

TEST REPORT

Test report no.: 1-4254/12-16-04



Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing laboratory

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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

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Manufacturer

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN

Test standard/s

47 CFR Part 24 Title 47 of the Code of Federal Regulations; Chapter I
Part 24 - Personal communications services
RSS - 133 Issue 5 Spectrum Management and Telecommunications Policy - Radio Standards
Specifications
2 GHz Personal Communication Services

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: LTE band 2
1850.7 MHz to 1909.3 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

1	Table of contents	2
2	General information	3
2.1	Notes and disclaimer	3
2.2	Application details	3
3	Test standard/s	3
4	Test environment	4
5	Test item	4
5.1	Additional information	4
6	Test laboratories sub-contracted	4
7	Summary of measurement results	5
7.1	LTE band II	5
8	RF measurements	6
8.1	Description of test setup	6
8.1.1	Radiated measurements	6
8.1.2	Conducted measurements	7
8.2	RSP100 test report cover sheet / performance test data	8
8.3	Results LTE band II	10
8.3.1	RF output power	10
8.3.2	Frequency stability	14
8.3.3	Spurious emissions radiated	17
8.3.4	Spurious emissions conducted	24
8.3.5	Block edge compliance	45
8.3.6	Occupied bandwidth	58
9	Test equipment and ancillaries used for tests	72
10	Observations	73
Annex A	Document history	74
Annex B	Further information	74
Annex C	Accreditation Certificate	75

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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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:	2012-07-09
End of test:	2012-07-17
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 24	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 24 - Personal communications services
RSS - 133 Issue 5	2009-02	Spectrum Management and Telecommunications Policy - Radio Standards Specifications 2 GHz Personal Communication Services

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:		52 %
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]	:	LTE band 2 1850.7 MHz to 1909.3 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

5.1 Additional information

Test setup- and EUT-photos are included in test report 1-4254/12-16-3

6 Test laboratories sub-contracted

None

7 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 24 RSS 133	passed	2012-07-17	-/-

7.1 LTE band II

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

8 RF measurements

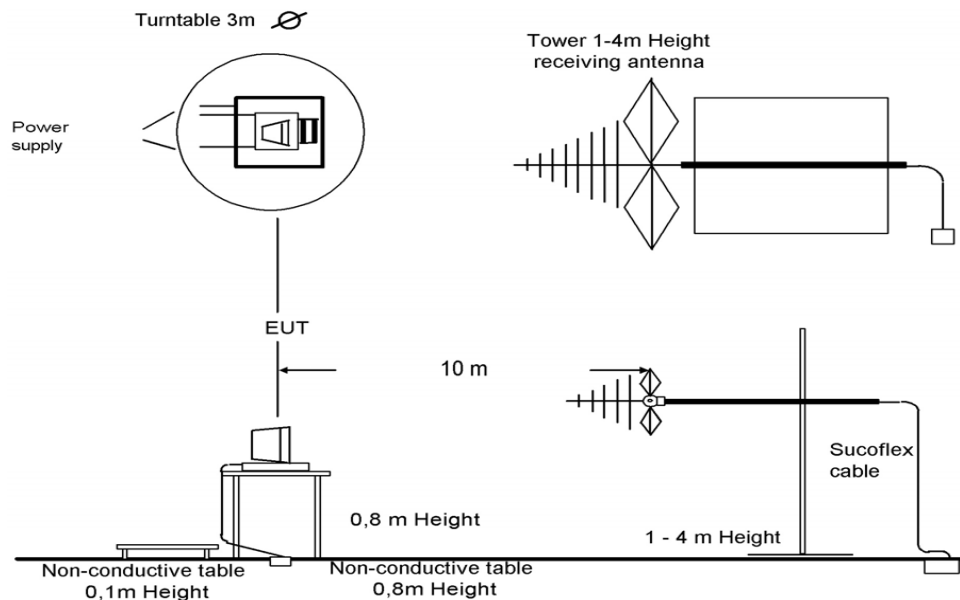
8.1 Description of test setup

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

8.1.1 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

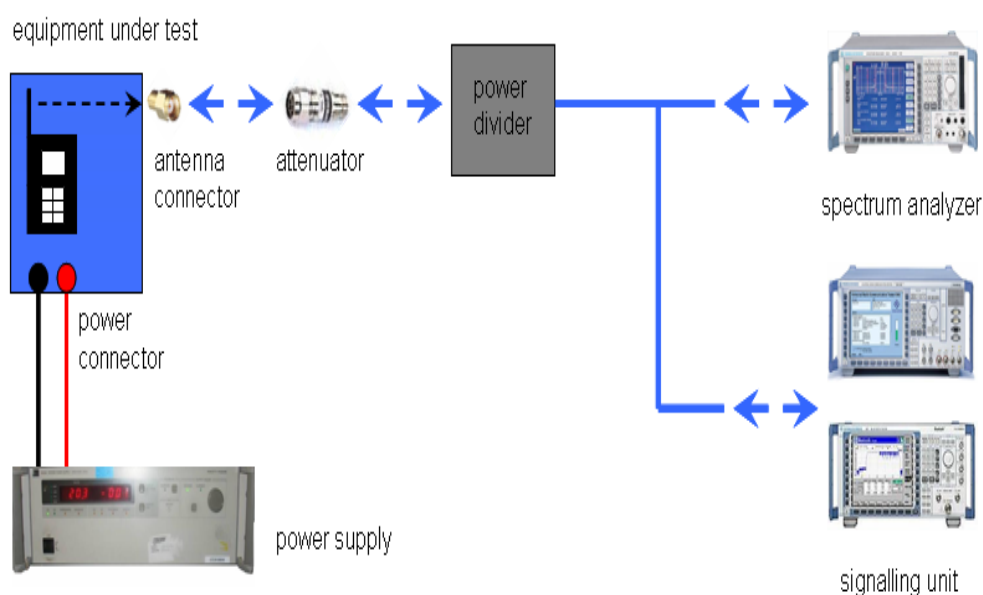


Picture 1: Diagram radiated measurements

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

8.1.2 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
$f < 150 \text{ kHz}$	200 Hz or	300 Hz
$150 \text{ kHz} \leq f < 25 \text{ MHz}$	9 kHz or	10 kHz
$25 \text{ MHz} \leq f < 1000 \text{ MHz}$	120 kHz or	100 kHz
$1000 \text{ MHz} \leq f$		1 MHz
NOTE: Specific requirements in CEPT/ERC/Recommendation 70-03 [2] shall be applied where applicable.		

8.2 RSP100 test report cover sheet / performance test data

Test Report Number	:	1-4254/12-16-04		
Equipment Model Number	:	PM-0140-BV		
Certification Number	:	4170B-PM0140		
Manufacturer (complete Address)	:	Sony Mobile Communications AB Nya Vattentorget 22188 Lund / SWEDEN		
Tested to radio standards specification no.	:	RSS - 133 Issue 5		
Open Area Test Site IC No.	:	IC 3462C-1		
Frequency Range	:	LTE: 1850.7 MHz to 1909.3 MHz		
GPS receiver turned	:	On		
RF-power [dBm] (max.)	:	Channel Bandwidth	Conducted	ERP / EIRP
		1.4 MHz	24.1 dBm	25.2 dBm
			23.5 dBm	24.4 dBm
		3 MHz	24.2 dBm	25.3 dBm
			23.2 dBm	24.5 dBm
		5 MHz	24.1 dBm	25.3 dBm
			23.6 dBm	24.3 dBm
		10 MHz	24.1 dBm	25.3 dBm
			23.2 dBm	24.3 dBm
		15 MHz	24.0 dBm	25.2 dBm
			23.3 dBm	24.3 dBm
		20 MHz	24.1 dBm	25.3 dBm
			23.6 dBm	24.4 dBm
		1.4 MHz	1083	
Occupied bandwidth (99%-BW) [kHz]	:	1.4 MHz	1083	
		3 MHz	2693	
			2693	
		5 MHz	4469	
			4469	
		10 MHz	8938	
			8938	
		15 MHz	13407	
			13467	
		20 MHz	17876	
			17876	
		1.4 MHz	QPSK	
		1.4 MHz	16-QAM	
		3 MHz	QPSK	
		3 MHz	16-QAM	
		5 MHz	QPSK	
		5 MHz	16-QAM	
		10 MHz	QPSK	
		10 MHz	16-QAM	
		15 MHz	QPSK	
		15 MHz	16-QAM	
		20 MHz	QPSK	
		20 MHz	16-QAM	

Type of modulation	:	QPSK; 16QAM	
Emission Designator (TRC-43)	1.4 MHz	1M08G7D	QPSK
		1M08W7D	16-QAM
	3 MHz	2M69G7D	QPSK
		2M69W7D	16-QAM
	5 MHz	4M47G7D	QPSK
		4M47W7D	16-QAM
	10 MHz	8M94G7D	QPSK
		8M94W7D	16-QAM
	15 MHz	13M4G7D	QPSK
		13M5W7D	16-QAM
	20 MHz	17M9G7D	QPSK
		17M9W7D	16-QAM
Antenna Information	:	integrated antenna	
Transmitter Spurious (worst case) [dBm]	:	-37 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



8.3 Results LTE band II

The EUT was set to transmit the maximum power.

8.3.1 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	
Detector:	Measured with CMW500
Sweep time:	
Video bandwidth:	
Resolution bandwidth:	
Span:	
Trace-Mode:	

Limits:

FCC	IC
CFR Part 24.232 CFR Part 2.1046	RSS 133, Issue 5, Section 6.4
Nominal Peak Output Power	
+33.00 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	1850.7	1 RB low	24.1	3.9	23.5	4.7
		1 RB high	24.1	3.9	23.5	4.8
		50% RB mid	24.1	5.2	23.3	5.4
		100% RB	23.2	5.4	22.4	6.4
	1880.0	1 RB low	24.0	3.3	23.3	4.0
		1 RB high	23.9	3.3	23.3	3.9
		50% RB mid	24.0	4.0	23.1	4.4
		100% RB	23.0	4.9	22.2	5.4
	1909.3	1 RB low	23.8	3.5	23.4	4.2
		1 RB high	23.7	3.5	23.2	4.3
		50% RB mid	23.8	3.8	22.9	5.0
		100% RB	22.8	5.3	21.9	6.4
3	1851.5	1 RB low	24.2	4.0	23.2	4.9
		1 RB high	24.0	4.2	23.2	4.8
		50% RB mid	23.2	5.3	22.5	5.6
		100% RB	23.3	5.4	22.5	6.2
	1880.0	1 RB low	24.1	3.3	23.0	4.3
		1 RB high	24.0	3.3	22.8	4.3
		50% RB mid	23.8	3.8	22.3	5.7
		100% RB	23.2	5.0	22.2	6.1
	1908.5	1 RB low	24.1	3.4	22.5	4.8
		1 RB high	23.7	3.7	22.3	4.9
		50% RB mid	23.6	4.4	22.4	5.3
		100% RB	23.1	5.5	21.9	6.2
5	1852.5	1 RB low	24.1	3.8	23.6	4.7
		1 RB high	24.0	4.0	23.3	5.0
		50% RB mid	23.3	4.9	22.4	6.5
		100% RB	23.3	5.7	22.2	6.5
	1880.0	1 RB low	24.1	3.4	22.7	4.6
		1 RB high	24.1	3.3	22.8	4.4
		50% RB mid	24.0	3.6	22.4	5.4
		100% RB	23.2	5.2	22.2	6.2
	1907.5	1 RB low	23.8	3.7	23.2	4.4
		1 RB high	23.7	3.7	23.1	4.2
		50% RB mid	23.4	4.5	22.4	5.6
		100% RB	23.0	5.4	22.3	6.2

10	1855	1 RB low	24.1	4.1	23.2	5.0
		1 RB high	24.0	4.3	23.2	5.0
		50% RB mid	23.7	5.3	22.4	6.5
		100% RB	23.2	5.9	22.3	6.5
	1880	1 RB low	24.0	3.5	22.8	4.6
		1 RB high	24.1	3.4	22.8	4.6
		50% RB mid	23.4	4.5	22.4	5.6
		100% RB	23.3	5.4	22.3	6.2
	1905	1 RB low	24.1	3.8	22.7	4.9
		1 RB high	23.8	3.7	22.5	4.7
		50% RB mid	23.2	5.6	22.2	6.0
		100% RB	23.1	5.7	22.0	6.5
15	1857.5	1 RB low	23.7	4.3	23.3	4.7
		1 RB high	23.9	4.1	23.2	4.7
		50% RB mid	23.1	5.8	22.4	6.3
		100% RB	23.2	6.0	22.2	6.8
	1880.0	1 RB low	23.9	3.7	22.5	5.0
		1 RB high	24.0	3.5	22.6	4.7
		50% RB mid	23.2	4.8	22.7	5.5
		100% RB	23.2	5.5	22.3	6.4
	1902.5	1 RB low	23.9	3.7	23.2	4.7
		1 RB high	23.7	3.6	23.0	4.6
		50% RB mid	23.7	4.4	22.5	5.5
		100% RB	23.1	5.9	22.2	6.4
20	1860	1 RB low	24.1	4.1	23.3	4.7
		1 RB high	24.1	3.7	23.1	4.5
		50% RB mid	23.3	5.5	22.4	6.5
		100% RB	23.1	5.8	22.2	6.8
	1880	1 RB low	24.1	3.6	23.4	4.5
		1 RB high	23.9	3.7	23.4	4.4
		50% RB mid	23.5	4.6	23.1	5.2
		100% RB	23.3	5.5	22.4	6.5
	1900	1 RB low	24.1	3.8	23.6	4.3
		1 RB high	23.8	3.8	23.2	4.3
		50% RB mid	23.2	4.8	22.2	5.8
		100% RB	23.2	5.6	22.3	6.6
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	1850.7	25.2	24.4
	1880.0	25.0	24.2
	1909.3	24.8	22.9
3	1851.5	25.3*)	24.5*)
	1880.0	25.2*)	24.2*)
	1908.5	25.1*)	23.9*)
5	1852.5	25.3*)	24.2*)
	1880.0	25.2*)	24.2*)
	1907.5	25.0*)	24.3*)
10	1855.0	25.2*)	24.3*)
	1880.0	25.3*)	24.3*)
	1905.0	25.1*)	24.0*)
15	1857.5	25.2*)	24.2*)
	1880.0	25.2*)	24.3*)
	1902.5	25.1*)	24.2*)
20	1860.0	25.1*)	24.2*)
	1880.0	25.3*)	24.4*)
	1900.0	25.2*)	24.3*)
Measurement uncertainty		± 3.0 dB	

*) calculated with antenna gain

Result: Passed

8.3.2 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 9400 (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.

Measurement:

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

Limits:

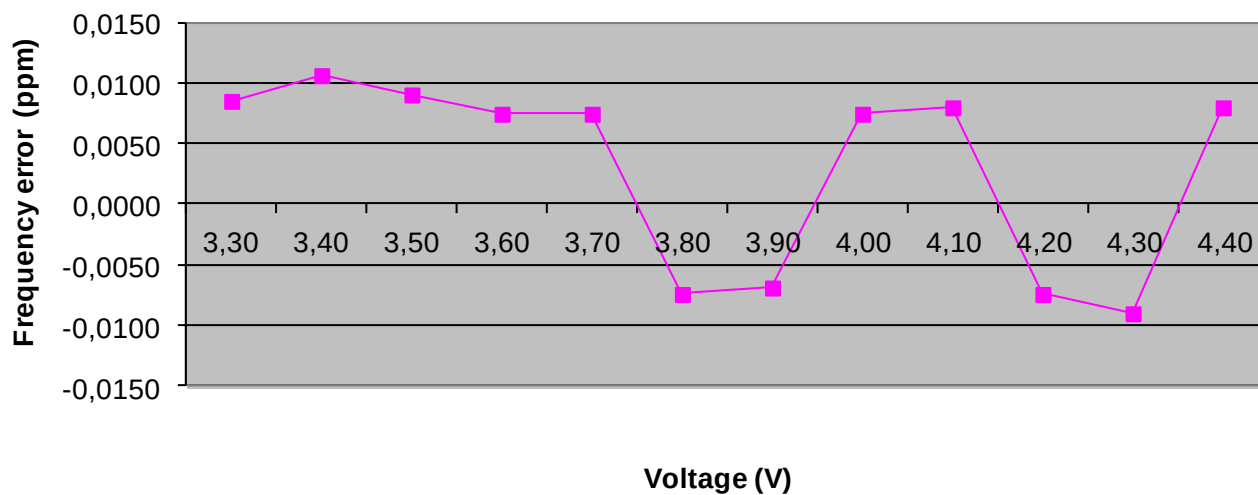
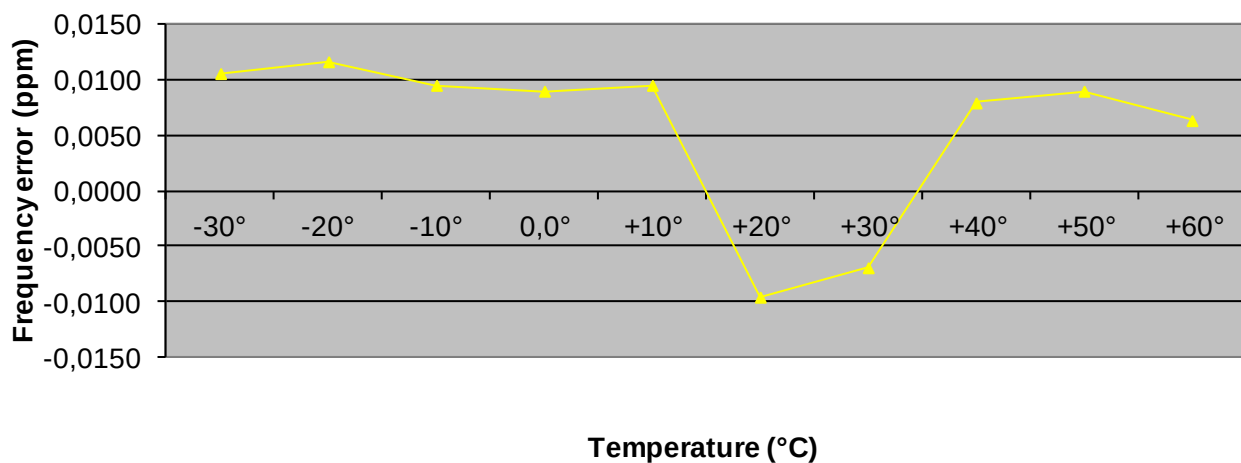
FCC	IC
CFR Part 24.235 CFR Part 2.1055	RSS 133, Issue 5, Section 6.3
Frequency Stability	
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.	

Results:**AFC FREQ ERROR versus VOLTAGE**

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.3	16	0.00000085	0.0085
3.4	20	0.00000106	0.0106
3.5	17	0.00000090	0.0090
3.6	14	0.00000074	0.0074
3.7	14	0.00000074	0.0074
3.8	-14	-0.00000074	-0.0074
3.9	-13	-0.00000069	-0.0069
4.0	14	0.00000074	0.0074
4.1	15	0.00000080	0.0080
4.2	-14	-0.00000074	-0.0074
4.3	-17	-0.00000090	-0.0090
4.4	15	0.00000085	0.0085

AFC FREQ ERROR versus TEMPERATURE

Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	20	0.00000106	0.0106
-20	22	0.00000117	0.0117
-10	18	0.00000096	0.0096
± 0	17	0.00000090	0.0090
10	18	0.00000096	0.0096
20	-18	-0.00000096	-0.0096
30	-13	-0.00000069	-0.0069
40	15	0.00000080	0.0080
50	17	0.00000090	0.0090
60	12	0.00000064	0.0064

Frequency Error vs. Voltage**Frequency Error vs. Temperature****Result:** Passed

8.3.3 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 1910 MHz. This was rounded up to 20 GHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band II.

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

- The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- The antenna output was terminated in a 50 ohm load (if possible).
- A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- 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.
- 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 24.238 CFR Part 2.1053	RSS 133, Issue 5, Section 6.5
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

Results:

Radiated emissions measurements were made only at the center carrier frequency of the LTE band II (1880 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 V 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. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

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	3710.0	-	2	3760.0	-	2	3810.0	-
3	5565.0	-	3	5640.0	-	3	5715.0	-
4	7420.0	-	4	7520.0	-	4	7620.0	-
5	9275.0	-	5	9400.0	-	5	9525.0	-
6	11130.0	-	6	11280.0	-	6	11430.0	-
7	12985.0	-	7	13160.0	-	7	13335.0	-
8	14840.0	-	8	15040.0	-	8	15240.0	-
9	16695.0	-	9	16920.0	-	9	17145.0	-
10	18550.0	-	10	18800.0	-	10	19050.0	-
Measurement uncertainty					± 3dB			

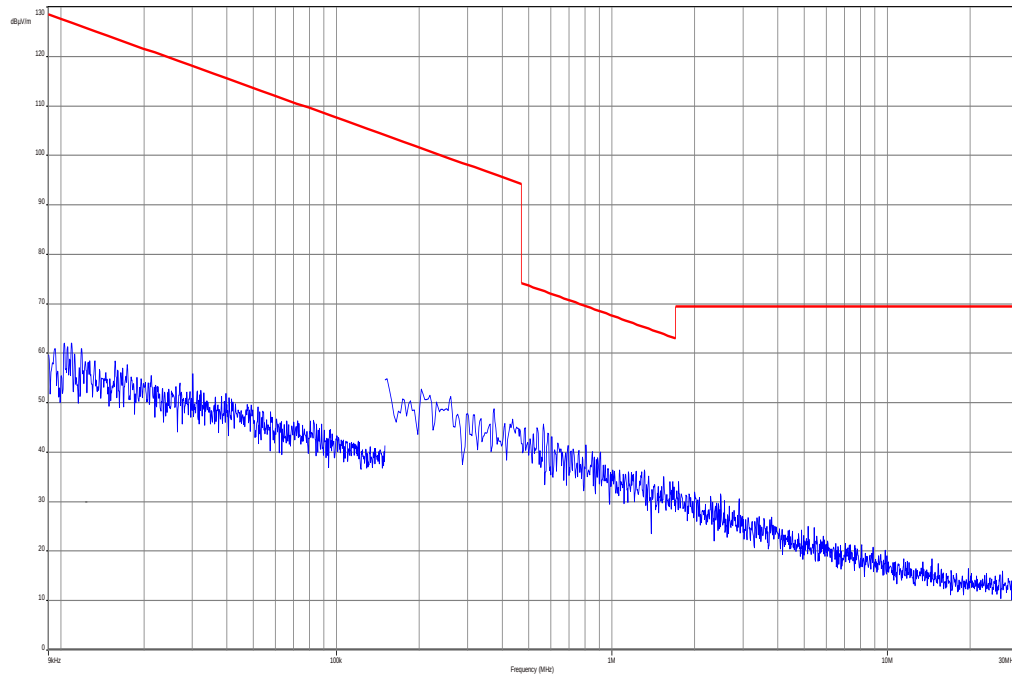
16-QAM:

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	3710.0	-	2	3760.0	-	2	3810.0	-
3	5565.0	-	3	5640.0	-	3	5715.0	-
4	7420.0	-	4	7520.0	-	4	7620.0	-
5	9275.0	-	5	9400.0	-	5	9525.0	-
6	11130.0	-	6	11280.0	-	6	11430.0	-
7	12985.0	-	7	13160.0	-	7	13335.0	-
8	14840.0	-	8	15040.0	-	8	15240.0	-
9	16695.0	-	9	16920.0	-	9	17145.0	-
10	18550.0	-	10	18800.0	-	10	19050.0	-
Measurement uncertainty					± 3dB			

