






# TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Matsushita Mobile Communications Development Europe.  
Panasonic X70U

To: FCC Part 22

**Test Report Serial No:**  
RFI/MPTB1/RP44323JD05A

<b>This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director:</b> 	<b>Checked By:</b> 
<b>Tested By:</b> 	<b>Release Version No: PDF01</b>
<b>Issue Date: 24 November 2003</b>	<b>Test Dates: 30 September 2003 to 30 October 2003</b>

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**RADIO FREQUENCY INVESTIGATION LTD**

**TEST REPORT**

**Operations Department**

**S.No. RFI/MPTB1/RP44323JD05A**

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## **1. Client Information**

<b>Company Name:</b>	Matsushita Mobile Communications Development Europe
<b>Address:</b>	2 Gables Way, Colthrop, Thatcham, Berkshire, RG19 4ZD, United Kingdom.
<b>Contact Name:</b>	Mr M Hargreaves

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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:	Panasonic
Model Name or Number:	X70U
Unique Type Identification:	X70U
IMEI Number:	004400622871885
FCC ID Number:	NWJ22B002A
Country of Manufacture:	China
Date of Receipt:	07 August 2003

**2.2. Accessories Supplied with Equipment Under Test (EUT)**

The following accessories were used during testing:

Description:	AC Charger
Brand Name:	Panasonic
Model Name or Number:	EB-CAX70
Serial Number:	001
Cable Length And Type:	1.5 m
Connected to Port:	Charger Connection

Description:	Headset
Brand Name:	Panasonic
Model Name or Number:	EB-EMD87
Serial Number:	001
Cable Length And Type:	1.2 m
Connected to Port:	Headset Connection

Description:	Battery
Brand Name:	Panasonic
Model Name or Number:	EB-BSX70
Serial Number:	None
Cable Length And Type:	N/A
Connected to Port:	Battery

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**Accessories Supplied with Equipment Under Test (EUT) (Continued)**

<b>Description:</b>	USB cable with AC charger port
<b>Brand Name:</b>	Panasonic
<b>Model Name or Number:</b>	EB-UCX70
<b>Serial Number:</b>	None
<b>Cable Length And Type:</b>	1 metre
<b>Connected to Port:</b>	Charger/Accessory Connection

**2.3. Description Of EUT**

The equipment under test is a tri-band (850 1800 & 1900) camera mobile handset, which supports IR and Bluetooth.

Note, the 850 MHz mode was the only mode tested only. The Bluetooth and PCS 1900 MHz modes have not been approved. This was at the request of the client.

**2.4. Modifications Incorporated In EUT**

The EUT has not been modified from what is described by the Model Number and Unique Type Identification stated above.

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**2.5. Additional Information Related To Testing**

<b>Power Supply Requirement:</b>	3.6V		
<b>Declared Battery End Point Voltage:</b>	4.2V (Max), 3.46V (Min)		
<b>Power Supply Requirement: (AC Battery Charger)</b>	Nominal 115 V 60 Hz AC Mains supply		
<b>Intended Operating Environment:</b>	Within GSM Network Coverage		
<b>Equipment Category:</b>	Cellular Phone		
<b>Type of Unit:</b>	Transceiver		
<b>Weight:</b>	92g		
<b>Dimensions:</b>	87mm(H) x 47mm(W) x 23.9mm(D)		
<b>Interface Ports:</b>	Charger Connection Headset Connection Serial Data Connection		
<b>Highest Fundamental Frequency:</b>	848.8 MHz		
<b>Highest Oscillator Frequency:</b>	3979.6 MHz		
<b>Transmit Frequency Range:</b>	824.2 MHz to 848.8 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	128	824.2
	Middle	190	836.6
	Top	251	848.8
<b>Receive Frequency Range:</b>	869.0 to 894.0 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	128	869.2
	Middle	190	881.6
	Top	251	893.8
<b>Maximum Power Output (ERP):</b>	29.3 dBm		

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## 2.6. Support Equipment

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

<b>Description:</b>	GSM Test set
<b>Brand Name:</b>	Wiltek
<b>Model Name or Number:</b>	42025
<b>Serial Number:</b>	0513018
<b>Cable Length And Type:</b>	N/A
<b>Connected to Port:</b>	RF Link (Air Interface)

<b>Description:</b>	Laptop
<b>Brand Name:</b>	Dell
<b>Model Name or Number:</b>	PP01X Latitude C840
<b>Serial Number:</b>	03J010-12961-2AQ-5407
<b>Cable Length And Type:</b>	N/A
<b>Connected to Port:</b>	Accessory

<b>Description:</b>	Laptop
<b>Brand Name:</b>	Packard Bell
<b>Model Name or Number:</b>	EASY Note: VX
<b>Serial Number:</b>	I600300050
<b>Cable Length And Type:</b>	N/A
<b>Connected to Port:</b>	Accessory



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### 3. Test Specification, Methods And Procedures

#### 3.1. Test Specifications

<b>Reference:</b>	FCC Part 22 Subpart H: 2002 (Cellular Radiotelephone Service)
<b>Title:</b>	Code of Federal Regulations, Part 22 (47CFR22) Personal Communication Services.
<b>Comments:</b>	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
<b>Purpose of Test:</b>	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

<b>Reference:</b>	FCC Part 15 Subpart B: 2001 (Section 15.107 and 15.109)
<b>Title:</b>	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices: Radio Frequency Devices.
<b>Comments:</b>	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
<b>Purpose of Test:</b>	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

<b>Reference:</b>	FCC Part 2 Subpart J: 2002 (Sections 2.1051 and 2.1053)
<b>Title:</b>	Code of Federal Regulations, Part 2 (47CFR) Frequency allocations and radio treaty matters; General Rules and Regulations
<b>Comments:</b>	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
<b>Purpose of Test:</b>	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

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### **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 (2001)

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.

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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 Conditions**

During testing, the EUT was powered by a Nominal 3.6 V DC Battery connected to a 115 V 60 Hz AC Mains charger.

### **5.2. 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 2.1 of this report connected and the disconnected. The combination that exhibited the worse case mode of operation was then used to perform final measurements.

Call mode, Transmitting on Top, Middle, Bottom channels or in Idle mode.

### **5.3. Configuration And Peripherals**

The EUT was tested in the following configuration:

Receive/Idle Mode: The EUT was configured with hands free kit, laptop via USB cable, AC battery charger, and internal battery as worst case.

Transmit Mode: The EUT was configured with hands free kit, AC battery charger, and internal battery. As the USB connection do not alter the characteristic of the transmitter emissions.

The EUT was programmed to operate on specific channels using a GSM test set.

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## **6. Summary Of Test Results**

<b>Range Of Measurements</b>	<b>Specification Reference</b>	<b>Port Type</b>	<b>Compliance Status</b>
Receiver/Idle Mode AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2002 Section 15.107	AC Mains Input	Complied
Receiver/Idle Mode Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.109	Antenna	Complied
Transmitter Effective Radiated Power (ERP)	C.F.R. 47 FCC Part 22: 2002 Section 22.913(a)	Antenna	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 22: 2002 Section 22.355	Antenna	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 22: 2002 Section 22.355	Antenna	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 22: 2002 Section 2.1049(i)	Antenna	Complied
Transmitter Radiated Out of Band Emissions	C.F.R. 47 FCC Part 22: 2002 Section 2.1053/22.917	Antenna	Complied
Radiated Band Edges	C.F.R. 47 FCC Part 2: 2002 Section 2.1053	Antenna	Complied

### **6.1. Location Of Tests**

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

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## **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.

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## 8. Test Results

### 8.1. Receiver/Idle Mode AC Conducted Spurious Emissions: Section 15.107

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

8.1.2. Tests were performed to identify the maximum emission levels on the AC mains line of the AC Charger whilst connected to the EUT.

#### Results: Quasi-Peak Detector Measurements On Live And Neutral Lines

Frequency (MHz)	Line	Q-P Level (dB $\mu$ V)	Q-P Limit (dB $\mu$ V)	Margin (dB)	Result
0.16855	Neutral	47.92	65.03	17.11	Complied
0.33786	Neutral	40.22	59.26	19.04	Complied
1.15532	Neutral	44.64	56.00	11.36	Complied
1.16130	Neutral	45.40	56.00	10.60	Complied
1.23876	Neutral	45.22	56.00	10.78	Complied
2.48703	Neutral	42.46	56.00	13.54	Complied
2.67108	Neutral	41.36	56.00	14.64	Complied
19.37105	Neutral	40.20	60.00	19.80	Complied

#### Results: Average Detector Measurements On Live And Neutral Lines

Frequency (MHz)	Line	Av. Level (dB $\mu$ V)	Av. Limit (dB $\mu$ V)	Margin (dB)	Result
0.16855	Neutral	42.89	55.03	12.14	Complied
0.33786	Neutral	30.83	49.26	18.43	Complied
1.15532	Neutral	29.23	46.00	16.77	Complied
1.16130	Neutral	29.15	46.00	16.85	Complied
1.23876	Neutral	29.12	46.00	16.88	Complied
2.48703	Neutral	25.98	46.00	20.02	Complied
2.67108	Neutral	24.53	46.00	21.47	Complied
19.37105	Neutral	33.26	60.00	16.74	Complied

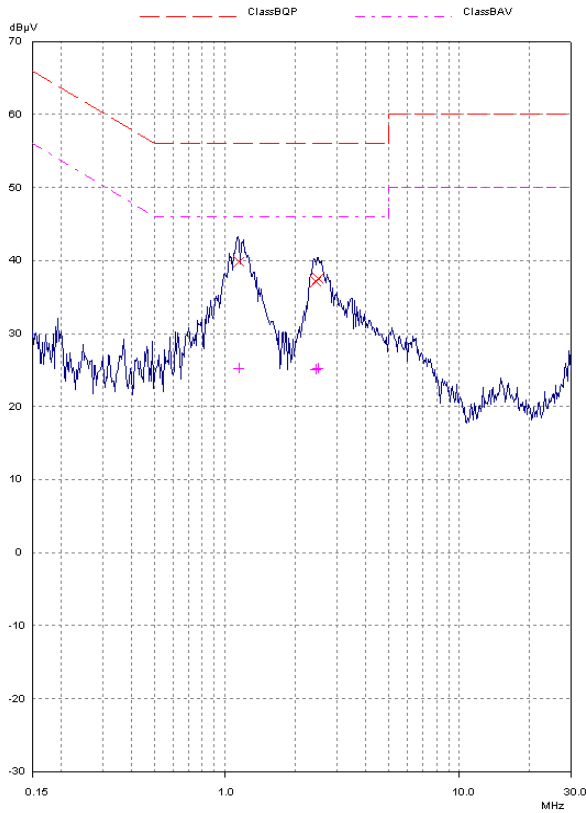
**Note:** The worst-case configuration was specified as the EUT connected with the USB adaptor to the laptop, AC Charger, Hands-free kit and internal battery.

