



# TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test Of: Panasonic Mobile Communications Ltd.  
X70 Mobile Handset

To: FCC Part 15.247

**Test Report Serial No:**  
RFI/MPTB2/RP44839JD06A

**Supersedes Test Report Serial No:**  
RFI/MPTB1/RP44839JD06A

|                                                                                                                                                                                           |                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>This Test Report Is Issued Under The Authority<br/>Of Richard Jacklin, Operations Director:</b><br> | <b>Checked By: Alan McHale</b><br> |
| <b>Tested By:</b><br>                                                                                  | <b>Release Version No: PDF01</b>                                                                                       |
| <b>Issue Date: 08 October 2003</b>                                                                                                                                                        | <b>Test Dates: 07 August 2003 to 15 August 2003</b>                                                                    |

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Basingstoke, Hampshire RG26 5RQ



**RADIO FREQUENCY INVESTIGATION LTD**

**TEST REPORT**

**Operations Department**

**S.No. RFI/MPTB2/RP44839JD06A**

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**1. Client Information**

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| <b>Company Name:</b> | Panasonic Mobile Communications Ltd.                                                |
| <b>Address:</b>      | 2 Gables Way,<br>Colthrop,<br>Thatcham,<br>Berkshire,<br>RG19 4ZB<br>United Kingdom |
| <b>Contact Name:</b> | Mr Mike 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)**

#### **2.1.1. Radiated RF Sample**

|                             |                 |
|-----------------------------|-----------------|
| Brand Name:                 | Panasonic       |
| Model Name or Number:       | X70             |
| Unique Type Identification: | X70             |
| IMEI Number:                | 004400622871349 |
| FCC ID Number:              | NWJ22B001A      |
| Country of Manufacture:     | China           |
| Date of Receipt:            | 07 August 2003  |

#### **2.1.2. Conducted RF Sample**

|                             |                  |
|-----------------------------|------------------|
| Brand Name:                 | Panasonic        |
| Model Name or Number:       | X70              |
| Unique Type Identification: | X70              |
| IMEI Number:                | 0044006228700226 |
| FCC ID Number:              | NWJ22B001A       |
| Country of Manufacture:     | China            |
| Date of Receipt:            | 07 August 2003   |

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## **2.2. Description Of EUT**

The equipment under test is a GSM tri-band (900, 1800 & 1900) camera mobile handset, which supports IR and Bluetooth. The GSM 900 and 1800 modes are intended for use only outside the USA.

## **2.3. 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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**2.4. Additional Information Related To Testing**

|                                                              |                                          |                |                         |
|--------------------------------------------------------------|------------------------------------------|----------------|-------------------------|
| Power Supply Requirement:<br>(Internal, lithium ion battery) | 3.7 V DC                                 |                |                         |
| Declared Battery Extreme Voltage Range                       | 4.2 V (Max), 3.46 V (Min)                |                |                         |
| Power Supply Requirement:<br>(AC Battery Charger)            | Nominal 115V, 60 Hz AC Mains Supply      |                |                         |
| Intended Operating Environment:                              | Within GSM Network Coverage              |                |                         |
| Equipment Category:                                          | Cellular Telephone                       |                |                         |
| Type of Unit:                                                | Transceiver                              |                |                         |
| Weight:                                                      | 92 g                                     |                |                         |
| Dimensions:                                                  | 87 mm(H) x 47 mm(W) x 23.9 mm(D)         |                |                         |
| Interface Ports:                                             | Charger Connection<br>Headset Connection |                |                         |
| Highest Fundamental Frequency                                | 2480 MHz                                 |                |                         |
| Transmit Frequency Range                                     | 2402.0 MHz to 2480.0 MHz                 |                |                         |
| Transmit Channels Tested                                     | Channel ID                               | Channel Number | Channel Frequency (MHz) |
|                                                              | Bottom                                   | 1              | 2402.0                  |
|                                                              | Middle                                   | 40             | 2441.0                  |
|                                                              | Top                                      | 79             | 2480.0                  |
| Receive Frequency Range                                      | 2402 MHz to 2480 MHz                     |                |                         |
| Receive Channels Tested                                      | Channel ID                               | Channel Number | Channel Frequency (MHz) |
|                                                              | Bottom                                   | 1              | 2402.0                  |
|                                                              | Middle                                   | 40             | 2441.0                  |
|                                                              | Top                                      | 79             | 2480.0                  |
| Antenna Gain                                                 | 1.6 dBi                                  |                |                         |
| Maximum Power Output (EIRP)                                  | 1.0 dBm                                  |                |                         |

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## **2.5. Support Equipment**

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

|                              |                                      |
|------------------------------|--------------------------------------|
| <b>Description:</b>          | Bluetooth Test Set (RFI Asset M1078) |
| <b>Brand Name:</b>           | Anritsu                              |
| <b>Model Name or Number:</b> | MT8850A                              |
| <b>Serial Number:</b>        | 6K00000244                           |
| <b>Connected to Port:</b>    | RF Link (Air Interface)              |

|                              |                    |
|------------------------------|--------------------|
| <b>Description:</b>          | AC Charger         |
| <b>Brand Name:</b>           | Panasonic          |
| <b>Model Name or Number:</b> | EB-CAX70UK         |
| <b>Serial Number:</b>        | 001                |
| <b>Connected to Port:</b>    | Charger Connection |

|                              |                    |
|------------------------------|--------------------|
| <b>Description:</b>          | Headset            |
| <b>Brand Name:</b>           | Panasonic          |
| <b>Model Name or Number:</b> | EB-UCX70           |
| <b>Serial Number:</b>        | 001                |
| <b>Connected to Port:</b>    | Headset Connection |

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### **3. Test Specification, Methods And Procedures**

#### **3.1. Test Specification**

|                         |                                                                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Reference:</b>       | FCC Part 15 Subpart C: 2002 (Section 15.247)                                                                                                                                          |
| <b>Title:</b>           | Code of Federal Regulations, Part 15 (47CFR15)<br>Radio Frequency Devices: Intentional Radiators                                                                                      |
| <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: 2002 (Section 15.107 and 15.109)                                                                                                                               |
| <b>Title:</b>           | Code of Federal Regulations, Part 15 (47CFR15)<br>Radio Frequency Devices: Unintentional Radiators.                                                                                   |
| <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 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**

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by a nominal 115V, 60 Hz AC mains supply.

### **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 then disconnected. The combination that exhibited the worse case mode of operation was then used to perform the final measurements.

Bluetooth mode transmitting on top, middle, bottom and hopping on all channels or in receive mode.

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

The EUT was tested in the following configuration:

Configured with hands free kit, AC battery charger and internal battery.

The EUT was commanded to operate on specific channels using an Anritsu Bluetooth 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 Conducted Emissions (AC Mains)    | C.F.R. 47 FCC Part 15: 2002 Section 15.107                         | AC Mains Terminals | Complied                 |
| Receiver Radiated Emissions                | C.F.R. 47 FCC Part 15: 2002 Section 15.109                         | Antenna            | Complied                 |
| Transmitter Conducted Emissions (AC Mains) | C.F.R. 47 FCC Part 15: 2002 Section 15.207                         | AC Mains Terminals | Complied                 |
| Transmitter 20 dB Bandwidth                | C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(1)                   | Antenna Terminals  | Complied                 |
| Transmitter Carrier Frequency Separation   | C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(1)                   | Antenna Terminals  | Complied                 |
| Transmitter Average Time of Occupancy      | C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(1)(iii)              | Antenna Terminals  | Complied                 |
| Transmitter Maximum Peak Output Power      | C.F.R. 47 FCC Part 15: 2002 Section 15.247(b)(1)                   | Antenna Terminals  | Complied                 |
| Transmitter Conducted Emissions            | C.F.R. 47 FCC Part 15: 2002 Section 15.247(c)                      | Antenna Terminals  | Complied                 |
| Transmitter Radiated Emissions             | C.F.R. 47 FCC Part 15: 2002 Section 15.247(c)<br>Section 15.209(a) | Antenna            | Complied                 |
| Transmitter Band Edge Conducted Emission   | C.F.R. 47 FCC Part 15: 2002 Section 15.247(c)                      | Antenna Terminals  | Complied                 |
| Transmitter Band Edge Radiated Emission    | C.F.R. 47 FCC Part 15: 2002 Section 15.247(c)<br>Section 15.209(a) | 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 9 for details of measurement uncertainties.

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**7.2. Receiver Conducted Emissions AC Mains: Section 15.107**

7.2.1. The EUT was configured as for AC conducted emissions measurements as described in section 8 of this report.

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

**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   |
|-----------------|---------|------------------------|------------------------|-------------|----------|
| 0.403           | Live    | 41.10                  | 57.79                  | 16.69       | Complied |
| 1.201           | Live    | 42.65                  | 56.00                  | 13.35       | Complied |
| 1.339           | Neutral | 42.44                  | 56.00                  | 13.56       | Complied |
| 1.464           | Live    | 47.02                  | 56.00                  | 8.98        | Complied |

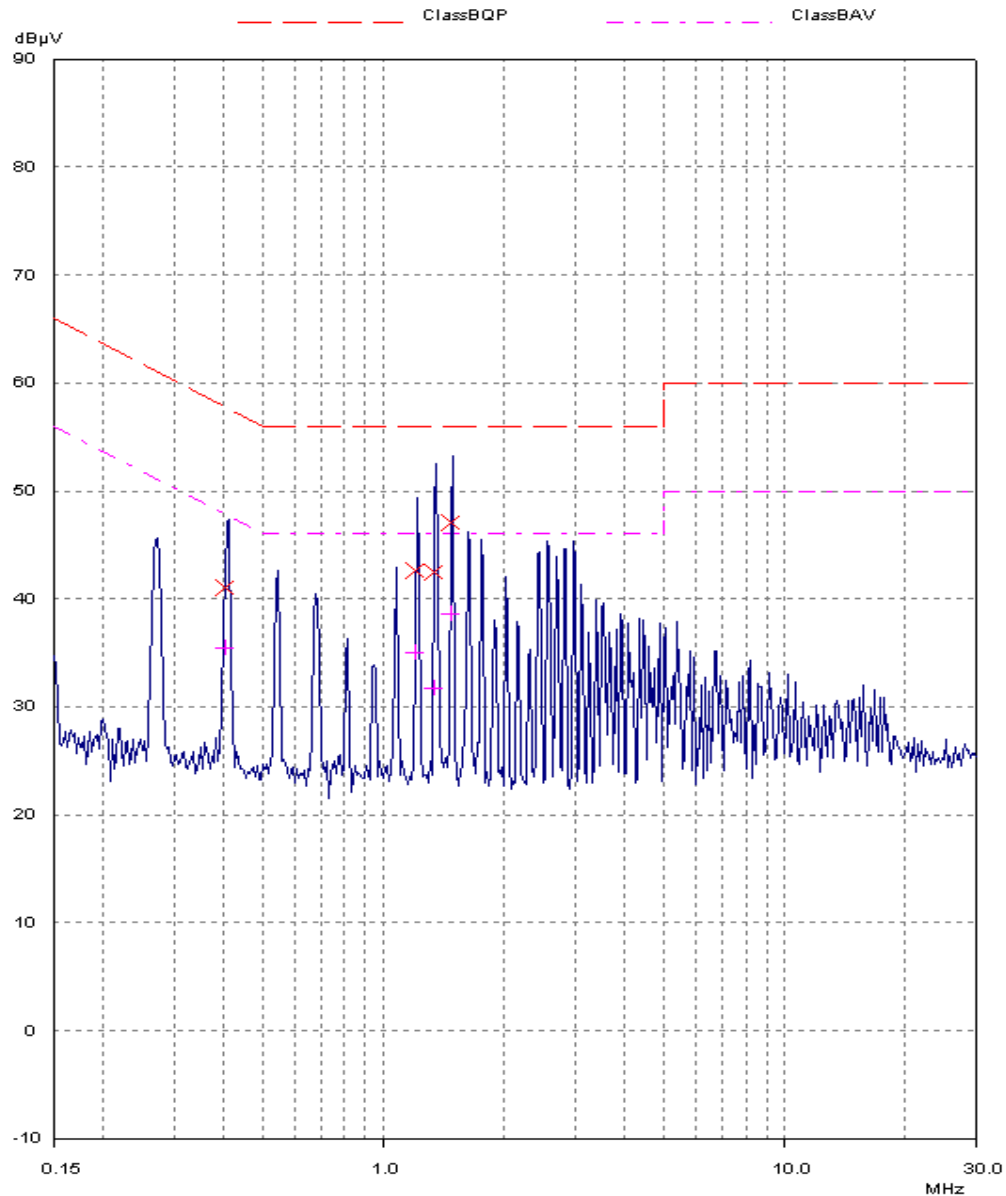
**Average Detector Measurements on Live and Neutral Lines**

| Frequency (MHz) | Line    | Avg Level (dB $\mu$ V) | Avg Limit (dB $\mu$ V) | Margin (dB) | Result   |
|-----------------|---------|------------------------|------------------------|-------------|----------|
| 0.403           | Live    | 35.44                  | 47.79                  | 12.35       | Complied |
| 1.201           | Live    | 35.08                  | 46.00                  | 10.92       | Complied |
| 1.339           | Neutral | 31.65                  | 46.00                  | 14.35       | Complied |
| 1.464           | Live    | 38.61                  | 46.00                  | 7.39        | Complied |

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**Receiver Conducted Emissions AC Mains: Section 15.107 (Continued)**

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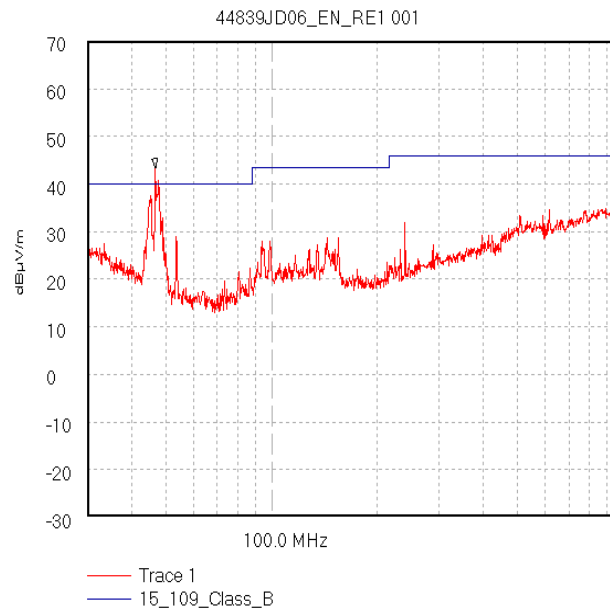
To: FCC Part 15.247

**7.3. Receiver Radiated 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 radiated field strength emissions testing as described in Section 8 of this report.