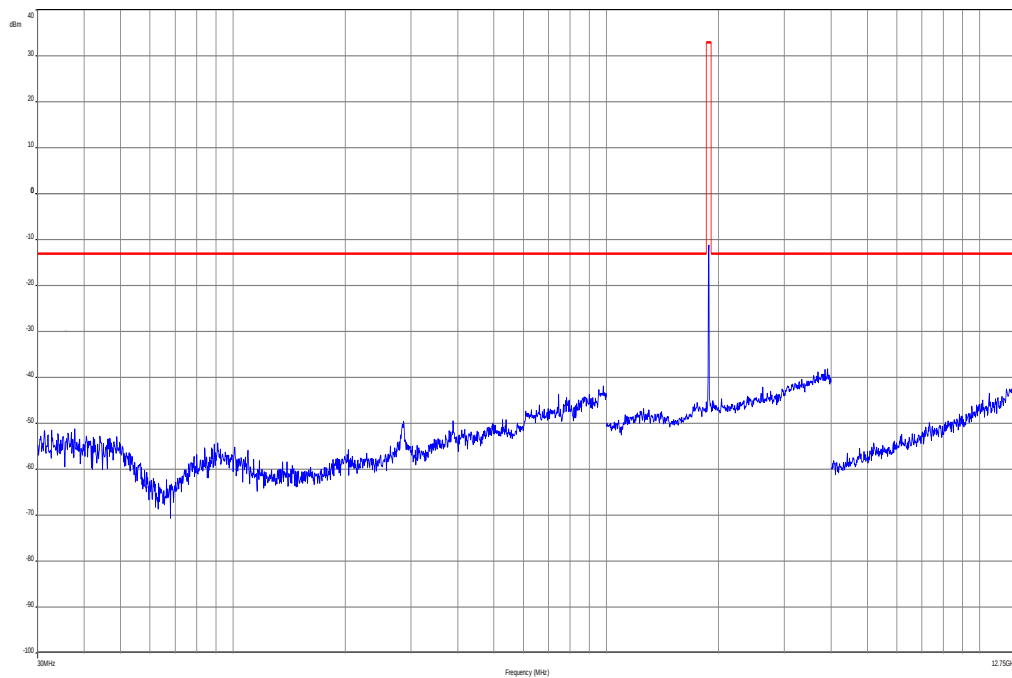
Result: Passed

QPSK with 10 MHz channel bandwidth

Plot 1: Channel 18900 (Traffic mode up to 30 MHz)



Plot 2: Channel 18900 (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

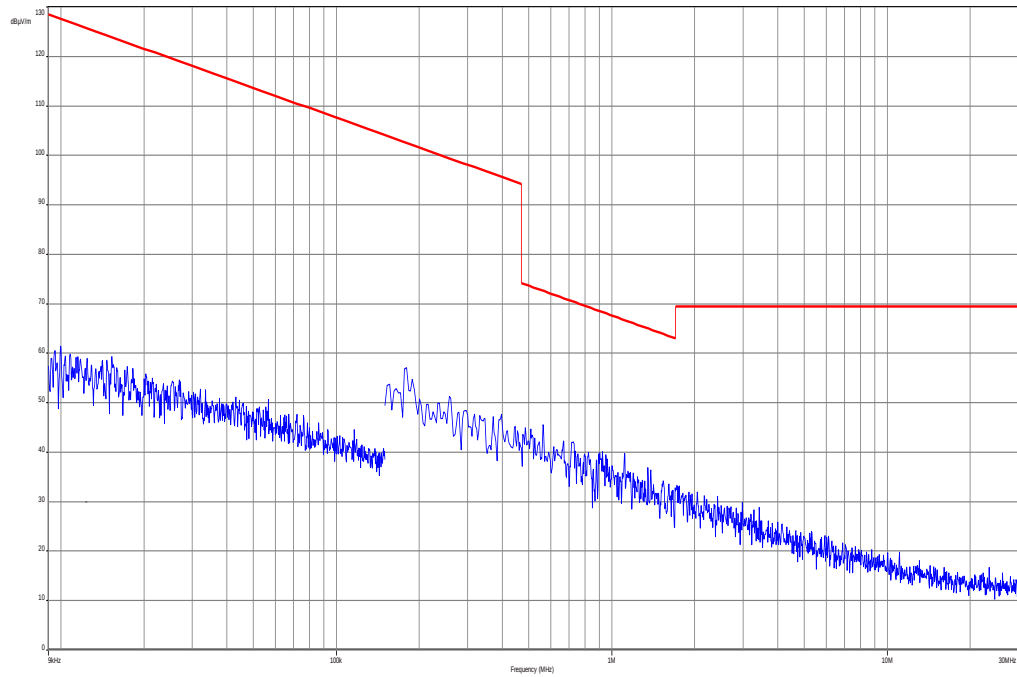
RBW 1 MHz RF Att 20 dB
 Ref Lvl -47.07 dBm VBW 1 MHz
 10 dBm 16.55911824 GHz SWT 74 ms Unit dBm

10 dB Offset
 -13 dBm
 1MAX
 1.3 GHz/
 Start 12 GHz Stop 25 GHz

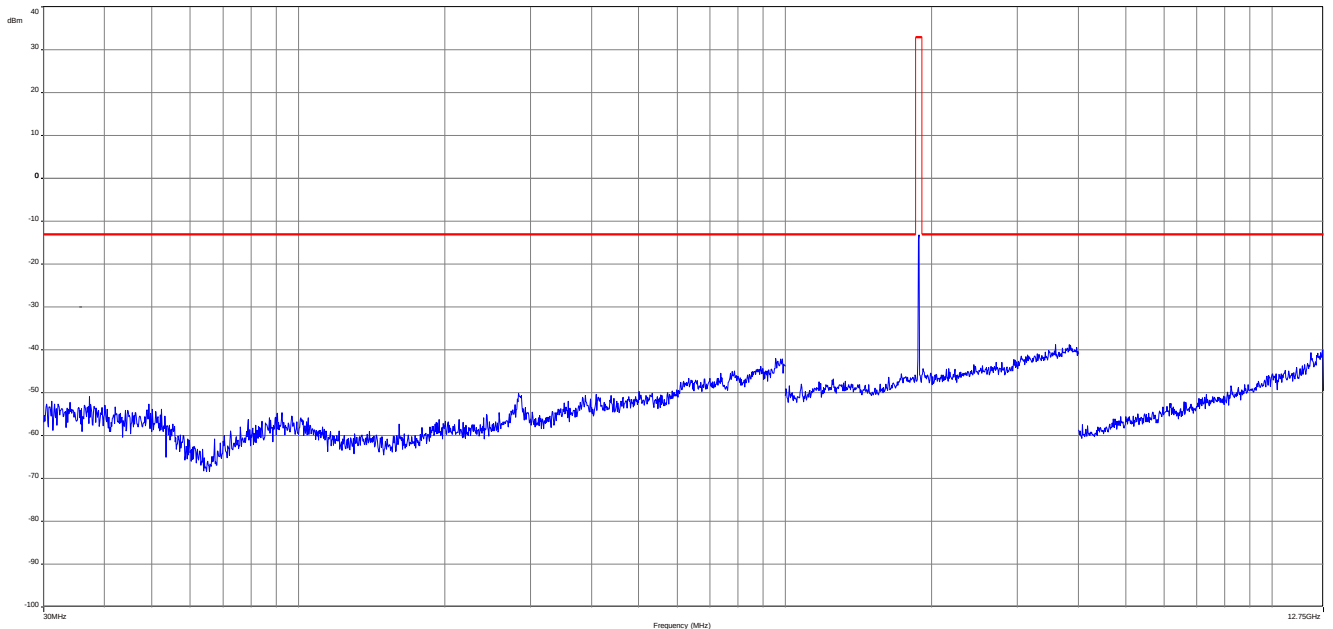
Date: 16.JUL.2012 14:38:41

16-QAM with 10 MHz channel bandwidth

Plot 4: Channel 18900 (Traffic mode up to 30 MHz)



Plot 5: Channel 18900 (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

The screenshot displays a Spectrum Analyzer interface. At the top, a red diamond icon with 'dB' is visible. The main display area shows a frequency spectrum from 12 GHz to 25 GHz. The vertical axis represents power in dBm, ranging from -90 to 10. A blue trace shows the noise floor, which is relatively flat around -50 dBm. A red horizontal line is drawn at -13 dBm, labeled 'p1 -13 dBm'. A green vertical line is drawn at 15.93386774 GHz, labeled '1MAX'. A marker is placed on the blue trace at this frequency, showing a value of -47.20 dBm. The top status bar provides various parameters: Ref Lvl (10 dBm), Marker 1 [T1] (-47.20 dBm), RBW (1 MHz), VBW (1 MHz), RF Att (20 dB), Unit (dBm), and SWT (74 ms).

Parameter	Value
Ref Lvl	10 dBm
Marker 1 [T1]	-47.20 dBm
RBW	1 MHz
VBW	1 MHz
RF Att	20 dB
Unit	dBm
SWT	74 ms

Start 12 GHz 1.3 GHz/ Stop 25 GHz

Date: 16.JUL.2012 14:39:14

8.3.4 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 19.1 GHz, data taken from 10 MHz to 20 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

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:	30 MHz – 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133, Issue 5, Section 6.5
Spurious Emissions Conducted	
Attenuation $\geq 43 + 10\log(P)$ (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	3701.4	-	2	3760.0	-	2	3818.6	-
3	5552.1	-	3	5640.0	-	3	5727.9	-
4	7402.8	-	4	7520.0	-	4	7637.2	-
5	9253.5	-	5	9400.0	-	5	9546.5	-
6	11104.2	-	6	11280.0	-	6	11455.8	-
7	12954.9	-	7	13160.0	-	7	13365.1	-
8	14805.6	-	8	15040.0	-	8	15274.4	-
9	16656.3	-	9	16920.0	-	9	17183.7	-
10	18507.0	-	10	18800.0	-	10	19093.0	-
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	3701.4	-	2	3760.0	-	2	3818.6	-
3	5552.1	-	3	5640.0	-	3	5727.9	-
4	7402.8	-	4	7520.0	-	4	7637.2	-
5	9253.5	-	5	9400.0	-	5	9546.5	-
6	11104.2	-	6	11280.0	-	6	11455.8	-
7	12954.9	-	7	13160.0	-	7	13365.1	-
8	14805.6	-	8	15040.0	-	8	15274.4	-
9	16656.3	-	9	16920.0	-	9	17183.7	-
10	18507.0	-	10	18800.0	-	10	19093.0	-
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	3705	-	2	3760.0	-	2	3815	-
3	5557.5	-	3	5640.0	-	3	5722.5	-
4	7410.0	-	4	7520.0	-	4	7630.0	-
5	9262.5	-	5	9400.0	-	5	9537.5	-
6	11115.0	-	6	11280.0	-	6	11445.0	-
7	12967.5	-	7	13160.0	-	7	13352.5	-
8	14820.0	-	8	15040.0	-	8	15260.0	-
9	16672.5	-	9	16920.0	-	9	17167.5	-
10	18525.0	-	10	18800.0	-	10	19075.0	-
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	3705	-	2	3760.0	-	2	3815	-
3	5557.5	-	3	5640.0	-	3	5722.5	-
4	7410.0	-	4	7520.0	-	4	7630.0	-
5	9262.5	-	5	9400.0	-	5	9537.5	-
6	11115.0	-	6	11280.0	-	6	11445.0	-
7	12967.5	-	7	13160.0	-	7	13352.5	-
8	14820.0	-	8	15040.0	-	8	15260.0	-
9	16672.5	-	9	16920.0	-	9	17167.5	-
10	18525.0	-	10	18800.0	-	10	19075.0	-
Measurement uncertainty					± 0.5dB			

Results: for 10 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	3710.0	-	2	3760.0	-	2	3810.0	-
3	5565.0	-	3	5640.0	-	3	5715.0	-
4	7420.0	-	4	7520.0	-	4	7620.0	-
5	9275.0	-	5	9400.0	-	5	9525.0	-
6	11130.0	-	6	11280.0	-	6	11430.0	-
7	12985.0	-	7	13160.0	-	7	13335.0	-
8	14840.0	-	8	15040.0	-	8	15240.0	-
9	16695.0	-	9	16920.0	-	9	17145.0	-
10	18550.0	-	10	18800.0	-	10	19050.0	-
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	3710.0	-	2	3760.0	-	2	3810.0	-
3	5565.0	-	3	5640.0	-	3	5715.0	-
4	7420.0	-	4	7520.0	-	4	7620.0	-
5	9275.0	-	5	9400.0	-	5	9525.0	-
6	11130.0	-	6	11280.0	-	6	11430.0	-
7	12985.0	-	7	13160.0	-	7	13335.0	-
8	14840.0	-	8	15040.0	-	8	15240.0	-
9	16695.0	-	9	16920.0	-	9	17145.0	-
10	18550.0	-	10	18800.0	-	10	19050.0	-
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	3720	-	2	3760.0	-	2	3800	-
3	5580.0	-	3	5640.0	-	3	5700.0	-
4	7440.0	-	4	7520.0	-	4	7600.0	-
5	9300.0	-	5	9400.0	-	5	9500.0	-
6	11160.0	-	6	11280.0	-	6	11400.0	-
7	13020.0	-	7	13160.0	-	7	13300.0	-
8	14880.0	-	8	15040.0	-	8	15200.0	-
9	16740.0	-	9	16920.0	-	9	17100.0	-
10	18600.0	-	10	18800.0	-	10	19000.0	-
Measurement uncertainty					± 0.5dB			

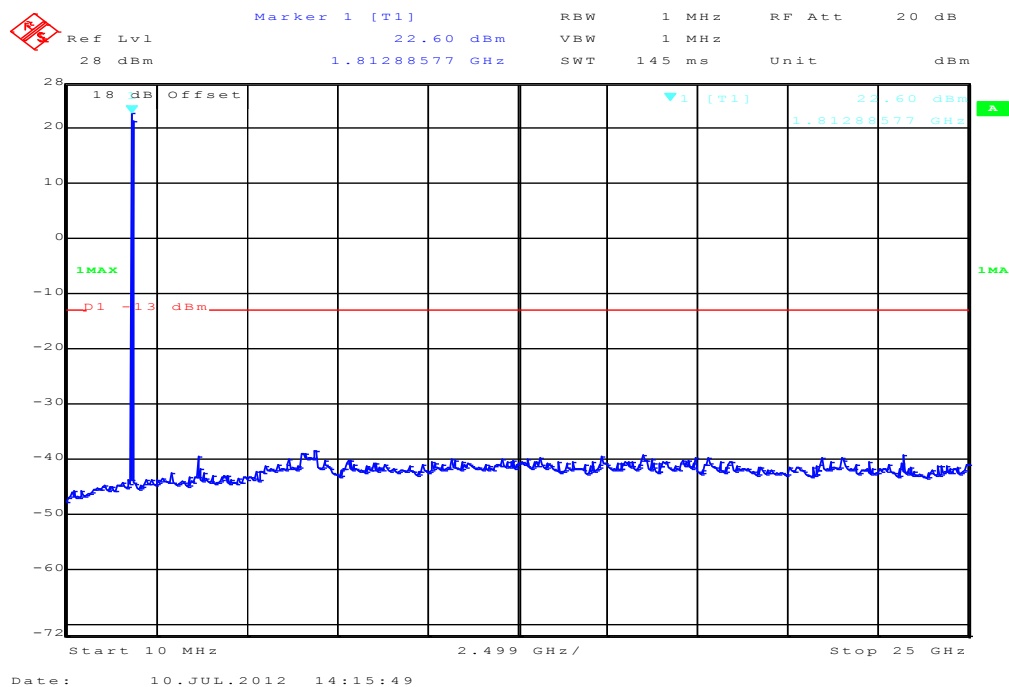
16-QAM:

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	3720	-	2	3760.0	-	2	3800	-
3	5580.0	-	3	5640.0	-	3	5700.0	-
4	7440.0	-	4	7520.0	-	4	7600.0	-
5	9300.0	-	5	9400.0	-	5	9500.0	-
6	11160.0	-	6	11280.0	-	6	11400.0	-
7	13020.0	-	7	13160.0	-	7	13300.0	-
8	14880.0	-	8	15040.0	-	8	15200.0	-
9	16740.0	-	9	16920.0	-	9	17100.0	-
10	18600.0	-	10	18800.0	-	10	19000.0	-
Measurement uncertainty					± 0.5dB			

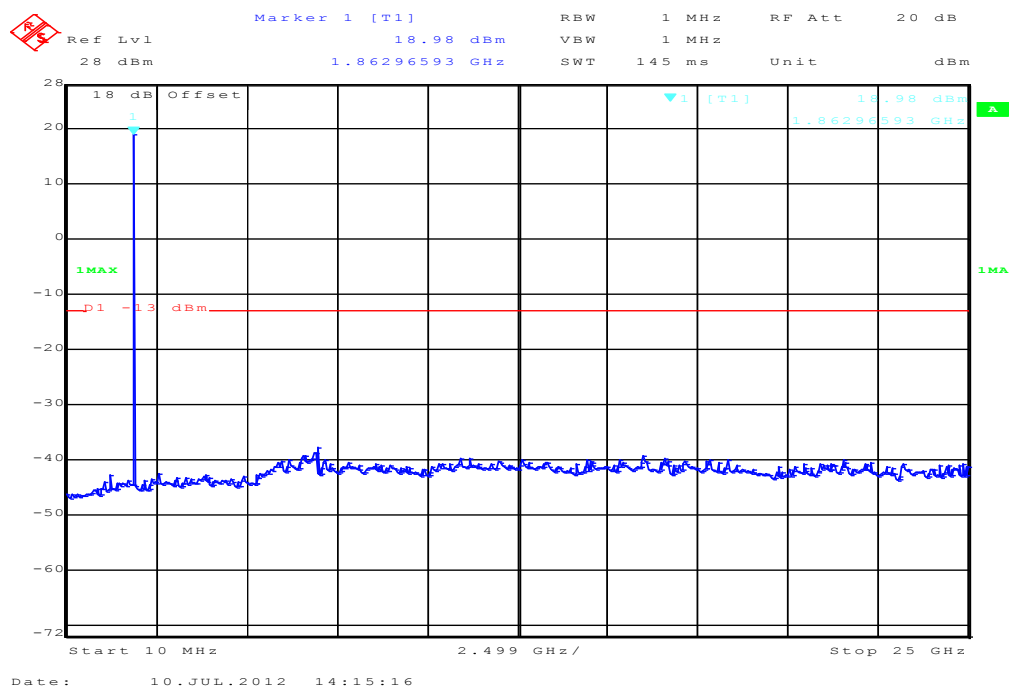
Result: Passed

Plots: QPSK with 1.4 MHz channel bandwidth

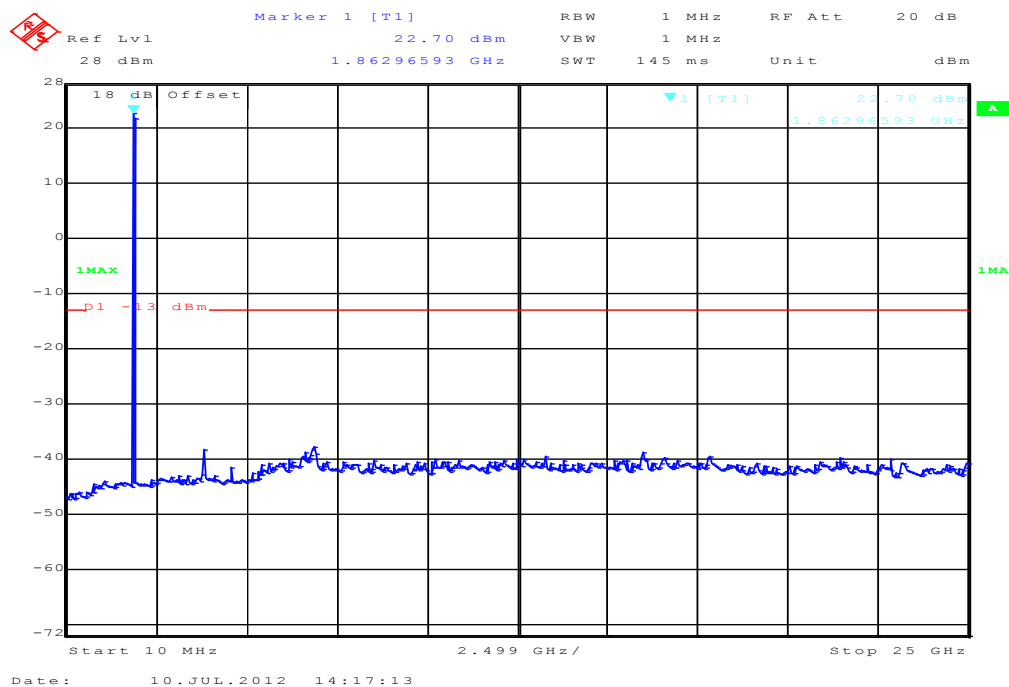
Plot 1: Lowest Channel (10 MHz - 25 GHz)

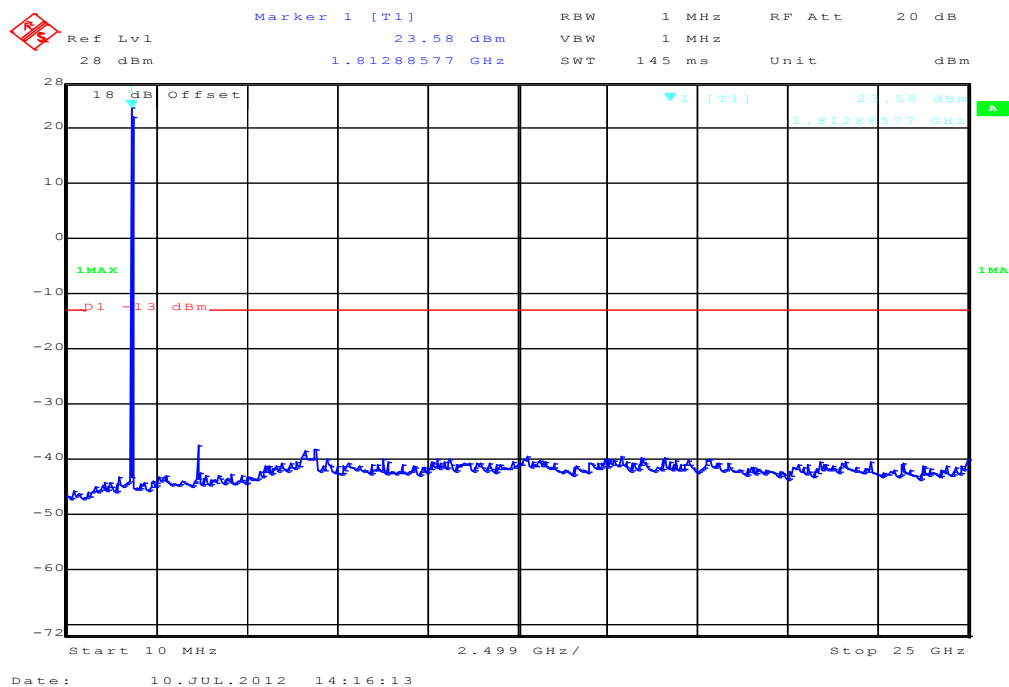
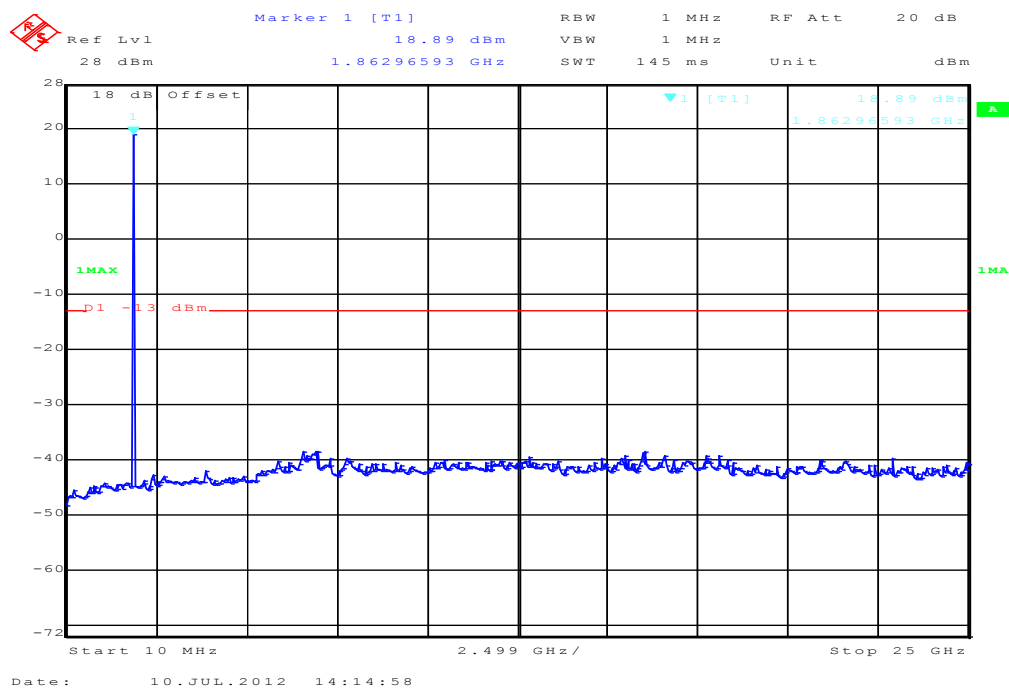


