

**TEST REPORT  
FROM  
RFI GLOBAL SERVICES LTD**

Test of: LCD Reader / 380-127

To: FCC Part 15.247: 2008 Subpart C

**Test Report Serial No:**  
RFI/RPT1/RP75386JD05A

<b>This Test Report Is Issued Under The Authority Of Brian Watson, Operations Director:</b>	pp <i>R. Graham</i>
<b>Checked By:</b>	R. Graham
<b>Signature:</b>	<i>R. Graham</i>
<b>Date of Issue:</b>	16 July 2009

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**1. Customer Information**












<b>Company Name:</b>	Paxton Access Ltd
<b>Address:</b>	Paxton House Home Farm Brighton Sussex BN1 9HU United Kingdom

## **2. Summary of Testing**

### **2.1. General Information**

<b>Specification Reference:</b>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart C (Radio Frequency Devices) - Section 15.247
<b>Specification Reference:</b>	47CFR15.107 and 47CFR15.109
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2008: Part 15 Subpart B (Radio Frequency Devices) - Sections 15.107 and 15.109
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	24 June 2009 to 15 July 2009

## 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Port Type	Result
Part 15.107	Idle Mode AC Conducted Emissions	AC Mains	
Part 15.109	Idle Mode Radiated Spurious Emissions	Antenna	
Part 15.207	Transmitter AC Conducted Emissions	AC Mains	
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	Antenna	
Part 2.1049	Transmitter 20 dB Bandwidth	Antenna	
Part 15.247(e)	Transmitter Peak Power Spectral Density	Antenna	
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power (EIRP)	Antenna	
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	Antenna	
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	Antenna	
<b>Key to Results</b>			
 = Complied  = Did not comply			

## 2.3. Methods and Procedures

<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.
<b>Reference:</b>	DA00-705 (2000)
<b>Title:</b>	Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

## 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>Brand Name:</b>	LCD Reader
<b>Model Name or Number:</b>	380-127
<b>Serial Number:</b>	None Stated
<b>Hardware Version Number:</b>	z-lc01 Rev. 11, ppc-lcd Rev. H
<b>Software Version Number:</b>	None Stated
<b>FCC ID Number:</b>	USE380127

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

The equipment under test was a proximity reader with a TFT display, built into the unit. It has functionality for reading tokens with 125KHz carrier frequencies. The reader also has a wireless 2.4 GHz connection that conforms to the IEEE 802.15.4 standard. The wireless connection is used to remotely download images from the USB dongle.

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

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing**

<b>Tested Technology:</b>	2.4 GHz (IEEE 802.15.4 standard)	
<b>Power Supply Requirement:</b>	12 V DC	
<b>Type of Unit:</b>	Transceiver	
<b>Modulation Type:</b>	DSSS	
<b>Transmit Frequency Range:</b>	2405 MHz	
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Frequency (MHz)</b>
	Single	2405
<b>Receive Frequency Range:</b>	2405 MHz	
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Frequency (MHz)</b>
	Single	2405
<b>Maximum Peak Power Output (EIRP)</b>	-8.3 dBm	

**3.5. Support Equipment**

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

<b>Description:</b>	Net2 1 door ACU with 2A PSU
<b>Brand Name:</b>	Paxton Access
<b>Model Name or Number:</b>	411-381
<b>Serial Number:</b>	Not stated



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

### **4.1. Operating Modes**

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

- All transmit mode tests were performed on a sample which had only one mode of operation (Load Modulation) and was continuously transmitting.
- All idle mode tests were performed on a separate second sample provided by the client with the transmitter switched off.

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

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

- Connected via a 5 meter multicore cable to a Net2 ACU reader port contained inside a 2A PSU cabinet. The ACU was powered by the same power supply. The input to the 2A PSU was connected to a 120 VAC 60 Hz supply.
- AC conducted emissions were performed with the EUT connected to the Net2 ACU and the Net2 ACU mains cable connected to a LISN. The LISN was connected to a 120 V AC 60 Hz mains supply.

