



Accredited testing-laboratory

DAR registration number: DAT-P-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.: 3463A-1 (IC)

Certification ID: DE 0001

Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

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Test report no. : 4-2410-01-05/07
Type identification : Nurit 8020
Applicant : Verifone Inc.
FCC ID : B32NURIT8000PCI
IC Reg. No. : 787C-N8000PCI
Test standards : 47 CFR Part 22
47 CFR Part 24
RSS - 132 Issue 2
RSS - 133 Issue 3
47 CFR Part 15



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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 1.5. 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:

2007-06-25

Detlev Gillmann



Date

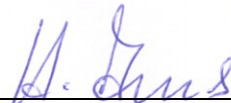
Name

Signature

Technical responsibility for area of testing:

2007-06-25

Harro Ames



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: DAT-P-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

Name:	Verifone Inc.
Street:	11 Ha'amal Street
Town:	48092 Park Afek Rosh Ha'ayin
Country:	Israel
Telephone:	
Fax:	+972 (0) 3 90 29 731
Contact:	Herr Andrey Glemb
E-mail:	Andrey_Glemb@verifone.com
Telephone:	+972 (0) 3 90 29 730 ext. 8268

1.4 Application details

Date of receipt of order:	2007-05-25
Date of receipt of test item:	2007-05-24
Date of start test:	2007-06-11
Date of end test	2007-06-14
Persons(s) who have been present during the test:	

2 Test standard/s:

47 CFR Part 22	2006-10	Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission subchapter B - common carrier services, Part 22-Public mobile services
47 CFR Part 24	2006-10	Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission subchapter B - common carrier services, Part 24-Personal communications services
RSS - 132 Issue 2	2005-09	Spectrum Management and Telecommunications Policy – Radio Standards Specifications Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz
RSS - 133 Issue 3	2005-06	Spectrum Management and Telecommunications Policy - Radio Standards Specifications 2 GHz Personal Communication Services
47 CFR Part 15	2006-08	Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices

3 Technical tests

3.1 Details of manufacturer

Name:	Verifone Inc.
Street:	11 Ha'amal Street
Town:	48092 Park Afek Rosh Ha'ayin
Country:	Israel

3.1.1 Test item

Kind of test item	:	payment equipment
Type identification	:	Nurit 8020
Serial Number	:	
Frequency	:	1850.2 – 1909.8 MHz and 824.2 – 848.8 MHz
Type of modulation	:	300KGXW (GMSK)
Number of channels	:	300 (PCS1900) and 125 (PCS850)
Antenna Type	:	Integral antenna
Power supply (normal)	:	7.4 V DC
Output power GSM 850 / GMSK	:	cond.: 32.3 dBm Peak ERP: 29.7 dBm (Burst);
Output power GSM 1900 / GMSK	:	cond : 29.4 dBm Peak EIRP: 29.8 dBm (Burst)
Transmitter Spurious (worst case)	:	0.2 μW / - 36.2dBm
Receiver Spurious (worst case)	:	47 μV/m @ 3 m
FCC ID	:	B32NURIT8000PCI
Certification No. IC	:	787C-N8000PCI
Open Area Test Site IC No.	:	IC 3463A-1
IC Standards	:	RSS132, Issue 2, RSS133, Issue 3

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:

2007-06-25

Detlev Gillmann



Date

Name

Signature

3.2 Test Setup

Hardware : VC
Software : NOS7 SVN:03

Mobile; (cond. measurements): -.-
Mobile; (rad. measurements) : -.-

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
3.1.1	RF Power Output	pass
3.1.2	Frequency Stability	pass
3.1.3	Radiated Emissions	pass
3.1.4	Receiver Radiated Emissions	pass
3.1.5	Conducted Spurious Emissions	pass
3.1.6	Block Edge Compliance	pass
3.1.7	Occupied Bandwidth	pass

4.1.2 GSM 850

Section in this Report	Test Name	Verdict
3.2.1	RF Power Output	pass
3.2.2	Frequency Stability	pass
3.2.3	Radiated Emissions	pass
3.2.4	Receiver Radiated Emissions	pass
3.2.5	Conducted Spurious Emissions	pass
3.2.6	Block Edge Compliance	pass
3.2.7	Occupied Bandwidth	pass

5 Measurements and results

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 PART PCS 1900

5.1.1 RF Power Output

Reference

FCC:	CFR Part 24.232, 2.1046
IC:	RSS 133, Issue 3, Section 4.3

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:

Power Step	Nominal Peak Output Power (dBm)	Tolerance (dB)
0	+30	± 2

Test Results: Output Power (conducted) GMSK Mode

Frequency (MHz)	Power Class	Peak Output Power (dBm)	Average Output Power (dBm)
1850.2	0	29.3	29.2
1880.0	0	29.3	29.2
1909.8	0	29.4	29.3
Measurement uncertainty		±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 1.5 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:

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

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

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

$$\text{Total Correction factor in EMI Receiver \# 2} = L_2 - L_1 + G_1$$

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:

Power Step	Burst PEAK EIRP (dBm)
0	<33

Test Results: Output Power (radiated) GMSK Mode

Frequency (MHz)	Power Class	Burst Peak EIRP (dBm)
1850.2	0	29.5
1880.0	0	29.8
1909.8	0	29.6
Measurement uncertainty		±0.5 dB

Sample Calculation:

Freq	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	EIRP Result			
MHz	dB μ V	dBm	dB i	dB d	dB	dBm			
1880.0	141.6	24.7	8.4	0.0	3.3	29.8			

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

5.1.2 Frequency Stability

Reference

FCC:	CFR Part 24.235, 2.1055
IC:	RSS 133, Issue 3, Section 4.2

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 RADIOCOMMUNICATION TESTER..

1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with 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..

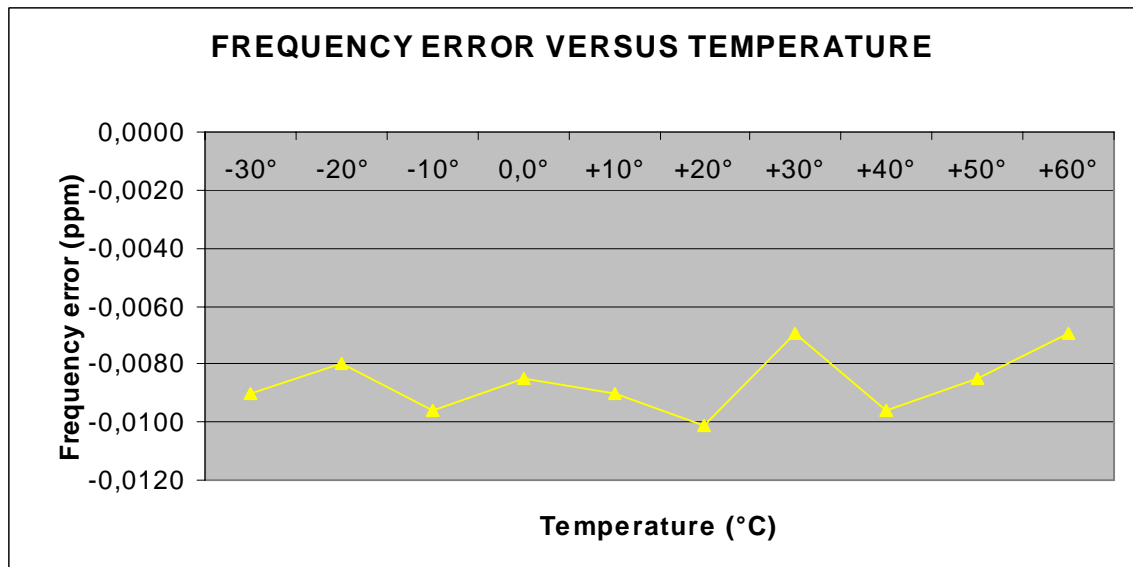
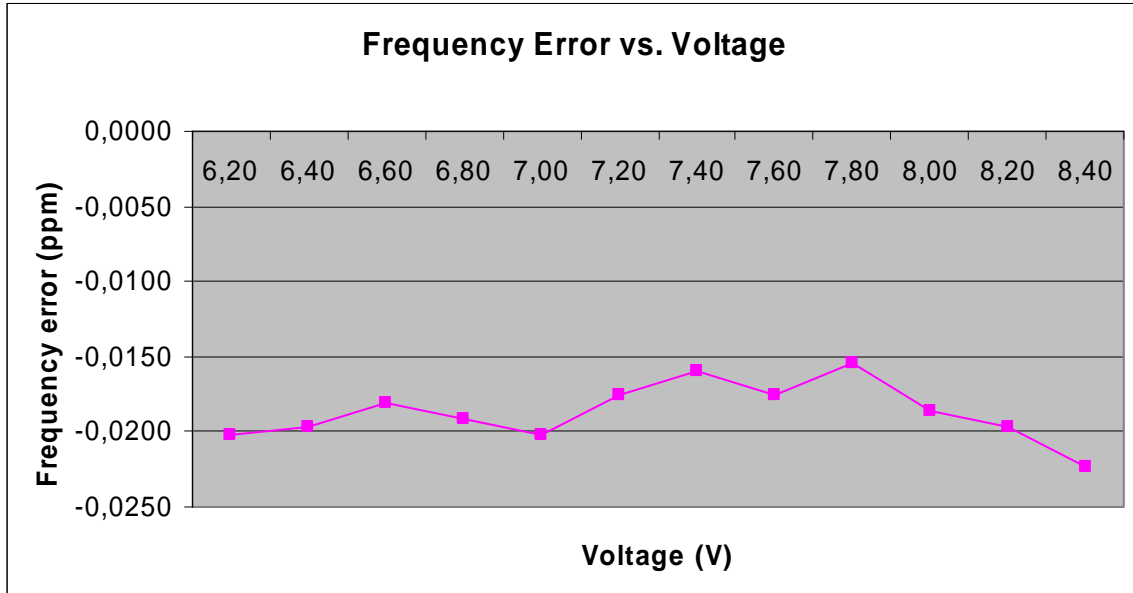
Test Results: AFC FREQ ERROR vs. VOLTAGE

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
6,20	-38	-0,00000202	-0,0202
6,40	-37	-0,00000197	-0,0197
6,60	-34	-0,00000181	-0,0181
6,80	-36	-0,00000191	-0,0191
7,00	-38	-0,00000202	-0,0202
7,20	-33	-0,00000176	-0,0176
7,40	-30	-0,00000160	-0,0160
7,60	-33	-0,00000176	-0,0176
7,80	-29	-0,00000154	-0,0154
8,00	-35	-0,00000186	-0,0186
8,20	-37	-0,00000197	-0,0197
8,40	-42	-0,00000223	-0,0223

Test Results: AFC FREQ ERROR vs. TEMPERATURE

777

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	-17	-0,00000090	-0,0090
-20	-15	-0,00000080	-0,0080
-10	-18	-0,00000096	-0,0096
±0.0	-16	-0,00000085	-0,0085
+10	-17	-0,00000090	-0,0090
+20	-19	-0,00000101	-0,0101
+30	-13	-0,00000069	-0,0069
+40	-18	-0,00000096	-0,0096
+50	-16	-0,00000085	-0,0085
+60	-13	-0,00000069	-0,0069



5.1.3 Radiated Emissions

Reference

FCC:	CFR Part 24.238, 2.1053
IC:	RSS 133, Issue 3, Section 4.4

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

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	<u>No peaks found < 20 dB below limit</u>	3760	<u>No peaks found < 20 dB below limit</u>	3819.6	<u>No peaks found < 20 dB below limit</u>
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	

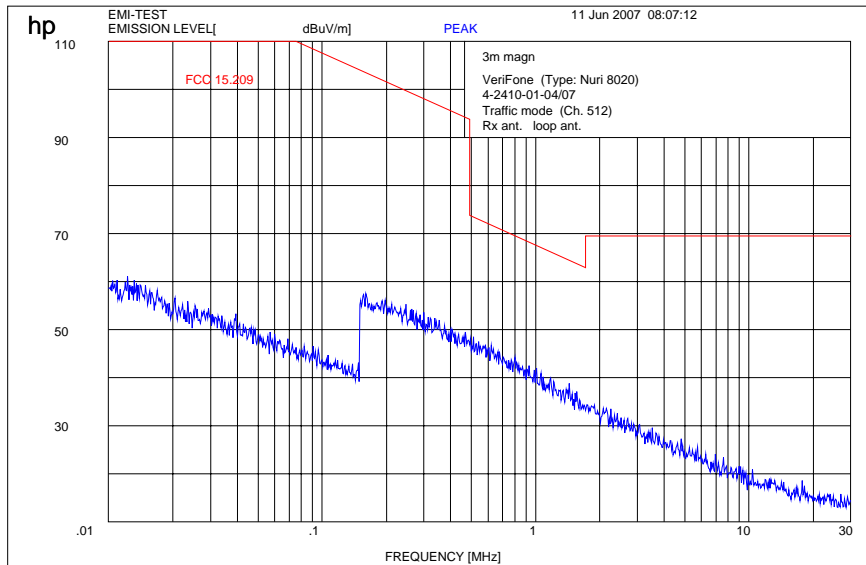
No peaks found < 20 dB below limit.

Sample calculation:

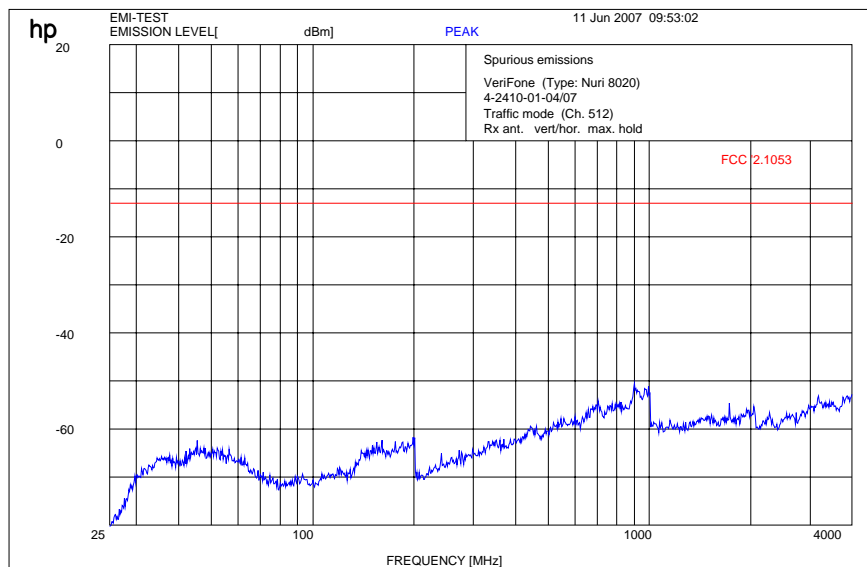
Freq	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	EIRP Result			
MHz	dBμV	dBm	dBi	dBd	dB	dBm			
1880.0	141.6	24.7	8.4	0.0	3.3	29.8			

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

Traffic mode up to 30 MHz (Valid for all 3 channels)



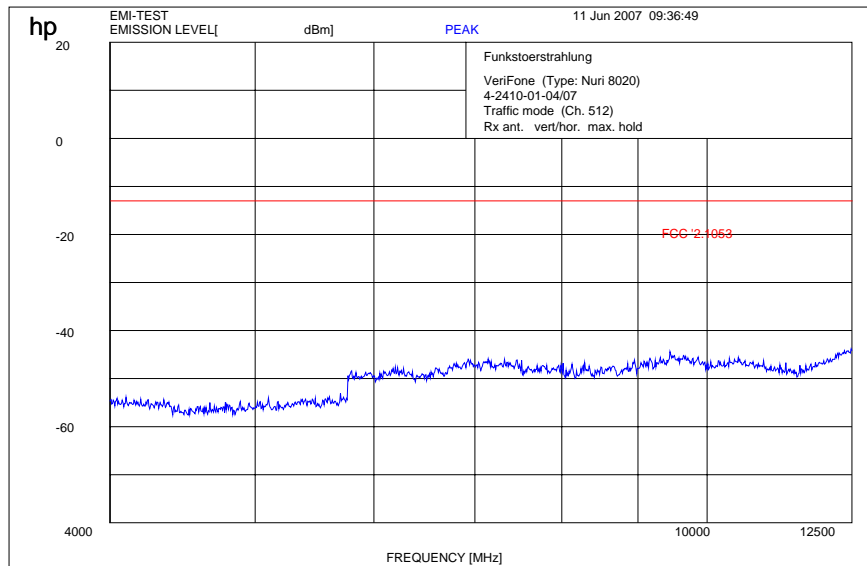
Channel 512 (30 MHz - 4 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$
 Carrier suppressed with a rejection filter

