

## TEST REPORT

Test report no.: 1-6234/13-08-03



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

**Research In Motion Limited**

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Waterloo, ON N2L 3W8 / CANADA

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### Manufacturer

**Research In Motion Limited**

305 Phillip Street

Waterloo, ON N2L 3W8 / CANADA

### Test standard/s

47 CFR Part 22

Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services

RSS - 132 Issue 3

Spectrum Management and Telecommunications Radio Standards Specification - Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 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 5 - 824.7 MHz to 848.3 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:	2013-09-04
Person(s) present during the test:	-/-

## 3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 22	01.10.2012	Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services
RSS - 132 Issue 3	01.01.2013	Spectrum Management and Telecommunications Radio Standards Specification - Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 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:		53 %
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 5 - 824.7 MHz to 848.3 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

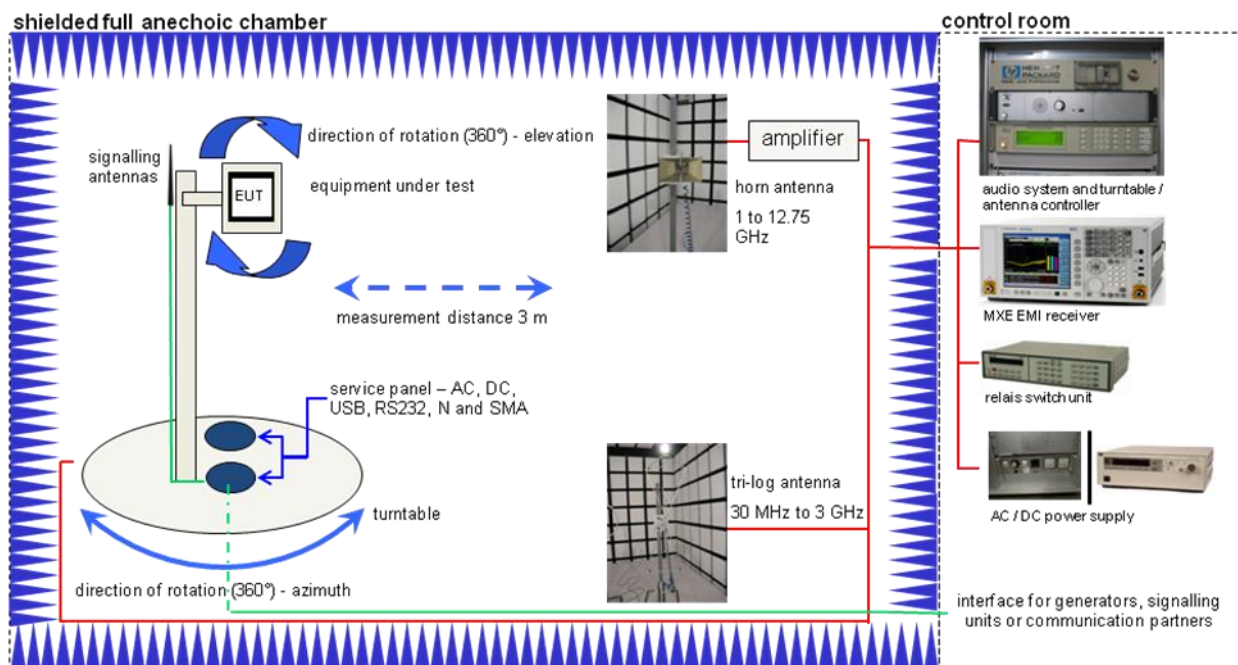
Reference documents: RIM\_EMI\_Matrix for Cetecom\_King\_RGF111LW (Aug-12-2013)

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
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

## 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 22 RSS 132	passed	2013-09-04	Tests according to manufacturer test plan.

### 9.1 LTE band V

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

## 10 Results LTE band V

The EUT was set to transmit the maximum power.

