TTI-P-G-166/98-30

Accredited Bluetooth Test Facility (BQTF)

Test report no.: 4_0551-01-03/02
FCC Part 24 and Part 22
GM48
FCC ID: PY76220501-BV

CETECOM – ICT Services GmbH
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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.

1.2 Testing laboratory

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Accredited testing laboratory
DAR-registration number : TTI-P-G-166/98-30
Accredited Bluetooth™ Test Facility (BQTF)
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

1.3 Details of applicant

Name : Sony Ericsson Mobile Communication AB
Street : Nya Vattentornet
City : 22188 Lund
Country : Sweden
Telephone : +46-46-193-242
Telefax : +46-46-193-295
Contact : Mr. Bo Johansson
Telephone : +46-46-193-242

1.4 Application details

Date of receipt of application : 25.02.2002
Date of receipt of test item : 25.02.2002
Date of test : 25.02.-26.02.2002

1.5 Test item

Type of equipment	:	**Dual Band PCS module (PCS 850 and PCS1900)**
Type designation	:	GM48 / 6220501-BV
Manufacturer	:	Applicant
Street	:	
City	:	
Country	:	
Serial number	:	IMEI 001003-83-033173-5
Additional informations: :		
Frequency	:	1850 – 1910 MHz and 824 – 849 MHz
Type of modulation	:	300KF2D
Number of channels	:	300 (PCS1900) and 125 (PCS850)
Antenna	:	coax socket and dedicated dual band antenna
Power supply	:	3.6V DC via socket
Output power PCS 850	:	cond. 30.47 dBm Peak , ERP 27.0 dBm (Burst); EIRP: 29.0 dBm (Burst)
Output power PCS 1900	:	cond 31.45 dBm Peak , ERP 27.51 dBm (Burst); EIRP: 29.61 dBm (Burst)
Type of equipment	:	Temperature range : -30°C - +60°C
FCC – ID	:	PY76220501-BV
Hardware	:	P1D
Software	:	R1A017

1.6 Test standards: FCC Part 22 and Part 24

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

2 Technical test

The radiated measurements were performed vertical and horizontal over the whole frequency range. We start at 1 m high with vertical receiving antenna and rotate the dish continuously. During rotation we use the antenna lift system to vary the high from 1 to 4 m. So we find maximum radiation output. At this points we do manual remeasurements. After this we do the same measurements in horizontal position of the receiving antenna. This (horizontal and vertical) is made for all the three planes of the test sample. We use the maximum received results.

The detector function and selection of bandwidth are according ANSI C63.2-1996 item 8.2.1 and ANSI C63.4-1992 Item 4.2.

Antennas are conform with ANSI C63.2-1996 item 15.

150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna

1GHz: Average, RBW 1MHz, VBW 10 MHz, wave guide horn

2.1 Summary of test results

We did measurements for PCS 850 with the same parameters as for PCS 1900.
No deviations from the technical specification(s) were ascertained in the course of the tests performed.

FINAL VERDICT: PASS

Technical responsibility for area of testing :

Date	Section	Name	Signature
2002-03-11	RSC 8414	Ames H..	

Technical responsibility for area of testing :

Date	Section	Name	Signature
2002-03-11	RSC8412	Hausknecht D.	

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

2.2 Testreport

TEST REPORT

Test report no. : 4_0551-01-03/02

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

PARAMETER TO BE MEASURED	Paragraph	PAGE
Part PCS 1900		
POWER OUTPUT	SUBCLAUSE § 24.232	8
FREQUENCY STABILITY	SUBCLAUSE § 24.235	10
AFC FREQ ERROR vs. VOLTAGE		11
AFC FREQ ERROR vs. TEMPERATURE		11
EMISSIONS LIMITS	§24.238	13
CONDUCTED SPURIOUS EMISSIONS		32
OCCUPIED BANDWIDTH	§2.989	41
PART PCS 850		
POWER OUTPUT	SUBCLAUSE § 24.232	48
FREQUENCY STABILITY	SUBCLAUSE § 24.235	50
AFC FREQ ERROR vs. VOLTAGE		51
AFC FREQ ERROR vs. TEMPERATURE		51
EMISSIONS LIMITS	§24.238	53
CONDUCTED SPURIOUS EMISSIONS		68
OCCUPIED BANDWIDTH	§2.989	77
CONDUCTED EMISSIONS	§ 15.107/207	84

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

PART PCS1900

POWER OUTPUT SUBCLAUSE § 24.232

Summery:

This paragraph contains both average , peak output powers and EIRP measurements for the mobile station.
In all cases, the peak output power is wthin the required mask (this mask is specified in the JTC standarts, 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 Spectrum 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

Power Measurements:

Conducted:

Frequency (MHz)	Power Step	Peak Output Power (dBm)	Average Output Power (dBm)
1850.2	0	31.45	31.32
1880.0	0	30.05	29.96
1909.8	0	30.46	30.35
Measurement uncertainty		±0.5 dB	

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

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."
Method of Measurement:
1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference center of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
2. A "reference path loss" is established as Pin + 2.1 - Pr.
3. The EUT is substituted for the dipole at the reference centre of the chamber. The EUT is put into CW test mode and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs is identified.
5. The EUT is then put into pulse mode at its maximum power level (Power Step 0).
6. "Gated mode" power measurements are performed with the receiving antenna placed at the co-ordinates determined in Step 3 to determine the output power as defined in FCC Rule 24.232 (b) and (c). The "reference path loss" from Step 1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.1 dBi) and known input power (Pin).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.1dBi.

Limits:

Power Step	Burst Average EIRP (dBm)
0	<33

Power Measurements:

Radiated:

Frequency (MHz)	Power Step	BURST AVERAGE (dBm)		MODULATION AVERAGE (dBm)	
		EIRP	ERP	EIRP	ERP
1850.2	0	29.61	27.51	20.61	18.51
1880.0	0	29.32	27.22	20.32	18.22
1909.8	0	29.05	26.95	20.05	17.95
Measurement uncertainty		±3 dB			

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
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FREQUENCY STABILITY SUBCLAUSE § 24.235

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 CMD 65 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 3.6 Volts, connected to the CMD 65 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, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with nominal 3.6 Volts. Vary supply voltage from minimum 3.4 Volts to maximum 4.0 Volts, in 0.05 Volt increments remeasuring carrier frequency at each voltage. Pause at 3.6 Volts for 1 1/2 hours unpowered, 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 3.6 Volts, connected to the CMD 65 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, unpowered, 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. As this transceiver is considered "Hand carried, battery powered equipment…," Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.4 Vdc and 4.0 Vdc, with a nominal voltage of 3.6 Vdc . Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of +11.1% and – 5.4 %. For the purposes of measuring frequency stability these voltage limits are to be used.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
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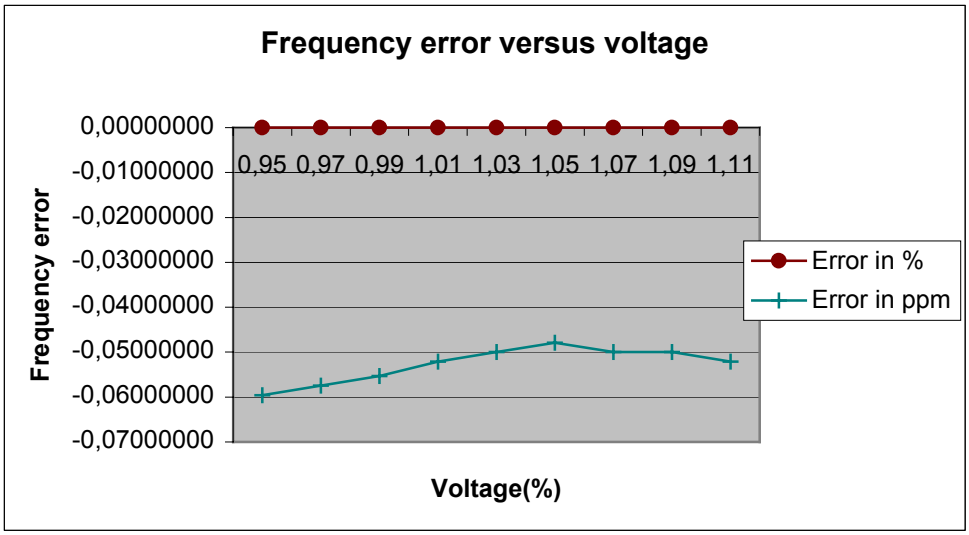
AFC FREQ ERROR vs. VOLTAGE

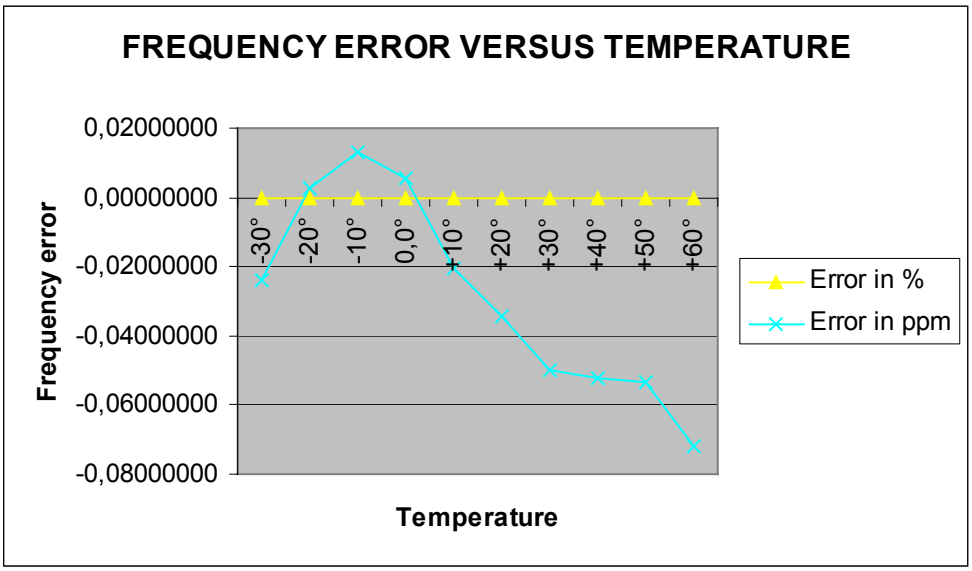
Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
3.40	-112	0.06	
3.45	-112	0.06	
3.50	-108	0.06	
3.55	-104	0.06	
3.60	-98	0.05	
3.65	-98	0.05	
3.70	-94	0.05	
3.75	-90	0.05	
3.80	-90	0.05	
3.85	-94	0.05	
3.90	-94	0.05	
3.95	-98	0.05	
4.00	-98	0.05	

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
-30	-45	0.02	
-20	+5	0.00	
-10	+25	0.01	
±0.0	+10	0.01	
+10	-38	0.02	
+20	-65	0.03	
+30	-98	0.05	
+40	-98	0.05	
+50	-100	0.05	
+60	-125	0.07	

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64





REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

EMISSIONS LIMITS §24.238

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 – 1992 requirements and is recognised 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 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 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:

$Pg = E^2 4\pi d^2 / 120\pi = E^2 d^2 /30$

where : P = power in watts
g = arithmetic gain of transmitting antenna over isotropic radiator.
E = maximum field strength in volts/meter
d = measurement distance in meter

Using a dipole gain of 1.67 or 2.2 dB and a test distance of 3 meters, this equation reduces to:

P(dBm) = E(dBuV/m) - 97.2dB

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.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Measurement Results:
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.

RESULTS OF OPEN FIELD RADIATED TEST FOR FCC-24:
The final open field radiated levels are presented on the next pages.

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

Channel 512

Data File : /40552_15.DOC 27 Feb 2002

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	31.951	29.5	26.6	-2.9	QP	V	104	252	18.1	

Channel 661

Data File : /40552_05.DOC 27 Feb 2002

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	31.886	29.5	27.0	-2.5	QP	V	102	17	18.1	
2	45.6	29.5	22.7	-6.8	PK	V	97	310	N/T	

Channel 810

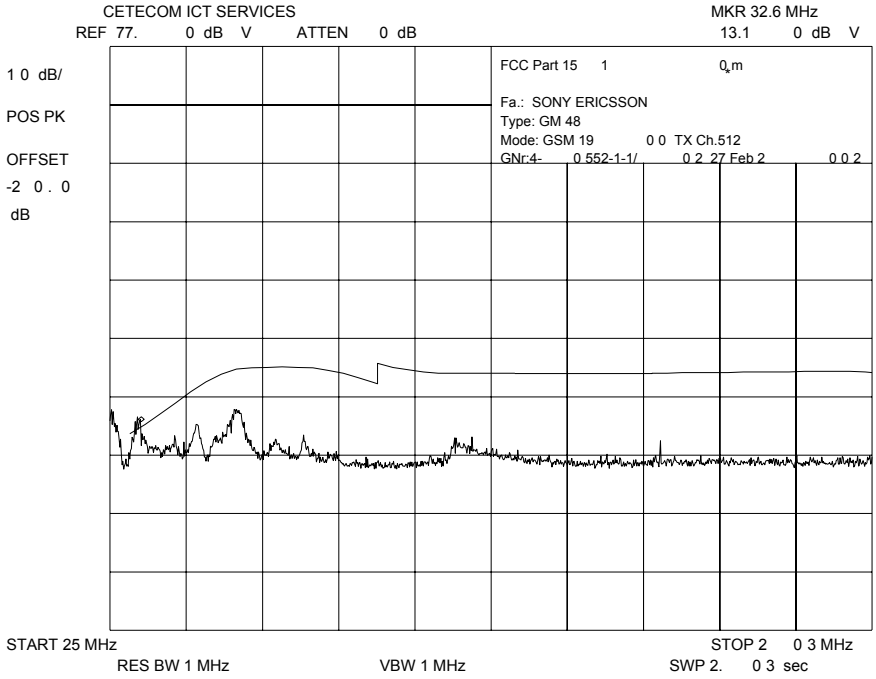
Data File : /40552_10.DOC 27 Feb 2002

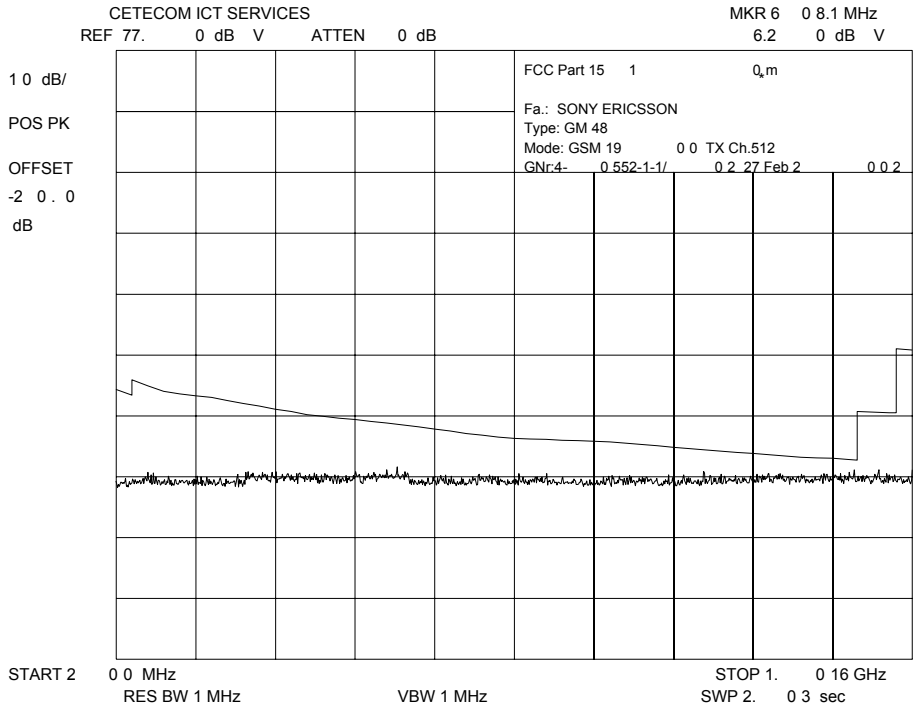
No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	31.898	29.5	26.6	-2.9	QP	V	173	360	18.1	
2	45.6	29.5	23.4	-6.1	PK	V	97	155	N/T	

N/T in CORR FACTOR column denotes a non-traceable signal.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 512 (up to 1 GHz)





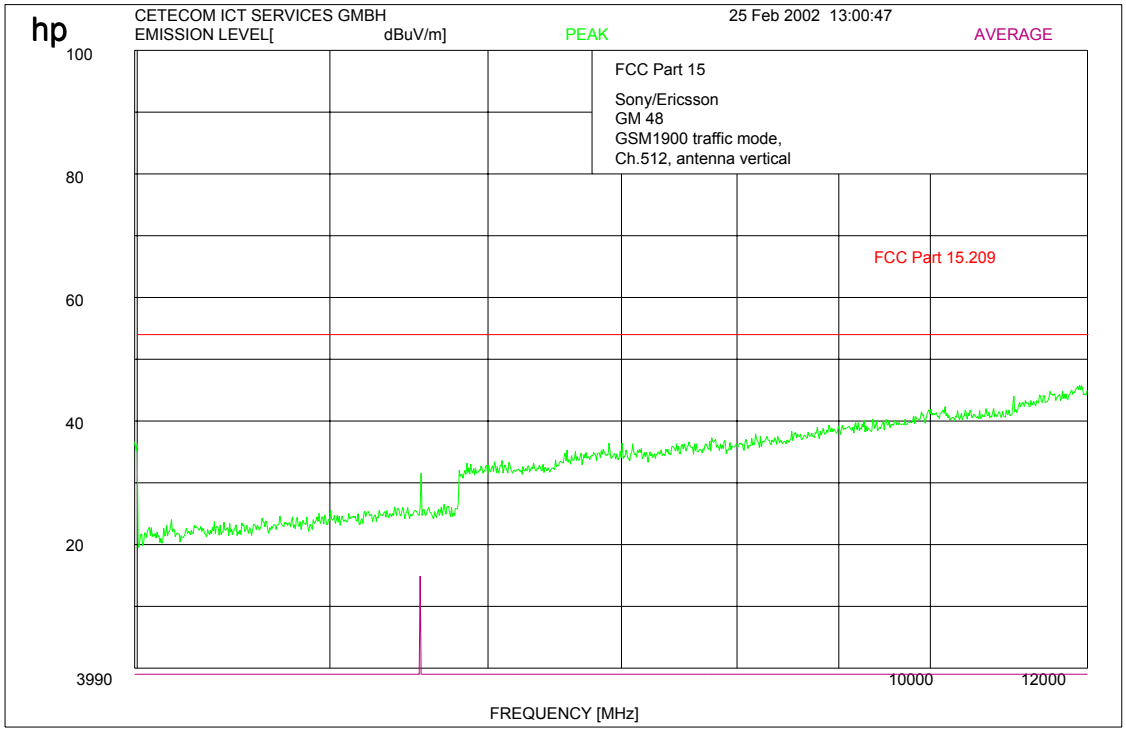
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 512 (up to 4 GHz)

3696.4 MHz 31.3 dBµV/m AV

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

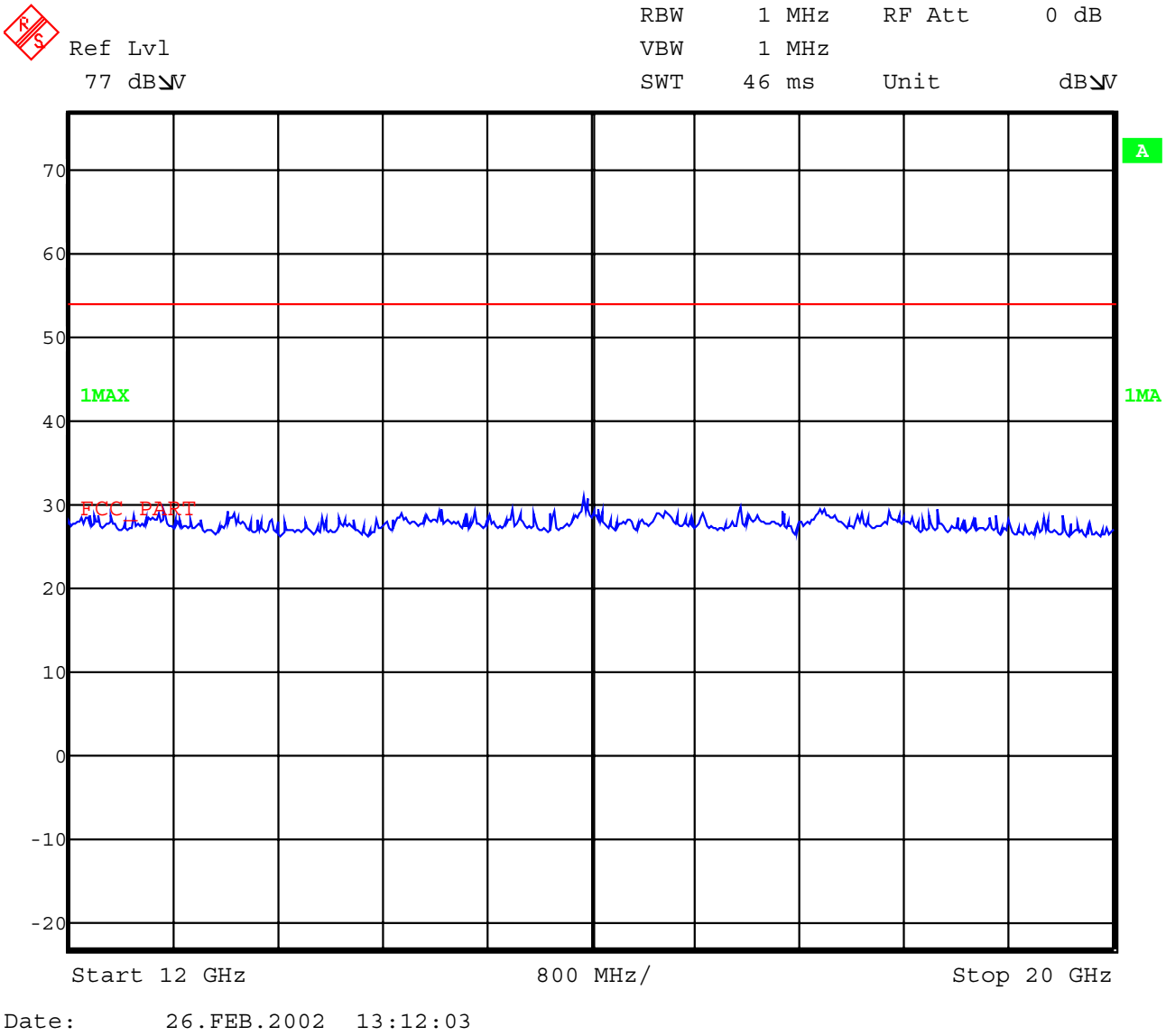
Channel 512 :– 12 GHz



5550 MHz 16.9 dBµV/m AV

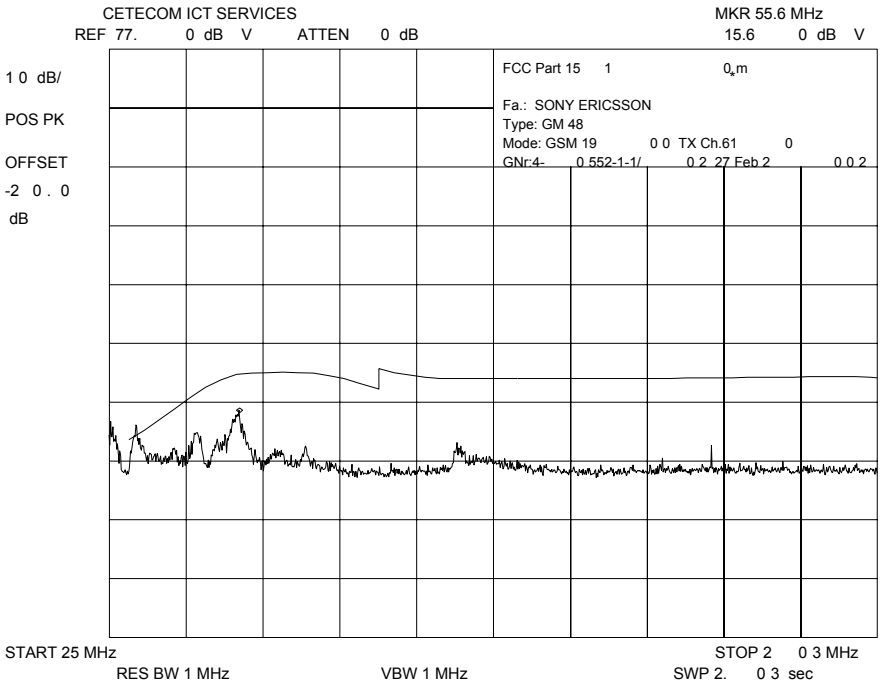
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

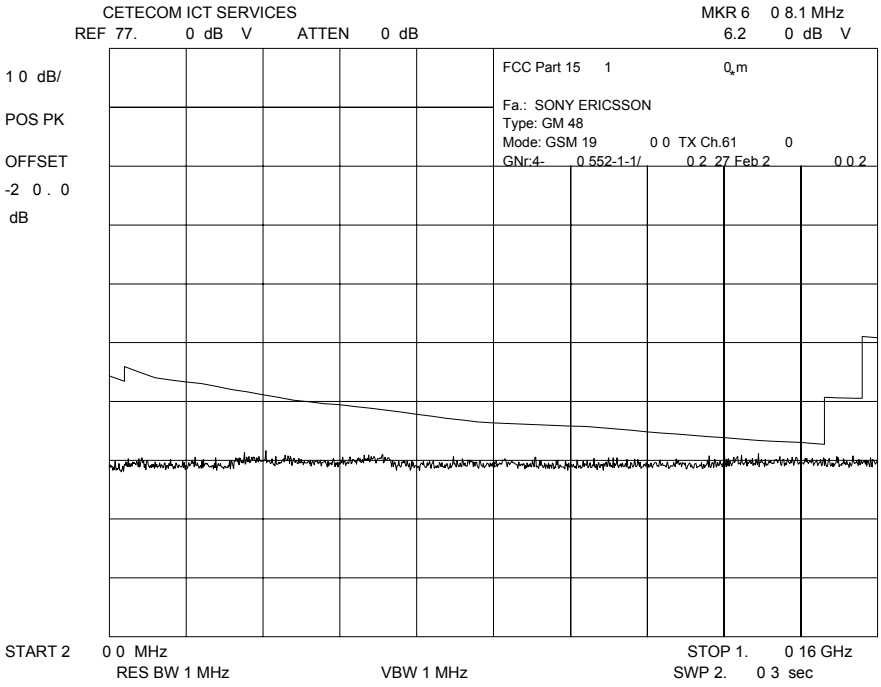
Channel 512 : 12 – 20 GHz



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 661 (up to 1 GHz)





REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
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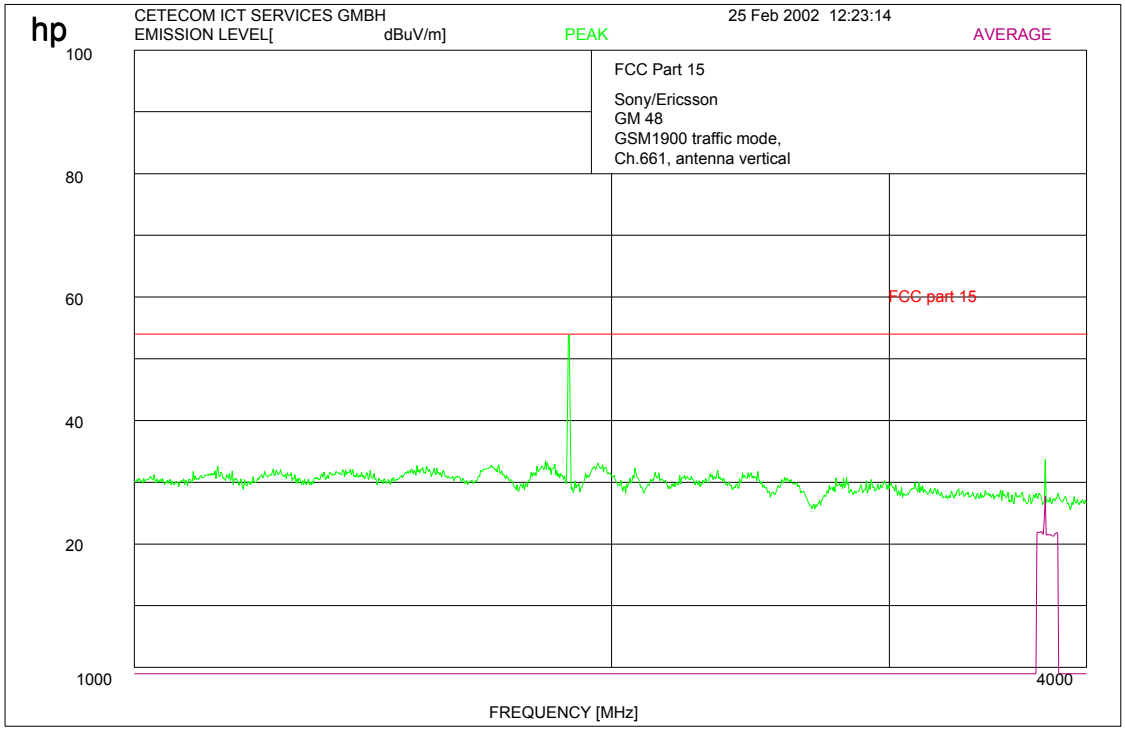
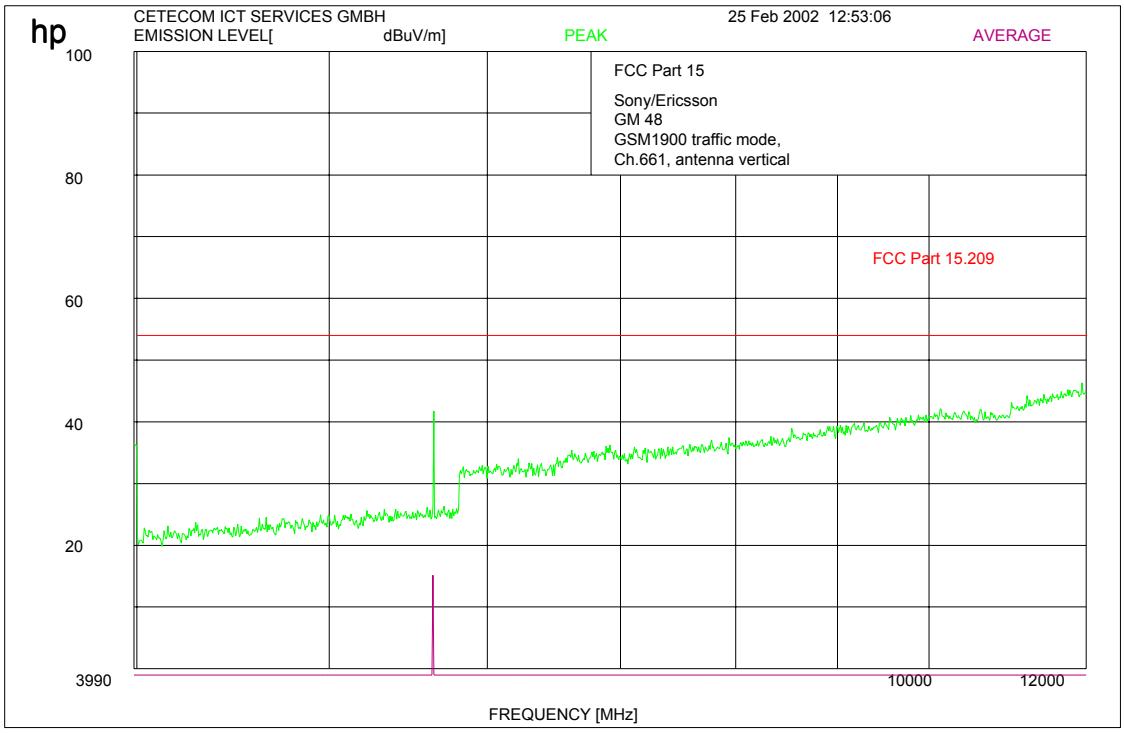
Channel 661 (up to 4 GHz)



3763.5 MHz 27.7dBµV/m AV

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 661 : 4 – 12 GHz



5636.1 MHz 15.1 dBµV/m AV

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
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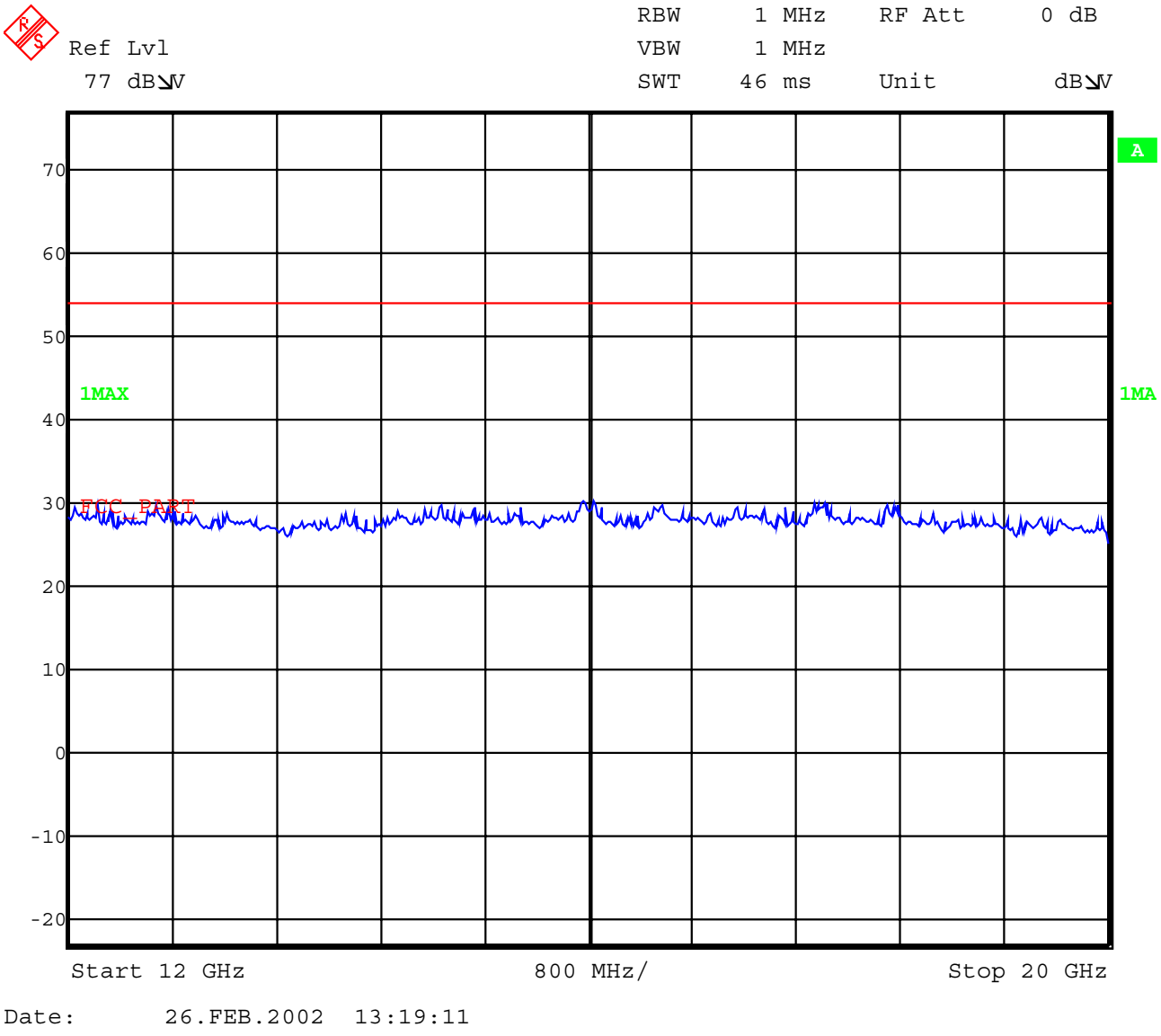
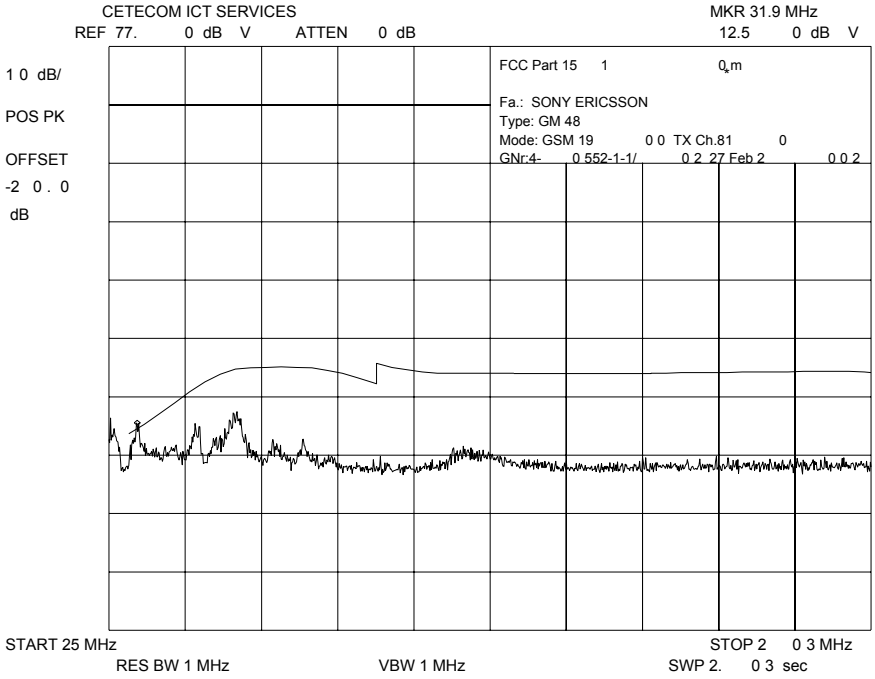
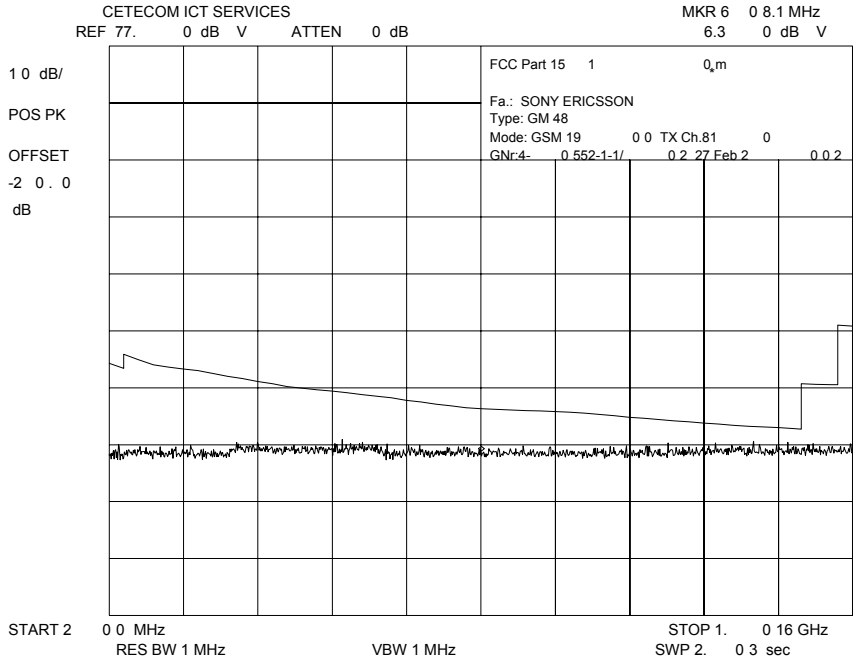
Channel 661 : 12 – 20 GHz



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

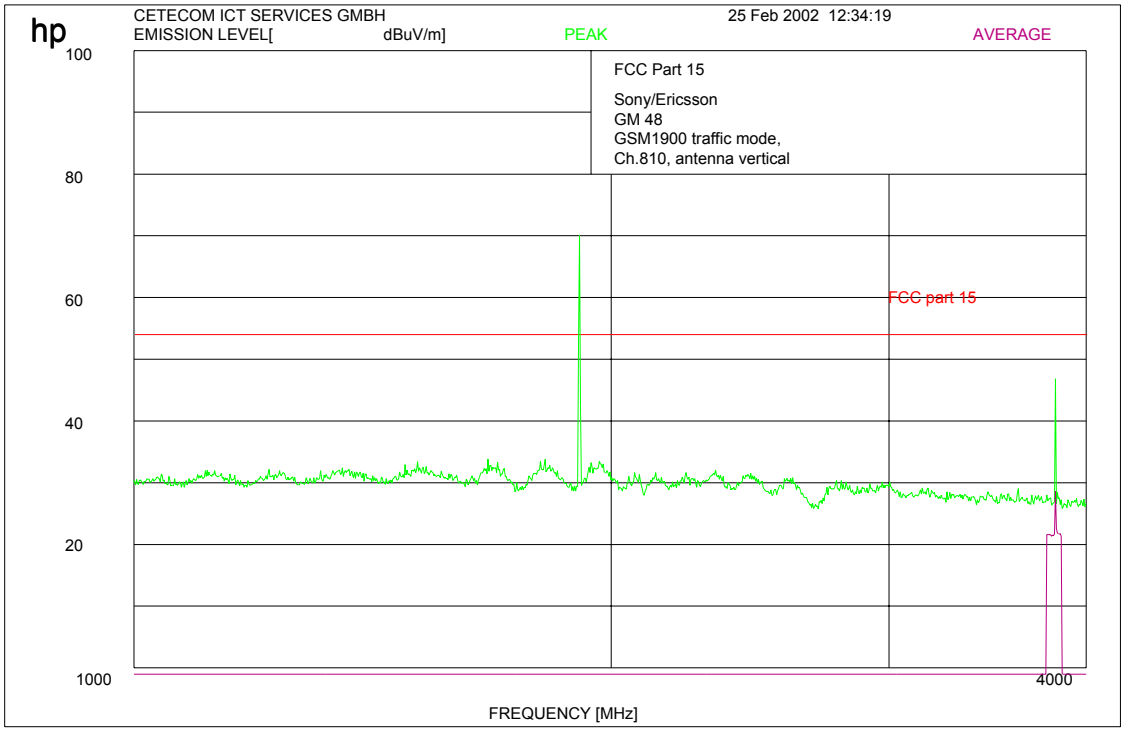
Channel 810 up to 1 GHz





REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

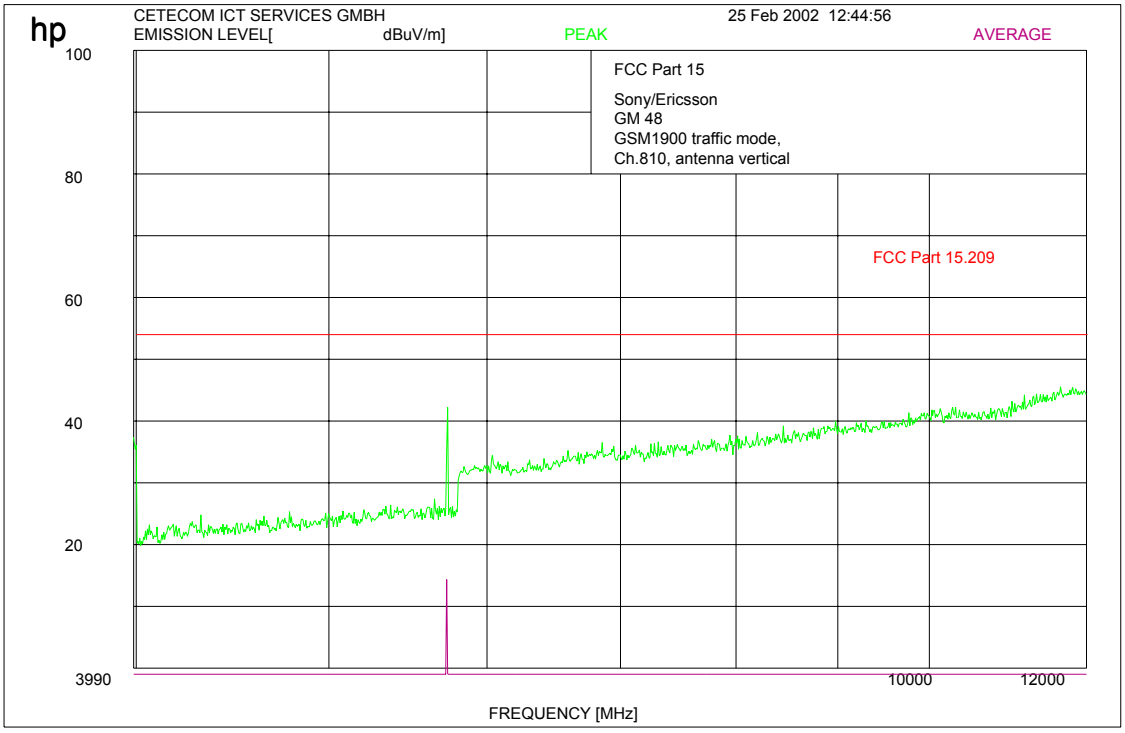
Channel 810 up to 4 GHz



3821.3 MHz 28.6 dBµV/m AV

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

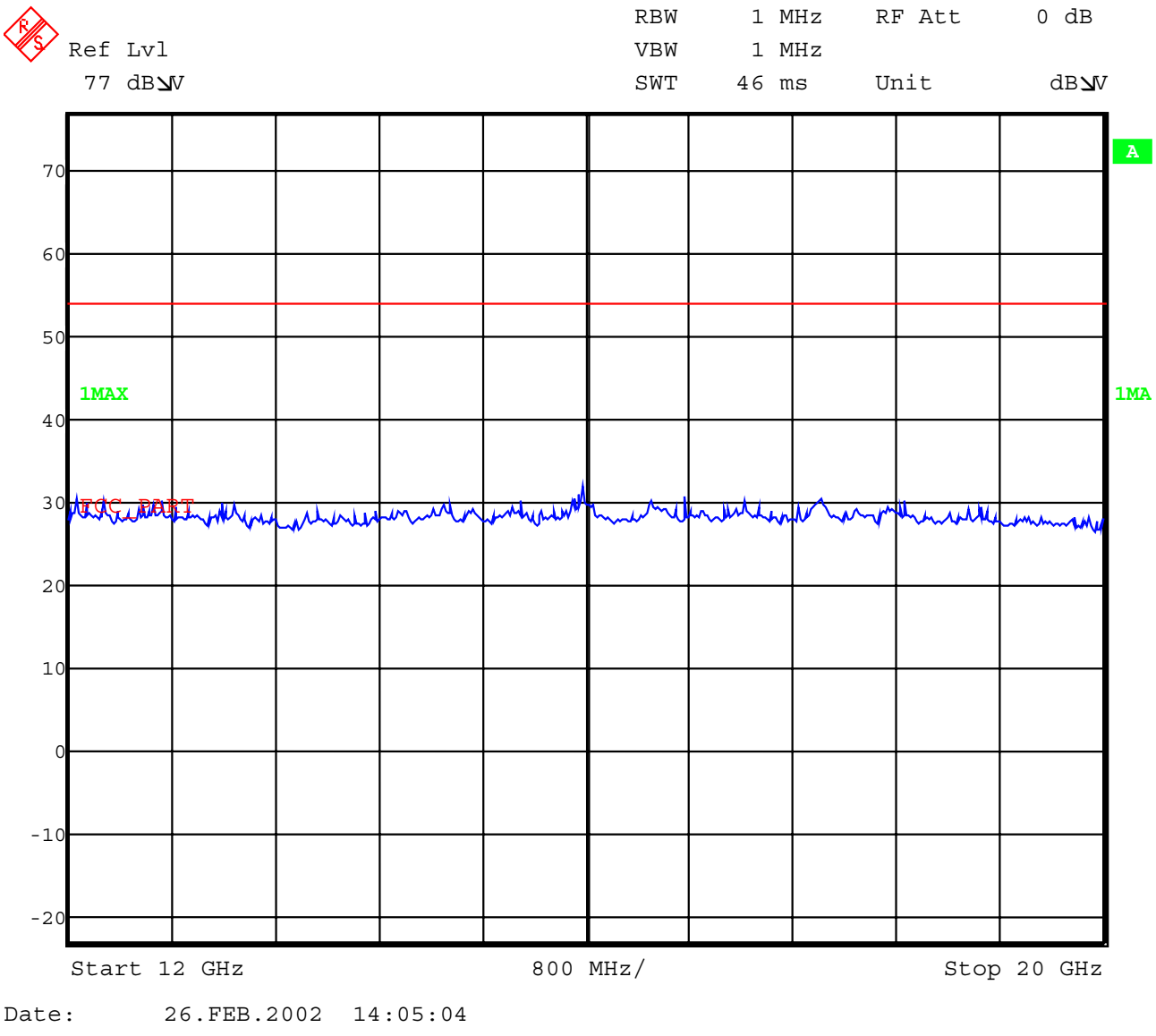
Channel 810 : 4 –12 GHz



5729.9 MHz 14.3 dBµV/m AV

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 810 : 12 – 20 GHz



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 661 (this is valid for all 3 channels and up to 1 GHz)
Idle-Mode

Test: Rad. Emission

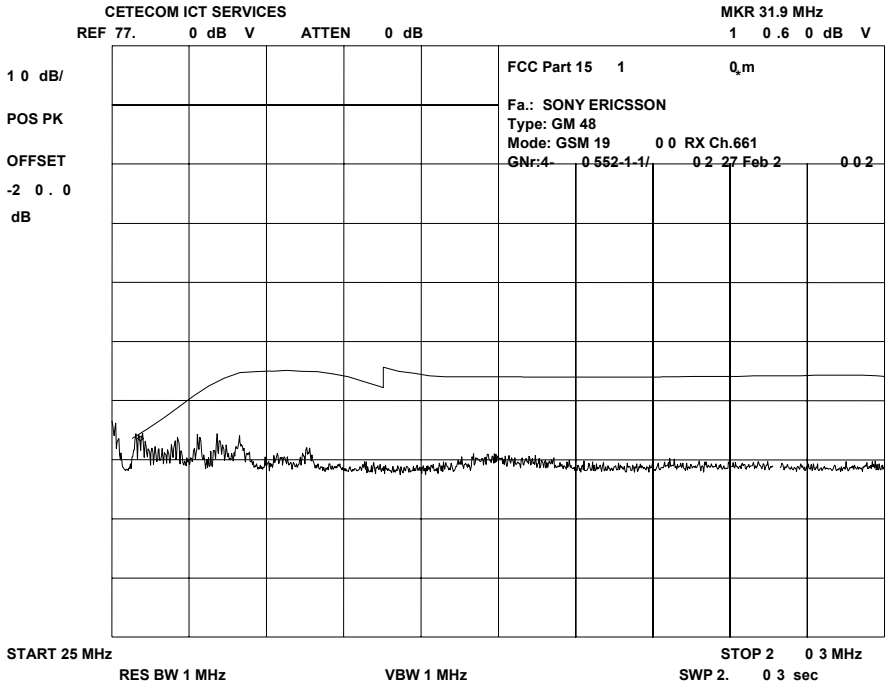
Data File : /10138_60_DOC 30 Jan 2002

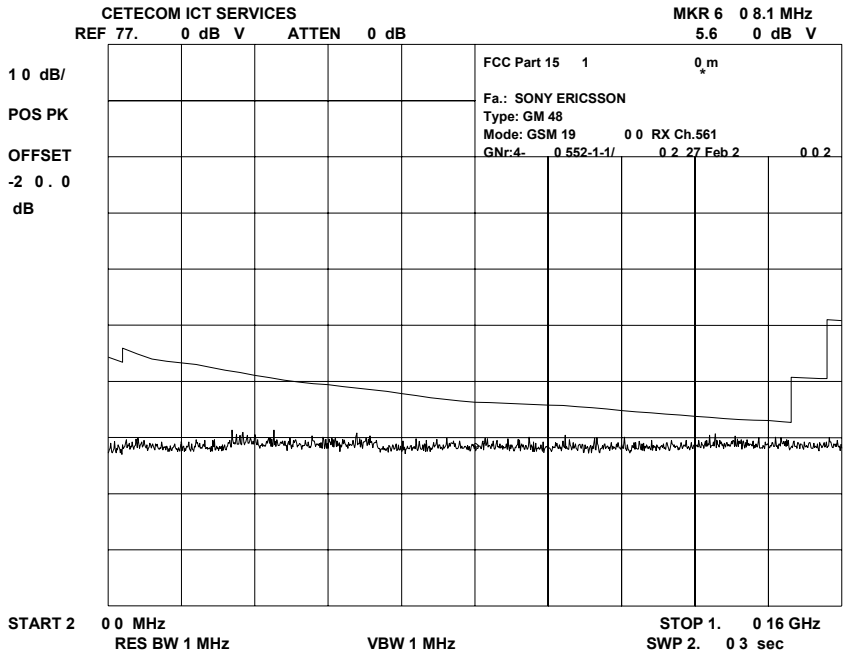
No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	48.3	29.5	19.0	-10.5	PK	V	97	360	N/T	
2	154.5	33.0	21.8	-11.2	PK	V	97	360	N/T	
3	159.9	33.0	24.7	-8.3	PK	V	97	360	N/T	

N/T in CORR FACTOR column denotes a non-traceable signal.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

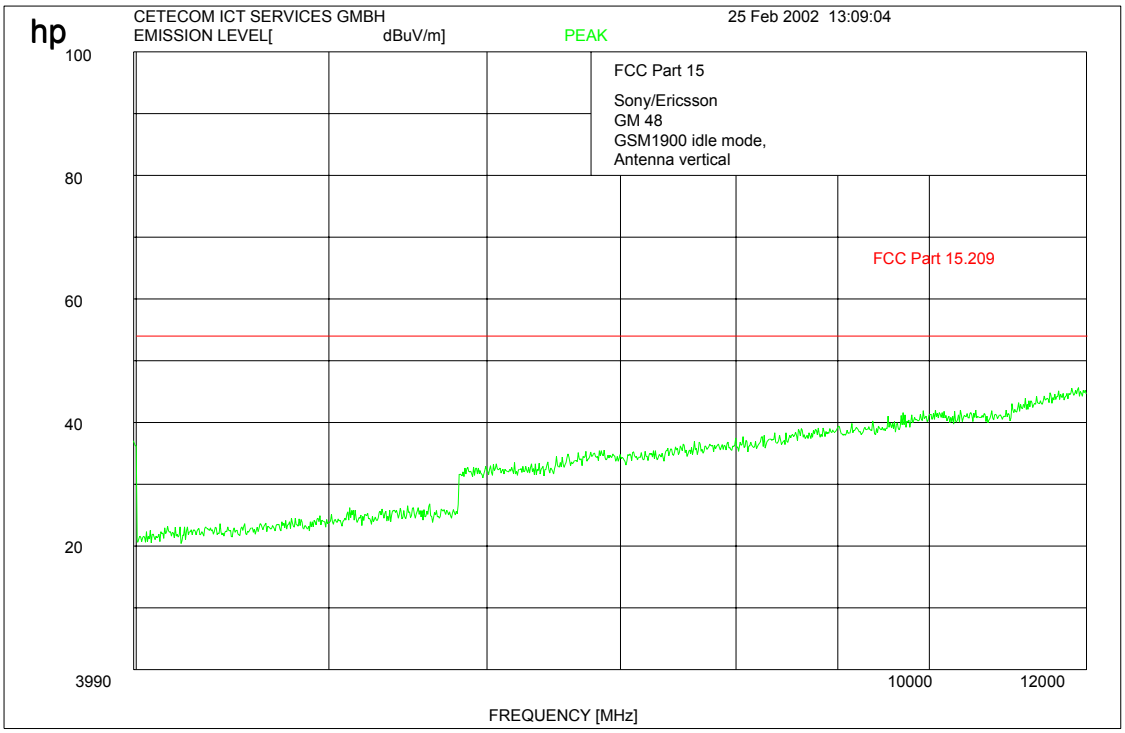
Channel 661 (this is valid for all 3 channels and up to 1 GHz)
Idle-Mode





