



**TEST REPORT
FROM
RFI GLOBAL SERVICES LTD**

Test of: Mk2 Hands Free Keycard

To: FCC Part 15.247: 2008 (Subpart C)

Test Report Serial No:
RFI/RPT4/RP74017JD08A

Supersedes Test Report Serial No:
RFI/RPT3/RP74017JD08A

This Test Report Is Issued Under The Authority Of Brian Watson, Technical Director:		
Checked By: Brian Watson		Report Copy No: PDF01
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1. Customer Information

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

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2. Equipment Under Test (EUT)

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

2.1. Identification of Equipment Under Test (EUT)

Brand Name:	Mk2 Hands Free Keycard
Model Number:	690-333
Serial Number:	#01
Hardware Version Number:	z-1370 rev 4, ppc-hfk rev B
FCC ID Number:	USE6903M2
Date of Receipt:	07 November 2008

2.2. Description of EUT

The equipment under test was a hands free keycard used for door entry security.

2.3. Modifications Incorporated in the EUT

During the course of testing the EUT was not modified.

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2.4. Support Equipment

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

Description:	Hands Free Interface
Brand Name:	Wireless Interface (transceiver) to Net2
Model Name or Number:	477-222
Serial Number:	None stated

Description:	Net2 ACU with 2A PSU in plastic cabinet
Model Name or Number:	411-501
Serial Number:	None stated

Description:	P75 Reader
Brand Name:	P75 Proximity Reader
Model Name or Number:	373-110
Serial Number:	None stated

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2.5. Additional Information Related to Testing

Power Supply Requirement:	Internal Battery Supply of 3 V		
Type of Equipment:	Transceiver		
Channel Spacing:	5 MHz		
Modulation Type:	DSSS		
Maximum Peak Power Output (EIRP):	-6.2 dBm		
Transmit Frequency Range:	2405 to 2480 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	11	2405
	Middle	18	2440
	Top	26	2480
Receive Frequency Range:	125 kHz		

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3. Test Specification, Methods and Procedures

Reference:	FCC Part 15.247: 2008 Subpart C
Title:	Code of Federal Regulations, Part 15.247 (47CFR22) (Intentional Radiators operating within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz)

3.1. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI C63.2 (1987)

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

ANSI C63.4 (2003)

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

ANSI C63.5 (1988)

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

ANSI C63.7 (1988)

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

CISPR 16-1: (1999)

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

3.2. Definition of Measurement Equipment

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

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4. Deviations from the Test Specification

There were no deviations from the test specification.

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5. Operation of the EUT during Testing

5.1. Operating Modes

The EUT was tested in the following operating modes:

- The EUT had been modified by the customer to constantly transmit once placed into test mode as the normal duty cycle is too short to perform measurements.
- Transmitter radiated emissions in standby mode tests were performed with the 3 V Lithium internal battery connected.
- Transmitter radiated emissions tests were performed with the EUT powered from a bench power supply as the high duty cycle in test mode causes the battery to discharge rapidly. The 3 V internal battery was fitted but not connected.
- Normal modulation was present when the EUT was transmitting.
- Tests were performed on the bottom, centre and top channels as required.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

- The Net2 ACU with proximity reader was used to put the EUT into test mode. Once the EUT had been placed in front of the reader, it constantly transmitted a modulated carrier at full power on a set channel.
- The Net2 ACU frequency setting was manually set using a rotary or DIL switch. This determined the frequency the EUT transmitted on when it had been power cycled and placed near the proximity reader. The NET2 ACU was turned off once the EUT had been put into test mode.

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6. Summary of Test Results

Range of Measurements	Specification Reference	Port Type	Result
Idle mode Radiated Spurious Emissions	C.F.R. 47 FCC Part 15 Section 15.109	Enclosure	Complied
Transmitter Minimum 6 dB Bandwidth	C.F.R. 47 FCC Part 15 Section 15.247	Antenna	Complied
Transmitter 20 dB Bandwidth	C.F.R. 47 FCC Part 2 Section 2.1049	Antenna	Complied
Transmitter Peak Power Spectral Density	C.F.R. 47 FCC Part 15 Section 15.247	Antenna	Complied
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15 Section 15.247	Antenna	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15 Sections 15.247 & 15.209	Antenna	Complied
Transmitter Band Edge Radiated Emissions	C.F.R. 47 FCC Part 15 Sections 15.247 & 15.209	Antenna	Complied

6.1. Location of Tests

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.

