

## TEST REPORT

Test report no.: 1-6234/13-08-05-A



### 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

**Research In Motion Limited**  
305 Phillip Street  
Waterloo. ON N2L 3W8 / CANADA

### Test standard/s

47 CFR Part 27 Title 47 of the Code of Federal Regulations; Chapter I; Part 27 - Miscellaneous wireless communications services

RSS - 139 Issue 2 Spectrum Management and Telecommunications Radio Standards Specification - 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:** Blackberry GSM Phones  
**Model name:** RGF111LW  
**FCC ID:** L6ARGF110LW  
**IC:** 2503A-RGF110LW  
**Frequency:** LTE E-UTRA band 4 – 1710 MHz to 1755 MHz  
LTE E-UTRA band 17 – 704 MHz to 716 MHz  
**Technology tested:** LTE  
**Antenna:** Integrated antenna  
**Power supply:** 3.80 V DC by Li - polymer battery

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

### Test report authorised:

Andreas Luckenbill  
Expert

### Test performed:

Marco Bertolino  
Testing Manager

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## 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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### 2.2 Application details

Date of receipt of order:	2013-08-19
Date of receipt of test item:	2013-08-23
Start of test:	2013-08-23
End of test:	2013-09-03
Person(s) present during the test:	-/-

## 3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 27	01.10.2012	Title 47 of the Code of Federal Regulations; Chapter I; Part 27 - Miscellaneous wireless communications services
RSS - 139 Issue 2	01.02.2009	Spectrum Management and Telecommunications Radio Standards Specification - 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
	$T_{max}$	No tests under extreme conditions!
	$T_{min}$	No tests under extreme conditions!
Relative humidity content:		50 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	3.80 V DC by Li - polymer battery
	$V_{max}$	No tests under extreme conditions!
	$V_{min}$	No tests under extreme conditions!

#### 5 Test item

Kind of test item	:	Blackberry GSM Phones
Type identification	:	RGF111LW
S/N serial number	:	Radiated units: IMEI EUT 1: 004402242479081 IMEI EUT 2: 004402242479065
HW hardware status	:	CER-57711-001 Rev. 2
SW software status	:	10.2.0.1155
Frequency band [MHz]	:	LTE E-UTRA band 4 – 1710 MHz to 1755 MHz LTE E-UTRA band 17 – 704 MHz to 716 MHz
Type of radio transmission	:	OFDM
Use of frequency spectrum	:	
Type of modulation	:	QPSK & 16 – QAM
Antenna	:	Integrated antenna
Power supply	:	3.80 V DC by Li - polymer battery

#### 5.1 Additional information

Test setup- and EUT-photos are included in test reports: 1-6234/13-08-01\_AnnexA  
1-6234/13-08-01\_AnnexC

#### 6 Test laboratories sub-contracted

None

## 7 Additional comments

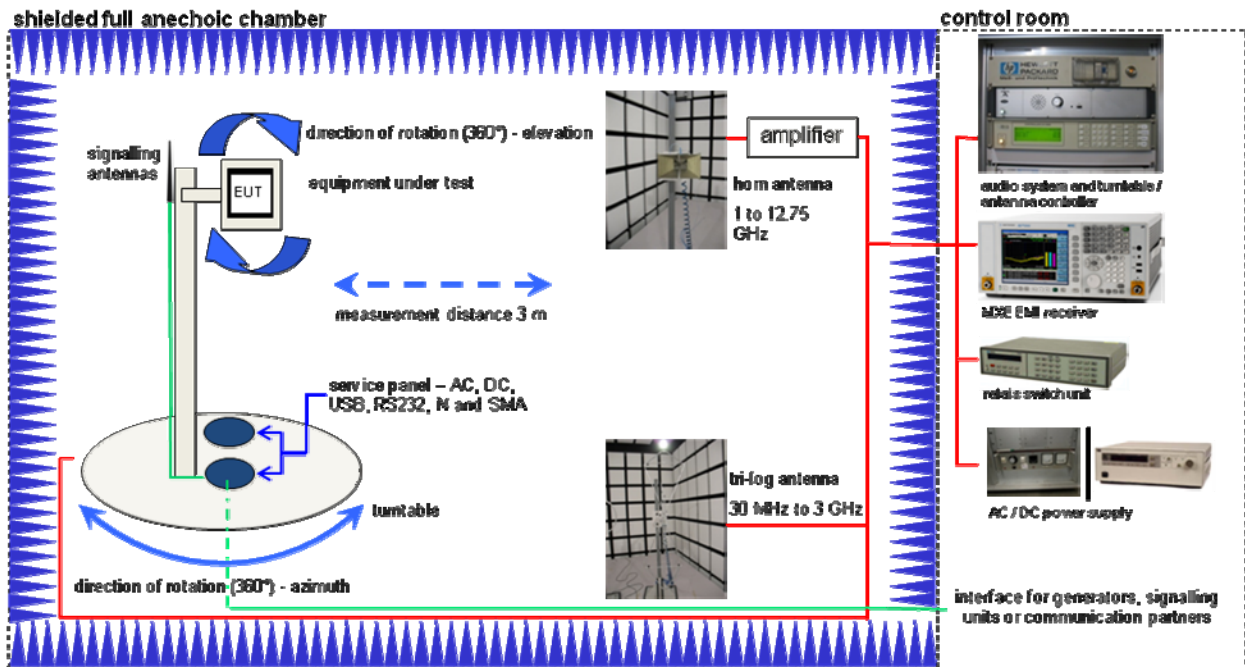
Reference documents: RIM\_EMI\_Matrix for Cetecom\_King\_RGF111LW (Aug-12-2013)

Special test descriptions: Tests according to manufacturer test plan.

Configuration descriptions: None

## 8 Description of the test setup

### 8.1 Radiated measurements chamber C



#### Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Three-Way Power Splitter. 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854
MXE EMI Receiver 20 Hz bis 26.5 GHz	N9038A	Agilent Technologies	MY51210197	300004405

## 8.2 Radiated measurements 12.75 GHz to 20 GHz



### Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Microwave System Amplifier. 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000786
Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300000486
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

## 9 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	2013-09-20	Tests according to manufacturer test plan

### 9.1 LTE – Band 4

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

### 9.2 LTE – Band 17

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed



### 9.3 LTE technologies supported by EUT

#### Channel bandwidth

	Band 4	Band 17
[MHz]		
1.4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20	<input checked="" type="checkbox"/>	<input type="checkbox"/>

#### Antenna

SISO	<input checked="" type="checkbox"/>
SIMO	<input type="checkbox"/>
MISO	<input type="checkbox"/>
MIMO	<input type="checkbox"/>

## 9.4 Results LTE – Band 4

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	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	Depends on Channel Bandwidth
Resolution bandwidth:	Depends on Channel Bandwidth
Span:	Zero Span
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 27.1101 CFR Part 2.1046	RSS 139
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	22.4	4.77	21.6	5.41
		1 RB high	22.3	4.83	21.9	5.33
		50% RB mid	22.1	4.67	21.3	5.96
		100% RB	21.2	5.81	20.0	6.73
	1732.5	1 RB low	21.7	5.62	20.6	4.49
		1 RB high	21.8	5.63	20.5	4.45
		50% RB mid	21.7	5.94	20.8	5.17
		100% RB	20.6	6.45	19.7	6.08
	1754.3	1 RB low	22.0	4.09	20.8	5.50
		1 RB high	21.8	4.13	20.7	5.47
		50% RB mid	21.8	4.74	21.1	5.52
		100% RB	21.0	6.30	20.2	6.35
3	1711.5	1 RB low	22.2	5.31	21.7	4.84
		1 RB high	22.0	5.38	21.7	4.95
		50% RB mid	21.1	6.57	19.9	5.70
		100% RB	21.3	6.31	20.3	5.79
	1732.5	1 RB low	21.7	4.50	20.7	5.63
		1 RB high	21.5	4.51	20.5	5.68
		50% RB mid	20.6	5.76	19.7	6.22
		100% RB	20.8	6.30	19.8	6.60
	1753.5	1 RB low	21.5	6.03	20.6	4.54
		1 RB high	21.7	5.77	20.6	4.39
		50% RB mid	20.8	6.16	19.9	5.49
		100% RB	20.9	6.79	19.9	5.96
5	1712.5	1 RB low	22.1	4.59	21.6	5.59
		1 RB high	22.1	4.66	21.7	5.57
		50% RB mid	21.3	5.31	20.4	6.22
		100% RB	21.2	6.07	20.2	6.78
	1732.5	1 RB low	21.8	4.89	21.3	4.76
		1 RB high	21.6	4.86	21.3	4.75
		50% RB mid	20.8	6.54	19.8	5.80
		100% RB	20.8	6.80	19.7	6.19
	1752.5	1 RB low	21.6	4.46	20.6	5.58
		1 RB high	21.9	4.26	20.8	5.41
		50% RB mid	20.9	5.40	20.0	6.31
		100% RB	20.9	5.92	20.0	7.00

