
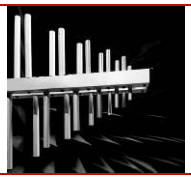
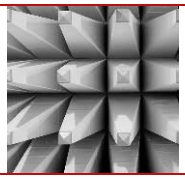

CETECOM™
CETECOM ICT Services
consulting - testing - certification

# TEST REPORT

**Test report no.: 1-5825/13-33-07**

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

## Testing laboratory


**CETECOM ICT Services GmbH**
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com


**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 & EMC (RCE)

## Applicant


**KYB Trondule Co.,Ltd**
3909, Ura, Nagaoka
Niigata 949-5406 / JAPAN
Phone: -/-
Fax: + 81 258 92 6921
Contact: Katsuyuki Harada
e-mail: harada@trondule.co.jp
Phone: +81 258 92 6903


## Manufacturer

**KYB Trondule Co.,Ltd**
3909, Ura, Nagaoka
Niigata 949-5406 / 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:** | **3G data terminal with integrated module** |
| **Model name:** | **KTDC14** |
| **FCC ID:** | **2ACF6KTDC14** |
| **IC:** | **-/-** |
| Frequency: | GSM: 824.2 – 848.8 MHz, 1850.2 – 1909.8 MHz<br>UMTS: 826.4 – 848.6 MHz, 1852.4 – 1907.6 MHz |
| Technology tested: | GSM, UMTS |
| Antenna: | Integrated antenna |
| Power supply: | 24.0V DC by external power supply |
| Temperature range: | -20°C to +55°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:

cn=Stefan Boes, o=CETECOM ICT Services GmbH, ou=BOE-111011, email=Stefan.Boes@cetecom.com, c=DE
2014.06.20 11:33:39 +02'00'

Stefan Bös
Senior Testing Manager

## Test performed:

cn=Tobias Wittenmeier, o=CETECOM ICT Services GmbH, ou=WIT-111222, email=tobias.wittenmeier@cetecom.com, c=DE
2014.06.20 11:44:11 +02'00'

Tobias Wittenmeier
Expert

# 1 Table of contents

# 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: | 2013-10-07 |
| Date of receipt of test item: | 2014-06-02 |
| Start of test: | 2014-06-02 |
| End of test: | 2014-06-03 |
| Person(s) present during the test: | -/- |

# 3 Test standard/s

| Test standard | Date | Test standard description |
|---|---|---|
| 47 CFR Part 22 | 2010-10 | Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services |
| 47 CFR Part 24 | 2010-10 | Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services |
| RSS - 132 Issue 3 | 2013-01 | 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 | 2013-01 | 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 |
| | $T_{max}$ | +55 | °C during high temperature tests |
| | $T_{min}$ | -20 | °C during low temperature tests |
| Relative humidity content: | | 55 % | |
| Barometric pressure: | | not relevant for this kind of testing | |
| Power supply: | $V_{nom}$ | 24.0 V | DC by external power supply |
| | $V_{max}$ | -/- V | |
| | $V_{min}$ | -/- V | |

## 5 Test item

| | | |
|---|---|---|
| **Kind of test item** | **:** | **3G data terminal with integrated module** |
| **Type identification** | **:** | **KTDC14** |
| | | |
| **S/N serial number** | **:** | **No information available** |
| **HW hardware status** | **:** | **Ver5** |
| **SW software status** | **:** | **Ver0.1** |
| **Frequency band [MHz]** | **:** | **GSM: 824.2 – 848.8 MHz, 1850.2 – 1909.8 MHz**<br>**UMTS: 826.4 – 848.6 MHz, 1852.4 – 1907.6 MHz** |
| **Type of modulation** | **:** | **GMSK; 8-PSK, QPSK; 16-QAM** |
| **Antenna** | **:** | **Integrated antenna** |
| **Power supply** | **:** | **24.0 V DC by external power supply** |
| **Temperature range** | **:** | **-20°C to +55 °C** |

### 5.1 Additional information

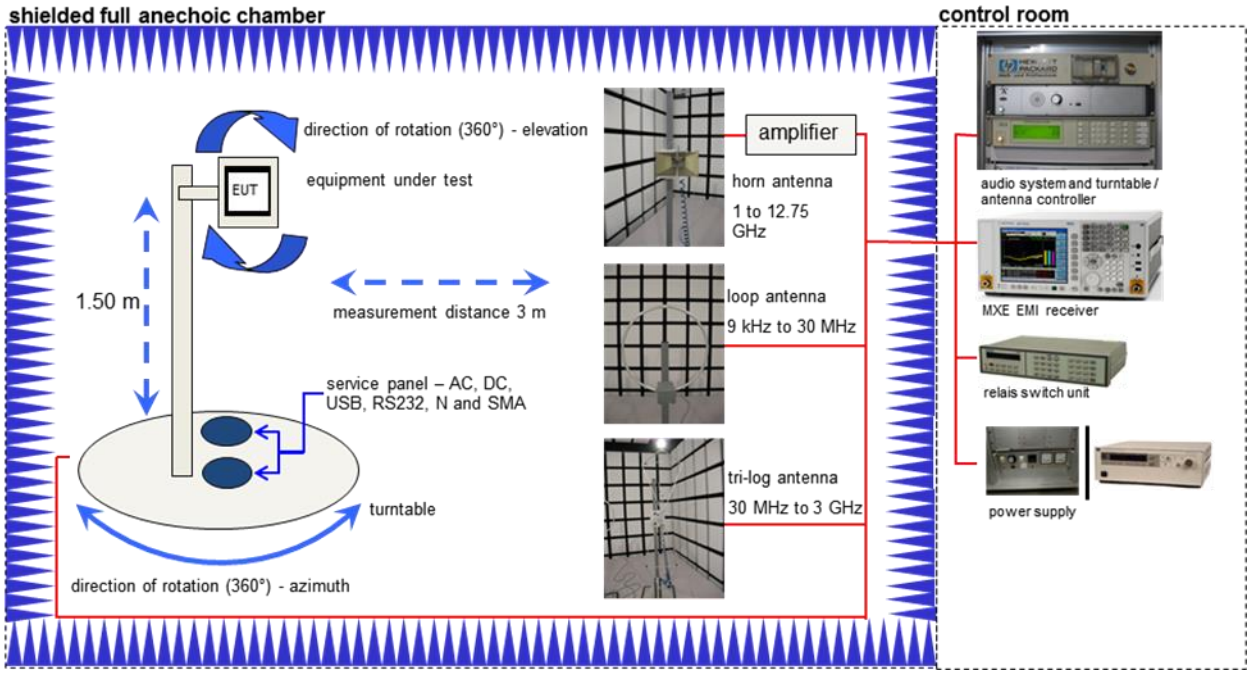
Test setup- and EUT-photos are included in test report 1-5825_13-33-01_AnnexA
1-5825_13-33-01_AnnexB
1-5825_13-33-01_AnnexC

