TTI-P-G-166/98-30

Accredited Bluetooth Test Facility (BQTF)

Test report no.: 2_2863-01-03/02
FCC Part 24
NOKIA D311 Type DTE-3

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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1.3 Details of applicant

Name : Nokia Mobile Phones / TCC Salo
Street : P.O. Box 86 (Joensuunkatu 7 E / Kiila 1 B)
City : FIN-24101 Salo
Country : Finland
Telephone : +358 (0) 7180 42913
Telefax : +358 (0) 7180 42920
Contact : Mr. Jarkko Luoma
Telephone : +358 (0) 7180 42913

1.4 Application details

Date of receipt of application : 04.04.2002
Date of receipt of test item : 24.04.2002
Date of test : 24.-26.04.2002
Re-issued : 01.07.2002

1.5 Test item

Type of equipment	:	**Dual Band GSM PCMCIA Card (PCS 850 / 1900 MHz) with 2.4 GHz RLAN**
Type designation	:	NOKIA D311, Type DTE-3
Manufacturer	:	Applicant
Street	:	
City	:	
Country	:	
Serial number	:	976000716; IMEI : 001004100753483
Additional informations: :		
Frequency	:	1850 – 1910 MHz
Type of modulation	:	300KGXW
Number of channels	:	300
Antenna	:	Integral antenna and socket
Power supply	:	5V via PCMCIA Slot
Output power	:	0,885W Peak , ERP : 0.580 W (Burst); EIRP:0.940 W (Burst)
Type of equipment	:	Temperature range : -30°C - +60°C
FCC – ID	:	
Hardware	:	0303
Software	:	2.02

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_2863-01-03/02

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

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 Hewlett Packard Power meter E4419B (peak and average)
This measurements were done at 3 frequencies, 824.22 MHz, 836.6 MHz and 848.8 MHz (bottom, middle and top of operational frequency range)
Peak power and Average power was measured with a calibrated Power Meter (HP E4419B). 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	29.47	29.35
1880.0	0	28.78	28.68
1909.8	0	28.54	28.42
Measurement uncertainty		±0.5 dB	

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(for reference numbers see test equipment listing)
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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	29.73	27.63	20.73	18.63
1880.0	0	29.29	27.19	20.29	18.19
1909.8	0	29.00	26.90	20.00	17.90
Measurement uncertainty		±3 dB			

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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 5,0 Volts. Vary supply voltage from minimum 4.75 Volts to maximum 5.25 Volts, in 0.05 Volt increments remeasuring carrier frequency at each voltage. Pause at 5.00 V dc
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 5.0 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.. This transceiver is specified to operate with an input voltage of between 4.75 Vdc and 5.25 Vdc, with a nominal voltage of 5.0 Vdc (powered via Laptop/PCMCIA Slot). 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 + 5 % and – 5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

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AFC FREQ ERROR vs. VOLTAGE

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
4,75	-54	-0,00000287	-0,0287
4,80	-18	-0,00000096	-0,0096
4,85	-28	-0,00000149	-0,0149
4,90	-26	-0,00000138	-0,0138
4,95	-26	-0,00000138	-0,0138
5,00	-24	-0,00000128	-0,0128
5,05	-24	-0,00000128	-0,0128
5,10	-21	-0,00000112	-0,0112
5,15	-22	-0,00000117	-0,0117
5,20	-22	-0,00000117	-0,0117
5,25	-20	-0,00000106	-0,0106

AFC FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	-35	-0,00000186	-0,0186
-20	-45	-0,00000239	-0,0239
-10	-34	-0,00000181	-0,0181
±0.0	-39	-0,00000207	-0,0207
+10	-40	-0,00000213	-0,0213
+20	-32	-0,00000170	-0,0170
+30	-36	-0,00000191	-0,0191
+40	-44	-0,00000234	-0,0234
+50	-32	-0,00000170	-0,0170
+60	-33	-0,00000176	-0,0176

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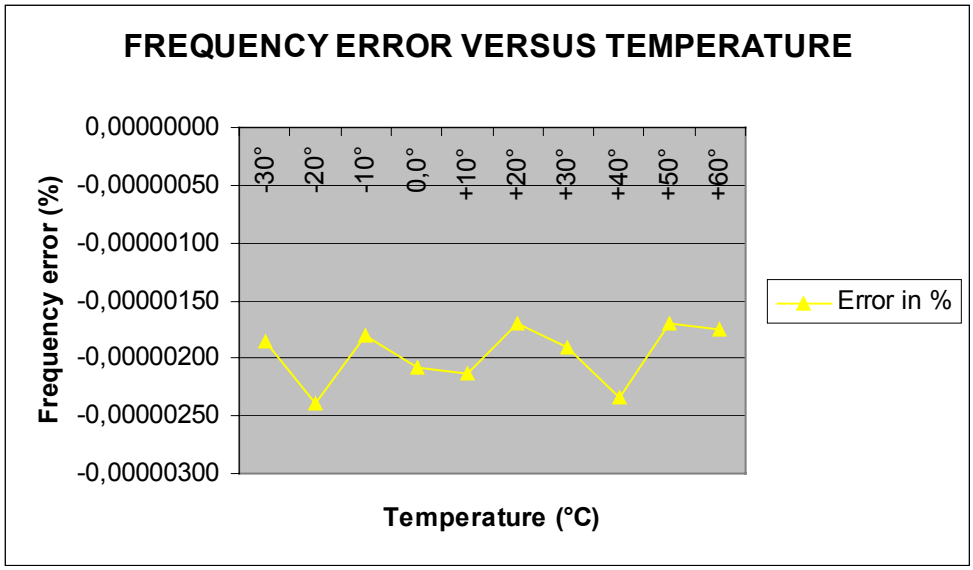

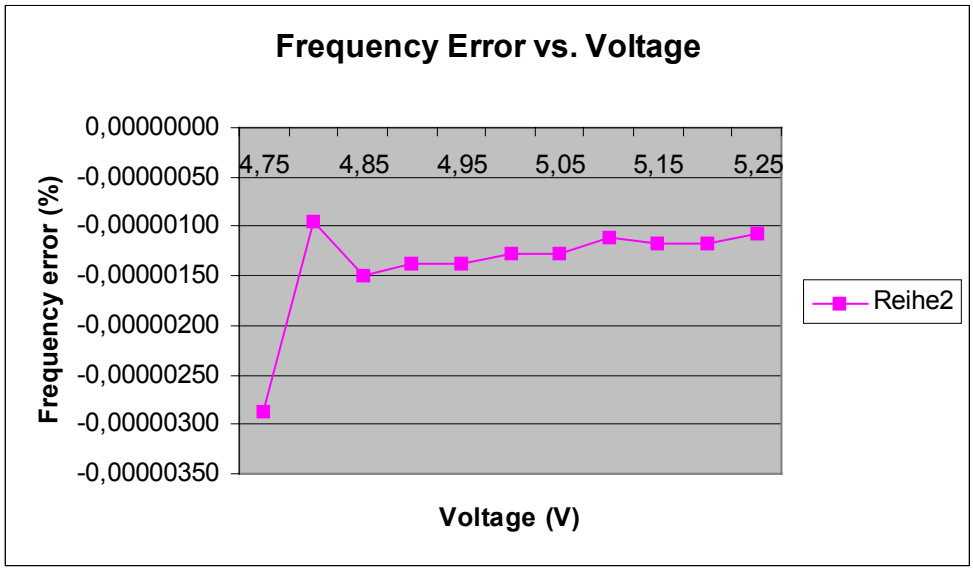

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EMISSIONS LIMITS §24.238

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:
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.

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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 !

As can be seen from this data, the emissions from the test item were within the specification limit. The plots are made to have an overview on which frequencies we have to the substitutions method

Channel 512

Data File : /22863_45.DOC 25 Apr 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	99.2	33.0	23.9	-9.1	PK	V	100	360	N/T	
2	128.5	33.0	22.2	-10.8	PK	V	100	360	N/T	
3	191.7	33.0	21.0	-12.0	PK	H	330	0	N/T	
4	198.7	33.0	25.9	-7.1	PK	V	100	360	N/T	
5	224.5	35.5	22.3	-13.2	PK	V	101	356	N/T	
6	240.8	35.5	25.5	-10.0	PK	H	329	0	N/T	
7	360.8	35.5	27.8	-7.7	PK	H	329	0	N/T	
8	397.5	35.5	28.4	-7.1	PK	H	329	0	N/T	
9	596.6	35.5	30.7	-4.8	PK	V	101	360	N/T	

Channel 661

Data File : /22863_50.DOC 25 Apr 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	66.2	29.5	17.9	-11.6	PK	V	100	360	N/T	
2	99.3	33.0	23.7	-9.3	PK	V	100	360	N/T	
3	128.7	33.0	23.2	-9.8	PK	V	100	360	N/T	
4	191.7	33.0	20.8	-12.2	PK	H	328	0	N/T	
5	198.7	33.0	26.2	-6.8	PK	V	100	360	N/T	
6	240.8	35.5	23.6	-11.9	PK	V	97	360	N/T	
7	297.9	35.5	25.8	-9.8	PK	V	97	360	N/T	
8	360.8	35.5	27.5	-8.0	PK	V	97	360	N/T	

Channel 810

Data File : /22863_55.DOC 25 Apr 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	66.2	29.5	17.4	-12.1	PK	V	100	0	N/T	
2	128.5	33.0	22.2	-10.8	PK	V	100	0	N/T	
3	198.9	33.0	25.8	-7.2	PK	V	100	0	N/T	
4	240.8	35.5	26.2	-9.3	PK	H	333	360	N/T	
5	297.9	35.5	26.0	-9.6	PK	V	100	0	N/T	
6	360.8	35.5	28.6	-6.9	PK	H	333	360	N/T	
7	397.5	35.5	28.7	-6.8	PK	H	333	360	N/T	

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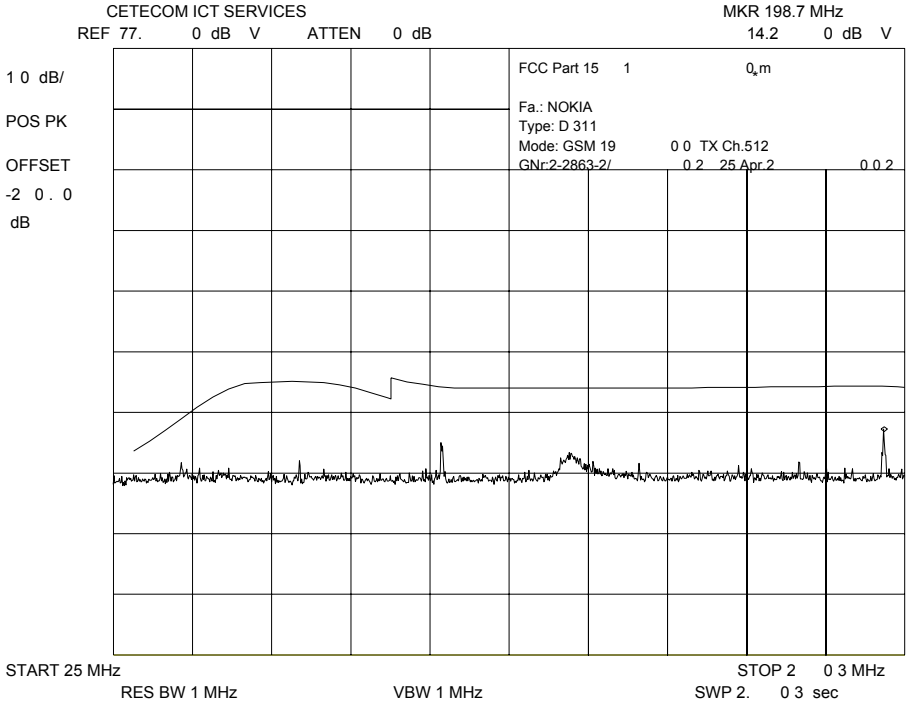
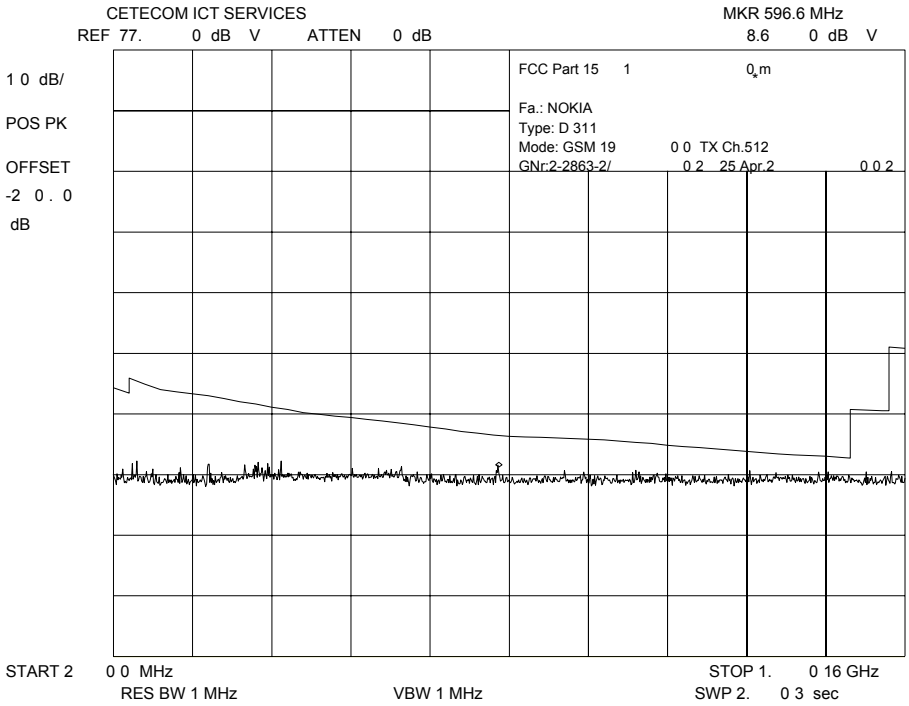
Channel 512 (up to 1 GHz vertical)





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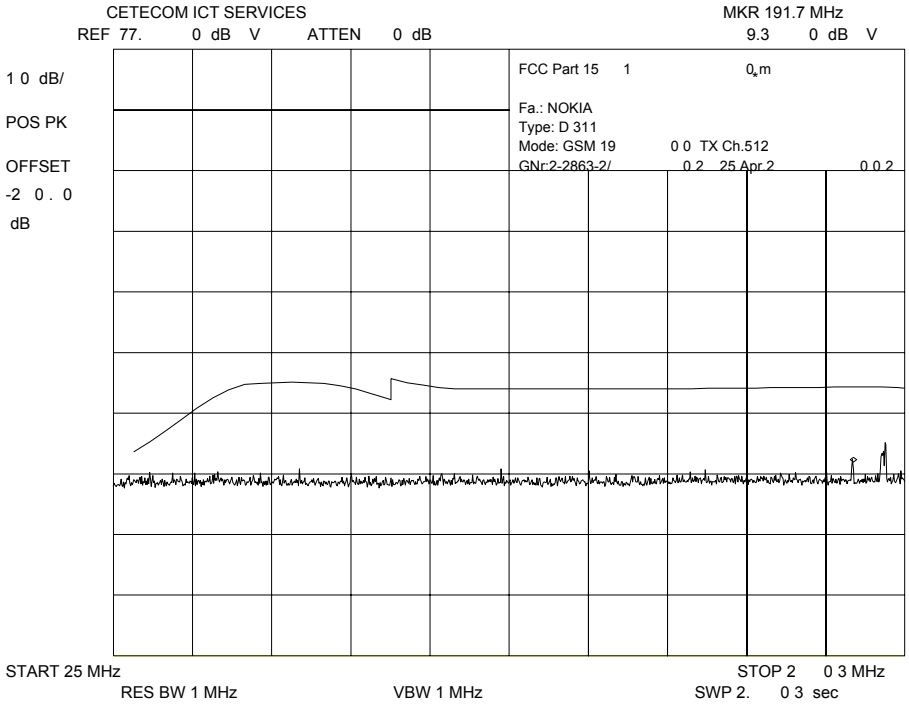
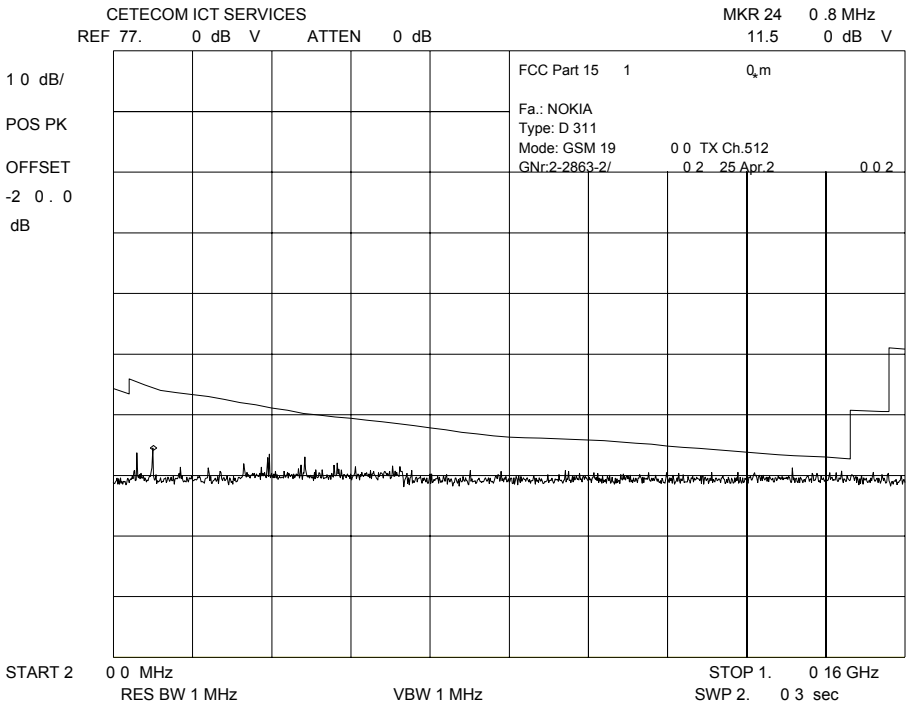
Channel 512 (up to 1 GHz horizontal)





REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
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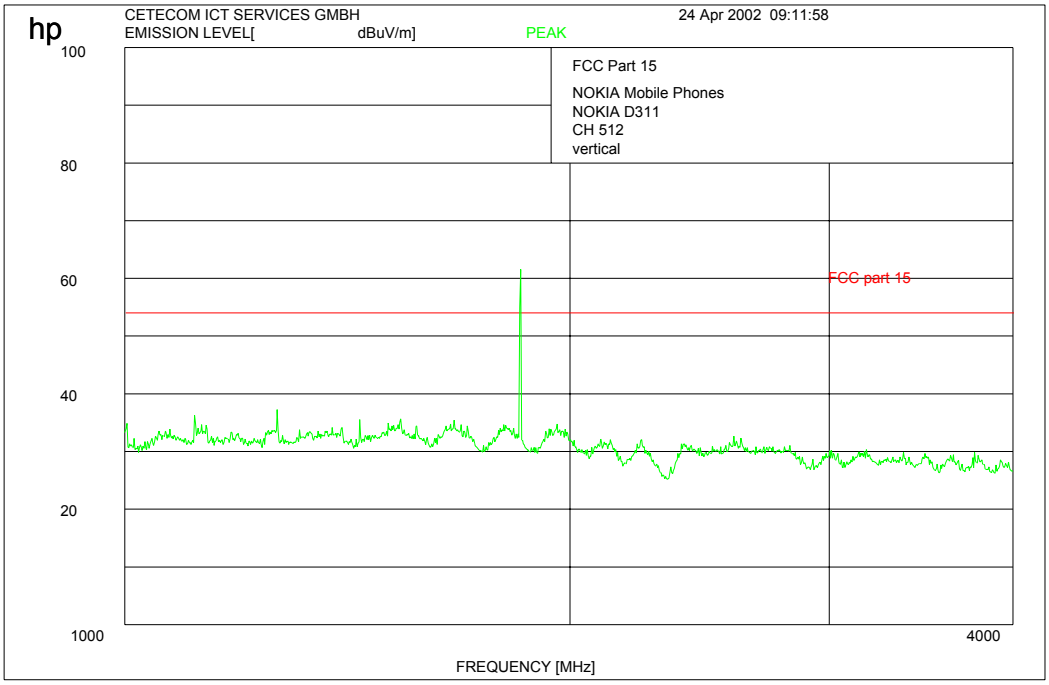
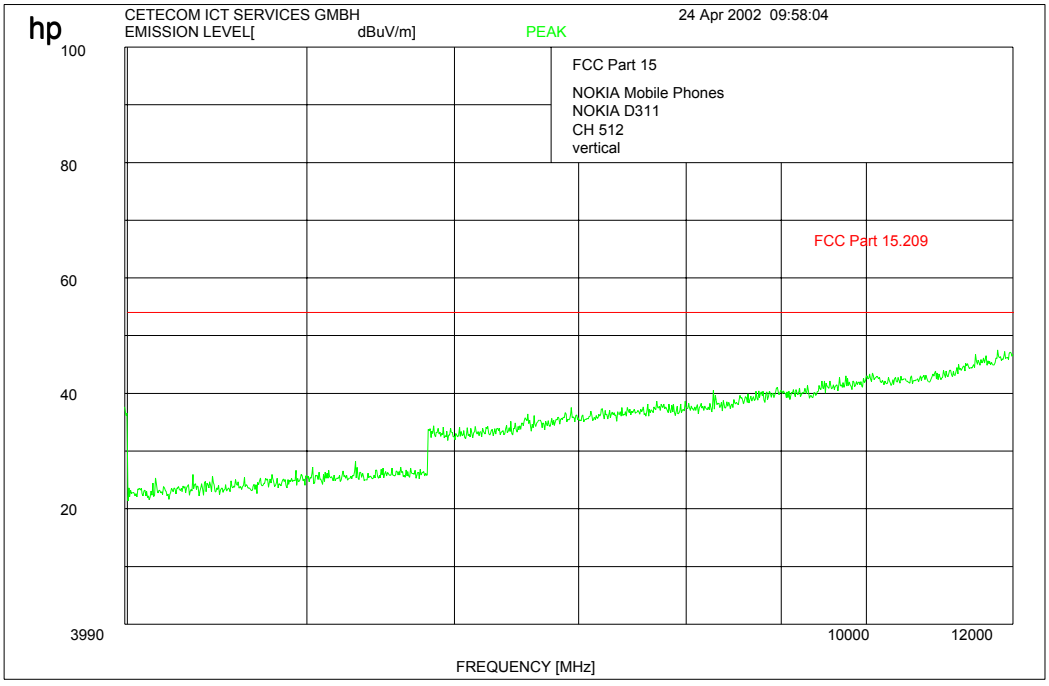
Channel 512 : 1 – 12 GHz (vertical)





REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
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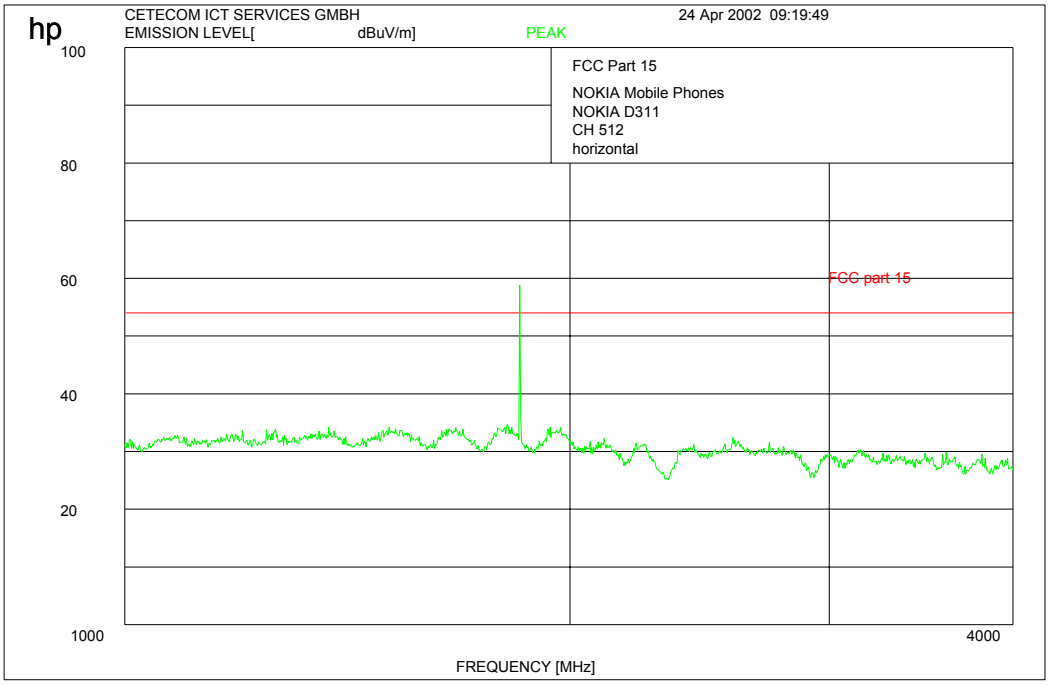
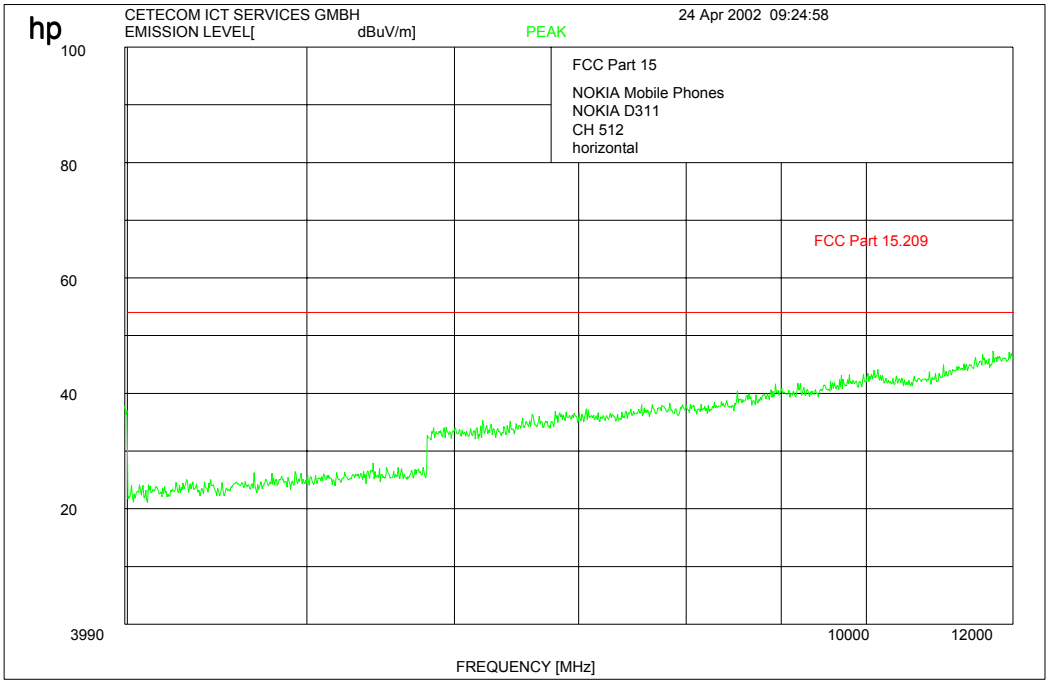
Channel 512 : 1 – 12 GHz (horizontal)





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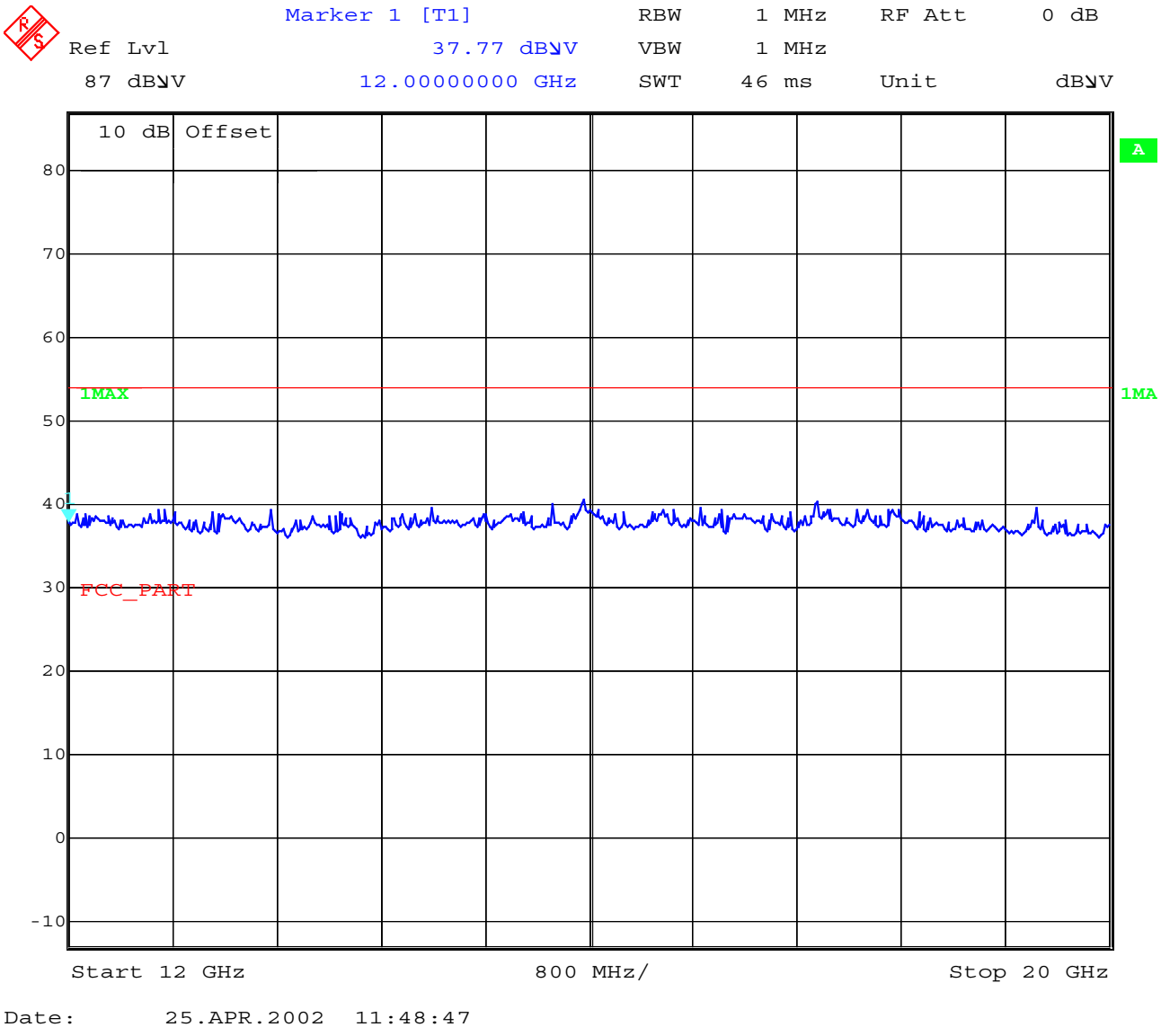
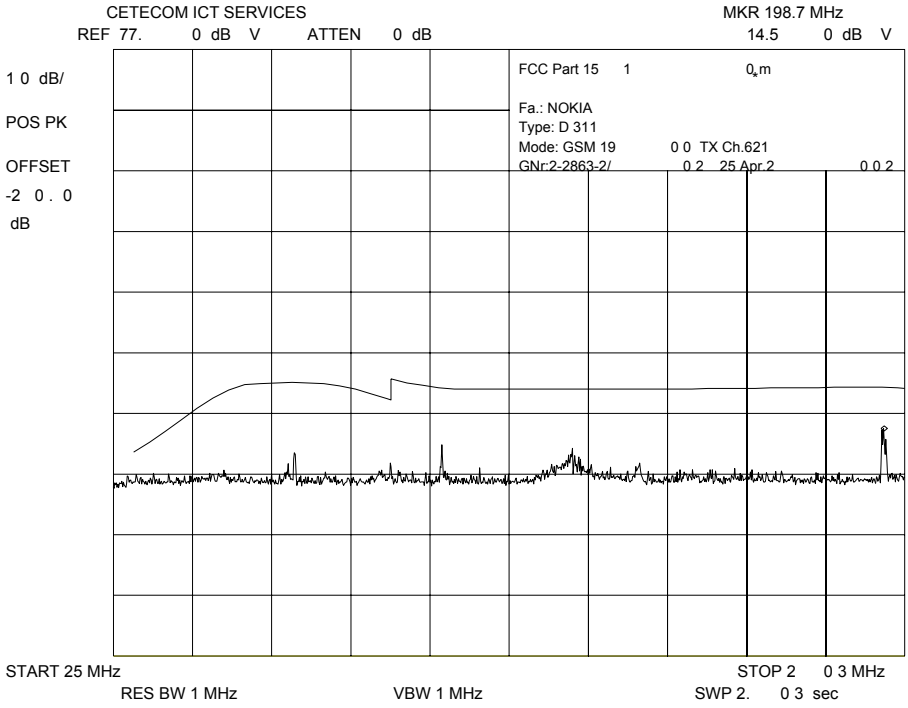
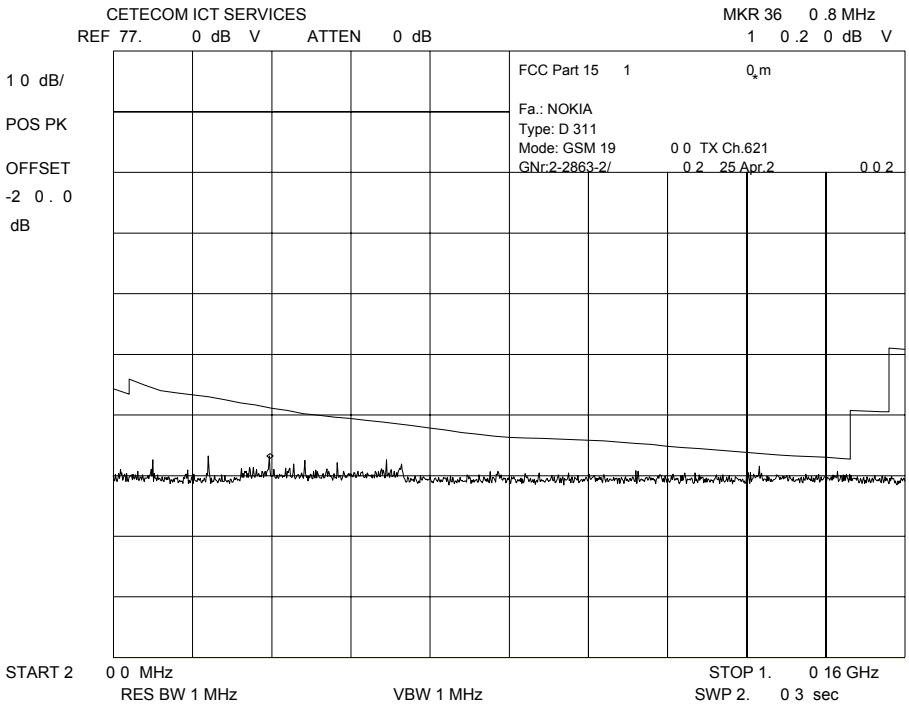
Channel 512 : 12 – 20 GHz



Channel 661 (up to 1 GHz vertical)