10	1715.0	1 RB low	22.2	5.57	21.4	4.88
		1 RB high	22.1	5.46	21.5	4.89
		50% RB mid	21.1	6.67	20.1	5.89
		100% RB	21.1	7.05	20.1	6.03
	1732.5	1 RB low	21.7	4.58	20.6	5.75
		1 RB high	21.6	4.53	20.4	5.73
		50% RB mid	20.8	5.77	19.9	6.83
		100% RB	20.8	6.09	19.7	6.93
	1750.0	1 RB low	21.6	5.85	20.6	4.57
		1 RB high	21.7	5.71	20.7	4.46
		50% RB mid	20.9	6.65	19.9	5.52
		100% RB	20.9	7.02	19.9	5.95
15	1717.5	1 RB low	22.1	4.97	21.7	5.41
		1 RB high	22.0	4.92	21.4	5.48
		50% RB mid	21.1	5.85	20.2	6.87
		100% RB	21.1	6.26	20.1	6.81
	1732.5	1 RB low	21.7	6.20	21.0	4.87
		1 RB high	21.7	6.08	20.9	4.72
		50% RB mid	20.7	6.91	19.8	5.79
		100% RB	20.7	6.98	19.9	6.16
	1747.5	1 RB low	21.6	4.63	20.4	6.04
		1 RB high	21.7	4.52	20.7	5.81
		50% RB mid	20.9	5.66	19.8	6.78
		100% RB	20.9	6.43	19.9	7.00
20	1720.0	1 RB low	22.4	5.91	21.6	4.77
		1 RB high	21.9	5.96	21.2	4.84
		50% RB mid	21.1	7.02	20.1	5.83
		100% RB	21.0	6.95	20.1	6.12
	1732.5	1 RB low	22.0	4.95	21.1	5.79
		1 RB high	21.8	4.80	21.3	5.45
		50% RB mid	20.8	5.86	19.8	6.77
		100% RB	20.9	6.18	19.9	6.81
	1745.0	1 RB low	21.5	4.87	21.0	5.01
		1 RB high	22.0	4.68	21.3	4.60
		50% RB mid	21.0	6.54	20.1	5.71
		100% RB	20.9	6.73	20.0	5.86
Measurement uncertainty			± 0.5 dB			

The output power was measured with the lowest supported channel bandwidth and with the number of resource blocks where the highest output power conducted was found.

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	18.3	17.1
	1732.5	16.9	16.0
	1754.3	18.8	18.0
3	1711.5	18.4*)	17.4*)
	1732.5	17.1*)	16.1*)
	1753.5	18.7*)	17.7*)
5	1712.5	18.3*)	17.3*)
	1732.5	17.1*)	16.0*)
	1752.5	18.7*)	17.8*)
10	1715.0	18.2*)	17.2*)
	1732.5	17.1*)	16.0*)
	1750.0	18.7*)	17.7*)
15	1717.5	18.2*)	17.2*)
	1732.5	17.0*)	16.2*)
	1747.5	18.7*)	17.7*)
20	1720.0	18.1*)	17.9*)
	1732.5	17.2*)	16.3*)
	1745.0	18.7*)	17.8*)
Measurement uncertainty		± 3.0 dB	

\*) calculated with antenna gain

	Gain (dBi)
low channel	-2.90
mid channel	-3.71
high channel	-2.23

**Result: Passed**

#### 9.4.2 Frequency stability

Not performed – tests according to manufacturer test plan.

### 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
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P. Power in Watts)	
-13 dBm	

**Results:**

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the LTE band 4 (1712.5 MHz, 1732.5 MHz and 1752.5 MHz). It was decided that measurements at these three carrier frequencies 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)					
Lowest channel		Middle channel		Highest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
All detected emissions are more than 20 dB below the limit!			All detected emissions are more than 20 dB below the limit!		
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty			± 3dB		

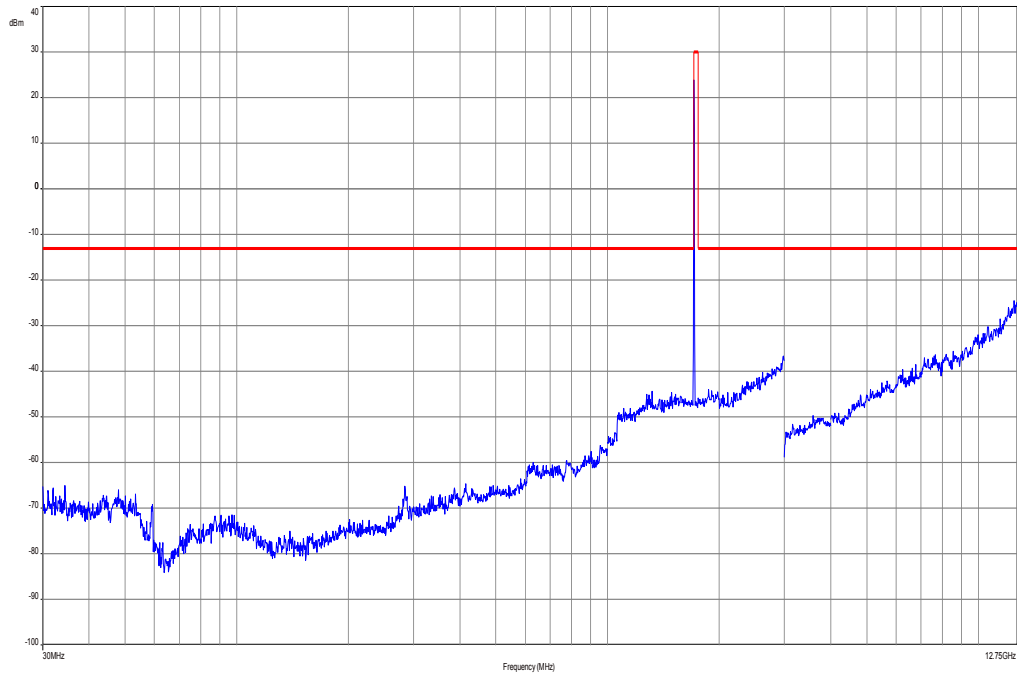
**16-QAM**

Spurious Emission Level (dBm)					
Lowest channel		Middle channel		Highest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
All detected emissions are more than 20 dB below the limit!			All detected emissions are more than 20 dB below the limit!		
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty			± 3dB		

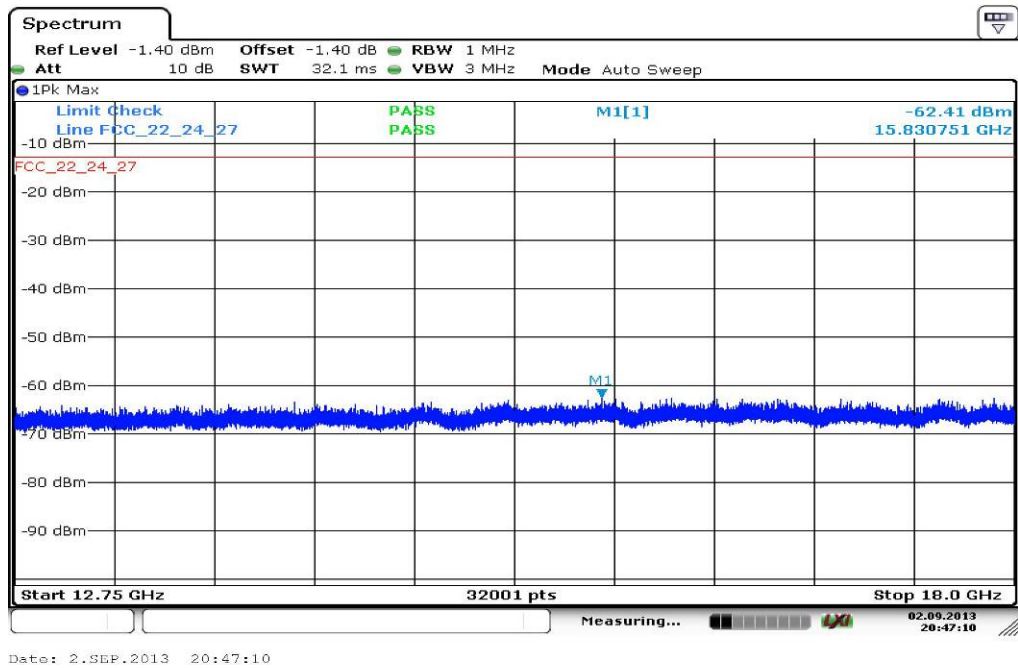
**Result: Passed**

**Plots: 16 QAM with 5 MHz 1 RB channel bandwidth**

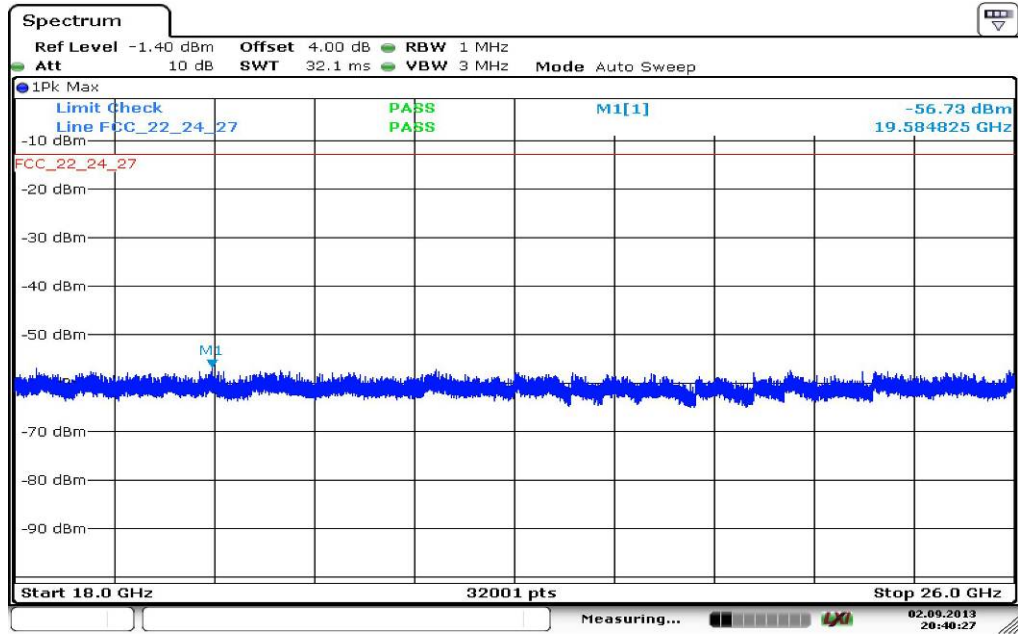
**Plot 1: lowest channel, 30 MHz to 12.75 GHz**