### 10.1.1 RF output power

#### Description:

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

#### Measurement:

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

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

Measurement parameters
Measured with CMW500

#### Limits:

FCC	IC
CFR Part 22.913 CFR Part 2.1046	RSS 132
Nominal Peak Output Power	
+38.45 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	824.7	1 RB low	23.1	5.56	22.5	6.07
		1 RB high	23.1	5.49	22.4	6.10
		50% RB mid	22.9	5.34	22.1	6.70
		100% RB	21.8	6.25	20.6	7.26
	836.5	1 RB low	22.9	5.98	21.6	4.58
		1 RB high	22.7	5.95	21.6	4.70
		50% RB mid	22.5	6.46	21.7	5.53
		100% RB	21.5	6.73	20.7	6.78
	848.3	1 RB low	22.5	5.37	21.8	5.85
		1 RB high	22.4	5.35	21.8	5.90
		50% RB mid	22.2	5.20	21.4	6.66
		100% RB	21.3	6.25	20.2	7.19
3	825.5	1 RB low	23.1	6.17	22.4	5.49
		1 RB high	22.8	5.93	22.4	5.46
		50% RB mid	21.8	7.05	20.7	6.26
		100% RB	21.9	6.64	20.9	5.93
	836.5	1 RB low	22.7	4.97	21.5	6.15
		1 RB high	22.7	4.50	21.6	5.68
		50% RB mid	21.4	6.39	20.6	6.75
		100% RB	21.7	6.51	20.8	6.69
	847.5	1 RB low	22.1	7.18	21.3	5.48
		1 RB high	22.2	6.54	21.2	5.02
		50% RB mid	21.2	7.30	20.4	6.54
		100% RB	21.4	7.15	20.4	6.46
5	826.5	1 RB low	23.1	5.20	22.8	5.96
		1 RB high	22.7	5.25	22.3	6.18
		50% RB mid	21.8	5.88	21.0	6.79
		100% RB	21.8	6.49	20.9	7.32
	836.5	1 RB low	22.7	5.50	22.1	5.25
		1 RB high	23.1	5.01	22.3	4.87
		50% RB mid	21.7	7.15	20.6	6.53
		100% RB	21.8	7.48	20.7	6.33
	846.5	1 RB low	22.5	5.47	21.3	6.70
		1 RB high	22.5	4.82	21.1	6.02
		50% RB mid	21.4	6.64	20.5	7.18
		100% RB	21.3	6.59	20.5	7.89

10	829	1 RB low	23.2	6.15	22.4	5.52
		1 RB high	22.6	6.15	22.0	5.57
		50% RB mid	21.7	7.36	20.7	6.59
		100% RB	21.5	7.76	20.5	6.32
	836.5	1 RB low	22.5	5.21	21.3	6.40
		1 RB high	22.6	4.95	21.4	6.16
		50% RB mid	21.9	6.36	20.9	7.47
		100% RB	21.8	6.47	20.7	7.36
	844	1 RB low	22.6	6.33	21.5	4.89
		1 RB high	22.1	6.62	21.0	5.07
		50% RB mid	21.5	8.11	20.6	6.59
		100% RB	21.3	7.78	20.4	6.36
Measurement uncertainty			± 0.5 dB			

The radiated 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	824.7	18.9	17.7
	836.5	18.3	17.5
	848.3	19.8	18.7
3	825.5	19.0*)	18.0*)
	836.5	18.5*)	17.6*)
	847.5	19.9*)	18.9*)
5	826.5	18.9*)	18.0*)
	836.5	18.6*)	17.5*)
	846.5	19.8*)	19.0*)
10	829.0	18.6*)	17.6*)
	836.5	18.6*)	17.5*)
	844.0	19.8*)	18.9*)
Measurement uncertainty		± 3.0 dB	

\*) calculated with antenna gain

	Gain (dBi)
Low channel	-2.86
Mid channel	-3.24
High channel	-1.47

**Result:** **Passed**

### 10.1.2 Frequency stability

Not performed – tests according to manufacturer test plan.

### 10.1.3 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 846.6 MHz. This was rounded up to 12 GHz. The resolution bandwidth is set as outlined in Part 22.917. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE band V.

