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TEST REPORT

Trio DataCom O Series Radio Modem Module

tested to

47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

Subpart C – Intentional Radiators

Section 15.247 – Operation in the band 902 – 928 MHz

for

Trio DataCom Pty Ltd

A handwritten signature in black ink, appearing to read "Andrew Cutler", is written over a light blue rectangular background.

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 **Trio DataCom O Series Radio Modem Module** complies with FCC Part 15 Subpart C as an Intentional Radiator when the methods as described in ANSI C63.4 - 2003 are applied.

2. RESULTS SUMMARY

The results from testing, carried out between 6th – 23rd July 2012, are summarised in the following table:

Clause	Parameter	Result
15.109	Digital device and Receiver radiated emission limits	Complies
15.111	Antenna power conduction limits for receivers	Complies
15.201	Equipment authorisation requirement	Certification required
15.203	Antenna requirement	Complies
15.204	External PA and antenna modifications	Complies
15.205	Restricted bands of operation	Complies
15.207	Conducted limits	Not tested.
15.209	Radiated emission limits	Complies
15.247		
(a)(1)(i)	Frequency hopping requirements	Not tested
(b)(2)	Peak output power	Complies
(b)(4)	Antenna gains greater than 6 dBi	Complies
(c)	Directional antenna gains greater than 6 dBi	Not applicable
(d)	Out of band emissions	Complies
(e)	Power spectral density	Not applicable
(f)	Hybrid systems	Not applicable
(g)	Use of all channels	Noted
(h)	Intelligent frequency hopping	Noted
(i)	Radio frequency hazards	Complies

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	Trio DataCom Pty Ltd
Address	41 Aster Avenue Carrum Downs
State	Victoria 3201
Country	Australia
Contact	Mr Brett Comber

5. DESCRIPTION OF TEST SAMPLE

Brand Name	Trio DataCom
Range	O Series
Model Number	OM900-00001-DH0
Product	Radio Modem Module
Manufacturer	Trio DataCom Pty Ltd
Country of Origin	Australia
Serial Number	212881
FCC ID	NI8OM900

This RF module has the following options which are identified as follows:

OM900-00001-XY0 where

X = Software option which is unrelated to RF compliance

Y = 0 or H which relates to safety approvals and is not related to RF compliance

The client advises that minor changes have been made to the transmitter power amplifier and that no other changes have been made.

Class 2 permissive change testing has been carried out to ensure that this previously certified device remains compliant.

This device that was tested and has the following specifications:

Rated output power:	1 watt (+30.0 dBm) Power adjustable between +10 and +30 dBm in 0.1 dB steps
Antennas:	Marathon Series BMY890K Yagi Antenna with 10.0 dBd gain Guardian Series BGY890K Yagi Antenna with 10.0 dBd gain Marathon Series BMO902J Omni Antenna with 9.0 dBd gain Guardian Series BGO902G Omni Antenna with 6.0 dBd gain
FCC band:	902 – 928 MHz
Test frequencies:	902.394 MHz, 915.0000 MHz, 927.606 MHz
Number of channels:	67
Channel spacing:	382 kHz
Modulation type:	Frequency hopping spread spectrum
Hopping sequence:	Pseudo random sequence.
Power Supply	This system is not sold with an AC power supply
Operating voltage:	3.3 Vdc and 5.0 Vdc

The device has the following external ports that were terminated as follows:

- Antenna 1 port (unique connector). A yagi or omni directional antenna was attached to this port.
- Antenna 2 antenna port (unique connector). This port was left unterminated.
- System port serial port. A laptop computer was attached to this port using a 20 cm length of data cable.
- Port A serial port. This port was not terminated.
- Port B serial port. This port was terminated with a 1.2 metre length of data cable

6. SETUPS AND PROCEDURES

Standard

The sample was tested in accordance with 47 CFR Part 15 Subpart C and in particular section 15.247

Methods and Procedures

The measurement methods and procedures as described in ANSI C63.4 - 2003 were used.

Section 15.107: Conducted emissions

The device contains a digital device. Refer to Section 15.207 for the conducted measurements that have been carried out.

Section 15.109: Radiated emission limits

The device contains a Class A digital device a Receiver operating between 902 – 928 MHz

A number of specific digital device emissions and receiver local oscillator emissions were observed.

Testing was carried out over the frequency range of 30 MHz to 3 GHz as the receiver local oscillator has a highest operating frequency of 1132 MHz.

The digital device highest operating frequency is less than 500 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 when the device was operating continuously with measurements being made at a distance of 10 metres for the digital device and at 3 metres for the receiver.

A receiver with a quasi peak detector with a 120 kHz bandwidth was used between 30 – 1000 MHz and between 1000 – 2,000 MHz a peak detector and an average detector were used with a 1 MHz resolution bandwidth.

The limits as described in Section 15.109 have been applied.

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

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 with measurements being made in both vertical and horizontal antenna polarisations.

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

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

Result: Complies

Digital device emissions at 10 metres. Class A limits applied

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna	Detector
80.000	25.1	25.2	39.5	14.3	Horizontal	Quasi Peak
120.000	22.6	19.8	43.5	20.9	Vertical	Quasi Peak
160.000	28.5	24.3	43.5	15.0	Vertical	Quasi Peak
200.000	22.1	19.5	43.5	21.4	Vertical	Quasi Peak
240.000	36.0	38.1	46.4	8.3	Horizontal	Quasi Peak
280.000	18.1	27.7	46.7	19.0	Horizontal	Quasi Peak
320.000	32.4	37.4	46.7	9.3	Horizontal	Quasi Peak
360.000	33.5	35.9	46.7	10.8	Horizontal	Quasi Peak
400.000	31.5	35.3	46.7	11.4	Horizontal	Quasi Peak
440.000	28.5	30.8	46.7	15.9	Horizontal	Quasi Peak
480.000	25.2	33.0	46.7	13.7	Horizontal	Quasi Peak
520.000	29.8	30.0	46.7	16.7	Horizontal	Quasi Peak
560.000	30.0	33.8	46.7	12.9	Horizontal	Quasi Peak
600.000	28.0	31.7	46.7	15.0	Horizontal	Quasi Peak
640.000	36.0	41.3	46.7	5.4	Horizontal	Quasi Peak
680.000	31.0	35.2	46.7	11.5	Horizontal	Quasi Peak
720.000	32.4	35.7	46.7	11.0	Horizontal	Quasi Peak
760.000	29.7	32.4	46.7	14.3	Horizontal	Quasi Peak
800.000	33.0	33.2	46.7	13.5	Horizontal	Quasi Peak
840.000	32.3	33.5	46.7	13.2	Horizontal	Quasi Peak
880.000	28.6	28.8	46.7	17.9	Horizontal	Quasi Peak
960.000	43.9	28.5	49.5	5.6	Vertical	Quasi Peak
1000.000	39.7	29.5	49.5	9.8	Vertical	Quasi Peak

Receiver local oscillator emissions observed. Class B limits applied

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna	Detector
927.6 MHz						
1131.656	50.1	51.5	74.0	22.5	Horizontal	Peak
	43.2	45.3	54.0	8.7	Horizontal	Average
915.0 MHz						
1119.045	49.8	52.6	74.0	21.4	Horizontal	Peak
	42.7	48.7	54.0	5.3	Horizontal	Average
902.4 MHz						
1106.435	49.8	52.7	74.0	21.3	Horizontal	Peak
	43.1	49.1	54.0	4.9	Horizontal	Average

Section 15.111: Antenna power conducted limits for receivers

In addition to the receiver radiated emission measurements, measurements were made at the antenna terminal of the device when it was programmed to operate in standby / receive mode.

