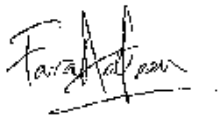
TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Panasonic Mobile Communications Development of Europe.
EB-X800

To: FCC Part 24

Test Report Serial No:
RFI/MPTE1/RP70944JD04A

This Test Report Is Issued Under The Authority Of Andrew Brown, Operations Manager:  PP	
Tested By: Fara Razally 	**Checked By: Nigel Davison** 
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1. Client Information

Company Name:	Panasonic Mobile Communications Development of Europe
Address:	2 Gables Way Colthrop Thatcham Berkshire RG19 4ZB
Contact Name:	Mr M Hargreaves

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:	Panasonic EB-X800
Model Name or Number:	EB-X800
Unique Type Identification:	Not Applicable
Serial Number:	004400000227437
FCC ID Number:	NWJ21C001A
Country of Manufacture:	Japan
Date of Receipt:	06 December 2004

2.2. Accessories

The following accessories were supplied with the EUT:

Description:	AC Battery Charger
Brand Name:	Panasonic
Model Name or Number:	EB-CAX800
Serial Number:	None Stated
Cable Length and Type:	1.5m
Connected Port:	Universal Interface Port

Description:	USB Cable
Brand Name:	Panasonic
Model Name or Number:	EB-USX800
Serial Number:	None Stated
Cable Length and Type:	0.8m
Connected Port:	Universal Interface Port

Description:	Branch Cable
Brand Name:	Panasonic
Model Name or Number:	EB-CBX800
Serial Number:	None Stated
Cable Length and Type:	0.7m
Connected Port:	Universal Interface Port

Accessories (Continued)

Description:	Car Charger
Brand Name:	Panasonic
Model Name or Number:	EB-CDG60
Serial Number:	020732
Cable Length and Type:	2.2m extended approx
Connected Port:	Universal Interface Port

Description:	Personal Hands free Kit
Brand Name:	Panasonic
Model Name or Number:	EB-EMX800
Serial Number:	None Stated
Cable Length and Type:	1.2m
Connected Port:	Universal Interface Port

Description:	Mini-SD Memory Card
Brand Name:	Panasonic
Model Name or Number:	16 MB
Serial Number:	None Stated
Cable Length and Type:	None Stated
Connected Port:	Not Applicable

2.3. Description of EUT

The equipment under test is a 'Flip Type' PCS 1900 mobile cellular telephone with GSM 900, DCS 1800 and Bluetooth support. The mobile includes a camera and IR optical transceiver.

2.4. Modifications Incorporated in EUT

During the course of testing the EUT was not modified.

2.5. Additional Information Related to Testing

Power Supply Requirement:	Internal battery supply of 3.7 V Lithium – ion battery		
Intended Operating Environment:	Within GSM Coverage		
Equipment Category:	GSM 900/GSM 1800/GSM 1900		
Type of Unit:	Portable (Standalone battery powered device)		
Interface Ports:	Enclosure, Personal Handsfree, Comms & Charger		
Transmit Frequency Range:	1850 MHz to 1910 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	512	1850.2
	Middle	660	1879.8
	Top	810	1909.8
Receive Frequency Range:	1930 MHz to 1990 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	512	1930.2
	Middle	660	1960.0
	Top	810	1989.8
Maximum Power Output (EIRP)	28.4 dBm		

2.6. Support Equipment

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

Description:	Bluetooth Test Set
Brand Name:	Anritsu
Model Name or Number:	MT885DA
Serial Number:	6K0000084
Cable Length and Type:	Not Applicable
Connected to Port:	RF Link

Description:	PC
Brand Name:	Panasonic
Model Name or Number:	None Stated
Serial Number:	None Stated
Cable Length and Type:	Serial 1.5
Connected to Port:	EUT Comms Port

3. Test Specification, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 24 Subpart E: 2003 (Broadband PCS)
Title:	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2002
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.

DA00-705 (2000)
Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.3. 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.

4. Deviations from the Test Specification

None.

5. Operation of the EUT During Testing

5.1. Operating Modes

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

Preliminary radiated scans were performed on the EUT, with the accessories stated in section 2.2 of this report connected and disconnected. The combinations that exhibited the worst case of the operation were then used to perform final measurements. This was found to be with the EUT connected to the branch cable, AC Charger and a PC connected.

Transmitter Mode:

For carrier output power, occupied bandwidth and final transmitter radiated measurements, testing was performed at full power on top, middle and bottom channel of the assigned frequency block.

For frequency stability testing, measurements were performed at full power on the top and bottom channels of the assigned frequency block at –30 °C through to +50 °C in 10 °C increments.

All transmitter radiated spurious pre-scan tests were performed at full power on the top channel of the assigned frequency block. Final measurements were then performed on the top, middle and bottom channels if an emission was identified.

Receiver/Idle modes:

Testing was performed with the call terminated from the GSM Test Simulator and the phone left in its idle mode.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

Configured with branch cable and AC battery charger connected to laptop via USB cable.

All tests were performed with the EUT connected via an air link or directly to a GSM test set via an access point.

The reason for choosing this configuration was that : It was found being the most likely to be the worst case configuration with regards to EMC.

6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Compliancy Status
Idle Mode AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2003 Section 15.107	AC Mains Input	Complied
Idle Mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15: 2003 Section 15.109	Enclosure	Complied
Transmitter Effective Isotropic Radiated Power (EIRP)	C.F.R. 47 FCC Part 24: 2003 Section 24.232	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 24: 2003 Section 24.235	Antenna	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 24: 2003 Section 24.235	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 24: 2003 Section 24.238	Antenna	Complied
Transmitter Out of Band Radiated Emissions	C.F.R. 47 FCC Part 24: 2003 Section 2.1053/24.238	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 2: 2003 Section 2.1053/24.238	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.

7. Measurements, Examinations and Derived Results

7.1. General Comments

7.1.1. This section contains test results only.

7.1.2. 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.

7.2. Idle Mode AC Conducted Spurious Emissions: Section 15.107

7.2.1. The EUT was configured as for AC conducted emissions measurements as described in Section 9 of this report.

7.2.2. Tests were performed to identify the maximum emissions levels on the AC Mains line of the EUT.

Results:

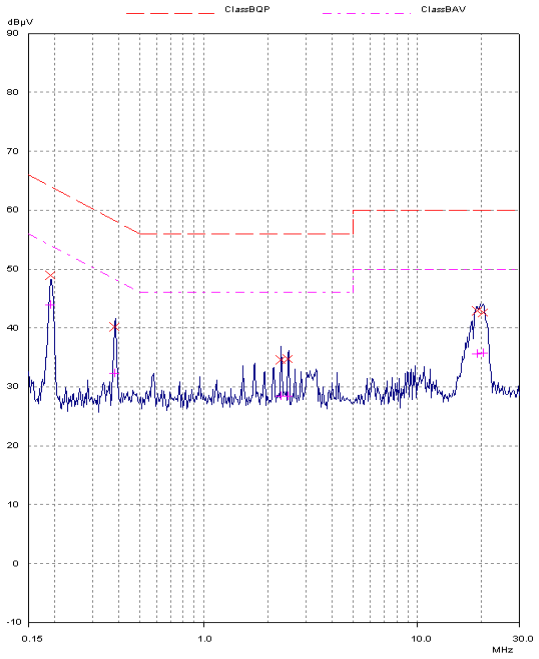
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.18957	Neutral	48.96	64.06	15.10	Complied
0.37993	Neutral	40.13	58.28	18.15	Complied
2.27905	Neutral	34.57	56.00	21.43	Complied
2.46917	Live	34.74	56.00	21.26	Complied
18.99257	Neutral	42.90	60.00	17.10	Complied
20.32294	Neutral	42.62	60.00	17.38	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
0.18957	Neutral	43.94	54.06	10.12	Complied
0.37993	Neutral	32.26	48.28	16.02	Complied
2.27905	Neutral	28.37	46.00	17.63	Complied
2.46917	Neutral	28.42	46.00	17.58	Complied
18.99257	Neutral	35.66	50.00	14.34	Complied
20.32294	Live	35.68	50.00	14.32	Complied

Idle Mode 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.

