



Global Product Certification  
EMC-EMF Safety Approvals

**Melbourne**  
176 Harrick Road  
Keilor Park, Vic 3042  
Tel: +61 3 9365 1000

**Sydney**

Unit 3/87 Station Road  
Seven Hills, NSW 2147  
Tel: +61 2 9624 2777

Email: [emc-general@emctech.com.au](mailto:emc-general@emctech.com.au)  
Web: [www.emctech.com.au](http://www.emctech.com.au)

## RADIO REPORT FOR CERTIFICATION to 47 CFR Part 15 Subpart C (Section 15.247)

**Report Number:** S201003-1 v1

**FCC ID:** 2AWR4ISRSC01

**Tested For:** Ellume Ltd  
**Device under Test :** Home COVID (I-SRS-C-01)  
**Model Number:** I-SRS-C-01  
**Part Number:** M1000221

**Issue Date:** 28<sup>th</sup> January 2021

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.

**REVISION TABLE**

Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	28/01/2021

# RADIO REPORT FOR CERTIFICATION

## 47 CFR Part 15 Subpart C (Section 15.247)

### CONTENTS

- 1.0 INTRODUCTION
- 2.0 GENERAL INFORMATION
- 3.0 TEST RESULTS
  - 3.1 §15.203 Antenna Requirement
  - 3.2 §15.204 Antenna Information
  - 3.3 §15.207 Disturbance Voltage on AC Mains
  - 3.4 §15.247(a)(2) 6 dB Bandwidth
  - 3.5 §15.247(e) 3kHz Peak Power Density
  - 3.6 §15.247(b) Peak Output Power
  - 3.7 §15.247(d) Spurious Radiated Emission
  - 3.8 §15.247(d) Out of Band Emissions
  - 3.9 §2.1049 99% Occupied Bandwidth
  - 3.10 §15.247 (i) Maximum Permissible Exposure
- 4.0 COMPLIANCE STATEMENT
- 5.0 MEASUREMENT UNCERTAINTY

- APPENDIX A PHOTOGRAHPS OF TEST SETUP
- APPENDIX B IDENTIFICATION PHOTOGRAPHS OF TEST SAMPLE (EXTERNAL)
- APPENDIX C IDENTIFICATION PHOTOGRAPHS OF TEST SAMPLE (INTERNAL)



## RADIO REPORT FOR CERTIFICATION

**Product :** Home COVID ( I-SRS-C-01)  
**Model Number:** I-SRS-C-01  
**Part Number:** M10000221

**FCC ID:** 2AWR4ISRSC01

**Manufacturer:** Ellume Ltd  
57 Didsbury Street,  
East Brisbane, QLD, 4169, Australia

**Tested for:** Ellume Ltd  
**Address:** 57 Didsbury Street,  
East Brisbane, QLD, 4169, Australia

**Phone:** +61 417 916 824  
**Contact:** Tim Laing

**Email:** [Tim.laing@ellumehealth.com](mailto:Tim.laing@ellumehealth.com)

**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

**Test Dates:** 15<sup>th</sup> October 2020 to 20<sup>th</sup> October 2020

**Issue Date:** 28<sup>th</sup> January 2021

**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:**  
  
Dong Feng

**Authorised Signatory:**  
  
Quinn Wu  
Lead Engineer  
EMC Technologies Pty Ltd.

**Issued by: EMC TECHNOLOGIES PTY. LTD.**  
Unit 3/87 Station Road, Seven Hills, NSW, 2147, Australia  
Phone: +61 2 9624 2777,  
E-mail: [emc-general@emctech.com.au](mailto:emc-general@emctech.com.au), Web: [www.emctech.com.au](http://www.emctech.com.au)

**RADIO REPORT FOR CERTIFICATION**  
to  
**47 CFR Part 15 Subpart C (section 15.247)**

## 1.0 INTRODUCTION

Radio tests were performed on Home COVID (I-SRS-C-01) with Model: I-SRS-C-01, in accordance with the applicable requirements of 47 CFR, Part 15 Subpart C – Section 15.247 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 and KDB 558074 v05r02 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247.

The measurement instrumentation conformed to the requirements of ANSI C63.2: 2016.

## 1.2 Summary of 47 CFR Part 15 Subpart C Results

FCC Part 15 Subpart C	Test Performed	Results
15.203	Antenna requirement	Complied
15.204	Antenna information	Complied
15.205	Restricted bands of operation	Complied
15.207	Disturbance voltage on AC Mains	Not Applicable EUT is Battery powered
15.247(c)	Spurious radiated emission 15.209 limit applied	Complied
15.247 (a2)	6 dB Bandwidth	Complied
15.247 (e)	3 kHz Peak Power Density	Complied
15.247 (b)	Peak Output Power	Complied
15.247 (c)	Antenna Gain > 6 dBi	Not Applicable Antenna Gain < 6 dBi
15.247 (d)	Out of Band Emissions	Complied
15.247 (f)	Hybrid Systems	Not Applicable
15.247 (i)	Radio Frequency Hazard	Complied
	99% Occupied bandwidth	Complied

## 1.3 Modifications by EMC Technologies

No modifications were performed on the EUT in order to achieve compliance.

## 2.0 GENERAL INFORMATION

### 2.1 EUT (Transmitter) Details

The Equipment Under Test (EUT) was identified as follows:

<b>FCC ID:</b>	2AWR4ISRSC01
<b>Manufacturer:</b>	Ellume Ltd
<b>Product :</b>	Home COVID (I-SRS-C-01)
<b>Model Number:</b>	I-SRS-C-01
<b>Part Number:</b>	M1000221
<b>Microprocessor:</b>	Nordic n RF52810
<b>Crystal Frequency:</b>	32MHz
<b>Highest Internal Frequency:</b>	2.480GHz
<b>Operating Band:</b>	2.400-2.4835GHz ISM band (Bluetooth Low Energy)
<b>Nominal Power:</b>	0.1W
<b>Antenna type and gain:</b>	Microstrip PCB-printed quarter-wave monopole 0 dBi
<b>Nominal Bandwidth:</b>	80MHz
<b>Modulation</b>	GFSK

### 2.2 Test Sample Description

Software application on smartphone will be loaded. The tester will navigate through the pre-test part of the application. The tester will activate the battery power on the DUT and pair to the smartphone application via Bluetooth when prompted by the smartphone application. The DUT is then effectively setup in the worst-case scenario for EMC testing purposes and ready for testing under each test case condition. Patient sample (mucus) is not required to be added to the analyzer DUT because this does not affect the electromagnetic operation of the DUT.

The product is intended to be used in a residential setting.

### 2.3 Test Configuration

Single test configuration only with no modulation of operating parameters by user. Throughout the test the DUT will continue to operate in worst-case conditions from an electromagnetic perspective. There will be continuous communication at the BLE frequency range of 2.45 GHz throughout the test until the result is obtained.

## 2.4 Test Facility

### 2.4.1 General

EMC Technologies Pty Ltd is listed by the FCC as a test laboratory able to perform compliance testing for the public. EMC Technologies is listed as an FCC part 47CFR2.948 test lab and may perform the testing required under Parts 15 and 18 – **FCC Registration Number 90560**.

EMC Technologies Pty Ltd has 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 – **Designation number AU0002**.

Measurements in this report were performed at EMC Technologies' laboratory in Seven Hills, New South Wales 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 (A<sup>2</sup>LA).

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: [www.nata.asn.au](http://www.nata.asn.au)

## 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 Keysight Technologies, NPL or in-house. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model Serial Number	Asset No:	Due Date DD/MM/YY
EMI Receiver	Model: ESU40 S/N: 100183	R-038	01/04/21
Antenna	Double Ridged Horn Antenna 1-18GHz Model: EMCO 3115 S/N: 3823	A-324	28/02/21
	Sunar RF Motion Model: JB1S/N: A021318	A-430	08/03/21
	ETS Lindgren Horn Antenna Model: 3160-09 S/N: 000066033	A-305	12/06/21
Cables	13m RG214 N-Type, 0.1- 6000MHz	SC-028	11/01/22
	Sucoflex SF104A/2x11N-47/4m S/N: MY709/4A	SC-041	20/05/21
	Huber Suhner Sucoflex 104Z S/N: 503147/4A	SC-043	05/01/22
Preamplifier	HP 8449B Preamplifier Model: HP 8449B S/N: 3008A01113	A-138	10/02/21
Shielded Room/ Test Laboratory	7.23m × 4.83m × 2.45m	N/A	N/A
Indoor Open Area Test Site (iOATS)	RFI Industries S800 S/N: 876, 3 metre site iOATS situated at Seven Hills, NSW	S032	10/02/22

### 3.0 TEST RESULTS

#### 3.1 §15.203 Antenna Requirement

**Requirement:**

No antenna other than that furnished by the responsible party shall be used with the device.

**Results:**

The antenna was integral to the device ensuring that it could not be replaced.  
EUT was fully enclosed.

**Conclusion:** Complied

#### 3.2 §15.204 Antenna Information

**Requirement:**

Provide information for every antenna proposed for the use with the EUT.

**Results:**

a) Antenna type:	Integral omnidirectional
b) Manufacture and model No.:	NA
c) Gain with reference to an isotropic radiator:	0 dBi

**Conclusion:** Complied

#### 3.3 §15.207 Disturbance Voltage on AC Mains

Testing on AC mains not applicable as the EUT is battery powered.

#### 3.4 §15.247(a2) 6 dB Bandwidth

**Requirement:**

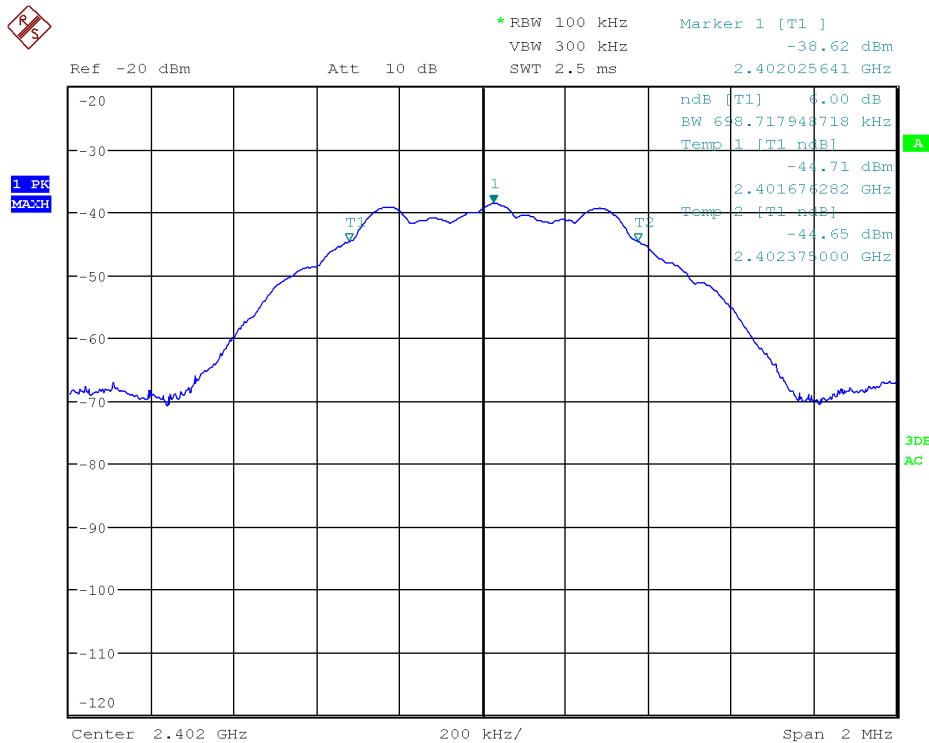
Systems using digital modulation techniques may operate in the 902-928MHz, 2400- 2483.5MHz, and 5725-5850MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.

**Results:**

6 dB Emission Bandwidth:

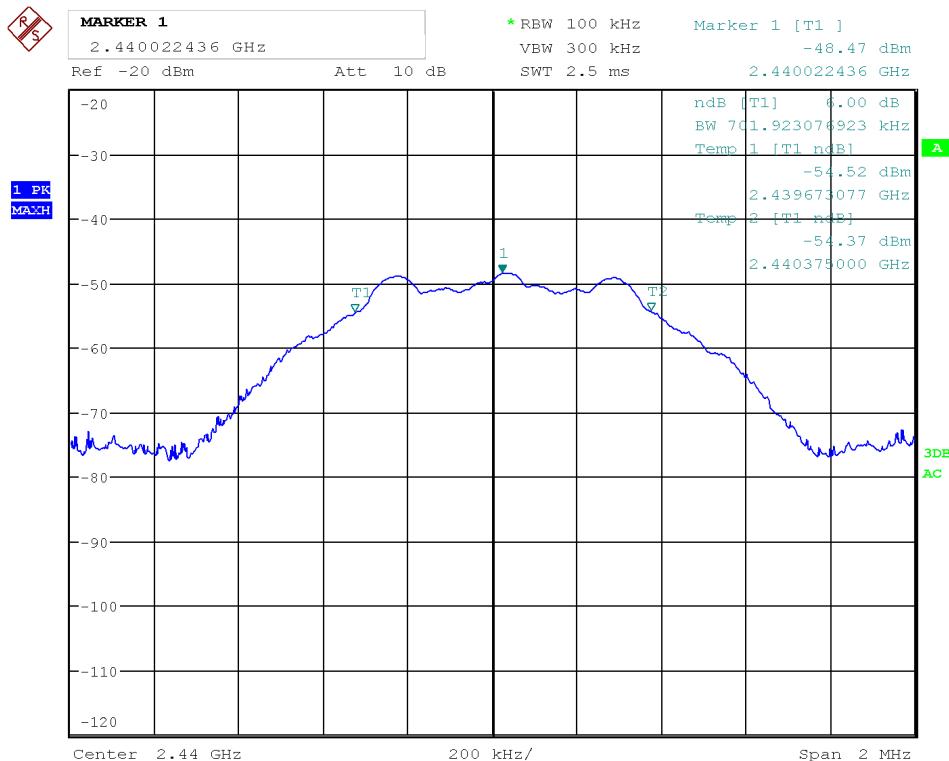
Centre Frequency [MHz]	6 dB Bandwidth [kHz]
2402	698.72
2440	701.92
2480	640.00

## Low Channel 2402 MHz



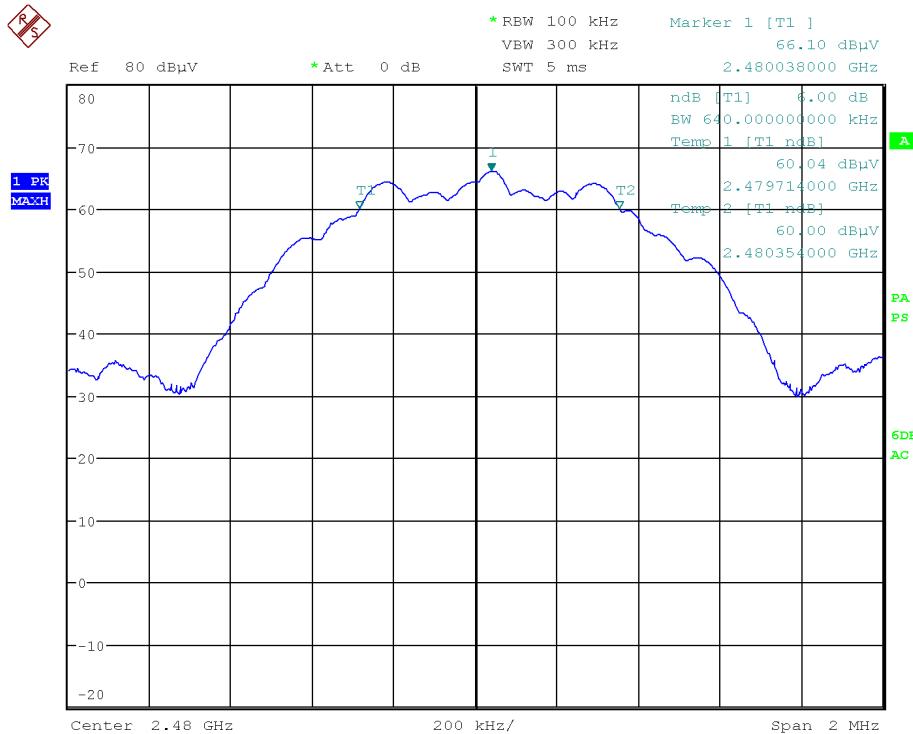
Date: 19.OCT.2020 21:49:25

## Middle Channel 2440 MHz



Date: 19.OCT.2020 21:53:05

### High Channel 2480 MHz



Date: 19.OCT.2020 17:22:05

**Conclusion:** Complied

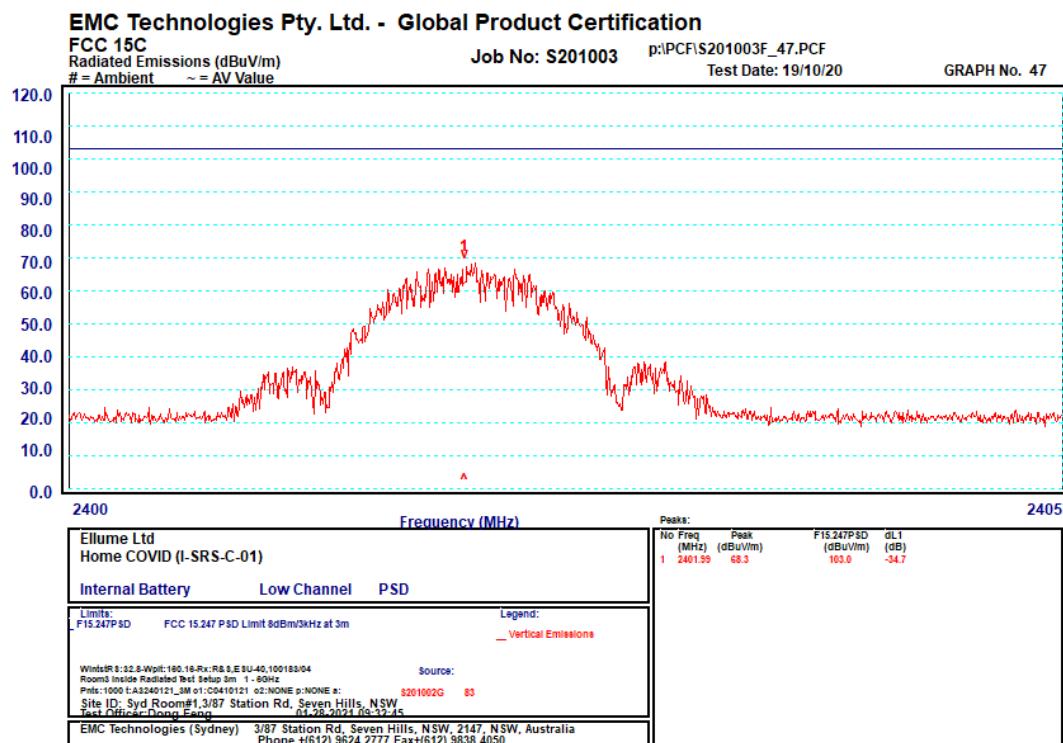
### 3.5 §15.247(e) 3 kHz Peak Power Density

#### Requirement:

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Radiated Measurement were performed at a distance of 3 metres.

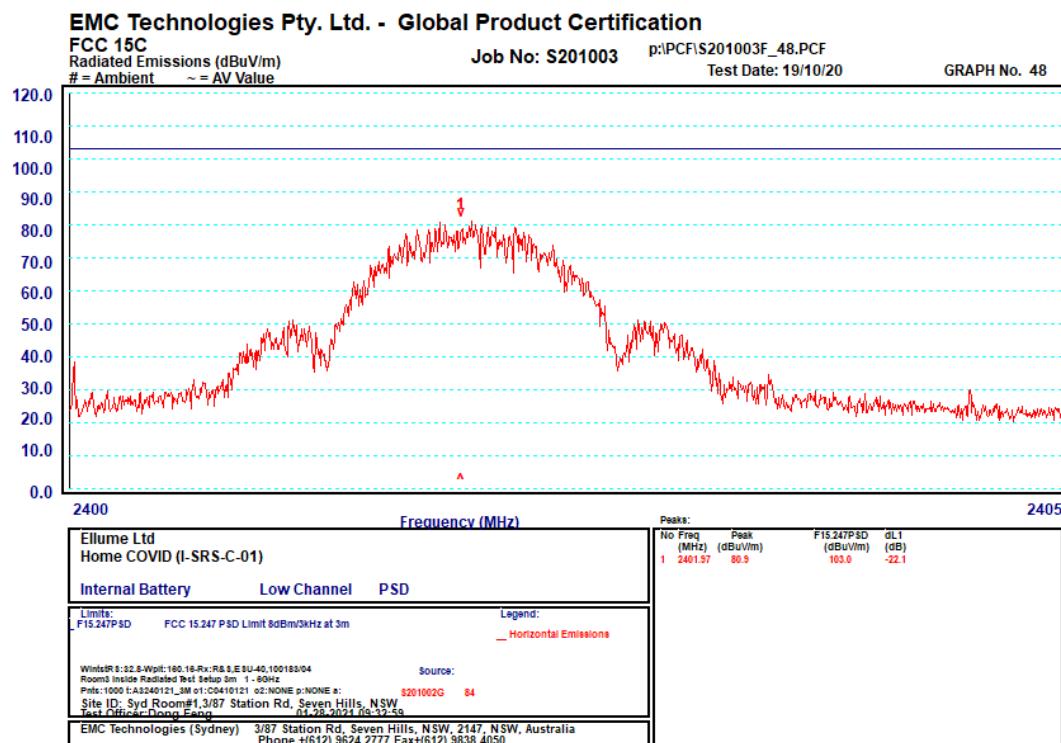
Limit of 8 dBm/3kHz has been converted to 103 dBuV/m per 3kHz at 3 metres distance.

**Results:****Graph 47****Low Channel****Vertical Polarisation****2400 to 2405MHz**

Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2401.99	Vertical	68.3	103.0	-34.7

All measured frequencies complied with the Limit by a margin of greater than 10dB.

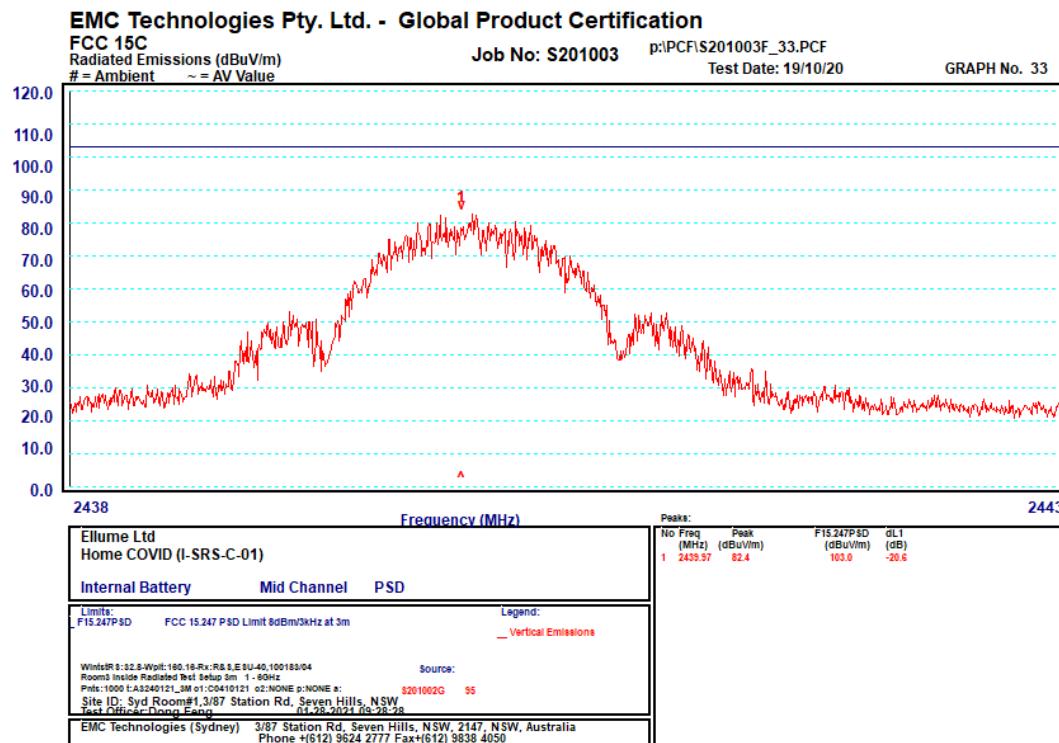
## Graph 48 Low Channel Horizontal Polarisation 2400 to 2405MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2401.97	Horizontal	80.9	103.0	-22.1

All measured frequencies complied with the Limit by a margin of greater than 10dB.

## Graph 33 Middle Channel Vertical Polarisation 2438 to 2443MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2439.97	Vertical	82.4	103.00	-20.6

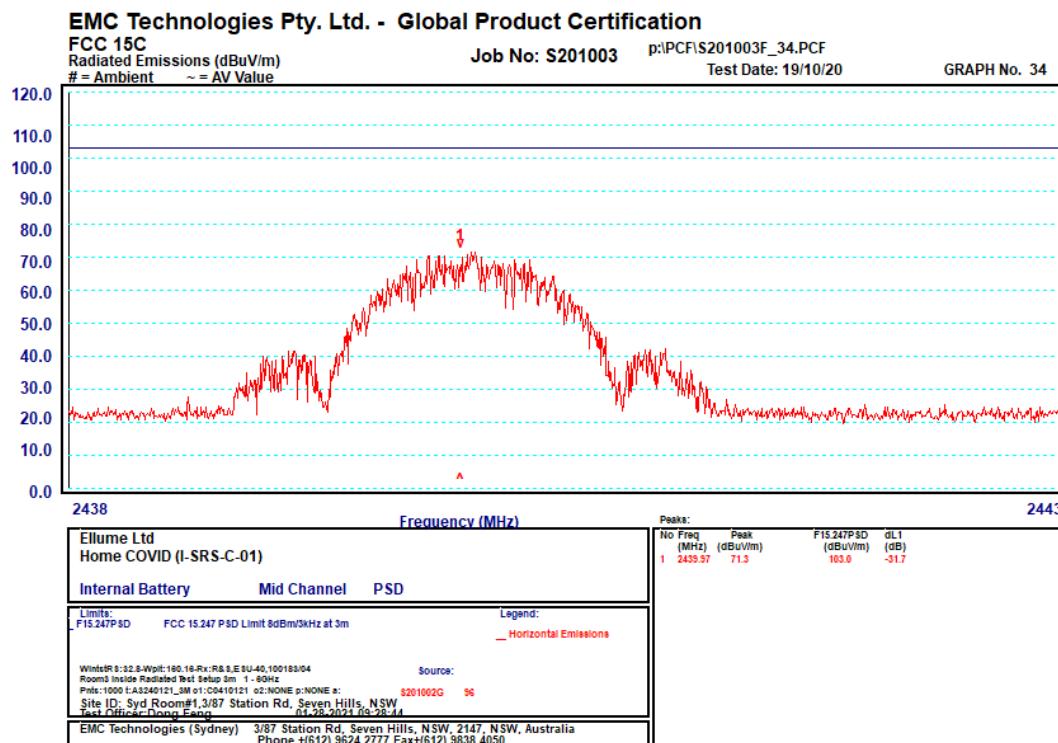
All measured frequencies complied with the Limit by a margin of greater than 10dB.

