



**TEST REPORT  
FROM  
RFI GLOBAL SERVICES LTD**

Test of: IPWireless 700 MHz V5 Node B Model AFB/VT

To: FCC Part 90: 2008 Subpart R

**Test Report Serial No:**  
RFI/RPT2/RP75336JD01B

**Version 2 Supersedes the Previous Version**

<b>This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director:</b>		
<b>Checked By:</b>	Tony Henriques	
<b>Signature:</b>		
<b>Date of Issue:</b>	28 January 2010	

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**1. Customer Information**
















<b>Company Name:</b>	IPWireless (UK) Ltd.
<b>Address:</b>	Unit 7 Greenways Business Park Bellinger Close Chippenham SN15 1BN United Kingdom

## **2. Summary of Testing**

### **2.1. General Information**

<b>Specification Reference:</b>	47CFR90
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 90 Subpart R (Regulations Governing the Licensing and Use of Frequencies in the 763-775 and 793-805 MHz Bands)
<b>Site Registration:</b>	209735
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	29 September 2009 to 19 November 2009

## 2.2. Summary of Test Results

FCC Reference (47CFR )	Measurement	Port Type	Result
Part 15.207	Transmitter AC Conducted Emissions	AC Mains	
Part 90.542(a)(3)	Transmitter Effective Radiated Power (ERP)	Antenna Terminals	
Part 2.1049	Transmitter Occupied Bandwidth	Antenna Terminals	
Part 90.539(d)	Transmitter Frequency Stability (Temperature & Voltage Variation)	Antenna Terminals	
Part 90.210(n)	Transmitter Conducted Emissions Mask	Antenna Terminals	
Part 90.543(e)	Transmitter Conducted Emissions (Out of Band)	Antenna Terminals	
Part 90.543(e)	Transmitter Band Edge Conducted Emissions	Antenna Terminals	
Part 90.543(e)(1)	Transmitter Conducted Emissions (769 to 775 MHz and 799 to 805 MHz bands)	Antenna Terminals	
Part 90.543(f)	Transmitter Conducted Emissions (1559 MHz to 1610 MHz band)	Antenna Terminals	
Part 90.543(e)	Transmitter Radiated Emissions (Out of Band)	Enclosure	
Part 90.543(e)	Transmitter Band Edge Radiated Emissions	Enclosure	
Part 90.543(e)(1)	Transmitter Radiated Emissions (769 to 775 MHz and 799 to 805 MHz bands)	Enclosure	
Part 90.543(f)	Transmitter Radiated Emissions (1559 MHz to 1610 MHz band)	Enclosure	
<b>Key to Results</b>			
 = Complied  = Did not comply			

### **2.3. Methods and Procedures**

<b>Reference:</b>	ANSI/TIA-603-C-2004
<b>Title:</b>	Land Mobile Communications Equipment, Measurements and performance Standards
<b>Reference:</b>	ANSI C63.4 (2003)
<b>Title:</b>	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.

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

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

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

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

<b>Description:</b>	Radio Shelf
<b>Brand Name:</b>	IPWireless
<b>Model Name or Number:</b>	AFB
<b>Serial Number:</b>	AFJ938000111
<b>FCC ID Number:</b>	PKTNODEBAFB

<b>Description:</b>	Digital Shelf
<b>Brand Name:</b>	IPWireless
<b>Model Name or Number:</b>	VT
<b>Serial Number:</b>	W1J73700CJ16

<b>Description:</b>	Sector card 2 (part of VT digital shelf)
<b>Brand Name:</b>	IPWireless
<b>Model Name or Number:</b>	Sector card
<b>Serial Number:</b>	VU1J73700RV17

#### **3.2. Description of EUT**

The equipment under test was a W-CDMA Wireless Base Station comprising a radio shelf and a digital shelf intended for mounting into a 19" rack. Both shelves are connected together to create a Node B. The equipment utilizes Frequency Division Duplex technology.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.



**3.4. Additional Information Related to Testing**

<b>Power Supply Requirement:</b>	-48.0 V DC $\pm$ 15%	
<b>Type of Unit:</b>	FDD Wireless base station transceiver	
<b>Modulation Type:</b>	QPSK, 16QAM, 64QAM	
<b>Duty Cycle:</b>	100%	
<b>Antenna Ports:</b>	Two x 7/16 female (marked ANT 1 and ANT 2)	
<b>Antenna Gain:</b>	Up to +20 dBi (stated)	
<b>Chip Rate:</b>	3.84 Mcps	
<b>Channel Bandwidth:</b>	5.0 MHz	
<b>Transmit Operating Band :</b>	763 MHz to 768 MHz	
<b>Transmit Channel Tested:</b>	<b>Channel ID</b>	<b>Channel Frequency (MHz)</b>
	Single	765.4
<b>Receive Operating Band:</b>	793 MHz to 798 MHz	

### **3.5. Support Equipment**

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

<b>Description:</b>	DC Power supply
<b>Brand Name:</b>	Agilent
<b>Model Name or Number:</b>	E4356A
<b>Serial Number:</b>	MY41000617

<b>Description:</b>	Sector card 1 (part of VT digital shelf)
<b>Brand Name:</b>	IPWireless
<b>Model Name or Number:</b>	Sector card
<b>Serial Number:</b>	VU1J73700RQ17

<b>Description:</b>	Sector card 2 (part of VT digital shelf)
<b>Brand Name:</b>	IPWireless
<b>Model Name or Number:</b>	Sector card
<b>Serial Number:</b>	VU1J73700RV17

<b>Description:</b>	Sector card 3 (part of VT digital shelf)
<b>Brand Name:</b>	IPWireless
<b>Model Name or Number:</b>	Sector card
<b>Serial Number:</b>	VU1J73700RW17

<b>Description:</b>	30 dB RF attenuator
<b>Brand Name:</b>	NARDA
<b>Model Name or Number:</b>	776C-30
<b>Serial Number:</b>	522

<b>Description:</b>	Laptop PC
<b>Brand Name:</b>	Sony
<b>Model Name or Number:</b>	Vaio VGN-BX195VT
<b>Serial Number:</b>	None Stated

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating mode(s):

- Transmitting and receiving simultaneously.
- Constantly transmitting the maximum of 15 timeslots at full power (+40 dBm) with a chip rate of 3.84 Mcps.
- No tests were performed in receive/idle mode as the device is constantly transmitting.
- The customer configured the EUT so that residual carrier breakthrough was present at the centre of the carrier in order to make frequency measurements.

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

- The radio shelf and digital shelf connected together as required and powered from a bench DC power supply.
- Three sector cards were fitted to the digital shelf. Sector 2 card was connected to the radio shelf via the fibre optic cables. Sector 1 and 3 cards were not used during the testing and were only fitted in order to fill the card slots. This is a standard configuration of the EUT.
- The laptop PC was connected to the Ethernet port on the digital shelf by a CAT5 cable. A bespoke application on the laptop PC was used to configure the RF parameters of the EUT as required.
- RF Conducted emission tests - One RF port was connected to the measurement equipment using previously calibrated RF cables, filters and attenuators. The unused RF port was terminated with suitable loads or attenuators. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.  
AC Conducted emission tests – The client stated that they do not provide a power supply for use with the EUT, the choice is left to the end user. A -48V battery supply or -48V mains powered supply may be used, therefore AC conducted emissions tests were performed using a bench power supply. The EUT was connected to a suitable bench power supply powered from a 120 VAC 60 Hz mains supply via a LISN and the output set to 48 VDC. The power supply input was connected to the mains supply via a LISN and the output connected to the EUT. All active ports on the EUT were terminated and the client stated that un-terminated ports were either inoperative or disabled.
- RF Radiated emission/case radiation tests - Both RF ports were terminated with suitable loads or attenuators. The EUT was connected to a suitable bench power supply powered from a 120 VAC 60 Hz mains supply and the output set to 48 VDC. All active ports on the EUT were terminated and the Client stated that un-terminated ports were either inoperative or disabled.
- For conducted and radiated emissions out of band testing, preliminary checks were made on all three modulation schemes and the mode which exhibited the highest emissions profile (i.e. 64QAM) was scanned across the required measurement frequency range. Where an emission was detected final emission measurements were performed on all three modulation schemes.

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

### **5.1. General Comments**

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 6. Measurement Uncertainty* for details.

