



TTI-P-G-166/98-30

Accredited Bluetooth Test Facility (BQTF)

Test report no.: 2_2885-01-03/02

FCC Part 24

713 05 01-BV

FCC ID: PY77130501

CETECOM – ICT Services GmbH

Untertürkheimerstr. 6-10

66117 Saarbrücken, Germany

Telephone: + 49 (0) 681 / 598-0

Fax: + 49 (0) 681 / 9075

Table of Contents

1 **General information**

- 1.1 **Notes**
- 1.2 **Testing laboratory**
- 1.3 **Details of applicant**
- 1.4 **Application details**
- 1.5 **Test item**
- 1.6 **Test standards**

2 **Technical test**

- 2.1 **Summary of test results**
- 2.2 **Test report**

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**

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Telephone : + 49 681 598 - 9100

Telefax : + 49 681 598 - 9075

E-mail : Michael.Berg@ict.cetecom.de

Internet : www.cetecom.de

Accredited testing laboratory

DAR-registration number : TTI-P-G-166/98-30

The Test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025.

Accredited Bluetooth™ Test Facility (BQTF)

BLUETOOTH™ is a trademark owned by Bluetooth SIG, Inc. and licensed to CETECOM

1.3 Details of applicant

Name : Sony Ericsson Mobile Communications AB
Street : Torshamnsgatan 39, Kista
City : SE-16480 Stockholm
Country : Sweden
Telephone : +46 8 757 35 00
Telefax : +46 8 757 19 10
Contact : Mr. Kenth Skoglund / Ms. Mia Jernhake
Telephone : +46 8 757 29 24 / +46 8 508 779 01

1.4 Application details

Date of receipt of application : 2002-05-03
Date of receipt of test item : 2002-06-10
Date of test : 2002-06-10 to 2002-06-13

1.5 Test item

Type of equipment : GSM 900/1800/1900 phone with Bluetooth™
Type designation : 713 05 01-BV
Manufacturer : applicant
Street :
City :
Country :
Serial number : A6101TR9P2
Additional informations:
Frequency : 1850 – 1910 MHz
Type of modulation : 300KGXW
Number of channels : 300
Antenna : Integral antenna and socket
Power supply : AC/DC Adapter 100-240V AC/5.1V DC
Type CST-13 BML 162 157/ 1R1B Type 4020069-BV
Output power : 0,877 W Peak , ERP : 0.530 W (Burst); EIRP:0.859 W (Burst)
Type of equipment : Temperature range : -30°C - +60°C
FCC – ID : PY77130501
Hardware : A
Software : CXC162002_R1A053

1.6 Test standards: FCC Part 24

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 re-measurements. 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.

All measurements was done based on ANSI C63.4.

2.1 Summary of test results

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 :

2002-04-29 RSC 8411 Berg M.

Date Section Name


Signature

Technical responsibility for area of testing :

2002-04-29 RSC8412 Hausknecht D.

Date Section Name


Signature

2.2 Testreport

TEST REPORT

Test report no. : 2_2885-01-03/02

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

| PARAMETER TO BE MEASURED Paragraph | PAGE |
|---|-------------|
| POWER OUTPUT SUBCLAUSE § 24.232 | 7 |
| FREQUENCY STABILITY SUBCLAUSE § 24.235 | 9 |
| AFC FREQ ERROR vs. VOLTAGE | 10 |
| AFC FREQ ERROR vs. TEMPERATURE | 10 |
| EMISSIONS LIMITS §24.238 | 12 |
| OCCUPIED BANDWIDTH §2.989 | 36 |
| CONDUCTED EMISSIONS § 15.107/207 | 43 |
| TEST SITE | 47 |
| PHOTOGRAPHS OF THE EQUIPMENT | 50 |

POWER OUTPUT

SUBCLAUSE § 24.232

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 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)

Peak power and Average power was measured with a calibrated Signal Analyzer (FSIQ from R&S). Peak power : max Power of the Signal measured with 3 MHz ResBW and 3 MHz VBW. Average power is the integrated Power over Time from the modulated GSM Signal in the CW-mode measured in burst

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 | 29.42 | 29.30 |
| 1880.0 | 0 | 29.30 | 29.20 |
| 1909.8 | 0 | 29.43 | 29.30 |
| 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, $ERP = EIRP - 2.1 \text{ dBi}$.

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 | 29.34 | 27.24 | 20.34 | 18.14 |
| 1880.0 | 0 | 29.09 | 26.99 | 20.09 | 19.99 |
| 1909.8 | 0 | 28.27 | 26.17 | 19.27 | 17.17 |
| Measurement uncertainty | | ±3 dB | | | |

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

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 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 3.6 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 3.6 Volts. Vary supply voltage from minimum 3.4 Volts to maximum 4.0 Volts, in 13 steps remeasuring carrier frequency at each voltage. Pause at 3.6 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 3.6 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.
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 3.4 V dc and 4.0 V dc, with a nominal voltage of 3.6V dc...

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

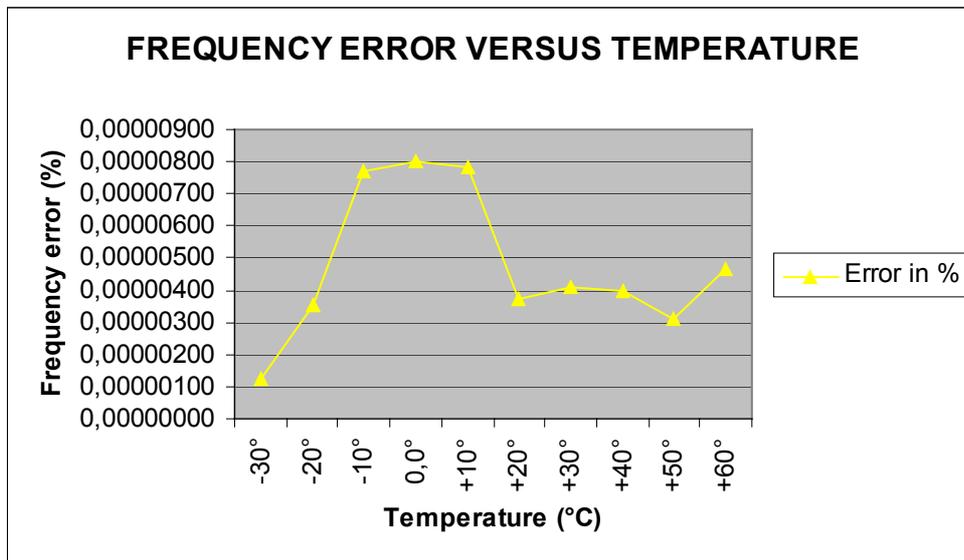
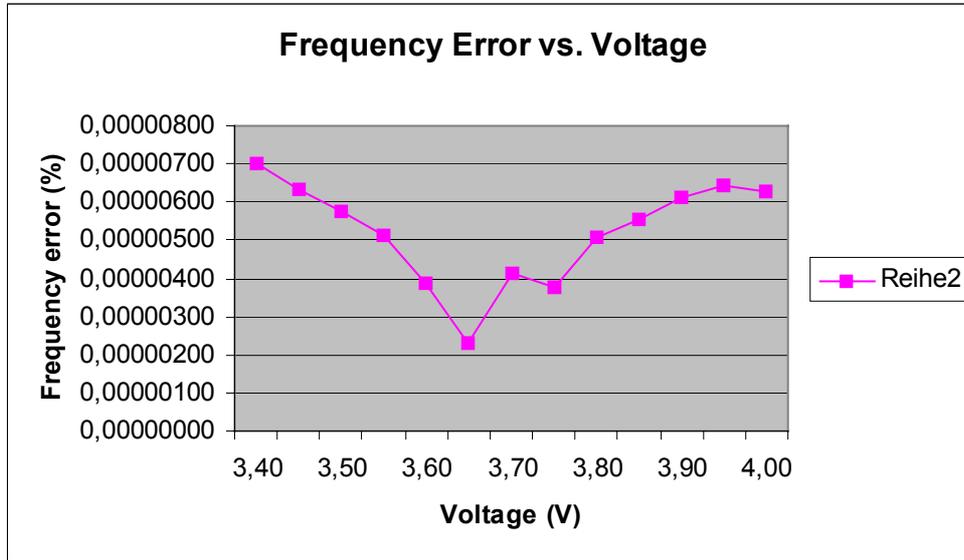
AFC FREQ ERROR vs. VOLTAGE

| Voltage (V) | Frequency Error (Hz) | Frequency Error (%) | Frequency Error (ppm) |
|-------------|----------------------|---------------------|-----------------------|
| 3.40 | 132 | 0,00000702 | 0,0702 |
| 3.45 | 119 | 0,00000633 | 0,0633 |
| 3.50 | 108 | 0,00000574 | 0,0574 |
| 3.55 | 96 | 0,00000511 | 0,0511 |
| 3.60 | 73 | 0,00000388 | 0,0388 |
| 3.65 | 43 | 0,00000229 | 0,0229 |
| 3.70 | 78 | 0,00000415 | 0,0415 |
| 3.75 | 71 | 0,00000378 | 0,0378 |
| 3.80 | 95 | 0,00000505 | 0,0505 |
| 3.85 | 104 | 0,00000553 | 0,0553 |
| 3.90 | 115 | 0,00000612 | 0,0612 |
| 3.95 | 121 | 0,00000644 | 0,0644 |
| 4.00 | 118 | 0,00000628 | 0,0628 |

AFC FREQ ERROR vs. TEMPERATURE

| TEMPERATURE (°C) | Frequency Error (Hz) | Frequency Error (%) | Frequency Error (ppm) |
|------------------|----------------------|---------------------|-----------------------|
| -30 | 23 | 0,00000122 | 0,0122 |
| -20 | 67 | 0,00000356 | 0,0356 |
| -10 | 145 | 0,00000771 | 0,0771 |
| ±0.0 | 151 | 0,00000803 | 0,0803 |
| +10 | 147 | 0,00000782 | 0,0782 |
| +20 | 70 | 0,00000372 | 0,0372 |
| +30 | 77 | 0,00000410 | 0,0410 |
| +40 | 75 | 0,00000399 | 0,0399 |
| +50 | 58 | 0,00000309 | 0,0309 |
| +60 | 87 | 0,00000463 | 0,0463 |

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



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

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 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:

- The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- The antenna output was terminated in a 50 ohm load.
- A double ridged waveguide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters using the equation shown below:

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

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:

$$P(\text{dBm}) = E(\text{dBuV/m}) - 97.2\text{dB}$$

Measurement Limit:

Sec. 24.238 Emission Limits.

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

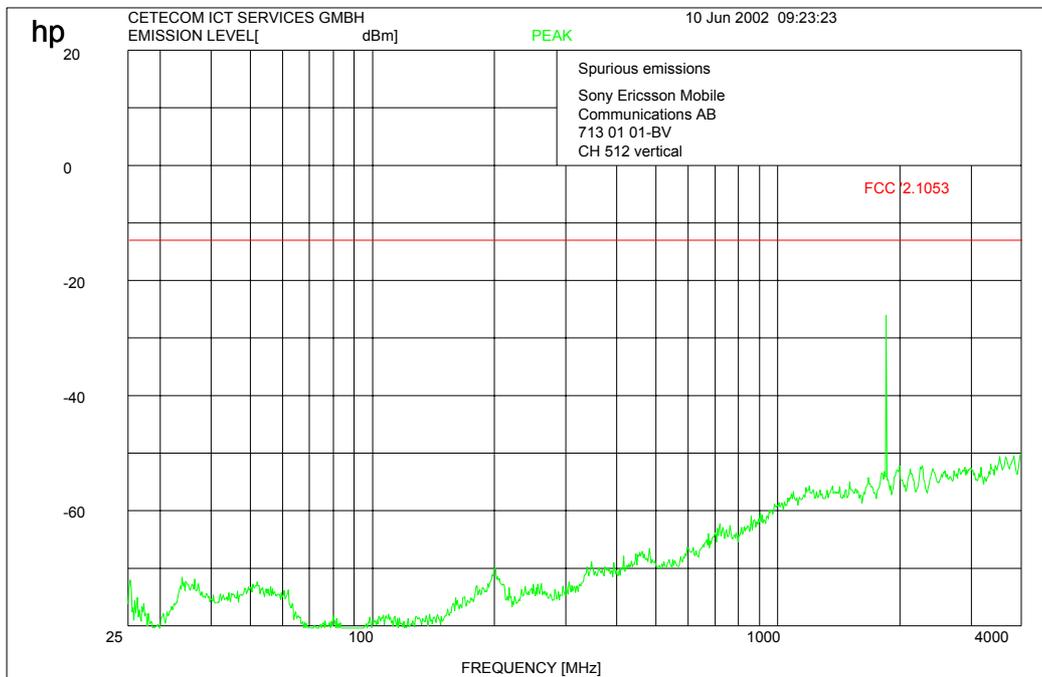
Measurement Results:

Radiated emissions 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.

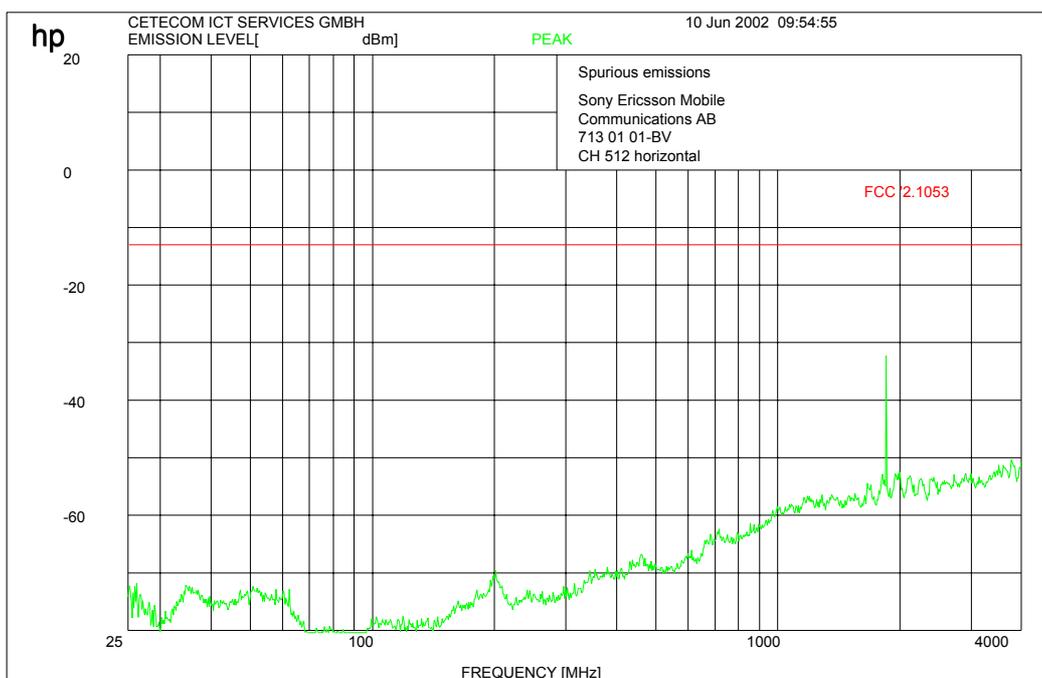
RESULTS OF OPEN FIELD RADIATED TEST FOR FCC-24:

No Radiated Emissions less than 20 dB below the limit was found !