Plot 2: Middle Channel (10 MHz - 25 GHz)

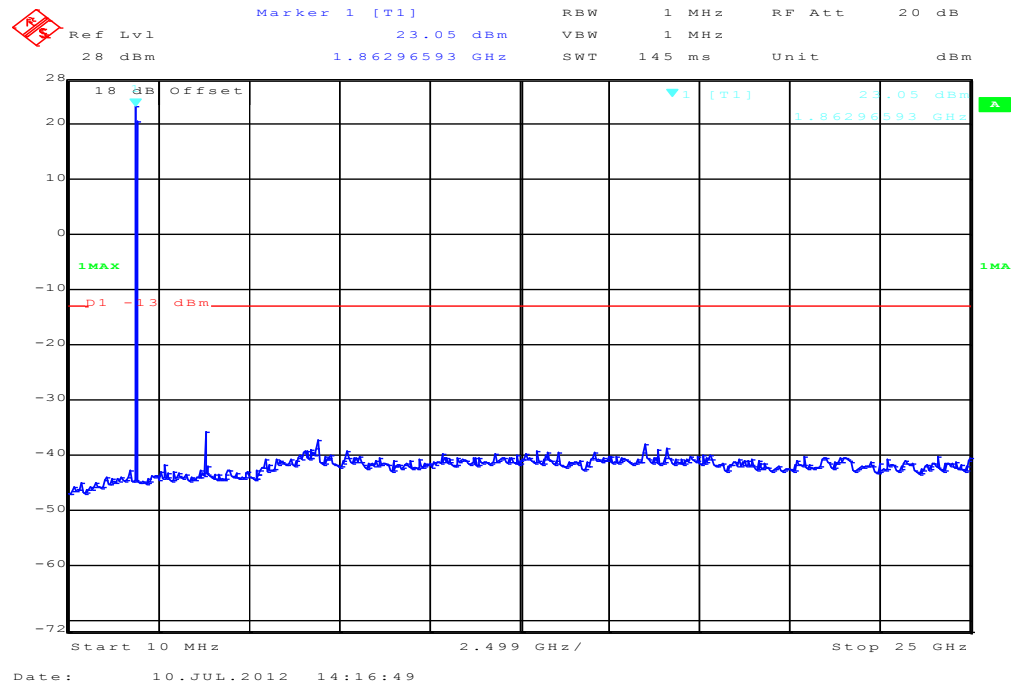


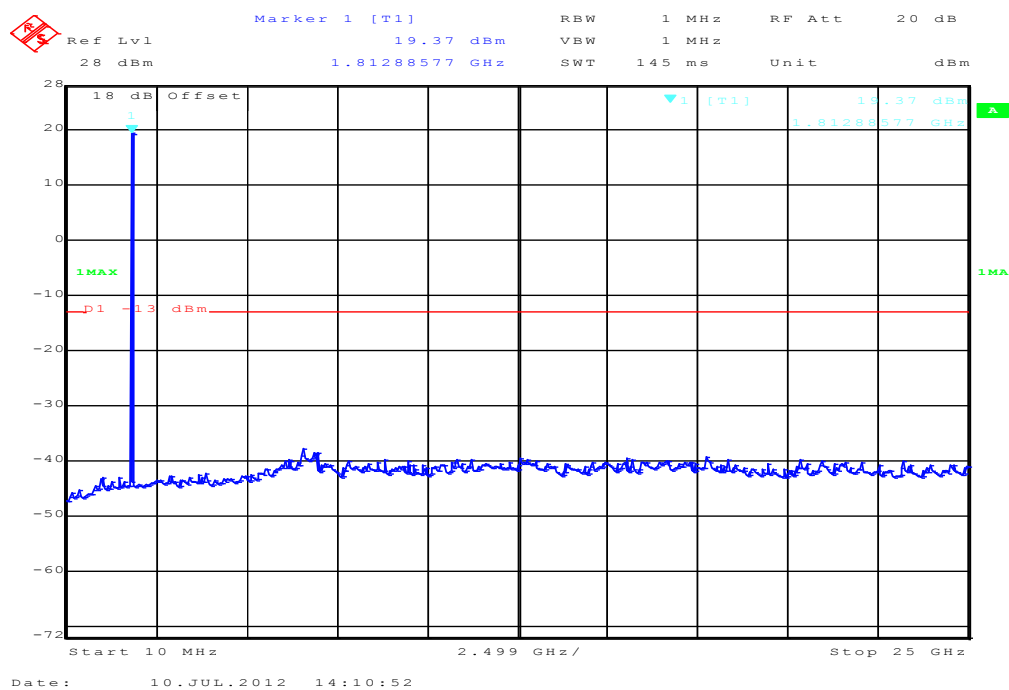
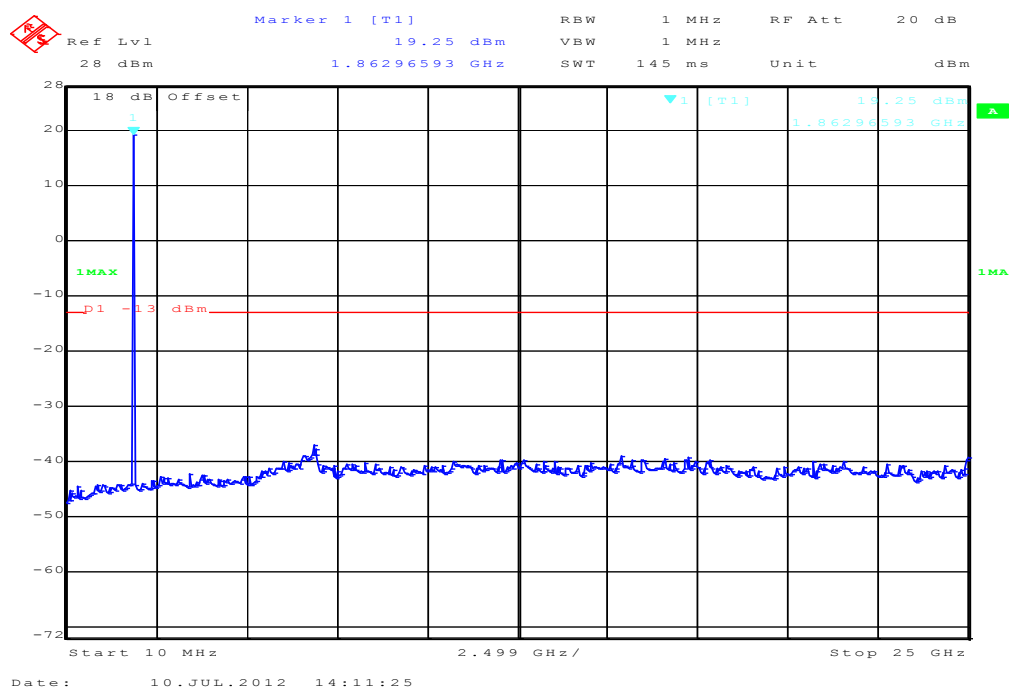
Plot 3: Highest Channel (10 MHz - 25 GHz)



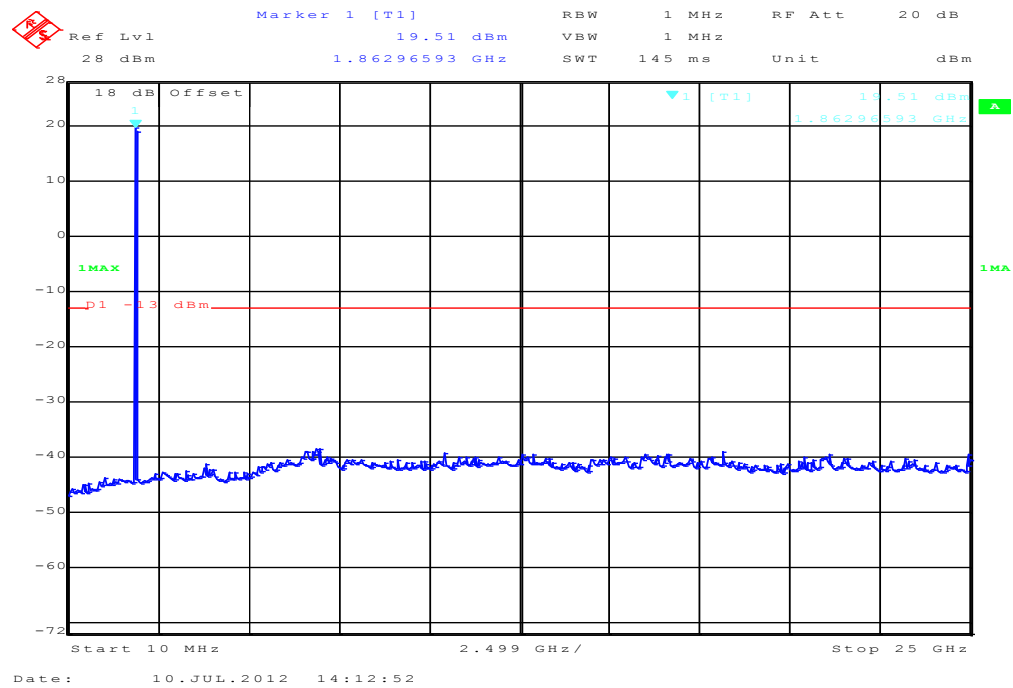
Plots: 16-QAM with 1.4 MHz channel bandwidth**Plot 4: Lowest Channel (10 MHz - 25 GHz)****Plot 5: Middle Channel (10 MHz - 25 GHz)**

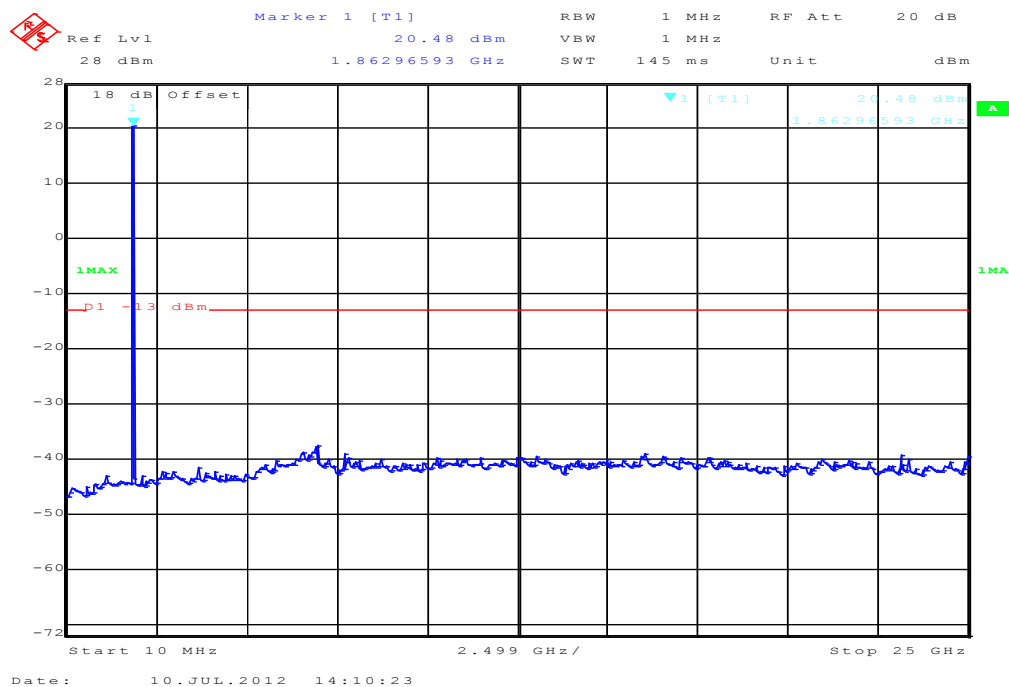
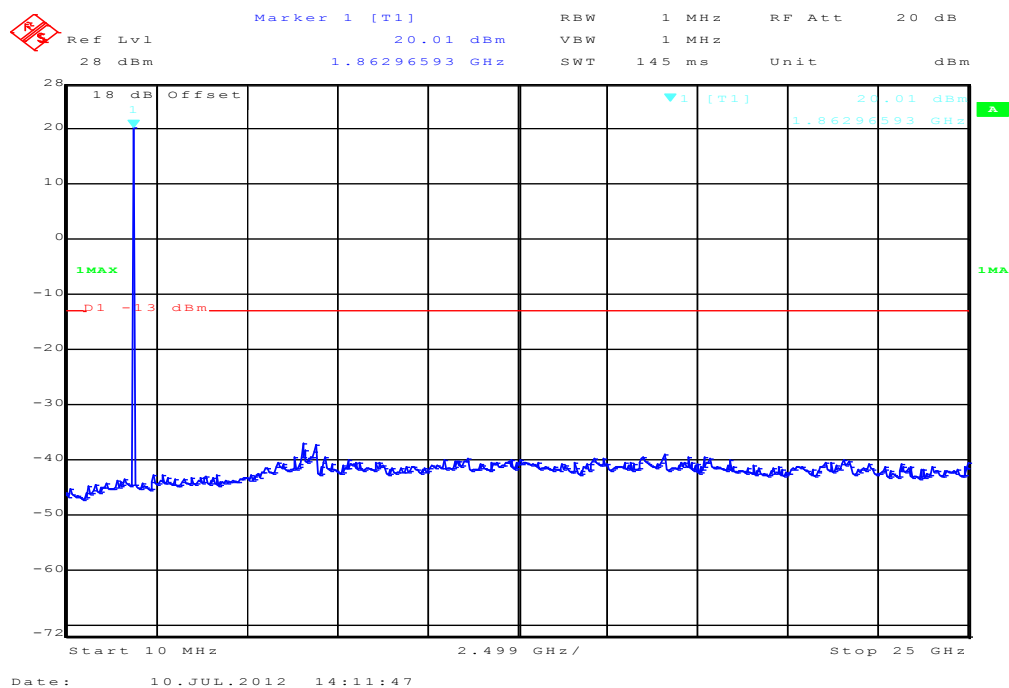
Plot 6: Highest Channel (10 MHz - 25 GHz)



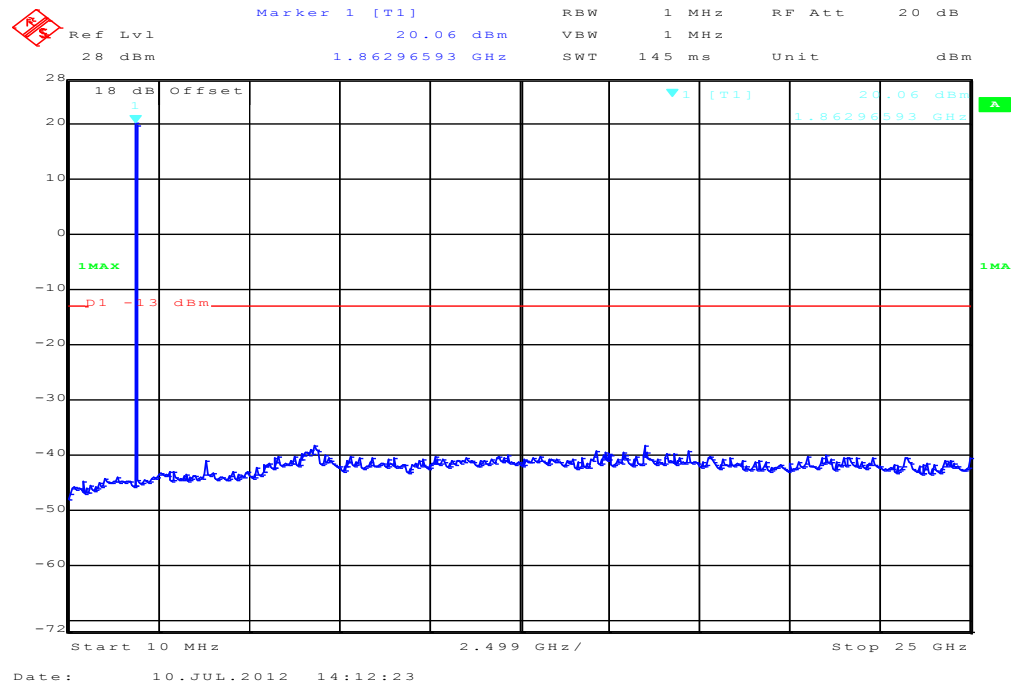
Plots: QPSK with 5 MHz channel bandwidth**Plot 1: Lowest Channel (10 MHz - 25 GHz)****Plot 2: Middle Channel (10 MHz - 25 GHz)**

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



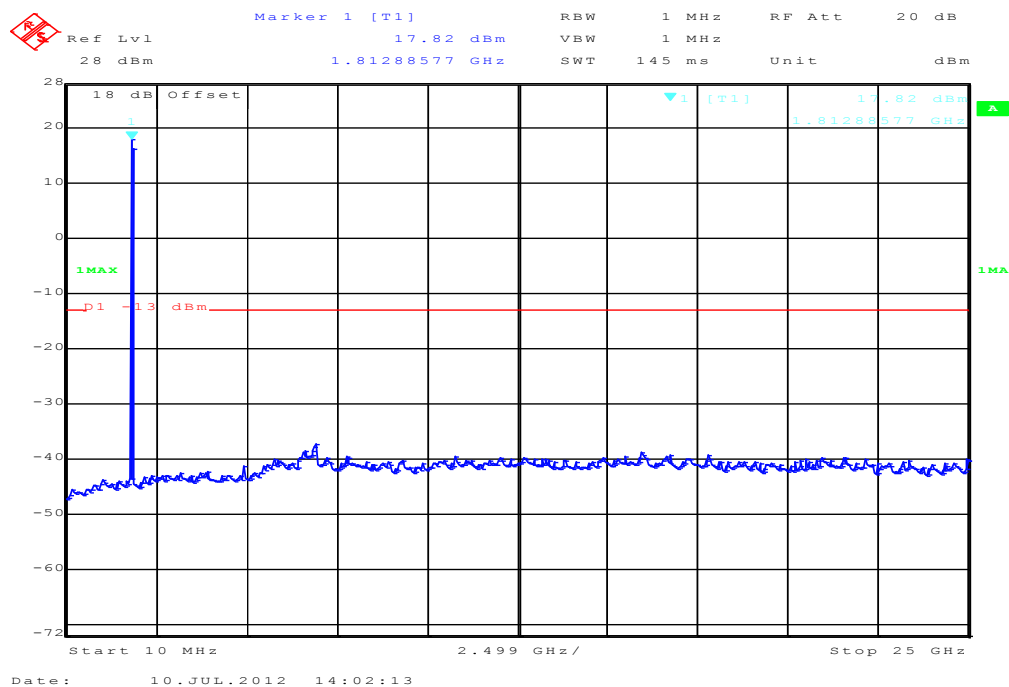
Plots: 16-QAM with 5 MHz channel bandwidth**Plot 4: Lowest Channel (10 MHz - 25 GHz)****Plot 5: Middle Channel (10 MHz - 25 GHz)**

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

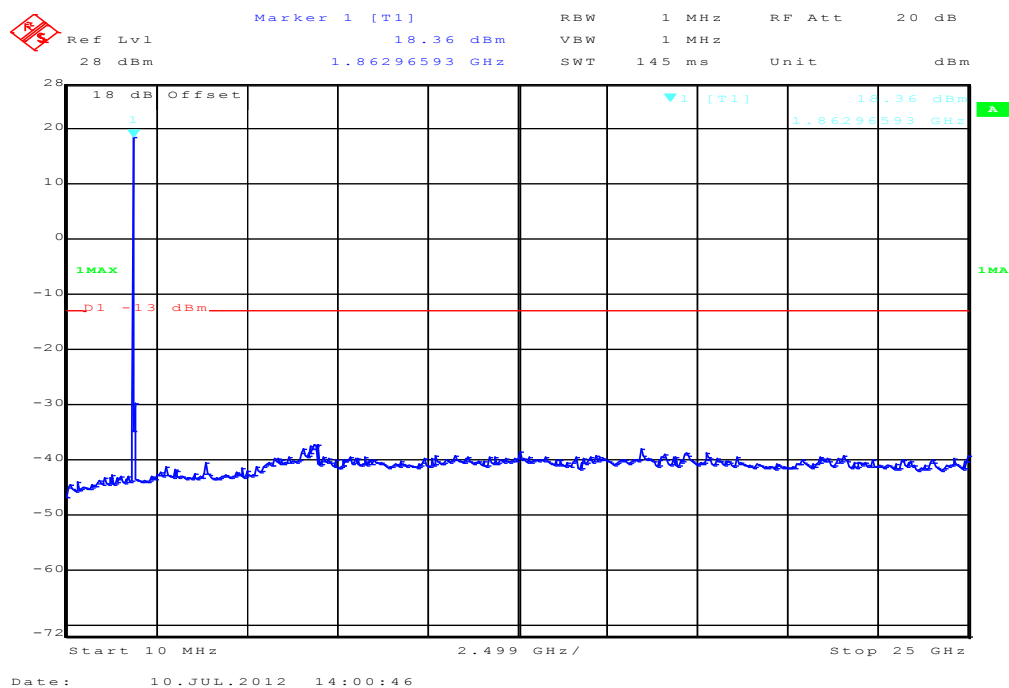


Plots: QPSK with 10 MHz channel bandwidth

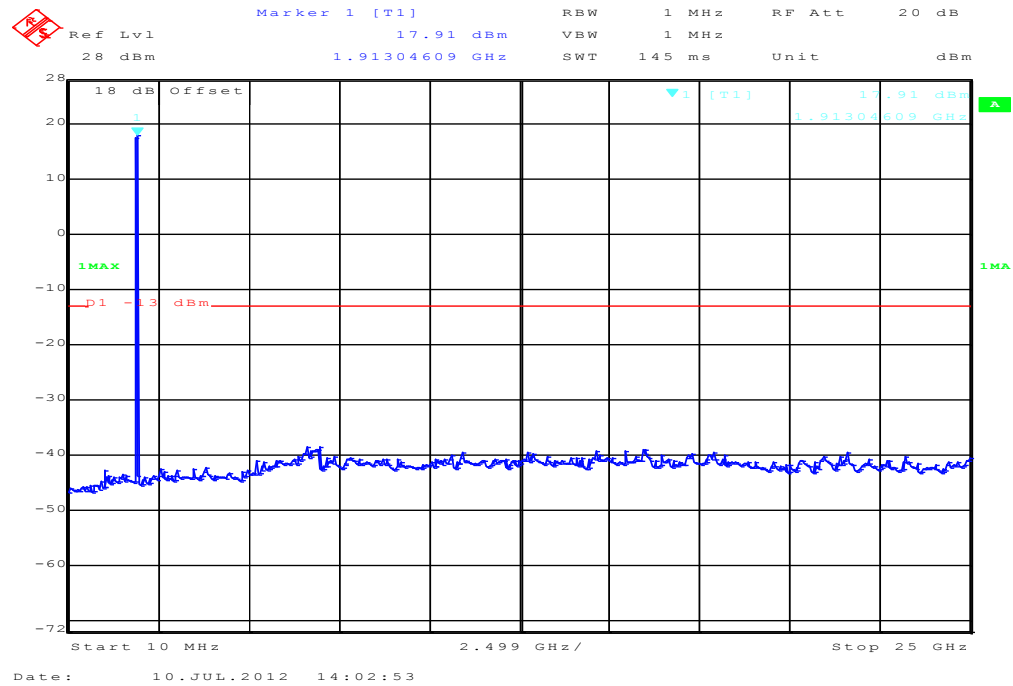
Plot 1: Lowest Channel (10 MHz - 25 GHz)