**5.2. Test Results****5.2.1. Transmitter AC Conducted Spurious Emissions****Test Summary:**

<b>FCC Part:</b>	15.207
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 7 and relevant annexes

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	35

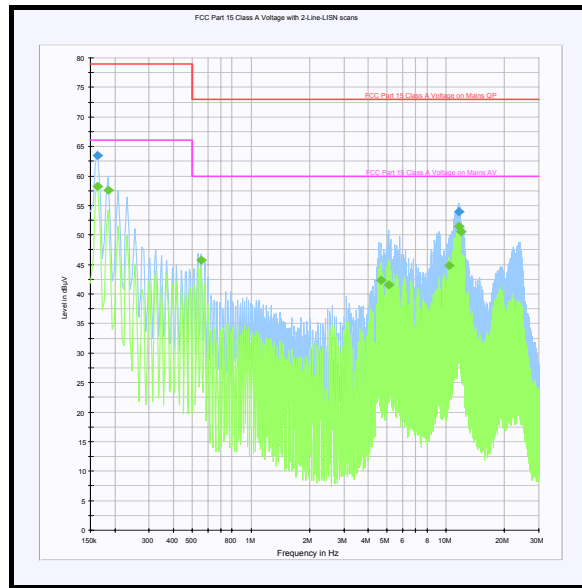
**Results: Quasi Peak Detector Measurements**

Frequency (MHz)	Line	Quasi Peak Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.163500	Live	63.4	79.0	15.6	Complied
11.692500	Live	54.0	73.0	19.0	Complied

**Results: Average Detector Measurements**

Frequency (MHz)	Line	Average Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.163500	Neutral	58.3	66.0	7.7	Complied
0.186000	Neutral	57.5	66.0	8.5	Complied
0.555000	Neutral	45.7	60.0	14.3	Complied
4.614000	Live	42.2	60.0	17.6	Complied
5.082000	Live	41.6	60.0	18.4	Complied
10.360500	Live	44.8	60.0	15.2	Complied
11.697000	Live	51.5	60.0	8.5	Complied
11.899500	Live	50.6	60.0	9.4	Complied

**Transmitter AC Conducted Spurious Emissions (continued)**



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

**5.2.2. Transmitter Effective Radiated Power (ERP)****Test Summary:**

<b>FCC Part:</b>	90.542(a)(3)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	35

**Results: Antenna Port 1**

Modulation	Frequency (MHz)	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
QPSK	765.4	38.9	20	58.9	60.0	1.1	Complied
16QAM	765.4	38.6	20	58.6	60.0	1.4	Complied
64QAM	765.4	38.7	20	58.7	60.0	1.3	Complied

**Results: Antenna Port 2**

Modulation	Frequency (MHz)	Conducted RF Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
QPSK	765.4	38.9	20	58.9	60.0	1.1	Complied
16QAM	765.4	38.9	20	58.9	60.0	1.1	Complied
64QAM	765.4	39.1	20	59.1	60.0	0.9	Complied

**Note(s):**

1. Measurements were performed with the EUT transmitting on all supported modulation types on both Antenna Port 1 and Antenna Port 2.

**5.2.3. Transmitter Occupied Bandwidth****Test Summary:**

<b>FCC Part:</b>	2.1049
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes referencing FCC Part 2.1049 (see note below)

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	35

**Results: Antenna Port 1**

Modulation	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
QPSK	765.4	100	300	4.118
16QAM	765.4	100	300	4.118
64QAM	765.4	100	300	4.118

**Results: Antenna Port 2**

Modulation	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
QPSK	765.4	100	300	4.118
16QAM	765.4	100	300	4.118
64QAM	765.4	100	300	4.118

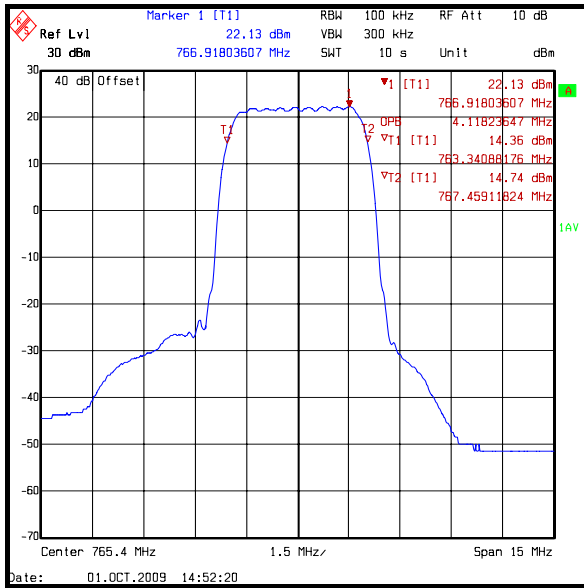
**Note(s):**

1. In lieu of the test method detailed in ANSI C63.4 Section 13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.
2. Measurements were performed with the EUT transmitting on all supported modulation types on both Antenna Port 1 and Antenna Port 2.

