

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Sony Ericsson Mobile Communications Int AB.
GC89 Mobile Station

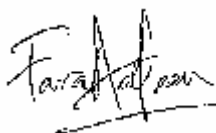
To: FCC Part 15.247: 2004 (Subpart C)

Test Report Serial No:
RFI/MPTE1/RP70868JD07A

This Test Report Is Issued Under The Authority
Of Andrew Brown, Operations Manager:

A handwritten signature in black ink, appearing to read 'Andrew Brown', with a stylized flourish at the end.

Tested By: Fara Razally

A handwritten signature in black ink, appearing to read 'Fara Razally', with a stylized flourish at the end.

Checked By: Nigel Davison

pp

A handwritten signature in black ink, appearing to read 'Nigel Davison', with a stylized flourish at the end.

Report Copy No:
PDF01

Issue Date: 26 April 2005

Test Dates: 28 February 2005 to 11 April 2005

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To: GC89 Mobile Station

FCC Part 15.247: 2004 (Subpart C)

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1. Client Information

Company Name:	Sony Ericsson Mobile Communications Int AB.
Address:	1 Lakeside Road Aerospace Centre Farnborough Hampshire GU14 6XP
Contact Name:	Mr M Bower

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2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification of Equipment Under Test (EUT)

Brand Name:	Sony Ericsson
Model Name or Number:	GC89
Unique Type Identification:	Not Applicable
Serial Number:	004601016298862
FCC ID Number:	PY7FF051011
Country of Manufacture:	None Stated
Date of Receipt:	28 February 2005

2.2. Accessories

The following accessories were supplied with the EUT:

Description:	Stick Antenna
Brand Name:	Sony Ericsson
Model Name or Number:	None Stated
Serial Number:	None Stated
Cable Length and Type:	Not Applicable
Connected to Port:	RF Antenna Port

2.3. Description of EUT

The equipment under test is a dual band (GSM 850 and PCS 1900) mobile station (PCMCIA card) incorporating WLAN technologies.

2.4. Modifications Incorporated in EUT

During the course of testing the EUT was not modified.

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2.5. Additional Information Related to Testing

Power Supply Requirement:	3.6 V DC supplied via PCMCIA interface of host PC		
Intended Operating Environment:	Residential, Commercial and Light Industry		
Equipment Category:	Short Range (Low Power)		
Type of Unit:	PCMCIA card		
Transmit Frequency Range:	2412 MHz to 2462 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1	2412.0
	Middle	6	2437.0
	Top	11	2462.0
Receive Frequency Range:	2412 MHz to 2462 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	1	2412.0
	Middle	6	2437.0
	Top	11	2462.0
Maximum Peak Power Output (EIRP)	2.8 dBm		

2.6. Port Identification

Port	Description	Type/Length	Applicable
1	Enclosure	-	Y
2	RF Antenna Port	Not Applicable	N

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2.7. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Laptop PC
Brand Name:	Dell
Model Name or Number:	Latitude D600
Serial Number:	CN-OD2125-48643-4CB-6452
Cable Length and Type:	Not Applicable
Connected to Port:	PCMCIA slot

Description:	Laptop PC
Brand Name:	Compaq
Model Name or Number:	EVO N610C J07M040.00
Serial Number:	N161CP180X430VC25X0L
Cable Length and Type:	Not Applicable
Connected to Port:	PCMCIA slot

Description:	Laptop PC
Brand Name:	Sony
Model Name or Number:	PCG-651M
Serial Number:	28377050 5101146
Cable Length and Type:	Not Applicable
Connected to Port:	PCMCIA slot

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3. Test Results

Reference:	FCC Part 15.247: 2004 Subpart C
Title:	Code of Federal Regulations, Part 15.247 (47CFR22) (Intentional Radiators operating within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz)

3.1. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003

Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1987)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

3.2. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the methods & procedures section above. Appendix 1 contains a list of the test equipment used.

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4. Deviations from the Test Specification

None.

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5. Operation of the EUT during Testing

5.1. Operating Modes

The EUT was tested in the following operating mode, unless otherwise stated.

Highest power level using CCK modulation at 11, 5.5 Mbps.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

Connected to a PCMCIA slot of a laptop pc and powered via ac mains of 110 volts.

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6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliance Status
Idle Mode AC Conducted Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.107	AC Mains	Complied
Idle Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2004 Section 15.109	Antenna	Complied
Transmitter AC Conducted Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.207	AC Mains	Complied
Transmitter Minimum 6 dB Bandwidth	C.F.R. 47 FCC Part 15: 2004 Section 15.247(a)(2)	Antenna Terminals	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 15: 2004 Section 2.1049	Antenna Terminals	Complied
Transmitter Peak Power Spectral Density	C.F.R. 47 FCC Part 15: 2004 Section 15.247(e)	Antenna Terminals	Complied
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15: 2004 Section 15.247(b)(3)	Antenna	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Sections 15.247(c) & 15.209(a)	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15: 2004 Sections 15.247(c) & 15.209(a)	Antenna	Complied

6.1. Location of Tests

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

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7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to section 8 for details of measurement uncertainties.

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7.2. Test Results

7.2.1. Receiver AC Conducted Spurious Emissions: Section 15.107

The EUT was configured for ac conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels present on the ac mains line of the EUT.

Results:

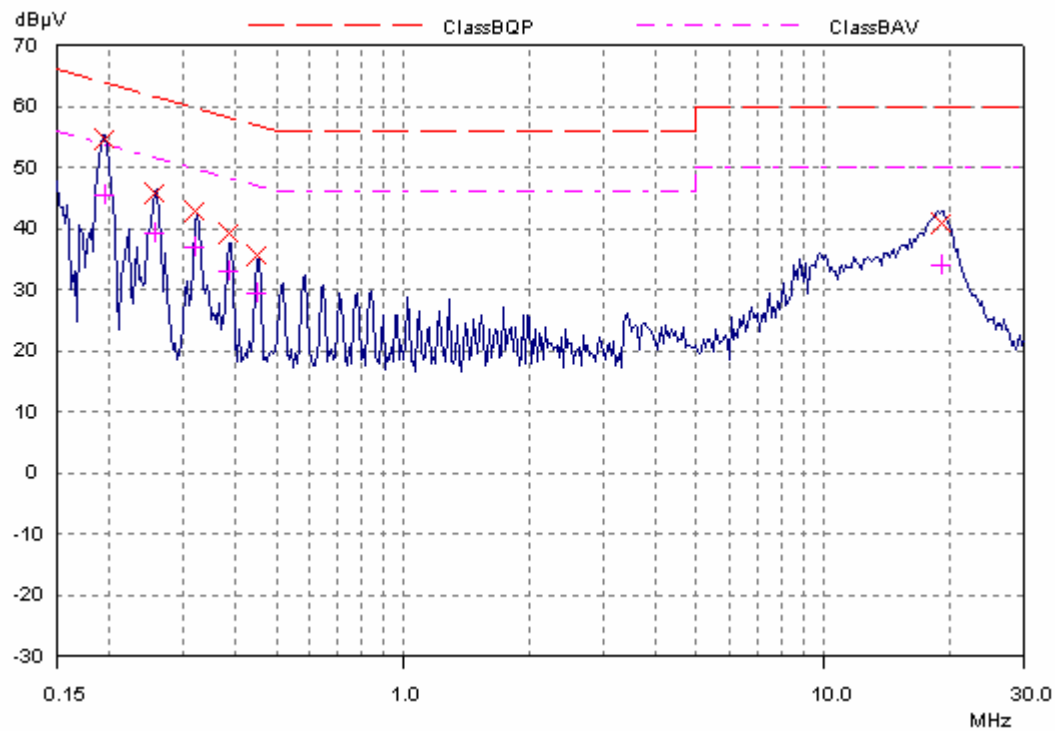
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.19517	Neutral	54.65	63.81	9.16	Complied
0.25801	Neutral	45.84	61.50	15.66	Complied
0.32158	Live	42.71	59.67	16.96	Complied
0.38669	Live	39.13	58.13	19.00	Complied
0.45056	Live	35.55	56.86	21.31	Complied
19.10363	Neutral	40.94	60.00	19.06	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.19517	Neutral	45.53	53.81	8.28	Complied
0.25801	Live	39.26	51.50	12.24	Complied
0.32158	Live	37.00	49.67	12.67	Complied
0.38669	Live	33.04	48.13	15.09	Complied
0.45056	Live	29.30	46.86	17.56	Complied
19.10363	Neutral	34.05	50.00	15.95	Complied