7.3.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

| Frequency (MHz) | Ant. Pol. | Q-P Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|-----------|--------------------------|----------------------|-------------|----------|
| 44.745          | Vert.     | 23.5                     | 40.0                 | 16.5        | Complied |
| 46.664          | Vert.     | 27.5                     | 40.0                 | 12.5        | Complied |
| 47.194          | Vert.     | 19.8                     | 40.0                 | 20.2        | Complied |
| 240.000         | Vert.     | 29.2                     | 40.0                 | 16.8        | Complied |



Start 30.0 MHz; Stop 1.0 GHz - Log Scale  
 Ref 70 dB $\mu$ V/m; Ref Offset 0.0 dB; 10 dB/div  
 RBW 120.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 380.0 mS  
 Peak 46.776 MHz, 43.34 dB $\mu$ V/m  
 Limit/Mask: 15\_109\_Class\_B; ; Limit Test Failed  
 Transducer Factors: A1037  
 8/7/2003 5:19:14 PM

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**Receiver Radiated Emissions: Section 15.109 (Continued)****7.3.2. Electric Field Strength Measurements (Frequency Range: 1.0 to 20.0 GHz)****Highest Average Level:**

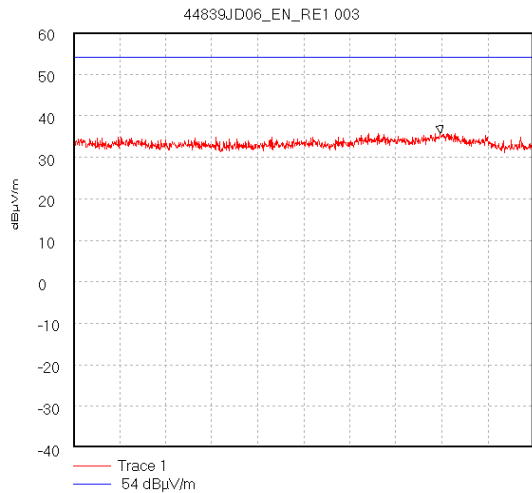
| Frequency (GHz) | Antenna Polarity (H/V) | Average Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Average Level (dB $\mu$ V/m) | Average Limit (dB $\mu$ V/m) | Average Margin (dB) | Result   |
|-----------------|------------------------|-------------------------------------|---------------------|-----------------|-------------------------------------|------------------------------|---------------------|----------|
| 5.891           | Horiz.                 | 5.4                                 | 24.4                | 2.0             | 31.8                                | 54.0                         | 22.2                | Complied |

**Highest Peak Level:**

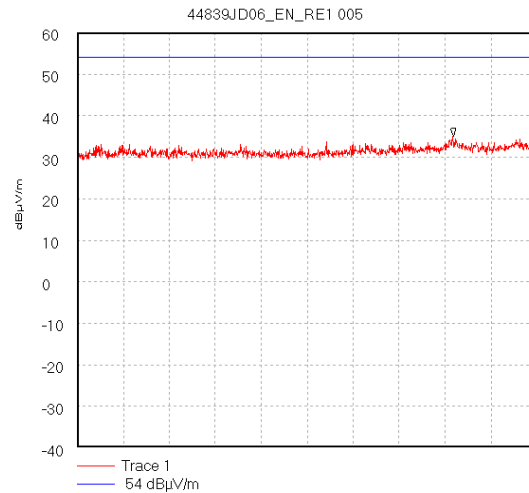
| Frequency (GHz) | Antenna Polarity (H/V) | Peak Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Peak Level (dB $\mu$ V/m) | Peak Limit (dB $\mu$ V/m) | Peak Margin (dB) | Result   |
|-----------------|------------------------|----------------------------------|---------------------|-----------------|----------------------------------|---------------------------|------------------|----------|
| 5.891           | Horiz.                 | 18.4                             | 24.4                | 2.0             | 44.8                             | 74.0                      | 29.2             | Complied |

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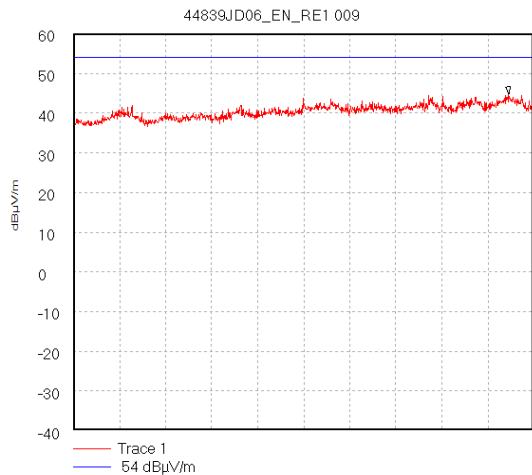
Issue Date: 08 October 2003

**Receiver Radiated Emissions: Section 15.109 (Continued)**

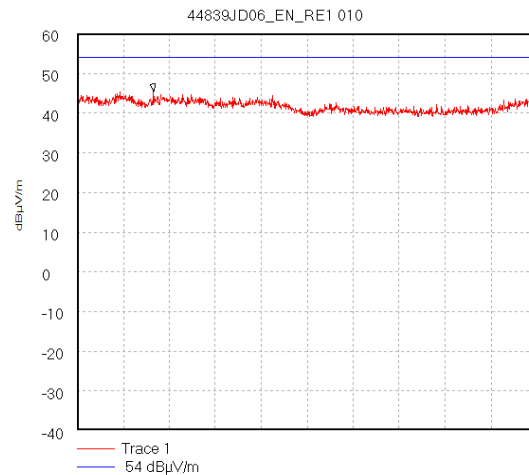
Start 1.0 GHz; Stop 2.0 GHz  
Ref 60 dBµV/m; Ref Offset 5.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.797 GHz; 35.78 dBµV/m  
Display Line: 54 dBµV/m; : Limit Test Passed  
8/7/2003 5:28:26 PM



Start 2.0 GHz; Stop 4.0 GHz  
Ref 60 dBµV/m; Ref Offset 5.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 3.636 GHz; 35.12 dBµV/m  
Display Line: 54 dBµV/m; : Limit Test Passed  
8/7/2003 5:30:42 PM



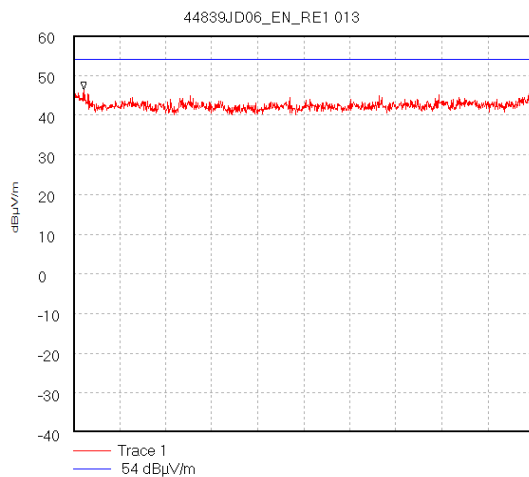
Start 4.0 GHz; Stop 6.0 GHz  
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 5.891111 GHz; 44.82 dBµV/m  
Display Line: 54 dBµV/m;  
Transducer Factors: 4to6g\_Horn  
18/08/2003 14:11:20



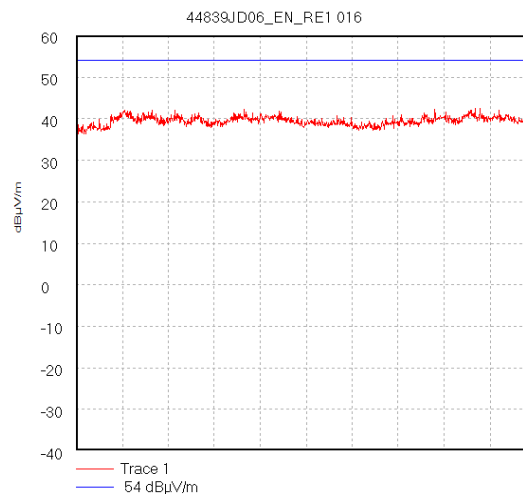
Start 6.0 GHz; Stop 8.0 GHz  
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 6.331111 GHz; 45.38 dBµV/m  
Display Line: 54 dBµV/m;  
Transducer Factors: 6to8g\_Horn  
18/08/2003 14:20:29

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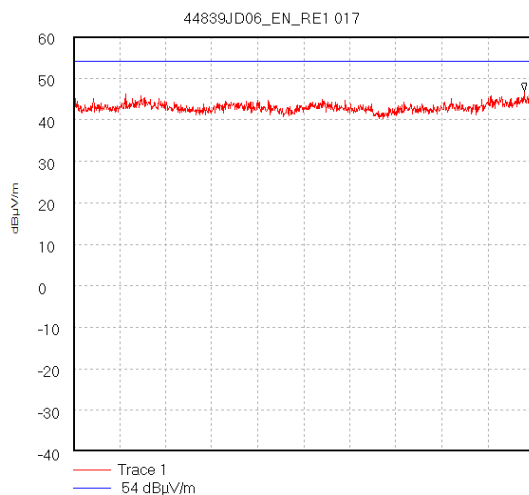
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**Receiver Radiated Emissions: Section 15.109 (Continued)**

Start 8.0 GHz; Stop 12.5 GHz  
Ref 60 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 8.1 GHz, 46.39 dBμV/m  
Display Line: 54 dBμV/m;  
Transducer Factors: 8to12G\_Horn  
18/08/2003 14:27:48



Start 12.5 GHz; Stop 18.0 GHz  
Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS  
Peak 17.92056 GHz, 42.74 dBμV/m  
Display Line: 54 dBμV/m;  
18/08/2003 14:41:16



Start 18.0 GHz; Stop 20.0 GHz  
Ref 60 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 19.96 GHz, 46.85 dBμV/m  
Display Line: 54 dBμV/m;  
18/08/2003 14:43:30

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**7.4. Transmitter Conducted Emissions AC Mains: Section 15.207**

7.4.1. The EUT was configured as for AC conducted emissions measurements as described in Section 8 of this report.

7.4.2. Tests were performed to identify the maximum emissions levels on the AC mains line of the EUT.

**Quasi-Peak Detector Measurements on Live and Neutral Lines****Middle Channel**

| Frequency (MHz) | Line    | Q-P Level (dB $\mu$ V) | Q-P Limit (dB $\mu$ V) | Margin (dB) | Result   |
|-----------------|---------|------------------------|------------------------|-------------|----------|
| 1.31396         | Live    | 45.44                  | 56.00                  | 10.56       | Complied |
| 1.44602         | Neutral | 39.45                  | 56.00                  | 16.55       | Complied |
| 1.56263         | Neutral | 42.80                  | 56.00                  | 13.20       | Complied |

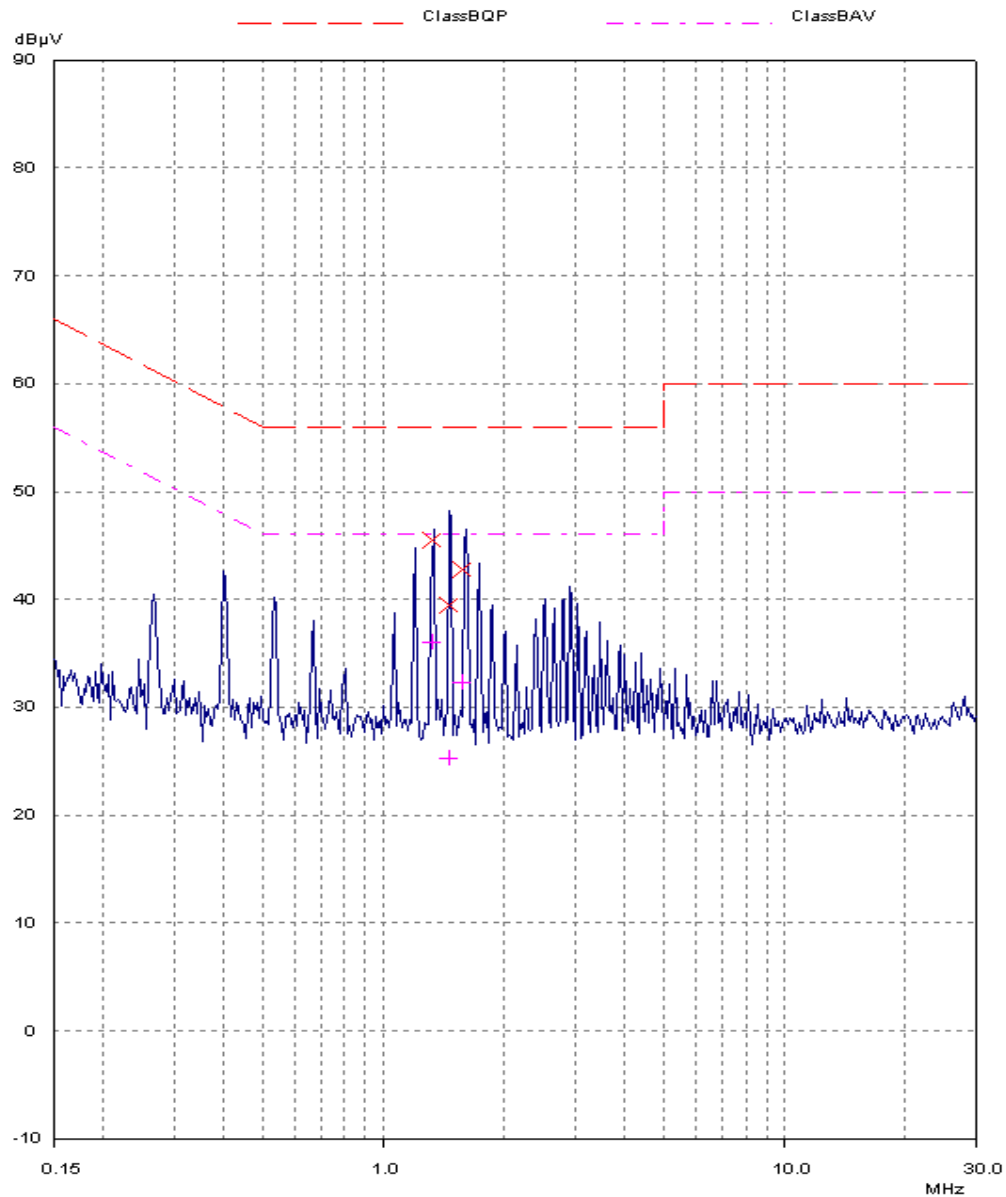
**Average Detector Measurements on Live and Neutral Lines****Middle Channel**

| Frequency (MHz) | Line    | Avg Level (dB $\mu$ V) | Avg Limit (dB $\mu$ V) | Margin (dB) | Result   |
|-----------------|---------|------------------------|------------------------|-------------|----------|
| 1.31396         | Live    | 36.07                  | 46.00                  | 9.93        | Complied |
| 1.44602         | Neutral | 25.33                  | 46.00                  | 20.67       | Complied |
| 1.56263         | Neutral | 32.29                  | 46.00                  | 13.71       | Complied |

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**Transmitter Conducted Emissions AC Mains: Section 15.207 (Continued)**



Test Of: Panasonic Mobile Communications Ltd.

