



**REVISION TABLE**

| <b>Version</b> | <b>Change Made</b>                               | <b>Date</b>      |
|----------------|--|------------------|
| 1              | Initial issue of document                        | 22 December 2021 |
| 2              | Update to FCC ID                                 | 9 February 2022  |
| 3              | Update to FCC ID                                 | 15 February 2022 |
| 4              | Update to Issue date on Page 1 from 2021 to 2022 | 21 February 2022 |



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**EMI TEST REPORT FOR CERTIFICATION  
FOR  
CERTIFICATION OF FCC Part 15.225**

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## RADIO REPORT FOR CERTIFICATION

**Device under Test:** MR-1  
**Model Number:** MR-1 Module

**FCC ID:** 2ACXQ-CL4NXPLUS-MR1

**Manufacturer:** Sato Vicinity Pty Ltd

**Tested for:** Sato Vicinity Pty Ltd  
**Address:** 32 Burrows Road, St Peters, NSW, 2038

**Phone:** +61 2 9562 9886

**Contact:** Tai Wai Pong  
**Email:** taiwai.pong@sato-global.com

**Standards:** **47 CFR Part 15** – Radio Frequency Devices  
**Subpart C** – Intentional Radiators  
**Section 15.225** – Operation within the band 13.110-14.010 MHz

**Result:** The MR-1 complied with the applicable requirements of the above standards. Refer to Reort S211114-1 v4 for full details.

**Test Date(s):** 23<sup>rd</sup> November 2021 to 24th November 2021

**Issue Date:** 21 February 2022

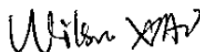
**Attestation:** I hereby certify that the Test Sample described herein was tested as described in this report and that the data included is that which was obtained during such testing.

**Test Engineer:**



**Dong Feng**

**Authorised Signatory:**



**Wilson Xiao – Lead Engineer Radio**  
**EMC Technologies Pty Ltd**

**Issued by:** EMC Technologies Pty. Ltd.,  
Unit 3, 87 Station Road, Seven Hills, NSW, 2147, Australia.

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## EMI TEST REPORT FOR CERTIFICATION of FCC PART 15.225

### 1.0 SUMMARY of RESULTS

This report details the results of EMI tests and measurements performed on the MR-1, with Model Number: MR-1 Module, in accordance with:

- Federal Communications Commission (FCC) regulations as detailed in Title 47 CFR, Part 15 Rules for intentional radiators.

| Section | FCC Part 15 Subpart C     | Test Performed  | Results   |
|---------|---------------------------|---|-----------|
| 3.1     | 15.203                    | Antenna requirement   | Complied  |
| 3.2     | 15.205                    | Restricted bands of operation   | Complied  |
| 3.3     | 15.207                    | Conducted limits  | Complied  |
| 3.4     | 15.225 (a), (b), (c), (d) | Carrier Signal Field Strength<br>13.110 – 14.010MHz; Spurious<br>Emission | Complied  |
| 3.5     | 15.225 (e)                | Frequency tolerance   | Complied  |
| 3.6     | 2.1049                    | Occupied Bandwidth  | 23.23 kHz |

### 1.1 Test Procedure

Radio measurements were performed in accordance with the appropriate procedures of ANSI C63.10: 2020

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



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## 2.0 GENERAL INFORMATION

(Information supplied by the Client)

### 2.1 General Description of Test Sample

|                                    |  |
|------------------------------------|--|
| <b>Manufacturer:</b>               | Sato Vicinity Pty Ltd  |
| <b>Test Sample:</b>                | MR-1   |
| <b>Model Number:</b>               | MR-1 Module  |
| <b>Microprocessor:</b>             | AT32UC3B064  |
| <b>Highest Internal Frequency:</b> | 27.12MHz   |
| <b>Operating Band:</b>             | 13.56MHz   |
| <b>Number of Channels:</b>         | 1  |
| <b>BOM</b>                         | 090-70-001-BOM Version C8 090-10-010-BOM Version C2  |
| <b>Main PCB Circuit</b>            | 090-10-001-SCH Version B4 090-10-010-SCH Version C2  |
| <b>Modulation:</b>                 | Phase Jitter Modulation  |
| <b>Antenna type and gain:</b>      | Inductive loop antenna, 1.5dBi   |
| <b>Input Supply:</b>               | 120V, 60Hz   |
| <b>FCC ID:</b>                     | 2ACXQ-CL4NXPLUS-MR1  |
| <b>Auxiliary Equipment</b>         | Sato CL4NXPlus Barcode Printer<br>Laptop, USB Mouse<br>Data Communication and power supply adaptor board |

### 2.2 Test Sample Description

MR-1 Module is a plug-in RFID radio device with integral antenna. It is an RFID read/write device designed to meet the requirements to manage tagging, monitor, and control a small number of items. It is designed to be incorporated in any hosts which has serial communication capability.

The unit consists of a connector for data communication and power source from the host. MR-1 is connected to antenna via a unique connector.

### 2.3 EUT Configurations

During testing, the MR-1 Transmitter Module will be connected and transmitting. The unit will be polling the antenna during the test cycle. In this mode, the test software will operate the data ports as follow:

- Laptop communicates with MR-1 module via the host, Sato CL4NXPlus printer
- MR-1 operates in normal operating mode in the Sato CL4NXPlus printer



## 2.4 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 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 – **Designation number AU0002.**

EMC Technologies indoor open area test site (iOATS) located at Unit 3, 87 Station Road, Seven Hills, NSW, Australia, 2147 has been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS-Gen, Issue 5 - **Industry Canada iOATS number - IC 4207A.**

Measurements in this report were performed at EMC Technologies' laboratory located at Unit 3, 87 Station Road, 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)



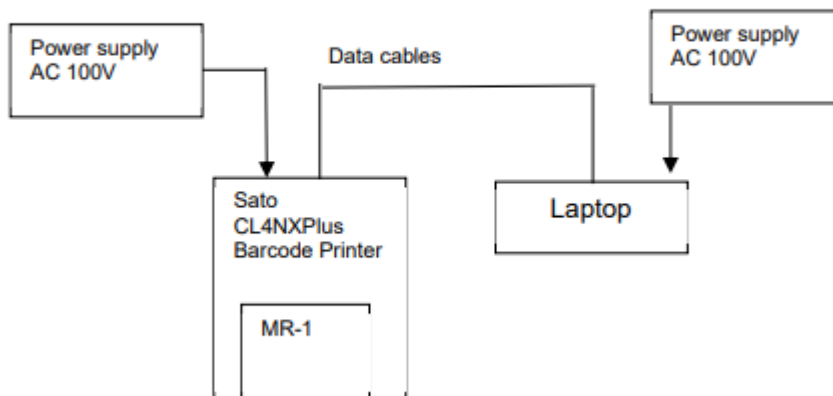
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## 2.5 Test Equipment Calibration

