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## **TEST REPORT**

**ICT Protégé RME-DFBT  
Rear Mount Electronic Reader**

*tested to*

**47 Code of Federal Regulations**

**Part 15 - Radio Frequency Devices  
Subpart C – Intentional Radiators**

**Section 15.209**

**Section 15.225**

**Operation within the band 13.110 -14.010 MHz**

**Section 15.249**

**Operation in the band 2400 – 2483.5 MHz**

*for*

**Integrated Control Technology**

This Test Report is issued with the authority of:

**Andrew Cutler- General Manager**



All tests reported herein  
have been performed in  
accordance with the  
laboratory's scope of  
accreditation

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## 1. STATEMENT OF COMPLIANCE

The **ICT Protégé RME-DFBT Rear Mount Electronic Reader** complies with FCC Part 15 Subpart C Sections 15.209, 15.225 and 15.249 as an Intentional Radiator when the methods as described in ANSI C63.10 - 2020 are applied.

## 2. RESULTS SUMMARY

The results from testing carried out on between Friday November 15<sup>th</sup> 2024 and Friday December 13<sup>th</sup> 2024 are summarised in the following table:

| Clause     | Parameter                                     | Result                                           |
|------------|-----------------------------------------------|--------------------------------------------------|
| 15.201     | Equipment authorisation requirement           | Certification required.                          |
| 15.203     | Antenna requirement                           | Complies. Antennas internal to the device.       |
| 15.204     | External PA and antenna modifications         | Not applicable. No external devices.             |
| 15.205     | Restricted bands of operation                 | Complies.                                        |
| 15.207     | Conducted limit                               | Not applicable. Internal battery powered device. |
| 15.209     | Radiated emission limits - Emissions < 30 MHz | Complies.                                        |
| 15.209     | Radiated emission limits – Emissions > 30 MHz | Complies.                                        |
| 15.225     | Radiated emission limits - Fundamental        | Complies.                                        |
| 15.225     | Frequency stability                           | Complies.                                        |
| 15.249 (a) | Field strength of fundamental                 | Complies.                                        |
| 15.249 (a) | Field strength of harmonics                   | Complies.                                        |
| 15.249 (b) | Fixed, point to point operations              | Not applicable.                                  |
| 15.249 (c) | 3 metre measurement distance                  | Noted                                            |
| 15.249 (d) | Spurious emission levels except harmonics     | Complies.                                        |
| 15.249 (e) | Detectors above 1000 MHz                      | Noted.                                           |
| 15.249 (f) | Reference to section 15.37(d)                 | Noted.                                           |

### 3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

**The client selected the test sample.**

**The report relates only to the sample tested.**

**The corrections or erasures in the test report are indicated in the report revision table.**

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

All testing was carried out as per the standard in the worst-case configuration with no deviations being applied.

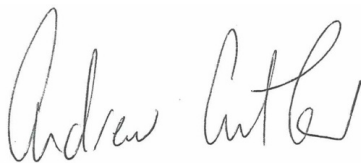
In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.

#### Report Revision Table

| Version  | Change Made    | Date        |
|----------|----------------|-------------|
| 241102.1 | Initial Issue. | 15 Dec 2024 |



Andrew Cutler  
General Manager  
EMC Technologies NZ Ltd

## 4. CLIENT INFORMATION

|                     |                                       |
|---------------------|---------------------------------------|
| <b>Company Name</b> | Integrated Control Technology Limited |
| <b>Address</b>      | 4 John Glenn Avenue, Rosedale         |
| <b>City</b>         | Auckland 0632                         |
| <b>Country</b>      | New Zealand                           |
| <b>Contact</b>      | Steven Whitaker                       |

## 5. DESCRIPTION OF TEST SAMPLE

|                          |                                          |
|--------------------------|------------------------------------------|
| <b>Brand Name</b>        | ICT Protege                              |
| <b>Model Number</b>      | RME-DFBT                                 |
| <b>Product</b>           | Rear Mount Electronic Reader             |
| <b>Manufacturer</b>      | Integrated Control Technology Ltd. (ICT) |
| <b>Country of Origin</b> | New Zealand                              |
| <b>Serial Number</b>     | Sample not serialised                    |
| <b>FCC ID</b>            | UAURMEDFBT                               |

### Product Description:

This device tested is a Rear Mount Mortise Wireless Lock

The Wireless Lock is triggered using an access card that operates on 13.560 MHz

The device also contains a Bluetooth device which allows remote access to the Wireless Lock

The product is powered using a 4.5 Vdc internal battery supply (3 x 1.5 Vdc dry cell batteries) this is replaced every two or three years.

## 6. SETUPS AND PROCEDURES

### Standard

The sample was tested in accordance with 47 CFR Part 15 Subpart C.

### Methods and Procedures

The measurement methods and procedures as described in ANSI C63.10 – 2020 were used.

### Section 15.201: Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is required for this device.

### Section 15.203: Antenna requirement

This device has an internal antenna for the 13.560 MHz transmitter.

This device has internal antennas for the 2.4 GHz Bluetooth transmitter.

**Result:** Complies.

### Section 15.204: External radio frequency power amplifiers and antenna modifications

It is not possible to attach an external power amplifier to this transmitter.

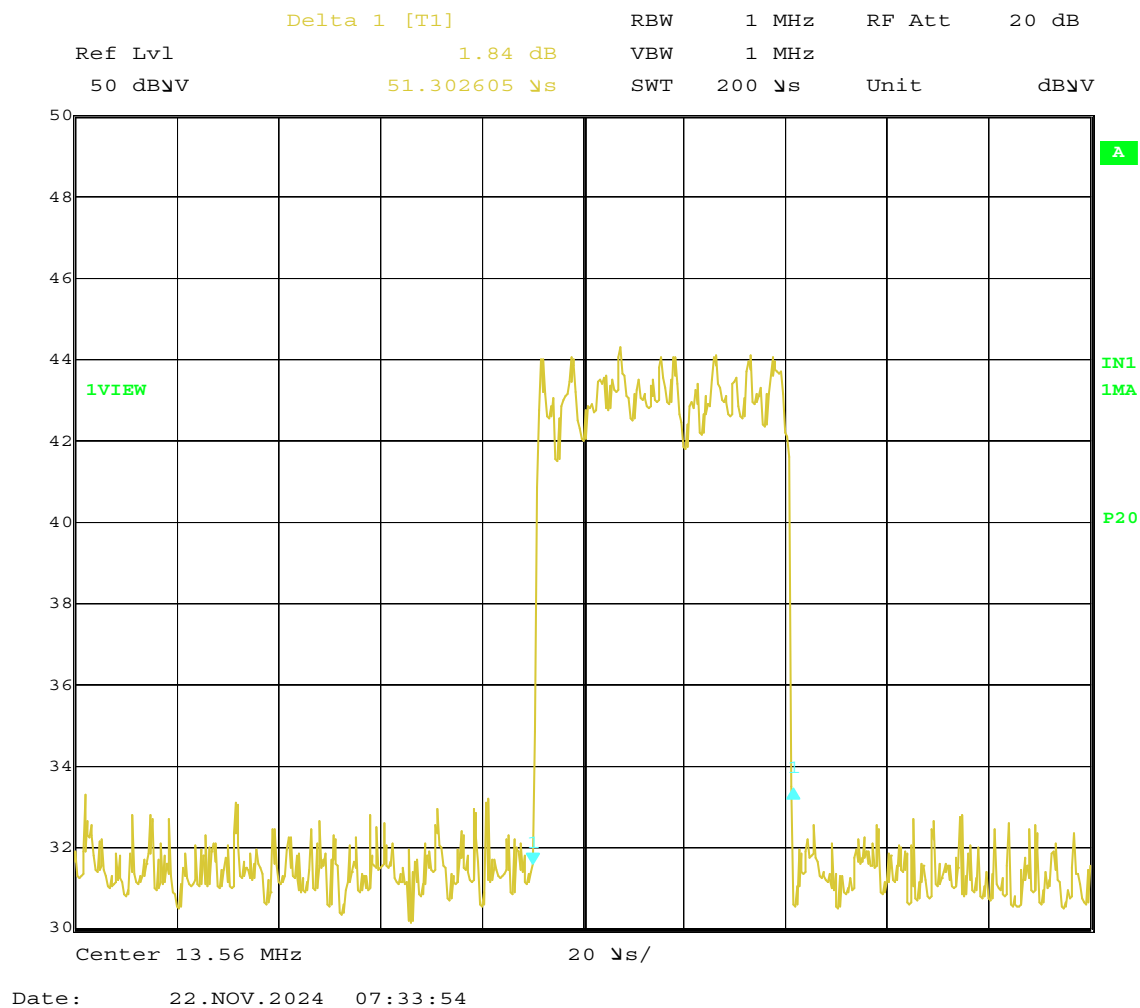
**Result:** Complies.

