



## Accredited testing-laboratory

**DAR registration number: DGA-PL-176/94-D1**

**Federal Motor Transport Authority (KBA)**  
**DAR registration number: KBA-P 00070-97**

**Recognized by the Federal Communications Commission**  
**Anechoic chamber registration no.: 90462 (FCC)**  
**Anechoic chamber registration no.: 3462C-1 (IC)**

**Certification ID: DE 0001**  
**Accreditation ID: DE 0002**

**Accredited Bluetooth® Test Facility (BQTF)**  
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Test report no. : 1-2166-01-02/10-C  
Type identification : RCW41GW  
Applicant : Research In Motion Limited  
FCC ID : L6ARCW40GW  
IC Certification No : 2503A-RCW40GW  
Test standards : 47 CFR Part 22  
47 CFR Part 24

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## 1 General information

### 1.1 Notes

The test results of this test report relate exclusively to the test item specified in 3.1.1. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

**Test laboratory manager:**

2010-05-25                    Marco Bertolino  
Date                            Name



Signature

**Technical responsibility for area of testing:**

2010-05-25                    Stefan Bös  
Date                            Name



Signature

## 1.2 Testing laboratory

### CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

e-mail: info@ICT.cetecom.de

Internet: <http://www.cetecom-ict.de>

**State of accreditation:**

The test laboratory (area of testing) is accredited according to  
DIN EN ISO/IEC 17025  
DAR registration number: DGA-PL-176/94-D1

**Accredited by:**

Federal Motor Transport Authority (KBA)  
DAR registration number: KBA-P 00070-97

**Testing location, if different from CETECOM ICT Services GmbH:**

Name :

Street :

Town :

Country :

Phone :

Fax :

## 1.3 Details of applicant

<b>Name:</b>	Research In Motion Limited
<b>Street:</b>	305 Phillip Street
<b>Town:</b>	Waterloo, ON N2L 3W8
<b>Country:</b>	Canada
<b>Telephone:</b>	+1-519-888-7465
<b>Fax:</b>	+1-519-888-6906
<b>Contact:</b>	Masud Attayi
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<b>Telephone:</b>	+1-519-888-7465

## 1.4 Application details

<b>Date of receipt of order:</b>	2010-02-11
<b>Date of receipt of test item:</b>	2010-04-06
<b>Date of start test:</b>	2010-04-06
<b>Date of end test:</b>	2010-04-09
<b>Persons(s) who have been present during the test:</b>	-/-

## 2 Test standard/s

<b>47 CFR Part 22</b>	<b>2009-10</b>	<b>Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission subchapter B - common carrier services, Part 22-Public mobile services</b>
<b>47 CFR Part 24</b>	<b>2009-10</b>	<b>Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission subchapter B - common carrier services, Part 24-Personal communications services</b>

### 3 Technical tests

#### 3.1 Details of manufacturer

Name:	<b>Research In Motion Limited</b>
Street:	<b>305 Phillip Street</b>
Town:	<b>Waterloo, ON N2L 3W8</b>
Country:	<b>Canada</b>

#### 3.1.1 Test item

Kind of test item	:	<b>Mobile Phone (GSM, GPRS, EGPRS, GPS, BT 2.0 + EDR, WLAN a/g/n)</b>
Type identification	:	<b>RCW41GW</b>
Serial Number	:	<b>IMEI: 004401135893473</b>
Frequency	:	<b>1850.2 – 1909.8 MHz and 824.2 – 848.8 MHz</b>
Type of modulation	:	<b>GMSK; 8-PSK; QPSK; 16QAM</b>
Number of channels	:	<b>300 (PCS1900) and 125 (PCS850) 103 (FDD V) / 278 (FDD II)</b>
Antenna Type	:	<b>Integrated PCB antenna</b>
Power supply (normal)	:	<b>DC supplied by Li-Ion-Battery</b>
Output power GSM 850 / GMSK	:	<b>ERP: 32.43 dBm (peak)</b>
Output power GSM 1900 / GMSK	:	<b>Not performed!</b>
Output power GSM 850 / 8-PSK	:	<b>ERP: 29.63 dBm (peak)</b>
Output power GSM 1900 / 8-PSK	:	<b>Not performed!</b>
FCC ID	:	<b>L6ARCW40GW</b>
Certification No. IC	:	<b>2503A-RCW40GW</b>
Open Area Test Site IC No.	:	<b>IC 3462C-1</b>
IC Standards	:	<b>RSS132, Issue 2, RSS133, Issue 5</b>

#### ATTESTATION:

#### DECLARATION OF COMPLIANCE:

I declare 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:

2010-05-25

Marco Bertolino

Date

Name



Signature

### 3.2 Test Setup

Hardware : CER-30952-001 Rev1  
Software : 917

Mobile; (cond. measurements) : -/-  
Mobile; (rad. measurements) : CER-30952-001 Rev.1

The radiated measurements were performed with Standard world wide charger.

## 4 Statement of Compliance

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

### 4.1 Summary of Measurement Results

- No deviations from the technical specifications were ascertained**
- There were deviations from the technical specifications ascertained

#### 4.1.1 PCS 1900

Section in this Report	Test Name	Verdict
5.1.1	RF Power Output radiated	not performed
5.1.2	Frequency Stability	not performed
5.1.3	Radiated Emissions	passed
5.1.4	Conducted Spurious Emissions	not performed
5.1.5	Block Edge Compliance	not performed
5.1.6	Occupied Bandwidth	not performed

#### 4.1.2 GSM 850

Section in this Report	Test Name	Verdict
5.2.1	RF Power Output radiated	passed
5.2.2	Frequency Stability	not performed
5.2.3	Radiated Emissions	passed
5.2.4	Conducted Spurious Emissions	not performed
5.2.5	Block Edge Compliance	not performed
5.2.6	Occupied Bandwidth	not performed

## 5 Measurements and results

### 5.1 PART PCS 1900

For Part 24/22 we use the substitution method (TIA/EIA 603).

All measurements in this report are done in GSM mode. The device is able to transmit data in GPRS mode also. But because the current measurements are performed in PEAK mode no other results from GPRS mode are possible. The only different is the modulation average power, which is 3 dB higher (by using 2 timeslots in the Up-link). All relevant tests have been repeated in 8-PSK Modulation if EDGE Mode is supported.

#### 5.1.1 RF Power Output

##### Reference

FCC:	CFR Part 24.232, 2.1046
IC:	RSS 133, Issue 5, Section 6.4

##### Summary:

This paragraph contains both average/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).

##### Method of Measurements:

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

The power was measured with R&S Signal Analyzer FSIQ 26 (peak and average)

These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0 MHz and 1909.8 MHz (bottom, middle and top of operational frequency range).

##### Limits:

Nominal Output Power (dBm)

+33

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.

##### Not performed

##### Test Results: Output Power (conducted) GMSK Mode

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

##### Test Results: Output Power (conducted) 8-PSK Mode

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

## EIRP Measurements

### Description:

This is the test for the maximum radiated power from the phone.

Rule Part 24.232(b) specifies that "Mobile/portable stations are limited to 2 watts e.i.r.p. peak power..." and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Measuring the EIRP of Spurious/Harmonic Emissions using Substitution Method

- (a) The measurements were performed with full rf output power and modulation.
- (b) Test was performed at listed 3m test site (listed with FCC, IC).
- (c) The transmitter under test was placed at the specified height on a non-conducting turntable (80 cm height)
- (d) The BICONILOG antenna (20 MHz to 1 GHz) or HORN antenna (1 GHz to 18 GHz) was used for measuring.
- (e) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level  
Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor  
$$E \text{ (dBuV/m)} = \text{Reading (dBuV)} + \text{Total Correction Factor (dB/m)}$$
- (f) Set the EMI Receiver and #2 as follows:
  - Center Frequency: test frequency
  - Resolution BW: 100 kHz
  - Video BW: same
  - Detector Mode: positive
  - Average: off
  - Span: 3 x the signal bandwidth
- (g) The test antenna was lowered or raised from 1 to 4 meters until the maximum signal level was detected.
- (h) The transmitter was rotated through 360° about a vertical axis until a higher maximum signal was received.
- (i) The test antenna was lowered or raised again from 1 to 4 meters until a maximum was obtained. This level was recorded.
- (j) The recorded reading was corrected to the true field strength level by adding the antenna factor, cable loss and subtracting the pre-amplifier gain.
- (k) The above steps were repeated with both transmitters' antenna and test receiving antenna placed in vertical and horizontal polarization. Both readings with the antennas placed in vertical and horizontal polarization shall be recorded.
- (l) Repeat for all different test signal frequencies

### Measuring the EIRP of Spurious/Harmonic Emissions using Substitution Method

(a) Set the EMI Receiver (for measuring E-Field) and Receiver #2 (for measuring EIRP) as follows:

Center Frequency : equal to the signal source  
 Resolution BW : 10 kHz  
 Video BW : same  
 Detector Mode : positive  
 Average : off  
 Span : 3 x the signal bandwidth

(b) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level

Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor

$E \text{ (dBuV/m)} = \text{Reading (dBuV)} + \text{Total Correction Factor (dB/m)}$

(c) Select the frequency and E-field levels for ERP/EIRP measurements.

(d) Substitute the EUT by a signal generator and one of the following transmitting antennas (substitution antenna): .DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz}.

(e) Mount the transmitting antenna at 0.8 meter high from the ground plane.

(f) Use one of the following antenna as a receiving antenna: .DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz }.

(g) If the DIPOLE antenna is used, tune its elements to the frequency as specified in the calibration manual.

(h) Adjust both transmitting and receiving antenna in a VERTICAL polarization.

(i) Tune the EMI Receivers to the test frequency.

(j) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.

(k) The transmitter was rotated through 360 o about a vertical axis until a higher maximum signal was received.

(l) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.

(m) Adjust input signal to the substitution antenna until an equal or a known related level to that detected from the transmitter was obtained in the test receiver.

(n) Record the power level read from the Average Power Meter and calculate the ERP/EIRP as follows:

$$P = P_1 - L_1 = (P_2 + L_2) - L_1 = P_3 + A + L_2 - L_1$$

$$\text{EIRP} = P + G_1 = P_3 + L_2 - L_1 + A + G_1$$

$$\text{ERP} = \text{EIRP} - 2.15 \text{ dB}$$

Total Correction factor in EMI Receiver # 2 =  $L_2 - L_1 + G_1$

Where: P: Actual RF Power fed into the substitution antenna port after corrected.

P1: Power output from the signal generator

P2: Power measured at attenuator A input

P3: Power reading on the Average Power Meter

EIRP: EIRP after correction

ERP: ERP after correction

(o) Adjust both transmitting and receiving antenna in a HORIZONTAL polarization, then repeat step (k) to (o)

(p) Repeat step (d) to (o) for different test frequency

(q) Repeat steps (c) to (j) with the substitution antenna oriented in horizontal polarization.

(r) Actual gain of the EUT's antenna is the difference of the measured EIRP and measured RF power at the RF port. Correct the antenna gain if necessary.

**Limits:**

Nominal Output Power (dBm)
+33

**Not performed****Test Results: Output Power (radiated) GMSK Mode**

Frequency (MHz)	Peak EIRP (dBm)
1850.2	-/-
1880.0	-/-
1909.8	-/-
Measurement uncertainty	± 3 dB

**Test Results: Output Power (radiated) 8-PSK Mode**

Frequency (MHz)	Peak EIRP (dBm)
1850.2	-/-
1880.0	-/-
1909.8	-/-
Measurement uncertainty	± 3 dB

**Sample Calculation:**

Freq	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	EIRP Result			
MHz	dB $\mu$ V	dBm	dBi	dBd	dB	dBm			
1909.8	132.3	24.6	8.4	0.0	3.3	29.7			

$$\text{EIRP} = \text{SG (dBm)} - \text{Cable Loss (dB)} + \text{Ant. gain (dBi)}$$

### 5.1.2 Frequency Stability

**Not performed**

**Reference**

FCC:	CFR Part 24.235, 2.1055
IC:	RSS 133, Issue 5, Section 6.3

**Method of Measurement:**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the mobile station in a "call mode". This is accomplished with the use of a R&S CMU 200 DIGITAL RADIOPHYSICAL TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with Vnom, connected to the CMU 200 and in a simulated call on channel 661 (center channel), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the mobile station, to prevent significant self warming.
4. Repeat the above measurements at 10 C increments from -30 C to +60 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
5. Re-measure carrier frequency at room temperature with Vnom. Vary supply voltage from Vmin to Vmax, in 12 steps re-measuring carrier frequency at each voltage. Pause at Vnom for 1 1/2 hours un-powered, to allow any self heating to stabilize, before continuing.
6. Subject the mobile station to overnight soak at +60 C.
7. With the mobile station, powered with Vnom, connected to the CMU 200 and in a simulated call on channel 661 (center channel), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the mobile station, to prevent significant self warming.
8. Repeat the above measurements at 10 C increments from +60 C to -30 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.

**Measurement Limit:**

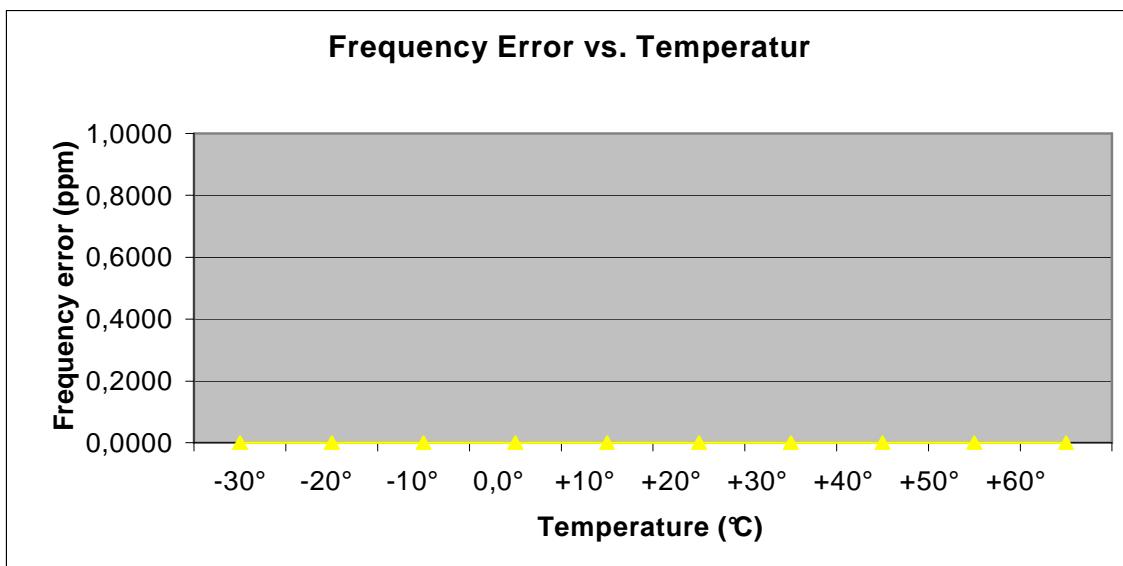
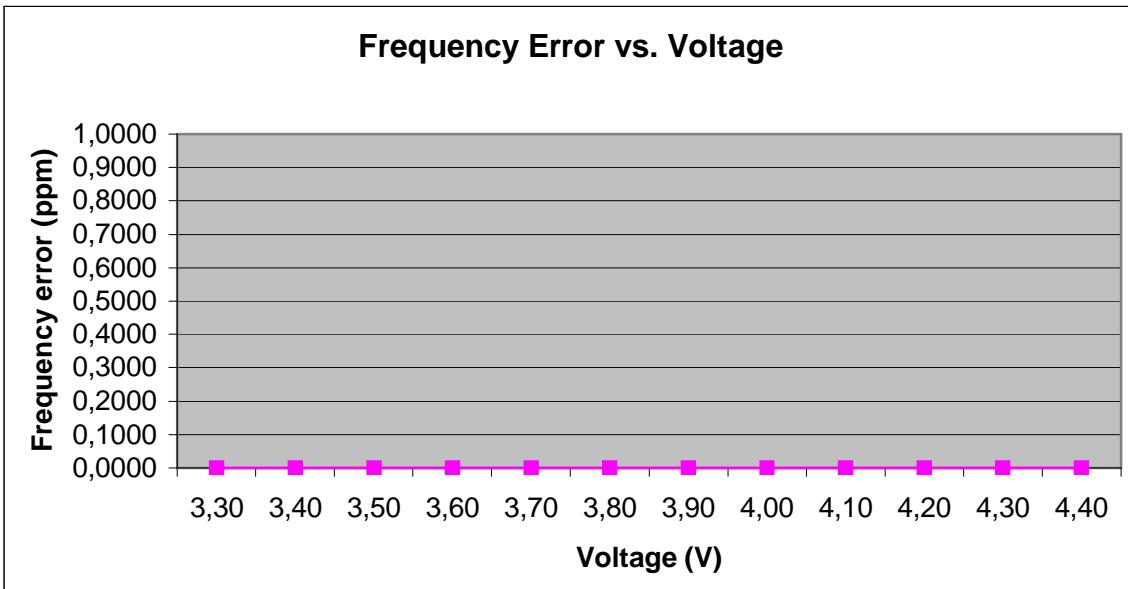
According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

**Test Results: AFC FREQ ERROR vs. VOLTAGE**

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.3			
3.4			
3.5			
3.6			
3.7		Not performed	
3.8			
3.9			
4.0			
4.1			
4.2			
4.3			
4.4			

**Test Results: AFC FREQ ERROR vs. TEMPERATURE**

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30			
-20			
-10			
±0.0			
+10		Not performed	
+20			
+30			
+40			
+50			
+60			



### 5.1.3 Radiated Emissions

#### Reference

FCC:	CFR Part 24.238, 2.1053
IC:	RSS 133, Issue 5, Section 6.5

#### Measurement Procedure:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2003 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 USPCS 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.
- c) A double ridged waveguide 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.
- e) Now each detected emissions were substituted by the Substitution method, in accordance with the TIA/EIA 603.

#### Measurement Limit:

Sec. 24.238 Emission Limits.

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43 + 10\log(P)$  dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

### **Measurement Results: Radiated Emissions**

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the USPCS 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 USPCS 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 table.

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.

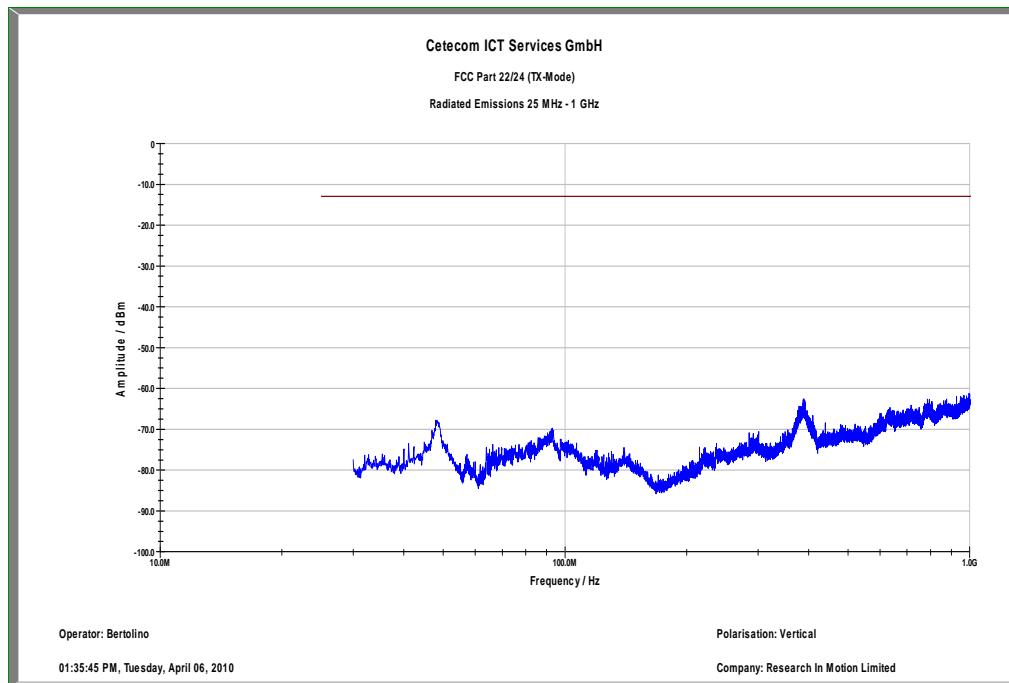
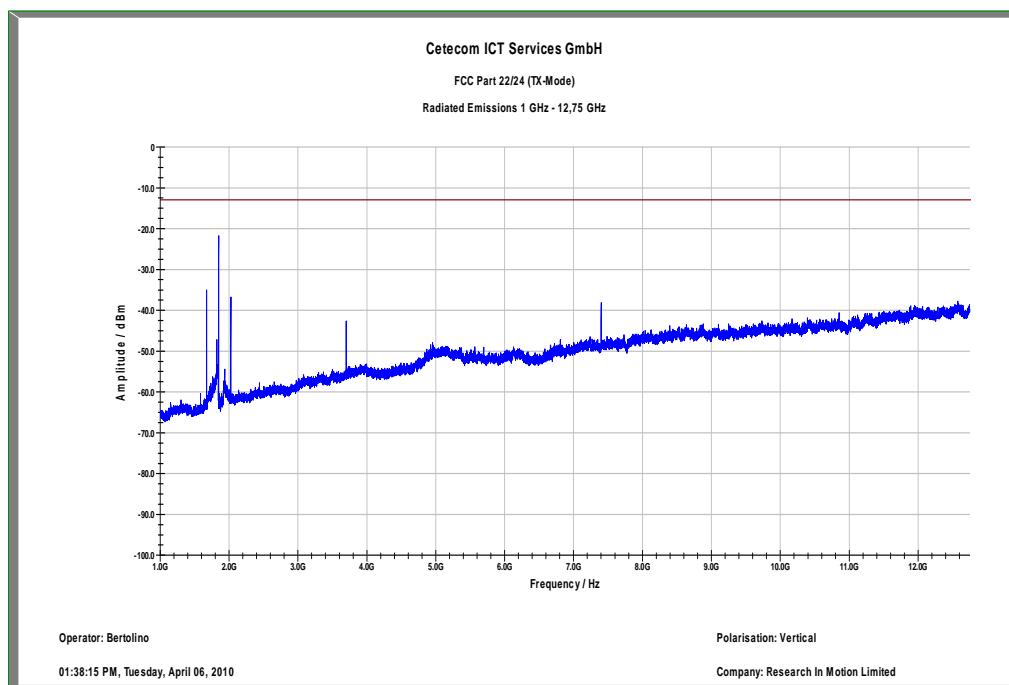
As can be seen from this data, the emissions from the test item were within the specification limit.