7.3. Idle Mode Radiated Spurious Emissions: Section 15.109

7.3.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

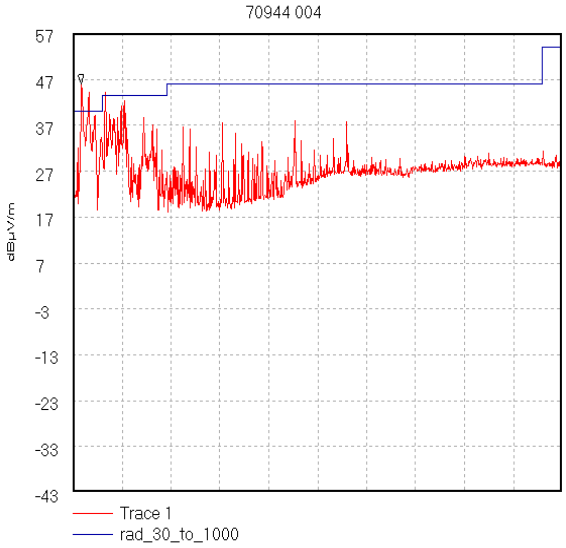
7.3.1.1. The EUT was configured as for receiver radiated emissions testing as described in Section 9 of this report.

7.3.1.2. Tests were performed to identify the maximum receiver or standby radiated emissions levels.

Results:

Frequency (MHz)	Antenna Polarity	Quasi-Peak Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
45.560	Vertical	17.6	40.0	22.4	Complied
60.973	Vertical	21.4	40.0	18.6	Complied
68.744	Vertical	20.4	40.0	19.6	Complied
125.100	Vertical	16.3	43.5	27.2	Complied
130.000	Vertical	17.6	43.5	25.9	Complied
169.004	Vertical	20.4	43.5	23.1	Complied
195.003	Horizontal	26.1	43.5	17.4	Complied
247.000	Horizontal	26.4	46.0	19.6	Complied
325.003	Horizontal	25.1	46.0	20.9	Complied
403.967	Vertical	18.9	46.0	27.1	Complied
572.003	Vertical	25.4	46.0	20.6	Complied

Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)



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

Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)

7.3.2. Electric Field Strength Measurements (Frequency Range: 1 to 12.5 GHz)

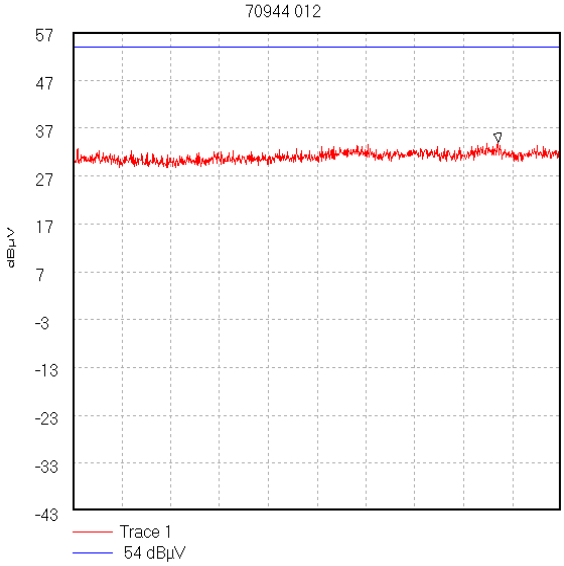
Results:

Highest Peak Level: Top Channel

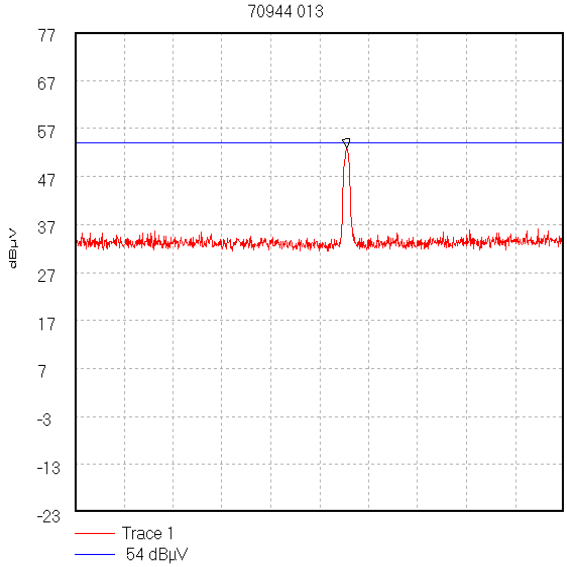
Frequency (GHz)	Antenna Polarity	Detector Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Actual Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
4.518	Horiz	7.6	24.2	1.7	33.5	54.0	20.5	Complied

Note: The peak level was compared to the average limit as apposed to being compared to the peak limit because this is the more onerous limit.

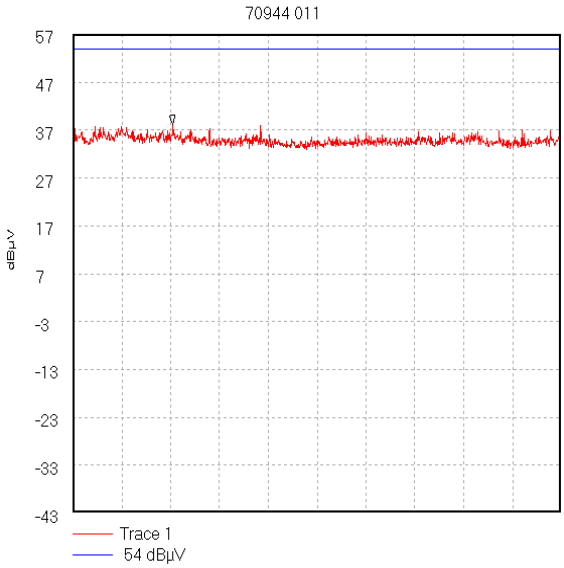
Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)