## **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. Idle Mode AC Conducted Spurious Emissions****Test Summary:**

<b>FCC Part:</b>	15.107(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 7 and relevant annexes

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	32

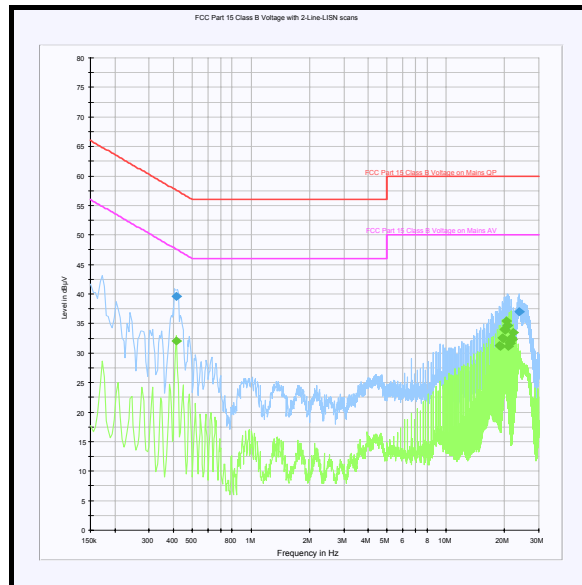
**Results: Quasi Peak Detector Measurements**

Frequency (MHz)	Line	Quasi Peak Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.415500	Neutral	39.6	57.5	17.9	Complied
20.751000	Neutral	34.6	60.0	25.4	Complied
23.748000	Neutral	37.0	60.0	23.0	Complied

**Results: Average Detector Measurements**

Frequency (MHz)	Line	Average Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.415500	Neutral	32.1	47.5	15.4	Complied
18.874500	Live	31.2	50.0	18.8	Complied
19.000500	Live	31.2	50.0	18.8	Complied
19.500000	Live	32.6	50.0	17.4	Complied
19.752000	Live	32.4	50.0	17.6	Complied
19.999500	Neutral	33.9	50.0	16.1	Complied
20.251500	Neutral	33.9	50.0	16.1	Complied
20.499000	Neutral	35.5	50.0	14.5	Complied
20.751000	Neutral	34.7	50.0	15.3	Complied
20.998500	Neutral	31.1	50.0	18.9	Complied
21.250500	Neutral	31.8	50.0	18.2	Complied
21.498000	Neutral	31.7	50.0	18.3	Complied
21.750000	Neutral	32.6	50.0	17.4	Complied
22.002000	Neutral	32.3	50.0	17.7	Complied
22.249500	Neutral	33.4	50.0	16.6	Complied

**Idle Mode 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. Idle Mode Radiated Spurious Emissions**

**Test Summary:**

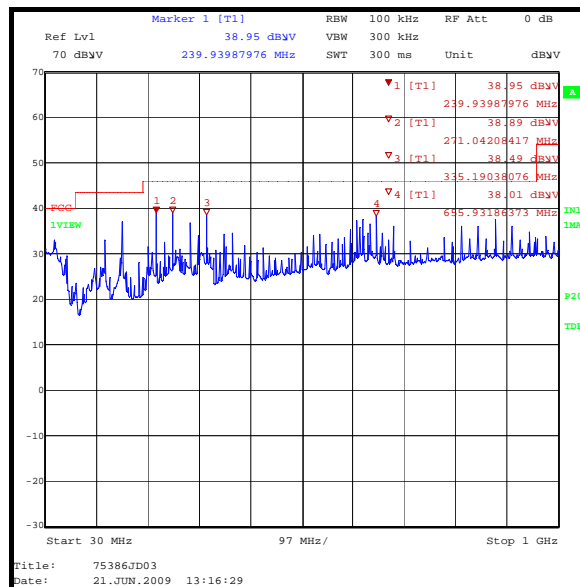
<b>FCC Part:</b>	15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes
<b>Frequency Range:</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	31

**Results:**

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
143.973	Vertical	33.3	43.5	10.2	Complied
175.993	Vertical	36.3	43.5	7.2	Complied
239.964	Vertical	40.6	46.0	5.4	Complied
271.969	Vertical	38.0	46.0	8.0	Complied
335.965	Vertical	38.6	46.0	7.4	Complied
619.169	Vertical	39.3	46.0	6.7	Complied
655.971	Vertical	39.6	46.0	6.4	Complied



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

**Idle Mode Radiated Spurious Emissions (continued)****Test Summary:**

<b>FCC Part:</b>	15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes
<b>Frequency Range:</b>	1 GHz to 12.75 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	31