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

| Equipment Type | Asset No:        | Make/Model/Serial Number  | Due Date<br>dd/mm/yyyy |
|----------------|------------------|---|------------------------|
| EMI Receivers  | R-038            | Rohde & Schwarz EMI Receiver<br>Model: ESU40 S/N: 100183 20Hz – 40GHz                             | 01/04/2022             |
|                | R-029            | Rohde & Schwarz EMI Test Receiver<br>Model: ESCI S/N: 100012 9kHz – 3GHz                          | 29/04/2022             |
| Antenna        | A-430            | Sunar RF Motion Model: JB1<br>S/N: A021318  | 14/04/2024             |
|                | A-008            | EMCO Model: 6502 SN: 9108-2660  | 12/12/2021             |
| LISN           | L-036<br>L-036-1 | R & S, Single Phase, MN: ESH3-Z5, SN: 832479/014<br>10dB Attenuator Model: R-415410 fixed to LISN | 22/04/2022             |
| Limiter        | L-003            | HP, 9kHz – 200MHz, MN: 11947A, SN: 3107A00857   | 14/01/2022             |
| RF Cables      | SC-028           | 13m RG214 N-Type, 0.1- 6000MHz  | 11/01/2022             |
|                | SC-003           | (0.01 to 1000 MHz) Room 1 MN: RG58 BNC-BNC,<br>SN: C003   | 06/01/2022             |

## 2.6 Test Sample Block Diagram



## 2.8 Modifications

No modifications were performed on EUT in order to comply with the standard.



### 3.0 TEST RESULTS

#### 3.1 §15.203 Antenna Requirement

| Parameters   |                        |
|--------------|------------------------|
| Antenna Gain | 1.5dBi                 |
| Antenna Type | Inductive loop antenna |

The antennas were internal to the device ensuring that they could not be replaced.

#### 3.2 §15.205 Restricted Bands of Operation

The limits of §15.209 were applied across the applicable spectrum and therefore complied with the restricted band requirements.

#### 3.3 §15.207/RSS-Gen 8.8 Conducted limits

##### 3.3.1 Test Procedure

The arrangement specified in ANSI C63.4: 2014 was adhered to for the conducted EMI measurements. The EUT was placed in the RF screened enclosure and a CISPR EMI Receiver as defined in ANSI C63.2: 2016 was used to perform the measurements.

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.

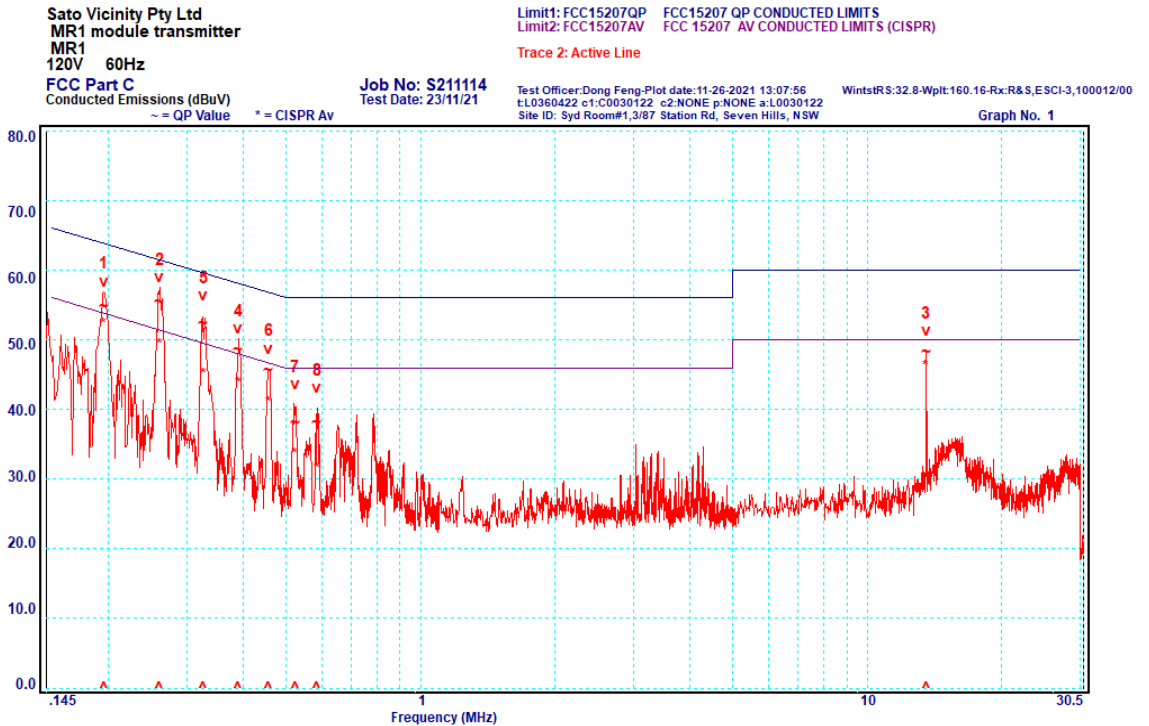
EUT power 120V 60Hz.

The limit applied was in accordance to the conducted limits defined in §15.207.



### 3.3.2 Results

**Graph 1 Active Line 0.145 to 30.5MHz**



| Plot | Frequency [MHz] | Line   | Quasi-Peak         |                    |                    | Average            |                    |                    |
|------|-----------------|--------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|      |                 |        | Level [dB $\mu$ V] | Limit [dB $\mu$ V] | Margin [ $\pm$ dB] | Level [dB $\mu$ V] | Limit [dB $\mu$ V] | Margin [ $\pm$ dB] |
| 1    | 0.196           | Active | 54.7               | 63.8               | -9.1               | 52.1               | 53.8               | -1.7*              |
| 2    | 0.261           | Active | 55.4               | 61.4               | -6.0               | 49.2               | 51.4               | -2.2*              |
| 3    | 13.560          | Active | 48.3               | 60.0               | -11.7              | 46.1               | 50.0               | -3.9               |
| 4    | 0.391           | Active | 48.5               | 58.0               | -9.5               | 43.6               | 48.0               | -4.4               |
| 5    | 0.327           | Active | 52.3               | 59.5               | -7.2               | 45.0               | 49.5               | -4.5               |
| 6    | 0.457           | Active | 45.6               | 56.7               | -11.1              | 40.8               | 46.7               | -5.9               |
| 7    | 0.524           | Active | 38.0               | 56.0               | -18.0              | 33.5               | 46.0               | -12.5              |
| 8    | 0.587           | Active | 38.0               | 56.0               | -18.0              | 31.4               | 46.0               | -14.6              |

\*This result is within the laboratory's measurement uncertainty. Refer to Section 5.0.