## Graph 34

## Middle Channel

## Horizontal Polarisation

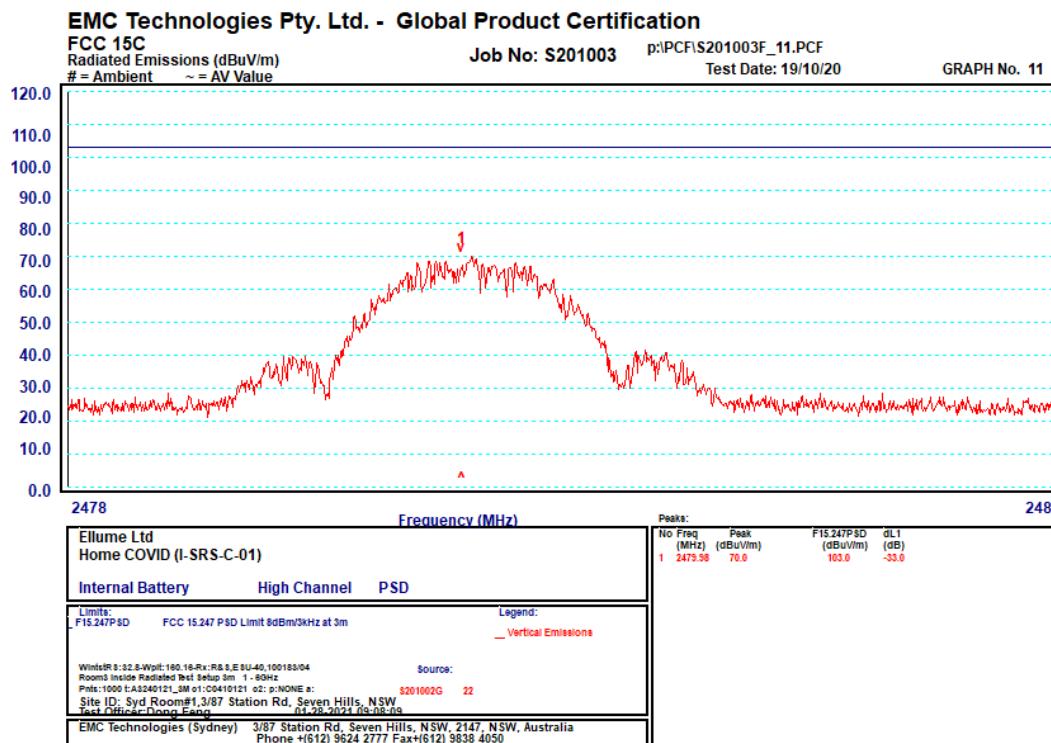
## 2438 to 2443MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2439.97	Horizontal	71.3	103.00	-31.7

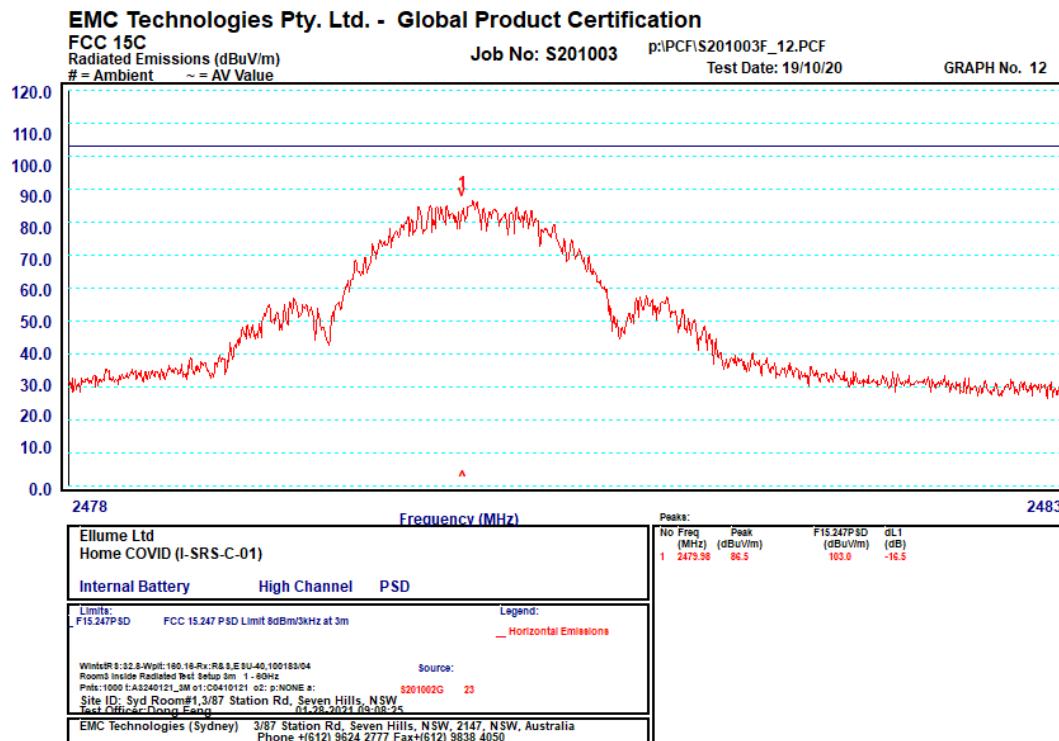
All measured frequencies complied with the Limit by a margin of greater than 10dB.

## Graph 11      High Channel      Vertical Polarisation      2478 to 2483MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2479.98	Vertical	70.0	103.00	-33.0

All measured frequencies complied with the Limit by a margin of greater than 10dB.

**Graph 12      High Channel      Horizontal Polarisation      2478 to 2483MHz**


Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2479.98	Horizontal	86.5	103.00	-16.5

All measured frequencies complied with the Limit by a margin of greater than 10dB.

### 3.6 §15.247(b) Peak Output power

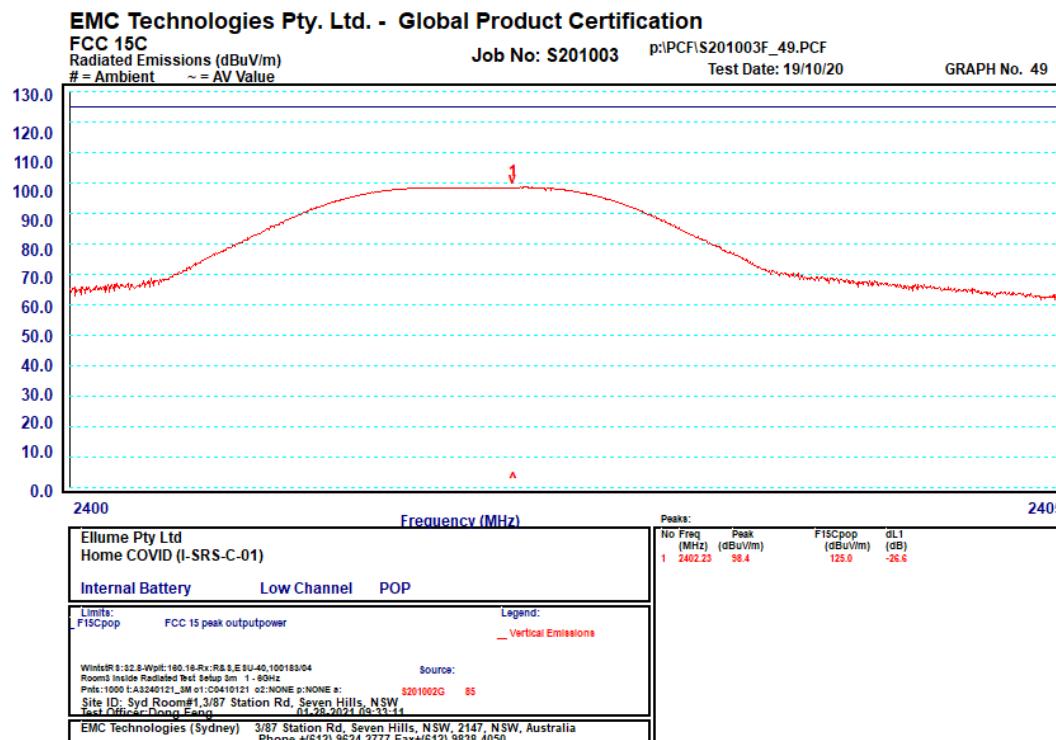
## Requirement:

For system using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz Bands: 1 Watt.

Radiated Measurement were performed at a distance of 3 metres.  
Limit of 1 Watt has been converted to 125 dBuV/m at 3 metres distance.

## Results:

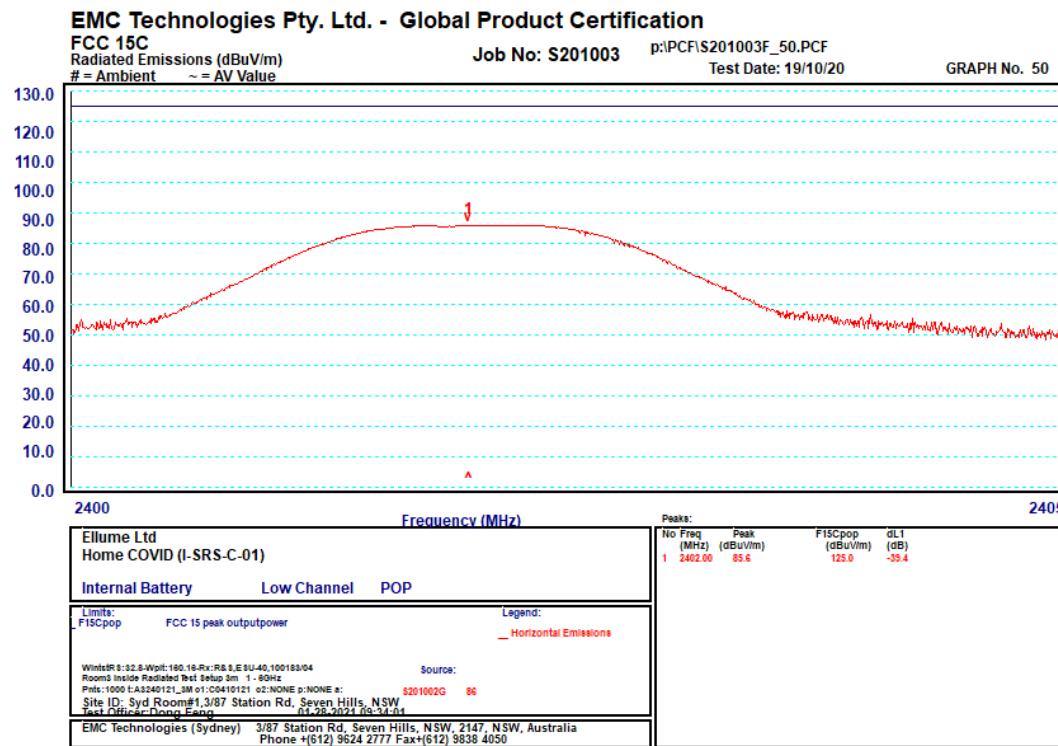
**Graph 49 Low Channel Vertical Polarisation 2400 to 2405MHz**



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2402.23	Vertical	98.4	125.0	-26.6

All measured frequencies complied with the Limit by a margin of greater than 10dB.

## Graph 50 Low Channel Horizontal Polarisation 2400 to 2405MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2402.00	Horizontal	85.6	125.0	-39.4

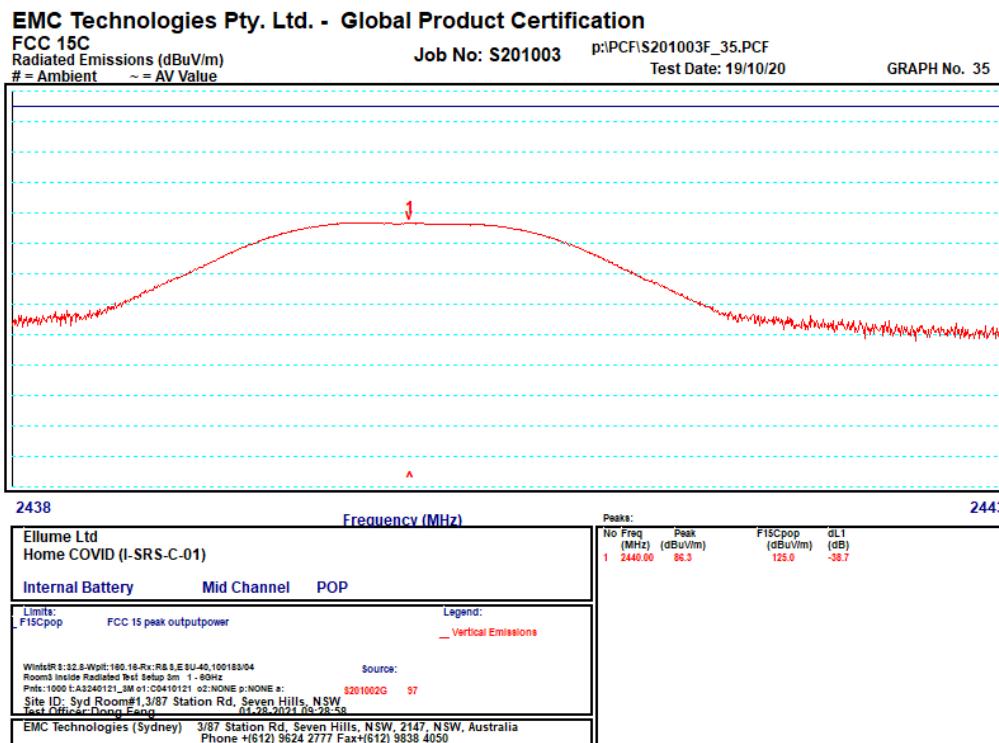
All measured frequencies complied with the Limit by a margin of greater than 10dB.

Graph 35

Middle Channel

Vertical Polarisation

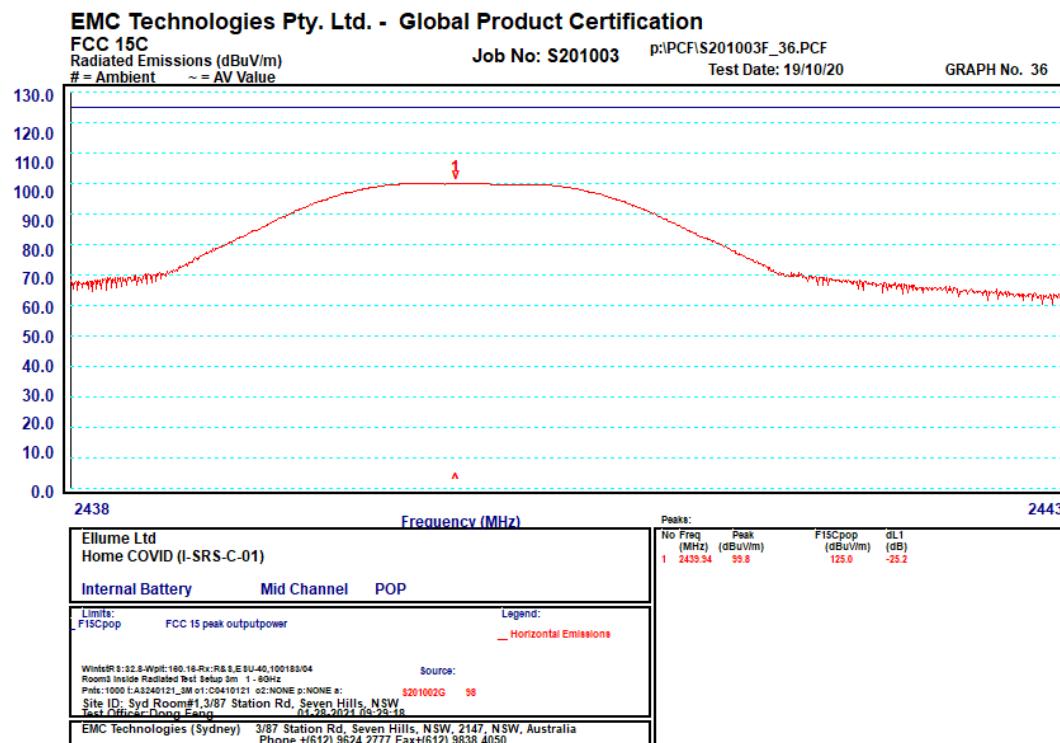
2483 to 2443MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2440	Vertical	86.3	125.0	-39.7

All measured frequencies complied with the Limit by a margin of greater than 10dB.

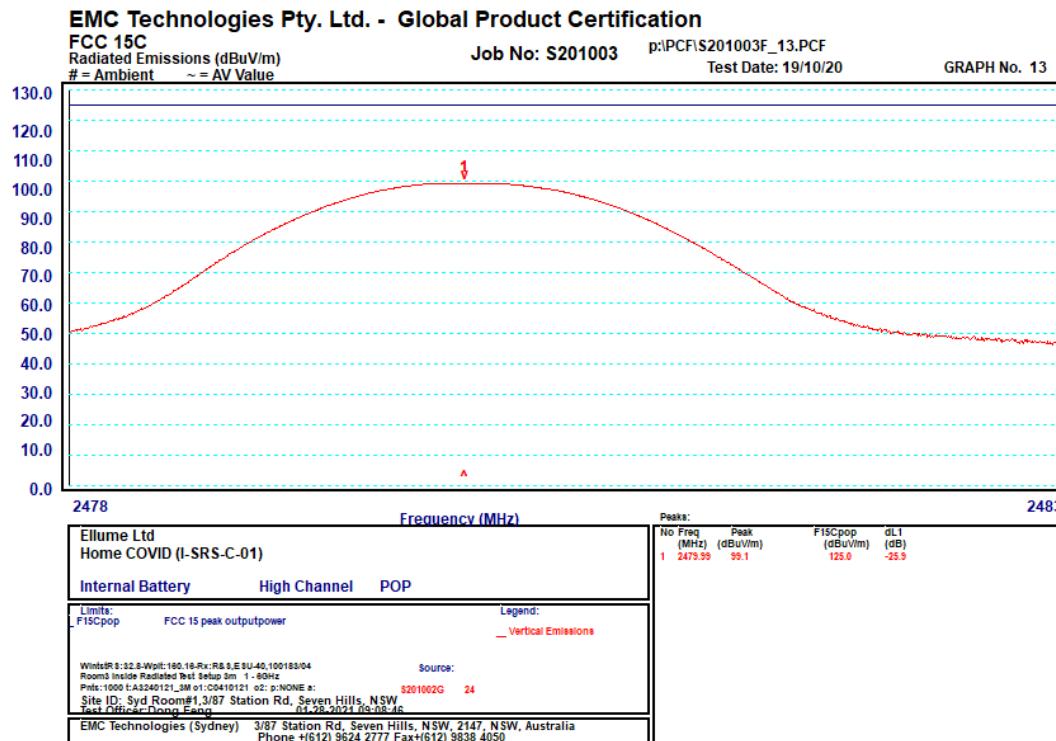
Graph 36 Middle Channel Horizontal Polarisation 2438 to 2443MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2439.94	Horizontal	99.8	125.0	-25.2

All measured frequencies complied with the limit by a margin of greater than 10dB.

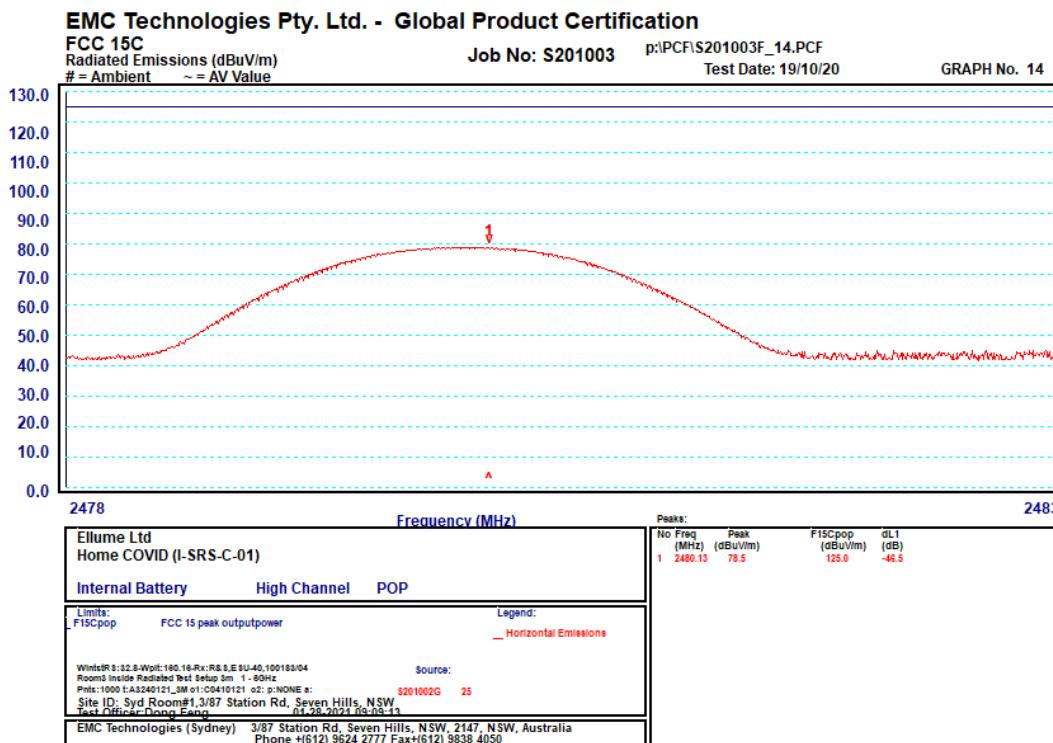
## Graph 13      High Channel      Vertical Polarisation      2478 to 2483MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2479.99	Vertical	99.1	125.0	-25.9

All measured frequencies complied with the limit by a margin of greater than 10dB.

## Graph 14      High Channel      Horizontal Polarisation      2478 to 2483MHz



Peak	Frequency [MHz]	Polarisation	Maximum Radiated Peak Value Measured (dBuV/m)	Limit (dBuV/m)	Margin [± dB]
1	2480.13	Horizontal	78.5	125.0	-46.5

All measured frequencies complied with the Limit by a margin of greater than 10dB.

### 3.7 §15.247(d) Spurious Radiated Emission

#### Requirement:

In any 100KHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a)

Limits of 15.209(a) was applied cross the applicable spectrum as that is the most stringent requirement.

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
30 to 1000	120	3	Biconilog antenna
1000 to 18 000	1000	3	Broad band horn

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 prescanned in three orthogonal orientations to decide maximum emission direction.

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 dB $\mu$ V. (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)

### 3.7.1 Frequency Band: 30 - 1000 MHz

Measurements were made at a distance of 3 metres. The §15.209 limit applied

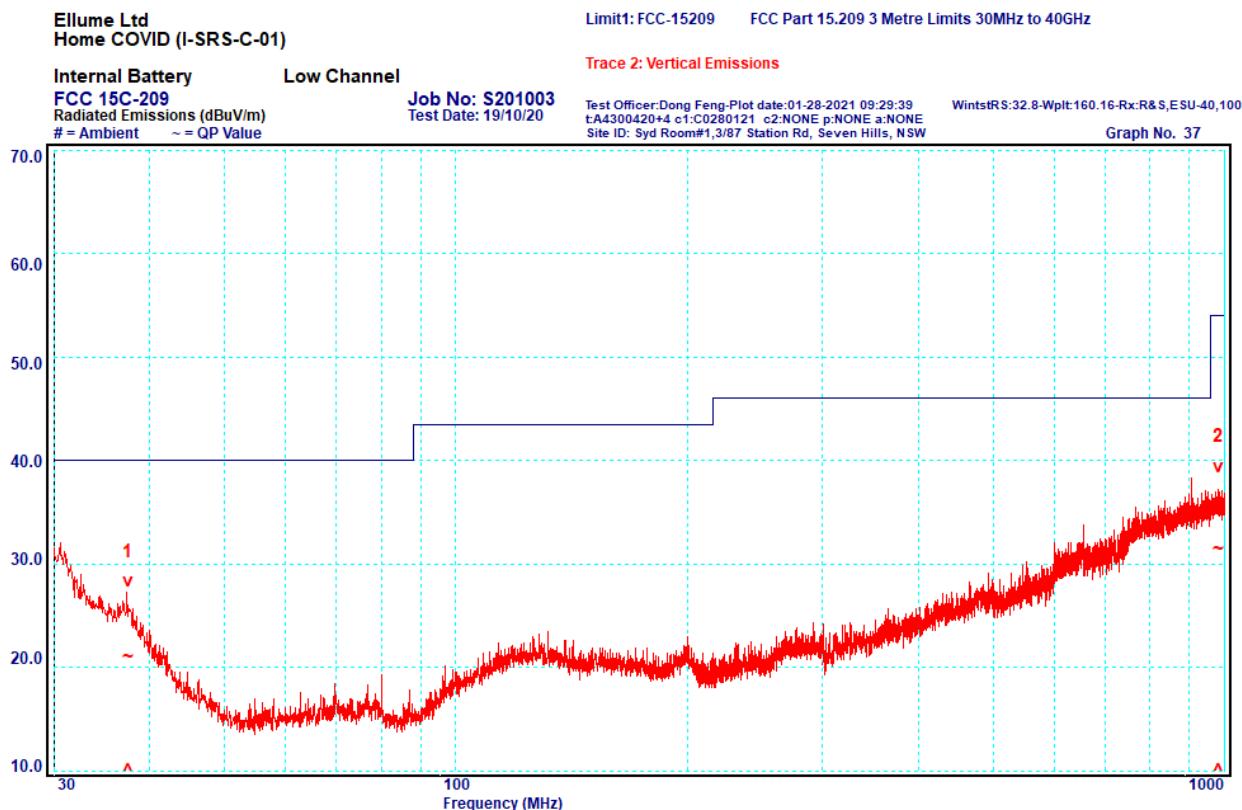
Test Result: All measured frequencies complied with the Limit by a margin of greater than 10dB.