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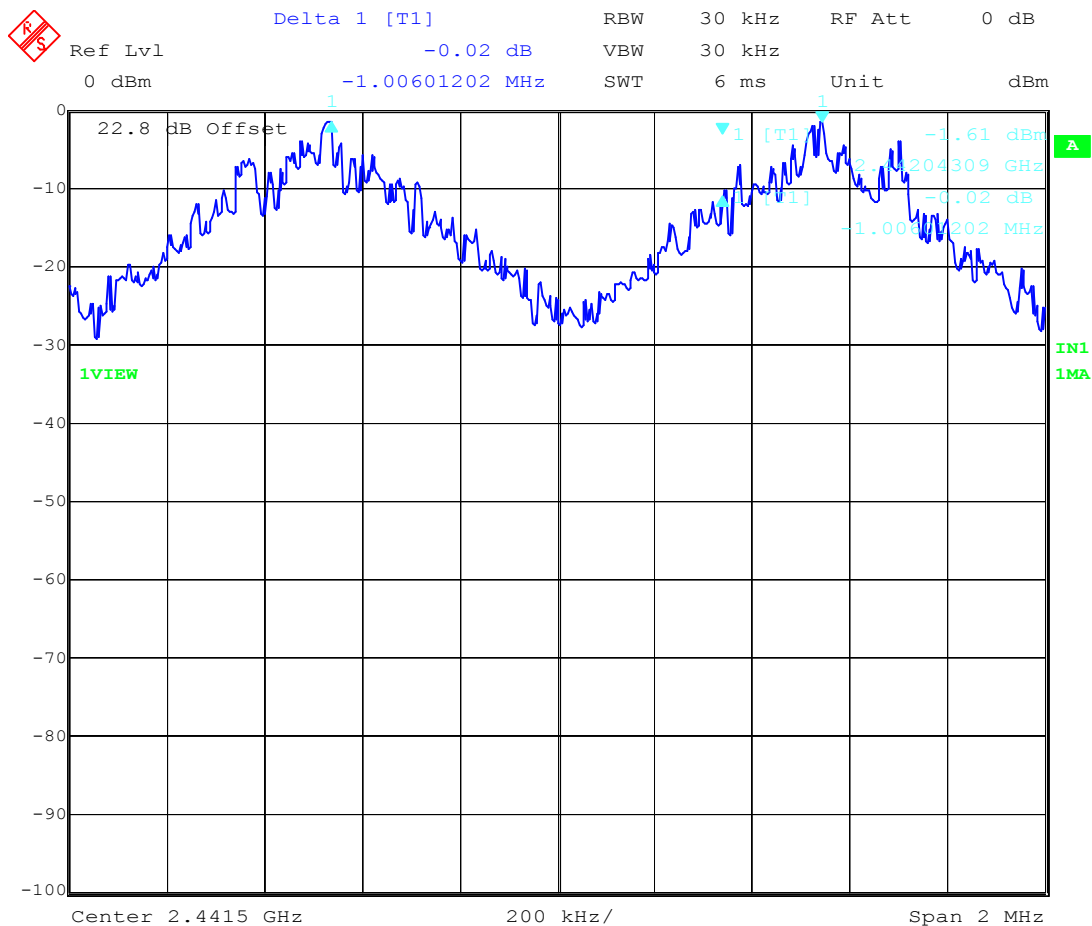
To: FCC Part 15.247

**7.6. Transmitter Carrier Frequency Separation: Section 15.247(a)(1)**

7.6.1. The EUT was configured as for carrier frequency separation measurements as described in Section 8 of this report.

7.6.2. Tests were performed to identify the carrier frequency separation.

| Transmitter Carrier Frequency Separation (kHz) | Limit (25 kHz or 20 dB BW whichever is greater) (kHz) | Margin (kHz) | Result   |
|------------------------------------------------|-------------------------------------------------------|--------------|----------|
| 1006.0                                         | 793.6                                                 | 212.4        | Complied |



Title: Panasonic X70 0044006228700226 FCC 15.247 Carrier Separation

Comment A: 44839JD06\_FCC\_Carrier\_Separation\_001

Date: 13.AUG.2003 14:11:19

Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

To: FCC Part 15.247

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**7.7. Transmitter Average Time of Occupancy: Section 15.247(a)(1)(iii)**

7.7.1. The EUT was configured as for average time of occupancy measurements as described in Section 8 of this report.

7.7.2. Tests were performed to identify the average time of occupancy.

| Emission Width (μs) | Number of Hopping Channels Employed | Number of Hops in 31.6 seconds | Average Time of Occupancy (s) | Limit (s) | Margin (s) | Result   |
|---------------------|-------------------------------------|--------------------------------|-------------------------------|-----------|------------|----------|
| 418.8               | 79                                  | 245                            | 0.103                         | 0.4       | 0.297      | Complied |



Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

To: FCC Part 15.247

**7.8.Transmitter Peak Output Power: Section 15.247(b)(1)**

7.8.1. The EUT was configured as for peak output power measurements as described in Section 8 of this report.

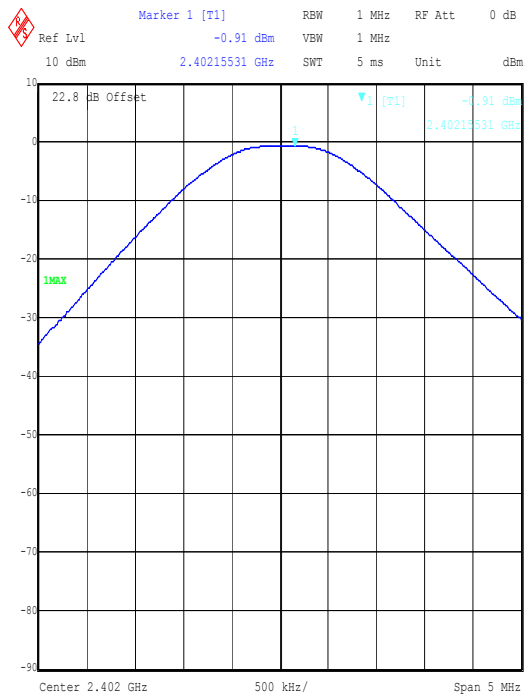
7.8.2. Tests were performed to identify the output power of the EUT.

| Channel | Input Voltage (AC) | Output Level (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Power Limit (dBm) | Margin (dB) | Result   |
|---------|--------------------|--------------------|--------------------|------------|-------------------|-------------|----------|
| Bottom  | 93.5               | -0.9               | 1.6                | 0.7        | 30.0              | 30.9        | Complied |
| Bottom  | 110.0              | -0.9               | 1.6                | 0.7        | 30.0              | 30.9        | Complied |
| Bottom  | 126.5              | -0.9               | 1.6                | 0.7        | 30.0              | 30.9        | Complied |

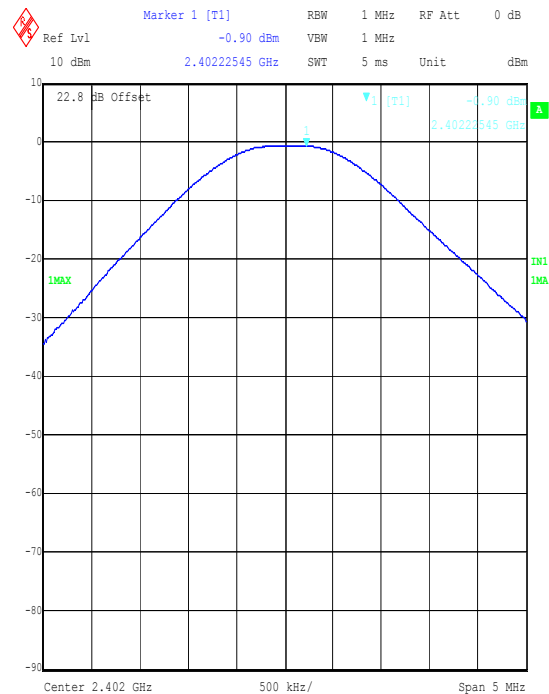
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

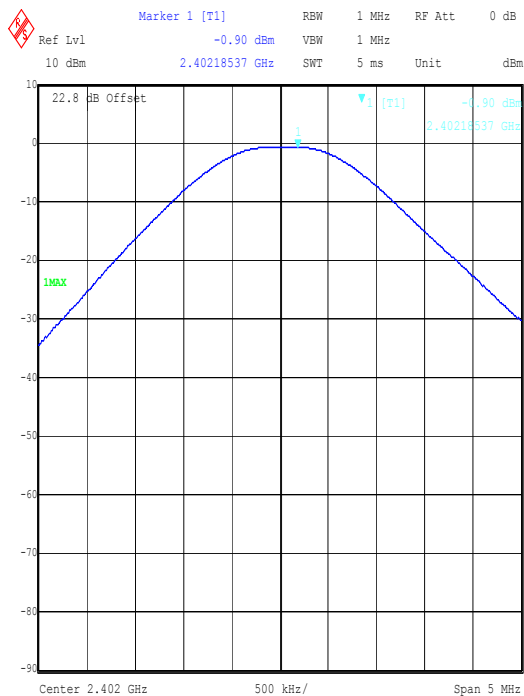
To: FCC Part 15.247

**Transmitter Peak Output Power: Section 15.247(b)(1) (Continued)**

Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Bottom\_LowV\_001  
Date: 13.AUG.2003 15:20:43



Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Bottom\_NomV\_004  
Date: 13.AUG.2003 15:11:41



Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Bottom\_HighV\_007  
Date: 13.AUG.2003 15:15:17

**Test Of: Panasonic Mobile Communications Ltd.****X70 Mobile Handset****To: FCC Part 15.247**

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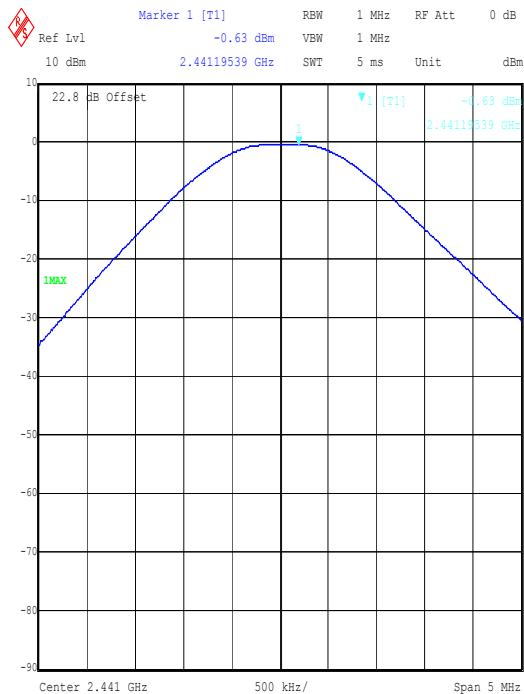
**Transmitter Peak Output Power: Section 15.247(b)(1) (Continued)**

| <b>Channel</b> | <b>Input Voltage (AC)</b> | <b>Output Level (dBm)</b> | <b>Antenna Gain (dBi)</b> | <b>EIRP (dBm)</b> | <b>Power Limit (dBm)</b> | <b>Margin (dB)</b> | <b>Result</b> |
|----------------|---------------------------|---------------------------|---------------------------|-------------------|--------------------------|--------------------|---------------|
| Middle         | 93.5                      | -0.6                      | 1.6                       | 1.0               | 30.0                     | 30.6               | Complied      |
| Middle         | 110.0                     | -0.6                      | 1.6                       | 1.0               | 30.0                     | 30.6               | Complied      |
| Middle         | 126.5                     | -0.6                      | 1.6                       | 1.0               | 30.0                     | 30.6               | Complied      |

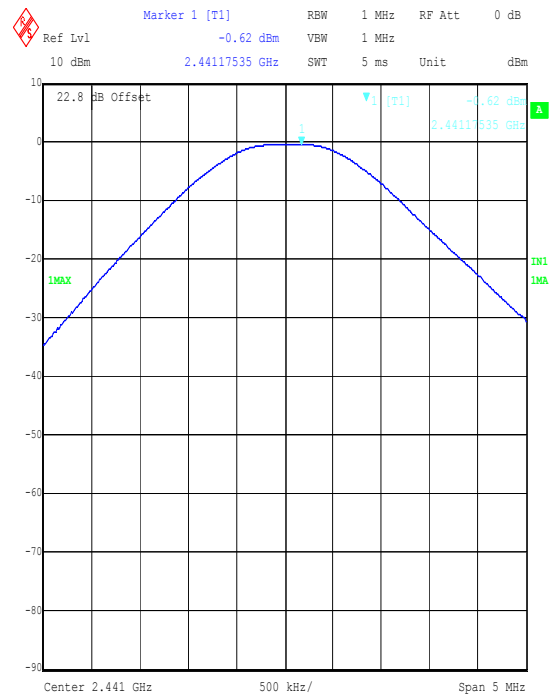
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

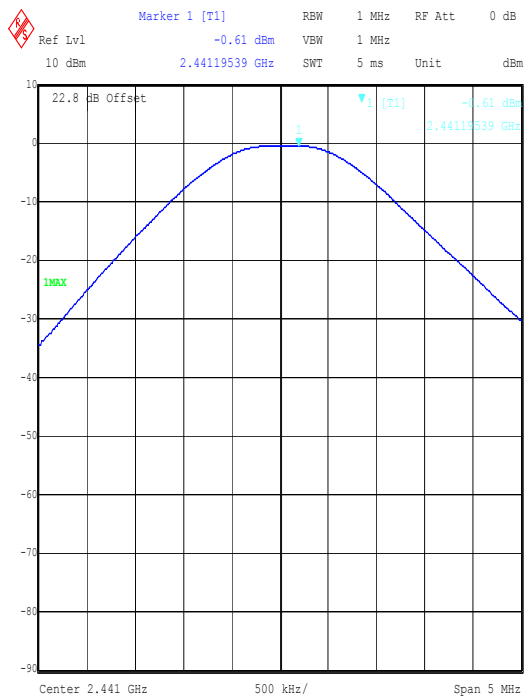
To: FCC Part 15.247

**Transmitter Peak Output Power: Section 15.247(b)(1) (Continued)**

Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Middle\_LowV\_002  
Date: 13.AUG.2003 15:19:54



Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Middle\_NomV\_005  
Date: 13.AUG.2003 15:12:17



Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Middle\_HighV\_008  
Date: 13.AUG.2003 15:16:04

**Test Of: Panasonic Mobile Communications Ltd.****X70 Mobile Handset****To: FCC Part 15.247**

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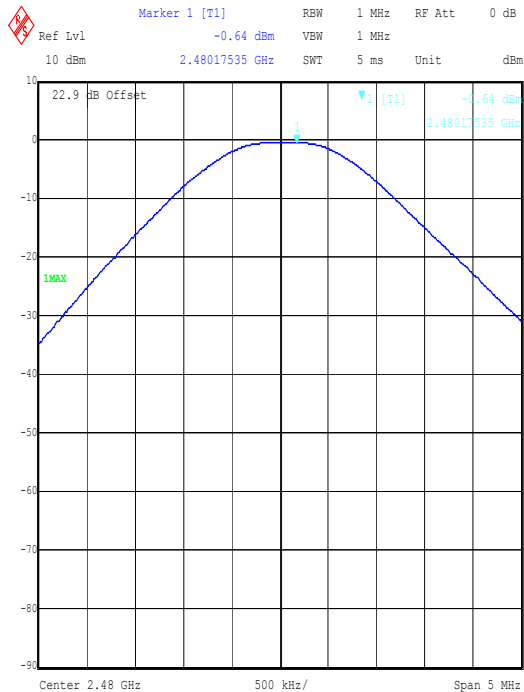
**Transmitter Peak Output Power: Section 15.247(b)(1) (Continued)**

| <b>Channel</b> | <b>Input Voltage (AC)</b> | <b>Output Level (dBm)</b> | <b>Antenna Gain (dBi)</b> | <b>EIRP (dBm)</b> | <b>Power Limit (dBm)</b> | <b>Margin (dB)</b> | <b>Result</b> |
|----------------|---------------------------|---------------------------|---------------------------|-------------------|--------------------------|--------------------|---------------|
| Top            | 93.5                      | -0.6                      | 1.6                       | 1.0               | 30.0                     | 30.6               | Complied      |
| Top            | 110.0                     | -0.7                      | 1.6                       | 0.9               | 30.0                     | 30.7               | Complied      |
| Top            | 126.5                     | -0.7                      | 1.6                       | 0.9               | 30.0                     | 30.7               | Complied      |

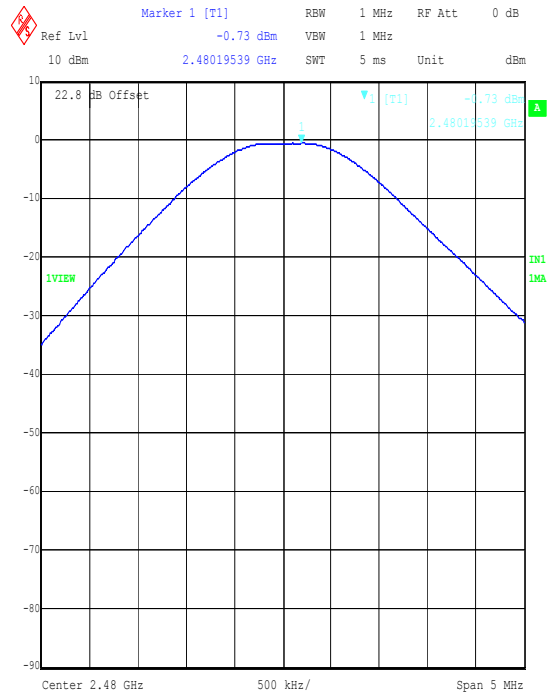
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

