

## TEST REPORT

Test report no.: 1-5825/13-30-08-C



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 Communications & Compatibility Testing (RCT)

### Applicant

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### Manufacturer

**KOMATSU Ltd.**  
3-25-1 Shinomiya  
254-8555 Hiratsuka, Kanagawa / JAPAN

### Test standard/s

47 CFR Part 22 Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services  
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:** Cellular terminal for construction machine  
**Model number:** KDTC630  
**FCC ID:** X4QKDTC630  
**IC:** 4472A-KDTC630  
**Frequency:** GSM: 824.2 – 848.8 MHz, 1850.2 – 1909.8 MHz  
UMTS: 826.4 – 846.6 MHz  
**Technology tested:** GSM, UMTS  
**Antenna:** External antenna  
**Power supply:** 24.0 V DC  
**Temperature range:** +23°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:

Marco Bertolino  
Testing Manager

### Test performed:

p.o.

Stefan Bös  
Senior 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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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:	2013-09-25
Date of receipt of test item:	2013-10-07
Start of test:	2013-10-07
End of test:	2013-11-22
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
47 CFR Part 24	01.10.2012	Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications 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
RSS - 133 Issue 6	01.01.2013	Spectrum Management and Telecommunications Policy - Radio Standards Specifications, 2 GHz Personal Communication Services

#### 4 Test environment

Temperature:	$T_{nom}$	+22 °C during room temperature tests
	$T_{max}$	-/- °C during high temperature tests
	$T_{min}$	-/- °C during low temperature tests
Relative humidity content:		53 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	24.0 V DC
	$V_{max}$	-/- V
	$V_{min}$	-/- V

#### 5 Test item

Kind of test item	:	Cellular terminal for construction machine
Type identification	:	KDTC630
S/N serial number	:	No information available
HW hardware status	:	7826-25-690C
SW software status	:	No information available
Frequency band [MHz]	:	GSM: 824.2 – 848.8 MHz, 1850.2 – 1909.8 MHz UMTS: 826.4 – 846.6 MHz
Type of modulation	:	GMSK, 8-PSK, QPSK
Antenna	:	Integrated antenna
Power supply	:	24.0 V DC
Temperature range	:	+23 °C

##### 5.1 Additional information

Test setup- and EUT-photos are included in test report:

1-5825\_13-30-01\_AnnexA

1-5825\_13-30-01\_AnnexB

1-5825\_13-30-01\_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 22, 24 RSS 132, 133	passed	2013-11-26	Only radiated tests performed

### 7.1 GSM 850

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

### 7.2 PCS 1900

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

**7.3 UMTS 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

## 8 RF measurements

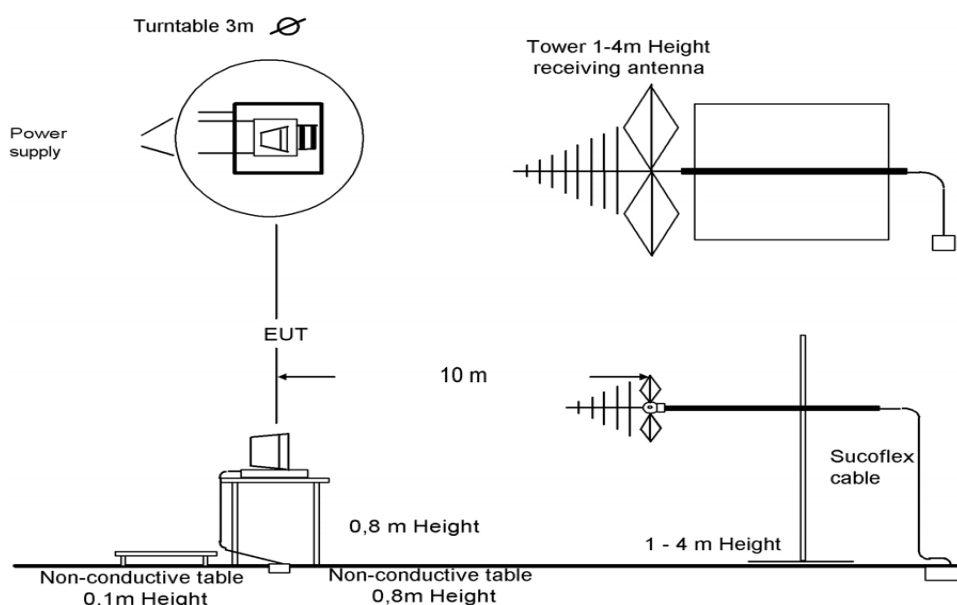
### 8.1 Description of test setup

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

#### 8.1.1 Radiated measurements

The radiated emissions from the EUT are performed in a semi anechoic chamber. The EUT is placed on a conductive turntable and powered with nominal voltage. The signalling is performed either from outside the chamber with a signalling unit (AP or other) by air link using a signalling antenna or directly by special test software from the customer.

