



TTI-P-G-166/98-30

Accredited Bluetooth Test Facility (BQTF)

Test report no.: 2_2746-01-01/01

FCC Part 24

1130202-BV/CN

FCC-ID: PY71130202

CETECOM – ICT Services GmbH

Untertürkheimerstr. 6-10

66117 Saarbrücken, Germany

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

Fax: + 49 (0) 681 / 9075

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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**

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

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 : Nya Vattentorget
City : S-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 : 03.12.2001
Date of receipt of test item : 04.12.2001
Date of test : 05.12.2001

1.5 Test item

Type of equipment : **GSM Tri Band Mobile Phone with integrated BLUETOOTH module**
Type designation : **Type: 1130202-BV/CN**
Manufacturer : Applicant
Street :
City :
Country :
Serial number : 004601-01-293475-7-01
Additional informations:
Frequency : GSM 1900 :1850 – 1910 MHz and Bluetooth 2402 – 2480 MHz
Type of modulation : GSM 1900 : 300KF2D Bluetooth : 1M00FXD / 79M0FXD
Number of channels : GSM 1900 : 300 Bluetooth : 79
Antenna : Integral antenna and socket
Power supply : 3.6 VDC accu Li-Polymer
Output power : GSM 1900 : 29.5 dBm Peak, Bluetooth : ca. 0.54 mW
Type of equipment : Temperature range : -30°C - +60°C
FCC – ID : PY71130202
Hardware : R1A
Software : R1A095prgCXC125265, R1A095prgCXC125326_TAE

1.6 Test standards: **FCC Part 24 / 15.247**

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.

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, waveguide horn

2.1 Summary of test results

Only spurious emission test from 30 MHz to 25 GHz were done with GSM 1900 and Bluetooth operating mode !

FINAL VERDICT : PASS

Technical responsibility for area of testing :

05.12.01 RSC 8411 Berg M.

Date

Section

Name

Signature



Technical responsibility for area of testing :

05.12.01 RSC8412 Hausknecht D.

Date

Section

Name

Signature



2.2 Testreport

TEST REPORT

Testreport no. : 2_2746-01-01/01

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

PARAMETER TO BE MEASURED	Paragraph	PAGE
EMISSIONS LIMITS	§24.238	7
TEST SITE		23
PHOTOGRAPHS OF THE EQUIPMENT		25

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 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.

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

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:

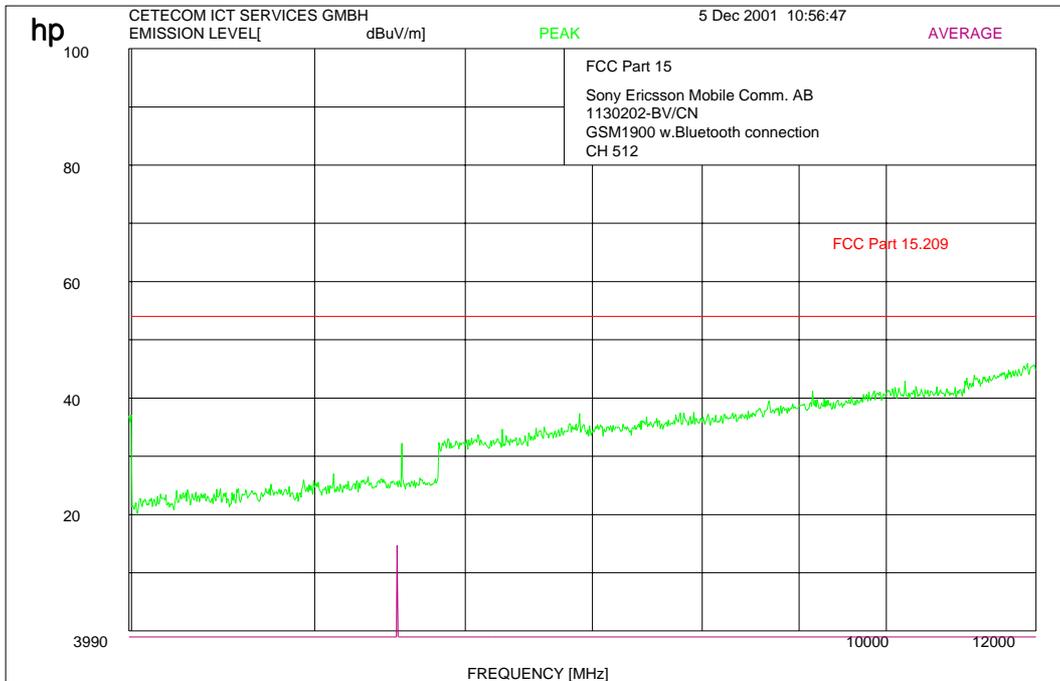
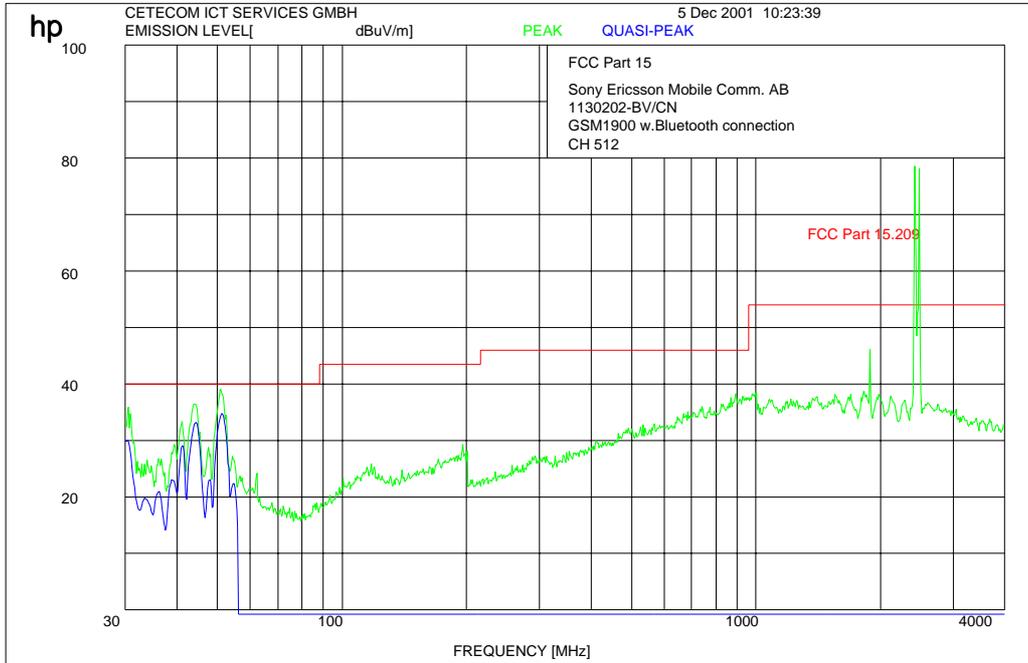
The final open field radiated levels are presented on the next pages.

