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TEST REPORT

Conrad Meier Fish Harvester B-010046
Remote Control Assembly

tested to the

Code of Federal Regulations (CFR) 47

**Part 15 – Radio Frequency Devices,
Subpart C – Intentional Radiators**

Section 15.249 – Operation in the band 900 – 928 MHz

for

Brand Developers Ltd

This Test Report is 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

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1. STATEMENT OF COMPLIANCE

The **Conrad Meier Fish Harvester B-010046 Remote Control Assembly** complies with 47 CFR Part 15 and in particular Sections, 15.205, 15.207, 15.209, 15.215 and 15.249 as detailed below when tested in accordance with ANSI C63.4 – 2003.

2. RESULTS SUMMARY

The results of testing carried out between 22nd May 2014 and the 16th June 2014 and on the 3rd October 2014 are detailed below.

Clause	Description	Result
15.201	Equipment authorisation requirement	Applied
15.203	Antenna requirement	Complies
15.204	External power amplifiers	Not applicable
15.205	Operation in restricted bands	Complies
15.207	Conducted emissions	Not applicable battery, powered device.
15.209	Radiated emissions	See below
15.215	Additional provisions	Complies
15.249 (a)	Field strength of fundamental	Complies
15.249 (a)	Field strength of harmonics	Complies
15.249 (b)	Fixed, point to point operations	Not applicable
15.249 (c)	3 metre measurement distance	Noted
15.249 (d)	Spurious emission levels except harmonics	Complies
15.249 (e)	Detectors above 1000 MHz	Noted
15.249 (f)	Reference to section 15.37(d)	Noted

3. CLIENT INFORMATION

Company Name Brand Developers Ltd

Address Unit H, 686 Rosebank Road
Avondale

City Auckland 1026

Country New Zealand.

Contact Mr Mikael Stewart

4. DESCRIPTION OF TEST SAMPLE

Brand Name	Conrad Meier Fish Harvester
Model Number	B-010046
Product	Hull Remote Control Assembly
Manufacturer	Brand Developers Ltd
Country of Origin	New Zealand
FCC ID	2ADCE-FH-HULL

The device that was tested is a remote control transceiver that operates on 924.5 MHz and is powered using lead acid batteries.

The device is located within a purpose built Kontiki floatation device.

It allows for the control of a battery operate motor and it also allows the device to be steered.

A Kontiki device is a fishing device that allows a long line, containing many hooks, to be taken several hundred meters from the shore line.

5. EQUIPMENT PARAMETERS

The 900 MHz transceiver in this device has the following RF specifications:

FCC Band:	902 - 928 MHz
Operating Frequency:	1 channel at 924.5 MHz
Rated Power:	less than 1 dBm
Modulation Type:	GFSK packet
Antenna Type:	Internal whip located on sealed circuit board
Power Supply:	2 x 12 Vdc lead acid batteries

6. ATTESTATION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

The client selected the test sample.

The report relates only to the sample tested.

This report contains no corrections or erasures.

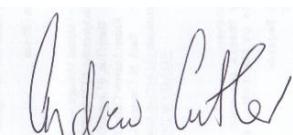
Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.



Andrew Cutler
General Manager
EMC Technologies NZ Ltd

7. TEST RESULTS

Section 15.201: Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is required for this device as it contains a 900 MHz transmitter.

Section 15.203 – Antenna requirement

This device uses an internal whip antenna that is mounted on a sealed circuit board

Result: Complies

Section 15.204: External radio frequency power amplifiers and antenna modifications

An external power amplifier is not supplied with this device and it is not possible to attach an external power amplifier.

Result: Complies.

Section 15.205 – Restricted bands of operation

Refer to measurements made with reference to Section 15.249 (a).

This device operates in the 902 - 928 MHz which is not a restricted band.

Result: Complies

Section 15.209 – Radiated emissions below 30 MHz

In accordance with section 15.249 (d) the general emission limits specified in Section 15.209 (a) have been applied to all emissions except the transmitter harmonics.

See Section 15.249 (a) for further details.

Low frequency measurements were attempted between 9 kHz – 30 MHz at the open area test site over a distance of 10 metres using a loop antenna the centre of which was 1 metre above the ground.

Testing was carried out with the device being placed in the centre of the test table standing upright.

The device was tested transmitting continuously once a second on 924.500 MHz.

The general limits described in 15.209 have been applied with the 300 metre and 30 metre limits being extrapolated by a factor of 40 dB per decade as allowed for in section 15.31(d) (2).