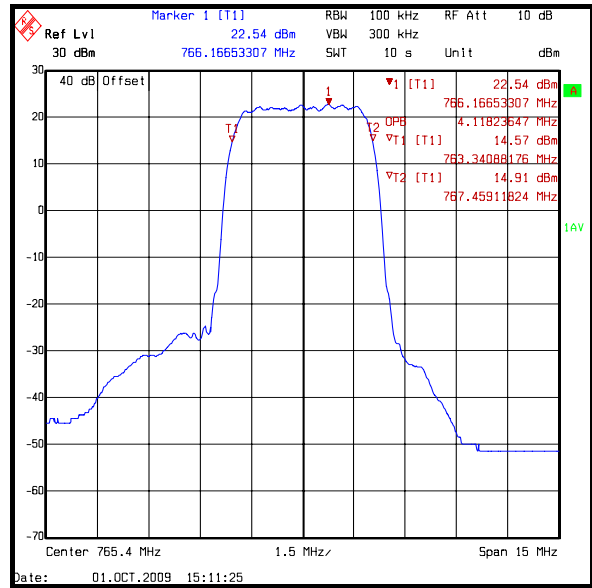


**Transmitter Occupied Bandwidth (continued)**

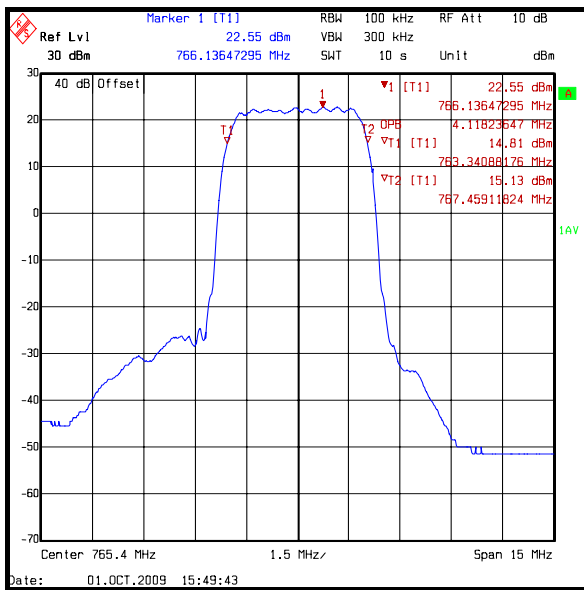
**Antenna Port 1**



**QPSK**



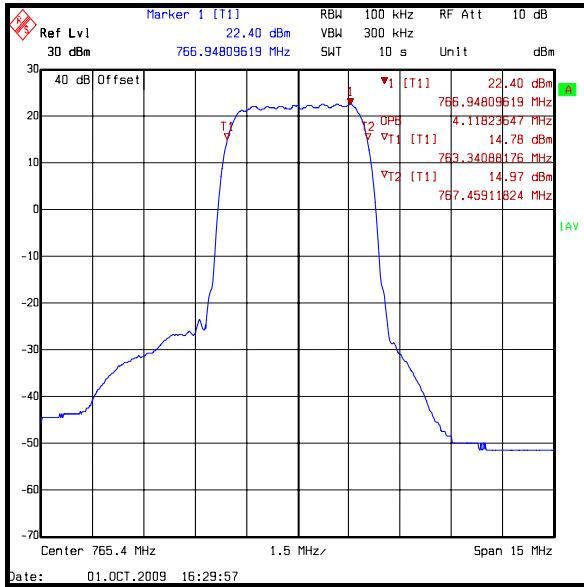
**16QAM**



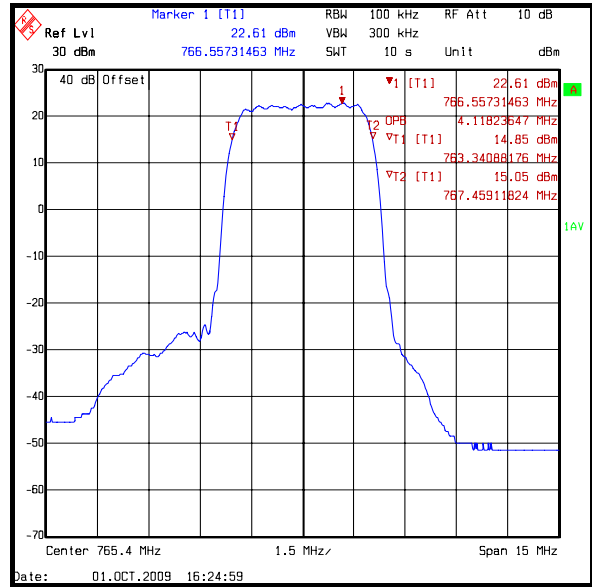
**64QAM**

### Transmitter Occupied Bandwidth (continued)

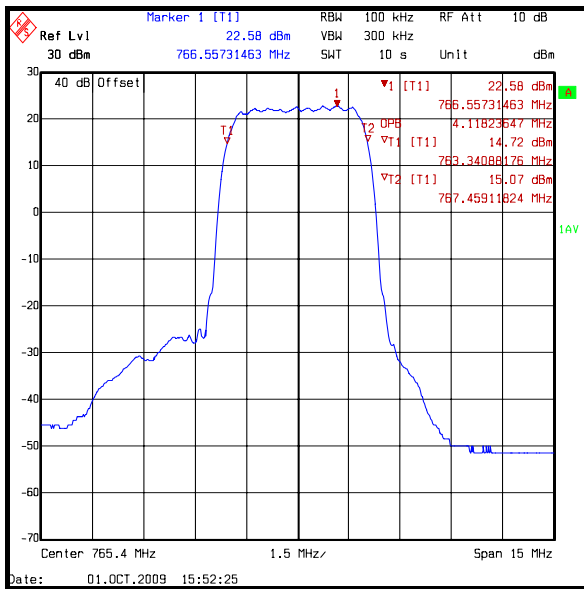
#### Antenna Port 2



QPSK



16QAM



64QAM

**5.2.4. Transmitter Frequency Stability - Temperature Variation****Test Summary:**

<b>FCC Part:</b>	90.539(d)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC Part 2.1055

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	43

**Results: Port 2**

Temp (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin
-30	765.399791	209	0.27	1.0	0.73
-20	765.399794	206	0.27	1.0	0.73
-10	765.399796	204	0.27	1.0	0.73
0	765.399798	202	0.26	1.0	0.74
10	765.399802	198	0.26	1.0	0.74
20	765.399802	198	0.26	1.0	0.74
30	765.399805	195	0.26	1.0	0.74
40	765.399810	190	0.25	1.0	0.75
50	765.399817	183	0.24	1.0	0.76

**Note(s):**

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

**5.2.5. Transmitter Frequency Stability - Voltage Variation****Test Summary:**

<b>FCC Part:</b>	90.539(d)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC Part 2.1055

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	43

**Results: Port 2**

<b>Supply Voltage (°C)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Error (Hz)</b>	<b>Frequency Error (ppm)</b>	<b>Limit (ppm)</b>	<b>Margin</b>
-40.8	765.399801	199	0.26	1.0	0.74
-48.0	765.399802	198	0.26	1.0	0.74
-55.2	765.399801	199	0.26	1.0	0.74

**Note(s):**

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

**5.2.6. Transmitter Conducted Emissions Mask**

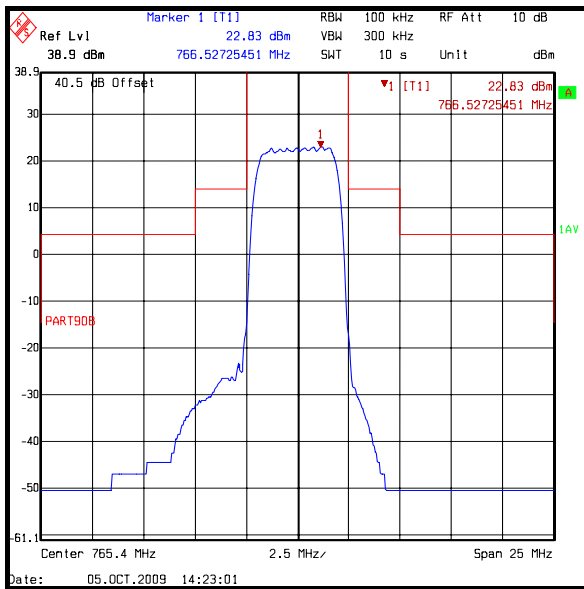
**Test Summary:**

<b>FCC Part:</b>	90.210(n) referencing Emissions Mask B as specified in 90.210(b)
<b>Test Method Used</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC Part 2.1051

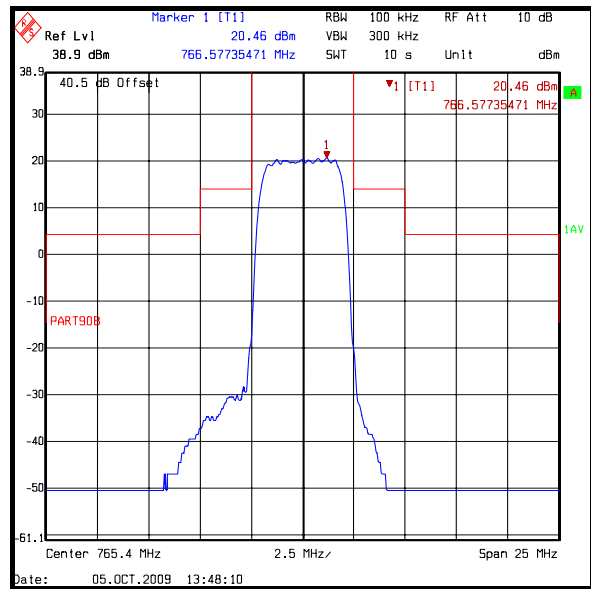
**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	31

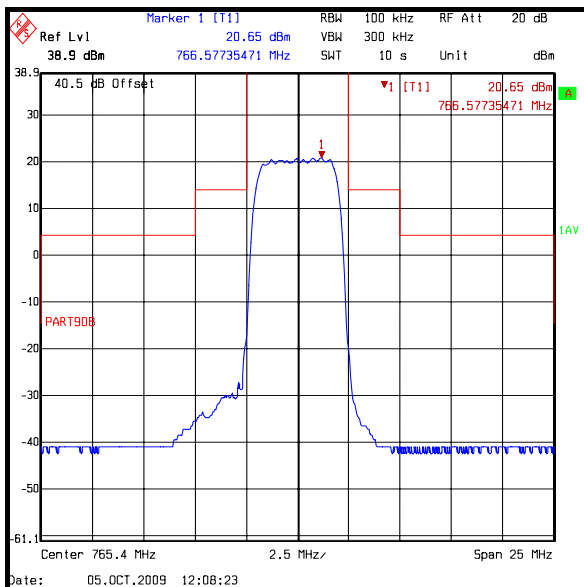
**Results: Port 2**



**QPSK**



**16QAM**



**64QAM**

**Transmitter Conducted Emissions Mask (continued)****Note(s):**

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.
2. It was not possible to supply an unmodulated carrier at maximum peak power due to the design of the EUT therefore the mask was relative to the modulated maximum conducted carrier power measured.

