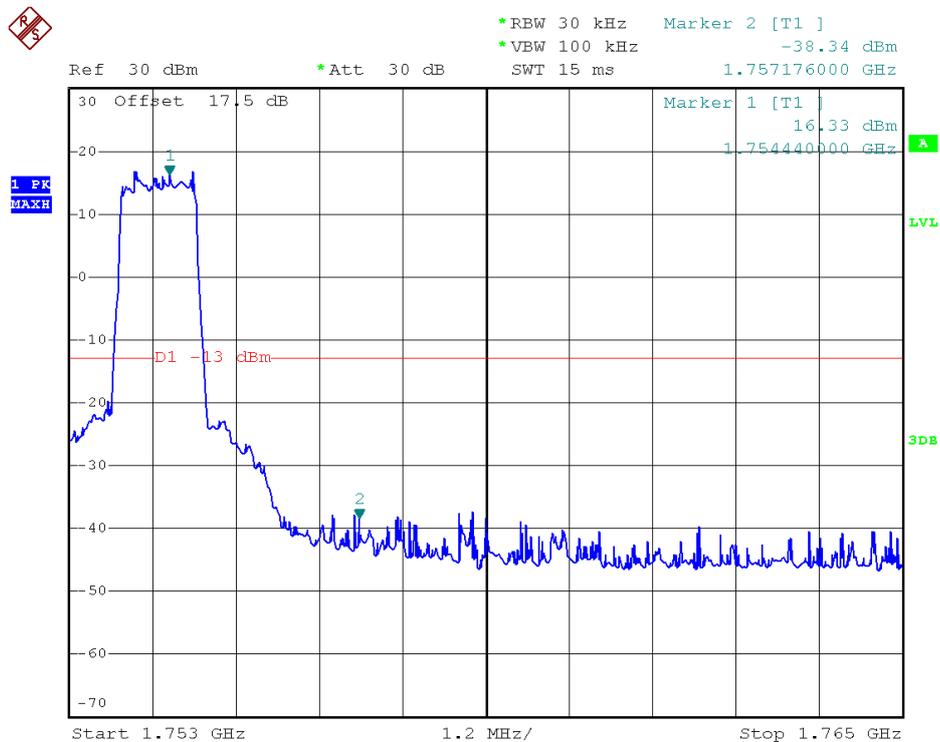
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



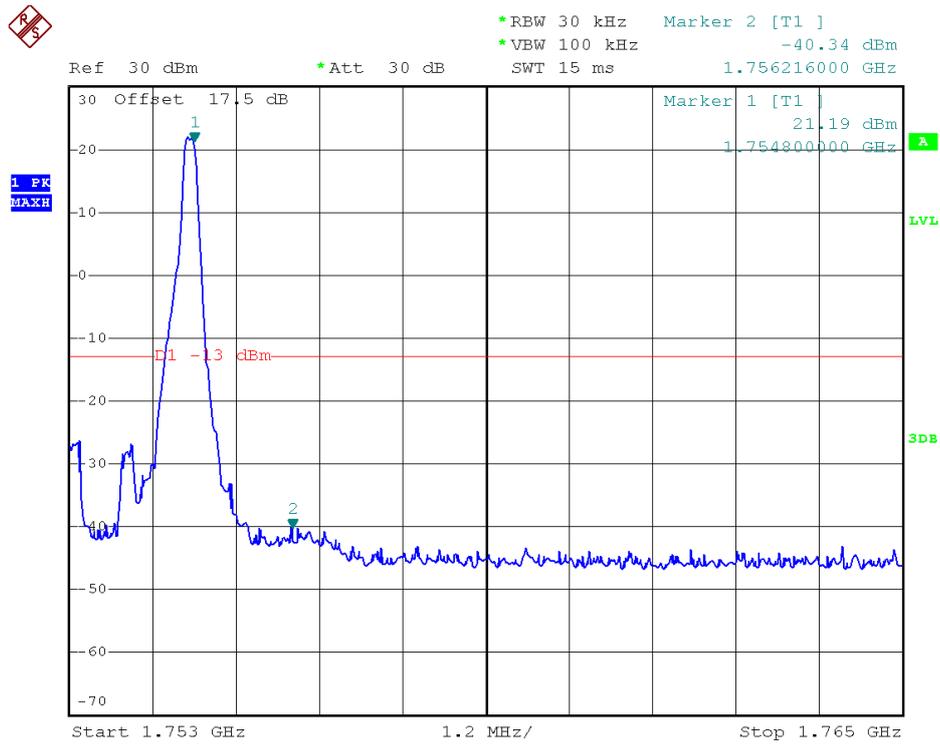
Lower Band Edge Plot for QPSK-RB Size 6, RB Offset 0



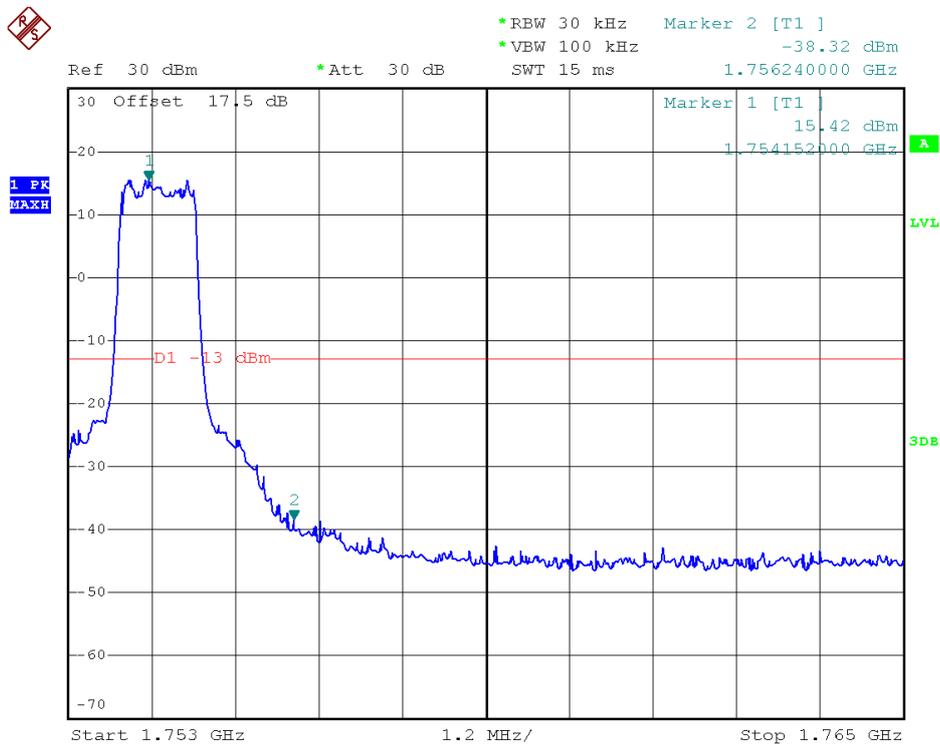
Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 5



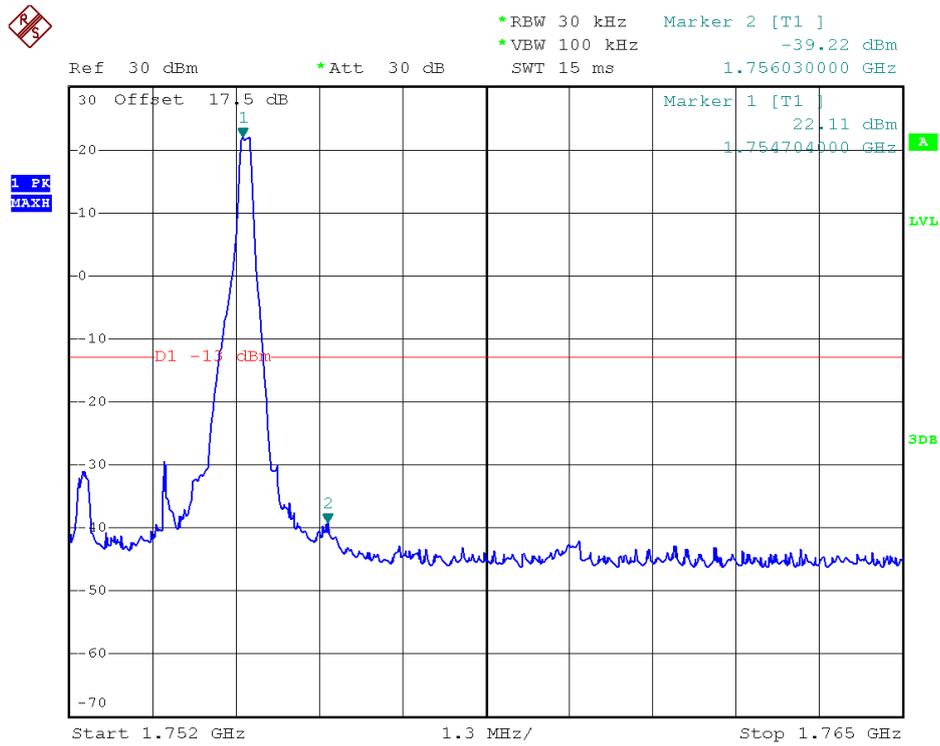
Higher Band Edge Plot for QPSK-RB Size 6, RB Offset 0



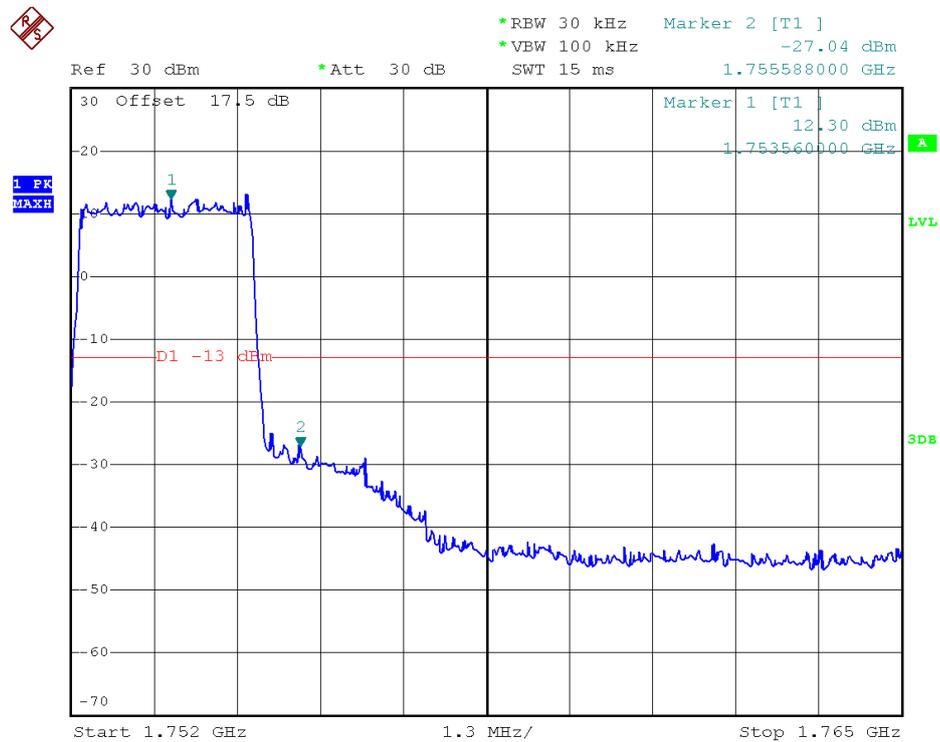
Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 5



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



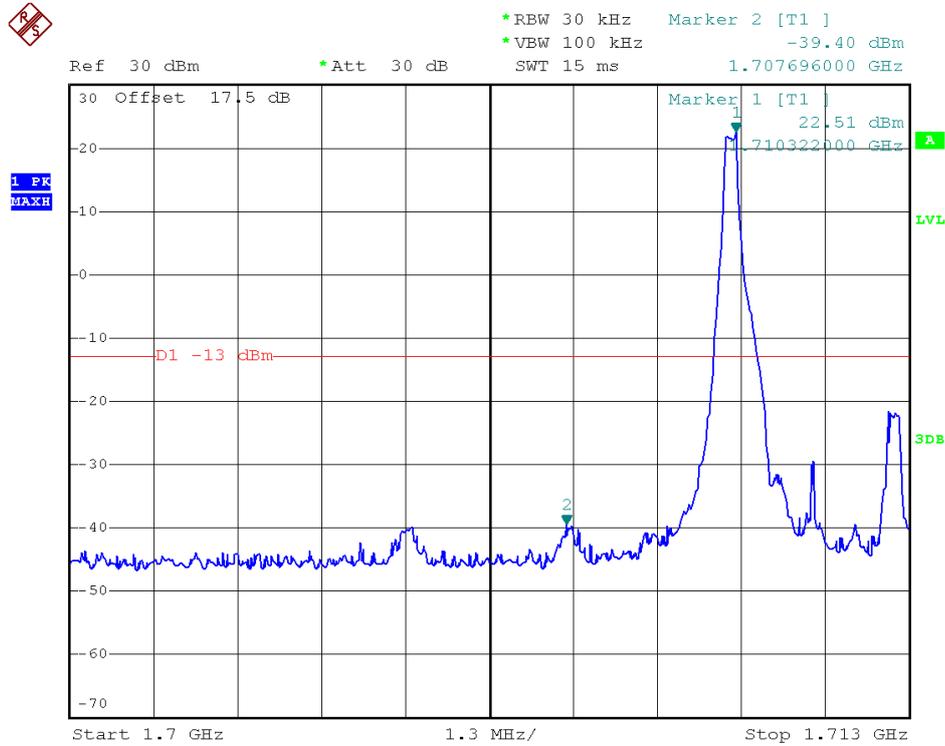
Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 14



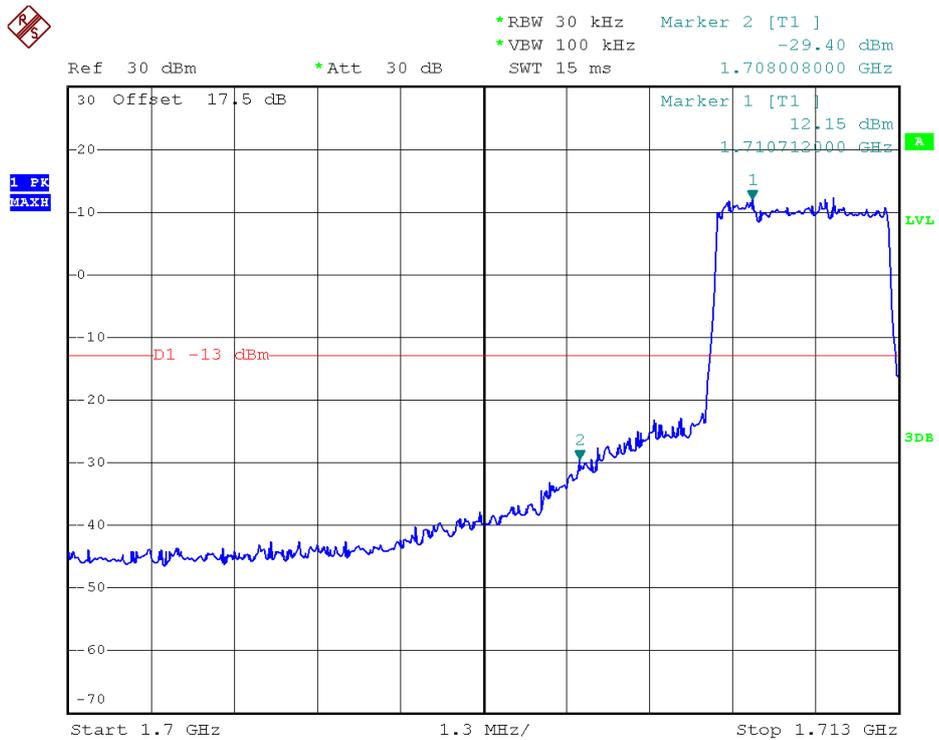
Higher Band Edge Plot for QPSK-RB Size 15, RB Offset 0



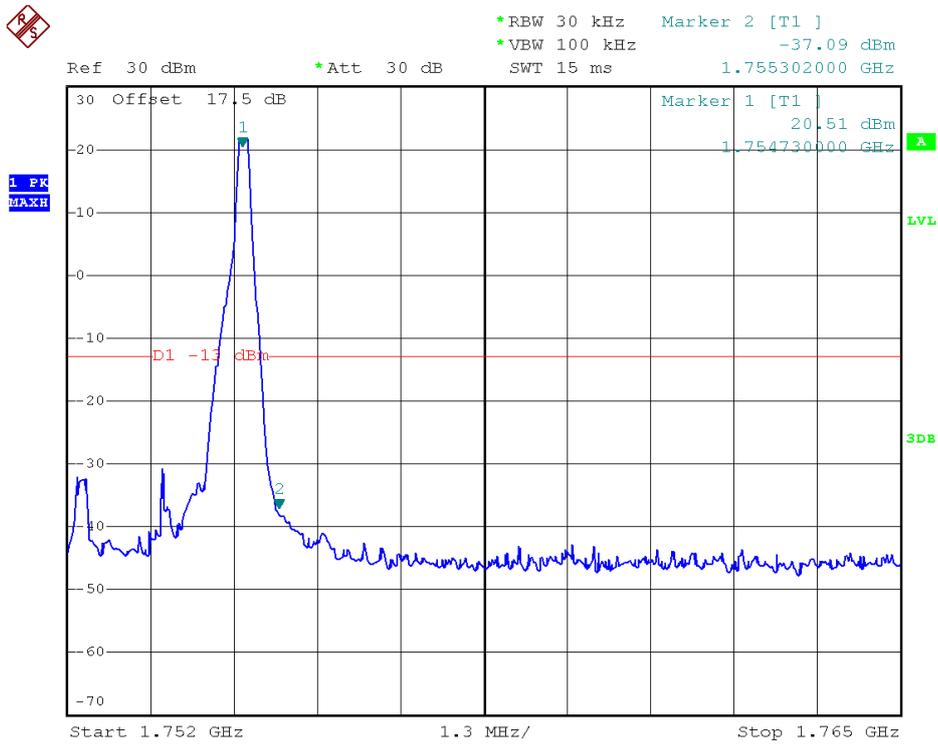
Band	LTE Band 4	Modulation	16QAM
Bandwidth	3MHz		