## 6 Test laboratories sub-contracted

None

# 7 Description of the test setup

## 7.1 Radiated measurements chamber C




**Equipment table:**

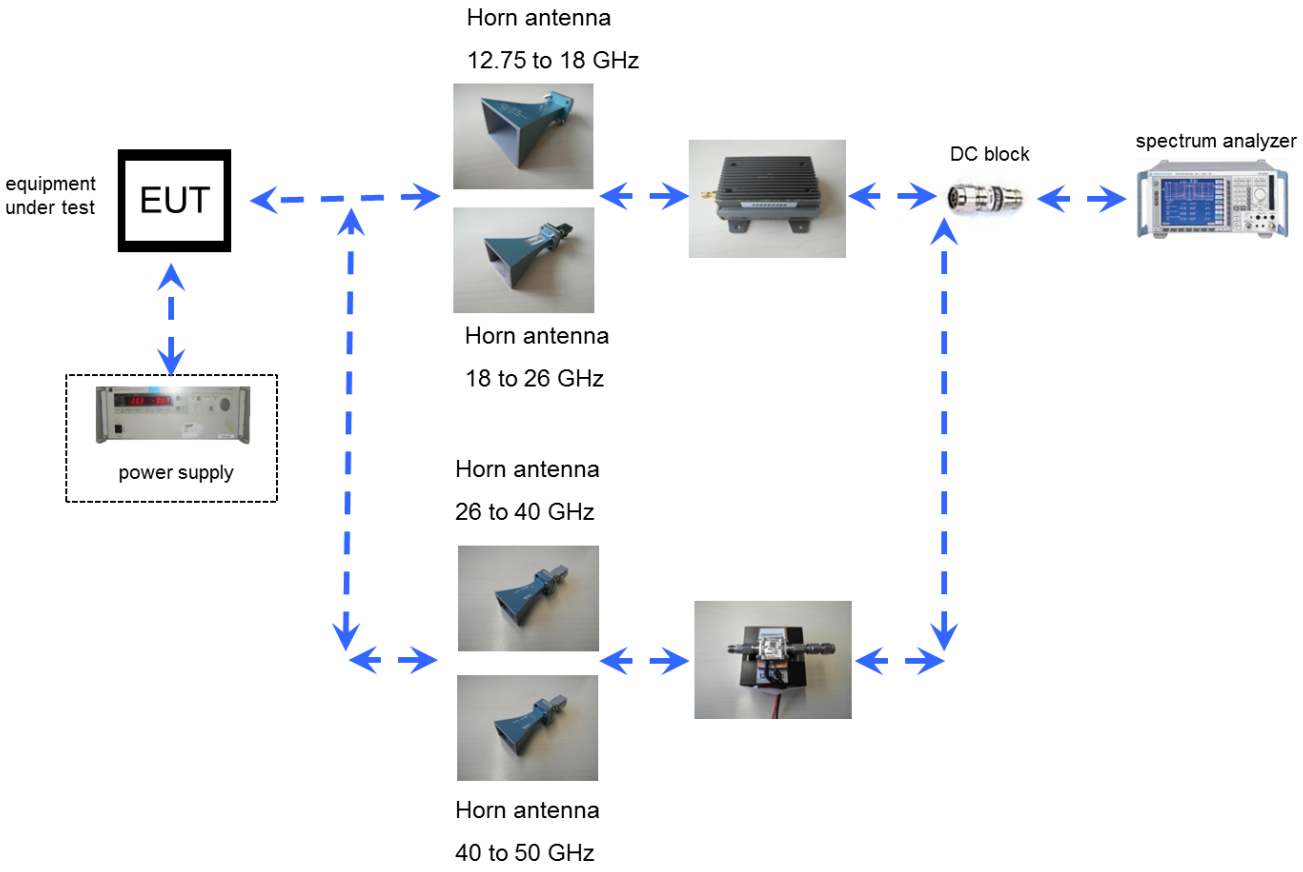
| Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom |
|---|---|---|---|---|
| MXE EMI Receiver 20 Hz bis 26,5 GHz | N9038A | Agilent Technologies | MY51210197 | 300004405 |
| TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 371 | 300003854 |
| Band Reject filter | WRCG2400/2483-2375/2505-50/10SS | Wainwright | 11 | 300003351 |
| Highpass Filter | WHKX7.0/18G-8SS | Wainwright | 18 | 300003789 |
| Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 |
| Active Loop Antenna | 6502 | EMCO | 8905-2342 | 300000256 |
| Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 |
| Switch / Control Unit | 3488A | HP Meßtechnik | * | 300000199 |
| Switch / Control Unit | 3488A | HP Meßtechnik | 2719A15013 | 300001156 |
| Isolating Transformer | MPL IEC625 Bus Regeltrenntravo | Erfi | 91350 | 300001155 |
| Three-Way Power Splitter, 50 Ohm | 11850C | HP Meßtechnik | | 300000997 |
| Amplifier | js42-00502650-28-5a | Parzich GMBH | 928979 | 300003143 |

## 7.2 Radiated measurements 12.75 GHz to 25 GHz


**Equipment table:**

| Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom |
|---|---|---|---|---|
| Std. Gain Horn Antenna 12.4 to 18.0 GHz | 639 | Narda | 8402 | 300000787 |
| Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | 8205 | 300002442 |
| Microwave System Amplifier, 0.5-26.5 GHz | 83017A | HP Meßtechnik | 00419 | 300002268 |
| Spectrum Analyzer 20 Hz - 50 GHz | FSU50 | R&S | 200012 | 300003443 |
| Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 |

## 7.3 Radiated measurements 12.75 GHz to 50 GHz




**Equipment table:**

| Equipment | Type | Manufacturer | Serial No. | INV. No Cetecom |
|---|---|---|---|---|
| Std. Gain Horn Antenna 12.4 to 18.0 GHz | 639 | Narda | 8402 | 300000787 |
| Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | 8205 | 300002442 |
| Microwave System Amplifier, 0.5-26.5 GHz | 83017A | HP Meßtechnik | 00419 | 300002268 |
| Spectrum Analyzer 20 Hz - 50 GHz | FSU50 | R&S | 200012 | 300003443 |
| Signal Analyzer 40 GHz | FSV40 | R&S | 101042 | 300004517 |

# 8 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, 27<br>RSS 132, 133, 139 | passed | 2014-06-20 | Delta test acc. customers demand |

## 8.1 GSM 850

| Test Case | temperature conditions | power source voltages | Pass | Fail | NA | NP | Remark |
|---|---|---|---|---|---|---|---|
| RF Output Power | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| Frequency Stability | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Spurious Emissions Radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| Spurious Emissions Conducted | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Block Edge Compliance | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Occupied Bandwidth | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |

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

## 8.2 PCS 1900

| Test Case | temperature conditions | power source voltages | Pass | Fail | NA | NP | Remark |
|---|---|---|---|---|---|---|---|
| RF Output Power | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| Frequency Stability | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Spurious Emissions Radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| Spurious Emissions Conducted | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Block Edge Compliance | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Occupied Bandwidth | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |

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

## 8.3 UMTS band II

| Test Case | temperature conditions | power source voltages | Pass | Fail | NA | NP | Remark |
|---|---|---|---|---|---|---|---|
| RF Output Power | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| Frequency Stability | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Spurious Emissions Radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| Spurious Emissions Conducted | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Block Edge Compliance | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Occupied Bandwidth | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |

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

## 8.4 UMTS band V

| Test Case | temperature conditions | power source voltages | Pass | Fail | NA | NP | Remark |
|---|---|---|---|---|---|---|---|
| RF Output Power | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| Frequency Stability | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Spurious Emissions Radiated | Nominal | Nominal | ☒ | ☐ | ☐ | ☐ | -/- |
| Spurious Emissions Conducted | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Block Edge Compliance | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |
| Occupied Bandwidth | Nominal | Nominal | ☐ | ☐ | ☐ | ☒ | -/- |

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

# 9 RF measurements

## 9.1 Results GSM 850

All GSM-band measurements are done in GSM mode only (circuit switched).
All relevant tests have been repeated using 8-PSK modulation if EDGE mode is supported. 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.

### 9.1.1 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.

| 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<br>CFR Part 2.1046 | RSS 132 |
| Nominal Peak Output Power | |
| +38.45 dBm<br>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 (radiated) GMSK mode | |
|---|---|
| **Frequency (MHz)** | **Average Output Power (dBm) - ERP** |
| 824.2 | 31.8 |
| 836.4 | 32.4 |
| 848.8 | 31.3 |
| Measurement uncertainty | ± 2.0 dB |

| Output Power (radiated) 8-PSK mode | |
|---|---|
| **Frequency (MHz)** | **Average Output Power (dBm) - ERP** |
| 824.2 | 22.2 |
| 836.4 | 23.0 |
| 848.8 | 21.9 |
| Measurement uncertainty | ± 2.0 dB |

**Result:** **Passed**

### 9.1.2 Frequency stability

**Not performed!**

### 9.1.3 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 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:

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

**Measurement:**

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

**Limits:**

| FCC | IC |
|---|---|
| CFR Part 22.917<br>CFR Part 2.1053 | RSS 132 |
| Spurious Emissions Radiated | |
| Attenuation ≥ 43 + 10log(P)<br>(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.

