



Global Product Certification
EMC-EMF Safety Approvals

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Electromagnetic Compatibility Test Report

Report No.: M2208030-4

TESTED FOR:

Zero Latency Pty. Ltd.

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ISSUED BY:

EMC Technologies Pty. Ltd.

176 Harrick Road, Keilor Park, VIC, 3042, Australia.

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Product Name: Game Controller

Model: Raptor v4

FCC ID: FCC ID: 2A8MY-ZL-03-16

Test Date(s): 01 September 2022

Issue Date: 31 October 2022

Specification(s): 47 CFR Part 15 – Subpart B

The test sample, under the condition and operating mode described in this test report, complies with the standard/s listed above.

Test Engineer:

Aswathi Nair

Authorized Signatory:

William Alam

Senior Test Engineer



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.

This report shall not be reproduced except in full.

Revision History

Version	Issue Date	Reason / Comments
1	31 October 2022	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
- ☐ Sydney Laboratory Unit 3/87 Station Road, Seven Hills, NSW 2147

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
Canada	ISED Canada	CAB Identifier Number: AU0001
Japan	VCCI	Company Number: 785
Taiwan	BSMI	Lab Code SL2-IN-E-5001R

1.2 Standards Applied

47 CFR Part 15 – Subpart B

Title 47 of the Code of Federal Regulations; Chapter 1; 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 client. All results herein apply only to the test sample.

47 CFR Part 15 – Subpart B					
Section	EMC Test	Range	Applicability	Limit	Result
15.107	Conducted Emission	150 KHz to 30 MHz	AC Mains	---	N/A ^{*1}
15.109	Radiated Emission	30 MHz to 6 GHz	Enclosure	Class A	Complied
*1 Not Applicable. EUT had no AC power port.					

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
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 without 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).

Radiated Emission						
Manufacturer	Model	Serial No.	Asset No.	Description	Cal. Date	Cal. Due
Frankonia	Room 13 SAC-3	-	R-144	Room 13 3m SAC	10/08/2020	10/08/2023
Sunar	JB1	A052518	A-434	Antenna Biconilog	13/11/2020	13/11/2022
Huber & Suhner	Sucoflex 104A	503061/4A	C-463	RF Cable	4/02/2022	04/02/2023
Huber & Suhner	Sucoflex 104A	507100 /4A	C-478	RF Cable	4/02/2022	04/02/2023
Rohde & Schwarz	ESW26	101306	R-143	EMC Receiver	29/07/2022	29/07/2023
EMCO	3115	9501-4398	A-406	Antenna Horn	10/01/2022	10/01/2023

2 Equipment Under Test

2.1 EUT Detail

(EUT details are supplied by customer)

Product Name:	Game Controller
Model:	Raptor v4
Manufacturer:	Zero Latency Pty. Ltd.
Part No:	ZL-03-16
Power Rating:	7.4V DC LiPo Battery
Highest Internal Frequency:	500MHz
Description:	Virtual reality handheld controller for commercial free-to-roam VR installations