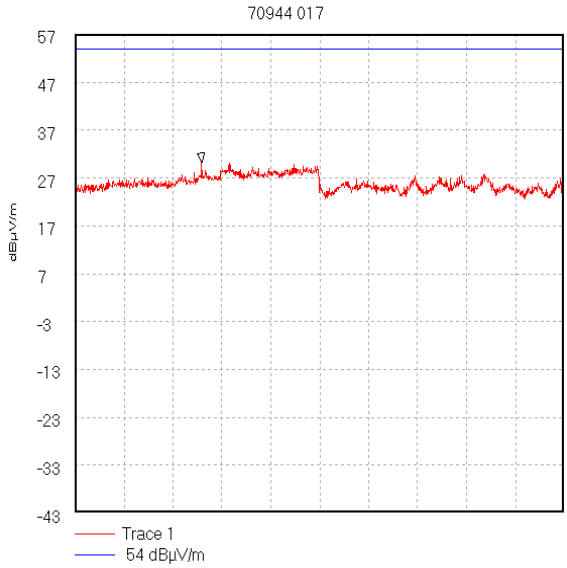
Start 1.0 GHz; Stop 1.85 GHz
Ref 57 dBµV; Ref Offset 11.8 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.740444 GHz, 34.05 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
13/12/2004 16:38:21



Start 1.91 GHz; Stop 2.0 GHz
Ref 77 dBµV; Ref Offset 11.8 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.96 GHz, 52.93 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
13/12/2004 16:44:57



Start 2.0 GHz; Stop 4.0 GHz
Ref 57 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.408889 GHz, 38.19 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
13/12/2004 16:28:30

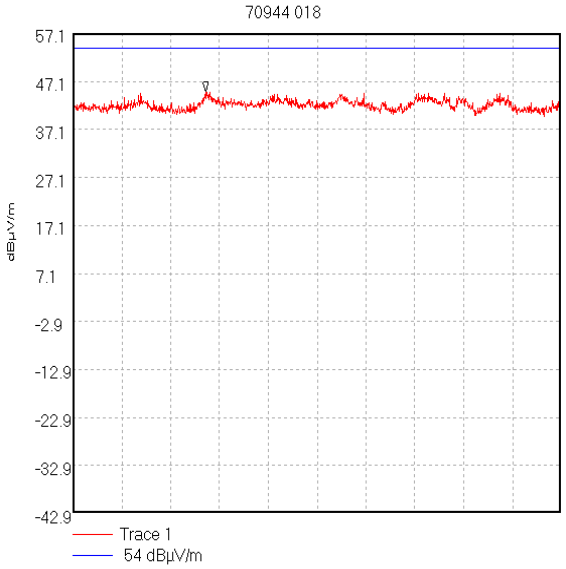


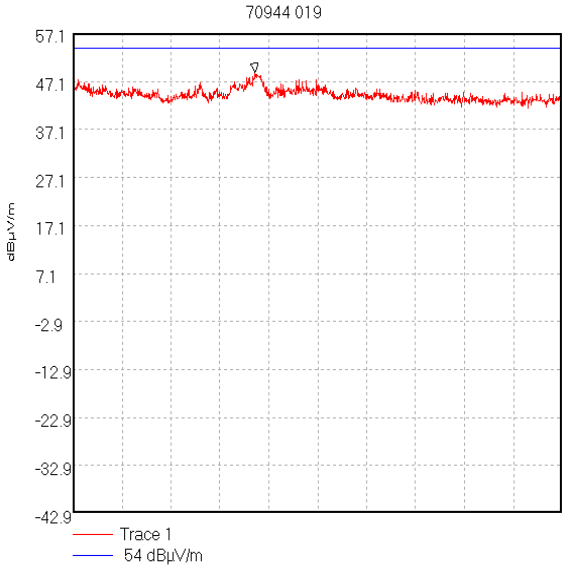
Start 4.0 GHz; Stop 6.0 GHz
Ref 57 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 4.518 GHz, 30.21 dBµV/m
Display Line: 54 dBµV/m;
14/12/2004 15:54:08

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

NOTE: Emission shown in plot 70944 013 at 1.96 GHz emanates from the test set and not the EUT. Because the emission is not from the EUT, no level has been recorded in the preceding table.

Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)





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

7.4. Transmitter Effective Isotropic Radiated Power (EIRP): Section 24.232

7.4.1. The EUT was configured as for Effective Isotropic Radiated Power as described in Section 9 of this report.

7.4.2. Tests were performed to identify the maximum Effective Isotropic Radiated Power (EIRP).

Results:

Channel	Measured Frequency (MHz)	Antenna Polarity	Maximum Transmitter EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	1850.2	Vert	28.4	33.0	4.6	Complied
Middle	1879.8	Horiz	28.2	33.0	4.8	Complied
Top	1909.8	Horiz	27.8	33.0	5.2	Complied

7.5. Transmitter Frequency Stability (Temperature Variation): Section 24.235

7.5.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

7.5.2. Tests were performed to identify the maximum frequency error of the EUT with variations in ambient temperature.

Results:

Bottom Channel (1850.2 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-19	1850.199981	1850.0	0.199981	Complied
-20	-15	1850.199985	1850.0	0.199985	Complied
-10	-2	1850.199998	1850.0	0.199998	Complied
0	-14	1850.199986	1850.0	0.199986	Complied
10	-5	1850.199995	1850.0	0.199995	Complied
20	7	1850.200007	1850.0	0.200007	Complied
30	-1	1850.199999	1850.0	0.199999	Complied
40	4	1850.200004	1850.0	0.200004	Complied
50	17	1850.200017	1850.0	0.200017	Complied

Transmitter Frequency Stability (Temperature Variation): Section 24.235 (Continued)

Results:

Top Channel (1909.8 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	-3	1909.799997	1910.0	0.200003	Complied
-20	-2	1909.799998	1910.0	0.200002	Complied
-10	7	1909.800007	1910.0	0.199993	Complied
0	-1	1909.799985	1910.0	0.200015	Complied
10	-2	1909.799998	1910.0	0.200002	Complied
20	21	1909.800021	1910.0	0.199979	Complied
30	-7	1909.799993	1910.0	0.200007	Complied
40	6	1909.800006	1910.0	0.199994	Complied
50	13	1909.800013	1910.0	0.199987	Complied

7.6. Transmitter Frequency Stability (Voltage Variation): Section 24.235

7.6.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

7.6.2. Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage.

Results:

Bottom Channel (1850.2 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.46	-4	1850.199996	1850	0.19996	Complied
3.7	-12	1850.199988	1850	0.19998	Complied

Transmitter Frequency Stability (Voltage Variation): Section 24.235 (Continued)

Results:

Top Channel (1909.8 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.46	-31	1909.799969	1910	0.200031	Complied
3.7	-9	1909.799991	1910	0.200009	Complied

7.7. Transmitter Occupied Bandwidth: Section 24.238

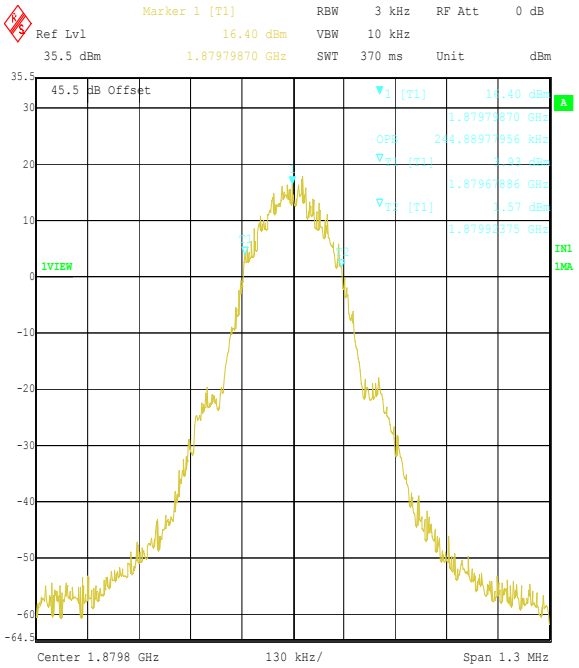
7.7.1. The EUT was configured as for occupied bandwidth measurements as described in Section 9 of this report.