Complied with both quasi peak and average limits by margins of at least 6.0dB and 1.7\*dB respectively.



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**Graph 2 Neutral Line 0.145 to 30.5MHz**

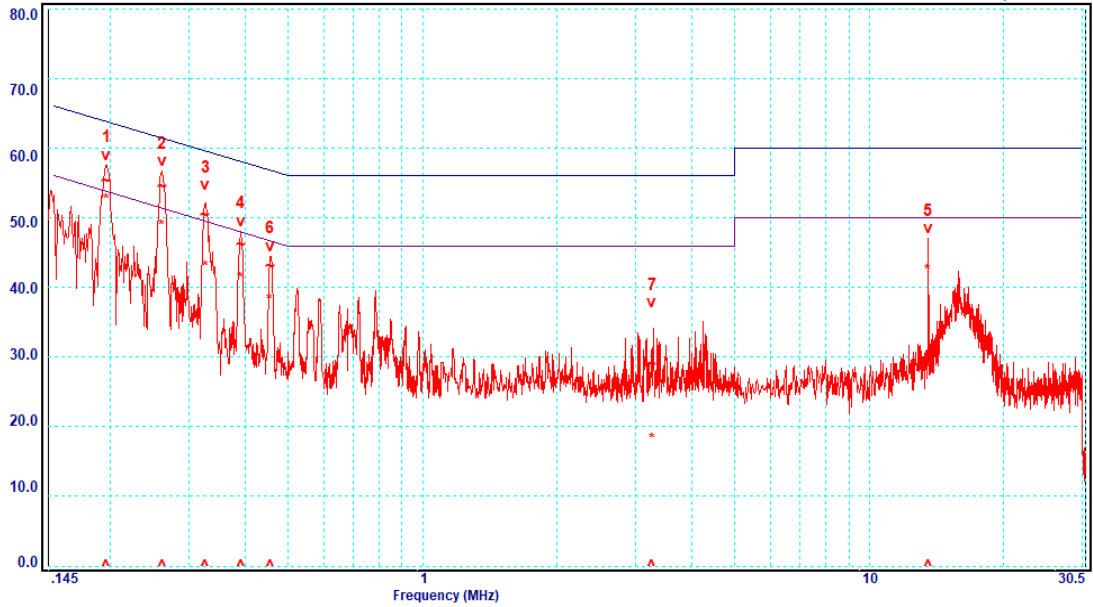
Sato Vicinity Pty Ltd  
MR1 module transmitter  
MR1  
120V 60Hz

FCC Part C  
Conducted Emissions (dBuV)  
-- = QP Value \* = CISPR Av

Job No: S211114  
Test Date: 23/11/21

Limit1: FCC15207QP FCC15207 QP CONDUCTED LIMITS  
Limit2: FCC15207AV FCC 15207 AV CONDUCTED LIMITS (CISPR)  
Trace 2: Neutral Line

Test Officer: Dong Feng-Plot date: 11-26-2021 13:07:19  
t:L0360422 c1:C0030122 c2:NONE p:NONE a:L0030122  
Site ID: Syd Room#1,3/87 Station Rd, Seven Hills, NSW



| Plot | Frequency [MHz] | Line    | Quasi-Peak   |              |              | Average      |              |              |
|------|-----------------|---------|--------------|--------------|--------------|--------------|--------------|--------------|
|      |                 |         | Level [dBμV] | Limit [dBμV] | Margin [±dB] | Level [dBμV] | Limit [dBμV] | Margin [±dB] |
| 1    | 0.196           | Neutral | 55.3         | 63.8         | -8.5         | 52.5         | 53.8         | -1.3*        |
| 2    | 0.262           | Neutral | 54.5         | 61.4         | -6.9         | 48.7         | 51.4         | -2.7*        |
| 3    | 0.327           | Neutral | 50.4         | 59.5         | -9.1         | 42.8         | 49.5         | -6.7         |
| 4    | 0.392           | Neutral | 46.1         | 58.0         | -11.9        | 41.1         | 48.0         | -6.9         |
| 5    | 13.560          | Neutral | 28.7         | 60.0         | -31.3        | 42.3         | 50.0         | -7.7         |
| 6    | 0.456           | Neutral | 43.0         | 56.8         | -13.8        | 38.1         | 46.8         | -8.7         |
| 7    | 3.265           | Neutral | 29.0         | 56.0         | -27.0        | 18.1         | 46.0         | -27.9        |

\*This result is within the laboratory's measurement uncertainty. Refer to Section 5.0.

Complied with both quasi peak and average limits by margins of at least 6.9dB and 1.3\*dB respectively.



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### 3.4 RADIATED MEASUREMENT TEST

The sample was slowly rotated with the measurement receiver 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. This process was performed for both horizontal and vertical antenna polarisations. 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.

#### 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/m.

AF = Antenna Factor in dB.

G = Preamplifier Gain in dB.

L = Cable loss in dB.



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### 3.4.1 §15.225(d) Transmitter Spurious Emissions

Radiated spurious emission measurements were performed in a semi-anechoic chamber compliant with CISPR 16-1-4.

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                         | 3                        | 0.6 metre loop antenna |
| 0.150 to 30           | 9                           | 3                        |                        |
| 30 to 300             | 120                         | 3                        | Biconilog hybrid       |

The limit applied is in accordance to the radiated emission limits defined in §15.209 Radiated emission limits & §15.225 limit mask.