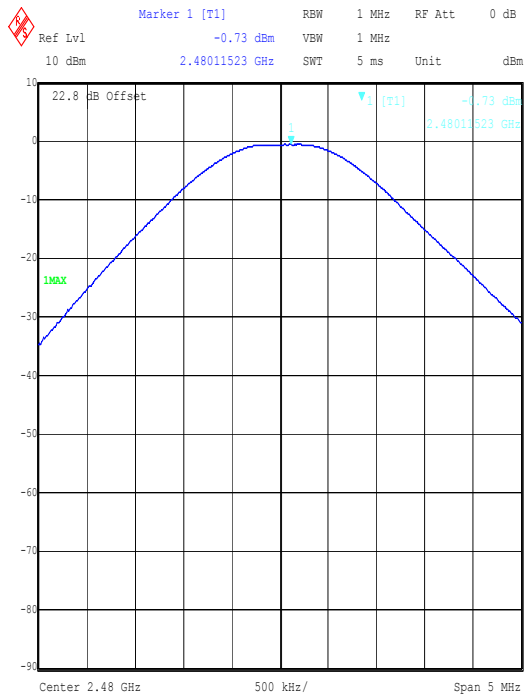
To: FCC Part 15.247

**Transmitter Peak Output Power: Section 15.247(b)(1) (Continued)**

Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Top\_LowV\_003  
Date: 13.AUG.2003 15:18:51



Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Top\_NomV\_006  
Date: 13.AUG.2003 15:13:01



Title: Panasonic X70 0044006228700226 FCC 15.247 Peak Output Power  
Comment A: 44839JD06\_FCC\_Output\_Power\_Top\_HighV\_009  
Date: 13.AUG.2003 15:16:42

Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

To: FCC Part 15.247

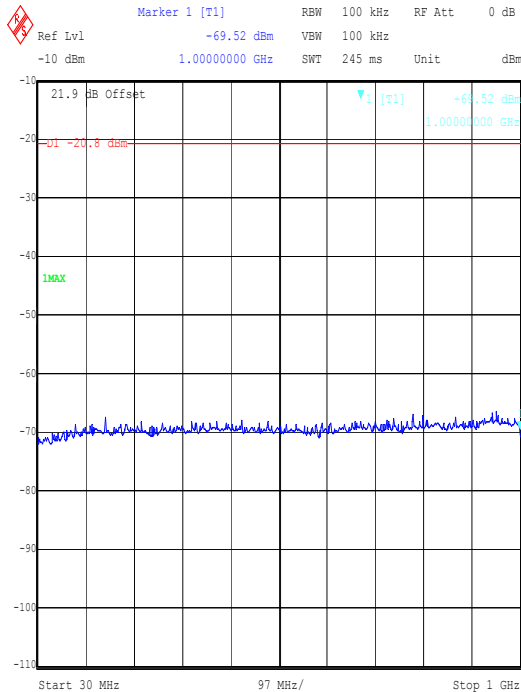
**7.9. Transmitter Conducted Emissions: Section 15.247(c)**

7.9.1. The EUT was configured as for conducted antenna port emissions measurements as described in Section 8 of this report.

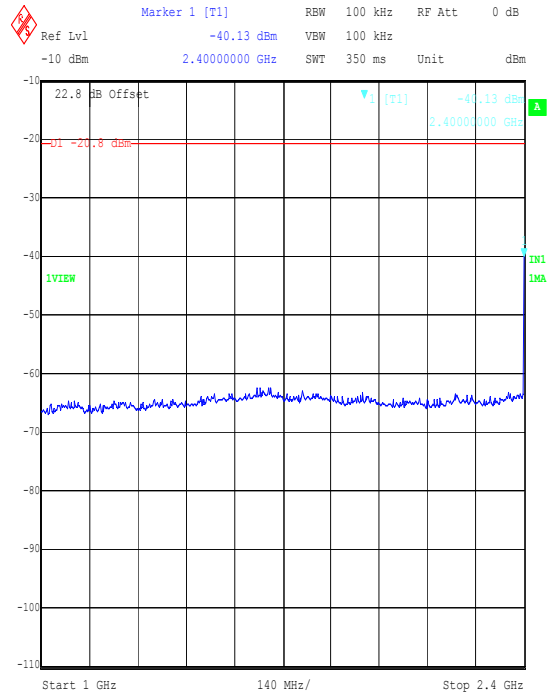
7.9.2. Tests were performed to identify the maximum conducted emissions levels on the antenna port.

**Results:****Highest Peak level: Bottom Channel**

| Frequency (GHz) | Peak Detector Level (dBm) | Peak Limit (dBm) | Peak Margin (dB) | Result   |
|-----------------|---------------------------|------------------|------------------|----------|
| 2.400           | -40.1                     | -20.8            | 19.3             | Complied |



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
 Comment A: 44839JD06\_FCC\_CE\_Bottom\_001  
 Date: 13.AUG.2003 11:50:08

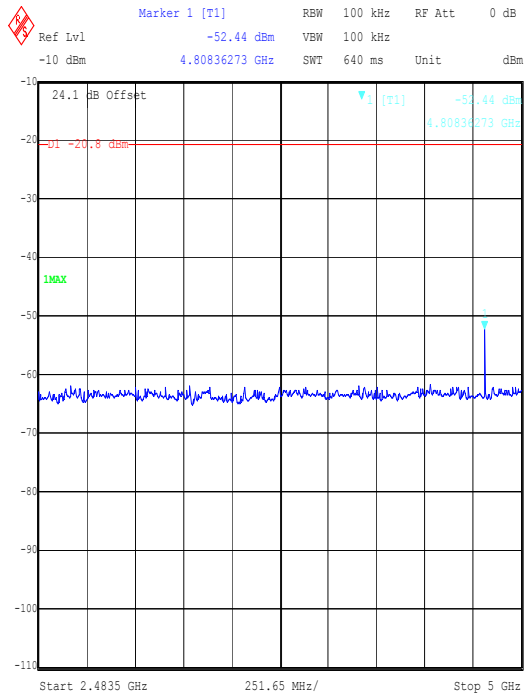


Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
 Comment A: 44839JD06\_FCC\_CE\_Bottom\_002  
 Date: 13.AUG.2003 11:58:03

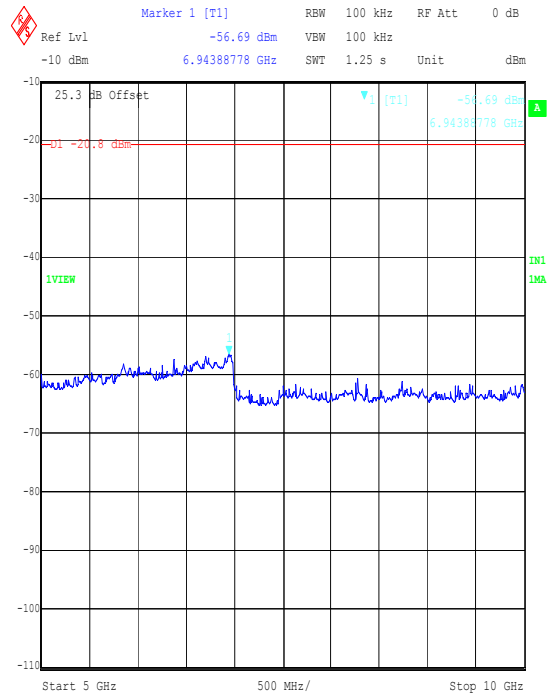
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

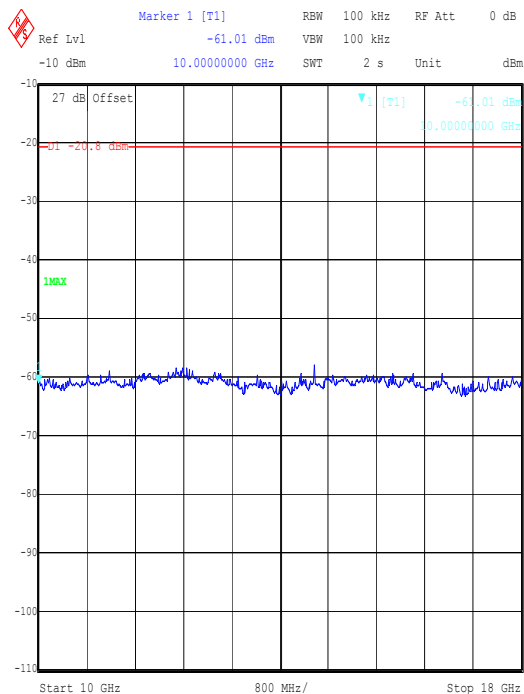
To: FCC Part 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)**

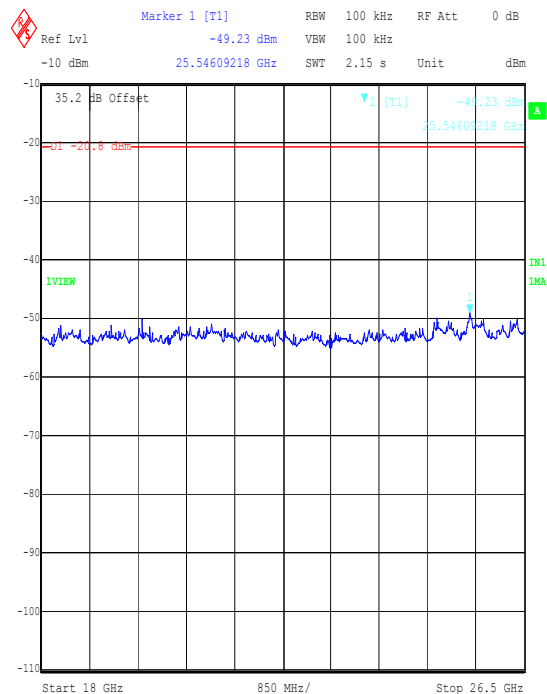
Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Bottom\_003  
Date: 13.AUG.2003 11:58:59



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Bottom\_004  
Date: 13.AUG.2003 12:00:08



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Bottom\_005  
Date: 13.AUG.2003 12:00:55



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Bottom\_006  
Date: 13.AUG.2003 12:02:13

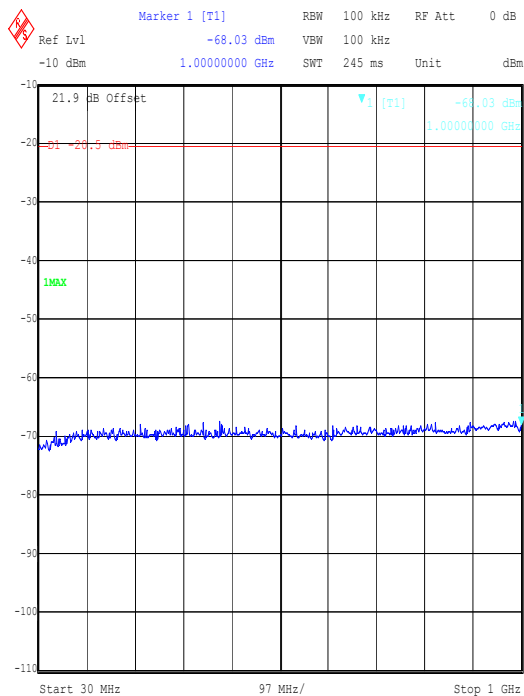
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

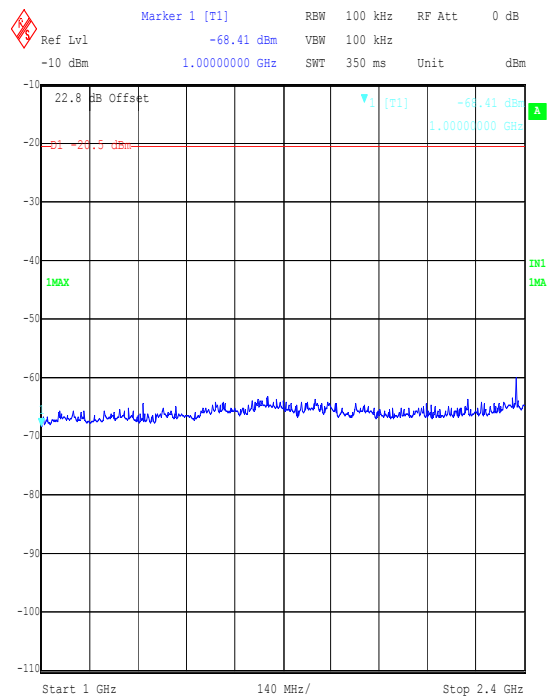
To: FCC Part 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)****Results:****Highest Peak level: Middle Channel**

| Frequency (GHz) | Peak Detector Level (dBm) | Peak Limit (dBm) | Peak Margin (dB) | Result   |
|-----------------|---------------------------|------------------|------------------|----------|
| 4.884           | -54.0                     | -20.5            | 33.5             | Complied |



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
 Comment A: 44839JD06\_FCC\_CE\_Middle\_007  
 Date: 13.AUG.2003 12:03:19

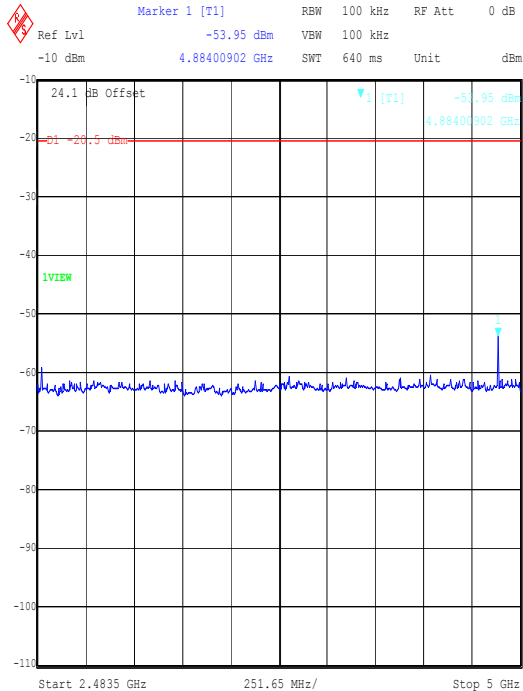


Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
 Comment A: 44839JD06\_FCC\_CE\_Middle\_008  
 Date: 13.AUG.2003 12:04:00

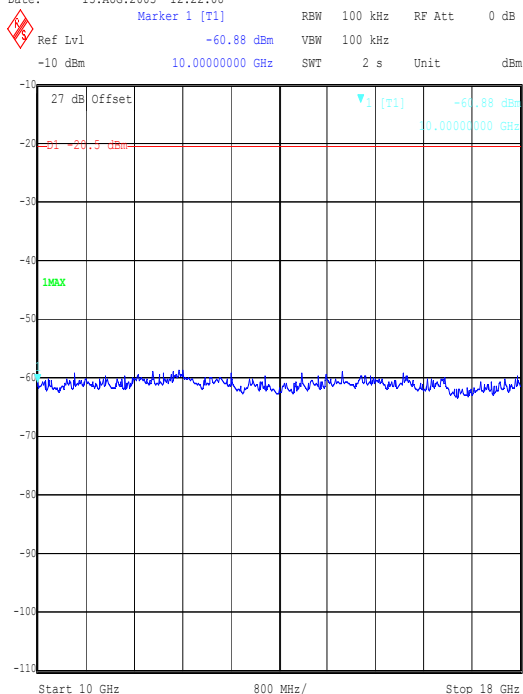
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

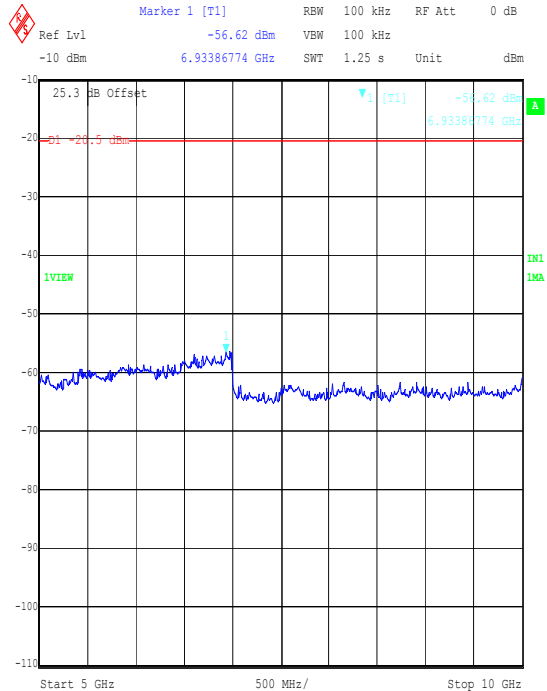
To: FCC Part 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)**

