Report On

FCC CFR 47 Part 15C Testing of the
RF Solutions Ltd
Firefly Transmitter

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REPORT ON

FCC CFR 47 Part 15C Testing of the
RF Solutions Ltd
Firefly Transmitter

Document 75903884 Report 02 Issue 2

August 2008

PREPARED FOR

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Authorised Signatory

DATED 11 August 2008

This report has been re-issued as Issue 2 to include the omitted bandwidth of the emission measurement

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ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15 C. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

P Harrison J Holcombe

UKAS TESTING 0141

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SECTION 1

REPORT SUMMARY

FCC CFR 47 Part 15C Testing of the
RF Solutions Ltd
Firefly Transmitter

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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the RF Solutions Ltd Firefly Transmitter to the requirements of FCC CFR 47 Part 15C: 2006.

Objective	To perform Electromagnetic Compatibility (EMC) Qualification Approval Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	RF Solutions Ltd
Model Number(s)	Transmitter
Serial Number(s)	Not Serialised
Software Version	2
Hardware Version	1
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15C: 2006
Incoming Release Date	Declaration of Build Status 20 May 2008
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Start of Test	27 May 2008
Finish of Test	5 August 2008
Name of Engineer(s)	P Harrison J Holcombe

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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 15C: 2006, is shown below.

Configuration 1 - Keyfob with Coin Cell						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
	15.207,	Conducted Emissions (AC Power Port)	Transmit with Modulation		N/A	FCC CFR 47 Part 15: 2006
2.2	15.209, 15.231 15.205	Radiated Emissions (Enclosure Port)	Transmit with Modulation	0	Pass	FCC CFR 47 Part 15: 2006

N/A – Not Applicable

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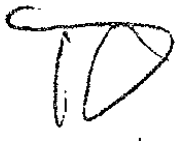
1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Firefly 433MHz 100m Range
MANUFACTURER	RF Solutions Ltd
TYPE	Transmitter
PART NUMBER	FIREFLY-TX
SERIAL NUMBER	
HARDWARE VERSION	1
SOFTWARE VERSION	2
TRANSMITTER OPERATING RANGE	100m
RECEIVER OPERATING RANGE	
COUNTRY OF ORIGIN	UK
INTERMEDIATE FREQUENCIES	NONE
ITU DESIGNATION OF EMISSION	
HIGHEST INTERNALLY GENERATED FREQUENCY	4MHz, 13.560MHz and 433.97MHz
OUTPUT POWER (W or dBm)	+6dBm
FCC ID	
INDUSTRY CANADA ID	
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Simple to use hand-held remote control with flexible transmitter button to receiver output mapping. Applications when paired with a suitable receiver include lighting control general purpose remote switching, industrial remote switching, access control.
BATTERY/POWER SUPPLY	
MANUFACTURING DESCRIPTION	Coin Cell
MANUFACTURER	
TYPE	Lithium
PART NUMBER	CR2032
VOLTAGE	3V
COUNTRY OF ORIGIN	
MODULES (if applicable)	
MANUFACTURING DESCRIPTION	433.92MHz TX Module
MANUFACTURER	RF Solutions Ltd
TYPE	433.92MHz/FM
POWER	+6dBm
FCC ID	
COUNTRY OF ORIGIN	UK
INDUSTRY CANADA ID	
EMISSION DESIGNATOR	
DHSS/FHSS/COMBINED OR OTHER	
ANCILLARIES (Not applicable)	

Signature: Trevor Dale, BENG, CENG, MIET



Date: 20 May 2008
Declaration of Build Status Serial Number: 75903884-01

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1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a RF Solutions Ltd Firefly Transmitter as shown in the photograph below. A full technical description can be found in the Manufacturers documentation.

Equipment Under Test

Product Service

1.4.2 Test Configuration

Configuration 1: Keyfob with Coin Cell

The EUT was configured in accordance with FCC CFR 47 Part 15C: 2006.

1.4.3 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 - Transmit with Modulation

Information on the specific test modes utilised are detailed in the test procedure for each individual test.

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1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or an open test area as appropriate.

The EUT was powered from a Coin Cell battery.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

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SECTION 2

TEST DETAILS

FCC CFR 47 Part 15C Testing of the
RF Solutions Ltd
Firefly Transmitter

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2.1 RADIATED EMISSIONS (ENCLOSURE PORT)

2.1.1 Specification Reference

FCC CFR 47 Part 15C: 2006, Clause 15.209, 15.231, 15.205

2.1.2 Equipment Under Test

Firefly Transmitter, S/N: Not Serialised

2.1.3 Date of Test and Modification State

27 May 2008 - Modification State 0
5 August 2008 – Modification State 0

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 15: 2006.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.1.6 Environmental Conditions

	27 May 2008	5 August 2008
Ambient Temperature	19.4°C	21.2°C
Relative Humidity	54%	43%
Atmospheric Pressure	1007mbar	1001mbar