7.7.2. Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

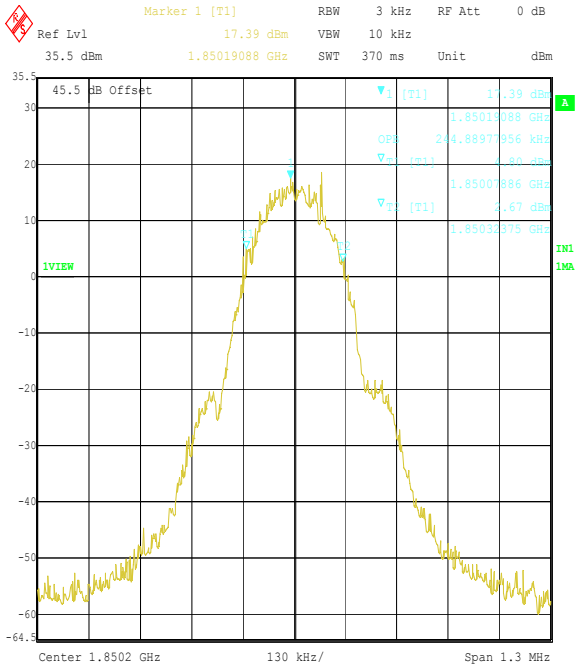
Results:

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	3.0	10.0	244.890
Middle	1879.8	3.0	10.0	244.890
Top	1909.8	3.0	10.0	242.285

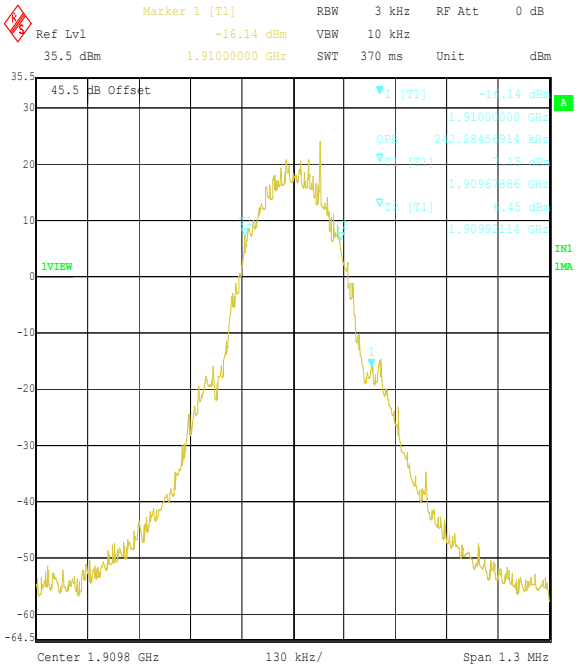
Transmitter Occupied Bandwidth: Section 24.238 (Continued)



Title: Panasonic 70944JD07 EUT:X800 FCC Part 24
Comment A: Transmitter Occupied Bandwidth
Date: 21.DEC.2004 17:06:00



Title: Panasonic 70944JD07 EUT:X800 FCC Part 24
Comment A: Transmitter Occupied Bandwidth
Date: 21.DEC.2004 17:04:28



Title: Panasonic 70944JD07 EUT:X800 FCC Part 24
Comment A: Transmitter Occupied Bandwidth
Date: 21.DEC.2004 17:01:05

Note: The occupied bandwidth is measured using the internal OBW function of the measurement analyser. The analyser automatically configures the measurement bandwidths to make an accurate measurement.
The results can be observed in the right hand corner of the graphs.

7.8. Transmitter Out of Band Radiated Emissions: Section 2.1053/ 24.238

7.8.1. The EUT was configured as for transmitter radiated emissions testing as described in Section 9 of this report.

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

Results:

Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3699.222	-27.4	-13.0	14.4	Complied
9251.789	-37.2	-13.0	24.2	Complied

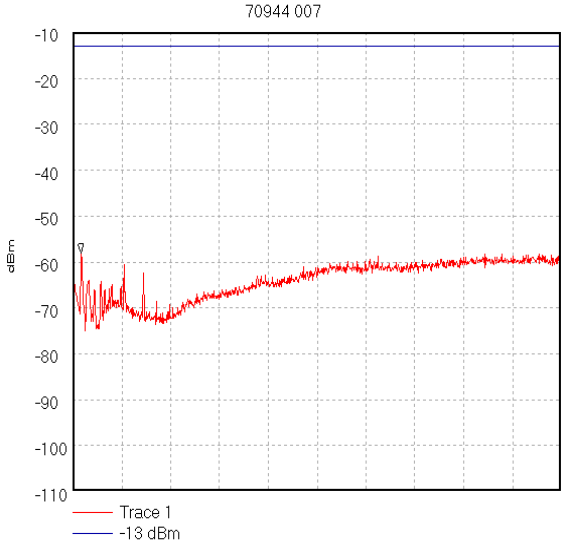
Middle Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3758.242	-16.9	-13.0	3.9	Complied
9398.762	-36.6	-13.0	23.6	Complied

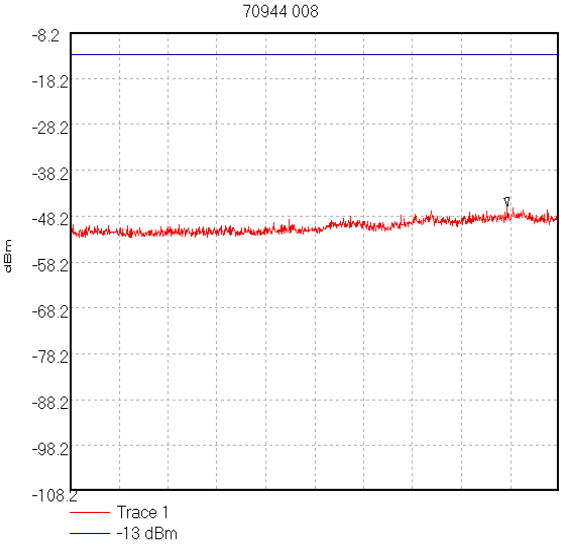
Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3818.287	-15.8	-13.0	2.8	Complied
9548.680	-38.3	-13.0	20.3	Complied

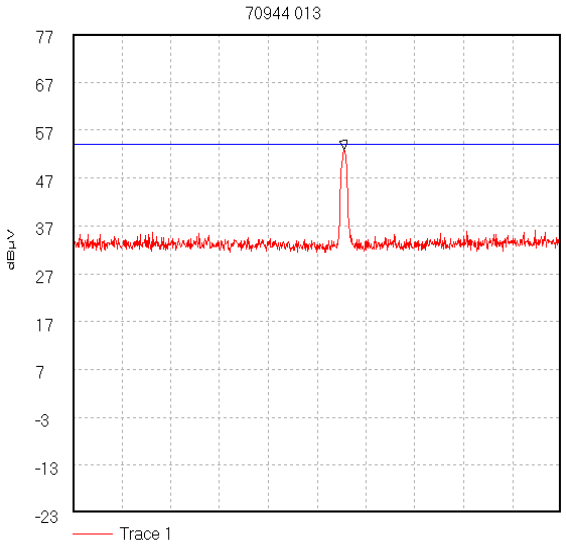
Transmitter Out of Band Radiated Emissions: Section 2.1051 & 24.238 (Continued)