Channel 512 (up to 4 GHz)

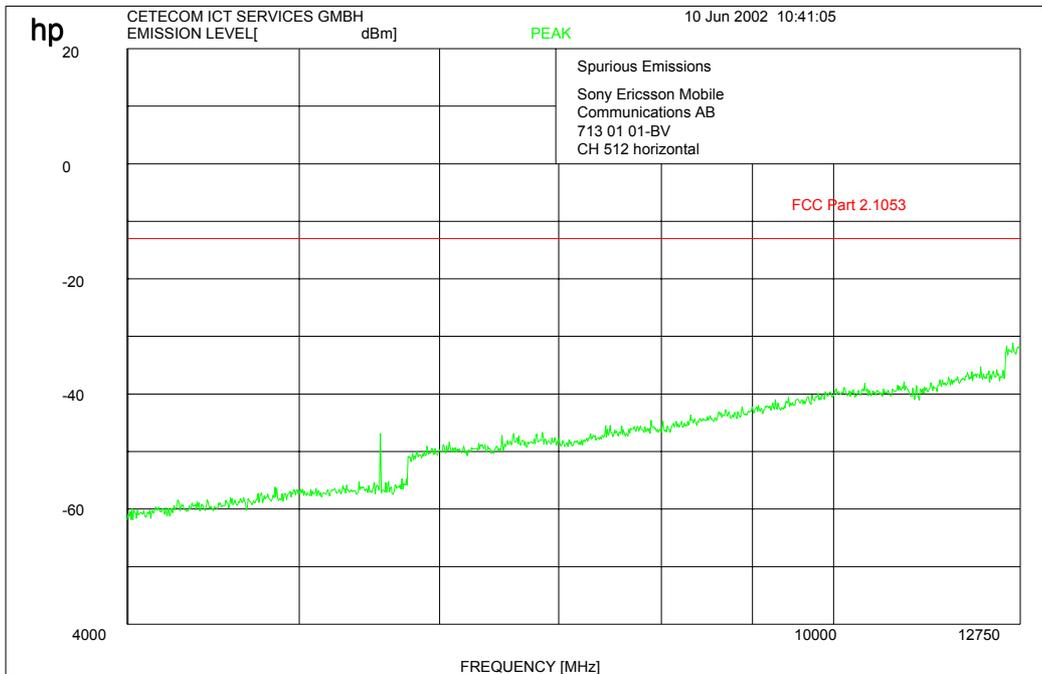
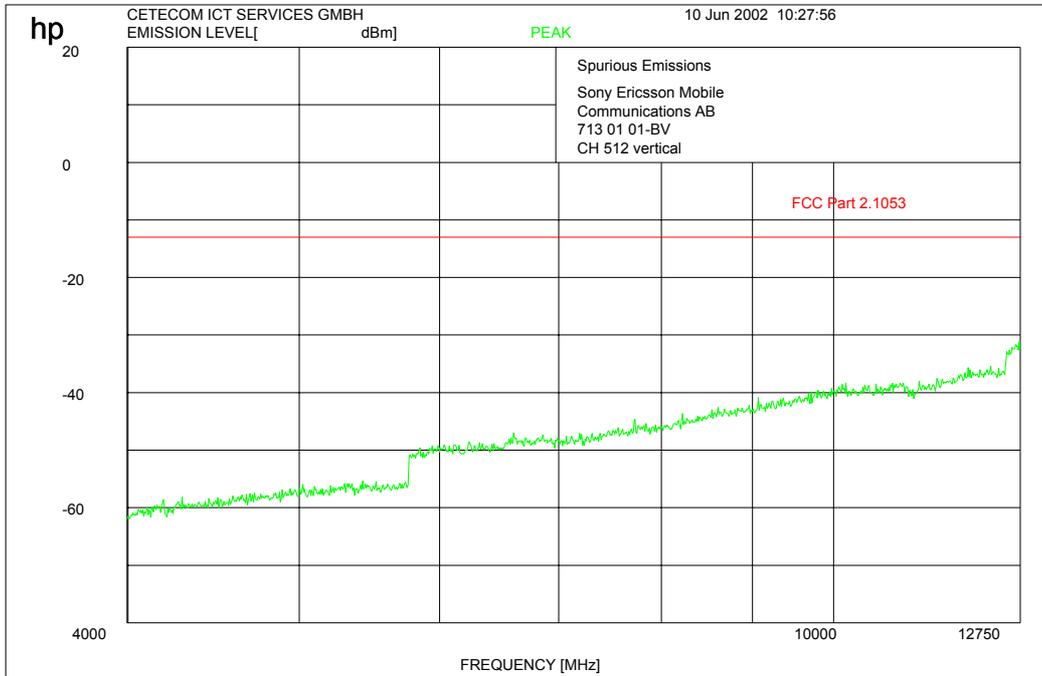


Peaks at 1850.2 MHz shows the carrier frequency suppressed by narrow band rejection filter



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

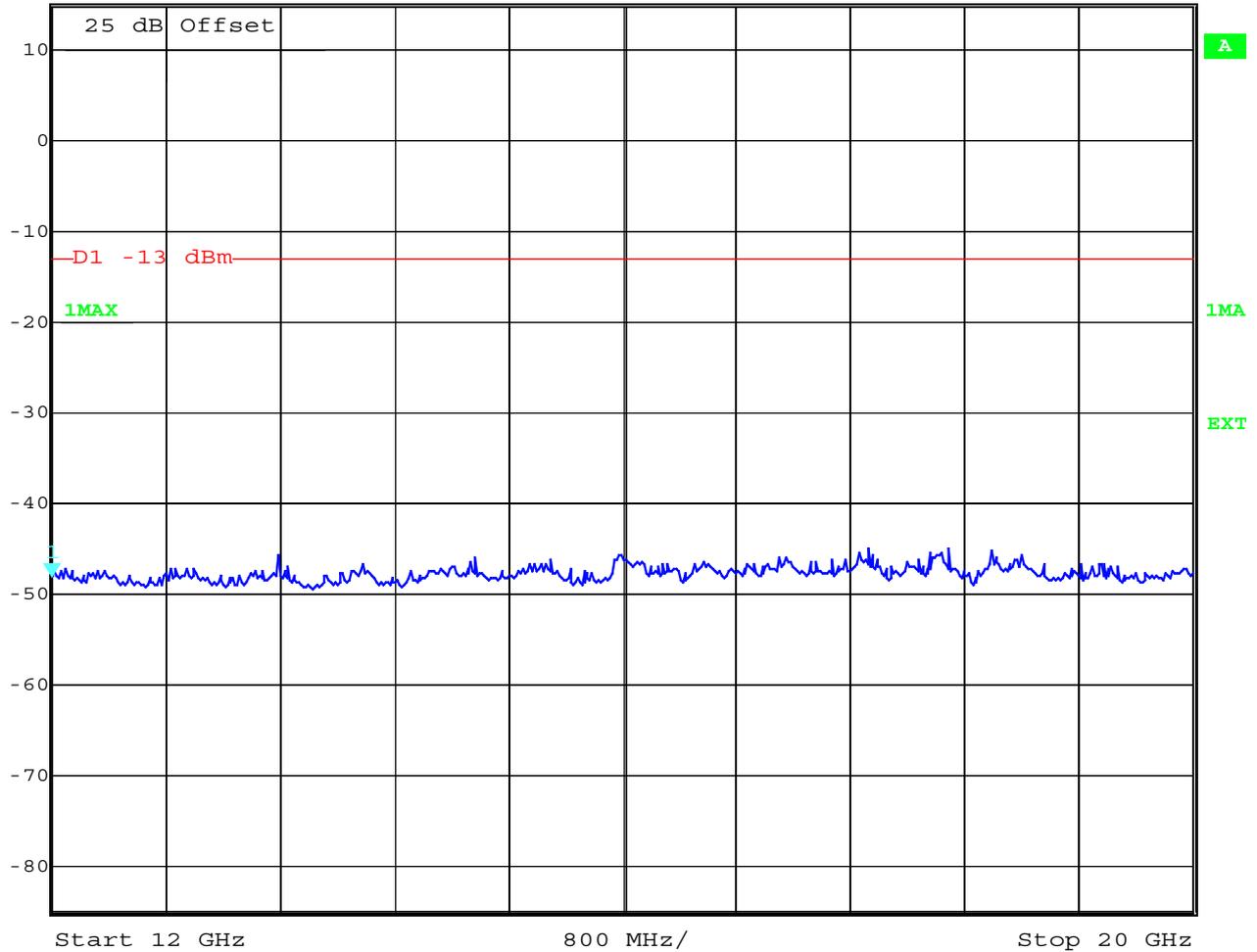
Channel 512 (up to 12 GHz)



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

Channel 512 : up to 20 GHz

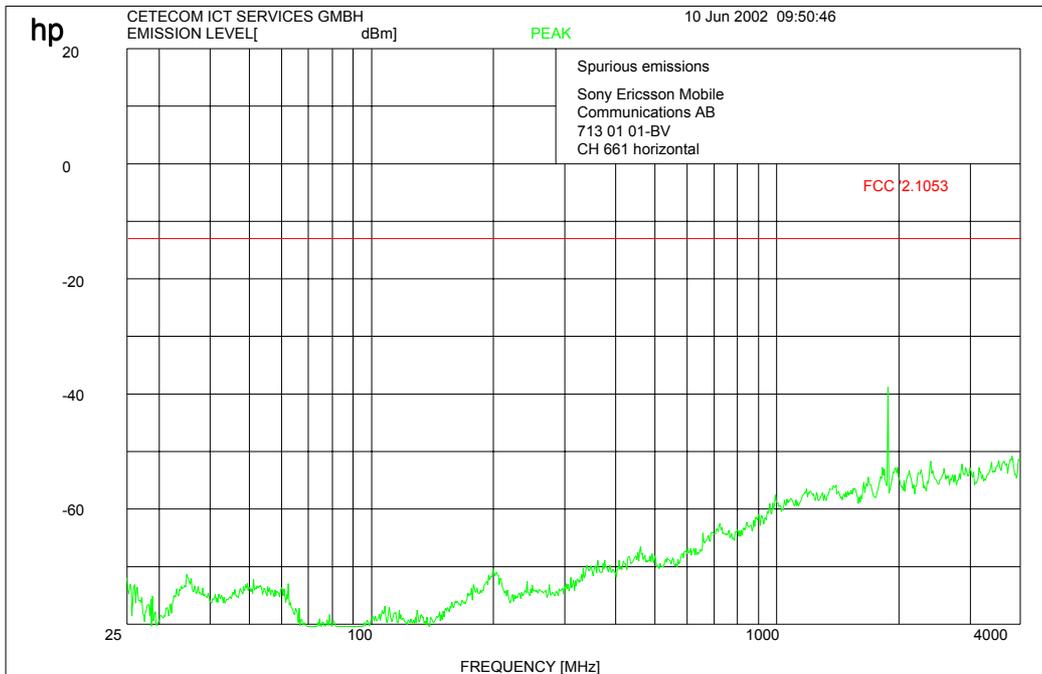
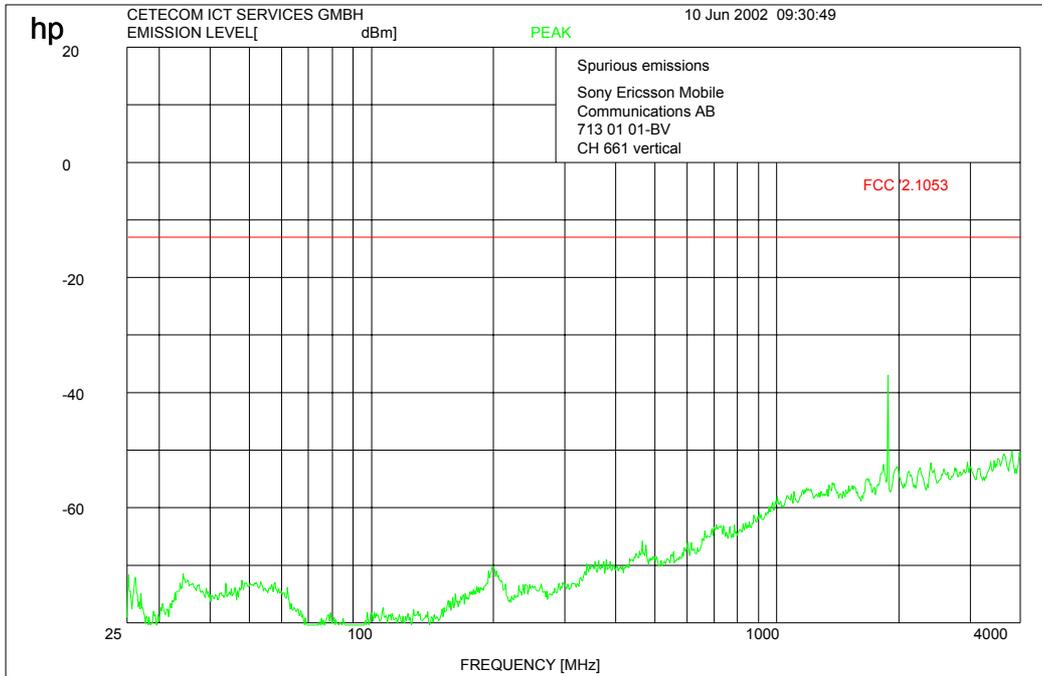
Marker 1 [T1]
RBW 3 MHz RF Att 0 dB
Ref Lvl -48.09 dBm
VBW 3 MHz
15 dBm
12.00000000 GHz
SWT 46 ms Unit dBm



Date: 11.JUN.2002 07:20:31

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

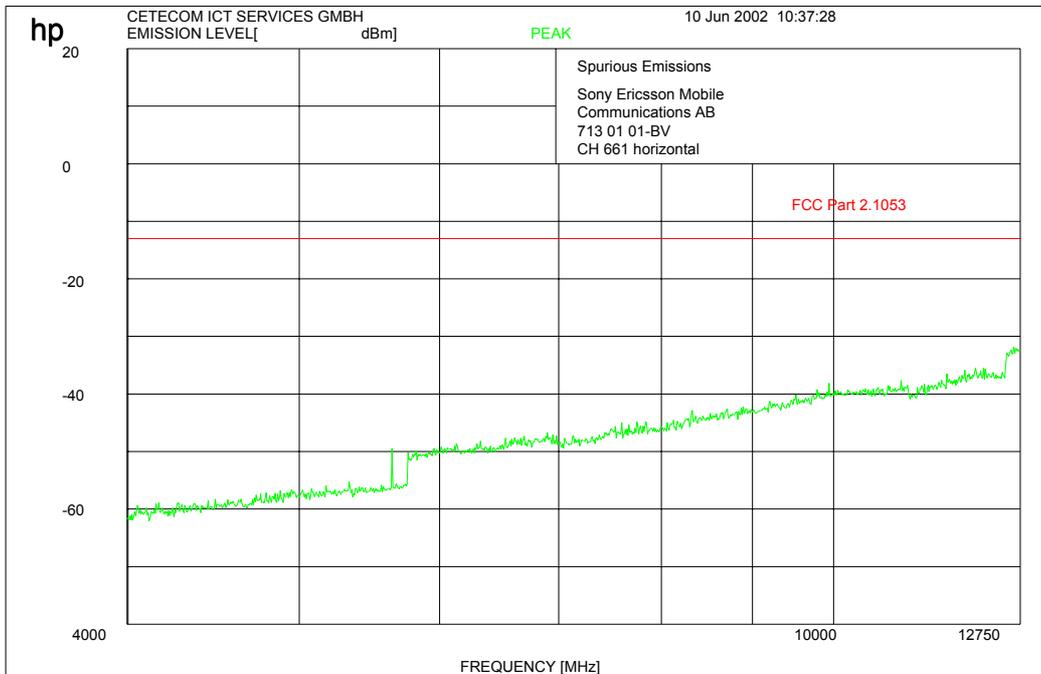
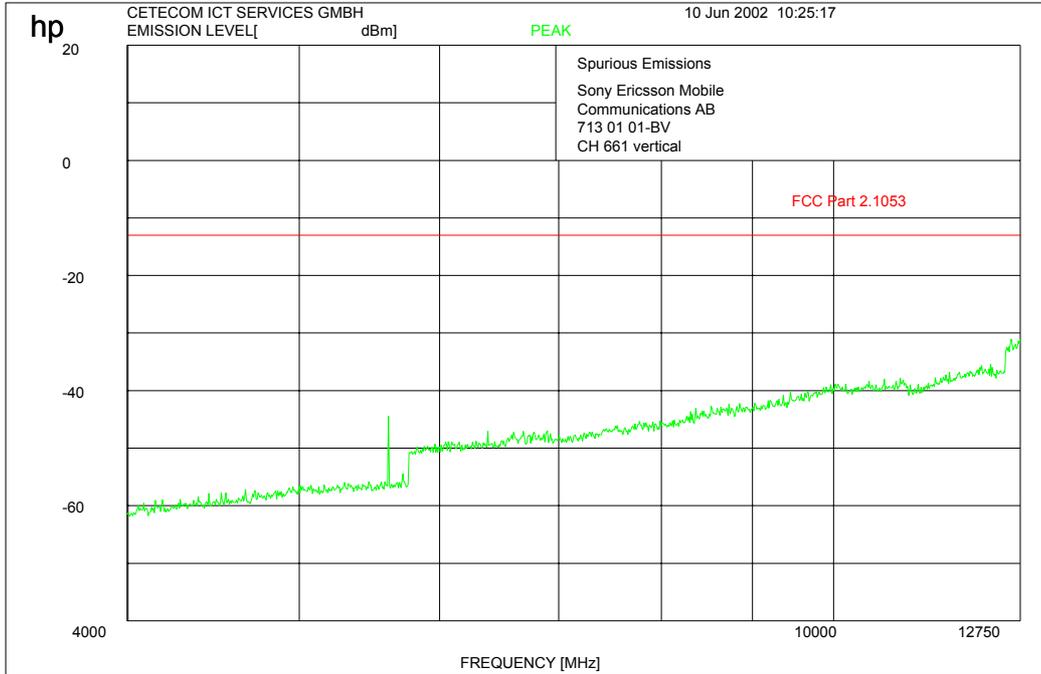
Channel 661 (up to 4 GHz)