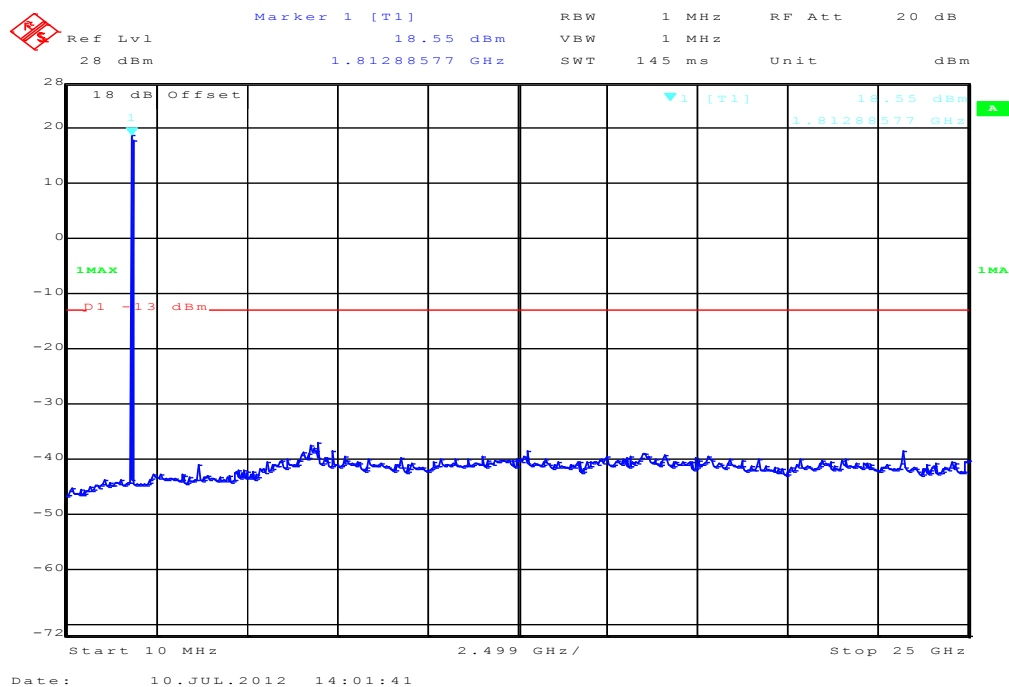
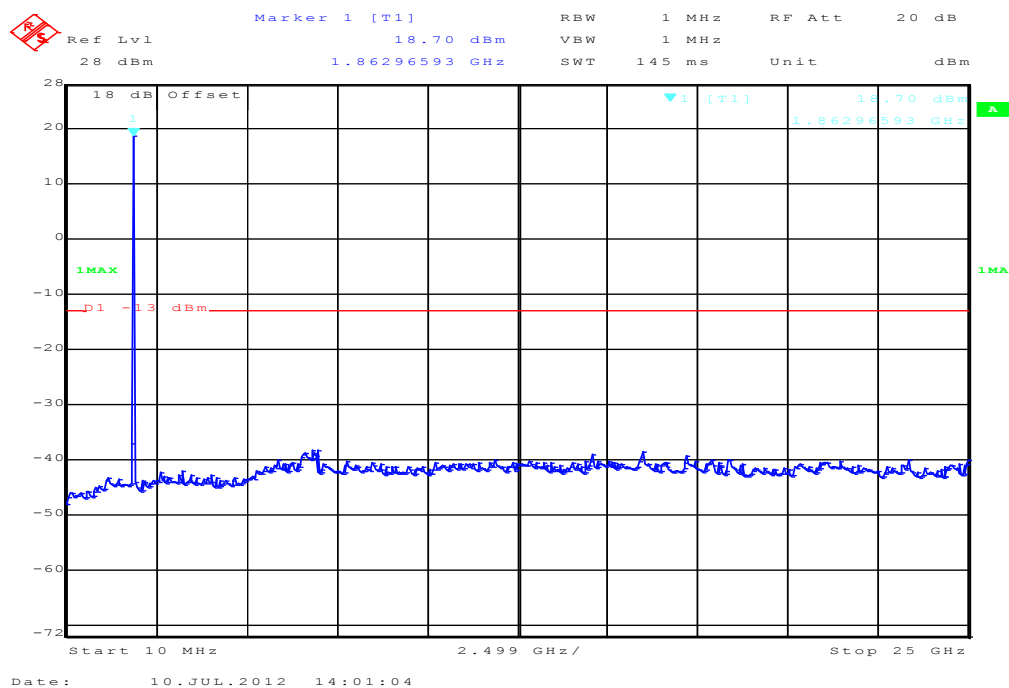


Plot 2: Middle Channel (10 MHz - 25 GHz)

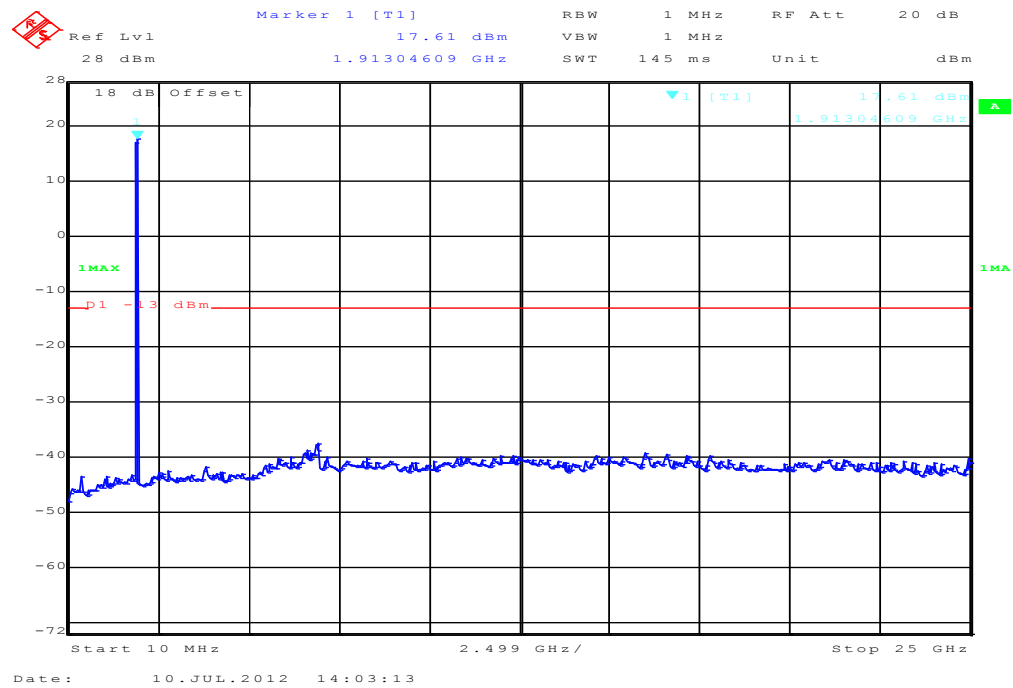


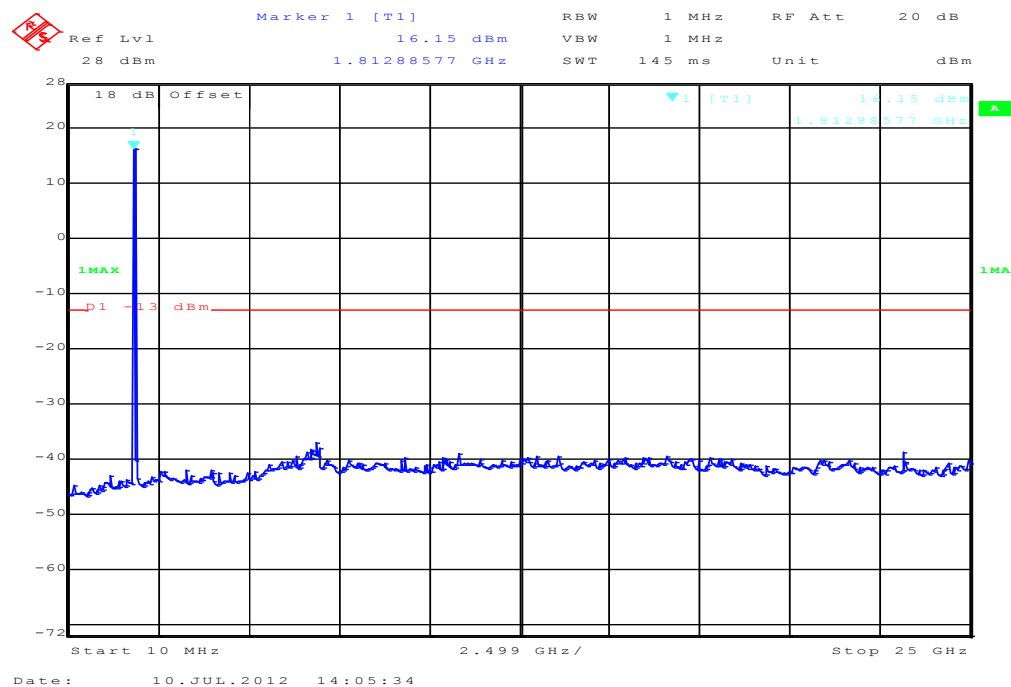
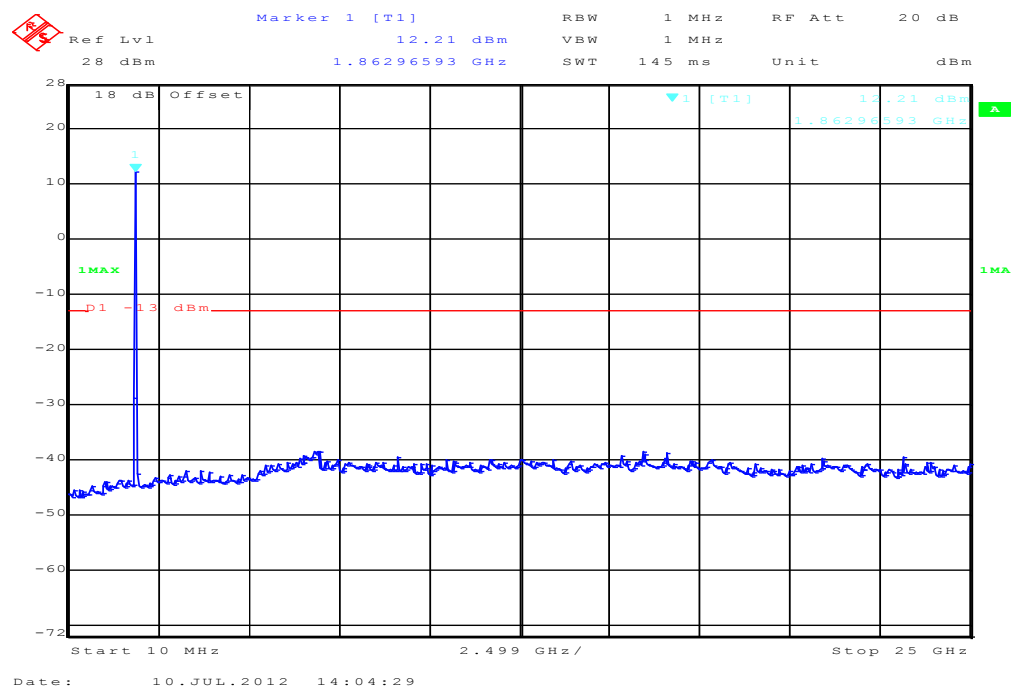
Plot 3: Highest Channel (10 MHz - 25 GHz)



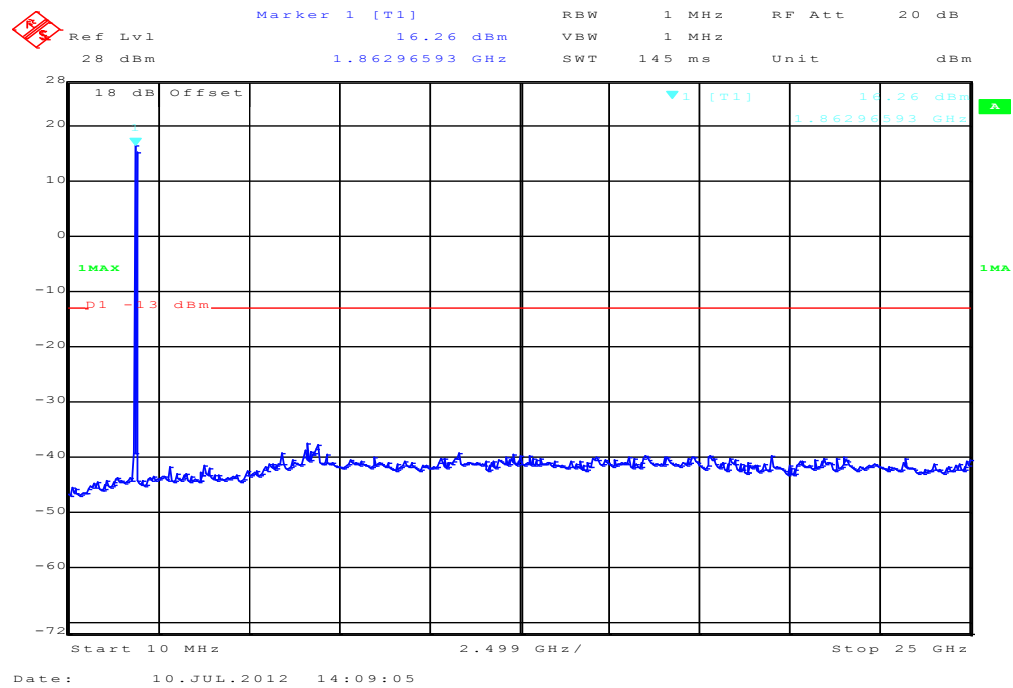
Plots: 16-QAM with 10 MHz channel bandwidth**Plot 4: Lowest Channel (10 MHz - 25 GHz)****Plot 5: Middle Channel (10 MHz - 25 GHz)**

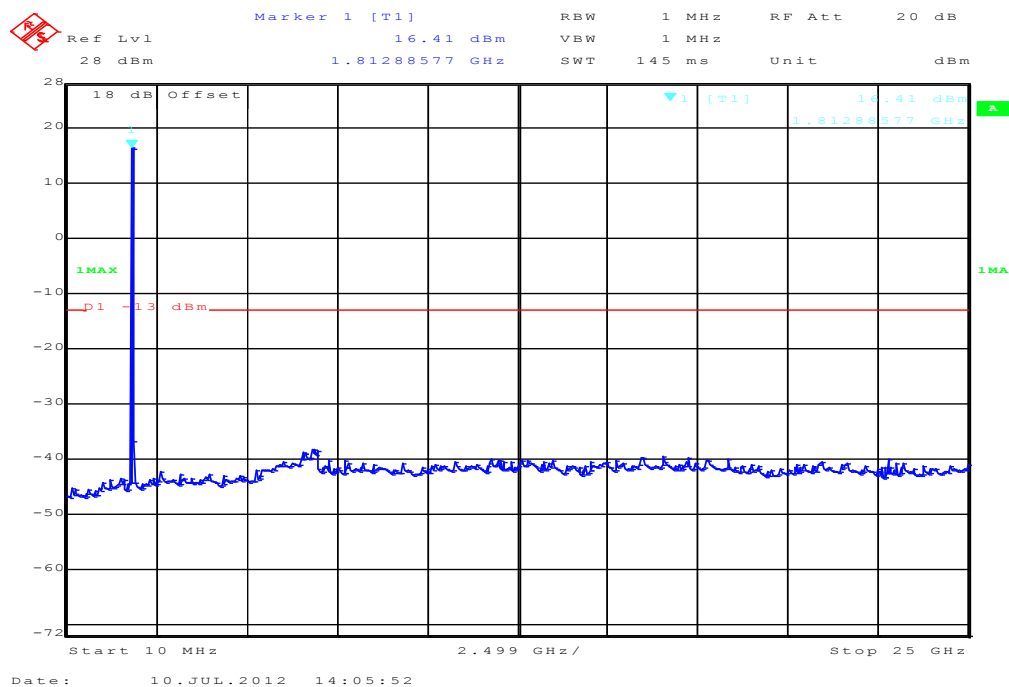
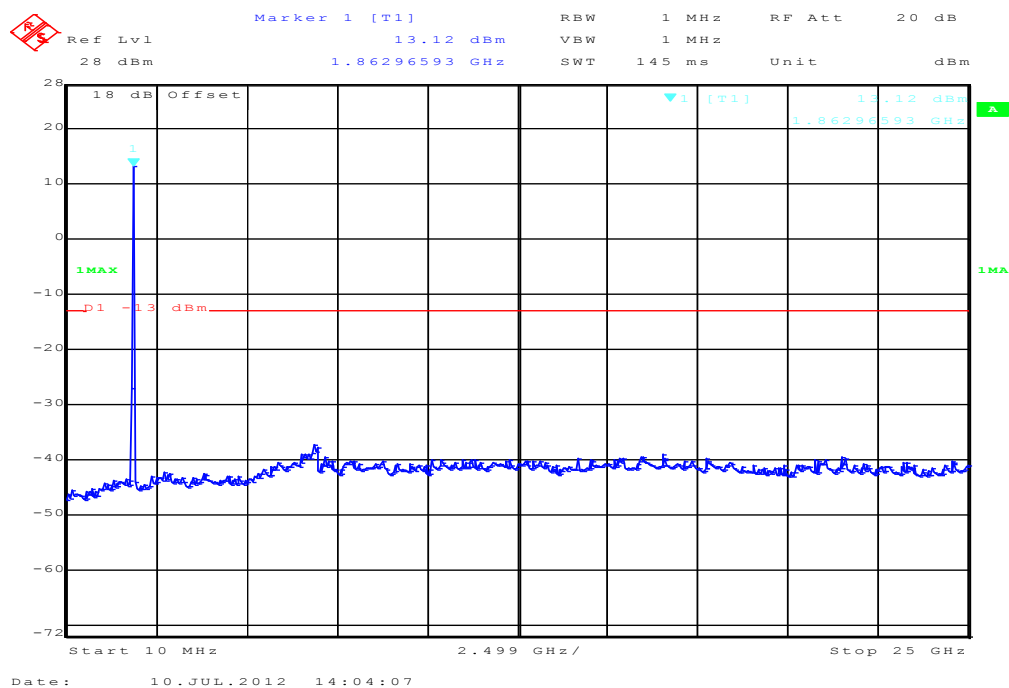
Plot 6: Highest Channel (10 MHz - 25 GHz)



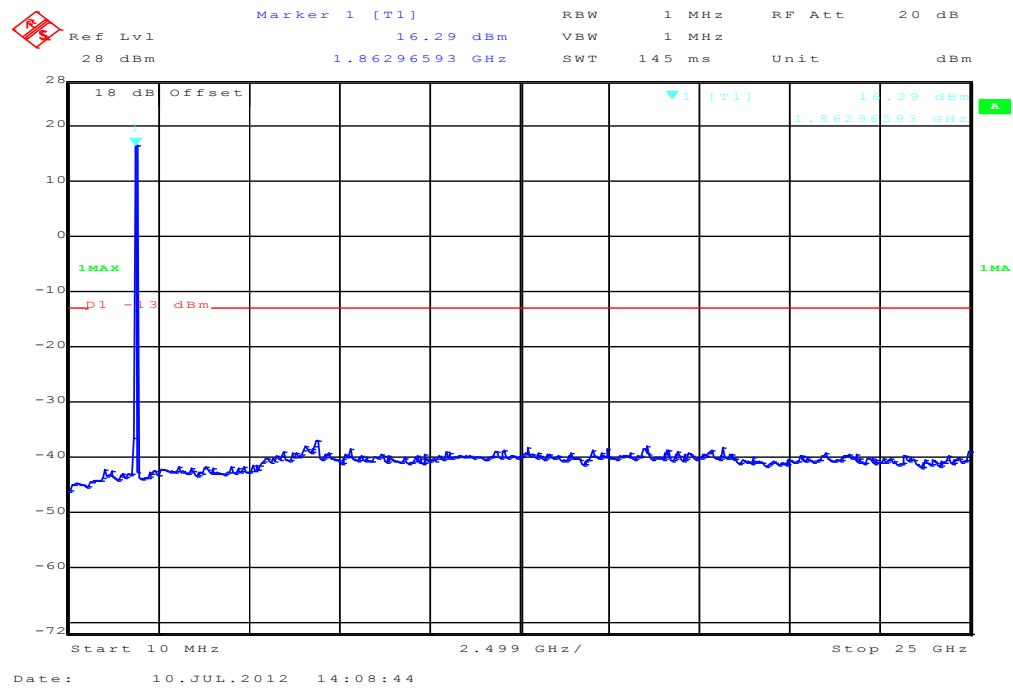
Plots: QPSK with 20 MHz channel bandwidth**Plot 1: Lowest Channel (10 MHz - 25 GHz)****Plot 2: Middle Channel (10 MHz - 25 GHz)**

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)



8.3.5 Block edge compliance

Description:

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

Measurement:

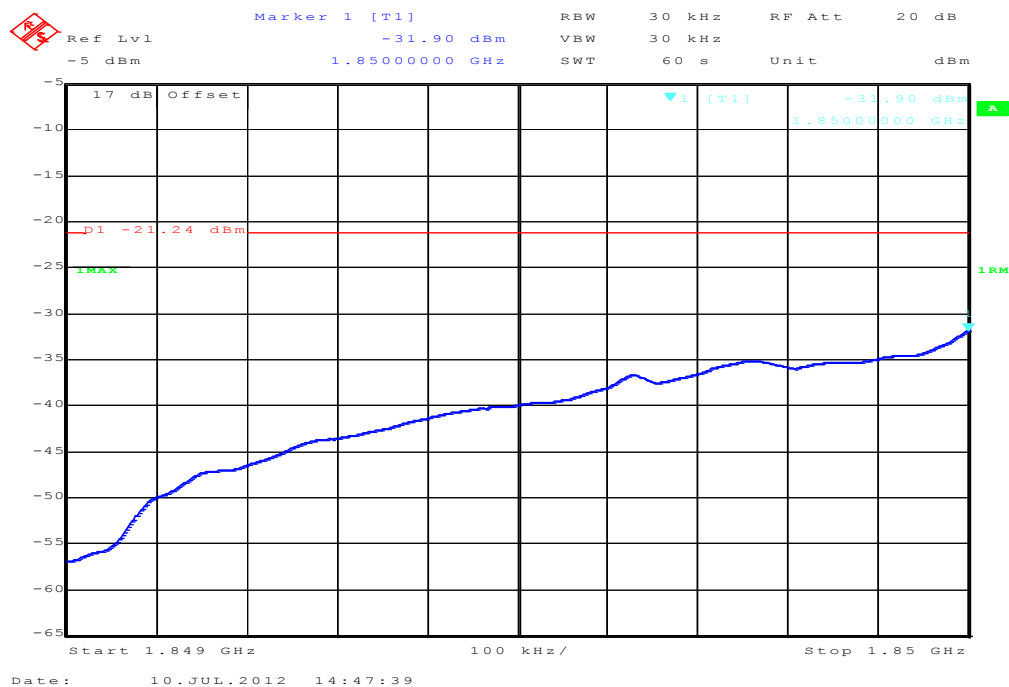
Measurement parameters	
Detector:	RMS
Sweep time:	60 sec.
Video bandwidth:	30 kHz
Resolution bandwidth:	30 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

Limits:

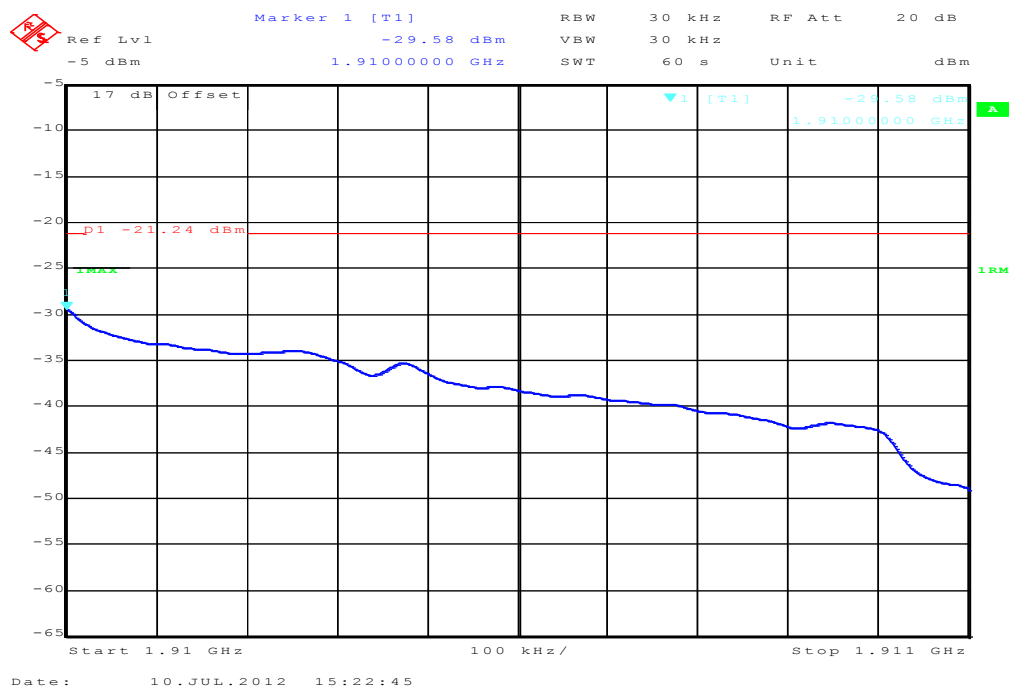
FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133, Issue 5, Section 6.5
Block Edge Compliance	
Part 24.238 specifies that “the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.” However, 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 -2.2185 adjustment to the limit [$10 \log(30 \text{ kHz} / 50 \text{ kHz}) = -2.2185$]. When this adjustment is applied to the limit, the limit becomes -15.2185.	
-15.22 dBm	