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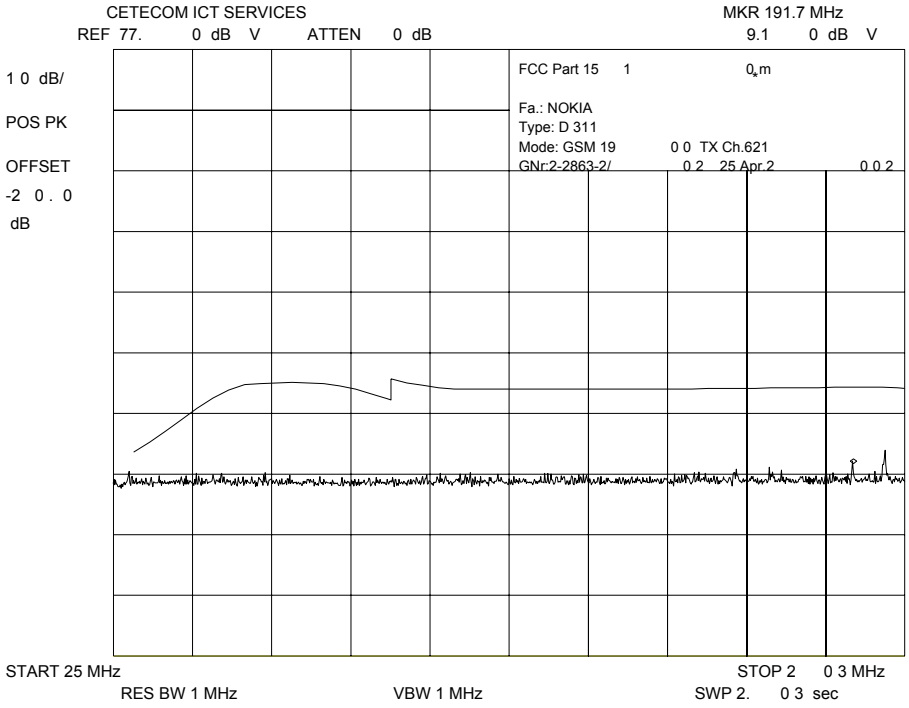
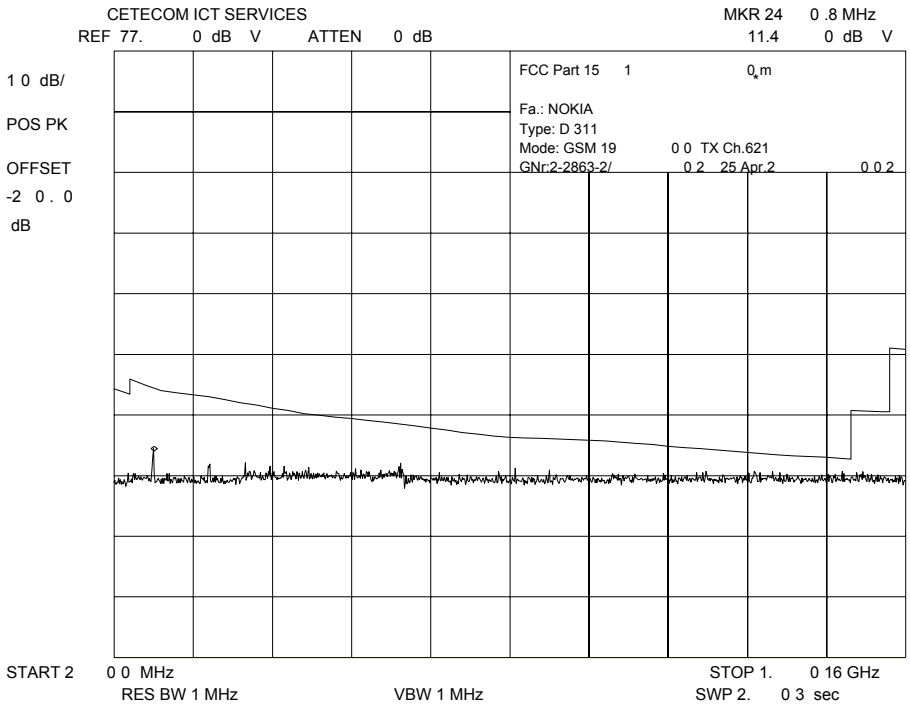
Channel 661 (up to 1 GHz horizontal)





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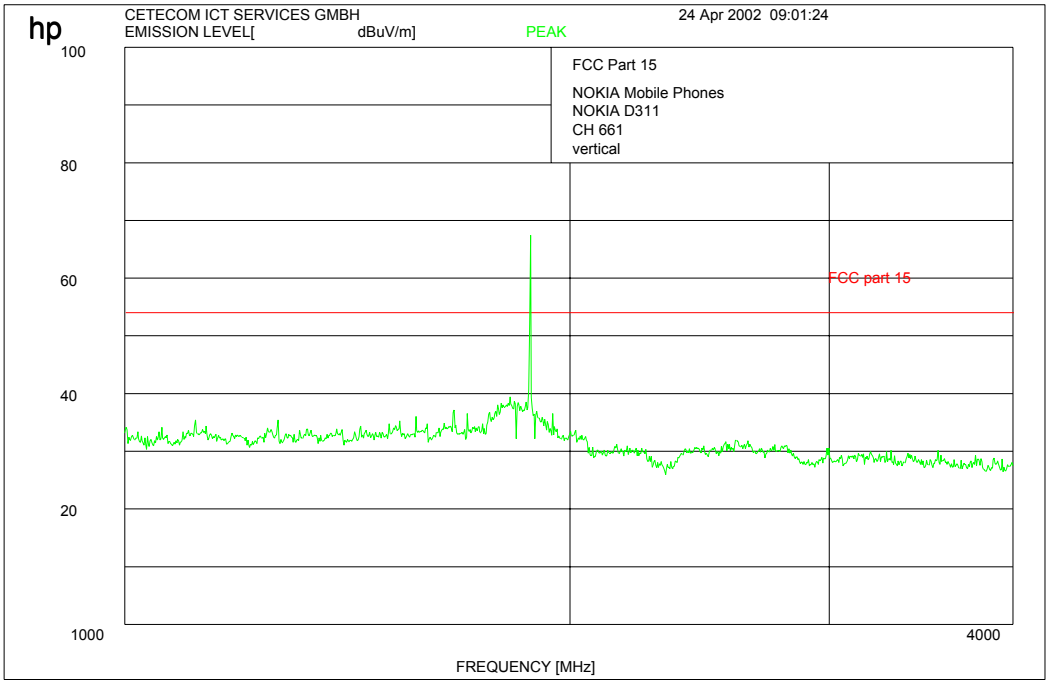
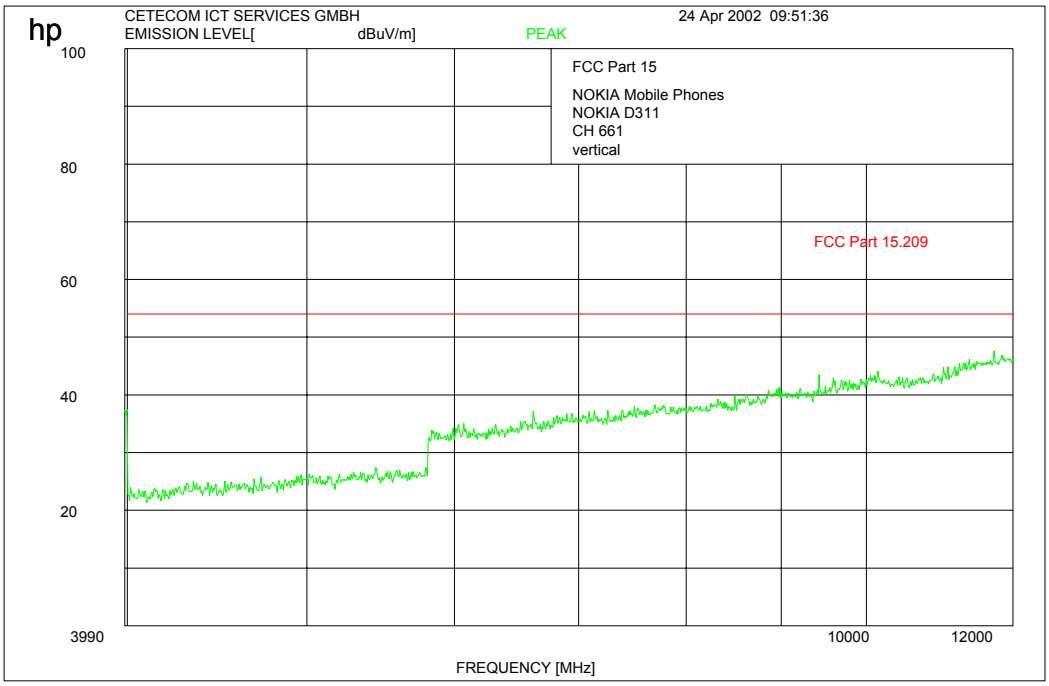
Channel 661 : 1 – 12 GHz (vertical)





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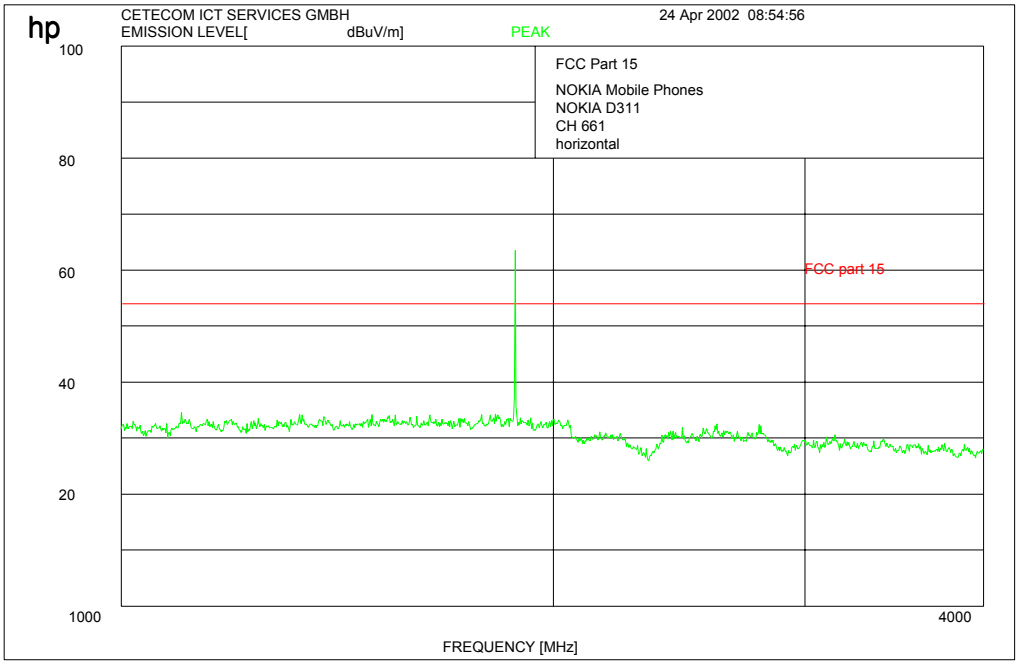
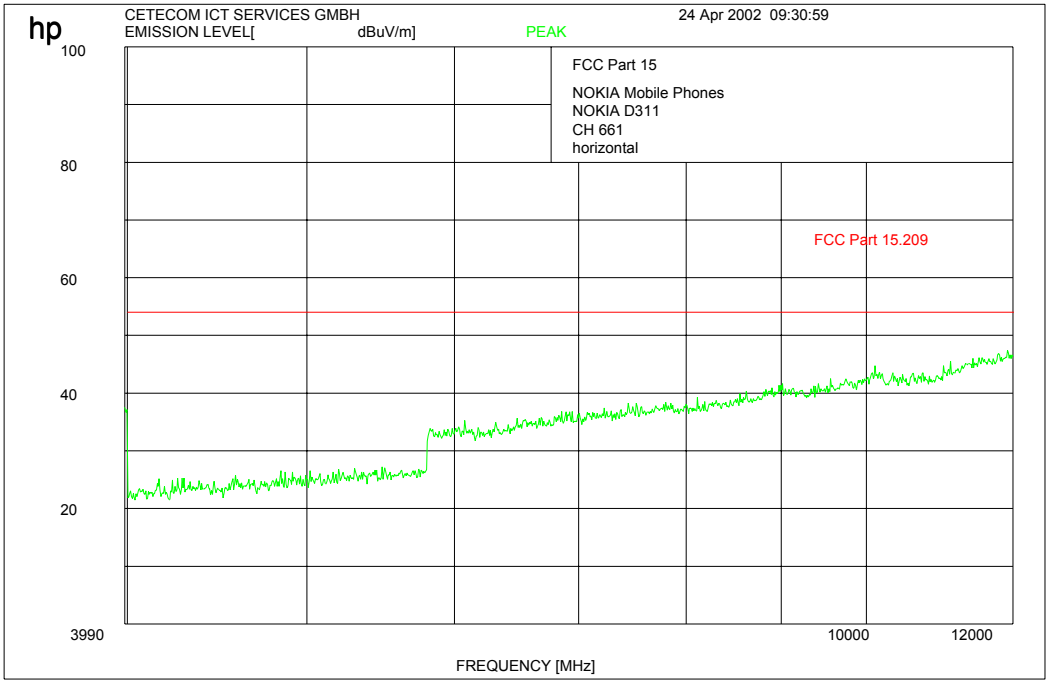
Channel 661 : 1 – 12 GHz (horizontal)





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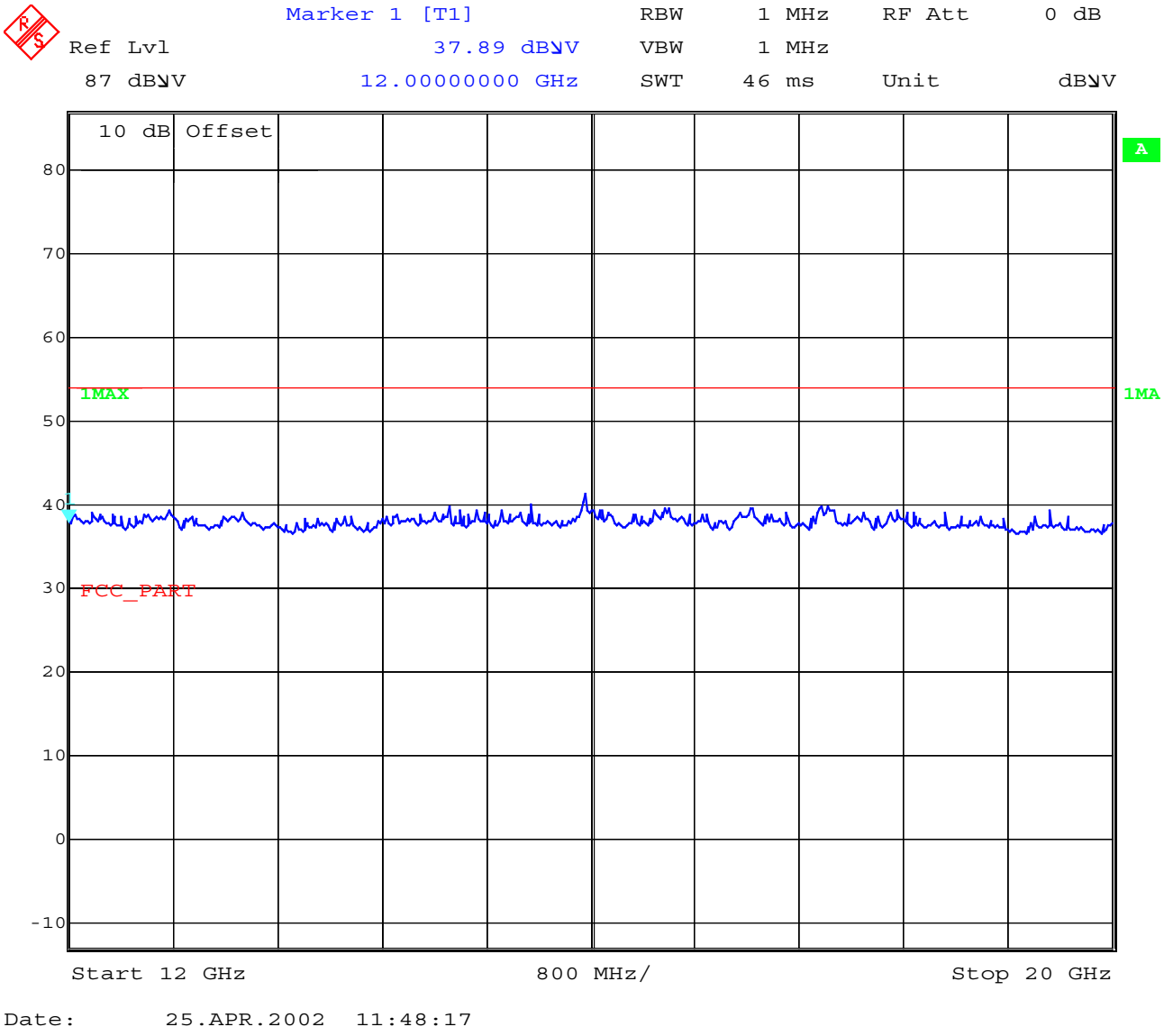
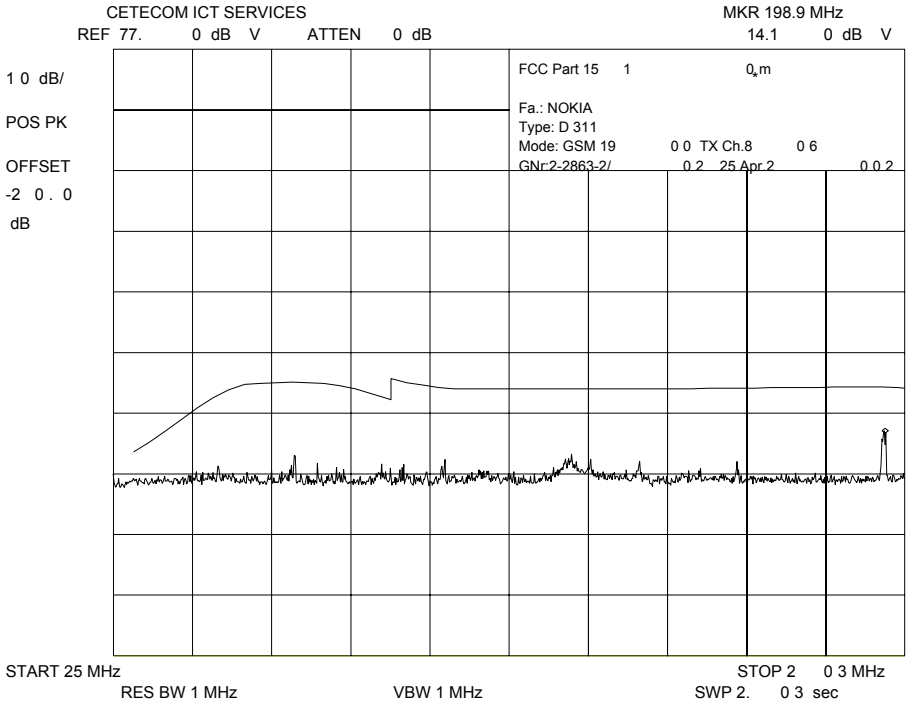
(for reference numbers see test equipment listing)
17 - 24