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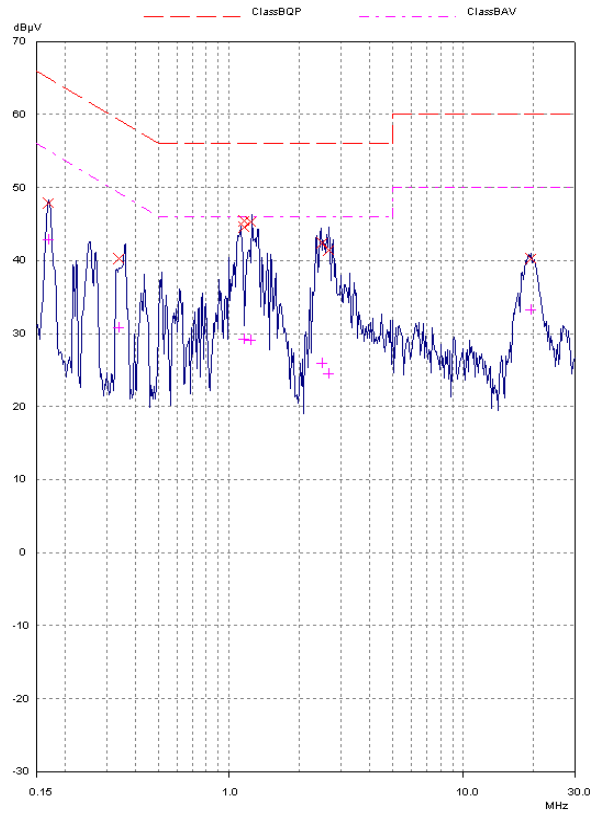
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**Idle Mode AC Conducted Spurious Emissions: Section 15.107 (Continued)**

**Normal Configuration**



**Worst Case Configuration**



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



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## **8.2. Receiver/Idle Mode Radiated Spurious Emission: Section 15.109**

### **8.2.1. Electric Field Strength Measurements (Frequency Range 30 to 1000 MHz)**

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

8.2.1.2. Tests were performed to identify the maximum radiated emissions levels while in receiver/idle mode.

#### **Results:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Q-P Level (dB<math>\mu</math>V/m)</b>	<b>Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
46.2790	Vert.	15.0	40.0	25.0	Complied
53.3916	Vert.	14.3	40.0	25.7	Complied
94.1820	Horiz.	14.9	43.5	28.6	Complied
103.5110	Vert.	16.9	43.5	26.6	Complied
197.7062	Horiz.	15.5	43.5	28.0	Complied
171.5970	Vert.	16.2	43.5	27.3	Complied
273.4138	Vert.	19.7	46.0	26.3	Complied
291.8148	Vert.	20.1	46.0	25.9	Complied
414.3528	Horiz.	17.7	46.0	28.3	Complied

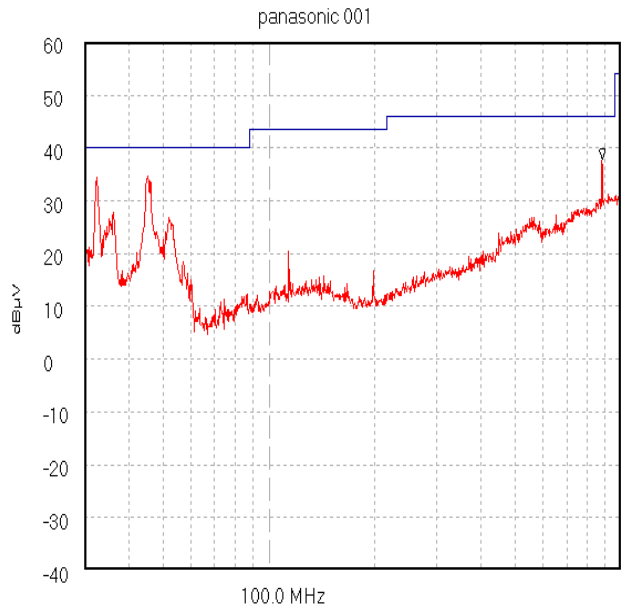
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**Receiver/Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)**

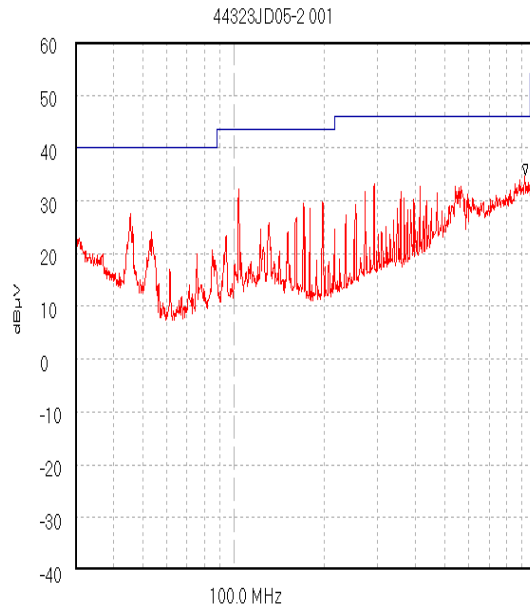
**Normal Configuration**



Trace 1  
15\_109\_Class\_B

Start 30.0 MHz; Stop 1.0 GHz - Log Scale  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 80.0 mS  
Peak 882.781 MHz, 37.76 dBµV  
Limit/Mask: 15\_109\_Class\_B; ; Limit Test Passed  
Transducer Factors: A490  
30/09/2003 16:25:49

**Worst Case Configuration**



Trace 1  
15\_109\_Class\_B

Start 30.0 MHz; Stop 1.0 GHz - Log Scale  
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div  
RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 380.0 mS  
Peak 921.438 MHz, 34.81 dBµV  
Limit/Mask: 15\_109\_Class\_B; ; Limit Test Passed  
Transducer Factors: A490  
23/10/2003 18:30:10

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

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**Receiver/Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)****8.2.2. Electric Field Strength Measurements (Frequency Range 1.0 to 20.0 GHz)**

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

8.2.2.2. Tests were performed to identify the maximum receiver or idle mode radiated emission level present in the band 30 MHz to 5 x the highest fundamental frequency.

**Results: Highest Peak Level**

Frequency (GHz)	Antenna Polarity	Peak Detector Level (dB $\mu$ V)	Antenna Factor	Cable Loss	Actual Peak Level (dB $\mu$ V/m)	Peak Level (dB $\mu$ V/m)	Peak Margin (dB)	Result
1.80924	Vert.	10.9	21.2	0.8	41.9	74.0	32.1	Complied
4.66147	Horiz.	12.0	24.2	2.0	38.2	74.0	35.8	Complied
11.63927	Vert.	5.1	30.6	2.9	38.6	74.0	35.4	Complied
14.00891	Vert.	-1.3	33.7	3.6	36.0	74.0	38.0	Complied
19.78529	Vert.	-3.5	37.1	5.0	5.0	74.0	35.4	Complied

**Results: Highest Average Level:**

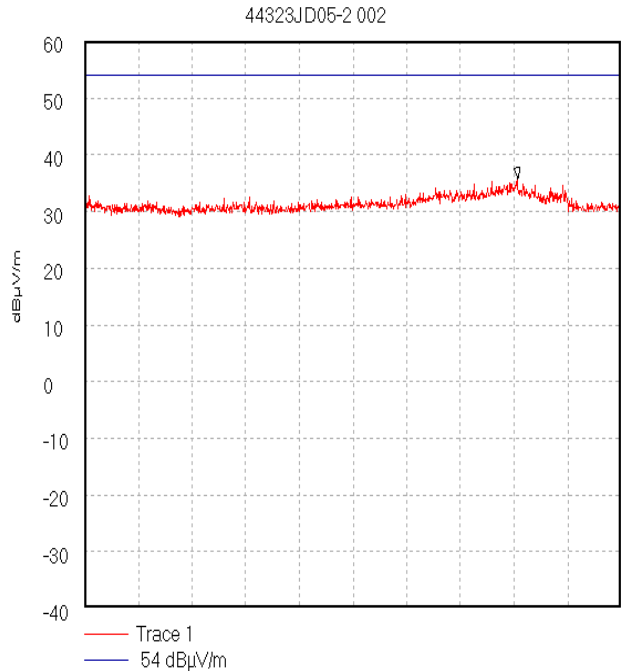
Frequency (GHz)	Antenna Polarity	Average Detector Level (dB $\mu$ V)	Antenna Factor	Cable Loss	Actual Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Peak Margin (dB)	Result
1.80924	Vert.	4.1	21.2	0.8	26.1	54.0	27.9	Complied
4.66147	Horiz.	-1.8	24.2	2.0	24.4	54.0	29.6	Complied
11.63927	Vert.	-10.0	30.6	2.9	23.5	54.0	30.5	Complied
14.00891	Vert.	-15.1	33.7	3.6	22.2	54.0	31.8	Complied
19.78529	Vert.	-17.3	37.1	5.0	24.8	54.0	29.2	Complied

