

## TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station

To: FCC Part 24: 2006 (Subpart E)

**Test Report Serial No:**  
RFI/RPTE2/RP72327JD01A

**Supersedes Test Report Serial No:**  
RFI/RPTE1/RP72327JD01A

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

pp.



**Tested By: Ian Watch**

pp.



**Checked By: Michael Derby**



**Report Copy No: PDF01**

**Issue Date: 29 November 2006**

**Test Dates: 06 November 2006 to 13 November 2006**

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Registered in England and Wales. Company number: 2117901

**Test of:** Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
**To:** FCC Part 24: 2006 (Subpart E)

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Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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## **Table of Contents**

1. Client Information .....	4
2. Equipment Under Test (EUT) .....	5
3. Test Specification .....	7
4. Deviations from the Test Specification .....	8
5. Operation of the EUT during Testing .....	9
6. Summary of Test Results .....	10
7. Measurements, Examinations and Derived Results .....	11
8. Measurement Uncertainty .....	29
9. Measurement Methods .....	30
Appendix 1. Test Equipment Used .....	35
Appendix 2. Test Configuration Drawings .....	36

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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## **1. Client Information**

<b>Company Name:</b>	Panasonic Mobile Comms Dev of Europe Ltd
<b>Address:</b>	2 Gables Way Colthrop Thatcham Berkshire RG19 4ZB United Kingdom
<b>Contact Name:</b>	Mr M Hargreaves

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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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)**

Description:	Dual Mobile Phone
Brand Name:	Panasonic
Model Name or Number:	VS70A
Unique Type Identification:	Sample C3
Serial Number:	004401220170043
Hardware Revision:	D
Software Revision:	706PVB01
FCC ID Number:	UCE206001A
Country of Manufacture:	None Stated
Date of Receipt:	06 November 2006

Description:	AC Charger US Type
Brand Name:	Panasonic
Model Name or Number:	EB-CAX800US
Unique Type Identification:	Sample C22
Country of Manufacture:	Philippines
Date of Receipt:	06 November 2006

### **2.2. Description of EUT**

The equipment under test is a Dual mode (3G/GSM) Mobile Station with Bluetooth capability.

### **2.3. Modifications Incorporated in EUT**

During the course of testing the EUT was not modified.

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

## 2.4. Additional Information Related to Testing

Power Supply Requirement:	Nominal 110 V, 60 Hz AC Mains supply (via AC Charger)		
Intended Operating Environment:	Within GSM Coverage Within <i>Bluetooth</i> Coverage		
Equipment Category:	GSM 1900		
Type of Unit:	Portable (Standalone Battery Powered Device)		
Transmitter Power (EIRP):	26.7 dBm (measured)		
Transmit Frequency Range:	1830.2 MHz to 1909.8 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	512	1830.2
	Middle	660	1879.8
	Top	810	1909.8
Receive Frequency Range:	1930.2 MHz to 1989.8 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	512	1930.2
	Middle	660	1959.8
	Top	810	1989.8

## 2.5. Port Identification

Port	Description	Type/Length	Applicable
1	Charger/ USB	>1.0 m, Multicore	Y
2	Handsfree Port	>1.0 m, Multicore	Y
3	USM	>1.0 m, Multicore	Y
4	Communications / Charger	>1.0 m, Multicore	Y

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

---

### **3. Test Specification**

Reference:	FCC Part 24 Subpart E: 2006 (Broadband PCS)
Title:	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.

#### **3.1. Methods and Procedures**

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003

Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1987)

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

ANSI C63.4 (2003)

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

ANSI C63.5 (1988)

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

ANSI C63.7 (1988)

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

CISPR 16-1: (1999)

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

#### **3.2. Definition of Measurement Equipment**

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

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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#### **4. Deviations from the Test Specification**

At the request of the client, only the Radiated measurements tests were performed.



Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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## **5. Operation of the EUT during Testing**

### **5.1. Operating Modes**

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

Connected (via wireless link) to a GSM system simulator, operating in GSM transceiver mode.

### **5.2. Configuration and Peripherals**

The EUT was tested in the following configuration unless otherwise stated:

Standalone operation, with AC charger Connected.

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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## **6. Summary of Test Results**

Range of Measurements	Specification Reference	Port Type	Compliance Status
Idle Mode Radiated Spurious Emissions	Section 15.109	Enclosure/Antenna	Complied
Transmitter Effective Isotropic Radiated Power (EIRP)	Section 24.232	Antenna	Complied
Transmitter Out of Band Radiated Emissions	Section 2.1053/24.238	Enclosure/Antenna	Complied
Transmitter Band Edge Radiated Emissions	Section 2.1053/24.238	Enclosure/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

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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## **7. Measurements, Examinations and Derived Results**

### **7.1. General Comments**

This section contains test results only.

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

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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## **7.2. Test Results**

### **7.2.1. Idle Mode Radiated Spurious Emissions: Section 15.109**

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

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

#### **Results:**

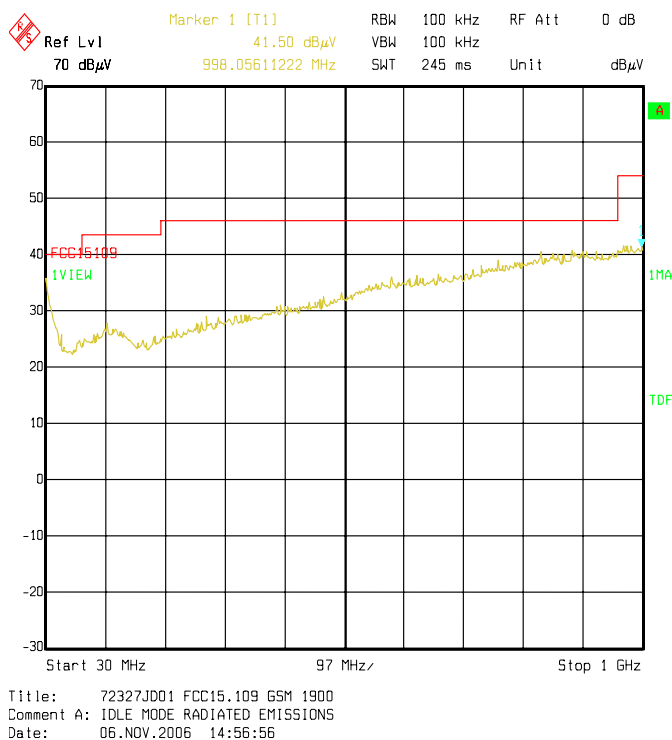
##### **Electric Field Strength Measurements (Frequency Range: 30 MHz to 1000 MHz)**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
998.056	Vertical	41.5	54.0	12.5	Complied