Between 9 – 90 kHz and between 110 – 490 kHz an Average detector and a Peak detector were used.

Where a peak detector was used the limit was increased by +20 dB

Between 90 kHz and 110 kHz band between 490 kHz and 30 MHz a Quasi Peak detector was used.

No emissions were detected on these frequencies of interest and no other emissions were detected from this device over the range of 9 kHz – 30 MHz

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests $(9 \text{ kHz} – 30 \text{ MHz}) \pm 4.8 \text{ dB}$

Section 15.209 – Radiated emissions above 30 MHz

In accordance with section 15.249 (d) the general emission limits specified in Section 15.209 (a) have been applied to all emissions except the transmitter harmonics.

See Section 15.249 (a) for further details.

Testing for general radiated emissions was carried out over the frequency range of 30 MHz to 3000 MHz as the device contains a receiver that operates at 924.5 MHz.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand.

Testing was carried out with the device being placed in the centre of the test table standing upright.

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, where appropriate, with an automated antenna tower.

Above 30 MHz the emission is measured in both vertical and horizontal antenna polarisations, where appropriate, using a quasi peak detector.

The emission level was determined in field strength by taking the following into consideration:

$$\text{Level (dB}\mu\text{V/m)} = \text{Receiver Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB)} + \text{Coax Loss (dB)}$$

Results:

No emissions observed from the system tested when measurements were attempted up to 3000 MHz using either horizontal or vertical polarisations.

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests $(30 - 3000 \text{ MHz}) \pm 4.1 \text{ dB}$

Section 15.215 (c) – Additional provisions to the general radiated emission limitations

The device operates in the 902-928 MHz band.

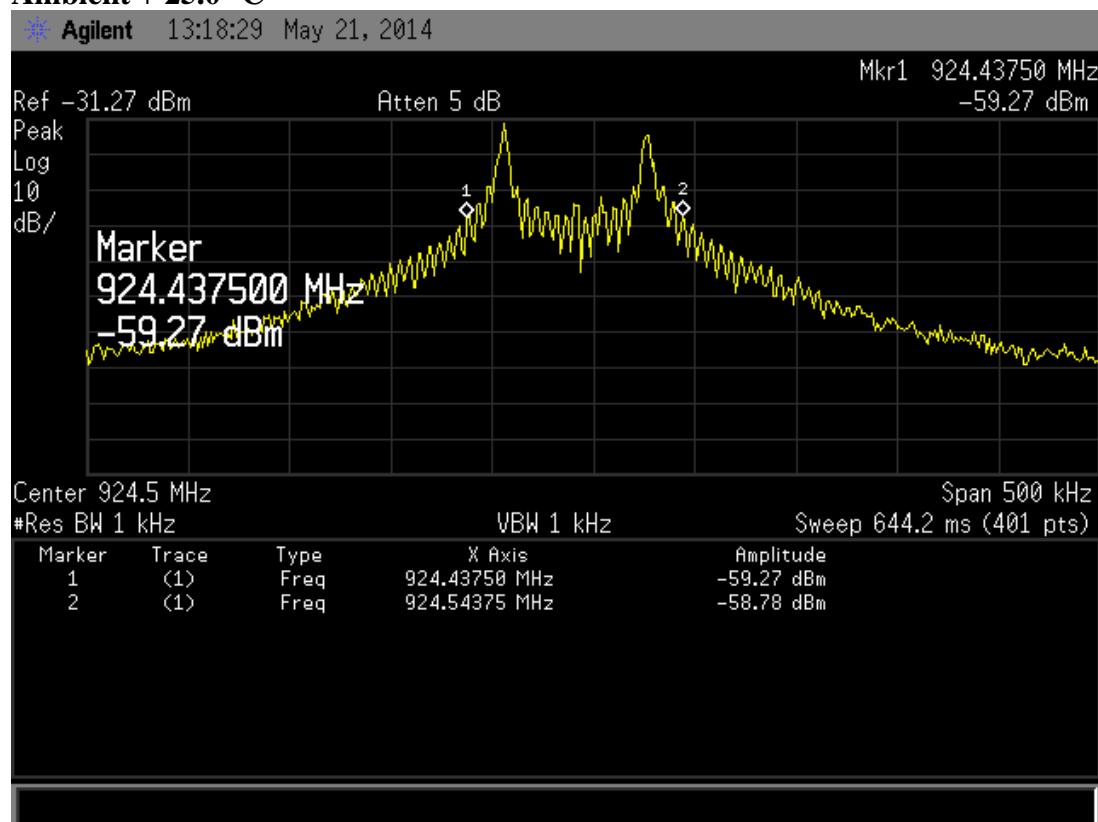
Relative spectrum mask measurements have been made when the device was operating on 924.500 MHz.

