# TEST REPORT
# FROM
# RFI GLOBAL SERVICES LTD

Test of: Panasonic
921P (VS84)

To: FCC Part 15.225: 2006 (Subpart C)

**Test Report Serial No:**
RFI/RPT1/RP73590JD07A

| | |
|---|---|
| **This Test Report Is Issued Under The Authority**<br>**Of Steve Flooks, Radio Performance Group Service Leader:**<br><br>**pp**  | |
| **Checked By: Nigel Davison**<br><br>  | **Report Copy No: PDF01** |
| **Issue Date: 10 July 2008** | **Test Dates: 13 June 2008 to 18 June 2008** |

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Registered in England and Wales. Company number:2117901

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## 1. Client Information

| | |
|---|---|
| **Company Name:** | Panasonic Mobile Comms Dev of Europe Ltd |
| **Address:** | Panasonic House<br>Willoughby Road<br>Bracknell<br>Berkshire<br>RG12 8FP |
| **Contact Name:** | Mr M Hargreaves |

# 2. Equipment Under Test (EUT)

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

## 2.1. Description of EUT

The equipment under test is a Dual mode (W-CDMA/GSM) Cellular Mobile Telephone with Bluetooth and RFID.

## 2.2. Identification of Equipment Under Test (EUT)

| | |
|---|---|
| **Description:** | GSM Mobile Phone |
| **Brand Name:** | Panasonic |
| **Model Name or Number:** | 921P (VS84) |
| **IMEI Number:** | 004401220573188 |
| **FCC ID Number:** | UCE208007A |
| **Country of Manufacture:** | Japan |
| **Date of Receipt:** | 05 June 2008 |

| | |
|---|---|
| **Description:** | GSM Mobile Phone |
| **Brand Name:** | Panasonic |
| **Model Name or Number:** | 921P (VS84) |
| **IMEI Number:** | 004401220573071 |
| **FCC ID Number:** | UCE208007A |
| **Country of Manufacture:** | Japan |
| **Date of Receipt:** | 05 June 2008 |

## 2.3. Modifications Incorporated in the EUT

EUT with IMEI 004401220573071 was modified with external RF connectors to aid bench testing.

## 2.4. Accessories

The following accessories were supplied with the EUT:

| | |
|---|---|
| **Description:** | Mains AC charger |
| **Brand Name:** | Kyushi Mitsumi |
| **Model Name or Number:** | JET ZTDAA1 |
| **Serial Number:** | AC Charger #01 |
| **Cable Length and Type:** | 1.5 metre / multicore |
| **Connected to Port** | Charger |

| | |
|---|---|
| **Description:** | Battery |
| **Brand Name:** | Sanyo |
| **Model Name or Number:** | UF463443(770mAh) |
| **Serial Number:** | VS84 Battery #8 |
| **Connected to Port** | Power |

| | |
|---|---|
| **Description:** | Personal Hands Free (stereo) |
| **Brand Name:** | Panasonic |
| **Model Name or Number:** | EB-EM003 |
| **Cable Length and Type:** | 1.8m / multi-core |
| **Connected to Port** | AV Out port |

| | |
|---|---|
| **Description:** | Micro-SD Memory Card |
| **Brand Name:** | Panasonic |
| **Connected to Port** | Dedicated micro-SD card port |

## 2.5. Support Equipment

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

| | |
|---|---|
| **Description:** | Laptop PC |
| **Model Name or Number:** | SONY Vaio PCG-VX7/BD |
| **Serial Number:** | Serial number has been partially erased and cannot be read |
| **Connected to Port:** | USB |

| | |
|---|---|
| **Description:** | USB Cable |
| **Model Name or Number:** | None Stated |
| **Serial Number:** | None Stated |
| **Cable Length and Type:** | 1.5m |
| **Connected to Port:** | USB |

## 2.6. Additional Information Related to Testing

| | | | |
|---|---|---|---|
| **Power Supply Requirement:** | Internal battery Supply of: 3.7V (nominal) | | |
| **Intended Operating Environment:** | Within GSM Coverage<br>UMTS coverage area | | |
| **Equipment Category:** | Bluetooth, GSM/GPRS, Short Range Device and UMTS FDD I | | |
| **Type of Unit:** | Portable (Standalone battery powered device)<br>Transceiver | | |
| **Transmit Frequency Range:** | 13.56 MHz to 13.56 MHz | | |
| **Transmit Channels Tested:** | **Channel ID** | **Channel Number** | **Channel Frequency (MHz)** |
| | Single Channel | Not Applicable | 13.56 |
| **Receive Frequency Range:** | 13.56 MHz to 13.56 MHz | | |
| **Receive Channels Tested:** | **Channel ID** | **Channel Number** | **Channel Frequency (MHz)** |
| | Single Channel | Not Applicable | 13.56 |

## 2.7. Port Identification

| Port | Description |
|---|---|
| 1 | Charge/Data |
| 2 | AV Out |
| 3 | USIM |
| 4 | Micro-SD |

# 3. Test Specification, Methods and Procedures

## 3.1. Test Specifications

| | |
|---|---|
| **Reference:** | FCC Part 15 Subpart C: 2006 (Sections 15.225) |
| **Title:** | Code of Federal Regulations, Part 15 (47CFR225)<br>Radio Frequency Devices. |

## 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.

## 3.3. Definition of Measurement Equipment

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

## 4. Deviations from the Test Specification

There were no deviations from the test specification.

