EMC Technologies (NZ) Ltd
PO Box 68-307, Newton
Auckland 1145
47 MacKelvie Street, Grey Lynn,
Auckland 1021
New Zealand
Phone 09 360 0862
Fax 09 360 0861
E-Mail Address: aucklab@ihug.co.nz
Web Site: www.emctech.com.au

TEST REPORT

Kruse GO Explorer Receiver

tested to

47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

Subpart A + B

for

Kruse Multilingual Systems Ltd

Testing carried out by :

Andrew Cutler- General Manager

Test Report issued with the authority of:

Andrew Cutler- General Manager

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Table of Contents

1. STATEMENT OF COMPLIANCE

The **Kruse GO Explorer Receiver** complies with FCC Part 15 Subpart A + B as a Receiver when the methods as described in ANSI C63.4 - 2003 are applied.

2. RESULTS SUMMARY

The results from testing, carried out between September 12th and September 17th 2013 are summarised in the following table:

Clause	Parameter	Result
15.101	Equipment authorisation requirement.	Certification required as the device would be categorised as a "Receiver".
15.103	Exempted devices.	Device is not exempt as it contains a digital device.
15.107	Conducted Emissions 0.15 - 30 MHz	Complies with a 7.7 dB margin at 432.0 kHz (Quasi Peak)
15.109	Radiated Emissions 30 - 5000 MHz	Complies with a 2.9 dB margin at 99.220 MHz (Vertical)
15.111	Antenna Terminal Disturbance 30 – 950 MHz	Not applicable. Receiver does not have an external antenna port.

3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

The client selected the test sample.

This report relates only to the sample tested.

This report contains no corrections or erasures.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

4. CLIENT INFORMATION

Company Name	Kruse Multilingual Systems Ltd
Address	PO Box 41169 St Lukes
City	Auckland 1346
Country	New Zealand
Contact	Mr Shaun O'Donnell

5. DESCRIPTION OF TEST SAMPLE

Brand Name	Kruse
Model Number	GO
Product	Explorer Receiver
Manufacturer	Kruse Multilingual Systems Ltd
Country of Origin	New Zealand
Serial Number	Sample not serialized
FCC ID	2AE66-KGE33

Product Description

The device tested is part of a system that consists of one master unit and one or many receiver units.

The receiver is powered using a re-chargable lithium polymer battery pack at 3.7 Vdc.

The receiver plays an audio commentaries that is held on the receiver which is triggered by a pulse from the master unit.

This pulse can be generated automatically by the master unit assessing its location using a GPS receiver or manually by the operator using the keypad on the master unit.

Band of Operation:	902 – 928 MHz	
Modulation:	Frequency hopping spread spectrum	
Number of channels:	50	
Operating frequencies:	922.0 – 926.9 MHz	
Channel spacing:	100 kHz	
Rated Conducted Power:	+10 dBm (10 mW)	
Frequencies in use:	Microcontroller	16.000 MHz,
	Audio Decoder	12.288 MHz
	RF Module	30.000 MHz
	LCD power supply	4.000 MHz
	Main power supply	850.0 kHz
Antenna Type:	Internal antenna	
Power Supply:	3.7 Vdc internal lithium polymer battery pack	
Ports:	Battery charger port Audio output port	
RF Module	Hope RF RFM22B Transceiver that operates in receive mode only	

6. SETUPS AND PROCEDURES

Standard

The sample was tested in accordance with 47 CFR Part 15 Subpart A and B.

Methods and Procedures

The following measurement methods and procedures have been applied:

- ANSI C63.4 – 2003

Section 15.101: Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is required for this device as it would be classed as a Class B computer peripheral.

Section 15.107: Conducted limits

Conducted Emissions testing was carried out over the frequency range of 150 kHz to 30 MHz which was carried out at the laboratory's MacKelvie Street premises in a 2.4 m x 2.4 m x 2.4 m screened room

Testing was carried out using a representative AC power supply system that was powered at 120 Vac 60 Hz which was used to charge the batteries that operate this device and was connected to the charging port on the device.