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Receiver AC Conducted Spurious Emissions: Section 15.107 (Continued)

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

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7.2.2. Receiver Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

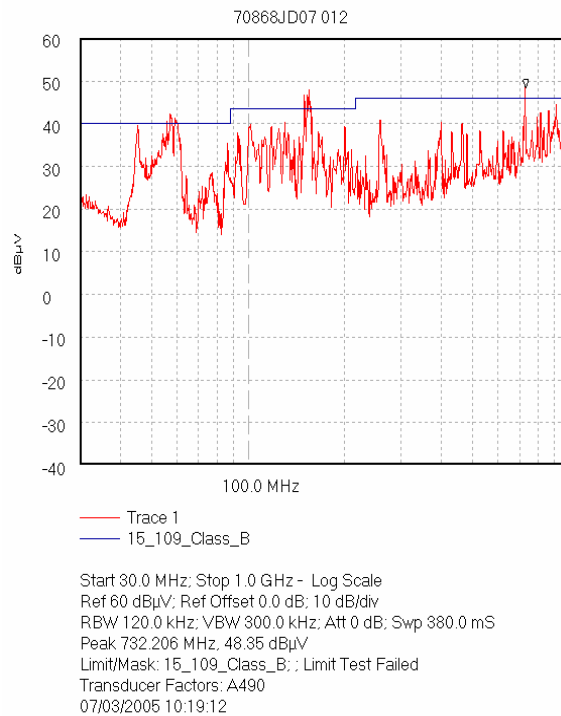
The EUT was configured as for radiated emission testing as described in section 9 of this report. Tests were performed to identify the maximum receiver or standby radiated emission levels.

Results:

Frequency (MHz)	Antenna Polarity	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
44.802	Vert.	21.5	40.0	18.5	Complied
57.510	Vert.	25.0	40.0	15.0	Complied
101.994	Vert.	32.7	43.5	10.8	Complied
156.327	Vert.	22.7	43.5	20.8	Complied
258.222	Vert.	19.4	46.0	26.6	Complied
364.486	Vert.	23.0	46.0	23.0	Complied
463.694	Vert.	25.9	46.0	20.1	Complied
533.110	Vert.	27.3	46.0	18.7	Complied
663.420	Vert.	29.8	46.0	16.2	Complied
728.966	Vert.	31.4	46.0	14.6	Complied
864.144	Vert.	34.5	46.0	11.5	Complied
912.150	Vert.	35.3	46.0	10.7	Complied

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Receiver Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements
(Frequency Range: 30 to 1000 MHz) (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

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7.2.3. Receiver Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements (Frequency Range: 1 to 12.5 GHz)**Results:****Highest Peak Level:**

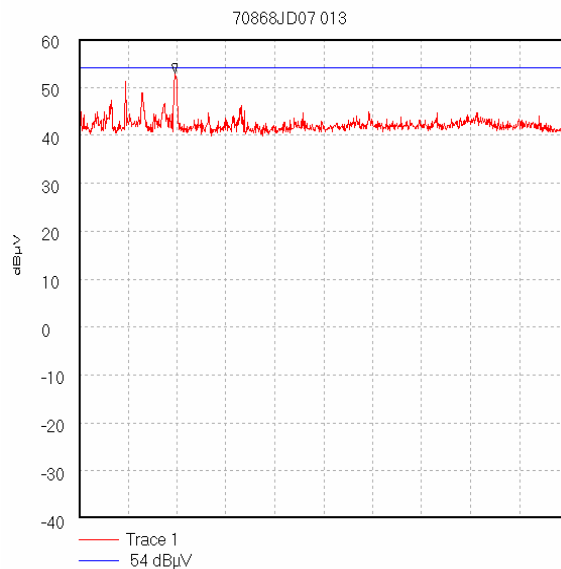
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.06626	Horiz.	22.4	21.8	6.5	50.7	74.0	23.3	Complied
1.09335	Horiz.	25.5	21.8	6.5	53.8	74.0	20.2	Complied
1.19545	Horiz.	24.5	20.8	6.7	52.0	74.0	22.0	Complied
3.28540	Horiz.	23.6	21.4	11.3	56.3	74.0	17.7	Complied

Highest Average Level:

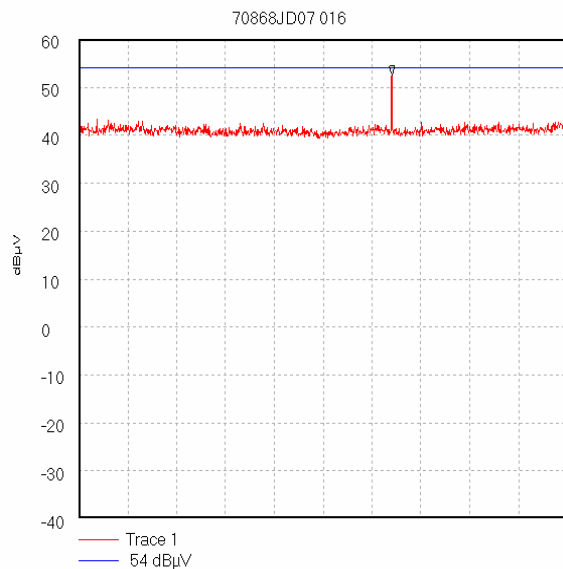
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.06626	Horiz.	9.4	21.8	6.5	37.7	54.0	16.3	Complied
1.09335	Horiz.	15.0	21.8	6.5	43.3	54.0	10.7	Complied
1.19545	Horiz.	11.6	20.8	6.7	39.1	54.0	14.9	Complied
3.28540	Horiz.	10.5	21.4	11.3	43.2	54.0	10.8	Complied

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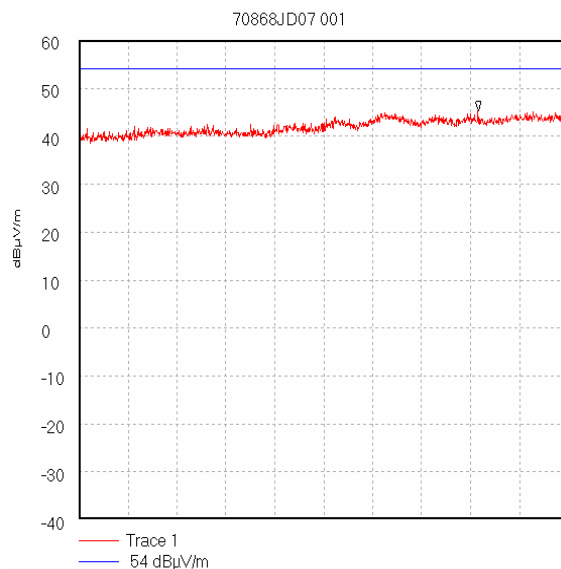
**Receiver Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements
(Frequency Range: 1 to 12.5 GHz) (Continued)**



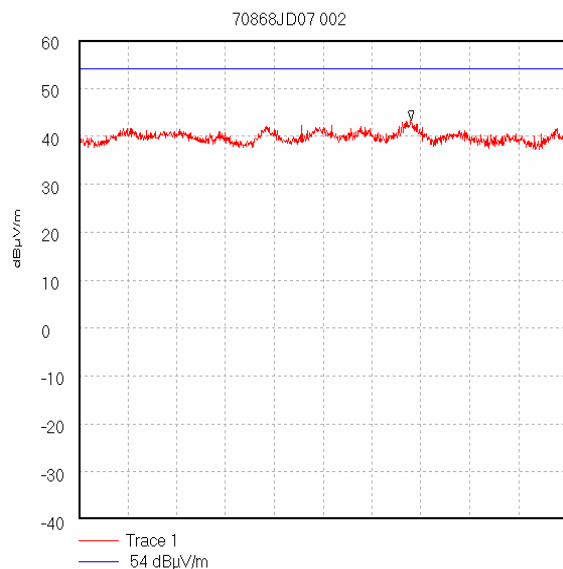
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBμV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.196 GHz, 53.02 dBμV
Display Line: 54 dBμV; ; Limit Test Passed
07/03/2005 10:47:50



