CETECOM ICT Services GmbH

Radio Satellite Communication
Untertürkheimer Straße 6-10 . D-66117 Saarbrücken
Telefon: +49 (0)681 598-0 Telefax: - 9075

Recognized by the
Federal Communications Commission
Anechoic Chamber Registration No.: 90462 (FCC)
Anechoic Chamber Registration No.: 3463 (IC)
TCB ID: DE 0001

Accredited by the
German Accreditation Council
DAR–Registration Number
TTI–P–G 081/94-D0

Independent ETSI
compliance test house

Test Report No.: 4-1220-31-05/04
Applicant: Sagem S.A.
Type: H2004a
Test Standards: FCC Part 22, 24
RSS132, 133
FCC ID: M9H95H04A

Table of Contents

1 GENERAL INFORMATION

1.1 Notes

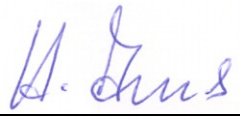
The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented 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.

1.2 Testing Laboratory

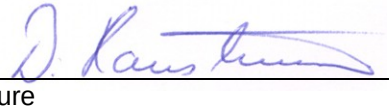
CETECOM ICT Services GmbH
Untertürkheimer Straße 6 - 10
66117 Saarbrücken
Germany
Telephone: + 49 681 598 - 9100
Telefax: + 49 681 598 - 9075
E-mail: info@ict.cetecom.de
Internet: www.cetecom-ict.de

Accredited testing laboratory
The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025.
DAR registration number: TTI-P-G-081/94-D0
Listed by: Federal Communications Commission (FCC)
Identification/Registration No : 90462

Laboratory Manager :

2004-08-05	RSC 8414	Ames	
Date	Section	Name	Signature

Technical responsibility for area of testing:

2004-08-05	RSC 8412	Hausknecht D.	
Date	Section	Name	Signature

1.3 Details of Applicant

Name: Sagem SA
Address: 2-4, rue du Petit Albi
City: 95800 Cergy Saint – Christophe
Country: France
Phone: + 33 1 30 73 70 70
Fax: + 33 1 30 73 16 60
Contact: Jean Marquet
Phone: + 33 1 30 73 37 37
Fax: + 33 1 34 25 74 11
e-mail: jean.marquet@sagem.com

1.4 Application Details

Date of test: 2004-08-03 to 2004-08-07

1.5 Test Item

Type of equipment:	GSM / PCS Mobile Phone GSM850/1800/1900
Type name:	H2004a
Manufacturer:	Sagem SA
Address:	2-4, rue du Petit Albi
City:	95800 Cergy Saint – Christophe
Country:	France
Frequency:	1850.2 – 1909.8 MHz and 824.2 – 848.8 MHz
Type of modulation:	300KGXW
Number of channels:	300 (PCS1900) and 125 (PCS850)
Antenna:	Integral antenna
Power supply (normal):	3,8 V DC Li-Polymer Battery
Output power GSM 850:	cond.: 32.6 dBm peak, ERP: 30.1 dBm (Burst); EIRP: 32.6 dBm (Burst)
Output power GSM 1900:	cond : 29.5 dBmPeak, ERP: 25.0 dBm (Burst); EIRP: 27.5 dBm (Burst)
Transmitter Spurious (worst case)	30.9 µW / -15.1 dBm
Receiver Spurious (worst case)	No peaks found
FCC ID:	M9H95H04a
Certification No. IC:	
Open Area Test Site IC No.:	3436
IC Standards	RSS132, Issue 1, RSS133, Issue 2, Rev. 1

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 :

2004-08-05	RSC 8414	Ames	
Date	Section	Name	Signature

Test Setup

Hardware: V64xx
Software: K 3, Px

Mobile; IMEI: 35409500000246-1 (cond. measurements)
Mobile; IMEI: 35409500000247-9 (rad. measurements)

SAGEM AC/DC Adapter;
Model No.: PS 53/1789 188516338
The radiated measurements were performed with an AC/DC charging unit.

1.6 Test Standards

FCC:	**CFR Part 22 H**
	CFR Part 24 E
IC:	**RSS 132, Issue 1**
	RSS 133, Issue 2, Rev. 1

2 STATEMENT OF COMPLIANCE

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

2.1 Summary of Measurement Results

2.1.1 PCS1900

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

2.1.2 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

3 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. 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).

3.1 PART PCS 1900

3.1.1 RF Power Output

Reference

FCC:	CFR Part 24.232, 2.1046
IC:	RSS 133, Issue 2, Rev. 1, Section 6.2

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)
This 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)

Frequency (MHz)	Power Step	Peak Output Power (dBm)	Average Output Power (dBm)
1850.2	0	29.5	29.4
1880.0	0	29.1	29.0
1908.8	0	28.7	28.6
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 was 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 (dBuV/m) = Reading (dBuV) + 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 wasrecorded.
(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 (dBuV/m) = Reading (dBuV) + 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 antenna (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 it's 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 thetransmitter 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 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 EIRP (dBm)
0	<33

Test Results: Output Power (radiated)

Frequency (MHz)	Power Step	BURST PEAK EIRP (dBm)
1850.2	0	26.7
1880.0	0	26.8
1909.8	0	27.5
Measurement uncertainty	±3 dB	

Sample Calculation:

Freg	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	ERIP Result			
MHz	dBµV	dBm	dBi	dBd	dB	dBm			
1809.8	125.6	22.3	8.4	0.0	3.3	27.5			

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

3.1.2 Frequency Stability

Reference

FCC:	CFR Part 24.235, 2.1055
IC:	RSS 133, Issue 2, Rev. 1, Section 7

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 (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 3.8 Volts. Vary supply voltage from minimum 3.3 Volts to maximum 4.4 Volts, in 12 steps re-measuring carrier frequency at each voltage. Pause at 3.7 V dc
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:

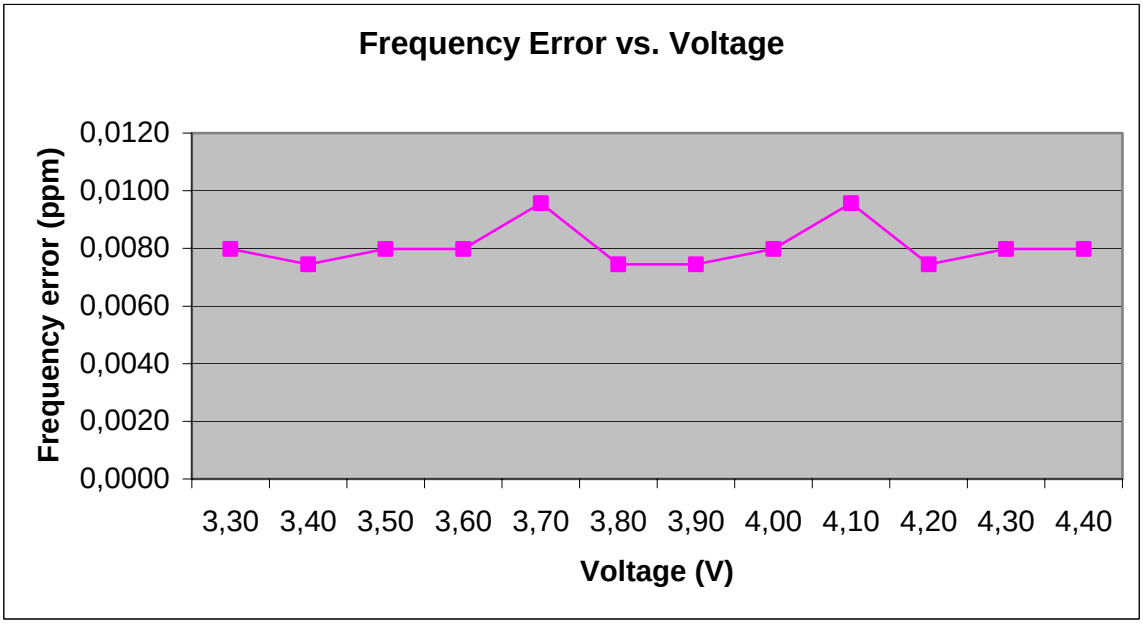
According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission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

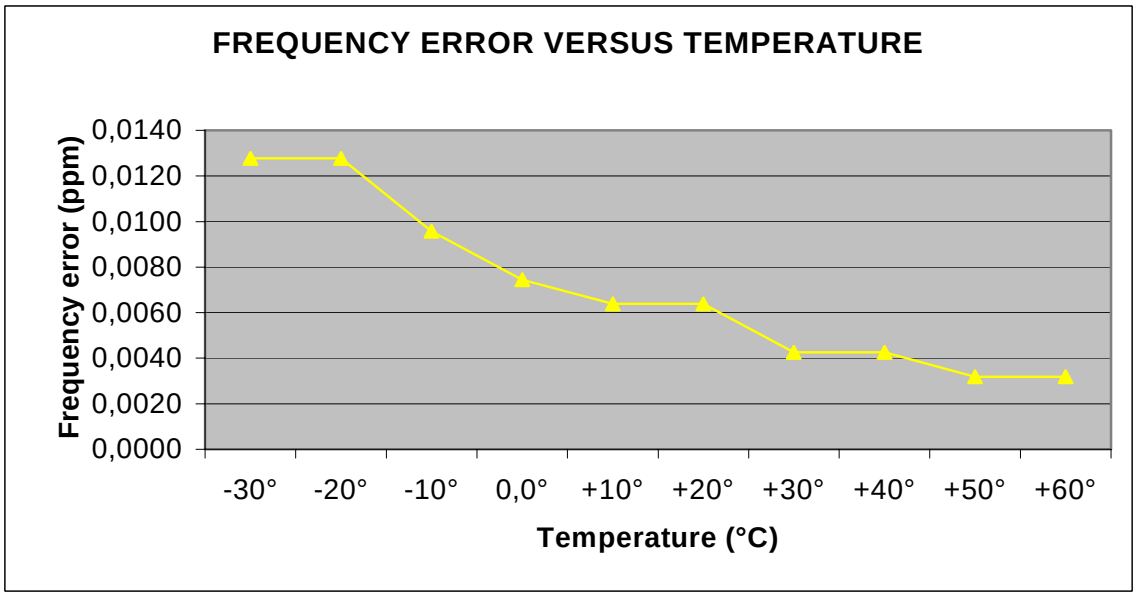
Test Results: AFC FREQ ERROR vs. VOLTAGE

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.3	15	0,00000080	0,0080
3.4	14	0,00000074	0,0074
3.5	15	0,00000080	0,0080
3.6	15	0,00000080	0,0080
3.7	18	0,00000096	0,0096
3.8	14	0,00000074	0,0074
3.9	14	0,00000074	0,0074
4.0	15	0,00000080	0,0080
4.1	18	0,00000096	0,0096
4.2	14	0,00000074	0,0074
4.3	15	0,00000080	0,0080
4.4	15	0,00000080	0,0080

Test Results: AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	24	0,00000128	0,0128
-20	24	0,00000128	0,0128
-10	18	0,00000096	0,0096
±0.0	14	0,00000074	0,0074
+10	12	0,00000064	0,0064
+20	12	0,00000064	0,0064
+30	8	0,00000043	0,0043
+40	8	0,00000043	0,0043
+50	6	0,00000032	0,0032
+60	6	0,00000032	0,0032


Frequency Error vs. Voltage
Frequency error (ppm)
0,0120
0,0100
0,0080
0,0060
0,0040
0,0020
0,0000
3,30 3,40 3,50 3,60 3,70 3,80 3,90 4,00 4,10 4,20 4,30 4,40
Voltage (V)


FREQUENCY ERROR VERSUS TEMPERATURE
Frequency error (ppm)
0,0140
0,0120
0,0100
0,0080
0,0060
0,0040
0,0020
0,0000
-30° -20° -10° 0,0° +10° +20° +30° +40° +50° +60°
Temperature (°C)

3.1.3 Radiated Emissions

Reference

FCC:	CFR Part 24.238, 2.1053
IC:	RSS 133, Issue 2, Rev. 1, Section 6.3

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 ad
justable 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 I 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+10Log(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, 1879.8 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.

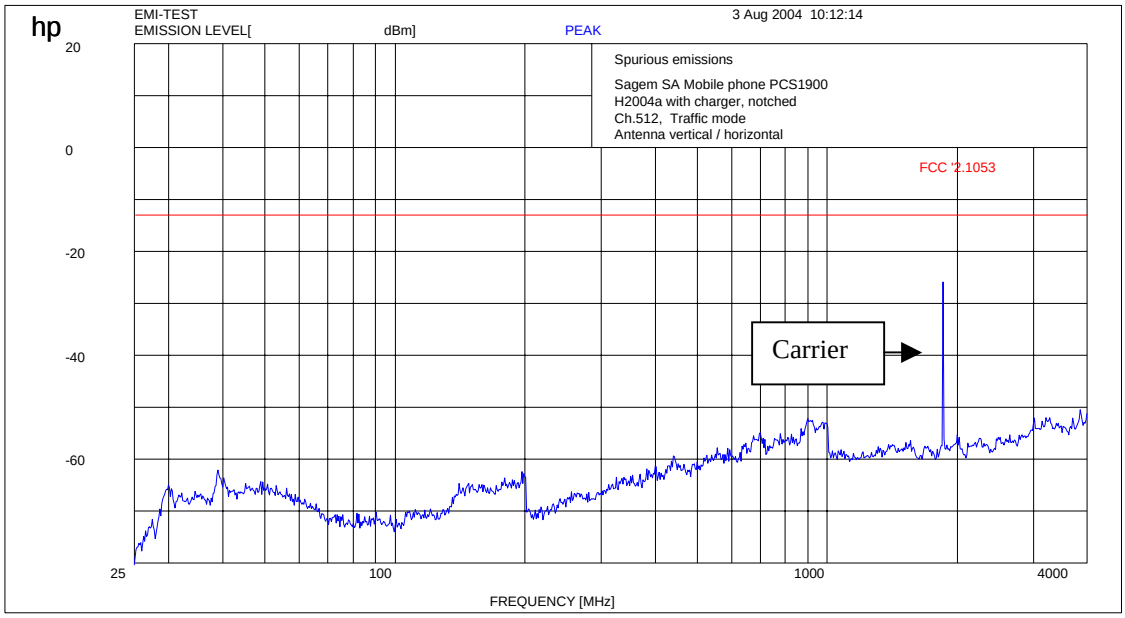
Harmonic	Tx ch.-512 Freq. (MHz)	Level (dBm)	Tx ch.-661 Freq. (MHz)	Level (dBm)	Tx ch.-810 Freq. (MHz)	Level (dBm)
2	3700.4	**no**	3760	**peaks**	3819.6	**found**
3	5550.6		5640		5729.4	
4	7400.8		7520		7639.2	
5	9251.0		9400		9549.0	
6	11101.2		11280		11458.8	
7	12951.4		13160		13368.6	
8	14801.6		15040		15278.4	
9	16651.8		16920		17188.2	
10	18502.0		18800		19098.0	

Sample calculation:

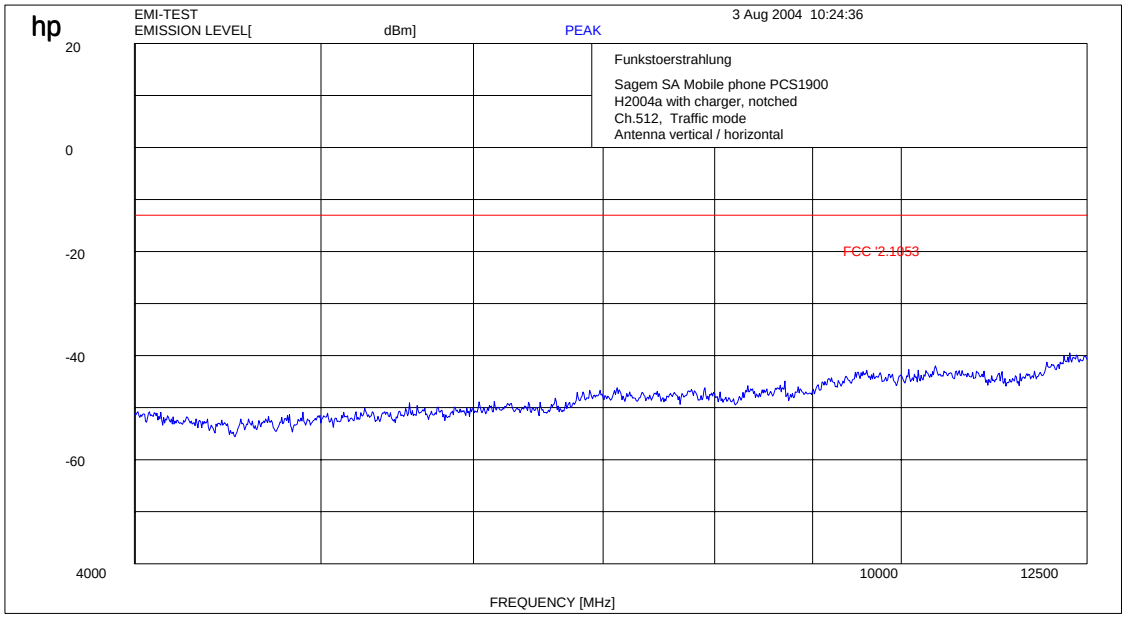
Freg	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	EIRP Result			
MHz	dBµV	dBm	dBi	dBd	dB	dBm			
1880.0	122.5	26.7	8.4	0.0	3.33	29.2			

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

Channel 512 (up to 4 GHz)



4-12 GHz

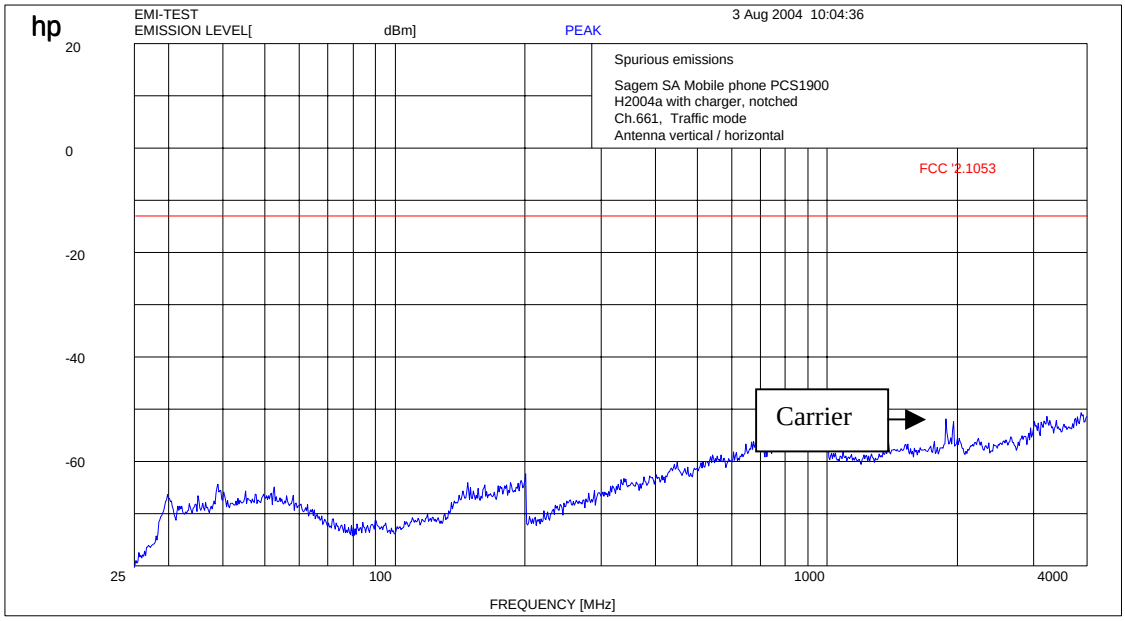


The measurements were performed up to 20 GHz with a special low-noise preamp and a wideband horn antenna. There were no spurs found.