Peaks at 1880 MHz shows the carrier frequency suppressed by narrow band rejection filter

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

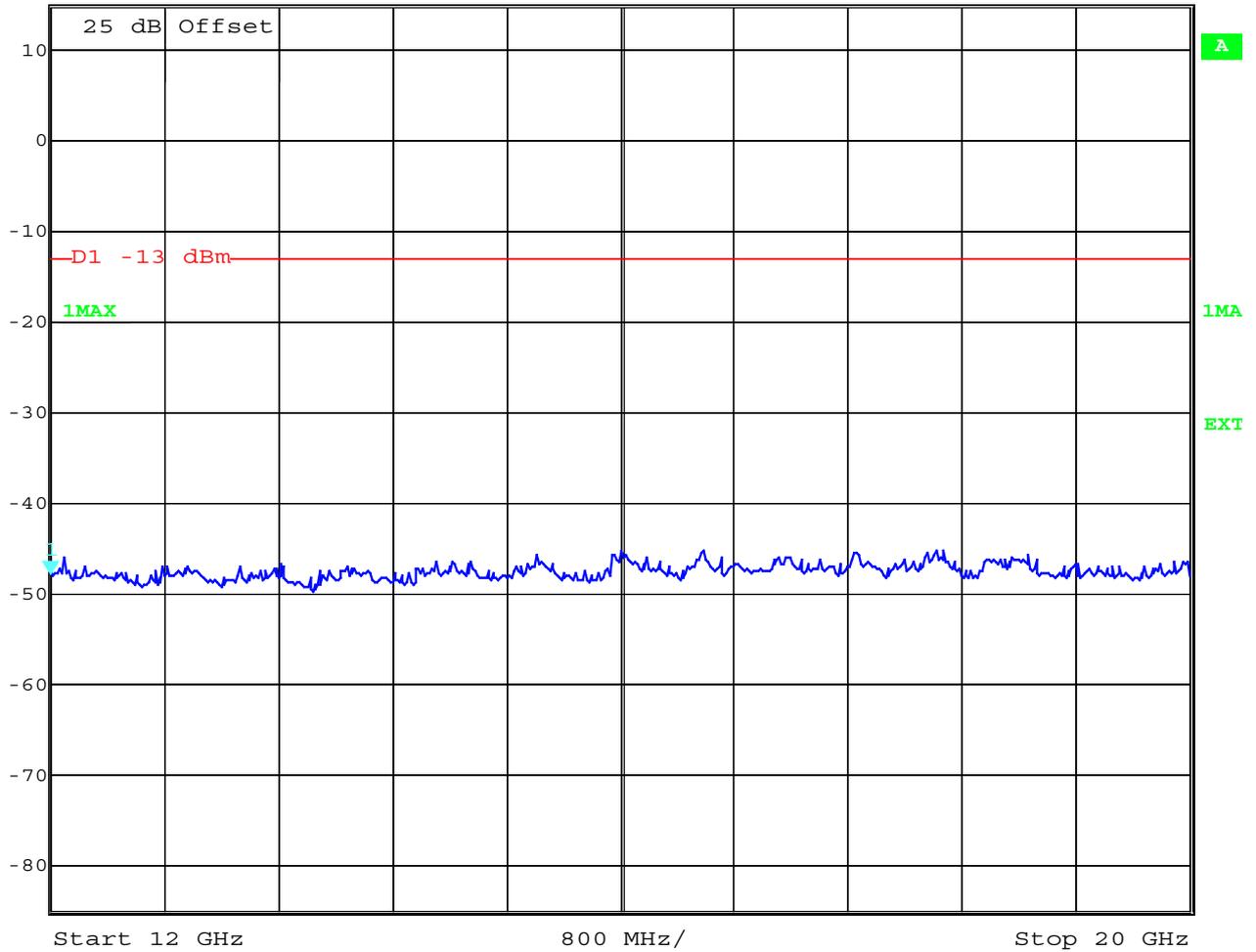
Channel 661 (up to 12 GHz)



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

Channel 661 : up to 20 GHz

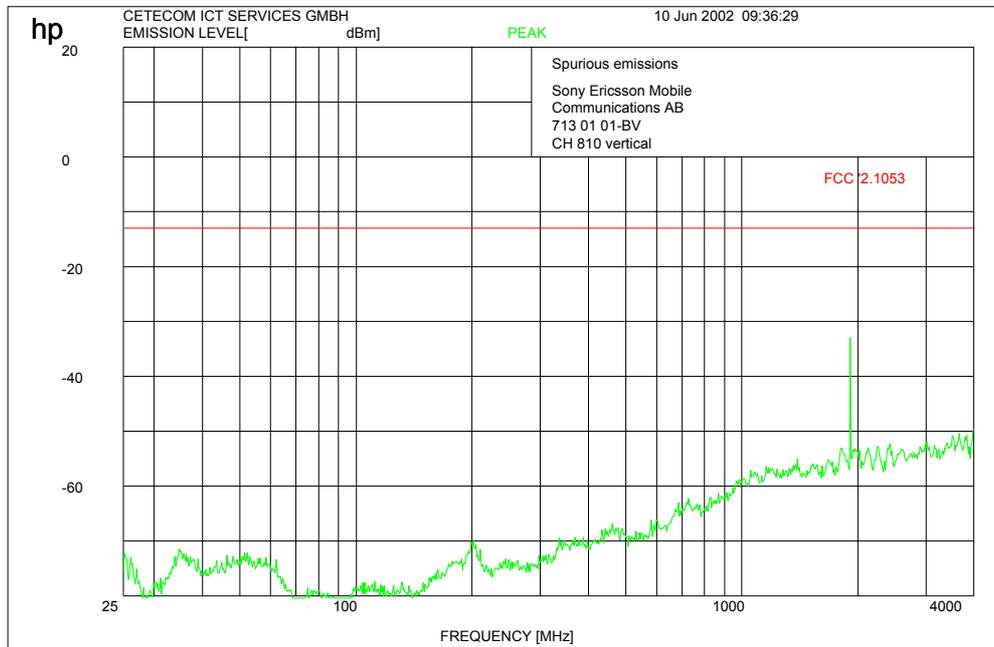
| | | | | | |
|--|---------------|-----------------|-------|--------|----------|
| | Marker 1 [T1] | RBW | 3 MHz | RF Att | 0 dB |
| | Ref Lvl | -47.92 dBm | VBW | 3 MHz | |
| | 15 dBm | 12.00000000 GHz | SWT | 46 ms | Unit dBm |



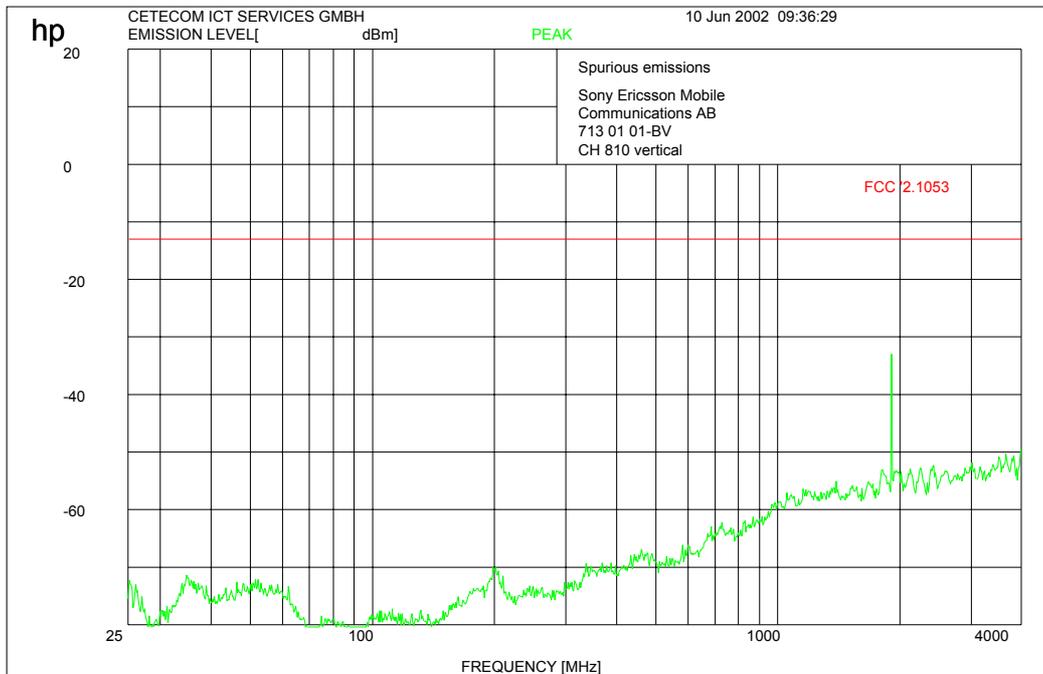
Date: 11.JUN.2002 07:21:08

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

Channel 810 up to 4 GHz

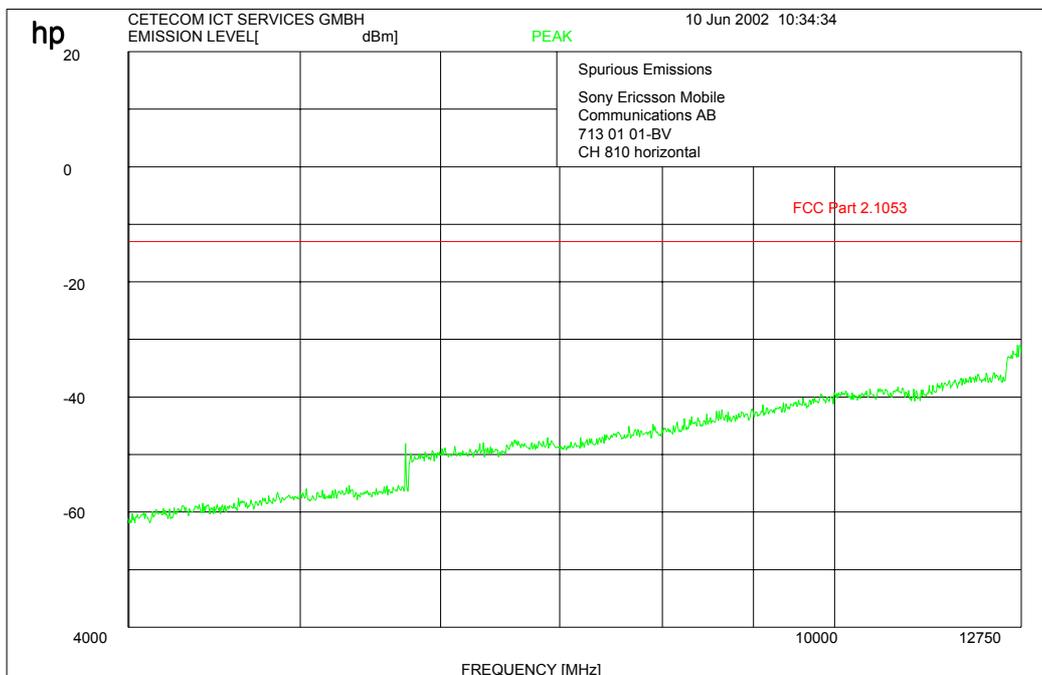
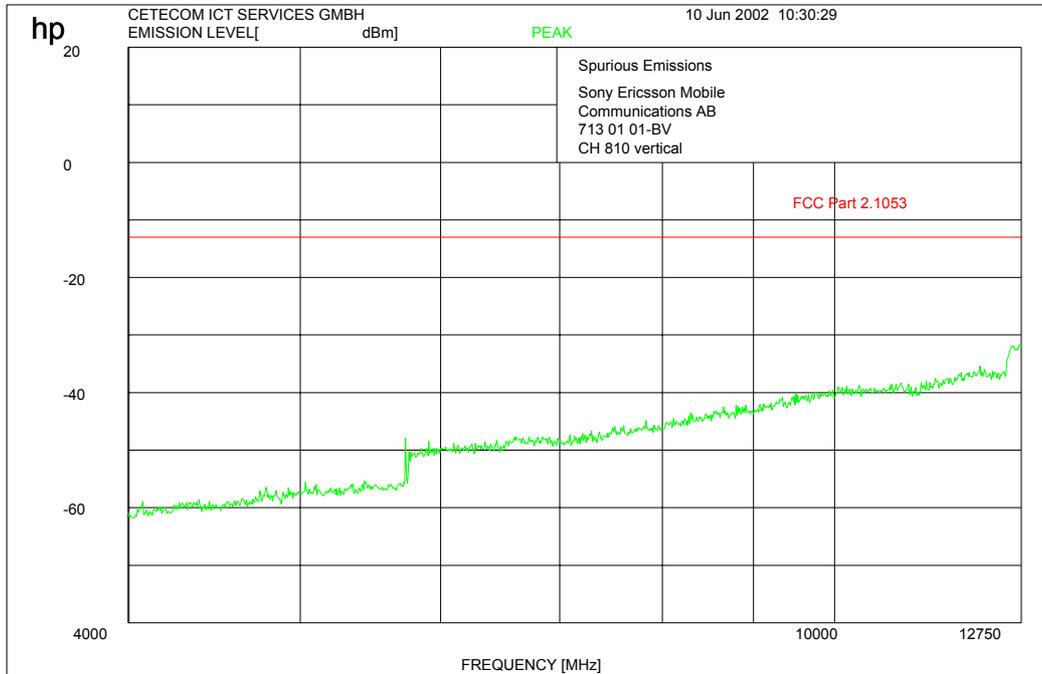


Peak at 1909.8 MHz shows the carrier frequency suppressed by narrow band rejection filter