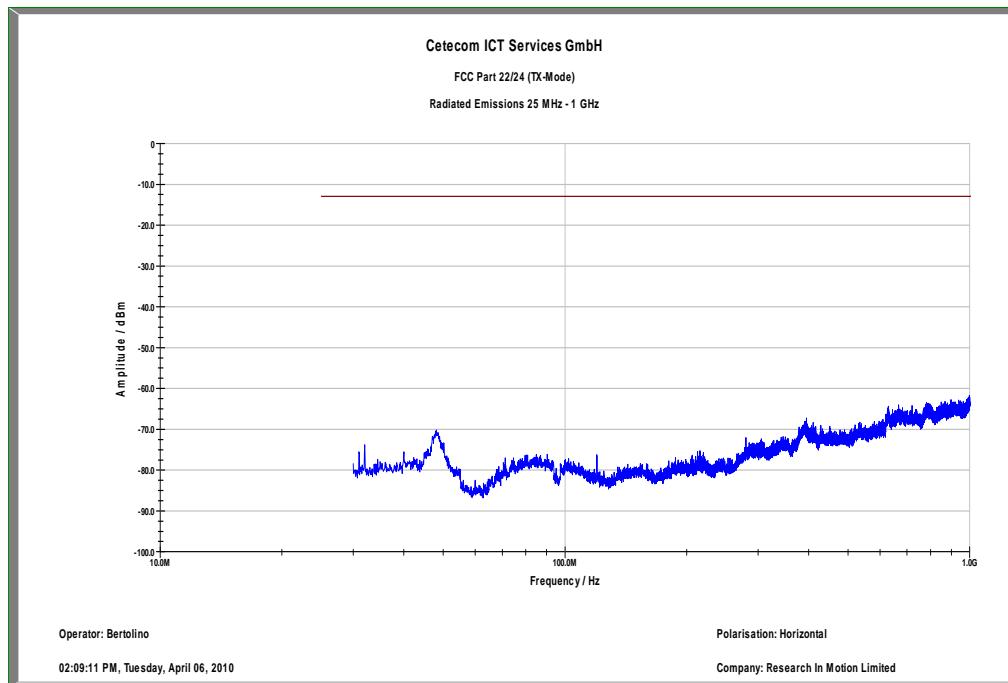
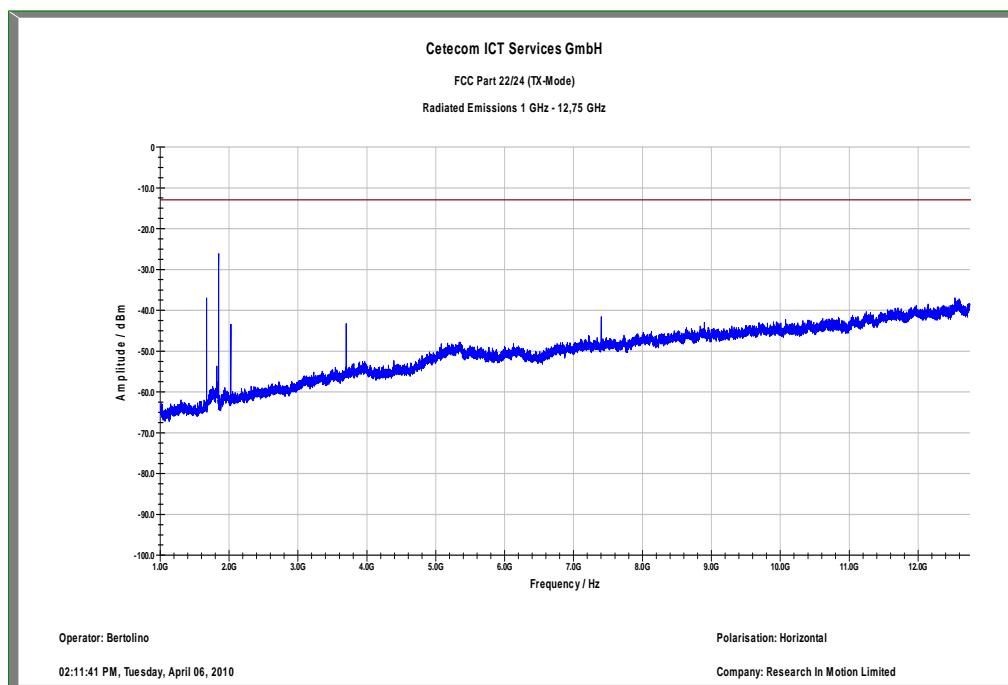
### **Results: GSM**

<b>Harmonic</b>	<b>Tx ch.-512 Freq. (MHz)</b>	<b>Level (dBm)</b>	<b>Tx ch.-661 Freq. (MHz)</b>	<b>Level (dBm)</b>	<b>Tx ch.-810 Freq. (MHz)</b>	<b>Level (dBm)</b>
--	1673.8	-31.24 dBm vertical -34.17 dBm horizontal	1700.9	-30.19 dBm vertical -33.60 dBm horizontal	1743.68	-29.86 dBm vertical -32.13 dBm horizontal
--	2026.37	-33.54 dBm vertical -35.98 dBm horizontal	2059.02	-36.05 dBm vertical -36.56 dBm horizontal	2075.87	-36.86 dBm vertical -37.66 dBm horizontal
2	3700.4	-37.64 dBm vertical -38.41 dBm horizontal	3760	-41.53 dBm vertical -43.20 dBm horizontal	3819.6	-42.67 dBm vertical -44.48 dBm horizontal
3	5550.6	-	5640.0	-	5729.4	-
4	7400.8	-32.10 dBm vertical -29.27 dBm horizontal	7520	-29.10 dBm vertical -26.57 dBm horizontal	7639.2	-28.15 dBm vertical -25.71 dBm horizontal
5	9251.0	-	9400	-	9549.0	-
6	11101.2	-	11280	-	11458.8	-
7	12951.4	-	13160	-	13368.6	-
8	14801.6	-	15040	-	15278.4	-
9	16651.8	-	16920	-	17188.2	-
10	18502.0	-	18800	-	19098.0	-

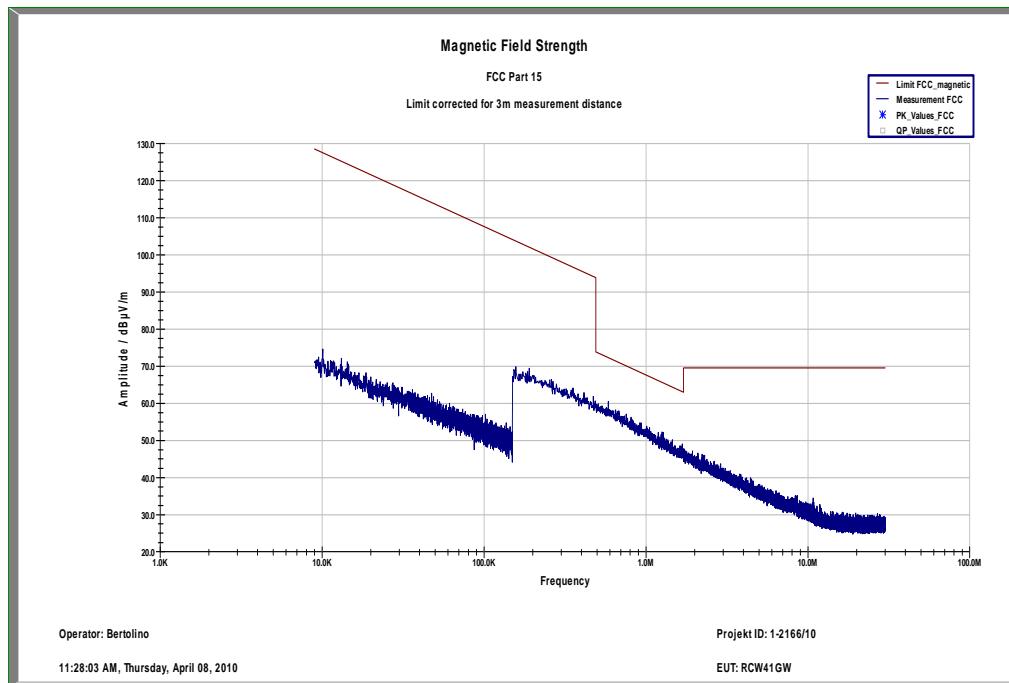
**Results: EGPRS / EDGE**

Harmonic	Tx ch.-512 Freq. (MHz)	Level (dBm)	Tx ch.-661 Freq. (MHz)	Level (dBm)	Tx ch.-810 Freq. (MHz)	Level (dBm)
--	1673.9	-29.72 dBm vertical -33.38 dBm horizontal	1701.01	-29.16 dBm vertical -32.73 dBm horizontal	1743.68	-27.84 dBm vertical -31.27 dBm horizontal
--	2026.42	-33.57 dBm vertical -36.20 dBm horizontal	2059.05	-33.04 dBm vertical -35.78 dBm horizontal	2075.87	-32.91 dBm vertical -35.34 dBm horizontal
2	3700.4	-40.53 dBm vertical -40.86 dBm horizontal	3760	-39.14 dBm vertical -39.62 dBm horizontal	3819.6	-38.72 dBm vertical -39.08 dBm horizontal
3	5550.6	-	5640.0	-	5729.4	-
4	7400.8	-33.94 dBm vertical -29.91 dBm horizontal	7520	-31.06 dBm vertical -27.34 dBm horizontal	7639.2	-28.69 dBm vertical -24.97 dBm horizontal
5	9251.0	-	9400	-	9549.0	-
6	11101.2	-	11280	-	11458.8	-
7	12951.4	-	13160	-	13368.6	-
8	14801.6	-	15040	-	15278.4	-
9	16651.8	-	16920	-	17188.2	-
10	18502.0	-	18800	-	19098.0	-

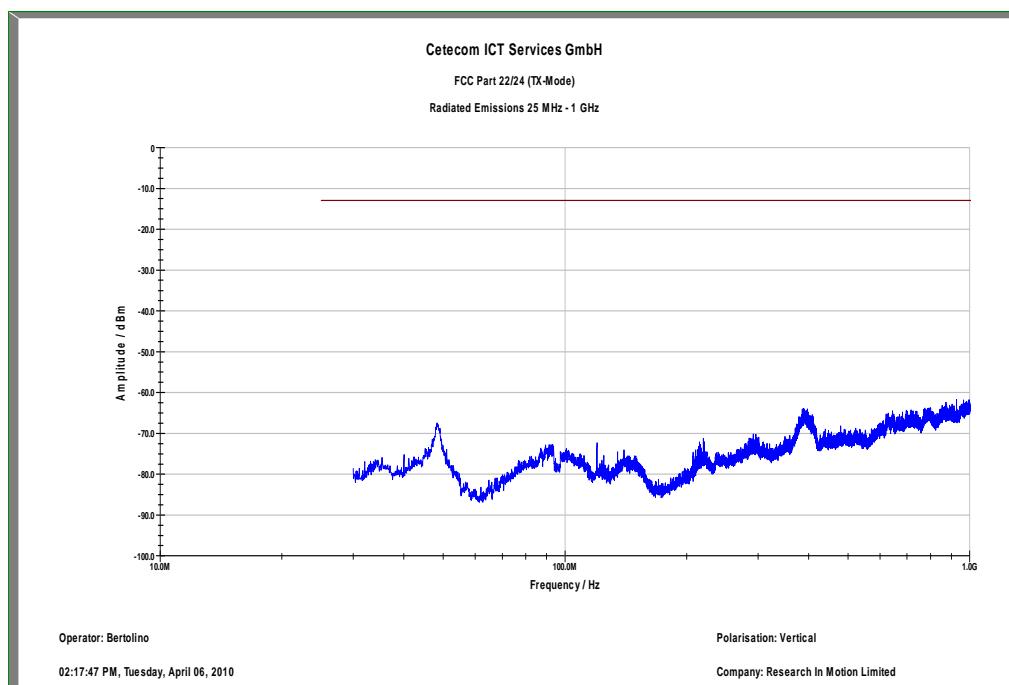
**Plot 1:** TX mode, channel 512, GSM, 30 MHz – 1 GHz, vertical polarization**Plot 2:** TX mode, channel 512, GSM, 1 GHz – 12.75 GHz, vertical polarization

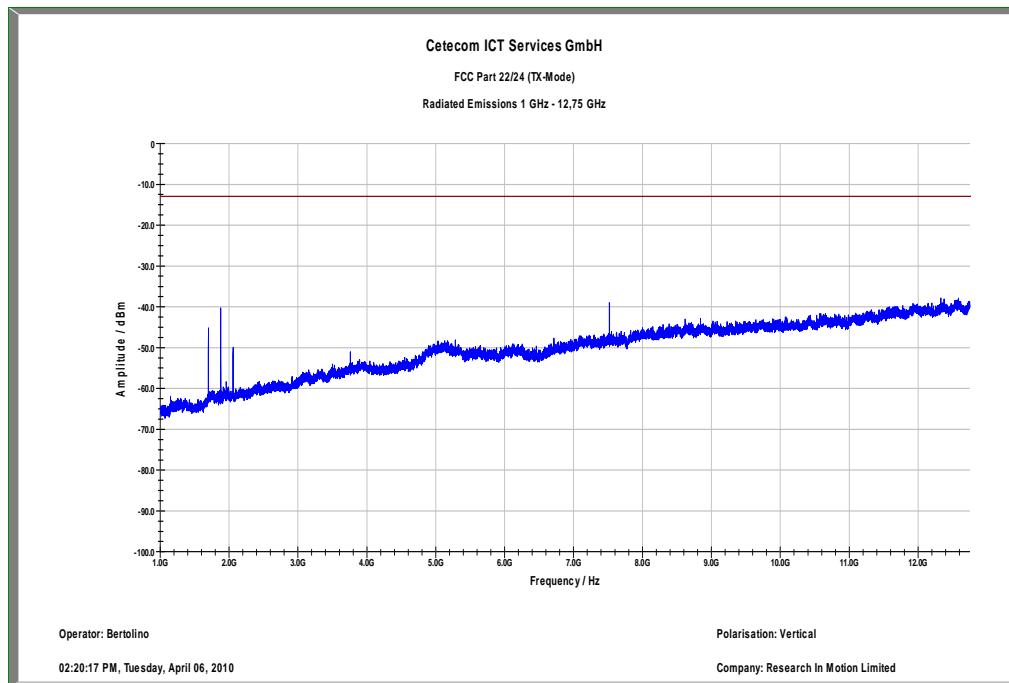
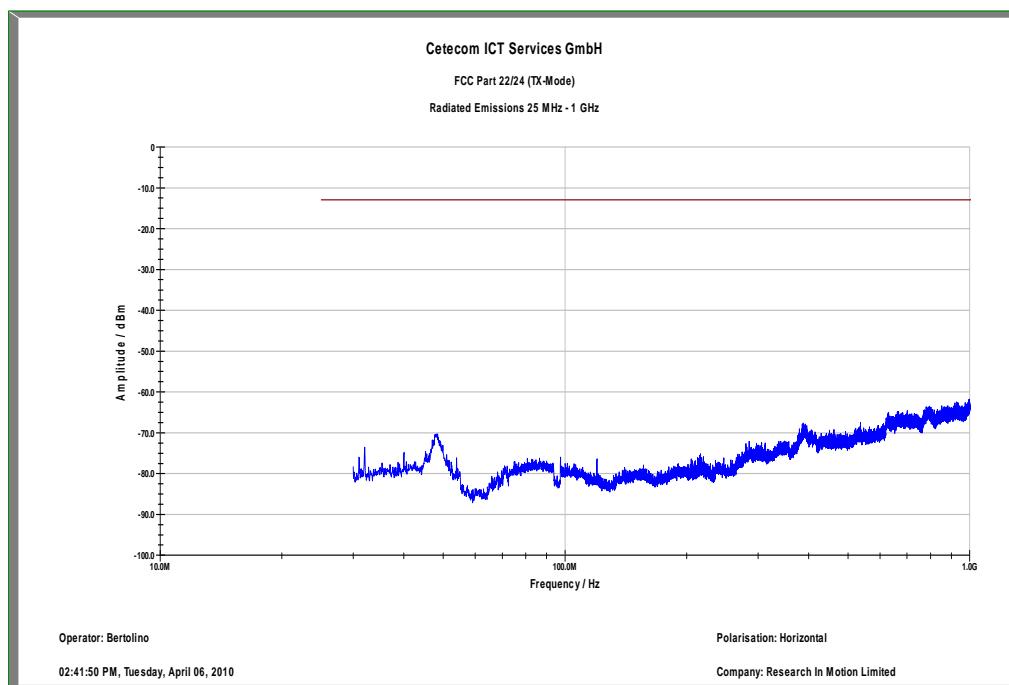
**Plot 3:** TX mode, channel 512, GSM, 30 MHz – 1 GHz, horizontal polarization**Plot 4:** TX mode, channel 512, GSM, 1 GHz – 12.75 GHz, horizontal polarization

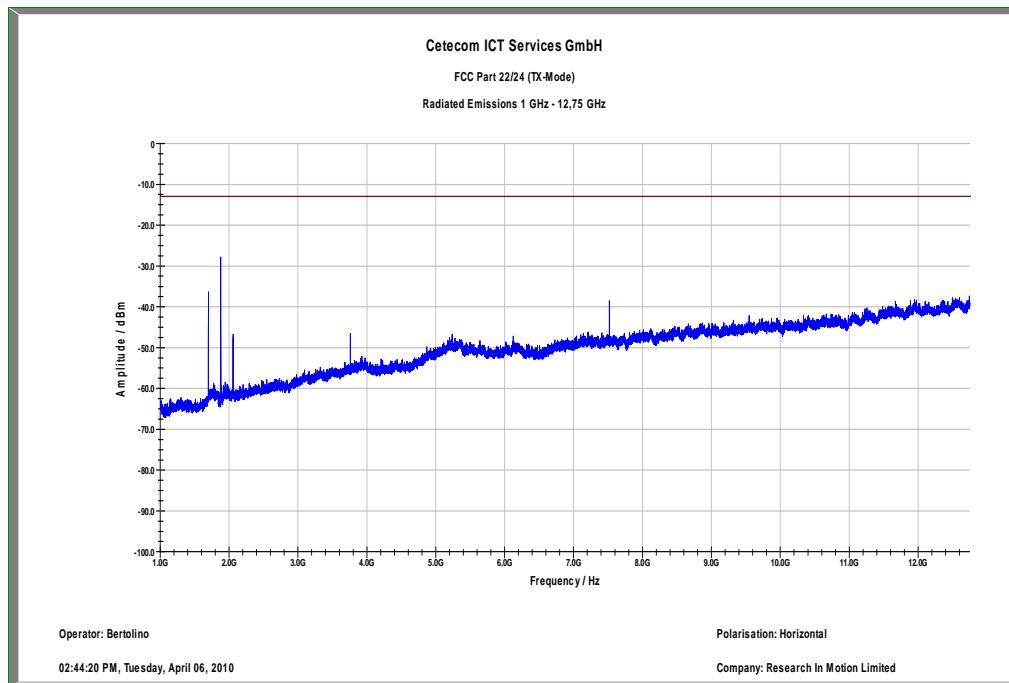
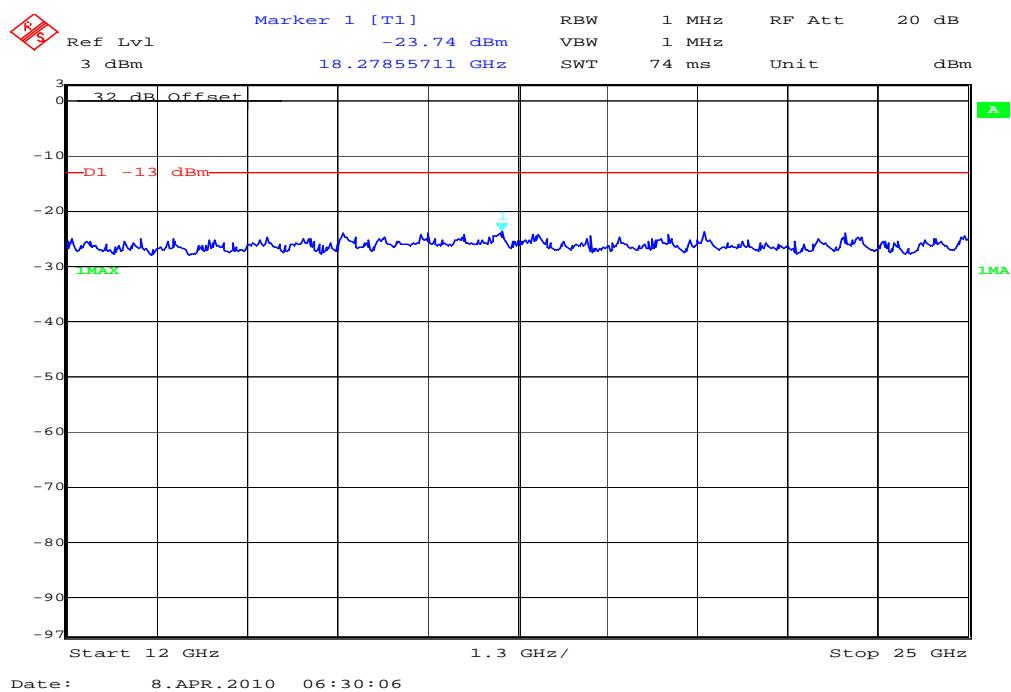
**Plot 5:** TX mode, channel 661, GSM, 10 kHz - 30 MHz (valid for all channels)