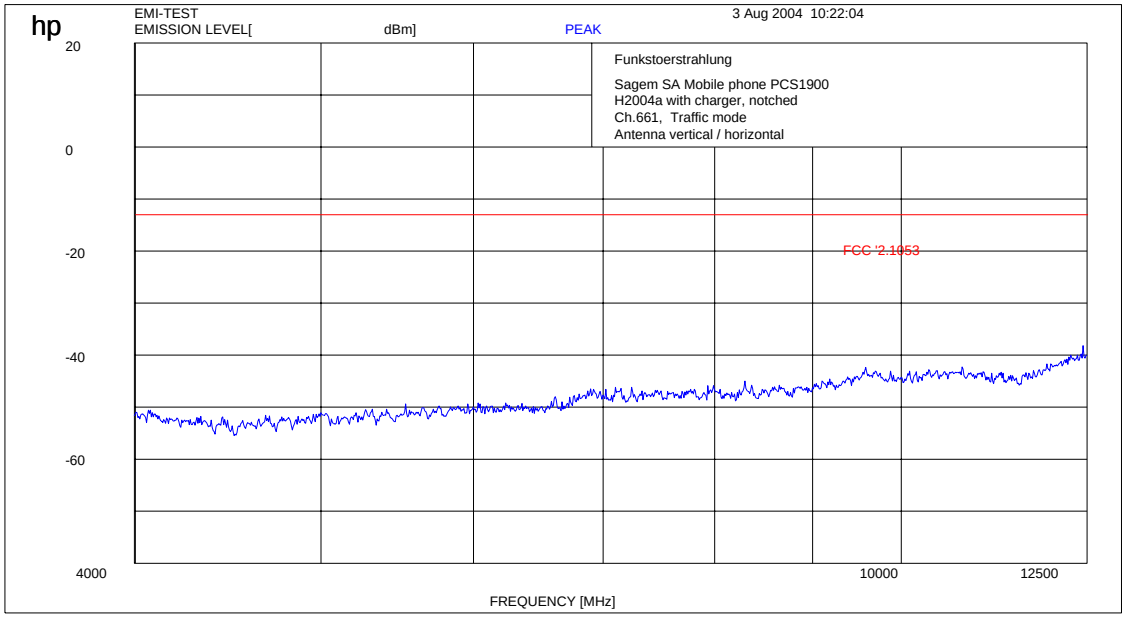
f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW / VBW 1 MHz

Carrier suppressed with a rejection filter

Channel 661 (up to 4 GHz)



4 – 12 GHz

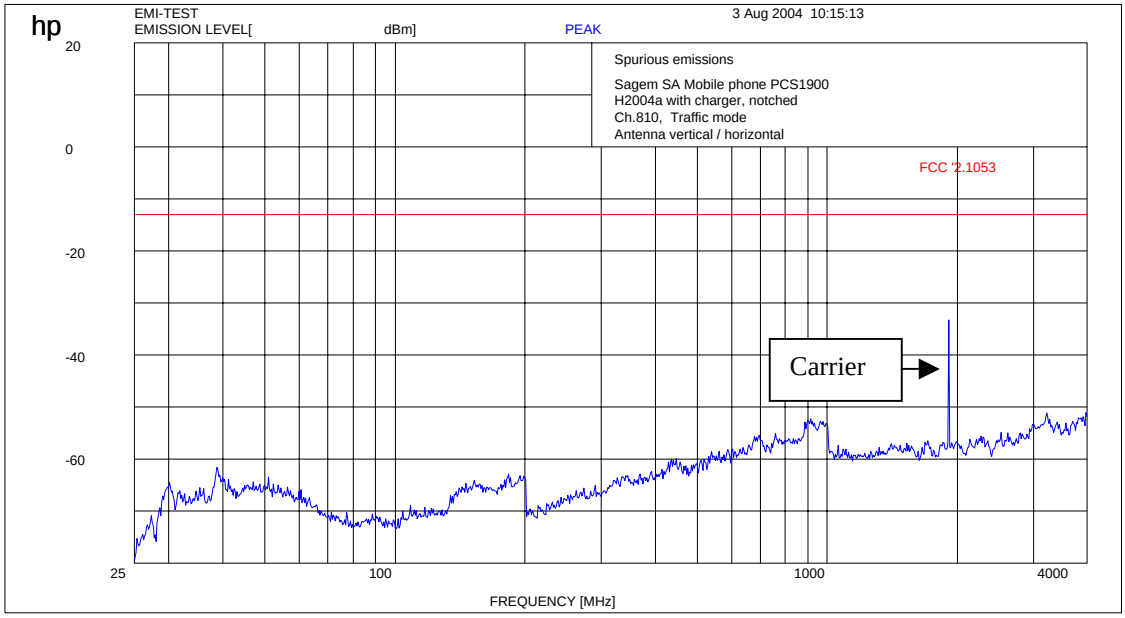


The measurements were performed up to 20 GHz with a special low-noise preamp and a wideband horn antenna. There were no spurs found.

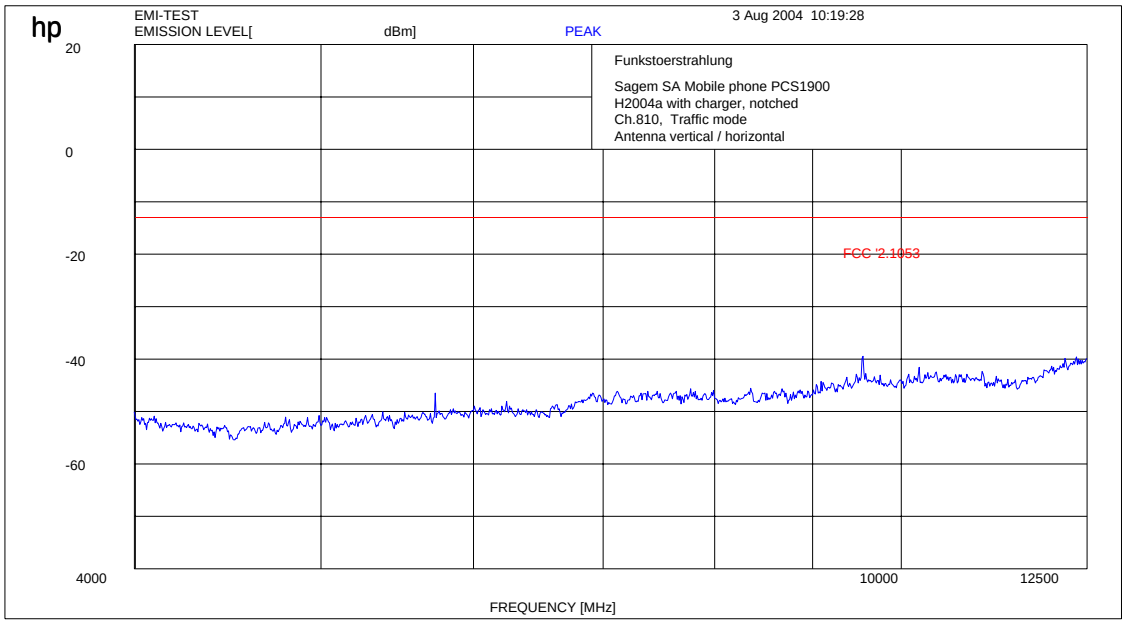
f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW / VBW 1 MHz

Carrier suppressed with a rejection filter.

Channel 810 (up to 4 GHz)



4 – 12 GHz



The measurements were performed up to 20 GHz with a special low-noise preamp and a wideband horn antenna. There were no spurs found.

f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW / VBW 1 MHz

Carrier suppressed with a rejection filter

3.1.4 Receiver Radiated Emissions

Reference

FCC:	CFR Part 15.109, 2.1053
IC:	RSS 133, Issue 2, Rev. 1, Section 6.3

Measurement Results

SPURIOUS EMISSIONS LEVEL (µV/m)								
Idle mode								
f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)
no	peaks	found						
Measurement uncertainty			±3 dB					

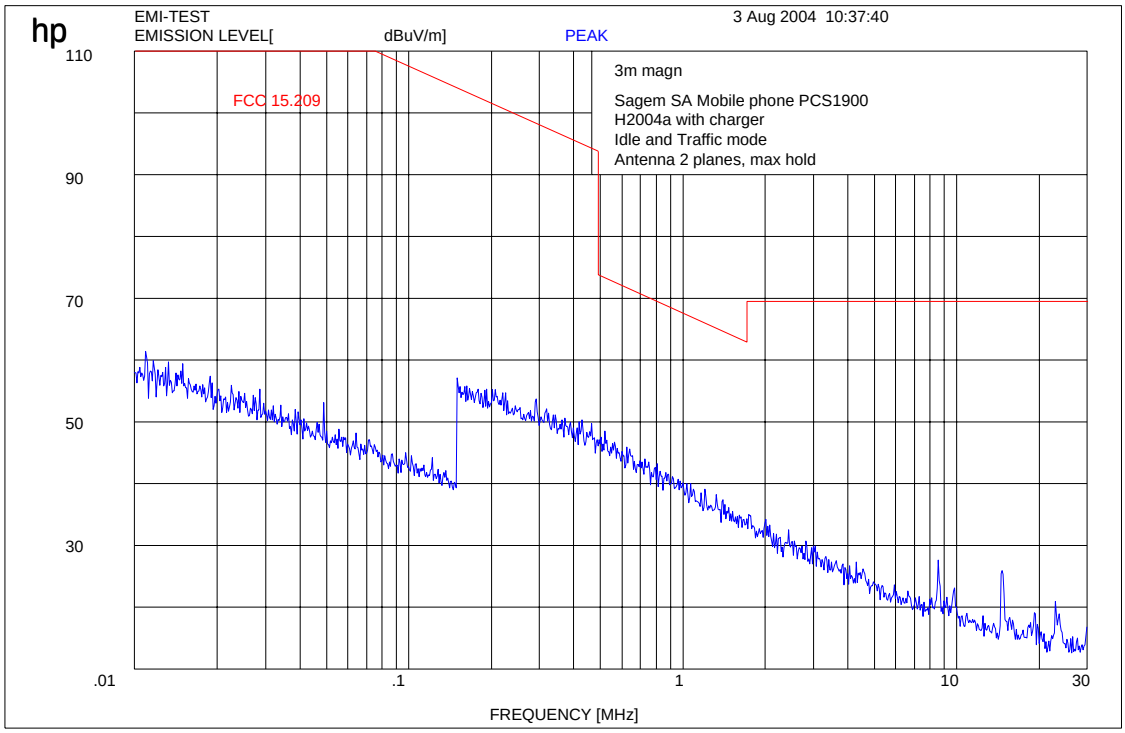
f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW: 1 MHz
H = Horizontal ; V= Vertical

For measurement distance see table below

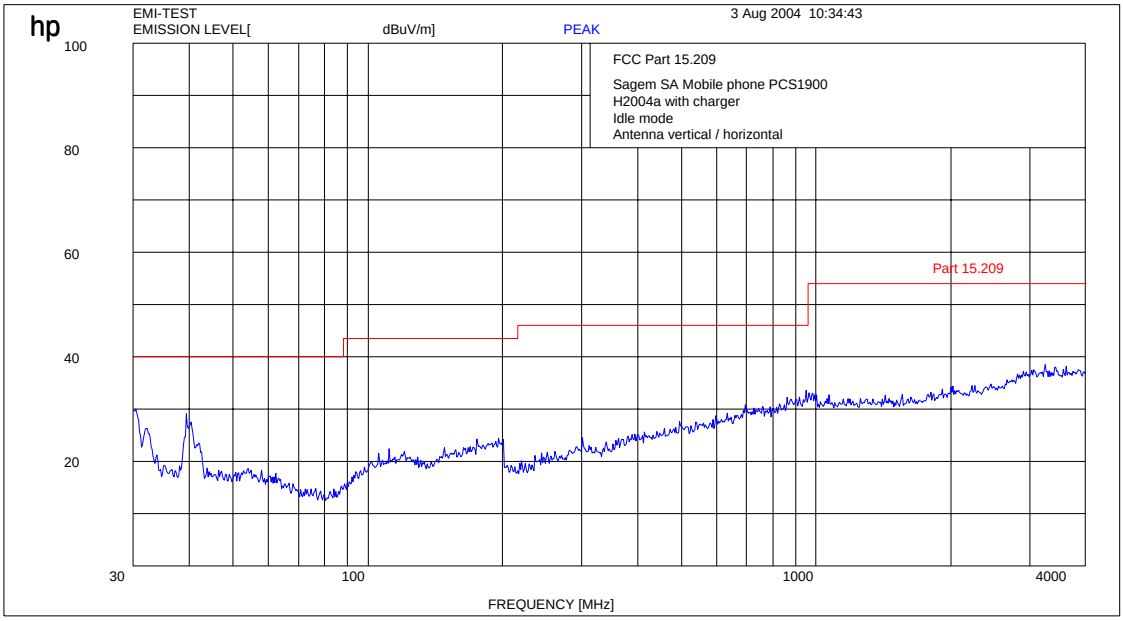
Limits: § 15.109

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

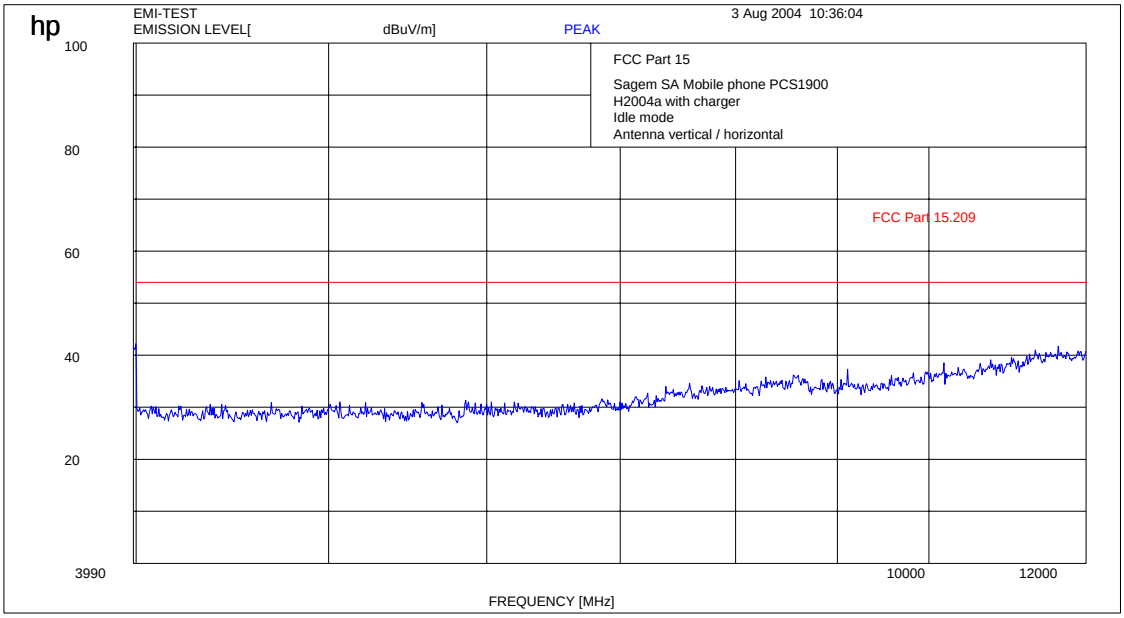
Idle mode up to 30 MHz



Idle-Mode (up to 4 GHz)



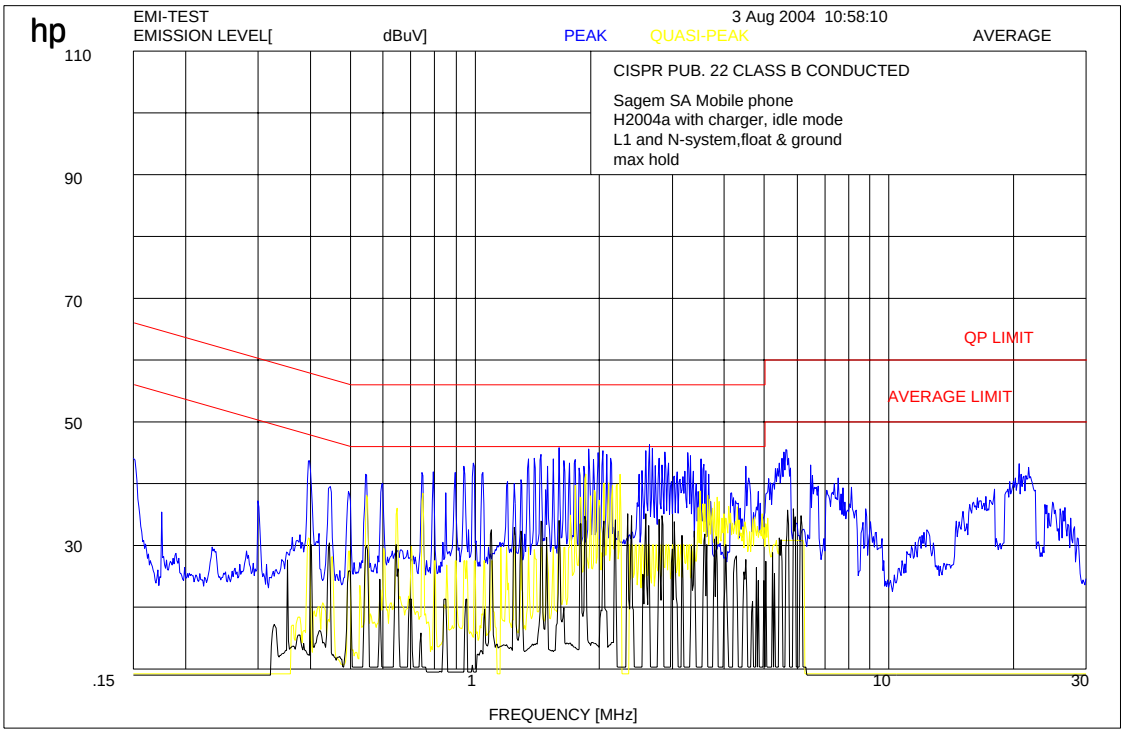
4 to 12 Ghz



f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW 1 MHz

The measurements were performed up to 20 GHz with a special low-noise preamp and a wideband horn antenna. There were no spurs found.

Conducted emissions with charger according to CISPR 22 for accessories.



The black line shows the Average values, the yellow line the QP-values.

