
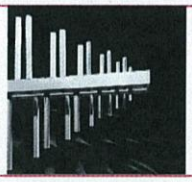
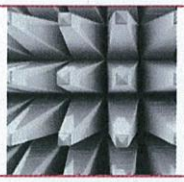

CETECOM™
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consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-4254/12-16-06

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing: Radio/Satellite Communications

Applicant

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN
Phone: +46 46 19 30 00
Fax: +46 46 19 32 95
Contact: Håkan Sjöberg
e-mail: hakan.sjoberg@sonymobile.com
Phone: +46 46 19 35 59

Manufacturer

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN

Test standard/s

47 CFR Part 27	Title 47 of the Code of Federal Regulations; Chapter I Part 27 - Miscellaneous Wireless Communications Service
RSS - 139 Issue 2	Advanced Wireless Services Equipment Operating in the Bands 1710-1755 MHz and 2110-2155 MHz

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS FDDI/FDDII/FDDIV/FDDV; HSPA; LTE Band 2/4/5/17; BT3.1; WLAN a/b/g/n; AGPS; RFID, FM Rx**
Model name:	**PM-0140-BV**
FCC ID:	**PY7PM-0140**
IC:	**4170B-PM0140**
Frequency:	1710.70 MHz – 1754.30 MHz
Technology tested:	LTE
Antenna:	Integrated antenna
Power Supply:	3.7 V DC by Li-polymer battery
Temperature Range:	-30°C to +60 °C

Test report authorised:

2012-07-17 Stefan Bös
Senior Testing Manager

Test performed:

2012-07-17 Andreas Luckenbill

1 Table of contents

2 General information

2.1 Notes and disclaimer

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In no case this test report can be considered as a Letter of Approval.

2.2 Application details

Date of receipt of order:	2012-03-14
Date of receipt of test item:	2012-06-25
Start of test:	2012-07-06
End of test:	2012-07-13
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 27	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 27 - Miscellaneous Wireless Communications Service
RSS - 139 Issue 2	2009-02	Advanced Wireless Services Equipment Operating in the Bands 1710-1755 MHz and 2110-2155 MHz

4 Test environment

Temperature:	T_{nom}	+22 °C	during room temperature tests
	T_{max}	+60 °C	during high temperature tests
	T_{min}	-30 °C	during low temperature tests
Relative humidity content:		57 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.7 V	DC by Li-polymer battery
	V_{max}	4.4 V	
	V_{min}	3.3 V	

5 Test item

Kind of test item	**:**	**GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS FDDI/FDDII/FDDIV/FDDV; HSPA; LTE Band 2/4/5/17; BT3.1; WLAN a/b/g/n; AGPS; RFID, FM Rx**
Type identification	**:**	**PM-0140-BV**
S/N serial number	**:**	**Rad. CB511Z7M8A, CB511Z7MKJ** **Cond. CB511Z7MCM, CB511Z7M8T**
HW hardware status	**:**	**AP1.2**
SW software status	**:**	**7.0.A.1.68, 7.0.B.0.102**
Frequency band [MHz]	**:**	**1710.70 MHz – 1754.30 MHz**
Type of modulation	**:**	**QPSK, 16-QAM**
Antenna	**:**	**Integrated antenna**
Power supply	**:**	**3.7 V DC by Li-polymer battery**
Temperature range	**:**	**-30°C to +60 °C**

6 Additional information

Test setup- and EUT-photos are included in test report 1-4254/12-16-03

7 Test laboratories sub-contracted

None

8 Summary of measurement results

☒	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	CFR Part 27 RSS 139	passed	2012-07-17	-/-

8.1 LTE – Band 4

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	
Frequency Stability	Nominal	Nominal	☒	☐	☐	☐	
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	
Spurious Emissions Conducted	Nominal	Nominal	☒	☐	☐	☐	
Block Edge Compliance	Nominal	Nominal	☒	☐	☐	☐	
Occupied Bandwidth	Nominal	Nominal	☒	☐	☐	☐	

Note:
NA = Not applicable; NP = Not performed

9 RF measurements

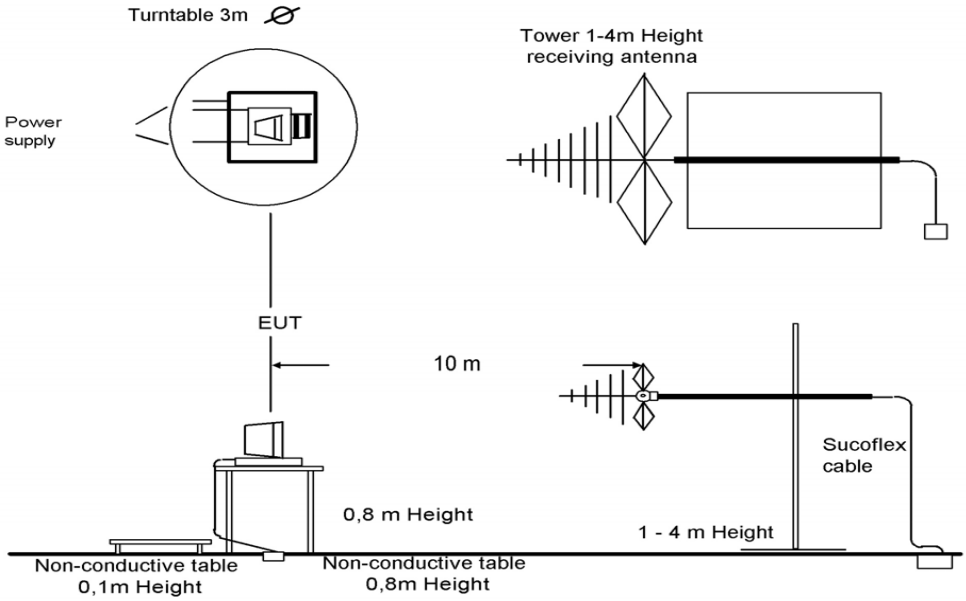
9.1 Description of test setup

For the spurious measurements we use the substitution method according TIA/EIA 603.

9.1.1 Radiated measurements

The radiated emissions from the EUT are performed in a semi anechoic chamber. The EUT is placed on a conductive turntable and powered with nominal voltage. The signalling is performed either from outside the chamber with a signalling unit (AP or other) by air link using a signalling antenna or directly by special test software from the customer.

Semi anechoic chamber

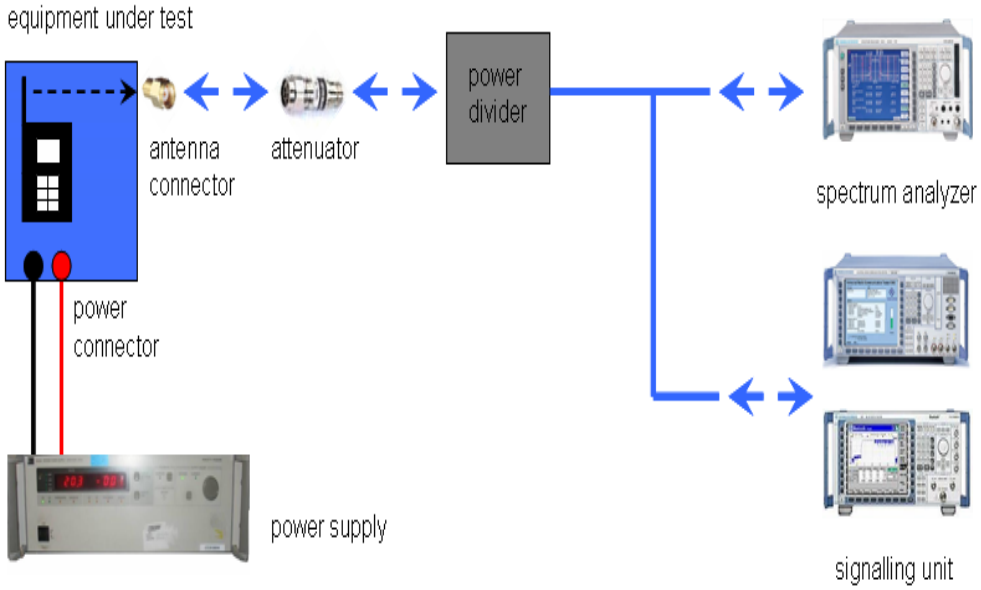


Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

9.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the signalling unit (AP or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm. If special software is used, there is no power divider necessary.



Picture 2: Diagram conducted measurements

The term measuring receiver refers to either a selective voltmeter or a spectrum analyser.

Frequency being measured f	Measuring receiver bandwidth 6 dB	Spectrum analyser bandwidth 3dB
f < 150 kHz	200 Hz or	300 Hz
150 kHz ≤ f < 25 MHz	9 kHz or	10 kHz
25 MHz ≤ f < 1000 MHz	120 kHz or	100 kHz
1000 MHz ≤ f		1 MHz
NOTE: Specific requirements in CEPT/ERC/Recommendation 70-03 [2] shall be applied where applicable.		

9.2 RSP100 test report cover sheet / performance test data

Test Report Number	:	1-4254/12-16-06			
Equipment Model Number	:	PM-0140-BV			
Certification Number	:	4170B-PM0140			
Manufacturer (complete Address)	:	Sony Mobile Communications AB Nya Vattentornet 22188 Lund / SWEDEN			
Tested to radio standards specification no.	:	RSS - 139 Issue 2			
Open Area Test Site IC No.	:	IC 3462C-1			
Frequency Range	:	LTE: 1710.70 MHz – 1754.30 MHz			
GPS receiver turned	:	On			
RF-power [dBm] (max.)	:	**Channel bandwidth**	**Conducted [dBm]**	**ERP / EIRP [dBm]**	**Mode**
		1.4	24.0	23.6	QPSK
			23.2	22.9	16-QAM
		3	24.1	24.0	QPSK
			23.3	23.3	16-QAM
		5	24.1	24.0	QPSK
			23.1	23.2	16-QAM
		10	24.3	24.1	QPSK
			23.2	23.1	16-QAM
		15	24.3	24.3	QPSK
			23.5	23.2	16-QAM
		20	24.0	24.0	QPSK
			23.7	23.1	16-QAM
Occupied bandwidth (99%-BW) [kHz]	:	1.4	1077		QPSK
			1083		16-QAM
		3	2681		QPSK
			2693		16-QAM
		5	4469		QPSK
			4469		16-QAM
		10	8938		QPSK
			8938		16-QAM
		15	13407		QPSK
			13407		16-QAM
		20	17876		QPSK
			17956		16-QAM

Type of modulation	:	QPSK; 16-QAM		
Emission Designator (TRC-43)	:	1.4	1M08G7D	QPSK
			1M08W7D	16-QAM
		3	2M68G7D	QPSK
			2M69W7D	16-QAM
		5	4M47G7D	QPSK
			4M47W7D	16-QAM
		10	8M94G7D	QPSK
			8M94W7D	16-QAM
		15	13M4G7D	QPSK
			13M4W7D	16-QAM
		20	17M9G7D	QPSK
			18M0W7D	16-QAM
Antenna Information	:	integrated antenna		
Transmitter Spurious (worst case) [dBm]	:	-27 dBm (noise floor)		
Receiver Spurious (worst case) [dBµV/m @ 3m]	:	32.5 @ 519.7 MHz*		

*value from report 1-4254/12-16-3

ATTESTATION:
DECLARATION OF COMPLIANCE:

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory Manager:

2012-07-17	**Andreas Luckenbill**	
Date	Name	Signature

9.3 LTE technologies supported by EUT

Channel bandwidth

	Band 4
[MHz]	
1.4	☒
3	☒
5	☒
10	☒
15	☒
20	☒

Antenna

SISO	☐
SIMO	☐
MISO	☒
MIMO	☐

9.4 Results LTE – Band IV

The EUT was set to transmit the maximum power.

9.4.1 RF output power

Description:

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters
Measured with CMW500

Limits:

FCC	IC
CFR Part 27.1101 CFR Part 2.1046	RSS 139, Issue 2, Section 6.4
Nominal Peak Output Power	
+30.00 dBm 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.	

Results:

Output Power (conducted)						
Bandwidth (MHz)	**Frequency (MHz)**	**Resource block allocation**	**Average Output Power (dBm) QPSK**	**Peak to Average Ratio (dB)**	**Average Output Power (dBm) 16-QAM**	**Peak to Average Ratio (dB)**
1.4	1710.7	1 RB low	23.9	4.7	22.9	5.3
		1 RB high	23.8	4.6	22.9	5.2
		50% RB mid	23.8	4.5	22.9	5.3
		100% RB	22.9	5.4	21.8	6.3
	1732.5	1 RB low	23.8	4.5	23.1	5.0
		1 RB high	23.7	4.6	23.2	5.0
		50% RB mid	23.2	5.0	23.2	5.0
		100% RB	22.9	5.4	22.2	5.9
	1754.3	1 RB low	24.0	4.6	23.0	5.2
		1 RB high	24.0	4.6	23.0	5.3
		50% RB mid	23.9	5.1	22.9	5.5
		100% RB	22.9	5.2	21.8	5.8
3	1711.5	1 RB low	23.9	3.6	23.1	4.4
		1 RB high	24.1	3.4	23.3	4.1
		50% RB mid	23.8	3.7	23.1	4.3
		100% RB	23.3	5.0	22.6	5.9
	1732.5	1 RB low	24.0	4.6	22.8	5.5
		1 RB high	23.7	4.7	22.6	5.5
		50% RB mid	23.0	5.5	22.1	6.9
		100% RB	23.0	5.5	22.1	6.9
	1753.5	1 RB low	24.0	3.2	22.6	4.5
		1 RB high	23.8	3.4	22.5	4.5
		50% RB mid	23.7	3.5	22.5	4.6
		100% RB	23.1	5.1	21.9	6.1
5	1712.5	1 RB low	24.1	3.3	23.1	3.9
		1 RB high	24.1	3.4	23.1	3.3
		50% RB mid	23.3	5.6	22.2	4.6
		100% RB	23.3	5.6	22.5	4.3
	1732.5	1 RB low	23.8	4.7	22.5	5.5
		1 RB high	23.5	4.6	22.2	5.6
		50% RB mid	22.2	5.6	22.2	5.6
		100% RB	23.0	5.9	22.0	7.0
	1752.5	1 RB low	24.0	4.8	23.0	5.3
		1 RB high	24.0	4.8	23.0	5.2
		50% RB mid	23.1	5.6	22.1	6.3
		100% RB	23.1	5.6	22.1	6.3

10	1715.0	1 RB low	23.9	3.6	22.6	4.7
		1 RB high	24.3	3.2	23.1	4.4
		50% RB mid	23.8	3.6	22.6	4.8
		100% RB	23.4	5.3	22.4	5.8
	1732.5	1 RB low	24.2	4.3	22.8	5.4
		1 RB high	23.9	4.6	22.6	5.5
		50% RB mid	24.0	4.6	22.8	5.4
		100% RB	23.0	6.1	22.1	7.1
	1750.0	1 RB low	23.9	4.0	23.2	4.6
		1 RB high	23.8	3.4	23.2	4.1
		50% RB mid	23.6	4.1	23.0	4.3
		100% RB	23.2	5.2	22.3	5.8
15	1717.5	1 RB low	24.2	3.6	23.4	4.8
		1 RB high	24.3	3.7	23.5	4.7
		50% RB mid	23.4	5.1	22.5	5.0
		100% RB	23.6	5.2	22.5	5.0
	1732.5	1 RB low	24.0	4.2	22.6	5.3
		1 RB high	23.8	4.4	22.5	5.5
		50% RB mid	24.0	4.2	22.6	5.3
		100% RB	23.0	6.2	22.1	7.3
	1747.5	1 RB low	24.0	4.1	23.4	4.4
		1 RB high	23.9	4.1	23.4	4.5
		50% RB mid	23.3	5.3	22.5	5.7
		100% RB	23.3	5.3	22.5	5.7
20	1720.0	1 RB low	23.9	3.8	23.7	3.8
		1 RB high	24.0	4.4	22.9	5.1
		50% RB mid	24.0	4.4	23.0	4.8
		100% RB	23.3	5.4	22.4	6.4
	1732.5	1 RB low	24.0	3.9	23.4	4.6
		1 RB high	24.0	4.0	23.4	4.9
		50% RB mid	23.9	4.1	23.4	4.9
		100% RB	23.1	6.2	22.2	7.1
	1745.0	1 RB low	23.9	4.7	23.3	5.2
		1 RB high	24.0	3.2	23.1	4.0
		50% RB mid	23.8	4.4	23.1	4.0
		100% RB	23.3	5.3	22.3	6.2
Measurement uncertainty			± 0.5 dB			

The output power was measured with the lowest supported channel bandwidth and with the maximum number of resource blocks.
All other bandwidths were calculated with the corresponding antenna gain (with full resource blocks).

Output Power (radiated)			
Bandwidth (MHz)	**Frequency (MHz)**	**Average Output Power (dBm) QPSK**	**Average Output Power (dBm) 16-QAM**
1.4	1710.7	23.6	22.5
	1732.5	23.6	22.9
	1754.3	23.6	22.5
3	1711.5	24.0*)	23.3*)
	1732.5	23.7*)	22.8*)
	1753.5	23.8*)	22.6*)
5	1712.5	24.0*)	23.2*)
	1732.5	23.7*)	22.7*)
	1752.5	23.8*)	22.8*)
10	1715.0	24.1*)	23.1*)
	1732.5	23.7*)	22.8*)
	1750.0	23.9*)	23.0*)
15	1717.5	24.3*)	23.2*)
	1732.5	23.7*)	22.8*)
	1747.5	24.0*)	23.2*)
20	1720.0	24.0*)	23.1*)
	1732.5	23.8*)	22.9*)
	1745.0	24.0*)	23.0*)
Measurement uncertainty		± 3.0 dB	

*) calculated with antenna gain

Result: **Passed**

9.4.2 Frequency stability

Description:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the mobile station in a “call mode”. This is accomplished with the use of a R&S CMW500 DIGITAL RADIOCOMMUNICATION TESTER.
1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with V_{nom}, connected to the CMW500 and in a simulated call on channel 1412 (centre channel), measure the carrier frequency. These measurements should be made within two minutes of powering up the mobile station, to prevent significant self warming.
4. Repeat the above measurements at 10°C increments from -30°C to +60°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with V_{nom}. Vary supply voltage from V_{min} to V_{max}, in 0.1 Volt steps remeasuring carrier frequency at each voltage. Pause at V_{nom} for 1.5 hours unpowered, to allow any self heating to stabilize, before continuing.
6. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

This measurement was performed with the highest channel bandwidth supported from the EUT on the middle channel

Measurement:

Measurement parameters	
Detector:	Measured with CMW500
Sweep time:	
Video bandwidth:	
Resolution bandwidth:	
Span:	
Trace-Mode:	

Limits:

FCC	IC
CFR Part 27.54 CFR Part 2.1055	RSS 139, Issue 2, Section 6.3
Frequency Stability	
< 2.5 ppm	

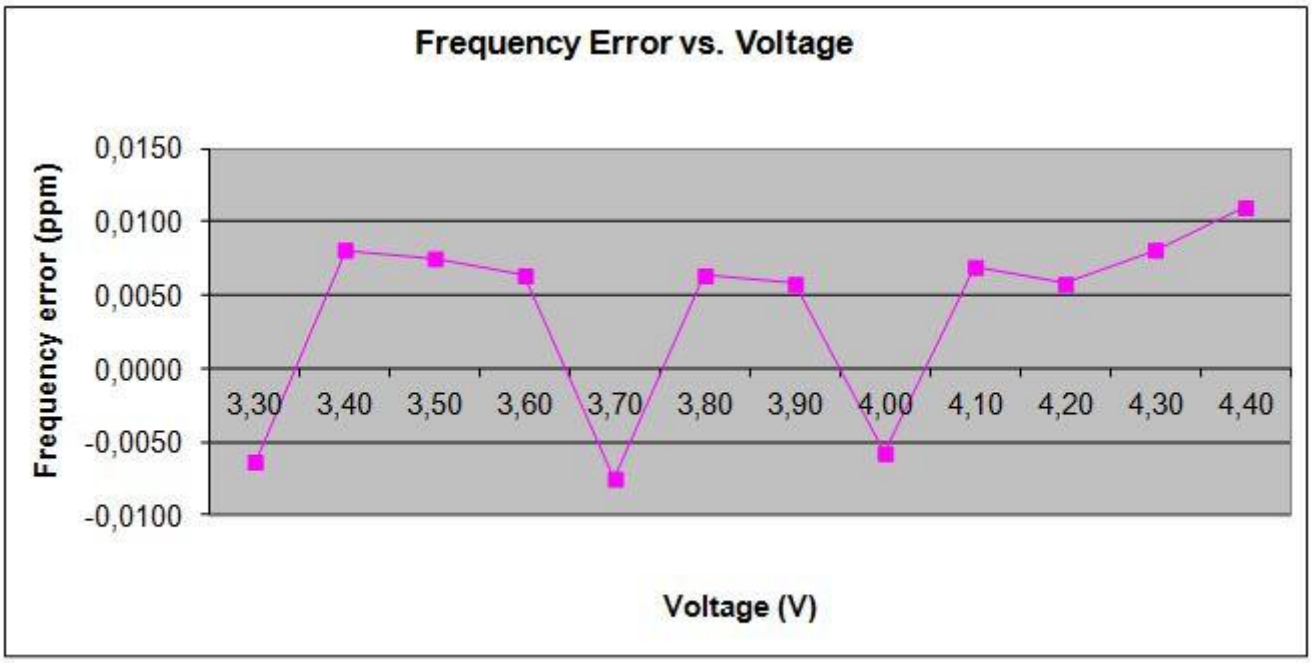
Results:

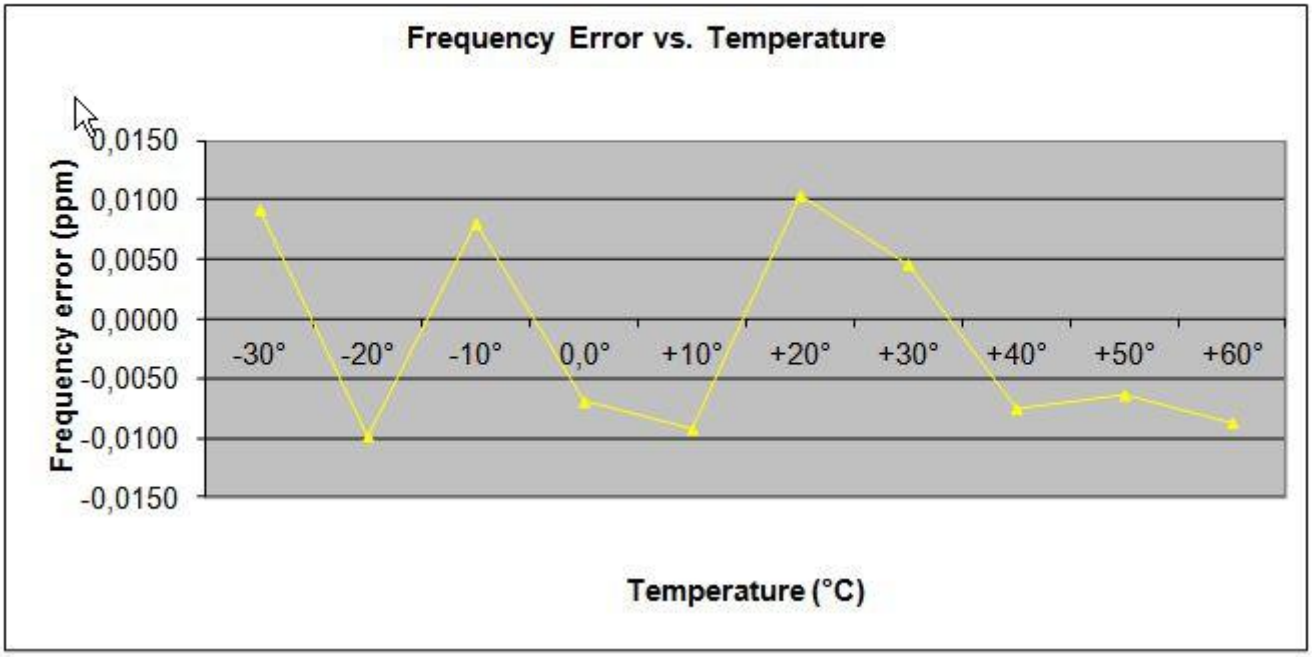
FREQ ERROR versus VOLTAGE

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.3	-11	-0.00000063	-0.0063
3.4	14	0.00000081	0.0081
3.5	13	0.00000075	0.0075
3.6	11	0.00000063	0.0063
3.7	-13	-0.00000075	-0.0075
3.8	11	0.00000063	0.0063
3.9	10	0.00000058	0.0058
4.0	-10	-0.00000058	-0.0058
4.1	12	0.00000069	0.0069
4.2	10	0.00000058	0.0058
4.3	14	0.00000081	0.0081
4.4	19	0.00000110	0.0110

FREQ ERROR versus TEMPERATURE

Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	16	0.00000092	0.0092
-20	-17	-0.00000098	-0.0098
-10	14	0.00000081	0.0081
± 0	-12	-0.00000069	-0.0069
10	-16	-0.00000092	-0.0092
20	18	0.00000104	0.0104
30	8	0.00000046	0.0046
40	-13	-0.00000075	-0.0075
50	-11	-0.00000063	-0.0063
60	-15	-0.00000087	-0.0087





Result: Passed

9.4.3 Spurious emissions radiated

Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2009 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1755 MHz. This was rounded up to 20 GHz. The resolution bandwidth is set as outlined in Part 27.53. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band 4.