Testing was carried out with the device receiving continuously.

The device was placed on top of the emissions table, which is 1 m x 1.5 m, 80 cm above the screened room floor which acts as the horizontal ground plane.

In addition the device was positioned 40 cm away from the screened room wall which acts as the vertical ground plane.

The artificial mains network was bonded to the screened room floor.

At all times the device was kept more than 80 cm from the artificial mains network.

The Class B limits have been applied.

The supplied plot is combined plot showing the worst case quasi peak and average results of both the phase and neutral lines to the representative AC power supply.

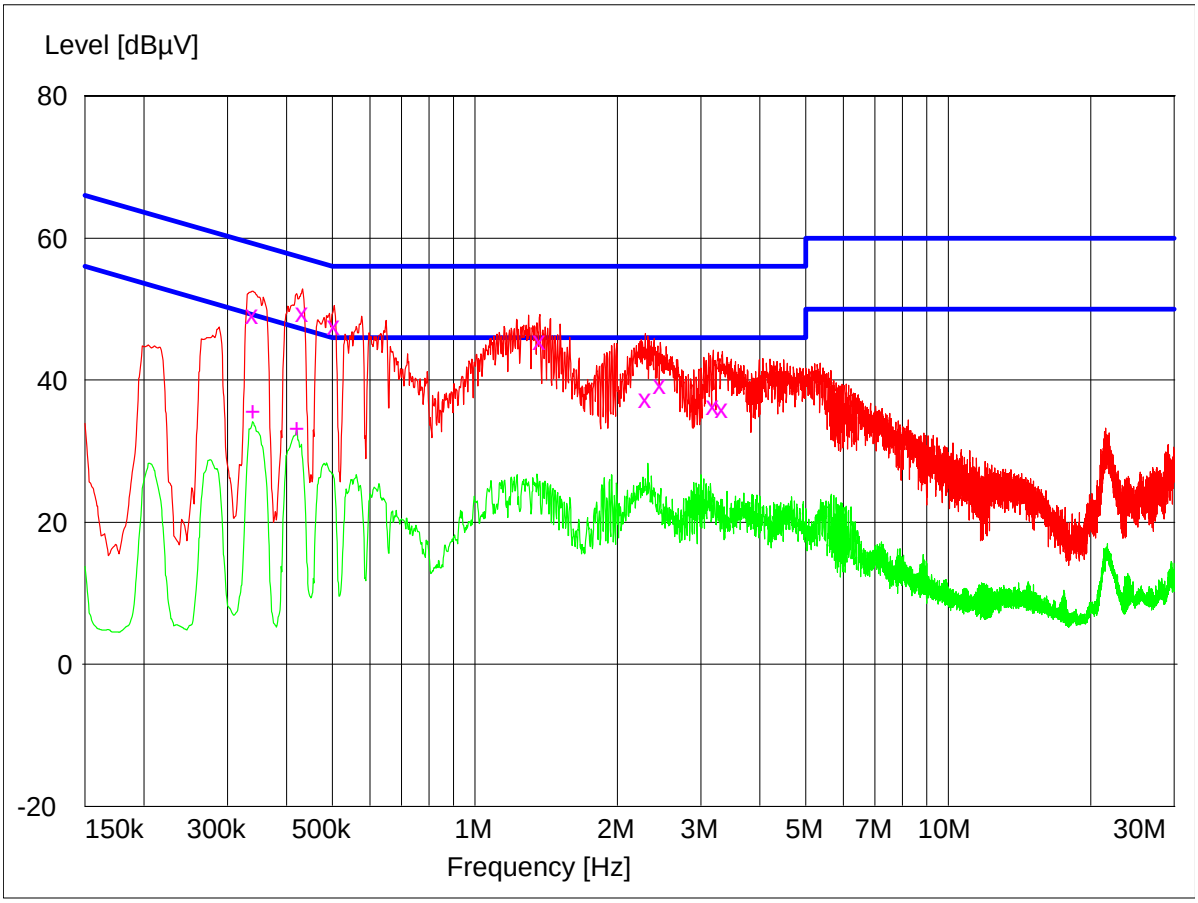
Quasi peak and average detectors have been used with resolution bandwidths of 9 kHz.