6.2. Site Registration Number

FCC 209735

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7. Measurements, Examinations and Derived Results

7.1. General Comments

This section contains test results only.

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

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7.2. Test Results

7.2.1. Idle Mode Radiated Spurious Emissions: Section 15.109

Ambient Temperature: 22°C Relative Humidity: 38%

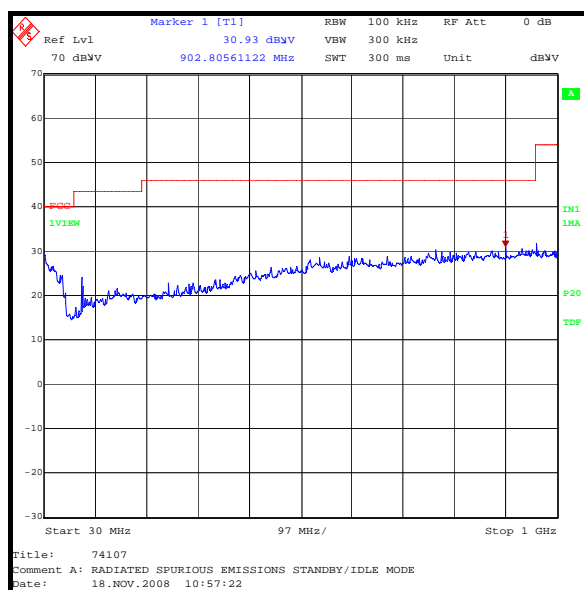
Tests were performed using the test methods detailed in ANSI C63.4 Section 8.

Results: Frequency Range: 30 to 1000 MHz

Frequency (MHz)	Antenna Polarity	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
902.805	Vertical	30.9	46.0	15.1	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.



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

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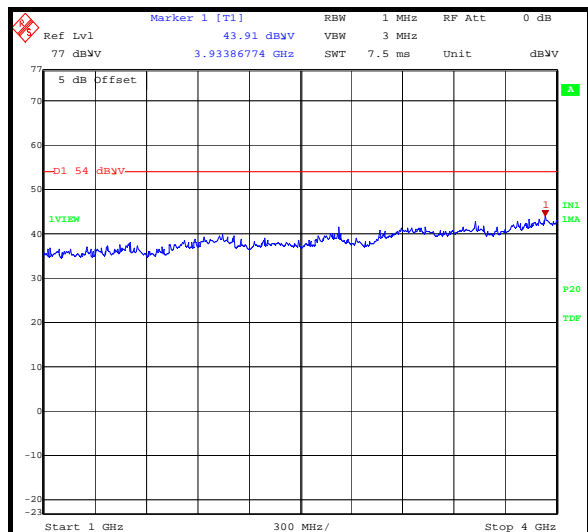
7.2.2. Idle Mode Radiated Spurious Emissions: Section 15.109 (Continued)**Results: Frequency Range: 1 to 12.75 GHz****Highest Peak Level:**

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Transducer Factor (dB)	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
7.462	Vertical	47.6	-1.0	46.6	54.0	7.4	Complied

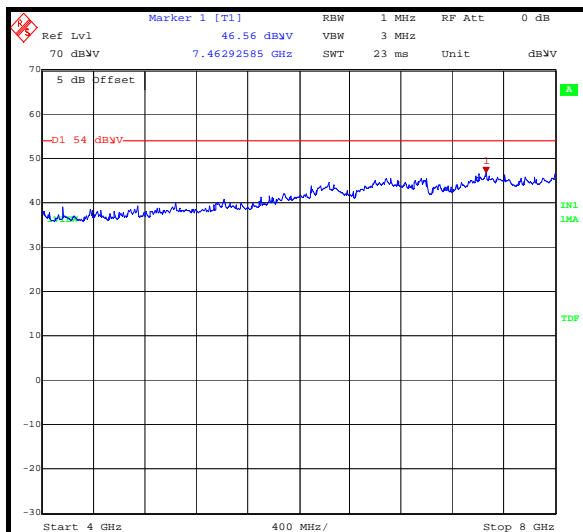
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because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