Measurements were made directly at the antenna port using a spectrum analyser with a resolution bandwidth of 100 kHz

Channel	Frequency MHz	Level dBm	Limit dBm	Margin dB
927.6 MHz	1131.656	-64.0	-57.0	-7.0
	2263.306	-91.0	-57.0	-34.0
	5658.256	-67.3	-57.0	-10.3
915.0 MHz	1119.045	-64.0	-57.0	-7.0
	2238.090	-88.0	-57.0	-31.0
	5595.225	-71.0	-57.0	-14.0
902.4 MHz	1106.435	-63.0	-57.0	-6.0
	2212.870	-84.0	-57.0	-27.0
	5532.175	-75.0	-57.0	-18.0

All other emissions observed to be less than -77.0 dBm

A limit of 2 nW (-57 dBm) has been applied

Result: Complies

Section 15.201: Equipment authorisation requirement

Class 2 Permissive Change Certification as detailed in Subpart J of Part 2 is being sought for this transmitter as changes have been made to the power amplifier.

The transmitter has previously been certified as a module with FCC ID: NI8OM900

Section 15.203: Antenna requirement

The antenna port for this transmitter module uses a unique connector (MMCX connectors)

Device was tested with the following antennas:

Marathon Series BMY890K Yagi Antenna with 10.0 dBd gain

Marathon Series BGY890K Yagi Antenna with 10.0 dBd gain

Marathon Series BMO902J Omni Antenna with 9.0 dBd gain

Guardian Series BGO902G Omni Antenna with 6.0 dBi gain

Result: Complies

Section 15.204: External radio frequency power amplifiers and antenna modifications

An external power amplifier is not supplied with this device.

The equipment manual contains a warning about modifications to the device including the antennas.

Result: Complies.

Section 15.205: Restricted bands of operation

The transmitters contained within this device operate in the 902 - 928 MHz band which is covered by Section 15.247.

Result: Complies.

Section 15.207 + Section 15.107: Conducted emissions testing

Retesting for conducted emissions was not carried out as no changes have been made to the power supply of this device

Result: Complies

Section 15.209: Radiated emission limits, general requirements

Refer to Section 15.109 Radiated emissions testing.

Between 30 MHz – 2000 MHz no specific transmitter emissions were observed.

The only emissions observed over this frequency band were from the digital device to which the Class A limit was applied and from the Receiver local oscillator.

Result: Complies

Section 15.247 (a) (1) (i) - Channel occupancy / bandwidth

This device has been configured to operate using 67 channels spaced at 382 kHz.

Re-testing was not carried out as this parameter has been previously tested and no changes have been made.

Section 15.247 (b) (2)– Peak output power

Measurements were carried out at the RF output terminals of the transmitter using a spectrum analyser.

Measurements were carried out using a span of 10 MHz and a resolution bandwidth of 1 MHz.

Measurements were made using the 110Vac representative power supply where the 110 Vac input voltage was varied between –15% and +15%.

Frequency	RF power output (dBm)		
	-15%	Nominal	+15%
902.394	29.9	29.9	29.9
915.000	29.9	29.9	29.9
927.606	29.7	29.7	29.7

The nominal maximum power of this device is +30 dBm.

Limits:

The maximum peak output power for frequency hopping systems operating in the 902 – 928 MHz band shall not exceed 1 watt (+30 dBm) for systems employing at least 50 channels.

Result: Complies

Section 15.247 (b)(4) Radiated transmitter power

Frequency (MHz)	Level (dBuV/m)	Power (dBm)	Limit (dBm)	Polarity	Margin (dB)	Tx Power (dBm)
BGY890K						
902.400	130.8	35.6	36.0	Vertical	0.4	23.8
902.400	112.0	16.8	36.0	Horizontal	19.2	23.8
915.000	130.8	35.6	36.0	Vertical	0.4	23.8
927.606	131.1	35.9	36.0	Vertical	0.1	23.8
BMY890K						
902.400	131.2	36.0	36.0	Vertical	0.0	23.8
915.000	131.2	36.0	36.0	Vertical	0.0	23.8
927.606	131.2	36.0	36.0	Vertical	0.0	23.8
BGO902G						
902.400	130.7	35.5	36.0	Vertical	0.5	27.8
915.000	130.9	35.7	36.0	Vertical	0.3	27.8
927.606	131.0	35.8	36.0	Vertical	0.2	27.8
BMO902J						
902.400	130.8	35.6	36.0	Vertical	0.4	24.8
915.000	130.8	35.6	36.0	Vertical	0.4	24.8
927.606	130.9	35.7	36.0	Vertical	0.3	24.8

Device was tested on an open area test site at a distance of 3 metres.

Testing was carried out using a resolution bandwidth of 1 MHz while the device was being modulated at a rate of 256 kB/sec while transmitting data.

The transmitter output power was reduced in order that the radiated power would not exceed +36 dBm with any of the above mentioned antennas attached

The transmitter and each antenna were rotated automatically (902J omni was rotated manually) and height scanned to obtain the highest observed field strength.

Limit:

The conducted power shall not exceed 1 watt (+30 dBm) and the antenna system gain shall not exceed 6 dBi. Therefore the radiated power shall not exceed +36 dBm EIRP.

Result: Complies

Measurement Uncertainty: ±4.1dB

Section 15.247 (c) – Out of band emissions

Measurements were made at the antenna port with a resolution bandwidth of 100 kHz.

Frequency: 902.394 MHz

Frequency (MHz)	Level (dBm)	Limit (dBm)
1804.600	-35.1	+10.0
2706.950	-41.3	+10.0
3609.300	< -50.0	+10.0
4511.530	< -50.0	+10.0
5414.850	-45.7	+10.0
6316.100	< -50.0	+10.0
7218.530	< -50.0	+10.0
8121.600	< -50.0	+10.0
9024.800	< -50.0	+10.0

Frequency: 915.000 MHz

Frequency (MHz)	Level (dBm)	Limit (dBm)
1830.000	-31.9	+10.0
2745.000	-43.5	+10.0
3660.000	< -50.0	+10.0
4575.000	< -50.0	+10.0
5490.000	-41.3	+10.0
6405.000	< -50.0	+10.0
7320.000	< -50.0	+10.0
8235.000	< -50.0	+10.0
9150.000	< -50.0	+10.0

Frequency: 927.606 MHz

Frequency (MHz)	Level (dBm)	Limit (dBm)
1855.212	-30.3	+10.0
2782.818	-45.4	+10.0
3710.424	< -50.0	+10.0
4638.030	< -50.0	+10.0
5565.636	-47.3	+10.0
6493.242	< -50.0	+10.0
7420.848	< -50.0	+10.0
8348.454	< -50.0	+10.0
9276.060	< -50.0	+10.0

Limit:

In any 100 kHz bandwidth outside the frequency band of operation, the RF power produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Result: Complies

Measurement Uncertainty: ± 3.3 dB

Band edge measurements:

At the band edges of 902 MHz and 928 MHz all emissions are required to be attenuated by more than 20 dB relative to the highest emission level observed in the band of operation.