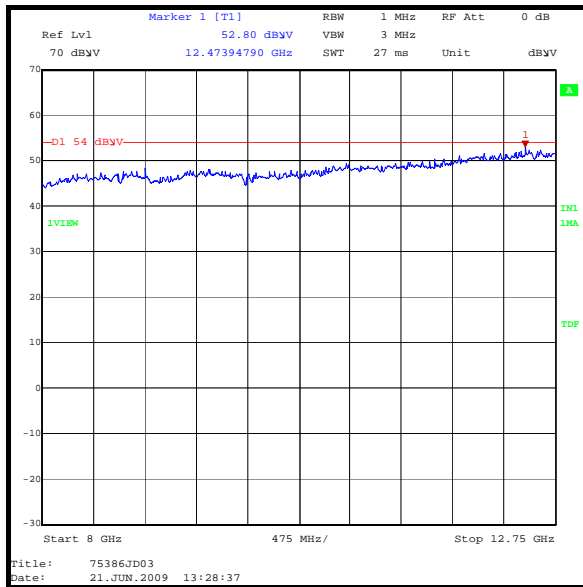
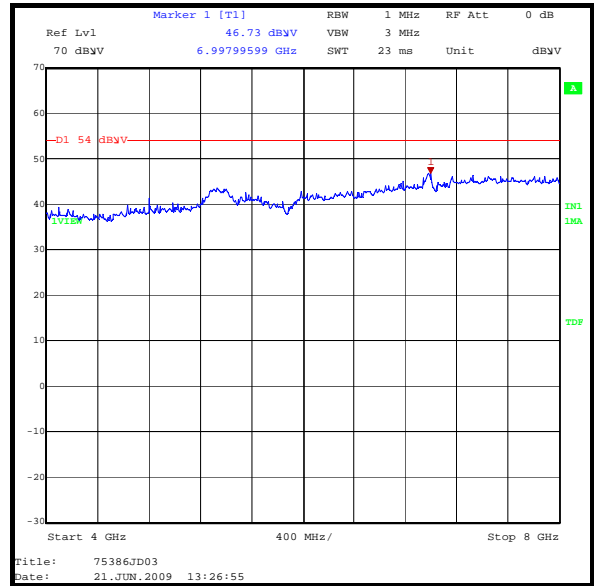
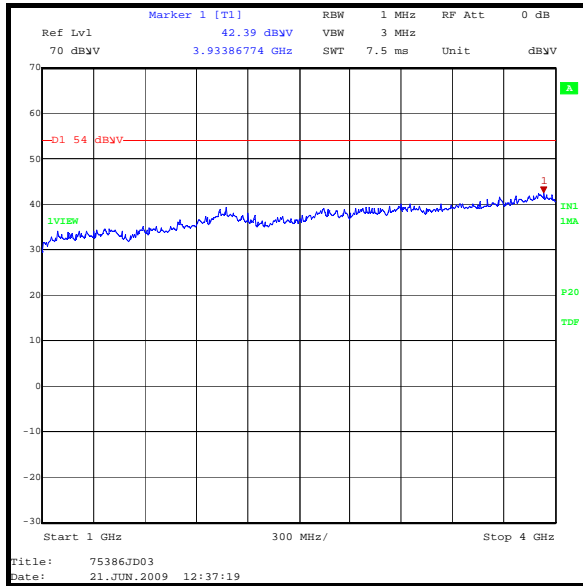
**Results:**

<b>Frequency (GHz)</b>	<b>Antenna Polarity</b>	<b>Detector Level (dB<math>\mu</math>V)</b>	<b>Transducer Factor (dB)</b>	<b>Peak Level (dB<math>\mu</math>V/m)</b>	<b>Average Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
12.474	Vertical	40.0	12.8	52.8	54.0	1.2	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 the more onerous limit.