**Plot 2: lowest channel, 12.75 GHz to 18 GHz**

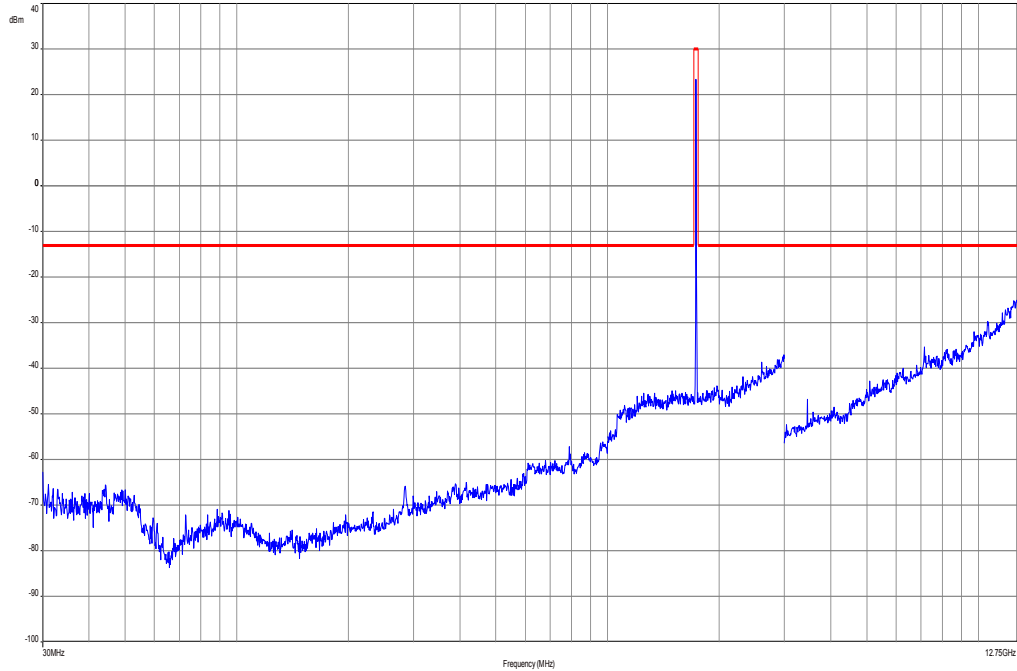


Plot 3: lowest channel, 18 GHz to 26 GHz

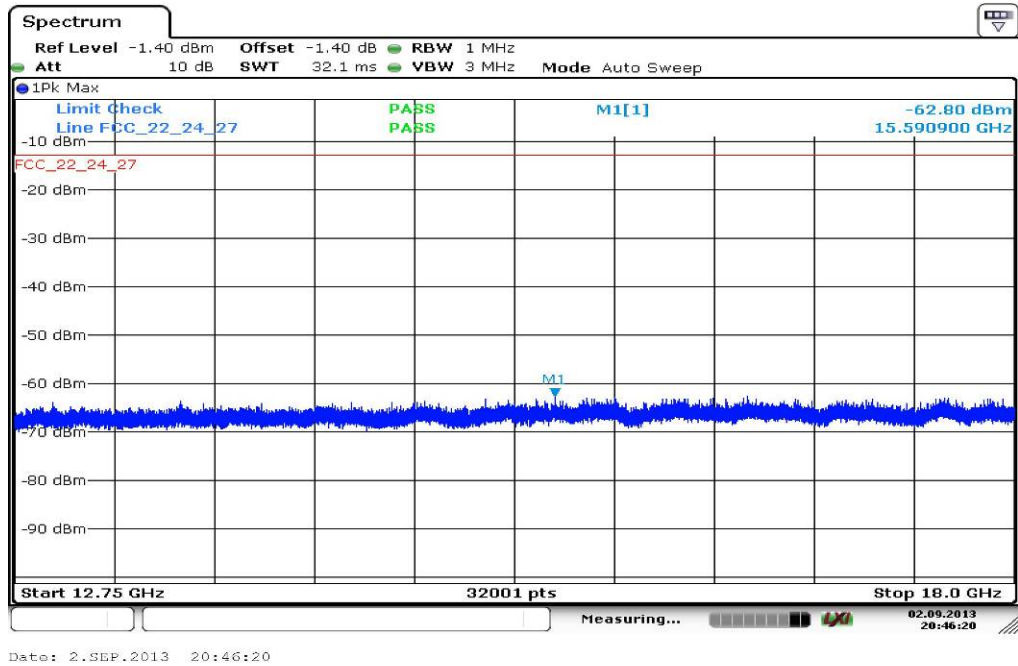


Date: 2.SEP.2013 20:40:27

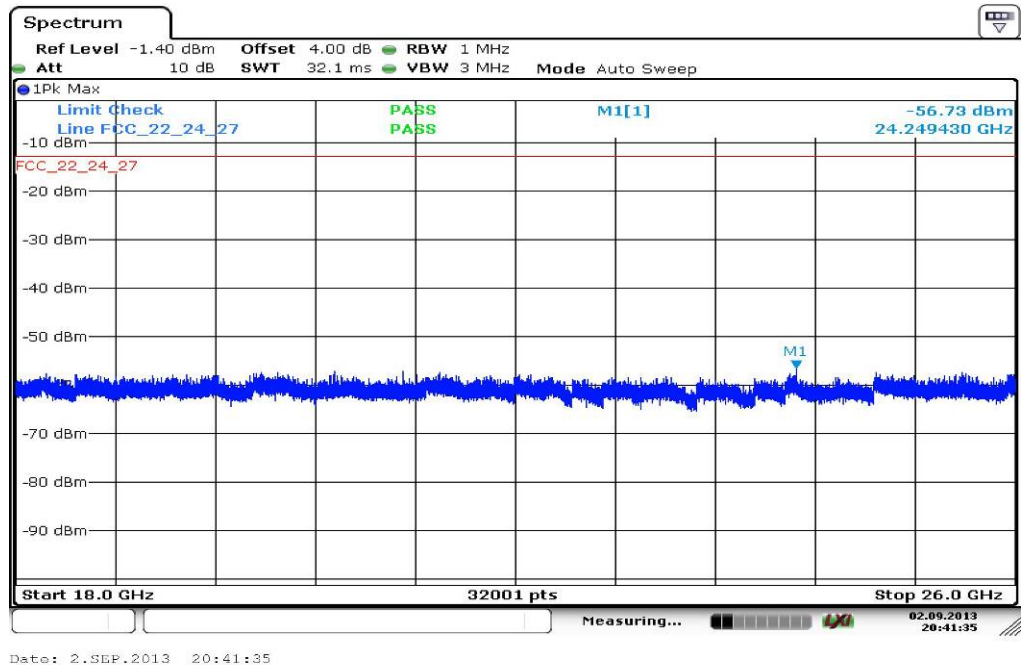
Plot 4: middle channel, 30 MHz to 12.75 GHz



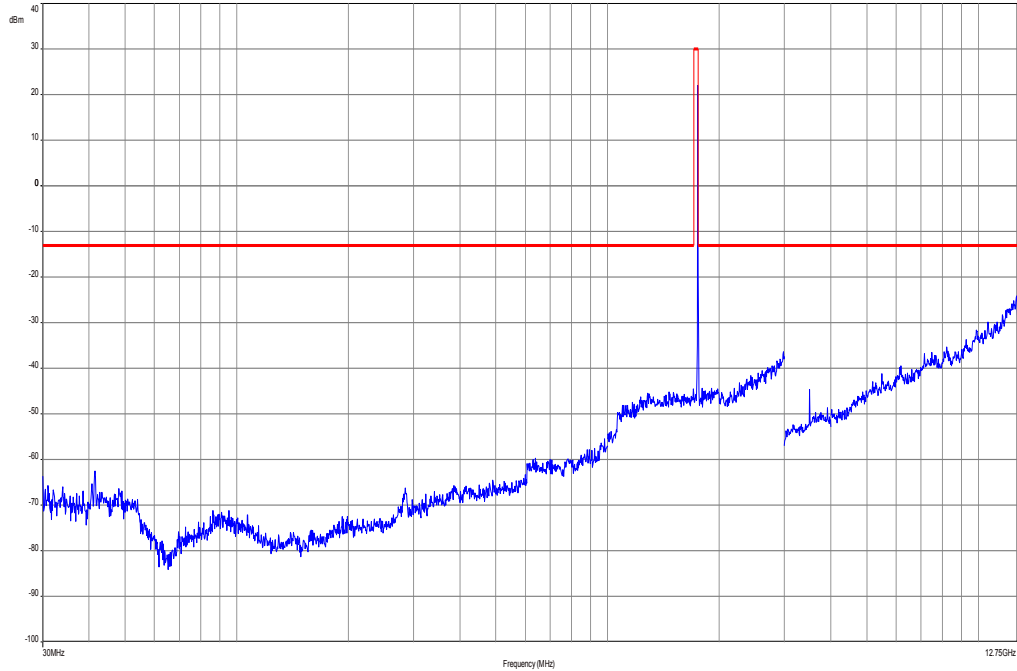
Plot 5: middle channel, 12.75 GHz to 18 GHz