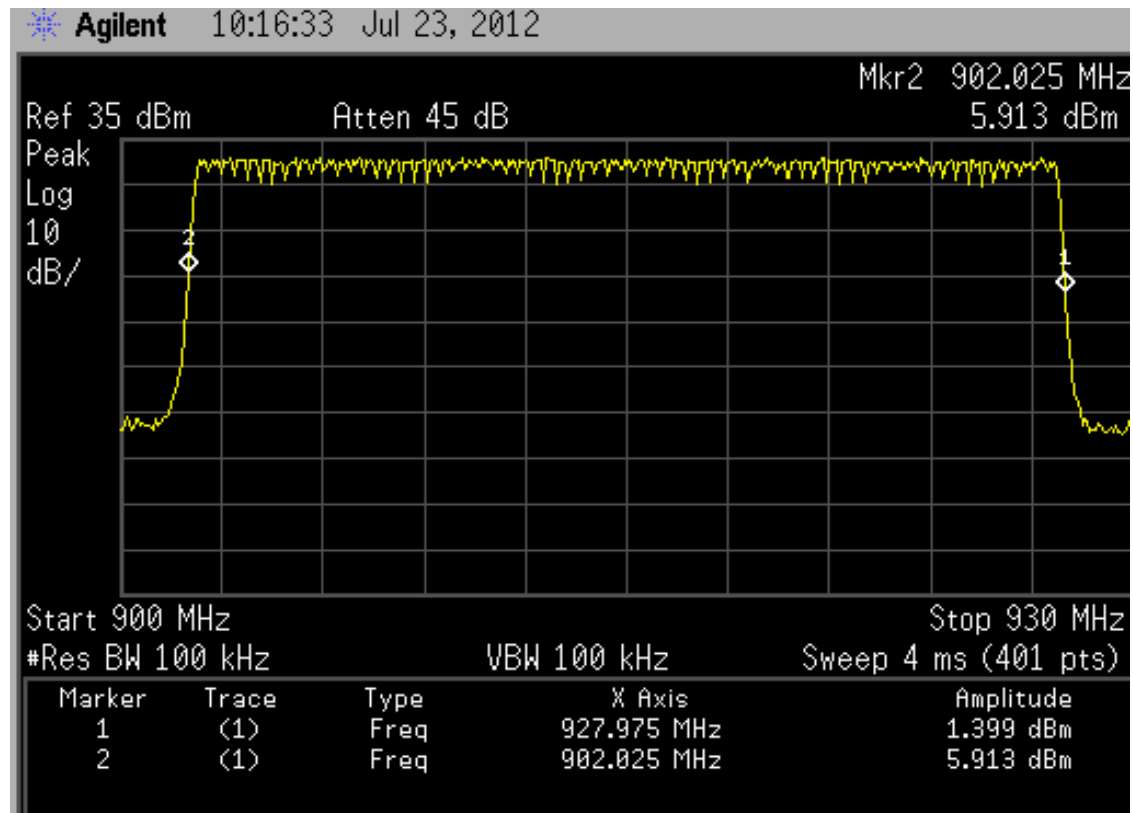
The rated power of this device is +30 dBm with highest measurement being +30 dBm.

Therefore at the band edge all levels will need to be less than +10 dBm when measured with a 100 kHz resolution bandwidth.

Was difficult to find the exact -20 dB points however the following points exceeded -20 dB and show that the emission spectrum remains within the 902 – 928 MHz window

Results

Frequency (MHz)	dBc	Level (dBm)	Limit (dBm)
902.0250	-24.1	+5.9	+10.0
927.9750	-28.6	+1.4	+10.0



At the test site radiated band edge measurements were made as follows:

Frequency (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity
BGY890K					
902.000	98.5	78.5	109.7	31.2	Vertical
928.000	96.2		109.7	13.5	Vertical
BMY890K					
902.000	99.1	78.5	110.9	32.4	Vertical
928.000	96.5		110.9	14.4	Vertical
BGO902G					
902.000	97.5	78.5	110.0	31.5	Vertical
928.000	98.3		110.0	11.7	Vertical
BMO902J					
902.000	97.5	78.5	109.9	31.4	Vertical
928.000	98.3		109.4	11.1	Vertical

Result: Complies

Restricted band radiated spurious emission measurements

A number of out of band emissions have been shown to fall within the restricted bands of operation as defined in section 15.205(a).

Radiated emission measurements were carried out with the limits as per section 15.209 applied when these emissions fell within the restricted bands.

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site, which is located at Driving Creek, Orere Point, Auckland. Details of this site have been filed with the Commission, Registration Number: 90838, which was last updated in Jan 2007..

The device 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 with the antenna located at a 3 m horizontal distance from the boundary of the device under test.

Measurements below 1000 MHz were made using an 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. The emission is measured in both vertical and horizontal antenna polarisations.

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)

Measurements were attempted up to 10fc on each operating frequency with no emissions being detected within 20 dB of the restricted frequency limit or the -20 dBc limit at each of these frequencies when this antenna was utilised.

BGY 890 K Yagi Antenna: 915.0 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1830.000	57.0	59.4	109.7	50.3	Horizontal	Peak
2745.000	< 58.0	< 58.0	74.0	-	-	Peak
2745.000	< 45.0	< 45.0	54.0	-	-	Average
3660.000	< 51.0	< 51.0	74.0	-	-	Peak
3660.000	< 39.0	< 39.0	54.0	-	-	Average
4575.000	< 62.0	< 62.0	74.0	-	-	Peak
4575.000	< 49.0	< 49.0	54.0	-	-	Average
5490.000	< 57.0	< 57.0	109.7	-	-	Peak
6405.000	< 58.0	< 58.0	109.7	-	-	Peak
7320.000	< 61.0	< 61.0	74.0	-	-	Peak
7320.000	< 47.0	< 47.0	54.0	-	-	Average
8235.000	< 57.0	< 57.0	74.0	-	-	Peak
8235.000	< 44.0	< 44.0	54.0	-	-	Average
9150.000	< 57.0	< 57.0	74.0	-	-	Peak
9150.000	< 45.0	< 45.0	54.0	-	-	Average

902.4 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1804.800	57.9	60.4	109.7	49.3	Horizontal	Peak
2707.200	< 58.0	< 58.0	74.0	-	-	Peak
2707.200	< 45.0	< 45.0	54.0	-	-	Average
3609.600	< 51.0	< 51.0	74.0	-	-	Peak
3609.600	< 39.0	< 39.0	54.0	-	-	Average
4512.000	< 62.0	< 62.0	74.0	-	-	Peak
4512.000	< 49.0	< 49.0	54.0	-	-	Average
5414.400	< 57.0	< 57.0	74.0	-	-	Peak
5414.400	< 43.0	< 43.0	54.0	-	-	Average
6316.800	< 58.0	< 58.0	109.7	-	-	Peak
7219.200	< 61.0	< 61.0	109.7	-	-	Peak
8121.600	< 57.0	< 57.0	74.0	-	-	Peak
8121.600	< 44.0	< 44.0	54.0	-	-	Average
9024.000	< 57.0	< 57.0	74.0	-	-	Peak
9024.000	< 45.0	< 45.0	54.0	-	-	Average

927.6 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1855.200	52.8	54.1	109.7	55.6	Horizontal	Peak
2782.800	< 58.0	< 58.0	74.0	-	-	Peak
2782.800	< 45.0	< 45.0	54.0	-	-	Average
3710.400	< 51.0	< 51.0	74.0	-	-	Peak
3710.400	< 39.0	< 39.0	54.0	-	-	Average
4638.000	< 62.0	< 62.0	74.0	-	-	Peak
4638.000	< 49.0	< 49.0	54.0	-	-	Average
5565.600	< 57.0	< 57.0	109.7	-	-	Peak
6493.200	< 58.0	< 58.0	109.7	-	-	Peak
7420.800	< 61.0	< 61.0	74.0	-	-	Peak
7420.800	< 47.0	< 47.0	54.0	-	-	Average
8348.400	< 57.0	< 57.0	74.0	-	-	Peak
8348.400	< 44.0	< 44.0	54.0	-	-	Average
9276.000	< 57.0	< 57.0	109.7	-	-	Peak

BMY 890 K Yagi Antenna: 915.0 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1830.000	56.3	57.1	110.9	53.8	Horizontal	Peak
2745.000	< 58.0	< 58.0	74.0	-	-	Peak
2745.000	< 45.0	< 45.0	54.0	-	-	Average
3660.000	< 51.0	< 51.0	74.0	-	-	Peak
3660.000	< 39.0	< 39.0	54.0	-	-	Average
4575.000	< 62.0	< 62.0	74.0	-	-	Peak
4575.000	< 49.0	< 49.0	54.0	-	-	Average
5490.000	< 57.0	< 57.0	109.7	-	-	Peak
6405.000	< 58.0	< 58.0	109.7	-	-	Peak
7320.000	< 61.0	< 61.0	74.0	-	-	Peak
7320.000	< 47.0	< 47.0	54.0	-	-	Average
8235.000	< 57.0	< 57.0	74.0	-	-	Peak
8235.000	< 44.0	< 44.0	54.0	-	-	Average
9150.000	< 57.0	< 57.0	74.0	-	-	Peak
9150.000	< 45.0	< 45.0	54.0	-	-	Average