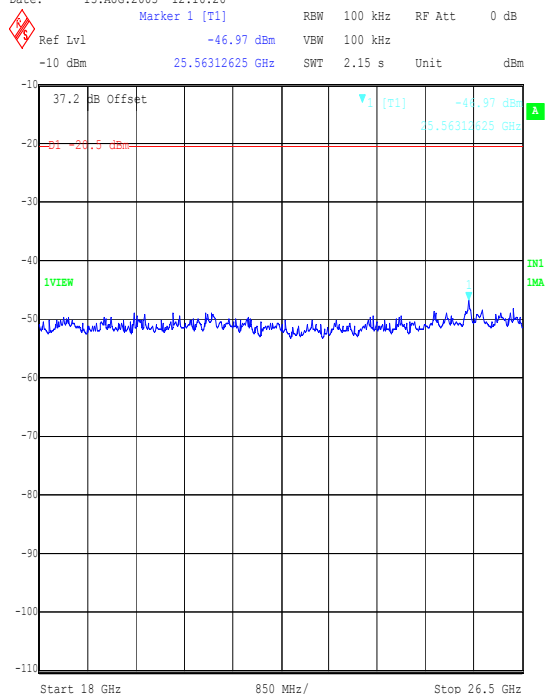
Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Middle\_009  
Date: 13.AUG.2003 12:22:08



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Middle\_011  
Date: 13.AUG.2003 12:17:20



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Middle\_010  
Date: 13.AUG.2003 12:16:26



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Middle\_012  
Date: 13.AUG.2003 12:22:56

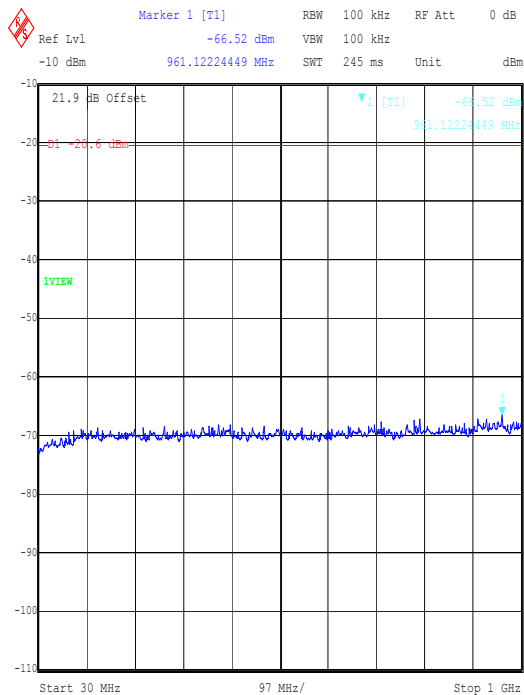
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

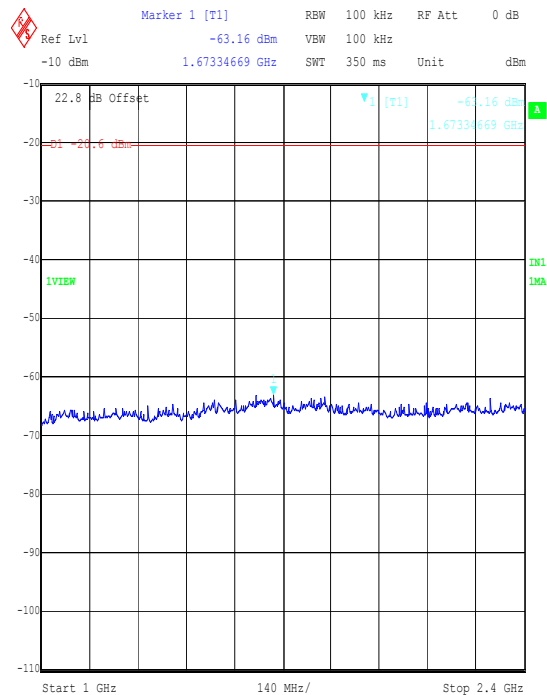
To: FCC Part 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)****Results:****Highest Peak level: Top Channel**

| Frequency (GHz) | Peak Detector Level (dBm) | Peak Limit (dBm) | Peak Margin (dB) | Result   |
|-----------------|---------------------------|------------------|------------------|----------|
| 4.9647          | -52.6                     | -20.6            | 32.0             | Complied |



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Top\_013  
Date: 13.AUG.2003 12:23:59

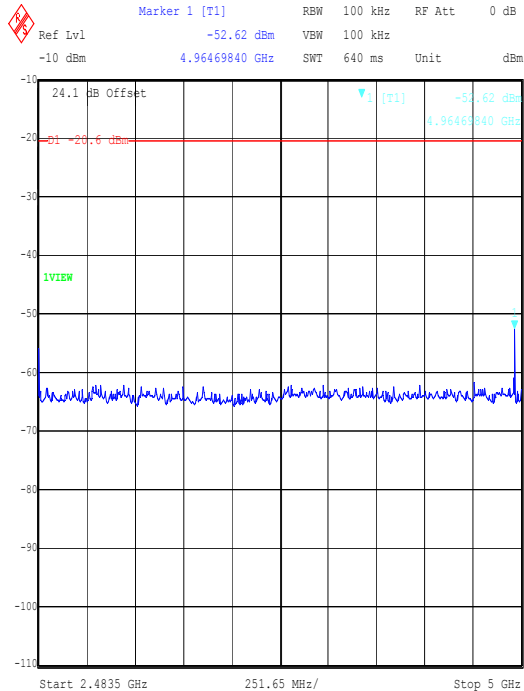


Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Top\_014  
Date: 13.AUG.2003 12:25:16

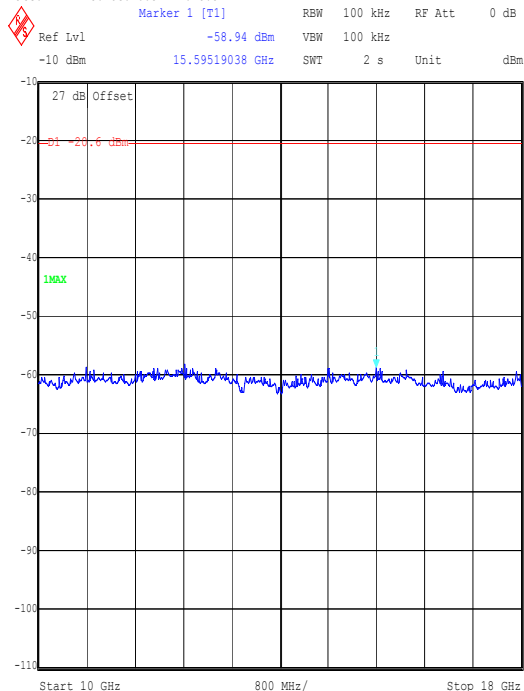
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

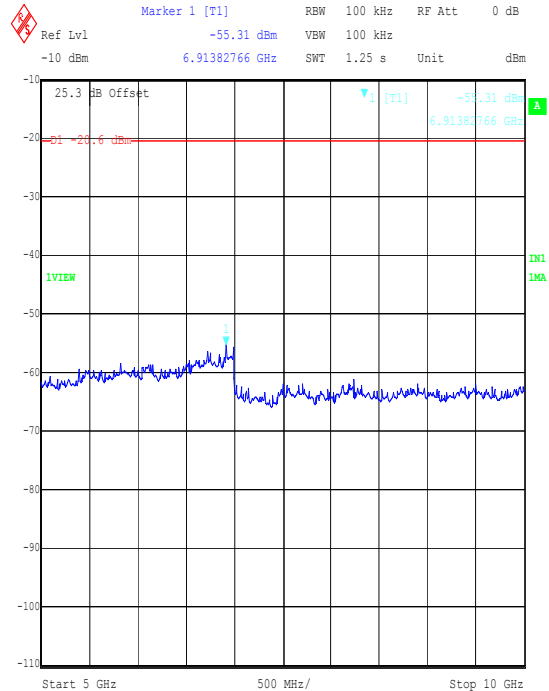
To: FCC Part 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)**

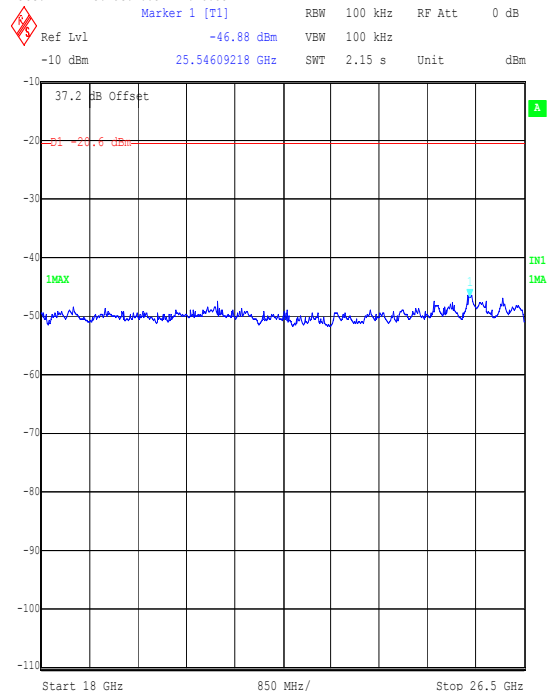
Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Top\_015  
Date: 13.AUG.2003 12:25:52



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Top\_017  
Date: 21.AUG.2003 15:27:32



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Top\_016  
Date: 13.AUG.2003 12:26:53



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Top\_018  
Date: 21.AUG.2003 15:25:31

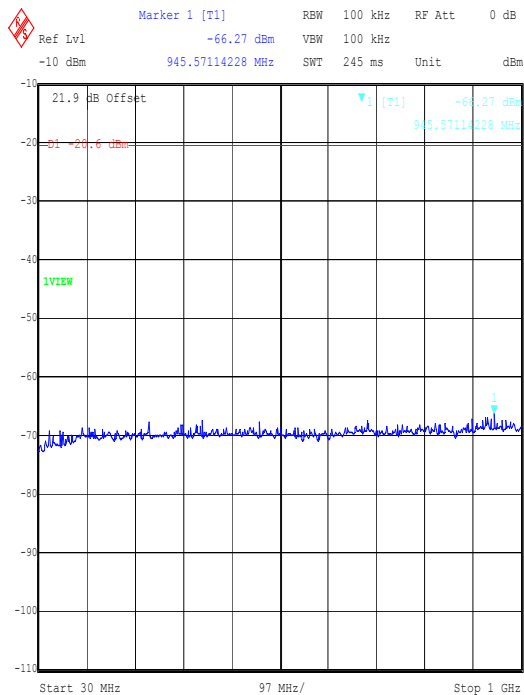
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

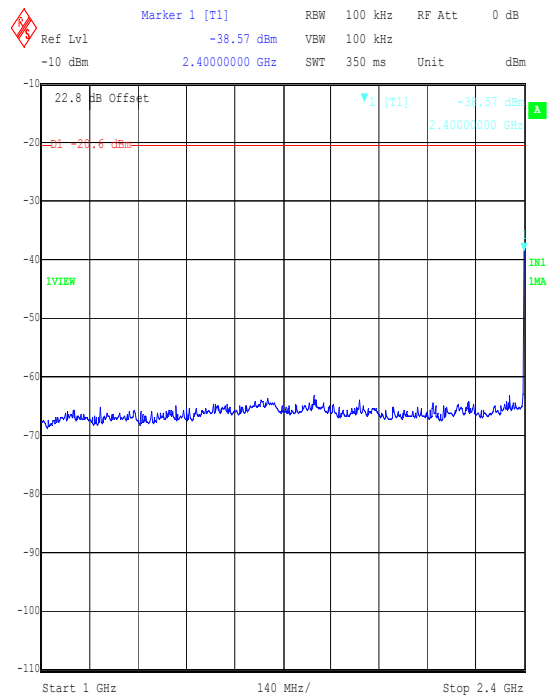
To: FCC Part 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)****Results:****Highest Peak level: Hopping All Channel**

| Frequency (GHz) | Peak Detector Level (dBm) | Peak Limit (dBm) | Peak Margin (dB) | Result   |
|-----------------|---------------------------|------------------|------------------|----------|
| 2.400           | -38.6                     | -20.6            | 18.0             | Complied |



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Hopping\_019  
Date: 13.AUG.2003 12:29:28

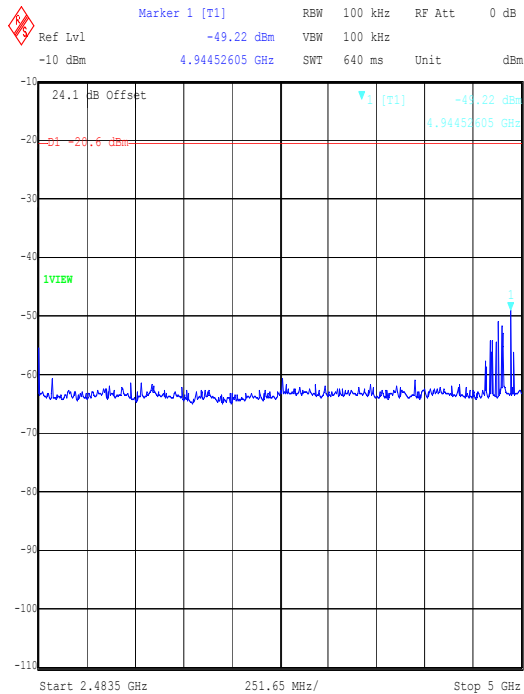


Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Hopping\_020  
Date: 13.AUG.2003 12:30:13

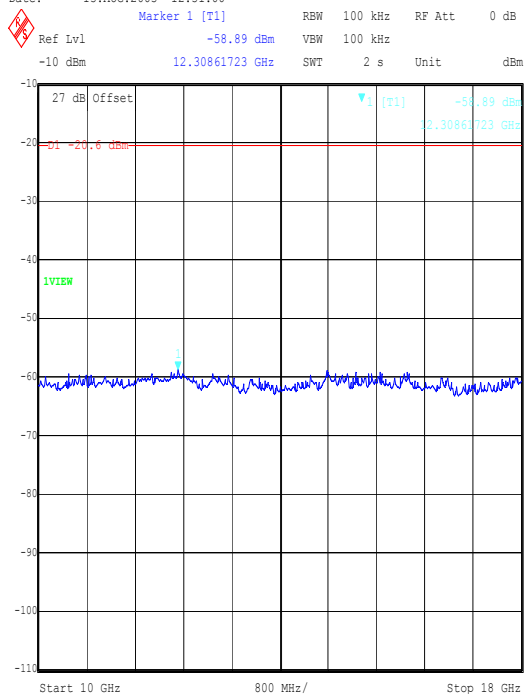
Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