## Section 15.205: Restricted bands of operation

The transmitter transmits on 13.560 MHz in two modes being

- standby while awaiting a card to open the door
- operating when a card is placed next to the reader and the lock locks or unlocks

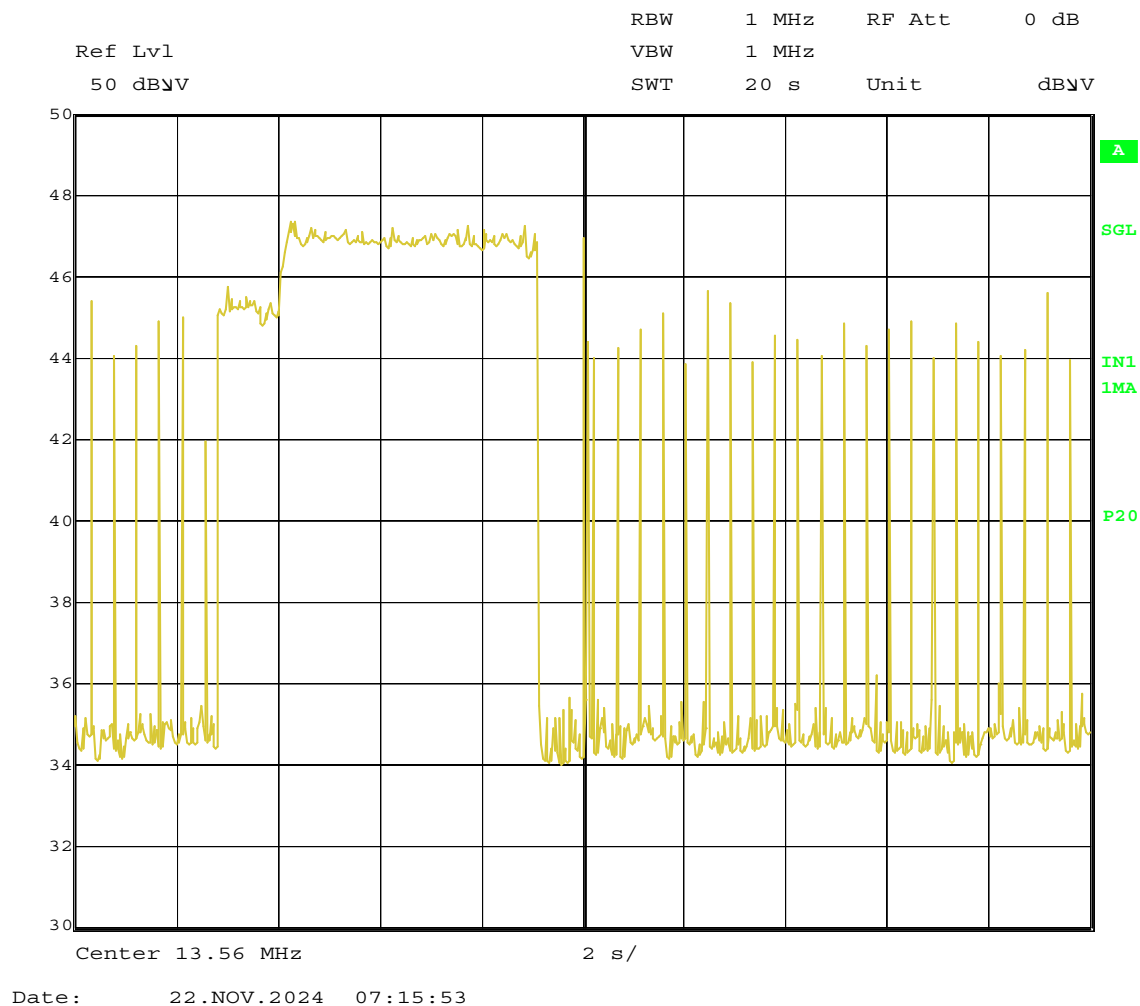
When operating in standby mode approximately 50  $\mu$ s pulse is transmitted ever 440 ms which is shown below.



When a card is presented the pulse transmission becomes continuous for approximately 5 to 6 seconds where the level steps up approximately 4 dB after about 1 second on initial transmission.

The plot below shows this.

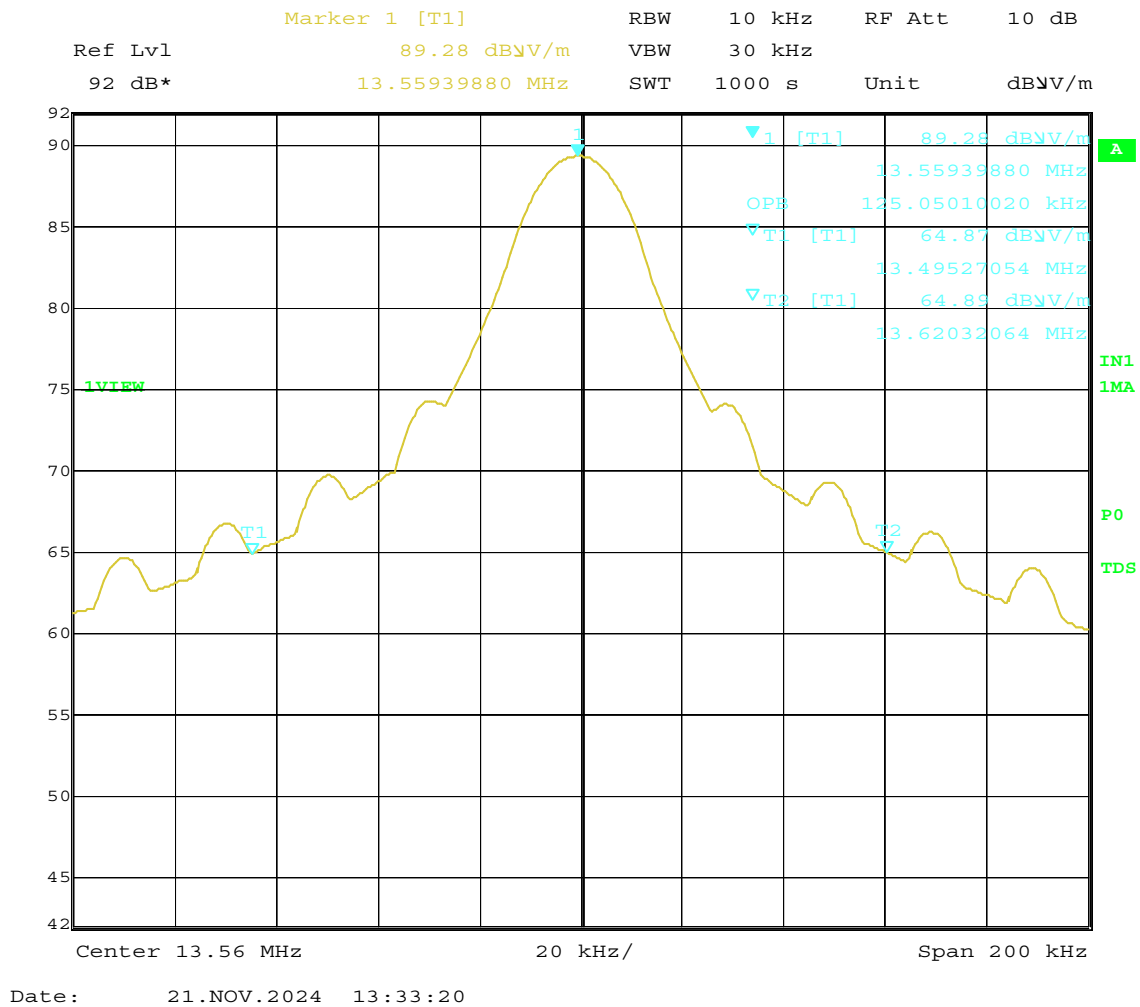
After the lock as unlocked and then locked the pulse transmission every 440 ms is once again evident.



In Standby mode this device would therefore fall into the band of 13.110 – 14.010 MHz that is covered by Section 15.225.

Measurements were made at the test site using a spectrum analyser.

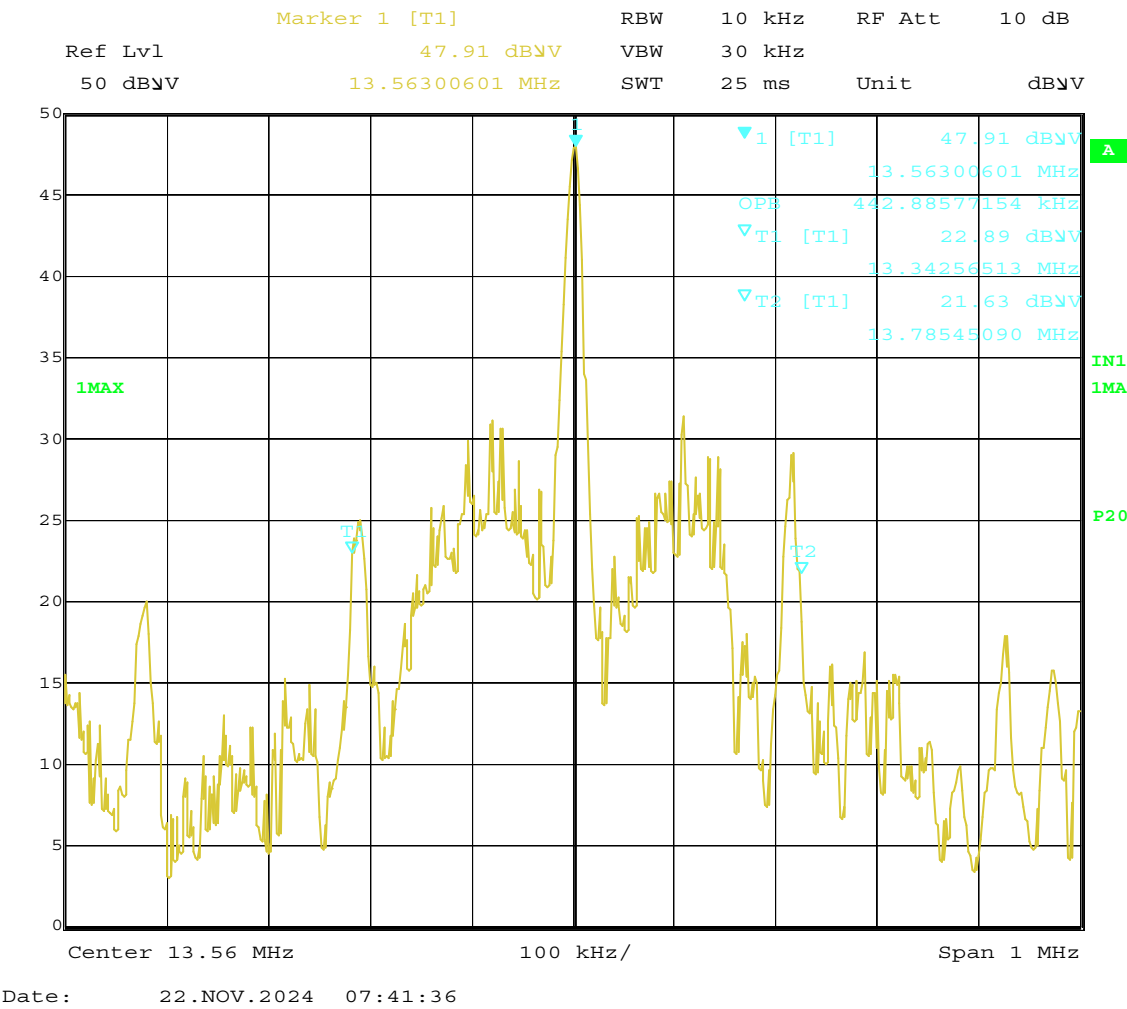
The plot below shows a 99% occupied bandwidth of 125.050 kHz.