**5.2.7. Transmitter Conducted Emissions (Out of Band)****Test Summary:**

<b>FCC Part:</b>	90.543(e)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC Part 2.1051
<b>Frequency Range:</b>	9 kHz to 12.75 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	23

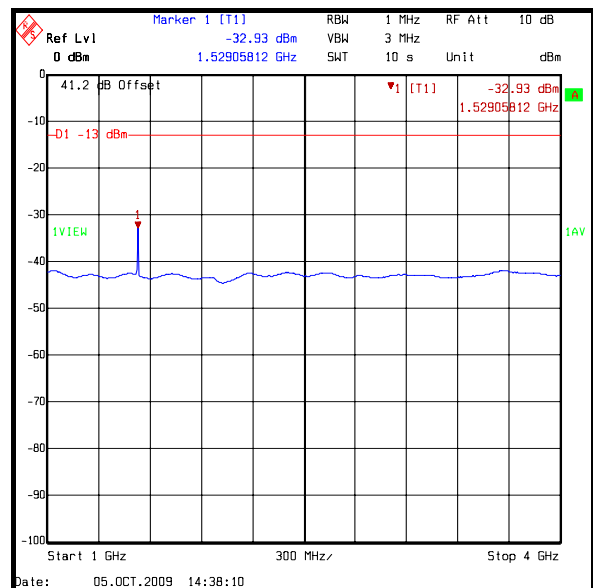
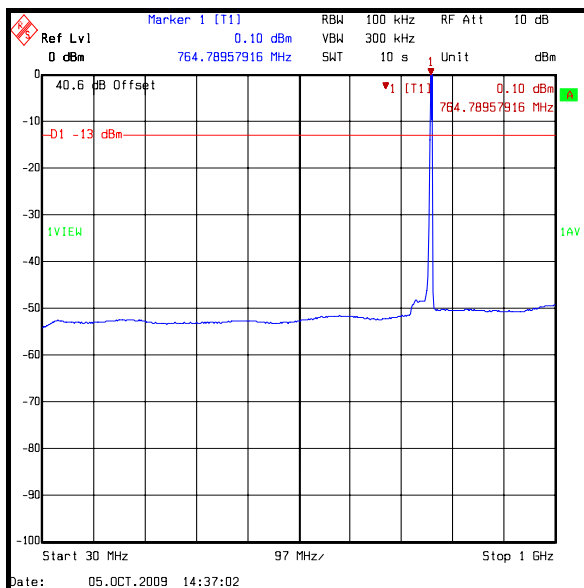
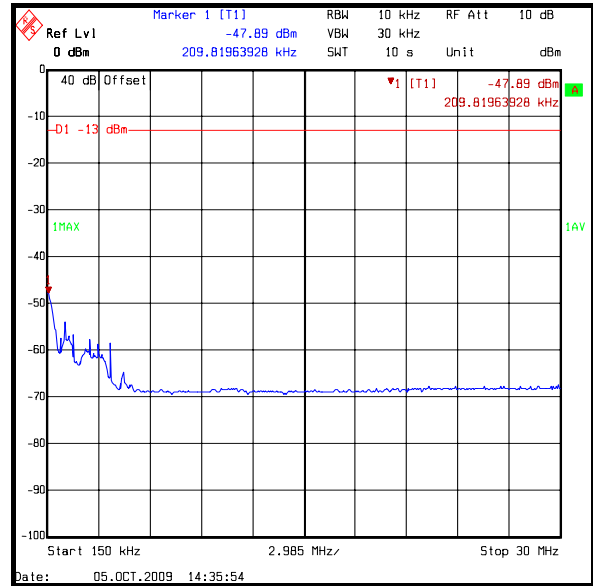
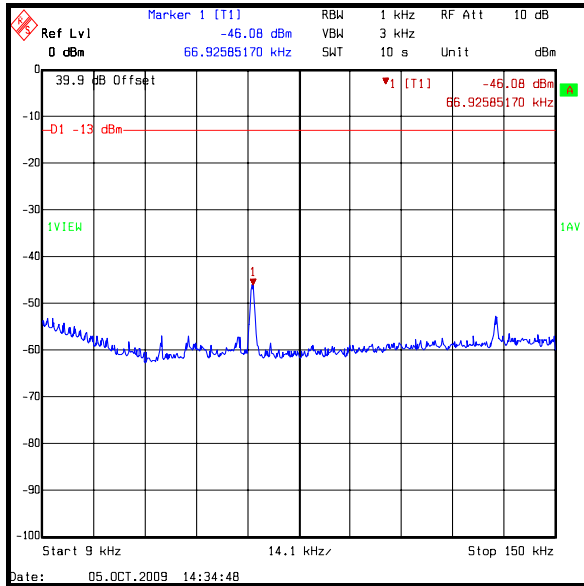
**Results: Port 2**

<b>Modulation</b>	<b>Frequency (MHz)</b>	<b>Emission Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
QPSK	1667.335	-34.2	-13.0	21.2	Complied
16QAM	1666.735	-34.9	-13.0	21.9	Complied
64QAM	1667.145	-33.9	-13.0	20.9	Complied

**Note(s):**

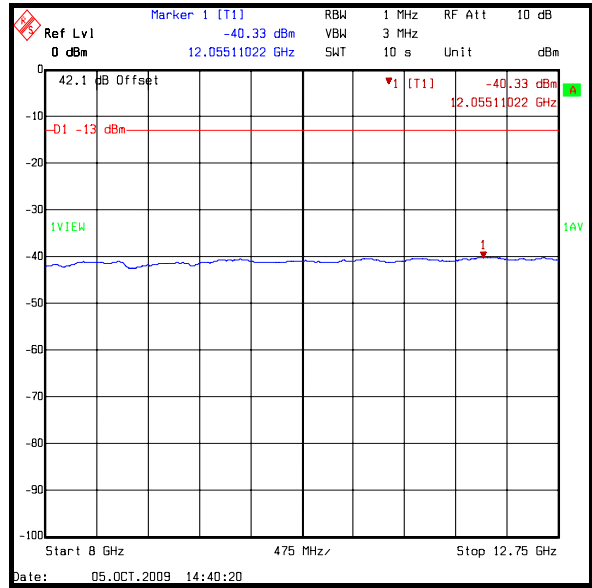
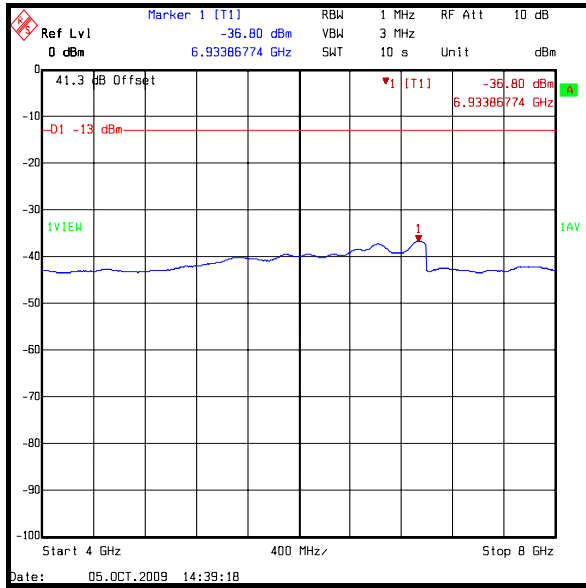
1. The emissions shown at approximately 764.790 MHz on the 30 MHz to 1 GHz plot is the carrier
2. All other emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.
3. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

**Transmitter Conducted Emissions (Out of Band) (continued)**





**Transmitter Conducted Emissions (Out of Band) (continued)**



**5.2.8. Transmitter Band Edge Conducted Emissions**

**Test Summary:**

<b>FCC Part:</b>	90.543(e)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC Part 2.1051

**Environmental Conditions:**

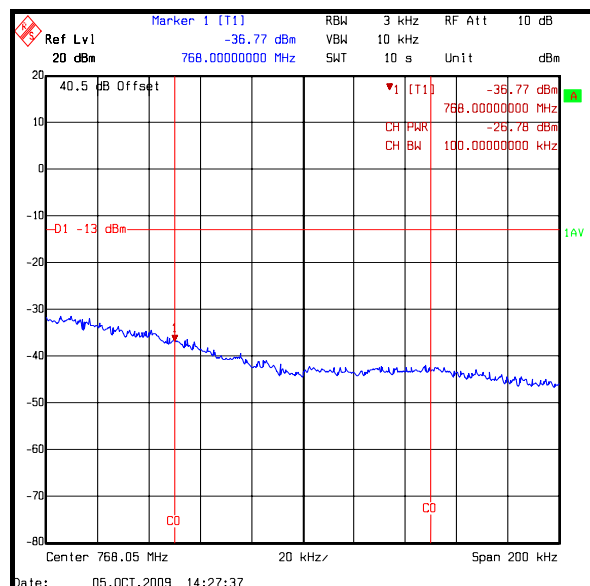
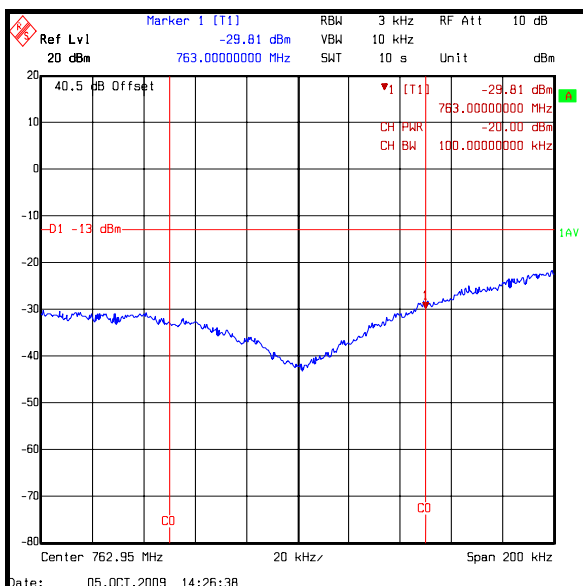
<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	37