The final open field emission (here 10m semi-anechoic chamber listed by FCC) test procedure is as follows:

a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
b) The antenna output was terminated in a 50 ohm load (if possible).
c) A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters.
e) Now each detected emissions were substituted by the substitution method, in accordance with the TIA/EIA 603 .

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 27.53(g) CFR Part 2.1053	RSS 139, Issue 2, Section 6.5
Spurious Emissions Radiated	
Attenuation ≥ 43 + 10log(P) (P, Power in Watts)	
-13 dBm	

Results:

Radiated emissions measurements were made only at the center carrier frequency of the LTE band 4 (1732.5 MHz). It was decided that measurements at this carrier frequency would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE band 4 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The final open field radiated levels are presented on the next pages.
All measurements were done in horizontal and vertical polarization; the plots show the worst case.
The plots show only the middle channel at the channel bandwidth and resource blocks with the highest output power. If spurious were detected, the lowest and highest channel and all supported channel bandwidths were checked, too.

As can be seen from this data, the emissions from the test item were within the specification limit.

QPSK:

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3430.0	-	2	3465.0	-	2	3500.0	-
3	5145.0	-	3	5197.5	-	3	5250.0	-
4	6860.0	-	4	6930.0	-	4	7000.0	-
5	8575.0	-	5	8662.5	-	5	8750.0	-
6	10290.0	-	6	10395.0	-	6	10500.0	-
7	12005.0	-	7	12127.5	-	7	12250.0	-
8	13720.0	-	8	13860.0	-	8	14000.0	-
9	15435.0	-	9	15592.5	-	9	15750.0	-
10	17150.0	-	10	17325.0	-	10	17500.0	-
Measurement uncertainty			± 3dB					

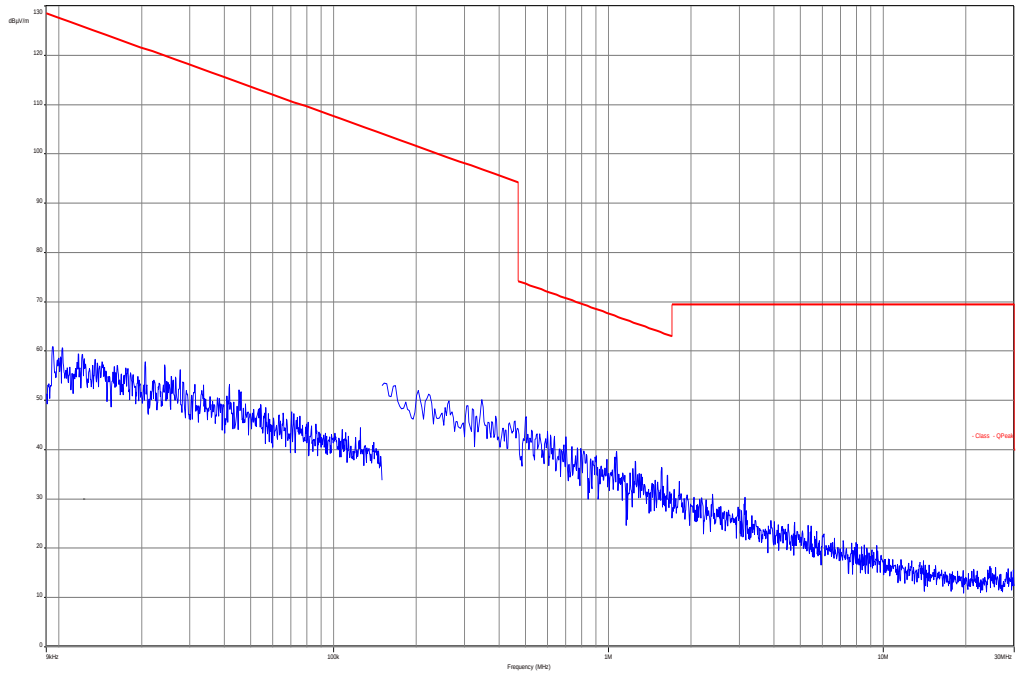
16-QAM

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3430.0	-	2	3465.0	-	2	3500.0	-
3	5145.0	-	3	5197.5	-	3	5250.0	-
4	6860.0	-	4	6930.0	-	4	7000.0	-
5	8575.0	-	5	8662.5	-	5	8750.0	-
6	10290.0	-	6	10395.0	-	6	10500.0	-
7	12005.0	-	7	12127.5	-	7	12250.0	-
8	13720.0	-	8	13860.0	-	8	14000.0	-
9	15435.0	-	9	15592.5	-	9	15750.0	-
10	17150.0	-	10	17325.0	-	10	17500.0	-
Measurement uncertainty			± 3dB					

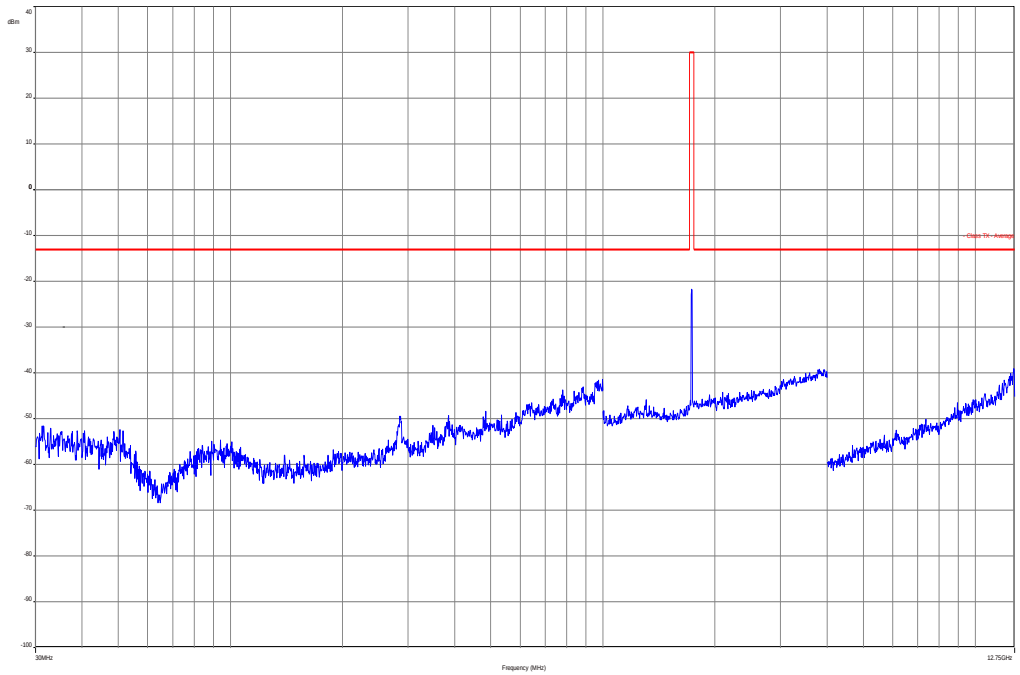
Result: **Passed**

QPSK with 10 MHz channel bandwidth

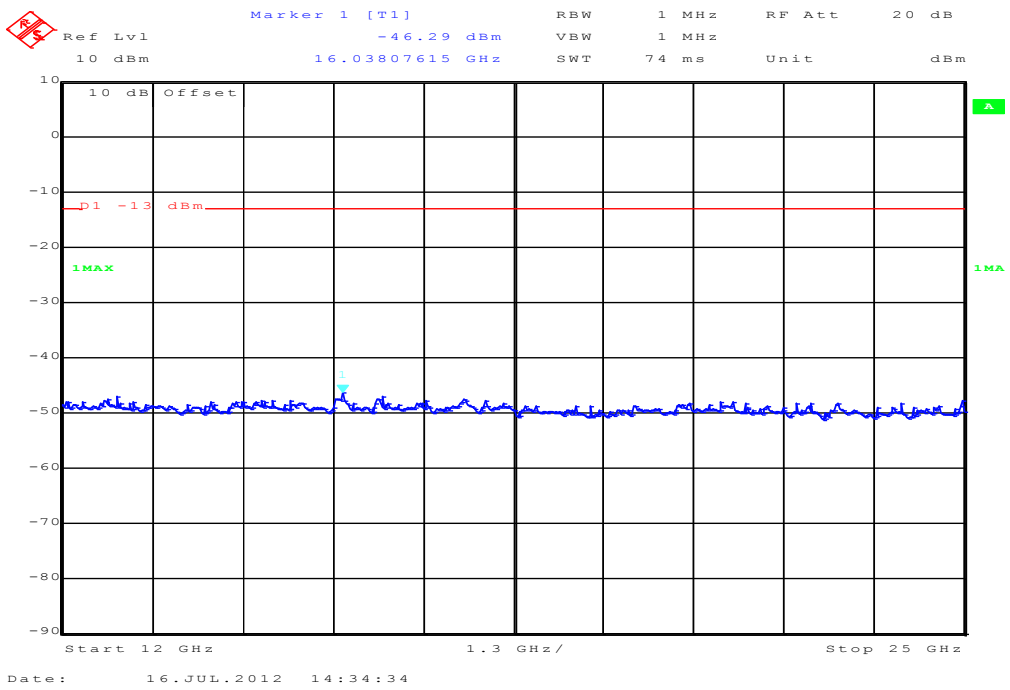
Plot 1: Channel 20175 (Traffic mode up to 30 MHz)



Plot 2: Channel 20175 (30 MHz - 12.75 GHz)

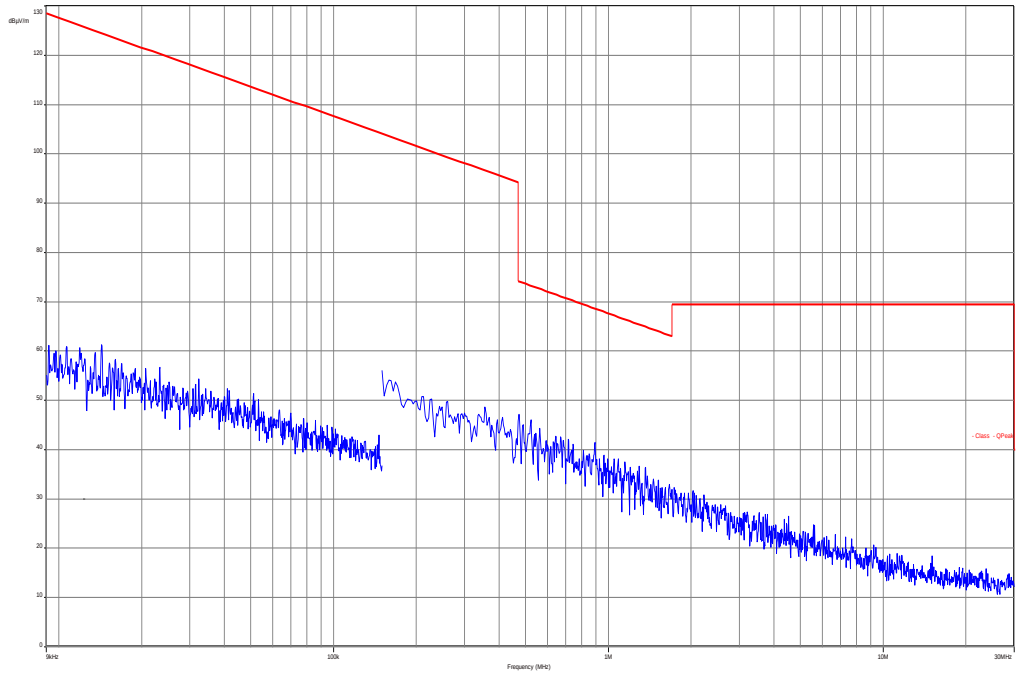


Plot 3: Channel 20175 (12 GHz – 25 GHz)

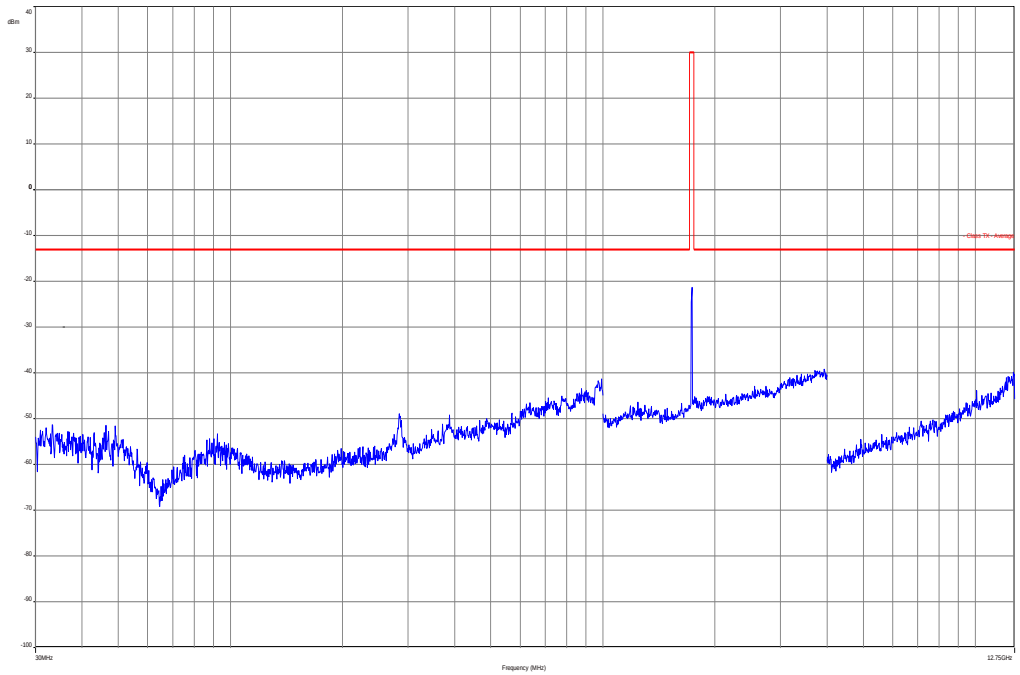


16-QAM with 10 MHz channel bandwidth

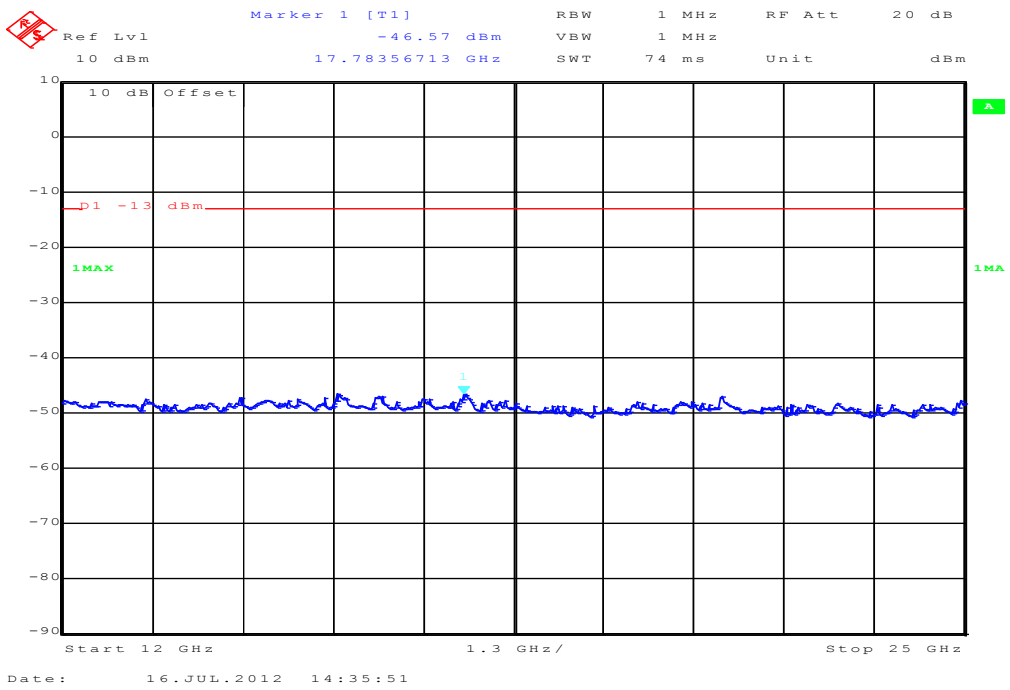
Plot 4: Channel 20175 (Traffic mode up to 30 MHz)



Plot 5: Channel 20175 (30 MHz - 12.75 GHz)



Plot 6: Channel 20175 (12 GHz – 25 GHz)



9.4.4 Spurious emissions conducted

Description:

The following steps outline the procedure used to measure the conducted emissions from the mobile station.
1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 17.6 GHz, data taken from 10 MHz to 25 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

For the measurement the lowest, middle and highest channel bandwidth was used. If spurious were found the other bandwidths were measured, too.

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Resolution bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Span:	10 MHz – 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 27.53(g) CFR Part 2.1053	RSS 139, Issue 2, Section 6.5
Spurious Emissions Conducted	
Attenuation ≥ 43 + 10log(P) (P, Power in Watts)	
-13 dBm	

Results: for 1.4 MHz channel bandwidth

QPSK

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3421.4	-	2	3465.0	-	2	3508.6	-
3	5132.1	-	3	5197.5	-	3	5262.9	-
4	6842.8	-	4	6930.0	-	4	7017.2	-
5	8553.5	-	5	8662.5	-	5	8771.5	-
6	10264.2	-	6	10395.0	-	6	10525.8	-
7	11974.9	-	7	12127.5	-	7	12280.1	-
8	13685.6	-	8	13860.0	-	8	14034.4	-
9	15396.3	-	9	15592.5	-	9	15788.7	-
10	17107.0	-	10	17325.0	-	10	17543.0	-
Measurement uncertainty			± 0.5dB					

16-QAM

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3421.4	-	2	3465.0	-	2	3508.6	-
3	5132.1	-	3	5197.5	-	3	5262.9	-
4	6842.8	-	4	6930.0	-	4	7017.2	-
5	8553.5	-	5	8662.5	-	5	8771.5	-
6	10264.2	-	6	10395.0	-	6	10525.8	-
7	11974.9	-	7	12127.5	-	7	12280.1	-
8	13685.6	-	8	13860.0	-	8	14034.4	-
9	15396.3	-	9	15592.5	-	9	15788.7	-
10	17107.0	-	10	17325.0	-	10	17543.0	-
Measurement uncertainty			± 0.5dB					

Results: for 5 MHz channel bandwidth

QPSK

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3425.0	-	2	3465.0	-	2	3505.0	-
3	5137.5	-	3	5197.5	-	3	5257.5	-
4	6850.0	-	4	6930.0	-	4	7010.0	-
5	8562.5	-	5	8662.5	-	5	8762.5	-
6	10275.0	-	6	10395.0	-	6	10515.0	-
7	11987.5	-	7	12127.5	-	7	12267.5	-
8	13700.0	-	8	13860.0	-	8	14020.0	-
9	15412.5	-	9	15592.5	-	9	15772.5	-
10	17125.0	-	10	17325.0	-	10	17525.0	-
Measurement uncertainty			± 0.5dB					

16-QAM

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3425.0	-	2	3465.0	-	2	3505.0	-
3	5137.5	-	3	5197.5	-	3	5257.5	-
4	6850.0	-	4	6930.0	-	4	7010.0	-
5	8562.5	-	5	8662.5	-	5	8762.5	-
6	10275.0	-	6	10395.0	-	6	10515.0	-
7	11987.5	-	7	12127.5	-	7	12267.5	-
8	13700.0	-	8	13860.0	-	8	14020.0	-
9	15412.5	-	9	15592.5	-	9	15772.5	-
10	17125.0	-	10	17325.0	-	10	17525.0	-
Measurement uncertainty			± 0.5dB					

Results: for 20 MHz channel bandwidth

QPSK

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3440.0	-	2	3465.0	-	2	3490.0	-
3	5160.0	-	3	5197.5	-	3	5235.0	-
4	6880.0	-	4	6930.0	-	4	6980.0	-
5	8600.0	-	5	8662.5	-	5	8725.0	-
6	10320.0	-	6	10395.0	-	6	10470.0	-
7	12040.0	-	7	12127.5	-	7	12215.0	-
8	13760.0	-	8	13860.0	-	8	13960.0	-
9	15480.0	-	9	15592.5	-	9	15705.0	-
10	17200.0	-	10	17325.0	-	10	17450.0	-
Measurement uncertainty			± 0.5dB					