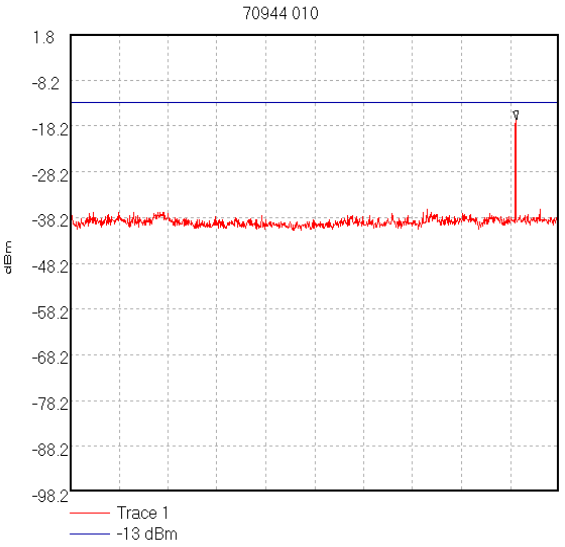
Start 30.0 MHz; Stop 1.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 440.0 mS
Peak 46.167 MHz, -58.01 dBm
Display Line: -13 dBm; ; Limit Test Passed
Transducer Factors: A1037
13/12/2004 14:56:18



Start 1.0 GHz; Stop 1.85 GHz
Ref -8.2 dBm; Ref Offset 11.8 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.76 GHz, -46.08 dBm
Display Line: -13 dBm; ; Limit Test Passed
Transducer Factors: A1037
13/12/2004 15:17:25



Start 1.91 GHz; Stop 2.0 GHz
Ref 77 dBµV; Ref Offset 11.8 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.96 GHz, 52.93 dBµV
Display Line: 54 dBµV; ; Limit Test Passed
13/12/2004 16:44:57

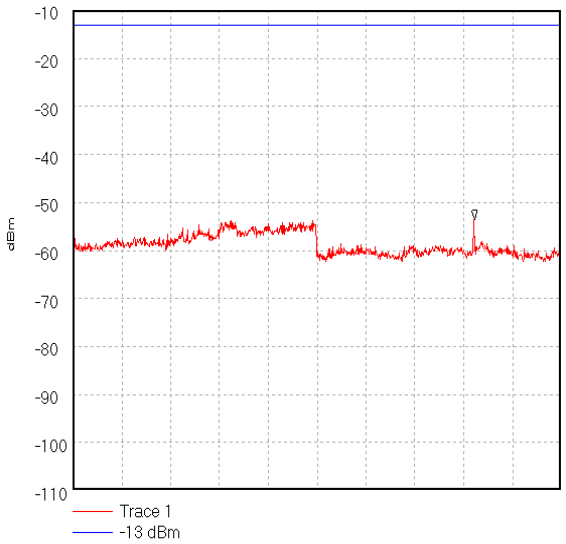


Start 2.0 GHz; Stop 4.0 GHz
Ref 1.8 dBm; Ref Offset 11.8 dB; 10 dB/div
RBW 1000.0 kHz; VBW 1.0 MHz; Att 10 dB; Swp 20.0 mS
Peak 3.824 GHz, -16.81 dBm
Display Line: -13 dBm; ; Limit Test Passed
Transducer Factors: A1037
13/12/2004 16:10:40

NOTE: Emission shown in plot 70944 013 at 1.96 GHz emanates from the GSM test set and not the EUT. Because the emission is not from the EUT, no level has been recorded in the preceding table.

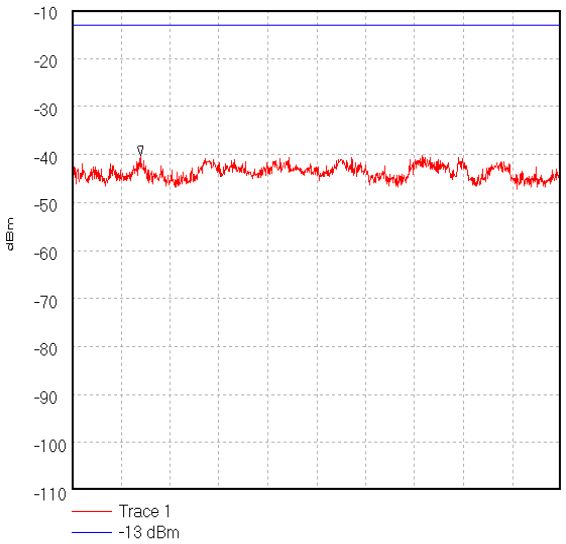
Transmitter Out of Band Radiated Emissions: Section 2.1051 & 24.238 (Continued)

70944 025



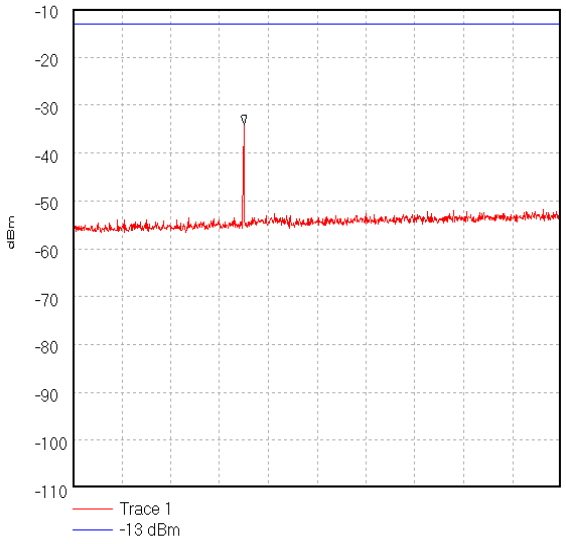
Start 4.0 GHz; Stop 6.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 5.644 GHz, -53.6 dBm
Display Line: -13 dBm;
15/12/2004 15:06:06

70944 026



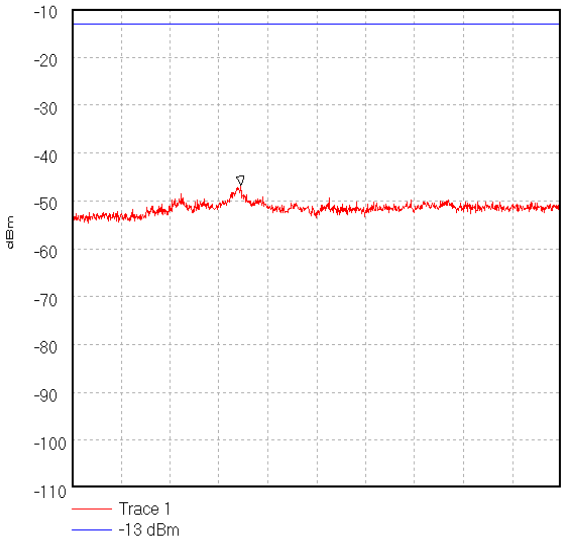
Start 6.0 GHz; Stop 8.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 20 dB; Swp 20.0 mS
Peak 6.28 GHz, -40.14 dBm
Display Line: -13 dBm;
15/12/2004 15:12:36