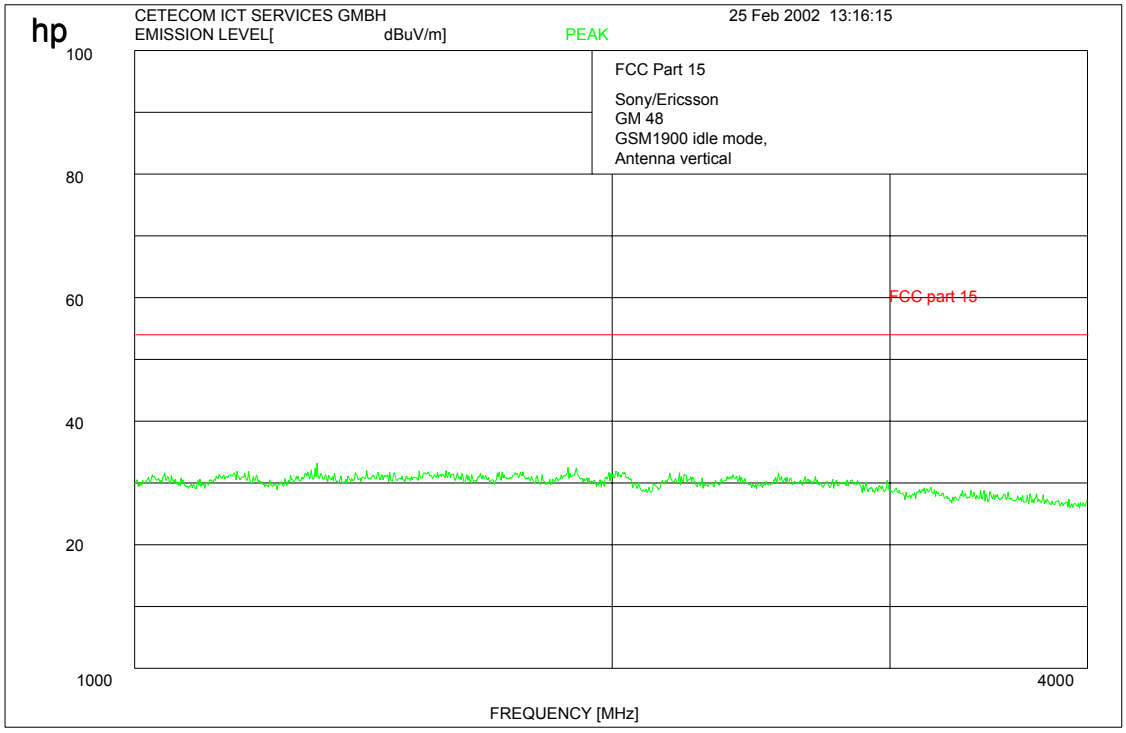
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 661 (this is valid for all 3 channels and up to 4 GHz)
Idle-Mode



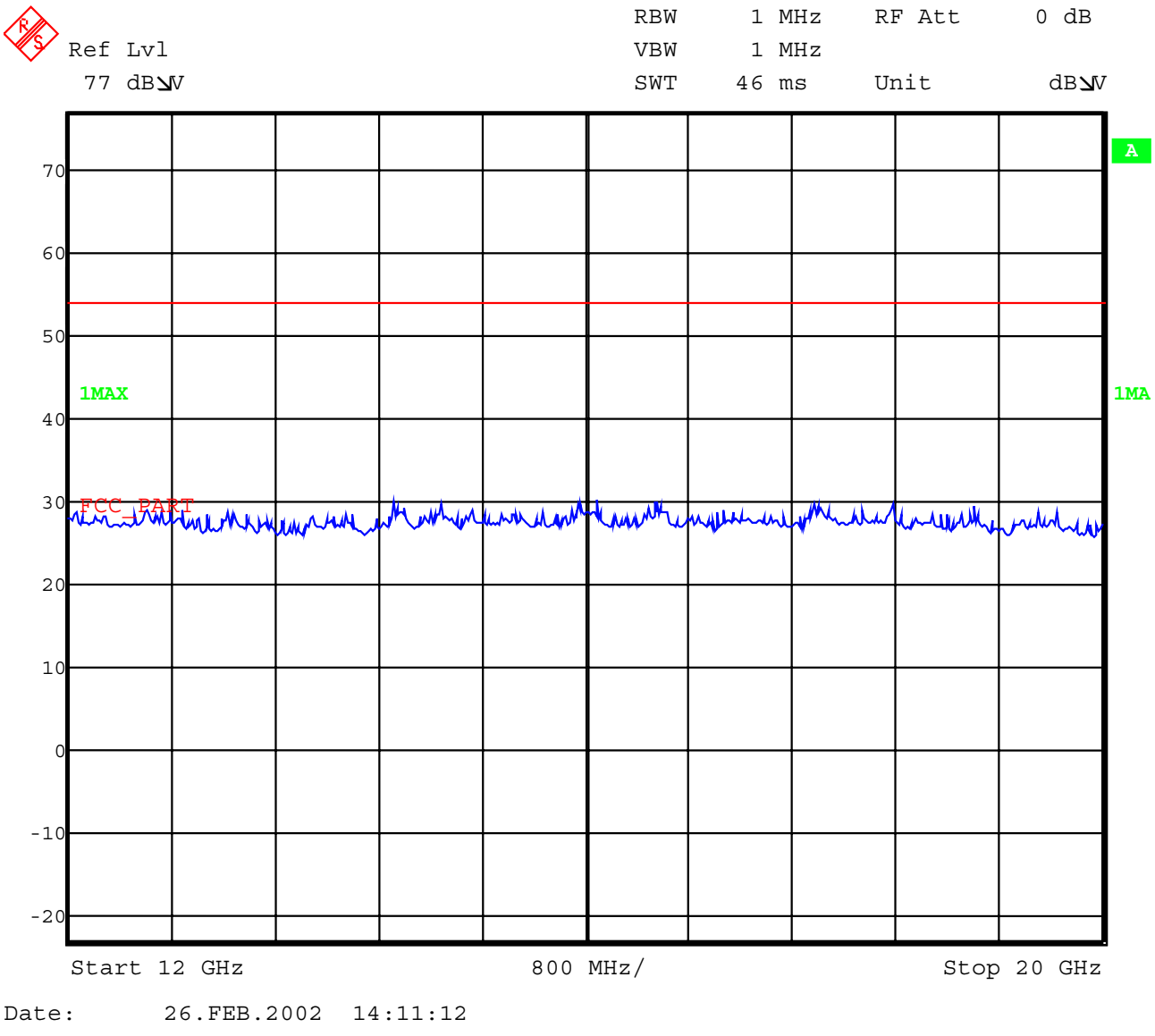
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 661 (this is valid for all 3 channels and 4 to 12 GHz)
Idle-Mode



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 661 (this is valid for all 3 channels and 12 to 20 GHz)
Idle-Mode



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

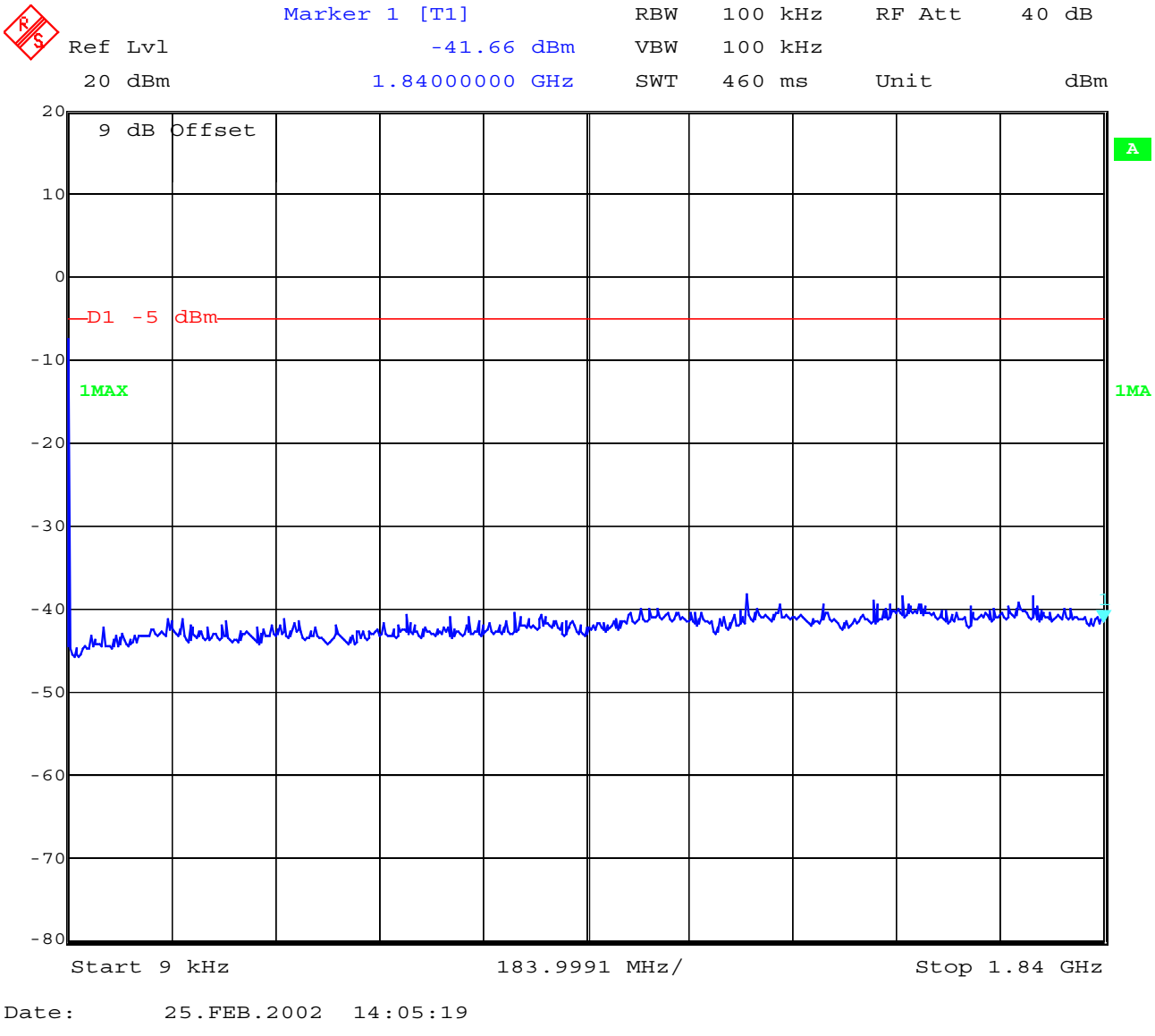
CONDUCTED SPURIOUS EMISSIONS

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:
Sec. 24.238 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 +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

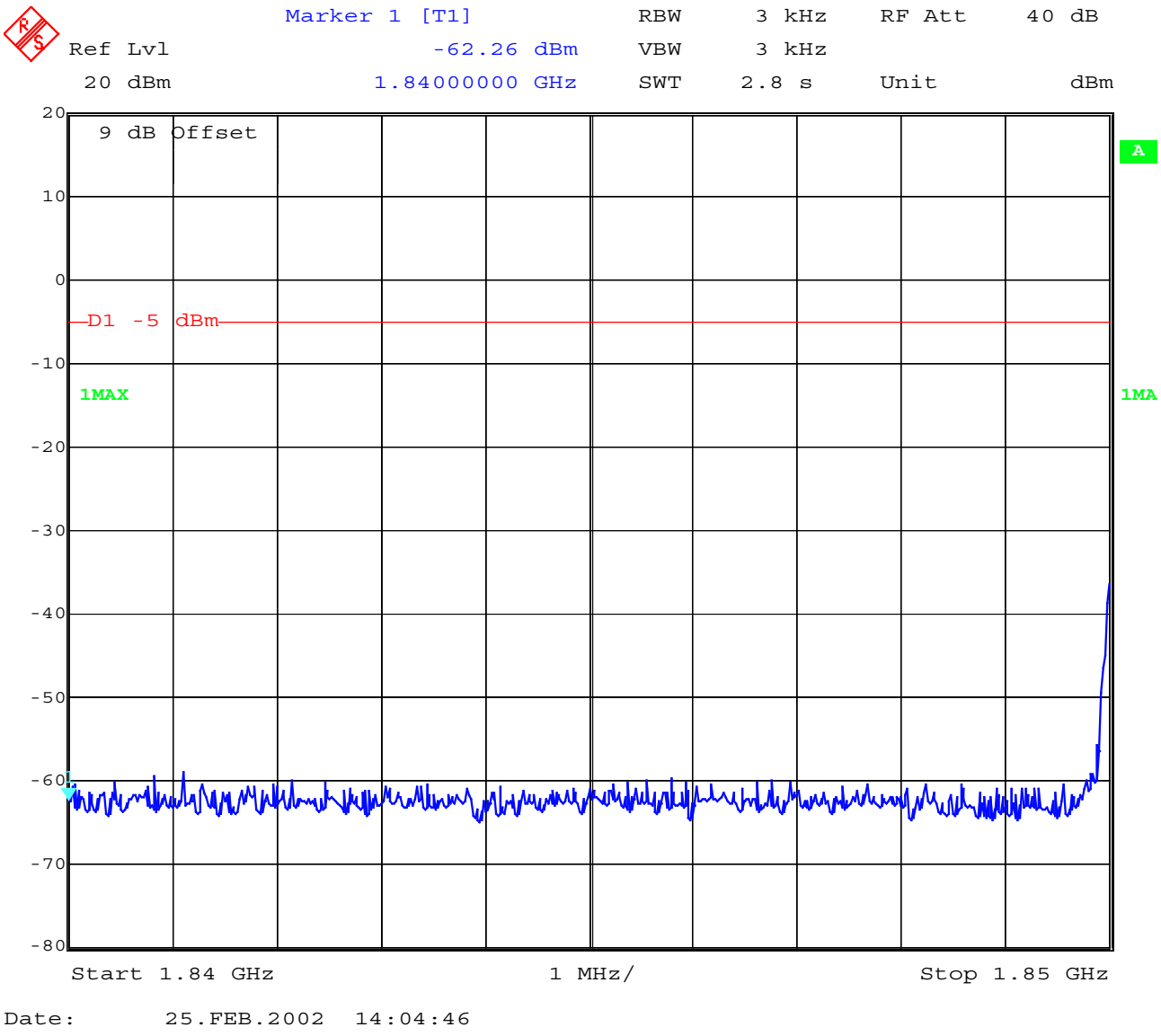
Measurements:

Channel: 512



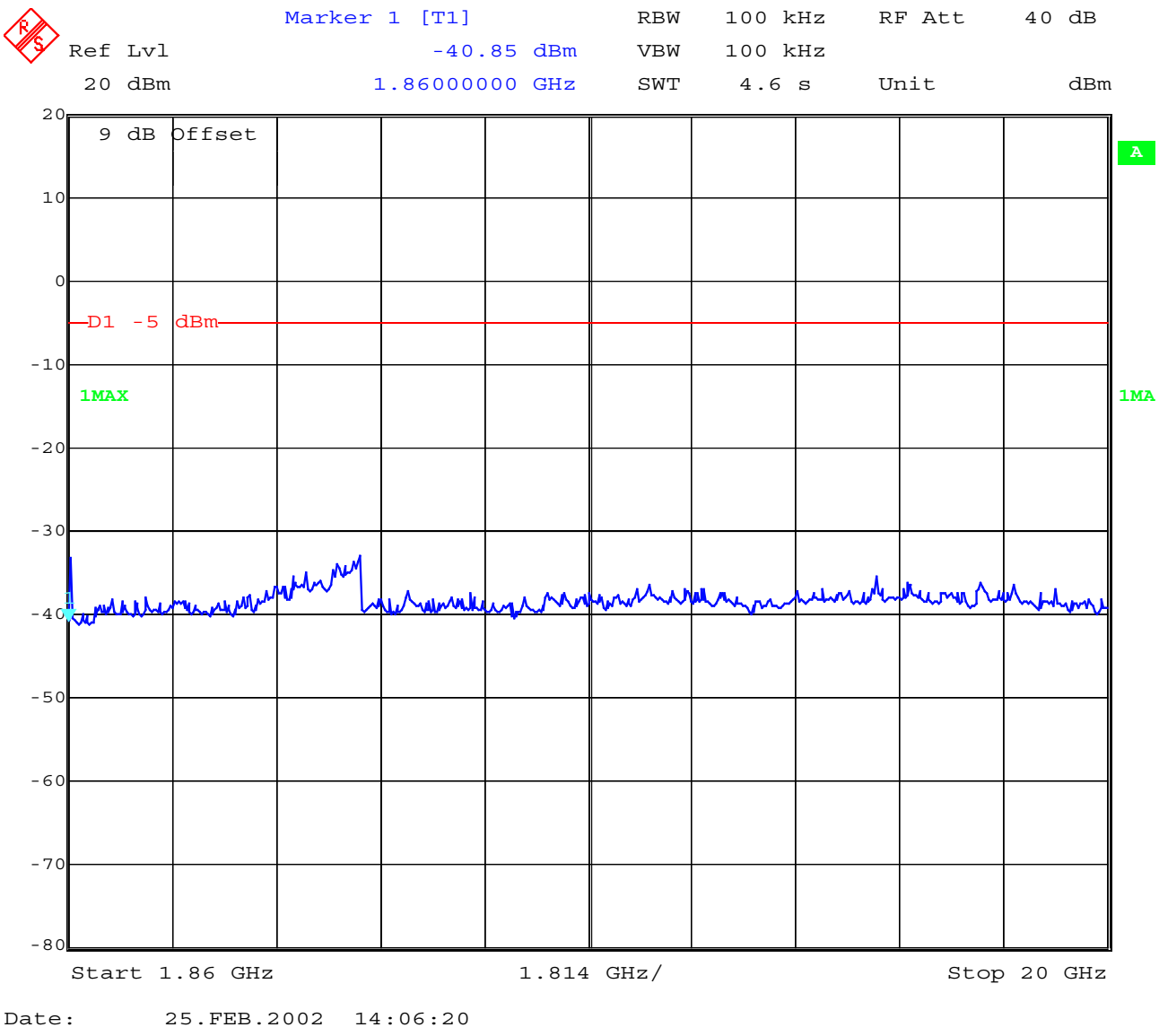
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 512



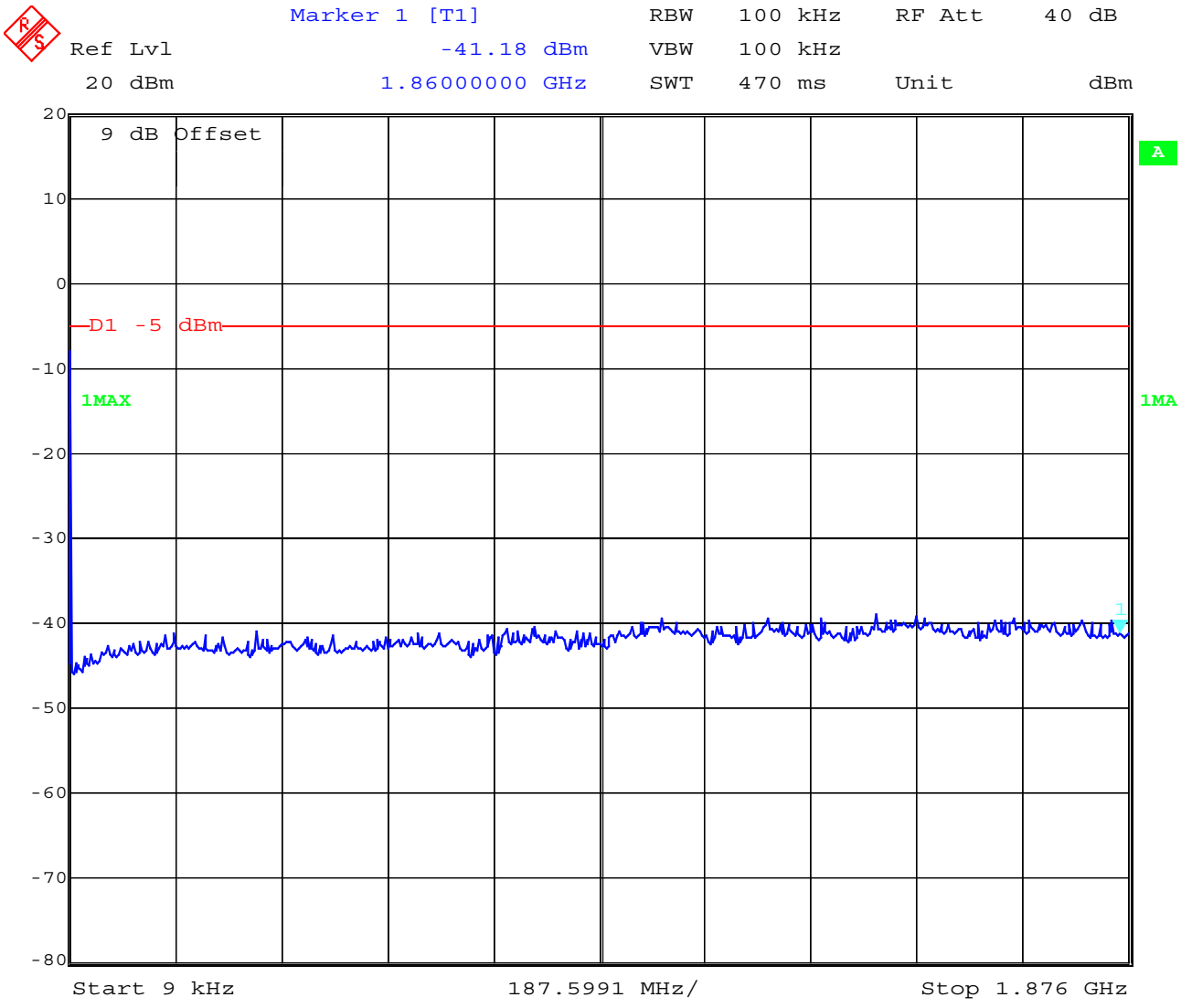
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 512



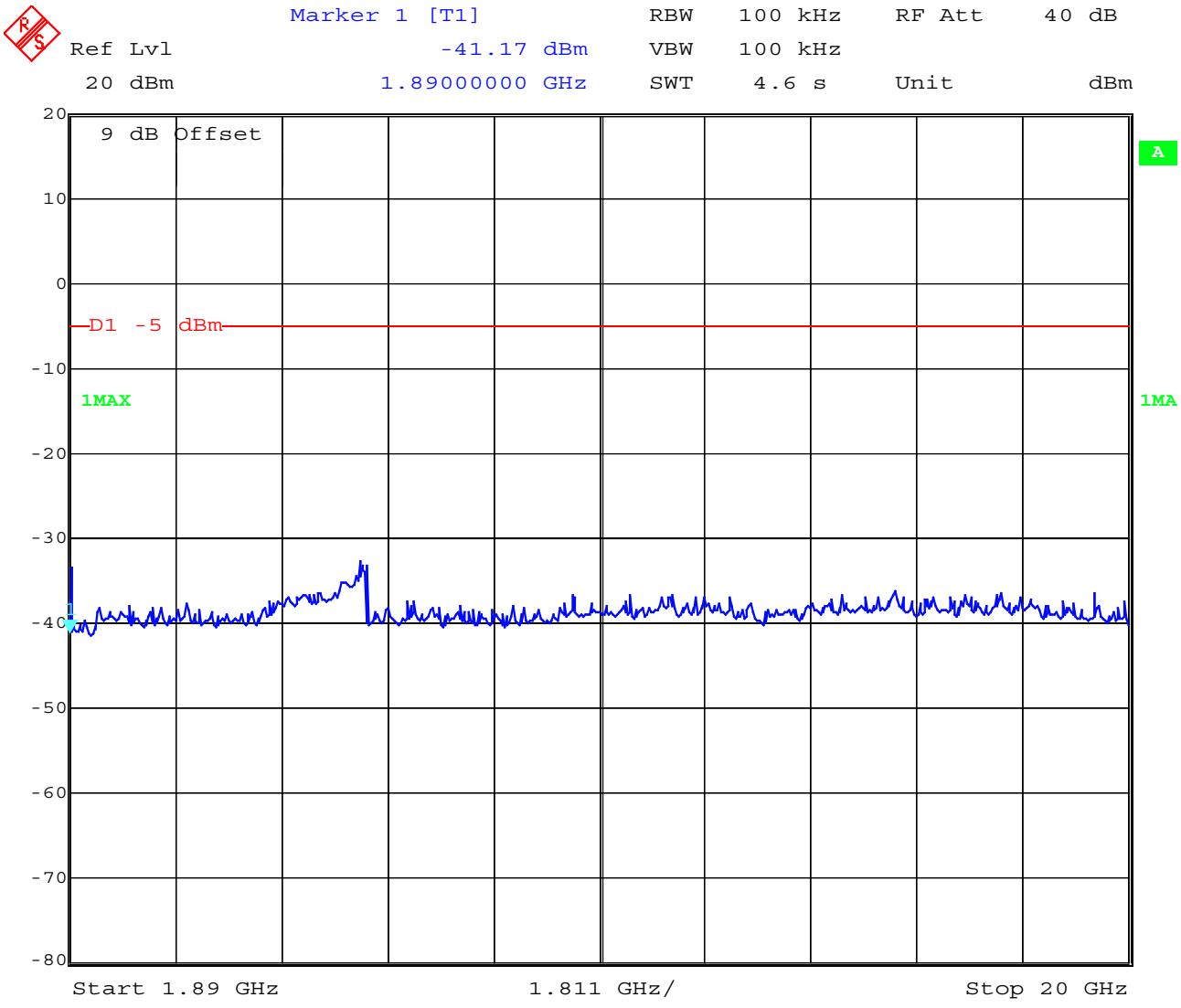
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 661



