



**TEST REPORT  
FROM  
RFI GLOBAL SERVICES LTD**

Test of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF

To: FCC Part 27: 2006 Subpart C

**Test Report Serial No:**  
RFI/RPTE1/RP72995JD01A

<b>This Test Report Is Issued Under The Authority Of Steve Flooks, Service Leader RPG:</b>		 <b>pp Brian Watson</b>
<b>Checked By: Brian Watson</b>		<b>Report Copy No: PDF01</b>
<b>Issue Date: 12 February 2008</b>	<b>Test Dates: 01 February 2008 to 06 February 2008</b>	

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields. Furthermore, the date of creation must match the issue date stated above. This report may be copied in full. The results in this report apply only to the sample(s) tested.

**RFI GLOBAL SERVICES LTD**

**TEST REPORT**

**S.No: RFI/RPTE1/RP72995JD01A**

**Page: 2 of 40**

**Issue Date: 12 February 2008**

**Test Of: IPWireless (UK) Ltd**  
**2.5 GHz UE P1D Modem, Model: KF**  
**To: FCC Part 27: 2006 Subpart C**

---

This page has been left intentionally blank.

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

**Table of Contents**

1. Client Information..... 4

2. Equipment Under Test (EUT) ..... 5

3. Test Specification, Methods and Procedures..... 8

4. Deviations from the Test Specification ..... 9

5. Operation of the EUT During Testing ..... 10

6. Summary of Test Results ..... 11

7. Measurements, Examinations And Derived Results..... 12

8. Measurement Uncertainty ..... 33

Appendix 1. Test Equipment Used ..... 34

Appendix 2. Measurement Methods ..... 35

Appendix 3. Test Configuration Drawings ..... 39

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

## 1. Client Information

<b>Company Name:</b>	IPWireless (UK) Ltd
<b>Address:</b>	Unit 7 Greenways Business Park Bellinger Close Chippenham Wiltshire SN15 1BN UK
<b>Contact Name:</b>	Mr P Warburg

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

## **2. Equipment Under Test (EUT)**

The following information has been supplied by the client:

### **2.1. Identification of Equipment Under Test (EUT)**

<b>Description:</b>	Wireless Broadband Modem
<b>Brand Name:</b>	IPWireless
<b>Model Name or Number:</b>	KF
<b>Serial Number:</b>	KF1A730001010
<b>FCC ID Number:</b>	PKTP1DKF2
<b>Country of Manufacture:</b>	UK
<b>Date of Receipt:</b>	01 February 2008

<b>Brand Name:</b>	AC/DC Power Adaptor
<b>Model Name or Number:</b>	I.T.E Power Supply
<b>Unique Type Identification:</b>	PSC05R-050 (IP)
<b>Serial Number:</b>	Not marked or stated
<b>Country of Manufacture:</b>	China
<b>Date of Receipt:</b>	01 February 2008

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

The unit under test was a 2.5 GHz wireless broadband modem.

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

During the course of testing the EUT was not modified.

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

#### 2.4. Additional Information Related to Testing

<b>Power Supply Requirement:</b>	Nominal 110 V, 60 Hz AC Mains Supply Internal 3.7 V DC backup battery	
<b>Intended Operating Environment:</b>	Residential, Commercial, Light Industry and Heavy Industry	
<b>Equipment Category:</b>	Broadband Radio Access Network	
<b>Type of Unit:</b>	Portable (Standalone battery powered device)	
<b>Chip Rate:</b>	7.68 Mcps	
<b>Bandwidth:</b>	10 MHz	
<b>Modulation Type:</b>	QPSK	
<b>Channel Spacing:</b>	200 kHz	
<b>Duty Cycle:</b>	33%	
<b>Highest Fundamental Frequency:</b>	2.6846 GHz	
<b>Antenna Type:</b>	External	
<b>Antenna Gain:</b>	Up to 7 dBi	
<b>Interface Ports:</b>	Data Port	
<b>Transmitter Output Power:</b>	+24 dBm	
<b>Transmit Frequency Range:</b>	2501.4 to 2684.6 MHz	
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Frequency (MHz)</b>
	Bottom	2501.4
	Middle	2593.0
	Top	2684.6
<b>Receive Frequency Range:</b>	2501.4 to 2684.6 MHz	
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Frequency (MHz)</b>
	Bottom	2501.4
	Middle	2593.0
	Top	2684.6

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

## **2.5. Support Equipment**

The following support equipment was supplied by the applicant and used to exercise the EUT during testing:

<b>Description:</b>	Laptop PC	Stub Antenna
<b>Brand Name:</b>	Sony	Maxrad
<b>Model Name or Number:</b>	Vaio	Not marked or stated
<b>Serial Number:</b>	None stated	Not marked or stated
<b>Cable Length and Type</b>	1.8m, USB	Not applicable
<b>Connected to Port:</b>	Data	RF via coax cable

<b>Description:</b>	7dBi Antenna	RF Cable
<b>Brand Name:</b>	Maxrad	Rhophase Microwave
<b>Model Name or Number:</b>	Z3238 2.5GHz MMDS	Not marked or stated
<b>Serial Number:</b>	Engineering sample	C340G
<b>Cable Length and Type</b>	Not applicable	1.8 Metres
<b>Connected to Port:</b>	RF via coax cable	EUT and Antenna

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

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

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

<b>Reference:</b>	FCC Part 27: 2007
<b>Title:</b>	Code of Federal Regulations, Part 27 (47CFR) Subpart C Miscellaneous Wireless Communications Services
<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: 2007 Class B
<b>Title:</b>	Code of Federal Regulations, Part 15 (47CFR) Radio Frequency Devices: Digital Devices.
<b>Comments:</b>	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.

#### **3.2. 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 (1996)

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

ANSI C63.4 (2003)

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

ANSI C63.5 (1998)

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.



Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

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

There were no deviations from the test specification.

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

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

### **5.1. Operating Modes**

The EUT was tested in the following operating modes:

- For all radiated tests, the EUT was transmitting at full power on bottom, middle or top channels as per the test requirement. The 15 timeslot frame was configured with 5 timeslots assigned to transmit and the remaining 10 timeslots assigned to receive using the high chip rate. This was considered to be the worst case configuration.
- The EUT was configured in continuous transceiver mode, therefore the receiver was active during all tests.
- Measurements were made with the EUT connected to a Stub Antenna and 7 dBi Antenna supplied by the Client. Both were connected to the EUT by a 1.8 metre coaxial cable also supplied by the Client.

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

The EUT was tested in the following configuration:

- An AC/DC power adaptor was used to supply DC power to the EUT.
- The data port was connected to a laptop during setup and was left connected to allow data flow to simulate normal operational use.

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

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

<b>Range of Measurements</b>	<b>Specification Reference</b>	<b>Port Type</b>	<b>Compliance Status</b>
Idle Mode Spurious Emissions	FCC Part 15.109	Enclosure	Complied
Equivalent Isotropic Radiated Power (EIRP)	FCC Part 27.50	Enclosure	Complied
Radiated Spurious Emissions	FCC Part 2.1051, Part 27.53	Enclosure	Complied
Radiated Spurious Emissions at Band Edge	FCC Part 2.1051, Part 27.53	Enclosure	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, UK.

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

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

### **7.1. General Comments**

This section contains test results only. Details of the test methods and procedures can be found in Appendix 2 of this report.

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: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

## **7.2. Test Results**

### **7.2.1. Radiated Emissions (Idle Mode): 30 MHz to 1.0 GHz**

The EUT was configured for receiver-radiated emissions testing, as described in Appendix 2 of this report.

