**CETECOM™****CETECOM ICT Services**  
consulting - testing - certification >>>

## TEST REPORT

Test report no.: 1-4254/12-61-14-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/Satellite Communications

### Applicant

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

### Manufacturer

**Sony Mobile Communications AB**  
Nya Vattentornet  
22188 Lund / SWEDEN

### Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

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 HSPA FDDI/V/VIII; LTE FDD 1/3/5/7/8/20; WLAN a/b/g/n; BT 3.1; BT LE; RFID; FM Rx; A-GPS
Model name:	PM-0240-BV
FCC ID:	PY7PM-0240
IC:	4170B-PM0240
Frequency:	13.56 MHz
Technology tested:	RFID
Antenna:	Integrated loop antenna
Power Supply:	3.7 V DC by Li - polymer battery
Temperature Range:	-20°C to +55 °C

### Test report authorised:

*p.o. Stefan Bös*  
2013-01-04 Stefan Bös  
Senior Testing Manager

### Test performed:

*Marco Bertolino*  
2013-01-04 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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In no case this test report can be considered as a Letter of Approval.

### 2.2 Application details

Date of receipt of order:	2012-11-02
Date of receipt of test item:	2012-11-05
Start of test:	2012-11-14
End of test:	2012-11-16
Person(s) present during the test:	-/-

## 3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2010-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

#### 4 Test environment

Temperature:	$T_{nom}$	+22 °C during room temperature tests
	$T_{max}$	+55 °C during high temperature tests
	$T_{min}$	-20 °C during low temperature tests
Relative humidity content:		44 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	3.7 V DC by Li - polymer battery
	$V_{max}$	4.1 V
	$V_{min}$	3.3 V

#### 5 Test item

Kind of test item	:	GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/V/VIII; LTE FDD 1/3/5/7/8/20; WLAN a/b/g/n; BT 3.1; BT LE; RFID; FM Rx; A-GPS
Type identification	:	PM-0240-BV
S/N serial number	:	Radiated units: CB5121RU8A, CB5121TU6B
HW hardware status	:	SP1.2
SW software status	:	10.1.A.0.194 and 10.1.A.1.17
Frequency band [MHz]	:	13.56
Type of radio transmission	:	Modulated carrier
Use of frequency spectrum	:	
Number of channels	:	1
Antenna	:	Integrated loop antenna
Power supply	:	3.7 V DC by Li - polymer battery
Temperature range	:	-20°C to +55 °C

#### 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 15 RSS 210, Issue 8, Annex 2.6	Passed	2013-01-04	-/-

Test Specification Clause	Test Case	Temperature Conditions	Power Source Voltages	Pass	Fail	NA	NP	Remark
§ 15.35 (c)/ RSS-GEN Issue 3	Timing of the transmitter (Duty cycle correction factor )	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
RSS-GEN Issue 3	99 % emission bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.225 (a)/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of Fundamental	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.209/ RSS-210 Issue 8 Annex 2.6	Fieldstrength of harmonics and spurious	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§ 15.225 (e)/ RSS-210 Issue 8 Annex 2.6	Frequency tolerance	Nominal	Extreme	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
		Extreme	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**Note:** NA = Not Applicable; NP = Not Performed

