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Electromagnetic Compatibility Test Report
Report No.: S2412003-1 v1TESTED FOR:ISSUED BY:DroneShieldEMC Technologies Pty LtdLevel 1, 235 Pyrmont Street, Pyrmont NSW 2009,
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Product Name:	RfPatrol Mk2 Wideband (WB)
Part Number:	DRO-035-000
FCC ID:	FCC ID: 2A9JZ-DRO-035-WB
Test Date(s):	30 January 2024 to 5 February 2025
Issue Date:	10 April 2025
Specification(s):	47 CFR Part 15 – Subpart B
The test sample, un with the standard/s	nder the condition and operating mode described in this test report, complies Isted above in accordance to the manufacturer's test plan.
The test sample, un with the standard/s Test Engineer:	nder the condition and operating mode described in this test report, complies a listed above in accordance to the manufacturer's test plan. Michael Kent



NATA Accreditation No. 5292 Accredited for compliance with ISO/IEC 17025 – Testing.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.



Revision History

Version	Issue Date	Reason / Comments
1	10 April 2025	Initial issue

General Remarks

EMC Technologies Pty Ltd 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.

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 customer 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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1 Project Overview

1.1 Test Facility

Measurements were performed at the following location:

- □ Melbourne Laboratory 176 Harrick Road, Keilor Park, VIC 3042, Australia
- Sydney Laboratory Unit 3, 87 Station Road, Seven Hills, NSW 2147, Australia

EMC Technologies Pty. Ltd. is an independently owned Australian company that is NATA accredited to ISO 17025 for both testing and calibration and ISO 17020 for Inspection. – **Accreditation Number 5292**.

Country	Assessment Body	Lab Code / Member No.	
Australia	NATA	Accreditation Number: 5292	
Europe	European Union	Notified Body Number: 0819	
USA	FCC	Designation Number: AU0001/AU0002	
Canada	ISED Canada	CAB Identifier Number: AU0001/AU0002	
Japan	VCCI	Company Number: 785	
Taiwan	BSMI	Lab Code SL2-IN-E-5001R	





1.2 Standards Applied Standards Applied

Unless otherwise noted, only the cited edition applies.

47 CFR Part 15 Radio Frequency Devices

Subpart B – Unintentional Radiators

ANSI C63.4: 2014

American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.





1.3 Results Summary

The test sample was provided by the customer. All results herein apply only to the test sample.

Intended Environment:	Class A

47 CFR Part 15 – Subpart B								
Section	EMC Test	Range	Applicability	Limit	Result			
15.107	Conducted Emission	150 kHz to 30 MHz	AC Mains	Class A	Complied			
15.109	Radiated Emission	30 MHz to 30 GHz	Enclosure	Class A	Complied			
15.121(b) Scanning Receiver N/A*1								
*1 EUT is not capable of converting cellular communication transmission to analog voice audio.								





1.4 Additions to, Deviations and Exclusions from the Method/Standard

No additions to, deviations or exclusions from the method/standard were performed.

1.5 Measurement Uncertainty

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

EMC Testing	Range	Value
Conducted Emission		
Mains Port	9kHz to 30 MHz	± 3.2 dB
Radiated Emission	150 kHz to 30 MHz	± 4.1 dB
	30 MHz to 300 MHz	± 5.1 dB
	300 MHz to 1000 MHz	± 4.7 dB
	1 GHz to 18 GHz	± 4.6 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%.

Application of measurement uncertainty for this report:

The referenced uncertainty standard specifies that determination of compliance shall be based on measurements <u>without</u> taking into account measurement uncertainty. However, the measurement uncertainty shall appear in the test report.





1.6 Test Equipment

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by a NATA accredited laboratory or the National Measurement Institute (NMI).

Conducted Emission							
Manufacturer	Model	Serial No.	Asset No.	Description	Cal. Date	Cal. Due	
Rohde & Schwarz	ESCI	100012	R-029	EMI Receiver	21/05/2024	21/05/2025	
TESEQ	NNB 51	47448	L-076	Single Phase LISN	07/11/2024	07/11/2025	
Hewlett Packard	11947A	3107A01261	L-010	Transient Limiter	04/11/2024	04/11/2025	
Rojone	LMR195- Ultraflex		SC-002	BNC Cable	31/10/2024	31/10/2025	
Hewlett Packard	6843A	3531A00172	A-116	Programmable Power Source	Verified	on Use	