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

#### **Results for stub antenna:**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
63.005	Vertical	18.1	40.0	21.9	Complied
115.080	Horizontal	23.8	43.5	19.7	Complied
170.810	Horizontal	27.8	43.5	15.7	Complied
249.749	Horizontal	23.0	46.0	23.0	Complied
444.017	Vertical	31.4	46.0	14.6	Complied

#### **Results for 7 dBi antenna:**

Frequency (MHz)	Antenna Polarity	Quasi Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
63.005	Horizontal	19.1	40.0	20.9	Complied
115.080	Vertical	22.2	43.5	21.3	Complied
170.810	Vertical	23.7	43.5	19.8	Complied
249.749	Horizontal	23.1	46.0	22.9	Complied
444.017	Horizontal	32.1	46.0	13.9	Complied

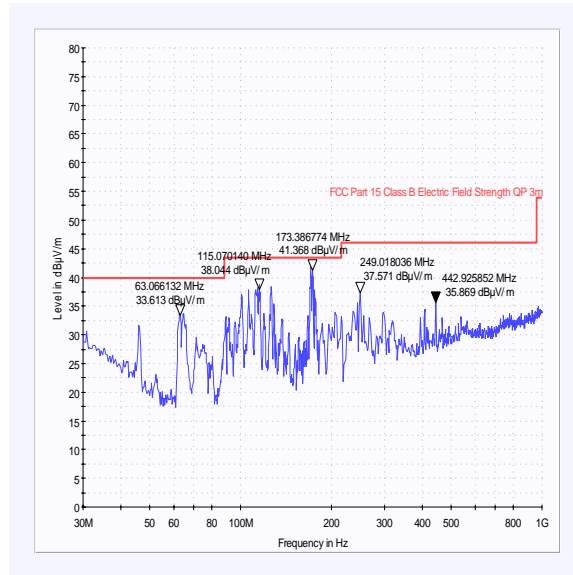
#### **Notes(s):**

1. All other emissions shown on the plots were investigated and found to be ambient or >20 dB below the applicable limit
2. Plot shown is a prescan only and all emissions present on the prescan plot were retested with both antennas

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

**Radiated Emissions (Idle Mode): 30 MHz to 1.0 GHz (Continued)**



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

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

### **7.2.2. Receiver Radiated Emission (Idle Mode): 1 GHz to 20 GHz**

The EUT was configured for receiver radiated emissions testing, as described in Appendix 2 of this report.

Tests were performed to identify the maximum receiver or idle mode radiated emissions levels.

#### **Results:**

##### **Highest Peak Level Stub Antenna:**

Frequency (MHz)	Antenna Polarity	Peak Detector Level (dB $\mu$ V)	Transducer Factor	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
17.988977	Vertical	36.9	13.1	50.0	54.0	4.0	Complied

##### **Highest Peak Level 7 dBi Antenna:**

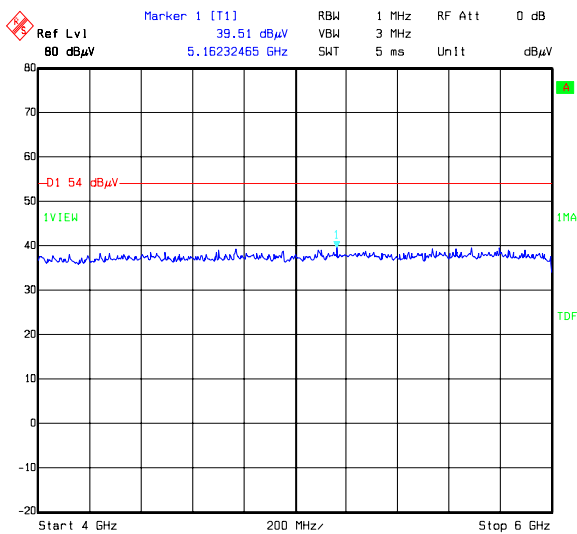
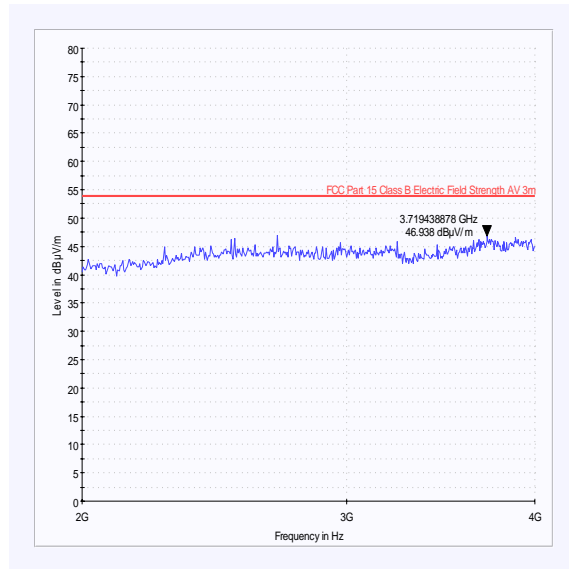
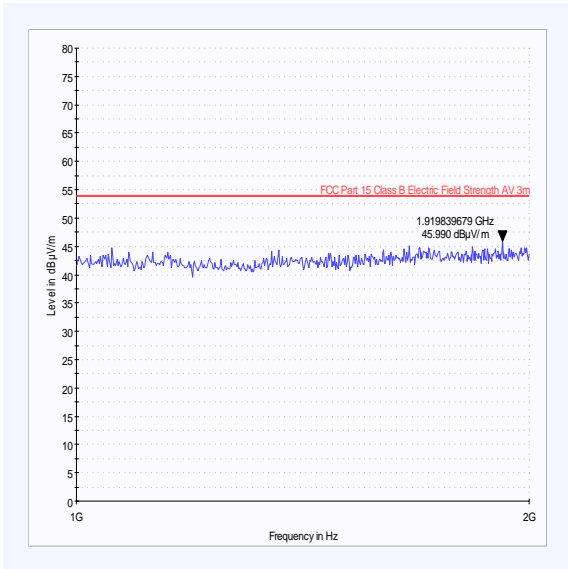
Frequency (MHz)	Antenna Polarity	Peak Detector Level (dB $\mu$ V)	Transducer Factor	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
16.445891	Vertical	39.3	11.3	50.6	54.0	3.4	Complied

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

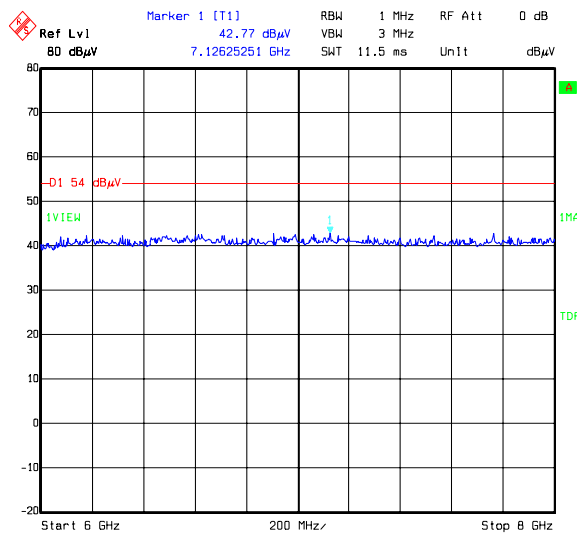
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.
2. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
3. All other emissions shown on the plots were investigated and found to be ambients or >20 dB below the applicable limit

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

**Receiver Radiated Emission (Idle Mode): 1 GHz to 20 GHz, Stub Antenna (Continued)**



Title: 72995JD01 FCC PART 27  
 Comment A: IDLE MODE RADIATED EMISSIONS STUB ANTENNA  
 Date: 05.FEB.2008 13:06:00

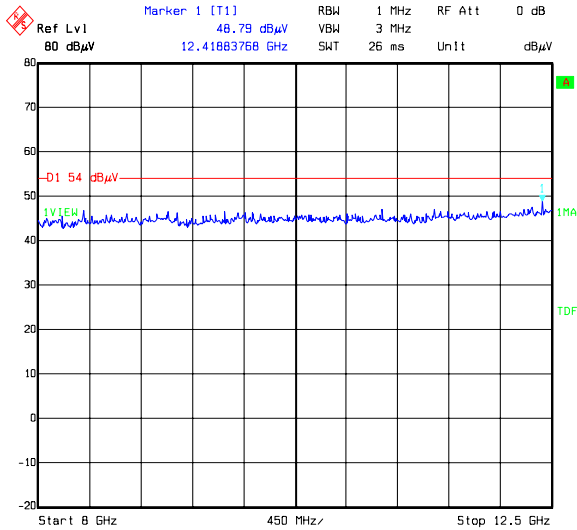


Title: 72995JD01 FCC PART 27  
 Comment A: IDLE MODE RADIATED EMISSIONS STUB ANTENNA  
 Date: 05.FEB.2008 13:03:06