**Idle Mode Radiated Spurious Emissions (continued)**



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

**5.2.3. 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>	30
<b>Relative Humidity (%):</b>	32

**Results: Quasi Peak Detector Measurements**

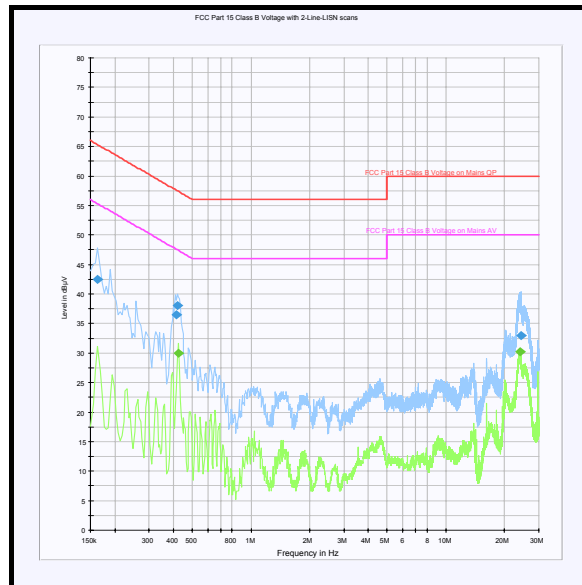
Frequency (MHz)	Line	Quasi Peak Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.163500	Live	42.5	65.3	22.8	Complied
0.415500	Neutral	36.4	57.5	21.1	Complied
0.420000	Neutral	38.1	57.4	19.3	Complied
24.369000	Neutral	32.9	60.0	27.1	Complied

**Results: Average Detector Measurements**

Frequency (MHz)	Line	Average Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.424500	Neutral	30.0	47.4	17.4	Complied
24.004500	Neutral	30.2	50.0	19.8	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.*

**5.2.4. Transmitter Minimum 6 dB Bandwidth**

**Test Summary:**

<b>FCC Part:</b>	15.247(a)(2)
<b>Test Method Used:</b>	As detailed in Public Notice DA 00-705 (March 30, 2000) (see note below)

**Environmental Conditions:**

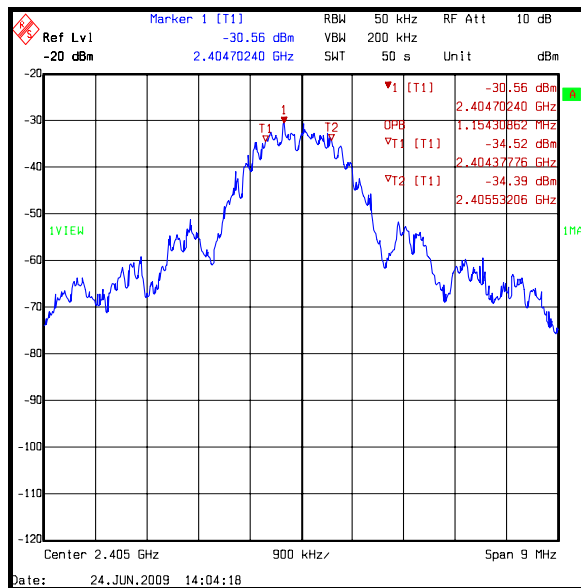
<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	30

**Results:**

Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
1.154	≥0.5	0.654	Complied

**Note(s):**

- In lieu of the test method detailed in Public Notice DA 00-705 the 6dB bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.



**5.2.5. Transmitter 20 dB Bandwidth**

**Test Summary:**

FCC Part:	2.1049
Test Method Used:	As detailed in Public Notice DA 00-705 (March 30, 2000) (see note below)

**Environmental Conditions:**

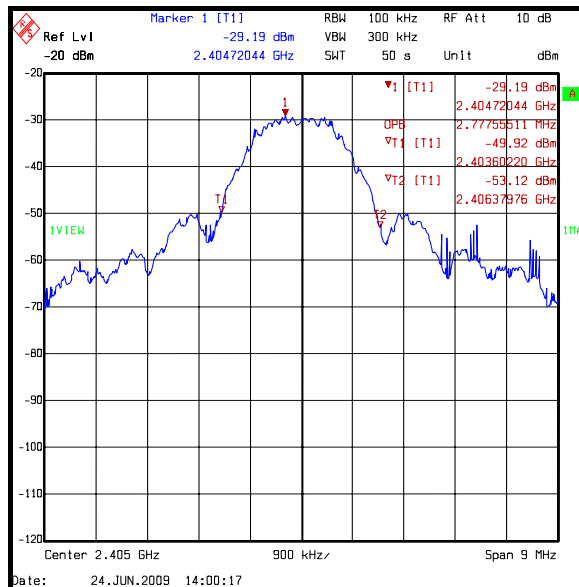
Temperature (°C):	26
Relative Humidity (%):	30

**Results:**

<b>Transmitter 20 dB Bandwidth (MHz)</b>
2.776

**Note(s):**

- In lieu of the test method detailed in Public Notice DA 00-705 the 20dB bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser.