3.1.5 Conducted Spurious Emissions

Reference

FCC:	CFR Part 24.238, 2.10.51
IC:	RSS 133, Issue 2, Rev. 1, Section 6.3

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

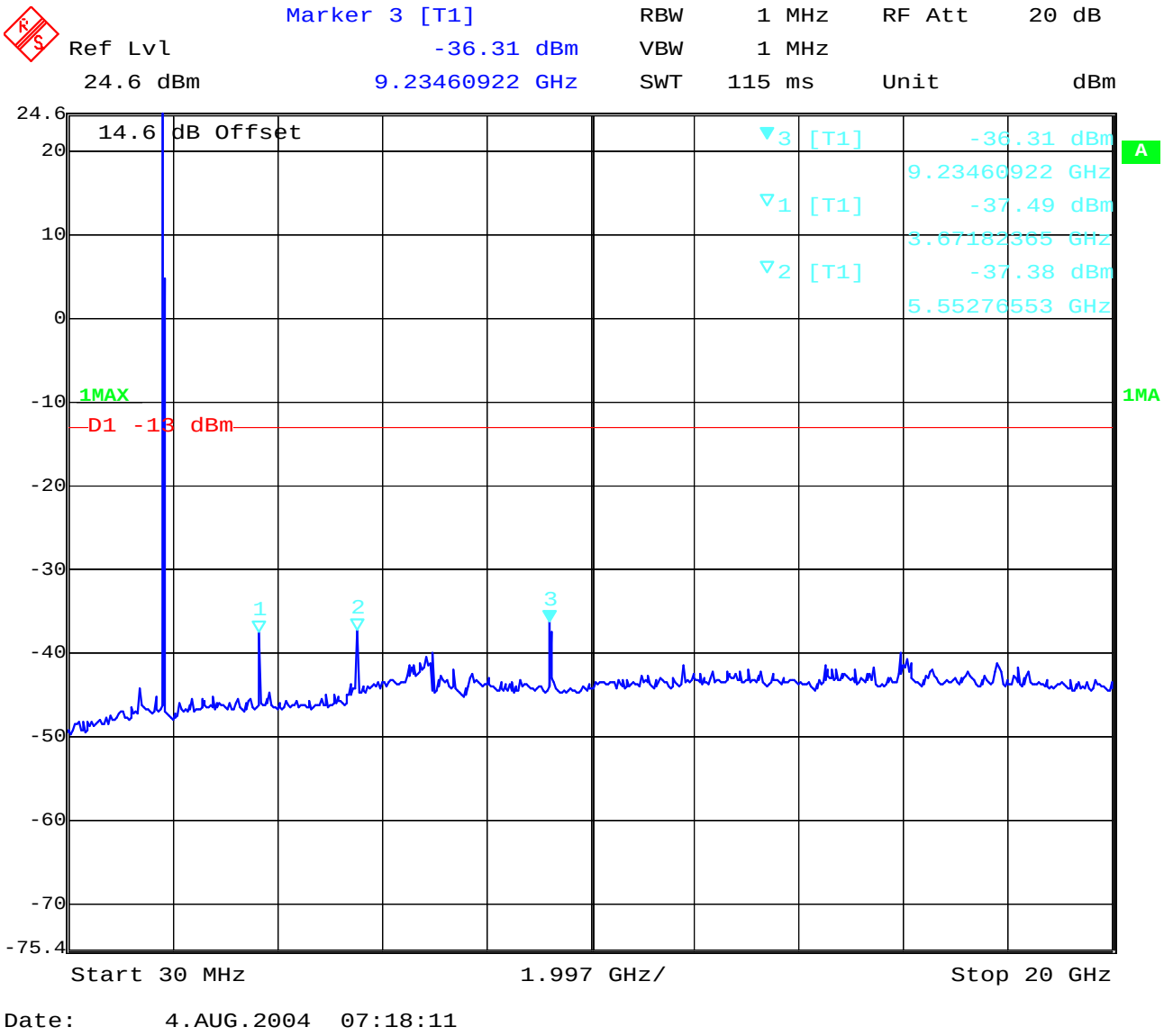
Measurement Limit:

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

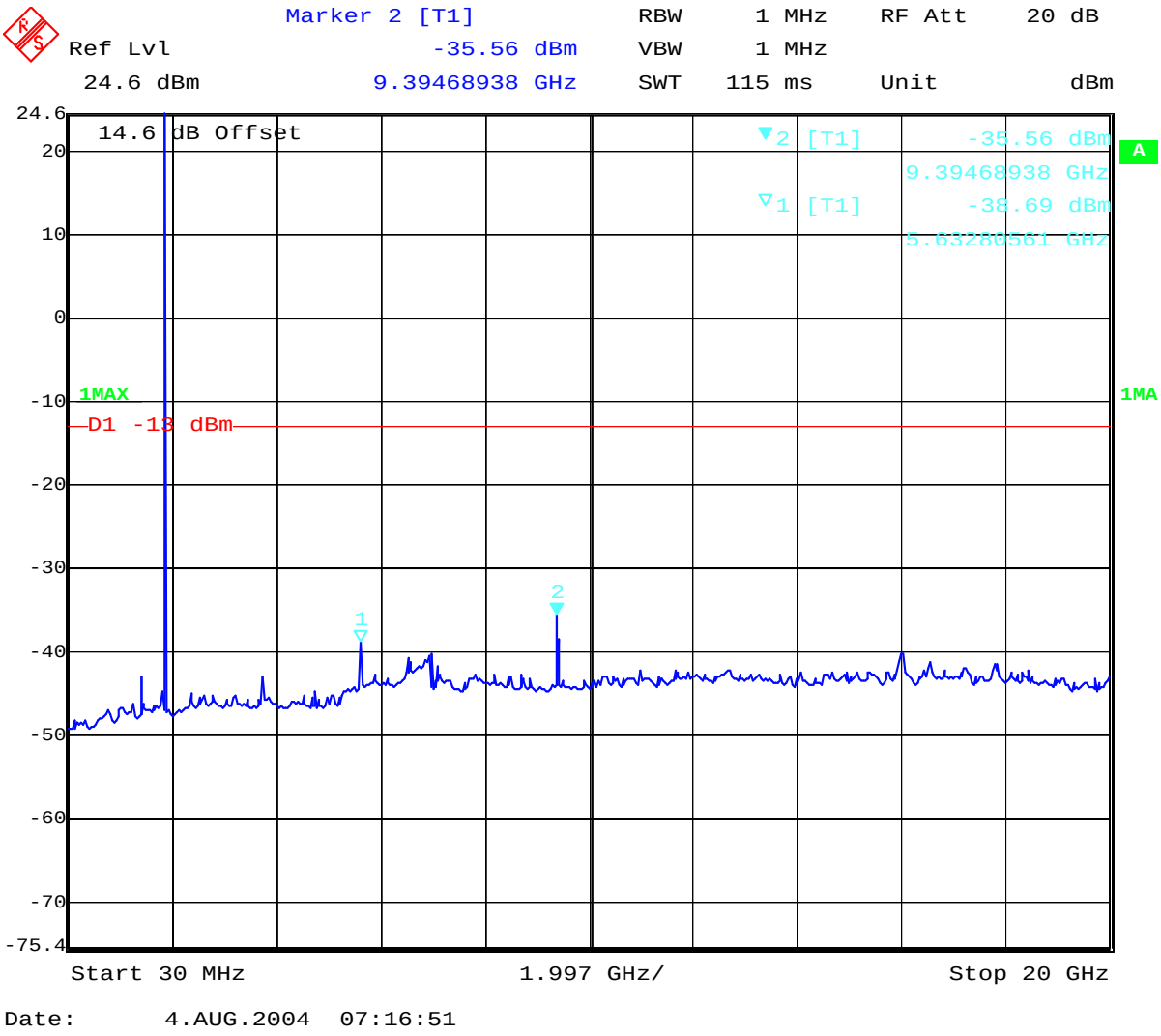
Measurement Results:

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	-37.5	3819.6	
3	5550.6	-38.7	5640	-37.4	5729.4	-39.6
4	7400.8		7520		7639.2	
5	9251.0	-35.6	9400	-36.3	9549.0	-36.9
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	

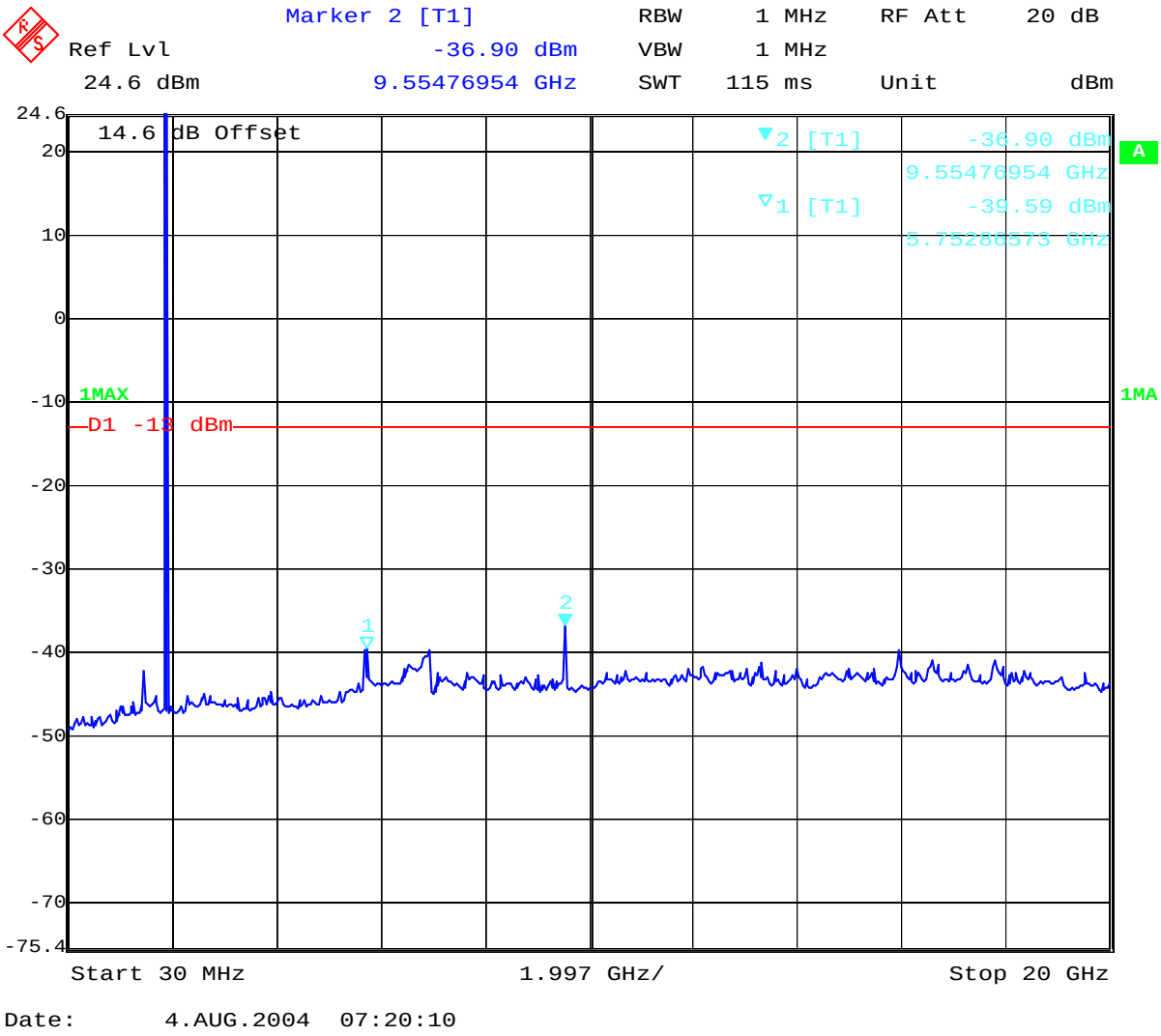
Channel: 512


Marker 3 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
-36.31 dBm
VBW 1 MHz
24.6 dBm
9.23460922 GHz
SWT 115 ms
Unit dBm
14.6 dB Offset
▼3 [T1]
-36.31 dBm
9.23460922 GHz
▽1 [T1]
-37.49 dBm
3.67182365 GHz
▽2 [T1]
-37.38 dBm
5.55276553 GHz
A
1MAX
1MA
D1 -13 dBm
24.6
20
10
0
-10
-20
-30
-40
-50
-60
-70
-75.4
Start 30 MHz
1.997 GHz/
Stop 20 GHz
Date: 4.AUG.2004 07:18:11

Channel 661


Marker 2 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
-35.56 dBm
VBW 1 MHz
24.6 dBm
9.39468938 GHz
SWT 115 ms
Unit dBm
14.6 dB Offset
▼2 [T1]
-35.56 dBm
9.39468938 GHz
▽1 [T1]
-38.69 dBm
5.63280561 GHz
A
1MAX
D1 -13 dBm
1MA
24.6
20
10
0
-10
-20
-30
-40
-50
-60
-70
-75.4
Start 30 MHz
1.997 GHz/
Stop 20 GHz
Date: 4.AUG.2004 07:16:51

Channel 810


Marker 2 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
-36.90 dBm
VBW 1 MHz
24.6 dBm
9.55476954 GHz
SWT 115 ms
Unit dBm
14.6 dB Offset
▼2 [T1]
-36.90 dBm
9.55476954 GHz
▽1 [T1]
-39.59 dBm
5.75280573 GHz
A
1MAX
D1 -13 dBm
1MA
24.6
20
10
0
-10
-20
-30
-40
-50
-60
-70
-75.4
Start 30 MHz
1.997 GHz/
Stop 20 GHz
Date: 4.AUG.2004 07:20:10

3.1.6 Block Edge Compliance

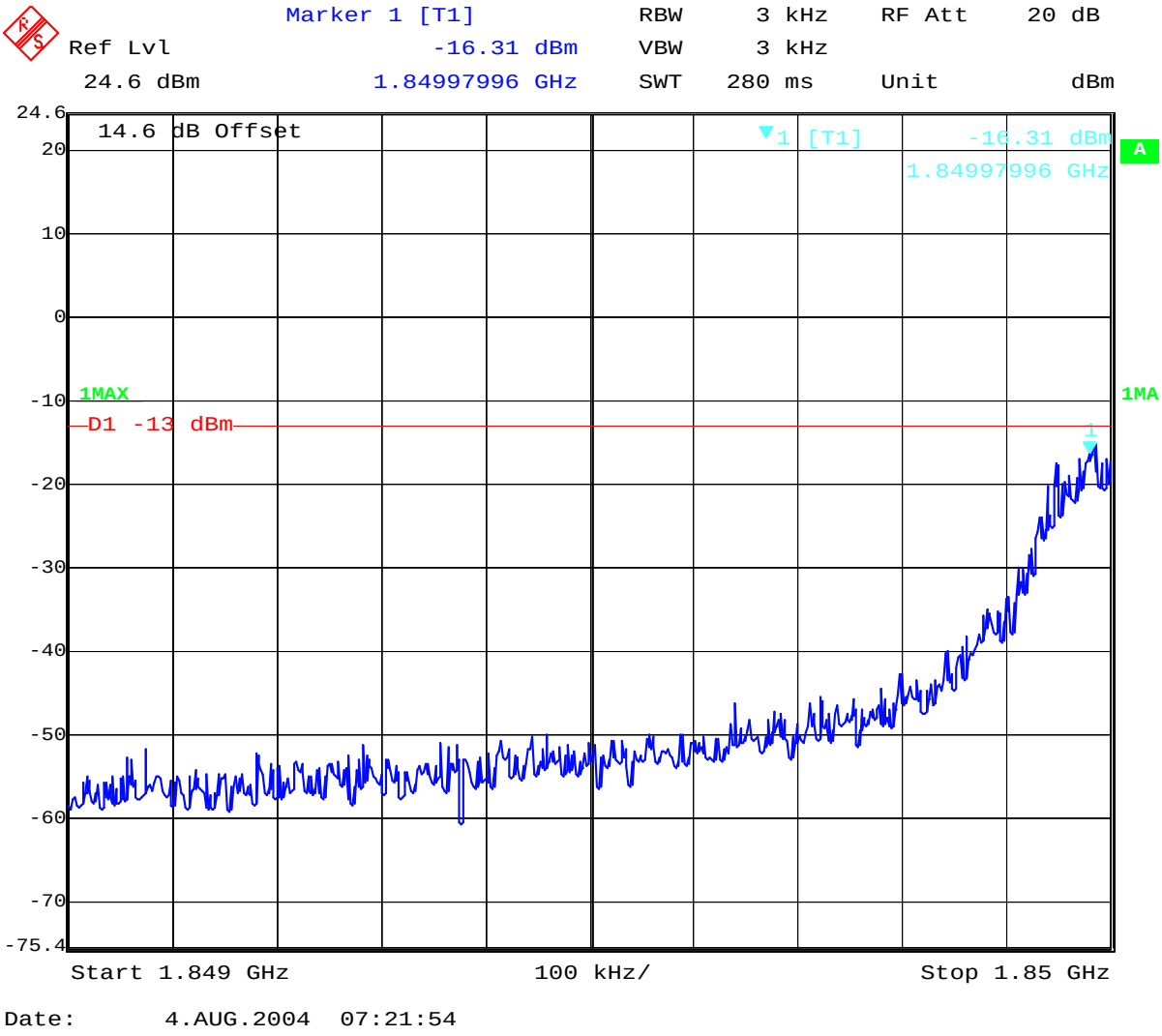
Reference

FCC:	CFR Part 24.238
IC:	RSS 133, Issue 2, Rev. 1, Section 6.3

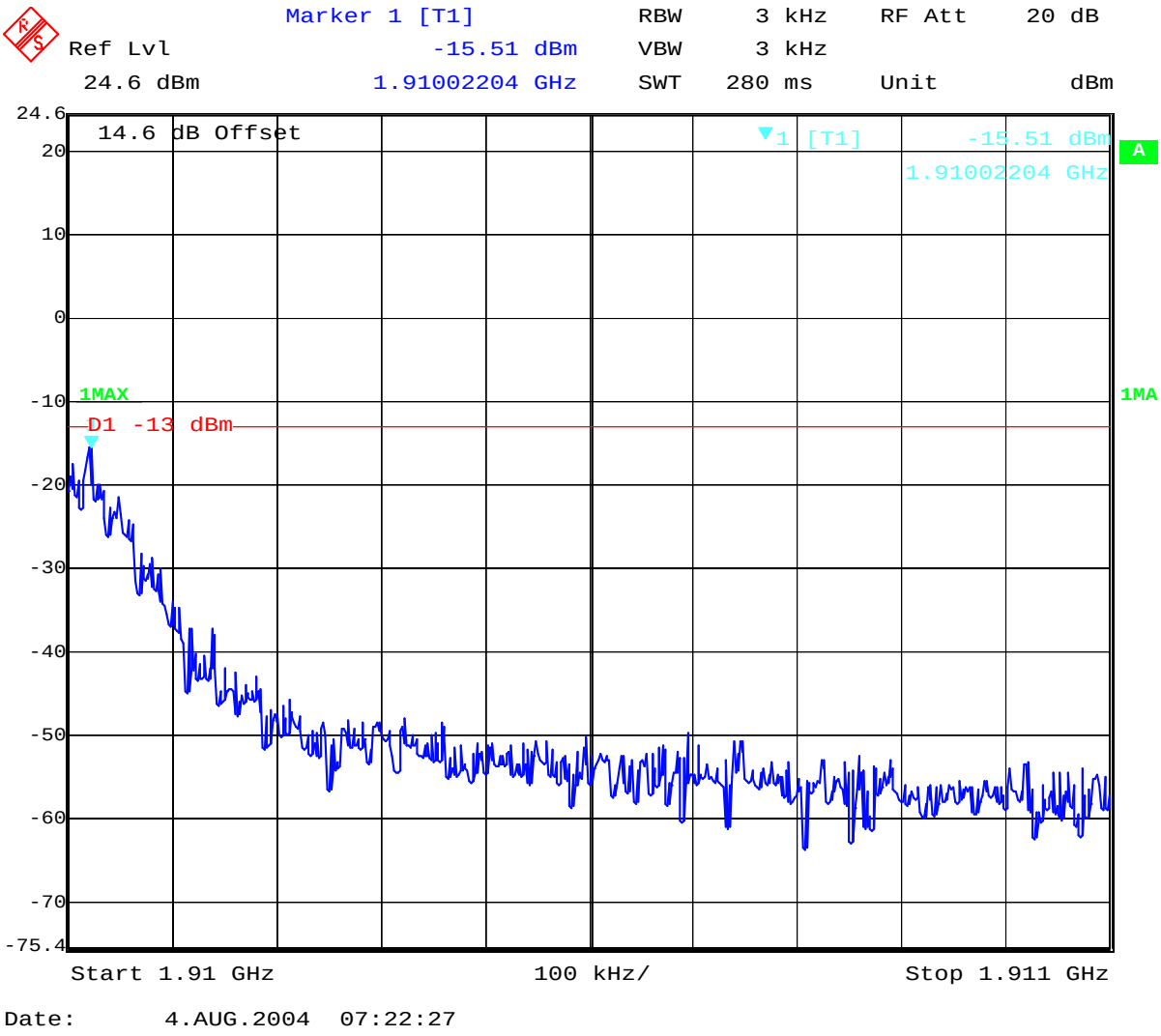
Measurement Limit:

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

Block 1 Channel 512



Block 6 Channel 810



3.1.7 Occupied Bandwidth

Reference

FCC:	CFR Part 24.238, 2.1049
IC:	RSS 133, Issue 2, Rev. 1, Section 5.6

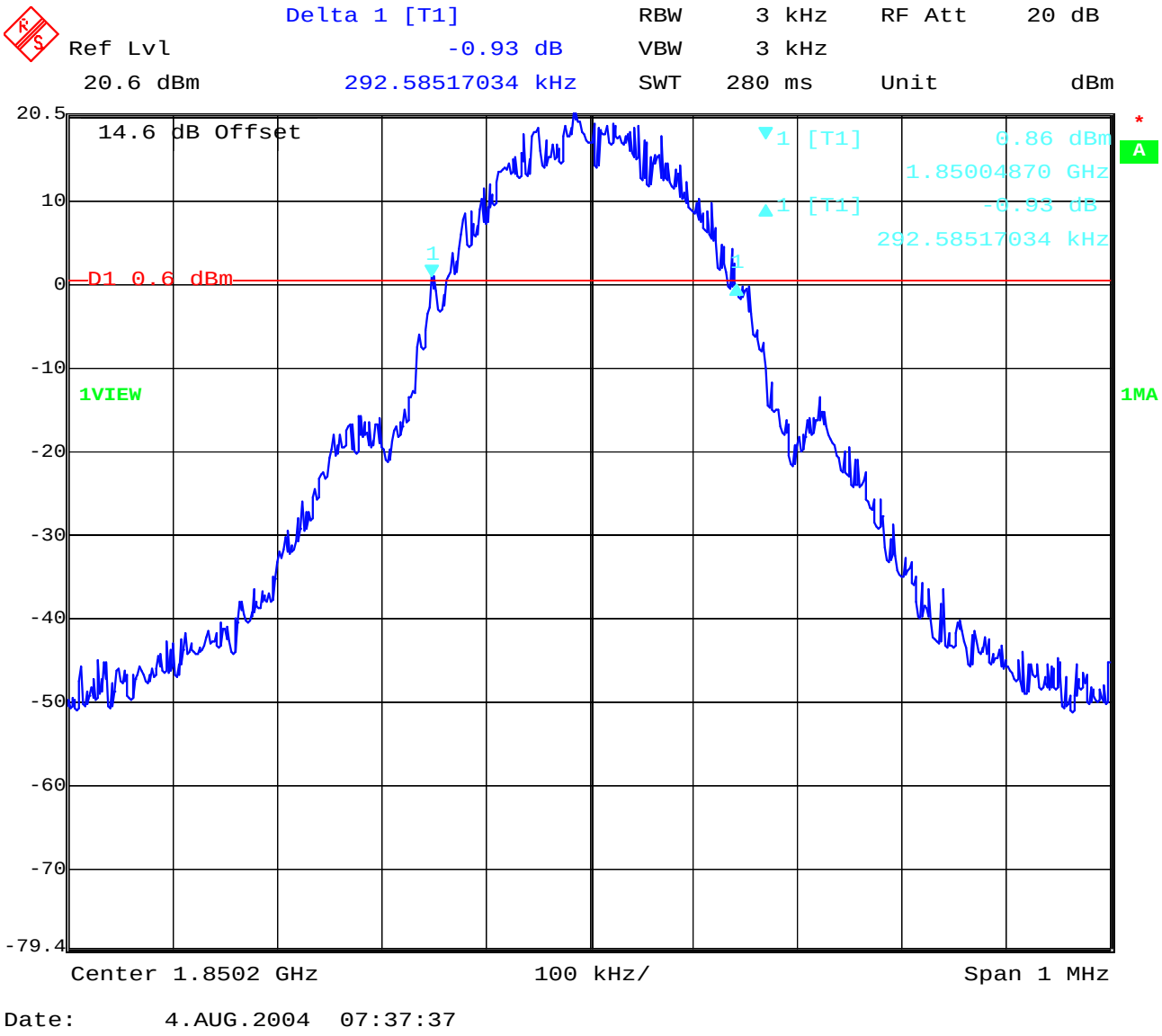
Occupied Bandwidth Results

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.