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

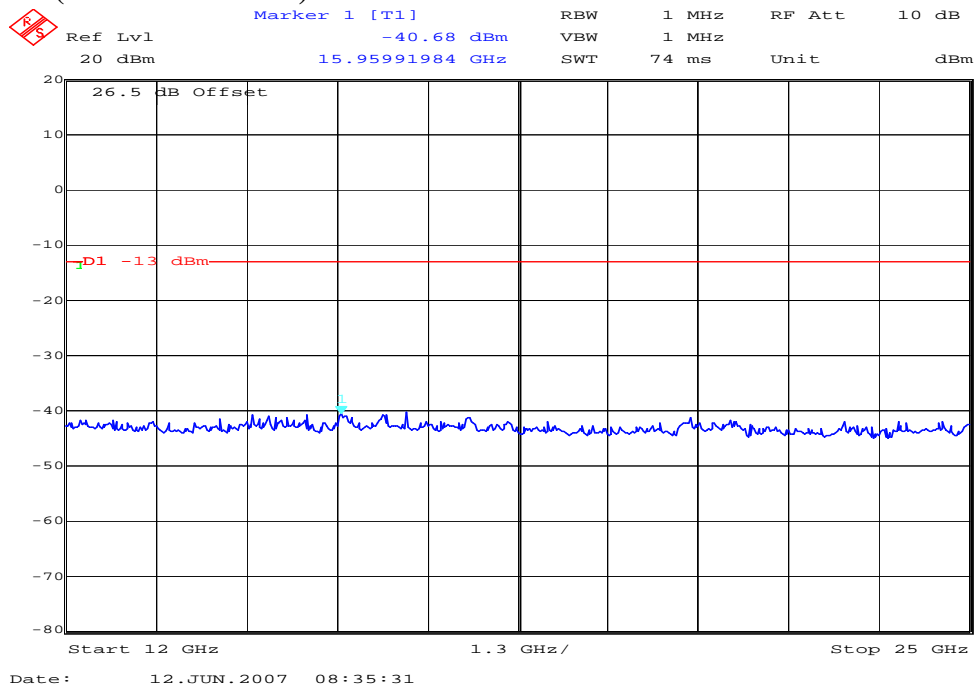
Channel 512 (4 GHz – 12.5 GHz)



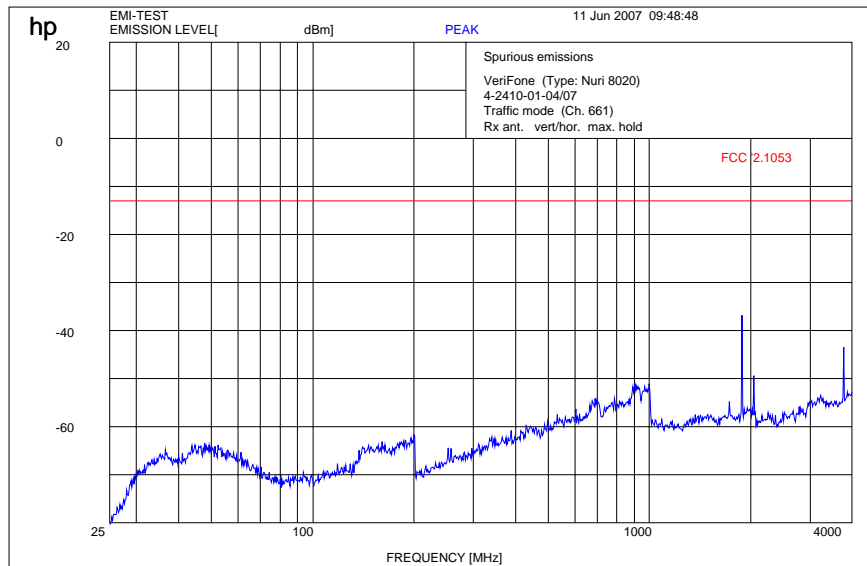
f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW / VBW 1 MHz

Channel 512 (12 GHz - 25 GHz) valid for all 3 channels



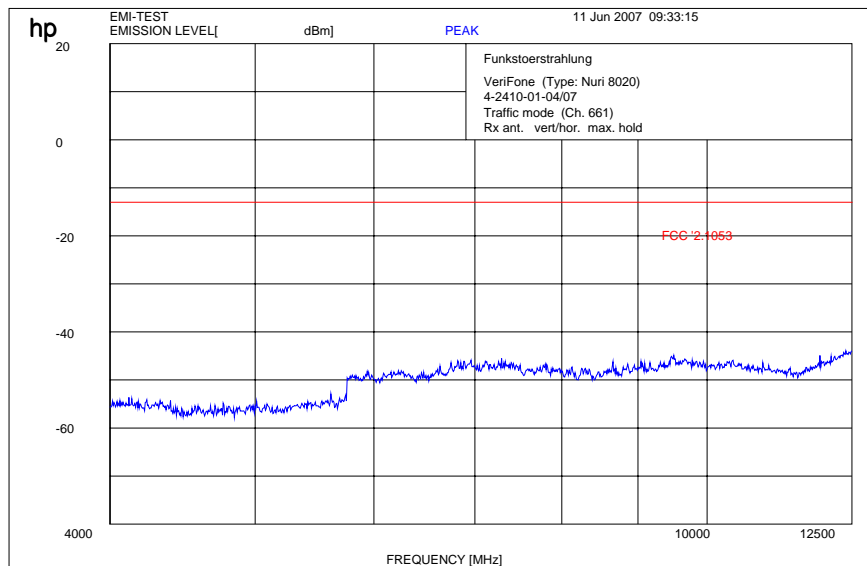
Channel 661 (30 MHz - 4 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$
 Carrier suppressed with a rejection filter

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

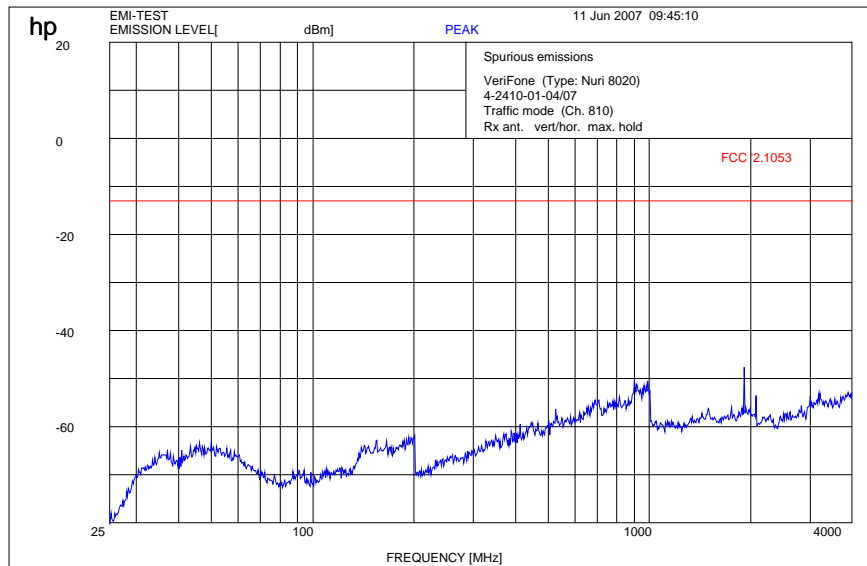
Channel 661 (4 GHz – 12.5 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

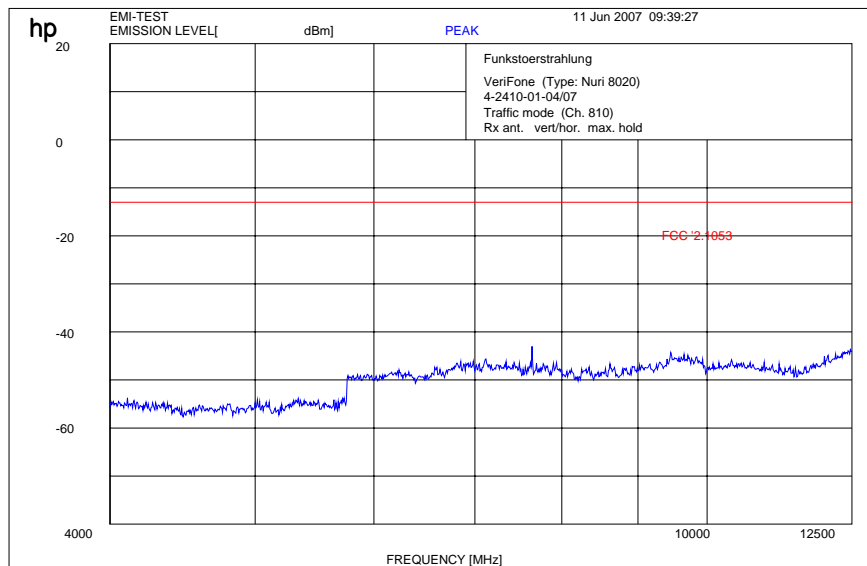
Channel 810 (30 MHz - 4 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$
 Carrier suppressed with a rejection filter

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

Channel 810 (4 GHz – 12.5 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

5.1.4 Receiver Radiated Emissions

Reference

FCC:	CFR Part 15.109, 2.1053
IC:	RSS 133, Issue 3, Section 4.5

Measurement Results

SPURIOUS EMISSIONS LEVEL ($\mu\text{V/m}$)								
Idle mode								
f (MHz)	Detector	Level ($\mu\text{V/m}$)	f (MHz)	Detector	Level ($\mu\text{V/m}$)	f (MHz)	Detector	Level ($\mu\text{V/m}$)
<u>No peaks found < 20 dB below limit</u>			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Measurement uncertainty			$\pm 3 \text{ dB}$					

$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW/VBW: 1 MHz

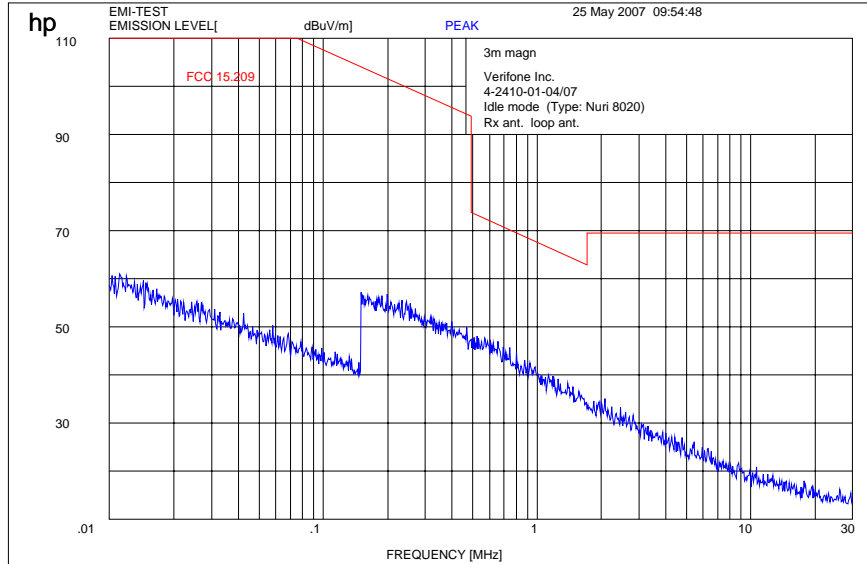
H = Horizontal ; V= Vertical

For measurement distance see table below

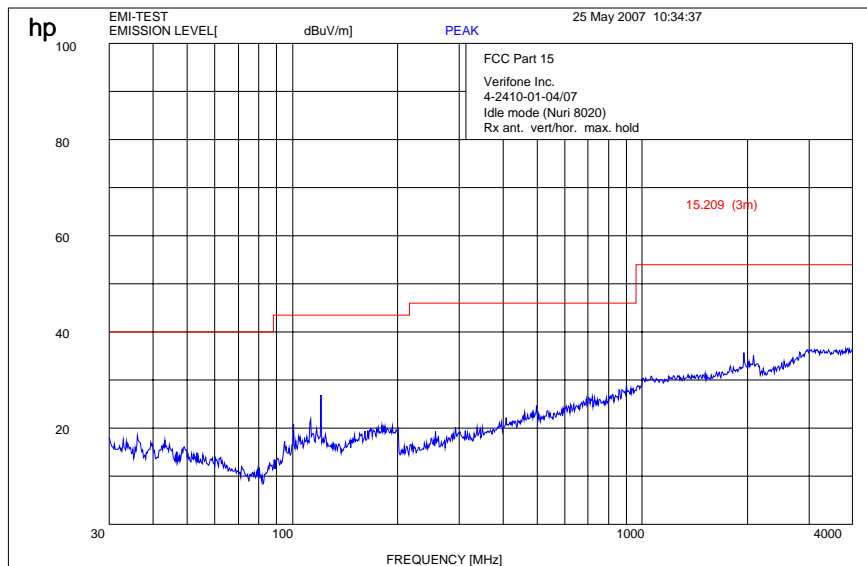
Limits: § 15.109

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

IDLE MODE (150 kHz- 30 MHz)



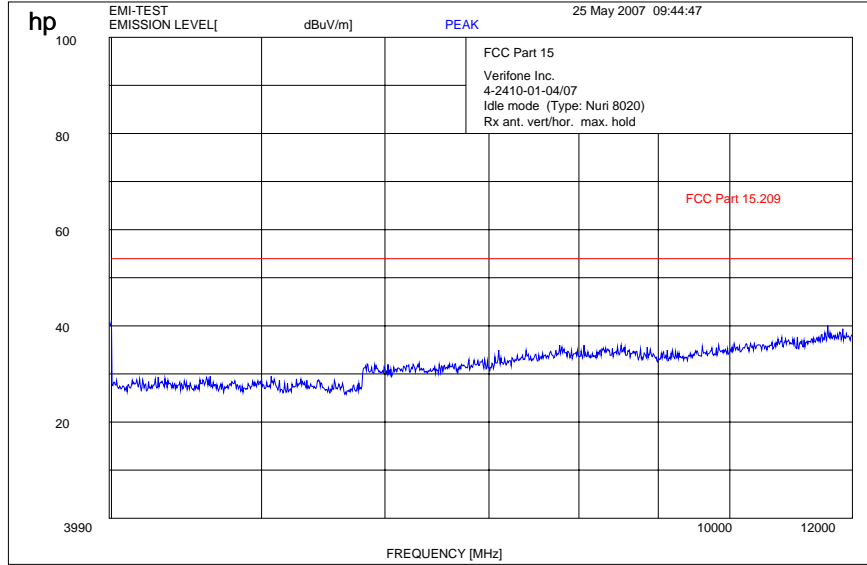
IDLE MODE (30 MHz - 4 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

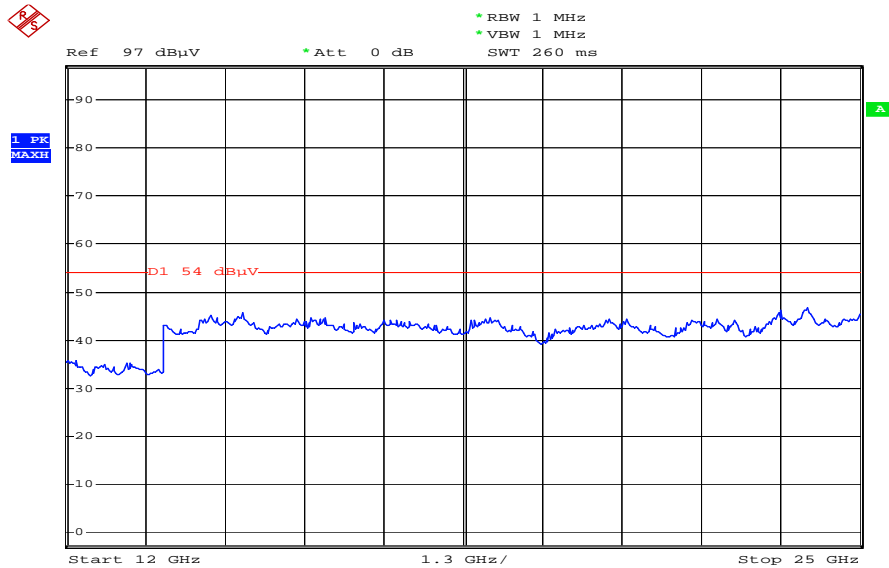
Idle Mode (4 GHz – 12.0 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

Idle Mode (12 GHz - 25 GHz)



Date: 29.MAY.2007 08:15:08

5.1.5 Conducted Spurious Emissions

Reference

FCC:	CFR Part 24.238, 2.10.51
IC:	RSS 133, Issue 3, Section 4.4

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

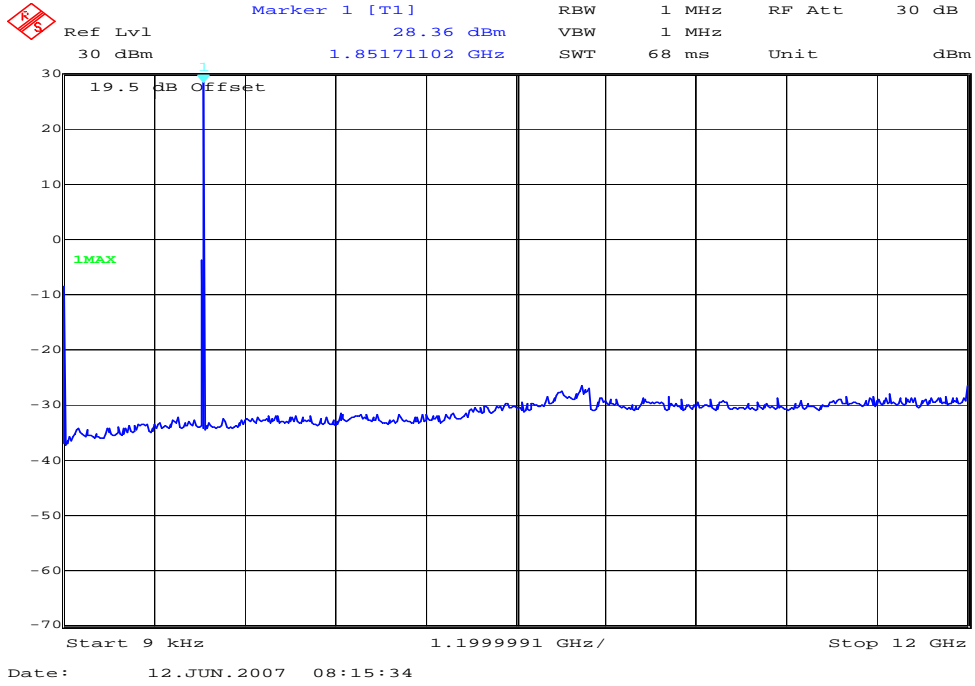
Measurement Limit:

(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 $43+10\text{Log}(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

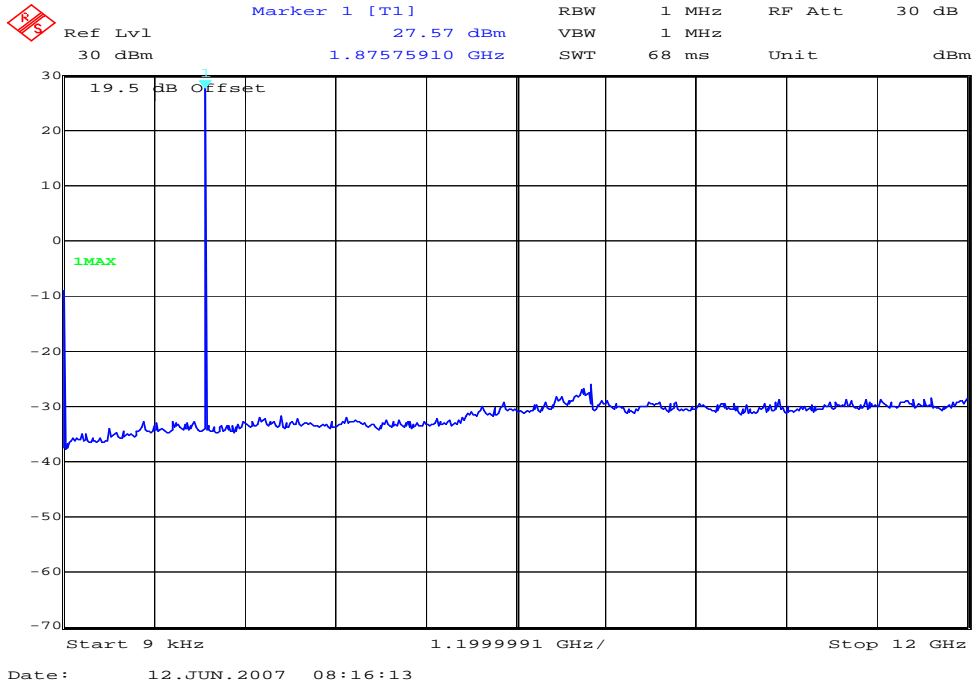
Measurement Results:

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	<u>No peaks found < 20 dB below limit</u>	3760	<u>No peaks found < 20 dB below limit</u>	3819.6	<u>No peaks found < 20 dB below limit</u>
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	

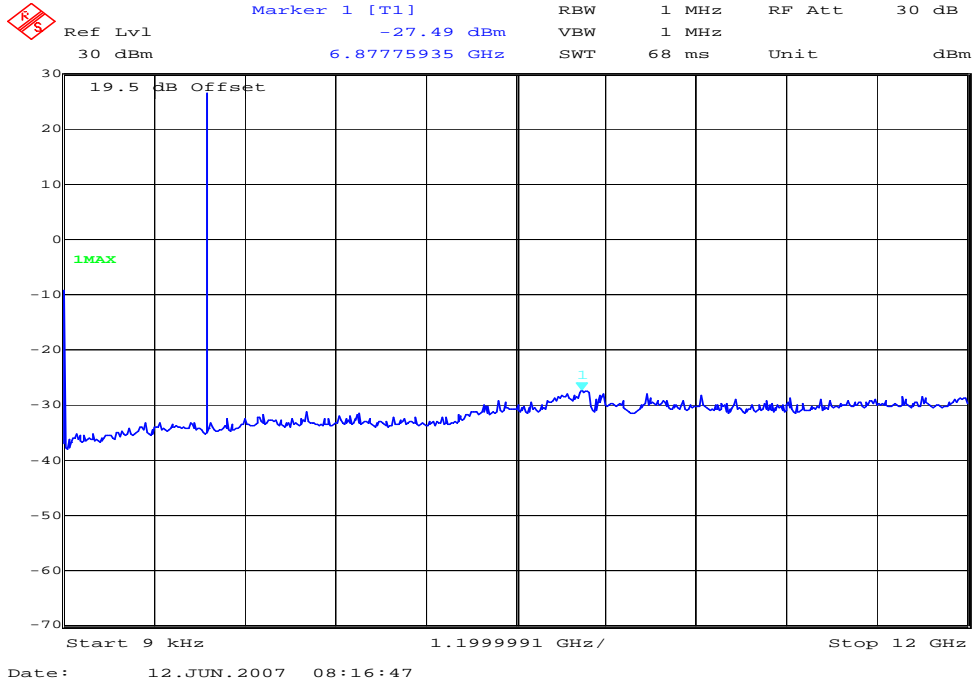
Channel: 512



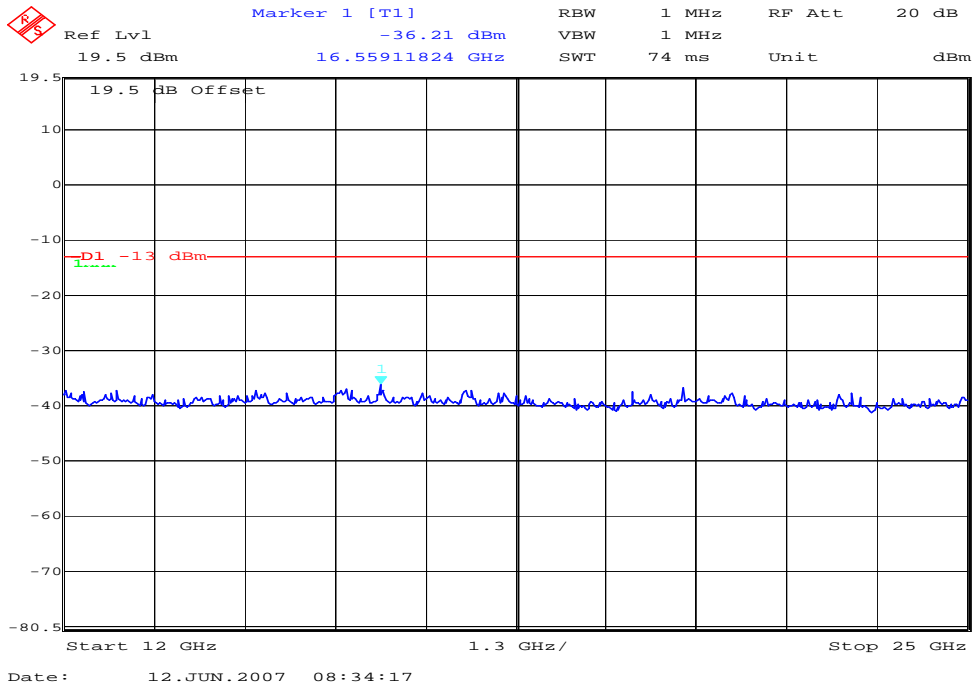
Channel 661



Channel 810



Channel 810



5.1.6 Block Edge Compliance

Reference

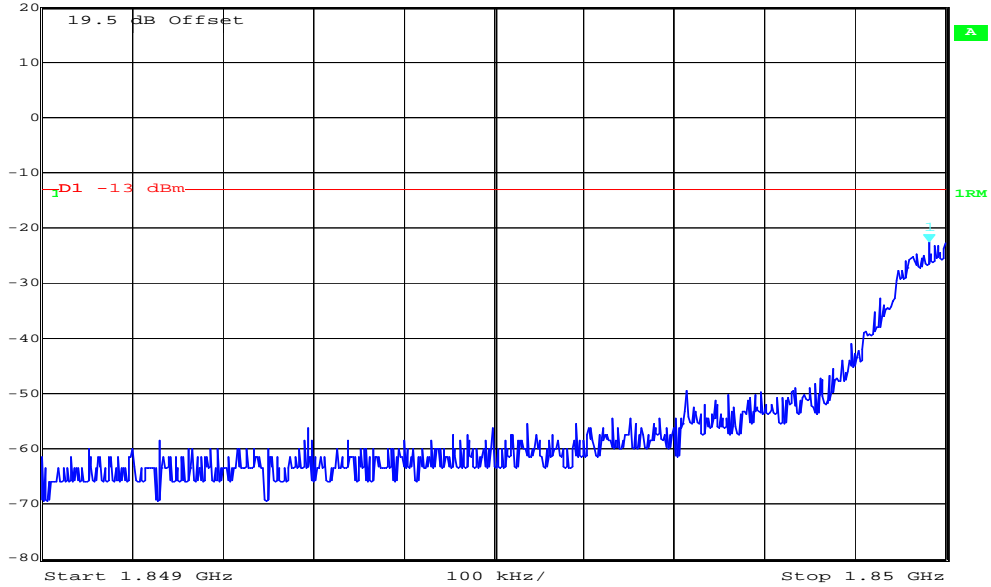
FCC:	CFR Part 24.238
IC:	RSS 133, Issue 3, Section 6.5

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 $43+10\text{Log}(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

Block 1 Channel 512

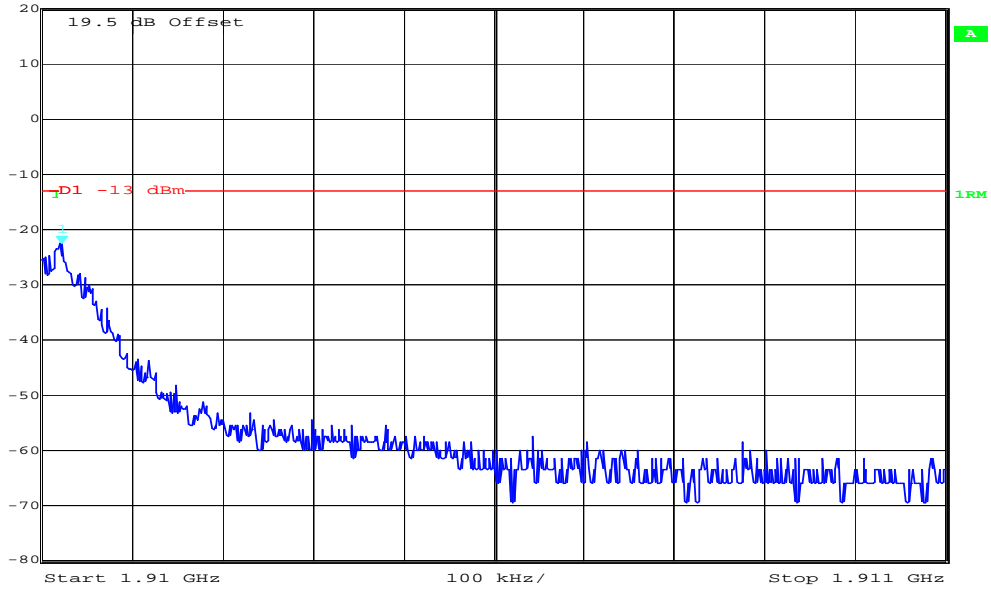
Ref Lvl 20 dBm Marker 1 [T1] RBW 3 kHz RF Att 30 dB
-22.56 dBm 1.84998196 GHz VBW 3 kHz
SWT 280 ms Unit dBm



Date: 12.JUN.2007 08:31:19

Block 6 Channel 810

Ref Lvl 20 dBm Marker 1 [T1] RBW 3 kHz RF Att 30 dB
-22.60 dBm 1.91002204 GHz VBW 3 kHz
SWT 280 ms Unit dBm



Date: 12.JUN.2007 08:32:09

5.1.7 Occupied Bandwidth

Reference

FCC:	CFR Part 24.238, 2.1049
IC:	RSS 133, Issue 3, 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.

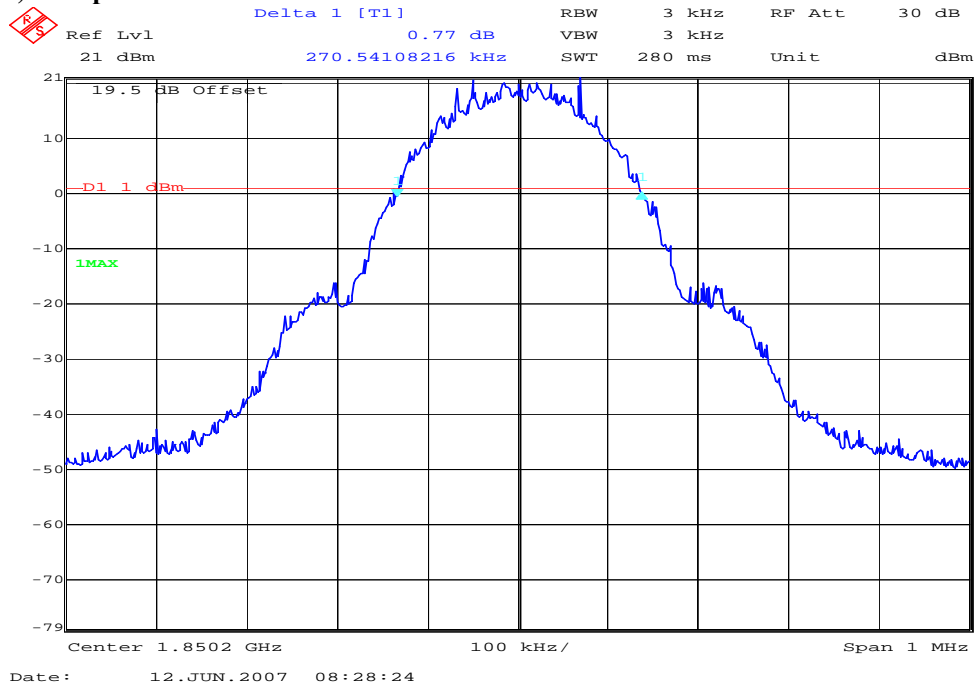
Normal mode

Frequency	99% Occupied Bandwidth kHz	-26 dBc Bandwidth kHz
1850.2 MHz	270.541	312.625
1880.0 MHz	274.549	312.625
1909.8 MHz	270.541	310.621

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.

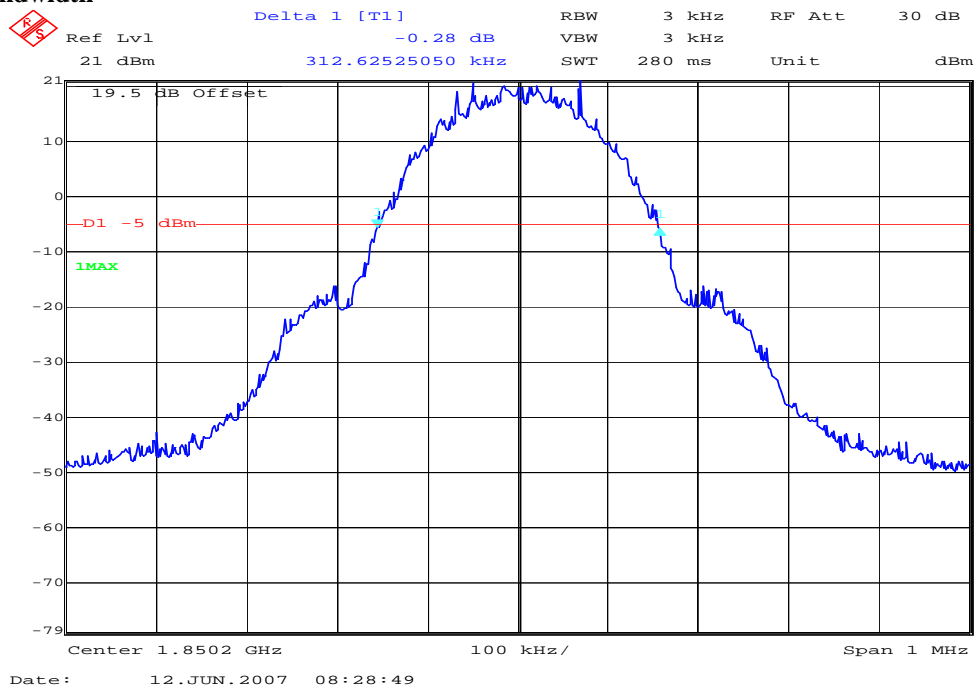
Channel 512

99% (-20 dB) Occupied Bandwidth



Channel 512

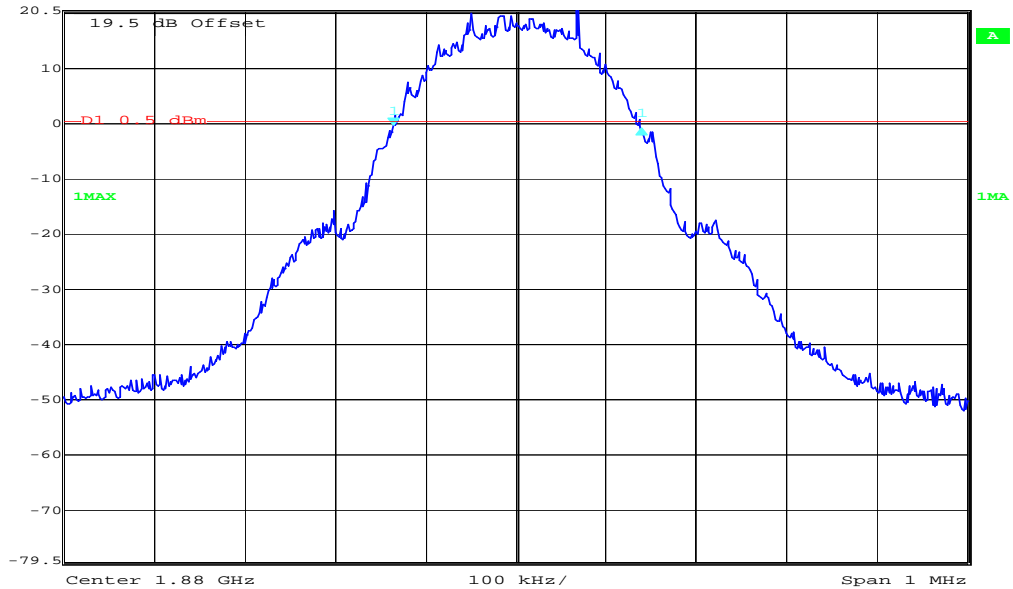
-26 dBc Bandwidth



Channel 661

99% (-20 dB) Occupied Bandwidth

	Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
	20.5 dBm	-0.39 dB	VBW	3 kHz		
		274.54909820 kHz	SWT	280 ms	Unit	dBm