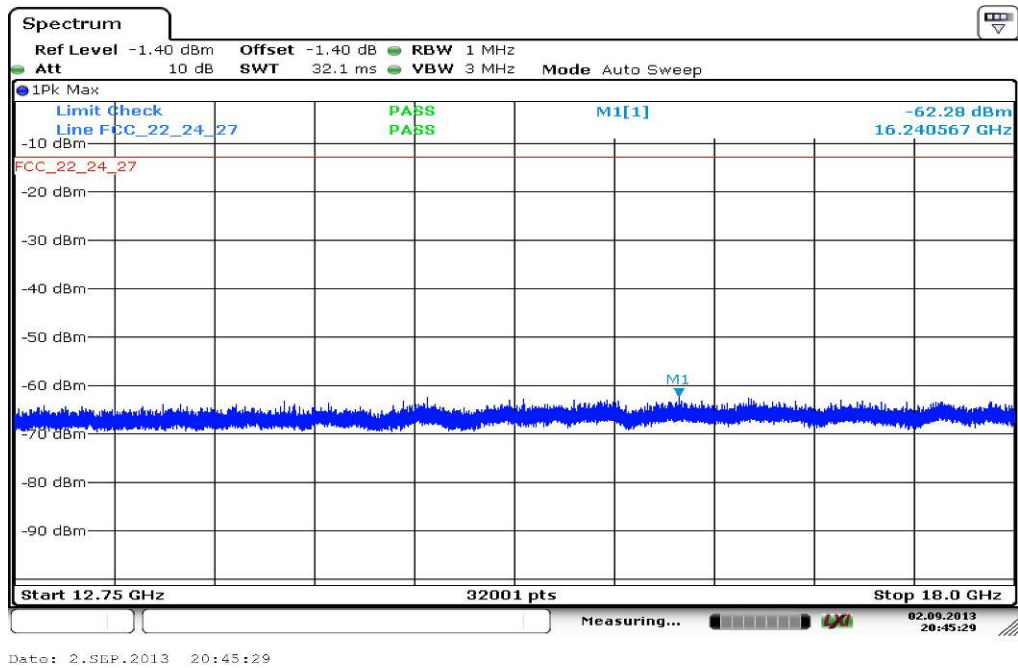
Plot 6: middle channel, 18 GHz to 26 GHz



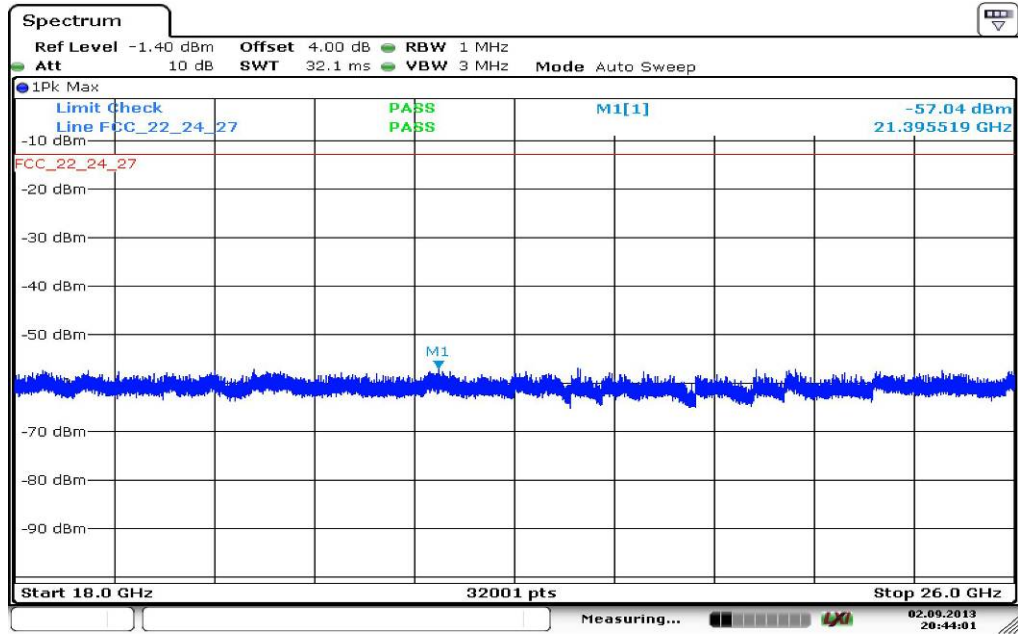
Plot 7: highest channel, 30 MHz to 12.75 GHz



Plot 8: highest channel, 12.75 GHz to 18 GHz



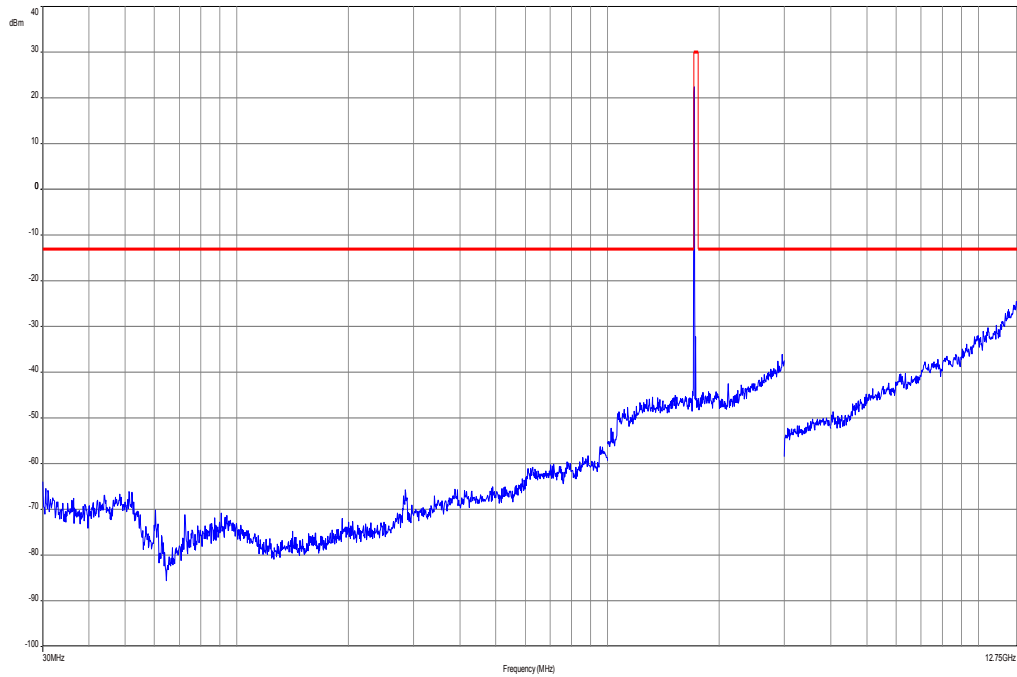
Plot 9: highest channel, 18 GHz to 26 GHz



