

EMC Technologies (NZ) Ltd

Test Report No 20230.1
Report date: 25 March 2002

TEST REPORT

Gallagher 125 Series Potted Grey Prox Card Reader

tested to the Specification

47 Code of Federal Regulations

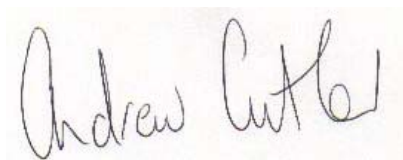
Part 15 - Radio Frequency Devices

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



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1. STATEMENT OF COMPLIANCE

The **Gallagher 125 Series Potted Grey Prox Card Reader** complies with FCC Part 15 Subpart C 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 mods	Not applicable. No external devices.
15.205	Restricted bands of operation	Complies.
15.207	Conducted limits	Complies with a 1.5 dB margin at 514 kHz in stand by.
15.209	Radiated emission limits - Fundamental	Complies with a 27.6 dB margin.
15.209	Radiated emission limits - Spurious emissions <30 MHz	Complies with a 39.9 dB margin at 625 kHz.
15.209	Radiated emission limits – Spurious emissions >30 MHz	Complies with a 4.4 dB margin at 182.260 MHz (vertical).

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3. CLIENT INFORMATION

Company Name	Gallagher Group Ltd
Address	Private Bag 3026
City	Hamilton
Country	New Zealand
Contact	Tony Smith

4. DESCRIPTION OF TEST SAMPLE

Brand Name	Gallagher
Model Number	125 Series Potted Grey
Product	Prox Card Reader
Manufacturer	Gallagher Group
Country of Origin	New Zealand
Serial Number	0201311257

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5. METHODS AND PROCEDURES

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.

6. RESULTS

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.

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Section 15.207: Conducted limits

Conducted emissions were carried out over the frequency range of 450 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 3.2 dB margin at 496 kHz when operating in stand by mode.

Measurement uncertainty with a confidence interval of 95% is:

- Conducted emissions test (0.45 - 30 MHz) $\pm$ 2.2 dB

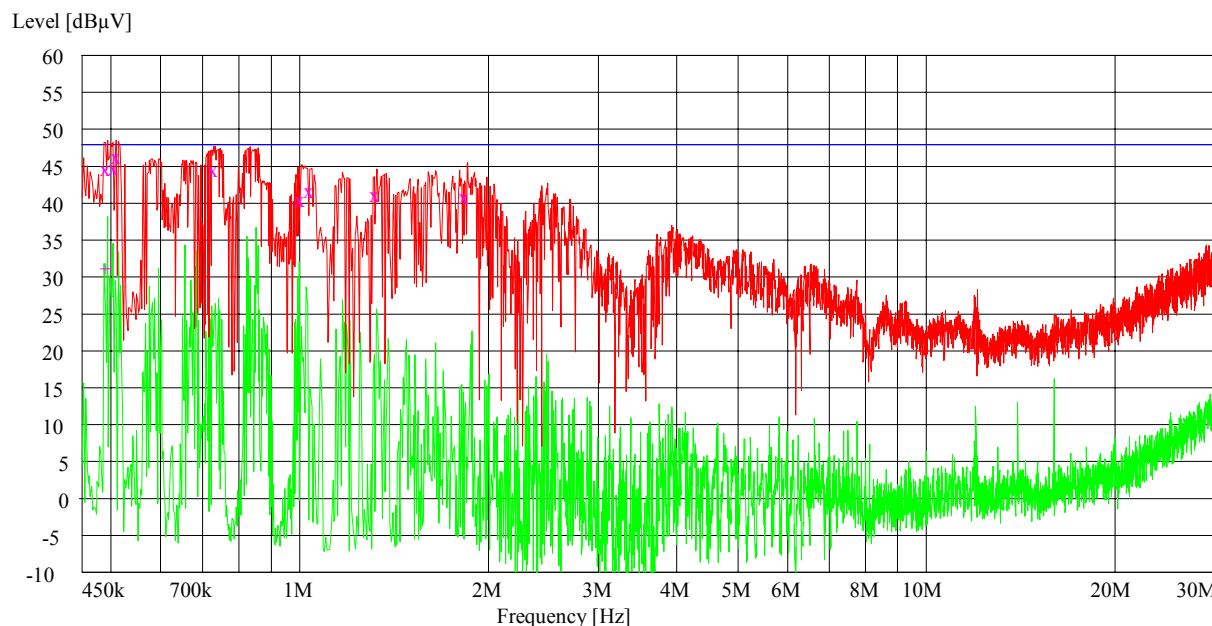
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Conducted emissions

Comments: Device attached to a Universal reader interface via a 4 wire cable, unit tested with card not being read. Universal reader powered at 110 Vac.