70944 027



Start 8.0 GHz; Stop 12.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 9.4 GHz, -34.04 dBm
Display Line: -13 dBm;
15/12/2004 15:18:36

70944 028



Start 12.0 GHz; Stop 18.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS
Peak 14.073 GHz, -46.79 dBm
Display Line: -13 dBm;
15/12/2004 15:23:37

Transmitter Out of Band Radiated Emissions: Section 2.1053/ 24.238 (Continued)

Integrated Power Over 1 MHz Strip Band: 1911 to 1912 MHz

1st 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	68.5	6	73.9
2	77.5	7	87.0
3	94.5	8	64.4
4	94.2	9	74.9
5	93.7	10	56.5
Total Peak Power:	785.1 nW/MHz		

Integrated Power Over 1 MHz Strip Band: 1912 to 1913 MHz

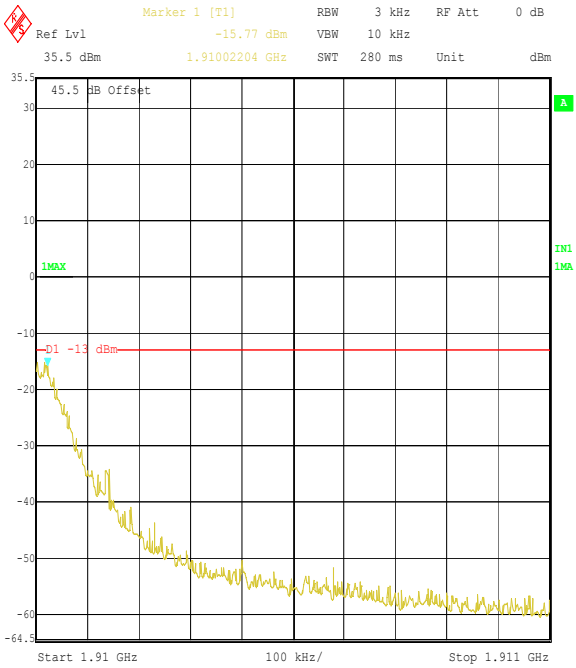
2nd 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	57.1	6	67.0
2	65.7	7	53.3
3	71.3	8	70.2
4	62.7	9	60.8
5	61.6	10	61.2
Total Peak Power:	630.9 nW/MHz		

Results:

Band (MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Status
1911 to 1912	-31.1	-13.0	-13.0	-18.1	Complied
1912 to 1913	-32.0	-13.0	-13.0	-19.0	Complied

Transmitter Out of Band Conducted Emissions: Section 2.1051 & 24.238 (Continued)



Title: Panasonic 70944JD07 EUT:X800 FCC Part 24
Comment A: Transmitter Out of Band Radiated Emissions
Date: 21.DEC.2004 16:33:44

7.9. Transmitter Radiated Emissions at Band Edges: Section 2.1053 & 24.238

7.9.1. The EUT was configured as for transmitter radiated emissions testing described in Section 9 of this report.

7.9.2. Tests were performed to identify the maximum emissions level at the band edges of the frequency block that the EUT will operate over.

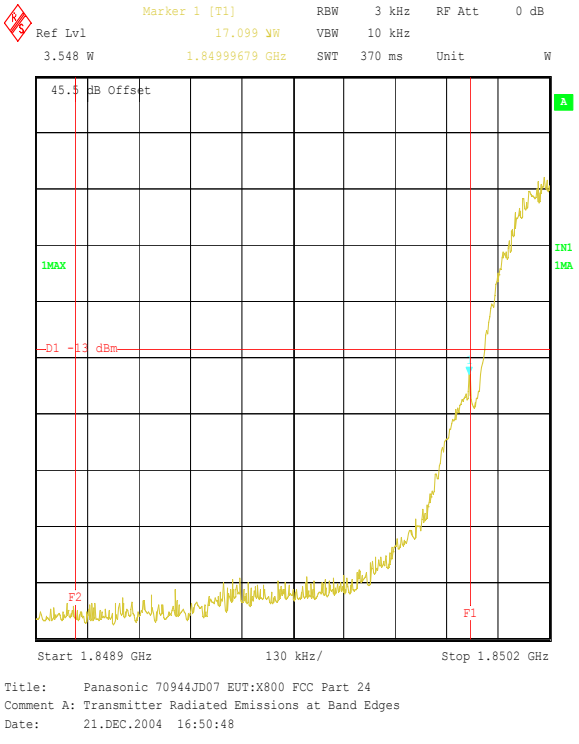
Results:

Bottom Band Edge

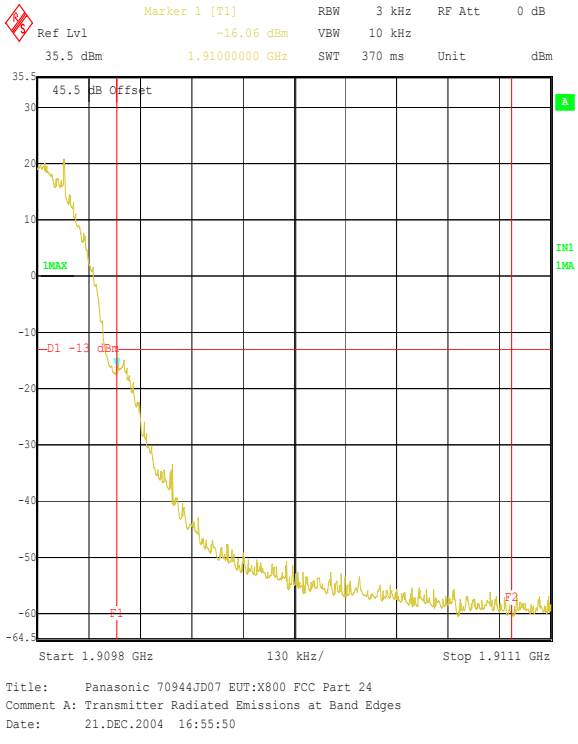
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-17.7	-13.0	4.7	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1910	-16.1	-13.0	3.1	Complied



Title: Panasonic 70944JD07 EUT:X800 FCC Part 24
Comment A: Transmitter Radiated Emissions at Band Edges
Date: 21.DEC.2004 16:50:48



Title: Panasonic 70944JD07 EUT:X800 FCC Part 24
Comment A: Transmitter Radiated Emissions at Band Edges
Date: 21.DEC.2004 16:55:50

8. Measurement Uncertainty

8.1. 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.

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

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

8.4. 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
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	+/- 1.78 dB
Frequency Stability	Not applicable	95%	+/- 20 Hz
Occupied Bandwidth	1850 to 1910 MHz	95%	+/- 0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 26 GHz	95%	+/- 1.78 dB

8.5. 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.

9. Measurement Methods

9.1. Effective Isotropic Radiated Power (EIRP)

EIRP measurements were performed in accordance with the standard, against appropriate limits.

The EIRP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4. The transmitter was fitted with an integral antenna; therefore all radiated tests were performed with the unit operating into the integral antenna.

The level of the EIRP was measured using a spectrum analyser.