**Results:**

Modulation	Frequency of 100 kHz strip adjacent to block edge (MHz)	Level in 100 kHz strip adjacent to block edge (dBm)	Band edge limit (dBm)	Margin (dB)	Result
QPSK	763	-20.0	-13.0	7.0	Complied
QPSK	768	-26.8	-13.0	13.8	Complied
16QAM	763	-22.6	-13.0	9.6	Complied
16QAM	768	-29.4	-13.0	16.4	Complied
64QAM	763	-22.6	-13.0	9.6	Complied
64QAM	768	-29.3	-13.0	16.3	Complied

**Note(s):**

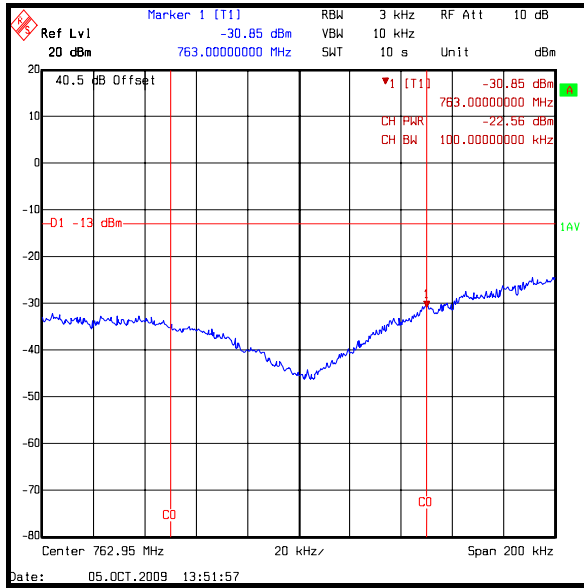
1. Measured using the channel power function of the spectrum analyser (channel bandwidth of 100 kHz).
2. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.



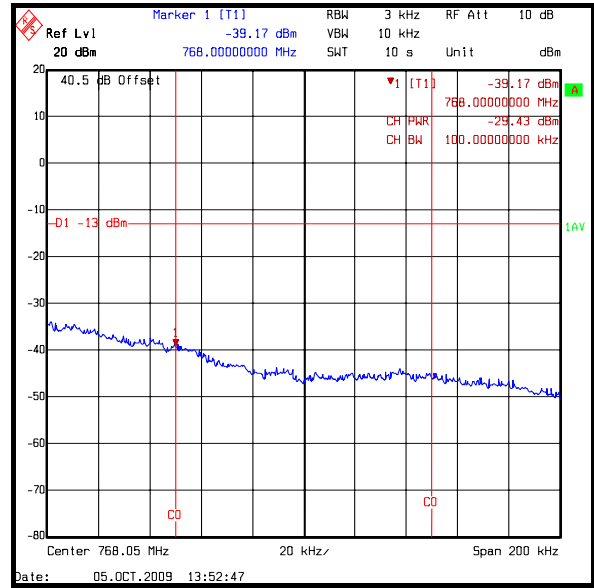
**QPSK – Lower Band Edge**

**QPSK – Upper Band Edge**

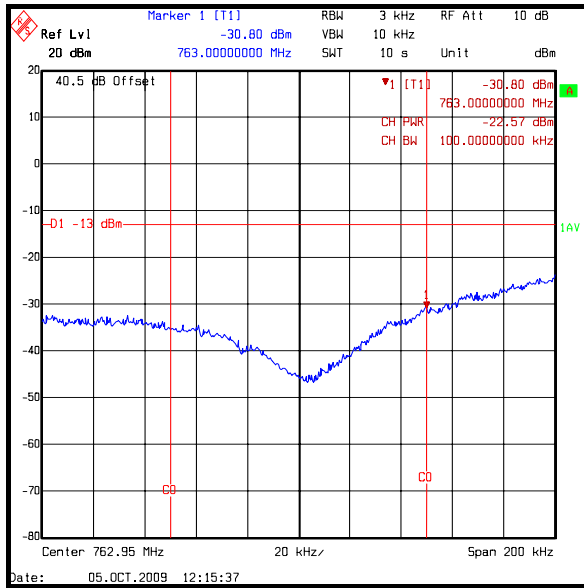
**Transmitter Band Edge Conducted Emissions (continued)**



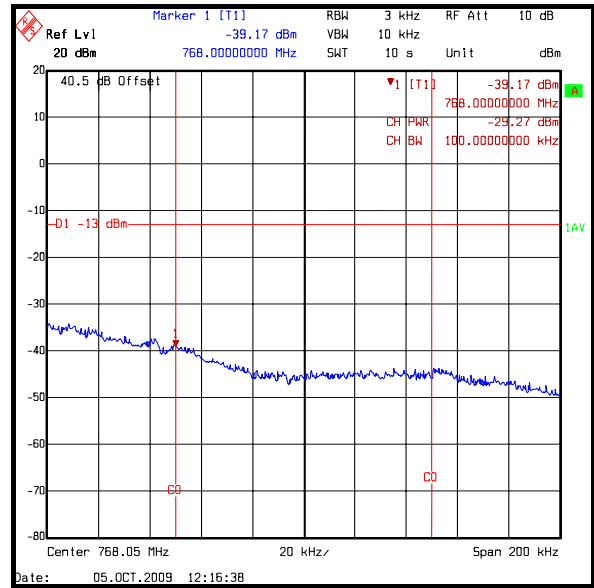
**16QAM – Lower Band Edge**



**16QAM – Upper Band Edge**



**64QAM – Lower Band Edge**



**64QAM – Upper Band Edge**

**5.3. Transmitter Conducted Emissions (769 MHz to 775 MHz and 799 MHz to 805 MHz bands)****Test Summary:**

<b>FCC Part:</b>	90.543(e)(1)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC Part 2.1051
<b>Frequency Range:</b>	769 MHz to 805 MHz (includes bands 769 MHz to 775 MHz and 799 MHz to 805 MHz)

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	33

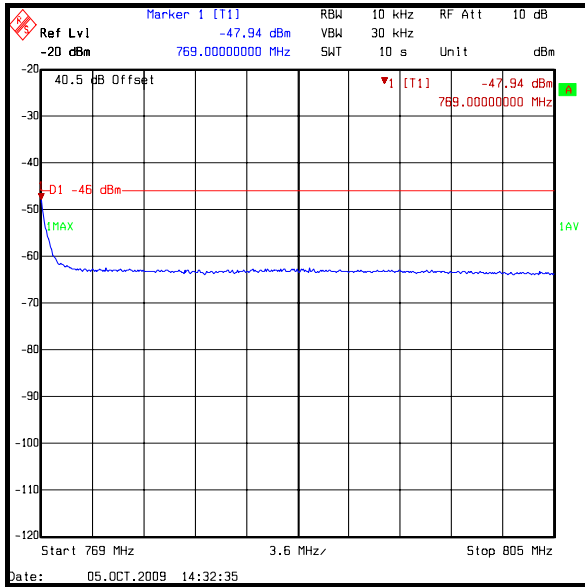
**Results: Port 2**

<b>Modulation</b>	<b>Frequency (MHz)</b>	<b>Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
QPSK	769.0	-47.9	-46.0	1.9	Complied
16QAM	769.0	-51.0	-46.0	5.0	Complied
64QAM	769.0	-51.2	-46.0	5.2	Complied