## 8 RF measurements

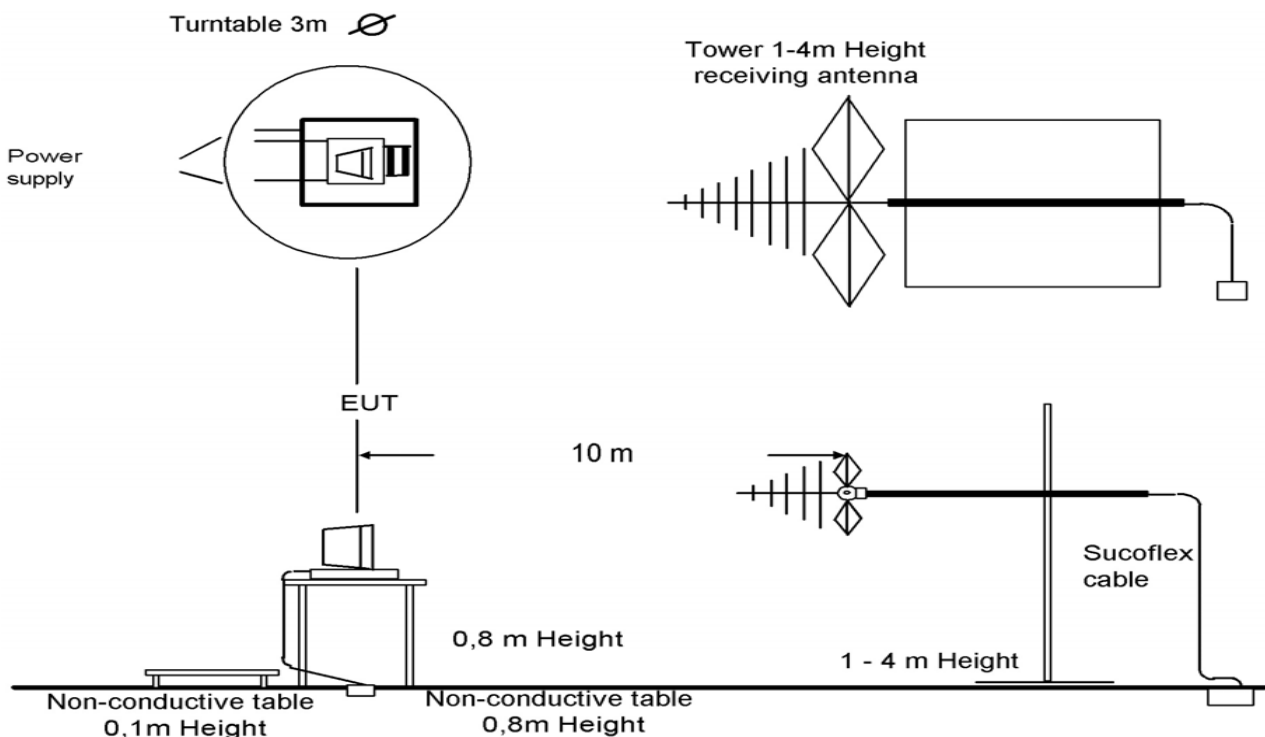
### 8.1 Description of test setup

#### 8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2009 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2009 clause 4.2.

Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



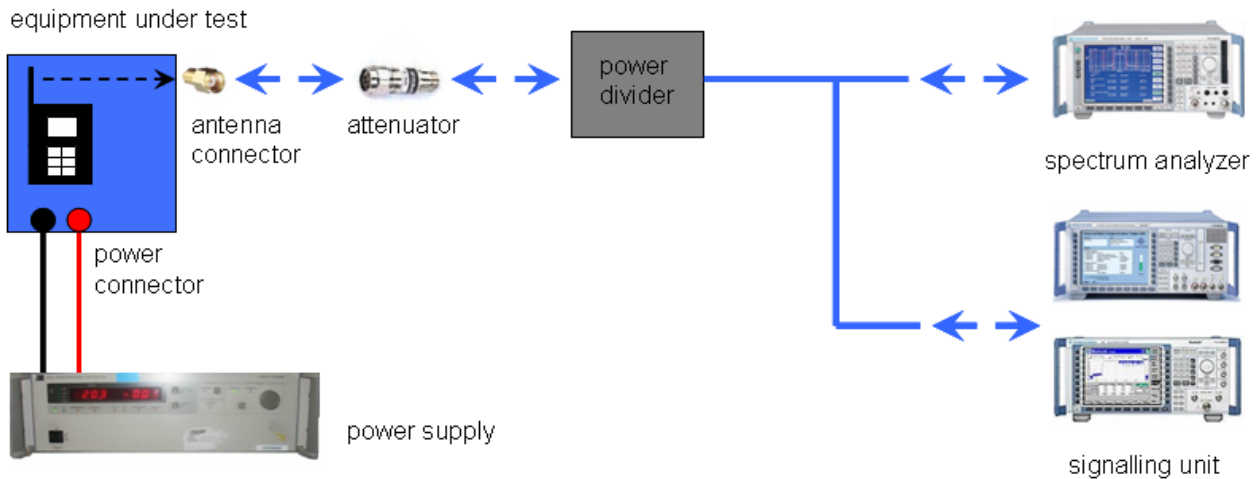
Picture 1: Diagram radiated measurements