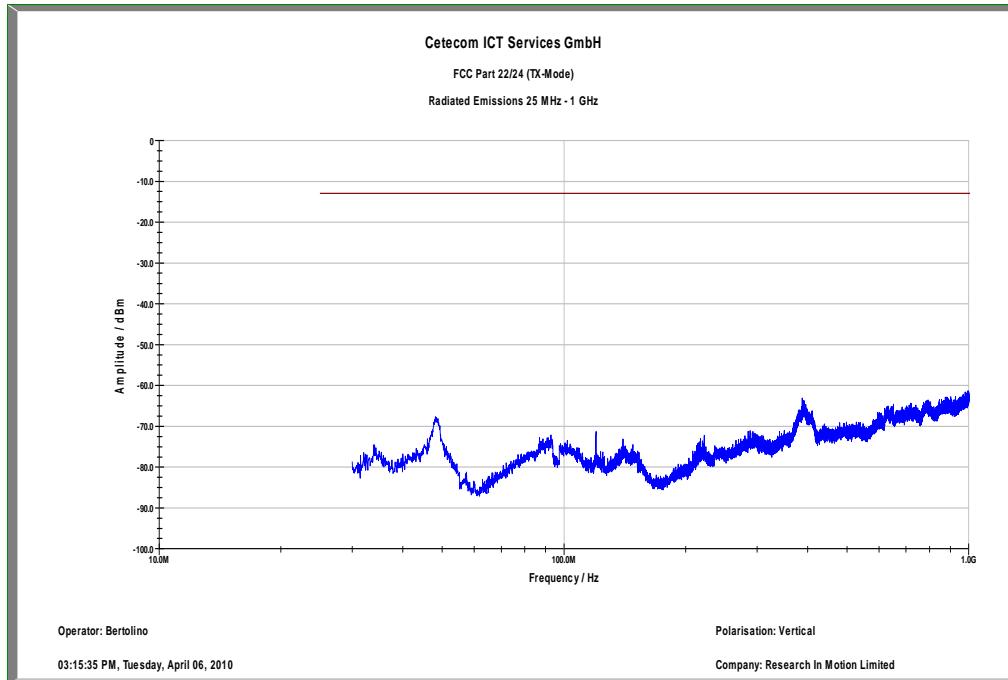
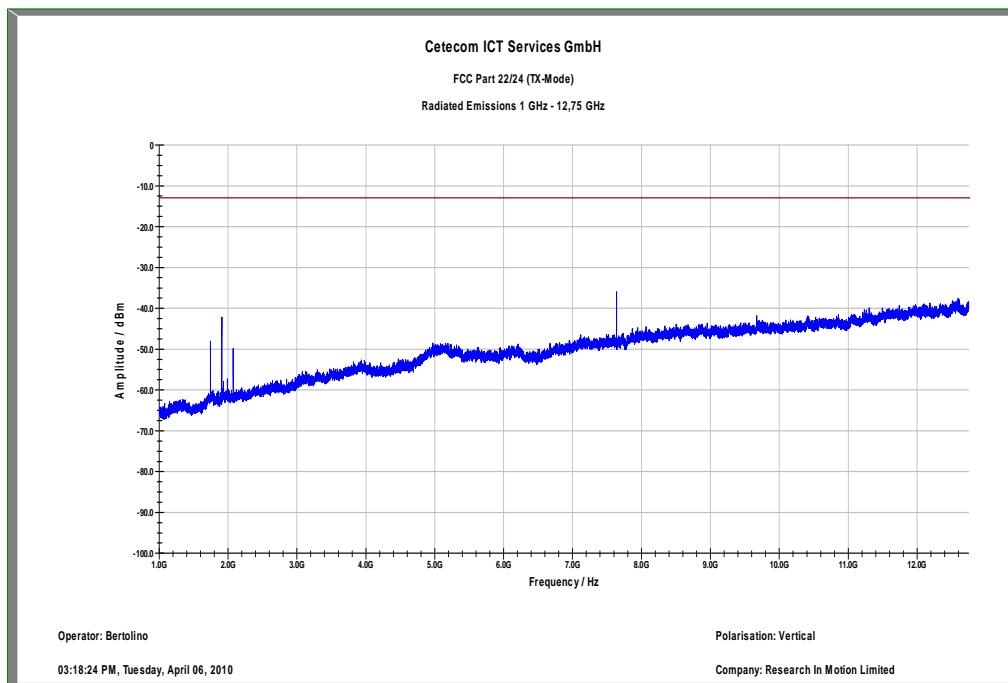


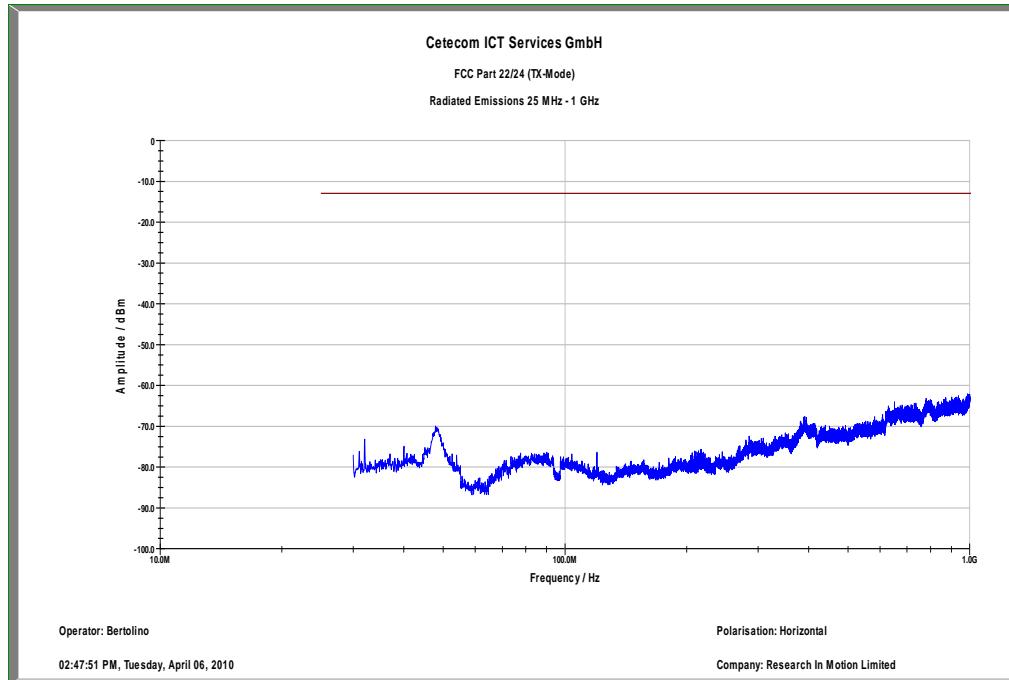
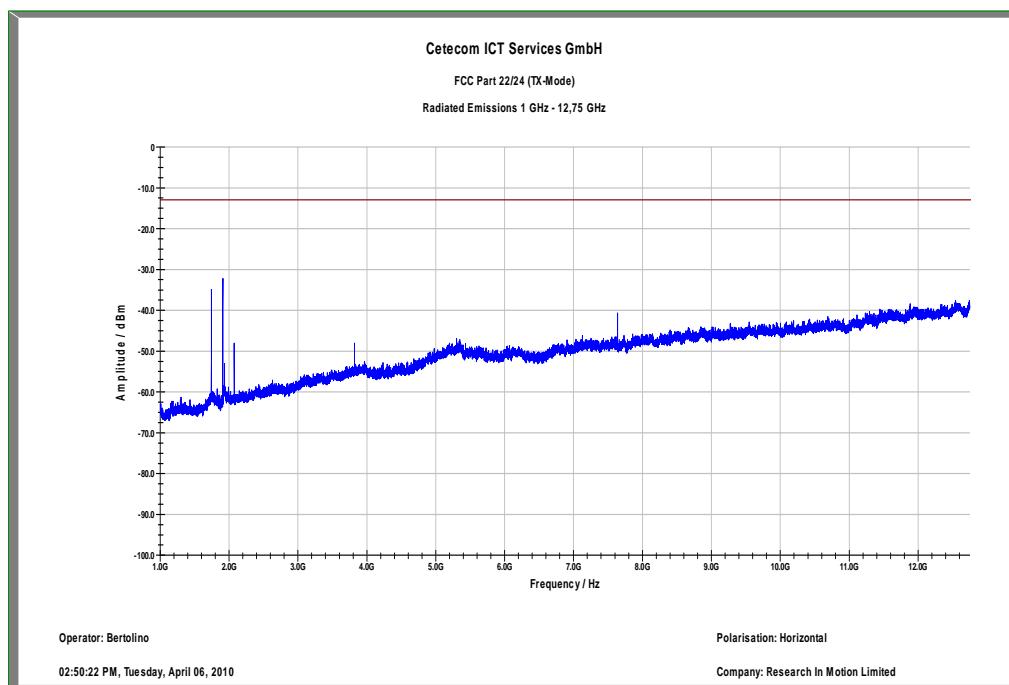
**Plot 7:** TX mode, channel 661, GSM, 30 MHz – 1 GHz, vertical polarization

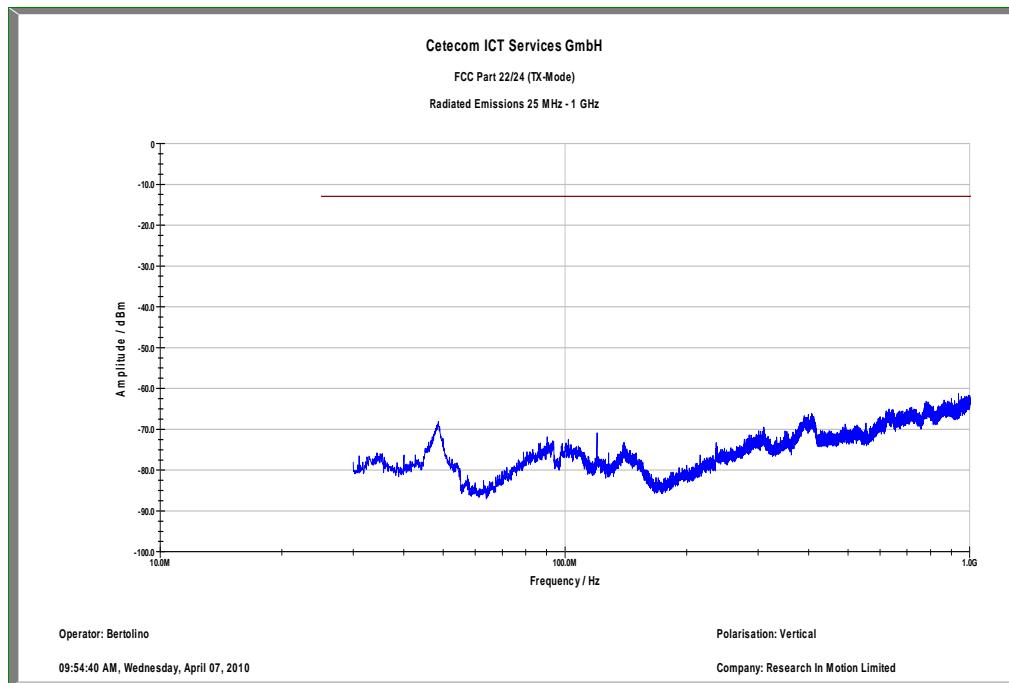
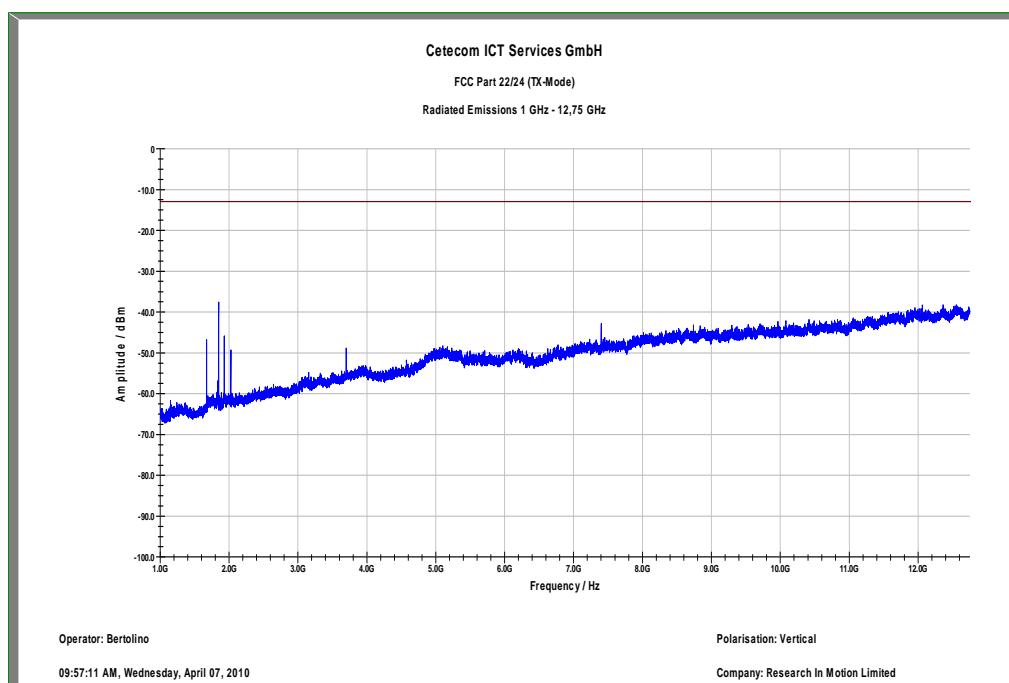


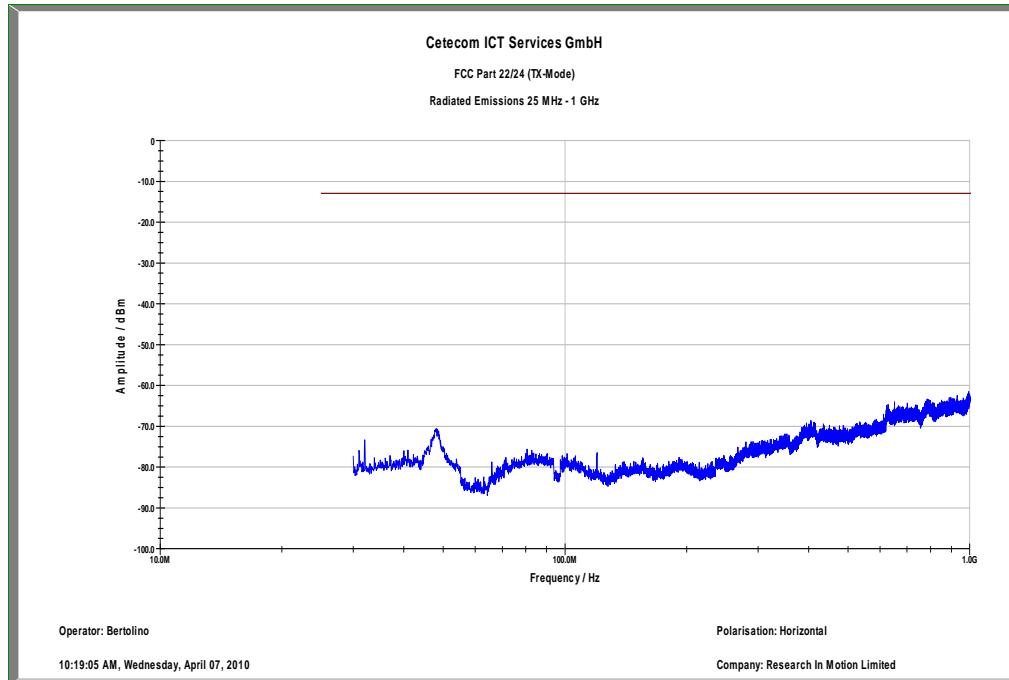
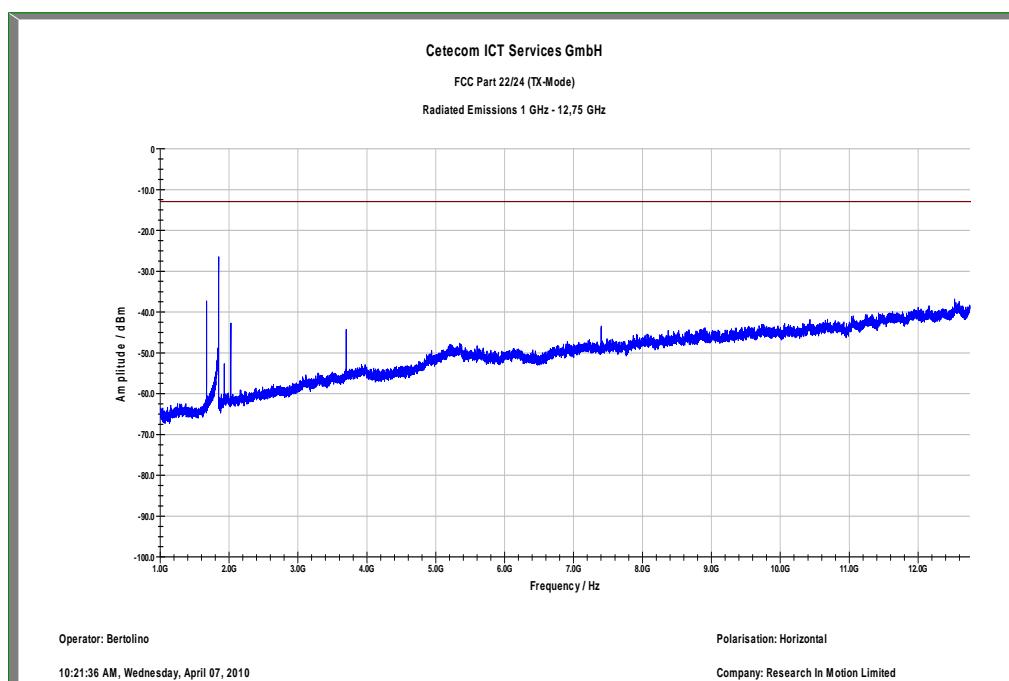
**Plot 8:** TX mode, channel 661, GSM, 1 GHz – 12.75 GHz, vertical polarization**Plot 9:** TX mode, channel 661, GSM, 30 MHz – 1 GHz, horizontal polarization

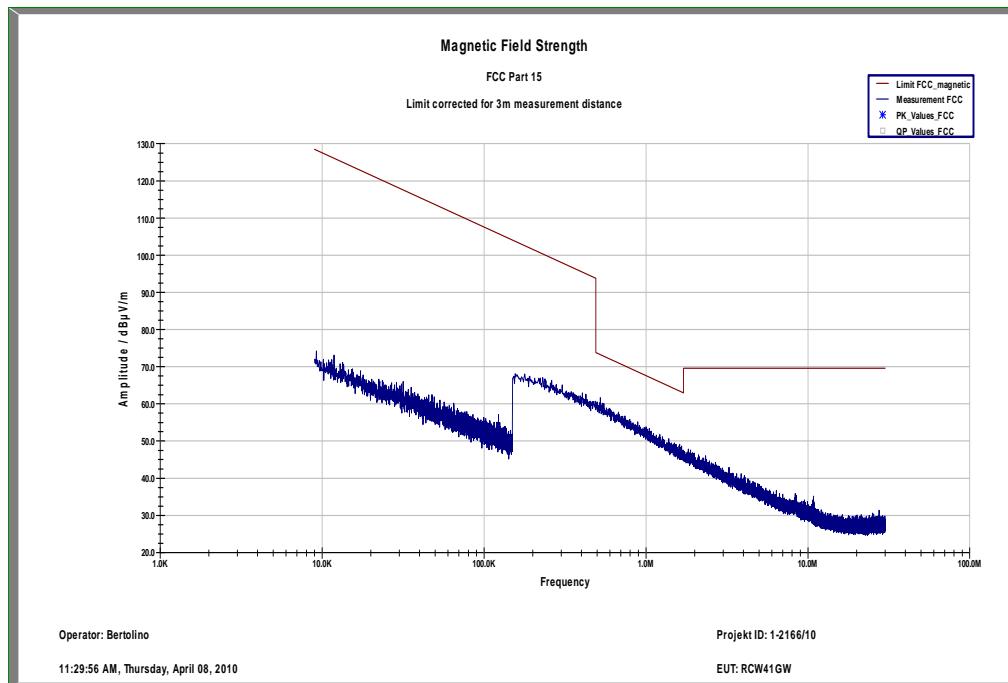
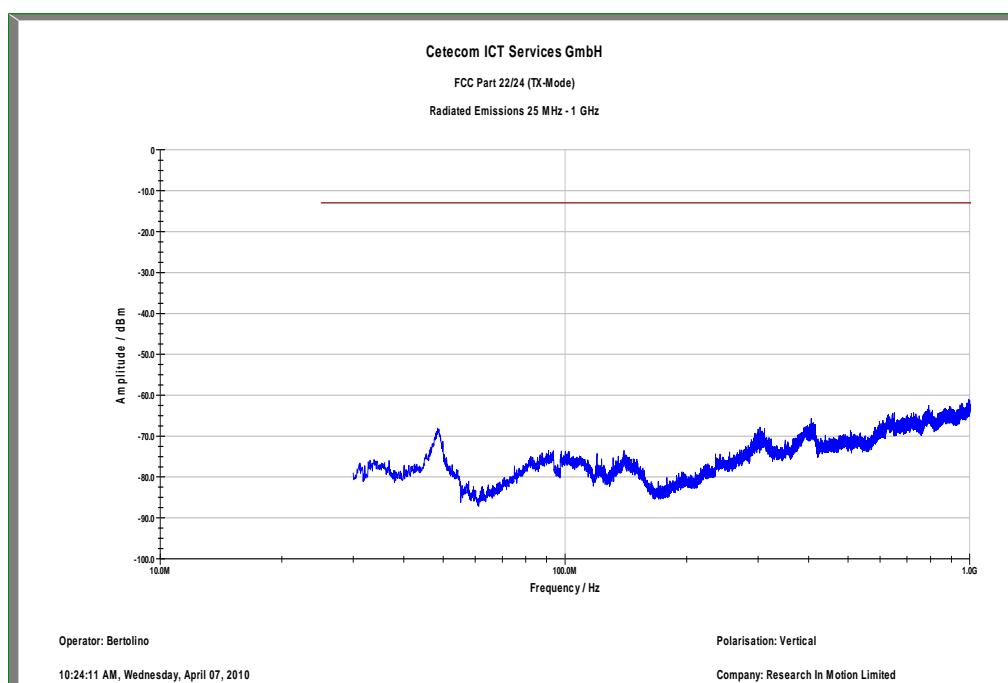
**Plot 10:** TX mode, channel 661, GSM, 1 GHz – 12.75 GHz, horizontal polarization**Plot 11:** TX mode, channel 661, GSM, 12 GHz - 25 GHz (valid for all channels)

