

**TEST REPORT
FROM
RFI GLOBAL SERVICES LTD**

Test of: Mk2 Hands Free Keyfob

To: FCC Part 15.247: 2008 (Subpart C)

Test Report Serial No:
RFI/RPT1/RP73736JD09A

This Test Report Is Issued Under The Authority
Of Steve Flocks, Service Leader:


pp

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1. Customer Information

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

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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 keyfob
Model Number:	690-222
Sub-Assembly Number:	z99-hk01
Serial Number:	None stated
Hardware Version Number:	z-1310 Rev. 8, ppc-key2 Rev. D.
FCC ID:	USE6902M2
Date of Receipt:	29 August 2008

2.2. Description of EUT

The equipment under test was an active keyfob (transponder) which can be carried somewhere on a user's person for hands free access control.

2.3. Modifications Incorporated in 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:	Wireless interface (transceiver) to Net2
Brand Name:	Hands Free Interface
Model Name or Number:	477-222

Description:	Net2 Access control unit
Brand Name:	Net2 ACU
Model Name or Number:	385-527

Description:	P200 proximity reader
Brand Name:	P200 Reader
Model Name or Number:	323-110

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2.5. Additional Information Related to Testing

Power Supply Requirement:	Internal Battery Supply of 3 V		
Type of Unit:	Transceiver		
Channel Spacing:	5 MHz		
Modulation Type:	DSSS		
Maximum Peak Power Output (EIRP):	-7.4 dBm		
Transmit Frequency Range:	2405 MHz 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 Results

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/TIA-603-B-2003

Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1987)

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

ANSI C63.4 (2003)

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

ANSI C63.5 (1988)

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

ANSI C63.7 (1988)

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

CISPR 16-1: (1999)

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

3.2. Definition of Measurement Equipment

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

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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, unless otherwise stated:

Transmit and Standby 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.
- 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:

- Stand alone.

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6. Summary of Test Results

Range of Measurements	FCC Part 15 Reference	Port Type	Result
Idle Mode Radiated Spurious Emissions	15.109	Antenna	Complied
Transmitter Minimum 6 dB Bandwidth	15.247(a)(2)	Antenna	Complied
Transmitter 20 dB Bandwidth	2.1049	Antenna	Complied
Transmitter Peak Power Spectral Density	15.247(e)	Antenna	Complied
Transmitter Maximum Peak Output Power	15.247(b)(3)	Antenna	Complied
Transmitter Radiated Emissions	15.247(d) & 15.209(a)	Antenna	Complied
Transmitter Band Edge Radiated Emissions	15.247(d) & 15.209(a)	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 Numbers

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. Receiver/Idle Radiated Spurious Emissions: Section 15.109

Ambient Temperature: 23 °C Relative Humidity: 55 %

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

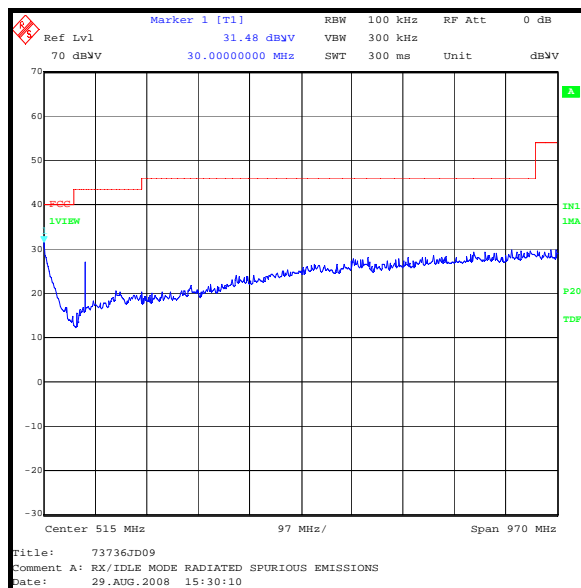
Results:

Electric Field Strength Measurements: 30 to 1000 MHz

Frequency (MHz)	Antenna Polarity	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
30.0	Vertical	31.5	40.0	8.5	Complied

Note(s):

1. No spurious emissions were detected above the noise floor of the measuring receiver; therefore, the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above.
2. The emission shown in the scan at 81.3 MHz was an ambient and unrelated to the EUT therefore no measurement was performed.
3. The pre-scan shown below covers the frequency range 30 MHz to 1 GHz