Semi anechoic chamber



Picture 1: Diagram radiated measurements

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

## 8.2 Results GSM 850

All GSM-band measurements are done in GSM mode only (packet data).

All tests were performed with one timeslot in uplink activated and one timeslot in downlink activated. For each mode the highest output power was determined and used.

### 8.2.1 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.

Measurement parameters	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	1 MHz
Resolution bandwidth:	1 MHz
Span:	Zero Span
Trace-Mode:	Max Hold

#### 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) GMSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
824.2	Np	Np
836.4	Np	Np
848.8	Np	Np
Measurement uncertainty	$\pm 0.5$ dB	

Np = not performed

Output Power (conducted) 8-PSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
824.2	Np	Np
836.4	Np	Np
848.8	Np	Np
Measurement uncertainty	$\pm 0.5$ dB	

Np = not performed

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	29.5
836.4	30.9
848.8	31.9
Measurement uncertainty	$\pm 2.0$ dB

Output Power (radiated) 8-PSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	23.3
836.4	24.6
848.8	25.5
Measurement uncertainty	$\pm 2.0$ dB

**Result:** Passed

## 8.2.2 Frequency stability

Not performed

### 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 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 848.8 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 GSM-850 band.

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 at the upper, center, and lower carrier frequencies of the GSM-850 band (824.2 MHz, 836.4 MHz and 848.8 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 GSM-850 band 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.