902.4 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1804.800	57.1	58.7	110.9	52.2	Horizontal	Peak
2707.200	< 58.0	< 58.0	74.0	-	-	Peak
2707.200	< 45.0	< 45.0	54.0	-	-	Average
3609.600	< 51.0	< 51.0	74.0	-	-	Peak
3609.600	< 39.0	< 39.0	54.0	-	-	Average
4512.000	< 62.0	< 62.0	74.0	-	-	Peak
4512.000	< 49.0	< 49.0	54.0	-	-	Average
5414.400	< 57.0	< 57.0	74.0	-	-	Peak
5414.400	< 43.0	< 43.0	54.0	-	-	Average
6316.800	< 58.0	< 58.0	109.7	-	-	Peak
7219.200	< 61.0	< 61.0	109.7	-	-	Peak
8121.600	< 57.0	< 57.0	74.0	-	-	Peak
8121.600	< 44.0	< 44.0	54.0	-	-	Average
9024.000	< 57.0	< 57.0	74.0	-	-	Peak
9024.000	< 45.0	< 45.0	54.0	-	-	Average

927.6 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1855.200	58.7	58.7	110.9	52.2	Horizontal	Peak
2782.800	< 58.0	< 58.0	74.0	-	-	Peak
2782.800	< 45.0	< 45.0	54.0	-	-	Average
3710.400	< 51.0	< 51.0	74.0	-	-	Peak
3710.400	< 39.0	< 39.0	54.0	-	-	Average
4638.000	< 62.0	< 62.0	74.0	-	-	Peak
4638.000	< 49.0	< 49.0	54.0	-	-	Average
5565.600	< 57.0	< 57.0	109.7	-	-	Peak
6493.200	< 58.0	< 58.0	109.7	-	-	Peak
7420.800	< 61.0	< 61.0	74.0	-	-	Peak
7420.800	< 47.0	< 47.0	54.0	-	-	Average
8348.400	< 57.0	< 57.0	74.0	-	-	Peak
8348.400	< 44.0	< 44.0	54.0	-	-	Average
9276.000	< 57.0	< 57.0	109.7	-	-	Peak

BMO902J Omni Directional Antenna: 915.0 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1830.000	56.3	57.1	109.9	52.8	Horizontal	Peak
2745.000	< 58.0	< 58.0	74.0	-	-	Peak
2745.000	< 45.0	< 45.0	54.0	-	-	Average
3660.000	< 51.0	< 51.0	74.0	-	-	Peak
3660.000	< 39.0	< 39.0	54.0	-	-	Average
4575.000	< 62.0	< 62.0	74.0	-	-	Peak
4575.000	< 49.0	< 49.0	54.0	-	-	Average
5490.000	< 57.0	< 57.0	109.7	-	-	Peak
6405.000	< 58.0	< 58.0	109.7	-	-	Peak
7320.000	< 61.0	< 61.0	74.0	-	-	Peak
7320.000	< 47.0	< 47.0	54.0	-	-	Average
8235.000	< 57.0	< 57.0	74.0	-	-	Peak
8235.000	< 44.0	< 44.0	54.0	-	-	Average
9150.000	< 57.0	< 57.0	74.0	-	-	Peak
9150.000	< 45.0	< 45.0	54.0	-	-	Average

902.4 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1804.800	54.1	57.3	109.9	52.6	Horizontal	Peak
2707.200	< 58.0	< 58.0	74.0	-	-	Peak
2707.200	< 45.0	< 45.0	54.0	-	-	Average
3609.600	< 51.0	< 51.0	74.0	-	-	Peak
3609.600	< 39.0	< 39.0	54.0	-	-	Average
4512.000	< 62.0	< 62.0	74.0	-	-	Peak
4512.000	< 49.0	< 49.0	54.0	-	-	Average
5414.400	< 57.0	< 57.0	74.0	-	-	Peak
5414.400	< 43.0	< 43.0	54.0	-	-	Average
6316.800	< 58.0	< 58.0	109.7	-	-	Peak
7219.200	< 61.0	< 61.0	109.7	-	-	Peak
8121.600	< 57.0	< 57.0	74.0	-	-	Peak
8121.600	< 44.0	< 44.0	54.0	-	-	Average
9024.000	< 57.0	< 57.0	74.0	-	-	Peak
9024.000	< 45.0	< 45.0	54.0	-	-	Average

927.6 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1855.200	56.3	59.1	109.9	50.8	Horizontal	Peak
2782.800	< 58.0	< 58.0	74.0	-	-	Peak
2782.800	< 45.0	< 45.0	54.0	-	-	Average
3710.400	< 51.0	< 51.0	74.0	-	-	Peak
3710.400	< 39.0	< 39.0	54.0	-	-	Average
4638.000	< 62.0	< 62.0	74.0	-	-	Peak
4638.000	< 49.0	< 49.0	54.0	-	-	Average
5565.600	< 57.0	< 57.0	109.7	-	-	Peak
6493.200	< 58.0	< 58.0	109.7	-	-	Peak
7420.800	< 61.0	< 61.0	74.0	-	-	Peak
7420.800	< 47.0	< 47.0	54.0	-	-	Average
8348.400	< 57.0	< 57.0	74.0	-	-	Peak
8348.400	< 44.0	< 44.0	54.0	-	-	Average
9276.000	< 57.0	< 57.0	109.7	-	-	Peak

BMO 902 G Omni Antenna: 915.0 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1830.000	56.3	57.1	110.0	52.9	Horizontal	Peak
2745.000	< 58.0	< 58.0	74.0	-	-	Peak
2745.000	< 45.0	< 45.0	54.0	-	-	Average
3660.000	< 51.0	< 51.0	74.0	-	-	Peak
3660.000	< 39.0	< 39.0	54.0	-	-	Average
4575.000	< 62.0	< 62.0	74.0	-	-	Peak
4575.000	< 49.0	< 49.0	54.0	-	-	Average
5490.000	< 57.0	< 57.0	109.7	-	-	Peak
6405.000	< 58.0	< 58.0	109.7	-	-	Peak
7320.000	< 61.0	< 61.0	74.0	-	-	Peak
7320.000	< 47.0	< 47.0	54.0	-	-	Average
8235.000	< 57.0	< 57.0	74.0	-	-	Peak
8235.000	< 44.0	< 44.0	54.0	-	-	Average
9150.000	< 57.0	< 57.0	74.0	-	-	Peak
9150.000	< 45.0	< 45.0	54.0	-	-	Average

902.4 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1804.800	54.1	57.3	110.0	52.7	Horizontal	Peak
2707.200	< 58.0	< 58.0	74.0	-	-	Peak
2707.200	< 45.0	< 45.0	54.0	-	-	Average
3609.600	< 51.0	< 51.0	74.0	-	-	Peak
3609.600	< 39.0	< 39.0	54.0	-	-	Average
4512.000	< 62.0	< 62.0	74.0	-	-	Peak
4512.000	< 49.0	< 49.0	54.0	-	-	Average
5414.400	< 57.0	< 57.0	74.0	-	-	Peak
5414.400	< 43.0	< 43.0	54.0	-	-	Average
6316.800	< 58.0	< 58.0	109.7	-	-	Peak
7219.200	< 61.0	< 61.0	109.7	-	-	Peak
8121.600	< 57.0	< 57.0	74.0	-	-	Peak
8121.600	< 44.0	< 44.0	54.0	-	-	Average
9024.000	< 57.0	< 57.0	74.0	-	-	Peak
9024.000	< 45.0	< 45.0	54.0	-	-	Average

927.6 MHz

Frequency MHz	Vertical dBuV/m	Horizontal dBuV/m	Limit dBuV/m	Margin dB	Antenna Polarity	Detector
1855.200	56.3	59.1	110.0	50.9	Horizontal	Peak
2782.800	< 58.0	< 58.0	74.0	-	-	Peak
2782.800	< 45.0	< 45.0	54.0	-	-	Average
3710.400	< 51.0	< 51.0	74.0	-	-	Peak
3710.400	< 39.0	< 39.0	54.0	-	-	Average
4638.000	< 62.0	< 62.0	74.0	-	-	Peak
4638.000	< 49.0	< 49.0	54.0	-	-	Average
5565.600	< 57.0	< 57.0	109.7	-	-	Peak
6493.200	< 58.0	< 58.0	109.7	-	-	Peak
7420.800	< 61.0	< 61.0	74.0	-	-	Peak
7420.800	< 47.0	< 47.0	54.0	-	-	Average
8348.400	< 57.0	< 57.0	74.0	-	-	Peak
8348.400	< 44.0	< 44.0	54.0	-	-	Average
9276.000	< 57.0	< 57.0	109.7	-	-	Peak

Where an emission falls outside of the restricted bands a limit being -20 dB below the highest fundamental emission level has been applied (between 129 - 130 dBuV/m).