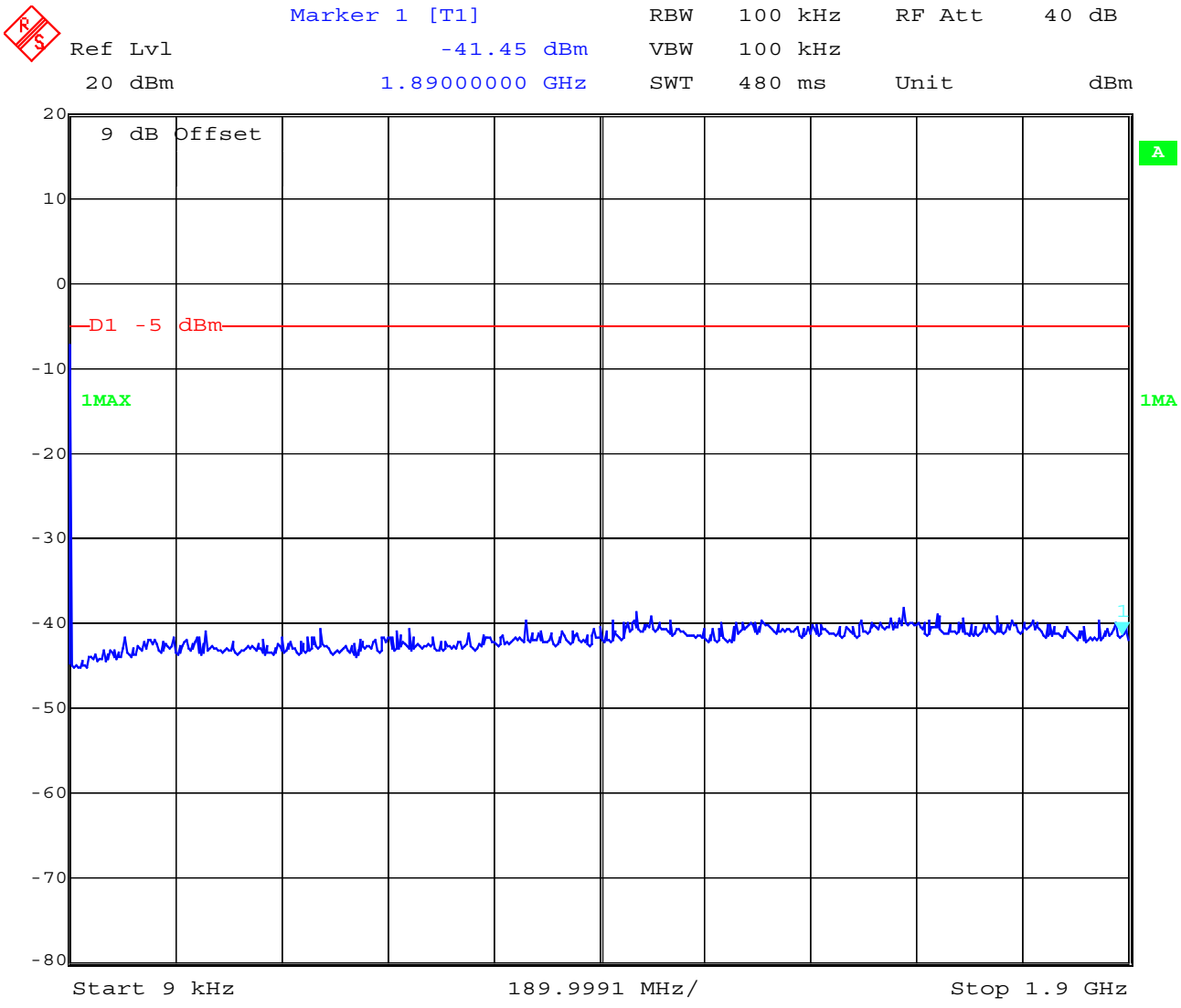
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 661



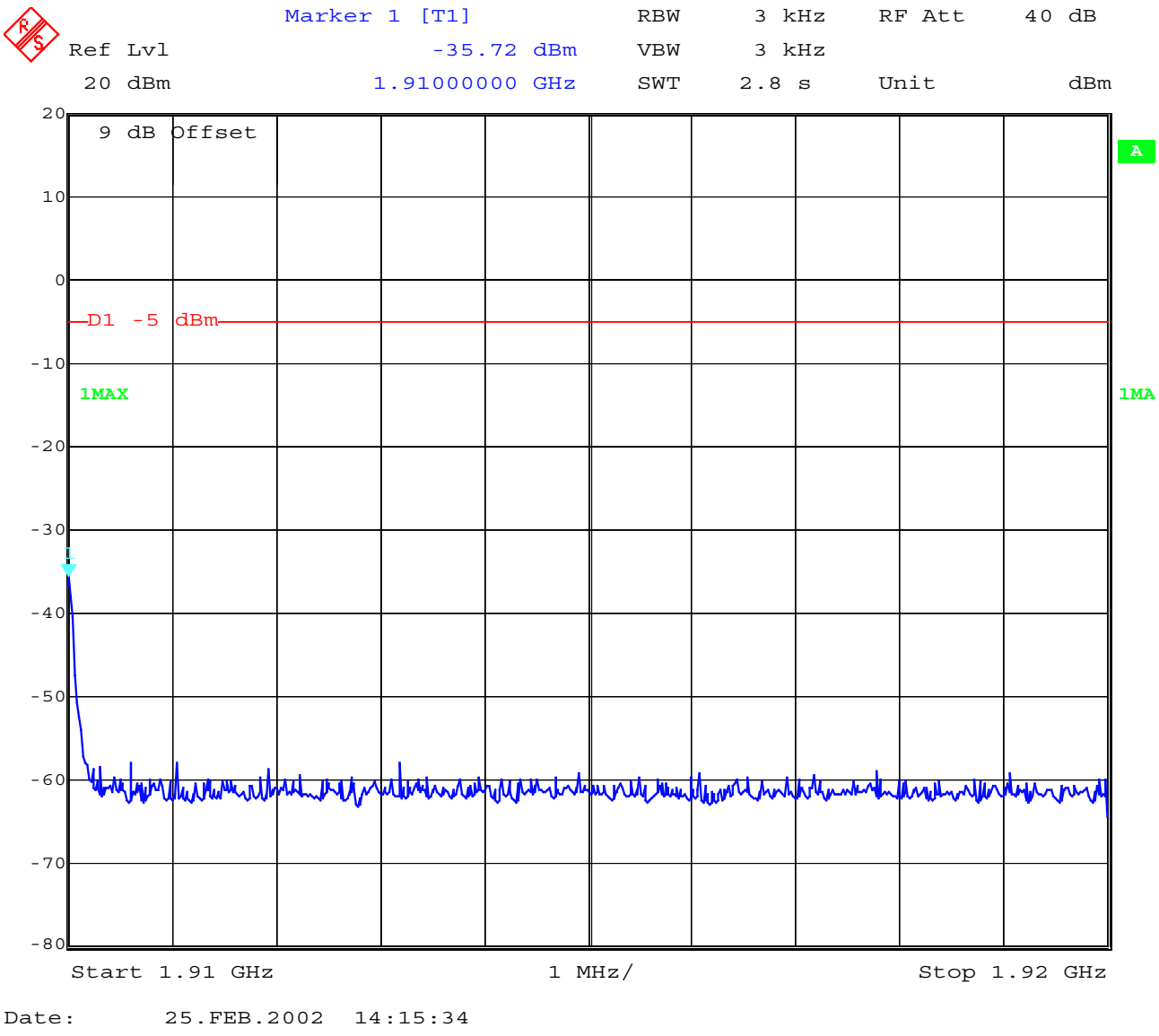
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 810



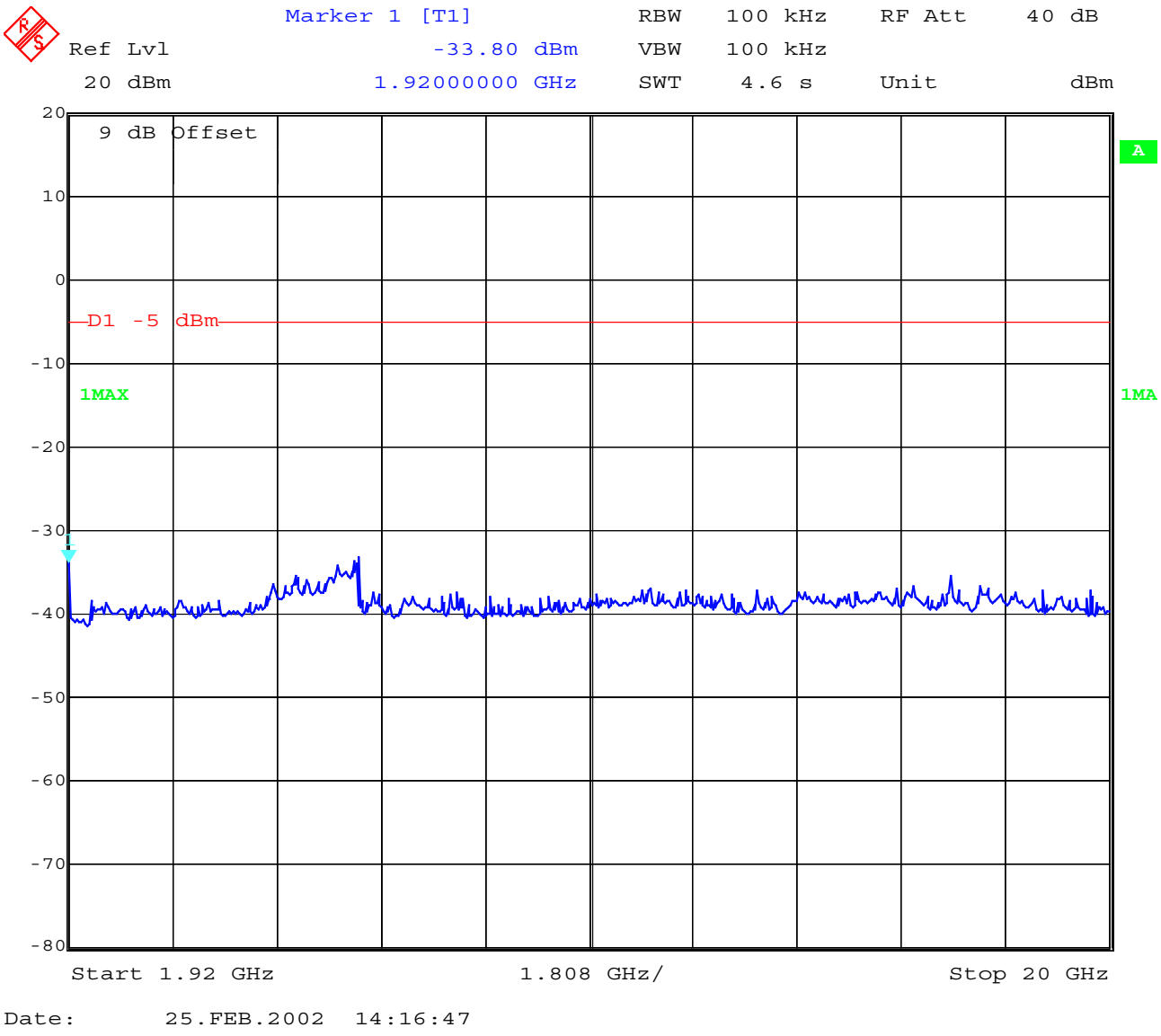
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 810



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 810



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

OCCUPIED BANDWIDTH §2.989

Occupied Bandwidth Results

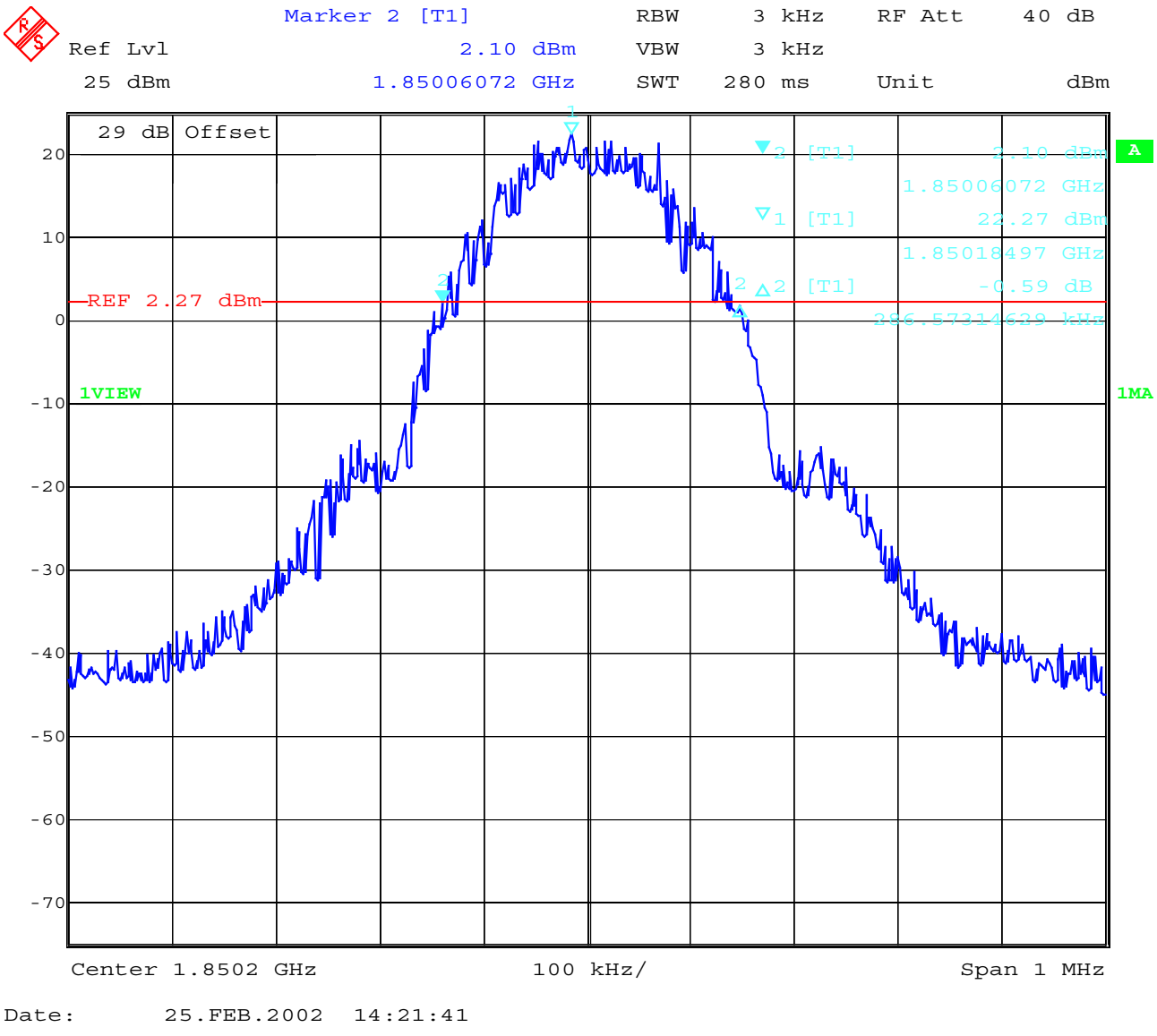
Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. Table 8.2 below lists the measured 99% power and -26dBC occupied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

Frequency	99% Occupied Bandwidth	-26 dBc Bandwidth
1850.2 MHz	286.6	318.6
1880.0 MHz	274.5	310.6
1909.2 MHz	266.5	310.6

Part 24.238 (a) requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 290 kHz, this equates to a resolution bandwidth of at least 2.96 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

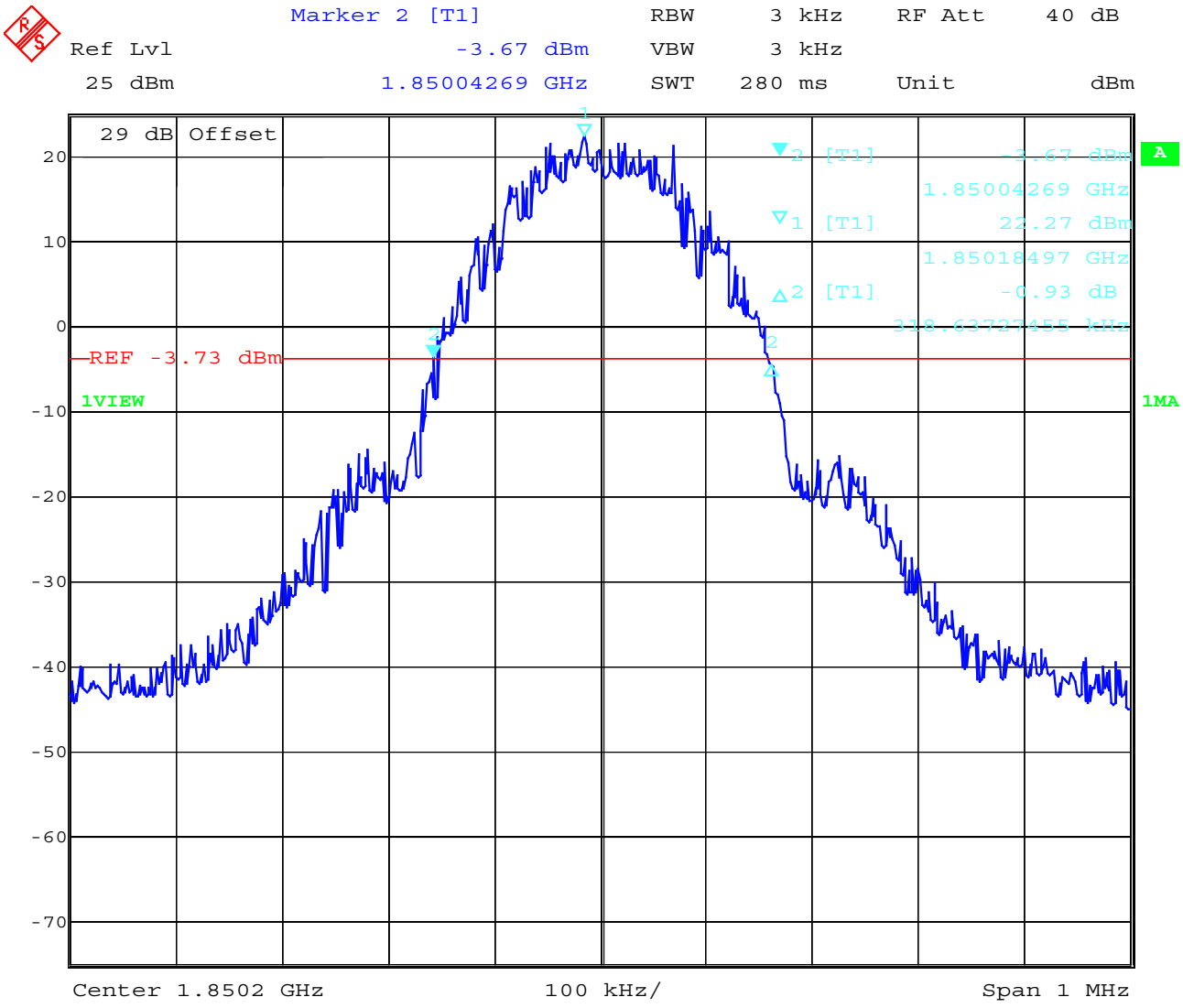
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 512
99% Occupied Bandwidth



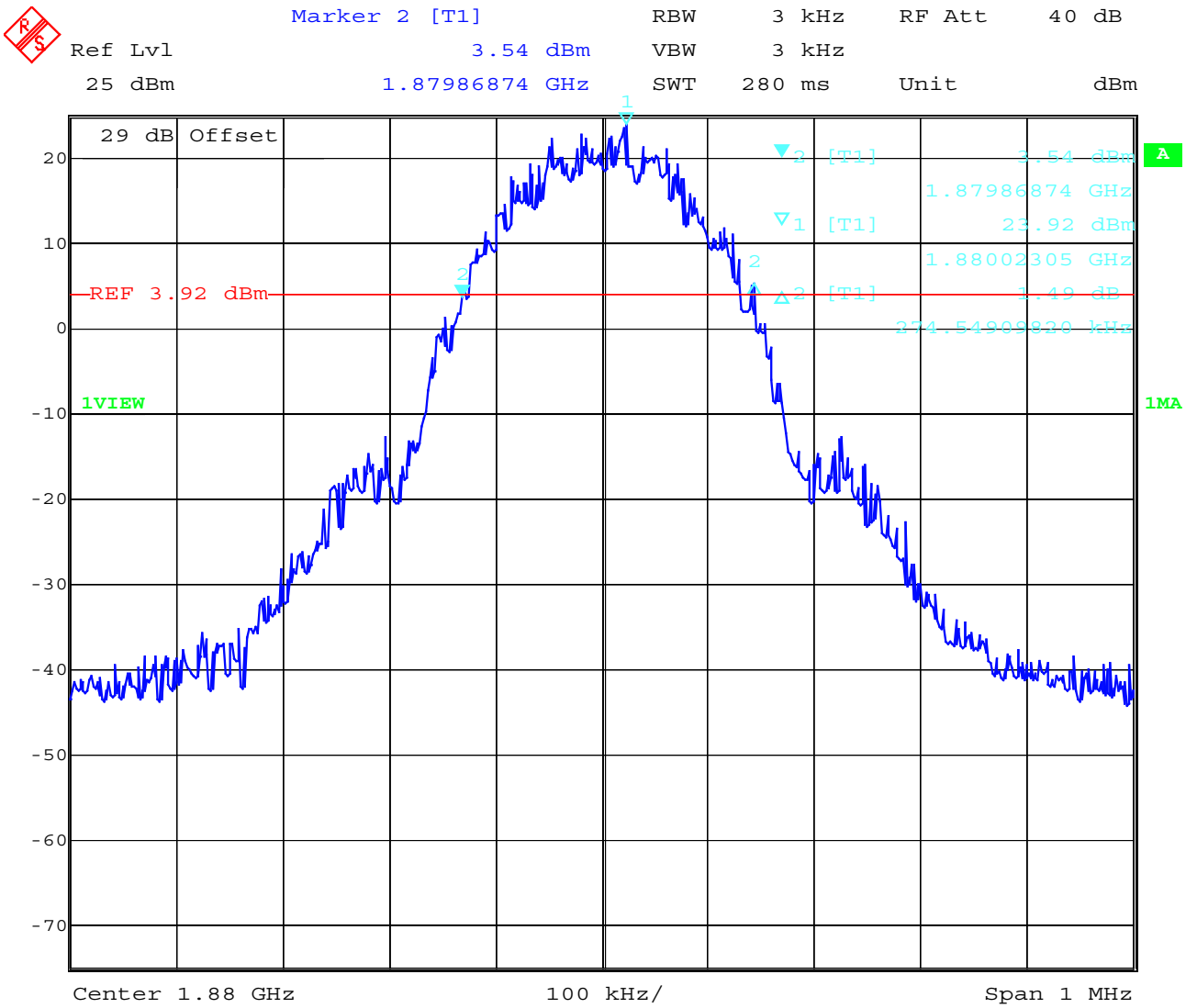
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 512
-26 dBc Bandwidth



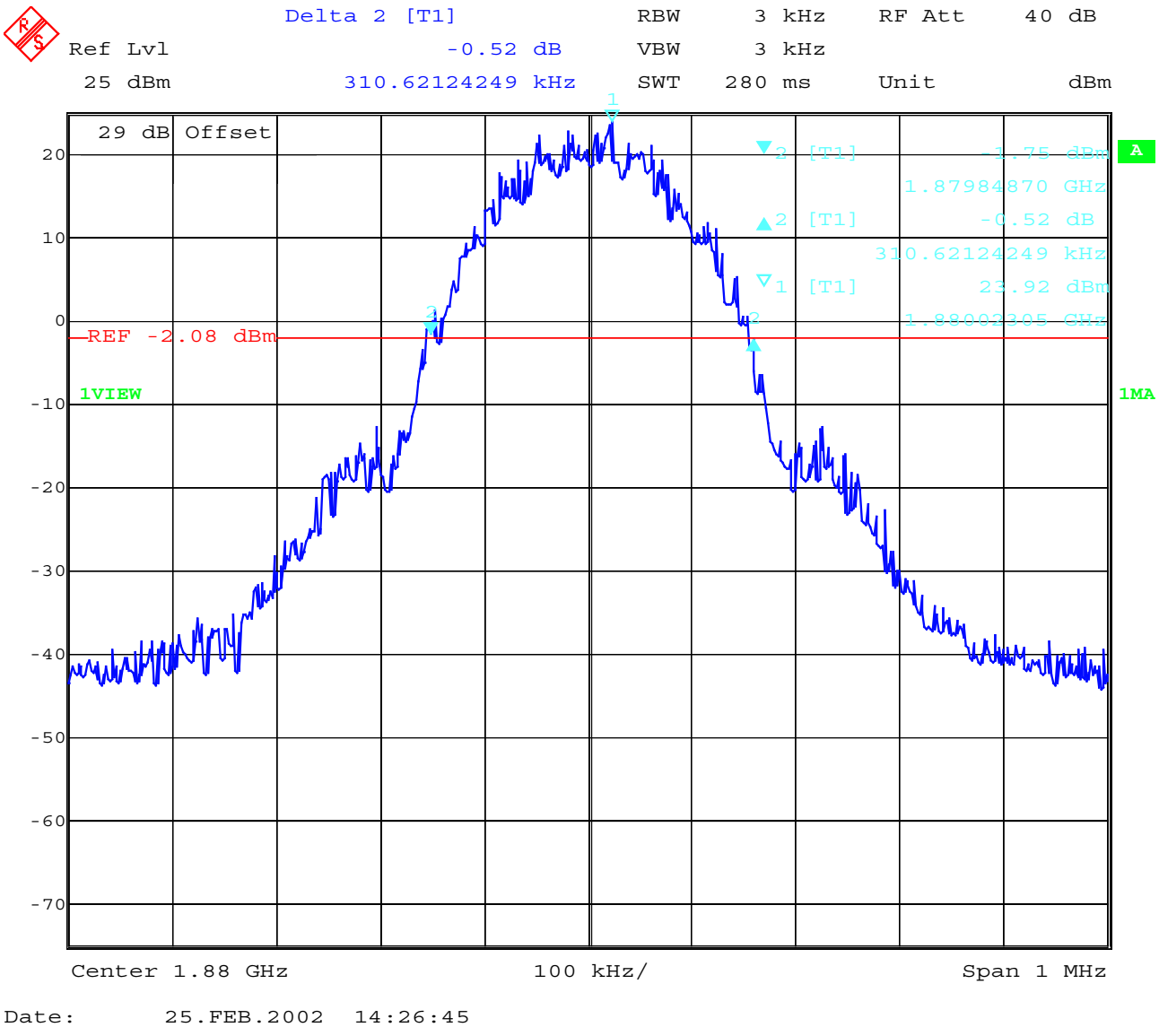
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 661
99% Occupied Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