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBμV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 3.282 GHz, 52.64 dBμV
Display Line: 54 dBμV; ; Limit Test Passed
07/03/2005 11:04:00



Start 4.0 GHz; Stop 5.0 GHz
Ref 60 dBμV/m; Ref Offset 16.7 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 4.816 GHz, 45.35 dBμV/m
Display Line: 54 dBμV/m;
10/03/2005 21:06:19

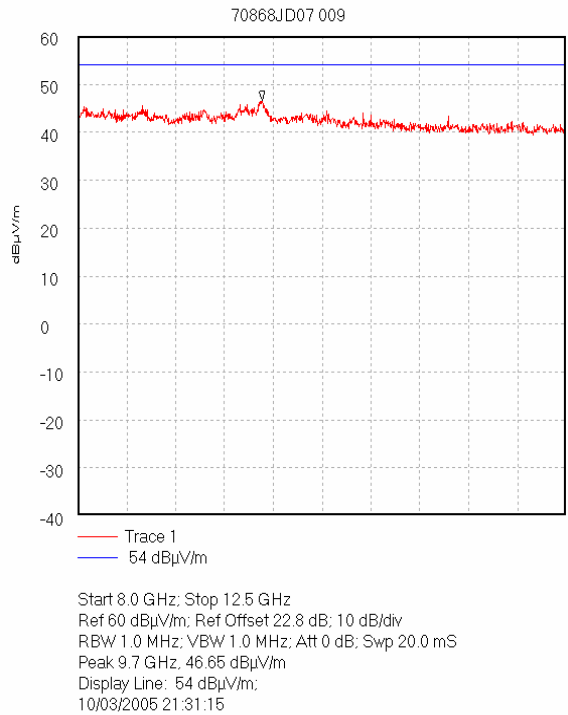
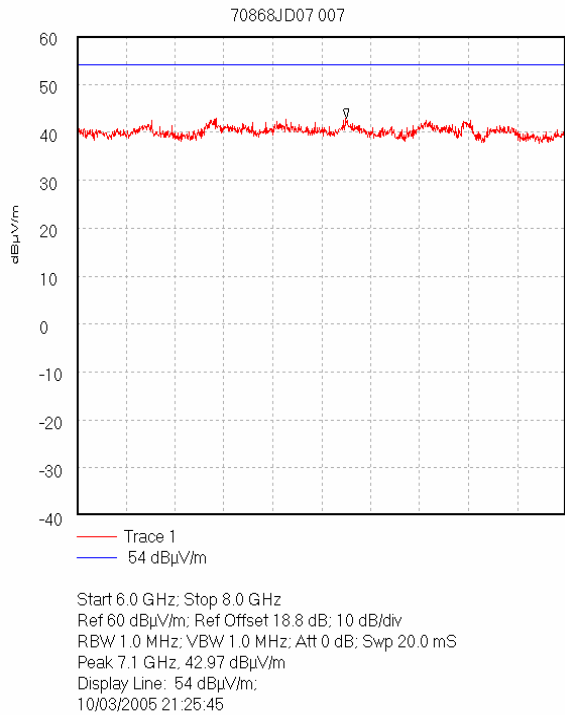


Start 5.0 GHz; Stop 6.0 GHz
Ref 60 dBμV/m; Ref Offset 16.7 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 5.68 GHz, 43.3 dBμV/m
Display Line: 54 dBμV/m;
10/03/2005 21:08:37

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

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**Receiver Radiated Spurious Emissions: Section 15.109 - Electric Field Strength Measurements
(Frequency Range: 1 to 12.5 GHz) (Continued)**



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

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7.2.4. Transmitter AC Conducted Spurious Emissions: Section 15.207

The EUT was configured for ac conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels present on the ac mains line of the EUT.

Results: Top Channel

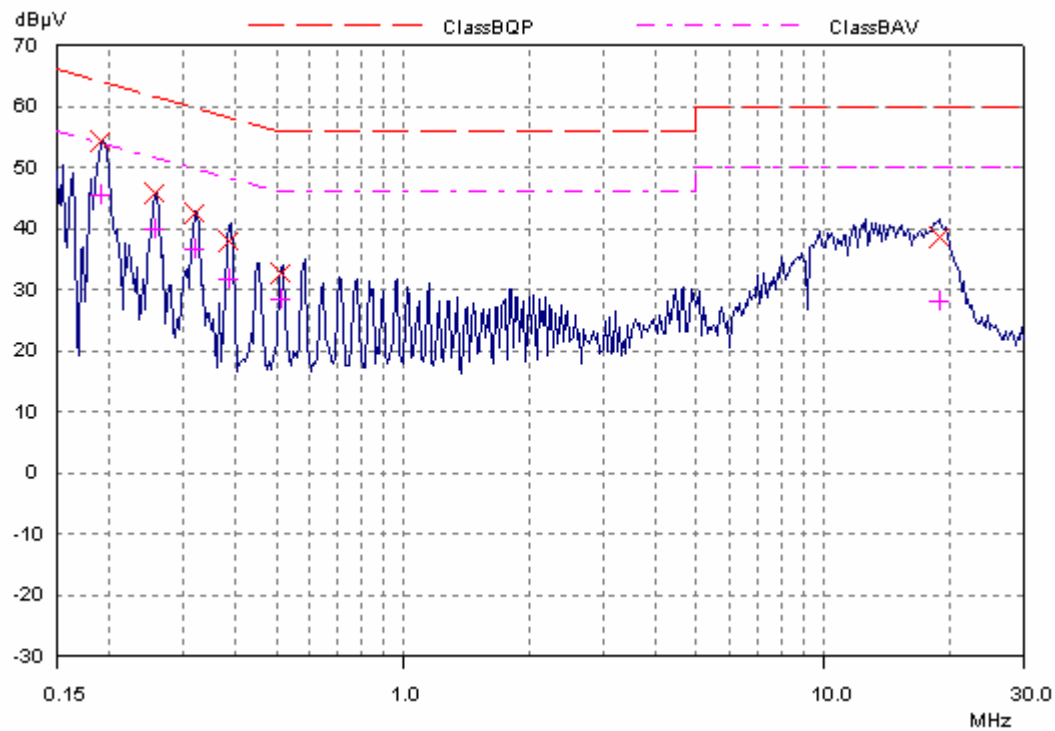
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.19083	Neutral	54.34	64.00	9.66	Complied
0.25769	Neutral	45.66	61.51	15.85	Complied
0.32169	Neutral	42.54	59.66	17.12	Complied
0.38649	Neutral	37.76	58.14	20.38	Complied
0.51561	Neutral	32.63	56.00	23.37	Complied
18.93367	Live	38.40	60.00	21.60	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.19083	Neutral	45.56	54.00	8.44	Complied
0.25769	Live	39.84	51.51	11.67	Complied
0.32169	Neutral	36.59	49.66	13.07	Complied
0.38649	Neutral	31.79	48.14	16.35	Complied
0.51561	Neutral	28.32	46.00	17.68	Complied
18.93367	Neutral	27.94	50.00	22.06	Complied

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Transmitter AC Conducted Spurious Emissions: Section 15.207 (Continued)

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

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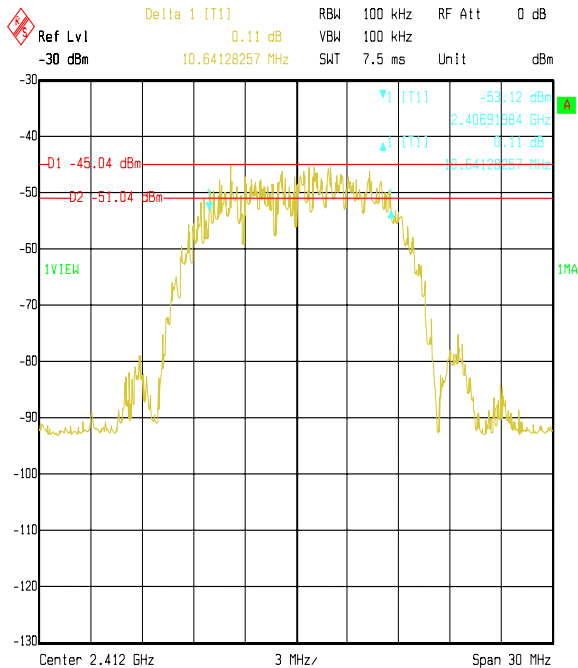
7.2.5. Transmitter Minimum 6 dB Bandwidth: Section 15.247(a)(2)

The EUT was configured for 6 dB bandwidth measurements as described in section 9 of this report.
Tests were performed to identify the 6 dB bandwidth.