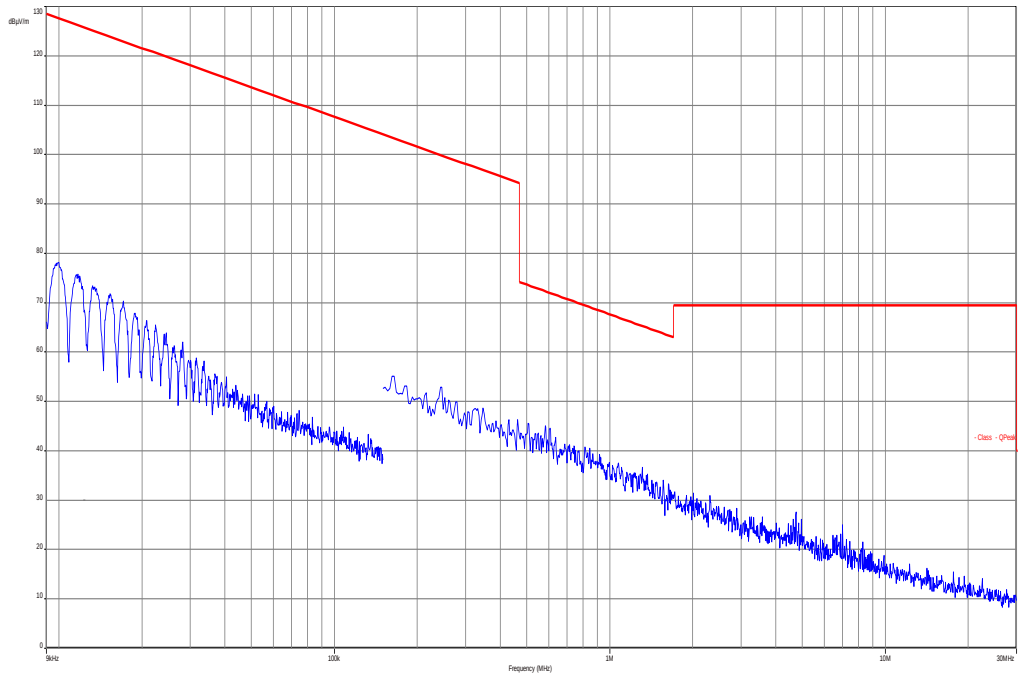
As can be seen from this data, the emissions from the test item were within the specification limit.

| 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 | | | | | |

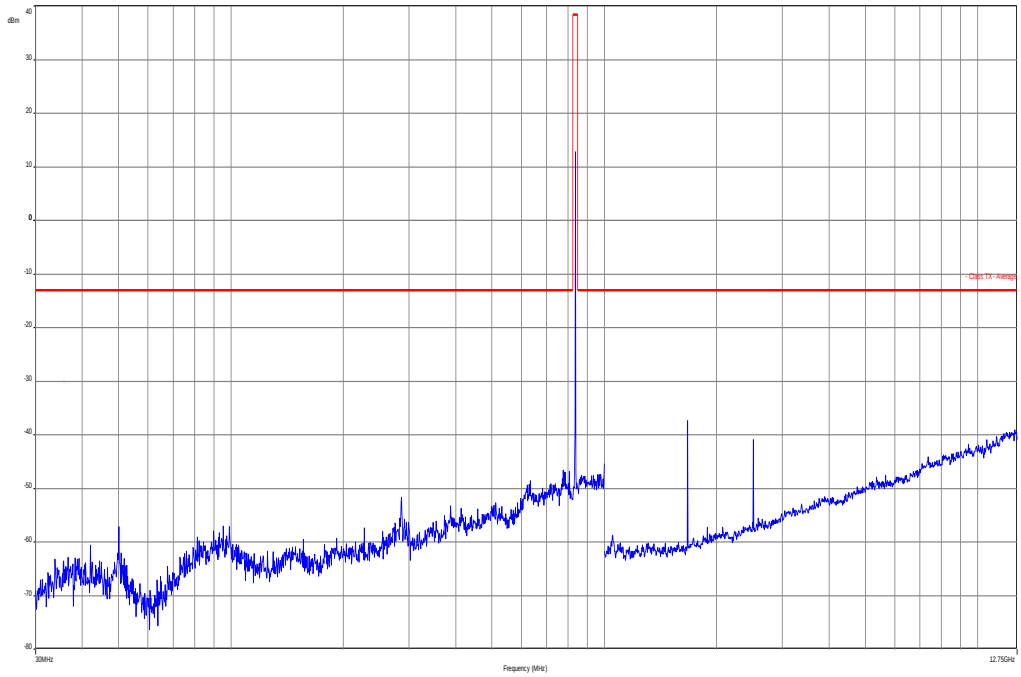
**Result:** **Passed**

**Plots:**

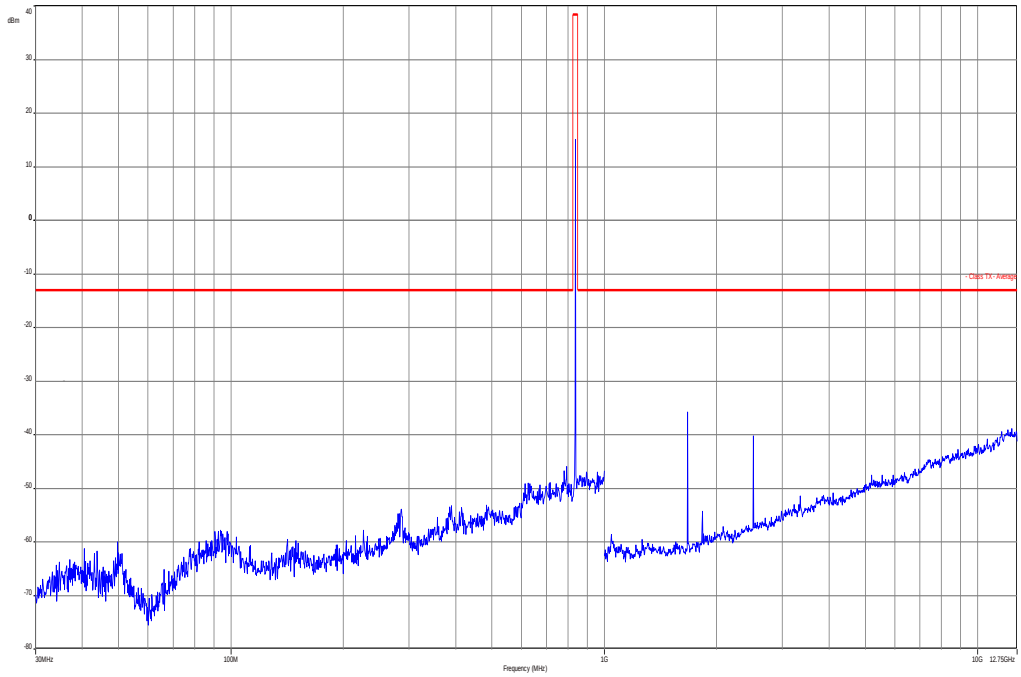
**Plot 1:** Channel 189 (Traffic mode up to 30 MHz)




**Plot 2:** Channel 189 (GMSK modulation, 30 MHz – 12.75 GHz)



**Plot 3:** Channel 189 (8-PSK modulation, 30 MHz – 12.75 GHz)



### 9.1.4 Spurious emissions conducted

**Not performed!**

### 9.1.5 Block edge compliance

**Not performed!**

### 9.1.6 Occupied bandwidth

**Not performed!**

## 9.2 Results PCS 1900

All GSM-band measurements are done in GSM mode only (circuit switched).
All relevant tests have been repeated using 8-PSK modulation if EDGE mode is supported. 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.

