EMC Technologies (NZ) Ltd

Test Report No **20802.1**
Report date: 16 August 2002

TEST REPORT

Cardax Prox Plus Reader 125 Series Grey Card Reader

tested to

47 Code of Federal Regulations

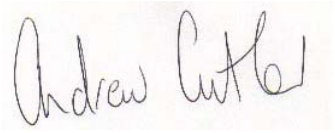
Part 15 - Radio Frequency Devices

Subpart C – Intentional Radiators

for

Gallagher Group Ltd

This Test Report is issued with the authority of:



Andrew Cutler - General Manager

Prepared By:

Karen Miller - Office Administrator

EMC Technologies (NZ) Ltd
STREET ADDRESS - 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand
POSTAL ADDRESS - PO Box 68 307, Newton, Auckland, New Zealand
Telephone: +64 9 360 0862 Fax: +64 9 360 0861
E-mail: aucklab@ihug.co.nz
Web Site: www.emctech.com.au

Table of Contents

1. STATEMENT OF COMPLIANCE

The **Gallagher Prox Plus Reader 125 Series Grey Card Reader** complies with FCC Part 15 Subpart C as an Intentional Radiator when the methods, as described in ANSI C63.4 - 1992, are applied.

2. RESULTS SUMMARY

The results from testing are summarised in the following table:

Clause	Parameter	Result
15.201	Equipment authorisation requirement.	Certification required.
15.203	Antenna requirement	Complies. Antenna integral.
15.204	External PA and antenna modifications	Not applicable. No external devices.
15.205	Restricted bands of operation	Complies. Device transmits on 125 kHz.
15.207	Conducted limits	Complies with a 12.9 dB margin at 475 kHz.
15.209	Radiated emission limits - Fundamental	Complies with a 22.9 dB margin.
15.209	Radiated emission limits - Spurious emissions <30 MHz	Complies with a 33.6 dB margin at 1250 kHz.
15.209	Radiated emission limits – Spurious emissions >30 MHz	Complies with a 14.5 dB margin at 67.580 MHz.

3. INTRODUCTION

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

The test sample was selected by the client.

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	Gallagher Group Ltd
Address	Private Bag 3026
City	Hamilton
Country	New Zealand
Contact	Mr Dave Grant

5. DESCRIPTION OF TEST SAMPLE

Brand Name	Gallagher
Model Number	Prox Plus Reader 125 Series
Product	Card Reader
Manufacturer	Gallagher Group
Country of Origin	New Zealand
Serial Number	0230145053

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 - 1992 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.

As can be seen from the attached photographs the antenna requirement does not apply to this transmitter, as the antenna is integral to the device.

Result: Complies.

Section 15.204: External radio frequency power amplifiers and antenna modifications.

From the attached photographs it can be seen that it is not possible to attach an external power amplifier to this transmitter. In addition the antenna is integral to the device and therefore only one antenna can be used with this transmitter.

Result: Complies.

Section 15.205: Restricted bands of operation.

The transmitter transmits on 125 kHz.

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

Result: Complies.

Section 15.207: Conducted limits

Conducted emissions were carried out over the frequency range of 150 kHz to 30 MHz.

Testing for conducted emissions 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.

The device was placed 0.8 m away from the artificial mains terminal network on the emissions test table which is 1 m x 1.5 m, and is 0.8 m above the screened room floor which acts as the horizontal ground plane and is 0.4 m away from the screened room wall which acts as the vertical ground plane.

The device was powered at 110 V AC from the mains.

Measurements were made using a receiver with a quasi peak detector and a bandwidth of 9 kHz.

The transmitter under test is powered from a Universal Card Reader Interface, which supplies the required 12 Vdc power source.

Result: Complies with a 12.9 dB margin at 475 kHz when the transmitter was operating continuously.