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

EMISSION LIMITATIONS					
f (MHz)	polarization	amplitude of emission (dB μ V/m) AVERAGE	amplitude of emission (dB μ V/m) QUASI PEAK	limit max. allowed emmission power (dB μ V/m)	results
CH 512					
41.22	V		29.1	40	Pass
44.57	V		33.2	40	Pass
51.36	V		34.8	40	Pass
5525.6	V	14.6		54	Pass
All	other	peaks	<<	limit	Pass
CH 662					
41.22	V		24.5	40	Pass
44.36	V		31.2	40	Pass
48.2	V		22.2	40	Pass
51.36	V		32.3	40	Pass
All	other	peaks	<<	limit	Pass
CH 810					
41.02	V		29.5	40	Pass
44.36	V		32.9	40	Pass
47.73	V		22.8	40	Pass
51.36	V		34.9	40	Pass
All	other	peaks	<<	limit	Pass
Measurement uncertainty		± 6 dB			

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

Channel 512 : 12 GHz



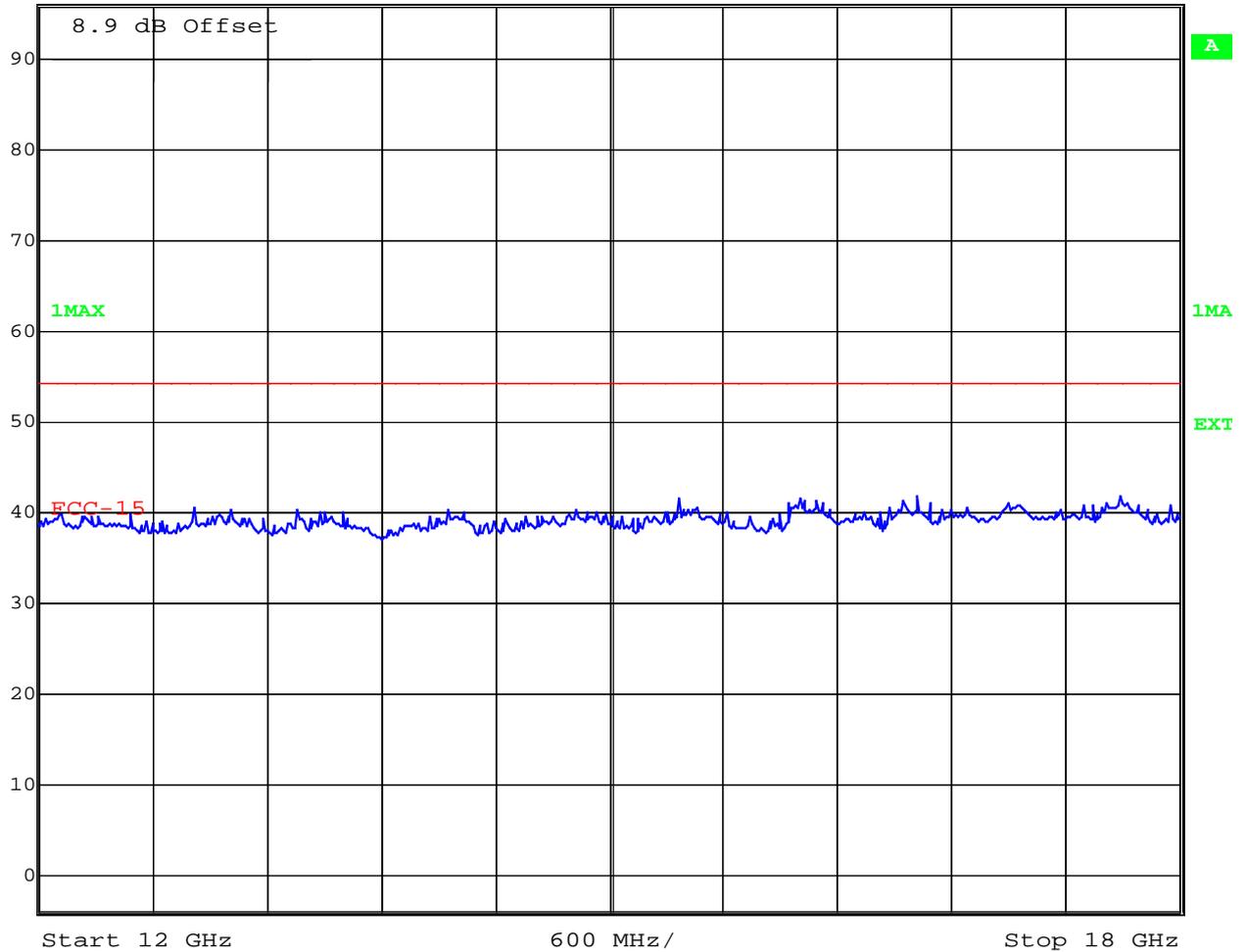
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 512 : 12 – 18 GHz



