Report On

FCC Testing of the
RF Solutions Ltd
Tensator Central Board

COMMERCIAL-IN-CONFIDENCE

FCC ID: P9OQ1864-CTRX

Document 75907908 Report 03 Issue 1 February 2010

TUV Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk

REPORT ON

FCC Testing of the
RF Solutions Ltd
Tensator Central Board

Document 75907908 Report 03 Issue 1

February 2010

PREPARED FOR

RF Solutions Ltd
Unit 21
Cliffe Industrial Estate
South Street
Lewes
East Sussex
BN8 6JL

PREPARED BY

N Bennett
Senior Administrator

APPROVED BY

C Gould
Authorised Signatory

M J Hardy
Authorised Signatory

DATED 04 February 2010

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. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

G Lawler

A Guy

R A Blagg

UKAS TESTING 0141

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

FCC Testing of the
RF Solutions Ltd
Tensator Central Board

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the RF Solutions Ltd, Tensator Central Board to the requirements of FCC CFR 47 Part 15.

Objective	To perform FCC 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	Q1864-CTRX
Serial Number(s)	Not Serialised
Software Version	Version 1
Hardware Version	Version 1
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15: 2007
Incoming Release Date	Declaration of Build Status 05 January 2010
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	13465 20 October 2009
Start of Test	23 October 2009
Finish of Test	27 January 2010
Name of Engineer(s)	A Guy G Lawler R A Blagg
Related Document(s)	ANSI C63.4: 2003

Product Service

1.2 BRIEF SUMMARY OF RESULTS

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

Configuration 1 - Stand Alone						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
2.1	15.109 15.231 15.205	Radiated Emissions (Enclosure Port)	Transmit with modulation	0	Pass	-
			Idle	0	Pass	
	15.107	Conducted Emissions (AC Power Port)	Transmit with modulation		N/A	
			Idle		N/A	
2.2	15.231	Bandwidth of the Emission	Transmit with modulation	0	Pass	-
			Idle		N/A	

N/A – Not Applicable

1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Tensator Central Board
MANUFACTURER	RF Solutions Ltd
TYPE	CTRX
PART NUMBER	Q1864-CTRX
SERIAL NUMBER	N/A
HARDWARE VERSION	Version 1
SOFTWARE VERSION	Version 1
TRANSMITTER OPERATING RANGE	-
RECEIVER OPERATING RANGE	-
COUNTRY OF ORIGIN	UK
INTERMEDIATE FREQUENCIES	-
ITU DESIGNATION OF EMISSION	433MF2D
HIGHEST INTERNALLY GENERATED FREQUENCY	-
OUTPUT POWER (W or dBm)	30µW
FCC ID	P90Q1864-CTRX
INDUSTRY CANADA ID	N/A
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Central control and transceiver for tensator que forwarding system

Signature 

Date 05 January 2010

D of B S Serial No 75907908

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

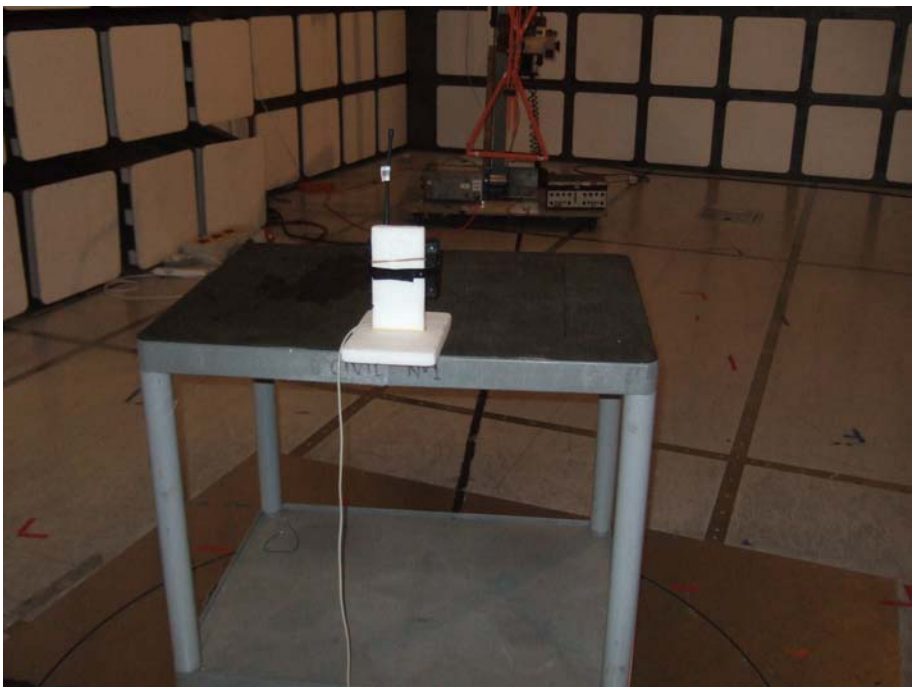
No responsibility will be accepted by TÜV Product Service as to the accuracy of the information declared in this document by the manufacturer.

Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a RF Solutions Ltd, Tensator Central Board as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.



Equipment Under Test

Product Service

1.4.2 Test Configuration

Configuration 1: Stand Alone

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

1.4.3 EUT Cable / Port Identification

Port	Max Cable Length specified	Usage	Type	Screened
USB	2.0m	Power/monitoring	Multicore	Yes

1.4.4 Modes of Operation

Modes of operation of EUT during testing were as follows:

Mode 1 – Transmit with modulation

Mode 2 – Idle

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

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 USB cable via a laptop.

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.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
RF Solutions Ltd
Tensator Central Board

2.1 RADIATED EMISSIONS (ENCLOSURE PORT)

2.1.1 Specification Reference

FCC CFR 47 Part 15, Clauses 15.109, 15.231(b) and 15.205

2.1.2 Equipment Under Test

Tensator Central Board, S/N: Not Serialised

2.1.3 Date of Test and Modification State

23 to 25 October, 26 November 2009 and 19 January 2010 - 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 ANSI C63.4.

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

Configuration 1 - Mode 1
- Mode 2

2.1.6 Environmental Conditions

	23 October 2009	25 October 2009	25 November 2009
Ambient Temperature	22.1°C	21.9°C	20.1°C
Relative Humidity	38%	33%	28%
Atmospheric Pressure	1005mbar	1010mbar	1000mbar

	19 January 2010
Ambient Temperature	25.6°C
Relative Humidity	23%
Atmospheric Pressure	1013mbar

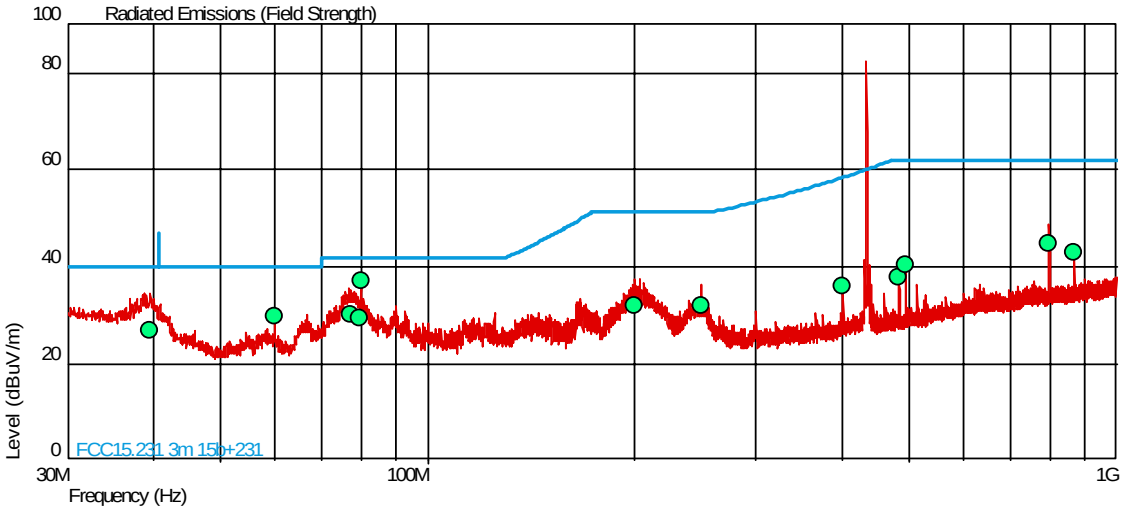
Product Service

2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15.231 (b) and FCC CFR 47 Part 15.205, for Radiated Emissions (Enclosure Port).

The test results are shown below.