The general limits as per section 15.209(a) have been applied to those emissions falling within the restricted bands.

Result: Complies

Section 15.247 (i) – Radio Frequency Hazard Information

As per Section 15.247 (i) Spread spectrum transmitters operating in the 902 – 928 MHz band are required to be operated in a manner that ensures that the public is not exposed to RF energy levels in accordance with CFR 47, Section 1.1307(b)(1).

In accordance with this section, and also Section 2.1091, this device has been defined as a mobile device whereby a distance of 20 cm or greater can normally be maintained between the user and the device.

In accordance with Section 1.1310 the Maximum Permissible Exposure (MPE) limits for the General Population / Uncontrolled Exposure of f/1500 have been applied.

The maximum distance from the antenna at which the MPE is met or exceeded is calculated from the equation relating field strength in V/m, transmit power in watts, transmit antenna gain and separation distance in metres:

$$E, \text{ V/m} = (\sqrt{30 * P * G}) / d$$

$$\text{Power density, mW/m}^2 = E^2/3770$$

$$E \text{ for MPE: } (902/1500) = E^2/3770$$

$$E = \sqrt{(902/1500)*3770}$$

$$E = \underline{47.6 \text{ V/m}}$$

The maximum radiated power measured was +36.0 dBm or 4.0 watts.

Therefore:

$$E = \sqrt{30 * P * G} / d$$

$$d = \sqrt{30 * P * G} / E$$

$$d = \sqrt{30 * 4.0} / 47.6$$

$$d = \underline{0.230 \text{ m or } 23 \text{ cm}}$$

In order to meet the MPE requirement for mobile devices a minimum safe distance greater than at least 23 cm will be required.

Result: Complies

7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	N/a
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	N/a
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3613	30 Jan 2013
Receiver	R & S	ESCS 30	847124/020	E1595	7 Apr 2013
Receiver	R & S	ESIB-40	100171	R-27-1	10 Oct 2012
Receiver	R & S	ESHS 10	828404/005	RFS 3728	2 Dec 2012
Spectrum Analyser	Hewlett Packard	E7405A	US39150142	3776	14 Dec 2012
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	30 Jan 2013
Horn Antenna	EMCO	3115	9511-4629	E1526	3 May 2013
Horn Antenna	EMCO	3116	92035	-	16 Jun 2013
Mains Network	R & S	ESH2-Z5	881362/034	3628	29 Jul 2012
Variac	General Radio	1592	-	RFS 3690	N/a
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	N/a
VHF Balun	Schwarzbeck	VHA 9103	-	RFS 3613	30 Jan 2013
Bandpass Filter	Telonic Berkley	3000-5-5EE	11014-1	4012	N/a
Bandpass Filter	Telonic Berkley	1500-5-5EE	00069-2	4011	N/a

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 on January 23rd, 2010.

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, 2005.

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, 2005

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies.

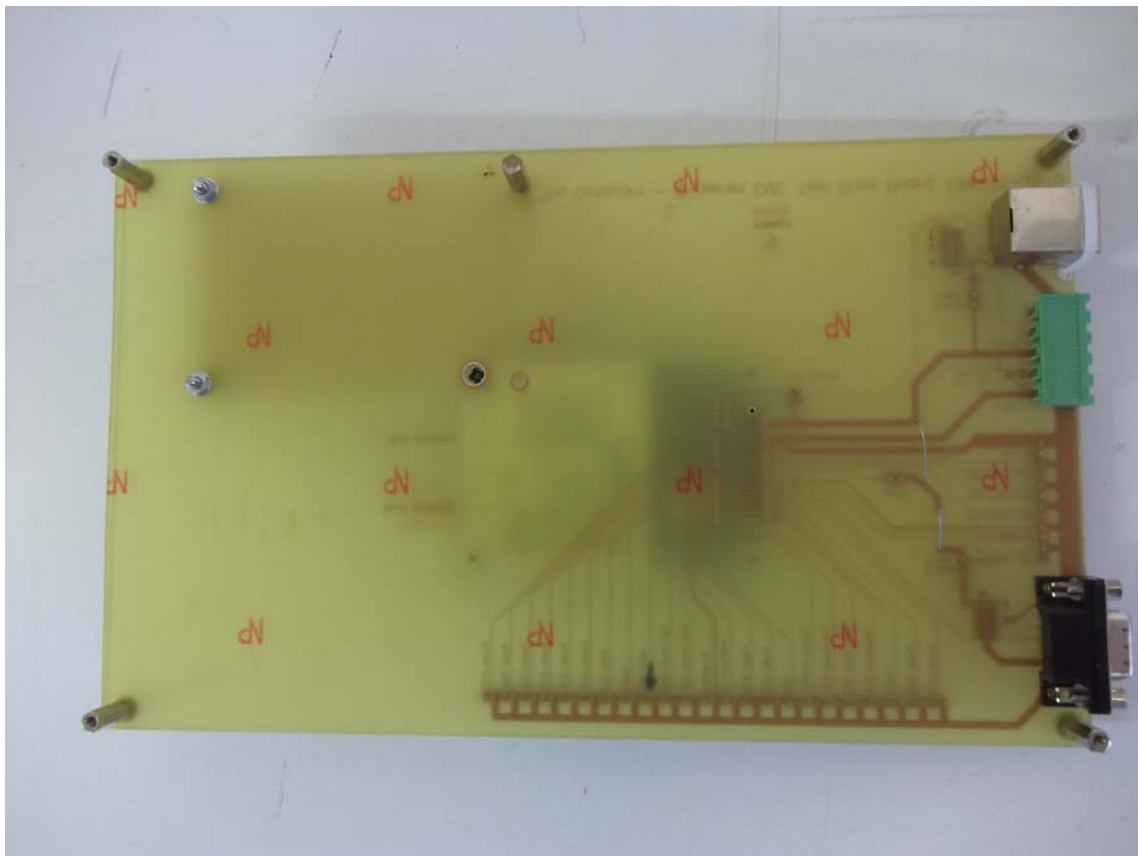
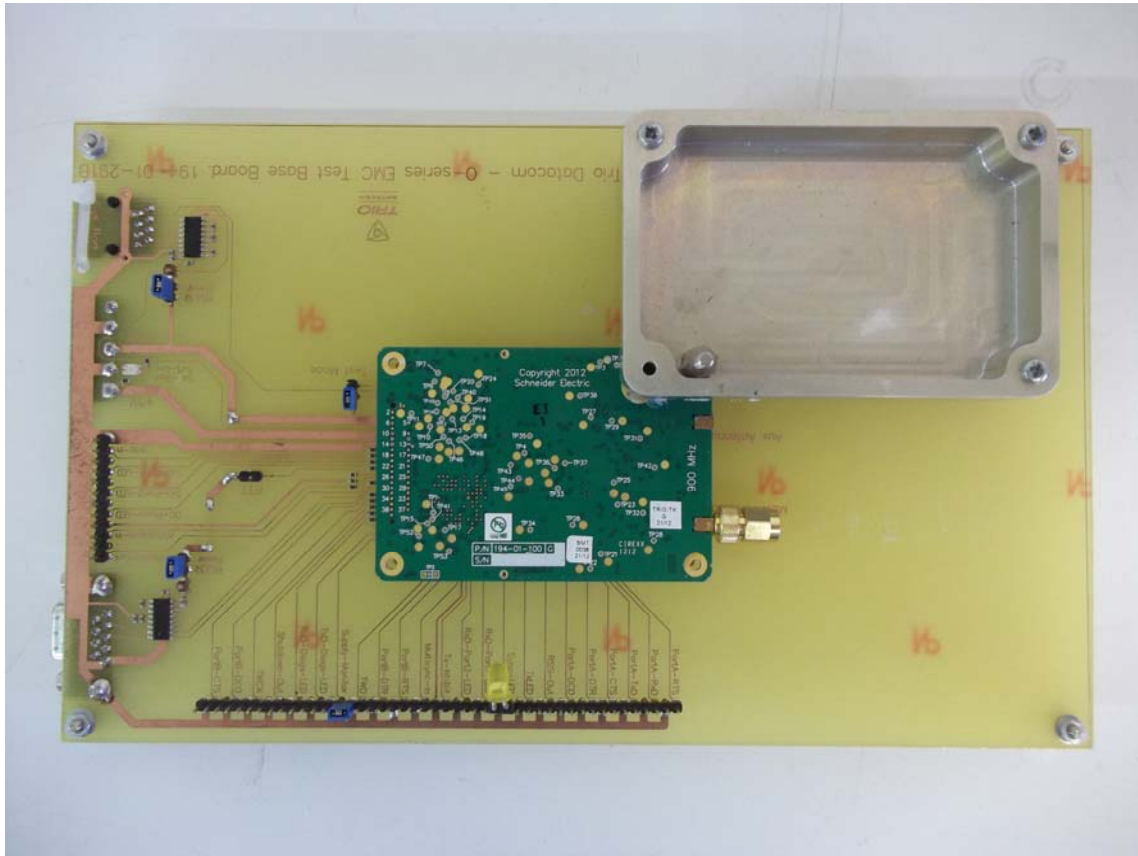
This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