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

Channel 810 up to 12 GHz

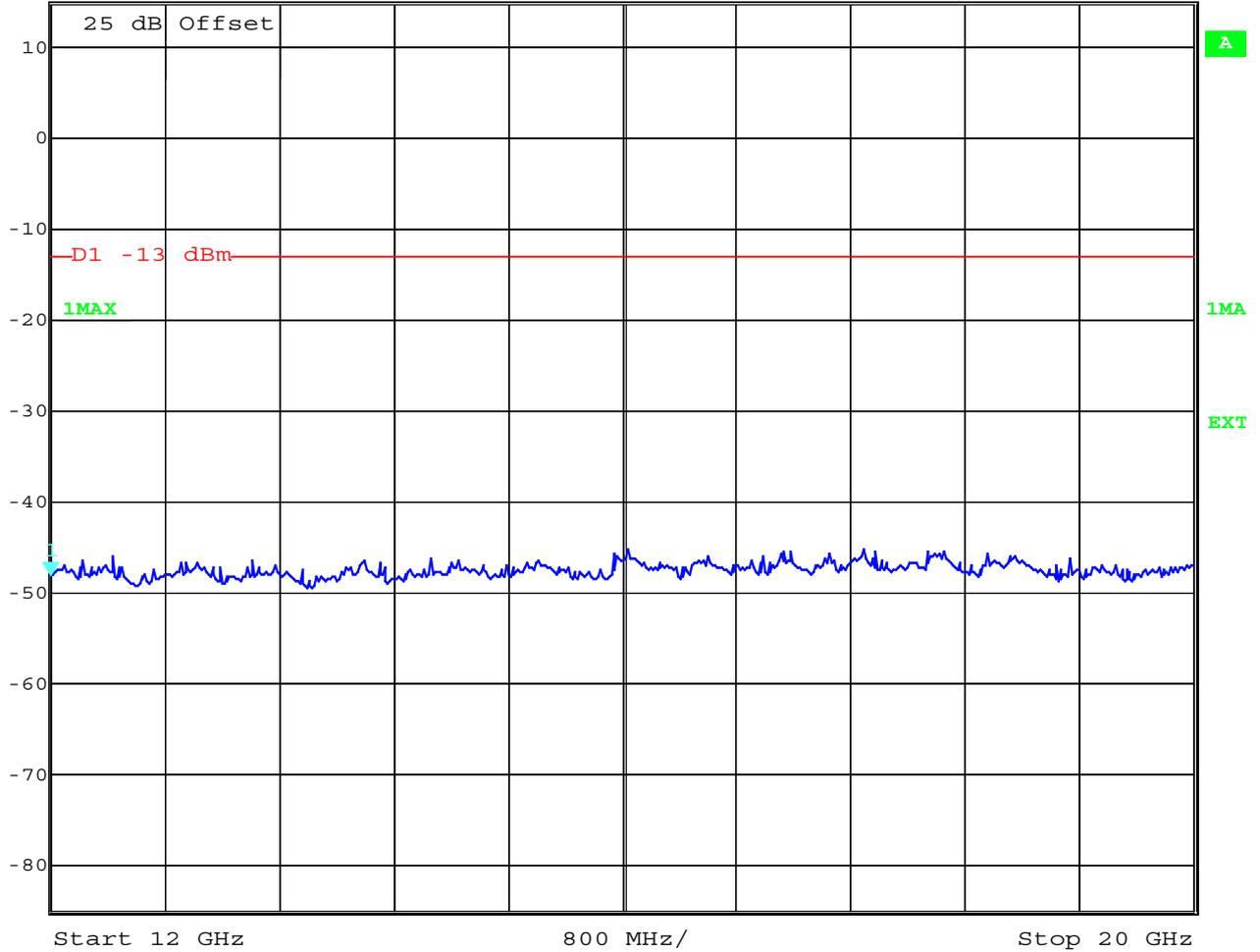


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 810 : up to 20 GHz



| | | | | | |
|---------|-----------------|-----|-------|--------|------|
| Ref Lvl | Marker 1 [T1] | RBW | 3 MHz | RF Att | 0 dB |
| 15 dBm | -48.15 dBm | VBW | 3 MHz | | |
| | 12.00000000 GHz | SWT | 46 ms | Unit | dBm |



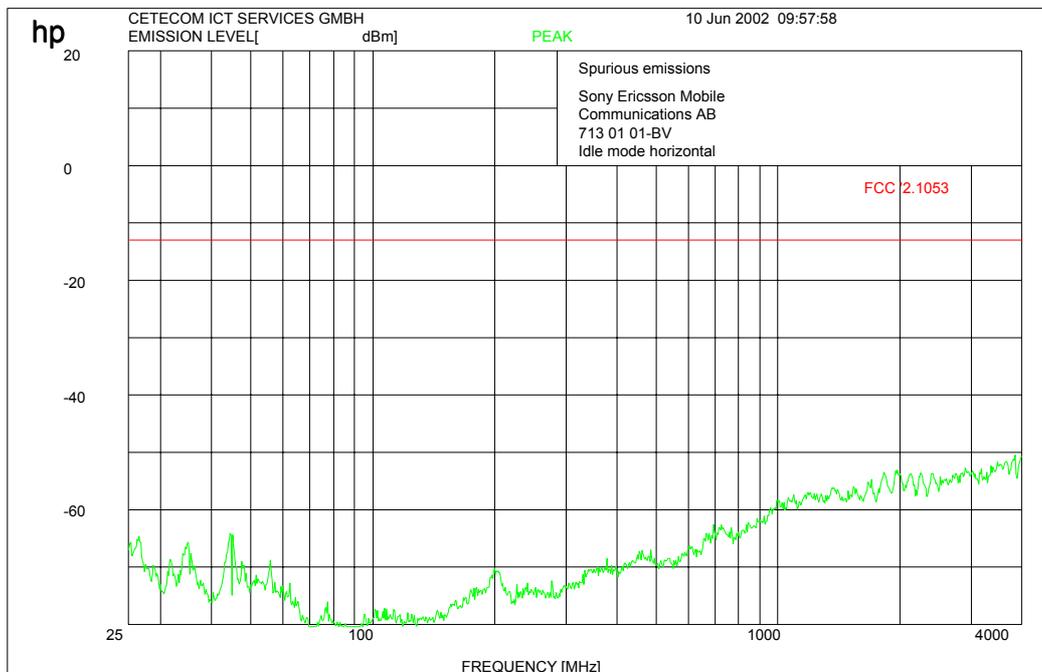
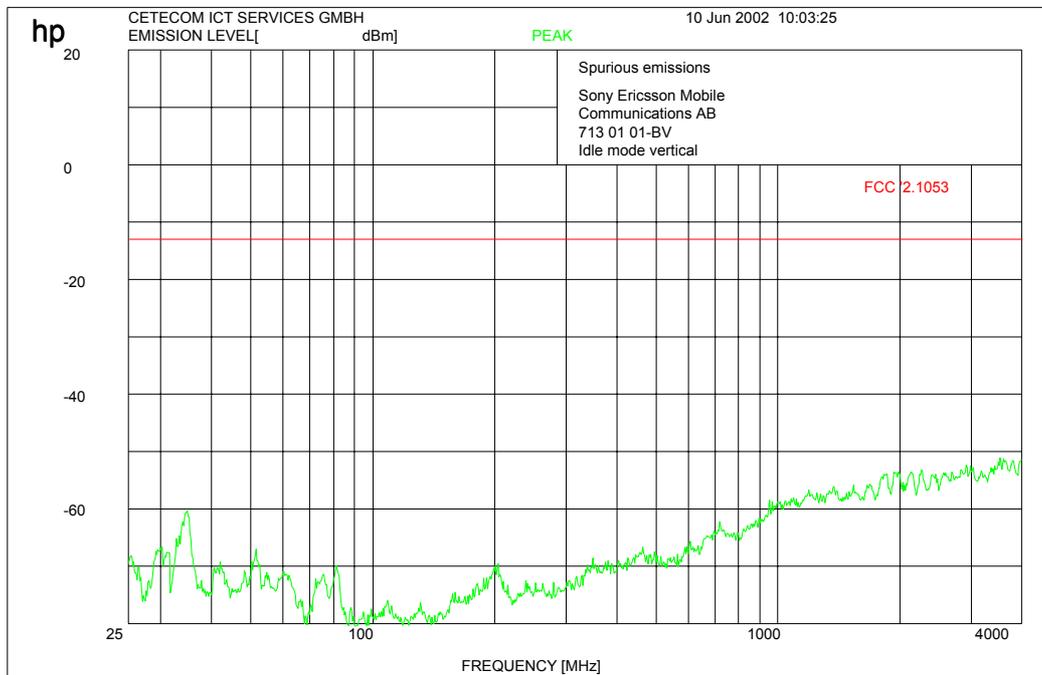
Date: 11.JUN.2002 07:21:40

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

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

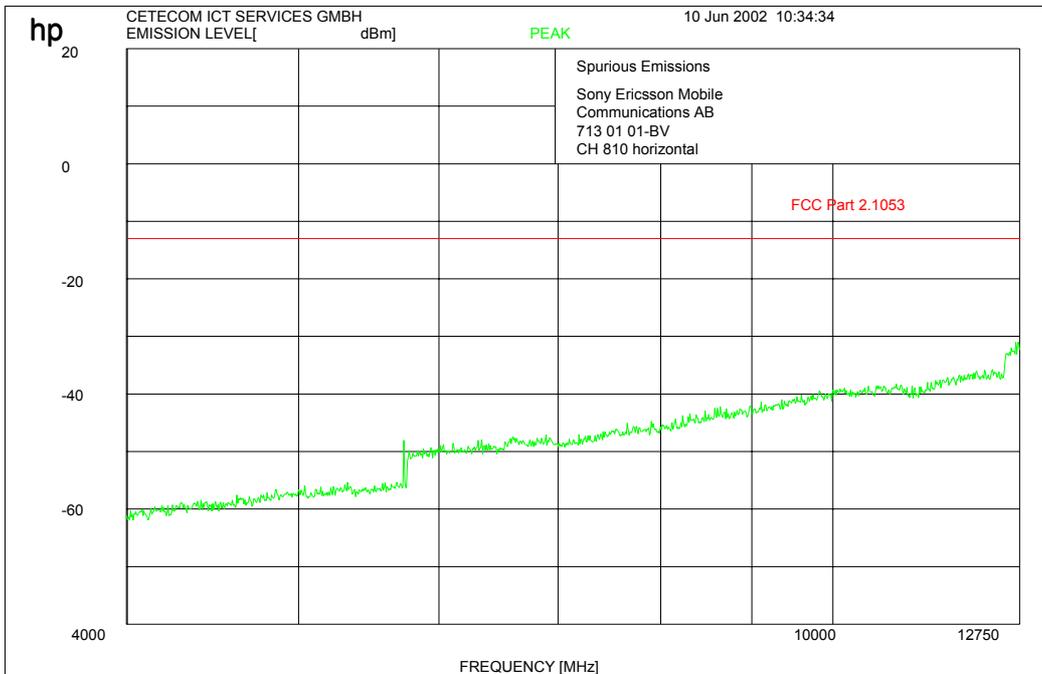
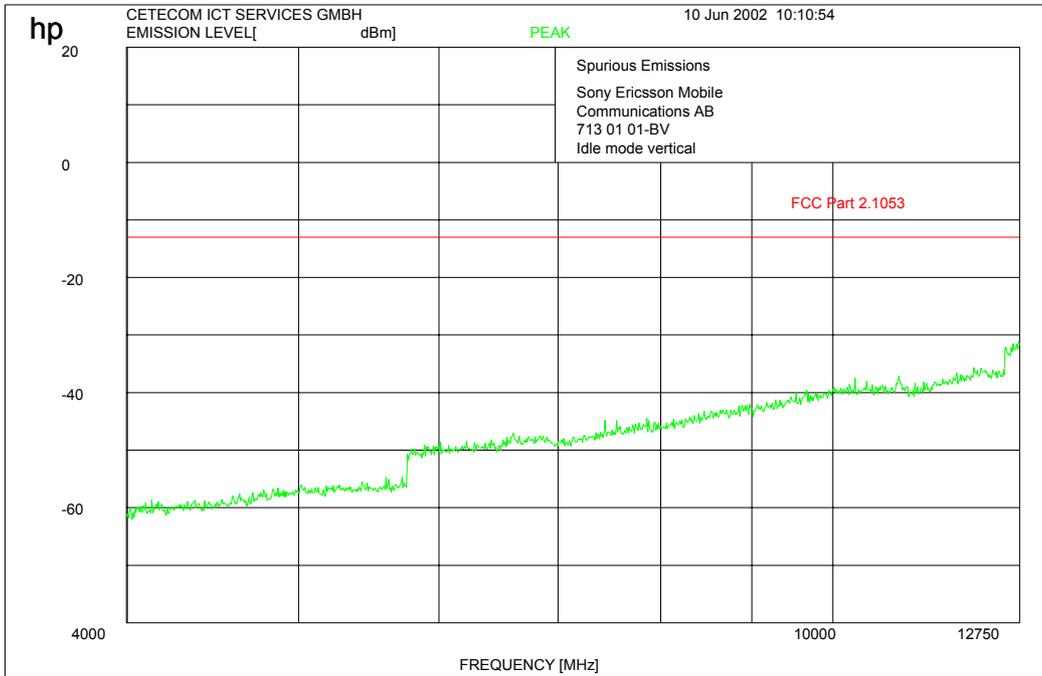
No Radiated Emissions less than 20 dB below the limit was found !

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)

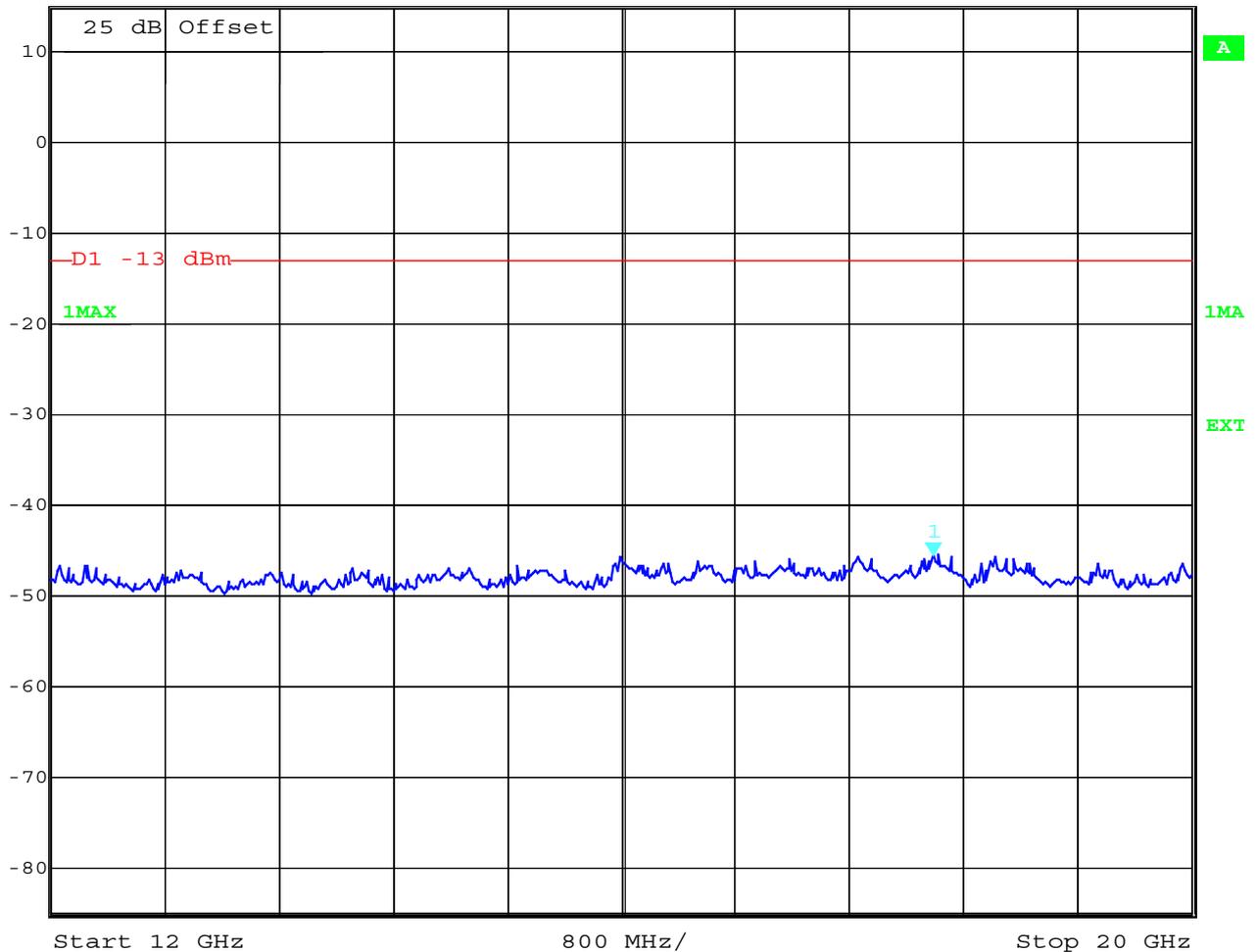
Channel 661 (this is valid for all 3 channels and up to 12 GHz , Idle-Mode