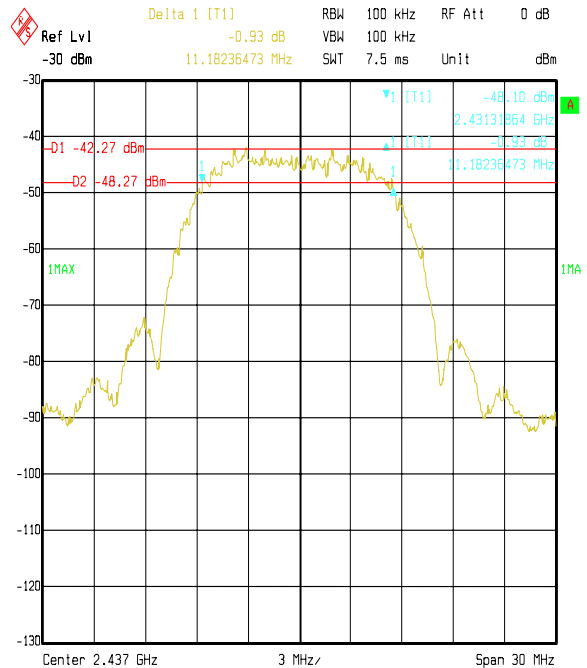
Results:

Channel	Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	10.6	≥ 0.5	10.1	Complied
Middle	11.2	≥ 0.5	10.7	Complied
Top	11.1	≥ 0.5	10.6	Complied

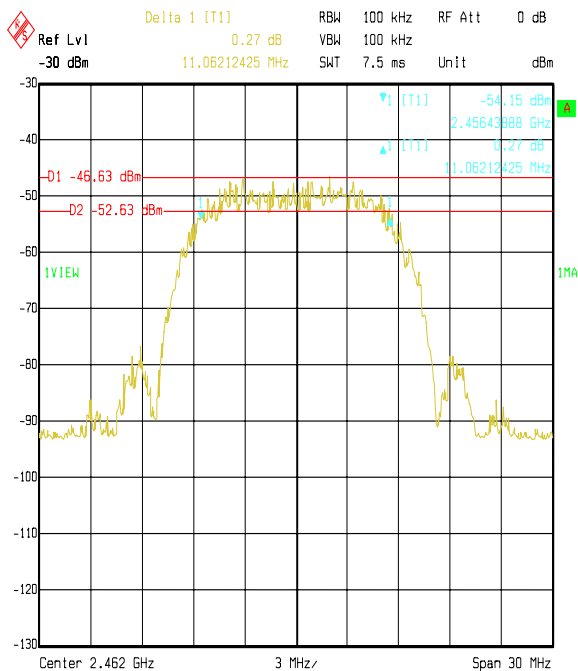
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Transmitter Minimum 6 dB Bandwidth: Section 15.247(a)(2) (Continued)

Title: 70868 Sony Ericsson Mobile GC89
Comment A: 6dB Bandwidth Bottom Channel
Date: 15.MAR.2005 18:14:03



Title: 70868 Sony Ericsson Mobile GC89
Comment A: 6dB Bandwidth Middle Channel
Date: 15.MAR.2005 18:23:53



Title: 70868 Sony Ericsson Mobile GC89
Comment A: 6dB Bandwidth Top Channel
Date: 15.MAR.2005 18:01:50

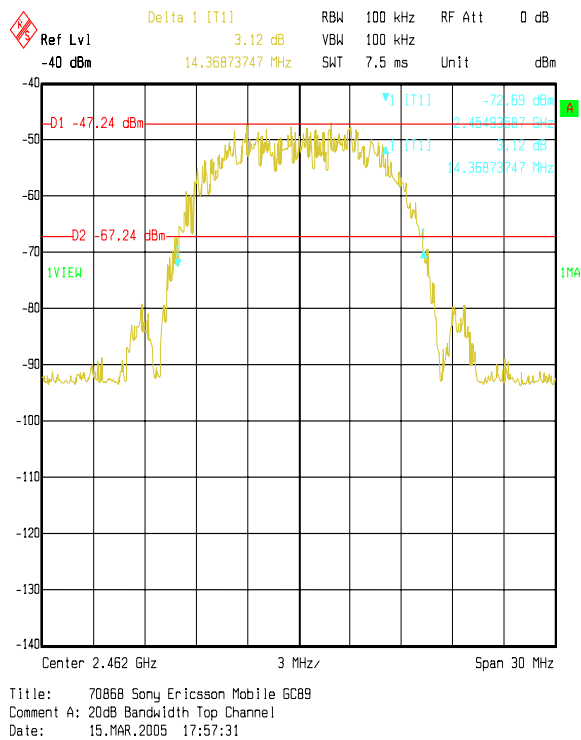
Test of: Sony Ericsson Mobile Communications Int AB.
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7.2.6. Transmitter 20 dB Bandwidth: Section 2.1049

The EUT was configured for 20 dB bandwidth measurements as described in section 9 of this report. Tests were performed to identify the 20 dB bandwidth.

Results:

Transmitter 20 dB Bandwidth (kHz)
14368.7



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7.2.7. Transmitter Peak Power Spectral Density: Section 15.247(e)

The EUT was configured for transmitter peak power spectral density measurements as described in section 9 of this report.

Tests were performed to identify the transmitter peak power spectral density.

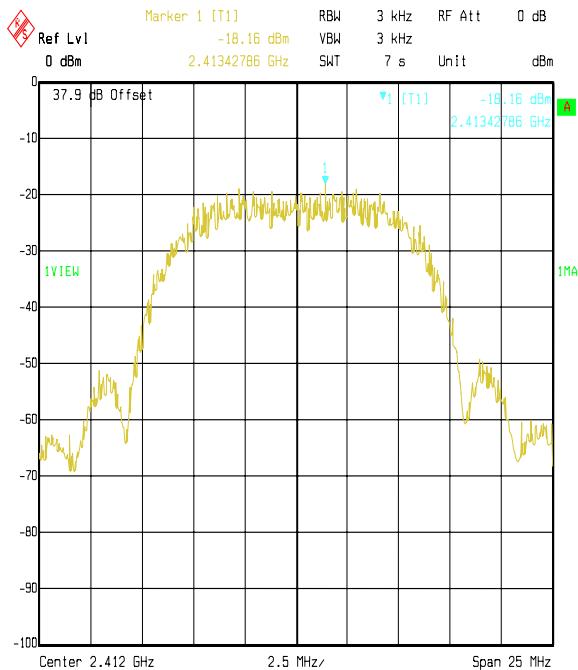
Results:

Channel	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	-18.2	8.0	26.2	Complied
Middle	-10.5	8.0	18.5	Complied
Top	-18.7	8.0	26.7	Complied

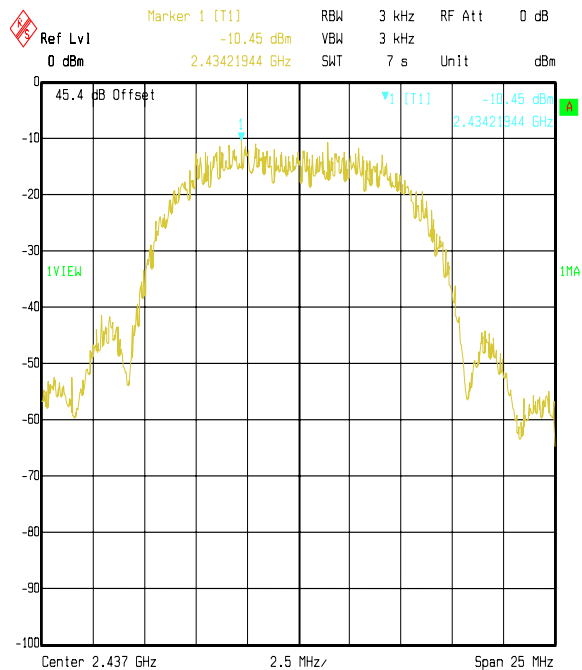
Test of: Sony Ericsson Mobile Communications Int AB.