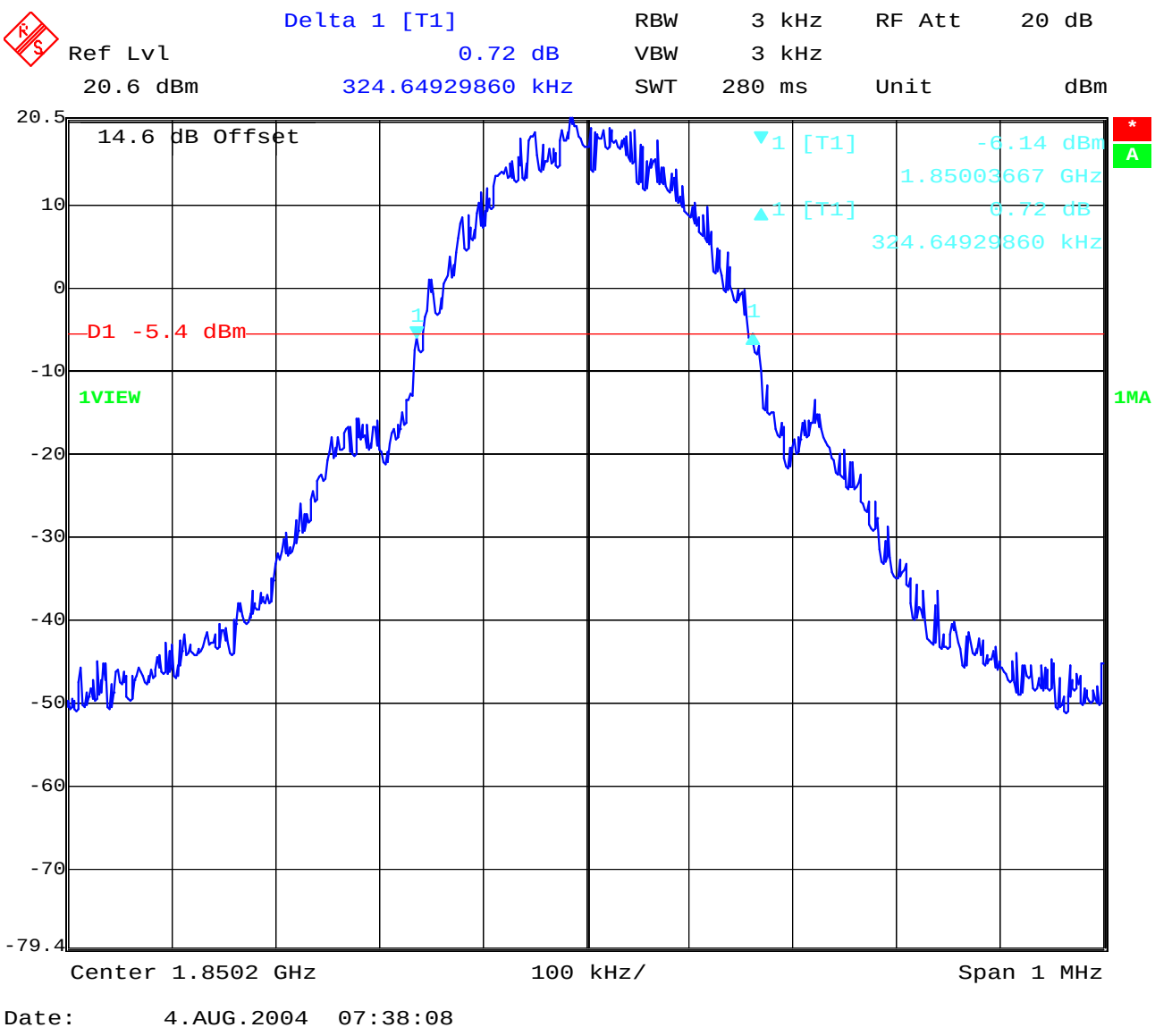
Frequency	99% Occupied Bandwidth kHz	-26 dBc Bandwidth kHz
1850.2 MHz	292.585	324.649
1880.0 MHz	278.557	318.637
1909.8 MHz	278.557	316.638

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.

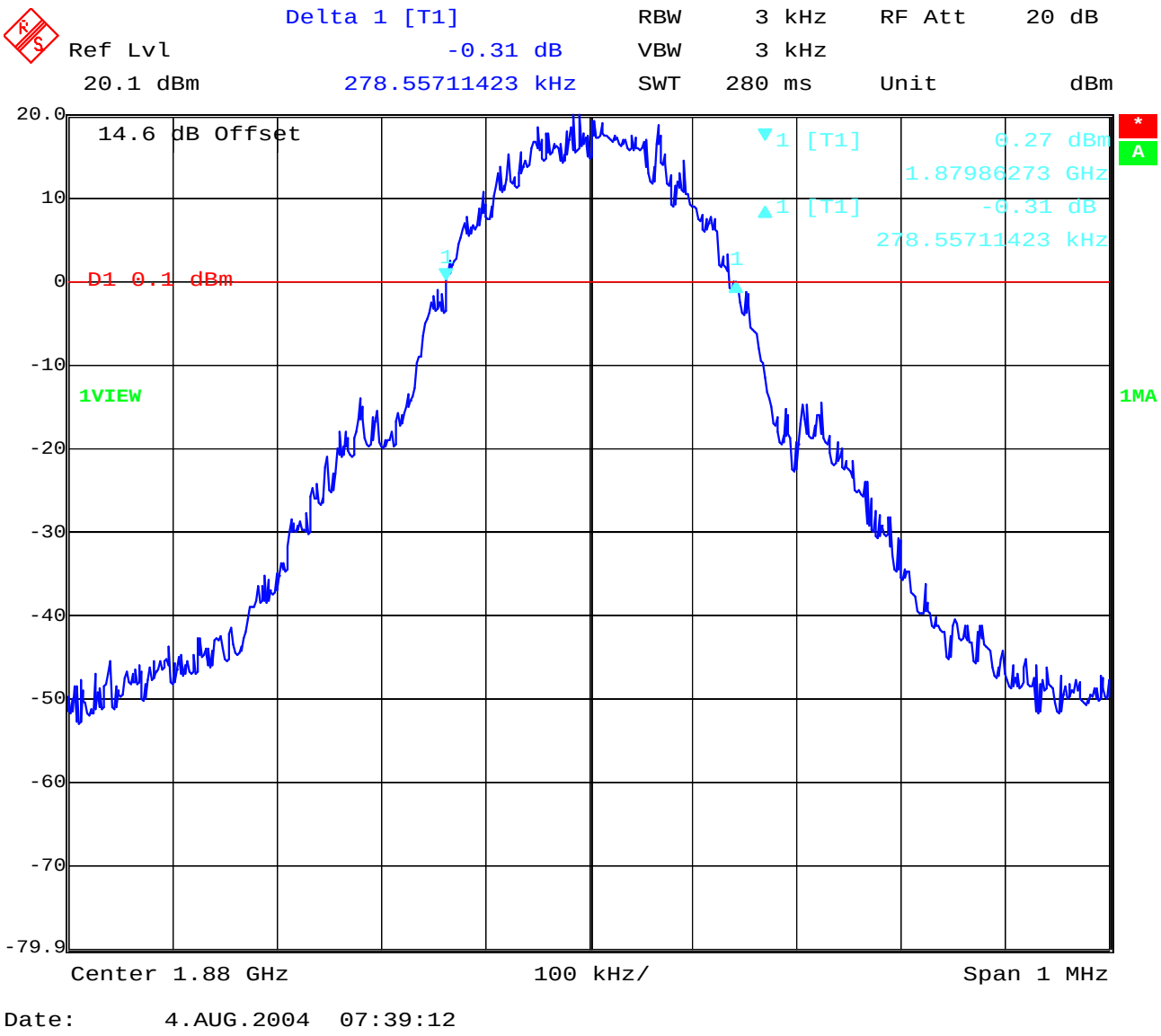
Channel 512
99% (-20 dB) Occupied Bandwidth



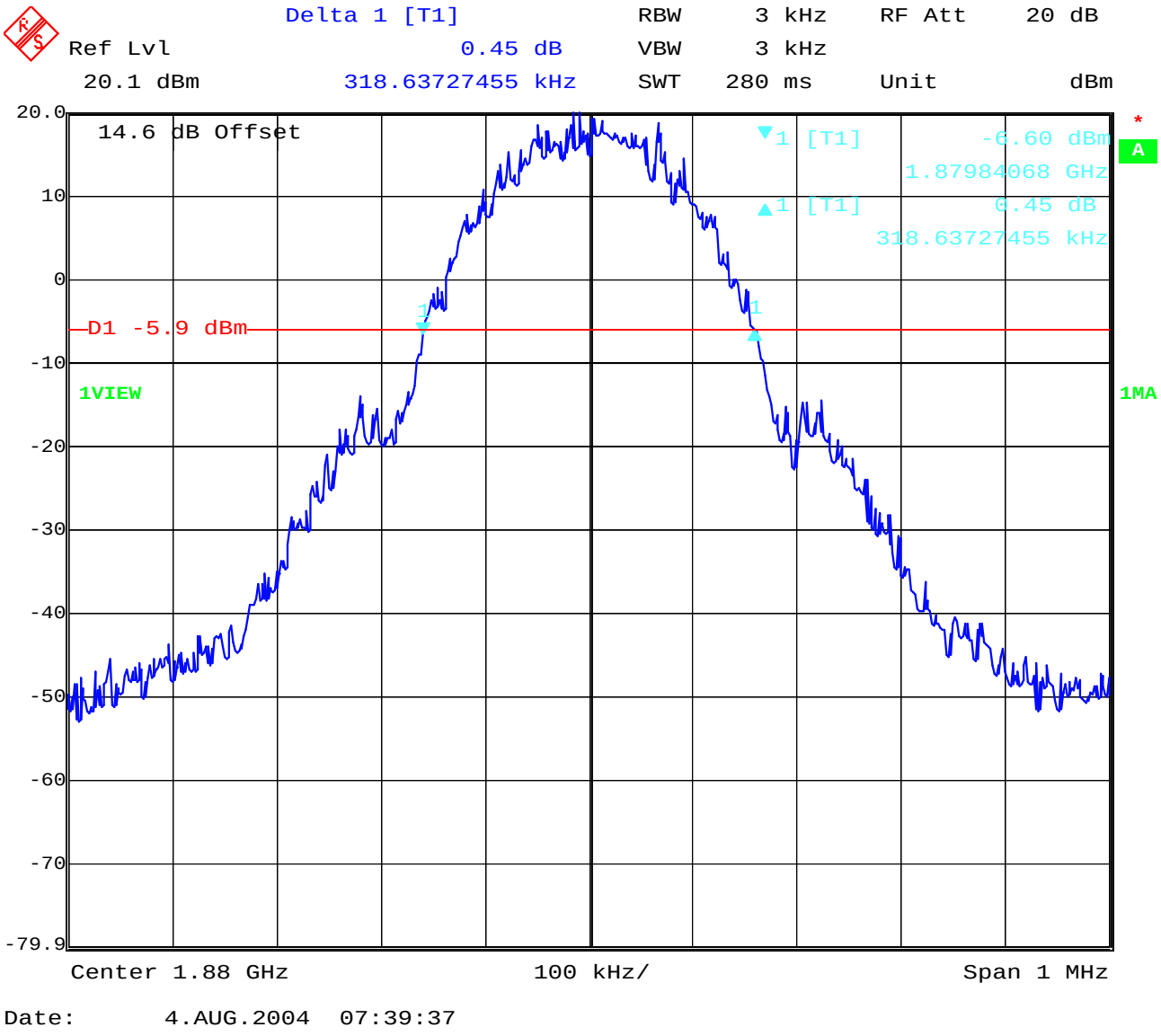
Channel 512
-26 dBc Bandwidth



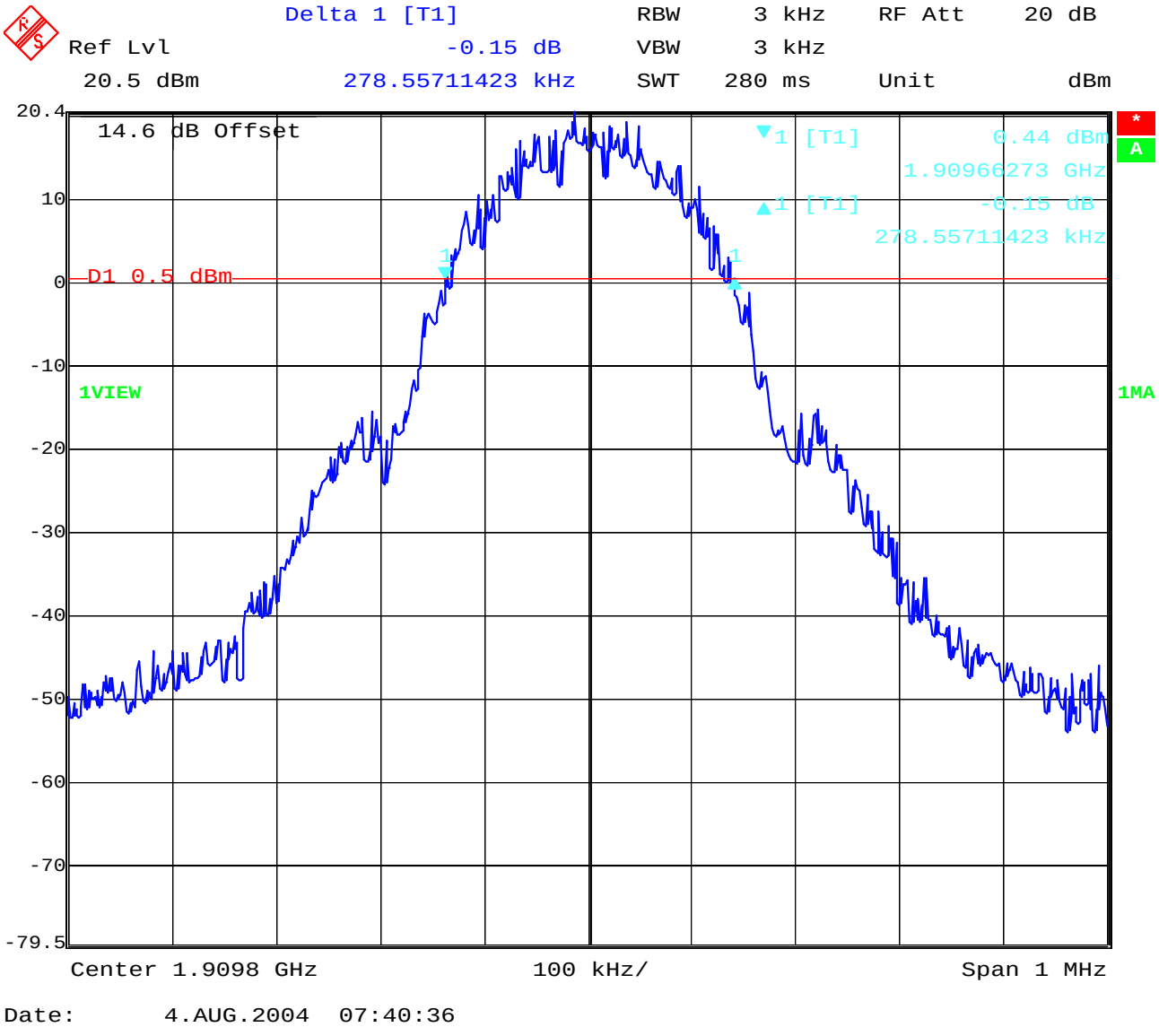
Channel 661
99% (-20 dB) Occupied Bandwidth



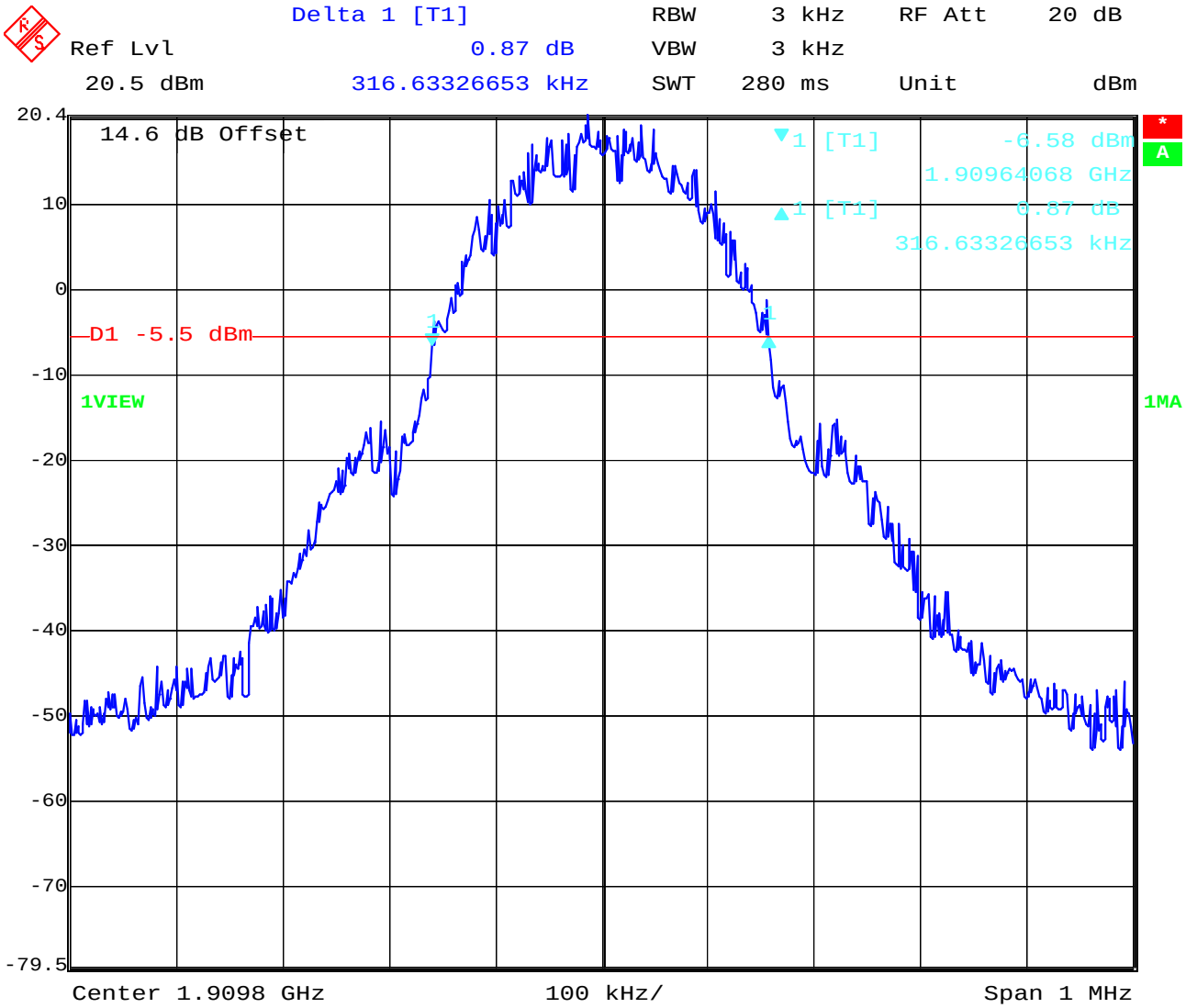
Channel 661
-26 dBc Bandwidth



Channel 810
99% (-20 dB) Occupied Bandwidth



Channel 810
-26 dBc Bandwidth



3.2 PART GSM 850

3.2.1 RF Power Output

Reference

FCC:	CFR Part 22.9.1.3, 2.1046
IC:	RSS 132, Issue 1, 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)
This measurements were done at 3 frequencies, 824.2 MHz, 836.2 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 Step	Peak Output Power (dBm)	Average Output Power (dBm)
824.2	5	32.6	32.4
836.4	5	32.5	32.7
848.8	5	32.2	32.1
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 was 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 (dBuV/m) = Reading (dBuV) + 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 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 (dBuV/m) = Reading (dBuV) + 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 antenna (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 it's 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 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 Step	BURST Peak (dBm)
		ERP
824.2	5	27.40
836.4	5	29.94
848.8	5	30.14
Measurement uncertainty: 1.5%		

