

EMC Technologies Pty Ltd ABN 82 057 105 549 176 Harrick Road, Keilor Park Victoria 3042, Australia

Ph: +61 (0)3 9365 1000 Fax: +61 (0)3 9331 7455 E-mail: sales@emctech.com.au

RADIO REPORT FOR CERTIFICATION to 47 CFR Part 15 Subpart C (Section 15.247) and RSS-247 Issue 2, February 2017							
FCC ID:	X4K-WL100V2						
IC:	8880A-WL100V2						
Device under Test / PMN:	Garage Door Lock						
Model Number / HVIN:	WLOCK-03						
Tested For:	Automatic Technology Australia Pty. Ltd.						
Report Number: Issue Date:	M160737-4R3 (Superseded report M150737-4R2) 13 February 2018						

EMC Technologies Pty Ltd reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. EMC Technologies Pty Ltd shall have no liability for any deductions, inferences or generalisations drawn by the client or others from EMC Technologies Pty Ltd issued reports. This report shall not be used to claim, constitute or imply product endorsement by EMC Technologies Pty Ltd.



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RADIO REPORT FOR CERTIFICATION

47 CFR Part 15 Subpart C (Section 15.247) and RSS-247 Issue 2, February 2017

CONTENTS

- 1.0 INTRODUCTION
- 2.0 GENERAL INFORMATION
- 3.0 TEST RESULTS
 - 3.1 §15.203/RSS-Gen 8.3 Antenna Requirement
 - 3.2 §15.207/RSS-Gen 8.8 Conducted Limits
 - 3.3 §15.247(a1)/RSS-247 5.1(b) Channel Separation
 - 3.4 §15.247(a1)/RSS-247 5.1(d) Number of channels and time of occupancy
 - 3.5 §15.247(b)/RSS-247 5.4(d) Peak Output Power
 - 3.6 §15.205/RSS-Gen 8.10 Restricted Bands of Operation
 - 3.7 §15.209/RSS-Gen 8.9 Radiated Emission Limits; General Requirements
 - 3.8 §15.247(d)/RSS-247 5.5 Out of Band Emissions
- 3.9 §15.247(i) Radio Frequency Exposure (Hazard) Information
- 3.10 RSS-Gen/RSS-102 Maximum Permissible Exposure
- 3.11 §2.1049/RSS-Gen 6.6 Occupied bandwidth 99% power
- 4.0 COMPLIANCE STATEMENT
- 5.0 MEASUREMENT UNCERTAINTY



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RADIO REPORT FOR CERTIFICATION

Issued by: EMC TECHNOLOGIES PTY. LTD. 176 Harrick Road, Keilor Park, Victoria 3042, AUSTRALIA. Phone: +61 3 9365 1000, E-mail: sales@emctech.com.au, Web: www.emctech.com.au FCC registration number: 494713 and ISED Canada Company number: IC 3569B

Product / PMN: Garage Door Lock Model / HVIN: WLOCK-03 Manufacturer: Automatic Technology Australia Pty. Ltd. FCC ID: FCC ID: X4K-WL100V2 IC: IC: 8880A-WL100V2 Tested for: Automatic Technology Australia Pty. Ltd. 6-8 Fiveways Boulevard, Keysborough Address: Victoria 3173, AUSTRALIA +61 (0)3 9791 0200 Phone: Contact: Nikolai Klepikov Email: nikolai.klepikov@ata-aust.com.au Standards: 47 CFR Part 15 – Radio Frequency Devices Subpart C - Intentional Radiators Section 15.247 - Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz RSS-247 Issue 2, February 2017 - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices RSS-Gen Issue 4, November 2014 - General Requirements for Compliance of Radio Apparatus RSS-102 Issue 5, March 2015 - Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) 20 April to 7th June 2017 Test Dates:

Issue Date:

13 February 2018

Attestation:

I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.

Test Engineer:

Rob Weir Wireless Certification Manager

Authorised Signatory:

mpla

Chris Zombolas Technical Director



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1.0 INTRODUCTION

Radio tests were performed on the Garage Door Lock, Model (HVIN) WLOCK-03 in accordance with the applicable requirements of 47 CFR, Part 15 Subpart C – Section 15.247 and RSS-247 Issue 2 for a Frequency Hopping Spread Spectrum transceiver (FHSS) operating within the band: 2400 MHz to 2483.5 MHz.

1.1 Test Procedure

Radio measurements were performed in accordance with the appropriate procedures of ANSI C63.10: 2013.

The measurement instrumentation conformed to the requirements of ANSI C63.2: 2009.