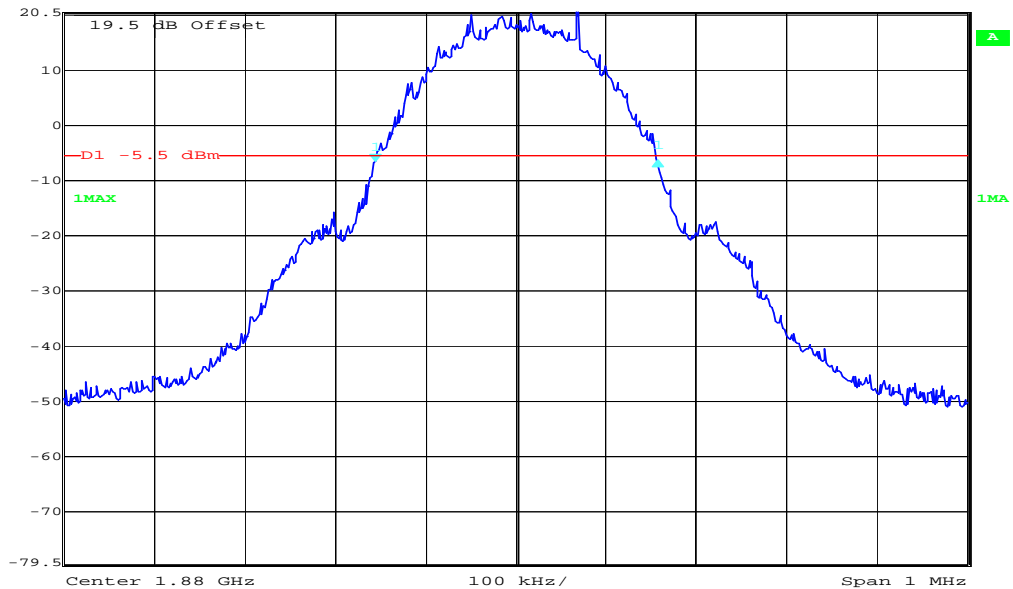


Date: 12.JUN.2007 08:24:35

Channel 661

-26 dBc Bandwidth

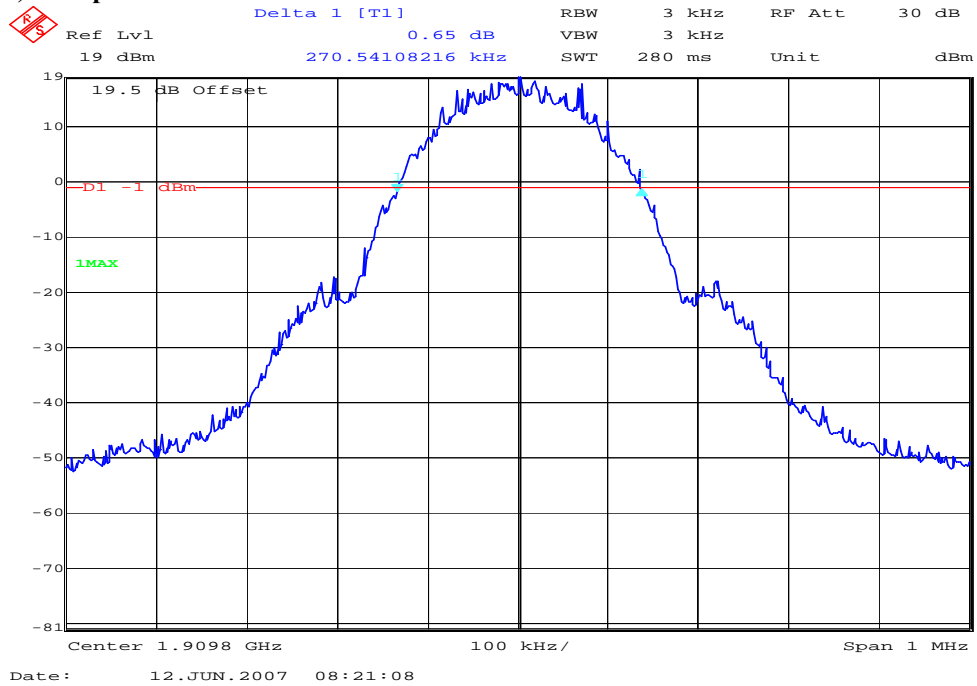
	Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
	20.5 dBm	0.36 dB	VBW	3 kHz		
		312.62525050 kHz	SWT	280 ms	Unit	dBm



Date: 12.JUN.2007 08:25:08

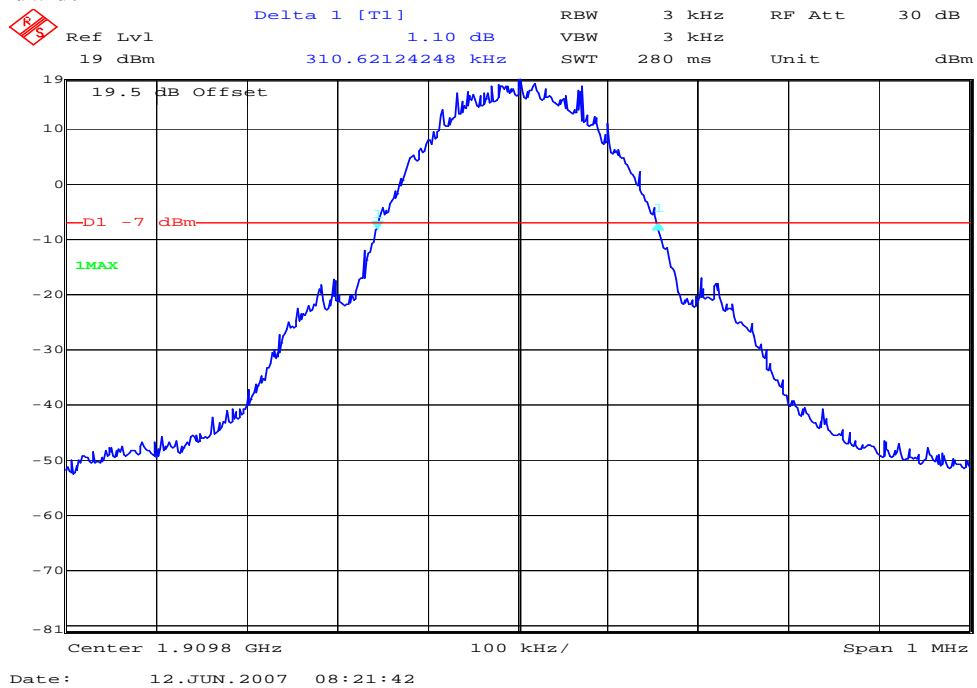
Channel 810

99% (-20 dB) Occupied Bandwidth



Channel 810

-26 dBc Bandwidth



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:

Power Step	Nominal Peak Output Power (dBm)	Tolerance (dB)
5	+33	± 2

Measurements Results Output Power (conducted)

Frequency (MHz)	Power Class	Peak Output Power (dBm)	Average Output Power (dBm)
824.2	5	32.2	32.1
836.4	5	32.2	32.1
848.8	5	32.3	32.2
Measurement uncertainty		±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 o 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 1.5 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:
 $P = P1 - L1 = (P2 + L2) - L1 = P3 + A + L2 - L1$
 $EIRP = P + G1 = P3 + L2 - L1 + A + G1$
 $ERP = EIRP - 2.15 \text{ dB}$

Total Correction factor in EMI Receiver # 2 = L2 – L1 + G1

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:

Power Step	Burst Peak (dBm)
0	<33

Measurement Results Output Power (Radiated)

Frequency (MHz)	Power Class	BURST Peak (dBm)
824.2	5	29.5
836.4	5	29.7
848.8	5	29.4
Measurement uncertainty		±0.5 dB

Sample calculation:

Freg	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	ERP	Substitution Antenna
MHz	dBμV	dBm	dBi	dBd	dB	dBm	
836.4	136.9	24.6	8.4	0.0	3.3	29.7	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

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 RADIOCOMMUNICATION TESTER..

1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with 3.7 Volts, connected to the CMU 200 and in a simulated call on channel 661 (centre 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:

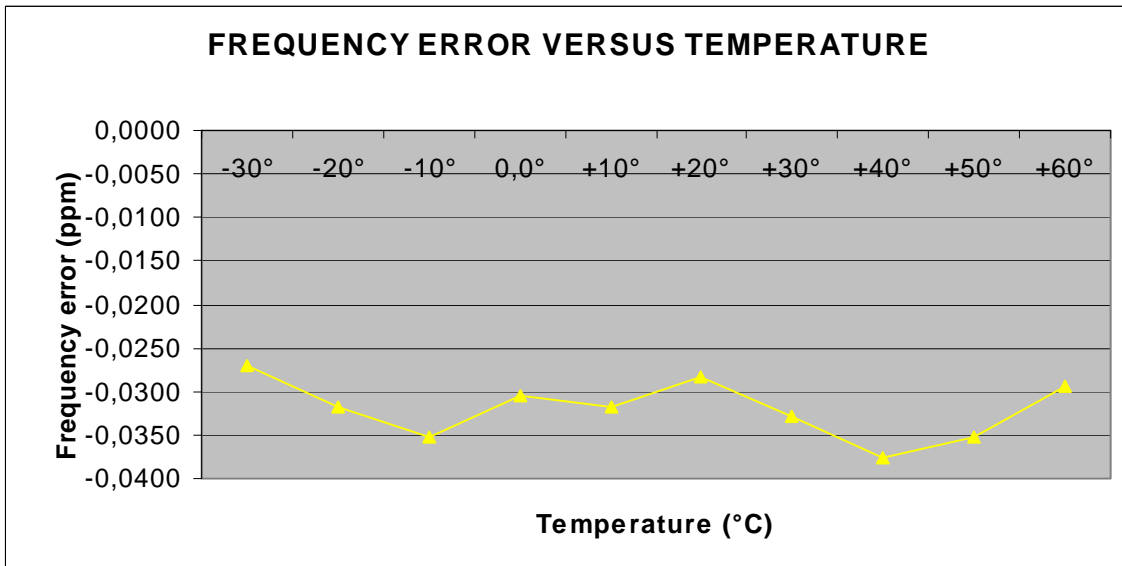
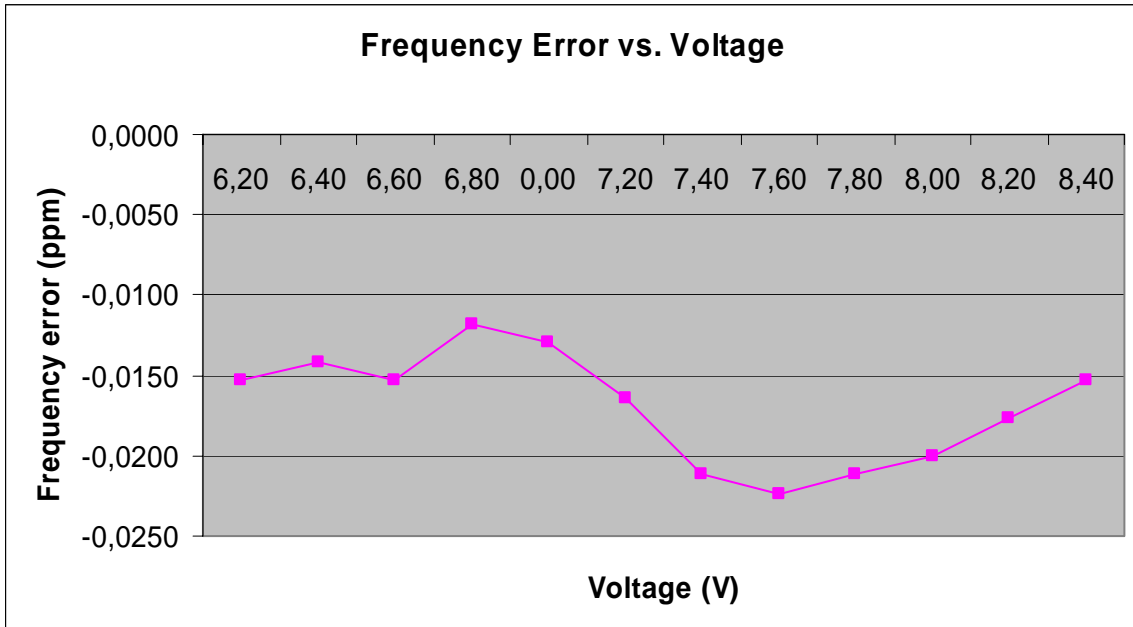
According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 22.355, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission 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

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
6,20	-13	-0,00000153	-0,0153
6,40	-12	-0,00000141	-0,0141
6,60	-13	-0,00000153	-0,0153
6,80	-10	-0,00000118	-0,0118
0,00	-11	-0,00000129	-0,0129
7,20	-14	-0,00000165	-0,0165
7,40	-18	-0,00000212	-0,0212
7,60	-19	-0,00000224	-0,0224
7,80	-18	-0,00000212	-0,0212
8,00	-17	-0,00000200	-0,0200
8,20	-15	-0,00000176	-0,0176
8,40	-13	-0,00000153	-0,0153

Measurement Results: AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	-23	-0,00000271	-0,0271
-20	-27	-0,00000318	-0,0318
-10	-30	-0,00000353	-0,0353
±0.0	-26	-0,00000306	-0,0306
+10	-27	-0,00000318	-0,0318
+20	-24	-0,00000282	-0,0282
+30	-28	-0,00000329	-0,0329
+40	-32	-0,00000376	-0,0376
+50	-30	-0,00000353	-0,0353
+60	-25	-0,00000294	-0,0294



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 $43+10\text{Log}(P)$ 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 shows the worst case.