#### **Note(s):**

1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

**Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)**

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

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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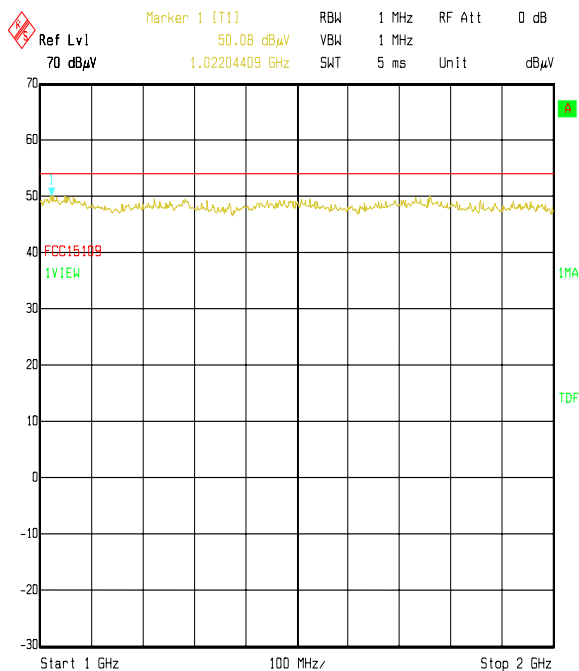
**Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)****Results:****Electric Field Strength Measurements (Frequency Range: 1 GHz to 10 GHz)****Peak Level:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
5.9038	Vertical	49.7	44.5	54.0	9.5	Complied
6.2285	Horizontal	44.0	40.5	54.0	13.5	Complied
8.5090	Vertical	43.4	41.6	54.0	12.4	Complied

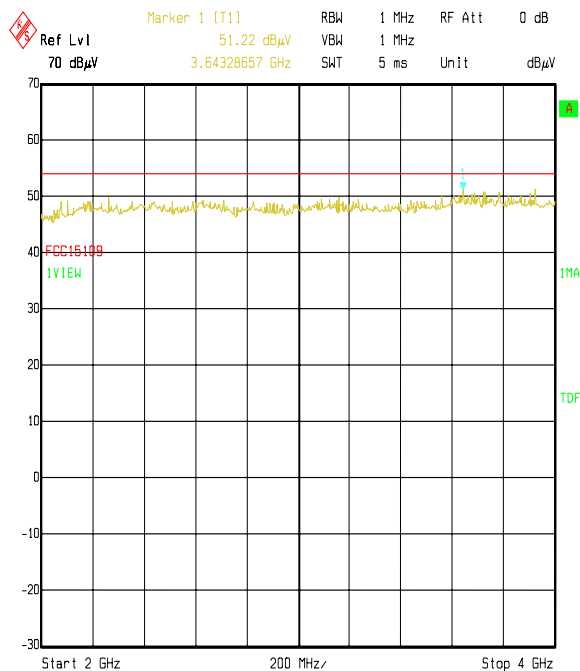
**Note(s):**

1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is a more onerous limit.

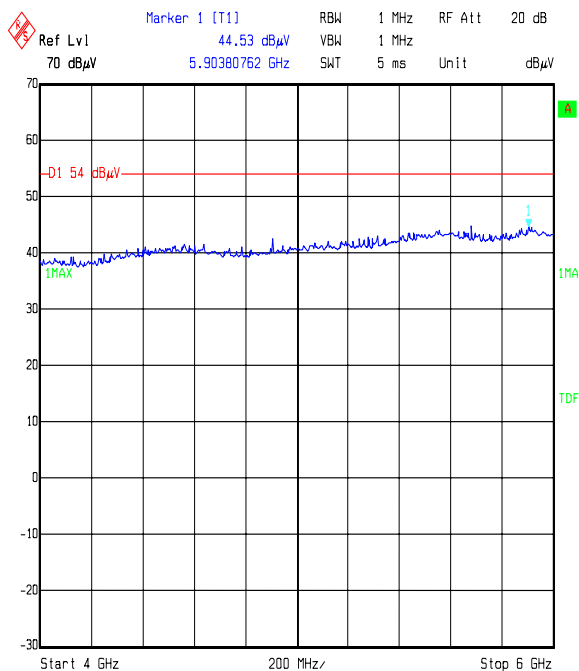
Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

**Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)**

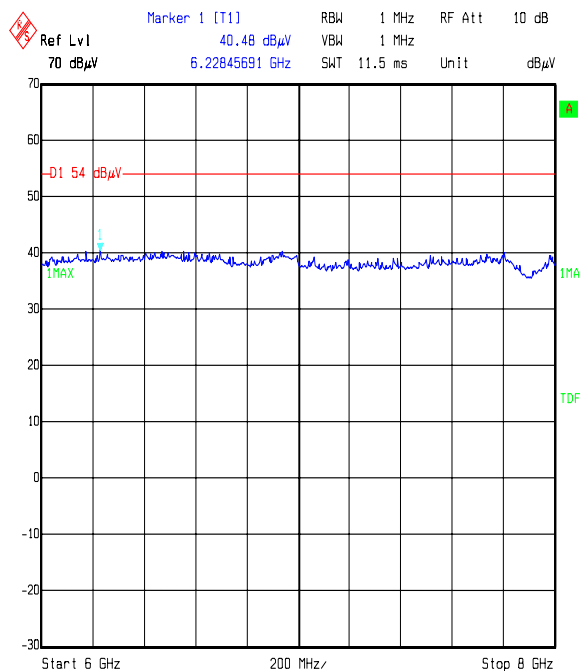
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Comment A: RX MODE RADIATED EMISSIONS  
Date: 06.NOV.2006 17:13:08



Title: 72327JD01 GSM 1900  
Comment A: RX MODE RADIATED EMISSIONS  
Date: 06.NOV.2006 17:30:09

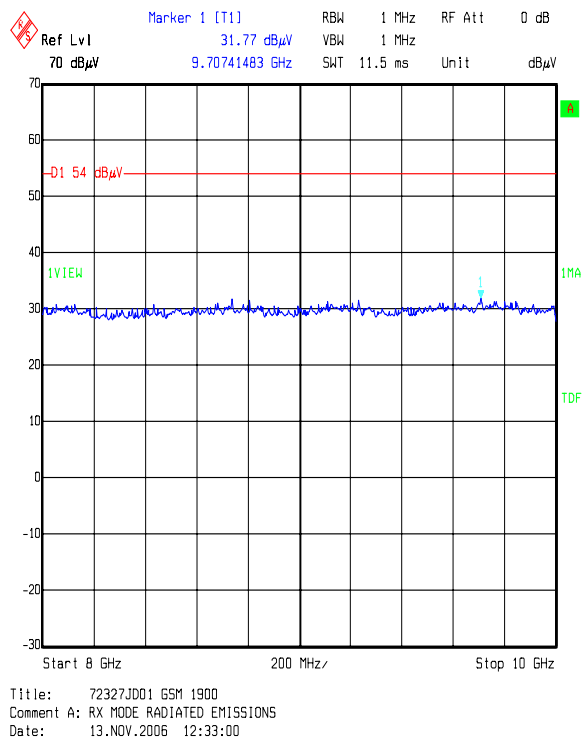


Title: 72327JD01 FCC PART 15.109  
Comment A: GSM 1900 RADIATED EMISSIONS TOP CHANNEL  
Date: 09.NOV.2006 16:44:28



Title: 72327JD01 FCC PART 15.109  
Comment A: GSM 1900 RADIATED EMISSIONS TOP CHANNEL  
Date: 09.NOV.2006 16:50:00

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

**Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)**

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



Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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

The EUT was configured for effective isotropic radiated power, as described in section 9 of this report.

Tests were performed to identify the maximum effective isotropic radiated power (EIRP).