1.2 Summary of 47 CFR Part 15 Subpart C Results

FCC Part 15	Test Performed	Results
Subpart C		
15.203	Antenna requirement	Complied
15.205	Restricted bands of operation	Complied
15.207	Conducted limits	Complied
15.209	Radiated emissions limits;	Complied
	general requirements	
15.247 (a1)	Channel Separation	Complied – 5 MHz
15.247 (a1)	Number of channels and time	Complied – 16 channels
	of occupancy	
15.247 (b)	Peak Output Power	Complied – 0.006 W
15.247 (c)	Antenna Gain > 6 dBi	Not Applicable
		Antenna gain < 6 dBi
15.247 (d)	Out of Band Emissions	Complied
15.247 (e)	Peak Power Spectral Density	Not Applicable
15.247 (f)	Hybrid Systems	Not Applicable
		Did not employ a hybrid system
15.247 (g)	Frequency hopping channel	Complied
	selection	
15.247 (h)	Simultaneous occupancy of	Not Applicable
	individual hopping frequencies	
15.247 (i)	Radio Frequency Hazard	Complied
		Evaluation exempt
2.1049	Occupied Bandwidth	1.756 MHz



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1.3 Summary of RSS-247 Results

RSS	Test Performed	Results
RSS-Gen (8.3)	Antenna requirement	Complied
RSS-Gen (8.8)	Conducted emissions limits	Complied
RSS-Gen (8.9)	Radiated Emission Limits	Complied
	(General requirements)	
RSS-Gen (8.10)	Operation in restricted Band	Complied
RSS-247 (5.1)	Frequency hopping channel	Complied
	selection	
RSS-247 (5.1)	Simultaneous occupancy of	Not Applicable
	individual hopping frequencies	
RSS-247 (5.1(b))	Channel Separation	Complied
RSS-247 (5.1(d))	Number of channels and time	Complied
	of occupancy	
RSS-247 (5.2)	Digital transmission systems	Not Applicable
RSS-247 (5.4(d))	Peak Output Power	Complied – 0.006 W
RSS-247 (5.5)	Out of Band Emissions	Complied
RSS-Gen (3.2)	Padia Fraguanay Hazard	Complied
RSS-102	Itadio Frequency Flazalu	Evaluation exempt
RSS-Gen (6.6)	Occupied Bandwidth	1.756 MHz

1.4 Modifications by EMC Technologies

No modifications were performed.

2.0 GENERAL INFORMATION

(Information supplied by the Client)

2.1 EUT (Transmitter) Details

Garage Door Lock
WLOCK-03
Frequency Hopping Spread Spectrum
2400 to 2483.5 MHz
2405 to 2480 MHz
GFSK
F1D
16
1/4 wavelength monopole, soldered to PCB
2 x C-type batteries

2.2 EUT (Host) Details

Host Marketing Name (HMN):

Auto-Lock

Manufacturer:

Automatic Technology Australia Pty. Ltd.

The host device is an automatic door lock. The radio communicates with a garage door base allowing it to change state, locked or unlocked. The radio had two modes having the same GFSK modulation, declared as mode 0 and mode 1 by the manufacturer. No transmission is intended in mode 0.



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2.2.1 Hopping Channel List

Channel Centre
Frequency [MHz]
2405
2410
2415
2420
2425
2430
2435
2440
2445
2450
2455
2460
2465
2470
2475
2480

2.2.2 Transition period and mode 1

The customer advised that it may be possible for a transmission to occur in a transition period when switching between the modes. A synchronisation line was provided with the sample that triggered when the modes changed. Emissions were observed on a receiver triggered by the sample to determine the output during transition period. Switching to and in mode 1 was also investigated.

Result: Any transmissions were investigated and conformed with applicable requirements.



2.2.3 Hopping frequency selection

The selection of hopping frequency was in a pseudo-random order. The following is an example provided by the customer. Each number represents the frequency of the channel, e.g. 2.4xx GHz, where xx is the number in the table.