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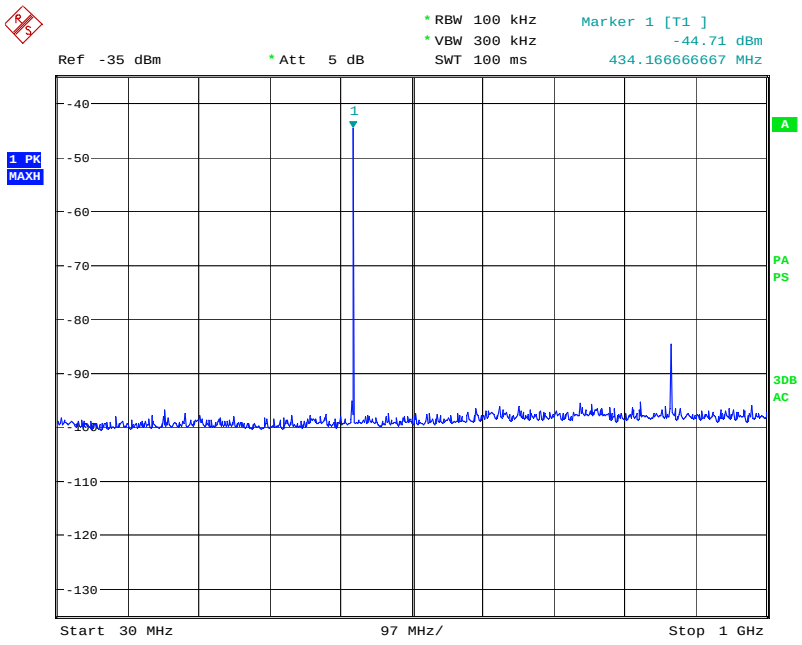
2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15C: 2006 for Radiated Emissions (Enclosure Port).

The test results are shown below.

Configuration 1 - Mode 1

30MHz to 1GHz

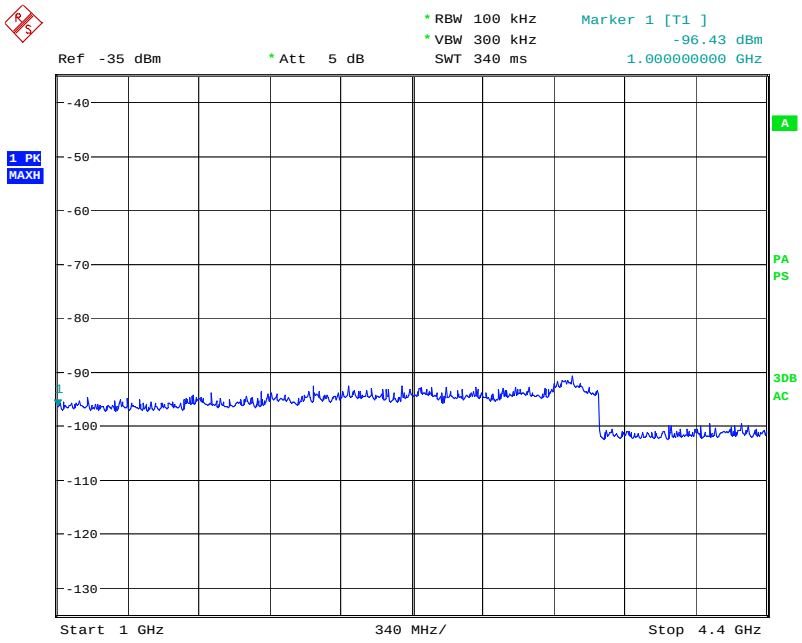


Date: 27.MAY.2008 12:25:48

Frequency MHz	Antenna Polarisation	Antenna Height cm	EUT Arc degrees	Result Peak dBµV/m	Limit dBµV/m	Margin dB
867.8685	Vertical	125	175	37.56	54.00	16.44

No other emissions were detected.

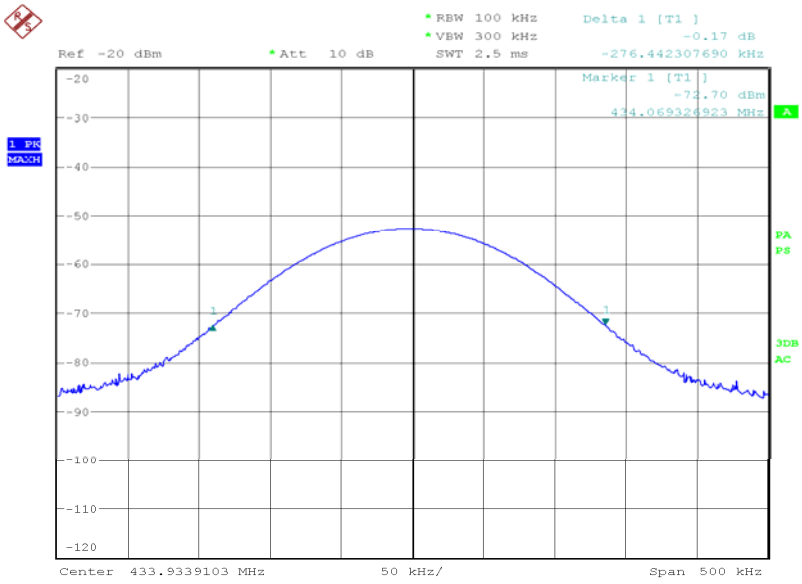
1GHz to 4.4GHz



Date: 27.MAY.2008 12:17:33

No emissions were detected within 15dB of the specification limit.