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

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling 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 communication base Station (CMU200 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.



Picture 2: Diagram conducted measurements

### 8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

### 8.3 RSP100 test report cover sheet / performance test data

Test Report Number	:	1-4254/12-61-14-A
Equipment Model Number	:	PM-0240-BV
Certification Number	:	4170B-PM0240
Manufacturer (complete Address)	:	Sony Mobile Communications AB Nya Vattentorget 22188 Lund / SWEDEN
Tested to radio standards specification no.	:	RSS 210, Issue 8, A2.6
Open Area Test Site IC No.	:	IC 3462C-1
Frequency Range or fixed frequency	:	13.56 MHz
Field Strength [dB $\mu$ V/m] (at which distance)	:	44.5 @ 10 m 24.5 @ 30 m
Occupied bandwidth (99%-BW) [kHz]	:	562.5 Hz
Type of modulation	:	N0N
Emission Designator (TRC-43)	:	563HN0N
Antenna Information	:	Integrated loop antenna
Transmitter Spurious (worst case) [dB $\mu$ V/m @ 3m]	:	30 dB $\mu$ V/m @ 830 MHz Peak
Receiver Spurious (worst case) [dB $\mu$ V/m @ 3m]	:	No stand alone receiver mode!

#### 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:

2013-01-04  
Date

Marco Bertolino  
Name

  
Signature



## 9 Measurement results

### 9.1 Timing of the transmitter

#### Measurement:

Measurement parameter	
Detector:	Positive peak
Sweep time:	100 ms
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	Zero span
Trace-Mode:	Single sweep

#### Limits:

FCC	IC
Timing of the transmitter	
<p>(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.</p>	

Duty cycle 100 %

**Result:** passed

## 9.2 Field strength of the fundamental

### Measurement:

Measurement parameter	
Detector:	Quasi Peak
Resolution bandwidth:	200 Hz up to 150 kHz, 9 kHz up to 30 MHz, 120 kHz up to 1 GHz
Video bandwidth:	≥ RBW
Trace-Mode:	Max Hold

### Limits:

FCC		IC
Fundamental Frequency (MHz)	Field strength of Fundamental (μV/m / dBμV/m)	Measurement distance (m)
13.553 to 13.567	15848 μV/m (84 dBμV/m)	30
	158489 μV/m (104 dBμV/m)	10 (Recalculated acc. to FCC part15.31 (f2))

### Results:

TEST CONDITIONS		MAXIMUM POWER (dBμV/m)	
Frequency		13.56 MHz	13.56 MHz
Mode		at 10 m distance	at 30 m distance
T <sub>nom</sub>	V <sub>nom</sub>	44.5	24.5*
Measurement uncertainty		±3dB	

\* Limits recalculated from 10m to 30m with 40 dB/decade according to FCC 15.31 (f2).