65	20	15	20	75	65	60	65	45	35	70	55	80	20	20	10	55
05	25	80	70	25	25	15	15	25	30	15	20	30	50	55	20	55
15	35	80	75	25	10	65	80	20	45	60	45	45	45	35	05	75
45	35	35	75	55	40	15	65	75	60	55	45	20	35	15	70	55
60	50	25	20	50	35	70	40	30	15	50	35	05	70	35	20	65
55	45	30	80	05	60	55	45	05	75	15	70	15	50	10	15	50
25	80	30	55	35	25	60	15	25	25	65	50	80	75	30	75	25
20	20	55	55	75	10	30	60	30	40	60	05	20	35	80	10	20
30	45	45	10	75	45	20	20	60	70	05	55	10	35	55	55	50
60	15	30	20	05	60	75	10	65	05	50	15	45	15	55	40	65



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FCC ID: X4K-WL100V2
IC: 8880A-WL100V2

25	80	65	35	70	35	10	70	70	75	25	15	10	15	40	05	10
80	55	20	60	55	75	35	75	60	05	60	25	05	80	50	20	05
45	35	25	05	35	20	80	55	05	60	45	20	35	30	55	50	15
50	45	45	25	80	30	15	50	55	75	15	05	60	05	45	65	75
80	65	25	10	35	65	55	50	15	65	35	15	05	40	60	25	20
55	50	10	20	10	55	25	20	35	05	50	50	10	60	05	35	75
20	10	70	40	60	40	70	45	20	75	65	70	45	75	35	55	50
30	60	35	15	80	60	20	60	35	25	20	75	75	80	75	40	20
30	05	55	70	40	70	05	55	15	30	75	50	35	55	20	65	45
50	75	30	30	30	20	80	35	25	30	05	10	75	15	45	15	35
35	15	05	35	50	25	25	75	10	55	10	70					

2.3 Test Configuration

The was configured to operate on each channel individual and transmit a modulated signal continuously. Flying leads with switches were connected to the device under test to change the transmitter parameters.

2.4 Test Facility

2.4.1 General

EMC Technologies Pty Ltd has also been accredited as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (DoC) and Certification under Parts 15 and 18 of the FCC Commission's rules – **Registration Number 494713 & Designation number AU0001.**

EMC Technologies indoor open are test site (iOATS) have been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS-Gen, Issue 8 - Industry Canada iOATS number - IC 3569B-2

Measurements in this report were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

2.4.2 NATA Accreditation

NATA is the Australian National laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A²LA).

EMC Technologies is accredited in Australia by the National Association of Testing Authorities (NATA). All testing in this report has been conducted in accordance with EMC Technologies' scope of NATA accreditation.

The current full scope of accreditation can be found on the NATA website: <u>www.nata.asn.au</u>



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2.5 Test Equipment Calibration

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Agilent Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI) or in-house. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model/Serial Number	Last Cal. dd/mm/yyyy	Due Date dd/mm/yyyy	Cal. Interval				
Chamber	Frankonia SAC-10-2	22/03/2017	22/03/2018	1 Year, *1				
	(R-139)							
EMI Receiver	R&S ESW26	31/03/2017	31/03/2018	1 Year, *2				
	2 Hz – 26.5 GHz							
	Sn: 101306 (R-143)	00/00/00/7	00/00/00/0	4.14 *0				
		23/02/2017	23/02/2018	1 Year, ^2				
	20 HZ – 40 GHZ							
	Sh: 100392 (R-140)	05/05/0040	05/05/0047	4 \/				
		25/05/2016	25/05/2017	1 Year, "2, "3				
	9 Km 2 - 3 Gm 2 Sp: 100011 (P 028)							
	31. 100011 (1-028)							
Antennas	EMCO 6502 Active Loop	20/07/2015	20/07/2018	3 Year *2				
/ intorniae	9 kHz - 30 MHz	20/01/2010	20/01/2010	0 10ai, 2				
	Sn. 9311-2801 (A-231)							
	SUNOL JB6 Biconilog	26/05/2016	26/05/2018	2 Year, *2				
	30 – 6000 MHz			,				
	Sn: A012312 (A-363)							
	EMCO 3115 Double Ridge Horn	15/07/2016	15/07/2019	3 Year, *1				
	1 – 18 GHz							
	Sn: 8908-3282 (A-004)							
	ETS-Lindgren 3160-09 Std Gain Horn	31/05/2016	31/05/2019	3 Year, *1				
	18 – 26.5 GHz							
	Sn: 66032 (A-307)							
0.11.		04/05/0047	04/05/0040	4 1/2 - 2 *4				
Cables	(C 422)	31/05/2017	31/05/2018	1 Year, "1				
	(0-422) Room 12 inhuilt cable Ranol 1 to 2 m	21/05/2017	21/05/2019	1 Voor *1				
	(C_{-121})	31/05/2017	31/03/2018	i ieai, i				
	Room 12 Antenna cable	31/05/2017	31/05/2018	1 Vear *1				
	(C-437)	51/05/2017	51/03/2010	i ieai, i				
	Sucoflex 104 Huber & Suhner	03/01/2017	03/01/2018	1 Year. *1				
	18 GHz, 5 m cable (C-337)			,				
	Sucoflex 102 Huber & Suhner	04/01/2017	04/01/2018	1 Year, *1				
	40 GHz, 3 m cable (C-273)							
Pre-amplifier	PRA1G2-35B Radio Technology	15/07/2016	15/07/2017	1 Year, *1				
	30 - 1000 MHz (A-098)							
	SG18-B3015 Electronic Development	03/08/2016	03/08/2017	1 Year, *1				
	Sales 1-18 GHz (A-288)							

Note *1. Internal NATA calibration.