### 9.2.1 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.

| 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<br>CFR Part 2.1046 | RSS 133 |
| Nominal Peak Output Power | |
| +33.00 dBm<br>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 (radiated) GMSK mode | |
|---|---|
| **Frequency (MHz)** | **Average Output Power (dBm) - EIRP** |
| 1850.2 | 32.0 |
| 1880.0 | 30.7 |
| 1909.8 | 30.5 |
| Measurement uncertainty | ± 2.0 dB |

| Output Power (radiated) 8-PSK mode | |
|---|---|
| **Frequency (MHz)** | **Average Output Power (dBm) - EIRP** |
| 1850.2 | 28.1 |
| 1880.0 | 27.8 |
| 1909.8 | 27.7 |
| Measurement uncertainty | ± 2.0 dB |

**Result:** **Passed**

### 9.2.2 Frequency stability

**Not performed!**

### 9.2.3 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 1910 MHz. Measurement 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 PCS1900 band.

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

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

**Measurement:**

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

**Limits:**

| FCC | IC |
|---|---|
| CFR Part 24.238<br>CFR Part 2.1053 | RSS 133 |
| Spurious Emissions Radiated | |
| Attenuation ≥ 43 + 10log(P)<br>(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.

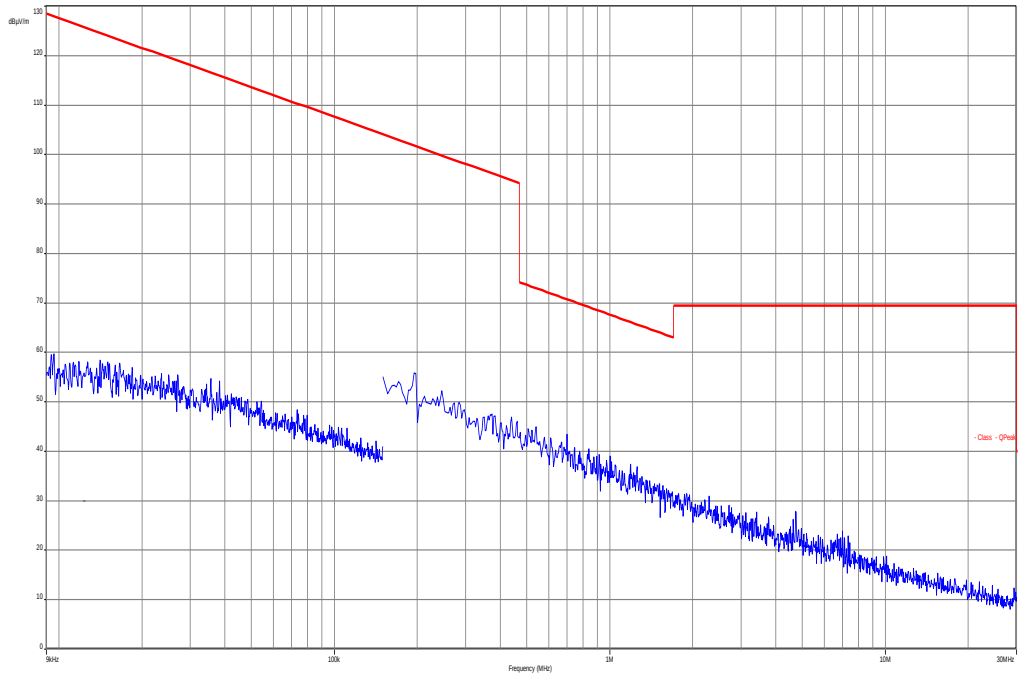
As can be seen from this data, the emissions from the test item were within the specification limit.