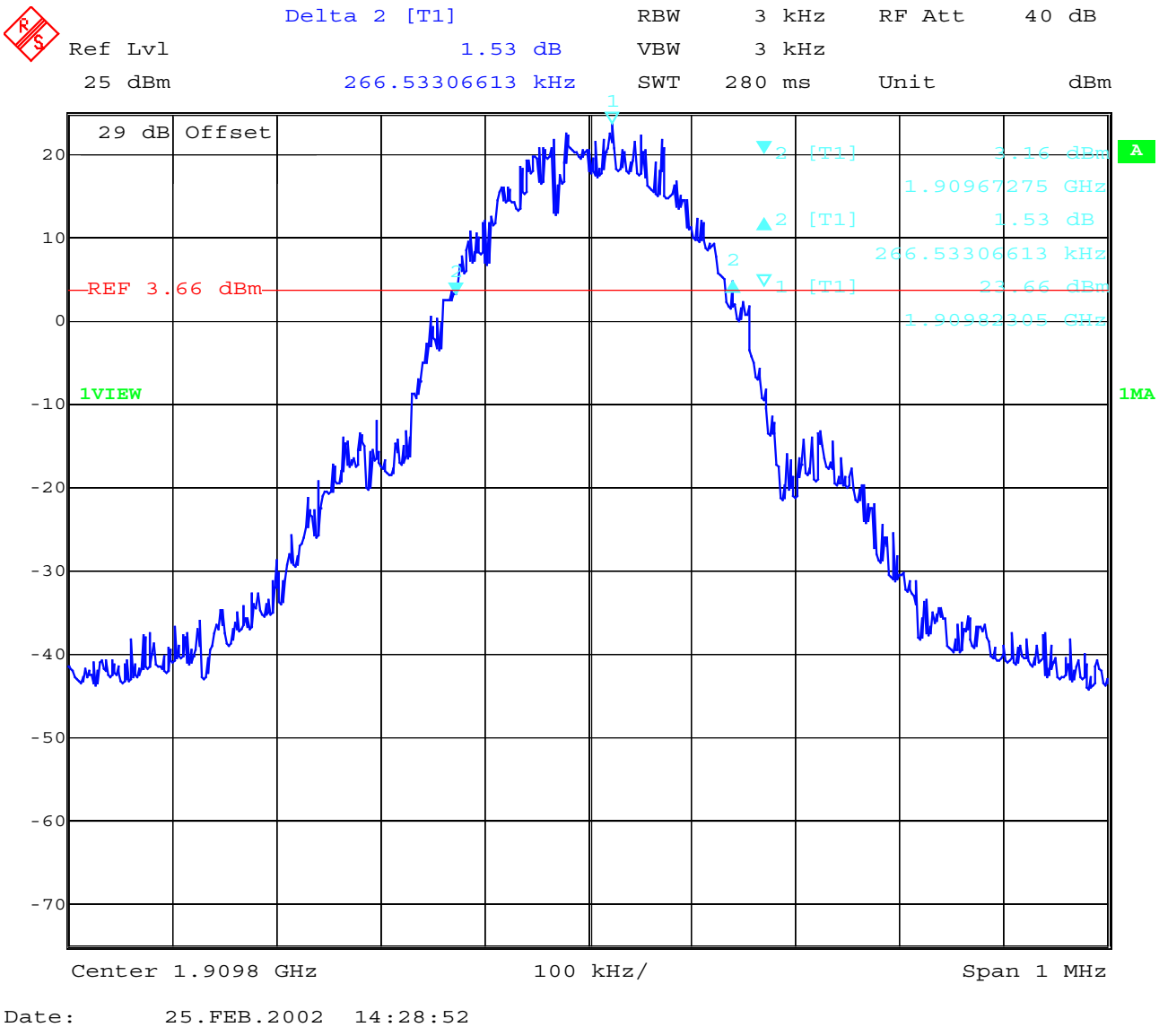
Channel 661
-26 dBc Bandwidth



Date: 25.FEB.2002 14:26:45

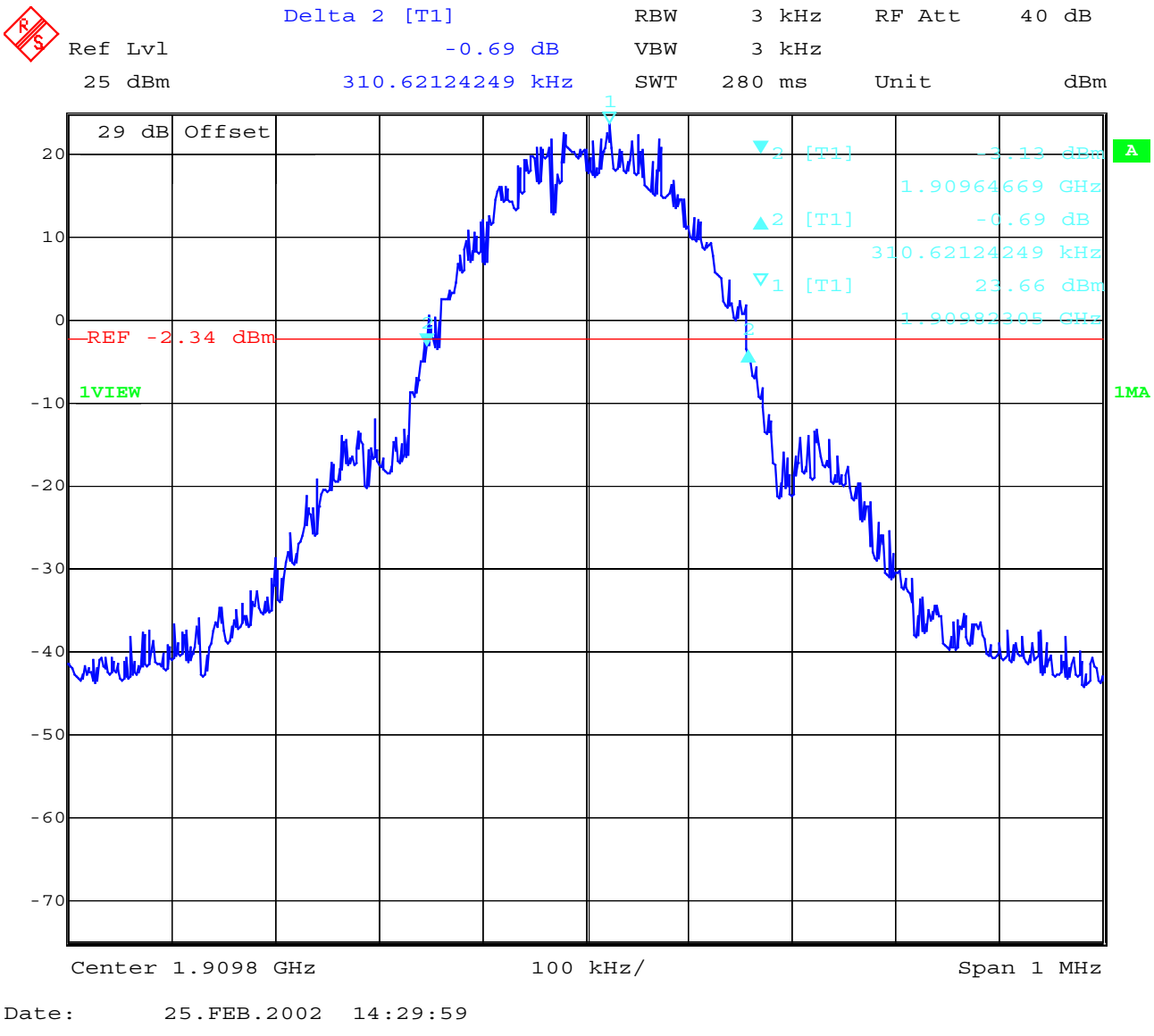
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 810
99% Occupied Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 810
-26 dBc Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

PART PCS850

POWER OUTPUT SUBCLAUSE § 24.232

Summery:

This paragraph contains both average , peak output powers and EIRP measurements for the mobile station.
In all cases, the peak output power is wthin the required mask (this mask is specified in the JTC standarts, 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 Spectrum Analyzer FSIQ 26 (peak and average)
This 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)
0	+30	± 2

Power Measurements:

Conducted:

Frequency (MHz)	Power Step	Peak Output Power (dBm)	Average Output Power (dBm)
824.2	0	30.47	30.36
836.4	0	29.12	29.02
848.8	0	29.46	29.35
Measurement uncertainty		±0.5 dB	

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

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."
Method of Measurement:
1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference center of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
2. A "reference path loss" is established as Pin + 2.1 - Pr.
3. The EUT is substituted for the dipole at the reference centre of the chamber. The EUT is put into CW test mode and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs is identified.
5. The EUT is then put into pulse mode at its maximum power level (Power Step 0).
6. "Gated mode" power measurements are performed with the receiving antenna placed at the co-ordinates determined in Step 3 to determine the output power as defined in FCC Rule 24.232 (b) and (c). The "reference path loss" from Step 1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.1 dBi) and known input power (Pin).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.1dBi.

Limits:

Power Step	Burst Average EIRP (dBm)
0	<33

Power Measurements:

Radiated:

Frequency (MHz)	Power Step	BURST AVERAGE (dBm)		MODULATION AVERAGE (dBm)	
		EIRP	ERP	EIRP	ERP
824.2	0	28.51	26.41	19.51	17.41
836.4	0	29.00	26.90	20.00	17.90
848.8	0	28.80	26.70	19.80	17.70
Measurement uncertainty		±3 dB			

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

FREQUENCY STABILITY SUBCLAUSE § 24.235

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 CMD 65 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 3.6 Volts, connected to the CMD 65 and in a simulated call on channel 189 (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, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with nominal 3.6 Volts. Vary supply voltage from minimum 3.4 Volts to maximum 4.0 Volts, in 0.05 Volt increments remeasuring carrier frequency at each voltage. Pause at 3.6 Volts for 1 1/2 hours unpowered, 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 3.6 Volts, connected to the CMD 65 and in a simulated call on channel 189 (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, unpowered, 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. As this transceiver is considered "Hand carried, battery powered equipment…," Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.4 Vdc and 4.0 Vdc, with a nominal voltage of 3.6 Vdc. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of + 11.1 % and – 5.4 %. For the purposes of measuring frequency stability these voltage limits are to be used.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

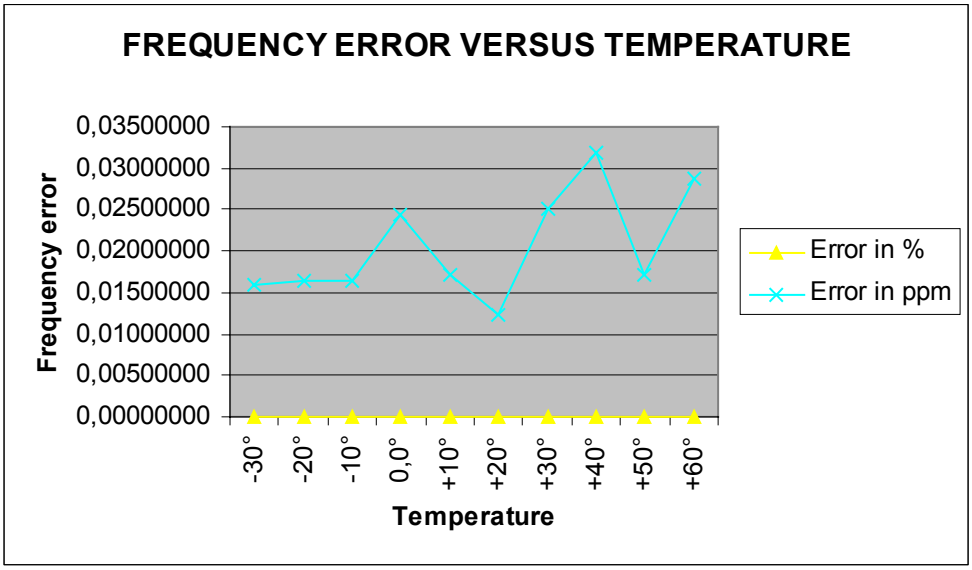
AFC FREQ ERROR vs. VOLTAGE

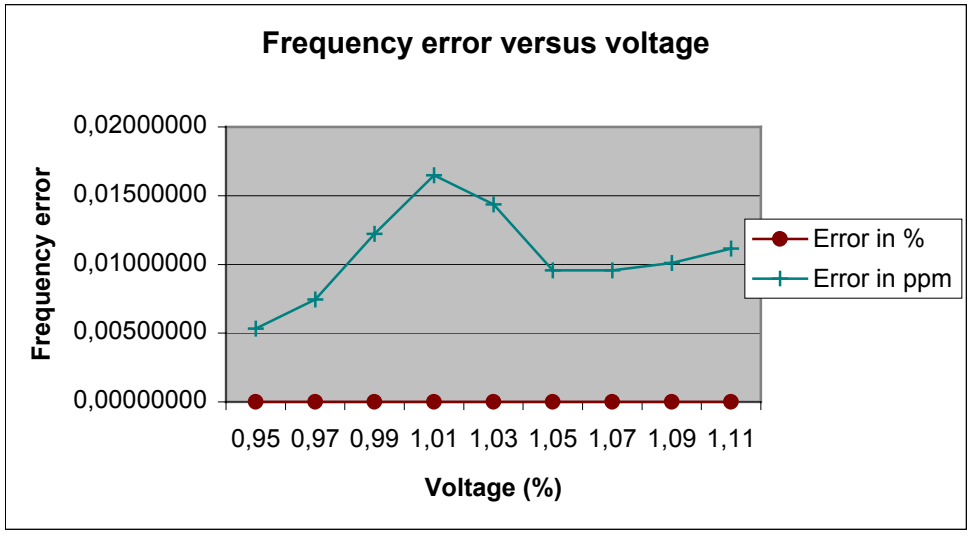
Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
3.40	+10	0.01	
3.45	+14	0.02	
3.50	+23	0.03	
3.55	+23	0.03	
3.60	+23	0.03	
3.65	+31	0.04	
3.70	+27	0.03	
3.75	+21	0.03	
3.80	+18	0.02	
3.85	+18	0.02	
3.90	+19	0.02	
3.95	+21	0.03	
4.00	+21	0.03	

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
-30	+30	0.04	
-20	+31	0.04	
-10	+31	0.04	
±0.0	+46	0.05	
+10	+32	0.04	
+20	+23	0.03	
+30	+47	0.06	
+40	+60	0.07	
+50	+32	0.04	
+60	+54	0.06	

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64





REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

EMISSIONS LIMITS §24.238

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 – 1992 requirements and is recognised 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 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 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 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:

$Pg = E^2 4\pi d^2 / 120\pi = E^2 d^2 /30$

where : P = power in watts
g = arithmetic gain of transmitting antenna over isotropic radiator.
E = maximum field strength in volts/meter
d = measurement distance in meter

Using a dipole gain of 1.67 or 2.2 dB and a test distance of 3 meters, this equation reduces to:

P(dBm) = E(dBuV/m) - 97.2dB

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.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

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.

RESULTS OF OPEN FIELD RADIATED TEST FOR FCC-24:
The final open field radiated levels are presented on the next pages.

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

Channel 128

Data File : /40552_30.DOC 27 Feb 2002

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	32.466	29.5	25.9	-3.6	QP	V	105	33	17.8	
8	812.1	35.5	32.8	-2.7	PK	V	97	360	N/T	UPLINK
9	822.7	35.5	102.	67.0	PK	V	97	360	N/T	CARRIER
10	866.8	35.5	42.1	6.6	PK	H	332	0	N/T	DOWNLINK
11	874.1	35.5	42.4	6.9	PK	H	332	0	N/T	DOWNLINK

Channel 189

Data File : /40552_25.DOC 27 Feb 1902 2002

No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	31.684	29.5	25.9	-3.6	QP	V	103	12	18.2	
5	824.3	35.5	34.8	-0.7	PK	H	331	0	N/T	UPLINK
6	834.9	35.5	100.	64.9	PK	V	97	360	N/T	CARRIER
7	874.1	35.5	42.2	6.7	PK	H	331	92	N/T	DOWNLINK
8	879.8	35.5	41.9	6.4	PK	H	331	32	N/T	DOWNLINK

Channel 251

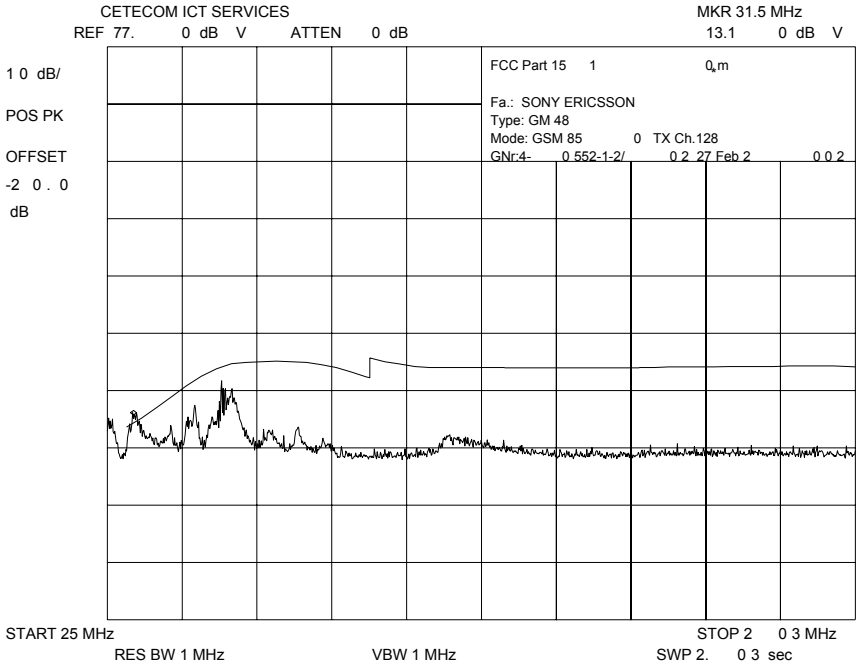
Data File : /40552_35.DOC 27 Feb 2002

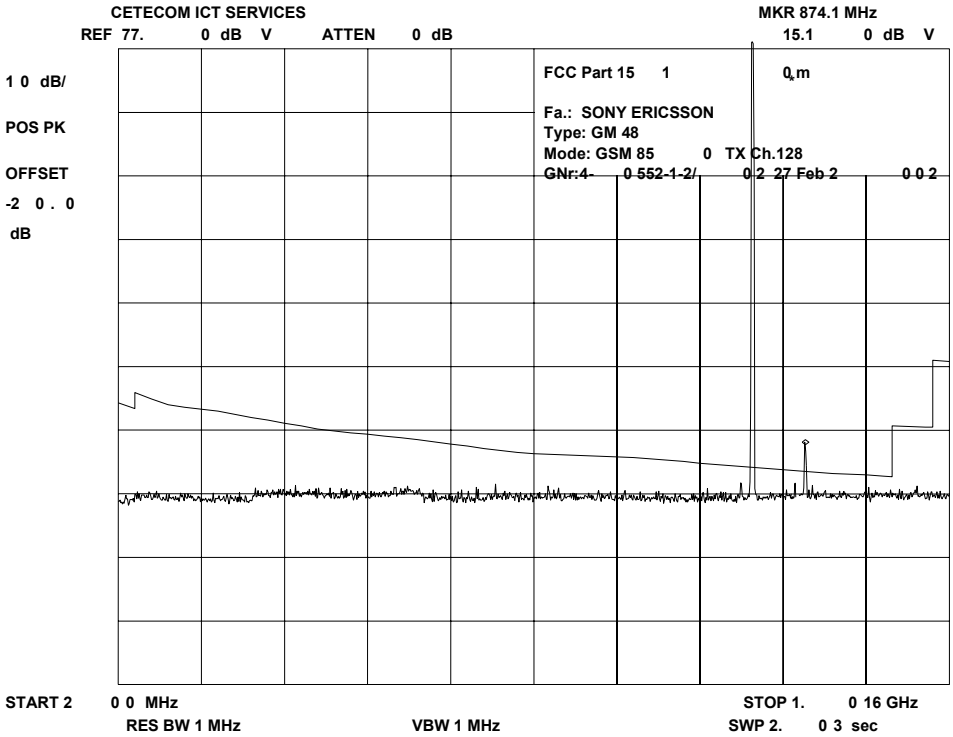
No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	31.928	29.5	27.2	-2.3	QP	V	97	355	18.1	
7	845.5	35.5	37.7	2.2	PK	V	97	0	N/T	UPLINK
8	846.4	35.5	100.	65.1	PK	V	97	122	N/T	CARRIER
9	874.1	35.5	42.5	7.0	PK	H	331	214	N/T	DOWNLINK
10	891.2	35.5	42.5	7.0	PK	H	331	303	N/T	DOWNLINK

N/T in CORR FACTOR column denotes a non-traceable signal.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 128 (up to 1 GHz)





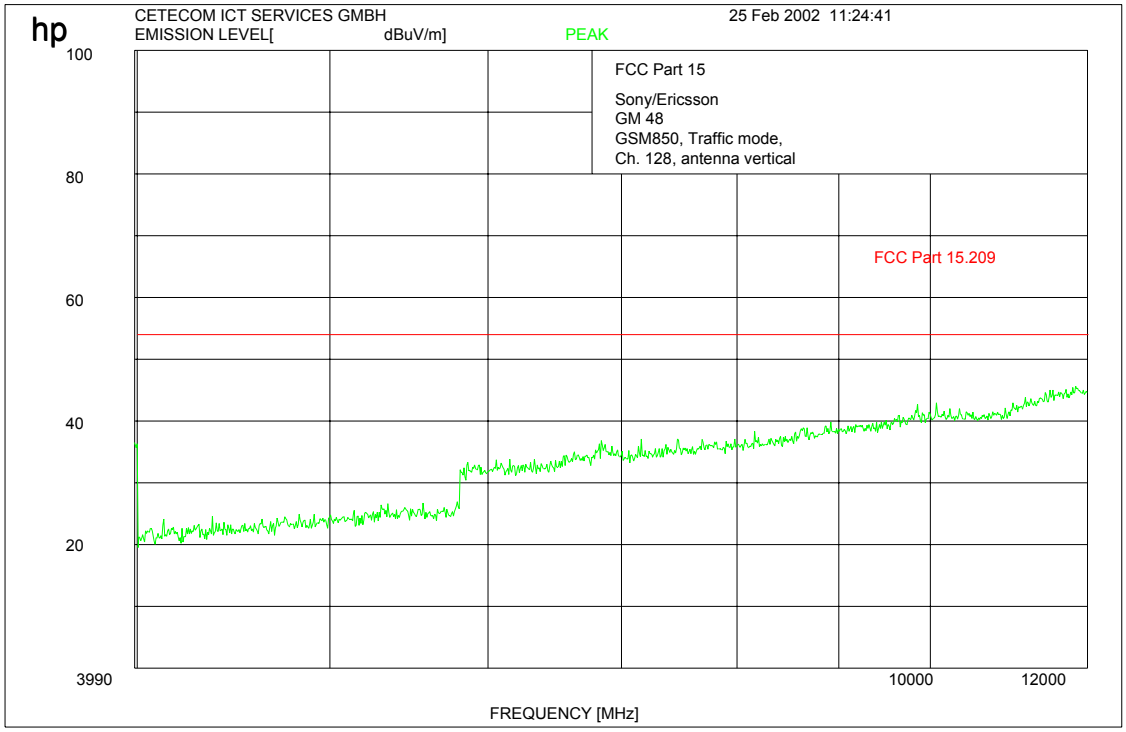
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 128 (up to 4 GHz)

371648.6MHz 31.9 dBµV/m AV

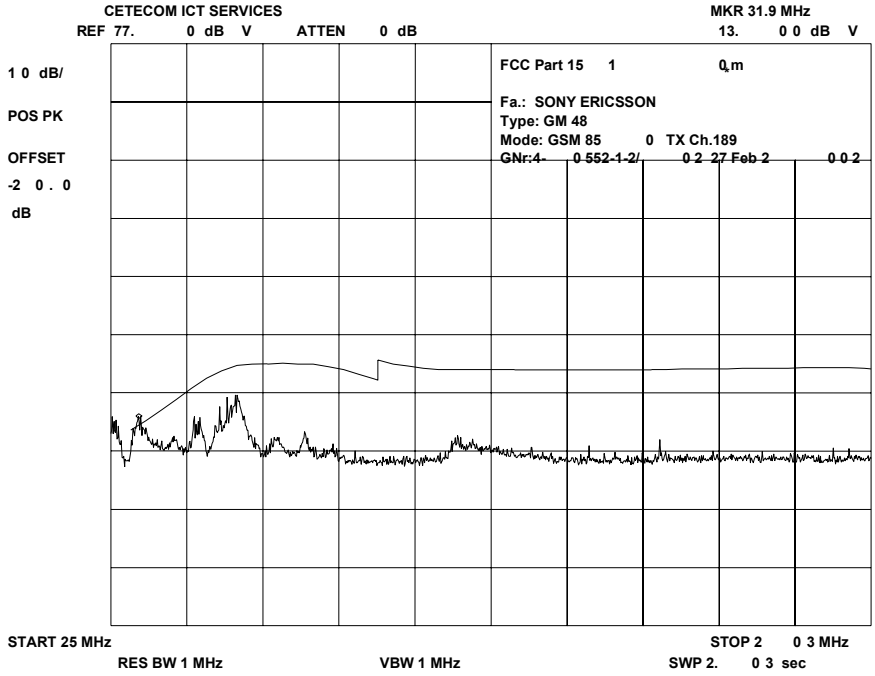
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

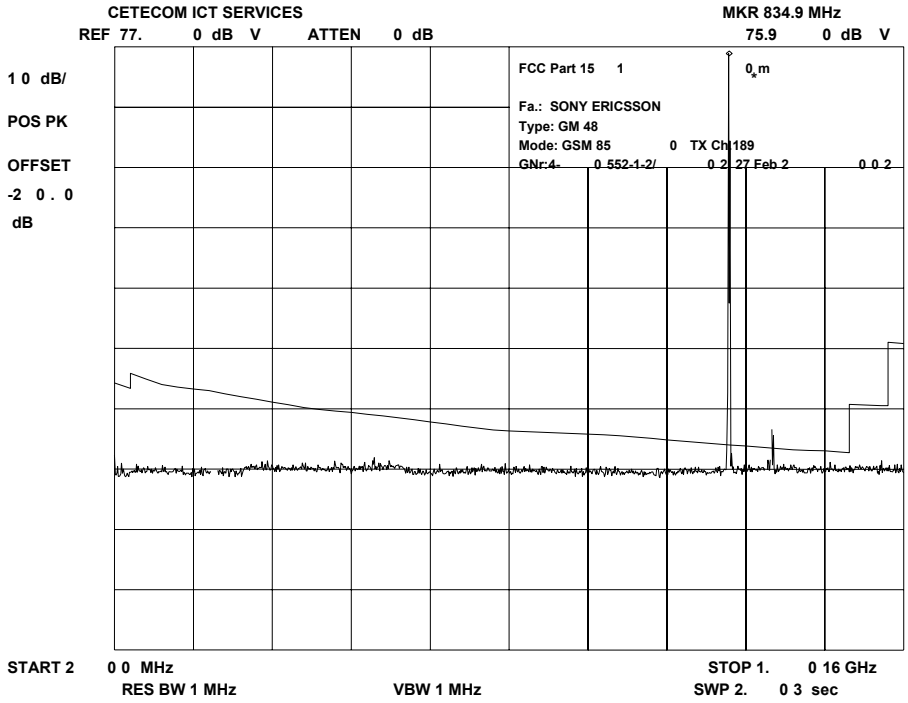
Channel 128 :– 12 GHz



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

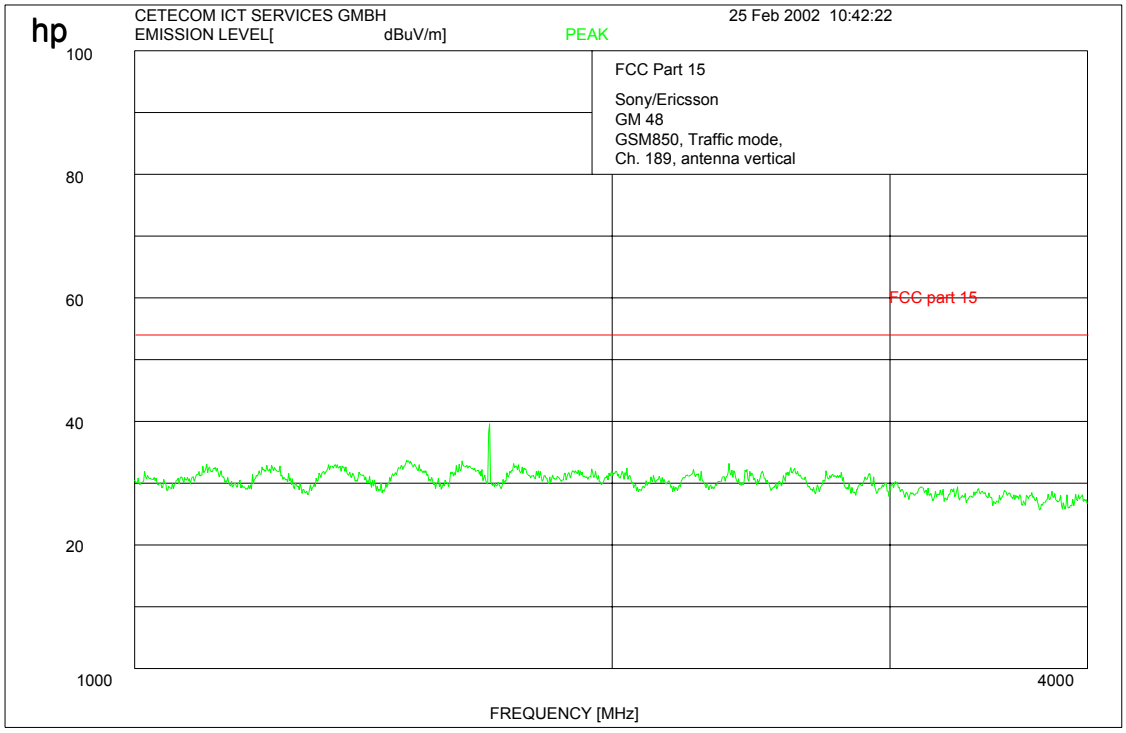
Channel 189 (up to 1 GHz)





REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

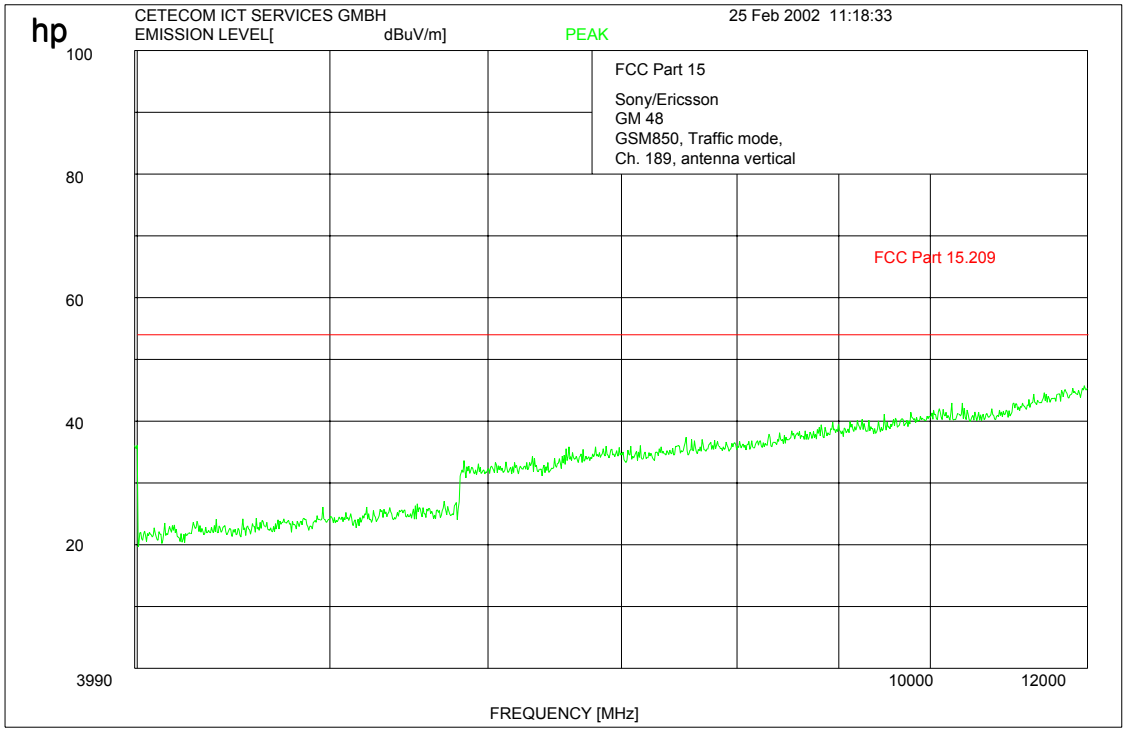
Channel 189 (up to 4 GHz)



1676.3 MHz 25.0 dBµV/m AV

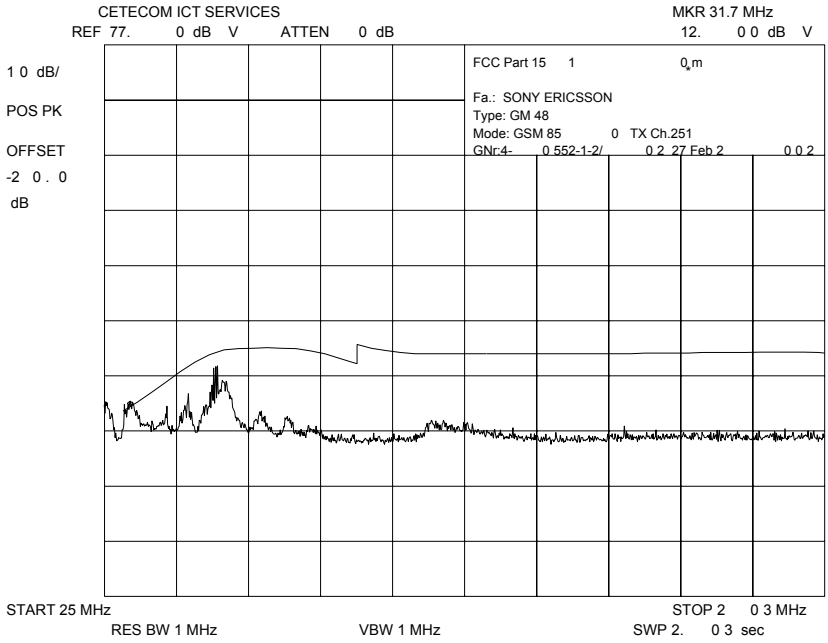
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

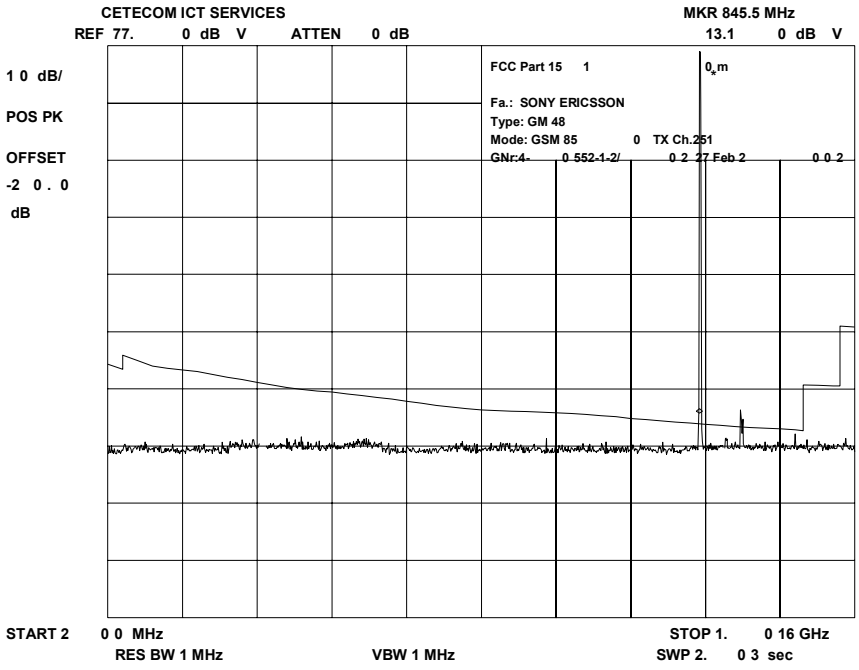
Channel 189 : 4 – 12 GHz



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

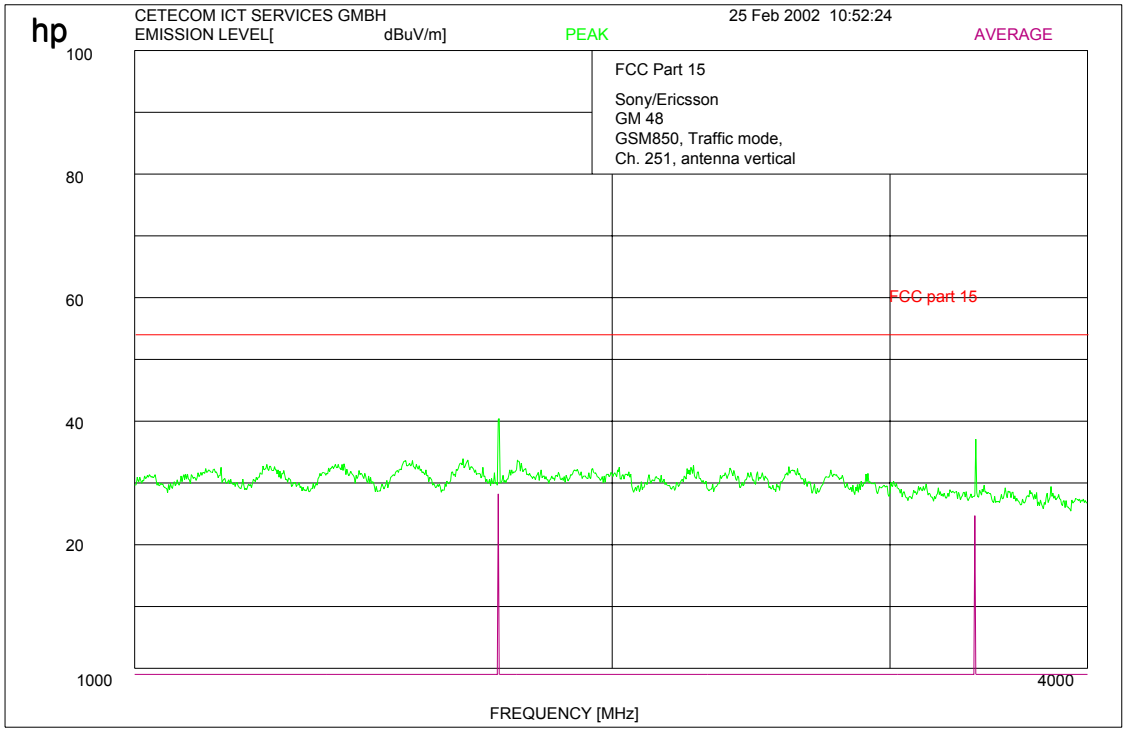
Channel 251 up to 1 GHz





REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 251 up to 4 GHz

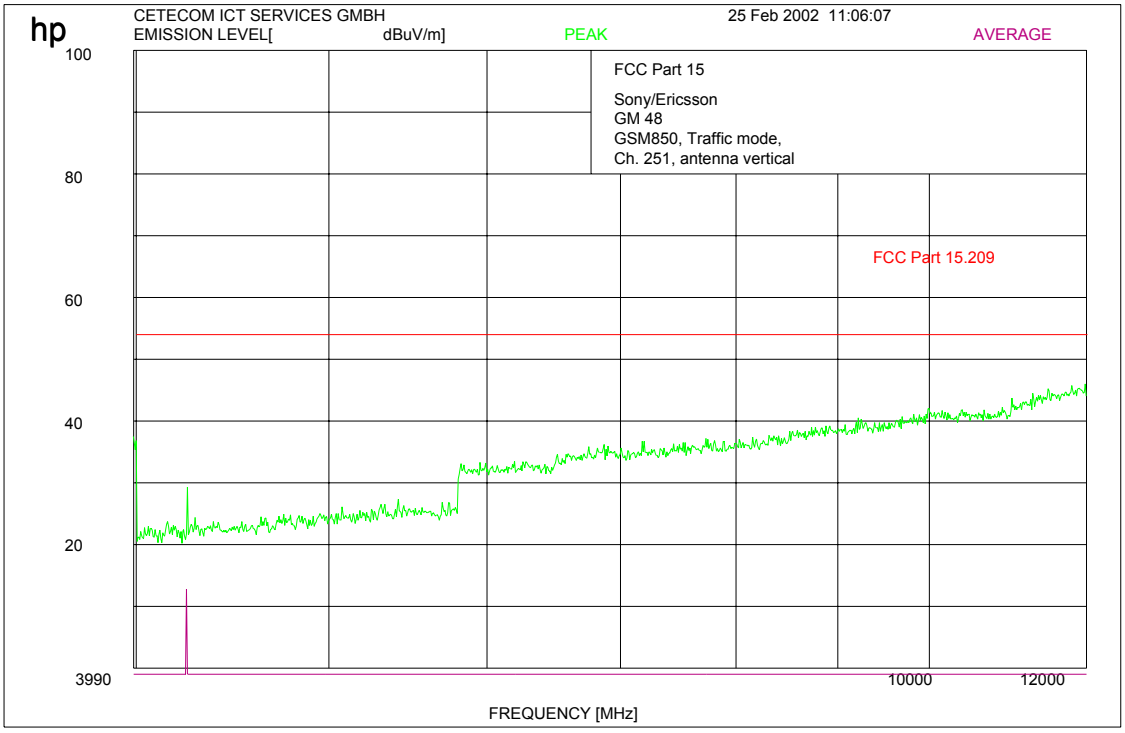


1697.3 MHz **28.2 dBµV/m AV**

3392.2 MHz **24.7 dBµV/m AV**

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 251 : 4 –12 GHz



4243.5 MHz 12.8 dBµV/m AV

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Channel 189 (this is valid for all 3 channels and up to 1 GHz)
Idle-Mode

Test: Rad. Emission

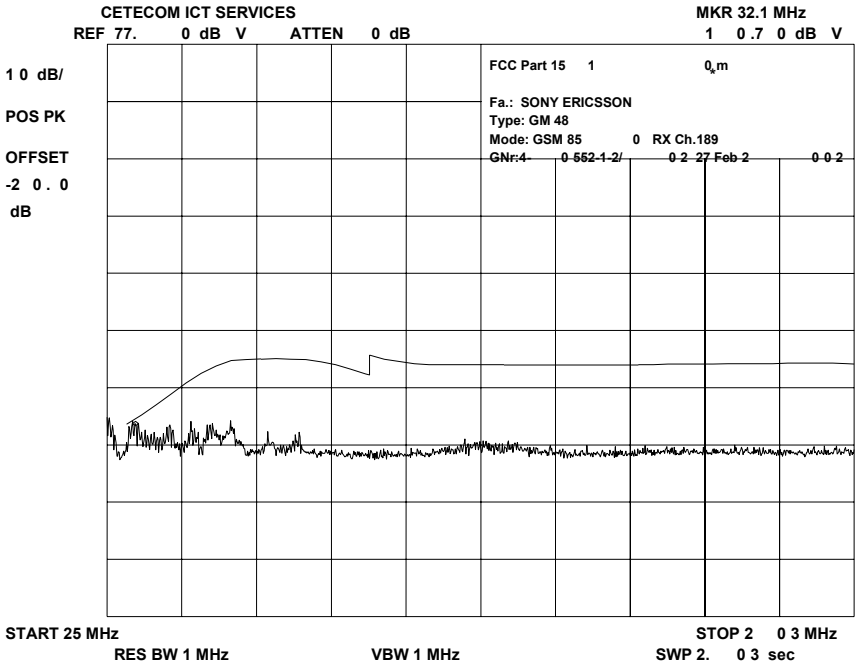
Data File : /40552_40.DOC 27 Feb 2002

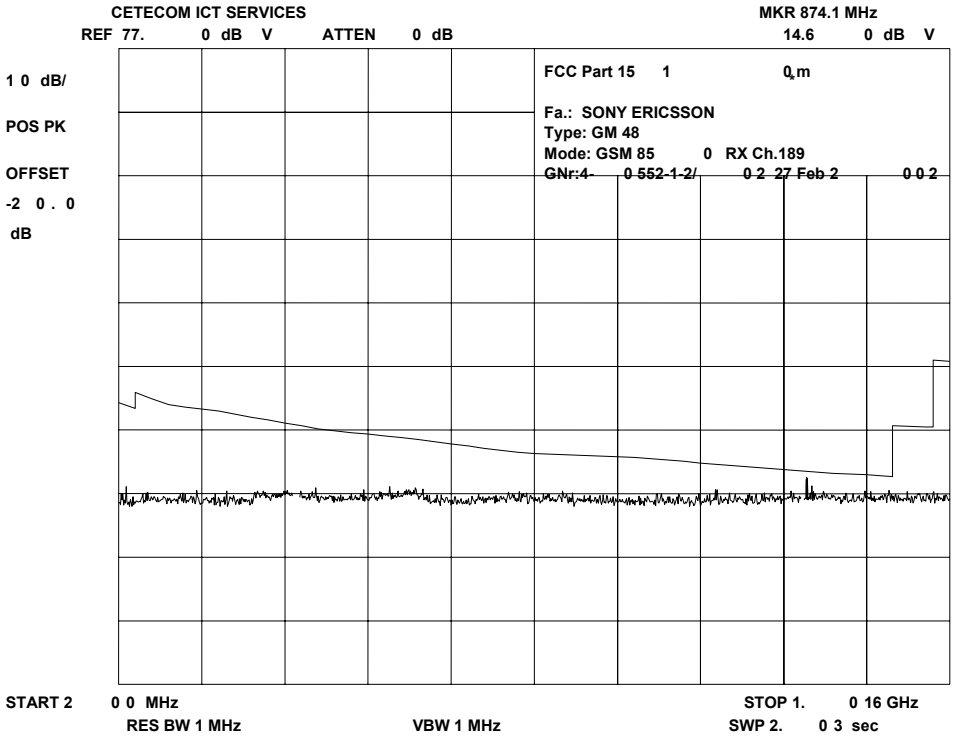
No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	31.642	29.5	26.4	-3.1	QP	V	105	349	18.2	
2	40.4	29.9	24.2	-5.3	PK	V	97	360	N/T	
3	45.4	29.5	22.2	-7.3	PK	V	97	360	N/T	
4	50.6	29.5	19.6	-9.9	PK	V	97	360	N/T	
5	54.8	29.5	19.0	-10.5	PK	V	97	360	N/T	

N/T in CORR FACTOR column denotes a non-traceable signal.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

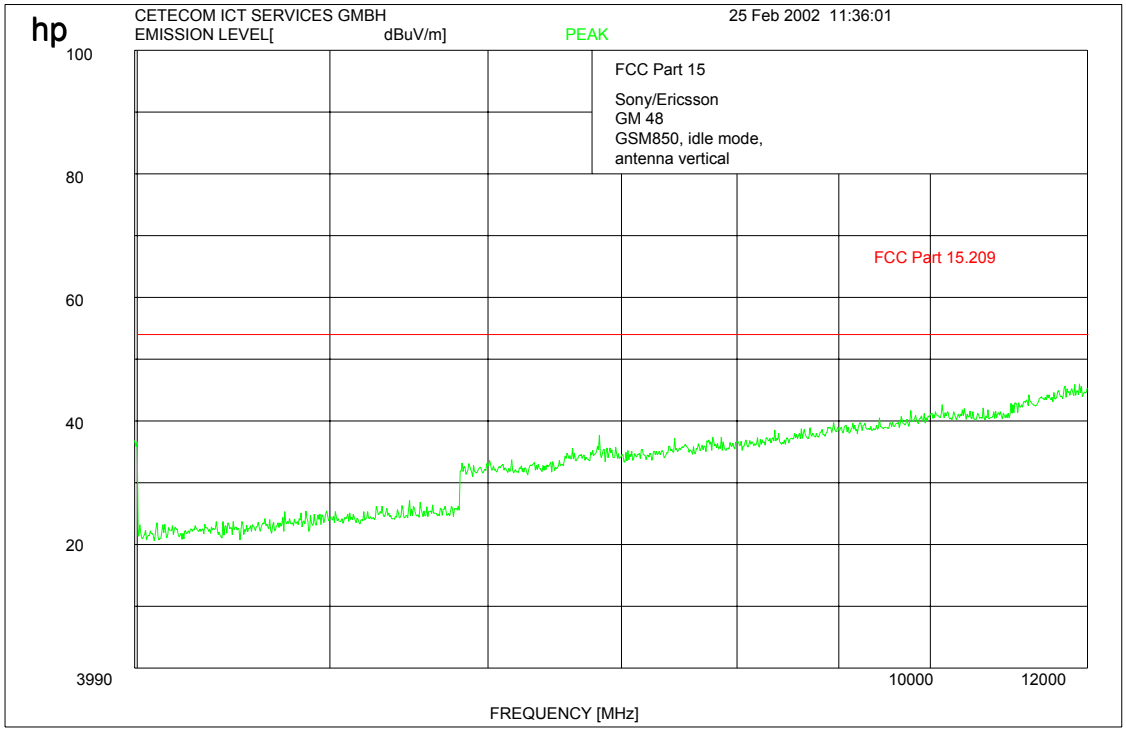
Channel 189 (this is valid for all 3 channels and up to 1 GHz)
Idle-Mode





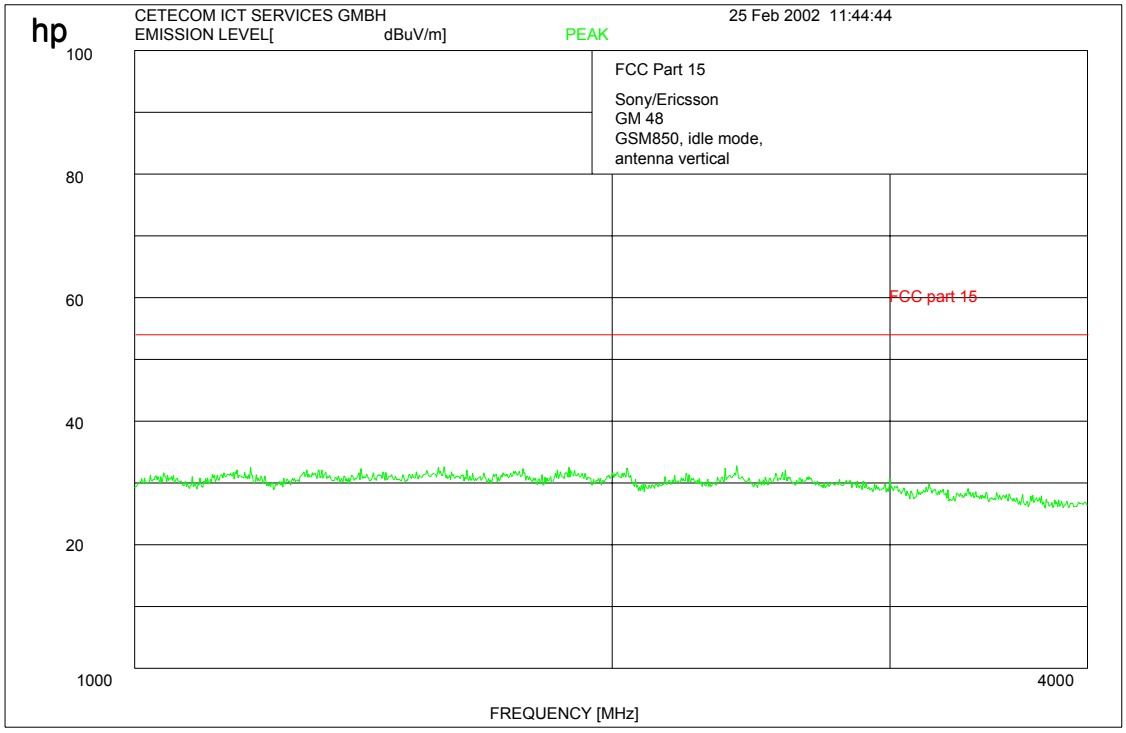
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 189 (this is valid for all 3 channels and up to 4 GHz)
Idle-Mode



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 189 (this is valid for all 3 channels and 4 to 12 GHz)
Idle-Mode



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

CONDUCTED SPURIOUS EMISSIONS

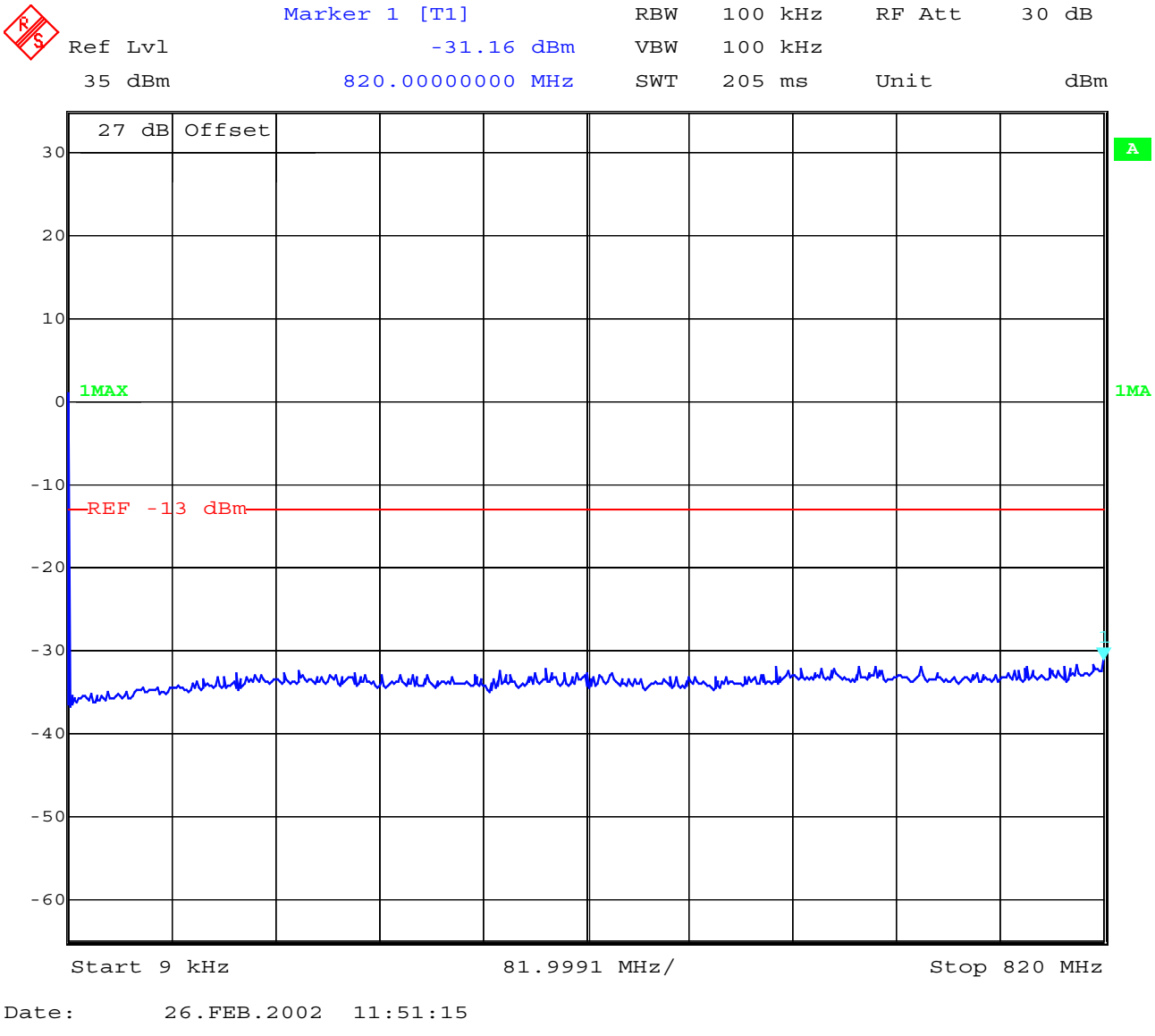
Measurement Procedure:
The following steps outline the procedure used to measure the conducted emissions from the mobile station.
1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least 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:
Sec. 24.238 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 +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

