# RF Test Report

| | |
|---|---|
| **Standard(s):** | FCC Part 15 Subpart 15.247,<br>RSS-247 Issue 3:2023<br>Unlicensed Intentional Radiators |
| **Issued To:** | Ecobee Inc<br>207 Queens Quay Suite 600,<br>Toronto, ON M5J 1A7<br>Canada |
| **Product Name:** | Smart Thermostat Lite and Smart Thermostat Essential |
| **Model:** | ECB701 |
| **FCC ID:** | WR9202428847PR |
| **IC:** | 7981A-202428847PR |
| **Report No.** | ML301244C-RF01 (DSS – Hybrid) |
| **Date of Issue:** | August 9, 2024 |

**Report Prepared By:**

Min Xie, Sr. EMC/RF Engineer

**Reviewed By:**

Amir Emami, Project Engineer

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# 1. Revision History

| Project No. & Revision | Report Date | Initials | Description |
|---|---|---|---|
| ML301244C-RF00 (DSS – FHSS) | July 26, 2024 | MX | Initial Release |
| ML301244C-RF01 (DSS – FHSS) | August 9, 2024 | MX | Updated product name. |

NOTE:

- Latest reports marked as a revision replace any previous report and/or report revision issued under the same project number.

Summary of Test Results

## 1.1 Test Verdict

Unless otherwise stated, the test data and results in this test report relate only to the sample(s) tested.

| Requirement | | Test Type | Result | Remark |
|---|---|---|---|---|
| **FCC** | **ISED** | | | |
| 15.203<br>15.247(b)(4) | RSS-247<br>5.4(d) | Antenna Gain and Requirement | Pass | PCB Trace Antenna<br>2.6 dBi |
| 15.247(a)(1) | RSS-247 5.1 | Emission Bandwidth | Pass | $BW_{20dB} \leq 250$ kHz |
| 15.247(a)(1) | RSS-247 5.1 | Channel Carrier Frequency Separation | Pass | $\Delta f \geq MAX \{25 kHz, BW_{20dB}\}$ |
| 15.247(a)(1) | RSS-247 5.1 | Time of Occupancy (Dwell Time) | Pass | $t_{ch} \leq 0.4$ s for $T = N_{ch} * 0.4$s |
| 15.247(b) | RSS-247 5.4 | Average Conducted Output Power | Pass | < 1 Watt |
| 15.247(d) | RSS-247<br>5.5 | Spurious Conducted Out of Band Emissions | Pass | < 30dBc |
| 15.247(f) | RSS-247 5.5 | Power Spectral Density | Pass | < 8 dBm in 3 kHz RBW |
| 15.247(d)/<br>15.209 | RSS-GEN 8.9<br>(Table 5 & 6) | Transmitter Spurious Radiated Emissions | Pass | --- |
| 15.207 | RSS-GEN<br>(Table 4) | Power Line Conducted Emissions | N/A | -- |

### 1.1.1 Test Verdict Notes and Justifications

The DUT was mounted as in normal usage. See the Test Setup Photos for details.

Antenna details obtained from Manufacturer's Datasheet.

## 1.2 Test Standards

| Standard | Description |
|---|---|
| 47 CFR FCC Part 15 Subpart C | Code of Federal Regulations – Radio Frequency Devices, Intentional Radiators |
| FCC KDB 558074:2019 | Digital Transmission Systems, measurements and procedures |
| RSS-247 Issue 3:2023 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices |
| RSS-GEN Issue 5:2021 | General Requirements for Compliance of Radio Apparatus |
| ANSI C63.4:2014 | Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| ANSI C63.10:2013 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| ISO 17025:2017 | General Requirements for the Competence of Testing and Calibration Laboratories |

## 1.3 Test Facility

All tests were performed at Megalab Group Inc., located at 150 Addison Hall Circle, Aurora, ON, L4G 3X8, Canada.
The 10-meter semi-anechoic chamber for radiated emission and radiated immunity is designed to handle weights of up to 10,000lb and has power capability of over 100A. The turntable is capable of supporting test devices or systems either floor standing or table top of up to 4 meters wide and 3m tall. Conducted emissions, unless otherwise specified, are performed on a 2.44m x 2.48m ground plane and using a 2.44m x 2.48m vertical ground plane if applicable.