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 22.917 CFR Part 2.1053	RSS 132
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

**Results:**

Radiated emissions measurements were made only with 5 MHz bandwidth and 1 RB in QPSK and . 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 / 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	1658.0	-/-	2	1673.0	-/-	2	1688.0	-/-
3	2487.0	-/-	3	2509.5	-/-	3	2532.0	-/-
4	3316.0	-/-	4	3346.0	-/-	4	3376.0	-/-
5	4145.0	-/-	5	4182.5	-/-	5	4220.0	-/-
6	4974.0	-/-	6	5019.0	-/-	6	5064.0	-/-
7	5803.0	-/-	7	5855.5	-/-	7	5908.0	-/-
8	6632.0	-/-	8	6692.0	-/-	8	6752.0	-/-
9	7461.0	-/-	9	7528.5	-/-	9	7596.0	-/-
10	8290.0	-/-	10	8365.0	-/-	10	8440.0	-/-
Measurement uncertainty					± 3dB			

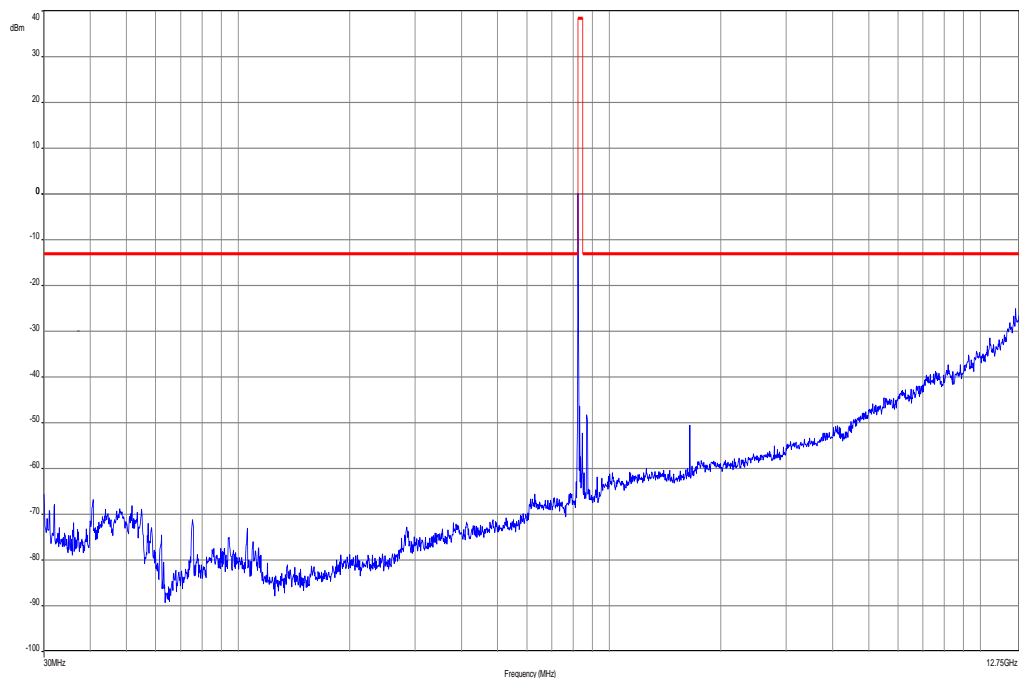
Note:

All detected emissions are more than 20 dB below the limit!