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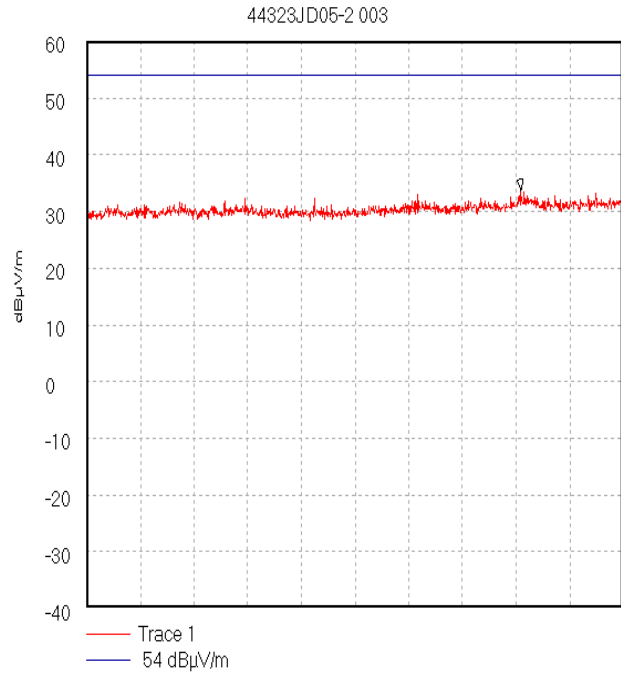
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**Receiver/Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)**



Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.807 GHz, 35.78 dBµV/m  
Display Line: 54 dBµV/m; ; Limit Test Failed  
Transducer Factors: 1 to 2  
23/10/2003 18:56:55



Start 2.0 GHz; Stop 4.0 GHz  
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 3.618 GHz, 33.72 dBµV/m  
Display Line: 54 dBµV/m; ; Limit Test Passed  
Transducer Factors: 2 to 4  
23/10/2003 19:02:25

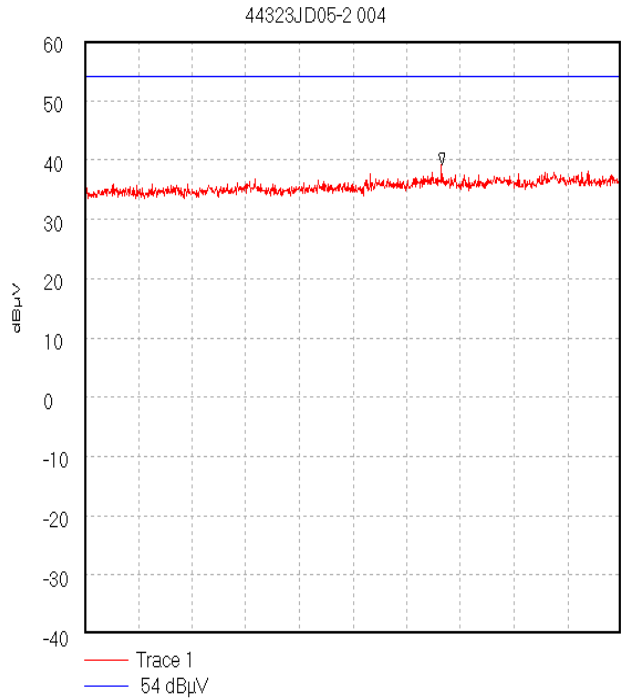
*Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

Test Of: **Matsushita Mobile Communications Development Europe.**

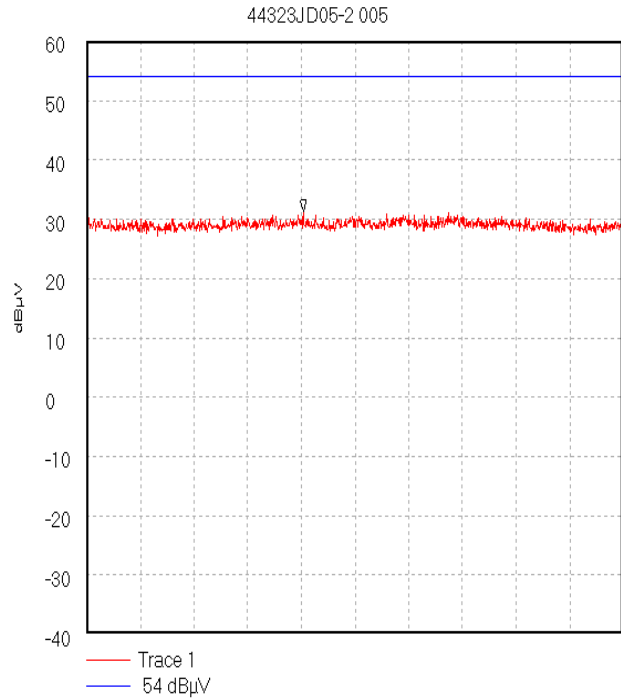
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**Receiver/Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)**



Start 4.0 GHz; Stop 5.0 GHz  
Ref 60 dBµV; Ref Offset 2.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 4.665556 GHz, 39.23 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
30/10/2003 18:26:00



Start 5.0 GHz; Stop 6.0 GHz  
Ref 60 dBµV; Ref Offset 2.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 5.404444 GHz, 31.34 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
30/10/2003 18:31:06

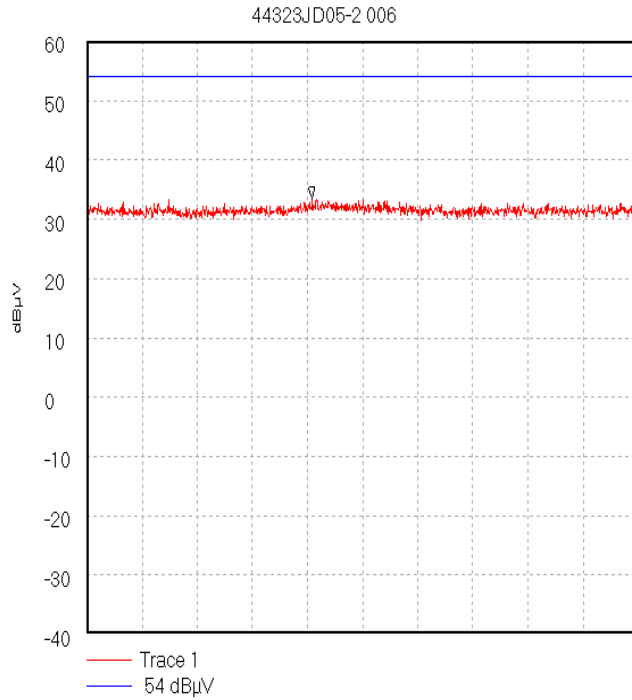
*Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

Test Of: **Matsushita Mobile Communications Development Europe.**

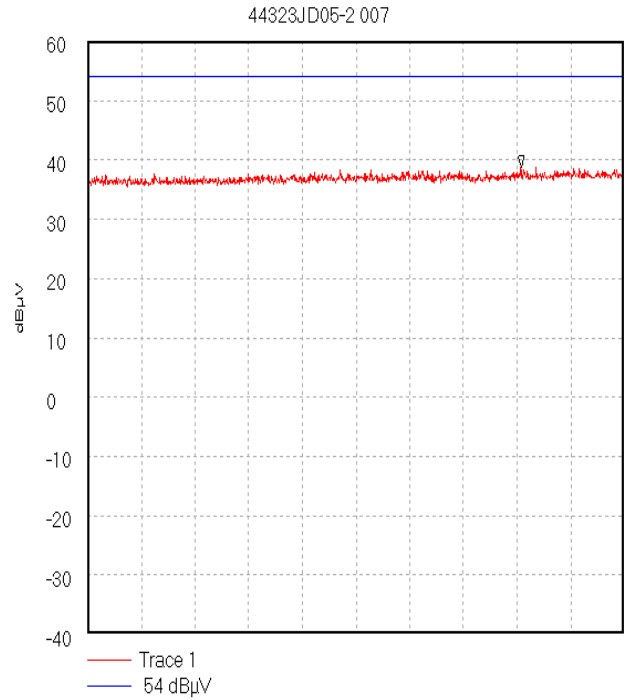
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**Receiver/Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)**



Start 6.0 GHz; Stop 8.0 GHz  
Ref 60 dBµV; Ref Offset 2.3 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 6.817778 GHz, 33.6 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
30/10/2003 18:32:19



Start 8.0 GHz; Stop 12.5 GHz  
Ref 60 dBµV; Ref Offset 2.9 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS  
Peak 11.635 GHz, 38.85 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
30/10/2003 18:37:48

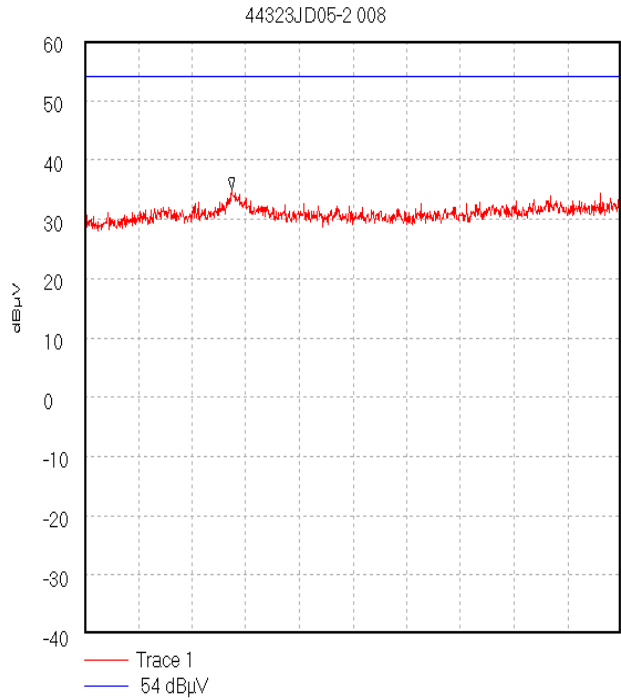
*Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