# 5. Operation of the EUT During Testing

## 5.1. Operating Modes

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

- Idle.
- Constantly transmitting at full power.

## 5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

- The transmitter was enabled using a bespoke application on a laptop PC supplied by the Client. The PC was connected to the EUT via a USB cable. The PC and cable were disconnected once the EUT had been configured.
- Mains charger was connected to the EUT during Idle mode AC conducted and radiated spurious emissions testing.
- As the EUT was incapable of transmitting while charging no AC Mains Conducted Emissions (150 kHz to 30 MHz) was performed in transmit mode.

## 6. Summary of Test Results

| Range of Measurements | FCC Part 15 | Port Type | Result |
|---|---|---|---|
| Receiver Mode AC Conducted Emissions (150 kHz to 30 MHz) | Section 15.107 | AC Mains | Complied |
| Receiver Mode Radiated Spurious Emissions | Section 15.109 | Enclosure | Complied |
| Transmitter Fundamental Field Strength | Section 15.225(a) | Antenna | Complied |
| Transmitter Radiated Spurious Emissions | Section 15.209 | Enclosure | Complied |
| Transmitter Band Edge Radiated Emissions | Section 15.209 | Antenna | Complied |
| Transmitter 20 dB Bandwidth | Section 2.1049 | Antenna | Complied |
| Transmitter Frequency Stability (Temperature & Voltage Variation) | Section 15.225(c) | Antenna | Complied |

### 6.1. Location of Tests

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

# 7. Measurements, Examinations and Derived Results

## 7.1. General Comments

7.1.1. This section contains test results only.

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

## 7.2. Test Results

### 7.2.1. Receiver Mode AC Mains Conducted Emissions

Ambient Temperature: 20ºC Relative Humidity: 49%

7.2.1.1. Tests were performed in accordance with C63.4 Section 7 and relevant annexes.

7.2.1.2. Tests were performed to identify the maximum emission levels on the AC mains line of the EUT.

**Results:**

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

| Frequency (MHz) | Line | Level (dBµV) | Limit (dBµV) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 0.482000 | Live | 32.7 | 56.3 | 23.6 | Complied |
| 0.498000 | Live | 30.9 | 56.0 | 25.1 | Complied |
| 0.622000 | Live | 26.6 | 56.0 | 29.4 | Complied |
| 0.994000 | Live | 30.6 | 56.0 | 25.4 | Complied |
| 1.370000 | Live | 25.1 | 56.0 | 30.9 | Complied |
| 1.858000 | Live | 37.7 | 56.0 | 18.3 | Complied |
| 1.866000 | Live | 37.4 | 56.0 | 18.6 | Complied |
| 1.990000 | Neutral | 32.0 | 56.0 | 24.0 | Complied |
| 2.242000 | Neutral | 30.8 | 56.0 | 25.2 | Complied |
| 2.366000 | Neutral | 28.8 | 56.0 | 27.2 | Complied |

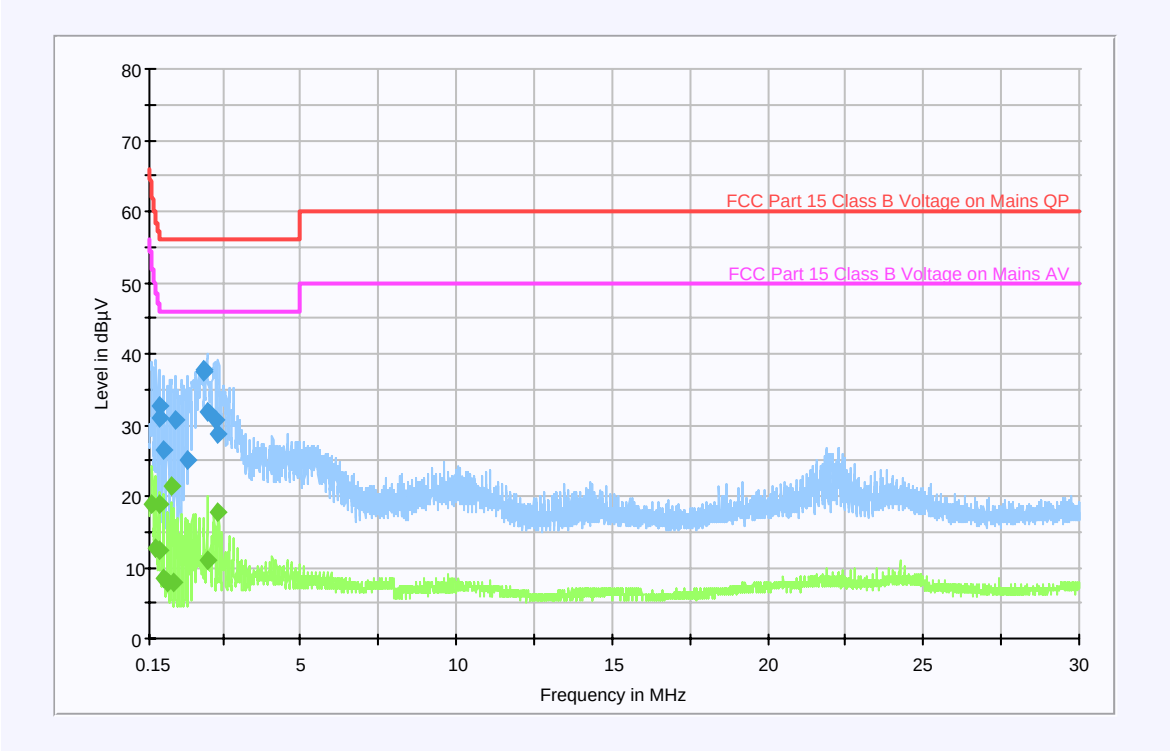
**Average Detector Measurements on Live and Neutral Lines**