Note *2. External NATA / A2LA calibration

Note *3. Testing performed with this equipment was performed when the equipment was within valid calibration period.



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3.0 TEST RESULTS

3.1 §15.203/RSS-Gen 8.3 Antenna Requirement

The antenna was integral to the device ensuring that it could not be replaced. A ¹/₄ wavelength monopole antenna was used and it was soldered directly onto the circuit board.





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3.2 §15.207/RSS-Gen 8.8 Conducted Limits

Not applicable, the device did not connect directly or indirectly to the AC mains as it was battery powered.



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3.3 §15.247(a1)/RSS-247 5.1(b) Channel Separation

In the band 2400.0 - 2483.5 MHz, the channel separation must be greater than 25 kHz or the 20 dB bandwidth, which ever is greater.

Mode 0: 20 dB Emission Bandwidth = 1.295 MHz



Channel Separation

Channel Separation [kHz]	Limit [kHz]	Result
5007	1295	Complied





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3.4 §15.247(a1)/RSS-247 5.1(d) Number of channels and time of occupancy

There must be at least 15 hopping channels employed by devices operating in the band 2400-2483.5 MHz.



The WLOCK-03 utilised 16 channels:



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Time of Occupancy

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed.

Time of occupancy in $0.4 \times 16 = 6.4$ seconds ≤ 0.4 seconds.

On time of one pulse	= 92 µs
Number of pulses in 64 ms	= 5
Number of pulses in 6.4 seconds	= 500
Total on time in 6.4 seconds	= 500 × 0.092 ms
	= 46 ms (limit = 400 ms)







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3.5 §15.247(b)/RSS-247 5.4(d) Peak Output power

Testing was performed in a semi-anechoic chamber at a distance of 3 metres. Different configurations of EUT and antenna polarization were investigated to produce highest emission EIRP and the EUT was set to transmit in continuous transmission mode.



Channel 2405 MHz



Channel 2445 MHz



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Channel 2480 MHz

Results:

Frequency	Meas	ured EIRI	2	EIDD	Conducted	Margin		
(MHz)	(dBµV/m)	/m) (dBm) (W)		Limit (W)	Limit (W)	(W)	Result	
2405	101.3	6.1	0.004	0.500	0.125	0.121	Complied	
2445	102.3	7.1	0.005	0.500	0.125	0.120	Complied	
2480	103.2	8.0	0.006	0.500	0.125	0.119	Complied	

The radiated power was compared directly to the conducted power limit as a worse case condition. As the measured EIRP did not exceed the conducted limit the antenna gain was not considered.

The antenna gain of an ideal ¼ wave monopole is 5.1 dBi and therefore the gain of the sample's antenna would not exceed 6 dBi.

Electric field to power conversion:

$$E = 20\log\left(\frac{\sqrt{30P}}{d}\right) + 120$$

Where:

 $E = \text{electric field strength } (dB\mu V/m)$

P = EIRP in Watts

d = measurement distance in metres



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3.6 §15.205/RSS-Gen 8.10 Restricted Bands of Operation

The restricted band limits were applied across the applicable spectrum and therefore complied with the restricted band requirements.

3.7 §15.209/RSS-Gen 8.9 Radiated emission limits; general requirements

The limits given in §15.247 and RSS-247 applied, however attenuation below the general levels was not required.

3.8 §15.247(d)/RSS-247 5.5 Out of Band Emissions

3.8.1 Radiated Spurious Measurements

Radiated spurious emission measurements were performed in a semi-anechoic chamber compliant with ANSI C63.4: 2014.

The test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of emissions.

Frequency range [MHz]	Measurement Bandwidth [kHz]	Measurement Distance [m]	Antenna
0.009 to 0.150	0.2	10	0.6 motro loop antonno
0.150 to 30	9	10	0.0 metre loop antenna
30 to 1000	120	10	Biconilog hybrid
1000 to 18 000	1000	3	Standard gain or broad
18 000 to 40 000	1000	1	band horns

The sample was slowly rotated with the spectrum analyser set to Max-Hold. This was performed for at least two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable and by varying the antenna height. Devices design for a fixed position were tested in that position, portable devices were tested in three orthogonal orientations.