Test Of: **Matsushita Mobile Communications Development Europe.**

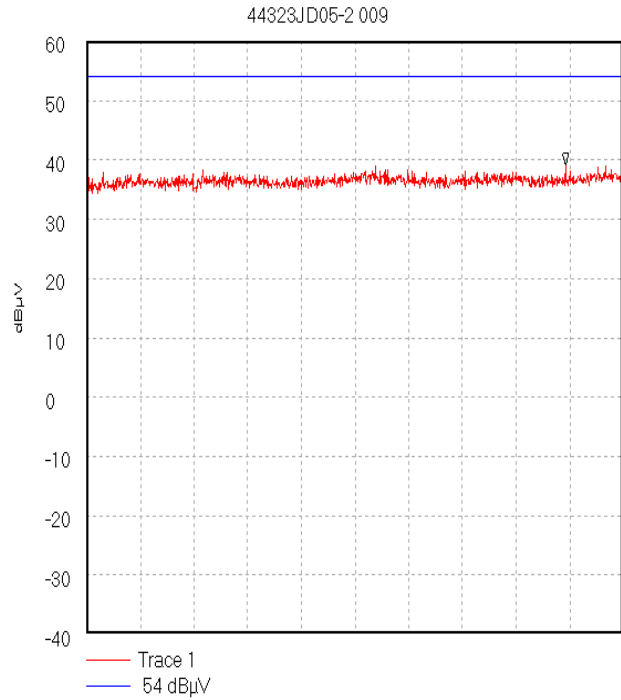
**Panasonic X70U**

To: **FCC Part 22**

**Receiver/Idle Mode Radiated Spurious Emission: Section 15.109 (Continued)**



Start 12.5 GHz; Stop 18.0 GHz  
Ref 60 dBµV; Ref Offset 3.6 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS  
Peak 14.009444 GHz; 35.04 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
30/10/2003 19:10:08



Start 18.0 GHz; Stop 20.0 GHz  
Ref 60 dBµV; Ref Offset 5.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 19.786667 GHz; 39.11 dBµV  
Display Line: 54 dBµV; ; Limit Test Passed  
30/10/2003 19:12:57

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

Test Of: Matsushita Mobile Communications Development Europe.

Panasonic X70U

To: FCC Part 22

**8.3. Transmitter Effective Radiated Power (ERP): Section 22.913(a)**

8.3.1. The EUT was configured as for Effective Radiated Power (ERP) as described in Section 9 of this report.

8.3.2. Tests were performed to identify the maximum effective radiated output power (ERP) from the EUT.

**Results:**

Channel	Measured Frequency (MHz)	Antenna Polarity	Maximum Transmitter ERP (dBm)	Limit ERP (dBm)	Margin (dB)	Result
Bottom	824.2	Vert.	26.9	38.4	11.5	Complied
Middle	836.6	Vert.	28.7	38.4	9.7	Complied
Top	848.8	Vert.	29.3	38.4	9.1	Complied



Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

**8.4. Transmitter Frequency Stability (Temperature Variation): Section 22.355**

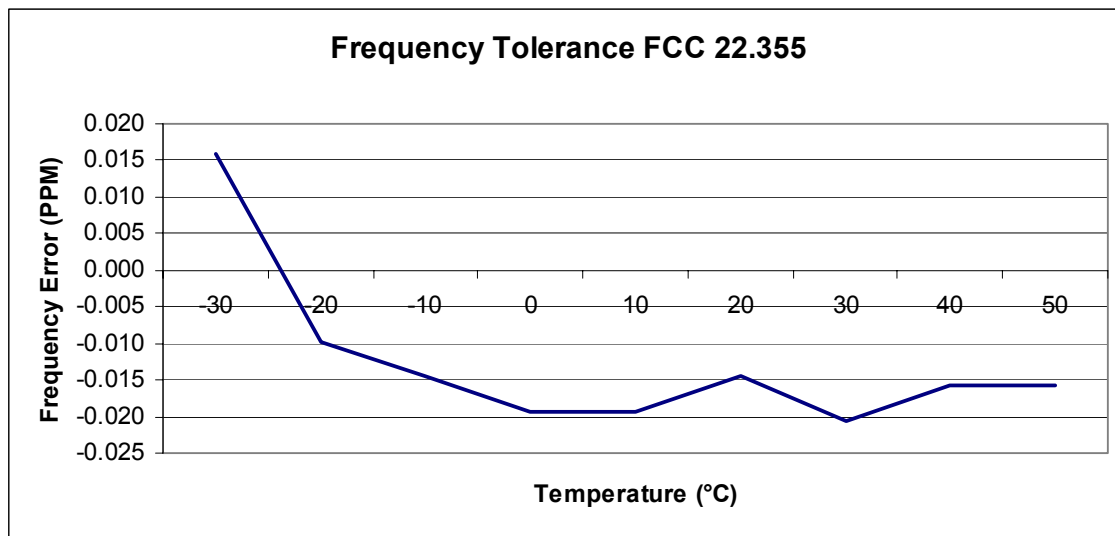
8.4.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

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

**Results: Bottom Channel (824.2 MHz)**

Temperature (°C)	Nominal Frequency	Measured Frequency	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	824.2	824.200013	13	0.016	2.5	2.484	Complied
-20	824.2	824.199992	-8	0.010	2.5	2.490	Complied
-10	824.2	824.199988	-12	0.015	2.5	2.485	Complied
0	824.2	824.199984	-16	0.019	2.5	2.481	Complied
10	824.2	824.199984	-16	0.019	2.5	2.481	Complied
20	824.2	824.199988	-12	0.015	2.5	2.485	Complied
30	824.2	824.199983	-17	0.021	2.5	2.479	Complied
40	824.2	824.199987	-13	0.016	2.5	2.484	Complied
50	824.2	824.199987	-13	0.016	2.5	2.484	Complied

**Frequency Variation From 824.2MHz**



Test Of: **Matsushita Mobile Communications Development Europe.  
Panasonic X70U**

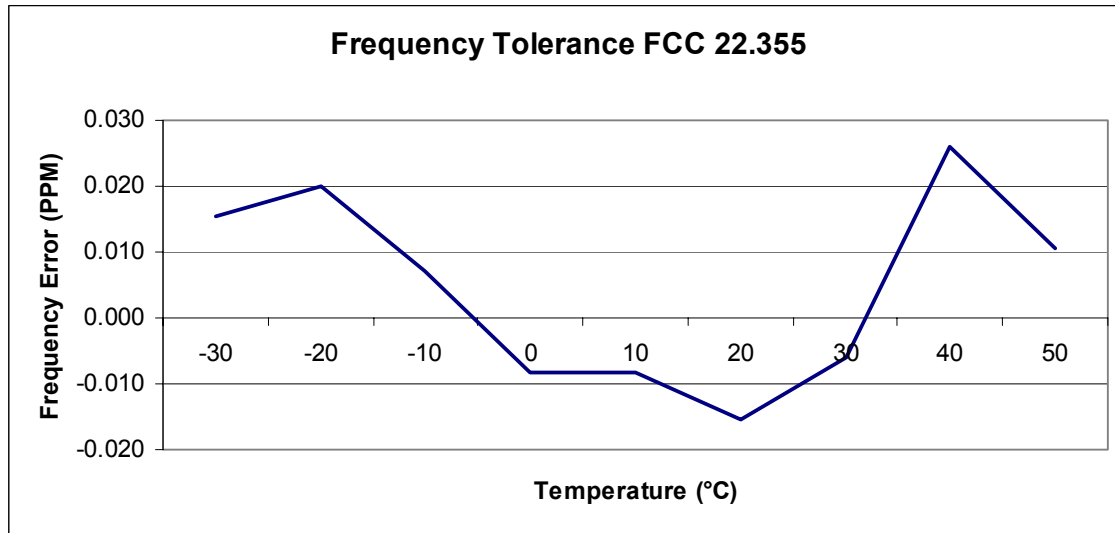
To: **FCC Part 22**

**Transmitter Frequency Stability (Temperature Variation): Section 22.355 (Continued)**

**Results: Top Channel (848.8 MHz)**

Supply Voltage (V)	Nominal Frequency	Measured Frequency	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	848.8	848.800013	13	0.015	2.5	2.484	Complied
-20	848.8	848.800017	17	0.020	2.5	2.480	Complied
-10	848.8	848.800006	6	0.007	2.5	2.493	Complied
0	848.8	848.799993	-77	0.008	2.5	2.492	Complied
10	848.8	848.799993	-7	0.008	2.5	2.492	Complied
20	848.8	848.799987	-13	0.016	2.5	2.484	Complied
30	848.8	848.799995	-5	0.006	2.5	2.494	Complied
40	848.8	848.800022	22	0.026	2.5	2.474	Complied
50	848.8	848.800009	9	0.011	2.5	2.489	Complied

**Frequency Variation From 848.8 MHz**



Test Of: **Matsushita Mobile Communications Development Europe.  
Panasonic X70U**

To: **FCC Part 22**

**8.5. Transmitter Frequency Stability (Voltage Variation): Section 22.355**

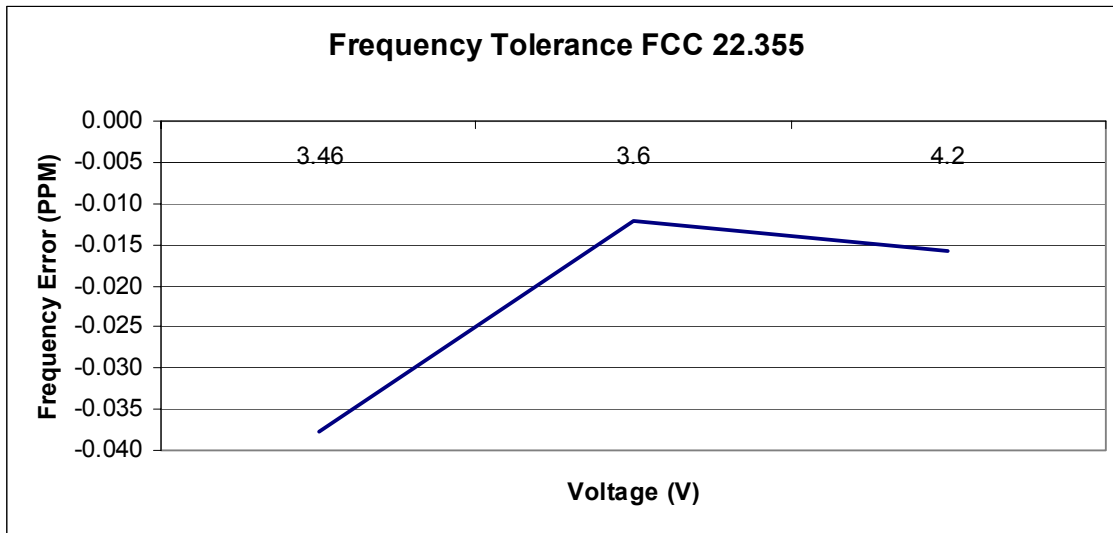
8.5.1. The EUT was configured as for frequency stability measurements as described in Section 9 of this report.