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

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

Marker 1 [T1]
RBW 3 MHz RF Att 0 dB
Ref Lvl -45.61 dBm
VBW 3 MHz
15 dBm
18.18837675 GHz
SWT 46 ms Unit dBm



Date: 11.JUN.2002 07:22:08

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

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

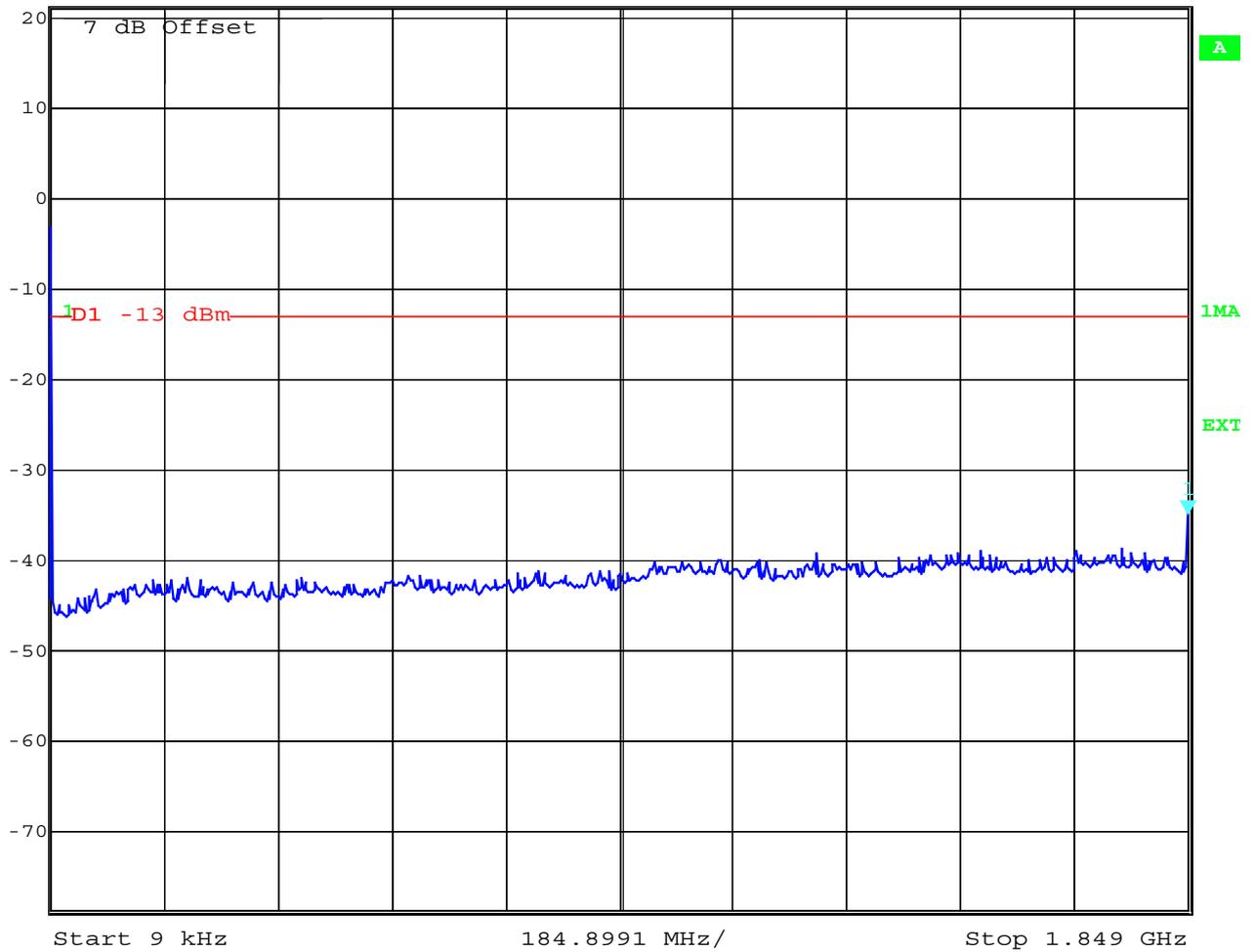
| EMISSION LIMITATIONS | | | | | |
|--------------------------------|--|------------------------------------|---|--|-----------------|
| f (MHz) | | amplitude of emission (dBm) | limit max. allowed emmission power (dBm) | actual attenuation below frequency of operation (dBc) | results |
| CH 512 | | | | | |
| 1850.2 | | 29.42 | -13.0 (42.42 dBc) | | carrier |
| 1850 | | -17.15 | | 46.57 | complies |
| CH 661 | | | | | |
| 1880.0 | | 29.30 | -13.0 (42.3dBc) | | carrier |
| 6572 | | -32.82 | | 62.12 | complies |
| CH 810 | | | | | |
| 1909.8 | | 29.43 | -13.0 (42.43 dBc) | | carrier |
| 1908.8 | | -28.07 | | 57.5 | complies |
| 1910.0 | | -16.07 | | 45.5 | complies |
| Measurement uncertainty | | ± 0.5dB | | | |

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

Measurements:

Channel: 512

| | | | | | |
|--|---------------|----------------|---------|---------|----------|
| | Marker 1 [T1] | RBW | 100 kHz | RF Att | 40 dB |
| | Ref Lvl | -35.01 dBm | VBW | 100 kHz | |
| | 21.2 dBm | 1.84900000 GHz | SWT | 470 ms | Unit dBm |

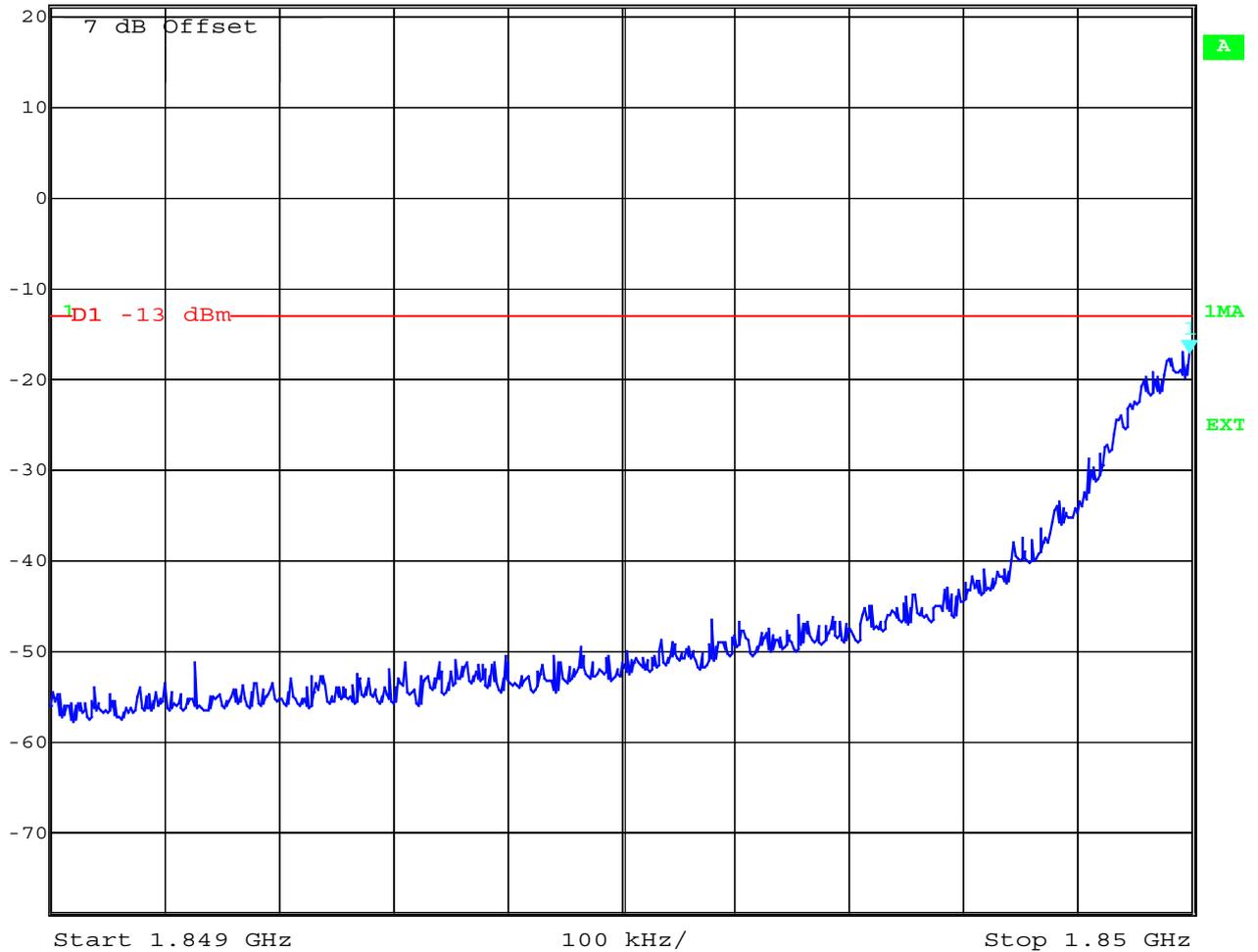


Date: 11.JUN.2002 08:07:14

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

Channel 512

| | | | | | |
|--|---------------|----------------|-------|--------|-------|
| | Marker 1 [T1] | RBW | 3 kHz | RF Att | 40 dB |
| | Ref Lvl | -17.15 dBm | VBW | 3 kHz | |
| | 21.2 dBm | 1.84999800 GHz | SWT | 280 ms | Unit |
| | | | | | dBm |

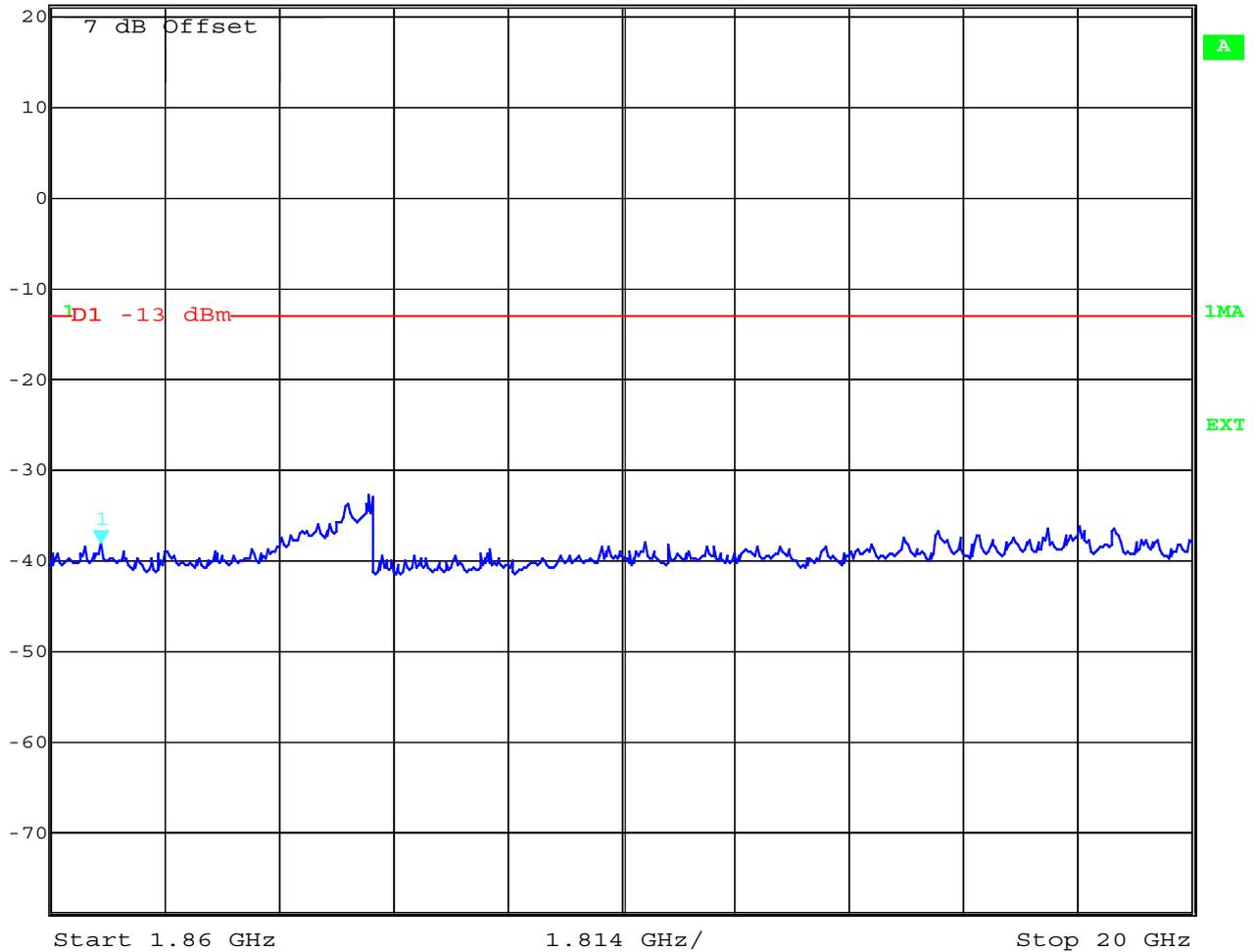


Date: 11.JUN.2002 08:06:28

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

Channel 512

| | | | | | | |
|--|----------|----------------|-----|---------|--------|-------|
| | Ref Lvl | Marker 1 [T1] | RBW | 100 kHz | RF Att | 40 dB |
| | 21.2 dBm | -38.18 dBm | VBW | 100 kHz | | |
| | | 2.65975952 GHz | SWT | 4.6 s | Unit | dBm |
| | | | | | | |