Ref Lvl
95.9 dB μ V

RBW	1 MHz	RF Att	0 dB
VBW	1 MHz		
SWT	34 ms	Unit	dB μ V



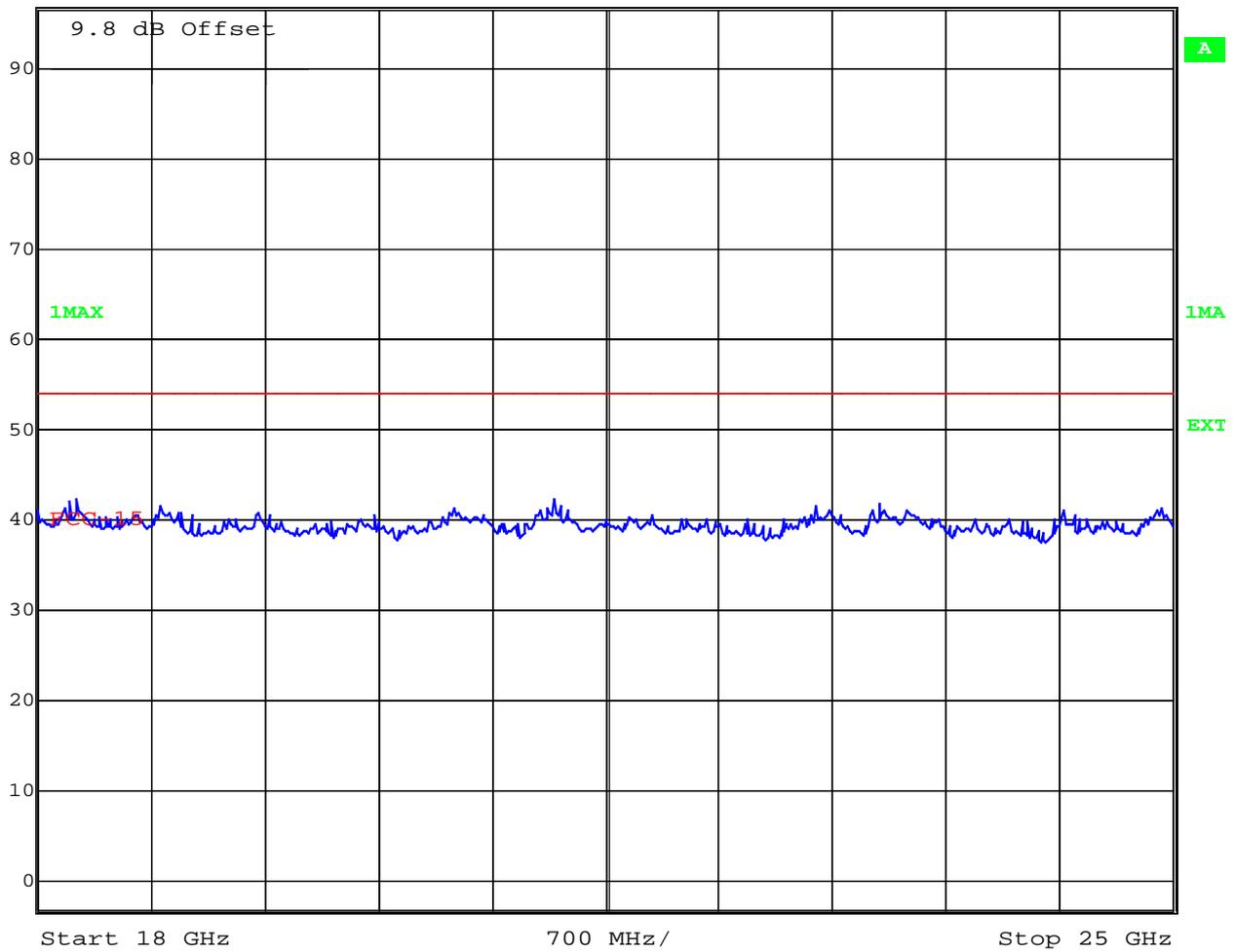
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 512 18 - 25 GHz