In Operating mode this device would therefore fall into the band of 13.110 – 14.010 MHz that is covered by Section 15.225.

Measurements were made at the test site using a spectrum analyser.

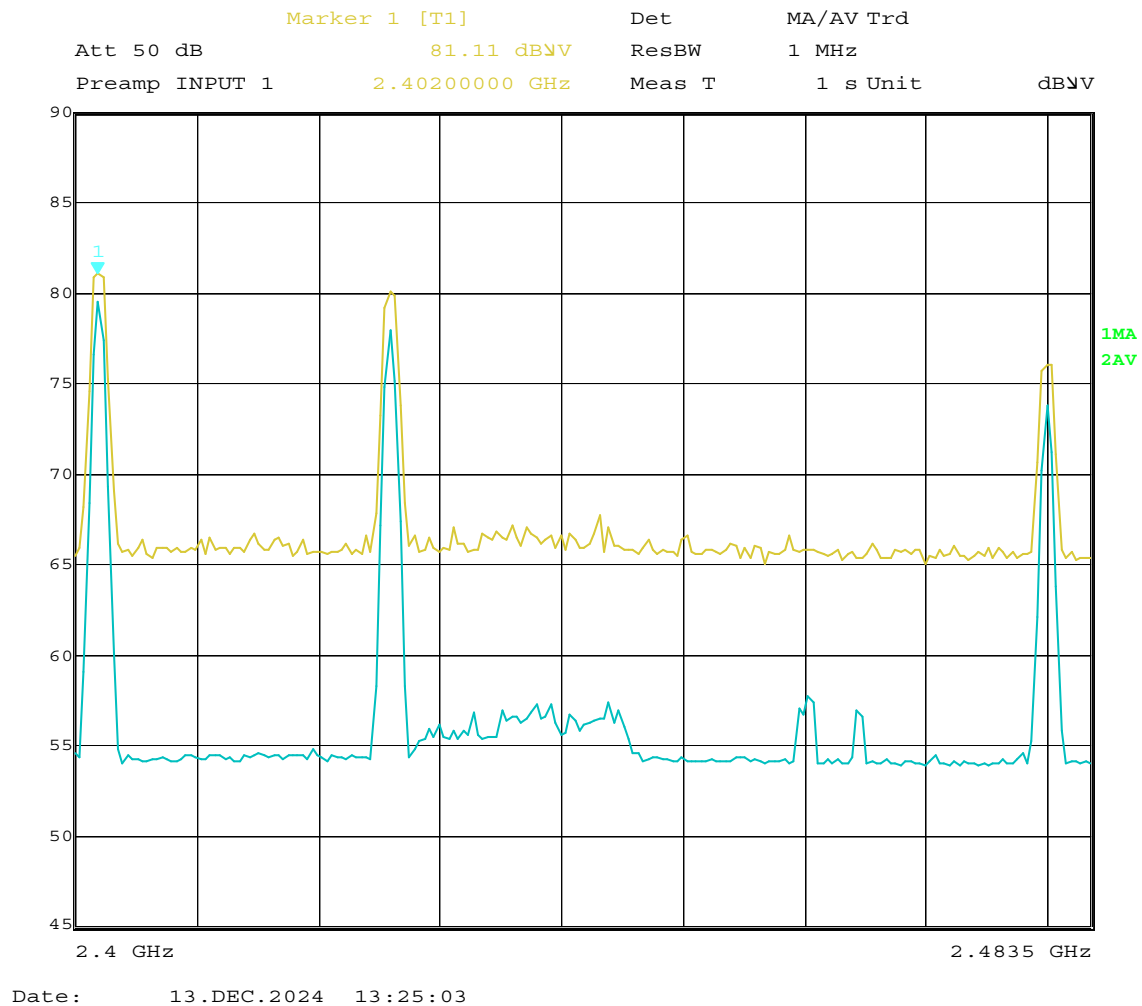
The plot below shows a 99% occupied bandwidth of 442.886 kHz.



The Bluetooth transmitter was observed transmitting on 2402, 2426 and 2480 MHz.

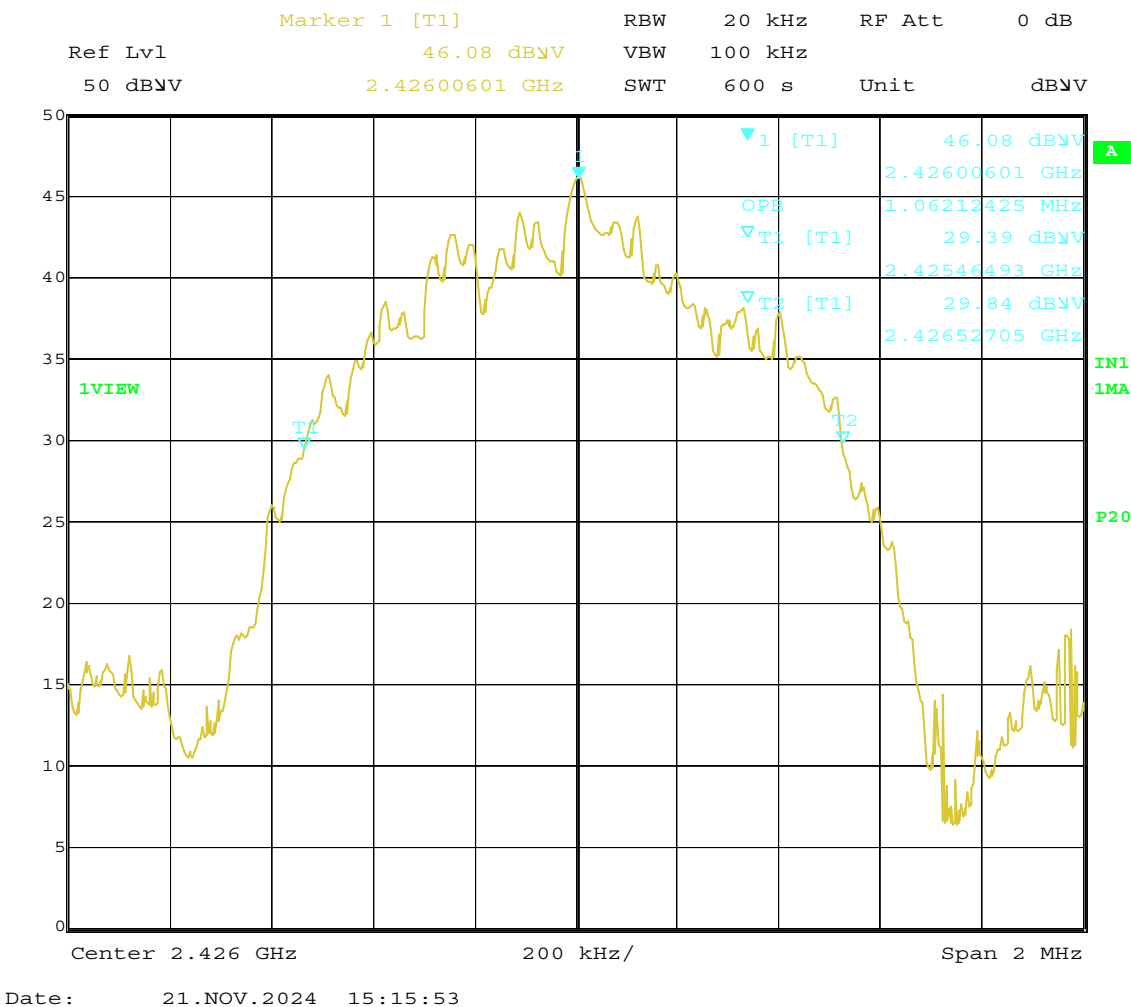
This device would therefore fall into the band of 2400.0 – 2483.5 MHz band that is covered by Section 15.249.

This is shown below



Bluetooth transmission on 2426 MHz

99% Occupied Bandwidth – 1062.124 kHz



Result: Complies

**Section 15.207: Conducted emissions testing**

Testing not applicable as this device is powered using an internal battery supply at 4.5 Vdc (3 x 1.5 Vdc dry cell batteries) that is removed when voltage decreases.

No provisions have been made for the attachment of a charger.