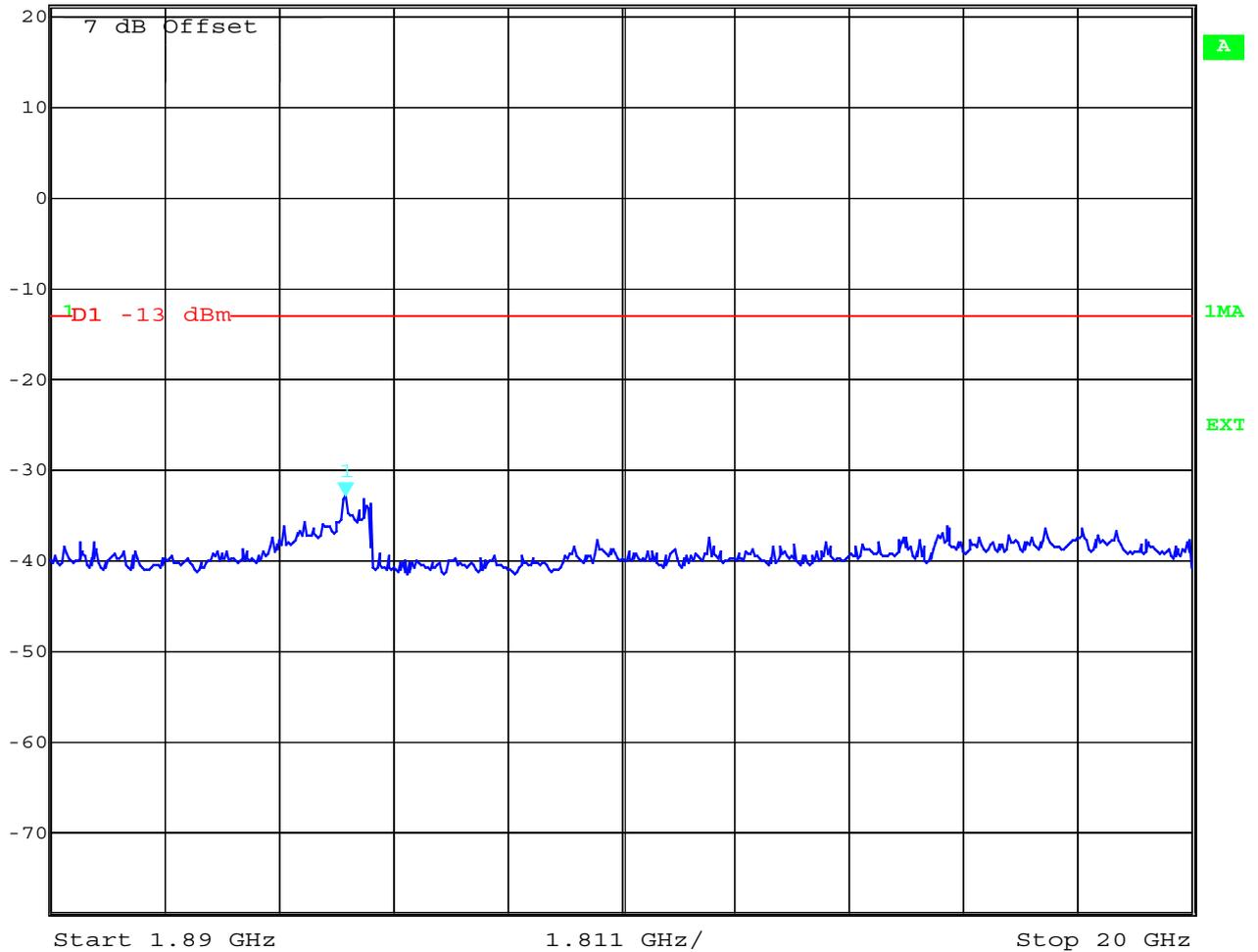


Date: 11.JUN.2002 08:09:54

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

Channel 661

| | | | | | |
|--|---------------|----------------|---------|---------|-------|
| | Marker 1 [T1] | RBW | 100 kHz | RF Att | 40 dB |
| | Ref Lvl | -32.83 dBm | VBW | 100 kHz | |
| | 21.2 dBm | 6.57174349 GHz | SWT | 4.6 s | Unit |
| | | | | | dBm |

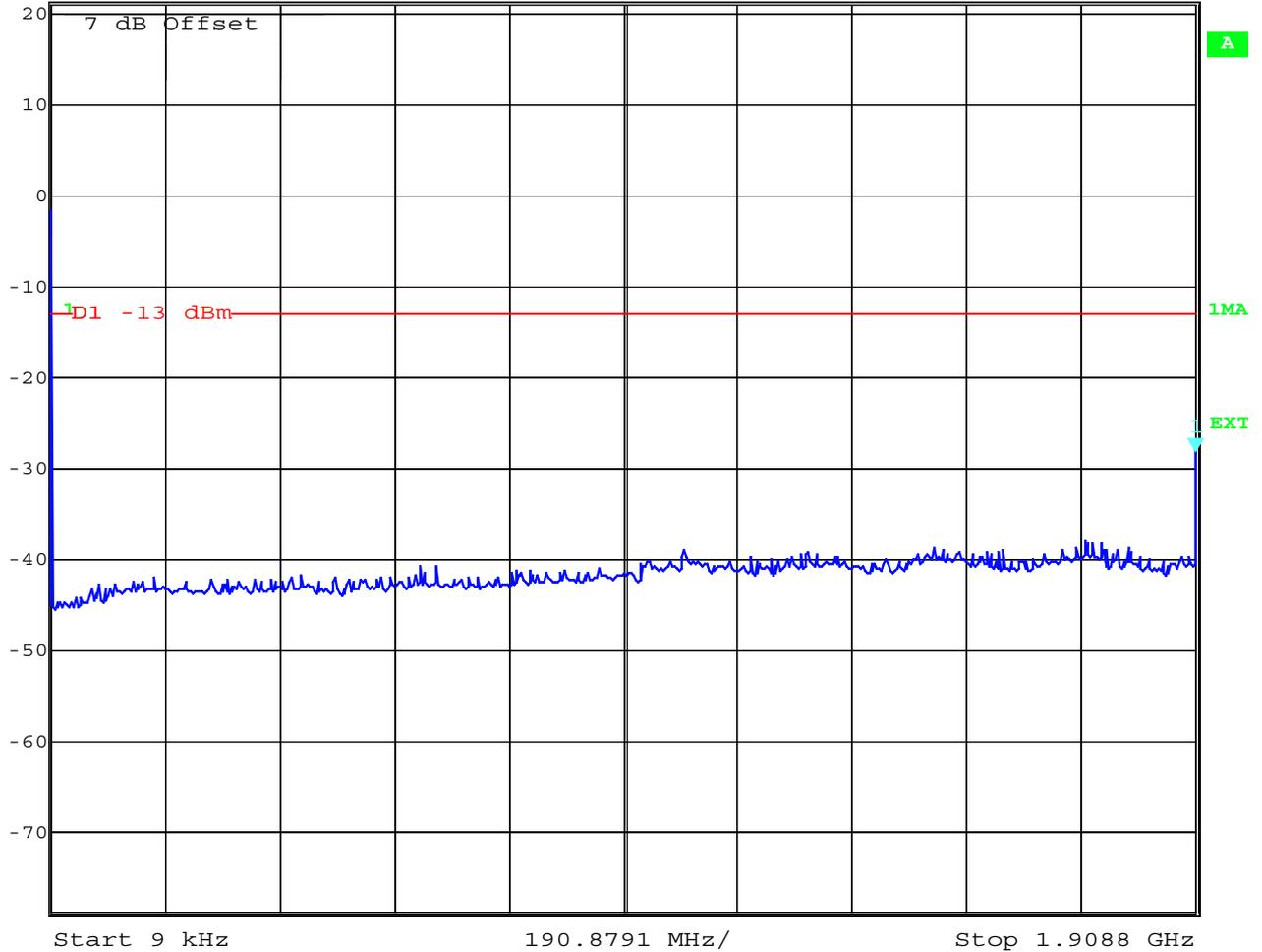


Date: 11.JUN.2002 08:11:57

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

Channel 810

| | | | | | |
|--|---------------|----------------|---------|---------|-------|
| | Marker 1 [T1] | RBW | 100 kHz | RF Att | 40 dB |
| | Ref Lvl | -28.07 dBm | VBW | 100 kHz | |
| | 21.2 dBm | 1.90880000 GHz | SWT | 480 ms | Unit |
| | | | | | dBm |



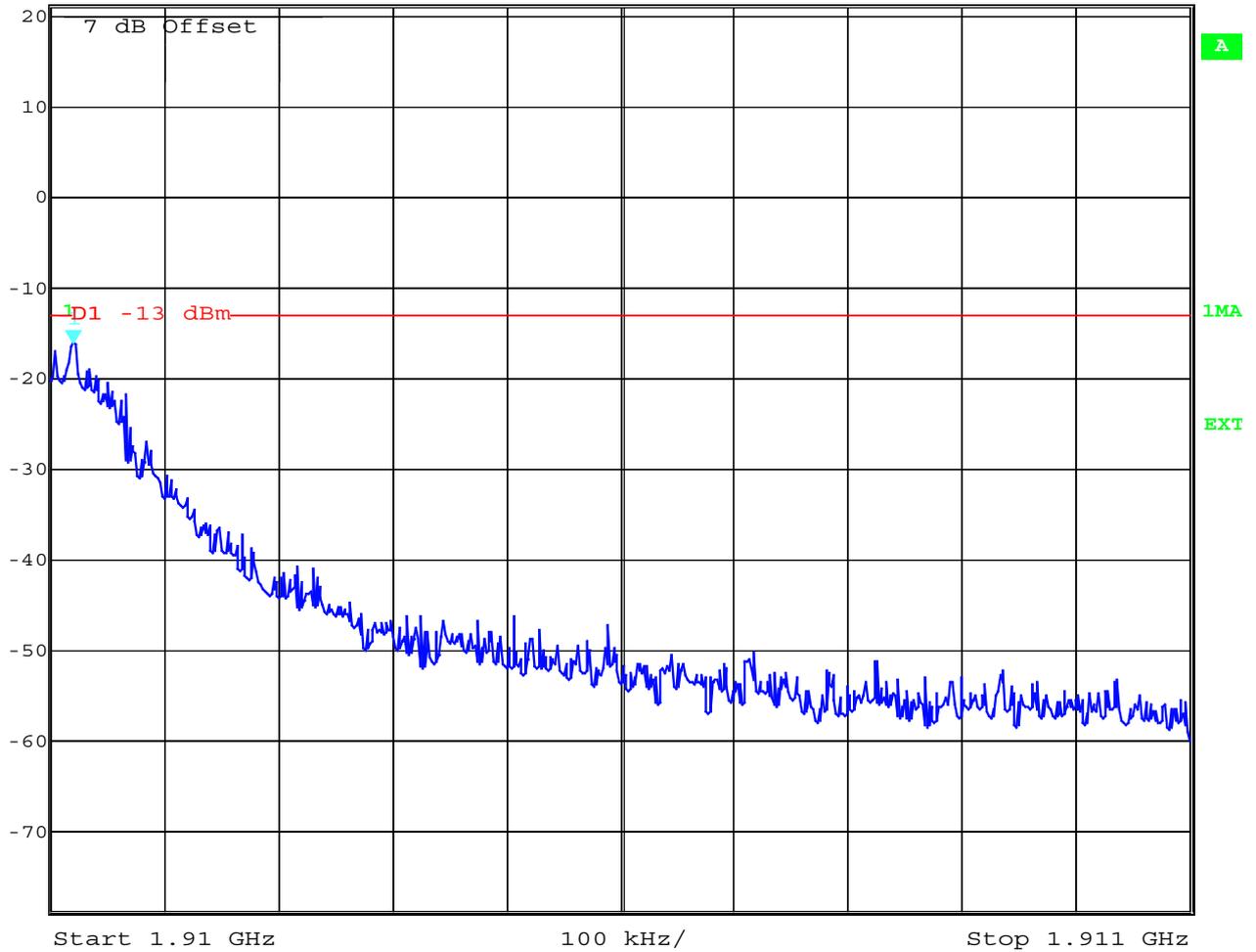
Date: 11.JUN.2002 08:17:59

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

Channel 810



| | | | | | |
|----------|----------------|-----|--------|--------|-------|
| | Marker 1 [T1] | RBW | 3 kHz | RF Att | 40 dB |
| Ref Lvl | -16.07 dBm | VBW | 3 kHz | | |
| 21.2 dBm | 1.91002004 GHz | SWT | 280 ms | Unit | dBm |

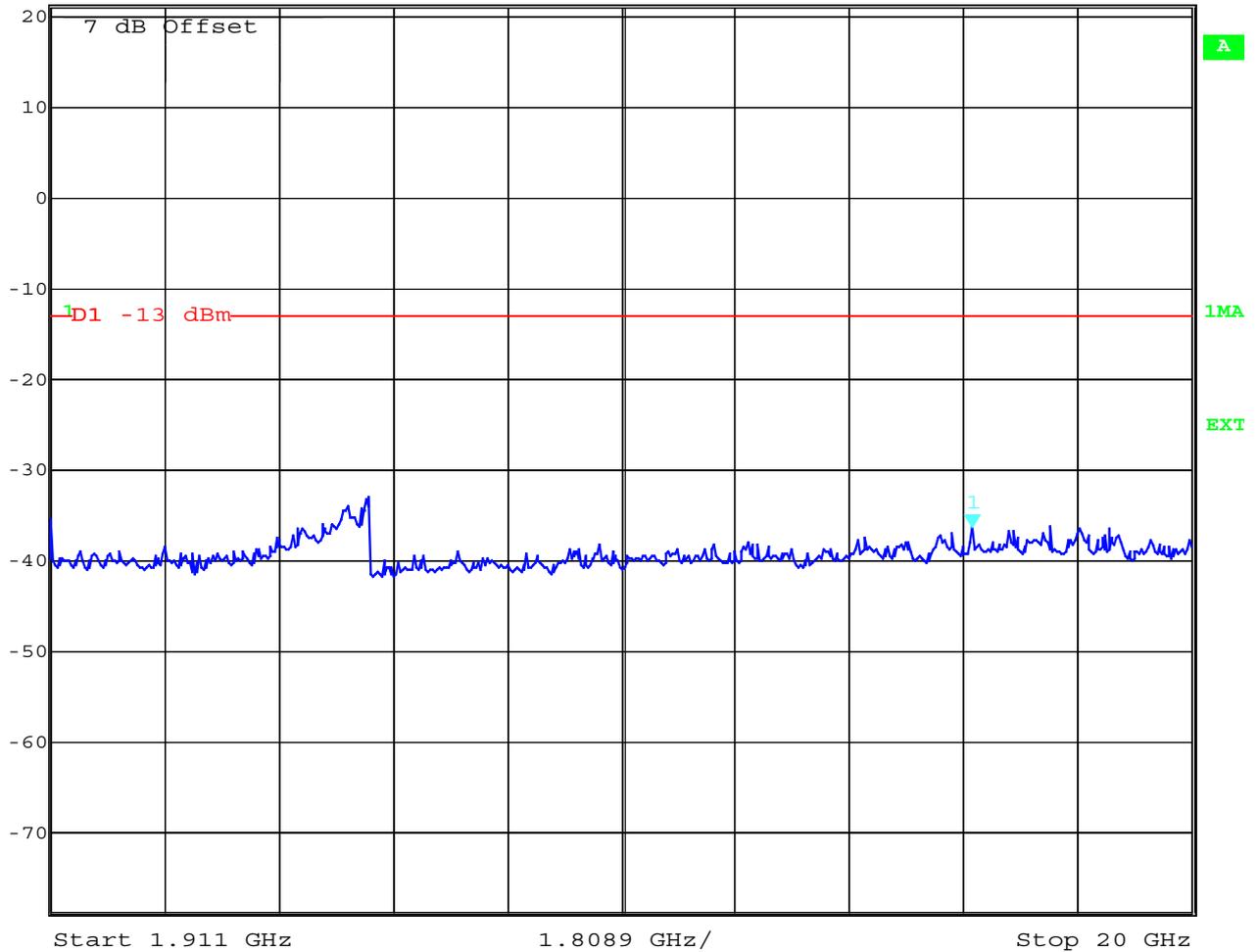


Date: 11.JUN.2002 08:20:03

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

Channel 810

| | | | | | |
|--|---------------|-----------------|---------|---------|-------|
| | Marker 1 [T1] | RBW | 100 kHz | RF Att | 40 dB |
| | Ref Lvl | -36.49 dBm | VBW | 100 kHz | |
| | 21.2 dBm | 16.51995190 GHz | SWT | 4.6 s | Unit |
| | | | | | dBm |