Measurement uncertainty with a confidence interval of 95% is:
- AC Mains port (0.15-30 MHz) ± 2.8 dB

Conducted Emissions – AC Input Power Port

Setup:	Receiver tested while playing a safety message when being charged using a representative power supply at 115 Vac 60 Hz.

Peak ---	Average --	Quasi Peak X	Average +



Final Quasi-Peak Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Phase	Rechecks dBµV
0.339000	49.20	59.2	10.0	L1	
0.432000	49.60	57.3	7.7	L1	
0.504000	47.70	56.0	8.3	L1	
1.371000	45.60	56.0	10.4	L1	
2.288000	37.40	56.0	18.6	L1	
2.463500	39.40	56.0	16.6	L1	
3.188000	36.40	56.0	19.6	L1	
3.332000	36.10	56.0	19.9	L1	

Final Average Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Phase	Rechecks dBµV
0.339000	35.60	49.3	13.7	L1	
0.420000	33.20	47.5	14.3	L1	

Section 15.109 – Radiated emissions

Radiated emission testing was carried out over the frequency range of 30 to 5000 MHz as the highest frequency in use is less than 1000 MHz as the receiver receives in the 900 MHz band.

Testing was carried out at the laboratory's open area test site - located at 670 Kawakawa Orere Rd, RD3, Papakura, New Zealand.

This site conforms to the requirements of CISPR 16 and ANSI C63.4 - 2003.

Before testing was carried out, a receiver Self Test and Internal Calibration was undertaken along with a check of all connecting cables and programmed antenna factors.

The device was placed on the test tabletop, which was a total of 0.8 m above the test site ground plane.

Measurements of the radiated field were made with the antenna located at a 3 metre horizontal distance from the boundary of the devices under test.

Testing is carried out by manually scanning between 30 and 5000 MHz in 100 kHz steps while aurally and visually monitoring for emissions.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height with an automated antenna tower.

The emission is measured in both vertical and horizontal antenna polarisations with the device being tested in three orientations (X, Y and Z plane) as the device is portable.

Below 1000 MHz a Quasi Peak detector with a bandwidth of 120 kHz is used and above 1000 MHz a Peak detector and an Average detector with a bandwidth of 1 MHz are used.

During the test, a number of ambient emissions are identified (list of which can be provided upon request).

The emission level is determined in field strength by taking the following into consideration:
Level (dBμV/m) = Receiver Reading (dBμV) + Antenna Factor (dB/m) + Coax Loss (dB)

Radiated Emissions 30 – 5000 MHz

Testing was carried with the receiver operating continuously while playing a safety message continuously that was being transmitted by the transmitter associated with this receiver.

The transmitter was placed approximately 10 metres from the receiver.

Attached to the receiver were an ear piece that was attached to the audio output socket and the battery charger that was charging the battery while the device was operating

The receiver was placed in the centre of the test table.

The receiver was tested in 3 orientation they being
- laying flat
- standing on edge
- standing upright

The charger was powered at 115 Vac 60 Hz.