Results: 1.4 MHz channel bandwidth

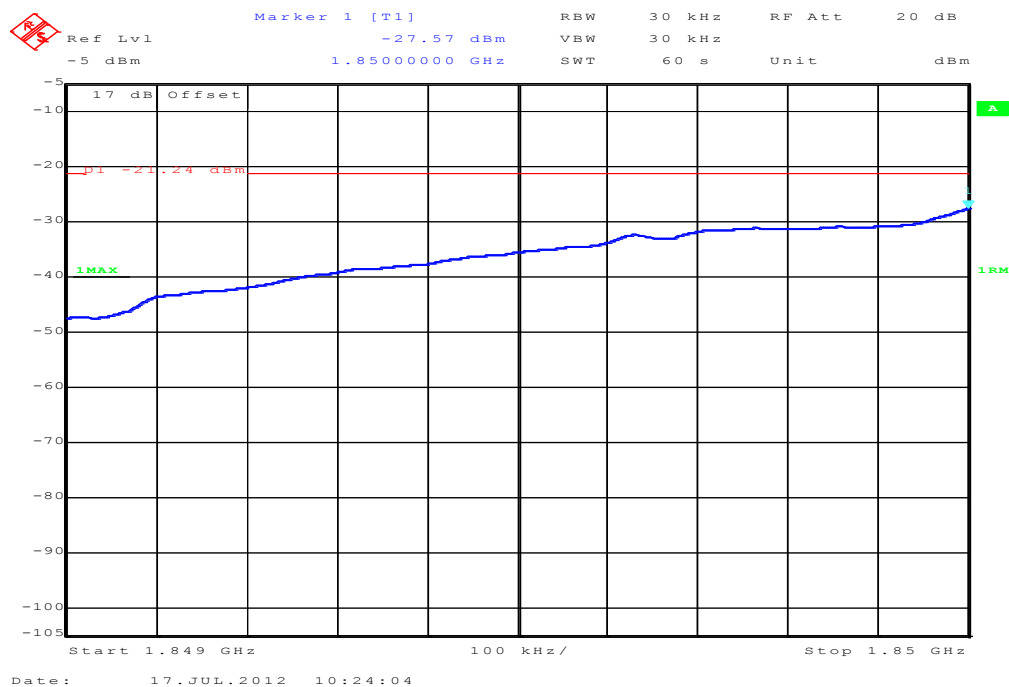
Plot 1: Lowest channel – QPSK



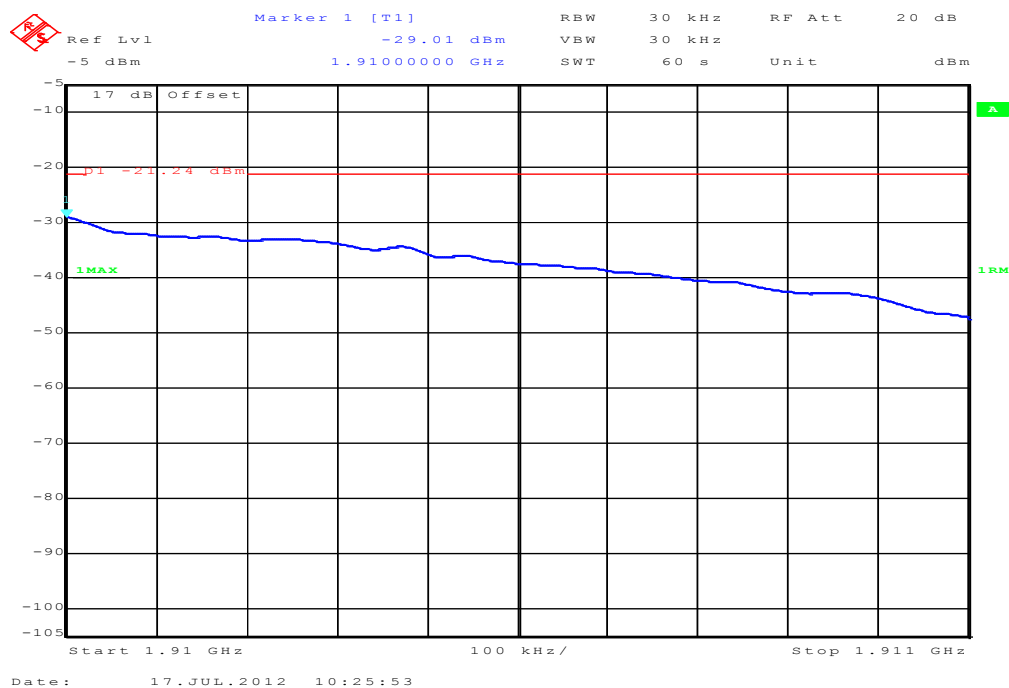
Plot 2: Highest channel – QPSK



Plot 3: Lowest channel – 16-QAM

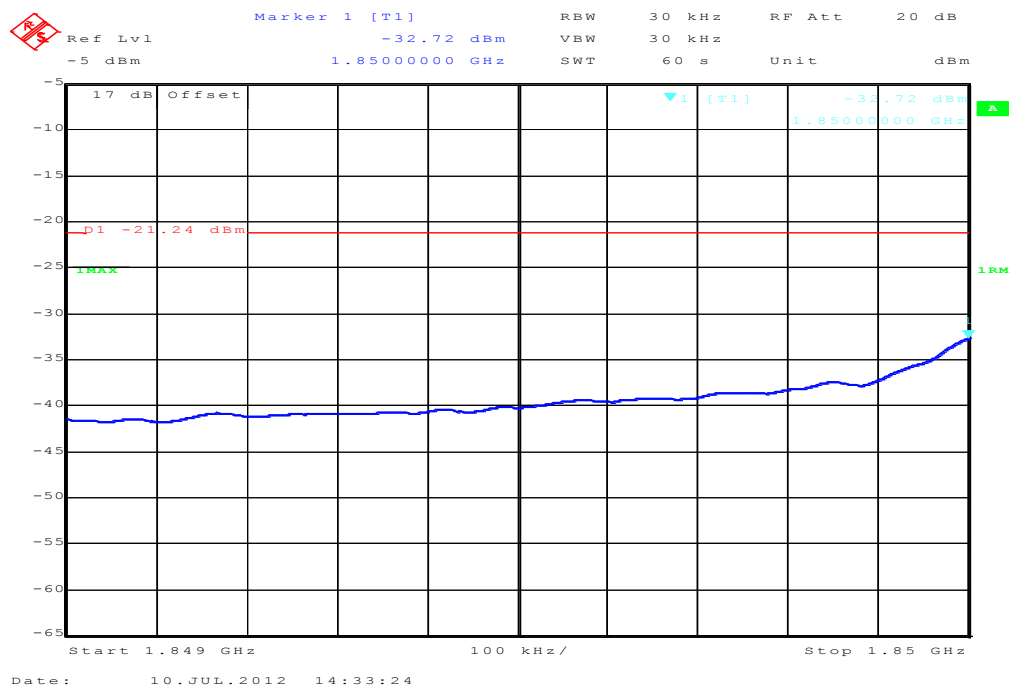


Plot 4: Highest channel – 16-QAM

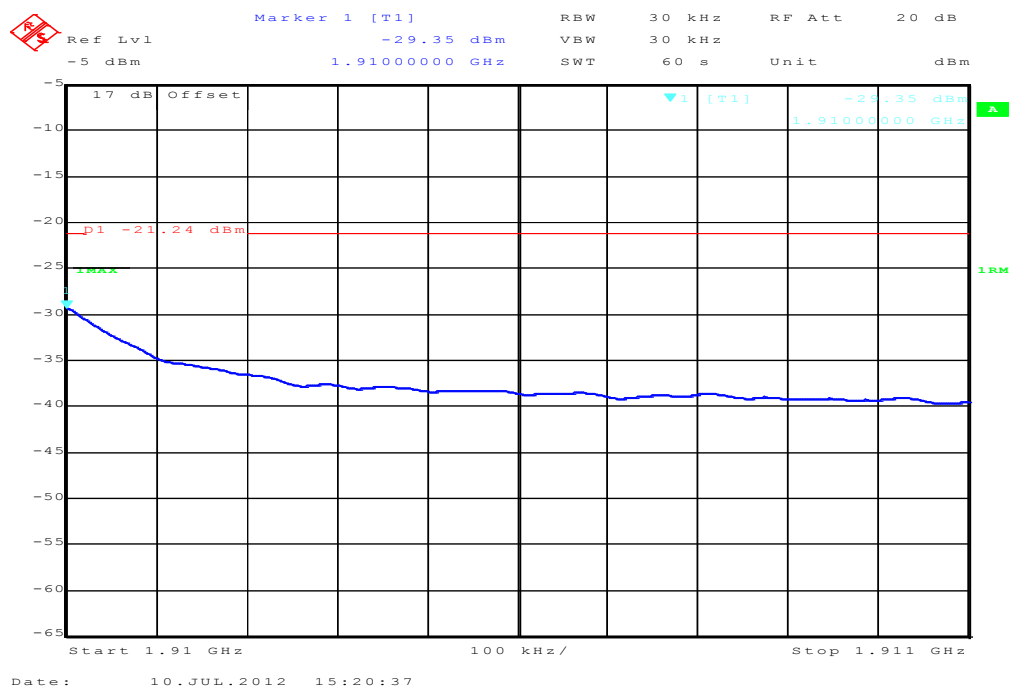


Results: 3 MHz channel bandwidth

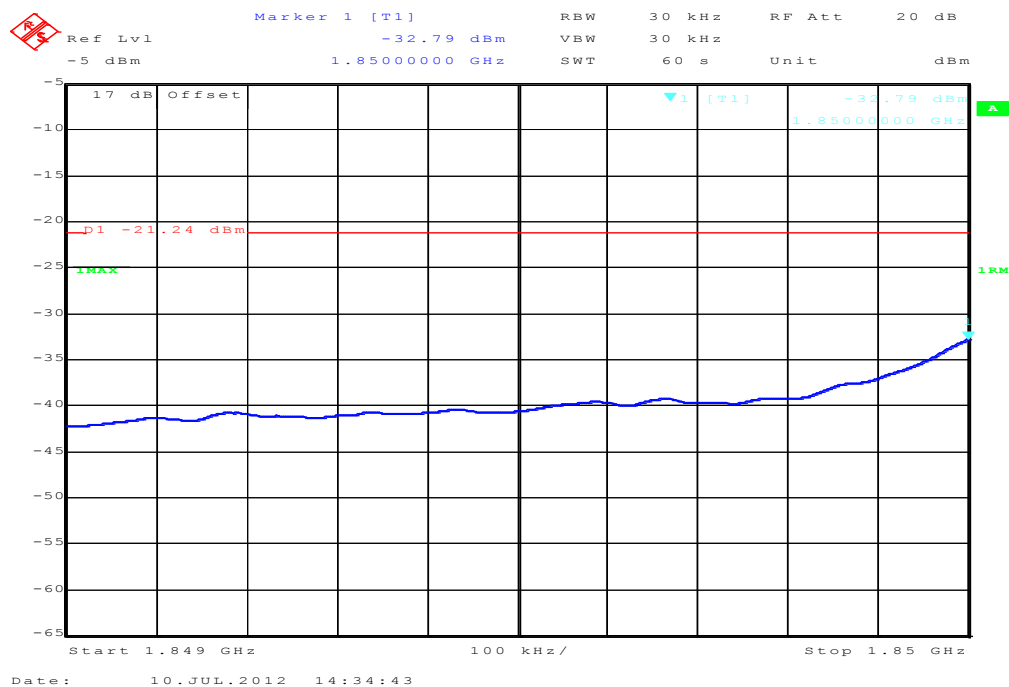
Plot 1: Lowest channel – QPSK



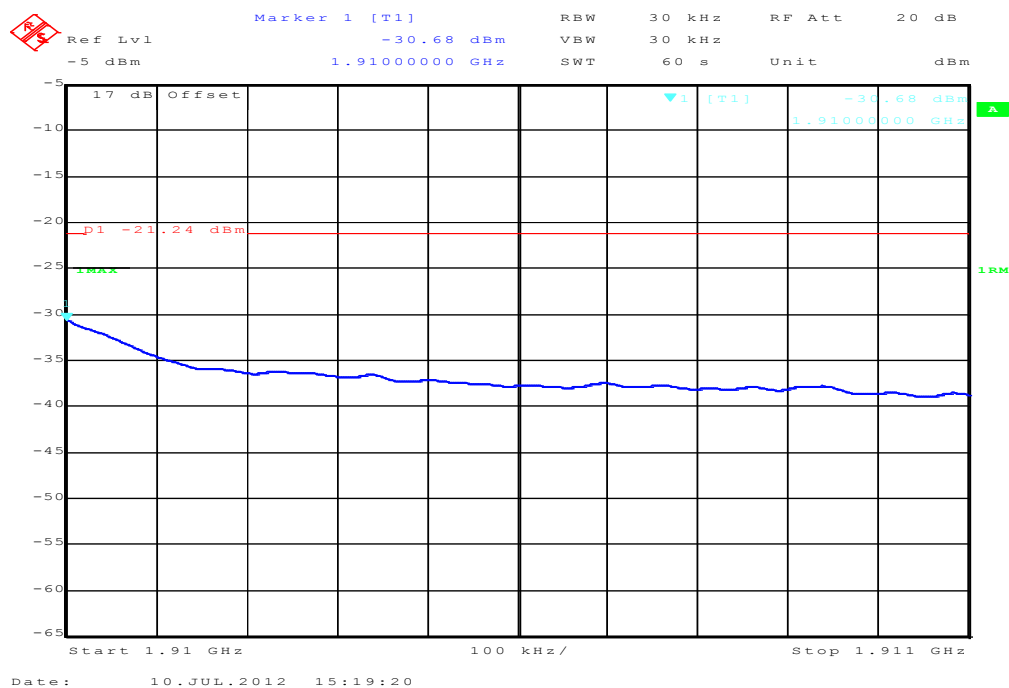
Plot 2: Highest channel – QPSK



Plot 3: Lowest channel – 16-QAM

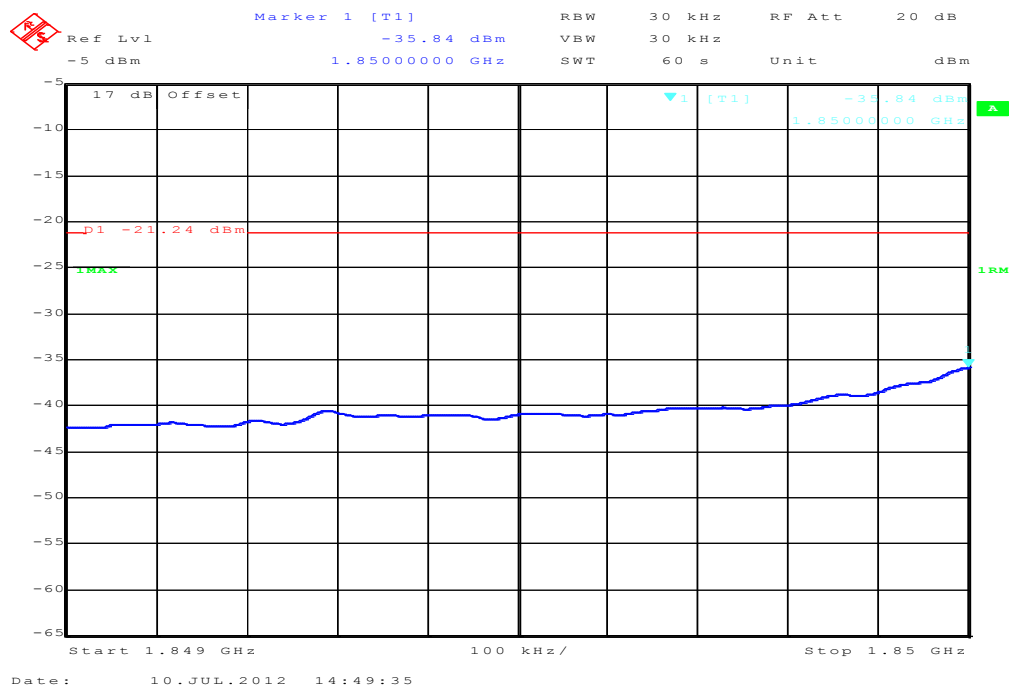


Plot 4: Highest channel – 16-QAM

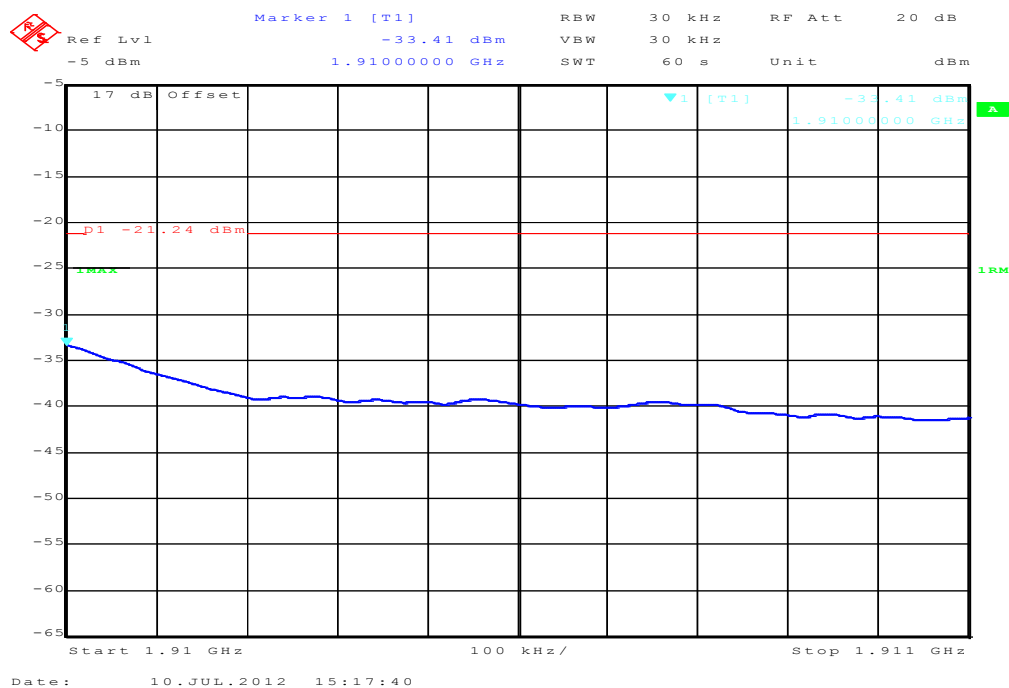


Results: 5 MHz channel bandwidth

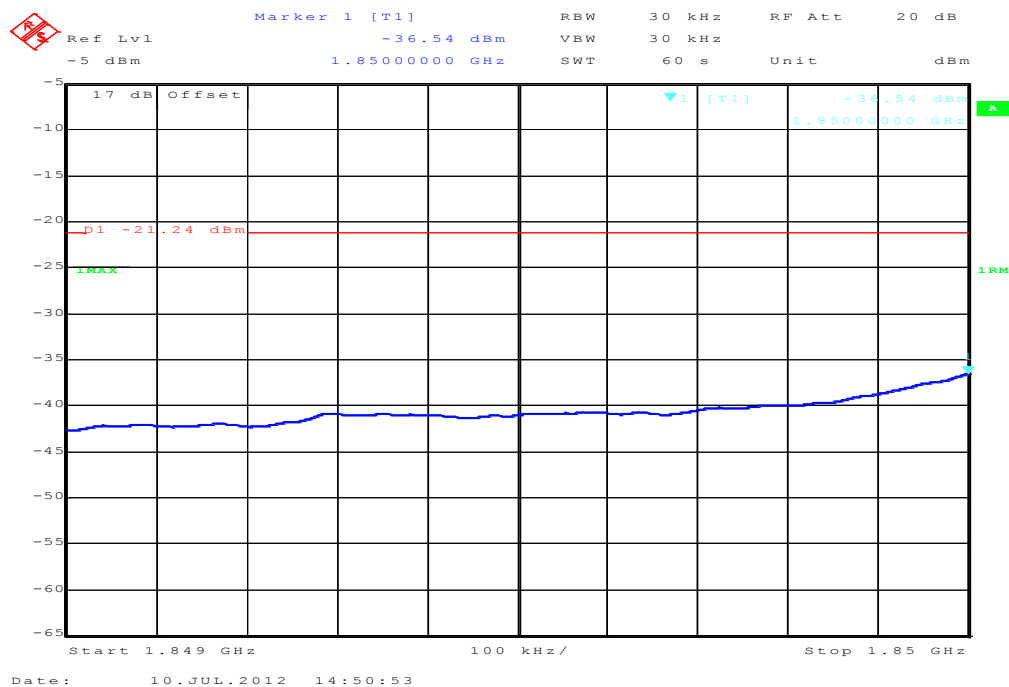
Plot 1: Lowest channel – QPSK



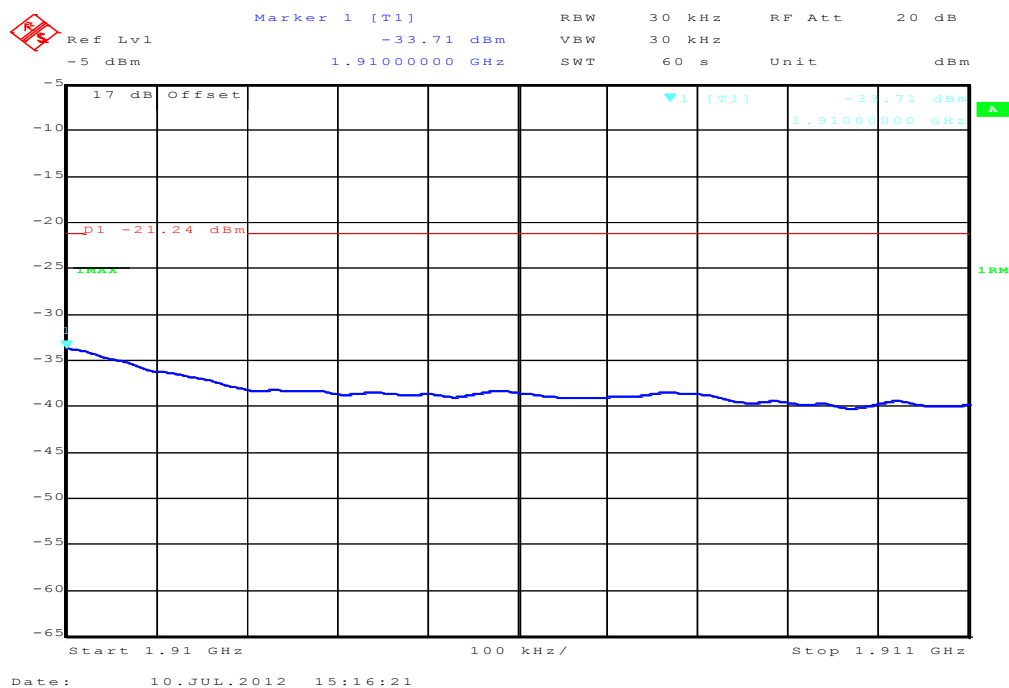
Plot 2: Highest channel – QPSK



Plot 3: Lowest channel – 16-QAM

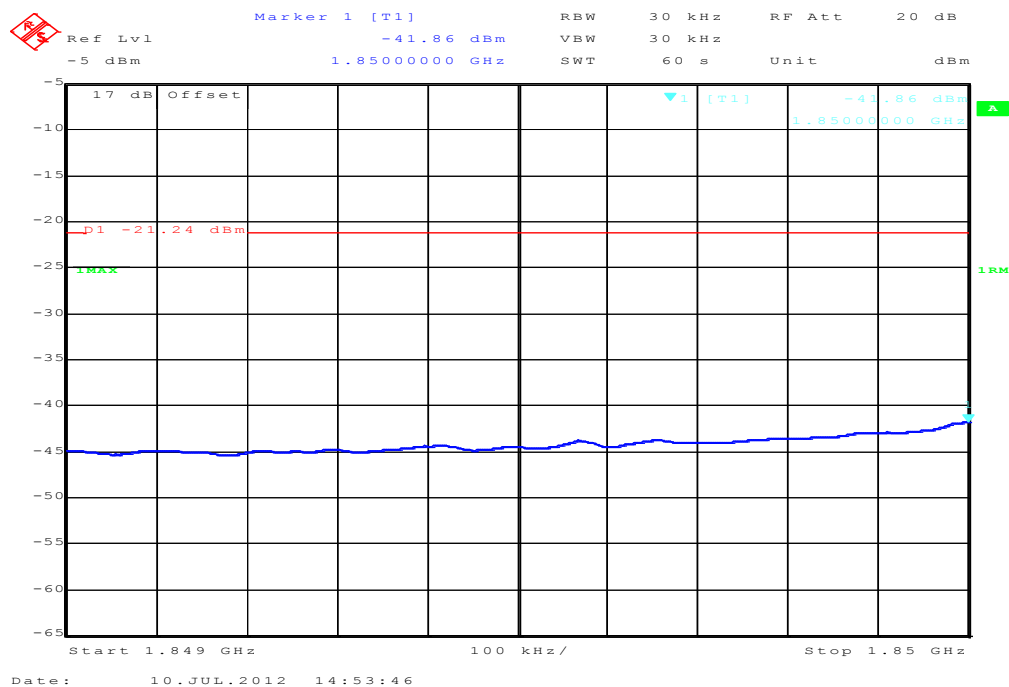


Plot 4: Highest channel – 16-QAM

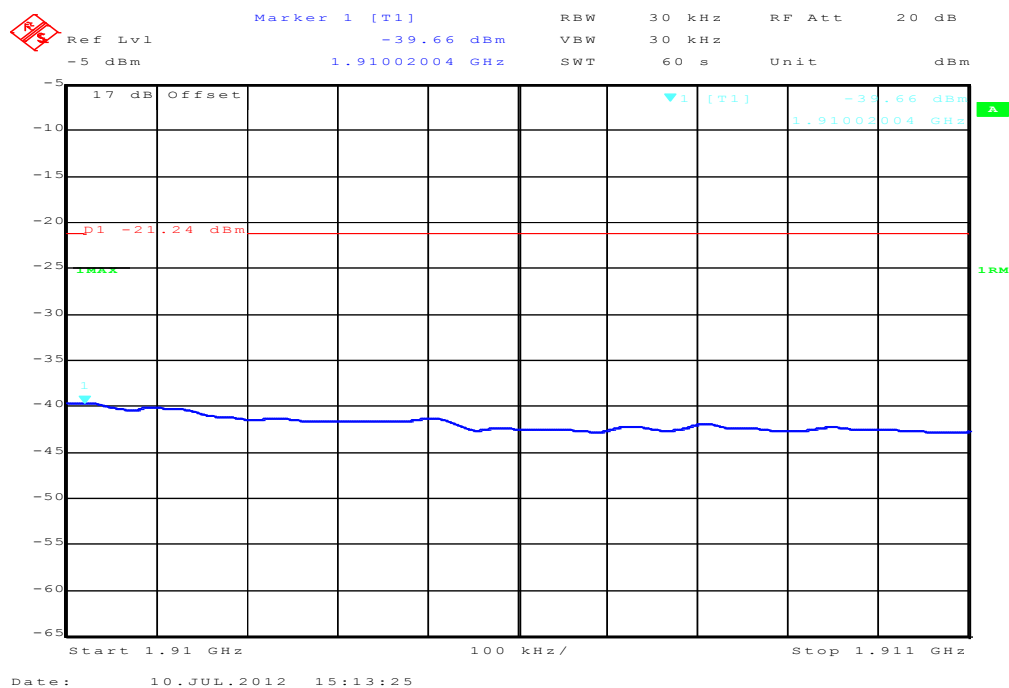


Results: 10 MHz channel bandwidth

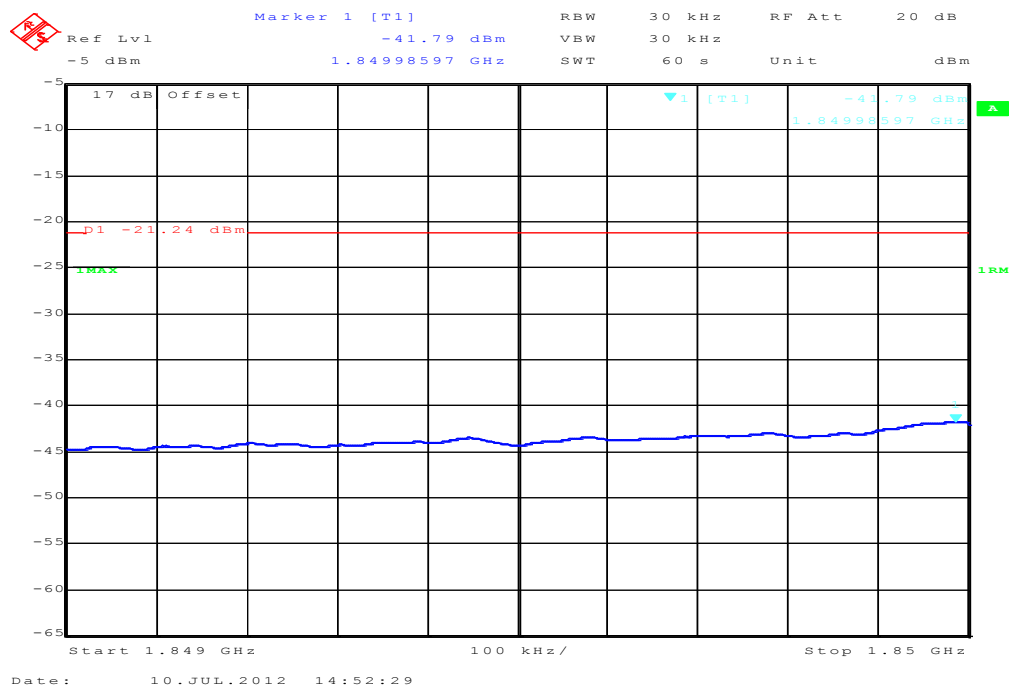
Plot 1: Lowest channel – QPSK



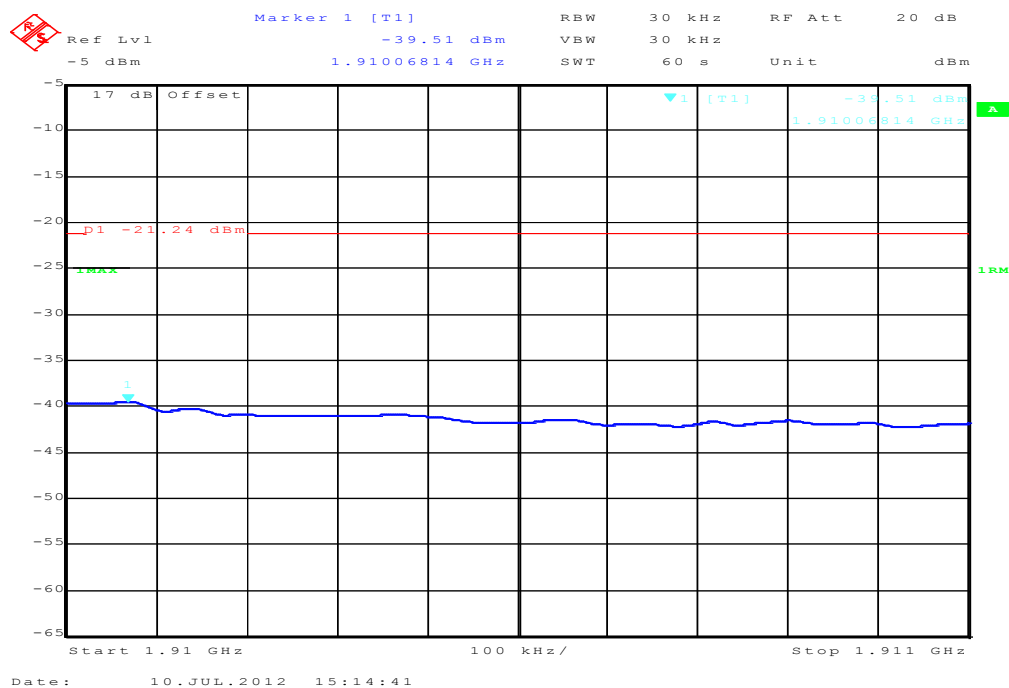
Plot 2: Highest channel – QPSK



Plot 3: Lowest channel – 16-QAM

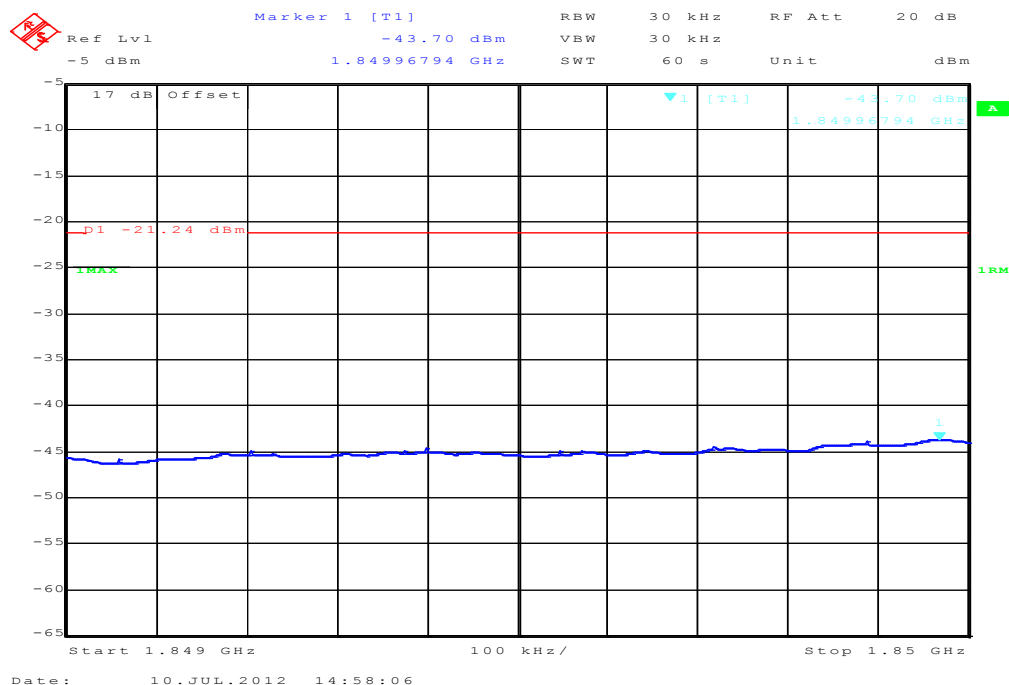


Plot 4: Highest channel – 16-QAM

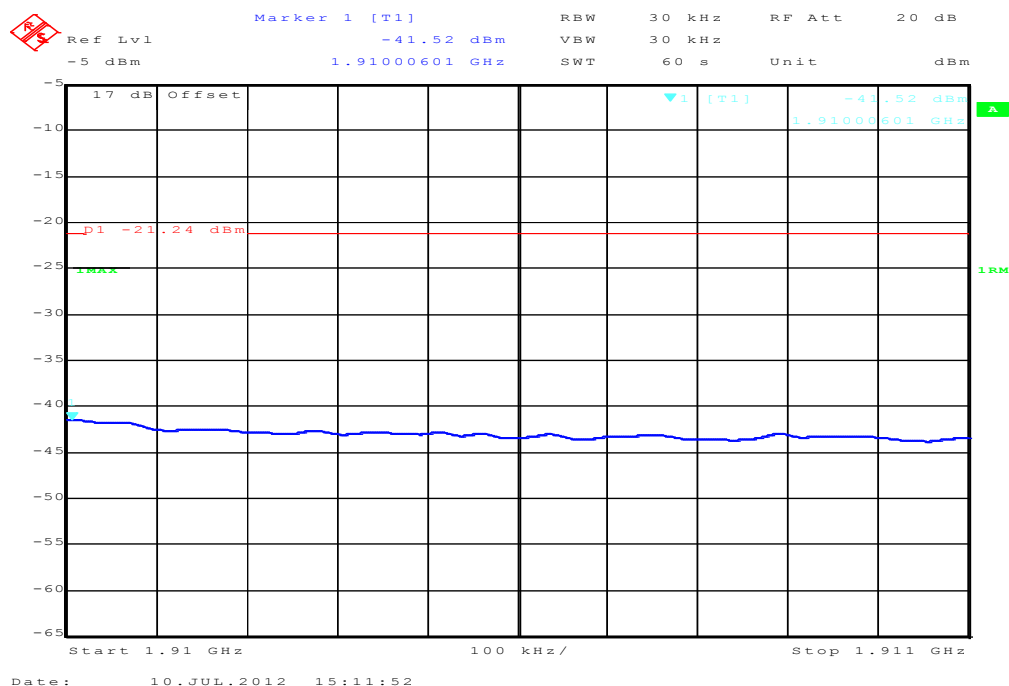


Results: 15 MHz channel bandwidth

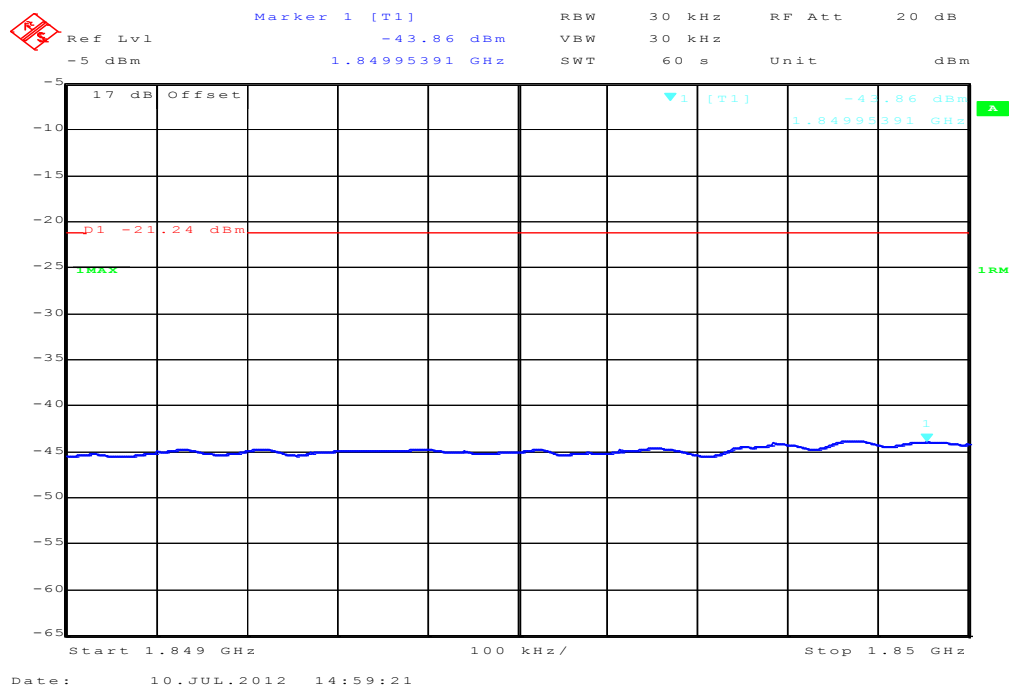
Plot 1: Lowest channel – QPSK



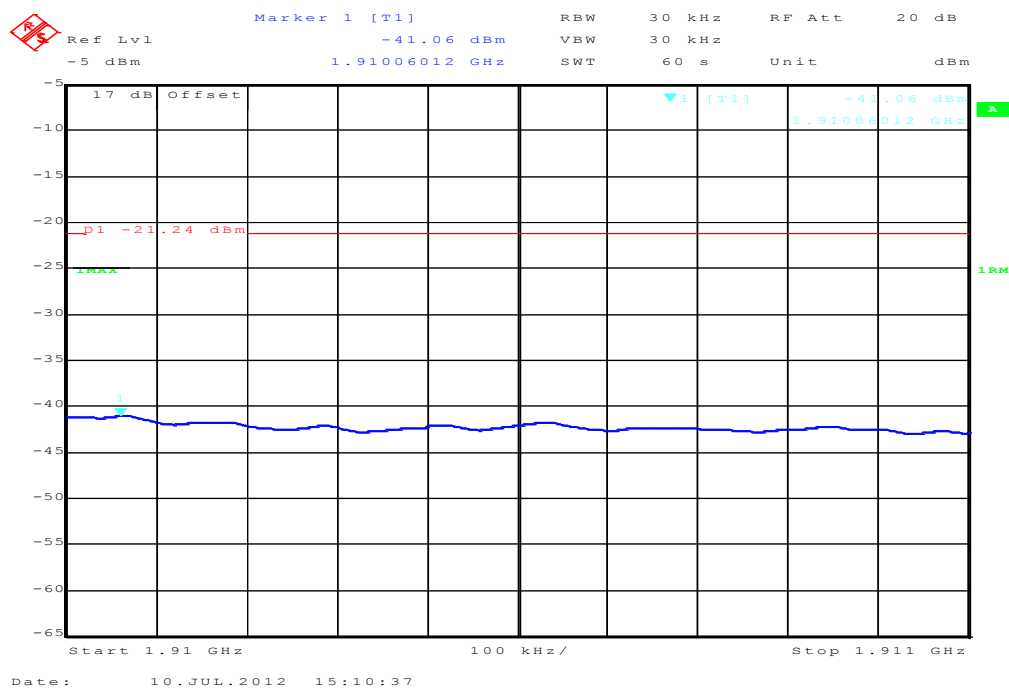
Plot 2: Highest channel – QPSK

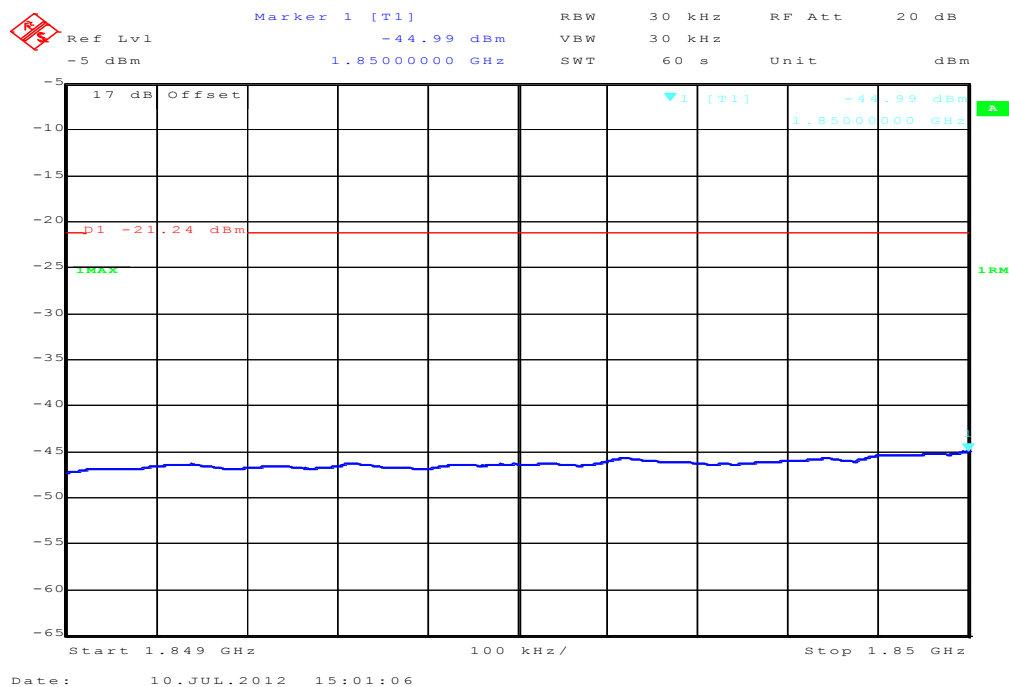
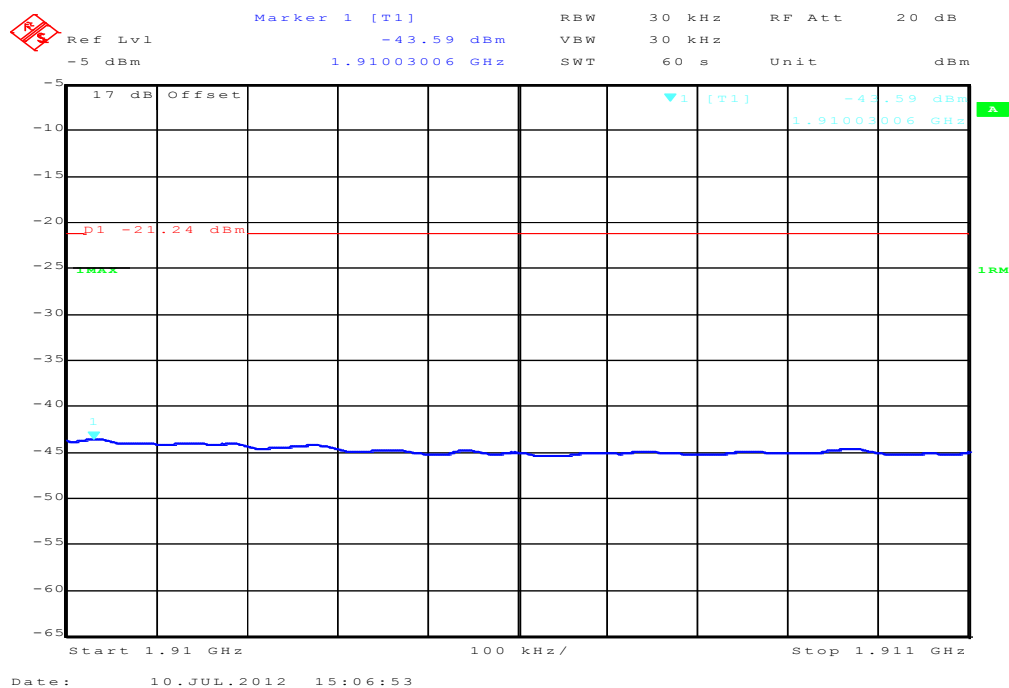


Plot 3: Lowest channel – 16-QAM



Plot 4: Highest channel – 16-QAM



Results: 20 MHz channel bandwidth**Plot 1: Lowest channel – QPSK****Plot 2: Highest channel – QPSK**

Marker 1 [T1]
 Ref Lvl -5 dBm
 -45.22 dBm
 1.84996192 GHz

RBW 30 kHz
 VBW 30 kHz
 SWT 60 s
 RF Att 20 dB
 Unit dBm

17 dB Offset
 -21.24 dBm
 -45.22 dBm
 1.84996192 GHz

Start 1.849 GHz
 100 kHz/
 Stop 1.85 GHz

Date: 10.JUL.2012 15:02:25

The screenshot shows a Spectrum Analyzer interface with the following details:

- Top Bar:**
 - RBW: 30 kHz
 - RF Att: 20 dB
 - Marker 1 [T1]: -42.91 dBm
 - VBW: 30 kHz
 - SWT: 60 s
 - Unit: dBm
- Left Panel:**
 - Ref Lvl: -5 dBm
 - 17 dB Offset
- Plot Area:**
 - A blue trace representing the signal spectrum, centered around 1.91 GHz.
 - A red horizontal line at -21.24 dBm, labeled "p1".
 - A green horizontal line at -25 dBm, labeled "17dB".
 - A green vertical line at 1.91003006 GHz, labeled "T1".
 - A green arrow pointing up at the top right of the plot area.
- Bottom Panel:**
 - Start: 1.91 GHz
 - 100 kHz/ (Sweep Rate)
 - Stop: 1.911 GHz
- Date/Time:** 10.JUL.2012 15:04:49

Page 57 of 75

8.3.6 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 extreme and mid frequencies of the LTE band II 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 bandwidth
Trace-Mode:	Max Hold

Limits:

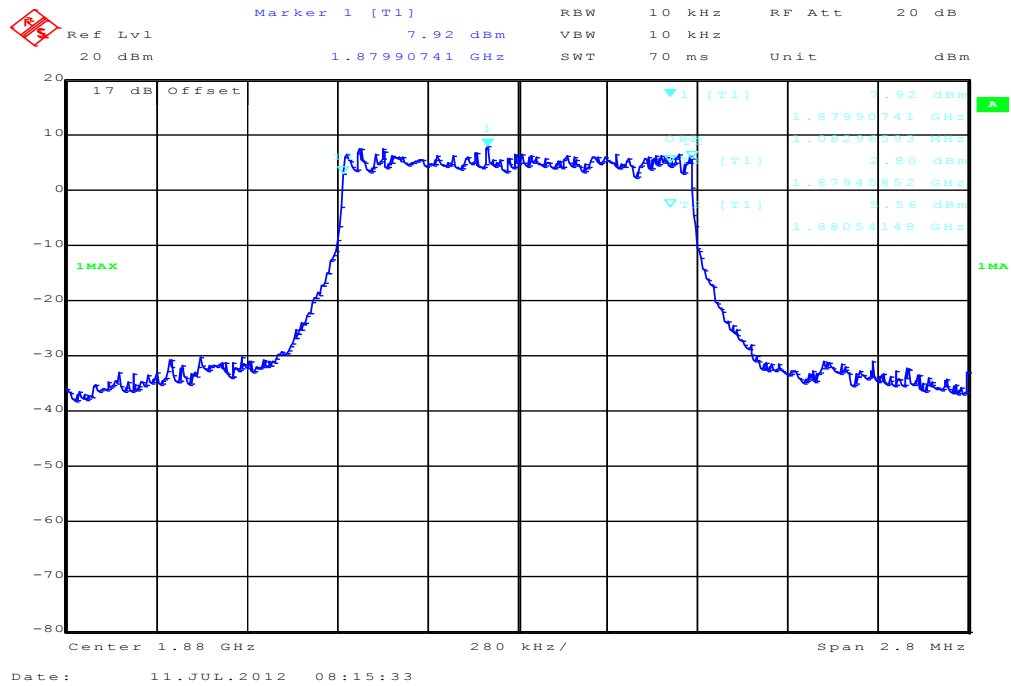
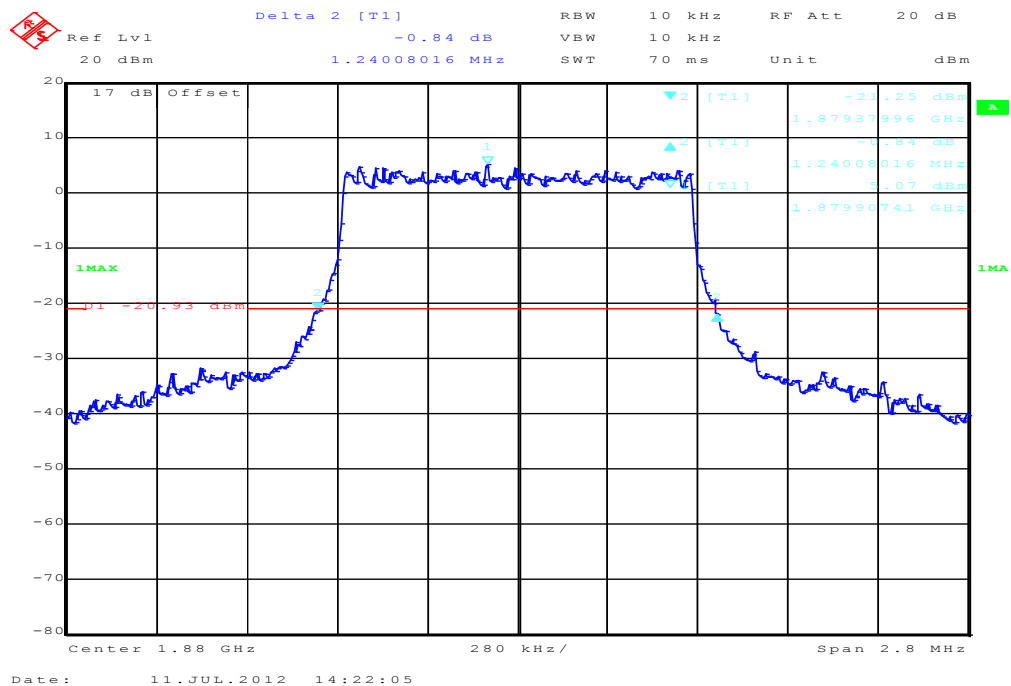
FCC	IC
CFR Part 24.238 CFR Part 2.1049	RSS 133, Issue 5, Section 6.5
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

Results:

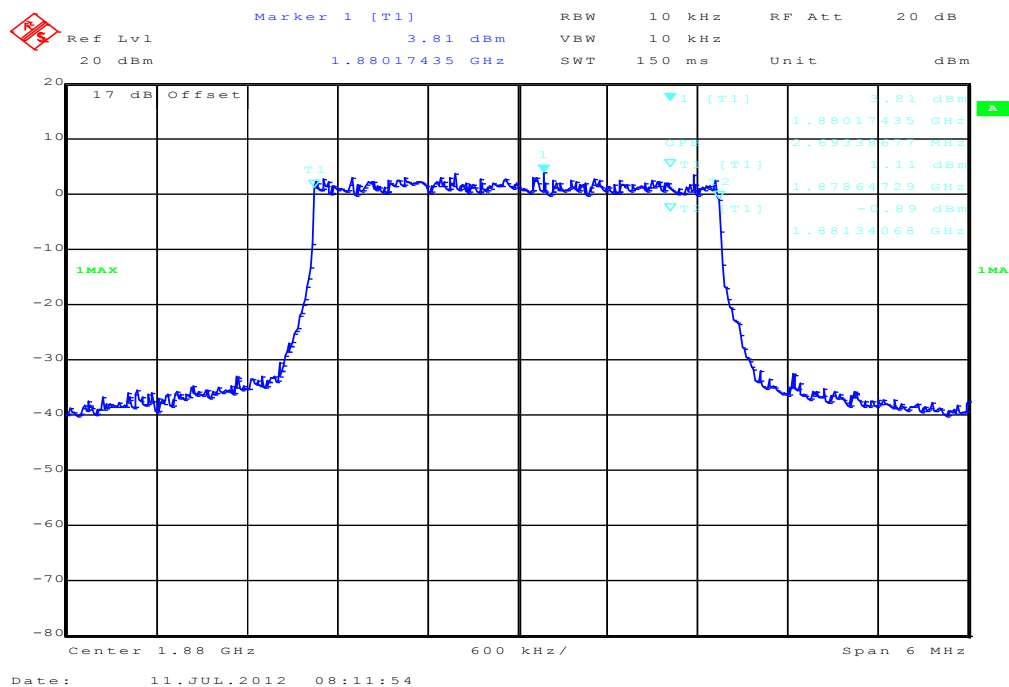
Occupied Bandwidth – QPSK		
Bandwidth (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
1.4	1083	1240
3.0	2693	2905
5.0	4469	4747
10.0	8938	9277
15.0	13407	13907
20.0	17876	18396
Measurement uncertainty	± 10 kHz	

Occupied Bandwidth – 16-QAM		
Bandwidth (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
1.4	1083	1240
3.0	2693	2881
5.0	4469	4749
10.0	8938	9278
15.0	13467	13907
20.0	17876	18396
Measurement uncertainty	± 10 kHz	

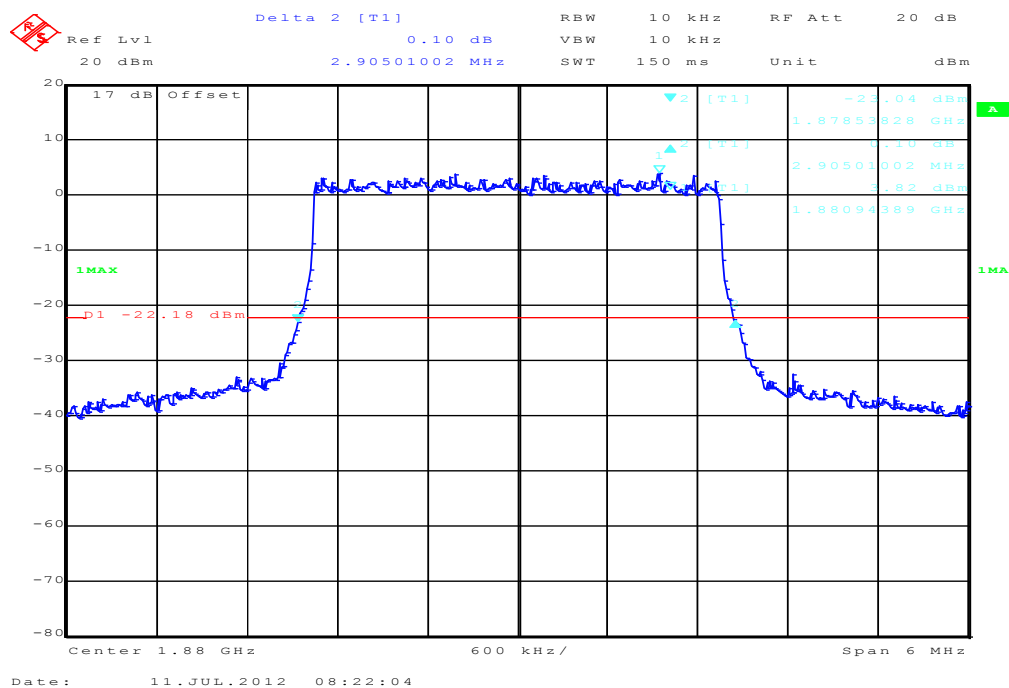
Result: Passed

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)



Marker 1 [T1]

RBW 10 kHz RF Att 20 dB

Ref Lvl 3.46 dBm

20 dBm 1.87814629 GHz

SWT 250 ms Unit dBm

17 dB Offset

1MAX

1.87814629 GHz 3.46 dBm

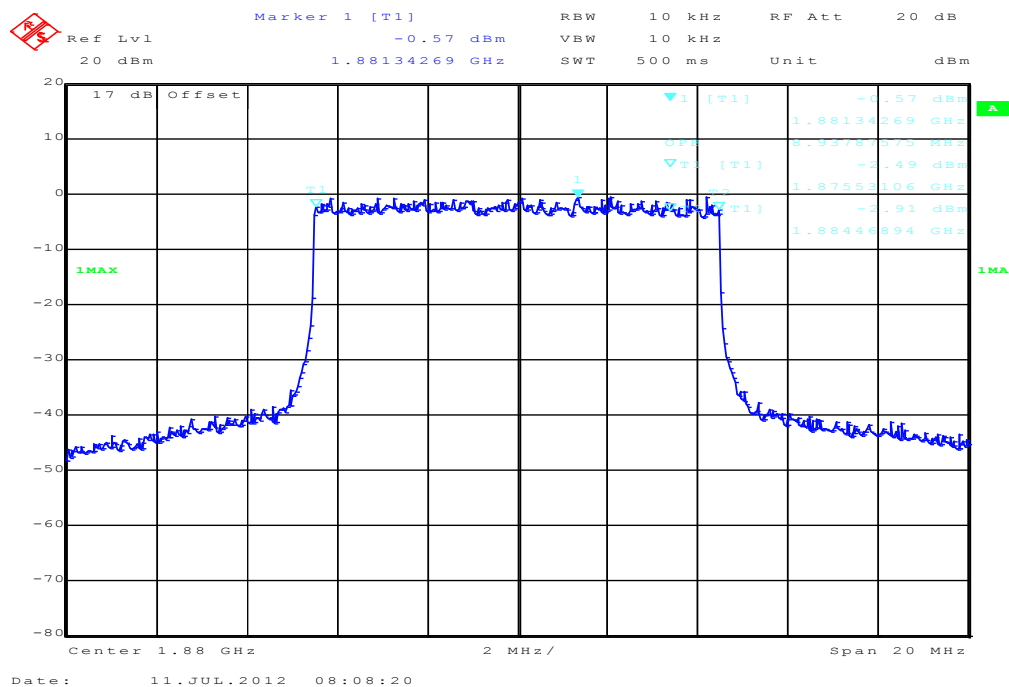
1.88223447 GHz 1.03 dBm

Center 1.88 GHz 1 MHz/ Span 10 MHz

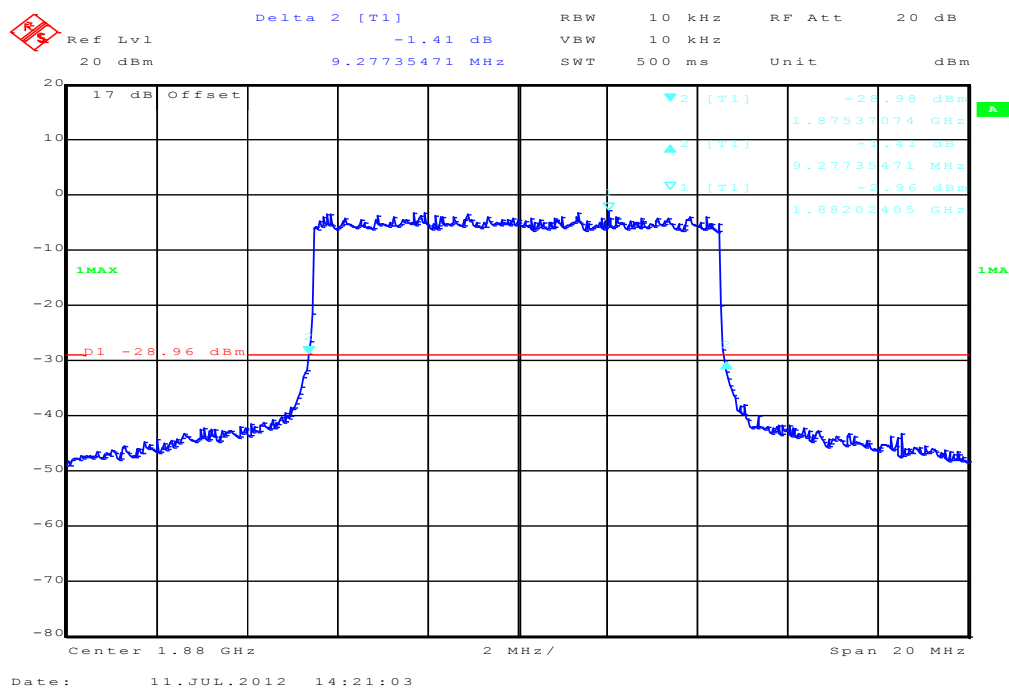
Date: 11.JUL.2012 08:10:09

[illegible]

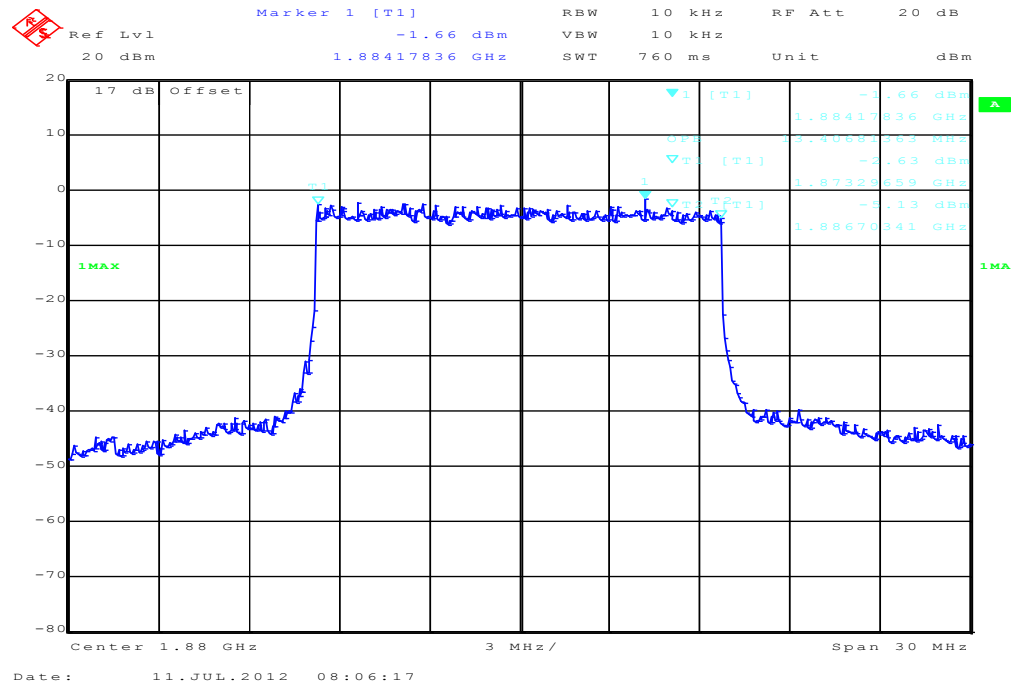
Plot 7: 10 MHz (99% - OBW)