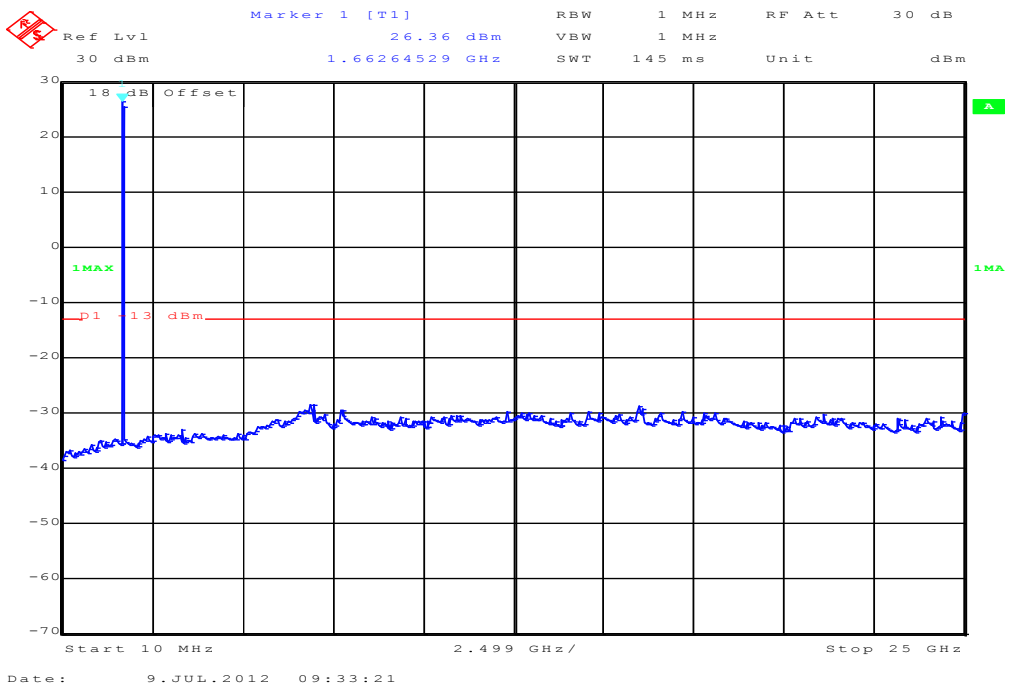
16-QAM

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3440.0	-	2	3465.0	-	2	3490.0	-
3	5160.0	-	3	5197.5	-	3	5235.0	-
4	6880.0	-	4	6930.0	-	4	6980.0	-
5	8600.0	-	5	8662.5	-	5	8725.0	-
6	10320.0	-	6	10395.0	-	6	10470.0	-
7	12040.0	-	7	12127.5	-	7	12215.0	-
8	13760.0	-	8	13860.0	-	8	13960.0	-
9	15480.0	-	9	15592.5	-	9	15705.0	-
10	17200.0	-	10	17325.0	-	10	17450.0	-
Measurement uncertainty			± 0.5dB					

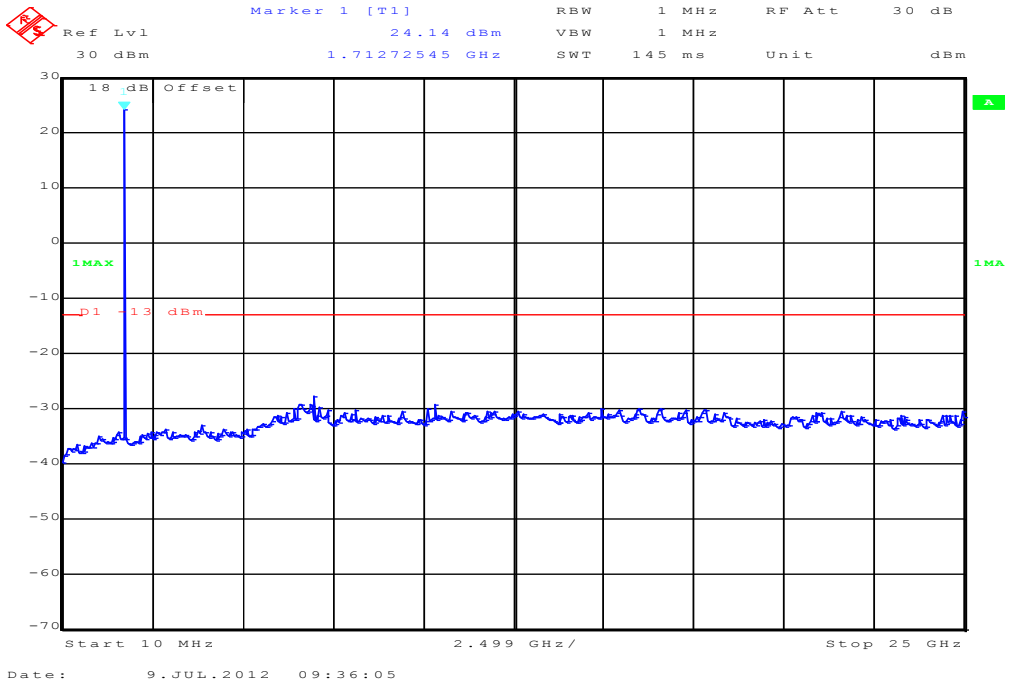
Result: Passed

Plots: QPSK with 1.4 MHz channel bandwidth

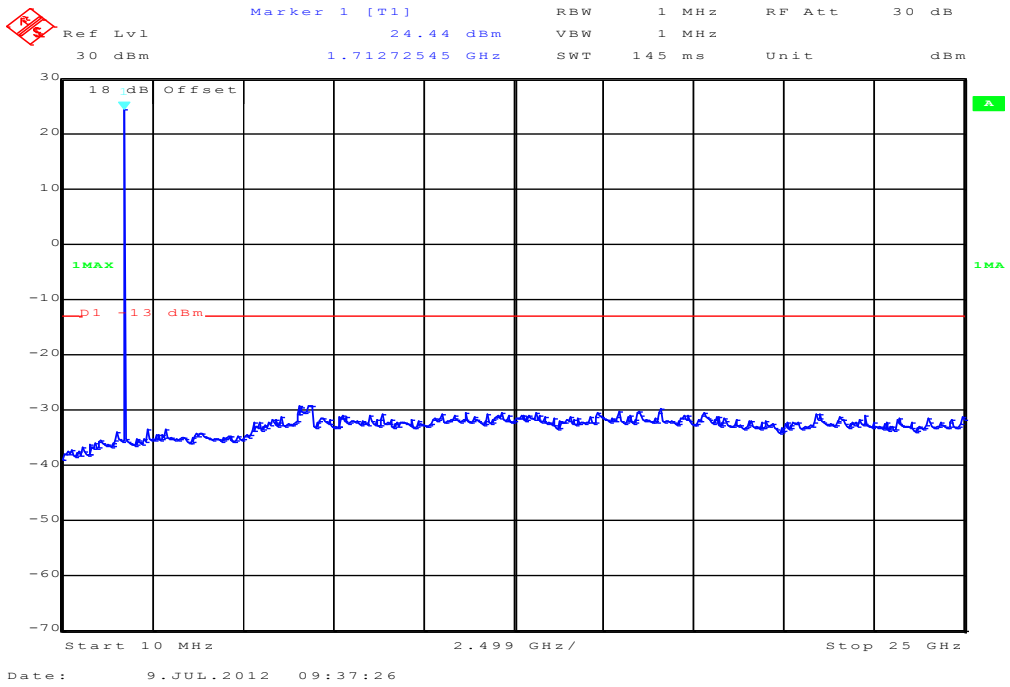
Plot 1: Lowest Channel (10 MHz - 25 GHz)



Plot 2: Middle Channel (10 MHz - 25 GHz)

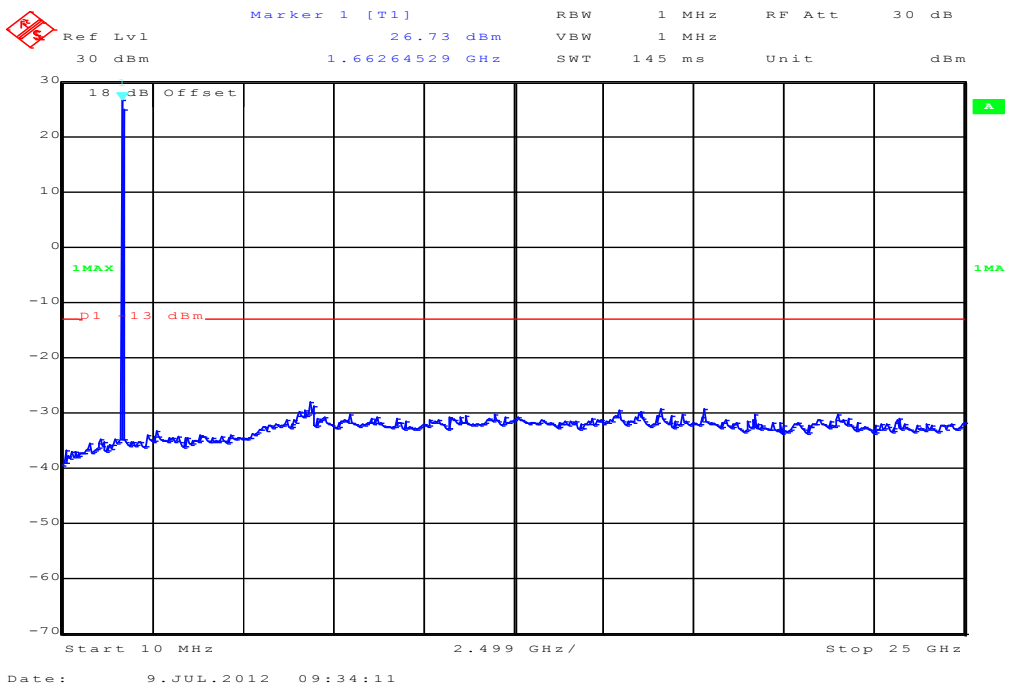


Plot 3: Highest Channel (10 MHz - 25 GHz)

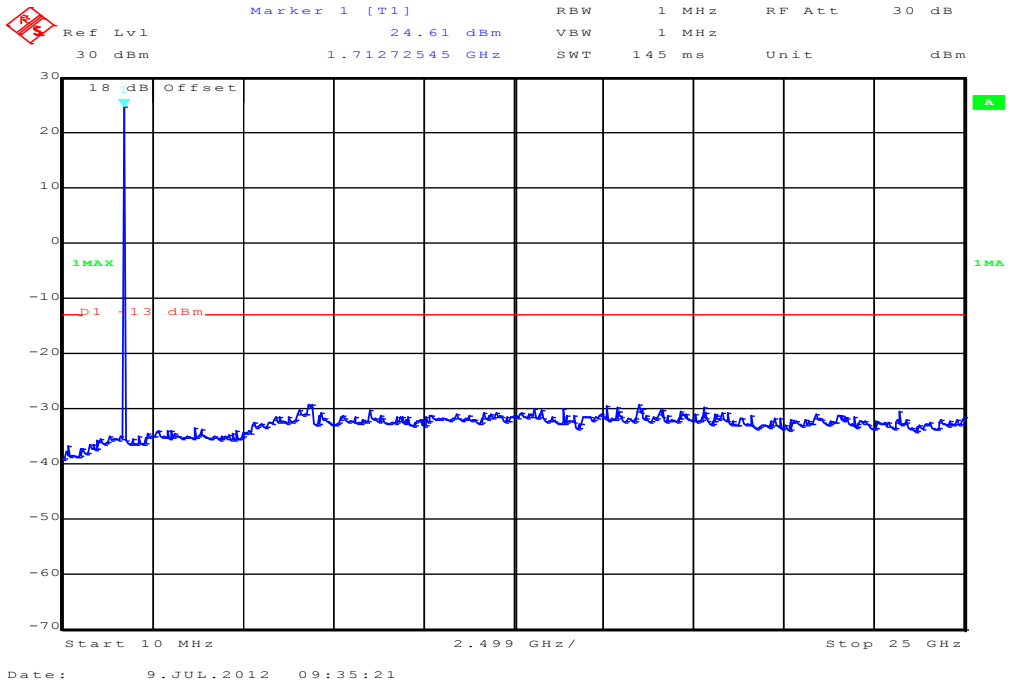


Plots: 16-QAM with 1.4 MHz channel bandwidth

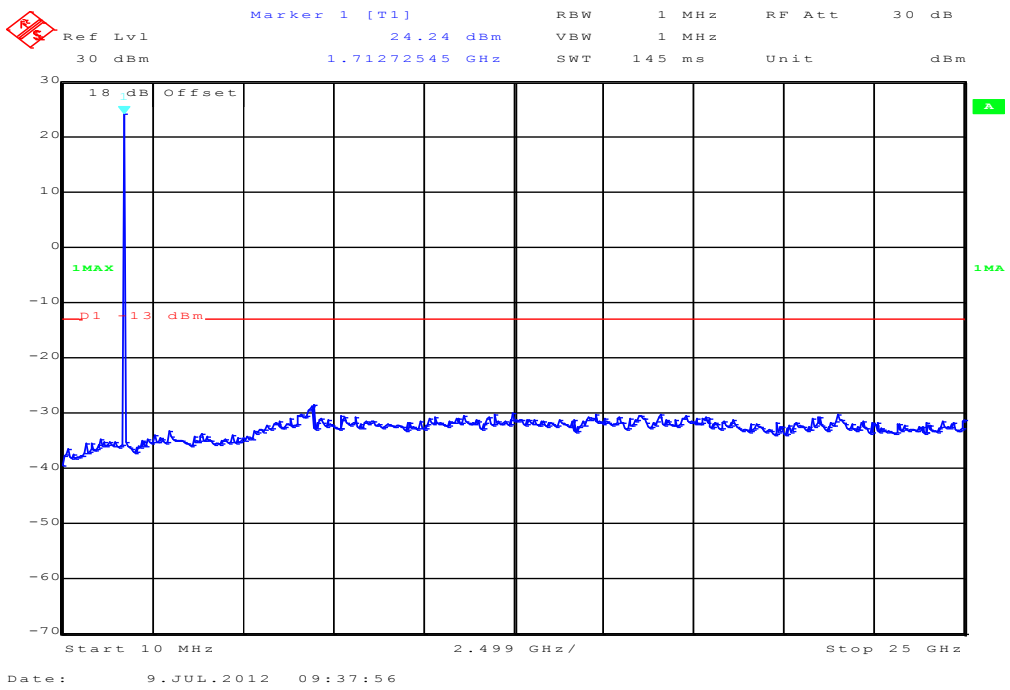
Plot 4: Lowest Channel (10 MHz - 25 GHz)



Plot 5: Middle Channel (10 MHz - 25 GHz)

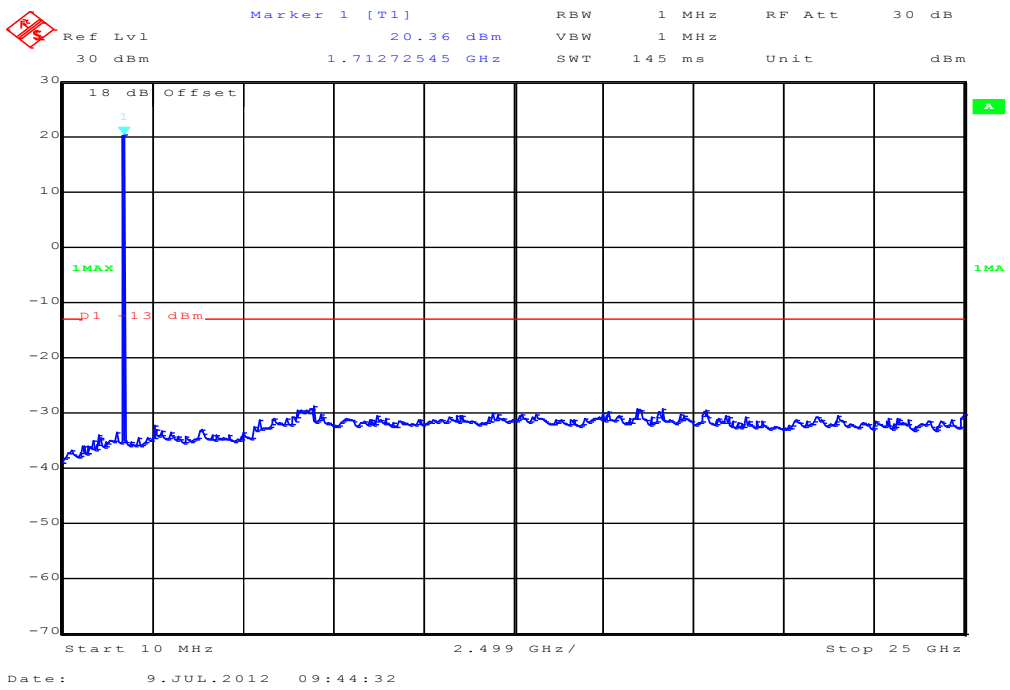


Plot 6: Highest Channel (10 MHz - 25 GHz)

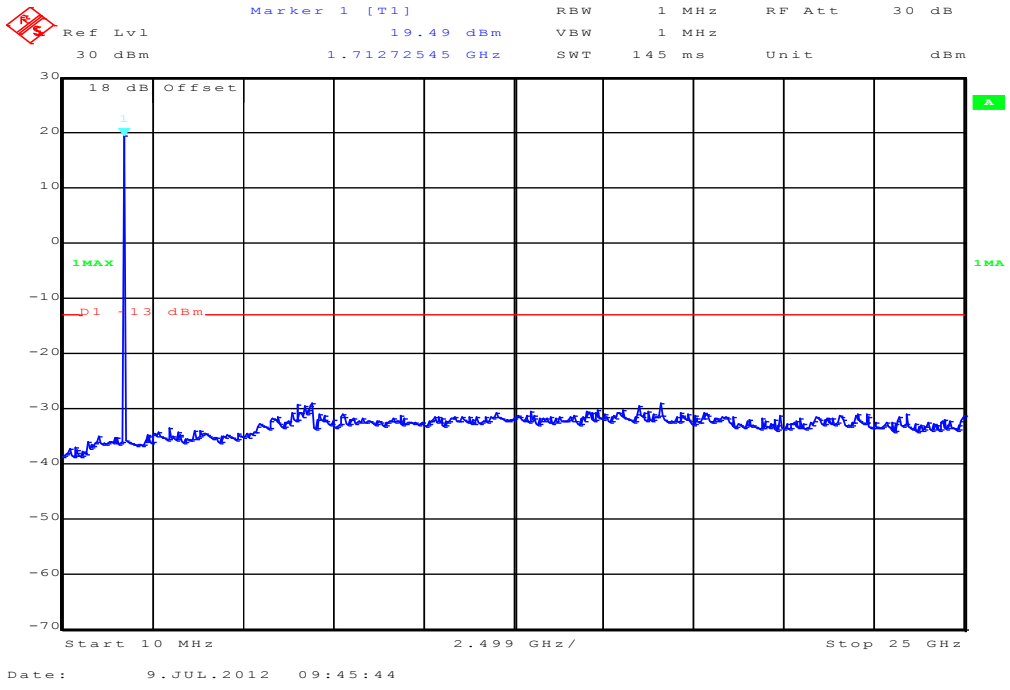


Plots: QPSK with 5 MHz channel bandwidth

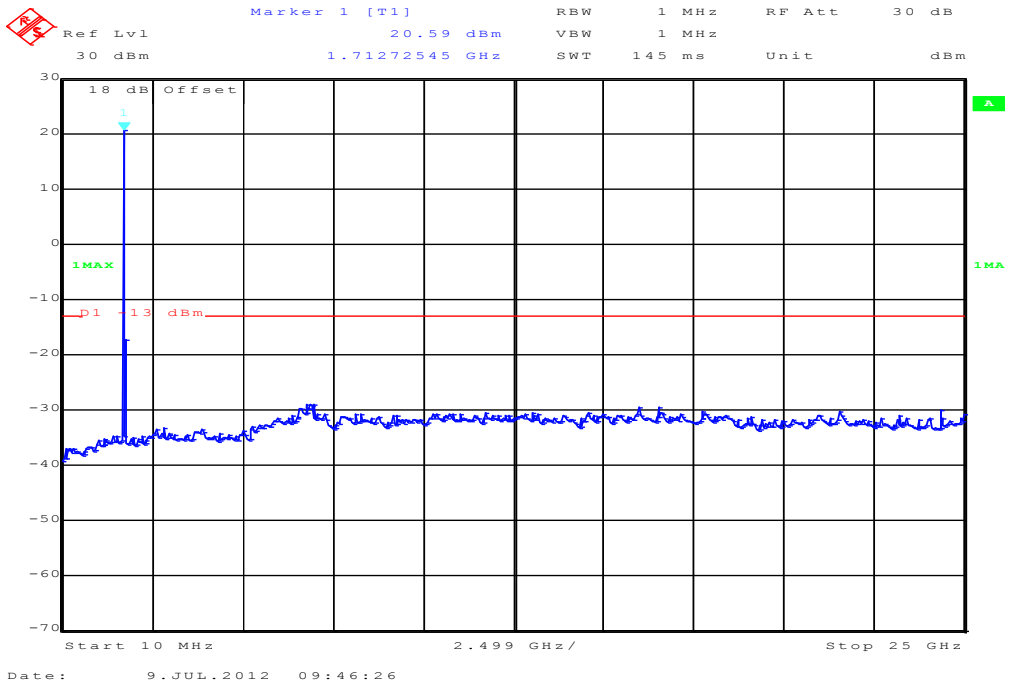
Plot 1: Lowest Channel (10 MHz - 25 GHz)



Plot 2: Middle Channel (10 MHz - 25 GHz)

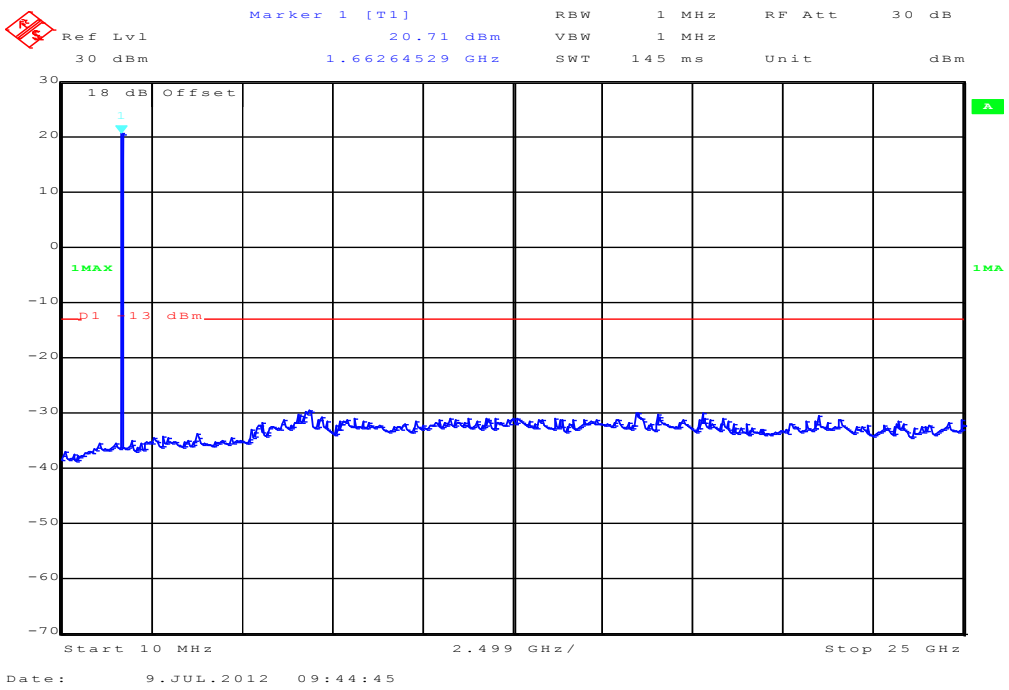


Plot 3: Highest Channel (10 MHz - 25 GHz)