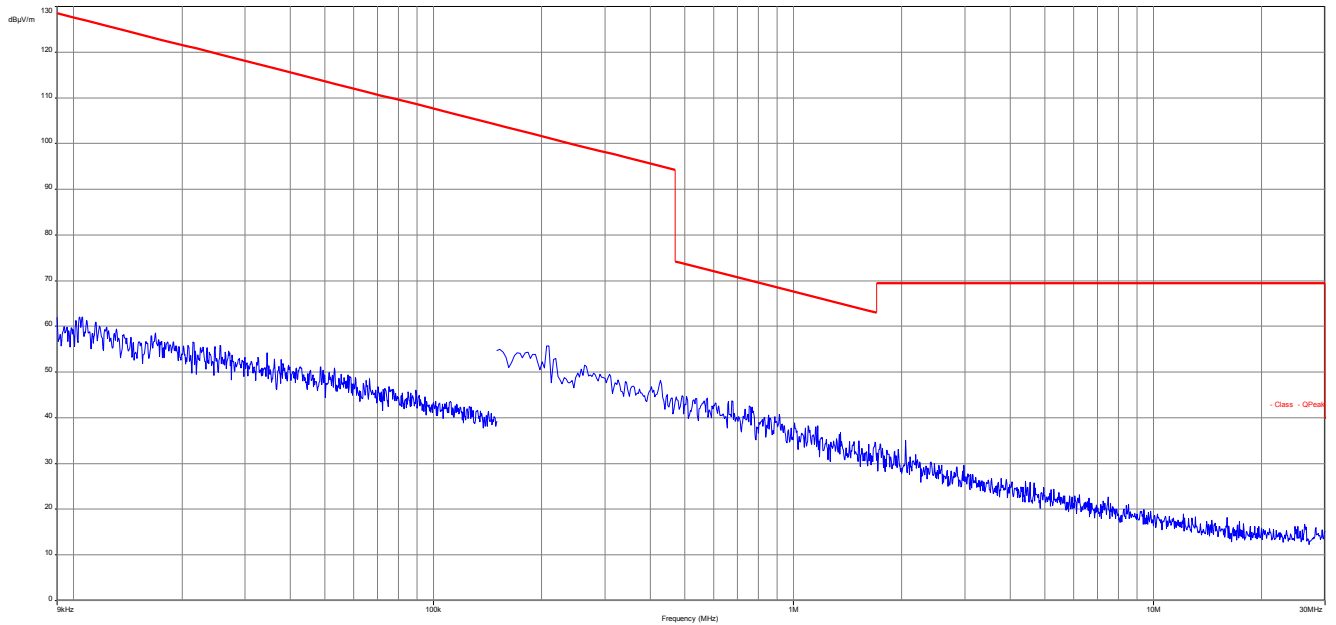
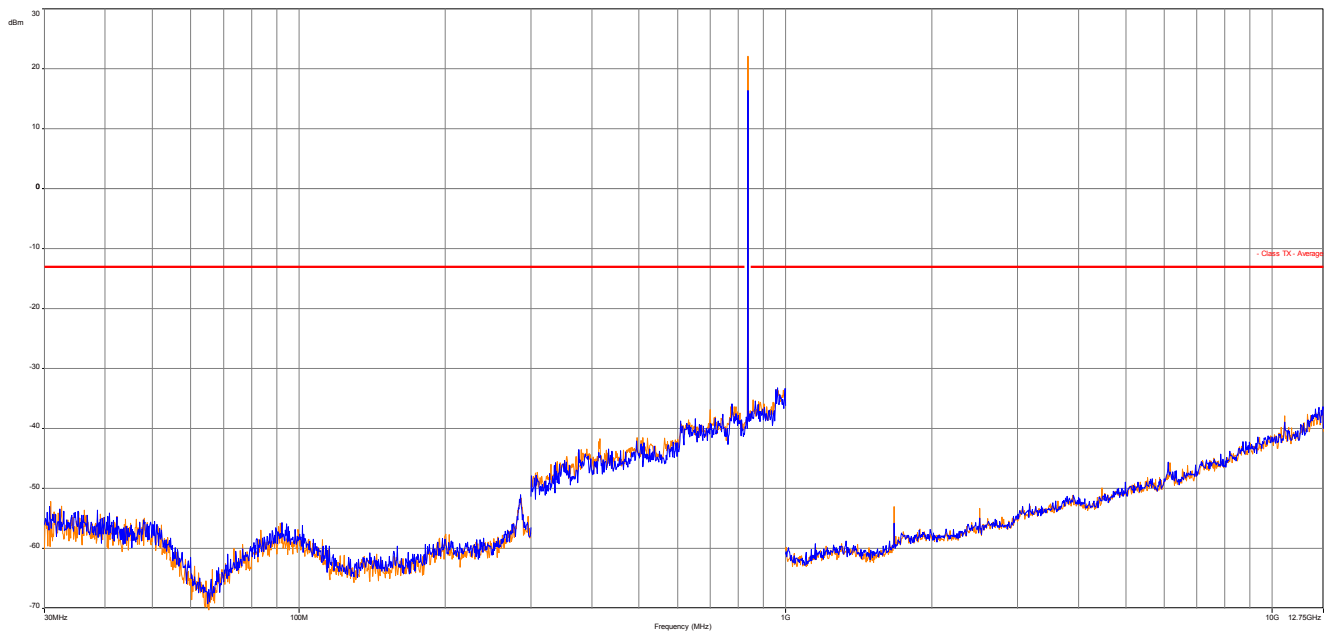
All measurements were done in horizontal and vertical polarization; the plots show the worst case.

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.

Spurious Emission Level (dBm)								
Harmonic	Ch. 128 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 189 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 251 Freq. (MHz)	Level [dBm]
2	1648.4	-	2	1672.8	-	2	1697.6	-
3	2472.6	-	3	2509.2	-	3	2546.4	-
4	3296.8	-	4	3345.6	-	4	3395.2	-
5	4121.0	-	5	4182.0	-	5	4244.0	-
6	4945.2	-	6	5018.4	-	6	5092.8	-
7	5769.4	-	7	5854.8	-	7	5941.6	-
8	6593.6	-	8	6691.2	-	8	6790.4	-
9	7417.8	-	9	7527.6	-	9	7639.2	-
10	8242.0	-	10	8364.0	-	10	8488.0	-
Measurement uncertainty					± 3dB			

**Result:** **Passed**

**Plots:****Plot 1:** Channel 189 (Traffic mode up to 30 MHz)**Plot 2:** Channel 189 (30 MHz – 12.75 GHz)

#### 8.2.4 Spurious emissions conducted

Not performed

#### 8.2.5 Block edge compliance

Not performed

#### 8.2.6 Occupied bandwidth

Not performed

### 8.3 Results PCS 1900

All GSM-band measurements are done in GSM mode only (packet data).

All tests were performed with one timeslot in uplink activated and one timeslot in downlink activated. For each mode the highest output power was determined and used.