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. Receiver Radiated Spurious Emissions: Section 15.109 (Continued)**Results:****Electric Field Strength Measurements (Frequency Range: 1 to 12.75 GHz)****Highest Peak Level:**

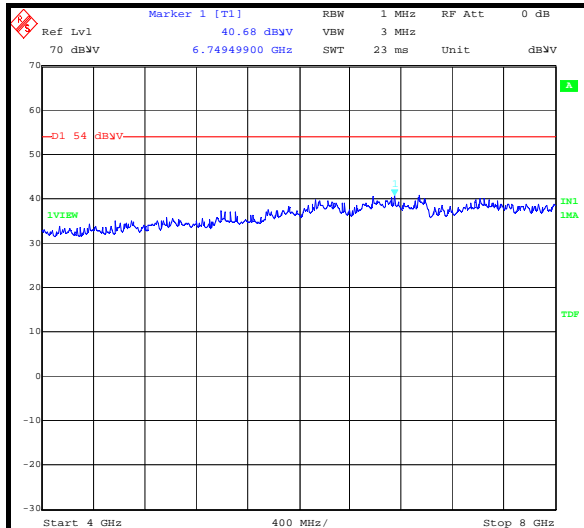
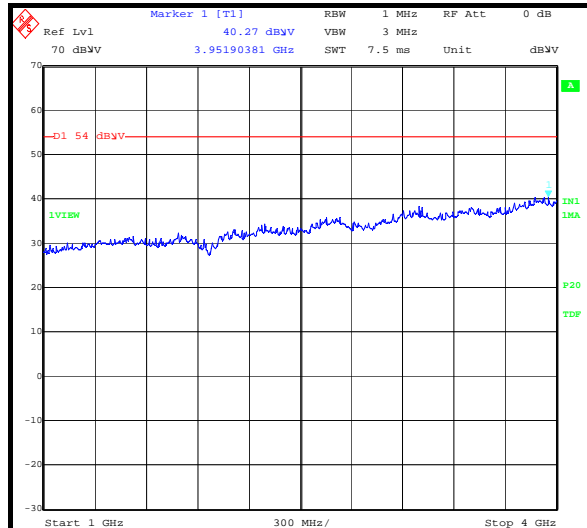
Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Transducer Factor (dB)	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
12.388	Horizontal	36.4	6.8	43.2	54.0	10.8	Complied

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.

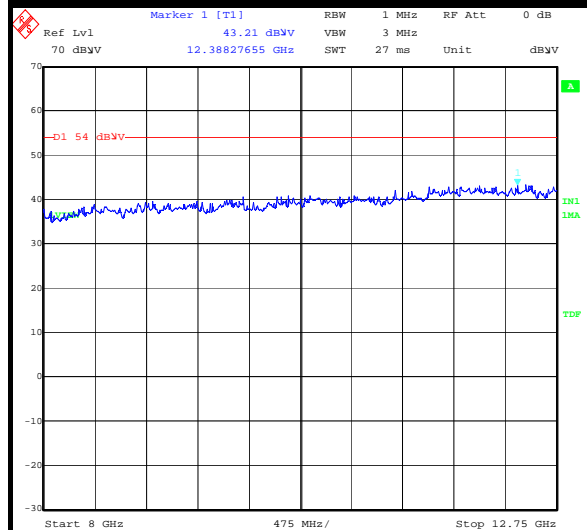
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Receiver Radiated Spurious Emissions: Section 15.109 (Continued)



Title: 73736JD09
Comment A: RX/IDLE MODE RADIATED SPURIOUS EMISSIONS
Date: 29.AUG.2008 15:34:54

Title: 73736JD09
Comment A: RX/IDLE MODE RADIATED SPURIOUS EMISSIONS
Date: 29.AUG.2008 15:36:44



Title: 73736JD09
Comment A: RX/IDLE MODE RADIATED SPURIOUS EMISSIONS
Date: 29.AUG.2008 15:38:35

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)