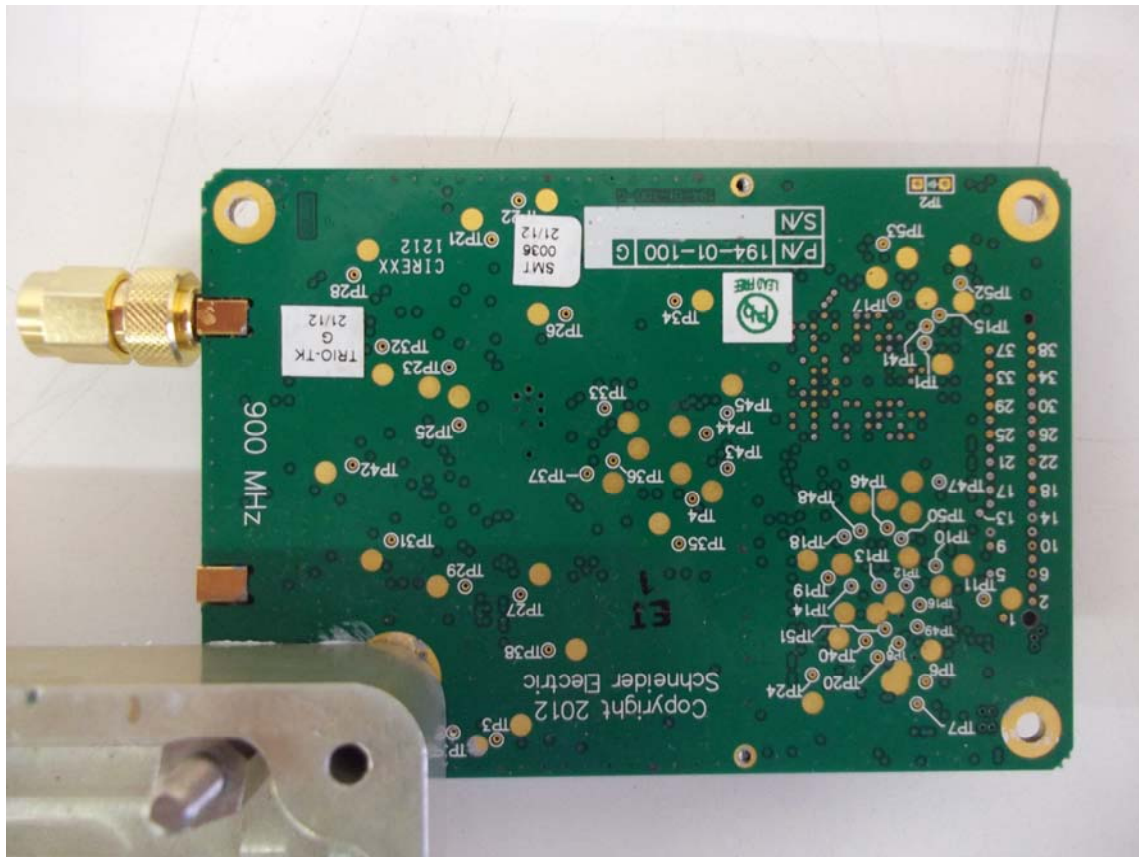
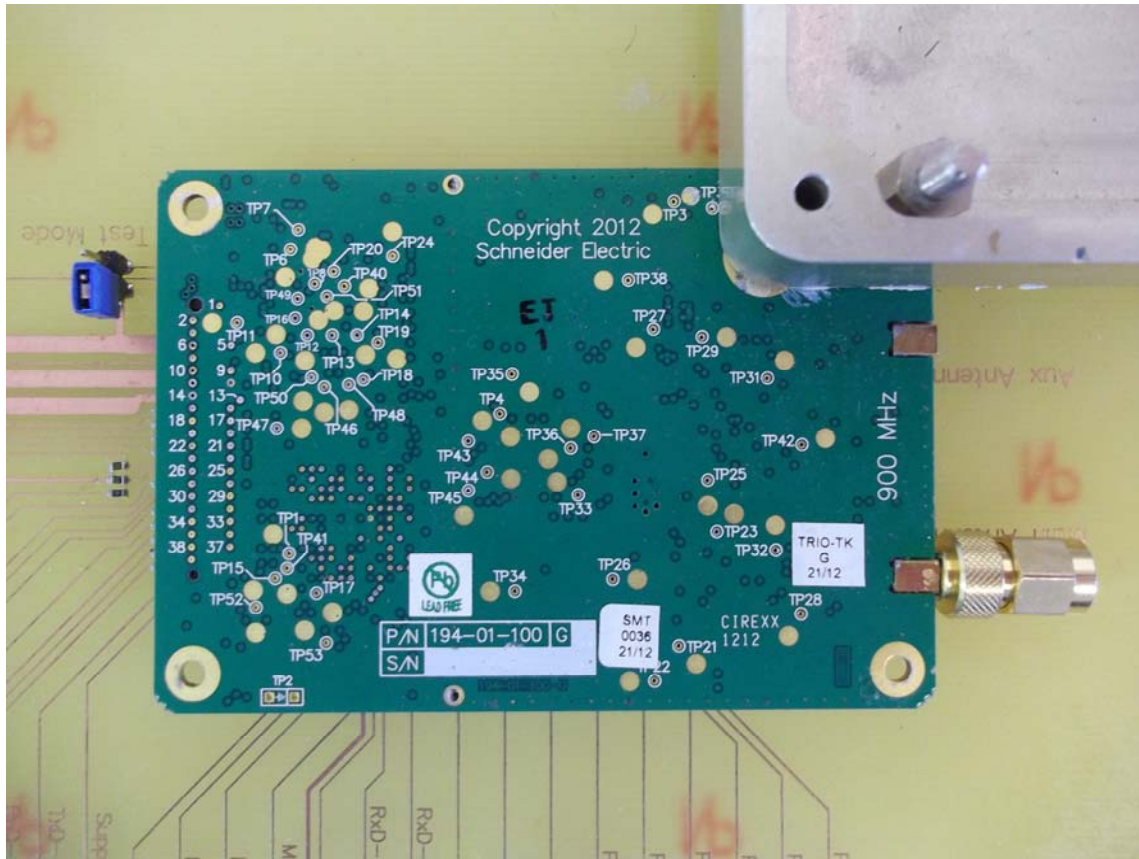
9. PHOTOGRAPHS