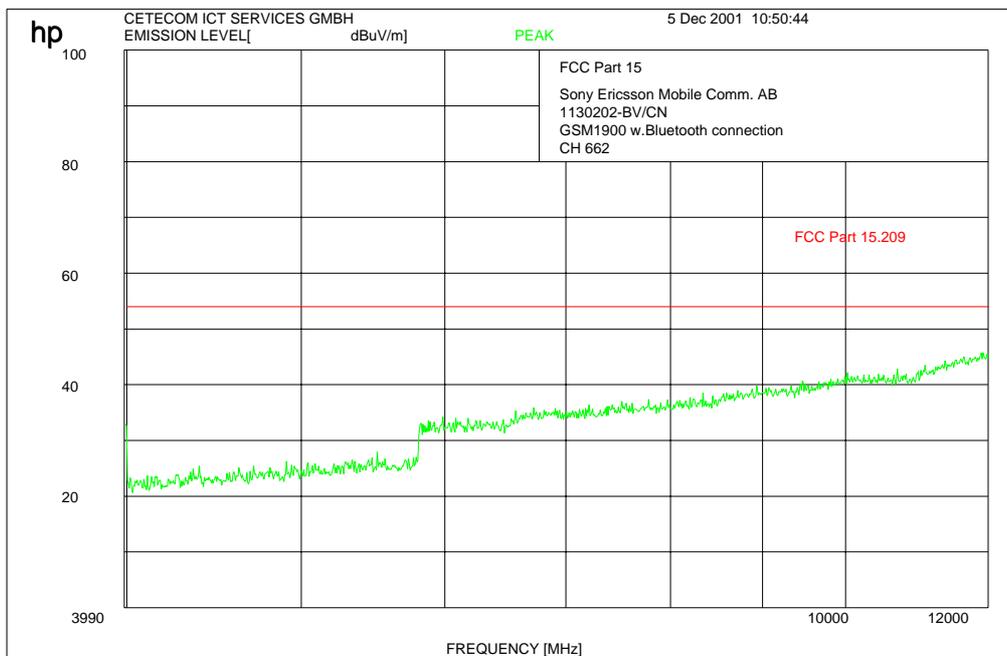
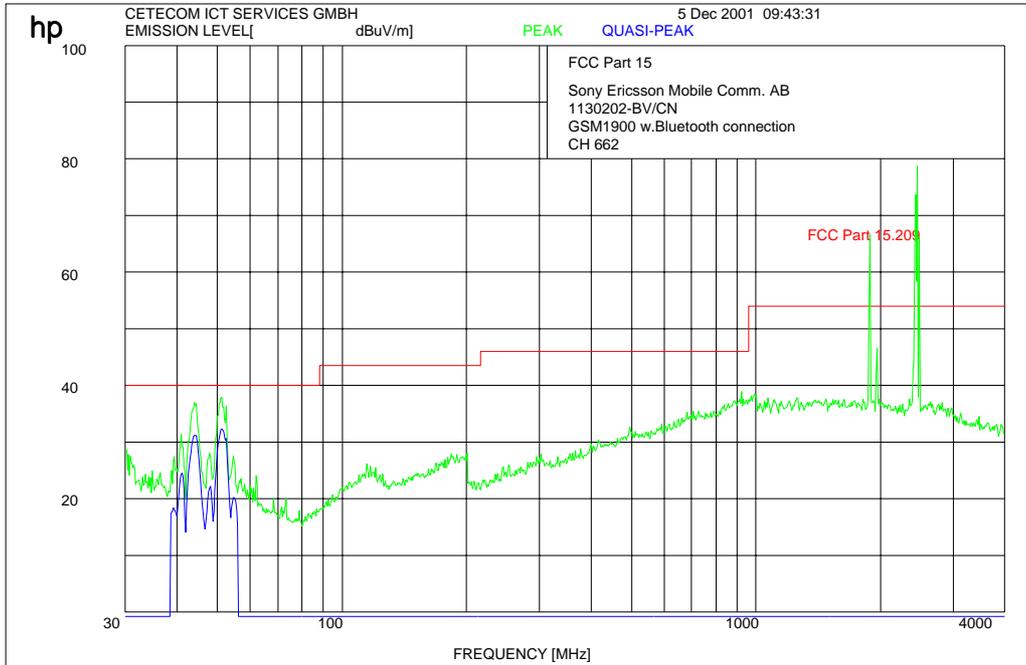
Ref Lvl	RBW	1 MHz	RF Att	0 dB
96.8 dB μ V	VBW	1 MHz		
	SWT	40 ms	Unit	dB μ V