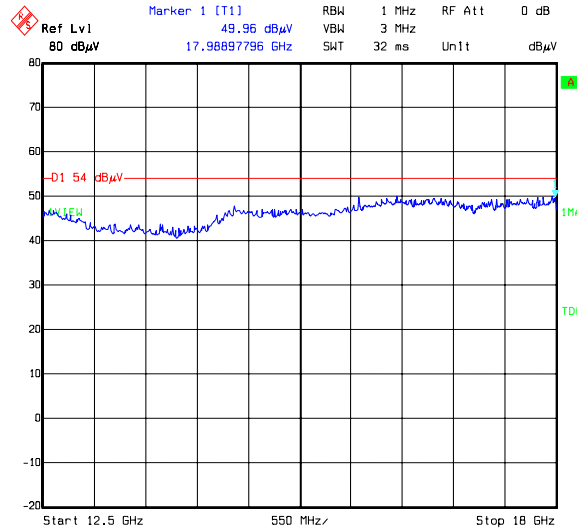


Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

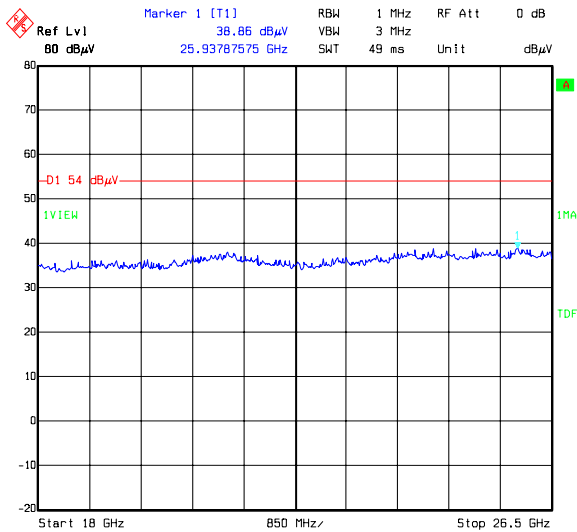
Receiver Radiated Emission (Idle Mode): 1 GHz to 20 GHz, Stub Antenna (Continued)



Title: 72995JD01 FCC PART 27  
Comment A: IDLE MODE RADIATED EMISSIONS STUB ANTENNA  
Date: 05.FEB.2008 13:00:22



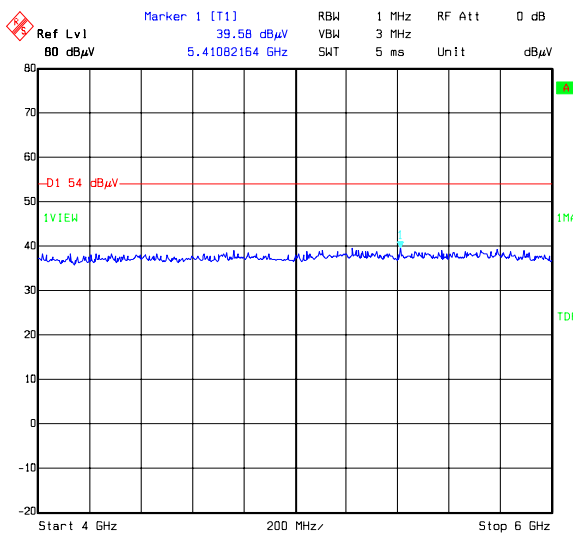
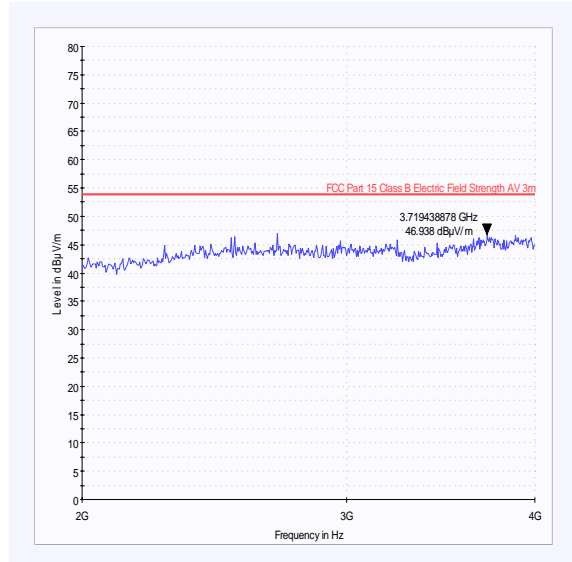
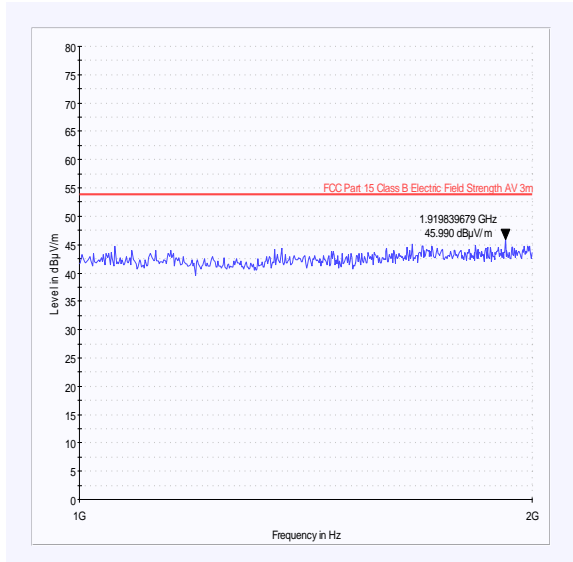
Title: 72995JD01 FCC PART 27  
Comment A: IDLE MODE RADIATED EMISSIONS STUB ANTENNA  
Date: 05.FEB.2008 12:56:37



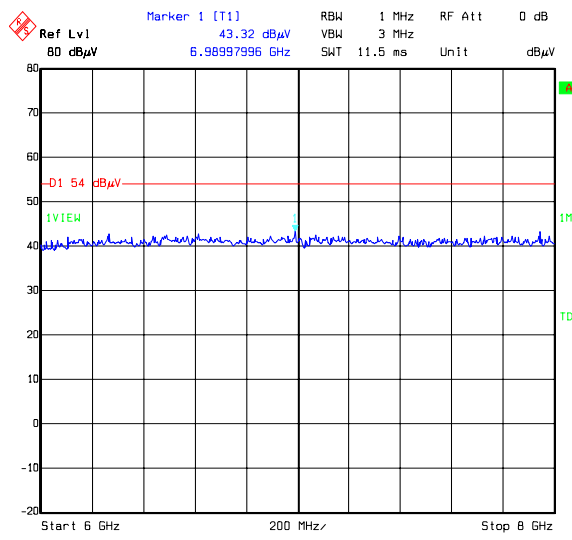
Title: 72995JD01 FCC PART 27  
Comment A: IDLE MODE RADIATED EMISSIONS STUB ANTENNA  
Date: 05.FEB.2008 12:53:42

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

**Receiver Radiated Emission (Idle Mode): 1 GHz to 20 GHz, 7 dBi antenna (Continued)**



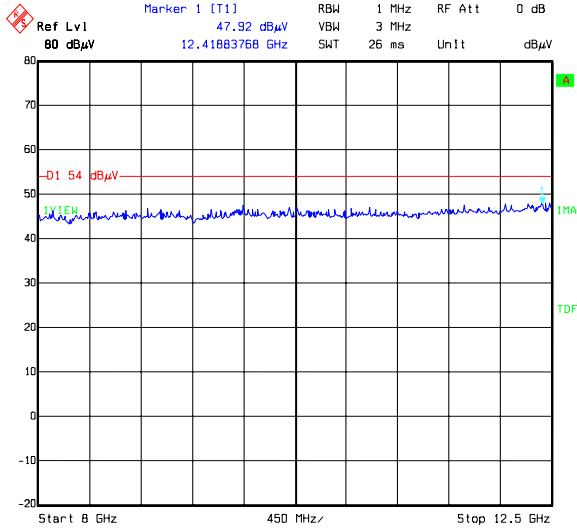
Title: 72995JD01 FCC PART 27  
 Comment A: IDLE MODE RADIATED EMISSIONS 7dBi ANTENNA  
 Date: 05.FEB.2008 12:28:52