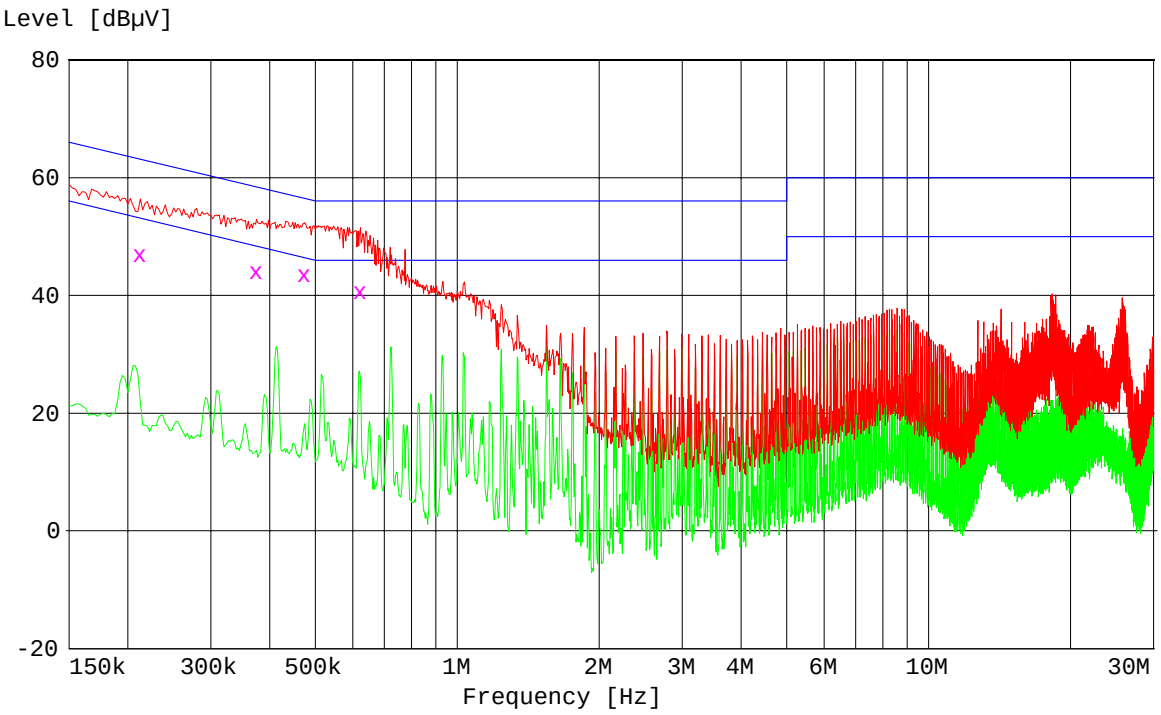
Measurement uncertainty with a confidence interval of 95% is:

- Conducted emissions test (0.45 - 30 MHz) ± 2.2 dB

Conducted Emissions

Comments:	Device tested when powered by the URI which was supplied with 110V AC. The transmitter was tested operating continuously on 125 kHz.

KEY			
Peak		Quasi Peak	X
Average		Average	+



Quasi-Peak Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
0.212500	46.89	63.11	16.22		N	
0.375000	44.02	58.39	14.37		N	
0.475000	43.52	56.43	12.91		N	
0.622500	40.71	56.00	15.29		N	

Average Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
No Recorded Results						

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 - 1992.

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

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.

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)

Fundamental emission

Frequency kHz	Level dBuV/m	Limit dBuV/m	Margin dB	Result
125.000	42.8	65.7	-22.9	Pass

Magnetic loop measurements were made at a distance of 30 metres.

Measurements were made while the device was attached to a Universal card reader which was being powered at 110 Vac.

A receiver with an average detector with a 9 kHz bandwidth was used to make the above measurements

The 300 metre limit of 19.2 uV (25.6 dBuV/m) has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2), which gives a limit of 1,928 uV (65.7 dBuV/m) at 30 metres.