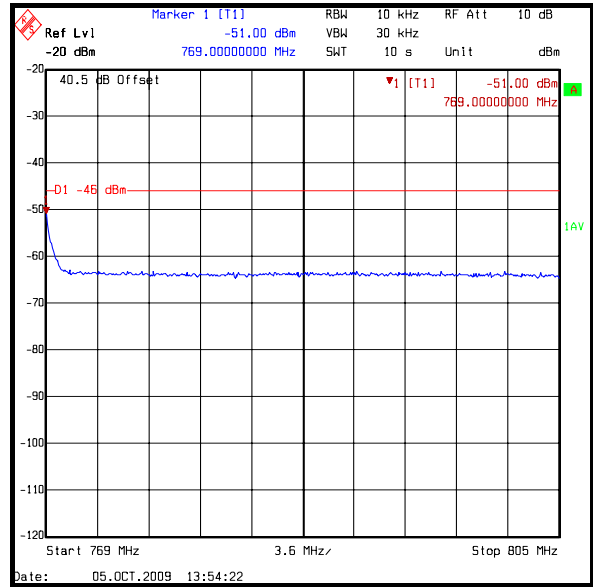
**Note(s):**

1. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

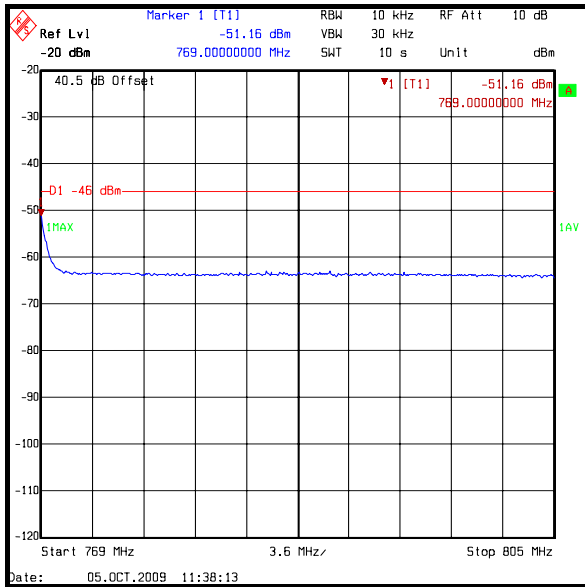
**Transmitter Conducted Emissions (769 MHz to 775 MHz and 799 MHz to 805 MHz bands)  
(continued)**



**QPSK**



**16QAM**



**64QAM**

**5.4. Transmitter Conducted Emissions (1559 MHz to 1610 MHz band) (continued)****Test Summary:**

<b>FCC Part:</b>	90.543(f)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.13 referencing FCC Part 2.1051
<b>Frequency Range:</b>	1559 MHz to 1610 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	33

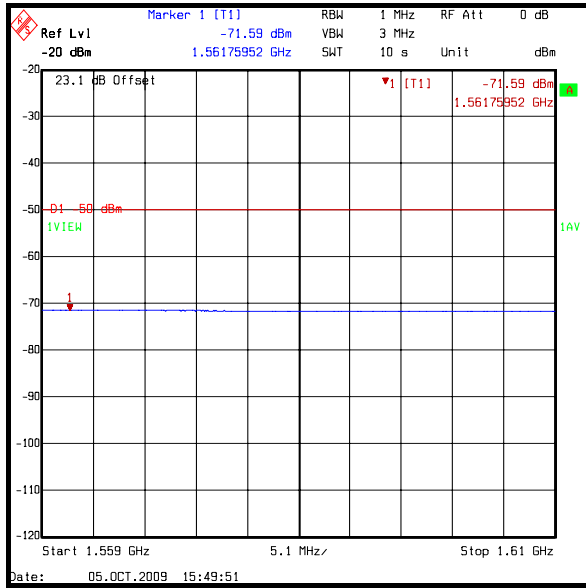
**Results: Port 2**

<b>Modulation</b>	<b>Frequency (MHz)</b>	<b>Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
QPSK	1561.760	-71.6	-50.0	21.6	Complied
16QAM	1560.533	-71.6	-50.0	21.6	Complied
64QAM	1559.000	-71.7	-50.0	21.7	Complied

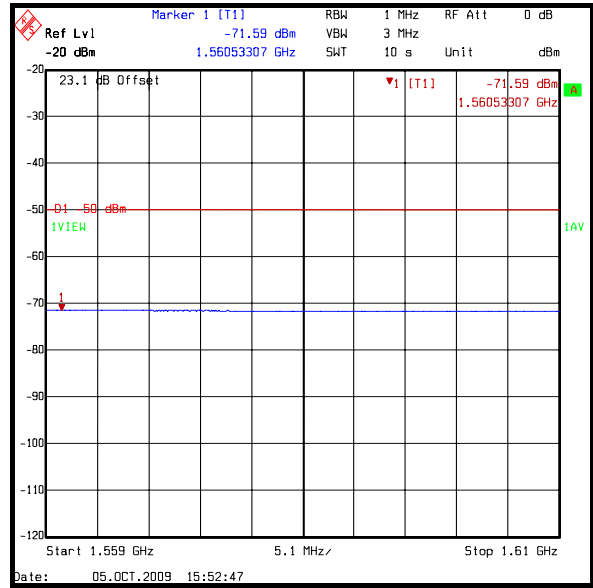
**Note(s):**

1. -80 dBW/MHz  $\equiv$  -50 dBm in a 1 MHz measurement bandwidth
2. No emissions were detected above the level of the noise floor of the measuring receiver.
3. Preliminary testing was performed on both antenna ports with the worse case port being selected for measurements.

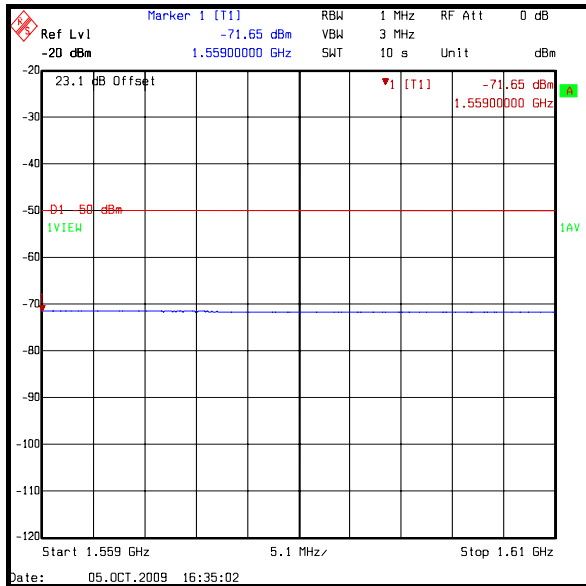
**Transmitter Conducted Emissions (1559 MHz to 1610 MHz band) (continued)**



**QPSK**



**16QAM**



**64QAM**



**5.4.1. Transmitter Radiated Emissions (Out of Band)****Test Summary:**

<b>FCC Part:</b>	90.543(e)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053
<b>Frequency Range:</b>	30 MHz to 12.75 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	33