#### 3.4.1.1 Frequency Band: 9 kHz to 30 MHz

Graph 3

#### Parallel Emissions

#### 9kHz to 30MHz

Sato Vicinity Pty Ltd  
MR1 module transmitter  
MR1  
120V 60Hz  
FCC Part C  
Radiated Emissions (dBuV/m)  
# = Ambient ~ = QP Value

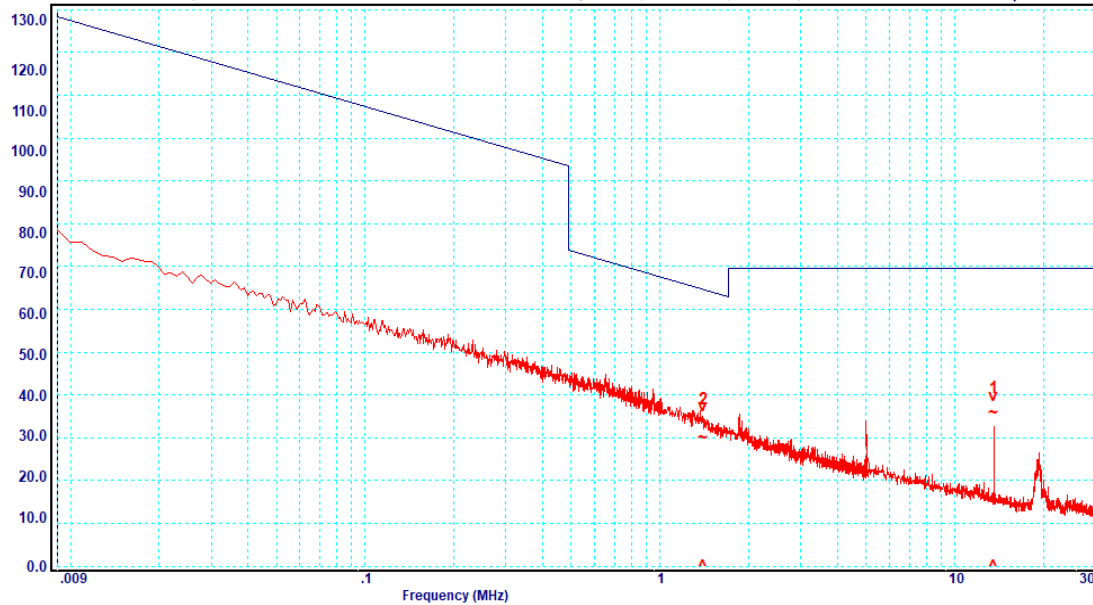
Limit1: FCC\_15209\_3mFcc Pt15 Subpart C Section 15.209(a) 3Metre Limits 9kHz to 3

Trace 2: Parallel

Job No: S211114  
Test Date: 23/11/21

Test Officer: Dong Feng Plot date: 11-26-2021 13:34:18 WinstorRS:32.8-Wplt:160.16-Rx:R&S,ESU-40,100183/04  
LA0081221E c1:C0280122-1 c2:NONE p:NONE a:NONE  
Site ID: Syd Room#3,3/87 Station Rd, Seven Hills, NSW

Graph No. 3



| Peak | Frequency (MHz) | Antenna Polarisation | Quasi Peak (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|------|-----------------|----------------------|---------------------|----------------|-------------|
| 1    | 13.560          | Parallel             | 35.9                | 69.5           | -33.6       |
| 2    | 1.400           | Parallel             | 29.9                | 64.7           | -34.8       |

Complied with the limit by a margin greater than 10dB.



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**Graph 4 Perpendicular Emissions 9kHz to 30MHz**

Sato Vicinity Pty Ltd  
 MR1 module transmitter  
 MR1  
 120V 60Hz  
 FCC Part C  
 Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Job No: S211114

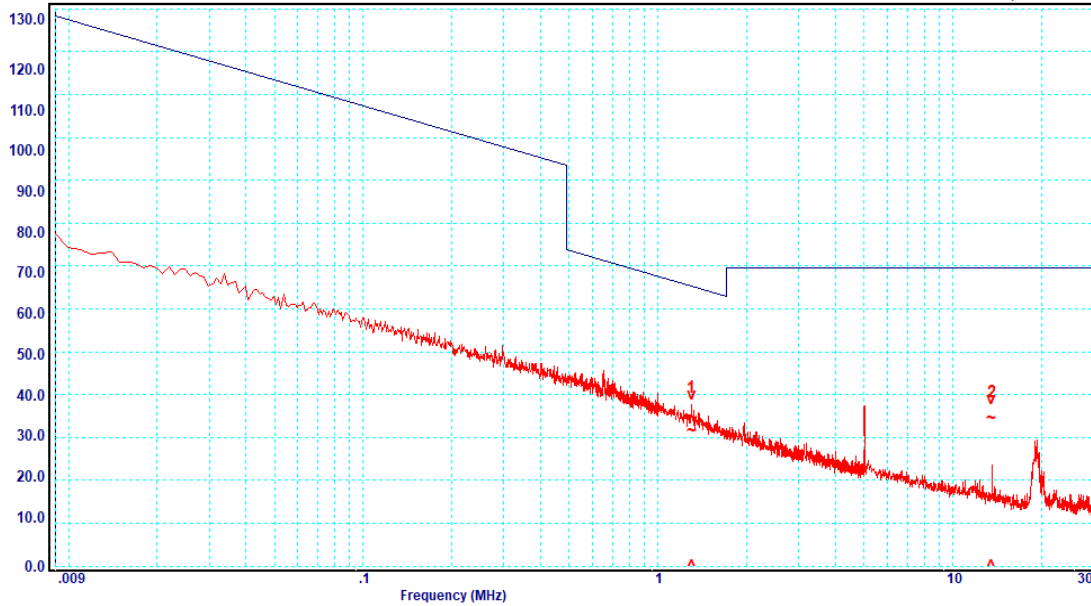
Test Date: 23/11/21

Trace 2: Perpendicular

Test Officer: Dong Feng Plot date: 11-26-2021 13:34:48  
 LA0081221E c1:00280122-1 c2:NONE p:NONE a:NONE  
 Site ID: Syd Room#3,3/87 Station Rd, Seven Hills, NSW

Winst@RS:32.8-Wplt:160.16-Rx:R&S,ESU-40,100183/04

Graph No. 4



| Peak | Frequency (MHz) | Antenna Polarisation | Quasi Peak (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------|-----------------|----------------------|---------------------|----------------|-------------|
| 1    | 1.302           | Perpendicular        | 31.4                | 65.4           | -34.0       |
| 2    | 13.560          | Perpendicular        | 34.6                | 69.5           | -34.9       |

Complied with the limit by a margin greater than 10dB.