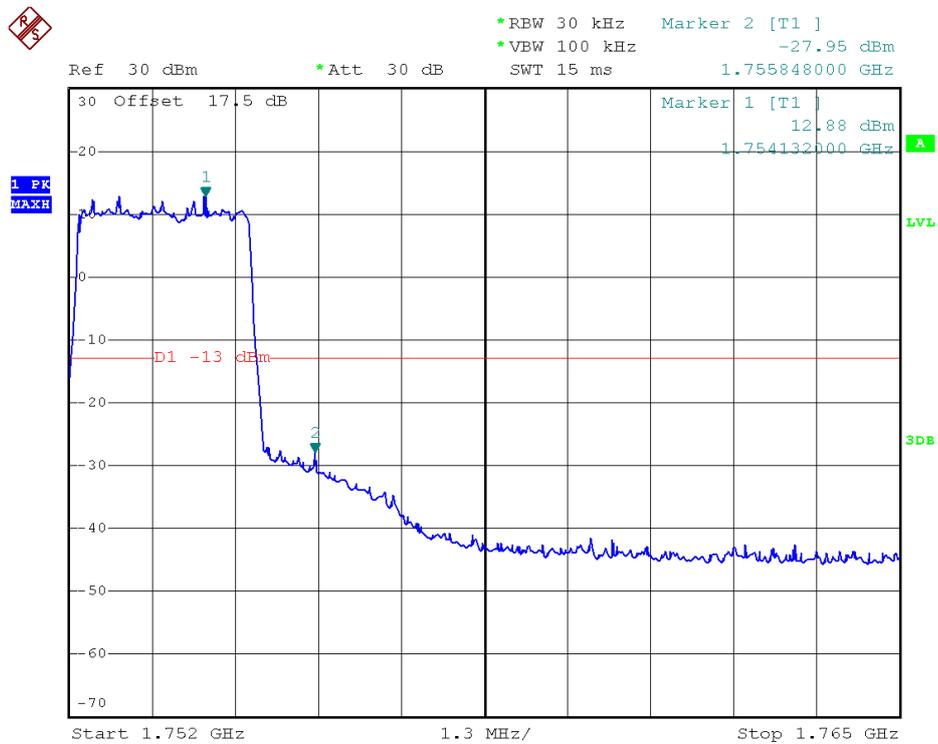
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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



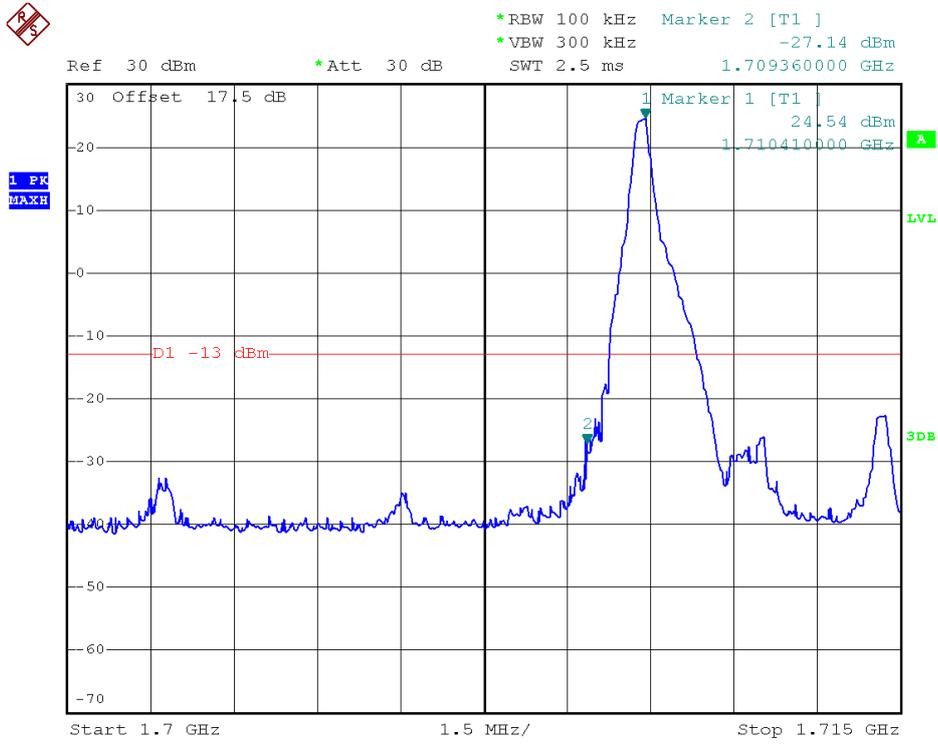
Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 14



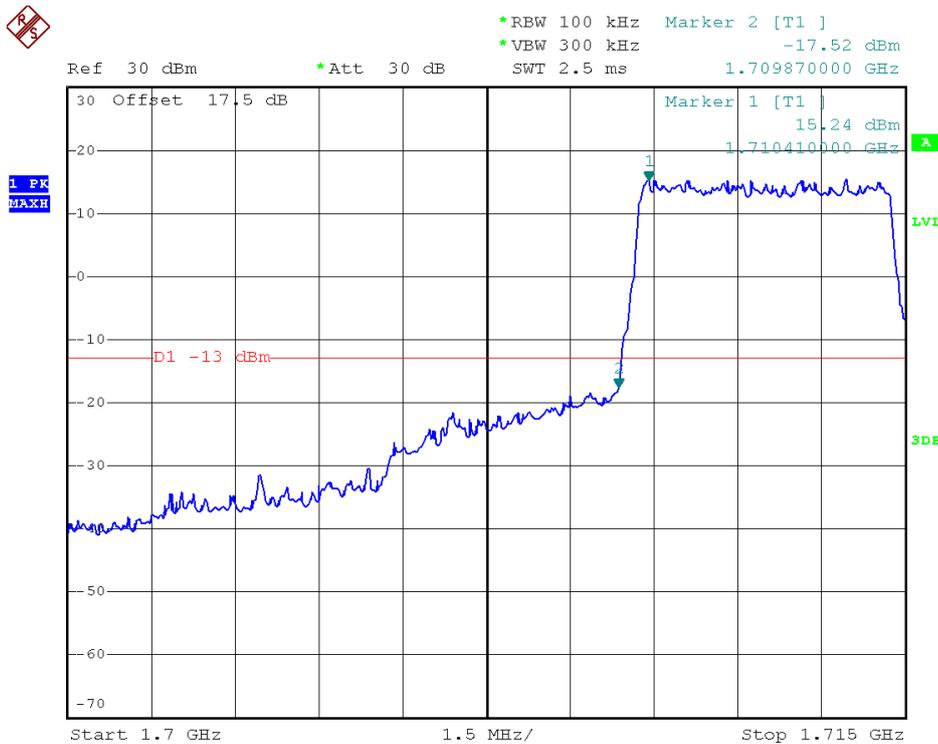
Higher Band Edge Plot for 16QAM -RB Size 15, RB Offset 0



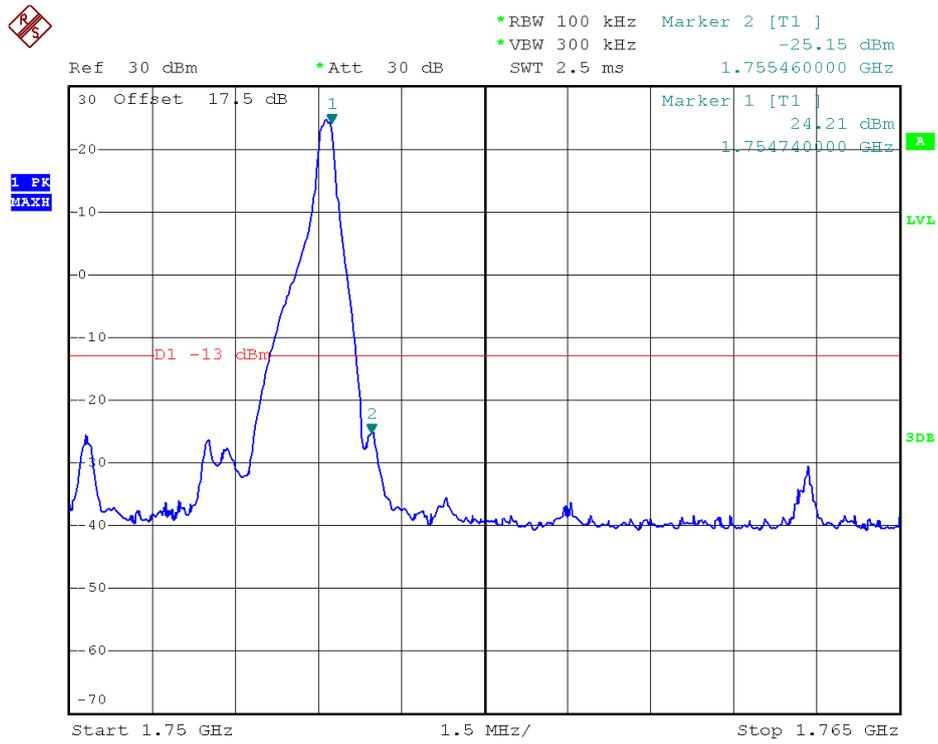
Band	LTE Band 4	Modulation	QPSK
Bandwidth	5MHz		



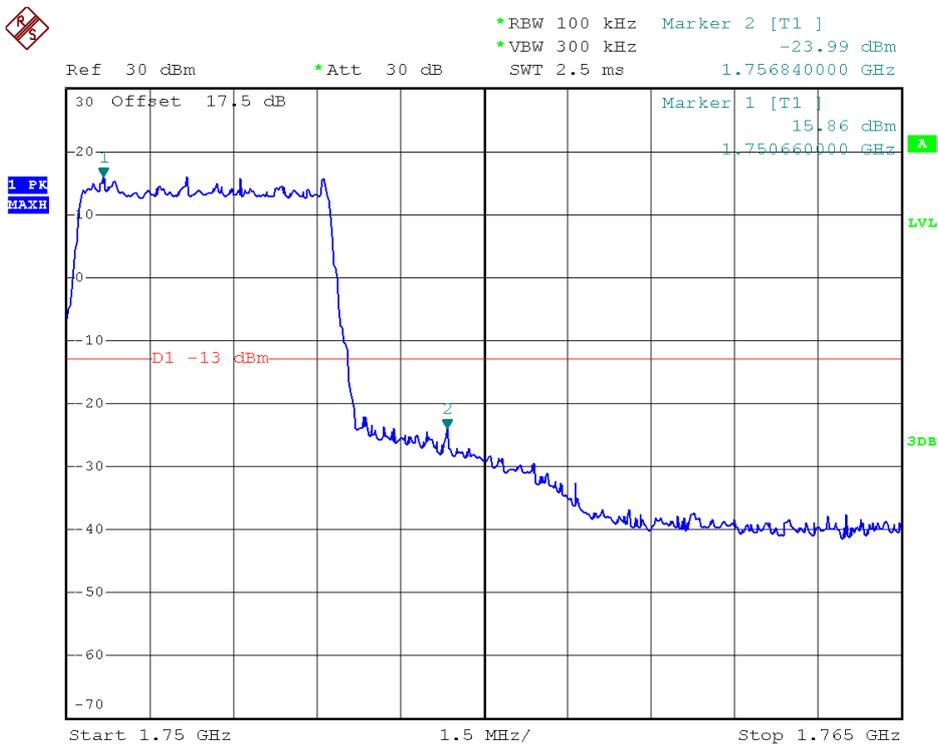
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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



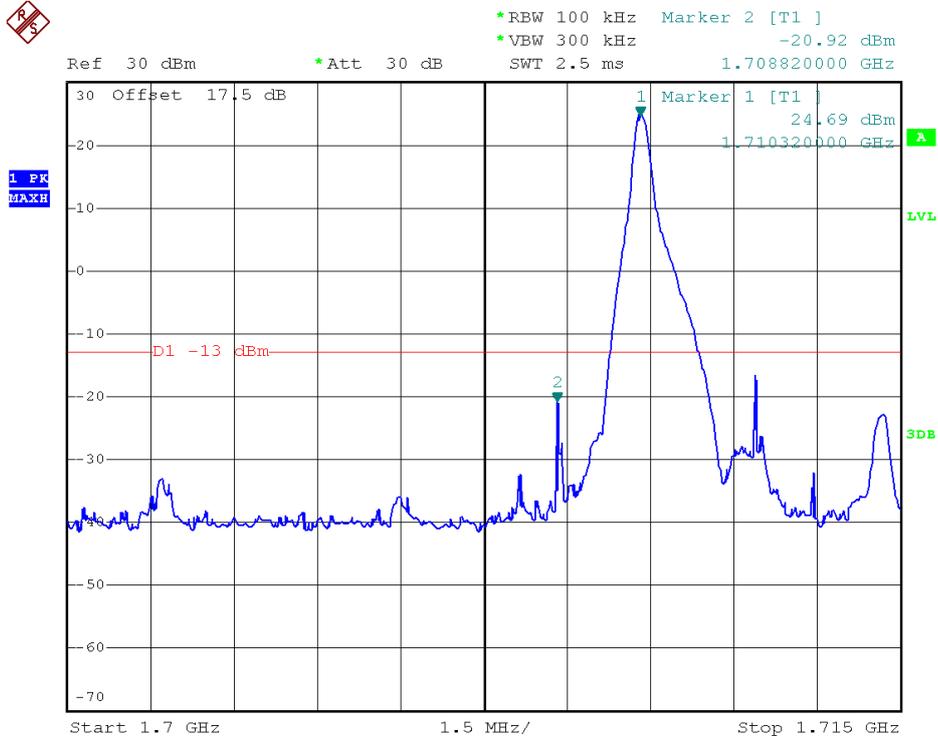
Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 24



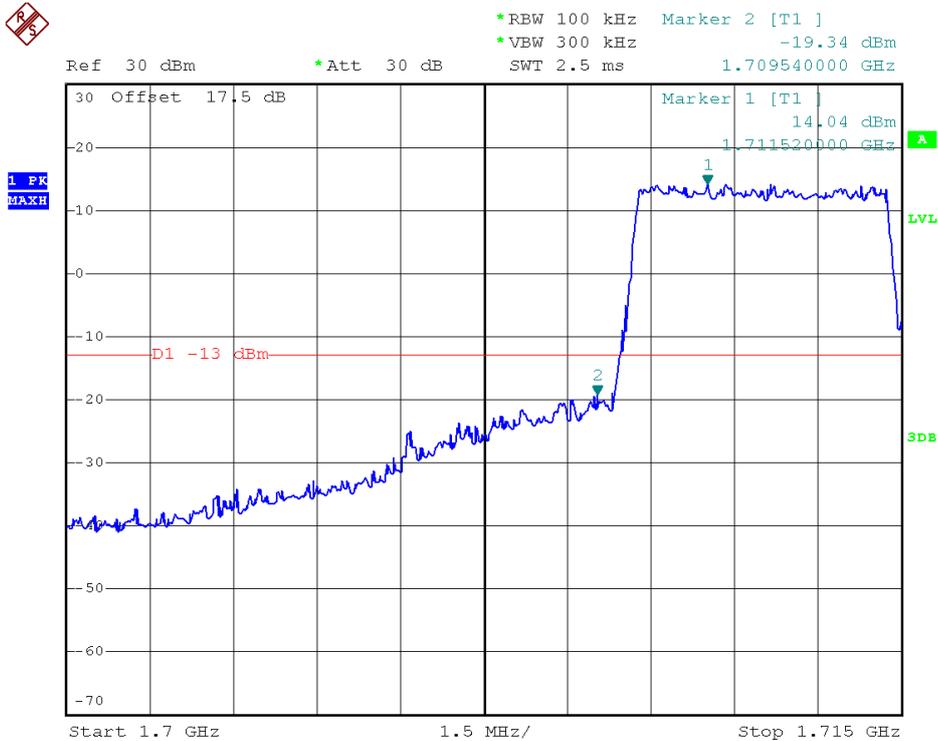
Higher Band Edge Plot for QPSK-RB Size 25, RB Offset 0



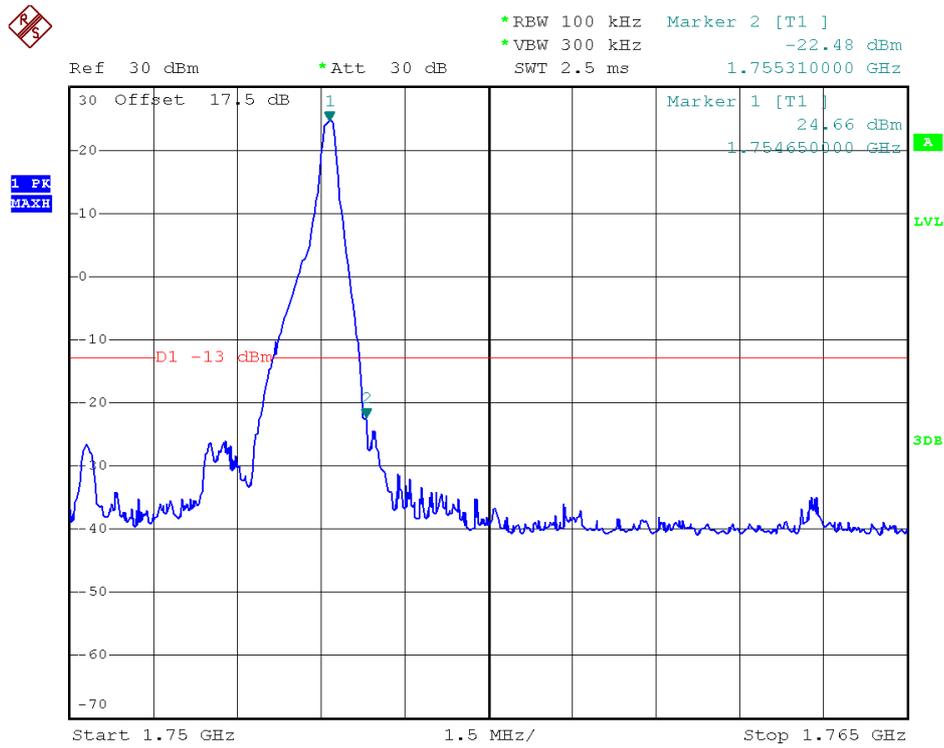
Band	LTE Band 4	Modulation	16QAM
Bandwidth	5MHz		