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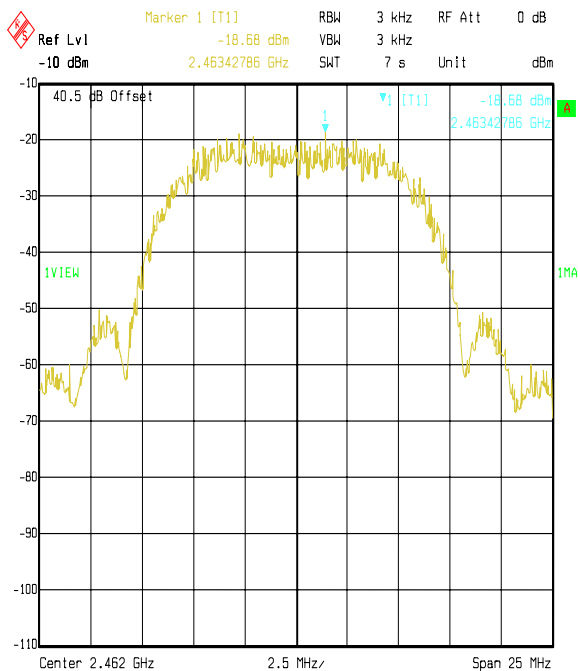
To: FCC Part 15.247: 2004 (Subpart C)

Transmitter Peak Power Spectral Density: Section 15.247(e) (Continued)

Title: 70868 Sony Ericsson Mobile GC89
Comment A: Peak Power Spectral Density Bottom Channel
Date: 15.MAR.2005 18:32:27



Title: 70868 Sony Ericsson Mobile GC89
Comment A: Peak Power Spectral Density Middle Channel
Date: 15.MAR.2005 18:27:26



Title: 70868 Sony Ericsson Mobile GC89
Comment A: Peak Power Spectral Density Top Channel
Date: 15.MAR.2005 18:35:22

Test of: Sony Ericsson Mobile Communications Int AB.
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7.2.8. Transmitter Maximum Peak Output Power: (EIRP) Section 15.247(b)(3)

The EUT was configured for transmitter peak output power measurements as described in Section 9 of this report.

Tests were performed to identify the transmitter maximum peak output power (EIRP) of the EUT.

Results:

AC Powered Devices

Channel	Input Voltage (AC)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	93.50	2.3	30.0	27.7	Complied
Bottom	110.00	1.8	30.0	28.2	Complied
Bottom	126.50	2.8	30.0	27.2	Complied
Middle	93.50	2.7	30.0	27.3	Complied
Middle	110.00	1.9	30.0	28.1	Complied
Middle	126.50	1.3	30.0	28.7	Complied
Top	93.50	0.8	30.0	29.2	Complied
Top	110.00	1.2	30.0	28.8	Complied
Top	126.50	1.1	30.0	28.9	Complied

Note(s):

1. These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.
-

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7.2.9. Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) – Electric Field Strength Measurements: 30 to 1000 MHz (emissions occurring in the restricted bands)

The EUT was configured for radiated emission testing as described in section 9 of this report. Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Note(s):

1. *No spurious emissions were measured below 1 GHz within the restricted band.*
-

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GC89 Mobile Station
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7.2.10. Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) – Electric Field Strength Measurements: 30 to 1000 MHz (emissions outside the restricted bands)

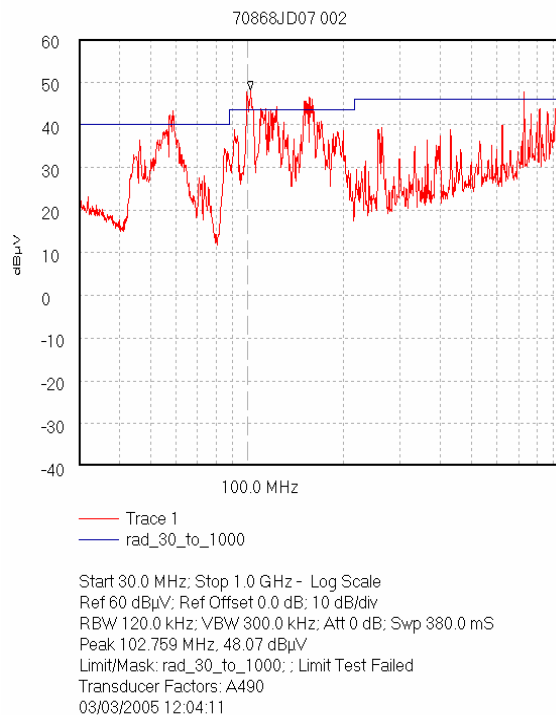
The EUT was configured for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Top Channel

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	-20 dBc Limit (dB μ V/m)	Margin (dB)	Result
101.994	Vert.	32.7	88.8	56.1	Complied



Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

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7.2.11. Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions occurring in the restricted bands)

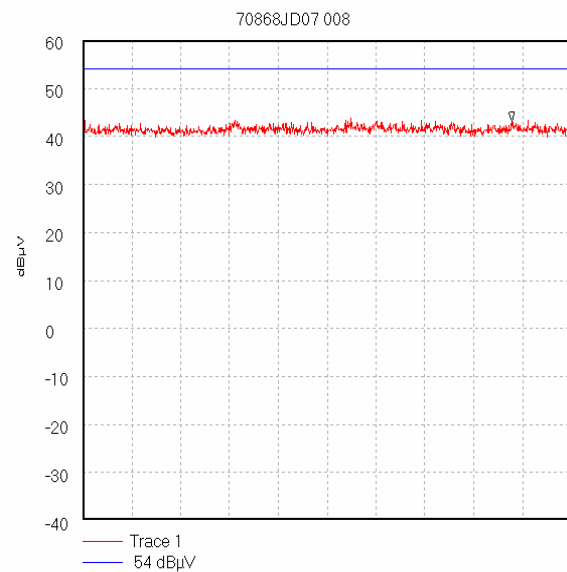
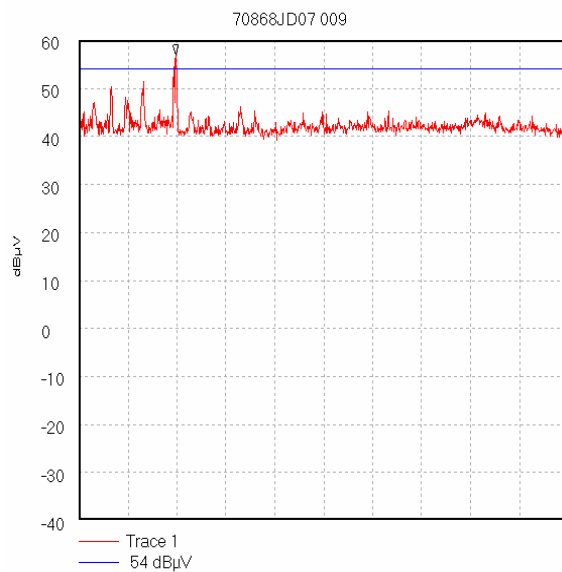
The EUT was configured for radiated emission testing as described in section 9 of this report. Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Highest Peak Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1.19545	Horiz.	24.5	20.8	6.7	52.0	74.0	22.0	Complied