**Results:**

Channel	Measured Frequency (MHz)	Antenna Polarity	Maximum Transmitter EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	1850.2	Vertical	24.0	33.0	9.0	Complied
Middle	1879.8	Vertical	26.4	33.0	6.6	Complied
Top	1909.8	Vertical	26.7	33.0	6.3	Complied

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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### **7.2.3. Transmitter Out of Band Radiated Emissions: Section 2.1053 & 24.238**

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

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

#### **Results:**

##### **Bottom Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1930.254	-40.0	-13.0	27.0	Complied
1989.697	-44.0	-13.0	31.0	Complied
3700.291	-31.7	-13.0	18.7	Complied
5551.102	-32.2	-13.0	19.2	Complied
7402.805	-36.8	-13.0	23.8	Complied

##### **Middle Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1959.881	-45.0	-13.0	32.0	Complied
1989.697	-45.0	-13.0	32.0	Complied
3759.784	-30.9	-13.0	17.9	Complied
5639.278	-32.0	-13.0	19.0	Complied
7519.038	-45.0	-13.0	32.0	Complied

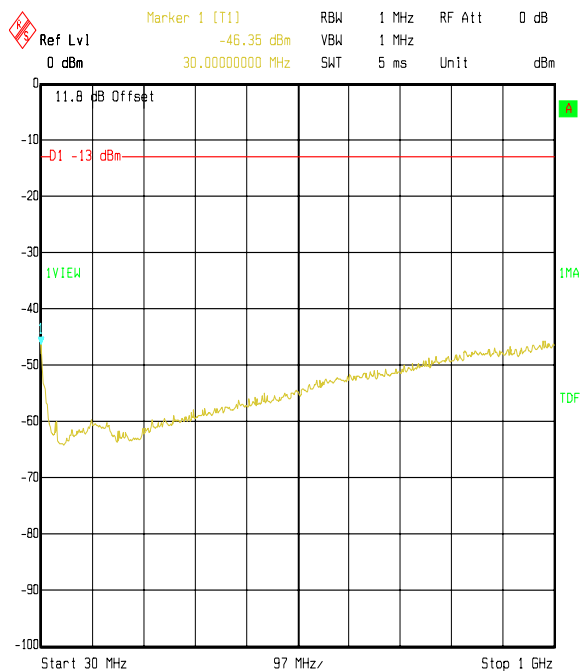
##### **Top Channel**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1989.825	-43.7	-13.0	30.7	Complied
3819.597	-31.5	-13.0	18.5	Complied
5731.462	-33.0	-13.0	20.0	Complied
7639.278	-42.8	-13.0	29.8	Complied

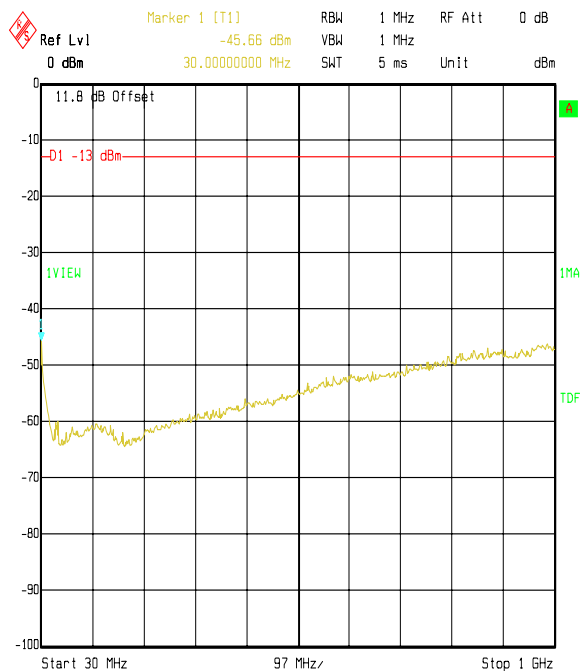
#### **Note(s):**

1. All other measurements were found to be greater than 20dB less than the limit.

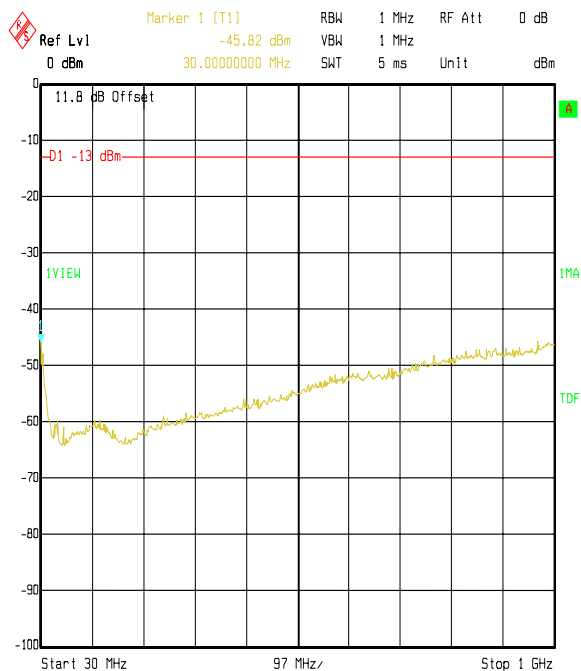
Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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

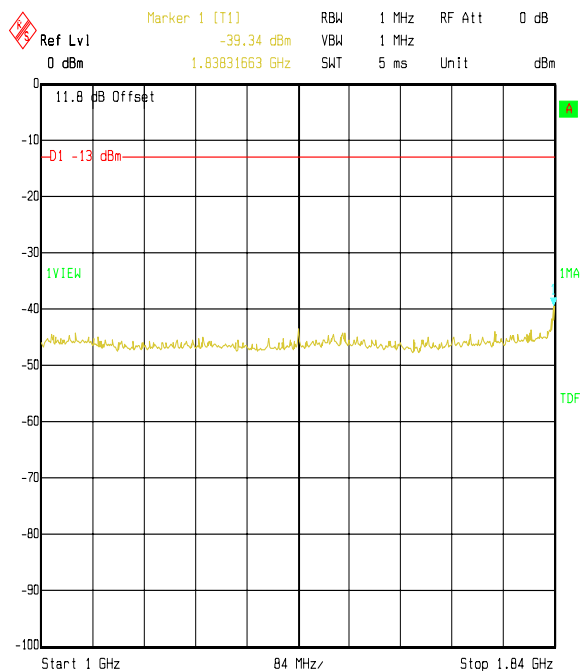
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Title: 72327JD01 GSM 1900  
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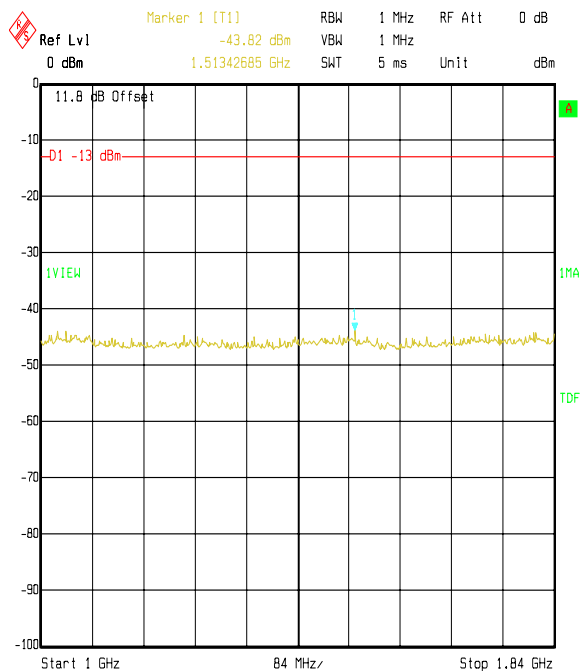
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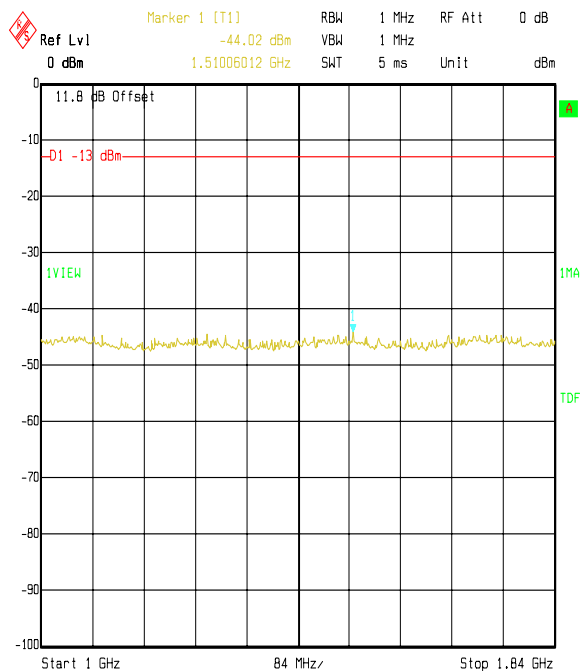
Title: 72327JD01 GSM 1900  
Comment A: TX MODE RADIATED EMISSIONS BOTTOM CHANNEL  
Date: 06.NOV.2006 16:18:58