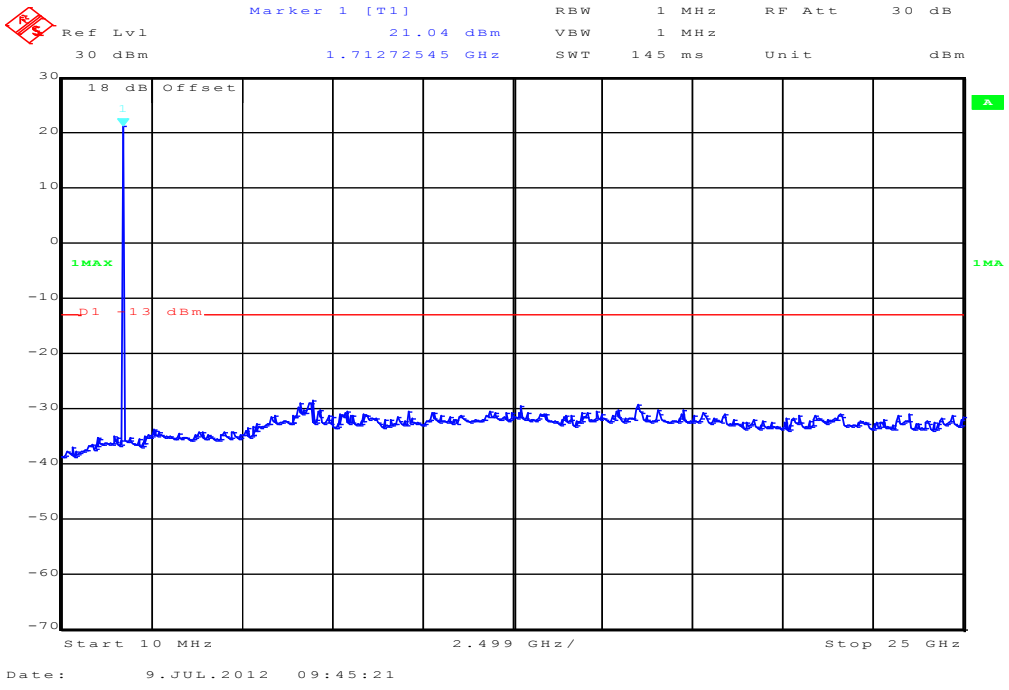


Plots: 16-QAM with 5 MHz channel bandwidth

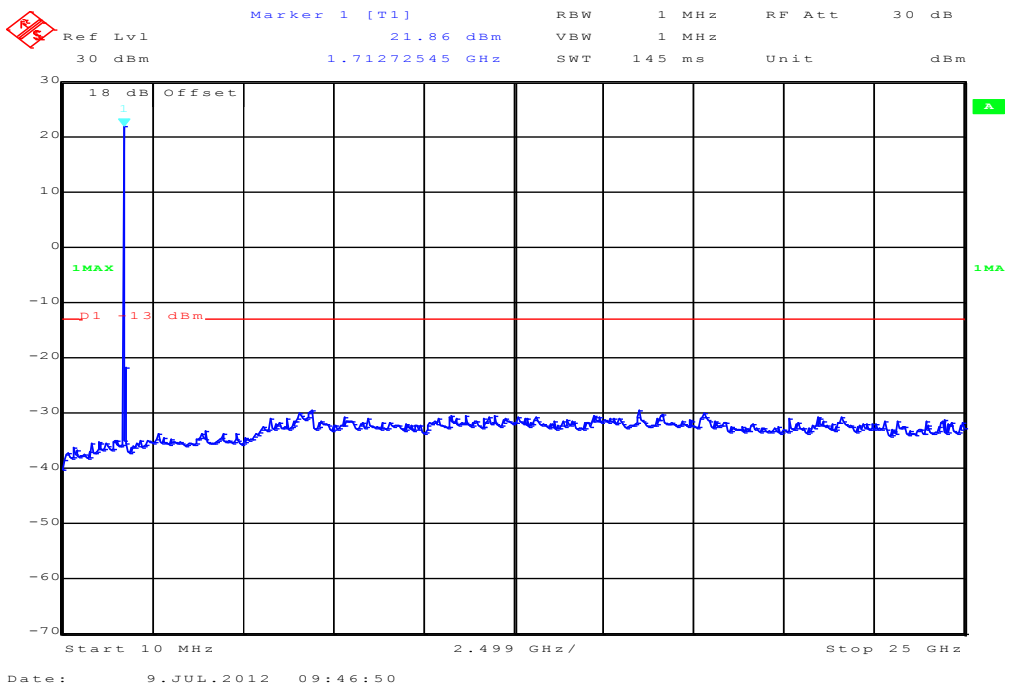
Plot 4: Lowest Channel (10 MHz - 25 GHz)



Plot 5: Middle Channel (10 MHz - 25 GHz)

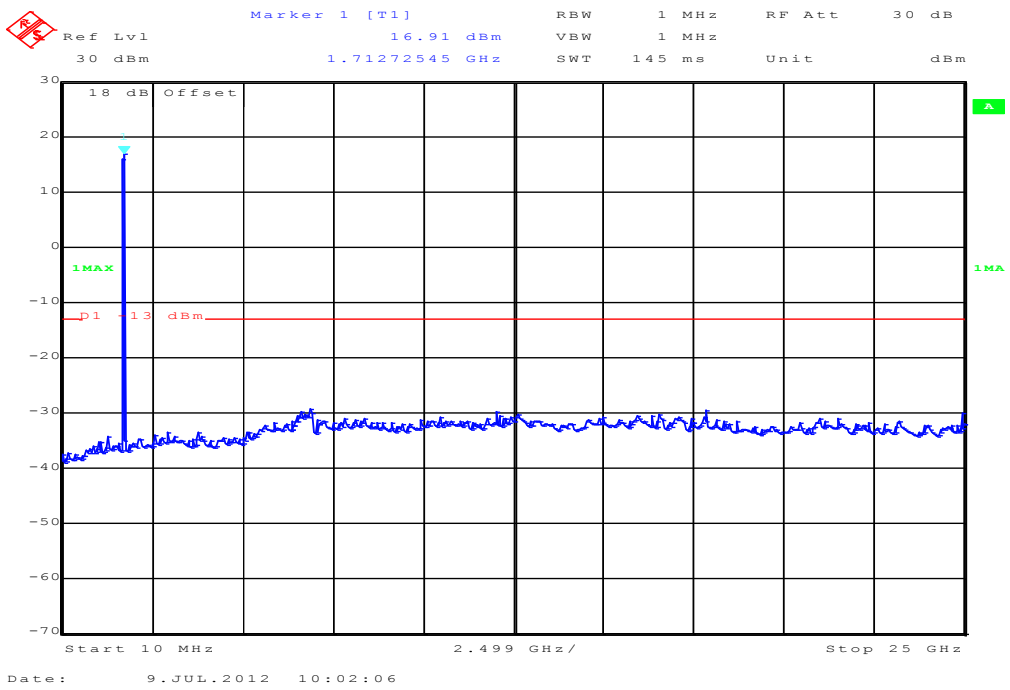


Plot 6: Highest Channel (10 MHz - 25 GHz)

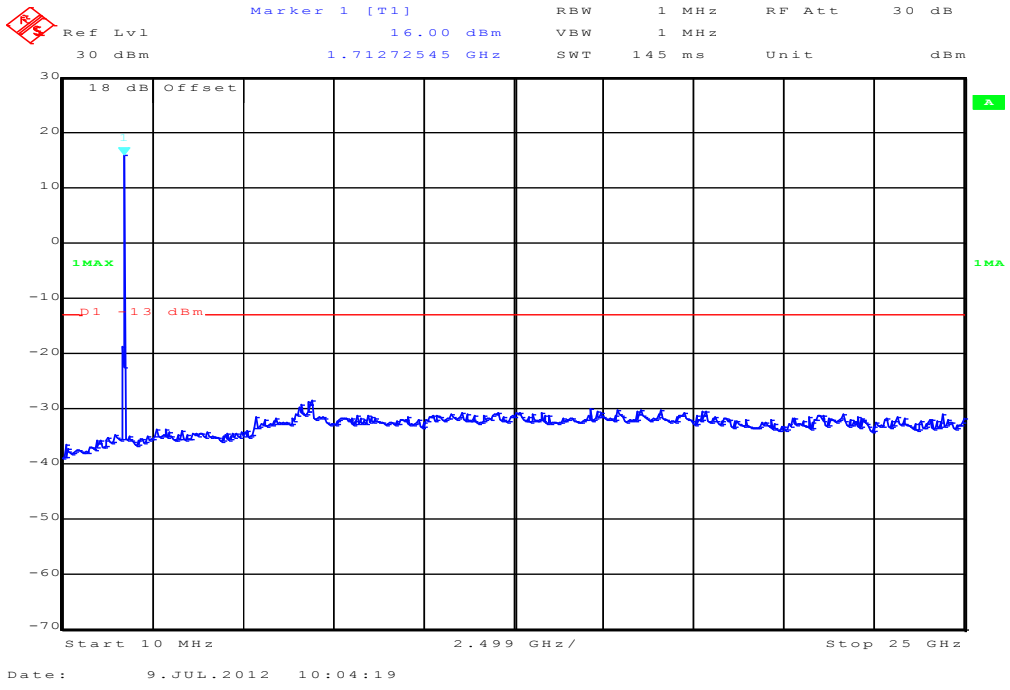


Plots: QPSK with 20 MHz channel bandwidth

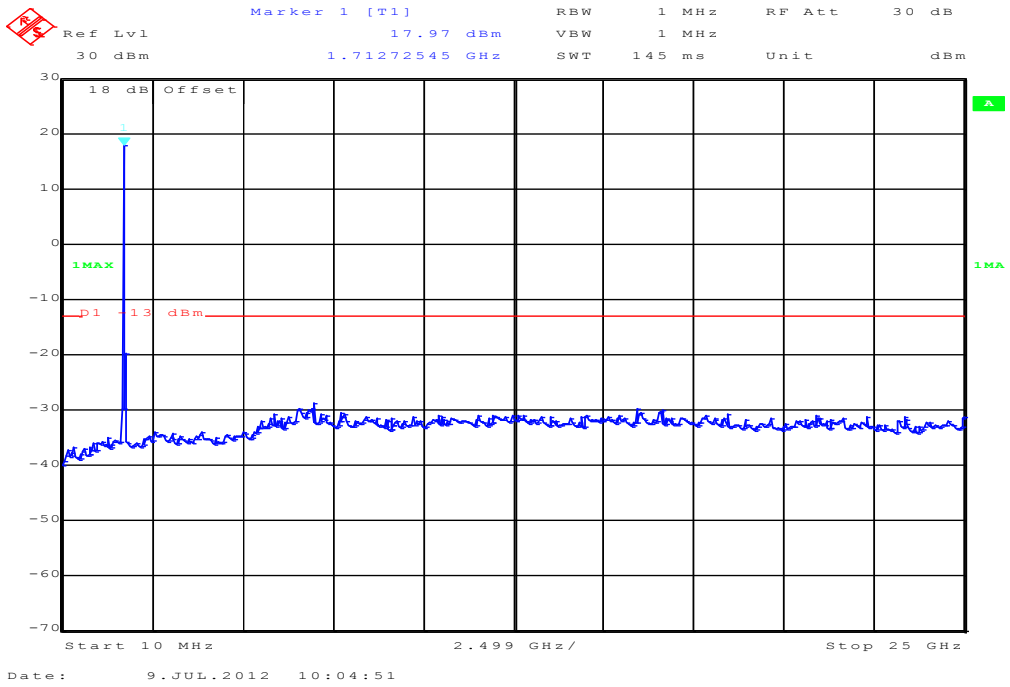
Plot 1: Lowest Channel (10 MHz - 25 GHz)



Plot 2: Middle Channel (10 MHz - 25 GHz)

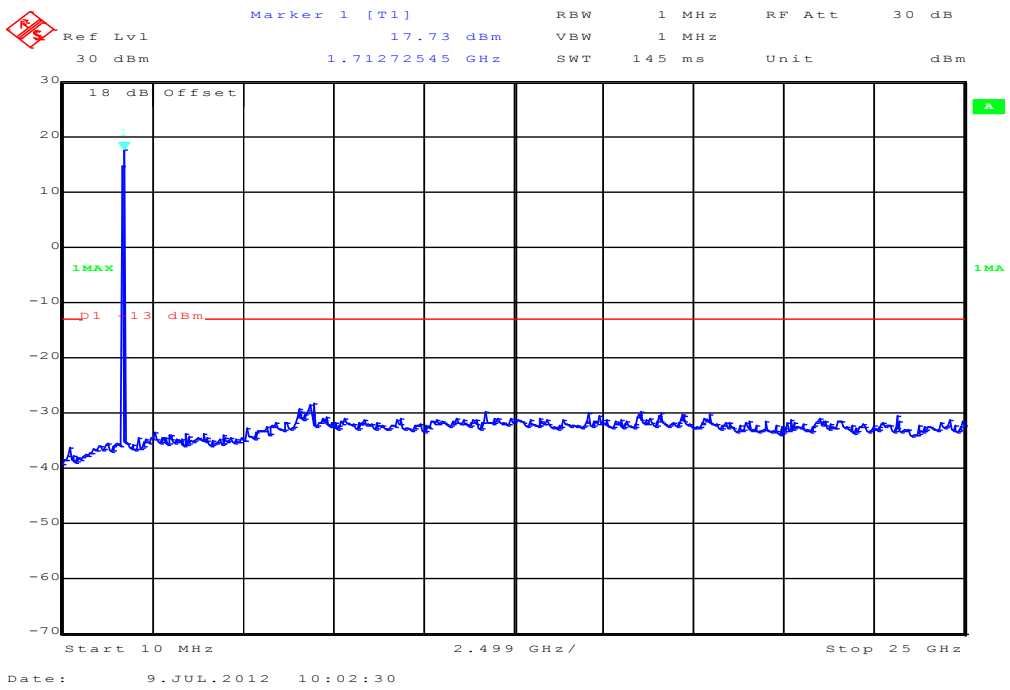


Plot 3: Highest Channel (10 MHz - 25 GHz)

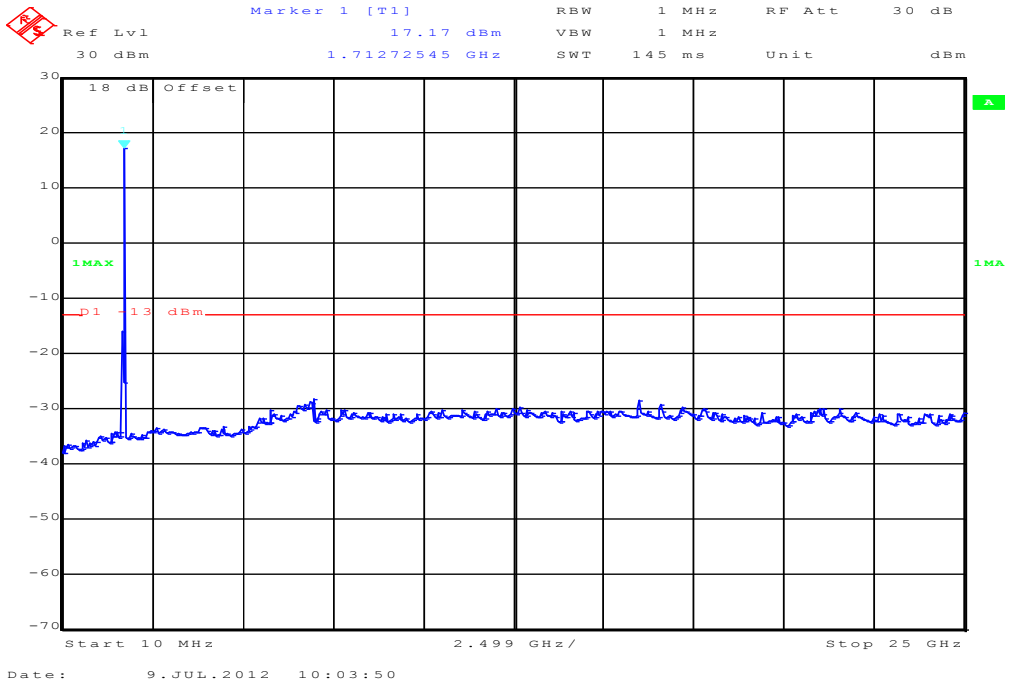


Plots: 16-QAM with 20 MHz channel bandwidth

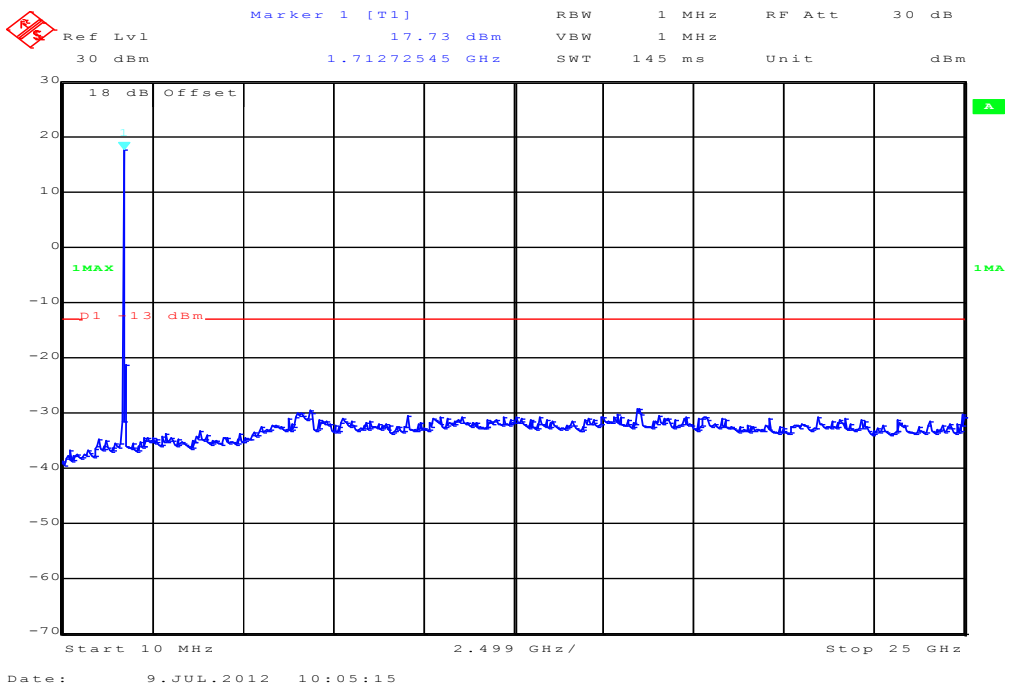
Plot 4: Lowest Channel (10 MHz - 25 GHz)



Plot 5: Middle Channel (10 MHz - 25 GHz)



Plot 6: Highest Channel (10 MHz - 25 GHz)



9.4.5 Block edge compliance

Description:

The spectrum at the band edges must comply with the spurious emissions limits.

For the measurement the lowest, middle and highest channel bandwidth was used. If spurious were found the other bandwidths were measured, too.

Measurement:

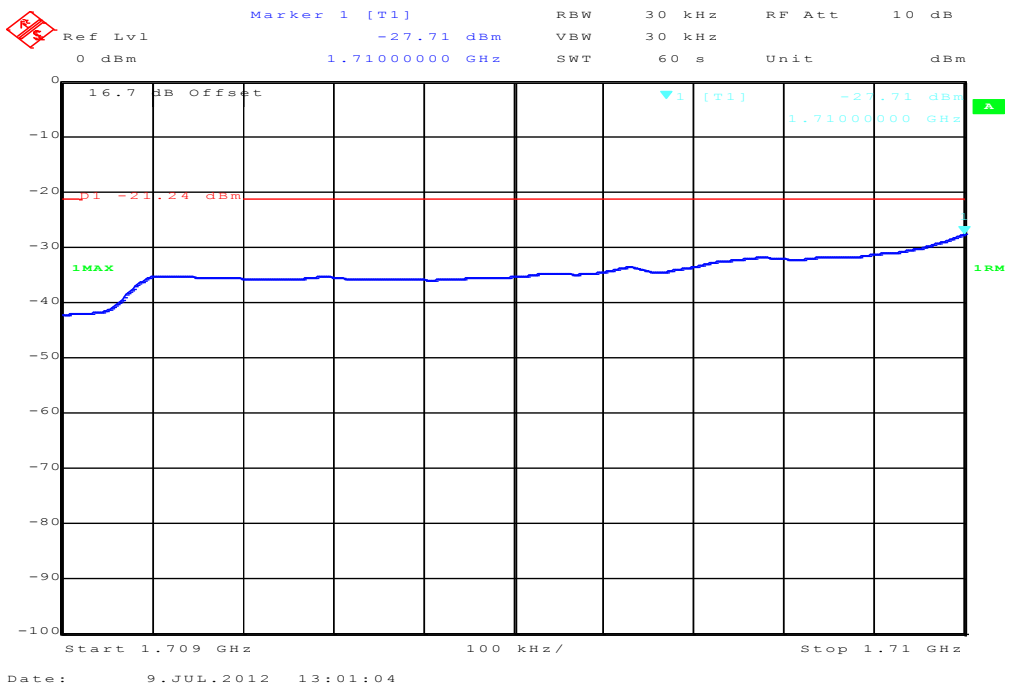
Measurement parameters	
Detector:	RMS
Sweep time:	60 s
Video bandwidth:	30 kHz
Resolution bandwidth:	30 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

Limits:

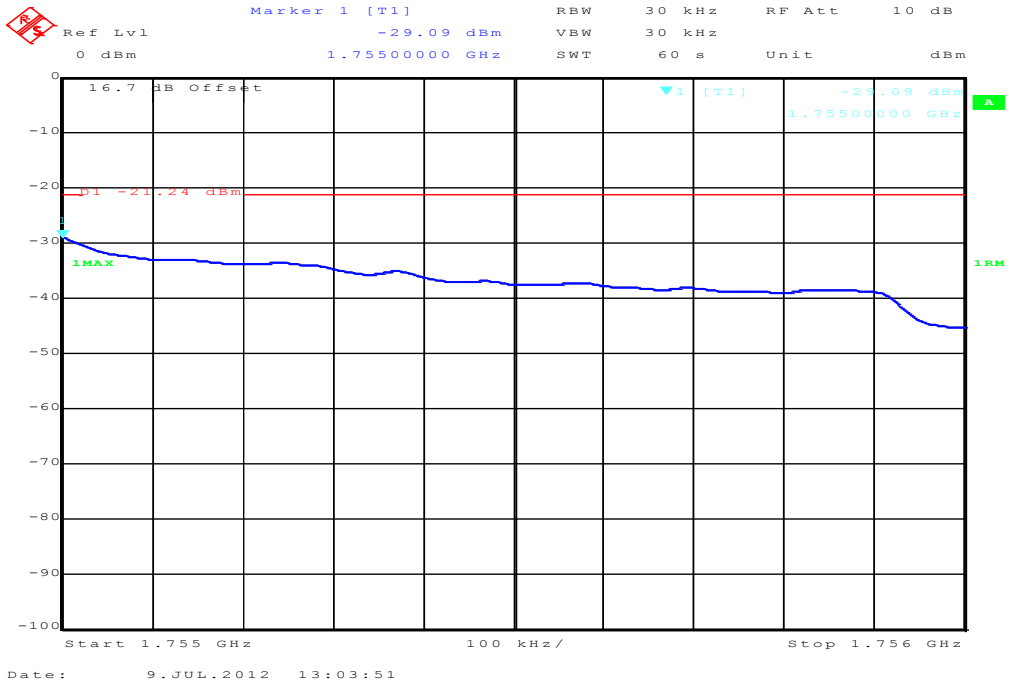
FCC	IC
CFR Part 27.53(g) CFR Part 2.1053	RSS 139, Issue 2, Section 6.5
Block Edge Compliance	
Part 27.53 specifies that “the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.” However, in publication number 890810, The FCC Office of Engineering and Technology specified the following correction to the limits when a resolution bandwidth smaller than 1% of the emission bandwidth is used: “An alternative is to add an additional correction factor of 10 Log (RBW1/ RBW2) to the 43 +10 log(P) limit. RBW1 is the narrower measurement resolution bandwidth and RBW2 is either the 1% emissions bandwidth or 1 MHz.” When using a 30 kHz bandwidth, this yields a -8.24 adjustment to the limit [10 log(30kHz/200kHz) = -8.24]. When this adjustment is applied to the limit, the limit becomes -21.24.	
-21.24 dBm	