Observations:

No emissions were detected from the device within 20 dB of the applicable limit in both modes of operation and in any of the device orientations using vertical or horizontal polarisations between 30 – 5000 MHz

Result: Complies.
Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (30 MHz – 500 MHz) ± 4.1 dB

7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due	Interval
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	Not applic	Not applic
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	Not applic	Not applic
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	Not applic	Not applic
Receiver	R & S	ESIB 40	100171	R-27-1	10 Oct 2013	1 year
Receiver	R & S	ESHS 10	828404/005	RFS 3728	2 Feb 2014	1 year
Mains Network	R & S	ESH2-Z5	881362/034	3628	29 Jul 2014	1 year
VHF Balun	Schwarzbeck	VHA 9103	-	RFS 3603	30 Jan 2014	3 years
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612	30 Jan 2014	3 years
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	30 Jan 2014	3 years
Horn Antenna	EMCO	3115	9511-4629	E1526	3 May 2014	3 years
Horn Antenna	EMCO	3116	92035	-	16 Jun 2014	3 years
Loop Antenna	EMCO	6502	9003-2485	3798	9 May 2014	3 years

8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies Ltd registration with the Federal Communications Commission as a listed facility, registration number: 90838, which was updated in July 2013.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

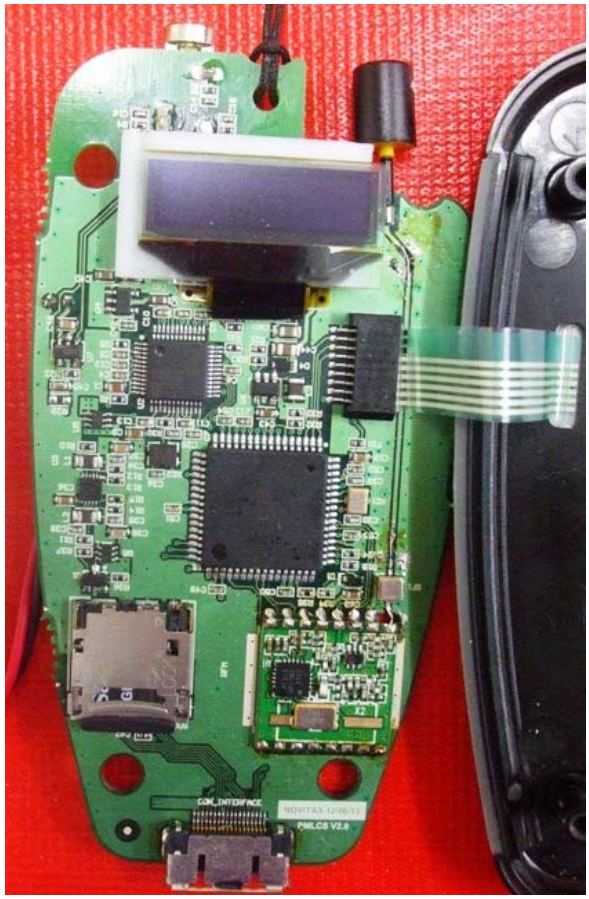
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies.
This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