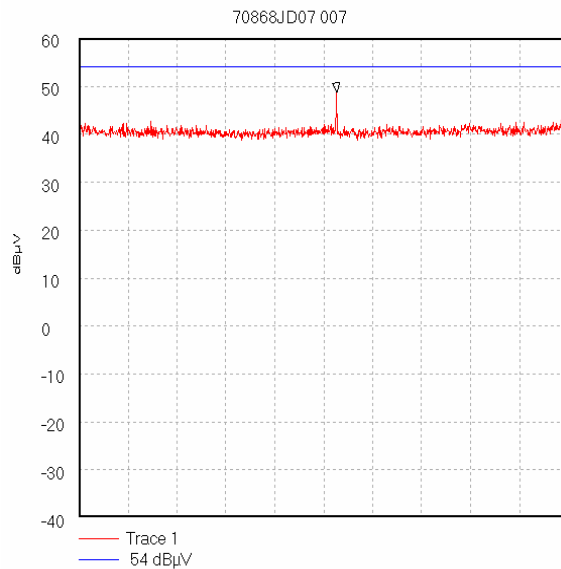
**Note - As the peak reading was less than the average limit, the average level was not measured.*



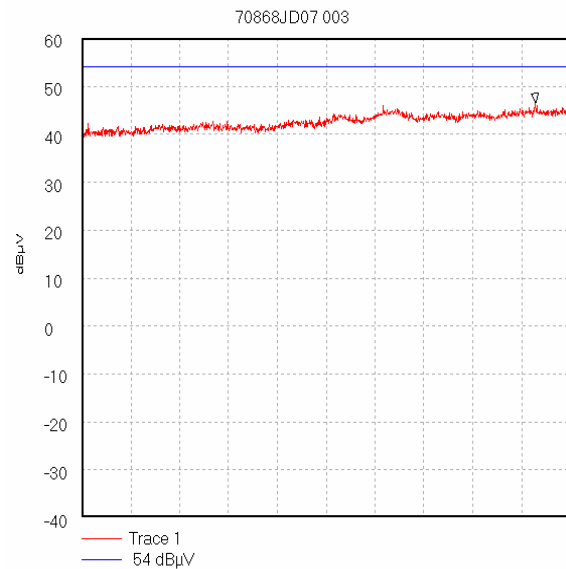
Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

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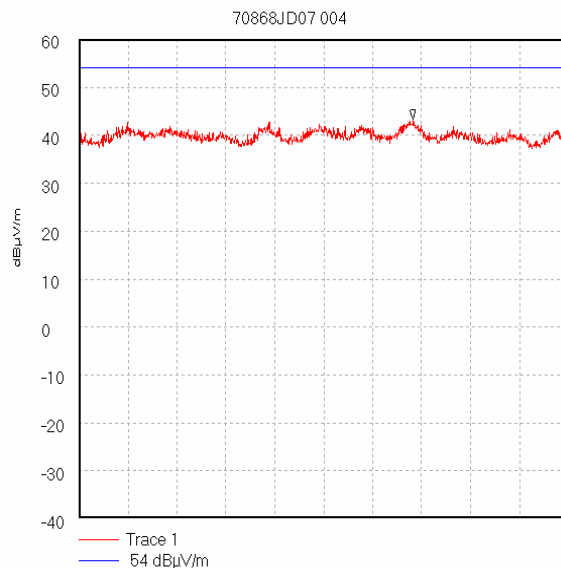
Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions occurring in the restricted bands) (Continued)



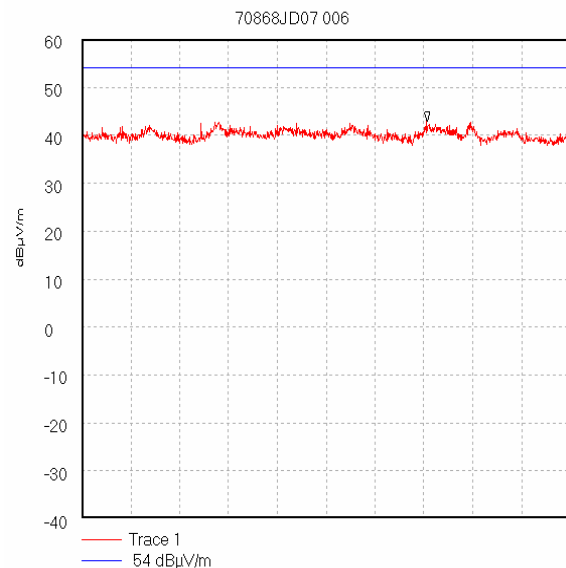
Start 2.4835 GHz; Stop 4.0 GHz
Ref 60 dBμV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 3.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 3.28219 GHz, 48.73 dBμV
Display Line: 54 dBμV; Limit Test Passed
03/03/2005 14:12:28



Start 4.0 GHz; Stop 5.0 GHz
Ref 60 dBμV; Ref Offset 16.7 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 4.929 GHz, 46.52 dBμV
Display Line: 54 dBμV;
10/03/2005 21:13:04



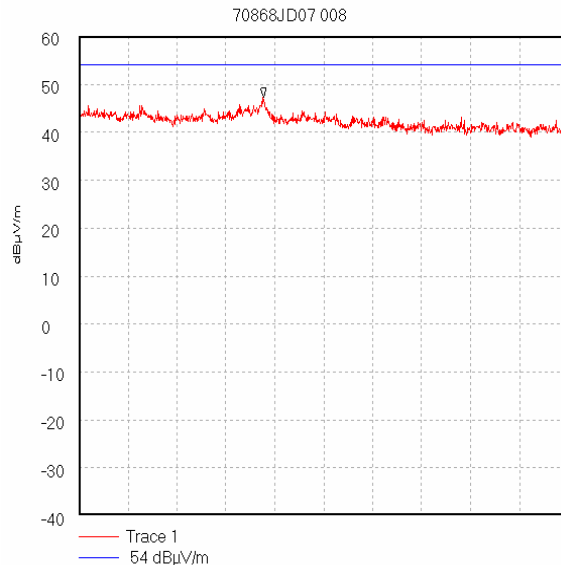
Start 5.0 GHz; Stop 6.0 GHz
Ref 60 dBμV/m; Ref Offset 16.7 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 5.683 GHz, 43.37 dBμV/m
Display Line: 54 dBμV/m;
10/03/2005 21:15:45



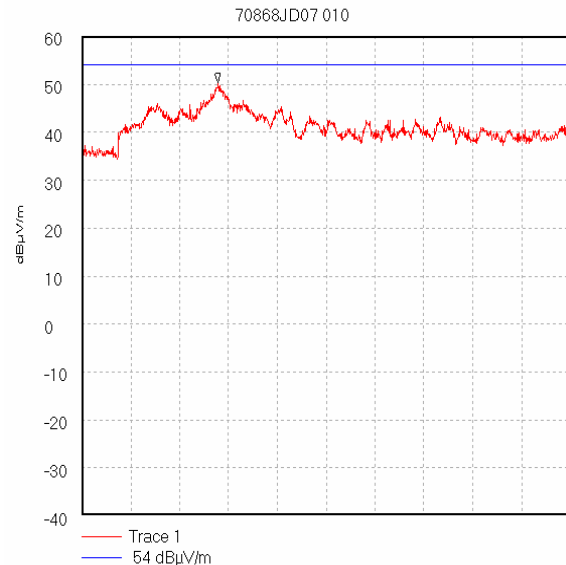
Start 6.0 GHz; Stop 8.0 GHz
Ref 60 dBμV/m; Ref Offset 18.8 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 7.413 GHz, 42.84 dBμV/m
Display Line: 54 dBμV/m;
10/03/2005 21:23:23