**Result: passed**

### 9.3 99 % emission bandwidth

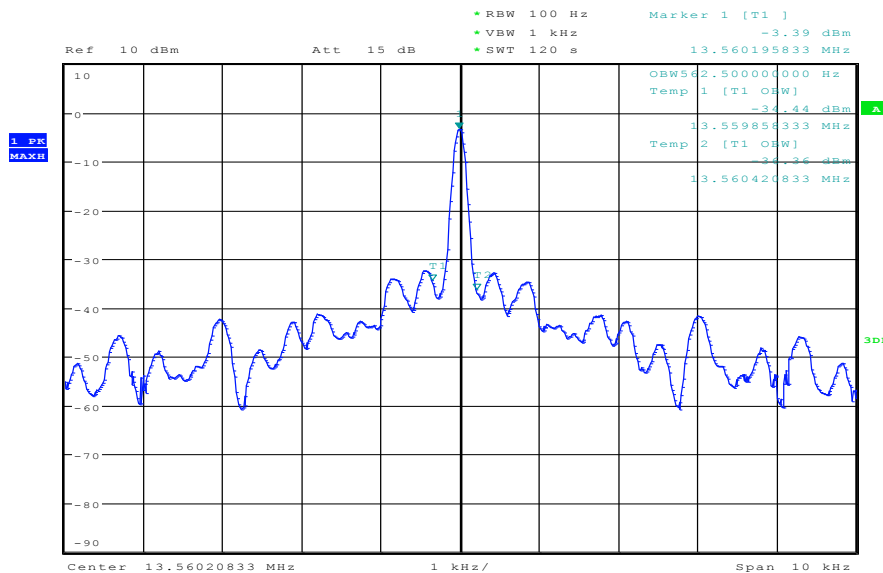
**Measurement:**

Measurement parameter	
Detector:	Peak
Resolution bandwidth:	> 1 % span
Video bandwidth:	≥ RBW
Trace-Mode:	Max Hold

**Results:**

TEST CONDITIONS		99 % emission bandwidth	
Frequency		13.56 MHz	
T <sub>nom</sub>	V <sub>nom</sub>	562.5 Hz	
Measurement uncertainty		± RBW	

**Plot:**



Date: 4.JAN.2013 08:16:57

## 9.4 Field strength of the harmonics and spurious

### Measurement:

Measurement parameter	
Detector:	Quasi Peak / Average
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	300 kHz
Span:	See plots!
Trace-Mode:	Max hold

### Limits:

FCC		IC	
<b>Field strength of the harmonics and spurious.</b>			
Frequency (MHz)	Field strength ( $\mu\text{V}/\text{m}$ )	Measurement distance (m)	
0.009 – 0.490	2400/F(kHz)	300	
0.490 – 1.705	24000/F(kHz)	30	
1.705 – 30	30 (29.5 dB $\mu\text{V}/\text{m}$ )	30	
30 – 88	100 (40 dB $\mu\text{V}/\text{m}$ )	3	
88 – 216	150 (43.5 dB $\mu\text{V}/\text{m}$ )	3	
216 – 960	200 (46 dB $\mu\text{V}/\text{m}$ )	3	