### 1.3.1 Accreditations

This report does not indicate any product endorsement by any government, accreditation agency, or Megalab Group Inc. Megalab Group Inc. shall have no liability for any deductions, interpretations or generalizations drawn by the client or others from the issued reports. If any opinions or interpretations are expressed in this report, they are outside Megalab Group Inc.'s scope of accreditation and do not necessarily reflect the opinions of Megalab Group Inc., unless otherwise specified.

**A2LA (Certificate #5179.02)**

Megalab Group Inc. is accredited to ISO/IEC 17025:2017 by the American Association for Laboratory Accreditation (A2LA) with Testing Certificate #5179.02. The laboratories current scope of accreditation can be found as listed on A2LA's website.

**ISED**

Megalab Group Inc. is registered with and recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.
Company Number: 28697

**FCC**

Megalab Group Inc. is registered with and recognized by the Federal Communications Commission (FCC) as an accredited testing laboratory.
Registration No. 200040

**VCCI**

The Semi-anechoic chamber of Megalab Group Inc. is registered with the Regulations for Voluntary Control Council for Interference (VCCI). Registration No.: R-20173, G-20174, C-20132, T-20133.

### 1.3.2 Measurement Uncertainty

As per ISO/IEC 17025 requirements, an evaluation of the measurement uncertainties associated with the emission test results should be included in the test report.

Where relevant, the following measurement uncertainty levels have been estimated for the tests performed on the DUT as specified in CISPR 16-4-2. The measurement uncertainties given below are based on a coverage factor k = 2 which yields approximately a 95% level of confidence for the near-normal distribution typical of most measurement results.

| Measurement | Frequency Range | Uncertainty |
|---|---|---|
| Conducted Emissions at AC Mains Power Port | 150kHz to 30MHz | 2.27 dB |
| Radiated Emissions | 30MHz to 1GHz | 5.22 dB |
| | 1GHz to 18GHz | 4.76 dB |

### 1.3.3 Sample Calculations

**Conducted Emissions**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Emission Level (dBµV) = | Read Level (dBµV) | + | LISN Factor (dB) | + | Attenuation Factor (dB) | + | Cable Loss (dB) | |
| = | 34.8 | + | 0.1 | + | 10.0 | + | 0.2 | |
| = | 45.1 | | | | | | | |

| | | | |
|---|---|---|---|
| Margin (dB) = | Limit (dBµV) | - | Emission Level (dBµV) |
| = | 60.0 | - | 45.1 |
| = | 14.9 | | |

**Radiated Emissions**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Emission Level (dBµV/m) = | Read Level (dBµV) | + | Antenna Factor (dB/m) | + | Cable Loss (dB) | - | Pre-Amp Gain (dB) | |
| = | 52.4 | + | 9.4 | + | 1.3 | - | 29.2 | |
| = | 33.9 | | | | | | | |

| | | | |
|---|---|---|---|
| Margin (dB) = | Limit (dBµV/m) | - | Emission Level (dBµV/m) |
| = | 50.0 | - | 33.9 |
| = | 16.1 | | |

### 1.3.4 Terms, Definitions and Abbreviations

| | |
|---|---|
| **AE** | Auxiliary Equipment |
| **DUT** | Device Under Test |
| **DTS** | Digital Transmission System |
| **EMC** | Electro-Magnetic Compatibility |
| **FHSS** | Frequency Hopping Spread Spectrum |
| **ISM** | Industrial, Scientific and Medical |
| **LISN** | Line Impedance Stabilization Network |
| **N/A** | Not Applicable |
| **NCR** | No Calibration Required |
| **RF** | Radio Frequency |
| **RBW** | Resolution Bandwidth |
| **VBW** | Video Bandwidth |

**Auxiliary Equipment/Support Equipment**
Equipment needed to exercise and/or monitor the operation of the DUT.

**Artificial Mains Network**
Network that provides a defined impedance to the DUT at radio frequencies, couples the disturbance voltage to the measuring receiver and decouples the test circuit from the supply mains.

**Class A Equipment**
Equipment suitable for use in all locations other than those allocated in residential environments and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

**Class B Equipment**
Equipment suitable for use in all locations, including in residential environments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

**Device Under Test**
Device or system being evaluated for compliance with the requirements of the Test Standards listed in this report.