| 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 | | | | | |

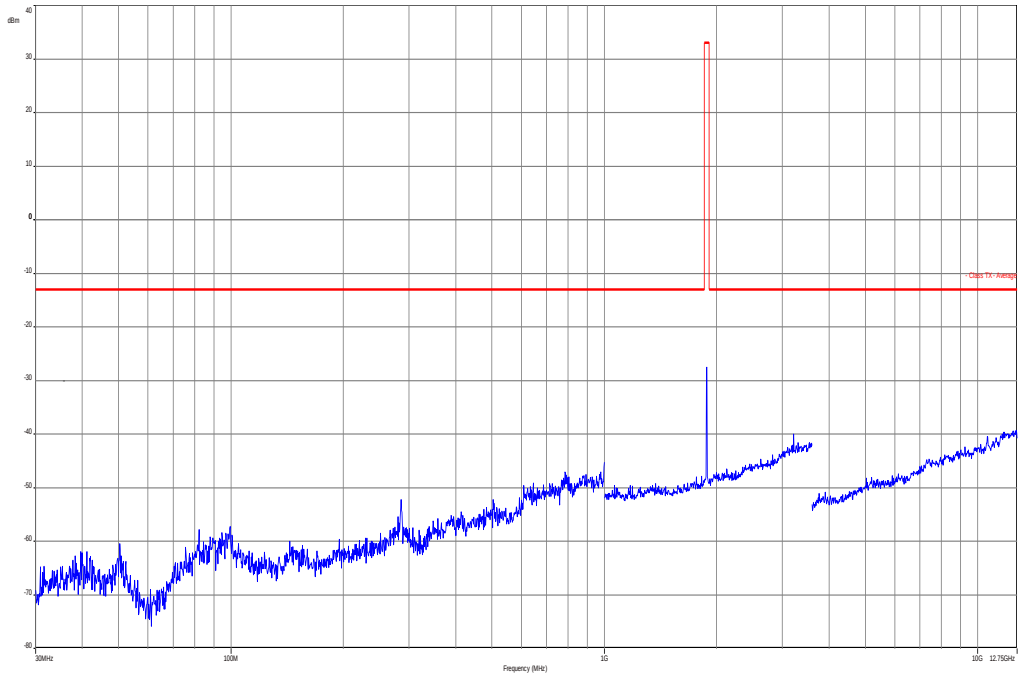
**Result:** **Passed**

**Plots:**

**Plot 1:** Channel 661 (Traffic mode up to 30 MHz)

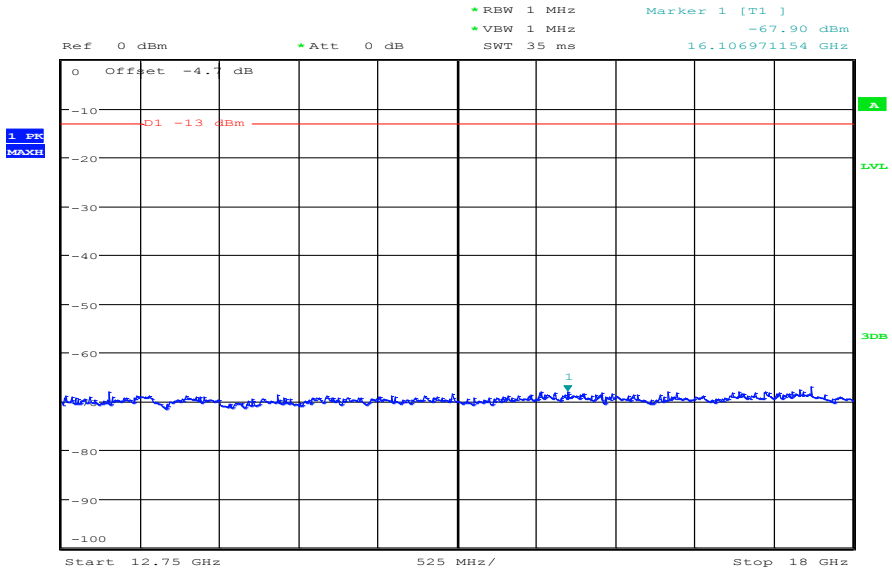



**Plot 2:** Channel 661 (GMSK modulation, 30 MHz – 12.75 GHz)



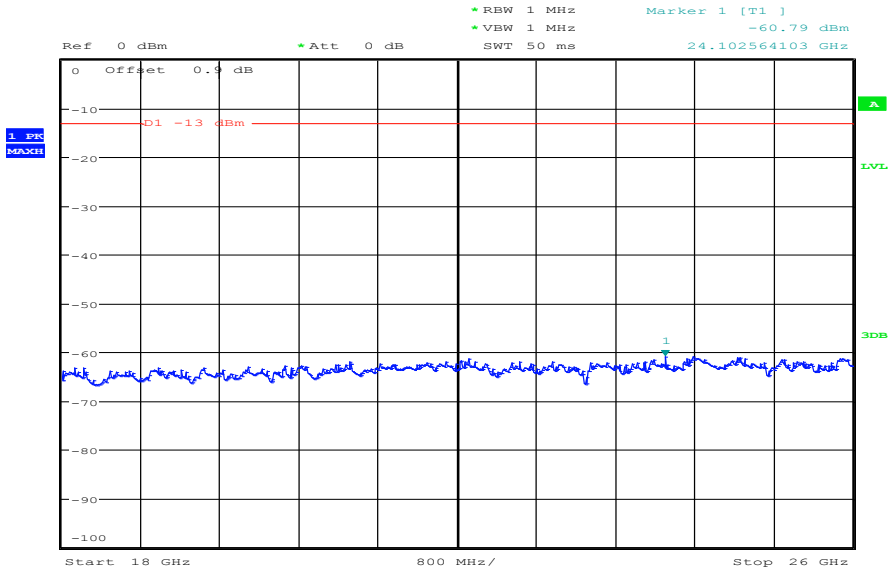

*Carrier notched with 1.9 GHz rejection filter*

**Plot 3:** Channel 661 (GMSK modulation, 12.75 GHz - 18 GHz)



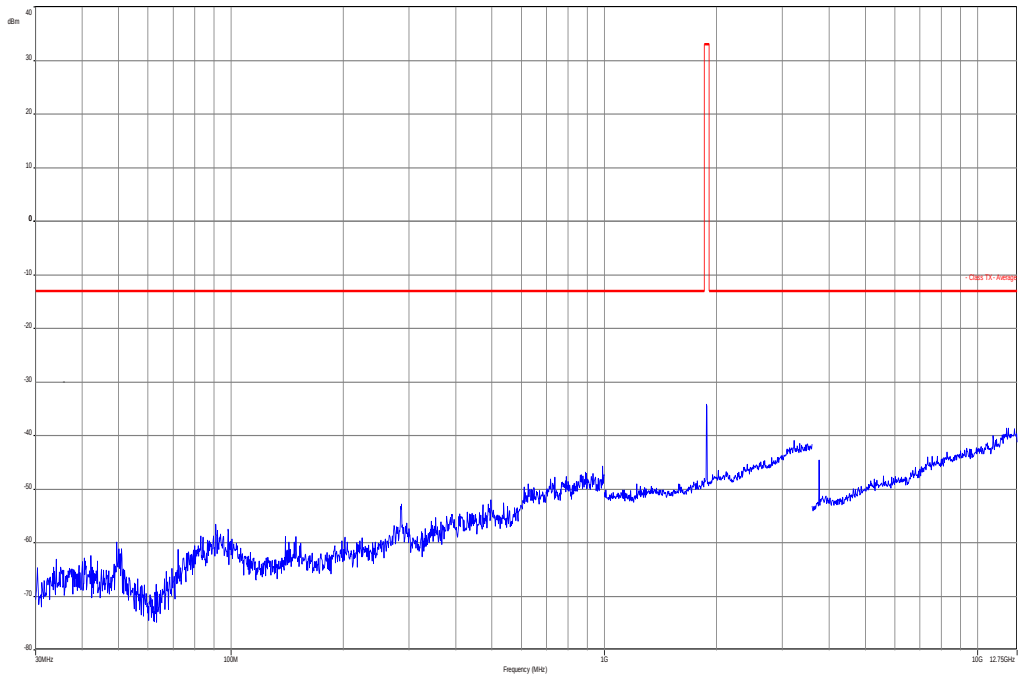

Date: 3.JUN.2014 07:41:55

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



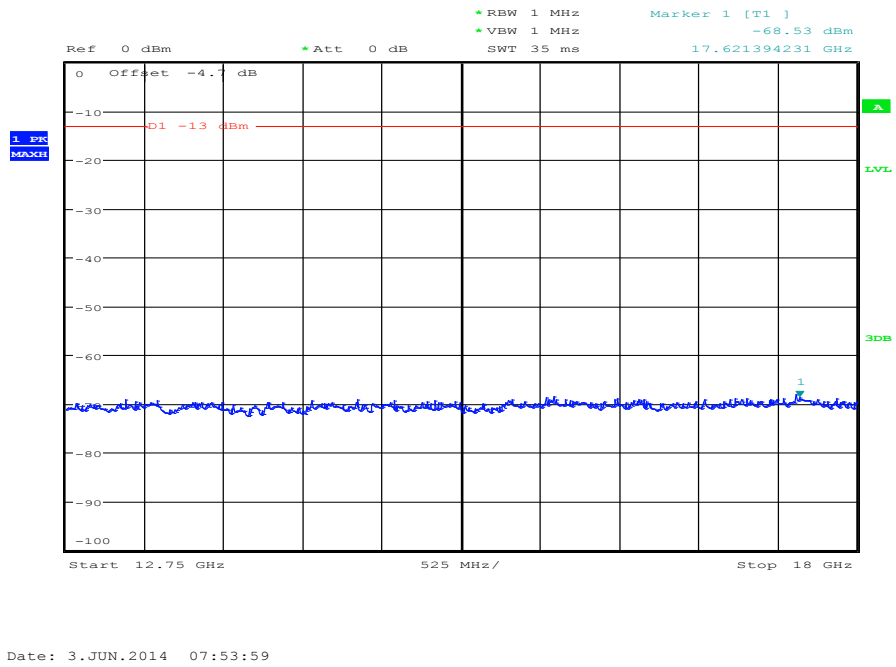

Date: 3.JUN.2014 07:43:56

**Plot 5:** Channel 661 (8-PSK modulation, 30 MHz – 12.75 GHz)

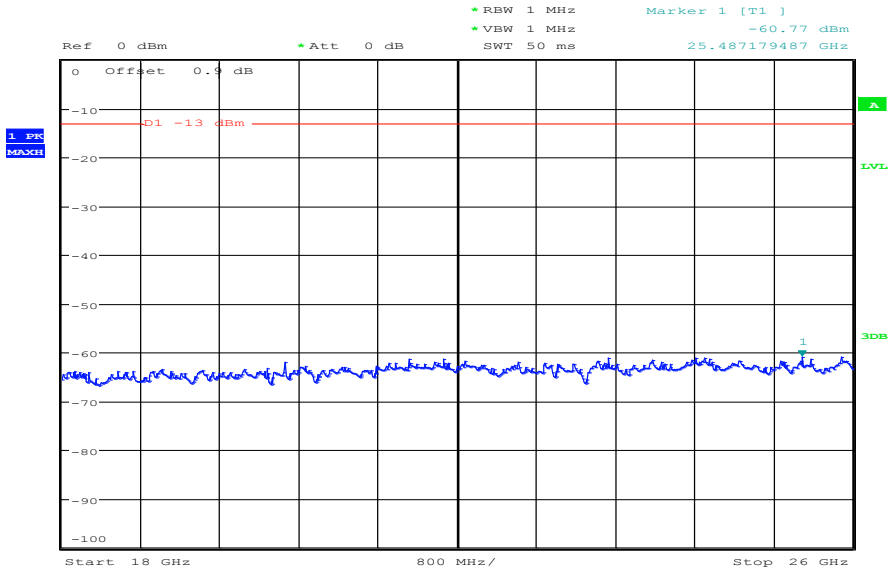


*Carrier notched with 1.9 GHz rejection filter*

**Plot 6:** Channel 661 (8-PSK modulation, 12.75 GHz - 18 GHz)



**Plot 7:** Channel 661 (8-PSK modulation, 18 GHz - 26 GHz)



### 9.2.4 Spurious emissions conducted

**Not performed!**

### 9.2.5 Block edge compliance

**Not performed!**

### 9.2.6 Occupied bandwidth

**Not performed!**

## 9.3 Results UMTS band II

All UMTS-band measurements are done in WCDMA mode only.
The connection was established with the following setup: WCDMA CS-RMC, Max Power (All Bit up)