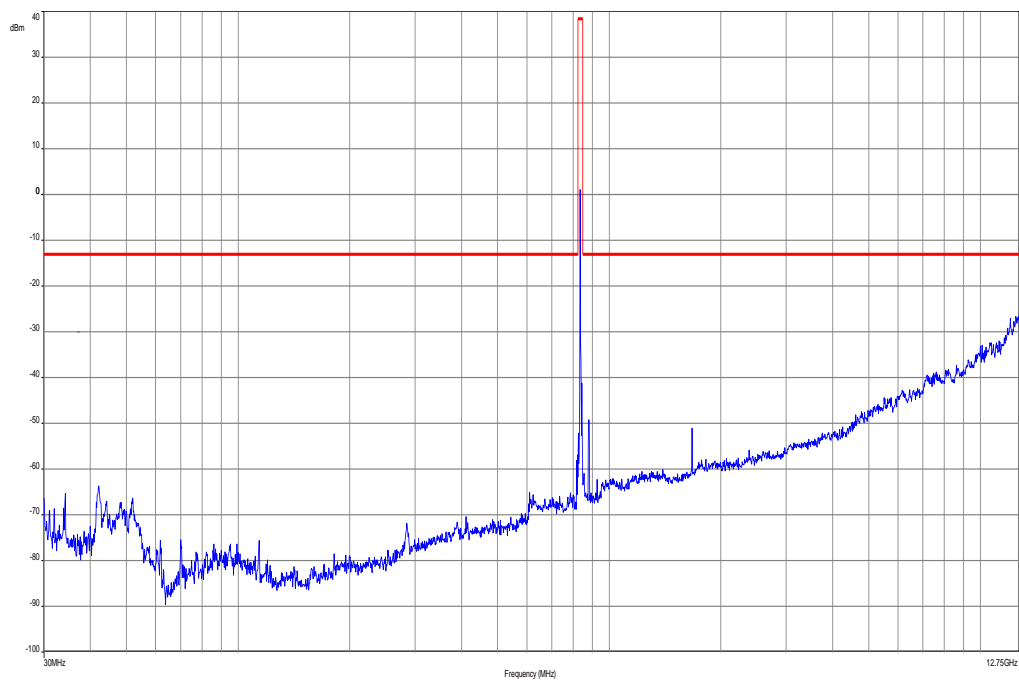
**Result:** **Passed**

**QPSK with 5 MHz channel bandwidth**

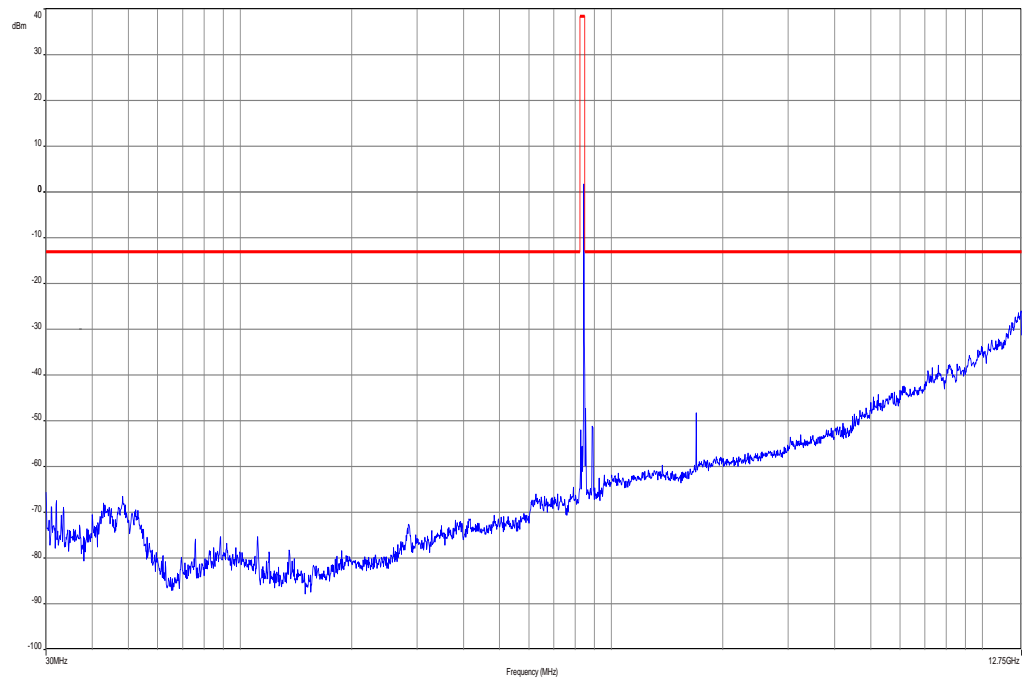
**Plot 1:** Channel 20425 (30 MHz – 12.75 GHz)