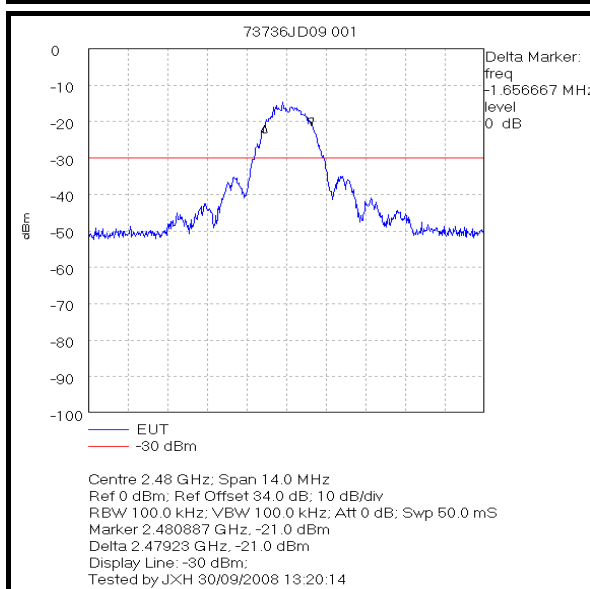
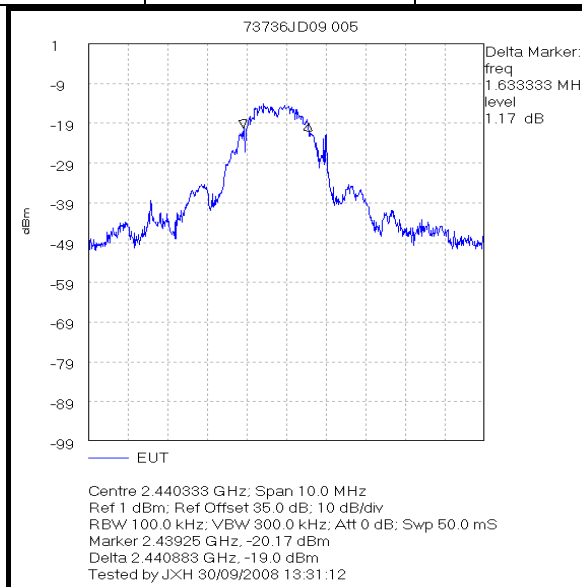
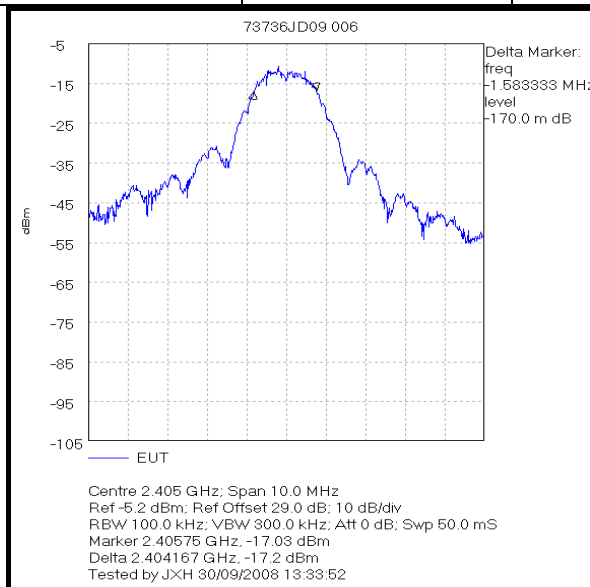
Ambient Temperature: 18 °C

Relative Humidity: 57 %

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	1.583	≥ 0.5	1.083	Complied
Middle	1.633	≥ 0.5	1.133	Complied
Top	1.667	≥ 0.5	1.167	Complied



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7.2.4. Transmitter 20 dB Bandwidth: Section 2.1049

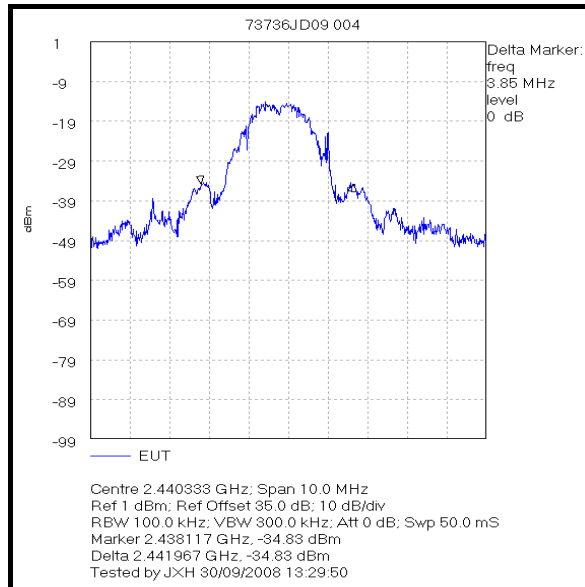
Ambient Temperature: 18 °C

Relative Humidity: 58 %

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

Results:

Transmitter 20 dB Bandwidth (kHz)
3850.000



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7.2.5. Transmitter Peak Power Spectral Density: Section 15.247(e)

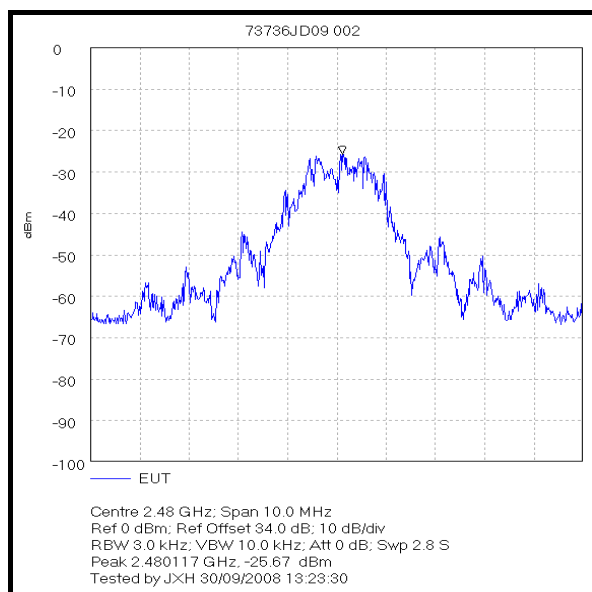
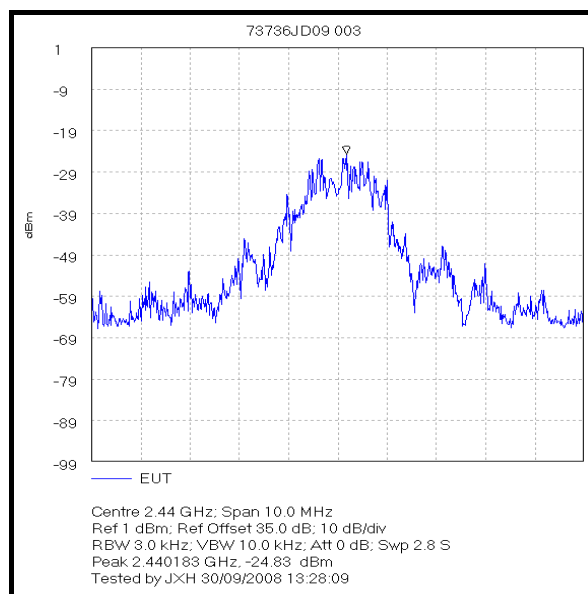
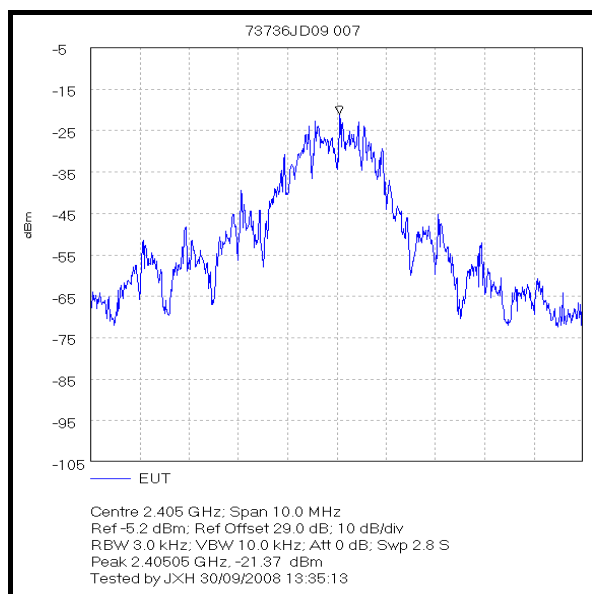
Ambient Temperature: 17 °C

Relative Humidity: 61 %

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

Results:

Channel	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	-21.4	8.0	29.4	Complied
Middle	-24.8	8.0	32.8	Complied
Top	-25.7	8.0	33.7	Complied