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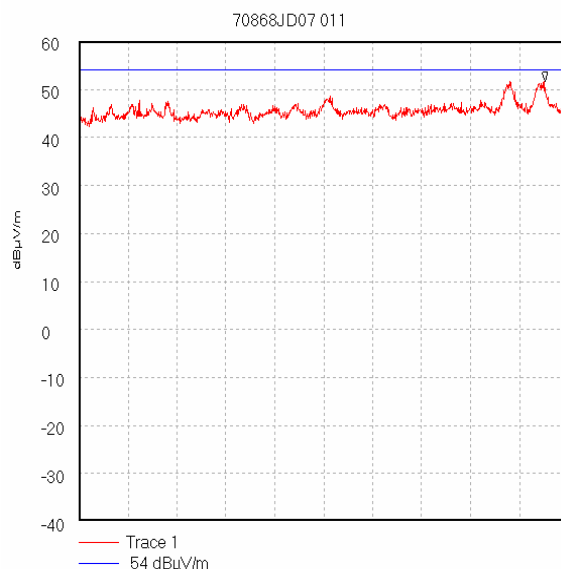
Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions occurring in restricted bands) (Continued)



Start 8.0 GHz; Stop 12.5 GHz
Ref 60 dBμV/m; Ref Offset 22.8 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 9.695 GHz, 47.31 dBμV/m
Display Line: 54 dBμV/m;
10/03/2005 21:29:44



Start 12.5 GHz; Stop 18.0 GHz
Ref 60 dBμV/m; Ref Offset 17.3 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS
Peak 14.034 GHz, 50.41 dBμV/m
Display Line: 54 dBμV/m;
10/03/2005 21:37:13



Start 18.0 GHz; Stop 25.0 GHz
Ref 60 dBμV/m; Ref Offset 20.8 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS
Peak 24.666 GHz, 51.68 dBμV/m
Display Line: 54 dBμV/m;
10/03/2005 21:40:47

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7.2.12. Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) - Electric Field Strength Measurements (Frequency Range: 1 to 25 GHz) (emissions outside the restricted bands)

The EUT was configured for radiated emission testing as described in section 9 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Results:

Note(s):

1. *No spurious emissions were measured above 1 GHz within the restricted band.*
-

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7.2.13. Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a)

The EUT was configured for band edge compliance of radiated emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum radiated band edge emissions.

Results:**Peak Power Level:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2.4000	Horiz.	32.8	21.5	1.3	55.6	88.8	32.4	Complied
2.4835	Horiz.	29.2	21.1	1.3	51.6	74.0	22.4	Complied

Note(s):

1. -20 dBc or 74.0 dBuV/m limit
-

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7.2.14. Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a)

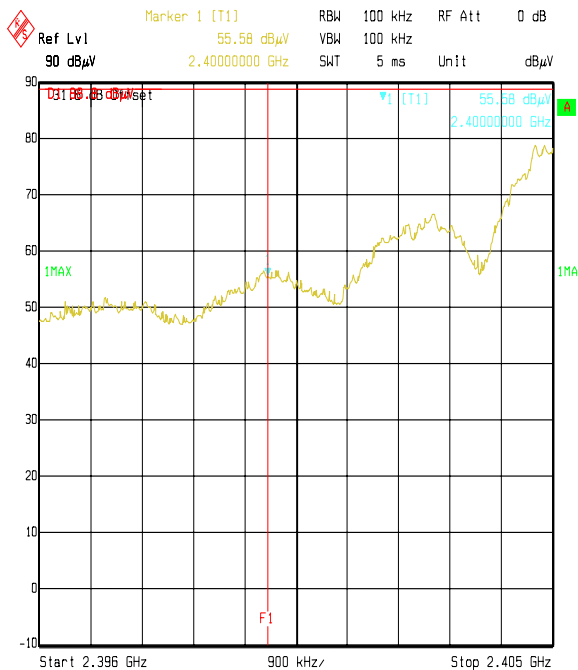
The EUT was configured for band edge compliance of radiated emission measurements as described in section 9 of this report.

Tests were performed to identify the average radiated band edge emissions.

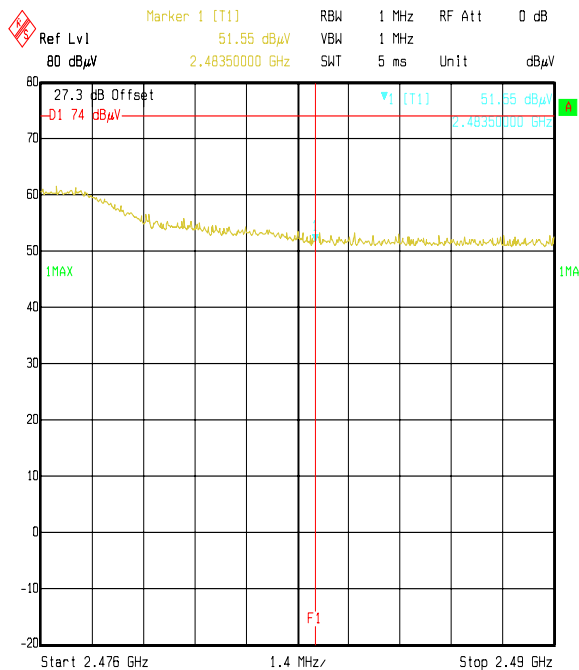
Results:

Average Power Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2.4835	Horiz.	29.3	21.1	1.3	51.7	54.0	2.3	Complied



Title: 70868 Sony Ericsson Mobile GC89
Comment A: Transmitter Radiated Lower Band Edge
Date: 15.MAR.2005 19:13:24



Title: 70868 Sony Ericsson Mobile GC89
Comment A: Transmitter Radiated Upper Band Edge Peak
Date: 15.MAR.2005 19:28:26

Test of: Sony Ericsson Mobile Communications Int AB.
GC89 Mobile Station
To: FCC Part 15.247: 2004 (Subpart C)

8. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.25 dB
Transmitter Maximum Peak Output Power	Not applicable	95%	±0.46 dB
Spectral Power Density	Not applicable	95%	±1.2 dB
6 dB/20 dB Bandwidth	Not applicable	95%	±0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±4.2 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

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9. Measurement Methods

9.1. AC Mains Conducted Emissions

AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane. The EUT was powered with 110V 60 Hz ac mains supplied via a line impedance stabilisation network (LISN).

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The test equipment settings for conducted emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz	9 kHz
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	>1 s
Observation Time:	Not applicable	>15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

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9.2. Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20 dB of the limit, in these cases the highest point of the noise floor was measured.

Where an emission fell inside a restricted band, measurements were made at the appropriate test distance using a measuring receiver with a quasi peak detector for measurements below 1000 MHz and an average and peak detector for measurements above 1000 MHz. A peak detector was used for all other measurements.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4.

All measurements on the open area test site were performed using broadband antennas in both vertical and horizontal polarisations.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

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Radiated Emissions (Continued)

At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Scans were performed to the upper frequency limits as stated in section 15.33

The final field strength was determined as the indicated level in dB μ V plus cable loss and antenna factor.

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements <1 GHz	Final Measurements ≥1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak / Average
Mode:	Max Hold	Not applicable	Max Hold
Bandwidth:	(120 kHz <1 GHz) (1 MHz ≥1 GHz)	120 kHz	1 MHz
Amplitude Range:	100 dB	100 dB	100 dB
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

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Minimum 6 dB Bandwidth

The EUT and spectrum analyser were configured as for conducted antenna port emissions.

Prior to testing being performed a suitable RF attenuator and cables were calibrated for the required frequencies. For each frequency the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

To determine the 6 dB bandwidth, a resolution bandwidth of 100 kHz was used, which is approximates to 1% of the 6 dB bandwidth. A video bandwidth of 100 kHz was used. The analyser was set to a span of greater than twice the 6 dB bandwidth and for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference established 6 dB below the peak level. The bandwidth was determined at the points where the 6 dB reference crossed the profile of the emission.

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9.3. Transmitter 20 dB Bandwidth

The EUT and spectrum analyser was configured as for transmitter for radiated measurements.