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

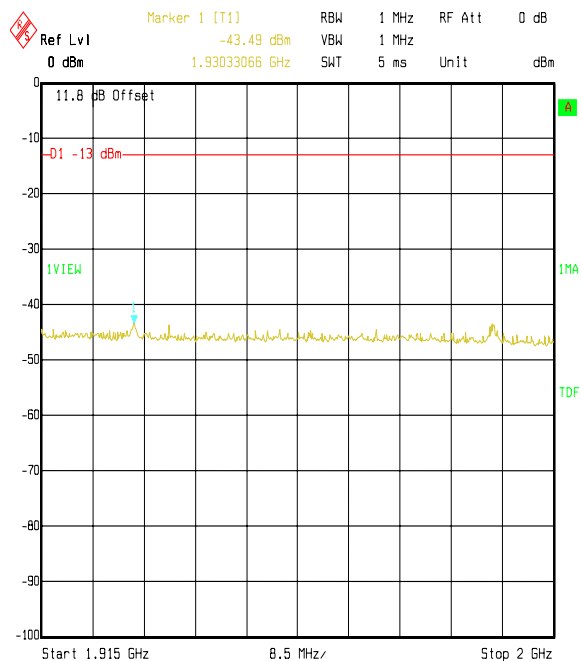
Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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

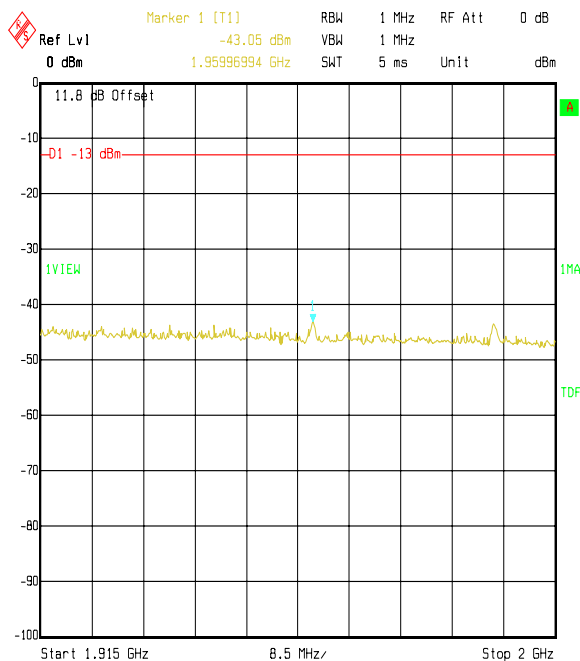
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Comment A: TX MODE RADIATED EMISSIONS MID CHANNEL  
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Comment A: TX MODE RADIATED EMISSIONS TOP CHANNEL  
Date: 06.NOV.2006 16:27:14



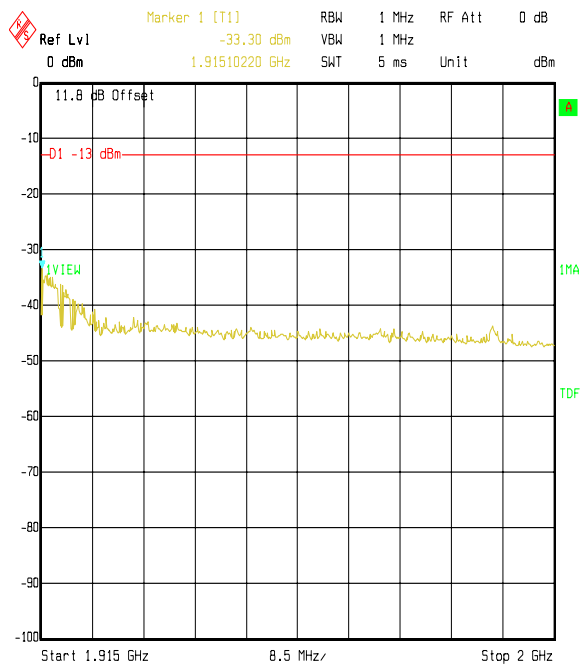
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Date: 06.NOV.2006 17:00:49



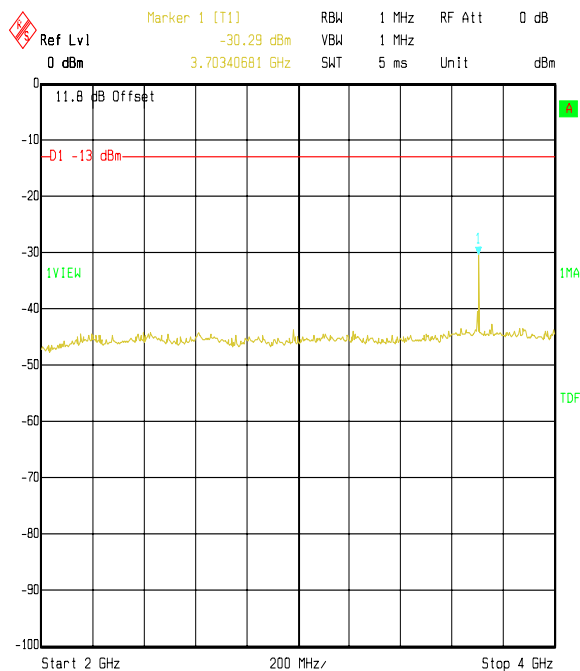
Title: 72327JD01 GSM 1900  
Comment A: TX MODE RADIATED EMISSIONS MID CHANNEL  
Date: 06.NOV.2006 16:52:22