Date: 5.DEC.2001 10:33:16

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

Channel 662 : 12 GHz

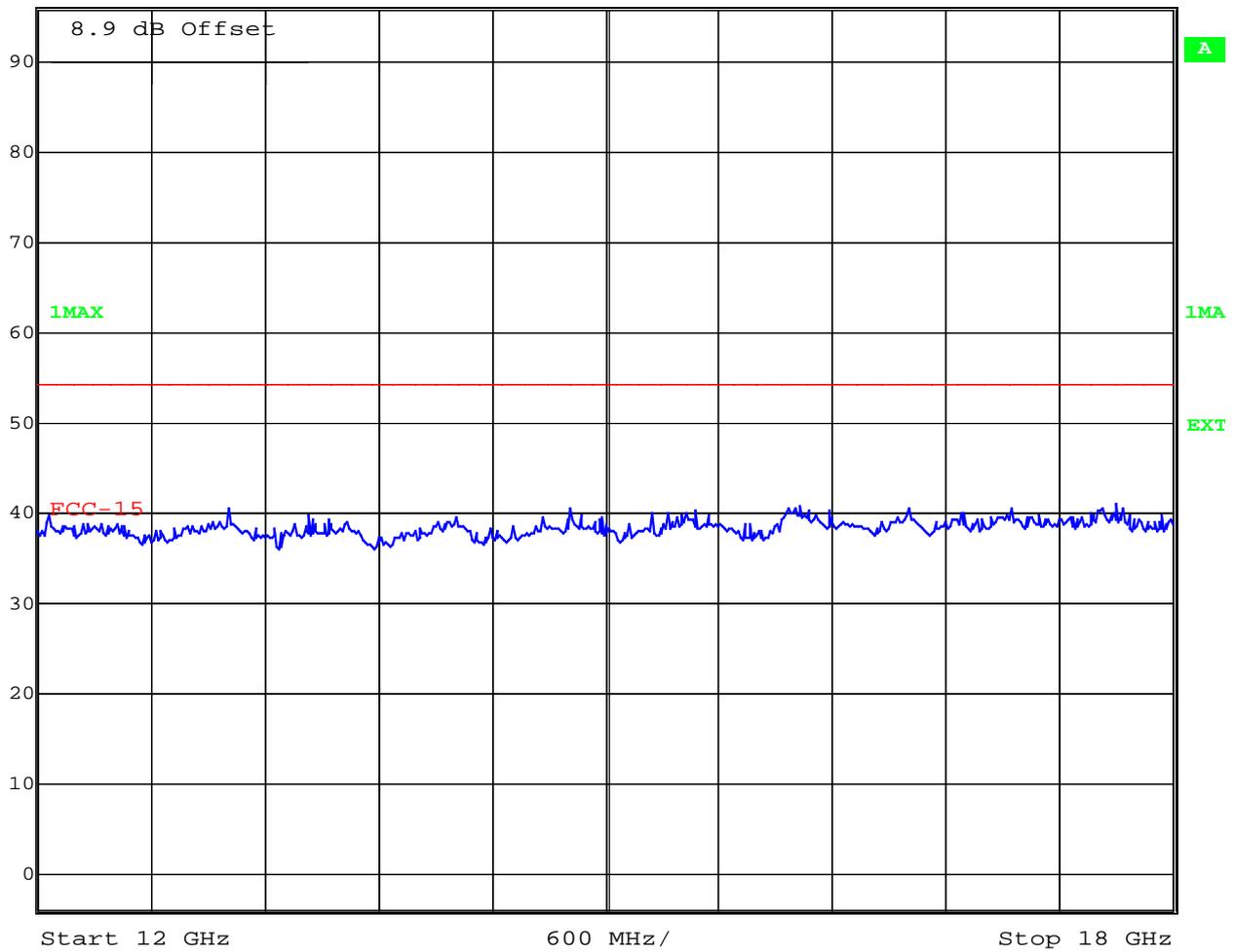


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 662 : 12 – 18 GHz



Ref Lvl	RBW	1 MHz	RF Att	0 dB
95.9 dBμV	VBW	1 MHz		
	SWT	34 ms	Unit	dBμV



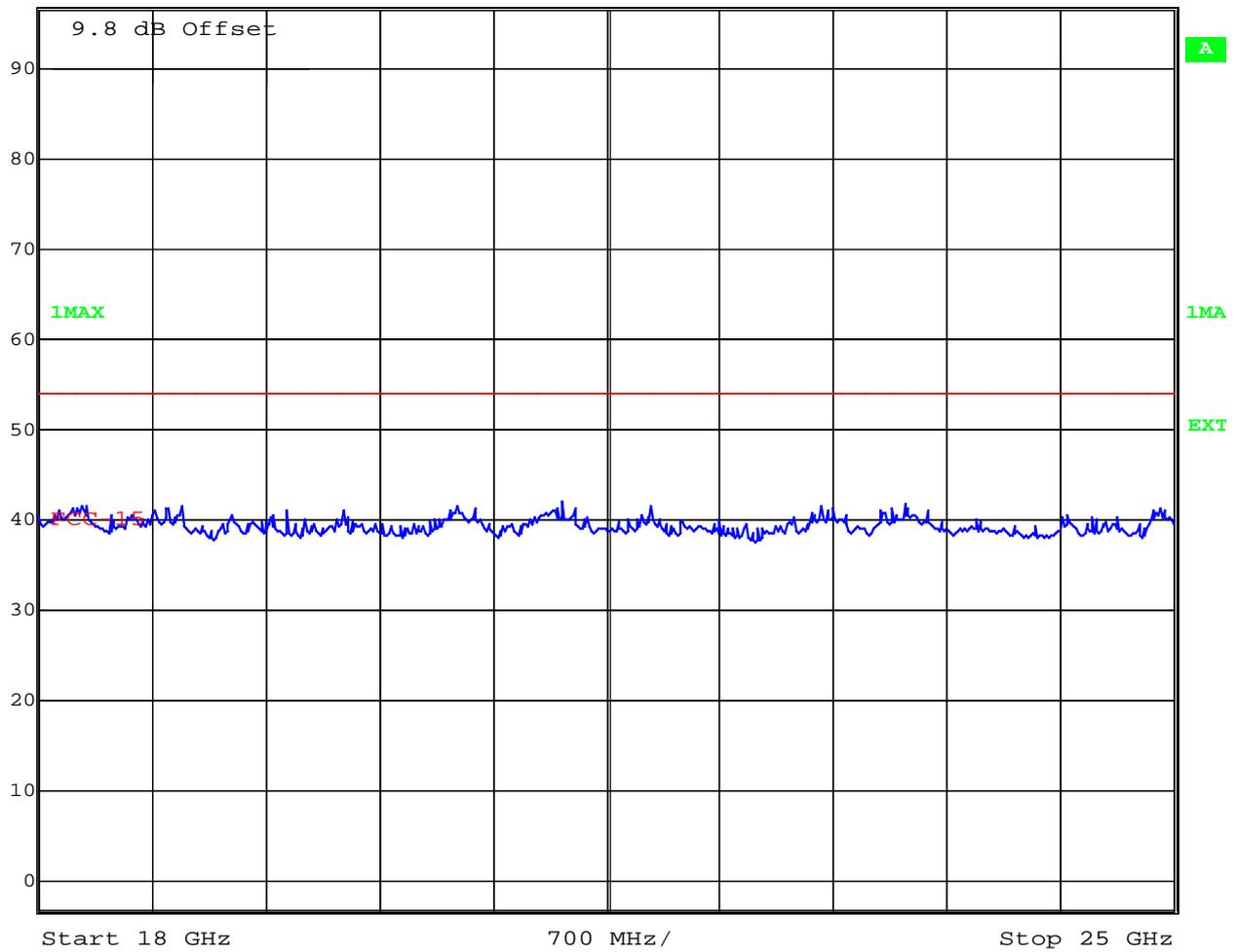
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REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 662 : 18 – 25 GHz