#### Low Channel

Graph 37

Vertical Polarisation

30 to 1000MHz



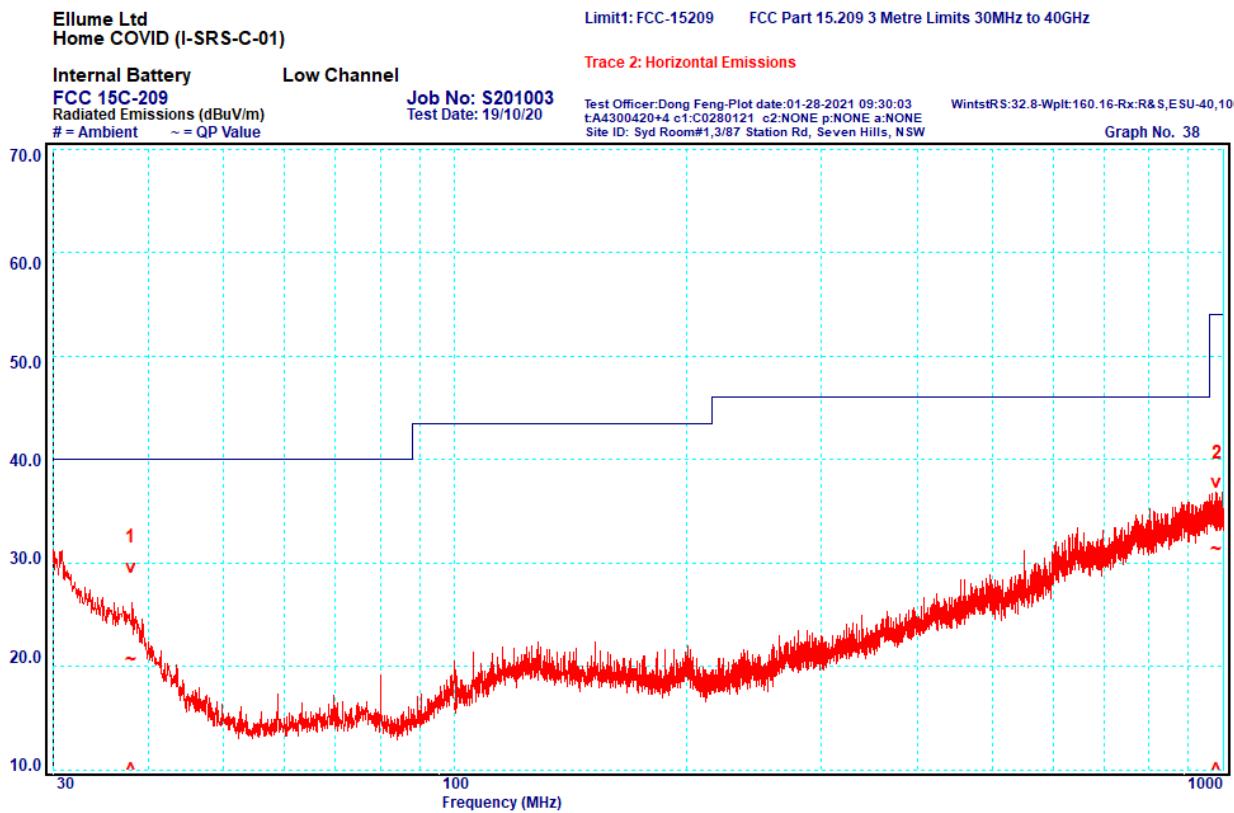
Peak	Frequency [MHz]	Polarisation	Quasi-Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	37.49	Vertical	21.0	40.0	-19.0
2	982.67	Vertical	31.4	54.0	-22.6

All measured frequencies complied with the limit by a margin of greater than 10dB.

Graph 38

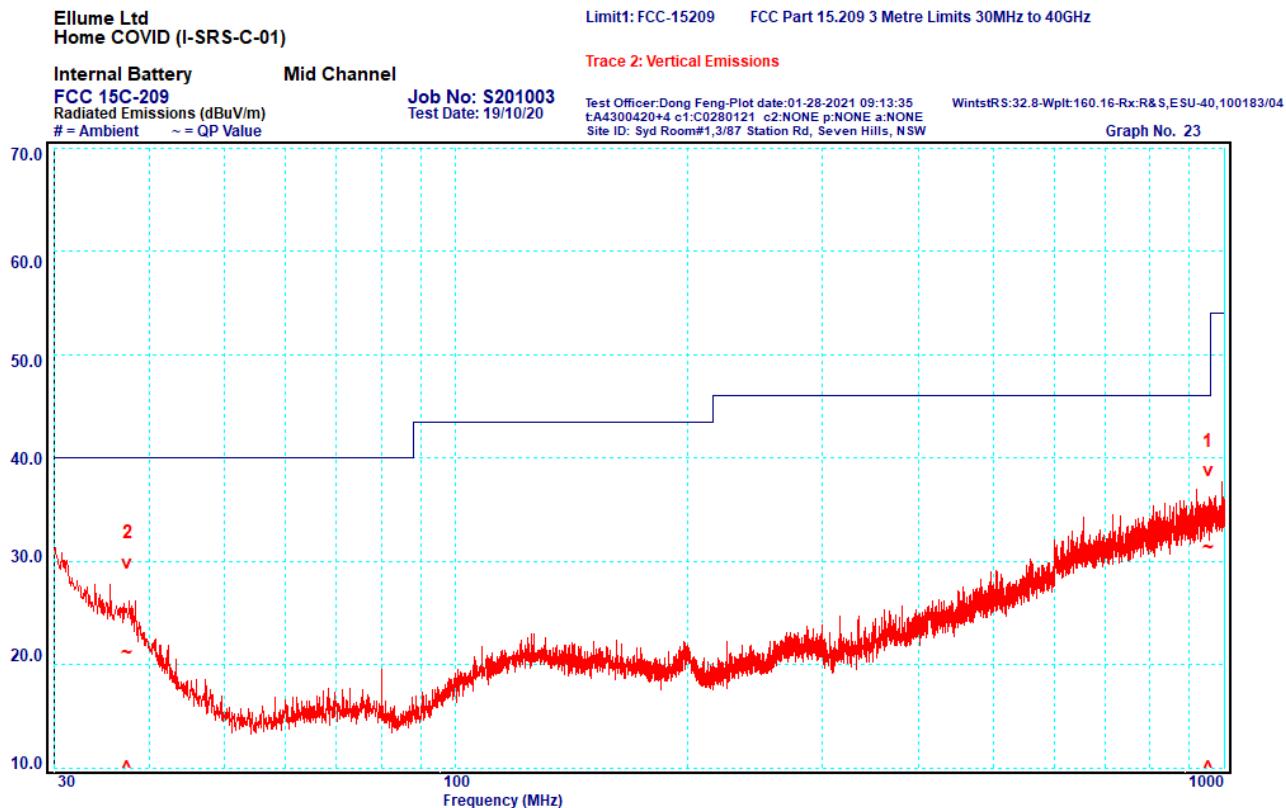
Horizontal Polarisation

30 to 1000MHz



Peak	Frequency [MHz]	Polarisation	Quasi-Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	37.90	Horizontal	20.7	40.0	-19.3
2	980.35	Horizontal	31.4	54.0	-22.6

All measured frequencies complied with the limit by a margin of greater than 10dB.

**Middle Channel****Graph 23****Vertical Polarisation****30 to 1000MHz**

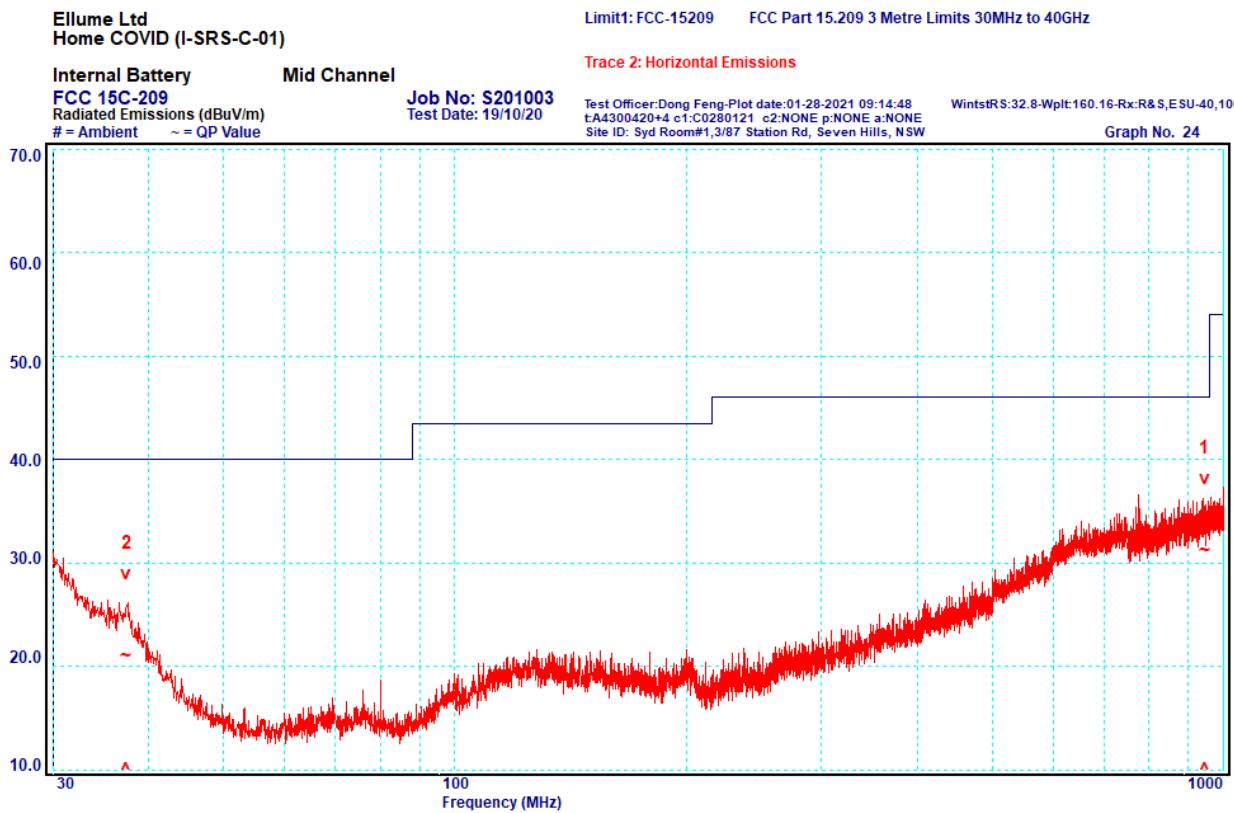
Peak	Frequency [MHz]	Polarisation	Quasi-Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	953.19	Vertical	31.3	46.0	-14.7
2	37.44	Vertical	21.1	40.0	-18.9

All measured frequencies complied with the limit by a margin of greater than 10dB.

Graph 24

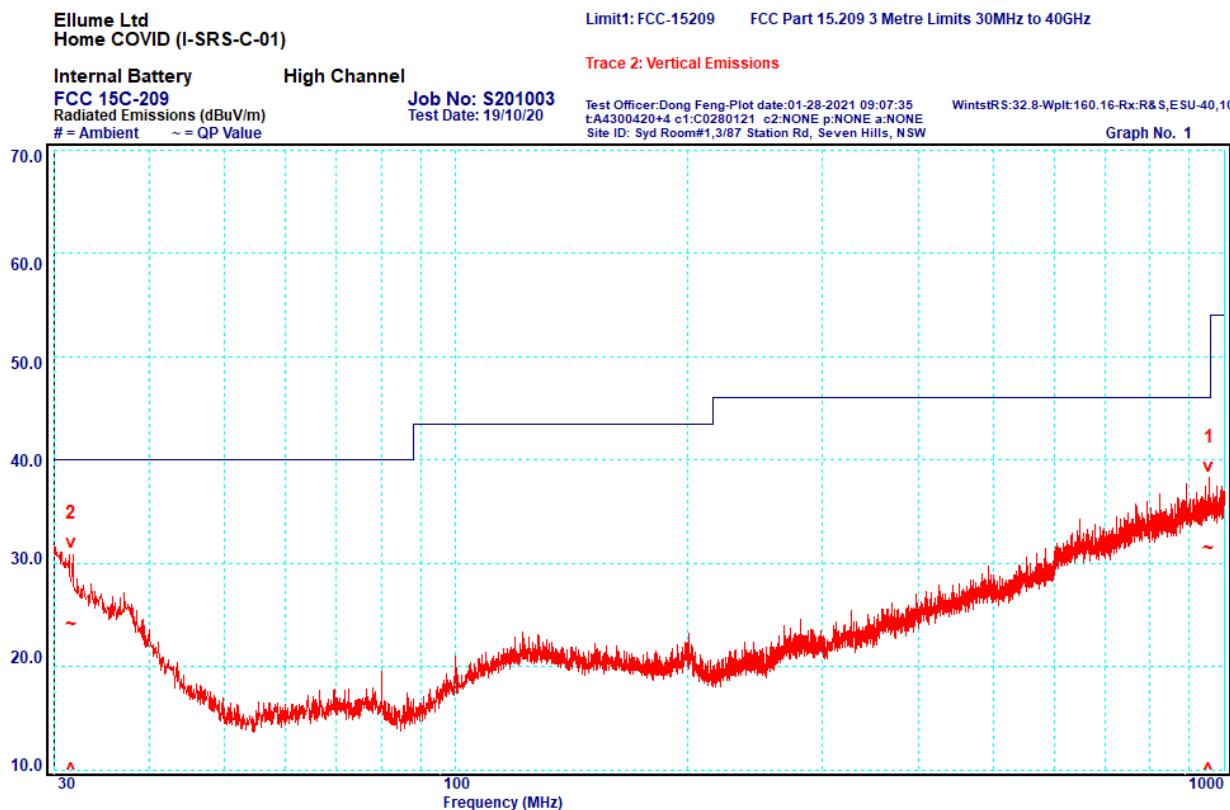
## Horizontal Polarisation

30 to 1000MHz



Peak	Frequency [MHz]	Polarisation	Quasi-Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	945.45	Horizontal	31.2	46.0	-14.8
2	37.41	Horizontal	20.9	40.0	-19.1

All measured frequencies complied with the limit by a margin of greater than 10dB.

**High Channel****Graph 1****Vertical Polarisation****30 to 1000MHz**

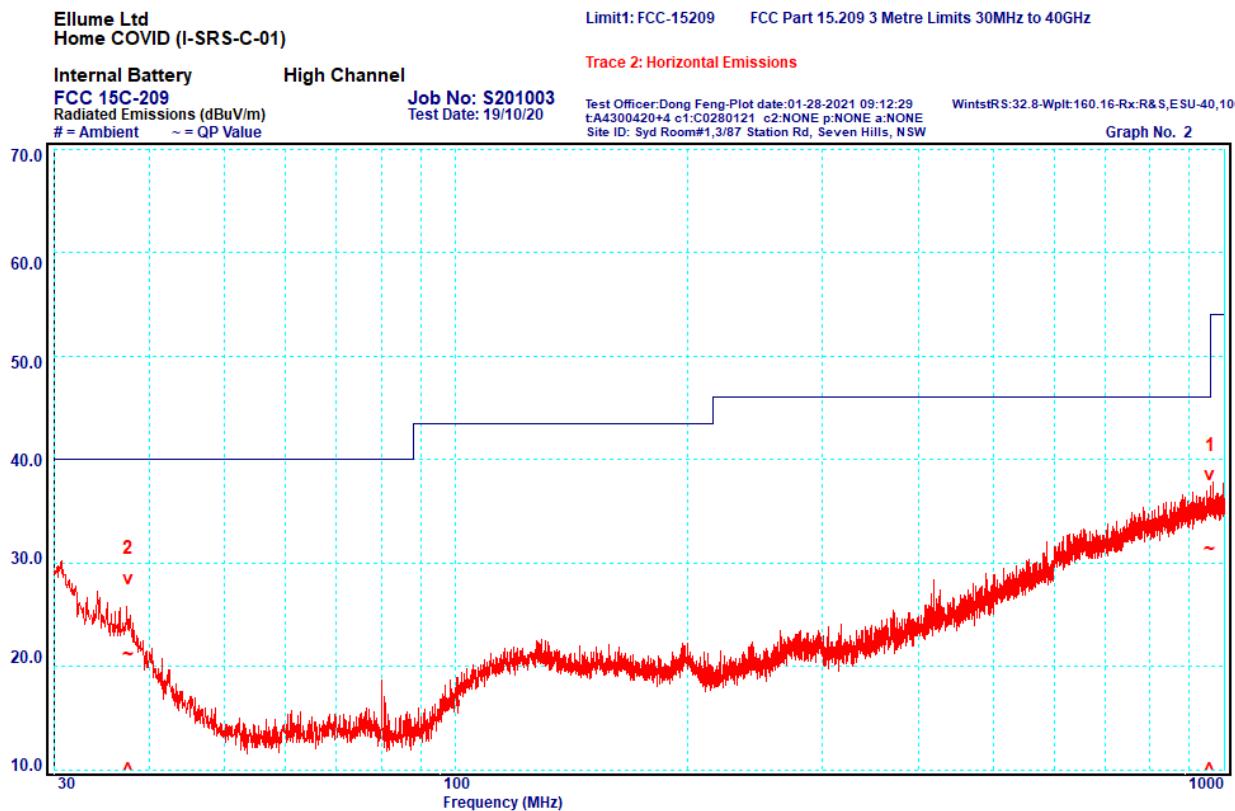
Peak	Frequency [MHz]	Polarisation	Quasi-Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	954.39	Vertical	31.4	46.0	-14.6
2	31.59	Vertical	24.0	40.0	-16.0

All measured frequencies complied with the limit by a margin of greater than 10dB.

## Graph 2

## Horizontal Polarisation

**30 to 1000MHz**



Peak	Frequency [MHz]	Polarisation	Quasi-Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	957.83	Horizontal	31.3	46.0	-14.7
2	37.46	Horizontal	21.2	40.0	-18.8

All measured frequencies complied with the Limit by a margin of greater than 10dB.

### 3.7.2 Frequency Band: 1000 – 18000 MHz

Measurements from 1 to 18 GHz were made at a distance of 3 metres. The §15.209(a) limits applied.

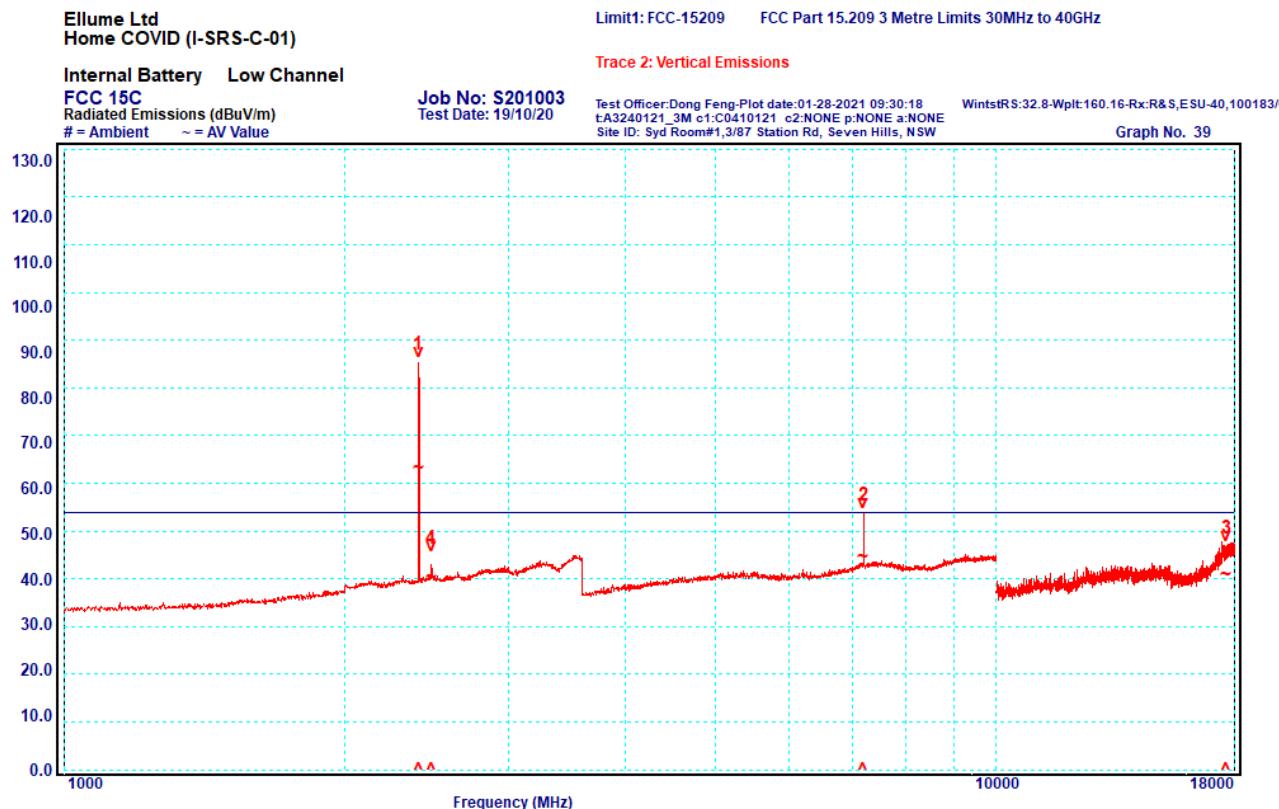
#### Average Measurement

##### Low Channel

Graph 39

Vertical Polarisation

1000 to 18000 MHz



Peak	Frequency [MHz]	Polarisation	Average [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	2401.91	Vertical	63.2	54.0	+9.2*
2	7205.31	Vertical	44.5	54.0	-9.5
3	17646.92	Vertical	40.8	54.0	-13.2
4	2479.02	Vertical	40.4	54.0	-13.6

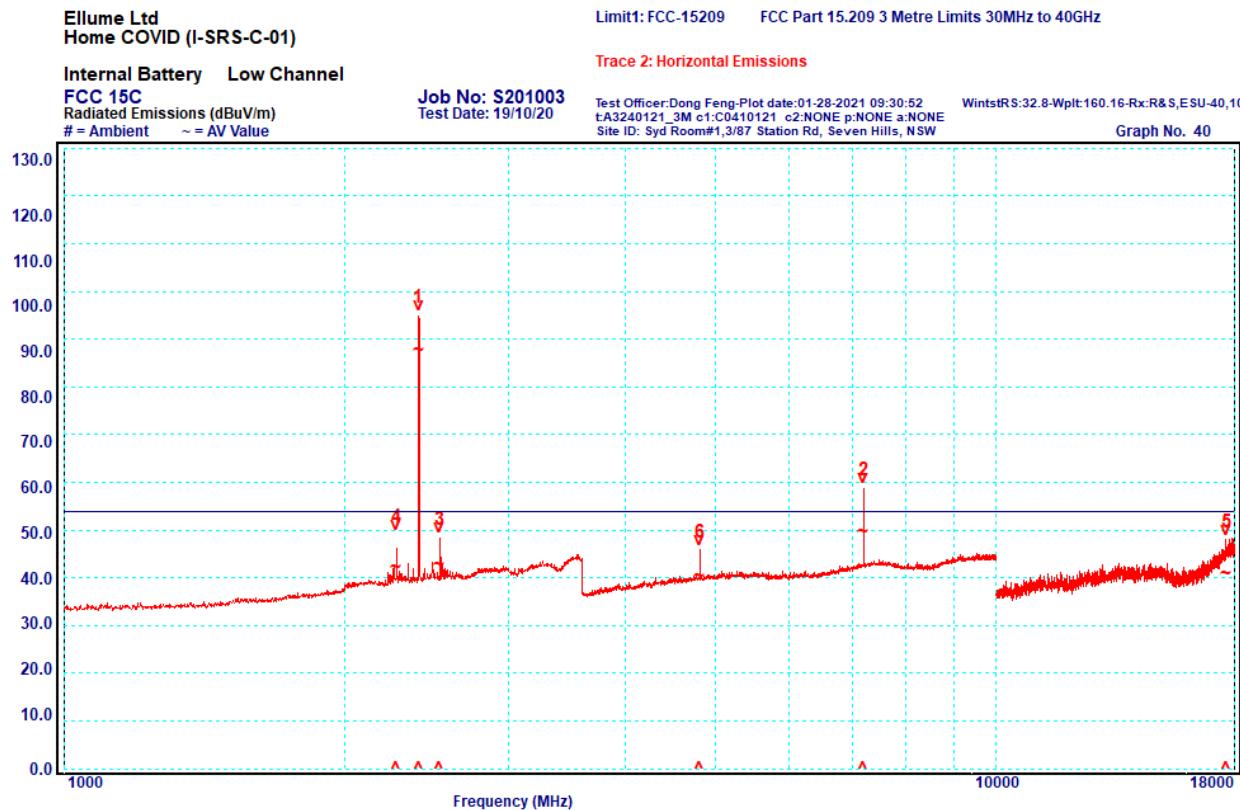
\* This reading is caused by the intentional radiator.

All measured frequencies complied with the average limit by a margin of at least 9.5dB.

Graph 40

## Horizontal Polarisation

1000 to 18000 MHz

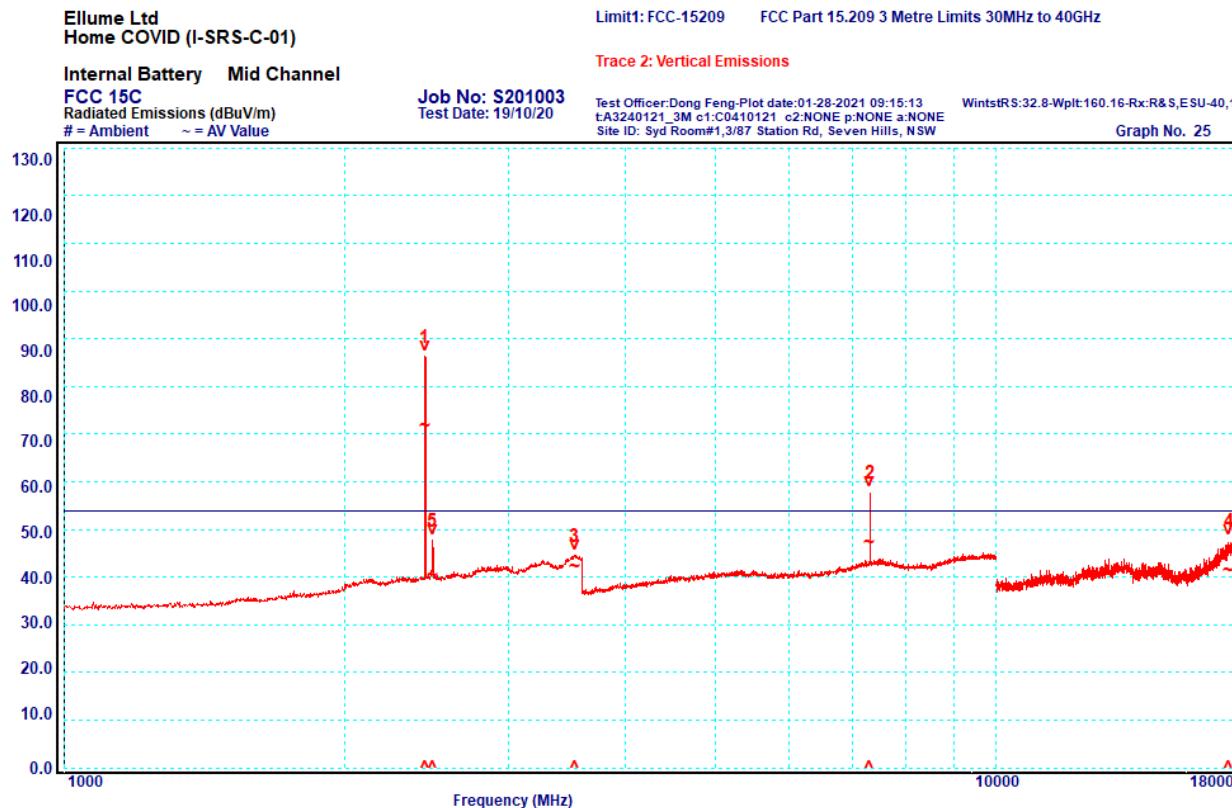


Peak	Frequency [MHz]	Polarisation	Average [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	2401.99	Horizontal	87.8	54.0	+33.8*
2	7205.29	Horizontal	49.6	54.0	-4.4**
3	2530.03	Horizontal	42.8	54.0	-11.2
4	2274.09	Horizontal	42.2	54.0	-11.8
5	17644.4	Horizontal	40.8	54.0	-13.2
6	4804.08	Horizontal	40.4	54.0	-13.6

\* This reading is caused by the intentional radiator.

