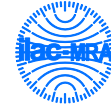


## TEST REPORT

Test report no.: 1-6965/13-04-04-A



Deutsche  
Akkreditierungsstelle  
D-PL-12076-01-01

### Testing laboratory

**CETECOM ICT Services GmbH**  
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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 Communications & Compatibility Testing (RCT)

### Applicant

**Sony Mobile Communications AB**  
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22188 Lund / SWEDEN  
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### Manufacturer

**Sony Mobile Communications AB**  
Nya Vattentorget  
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

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

### Test Item

**Kind of test item:** Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDD/III/IV/V/VIII; LTE FDD1/2/3/4/5/7/8/13/17/20; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS  
**Type name:** PM-0740-BV  
**FCC ID:** PY7PM-0740  
**Frequency:** LTE FDD 2:1850 MHz to 1910 MHz  
**Technology tested:** LTE FDD 2  
**Antenna:** Integrated antenna  
**Power supply:** 3.7 V DC by Li - polymer battery  
**Temperature range:** -30°C to +60°C

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

**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 Results LTE band II** .....8

        8.2.1 RF output power .....8

        8.2.2 Frequency stability .....12

        8.2.3 Spurious emissions radiated .....14

        8.2.4 Spurious emissions conducted .....21

        8.2.5 Block edge compliance .....52

        8.2.6 Occupied bandwidth .....65

**9 Test equipment and ancillaries used for tests** .....73

**10 Observations** .....74

**Annex A Document history** .....75

**Annex B Further information**.....75

**Annex C Accreditation Certificate** .....76

## 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.

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

### 2.2 Application details

Date of receipt of order:	2013-11-29
Date of receipt of test item:	2013-12-02
Start of test:	2013-12-04
End of test:	2013-12-19
Person(s) present during the test:	-/-

## 3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 24		Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications 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:		42 %
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	:	Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDD/II/IV/V/VIII; LTE FDD1/2/3/4/5/7/8/13/17/20; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS
Type name	:	PM-0740-BV
S/N serial number	:	Cond: CB5A1W1HRO, CB5A1W1HP7 Rad: CB5A1W1HQ9, CB5A1W1HRX
HW hardware status	:	AP1.1
SW software status	:	17.0.A.0.256
Frequency band [MHz]	:	LTE FDD 2: 1850 MHz to 1910 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: 1-6965/13-04-01\_AnnexA  
1-6965/13-04-01\_AnnexB  
1-6965/13-04-01\_AnnexC

#### 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	passed	2014-01-22	-/-

### 7.1 LTE band II

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 checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