Sample calculation:

Freg	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	ERIP Result	ERP	Substitution Antenna
MHz	dBµV	dBm	dBi	dBd	dB	dBm	dBm	
848.8	128.4	38.9		-10.50	1.67		30.1	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

3.2.2 Frequency Stability

Reference

FCC:	CFR Part 22.355, 2.1055
IC:	RSS 132, Issue 1, 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:

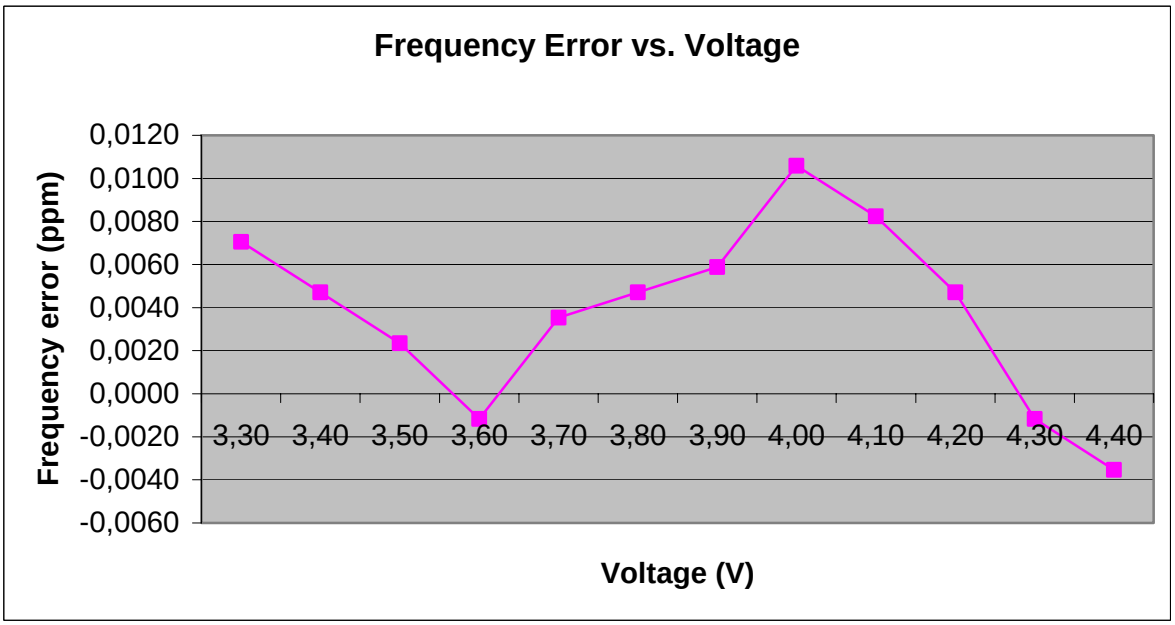
According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 22.355, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission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

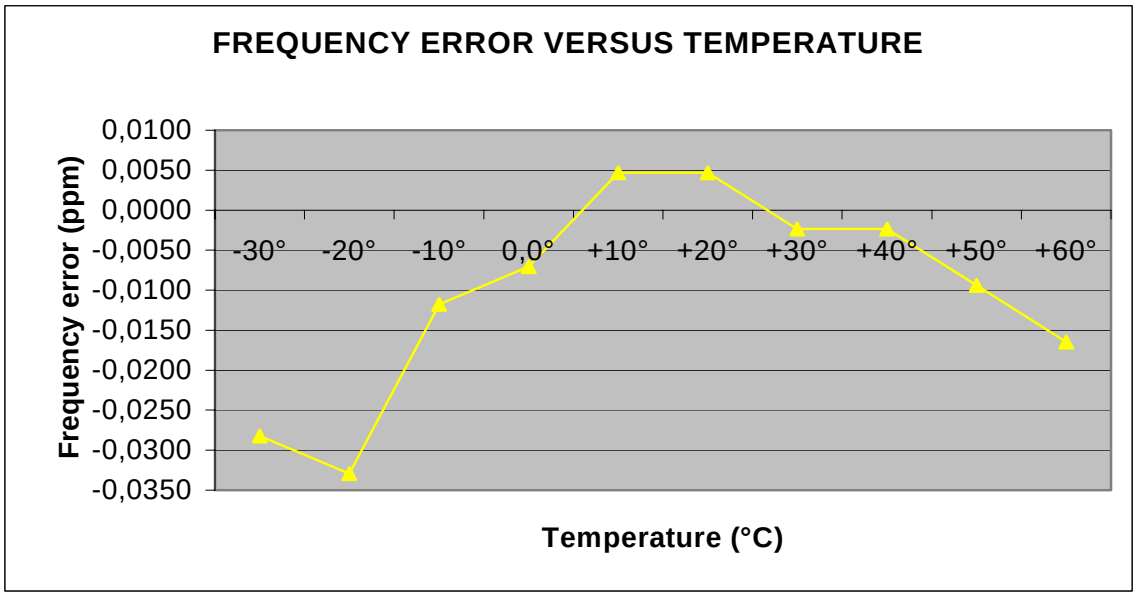
Measurement Results: AFC FREQ ERROR vs. VOLTAGE

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.3	6	0,00000071	0,0071
3.4	4	0,00000047	0,0047
3.5	2	0,00000024	0,0024
3.6	-1	-0,00000012	-0,0012
3.7	3	0,00000035	0,0035
3.8	4	0,00000047	0,0047
3.9	5	0,00000059	0,0059
4.0	9	0,00000106	0,0106
4.1	7	0,00000082	0,0082
4.2	4	0,00000047	0,0047
4.3	-1	-0,00000012	-0,0012
4.4	-3	-0,00000035	-0,0035

Measurement Results: AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	-24	-0,00000282	-0,0282
-20	-28	-0,00000329	-0,0329
-10	-10	-0,00000118	-0,0118
±0.0	-6	-0,00000071	-0,0071
+10	4	0,00000047	0,0047
+20	4	0,00000047	0,0047
+30	-2	-0,00000024	-0,0024
+40	-2	-0,00000024	-0,0024
+50	-8	-0,00000094	-0,0094
+60	-14	-0,00000165	-0,0165


Frequency Error vs. Voltage
Frequency error (ppm)
0,0120
0,0100
0,0080
0,0060
0,0040
0,0020
0,0000
-0,0020
-0,0040
-0,0060
3,30 3,40 3,50 3,60 3,70 3,80 3,90 4,00 4,10 4,20 4,30 4,40
Voltage (V)


FREQUENCY ERROR VERSUS TEMPERATURE
Frequency error (ppm)
0,0100
0,0050
0,0000
-0,0050
-0,0100
-0,0150
-0,0200
-0,0250
-0,0300
-0,0350
-30° -20° -10° 0,0° +10° +20° +30° +40° +50° +60°
Temperature (°C)

3.2.3 Radiated Emissions

Reference

FCC:	CFR Part 22.917, 2.1053
IC:	RSS 132, Issue 1, 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 I 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+10Log(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, 836.2 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.

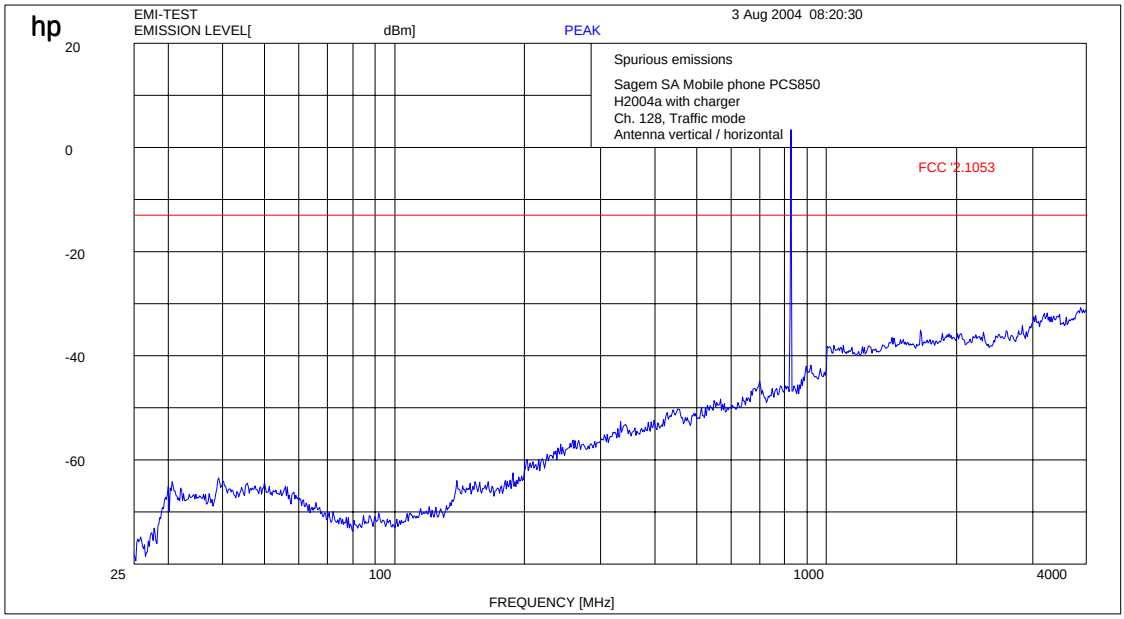
Harmonic	Tx ch.-128 Freq. (MHz)	Level (dBm)	Tx ch.-190 Freq. (MHz)	Level (dBm)	Tx ch.-251 Freq. (MHz)	Level (dBm)
2	1648.4	-30.6	1673.2	-20.6	1697.6	-15.1
3	2472.6		2509.8		2546.4	-29.5
4	3296.8		3346.4		3395.2	
5	4121.0		4183.0		4244.0	
6	4945.2		5019.6		5092.8	
7	5769.4		5856.2		5941.6	
8	6593.6		6692.8		6790.4	
9	7417.8		7529.4		7639.2	
10	8242.0		8366.0		8488.0	

Sample calculation:

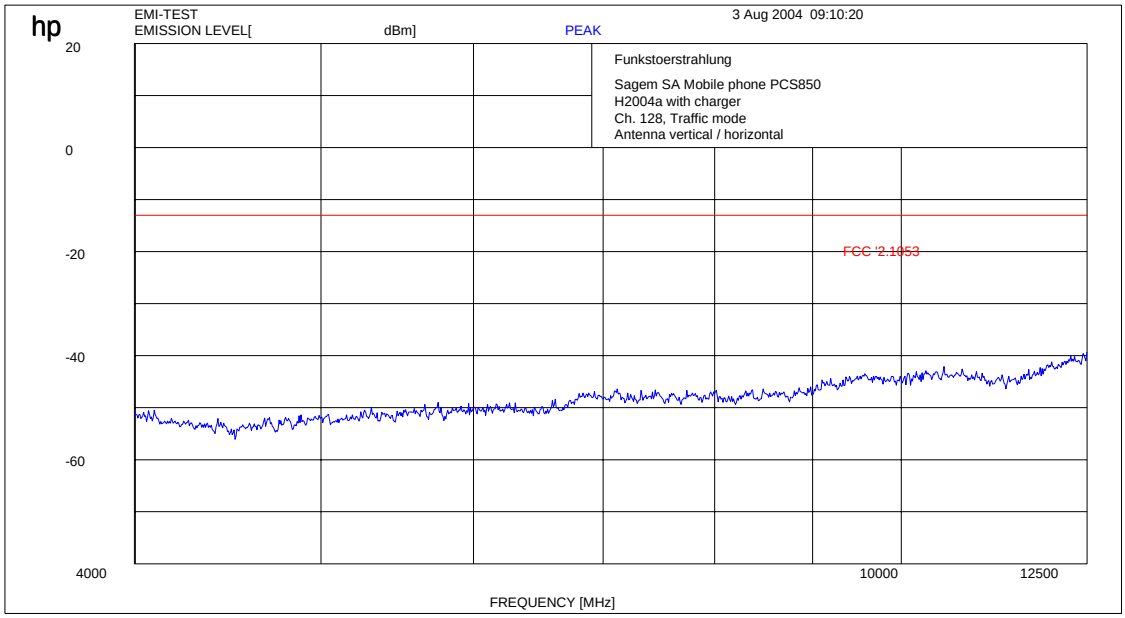
Freg	SA Reading	SG Setting	Ant. gain	Dipol gain	Cable loss	ERIP Result	ERP	Substitution Antenna
MHz	dBµV	dBm	dBi	dBd	dB	dBm	dBm	
836.4	122.0	36.5		-10.50	1.67		24.0	UHAP Schwarzbeck S/N 460

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

Channel 128 (up to 4 GHz)

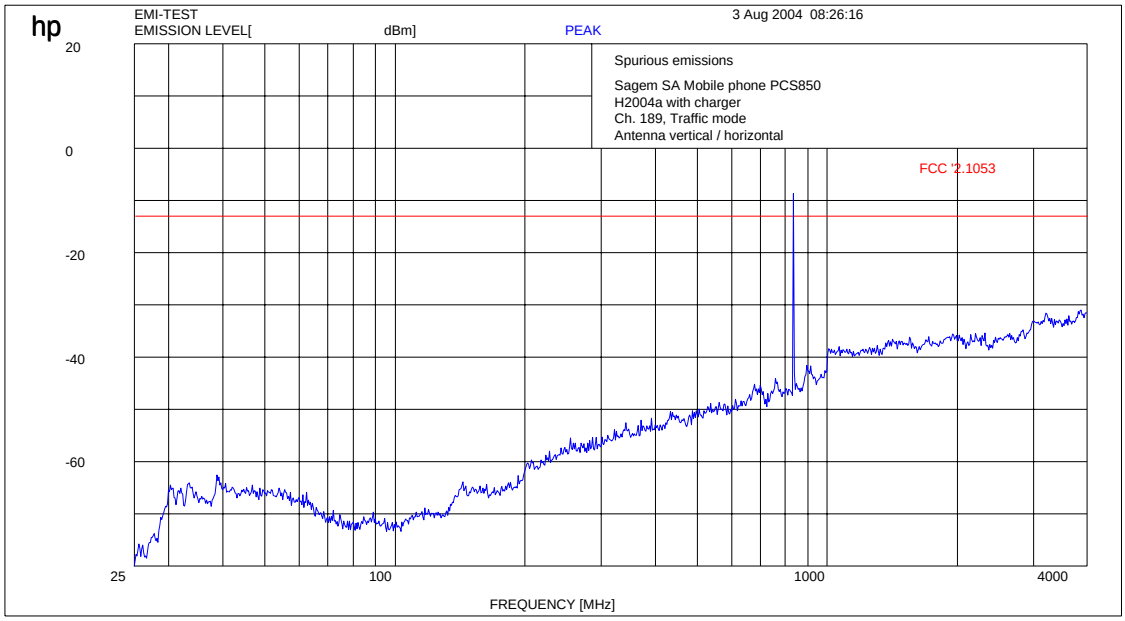


up to 12 GHz

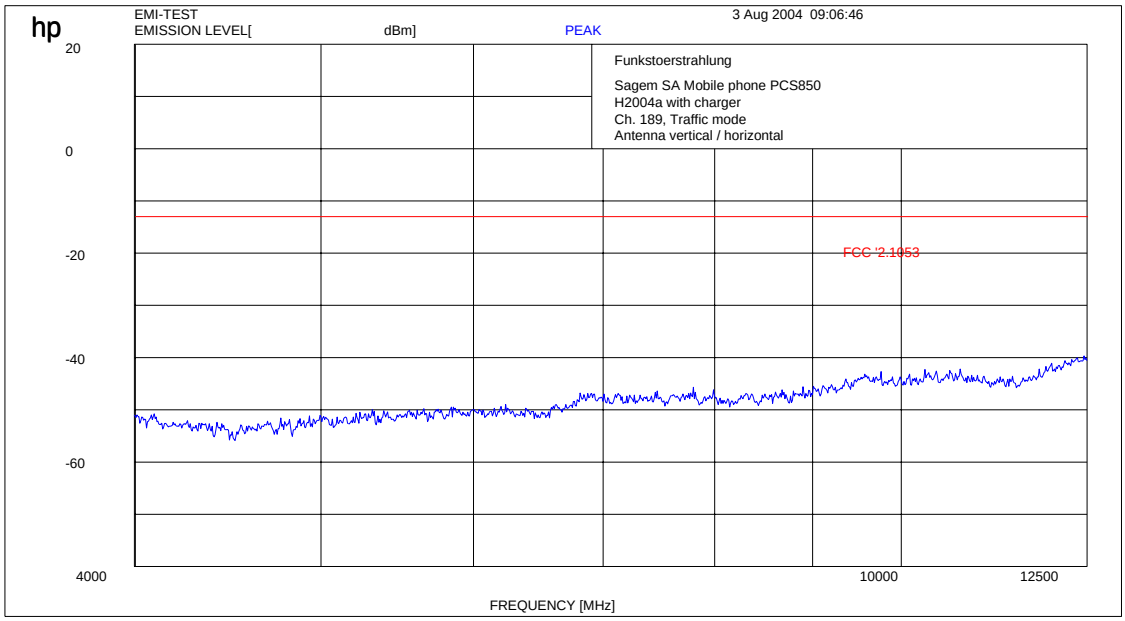


f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW 1 MHz
Carrier suppressed with a rejection filter

Channel 189 (up to 4 GHz)