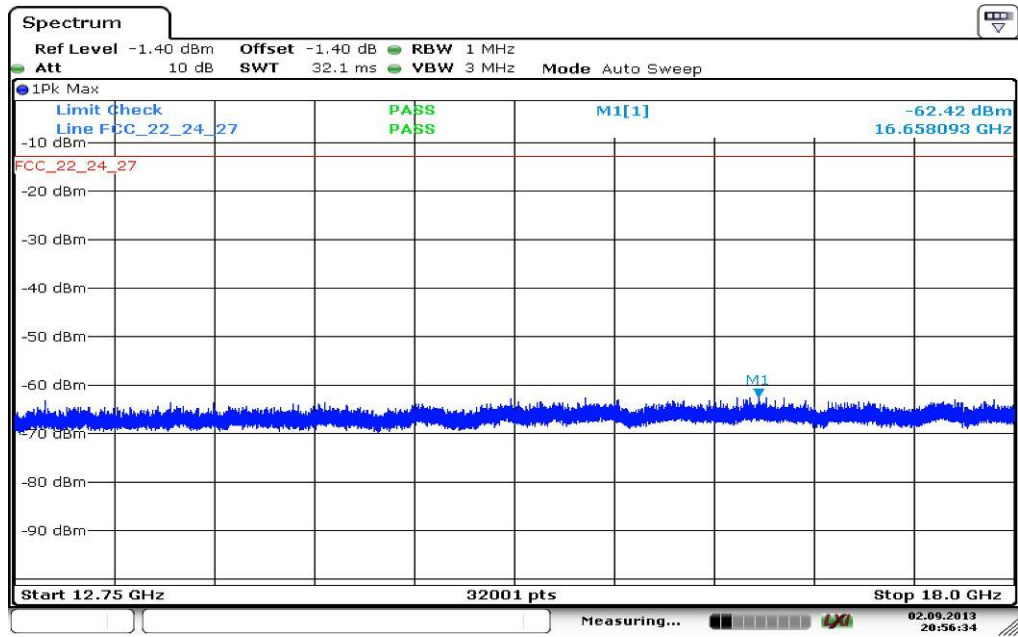
Date: 2.SEP.2013 20:44:01

**Plots: QPSK with 10 MHz 1 RB channel bandwidth**

**Plot 1: lowest channel, 30 MHz to 12.75 GHz**



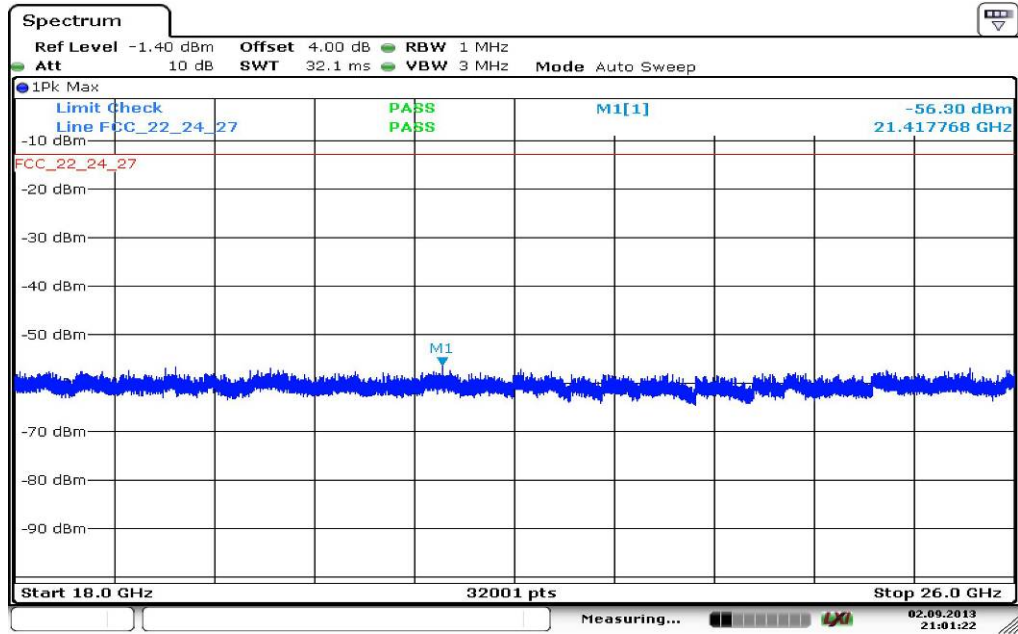
**Plot 2: lowest channel, 12.75 GHz to 18 GHz**