The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical antenna polarisations.

Calculation of field strength

The field strength was calculated automatically by software using pre-stored calibration data. The method of calculation is shown below:

E = V + AF - G + L

Where:

- **E** = Radiated Field Strength in $dB\mu V/m$.
- V = EMI Receiver Voltage in dBµV. (measured value)
- **AF** = Antenna Factor in dB. (stored as a data array)
- **G** = Preamplifier Gain in dB. (stored as a data array)
- L = Cable loss in dB. (stored as a data array of Insertion Loss versus frequency)



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Average value of pulsed emissions

The transmitted signal was pulsed. The following duty cycle correction was applied to the peak levels to calculate average emissions at frequencies above 1 GHz.

$$\delta$$
 (*dB*) = 20log(Δ)

 δ = duty cycle correction factor Δ = duty cycle

Duty cycle:

On time = 100 μ s Pulses in 100 ms = 10 $\Delta = 0.01$



Duty cycle correction: $\delta = 20 \log(0.01)$ $\delta = -40.0 \, dB$

3.8.2 Conclusion

The sample complied with the applicable radiated spurious emission limits §15.247 and RSS-247. Refer to the following graphs for the results.



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Frequency Band: 9 kHz - 30 MHz

Measurements were made at a distance of 10 metres. The measurement of emissions between 9 kHz – 150 kHz were made with a resolution bandwidth (RBW) of 200 Hz and the video bandwidth (VBW) of 3 kHz, 150 kHz – 30 MHz were measured with the resolution bandwidth (RBW) of 9 kHz and the video bandwidth (VBW) of 30 kHz.



Channel 2405 MHz



Channel 2445 MHz



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Channel 2480 MHz



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Frequency Band: 30 - 1000 MHz

Measurements were made at a distance of 10 metres. The measurement of emissions between 30 - 1000 MHz were made with a resolution bandwidth (RBW) of 120 kHz and the video bandwidth (VBW) of 300 kHz.

The §15.209 and RSS-Gen 8.10 limits were applied.

Maximum Results:

No emissions were detected above the measurement system noise floor.



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RBW Input 1 AC Att	(CISPR) 120 kHz 10 dB	MT Preamp	100 ms OFF <mark>- St</mark> e	10 ep LIN	m-A098				
Level	dBµV/m		Fre	quency	Y	245.	04000	4 00	1Hz
Max Peak	15.02 0	-	20	40		60	80		100
Scan 🛛 1Pk Max	12 M			30 03			12 10		
Limit Check Line FCC15B 45 dBµV/m	F	00 MH2PAS	38 38						
40 dBuV/m FCC15BF									
35 dBµV/m									
.30.dBμV/m								hur	mant
							medenial day	w	
15 dBµV/m		www	And Mary	a for the second	manim	Anathenny			
10 dBµV/m	your growth althe and	Mr.		. w.					
5 dBµV/m									
Start 30.0 MHz				TI	-			Stop 1	.0 GHz





Channel 2405, Horizontal Polarisation



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Channel 2445, Vertical Polarisation



Channel 2445, Horizontal Polarisation



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Channel 2480, Vertical Polarisation



Channel 2480, Horizontal Polarisation



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Frequency Band: 1 000 – 25 000 MHz

Measurements to 18 GHz were made at a distance of 3 metres and 18 to 25 GHz at 1 metre. The measurements were made with a resolution bandwidth (RBW) of 1000 kHz and the video bandwidth (VBW) of 1000 kHz.

The §15.209 and RSS-Gen 8.10 limits were applied.

Maximum Peak Results:

Channel	Frequency [MHz]	Peak [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2405 MHz	2395.00	63.1	74.0	-10.9
	4810.00	70.0	74.0	-4.0
2445 MHz	4890.00	69.4	74.0	-4.6
2480 MHz	4960.00	65.9	74.0	-8.1

Maximum Average Results, correction factor of -40.0 dB to peak:

Channel	Frequency [MHz]	Peak [dBµV/m]	Average [dBµV/m]	Limit [dBµV/m]	Margin [dB]
2405 MHz	2395.00	63.1	23.1	54.0	-30.9
	4810.00	70.0	30.0	54.0	-24.0
2445 MHz	4890.00	69.4	29.4	54.0	-24.6
2480 MHz	4960.00	65.9	25.9	54.0	-28.1