**5.2.6. Transmitter Peak Power Spectral Density**

**Test Summary:**

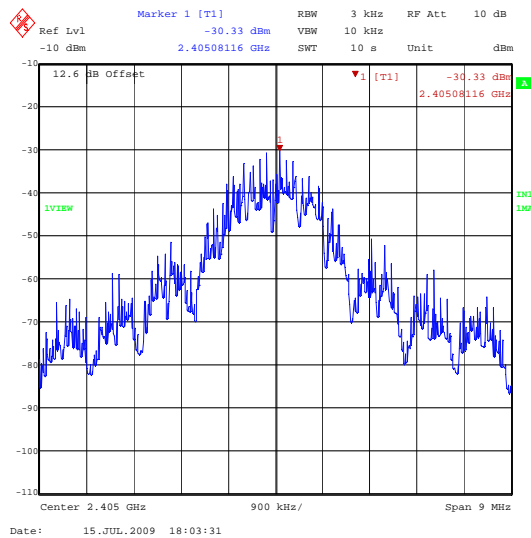
FCC Part:	15.247(e)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 and FCC CFR Part 2

**Environmental Conditions:**

Temperature (°C):	30
Relative Humidity (%):	37

**Results:**

Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
-30.3	8.0	38.3	Complied



**5.2.7. Transmitter Maximum Peak Output Power (EIRP)****Test Summary:**

<b>FCC Part:</b>	15.247(b)(3)
<b>Test Method Used:</b>	As detailed in Public Notice DA 00-705 (March 30, 2000), ANSI TIA-603-C-2004 and FCC CFR Part 2

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	30

**Results: Battery Powered Devices**

<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
-8.3	30.0	38.3	Complied

**Note(s):**

1. This test was performed radiated therefore the EUT antenna gain is encompassed in the final result and not measurable.

**5.2.8. Transmitter Radiated Emissions****Test Summary:**

<b>FCC Part:</b>	15.247(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes
<b>Frequency Range</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	30

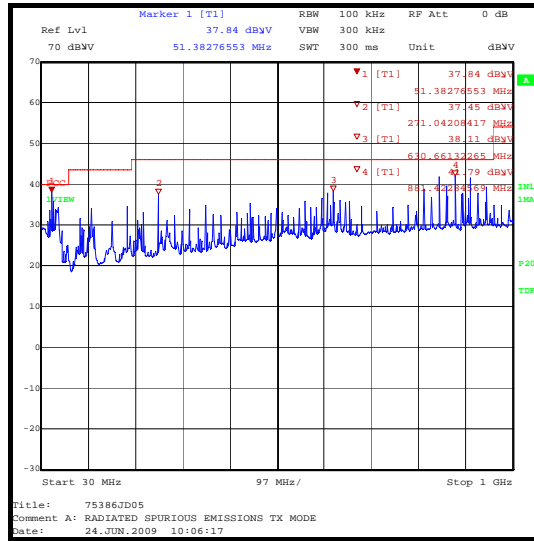
**Results: Top Channel - Emissions Occurring in the Restricted Bands**

Frequency (MHz)	Antenna Polarity	Q-P Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
132.707	Vertical	32.4	43.0	10.6	Complied
271.998	Vertical	38.3	46.0	7.7	Complied

**Results: Top Channel - Emissions Occurring outside the Restricted Bands**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
51.602	Vertical	36.9	66.9	30.0	Complied
206.454	Vertical	29.5	66.9	37.4	Complied
367.975	Vertical	35.1	66.9	31.8	Complied
572.001	Vertical	37.4	66.9	29.5	Complied
619.190	Vertical	37.3	66.9	29.6	Complied
630.982	Vertical	38.9	66.9	28.0	Complied
815.985	Vertical	40.5	66.9	26.4	Complied
847.976	Vertical	42.9	66.9	24.0	Complied
879.996	Vertical	39.4	66.9	27.5	Complied
911.986	Vertical	43.0	66.9	23.9	Complied