Date: 11.JUN.2002 08:22:06

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

OCCUPIED BANDWIDTH **§2.989**

Occupied Bandwidth Results

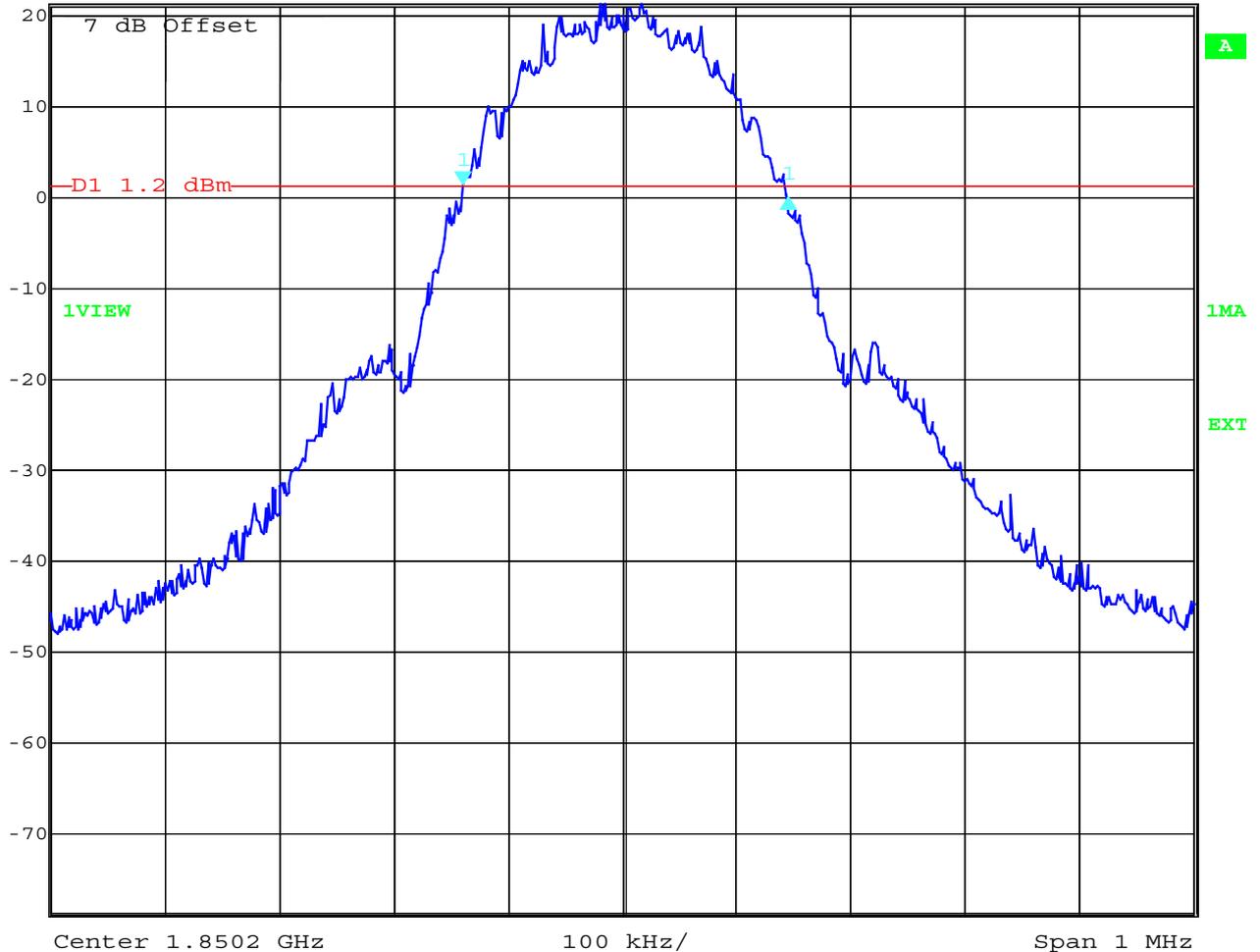
Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. Table 8.2 below lists the measured 99% power and -26dBC occupied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

| Frequency | 99% Occupied Bandwidth | -26 dBc Bandwidth |
|------------|------------------------|-------------------|
| 1850.2 MHz | 284.569 | 316.633 |
| 1880.0 MHz | 272.545 | 310.621 |
| 1909.8 MHz | 278.557 | 316.633 |

Part 24.238 (a) requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 280 kHz, this equates to a resolution bandwidth of at least 2.6 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

Channel 512
99% Occupied Bandwidth

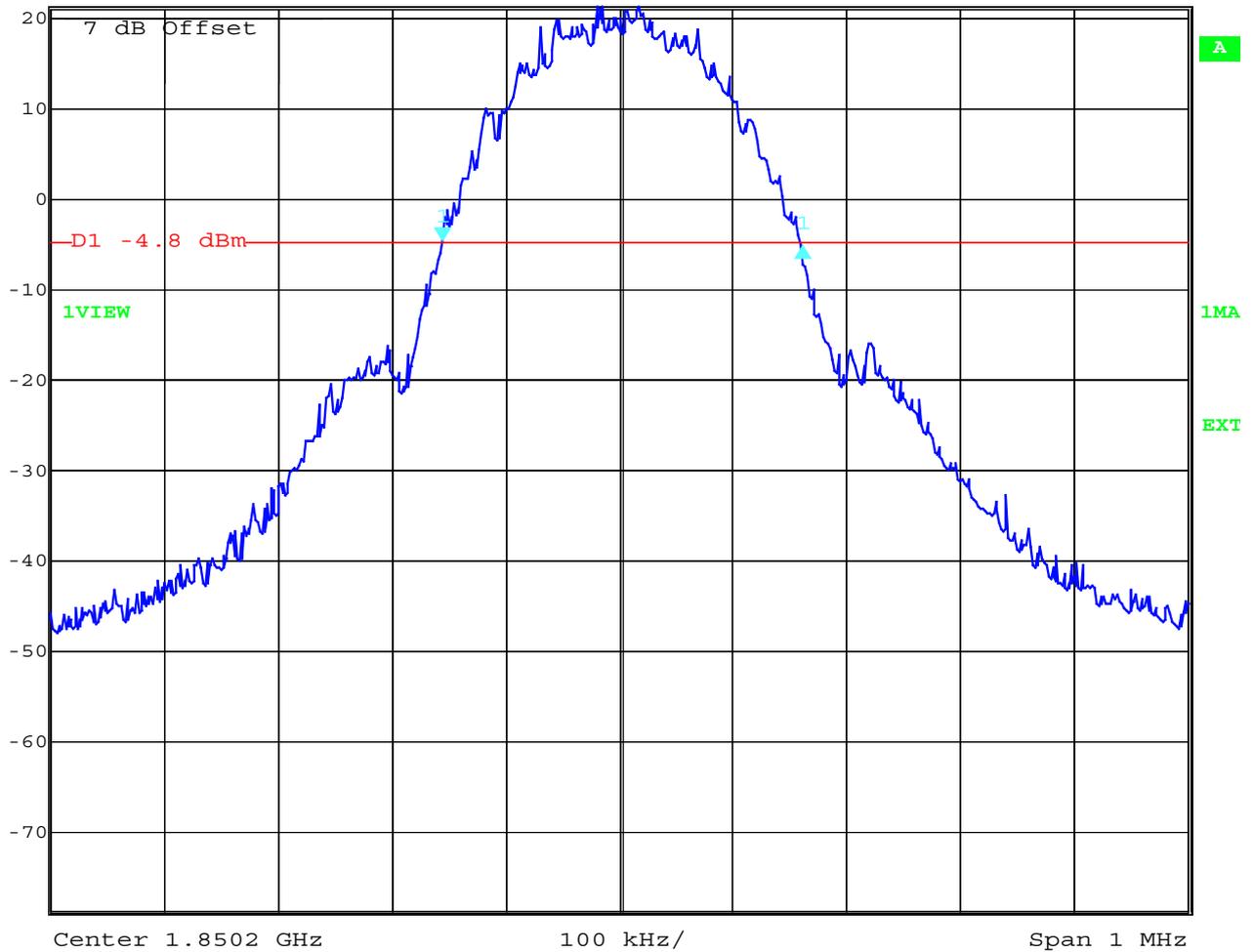
| | | | | | |
|--|--------------|------------------|-------|--------|-------|
| | Delta 1 [T1] | RBW | 3 kHz | RF Att | 40 dB |
| | Ref Lvl | -1.37 dB | VBW | 3 kHz | |
| | 21.2 dBm | 284.56913828 kHz | SWT | 280 ms | Unit |



Date: 11.JUN.2002 08:02:03

Channel 512
-26 dBc Bandwidth

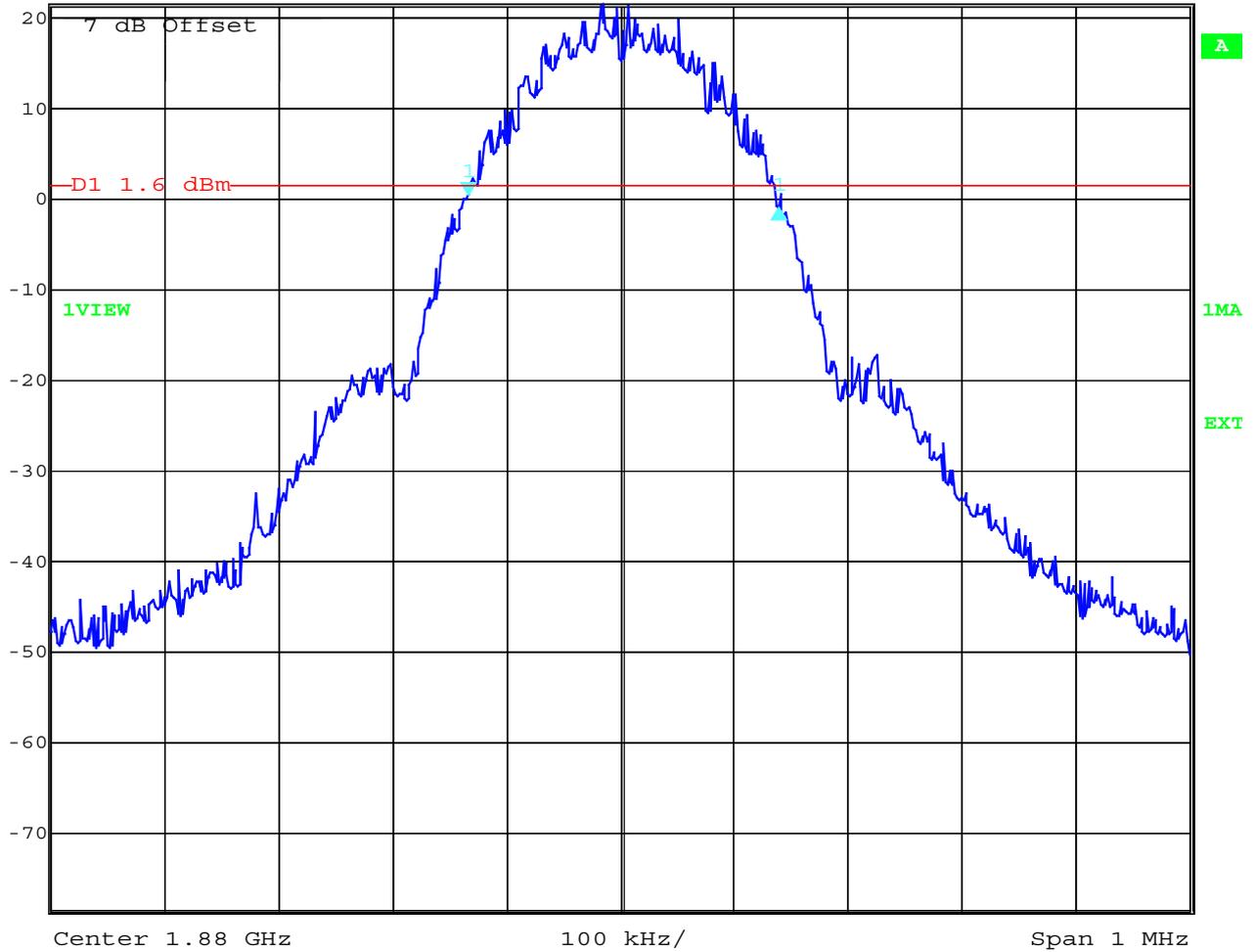
| | | | | | |
|--|--------------|------------------|-------|--------|-------|
| | Delta 1 [T1] | RBW | 3 kHz | RF Att | 40 dB |
| | Ref Lvl | -0.69 dB | VBW | 3 kHz | |
| | 21.2 dBm | 316.63326653 kHz | SWT | 280 ms | Unit |



Date: 11.JUN.2002 08:02:43

Channel 661
99% Occupied Bandwidth

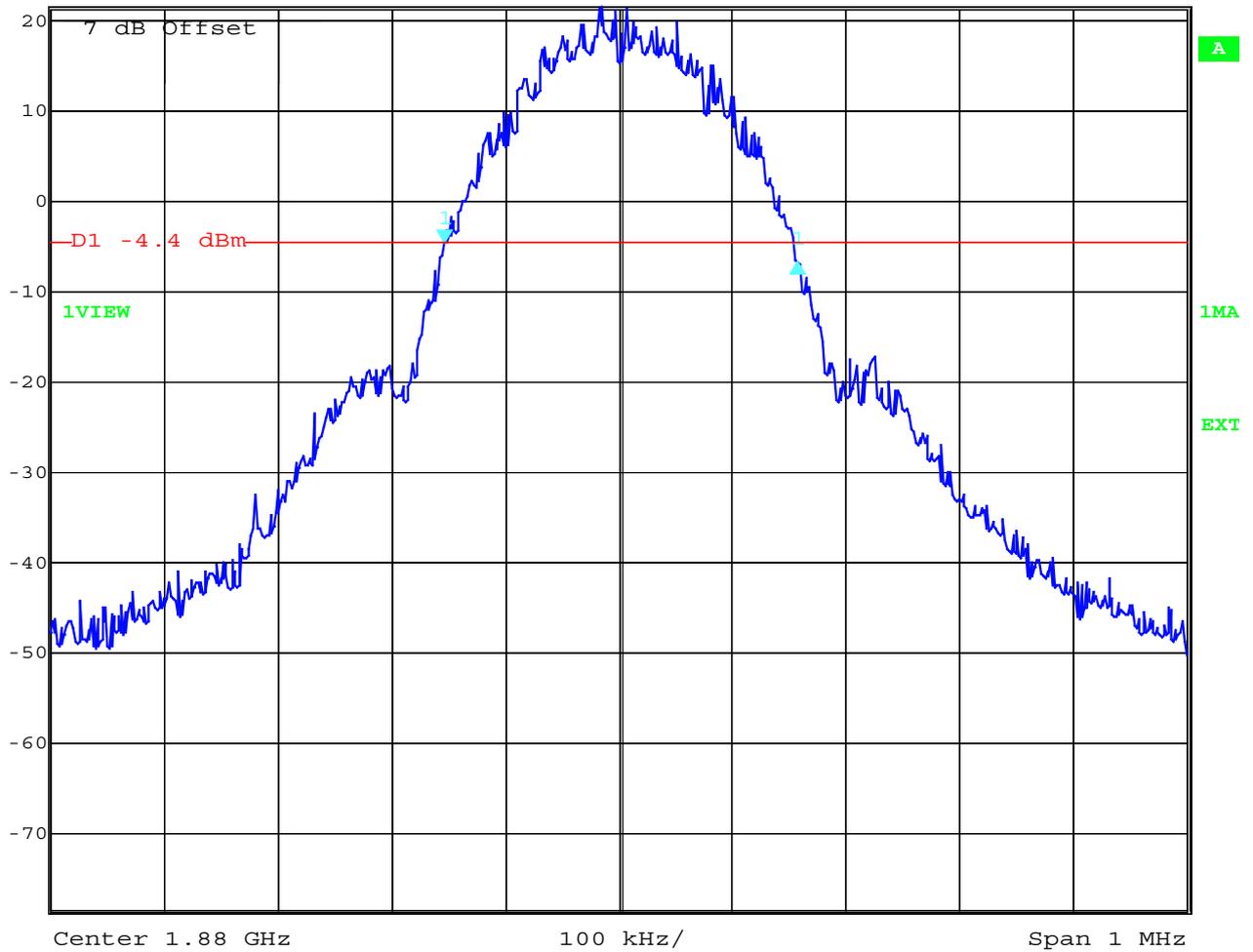
| | | | | | |
|--|--------------|------------------|-------|--------|---------------|
| | Delta 1 [T1] | RBW | 3 kHz | RF Att | 40 dB |
| | Ref Lvl | -1.52 dB | VBW | 3 kHz | |
| | 21.6 dBm | 272.54509018 kHz | SWT | 280 ms | Unit dBm |