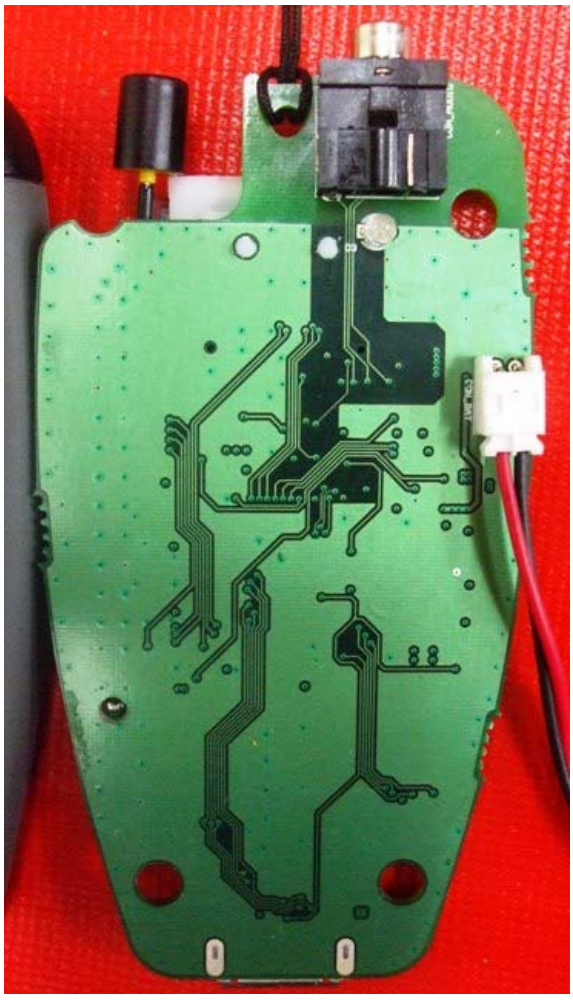
9. PHOTOGRAPHS

External views

Power supply unit

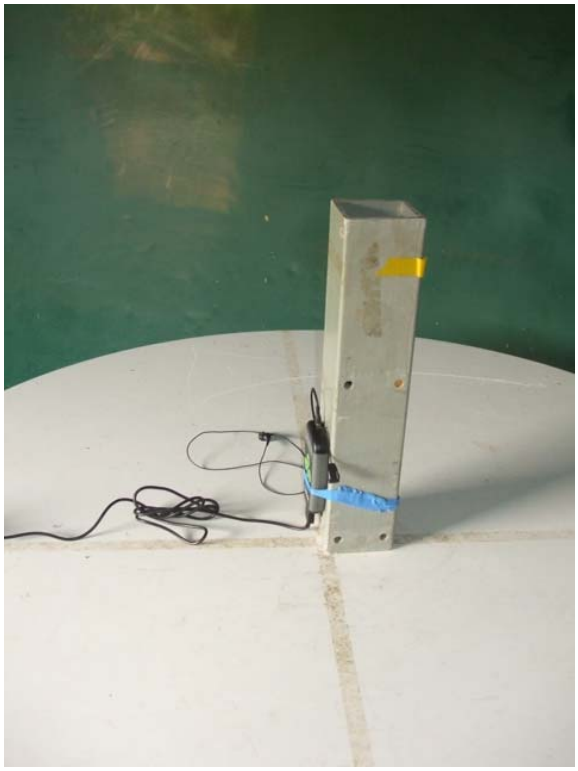
Internal views

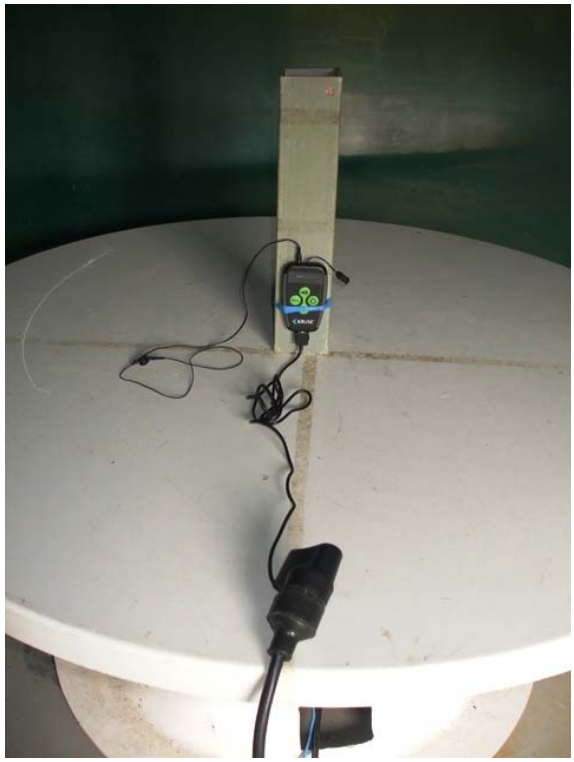




Conducted emissions test setup

Radiated emissions setup – Standing up right





Laying flat

Edge on