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**Graph 5 Ground Parallel Emissions 9kHz to 30MHz**

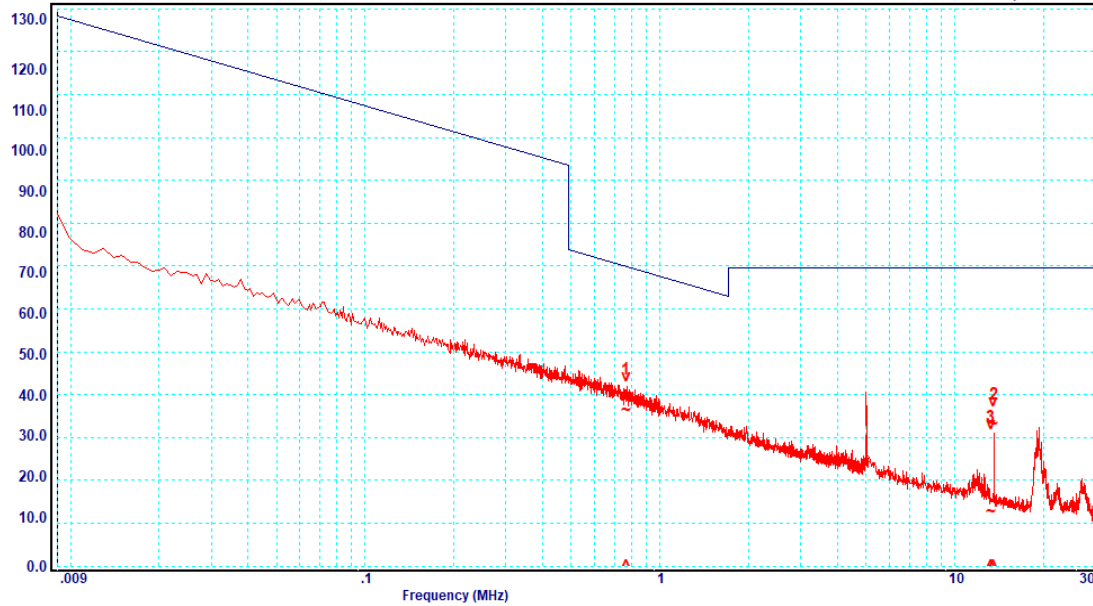
Sato Vicinity Pty Ltd  
 MR1 module transmitter  
 MR1  
 120V 60Hz  
 FCC Part C  
 Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Job No: S211114  
 Test Date: 23/11/21

Limit1: FCC\_15209\_3mFcc Pt15 Subpart C Section 15.209(a) 3Metre Limits 9kHz to 3

Trace 2: Ground Parallel

Test Officer: Dong Feng Plot date: 11-26-2021 13:35:45 Winst:RS:32.8-Wplt:160.16-Rx:R&S,ESU-40,100183/04  
 LA0081221E c1:50280122-1 c2:NONE p:NONE a:NONE  
 Site ID: Syd Room#3,3/87 Station Rd, Seven Hills, NSW Graph No. 5



| Peak | Frequency (MHz) | Antenna Polarisation | Quasi Peak (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------|-----------------|----------------------|---------------------|----------------|-------------|
| 1    | 0.766           | Ground Parallel      | 36.2                | 69.9           | -33.7       |
| 2    | 13.560          | Ground Parallel      | 33.1                | 69.5           | -36.4       |
| 3    | 13.260          | Ground Parallel      | 12.5                | 69.5           | -57.0       |

Complied with the limit by a margin greater than 10dB.



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3.4.1.2 Frequency Band: 30 to 300 MHz

Graph 6

Vertical Emissions

30MHz to 1000MHz

Sato Vicinity Pty Ltd  
 MR1 module transmitter  
 MR1  
 120V 60Hz  
 FCC Part C  
 Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

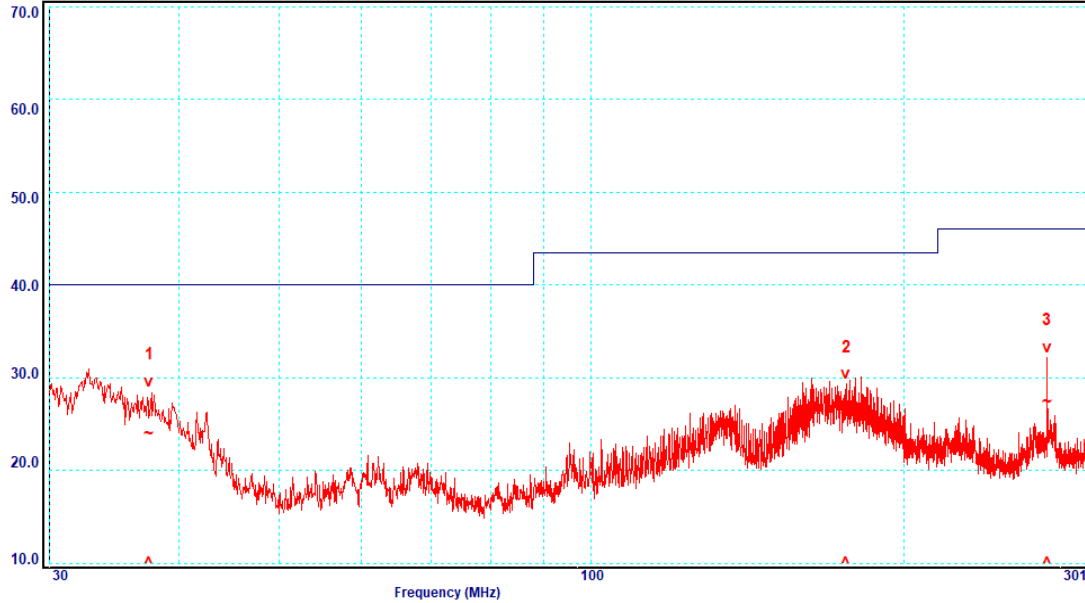
Limit1: FCC-15209 FCC Part 15.209 3 Metre Limits 30MHz to 40GHz

Trace 2: Vertical Emissions

Job No: S211114  
 Test Date: 23/11/21

Test Officer: Dong Feng-Plot date: 11-26-2021 13:41:08 WinstorRS:32.8-Wplt:160.16-Rx:R&S,ESU-40,100183/04  
 t:A4300424+4 c1:C0280122-1 c2:NONE p:NONE a:NONE  
 Site ID: Syd Room#3,3/87 Station Rd, Seven Hills, NSW

Graph No. 6



| Peak | Frequency (MHz) | Antenna Polarisation | Quasi Peak (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------|-----------------|----------------------|---------------------|----------------|-------------|
| 1    | 37.490          | Vertical             | 23.9                | 40.0           | -16.1       |
| 2    | 176.180         | Vertical             | 26.2                | 43.5           | -17.3       |
| 3    | 275.040         | Vertical             | 27.4                | 46.0           | -18.6       |

Complied with the limit by a margin of greater than 10dB.