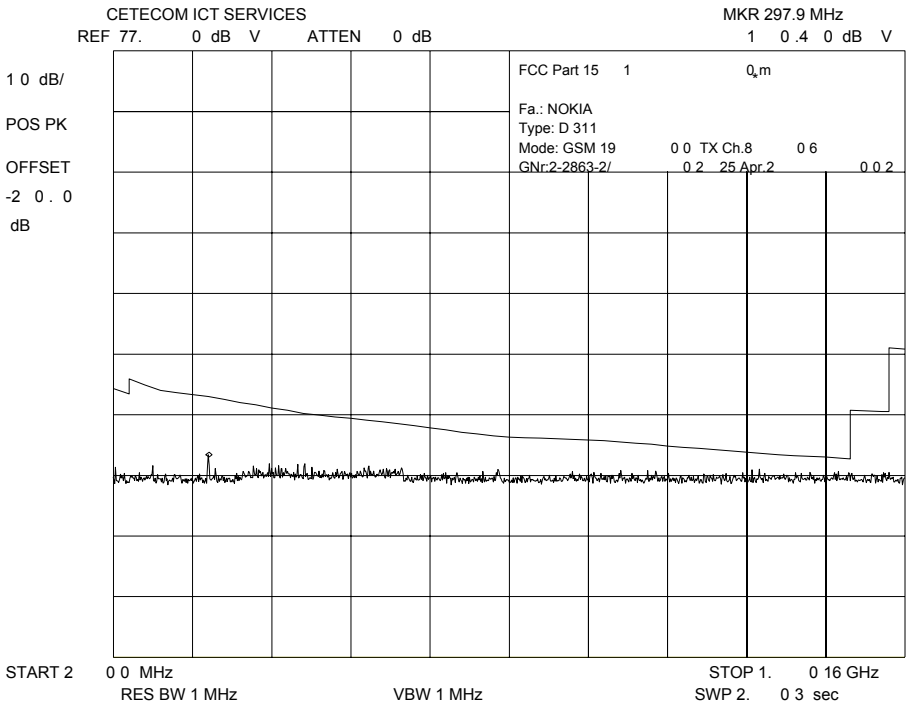
Channel 661 : 12 – 20 GHz



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

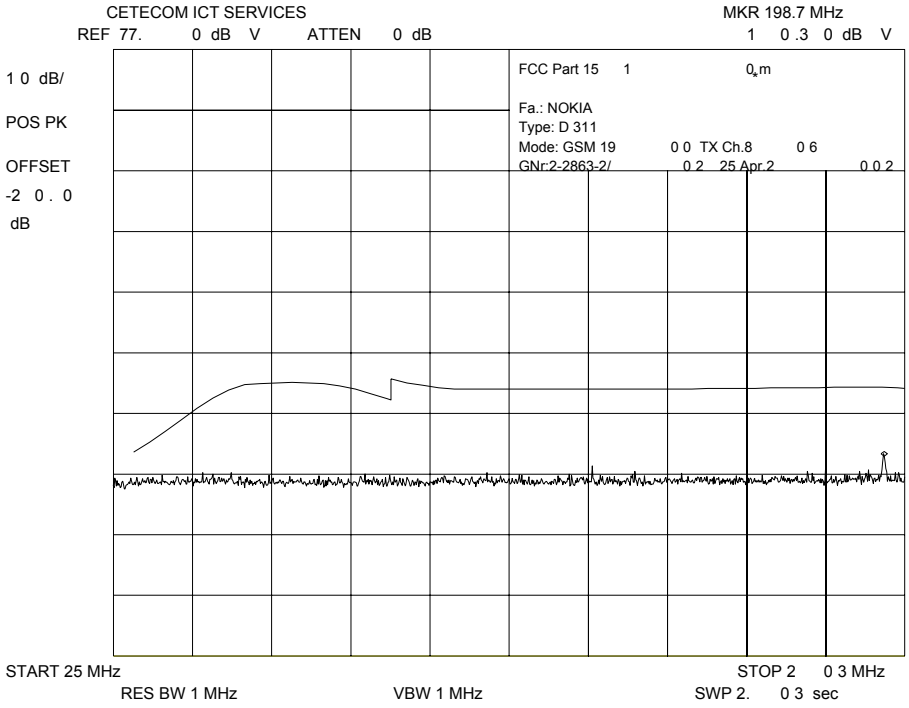
Channel 810 up to 1 GHz (vertical)

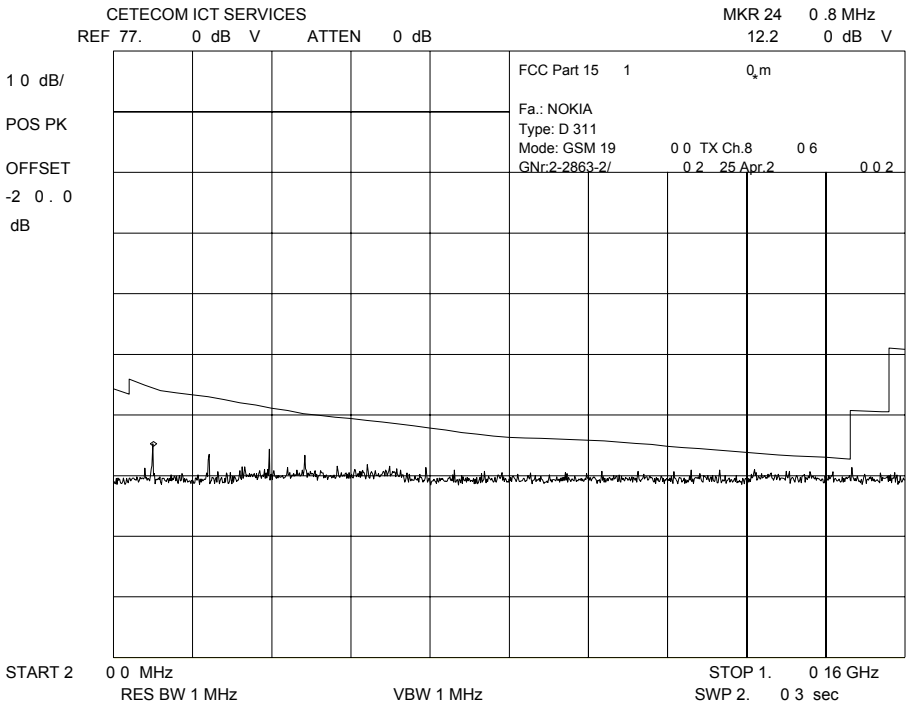




REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

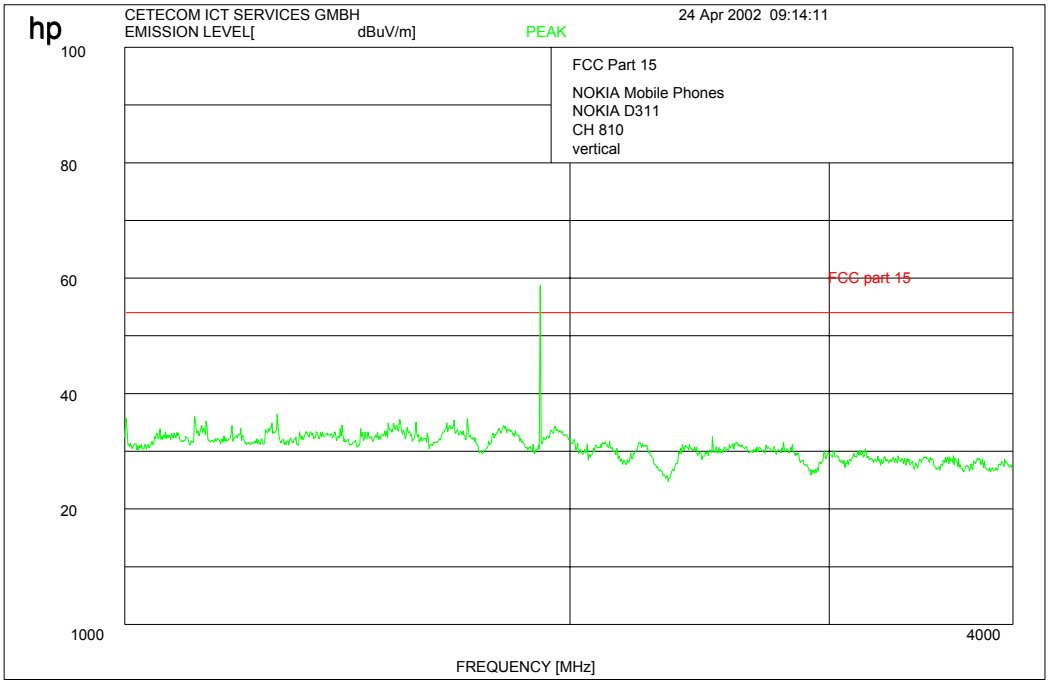
Channel 810 up to 1 GHz (horizontal)

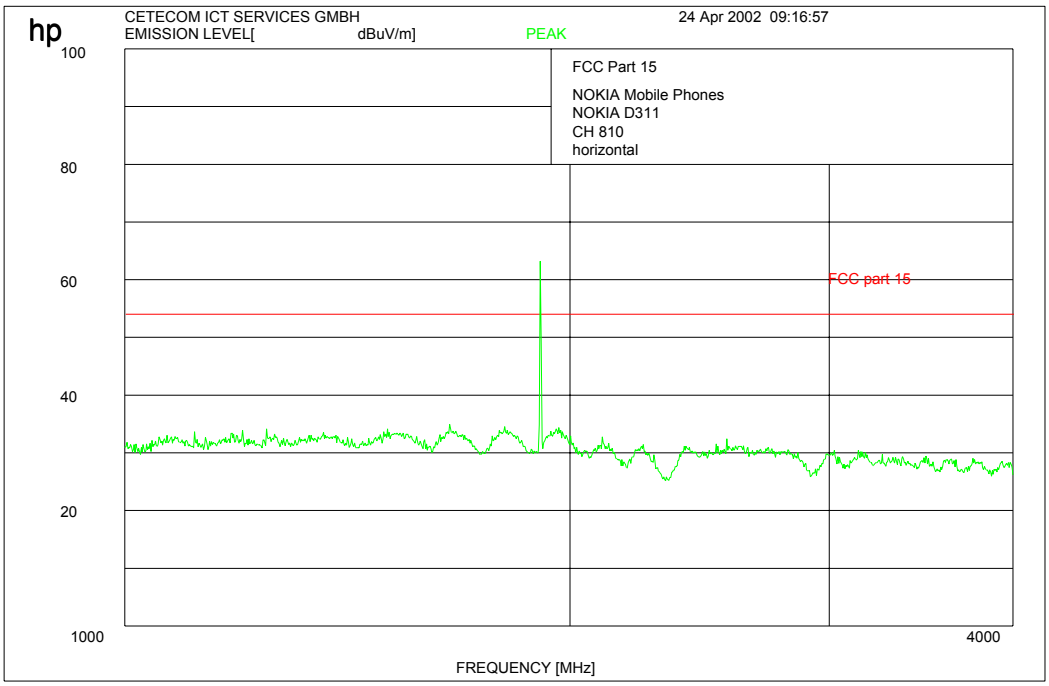




REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

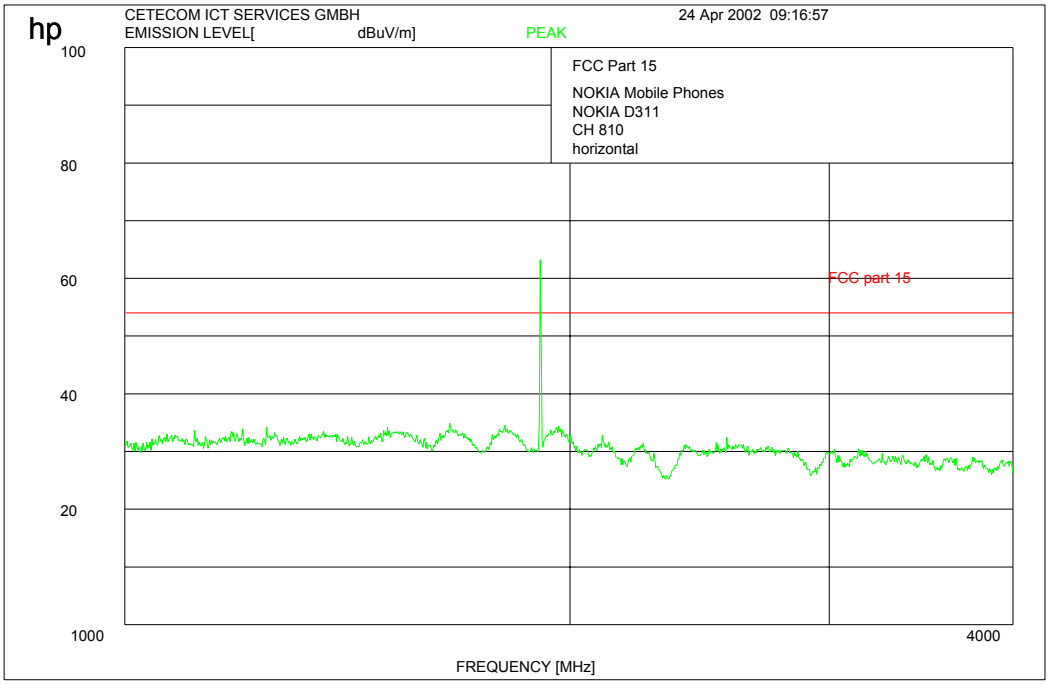
Channel 810 : 1 –12 GHz (vertical)

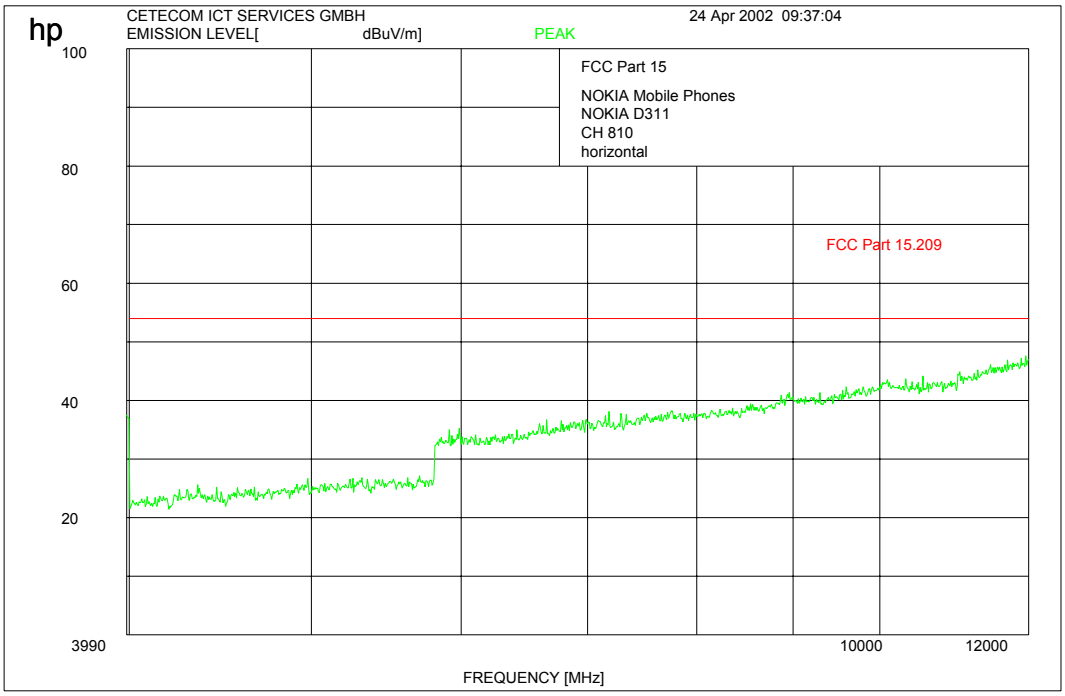




REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

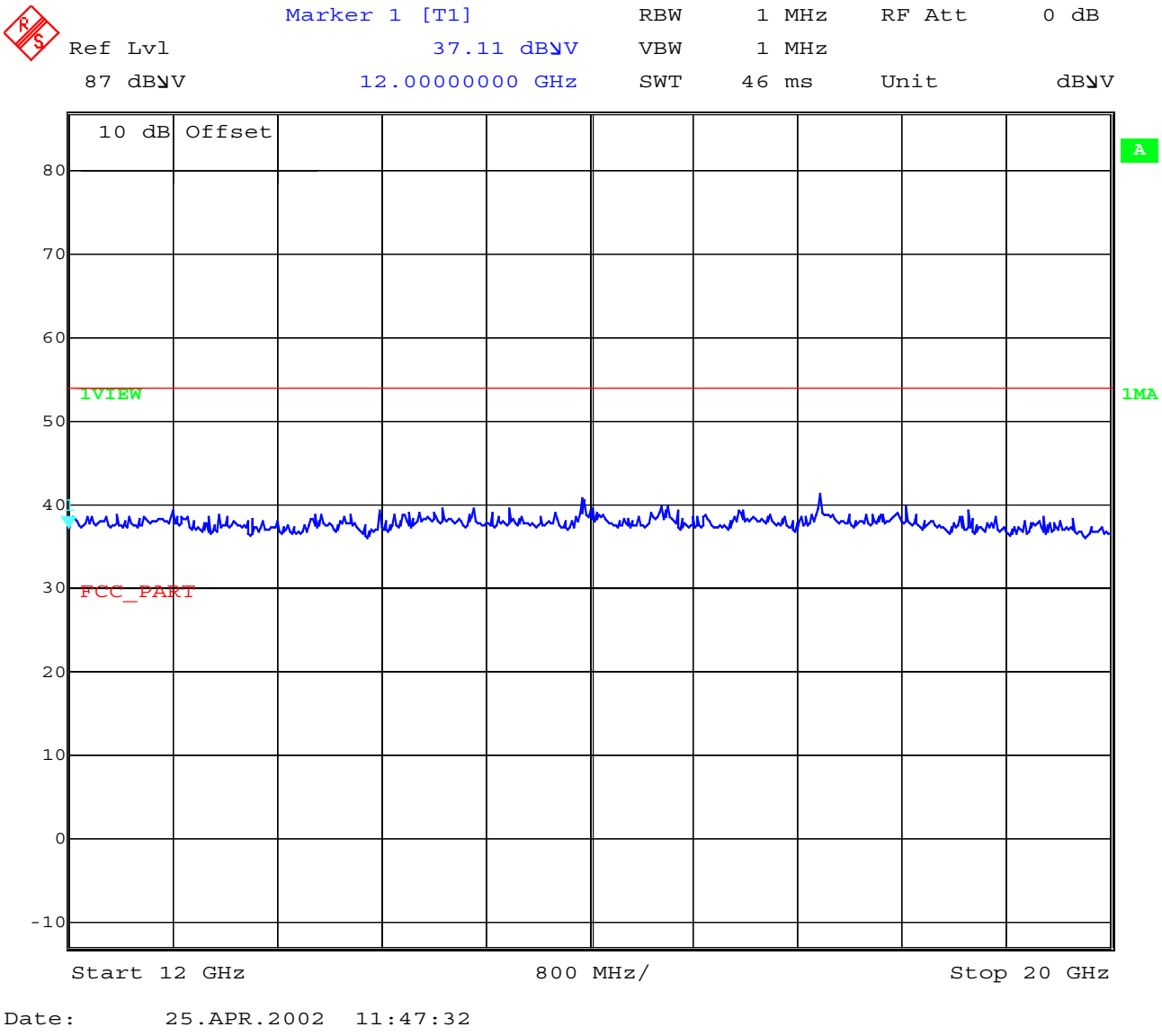
Channel 810 : 1 –12 GHz (horizontal)