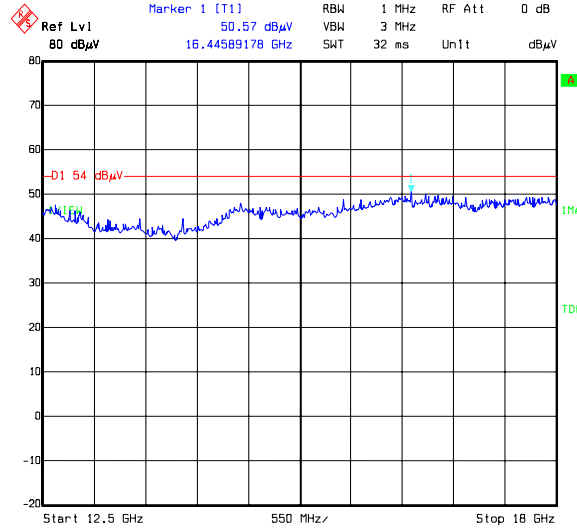
Title: 72995JD01 FCC PART 27  
 Comment A: IDLE MODE RADIATED EMISSIONS 7dBi ANTENNA  
 Date: 05.FEB.2008 12:33:04

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

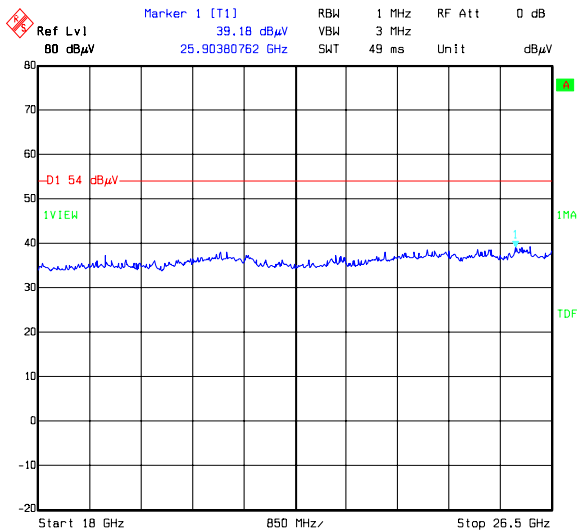
Receiver Radiated Emission (Idle Mode): 1 GHz to 20 GHz, 7 dBi antenna (Continued)



Title: 72995JD01 FCC PART 27  
Comment A: IDLE MODE RADIATED EMISSIONS 7dBi ANTENNA  
Date: 05.FEB.2008 12:37:13



Title: 72995JD01 FCC PART 27  
Comment A: IDLE MODE RADIATED EMISSIONS 7dBi ANTENNA  
Date: 05.FEB.2008 12:41:07



Title: 72995JD01 FCC PART 27  
Comment A: IDLE MODE RADIATED EMISSIONS 7dBi ANTENNA  
Date: 05.FEB.2008 12:47:26

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

### 7.2.3. Equivalent Isotropic Radiated Power (EIRP):

The EUT was configured for conducted RF output power, as described in Appendix 2 of this report.

#### Results for Stub Antenna

Channel	Frequency (MHz)	Conducted power (dBm)	EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	2501.4	22.6	24.6	33.0	8.4	Complied
Middle	2593.0	22.6	24.6	33.0	8.4	Complied
Top	2684.6	22.5	24.5	33.0	8.5	Complied

#### Results for 7 dBi Antenna

Channel	Frequency (MHz)	Conducted power (dBm)	EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	2501.4	22.6	29.6	33.0	3.4	Complied
Middle	2593.0	22.6	29.6	33.0	3.4	Complied
Top	2684.6	22.5	29.5	33.0	3.5	Complied

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

#### **7.2.4. Transmitter Radiated Emissions**

The EUT was configured for transmitter radiated emissions testing, as described in Appendix 2 of this report.

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

#### **Bottom Channel, Stub Antenna:**

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
61.661	-88.1	-25.0	63.1	Complied
756.157	-46.3	-25.0	21.3	Complied
1699.318	-46.3	-25.0	21.3	Complied
2774.576	-47.8	-25.0	22.8	Complied
4999.048	-54.2	-25.0	29.2	Complied

#### **Middle Channel, Stub Antenna:**

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
61.661	-88.1	-25.0	63.1	Complied
756.157	-46.3	-25.0	21.3	Complied
2774.576	-47.8	-25.0	22.8	Complied
5189.879	-34.8	-25.0	9.8	Complied

#### **Top Channel, Stub Antenna:**

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
61.661	-88.1	-25.0	63.1	Complied
756.157	-46.3	-25.0	21.3	Complied
1925.505	-35.7	-25.0	10.7	Complied
2774.576	-47.8	-25.0	22.8	Complied
5365.430	-43.7	-25.0	18.7	Complied

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

**Transmitter Radiated Emissions (Continued)**

**Bottom Channel, 7dBi Antenna:**

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
61.661	-84.1	-25.0	59.1	Complied
756.157	-44.6	-25.0	19.6	Complied
1671.112	-47.3	-25.0	22.3	Complied
2774.576	-45.8	-25.0	20.8	Complied
4999.138	-55.3	-25.0	30.3	Complied

**Centre Channel, 7dBi Antenna:**

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
61.661	-84.1	-25.0	59.1	Complied
756.157	-44.6	-25.0	19.6	Complied
2774.576	-45.8	-25.0	20.8	Complied
5189.890	-46.5	-25.0	21.5	Complied

**Top Channel, 7dBi Antenna:**

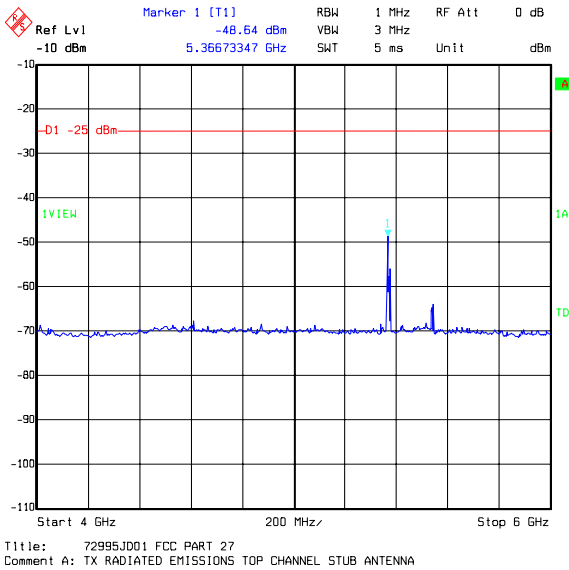
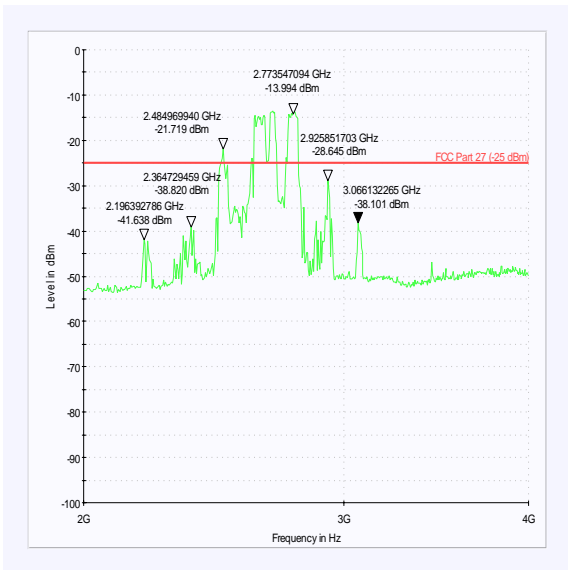
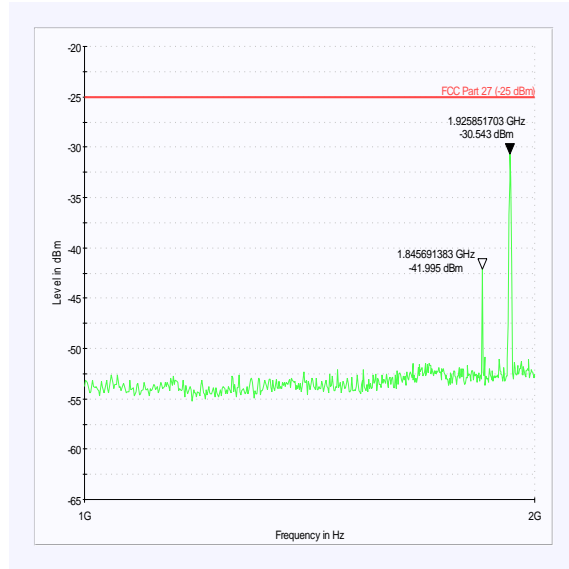
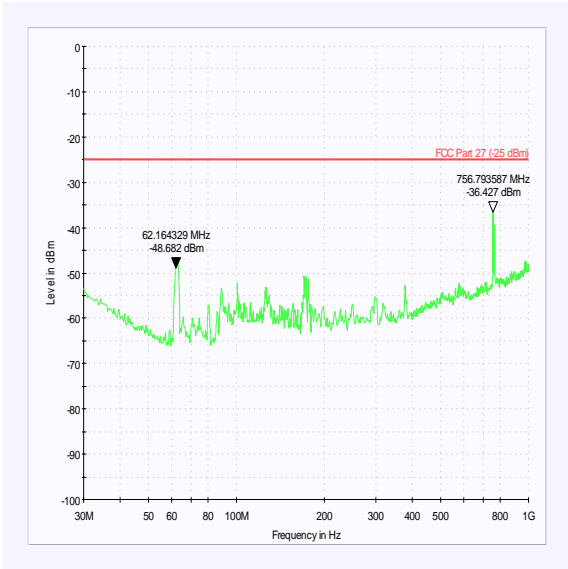
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
61.661	-84.1	-25.0	59.1	Complied
756.157	-44.6	-25.0	19.6	Complied
1923.667	-40.3	-25.0	15.3	Complied
2774.576	-45.8	-25.0	20.8	Complied
5365.410	-42.7	-25.0	17.7	Complied

