

EMC Technologies (NZ) Ltd

Test Report No 80303.1

Report date: 2 May 2008

TEST REPORT

IPICO IP 3490 Dual Frequency Proximity Reader

tested to

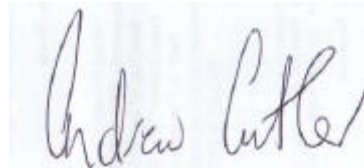
47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

Subpart C – Intentional Radiators

for

IPICO Australasia



This Test Report is issued with the authority of:

Andrew Cutler - General Manager



EMC Technologies (NZ) Ltd

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1. STATEMENT OF COMPLIANCE

The **IPICO IP 3490 Dual Frequency Proximity Reader** complies with FCC Part 15 Subpart C as an Intentional Radiator when the methods as described in ANSI C63.4 - 2003 are applied with measurements falling within the window of uncertainty for this test method.

2. RESULTS SUMMARY

Clause	Parameter	Result
15.201	Equipment authorisation requirement	Certification required.
15.203	Antenna requirement	Complies. Antenna internal to the device.
15.204	External PA and antenna modifications	Not applicable. No external devices.
15.205	Restricted bands of operation	Complies. Device transmits on 125.0 kHz.
15.207	Conducted limits	Complies.
15.209	Radiated emission limits - Fundamental	Complies.
15.209	Radiated emission limits - Spurious emissions <30 MHz	Complies.
15.209	Radiated emission limits – Spurious emissions >30 MHz	Complies with a 3.7 dB margin at 168.440 MHz (Horizontal).

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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	IPICO Australasia
Address	PO Box 19 Redcliffe
State	Queensland 4020
Country	Australia
Contact	Mr Roger Dunn / Mr Mark Fletcher

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5. DESCRIPTION OF TEST SAMPLE

Brand Name	IPICO
Model Number	IP 3490
Product	Dual Frequency Proximity Reader
Manufacturer	IPICO South Africa
Country of Origin	South Africa
Serial Number	5020092
FCC ID	Not yet determined
Ancillary Equipment	ASUS A3F Laptop Computer. Sn# 65N0AG003012

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6. RESULTS

Standard

The sample was tested in accordance with 47 CFR Part 15 Subpart C.

Methods and Procedures

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

Section 15.201: Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is required for this device.

Section 15.203: Antenna requirement

This device has an internal antenna.

Result: Complies.

Section 15.204: External radio frequency power amplifiers and antenna modifications

It is not possible to attach an external power amplifier to this transmitter.

Result: Complies.

Section 15.205: Restricted bands of operation

The transmitter transmits on 125.0 kHz.

This falls between the restricted bands of 90 – 110 kHz and 495 – 505 kHz.

Result: Complies.

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Section 15.107: Conducted limits

Conducted emission testing has been carried out when the device was attached to the USB port of a Class B laptop that was being powered using a representative 110 Vac power supply.

The device was operated transmitting continuously.

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

Measurements on both the phase and neutral lines were made using either a Quasi Peak or an Average detector with a 9 kHz bandwidth.

The supplied conducted emission plot is a combined plot showing the worst case of the Peak, Quasi Peak and Average levels for both phase and neutral.

The Class B conducted limits have been applied

Result: Complies with a 1.4 dB margin at 195 kHz (Average). Measurement falls within the window of uncertainty for this test method.

Measurement uncertainty with a confidence interval of 95% is:

- Mains terminal tests $(0.15 - 30 \text{ MHz}) \pm 2.2 \text{ dB}$

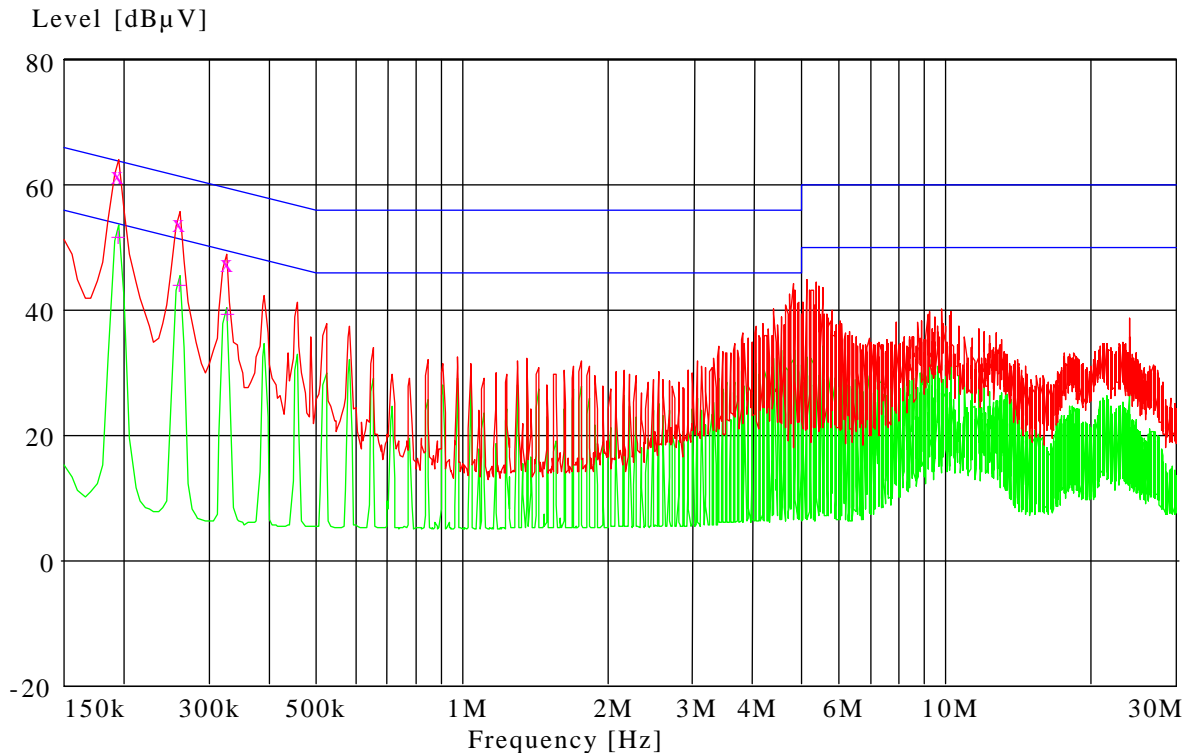
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Conducted emissions

Comments:	Device tested operating continuously when attached to the USB port of an ASUS laptop pc that was powered at 110 Vac.
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Peak -----	Average -----	Quasi Peak X	Average +
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Quasi-Peak Measurements

Frequency MHz	Level dBmV	Limit dBmV	Margin dB	Phase	Rechecks dBmV
0.143300	42.50	50.7	8.1	N	61.8
0.195000	62.10	63.8	1.6	N	
0.260000	54.40	61.4	6.9	N	
0.325000	47.80	59.5	11.7	L1	
4.750000	37.40	56.0	18.6	N	
4.820000	38.40	56.0	17.6	L1	
4.890000	38.10	56.0	17.9	L1	

Average Measurements

Frequency MHz	Level dBmV	Limit dBmV	Margin dB	Phase	Rechecks dBmV
0.195000	52.30	53.8	1.4	N	52.0
0.260000	44.70	51.4	6.7	N	
0.325000	40.10	49.5	9.4	N	
4.170000	31.60	46.0	14.4	L1	
4.560000	29.20	46.0	16.8	L1	
4.880000	27.10	46.0	18.9	N	

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Section 15.209: Radiated emission limits, general requirements

Radiated emissions testing was carried out over the frequency range of 100 kHz to 1000 MHz.

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

This site conforms to the requirements of CISPR 16, Part 1, Clause 16, and ANSI C63.4 - 2003.

Above 30 MHz the transmitter was tested above a metallic ground plane being placed on the test table at a height of 0.8 m.

Below 30 MHz testing was carried out on the grass test site with the antenna and the transmitter being placed on the ground.

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.

Below 30 MHz a magnetic loop is used with the centre of the loop being 1 metre above the ground.

Above 30 MHz the emission is measured in both vertical and horizontal antenna polarisations, where appropriate.

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

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

Pre testing in the X, Y and Z planes showed that the worst case emissions from this device were observed when it was positioned in the X plane.

Testing was therefore carried out in this position as can be seen from the photographs.

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Fundamental emission:

Measurements were attempted using a magnetic loop antenna and a receiver with an average detector and a peak detector both using a 9 kHz bandwidth

Measurements were made at a distance of 10 metres.

No emissions could be detected at this distance.