The test antenna was positioned in the horizontal plane. The EUT was oriented in the X plane. The test antenna was then raised and lowered until a maximum peak was observed. The turntable was then rotated through 360 degrees and the maximum peak reading obtained. The height search was then repeated to take into consideration the new angular position of the turntable. The maximum reading observed was then recorded. This procedure was then repeated with the EUT oriented in the Y and Z planes. The highest reading taken in all 3 planes was recorded. The entire procedure was then repeated with the test antenna set in the Vertical polarity.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For EIRP measurements a Horn antenna whose gain was based on an isotropic antenna was used, ERP measurements were done using a dipole. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The EIRP was calculated as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain

All measurements were performed using broadband Horn antennas.

Effective Isotropic Radiated Power (EIRP) (Continued)

Circumstances where the signal generator could not produce the desired power substitution was performed with the signal generator set to 0 dBm. The radiated signal was maximised as previously described. The level indicated on the measuring receiver was noted. The delta between this level and the maximum level for the EUT was calculated and also noted. The EIRP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated EIRP to obtain the substituted EUT EIRP.

Delta (dB) = EUT – SG

where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual EIRP is calculated as:

EIRP SG= Signal Generator Level - Cable Loss + Antenna Gain

The EUT EIRP is calculated as:

EIRP EUT = EIRP SG + Delta.

The test equipment settings for EIRP measurements were as follows:

Receiver Function	**Setting**
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	100 dB
Sweep Time:	Coupled

9.2. Frequency Stability

The EUT was situated within an environmental test chamber and connected directly to the GSM test set via an access port.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range –30 to 50 degrees C.

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage (for hand carried battery operated equipment) or by varying the primary supply voltage from 85% to 115% of the nominal value for all other equipment types.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions and ensure they remained within specified operating parameters.

Measurements were made on the top and bottom channels.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

Once the environmental chamber had reached thermal equilibrium, the nominal frequency of the EUT was measured and recorded. The recorded frequency was compared to the applicants declared operating frequency band edges.

In order to show compliance, the measured frequency must remain within the declared frequency band.

The reported data shows the nominal frequency drift and its margin from the band edge. If this margin is positive, the result is compliant. If it goes negative, the result is a non-compliance.

9.3. Occupied Bandwidth

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function and a GSM test set via a bi-directional coupler to its antenna port.

Measurements were performed to determine the Occupied Bandwidth in accordance with FCC Part 2.1049. The Occupied Bandwidth was measured from the fundamental emission at the bottom middle and top channels.

As the EUT is a PCS phone, no modulation input port was available. A call was therefore set up using the PCS/GSM simulator and using normal modulation. The Occupied Bandwidth was measured in this configuration.

The Occupied Bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB or ESIB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the spectrum analyser user manual for this measurement, i.e., RBW $\geq$ 1% of occupied bandwidth. A value of 3 kHz was used.

9.4. 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 115V 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

9.5. Transmitter Radiated Emissions

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

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 10 times the highest fundamental frequency. The scans were performed within a screened chamber in order to identify frequencies on which the EUT was generating spurious. This procedure identified the frequencies from the EUT, which required further examination. Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit by characterising the screen room using a known signal source set at exactly the same location as the EUT. The signal source was derived from either a horn antenna or a dipole dependant on the frequency band under investigation. Any levels within 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a Peak detector was used for final measurements at each frequency recorded in the screen room.

The levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the vertical polarisation. 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. The procedure was repeated for the horizontal polarisation.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For EIRP measurements a Horn antenna whose gain was based on an isotropic antenna was used, ERP measurements were done using a dipole. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The EIRP was calculated as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain

The limit in the standard states that emissions shall be attenuated by at least 43+10 log (P) dB below the transmitter power (P), where (P) is the maximum measured fundamental power for the channel under test. This limit always reduces to –13 dBm therefore, the limit line presented on the accompanying plots is set to –13 dBm.

Any spurious measured were then compared to the –13 dBm limit. The requirement is for the emission to be less than –13 dBm. The margin between emission and limit is recorded and should always be positive to indicate compliance.

All measurements were performed using broadband Horn antennas.

Transmitter Radiated Emissions (Continued)

It should be noted that FCC Part 24.238 states that the 1st MHz band immediately adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. This bandwidth was found by calculating 1% of the bandwidth measured in the transmitter occupied bandwidth section of this report. The next largest available bandwidth above this calculated figure was, therefore, used i.e. 3 kHz.

The measurements in the 2nd and 3rd 1 MHz blocks away from the adjacent 1 MHz block from 1911 MHz to 1912 MHz and 1912 MHz to 1913 MHz were carried out using an analyser span of 1 MHz and a 100 kHz receiver resolution bandwidth (RBW). 10 linear readings were taken for each 100 kHz strip across the 1 MHz band. These readings were integrated to give the emission level in an equivalent 1 MHz bandwidth.

9.6. Receiver Radiated Emissions

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

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to the upper frequency detailed in Section 15.33(b) were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT, which required further examination. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit. Levels within 20 dB of this limit were measured where possible, on occasion, the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a Quasi-Peak detector was used for measurements below 1000 MHz, for measurements above 1000 MHz average and peak detectors were used.

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.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. 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. The procedure was repeated for the vertical polarisation.

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

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

Receiver Function	**Initial Scan**	**Final Measurements Below 1 GHz**	**Final Measurements Above 1 GHz**
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz < 1 GHz) (1 MHz > 1 GHz)	120 kHz	1 MHz (If Applicable)
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A004	ESH3-Z5 LISN	Rohde & Schwarz	ESH3-Z5	890 604/027
A028	Horn Antenna	Eaton	91888-2	304
A1362	Eaton	Stoddart Aircraft Radio Co., Inc.	91889-1	N/A
A197	Site 2 Controller SC144	Unknown	SC144	150720
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519
A256	WG 18 Microwave Horn	Flann Microwave	18240-20	400
A259	Bilog Antenna	Chase	CBL6111	1513
A288	Bilog Antenna	Chase	CBL6111A	1589
A428	WG 12 horn	Flann	12240-20	134
A509	Co-ax Switch	RS components	DC-1.5 GHz	N/A
E013	PCN Environmental Chamber	Sanyo	ATMOS chamber	None
L0733	Anritsu MT8820A	Anritsu	MT8820A	6K0001055
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M069	ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	829 808/007 (DU) / 827 063/008 (RU)
M105	Fluke 77 DVM	Fluke	77	963580770
M1124	Rohde & Schwarz	Rohde & Schwarz	ESIB26	100046K
M1140	Anritsu	Anritsu	MT8820A	6K0000647
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
M505	Analyser Display Unit	Rohde & Schwarz	ESAI-D	825316/010
M506	RF unit	Rohde & Schwarz	ESBI-RF	827060/004
S001	DC Supply	GW	GPQ-2030	7112644
S011	D.C. PSU	INSTEK	PR-3010H	9401270
S503	Antenna Mast	EMCO	1051-25	9205 1670