2.2 Reference Document

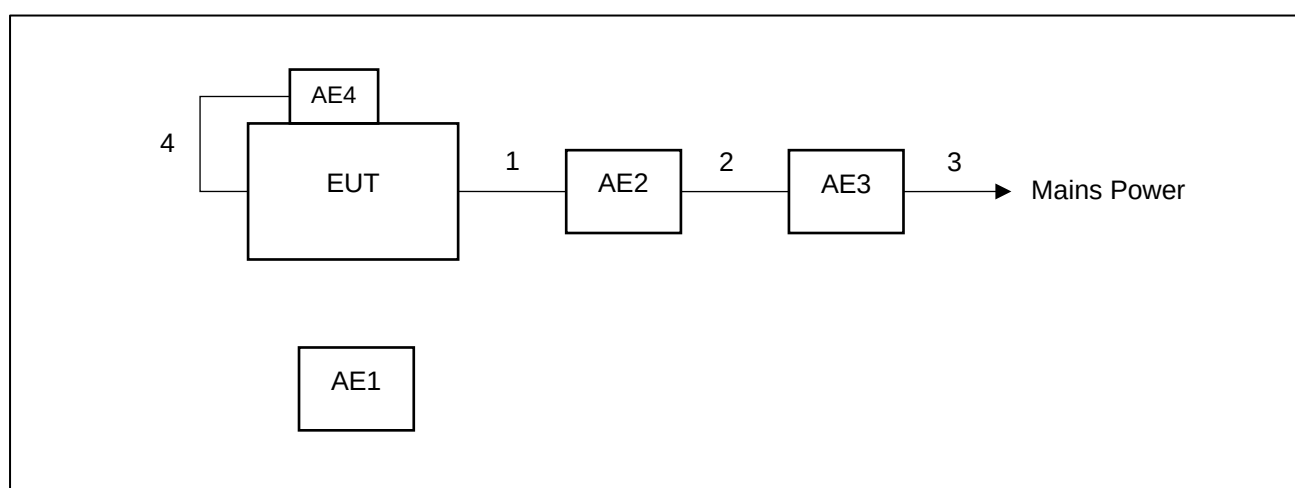
No.	Document Title	Issue No.
	None supplied	

2.3 Test Configuration

Installation Type:	☒ Tabletop ☐ Floor-Standing ☐ Combination Tabletop and Floor-Standing
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Auxiliary Equipment				
No.	Description	Model	Serial No.	Remark
AE1	Headset	Focus 3	---	---
AE2	Balanced charger	BC-4S15D	---	2-4S Li-Poly/LI-ion Battery Balance charger and voltage detector
AE3	AC/DC adaptor	Mean Well GST60A12	GST60A12-P1JR	Input:100-240V AC,50/60Hz Output:12V DC, 5.0A, 60W max
AE4	Wrist Tracker	HTC VIVE	---	---

Cable used for testing				
No.	Description	Length	Shielded	Remark
1	DC/Signal cable	< 3m	No	---
2	Balanced charger cable	< 3m	No	---
3	AC/DC adaptor cable	< 3m	No	---
4	USB-C Cable	< 3m	Yes	---



2.4 Operating Test Mode

Mode No.	Description
1	EUT was operated in charging mode using an external AC/DC adaptor which was connected via a balanced charger. EUT was configured to operate its worst case. Gun Controller was configured to automatically simulate worst case scenarios and Focus 3 Headset which was connected to the controller was used to validate data transfers. The tracker (auxiliary equipment) was the pathway for the controller to communicate with the headset.

2.5 Modifications

No modifications were required to achieve compliance.

3 Evaluation of Emission Test Results

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 Radiated Emissions

3.1.1 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 dBμV/m.