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

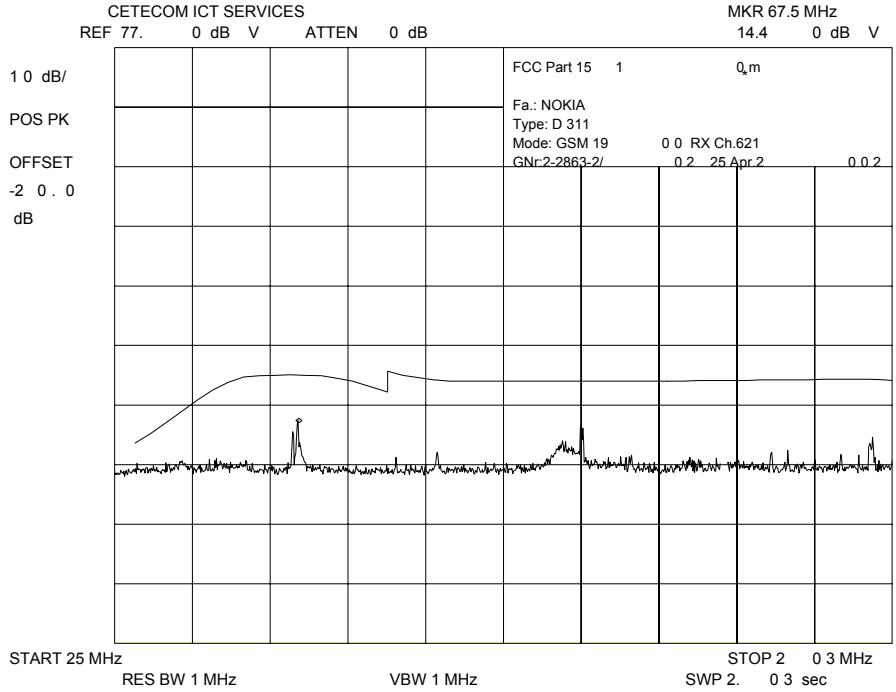
Data File : /22863_60.DOC 25 Apr 2002

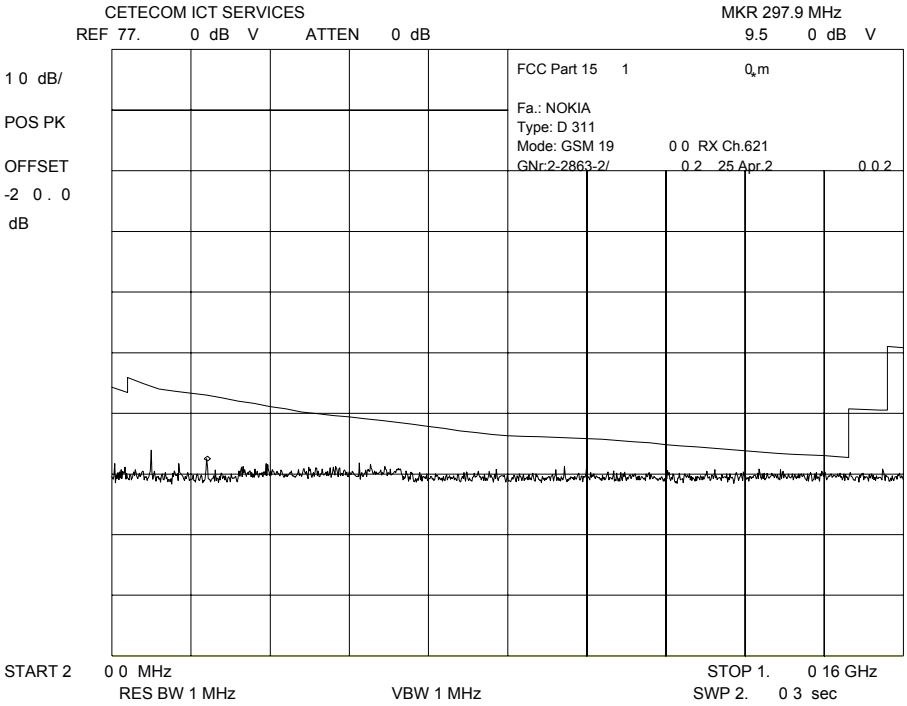
No	EMISSION FREQUENCY MHz	SPEC LIMIT dBuV/m	MEASUREMENTS ABS	dLIM dB	MODE	POL	SITE HGT cm	AZM deg	CORR FACTOR dB	COMMENTS
1	67.5	29.5	21.9	-7.7	PK	V	100	0	N/T	
2	132.1	33.0	25.1	-7.9	PK	V	100	0	N/T	
3	185.3	33.0	21.8	-11.3	PK	H	331	360	N/T	
4	191.6	33.0	21.2	-11.8	PK	H	331	360	N/T	
5	199.0	33.0	23.3	-9.7	PK	V	100	0	N/T	
6	240.8	35.5	24.9	-10.6	PK	V	101	0	N/T	
7	297.9	35.5	25.1	-10.5	PK	V	101	0	N/T	
8	360.8	35.5	26.7	-8.8	PK	H	330	360	N/T	
9	397.5	35.5	28.4	-7.1	PK	H	330	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)
64

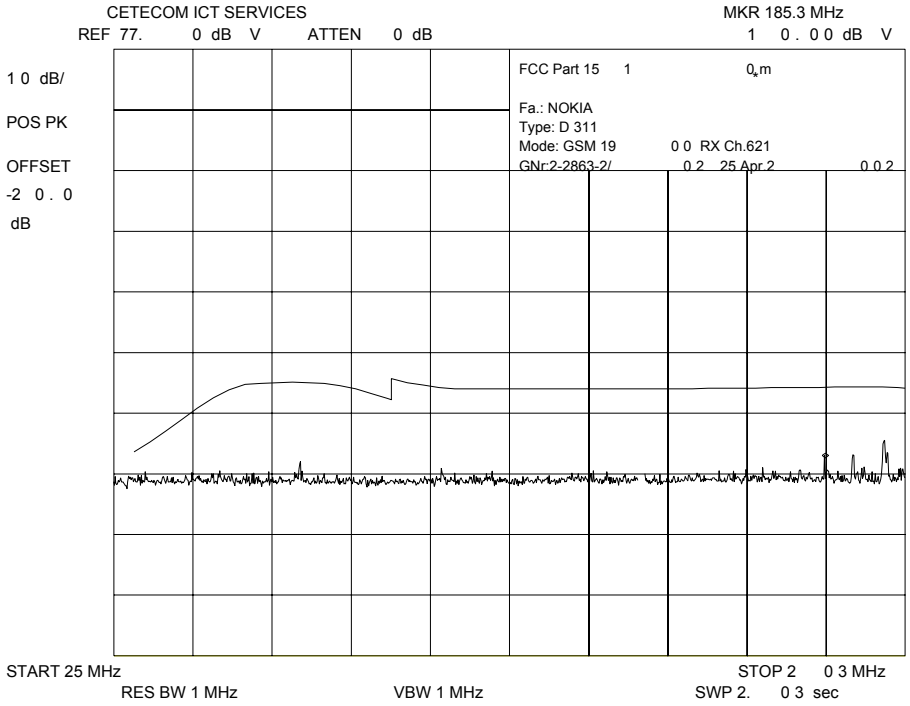
Channel 661 (this is valid for all 3 channels and up to 1 GHz , vertical)
Idle-Mode

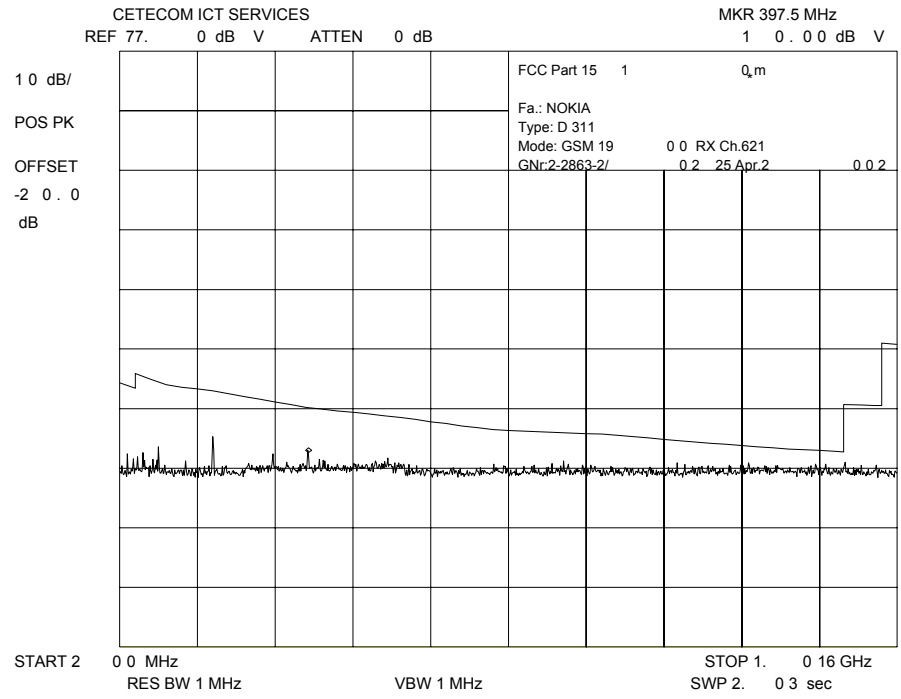




REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

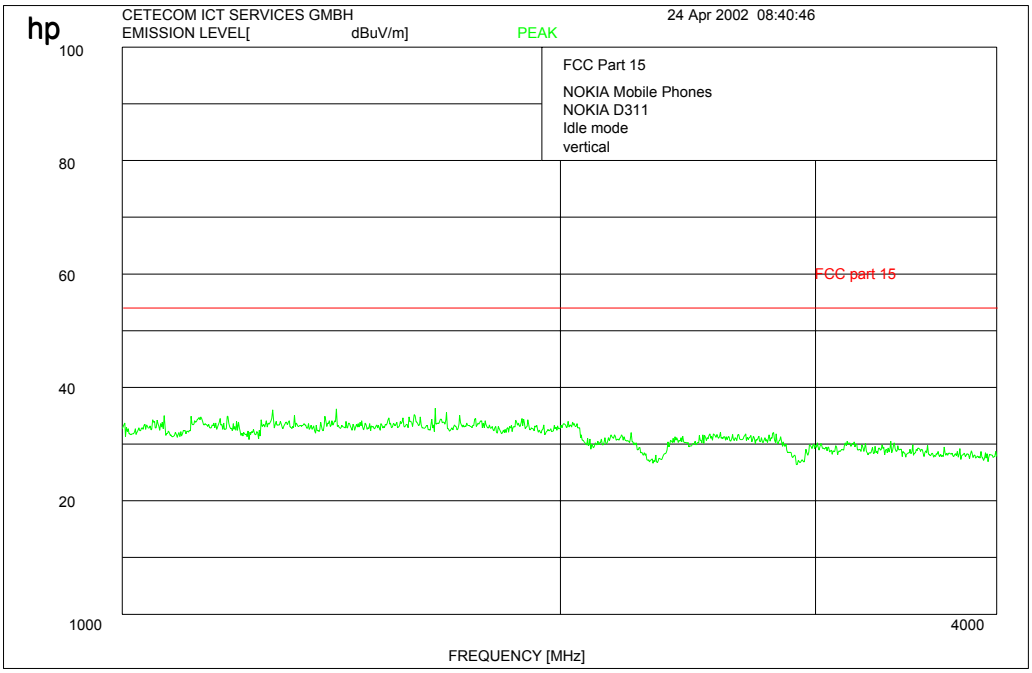
Channel 661 (this is valid for all 3 channels and up to 1 GHz , horizontal)
Idle-Mode

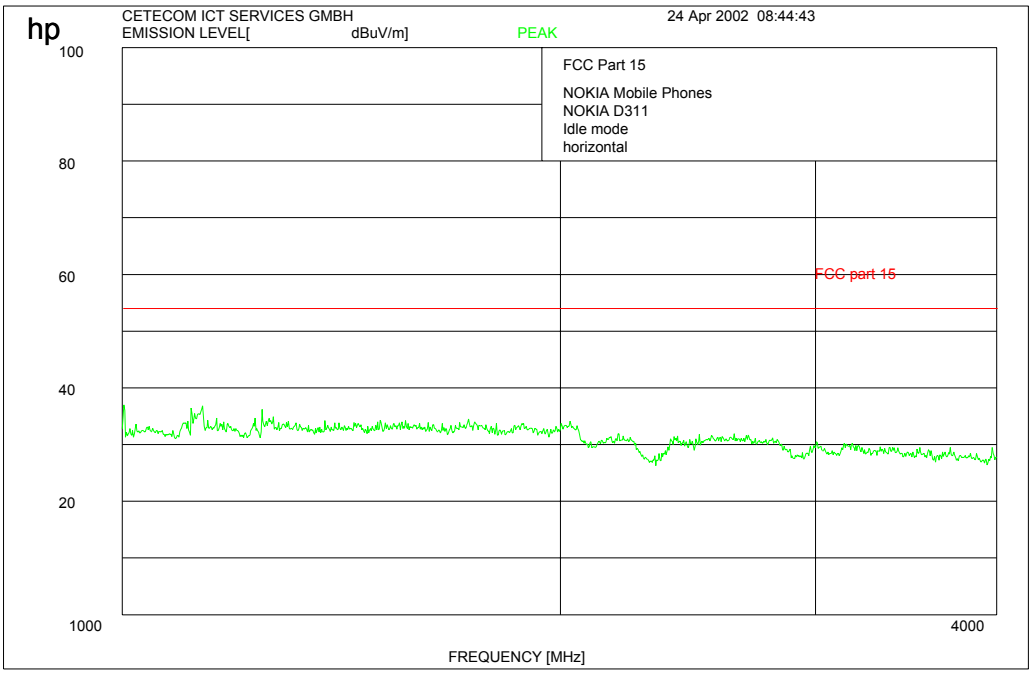




REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

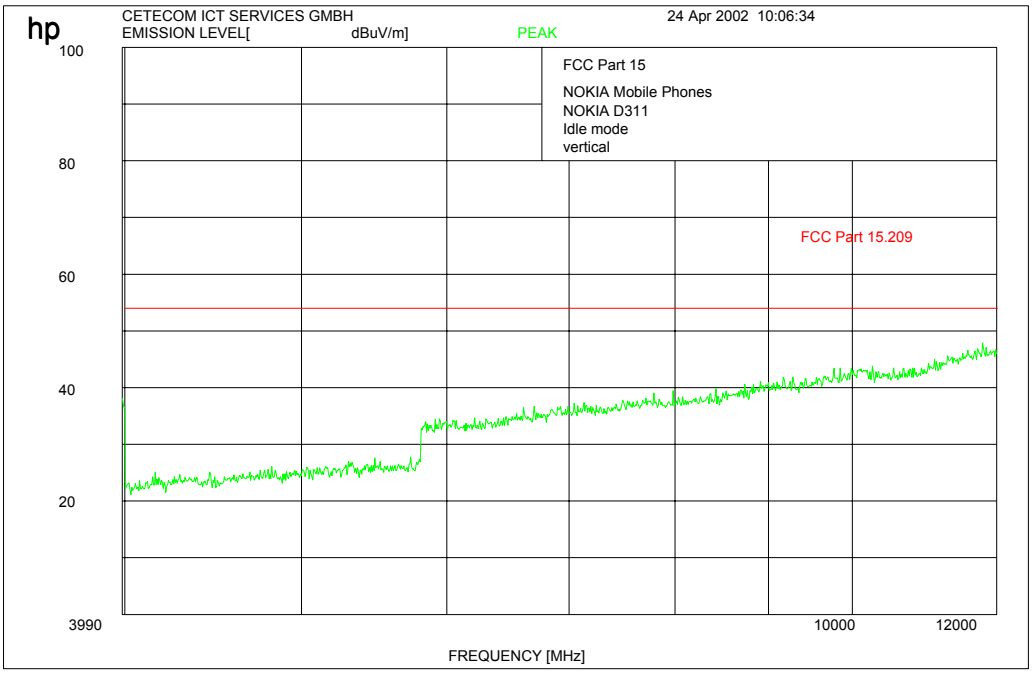
Channel 661 (this is valid for all 3 channels and up to 4 GHz)
Idle-Mode