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Channel 2405 MHz – Vertical, 1 to 18 GHz



10 to 18 GHz



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Channel 2405 MHz – Horizontal, 1 to 18 GHz











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Channel 2405 MHz – Vertical and Horizontal Combined 18 to 25 GHz

Meas BW (6dB) 1 Att Input	MHz Meas Time 10 0 dB Preamp 1 AC PS	0 ms On Step TD Scan On Notch Off			Frequency	21.5100000 GHz
2 Scan	2					■1Pk Max ■ 2Av Max
Limit Check Line FCC158F		PASS PASS				
90 dBµV/m				6		
80 dBµV/m						
70 dBµV/m						
60.dSpv/ca-	Aprilia and a transform	enerse managements	drawy - garget the survey of the survey of the	and the second stand	al and a construction of the	to the post of the second strain the second strain the second strain strain strain strain strain strain strain s
FCC158F						
50 dBµV/m	MANNA CONTRACTION	Male - res - war - will all have -		Marine and the second section of the second	Construction of the Constr	THE PROPERTY AND A DESCRIPTION OF THE PROPERTY
40 dBµV/m						
30 dBµV/m						
Start 18.0 GHz			TF			Stop 25.0 GHz



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Channel 2445 MHz – Vertical, 1 to 18 GHz



1 to 8 GHz

2 Scan		8. B.			<u>s</u>	1Pk I	Max • 2Av Max
Limit Check	PAS	S				MI[1]	53,04 dBµV/m
Line FCC15BF	PAS	S				8.0	00750000 GHz
65 dBµV/m							
60 dBµV/m							
55 dBµV/m-							A Man Martin
FCC15BF	a harrow a superior of the second	terrestation of a contraction	M. Mar Margar Margar	ARA SUPPORT WAR	W. W. Martin Martine	and the second s	
50 dBµV/m							
45 dBµV/m							
						~~~~~	mm
90.38µV/m					and an and a second		
35 d8µ∨/m	-						
30 dBµV/m							
25 d8µV/m							
Start 8.0 GHz							Stop 10.0 GHz

#### 8 to 10 GHz



## 10 to 18 GHz



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#### Channel 2445 MHz – Horizontal, 1 to 18 GHz



### 1 to 8 GHz

2 Scan		04			16 S			01Pk	Max 2Av Max
Limit Che	ick		PAS	S				M1[1]	53.02 dBµV/m
Line FCC	15BF		PAS	S				8.0	00500000 GHz
65 dBµV/m					-				
60 dBµV/m									
55 dBµV/m		1 4 10 1		2	4 4			to the barts	D.M.A. A.A.M.P.
FCC15BF/	A a a water a free of the	W. P. A. A. A. A. Maria	and a gradient species	Pur the work of the start	and and a subject	and the prover of a	and the second second	IN ADDATES ALL ALL ALL ALL ALL ALL ALL ALL ALL AL	
50 dBµV/m									
45 dBµV/m									
10 0 10 0 0 0 0			~~~~~	- 10 M				manna	mm
40.0804/m				A MARKAN A	Area and a decision		0.0.0 0.0.0		
35 dBµV/m									-
30 dBµV/m		n		5					
25 dBµV/m									
Start 8.0 GHz									Stop 10.0 GHz

#### 8 to 10 GHz



# 10 to 18 GHz



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### Channel 2445 MHz – Vertical and Horizontal Combined 18 to 25 GHz

Meas BW (6dB) 1 Att Input	MHz Meas Time 10 0 dB Preamp 1 AC PS	0 ms On <b>Step</b> TD Scan On <b>Notch</b> Off			Frequency	21.5100000 GHz
2 Scan	2					■1Pk Max ■ 2Av Max
Limit Check Line FCC158F		PASS PASS				
90 dBµV/m				6		
80 dBµV/m						
70 dBµV/m						
60.dSpv/ca-	Aprilia and a transform	enerse managements	drawy - garget the survey of the survey of the	and the second stand	al and a construction of the	to the posting and the second stranger of the second
FCC158F						
50 dBµV/m	MANNA CARACTER CARACTER	Male - res - war - will all have -		Marine and the second second second	Construction of the Constr	THE PROPERTY AND A DESCRIPTION OF THE PROPERTY
40 dBµV/m						
30 dBµV/m						
Start 18.0 GHz			TF			Stop 25.0 GHz



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### Channel 2480 MHz – Vertical, 1 to 18 GHz