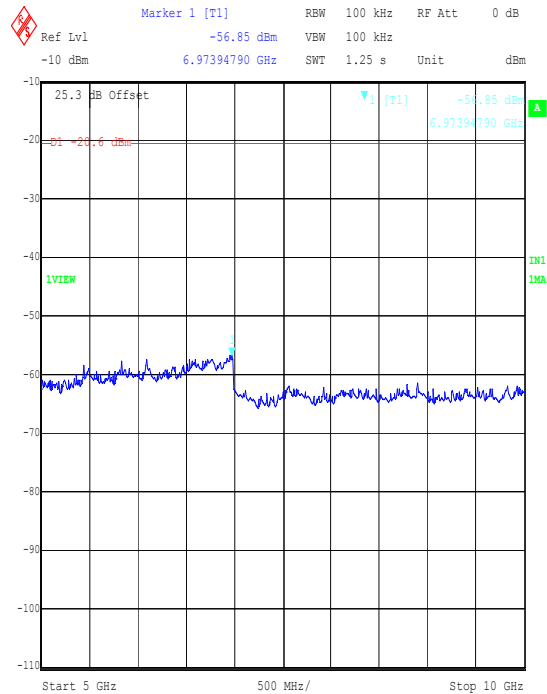
To: FCC Part 15.247

**Transmitter Conducted Emissions: Section 15.247(c) (Continued)**

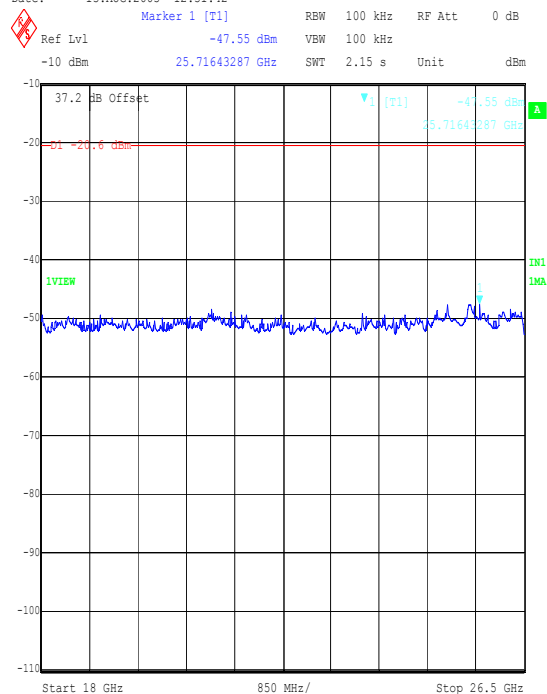
Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Hopping\_021  
Date: 13.AUG.2003 12:31:00



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Hopping\_023  
Date: 13.AUG.2003 12:32:30



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Hopping\_022  
Date: 13.AUG.2003 12:31:42



Title: Panasonic X70 0044006228700226 FCC 15.247 Conducted Spurious  
Comment A: 44839JD06\_FCC\_CE\_Hopping\_024  
Date: 13.AUG.2003 12:33:11

Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

To: FCC Part 15.247

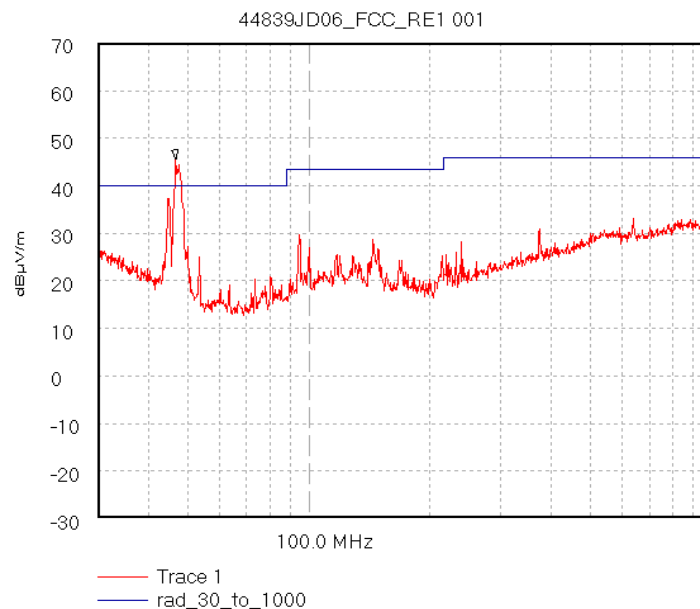
**7.10. Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a)****7.10.1. Electric Field Strength Measurements: 30 to 1000 MHz.**

7.10.1.1. The EUT was configured as for radiated field strength measurements as described in Section 8 of this report.

7.10.1.2. Tests were performed to identify the maximum radiated emissions levels.

**Bottom Channel**

| Frequency (MHz) | Ant. Pol. | Q-P Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|-----------|--------------------------|----------------------|-------------|----------|
| 44.865          | Vert.     | 16.5                     | 40.0                 | 23.5        | Complied |
| 46.663          | Vert.     | 27.4                     | 40.0                 | 12.6        | Complied |
| 47.194          | Vert.     | 19.7                     | 40.0                 | 20.3        | Complied |



Start 30.0 MHz; Stop 1.0 GHz - Log Scale  
 Ref 70 dB $\mu$ V/m; Ref Offset 0.0 dB; 10 dB/div  
 RBW 68.966 kHz; VBW 100.0 kHz; Att 0 dB; Swp 260.0 mS  
 Peak 46.776 MHz, 45.58 dB $\mu$ V/m  
 Limit/Mask: rad\_30\_to\_1000; ; Limit Test Failed  
 Transducer Factors: A1037  
 8/7/2003 3:46:43 PM

Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

To: FCC Part 15.247

**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)****7.10.2. Electric Field Strength Measurements: 1.0 to 26.5 GHz****Highest Average Level: Bottom Channel**

| Frequency (GHz) | Antenna Polarity (H/V) | Average Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Average Level (dB $\mu$ V/m) | Average Limit (dB $\mu$ V/m) | Average Margin (dB) | Result   |
|-----------------|------------------------|-------------------------------------|---------------------|-----------------|-------------------------------------|------------------------------|---------------------|----------|
| 5.0377          | Horiz.                 | 3.2                                 | 24.4                | 2.0             | 29.6                                | 54.0                         | 24.4                | Complied |

**Highest Peak Level: Bottom Channel**

| Frequency (GHz) | Antenna Polarity (H/V) | Peak Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Peak Level (dB $\mu$ V/m) | Peak Limit (dB $\mu$ V/m) | Peak Margin (dB) | Result   |
|-----------------|------------------------|----------------------------------|---------------------|-----------------|----------------------------------|---------------------------|------------------|----------|
| 5.0377          | Horiz.                 | 17.0                             | 24.4                | 2.0             | 43.4                             | 74.0                      | 30.6             | Complied |

**Highest Average Level: Middle Channel**

| Frequency (GHz) | Antenna Polarity (H/V) | Average Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Average Level (dB $\mu$ V/m) | Average Limit (dB $\mu$ V/m) | Average Margin (dB) | Result   |
|-----------------|------------------------|-------------------------------------|---------------------|-----------------|-------------------------------------|------------------------------|---------------------|----------|
| 5.8711          | Horiz.                 | 5.3                                 | 24.4                | 2.0             | 31.7                                | 54.0                         | 22.3                | Complied |

**Highest Peak Level: Middle Channel**

| Frequency (GHz) | Antenna Polarity (H/V) | Peak Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Peak Level (dB $\mu$ V/m) | Peak Limit (dB $\mu$ V/m) | Peak Margin (dB) | Result   |
|-----------------|------------------------|----------------------------------|---------------------|-----------------|----------------------------------|---------------------------|------------------|----------|
| 5.8711          | Horiz.                 | 19.0                             | 24.4                | 2.0             | 45.4                             | 74.0                      | 28.6             | Complied |

Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

To: FCC Part 15.247

**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)****Highest Average Level: Top Channel**

| Frequency (GHz) | Antenna Polarity (H/V) | Average Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Average Level (dB $\mu$ V/m) | Average Limit (dB $\mu$ V/m) | Average Margin (dB) | Result   |
|-----------------|------------------------|-------------------------------------|---------------------|-----------------|-------------------------------------|------------------------------|---------------------|----------|
| 5.0622          | Horiz.                 | 3.5                                 | 24.4                | 2.0             | 29.9                                | 54.0                         | 24.1                | Complied |

**Highest Peak Level: Top Channel**

| Frequency (GHz) | Antenna Polarity (H/V) | Peak Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Peak Level (dB $\mu$ V/m) | Peak Limit (dB $\mu$ V/m) | Peak Margin (dB) | Result   |
|-----------------|------------------------|----------------------------------|---------------------|-----------------|----------------------------------|---------------------------|------------------|----------|
| 5.0622          | Horiz.                 | 17.8                             | 24.4                | 2.0             | 44.2                             | 74.0                      | 29.8             | Complied |

**Highest Average Level: Hopping All Channels**

| Frequency (GHz) | Antenna Polarity (H/V) | Average Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Average Level (dB $\mu$ V/m) | Average Limit (dB $\mu$ V/m) | Average Margin (dB) | Result   |
|-----------------|------------------------|-------------------------------------|---------------------|-----------------|-------------------------------------|------------------------------|---------------------|----------|
| 5.8803          | Horiz.                 | 5.6                                 | 24.4                | 2.0             | 32.0                                | 54.0                         | 22.0                | Complied |

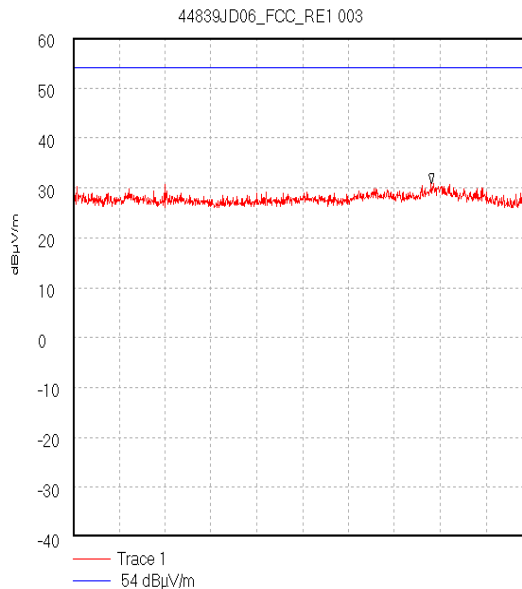
**Highest Peak Level: Hopping All Channels**

| Frequency (GHz) | Antenna Polarity (H/V) | Peak Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Peak Level (dB $\mu$ V/m) | Peak Limit (dB $\mu$ V/m) | Peak Margin (dB) | Result   |
|-----------------|------------------------|----------------------------------|---------------------|-----------------|----------------------------------|---------------------------|------------------|----------|
| 5.8803          | Horiz.                 | 19.3                             | 24.4                | 2.0             | 45.7                             | 74.0                      | 28.3             | Complied |

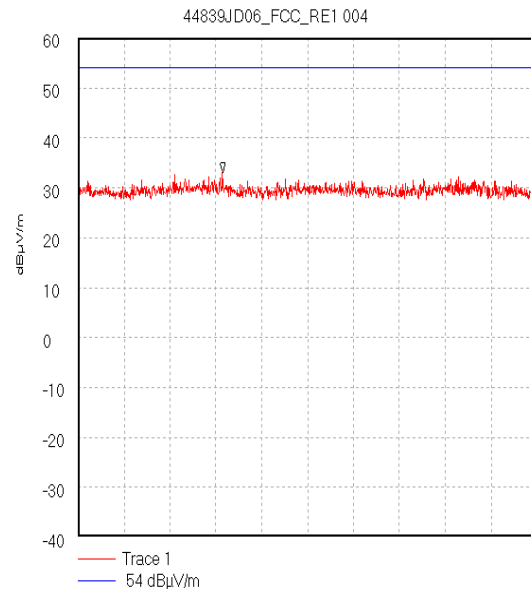
Test Of: **Panasonic Mobile Communications Ltd.**To: **X70 Mobile Handset**

FCC Part 15.247

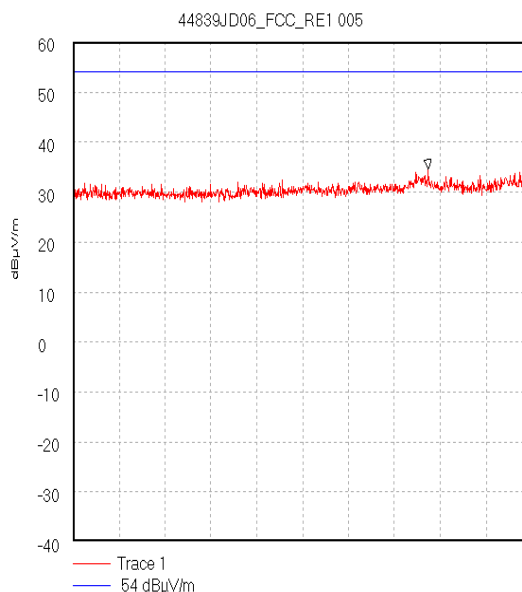
Issue Date: 08 October 2003

**Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)**

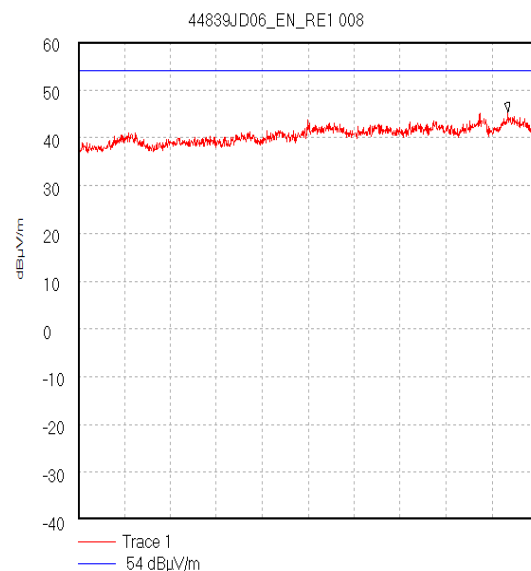
Start 1.0 GHz; Stop 2.0 GHz  
 Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 640.0 mS  
 Peak 1.781 GHz; 30.8 dBμV/m  
 Display Line: 54 dBμV/m; ; Limit Test Passed  
 8/7/2003 4:02:29 PM



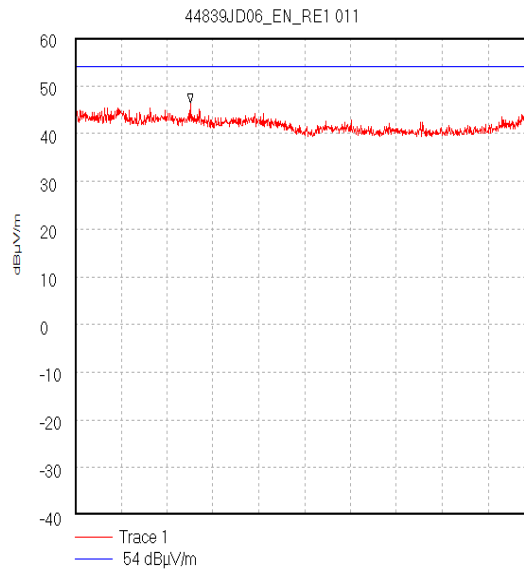
Start 2.0 GHz; Stop 2.4 GHz  
 Ref 60 dBμV/m; Ref Offset 5.0 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 260.0 mS  
 Peak 2.126 GHz; 33.11 dBμV/m  
 Display Line: 54 dBμV/m; ; Limit Test Passed  
 8/7/2003 4:06:04 PM



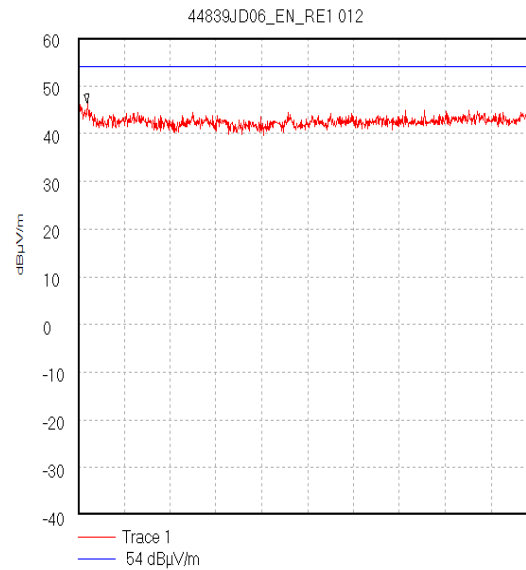
Start 2.484 GHz; Stop 4.0 GHz  
 Ref 60 dBμV/m; Ref Offset 5.0 dB; 10 dB/div  
 RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 960.0 mS  
 Peak 3.658 GHz; 34.54 dBμV/m  
 Display Line: 54 dBμV/m; ; Limit Test Passed  
 8/7/2003 4:07:34 PM