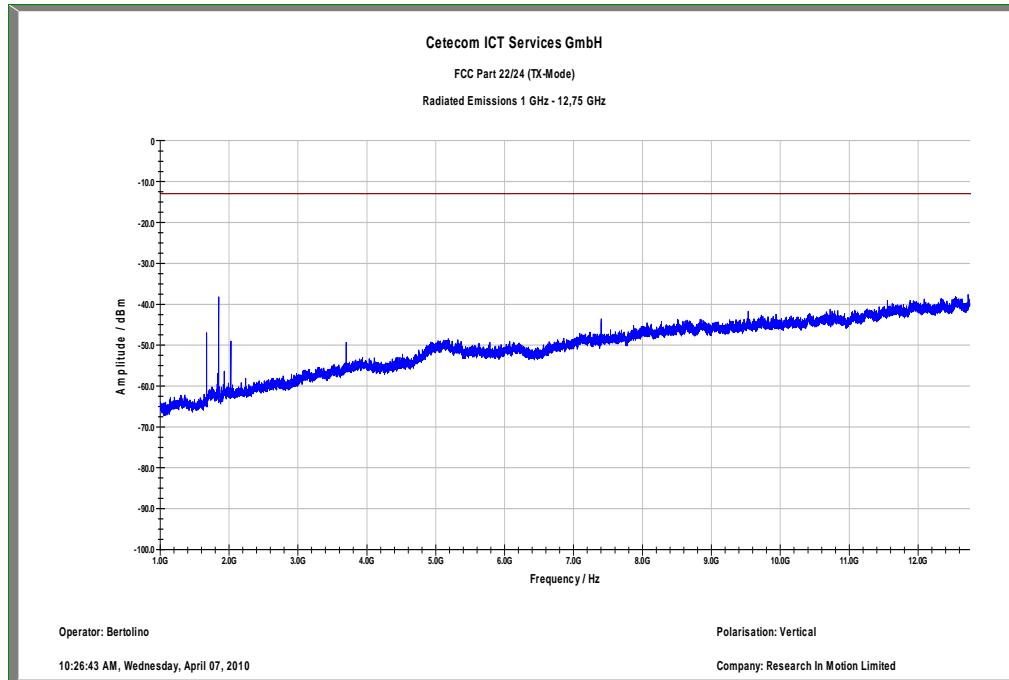
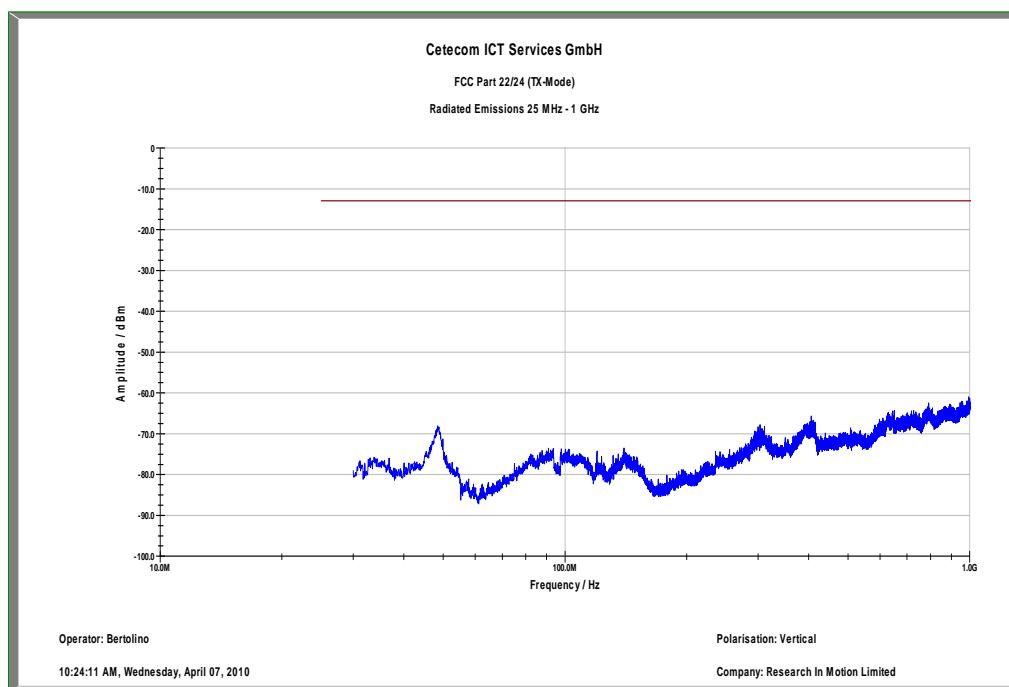
**Plot 12:** TX mode, channel 810, GSM, 30 MHz – 1 GHz, vertical polarization**Plot 13:** TX mode, channel 810, GSM, 1 GHz – 12.75 GHz, vertical polarization

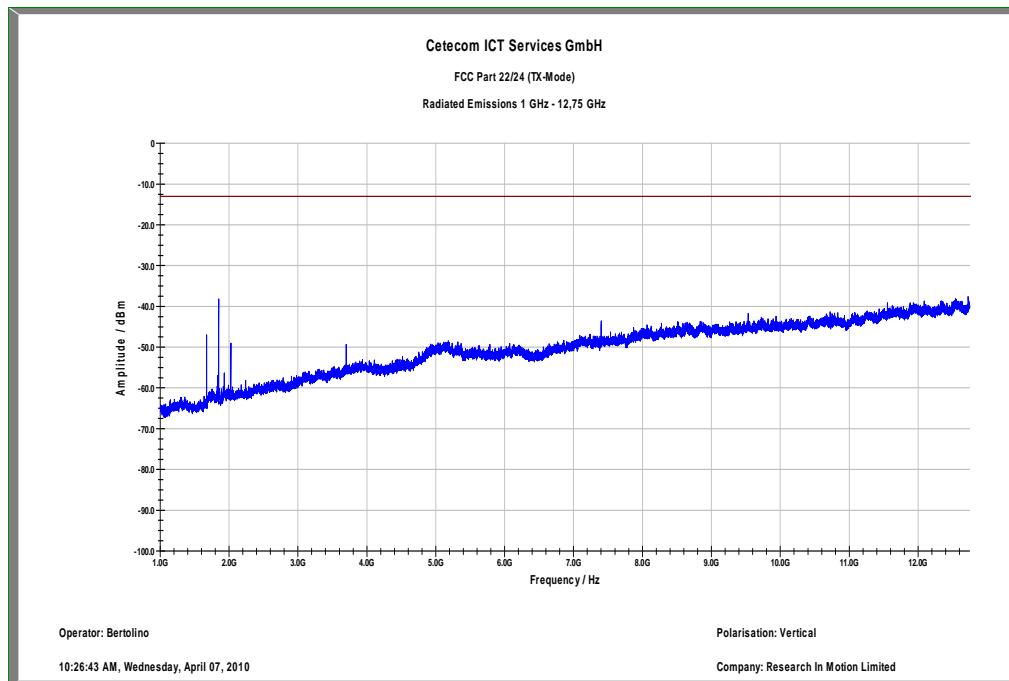
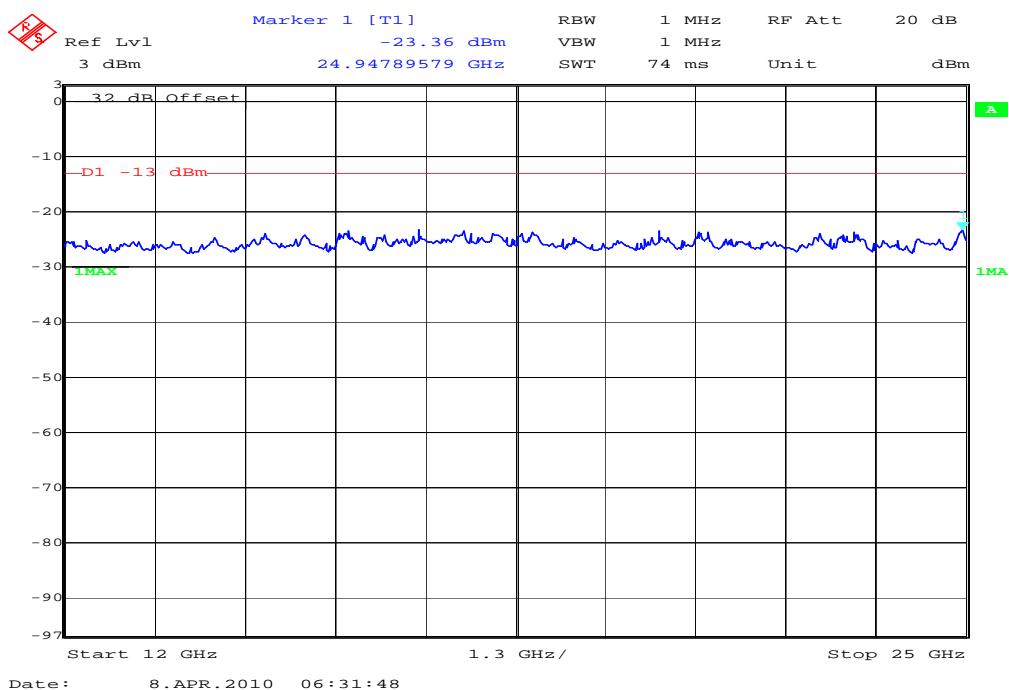
**Plot 14:** TX mode, channel 810, GSM, 30 MHz – 1 GHz, horizontal polarization**Plot 15:** TX mode, channel 810, GSM, 1 GHz – 12.75 GHz, horizontal polarization

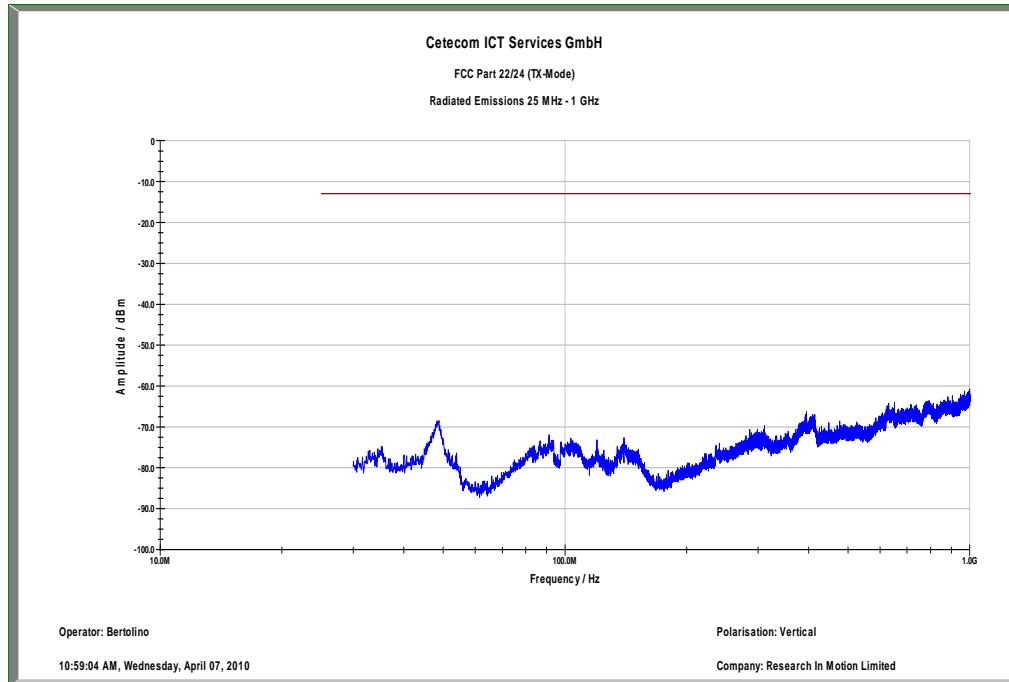
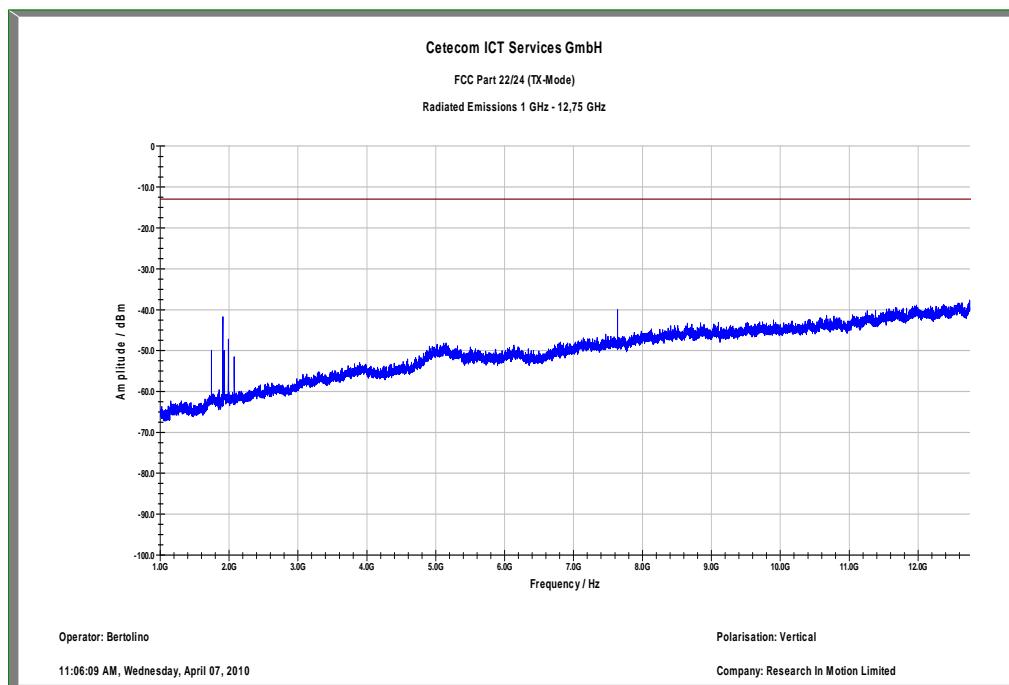
**Plot 16:** TX mode, channel 512, EDGE, 30 MHz – 1 GHz, vertical polarization**Plot 17:** TX mode, channel 512, EDGE, 1 GHz – 12.75 GHz, vertical polarization

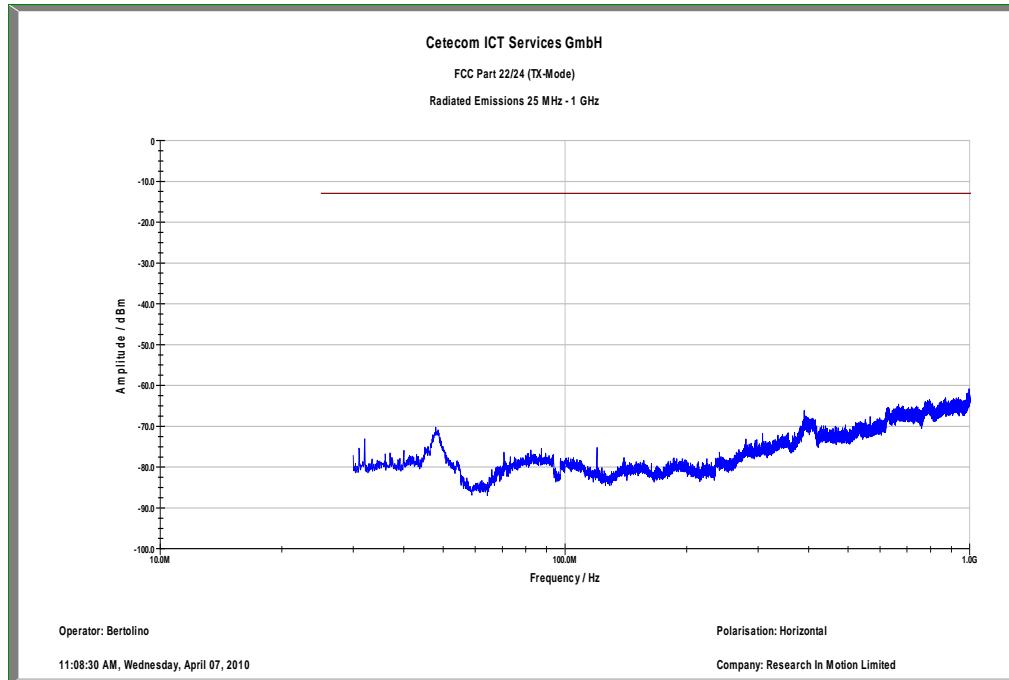
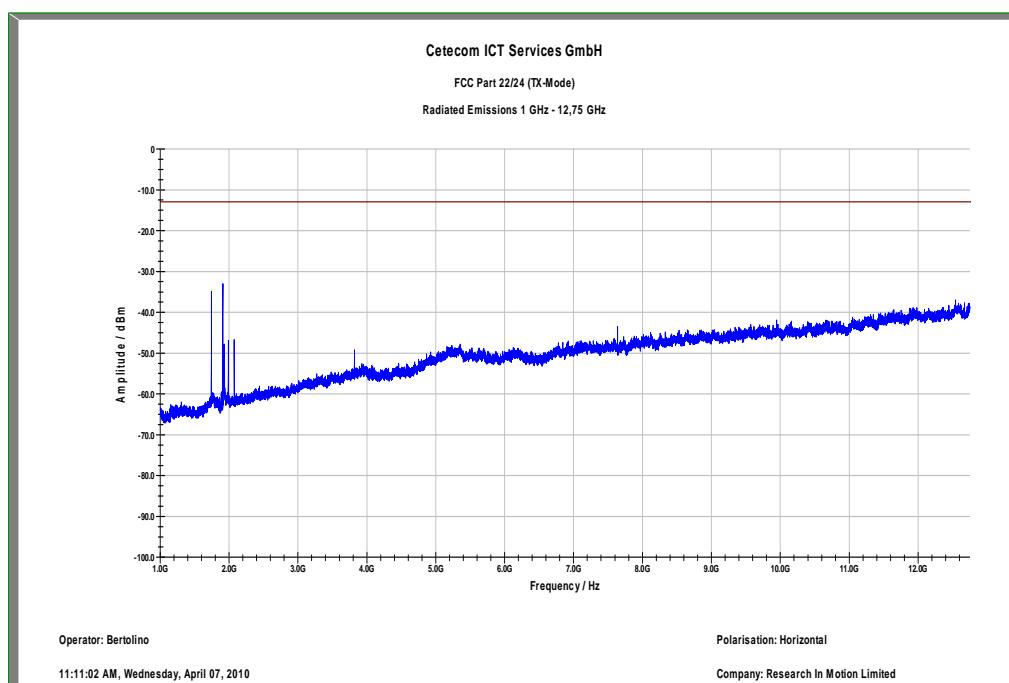
**Plot 18:** TX mode, channel 512, EDGE, 30 MHz – 1 GHz, horizontal polarization**Plot 19:** TX mode, channel 512, EDGE, 1 GHz – 12.75 GHz, horizontal polarization

**Plot 20:** TX mode, channel 661, EDGE, 10 kHz - 30 MHz (valid for all channels)**Plot 21:** TX mode, channel 661, EDGE, 30 MHz – 1 GHz, vertical polarization

**Plot 22:** TX mode, channel 661, EDGE, 1 GHz – 12.75 GHz, vertical polarization**Plot 23:** TX mode, channel 661, EDGE, 30 MHz – 1 GHz, horizontal polarization

**Plot 24:** TX mode, channel 661, EDGE, 1 GHz – 12.75 GHz, horizontal polarization**Plot 25:** TX mode, channel 661, EDGE, 12 GHz - 25 GHz (valid for all channels)

**Plot 26:** TX mode, channel 810, EDGE, 30 MHz – 1 GHz, vertical polarization**Plot 27:** TX mode, channel 810, EDGE, 1 GHz – 12.75 GHz, vertical polarization

**Plot 28:** TX mode, channel 810, EDGE, 30 MHz – 1 GHz, horizontal polarization**Plot 29:** TX mode, channel 810, EDGE, 1 GHz – 12.75 GHz, horizontal polarization

### 5.1.4 Conducted Spurious Emissions

**Not performed**

**Reference**

FCC:	CFR Part 24.238, 2.10.51
IC:	RSS 133, Issue 5, Section 6.5

**Measurement Procedure:**

The following steps outline the procedure used to measure the conducted emissions from the mobile station.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency.

For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 19.1 GHz, data taken from 10 MHz to 20 GHz.