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

## 8 RF measurements

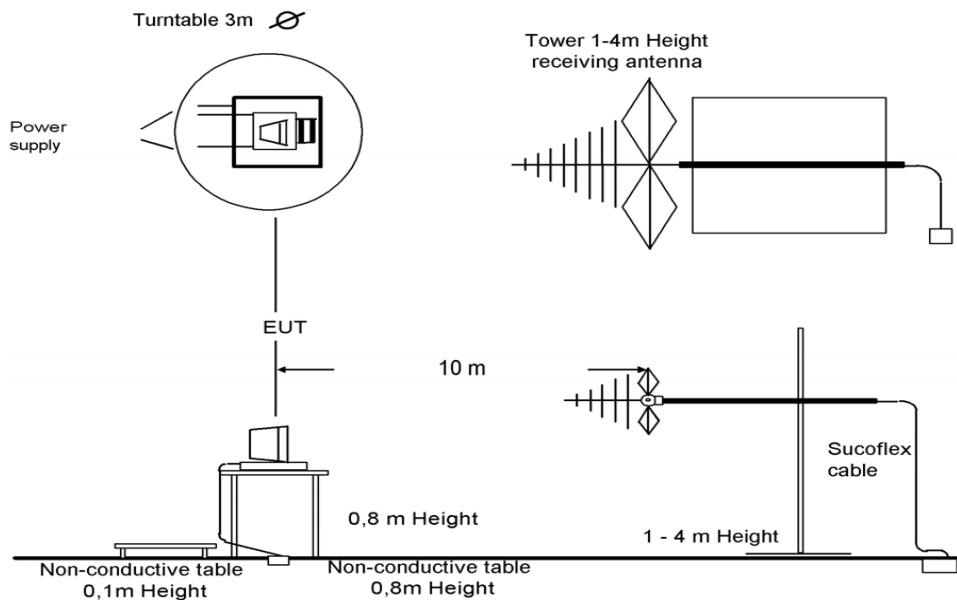
### 8.1 Description of test setup

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

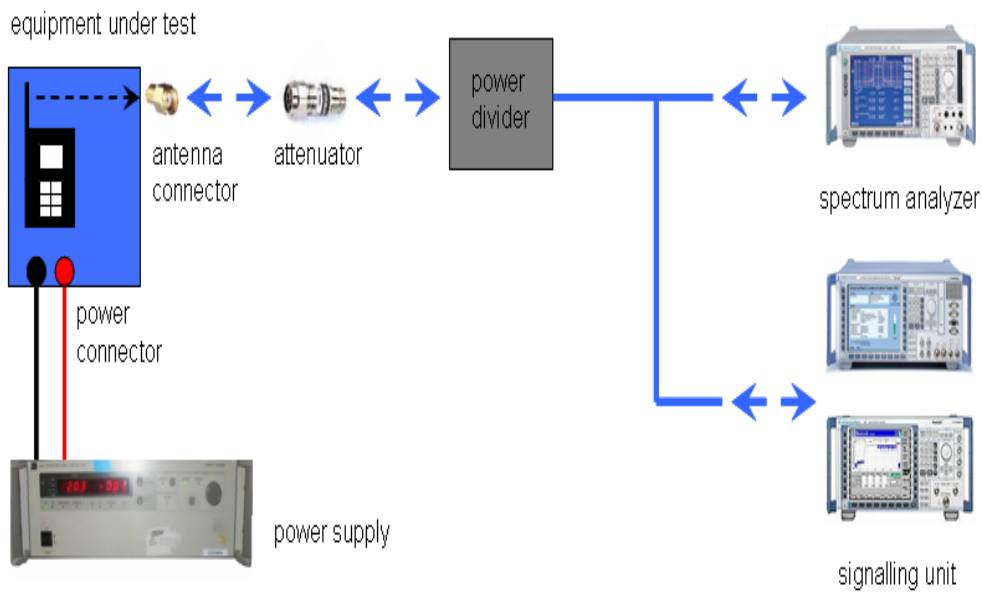
- 9 kHz - 30 MHz: active loop antenna
- 30 MHz – 1 GHz: tri-log antenna
- > 1 GHz: horn antenna

Frequency being measured f	Measuring receiver bandwidth 6 dB	Spectrum analyser bandwidth 3dB
$f < 150 \text{ kHz}$	200 Hz or	300 Hz
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	9 kHz or	10 kHz
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	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.

### 8.1.2 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
10 MHz ≤ f < 1000 MHz	120 kHz or	100 kHz
1000 MHz ≤ f		1 MHz
NOTE: Specific requirements in CEPT/ERC/Recommendation 70-03 [2] shall be applied where applicable.		

## 8.2 Results LTE band II

The EUT was set to transmit the maximum power.

### 8.2.1 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	-/-
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	23.4	4.30	22.6	5.12
		1 RB high	23.4	4.38	22.6	5.16
		50% RB mid	23.4	4.42	22.3	5.41
		100% RB	22.4	5.38	21.2	6.37
	1880.0	1 RB low	23.3	5.60	22.3	4.74
		1 RB high	23.4	5.53	22.2	4.69
		50% RB mid	23.3	5.43	22.5	4.75
		100% RB	22.3	6.00	21.4	5.58
	1909.3	1 RB low	23.6	4.47	22.7	5.48
		1 RB high	23.6	4.49	22.7	5.46
		50% RB mid	23.6	4.67	22.5	5.65
		100% RB	22.6	5.71	21.6	6.18
3	1851.5	1 RB low	23.5	5.09	22.6	4.17
		1 RB high	23.5	5.36	22.6	4.50
		50% RB mid	22.4	5.93	21.1	4.90
		100% RB	22.4	6.33	21.4	5.63
	1880.0	1 RB low	23.3	4.51	22.2	5.25
		1 RB high	23.3	4.72	22.2	5.48
		50% RB mid	22.3	4.68	21.2	5.38
		100% RB	22.3	5.83	21.3	6.56
	1908.5	1 RB low	23.7	5.77	22.5	4.56
		1 RB high	23.7	5.70	22.4	4.36
		50% RB mid	22.6	5.72	21.5	4.92
		100% RB	22.6	6.29	21.6	5.37
5	1852.5	1 RB low	23.5	4.19	22.4	5.27
		1 RB high	23.4	4.69	22.3	5.44
		50% RB mid	22.4	5.07	21.4	5.95
		100% RB	22.5	5.53	21.4	6.43
	1880.0	1 RB low	23.3	4.26	22.5	4.73
		1 RB high	23.2	4.58	22.6	4.69
		50% RB mid	22.3	5.79	21.3	4.92
		100% RB	22.3	6.67	21.2	5.55
	1907.5	1 RB low	23.3	4.69	22.1	5.61
		1 RB high	23.6	4.47	22.4	5.72
		50% RB mid	22.6	5.03	21.5	5.89
		100% RB	22.6	5.57	21.5	6.63

