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RF Exposure Compliance Report

Report No.: M2409020-3

TESTED FOR:	**ISSUED BY:**
Minelab Electronics Pty Ltd	EMC Technologies Pty. Ltd.
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Product Name:	Metal Detector
Model:	Vanquish 560, Vanquish 460
Part Number:	D40056
FCC ID:	Z4C-0056
Assessment Date(s):	3 March 2025
Issue Date:	24 April 2025
Specification(s):	**447498 D01 General RF Exposure Guidance v06** *RF exposure procedures and equipment authorization policies for mobile and portable devices.*
Based on an assessment of the documentation provided and the declared separation distance from the human body under normal use, the Metal Detector, model: Vanquish 360/460/560, is exempted from SAR evaluation.	
Assessment Engineer(s):	Ruel Badajos
Authorized Signatory:	Shabbir Ahmed Technical Director

Revision History

Version	Issue Date	Reason / Comments
1	24 April 2025	Initial issue

General Remarks

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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Content

1 Project Overview

1.1 Introduction

The transmitter was assessed against FCC KDB 447498 D01 General RF Exposure Guidance v6.

This report shows the SAR exclusion in accordance with FCC KDB 447498 D01 clause 4.3.1.

The device information provided by the Customer.

1.2 Laboratory Overview

Inspections were performed at the following location:

☒ Melbourne Laboratory 176 Harrick Road, Keilor Park, Vic 3042

☐ Sydney Laboratory Unit 3/87 Station Road, Seven Hills, NSW 2147

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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

1.3 Standards Applied

Unless otherwise noted, only the cited edition applies.

KDB 447498 D01 General RF Exposure Guidance v06
RF exposure procedures and equipment authorization policies for mobile and portable devices

*Latest version of the standard applied.

1.4 Device Details

(Information supplied by the Client)

This product is a personal metal detector, intended to detect metal targets of various sizes at different depths, in environments such as parks, fields and beaches.

Manufacturer:	Minelab Electronics Pty Ltd
Test Sample:	Metal Detector
Model:	Vanquish 560, Vanquish 460
FCC ID:	Z4C-0056
Part Number:	D40056
Serial Number:	Main detector: AQ3_P12
Distance From human body in normal use:	Greater than 20cm

1.5 Transmitters Details

Transmitter parameters were provided by the customer and are shown below:

Transmitter #1	
Wireless Interface 1:	Nordic Semiconductor nRF5340
Operating Frequency:	2400 – 2483.5 MHz, Bluetooth Low Energy (BLE)
Max RF Output Power	+3dBm (2mW)
Antenna Type:	Inverted F Antenna
Max Antenna gain:	3.3 dBi
Distance From human body in normal use:	at least 5cm*

2 SAR Test Exclusion Threshold For 100 MHz to 6 GHz and ≤50mm

Table1: SAR test exclusion threshold 100 MHz- 6GHz

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	*SAR Test Exclusion Threshold* (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	
MHz	30	35	40	45	50	mm
150	232	271	310	349	387	*SAR Test Exclusion Threshold* (mW)
300	164	192	219	246	274	
450	134	157	179	201	224	
835	98	115	131	148	164	
900	95	111	126	142	158	
1500	73	86	98	110	122	
1900	65	76	87	98	109	
2450	57	67	77	86	96	
3600	47	55	63	71	79	
5200	39	46	53	59	66	
5400	39	45	52	58	65	
5800	37	44	50	56	62	

Note: 10-g Extremity SAR Test Exclusion Power Thresholds are 2.5 times higher than the 1-g *SAR Test Exclusion Thresholds* indicated above. These thresholds do not apply, by extrapolation or other means, to occupational exposure limits.

The 1-g Body SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\frac{\text{max. power of channel, including tuneup tolerance (mW)}}{\text{min. test separation distance (mm)}} * \sqrt{f(GHz)} \leq 3.0$$

Where:

- f(GHz) is the RF channel transmit frequency in GHz.
- Power and distance are rounded to the nearest mW and mm before calculation.
- The result is rounded to one decimal place for comparison.
- The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz.
- The minimum test separation distance is 30mm.

3 Uncertainty

EMC Technologies has evaluated the tools and methods used to perform Radiated Electromagnetic Field predictions/testing.

The estimated inspection uncertainties shown within this report are as follows:

Electromagnetic Modelling

30 MHz to 100GHz ±2.8 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%.

4 Assumptions in this Assessment

This assessment does not include accumulated RF fields from nearby sites/antennas or possible radio signal reflections or attenuation due to buildings or the general environment.

Antenna parameters and power setting were supplied by the customer.

The aperture of the radiating element assumed to be a point source in free space and far field conditions.

5 Evaluation Result

The separation distance between the Bluetooth antenna and the user is at least 50mm, and the output power is 3dBm (2mW).

The standalone transmitter is exempted from SAR if the below condition satisfied in conjunction with threshold power condition in table 1.

$$\frac{\text{max. power of channel, including tune} - \text{up tolerance (mW)}}{\text{min. test separation distance (mm)}} * \sqrt{f(GHz)} \leq 3.0$$

Where

- Minimum test separation distance (mm): 50,
  The minimum test separation distance is determined by the smallest distance from the antenna (radiating structures) to the outer surface of the device.

- Maximum power of channel (mW): 2 (1.98 mW rounded off to 2 mW)
  Time-averaged maximum conducted output power.

$$\frac{\text{max. power of channel, including tune} - \text{up tolerance (mW)}}{\text{min. test separation distance (mm)}} * \sqrt{f(GHz)} = \frac{2\ mW}{50mm} * \sqrt{2.45\ GHz}$$

$$= \mathbf{0.06} < \mathbf{3.0}$$

As the transmitted power (EIRP) is **4.3 mW** (6.3 dBm), less than 96 mW indicated in table (1) and the result of the above condition is **0.06** (less than 3), this transmitter exempted from SAR evaluation for FCC compliance purposes.

Appendix A – Reference Documents

Document	Comments
Aquarius-MLE-ETSI303454_TestPlan-v1 VAN2044-01 - EMC Formal Compliance Test Plan	EUT details and Operating Frequency
Aquarius-Form 005 Customer and EUT Information-20250116 V2	RF Conducted Output Power

-- END OF REPORT --