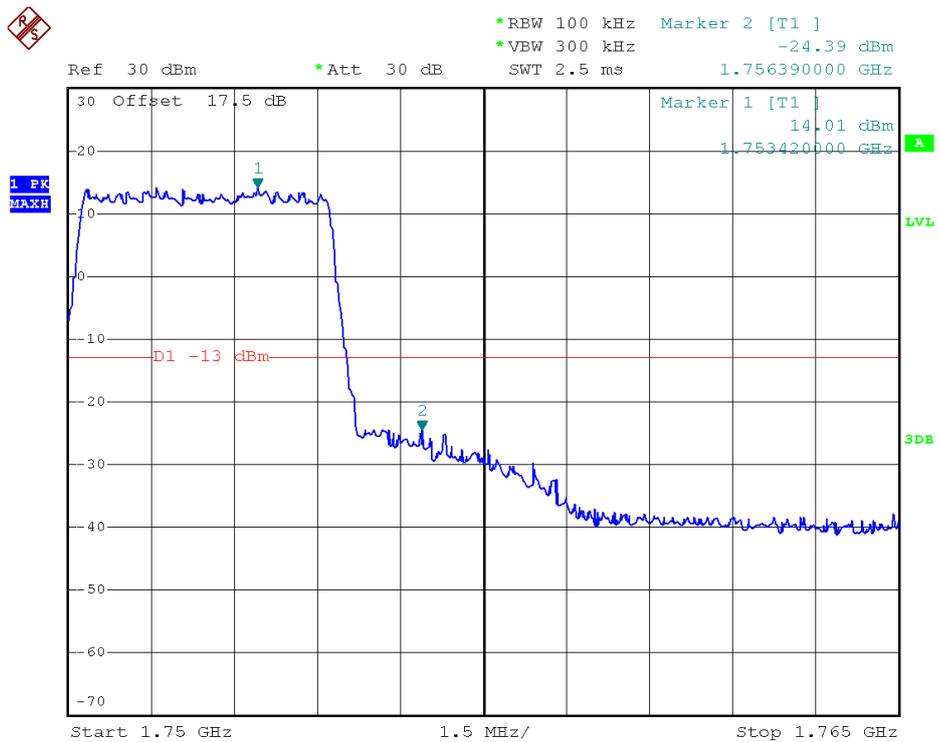
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

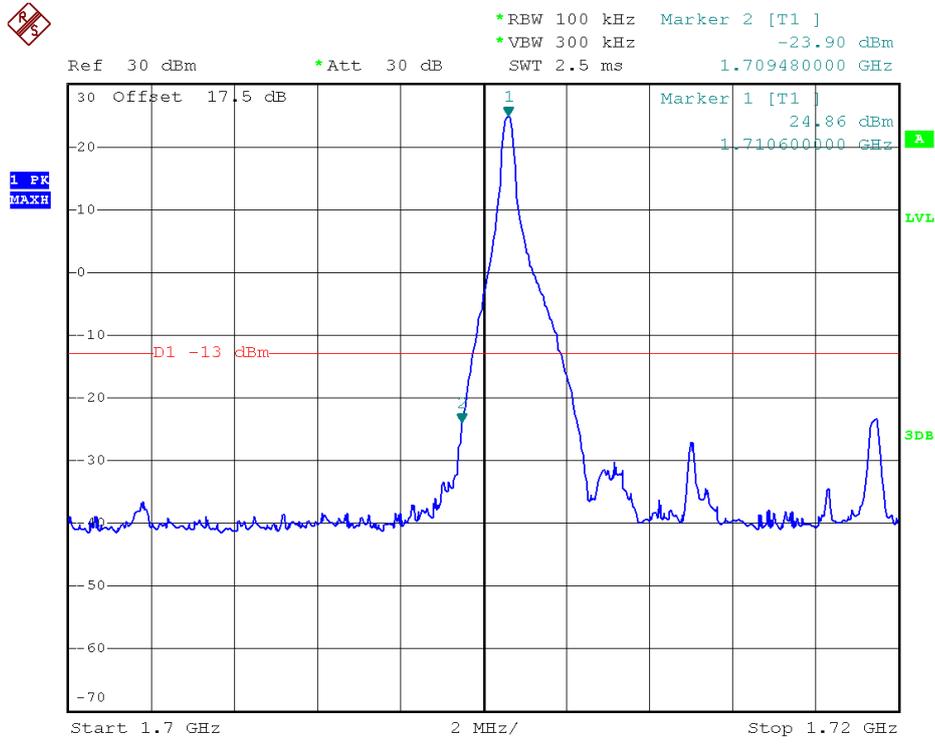


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 24

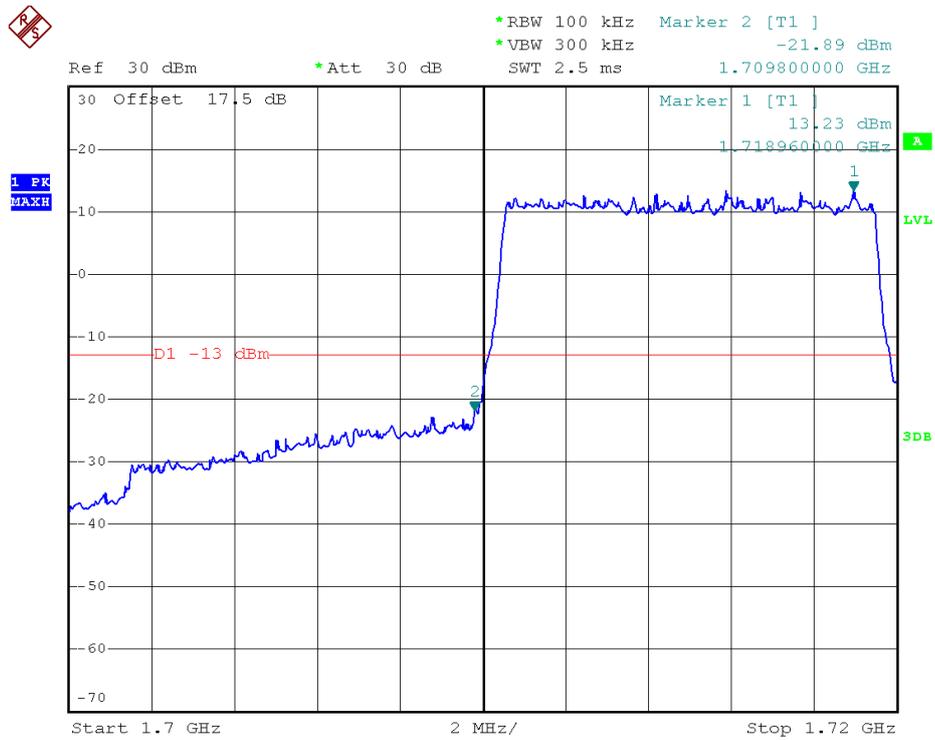


Higher Band Edge Plot for 16QAM -RB Size 25, RB Offset 0

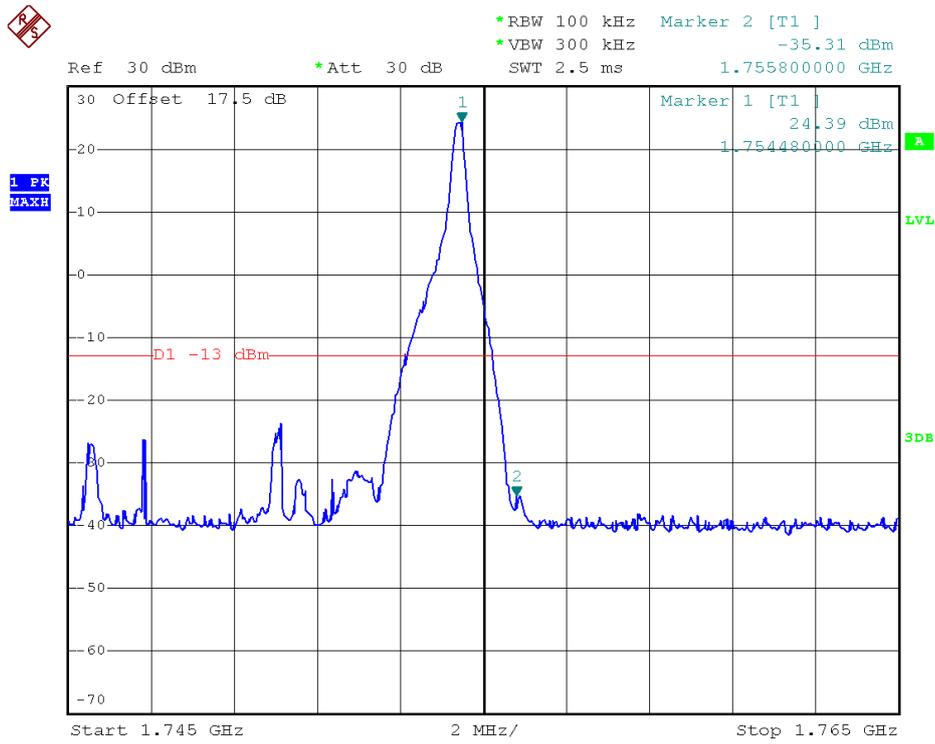
Band	LTE Band 4	Modulation	QPSK
Bandwidth	10MHz		



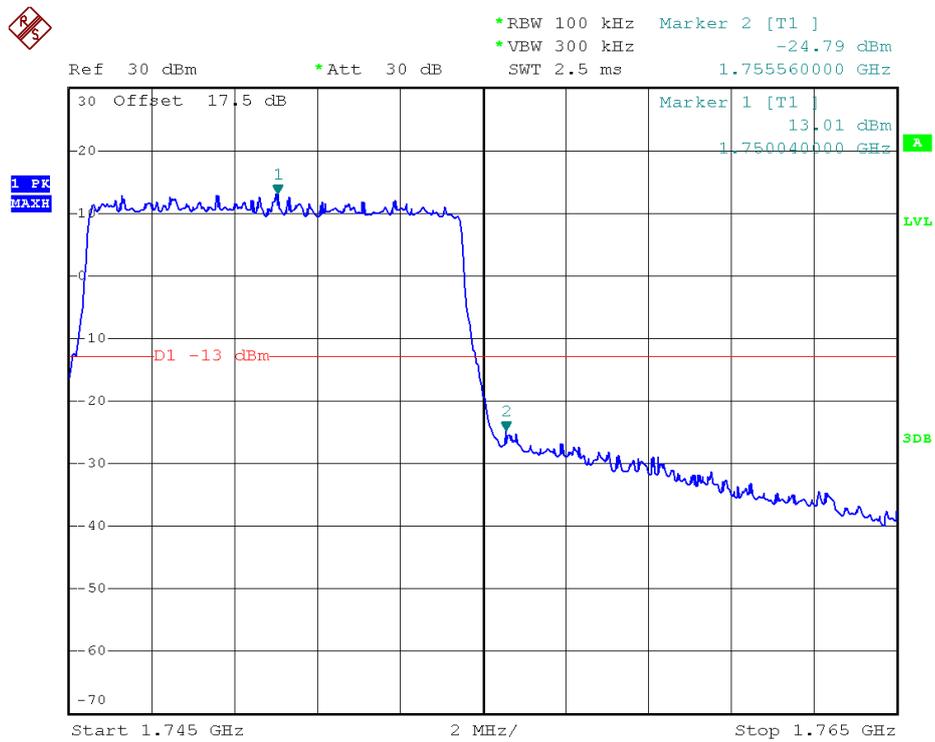
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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



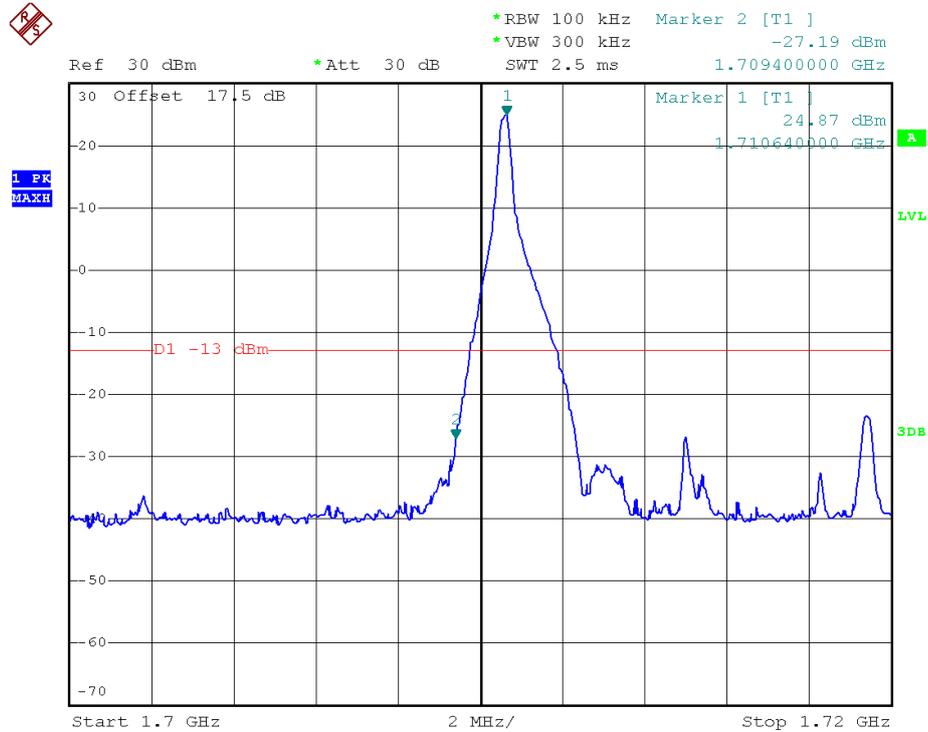
Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 49



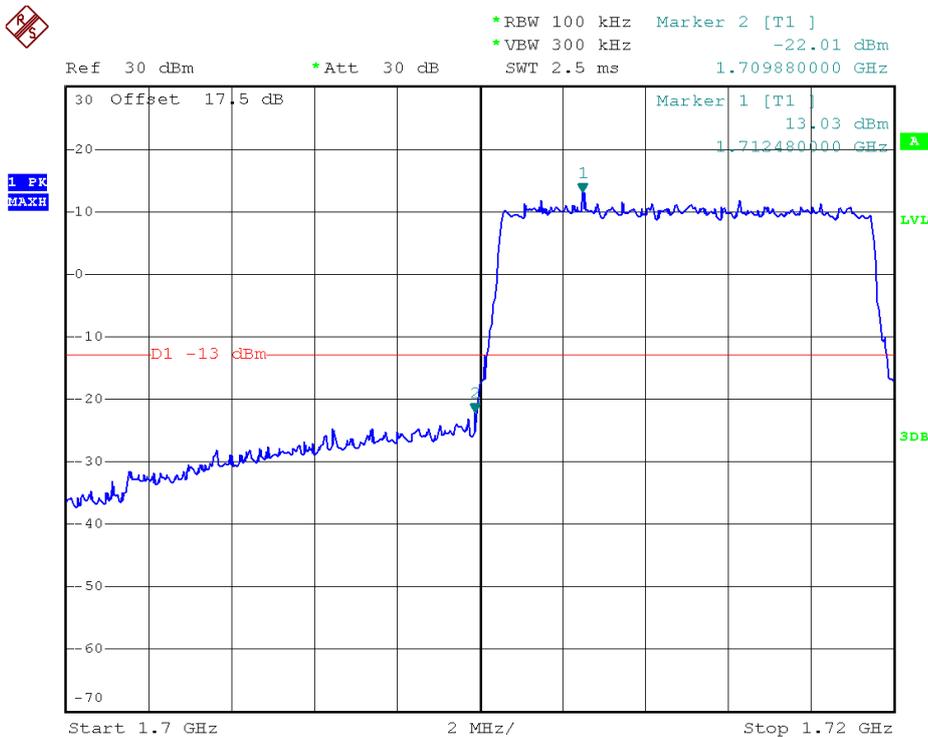
Higher Band Edge Plot for QPSK-RB Size 50, RB Offset 0



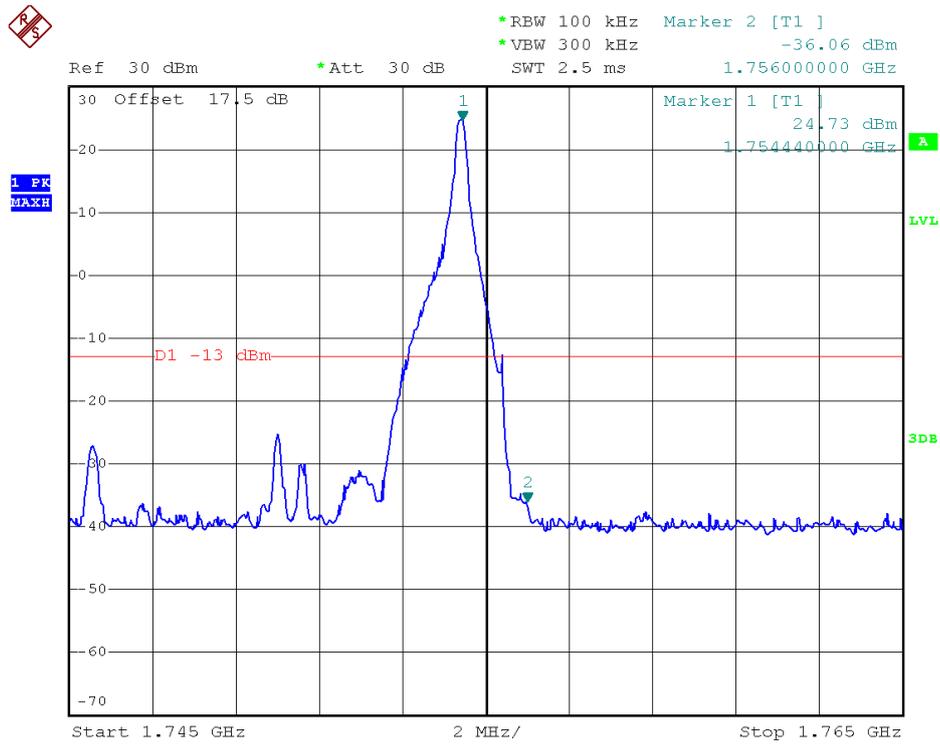
Band	LTE Band 4	Modulation	16QAM
Bandwidth	10MHz		



