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TEST REPORT

Millar Instruments / Telemetry Research TR181
SmartPad Wireless Charger plus Receiver

tested to

47 Code of Federal Regulations

Part 18 – Industrial, Scientific and Medical Equipment

for

Millar Instruments Ltd / Telemetry Research 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 **Millar Instruments / Telemetry Research TR181 SmartPad Wireless Charger plus Receiver** complies with FCC Part 18 when the methods as described in ANSI C63.4 – 2003 are applied.

2. RESULTS SUMMARY

Clause	Parameter	Result
18.203	Equipment authorisation requirement	Non consumer ISM equipment.
18.301	Operating frequencies	Complies. Device operates on 198.7 kHz
18.303	Prohibited frequency bands	Noted.
18.305	Field Strength Limits	Complies
18.307	Conducted limits	Not applicable. Device does not fall into any of the categories listed.
18.309	Frequency range of measurements	Noted
18.311	Methods of measurement	Tested in accordance with ANSI C63.4 2003.

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	Millar Instruments Ltd / Telemetry Research Ltd
Address	Level 1, 70 Symonds Street Grafton
City	Auckland 1010
Country	New Zealand
Contact	Mr David Budgett

5. DESCRIPTION OF TEST SAMPLE

Brand Name	Telemetry Research
Model	TR181
Product	SmartPad Wireless Charger plus Receiver
Manufacturer	Telemetry Research Ltd
Country of Origin	New Zealand
Serial Number	4658
FCC ID	V58HU71

The device that was tested is a wireless charger that operates on 198.7 kHz to enable Telemeter devices to be charged.

The device also includes a 2.4 GHz transceiver that is used to communicate with Telemeter devices which are placed on the charging pad.

The 2.4 GHz device is covered by FCC part 15 and is subject to a separate test report.

Typically the device would be used in a laboratory environment and would be used to charge telemeter devices that are attached to rats and mice.

The device is powered using a 120 Vac to 48 Vdc external power supply

The client has estimated that the output of the 198.7 kHz transmitter is less than 500 watts.

All testing was carried out at maximum charging power which equates to maximum magnetic field strength.

6. STANDARD, SETUPS AND PROCEDURES

Standard

The sample was tested in accordance with FCC Part 18.

Methods and Procedures

The measurement methods and procedures used, as described in ANSI C63.4 – 2003.

All testing was carried out at maximum charging power which equates to maximum magnetic field strength.

7. RESULTS

Section 18.203: Equipment Authorisation

The device that is tested is a commercial device.

It is not a consumer device.

Therefore as a minimum the verification process will apply.

Section 18.301: Operating frequencies

The SmartPad transmits on 198.7 kHz and therefore it falls between the FCC restricted bands of 90-110 kHz and 495 – 505 kHz where the general limits apply.

The low power transmitting device operates in the 2400 – 2483.5 MHz ISM band.

Result: Complies

Section 18.305: Field strength limits

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 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.

The device was operated whilst charging a telemeter transmitter continuously.

Measurements of the radiated field were made with the antenna located at a 10 metre horizontal distance from the boundary of the devices under test.

Between 100 kHz and 30 MHz testing was carried out using a magnetic loop antenna, the centre of which was placed 1 metre above the ground plane.

The device was rotated using a turntable with various orientations of the loop antenna to give the worst case result.

The 300 metre limit at this frequency has been converted to a 10 metre limit using a factor if 40 dB per decade.

Measurements between 100 - 500 kHz were carried out using a peak and average detector with a bandwidth of 10 kHz.

Above 500 kHz and below 30 MHz a quasi peak detector with 9 kHz bandwidth was used.

The peak limit below 500 kHz is the average limit as per the specification + 20 dB

Between 30 and 1000 MHz testing is carried out by manually scanning 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 using a Quasi Peak detector with a bandwidth of 120 kHz.

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)

Result: Complies
Measurement uncertainty with a confidence interval of 95% is:
(0.100 – 1000 MHz) ± 4.1 dB

Fundamental emission:

Frequency kHz	Loop dBµV/m	Limit dBµV/m	Margin dB	Result	Detector
198.700	83.1	102.6	19.5	Pass	Peak
198.700	82.4	82.6	0.2	Pass	Average

Part 18 specifies a limit of 15 uV/m at 300 metres for any type of device operating on any non ISM frequency below 500 watts

15 uV/m = 23.5 dBuV/m

Measurements made at 10 metres with the 300 metre limit extrapolated by 40 dB per decade below 30 MHz.