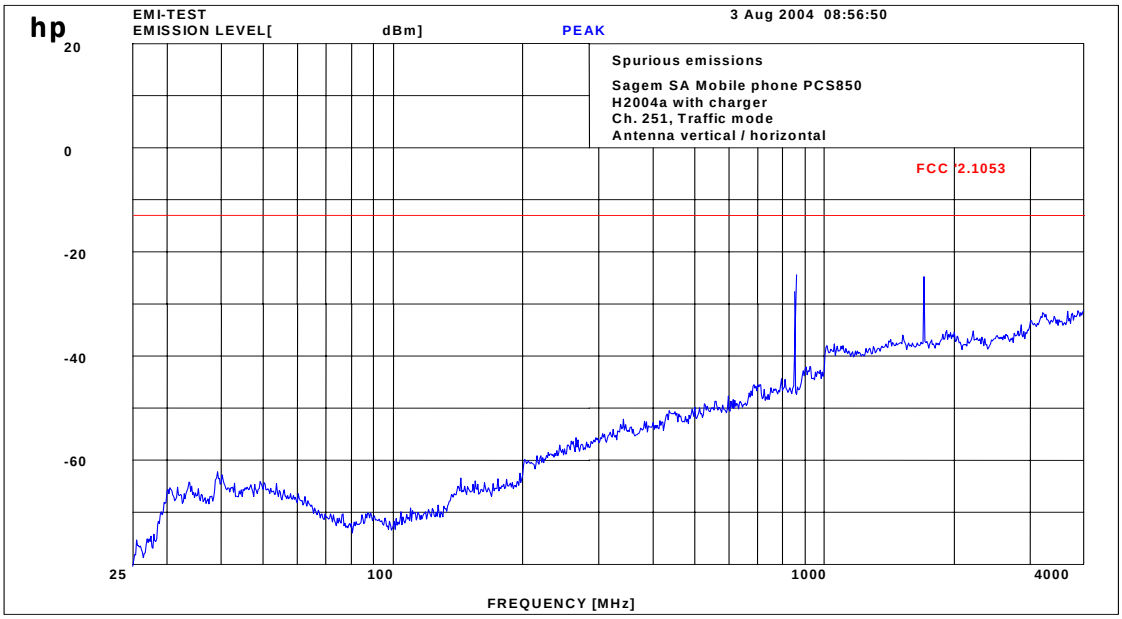


up to 12 GHz

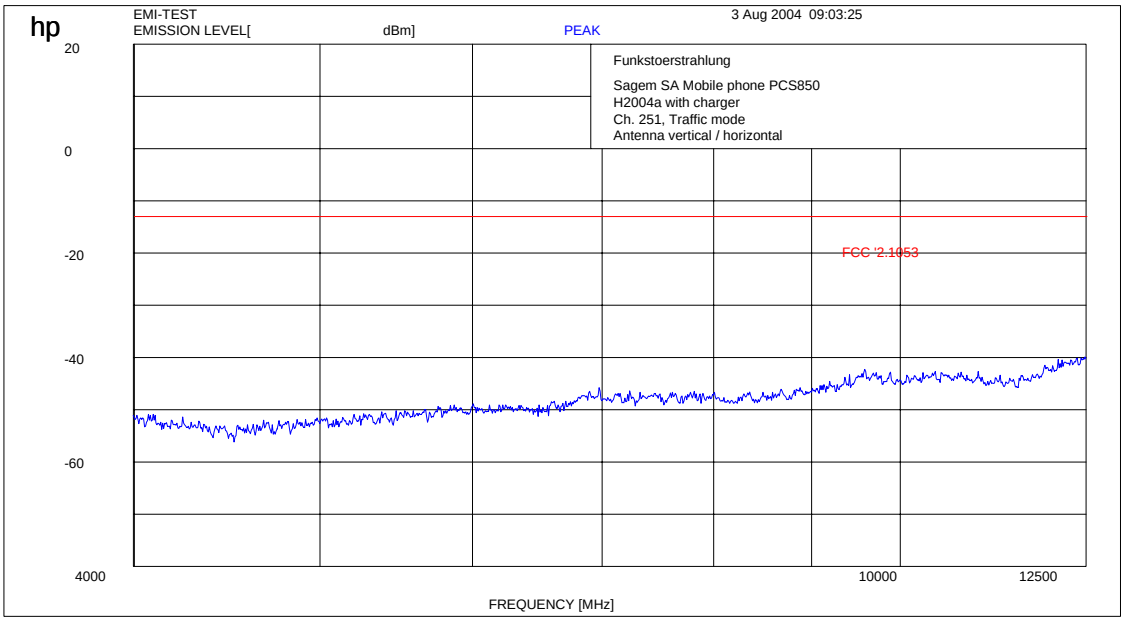


f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW 1 MHz
Carrier suppressed with a rejection filter

Channel 251 (up to 4 GHz)



up to 12 GHz



f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW 1 MHz
Carrier suppressed with a rejection filter

3.2.4 Receiver Radiated Emissions

Reference

FCC:	CFR Part 15.109, 2.1053
IC:	RSS 132, Issue 1, Section 4.6 and 6.6

Measurement Results

SPURIOUS EMISSIONS LEVEL (µV/m)								
CH 128			CH 189			CH 251		
f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)
no	peaks	found						
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW: 1 MHz

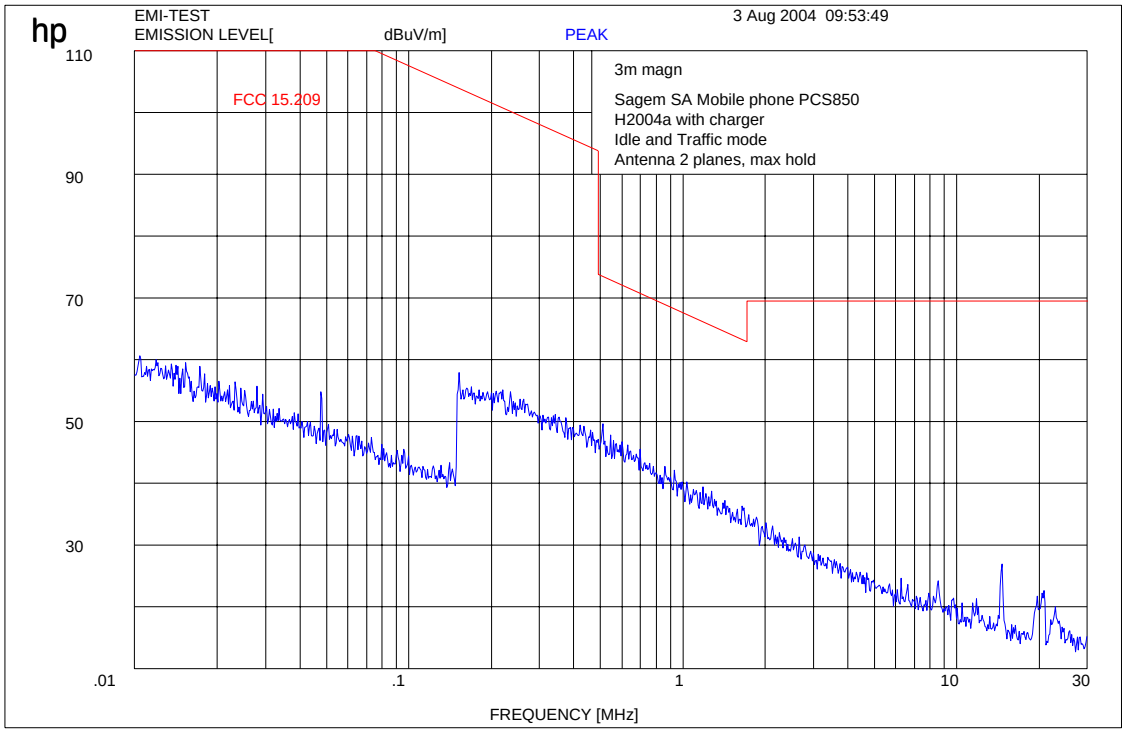
H = Horizontal ; V= Vertical

Measurement distance see table

Limits: § 15.109

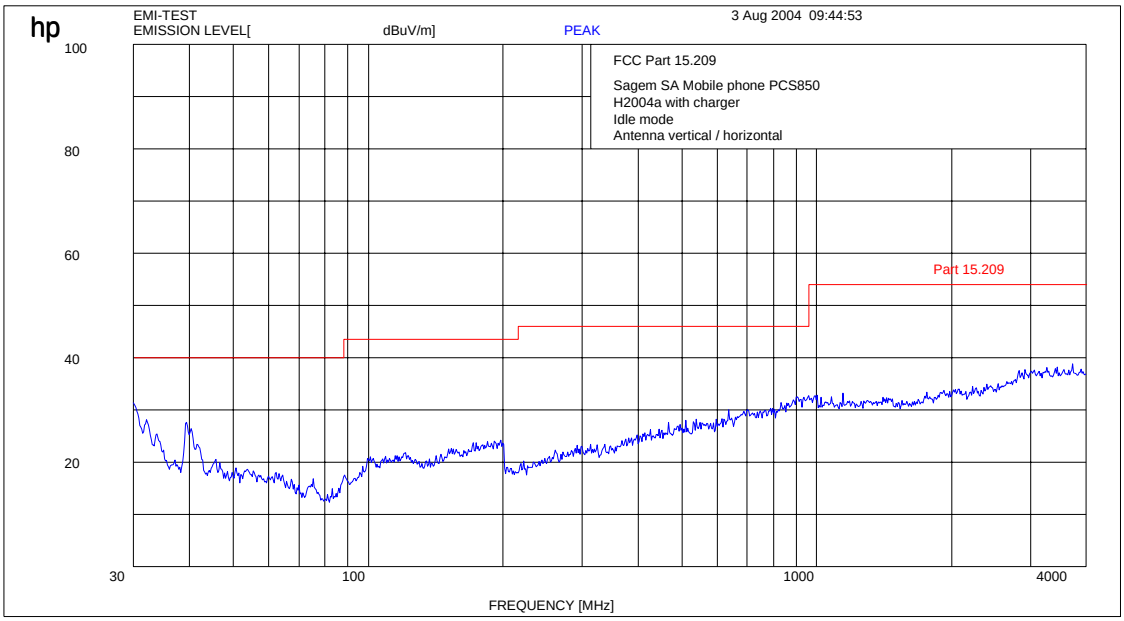
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

Idle-Mode (up to 30 MHz)

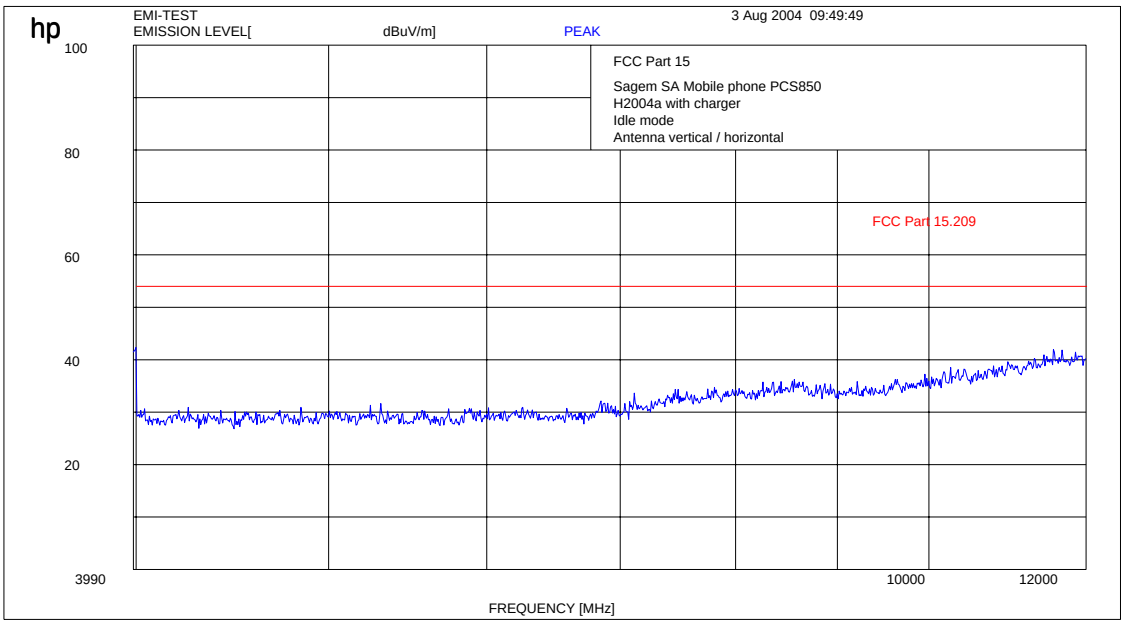


f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW 1 MHz

Idle-Mode (up to 4 GHz)



up to 12 GHz



3.2.5 Conducted Spurious Emissions

Reference

FCC:	CFR Part 22.917, 1.1051
IC:	RSS 132, Issue 1, 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 transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

USPCS Transmitter Channel Frequency
128 824.2 MHz
189 836.2 MHz
251 848.8 MHz

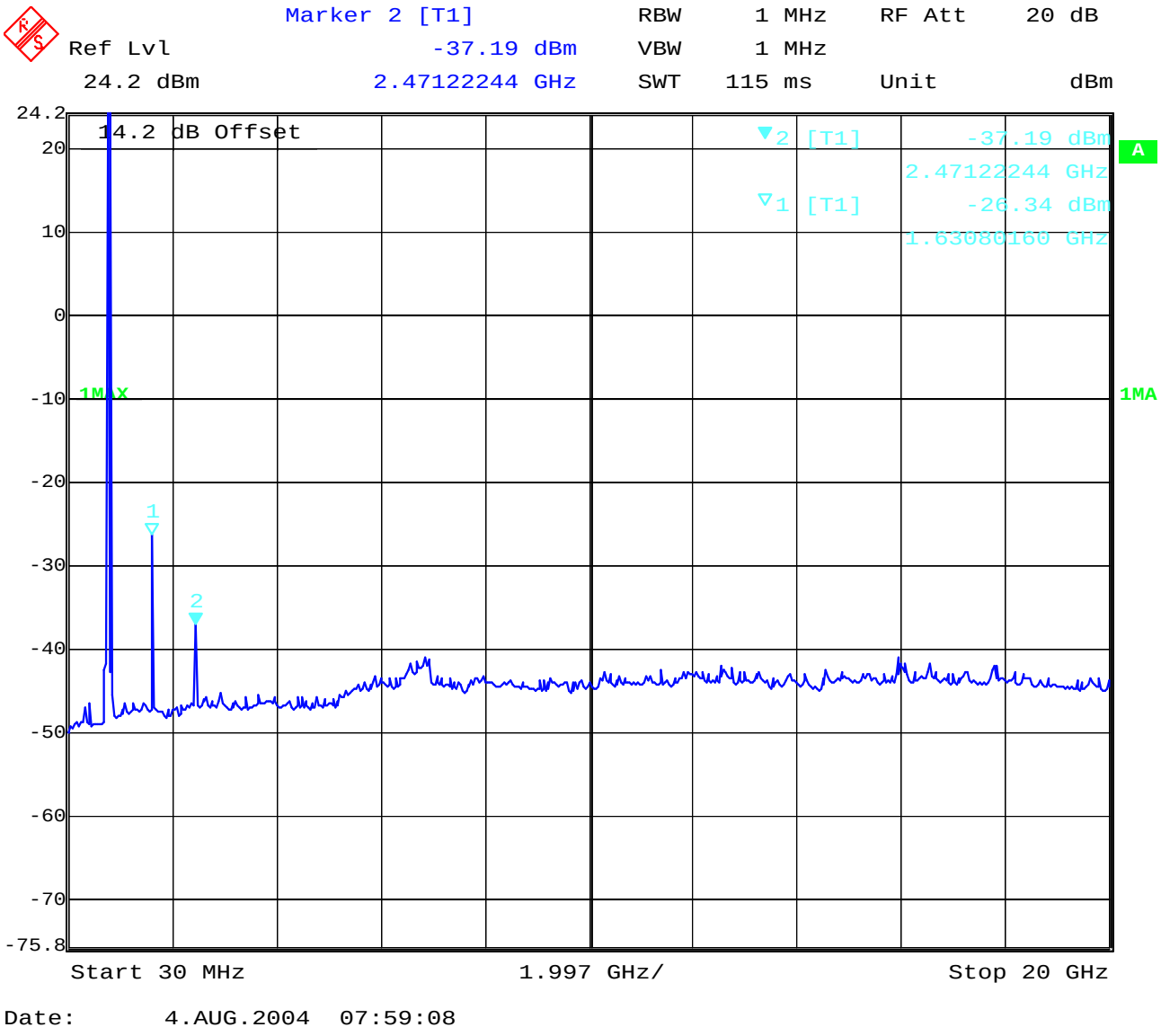
Measurement Limit

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

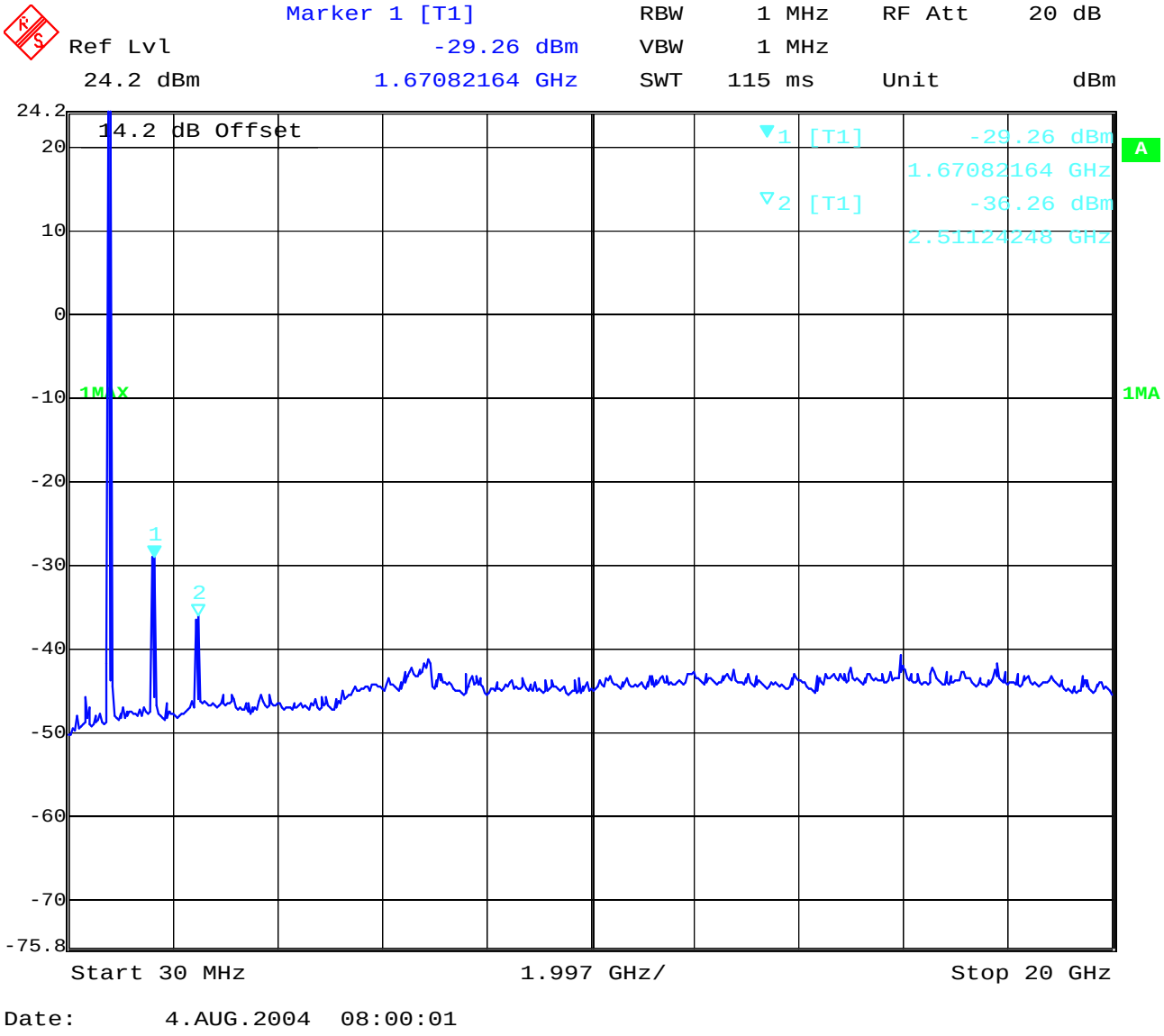
Measurement Results

Harmonic	TX CH.-128 Freq. (MHz)	Level (dBm)	TX CH.-190 Freq. (MHz)	Level (dBm)	TX CH.-251 Freq. (MHz)	Level (dBm)
2	1648.4	-26.3	1673.2	-29.3	1697.6	-31.8
3	2472.6	-37.2	2509.8	-36.3	2546.4	-36.5
4	3296.8		3346.4		3395.2	
5	4121.0		4183.0		4244.0	
6	4945.2		5019.6		5092.8	
7	5769.4		5856.2		5941.6	
8	6593.6		6692.8		6790.4	
9	7417.8		7529.4		7639.2	
10	8242.0		8366.0		8488.0	