Results: 1.4 MHz channel bandwidth

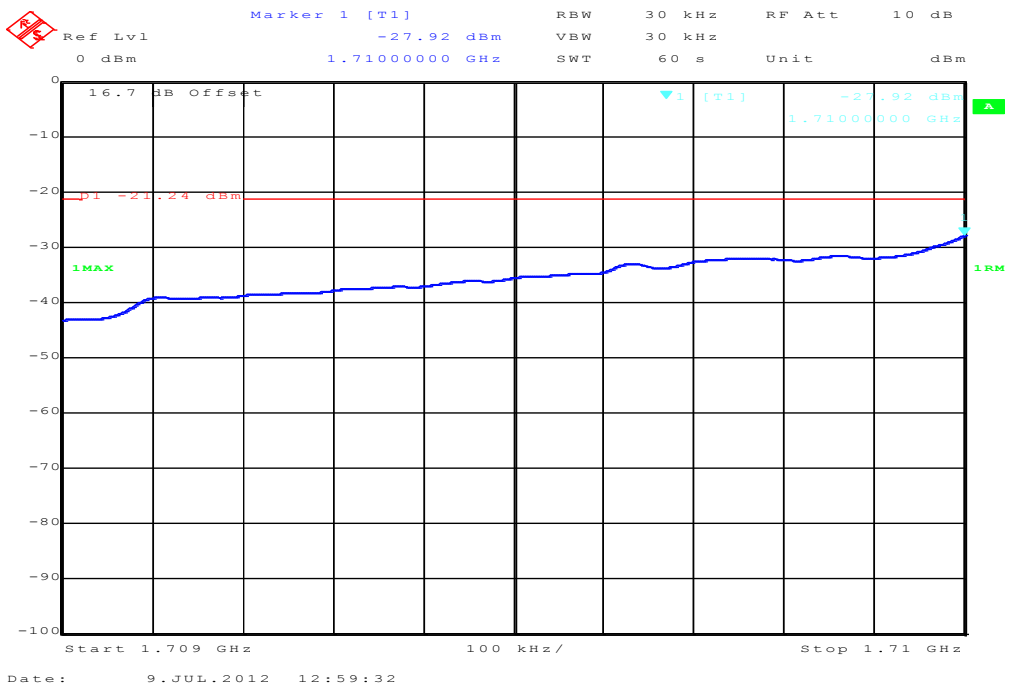
Plot 1: Lowest Channel – QPSK



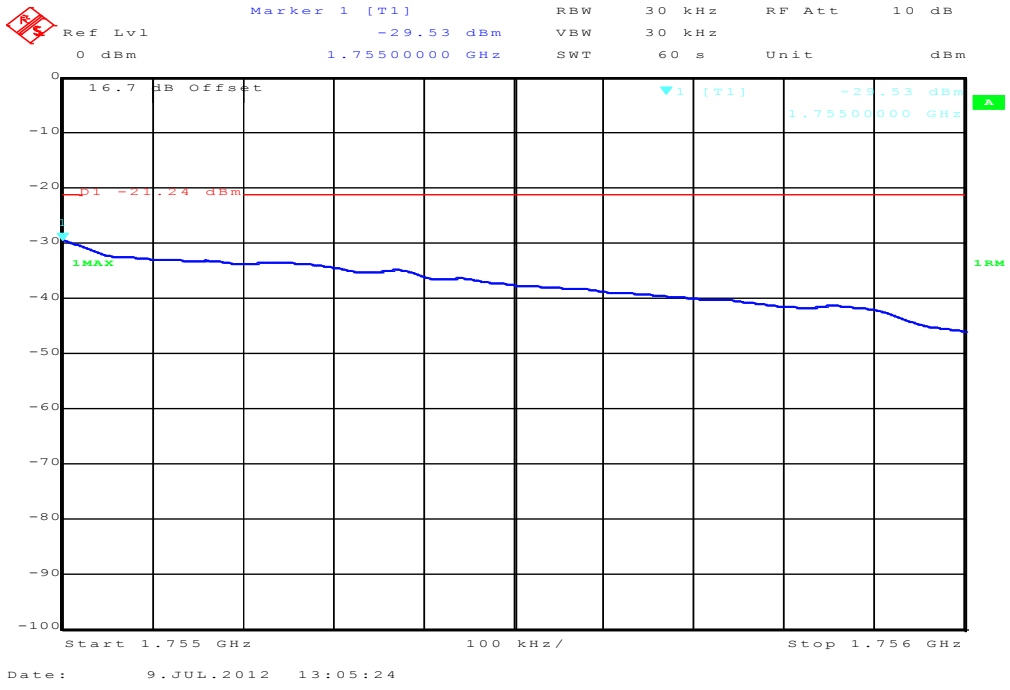
Plot 2: Highest Channel – QPSK



Plot 3: Lowest Channel – 16-QAM

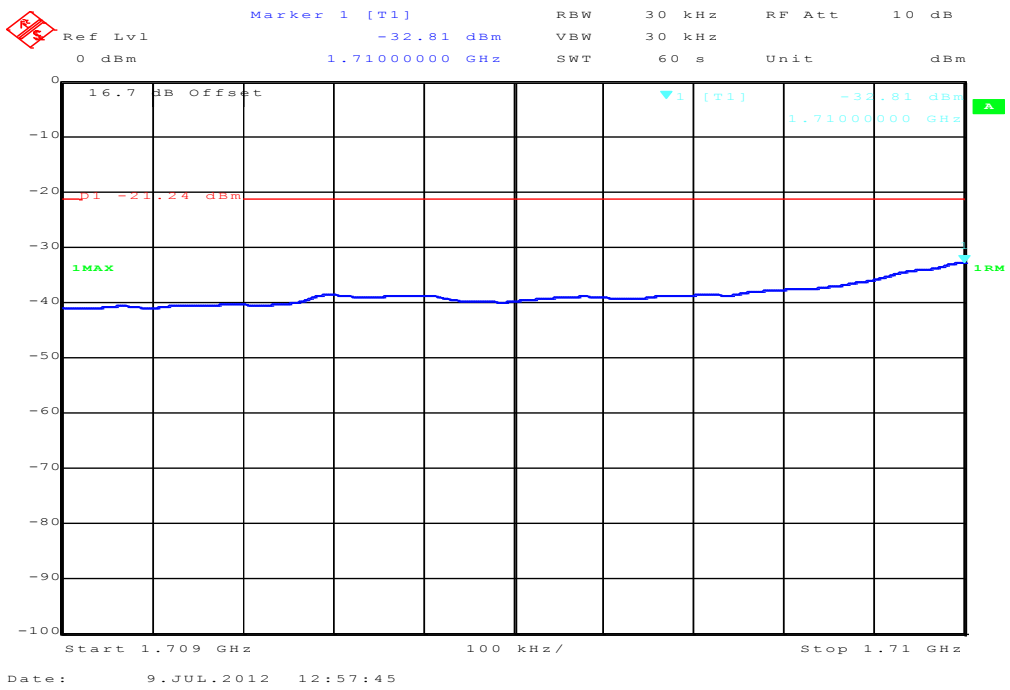


Plot 4: Highest Channel – 16-QAM

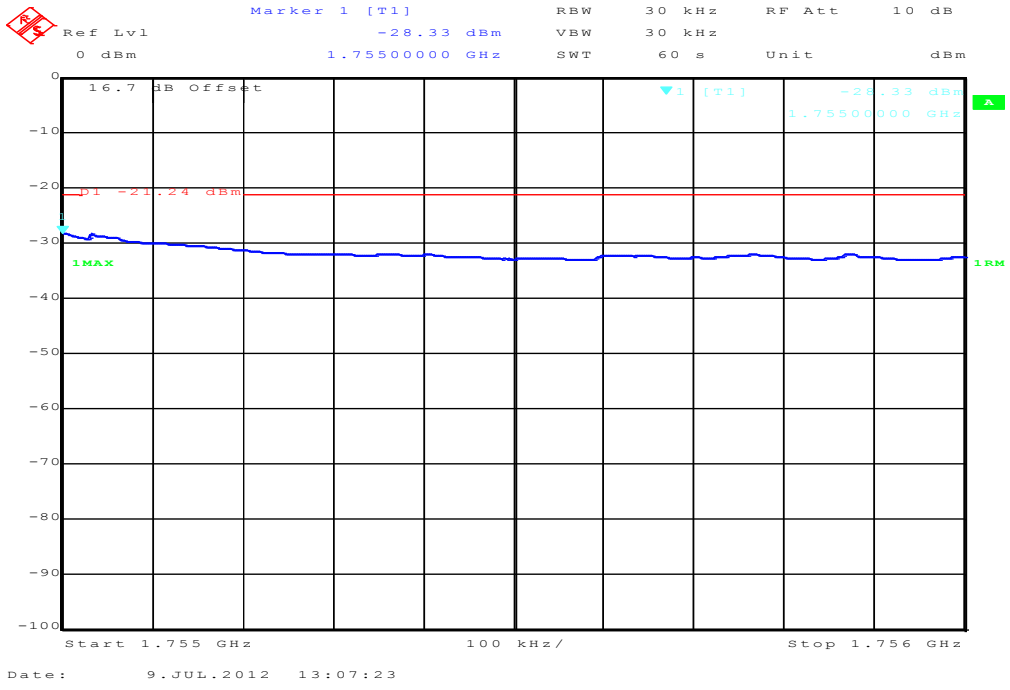


Results: 5 MHz channel bandwidth

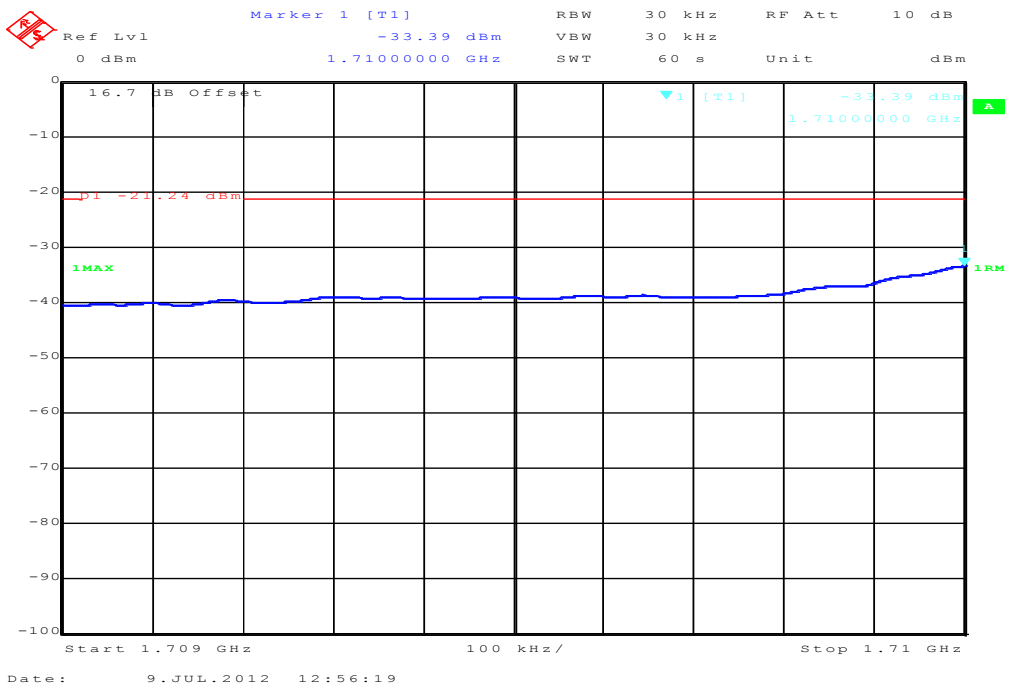
Plot 1: Lowest Channel – QPSK



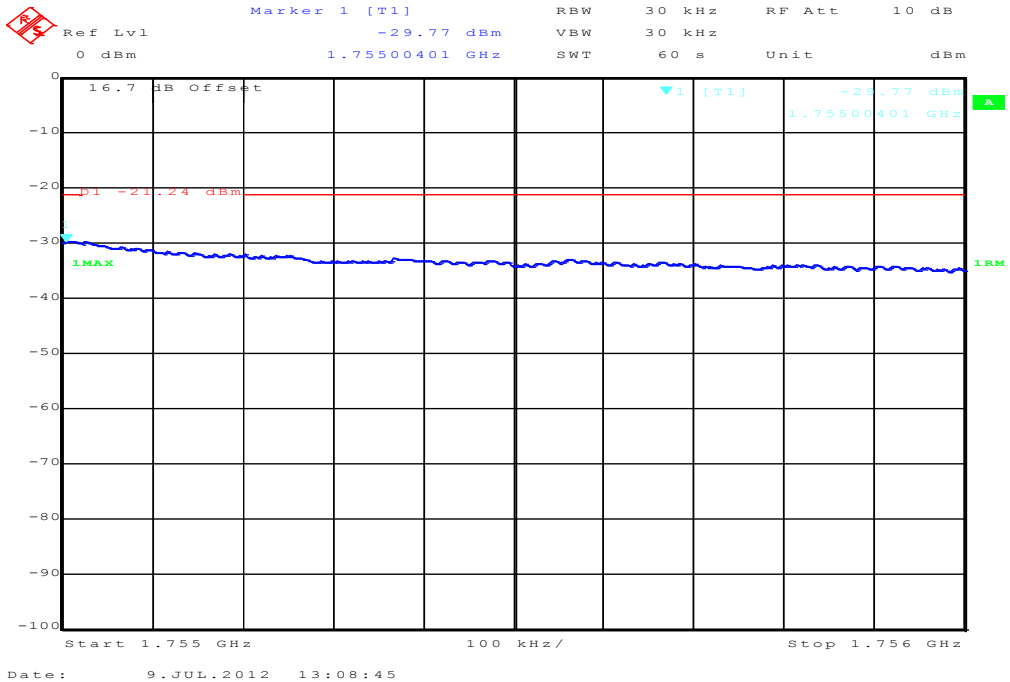
Plot 2: Highest Channel – QPSK



Plot 3: Lowest Channel – 16-QAM

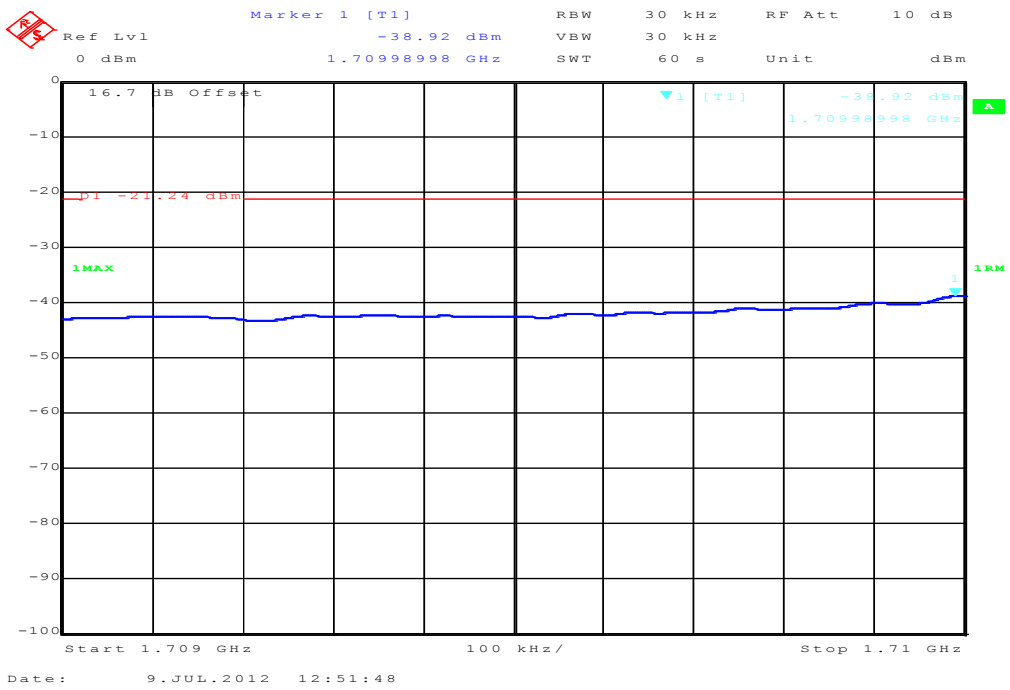


Plot 4: Highest Channel – 16-QAM

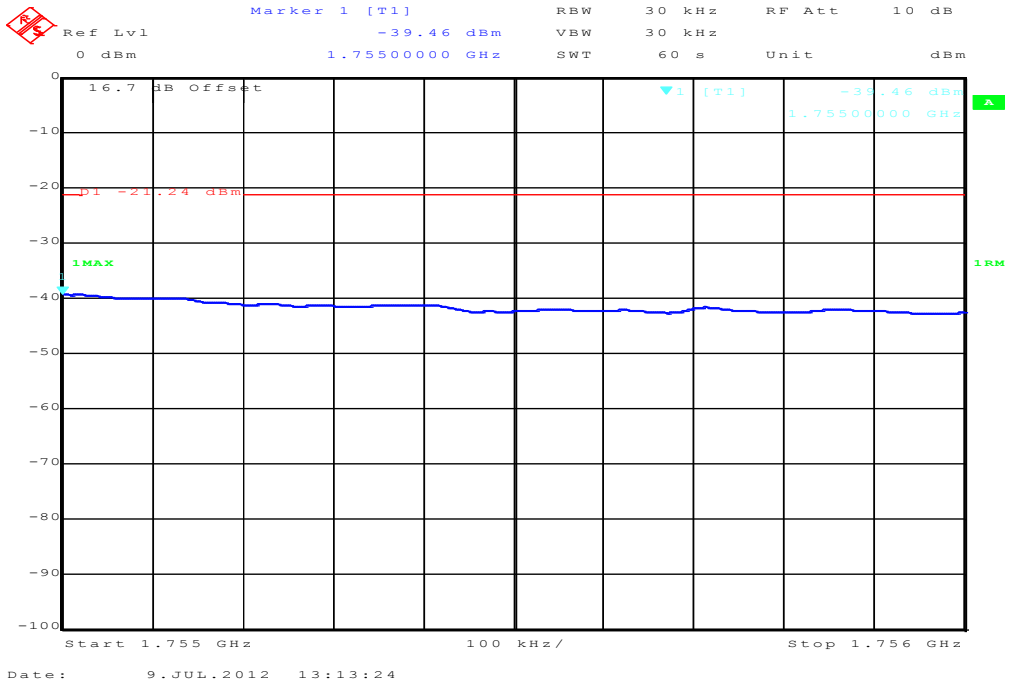


Results: 10 MHz channel bandwidth

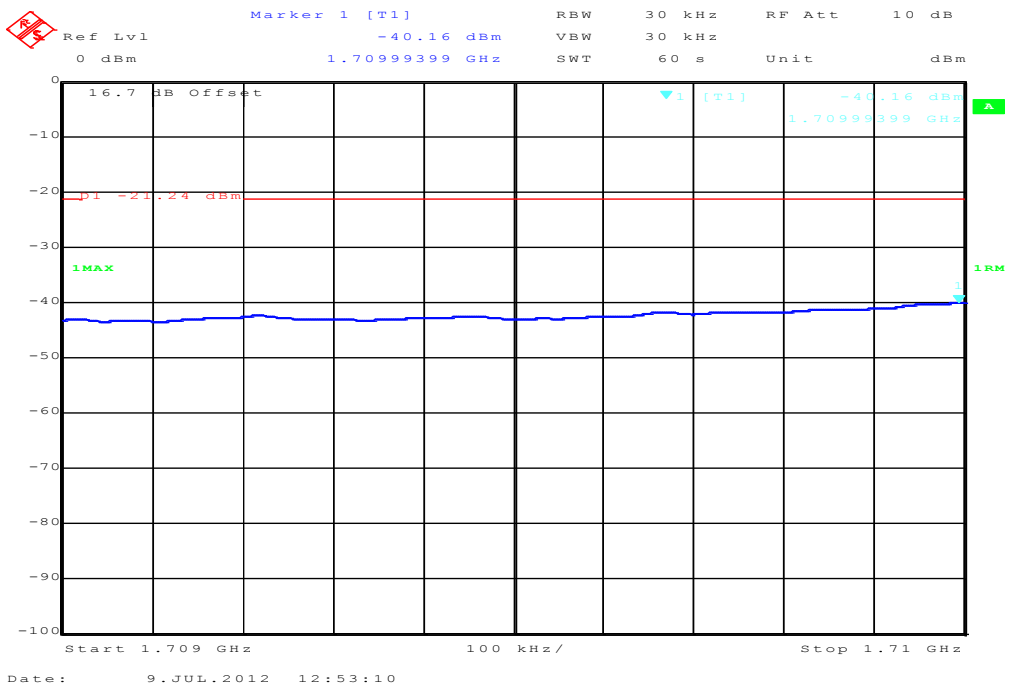
Plot 1: Lowest Channel – QPSK



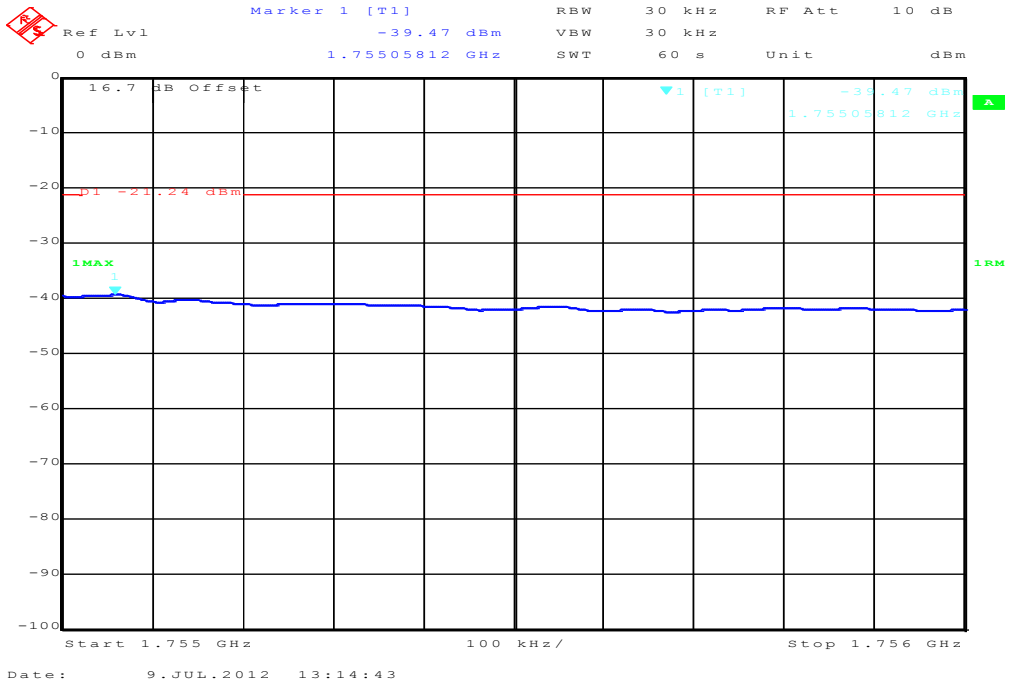
Plot 2: Highest Channel – QPSK



Plot 3: Lowest Channel – 16-QAM

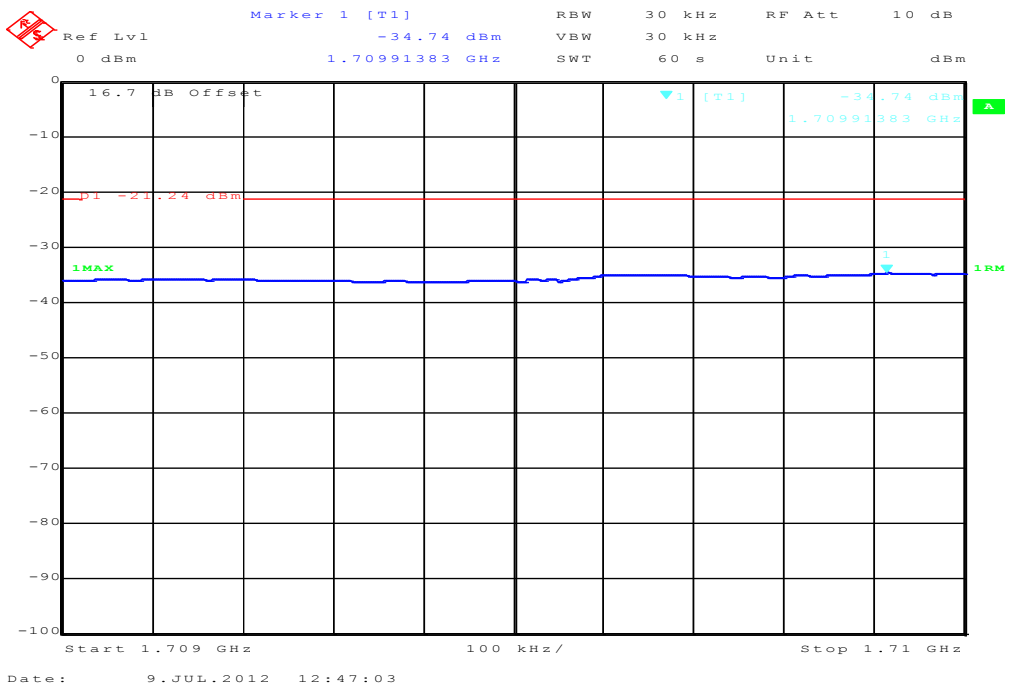


Plot 4: Highest Channel – 16-QAM

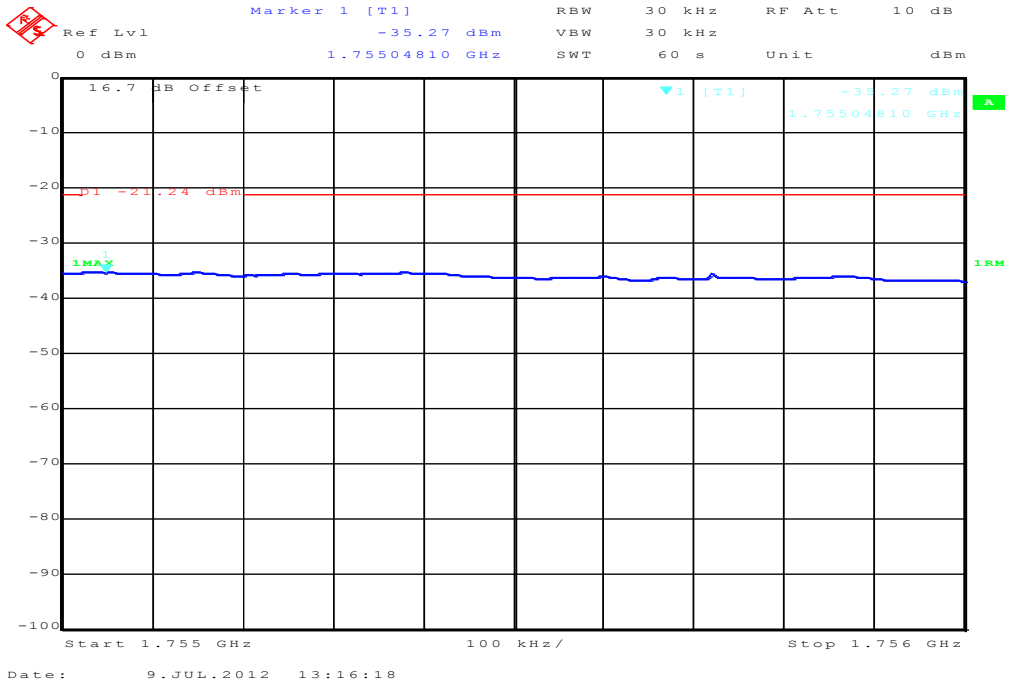


Results: 20 MHz channel bandwidth

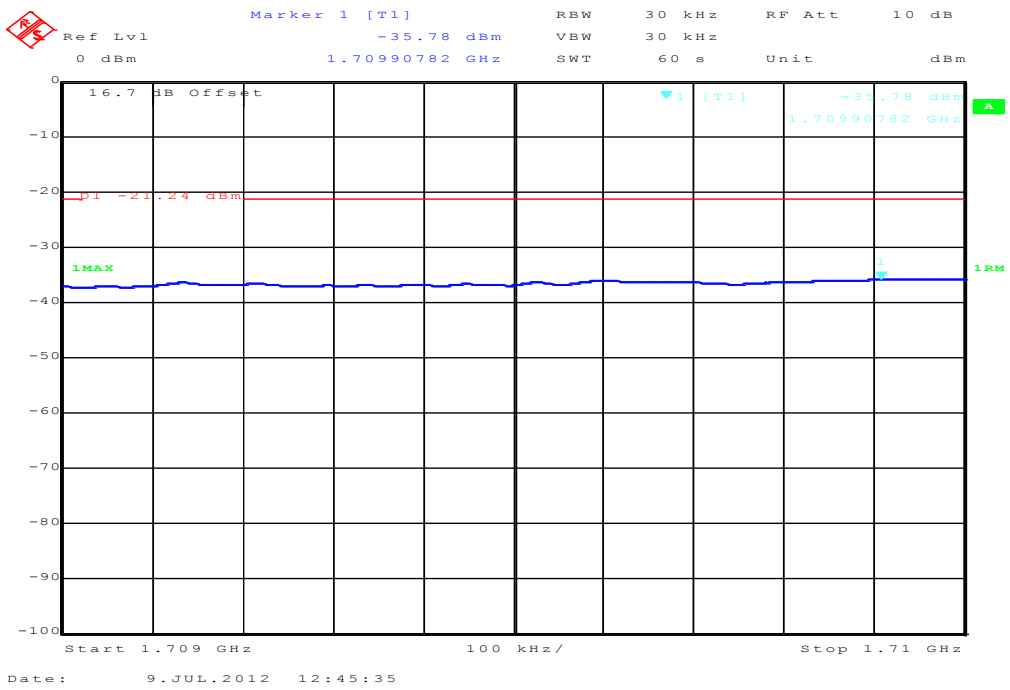
Plot 1: Lowest Channel – QPSK



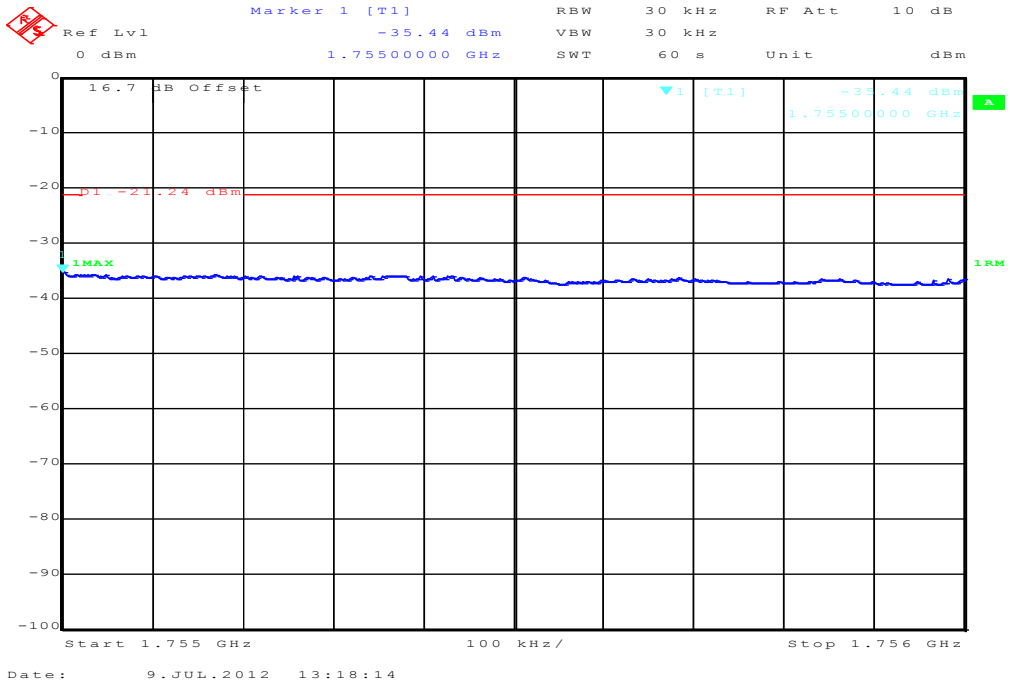
Plot 2: Highest Channel – QPSK



Plot 3: Lowest Channel – 16-QAM



Plot 4: Highest Channel – 16-QAM



Result: **Passed**