### Results:

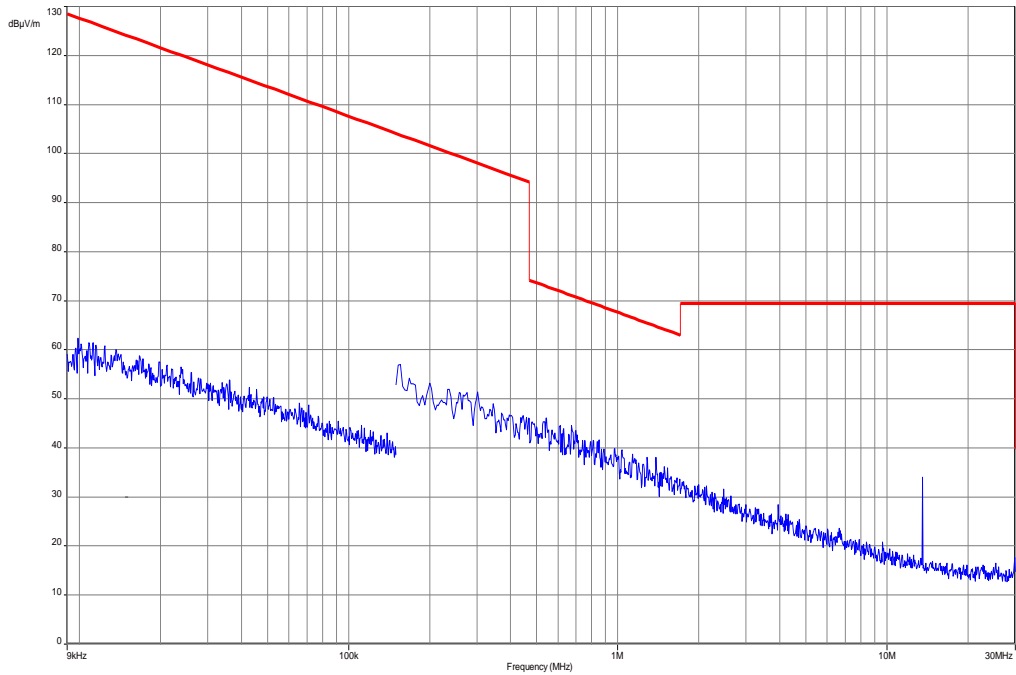
EMISSION LIMITATIONS				
f [MHz]	Detector	Limit max. allowed [dB $\mu\text{V}/\text{m}$ ]	Amplitude of emission [dB $\mu\text{V}/\text{m}$ ]	Results
Please take a look at the table below the 1 GHz plot!				