**Plot 2:** Channel 20525 (30 MHz – 12.75 GHz)



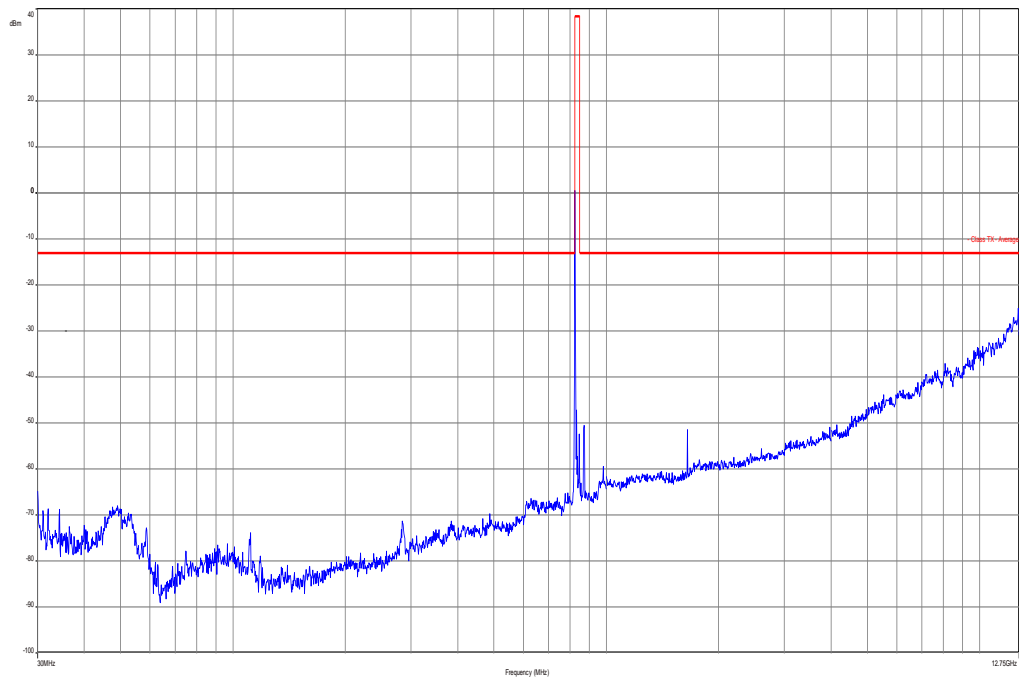
**Plot 3:** Channel 20625 (30 MHz – 12.75 GHz)