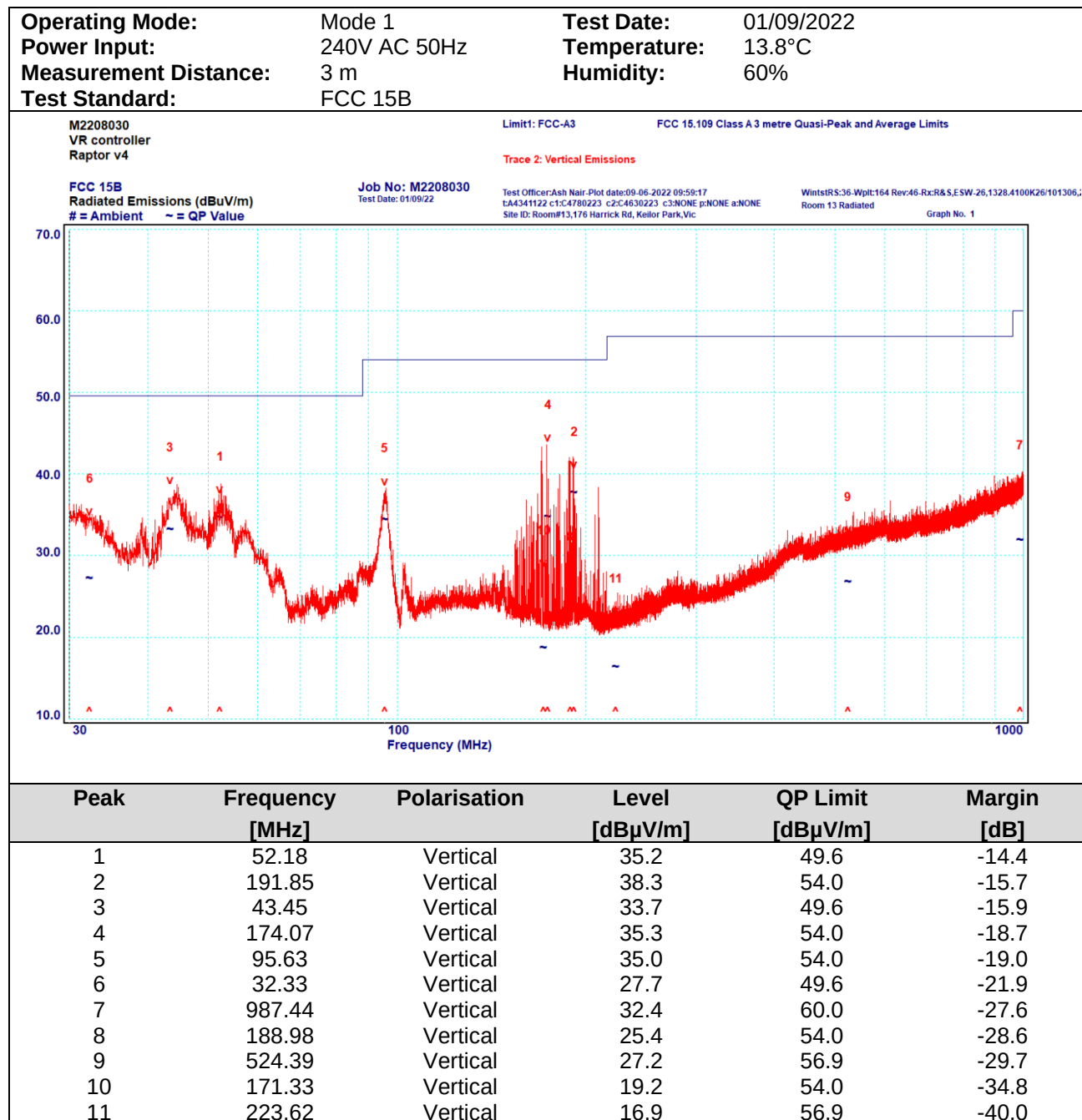
V = EMI Receiver Voltage in dBμV/m.

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)

3.1.2 Measurement Data: 47 CFR PART 15B (30 to 1000 MHz)



Operating Mode:	Mode 1	Test Date:	01/09/2022
Power Input:	240V AC 50Hz	Temperature:	13.8°C
Measurement Distance:	3 m	Humidity:	60%
Test Standard:	FCC 15B		