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (100 kHz - 30 MHz) ± 4.8 dB

Section 15.209: Spurious Emissions (below 30 MHz)

Frequency kHz	Level dBuV/m	Limit dBuV/m	Margin dB	Result
250.0	14.1	79.6	-65.5	Pass
375.0	18.0	76.1	-58.1	Pass
500.0	12.7	53.6	-40.9	Pass
625.0	17.0	51.7	-34.7	Pass
750.0	10.2	50.1	-39.9	Pass
875.0	12.4	48.8	-36.4	Pass
1000.0	9.1	47.6	-38.5	Pass
1125.0	9.7	46.6	-36.9	Pass
1250.0	12.1	45.7	-33.6	Pass
1375.0	8.0	44.8	-36.8	Pass
1500.0	7.5	44.1	-36.6	Pass
1625.0	7.0	43.4	-36.4	Pass

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

Measurements were made while the device was attached to a Universal card reader which was being powered at 110 Vac.

A receiver with an average detector with a 9 kHz bandwidth was used between 125 – 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) and 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).

No further transmitter spurious emissions were detected above 1600.0 kHz.

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

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (100 kHz - 30 MHz) ± 4.8 dB

Section 15.209: Spurious Emissions (above 30 MHz)

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

Measurements were made while the device was attached to a Universal card reader which was being powered at 110 Vac.

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

No transmitter spurious emissions were observed.

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

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.

Measurement uncertainty with a confidence interval of 95% is:

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

Frequency	Level		Recheck	Limit	Margin	Result	Worst Case
	Vertical	Hort					Antenna
MHz	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB		
30.710	22.2			40.0	17.8	Pass	Vertical
36.860	19.5	13.2		40.0	20.5	Pass	Vertical
46.070	19.4			40.0	20.6	Pass	Vertical
50.740	23.9			40.0	16.1	Pass	Vertical
51.300	22.5			40.0	17.5	Pass	Vertical
54.400	22.0			40.0	18.0	Pass	Vertical
55.200	24.6			40.0	15.4	Pass	Vertical
56.300	21.0			40.0	19.0	Pass	Vertical
58.360	22.6			40.0	17.4	Pass	Vertical
61.430	25.0			40.0	15.0	Pass	Vertical
64.000	24.2			40.0	15.8	Pass	Vertical
64.500	24.1			40.0	15.9	Pass	Vertical
65.530	22.4			40.0	17.6	Pass	Vertical
67.580	25.5			40.0	14.5	Pass	Vertical
68.290	20.8			40.0	19.2	Pass	Vertical
80.000	18.5			40.0	21.5	Pass	Vertical
107.510	20.1	10.0		43.5	23.4	Pass	Vertical
144.370	17.0			43.5	26.5	Pass	Vertical
150.510	18.1			43.5	25.4	Pass	Vertical
159.730	19.6			43.5	23.9	Pass	Vertical
165.870	18.8			43.5	24.7	Pass	Vertical
172.010	19.5			43.5	24.0	Pass	Vertical

7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref
Aerial Controller	EMCO	1090	9112-1062	RFS 3710
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612
Log Periodic Antenna	Schwarzbeck	UHALP 9107	-	RFS 3702
Measurement Receiver	Rohde & Schwarz	ESCS 30	847124/020	E1595
Measurement Receiver	Rohde & Schwarz	ESHS 10	828404/005	RFS 3728
2m Tripple Loop Antenna	Rohde & Schwarz	HM020	843885/004	-
Loop Antenna	Schwarzbeck	FMZ 1514	-	RFS 3602
Magnetic Loops	Schwarzbeck	FMZ 15141	-	RFS 3653
Magnetic Loops	Schwarzbeck	FMZ 15142	-	RFS 3654
Artificial Mains Network	Rohde & Schwarz	ESH2-Z5	881362/034	RFS 3628
Variac	General Radio	1592	-	RFS 3690
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709
VHF Balun Antenna	Schwarzbeck	VHA 9103		RFS 3603

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 March 25th, 2002.

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 17025.1999.

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 17025.1999.

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.

10. PHOTOGRAPHS