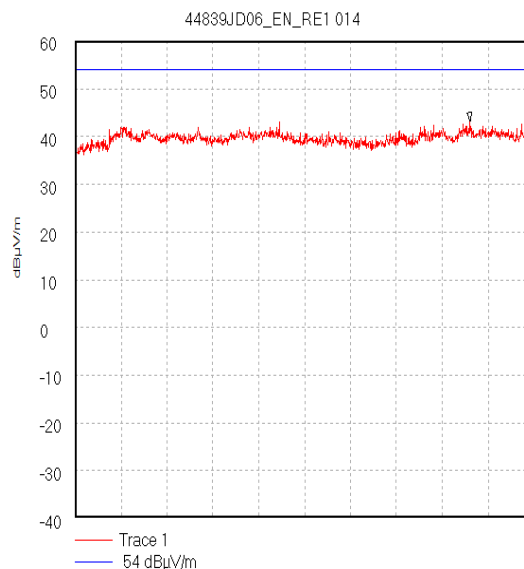
Start 4.0 GHz; Stop 6.0 GHz  
 Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div  
 RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
 Peak 5.871111 GHz; 45.4 dBμV/m  
 Display Line: 54 dBμV/m;  
 Transducer Factors: 4to6g\_Horn  
 18/08/2003 14:04:03

Test Of: **Panasonic Mobile Communications Ltd.****X70 Mobile Handset**To: **FCC Part 15.247****Transmitter Radiated Emissions: Section 15.247(c) and 15.209(a) (continued)**

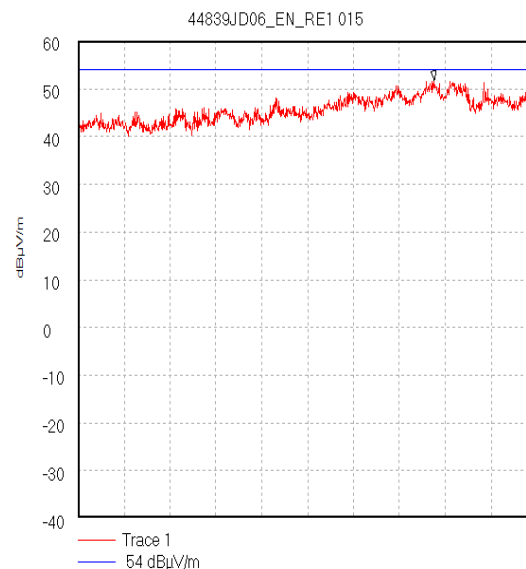
Start 6.0 GHz; Stop 8.0 GHz  
 Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div  
 RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
 Peak 6.502222 GHz, 46.34 dBμV/m  
 Display Line: 54 dBμV/m;  
 Transducer Factors: 6to8g\_Horn  
 18/08/2003 14:22:33



Start 8.0 GHz; Stop 12.5 GHz  
 Ref 60 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 8.09 GHz, 46.37 dBμV/m  
 Display Line: 54 dBμV/m;  
 Transducer Factors: 8to12G\_Horn  
 18/08/2003 14:25:55



Start 12.5 GHz; Stop 18.0 GHz  
 Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div  
 RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS  
 Peak 17.236111 GHz, 43.19 dBμV/m  
 Display Line: 54 dBμV/m;  
 Transducer Factors: 12to18G\_Horn  
 18/08/2003 14:33:41



Start 18.0 GHz; Stop 26.5 GHz  
 Ref 60 dBμV/m; Ref Offset 0.0 dB; 10 dB/div  
 RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 40.0 mS  
 Peak 24.601667 GHz, 51.8 dBμV/m  
 Display Line: 54 dBμV/m;  
 Transducer Factors: 18to26  
 18/08/2003 14:39:25

Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

To: FCC Part 15.247

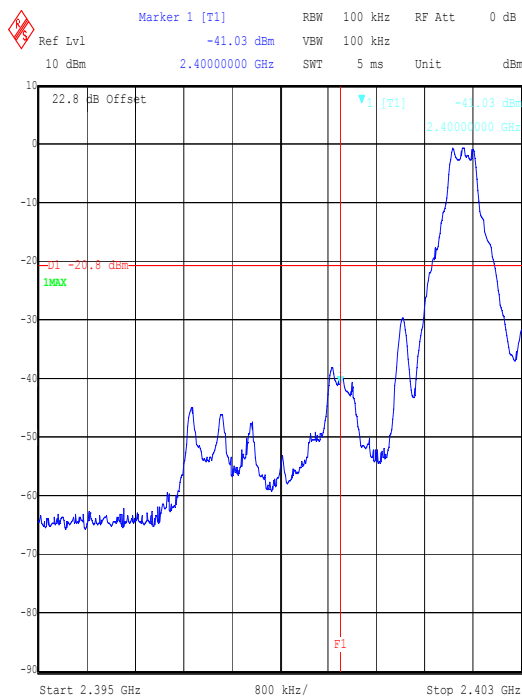
**7.11. Transmitter Band Edge Conducted Emissions: Section 15.247(c)****7.11.1. Electric Field Strength Measurements**

7.11.1.1. The EUT was configured as for conducted antenna port emissions measurements as described in Section 8 of this report.

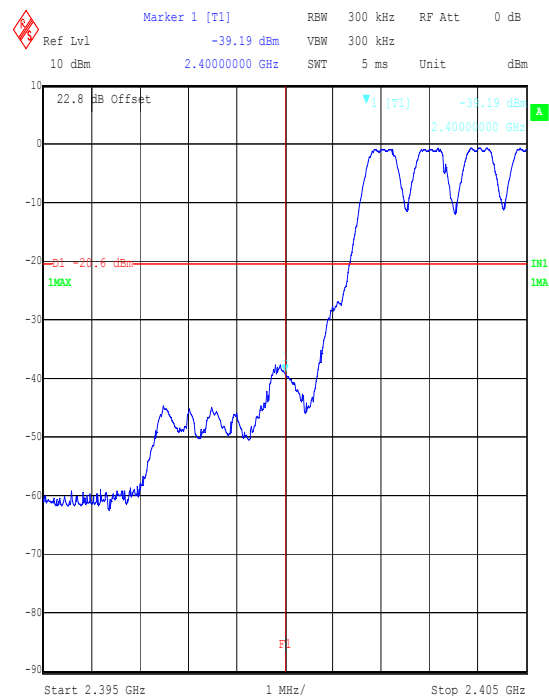
7.11.1.2. Tests were performed to identify the maximum conducted band edge emissions.

**Highest Peak Level Lower Band Edge**

| Frequency (GHz) | Mode    | Peak Detector level (dBm) | Peak Limit (dBm) | Peak Margin (dB) | Result   |
|-----------------|---------|---------------------------|------------------|------------------|----------|
| 2.400           | Static  | -41.0                     | -20.8            | 20.1             | Complied |
| 2.400           | Hopping | -39.2                     | -20.6            | 18.6             | Complied |



Title: Panasonic X70 0044006228700226 FCC 15.247 Lower Band-Edge  
Comment A: 44839JD06\_FCC\_Lower\_band\_Edge\_Bottom\_002  
Date: 13.AUG.2003 14:22:05



Title: Panasonic X70 0044006228700226 FCC 15.247 Lower Band-Edge  
Comment A: 44839JD06\_FCC\_Lower\_band\_Edge\_Hopping\_001  
Date: 13.AUG.2003 14:20:41

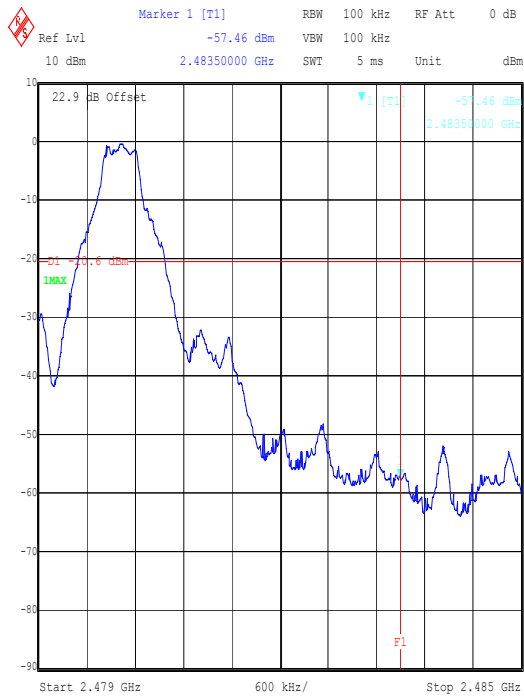
Test Of: Panasonic Mobile Communications Ltd.

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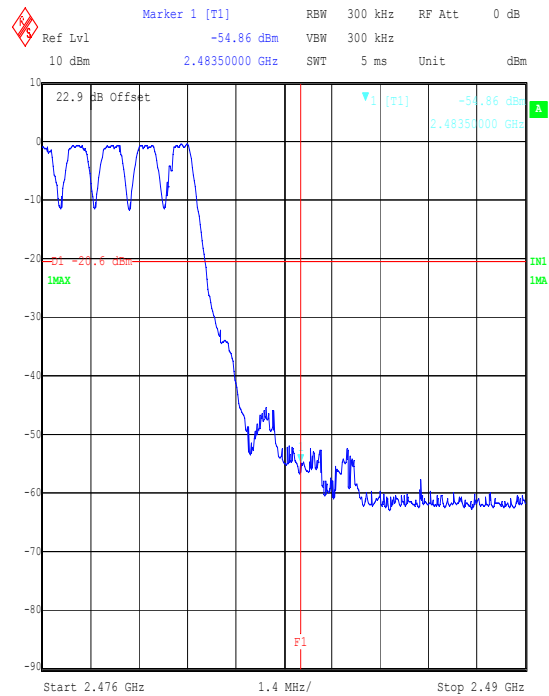
To: FCC Part 15.247

**Transmitter Band Edge Conducted Emissions: Section 15.247(c) (Continued)****Highest Peak Level Upper Band Edge**

| Frequency (GHz) | Mode    | Peak Detector level (dBm) | Peak Limit (dBm) | Peak Margin (dB) | Result   |
|-----------------|---------|---------------------------|------------------|------------------|----------|
| 2.4835          | Static  | -57.5                     | -20.6            | 36.9             | Complied |
| 2.4835          | Hopping | -54.9                     | -20.6            | 34.3             | Complied |



Title: Panasonic X70 0044006228700226 FCC 15.247 Upper Band-Edge  
Comment A: 44839JD06\_FCC\_Upper\_band\_Edge\_Top\_001  
Date: 13.AUG.2003 14:23:42



Title: Panasonic X70 0044006228700226 FCC 15.247 Upper Band-Edge  
Comment A: 44839JD06\_FCC\_Upper\_band\_Edge\_Hopping\_002  
Date: 13.AUG.2003 14:25:11

Test Of: Panasonic Mobile Communications Ltd.

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To: FCC Part 15.247

**7.12. Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a)****7.12.1. Electric Field Strength Measurements**

7.12.1.1. The EUT was configured as for band edge compliance of radiated emissions measurements as described in Section 8 of this report.

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

**Peak Power Level Hopping Mode:**

| Frequency (GHz) | Antenna Polarity (H/V) | Actual Peak level (dBm) | Peak Limit (dBm) | Peak Margin (dB) | Result   |
|-----------------|------------------------|-------------------------|------------------|------------------|----------|
| 2.4000          | Horiz.                 | -47.1                   | -22.5            | 24.6             | Complied |

**Peak Power Level Hopping Mode:**

| Frequency (GHz) | Antenna Polarity (H/V) | Peak Detector level (dBμV) | Antenna factor (dB) | Cable loss (dB) | Actual Peak Level (dBμV/m) | Peak Limit (dBμV/m) | Peak Margin (dB) | Result   |
|-----------------|------------------------|----------------------------|---------------------|-----------------|----------------------------|---------------------|------------------|----------|
| 2.4835          | Horiz.                 | 23.7                       | 21.1                | 2.0             | 46.8                       | 74.0                | 27.2             | Complied |

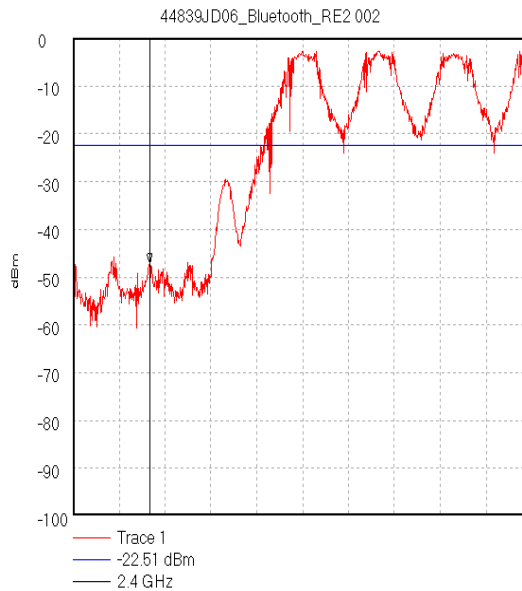
**Average Power Level Hopping Mode:**

| Frequency (GHz) | Antenna Polarity (H/V) | Average Detector level (dBμV) | Antenna factor (dB) | Cable loss (dB) | Actual Average Level (dBμV/m) | Average Limit (dBμV/m) | Average Margin (dB) | Result   |
|-----------------|------------------------|-------------------------------|---------------------|-----------------|-------------------------------|------------------------|---------------------|----------|
| 2.4835          | Horiz.                 | 15.0                          | 21.1                | 2.0             | 38.1                          | 54.0                   | 15.9                | Complied |

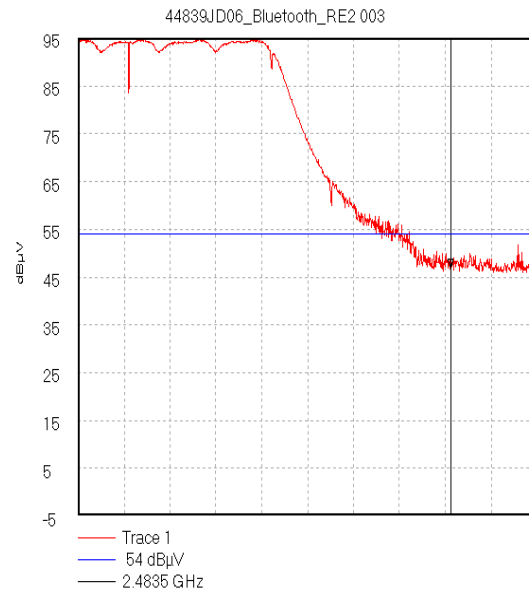
Test Of: Panasonic Mobile Communications Ltd.

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To: FCC Part 15.247

**Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a) (Continued)**

Start 2.399 GHz; Stop 2.405 GHz  
Ref 0 dBm; Ref Offset 27.8 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 20.0 mS  
Marker 2.4 GHz, -47.13 dBm  
Display Line: -22.51 dBm;  
22/08/2003 14:45:43



Start 2.477 GHz; Stop 2.485 GHz  
Ref 95 dBμV; Ref Offset 2.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 10 dB; Swp 20.0 mS  
Marker 2.4835 GHz, 46.78 dBμV  
Display Line: 54 dBμV; ; Limit Test Failed  
22/08/2003 15:00:49

Test Of: Panasonic Mobile Communications Ltd.