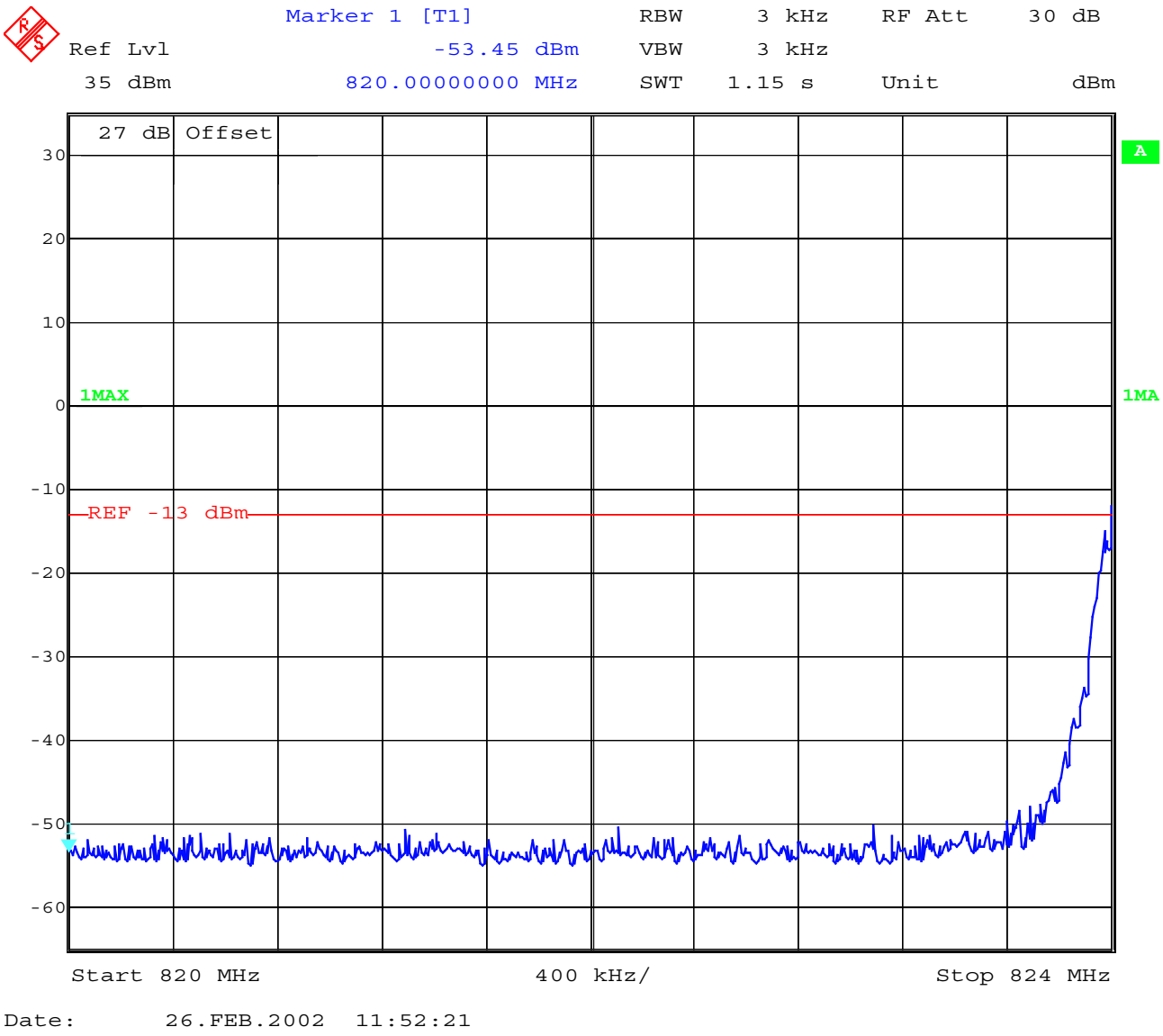
Measurements:

Channel: 128



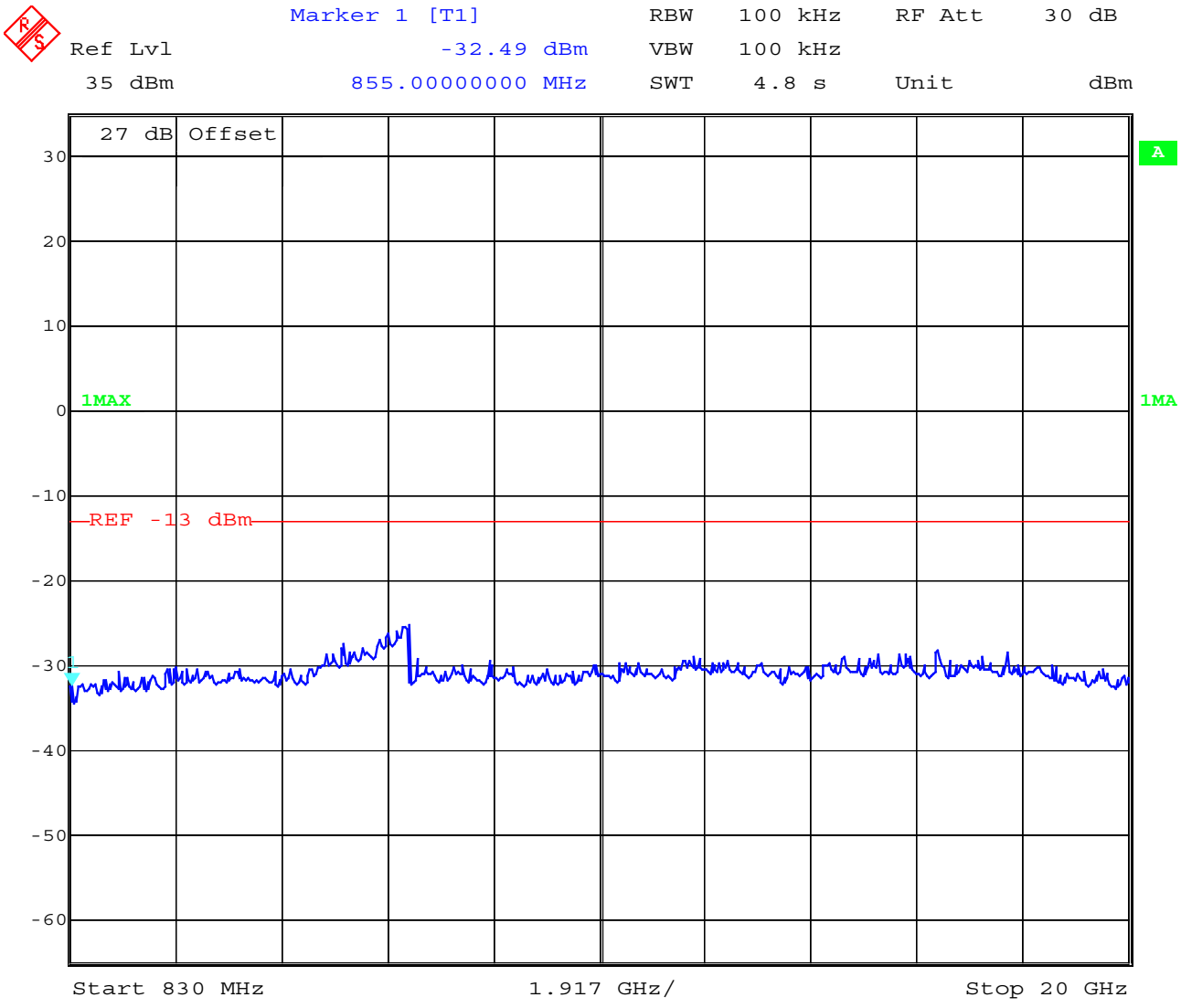
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 128



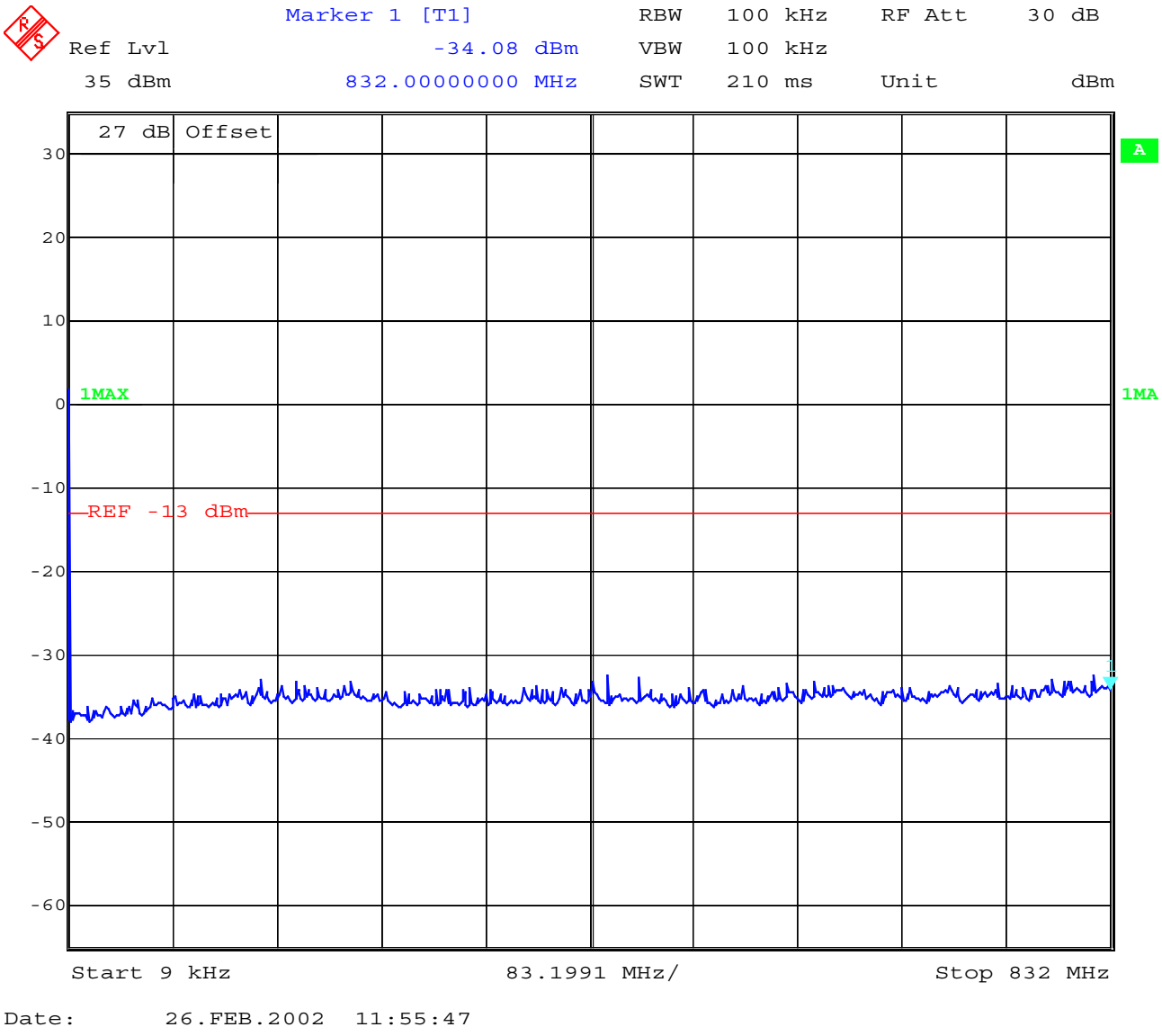
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 128 Average



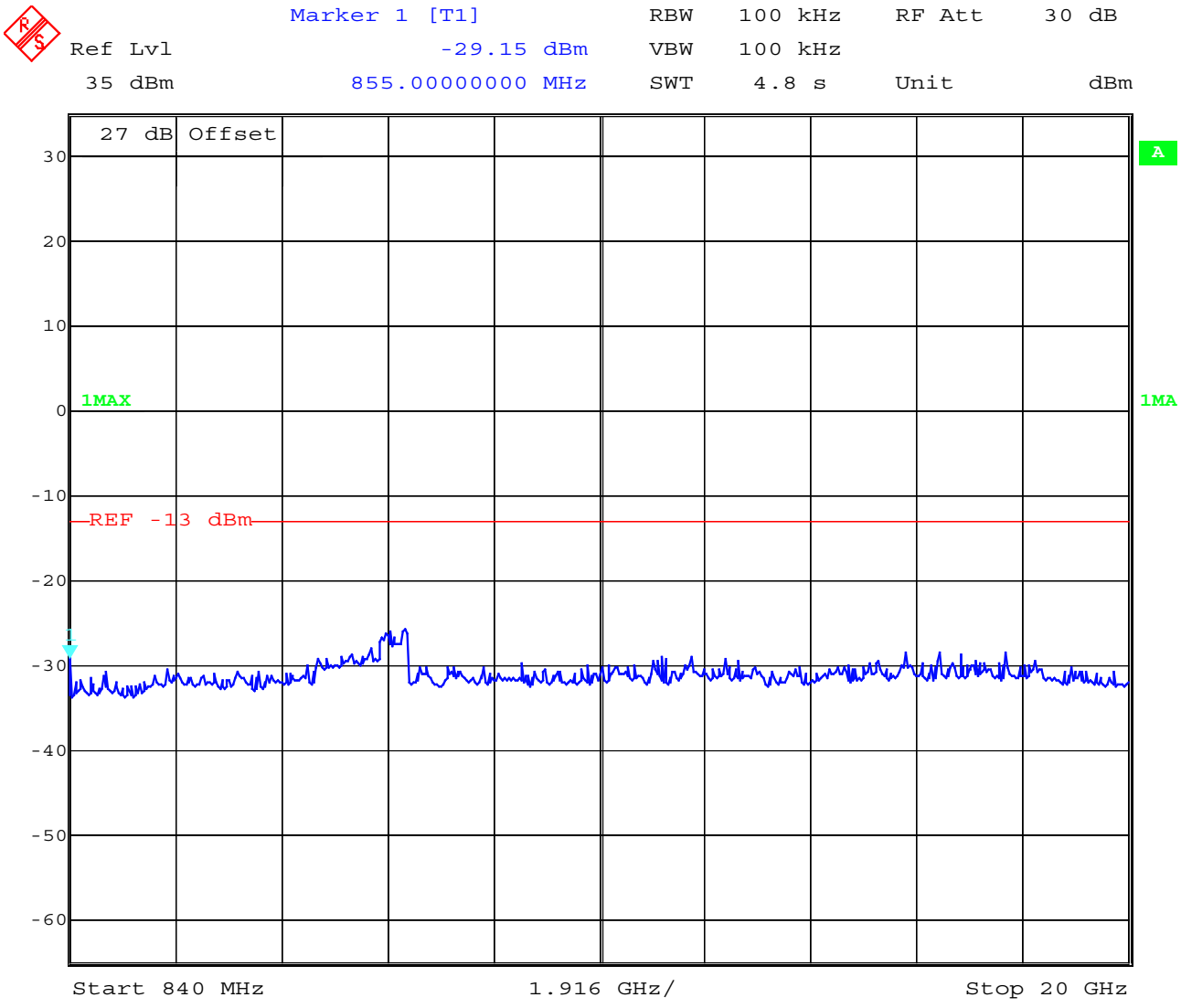
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 189



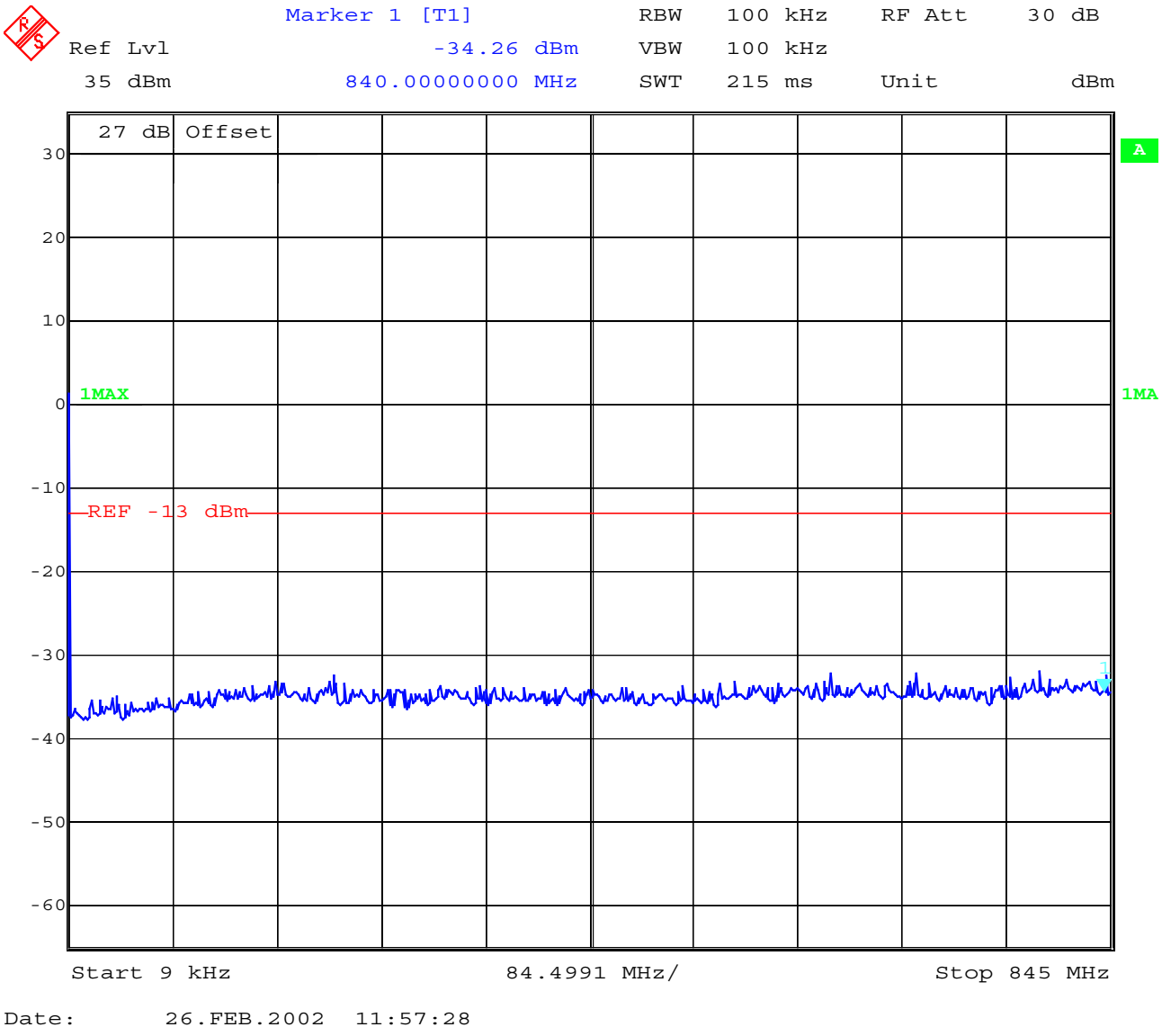
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 189



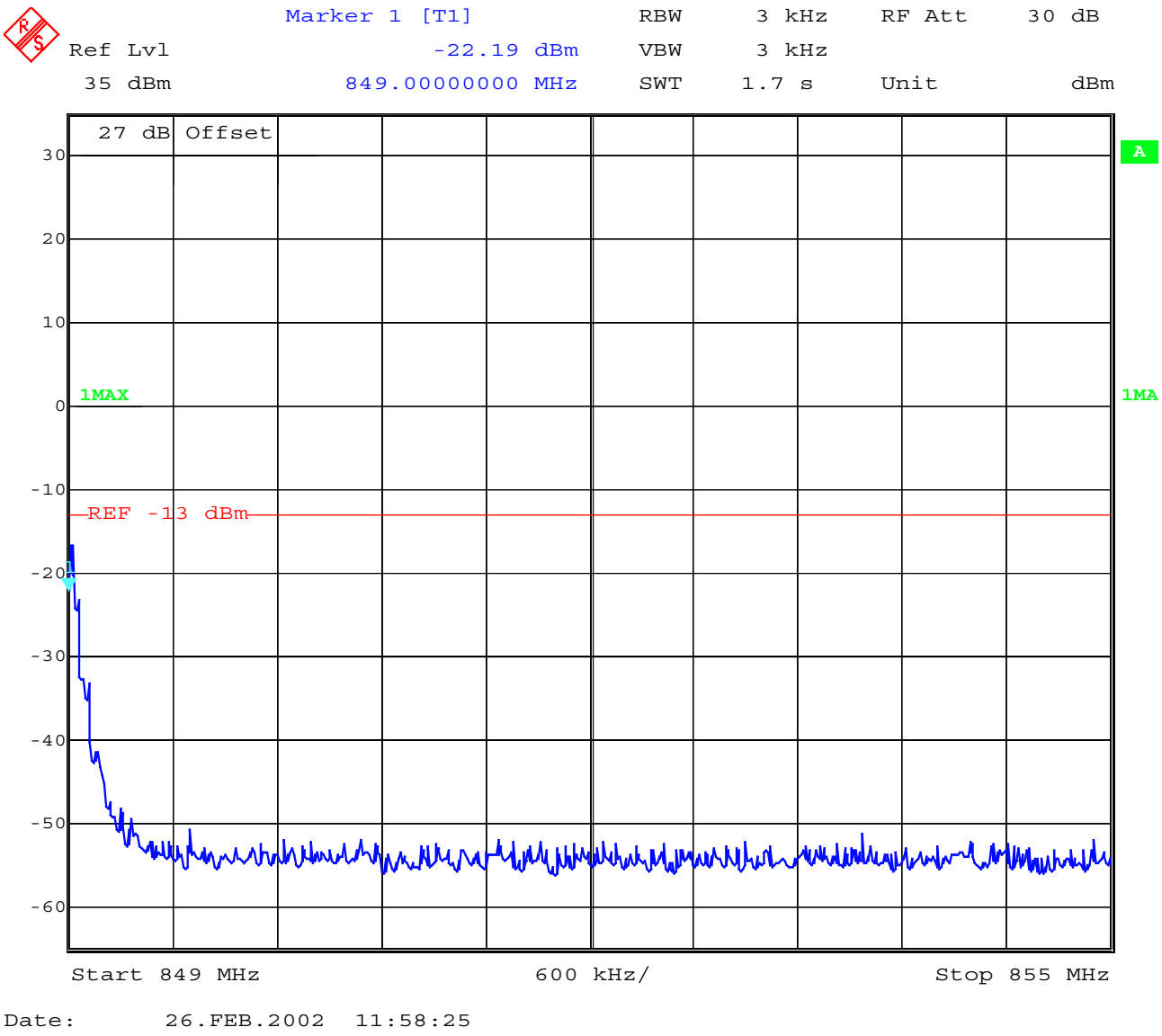
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 251



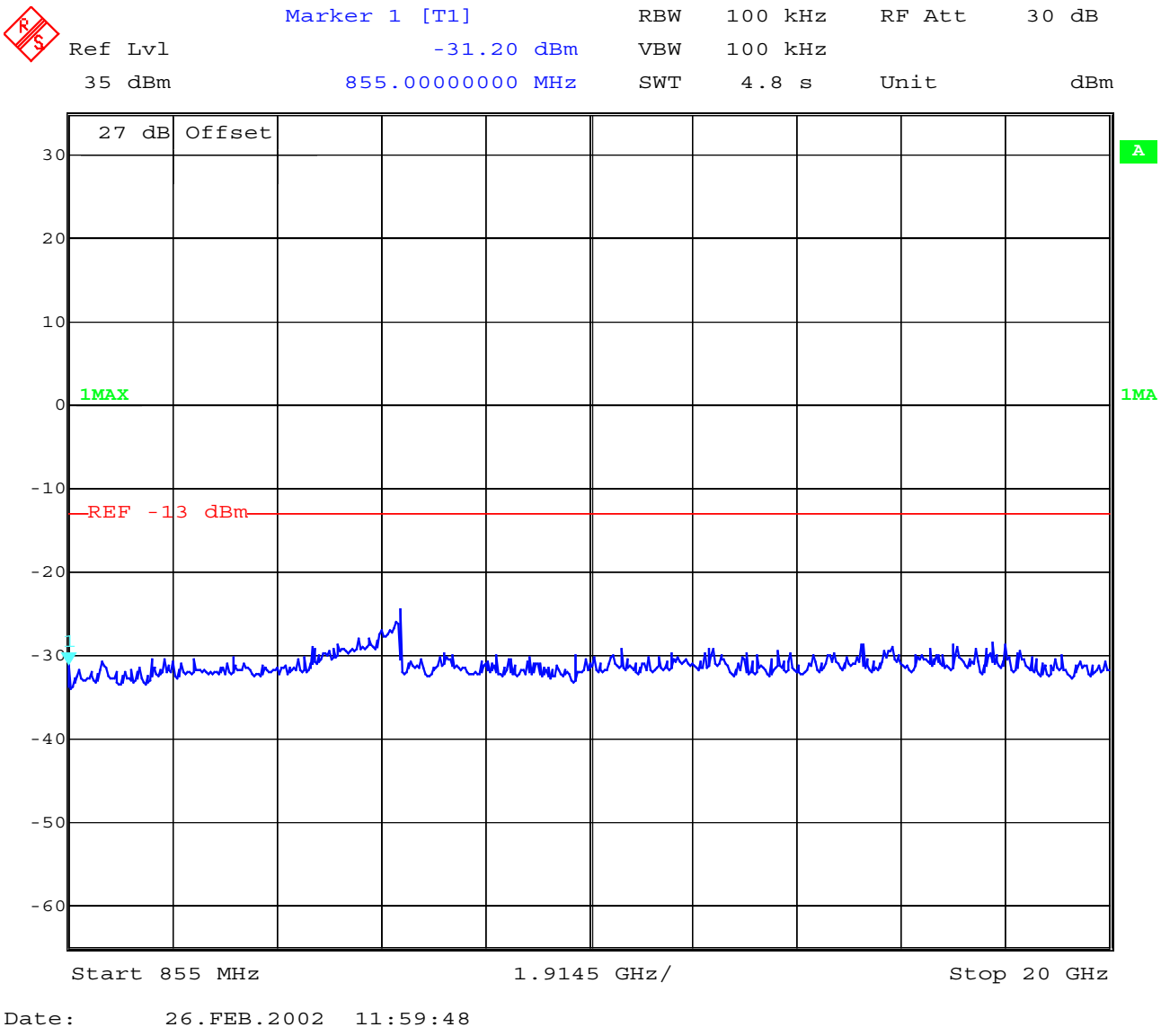
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 251