| Frequency (MHz) | Line | Level (dBµV) | Limit (dBµV) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 0.246000 | Live | 18.9 | 51.9 | 33.0 | Complied |
| 0.354000 | Live | 12.6 | 48.9 | 36.3 | Complied |
| 0.474000 | Neutral | 12.3 | 46.4 | 34.1 | Complied |
| 0.498000 | Live | 19.0 | 46.0 | 27.0 | Complied |
| 0.590000 | Neutral | 8.4 | 46.0 | 37.6 | Complied |
| 0.710000 | Live | 7.9 | 46.0 | 38.1 | Complied |
| 0.826000 | Live | 21.3 | 46.0 | 24.7 | Complied |
| 0.942000 | Neutral | 7.9 | 46.0 | 38.1 | Complied |
| 1.994000 | Neutral | 10.9 | 46.0 | 35.1 | Complied |
| 2.366000 | Live | 17.8 | 46.0 | 28.2 | Complied |

**Note(s):**

*1. EUT IMEI: 004401220573188.*

## Receiver Mode AC Mains Conducted Emissions (Continued)




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

## 7.2.2. Receiver Mode Radiated Spurious Emissions

Ambient Temperature: 18ºC Relative Humidity: 41%

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

Tests were performed in accordance with C63.4 Section 8 and relevant annexes.

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

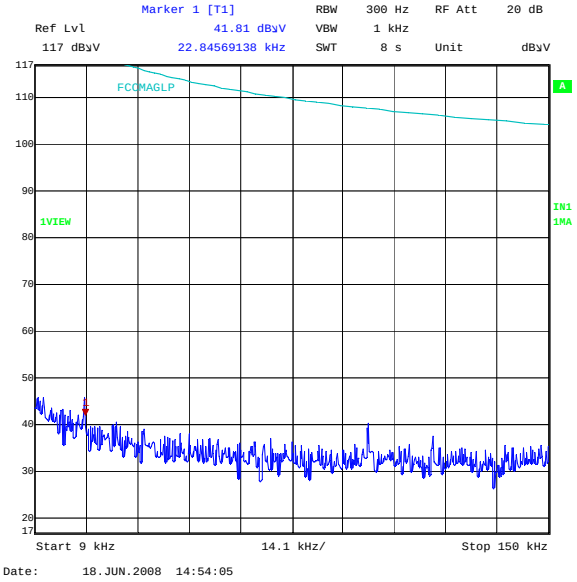
**Results:**

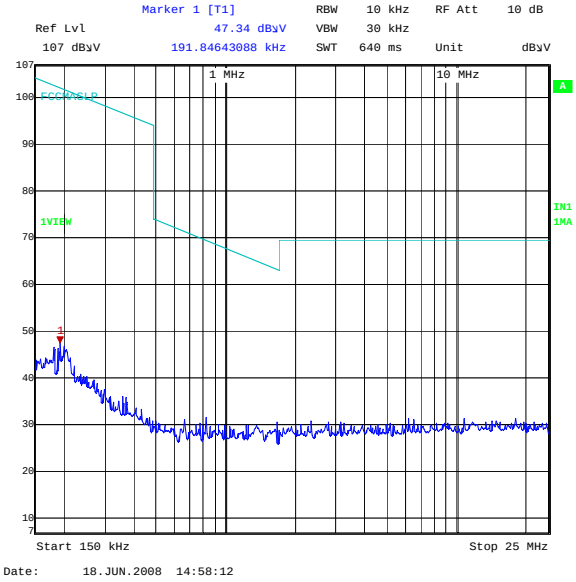
| Frequency (MHz) | Antenna Polarity | Q-P Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 991.783 | Horizontal | 38.3 | 54.0 | 15.7 | Complied |