M2208030
VR controller
Raptor v4

Limit1: FCC-A3
FCC 15.109 Class A 3 metre Quasi-Peak and Average Limits

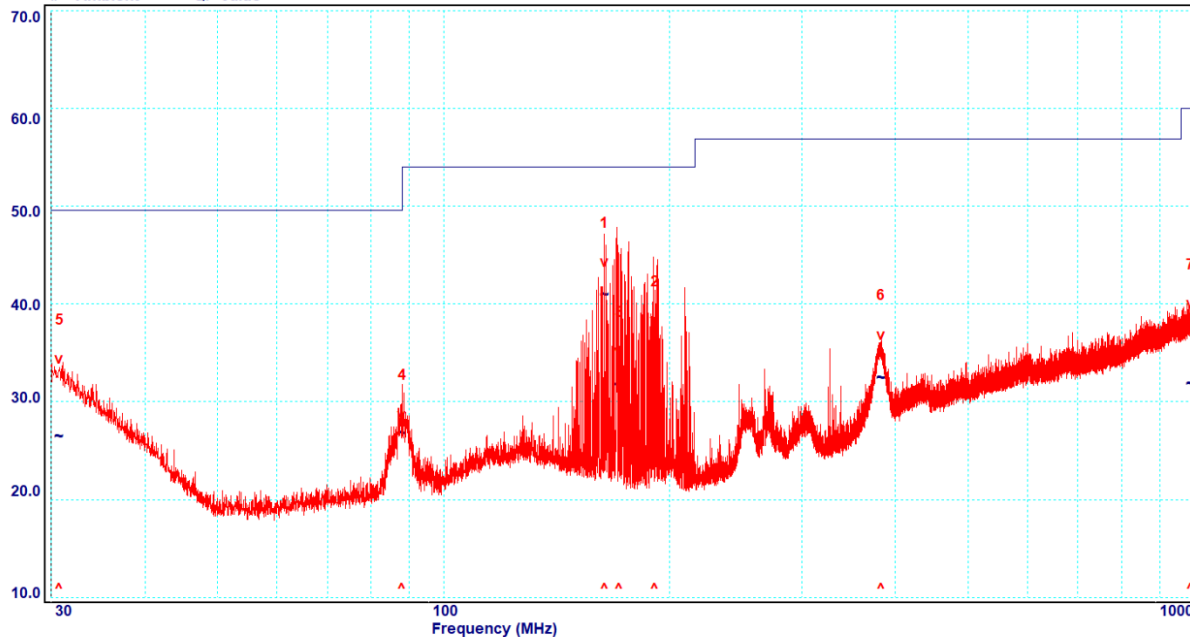
Trace 2: Horizontal Emissions

Job No: M2208030
Test Date: 01/09/22

Test Officer: Ash Nair-Plot date: 09-06-2022 10:00:23
tA4341122 c1:C4780223 c2:C4630223 c3:NONE p:NONE a:NONE
Site ID: Room#13,176 Harrick Rd, Kellor Park, Vic