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

**Results: Bottom Channel (824.2 MHz)**

Supply Voltage (V)	Nominal Frequency	Measured Frequency	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
3.46	824.2	824.199969	-31	0.038	2.5	2.462	Complied
3.6	824.2	824.199990	-10	0.012	2.5	2.488	Complied
4.2	824.2	824.199987	-13	0.016	2.5	2.484	Complied

**Frequency Variation From 824.2 MHz**



Test Of: **Matsushita Mobile Communications Development Europe.  
Panasonic X70U**

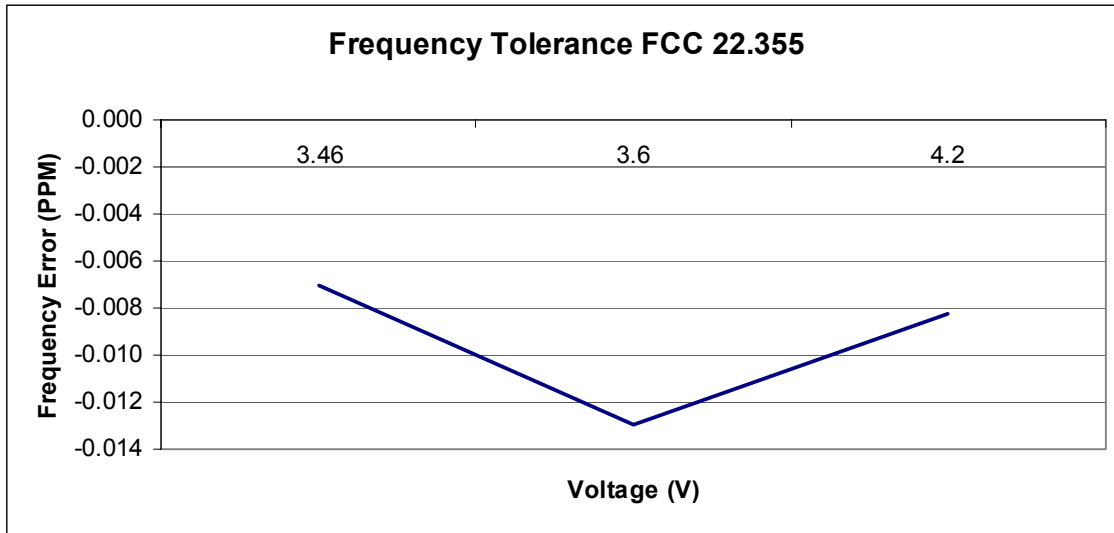
To: **FCC Part 22**

**Transmitter Frequency Stability (Voltage Variation): Section 22.355 (Continued)**

**Results: Top Channel (848.8 MHz)**

Supply Voltage (V)	Nominal Frequency	Measured Frequency	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
3.46	848.8	848.799994	-6	0.007	2.5	2.493	Complied
3.6	848.8	848.799989	-11	0.013	2.5	2.487	Complied
4.2	848.8	848.799993	-7	0.008	2.5	2.492	Complied

**Frequency Variation From 848.8 MHz**



Test Of: **Matsushita Mobile Communications Development Europe.  
Panasonic X70U**

To: **FCC Part 22**

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### **8.6. Transmitter Occupied Bandwidth: Section 2.1049(i)**

8.6.1. The EUT was configured as for Occupied Bandwidth measurements as described in Section 9 of this report.

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

#### **Results:**

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Resolution Bandwidth (kHz)</b>	<b>Video Bandwidth (kHz)</b>	<b>Occupied Bandwidth (kHz)</b>
Bottom	824.2	3.0	10.0	241.683367
Middle	836.6	3.0	10.0	245.290581
Top	848.8	3.0	10.0	245.290581

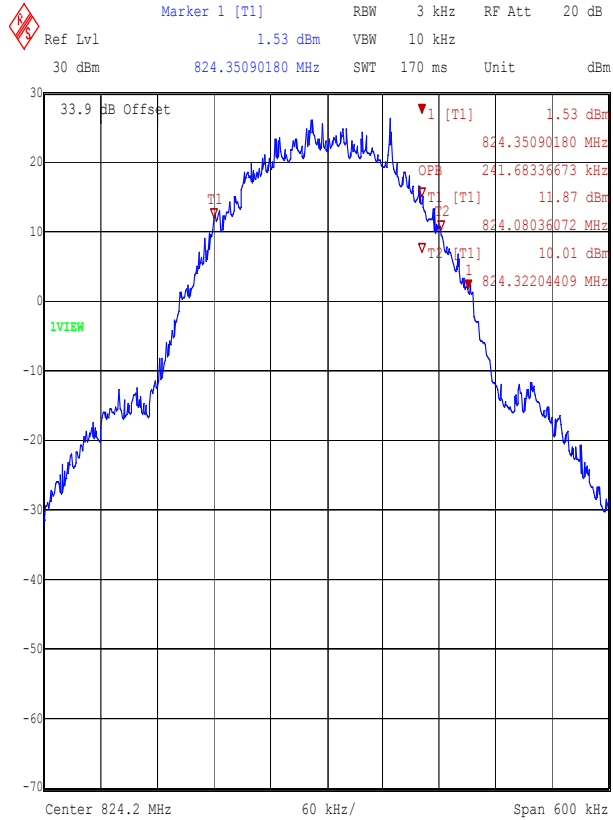
Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

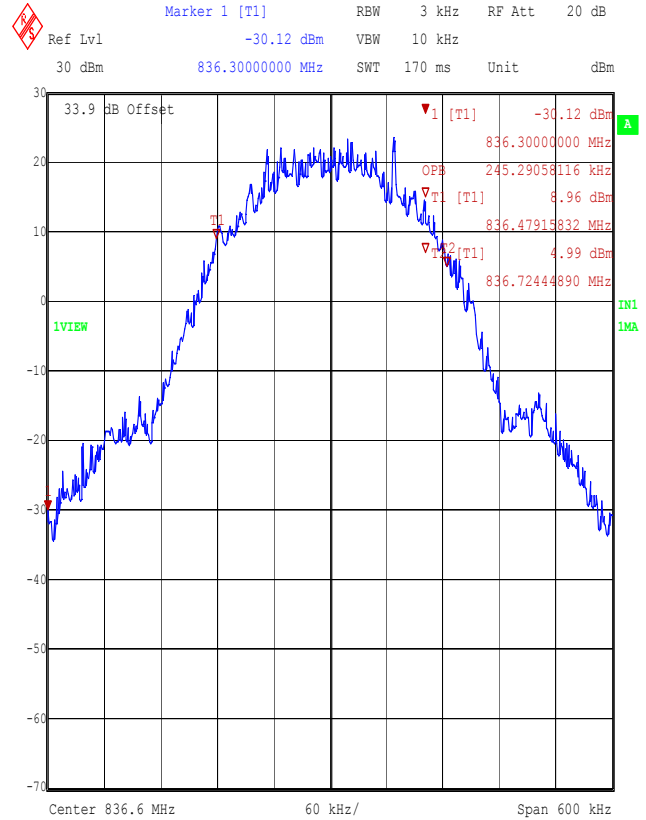
**Transmitter Occupied Bandwidth: Section 2.1049(i) (Continued)**

**Bottom Channel**



Title: Matsushita EUT: X70 IMEI 004400622871885, FCC P22.  
 Comment A: 44323JD05\_FCC\_P22\_Occupied\_Bandwidth\_Bottom  
 Date: 10.OCT.2003 20:51:14

**Middle Channel**



Title: Matsushita EUT: X70 IMEI 004400622871885, FCC P22.  
 Comment A: 44323JD05\_FCC\_P22\_Occupied\_Bandwidth\_Middle  
 Date: 10.OCT.2003 20:52:36

**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 vital data is reported in the upper right portion of the graph. See attached graphs.**