### 1 to 8 GHz

2 Scan								IPk	Max  2Av Max
Limit Che	ck		PAS	S				M1[1]	52.87 dBµV/m
Line FCC	L5BF		PAS	5				8.0	00500000 GHz
65 dBµV/m									
60 dBµV/m									
55 dBµV/m	L.L.		1. A. 1. A. 1. A. 1						and a hotel for
FCC158F	Sena Manalaka	Mar Maria	an a contraction for	and a strange with the second	and all south and all the	all and a show a	North Marian	and the stand of the	
50 dBµV/m									
45 dBµV/m									
40 dBdV/ma.a.a.a		00000000	hanna		and the second second	and the second second second	حجممعم	m	mm
35 dBµV/m									
30 dBµV/m									
25 dBµV/m					-				42
Start 8.0 GHz									Stop 10.0 GHz

### 8 to 10 GHz



#### 10 to 18 GHz



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# Channel 2480 MHz – Horizontal, 1 to 18 GHz



### 1 to 8 GHz

2 Scan	7/4	9A		51 I	£ 5		8	IPk	Max • 2Av Max
								MI[1]	52.72 dBµV/m
65 dBµ∨/m				12				04	000000000
60 dBµ∨/m									
55 dBµV/m	A. A. a. A. a. A.	Anthene	and a state		An a second			1. 1. 1. 1. 1. 1010	CALLO AMANTA
50 dBµV/m	A	ALLANNAN.		and an Astrony	e- a arta)-adaadariad	and an Alexandrean field	Muller desired a		
45 dBµV/m	-			e					
∿40.dBµV/m	400000000	0000000				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		m	mm
35 dBµV/m									
30 dBµV/m	-			-					
25 dBµV/m									
Start 8.0 GHz	2			<u>.</u>					Stop 10.0 GHz

#### 8 to 10 GHz



### 10 to 18 GHz



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### Channel 2480 MHz – Vertical and Horizontal Combined 18 to 25 GHz

Meas BW (6dB) 1 Att Input	MHz Meas Time 10 OdB Preamp 1 AC PS	0 ms On Step TD Scan On Notch Off			Frequency	21.5100000 GHz
TDS Input1 "18-26GHz 2 Scan	Ζ"					1Pk Max 2Av Max
Limit Check Line FCC158F		PASS				
90 dBµV/m-				5	8	
80 dBµV/m						
70 dBuV/m						
60 dSW/rates (100 and 100 and	Be shelowney white we don't	one may many wanter when	how we have the second second	The action was and	al and a stream day of the	prophysican and the synthesis days through
FCC158F						
50 dBµV/m	MANNA CONTRACTION	Mada - reason - and a state of the Mada -	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Marine and the second second second	Construction of the International Constr	The second s
40 dBµV/m						
30 dBµV/m						
Start 18.0 GHz			TF			Stop 25.0 GHz



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#### 3.8.3 Band-Edge Emission Measurements

Emissions within 5 MHz of an authorised band edge were measured.

#### Channel 2405 MHz, Lower Band Edge:

Ref Level 102.	00 dBµV/m	112220-011		RBW 1	MHz					2		
Att Input	0 dB 1 AC	PS	00 ms On	VBW 3 Notch	MHz Off	Mode Au	to Sweep			F	requency 2.	4000000 GHz
1 Frequency Sw	еер										o1Pk Ma	x • 2Av MaxLog
100 dBµV/m									С		M1[1]	68.88 dBµV/m 2.40000000 GHz 45.21 dBuV/m
90 dBµV/m			1								ine[2]	2,4000000 GHz
B0 dBµ/v/m-						-	-				1	4
70 dBµV/m		CHARLENAR	a margarian	have been the week	and the second	والإساحينية	M1	a perference and	ale and a second		and a	
60 dBµ/v/m	landa komenta da										1 million	
FCC15BF 50 dBµV/m							M2			- A		
40 dBµ/v/m-	حياله والمالي في المالية ال			arrende de		and a second	eren eren eren eren eren eren eren eren			- American Contraction of the Co		
30 dBµV/m		-				-			1)			
20 dBµV/m		-										-
10 dBµV/m-							VI					_
CF 2.4 GHz				1	001 p	ots		1	.0 MHz/			Span 10.0 MHz

Maximum Peak Results:

Channel	Frequency	Peak	Limit	Margin
	[MHz]	[dBµV/m]	[dBµV/m]	[dB]
2405 MHz	2400.00	68.9	74.0	-5.1

Maximum Average Results, correction factor of -40.0 dB to peak:

Channel	Frequency	Average	Limit	Margin
	[MHz]	[dBµV/m]	[dBµV/m]	[dB]
2405 MHz	2400.00	28.9	54.0	-25.1