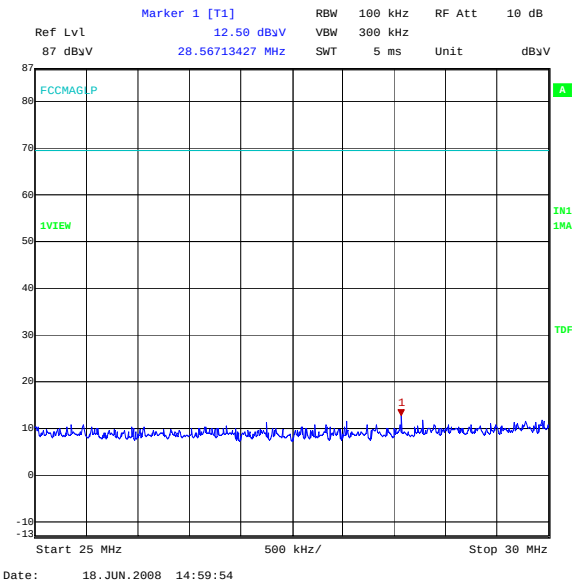
**Note(s):**

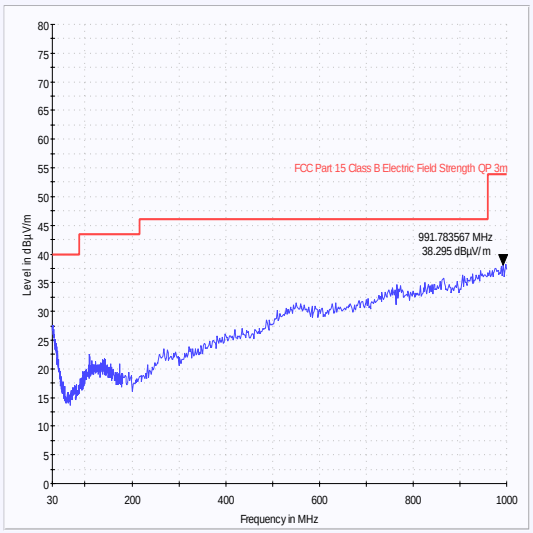
*1. EUT IMEI: 004401220573188.*

## Receiver Mode Radiated Spurious Emissions (Continued)




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

## 7.2.4. Transmitter Fundamental Field Strength

Ambient Temperature: 20ºC Relative Humidity: 45%

Tests were performed in accordance with C63.4 Section 8 and relevant annexes.

The limit is specified at a test distance of 30 metres. However as specified by section 15.31 (f(2)), measurements may be performed at a closer distance, and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

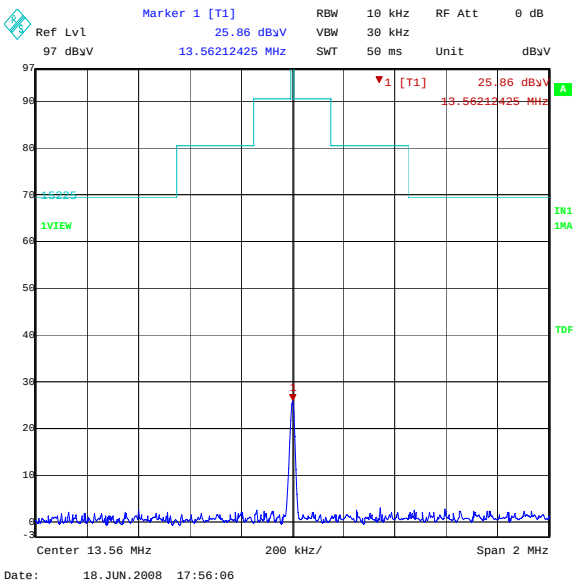
**Results:**

**Battery Powered Devices**

| Frequency (MHz) | Antenna Polarity | Q-P Level (dBµV/m) | Limit at 30 metres (dBµV/m) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 13.56 | Loop edge on to EUT | 25.9 | 124.0 | 97.1 | Complied |

**Note(s):**

*1. EUT IMEI: 004401220573188.*



## 7.2.5. Transmitter Radiated Spurious Emissions

Ambient Temperature: 18ºC Relative Humidity: 41%

## 7.2.6. Electric Field Strength Measurements (Frequency Range: 9 kHz to 1000 MHz)

Tests were performed in accordance with C63.4 Section 8 and relevant annexes.

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

Limits below 30 MHz are specified at test distance of 30 metres, whilst below 0.49 MHz they are specified at a test distance of 300 metres. However as specified by section 15.31 (f)(2), measurements may be performed at a closer distance, and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

**Results:**

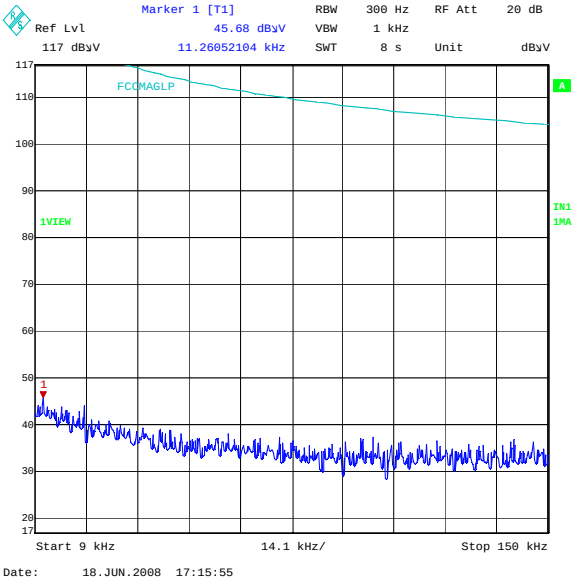
| Frequency (MHz) | Antenna Polarity | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Result |
|---|---|---|---|---|---|
| 135.596 | Horizontal | 31.4 | 43.5 | 12.1 | Complied |
| 311.866 | Horizontal | 28.6 | 46.0 | 17.4 | Complied |