### 9.3.1 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.

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 24.232<br>CFR Part 2.1046 | RSS 133 |
| Nominal Peak Output Power | |
| +33.00 dBm<br>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 (radiated) WCDMA mode | |
|---|---|
| **Frequency (MHz)** | **Average Output Power (dBm) - EIRP** |
| 1852.4 | 26.0 |
| 1880.0 | 26.1 |
| 1907.6 | 25.9 |
| Measurement uncertainty | ± 2.0 dB |

**Result:** **Passed**

### 9.3.2 Frequency stability

**Not performed!**

## 9.3.3 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 UMTS 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 1 GHz: 100 kHz<br>Above 1 GHz: 1 MHz |
| Resolution bandwidth: | Below 1 GHz: 100 kHz<br>Above 1 GHz: 1 MHz |
| Span: | 100 MHz Steps |
| Trace-Mode: | Max Hold |

**Limits:**

| FCC | IC |
|---|---|
| CFR Part 24.238<br>CFR Part 2.1053 | RSS 133 |
| Spurious Emissions Radiated | |
| Attenuation ≥ 43 + 10log(P)<br>(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 II (1852.4 MHz, 1880.0 MHz and 1907.6 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 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.

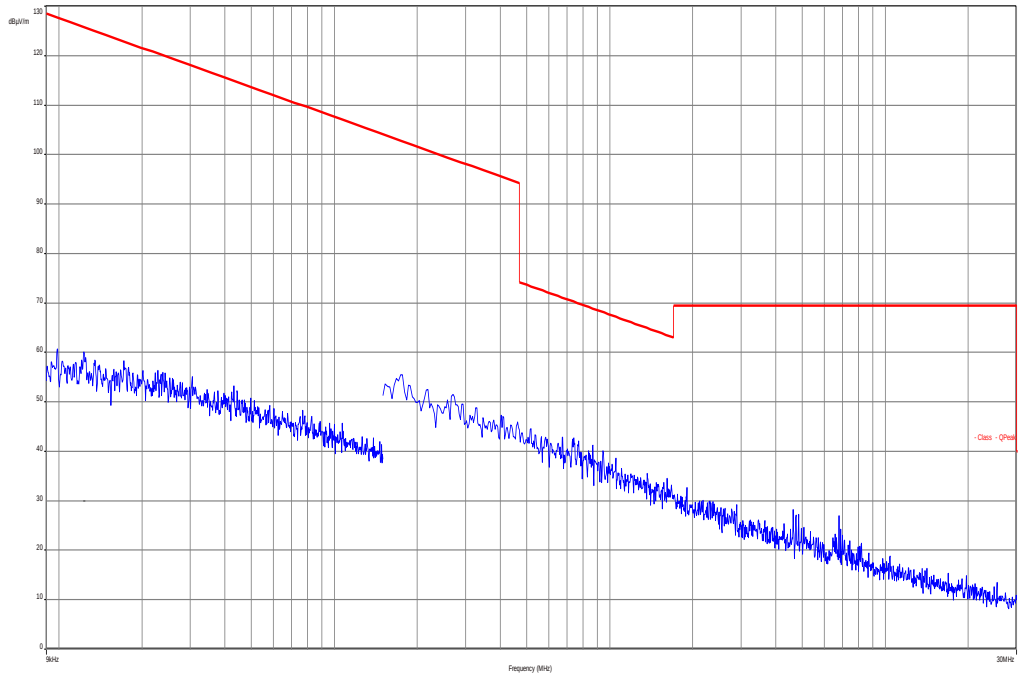
As can be seen from this data, the emissions from the test item were within the specification limit.

| SPURIOUS EMISSION LEVEL (DBM) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Harmonic | Ch. 9262 Freq. (MHz) | Level [dBm] | Harmonic | Ch. 9400 Freq. (MHz) | Level [dBm] | Harmonic | Ch. 9538 Freq. (MHz) | Level [dBm] |
| 2 | 3704.8 | - | 2 | 3760.0 | - | 2 | 3815.2 | - |
| 3 | 5557.2 | - | 3 | 5640.0 | - | 3 | 5722.8 | - |
| 4 | 7409.6 | - | 4 | 7520.0 | - | 4 | 7630.4 | - |
| 5 | 9262.0 | - | 5 | 9400.0 | - | 5 | 9538.0 | - |
| 6 | 11114.4 | - | 6 | 11280.0 | - | 6 | 11445.6 | - |
| 7 | 12966.8 | - | 7 | 13160.0 | - | 7 | 13353.2 | - |
| 8 | 14819.2 | - | 8 | 15040.0 | - | 8 | 15260.8 | - |
| 9 | 16671.6 | - | 9 | 16920.0 | - | 9 | 17168.4 | - |
| 10 | 18524.0 | - | 10 | 18800.0 | - | 10 | 19076.0 | - |
| Measurement uncertainty | | | ± 3dB | | | | | |