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**Graph 7**

**Horizontal Emissions**

**30MHz to 1000MHz**

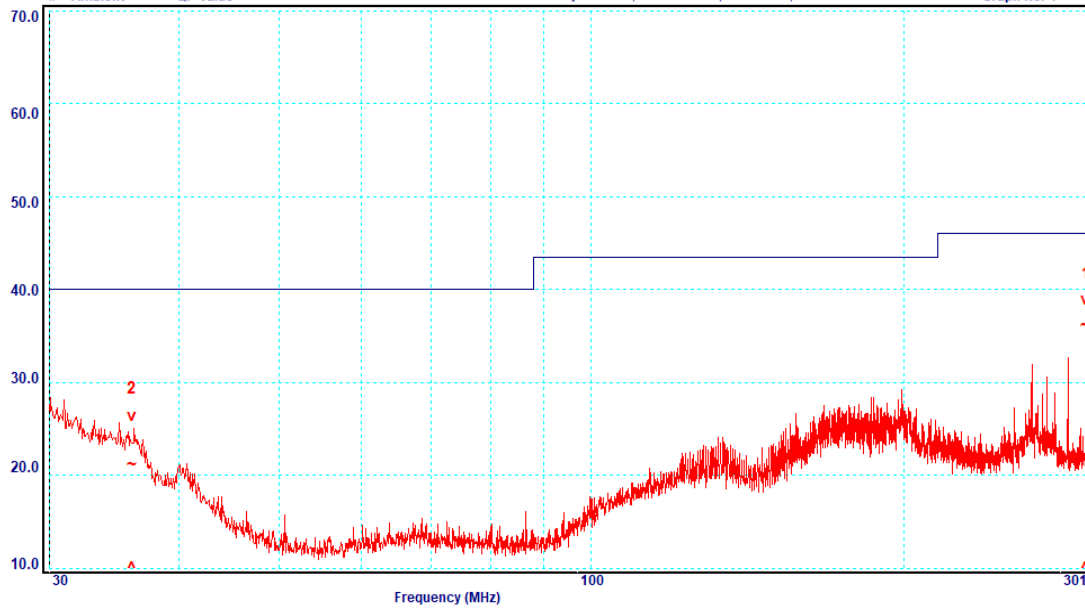
Sato Vicinity Pty Ltd  
 MR1 module transmitter  
 MR1  
 120V 60Hz  
 FCC Part C  
 Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Limit1: FCC-15209 FCC Part 15.209 3 Metre Limits 30MHz to 40GHz

Trace 2: Horizontal Emissions

Job No: S211114  
 Test Date: 23/11/21

Test Officer: Dong Feng Plot date: 11-26-2021 13:43:05  
 LA4300424+4 c1: C0280122-1 c2: NONE p: NONE a: NONE  
 Winst@RS: 32.8-Wplt: 160.16-Rx: R&S, ESU-40, 100183/04  
 Site ID: Syd Room#3, 3/87 Station Rd, Seven Hills, NSW  
 Graph No. 7



| Peak | Frequency (MHz) | Antenna Polarisation | Quasi Peak (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|------|-----------------|----------------------|---------------------|----------------|-------------|
| 1    | 300.000         | Horizontal           | 36.1                | 46.0           | -9.9        |
| 2    | 36.060          | Horizontal           | 21.1                | 40.0           | -18.9       |

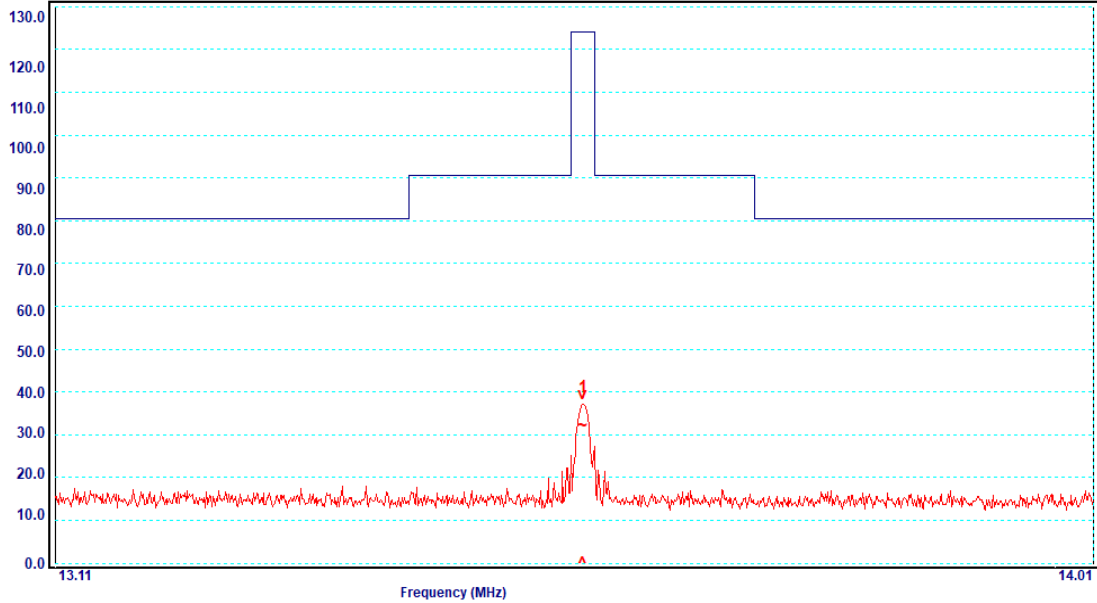
Complied with the limit by a margin of at least 9.9dB.



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**3.4.1.3 Frequency Band: 13.11 MHz to 14.01 MHz (§15.225 (a), (b), (c))**

**Graph 8 Parallel Emissions 9kHz to 30MHz**  
 Sato Vicinity Pty Ltd  
 MR1 module transmitter  
 MR1  
 120V 60Hz  
 FCC Part C  
 Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value  
 Limit1: FCC15.225 FCC Part 15.225  
 Trace 2: Parallel  
 Job No: S211114  
 Test Date: 23/11/21  
 Test Officer: Dong Feng-Plot date: 11-26-2021 13:54:10  
 LA0081221E c1: C0280122-1 c2: NONE p: NONE a: NONE  
 WintstRS: 32.8-Wplt: 160.16-Rx: R&S,ESU-40,100183/04  
 Site ID: Syd Room#3,3/87 Station Rd, Seven Hills, NSW  
 Graph No. 8



| Peak | Frequency (MHz) | Antenna Polarisation | Quasi Peak (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------|-----------------|----------------------|---------------------|----------------|-------------|
| 1    | 13.560          | Parallel             | 32.1                | 124.0          | -91.9       |

Complied with the limit by a margin greater than 10dB.