The device was then placed at a distance of 1 metre in order to determine the frequency of operation and to ensure that it was operating.

The device was observed to be operating and it was on the frequency stated by the customer.

The limit at 300 metre has been extrapolated to measurement distance of 10 metres using a factor of 40 dB per decade as detailed in section 15.31(f)(2).

Measurements were made while the device was attached to a laptop computer that was being powered at 110 Vac.

Testing was carried out when the device was transmitting continuously.

Frequency (kHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Distance (metres)
125.000	-	85.7	-	10

Frequency (kHz)	Peak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Distance (metres)
125.000	-	105.7	-	10

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz) ± 4.8 dB

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Section 15.209: Spurious Emissions (below 30 MHz)

Frequency (kHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Distance (metres)
250.000	-	79.6	-	Average
250.000	-	99.6	-	Peak
375.000	-	76.1	-	Average
375.000	-	96.1	-	Peak
500.000	-	53.6	-	Quasi Peak
625.000	-	51.7	-	Quasi Peak
750.000	-	50.1	-	Quasi Peak
875.000	-	48.8	-	Quasi Peak
1000.000	-	47.6	-	Quasi Peak
1125.000	-	46.6	-	Quasi Peak
1250.000	-	45.7	-	Quasi Peak

No spurious emissions were detected from the transmitter.

Magnetic loop measurements were attempted at a distance of 10 metres.

At each frequency the measurement antenna was further adjusted to give the highest field strength.

A receiver with an average detector and a peak detector using a 9 kHz bandwidth was used between 110 – 490 kHz and a quasi peak detector with a 9 kHz bandwidth was used between 490 kHz – 30.0 MHz.

The 300 metre limit between 125 – 490 kHz has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2).

The 30 metre limit between 490 – 1705 kHz has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2).

The limit between 110 – 490 kHz was increased by 20 dB when the peak detector was used.

The spurious emissions observed do not exceed the level of the fundamental emission.

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz) ± 4.8 dB

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Section 15.209: Spurious Emissions (above 30 MHz)

Measurements between 30 – 1000 MHz have been made at a distance of 3 metres.

A receiver with a quasi peak detector with a 120 kHz bandwidth was used between 30 – 1000 MHz.

Measurements were carried out as the device contains a digital device.

The device was tested transmitting continuously on 125 kHz.

Device was connected to the USB port of an ASUS laptop computer that was powered at 110 Vac.

The limits as described in Section 15.209 have been applied as follows:

30.0 – 88.0 MHz	100 uV/m	40 dBuV/m
88.0 – 216.0 MHz	150 uV/m	43.5 dBuV/m
216.9 – 960.0 MHz	200 uV/m	46.0 dBuV/m

Result: Complies with a 3.7 dB margin at 168.440 MHz (Horizontal).

Measurement falls within the window of uncertainty for this test method.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 1000 MHz) ± 4.1 dB

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Spurious Emissions

Frequency MHz	Vertical dBuV/m	Hort dBuV/m	Limit dBuV/m	Margin dB	Result	Antenna
40.000	17.0		40.0	23.0	Pass	Vertical
48.000	20.7		40.0	19.3	Pass	Vertical
48.070	29.0	26.5	40.0	11.0	Pass	Vertical
72.112	23.0	31.2	40.0	8.8	Pass	Horizontal
96.043	33.6	34.6	43.5	8.9	Pass	Horizontal
144.000		19.5	43.5	24.0	Pass	Horizontal
144.228	25.5	28.7	43.5	14.8	Pass	Horizontal
168.000		30.3	43.5	13.2	Pass	Horizontal
168.440	31.4	39.8	43.5	3.7	Pass	Horizontal
192.000		28.5	43.5	15.0	Pass	Horizontal
192.500	24.6	34.1	43.5	9.4	Pass	Horizontal
240.000	26.8	33.1	46.0	12.9	Pass	Horizontal
240.558	24.1	29.5	46.0	16.5	Pass	Horizontal
336.000		31.1	46.0	14.9	Pass	Horizontal
336.748		35.2	46.0	10.8	Pass	Horizontal
384.800		31.6	46.0	14.4	Pass	Horizontal
432.000		28.2	46.0	17.8	Pass	Horizontal
481.050	33.2	38.1	46.0	7.9	Pass	Horizontal
913.963		32.4	46.0	13.6	Pass	Horizontal

All other emissions had a margin to the limit exceeding 18 dB when measurements were attempted up to 1000 MHz using both vertical and horizontal polarisations.