#### 8.3.1 RF output power

##### Description:

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

##### Measurement:

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

Measurement parameters	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	1 MHz
Resolution bandwidth:	1 MHz
Span:	Zero Span
Trace-Mode:	Max Hold

##### Limits:

FCC	IC
CFR Part 24.232 CFR Part 2.1046	RSS 133
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) GMSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
1850.2	Np	Np
1880.0	Np	Np
1909.8	Np	Np
Measurement uncertainty	$\pm 0.5$ dB	

Np = not performed

Output Power (conducted) 8-PSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
1850.2	Np	Np
1880.0	Np	Np
1909.8	Np	Np
Measurement uncertainty	$\pm 0.5$ dB	

Np = not performed

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	28.8
1880.0	29.5
1909.8	30.0
Measurement uncertainty	$\pm 2.0$ dB

Output Power (radiated) 8-PSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	24.7
1880.0	25.3
1909.8	25.7
Measurement uncertainty	$\pm 2.0$ dB

**Result:** Passed



### 8.3.2 Frequency stability

Not performed

### 8.3.3 Spurious emissions radiated

#### Description:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2009 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. This was rounded up to 20 GHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS1900 band.

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

- The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- The antenna output was terminated in a 50 ohm load (if possible).
- A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters.
- Now each detected emissions were substituted by the substitution method, in accordance with the TIA/EIA 603.

#### Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

#### Limits:

FCC	IC
CFR Part 24.238 CFR Part 2.1053	RSS 133
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 PCS1900 band (1850.2 MHz, 1880.0 MHz and 1909.8 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 PCS1900 band 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.

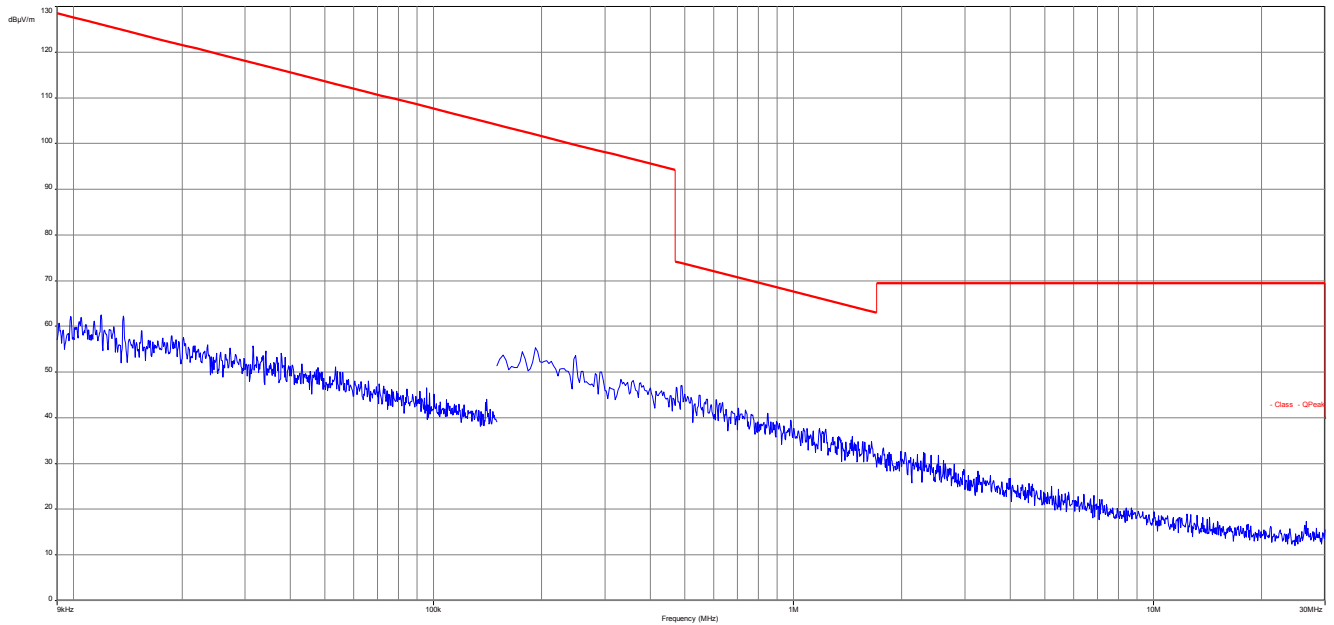
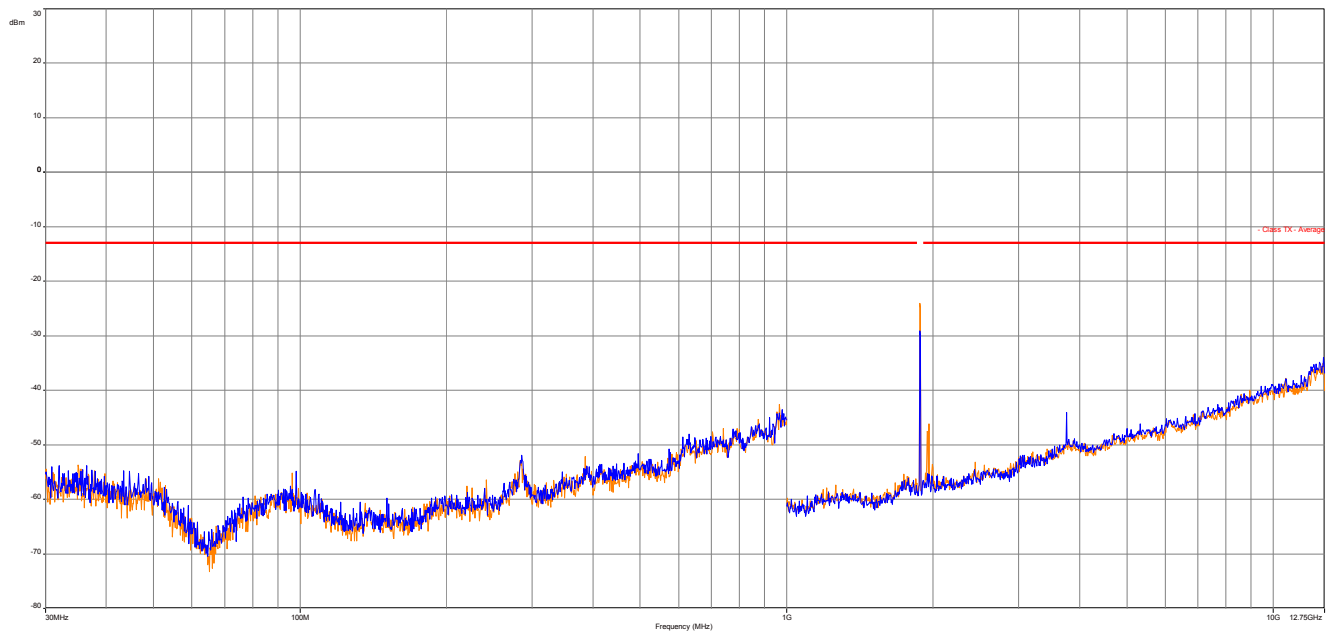
All measurements were done in horizontal and vertical polarization; the plots show the worst case.