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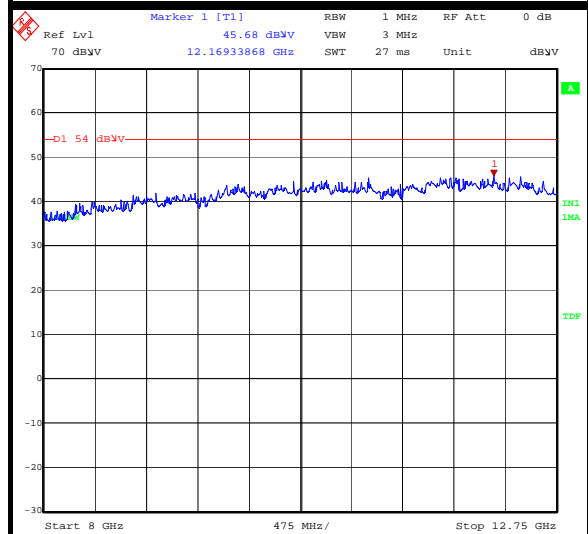
Idle Mode Radiated Spurious Emissions (Continued)



Title: 74107
 Comment A: RADIATED SPURIOUS EMISSIONS STANDBY/IDLE MODE
 Date: 18.NOV.2008 11:25:30



Title: 74107
 Comment A: RADIATED SPURIOUS EMISSIONS STANDBY/IDLE MODE
 Date: 18.NOV.2008 11:30:16



Title: 74107
 Comment A: RADIATED SPURIOUS EMISSIONS STANDBY/IDLE MODE
 Date: 18.NOV.2008 11:38:32

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

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7.2.3. Transmitter Minimum 6 dB Bandwidth: Section 15.247(a)(2)

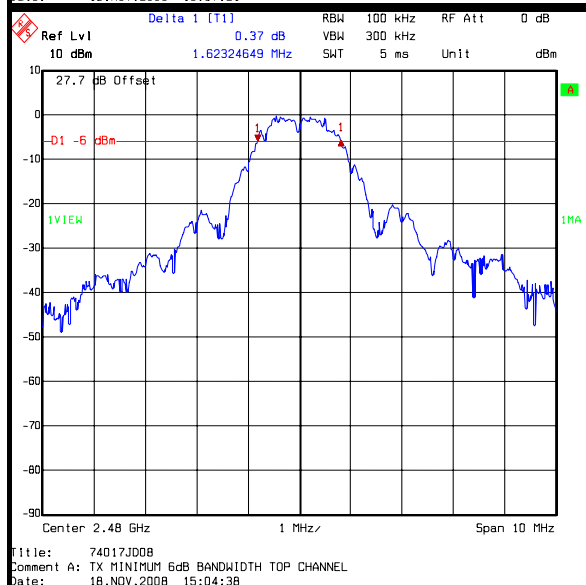
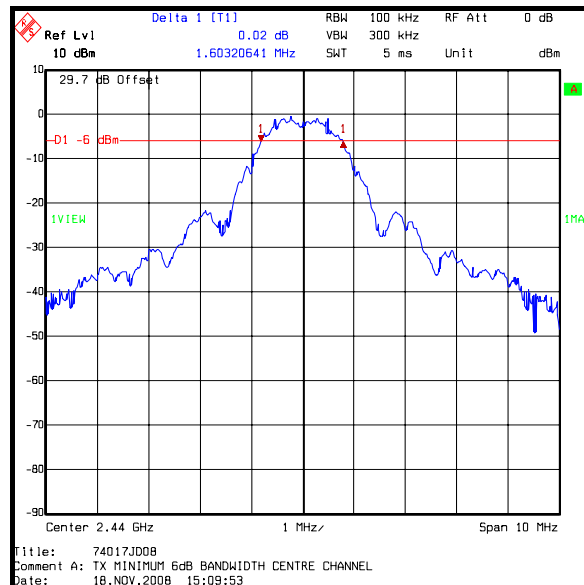
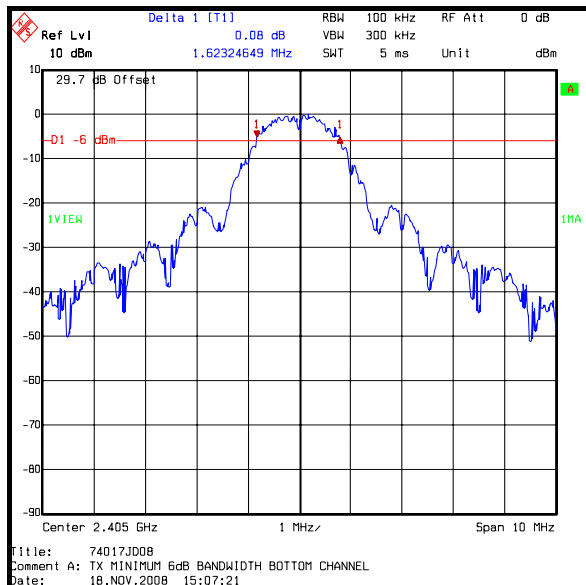
Ambient Temperature: 22°C