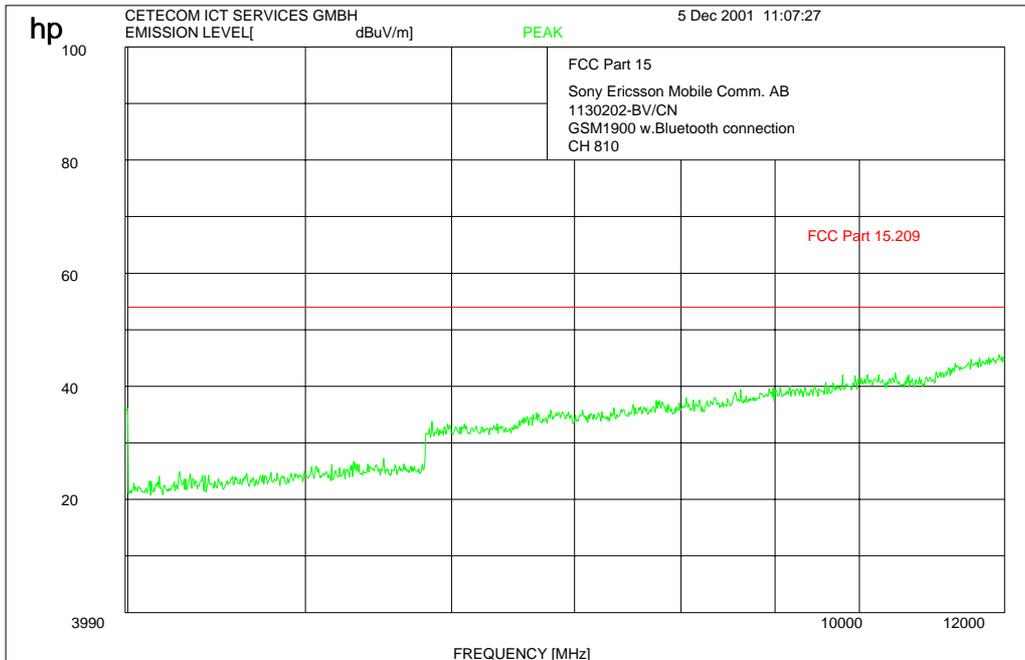
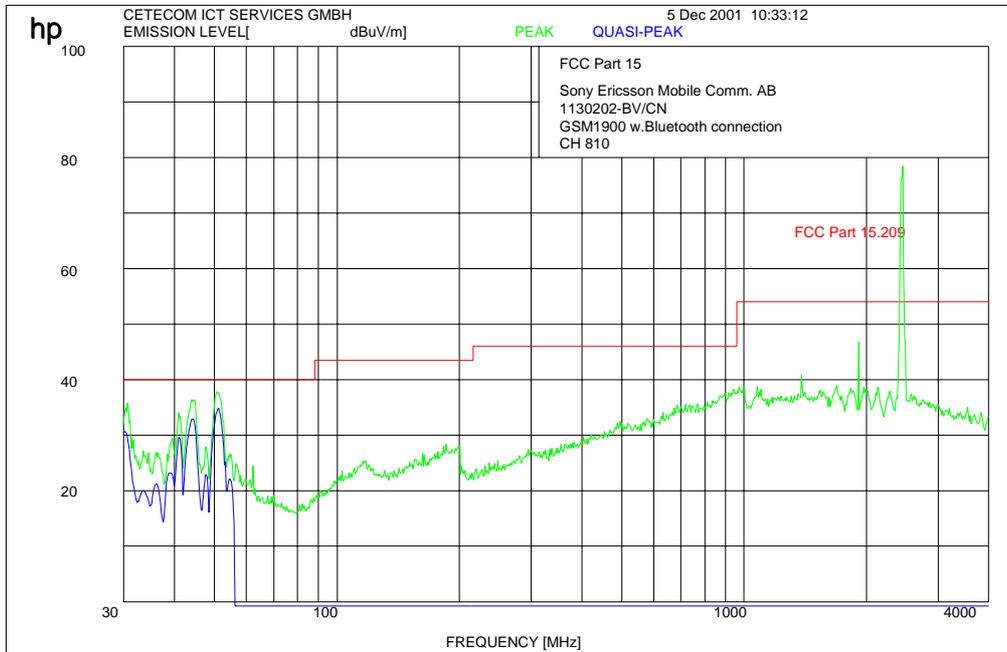
Ref Lvl	RBW	1 MHz	RF Att	0 dB
96.8 dB μ V	VBW	1 MHz	Unit	dB μ V
	SWT	40 ms		