**Transmitter Radiated Emissions (continued)**



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

**Transmitter Radiated Emissions (continued)****Test Summary:**

<b>FCC Part:</b>	15.247(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes
<b>Frequency Range</b>	1 GHz to 26.5 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	30

**Results: Electric Field Strength Measurements, Highest Peak Level:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
17.463	Vertical	38.3	17.2	55.5	74.0	18.5	Complied

**Results: Highest Average Level**

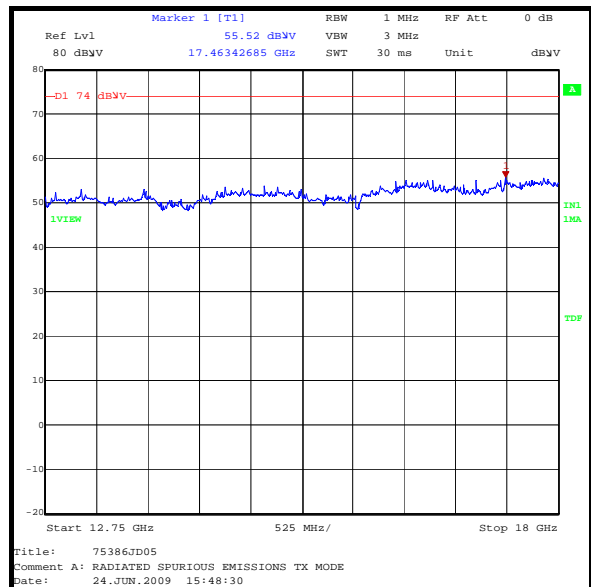
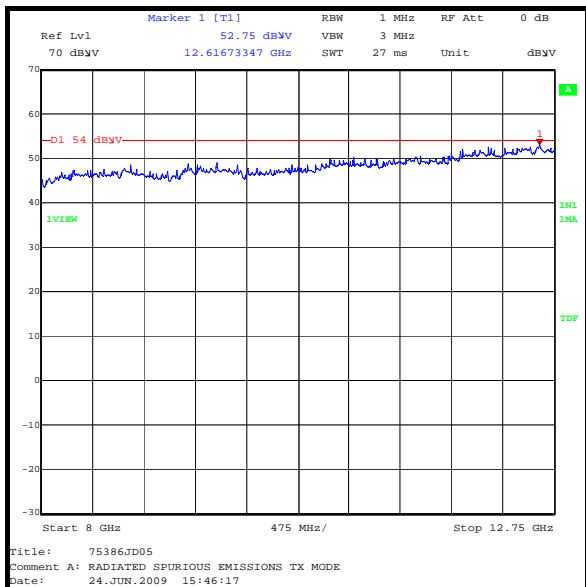
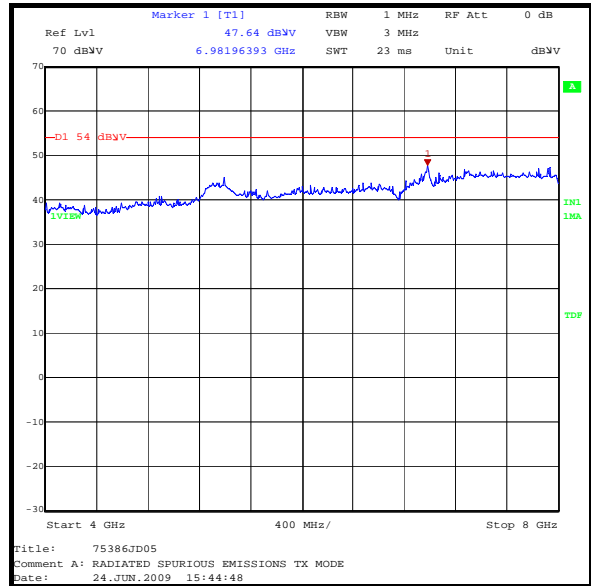
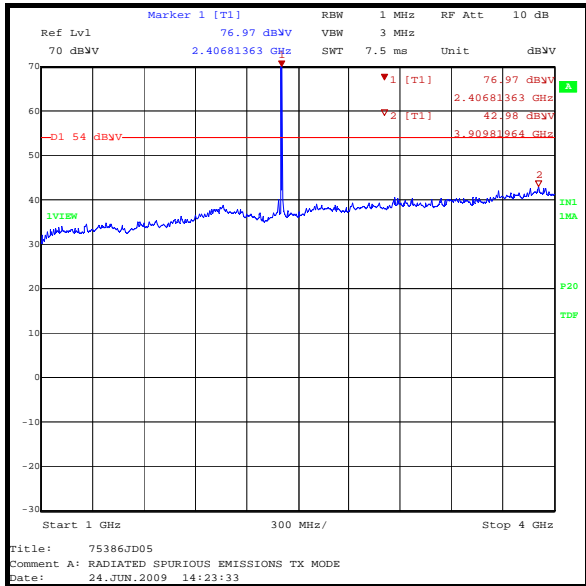
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
17.463	Vertical	27.7	17.2	44.9	54.0	9.1	Complied