**Result:** passed

**Plots of the measurements**

**Plot 1:** 9 kHz – 30 MHz; Part 15.209 Magnetics, Measurement distance 3m

Transmit frequency 13.56 MHz



**Plot 2: 30 MHz – 1000 MHz**

Transmit frequency 13.56 MHz

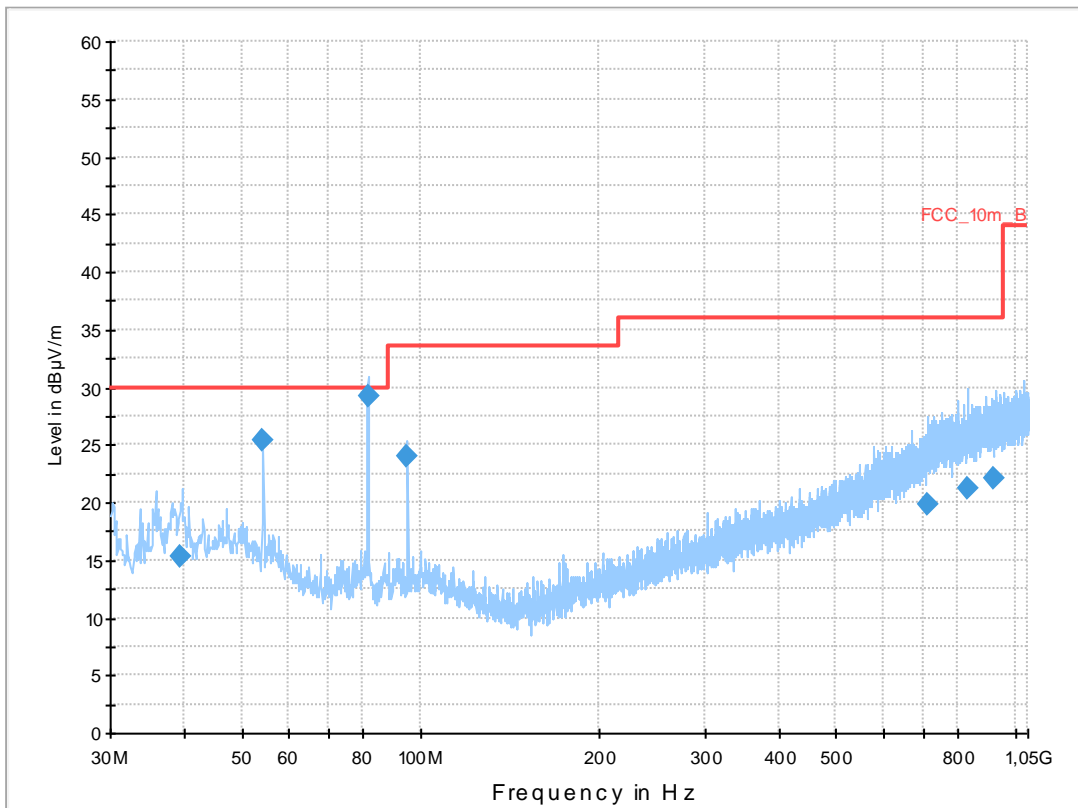
**Common Information**

EUT: PM-0240-BV  
 Serial Number:  
 Test Description: FCC part 15 class B @ 10 m  
 Operating Conditions: NFC cont. polling + charging  
 Operator Name: Medrow  
 Comment: AC: 115 V / 60 Hz

**Scan Setup: STAN\_Fin [EMI radiated]**

Hardware Setup: Electric Field (NOS)  
 Receiver: [ESCI 3]  
 Level Unit: dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB

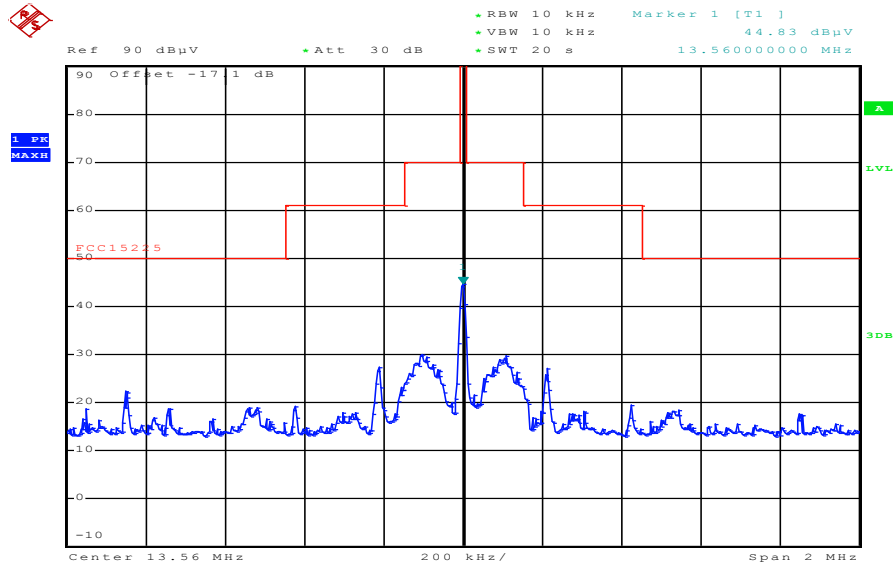


**Final Result 1**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
39.349500	15.4	1000.0	120.000	98.0	V	171.0	13.4	14.6	30.0	
54.230700	25.5	1000.0	120.000	132.0	V	280.0	13.0	4.5	30.0	
81.356550	29.1	1000.0	120.000	170.0	V	280.0	9.3	0.9	30.0	
94.932900	24.0	1000.0	120.000	153.0	V	261.0	11.2	9.5	33.5	
710.646450	19.8	1000.0	120.000	98.0	H	183.0	22.8	16.2	36.0	
830.065500	21.2	1000.0	120.000	170.0	H	88.0	24.3	14.8	36.0	
...	...	...	...	...	...	...	...	...	...	...