Device cannot be directly or in-directly connected to the public AC mains supply.

**Result:** Not applicable



## Section 15.209: Radiated Emission Limits, General Requirements

Radiated emissions testing was carried out over the frequency range of 100 kHz to 25,000 MHz as the device contains a Bluetooth Transmitter.

Testing was carried out at the laboratory's open area test site - located at Driving Creek, Orere Point, Auckland, New Zealand.

An enclosure containing absorber material, Panashield HYB-NF-12, has been placed between the turntable and the measurement antenna for when measurements are made above 1 GHz.

This material has no absorbing affect below 1 GHz with site verification measurements confirming this.

Testing carried out when the device was placed in the centre of the table standing upright.

Below 1000 MHz the top of the test table was 80 cm above the test site ground plane.

Above 1000 MHz the top of the test table was 150 cm above the test site ground plane

Device tested has a 13.560 MHz card reader that was operated in standby and continuous operating modes.

The device also supports Bluetooth functionality in the 2.4 GHz band which was active during the test.

Device was tested when powered using an internal 4.5 Vdc battery supply.

The lock was periodically activated using a supplied swipe card which caused the lock to open and close which confirmed continuing correct operations.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height, where appropriate, with an automated antenna tower.

Below 30 MHz a magnetic loop is used with the centre of the loop being 1 metre above the ground with a test distance of 10 metres being used.

Between 100 – 490 kHz a Peak and Average detector with a bandwidth of 9 kHz was used

Between 490 kHz – 30 MHz a Quasi Peak detector with a bandwidth of 9 kHz was used.

Above 30 MHz the emission is measured in both vertical and horizontal antenna polarisations, where appropriate at a test distance of 3 metres.

A quasi peak detector with a 120 kHz bandwidth was used between 30 – 1000 MHz

Above 1000 MHz an Average and a Peak detector were used which used a bandwidth of 1 MHz

**Section 15.209: Radiated Emission Limits, General Requirements cont.**

The emission level was determined in field strength by taking the following into consideration:

$$\text{Level (dB}\mu\text{V/m)} = \text{Receiver Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB/m)} + \text{Coax Loss (dB)}$$

For example, if an emission of 30 dB $\mu$ V was observed at 30 MHz.

$$45.5 \text{ dB}\mu\text{V/m} = 30.0 \text{ dB}\mu\text{V} + 14 \text{ dB/m} + 1.5 \text{ dB}$$

**Result:** Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 25000 MHz)  $\pm 4.1 \text{ dB}$
- Free radiation tests (100 kHz – 30 MHz)  $\pm 4.8 \text{ dB}$



## Section 15.209: 13.560 MHz Transmitter below 30 MHz Spurious Emissions Measurements

Standby operating mode

| Frequency (MHz) | Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|----------------------|----------------------|-------------|
| 27.120          | 15.3                 | 48.6                 | 33.3        |

Operating mode

| Frequency (MHz) | Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|----------------------|----------------------|-------------|
| 27.120          | 10.1                 | 48.6                 | 38.5        |

Magnetic loop measurements were attempted at a distance of 10 metres.

A receiver using a Quasi Peak detector with a 9 kHz bandwidth was used between 490 kHz – 30.0 MHz.

The 30 metre limit between 1.705 MHz – 30 MHz has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2).

The limit at 27.120 MHz when measured at 30 metres is 30  $\mu$ V/m or 29.54 dB $\mu$ V/m.

Therefore when scaled the limit at 10 metres will be 48.6 dB $\mu$ V/m as detailed below.

$$= 29.54 \text{ dB}\mu\text{V/m} + -40 \text{ dB/decade} * (\log(10) - \log(30))$$

$$= 29.54 \text{ dB}\mu\text{V/m} + -40 \text{ dB/decade} * (1.000 - 1.477)$$

$$= 29.54 \text{ dB}\mu\text{V/m} + -40 \text{ dB/decade} * -0.477$$

$$= 29.54 \text{ dB}\mu\text{V/m} + 19.08$$

$$= 48.6 \text{ dB}\mu\text{V/m}$$

The spurious emission observed does not exceed the level of the fundamental emission

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz)  $\pm 4.8$  dB

## Section 15.209: Spurious Emissions (above 30 MHz) – Standby mode

Measurements between 30 – 25000 MHz have been made at a distance of 3 metres.

A receiver using a detector with a 120 kHz bandwidth was used between 30 – 1000 MHz as the emission consisted of a 50 us pulse every 440 ms.

No Quasi Peak emissions were detected.

The emissions were measured using a peak detector and recorded gain the Quasi Peak limits.

The limits as described in Section 15.209 have been applied.

| Frequency (MHz) | Vertical (dBµV/m) | Horizontal (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Antenna Pol | Detector |
|-----------------|-------------------|---------------------|----------------|-------------|-------------|----------|
| 40.680          | 30.7              | 23.7                | 40.0           | 9.3         | Vertical    | Peak     |
| 54.240          | 25.1              | 18.2                | 40.0           | 14.9        | Vertical    | Peak     |
| 67.800          | 22.3              | 17.1                | 40.0           | 17.7        | Vertical    | Peak     |
| 81.360          | 19.8              | 16.4                | 40.0           | 20.2        | Vertical    | Peak     |
| 108.480         | 21.5              | 23.6                | 43.5           | 19.9        | Vertical    | Peak     |
| 122.040         | 32.8              | 24.8                | 43.5           | 10.7        | Vertical    | Peak     |
| 135.600         | 32.9              | 26.2                | 43.5           | 10.6        | Vertical    | Peak     |
| 149.160         | 33.5              | 28.5                | 43.5           | 10.0        | Vertical    | Peak     |
| 162.720         | 31.7              | 26.2                | 43.5           | 11.8        | Vertical    | Peak     |
| 176.280         | 32.7              | 26.5                | 43.5           | 10.8        | Vertical    | Peak     |
| 189.840         | 28.1              | 26.6                | 43.5           | 15.4        | Vertical    | Peak     |
| 203.400         | 30.4              | 25.9                | 43.5           | 13.1        | Vertical    | Peak     |
| 216.960         | 26.8              | 26.2                | 46.0           | 19.2        | Vertical    | Peak     |
| 230.520         | 27.5              | 25.9                | 46.0           | 18.5        | Vertical    | Peak     |
| 244.080         | 28.2              | 27.8                | 46.0           | 17.8        | Vertical    | Peak     |
| 257.640         | 27.8              | 29.1                | 46.0           | 16.9        | Vertical    | Peak     |
| 271.200         | 29.3              | 28.9                | 46.0           | 16.7        | Vertical    | Peak     |
| 284.760         | 29.5              | 28.6                | 46.0           | 16.5        | Vertical    | Peak     |
| 298.320         | 30.4              | 30.1                | 46.0           | 15.6        | Vertical    | Peak     |
| 352.560         | 32.1              | 27.7                | 46.0           | 13.9        | Vertical    | Peak     |
| 379.680         | 32.7              | 27.9                | 46.0           | 13.3        | Vertical    | Peak     |

Above 1000 MHz the only emissions observed were from the Bluetooth transmitter that was observed advertising on 2402, 2426 and 2480 MHz.

All other emissions observed had a margin to the limit that exceeded 15 dB when measurements were made between 30 – 25000 MHz using both vertical and horizontal polarisations.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 MHz – 25000 MHz)  $\pm$  4.1 dB

## Section 15.209: Spurious Emissions (above 30 MHz) – Operating Mode

Measurements between 30 – 25000 MHz have been made at a distance of 3 metres.

Modifications were made by the client to product which enable the 13.560 MHz transmitter to operate for approximately 400 ms every two seconds which simulating the reading of a card.

A Quasi Peak detector was used to make these measurements.

The limits as described in Section 15.209 have been applied.

| Frequency (MHz) | Vertical (dBµV/m) | Horizontal (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Antenna Pol | Detector |
|-----------------|-------------------|---------------------|----------------|-------------|-------------|----------|
| 40.680          | 36.0              | 20.6                | 40.0           | 4.0         | Vertical    | QP       |
| 67.800          | 26.2              | 17.5                | 40.0           | 13.8        | Vertical    | QP       |
| 94.920          | 32.1              | 24.1                | 43.5           | 11.4        | Vertical    | QP       |
| 122.040         | 18.5              | 19.1                | 43.5           | 24.4        | Horizontal  | QP       |
| 149.160         | 31.5              | 30.1                | 43.5           | 12.0        | Vertical    | QP       |
| 176.280         | 24.9              | 21.5                | 43.5           | 18.6        | Vertical    | QP       |
| 203.400         | 23.2              | 24.1                | 43.5           | 19.4        | Horizontal  | QP       |
| 230.520         |                   | 24.5                | 46.0           | 21.5        | Horizontal  | QP       |
| 271.200         | 26.5              | 24.1                | 46.0           | 19.5        | Vertical    | QP       |
| 298.320         | 30.2              | 27.6                | 46.0           | 15.8        | Vertical    | QP       |
| 311.880         | 26.3              |                     | 46.0           | 19.7        | Vertical    | QP       |
| 339.000         | 30.6              | 24.5                | 46.0           | 15.4        | Vertical    | QP       |
| 352.560         | 31.1              | 23.1                | 46.0           | 14.9        | Vertical    | QP       |
| 366.120         | 35.5              | 27.2                | 46.0           | 10.5        | Vertical    | QP       |
| 379.680         | 28.1              |                     | 46.0           | 17.9        | Vertical    | QP       |
| 393.240         | 28.3              |                     | 46.0           | 17.7        | Vertical    | QP       |
| 474.600         | 26.4              |                     | 46.0           | 19.6        | Vertical    | QP       |
| 583.080         | 30.4              |                     | 46.0           | 15.6        | Vertical    | QP       |

Above 1000 MHz the only emissions observed were from the Bluetooth transmitter that was observed advertising on 2402, 2426 and 2480 MHz.