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

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	<u>No peaks found < 20 dB below limit</u>	1672.8	<u>No peaks found < 20 dB below limit</u>	1697.6	<u>No peaks found < 20 dB below limit</u>
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	

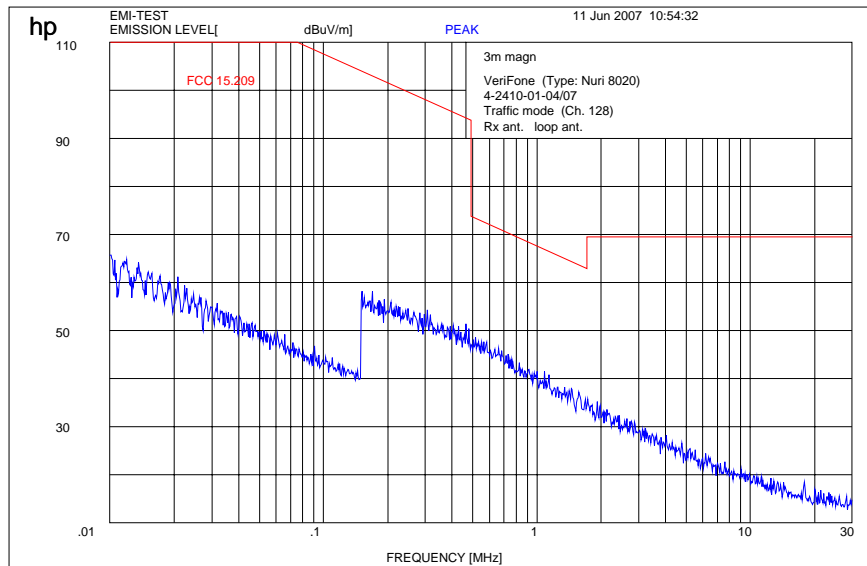
Sample calculation:

Freq	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	ERP	Substitution Antenna
MHz	dB μ V	dBm	dBi	dBd	dB	dBm	
836.4	136.9	24.6	8.4	0.0	3.3	29.7	UHAP Schwarzbeck S/N 460

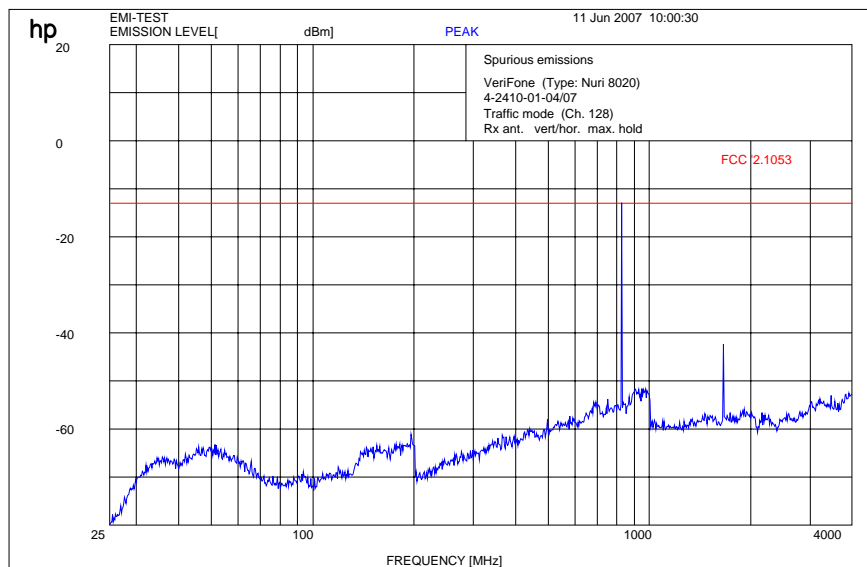
$ERP = SG \text{ (dBm)} - \text{Cable Loss (dB)} + \text{Ant. gain (dB)}$

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

Traffic mode up to 30 MHz (Valid for all 3 channels)



Channel 128 (30 MHz - 4 GHz)

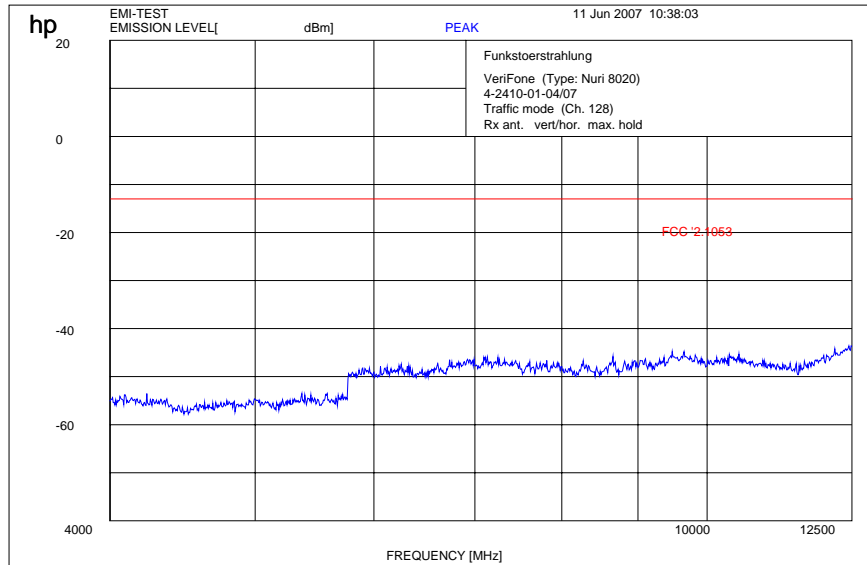


$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

Carrier suppressed with a rejection filter

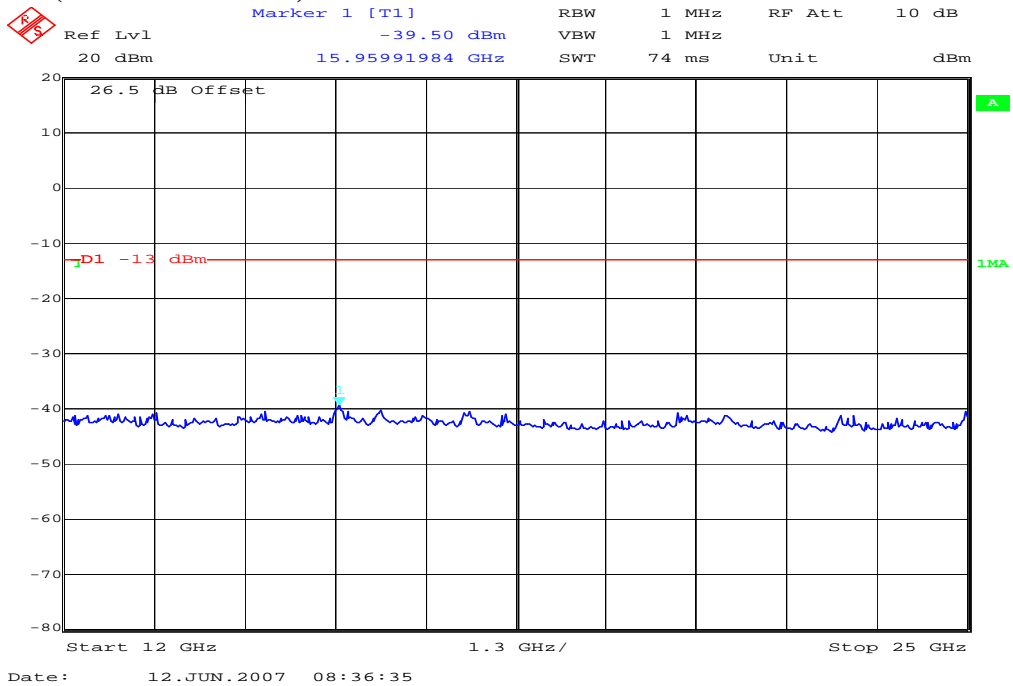
Channel 128 (4 GHz – 12.5 GHz)



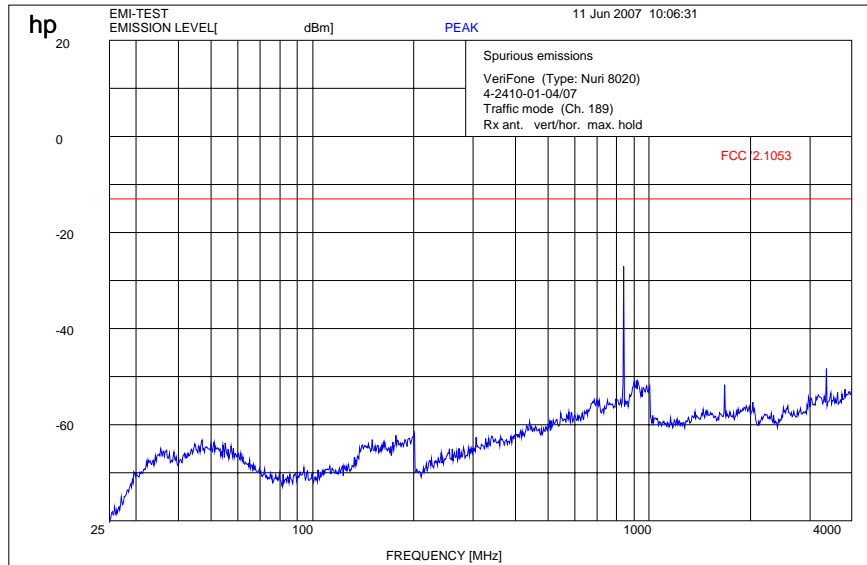
$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

Channel 128 (12 GHz - 25 GHz) valid for all 3 channels



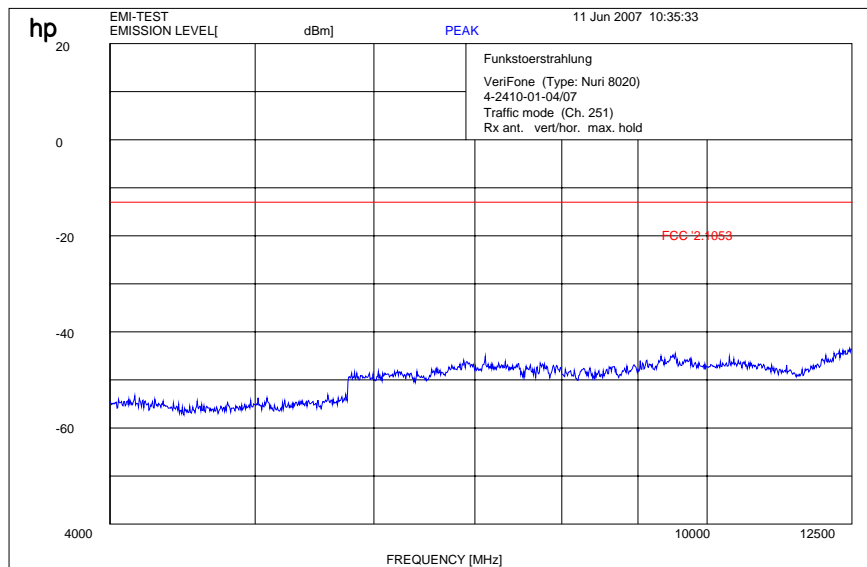
Channel 189 (30 MHz - 4 GHz)



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz
Carrier suppressed with a rejection filter

$f \geq 1 \text{ GHz}$: RBW / VBW 1 MHz

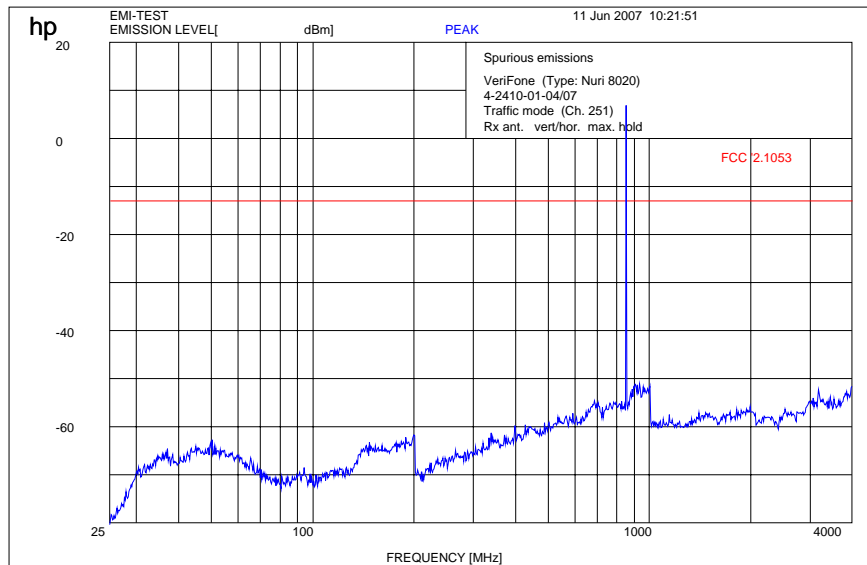
Channel 189 (4 GHz – 12.5 GHz)



$f < 1 \text{ GHz}$: RBW/VBW: 100 kHz

$f \geq 1 \text{ GHz}$: RBW / VBW 1 MHz

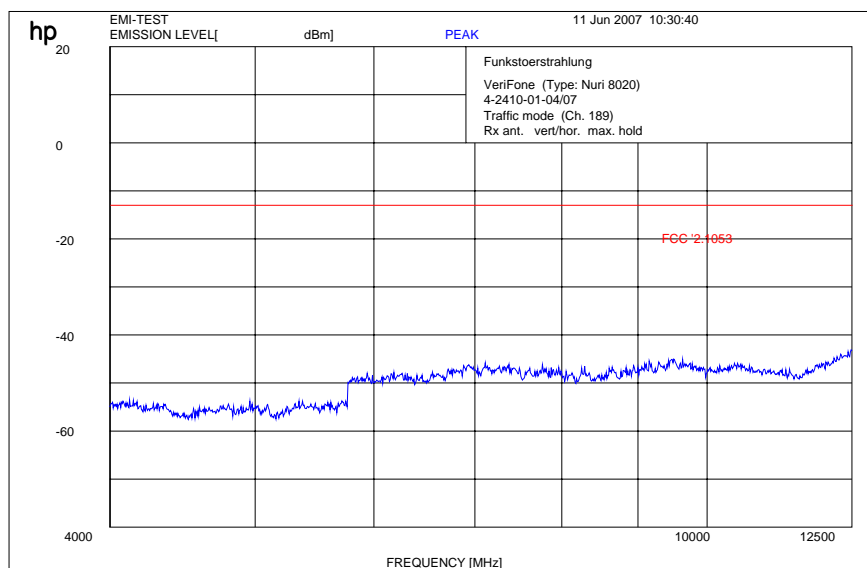
Channel 251 (30 MHz - 4 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$
 Carrier suppressed with a rejection filter

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

Channel 251 (4 GHz – 12.5 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

5.2.4 Receiver Radiated Emissions

Reference

FCC:	CFR Part 15.109, 2.1053
IC:	RSS 132, Issue 2, Section 4.6 and 6.6

SPURIOUS EMISSIONS LEVEL ($\mu\text{V/m}$)								
Idle Mode								
f (MHz)	Detector	Level ($\mu\text{V/m}$)	f (MHz)	Detector	Level ($\mu\text{V/m}$)	f (MHz)	Detector	Level ($\mu\text{V/m}$)
<u>No peaks found < 20 dB below limit</u>			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
			-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
Measurement uncertainty			± 3 dB					

$f < 1$ GHz : RBW/VBW: 100 kHz

$f \geq 1$ GHz : RBW/VBW: 1 MHz

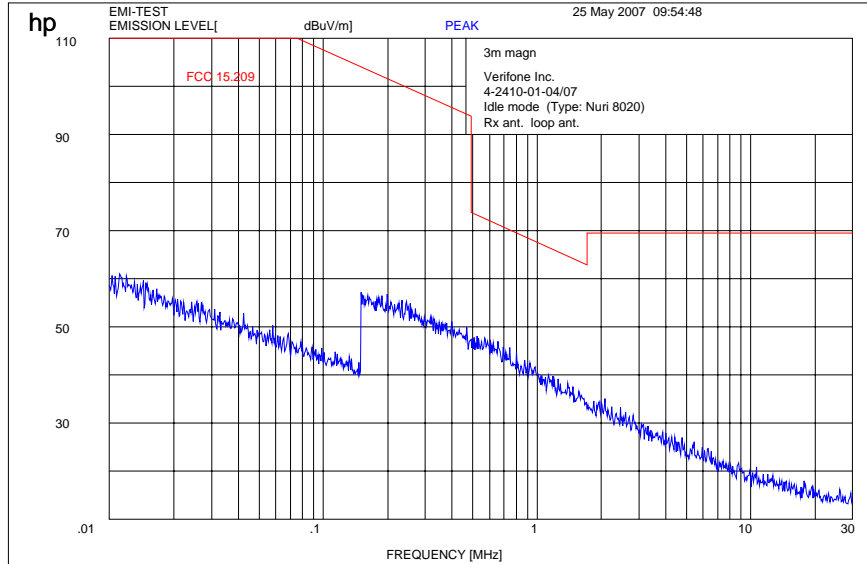
H = Horizontal; V= Vertical

Measurement distance see table

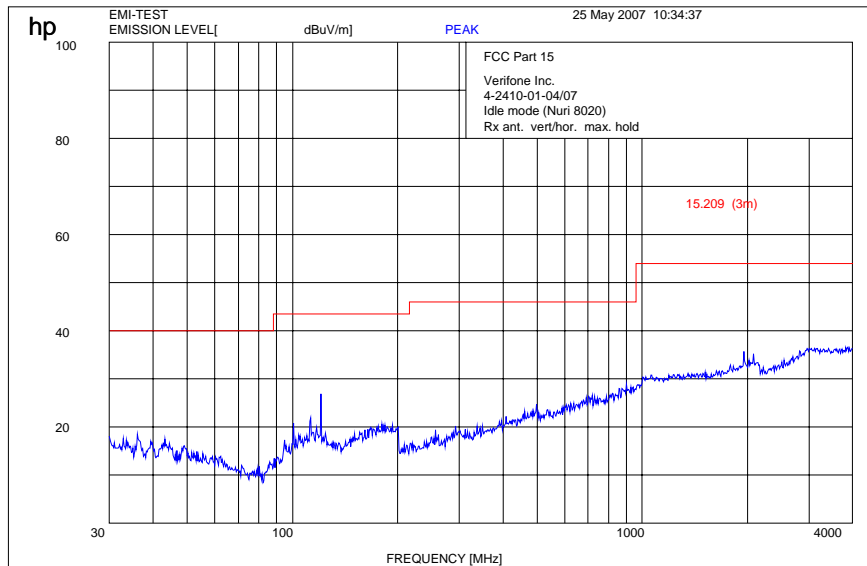
Limits: § 15.109

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

IDLE MODE (150 kHz- 30 MHz)



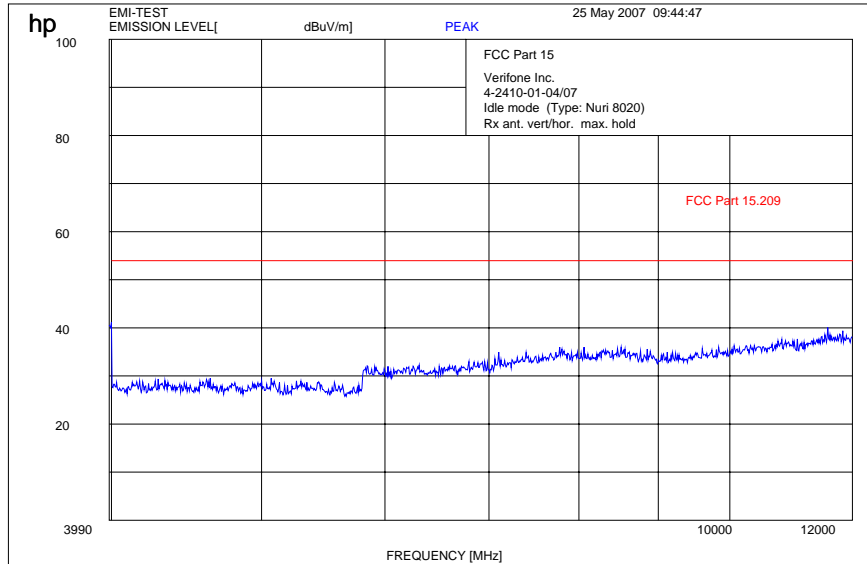
IDLE MODE (30 MHz - 4 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