Radiated Emission						
Manufacturer	Model	Serial No.	Asset No.	Description	Cal. Date	Cal. Due
Rohde & Schwarz	ESU40	100183	R-038	EMI Receiver	30/04/2024	30/04/2025
SunAR RF Motion	JB1	A021318	A-430	Bilog Antenna	24/04/2024	24/04/2027
EMCT			SC-028	RF Cable	29/10/2024	29/10/2025
Huber & Suhner	SF104A/2x11N- 47/4m	Sn MY709/4A	SC-041	RF Cable	31/10/2024	31/10/2025
EMCO	3115	3823	A-324	Horn Antenna	18/12/2023	18/12/2026
ETS-Lindgren	3160-09	00066033	A-305	Horn Antenna	18/01/2024	18/01/2027
ETS-Lindgren	3160-10	00064180	A-308	Horn Antenna	18/01/2024	18/01/2027
Pasternack	PE319-36	63308	C-413	Microwave Cable	18/06/2024	18/06/2025
Pasternack	PE319-36	83308	C-414	Microwave Cable	18/06/2024	18/06/2025
RFI Industries	S800	876	S-032	Room 3, 3m SAC	16/05/2024	16/05/2026
Hewlett Packard	6843A	3531A00172	A-116	Programmable Power Source	Verified	on Use





2 Equipment Under Test

2.1 EUT Detail

(EUT details are supplied by customer)

Product Name:	RfPatrol Mk2 Wideband (WB)
Model:	RfPatrol Mk2 Wideband (WB)
Manufacturer:	DroneShield
Serial No:	0350198542647
Power Rating:	10.8V Battery (BT-70716BG / BT-70716BV / MP5355-7)
Software Version:	6.2.4
Hardware Version:	DRO-035_L
Highest Internal Frequency:	1 GHz CPU (runs at 666 MHz) 70MHz to 6000MHz internal oscillator
Description:	RfPatrol Mk2 Wideband (WB) is a compact and lightweight omni- directional drone detection solution. Its design and size allow it to be portable and worn by the operator.
	The RfPatrol Mk2 Wideband (WB) is a highly versatile, completely passive/non-emitting wearable UAS detection device. The device offers the user real situational awareness without distraction or complex operation. It has been designed to be highly effective for a variety of operators in a range of demanding environments. The RfPatrol device automatically detects drones moving at any speed.

Radio Module 1	
Manufacturer:	Analog Devices Inc
Model	ADRV9361
Operating Bands	400 MHz -2517 MHz (including 433MHz ISM, 863 MHz EU, 915 MHz ISM and 2.4 GHz ISM)
	4800 MHz – 6000 MHz (including 5.2 GHz ISM and 5.8 GHz ISM)
Technology:	OFDM, FHSS and DSSS Detection
Modulation:	Detection only, signals are not demodulated
Antenna Type and Gain:	Alpha antenna: 2000 MHz -6000 MHz linear, 2 to 4dBi, Bravo antenna: 380 MHz -7200 MHz linear, -4 to 8dBi, Charlie antenna: 800 MHz -2720 MHz linear, 3.5dBi
Comment:	

Module is a transceiver, but configured and programmed only as a receiver





Radio Module 2 Manufacturer: ASUS USB-AX56 Model **Operating Bands** 2400-2483.5 MHz 5150-5350 MHz 5470-5725 MHz Technology: 2.4 GHz and 5 GHz dual-band Wi-Fi Modulation: Detection only, signals are not demodulated Alpha antenna: 2000 MHz -6000 MHz linear, 2 to 4dBi Antenna Type and Gain: Comment: Module is a transceiver, but configured and programmed only as a receiver

2.2 Reference Document

No.	Document Title	Issue No.
1	S2412003 Form 005 Customer and EUT Information (RfPatrolMKII)	
2	DRO-035-RfPatrol_Mk2_WB-FCC_CE-Test_Procedure	Revision 2.0
3	RfPatrol MK2 Wideband User Manual	6.3.0_DRAFT





2.3 Test Configuration

Installation Type:	⊠Tabletop
	□ Floor-Standing
	□Combination Tabletop and Floor-Standing

EUT					
No.	Manufacturer	Model	Serial No.	Remark	
EUT1	DroneShield	RfPatrol Mk2 Wideband (WB)	0350198542647	PN: DRO-035-000	
EUT2	DroneShield	Alpha Antenna		2 GHz-6 GHz PN: DRO-555-200	
EUT3	DroneShield	Bravo Antenna		380 MHz – 7.2 GHz PN: DRO-555-206	
EUT4	DroneShield	Charlie Antenna		800 MHz – 2.7 GHz PN: DRO-555-202	
EUT5	Bren-Tronics	BT-70716BV	26651	Rechargeable Battery PN: DRO-666-100 DRO-666-109	
EUT6	Glenair	TS3-022 Rev C	001220	Universal Radio Power Booster (RPB) PN: DRO-888-484 DRO-888-485	
EUT7	ETA-USA	DTD120-19SX-F-W6	E23020704-2M- 0108-2329	AC Power Adapter Input: 100-240VAC, 2-1A, 50-60Hz Output: 19VDC, 6.32A PN: DRO-888-490	