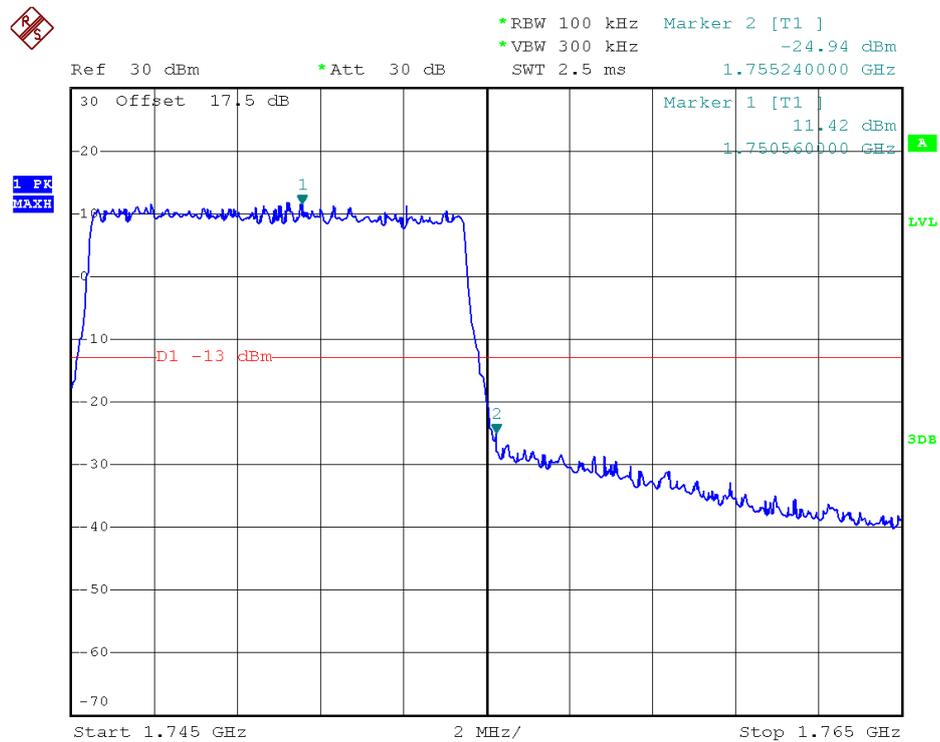
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

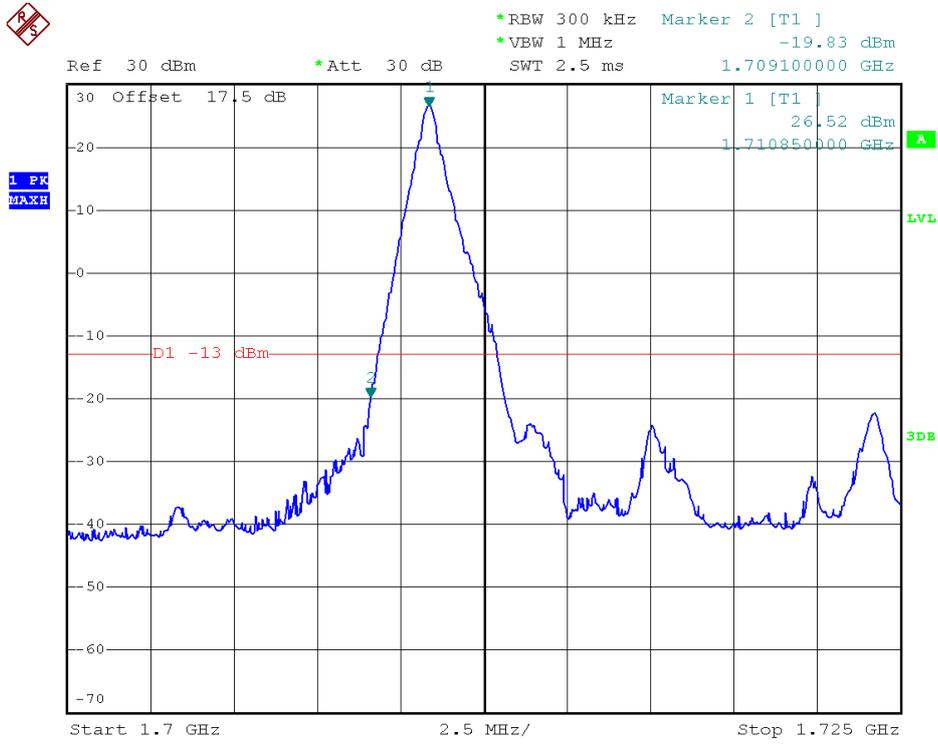


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 49

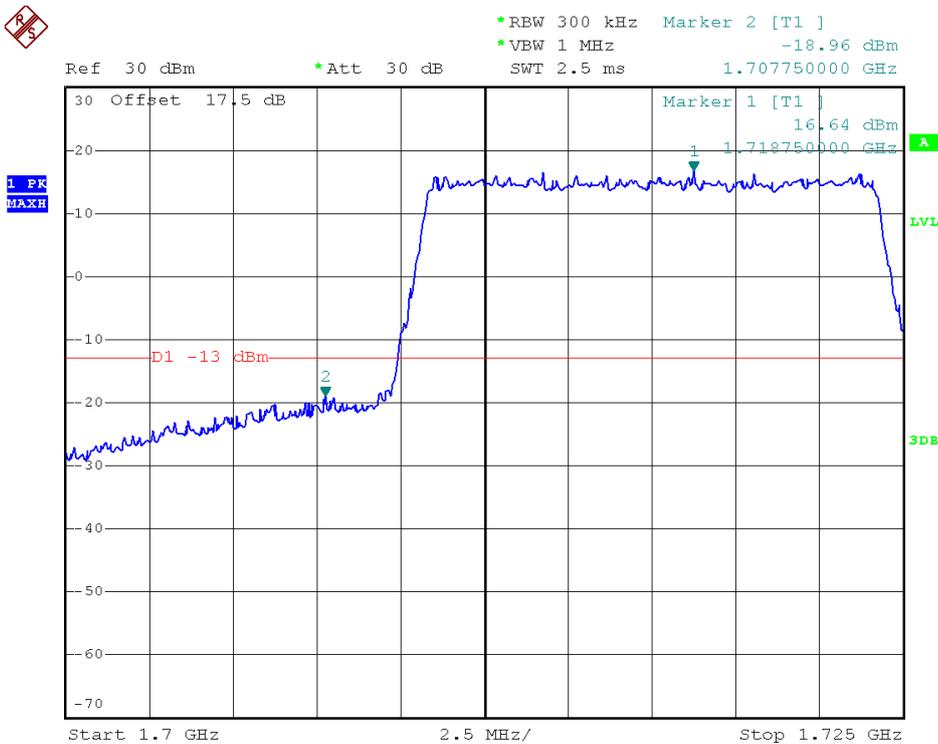


Higher Band Edge Plot for 16QAM -RB Size 50, RB Offset 0

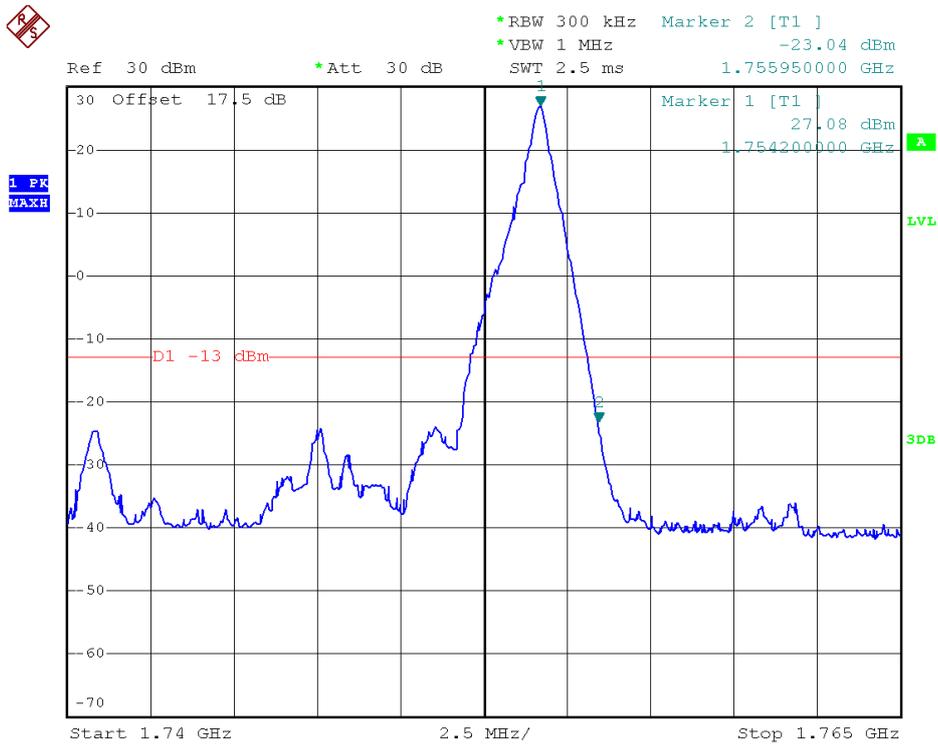
Band	LTE Band 4	Modulation	QPSK
Bandwidth	15MHz		



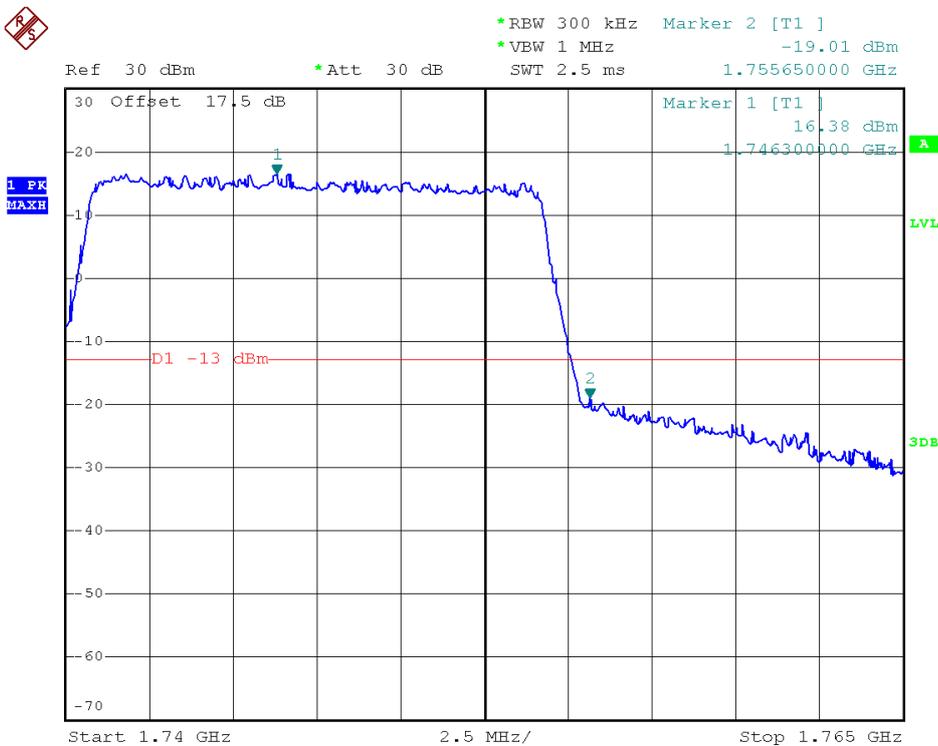
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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



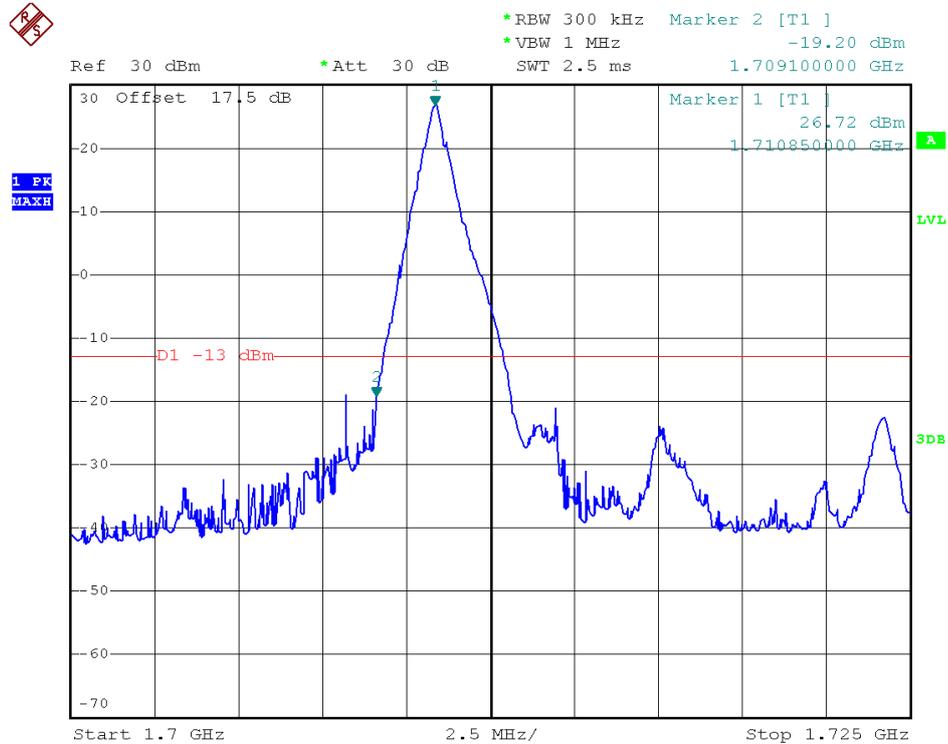
Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 74



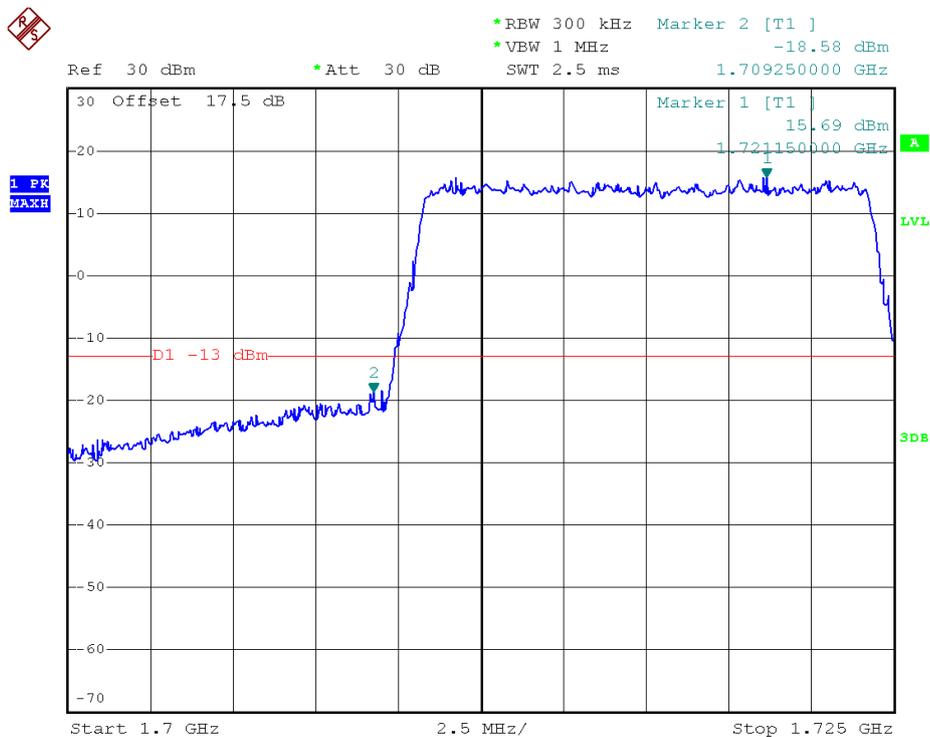
Higher Band Edge Plot for QPSK-RB Size 75, RB Offset 0