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

Channel 251



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 – 24, 64

OCCUPIED BANDWIDTH §2.989

Occupied Bandwidth Results

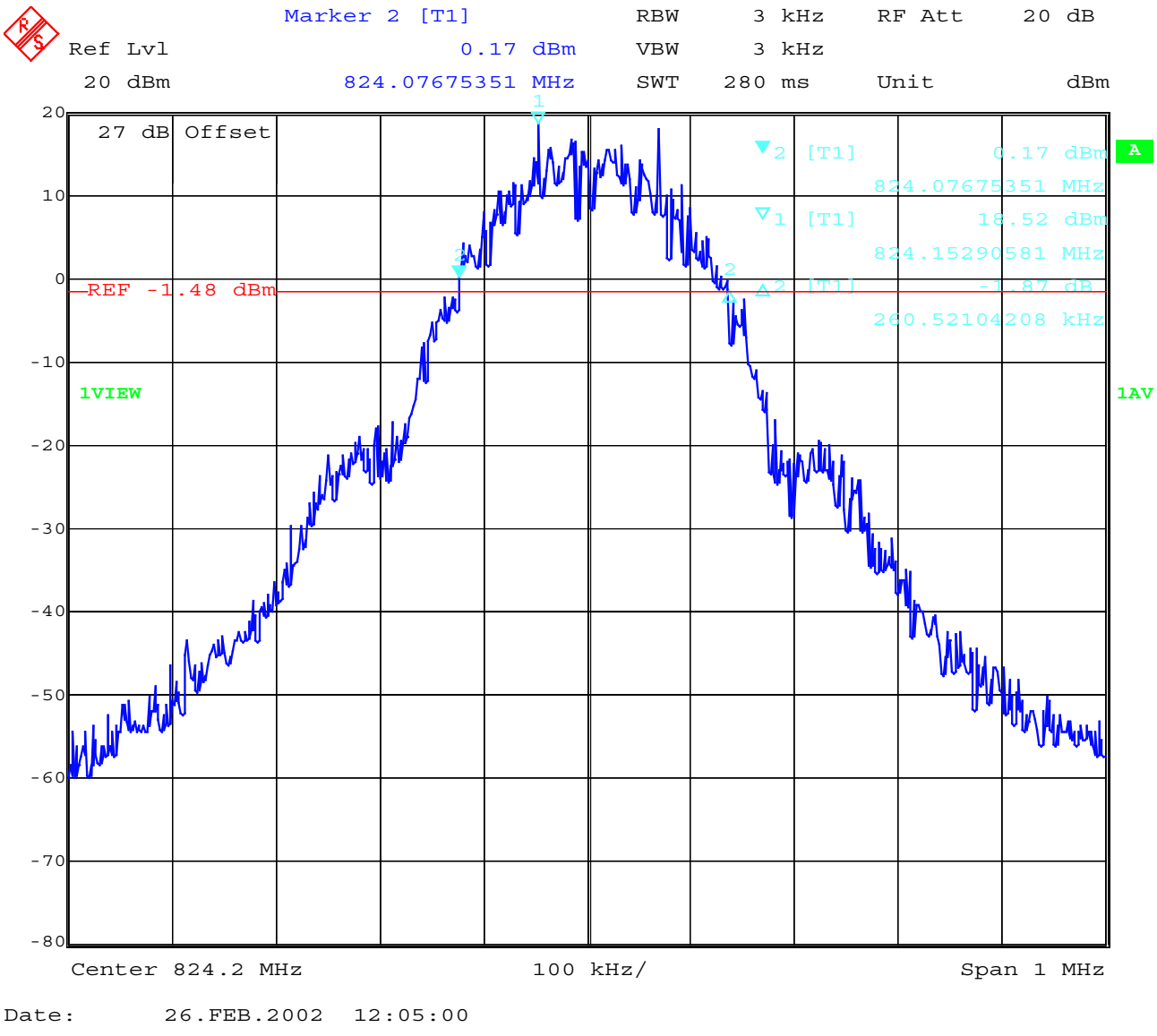
Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. Table 8.2 below lists the measured 99% power and -26dBC occupied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

Frequency	99% Occupied Bandwidth	-26 dBc Bandwidth
824.2 MHz	282.525	310.621
836.2 MHz	274.549	310.621
848.8 MHz	270.541	304.609

Part 24.238 (a) requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 290 kHz, this equates to a resolution bandwidth of at least 2.96 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

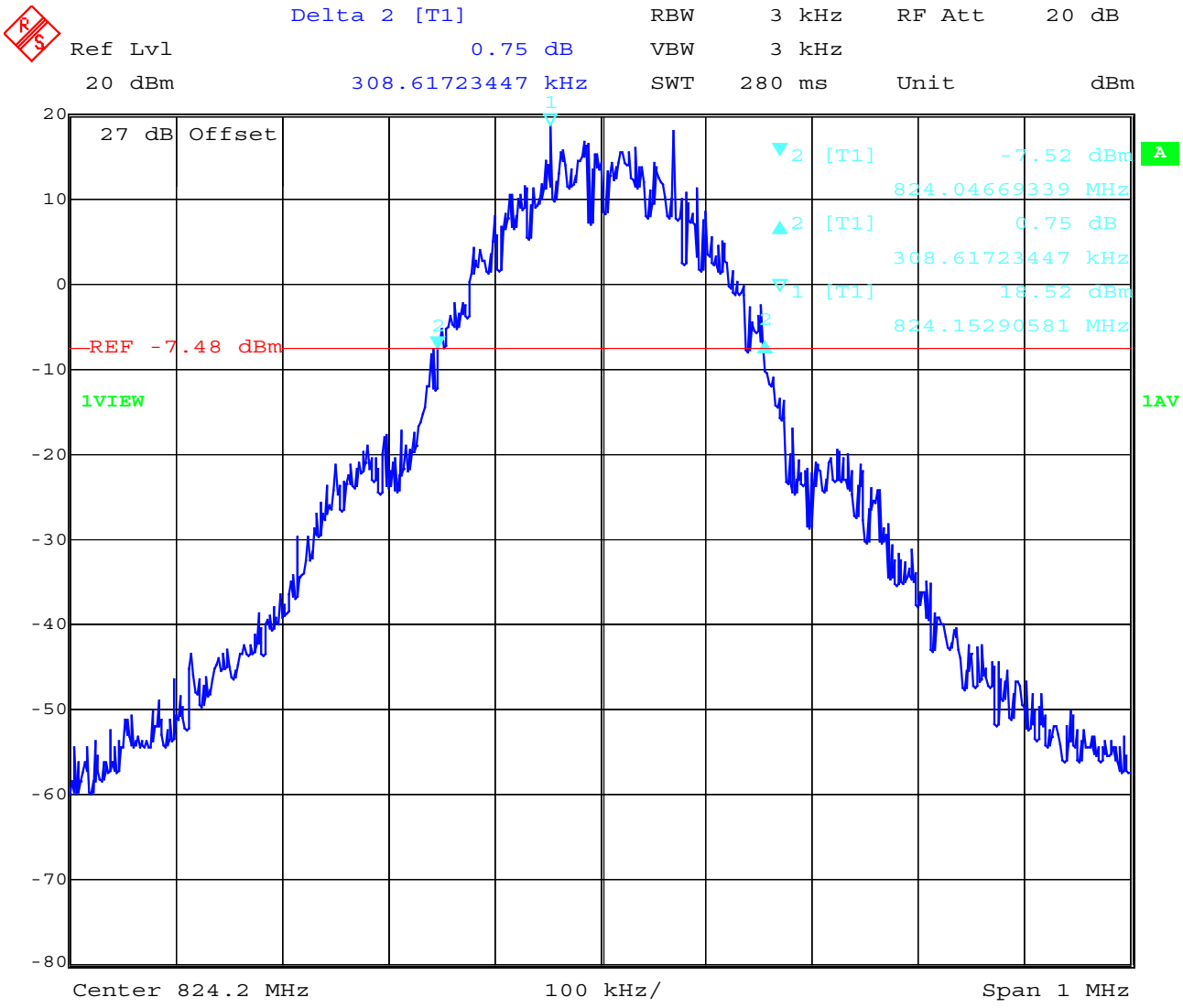
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

Channel 128
99% Occupied Bandwidth



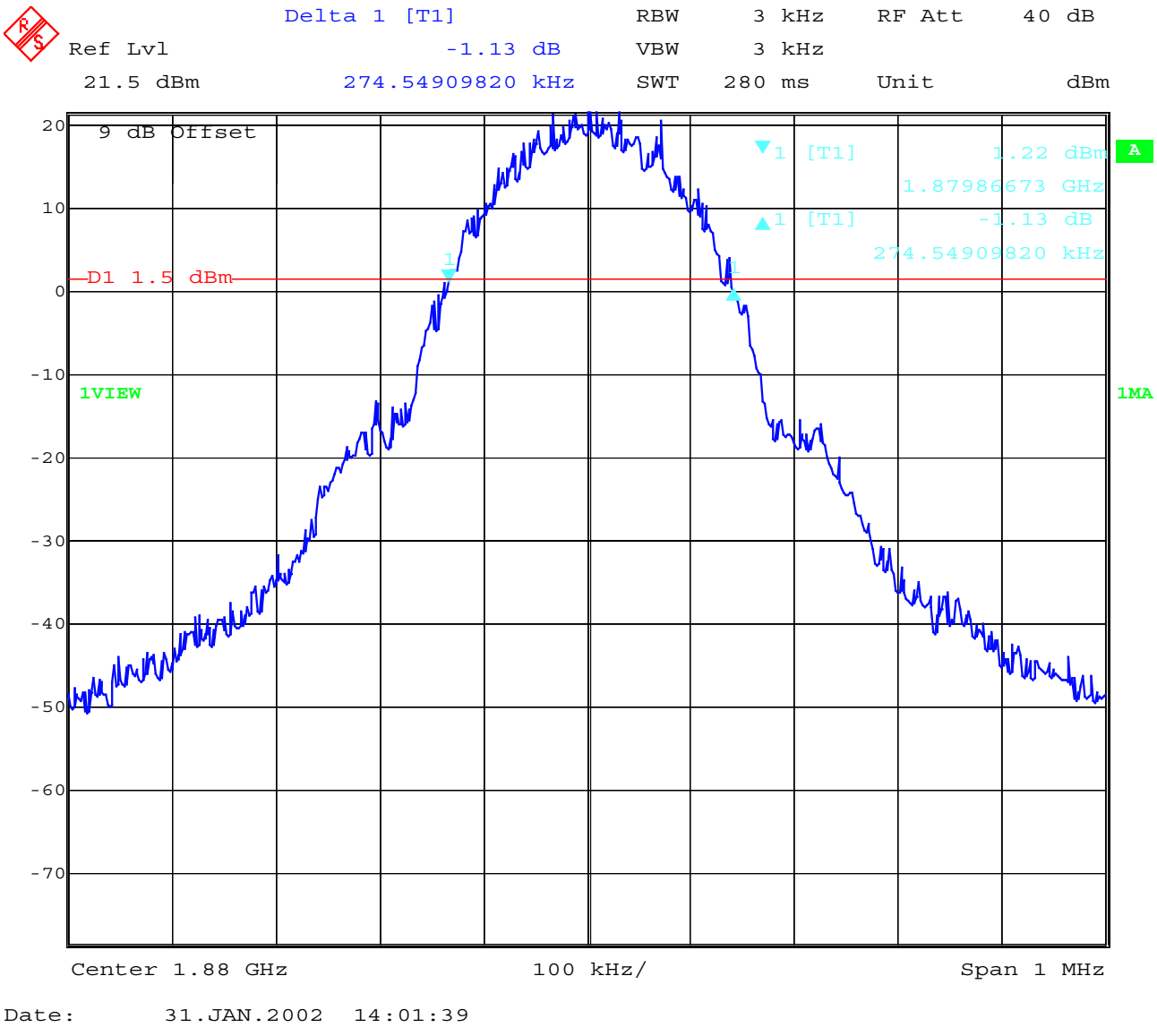
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

Channel 128
-26 dBc Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

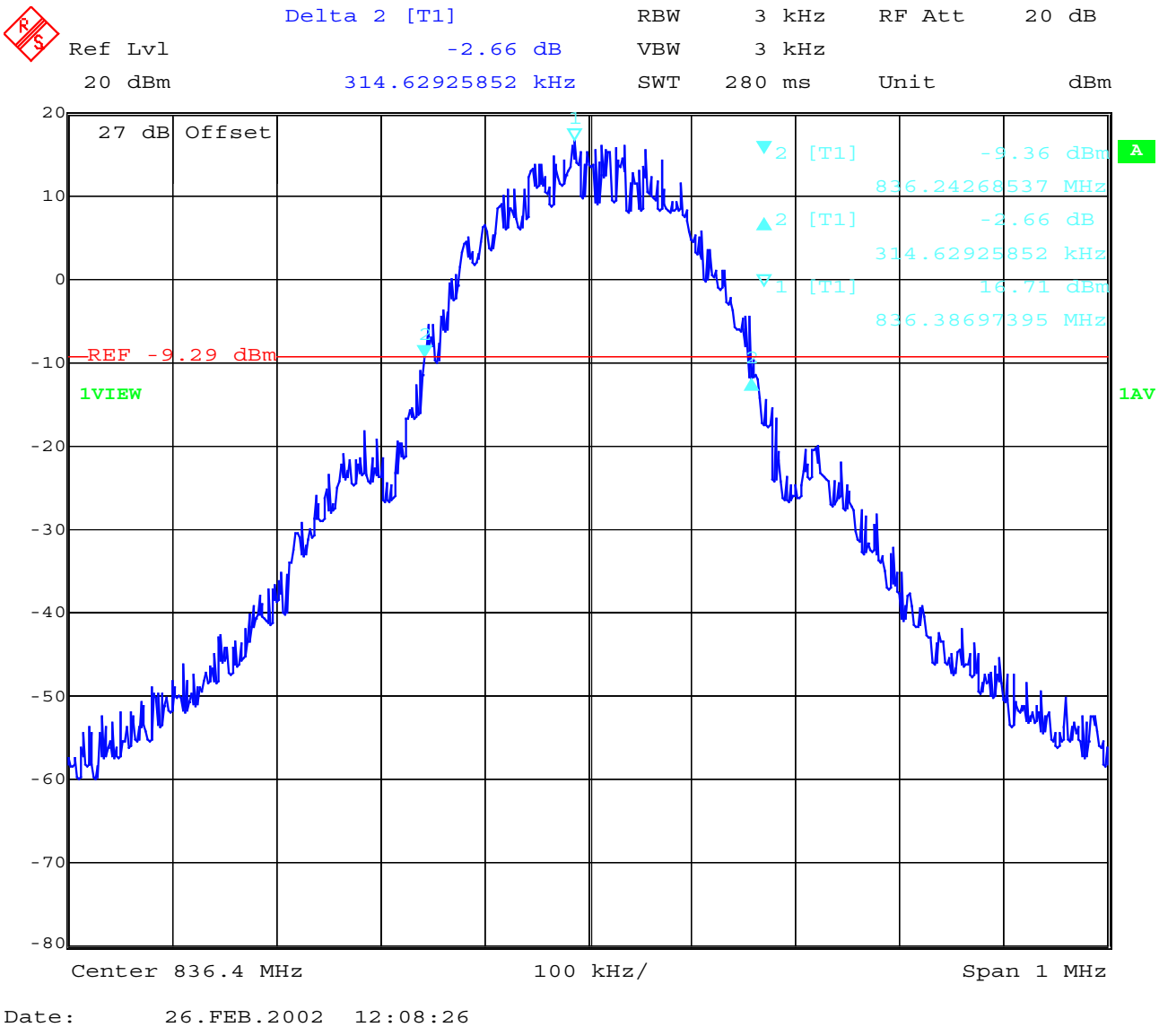
Channel 189
99% Occupied Bandwidth



Date: 31.JAN.2002 14:01:39

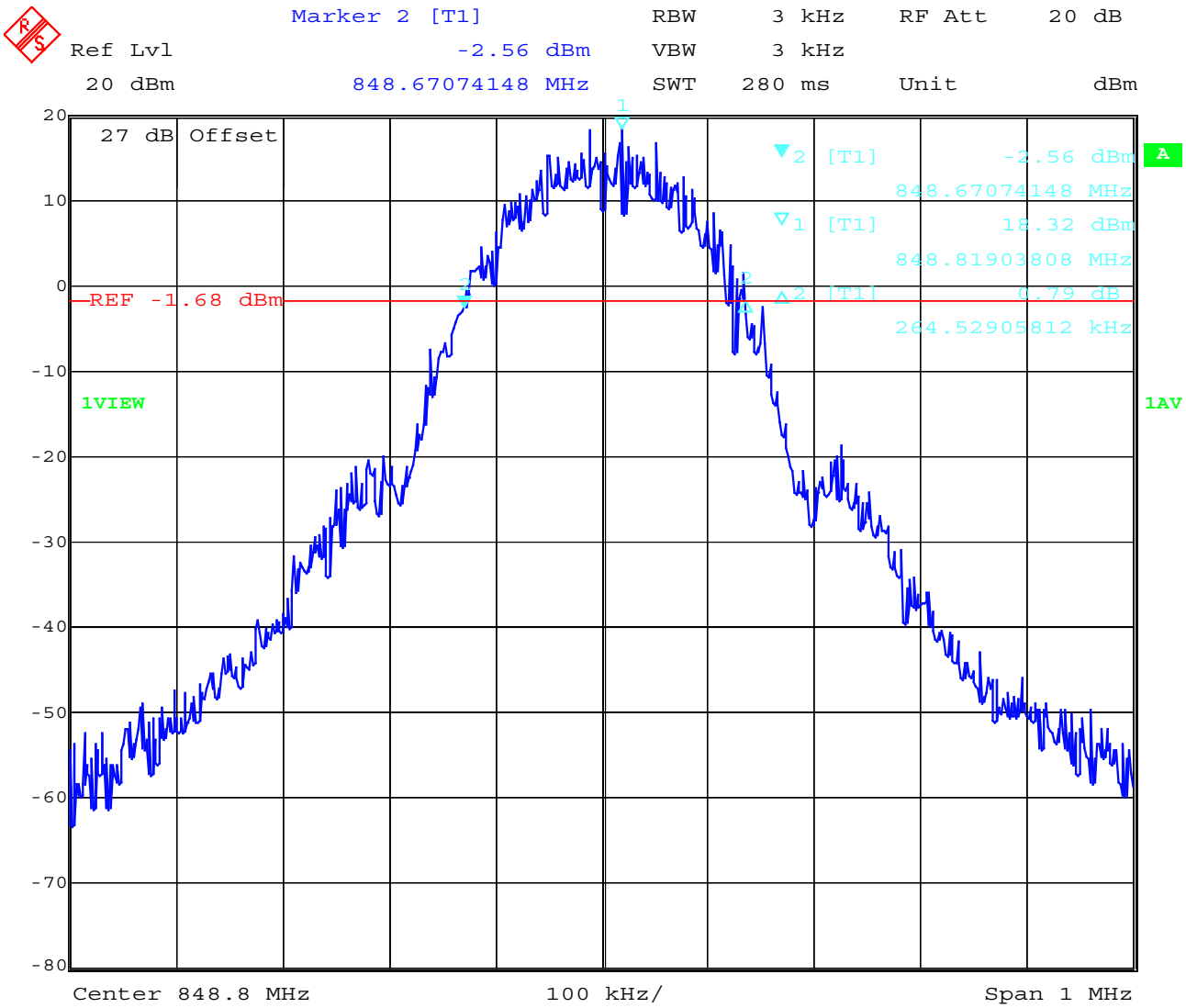
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

Channel 189
-26 dBc Bandwidth



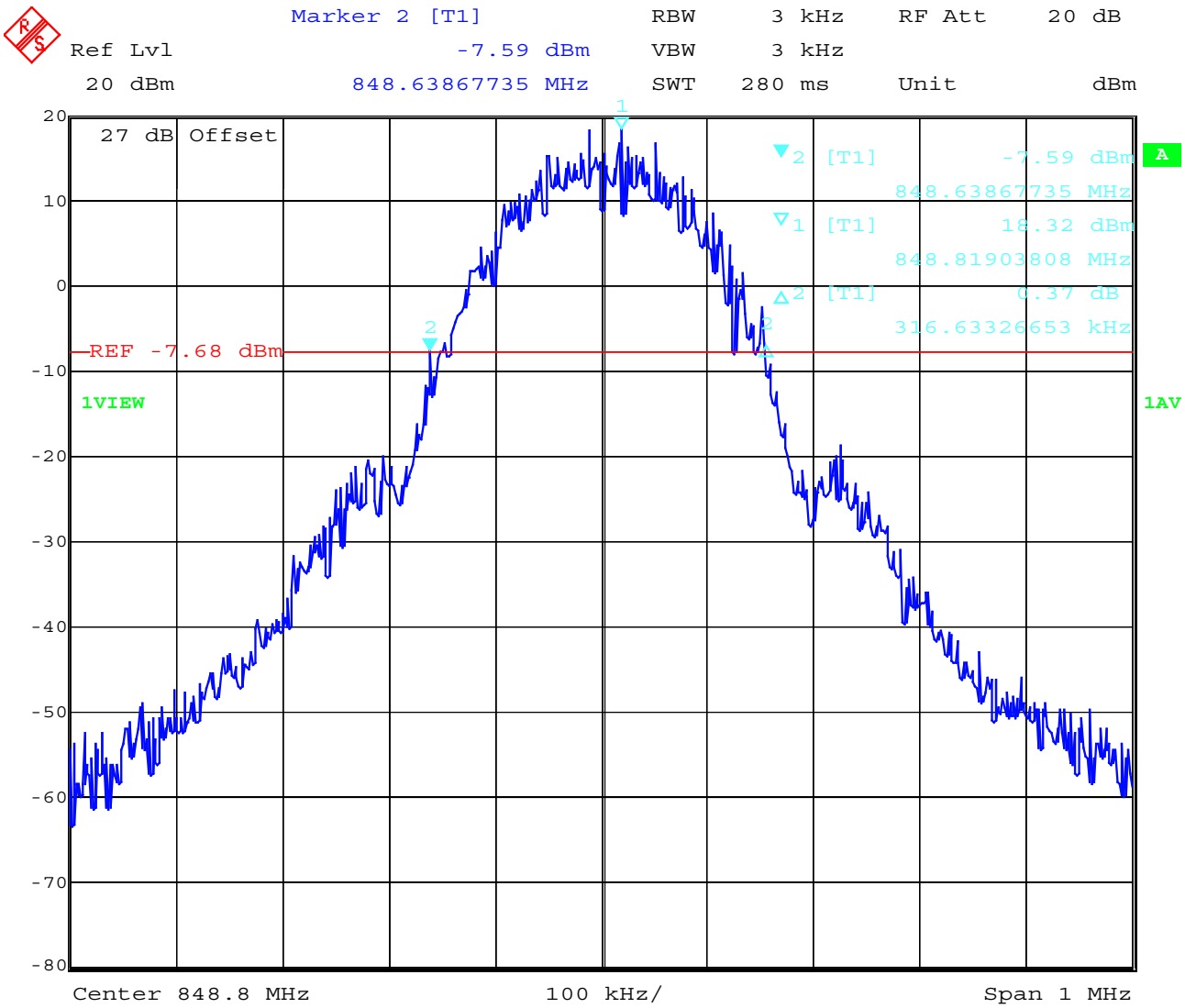
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

Channel 251
99% Occupied Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

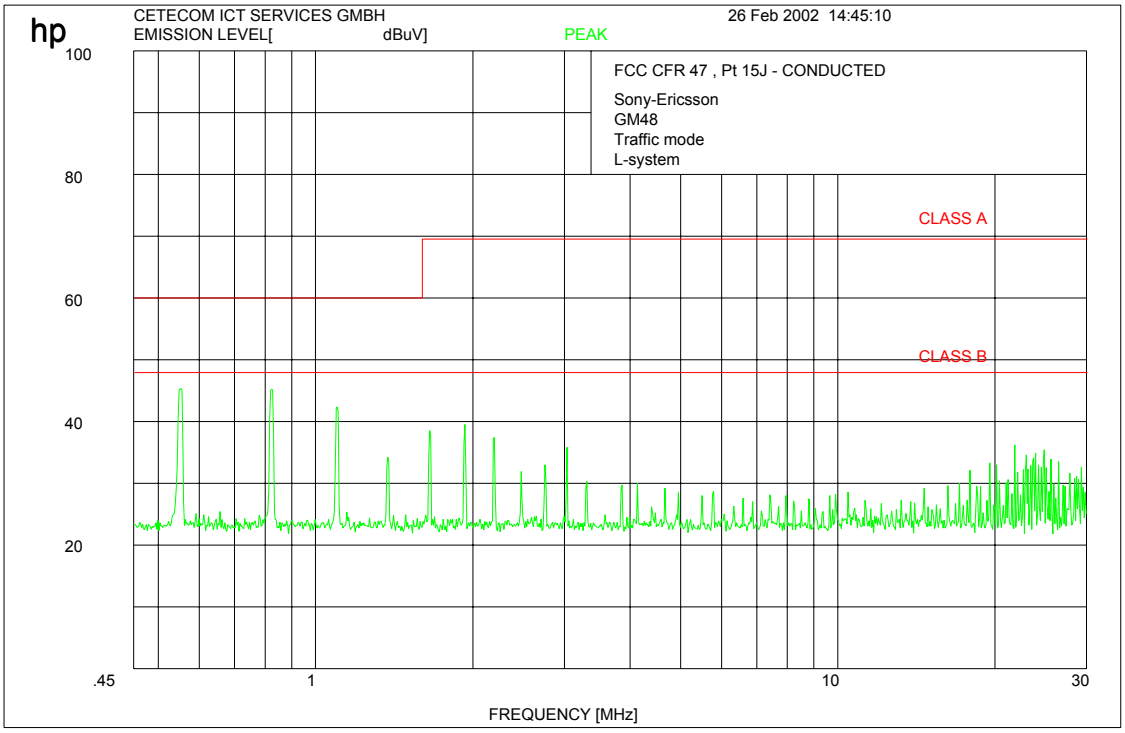
Channel 810
-26 dBc Bandwidth



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

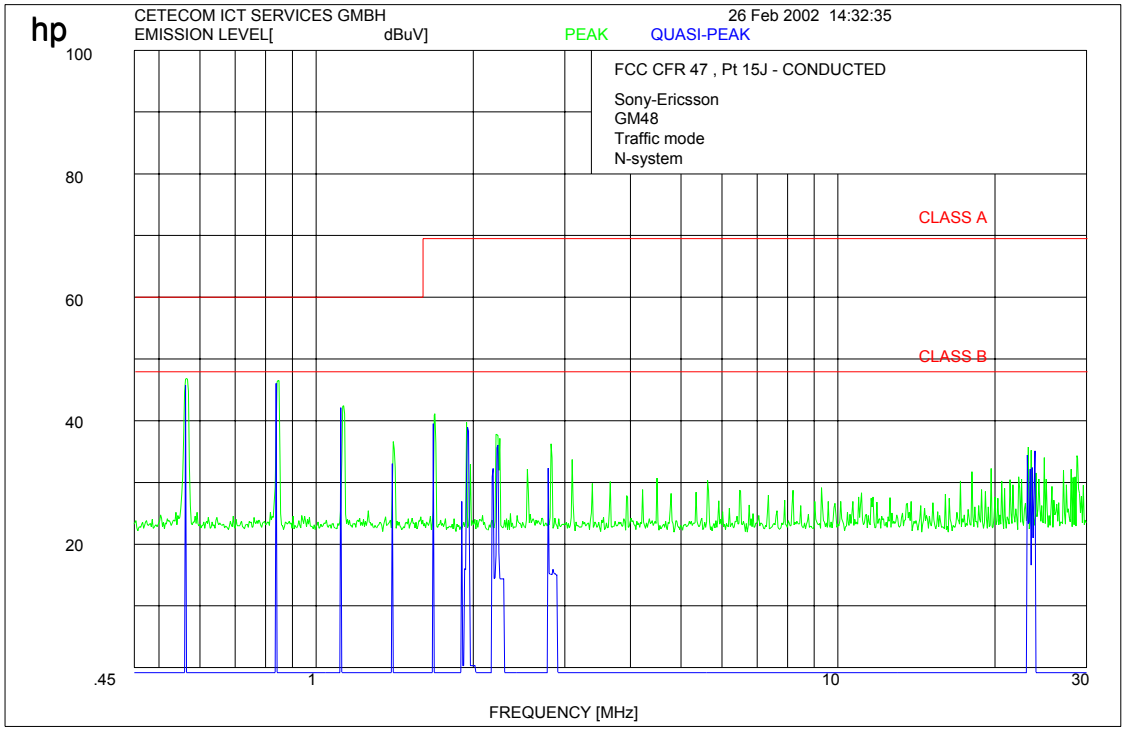
CONDUCTED EMISSIONS § 15.107/207

Line-L1



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

Line N



0.5644 MHz	45.7 dBµV/m	QP
0.8408 MHz	46.0 dBµV/m	QP
1.118 MHz	42.1 dBµV/m	QP
1.403 MHz	33.0 dBµV/m	QP
1.680 MHz	39.5 dBµV/m	QP
1.954 MHz	38.9 dBµV/m	QP
2.188 MHz	32.2 dBµV/m	QP
2.235 MHz	36.0 dBµV/m	QP
2.791 MHz	32.3 dBµV/m	QP
23.03 MHz	34.4 dBµV/m	QP
23.32 MHz	32.1 dBµV/m	QP
23.52 MHz	32.4 dBµV/m	QP
23.82 MHz	35.1 dBµV/m	QP

All spurious are below limit

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
62 - 63

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

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

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

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
66				
67				
68				