Date: 2.SEP.2013 20:56:34

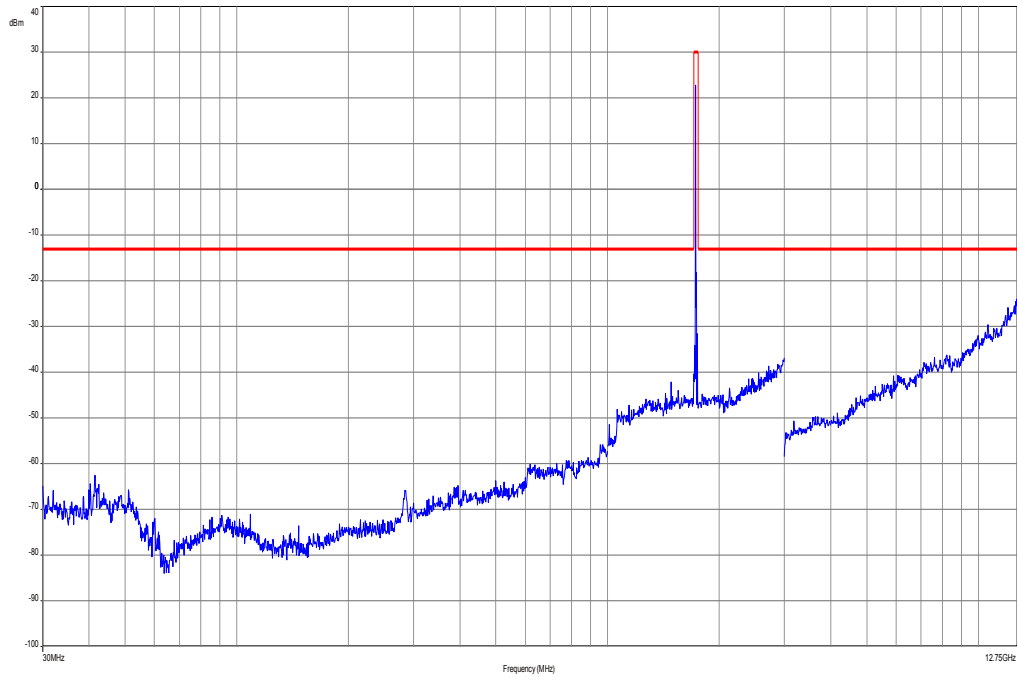


Plot 3: lowest channel, 18 GHz to 26 GHz

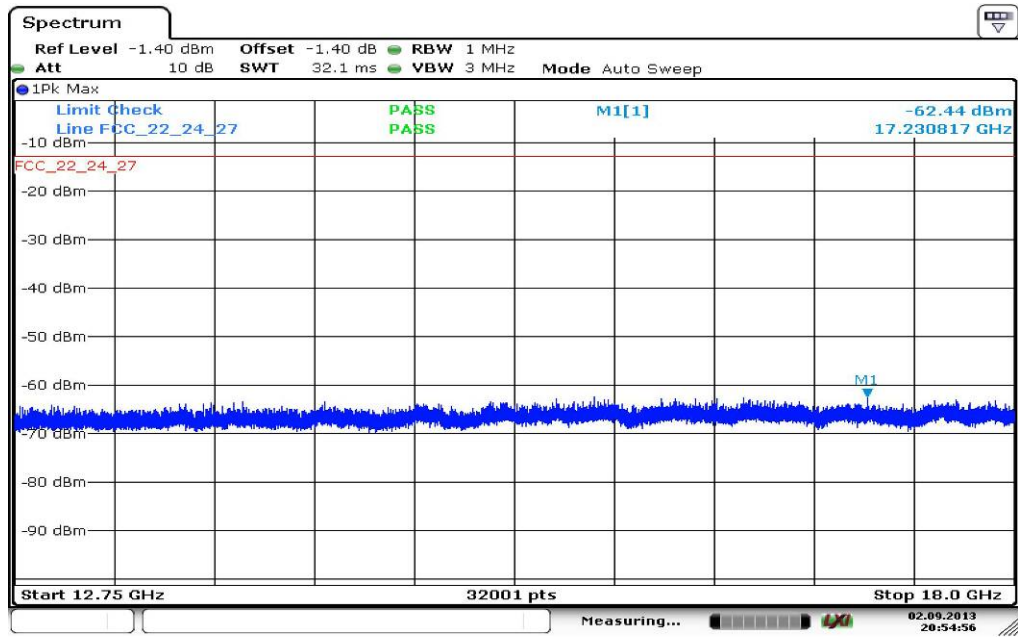


Date: 2.SEP.2013 21:01:22

Plot 4: middle channel, 30 MHz to 12.75 GHz

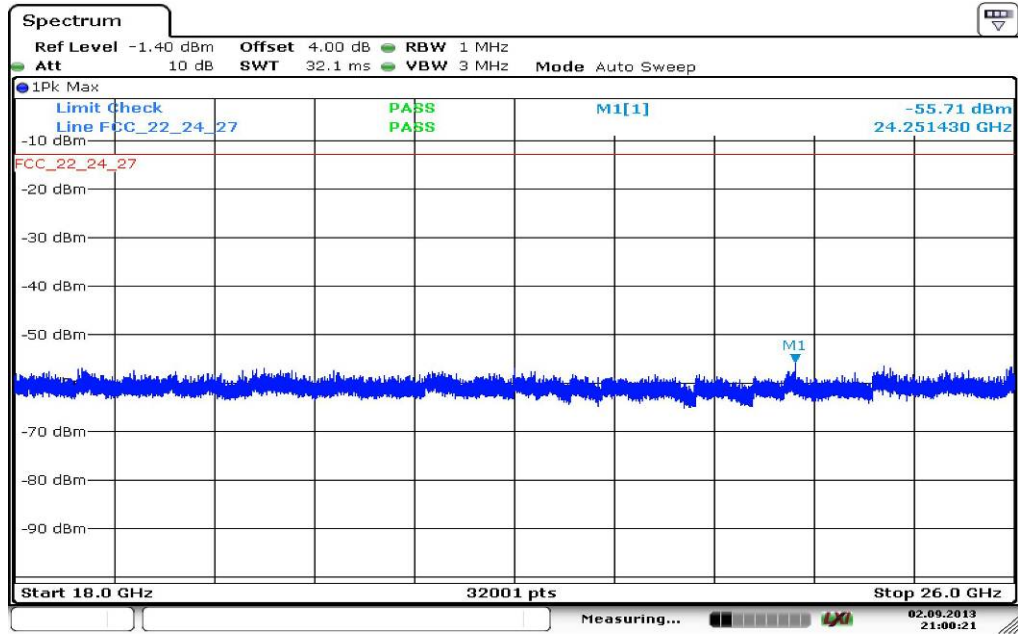


Plot 5: middle channel, 12.75 GHz to 18 GHz



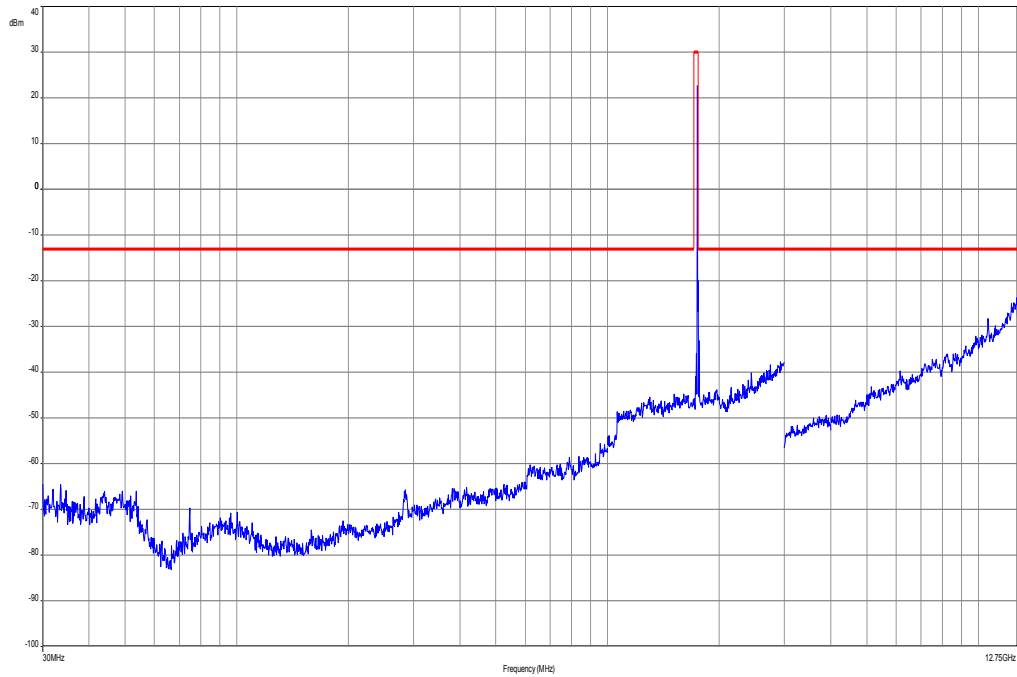
Date: 2.SEP.2013 20:54:56

Plot 6: middle channel, 18 GHz to 26 GHz

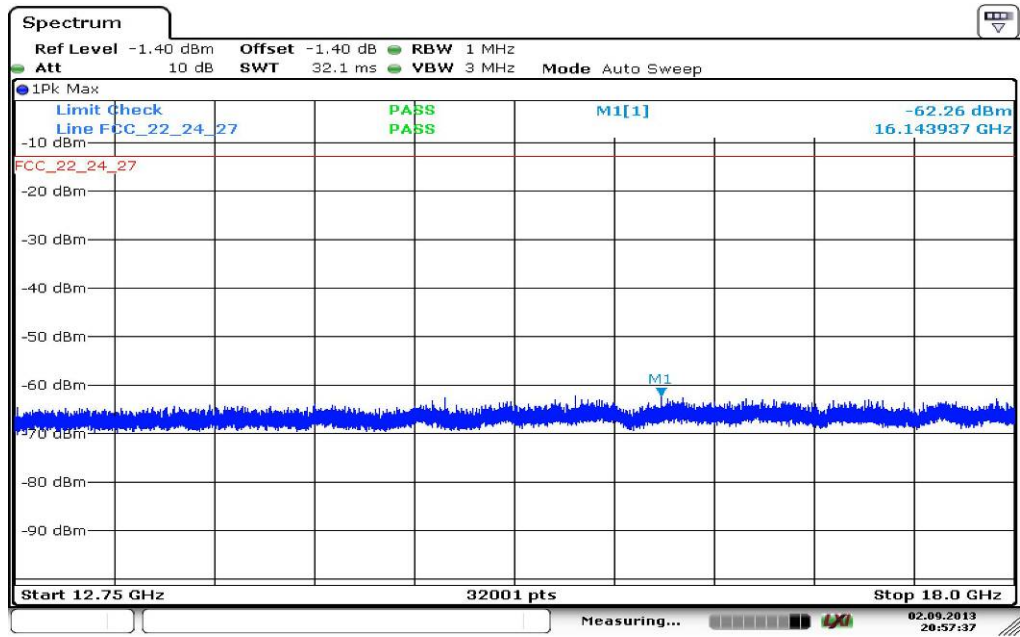


Date: 2.SEP.2013 21:00:21

Plot 7: highest channel, 30 MHz to 12.75 GHz

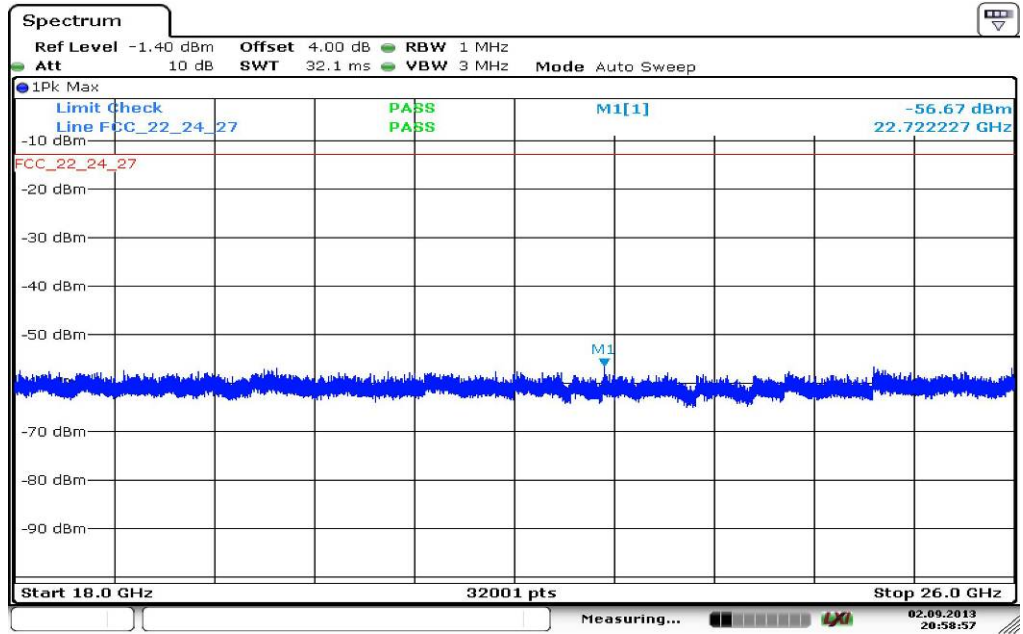


Plot 8: highest channel, 12.75 GHz to 18 GHz



Date: 2.SEP.2013 20:57:37

Plot 9: highest channel, 18 GHz to 26 GHz



Date: 2.SEP.2013 20:58:57

#### **9.4.4 Spurious emissions conducted**

Not performed – tests according to manufacturer test plan.

#### **9.4.5 Block edge compliance**

Not performed – tests according to manufacturer test plan.

#### **9.4.6 Occupied bandwidth**

Not performed – tests according to manufacturer test plan.

## 9.5 Results LTE – Band 17

The EUT was set to transmit the maximum power.

### 9.5.1 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:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	Depends on Channel Bandwidth
Resolution bandwidth:	Depends on Channel Bandwidth
Span:	Zero Span
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 27.53 CFR Part 2.1046	RSS 139
Nominal Peak Output Power	
+35.00 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)
5	706.5	1 RB low	21.7	4.97	21.5	5.93
		1 RB high	21.8	5.07	21.4	5.96
		50% RB mid	20.9	5.96	20.1	6.84
		100% RB	20.8	6.49	19.9	7.37
	710.0	1 RB low	21.9	5.25	21.5	5.15
		1 RB high	22.0	5.30	21.7	5.26
		50% RB mid	21.0	6.84	20.1	6.18
		100% RB	21.0	7.27	20.1	6.24
	713.5	1 RB low	21.9	4.93	20.8	6.10
		1 RB high	21.7	5.04	20.6	6.25
		50% RB mid	21.1	6.16	20.3	6.89
		100% RB	21.1	6.23	20.3	7.66
10	709.0	1 RB low	21.9	5.97	21.2	5.29
		1 RB high	22.1	6.11	21.6	5.57
		50% RB mid	21.0	6.99	20.0	6.10
		100% RB	20.9	7.25	20.0	6.27
	710.0	1 RB low	21.5	5.07	21.1	5.93
		1 RB high	22.0	5.02	20.6	6.38
		50% RB mid	21.1	6.25	20.2	7.29
		100% RB	21.2	6.42	20.1	7.31
	711.0	1 RB low	21.1	6.72	20.0	5.33
		1 RB high	21.7	6.76	20.6	5.29
		50% RB mid	21.3	7.32	20.3	6.00
		100% RB	21.2	7.33	20.3	6.26
Measurement uncertainty			± 0.5 dB			



The output power was measured with the lowest supported channel bandwidth and with the number of resource blocks where the highest output power conducted was found.