Log (300 m) - Log (10 m) = 1.477 decades

40 dB per decade x 1.477 decades = 59.1 dB

Limit at 10 metres will therefore be 23.5 + 59.1 = 82.6 dBuV/m

Spurious Emissions: Below 30 MHz

Frequency kHz	Loop dBµV/m	Limit dBµV/m	Margin dB	Result	Detector
397.400	56.2	102.6	46.4	Pass	Peak
397.400	47.5	82.6	36.2	Pass	Average
596.100	< 50.0	82.6	> 32.6	Pass	Quasi Peak
794.800	< 50.0	82.6	> 32.6	Pass	Quasi Peak
993.500	< 50.0	82.6	> 32.6	Pass	Quasi Peak
1192.200	< 50.0	82.6	> 32.6	Pass	Quasi Peak
1390.900	< 50.0	82.6	> 32.6	Pass	Quasi Peak
1589.600	< 50.0	82.6	> 32.6	Pass	Quasi Peak
1788.300	< 50.0	82.6	> 32.6	Pass	Quasi Peak
1987.000	< 50.0	82.6	> 32.6	Pass	Quasi Peak
25158.500	27.2	82.6	55.4	Pass	Quasi Peak
24375.000	27.1	82.6	55.5	Pass	Quasi Peak
23193.300	24.5	82.6	58.1	Pass	Quasi Peak
25555.900	26.5	82.6	56.1	Pass	Quasi Peak
29899.790	31.2	82.6	51.4	Pass	Quasi Peak

Spurious Emissions: 30 - 1000 MHz

Frequency MHz	Vertical dBµV/m	Horizontal dBµV/m	Limit dBµV/m	Margin dB	Result	Antenna
30.232	33.3		53.0	19.7	Pass	Vertical
41.632	48.0		53.0	5.0	Pass	Vertical
44.762	52.9		53.0	0.1	Uncert	Vertical
45.110	53.0	40.5	53.0	0.0	Uncert	Vertical
45.459	49.1		53.0	3.9	Uncert	Vertical
47.140	49.6		53.0	3.4	Uncert	Vertical
47.300	47.2		53.0	5.8	Pass	Vertical
47.551	47.3		53.0	5.7	Pass	Vertical
54.176	43.1		53.0	9.9	Pass	Vertical
65.450	36.5		53.0	16.5	Pass	Vertical
80.100	35.8		53.0	17.2	Pass	Vertical
163.406	34.9		53.0	18.1	Pass	Vertical
235.740	33.2		53.0	19.8	Pass	Vertical
236.128		37.6	53.0	15.4	Pass	Horizontal

Part 18 specifies a limit of 15 uV/m at 300 metres for any type of device operating on any non ISM frequency below 500 watts

15 uV/m = 23.5 dBuV/m

Measurements made at 10 metres with the 300 metre limit extrapolated by 20 dB per decade above 30 MHz.

Log (300 m) - Log (10 m) = 1.477 decades

20 dB per decade x 1.477 decades = 29.5 dB

Limit at 10 metres will therefore be 23.5 + 29.5 = 53.0 dBuV/m

Section 18.307: Conducted limits

Not applicable as this equipment is not

a) Ultrasonic equipment
b) Induction cooking equipment
c) RF lighting

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	-
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	Not applic	-
Receiver	R & S	ESIB 40	100171	R-27-1	21 Oct 2013	1 year
VHF Balun	Schwarzbeck	VHA 9103	-	RFS 3603	7 Feb 2014	1 year
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612	7 Feb 2014	1 year
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	7 Feb 2014	1 year
Loop Antenna	EMCO	6502	9003-2485	3798	12 Dec 2013	1 year

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 February, 2011.

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 17025:2005.