2. Determine mobile station transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

USPCS Transmitter Channel Frequency:

512 1850.2 MHz

661 1880.0 MHz

810 1909.8 MHz

**Measurement Limit:**

(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

**Measurement Results:**

Harmonic	Tx ch.-512 Freq. (MHz)	Level (dBm)	Tx ch.-661 Freq. (MHz)	Level (dBm)	Tx ch.-810 Freq. (MHz)	Level (dBm)
2	3700.4	-	3760	-	3819.6	-
3	5550.6	-	5640	-	5729.4	-
4	7400.8	-	7520	-	7639.2	-
5	9251.0	-	9400	-	9549.0	-
6	11101.2	-	11280	-	11458.8	-
7	12951.4	-	13160	-	13368.6	-
8	14801.6	-	15040	-	15278.4	-
9	16651.8	-	16920	-	17188.2	-
10	18502.0	-	18800	-	19098.0	-

### 5.1.5 Block Edge Compliance

**Not performed**

**Reference**

FCC:	CFR Part 24.238
IC:	RSS 133, Issue 5, Section 6.5

**Measurement Limit:**

(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

### 5.1.6 Occupied Bandwidth

**Not performed**

**Reference**

FCC:	CFR Part 24.238, 2.1049
IC:	RSS 133, Issue 5, Section 6.5

#### Occupied Bandwidth Results

Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. Table 8.2 below lists the measured 99% power and -26dBc occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Normal mode

Frequency	99% Occupied Bandwidth kHz	-26 dBc Bandwidth kHz
1850.2 MHz	-	-
1880.0 MHz	-	-
1909.8 MHz	-	-

EDGE mode

Frequency	99% Occupied Bandwidth kHz	-26 dBc Bandwidth kHz
1850.2 MHz	-	-
1880.0 MHz	-	-
1909.8 MHz	-	-

Part 24.238 (a) requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 300.0 kHz, this equates to a resolution bandwidth of at least 3.0 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

## 5.2 PART GSM 850

### 5.2.1 RF Power Output

#### Reference

FCC:	CFR Part 22.9.1.3, 2.1046
IC:	RSS 132, Issue 2, Section 4.4 and 6.4

#### Summary:

This paragraph contains both average, peak output powers 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).

#### Method of Measurements:

The mobile was set up for the max. output power with pseudo random data modulation. The power was measured with R&S Signal Analyzer FSIQ 26 (peak and average) These measurements were done at 3 frequencies, 824.2 MHz, 836.4 MHz and 848.8 MHz (bottom, middle and top of operational frequency range).

#### Limits:

Nominal Peak Output Power (dBm)
+38.45

#### Not performed

#### Test Results: Output Power (conducted) GMSK Mode

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

#### Test Results: Output Power (conducted) 8-PSK Mode

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

### **ERP Measurements**

Description: This is the test for the maximum radiated power from the phone.  
Rule Part 22.913 specifies that "Mobile/portable stations are limited to 7 watts ERP.

Measuring the EIRP of Spurious/Harmonic Emissions using Substitution Method

- (a) The measurements were performed with full rf output power and modulation.
- (b) Test was performed at listed 3m test site (listed with FCC, IC).
- (c) The transmitter under test was placed at the specified height on a non-conducting turntable (80 cm height)
- (d) The BICONILOG antenna (20 MHz to 1 GHz) or HORN antenna (1 GHz to 18 GHz) was used for measuring.

(e) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level  
Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor  
 $E \text{ (dBuV/m)} = \text{Reading (dBuV)} + \text{Total Correction Factor (dB/m)}$

(f) Set the EMI Receiver and #2 as follows:

Center Frequency: test frequency

Resolution BW: 100 kHz

Video BW: same

Detector Mode: positive

Average: off

Span: 3 x the signal bandwidth

(g) The test antenna was lowered or raised from 1 to 4 meters until the maximum signal level was detected.

(h) The transmitter was rotated through 360° about a vertical axis until a higher maximum signal was received.

(i) The test antenna was lowered or raised again from 1 to 4 meters until a maximum was obtained. This level was recorded.

(j) The recorded reading was corrected to the true field strength level by adding the antenna factor, cable loss and subtracting the pre-amplifier gain.

(k) The above steps were repeated with both transmitters' antenna and test receiving antenna placed in vertical and horizontal polarization. Both readings with the antennas placed in vertical and horizontal polarization shall be recorded.

(l) Repeat for all different test signal frequencies

### Measuring the ERP of Spurious/Harmonic Emissions using Substitution Method

(a) Set the EMI Receiver (for measuring E-Field) and Receiver #2 (for measuring ERP) as follows:

Center Frequency : equal to the signal source  
 Resolution BW : 10 kHz  
 Video BW : same  
 Detector Mode : positive  
 Average : off  
 Span : 3 x the signal bandwidth

(b) Load an appropriate correction factors file in EMI Receiver for correcting the field strength reading level

Total Correction Factor recorded in the EMI Receiver = Cable Loss + Antenna Factor

$E \text{ (dBuV/m)} = \text{Reading (dBuV)} + \text{Total Correction Factor (dB/m)}$

(c) Select the frequency and E-field levels for ERP/EIRP measurements.

(d) Substitute the EUT by a signal generator and one of the following transmitting antennas (substitution antenna): .DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz}.

(e) Mount the transmitting antenna at 0.8 meter high from the ground plane.

(f) Use one of the following antenna as a receiving antenna: .DIPOLE antenna for frequency from 30-1000 MHz or .HORN antenna for frequency above 1 GHz }.

(g) If the DIPOLE antenna is used, tune its elements to the frequency as specified in the calibration manual.

(h) Adjust both transmitting and receiving antenna in a VERTICAL polarization.

(i) Tune the EMI Receivers to the test frequency.

(j) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.

(k) The transmitter was rotated through 360° about a vertical axis until a higher maximum signal was received.

(l) Lower or raise the test antenna from 1 to 4 meters until the maximum signal level was detected.

(m) Adjust input signal to the substitution antenna until an equal or a known related level to that detected from the transmitter was obtained in the test receiver.

(n) Record the power level read from the Average Power Meter and calculate the ERP/EIRP as follows:

$$P = P_1 - L_1 = (P_2 + L_2) - L_1 = P_3 + A + L_2 - L_1$$

$$\text{EIRP} = P + G_1 = P_3 + L_2 - L_1 + A + G_1$$

$$\text{ERP} = \text{EIRP} - 2.15 \text{ dB}$$

Total Correction factor in EMI Receiver # 2 =  $L_2 - L_1 + G_1$

Where: P: Actual RF Power fed into the substitution antenna port after corrected.

P1: Power output from the signal generator

P2: Power measured at attenuator A input

P3: Power reading on the Average Power Meter

EIRP: EIRP after correction

ERP: ERP after correction

(o) Adjust both transmitting and receiving antenna in a HORIZONTAL polarization, then repeat step (k) to (o)

(p) Repeat step (d) to (o) for different test frequency

(q) Repeat steps (c) to (j) with the substitution antenna oriented in horizontal polarization.

(r) Actual gain of the EUT's antenna is the difference of the measured EIRP and measured RF power at the RF port. Correct the antenna gain if necessary.

**Limits:**

Nominal Output Power (dBm)
+38.45

**Test Results: Output Power (radiated) GMSK Mode**

Frequency (MHz)	Peak ERP (dBm)
824.2	30.76 (vertical / horizontal)
836.4	31.43 (vertical / horizontal)
848.8	32.43 (vertical / horizontal)
Measurement uncertainty	± 3 dB

**Test Results: Output Power (radiated) 8-PSK Mode**

Frequency (MHz)	Peak ERP (dBm)
824.2	29.05 (vertical / horizontal)
836.4	29.35 (vertical / horizontal)
848.8	29.63 (vertical / horizontal)
Measurement uncertainty	± 3 dB

**Sample calculation:**

Freq	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	ERP	Substitution Antenna
MHz	dB $\mu$ V	dBm	dBi	dBd	dB	dBm	
848.8	137.8	26.6	8.4	0.0	3.3	31.7	UHAP Schwarzbeck S/N 460

ERP = SG (dBm) - Cable Loss (dB) + Ant. gain (dB)

\*ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.1dBi

### 5.2.2 Frequency Stability

**Not performed**

**Reference**

FCC:	CFR Part 22.355, 2.1055
IC:	RSS 132, Issue 2, Section 4.3 and 6.3

**Method of Measurement:**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the mobile station in a “call mode”. This is accomplished with the use of a R&S CMU 200 DIGITAL RADIOPHYSICAL TESTER..

1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with 3.7 Volts, connected to the CMU 200 and in a simulated call on channel 661 (center channel), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the mobile station, to prevent significant self warming.
4. Repeat the above measurements at 10 C increments from -30 C to +60 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal 3.7 Volts. Vary supply voltage from minimum 3.3 Volts to maximum 4.4 Volts, in 13 steps re-measuring carrier frequency at each voltage. Pause at 3.7 V ac Volts for 1 1/2 hours un-powered, to allow any self heating to stabilize, before continuing.
6. Subject the mobile station to overnight soak at +60 C.
7. With the mobile station, powered with 3.7 Volts, connected to the CMU 200 and in a simulated call on channel 661 (center channel), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the mobile station, to prevent significant self warming.
8. Repeat the above measurements at 10 C increments from +60 C to -30 C. Allow at least 1 1/2 hours at each temperature, un-powered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.

**Measurement Limit:**

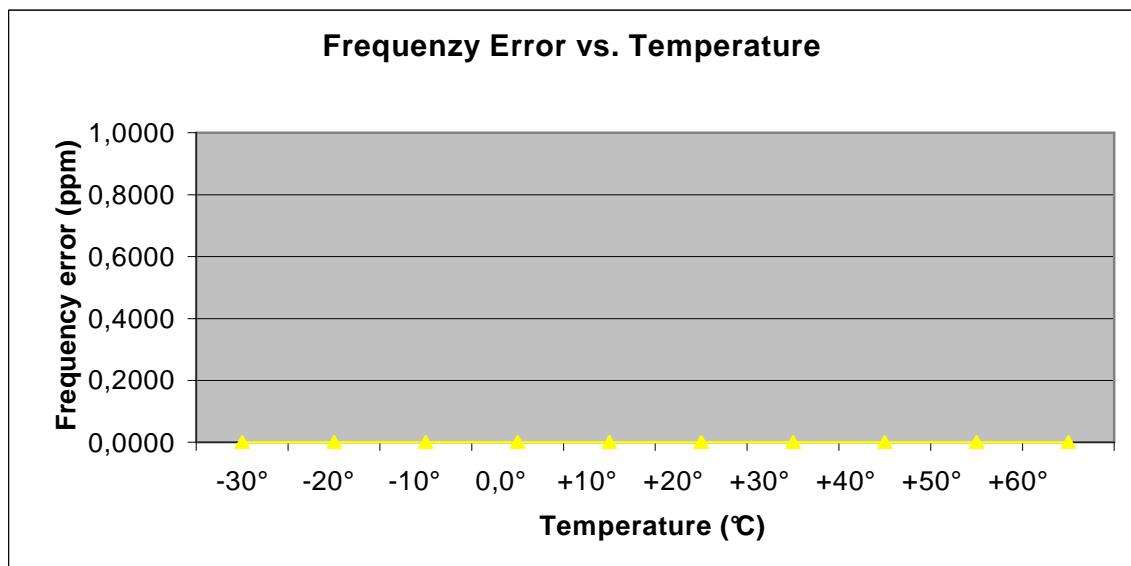
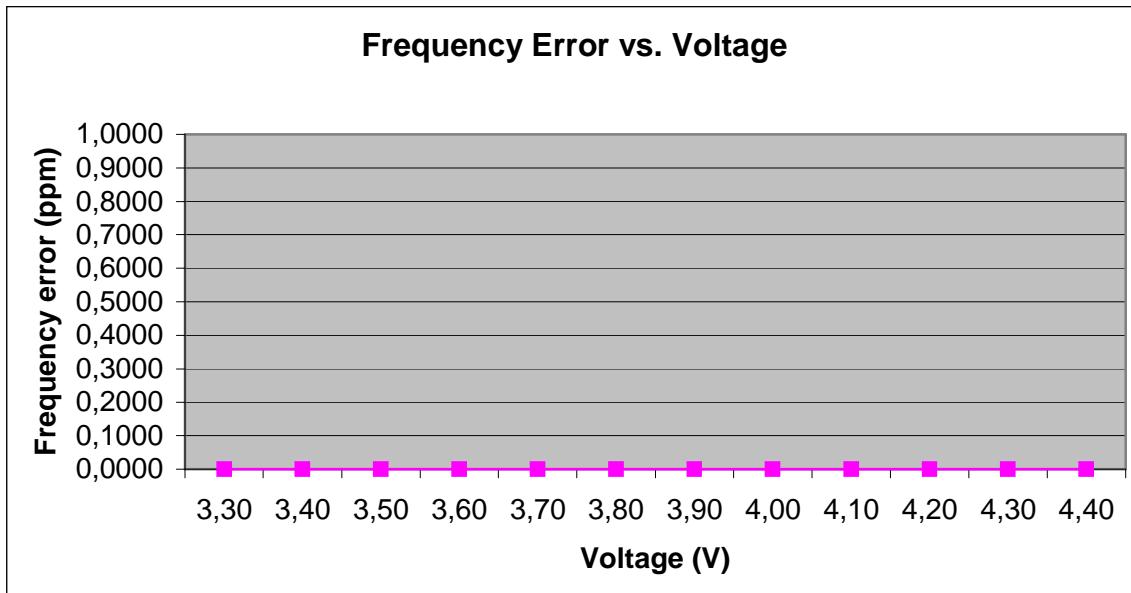
According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 22.355, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. This transceiver is specified to operate with an input voltage of between 3.3 V dc and 4.4 V dc, with a nominal voltage of 3.7 V dc.

**Measurement Results: AFC FREQ ERROR vs. VOLTAGE**

<b>Voltage (V)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (%)</b>	<b>Frequency Error (ppm)</b>
3.3			
3.4			
3.5			
3.6			
3.7			
3.8		Not performed	
3.9			
4.0			
4.1			
4.2			
4.3			
4.4			

**Measurement Results: AFC FREQ ERROR vs. TEMPERATURE**

<b>TEMPERATURE (°C)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (%)</b>	<b>Frequency Error (ppm)</b>
-30			
-20			
-10			
±0.0			
+10		Not performed	
+20			
+30			
+40			
+50			
+60			



### 5.2.3 Radiated Emissions

#### Reference

FCC:	CFR Part 22.917, 2.1053
IC:	RSS 132, Issue 2, Section 4.5 and 6.5

#### Measurement Procedure:

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2003 requirements and is recognized by the FCC to be in compliance for a 3 and a10 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 USPCS 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.
- 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 using the equation shown below:
- e) Now each detected emissions were substituted by the Substitution method, in accordance with the TIA/EIA 603.

#### Measurement Limit:

Sec. 22.917 Emission Limits.

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43 + 10 \log(P)$  dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

### **Measurement Results:**

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the USPCS 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 USPCS 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.

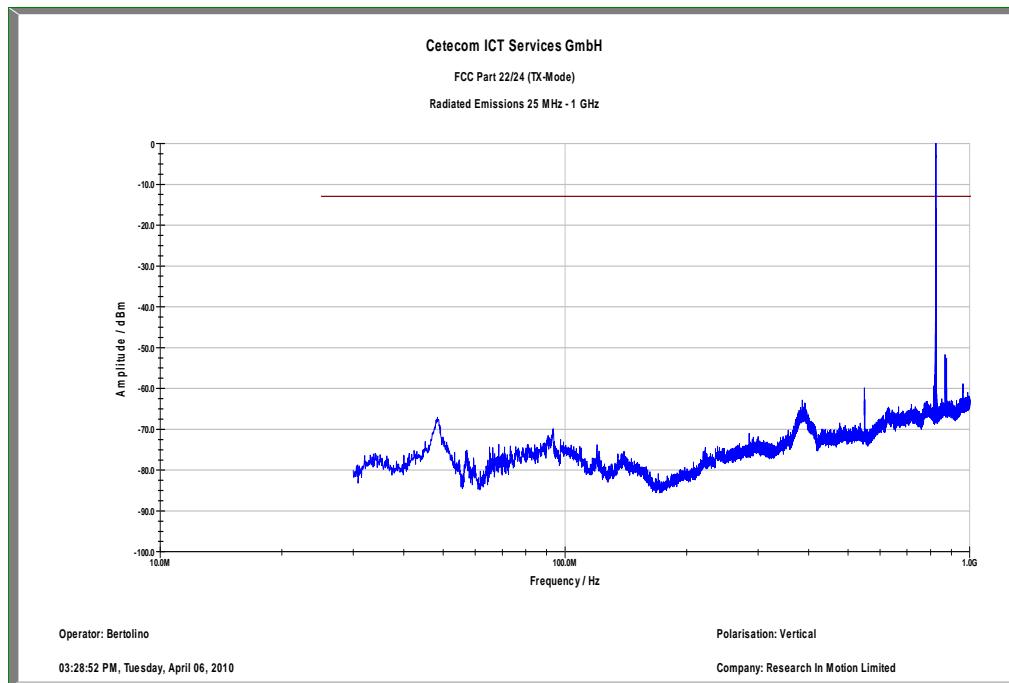
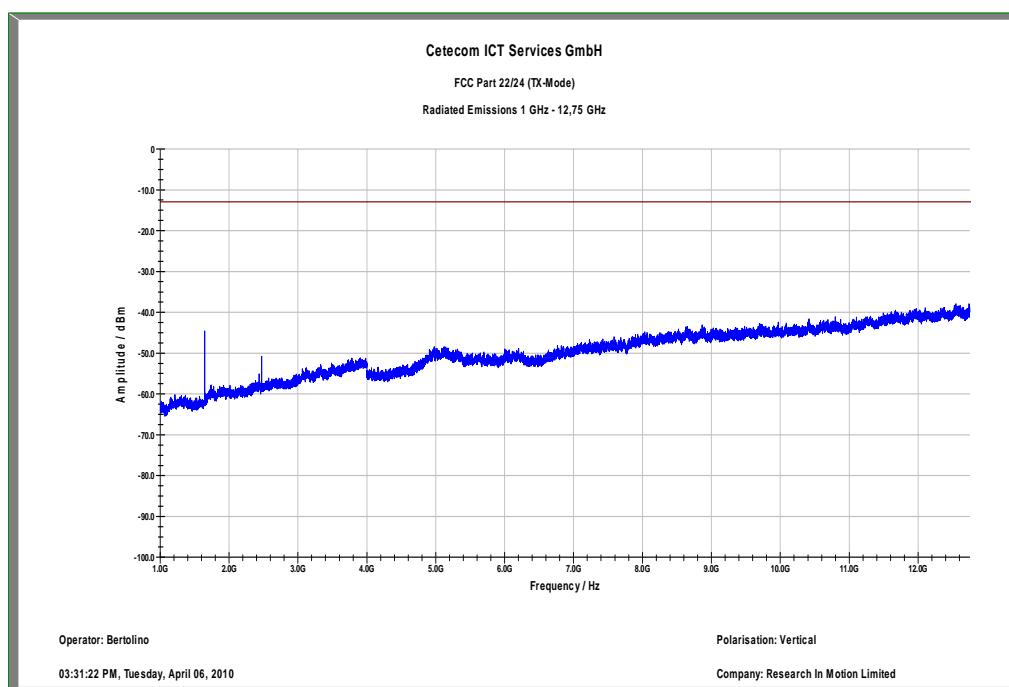
As can be seen from this data, the emissions from the test item were within the specification limit.