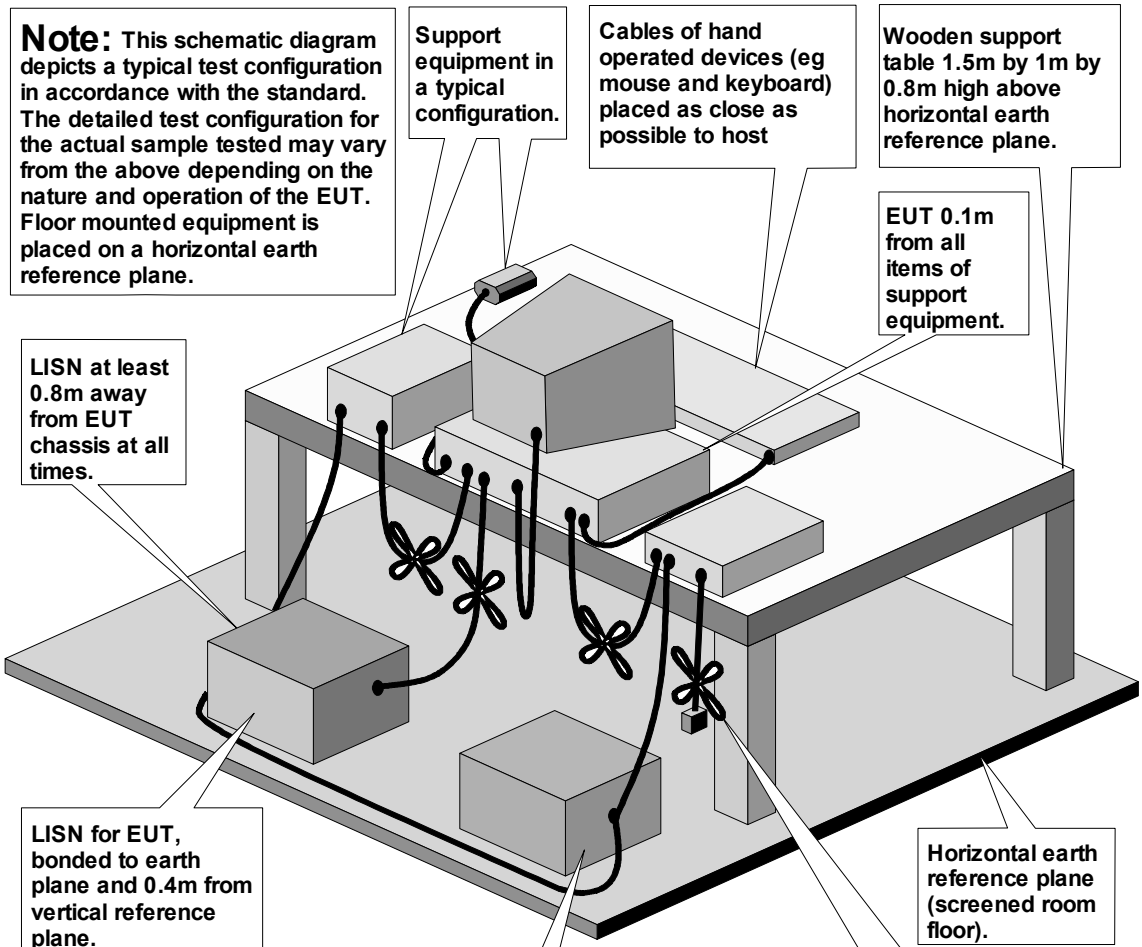
NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\70944JD04\EMICON	Test configuration for measurement of conducted emissions.
DRG\70944JD04\EMIRAD	Test configuration for measurement of radiated emissions.

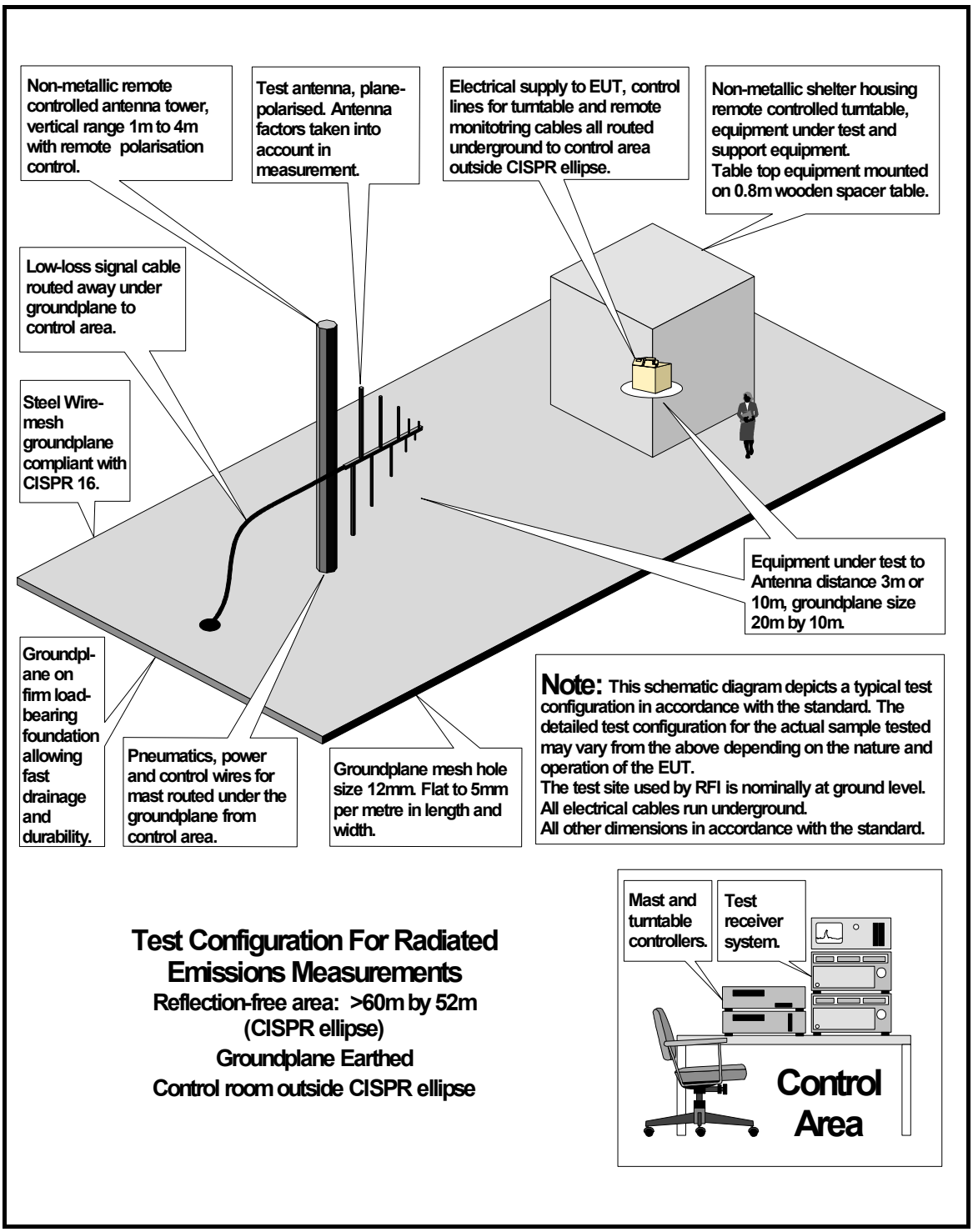
DRG\70944JD04\EMICON



Typical Test Configuration For Conducted Emissions Measurements In Accordance With ANSI C63.4-1992

Tests performed in a screened enclosure

DRG\70944JD04\EMIRAD



Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m (CISPR ellipse)

Groundplane Earthed

Control room outside CISPR ellipse