Configuration 1 - Mode 1



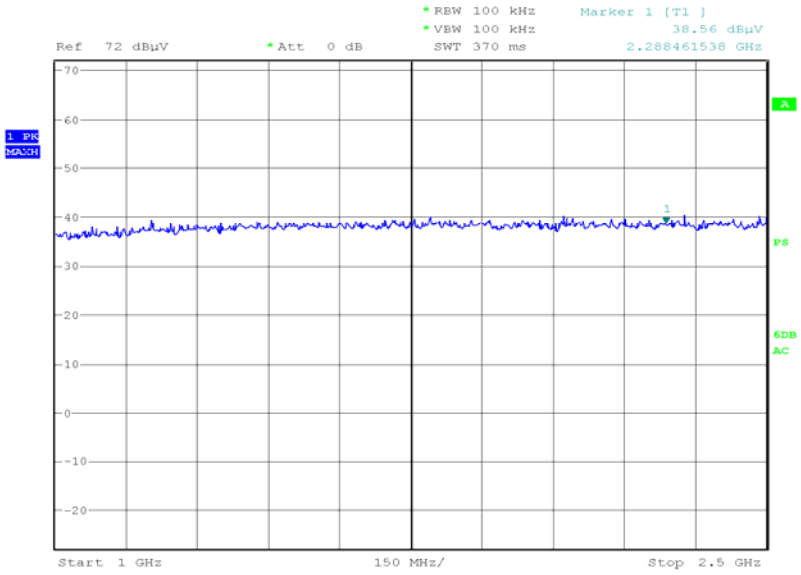
Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (deg)	Height (m)	Polarity
39.577	27.0	22.4	40.0	100	-13.0	-77.6	360	1.00	Vertical
59.999	29.7	30.5	40.0	100	-10.3	-69.5	304	1.00	Vertical
77.477	30.2	32.4	42.0	125	-9.8	-92.6	231	1.00	Vertical
79.611	29.4	29.5	42.0	125	-10.6	-95.5	209	1.00	Vertical
79.997	37.0	70.8	42.0	125	-3.0	-54.2	257	1.00	Vertical
200.060	32.0	39.8	51.5	375	-11.5	-335.2	77	1.00	Vertical
250.014	32.1	40.3	51.5	375	-13.9	-334.7	360	1.00	Vertical
400.003	35.9	62.4	59.6	958.3	-10.1	-895.9	316	1.00	Vertical
484.051	38.0	79.4	62.0	1250	-8.0	-1170.6	101	1.00	Vertical
493.970	40.2	102.3	62.0	1250	-5.8	-1147.7	125	1.00	Vertical
797.748	44.9	175.8	62.0	1250	-1.1	-1074.2	0	0.00	Horizontal
868.114	42.9	139.6	62.0	1250	-3.1	-1110.4	210	1.00	Horizontal

Emission at 433 MHz is the carrier.