9.4.6 Occupied bandwidth

Description:

Measurement of the occupied bandwidth of the transmitted signal.

Measurement:

Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the mid frequencies of the LTE band 4 frequency band. The table below lists the measured 99% power and -26dBc occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	10 kHz
Resolution bandwidth:	10 kHz
Span:	2 x nominal BW
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 27.53(h) CFR Part 2.1049	RSS 139, Issue 2, Section 6.5
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

Results:

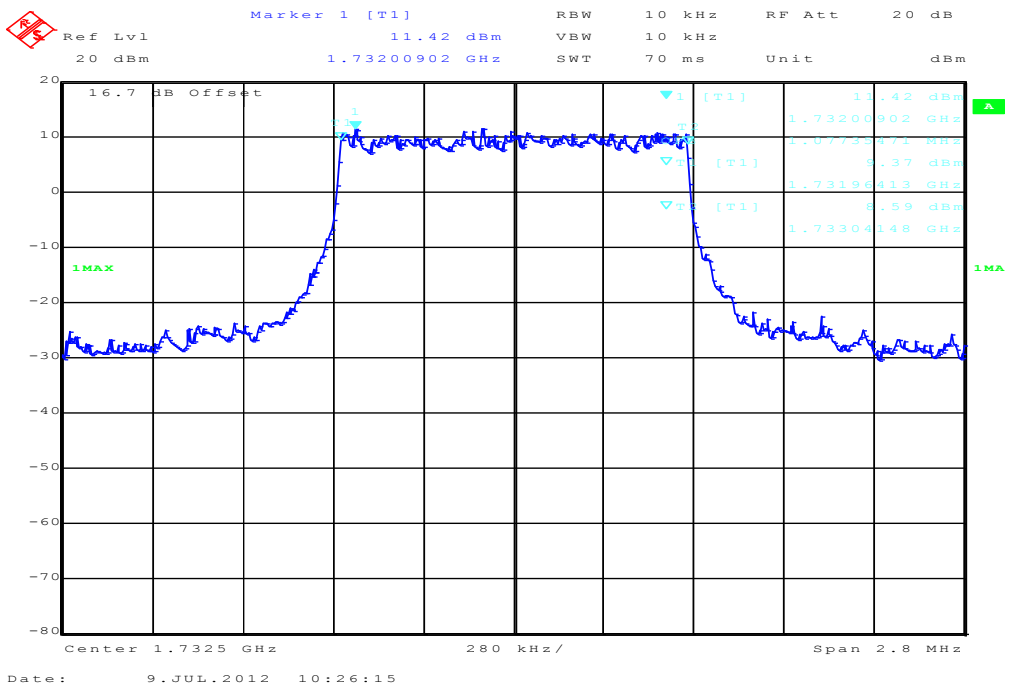
Occupied Bandwidth - QPSK		
Bandwidth [MHz]	**99% OBW (kHz)**	**-26 dBc BW (kHz)**
1.4	1077	1240
3	2681	2898
5	4469	4733
10	8938	9303
15	13407	13872
20	17876	18421
Measurement uncertainty	± 100 kHz	

Occupied Bandwidth – 16-QAM		
Bandwidth [MHz]	**99% OBW (kHz)**	**-26 dBc BW (kHz)**
1.4	1083	1263
3	2693	2910
5	4469	4774
10	8938	9383
15	13407	13932
20	17956	18501
Measurement uncertainty	± 100 kHz	

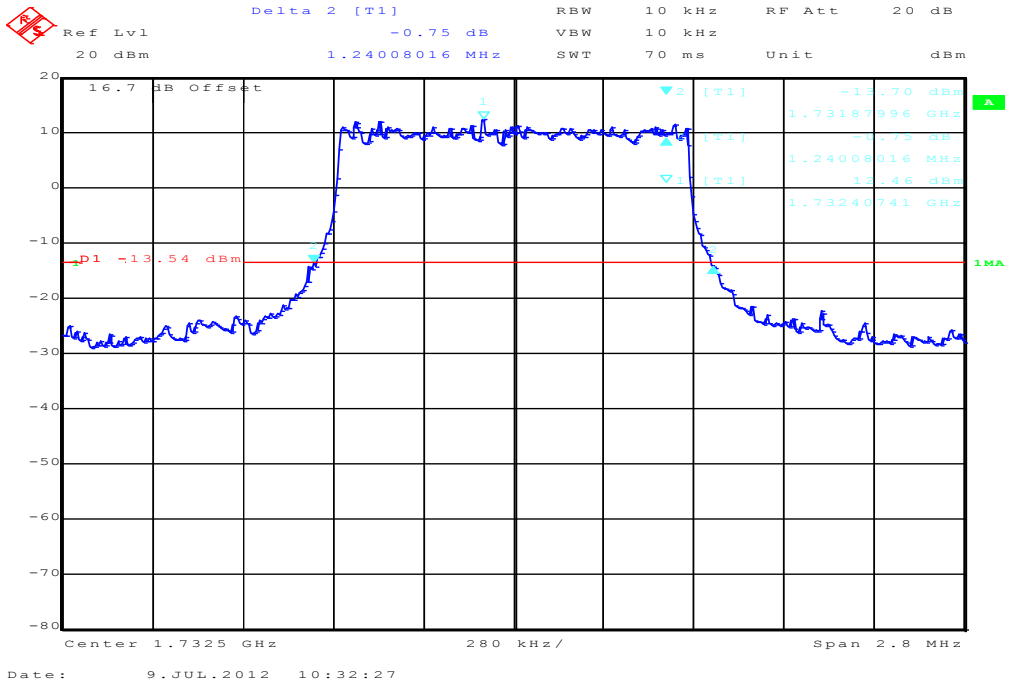
Result: **Passed**

Plots: QPSK

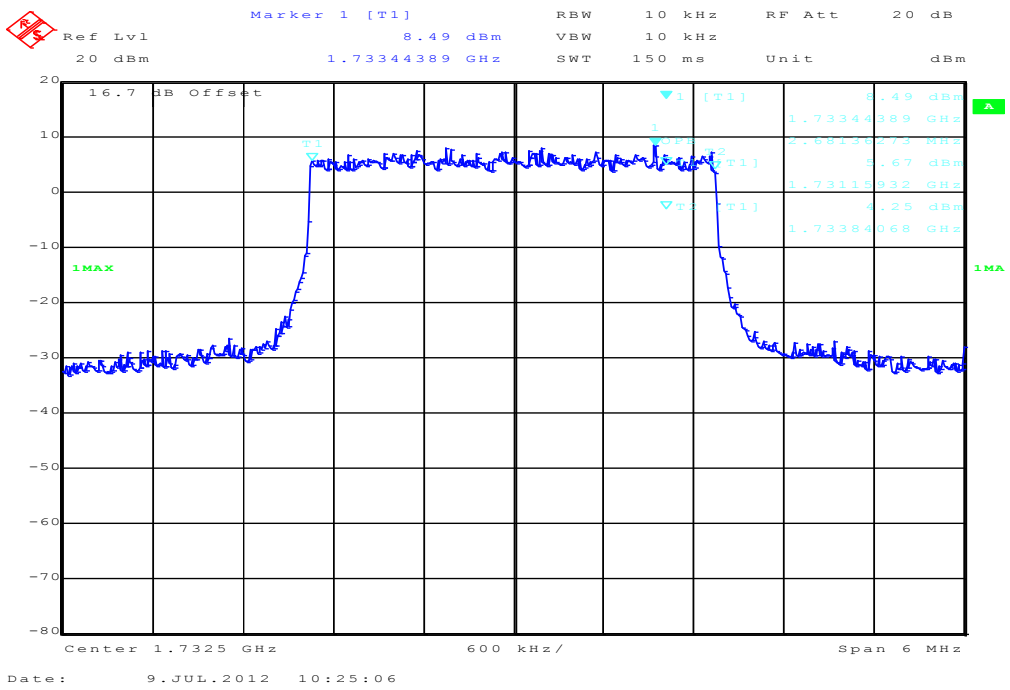
Plot 1: 1.4 MHz (99% - OBW)



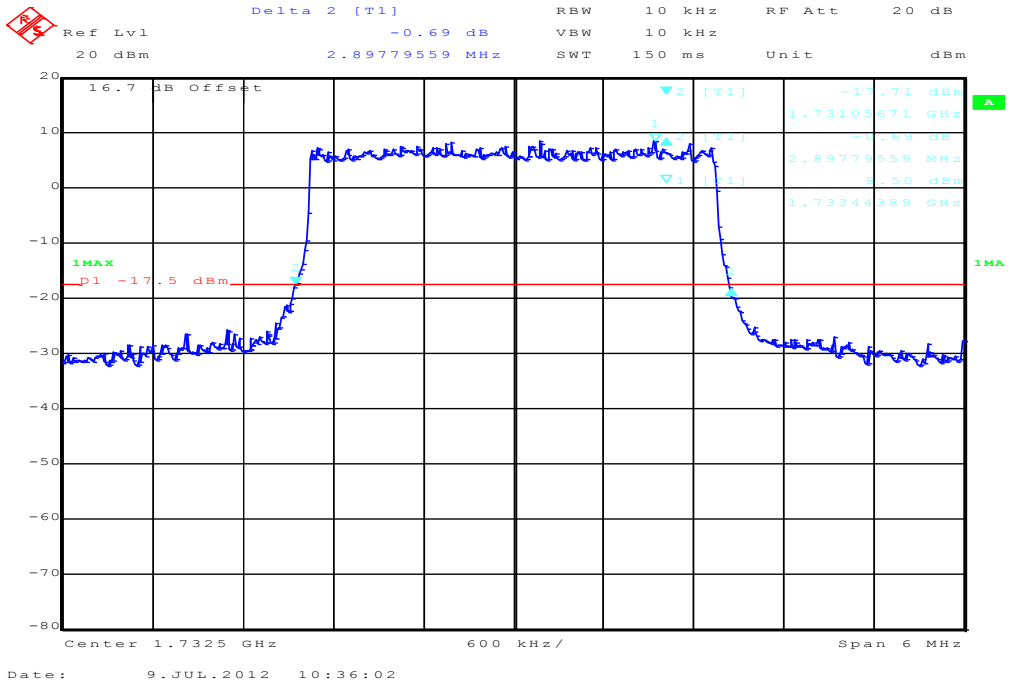
Plot 2: 1.4 MHz (-26 dBc BW)



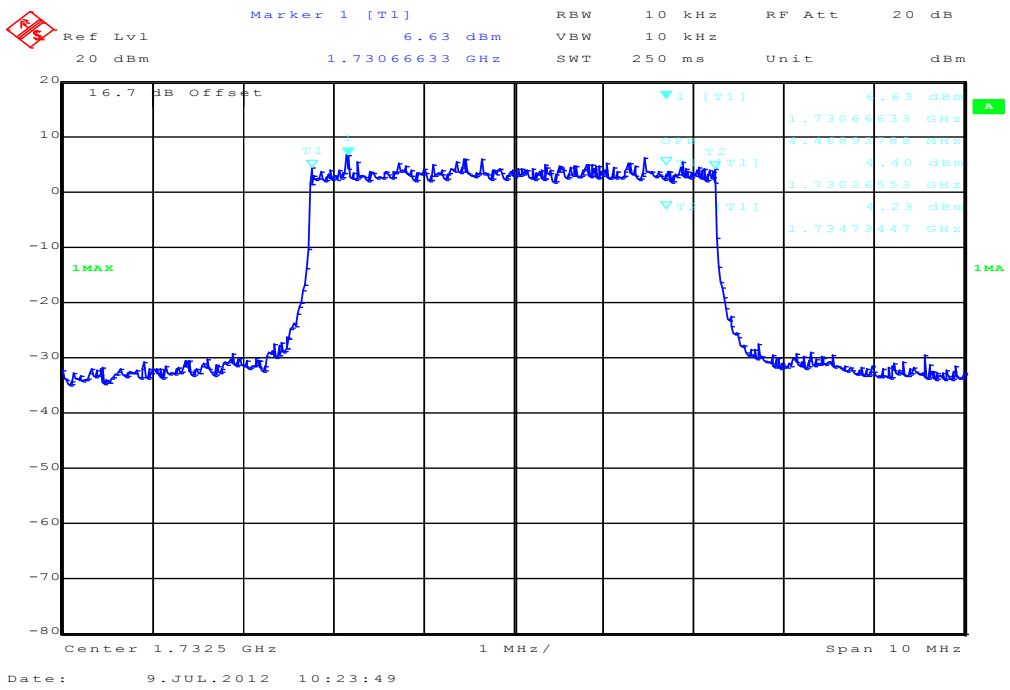
Plot 3: 3 MHz (99% - OBW)