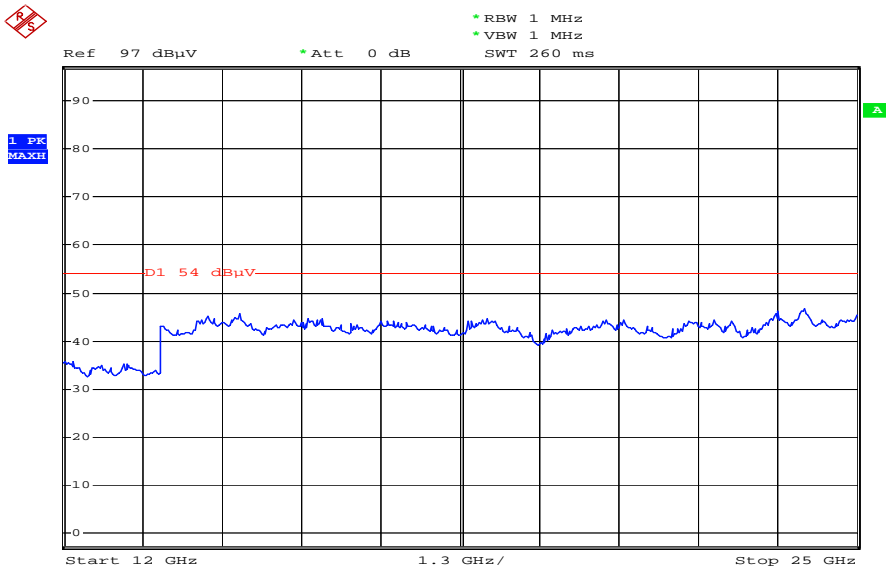
Idle Mode (4 GHz – 12.0 GHz)



$f < 1 \text{ GHz} : \text{RBW/VBW: } 100 \text{ kHz}$

$f \geq 1 \text{ GHz} : \text{RBW / VBW } 1 \text{ MHz}$

Idle Mode (12 GHz - 25 GHz)



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5.2.5 Conducted Spurious Emissions

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

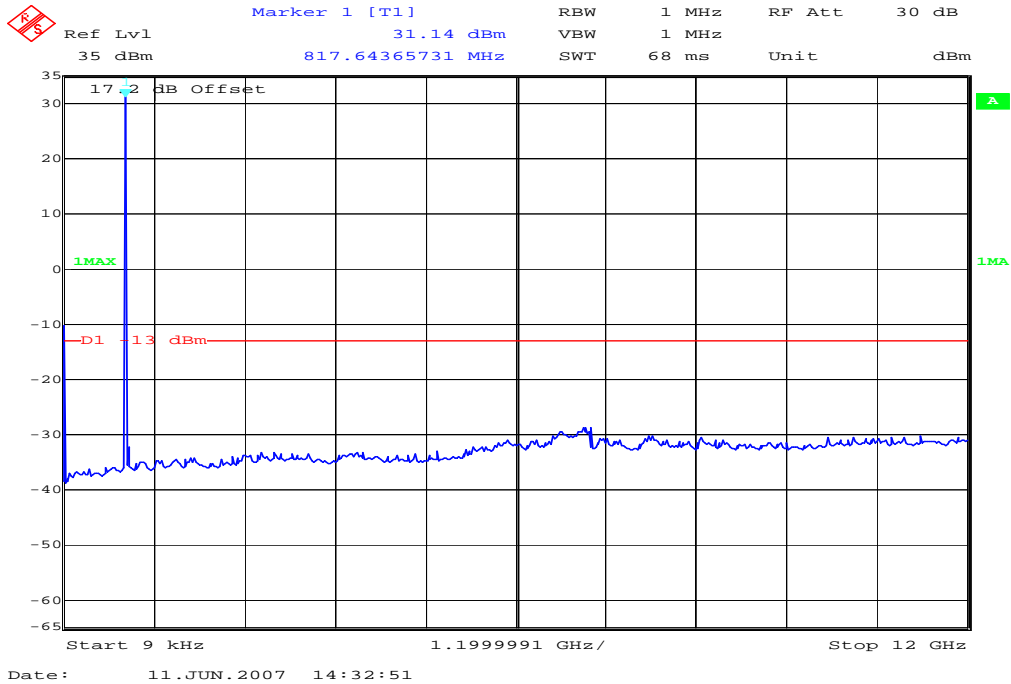
Measurement Limit

(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 $43+10\text{Log}(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

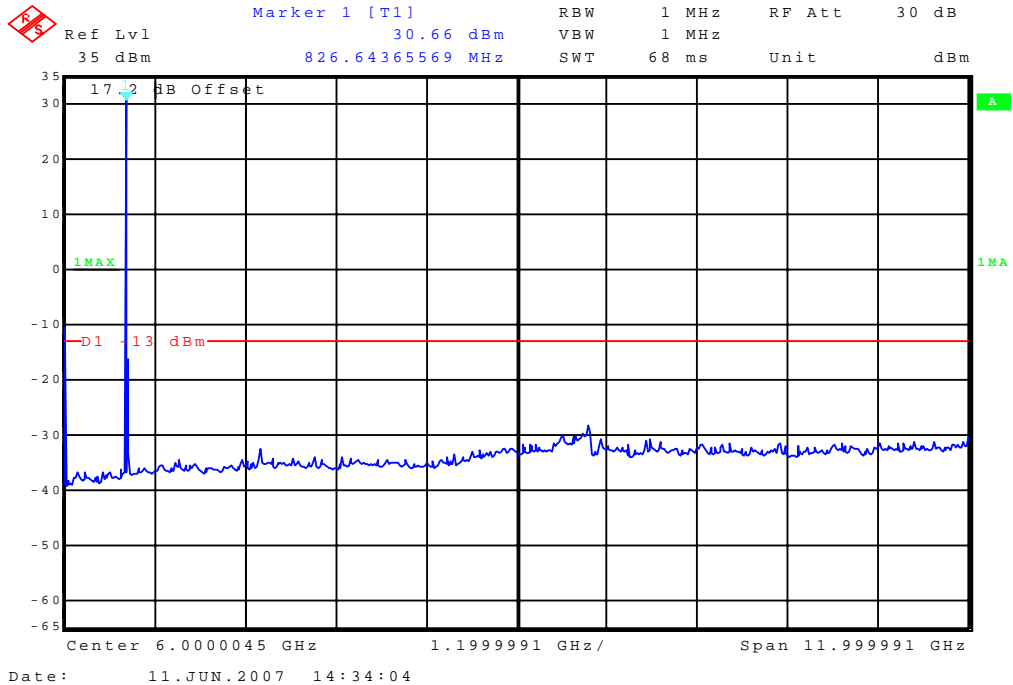
Measurement Results

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	<u>No peaks found < 20 dB below limit</u>	1672.8	<u>No peaks found < 20 dB below limit</u>	1697.6	<u>No peaks found < 20 dB below limit</u>
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	

Channel: 128



Channel 189



5.2.6 Block Edge Compliance

Reference

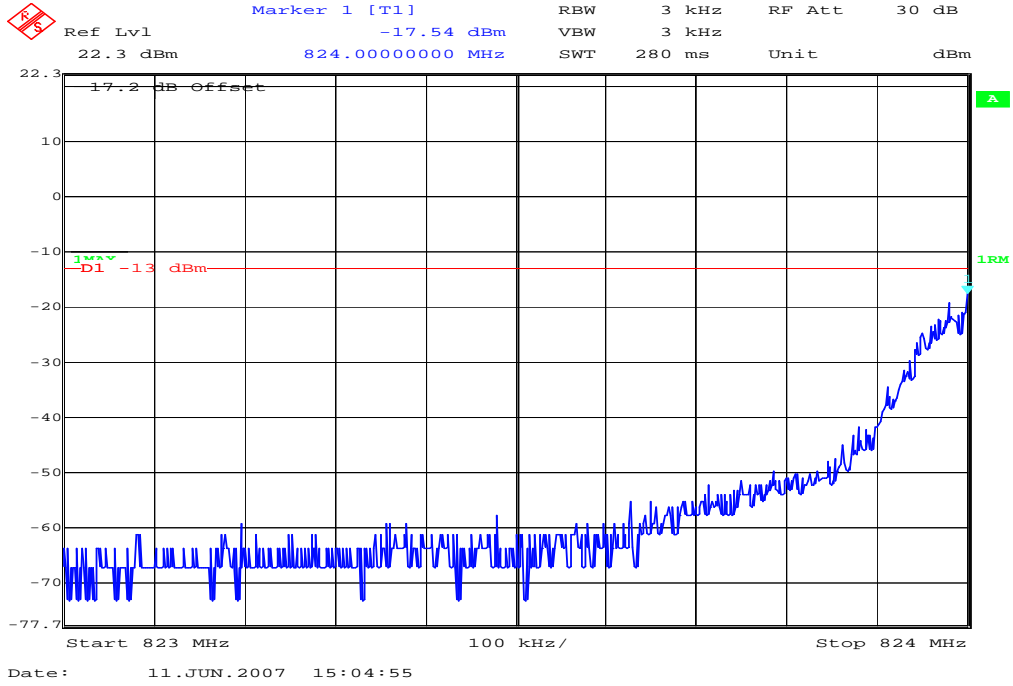
FCC:	CFR Part 22.917
IC:	RSS 132, Issue 2, Section 6.5

Measurement Limit:

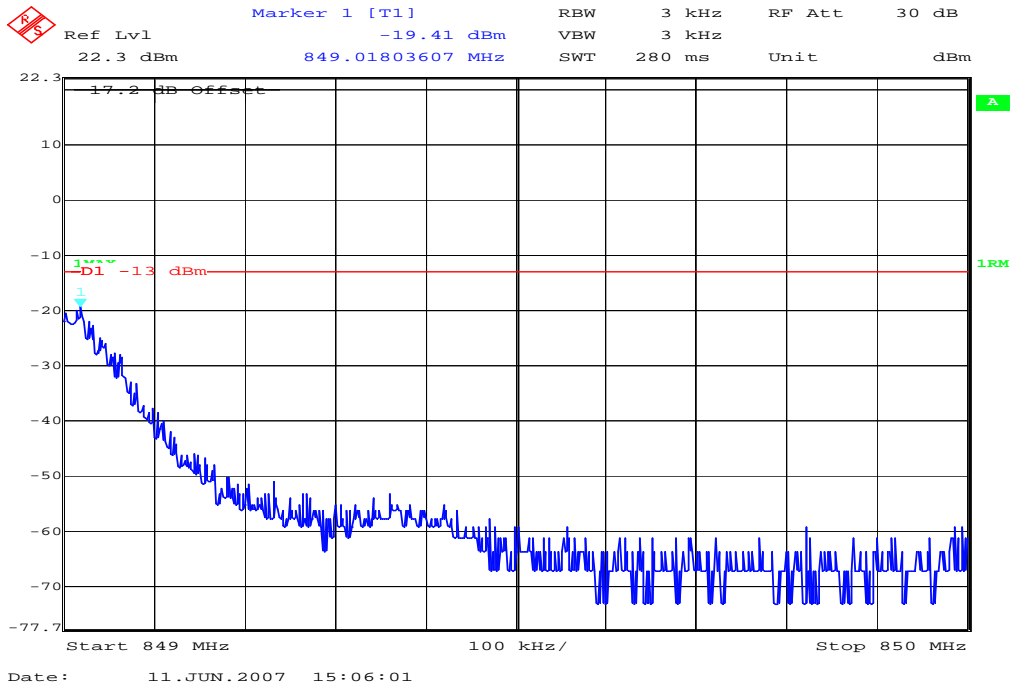
Sec. 22.917(b) Emission Limits.

(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 $43+10\text{Log}(P)$ dB. For all power levels +33 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

Block 1 Channel 128



Block 4 Channel 251



5.2.7 Occupied Bandwidth

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.

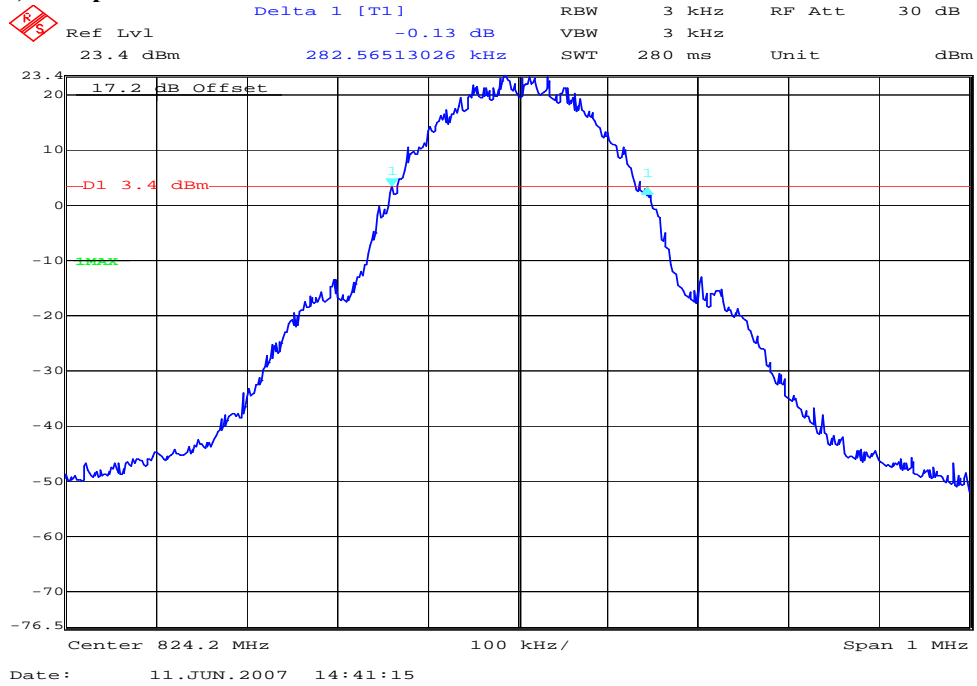
Normal mode

Frequency	99% Occupied Bandwidth (kHz)	-26 dBc Bandwidth (kHz)
824.2 MHz	282.565	314.629
836.4 MHz	274.549	312.625
848.8 MHz	274.549	312.625

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.

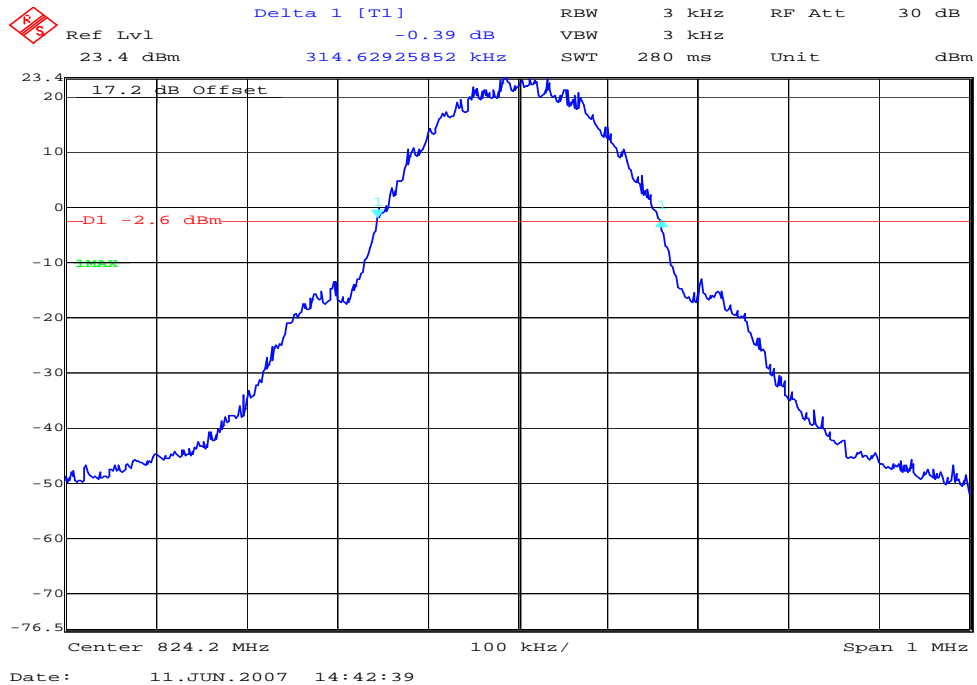
Channel 128

99% (-20 dB) Occupied Bandwidth



Channel 128

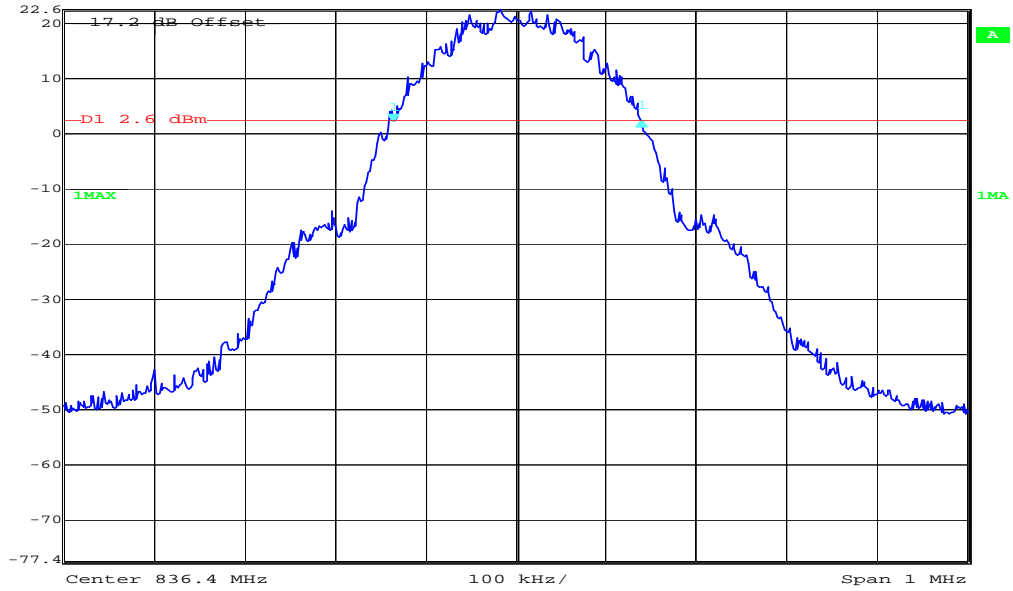
-26 dBc Bandwidth



Channel 189

99% (-20 dB) Occupied Bandwidth

	Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
	22.6 dBm	0.29 dB	VBW	3 kHz	Unit	dBm
		274.54909820 kHz	SWT	280 ms		