\*\* This reading is within our measurement uncertainty.

All measured frequencies complied with the average limit by a margin of at least 4.4dB\*\*.

**Middle Channel****Graph 25****Vertical Polarisation****1000 to 18000 MHz**

Peak	Frequency [MHz]	Polarisation	Average [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	2439.92	Vertical	71.8	54.0	+17.8*
2	7319.44	Vertical	47.1	54.0	-6.9
3	3530.04	Vertical	42.1	54.0	-11.9
4	17757.61	Vertical	41.4	54.0	-12.6
5	2486.45	Vertical	40.4	54.0	-13.6

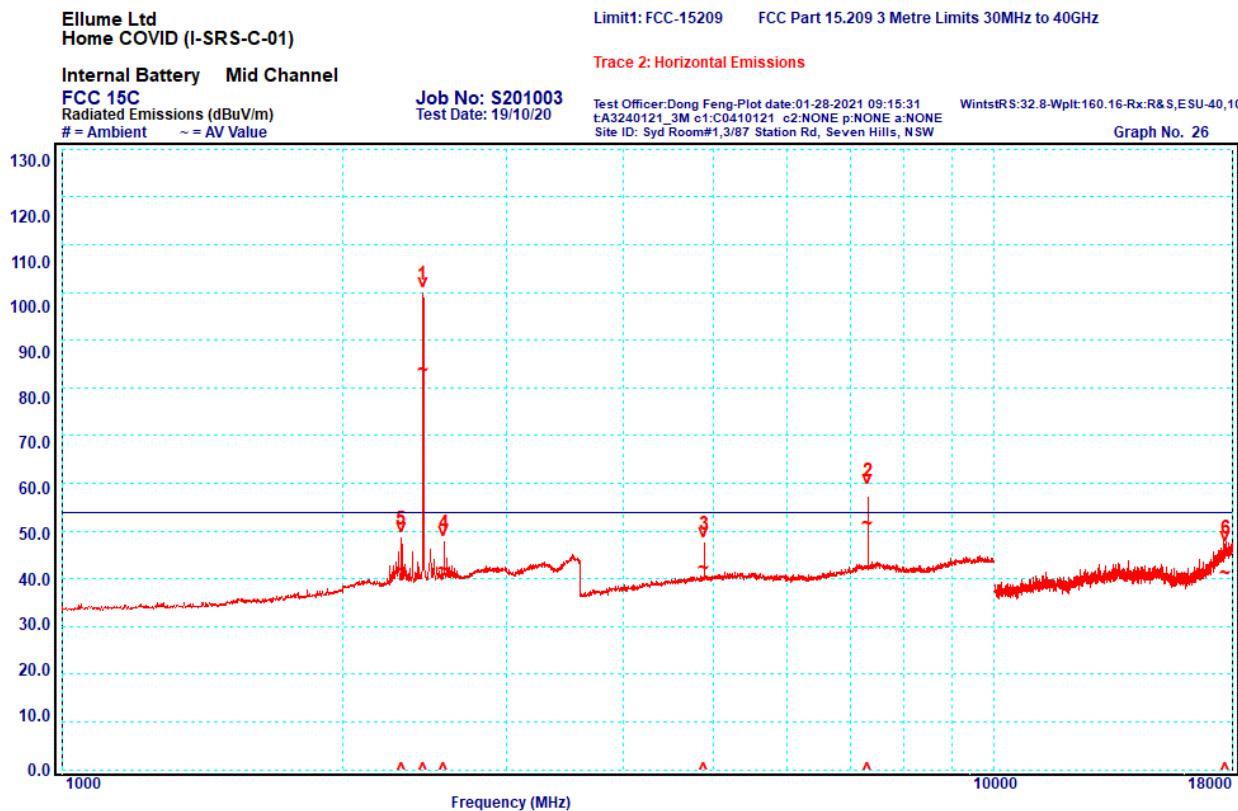
\* This reading is caused by the intentional radiator.

All measured frequencies complied with the average limit by a margin of at least 6.9dB.

Graph 26

## Horizontal Polarisation

1000 to 18000 MHz

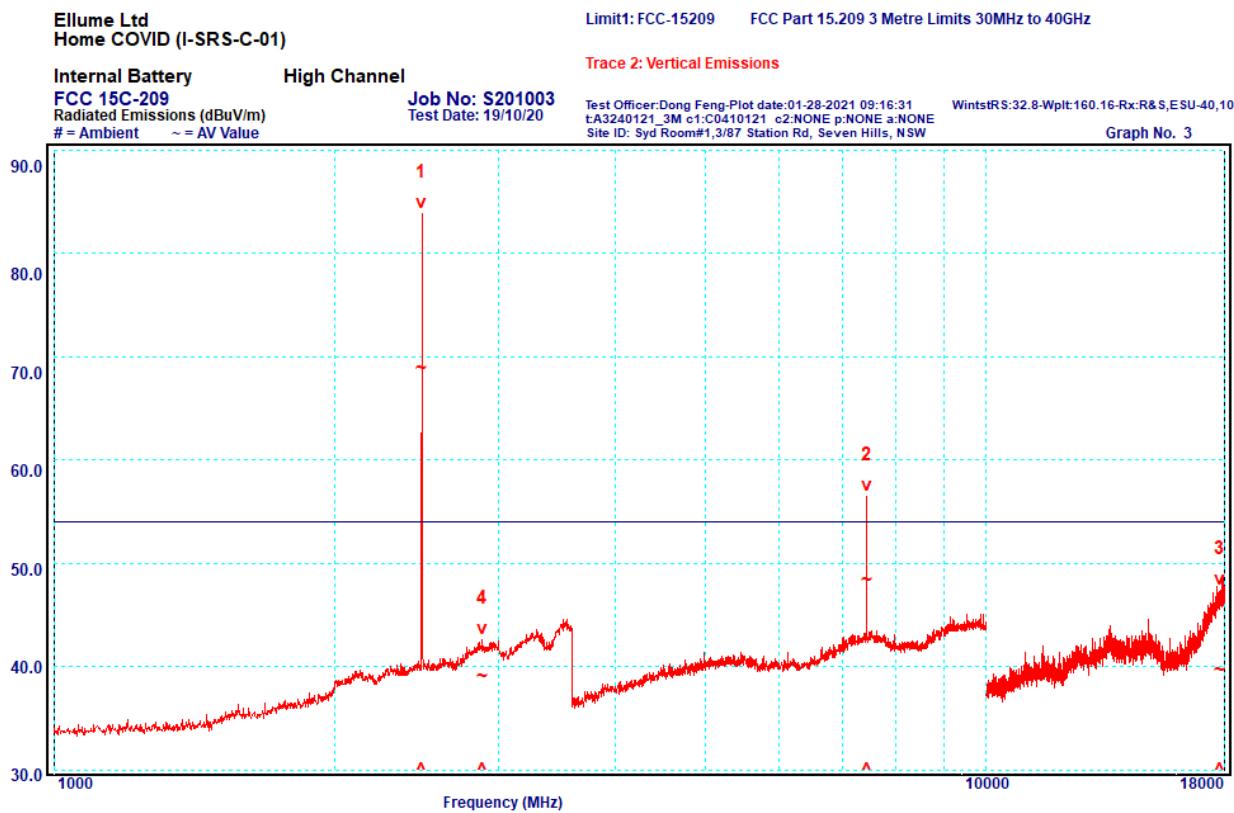


Peak	Frequency [MHz]	Polarisation	Average [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	2439.91	Horizontal	83.6	54.0	+29.6*
2	7319.38	Horizontal	51.4	54.0	-2.6**
3	4880.02	Horizontal	42.2	54.0	-11.8
4	2568.03	Horizontal	42.0	54.0	-12.0
5	2311.96	Horizontal	41.7	54.0	-12.3
6	17704.56	Horizontal	41.1	54.0	-12.9

\* This reading is caused by the intentional radiator.

\*\* This reading is within our measurement uncertainty.

All measured frequencies complied with the average limit by a margin of at least 2.6dB\*\*.

**High Channel****Graph 3****Vertical Polarisation****1000 to 18000 MHz**

Peak	Frequency [MHz]	Polarisation	Average [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	2480.00	Vertical	68.8	54.0	+14.8*
2	7439.44	Vertical	48.4	54.0	-5.6
3	17796.9	Vertical	39.6	54.0	-14.4
4	2880.08	Vertical	39.0	54.0	-15.0

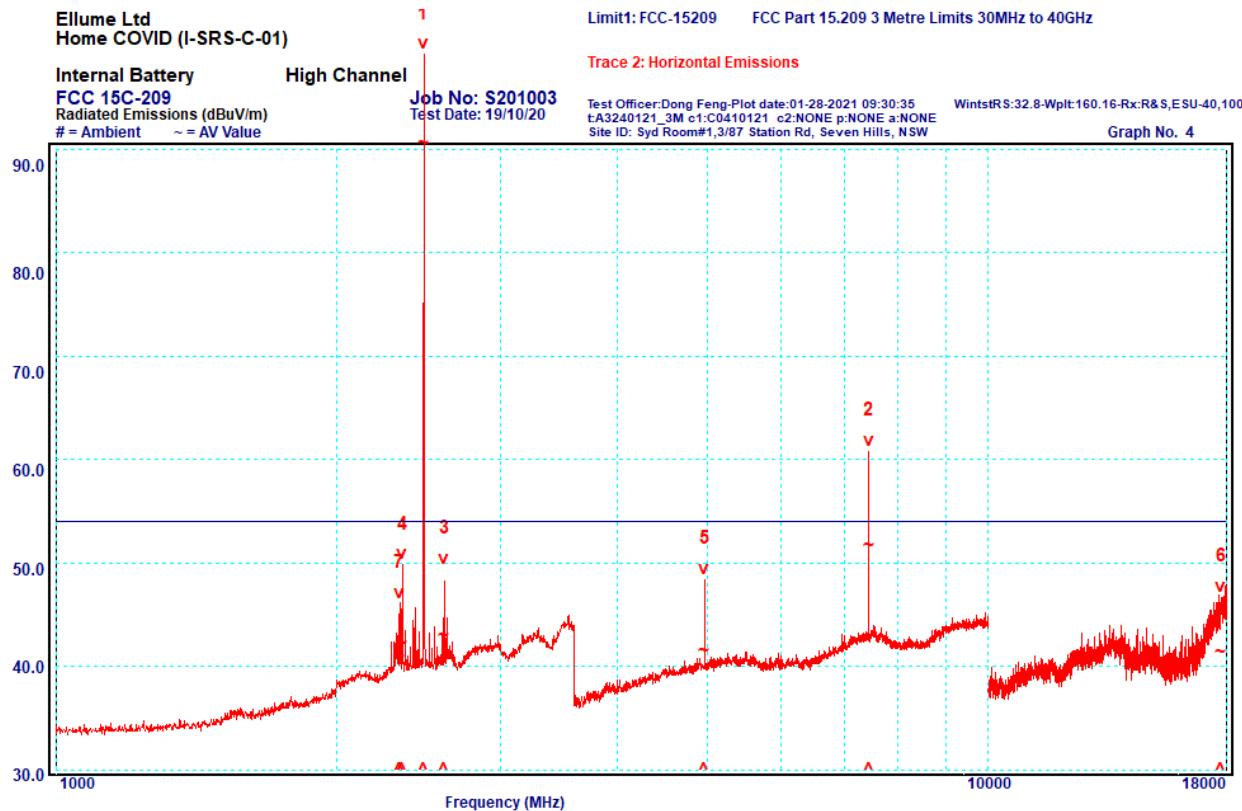
\* This reading is caused by the intentional radiator.

All measured frequencies complied with the average limit by a margin of at least 5.6dB.

Graph 4

Horizontal Polarisation

1000 to 18000 MHz



Peak	Frequency [MHz]	Polarisation	Average[dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	2480.00	Horizontal	90.6	54.0	+36.6*
2	7439.41	Horizontal	51.6	54.0	-2.4**
3	2608.07	Horizontal	43.0	54.0	-11.0
4	2352.1	Horizontal	42.3	54.0	-11.7
5	4959.57	Horizontal	41.4	54.0	-12.6
6	17755.88	Horizontal	41.4	54.0	-12.6
7	2335.97	Horizontal	40.8	54.0	-13.2

\* This reading is caused by the intentional radiator.

\*\* This reading is within our measurement uncertainty.

All measured frequencies complied with the average limit by a margin of at least 2.4dB\*\*.

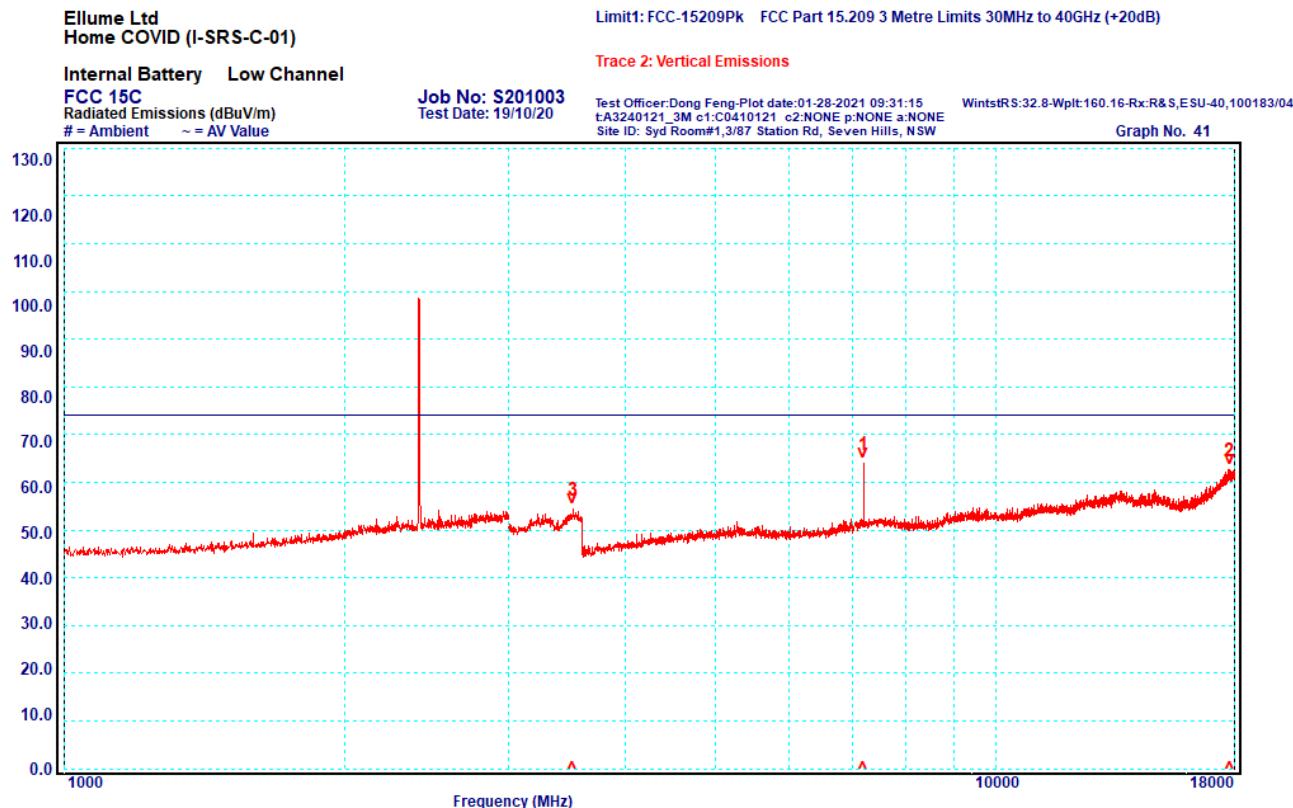
## Peak Measurement

### Low Channel

Graph 41

Vertical Polarisation

1000 to 18000 MHz



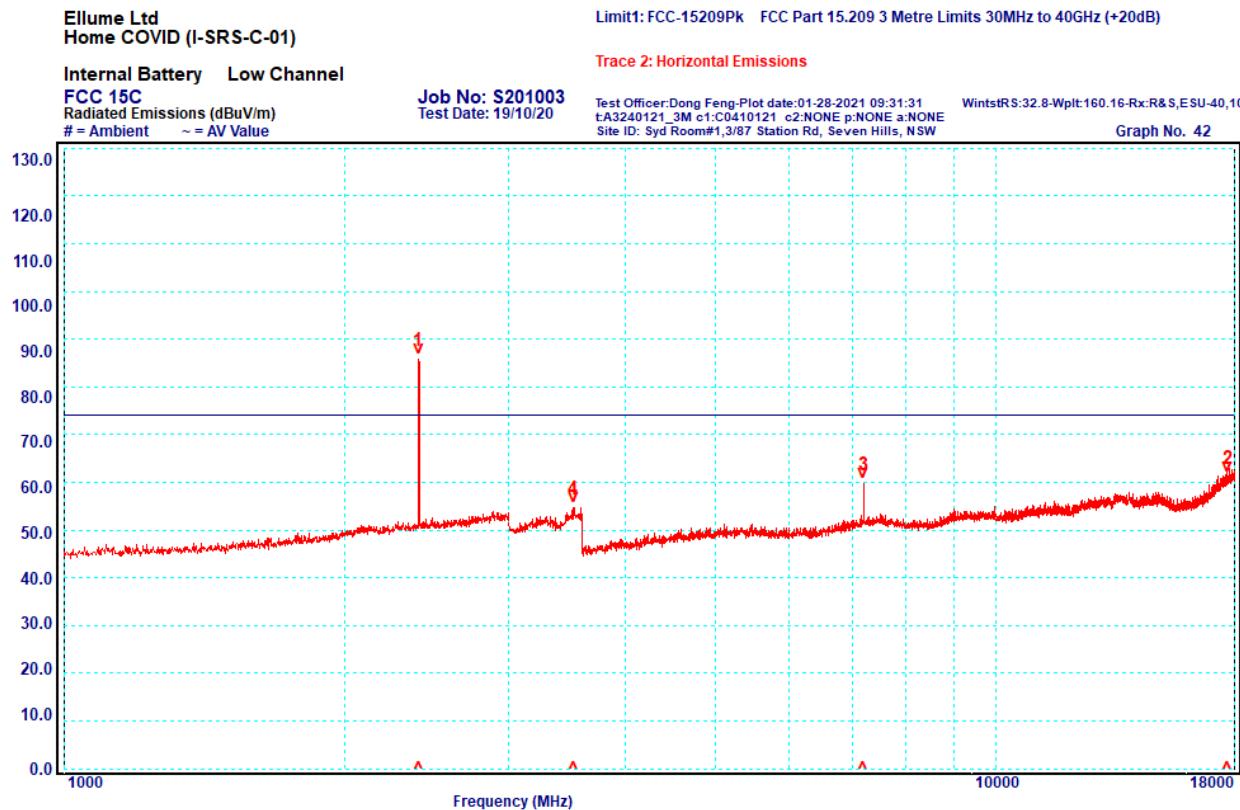
Peak	Frequency [MHz]	Polarisation	Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	7203.12	Vertical	64.0	74.0	-10.0
2	17780.3	Vertical	62.5	74.0	-11.5
3	3514.83	Vertical	54.4	74.0	-19.6

All measured frequencies complied with the peak limit by a margin of at least 10dB.

Graph 42

## Horizontal Polarisation

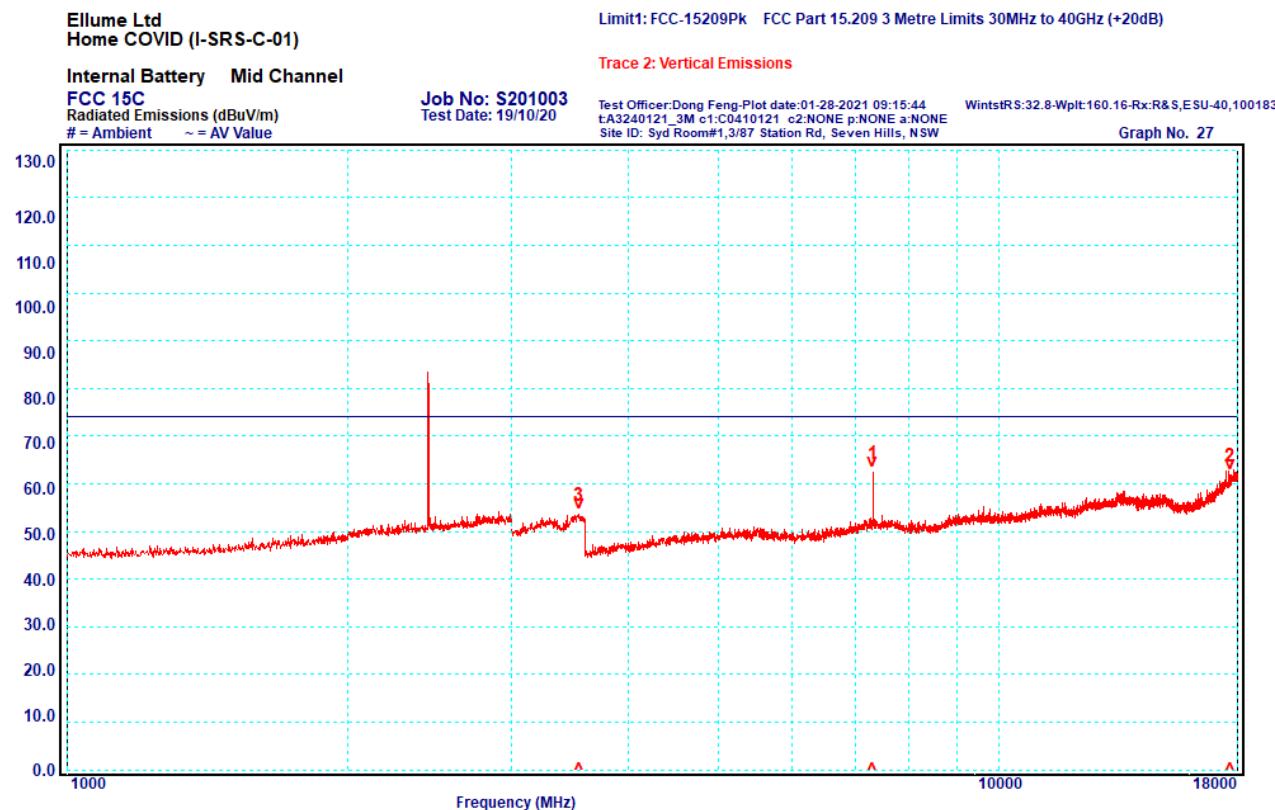
1000 to 18000 MHz



Peak	Frequency [MHz]	Polarisation	Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	2400.63	Horizontal	85.8	74.0	+11.8*
2	17700.38	Horizontal	61.0	74.0	-13.0
3	7203.12	Horizontal	59.6	74.0	-14.4
4	3517.83	Horizontal	54.8	74.0	-19.2

\* This reading is caused by the intentional radiator.

All measured frequencies complied with the peak limit by a margin of greater than 10dB.

**Middle Channel****Graph 27****Vertical Polarisation****1000 to 18000 MHz**

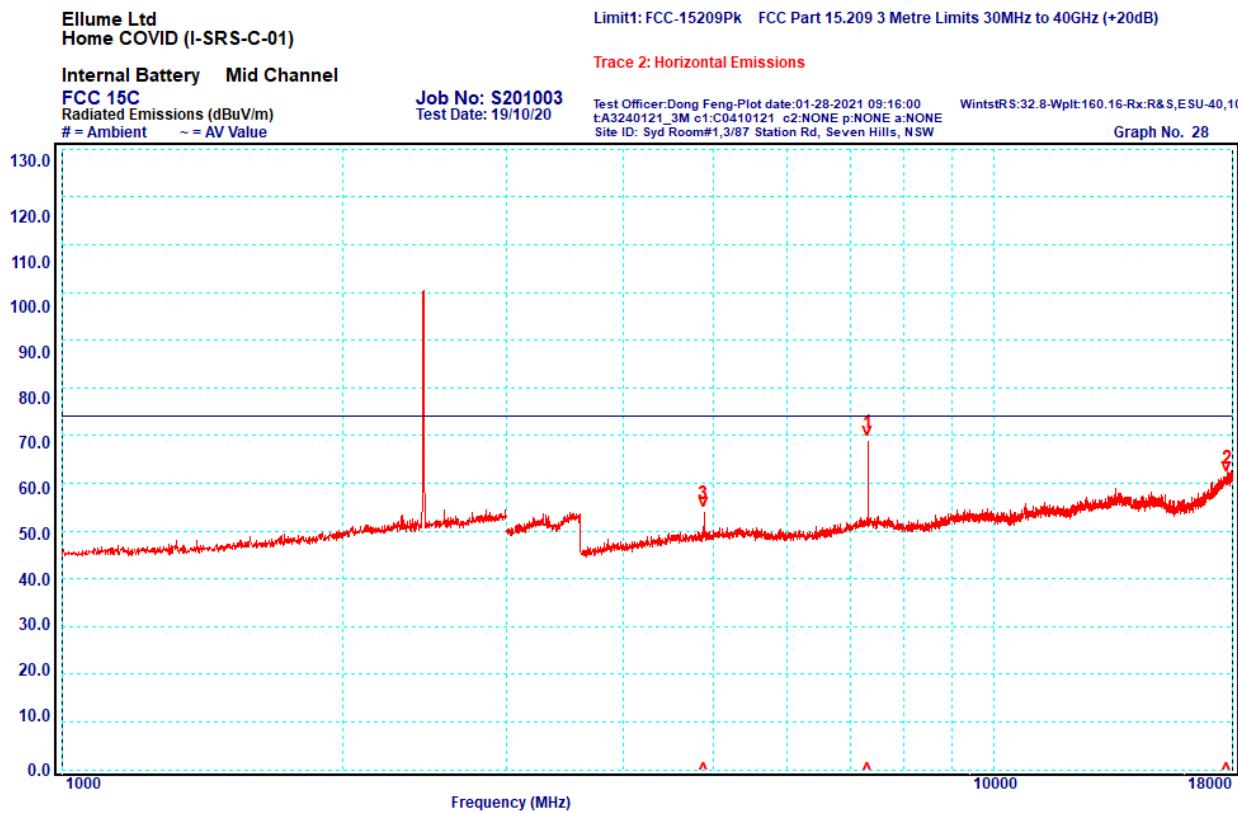
Peak	Frequency [MHz]	Polarisation	Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	7319.03	Vertical	62.3	74.0	-11.7
2	17664.42	Vertical	61.8	74.0	-12.2
3	3541.82	Vertical	53.6	74.0	-20.4

All measured frequencies complied with the peak limit by a margin of greater than 10dB.