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

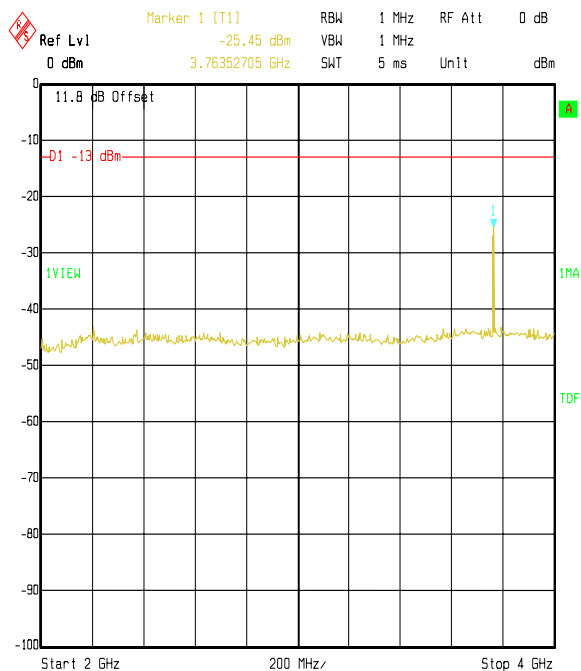
Test of: **Panasonic Mobile Comms Dev of Europe Ltd**  
**VS70A Dual Mode (3G/GSM) Mobile Station**  
To: **FCC Part 24: 2006 (Subpart E)**

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

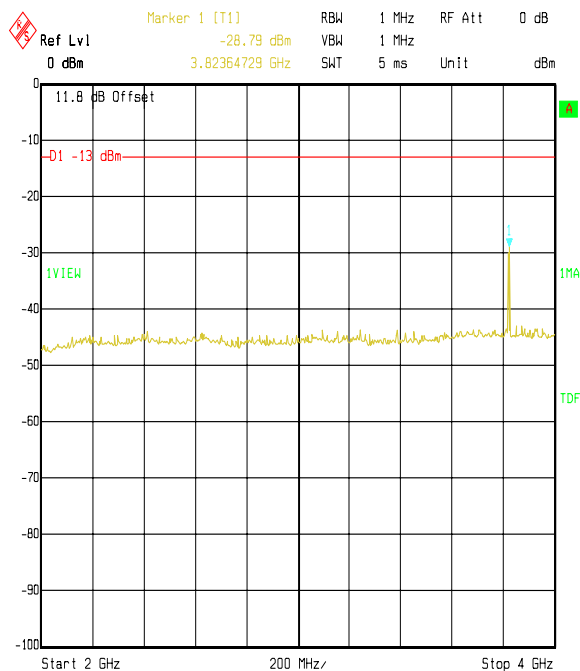
Title: 72327JD01 GSM 1900  
Comment A: TX MODE RADIATED EMISSIONS TOP CHANNEL  
Date: 06.NOV.2006 16:43:06



Title: 72327JD01 GSM 1900  
Comment A: TX MODE RADIATED EMISSIONS BOTTOM CHANNEL  
Date: 06.NOV.2006 17:37:19



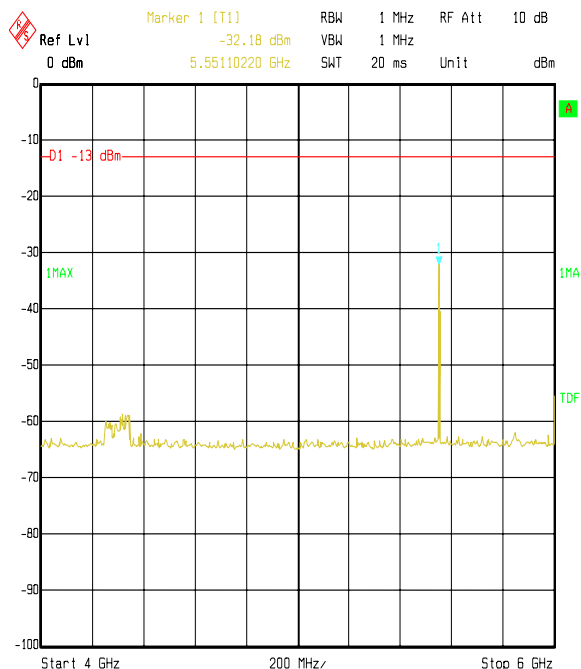
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Date: 06.NOV.2006 17:41:45



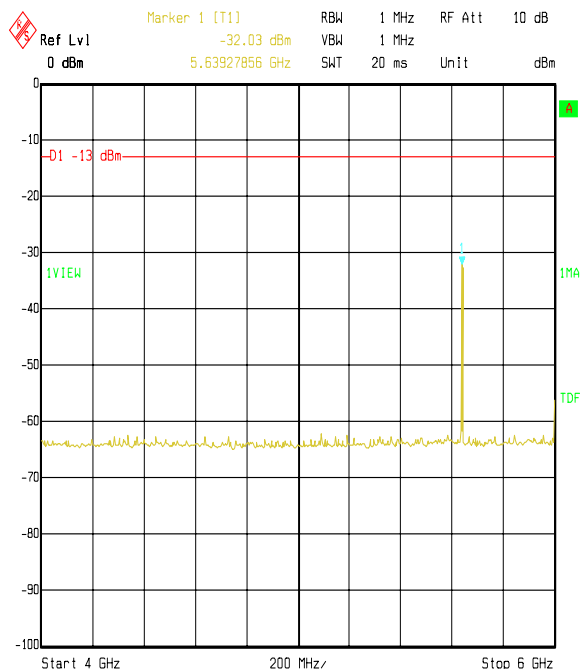
Title: 72327JD01 GSM 1900  
Comment A: TX MODE RADIATED EMISSIONS TOP CHANNEL  
Date: 06.NOV.2006 17:45:15

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.  
The Plot with the emission at 3.7635 GHz incorrectly states Bottom Channel, when it was tested on the Top Channel.*

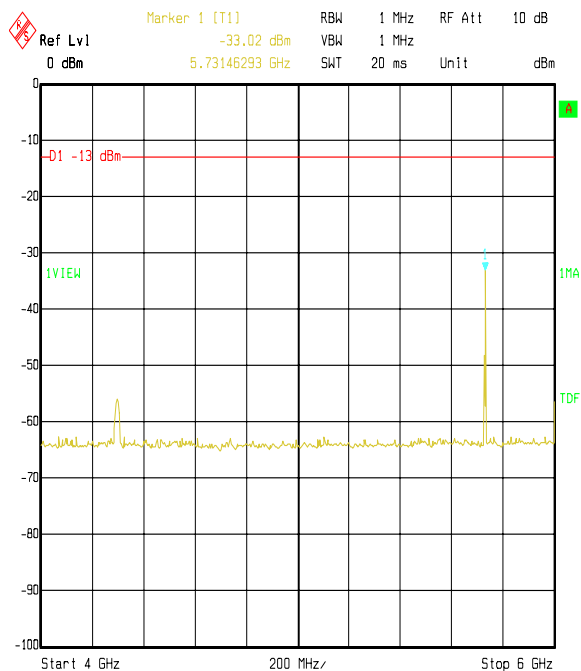
Test of: **Panasonic Mobile Comms Dev of Europe Ltd**  
**VS70A Dual Mode (3G/GSM) Mobile Station**  
To: **FCC Part 24: 2006 (Subpart E)**