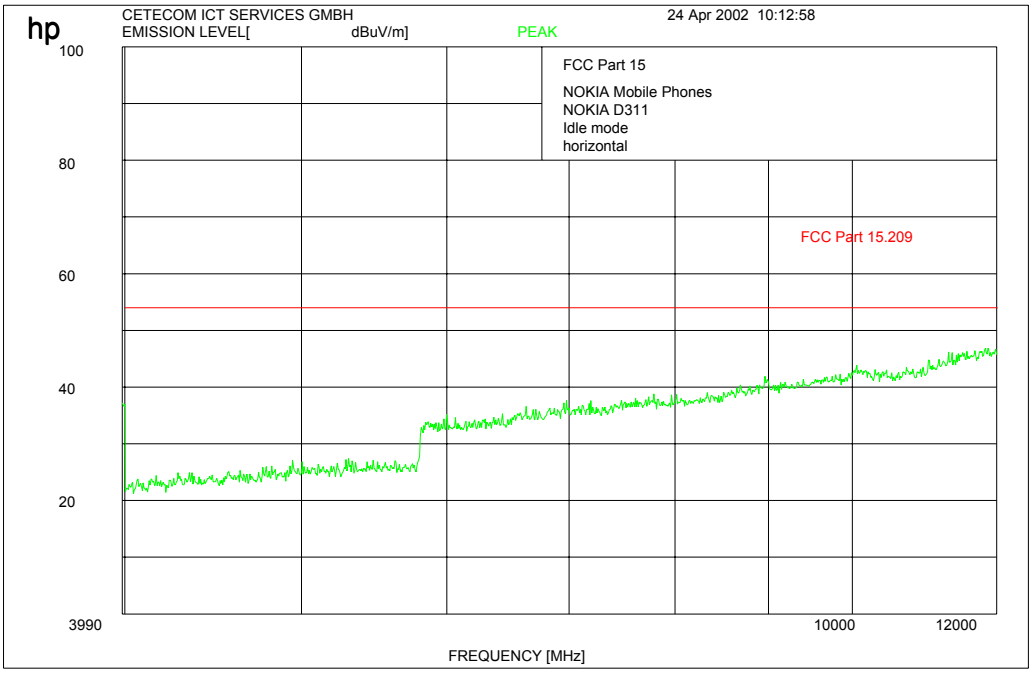




REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

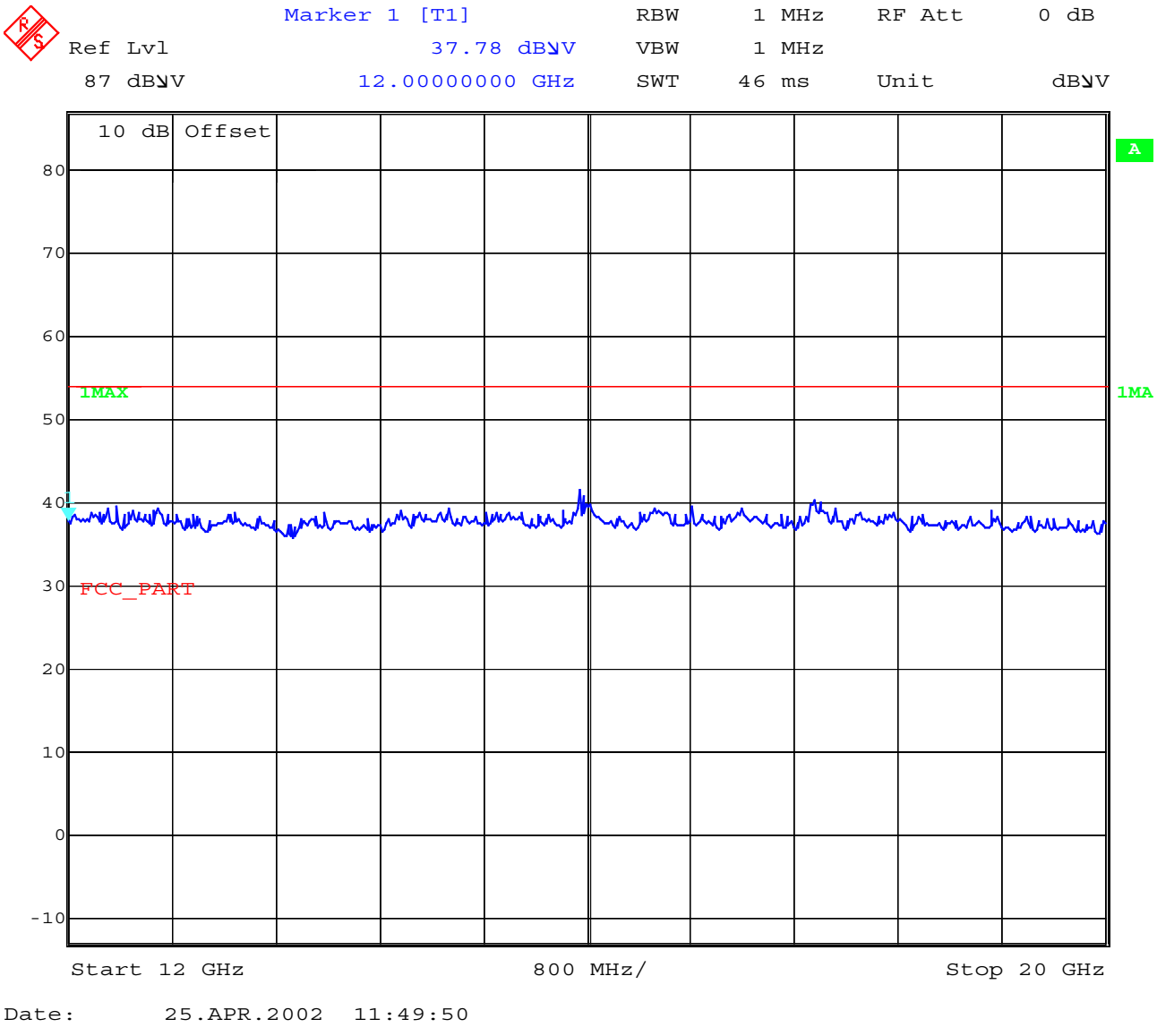
Channel 661 (this is valid for all 3 channels and 4 to 12 GHz)
Idle-Mode





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

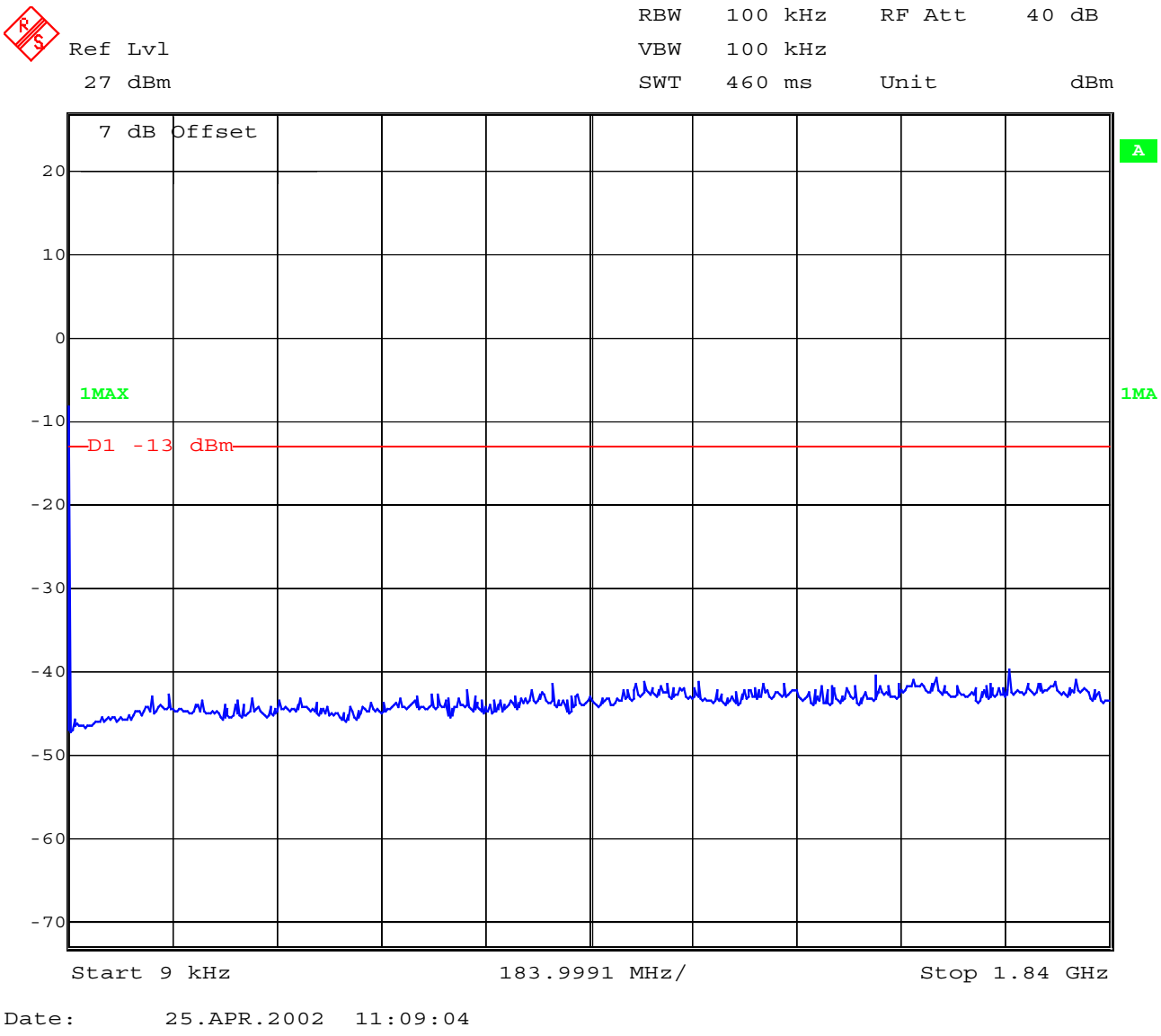
Measurement Limit:
Sec. 24.238 Emission Limits.
(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +30 dBm to 0
dBm, this becomes a constant specification limit of -13 dBm.

EMISSION LIMITATIONS					
f (MHz)		**amplitude of emission (dBm)**	**limit max. allowed emmision power (dBm)**	**actual attenuation below frequency of operation (dBc)**	**results**
CH 512					
1850		**-14.23**	**-13 (42.47 dBc)**	**43.7**	**Complies**
5859		**-37.39**		**66.86**	**Complies**
CH 661					
1736		**-41.17**	**-13 (41.78dBc)**	**69.95**	**Complies**
CH 810					
1736		**-42.97**	**-13 (41.26dBc)**	**71.51**	**Complies**
1910		**-16.98**		**45.52**	**Complies**
6043		**-37.18**		**65.72**	**Complies**
Measurement uncertainty		**± 0.5dB**			

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

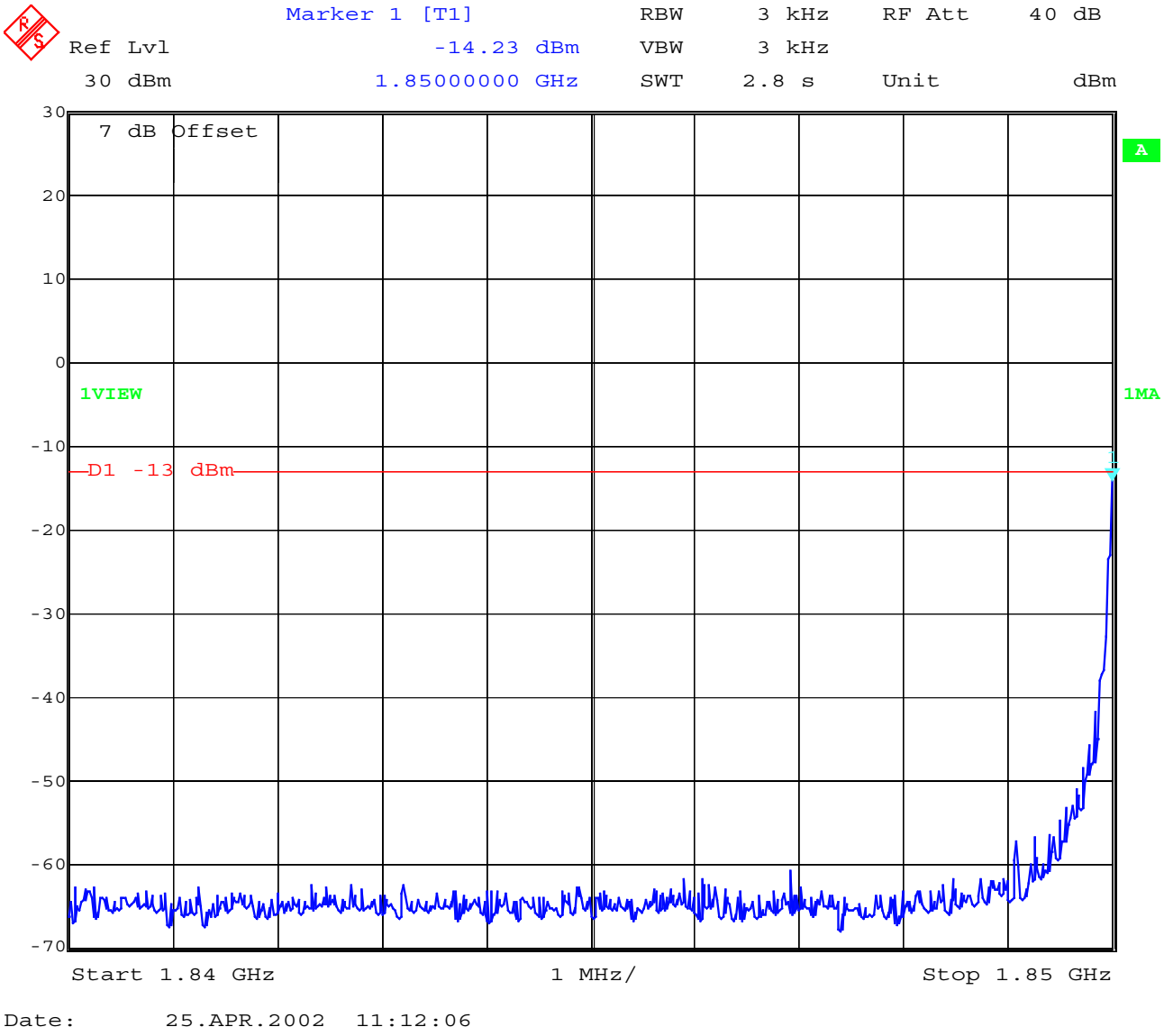
Measurements:

Channel: 512



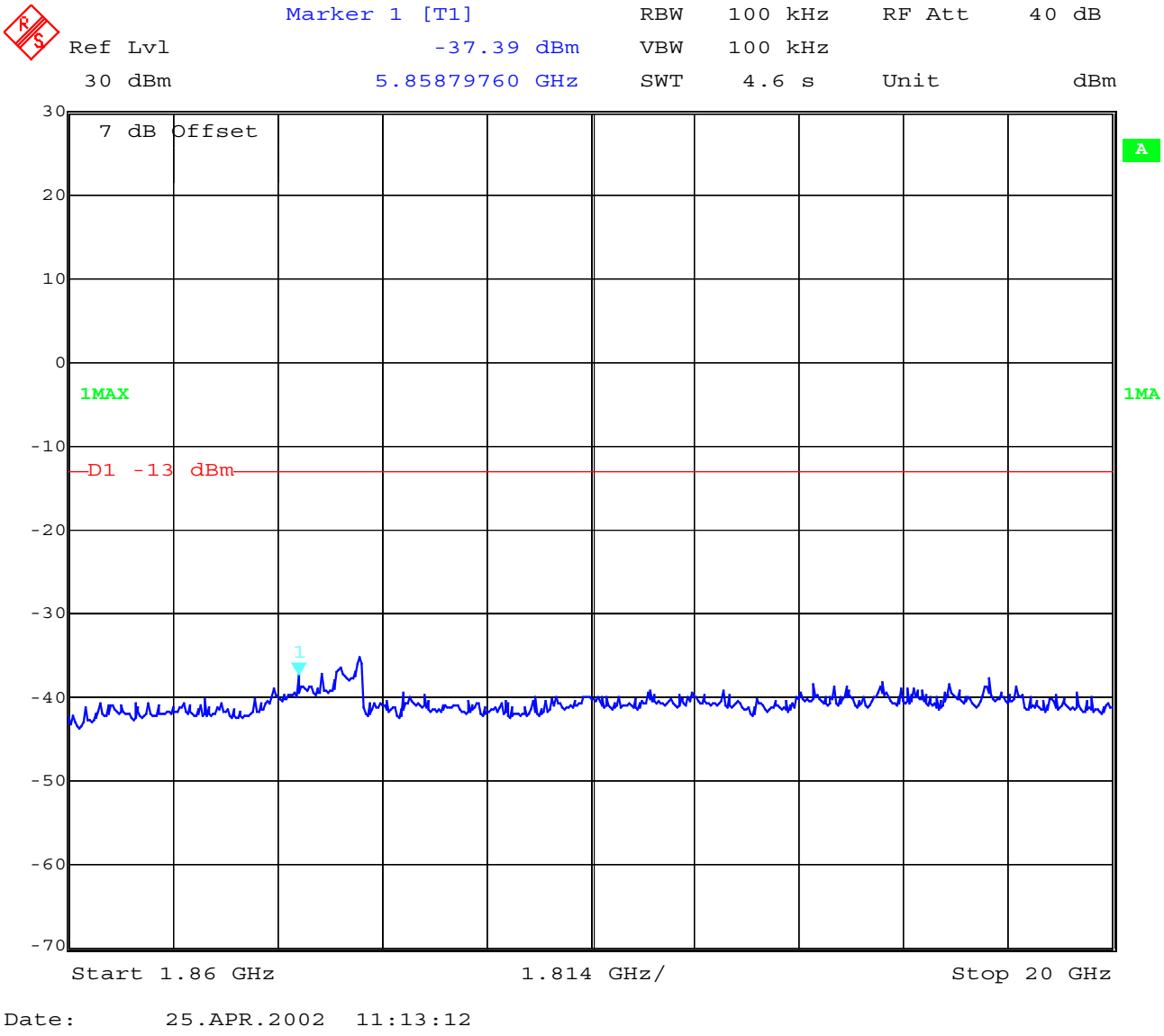
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 512