Graph 28

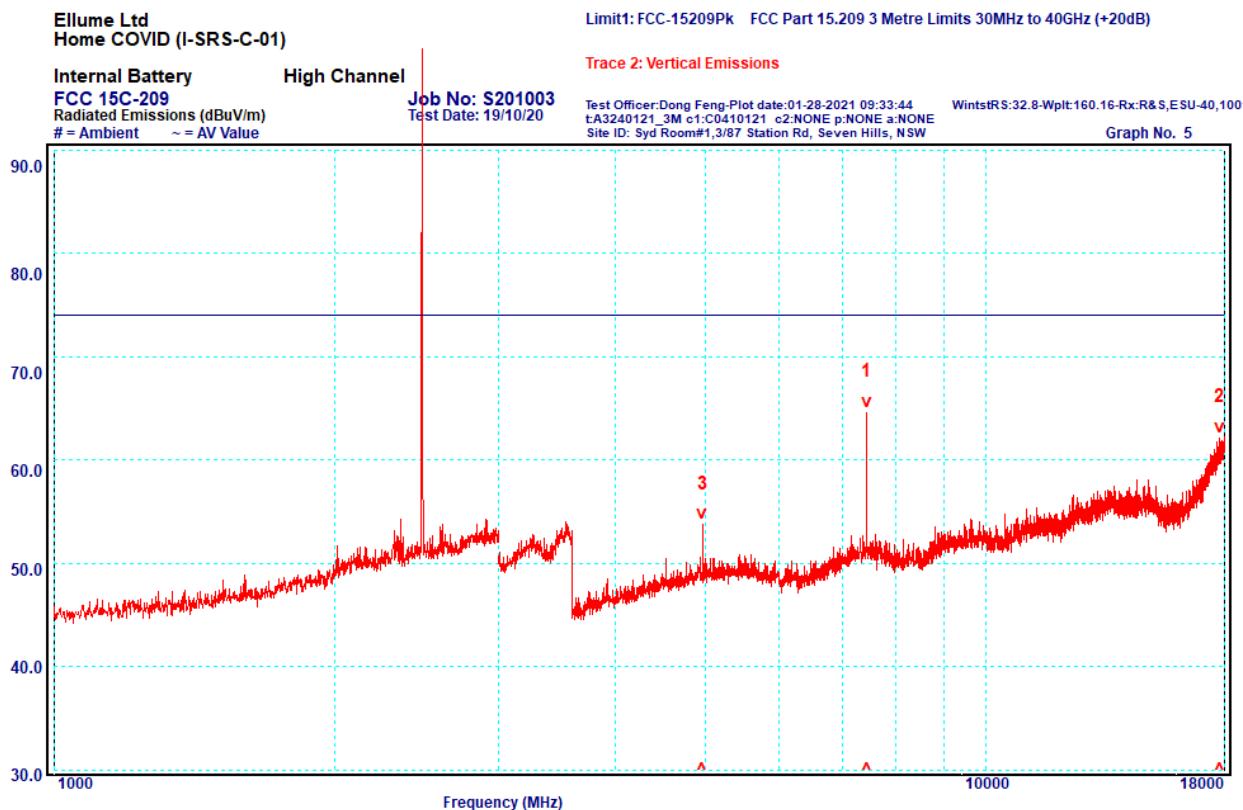
## Horizontal Polarisation

1000 to 18000 MHz



Peak	Frequency [MHz]	Polarisation	Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	7319.03	Horizontal	68.8	74.0	-5.2
2	17744.34	Horizontal	61.3	74.0	-12.7
3	4879.39	Horizontal	54.0	74.0	-20.0

All measured frequencies complied with the peak limit by a margin of at least 5.2dB.

**High Channel****Graph 5****Vertical Polarisation****1000 to 18000 MHz**

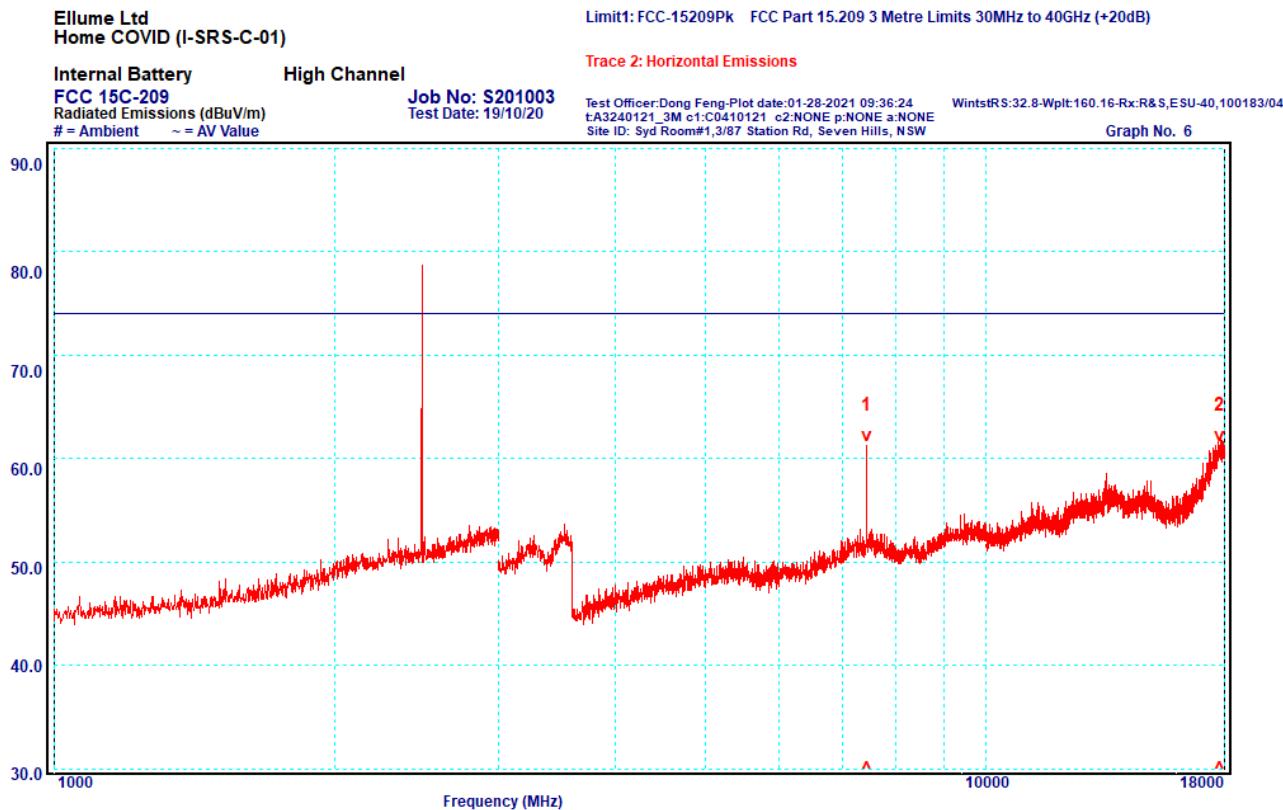
Peak	Frequency [MHz]	Polarisation	Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	7438.95	Vertical	64.6	74.0	-9.4
2	17772.31	Vertical	62.1	74.0	-11.9
3	4960.36	Vertical	53.7	74.0	-20.3

All measured frequencies complied with the peak limit by a margin of at least 9.4dB.

Graph 6

Horizontal Polarisation

1000 to 18000 MHz



Peak	Frequency [MHz]	Polarisation	Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	7438.95	Horizontal	61.2	74.0	-12.8
2	17788.3	Horizontal	61.2	74.0	-12.8

All measured frequencies complied with the peak limit by a margin of greater than 10dB.

### 3.7.3 Frequency Band: 18000 – 2650 MHz

Measurements from 18 to 26.5 GHz were made at a distance of 3 metres.

The §15.209(a) limits applied.

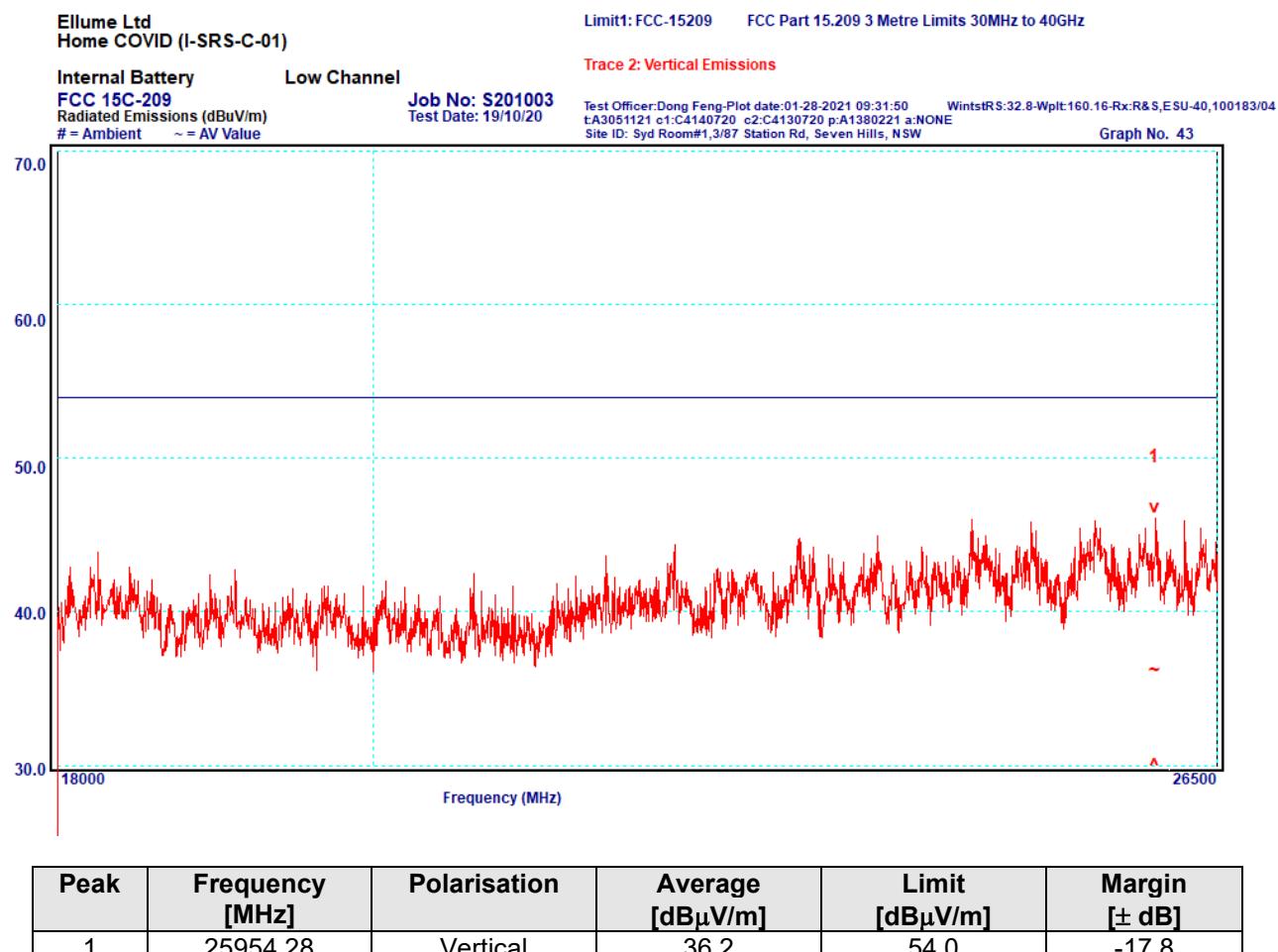
#### Average Measurement

##### Low Channel

Graph 43

Vertical Polarisation

18000 to 26500 MHz

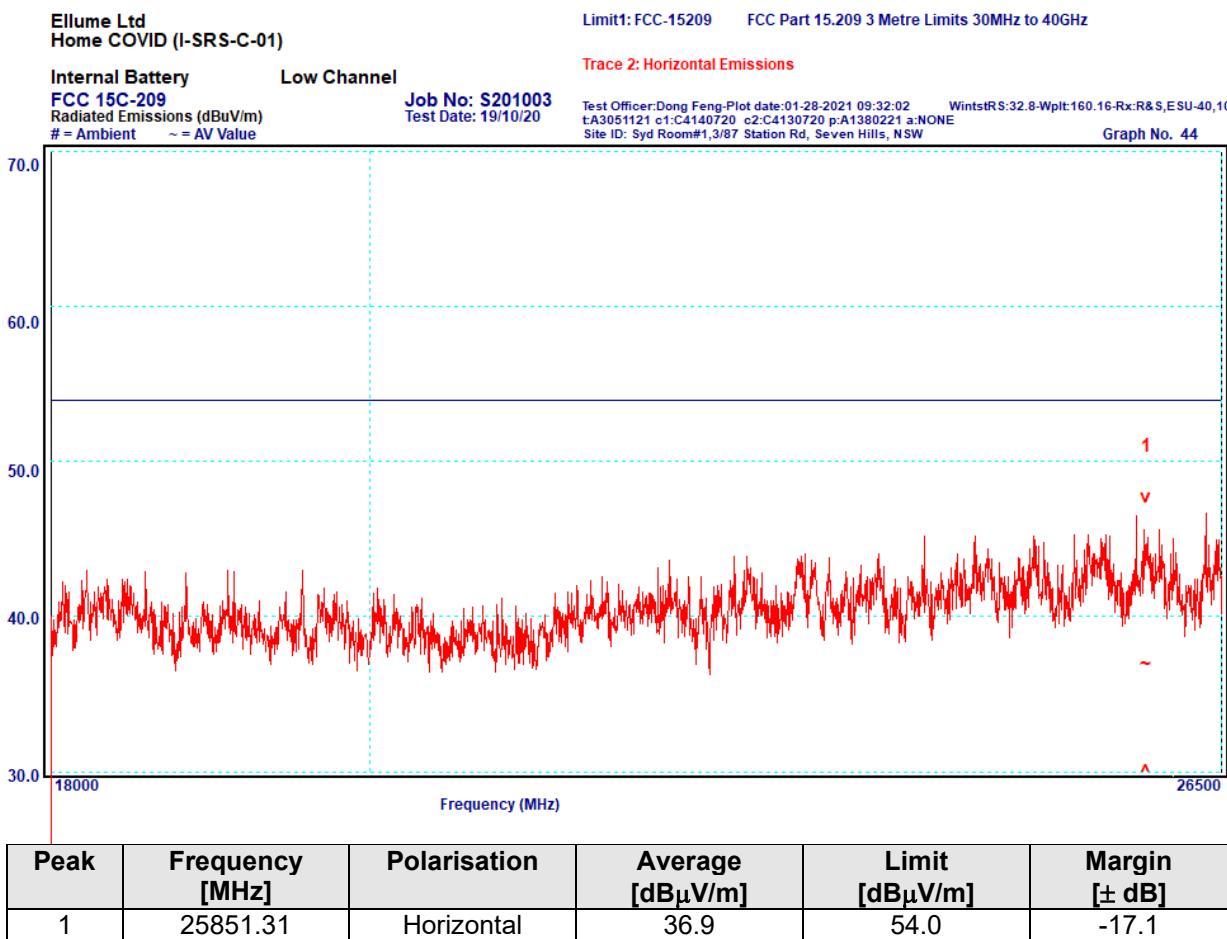


All measured frequencies complied with the average limit by a margin of greater than 10dB.

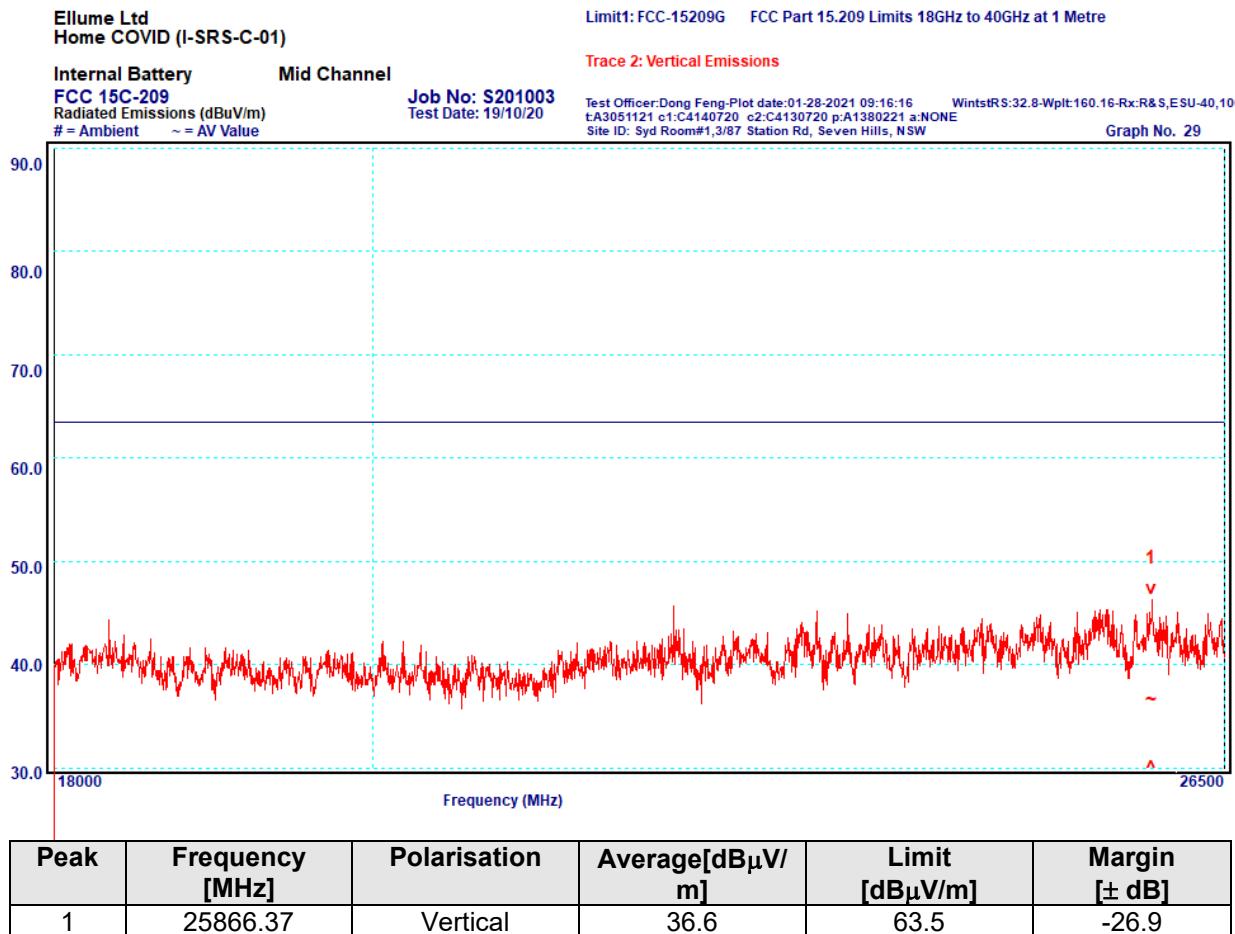
Graph 44

## Horizontal Polarisation

18000 to 26500 MHz



All measured frequencies complied with the average limit by a margin of greater than 10dB.

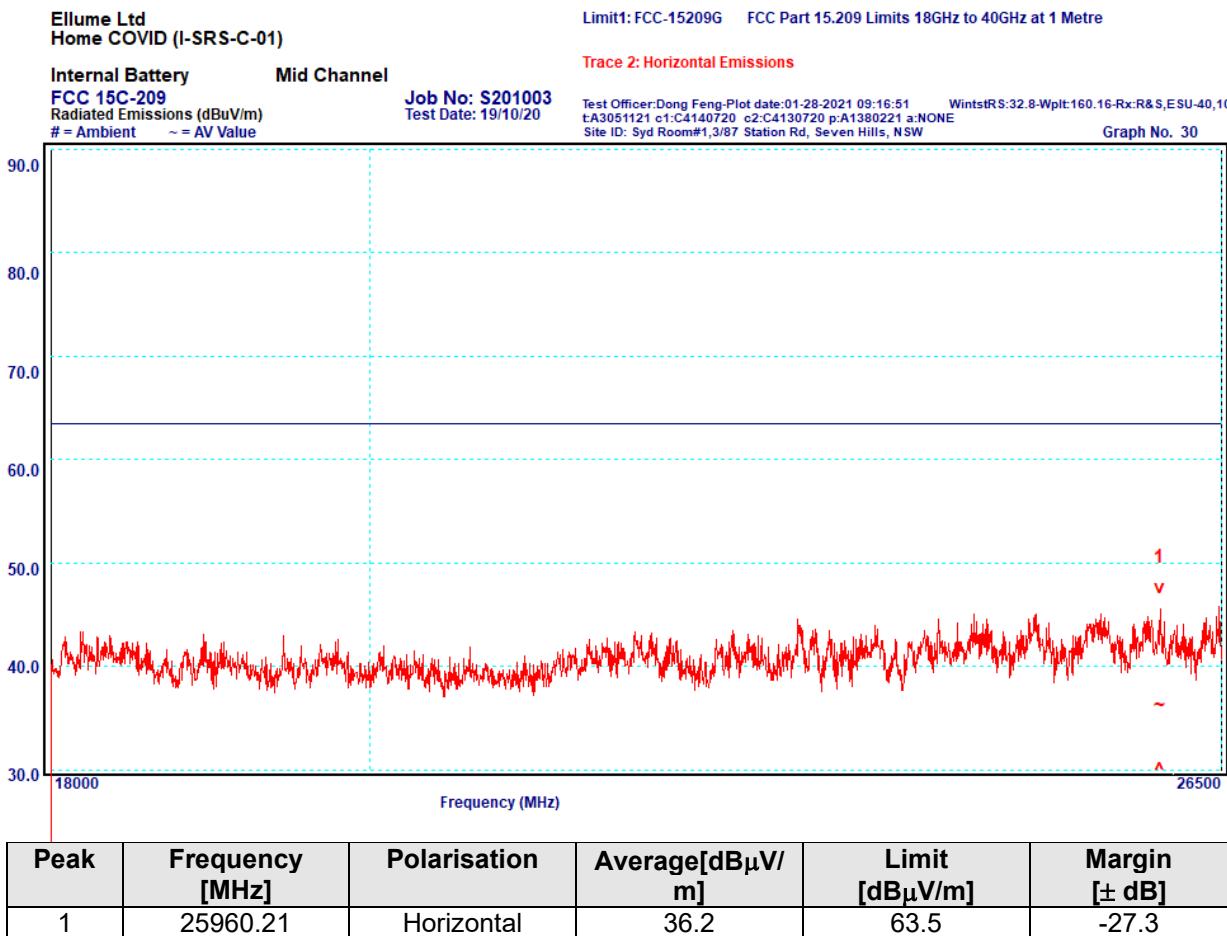
**Middle Channel****Graph 29****Vertical Polarisation****18000 to 26500 MHz**

All measured frequencies complied with the average limit by a margin of greater than 10dB.

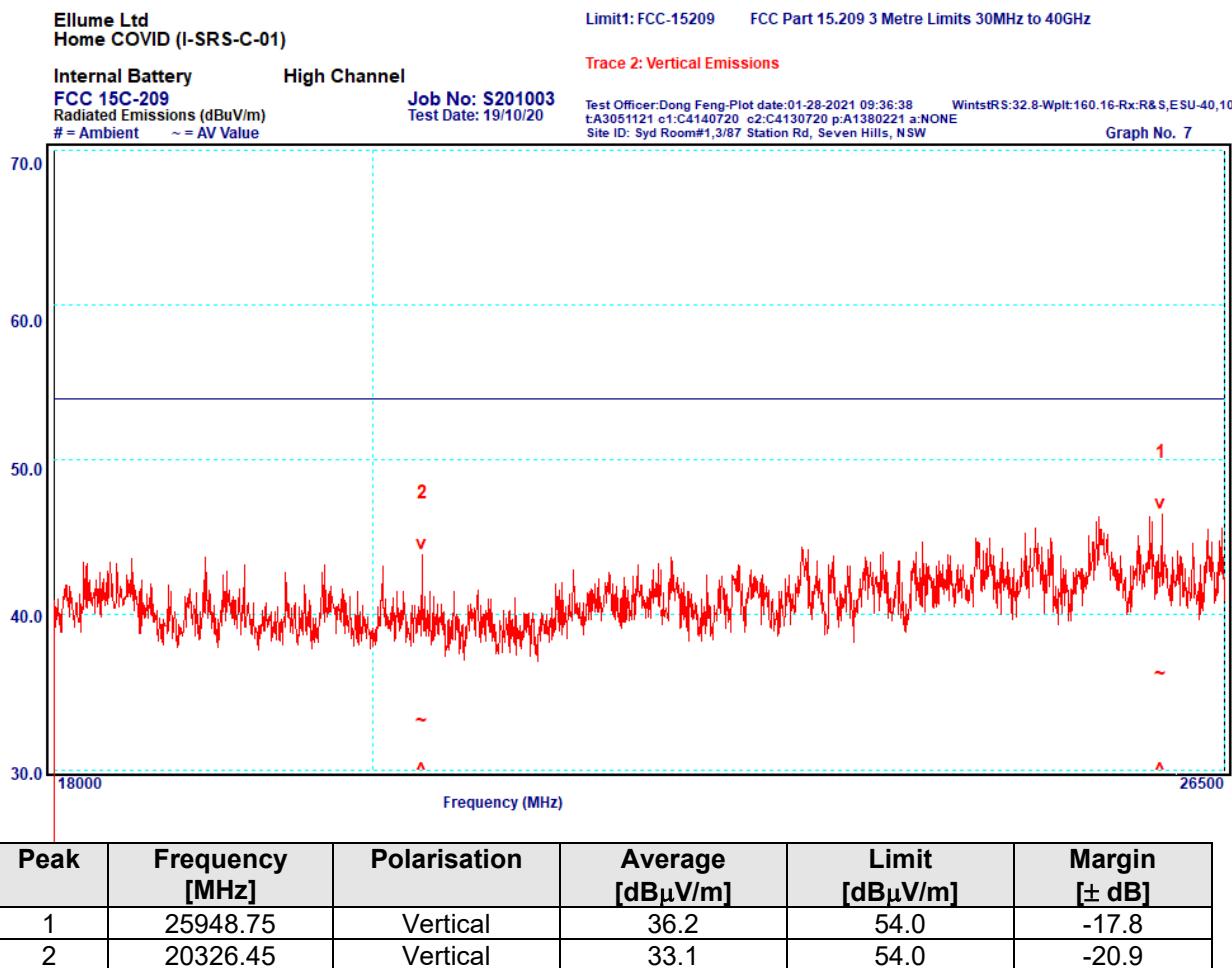
Graph 30

Horizontal Polarisation

18000 to 26500 MHz



All measured frequencies complied with the average limit by a margin of greater than 10dB.