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

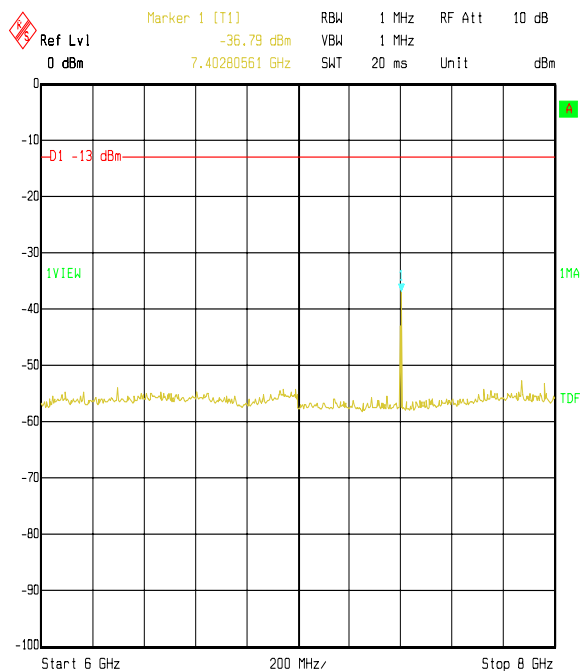
Title: 72327JD01 FCC PART 24  
Comment A: TX RADIATED EMISSIONS  
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Title: 72327JD01 FCC PART 24  
Comment A: TX RADIATED EMISSIONS  
Date: 07.NOV.2006 16:41:05



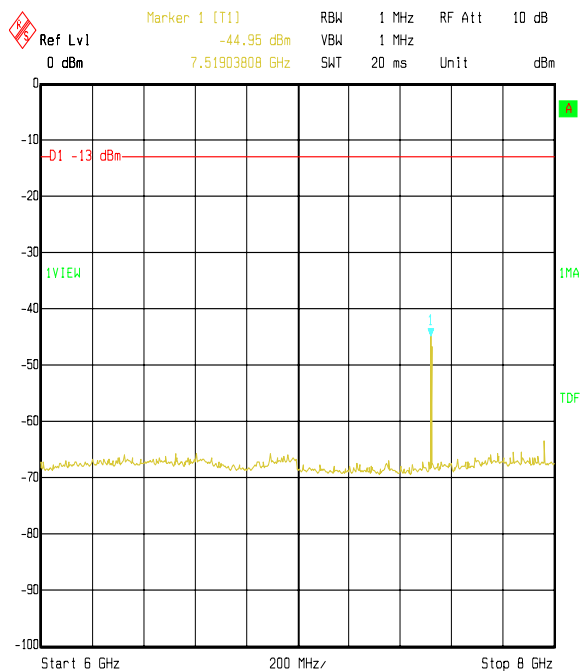
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Date: 07.NOV.2006 16:36:08



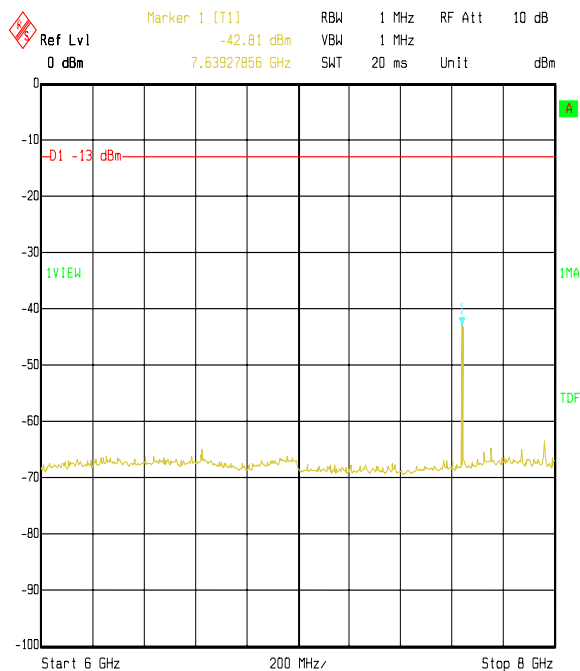
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Comment A: TX RADIATED EMISSIONS  
Date: 07.NOV.2006 16:17:16

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

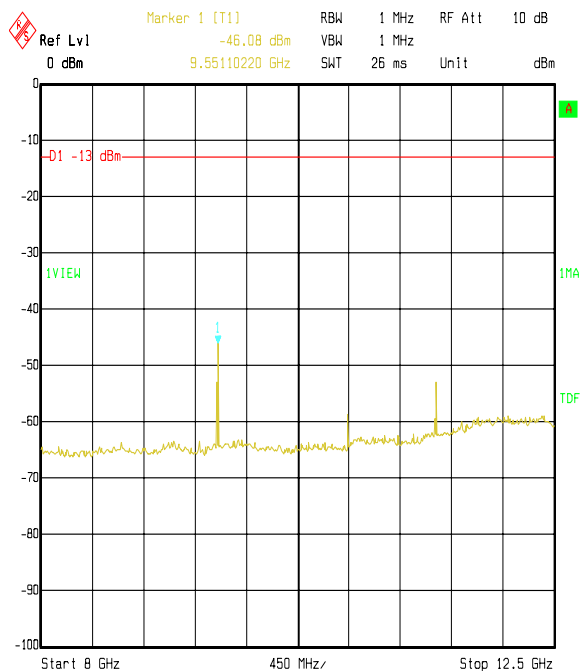
Test of: **Panasonic Mobile Comms Dev of Europe Ltd**  
**VS70A Dual Mode (3G/GSM) Mobile Station**  
To: **FCC Part 24: 2006 (Subpart E)**

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

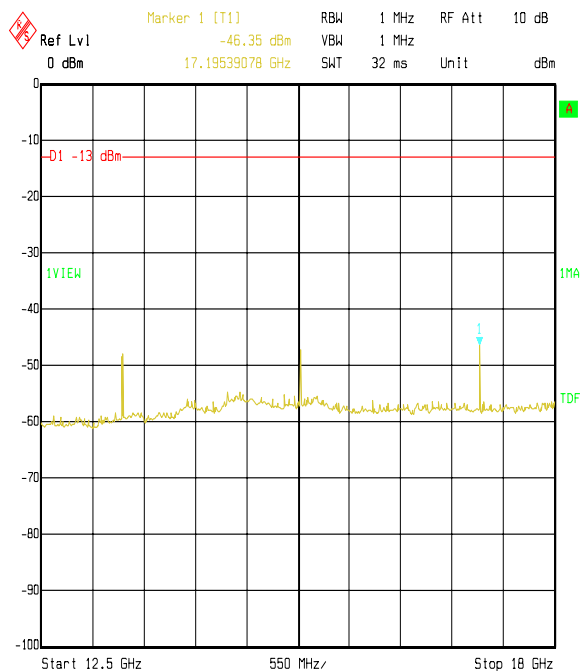
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Comment A: TX RADIATED EMISSIONS  
Date: 07.NOV.2006 16:09:02



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Comment A: TX RADIATED EMISSIONS  
Date: 07.NOV.2006 15:56:47