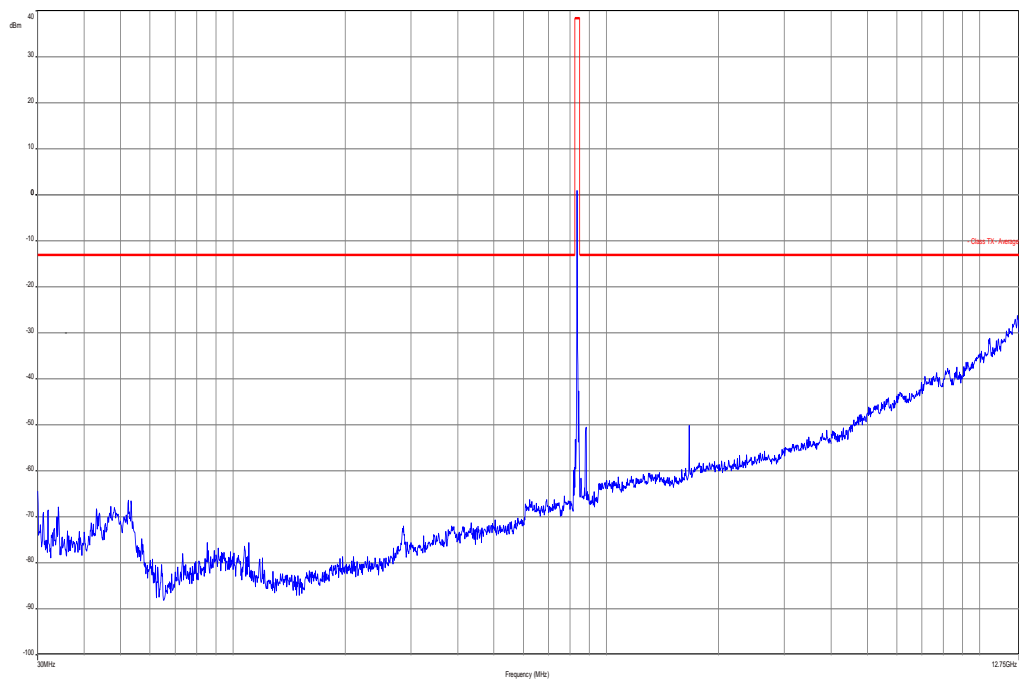


**16-QAM with 5 MHz channel bandwidth**

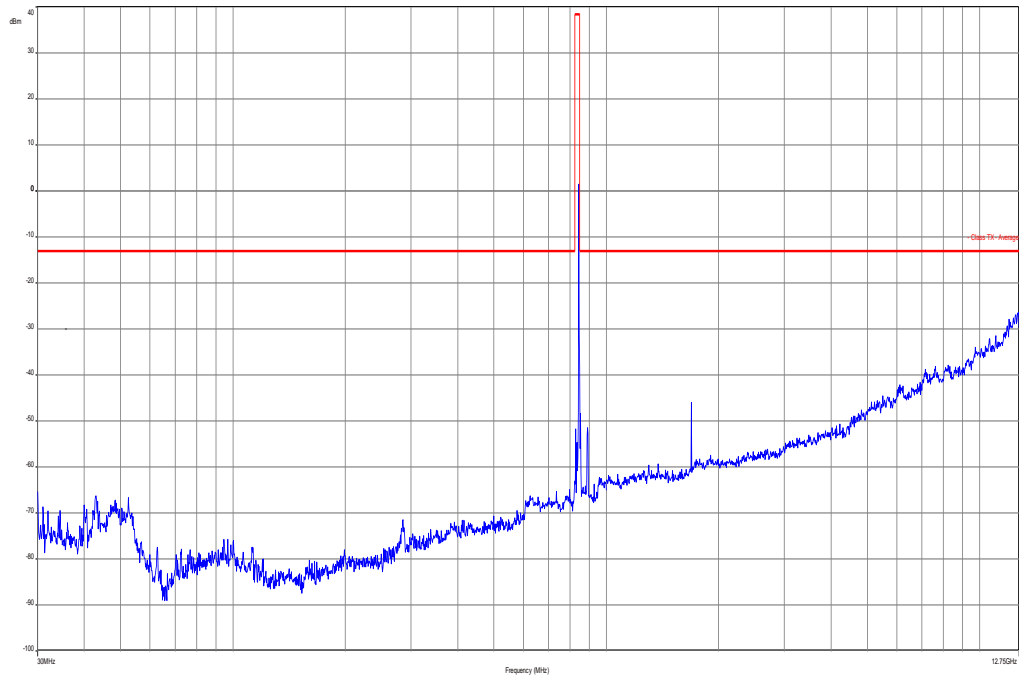
**Plot 1:** Channel 20425 (30 MHz – 12.75 GHz)



**Plot 2:** Channel 20525 (30 MHz – 12.75 GHz)



**Plot 3:** Channel 20625 (30 MHz – 12.75 GHz)



#### **10.1.4 Spurious emissions conducted**

Not performed – tests according to manufacturer test plan.

#### **10.1.5 Block edge compliance**

Not performed – tests according to manufacturer test plan.

#### **10.1.6 Occupied bandwidth**

Not performed – tests according to manufacturer test plan.

## 11 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	vIKI!	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.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	371	300003854	vIKI!	14.10.2011	14.10.2014
6	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologi es	MY51210197	300004405	k	21.02.2013	21.02.2014

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

## 12 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

**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

### Back side of certificate