**Note(s):**

1. All other emissions shown on the plots were investigated and found to be ambience or >20 dB below the applicable limit.

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

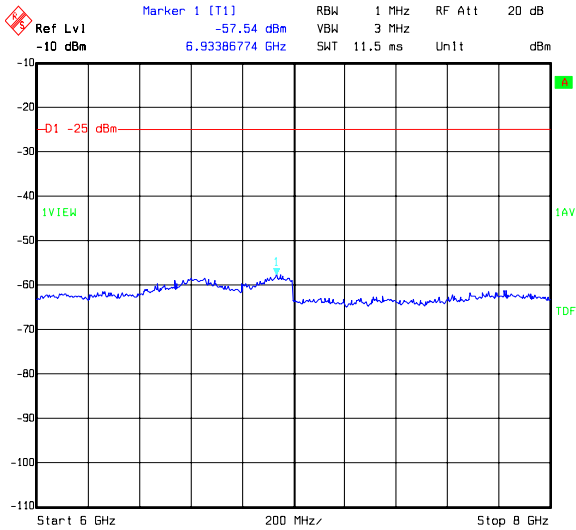
**Transmitter Radiated Emissions (Continued) Stub Antenna**



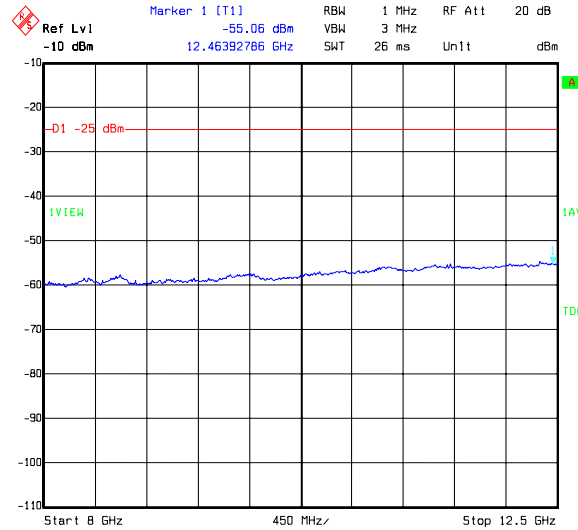
Title: 72995JD01 FCC PART 27  
 Comment A: TX RADIATED EMISSIONS TOP CHANNEL STUB ANTENNA  
 Date: 05.FEB.2008 13:32:22

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

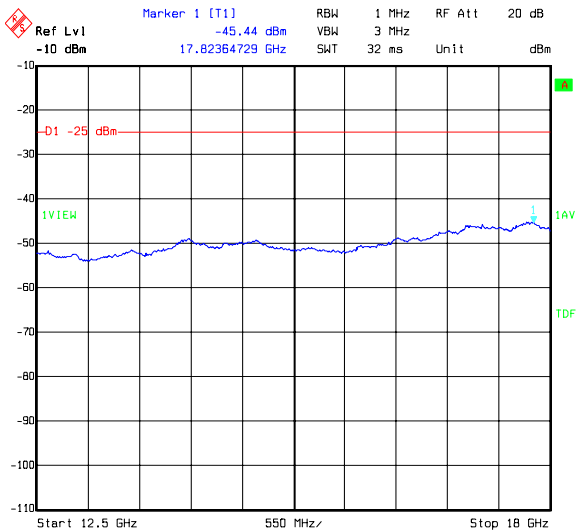
Transmitter Radiated Emissions (Continued) Stub Antenna



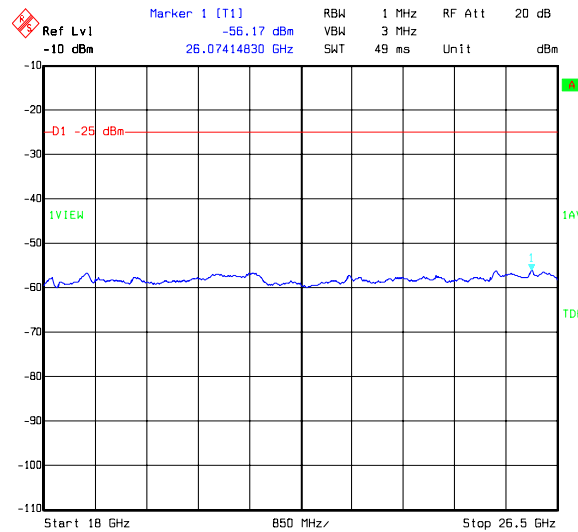
Title: 72995JD01 FCC PART 27  
Comment A: TX RADIATED EMISSIONS TOP CHANNEL STUB ANTENNA  
Date: 05.FEB.2008 14:28:22



Title: 72995JD01 FCC PART 27  
Comment A: TX RADIATED EMISSIONS TOP CHANNEL STUB ANTENNA  
Date: 05.FEB.2008 14:24:32



Title: 72995JD01 FCC PART 27  
Comment A: TX RADIATED EMISSIONS TOP CHANNEL STUB ANTENNA  
Date: 05.FEB.2008 14:32:36



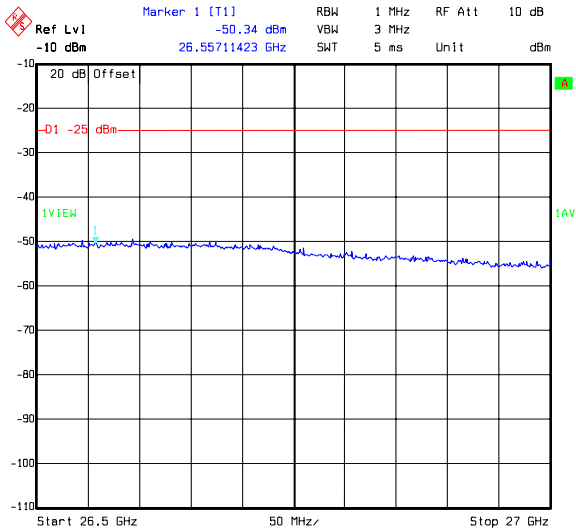
Title: 72995JD01 FCC PART 27  
Comment A: TX RADIATED EMISSIONS TOP CHANNEL STUB ANTENNA  
Date: 05.FEB.2008 14:49:46



Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

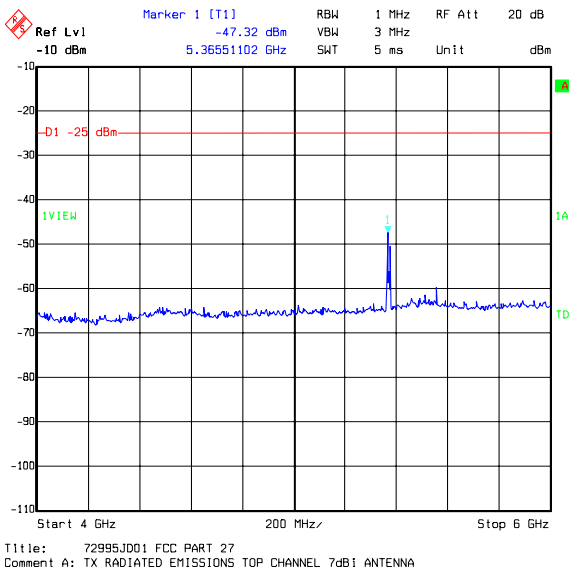
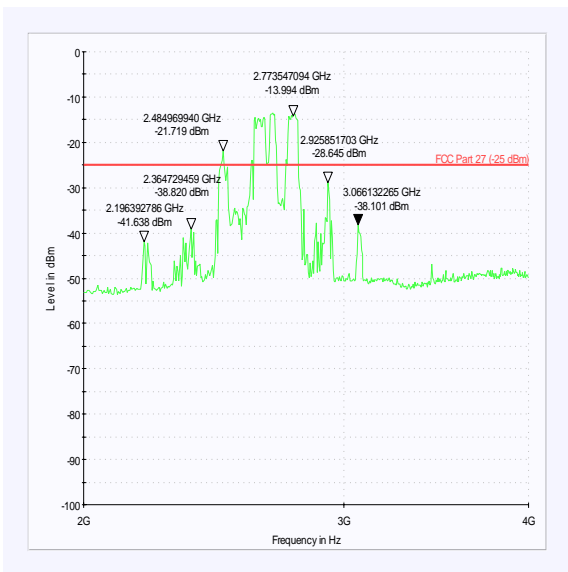
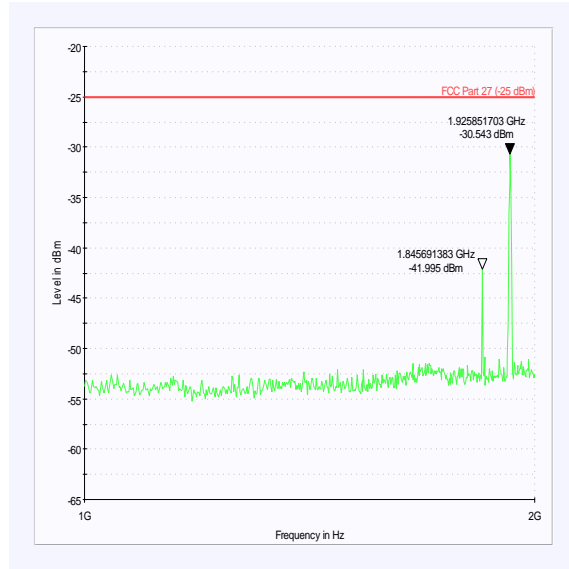
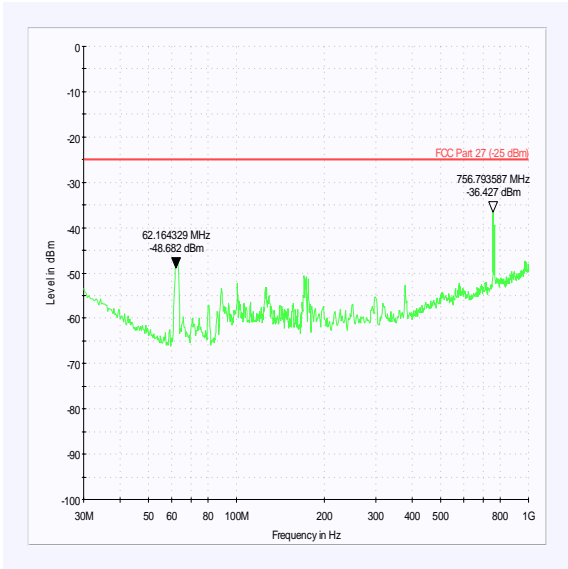
**Transmitter Radiated Emissions (Continued) Stub Antenna**



Title: 72995JD01 FCC PART 27  
Comment A: TX RADIATED EMISSIONS TOP CHANNEL STUB ANTENNA  
Date: 06.FEB.2008 16:32:07

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

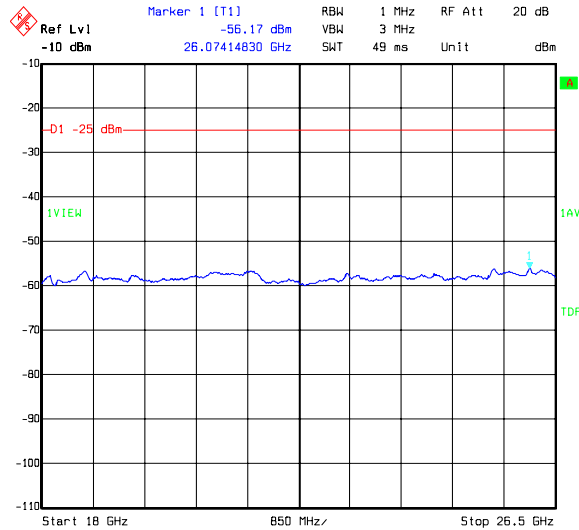
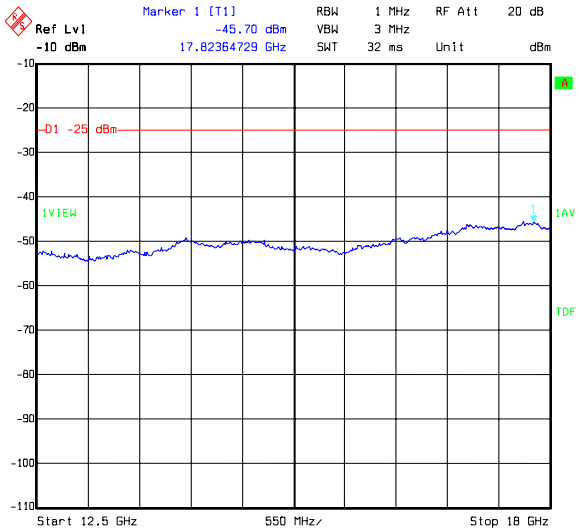
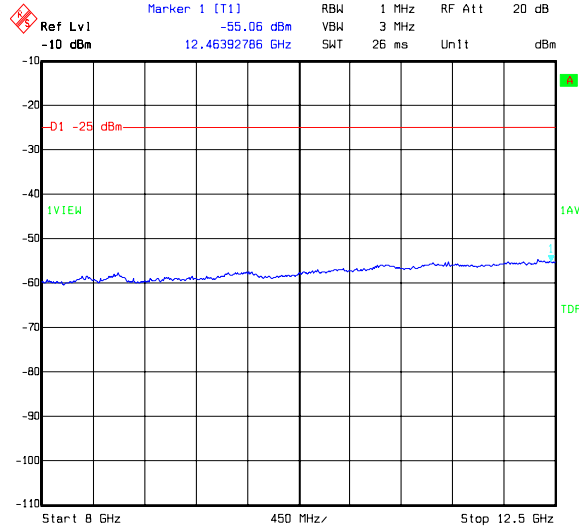
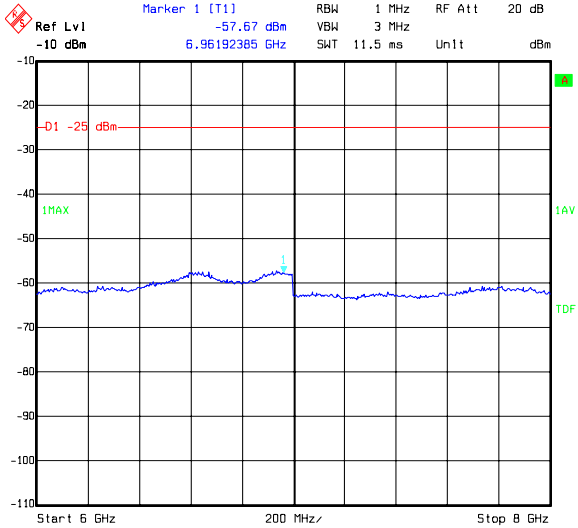
**Transmitter Radiated Emissions (Continued) 7 dBi Antenna**



Title: 72995JD01 FCC PART 27  
 Comment A: TX RADIATED EMISSIONS TOP CHANNEL 7dBi ANTENNA  
 Date: 05.FEB.2008 14:12:50