**Electro-Magnetic Compatibility**
Ability of equipment or system to function satisfactorily in its EM environment without introducing intolerable electromagnetic disturbances to anything in that environment.

**Electromagnetic Disturbance**
Any electromagnetic phenomenon which may degrade the performance of a device, equipment or system.

# 2. General Information

## 2.1 Client Information

| | |
|---|---|
| Company | Ecobee Inc |
| Address | 207 Queens Quay Suite 600,<br>Toronto, ON M5J 1A7<br>Canada |
| Contact | John Russomanno |
| Email | john@ecobee.com |

## 2.2 Device Under Test (DUT)

### 2.2.1 DUT Information

| | |
|---|---|
| DUT Name | Smart Thermostat Lite and Smart Thermostat Essential |
| DUT Model(s) | ECB701 |
| Serial Number | Production Sample |
| Power Source (AC / DC / Battery) | AC |
| Input Voltage (V) or Range | 24Vac |
| Frequency (Hz) or Range | 60Hz |
| Mode(s) of Operation | Continuous transmission |
| Connectors Available on DUT | Standard thermostat connections |
| **Transmitter Information** | |
| FCC ID | WR9202428847PR |
| IC | 7981A-202428847PR |
| Technology Used | Hybrid |
| Operating Frequency | 920 MHz – 928 MHz |
| Modulation Type | FSK |
| Number of Channels | 50 |
| Antenna Manufacturer | Custom – PCB trace |
| Antenna Model | N/A |
| Antenna Type | Monopole |
| Antenna Gain | 2.6 dBi |

Note: Above antenna information is provided by the client. The characteristics and gain are obtained from the Antenna Manufacturer's Data Sheet.

### 2.2.2 DUT Description

EUT is a smart thermostat; it contains 2400 – 2483.5 MHz DTS (802.11 b/g/n and BLE) transmitters on one chip, and a 920 – 928 MHz FHSS/Hybrid transmitter on second chip.

This report documents the compliance of the BLE transmitter.

## 2.3 Test Setup of DUT

### 2.3.1 Configuration

The DUT was configured in a direct test mode with the following parameters

- For all the tests, the DUT was set to transmit continuously with 100% duty cycle
- Output Power setting: 12 dBm (Peak)
- Channels:
  - 0 (low, 920 MHz),
  - 49 (High, 927.35 MHz)
- Packet Type: Random

During all radiated emission measurements, the DUT was mounted in three orthogonal axes. See Test Setup Photos for axis details.

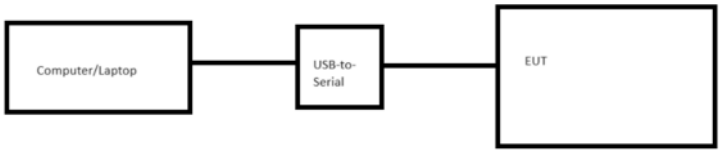



Figure 1 – Configuration Block Diagram

| Description of I/O Cables | | | |
|---|---|---|---|
| **Cable Function** | **Length of Cable (m)** | **Shielded (Y/N)** | **Outdoor Use (Y/N)** |
| Thermostat control | >3 | N | N |

### 2.3.2 Support Equipment

| Device | Manufacturer | Model | S/N |
|---|---|---|---|
| Custom USB Interface | Ecobee | -- | --- |

## 2.4 Modifications for Compliance

No modifications were made to the device under test to comply with the testing requirements.

# 3. Test Results

## 3.1 Emission Bandwidth

| | | | |
|---|---|---|---|
| Test Date: | May 14, 2024 | Initials: | MX |
| Temperature (°C) | 21.8 | | |
| Relative Humidity (%) | 53.6 | | |
| Barometric Pressure (kPa) | 101.0 | | |

During this test, the transmitter's 20 dB and 99% emission bandwidth will be examined and verify that the upper and lower frequency are always kept within the working frequency range band.