KEY			
Peak		Quasi Peak	X
Average		Average	+



Quasi-Peak Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.494000	44.93	48.00	3.07		L1	
0.510000	45.09	48.00	2.91		L1	45.2
0.514000	46.49	48.00	1.51		N	47.1
0.734000	44.81	48.00	3.19		N	44.9
1.010000	40.63	48.00	7.37		L1	
1.045000	42.01	48.00	5.99		L1	
1.330000	41.41	48.00	6.59		N	
1.850000	41.16	48.00	6.84		L1	

Average Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.494000	31.35	48.00	16.65		L1	

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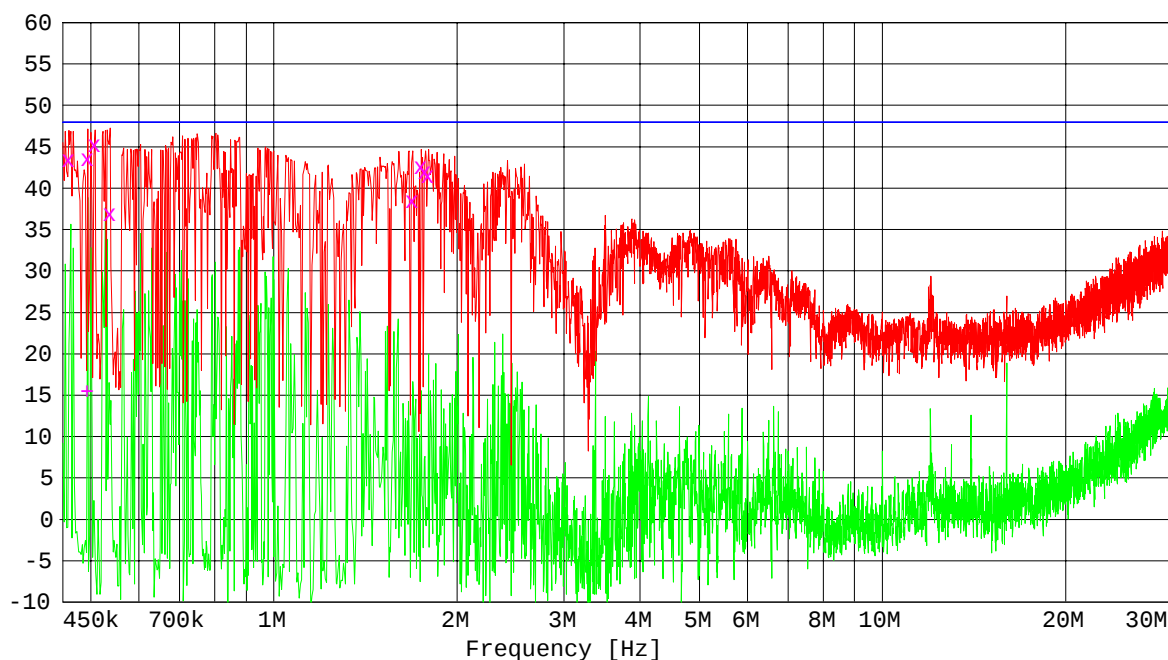
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KEY			
Peak		Quasi Peak	X
Average		Average	+

Level [dB μ V]



Quasi-Peak Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.460000	43.44	48.00	4.56		L1	43.6 45.0
0.494000	43.57	48.00	4.43		N	
0.508000	45.23	48.00	2.77		L1	
0.538000	36.96	48.00	11.04		N	
1.690000	38.53	48.00	9.47		L1	
1.745000	42.62	48.00	5.38		N	
1.775000	41.97	48.00	6.03		L1	
1.795000	41.54	48.00	6.46		L1	

Average Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.494000	15.43	48.00	32.57		L1	

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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 - 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:

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

Fundamental emission

Frequency kHz	Level dBuV/m	Limit dBuV/m	Margin dB	Result
125.000	58.1	85.7	-27.6	Pass

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

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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 19,200 uV (85.7 dBuV/m) at 10 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
375.000	21.1	76.1	55.0	Pass
625.000	11.8	51.7	39.9	Pass
875.000	7.4	48.8	41.4	Pass
Nil further observed				

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.

A receiver with a quasi peak detector with a 9 kHz bandwidth was used between 490 kHz – 30.0 MHz.

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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 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)

Frequency MHz	Level		Recheck dB μ V/m	Limit dB μ V/m	Margin dB	Result	Worst Case Antenna
	Vertical dB μ V/m	Horizontal dB μ V/m					
36.860	25.3			40.0	14.7	Pass	Vertical
37.760	22.8			40.0	17.2	Pass	Vertical
48.000	26.0			40.0	14.0	Pass	Vertical
58.360	21.6			40.0	18.4	Pass	Vertical
59.270	23.5			40.0	16.5	Pass	Vertical
60.740	24.4			40.0	15.6	Pass	Vertical
61.430	24.5			40.0	15.5	Pass	Vertical
64.500	23.2			40.0	16.8	Pass	Vertical
65.460	22.3			40.0	17.7	Pass	Vertical
67.578	25.0			40.0	15.0	Pass	Vertical
73.480	24.6			40.0	15.4	Pass	Vertical
74.260	24.8			40.0	15.2	Pass	Vertical
80.000	29.7			40.0	10.3	Pass	Vertical
80.770	27.1			40.0	12.9	Pass	Vertical
86.000	28.3			40.0	11.7	Pass	Vertical
107.500	21.2			43.5	22.3	Pass	Vertical
111.130	22.5			43.5	21.0	Pass	Vertical
112.630	22.8			43.5	20.7	Pass	Vertical
113.650	26.3			43.5	17.2	Pass	Vertical
120.130	20.7			43.5	22.8	Pass	Vertical