Measurements have actually been made at the -26 dB points as a worst case scenario

Frequency (MHz)	F low (MHz)	F high (MHz)	Temperature °C
924.5000	924.43750	924.54375	Ambient

The device can be seen to stay within the band of 902 - 928 MHz at the -26 dB points

Ambient + 25.0 °C



Results: Complies

Section 15.249 (a) – Field strength of the Fundamental and Harmonics

Radiated emission measurements were carried out with the limits as per section 15.249 (a) being applied to the Fundamental and Harmonics of each transmitter.

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site, which is located at Driving Creek, Orere Point, Auckland.

The transmitter was placed on the test table top which was a total of 0.8 m above the test site ground plane.

Measurements of the radiated field were made 3 metres from the transmitting antenna.

Measurements below 1000 MHz were made using a Quasi Peak Detector with a bandwidth of 120 kHz.

Measurements above 1000 MHz were made using an average detector with a bandwidth of 1.0 MHz and also a peak detector with a bandwidth of 1.0 MHz.

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.

All emissions were measured in both vertical and horizontal antenna polarisations.

The emission is measured in both vertical and horizontal antenna polarisations with no measurements were made above the 10th harmonic

Testing was carried out with the device being placed in the centre of the test table standing upright

Testing was carried out whilst the device was transmitting once every second

The emission level is determined in field strength by taking the following into consideration:

Level (dB μ V/m) = Receiver Reading (dB μ V) + Antenna Factor (dB) + Coax Loss (dB) – Amplifier Gain (dB)

Fundamental emission

Testing was carried out as detailed below when the device was positioned in its normal mode of operating which would be when it was floating in the sea.

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Antenna	Margin (dB)
924.500	71.9	94.0	Vertical	22.1
924.500	73.8	94.0	Horizontal	20.2

Measurements were made using a quasi peak detector with a 120 kHz bandwidth

Section 15.249 specifies a limit of 50 mV/m (94 dB μ V/m) when a quasi-peak detector is used for devices operating in the band of 902-928 MHz.

This limit has been converted to dB μ V/m using the formula $20 * (\log 0.050 / 0.000001)$

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests $(30 - 25,000 \text{ MHz}) \pm 4.1 \text{ dB}$

Harmonic Emissions

Transmitting on 924.500 MHz

Frequency (MHz)	Vertical (dB μ V/m)	Horizontal (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna	Detector	BW (MHz)
1849.000	52.1	53.5	74.0	20.5	Horizontal	Peak	1.0
1849.000	40.1	42.4	54.0	11.6	Horizontal	Average	1.0
2773.500	< 59.2	< 59.2	74.0	> 14.8	Vert / Hort	Peak	1.0
2773.500	< 45.6	< 45.6	54.0	> 8.4	Vert / Hort	Average	1.0
3698.000	< 53.1	< 53.1	74.0	> 20.9	Vert / Hort	Peak	1.0
3698.000	< 39.8	< 39.8	54.0	> 14.2	Vert / Hort	Average	1.0
4622.500	< 54.2	< 54.2	74.0	> 19.8	Vert / Hort	Peak	1.0
4622.500	< 41.3	< 41.3	54.0	> 12.7	Vert / Hort	Average	1.0
5547.000	< 57.5	< 57.5	74.0	> 16.5	Vert / Hort	Peak	1.0
5547.000	< 44.5	< 44.5	54.0	> 9.5	Vert / Hort	Average	1.0
6471.500	< 61.1	< 61.1	74.0	> 12.9	Vert / Hort	Peak	1.0
6471.500	< 47.4	< 47.4	54.0	> 6.6	Vert / Hort	Average	1.0
7396.000	< 55.3	< 55.3	74.0	> 18.7	Vert / Hort	Peak	1.0
7396.000	< 41.4	< 41.4	54.0	> 12.6	Vert / Hort	Average	1.0
8320.500	< 56.2	< 56.2	74.0	> 17.8	Vert / Hort	Peak	1.0
8320.500	< 42.5	< 42.5	54.0	> 11.5	Vert / Hort	Average	1.0
9245.000	< 56.8	< 56.8	74.0	> 17.2	Vert / Hort	Peak	1.0
9245.000	< 43.7	< 43.7	54.0	> 10.3	Vert / Hort	Average	1.0

Measurements were attempted at a distance of 3 metres using vertical and horizontal polarisations with a peak and an average detector with a 1 MHz bandwidth being used.