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## Channel 2480 MHz, Upper Band Edge:

1 Frequency Sweep							🔉 1 Pk Max	2Av MaxLog
	1						M1[1]	74.04 dBµV/m
- UPAPARTAN							2	.48350000 GHz
DO dBubling	Maria						M2[2]	45.70 dBµV/m
of depoying	all						2	48350000 GHz
M	-10	No.						
PD dBustion	1 mg			_				
Be abovin	W							
1	h			Second Second				
70 dBi M/m		N.						
10 dept/m		1					and the second second	aller and the second second
		When the second se						
60 dBu//m-		2						
		The second						
COCATERE	-	Marken						
50 dBuV/m	-	3	1 and 1		0	-		
			Whynes					
			0.100	The Marked State Street prover	- warman and and	and the second second		alle marke
40 dBµV/m					-			
30 dBµV/m								
Lobert Manufater								
20 dBµ/V/m	-				0			
1947 (1470)								
10 dBµ/V/m	+							
			VI					
			Ĩ					
CF 2.4835 GHz		1001 pts		1	1.0 MHz/	***	5	Span 10.0 MHz

Maximum Peak Results:

Channel	Frequency	Peak	Limit	Margin
	[MHz]	[dBµV/m]	[dBµV/m]	[dB]
2480 MHz	2483.50	74.0	74.0	0.0

Maximum Average Results:

Channel	Frequency	Average	Limit	Margin
	[MHz]	[dBµV/m]	[dBµV/m]	[dB]
2480 MHz	2483.50	34.0	54.0	-20.0



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# 3.9 §15.247(i) Maximum Permissible Exposure

The Maximum Permissible Exposure (MPE) limit defined in §1.1310 for a transmitter operating at 2400 MHz is:

MPE limit	= 1 mW/cm ² = 1 mW/cm ² = 61.4 V/m	$(V/m) = \sqrt{(1200 \times \pi \times mW/cm^2)}$
Field strength	= $[\sqrt{30 \times \text{ transmitter EIRP, mW}}]$ = $[\sqrt{30 \times 0.006}] \div 0.2 \text{ V/m}$	] ÷ [minimum separation distance, metres] V/m
	$= 2.1 \text{ V/m} = 0.001 \text{ mW/cm}^2$	$(mW/cm^2) = (V/m)^2 \div (1200 \times \pi)$

As the calculated field strength generated by the transmitter is less than the limit the Garage Door Lock, Model (HVIN) WLOCK-03 is deemed to comply with the radio frequency exposure requirements.

## 3.10 RSS-Gen 3.2/RSS-102 Maximum Permissible Exposure

The Garage Door Lock, Model (HVIN) WLOCK-03 was considered a mobile device and not intended to be operated within 20 cm of user or nearby person.

RF exposure evaluation is exempt if the following criteria is met:

Time averaged e.i.r.p.  $\leq 1.31 \times 10^{-2} \times [f_{(MHz)}]^{0.6834} W$ 

 $1.31 \times 10^{-2} \times [f_{(MHz)}]^{0.6834} = 2.7 W$ 

The measured e.i.r.p. (not time averaged) was **0.006 W** 

As the radiated power generated by the transmitter was less than the limit the Garage Door Lock, Model (HVIN) WLOCK-03 is deemed to comply with the radio frequency exposure requirements.



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# 3.11 §2.1049/RSS-Gen 6.6 Occupied bandwidth – 99% power

The bandwidth containing 99% power of the transmitted signal was measured using the procedure from ANSI C63.10 section 6.9.

The 99% power bandwidth was 1.756 MHz.



Channel 2405 MHz



Channel 2445 MHz



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Channel 2480 MHz

# 4.0 MEASUREMENT UNCERTAINTY

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Conducted Emissions:	9 kHz to 30 MHz	±3.2 dB
Radiated Emissions:	9 kHz to 30 MHz 30 MHz to 300 MHz 300 MHz to 1000 MHz 1 GHz to 18 GHz	±4.1 dB ±5.1 dB ±4.7 dB ±4.6 dB
Peak Output Power:		±1.5 dB
Peak Power Spectral Density:		±1.5 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

# 5.0 COMPLIANCE STATEMENT

The Garage Door Lock, Model (HVIN) WLOCK-03 tested on behalf of Automatic Technology Australia **complied** with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators) and RSS-247 Issue 2 for a Frequency Hopping Spread Spectrum transceiver (FHSS) operating within the band: 2400 MHz to 2483.5 MHz.



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