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

Ambient Temperature: 24 °C

Relative Humidity: 44 %

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	-7.4	30.0	37.4	Complied
Middle	-9.3	30.0	39.3	Complied
Top	-9.9	30.0	39.9	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: 23 °C Relative Humidity: 55 %

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

Results:

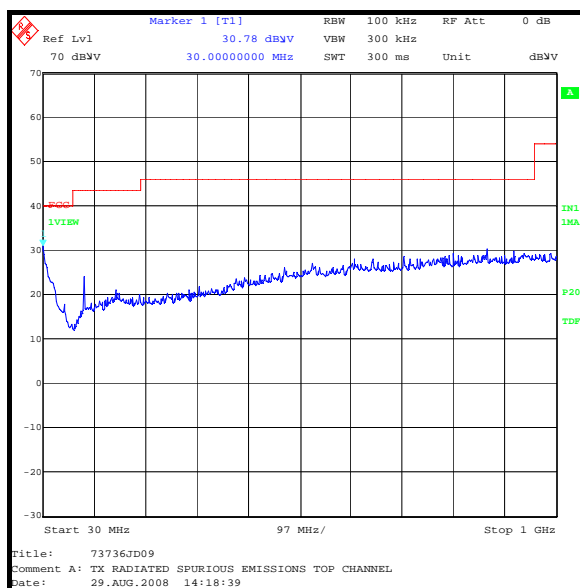
Electric Field Strength Measurements: 30 to 1000 MHz

Top Channel

Frequency (MHz)	Antenna Polarity	Q-P Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
30.0	Vertical	30.8	40.0	9.2	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.
2. The emission shown in the scan at 81.3 MHz was an ambient and unrelated to the EUT therefore no measurement was performed.



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

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

Electric Field Strength Measurements (Frequency Range: 1 to 26.5 GHz)

Results:

Highest Peak Level: Top Channel

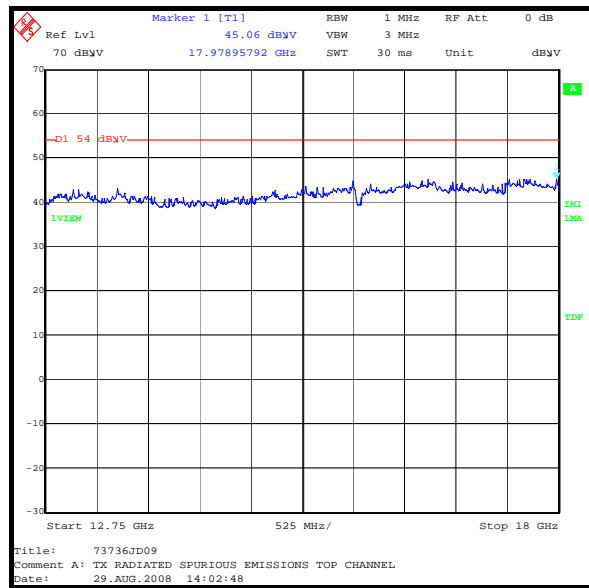
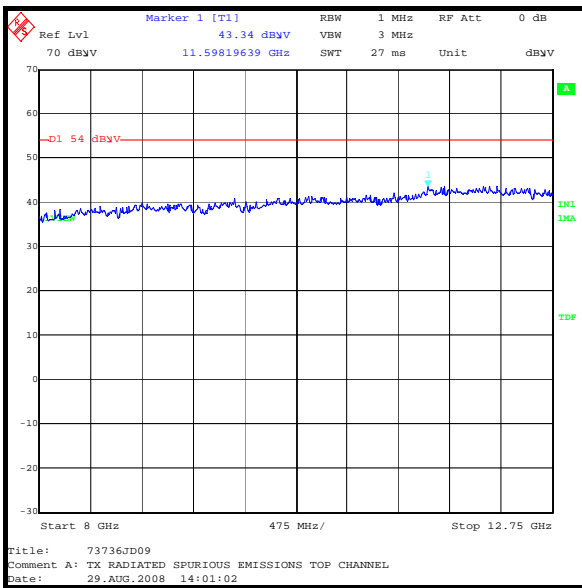
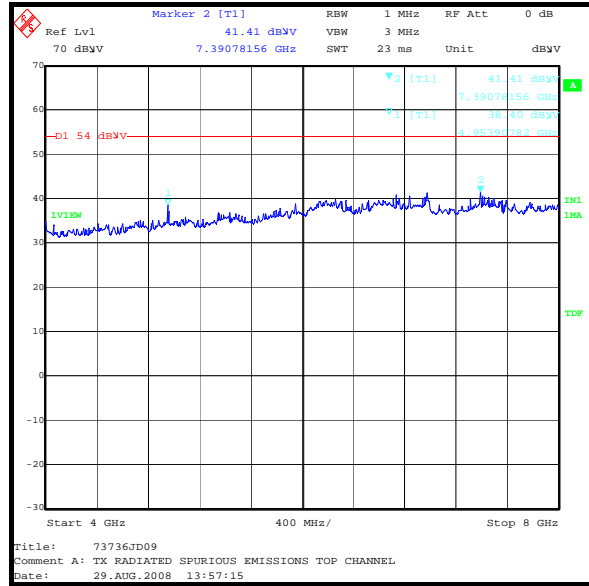
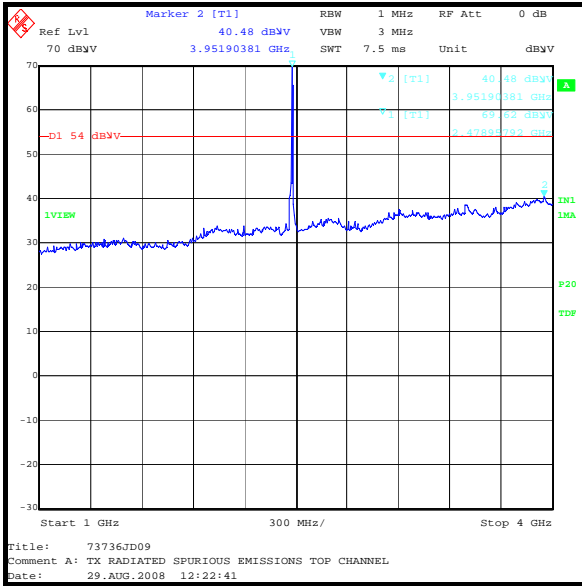
Frequency (GHz)	Antenna Polarity	Detector Level (dB μ V)	Transducer Factor (dB)	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
17.978	Horizontal	40.9	4.2	45.1	54.0	8.9	Complied

