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## **TEST REPORT**

### **Gallagher BR Series (G03111) Smart Reader with Sheep Crate Drafter (G05714) Antenna**

*tested to*

**47 Code of Federal Regulations**

**Part 15 - Radio Frequency Devices**

**Subpart C – Intentional Radiators**

*for*

**Gallagher Group Ltd**

A handwritten signature in black ink that reads "Andrew Cutler". The signature is written in a cursive style and is positioned above a horizontal line.

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 **Gallagher BR Series (G03111) Smart Reader with Sheep Crate Drafter (G05714) Antenna** 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

Clause	Parameter	Result
15.201	Equipment authorisation requirement	Certification required.
15.203	Antenna requirement	Complies. Antenna connects externally to the device and has a unique non standard fitting.
15.204	External PA and antenna modifications	Noted.
15.205	Restricted bands of operation	Complies. Device transmits on 134.2 kHz.
15.207	Conducted limits	Complies with an 11.7 dB margin at 1701.000 kHz (Average).
15.209	Radiated emission limits - Fundamental	Complies with a 0.5 dB margin (average) at 134.2 kHz
15.209	Radiated emission limits - Spurious emissions <30 MHz	Complies with a 0.6 dB margin at 671.000 kHz (average)
15.209	Radiated emission limits – Spurious emissions >30 MHz	Complies with a 6.9 dB margin at 576.500 MHz (Horizontal)

### **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**

<b>Company Name</b>	Gallagher Group Ltd
<b>Address</b>	Private Bag 3026
<b>City</b>	Hamilton 3240
<b>Country</b>	New Zealand
<b>Contact</b>	Mr Paul Young

## 5. DESCRIPTION OF TEST SYSTEM

<b>Brand Name</b>	Gallagher
<b>Product</b>	BR Series (G03111)
<b>Model Number</b>	Smart Reader
<b>Serial Number</b>	XTESTIDX
<b>Antenna</b>	Sheep Crate Drafter (G05714) Antenna
<b>Serial Number</b>	Not serialised
<b>Manufacturer</b>	Gallagher Group Ltd
<b>Country of Origin</b>	New Zealand
<b>Power Supply</b>	FranMar FRA050-S12-8 AC Adaptor
<b>Serial Number</b>	Not serialised
<b>FCC ID</b>	Not yet determined

The system that was tested was an integrated animal management device that included

- A Sheep Crate Drafter
- A BR Series Smart Reader
- A Gallagher Weight Station Device

Typically an animal would be herded into this device and then held by the drafting device which the animal tag is read, the animal is weighed and any other animal management activities are undertaken while it is in-capacitated.

The Smart Reader is operated using an internal battery and had previously been tested and certified using different types of antenna.

When the AC adaptor is attached for charging purposes the transmitter no longer operates.

## **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 operates with an external antenna using a unique custom connector.

The antenna panels form the sides of the sheep crate drafter.

**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 134.2 kHz.

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

**Result:** Complies.

### **Section 15.107: Conducted limits**

Conducted emission testing has been carried out when the device was powered at 120 Vac using the supplied power supply.

Testing was carried out while the device was charging the reader as the transmitter does not operate when the AC adaptor is attached.

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.

Testing was carried out in accordance with section 15.207(a) using a measuring receiver and a 50  $\mu$ H / 50 ohm artificial mains network which is also known as a line impedance stabilisation network (LISN).