Relative Humidity: 38%

The peak level was then determined and a reference established 6 dB below the peak level. The bandwidth was determined at the points where the 6 dB reference crossed the profile of the emission.

Results:

Channel	Transmitter 6 dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	1.623	≥ 0.5	1.123	Complied
Middle	1.603	≥ 0.5	1.103	Complied
Top	1.623	≥ 0.5	1.123	Complied



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7.2.4. Transmitter 20 dB Bandwidth: Section 2.1049

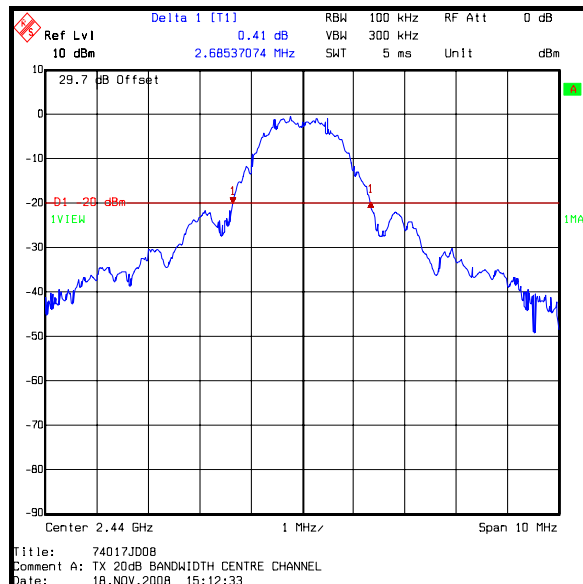
Ambient Temperature: 22°C

Relative Humidity: 38%

Tests were performed using the test methods detailed in Public Notice DA 00-705 (March 30, 2000).

Results:

Transmitter 20 dB Bandwidth (kHz)
2685.370



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7.2.6. Transmitter Maximum Peak Output Power: (EIRP) Section 15.247(b)(3)

Ambient Temperature: 23°C

Relative Humidity: 37%

Tests were performed using the test methods detailed in ANSI TIA-603-C-2004 and FCC CFR Part 2.

Results:

Battery Powered Devices

Channel	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	-7.7	30.0	37.7	Complied
Middle	-7.9	30.0	37.9	Complied
Top	-6.2	30.0	36.2	Complied

Note(s):

1. These tests were performed radiated; therefore the EUT antenna gain is encompassed in the final result and not measurable.