10	1855	1 RB low	23.4	5.20	22.5	4.28
		1 RB high	23.3	5.36	22.5	4.72
		50% RB mid	22.4	5.89	21.4	5.01
		100% RB	22.4	6.63	21.3	5.91
	1880	1 RB low	23.2	4.55	22.3	5.49
		1 RB high	23.3	4.66	22.1	5.64
		50% RB mid	22.3	5.00	21.3	5.80
		100% RB	22.2	5.92	21.2	6.74
	1905	1 RB low	23.5	5.44	22.2	4.52
		1 RB high	23.6	5.88	22.3	4.56
		50% RB mid	22.2	5.96	21.2	5.05
		100% RB	22.3	6.18	21.3	5.26
15	1857.5	1 RB low	23.5	4.38	22.6	5.22
		1 RB high	23.2	4.86	22.4	5.49
		50% RB mid	22.4	5.02	21.4	5.95
		100% RB	22.5	5.51	21.4	6.38
	1880.0	1 RB low	23.2	5.43	22.6	4.78
		1 RB high	23.3	5.32	22.7	4.68
		50% RB mid	22.2	5.98	21.2	5.05
		100% RB	22.3	6.41	21.3	5.67
	1902.5	1 RB low	23.3	4.80	22.1	5.83
		1 RB high	23.5	4.63	22.3	5.84
		50% RB mid	22.3	4.98	21.1	5.84
		100% RB	22.3	5.67	21.3	6.53
20	1860	1 RB low	23.4	5.40	22.4	4.45
		1 RB high	23.2	5.60	22.3	5.07
		50% RB mid	22.3	6.04	21.2	5.09
		100% RB	22.3	6.29	21.2	5.39
	1880	1 RB low	23.1	5.02	22.4	5.66
		1 RB high	23.0	4.92	22.3	5.53
		50% RB mid	22.3	5.14	21.2	6.04
		100% RB	22.3	5.72	21.3	6.26
	1900	1 RB low	23.2	5.30	22.4	4.93
		1 RB high	23.3	5.44	22.6	4.77
		50% RB mid	22.4	5.88	21.2	5.12
		100% RB	22.3	6.32	21.3	5.33
Measurement uncertainty			± 0.5 dB			

The output power radiated is measured with the mode which has the highest conducted output power.

Output Power (radiated)			
Bandwidth (MHz)	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (dBm)
		QPSK	16-QAM
1.4	1850.7	24.5	23.7
	1880.0	24.8	23.9
	1909.3	24.8	23.9
3	1851.5	24.6	23.7
	1880.0	24.7	23.6
	1908.5	24.9	23.7
5	1852.5	24.6	23.5
	1880.0	24.7	24.0
	1907.5	24.8	23.6
10	1855.0	24.5	23.6
	1880.0	24.7	23.7
	1905.0	24.8	23.5
15	1857.5	24.6	23.7
	1880.0	24.7	24.1
	1902.5	24.7	23.5
20	1860.0	24.5	23.5
	1880.0	24.5	23.8
	1900.0	24.5	23.8
Measurement uncertainty		± 3.0 dB	