**Plot 3: Spectrum mask part 15.225 (a, b, c, d)**

Limits recalculated from 30 m to 10 m with 40 dB/decade according to FCC 15.31 (f2)



Date: 14.NOV.2012 15:42:56

The transmitter holds the requirements of FCC 15.225 (a, b, c and d)

## 9.5 Frequency tolerance

**Measurement:**

Measurement parameter	
Detector:	Positive peak
Sweep time:	Auto
Resolution bandwidth:	10 Hz
Video bandwidth:	1 MHz
Span:	1 kHz
Trace-Mode:	Clear – write

**Limits:**

FCC	IC
The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.	

**Result:** passed

Frequency tolerance								
Over temperature variation			Over voltage variation					
Limit is +/- 1.356 kHz			Limit is +/- 1.356 kHz			-/-		
T (°C)]	Frequency	result	Power voltage	Frequency	result	F [MHz]	Detector	Level [µV/m]
-20°	13.560 078	Pass	3.3 V	13.560 190	Pass			
-10°	13.560 133	Pass	3.4 V	13.560 085	Pass			
0°	13.560 184	Pass	3.5 V	13.560 110	Pass			
10°	13.560 193	Pass	3.6 V	13.560 145	Pass			
20°	13.560 161	Pass	3.7 V	13.560 161	Pass			
30°	13.560 135	Pass	3.8 V	13.560 068	Pass			
40°	13.560 135	Pass	3.9 V	13.560 060	Pass			
50°	13.560 130	Pass	4.0 V	13.560 024	Pass			
55°	13.560 129	Pass	4.1 V	13.560 089	Pass			
			4.2 V	13.560 187	Pass			
			4.3 V	13.560 128	Pass			
			4.4 V	13.560 146	Pass			
Measurement uncertainty			±100 Hz					



## 9.6 AC line conducted

### Measurement:

Measurement parameter	
Detector:	Peak / Quasi peak / Average
Sweep time:	Auto
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max hold

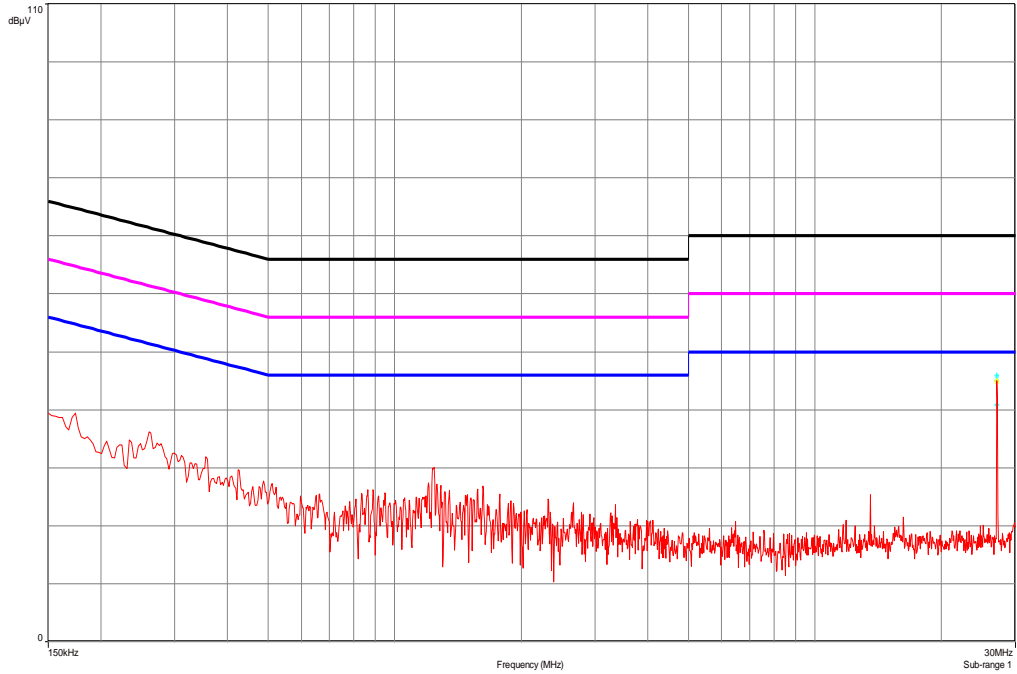
### Limits:

FCC	IC	
Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

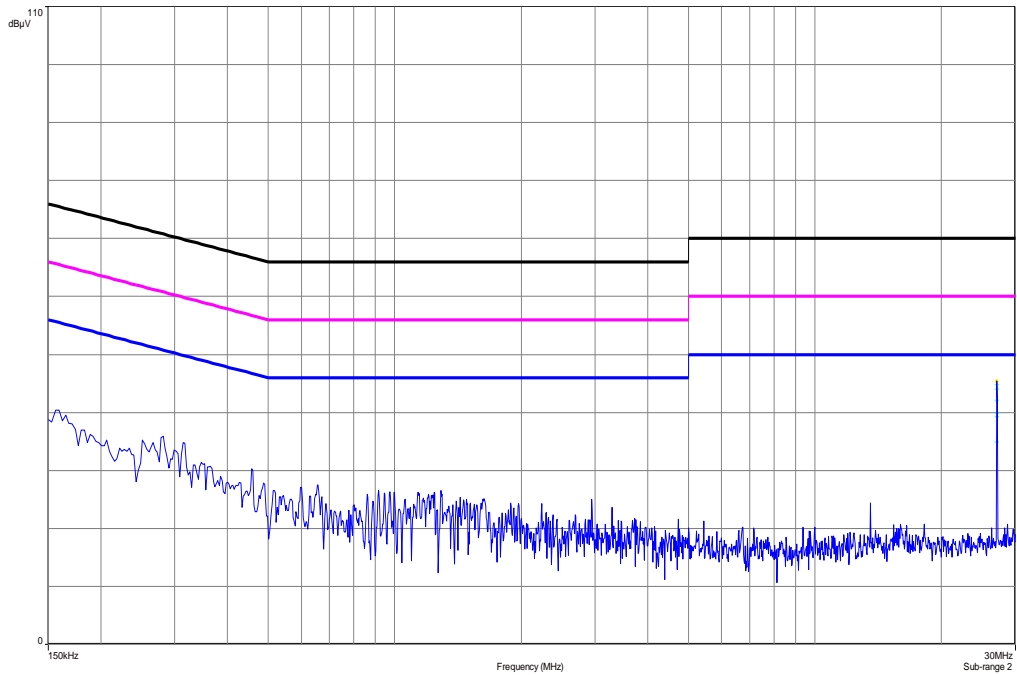
Result: **passed**

**Plots:**

Plot 1: phase line



Plot 2: neutral line



## 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	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B597 9	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 1166.5950. 03	R&S	100083	300003312	k	04.01.2012	04.01.2013
5	n. a.	Analyzer- Reference- System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	14.07.2011	14.07.2013
6	n. a.	Amplifier	JS42- 00502650- 28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS- LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS- LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS- LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbe ck	295	300003787	k	12.04.2012	12.04.2014
11	n. a.	Spectrum- Analyzer	FSU26	R&S	200809	300003874	k	06.01.2012	06.01.2014
12	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
13	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
14	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologi es	MY51210197	300004405	k	19.12.2011	19.12.2012
15	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	20.09.2011	20.09.2013
16	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004xxx	k	22.10.2012	22.10.2013
17	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	06.01.2014
18	n. a.	Test Receiver	ESH2	R&S	871921/095	300002505	Ve	12.01.2012	12.01.2014
19	n. a.	Loop Antenna 9 KHz - 30 MHz	HFH2-Z2	R&S	872096/61	300001824	vIKI!	09.03.2012	09.03.2015

### 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

## 11 Observations

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