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7.2.7. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a)

Ambient Temperature: 22°C Relative Humidity: 38%

Tests were performed using the test methods detailed in ANSI C63.4 Section 8

Results: Frequency Range: 30 to 1000 MHz

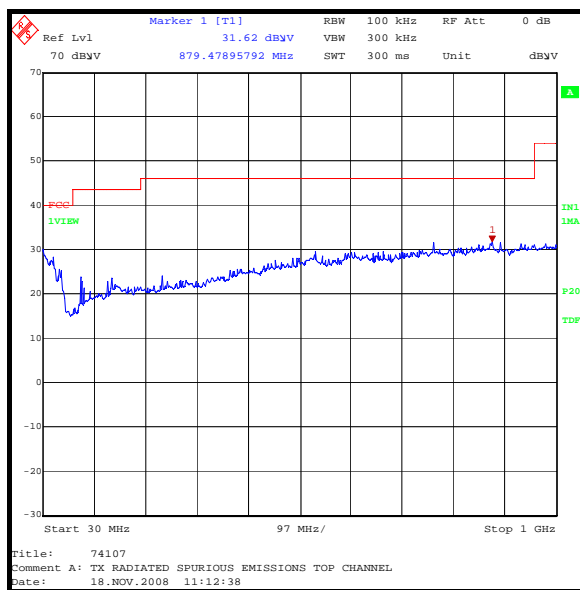
Top Channel

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
879.478	Vertical	31.6	46.0	14.4	Complied

Tests were performed using the test methods detailed in ANSI C63.4 Section 8

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. All channels exhibited similar results and therefore only the top channel's data is reported here.



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

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7.2.8. Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)

Results: Frequency Range: 1 to 26.5 GHz

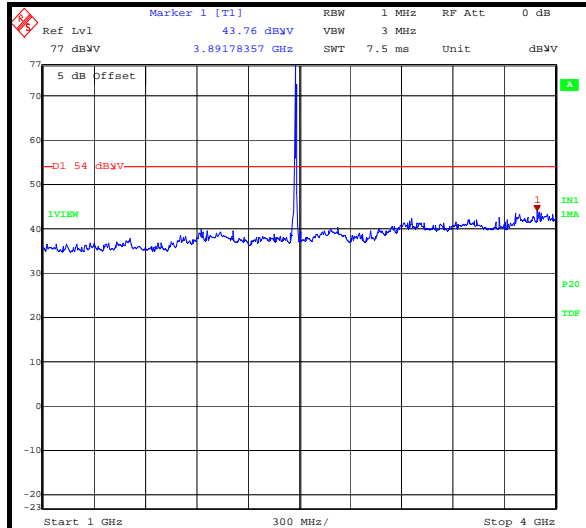
Highest Peak Level: Top Channel

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Transducer Factor (dB)	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
17.768	Vertical	43.1	3.7	46.8	54.0	7.2	Complied

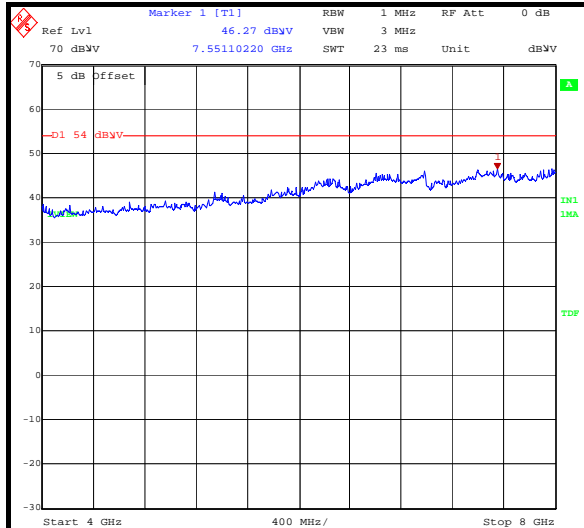
1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
2. The carrier is shown on the 1 GHz to 4 GHz plot at approximately 2.479 GHz and the level for this channel is recorded on a different results page.

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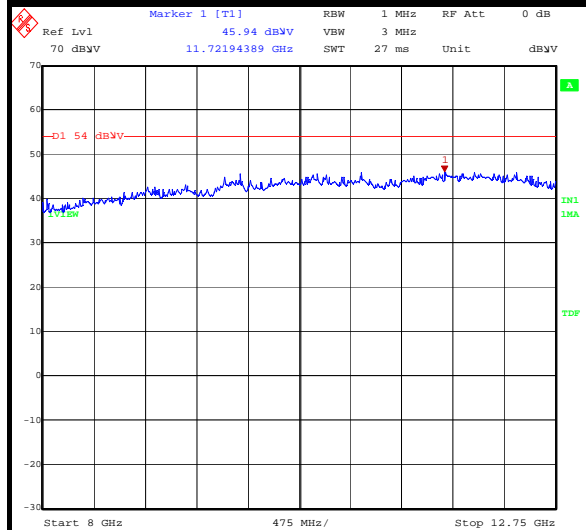
Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