Auxiliary Equipment							
No.	Description Model Serial No. Remark						
AE1	Headphone			EMCT Supplied			

Cable	Cable used for testing					
No.	Description	Length	Shielded	Remark		
1	TNC Extension Cable (Red)	< 3m	Yes	PN: DRO-111-408		
2	TNC Extension Cable (Blue)	< 3m	Yes	PN: DRO-111-409		
3	TNC Extension Cable (Yellow)	< 3m	Yes	PN: DRO-111-410		
4	Audio Cable (Military connector to 3.5mm jack)	< 3m	Yes	PN: DRO-111-500		
5	Adaptor Cable	< 3m	Yes	Mfg: Glenair TS1-088-6		
6	DC Power Cable	< 3m	Yes			
7	AC Power Cable	< 3m	No			





Block Diagram – Charging Mode



2.4 Operating Test Mode

Mode No.	Description					
1	The EUT was set up in accordance with standard and as per the customer's test procedure.					
	Testing was performed in GLIMPSE mode (position 3). The EUT was configured lying flat on the test bench with 3 antennas attached via extension cables and EMCT supplied Headphone was attached via Audio cable.					
Comment:						
EUT has 4	configurations:					
Battery ope Battery ope Battery cha Battery cha	rated – lying flat position rated – standing upright position rging – lying flat position rging – standing upright position					
These mod charging –	These modes were evaluated (scans performed in both configurations) with the worst-case mode (battery charging – lying flat position) reported.					

2.5 Modifications

No modifications were required to achieve compliance.





3 Evaluation of Emission Test Results

Conducted and/or Radiated Emission measurements were tested according to the following configuration/s:

Limit:	Class A			
Receiver Bandwidth:	6 dB			
Detector:	0.009 – 0.15 MHz:	QP		
	0.15 - 30 MHz:	QP, AV		
	30 - 1000 MHz:	QP		
	Above 1000 MHz:	PK, AV		
Antenna:	□ 0.009 - 30 MHz	Loop Antenna		
	🖂 30 - 1000 MHz	Biconilog		
	🖂 1 - 18 GHz	Double-Ridged Guide Horn		
	🖂 18 - 40 GHz	Standard Gain Horn		

Margin is calculated by subtracting the emission level by limit value. Negative margin signifies emission level below the specified limit.

3.1 Conducted Emission

3.1.1 Measurement Procedure

The EMI Receiver was operated under program control using the Max-Hold function and automatic frequency scanning, measurement, and data logging techniques. The specified 0.15 MHz to 30 MHz frequency range was sub-divided into sub-ranges to ensure that all short duration peaks were captured.

The various operating modes of the system were investigated. For each of the sub-ranges, the EMI receiver was set to continuous scan with the Peak detector set to Max-Hold mode. The Quasi-Peak detector and the Average detector were then invoked to measure the actual Quasi-Peak and Average level of the most significant peaks, which were detected.

Calculation of voltage level

The voltage levels were automatically measured in software and compared to the test limit. The method of calculation was as follows:

$$V_{emi} = V_{rx} + L$$

Where: V_{emi} = The Measured EMI voltage in dBµV to be compared to the limit.

 V_{rx} = The Voltage in dBµV read directly at the EMI receiver.

L = The insertion loss in dB of the LISN, cables and transient Limiter





Operating Mode: Mode 1 **Test Date:** 05/02/2025 **Power Input:** 120 Vac 60 Hz **Temperature:** 23°C Port: AC Mains Port (Active Line) Humidity: 48% **Test Standard:** FCC 15B DroneShield RfPatrol Mk2 Wideband (WB) SN: 0350198542647 120Vac 60Hz Battery charging FCC CLASS A QP CONDUCTED LIMITS (CISPR) FCC CLASS A AV CONDUCTED LIMITS (CISPR) Limit1: FCCN_AQP Limit2: FCCN_AAV Trace 2: Active Line FCC Class A Conducted Emissions (dBuV) - = QP Values * = Avg Values Job No: S2412003 Test Date: 05/02/2025 Test Officer:Michael Kent-Plot date:17/03/2025 09:11:22 WintstR5:36.46-Wpit:164.77.45:cR8.5E.SCI-3,100012/003,4.42 L0761125 c1:SC0021025 c2:NONE c3:NONE p3:NONE at:L0101125 iP:DFF Conducted Emission Room 2 L076 Graph No. 1 80.0 70.0 60.0 50.0 2 40.0 7 30.0 20.0 10.0 0.0 30 Frequency (MHz) Port Quasi Peak Peak Frequency Average Level Limit Margin Level Limit Margin [MHz] [dBµV] [dBµV] [dB] [dBµV] [dBµV] [dB] 1 0.15 Active 48.6 79.0 -30.4 24.8 66.0 -41.2 2 11.94 34.1 73.0 -38.9 25.5 60.0 -34.5 Active 3 0.32 Active 38.0 79.0 -41.0 32.1 66.0 -33.9 4 0.92 Active 31.6 73.0 -41.4 23.5 60.0 -36.5 5 18.53 Active 30.3 73.0 -42.7 22.7 60.0 -37.3 Active 30.3 -42.7 6 73.0 20.9 60.0 -39.1 0.61 -47.0 7 2.50 Active 26.0 73.0 18.9 60.0 -41.1