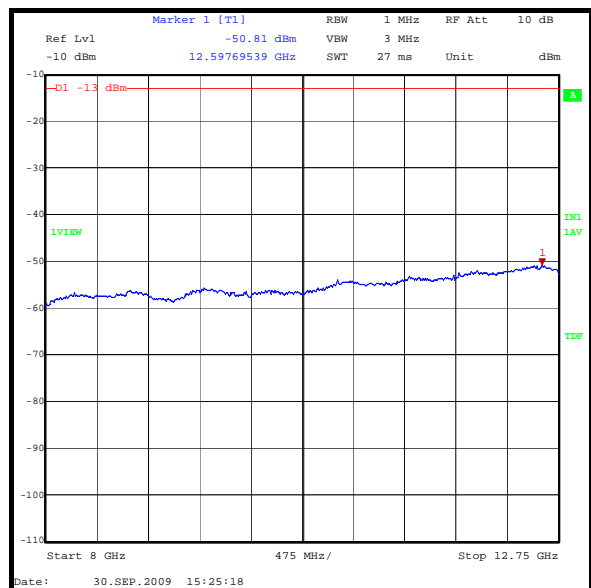
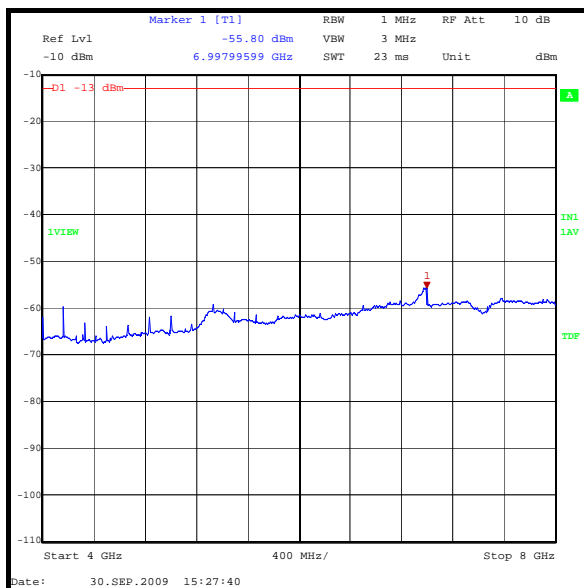
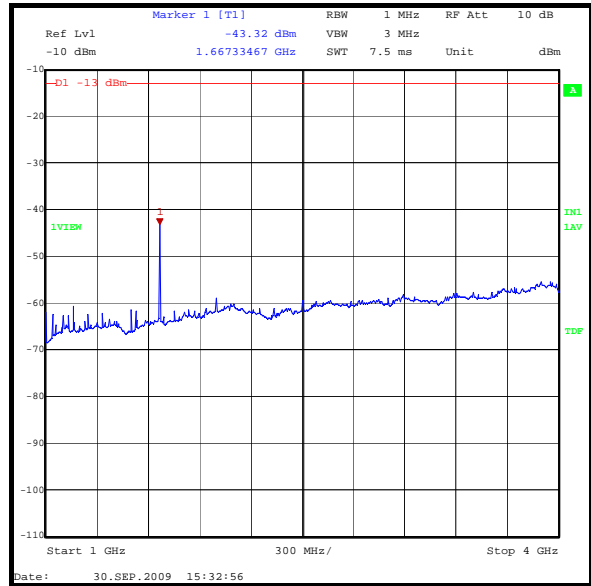
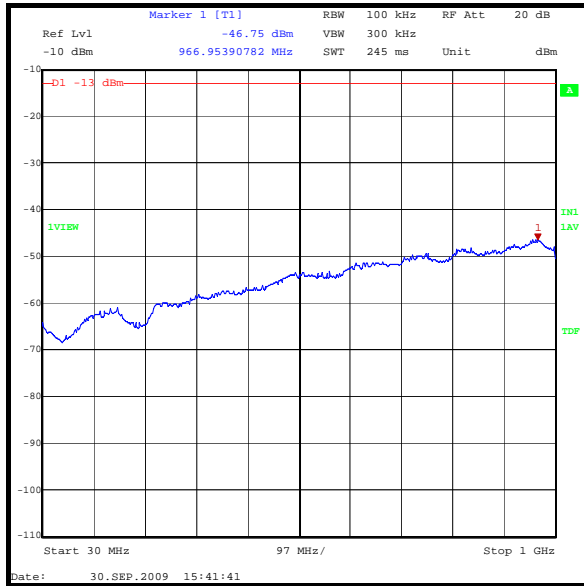
**Results:**

<b>Modulation</b>	<b>Frequency (MHz)</b>	<b>Emission Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
QPSK	1667.335	-34.2	-13.0	21.2	Complied
16QAM	1667.735	-34.9	-13.0	21.9	Complied
64QAM	1667.145	-33.9	-13.0	20.9	Complied

**Note(s):**

1. The carrier and all other emissions were >20 dB below the applicable limit or below the level of the noise floor of the measuring receiver.

**Transmitter Radiated Emissions (Out of Band) (continued)**



**5.4.2. Transmitter Band Edge Radiated Emissions**

**Test Summary:**

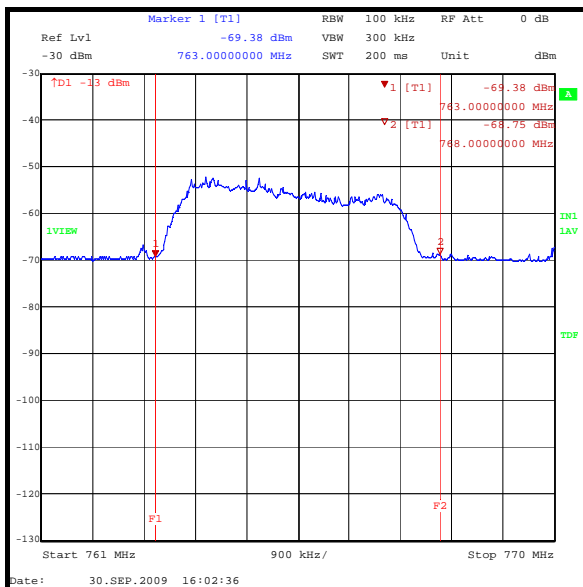
<b>FCC Part:</b>	90.543(e)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053

**Environmental Conditions:**

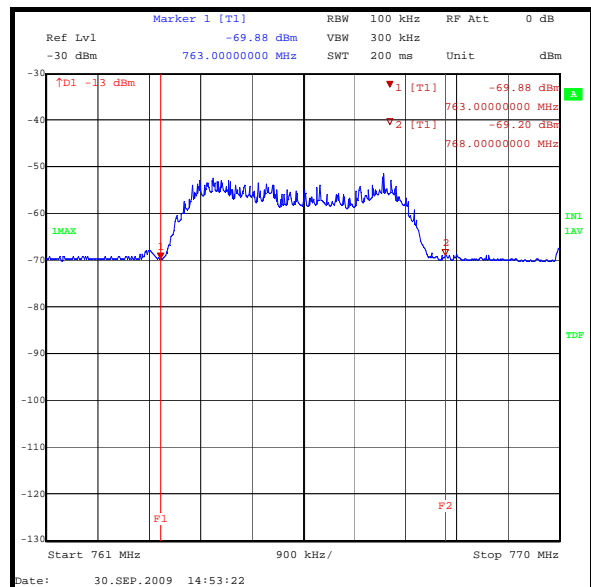
<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	33

**Results:**

Modulation	Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
QPSK	763.0	-69.4	-13.0	56.4	Complied
QPSK	768.0	-68.8	-13.0	55.8	Complied
16QAM	763.0	-69.9	-13.0	56.9	Complied
16QAM	768.0	-69.2	-13.0	56.2	Complied
64QAM	763.0	-69.4	-13.0	56.4	Complied
64QAM	768.0	-68.3	-13.0	55.3	Complied

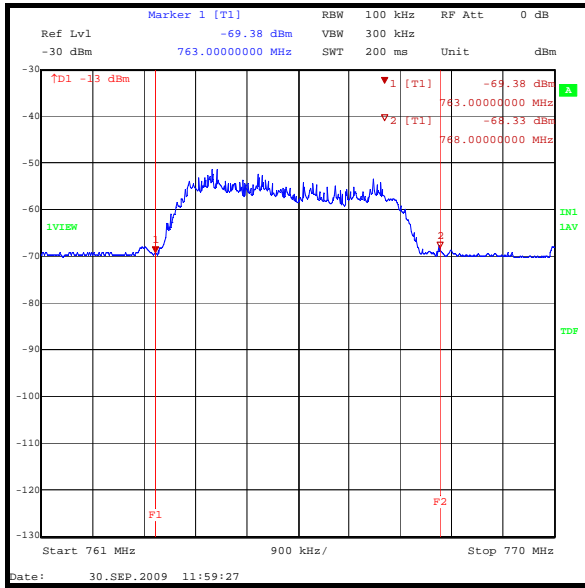


**QPSK**



**16QAM**

**Transmitter Band Edge Radiated Emissions (continued)**



**64QAM**

**5.4.3. Transmitter Radiated Emissions (769 MHz to 775 MHz and 799 MHz to 805 MHz bands)****Test Summary:**

<b>FCC Part:</b>	90.543(e)(1)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053
<b>Frequency Ranges:</b>	769 MHz to 805 MHz (includes bands 769 MHz to 775 MHz and 799 MHz to 805 MHz)

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	33

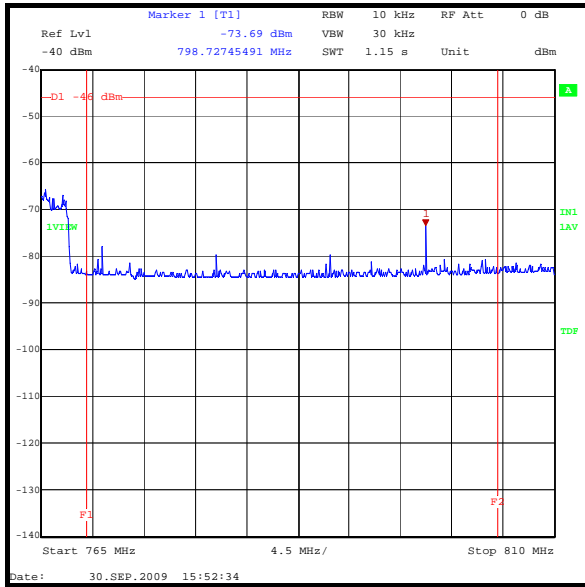
**Results:**

<b>Modulation</b>	<b>Frequency (MHz)</b>	<b>Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
QPSK			Note 1		
16QAM			Note 1		
64QAM			Note 1		