All other emissions observed had a margin to the limit that exceeded 15 dB when measurements were made between 30 – 25000 MHz using both vertical and horizontal polarisations.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 MHz – 25000 MHz)  $\pm$  4.1 dB

## Section 15.225: Fundamental Emission:

Measurements were made using a magnetic loop antenna and a receiver using a Quasi Peak detector using a 9 kHz bandwidth

Measurements were made at a distance of 10 metres with the limit being determined by using the extrapolation factor of 40 dB per decade limit, as detailed in section 15.31 f (2).

The limit at 30 m at 13.560 MHz is 15,848 uV/m or 84.0 dBuV/m.

Applying the extrapolation factor of 40 dB/ per decade, the limit is 103.1 dBuV/m.

$$\begin{aligned} &= 84.0 \text{ dBuV/m} + -40 \text{ dB/decade} * (\log(10) - \log(30)) \\ &= 84.0 \text{ dBuV/m} + 19.08 \\ &= 103.1 \text{ dBuV/m} \end{aligned}$$

Testing was carried out in Standby and Operating mode when the 4.5 Vdc supply to the device was varied by - 15% as dry cell batteries are used.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz)  $\pm 4.8$  dB

Standby mode

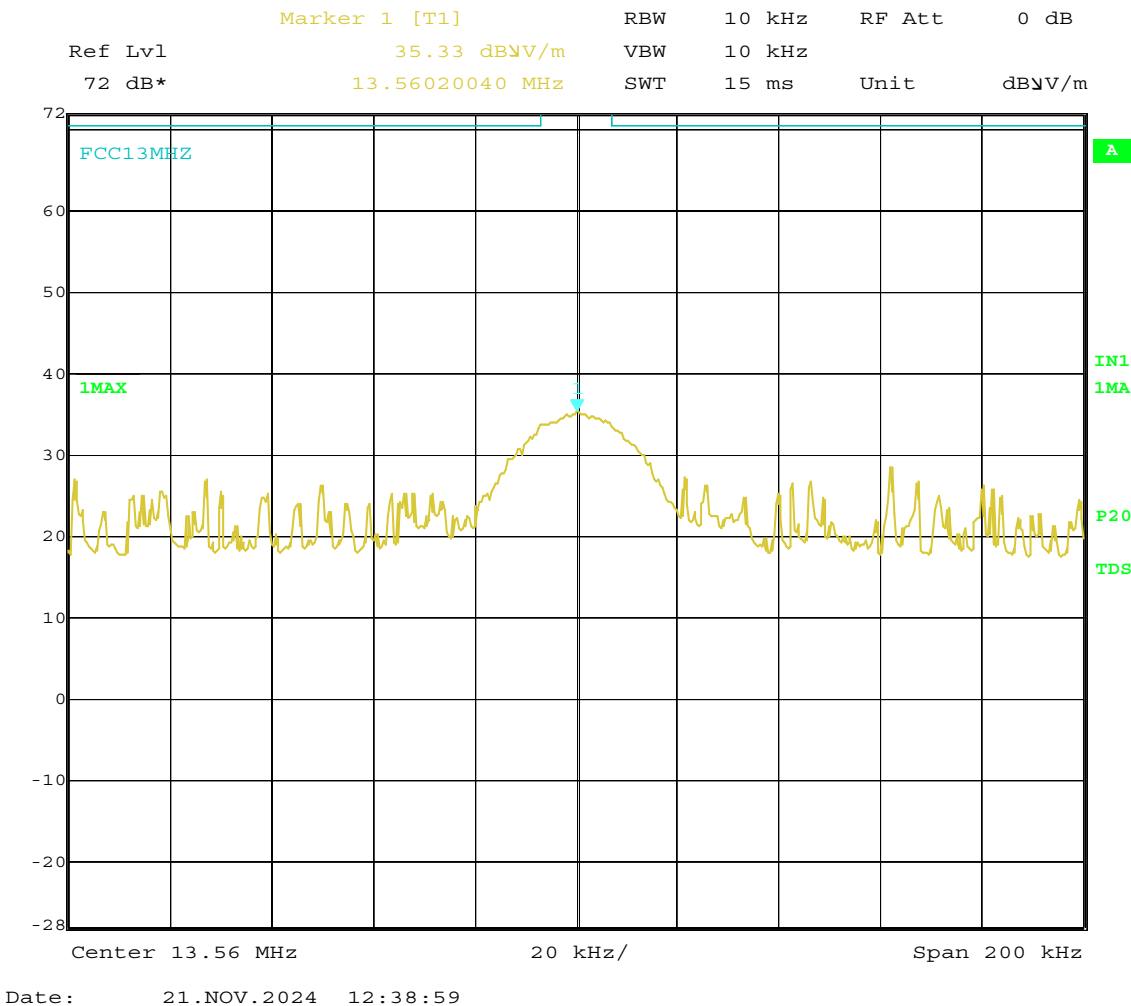
| Frequency (MHz) | Level (dBuV/m) | Distance (metres) | Limit (dBuV/m) | Voltage (Vdc) | Margin (dB) |
|-----------------|----------------|-------------------|----------------|---------------|-------------|
| 13.560          | 33.8           | 10.0              | 103.1          | 3.8           | 69.3        |
| 13.560          | 33.8           | 10.0              | 103.1          | 4.5           | 69.3        |

Operating mode

| Frequency (MHz) | Level (dBuV/m) | Distance (metres) | Limit (dBuV/m) | Voltage (Vdc) | Margin (dB) |
|-----------------|----------------|-------------------|----------------|---------------|-------------|
| 13.560          | 42.6           | 10.0              | 103.1          | 3.8           | 60.5        |
| 13.560          | 42.6           | 10.0              | 103.1          | 4.5           | 60.5        |

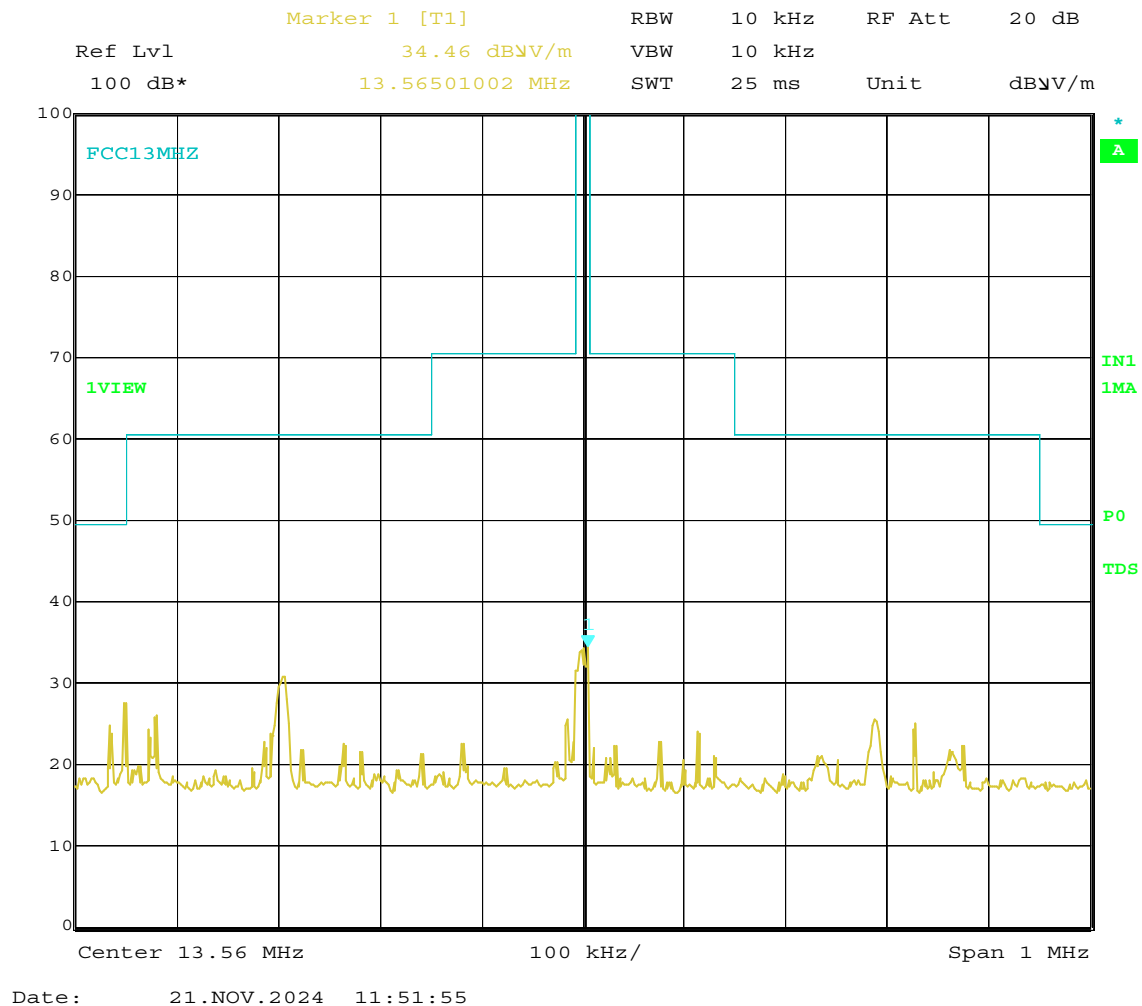
Standby mode:

A spectrum analyser plot showing the carrier and modulation peaks within +/- 100 kHz.