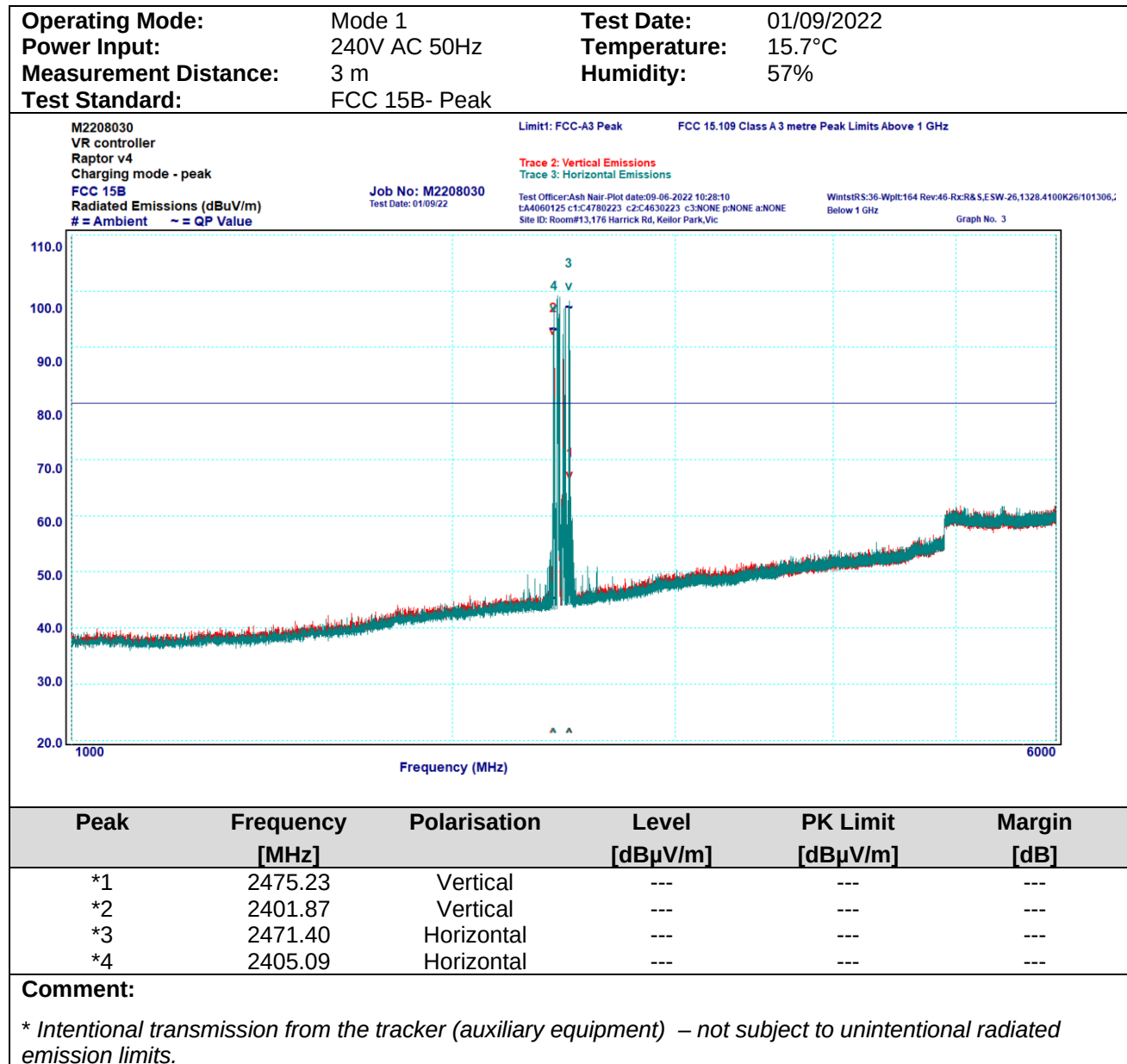
WintstRS:36-Wp1t:164 Rev:46-Rx:R&S,ESW-26,1328.4100K26/101306,
Room 13 Radiated