3.1.2 Measurement Data – 150 kHz to 30 MHz



















3.1.3 Minimum Margin

Mode	Line	Frequency	Detector	Margin	
Mode 1, 240 Vac 50 Hz	Active	0.31 MHz	AV	-27.1 dB	
The EUT complied with FCC Class A limit.					





3.2 Radiated Emission

3.2.1 Measurement Procedure

The EUT was set up on the middle of turntable above the ground plane. The EMI Receiver was operated under software control via the PC Controller through the IEEE.488 Interface Bus Card Adaptor. The test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of possible EMI peaks while also permitting fast frequency scan times.

The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for at least two antenna heights. Each significant peak was then investigated and maximised with the Quasi-Peak detector for measurements below 1 GHz; and an Average and a Peak detector for measurements above 1 GHz. The measurement data for each frequency range was automatically corrected by the software for cable losses, antenna factors and preamplifier gain and all data were then stored on disk in sequential data files. 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

AF = Antenna Factor in dB/m. (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)





3.2.2 Measurement Data – 30 to 1000 MHz













3.2.3 Measurement Data - 1 to 18 GHz

























3.2.4 Measurement Data - 18 to 30 GHz

Operating Mod	e:	Mode 1	Test Date:	04/02/2025
Power Input:		120 Vac 60 Hz	Temperature:	22°C
Measurement	Distance:	1 m	Humidity:	50%
Test Standard:		FCC 15B – Peak	-	
DroneShield RfPatrol Mk2 Widd SN: 035019854264 120Vac 60H2 Batt FCC Class A Radiated Emissio y = Peak Values	eband (WB) 17 ery Charging - lyi ns (dBuV/m) # =	ing flat position Job No: S2412003 Test Date: 04/02/2025	Limit1: FCC-A1PK FCC CLAS Trace 2: Vertical Emissions Test Officer-Michael Kent-Piol date:17/03/2025 09:2 CA3000127-H c1:C4130625 c:2C4140625 c:3NONE SNE ID: SNE ROOMER 3 Seven Hist, NSW	SSA RAD PEAK LIMITS 1 - 40GHz at 1m 1:36 WintstRs:36.45 Wpit:164.77-Rx:R&S_ESU-40,100183/040,4.73 p30ONE eXIONE IP:ON2 Radiated Emission 18-40GHz Inside Graph No. 33
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		Frequency (MHz)		
0				
Comment:				
* No peaks were	e measure	d within 10 dB of the l	imit.	





Operating Mode:	Mode 1	Test Da	te:	04/02/2025
Power Input:	120 Vac 60 Hz	Temper	ature.	22°C
Measurement Distance	- 1 m	Humidi	v	50%
Test Standard	FCC 15B – Peak	Trainian	. y .	0070
DroneShield RfPatrol Mk2 Wideband (WB) SN: 0350198542647		Limit1: FCC-A1PK	FCC CLASS AF	RAD PEAK LIMITS 1 - 40GHz at 1m
120Vac 60Hz Battery Charging - FCC Class A Radiated Emissions (dBuV/m) v = Peak Values	lying flat position Job No: S2412003 Test Date: 04/02/2025 # = Ambient	Test Officer:Michael Kent-Plot date: t:A3080127-H c1:C4130625_c2:C41 Site ID: Syd Room#3 Seven Hills, NS	17/03/2025 09:21:59 40625 c3:NONE p:NOP W	WintstRs:36.45-Wpit:164.77.4x:R&S.ESU-40,100103/040,4.73 KE e:NONE IP:ON2 Radiated Emission 18-40GHz inside Graph No. 34
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50.0				
40.0 18000	Frequency (MHz)			30000
Comment:				
* No peaks were measu	red within 10 dB of the l	imit.		













3.2.5 Minimum Margin

Mode	Polarisation	Frequency	Detector	Margin	
Mode 1, 120 Vac 60 Hz	Horizontal	217.79 MHz	QP	-9.5 dB	
The EUT complied with FCC Class A limit.					





4 Device Identification Photographs

Refer to:

CONF_[DRO-035-WB] Internal Photos CONF_[DRO-035-WB] External Photos CONF_[DRO-035-WB] Test Setup Photos