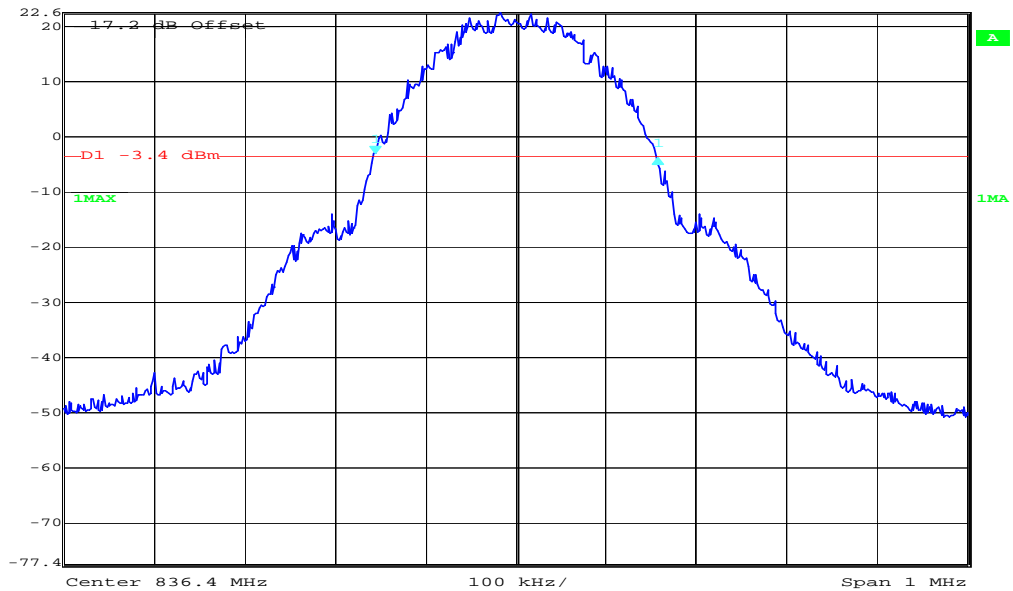


Date: 11.JUN.2007 14:45:13

Channel 189

-26 dBc Bandwidth

	Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
	22.6 dBm	-0.71 dB	VBW	3 kHz	Unit	dBm
		312.62525050 kHz	SWT	280 ms		

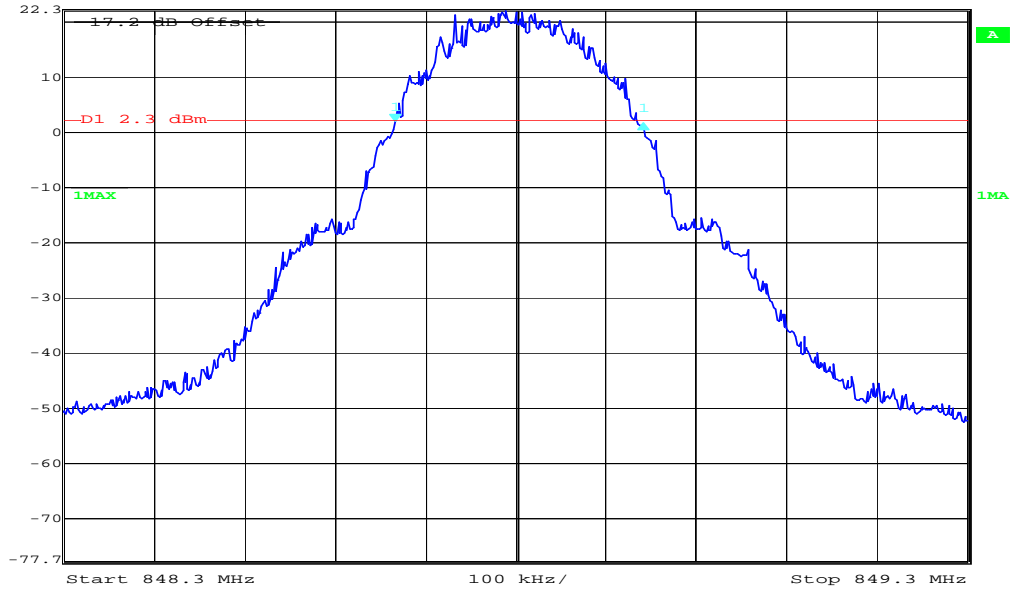


Date: 11.JUN.2007 14:45:42

Channel 251

99% (-20 dB) Occupied Bandwidth

	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
Ref Lvl	-0.29 dB	VBW	3 kHz	Unit	dBm
22.3 dBm	274.54909820 kHz	SWT	280 ms		

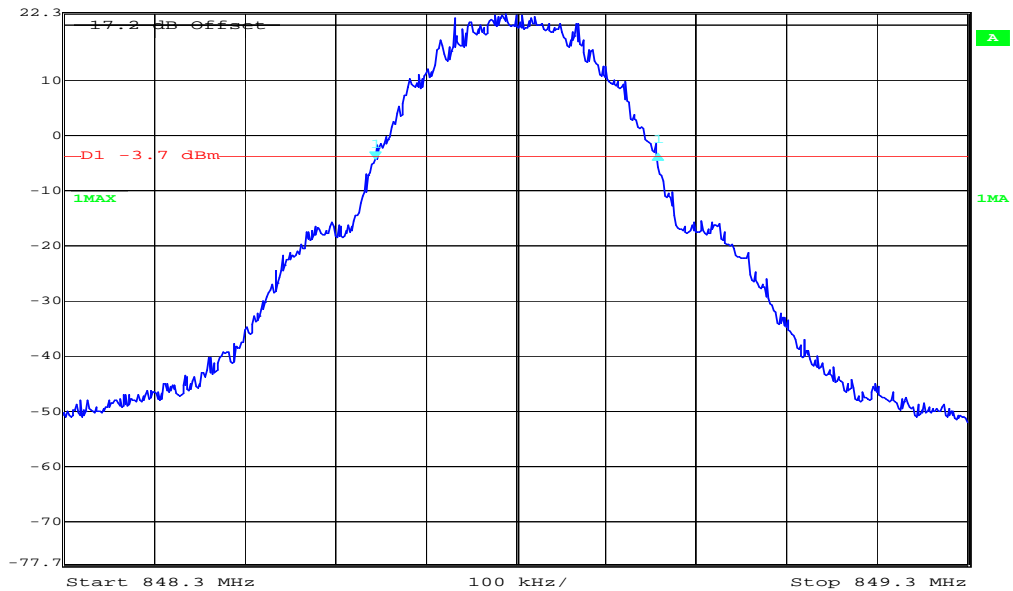


Date: 11.JUN.2007 14:48:15

Channel 251

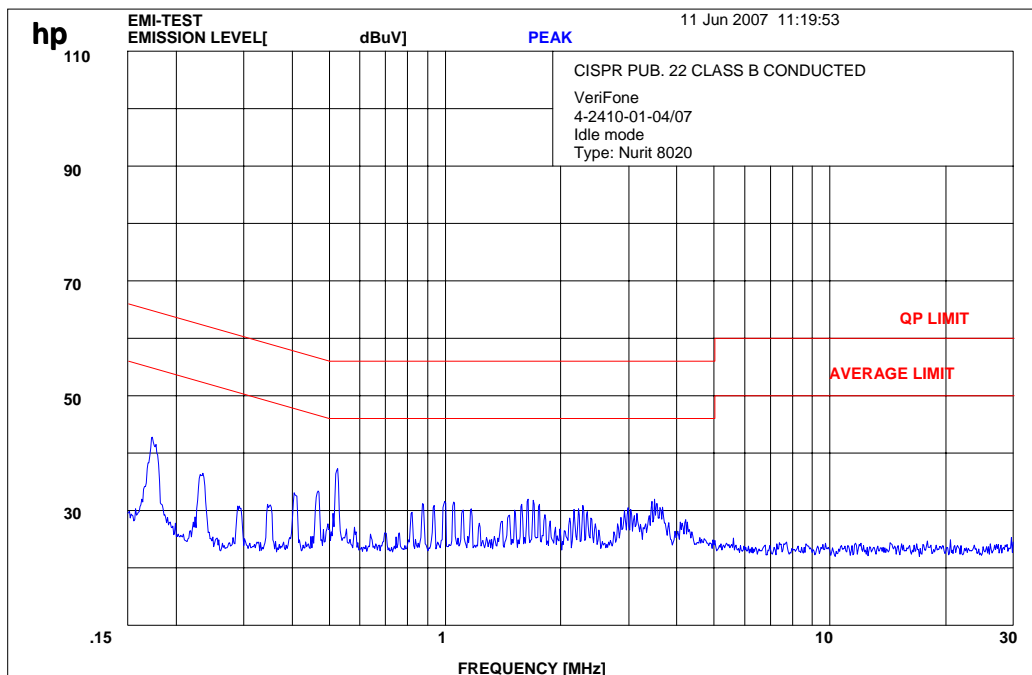
-26 dBc Bandwidth

	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
Ref Lvl	1.08 dB	VBW	3 kHz	Unit	dBm
22.3 dBm	312.62525050 kHz	SWT	280 ms		



Date: 11.JUN.2007 14:48:51

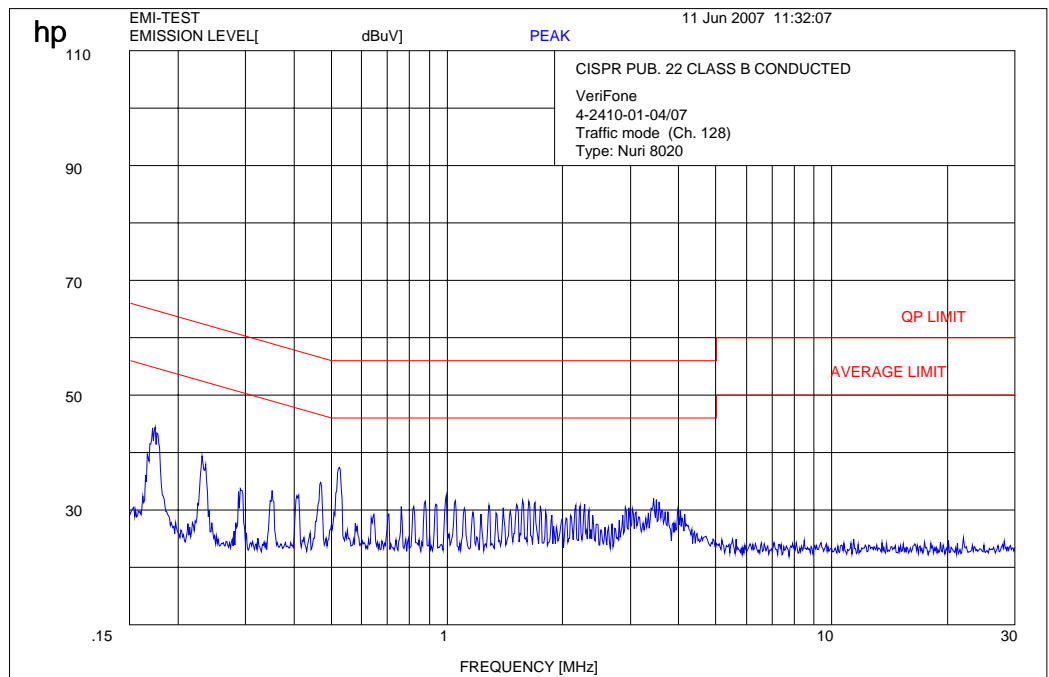
EUT: : AC/DC Adaptor VeriFone (ModelNo.: TRF1001)
 (with Nurit 8020)
 Power AC (measured) : 115 V / 60 Hz
 Manufacturer: : VeriFone
 Operating Condition : Idle mode
 Test Site: : Room 006 (Shielded chamber)
 Operator: : Gillmann



Upper Limit LINE CISPPR 22 QP
 Lower Limit LINE CISPPR 22 AV

Setting : 150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth,
 L1 and N – system (max. Hold)

EUT: : AC/DC Adaptor VeriFone (Model No.: TRF1001)
 (with Nurit 8020)
 Power AC (measured) : 115 V / 60 Hz
 Manufacturer: : VeriFone
 Operating Condition : Traffic mode (Part 22 / 24)
 Test Site: : Room 006 (Shielded chamber)
 Operator: : Gillmann



Upper Limit LINE CISPPR 22 QP
 Lower Limit LINE CISPPR 22 AV

Setting : 150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth,
 L1 and N – system (max. Hold)