Date: 5.DEC.2001 10:33:35

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

Channel 810 : - 12 GHz



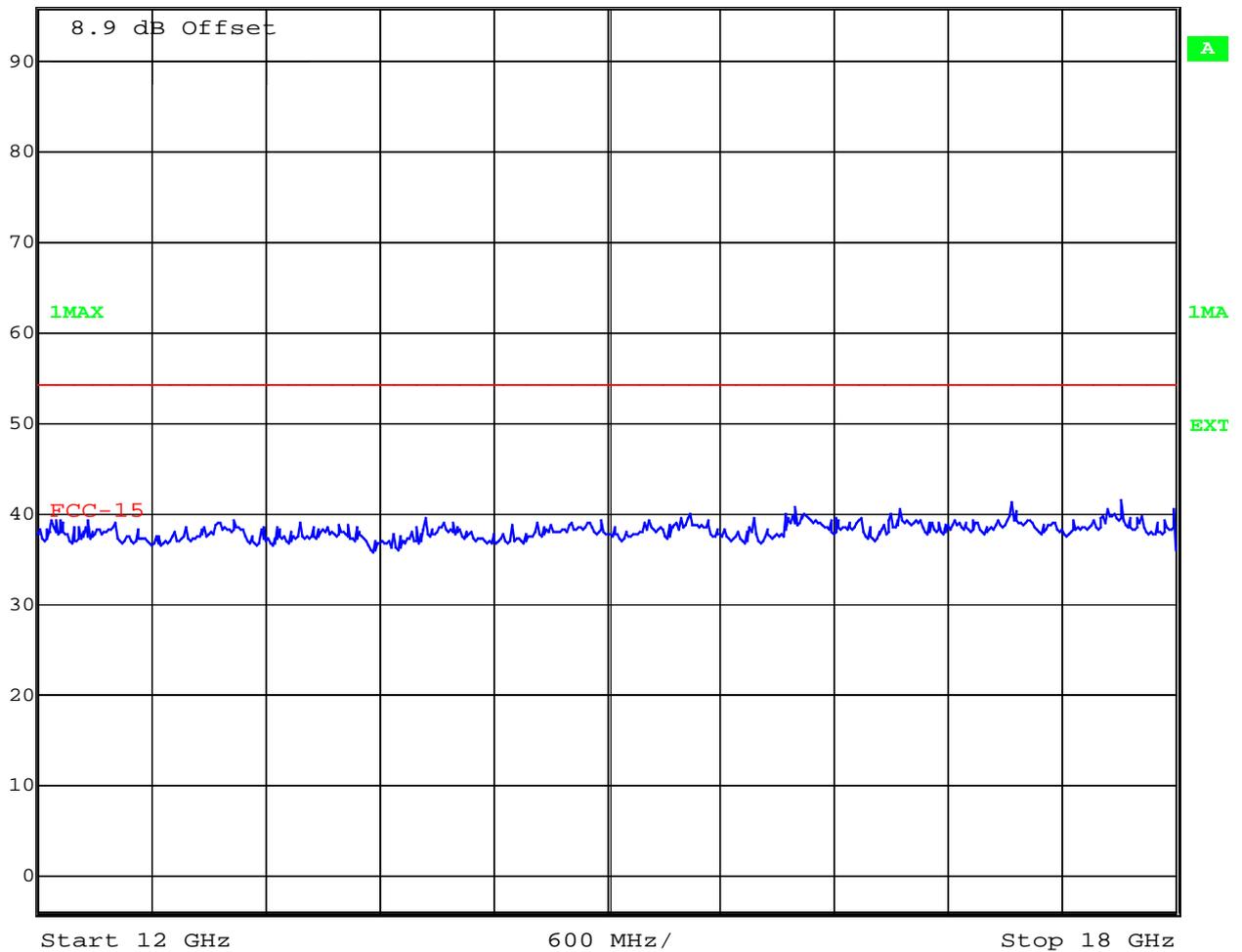
REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 810 : 12 – 18 GHz



Ref Lvl
95.9 dB μ V

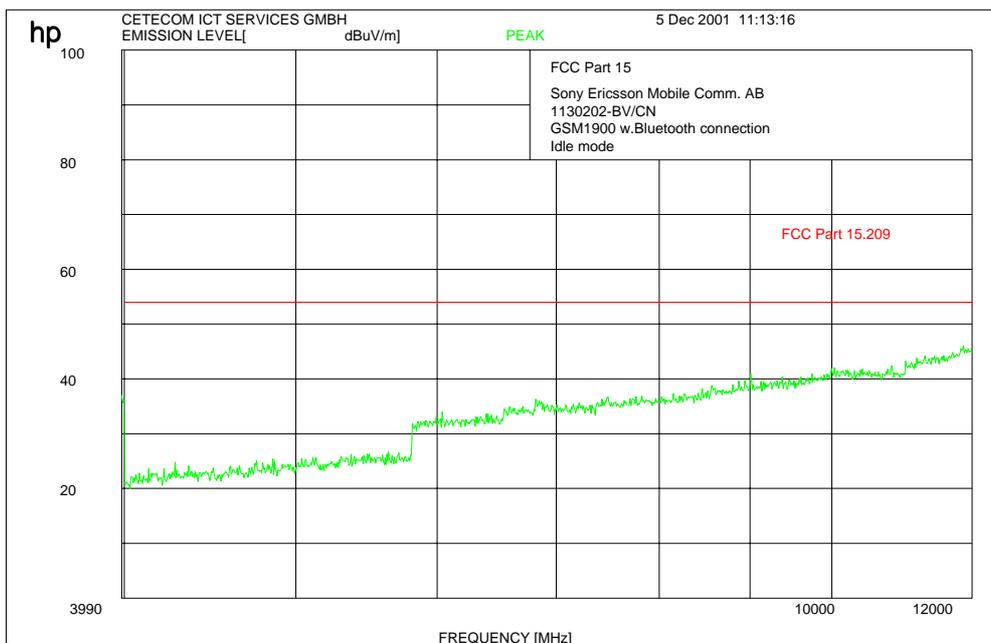
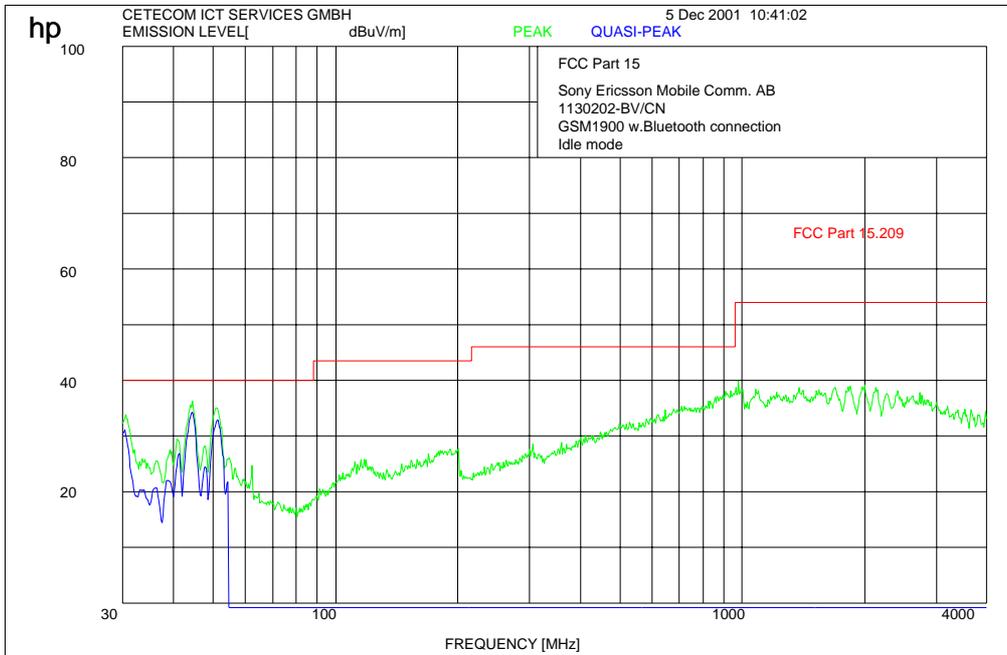
RBW	1 MHz	RF Att	0 dB
VBW	1 MHz		
SWT	34 ms	Unit	dB μ V