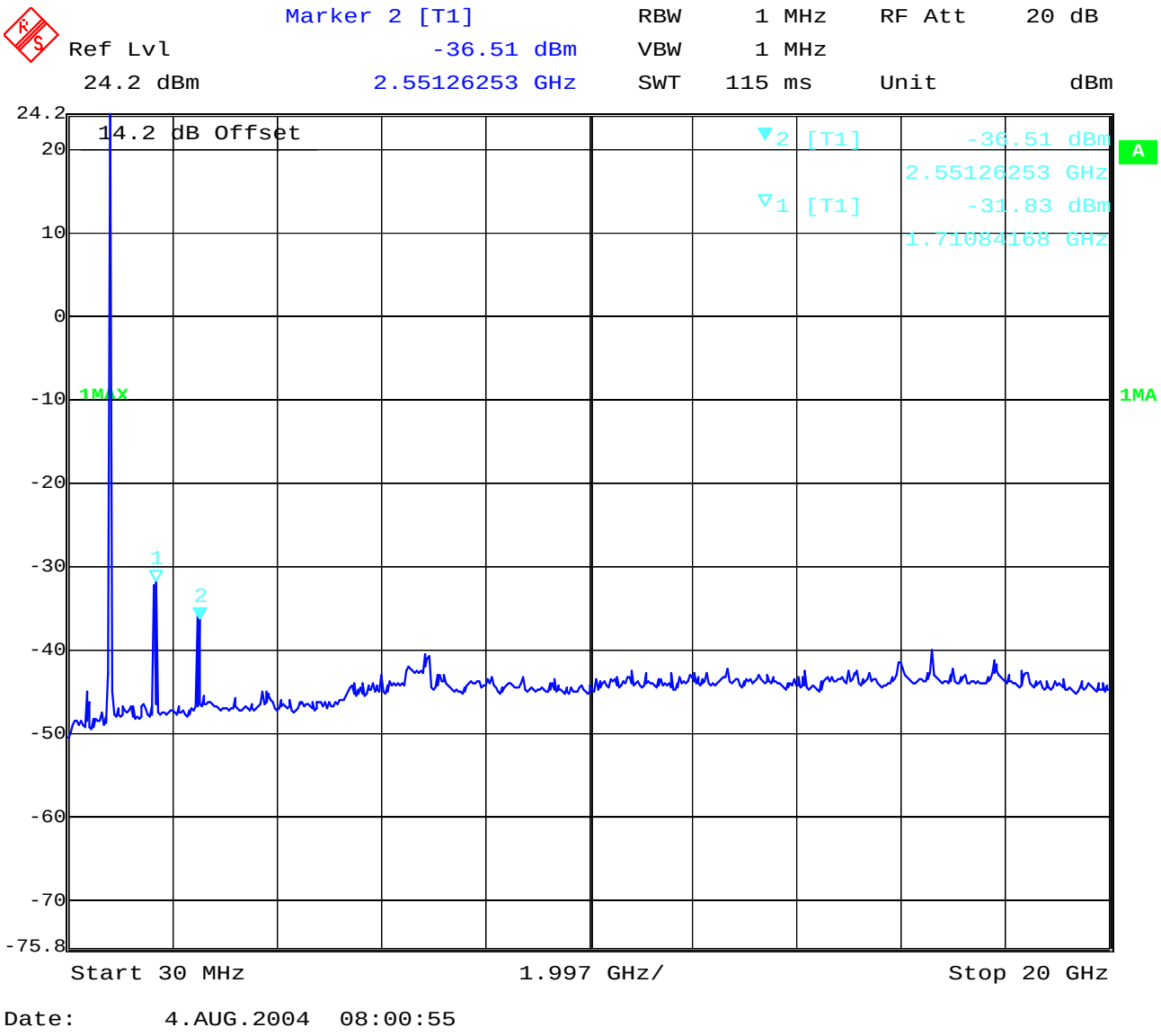
Channel: 128


Marker 2 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
-37.19 dBm
VBW 1 MHz
24.2 dBm
2.47122244 GHz
SWT 115 ms
Unit dBm
14.2 dB Offset
2 [T1]
-37.19 dBm
2.47122244 GHz
1 [T1]
-26.34 dBm
1.63080160 GHz
1MAX
1MA
A
24.2
20
10
0
-10
-20
-30
-40
-50
-60
-70
-75.8
Start 30 MHz
1.997 GHz/
Stop 20 GHz
Date: 4.AUG.2004 07:59:08

Channel 189


Marker 1 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
-29.26 dBm
VBW 1 MHz
24.2 dBm
1.67082164 GHz
SWT 115 ms
Unit dBm
14.2 dB Offset
1 [T1] -29.26 dBm
1.67082164 GHz
2 [T1] -36.26 dBm
2.51124248 GHz
A
1MAX
1MA
24.2
20
10
0
-10
-20
-30
-40
-50
-60
-70
-75.8
Start 30 MHz
1.997 GHz/
Stop 20 GHz
Date: 4.AUG.2004 08:00:01

Channel 251


Marker 2 [T1]
RBW 1 MHz
RF Att 20 dB
Ref Lvl
-36.51 dBm
VBW 1 MHz
24.2 dBm
2.55126253 GHz
SWT 115 ms
Unit dBm
14.2 dB Offset
2 [T1]
-36.51 dBm
2.55126253 GHz
1 [T1]
-31.83 dBm
1.71084168 GHz
A
1MAX
1MA
24.2
20
10
0
-10
-20
-30
-40
-50
-60
-70
-75.8
Start 30 MHz
1.997 GHz/
Stop 20 GHz
Date: 4.AUG.2004 08:00:55

3.2.6 Block Edge Compliance

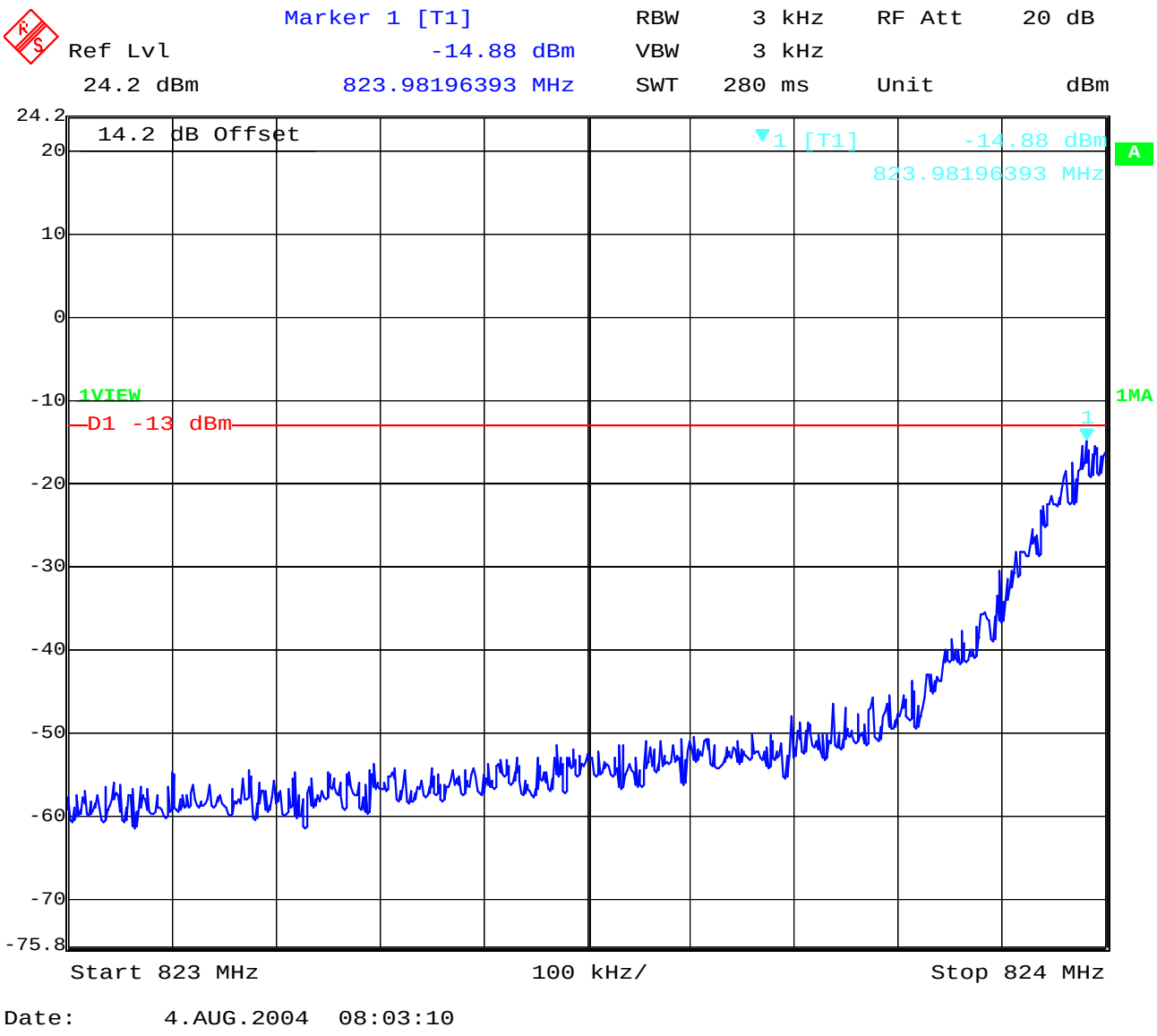
Reference

FCC:	CFR Part 22.917
IC:	RSS 132, Issue 1, Section 6.5

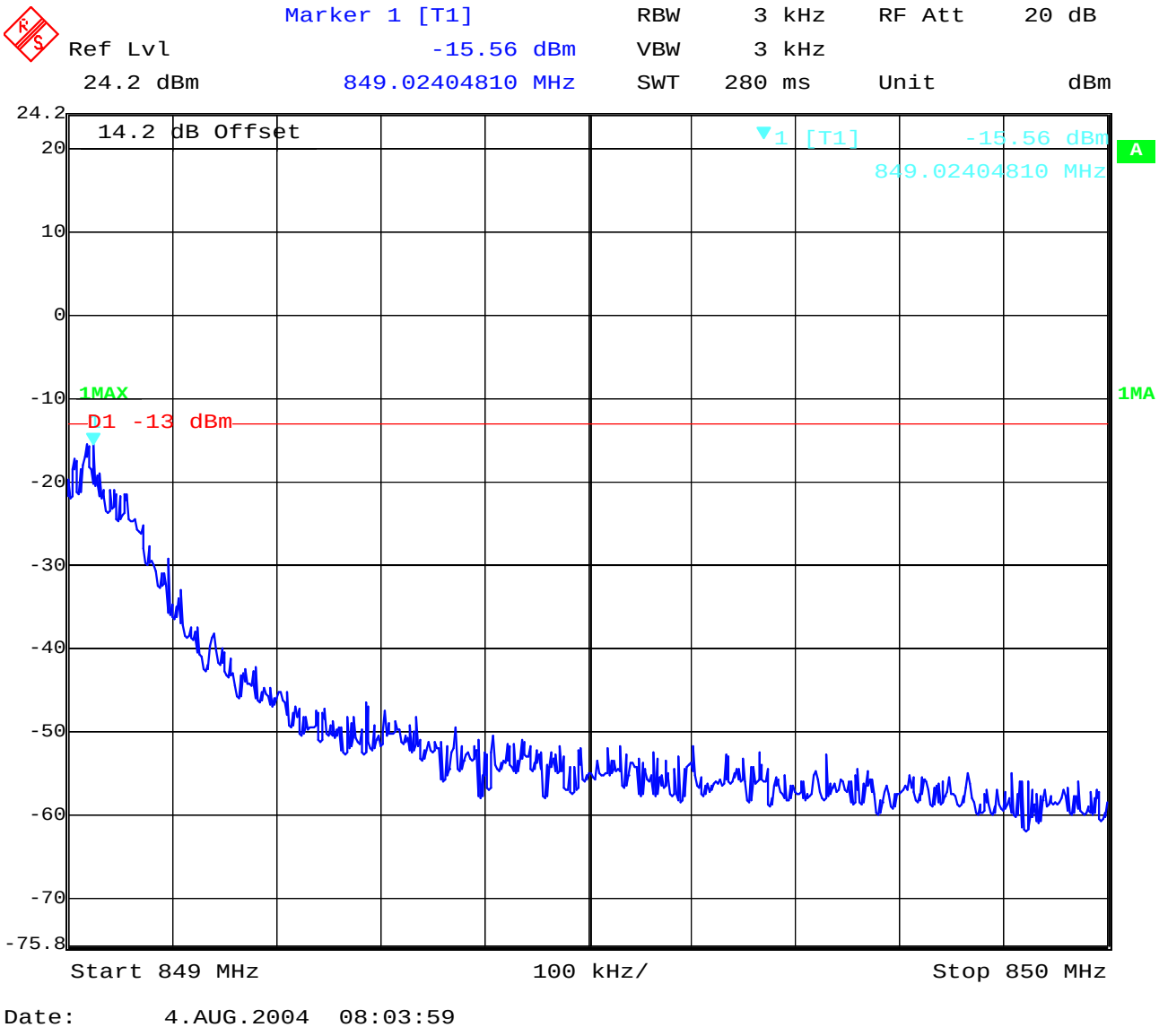
Measurement Limit:

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+10Log(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



3.2.7 Occupied Bandwidth

Reference

FCC:	CFR Part 22.917, 2.1049
IC:	RSS 132, Issue 1, Section 4.2

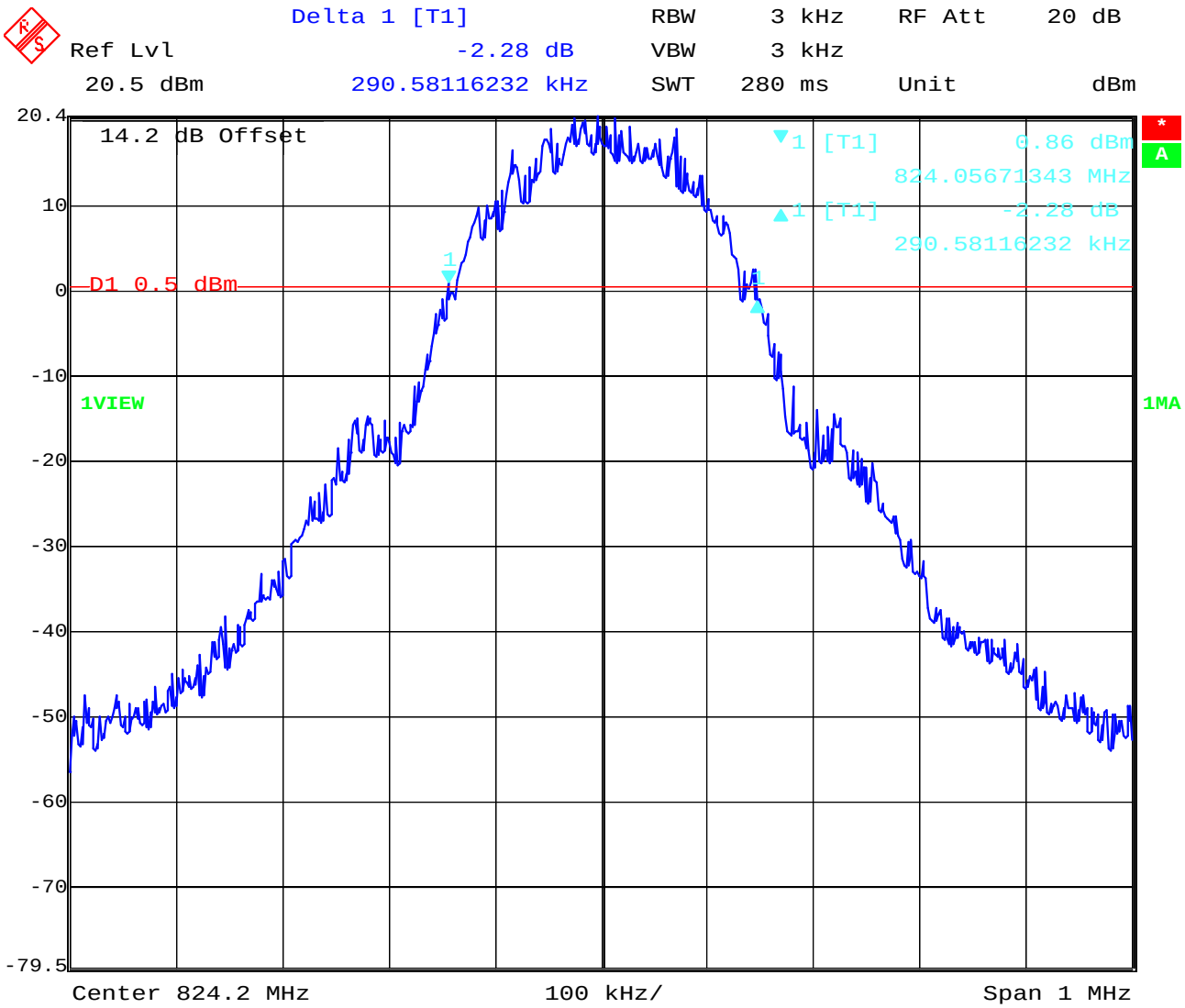
Occupied Bandwidth Results

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.

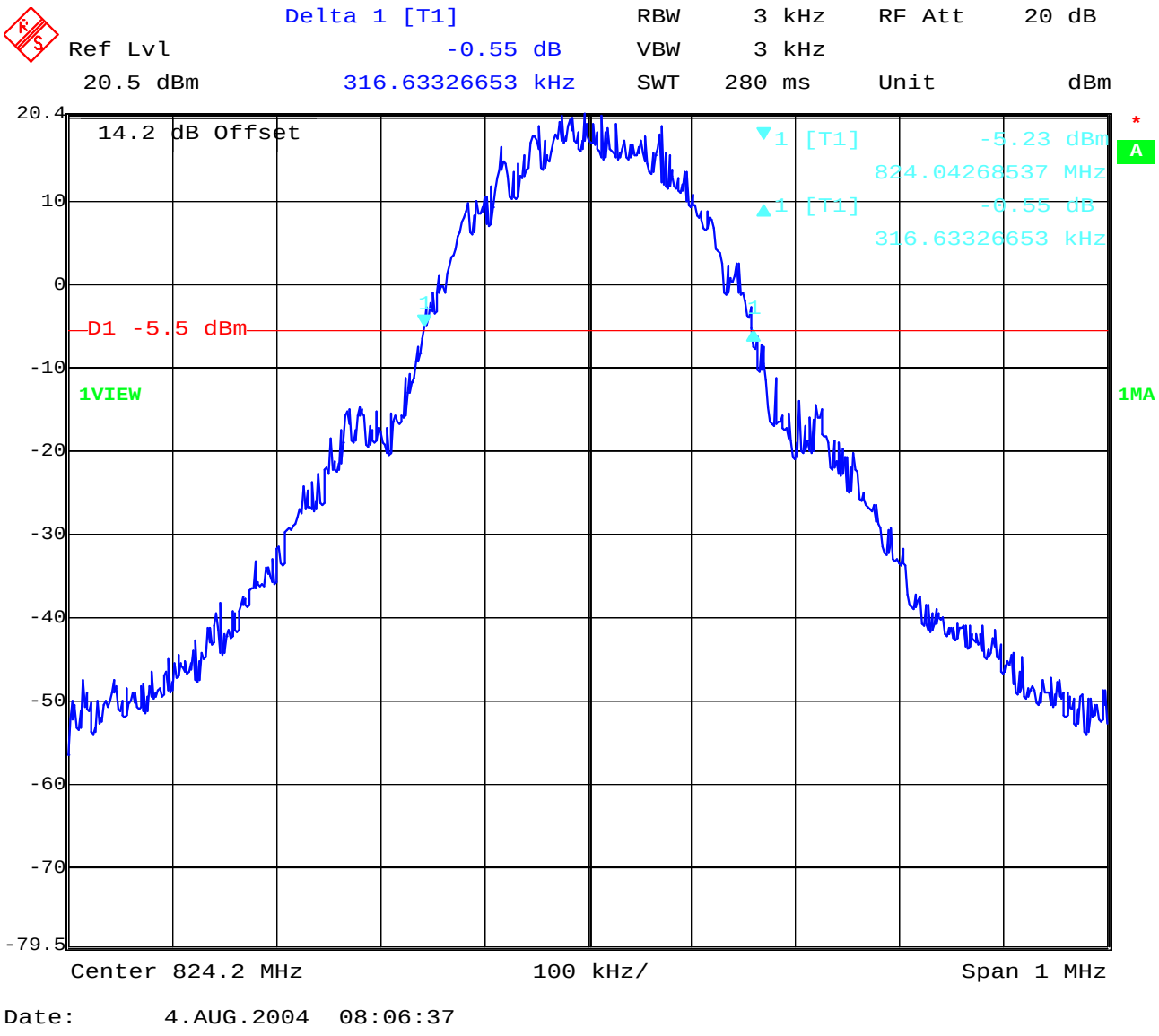
Frequency	99% Occupied Bandwidth (kHz)	-26 dBc Bandwidth (kHz)
824.2 MHz	290.581	316.633
836.4 MHz	292.585	318.637
848.8 MHz	288.577	314.629

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.