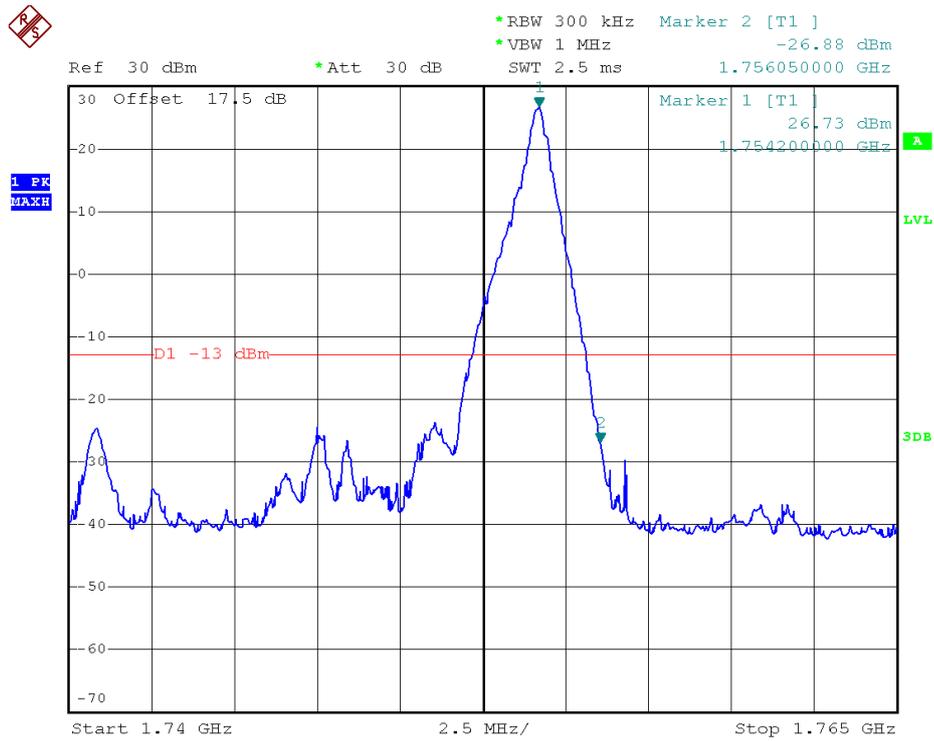
Band	LTE Band 4	Modulation	16QAM
Bandwidth	15MHz		



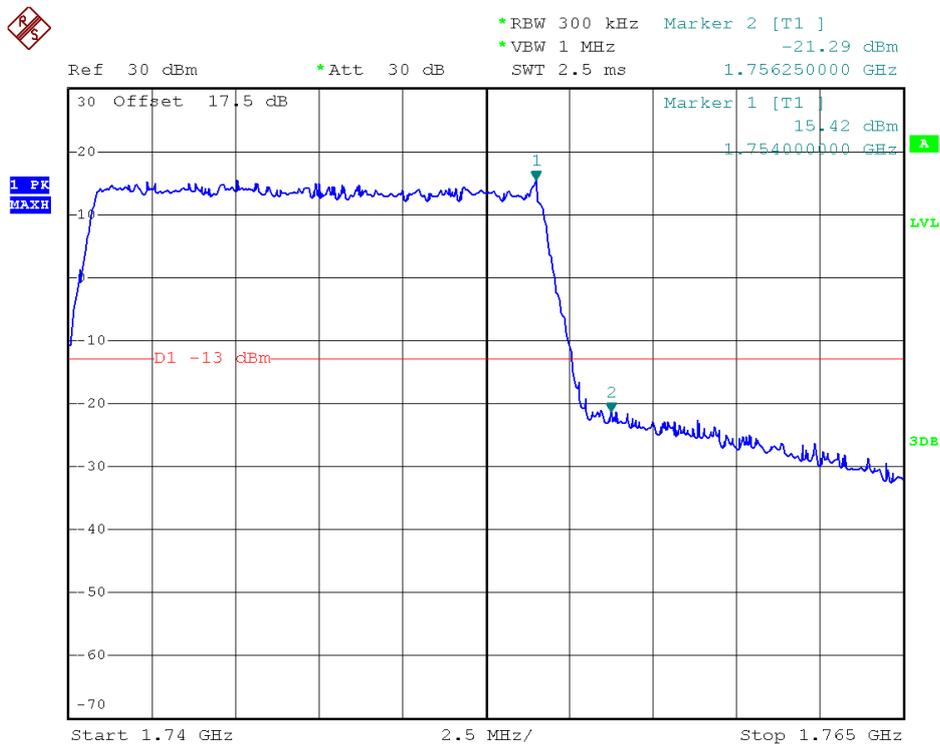
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

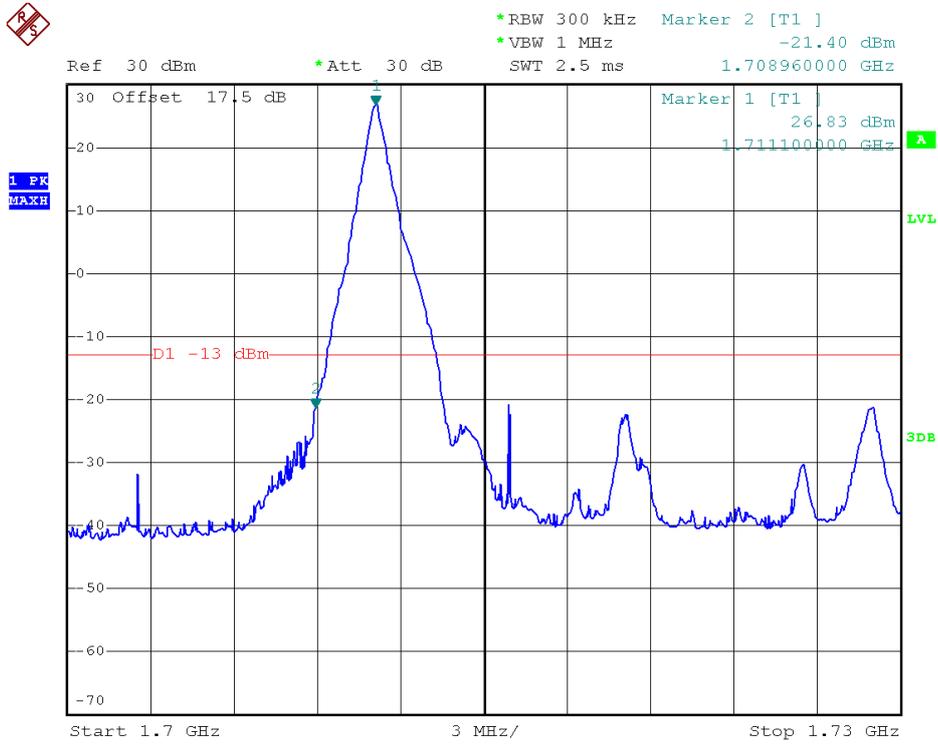


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 74

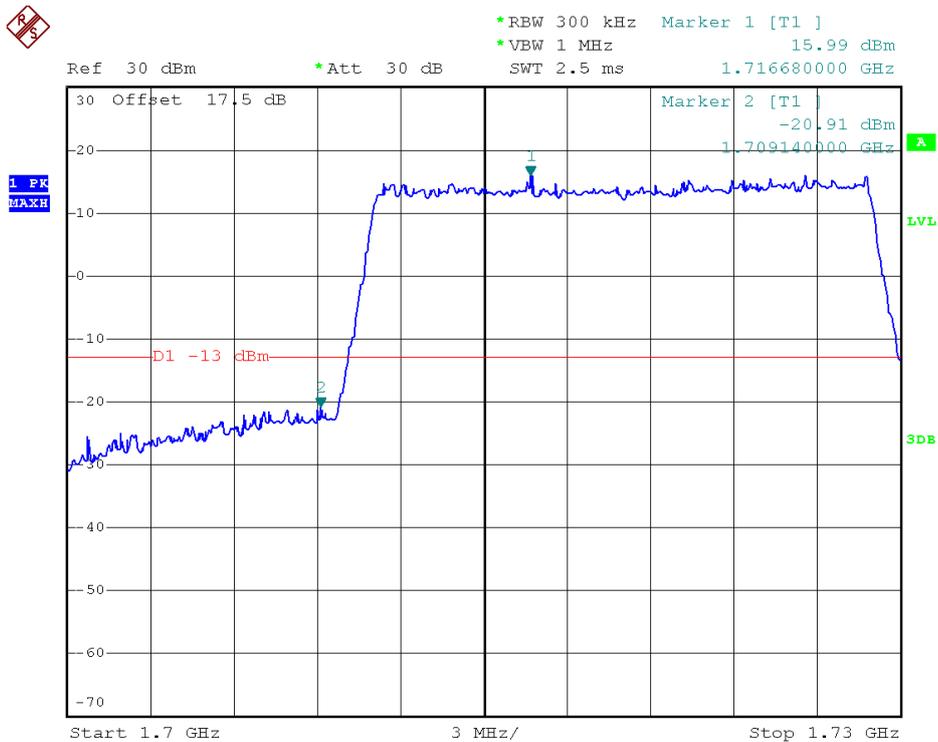


Higher Band Edge Plot for 16QAM -RB Size 75, RB Offset 0

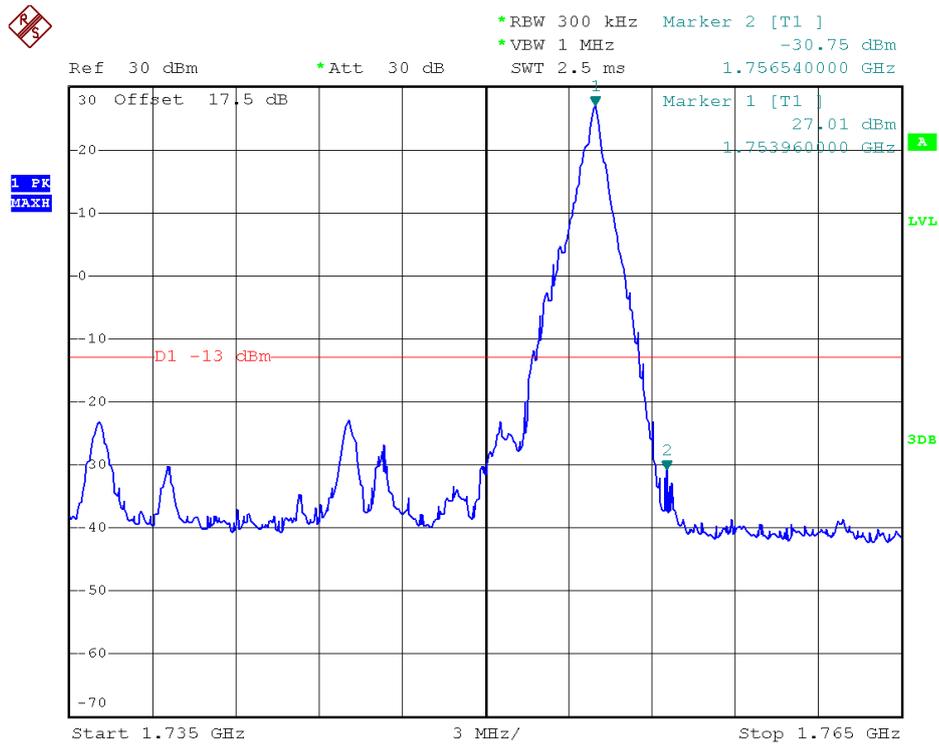
Band	LTE Band 4	Modulation	QPSK
Bandwidth	20MHz		



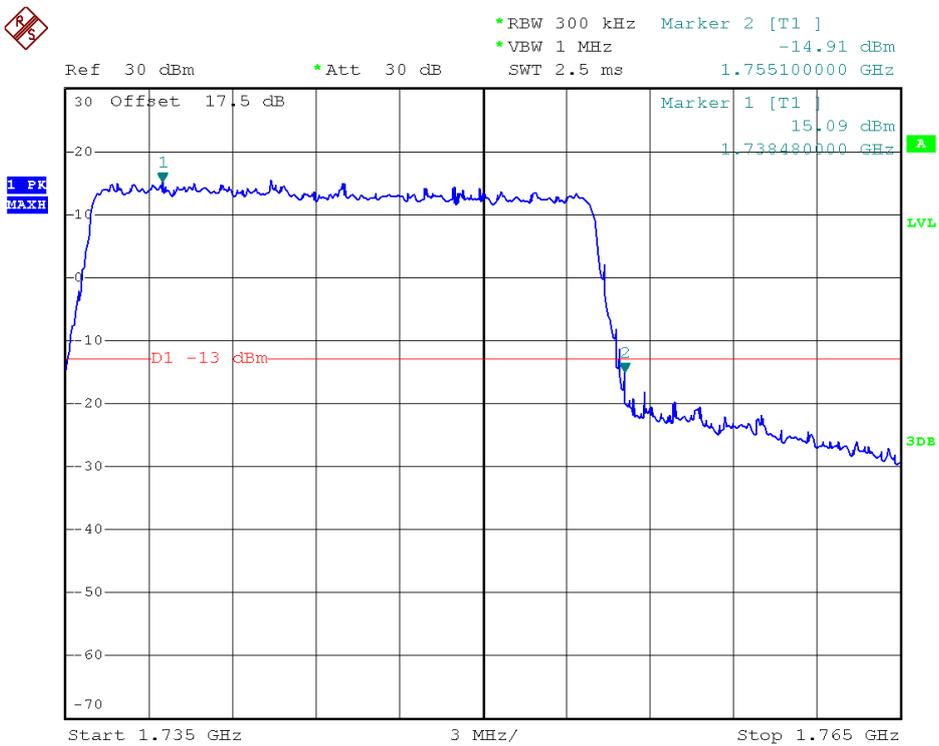
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



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

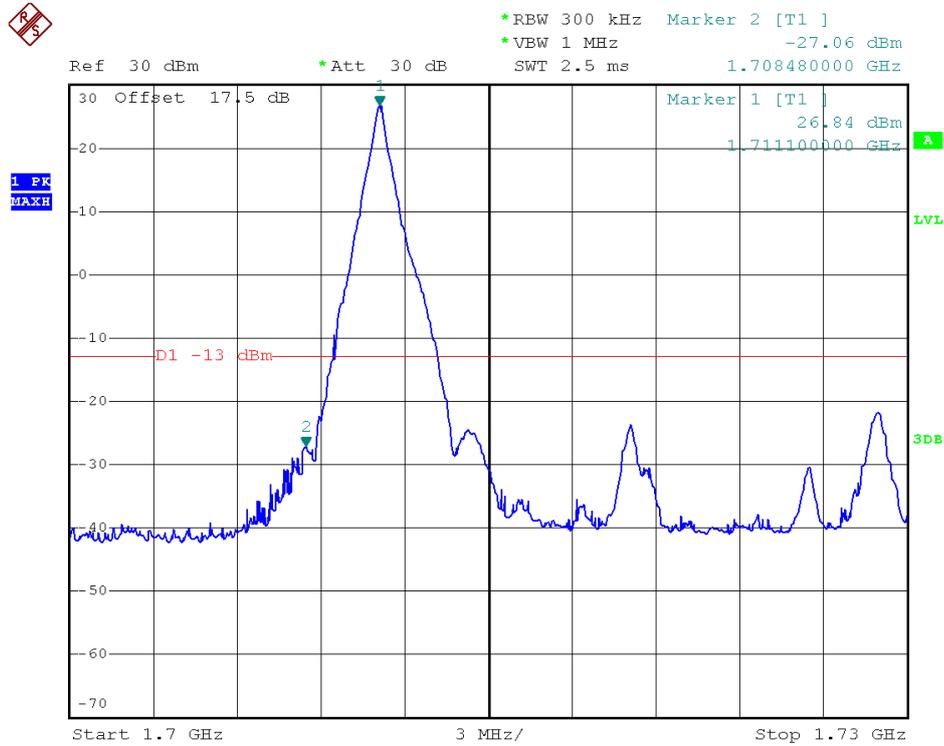


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 99

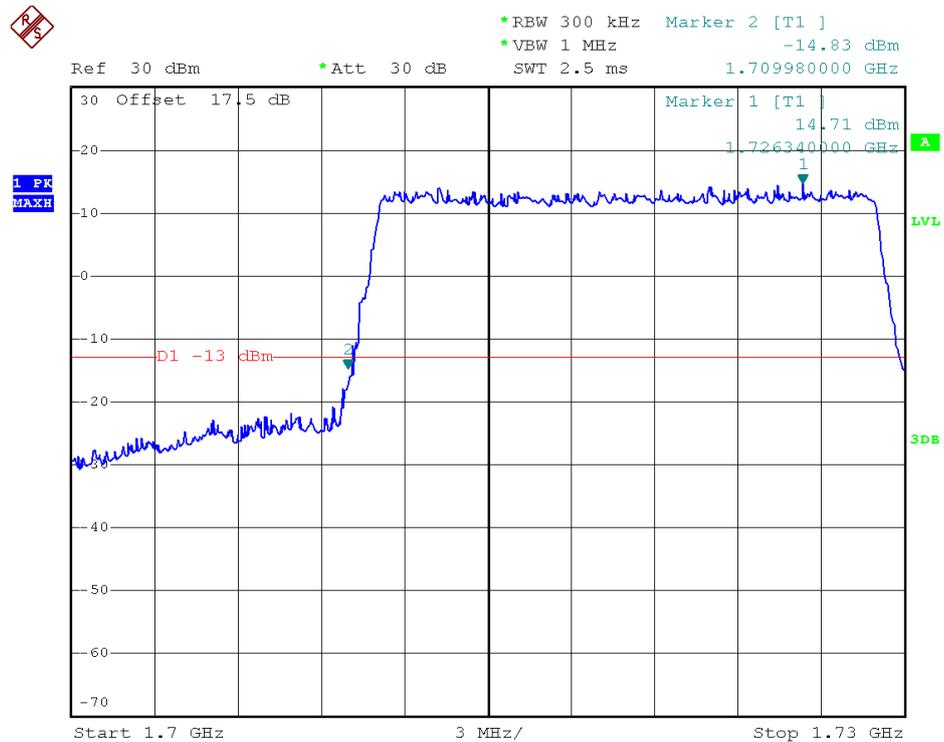


Higher Band Edge Plot for QPSK-RB Size 100, RB Offset 0

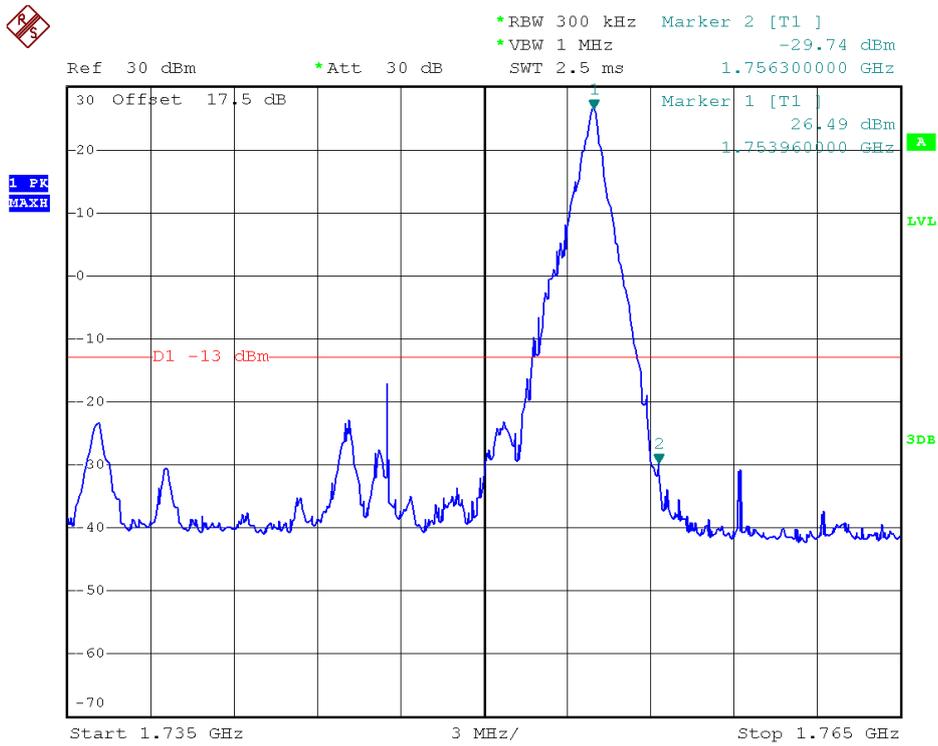
Band	LTE Band 4	Modulation	16QAM
Bandwidth	20MHz		