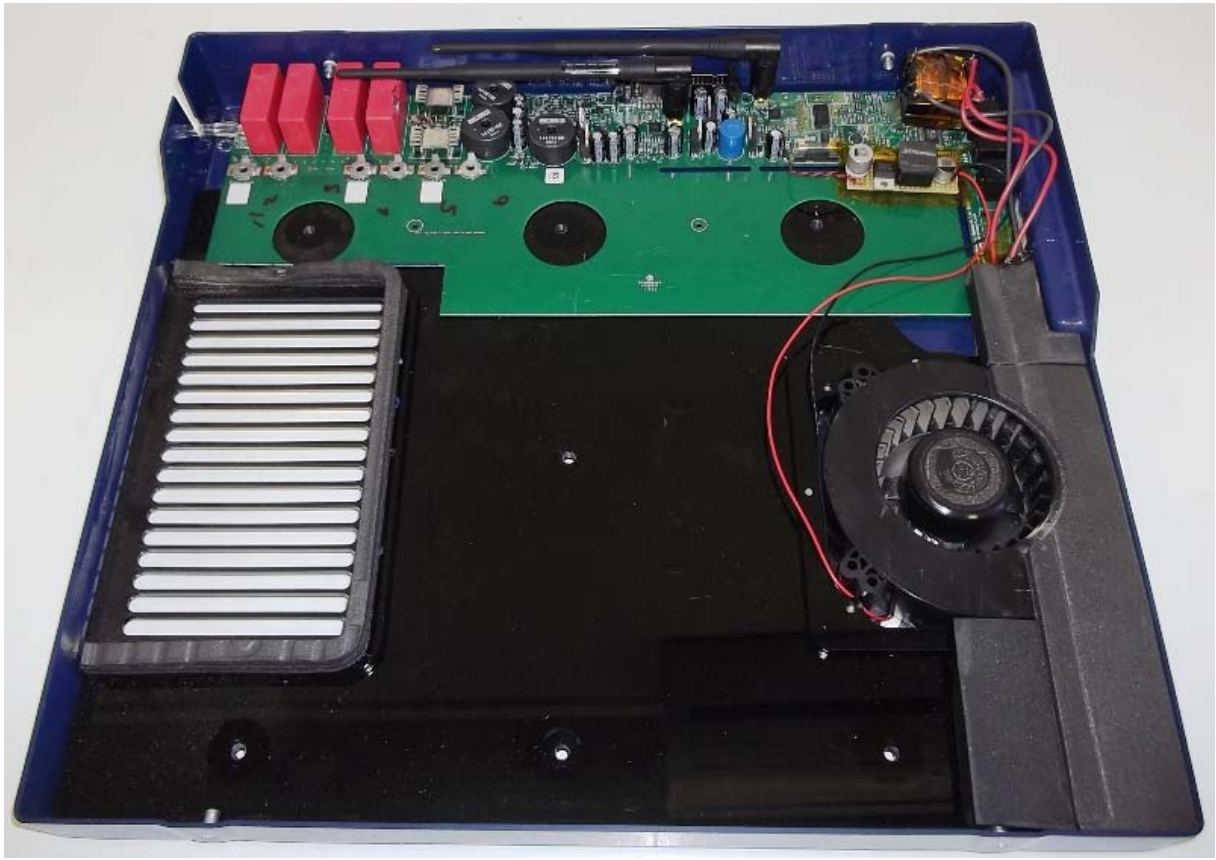
All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ISO 17025: 2005.

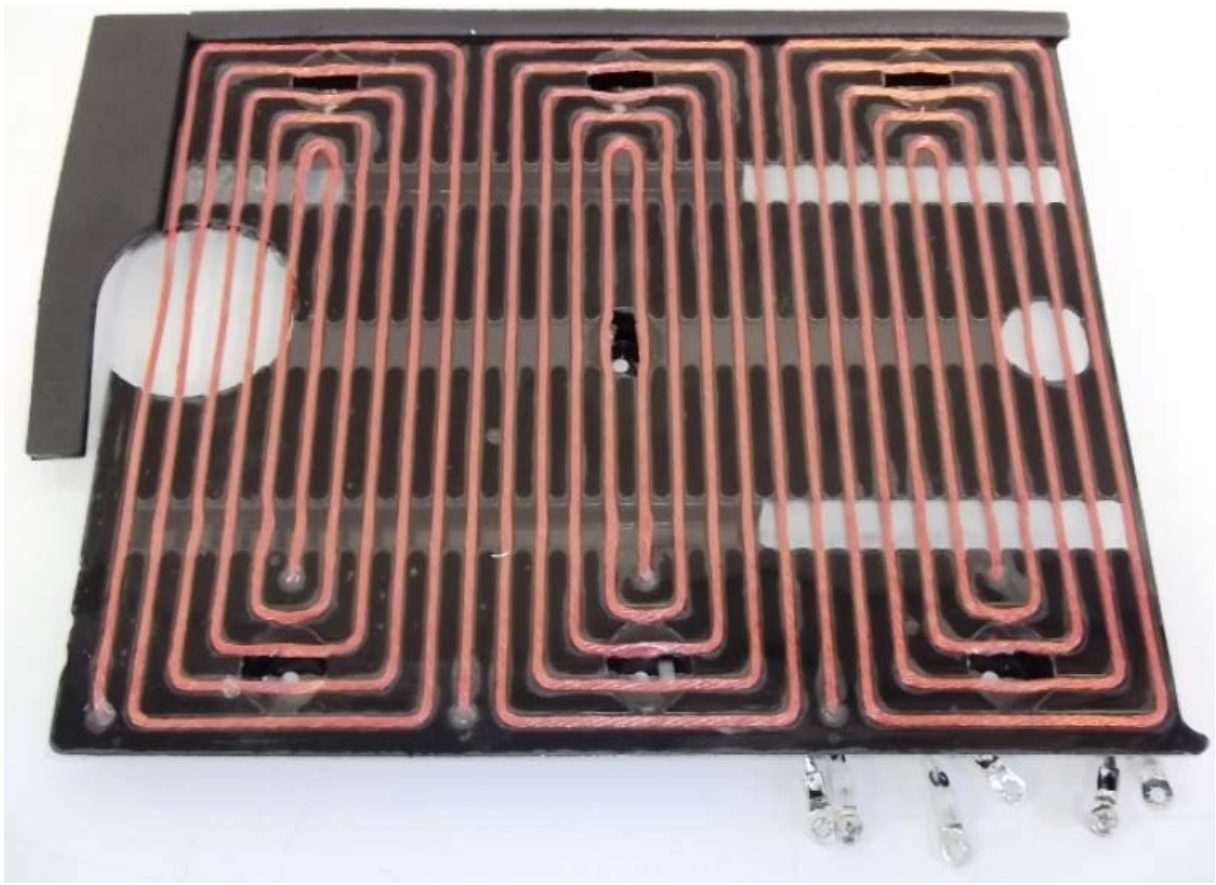
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with a number of accreditation bodies in various economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied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