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
5	706.5	17.9	17.0
	710.0	16.8	15.9
	713.5	18.1	17.3
10	709.0	18.0*)	17.1*)
	710.0	17.0*)	15.9*)
	711.0	18.2*)	17.3*)
Measurement uncertainty		± 3.0 dB	

\*) calculated with antenna gain

	Gain (dBi)
low channel	-2.88
mid channel	-4.17
high channel	-3.00

**Result: Passed**

## 9.5.2 Frequency stability

Not performed – tests according to manufacturer test plan.

### 9.5.3 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 746 MHz. This was rounded up to 12 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 17.

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 s
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	-/-
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P. Power in Watts)	
-13 dBm	

**Results:**

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the LTE band 17. It was decided that measurements at these three carrier frequencies 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 17 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)					
Lowest channel		Middle channel		Highest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
All detected emissions are more than 20 dB below the limit!			All detected emissions are more than 20 dB below the limit!		
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty			± 3dB		

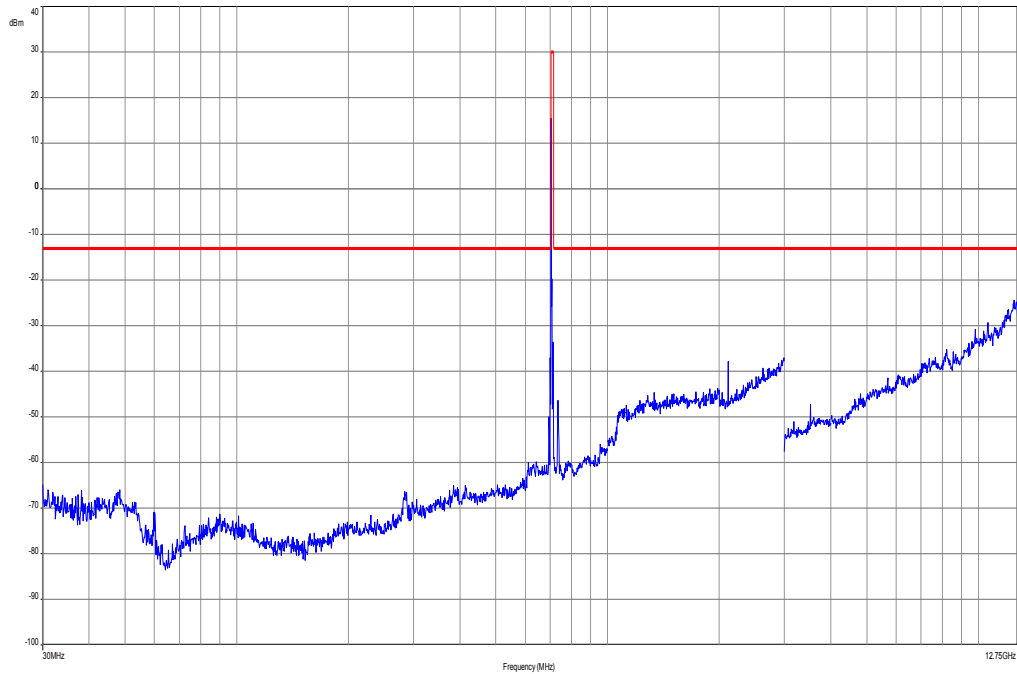
**16-QAM**

Spurious Emission Level (dBm)					
Lowest channel		Middle channel		Highest channel	
Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]	Spurious emissions	Level [dBm]
All detected emissions are more than 20 dB below the limit!			All detected emissions are more than 20 dB below the limit!		
	-		-		-
	-		-		-
	-		-		-
Measurement uncertainty			± 3dB		

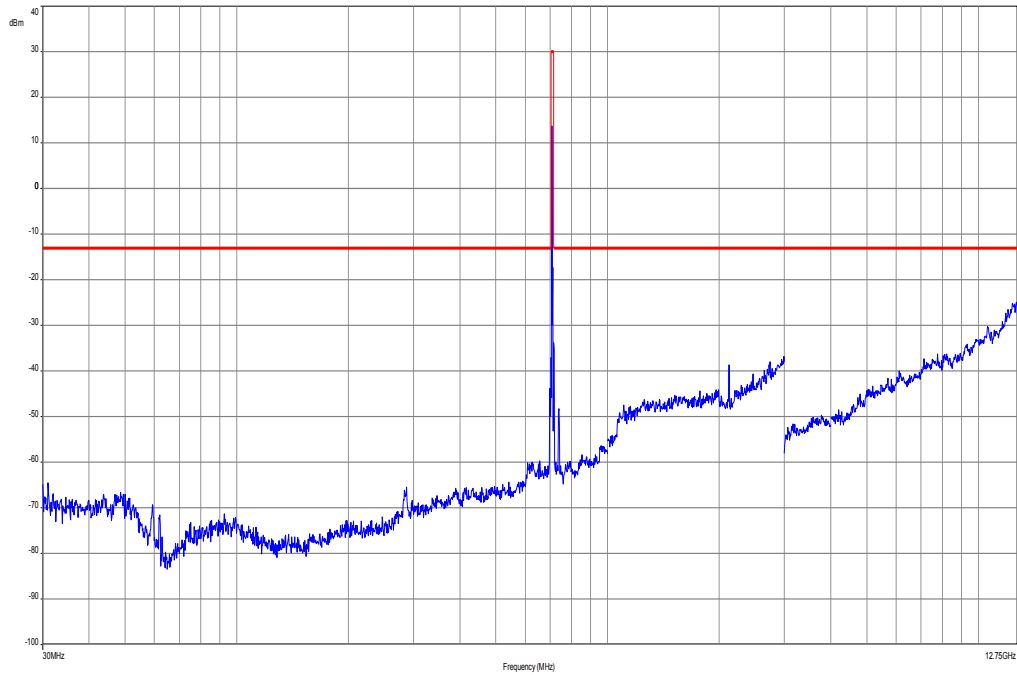
**Result: Passed**

**Plots: QPSK with 10 MHz channel bandwidth**

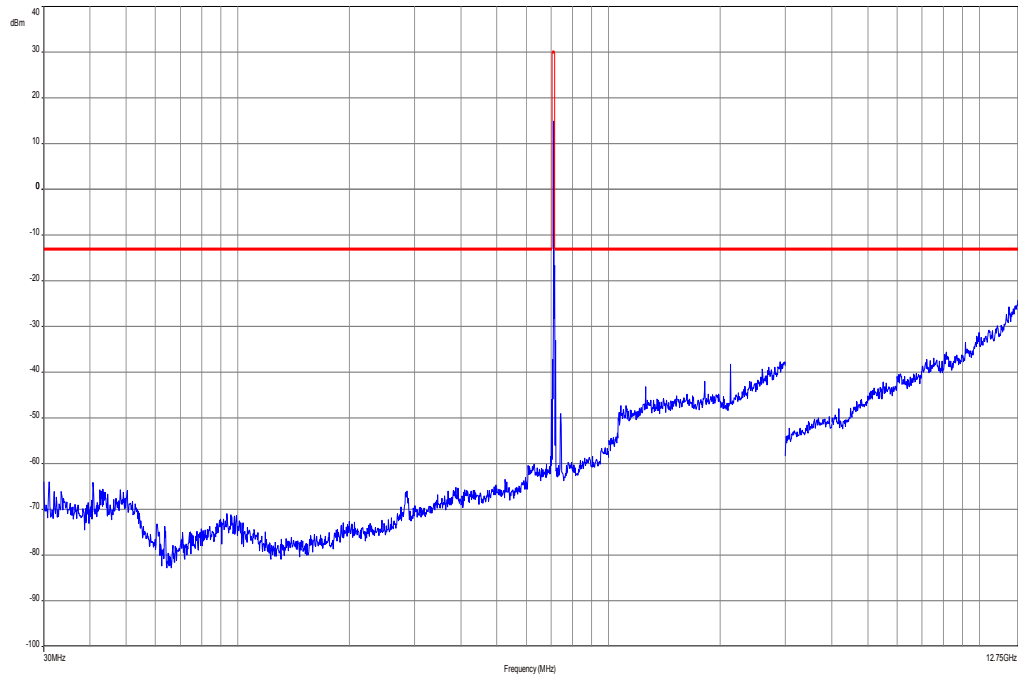
**Plot 1: lowest channel, 30 MHz to 12.75 GHz**