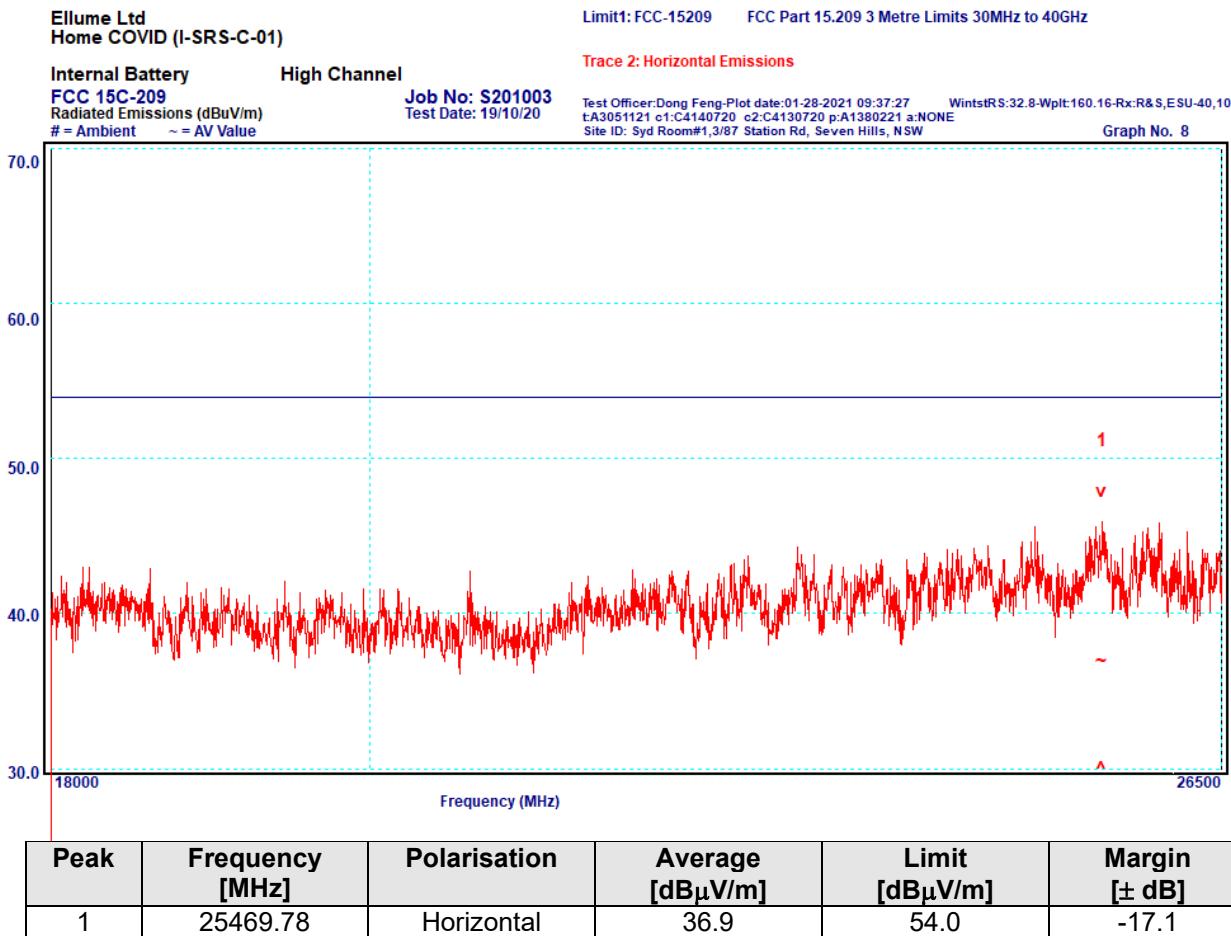
**High Channel****Graph 7****Vertical Polarisation****18000 to 26500 MHz**

All measured frequencies complied with the average limit by a margin of greater than 10dB.

Graph 8

Horizontal Polarisation

18000 to 26500 MHz



All measured frequencies complied with the average limit by a margin of greater than 10dB.

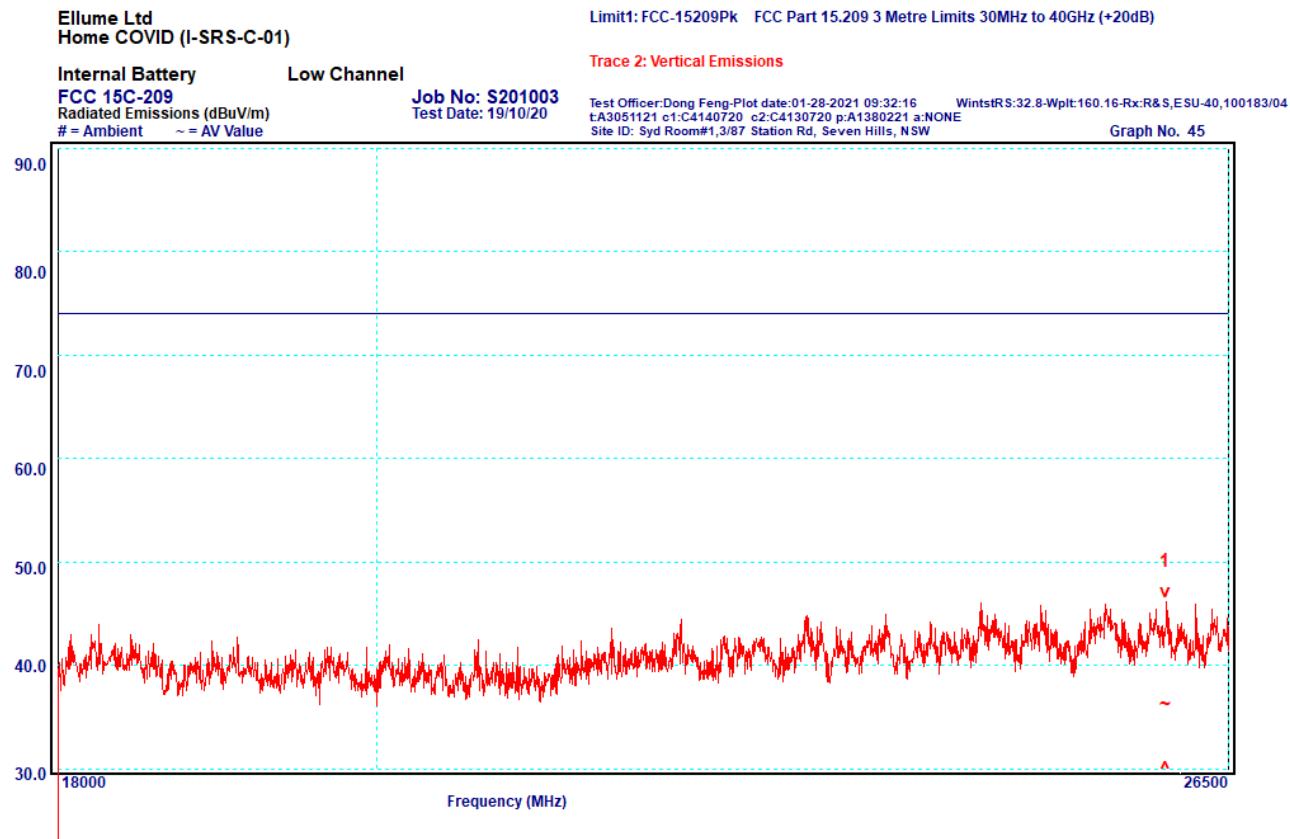
## Peak Measurement

### Low Channel

Graph 45

Vertical Polarisation

18000 to 26500MHz



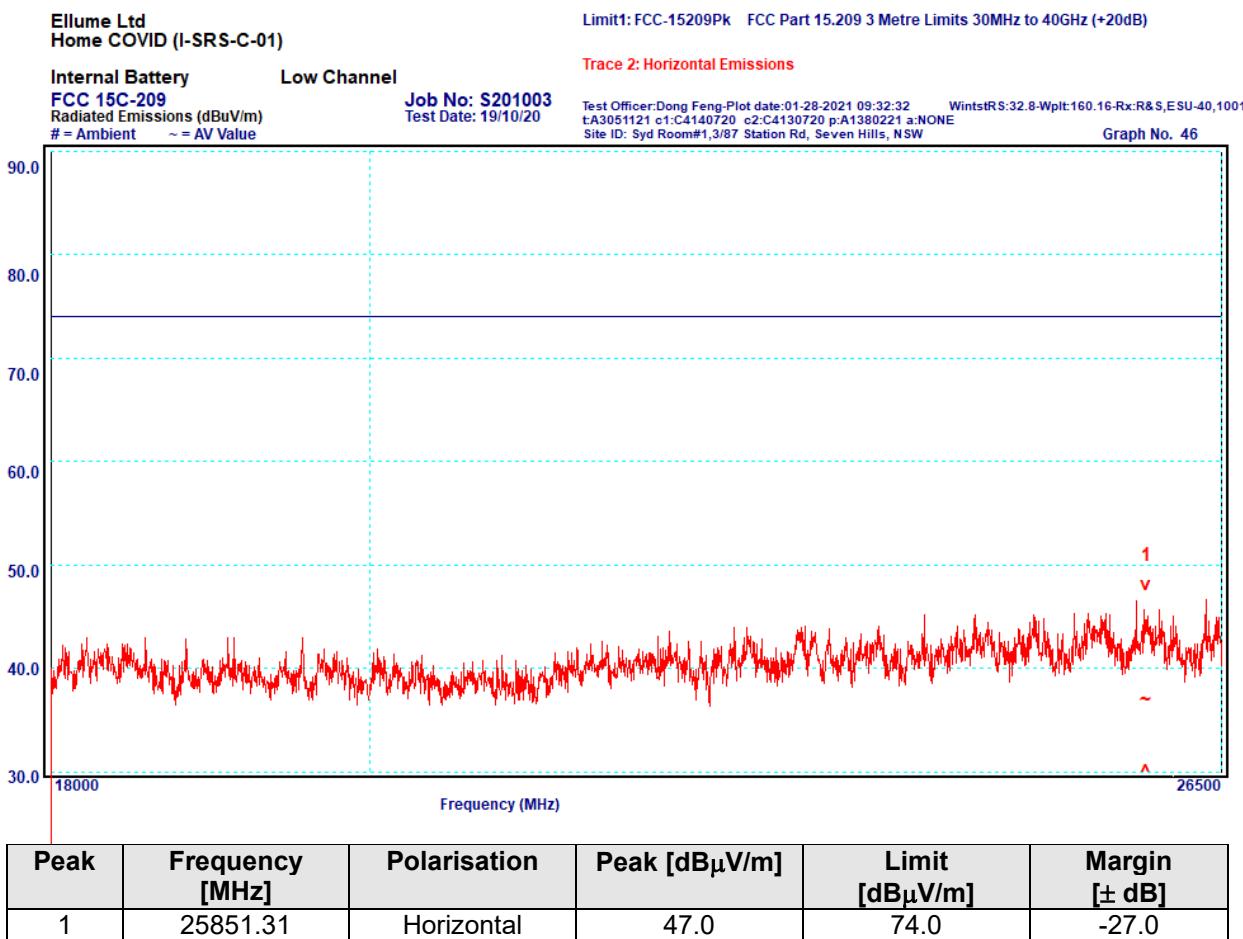
Peak	Frequency [MHz]	Polarisation	Peak [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [ $\pm$ dB]
1	25954.28	Vertical	46.1	74.0	-27.9

All measured frequencies complied with the peak limit by a margin of greater than 10dB.

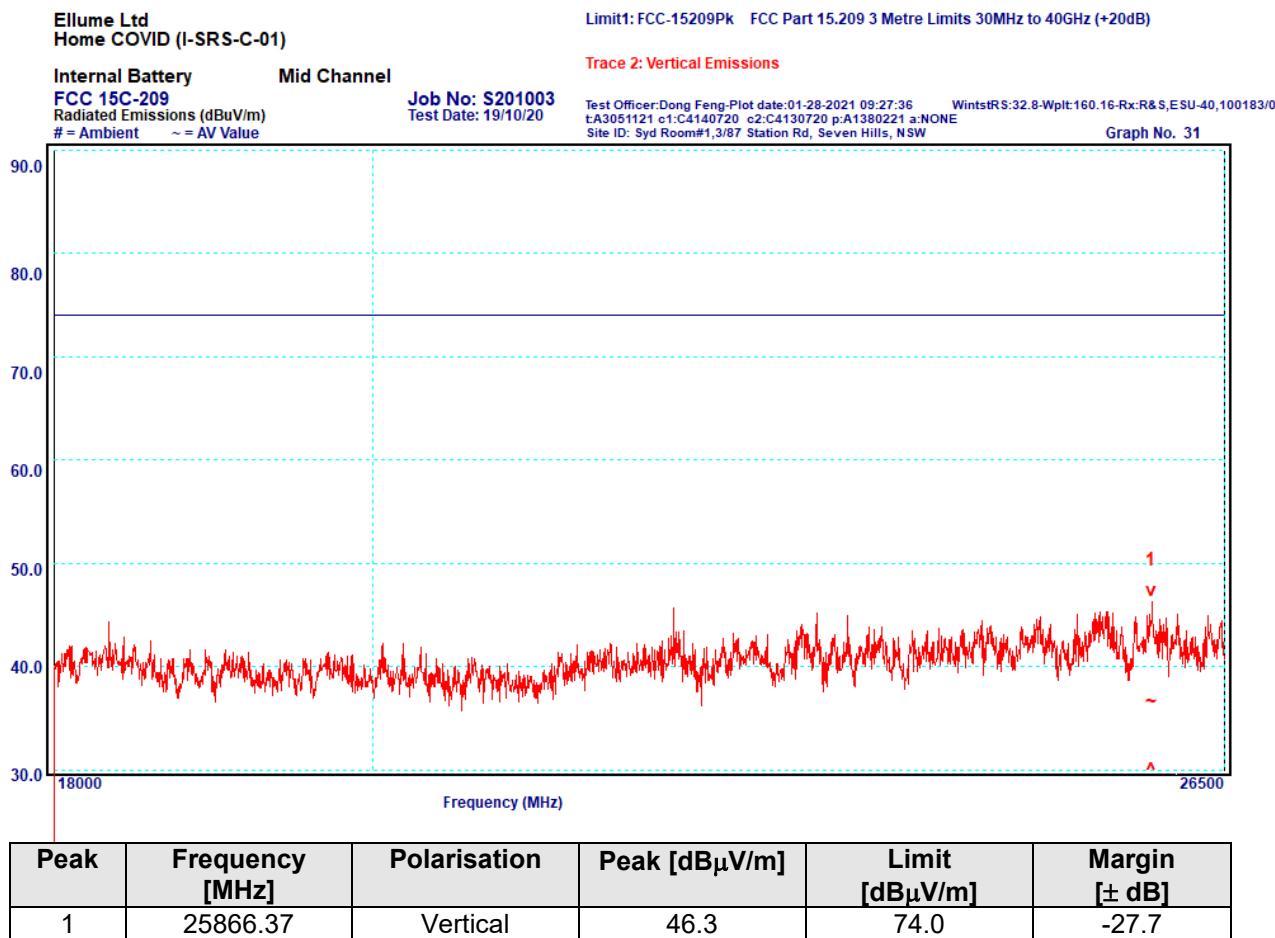
Graph 46

Horizontal Polarisation

18000 to 26500 MHz



All measured frequencies complied with the peak limit by a margin of greater than 10dB.

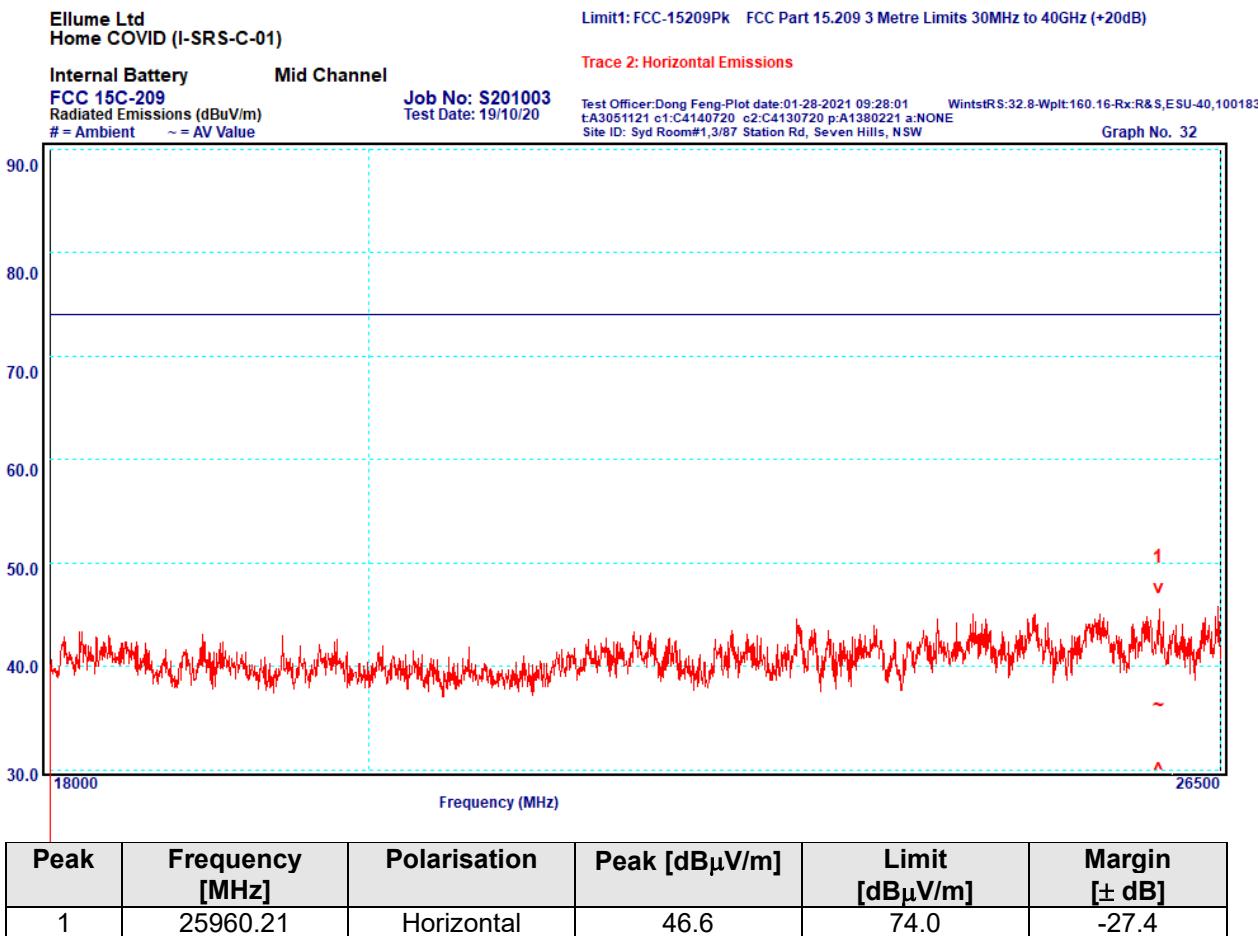
**Middle Channel****Graph 31****Vertical Polarisation****18000 to 26500 MHz**

All measured frequencies complied with the peak limit by a margin of greater than 10dB.

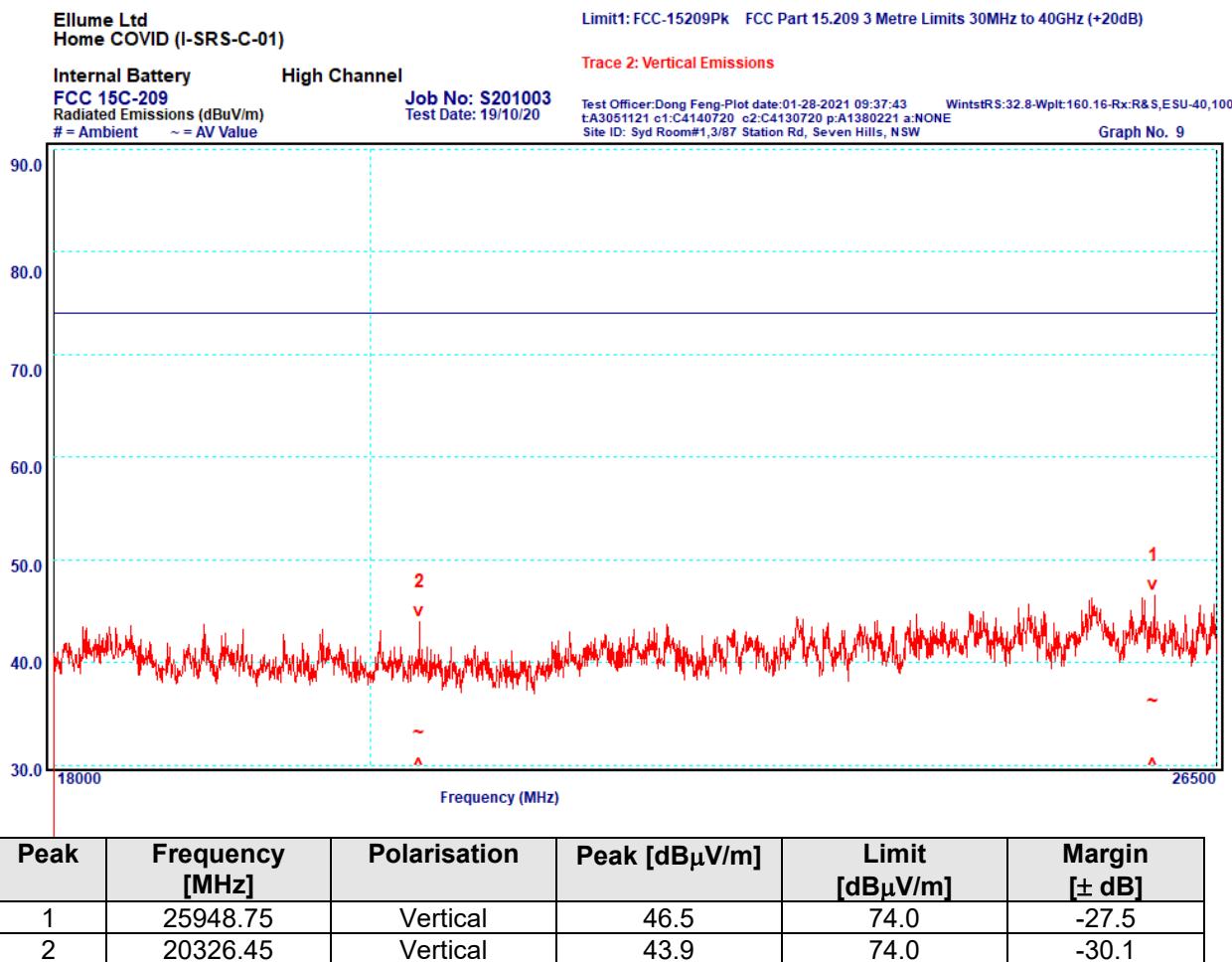
Graph 32

## Horizontal Polarisation

18000 to 26500 MHz



All measured frequencies complied with the peak limit by a margin of greater than 10dB.

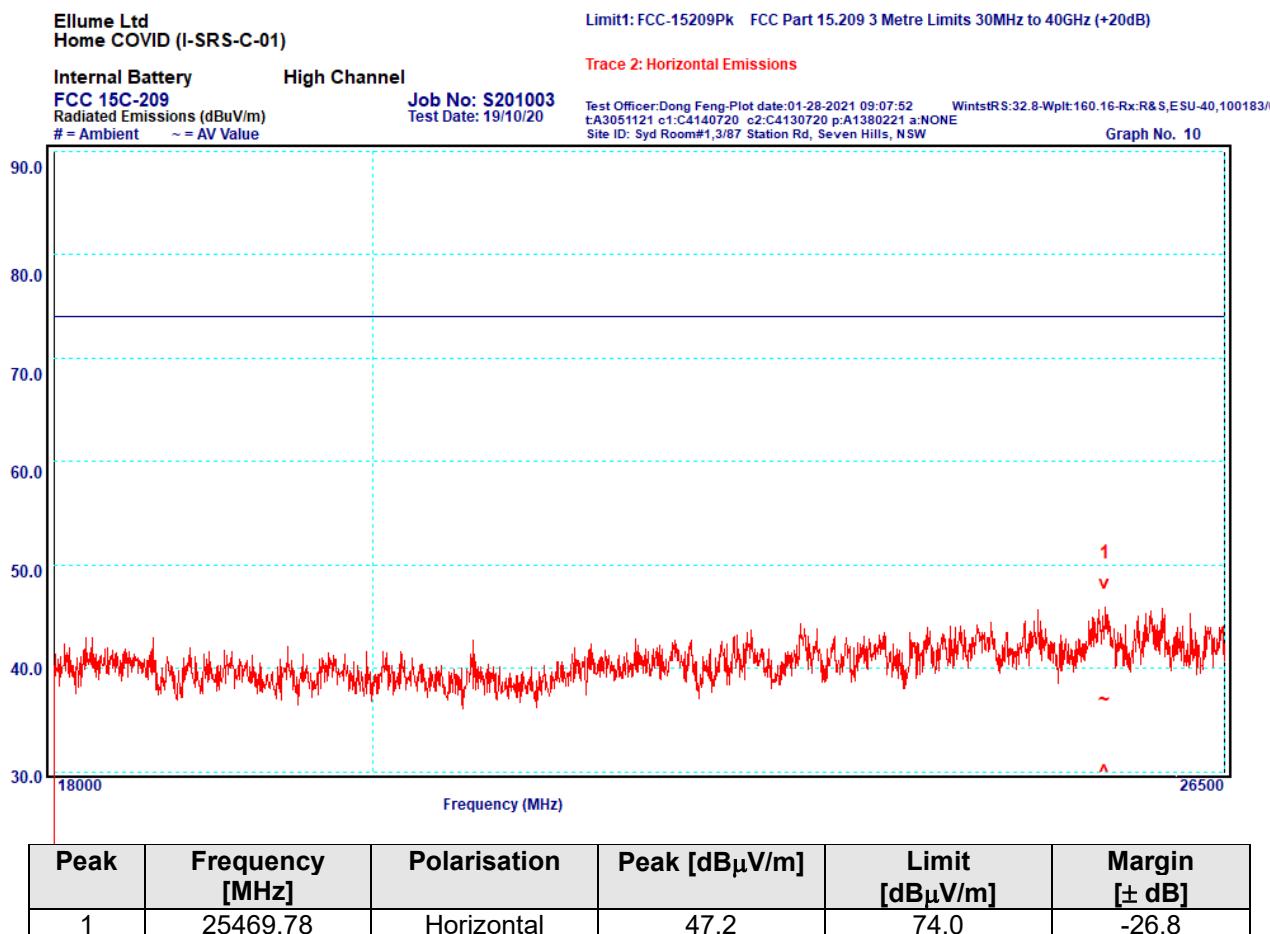
**High Channel****Graph 9****Vertical Polarisation****18000 to 26500 MHz**

All measured frequencies complied with the peak limit by a margin of greater than 10dB.