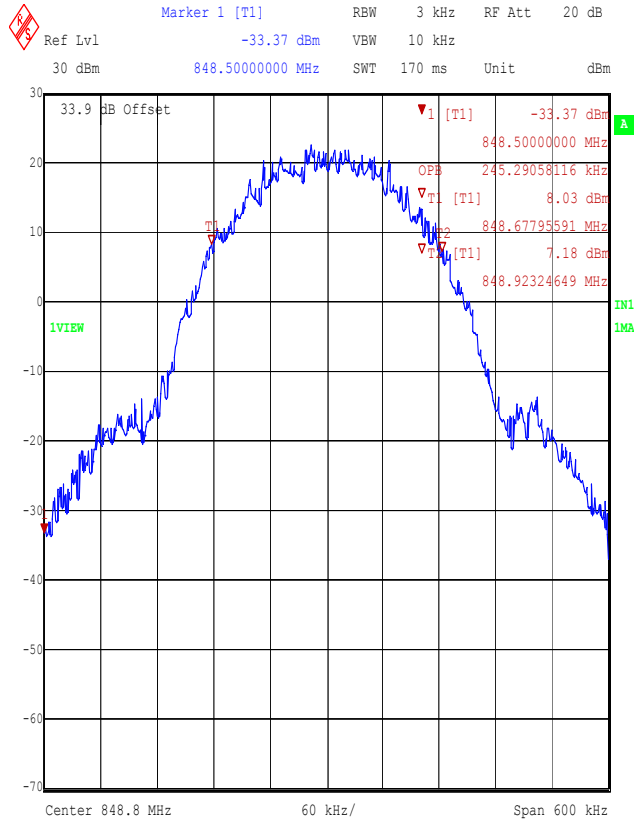
Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

**Transmitter Occupied Bandwidth: Section 2.1049(i) (Continued)**

**Top Channel**



Title: Matsushita EUT: X70 IMEI 004400622871885. FCC P22.  
 Comment A: 44323JD05\_FCC\_P22\_Occupied\_Bandwidth\_Top  
 Date: 10.OCT.2003 20:55:25

*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 vital data is reported in the upper right portion of the graph. See attached graphs.*

Test Of: **Matsushita Mobile Communications Development Europe.  
Panasonic X70U**

To: **FCC Part 22**

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### **8.7. Transmitter Radiated Out of Band Emissions: Section 2.1053 & 22.917**

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

8.7.2. Tests were performed to identify the maximum out of band transmitter radiated spurious emission level present in the band 30 MHz to 10 x the highest fundamental frequency.

#### **Results: Bottom Channel**

<b>Frequency (MHz)</b>	<b>Peak Emission Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
1648.277	-46.2	-13.0	33.2	Complied

#### **Results: Middle Channel**

<b>Frequency (MHz)</b>	<b>Peak Emission Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
1673.322	-46.9	-13.0	33.9	Complied

#### **Results: Top Channel**

<b>Frequency (MHz)</b>	<b>Peak Emission Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
1697.583	47.6	-13.0	34.6	Complied

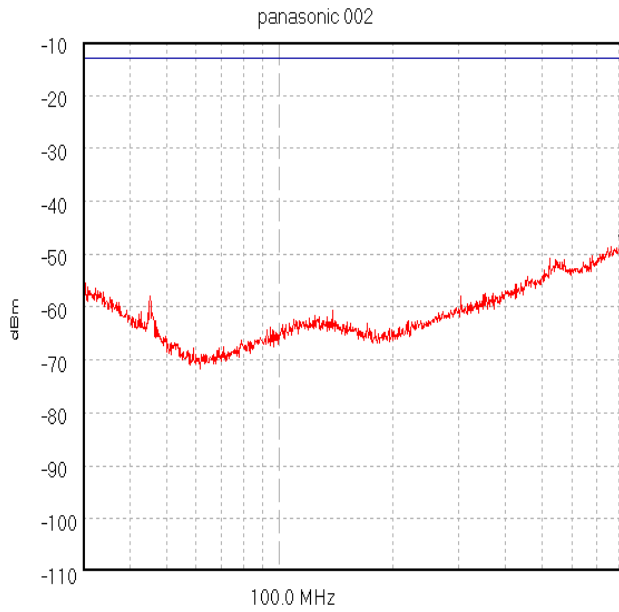


Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

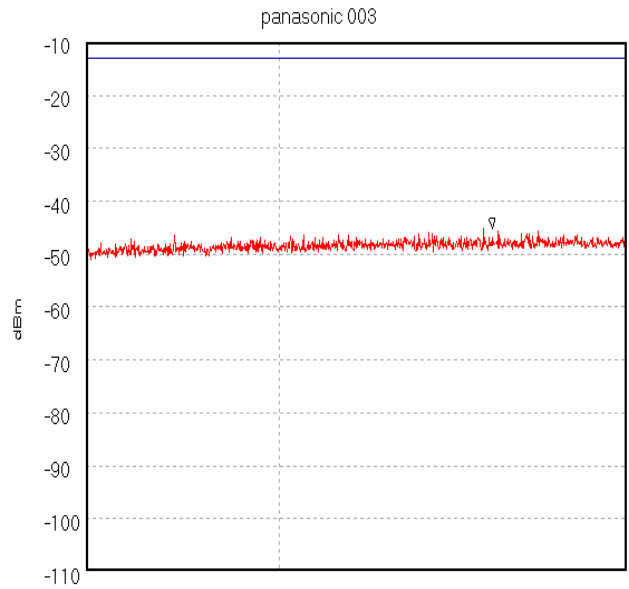
To: **FCC Part 22**

**Transmitter Out of Band Emissions – Middle Channel: Section 2.1053 & 22.917 (Continued)**



Trace 1  
-13 dBm

Start 30.0 MHz; Stop 824.0 MHz - Log Scale  
Ref -10 dBm; Ref Offset 10.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 100.0 mS  
Peak 820.973 MHz, -48.11 dBm  
Display Line: -13 dBm; ; Limit Test Passed  
Transducer Factors: A490  
30/09/2003 16:34:03



Trace 1  
-13 dBm

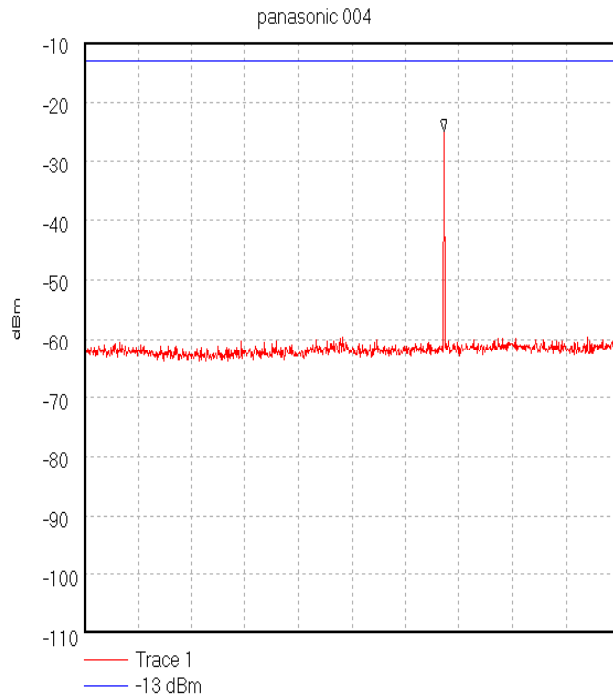
Start 849.0 MHz; Stop 1.0 GHz - Log Scale  
Ref -10 dBm; Ref Offset 10.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 100.0 mS  
Peak 960.069 MHz, -45.14 dBm  
Display Line: -13 dBm; ; Limit Test Passed  
Transducer Factors: A490  
30/09/2003 16:36:15

Test Of: **Matsushita Mobile Communications Development Europe.**

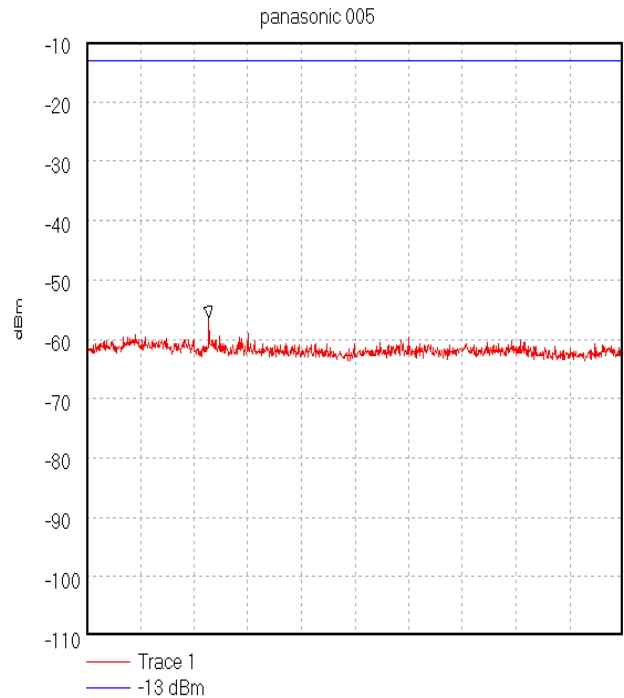
**Panasonic X70U**

To: **FCC Part 22**

**Transmitter Out of Band Emissions – Middle Channel: Section 2.1053 & 22.917 (Continued)**



Start 1.0 GHz; Stop 2.0 GHz  
Ref -10 dBm; Ref Offset 37.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 640.0 mS  
Peak 1.672 GHz, -24.85 dBm  
Display Line: -13 dBm; ; Limit Test Failed  
30/09/2003 16:43:52



Start 2.0 GHz; Stop 4.0 GHz  
Ref -10 dBm; Ref Offset 36.0 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 1.28 S  
Peak 2.456 GHz, -56.31 dBm  
Display Line: -13 dBm; ; Limit Test Passed  
30/09/2003 16:49:19