As per section 15.249 a limit of 500 μ V/m applies to the harmonic emissions when an average detector is used.

This limit has been converted to dB μ V/m using the formula $20 * (\log 500)$ with a factor of + 20 dB being added to determine the peak limit.

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests $(30 - 25,000 \text{ MHz}) \pm 4.1 \text{ dB}$

8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due	Interval
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	Not applic	-
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	Not applic	-
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612	7 Feb 2015	1 year
Horn Antenna	EMCO	3115	9511-4629	E1526	14 June 2017	3 year
Horn Antenna	EMCO	3116	92035	-	10 May 2016	3 year
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	7 Feb 2015	1 year
Receiver	R & S	ESIB 40	100171	R-27-1	29 Jan 2015	1 year
Spectrum Analyser	Hewlett Packard	E7405A	US39150142	3771	7 July 2015	1 year
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	Not applic	-
VHF Balun	Schwarzbeck	VHA 9103	-	RFS 3603	7 Feb 2015	1 year
Loop Antenna	EMCO	6502	9003-2485	3798	14 Jul 2017	3 year

At the time of testing all test equipment was within calibration

9. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd registration with the Federal Communications Commission as a listed facility, Registration Number: 90838, which was updated in June 2014.

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

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

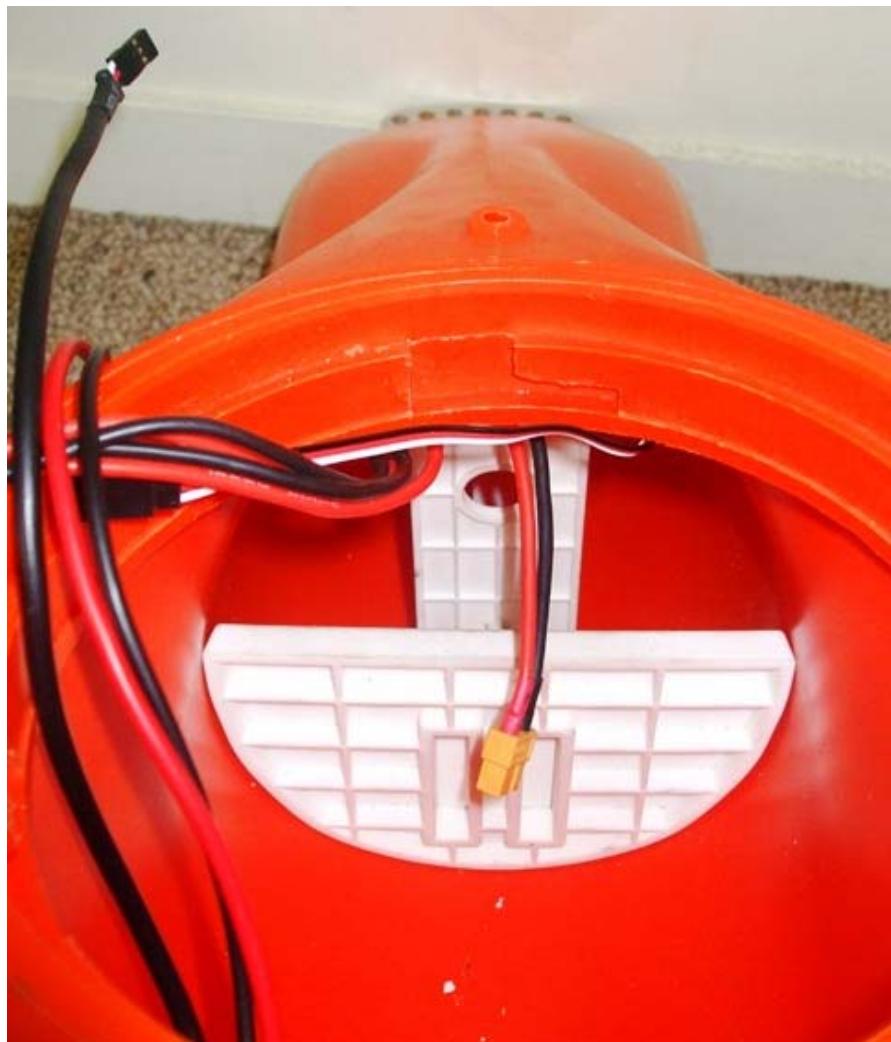
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with a number of accreditation bodies in various economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied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