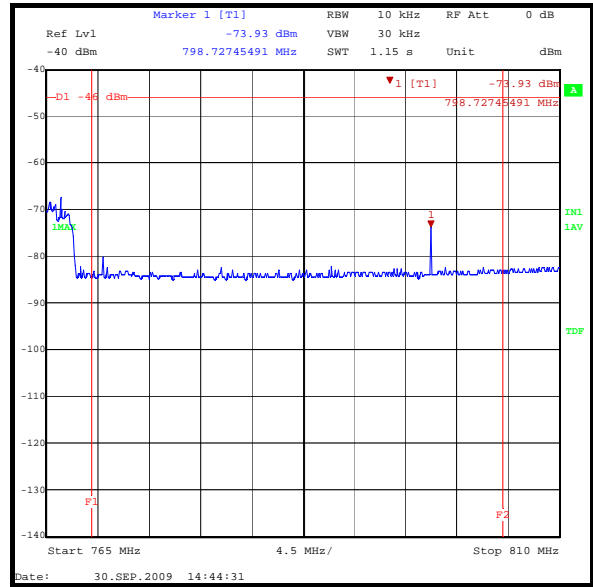
**Note(s):**

1. No emissions were detected were detected within 20 dB of the limit in the bands 769 MHz to 775 MHz and 799 MHz to 805 MHz.

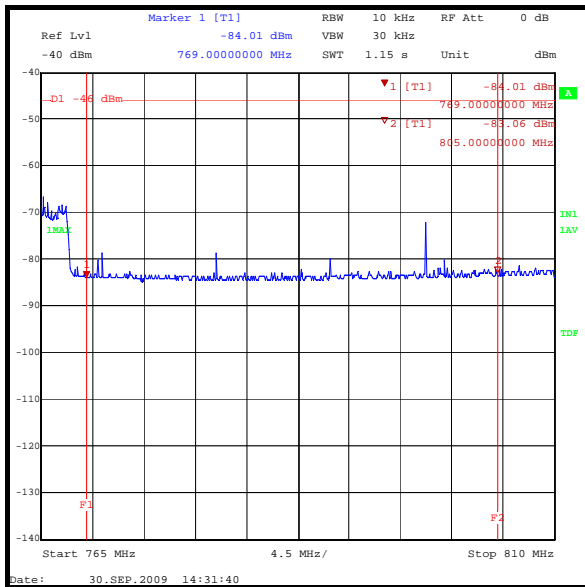
**Transmitter Radiated Emissions (769 MHz to 775 MHz and 799 MHz to 805 MHz bands)  
(continued)**



**QPSK**



**16QAM**



**64QAM**

**5.4.4. Transmitter Radiated Emissions (1559 MHz to 1610 MHz band)****Test Summary:**

<b>FCC Part:</b>	90.543(f)
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12. referencing FCC Part 2.1053
<b>Frequency Ranges:</b>	1559 MHz to 1610 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	33

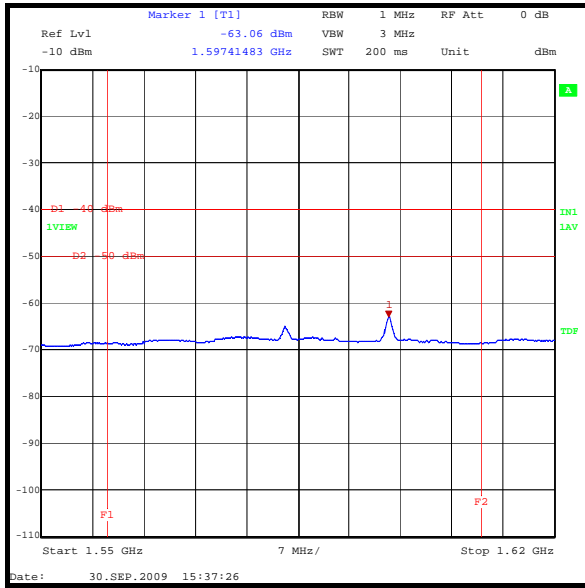
**Results:**

<b>Modulation</b>	<b>Frequency (MHz)</b>	<b>Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
QPSK	1597.415	-63.1	-50.0	13.1	Complied
16QAM	1597.555	-61.9	-50.0	11.9	Complied
64QAM	1597.555	-61.5	-50.0	11.5	Complied

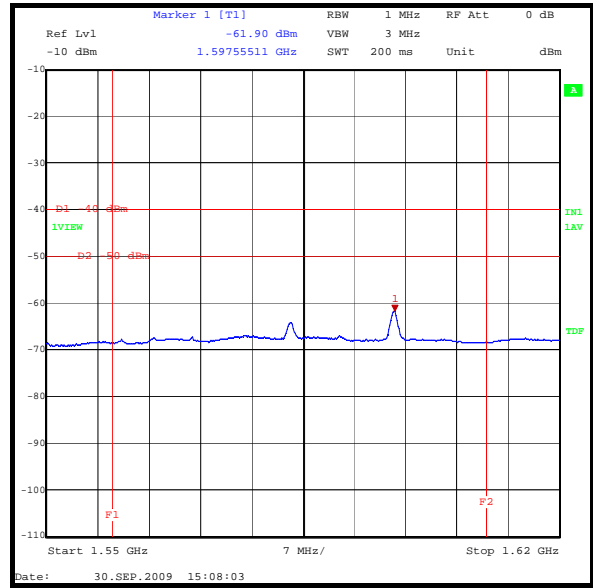
**Note(s):**

1. -80 dBW/MHz  $\equiv$  -50 dBm in a 1 MHz measurement bandwidth

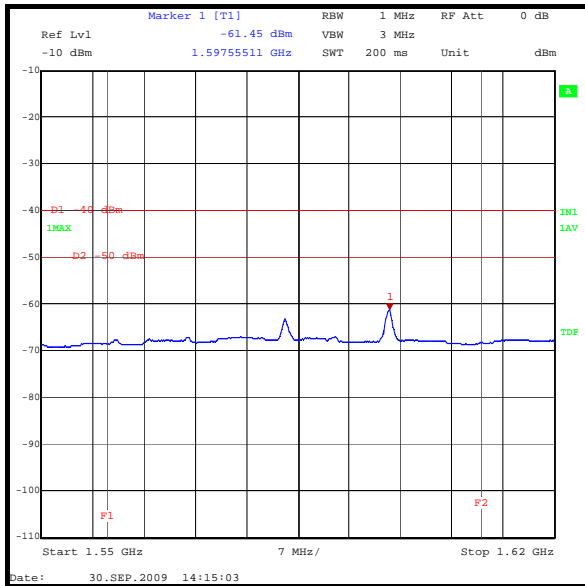
**Transmitter Radiated Emissions (1559 MHz to 1610 MHz band) (continued)**



**QPSK**



**16QAM**



**64QAM**



## **6. 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>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	95%	+/- 3.25 dB
Maximum Output Power	95%	±0.27 dB
Occupied Bandwidth	95%	±0.92 ppm
Frequency Stability	95%	±0.92 ppm
Conducted Emissions - Antenna Port	95%	±2.62 dB
Radiated Emissions	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.

## Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1399	Attenuator	Weinschel	WA46-10	A126	Calibrated before use	-
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	27 Nov 2009	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	05 Jan 2009	12
A188	High Pass Filter	Aerial Facilities	TF179- 2/50N	473 813	Calibrated before use	-
A288	Antenna	Chase	CBL6111A	1589	13 Mar 2009	12
E0516	Environmental Chamber	TAS	LT1000	23880706	Calibrated before use	12
K0001	5m SA Chamber	Rainford EMC	N/A	N/A	04 May 2009	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 Sep 2009	12
M1068	Thermometer	Iso-Tech	RS55	93102884	09 Jul 2009	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	09 Dec 2008	12
M1252	Signal Generator	HP	83640A	3119A00489	Calibrated before use	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	22 Apr 2009	12
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	14 May 2009	12

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