Product Service

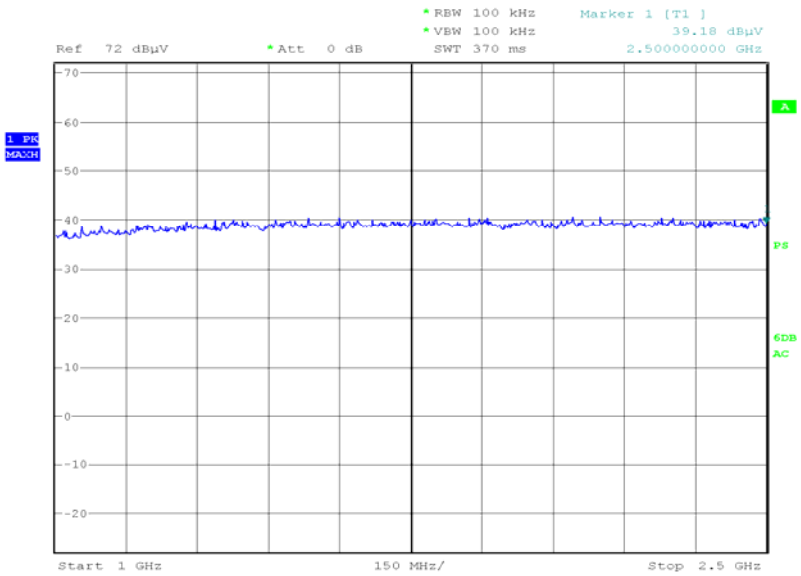
1GHz to 2.5GHz

Vertical



Date: 25.OCT.2009 13:04:35

Horizontal

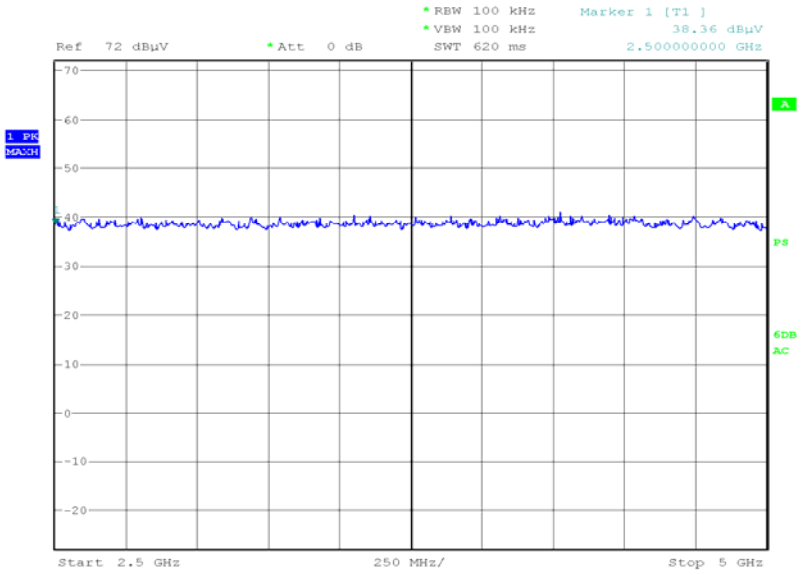


Date: 25.OCT.2009 13:32:46

Product Service

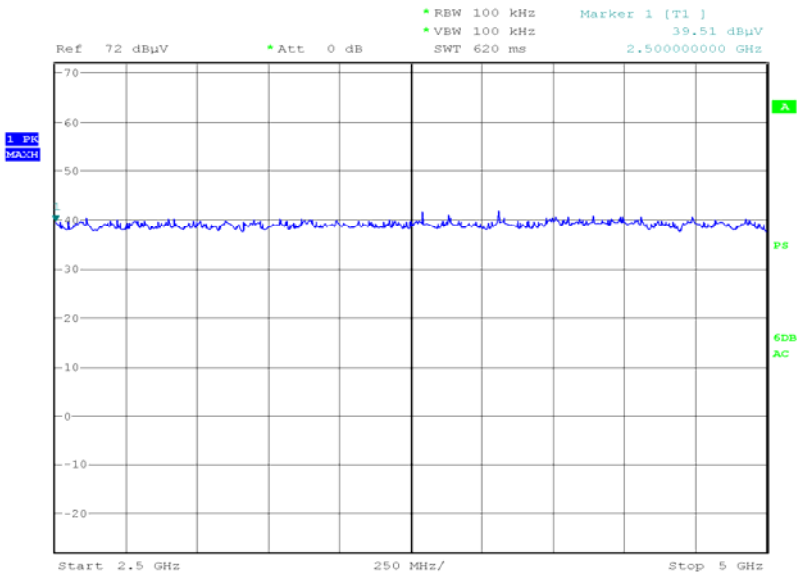
2.5GHz to 5GHz

Vertical



Date: 25.OCT.2009 13:07:08

Horizontal



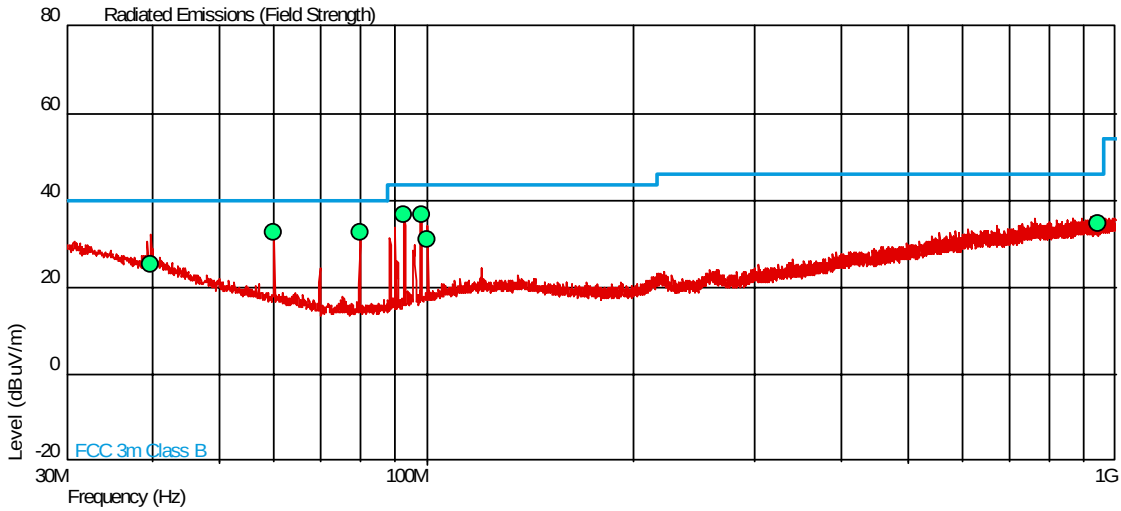
Date: 25.OCT.2009 13:14:15

Product Service

For the period of test the EUT met the requirements of FCC CFR 47 Part 15.109 for Radiated Emissions (Enclosure Port).

The test results are shown below.

Configuration 1 - Mode 2

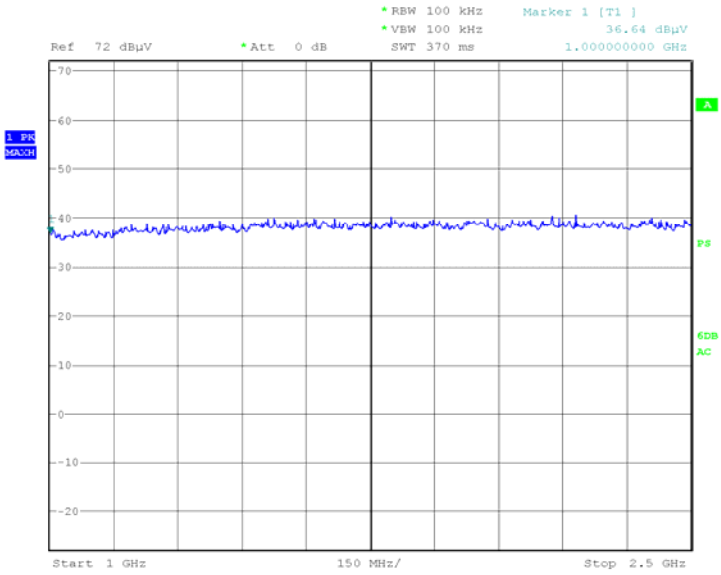


Frequency (MHz)	QP Level (dBµV/m)	QP Level (µV/m)	QP Limit (dBµV/m)	QP limit (µV/m)	QP Margin (dBµV/m)	QP Margin (µV/m)	Angle (deg)	Height (m)	Polarity
39.798	25.5	18.8	40.0	100	-14.5	-81.2	359	1.00	Vertical
59.996	32.8	43.7	40.0	100	-7.2	-56.3	310	1.00	Vertical
79.996	32.7	43.2	40.0	100	-7.3	-56.8	127	1.00	Vertical
92.906*	36.6	67.8	43.5	150	N/A	-82.2	91	1.00	Vertical
98.199*	36.5	67.6	43.5	150	N/A	N/A	53	1.21	Vertical
100.294*	31.0	35.5	43.5	150	N/A	N/A	60	1.00	Vertical
942.361	34.7	54.3	46.0	200	-11.3	-145.7	22	1.00	Vertical

* and N/A indicate an Ambient signal and should be ignored.