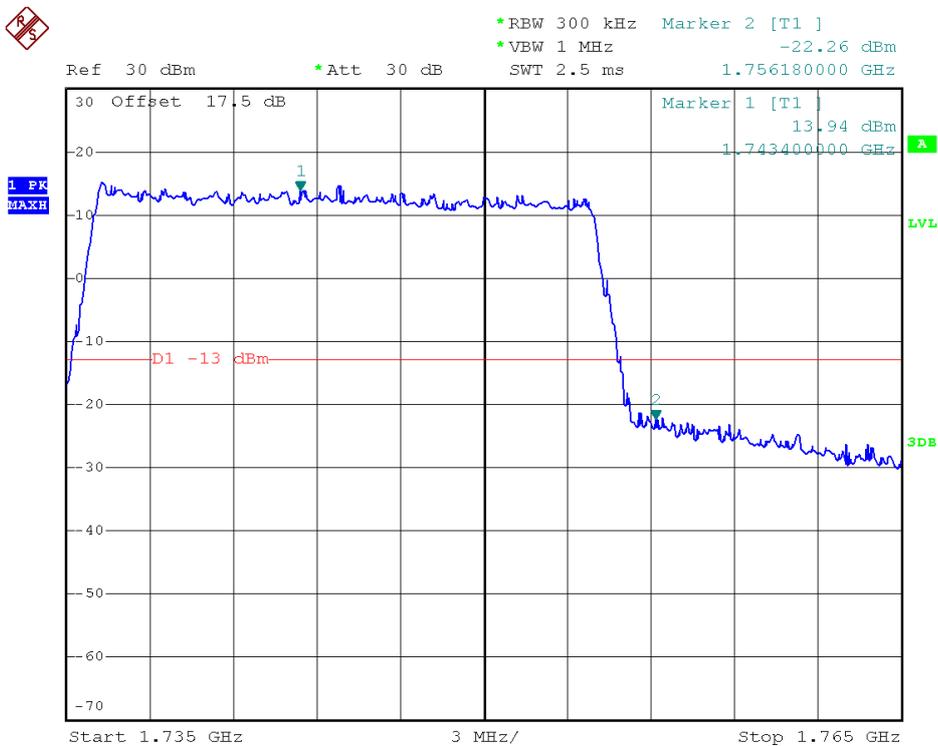
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



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

2.7 Transmitter Radiated Power (EIRP/ERP)

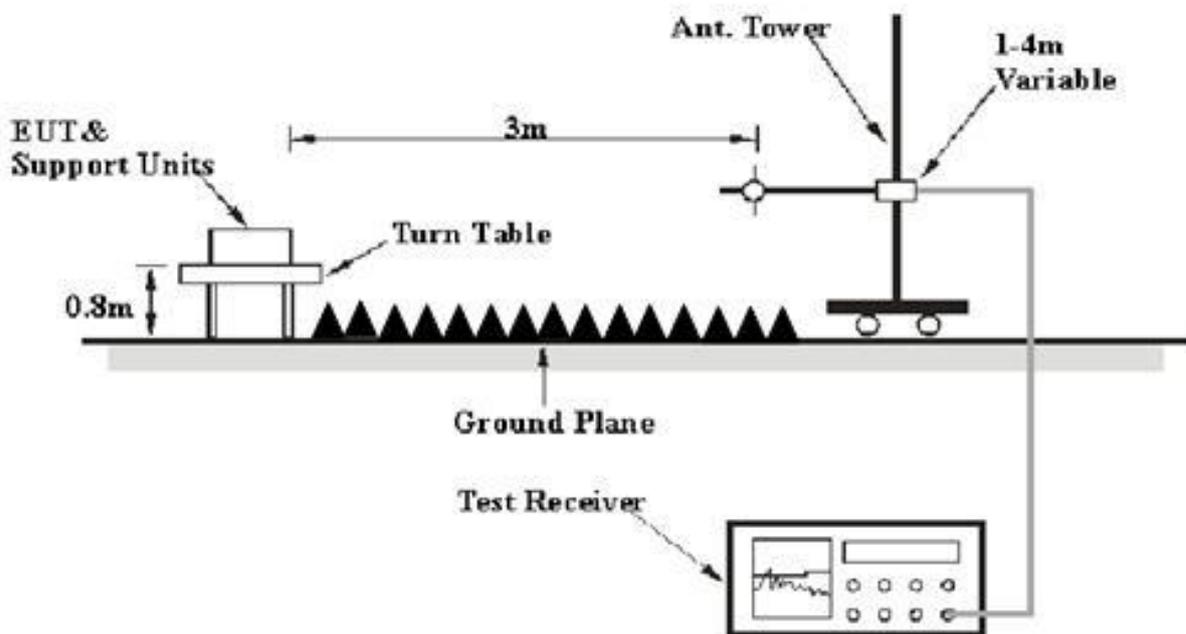
2.7.1 Requirement

Equivalent isotropic 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 v02r02. Mobile and portable (hand-held) stations operating are limited to average EIRP of 2 watts with LTE band 2 / 7 and 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 v02r02.

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	Verdict
			RB Size	RB Offset				
4	1.4	QPSK	3	0	1710.7	18.40	H	PASS
4	1.4	QPSK	3	2	1732.5	18.32	H	PASS
4	1.4	QPSK	1	2	1754.3	18.39	H	PASS
4	1.4	QPSK	3	0	1710.7	17.86	V	PASS
4	1.4	QPSK	3	2	1732.5	17.64	V	PASS
4	1.4	QPSK	1	2	1754.3	17.69	V	PASS
4	1.4	16QAM	3	2	1710.7	16.71	H	PASS
4	1.4	16QAM	3	2	1732.5	16.80	H	PASS
4	1.4	16QAM	3	2	1754.3	16.77	H	PASS
4	1.4	16QAM	3	2	1710.7	15.97	V	PASS
4	1.4	16QAM	3	2	1732.5	15.88	V	PASS
4	1.4	16QAM	3	2	1754.3	15.92	V	PASS
4	3	QPSK	1	0	1711.5	18.40	H	PASS
4	3	QPSK	1	0	1732.5	18.41	H	PASS
4	3	QPSK	1	7	1753.5	18.36	H	PASS
4	3	QPSK	1	0	1711.5	17.76	V	PASS
4	3	QPSK	1	0	1732.5	17.74	V	PASS
4	3	QPSK	1	7	1753.5	17.77	V	PASS
4	3	16QAM	1	14	1711.5	16.79	H	PASS
4	3	16QAM	1	14	1732.5	16.80	H	PASS
4	3	16QAM	1	14	1753.5	16.77	H	PASS
4	3	16QAM	1	14	1711.5	15.87	V	PASS
4	3	16QAM	1	14	1732.5	15.92	V	PASS
4	3	16QAM	1	14	1753.5	15.89	V	PASS
4	5	QPSK	1	12	1712.5	18.35	H	PASS
4	5	QPSK	1	24	1732.5	18.34	H	PASS
4	5	QPSK	1	24	1752.5	18.29	H	PASS
4	5	QPSK	1	12	1712.5	17.75	V	PASS
4	5	QPSK	1	24	1732.5	17.71	V	PASS
4	5	QPSK	1	24	1752.5	17.69	V	PASS
4	5	16QAM	1	24	1712.5	16.79	H	PASS
4	5	16QAM	1	0	1732.5	16.83	H	PASS
4	5	16QAM	1	0	1752.5	16.81	H	PASS
4	5	16QAM	1	24	1712.5	15.87	V	PASS
4	5	16QAM	1	0	1732.5	15.78	V	PASS



LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	EIRP (dBm)	H/V	Verdict
			RB Size	RB Offset				
4	5	16QAM	1	0	1752.5	15.82	V	PASS
4	10	QPSK	1	24	1715	18.37	H	PASS
4	10	QPSK	1	0	1732.5	18.30	H	PASS
4	10	QPSK	1	24	1750	18.29	H	PASS
4	10	QPSK	1	24	1715	17.69	V	PASS
4	10	QPSK	1	0	1732.5	17.68	V	PASS
4	10	QPSK	1	24	1750	17.72	V	PASS
4	10	16QAM	1	24	1715	16.70	H	PASS
4	10	16QAM	1	0	1732.5	16.72	H	PASS
4	10	16QAM	1	24	1750	16.71	H	PASS
4	10	16QAM	1	24	1715	15.81	V	PASS
4	10	16QAM	1	0	1732.5	15.78	V	PASS
4	10	16QAM	1	24	1750	15.85	V	PASS
4	15	QPSK	1	74	1717.5	18.40	H	PASS
4	15	QPSK	1	74	1732.5	18.28	H	PASS
4	15	QPSK	1	0	1747.5	18.31	H	PASS
4	15	QPSK	1	74	1717.5	17.66	V	PASS
4	15	QPSK	1	74	1732.5	17.69	V	PASS
4	15	QPSK	1	0	1747.5	17.73	V	PASS
4	15	16QAM	1	74	1717.5	16.69	H	PASS
4	15	16QAM	1	0	1732.5	16.78	H	PASS
4	15	16QAM	1	0	1747.5	16.67	H	PASS
4	15	16QAM	1	74	1717.5	15.69	V	PASS
4	15	16QAM	1	0	1732.5	15.72	V	PASS
4	15	16QAM	1	0	1747.5	15.78	V	PASS
4	20	QPSK	1	0	1720	18.45	H	PASS
4	20	QPSK	1	0	1732.5	18.34	H	PASS
4	20	QPSK	1	0	1745	18.43	H	PASS
4	20	QPSK	1	0	1720	17.86	V	PASS
4	20	QPSK	1	0	1732.5	17.82	V	PASS
4	20	QPSK	1	0	1745	17.79	V	PASS
4	20	16QAM	1	0	1720	16.79	H	PASS
4	20	16QAM	1	0	1732.5	16.92	H	PASS
4	20	16QAM	1	0	1745	16.87	H	PASS
4	20	16QAM	1	0	1720	15.72	V	PASS
4	20	16QAM	1	0	1732.5	15.78	V	PASS
4	20	16QAM	1	0	1745	15.75	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 Band 7

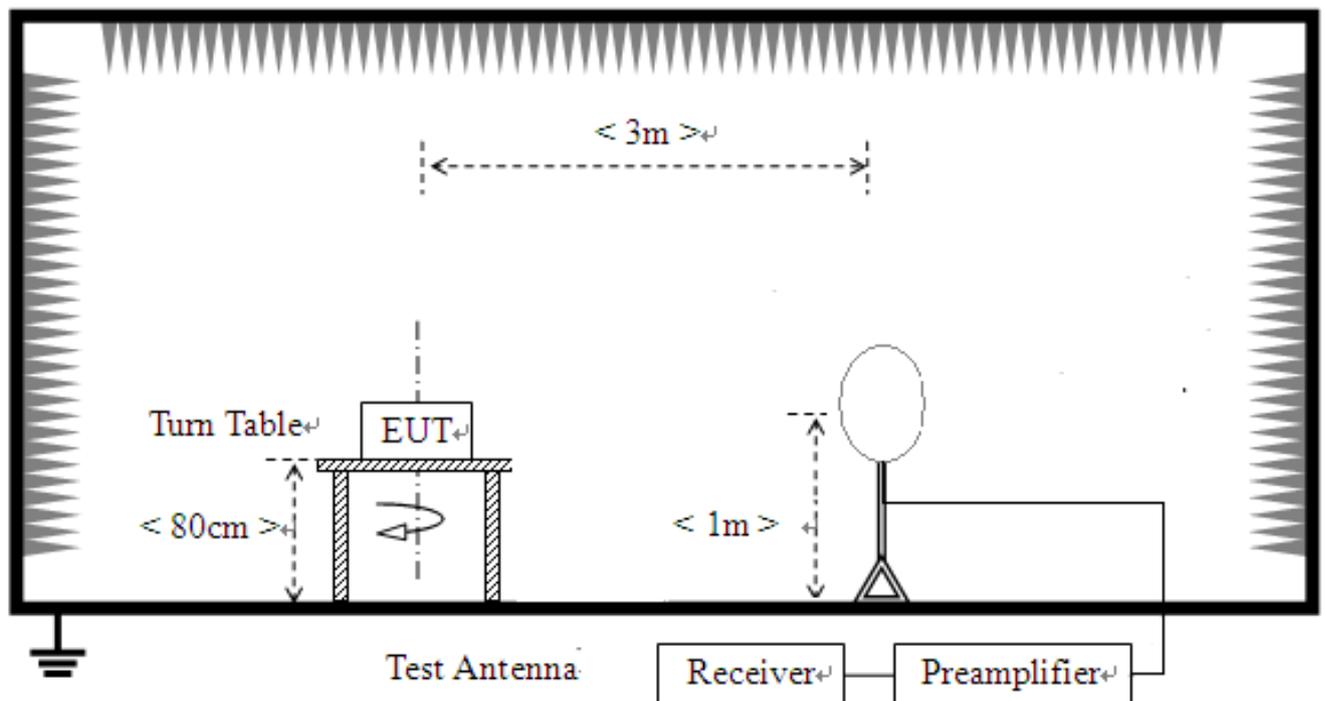
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $55 + 10 \log (P)$ dB.

2.8.2 Measuring Instruments

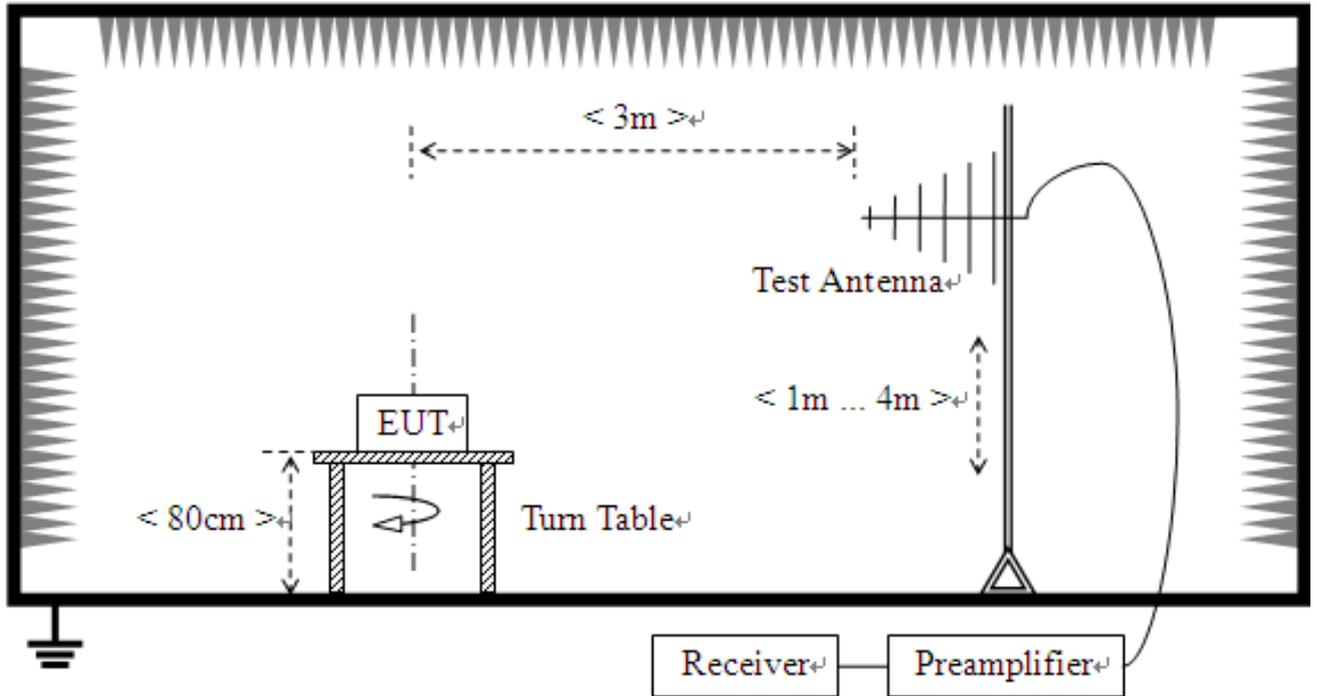
The measuring equipment is listed in the section 3 of this test report.