Graph No. 2

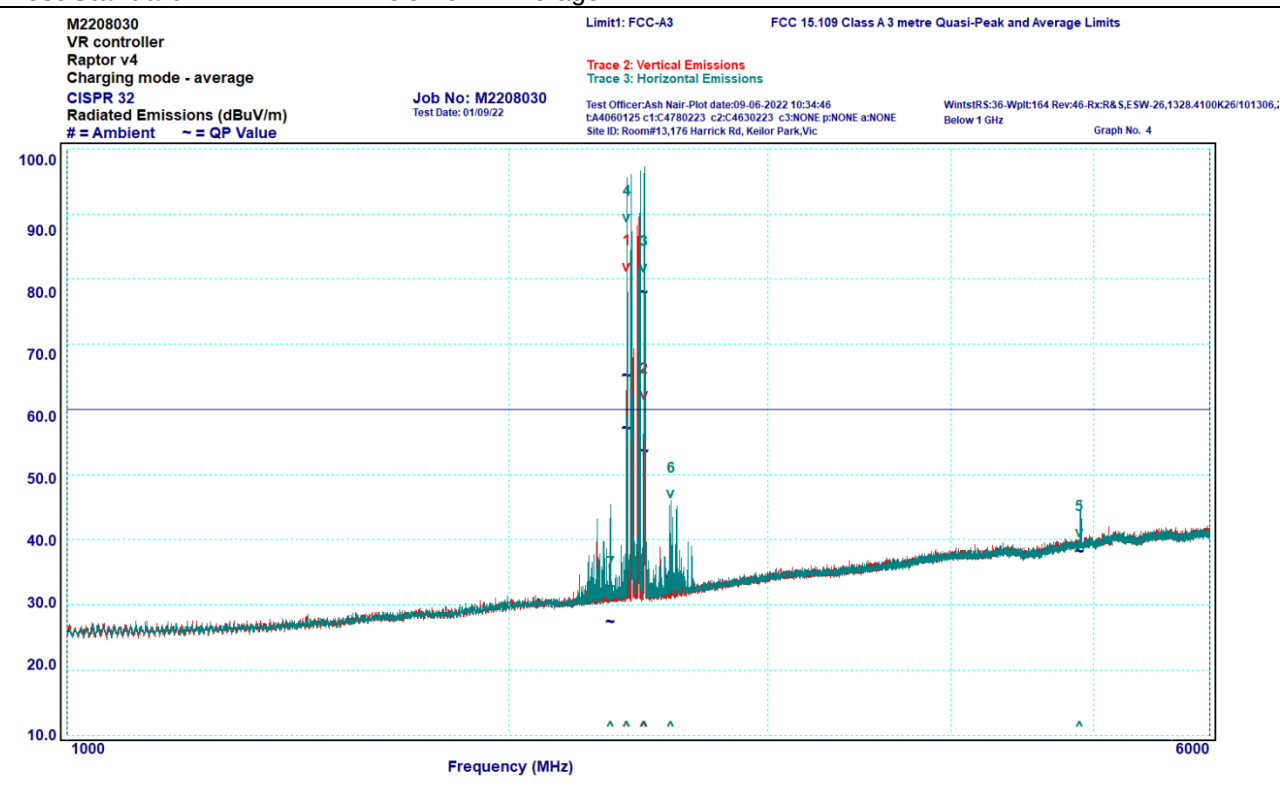


Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	QP Limit [dBuV/m]	Margin [dB]
1	163.71	Horizontal	41.4	54.0	-12.6
2	191.13	Horizontal	35.4	54.0	-18.6
3	171.47	Horizontal	32.2	54.0	-21.8
4	88.00	Horizontal	27.3	49.6	-22.3
5	30.78	Horizontal	26.9	49.6	-22.7
6	382.90	Horizontal	32.9	56.9	-24.0
7	989.95	Horizontal	32.3	60.0	-27.7

3.1.3 Measurement Data: 47 CFR PART 15B (1 to 6 GHz)



Operating Mode:	Mode 1	Test Date:	01/09/2022
Power Input:	240V AC 50Hz	Temperature:	15.7°C
Measurement Distance:	3 m	Humidity:	57%
Test Standard:	FCC 15B - Average		



Peak	Frequency [MHz]	Polarisation	Level [dBuV/m]	AV Limit [dBuV/m]	Margin [dB]
*1	2403.91	Vertical	---	---	---
*2	2471.71	Vertical	---	---	---
*3	2469.59	Horizontal	---	---	---
*4	2403.93	Horizontal	---	---	---
5	2575.83	Horizontal	38.7	60.0	-21.3
6	4887.51	Horizontal	34.7	60.0	-25.3
7	2343.88	Horizontal	27.9	60.0	-32.1

Comment:

* Intentional transmission from the tracker (auxiliary equipment) – not subject to unintentional radiated emission limits.

3.1.4 Minimum Margin – FCC 15B

Mode	Polarisation	Frequency	Detector	Margin
Mode 1, 240VAC 50Hz	Horizontal	163.71 MHz	QP	-12.6 dB

The EUT complied with the FCC 15B, Class A limit.

--End of Report--