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7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	Not applicable
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	Not applicable
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612	7 Feb 2009
Receiver	R & S	ESCS 30	847124/020	E1595	21 Dec 2008
Receiver	R & S	ESHS 10	828404/005	RFS 3728	11 Jan 2009
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	7 Feb 2009
Loop Antenna	EMCO	6502	9003-2485	HTS0201	11 July 2008
Mains Network	R & S	ESH2-Z5	881362/032	3628	8 June 2008
Variac	General Radio	1592	-	RFS 3690	Not applicable
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	Not applicable
VHF Balun	Schwarzbeck	VHA 9103	-	RFS 3603	7 Feb 2009

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, 2007.

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 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

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9. PHOTOTGRAPHS

External photos



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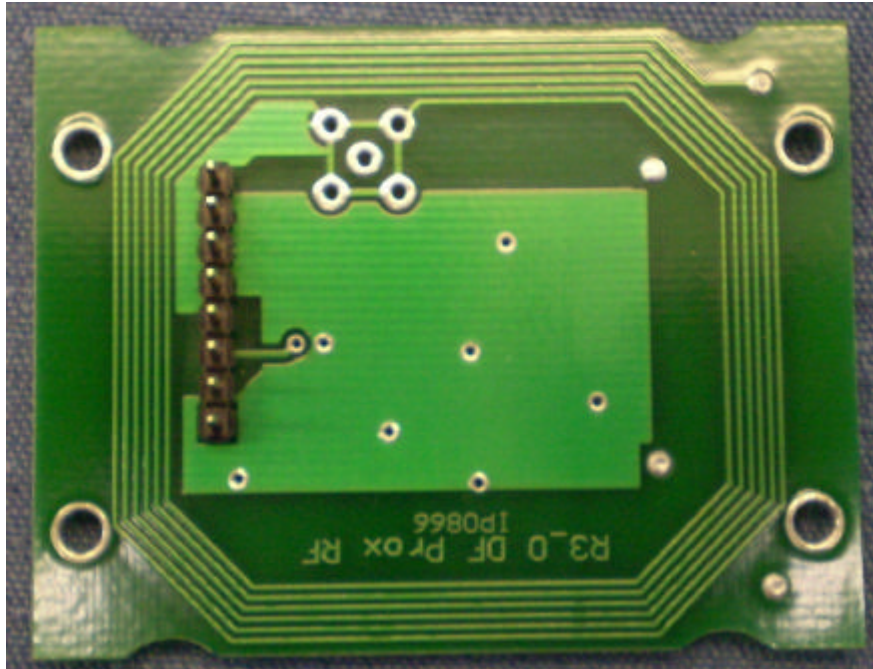
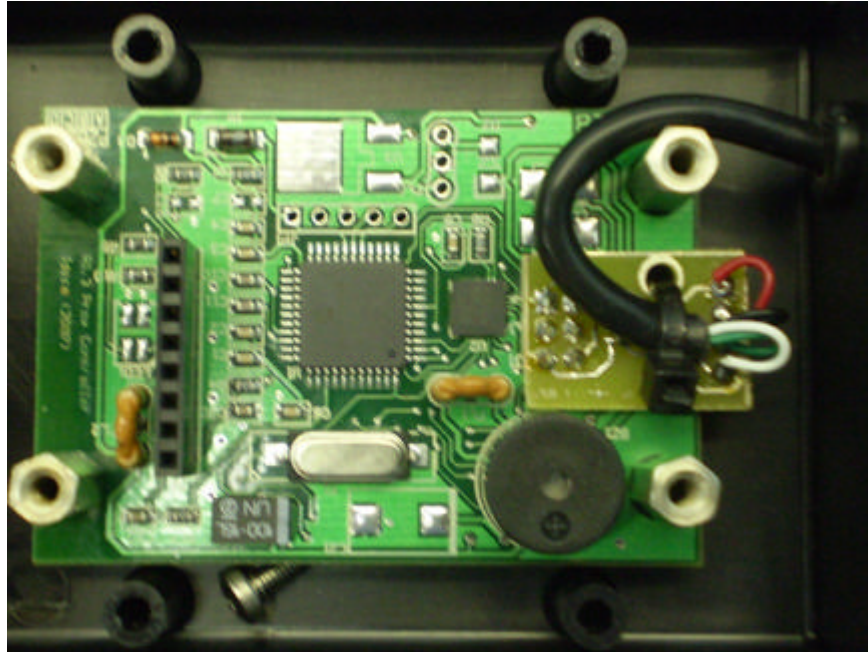
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Internal Views