2.8.3 Test Setup

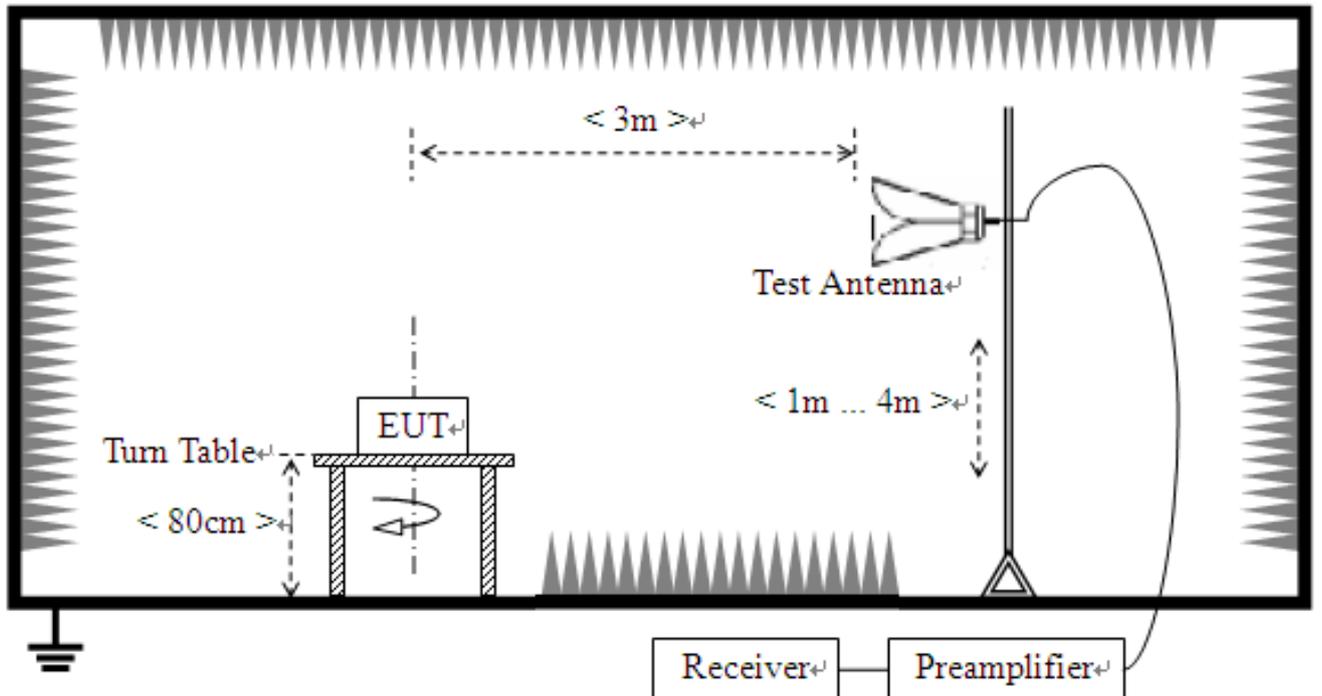
For radiated emissions from 30MHz to 1GHz



For radiated emissions above 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.

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

<For Band 7>

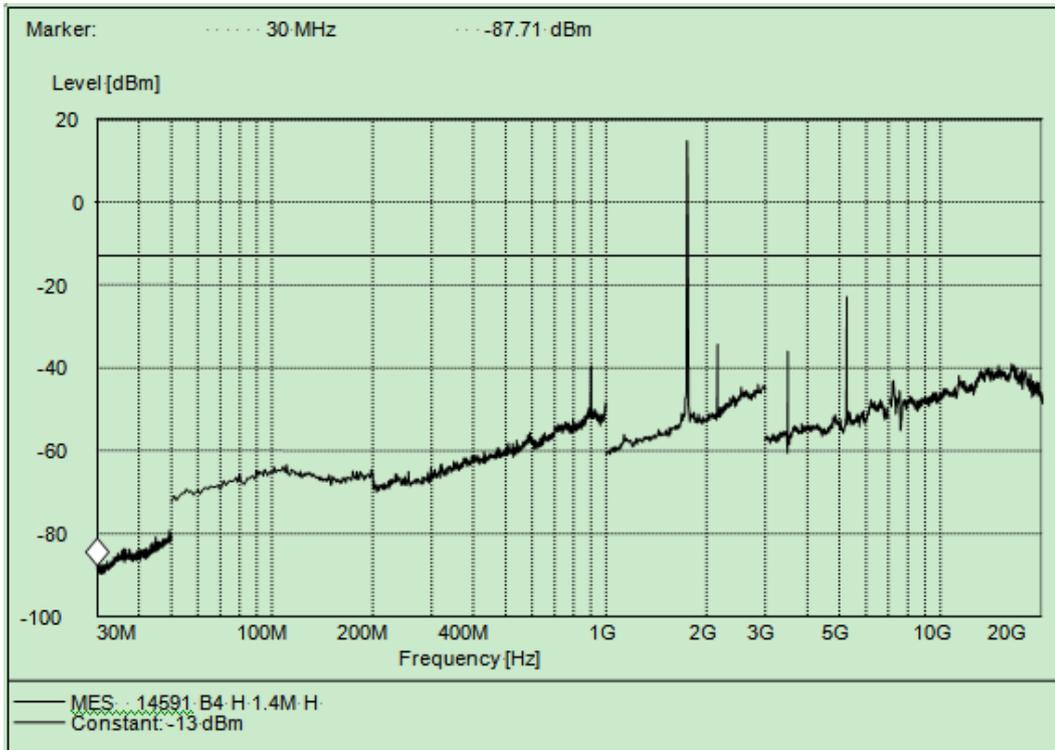
$$\begin{aligned} & \text{The limit line is derived from } 55 + 10\log(P)\text{dB below the transmitter power } P(\text{Watts}) \\ & = P(\text{W}) - [55 + 10\log(P)] \text{ (dB)} \\ & = [30 + 10\log(P)] \text{ (dBm)} - [55 + 10\log(P)] \text{ (dB)} \\ & = -25\text{dBm}. \end{aligned}$$

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.

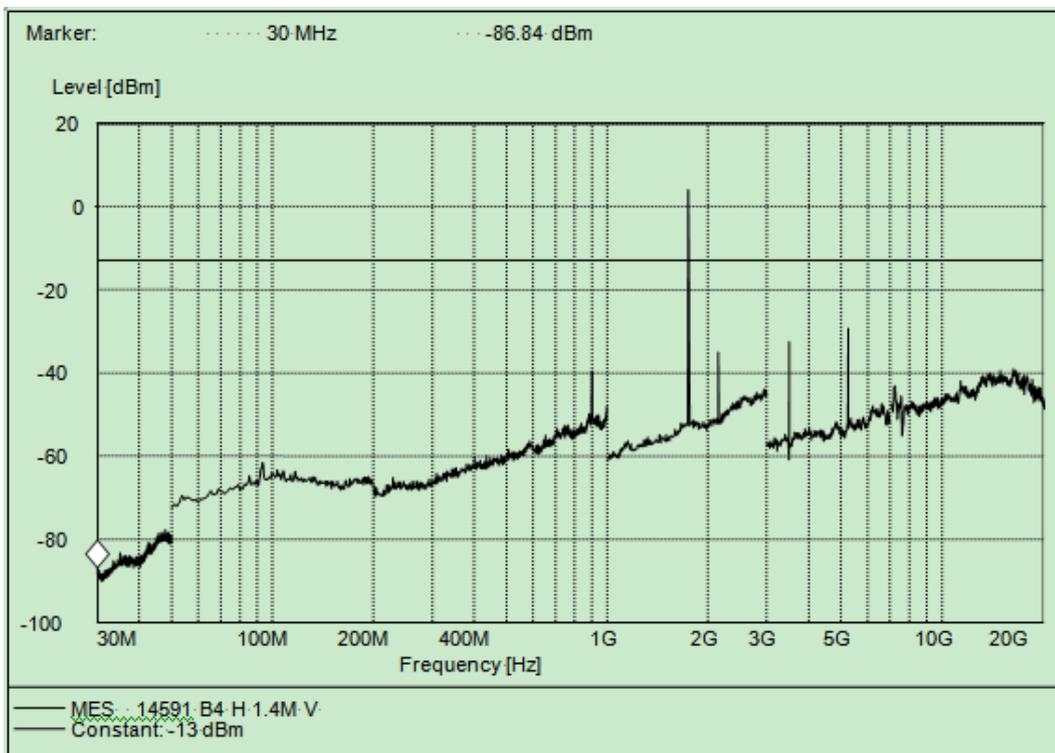


13. The maximum RB configurations of the Radiated Spurious Emissions as RB Size 1, RB Offset 0
14. For 9KHz to 30MHz: the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported here.

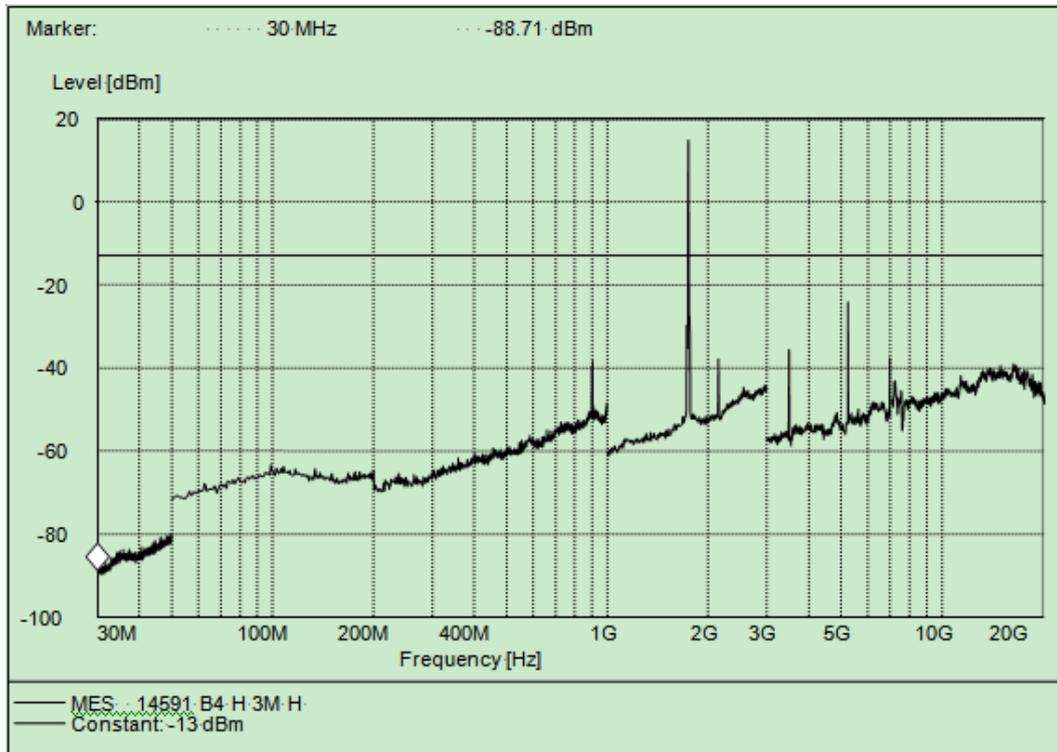
2.8.5 Test Result (Plots) of Radiated Spurious Emission



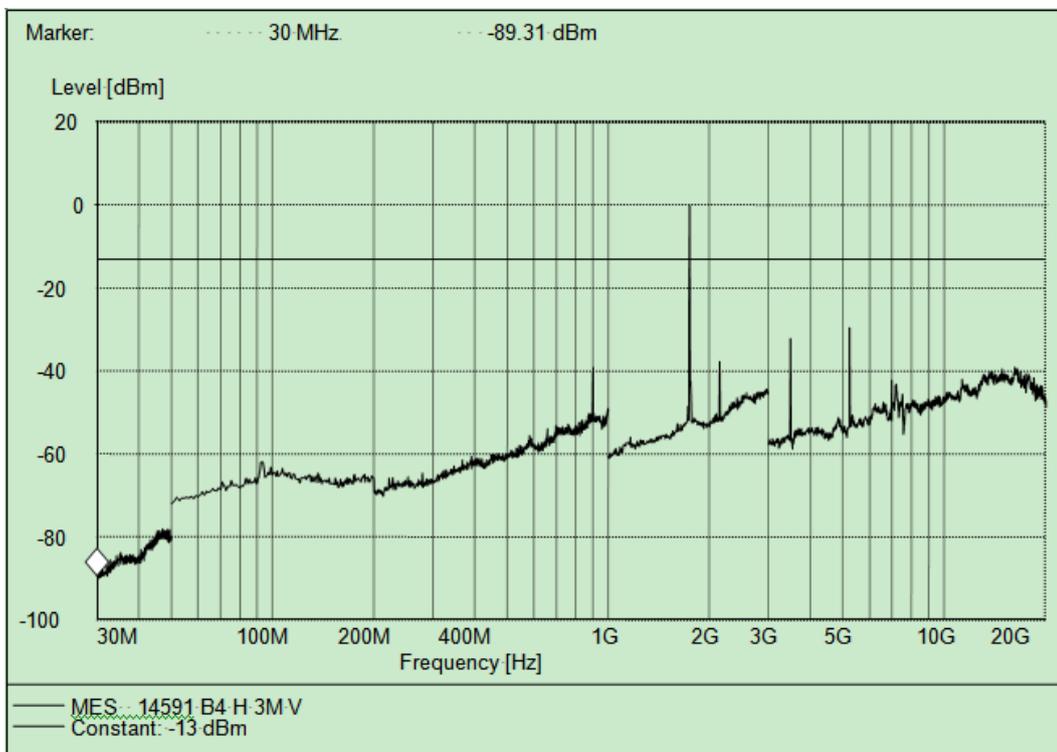
LTE Band 4 QPSK 1.4MHz BW Test Antenna Horizontal



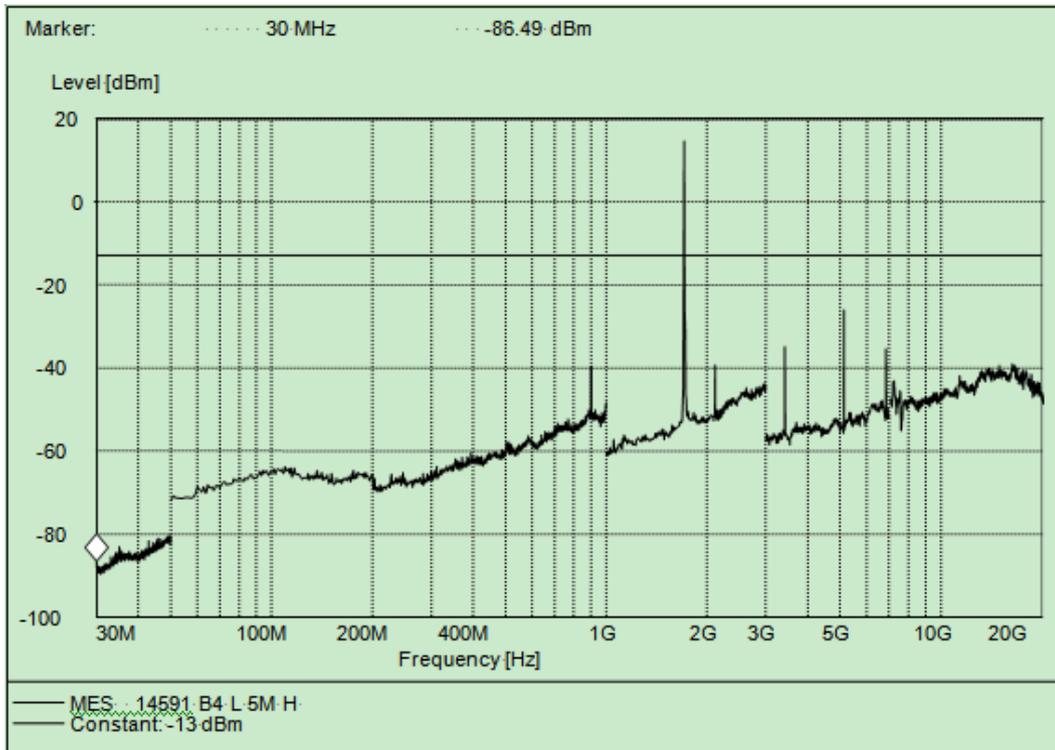
LTE Band 4 QPSK 1.4MHz BW Test Antenna Vertical



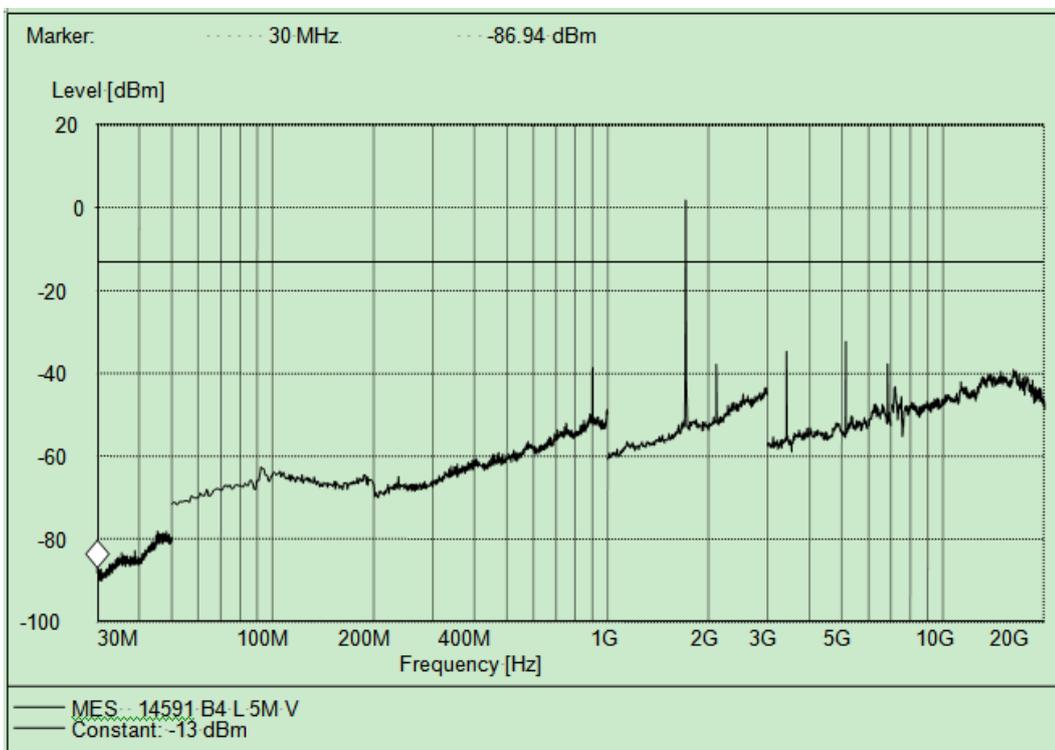
LTE Band 4 QPSK 3MHz BW Test Antenna Horizontal