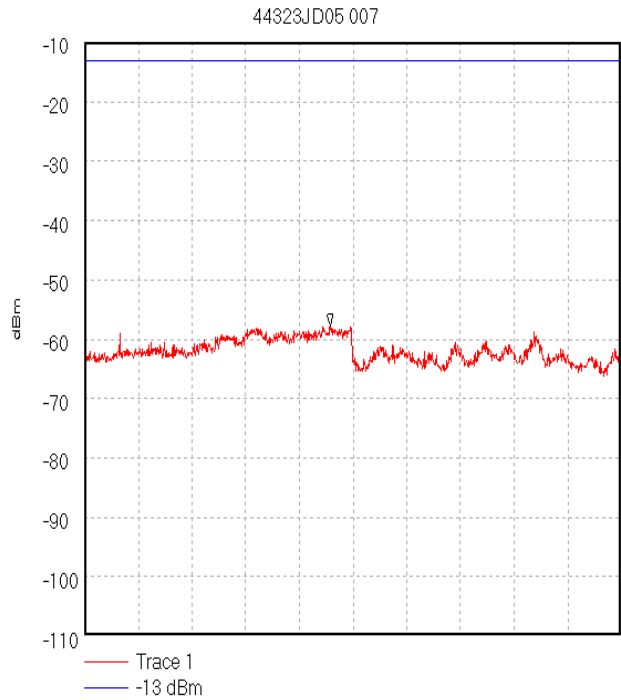
*Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

Test Of: **Matsushita Mobile Communications Development Europe.**

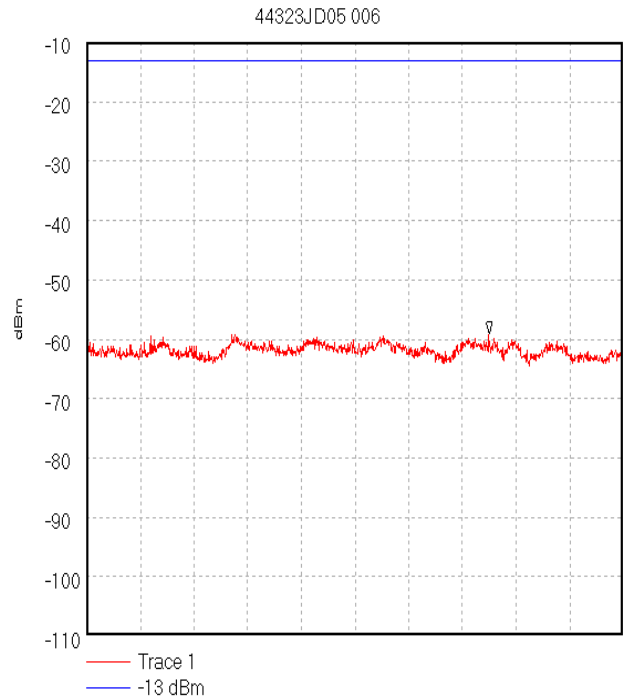
**Panasonic X70U**

To: **FCC Part 22**

**Transmitter Out of Band Emissions – Middle Channel: Section 2.1053 & 22.917 (Continued)**



Start 4.0 GHz; Stop 6.0 GHz  
Ref -10 dBm; Ref Offset 30.8 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 600.0 mS  
Peak 4.915556 GHz, -57.71 dBm  
Display Line: -13 dBm;  
02/10/2003 15:23:02



Start 6.0 GHz; Stop 8.0 GHz  
Ref -10 dBm; Ref Offset 33.4 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 600.0 mS  
Peak 7.5 GHz, -59.13 dBm  
Display Line: -13 dBm;  
02/10/2003 15:20:22

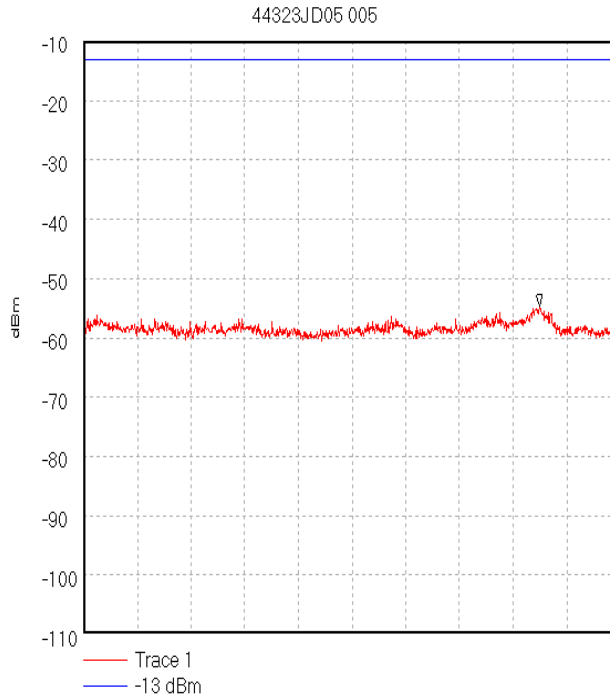
*Note: these plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

Test Of: **Matsushita Mobile Communications Development Europe.  
Panasonic X70U**

To: **FCC Part 22**

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**Transmitter Out of Band Emissions – Middle Channel: Section 2.1053 & 22.917 (Continued)**



Start 8.0 GHz; Stop 10.0 GHz  
Ref -10 dBm; Ref Offset 38.1 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 600.0 mS  
Peak 9.7 GHz, -54.64 dBm  
Display Line: -13 dBm;  
02/10/2003 15:15:19

Test Of: Matsushita Mobile Communications Development Europe.

Panasonic X70U

To: FCC Part 22

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**8.8. Transmitter Radiated Emissions At Band Edges: Section 2.1053**

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

8.8.2. Tests were performed to identify the maximum emission levels at the band edges of the frequency block of operation.

**Results: Bottom Band Edge**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824.0	-16.55	-13.0	3.55	Complied

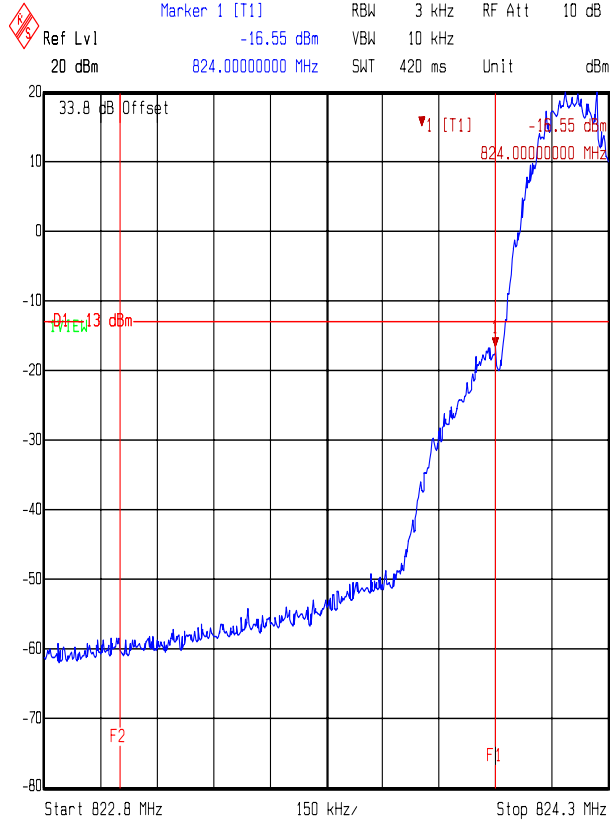
**Results: Top Band Edge**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
849.0	-16.43	-13.0	3.43	Complied

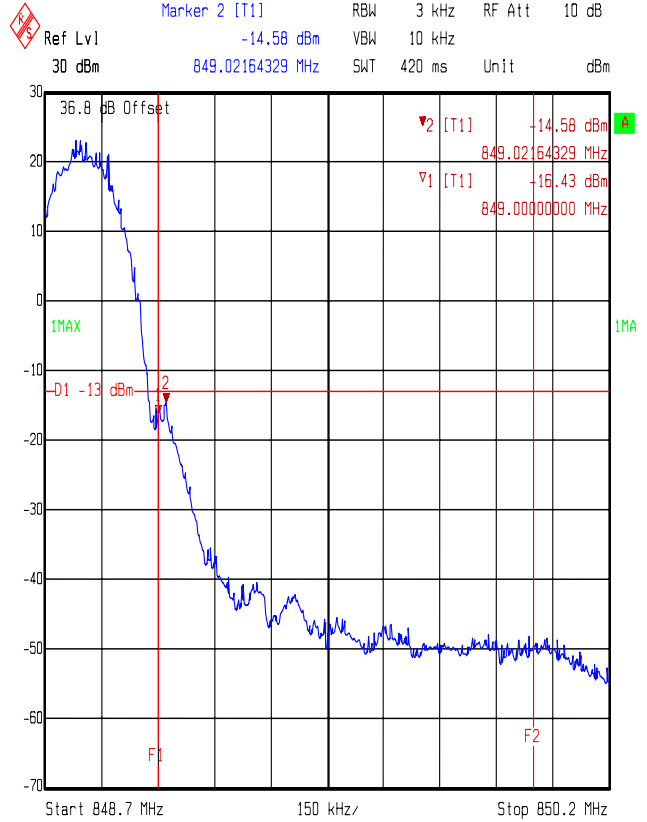
**Bottom Band Edge****Top Band Edge**

Test Of: **Matsushita Mobile Communications Development Europe.  
Panasonic X70U**

To: **FCC Part 22**



Title: Matsushita EUT: X70. FCC Part22. Radiated Upper Band-Edge  
Comment A: 44323J05\_FCC\_P22\_Bottom\_Channel\_GSM850  
Date: 14.OCT.2003 21:33:31



Title: Matsushita EUT: X70. FCC Part22. Radiated Upper Band-Edge  
Comment A: 44323JD05\_FCC\_P22\_Top\_Channel\_GSM850  
Date: 14.OCT.2003 20:08:34

Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

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## **9. Measurement Methods**

### **9.1. Effective Radiated Power (ERP)**

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

The ERP 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; as such all radiated tests were performed with the unit operating into the integral antenna.