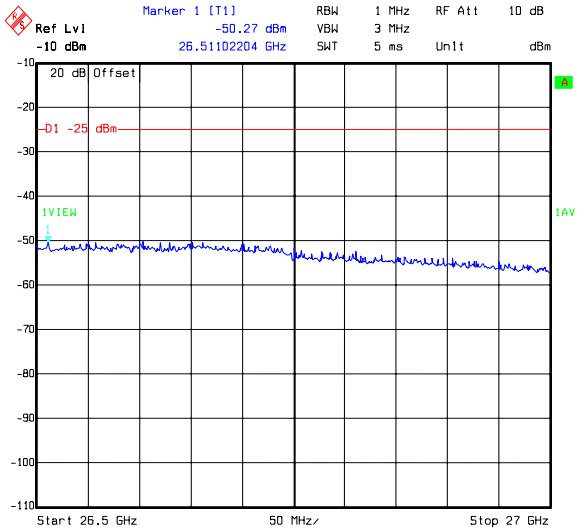
Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

Transmitter Radiated Emissions (Continued) 7 dBi Antenna



Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

**Transmitter Radiated Emissions (Continued) 7 dBi Antenna**



Title: 72995JD01 FCC PART 27  
Comment A: TX RADIATED EMISSIONS TOP CHANNEL 7dBi ANTENNA  
Date: 06.FEB.2008 16:35:02

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

### 7.2.5. Transmitter Radiated Emissions at Band Edges

#### Results:

Stub Antenna measured with a 300 kHz resolution bandwidth:

#### Bottom Band Edge

Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2496	-36.7	-13.0	23.7	Complied

#### Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690	-46.9	-13.0	33.9	Complied

#### Results:

Stub Antenna measured with a 1 MHz resolution bandwidth:

#### Bottom Band Edge

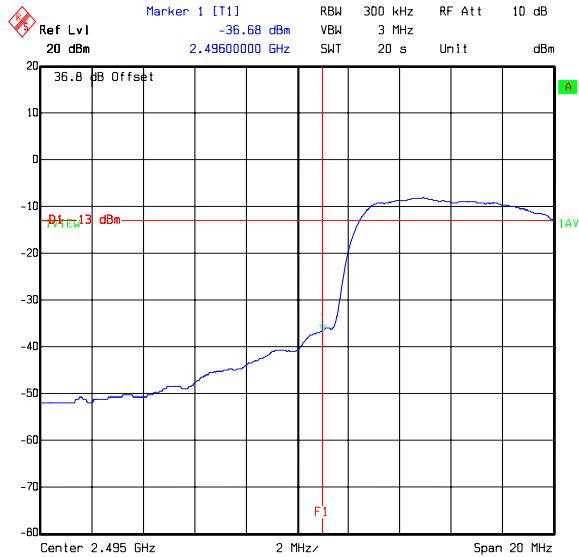
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2496	-26.0	-13.0	13.0	Complied

#### Top Band Edge

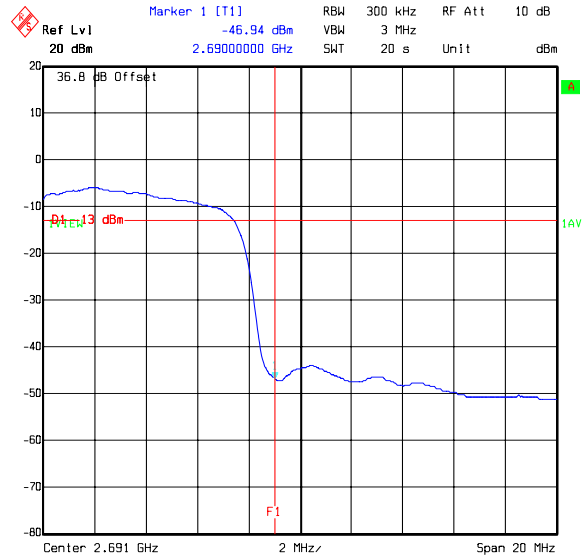
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690	-28.0	-13.0	15.0	Complied

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

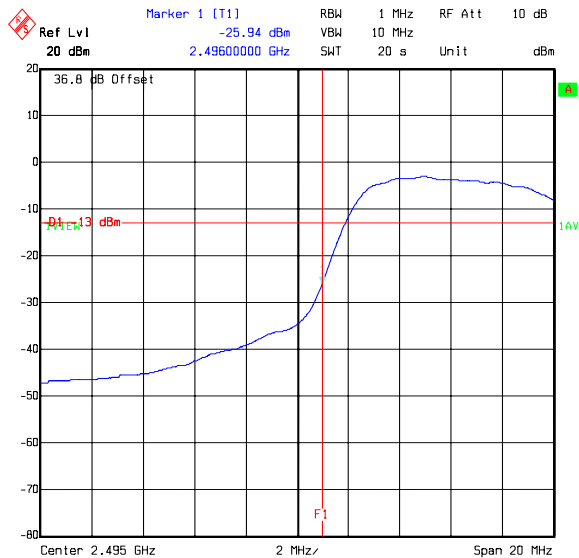
Transmitter Radiated Emissions at Band Edges (Continued) Stub Antenna



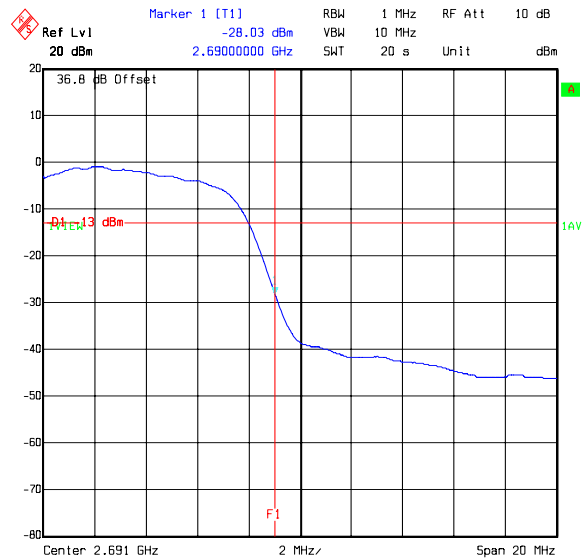
Date: 06.FEB.2008 15:45:23



Date: 06.FEB.2008 15:25:00



Date: 06.FEB.2008 15:43:29



Date: 06.FEB.2008 15:22:52

Test Of: IPWireless (UK) Ltd  
 2.5 GHz UE P1D Modem, Model: KF  
 To: FCC Part 27: 2006 Subpart C

---

### 7.2.6.Transmitter Radiated Emissions at Band Edges (Continued) 7 dBi Antenna

#### Results:

7 dBi Antenna measured with a 300 kHz resolution bandwidth:

#### Bottom Band Edge

Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2496	-37.3	-13.0	24.3	Complied

#### Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690	-44.9	-13.0	11.9	Complied

#### Results:

7 dBi Antenna measured with a 1 MHz resolution bandwidth:

#### Bottom Band Edge

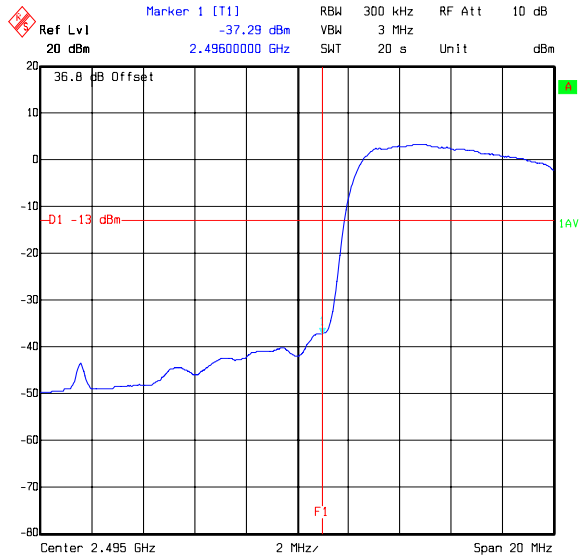
Frequency (MHz)	Spurious Emission (dBm)	Limit (dBm)	Margin (dB)	Result
2496	-16.1	-13.0	3.1	Complied