Date: 5.DEC.2001 10:31:51

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

**Channel 662 (this is valid for all 3 channels and up to 12 GHz)
Idle-Mode**

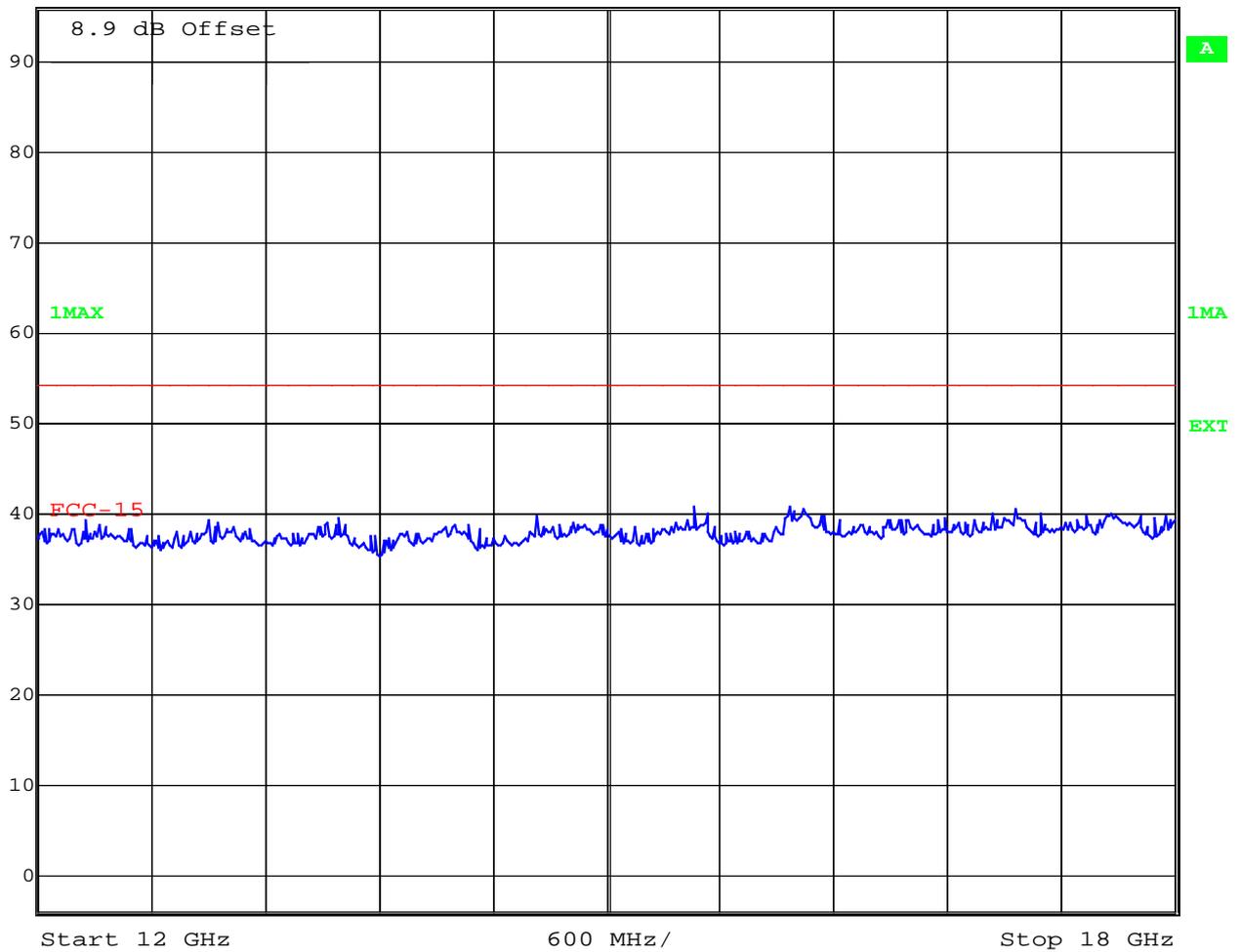


REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)

Channel 662 (this is valid for all 3 channels and up to 18 GHz)
Idle-Mode



Ref Lvl	RBW	1 MHz	RF Att	0 dB
95.9 dB μ V	VBW	1 MHz		
	SWT	34 ms	Unit	dB μ V



Date: 5.DEC.2001 10:32:12

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

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				