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**Graph 9 Perpendicular Emissions 9kHz to 30MHz**

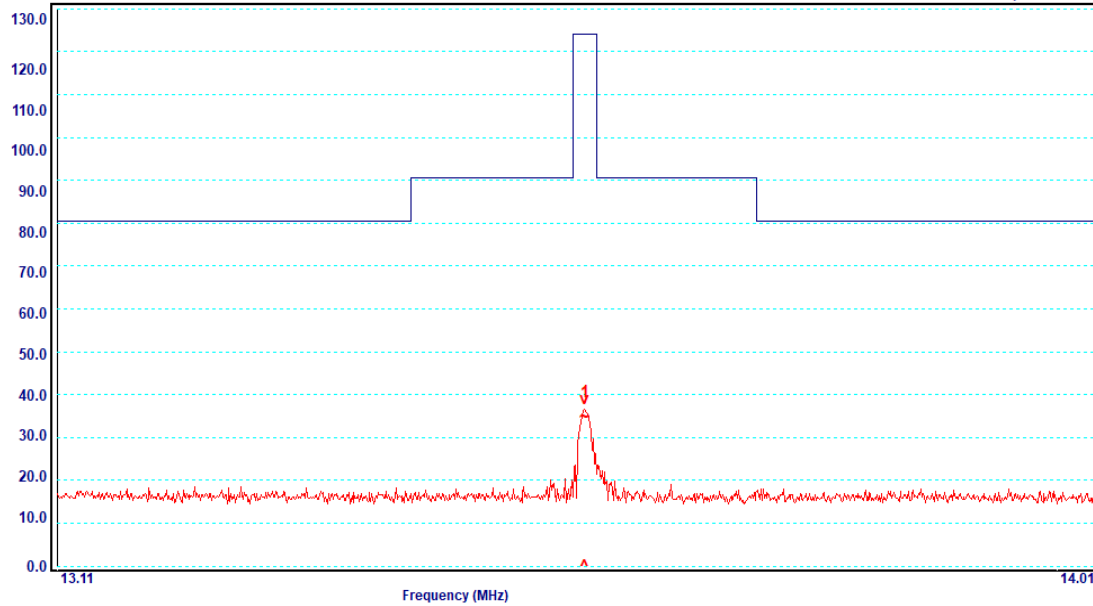
Sato Vicinity Pty Ltd  
 MR1 module transmitter  
 MR1  
 120V 60Hz  
 FCC Part C  
 Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Limit1: FCC15.225 FCC Part 15.225

Trace 2: Perpendicular

Job No: S211114  
 Test Date: 23/11/21

Test Officer: Dong Feng Plot date: 11-26-2021 13:54:41 Winst@RS:32.8-Wplt:160.16-Rx:R&S,ESU-40,100183/04  
 LA0081221E c1:00280122-1 c2:NONE p:NONE a:NONE  
 Site ID: Syd Room#3,3/87 Station Rd, Seven Hills, NSW Graph No. 9



| Peak | Frequency (MHz) | Antenna Polarisation | Quasi Peak (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------|-----------------|----------------------|---------------------|----------------|-------------|
| 1    | 13.560          | Perpendicular        | 34.7                | 124.0          | -89.3       |

Complied with the limit by a margin greater than 10dB.



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**Graph 10** **Ground Parallel Emissions** **9kHz to 30MHz**

Sato Vicinity Pty Ltd  
 MR1 module transmitter  
 MR1  
 120V 60Hz  
 FCC Part C  
 Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Limit1: FCC15.225 FCC Part 15.225

Trace 2: Ground Parallel

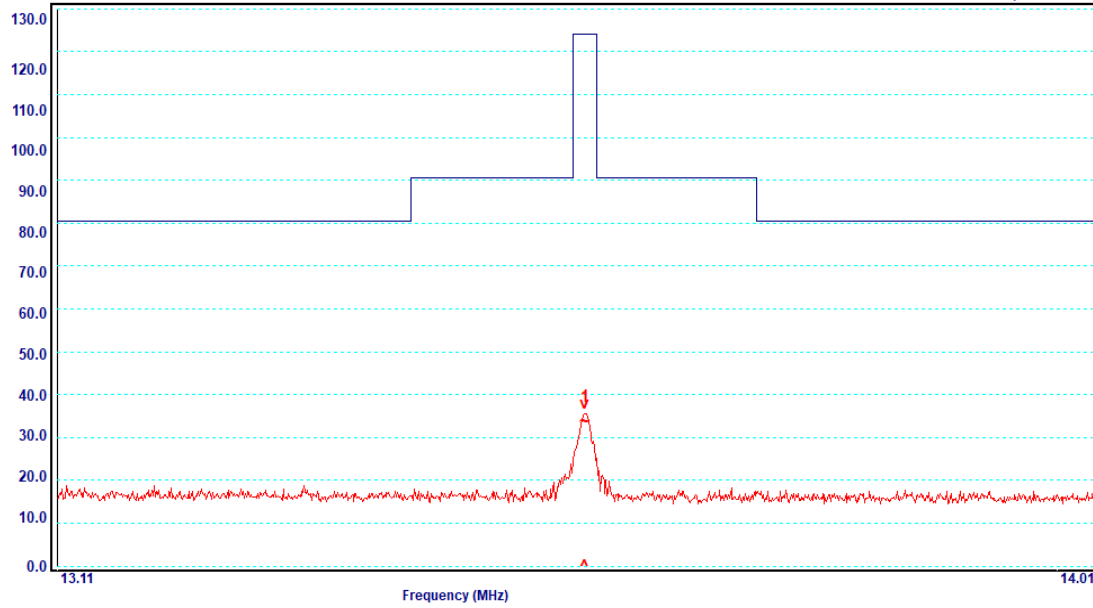
Job No: S211114

Test Date: 23/11/21

Test Officer: Dong Feng Plot date: 11-26-2021 13:55:16  
 LA0081221E c1:00280122-1 c2:NONE p:NONE a:NONE  
 Site ID: Syd Room#3,3/87 Station Rd, Seven Hills, NSW

Winst@RS:32.8-Wplt:160.16-Rx:R&S,ESU-40,100183/04

Graph No. 10



| Peak | Frequency (MHz) | Antenna Polarisation | Quasi Peak (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|------|-----------------|----------------------|---------------------|----------------|-------------|
| 1    | 13.560          | Ground Parallel      | 33.6                | 124.0          | 91.4        |

Complied with the limit by a margin greater than 10dB.