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.

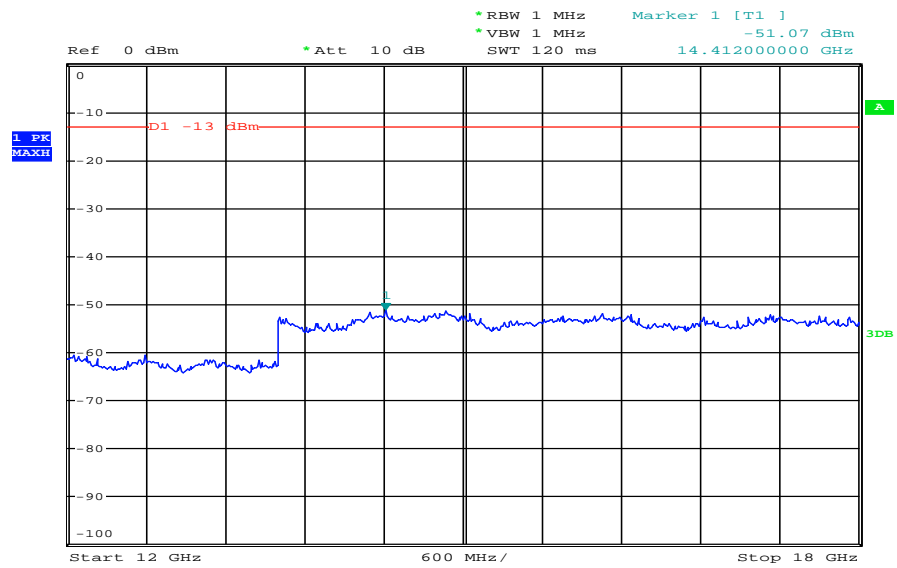
Spurious Emission Level (dBm)								
Harmonic	Ch. 512 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 661 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 810 Freq. (MHz)	Level [dBm]
2	3700.4	-	2	3760.0	-	2	3819.6	-
3	5550.6	-	3	5640.0	-	3	5729.4	-
4	7400.8	-	4	7520.0	-	4	7639.2	-
5	9251.0	-	5	9400.0	-	5	9549.0	-
6	11101.2	-	6	11280.0	-	6	11458.8	-
7	12951.4	-	7	13160.0	-	7	13368.6	-
8	14801.6	-	8	15040.0	-	8	15278.4	-
9	16651.8	-	9	16920.0	-	9	17188.2	-
10	18502.0	-	10	18800.0	-	10	19098.0	-
Measurement uncertainty					± 3dB			