Graph 10

Horizontal Polarisation

18000 to 26500 MHz



All measured frequencies complied with the peak limit by a margin of greater than 10dB.

### Conclusion:

The EUT complied with the limits of FCC Rule Part 15 Subpart C, 15.209.

## 3.8 15.247(d) Out of Band Emissions

### Requirement:

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

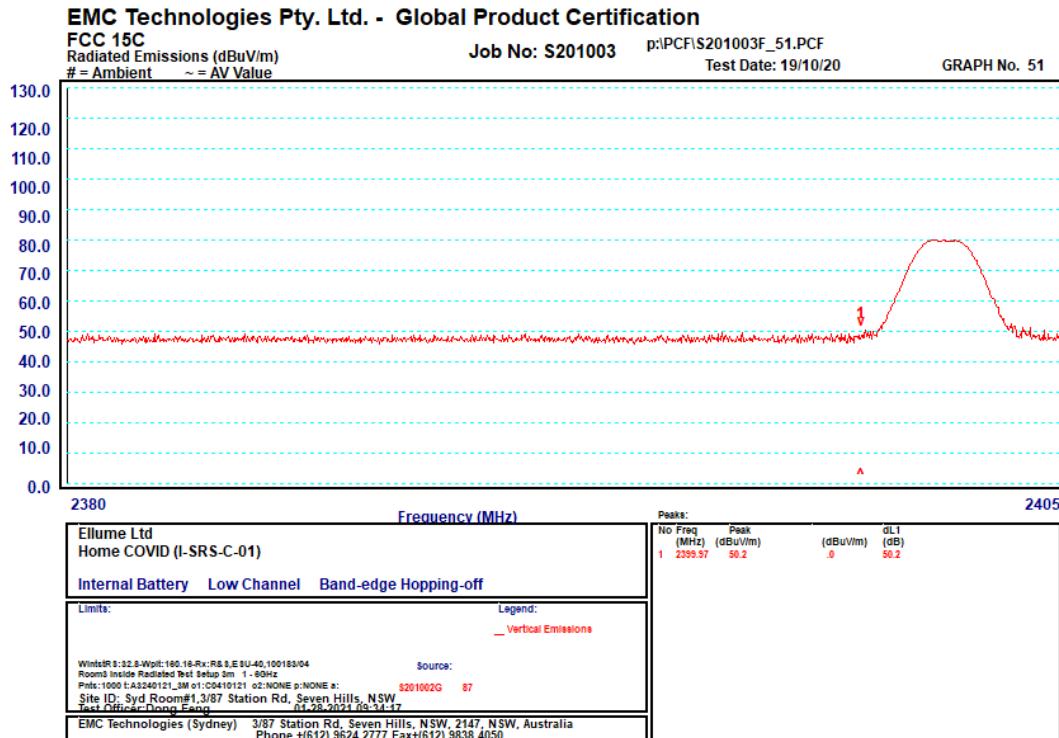
### 3.8.1 Authorized-band band-edge

Channel 2402 MHz Hopping off

Graph 51

Vertical Polarisation

2380 to 2405MHz

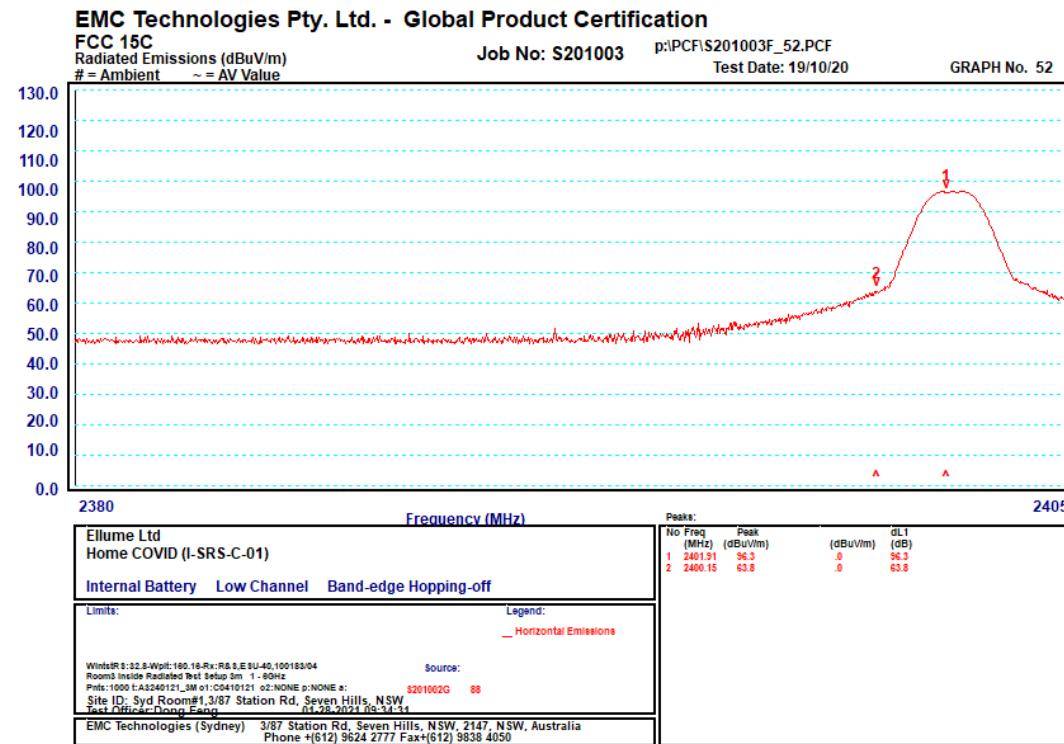


**Result:** No Emission Bandwidth were found within 2390MHz to 2405MHz.

Graph 52

Horizontal Polarisation

2380 to 2405MHz



**Result:** No Emission Bandwidth were found within 2390MHz to 2405MHz.

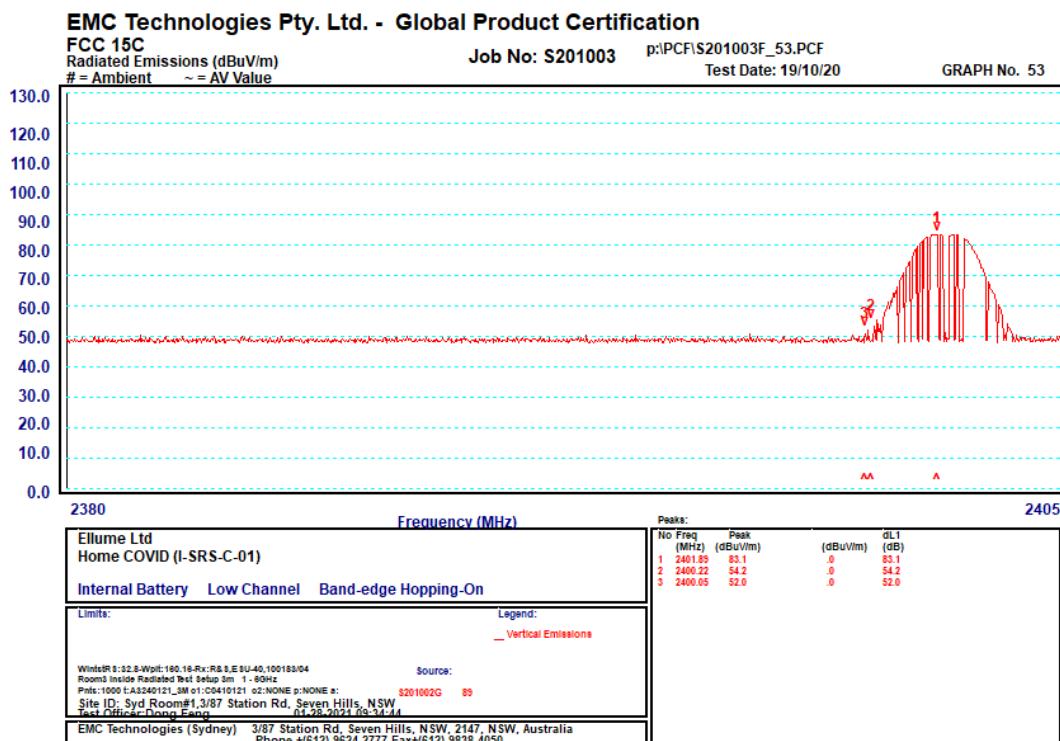
## Channel 2402 MHz

Hopping on

## Graph 53

Vertical Polarisation

2380 to 2405MHz

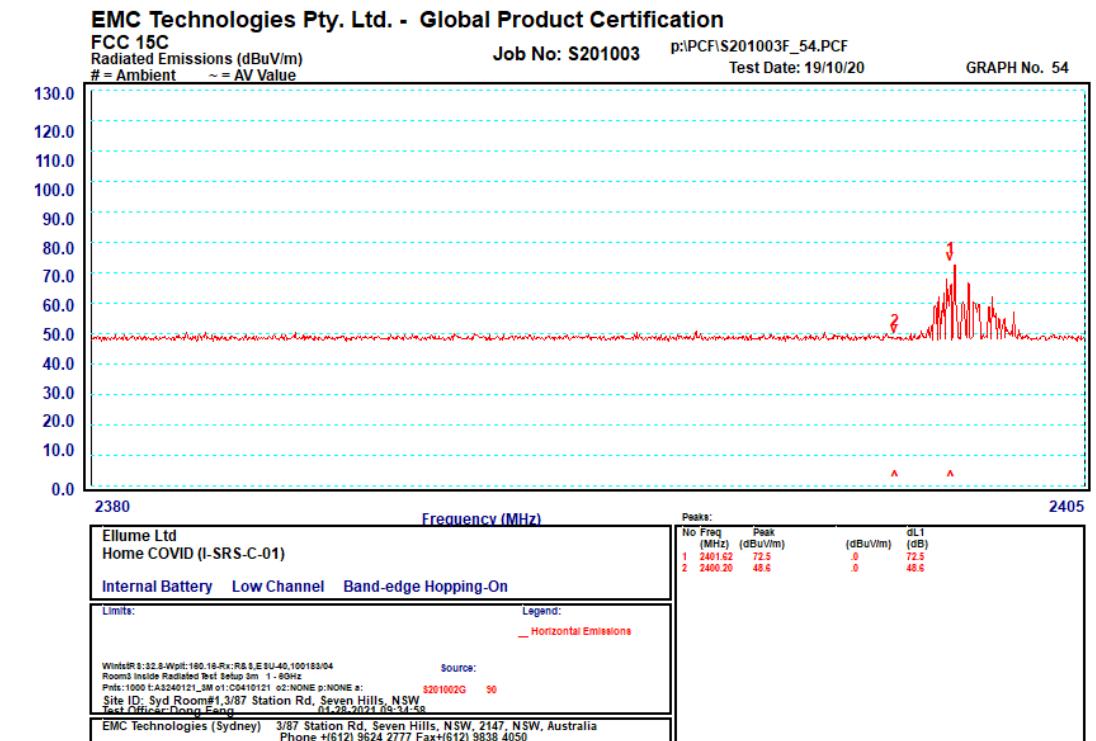


**Result:** No Emission Bandwidth were found within 2390MHz to 2405MHz

## Graph 54:

Horizontal Polarisation

2380 to 2405MHz.



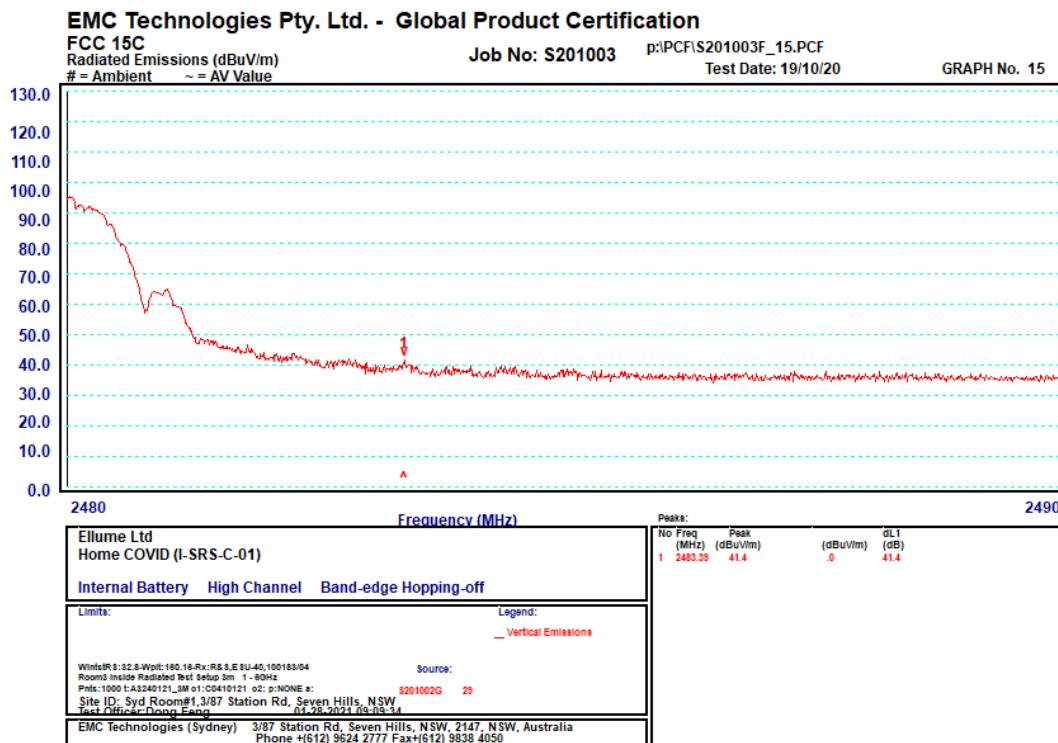
**Result:** No Emission Bandwidth were found within 2390MHz to 2405MHz.

## Channel 2480 MHz - Hopping off

Graph 15

Vertical Polarisation

2478 to 2495MHz

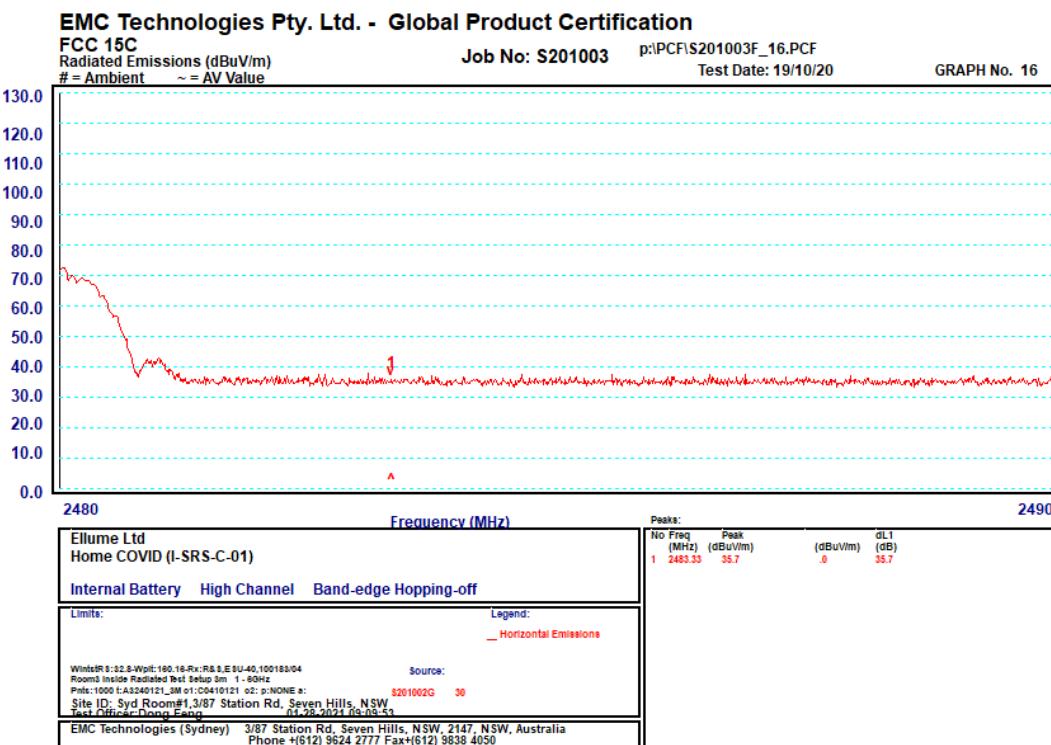


**Result:** No Emission Bandwidth were found within 2483.5MHz to 2490MHz.

Graph 16

Horizontal Polarisation

2478 to 2495MHz



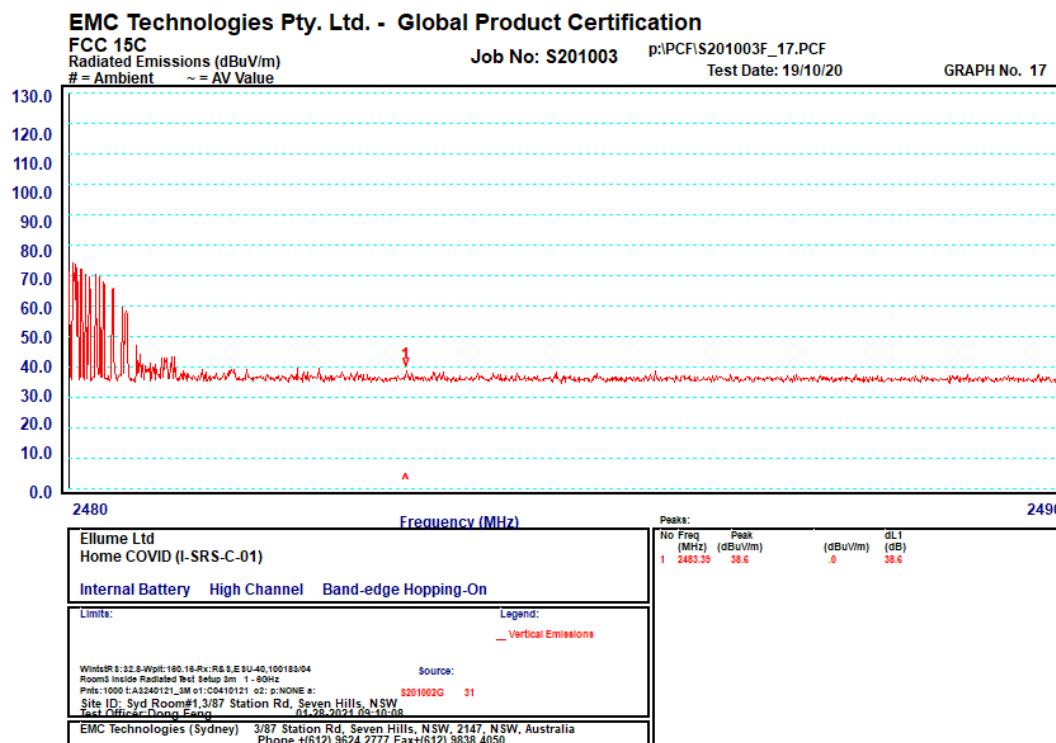
**Result:** No Emission Bandwidth were found within 2483.5MHz to 2490MHz.

## Channel 2480 MHz Hopping on

## Graph 17

## Vertical Polarisation

## 2478 to 2495MHz

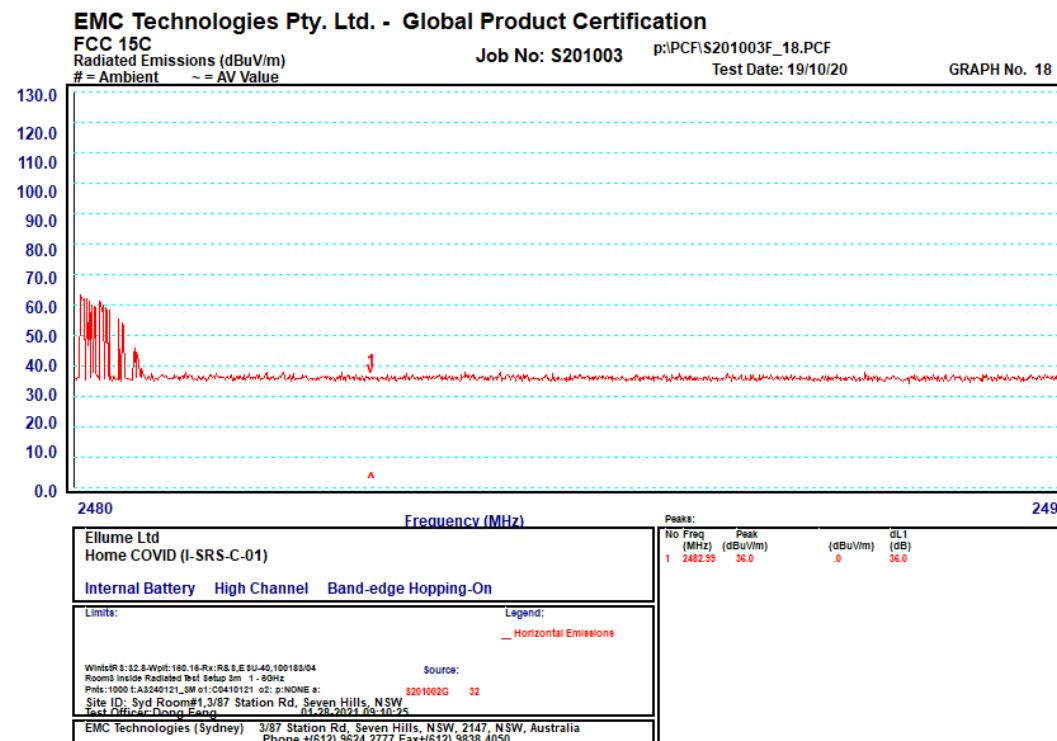


**Result:** No Emission Bandwidth were found within 2483.5MHz to 2490MHz.

## Graph 18

## Horizontal Polarisation

## 2478 to 2495MHz



**Result:** No Emission Bandwidth were found within 2483.5MHz to 2490MHz.

### 3.8.2 Restricted-band band-edge

This was done by radiated measurement according to C63.10 Clause 6.10.5

The peak measurements were made with a resolution bandwidth (RBW) of 1000 kHz and the video bandwidth (VBW) of 1000 kHz. The average measurement were made with a resolution bandwidth(RBW) of 1000kHz and the video bandwidth(VBW) of 10kHz.