**Note(s):**

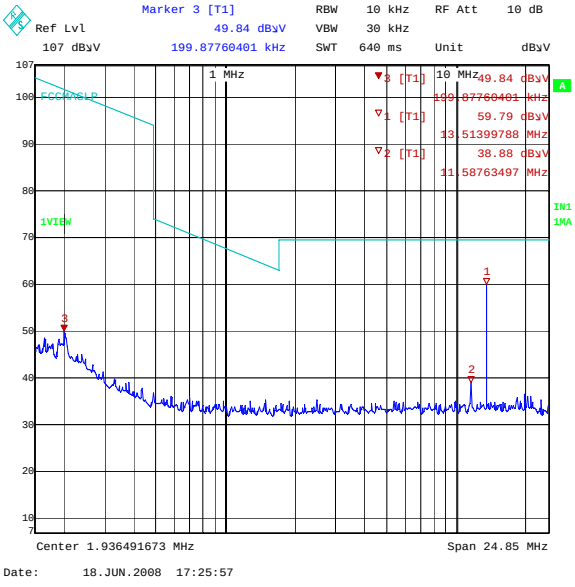
1. *EUT IMEI: 004401220573188.*
2. *The carrier is shown on the above plot at 13.5 MHz.*

**Test of:** **Panasonic**
**921P (VS84)**
**To:** **FCC Part 15.225: 2006 (Subpart C)**

## Transmitter Radiated Spurious Emissions (Continued)

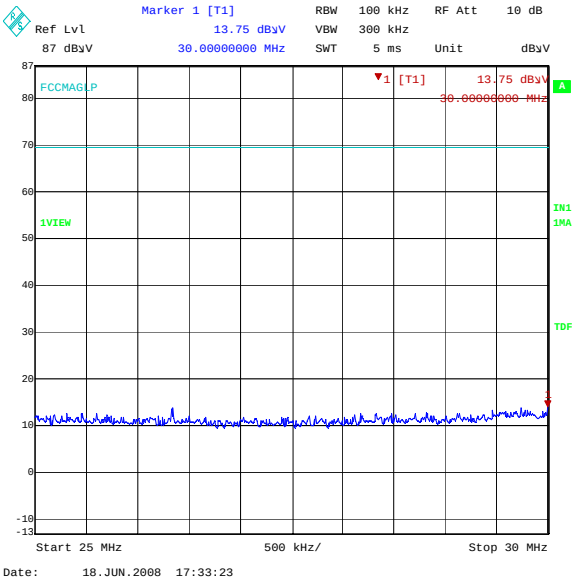



Date: 18.JUN.2008 17:15:55

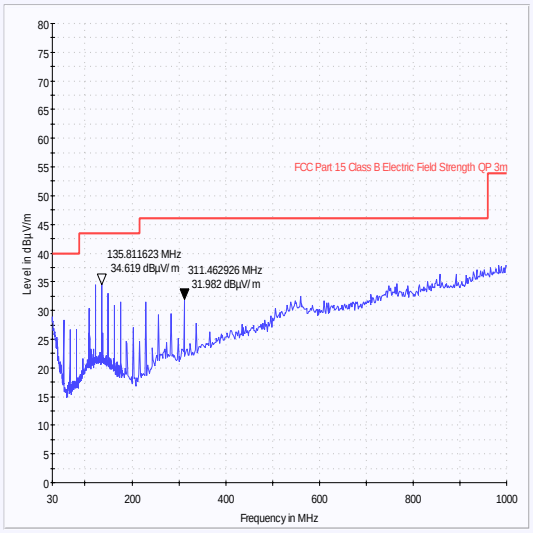



Date: 18.JUN.2008 17:25:57

See note 2 above




Date: 18.JUN.2008 17:33:23




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

## 7.2.7. Transmitter Radiated Emissions at Band Edges

Ambient Temperature: 20ºC Relative Humidity: 45%

Tests were performed in accordance with C63.4 Section 8 and relevant annexes.

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

**Results:**

**Bottom Band Edge**

| Frequency (MHz) | Q-P Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result |
|---|---|---|---|---|
| 13.11 | 1.6 | 80.5 | 78.9 | Complied |

**Top Band Edge**

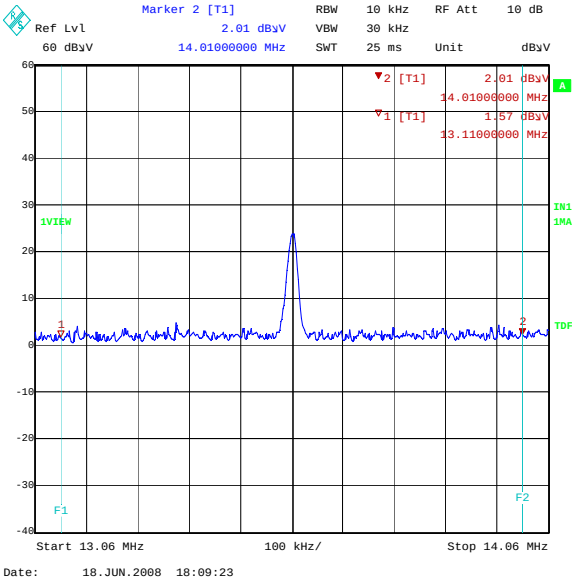
| Frequency (MHz) | Q-P Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Result |
|---|---|---|---|---|
| 14.01 | 2.0 | 80.5 | 78.5 | Complied |