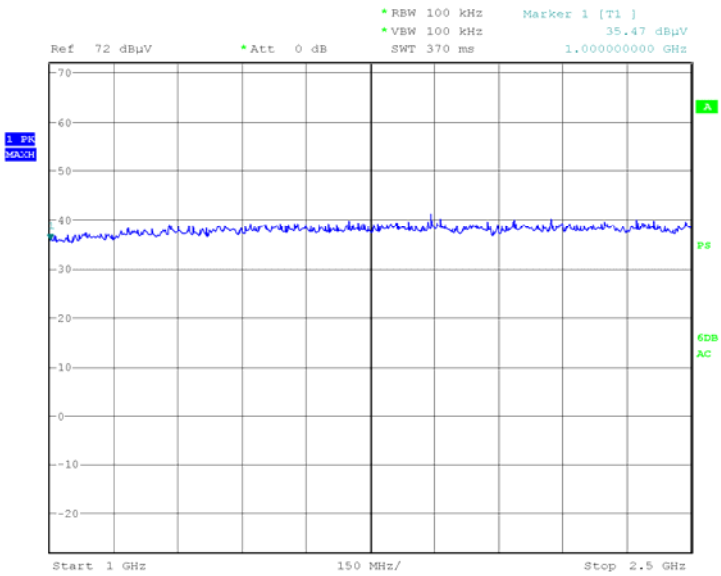
1GHz to 2.5GHz

Vertical



Date: 25.OCT.2009 12:53:01

Horizontal



Date: 25.OCT.2009 12:55:21

Product Service

2.2 BANDWIDTH OF THE EMISSIONS

2.2.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.231

2.2.2 Equipment Under Test

Tensator Central Board, S/N: Not Serialised

2.2.3 Date of Test and Modification State

27 January 2010 - Modification State 0

2.2.4 Test Equipment Used

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

2.2.5 Test Method and Operating Modes

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

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

Configuration 1 - Mode 1

2.2.6 Environmental Conditions

	27 January 2010
Ambient Temperature	22.8°C
Relative Humidity	22.7%

Product Service

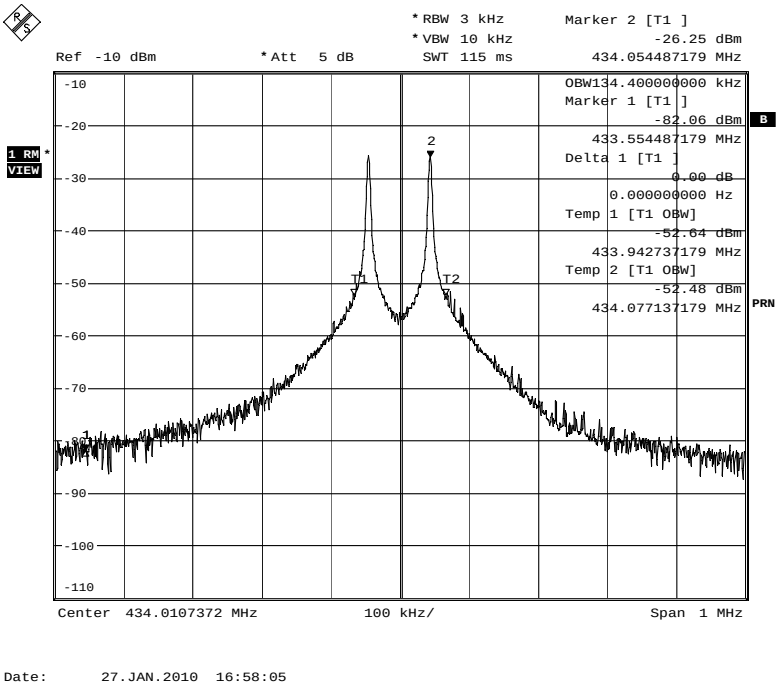
2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15, for Bandwidth of the Emission.

The test results are shown below.

Configuration 1 - Mode 1

Channel Number/Frequency	Result (MHz)	Limit (MHz)
433.920	0.1344	1.0848



Limit Clause

The 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70 MHz to 900 MHz. For devices opeating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

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 (1GHz-18GHz)	EMCO	3115	235	12	12-Oct-2010
Pre-Amplifier	Phase One	PS04-0085	1532	12	16-Sep-2010
Screened Room (5)	Rainford	Rainford	1545	36	11-Feb-2011
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Turntable/Mast Controller	EMCO	2090	1610	-	TU
Antenna (Bilog)	Chase	CBL6143	287	24	21-Jan-2010
Antenna (Bilog)	Chase	CBL6143	2904	24	28-Nov-2009
Signal Generator	Rohde & Schwarz	SMR40	3171	12	4-Aug-2010
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	1-Sep-2010
Section 2.2 Radio (Tx) - Occupied Bandwidth					
GPS Frequency Standard	Rapco	GPS-804/3	1312	6	4-Mar-2010
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	2-Nov-2010
Hygrometer	Rotronic	I-1000	2891	12	17-Apr-2010

TU – Traceability Unscheduled

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†
DC Input Ripple Immunity	Current Voltage	0.45% 0.91%
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

Product Service

SECTION 4

PHOTOGRAPHS

Product Service

4.1 TEST SET UP PHOTOGRAPHS

Radiated Emissions (Enclosure Port)

Product Service

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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).