**Result:** Passed

## 8.2.2 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	-/-
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	-11	-0.00000059	-0.0059
3.4	9	0.00000048	0.0048
3.5	11	0.00000059	0.0059
3.6	-17	-0.00000090	-0.0090
3.7	14	0.00000074	0.0074
3.8	11	0.00000059	0.0059
3.9	12	0.00000064	0.0064
4.0	12	0.00000064	0.0064
4.1	12	0.00000064	0.0064
4.2	-14	-0.00000074	-0.0074
4.3	-15	-0.00000080	-0.0080
4.4	14	0.00000074	0.0074

**AFC FREQ ERROR versus TEMPERATURE**

Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	18	0.00000096	0.0096
-20	18	0.00000096	0.0096
-10	11	0.00000059	0.0059
± 0	-13	-0.00000069	-0.0069
10	16	0.00000085	0.0085
20	13	0.00000069	0.0069
30	15	0.00000080	0.0080
40	13	0.00000069	0.0069
50	-14	-0.00000074	-0.0074
60	-12	-0.00000064	-0.0064

**Result:** Passed

### 8.2.3 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 9 kHz 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. To cover this measurement is made up to 25 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:

- 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 150 kHz:	200 Hz
	150 kHz ≤ f < 30 MHz:	9 kHz
	30 MHz ≤ f < 1000 MHz:	100 kHz
	Above 1 GHz:	1 MHz
Resolution bandwidth:	below 150 kHz:	200 Hz
	150 kHz ≤ f < 30 MHz:	9 kHz
	30 MHz ≤ f < 1000 MHz:	100 kHz
	Above 1 GHz:	1 MHz
Span:	100 MHz Steps	
Trace-Mode:	Max Hold	

**Limits:**

FCC	-/-
Spurious Emissions Radiated	
Attenuation ≥ 43 + 10log(P) (P, Power in Watts)	
-13 dBm	

**Results:**

Radiated emissions measurements were made only at the center carrier frequency of the LTE band 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 II 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	No peaks detected.	2	3760.0	No peaks detected.	2	3810.0	No peaks detected.
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:**

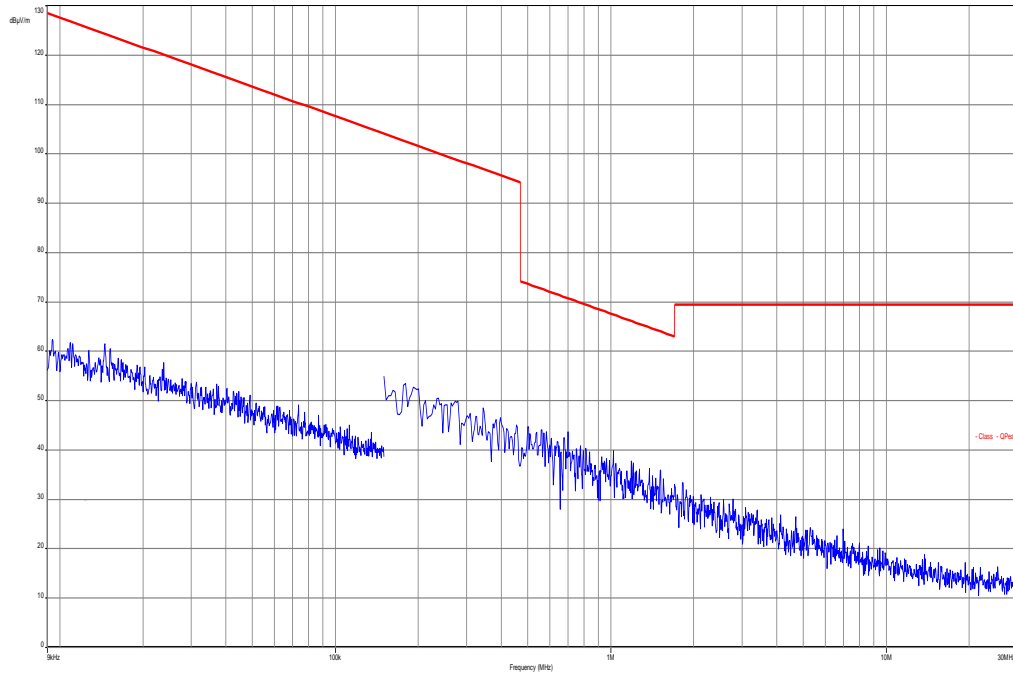
Spurious Emission Level (dBm)								
Harmonic	Lowest channel Freq. (MHz)	Level [dBm]	Harmonic	Middle channel Freq. (MHz)	Level [dBm]	Harmonic	Highest channel Freq. (MHz)	Level [dBm]
2	3710.0	No peaks detected.	2	3760.0	No peaks detected.	2	3810.0	No peaks detected.
3	5565.0		3	5640.0		3	5715.0	
4	7420.0		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