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

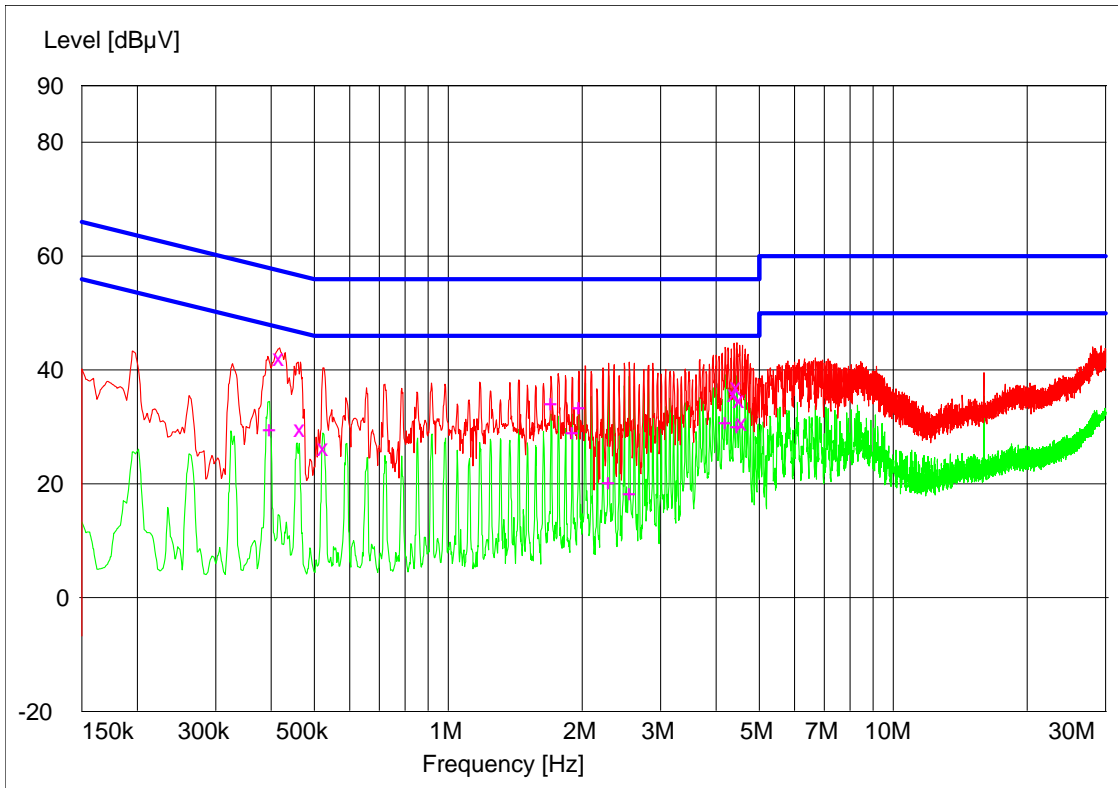
Measurement uncertainty with a confidence interval of 95% is:

Conducted emissions tests (0.15 - 30 MHz)  $\pm$  2.2 dB

### Conducted Emissions – AC Input Power Port

<b>Setup:</b>	Device tested continuously charging the BR reader when powered at 120 Vac using the supplied AC adaptor.
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Peak ---   
 Average --   
 Quasi Peak X   
 Average +



Final Quasi-Peak Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Phase	Rechecks dBµV
0.417000	42.10	57.6	15.5	L1	
0.465000	29.70	56.7	27.0	N	
0.525000	26.40	56.0	29.6	N	
4.385000	35.90	56.0	20.1	N	
4.448000	37.10	56.0	18.9	L1	
4.515500	34.80	56.0	21.2	N	
4.578500	30.80	56.0	25.2	N	

Final Average Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Phase	Rechecks dBµV
0.396000	29.60	47.9	18.3	N	
1.701000	34.30	46.0	11.7	L1	
1.896000	29.10	46.0	16.9	N	
1.962000	33.60	46.0	12.4	N	
2.292500	20.30	46.0	25.7	L1	
2.553500	18.40	46.0	27.6	L1	
4.191500	31.00	46.0	15.0	L1	
4.448000	30.20	46.0	15.8	L1	



## **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 and ANSI C63.4 - 2003.

Testing was carried out when the device was powered using the internal battery supply that had been charged overnight and was indicating full capacity.

The device was placed on top of the turntable with the Smart Reader being approximately 1 metre above the ground.

Attached to the Smart Reader RS-232 port was a Gallagher Weigh Scale device.

Low frequency measurements below 30 MHz were not made on the metallic ground plane but on a grass test site at a distance of 10 metres using a magnetic loop antenna.

The centre of this loop antenna was placed 1 metre above the test site ground.

The Sheep Crate Drafter was manually positioned on the radial giving the highest field strength.

Above 30 MHz testing was carried out at the test site using a metallic ground plane where emissions were measured in both vertical and horizontal antenna polarisations.

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

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

### Fundamental emission:

Measurements were made 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 with the limit being determined by using the extrapolation factor of 40 dB per decade limit as detailed in section 15.31 f (2).

The average limit at 300 m at 134.2 kHz is 17.8 uV/m or 25 dBuV/m and 45 dBuV/m in peak.

Frequency kHz	Detector	Distance metres	Level dBuV/m	Limit (dBuV/m)	Margin (dB)
134.200	Average	10	84.5	85.0	0.5
134.200	Peak	10	94.3	105.0	10.7

Testing was also carried out to determine whether a variation in the supply voltage would cause a significant change in field strength.

The client advises that the maximum charged supply voltage is 12.6 Vdc and the device turns off if the supply voltage goes below approximately 11.5 Vdc.

Testing was therefore carried out at 12.6, 12.0 and 11.6 Vdc with the field strength being observed at 134.2 kHz using an average detector.

Voltage (Vdc)	Field Strength (dBuV/m)
12.6	84.5
12.0	83.7
11.6	84.5

A significant variation was not observed

The device was observed to turn off when the supply voltage went below 11.6 Vdc

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz)  $\pm 4.8$  dB

## Section 15.209: Spurious Emissions (below 30 MHz)

Magnetic loop measurements were made 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 fundament emission.