Standby mode:

A spectrum analyser plot showing the carrier and modulation peaks within +/- 500 kHz.



Measurement was made at the test site and due to the time of day a number of ambient emissions can be seen which are not from the device under test

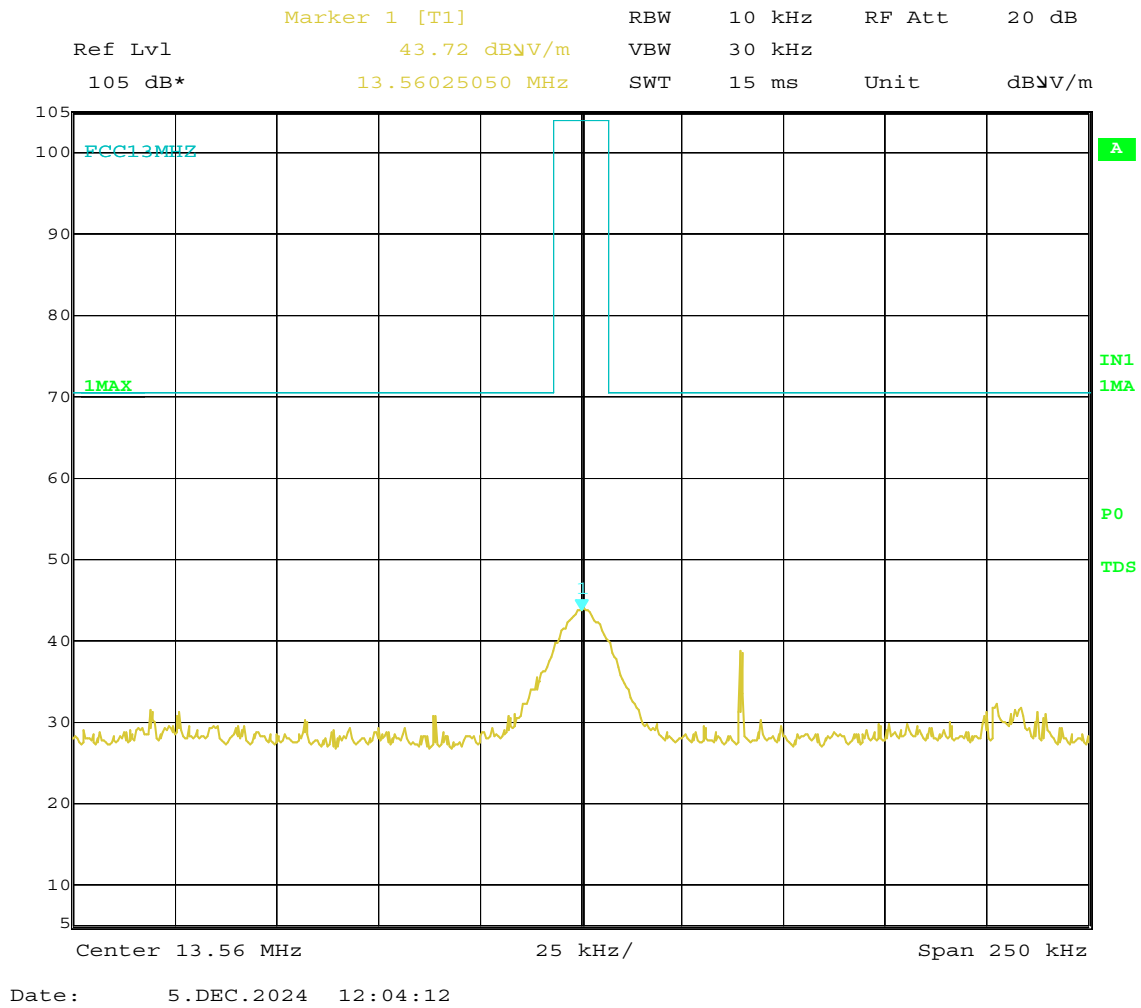
**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz)  $\pm 4.8$  dB

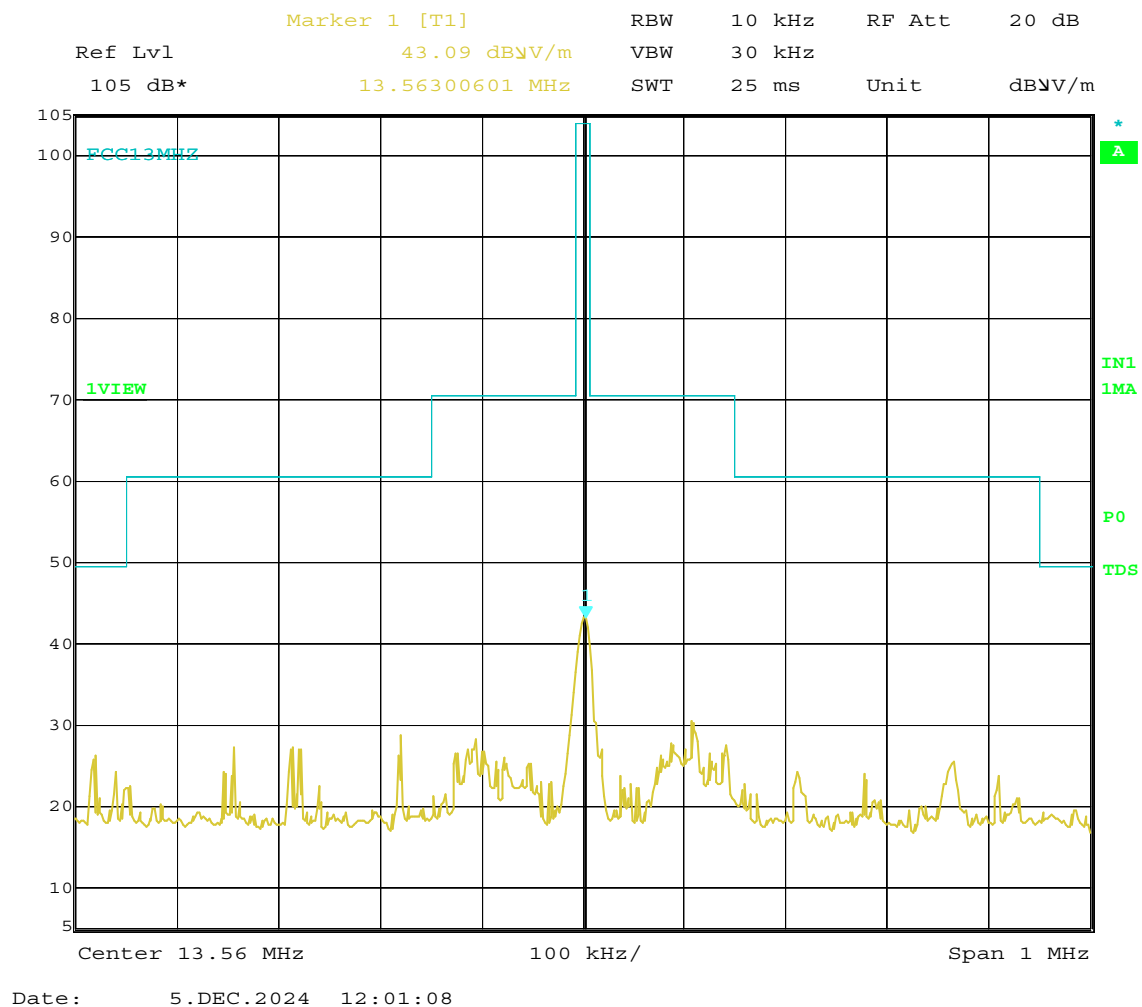
Operating mode:

A spectrum analyser plot showing the carrier and modulation peaks within +/- 125 kHz.



Operating mode:

A spectrum analyser plot showing the carrier and modulation peaks within +/- 500 kHz.



**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (100 kHz – 30 MHz)  $\pm 4.8$  dB

### Section 15.225: Frequency Tolerance:

The frequency tolerance of the carrier is required to be +/- 0.01% of operating frequency when the temperature is varied between -20 degrees C and +50 degrees C.

Testing was carried out in Standby mode and Continuous operating mode with the same results being observed.

The device operates nominally on 13.560 MHz which gives a frequency tolerance of +/- 1,356.0 Hz.

| Temperature (°C) | Frequency (MHz) | Difference (Hz) |
|------------------|-----------------|-----------------|
| 50.0             | 13.559 800      | -600            |
| 40.0             | 13.559 700      | -300            |
| 30.0             | 13.559 600      | -400            |
| 20.0             | 13.559 600      | -400            |
| 10.0             | 13.559 800      | -200            |
| 0.0              | 13.559 850      | -150            |
| -10.0            | 13.559 600      | -400            |
| -20.0            | 13.559 900      | -100            |

The 4.5 Vdc supply voltage was varied by - 15% at 20 degrees C (ambient).

| Voltage (Vdc) | Frequency (MHz) | Difference (Hz) |
|---------------|-----------------|-----------------|
| 3.8           | 13.559 600      | -400            |
| 4.5           | 13.559 600      | -400            |

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

Frequency tolerance  $\pm 50$  Hz

## Section 15.249 (a) – Field Strength of the Fundamental and Harmonics

Radiated emission measurements were carried out with the limits as per section 15.249 (a) being applied to the Fundamental and Harmonics of each transmitter.

Testing was carried out at EMC Technologies (NZ) Ltd Open Area Test Site, which is located at Driving Creek, Orere Point, Auckland.