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### 3.5 §15.225(e) Frequency Tolerance

The Frequency Tolerance was measured using the procedure from ANSI C63.10 section 6.8.

#### 3.5.1 Supply Voltage Variation

The mains supply was lowered from 120V 60Hz to 102V (85% of nominal supply) and maintained until the frequency was stable. The mains supply was then increased from 120V 60Hz to 138V (115% of nominal supply) and maintained until the frequency was stable.

| Temperature | Supply Voltage | Frequency Reading [MHz] | Frequency Variation [%] |
|-------------|----------------|-------------------------|-------------------------|
| 20°C        | 85% (102 V)    | 13.56                   | 0%                      |
| 20°C        | 115% (138 V)   | 13.56                   | 0%                      |

|   |      |    |
|---|------|----|
| Maximum Frequency Variation to Nominal Frequency: | 13.6 | 0% |
|---|------|----|

The frequency tolerance of the carrier signal was maintained within  $\pm 0.01\%$  of the operating frequency during the voltage variation test.

#### 3.5.2 Temperature Variation

The ambient temperature with a supply voltage of 120V 60Hz was varied between -20°C and +50°C. The frequency of the carrier was observed and compared to the nominal frequency.

| Supply Voltage | Temperature | Frequency Reading [MHz] | Frequency Variation [%] |
|----------------|-------------|-------------------------|-------------------------|
| 120 V          | -20°C       | 13.56                   | 0%                      |
| 120 V          | -10°C       | 13.56                   | 0%                      |
| 120 V          | 0°C         | 13.56                   | 0%                      |
| 120 V          | 10°C        | 13.56                   | 0%                      |
| 120 V          | 20°C        | 13.56                   | 0%                      |
| 120 V          | 30°C        | 13.56                   | 0%                      |
| 120 V          | 40°C        | 13.56                   | 0%                      |
| 120 V          | 50°C        | 13.56                   | 0%                      |

|   |       |    |
|---|-------|----|
| Maximum Frequency Variation to Nominal Frequency: | 13.56 | 0% |
|---|-------|----|

The frequency tolerance of the carrier signal was maintained within  $\pm 0.01\%$  of the operating frequency during the temperature variation test.

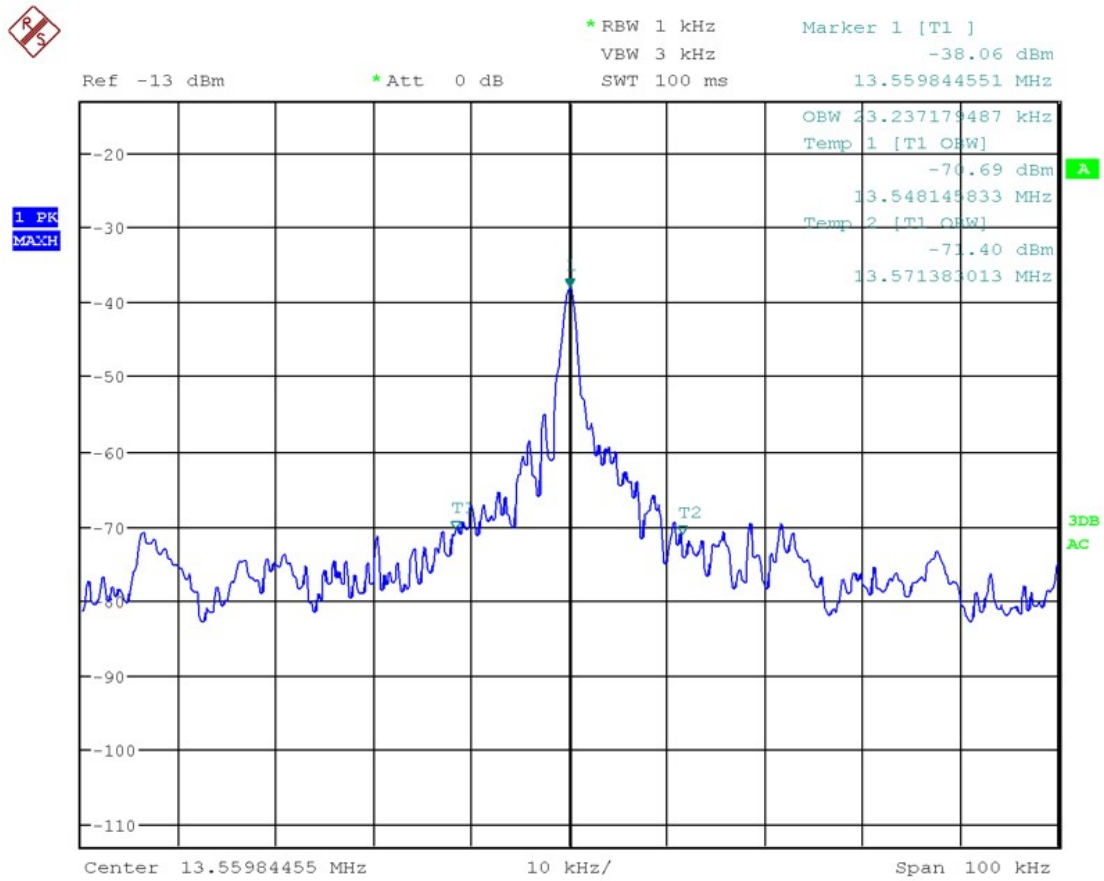


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### 3.6 §2.1049 Occupied bandwidth – 99% power

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

The 99% power bandwidth was **23.23kHz**.



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## 4.0 COMPLIANCE STATEMENT

The MR-1 with Model: MR-1 Module, complied with the requirements of FCC Part 15 Rules for an intentional radiator when tested in accordance with FCC Part 15.225.

## 5.0 Uncertainties

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

9kHz to 30 MHz             $\pm 3.2$  dB

### Radiated Emissions

9kHz to 30MHz             $\pm 4.1$  dB

30MHz to 300MHz         $\pm 5.1$  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%.



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