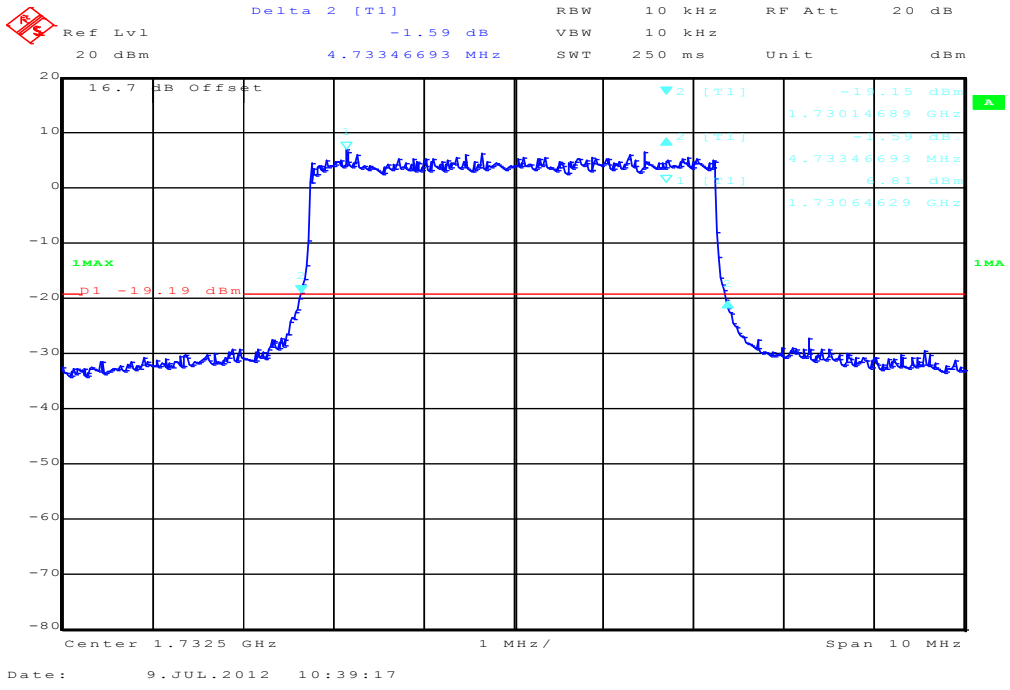
Plot 4: 3 MHz (-26 dBc BW)



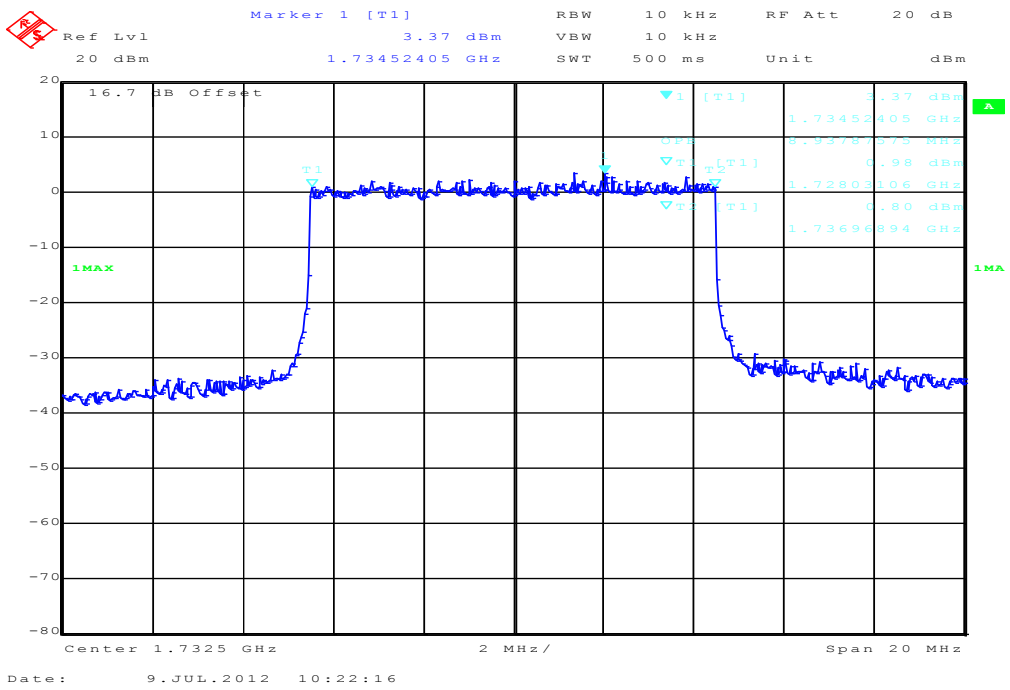
Plot 5: 5 MHz (99% - OBW)



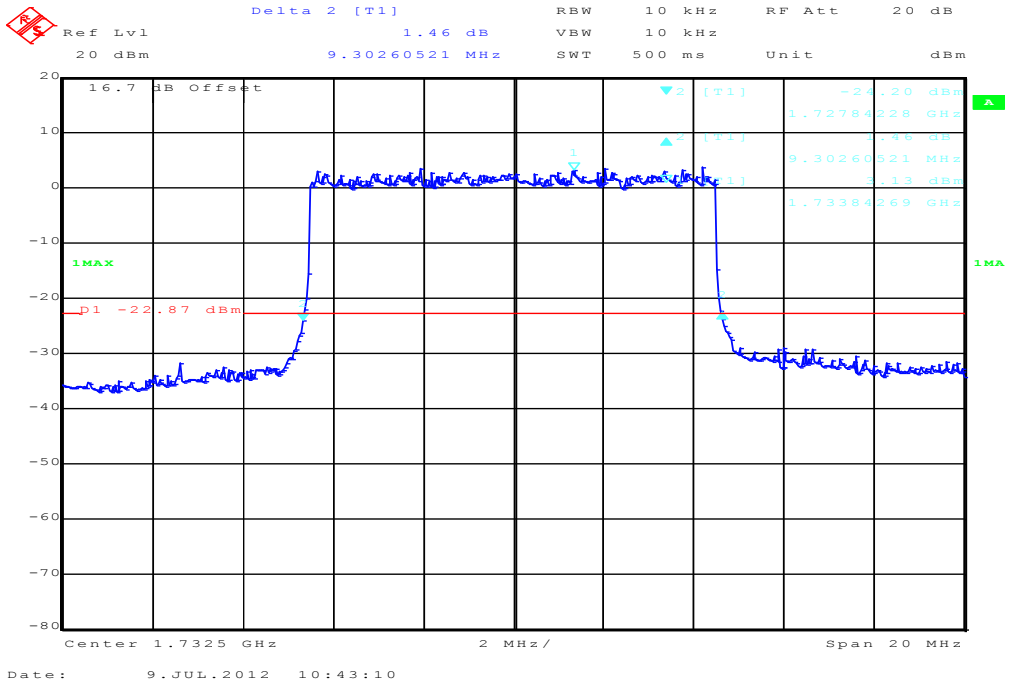
Plot 6: 5 MHz (-26 dBc BW)



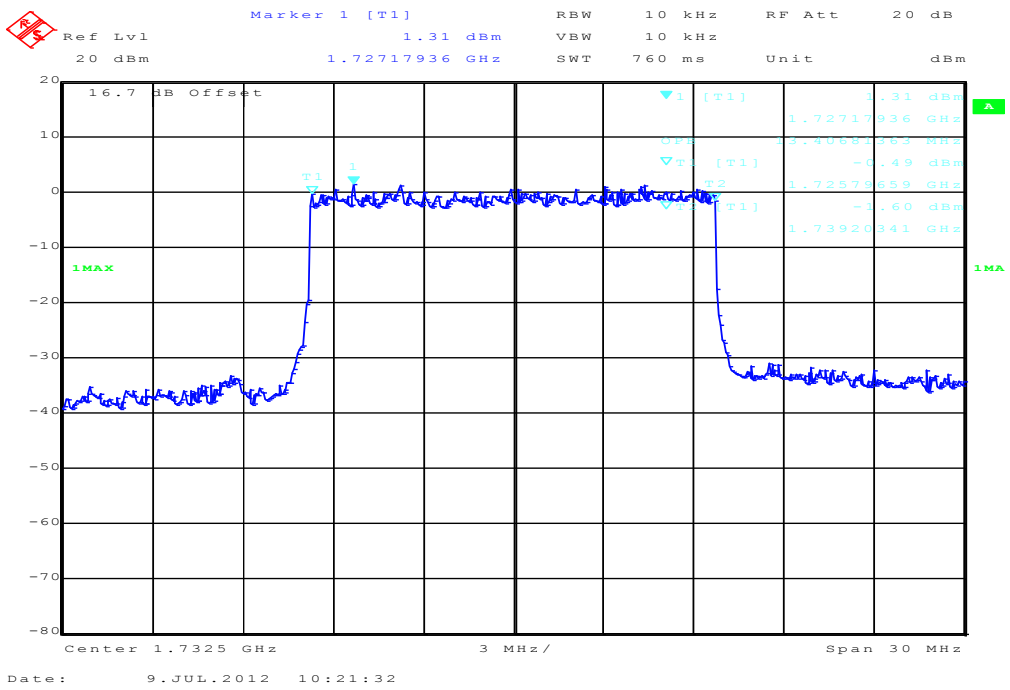
Plot 7: 10 MHz (99% - OBW)



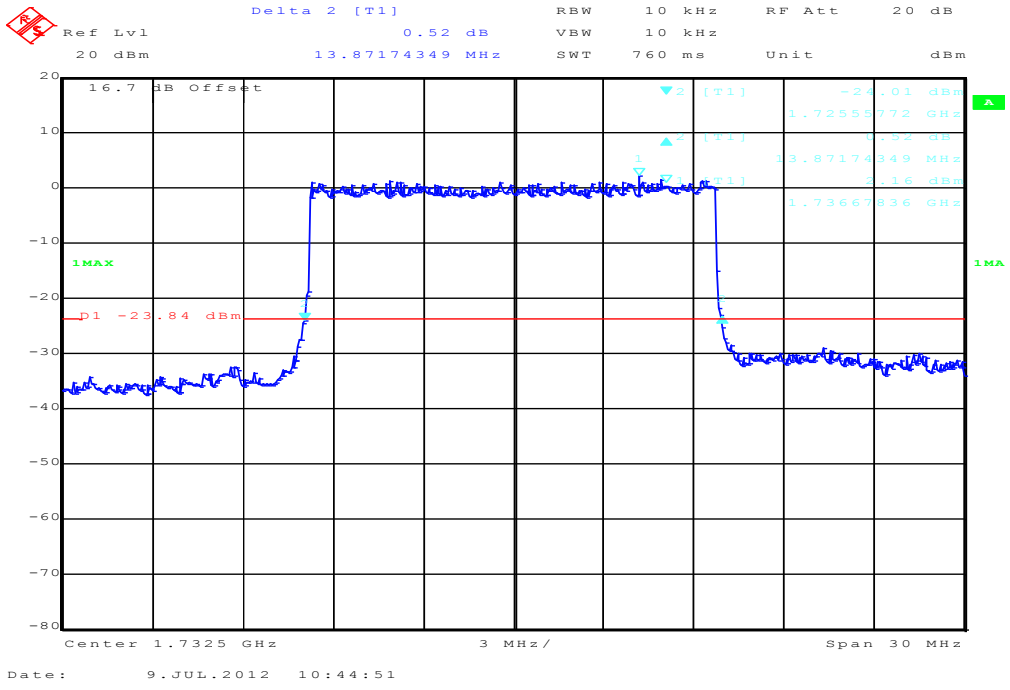
Plot 8: 10 MHz (-26 dBc BW)



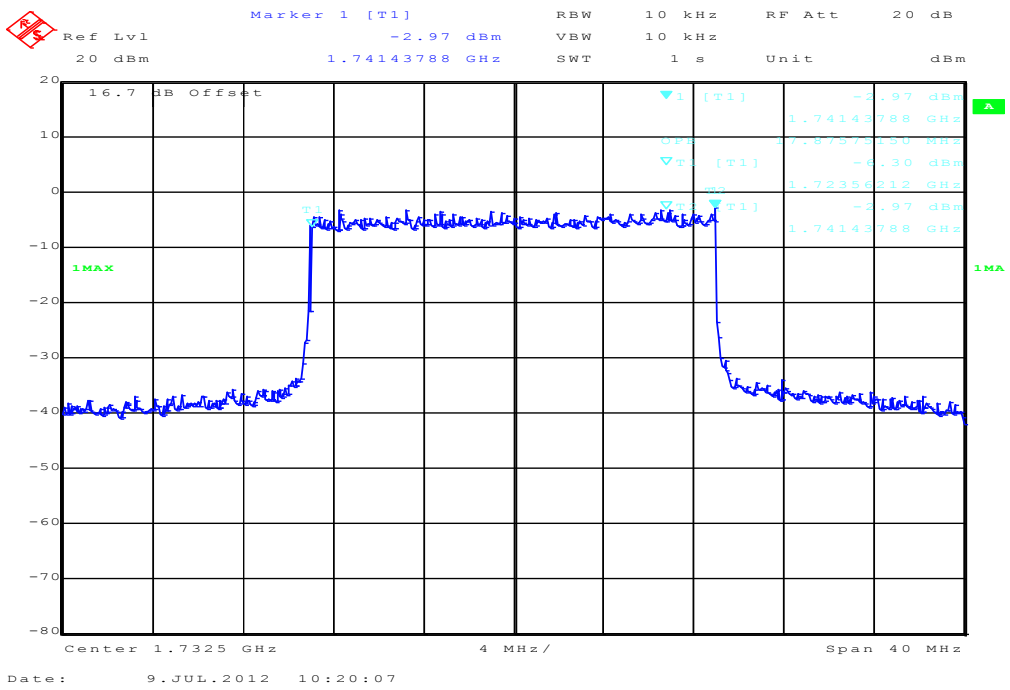
Plot 9: 15 MHz (99% - OBW)



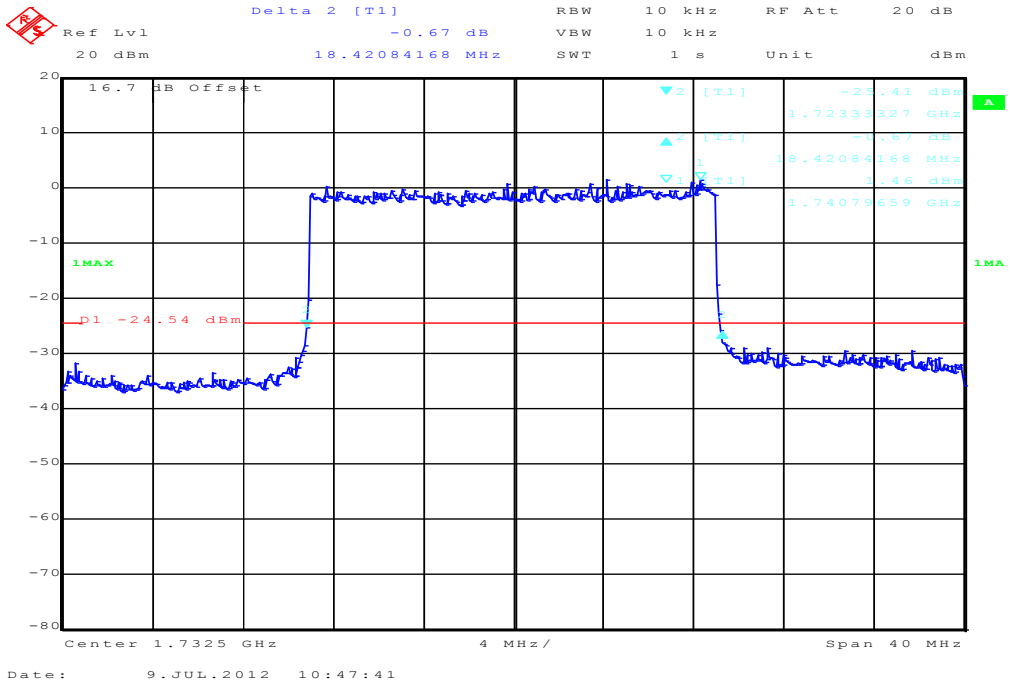
Plot 10: 15 MHz (-26 dBc BW)



Plot 11: 20 MHz (99% - OBW)

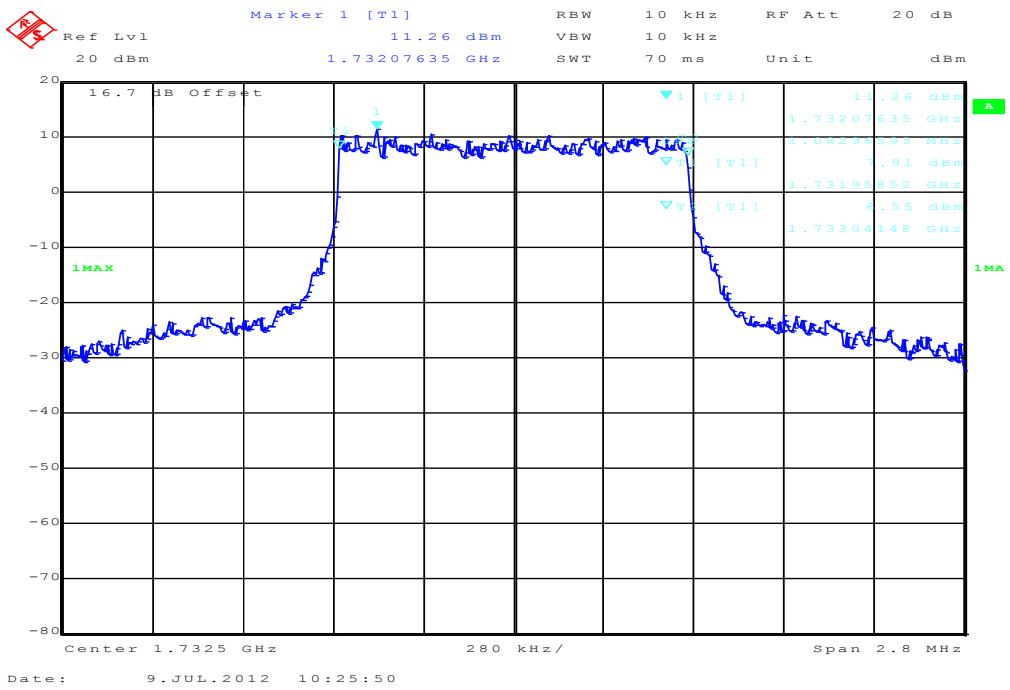


Plot 12: 20 MHz (-26 dBc BW)

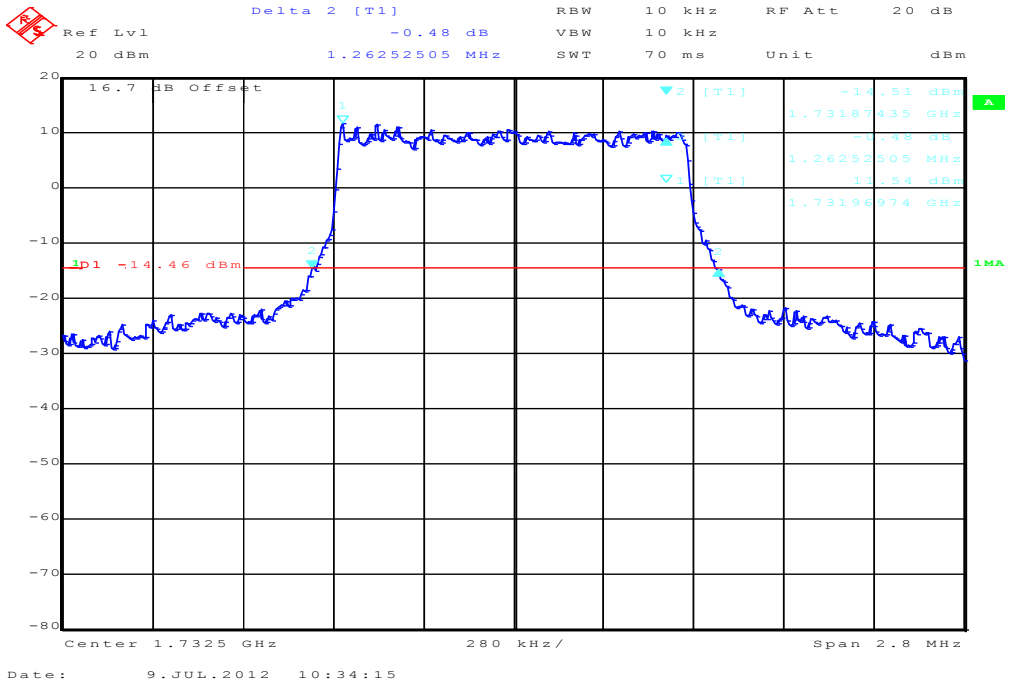


Plots: 16-QAM

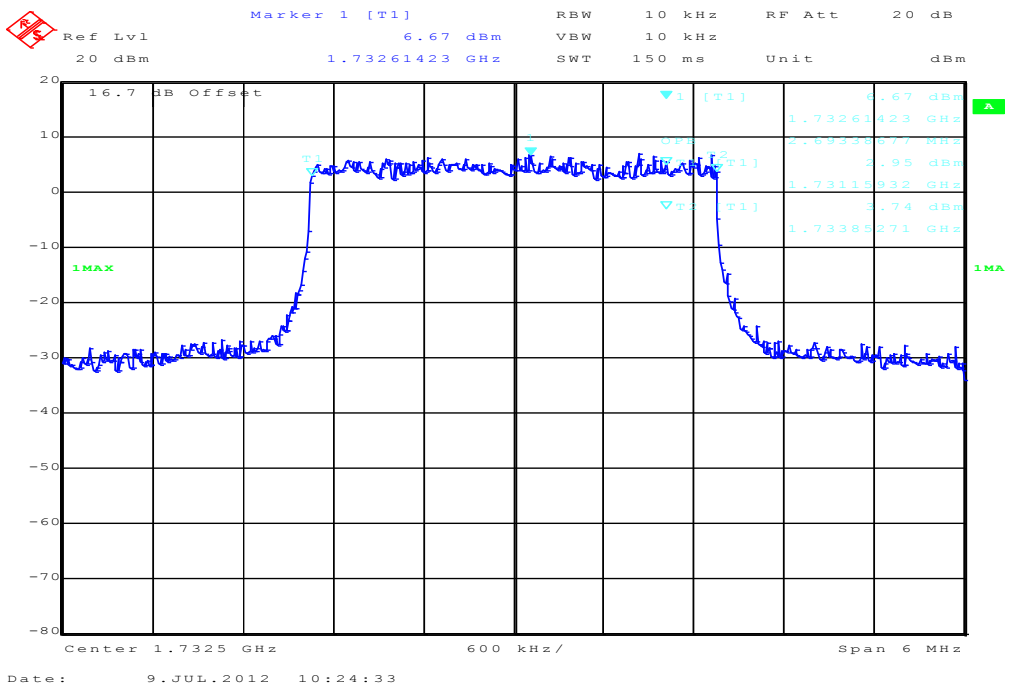
Plot 1: 1.4 MHz (99% - OBW)