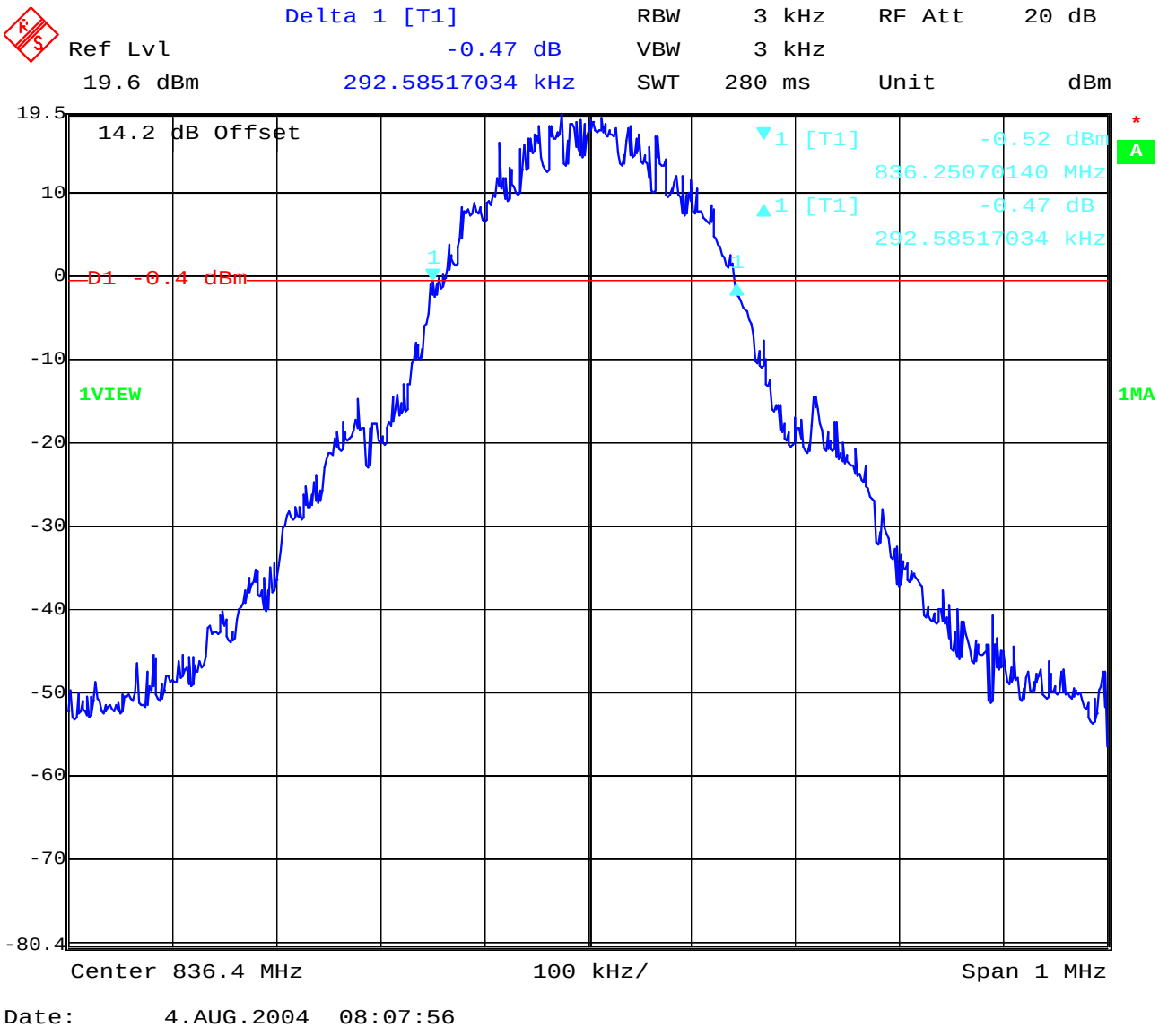
Channel 128
99% (-20 dB) Occupied Bandwidth



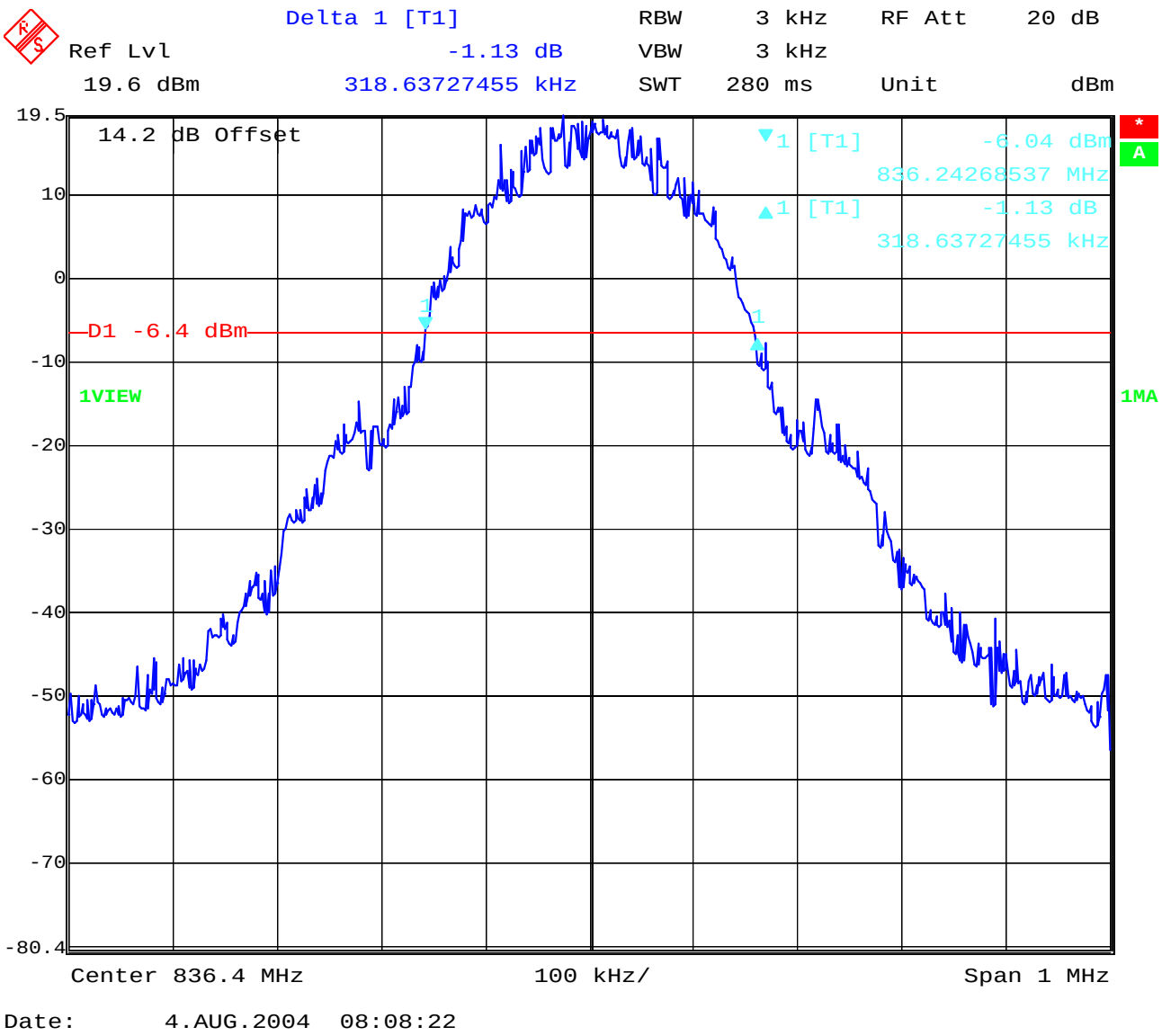
Channel 128
-26 dBc Bandwidth



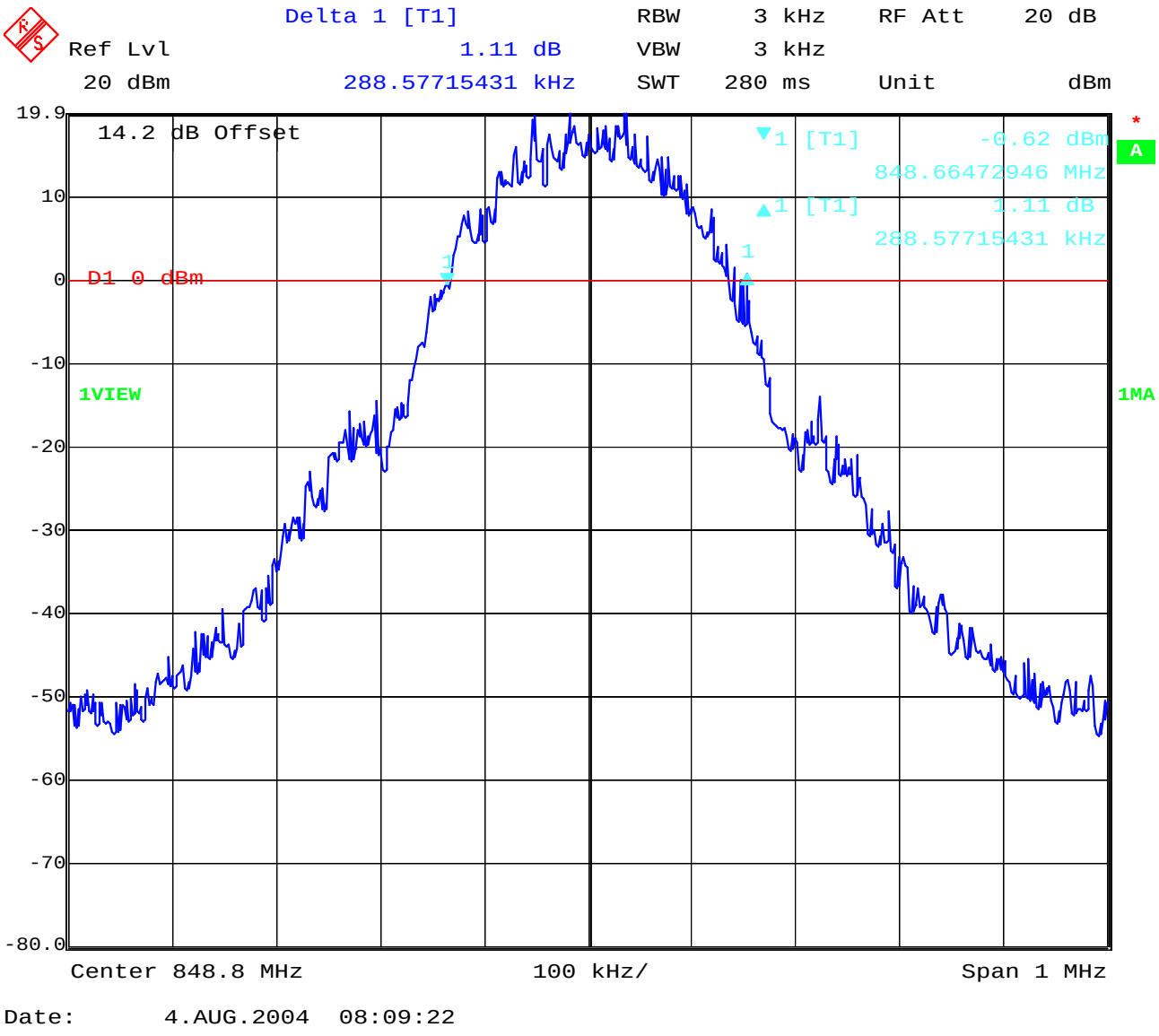
Channel 189
99% (-20 dB) Occupied Bandwidth



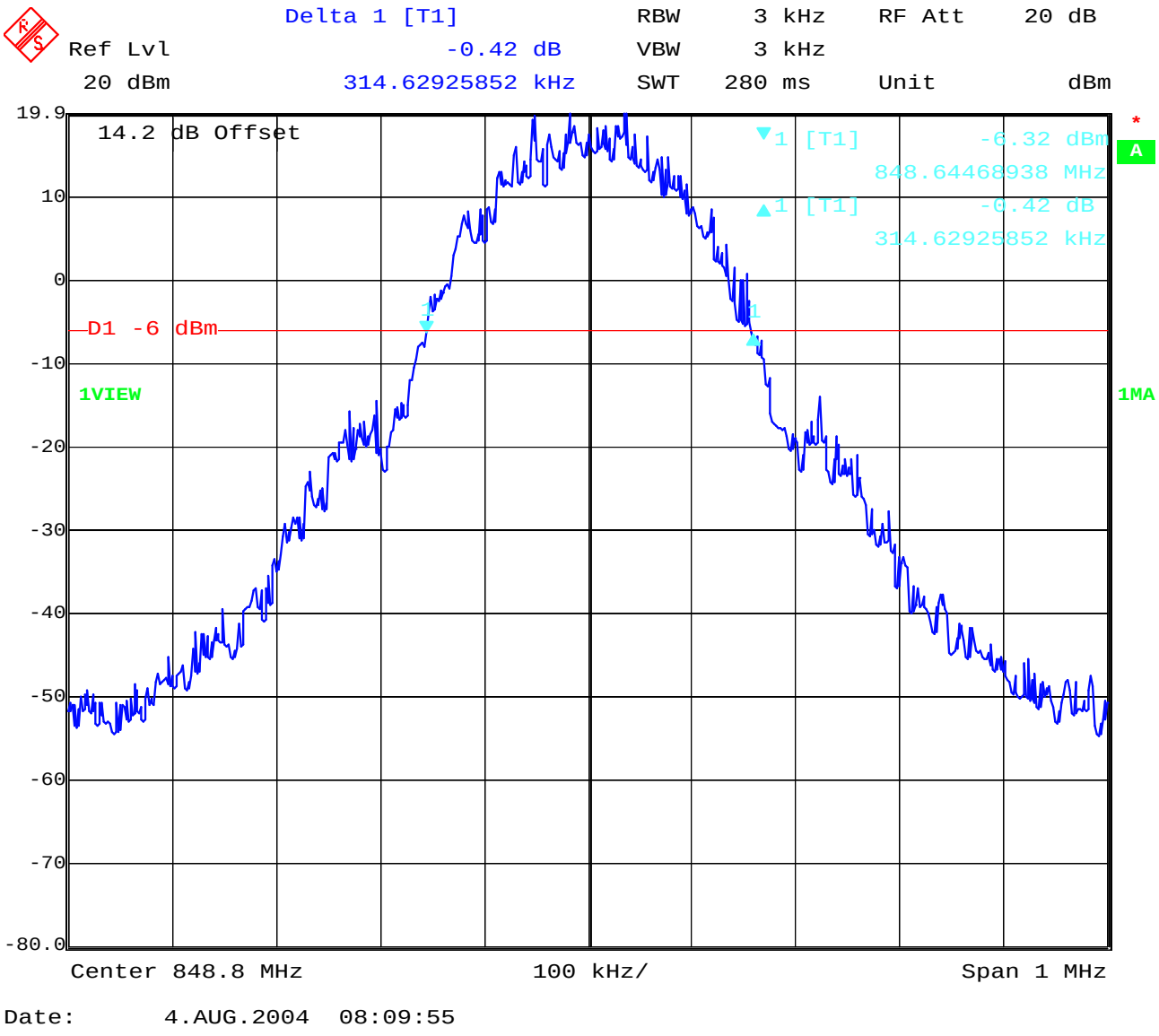
Channel 189
-26 dBc Bandwidth



Channel 251
99% (-20 dB) Occupied Bandwidth



Channel 251
-26 dBc Bandwidth



4 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	8566 A	Hewlett-Packard	1925A00257
02	Analyzer Display	8566 A	Hewlett-Packard	1925A00860
03	Oscilloscope	7633	Tektronix	230054
04	Radio Communication Analyzer	CMTA 54	Rohde & Schwarz	894 043/010
05	System Power Supply	6038 A	Hewlett-Packard	2848A07027
06	Signal Generator	8111 A	Hewlett-Packard	2215G00867
07	Signal Generator	8662 A	Hewlett-Packard	2224A01012
08	Function Generator	AFGU	Rohde & Schwarz	862 480/032
09	Regulating Transformer	MPL	Erfi	91350
10	LISN	NNLA 8120	Schwarzbeck	8120331
11	Relay-Matrix	PSU	Rohde & Schwarz	893 285/020
12	Power-Meter	436 A	Hewlett-Packard	2101A12378
13	Power-Sensor	8484 A	Hewlett-Packard	2237A10156
14	Power-Sensor	8482 A	Hewlett-Packard	2237A00616
15	Modulation Meter	9008	Racal-Dana	2647
16	Frequency Counter	5340 A	Hewlett-Packard	1532A03899
17	Anechoic Chamber	---	MWB	87400/002
18	Spectrum Analyzer	85660 B	Hewlett-Packard	2747A05306
19	Analyzer Display	85662 A	Hewlett-Packard	2816A16541
20	Quasi Peak Adapter	85650 A	Hewlett-Packard	2811A01131
21	RF-Preselector	85685 A	Hewlett-Packard	2833A00768
22	Biconical Antenna	3104	Emco	3758
23	Log. Per. Antenna	3146	Emco	2130
24	Double Ridged Horn	3115	Emco	3088
25	EMI-Testreceiver	ESAI	Rohde & Schwarz	863 180/013
26	EMI-Analyzer-Display	ESAI-D	Rohde & Schwarz	862 771/008
27	Biconical Antenna	HK 116	Rohde & Schwarz	888 945/013
28	Log. Per. Antenna	HL 223	Rohde & Schwarz	825 584/002
29	Relay-Switch-Unit	RSU	Rohde & Schwarz	375 339/002
30	Highpass	HM985955	FSY Microwave	001
31	Amplifier	P42-GA29	Tron-Tech	B 23602
32	Anechoic Chamber		Frankonia	
33	Control Computer	PSM 7	Rohde & Schwarz	834 621/004
34	EMI Test Receiver	ESMI	Rohde & Schwarz	827 063/010
35	EMI Test Receiver	Display	Rohde & Schwarz	829 808/010

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
36	Control Computer	HD 100	Deisel	100/322/93
37	Relay Matrix	PSN	Rohde & Schwarz	829 065/003
38	Control Unit	GB 016 A2	Rohde & Schwarz	344 122/008
39	Relay Switch Unit	RSU	Rohde & Schwarz	316 790/001
40	Power Supply	6032A	Hewlett Packard	2846A04063
41	Spectrum Monitor	EZM	Rohde & Schwarz	883 720/006
42	Measuring Receiver	ESH 3	Rohde & Schwarz	890 174/002
43	Measuring Receiver	ESVP	Rohde & Schwarz	891 752/005
44	Bicon Ant. 20-300MHz	HK 116	Rohde & Schwarz	833 162/011
45	Logper Ant. 0.3-1 GHz	HL 223	Rohde & Schwarz	832 914/010
46	Amplifier 0.1-4 GHz	AFS4	Miteq Inc.	206461
47	Logper Ant. 1-18 GHz	HL 024 A2	Rohde & Schwarz	342 662/002
48	Polarisation Network	HL 024 Z1	Rohde & Schwarz	341 570/002
49	Double Ridged Horn Antenna 1-26.5 GHz	3115	EMCO	9107-3696
50	Microw. Sys. Amplifier 0.5-26.5 GHz	8317A	Hewlett Packard	3123A00105
51	Audio Analyzer	UPD	Rohde & Schwarz	1030.7500.04
52	Controler	PSM 7	Rohde & Schwarz	883 086/026
53	DC V-Network	ESH3-Z6	Rohde & Schwarz	861 406/005
54	DC V-Network	ESH3-Z6	Rohde & Schwarz	893 689/012
55	AC 2 Phase V-Network	ESH3-Z5	Rohde & Schwarz	861 189/014
56	AC 2 Phase V-Network	ESH3-Z5	Rohde & Schwarz	894 981/019
57	AC-3 Phase V-Network	ESH2-Z5	Rohde & Schwarz	882 394/007
58	Power Supply	6032A	Rohde & Schwarz	2933A05441
59	RF-Test Receiver	ESVP.52	Rohde & Schwarz	881 487/021
60	Spectrum Monitor	EZM	Rohde & Schwarz	883 086/026
61	RF-Test Receiver	ESH3	Rohde & Schwarz	881 515/002
62	Relay Matrix	PSU	Rohde & Schwarz	882 943/029
63	Relay Matrix	PSU	Rohde & Schwarz	828 628/007
64	Spectrum Analyzer	FSIQ 26	Rohde & Schwarz	119.6001.27
65	Spectrum Analyzer	HP 8565E	Hewlett Packard	3473A00773