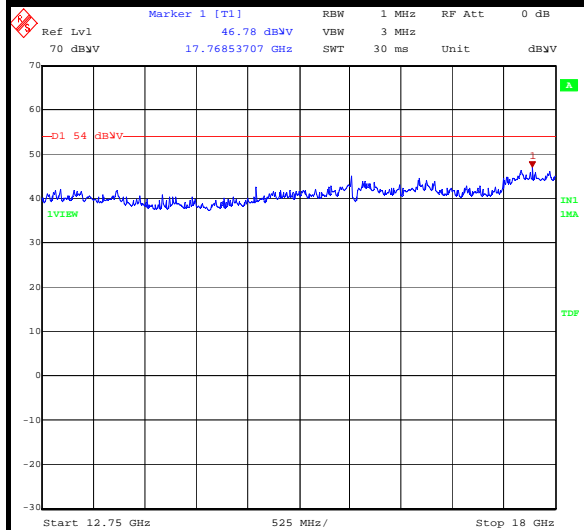
Title: 74107
 Comment A: TX RADIATED SPURIOUS EMISSIONS TOP CHANNEL
 Date: 18.NOV.2008 11:22:20



Title: 74107
 Comment A: TX RADIATED SPURIOUS EMISSIONS TOP CHANNEL
 Date: 18.NOV.2008 11:33:03



Title: 74107
 Comment A: TX RADIATED SPURIOUS EMISSIONS TOP CHANNEL
 Date: 18.NOV.2008 11:35:56

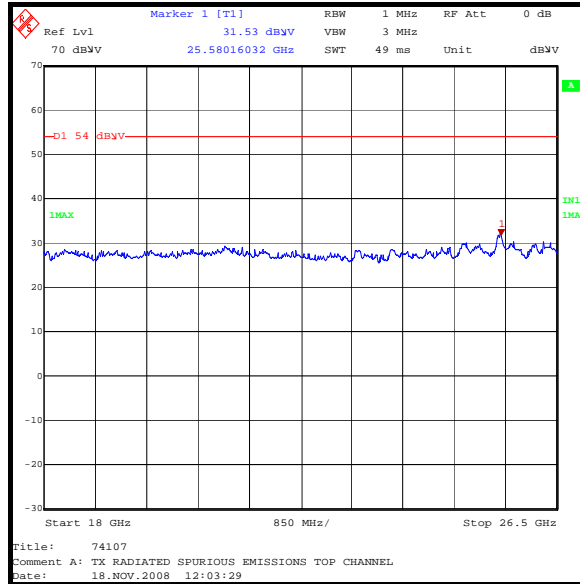


Title: 74107
 Comment A: TX RADIATED SPURIOUS EMISSIONS TOP CHANNEL
 Date: 18.NOV.2008 11:50:01

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

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Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



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7.2.9. Transmitter Band Edge Radiated Emissions: Section 15.247(d) & 15.209(a)

Ambient Temperature: 22°C

Relative Humidity: 38%

Tests were performed using the test methods detailed in ANSI C63.4 Section 8 and Public Notice DA 00-705 (March 30, 2000).

Results:

Peak Power Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Transducer Factor (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2.4000	Vertical	47.4	-7.7	39.7	63.0*	23.3	Complied
2.4835	Vertical	76.1	-8.0	68.1	74.0	5.9	Complied

Note(s):

* -20 dBc limit.