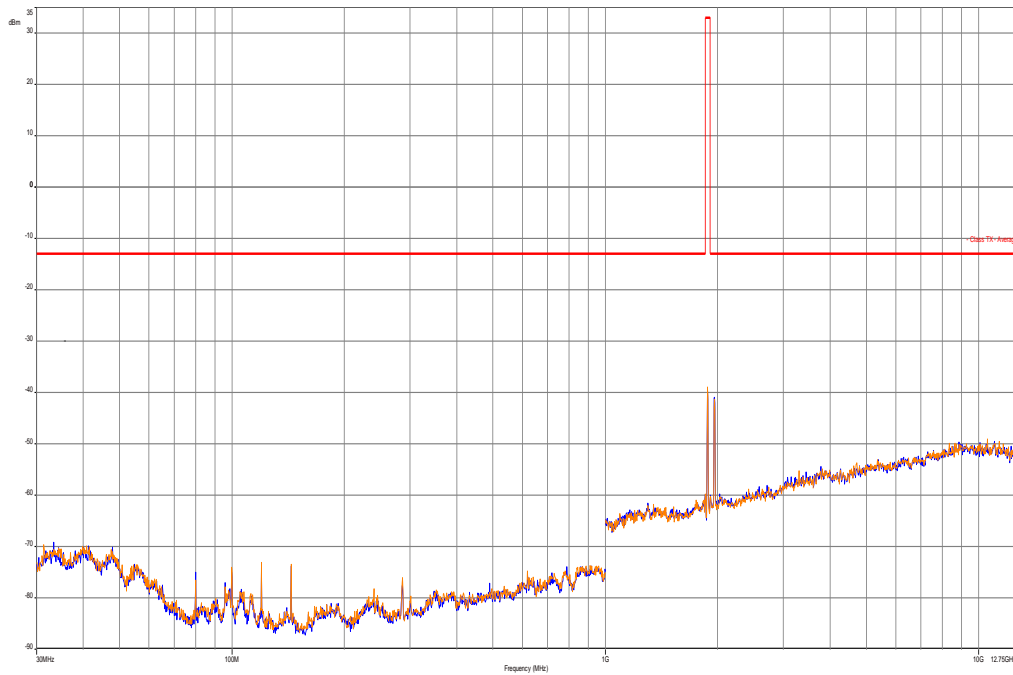


**QPSK with 10 MHz channel bandwidth**

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

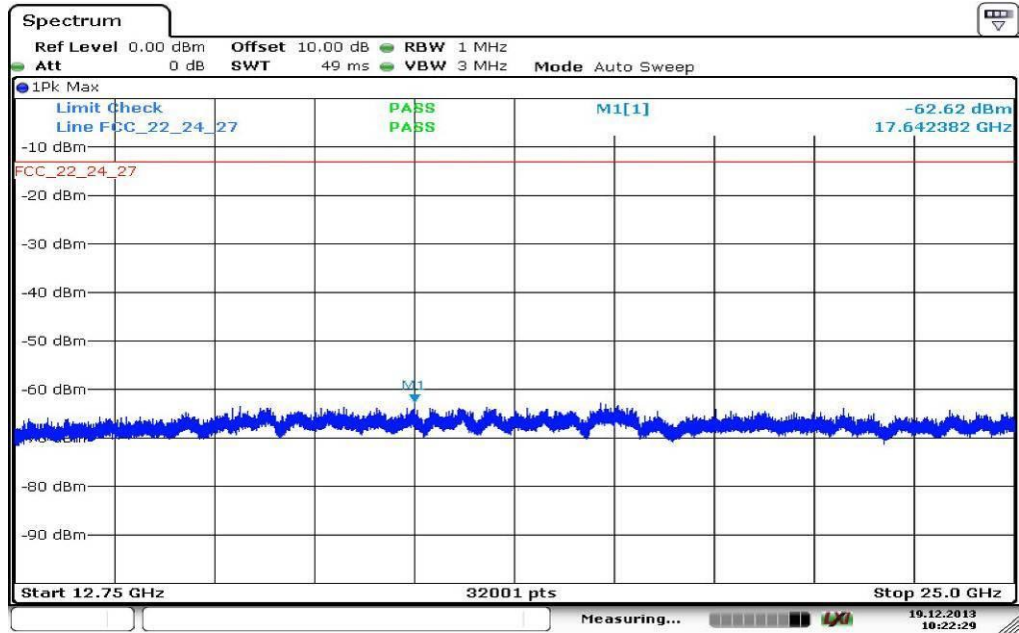