**Note(s):**

1. *EUT IMEI: 004401220573188.*
2. *Measurements were performed at 3 meters and the limit corrected accordingly.*

**Test of:** **Panasonic**
**921P (VS84)**
**To:** **FCC Part 15.225: 2006 (Subpart C)**

## Transmitter Radiated Emissions at Band Edges (Continued)




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

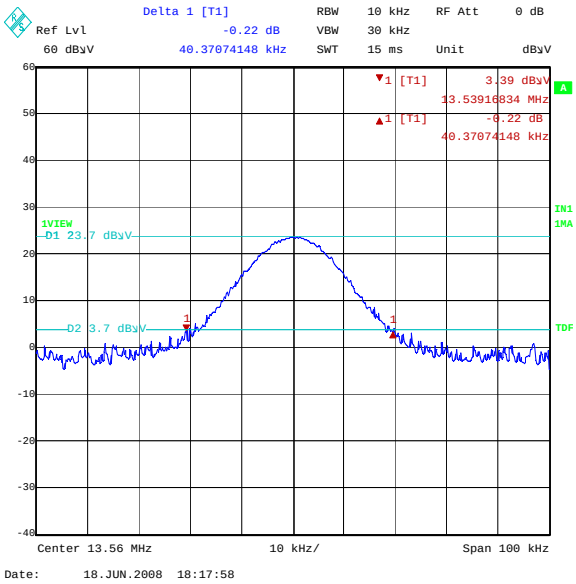
## 7.2.8.Transmitter 20 dB Bandwidth

Ambient Temperature: 20ºC Relative Humidity: 45%

Tests were performed in accordance with C63.4 Section 10.1.8.8 and 13.1.7 and relevant annexes with the only deviation being that the 20 dBc bandwidth was reported.

This test is not required to show compliance to 15.225 but has been included for information in order to aid Industry Canada (IC) applications.

| Transmitter 20 dB Bandwidth (Hz) |
|---|
| 40.370 |




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

## 7.2.9. Transmitter Frequency Stability (Temperature & Voltage Variation)

Ambient Temperature: 20ºC Relative Humidity: 45%

Tests were performed in accordance with C63.4 Section 10.1.8.7 and 13.1.6 and relevant annexes

Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20°C.

Tests were performed in accordance with FCC Part 2.1055 but over the frequency range specified in FCC Part 15.

**Maximum frequency error of the EUT with variations in ambient temperature**

| Temp (°C) | Nominal Frequency | Measured Frequency | Frequency Error (Hz) | Frequency Error (%) | Limit (%) | Margin (%) | Result |
|---|---|---|---|---|---|---|---|
| -20 | 13.56 | 13.560172 | +172 | 0.0013 | 0.01 | 0.0087 | Complied |
| 20 | 13.56 | 13.560085 | +85 | 0.0006 | 0.01 | 0.0094 | Complied |
| 50 | 13.56 | 13.559947 | -53 | 0.0004 | 0.01 | 0.0096 | Complied |

**Maximum frequency error of the EUT with variations in nominal operating voltage at an ambient temperature of 20°C**

| Supply Voltage (V) | Nominal Frequency | Measured Frequency | Frequency Error (Hz) | Frequency Error (%) | Limit (%) | Margin (%) | Result |
|---|---|---|---|---|---|---|---|
| 3.4 | 13.56 | 13.560084 | +84 | 0.0006 | 0.01 | 0.0094 | Complied |
| 3.7 | 13.56 | 13.560085 | +85 | 0.0006 | 0.01 | 0.0094 | Complied |
| 4.2 | 13.56 | 13.560084 | +84 | 0.0006 | 0.01 | 0.0094 | Complied |

**Note(s):**

*1. EUT IMEI. 004401220573071.*

## 8. Measurement Uncertainty

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

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

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

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

| Measurement Type | Range | Confidence Level (%) | Calculated Uncertainty |
|---|---|---|---|
| AC Conducted Spurious Emissions | 0.15 MHz to 30 MHz | 95% | ±3.25 dB |
| Occupied Bandwidth | N/A | 95% | ±0.12 % |
| Frequency Stability | N/A | 95% | ±11.37 ppm |
| Radiated Spurious Emissions | 9 kHz to 30 MHz | 95% | ±3.53 dB |
| Radiated Spurious Emissions | 30 MHz to 1000 MHz | 95% | ±5.26 dB |