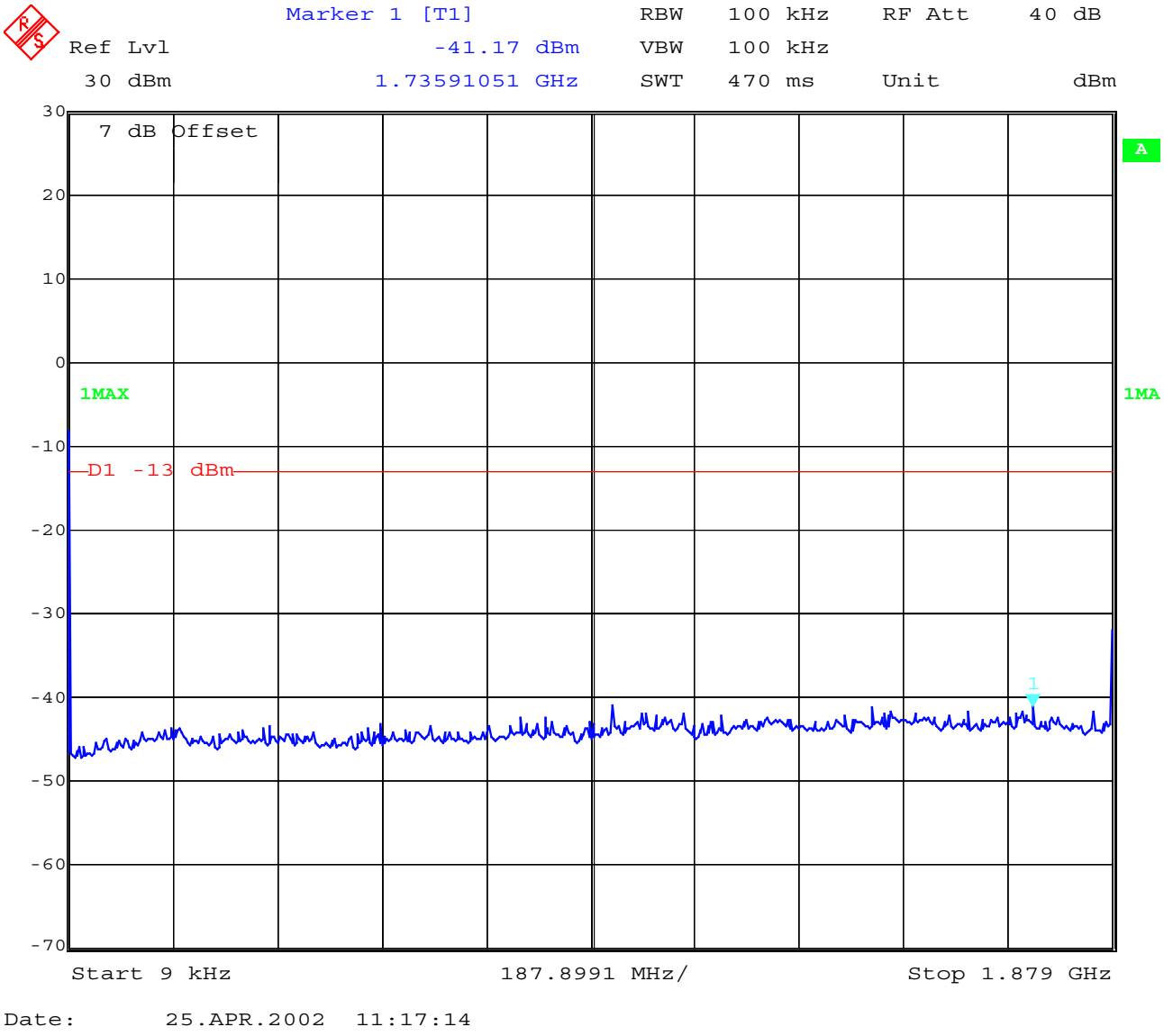


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 512

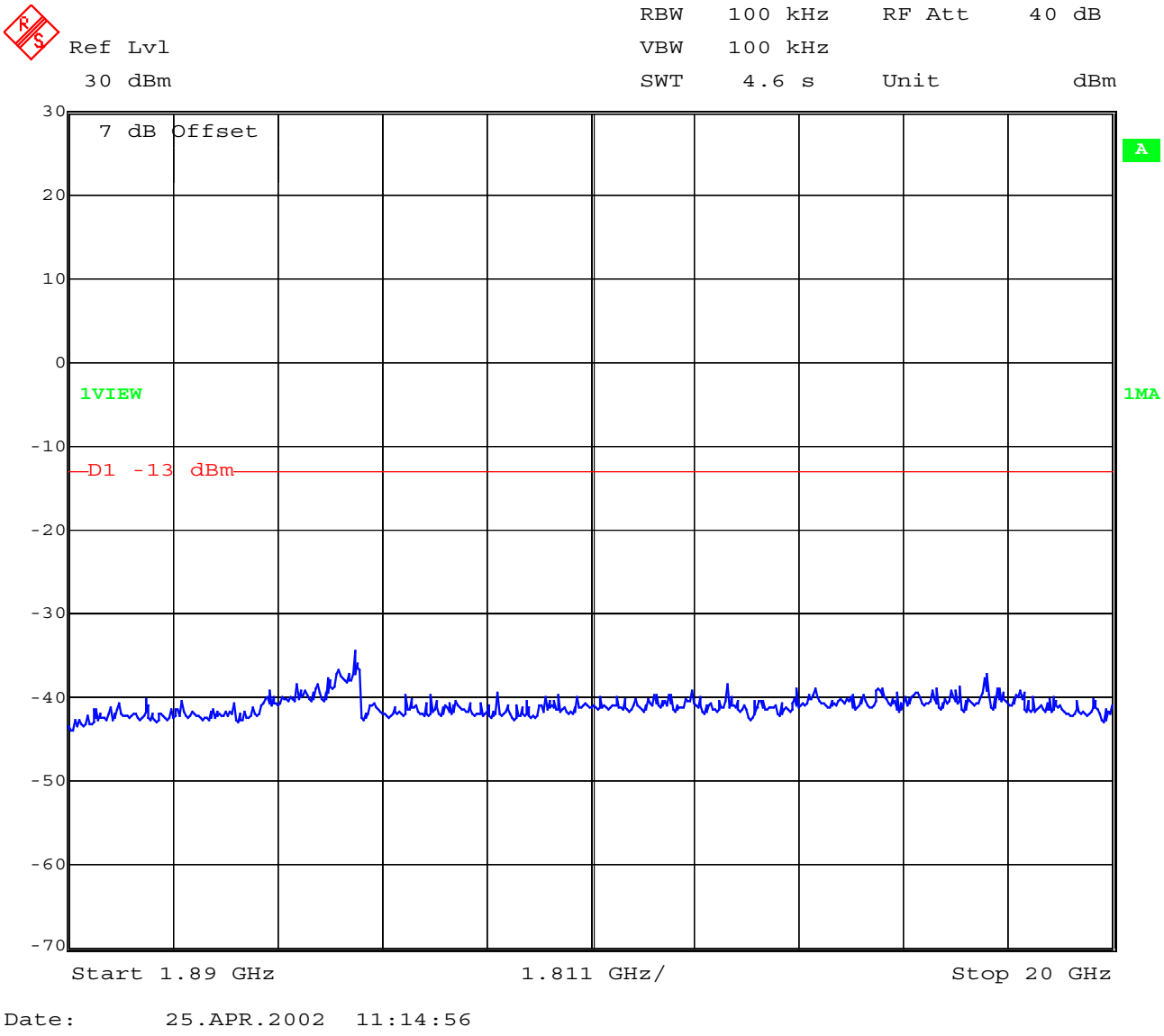

Marker 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-37.39 dBm
VBW 100 kHz
30 dBm
5.85879760 GHz
SWT 4.6 s
Unit dBm
7 dB Offset
A
1MAX
1MA
D1 -13 dBm
Start 1.86 GHz
1.814 GHz/
Stop 20 GHz
Date: 25.APR.2002 11:13:12

Channel 661



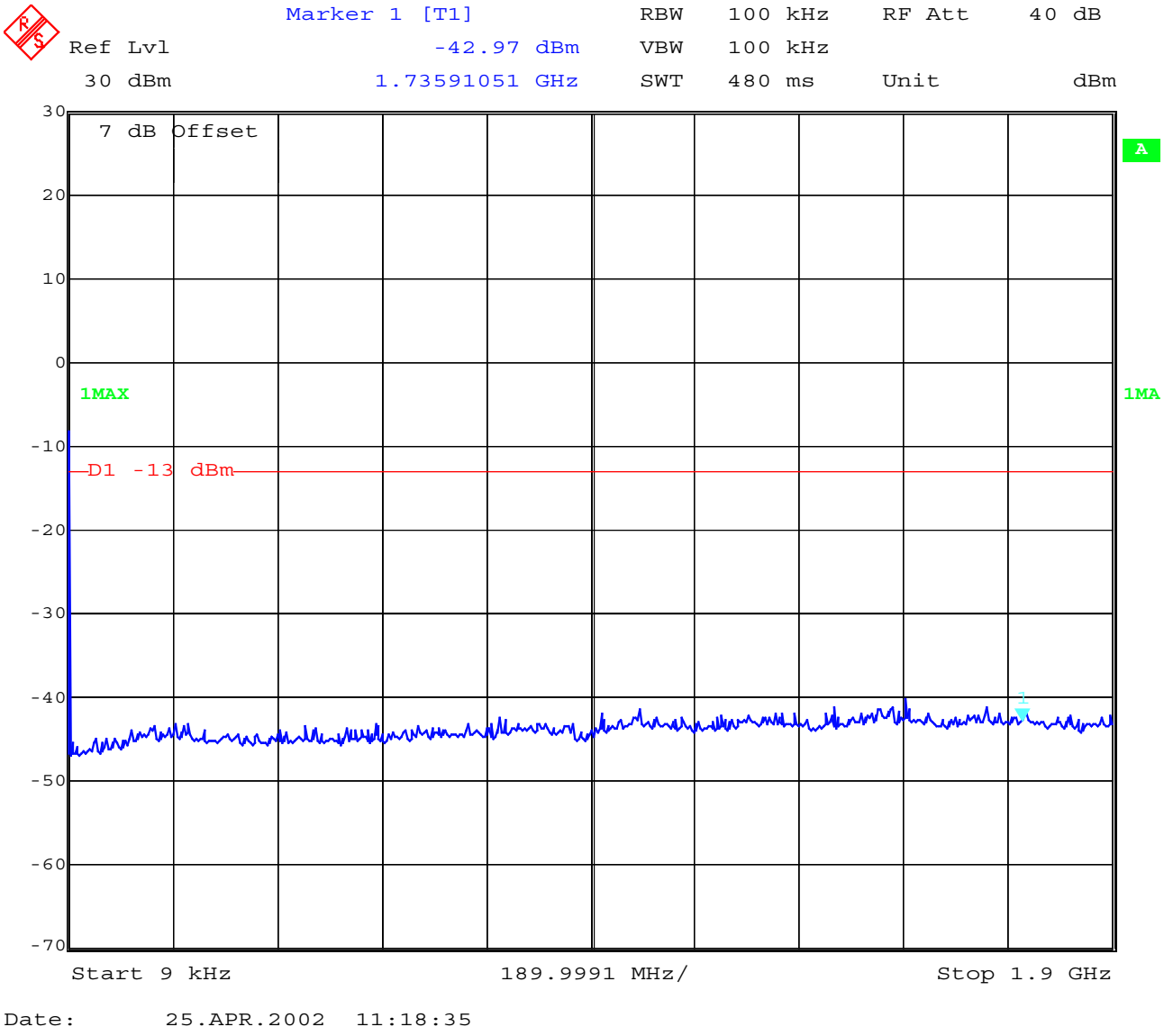
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 661



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

Channel 810

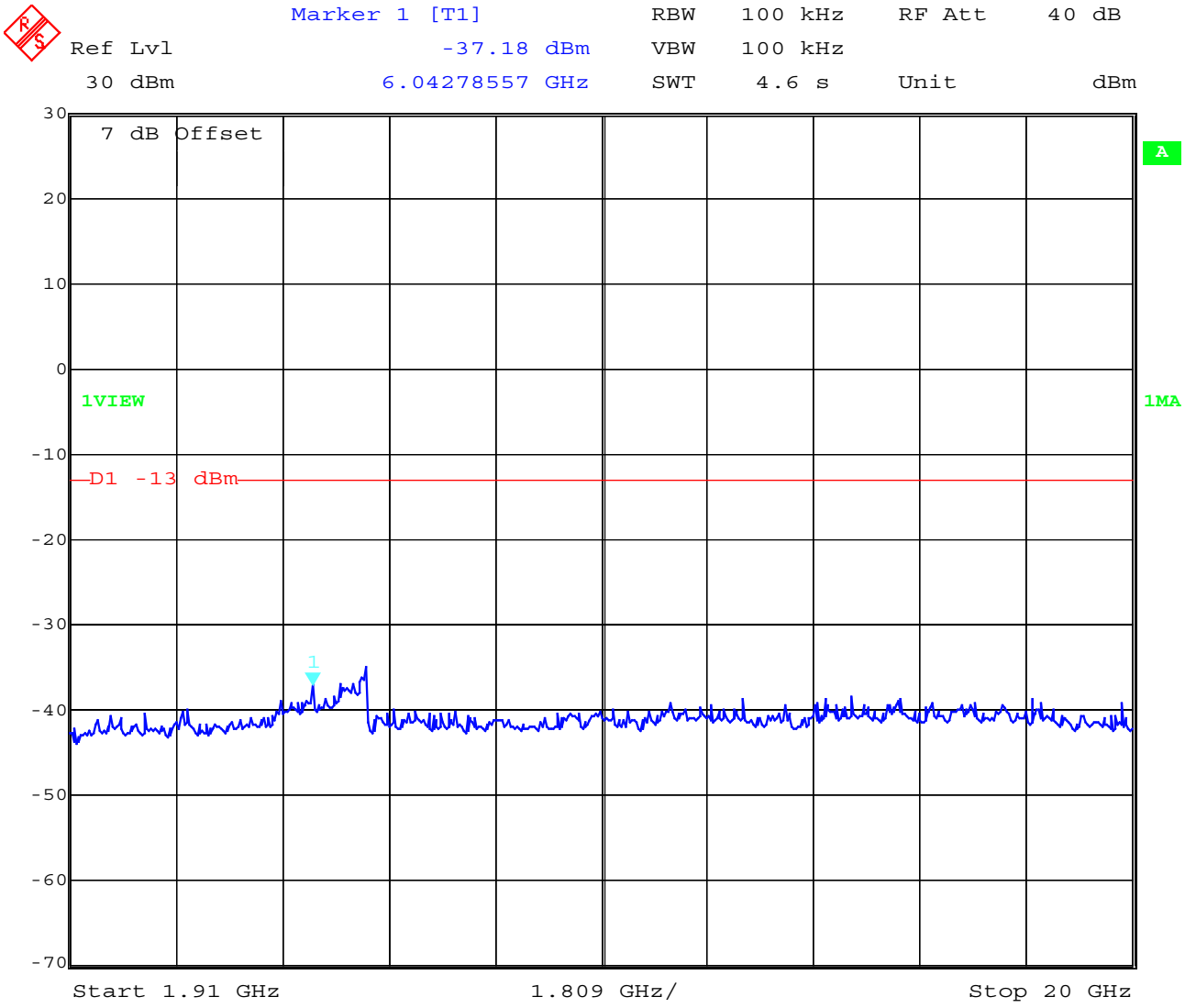


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 810

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

Channel 810



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

OCCUPIED BANDWIDTH §2.989

Occupied Bandwidth Results

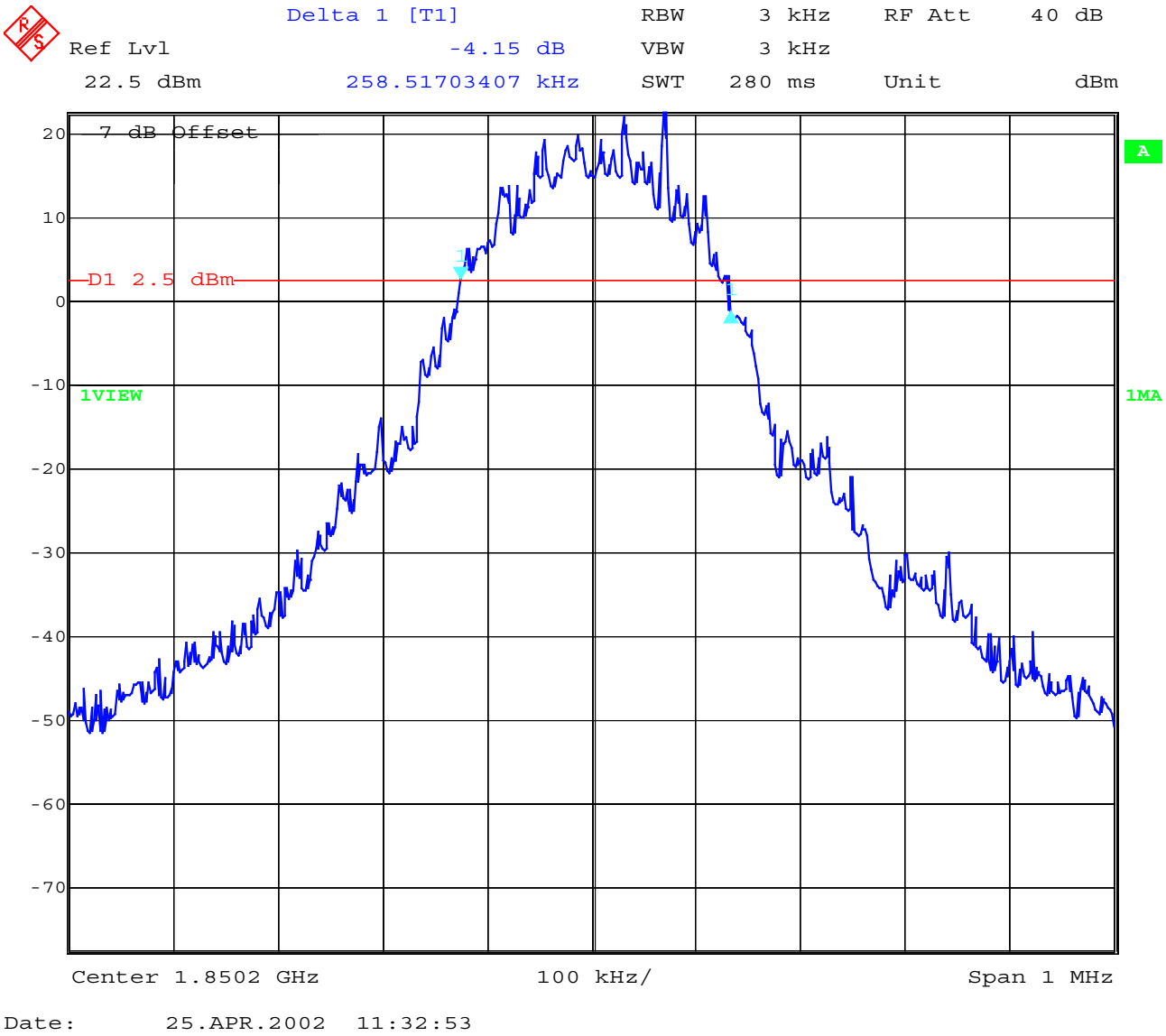
Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. Table 8.2 below lists the measured 99% power and -26dBC occupied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

Frequency	99% Occupied Bandwidth	-26 dBc Bandwidth
1850.2 MHz	258.517	292.585
1880.0 MHz	260.521	302.605
1909.2 MHz	256.513	300.601

Part 24.238 (a) requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 260 kHz, this equates to a resolution bandwidth of at least 2.6 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