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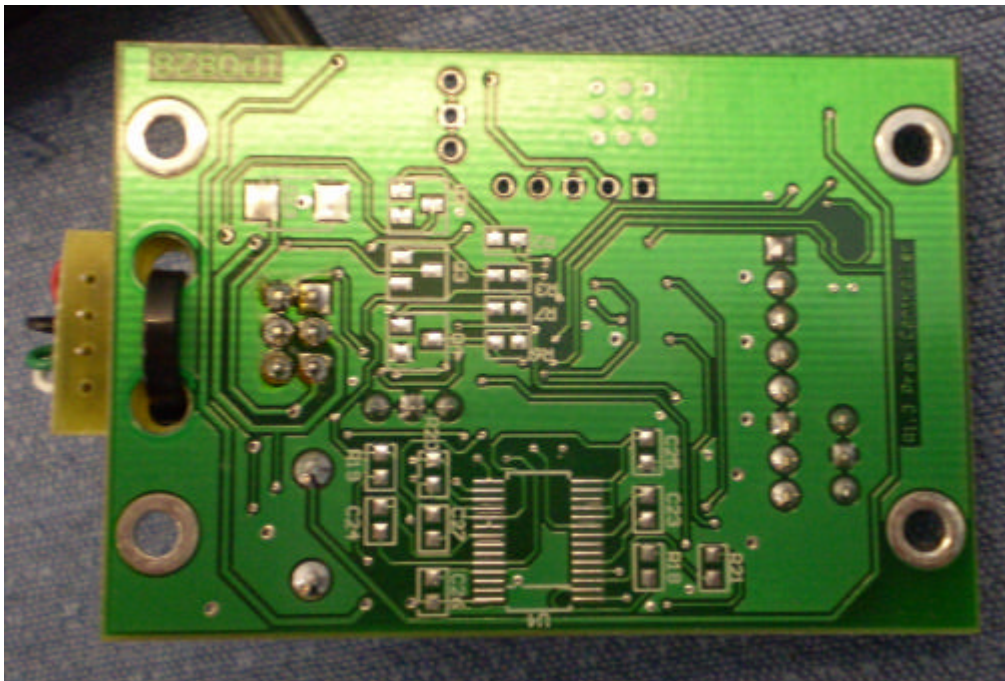
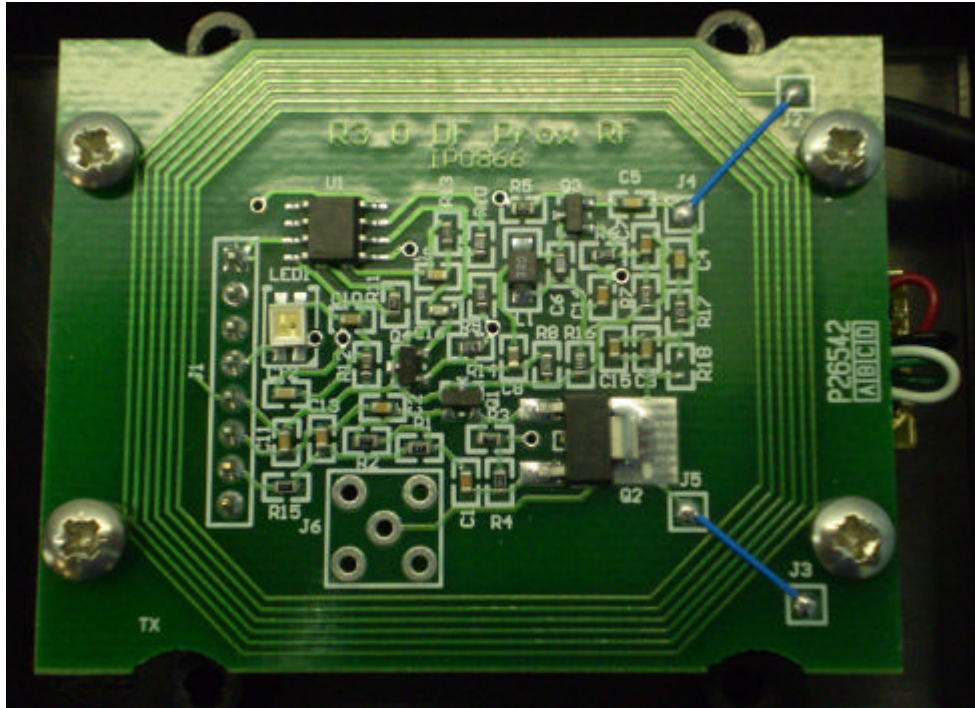
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Radiated emissions test set up