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

## Appendix 1. Test Equipment Used

| RFI No. | Instrument | Manufacturer | Type No. | Serial No. | Date Last Calibrated | Cal. Interval (Months) |
|---|---|---|---|---|---|---|
| A007 | Antenna | Rohde & Schwarz | HFH2-Z2 | 880 458/020 | 28 Feb 2008 | 12 |
| A008 | Tripod | Rohde & Schwarz | HFU-Z | None | Calibration not required | - |
| A1037 | Antenna | Chase EMC Ltd | CBL6112B | 2413 | 29 May 2008 | 12 |
| A1069 | Single Phase LISN | Rohde & Schwarz | ESH3-Z5 | 837469/012 | 07 Mar 2008 | 12 |
| A1829 | Pulse Limiter | Rhode & Schwarz | ESH3-Z2 | 100671 | 16 Jan 2008 | 12 |
| A490 | Antenna | Chase | CBL6111A | 1590 | 07 Feb 2008 | 12 |
| A649 | Single Phase LISN | Rohde & Schwarz | ESH3-Z5 | 825562/008 | 07 Mar 2008 | 12 |
| C1111 | Cable | Semflex Inc. | X116BFSX10080 | 0337 | Calibrated before use | - |
| C363 | Cable | Rosenberger | RG142 | None | 20 Apr 2008 | 12 |
| E0513 | Environmental Chamber | TAS | LT600 Series 3 | 23900506 | Calibration not required | - |
| G088 | Power Supply Unit | Thurlby Thandar | CPX200 | 100700 | Calibration not required | - |
| M1249 | Thermometer | Fluke | 52II | 88800049 | 20 Sep 2007 | 12 |
| M1251 | Digital Multimeter | Fluke | 175 | 89170179 | 21 Dec 2007 | 12 |
| M1263 | Test Receiver | Rohde & Schwarz | ESIB7 | 100265 | 06 Feb 2008 | 12 |
| M1379 | Test Receiver | Rohde and Schwarz | ESIB7 | 100330 | 02 Aug 2007 | 12 |
| M295 | Spectrum Analyser | Hewlett Packard | 8564E | 3846A01561 | 13 Nov 2007 | 12 |
| S209 | Anechoic Chamber | RFI | 9 | None | Verified before use | - |
| S212 | Emissions Screened Room | RFI | 12 | None | Verified before use | - |
| S216 | Site 16 | RFI | 16 | None | Calibration not required | - |

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

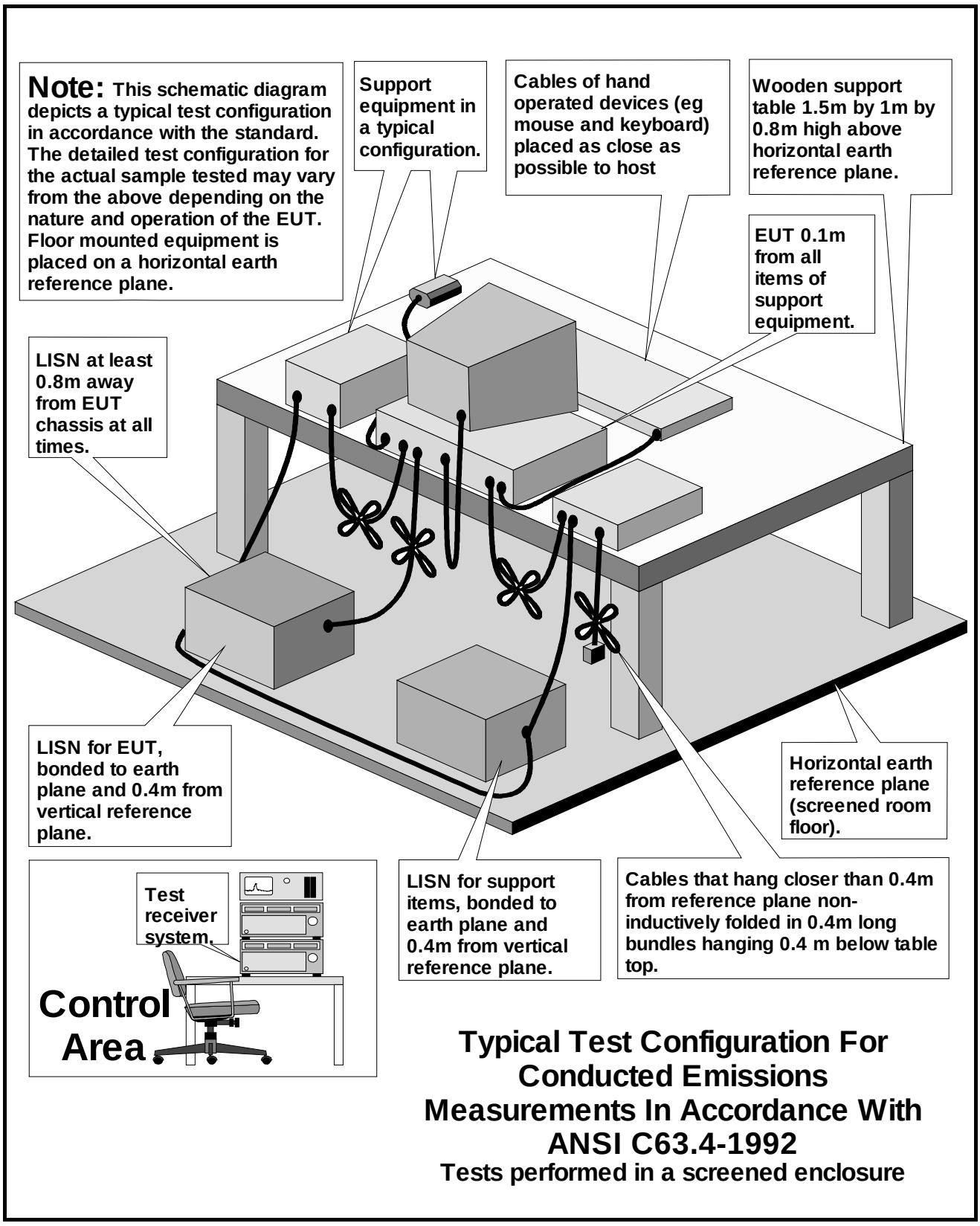
## Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

| Drawing Reference Number | Title |
|---|---|
| DRG\73590JD07\EMICON | Test configuration for measurement of conducted emissions. |
| DRG\73590JD07\EMIRAD | Test configuration for measurement of radiated emissions. |