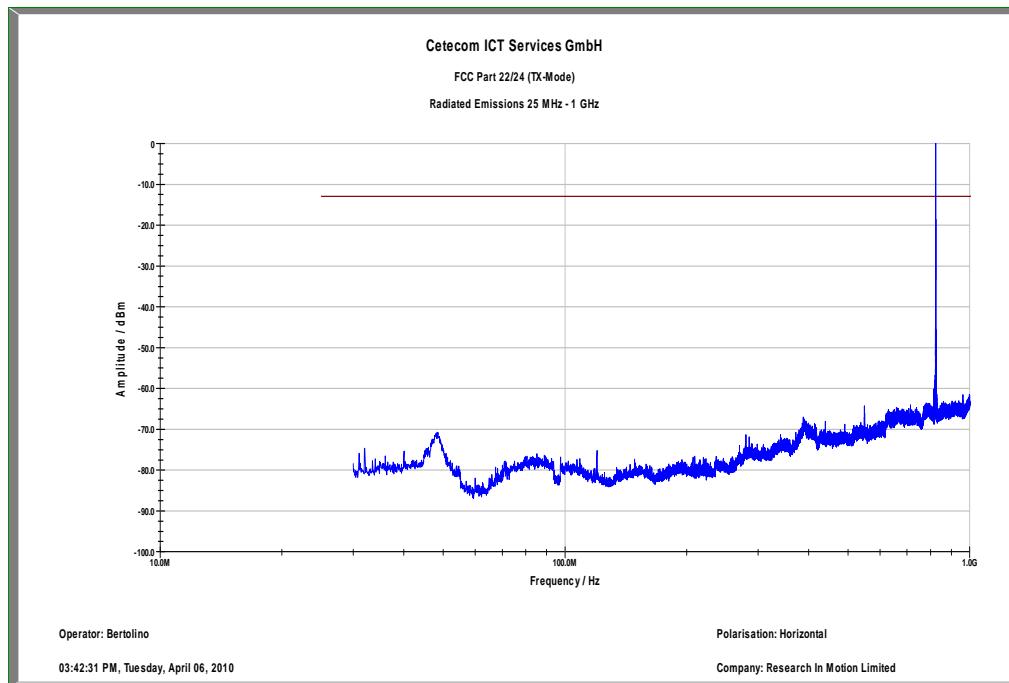
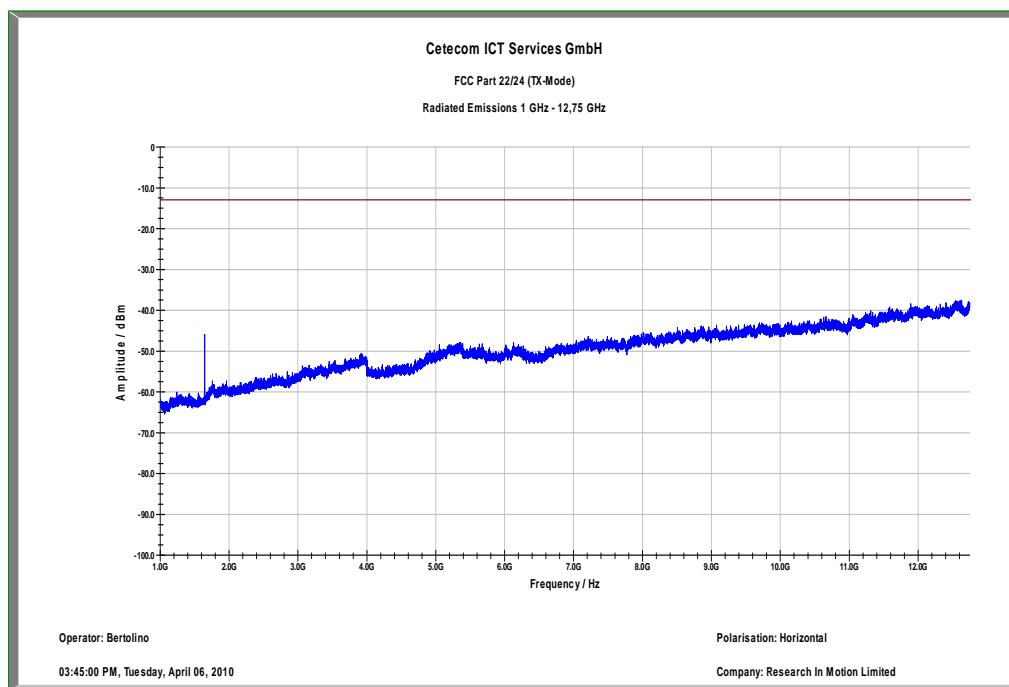
### **Results: GSM**

Harmonic	Tx ch.-128 Freq. (MHz)	Level (dBm)	Tx ch.-189 Freq. (MHz)	Level (dBm)	Tx ch.-251 Freq. (MHz)	Level (dBm)
2	1648.4	-34.17 dBm vertical -30.70 dBm horizontal	1672.8	-34.66 dBm vertical -31.94 dBm horizontal	1697.6	-35.97 dBm vertical -33.94 dBm horizontal
3	2472.6	-43.42 dBm vertical -42.48 dBm horizontal	2509.2	-44.31 dBm vertical -43.32 dBm horizontal	2546.4	-44.72 dBm vertical -43.49 dBm horizontal
4	3296.8	-	3345.6	-	3395.2	-
5	4121.0	-	4182.0	-	4244.0	-
6	4945.2	-	5018.4	-	5092.8	-
7	5769.4	-	5854.8	-	5941.6	-
8	6593.6	-	6691.2	-	6790.4	-
9	7417.8	-	7527.6	-	7639.2	-
10	8242.0	-	8364.0	-	8488.0	-

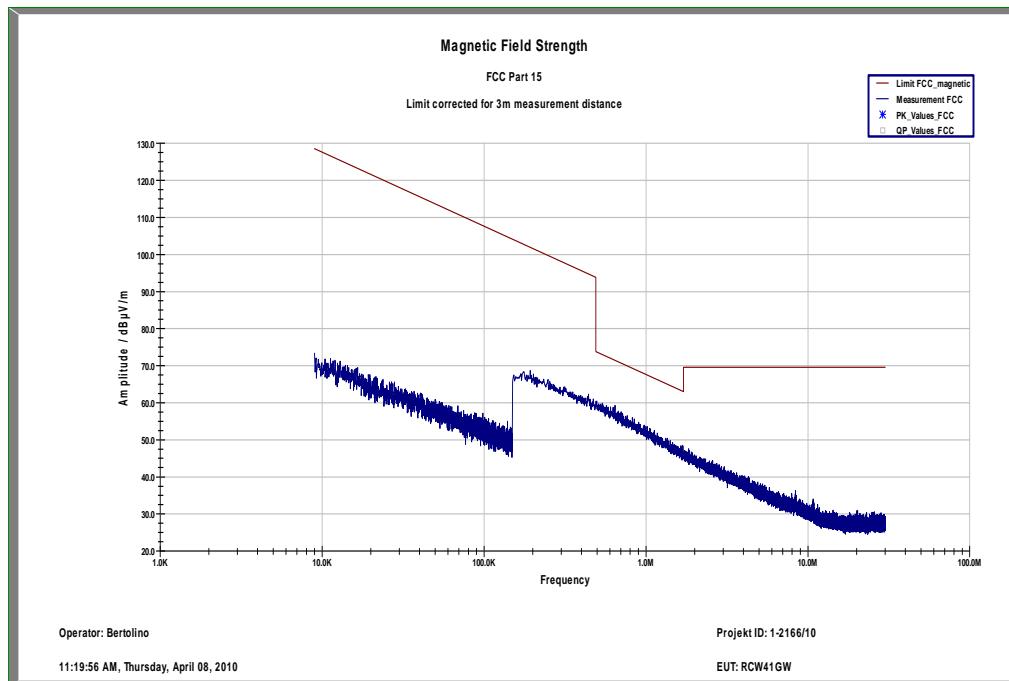
**Results: EGPRS / EDGE**

Harmonic	Tx ch.-128 Freq. (MHz)	Level (dBm)	Tx ch.-189 Freq. (MHz)	Level (dBm)	Tx ch.-251 Freq. (MHz)	Level (dBm)
2	1648.4	-37.47 dBm vertical -33.83 dBm horizontal	1672.8	-37.23 dBm vertical -34.90dBm horizontal	1697.6	-39.38 dBm vertical -35.72 dBm horizontal
3	2472.6	-	2509.2	-	2546.4	-
4	3296.8	-	3345.6	-	3395.2	-
5	4121.0	-	4182.0	-	4244.0	-
6	4945.2	-	5018.4	-	5092.8	-
7	5769.4	-	5854.8	-	5941.6	-
8	6593.6	-	6691.2	-	6790.4	-
9	7417.8	-	7527.6	-	7639.2	-
10	8242.0	-	8364.0	-	8488.0	-

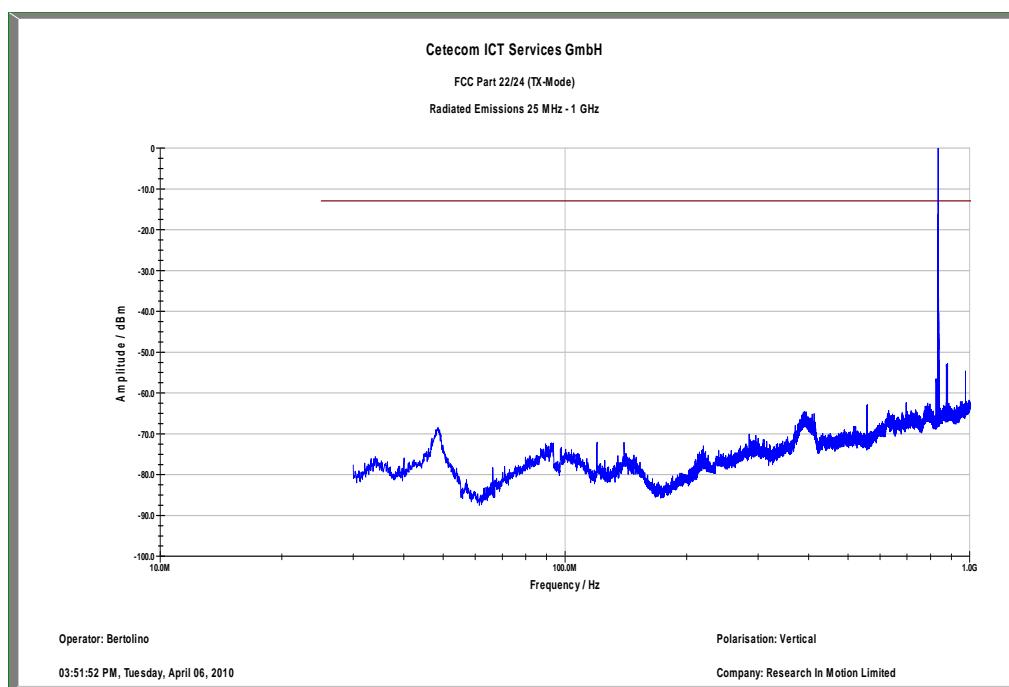
**Plot 1:** TX mode, channel 128, GSM, 30 MHz – 1 GHz, vertical polarization**Plot 2:** TX mode, channel 128, GSM, 1 GHz – 12.75 GHz, vertical polarization

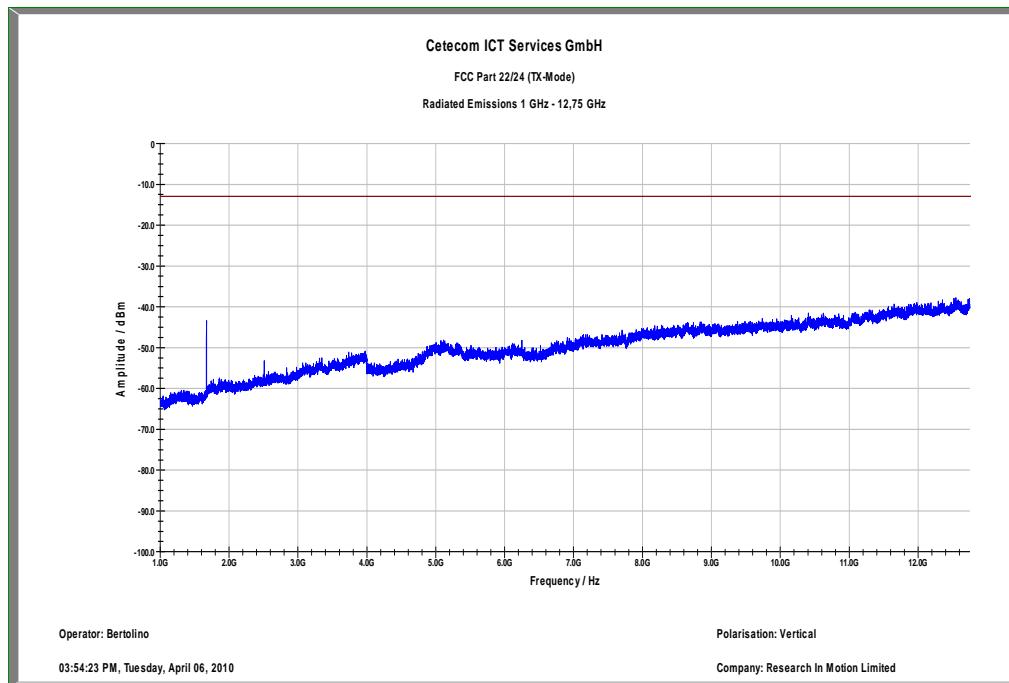
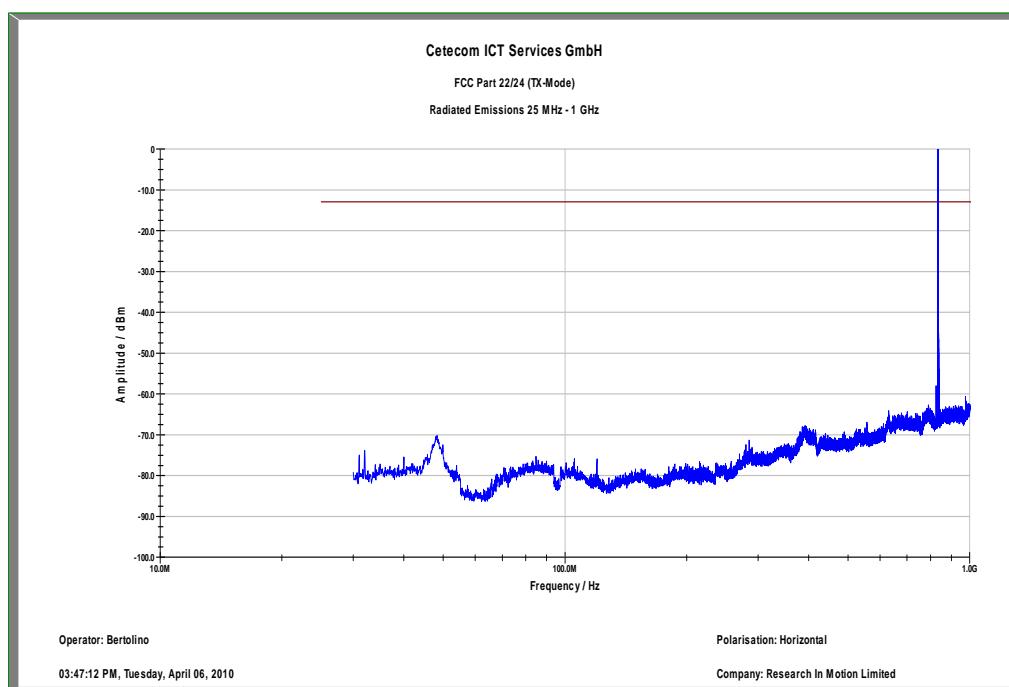
**Plot 3:** TX mode, channel 128, GSM, 30 MHz – 1 GHz, horizontal polarization**Plot 4:** TX mode, channel 128, GSM, 1 GHz – 12.75 GHz, horizontal polarization

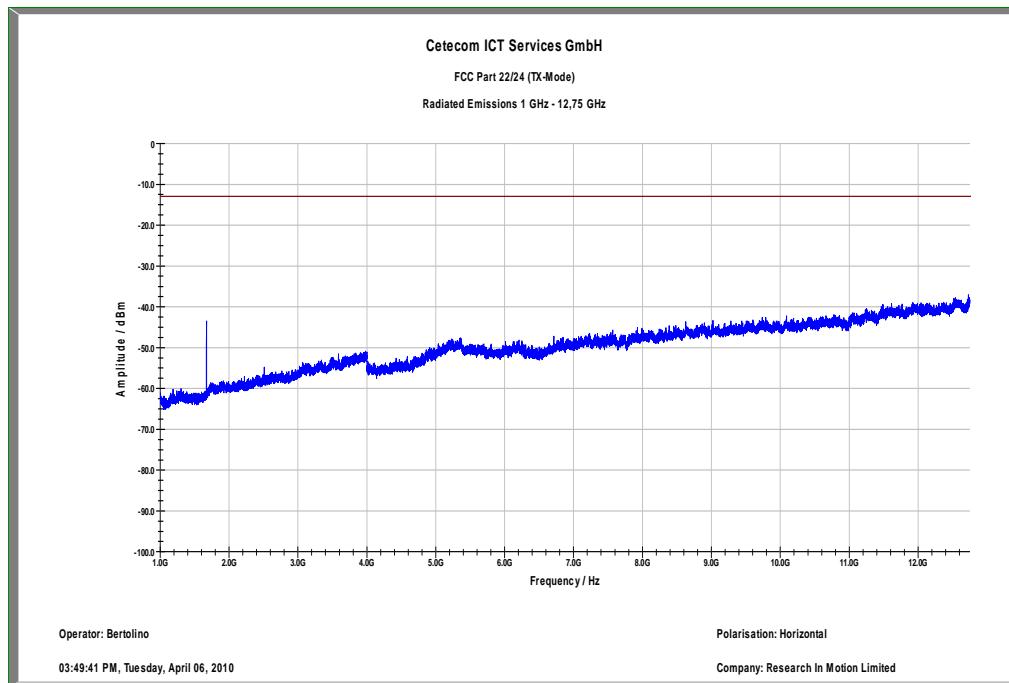
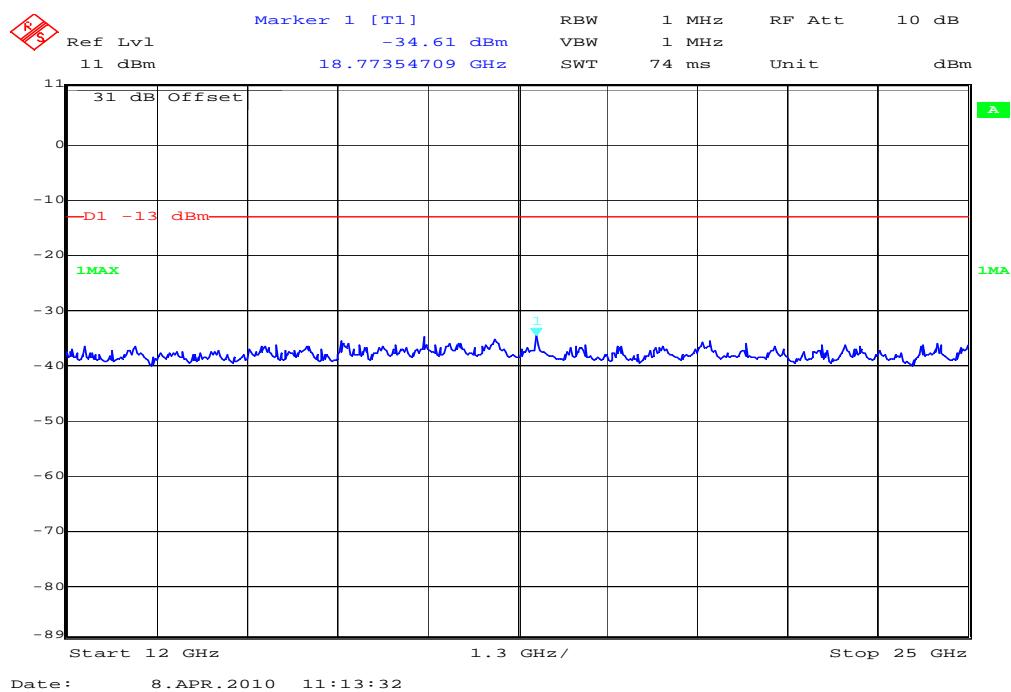
**Plot 5:** TX mode, channel 189, GSM, 10 kHz - 30 MHz (valid for all channels)

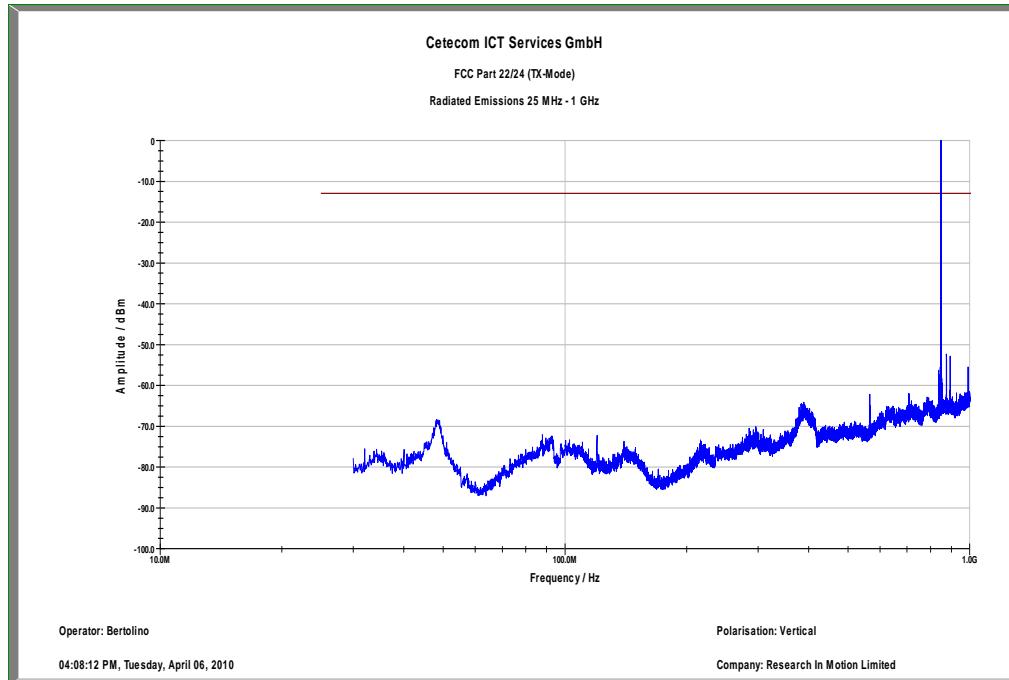
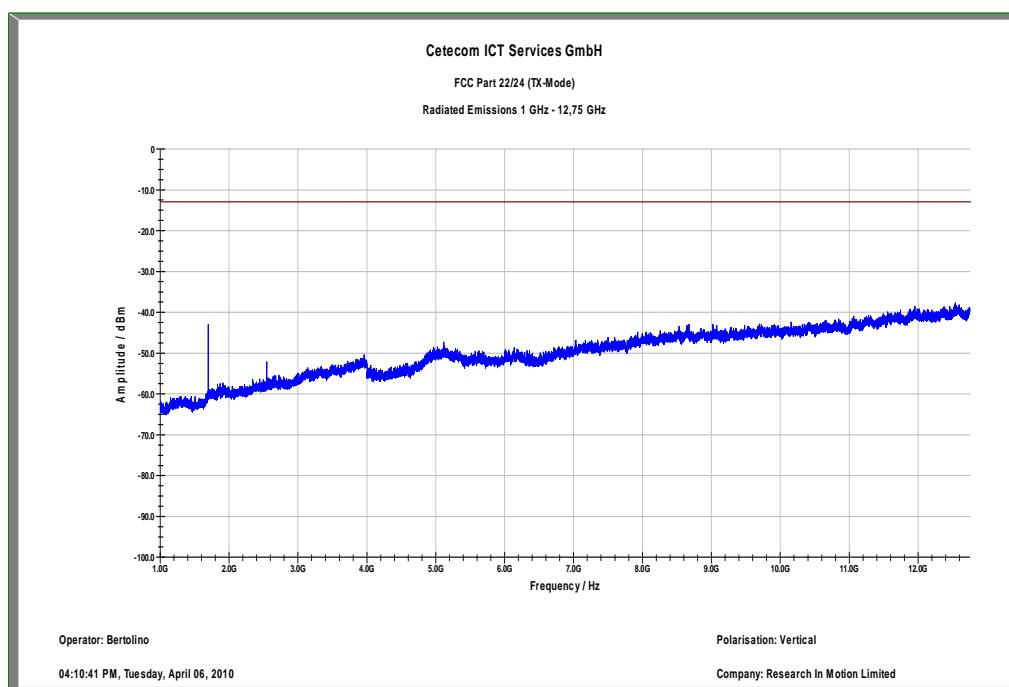