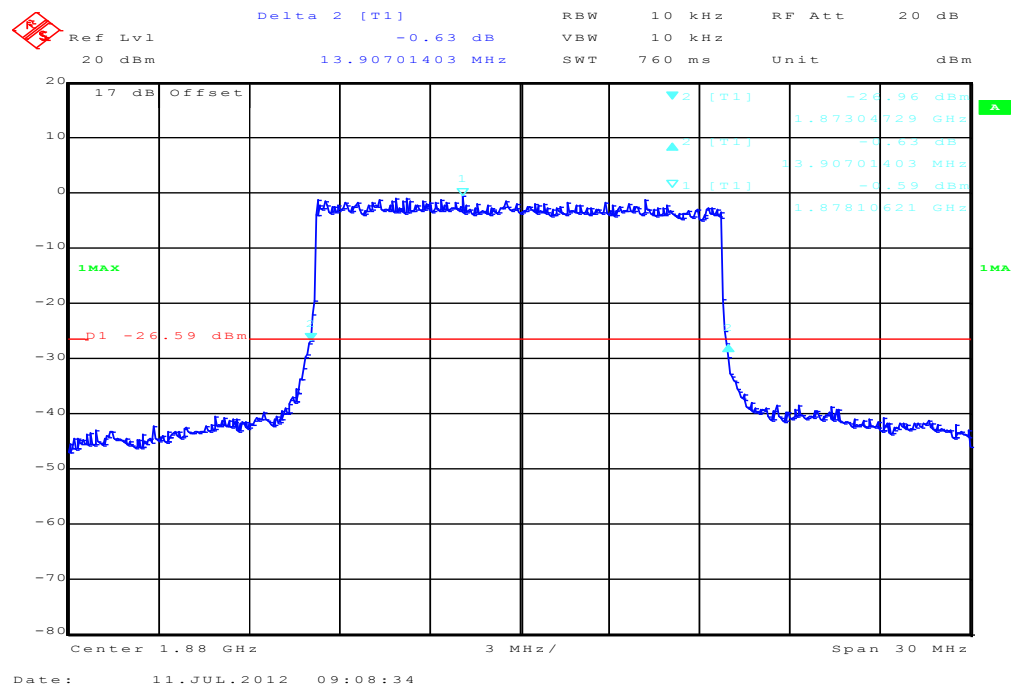
Plot 8: 10 MHz (-26 dBc BW)



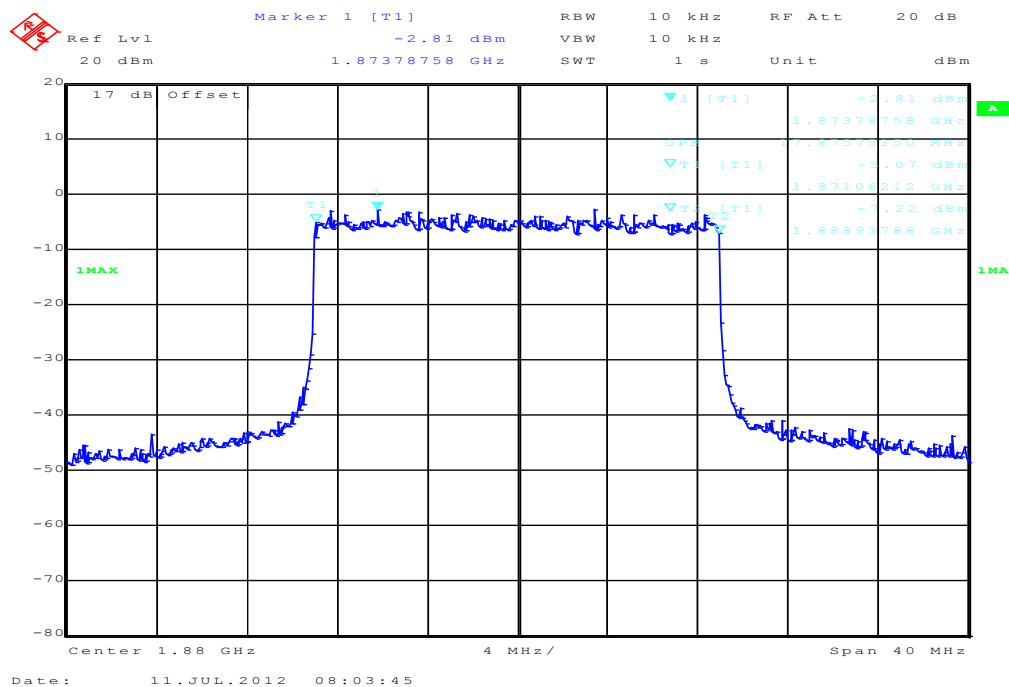
Plot 9: 15 MHz (99% - OBW)



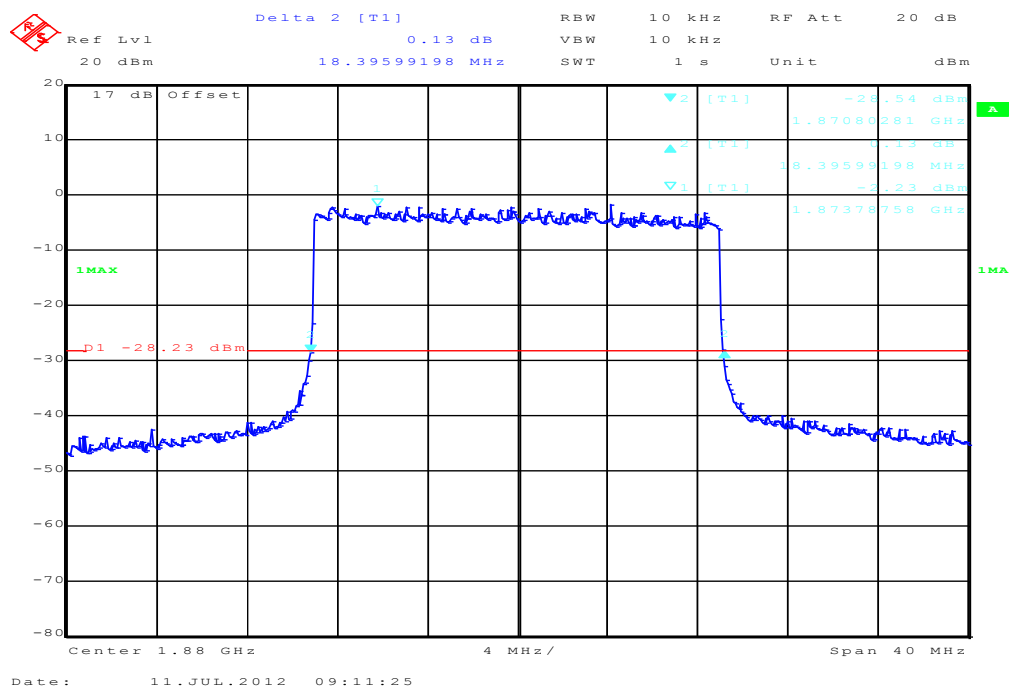
Plot 10: 15 MHz (-26 dBc BW)

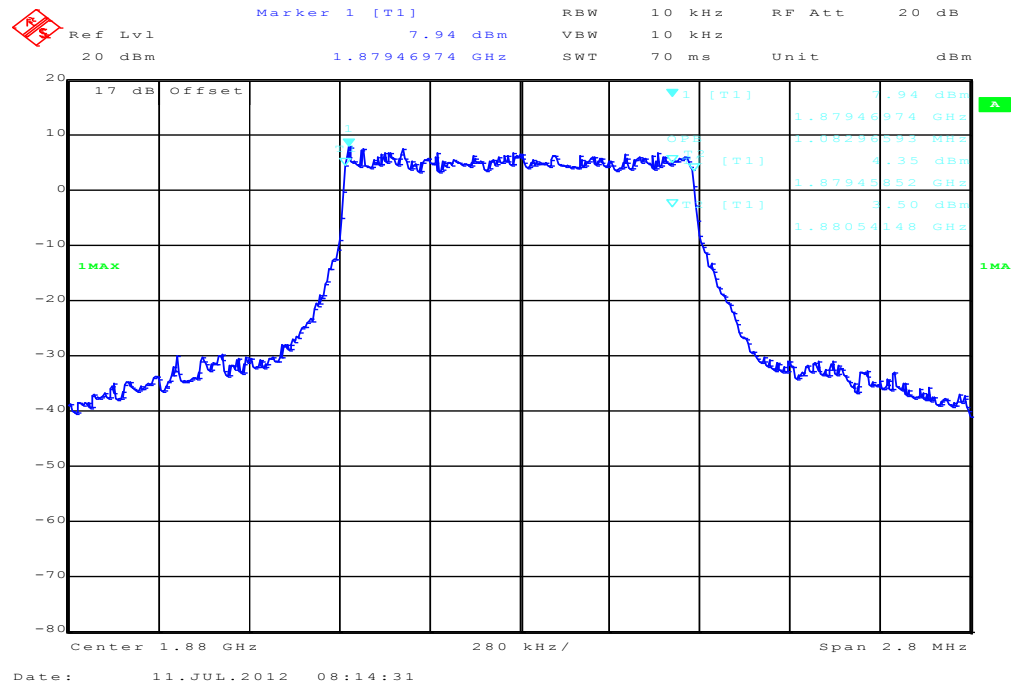
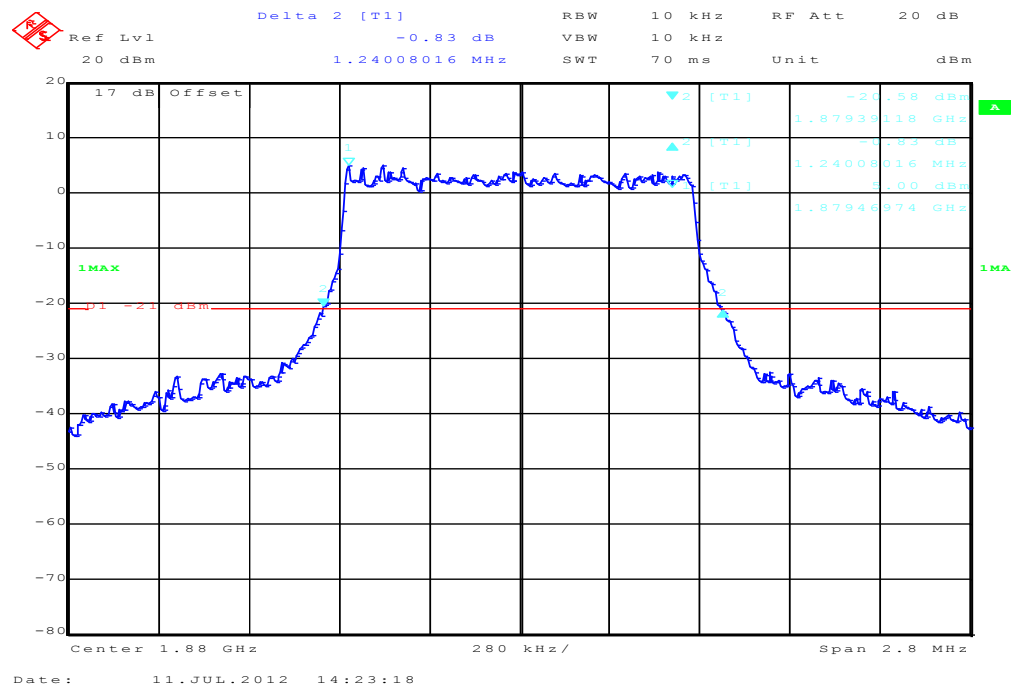


Plot 11: 20 MHz (99% - OBW)



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)**

RBW 10 kHz RF Att 20 dB
 Ref Lvl 4.82 dBm VBW 10 kHz
 20 dBm 1.87916433 GHz SWT 150 ms Unit dBm

17 dB Offset
 1MAX
 1MAX

Marker 1 [T1]
 4.82 dBm
 1.87916433 GHz
 1.87916433 GHz
 1.87863932 GHz
 1.88139271 GHz

Center 1.88 GHz 600 kHz/ Span 6 MHz

Date: 11.JUL.2012 08:12:42

Delta 2 [T1]

Parameter	Value
Ref Lvl	-1.39 dB
RBW	10 kHz
RF Att	20 dB
VBW	10 kHz
SWT	150 ms
Unit	dBm

Signal Data:

Marker	Freq	Power
1	1.88096192 MHz	-1.39 dBm
2	1.87856232 GHz	-21.22 dBm
3	1.87915230 GHz	-21.24 dBm

Plot Settings:

- Center: 1.88 GHz
- Span: 6 MHz
- Resolution Bandwidth (RBW): 10 kHz
- Sweep Time (SWT): 150 ms
- Reference Level (Ref Lvl): -1.39 dBm
- Offset: 17 dB
- Video Bandwidth (VBW): 10 kHz
- Attenuation (RF Att): 20 dB

Marker 1 [T1] RBW 10 kHz RF Att 20 dB

Ref Lvl 3.30 dBm VBW 10 kHz

20 dBm 1.87928858 GHz SWT 250 ms Unit dBm

17 dB Offset

1MAX

▼1 [T1] 3.30 dBm

OPB 1.87928858 GHz

▼T1 [T1] -8.10 dBm

▼T2 1.87778253 GHz

▼T3 [T1] 0.06 dBm

1.88228447 GHz

1MAX

Center 1.88 GHz 1 MHz/ Span 10 MHz

Date: 11.JUL.2012 08:10:59

Delta 2 [T1]

Ref Lvl 20 dBm

RBW 10 kHz

VBW 10 kHz

RF Att 20 dB

SWT 250 ms

Unit dBm

17 dB Offset

1 MAX

1 4.74869739 MHz

2 1.87761643 GHz

3 1.87928858 GHz

4 -21.90 dBm

5 -1.33 dBm

6 4.74869739 MHz

7 3.50 dBm

8 -22.5 dBm

Center 1.88 GHz

1 MHz/

Span 10 MHz

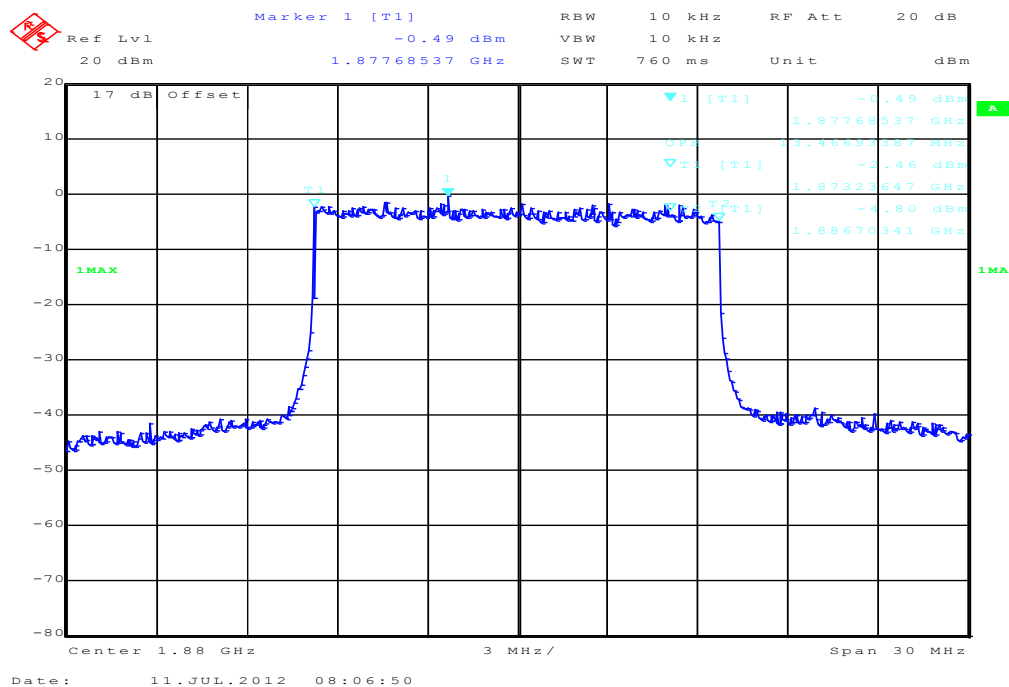
Date: 11.JUL.2012 08:39:51

[illegible]

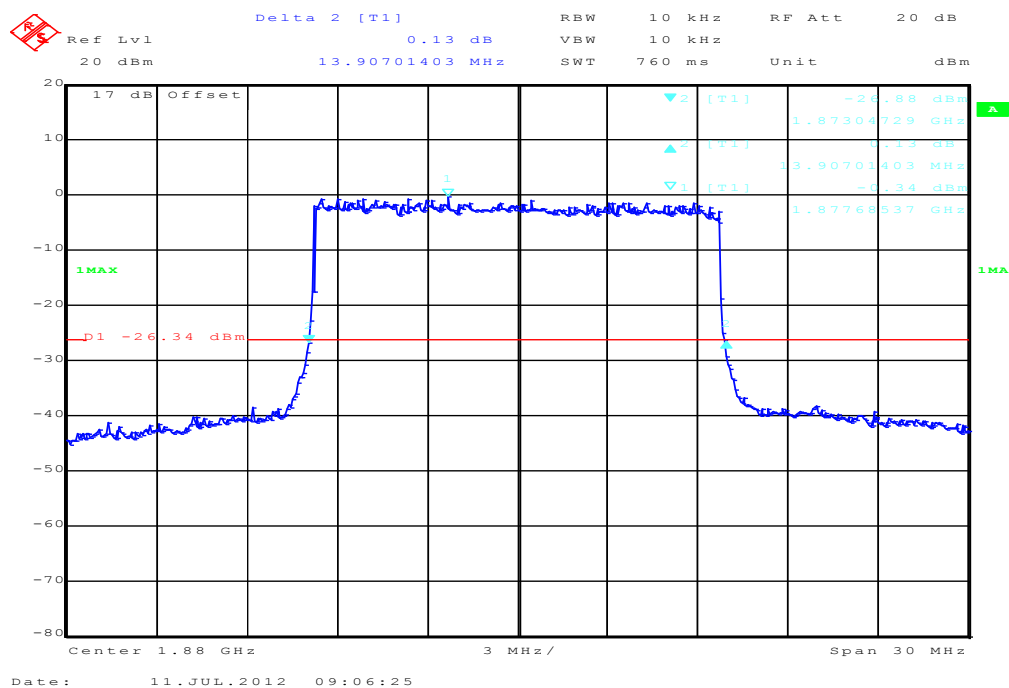
Delta 2 [T1] 1.55 dB RBW 10 kHz RF Att 20 dB
 Ref Lvl 20 dBm VBW 10 kHz
 20 dBm 9.27775551 MHz SWT 500 ms Unit dBm

17 dB Offset
 1MAX
 1.87533186 GHz
 9.27775551 MHz
 1.88086172 GHz
 1.88 GHz
 20 MHz

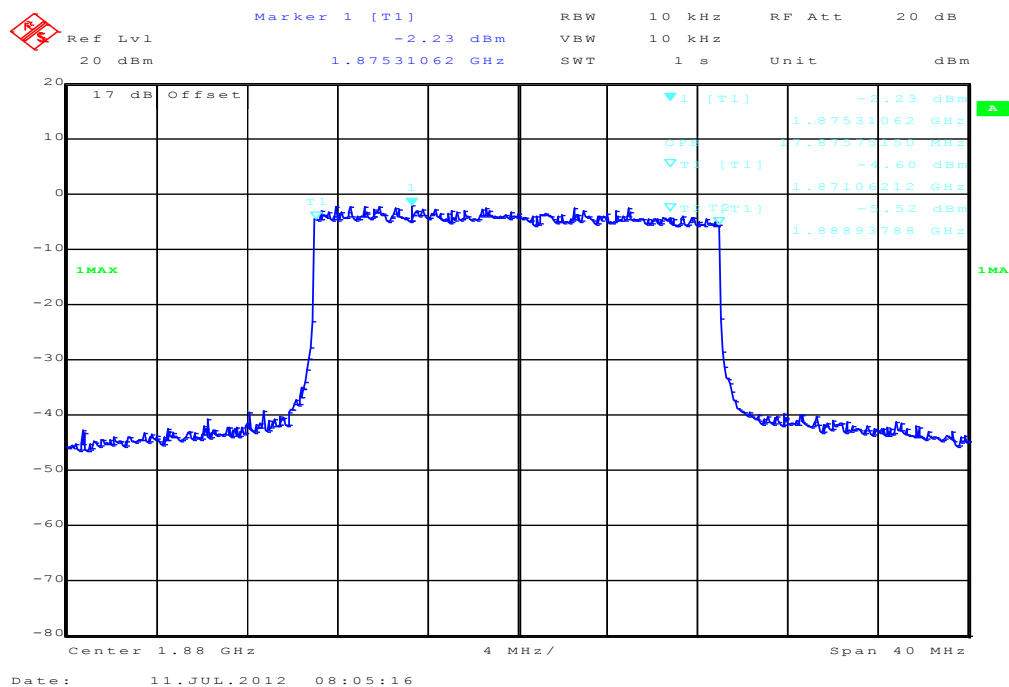
Plot 9: 15 MHz (99% - OBW)



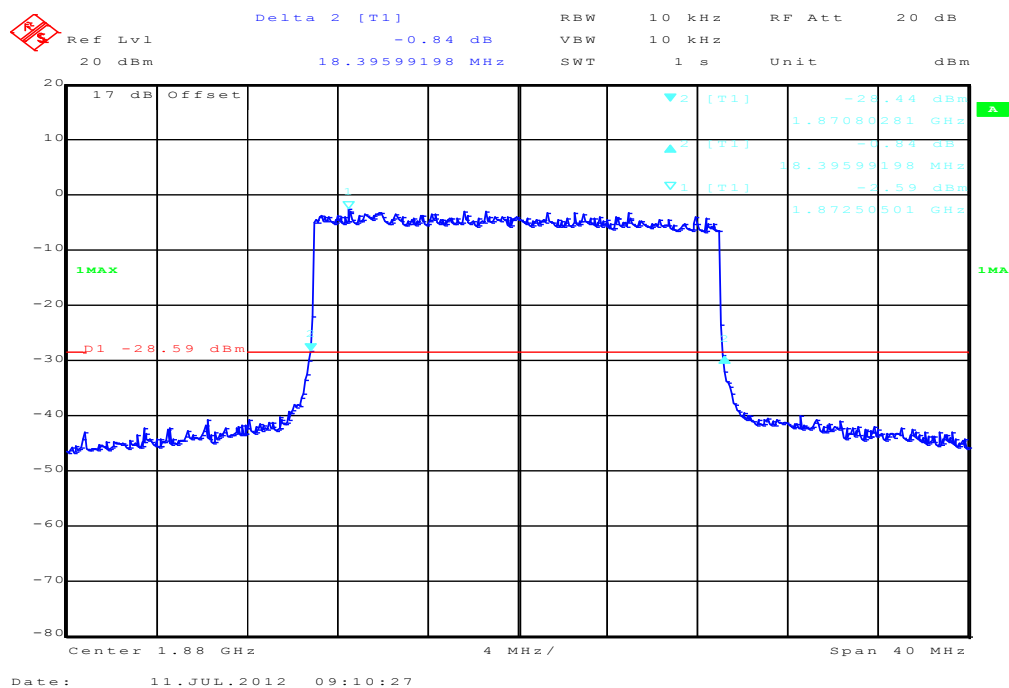
Plot 10: 15 MHz (-26 dBc BW)



Plot 11: 20 MHz (99% - OBW)



Plot 12: 20 MHz (-26 dBc BW)



9 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	vIKI!	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.	Band Reject filter	WRCG185 5/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014
11	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	19.12.2011	19.12.2012
12	19	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9107-3697	300001605	Ve	19.10.2010	19.10.2012
13	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
14	n. a.	Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM	FSIQ26	R&S	835111/0004	300002678	Ve	04.11.2010	04.11.2012

Agenda: Kind of Calibration

k calibration / calibrated
 ne not required (k, ev, izw, zw not required)
 ev periodic self verification
 Ve long-term stability recognized
 vIKI! Attention: extended calibration interval
 NK! Attention: not calibrated

EK limited calibration
 zw cyclical maintenance (external cyclical maintenance)
 izw internal cyclical maintenance
 g blocked for accredited testing
 *) next calibration ordered / currently in progress

10 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



Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Entrusted according to Section 8 subsection 1 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
Short 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) Rüdiger Eger
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_Akkred_Urk_EN17025-En_incl_Annex.pdf