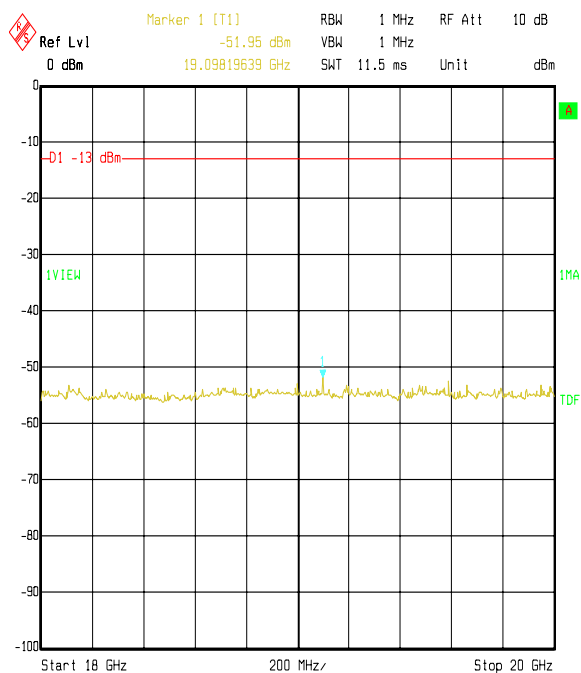
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Comment A: TX RADIATED EMISSIONS  
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Title: 72327JD01 FCC PART 24  
Comment A: TX RADIATED EMISSIONS  
Date: 07.NOV.2006 17:17:07

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

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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

Title: 72327JD01 FCC PART 24  
Comment A: TX RADIATED EMISSIONS  
Date: 07.NOV.2006 17:28:09

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



Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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

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

1<sup>st</sup> 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	501	6	50
2	251	7	50
3	79	8	50
4	100	9	39
5	63	10	31
Total Peak Power:		1214 nW/MHz	

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

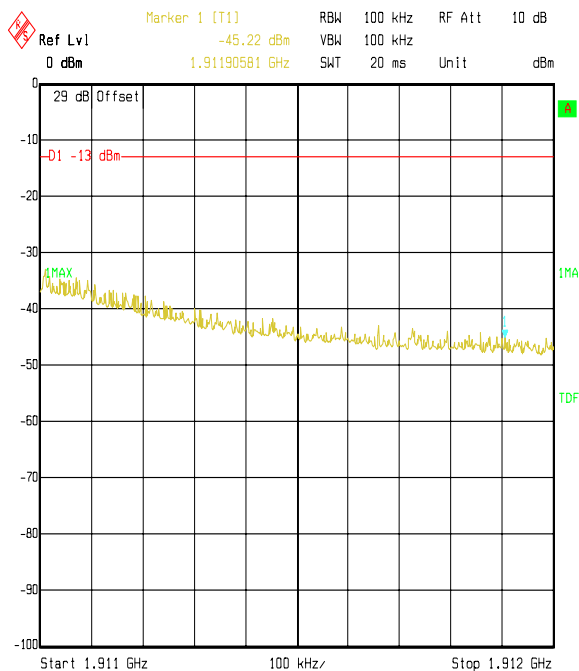
2<sup>nd</sup> 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	31	6	25
2	31	7	25
3	31	8	25
4	25	9	15
5	25	10	20
Total Peak Power:		253 nW/MHz	

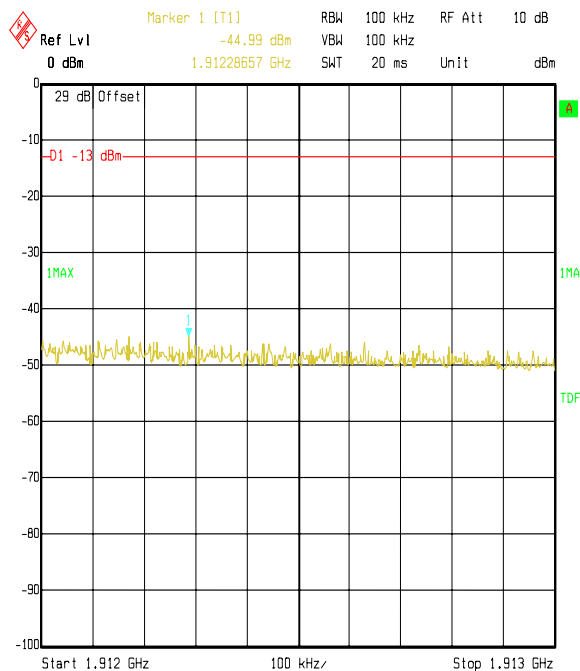
**Results:**

Band (MHz)	Peak Power (nW/MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Status
1911 to 1912	1214	-29.0	-13.0	16.0	Complied
1912 to 1913	253	-36.0	-13.0	23.0	Complied

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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

Title: 72327JD01 FCC PART 24  
Comment A: OUT OF BAND EMISSIONS 1911 - 1912 MHz  
Date: 07.NOV.2006 14:42:05



Title: 72327JD01 FCC PART 24  
Comment A: OUT OF BAND EMISSIONS 1912 - 1913 MHz  
Date: 07.NOV.2006 14:46:34

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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

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

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

**Results:****Bottom Band Edge**

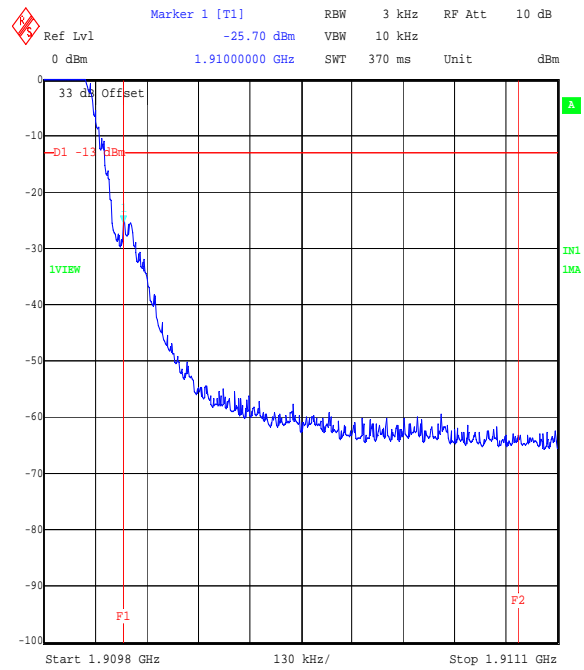
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-30.6	-13.0	17.6	Complied

**Top Band Edge**

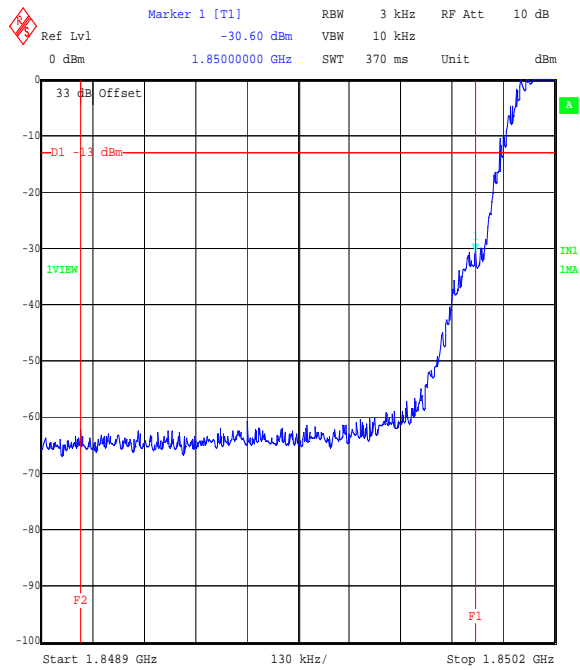
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1910	-25.7	-13.0	12.7	Complied

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

Transmitter Radiated Emissions at Band Edges: Section 2.1053 & 24.238 (Continued)



Title: 72327JD01 FCC PART 24  
Comment A: UPPER BAND EDGE RADIATED EMISSIONS  
Date: 10.NOV.2006 12:35:46



Title: 72327JD01 FCC PART 24  
Comment A: LOWER BAND EDGE RADIATED EMISSIONS  
Date: 10.NOV.2006 12:30:31

Test of: **Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station**  
To: **FCC Part 24: 2006 (Subpart E)**

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## **8. Measurement Uncertainty**

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

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

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

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

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	±2.54 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±4.64 dB
Radiated Spurious Emissions	1 GHz to 26 GHz	95%	±2.94 dB

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

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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## **9. Measurement Methods**

### **9.1. Effective Isotropic Radiated Power (EIRP)**

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

The EIRP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4. The transmitter was fitted with an integral antenna; therefore all radiated tests were performed with the unit operating into the integral antenna.