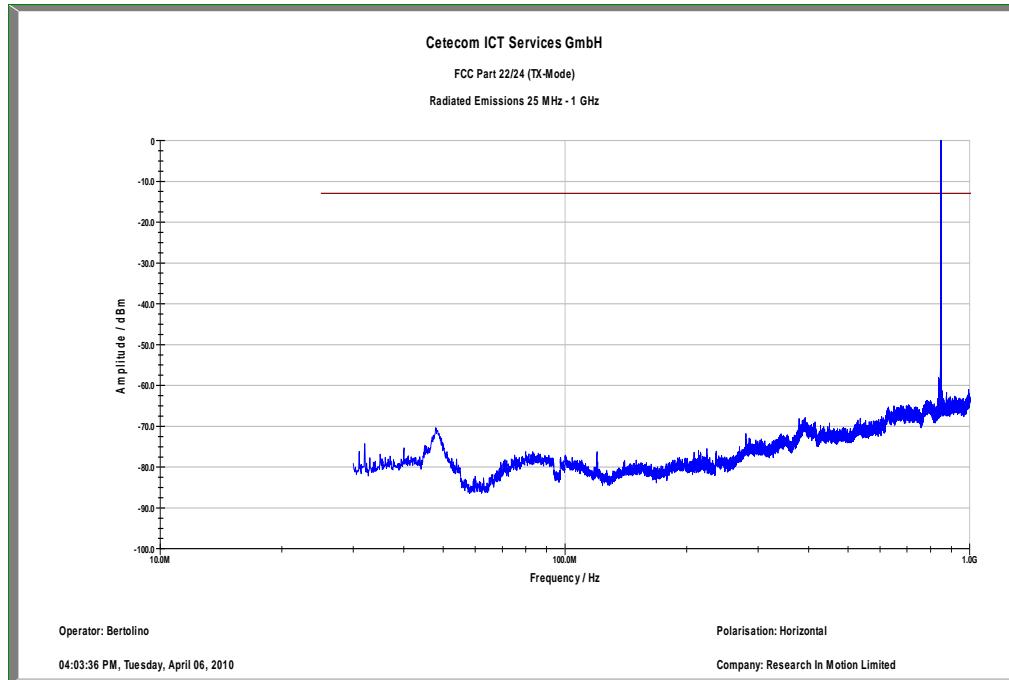
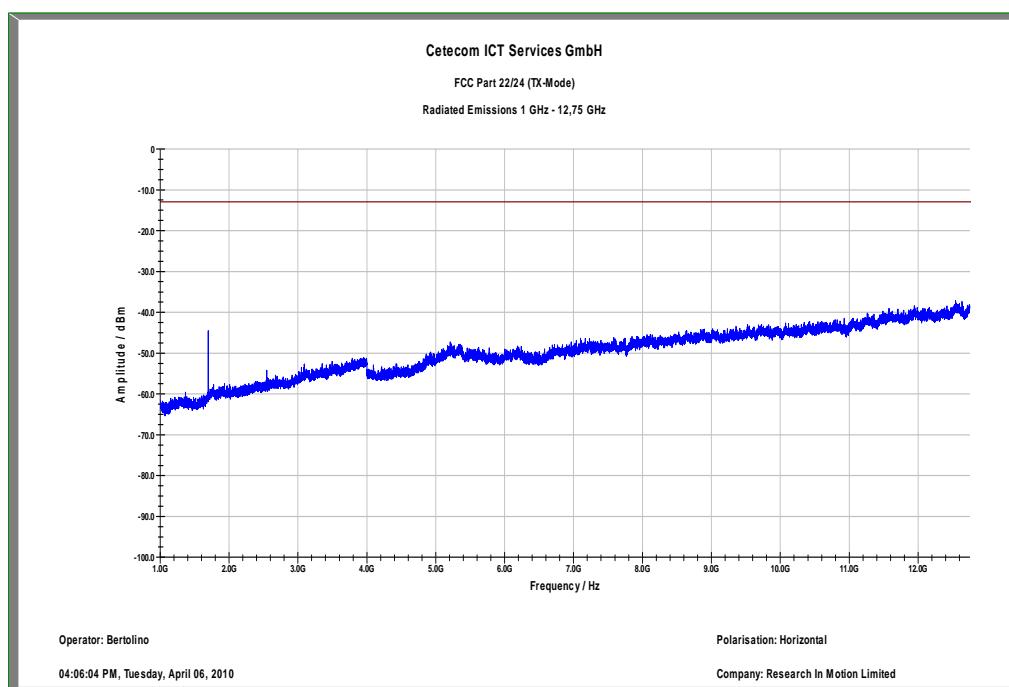
**Plot 7:** TX mode, channel 189, GSM, 30 MHz – 1 GHz, vertical polarization

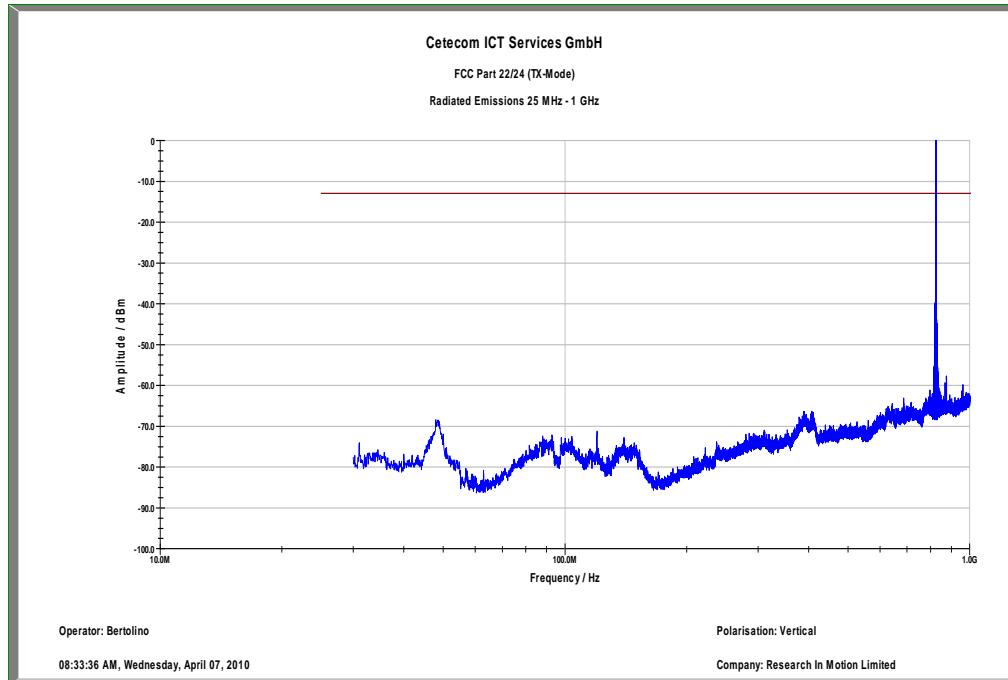
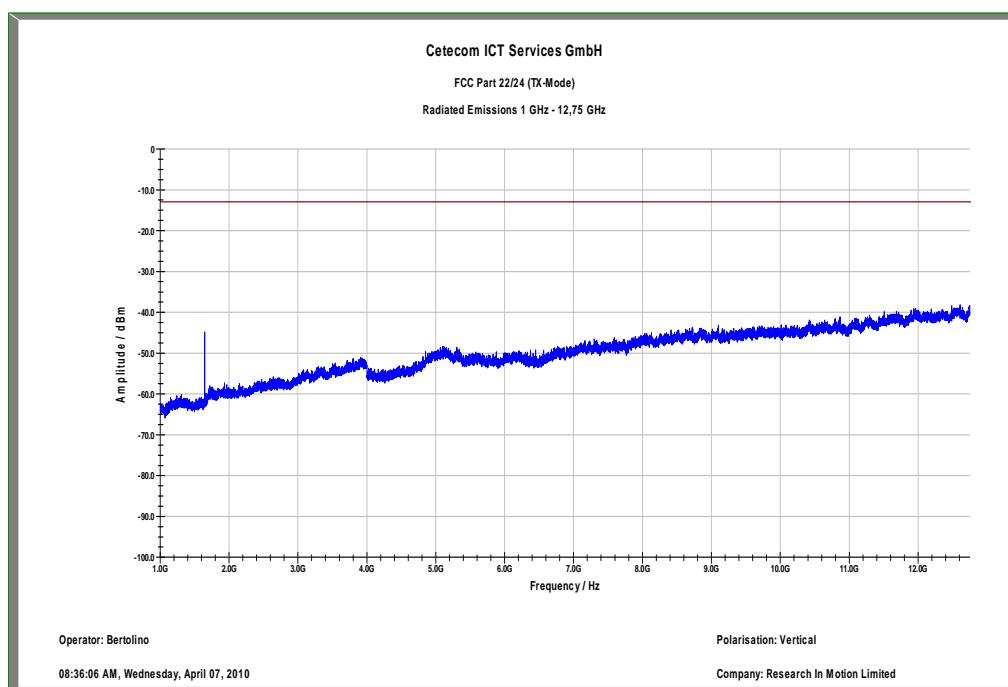


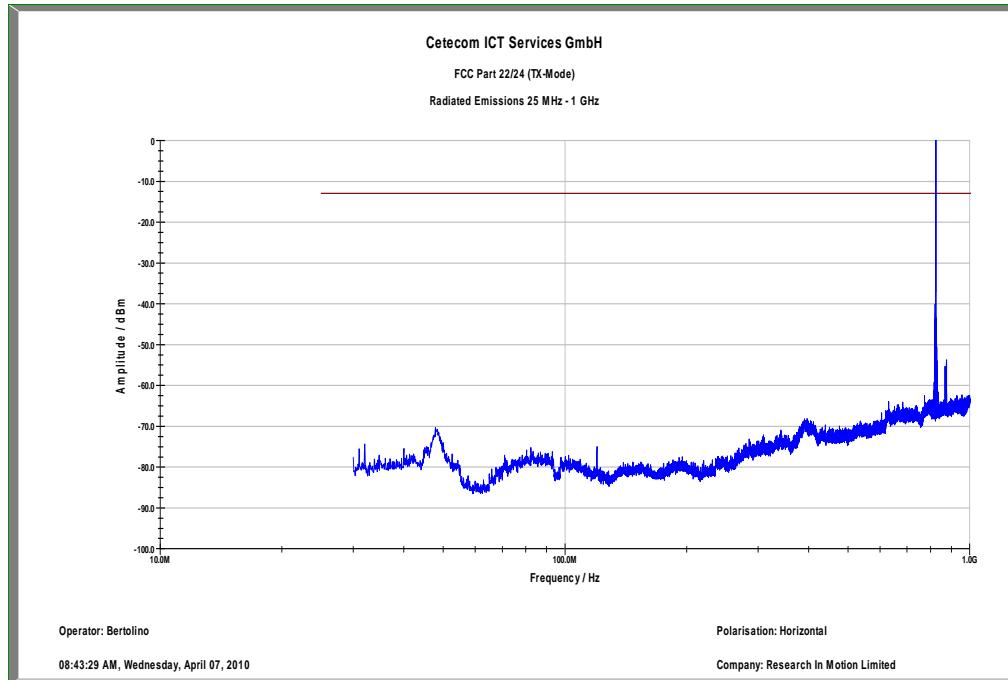
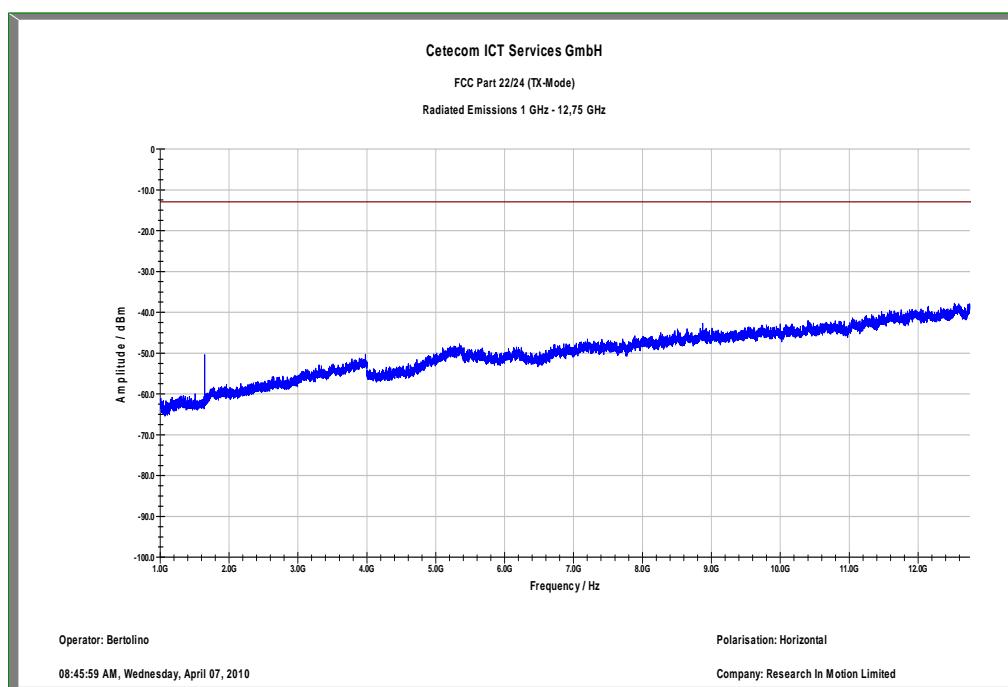
**Plot 8:** TX mode, channel 189, GSM, 1 GHz – 12.75 GHz, vertical polarization**Plot 9:** TX mode, channel 189, GSM, 30 MHz – 1 GHz, horizontal polarization

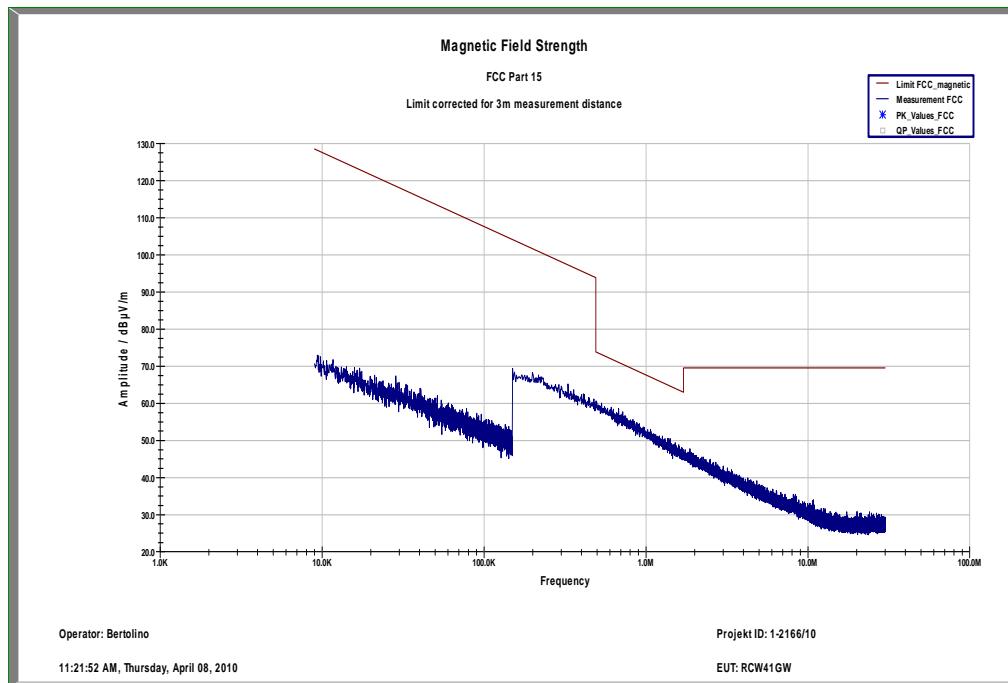
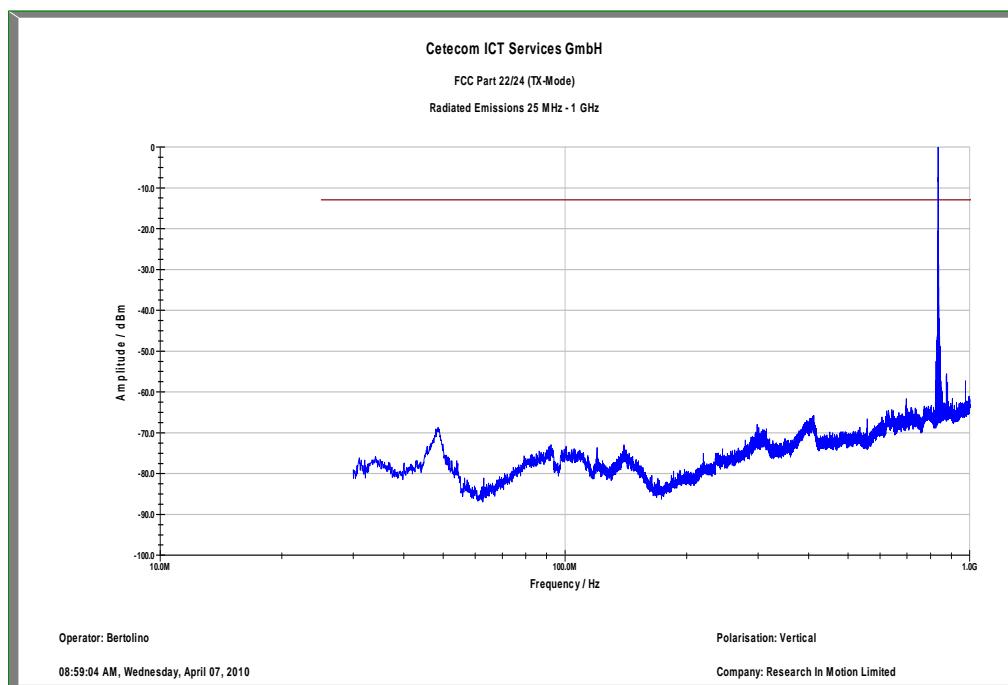
**Plot 10:** TX mode, channel 189, GSM, 1 GHz – 12.75 GHz, horizontal polarization**Plot 11:** TX mode, channel 189, GSM, 12 GHz - 25 GHz (valid for all channels)

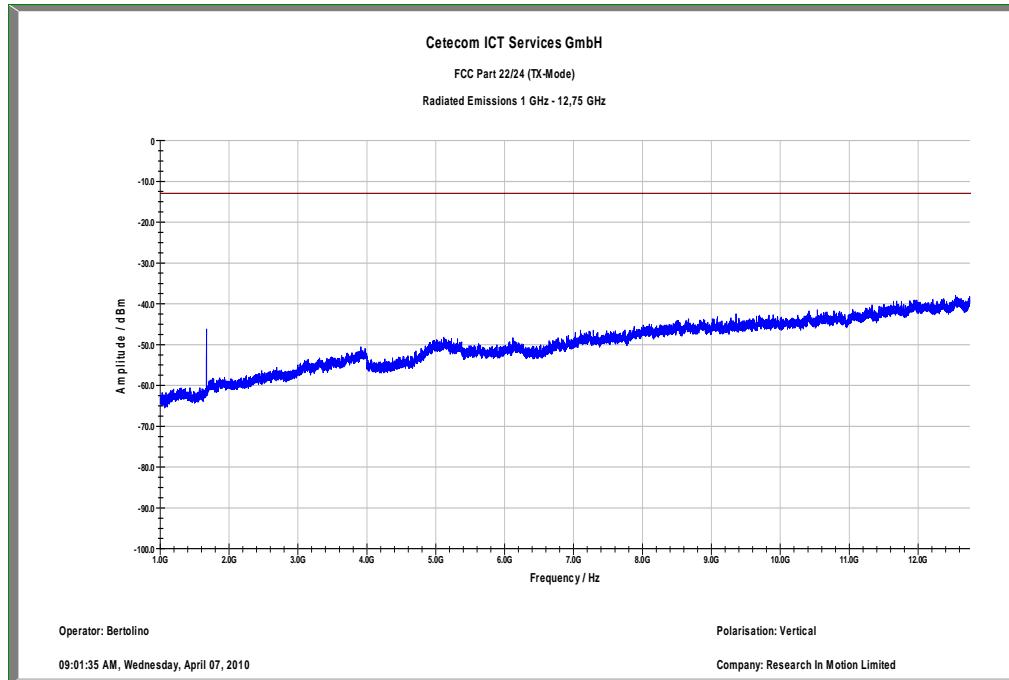
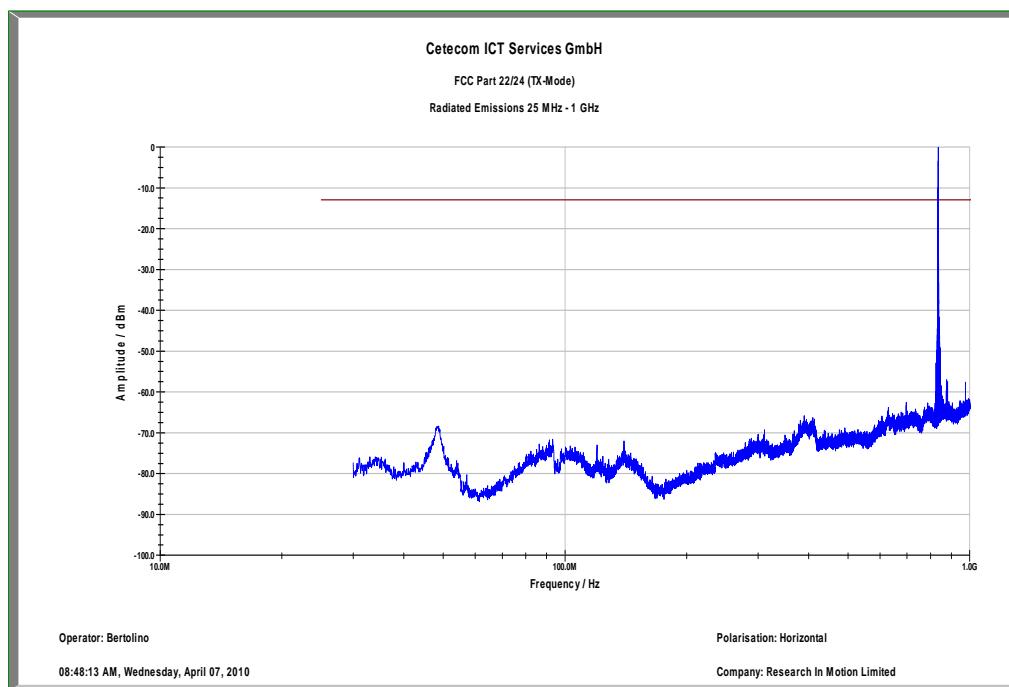
**Plot 12:** TX mode, channel 251, GSM, 30 MHz – 1 GHz, vertical polarization**Plot 13:** TX mode, channel 251, GSM, 1 GHz – 12.75 GHz, vertical polarization