20dB Bandwidth measurement



Date: 5.AUG.2008 15:03:54

Measured Bandwidth is 276.4kHz. Limit is 1.084MHz with a carrier of 433.94MHz.

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SECTION 3

TEST EQUIPMENT USED

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3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 EMC - Radiated Emissions					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Jun-2008
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	235	12	29-Jun-2008
Pre-Amplifier	Phase One	PS04-0085	1532	-	TU
Screened Room (5)	Rainford	Rainford	1545	36	11-Feb-2011
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Turntable/Mast Controller	EMCO	2090	1607	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	28-Nov-2009
Antenna (Biconnical)	Schaffner	VBA6106A	3106	12	26-Mar-2009
Signal Generator (10MHz to 40GHz)	Rohde & Schwarz	SMR40	3171	12	11-Jul-2008
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	15-Mar-2009

TU – Traceability Unscheduled

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3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	26MHz to 2.5GHz Test Amplitude	1.4dB†
Conducted Susceptibility	100kHz to 250MHz Amplitude	1.8dB†
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.4dB*
Magnetic Field/Flux iaw EN 50366	10Hz to 400kHz	2.64%
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—
Compass Safe Distance	Azimuth Accuracy	0.10°

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

* In accordance with CISPR 16-4
† In accordance with UKAS Lab 34

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SECTION 4

PHOTOGRAPHS

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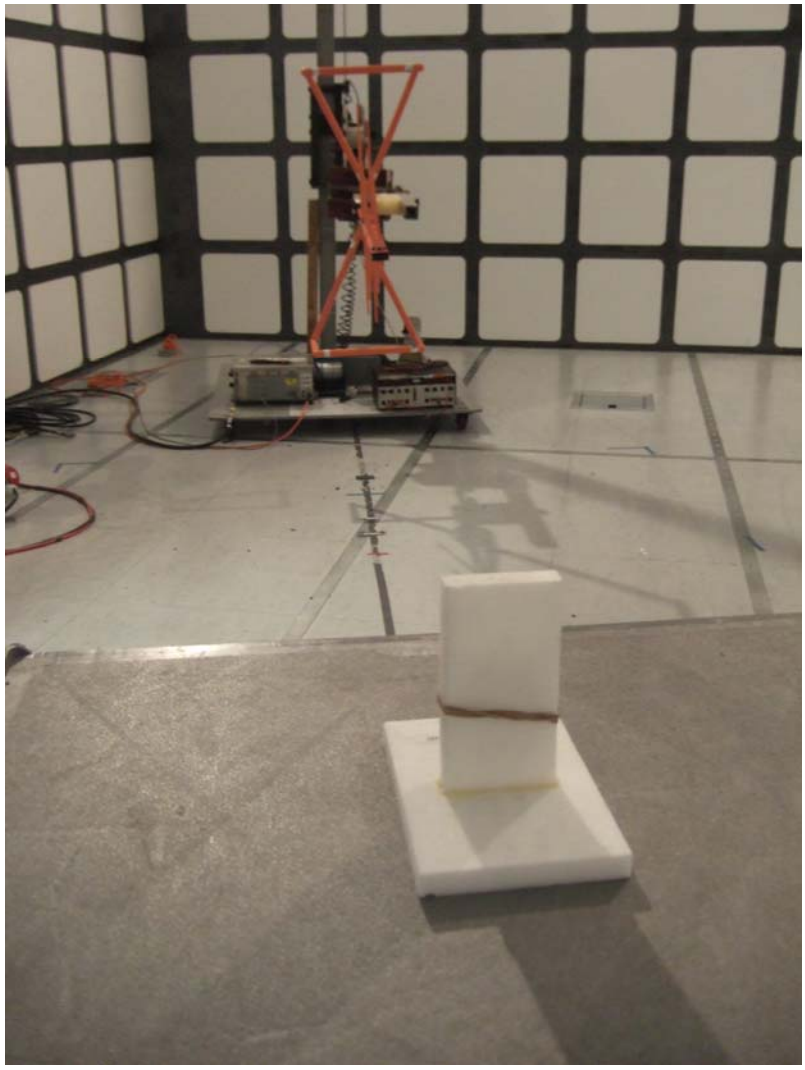
4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)



Radiated Emissions (Enclosure Port) Test Setup

Radiated Emissions (Enclosure Port) Test Setup

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SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Product Service

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).