The level of the ERP 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 ERP measurements a dipole antenna was used. 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 ERP was calculated as:-

$$\text{ERP} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

### **Effective Radiated Power (ERP) (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 ERP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated ERP to obtain the substituted EUT ERP.

$$\text{Delta (dB)} = \text{EUT} - \text{SG}$$

Where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual ERP is calculated as:

$$\text{ERP SG} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

The EUT ERP is calculated as:

$$\text{ERP EUT} = \text{ERP SG} + \text{Delta.}$$

The test equipment settings for ERP measurements were as follows:

<b>Receiver Function</b>	<b>Setting</b>
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	>= Emission Bandwidth
Amplitude Range:	100 dB
Sweep Time:	Coupled



Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

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### **9.2. FCC Part 2.1055: Frequency Stability**

The EUT was situated within an environmental test chamber and connected to the GSM test set via an air link.

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 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.

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.

The frequency error measured was converted to an error in ppm using the following formula as defined by TIA\_EIA\_603A :-

$$\text{ppm error} = \left( \frac{MCF_{\text{MHz}}}{ACF_{\text{MHz}}} - 1 \right) * 10^6$$

where  $MCF_{\text{MHz}}$  is the measured carrier frequency in MHz  
 $ACF_{\text{MHz}}$  is the assigned carrier frequency in MHz

The measured ppm had to be less than the relevant limits in order to comply.

Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

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### **9.3. Occupied Bandwidth**

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function and a GSM test set via an air link.

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 thus 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  $\leq$  1% of occupied bandwidth. A value of 3 kHz was used.

Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

#### **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.

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.

During the swept measurements (and also during subsequent final measurements on single frequencies) 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.

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:

<b>Receiver Function</b>	<b>Initial Scan</b>	<b>Final Measurements</b>
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

Test Of: **Matsushita Mobile Communications Development Europe.**

**Panasonic X70U**

To: **FCC Part 22**

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### **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 20dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20dB 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 6dB 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 radiated power was calculated as:-

$$\text{EIRP/ERP} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

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**Transmitter Radiated Emissions (Continued)**

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  $-13\text{dBm}$  therefore, the limit line presented on the accompanying plots is set to  $-13\text{dBm}$ .

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

It should be noted that FCC Part 22.917 states that the 1<sup>st</sup> 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.

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### **9.6. Receiver/Idle 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 5 times the highest unintentionally generated frequency 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 20dB of this limit were measured where possible, on occasion, the receiver noise floor came within the 20dB 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 dB $\mu$ V plus cable loss and antenna factor.

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

<b>Receiver Function</b>	<b>Initial Scan</b>	<b>Final Measurements Below 1GHz</b>	<b>Final Measurements Above 1 GHz</b>
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz < 1GHz) (1MHz > 1GHz)	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

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## **10. Measurement Uncertainty**

10.1. 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.

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

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

10.4. 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".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	0.15 MHz to 30.0 MHz	95%	+/- 3.25 dB
Effective Radiated Power (ERP)	Not applicable	95%	+/- 1.78 dB
Frequency Stability	Not applicable	95%	+/- 0.01 ppm
Occupied Bandwidth	1850 to 1910 MHz	95%	+/- 0.12 %
Radiated Spurious Emissions	30.0 MHz to 1000.0 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1.0 GHz to 26.0 GHz	95%	+/- 1.78 dB

10.5. 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.

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**Appendix 1. Test Equipment Used**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A003	ESH3-Z2 Pulse Limiter	Rohde & Schwarz	ESH3-Z2	357 881/052
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A059	3146 Log Periodic Antenna	EMCO	3146	8902-2378
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
A1141	HP 11691D	Hewlett Packard	11691D	1212A02494
A197	Site 2 Controller SC144	Unknown	SC144	150720
A248	60 dB Variable Attenuator	Narda	743-60	01411
A253	WG 12 Microwave Horn	Flann Microwave	12240-20	128
A255	WG 16 Microwave Horn	Flann Microwave	16240-20	519
A259	Bilog Antenna	Chase	CBL6111	1513
A276	OATS Positioning Controller	Rohde & Schwarz	HCC	
A392	3 dB attenuator (9)	Suhner	6803.17.B	None
A430	WG 18 horn	Flann	18240-20	425
A436	WG 20 horn	Flann	20240-20	330
C1000	Cable	Rosenberger	FA210A1020 M30309	002
C1001	Cable	Rosenberger	FA210A1020 M30309	003
C1065	Cable	Rosenberger	UFA210-1- 7872	0985
C1081	Cable	Rosenberger	FA210A1020 M5050	28463-2
C151	Cable	Rosenberger	UFA210A-1- 1181-70x70	None
C453	Cable	Rosenberger	RG142XX- 001-RFIB	C453-10081998
C457	Cable	Rosenberger	RG142XX- 002-RFIB	C457-10081998
C461	Cable	Rosenberger	UFA210A-1- 1182-704704	98H0305
C468	N-Type Coaxial Cable	Rosenberger	UFA210A-1- 3937-504504	98L0440
E013	PCN Environmental Chamber	Sanyo	ATMOS chamber	None



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**Test Equipment Used (Continued)**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
G085	Generator	Hewlett Packard	83650L	3614A00104
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M028	FSB Spectrum Analyser	Rohde & Schwarz	FSB	860 001/009 (RF), 860 161/007 (Display)
M069	ESMI Spectrum Analyser / Receiver	Rohde & Schwarz	ESMI	829 808/007 (DU) / 827 063/008 (RU)
M072	FSM Spectrum Analyser	Rohde & Schwarz	FSM	862 967/010 (RF) & 863 912/048 (Display)
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
M1093	Will tek	Will tek	4202S	0513018
M1124	Rohde & Schwarz	Rohde & Schwarz	ESIB26	100046K
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
M281	Power Meter	Hewlett Packard	E4418A (EPM441A)	GB37170210-01
M283	Power Sensor	Hewlett Packard	8487A	3318A03241
S009	D.C. PSU	Farnell	PDD3502A	174
S201	Site 1	RFI	1	None
S202	Site 2	RFI	2	None
S212	Site 12	RFI	12	None
S503	Antenna Mast	EMCO	1051-25	9205 1670

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

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## **Appendix 2. Test Configuration Drawings**

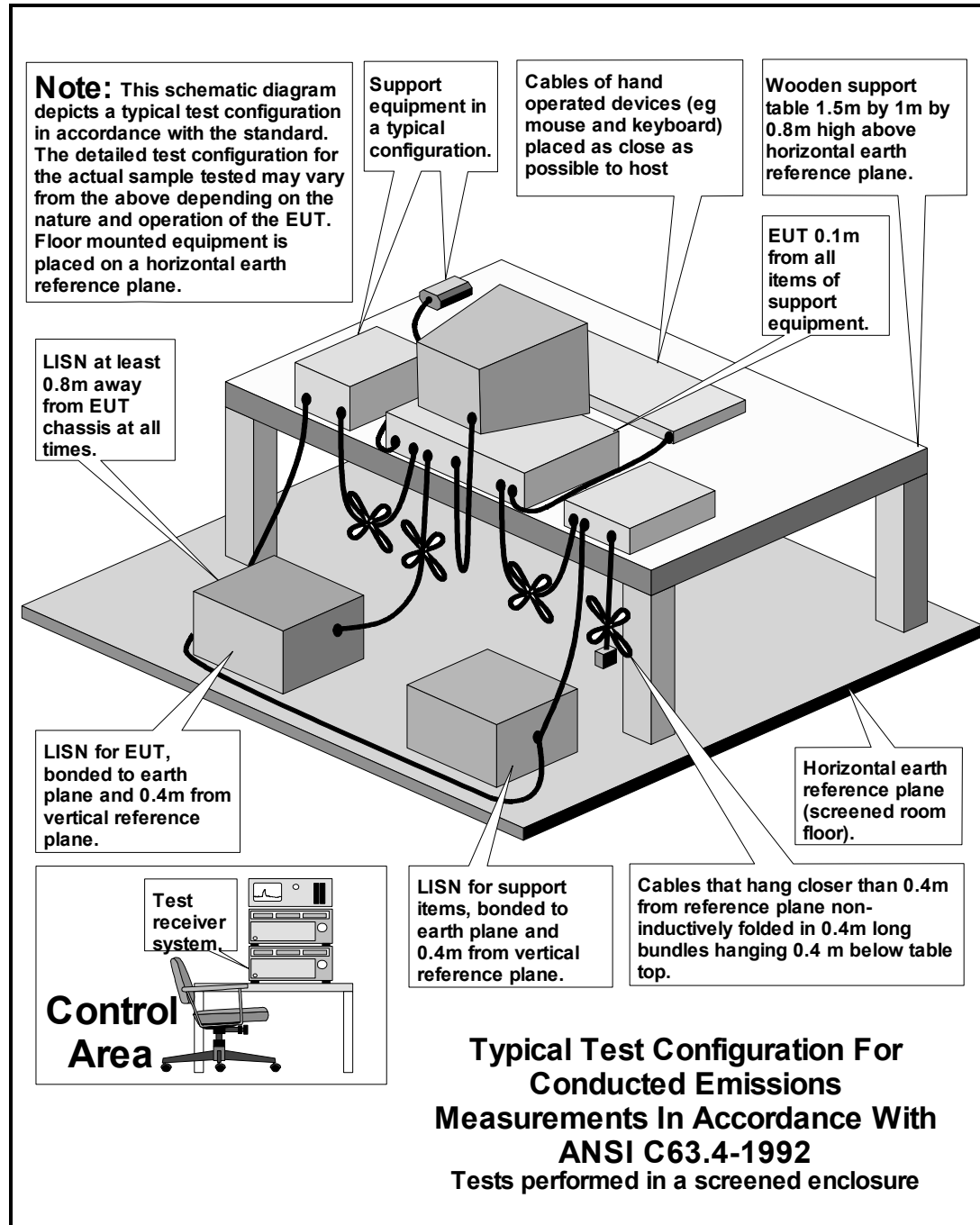
This appendix contains the following drawings:

<b>Drawing Reference Number</b>	<b>Title</b>
DRG\44323JD05\EMICON	Test configuration for measurement of conducted emissions
DRG\44323JD05\EMIRAD	Test configuration for measurement of radiated emissions

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