**Note(s):**

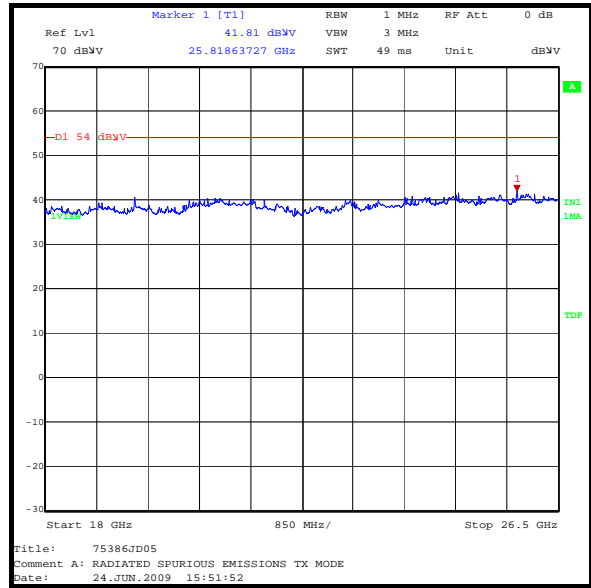
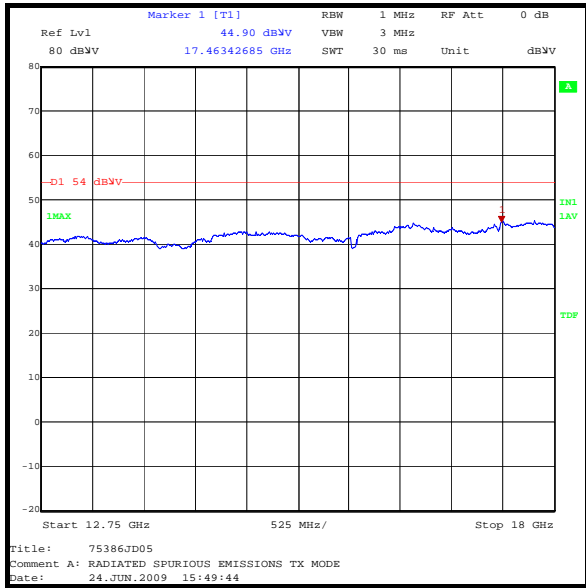
1. The carrier is shown on the 1 GHz to 4 GHz plot.
2. All pre-scans were performed with a peak detector against average or Q-P limits apart from measurements made in the range of 12.75 to 18 GHz where pre-scans were performed with peak and average detectors and the applicable limit applied. This was due to the noise floor exceeding the average limit when using a peak detector.
3. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak and average noise floor reading of the measuring receiver were recorded as shown in the tables above.



**Transmitter Radiated Emissions (continued)**



**Transmitter Radiated Emissions (continued)**



**5.2.9. Transmitter Band Edge Radiated Emissions****Test Summary:**

<b>FCC Part:</b>	15.247(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8 and relevant annexes

**Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	30

**Results: Peak Power Level**

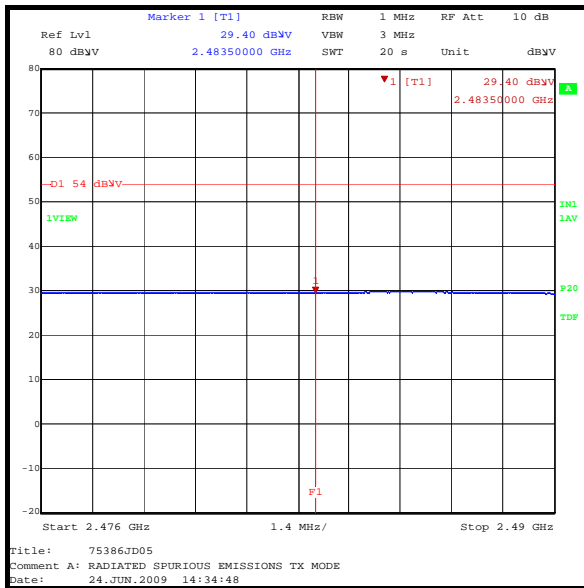
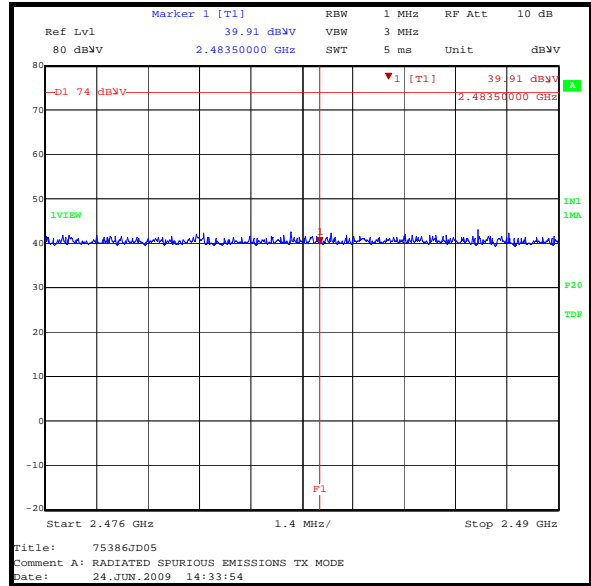
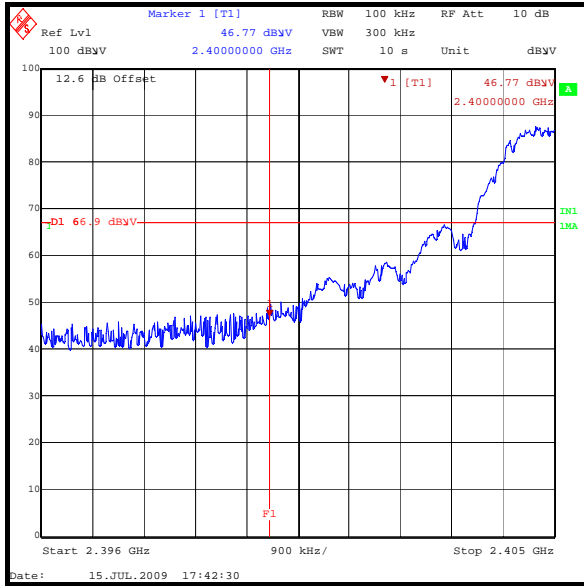
Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4000	Horizontal	47.0	-0.2	46.8	66.9*	20.1	Complied
2.4835	Horizontal	40.2	-0.3	39.9	74.0	34.1	Complied

\* -20 dBc limit.

**Results: Average Power Level Static Mode**

Frequency (GHz)	Antenna Polarity	Detector Level (dB $\mu$ V)	Transducer Factor (dB)	Actual Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2.4835	Horizontal	29.7	-0.3	29.4	54.0	24.6	Complied

### Transmitter Band Edge Radiated Emissions (continued)



## **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>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.72 dB
Transmitter Maximum Peak Output Power	Not Applicable	95%	±2.94 dB
Spectral Power Density	2.4 GHz to 2.4835 GHz	95%	±2.94 dB
6 dB / 20 dB Bandwidth	Not Applicable	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 40 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.

**Appendix 1. Test Equipment Used**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1299	Antenna	Schaffner	CBL6143	5094	28 Jul 2008	12
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1818	Antenna	EMCO	3115	00075692	25 Oct 2008	12
A1830	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100668	05 Jan 2009	12
A649	Single Phase LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Mar 2009	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	26 Aug 2008	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	09 Mar 2009	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	09 Dec 2008	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	22 Apr 2009	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	14 Aug 2008	12

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