An enclosure containing absorber material, Panashield HYB-NF-12, has been placed between the turntable and the measurement antenna for when measurements are made above 1 GHz.

This material has no absorbing affect below 1 GHz with site verification measurements.

Below 1000 MHz the transmitter was placed on the test table top which was a total of 0.8 m above the test site ground plane.

Above 1000 MHz the transmitter was placed on the test table top which was a total of 1.5 m above the test site ground plane.

Measurements of the radiated field were made 3 metres from the transmitting antenna.

Measurements below 1000 MHz were made using a Quasi Peak Detector with a bandwidth of 120 kHz.

Measurements above 1000 MHz were made using an average detector with a bandwidth of 1.0 MHz and also a peak detector with a bandwidth of 1.0 MHz.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height with an automated antenna tower.

All emissions were measured in both vertical and horizontal antenna polarisations.

The emission is measured in both vertical and horizontal antenna polarisations with no measurements were made above the 10<sup>th</sup> harmonic.

Testing was carried out when the device was powered using an 4.5 Vdc battery.

Testing was carried out with the device being placed in the centre of the test table standing vertically upright.

The device was tested when transmitting continuously on 2402, 2426 and 2480 MHz

The emission level is determined in field strength by taking the following into consideration:

Level (dBμV/m) = Receiver Reading (dBμV) + Antenna Factor (dB/m) + Coax Loss (dB) – Amplifier Gain (dB)

## Fundamental Emission

Testing was carried out as detailed below

| Frequency (MHz) | Vertical (dB $\mu$ V/m) | Horizontal (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Antenna Pol. | Detector | BW    |
|-----------------|-------------------------|---------------------------|----------------------|-------------|--------------|----------|-------|
| 2402.000        | 74.1                    | 67.4                      | 114.0                | 39.9        | Horizontal   | Peak     | 1 MHz |
| 2402.000        | 41.5                    | 41.5                      | 94.0                 | 52.5        | Vertical     | Average  | 1 MHz |
| -               |                         |                           |                      |             |              | -        | -     |
| 2426.000        | 74.1                    | 66.2                      | 114.0                | 39.9        | Horizontal   | Peak     | 1 MHz |
| 2426.000        | 41.5                    | 41.5                      | 94.0                 | 52.5        | Vertical     | Average  | 1 MHz |
| -               |                         |                           |                      |             |              | -        | -     |
| 2480.000        | 71.4                    | 65.4                      | 114.0                | 42.6        | Vertical     | Peak     | 1 MHz |
| 2480.000        | 41.7                    | 41.7                      | 94.0                 | 52.3        | Vertical     | Average  | 1 MHz |

Section 15.249 specifies a limit of 50 mV/m (94 dB $\mu$ V/m) when an average detector is used for devices operating in the band of 2400 – 2483.5 MHz.

A peak limit of 114 dB $\mu$ V/m has also been applied.

This limit has been converted to dB $\mu$ V/m using the formula  $20 * (\log 0.050 / 0.000001)$

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 25,000 MHz)  $\pm$  4.1 dB

## Spurious Emissions

### Transmitting on 2402 MHz

| Frequency (MHz) | Vertical (dBuV/m) | Horizontal (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Antenna    | BW    |
|-----------------|-------------------|---------------------|----------------|-------------|----------|------------|-------|
| 4804.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 4804.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 7206.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 7206.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 9608.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 9608.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 12010.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 12010.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 14413.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 14413.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 16814.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 16814.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 19216.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 19216.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 21618.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 21618.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 24020.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 24020.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |

## Spurious Emissions

### Transmitting on 2426 MHz

| Frequency (MHz) | Vertical (dBuV/m) | Horizontal (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Antenna    | BW    |
|-----------------|-------------------|---------------------|----------------|-------------|----------|------------|-------|
| 4852.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 4852.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 7278.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 7278.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 9704.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 9704.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 12130.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 12130.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 14556.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 14556.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 16982.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 16982.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 19408.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 19408.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 21834.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 21834.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 24260.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 24260.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |

## Spurious Emissions

### Transmitting on 2480 MHz

| Frequency (MHz) | Vertical (dBuV/m) | Horizontal (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Antenna    | BW    |
|-----------------|-------------------|---------------------|----------------|-------------|----------|------------|-------|
| 4960.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 4960.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 7440.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 7440.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 9920.000        | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 9920.000        | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 12400.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 12400.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 14880.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 14880.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 17360.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 17360.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 19840.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 19840.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 22320.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 22320.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |
| -               | -                 | -                   | -              | -           | -        | -          | -     |
| 24800.000       | < 59              | < 59                | 74.0           | > 15        | Peak     | Vert/Horiz | 1 MHz |
| 24800.000       | < 46              | < 46                | 54.0           | > 8         | Average  | Vert/Horiz | 1 MHz |

Measurements were performed at a distance of 3 metres using vertical and horizontal polarisations with a peak and an average detector with a 1 MHz bandwidth being used.

As per section 15.249 a limit of 500 uV/m applies to the harmonic emissions when an average detector is used.

This limit has been converted to dBuV/m using the formula  $20 * (\log 500)$  with a factor of + 20 dB being added to determine the peak limit.

**Result:** Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 25,000 MHz)  $\pm 4.1$  dB

## Section 15.215 (c) – Additional Provisions to the General Radiated Emissions Limitations

The device operates in the 2400 – 2483.5 MHz band.

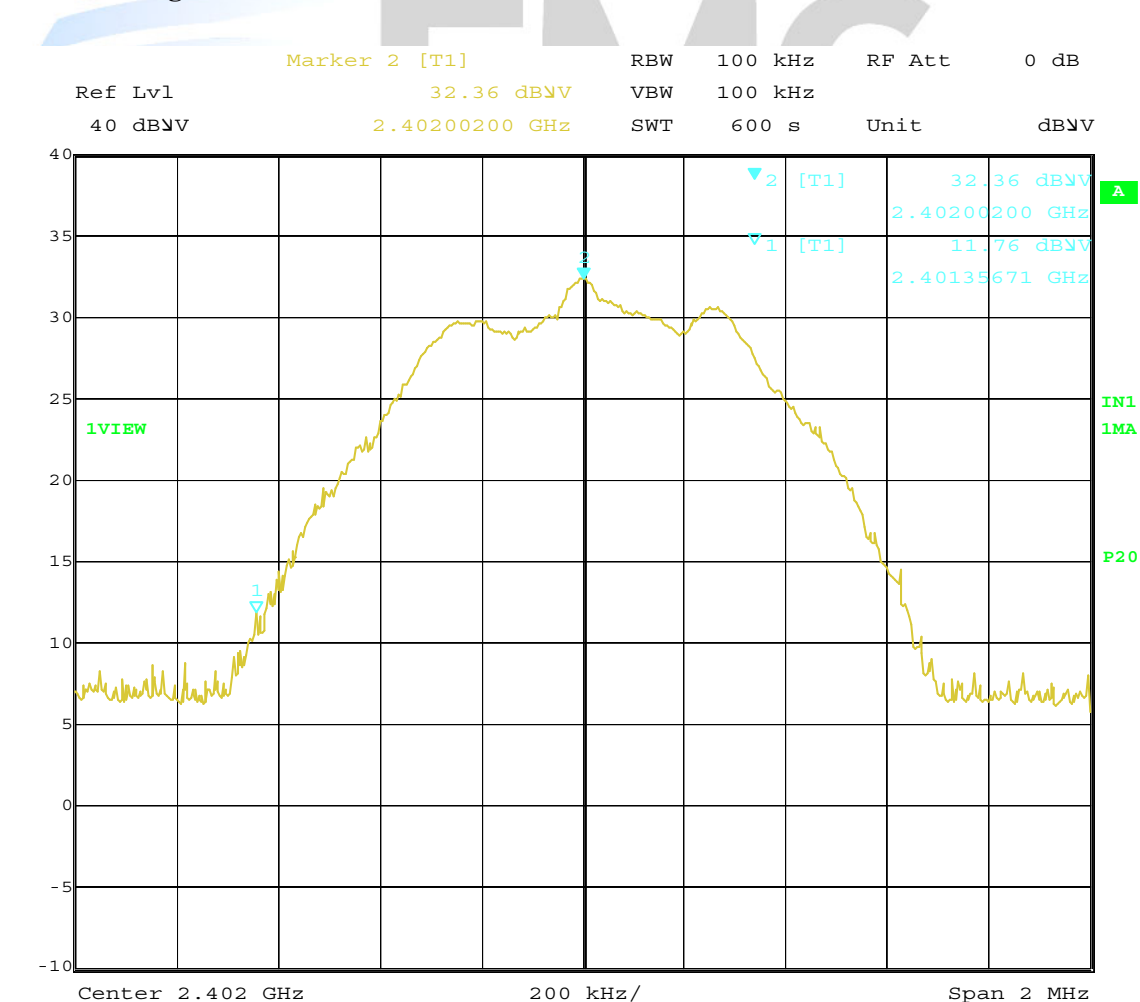
Relative spectrum mask measurements have been made when the device was operating on 2402 MHz, 2426 MHz and 2480 MHz

Measurements made at the -20 dB points.

| Frequency (MHz) | F low (MHz) | F high (MHz) |
|-----------------|-------------|--------------|
| 2402.000        | 2401.3567   | -            |
| 2480.000        | -           | 2480.6513    |