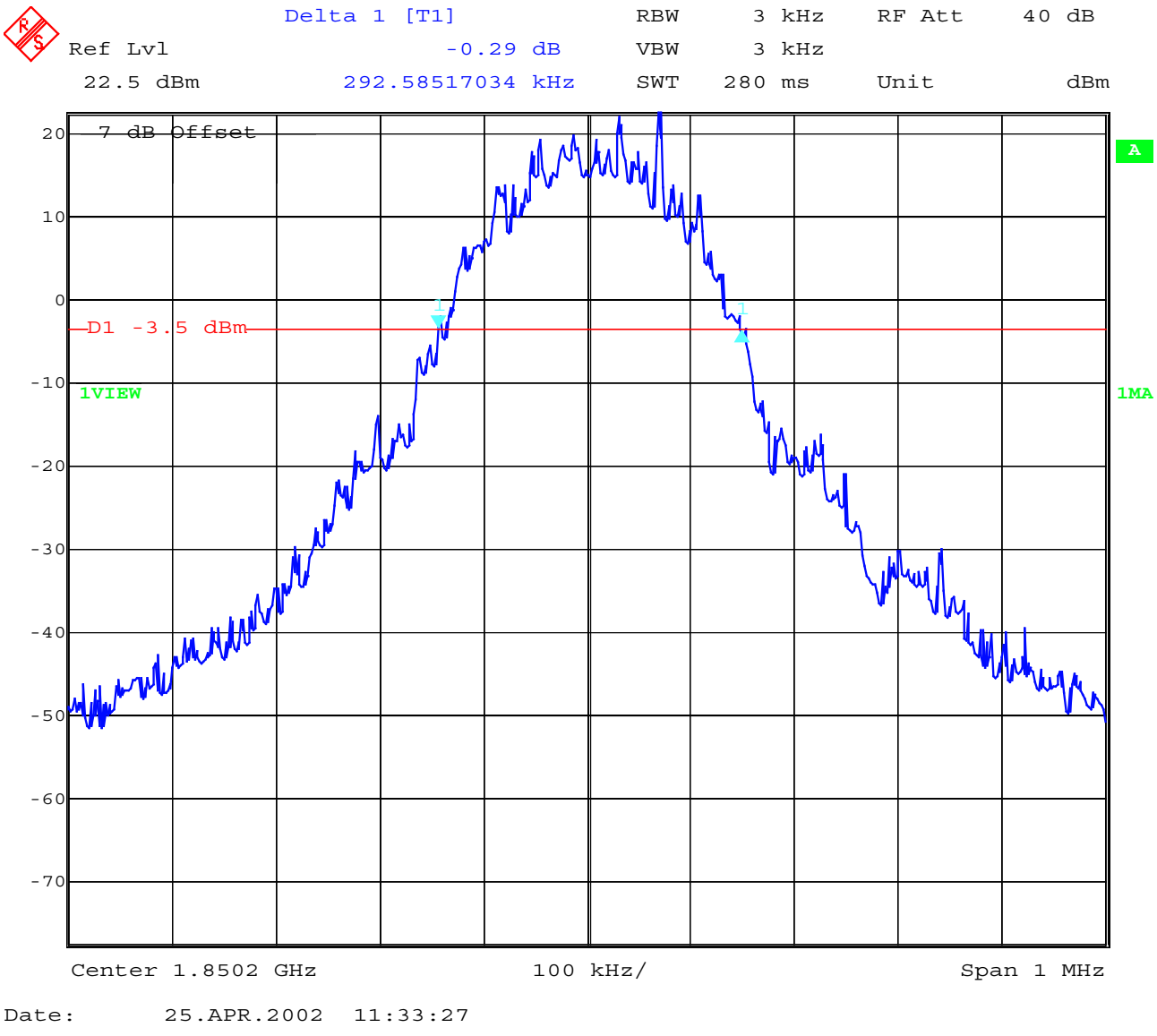
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 512
99% Occupied Bandwidth



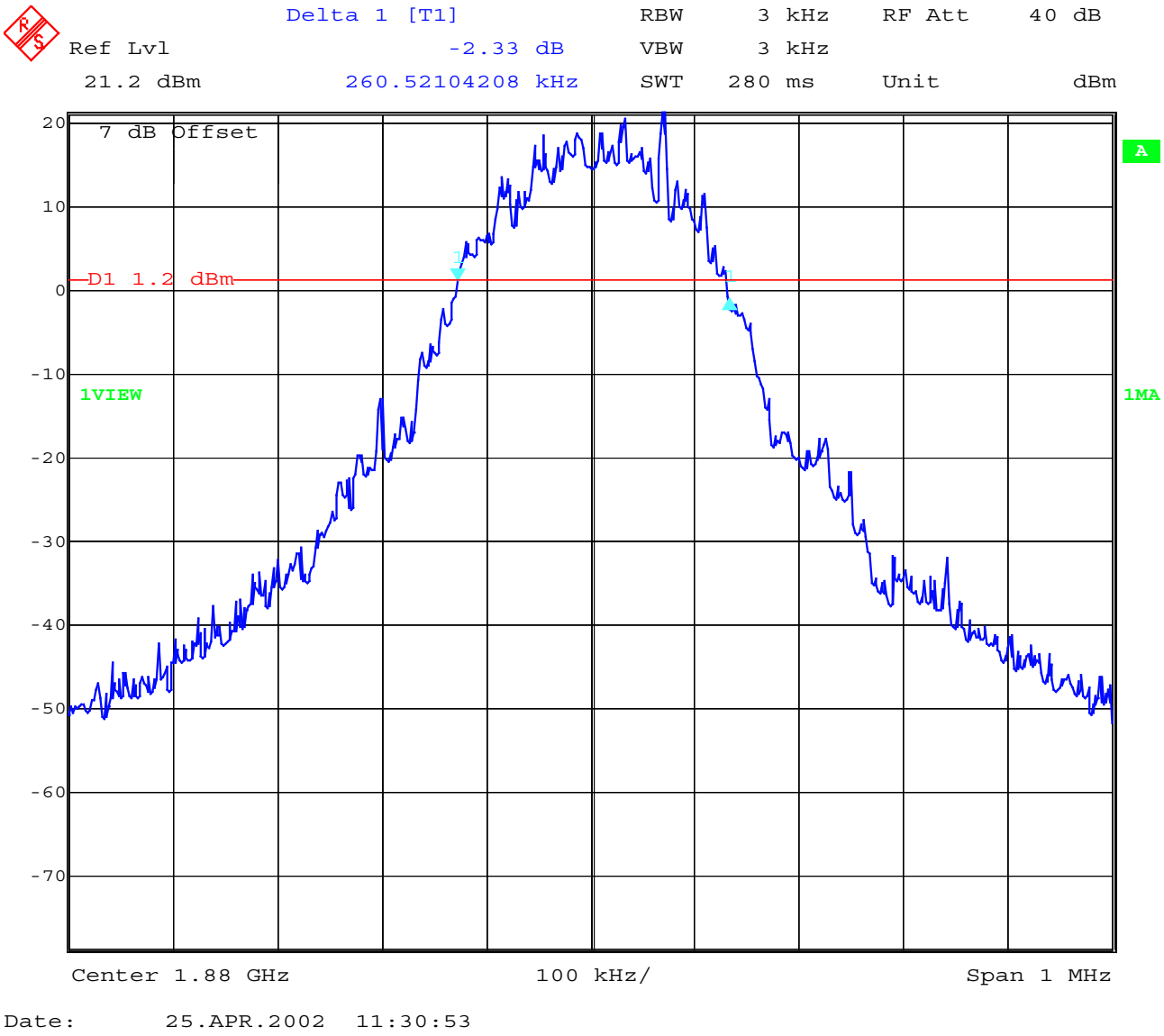
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 512
-26 dBc Bandwidth



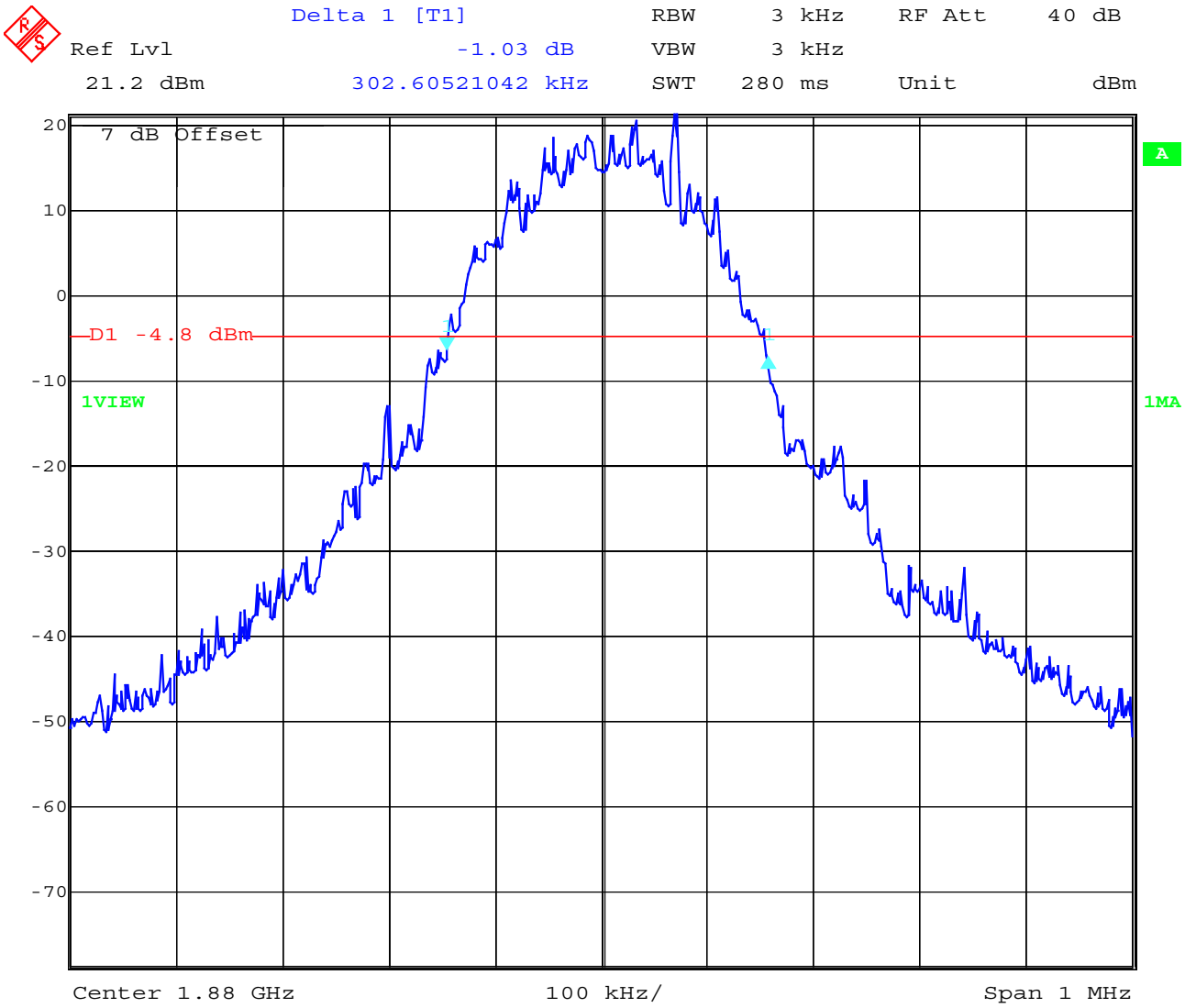
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 661
99% Occupied Bandwidth



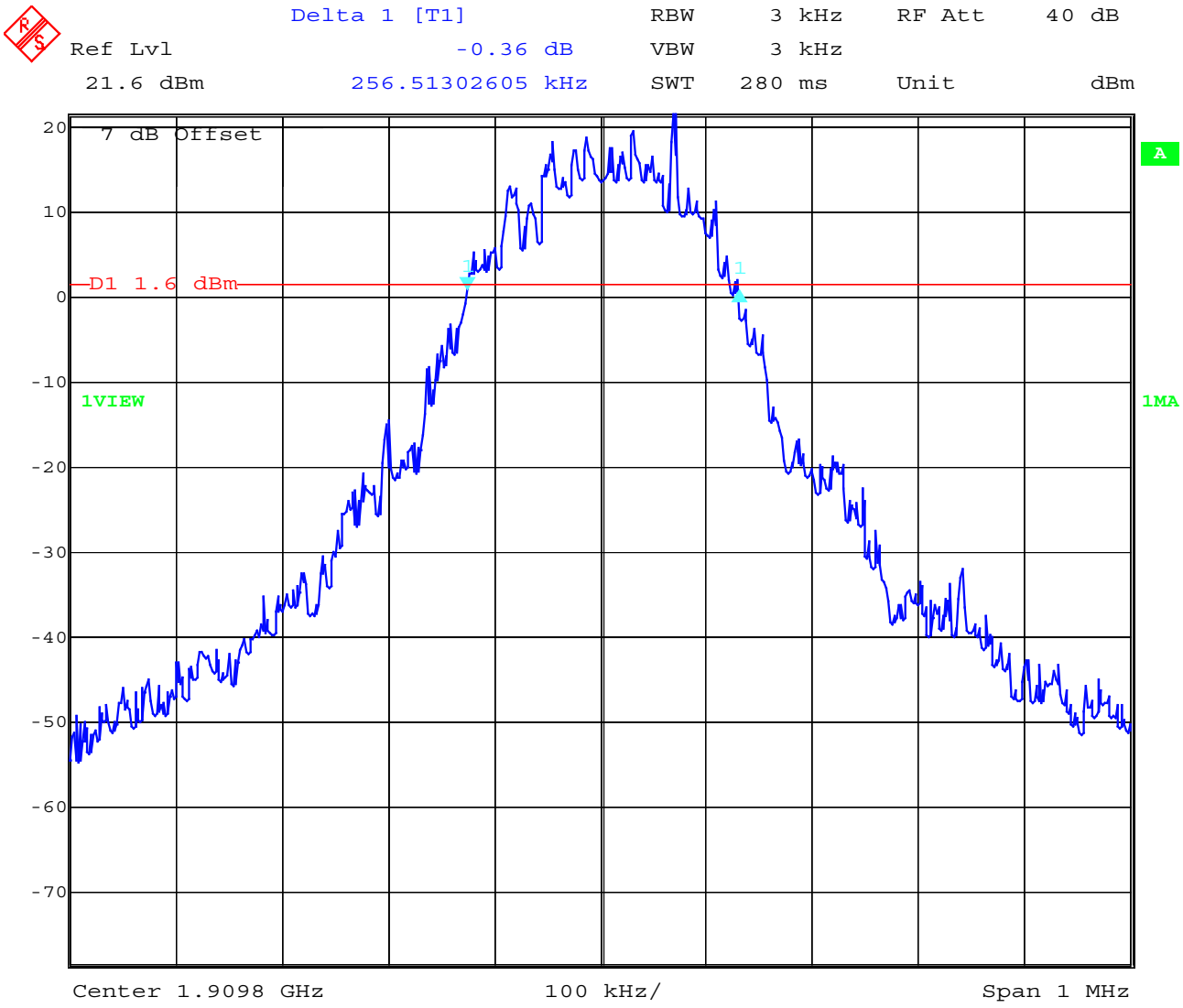
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 661
-26 dBc Bandwidth



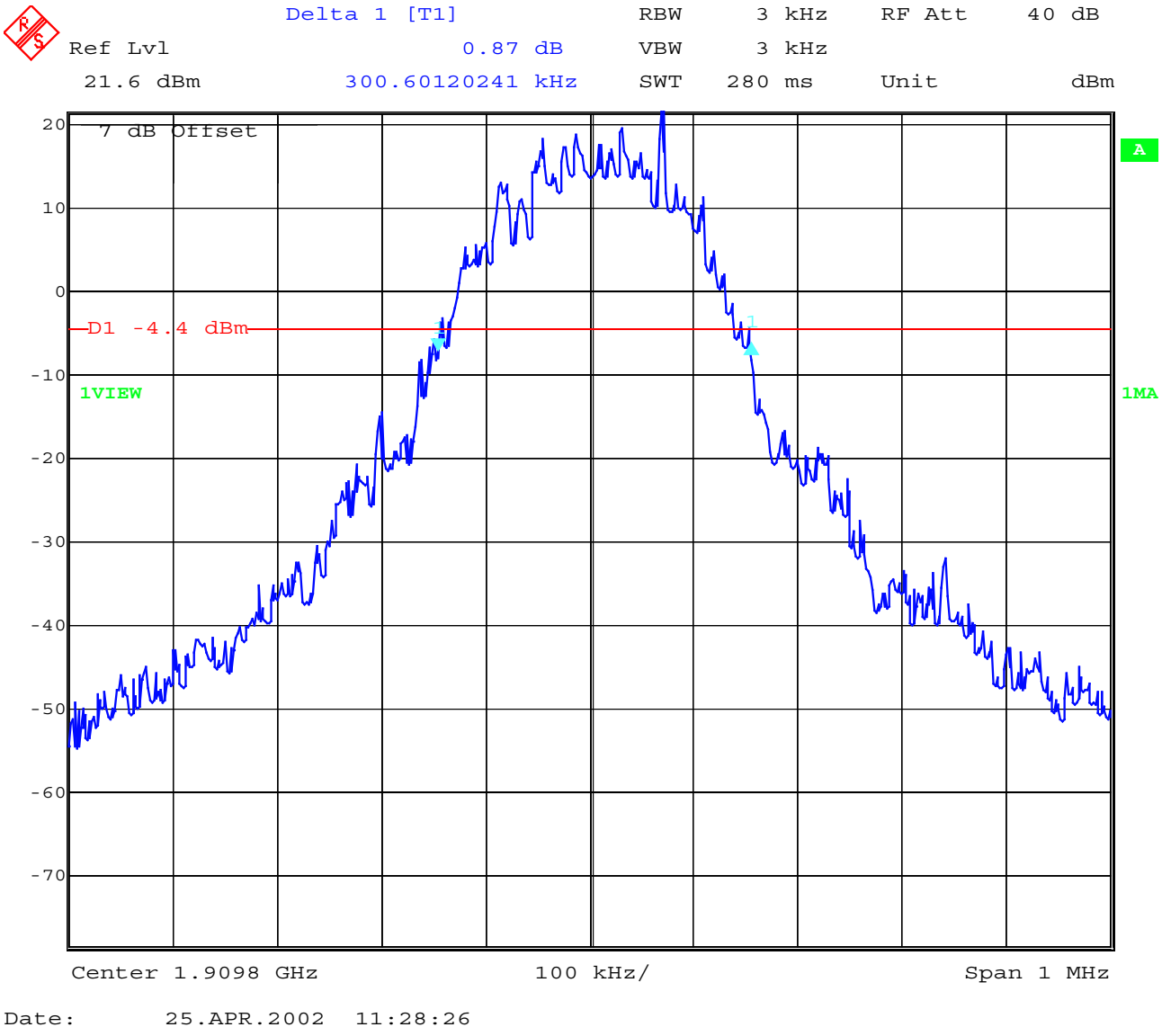
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
64

Channel 810
99% Occupied Bandwidth



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

Channel 810
-26 dBc Bandwidth



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

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
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