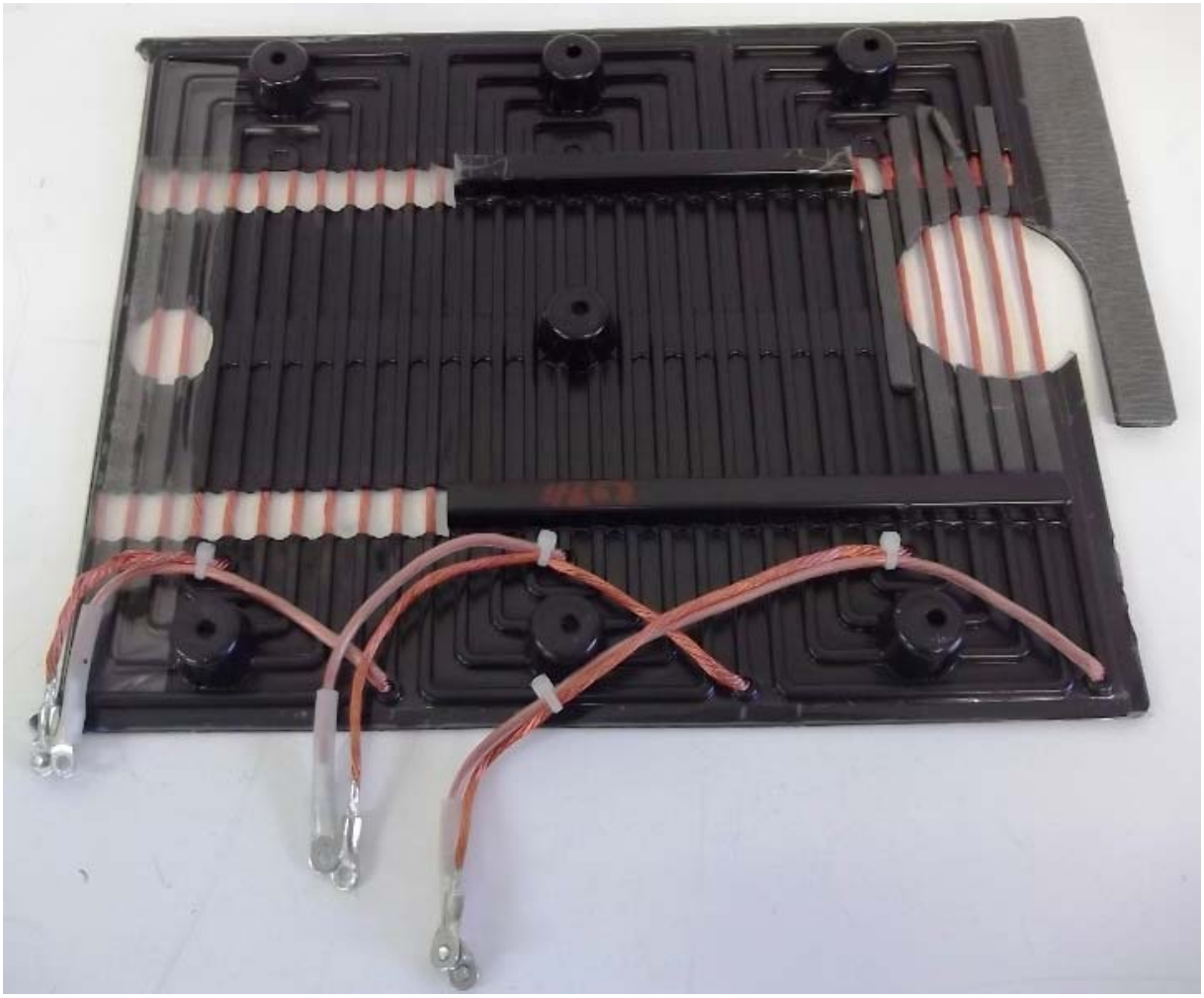
10. PHOTOGRAPHS

External photos

Internal Photos







Radiated emissions test set up photos