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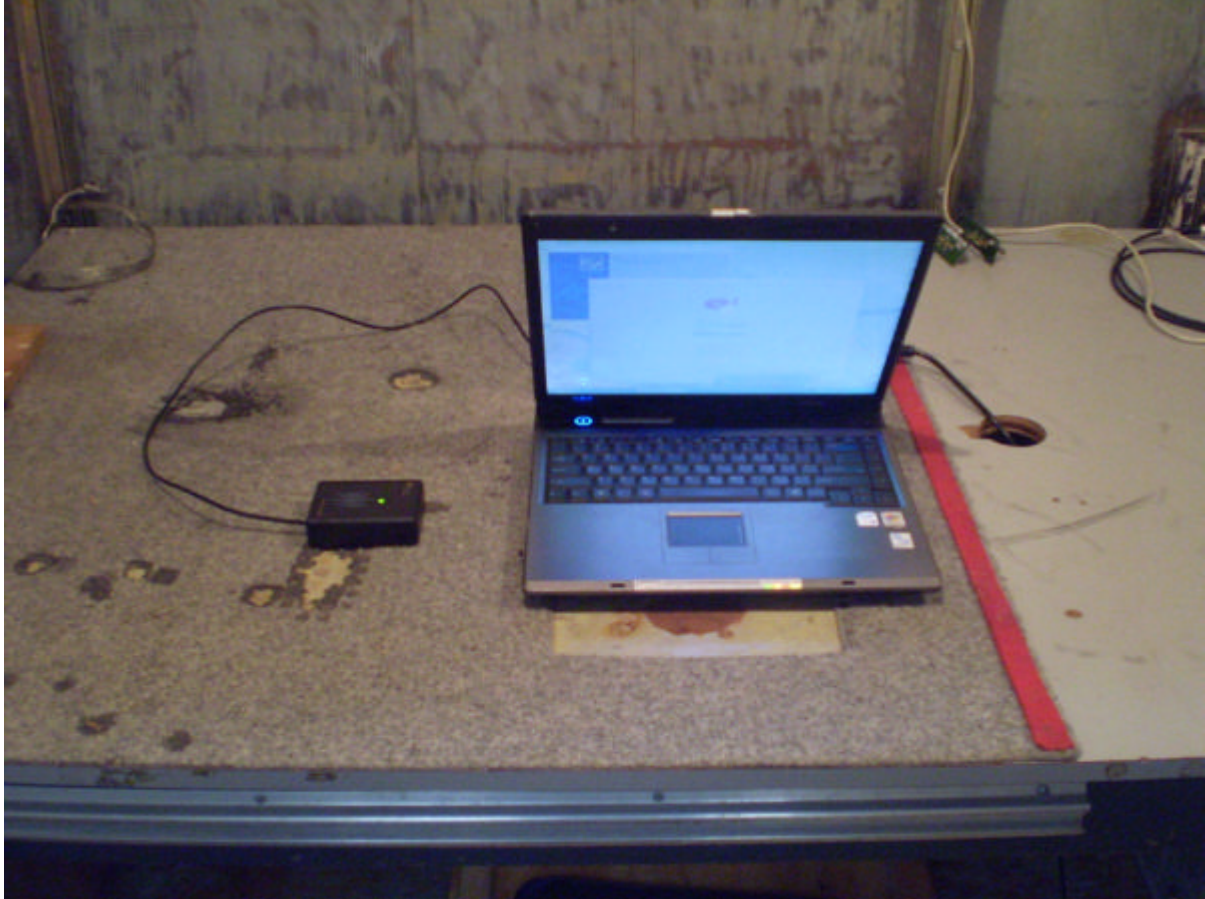
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Conducted emissions test set up



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