To determine the occupied bandwidth, a resolution bandwidth of 100 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of a least the same value was used. The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level. The bandwidth was determined at the points where the 20 dB reference crossed the profile of the emission.

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9.4. Spectral Power Density

The EUT and spectrum analyser were configured as for conducted antenna port emissions measurements.

Prior to testing being performed a suitable RF attenuator and cables were calibrated for the required frequencies. For each frequency the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

Prior to the measurement being taken the spectrum analyser was tuned to the fundamental frequency of the EUT.

A resolution bandwidth of 3 kHz was selected and the analyser was set to a span greater than twice the 6 dB bandwidth. The trace was max held and a reading was taken at the peak point of the trace.

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9.5. Peak Output Power

The EUT and spectrum analyser were configured as for conducted antenna port emissions measurements.

Prior to testing being performed a suitable RF attenuator and cables were calibrated for the required frequencies. For each frequency to be measured, the calibrated level of the attenuator and cable were entered as an offset into a spectrum analyser to compensate for the measurement set up.

To determine the transmitter output power, the EUT was operated at maximum power and a result was obtained from the spectrum analyser using the channel power function set up according the defined bandwidth and channel spacing of the EUT.

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9.6. Band Edge Compliance of RF Radiated Emissions

The EUT and spectrum analyser were configured as for radiated measurements.

To determine band edge compliance, the analyser resolution bandwidth was set to $\geq 1\%$ of the analyser span. The video bandwidth was set to be $\geq$ to the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

A plot of the lower band edge of the allocated frequency band was produced. A marker was set to the level of the highest in band emission with a limit line set to 20 dB below this. The marker was then placed on the highest out of band emission (the specification states that either the band edge level must be measured or the highest out of band emission, whichever is the greater). The plots show that the highest out of band emission complies with the -20 dBc Limit.

The above procedure was then repeated for the upper band edge except that, as the upper band edge fell on a restricted band edge (as defined in section 15.205(a)), the limit for the restricted band was applied instead of the -20 dBc limit i.e. the general limits defined in section 15.209(a).

Final measurements were performed on the worst-case configuration as described in part 15.31(i).

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Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A032	Double Ridge Guide Antenna	EMCO	3115	2874
A1069	ESH3-Z5	Rohde & Schwarz	ESH3-Z5	837469/012
A1361	ESH3-Z2 Pulse Limiter	Rohde & Schwarz	ESH3-Z2	A1361-20112003
A254	WG 14 Microwave Horn	Flann Microwave	14240-20	139
A428	WG 12 horn	Flann	12240-20	134
A429	WG 16 horn	Flann	16240-20	561
A430	WG 18 horn	Flann	18240-20	425
A436	WG 20 horn	Flann	20240-20	330
A490	Bilog Antenna	Chase	CBL6111A	1590
C1078	Rosenberger 3m Cable	Rosenberger	FA210A1030M5050	28464-2
C1080	Rosenberger Cable 3m	Rosenberger	FA210A1030M5050	28464-1
C1082	Rosenberger Cable 2m	Rosenberger	FA210A1020M5050	28463-1
C363	BNC Cable	Rosenberger	RG142	None
C374	Cable	Rosenberger	RG400	None
C460	Cable	Rosenberger	UFA210A-1-1182-704704	98H0304
G013	SMHU Signal Generator	Rohde & Schwarz	SMHU	894 055/003
M028	FSB Spectrum Analyser	Rohde & Schwarz	FSB	860 001/009 (RF), 860 161/007 (Display)
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
M1123	Boonton	Boonton	4531	138201
M1138	CMU 200	Rohde & Schwarz	CMU 200-1100.0008.02	836202/093
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016
M505	Analyser Display Unit	Rohde & Schwarz	ESAI-D	825316/010
M506	RF unit	Rohde & Schwarz	ESBI-RF	827060/004
S202	Site 2	RFI	2	S202-15011990
S209	Site 9	RFI	9	
S212	Site 12	RFI	12	

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

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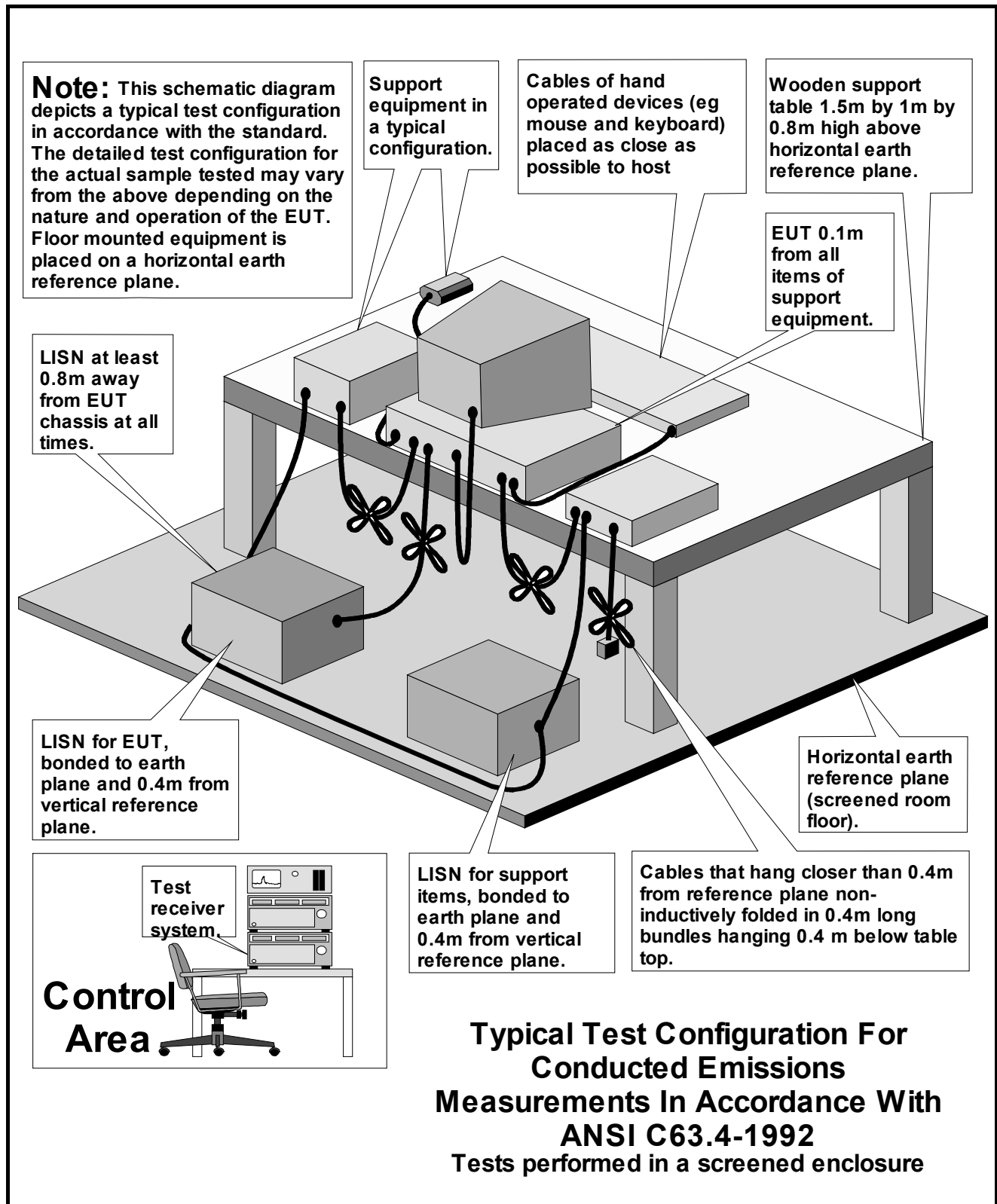
Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\70868JD07\EMICON	Test configuration for measurement of conducted emissions.
DRG\70868JD07\EMIRAD	Test configuration for measurement of radiated emissions.

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DRG\70868JD07\EMIRAD