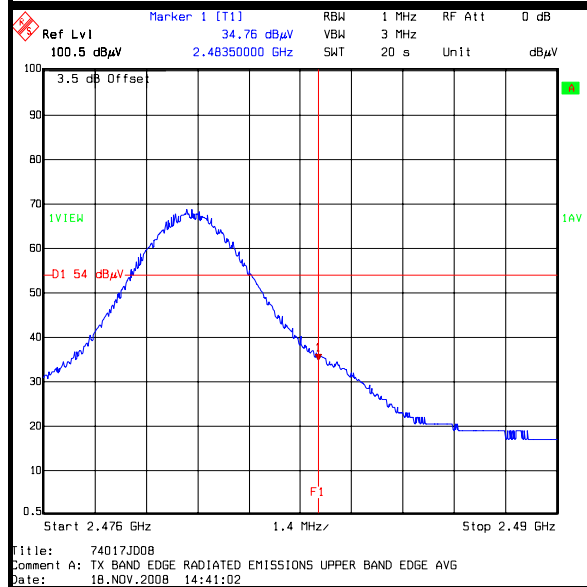
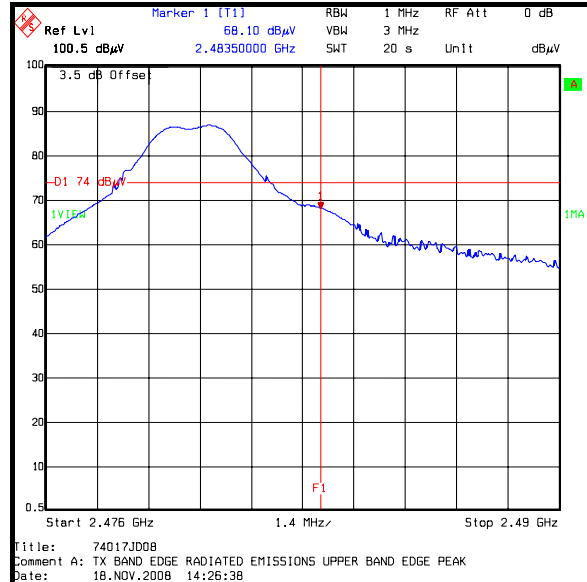
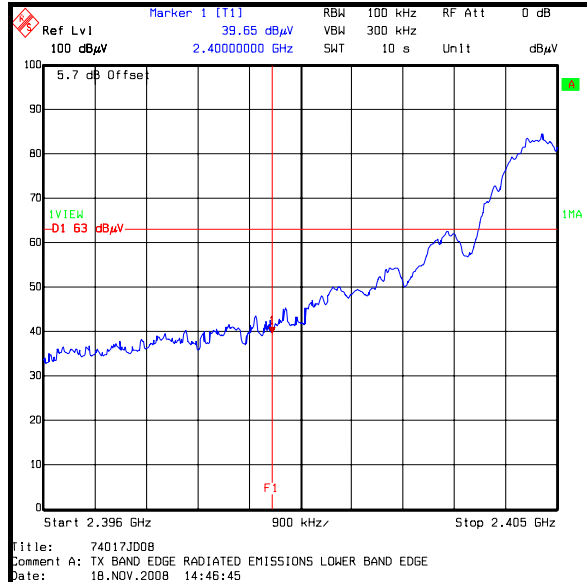
** Peak measurements were performed on the band edge frequency 2.4835 GHz, as it lies within the restricted bands.

Average Power Level:

Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Transducer Factor (dB)	Actual Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2.4835	Vertical	42.8	-8.0	34.8	54.0	19.2	Complied

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Transmitter Band Edge Radiated Emissions (Continued)



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8. Measurement Uncertainty

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

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

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

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

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
6 dB / 20 dB Bandwidth	Not Applicable	95%	±0.6 ppm
Spectral Density	Not Applicable	95%	±2.94 dB
Maximum Peak Output Power	Not Applicable	95%	±2.94 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±4.64 dB
Radiated Spurious Emissions	1 GHz 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.

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Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1227	Pre Amplifier	Agilent	8449B	3008A01566	01 Oct 2008	12
A1299	Antenna	Schaffner	CBL6143	5094	28 Jul 2008	12
A1793	Pre Amplifier	A.H.Systems	PAM-0118	183	03 Jul 2008	12
A1818	Antenna	EMCO	3115	00075692	25 Oct 2008	12
A436	Antenna	Flann	20240-20	330	24 Apr 2006	36
K0002	3m RSE chamber	Rainford EMC	N/A	N/A	26 Aug 2008	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	19 Feb 2008	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986/022	29 Nov 2007	12

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