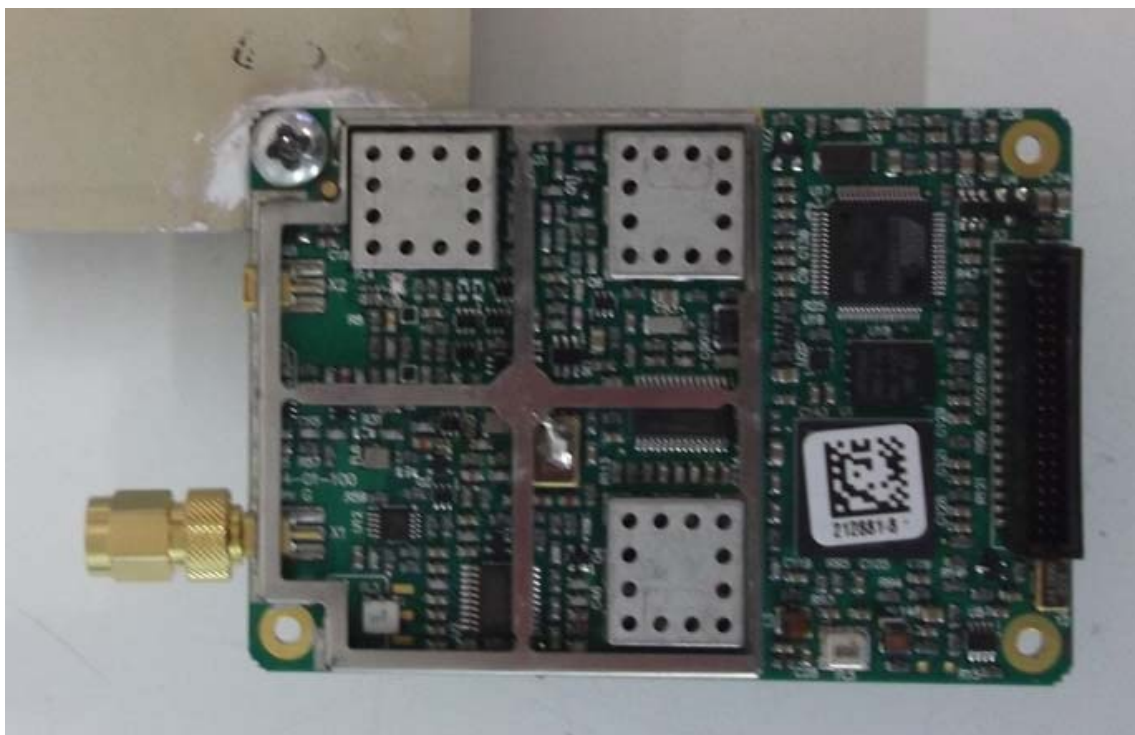
Items submitted

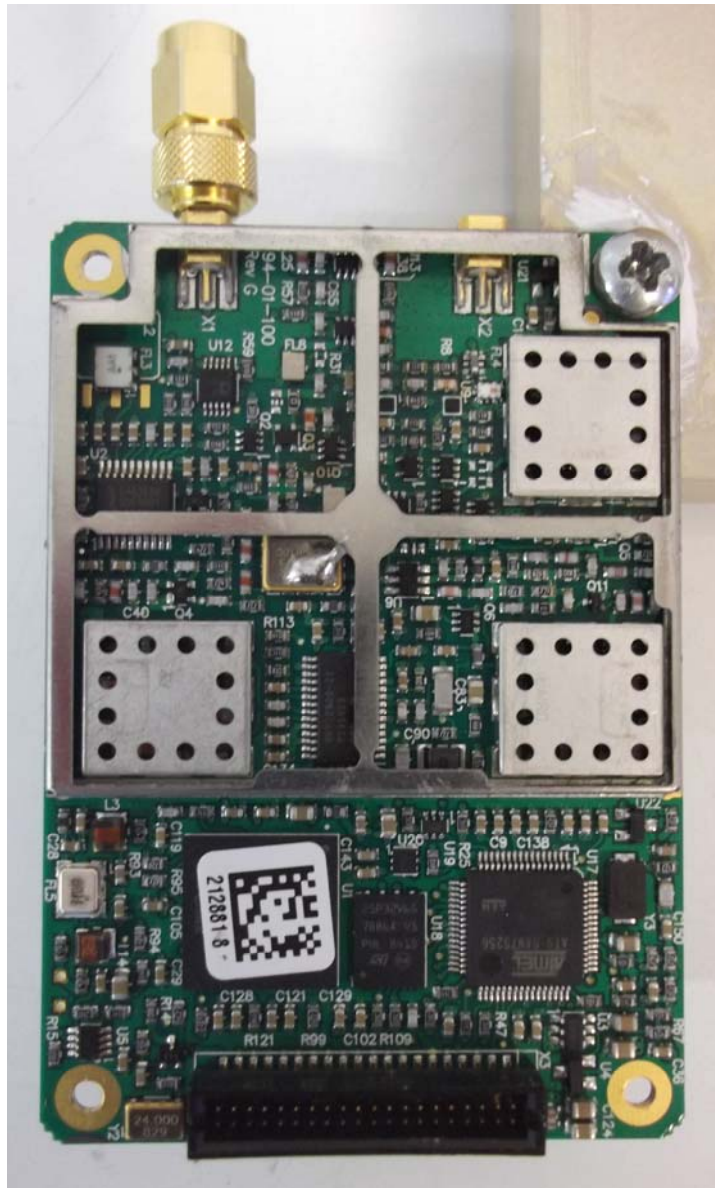


External / Internal Photos





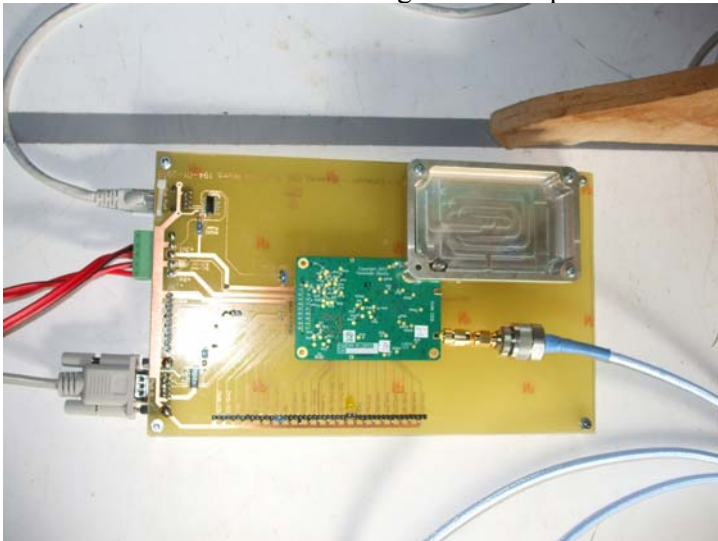




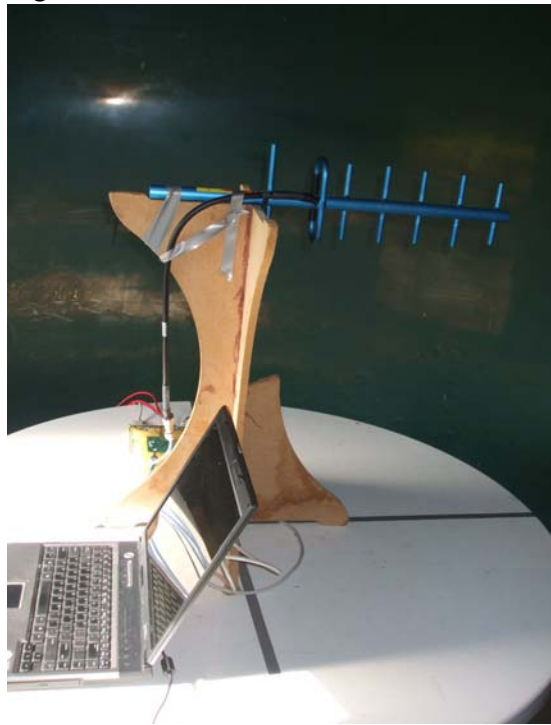
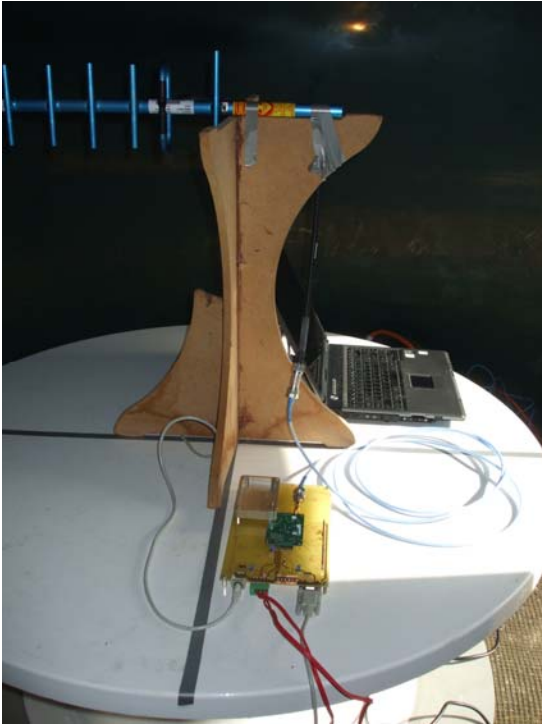
Label



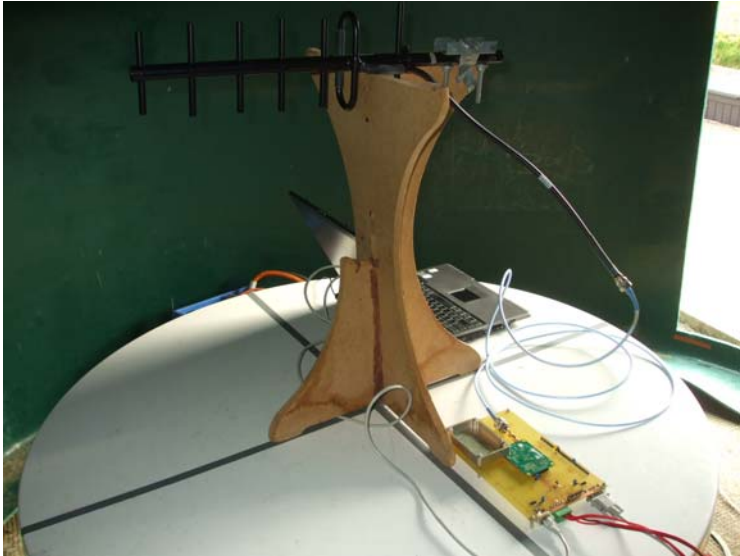