**Result:** Passed

**Plots:****Plot 1: Channel 661 (Traffic mode up to 30 MHz)****Plot 2: Channel 661 (30 MHz – 12.75 GHz)**

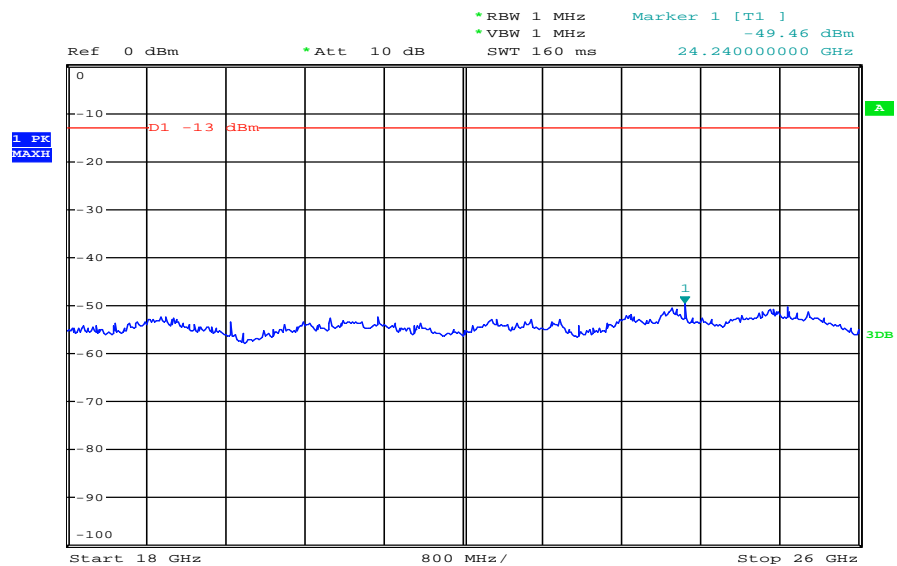
*Carrier notched with 1.9 GHz rejection filter*

**Plot 3: Channel 661 (12 GHz - 18 GHz)**



Date: 18.OCT.2013 08:29:02

**Plot 4: Channel 661 (18 GHz - 26 GHz)**



Date: 18.OCT.2013 08:32:14

#### 8.3.4 Spurious emissions conducted

Not performed

#### 8.3.5 Block edge compliance

Not performed

#### 8.3.6 Occupied bandwidth

Not performed

## 8.4 Results UMTS band V

All UMTS-band measurements are done in WCDMA mode only.

The connection was established with the following setup: WCDMA RMC, Max Power (All Bit up)

### 8.4.1 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	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	10 MHz
Resolution bandwidth:	10 MHz
Span:	Zero Span
Trace-Mode:	Max Hold

#### 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) WCDMA mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
826.4	Np	Np
836.0	Np	Np
846.6	Np	Np
Measurement uncertainty	± 0.5 dB	

Output Power (radiated) WCDMA mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
826.4	20.5
836.0	21.3
846.6	22.6
Measurement uncertainty	± 2.0 dB

**Result:** **Passed**



#### 8.4.2 Frequency stability

Not performed

### 8.4.3 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 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 UMTS 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 at the upper, center, and lower carrier frequencies of the UMTS band V (826.4 MHz, 836.0 MHz and 846.6 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 UMTS 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.