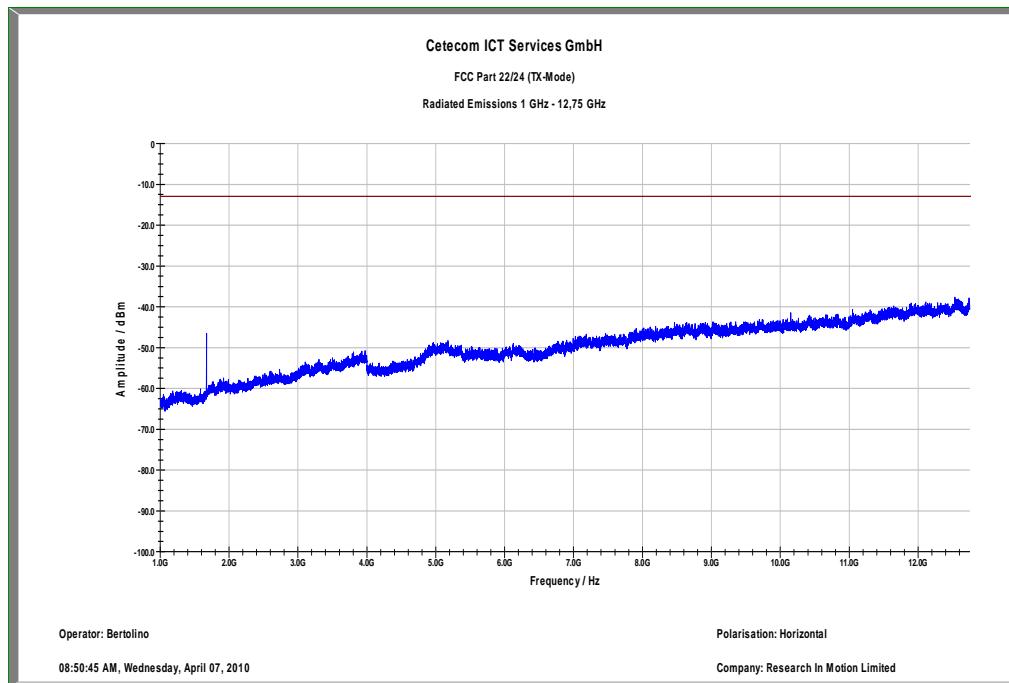
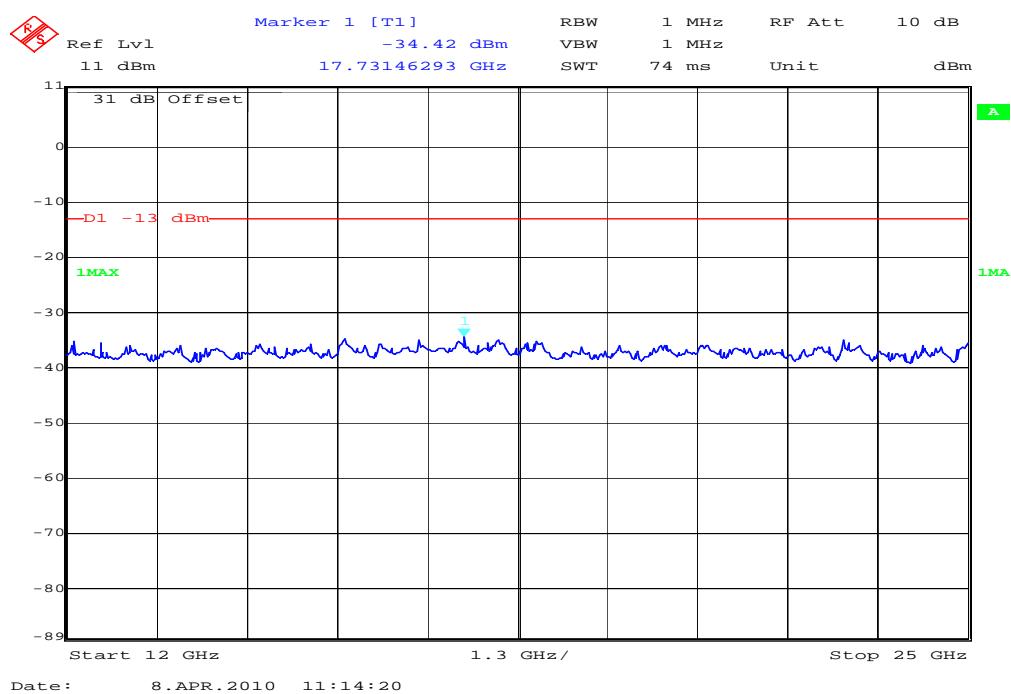
**Plot 14:** TX mode, channel 251, GSM, 30 MHz – 1 GHz, horizontal polarization**Plot 15:** TX mode, channel 251, GSM, 1 GHz – 12.75 GHz, horizontal polarization

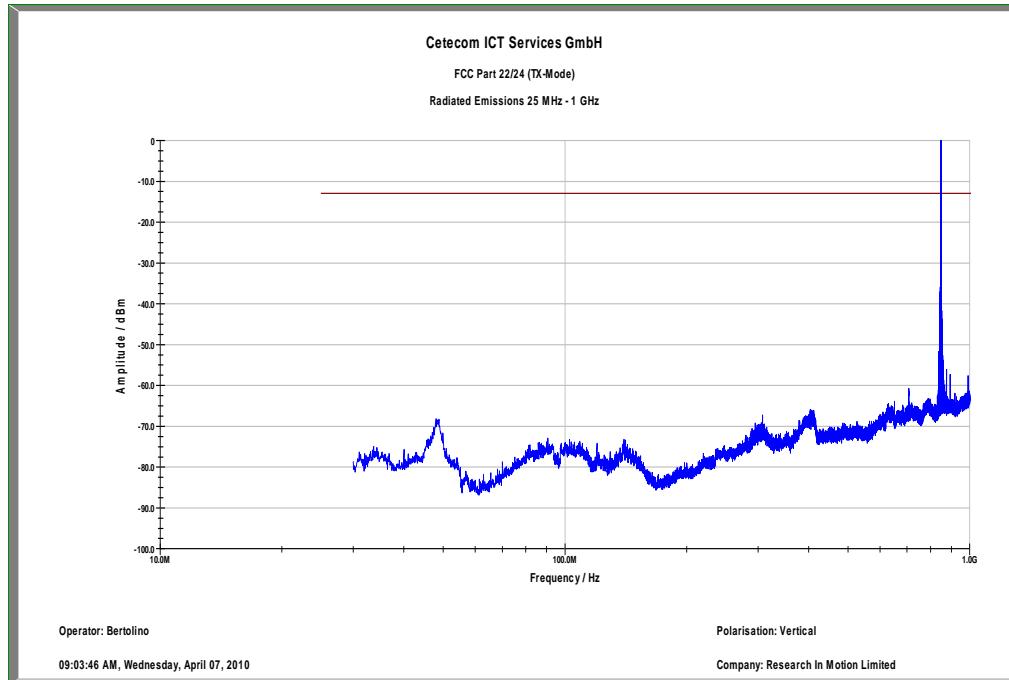
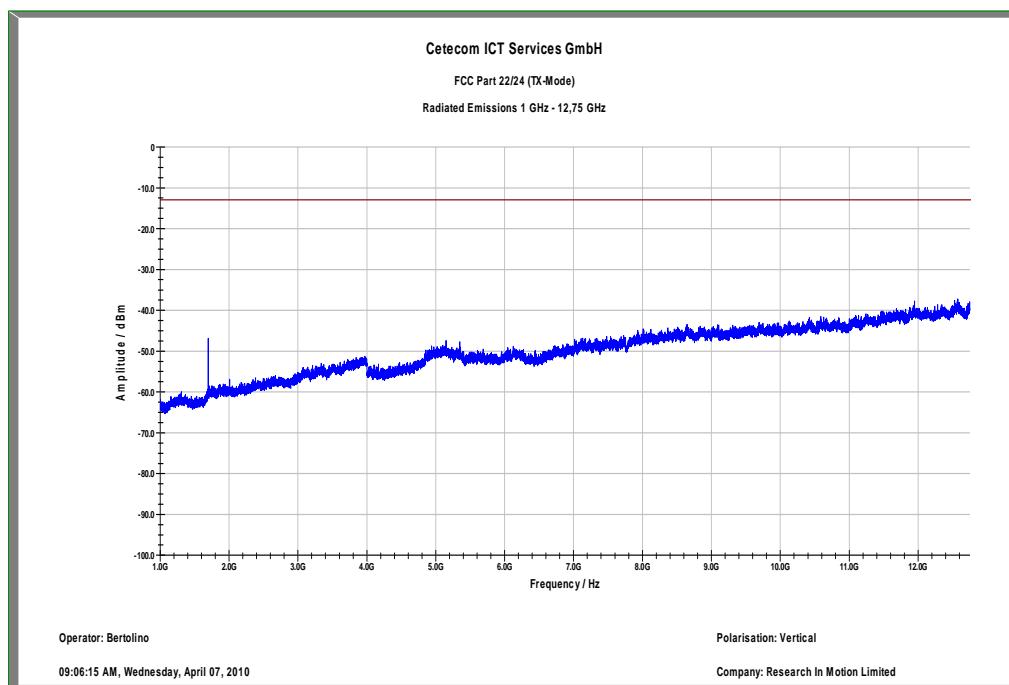
**Plot 16:** TX mode, channel 128, EGPRS / EDGE, 30 MHz – 1 GHz, vertical polarization**Plot 17:** TX mode, channel 128, EGPRS / EDGE, 1 GHz – 12.75 GHz, vertical polarization

**Plot 18:** TX mode, channel 128, EGPRS / EDGE, 30 MHz – 1 GHz, horizontal polarization**Plot 19:** TX mode, channel 128, EGPRS / EDGE, 1 GHz – 12.75 GHz, horizontal polarization

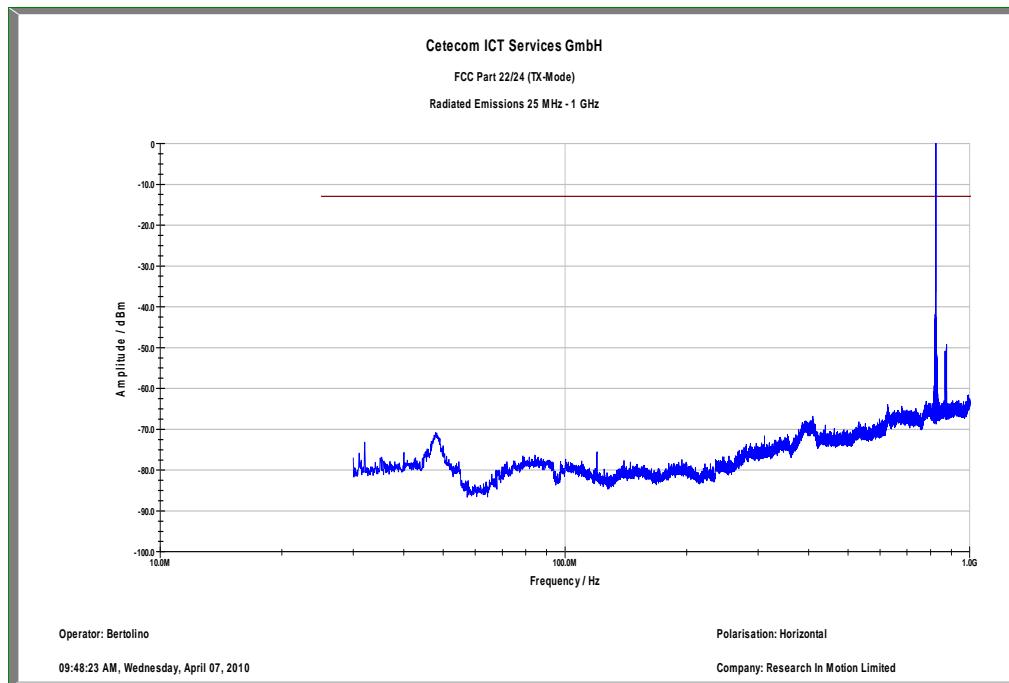
**Plot 20:** TX mode, channel 189, EGPRS / EDGE, 150 kHz - 30 MHz (valid for all channels)**Plot 21:** TX mode, channel 189, EGPRS / EDGE, 30 MHz – 1 GHz, vertical polarization

**Plot 22:** TX mode, channel 189, EGPRS / EDGE, 1 GHz – 12.75 GHz, vertical polarization**Plot 23:** TX mode, channel 189, EGPRS / EDGE, 30 MHz – 1 GHz, horizontal polarization

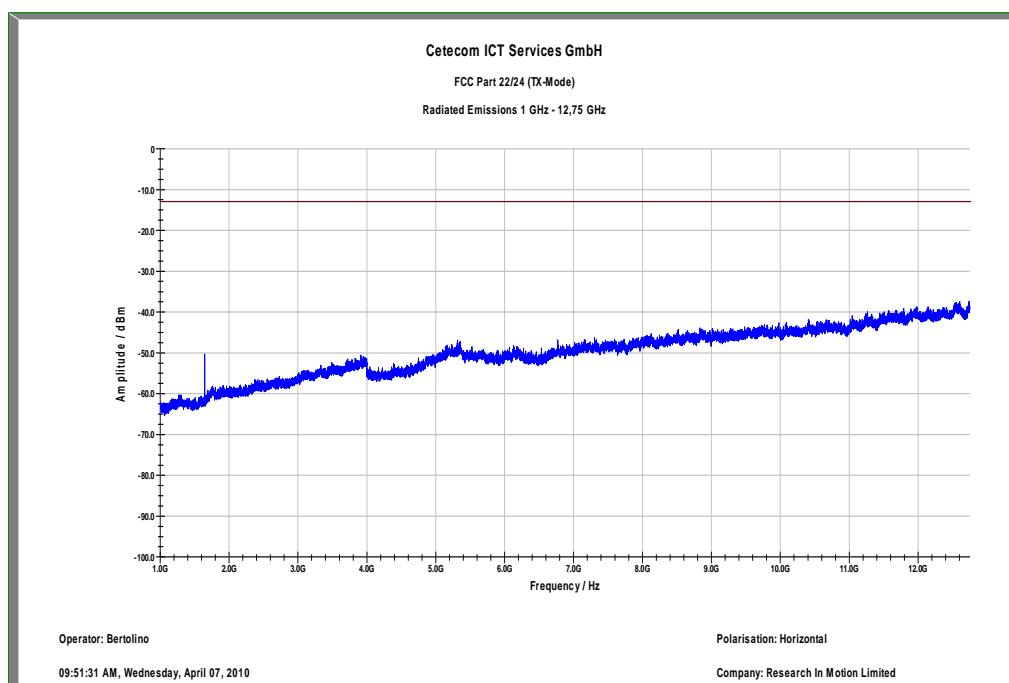
**Plot 24:** TX mode, channel 189, EGPRS / EDGE, 1 GHz – 12.75 GHz, horizontal polarization**Plot 25:** TX mode, channel 189, EGPRS / EDGE, 12 GHz - 25 GHz (valid for all channels)

**Plot 26:** TX mode, channel 251, EGPRS / EDGE, 30 MHz – 1 GHz, vertical polarization**Plot 27:** TX mode, channel 251, EGPRS / EDGE, 1 GHz – 12.75 GHz, vertical polarization

**Plot 28:** TX mode, channel 251, EGPRS / EDGE, 30 MHz – 1 GHz, horizontal polarization



**Plot 29:** TX mode, channel 251, EGPRS / EDGE, 1 GHz – 12.75 GHz, horizontal polarization



### 5.2.4 Conducted Spurious Emissions

**Not performed**

**Reference**

FCC:	CFR Part 22.917, 1.1051
IC:	RSS 132, Issue 2, Section 4.5 and 6.5

**Measurement Procedure**

The following steps outline the procedure used to measure the conducted emissions from the mobile station.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 19.1 GHz, data taken from 10 MHz to 20 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

USPCS Transmitter Channel Frequency

128 824.2 MHz

189 836.4 MHz

251 848.8 MHz

**Measurement Limit**

(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

**Measurement Results**

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

### 5.2.5 Block Edge Compliance

**Not performed**

**Reference**

FCC:	CFR Part 22.917
IC:	RSS 132, Issue 2, Section 6.5

**Measurement Limit:**

Sec. 22.917(b) Emission Limits.

(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43+10\log(P)$  dB. For all power levels +33 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

### 5.2.6 Occupied Bandwidth

**Not performed**

**Reference**

FCC:	CFR Part 22.917, 2.1049
IC:	RSS 132, Issue 2, Section 4.2

**Occupied Bandwidth Results**

Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. Table below lists the measured 99% power and -26dBc occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Normal mode

Frequency	99% Occupied Bandwidth (kHz)	-26 dBc Bandwidth (kHz)
824.2 MHz	-	-
836.4 MHz	-	-
848.8 MHz	-	-

EDGE mode

Frequency	99% Occupied Bandwidth (kHz)	-26 dBc Bandwidth (kHz)
824.2 MHz	-	-
836.4 MHz	-	-
848.8 MHz	-	-

Part 22 requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 300 kHz, this equates to a resolution bandwidth of at least 3 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

## 6 Test equipment and ancillaries used for tests

In order to simplify the identification of the equipment used at each specific test, each item of test equipment and ancillaries are provided with an identifier or number in the equipment list below.

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).

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kal. Art	Last Calibration	Next Calibration
1	n. a.	Double-Ridged Waveguide Horn Antenna	3115	EMCO	8812-3088	300001032	vIKI!	05.03.2009	05.03.2011
		1-26.5GHz							
2	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
3	n. a.	Monitor	35731	HP		300002294			
4	n. a.	Workstation	9000/300	HP		300002295			
5	n. a.	Anechoic chamber		MWB	87400/02	300000996			
6	n. a.	Relaismatrix (FTA)	HP3488A	HP Meßtechnik	2719A15013	300000151	ne		
7	n. a.	Band Reject filter	WRCG1855/1910- 1835/1925- 40/8SS	Wainwright	7	300003350	ev		
8	n. a.	Band Reject filter	WRCG2400/2483- 2375/2505- 50/10SS	Wainwright	11	300003351	ev		
9	n. a.	Software Option for CMU 200	CMU-K69	R&S	100109	300003198	ne		

10	n. a.	USB/GPIB Interface	82357A	Meilhaus	MY45468646	300003428	ne	
EGPRS-Treiber								
11	n. a.	EGPRS-Treiber	für EMQ-100	EMCO	none	300003441	ne	
Software								
12	n. a.	TILE-Software Emission	Quantum Change, Modell TILE- ICS/FULL	EMCO	none	300003451	ne	
WCHK2.9/18G-12SS								
13	n. a.	Highpass Filter	Wainwright	1	300003492	ev		
14	n. a.	Hygro-Thermometer	-/-, 5-45°C, 20-100%rF	-/-	400000110	izw	08.04.2009	08.04.2010
Software								
15	n. a.	Option für CMU	CMU-K56	R&S	100504	300003765	ne	
200								
Software								
16	n. a.	Option for CMU	CMU-K62	R&S	103402	300003606	ne	
200								
Software								
17	n. a.	Option for CMU	CMU-K64	R&S	102001	300003607	ne	
200								
18	n. a.	Highpass Filter	WCHK1.1/15G-10SS	Wainwright	3	300003255	ev	
19	n. a.	Highpass Filter	WCHK7.0/18G-8SS	Wainwright	18	300003789	ne	
PSA Spectrum Analyzer 3 Hz - 26.5 GHz								
20	n. a.		E4440A	Agilent Vertr. Bad Hom	MY48250080	300003812	k	
05.08.2008								
MXG								
21	n. a.	Microwave Analog Signal	N5183A	Agilent Vertr. Bad Hom	MY47420220	300003813	k	
06.08.2008								
Generator								
22	n. a.	RF Filter	N9039A	Agilent Vertr. Bad Hom	MY48260003	300003825	vlKI!	
19.08.2008								
Section 9kHz - 1GHz								
23	n. a.	TRILOG Super Breitband	VULB9163	Schwarzbeck	371	300003854	vlKI!	
17.12.2008								

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Antenne								
24	n. a.	High Pass Filter	VHF-3500+	Mini Circuits	-/-	400000193	ne	
Universal								
25	n. a.	Communication	CMU 200	R&S	103992	300003231	vIKI!	04.06.2008 04.06.2010
Tester								