**Test of:** Panasonic
921P (VS84)
**To:** FCC Part 15.225: 2006 (Subpart C)

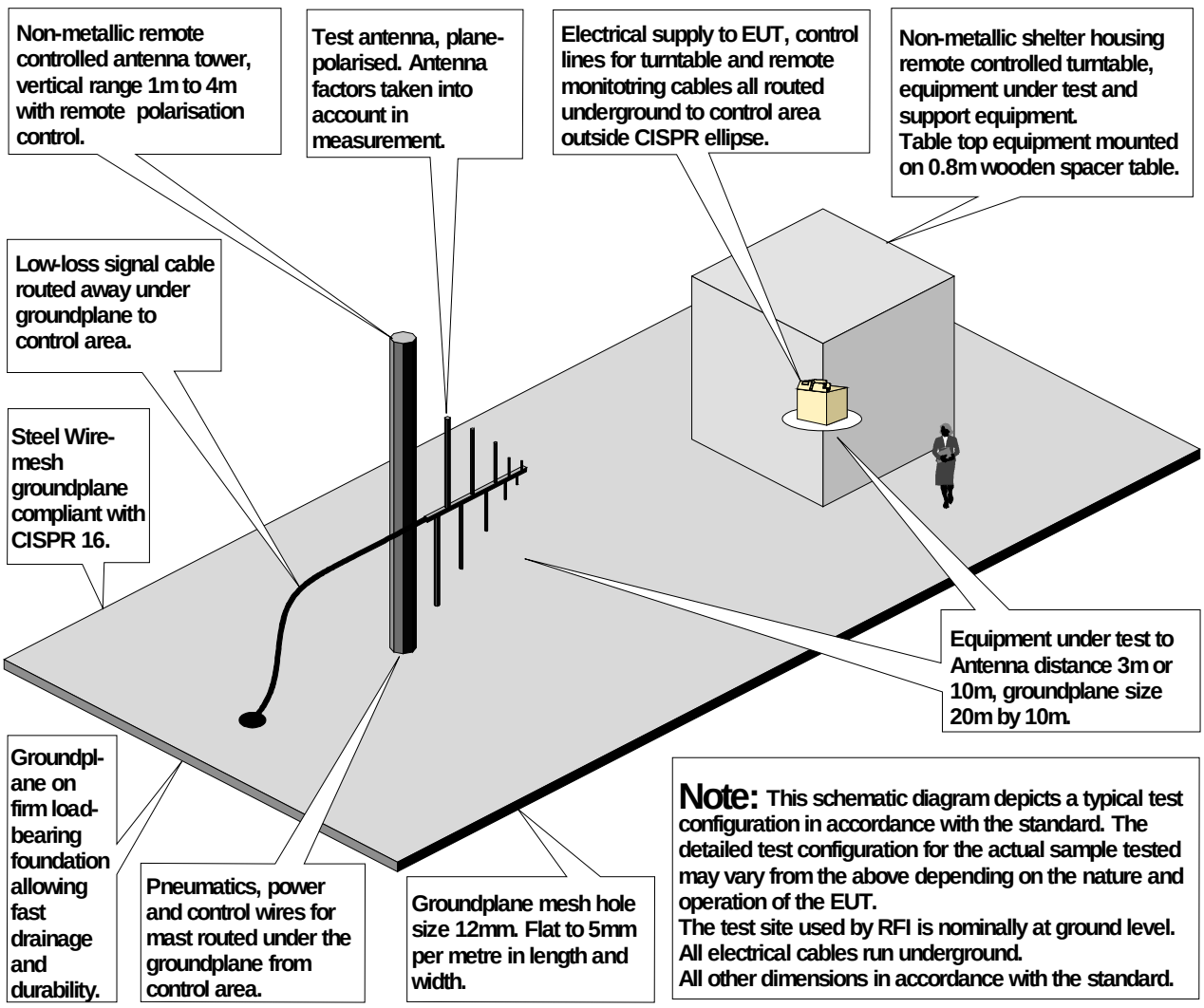
**DRG\73590JD07\EMICON**




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

**Tests performed in a screened enclosure**

**DRG\73590JD07\EMIRAD**




**Note:** This schematic diagram depicts a typical test configuration in accordance with the standard. The detailed test configuration for the actual sample tested may vary from the above depending on the nature and operation of the EUT.
The test site used by RFI is nominally at ground level.
All electrical cables run underground.
All other dimensions in accordance with the standard.

## Test Configuration For Radiated Emissions Measurements

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

**Groundplane Earthed**

**Control room outside CISPR ellipse**