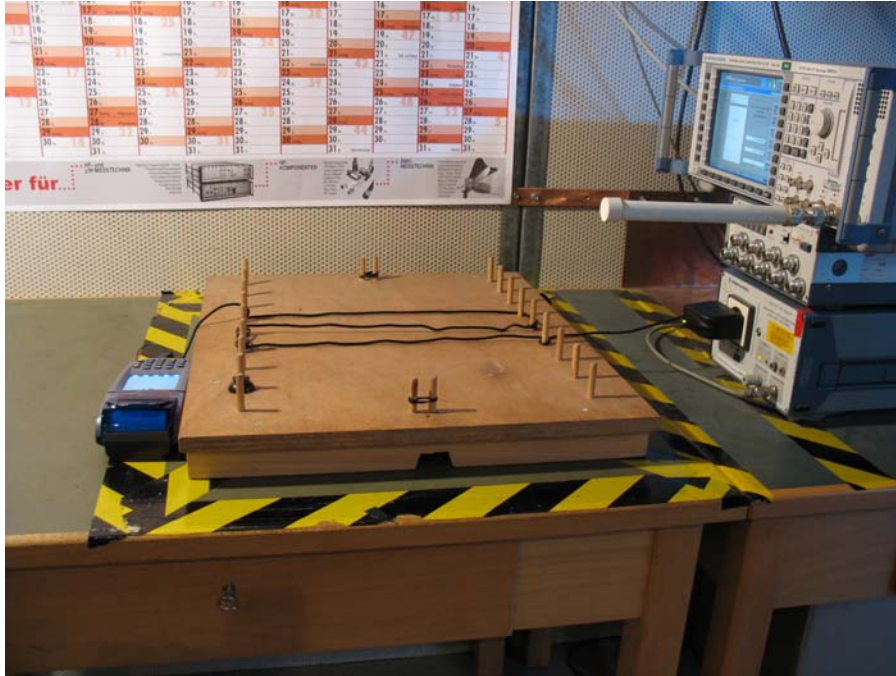
6 Test Equipment utilized

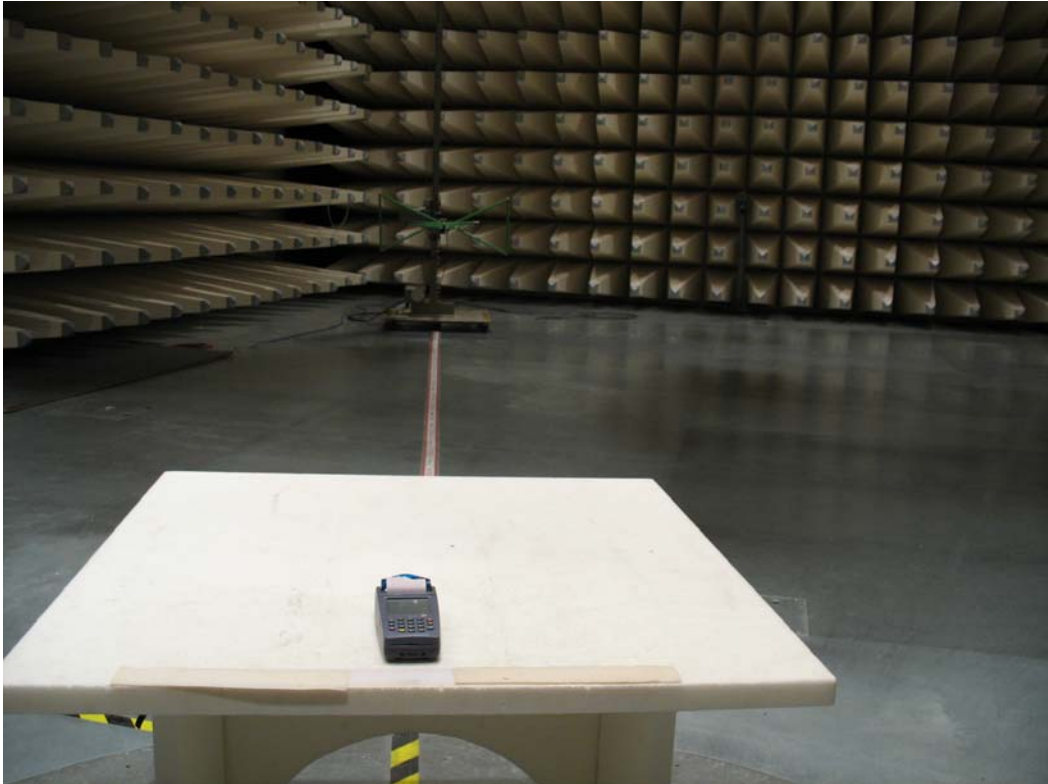
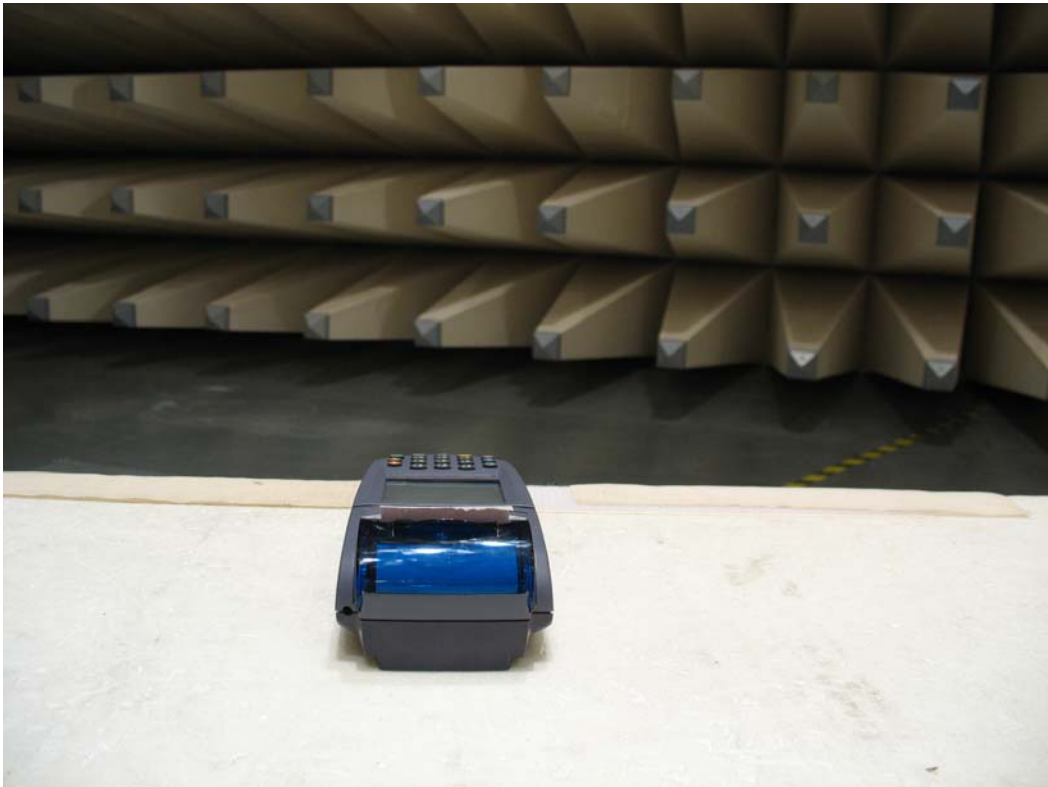
To simplify the identification of the test equipment used on each page of the test report, each item of test equipment and ancillaries such as probes are identified throughout the report by numbers in brackets according to the table below.

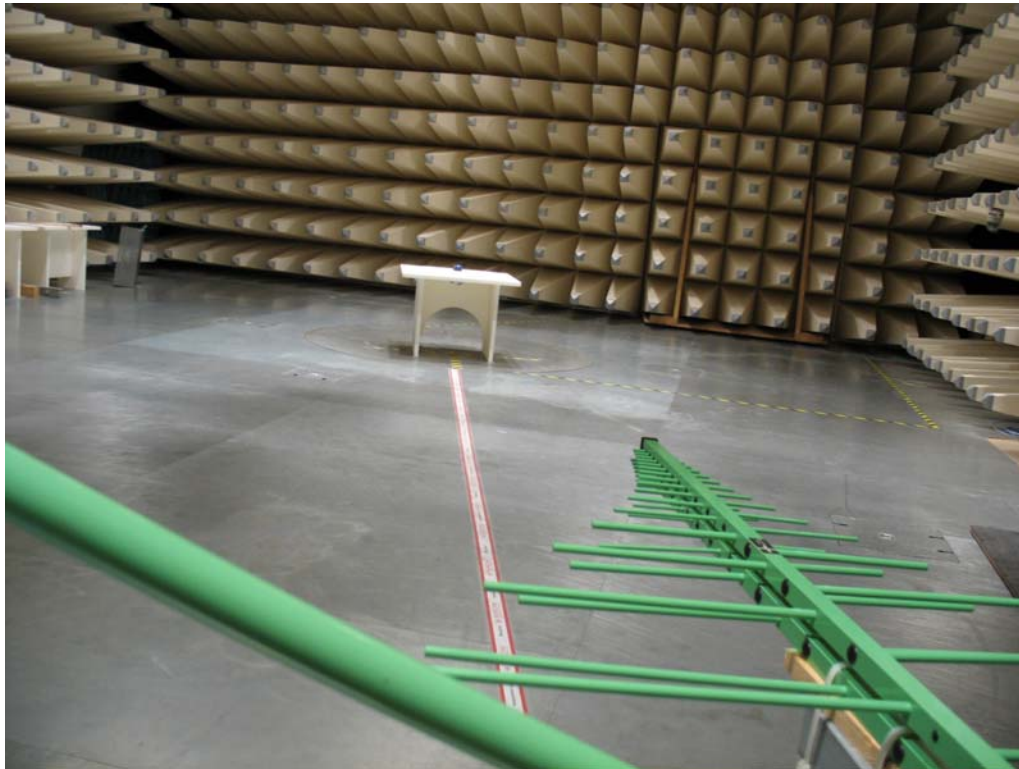
No.	Instrument/ Ancillary	Manufacturer	Type	Serial-No.	Internal ID No.
Radiated emission in chamber C					
1.	Fully anechoic chamber	MWB		87400/02	300000996
2.	Bi conical antenna	EMCO	3104C	9909-4868	300002590
3.	Log. Per. antenna	EMCO	3146	2130	300001603
4.	Double ridge horn	EMCO	3115P	3088	300001032
5.	Active loop antenna	EMCO	6502	2210	300001015
6.	Loop antenna	Rohde & Schwarz	HFH2-Z2	891847-35	300001169
7.	Spectrum analyzer	Hewlett-Packard	8566B	2747A05306	300001000
8.	Spectrum analyzer display	Hewlett-Packard	85662A	2816A16541	300002297
9.	Quasi peak adapter	Hewlett-Packard	85650A	2811A01131	300000999
10.	RF pre selector	Hewlett-Packard	85685A	2833A00768	400000081
11.	Workstation	Hewlett-Packard	Vectra VL		300001688
12.	Software	Hewlett-Packard	EMI Halle C		300000983
13.	Power attenuator	Byrd	8325	1530	300001595
14.	Band reject filter	Wainwright	WRCG1855/1910	7	300003350
15.	Band reject filter	Wainwright	WRCG2400/2483	11	300003351
16.	Power supply unit	Hewlett-Packard	6032A	2818A03450	300001040
17.	Universal communication tester	Rohde & Schwarz	CMU 200	103992	300003231
Laboratories Short Range Devices					
18.	Amplifier	Parzich GMBH	js42-00502650-28-5a	928979	300003143
19.	Analog-/Digital multi-meter		DF-971A	438309, 438320, 438361	400000082
20.	Audio Analyzer 2Hz - 300 kHz	Rohde & Schwarz	UPD	841074/009	300001236
21.	Bit error analyzer	Hewlett-Packard	37732A	3606U03073	300001446
22.	Communication tester	Rohde & Schwarz	CMD55	831050/082	300003018
23.	Communication test Set	Schlumberger	4040	1725117	300001387
24.	Directional coupler	Amplifier Research	DC 3010	12709	300001226
25.	Directional coupler	EMV	DC3010	12306	300001429
26.	Field strength meter (Near field probe)	EMCO	7405	9202-2150	300001203
27.	Frequency Counter	Hewlett-Packard	5386A	2704A01243	300000998
28.	Climatic chamber	Heraeus Voetsch	VT 4002	5,8566E+13	300003019
29.	Climatic chamber	Heraeus Voetsch	VT 4002	521/83761	300002326
30.	Power measuring head	Hewlett-Packard	8484A	2237A10156	300001140
31.	Power measuring head	Hewlett-Packard	8482A	2237A06016	300001139
32.	Power measuring head	Hewlett-Packard	8484A	2237A10494	300001666
33.	Power measuring head	Hewlett-Packard	8482A	1925A04674	300001667
34.	Power measuring head	Hewlett-Packard	8485A	2238A00849	300001668
35.	Power measuring head	Hewlett-Packard	8482A	2237A06009	300001267
36.	Power measuring head (attenuator)	Hewlett-Packard	8482B	2703A02586	300001492
37.	Local Oscillator	Hewlett-Packard	70900A	2842A02221	300002019
38.	Measurement Receiver	Rohde & Schwarz	ESH 2	871921/095	300002505
39.	Multi-meter (Hand)	Siemens	Multizet		300001102
40.	Multi-meter (Hand)	Goerz	6EP		300001116
41.	Multi-meter (Hand)	MetraWatt	MA4S		300001740
42.	Multi-meter digital	Rohde & Schwarz	UDS 5	872677/042	300001325
43.	Power supply	Hewlett-Packard	6038A	3122A11097	300001204
44.	Power supply	Hewlett-Packard	6038A	2848A07027	300001174
45.	Power supply	Zentro	2X30V	2007	300001109
46.	Power supply	Hewlett-Packard	6038A	2752A04866	300001161
47.	Power supply	Heiden	1108-32	1701	300001392
48.	Power supply	Heiden	1108-32	1802	300001383
49.	Power supply	Heiden	1108-32	3202	300001187

No.	Instrument/ Ancillary	Manufacturer	Type	Serial-No.	Internal ID No.
Conducted emission on AC line Room 006					
110.	Measurement receiver	Rohde & Schwarz	ESH3	881515/002	300002490
111.	Measurement receiver	Rohde & Schwarz	ESVP	881487/021	300002491
112.	Measurement receiver	Rohde & Schwarz	ESH3	890174/002	300000296
113.	V-network AC	Rohde & Schwarz	ESH3 Z5	892475/017	300002209
114.	V-network AC	Rohde & Schwarz	ESH3-Z5	892239/020	300002506
115.	Software	Rohde & Schwarz	ESK-1		
116.	DC power supply	Hewlett-Packard	6032A	2743A02600	300001498
117.	V-network AC	Rohde & Schwarz	ESH3-Z5	861189/014	300001458
118.	V-network DC	Rohde & Schwarz	ESH3-Z6	893689/012	300001504
119.	V-network DC	Rohde & Schwarz	ESH3-Z6	861406/005	300001518
120.					
121.					
122.					
123.					
124.					
125.					
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148.					

7 Photographs of the Test Set-up







8 Photographs of the EUT

Photo No.: 1



Photo No.: 2



Photo No.: 3



Photo No.: 4



Photo No.: 5

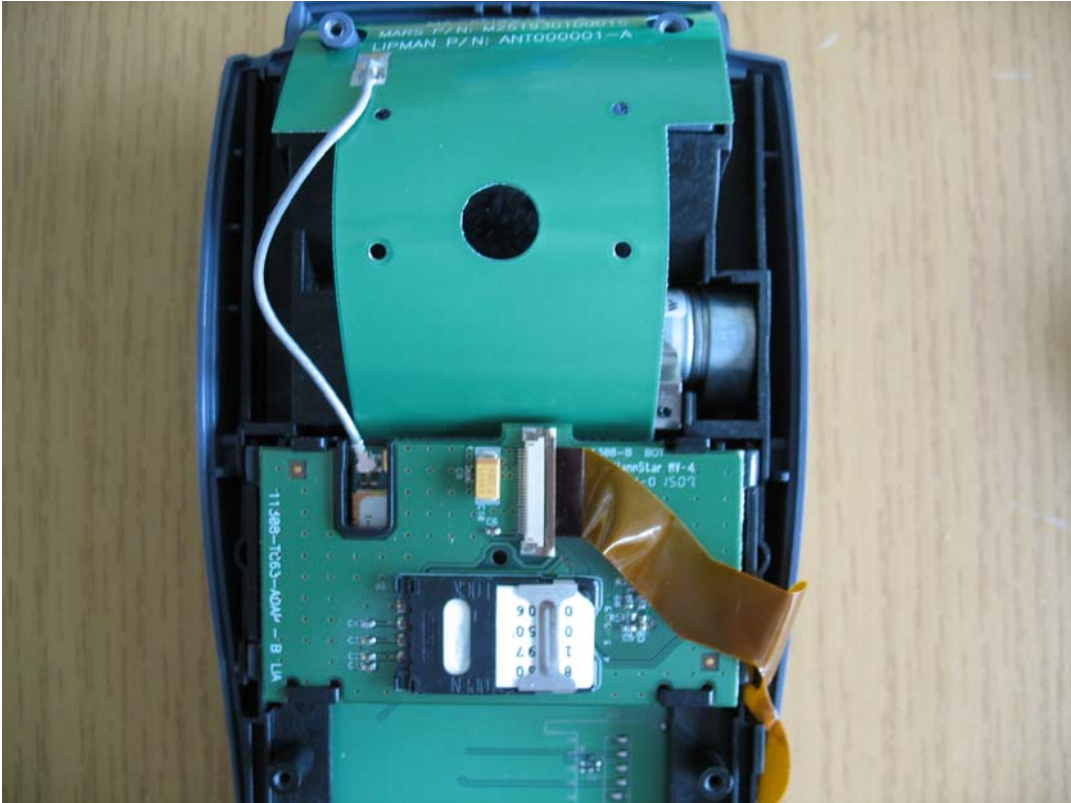


Photo No.: 6



Photo No.: 8

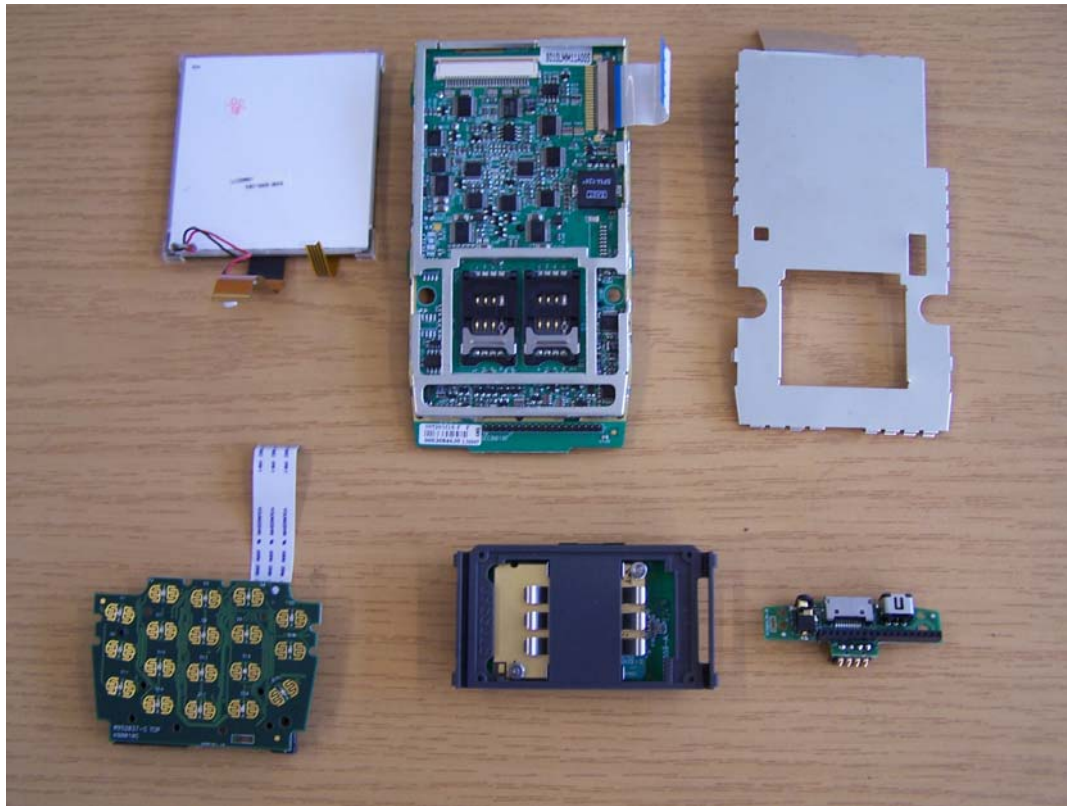


Photo No.: 10