### 3.1.1 Limits

Systems using frequency hopping techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands with maximum allowable 20 dB bandwidth, specified in FCC 15.247 (a)(1) and RSS-247 Section 5.1, summarized below:

| Frequency Band | Maximum 20 dB Bandwidth Limit | |
|---|---|---|
| | $P_{max\text{-}pk} \leq 1$ W | |
| 902–928 MHz | $BW_{20dB} \leq 250$ kHz | 250 kHz < $BW_{20dB} \leq 500$ kHz<br><br>Provide:<br>$P_{max\text{-}pk} \leq 0.25$ W<br>$t_{ch} \leq 0.4$ s for $T = 10$ s |
| 2400–2483.5 MHz | Max. $BW_{20dB}$ not specified | |
| 5725–5850 MHz | *$BW_{20dB} \leq 1$ MHz* | |

*Note: FCC 15.247 and RSS-247 did not explicitly specify a maximum 20 dB bandwidth for FHSS operating in the 2400–2483.5 MHz band. The maximum 20 dB bandwidth is implicitly limited by the minimum number of hopping channels; i.e., the 20 dB bandwidth multiplied by minimum number of channels shall be within the 2400–2483.5 MHz band.

For 2400–2483.5 MHz band, the minimum number of channels specified is 15 channels. Thus, the maximum 20 dB bandwidth shall be less than 5.5 MHz (83.5 MHz/15).

The DUT operates in the 902 – 928 MHz. The applicable 20 dB BW limit is $BW_{20dB} \leq 250$ kHz.

99% bandwidth limit is not specified but is required for certification application.

### 3.1.2 Test Procedure

Tested according to ANSI C63.10 Section 6.9.2 for 20 dB bandwidth and Section 6.9.3 for 99% bandwidth.

For 20 dB Emission Bandwidth:

a) Set RBW in the range of 1% to 5% of the actual occupied bandwidth.

b) Set VBW ≥ [3 × RBW].
c) Span set to 2 to 5 times the occupied bandwidth.
d) Detector: Peak
e) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

For 99% Emission Bandwidth:

a) Set RBW in the range of 1% to 5% of the actual occupied bandwidth.
b) Set VBW ≥ [3 × RBW].
c) Span set to 1.5 to 5 times the occupied bandwidth.
d) Detector: Peak
e) Use the 99% power bandwidth function of the instrument to measure bandwidth.

### 3.1.3 Test Results

The DUT met the 20 dB requirement; the 20 dB BW of the DUT is ≤ 250 kHz.

| Frequency (MHz) | 20 dB Bandwidth (kHz) | 99% Occupied Bandwidth (kHz) | 20 dB Bandwidth Limit (kHz) | Test Result |
|---|---|---|---|---|
| 920.00 | 87.08 | 87.90 | ≤ 250 | Pass |
| 927.35 | 86.84 | 87.16 | ≤ 250 | Pass |