Note(s):

- 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.*
- 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.*

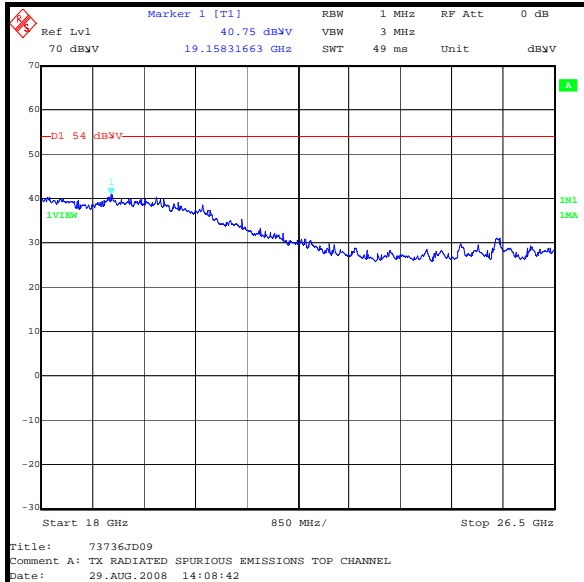
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Transmitter Radiated Emissions: Section 15.247(d) and 15.209(a) (Continued)



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



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

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

Ambient Temperature: 20 °C

Relative Humidity: 55 %

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	32.6	7.7	40.3	67.9*	27.6	Complied
2.4835	Horizontal	49.0	7.7	56.7	74.0	17.3	Complied

Note(s):

* -20 dBc limit.