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To: FCC Part 15.247

**Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a) (Continued)****Peak Power Level Static Mode:**

| Frequency (GHz) | Antenna Polarity (H/V) | Actual Peak level (dBm) | Peak Limit (dBm) | Peak Margin (dB) | Result   |
|-----------------|------------------------|-------------------------|------------------|------------------|----------|
| 2.4000          | Horiz.                 | -48.3                   | -22.6            | 25.7             | Complied |

**Peak Power Static Mode:**

| Frequency (GHz) | Antenna Polarity (H/V) | Peak Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Peak Level (dB $\mu$ V/m) | Peak Limit (dB $\mu$ V/m) | Peak Margin (dB) | Result   |
|-----------------|------------------------|----------------------------------|---------------------|-----------------|----------------------------------|---------------------------|------------------|----------|
| 2.4835          | Horiz.                 | 25.1                             | 21.1                | 2.0             | 48.2                             | 74.0                      | 25.8             | Complied |

**Average Power Level Static Mode:**

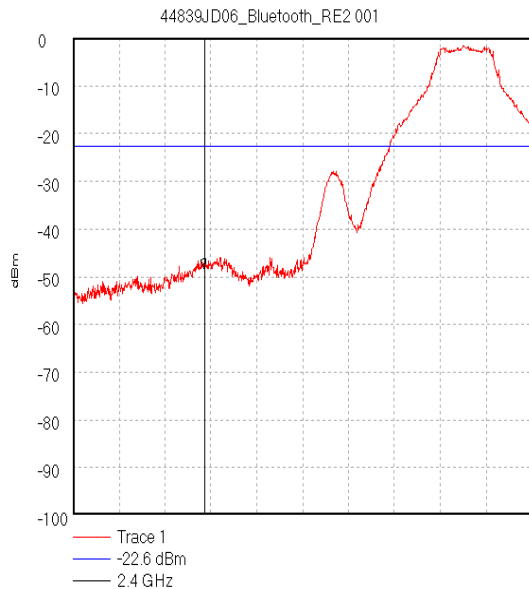
| Frequency (GHz) | Antenna Polarity (H/V) | Average Detector level (dB $\mu$ V) | Antenna factor (dB) | Cable loss (dB) | Actual Average Level (dB $\mu$ V/m) | Average Limit (dB $\mu$ V/m) | Average Margin (dB) | Result   |
|-----------------|------------------------|-------------------------------------|---------------------|-----------------|-------------------------------------|------------------------------|---------------------|----------|
| 2.4835          | Horiz.                 | 16.4                                | 21.1                | 2.0             | 35.5                                | 54.0                         | 18.5                | Complied |

Test Of: Panasonic Mobile Communications Ltd.

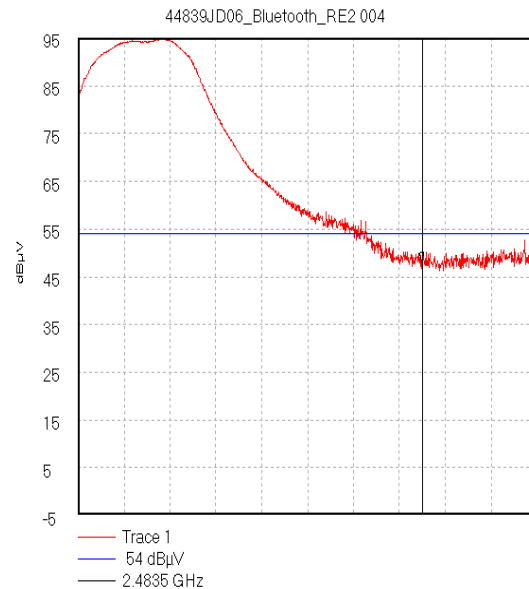
X70 Mobile Handset

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Issue Date: 08 October 2003

**Transmitter Band Edge Radiated Emissions: Section 15.247(c) & 15.209(a) (Continued)**

Start 2.399 GHz; Stop 2.4025 GHz  
Ref 0 dBm; Ref Offset 27.8 dB; 10 dB/div  
RBW 100.0 kHz; VBW 100.0 kHz; Att 0 dB; Swp 20.0 mS  
Marker 2.4 GHz, -48.33 dBm  
Display Line: -22.6 dBm;  
22/08/2003 14:32:54



Start 2.479 GHz; Stop 2.485 GHz  
Ref 95 dBμV; Ref Offset 2.0 dB; 10 dB/div  
RBW 1000.0 kHz; VBW 1.0 MHz; Att 10 dB; Swp 20.0 mS  
Marker 2.4835 GHz, 48.18 dBμV  
Display Line: 54 dBμV; ; Limit Test Failed  
22/08/2003 15:04:21

Test Of: Panasonic Mobile Communications Ltd.

X70 Mobile Handset

To: FCC Part 15.247

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## **8. Measurement Methods**

### **8.1. AC Mains Conducted Emissions**

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

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane. The EUT powered with 115 V 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 EUT was configured in accordance with section 5.2 of this report.

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

| Receiver Function | Initial Scan     | Final Measurements  |
|-------------------|------------------|---------------------|
| Detector Type:    | Peak             | Quasi-Peak (CISPR)* |
| Mode:             | Max Hold         | Not applicable      |
| Bandwidth:        | 9 kHz            | 9 kHz               |
| Amplitude Range:  | 100 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      |

\* In some instances an Average detector function may also have been used, where this was the case it would have been documented in the relevant section.

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## **8.2. Radiated Field Strength Emissions**

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

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

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

In either case the measurement was made at the appropriate distance using a measuring receiver with a Quasi-Peak detector for measurements below 1000 MHz and an Average and Peak detector for measurements above 1000 MHz.

All measurements on the open area test site were performed using broadband antennas.

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

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

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

Scans were performed to the upper frequency limit as stated in 15.33(a)(1)

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

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**Radiated Field Strength Emissions (Continued)**

The EUT was configured in accordance with section 5.2 of this report for radiated emissions testing.

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

| Receiver Function | Initial Scan<br>Below 1000 MHz | Final Measurements<br>Below 1000 MHz |
|-------------------|--------------------------------|--------------------------------------|
| Detector Type:    | Peak                           | Quasi-Peak (CISPR)                   |
| Mode:             | Max Hold                       | Not applicable                       |
| Bandwidth:        | 100 kHz                        | 120 kHz                              |
| Amplitude Range:  | 100 dB                         | 100 dB                               |
| Measurement Time: | Not applicable                 | > 1 s                                |
| Observation Time: | Not applicable                 | > 15 s                               |
| Step Size:        | Continuous sweep               | Not applicable                       |
| Sweep Time:       | Coupled                        | Not applicable                       |

| Receiver Function | Initial Scan<br>Above 1000 MHz | Final Measurements<br>Above 1000 MHz |
|-------------------|--------------------------------|--------------------------------------|
| Detector Type:    | Peak                           | Peak/Average                         |
| Mode:             | Max Hold                       | Max Hold where applicable            |
| Bandwidth:        | 100 kHz                        | 1 MHz                                |
| Amplitude Range:  | 100 dB                         | 100 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: Panasonic Mobile Communications Ltd.**

**X70 Mobile Handset**

**To: FCC Part 15.247**

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### **8.3. Carrier Frequency Separation / 20 dB Bandwidth**

The EUT and spectrum analyser was configured as for radiated measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine the bandwidth and separation of each transmission channel the analyser was configured to measure two adjacent channels.

To determine the occupied bandwidth, a resolution bandwidth of 10 kHz was used, which is greater than 1% of the 20 dB bandwidth. A video bandwidth of a least the same value was used. The analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference line was drawn 20 dB below the peak level. The bandwidth was determined at the points where the 20 dB reference crossed the profile of the emission.

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**To: FCC Part 15.247**

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#### **8.4. Average Time of Occupancy**

The EUT and spectrum analyser was configured as for radiated measurements, and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

First the maximum packet length was determined on the centre channel.

The measurement analyser was configured to the time domain mode by setting the span to 0 with a sweep time sufficiently wide enough to measure one pulse.

The EUT was configured to operate in normal mode of operation.

The pulse width of one transmission was then recorded.

The measurement analyser was then configured in 0 span with the time domain and a 31.6 second sweep time. This period was determined by multiplying the number of channels the device operates over (79) by 0.4 seconds.

The number of transmissions within this period was noted and multiplied by the pulse width recorded earlier. This gives the maximum occupancy over 31.6 seconds.

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**X70 Mobile Handset**

**To: FCC Part 15.247**

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### **8.5. Peak Output Power**

The EUT and spectrum analyser were configured as for radiated measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

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

To determine the transmitter output power, the EUT was operated at maximum power and a result was obtained from the wideband power meter.

The EUT was configured in accordance with section 5.2 of this report

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**8.6. Band Edge Compliance of RF Radiated Emissions**

The EUT and spectrum analyser were configured as for Radiated measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine band-edge compliance, the analyser resolution bandwidth was set to  $\geq 1\%$  of the analyser span. The video bandwidth was set to be no less than the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

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

If the upper or lower band edges fell on a restricted band edge then the limit set for the restricted band would be applied instead of the 20 dBc limit.

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

The EUT was configured in accordance with section 5.2 of this report

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## **9. Measurement Uncertainty**

9.1. 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.

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

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

9.4. 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                   |
| Carrier Output Power             | Not applicable         | 95%                         | +/- 0.46 dB                   |
| Conducted Emissions Antenna Port | 9 kHz to 26.5 GHz      | 95%                         | +/- 1.2 dB                    |
| Time Occupancy                   | Not applicable         | 95%                         | +/- 10 %                      |
| Channel Separation               | Not applicable         | 95%                         | +/- 10 %                      |
| Minimum Bandwidth                | Not applicable         | 95%                         | +/- 0.12 %                    |
| Occupied Bandwidth               | Not applicable         | 95%                         | +/- 0.12 %                    |
| Radiated Spurious Emissions      | 30.0 MHz to 1000.0 MHz | 95%                         | +/- 5.26 dB                   |
| Radiated Spurious Emissions      | 1.0 GHz to 26.5 GHz    | 95%                         | +/- 1.78 dB                   |

9.5. 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.                                     |
|---------|-------------------------------|----------------------------|---------------------------|------------------------------------------------|
| A027    | Horn Antenna                  | Eaton                      | 9188-2                    | 301                                            |
| A031    | 2 to 4 GHz Eaton Horn Antenna | Eaton                      | 91889-2                   | 557                                            |
| A049    | 370 BNM 5W Termination        | Narda                      | 370 BNM                   | None                                           |
| A197    | Site 2 Controller SC144       | Unknown                    | SC144                     | 150720                                         |
| A253    | WG 12 Microwave Horn          | Flann Microwave            | 12240-20                  | 128                                            |
| A254    | WG 14 Microwave Horn          | Flann Microwave            | 14240-20                  | 139                                            |
| 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                                           |
| A274    | 3 Phase Surge CDN             | Schaffner                  | CDN 113                   | 220                                            |
| A427    | WG 14 horn                    | Flann                      | 14240-20                  | 150                                            |
| A428    | WG 12 horn                    | Flann                      | 12240-20                  | 134                                            |
| A430    | WG 18 horn                    | Flann                      | 18240-20                  | 425                                            |
| A436    | WG 20 horn                    | Flann                      | 20240-20                  | 330                                            |
| C1079   | Rosenberger 1m Cable          | Rosenberger                | FA210A1010M<br>5050       | 28462-1                                        |
| C1080   | Rosenberger Cable 3m          | Rosenberger                | FA210A1030M<br>5050       | 28464-1                                        |
| C1081   | Rosenberger Cable 2m          | Rosenberger                | FA210A1020M<br>5050       | 28463-2                                        |
| C461    | Cable                         | Rosenberger                | UFA210A-1-<br>1182-704704 | 98H0305                                        |
| C468    | N-Type Coaxial Cable          | Rosenberger                | UFA210A-1-<br>3937-504504 | 98L0440                                        |
| M003    | Spectrum Monitor              | Rohde & Schwarz            | EZM                       | 883 580/008                                    |
| M023    | ESVP Receiver                 | Rohde & Schwarz            | ESVP                      | 872 991/027                                    |
| M072    | FSM Spectrum Analyser         | Rohde & Schwarz            | FSM                       | 862 967/010 (RF)<br>& 863 912/048<br>(Display) |
| M1093   | Will tek                      | Will tek                   | 4202S                     | 0513018                                        |
| M173    | Turntable Controller          | R.H.Electrical<br>Services | RH351                     | 3510020                                        |
| S201    | Site 1                        | RFI                        | 1                         |                                                |

**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:

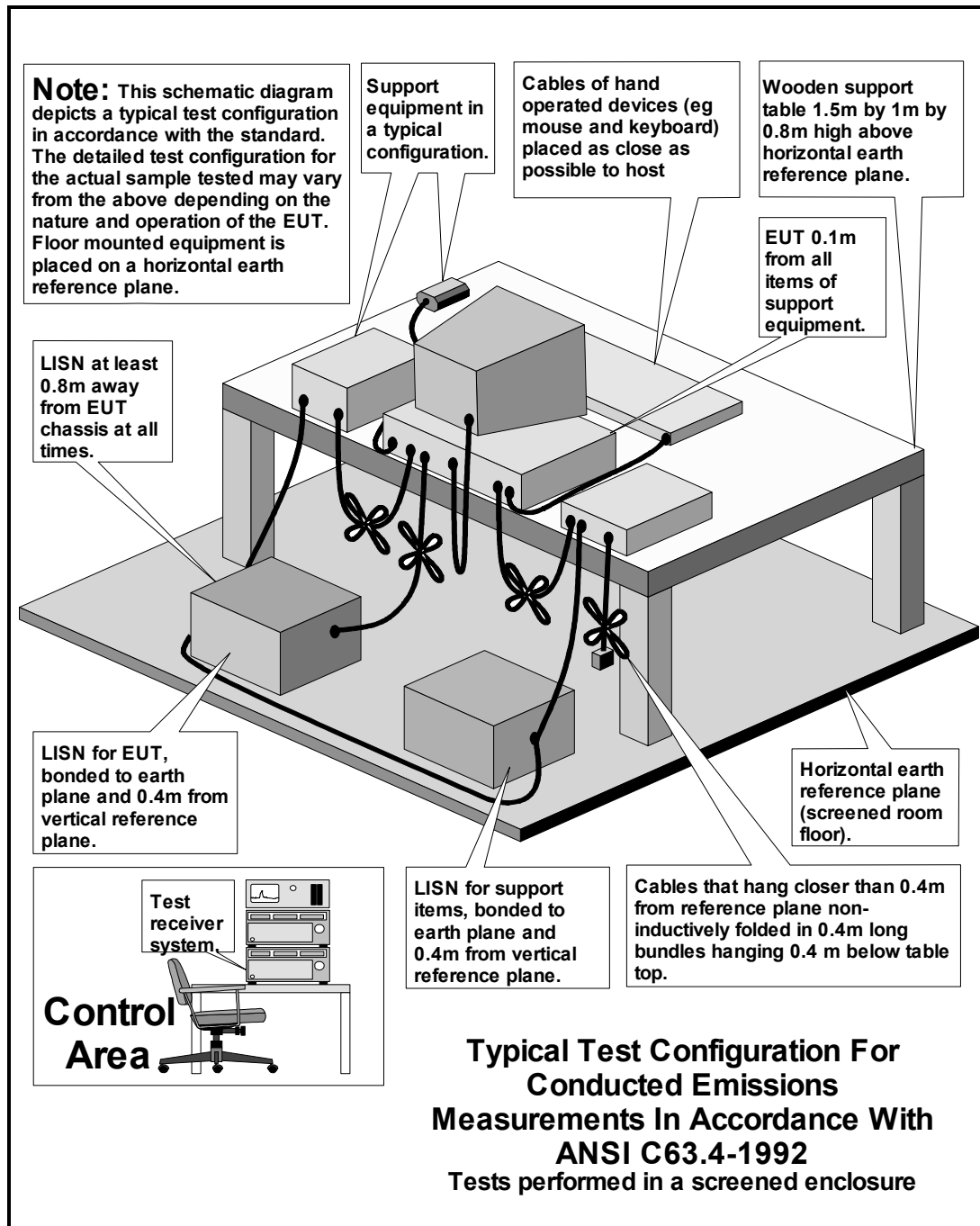
| <b>Drawing Reference Number</b> | <b>Title</b>                                              |
|---------------------------------|-----------------------------------------------------------|
| DRG\44439JD06\EMICON            | Test configuration for measurement of conducted emissions |
| DRG\44439JD06\EMIRAD            | Test configuration for measurement of radiated emissions  |

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DRG\44439JD06\EMICON



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DRG\44439JD06\EMIRAD