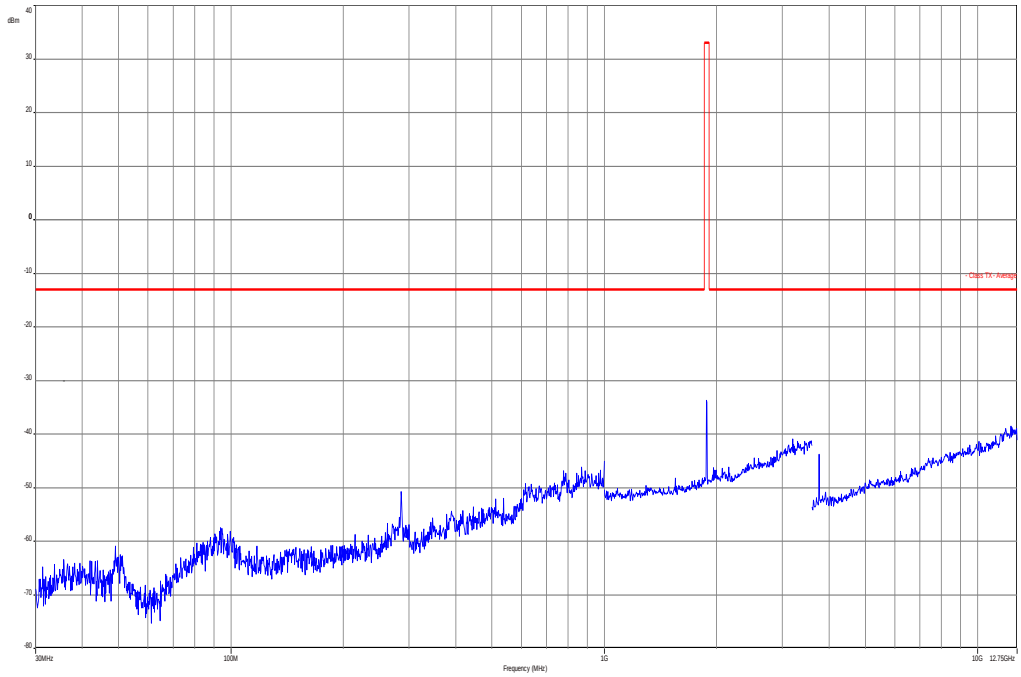
**Result:** **Passed**

**Plots:**

**Plot 1:** Channel 9400 (Traffic mode up to 30 MHz)

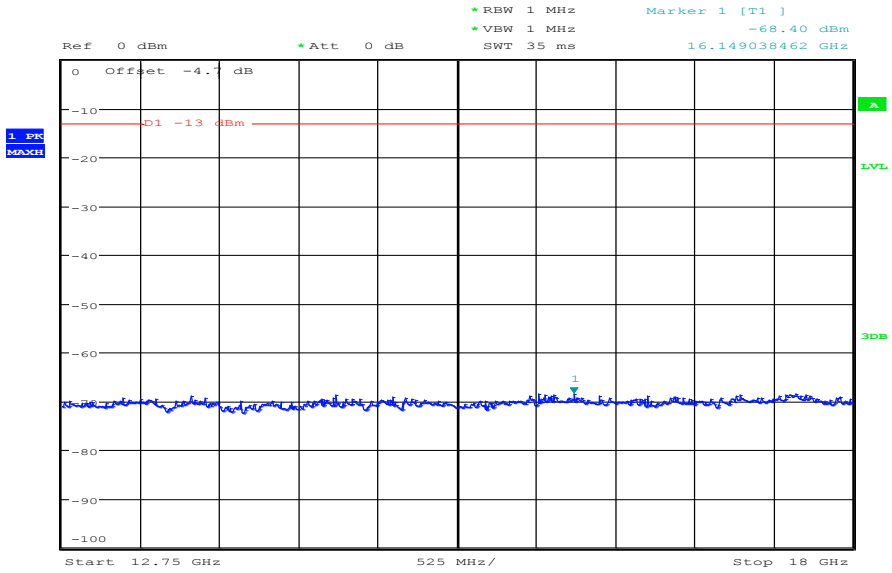



**Plot 2:** Channel 9400 (30 MHz – 12.75 GHz)



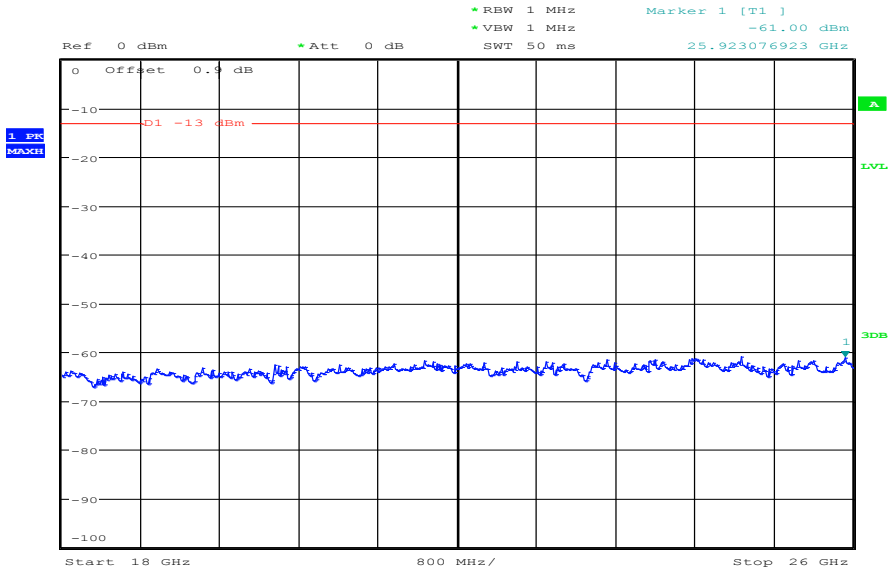

*Carrier notched with 1.9 GHz rejection filter*

**Plot 3:** Channel 9400 (12.75 GHz - 18 GHz)




Date: 3.JUN.2014 08:24:14

**Plot 4:** Channel 9400 (18 GHz - 26 GHz)




Date: 3.JUN.2014 08:26:33

### 9.3.4 Spurious emissions conducted

**Not performed!**

### 9.3.5 Block edge compliance

**Not performed!**

### 9.3.6 Occupied bandwidth

**Not performed!**

## 9.4 Results UMTS band V

All UMTS-band measurements are done in WCDMA mode only.
The connection was established with the following setup: WCDMA CS-RMC, Max Power (All Bit up)

### 9.4.1 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<br>CFR Part 2.1046 | RSS 132 |
| Nominal Peak Output Power | |
| +38.45 dBm<br>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 (radiated) WCDMA mode | |
|---|---|
| **Frequency (MHz)** | **Average Output Power (dBm) - ERP** |
| 826.4 | 23.9 |
| 836.0 | 24.1 |
| 846.6 | 22.3 |
| Measurement uncertainty | ± 2.0 dB |

**Result:** **Passed**

### 9.4.2 Frequency stability

**Not performed!**

## 9.4.3 Spurious emissions radiated

**Description:**

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2009 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 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:

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

**Measurement:**

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

**Limits:**

| FCC | IC |
|---|---|
| CFR Part 22.917<br>CFR Part 2.1053 | RSS 132 |
| Spurious Emissions Radiated | |
| Attenuation ≥ 43 + 10log(P)<br>(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.

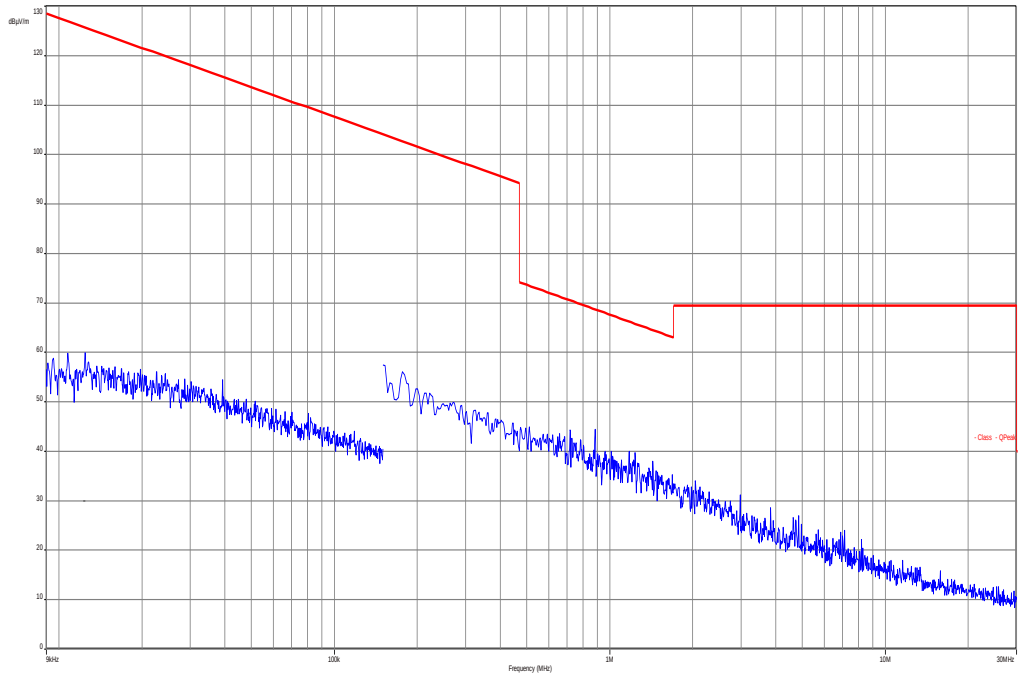
As can be seen from this data, the emissions from the test item were within the specification limit.