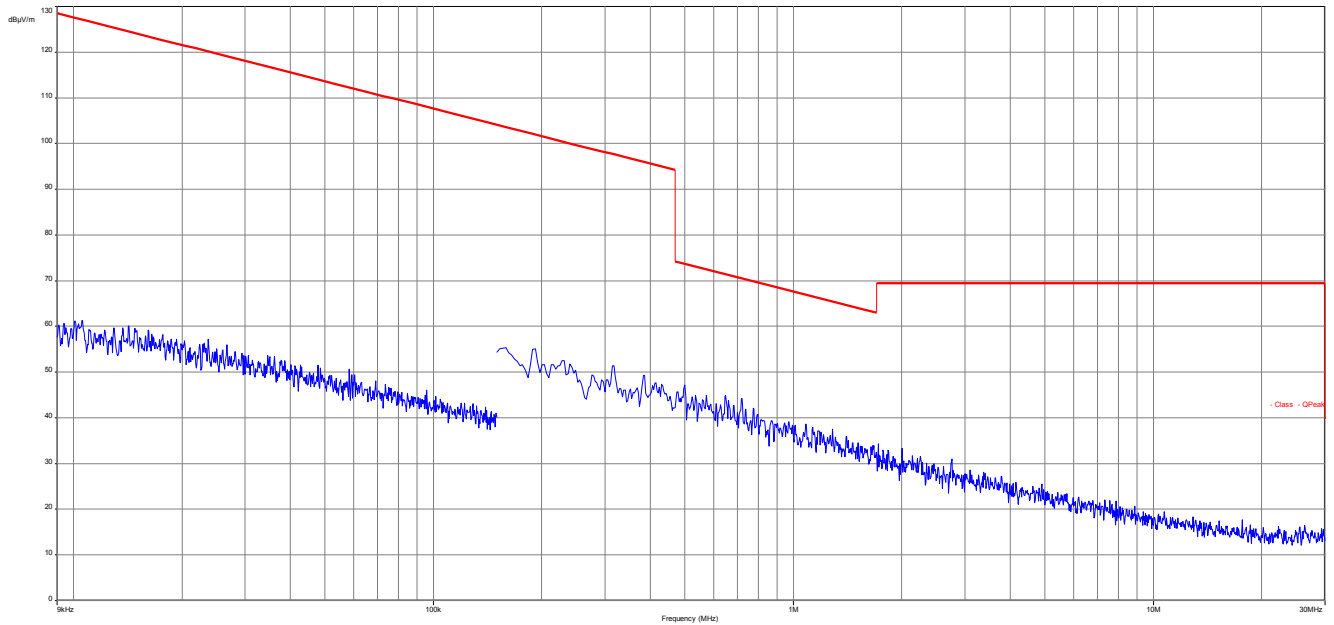
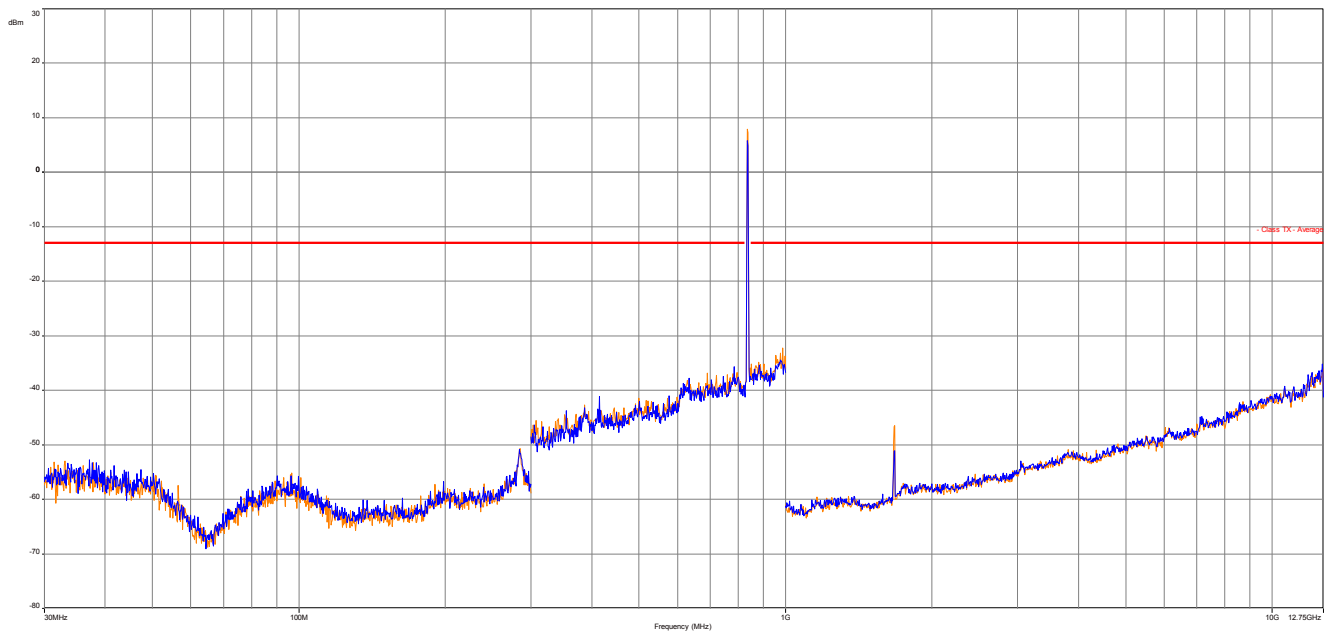
All measurements were done in horizontal and vertical polarization; the plots show the worst case.