**Plot 2: Channel 18900 (30 MHz – 12.75 GHz)**



*Carrier notched with 1.9 GHz rejection filter*

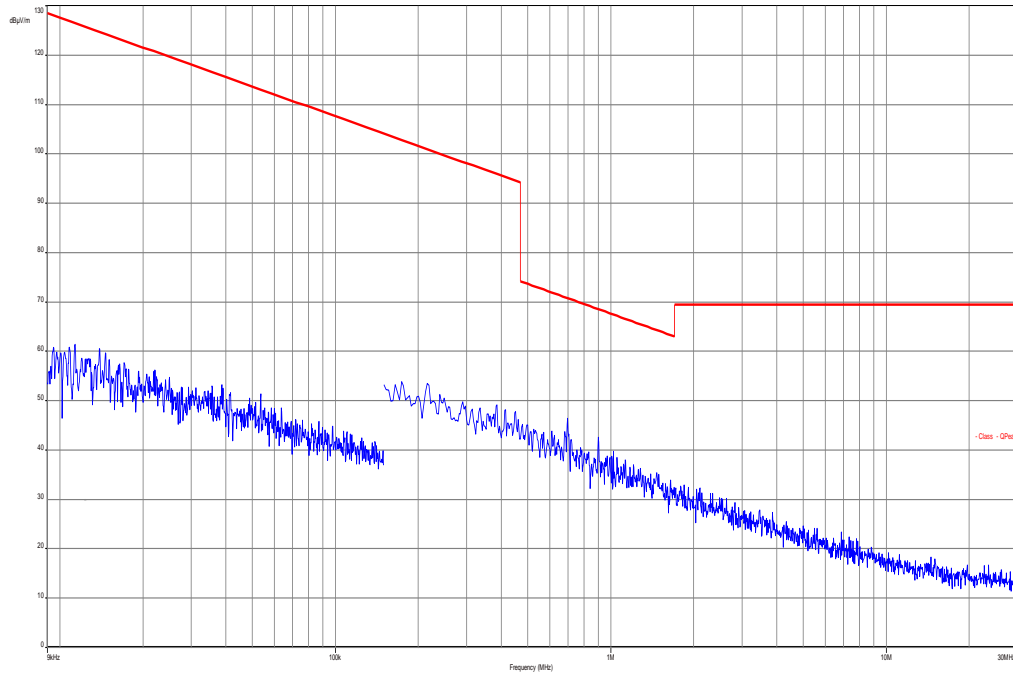
Plot 3: Channel 18900 (12.75 GHz – 25 GHz)