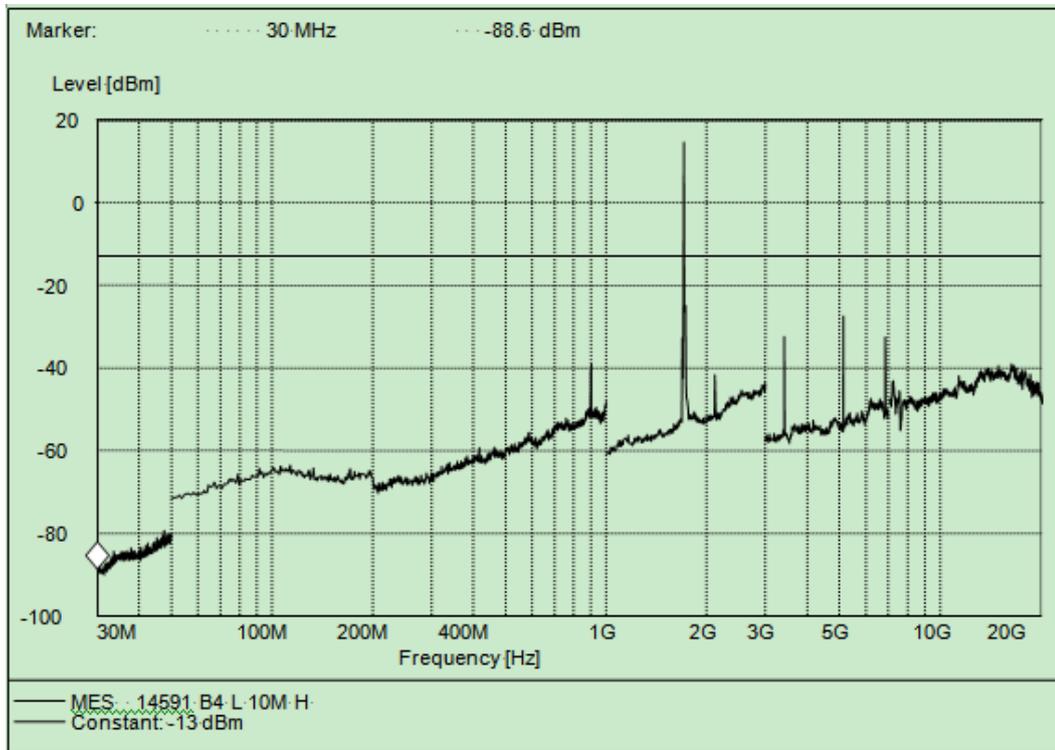
LTE Band 4 QPSK 3MHz BW Test Antenna Vertical



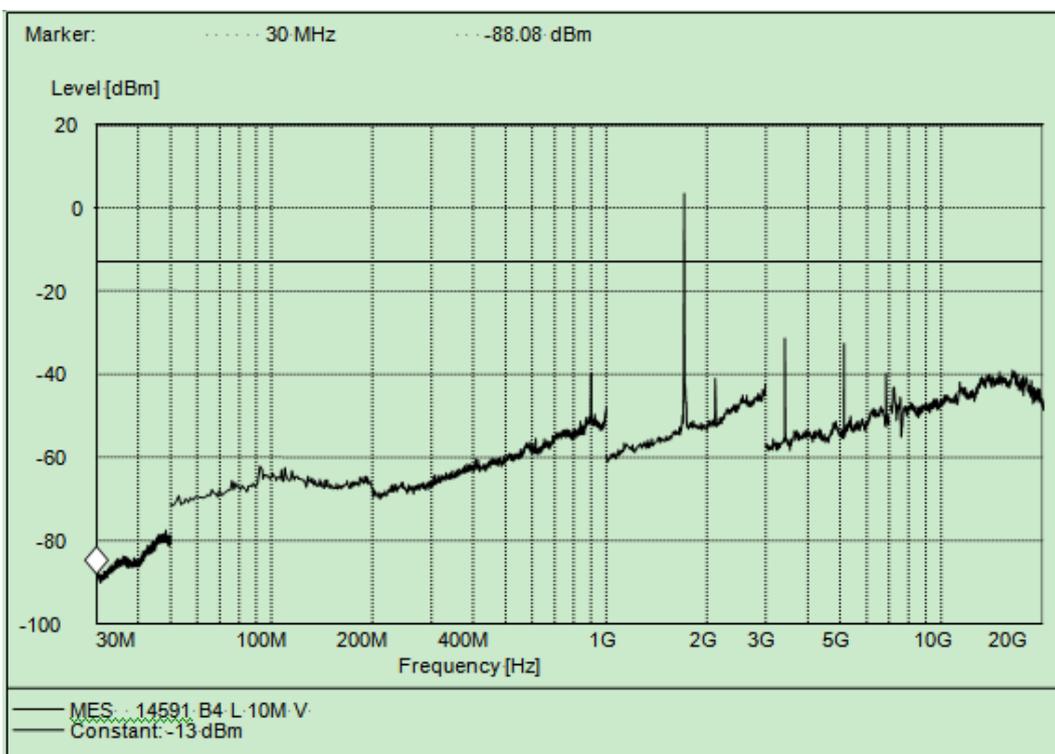
LTE Band 4 QPSK 5MHz BW Test Antenna Horizontal



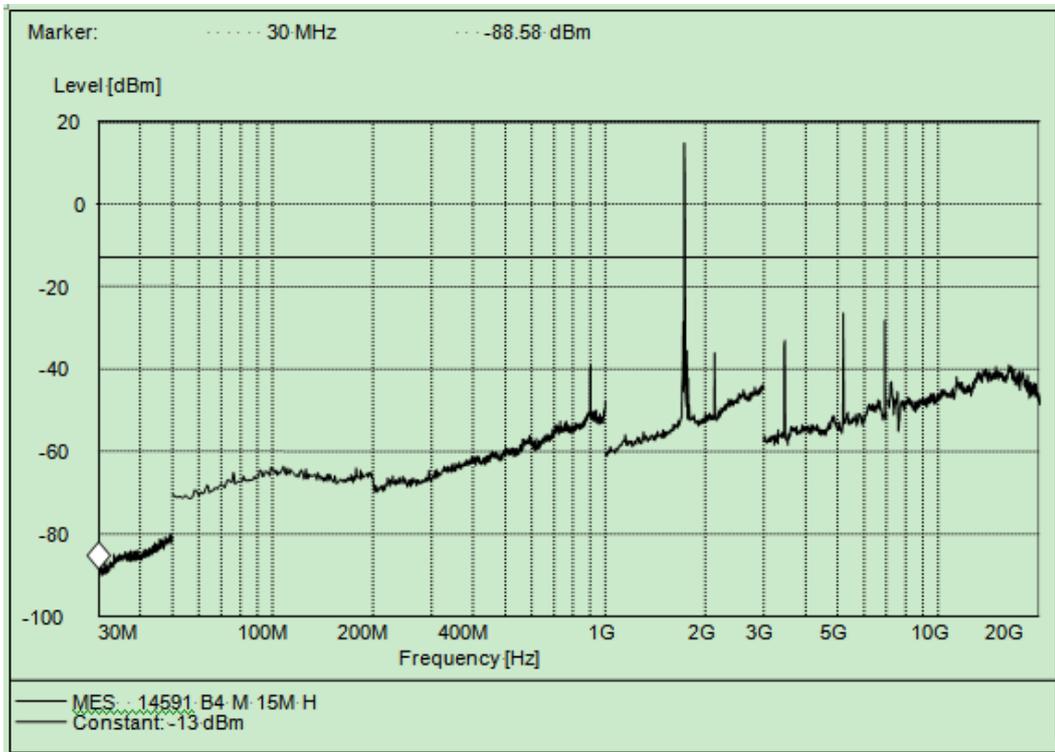
LTE Band 4 QPSK 5MHz BW Test Antenna Vertical



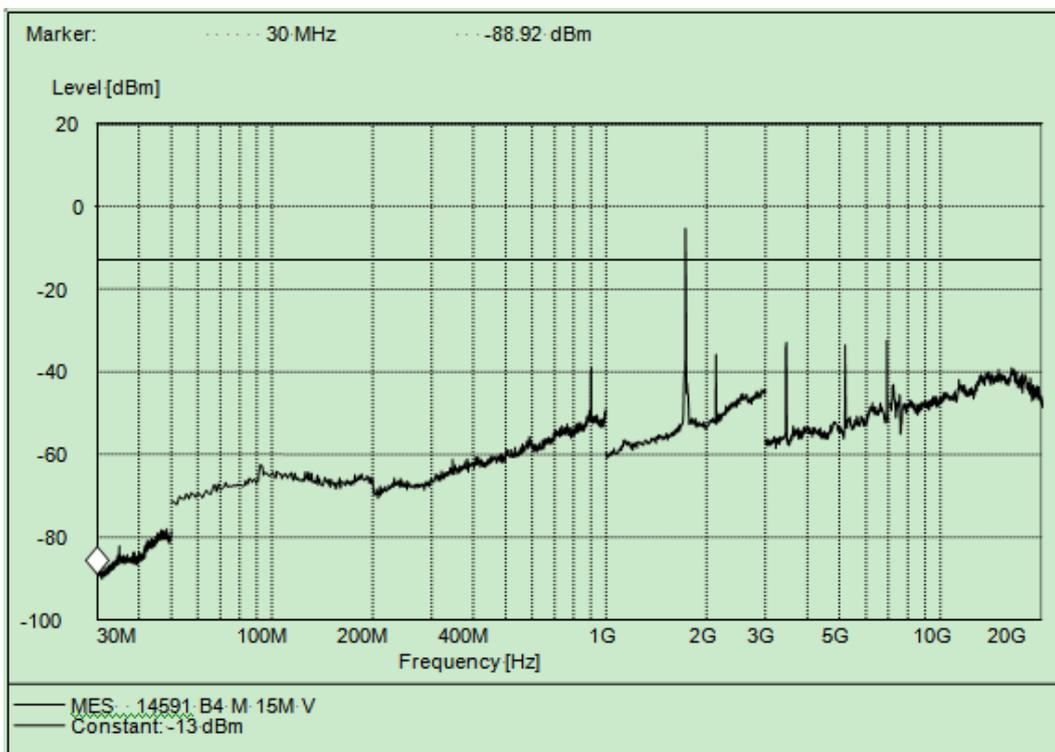
LTE Band 4 QPSK 10MHz BW Test Antenna Horizontal



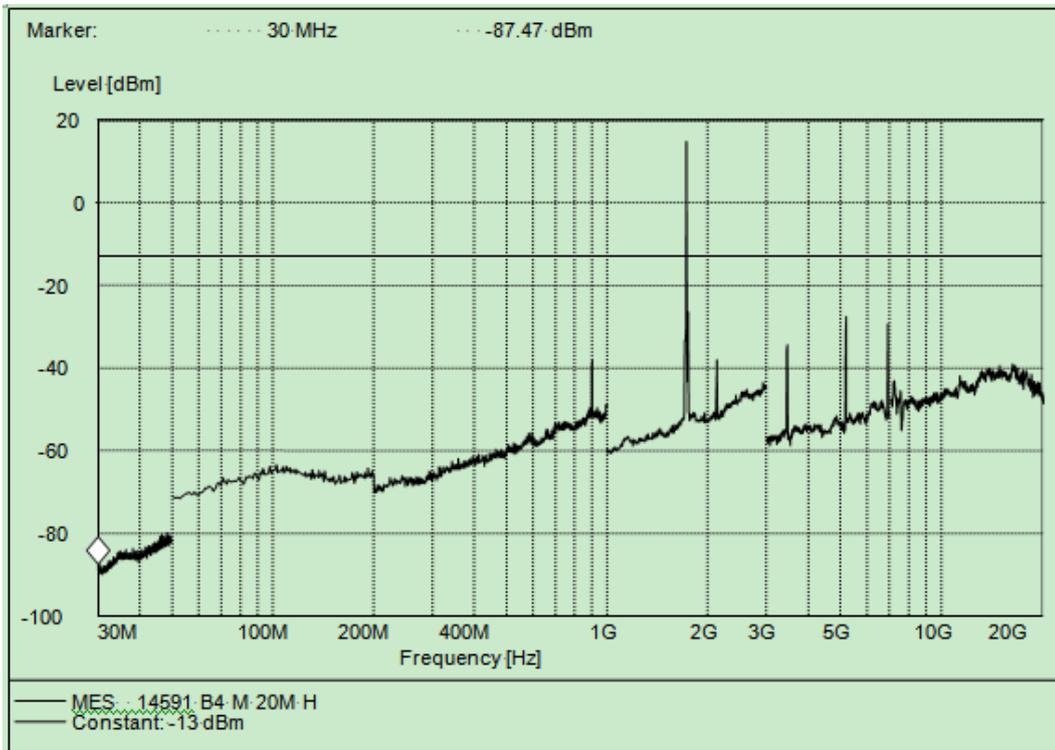
LTE Band 4 QPSK 10MHz BW Test Antenna Vertical



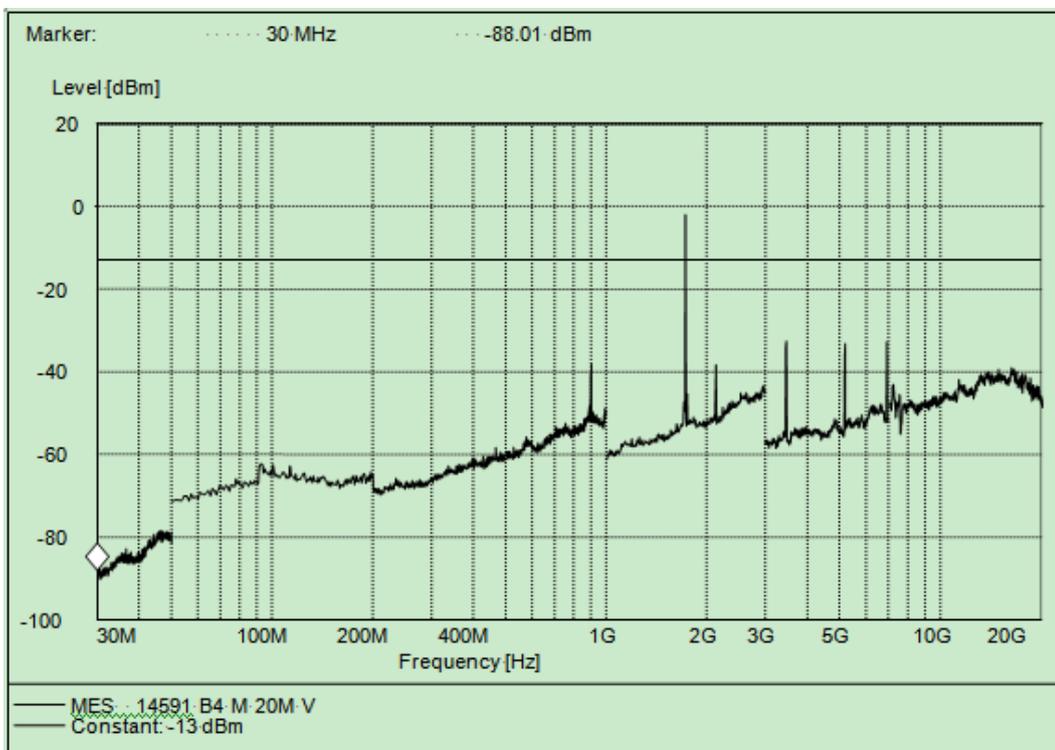
LTE Band 4 QPSK 15MHz BW Test Antenna Horizontal



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



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	2016.06.01	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	2016.06.01	Radiation
Bilog Antenna	Schwarz beck	VULB 9163	9163-274	2015.06.02	2016.06.01	Radiation
Double ridge horn antenna	R&S	HF906	100150	2015.06.02	2016.06.01	Radiation
Ultra-wideband antenna	R&S	HL562	100089	2015.06.02	2016.06.01	Radiation
Test Antenna – Horn (18-26.5GHz)	ETS	3160-09	A0902607	2015.06.02	2016.06.01	Radiation
Amplifier 20M~3GHz	R&S	PAP-0203H	22018	2015.06.02	2016.06.01	Radiation
Ampilier 1G~18GHz	R&S	MITEQ AFS42-00101 800	25-S-42	2015.06.02	2016.06.01	Radiation
Ampilier 18G~40GHz	R&S	JS42-180026 00-28-5A	12111.0980.0 0	2015.06.02	2016.06.01	Radiation
Spectrum Analyzer	R&S	FSP40	1164.4391.40	2015.07.07	2016.07.06	Conducted
Power Meter	R&S	NRVS	1020.1809.02	2015.06.02	2016.06.01	Conducted
Power Sensor	R&S	NRV-Z4	823.3618.03	2015.06.02	2016.06.01	Conducted
LISN	ROHDE&SCH WARZ	ESH2-Z5	A0304221	2015.06.02	2016.06.01	Conducted
Test Receiver	R&S	ESCS30	A0304260	2015.06.02	2016.06.01	Conducted
Cable	SUNHNER	SUCOFLEX 100	/	2015.06.02	2016.06.01	Radiation
Cable	SUNHNER	SUCOFLEX 104	/	2015.06.02	2016.06.01	Radiation

** END OF REPORT **