| 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 | | | | | |

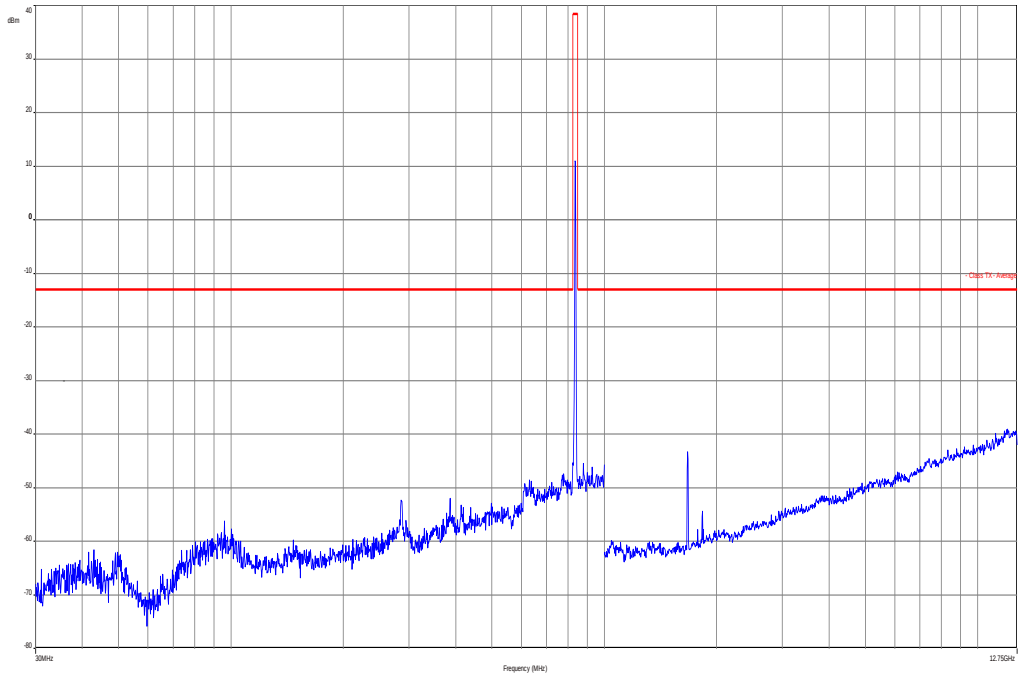
**Result:** **Passed**

**Plots:**

**Plot 1:** Channel 4180 (Traffic mode up to 30 MHz)




**Plot 2:** Channel 4180 (30 MHz – 12.75 GHz)



### 9.4.4 Spurious emissions conducted

**Not performed!**

### 9.4.5 Block edge compliance

**Not performed!**

### 9.4.6 Occupied bandwidth

**Not performed!**

## 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 (Lab/Item).

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A026 | Std. Gain Horn Antenna 12.4 to 18.0 GHz | 639 | Narda | 8402 | 300000787 | k | 22.07.2013 | 22.07.2015 |
| 2 | A029 | Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | 8205 | 300002442 | k | 19.07.2013 | 19.07.2015 |
| 3 | n. a. | Spectrum Analyzer 20 Hz - 50 GHz | FSU50 | R&S | 200012 | 300003443 | Ve | 09.10.2012 | 09.10.2014 |
| 4 | n. a. | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP Meßtechnik | 2818A03450 | 300001040 | Ve | 12.01.2012 | 12.01.2015 |
| 5 | n. a. | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 | vlKl! | 08.05.2013 | 08.05.2015 |
| 6 | n. a. | Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 | ev | | |
| 7 | n. a. | Switch / Control Unit | 3488A | HP Meßtechnik | * | 300000199 | ne | | |
| 8 | 90 | Active Loop Antenna 10 kHz to 30 MHz | 6502 | Kontron Psychotech | 8905-2342 | 300000256 | k | 13.06.2013 | 13.06.2015 |
| 9 | n. a. | Amplifier | js42-00502650-28-5a | Parzich GMBH | 928979 | 300003143 | ne | | |
| 10 | n. a. | Band Reject filter | WRCG1855/1910-1835/1925-40/8SS | Wainwright | 7 | 300003350 | ev | | |
| 11 | n. a. | Band Reject filter | WRCG2400/2483-2375/2505-50/10SS | Wainwright | 11 | 300003351 | ev | | |
| 12 | n. a. | Highpass Filter | WHKX7.0/18G-8SS | Wainwright | 18 | 300003789 | ne | | |
| 13 | n. a. | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 371 | 300003854 | vlKl! | 14.10.2011 | 14.10.2014 |
| 14 | n. a. | MXE EMI Receiver 20 Hz bis 26,5 GHz | N9038A | Agilent Technologies | MY51210197 | 300004405 | k | 13.03.2014 | 13.03.2015 |
| 15 | n. a. | 4U RF Switch Platform | L4491A | Agilent Technologies | MY50000037 | 300004509 | ne | | |

**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 |
| vlkl! | 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.

## Annex A Document history

| Version | Applied changes | Date of release |
|---|---|---|
| | Initial release | 2014-06-20 |

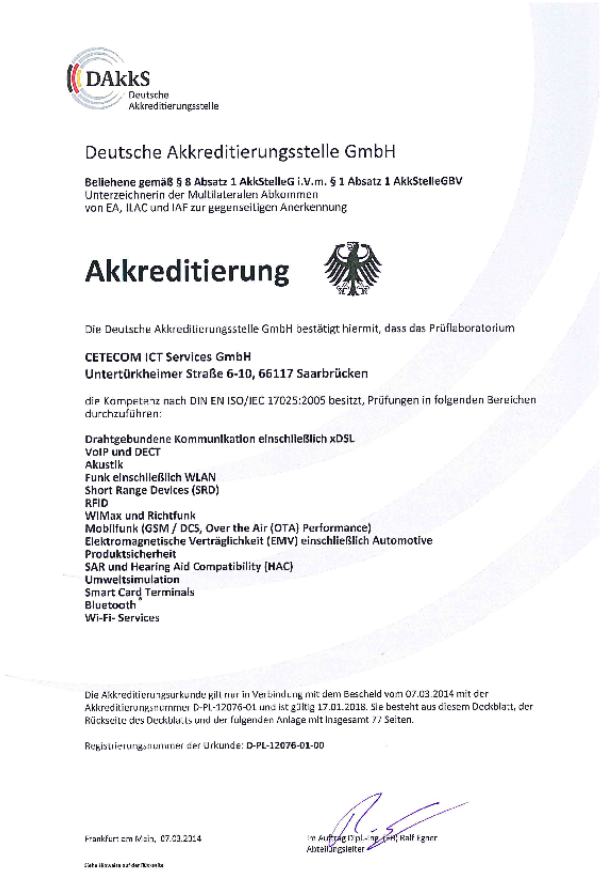
## Annex B Further information

**Glossary**

AVG - Average
DUT - Device under test
EMC - Electromagnetic Compatibility
EN - European Standard
EUT - Equipment under test
ETSI - European Telecommunications Standard Institute
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software

## Annex C Accreditation Certificate

Front side of certificate



DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

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

**Akkreditierung**

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

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

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

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

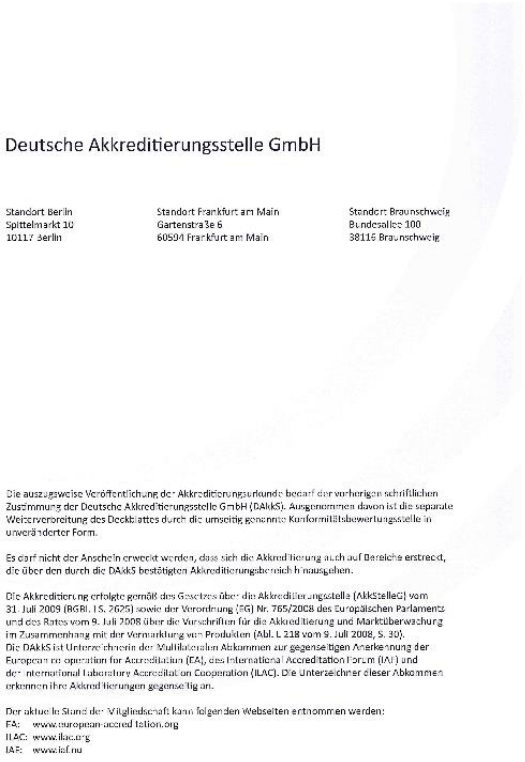
Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 07.03.2014 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 77 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12076-01-00**

Frankfurt am Main, 07.03.2014

Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Abteilungsleiter

Back side of certificate



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Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

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

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

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

**Note:**

**The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.**

http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html