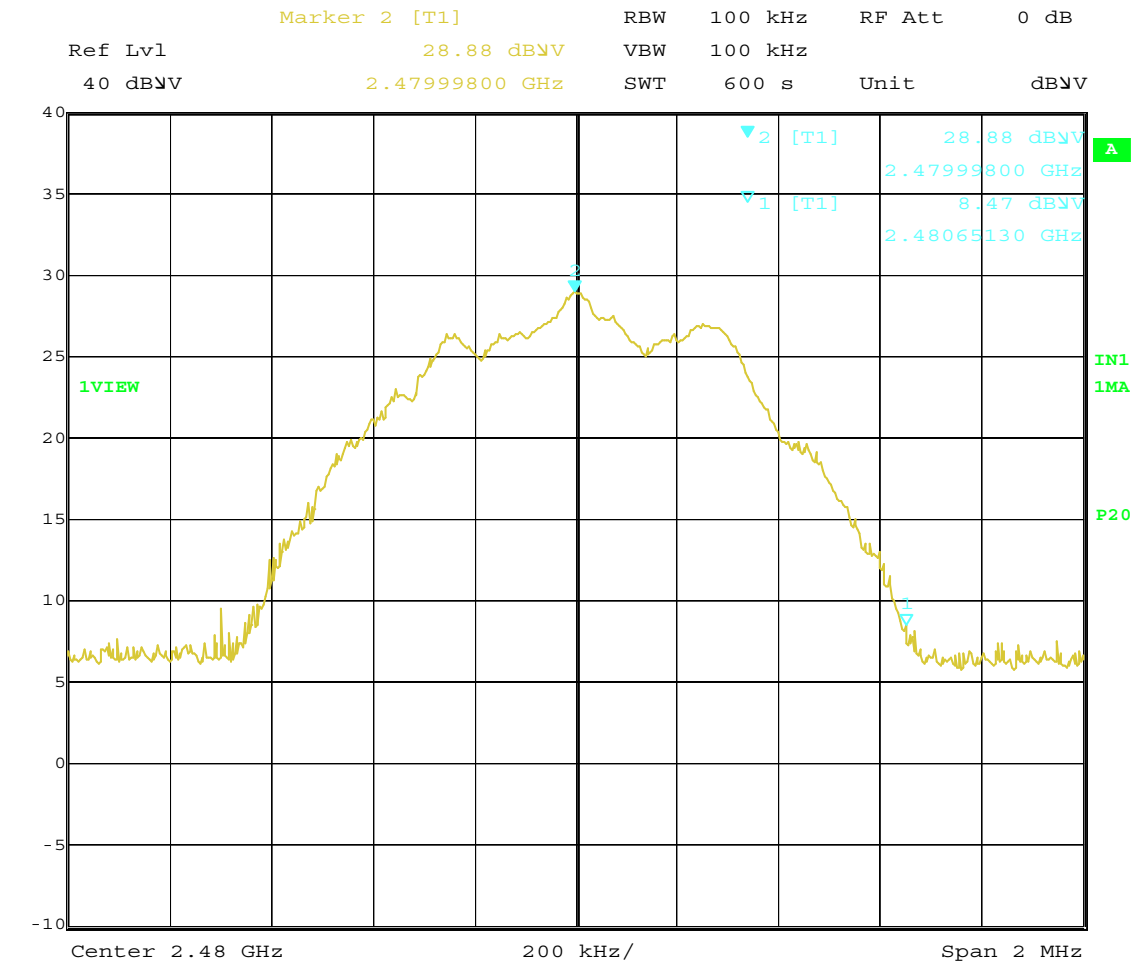
The device can be seen to stay within the band of 2400 – 2483.5 MHz at the -20 dB points

### Transmitting on 2402 MHz



Date: 21.NOV.2024 14:35:34

Transmitting on 2480 MHz



Date: 21.NOV.2024 14:49:03

Result: Complies

Global Product Certification

## 7. TEST EQUIPMENT USED

| Instrument        | Manufacturer | Model       | Serial No     | Asset Ref  | Cal Due       | Period  |
|-------------------|--------------|-------------|---------------|------------|---------------|---------|
| Aerial Controller | EMCO         | 1090        | 9112-1062     | RFS 3710   | Not applic    | N/a     |
| Aerial Mast       | EMCO         | 1070-1      | 9203-1661     | RFS 3708   | Not applic    | N/a     |
| VHF Balun         | Schwarzbeck  | VHA 9103    | 11042021A     | 3696       | 23 Nov 2025   | 3 years |
| Biconical Antenna | Schwarzbeck  | BBA 9106    | 11042021A     | 3697       | 23 Nov 2025   | 3 years |
| Horn Antenna      | EMCO         | 3115        | 9511-4629     | E1526      | 3 April 2025  | 3 years |
| Log Periodic      | Schwarzbeck  | VUSLP 9111B | 112+11042021B | 4025       | 16 Nov 2025   | 3 years |
| Loop Antenna      | EMCO         | 6502        | 9003-2485     | 3798       | 7 March 2025  | 3 years |
| Receiver          | R & S        | ESIB 40     | 100295        | 4030       | 6 Oct 2025    | 1 year  |
| Turntable         | EMCO         | 1080-1-2.1  | 9109-1578     | RFS 3709   | Not applic    | N/a     |
| Helix cable       | Andrews      | L6PNM-RPD   | 22869         | Oats Cable | 30 Dec 2024   | 1 year  |
| Thermal chamber   | Contherm     | M180F       | 86025         | N/a        | N/a           | N/a     |
| Thermometer       | DSIR         | RT200       | 35            | EMC4029    | 21 April 2027 | 5 years |

At the time of testing all equipment was within calibration.

## 8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd designation as a FCC Accredited Laboratory by International Accreditation New Zealand, designation number: NZ0002 under the APEC TEL MRA.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

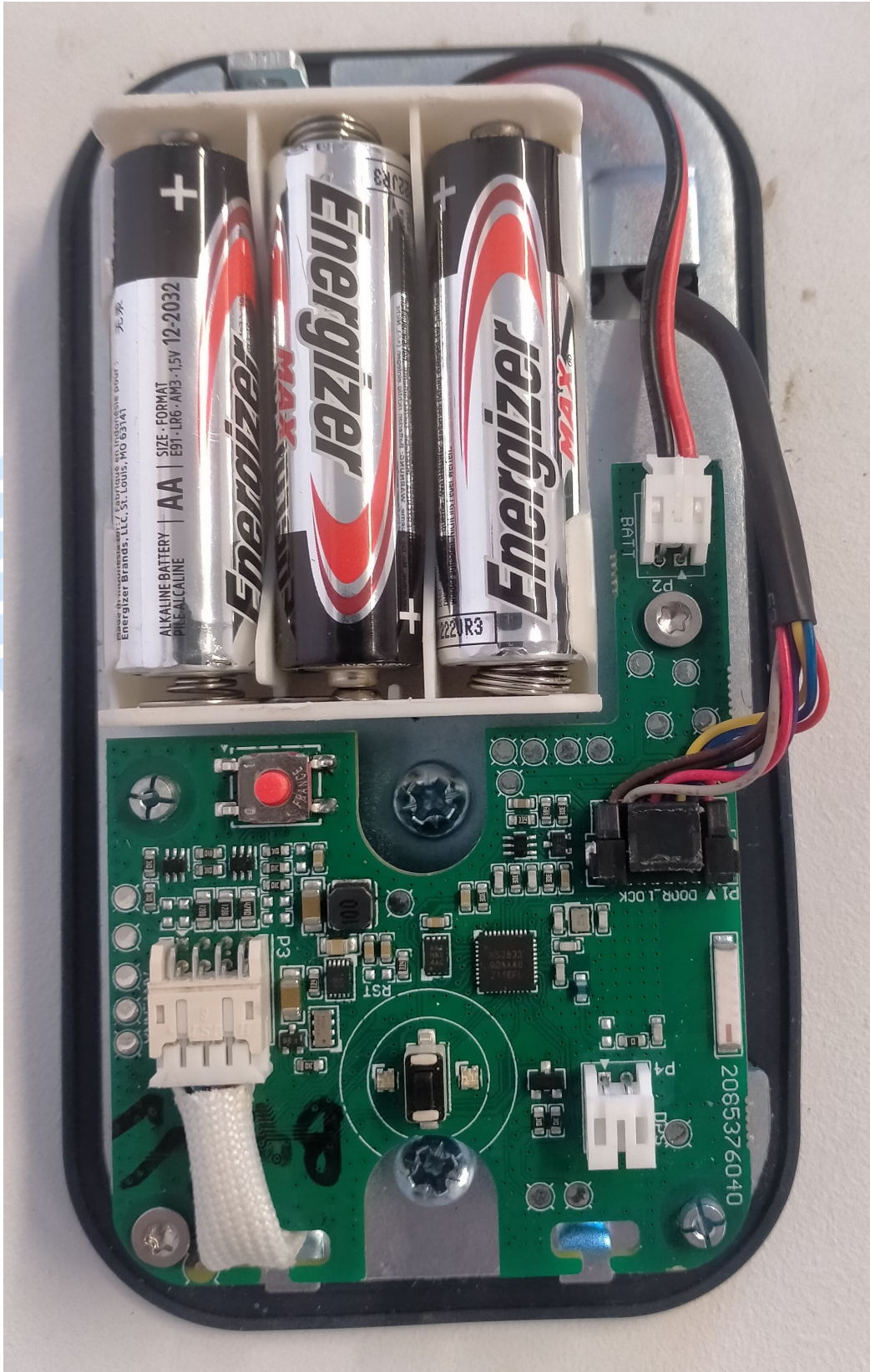
International Accreditation New Zealand has International Laboratory Accreditation Council (ILAC) Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies.

This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden).

Further details can be supplied on request.

## 9. PHOTOGRAPHS

### Device Under Test External Views

















## Radiated emission test Set Up Photos

