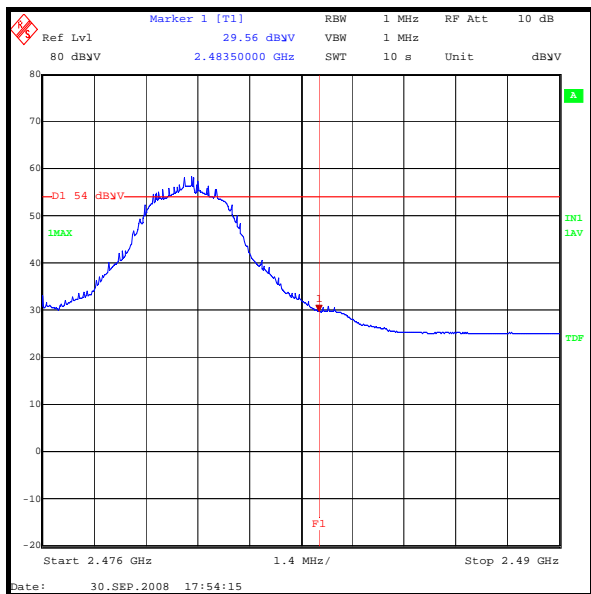
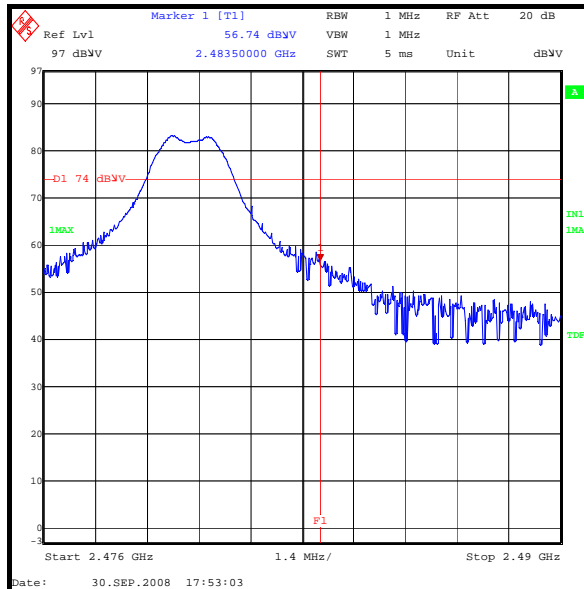
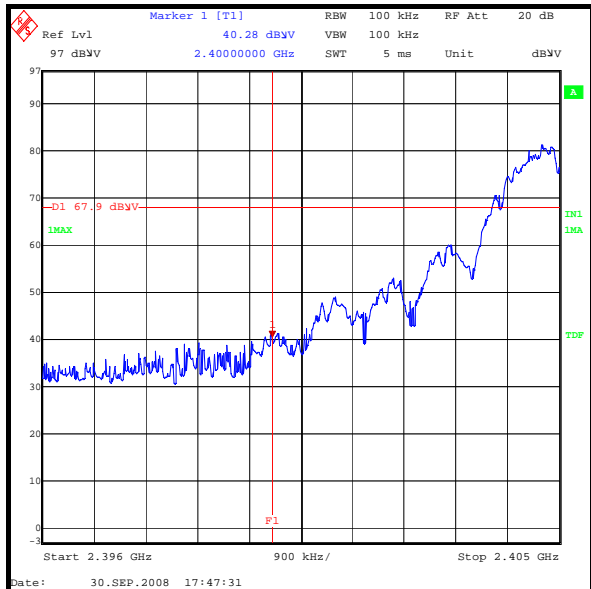
Peak measurements were performed on the band edge frequency 2.4835 GHz, as it lies within the restricted bands.

Average Power Level Static Mode:

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	Horizontal	21.9	7.7	29.6	54.0	24.4	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
Transmitter Maximum Peak Output Power	Not applicable	95%	±2.94 dB
Spectral Power Density	Not applicable	95%	±0.27 dB
6 dB/20 dB Bandwidth	Not applicable	95%	±11.4 ppm
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)
A1299	Antenna	Schaffner	CBL614 3	5094	28 Jul 2008	12
A1515	Horn Antenna	Stoddart	92341-1	0436	17 Nov 2006	36
A1793	Pre Amplifier	A.H.Systems Inc.	PAM- 0118	183	03 Jul 2008	12
A1818	Antenna	EMCO	3115	00075692	25 Oct 2007	12
A436	Antenna	Flann	20240- 20	330	24 Apr 2006	36
K0002	Site Reference 4421	Rainford EMC	N/A	N/A	26 Aug 2008	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	19 Feb 2008	12
M166	Thermometer/Barometer /Hygrometer	EuroCom	None	None	18 Jun 2008	12
M295	Spectrum Analyser	Hewlett Packard	8564E	3846A01561	13 Nov 2007	12

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

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Appendix 2. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\73736JD09\EMIRAD	Test configuration for measurement of radiated emissions.

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DRG\73736JD09\EMIRAD