Date: 11.JUN.2002 07:59:51

Channel 661
-26 dBc Bandwidth

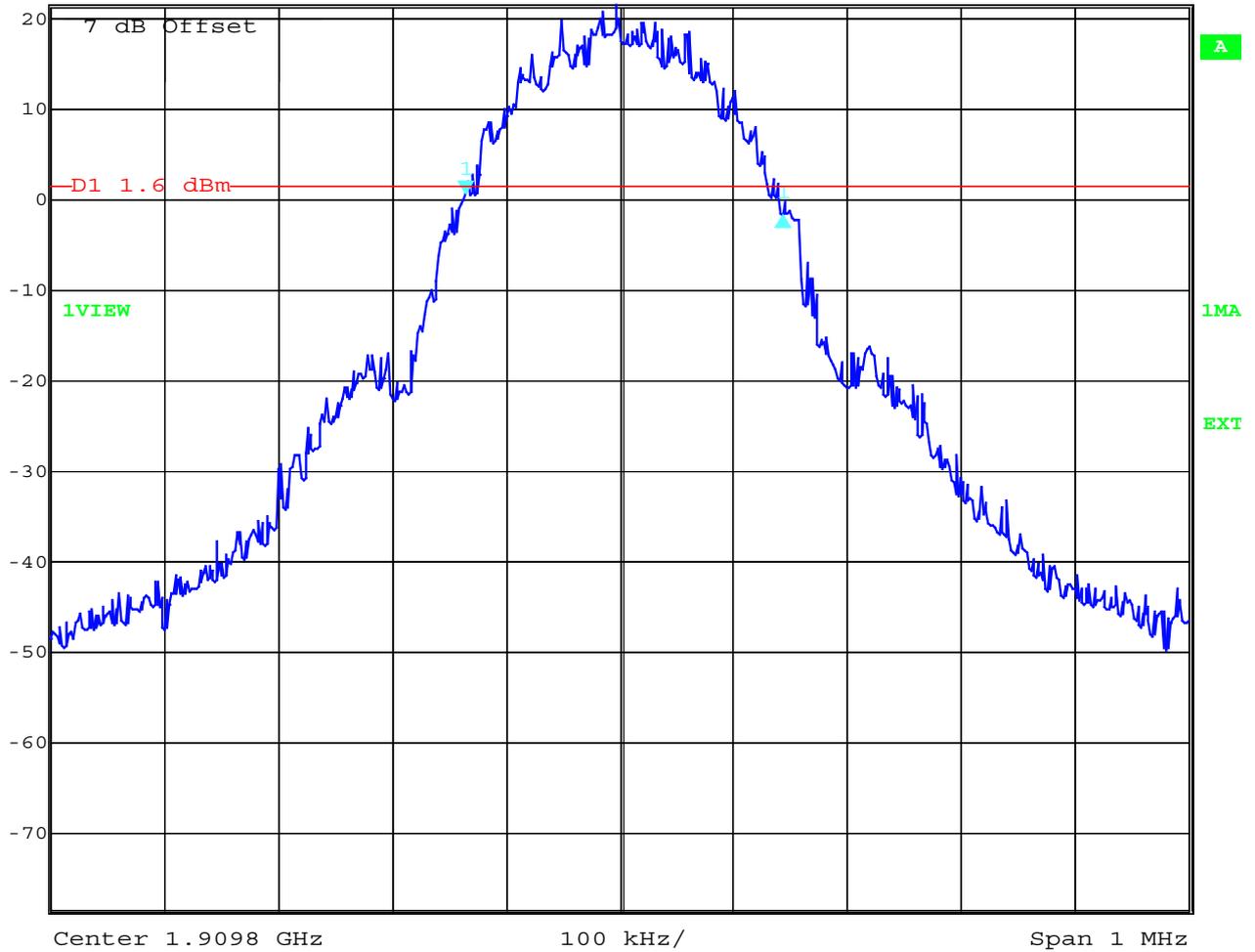
| | | | | | |
|--|--------------|------------------|-------|--------|-------|
| | Delta 1 [T1] | RBW | 3 kHz | RF Att | 40 dB |
| | Ref Lvl | -2.27 dB | VBW | 3 kHz | |
| | 21.6 dBm | 310.62124248 kHz | SWT | 280 ms | Unit |



Date: 11.JUN.2002 07:59:09

Channel 810
99% Occupied Bandwidth

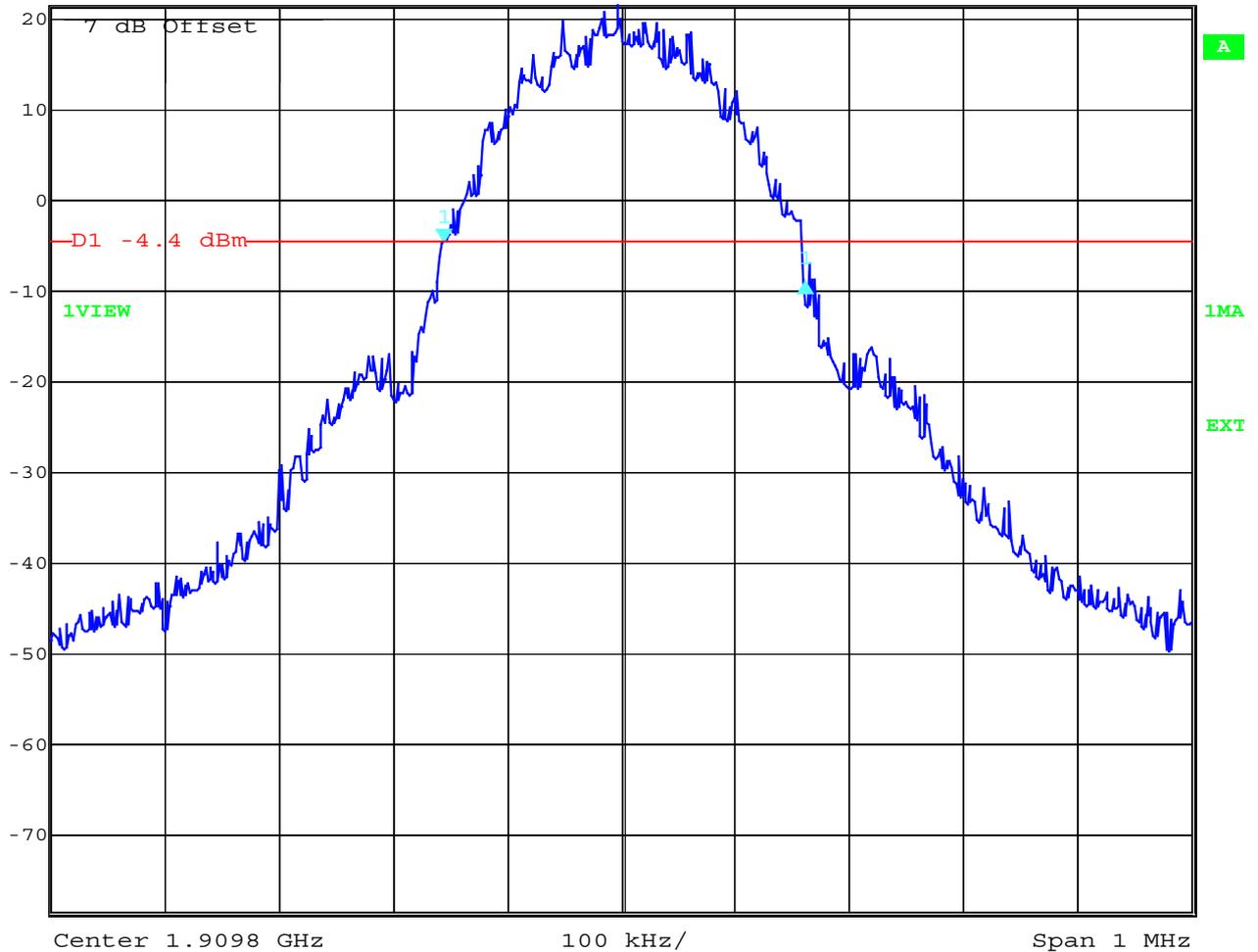
| | | | | | |
|--|--------------|------------------|-------|--------|-------|
| | Delta 1 [T1] | RBW | 3 kHz | RF Att | 40 dB |
| | Ref Lvl | -2.48 dB | VBW | 3 kHz | |
| | 21.6 dBm | 278.55711423 kHz | SWT | 280 ms | Unit |



Date: 11.JUN.2002 07:56:54

Channel 810
-26 dBc Bandwidth

| | | | | | |
|--|--------------|------------------|-------|--------|---------------|
| | Delta 1 [T1] | RBW | 3 kHz | RF Att | 40 dB |
| | Ref Lvl | -4.34 dB | VBW | 3 kHz | |
| | 21.6 dBm | 316.63326653 kHz | SWT | 280 ms | Unit dBm |



Date: 11.JUN.2002 07:57:53

Conducted emissions

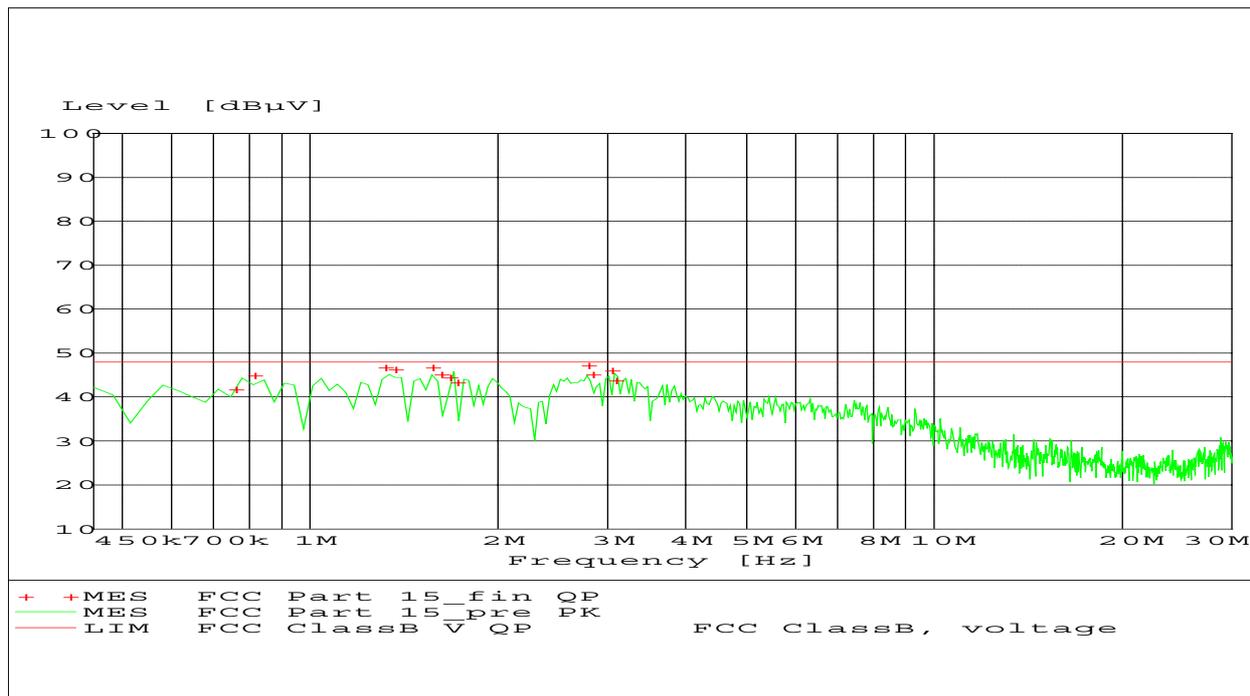
§ 15.107/207

EUT: 713 05 01-BV
 Applicant: Sony Ericsson
 Operating condition: Tx/Rx-mode
 Test Site: CETECOM ICT Services GmbH Saarbrücken, Room 006
 Operator: Berg M.

Power Supply: 115V/60Hz
 Start of Test: 17.06.02 / 11:53:58

SCANTABELLE: "FCC Part 15 AC"

| | | | | | | |
|-------------------|----------|--------------------|----------|----------|---------|-----------------|
| Kurzbeschreibung: | | Voltage Mains 1.60 | | | | |
| Start- | Stop- | Schritt- | Detektor | Meß- | ZF- | Transducer |
| Frequenz | Frequenz | weite | | zeit | Bandbr. | |
| 450.0 kHz | 30.0 MHz | 6.0 kHz | MaxPeak | 100.0 ms | 10 kHz | ESH3-Z5 L1 2209 |



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

CONDUCTED EMISSIONS

§ 15.207

MEßERGEBNIS: "FCC Part 15_fin QP"

17.06.02 11:57

| Frequenz MHz | Pegel dBµV | Transd dB | Limit dBµV | Margin dB | Line | PE |
|-----------------|---------------|--------------|---------------|--------------|------|-----|
| 0.756000 | 41.90 | 10.3 | 48 | 6.1 | N | GND |
| 0.810000 | 45.00 | 10.3 | 48 | 2.9 | N | GND |
| 1.314000 | 46.80 | 10.3 | 48 | 1.1 | N | GND |
| 1.362000 | 46.40 | 10.5 | 48 | 1.6 | N | GND |
| 1.566000 | 47.00 | 10.4 | 48 | 1.0 | L1 | FLO |
| 1.614000 | 45.30 | 10.3 | 48 | 2.6 | L1 | FLO |
| 1.668000 | 44.60 | 10.3 | 48 | 3.4 | L1 | GND |
| 1.716000 | 43.50 | 10.3 | 48 | 4.5 | L1 | GND |
| 2.778000 | 47.30 | 10.4 | 48 | 0.7 | N | FLO |
| 2.826000 | 45.40 | 10.4 | 48 | 2.6 | N | FLO |
| 3.036000 | 46.10 | 10.4 | 48 | 1.8 | L1 | GND |
| 3.078000 | 43.80 | 10.4 | 48 | 4.1 | L1 | GND |

Limits

SUBCLAUSE § 15.107 / 207

| Frequency (MHz) | Conducted Limits (µV) |
|---------------------|-----------------------------------|
| 0.45 – 1.705 | 1000 / 60 dBµV (Class A) |
| 1.705 – 30.0 | 3000 / 69.5 dBµV (Class A) |
| 0.45 – 30.0 | 250 / 48 dBµV (Class B) |

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 | | | | |