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Frequency	Level		Recheck	Limit	Margin	Result	Worst Case
	Vertical	Horizontal					Antenna
MHz	dB μ V/m	dB μ V/m	dB μ V/m	dB μ V/m	dB		
132.510	20.6			43.5	22.9	Pass	Vertical
141.630	24.2			43.5	19.3	Pass	Vertical
142.880	26.2			43.5	17.3	Pass	Vertical
143.130	26.4			43.5	17.1	Pass	Vertical
144.630	27.6			43.5	15.9	Pass	Vertical
145.130	29.0			43.5	14.5	Pass	Vertical
147.380	32.0	21.3		43.5	11.5	Pass	Vertical
148.890	32.4	21.8		43.5	11.1	Pass	Vertical
154.010	32.4	23.5		43.5	11.1	Pass	Vertical
159.260	35.1	23.9		43.5	8.4	Pass	Vertical
160.260	36.0	24.9		43.5	7.5	Pass	Vertical
161.510	36.0	24.3		43.5	7.5	Pass	Vertical
162.890	37.6	26.3		43.5	5.9	Pass	Vertical
164.260	38.7	29.6		43.5	4.8	Pass	Vertical
165.260	38.7	31.2		43.5	4.8	Pass	Vertical
166.260	37.2	31.3		43.5	6.3	Pass	Vertical
167.260	33.3	30.7		43.5	10.2	Pass	Vertical
168.260	30.2	30.5		43.5	13.0	Pass	Horizontal
169.260	36.9	31.9		43.5	6.6	Pass	Vertical
170.260	36.7	33.3		43.5	6.8	Pass	Vertical
172.260	38.6	34.8		43.5	4.9	Pass	Vertical
176.260	34.8	32.2		43.5	8.7	Pass	Vertical
180.260	34.2	29.4		43.5	9.3	Pass	Vertical
182.260	39.1	31.6		43.5	4.4	Pass	Vertical
186.260	33.6	27.3		43.5	9.9	Pass	Vertical
188.260	30.5	24.6		43.5	13.0	Pass	Vertical
274.510	21.0	19.6		46.0	25.0	Pass	Vertical
294.520	25.6	19.7		46.0	20.4	Pass	Vertical
300.520	25.5	19.3		46.0	20.5	Pass	Vertical
305.520	26.0	21.3		46.0	20.0	Pass	Vertical
359.520	25.0			46.0	21.0	Pass	Vertical
361.520	25.5			46.0	20.5	Pass	Vertical
382.660	27.9			46.0	18.1	Pass	Vertical
553.670	28.6			46.0	17.4	Pass	Vertical

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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.

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

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) $\pm$ 4.1 dB

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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 12th, 2002.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to the New Zealand Code of Laboratory Management Practice incorporating ISO Guide 25: 1990 and ISO 9002: 1994.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to the New Zealand Code of Laboratory Management Practice incorporating ISO Guide 25: 1990 and ISO 9002: 1994.

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 25 accreditation bodies in 21 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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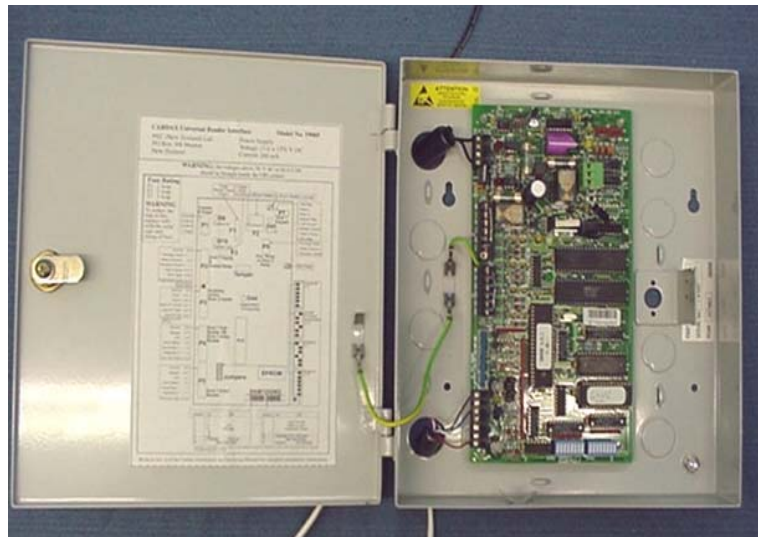
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10. PHOTOGRAPHS

Transmitter



Universal Card Reader



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Radiated Emissions test set-up



Conducted Emissions test set-up



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