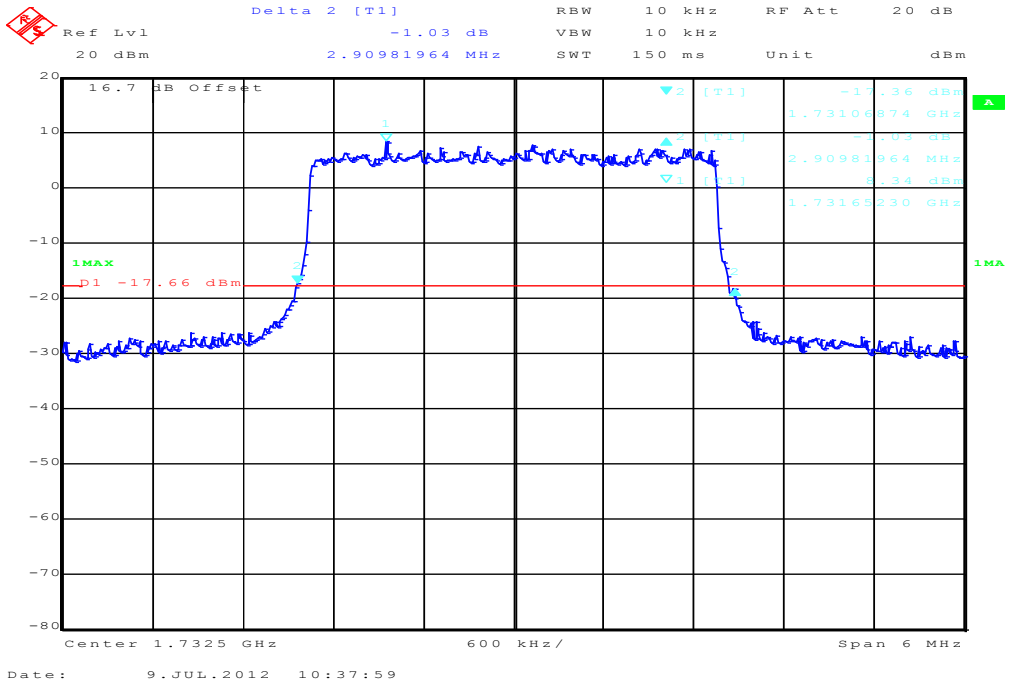
Plot 2: 1.4 MHz (-26 dBc BW)



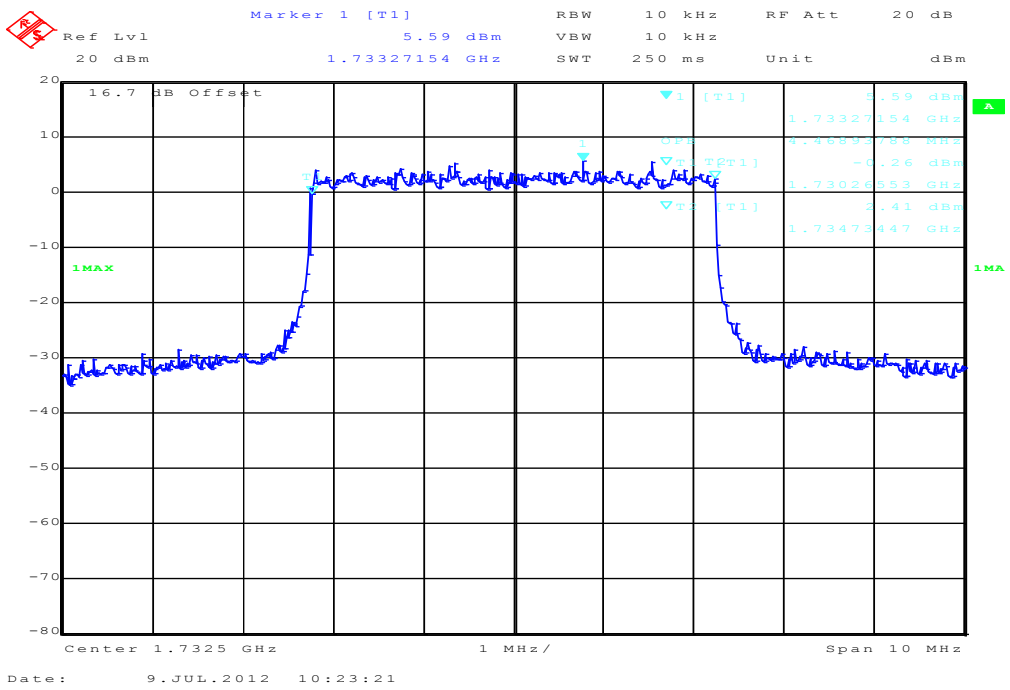
Plot 3: 3 MHz (99% - OBW)



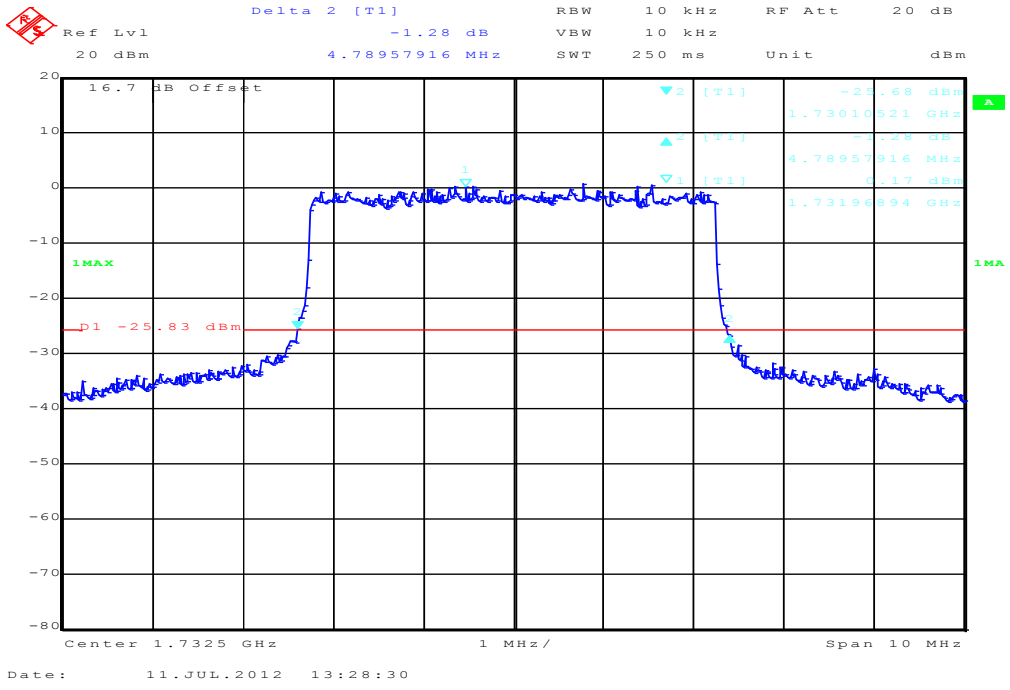
Plot 4: 3 MHz (-26 dBc BW)



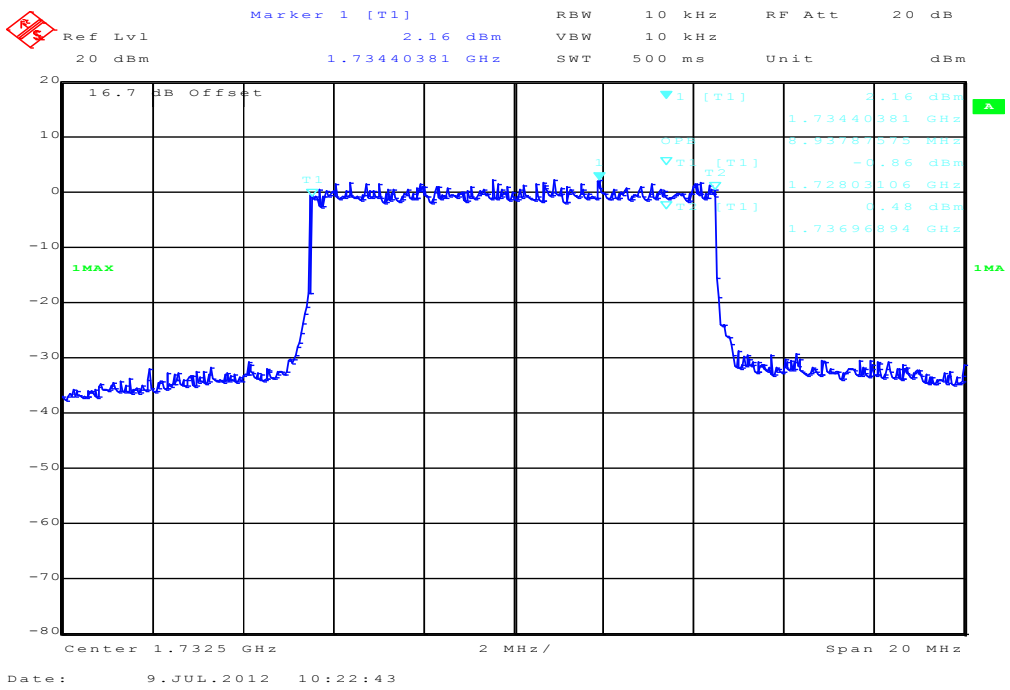
Plot 5: 5 MHz (99% - OBW)



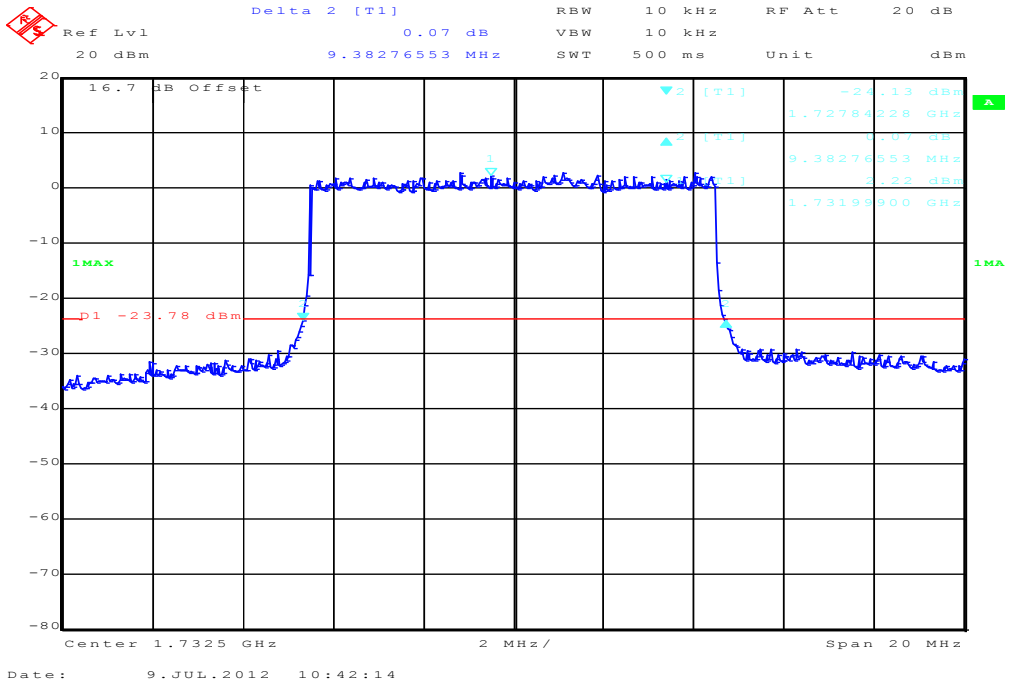
Plot 6: 5 MHz (-26 dBc BW)



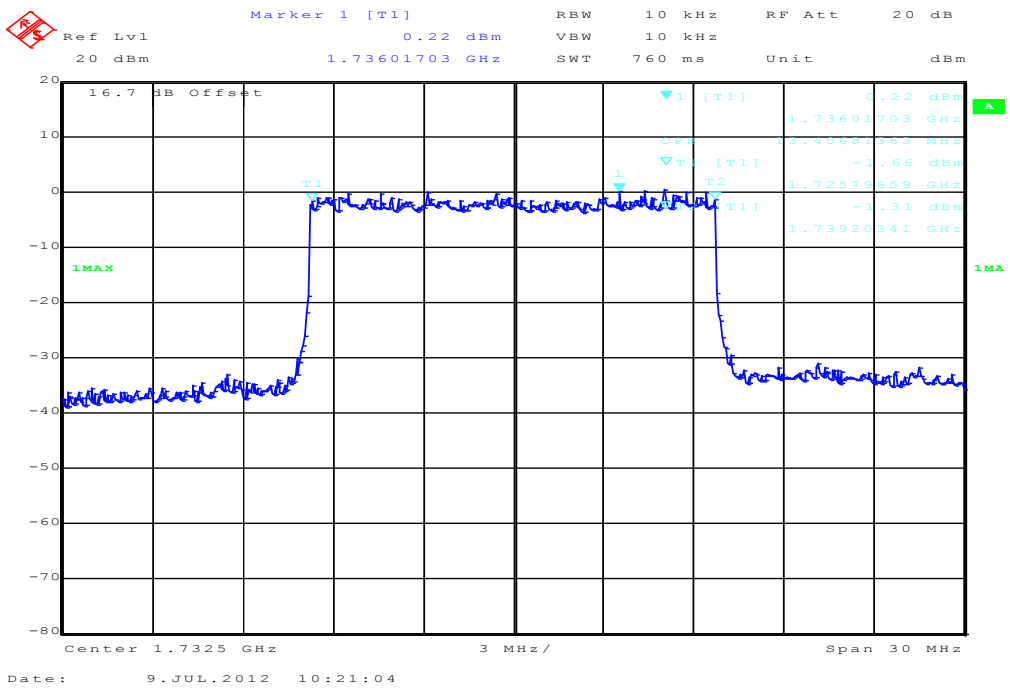
Plot 7: 10 MHz (99% - OBW)



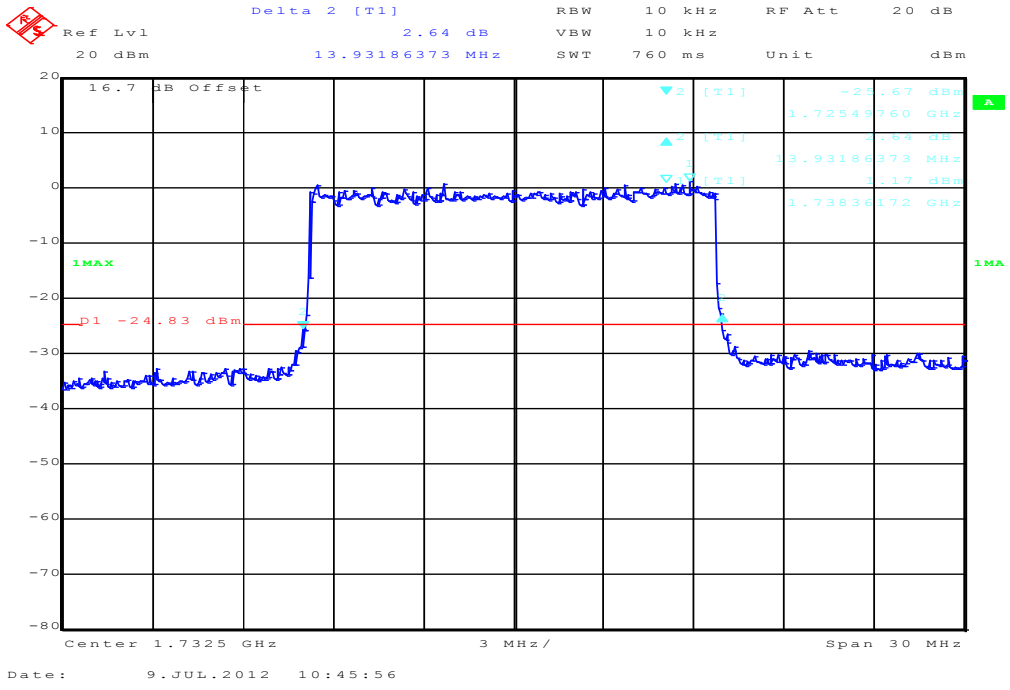
Plot 8: 10 MHz (-26 dBc BW)



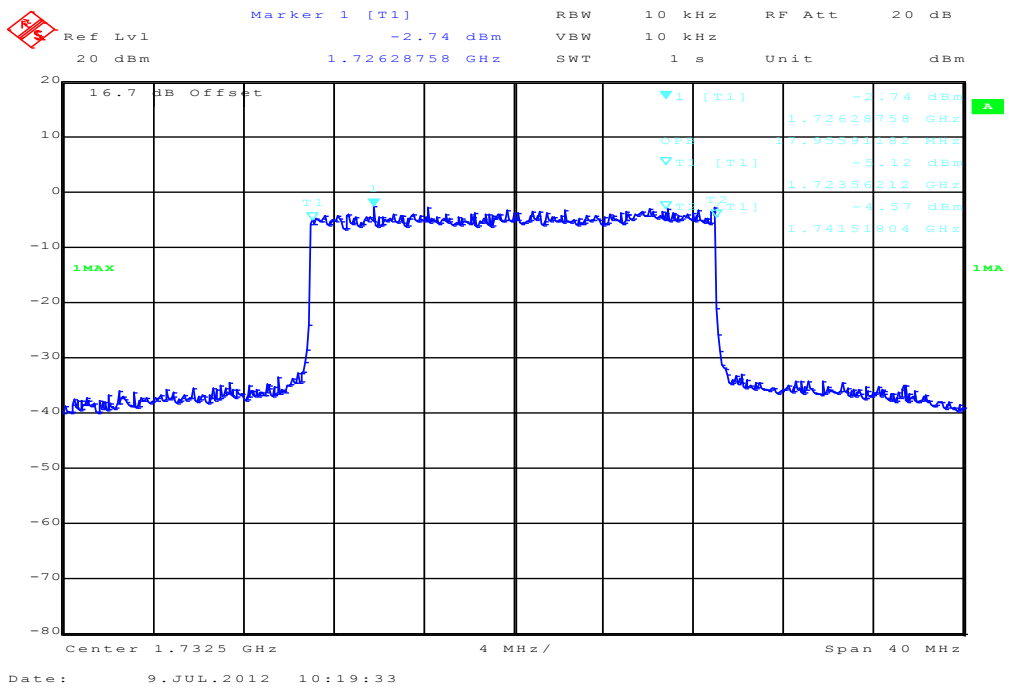
Plot 9: 15 MHz (99% - OBW)



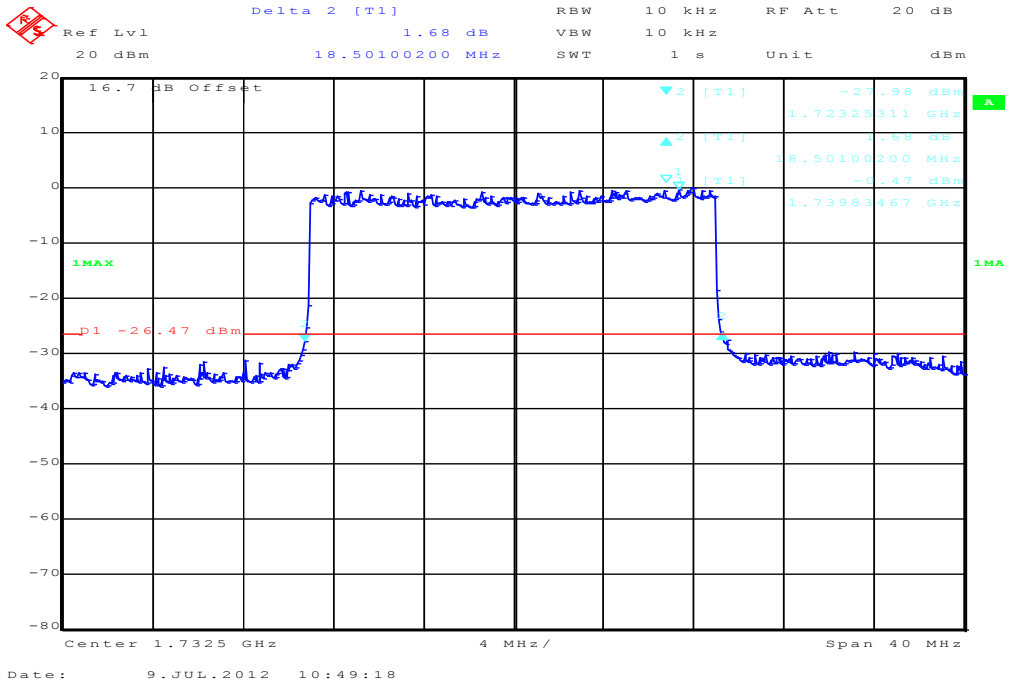
Plot 10: 15 MHz (-26 dBc BW)



Plot 11: 20 MHz (99% - OBW)



Plot 12: 20 MHz (-26 dBc BW)



10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Wideband Radio Communication Tester	CMW500	R&S	102375	300004187 _0		04.01.2011	
2	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	11.05.2011	11.05.2013
3	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
4	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
5	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
6	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
7	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
8	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
9	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	14.10.2011	14.10.2014
10	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	19.12.2011	19.12.2012
11	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
12	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
13	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
14	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	04.01.2012	04.01.2013
15	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/00205	300003314	k	14.07.2011	14.07.2013
16	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
17	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
18	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
19	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
20	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	
21	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	06.01.2012	06.01.2014
22	n. a.	DC Power	1108-32	Heiden	001802	300001383	Ve	23.06.2010	23.06.2013

		Supply 0 – 32V							
23	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
24	n. a.	Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM	FSiQ26	R&S	835111/0004	300002678	Ve	04.11.2010	04.11.2012
25	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000787	ne		
26	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300002442	ne		
27	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
28	19	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9107-3697	300001605	Ve	19.10.2010	19.10.2012

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

11 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2012-07-17

Annex B Further information

Glossary

AVG - Average
DUT - Device under test
EMC - Electromagnetic Compatibility
EN - European Standard
EUT - Equipment under test
ETSI - European Telecommunications Standard Institute
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software

Annex C Accreditation Certificate

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Entrusted according to Section 8 subsection1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of
EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the testing laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10
66117 Saarbrücken

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

Wired communications and DECT
Acoustic
Radio
Shirt Range Devices (SRD)
RFID
WiMax and Richtfunk
Mobile radio (GSM / DCS), Over the Air (OTA) Performance
Electromagnetic Compatibility (EMC) incl. Automotive
Product safety
SAR and Hearing Aid Compatibility (HAC)
Environmental simulation
Smart Card Terminals
Bluetooth
Wi-Fi-Services

The accreditation certificate shall only apply in connection with the notice of accreditation of 13.04.2011 with the accreditation number D-PL-12076-01 and is valid until 03.09.2014. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 82 pages.

Registration number of the certificate: **D-PL-12076-01-01**

Frankfurt am Main, 13.04.2011

Dipl.-Ing. (FH) Rolf Egner
Head of Division 2

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf.

Front side of certificate

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkkS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.

No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkkS.

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Back side of certificate

Note:
The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

http://www.cetecom.com/fileadmin/de/CETECOM_D_Saarbruecken/accreditations_Jan_2010/DAKKS_Akkredi_Urk_EN17025-En_incl_Annex.pdf