#### Top Band Edge

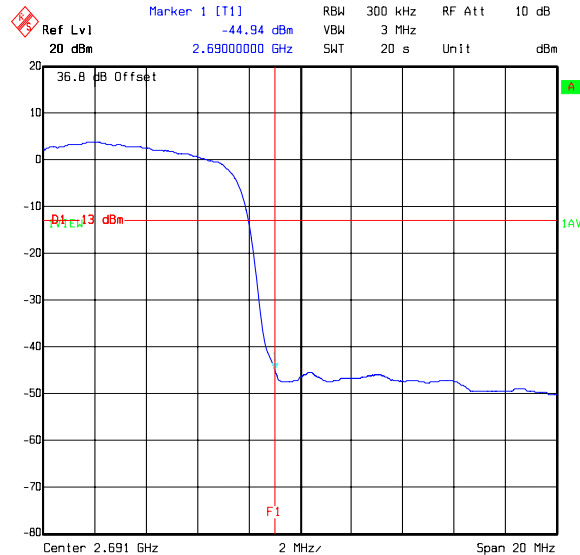
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2690	-18.7	-13.0	5.7	Complied

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

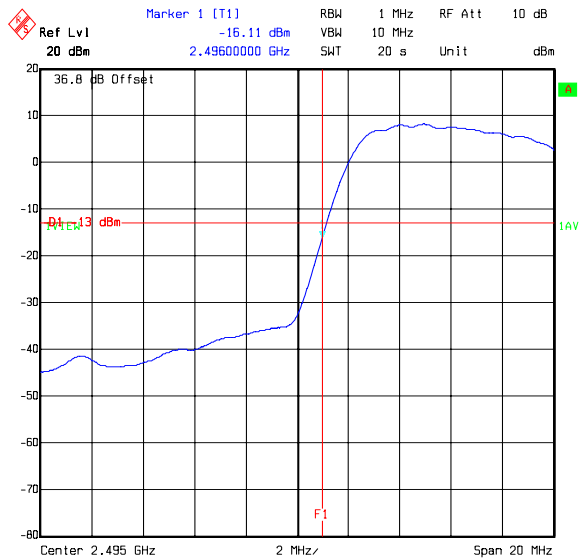
Transmitter Radiated Emissions at Band Edges (Continued) 7 dBi Antenna



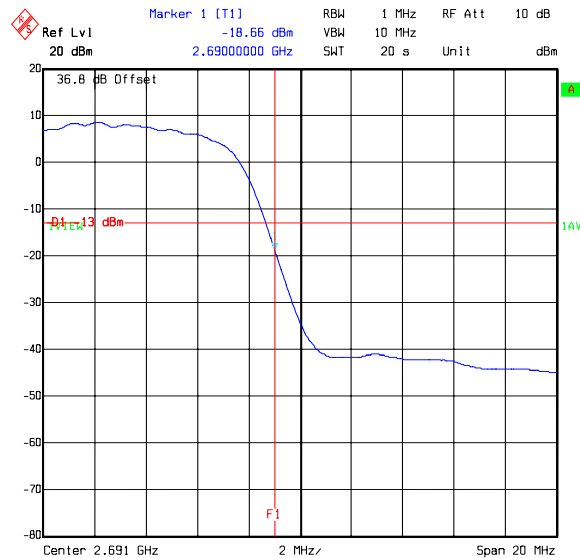
Date: 06.FEB.2008 15:38:54



Date: 06.FEB.2008 15:36:45



Date: 06.FEB.2008 15:41:03



Date: 06.FEB.2008 15:35:22



Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

## **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”.

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level</b>	<b>Calculated Uncertainty</b>
Carrier Output Power	Not applicable	95%	± 0.46 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 5.26 dB
Radiated Spurious Emissions	1 GHz to 27 GHz	95%	± 4.78 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: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

### Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A028	Antenna	Eaton	91888-2	304	08 Jun 2006	36
A031	Antenna	Eaton	91889-2	557	08 Jun 2006	36
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A253	Antenna	Flann Microwave	12240-20	128	17 Nov 2006	36
A254	Antenna	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	Antenna	Flann Microwave	16240-20	519	17 Nov 2006	36
A256	Antenna	Flann Microwave	18240-20	400	17 Nov 2006	36
A259	Antenna	Chase	CBL6111	1513	13 Mar 2007	12
A435	Antenna	Flann	22240-20	400	21 Jul 2006	36
A436	Antenna	Flann	20240-20	330	24 Apr 2006	36
C1065	Cable	Rosenberger	UFA210-1-7872	0985	06 Jun 2007	12
C1164	Cable	Rosenberger Micro-Coax	FA210A1015007070	43188-1	04 Jun 2007	12
C1167	Cable	Rosenberger Micro-Coax	FA210A1030007070	43190-01	05 Jun 2007	12
M023	Test Receiver	Rohde & Schwarz	ESVP	872 991/027	24 Apr 2007	12
M024	Spectrum Monitor	Rohde & Schwarz	EZM	873 952/006	Calibrated before use	-
M1242	Spectrum Analyser	Rohde & Schwarz, Inc.	FSEM30	845986/022	29 Nov 2007	12
M1267	Thermal Power Sensor	Rohde and Schwarz	NRV-Z52	100155	20 Mar 2007	12
M1379	Test Receiver	Rohde and Schwarz	ESIB7	100330	02 Aug 2007	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	19 Mar 2007	12
S201	Open Area Test Site	RFI	1	None	25 May 2007	12
S202	Site 2	RFI	2	S202-15011990	17 Nov 2007	12

**NB** In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule. All equipment was calibrated at the time of the test.

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

## Appendix 2. Measurement Methods

### A2.1. 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 5 times the highest unintentionally generated frequency were performed within a screened chamber in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT which required further examination. In order to minimise the time taken for the swept measurements, a peak detector was used in conjunction with the appropriate detector measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

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

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

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 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 Below 1 GHz	Final Measurements Above 1 GHz
Detector Type:	Peak	Quasi-Peak (CISPR)	Peak/Average
Mode:	Max Hold	Not applicable	Not applicable
Bandwidth:	(120 kHz < 1 GHz) (1 MHz > 1 GHz)	120 kHz	1 MHz (If Applicable)
Amplitude Range:	60 dB	20 dB	20 dB (typical)
Step Size:	Continuous sweep	Not applicable	Not applicable
Sweep Time:	Coupled	Not applicable	Not applicable

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

## **A2.2. Equivalent Isotropic Radiated Power (EIRP)**

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

The Output power was measured using a wideband power meter.

A 1.8 metre coaxial cable with 1.3dB of loss was used to connect the EUT to the power meter. This cable was supplied by the Client.

The maximum conducted output power on bottom middle and top channels was measured using the power meter. The declared antenna gain for the Stub Antenna (2 dBi) and the 7 dBi antenna was added to the measured conducted power.

A duty cycle offset of 4.8 dB was used.

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

### A2.3. Transmitter Radiated Emissions

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

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 10 times the highest fundamental frequency were performed in order to identify frequencies on which the EUT was generating spurious emissions. This determined the frequencies from the EUT that 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 metres and a measurement distance of 3 metres, below 4 GHz; above 18 GHz a 1 metre measurement distance was used, above 26.5 GHz a 0.3 metre measurement distance was used. A limit line was set to the specification limit. Levels within 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and spectrum analyser with an average detector was used for final measurements.

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.

Once the final amplitude (maximised) had been obtained and noted, the EUT was replaced by a substitution antenna, and a substitution method applied. The substitution antennas used were a horn antenna for measurements greater than or equal to 1 GHz and a dipole for measurements below 1 GHz. 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:-

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

Once the EIRP was obtained, the difference between it and the level of the fundamental emission for the EUT was noted at the spurious attenuation level in dBc. The following formula was used as described in TIA\_EIA\_603B

$$\text{dB} = 10 \log_{10} \left( \frac{\text{TX power in watts}}{0.001} \right) - \text{spurious level (dBm)}$$

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

**Transmitter Radiated Emissions (Continued)**

The limit in the standard states that emissions shall be attenuated by not less than  $43 + 10 \log (P)$  dB at the channel edge and  $55 + 10 \log (P)$  dB at 5.5 MHz from the channel edges, where (P) is the maximum measured fundamental power in Watts for the channel under test. These calculations give absolute levels of -13 dBm and -25 dBm.

The frequency band described above was investigated with the transmitter operating at full power. Any spurious observed were then recorded and compared to the limit. The margin between emission and limit is recorded and should always be positive to indicate compliance.

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

---

### **Appendix 3. Test Configuration Drawings**

This Appendix contains the following drawing:

Drawing Reference Number	Title
DRG\72995JD01\EMIRAD	Test configuration for measurement of radiated emissions

Test Of: IPWireless (UK) Ltd  
2.5 GHz UE P1D Modem, Model: KF  
To: FCC Part 27: 2006 Subpart C

DRG\72995JD01\EMIRAD