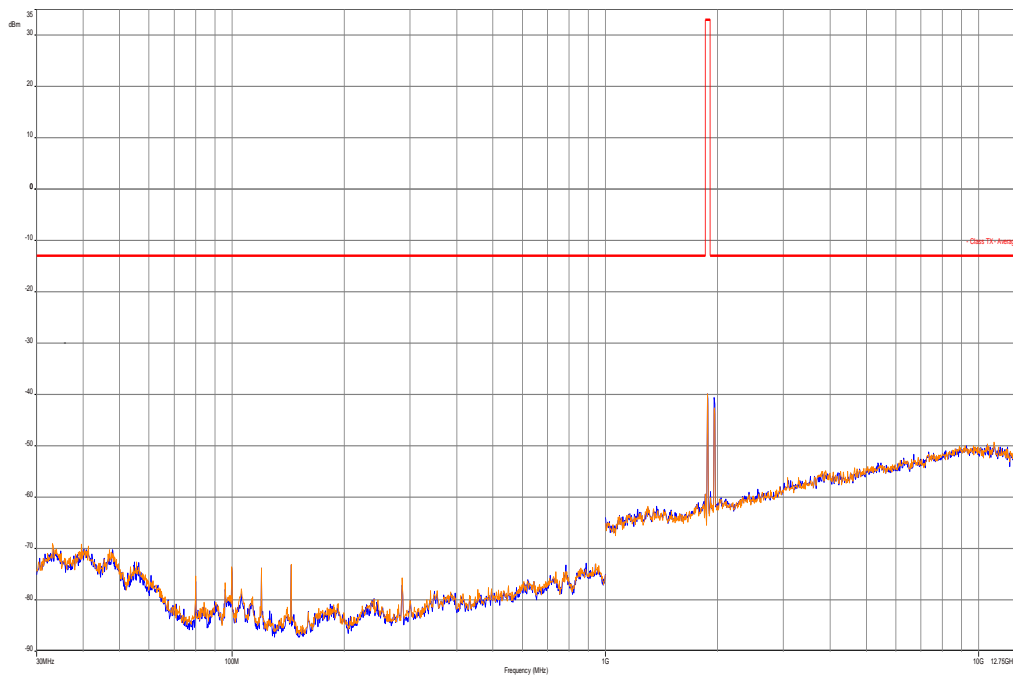
Date: 19.DEC.2013 10:22:29

**16-QAM with 10 MHz channel bandwidth**

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

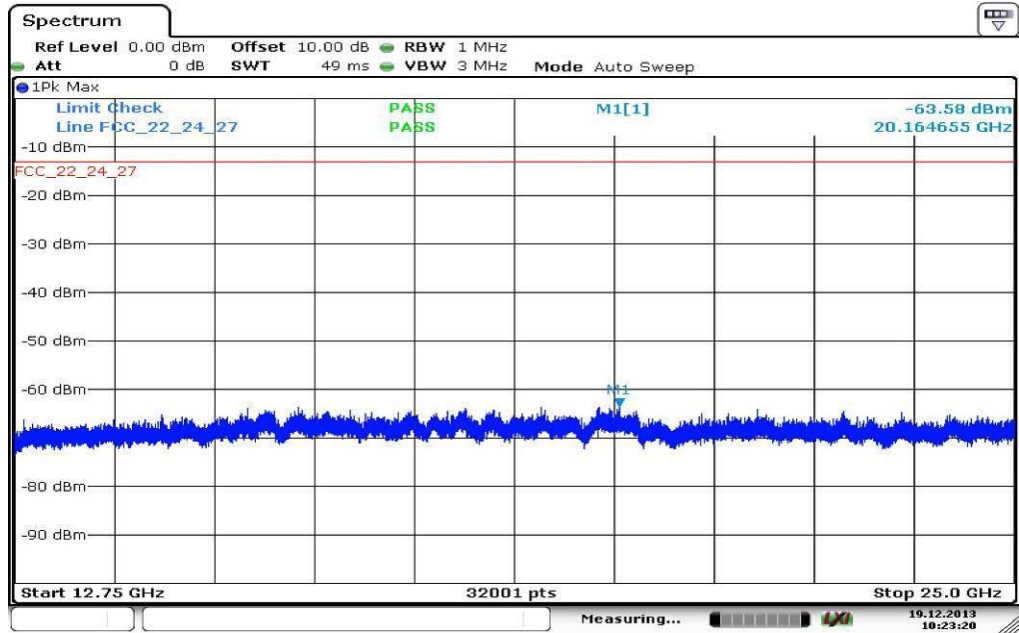


**Plot 5: Channel 18900 (30 MHz – 12.75 GHz)**



*Carrier notched with 1.9 GHz rejection filter*

Plot 6: Channel 18900 (12.75 GHz – 25 GHz)



Date: 19.DEC.2013 10:23:20