**Results:**

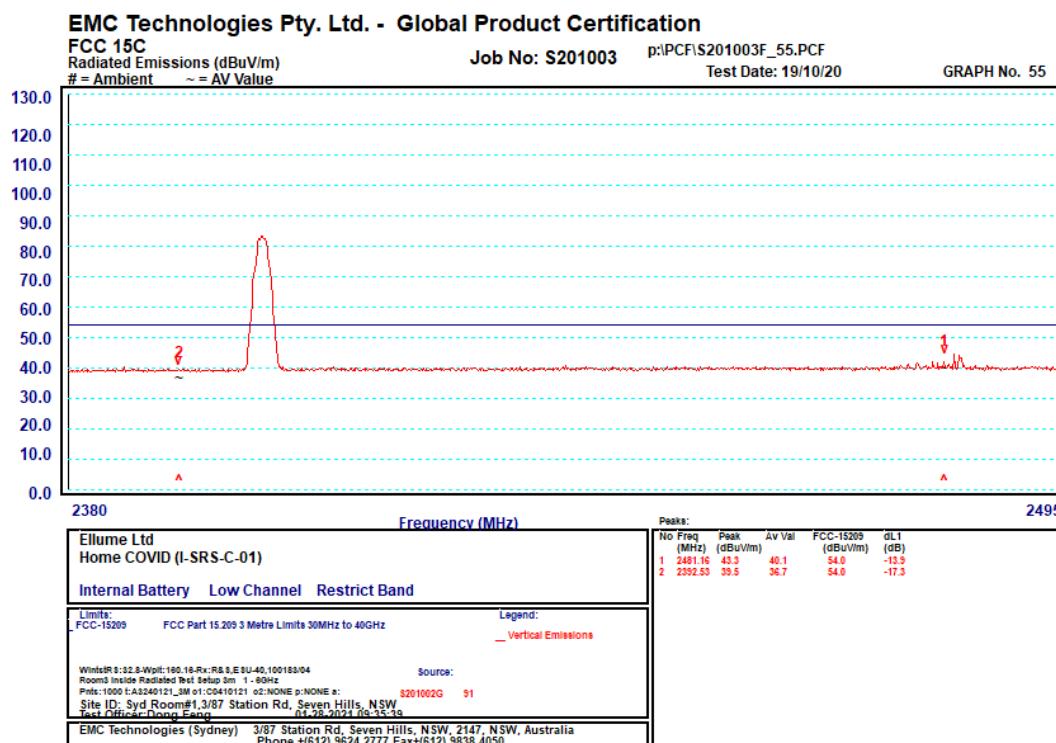
**Channel 2402 MHz, Bottom Band Edge:**

Hopping off, Marks being set to around 2390MHz and 2483.5MHz

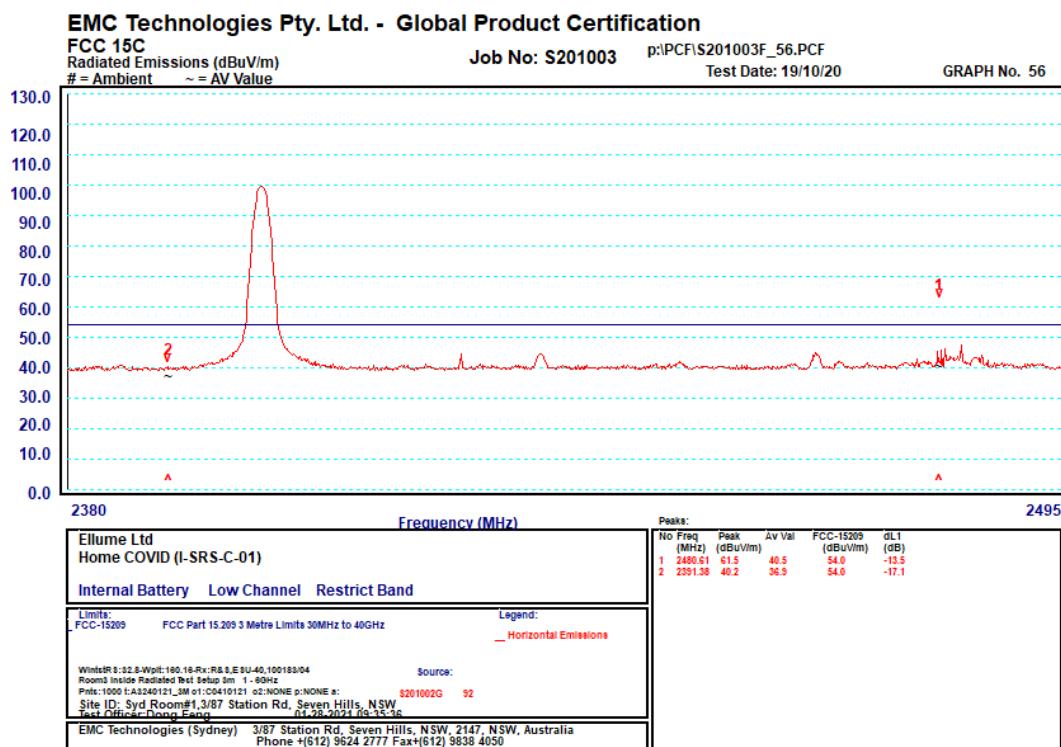
**Channel 2480 MHz, Top Band Edge:**

Hopping off, Marks being set to around 2390MHz and 2483.5MHz

**Channel 2402 MHz Average measurement**      **Hopping off**  
**Graph 55**      **Vertical Polarisation**      **2380 to 2495MHz**



**Graph 56**      **Horizontal Polarisation**      **2380 to 2495MHz**

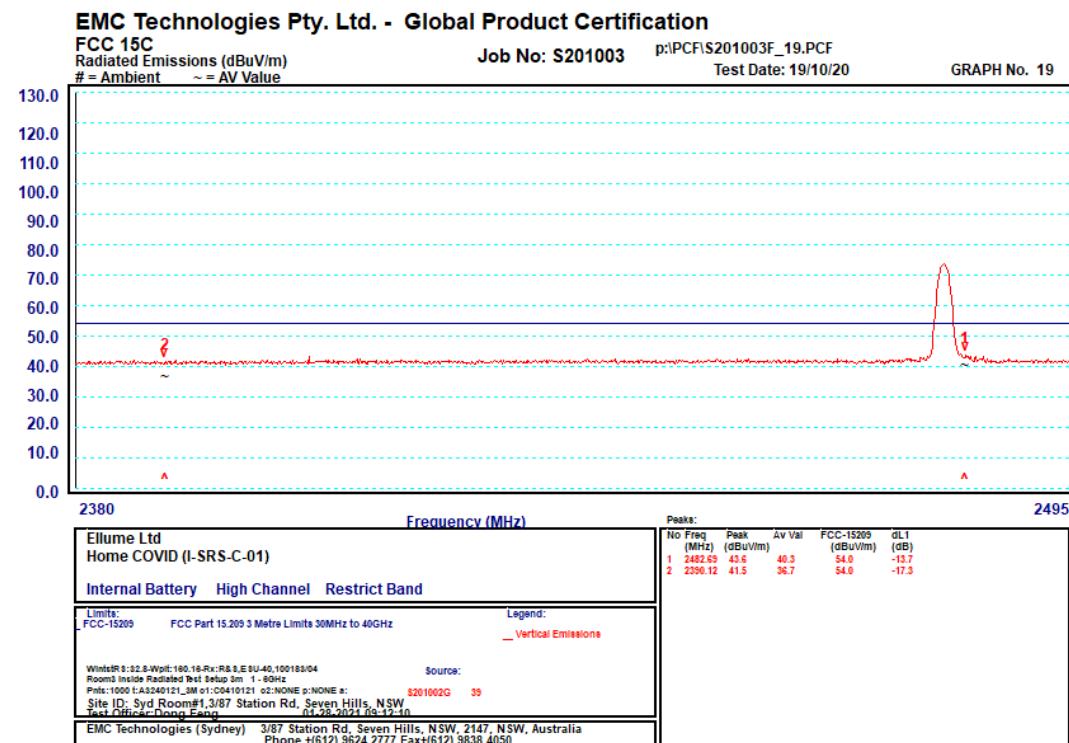


## Channel 2480 MHz Average measurement - Hopping off

Graph 19

Vertical Polarisation

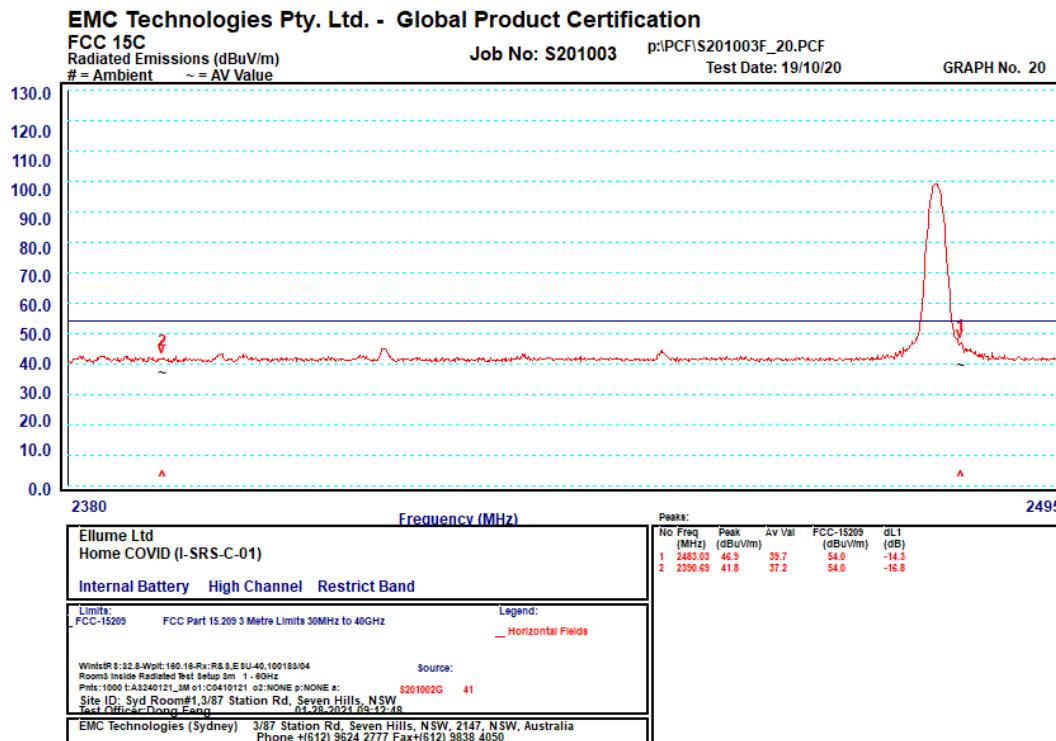
2380 to 2495MHz



Graph 20

Horizontal Polarisation

2380 to 2495MHz

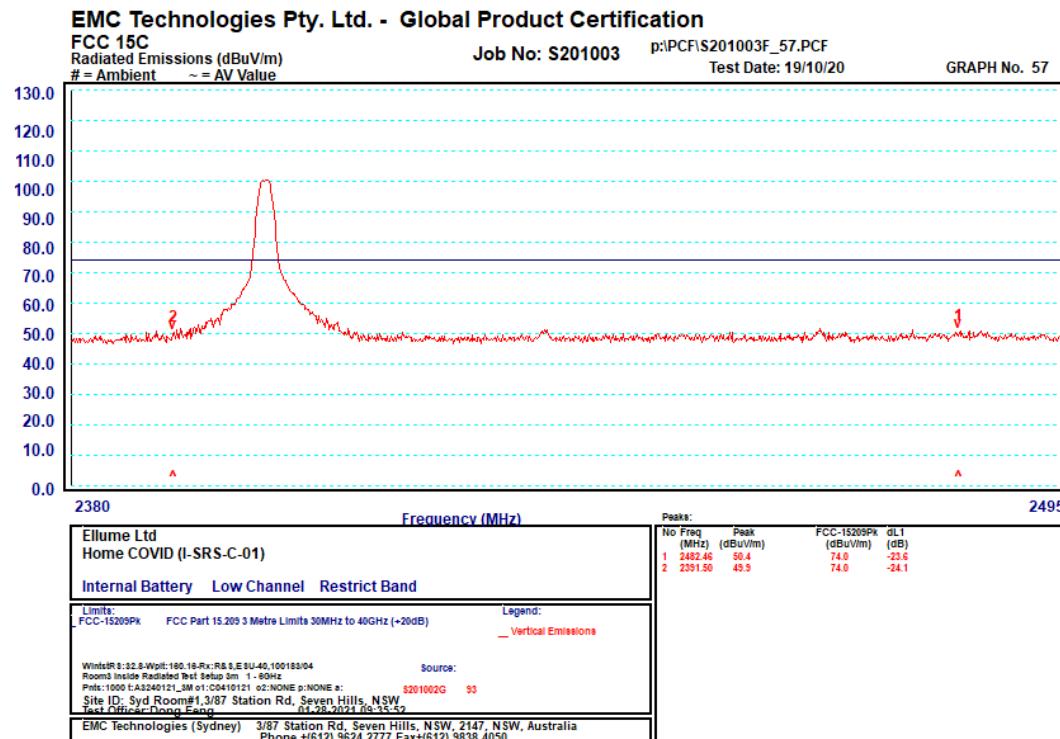


## Channel 2402 MHz – Peak Measurement – Hopping Off

Graph 57

Vertical Polarisation

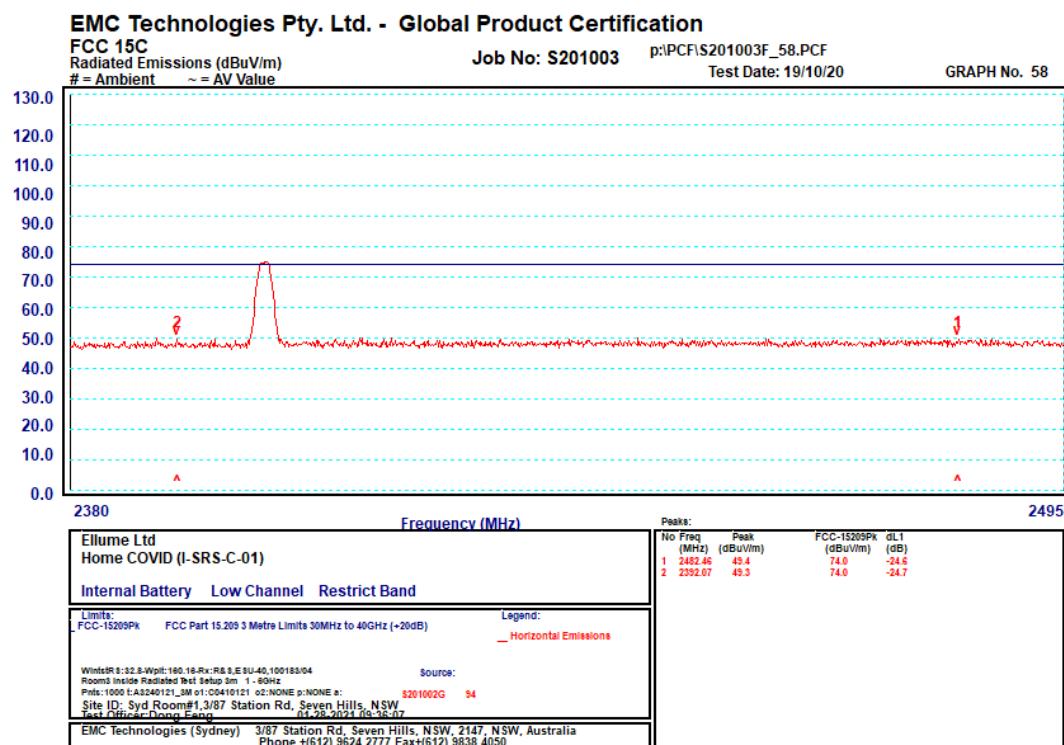
2380 to 2495MHz



Graph 58

Horizontal Polarisation

2380 to 2495MHz

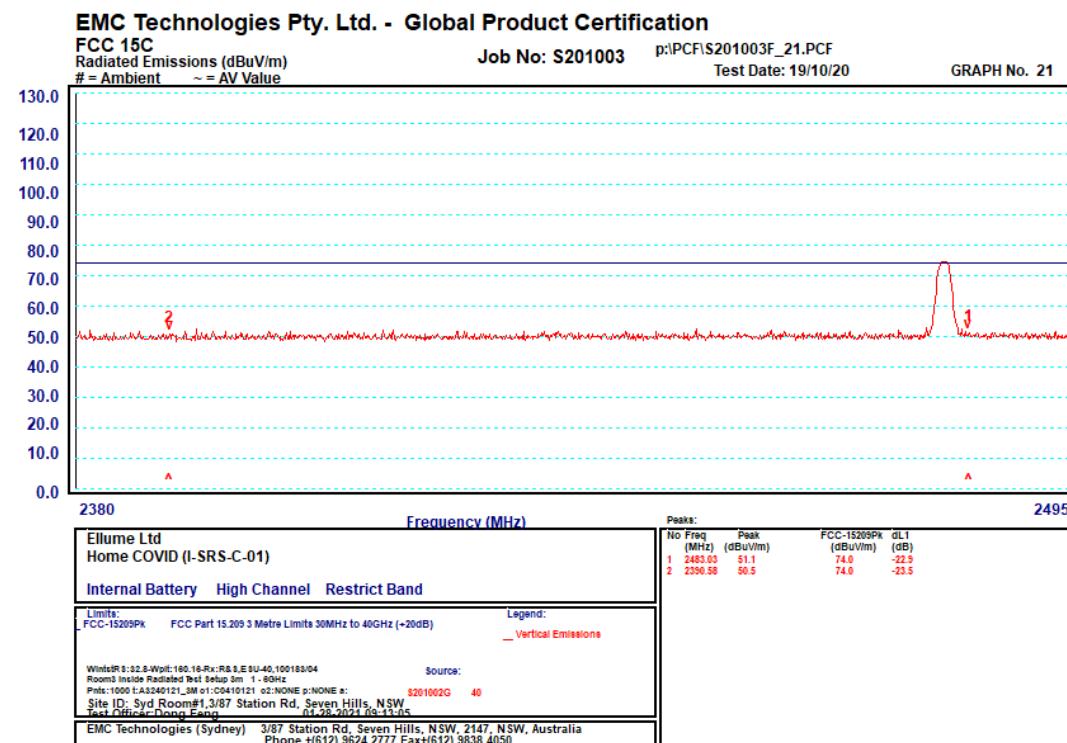


## Channel 2480 MHz – Peak Measurements – Hopping Off

Graph 21

Vertical Polarisation

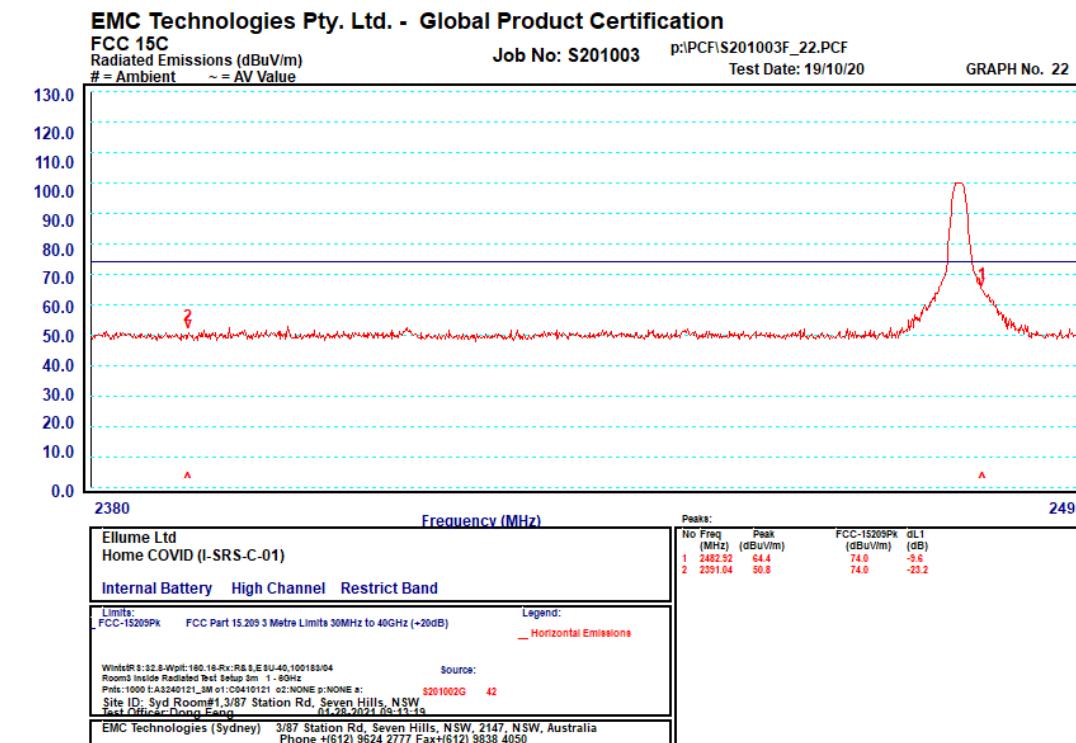
2380 to 2495MHz



Graph 22

Horizontal Polarisation

2380 to 2495MHz



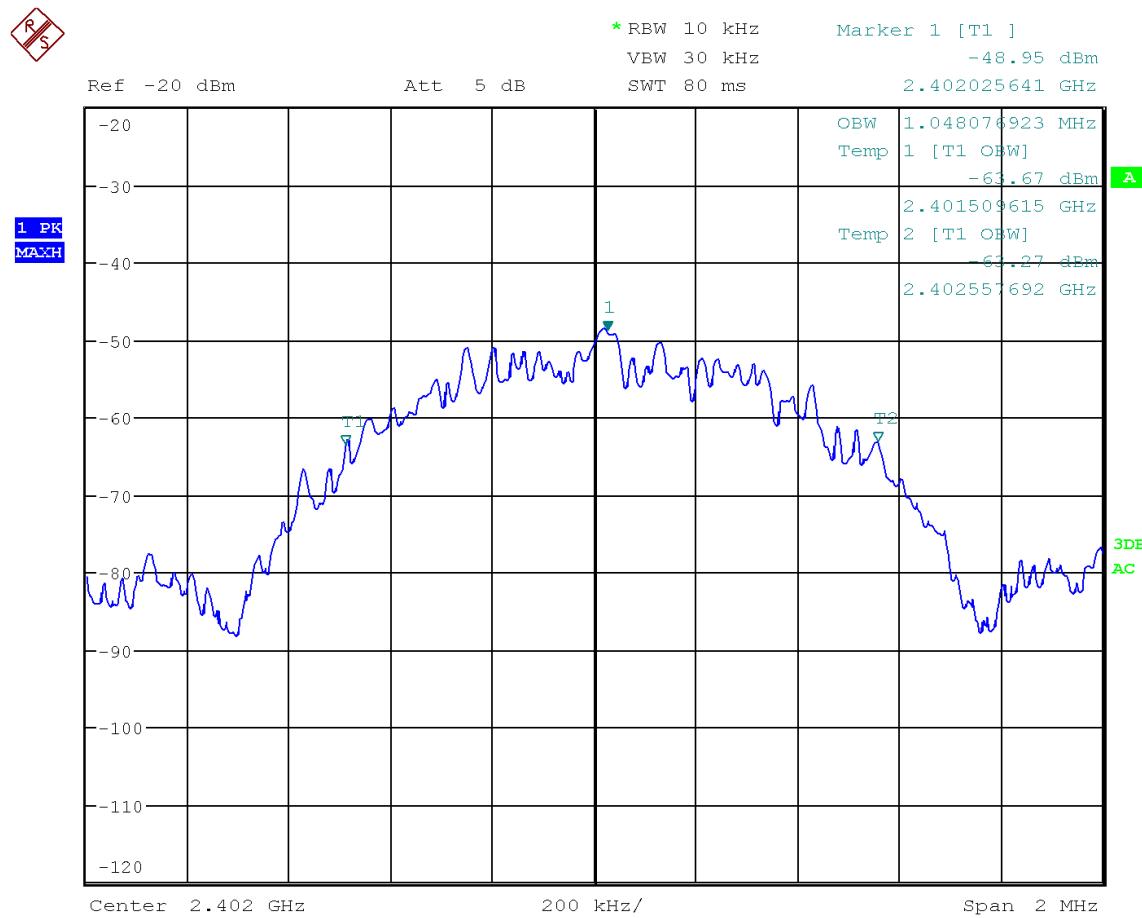
### 3.9 §2.1049 Occupied bandwidth – 99% power

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

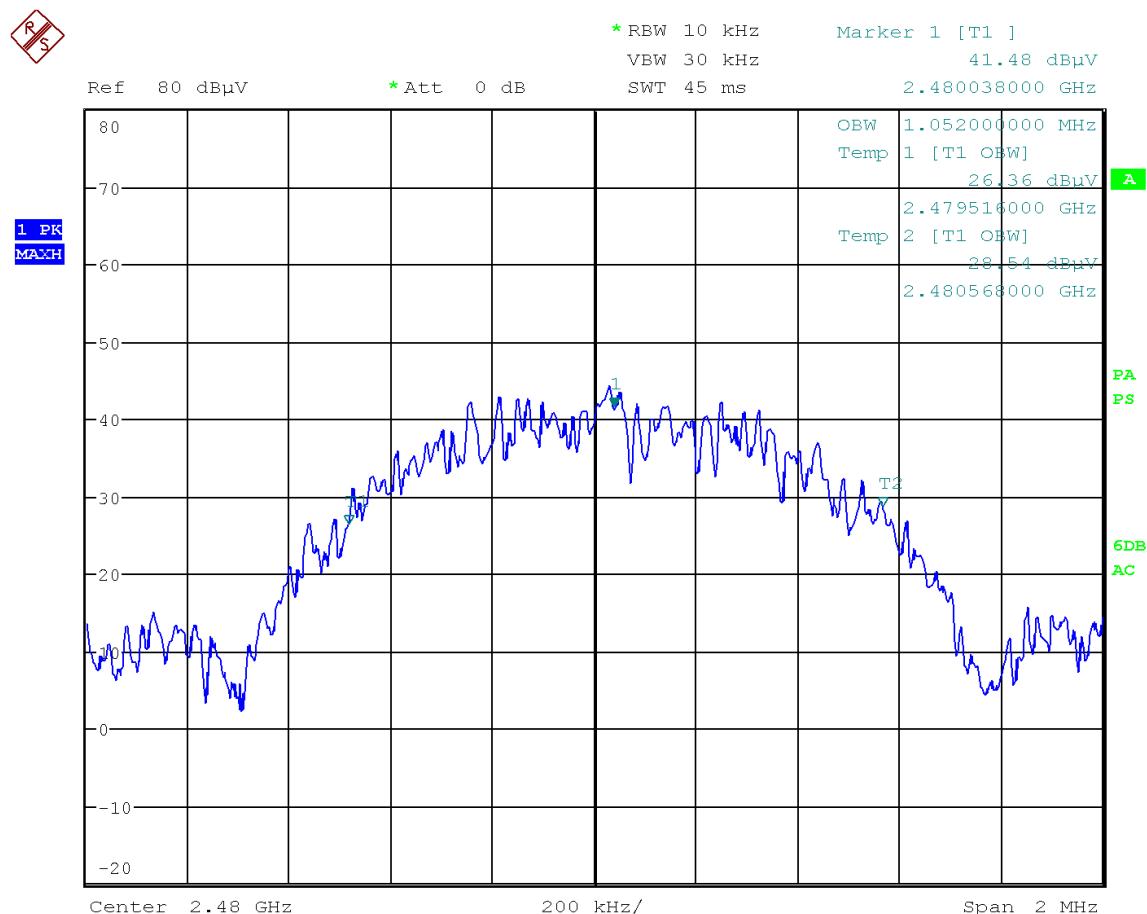
Channel [kHz]	99% Bandwidth [MHz]	Low Frequency [GHz]	High Frequency [GHz]
2402	1.048	2.4015	2.4025
2480	1.052	2.4795	2.4805

#### 99% Occupied Bandwidth

##### Channel 2402



Date: 19.OCT.2020 21:50:46

**99% Occupied Bandwidth****Channel 2480**

Date: 19.OCT.2020 17:30:35

### 3.10 §15.247(i) Maximum Permissible Exposure

**Requirement:**

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the commission's guidelines. See §1.1307(b)(1) of this chapter.

Due to the nature of EUT, Calculations were performed according to devices used within 20 cm of person (FCC2.1093) - < 50mm test separation.

KDB 447498 D01 V06 was used to calculate the minimum separation distance allowed before SAR measurements were required.

**1-g Head or Body SAR:**

$$\left( \frac{\text{max.channel power, mW}}{\text{min.separation distance, mm}} \right) \times \sqrt{f(\text{GHz})} \leq 3.0$$

**10-g Extremity SAR:**

$$\left( \frac{\text{max.channel power, mW}}{\text{min.separation distance, mm}} \right) \times \sqrt{f(\text{GHz})} \leq 7.5$$

**Result:**

Maximum measured power, E.I.R.P. = 99.8 dB $\mu$ V/m (3 meters) = 4.57 = 2.865mW

Minimum separation distance = 5mm

Highest frequency = 2.48 GHz

$$2.865\text{mW} / 5 \text{ mm} \times \sqrt{2.48 \text{ GHz}} = 0.902$$

**Conclusion:** Complied.

## 4.0 COMPLIANCE STATEMENT

The Home COVID (I-SRS-C-01) with Model Number: I-SRS-C-01 tested on behalf of Ellume Ltd complied with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators) operating within the band: 2400 MHz to 2483.5 MHz.

## 5.0 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:

<b>Radiated Emissions:</b>	9 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%.