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.

Spurious Emission Level (dBm)								
Harmonic	Ch. 4132 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4180 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4233 Freq. (MHz)	Level [dBm]
2	1652.8	-	2	1672.0	-	2	1693.2	-
3	2479.2	-	3	2508.0	-	3	2539.8	-
4	3305.6	-	4	3344.0	-	4	3386.4	-
5	4132.0	-	5	4180.0	-	5	4233.0	-
6	4958.4	-	6	5016.0	-	6	5079.6	-
7	5784.8	-	7	5852.0	-	7	5926.2	-
8	6611.2	-	8	6688.0	-	8	6772.8	-
9	7437.6	-	9	7524.0	-	9	7619.4	-
10	8264.0	-	10	8360.0	-	10	8466.0	-
Measurement uncertainty					± 3dB			

**Result:** **Passed**

**Plots:****Plot 1: Channel 4180 (Traffic mode up to 30 MHz)****Plot 2: Channel 4180 (30 MHz – 12.75 GHz)**

#### 8.4.4 Spurious emissions conducted

Not performed

#### 8.4.5 Block edge compliance

Not performed

#### 8.4.6 Occupied bandwidth

## 9 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	CR 79	Std. Gain Horn Antenna 26.5- 40.0 GHz	V637	Narda	7911	300001751	ne		
2	11b	Microwave System Amplifier, 0.5- 26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
3	A025	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000786	ne		
4	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
5	A027	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300000486	ne		
6	A028	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300002440	ne		
7	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300002442	k	19.07.2013	19.07.2015
8	A030	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300000487	ne		
9	n. a.	Std. Gain Horn Antenna 26.5- 40.0 GHz	V637	Narda	7911	300001752	ne		
10	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	09.10.2012	09.10.2014
11	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140...+30dBm	FSP30	R&S	100886	300003575	k	22.08.2012	22.08.2014
12	n. a.	MXA Signal Analyzer 20 Hz - 26.5 GHz	N9020A MXA Signal Analyzer	Agilent Technologi es	US46220229	300003805	vIKI!	16.01.2013	16.01.2015
13	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		
14	n. a.	PXA Spectrum Analyzer 3Hz to 50GHz	N9030A PXA Signal Analyzer	Agilent Technologi es	US51350267	300004338	k	16.12.2012	16.12.2013
15	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2012	22.01.2014
16	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
17	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	08.05.2013	08.05.2015
18	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
19	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
20	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	06.01.2014
21	n. a.	Switch / Control	3488A	HP	2719A15013	300001156	ne		

		Unit		Meßtechnik					
22	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
23	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
24	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
25	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
26	n. a.	Band Reject filter	WRCG185 5/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
27	n. a.	Band Reject filter	WRCG240 0/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
28	n. a.	Highpass Filter	WHKX7.0/1 8G-8SS	Wainwright	18	300003789	ne		
29	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKI!	14.10.2011	14.10.2014
30	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014

**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  
 vlKI! Attention: extended calibration interval  
 NK! Attention: not calibrated

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

## 10 Observations

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

**Annex A Document history**

Version	Applied changes	Date of release
1.0	Initial release	2013-11-05
-A	Front page "Model name" changed to "Model number"	2013-11-20
-B	Output power remeasured	2013-11-25
-C	Picture annexes removed	2013-11-26

**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

Befehlens gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV  
Unterzeichnerin der Multilateralen Abkommen  
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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  
WiMax und Richtfunk  
Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)  
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive  
Produktsicherheit  
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Smart Card Terminals  
Bluetooth  
Wi-Fi-Services

Die Akkreditierungskunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der  
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Frankfurt am Main, 18.01.2013

Seite 1/1 von 1 auf der Rückseite

Im Auftrag  
Dirk J. (Prof.) Jäger  
Abteilungsleiter

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

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Spittelmarkt 10  
10117 Berlin

Standort Frankfurt am Main  
Gartenstraße 6  
60594 Frankfurt am Main

Standort Braunschweig  
Rundelsallee 100  
38116 Braunschweig

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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.

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