Frequency kHz	Level dBuV/m	Limit dBuV/m	Margin dB	Detector	Comment
268.400	-	79.0	-	Average	Nil observed
268.400	-	99.0	-	Peak	Nil observed
402.600	42.5	75.5	33.0	Average	
402.600	54.1	95.5	41.4	Peak	
536.800	> 49	53.0	-	Quasi Peak	Ambient
671.000	50.5	51.1	0.6	Quasi Peak	
805.200	> 44	49.5	-	Quasi Peak	Ambient
939.400	> 42	48.1	-	Quasi Peak	Ambient
1073.600	> 43	47.0	-	Quasi Peak	Ambient
1207.800	> 31	46.0	-	Quasi Peak	Nil observed
1342.000	> 31	45.0	-	Quasi Peak	Nil observed
1476.200	> 40	44.2	-	Quasi Peak	Ambient
1610.400	> 27	43.5	-	Quasi Peak	Nil observed

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz)  $\pm$  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.

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 that operates on 17.1776 MHz.

The device was tested transmitting continuously on 134.2 kHz.

Testing was carried out when the device was powered using the internal battery supply that had been charged overnight and was indicating full capacity.

The device was placed on top of the turntable with the Smart Reader being approximately 1 metre above the ground.

Attached to the Smart Reader RS-232 port was a Gallagher Weigh Scale 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
Above 960 MHz	500 uV/m	54.0 dBuV

**Result:** Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 1000 MHz)  $\pm$  4.1 dB

**Results:**

<b>Frequency MHz</b>	<b>Vertical dBuV/m</b>	<b>Horizontal dBuV/m</b>	<b>Limit dBuV/m</b>	<b>Margin dB</b>	<b>Antenna</b>
51.528	21.9		40.0	18.1	Vertical
68.705	26.4		40.0	13.6	Vertical
72.465	18.0		40.0	22.0	Vertical
75.148	19.1		40.0	20.9	Vertical
85.883	21.2		40.0	18.8	Vertical
103.061	25.4		43.5	18.1	Vertical
137.416	31.3	32.0	43.5	11.5	Horizontal
274.825	34.9	38.6	46.0	7.4	Horizontal
289.000		38.3	46.0	7.7	Horizontal
294.000	31.1		46.0	14.9	Vertical
343.542	27.8	28.5	46.0	17.5	Horizontal
412.250	36.1	34.1	46.0	9.9	Vertical
480.963	30.2	28.9	46.0	15.8	Vertical
498.140	30.5		46.0	15.5	Vertical
576.500	38.5	39.1	46.0	6.9	Horizontal
588.750		38.7	46.0	7.3	Horizontal
592.250	37.1		46.0	8.9	Vertical

All other emissions detected had a margin to limit that exceeded 15 dB when measurements were attempted up to 1 GHz using both vertical and horizontal polarisations.

## 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 3613	30/01/2014
Receiver	R & S	ESIB 40		E1595	10/06/2012
Receiver	R & S	ESHS 10	828404/005	RFS 3728	29/10/2011
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	30/01/2014
Loop Antenna	EMCO	6502	9003-2485	3798	12/06/2012
Mains Network	R & S	ESH2-Z5	881362/034	3628	29/07/2012
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 3613	30/01/2014

## 8. ACCREDITATIONS

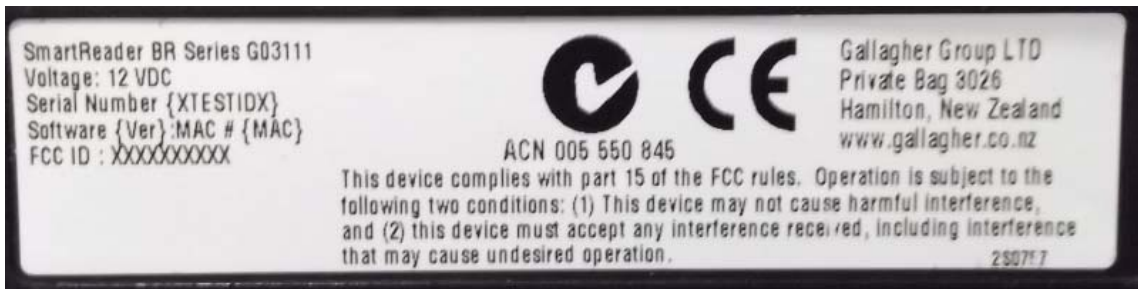
Testing was carried out in accordance with EMC Technologies Ltd registration with the Federal Communications Commission as a listed facility, registration number: 90838, which was updated on 15 February, 2011.

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. PHOTOTGRAPHS



## Low Frequency Grass Test Set Up





Above 30 MHz test set up





## Conducted Emissions Test Set Up