**Plot 2: middle channel, 30 MHz to 12.75 GHz**

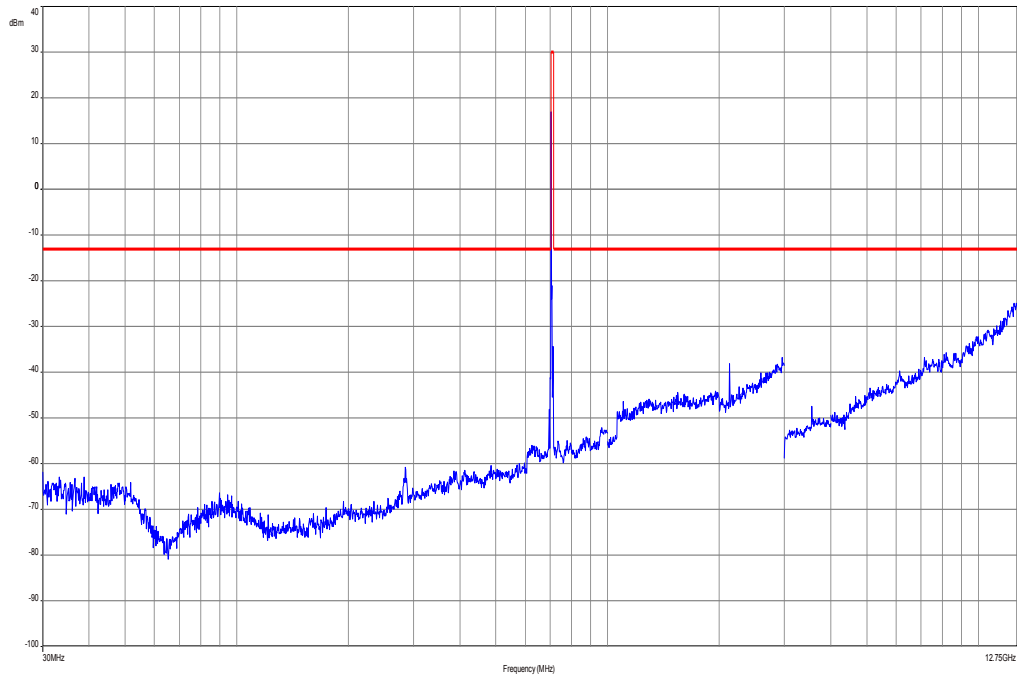


Plot 3: highest channel, 30 MHz to 12.75 GHz

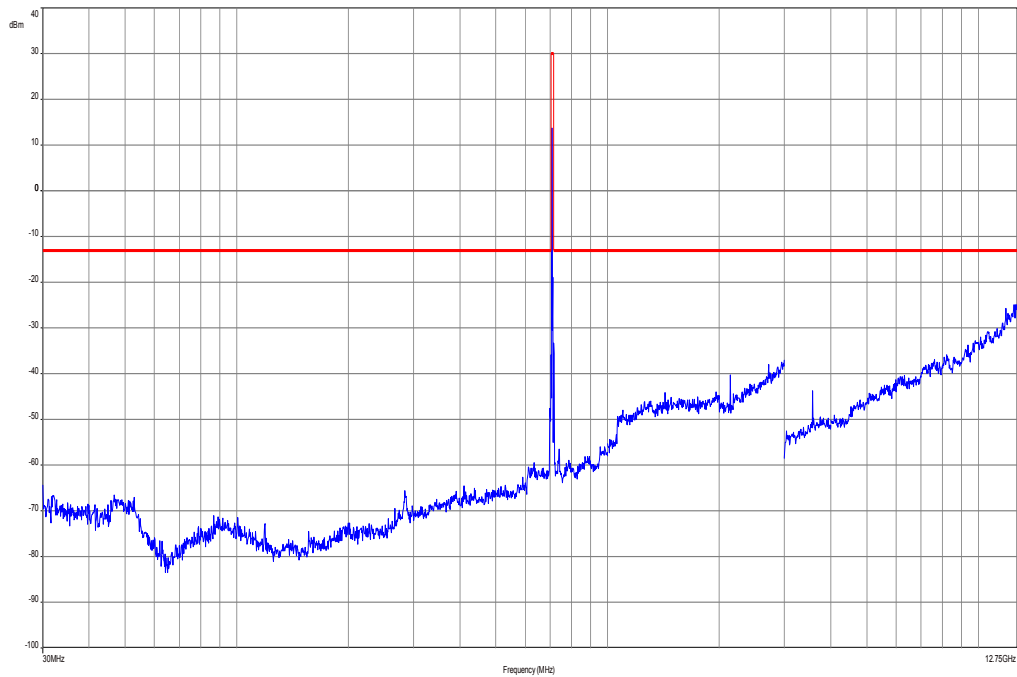


**Plots: 16 – QAM with 5 MHz channel bandwidth**

**Plot 1: lowest channel, 30 MHz to 12.75 GHz**

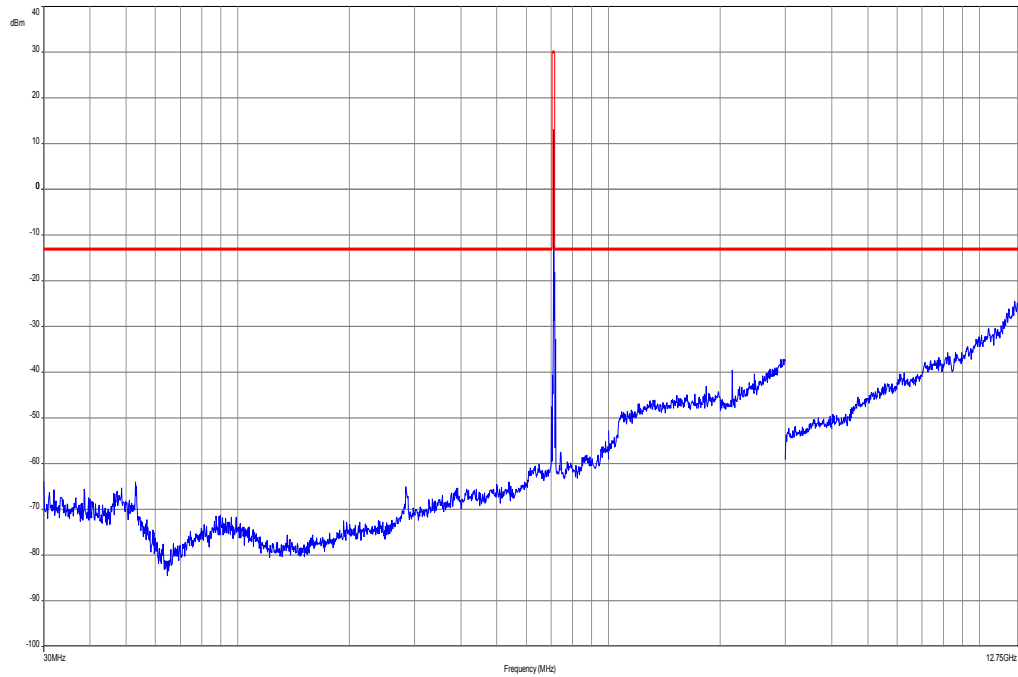


**Plot 2: middle channel, 30 MHz to 12.75 GHz**





Plot 3: highest channel, 30 MHz to 12.75 GHz



#### 9.5.4 Spurious emissions conducted

Not performed – tests according to manufacturer test plan.

#### 9.5.5 Block edge compliance

Not performed – tests according to manufacturer test plan.

#### 9.5.6 Occupied bandwidth

Not performed – tests according to manufacturer test plan.

## 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.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vKI!	08.05.2013	08.05.2015
2	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
3	n. a.	Three-Way Power Splitter. 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
4	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
5	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
6	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vKI!	14.10.2011	14.10.2014
7	n. a.	MXE EMI Receiver 20 Hz bis 26.5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
8	11b	Microwave System Amplifier. 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
9	A025	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000786	ne		
10	A027	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300000486	ne		
11	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2012	22.10.2013

### 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
vKI!	Attention: extended calibration interval	*)	next calibration ordered / currently in progress
NK!	Attention: not calibrated		

## 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	2013-09-04
-A	Correction of RF output limit LTE17	2013-09-20

**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

Front side of certificate



Deutsche Akkreditierungsstelle GmbH

Befehlense gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV  
 Unterzeichnerin der Multilateralen Abkommen  
 von EA, ILAC und IAF zur gegenseitigen Anerkennung

**Akkreditierung**



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

**CETECOM ICT Services GmbH**  
 Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

- Drahtgebundene Kommunikation einschließlich xDSL
- VoIP und DECT
- Akustik
- Funk einschließlich WLAN
- Short Range Devices (SRD)
- RFID
- WiFiMax und Richtfunk
- Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
- Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
- Produktsicherheit
- SAR und Hearing Aid Compatibility (HAC)
- Umweltsimulation
- Smart Card Terminals
- Bluetooth
- Wi-Fi-Services

Die Akkreditierungskunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 80 Seiten.

Registrierungsnummer der Urkunde: D-PL-12076-01-01

Frankfurt am Main, 18.01.2013

Bitte Hinweise auf der Rückseite

Im Auftrag  
 Dr. Ingrid Pfeiffer  
 Abteilungsleiterin

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin  
 Spittelmarkt 10  
 10117 Berlin

Standort Frankfurt am Main  
 Gartenstraße 6  
 60594 Frankfurt am Main

Standort Braunschweig  
 Bundesallee 100  
 38116 Braunschweig

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Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAKKS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abl. L 218 vom 9. Juli 2008, S. 30). Die DAKKS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

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 ILAC: [www.ilac.org](http://www.ilac.org)  
 IAF: [www.iaf.nu](http://www.iaf.nu)

### 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/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>