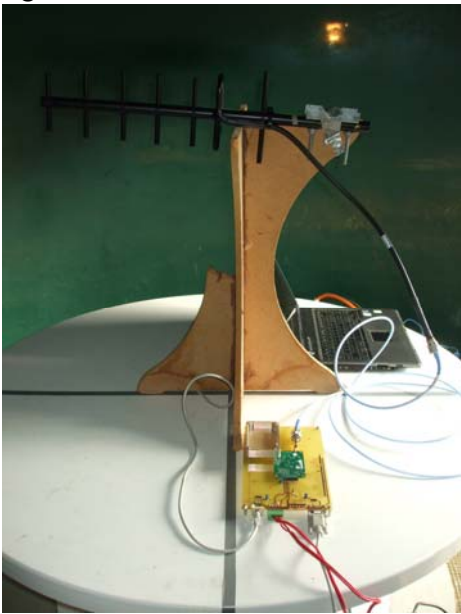
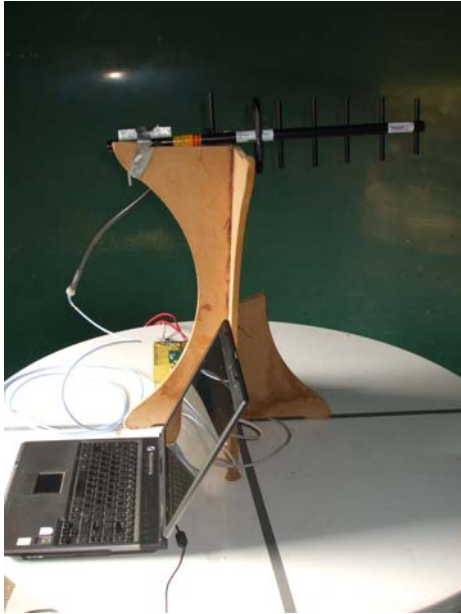
Radiated emissions general set up



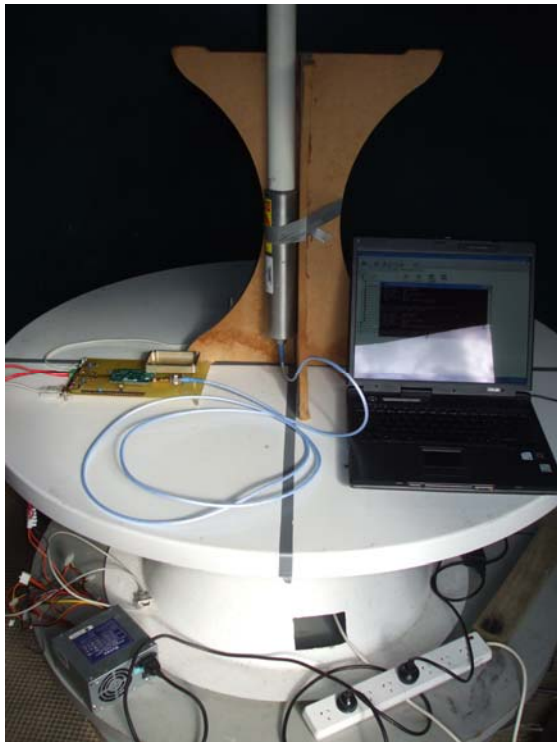
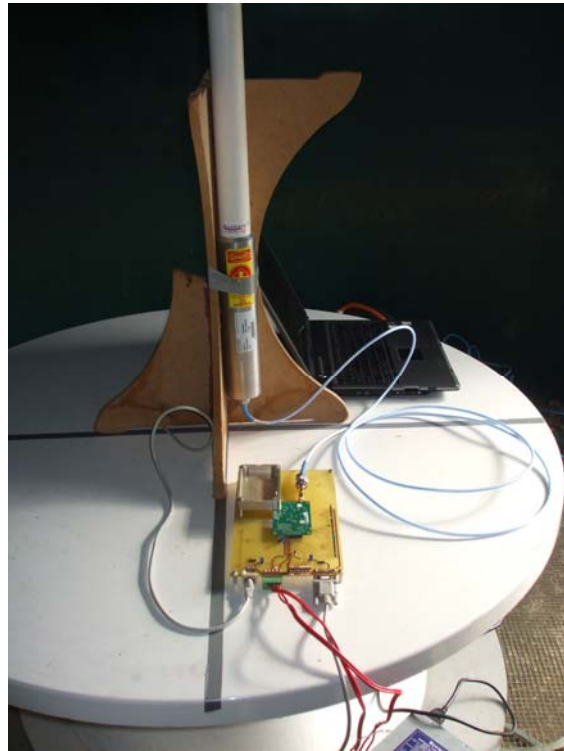
Marathon Series Yagi BMY 890K



Guardian Series Yagi BGY 890K



Guardian Series Omni BGO 902G



Marathon Series Omni BGO 902J