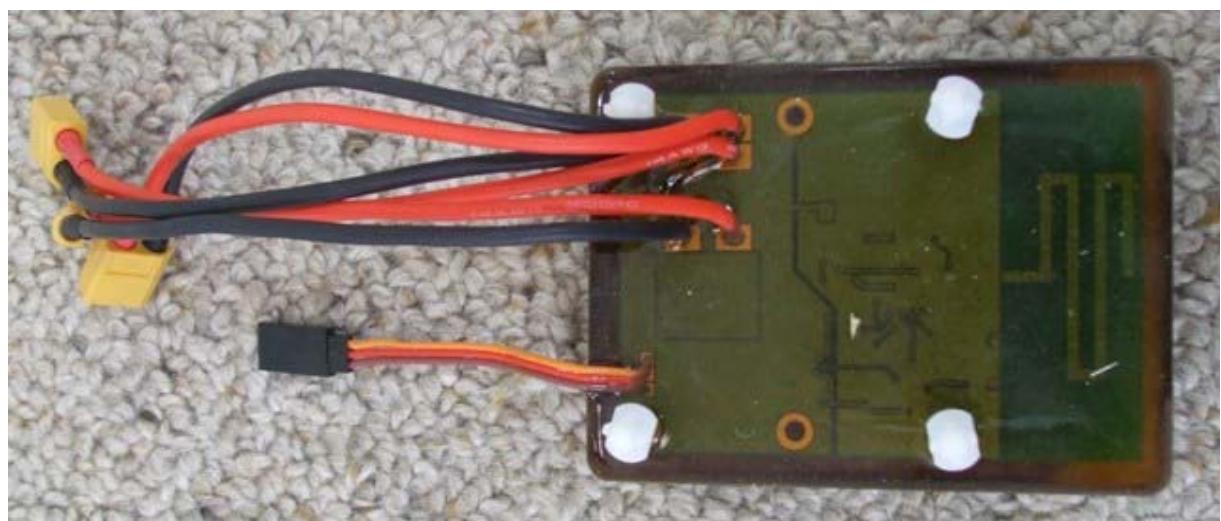
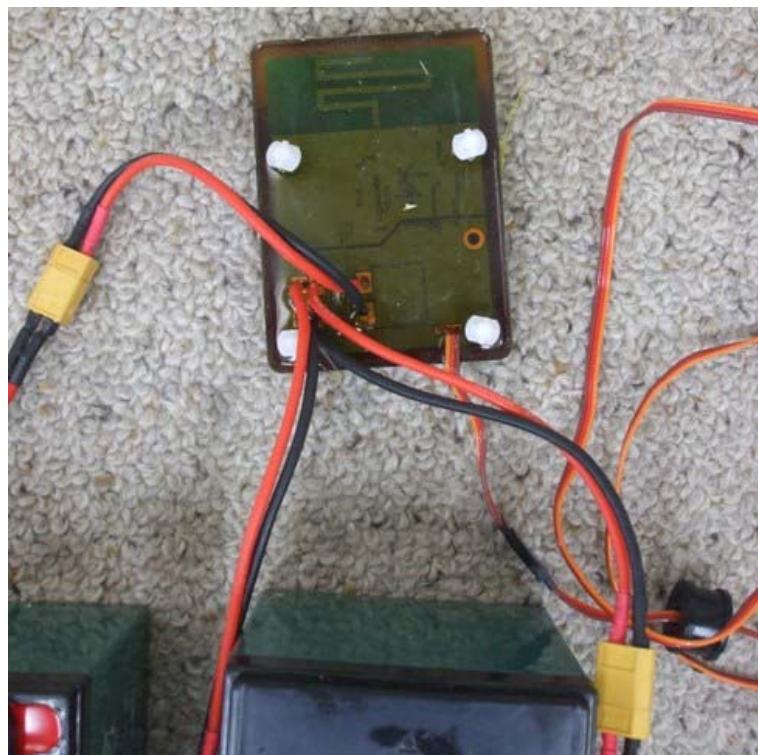
10. PHOTOGRAPHS

External Photos / Internal Photos









Test Set Up Photos





Radiated emissions test set up photos – Below 30 MHz



Radiated emissions test set up photos – Above 30 MHz