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

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

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

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

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

All measurements were performed using broadband Horn antennas.

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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**Effective Isotropic Radiated Power (EIRP) (Continued)**

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

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

where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual EIRP is calculated as:

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

The EUT EIRP is calculated as:

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

The test equipment settings for EIRP measurements were as follows:

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

Test of: **Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station**  
To: **FCC Part 24: 2006 (Subpart E)**

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## **9.2. Transmitter Radiated Emissions**

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

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

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

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

The levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the vertical polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the horizontal polarisation.

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

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

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

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

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

All measurements were performed using broadband horn antennas.



Test of: **Panasonic Mobile Comms Dev of Europe Ltd**  
**VS70A Dual Mode (3G/GSM) Mobile Station**  
To: **FCC Part 24: 2006 (Subpart E)**

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**Transmitter Radiated Emissions (Continued)**

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

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

Test of: **Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station**  
To: **FCC Part 24: 2006 (Subpart E)**

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### **9.3. Receiver Radiated Emissions**

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

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

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

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

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the vertical polarisation.

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

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

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

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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### **Appendix 1. Test Equipment Used**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
A027	Horn Antenna	Eaton	9188-2	301	08 Jun 2006	36
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557	08 Jun 2006	36
A1534	Preamplifier 1-26.5 GHz	Hewlett Packard	8449B OPT H02	3008A00405	29 Jul 2006	12
A428	WG 12 horn	Flann	12240-20	134	06 Oct 2006	36
A490	Bilog Antenna	Chase	CBL6111A	1590	09 Sept 2006	12
C1069	Cable	Rosenberger	FB311A10 50M5050	2302 26382-1	22 Jan 2006	12
C1164	1.5m N-type Cable	Rosenberger Micro-Coax	FA210A10 15007070	43188-1	Cal Before Use	12
C1166	2m N-Type Cable	Rosenberger Micro-Coax	FA210A10 20007070	43189-02	Cal Before Use	12
C305	Cable	Rosenberger	UFA 210A-1- 0787- 50x50	2681	29 Jan 2006	12
M1242	FSEM30 Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986_022	22 Sept 2006	12
S202	Site 2	RFI	2	S202- 15011990	N/A	-
S205	Site 5	RFI	5		N/A	-

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

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

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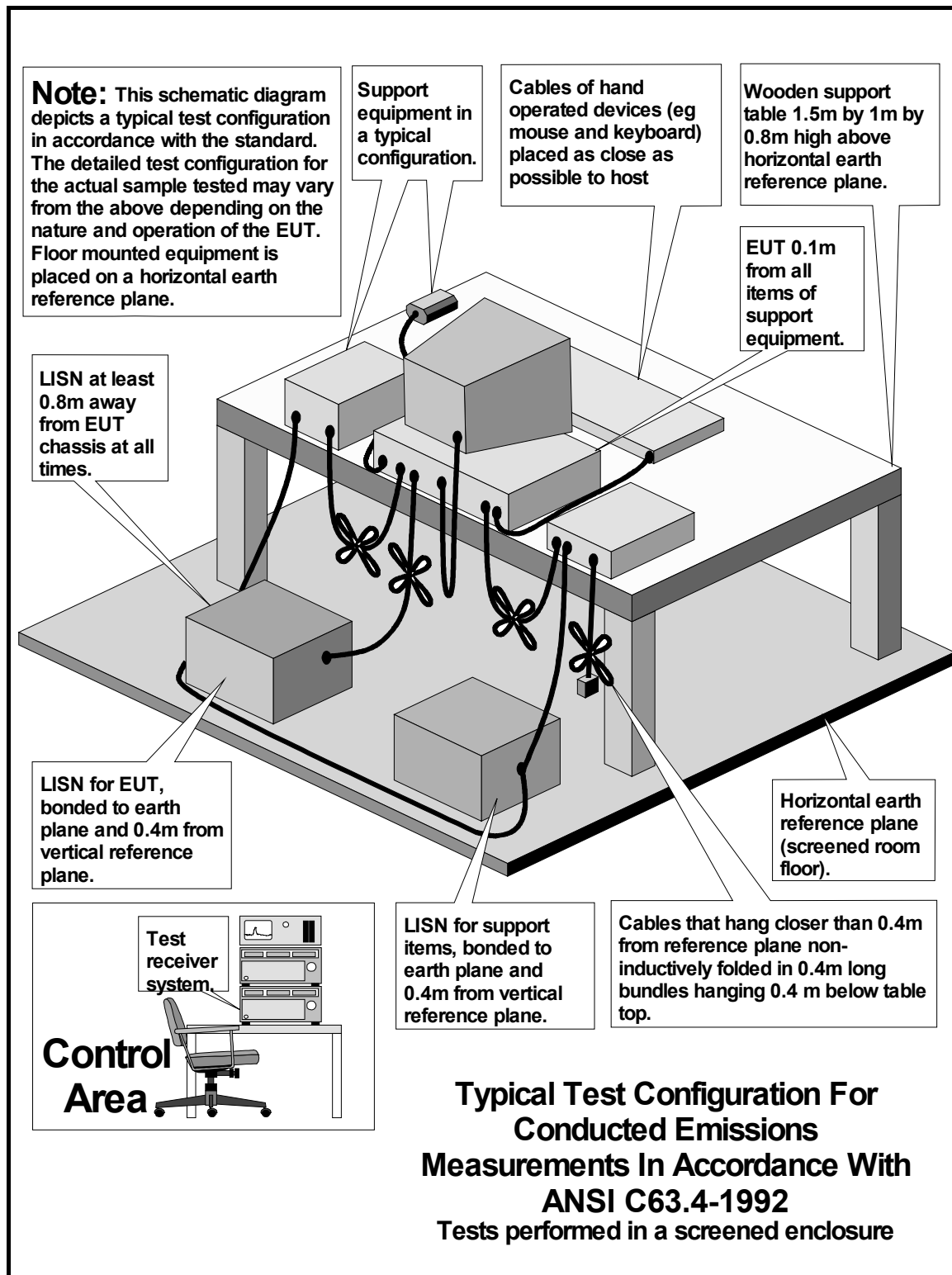
## **Appendix 2. Test Configuration Drawings**

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\72327JD01\EMICON	Test configuration for measurement of conducted emissions.
DRG\72327JD01\EMIRAD	Test configuration for measurement of radiated emissions.

Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

DRG\72327JD01\EMICON



Test of: Panasonic Mobile Comms Dev of Europe Ltd  
VS70A Dual Mode (3G/GSM) Mobile Station  
To: FCC Part 24: 2006 (Subpart E)

DRG\72327JD01\EMIRAD