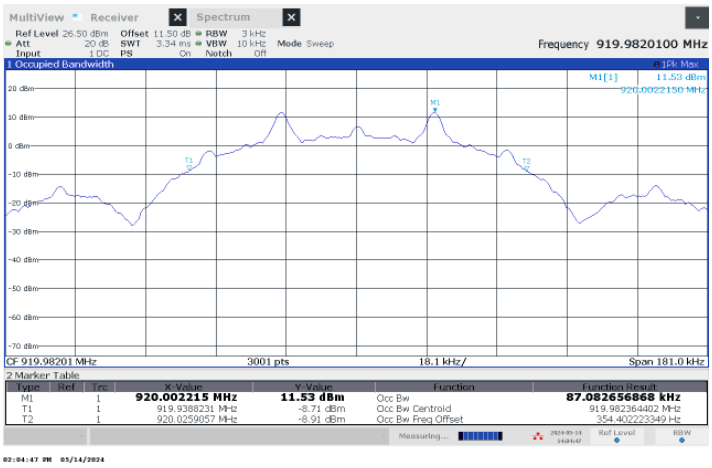



Figure 2 – 20 dB Bandwidth - Low Channel

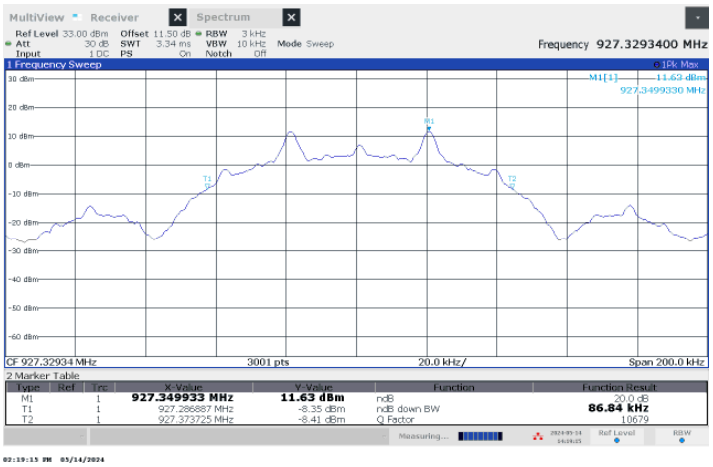



Figure 3 – 20 dB Bandwidth - High Channel

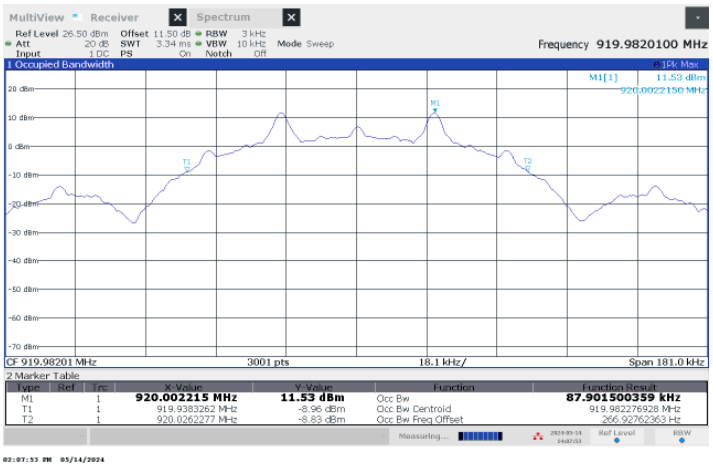



Figure 4 – 99% Bandwidth - Low Channel

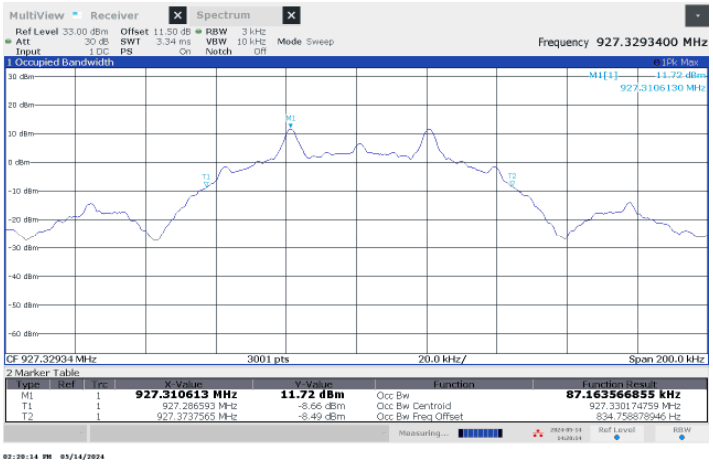



Figure 5 – 99% Bandwidth - High Channel

### 3.1.4 Test Equipment List

| Equipment ID | Description | Manufacturer | Model | Calibration Date | Calibration Due |
|---|---|---|---|---|---|
| EQ_EMC_58 | EMI Receiver | Rohde & Schwarz | ESW 44 | Mar 1, 2024 | Mar 1, 2026 |
| EQ_EMC_115 | 10dB Attenuator | Fairview Microwave | SA18E-10 | NCR | NCR |

## 3.2 Channel Carrier Frequency Separation

| | | | |
|---|---|---|---|
| Test Date: | May 14, 2024 | Initials: | MX |
| Temperature (°C) | 21.8 | | |
| Relative Humidity (%) | 53.6 | | |
| Barometric Pressure (kPa) | 101.0 | | |

During this test, the channel carrier frequency separation of the transmitter will be examined. This specification facilitates the prevention of data corruption while also indirectly limiting the power density of a transmitter which enable other transmitters to coexist in the same frequency band.

### 3.2.1 Limits

Systems using frequency hopping techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands with minimum allowable channel carrier frequency separation - $\Delta f$, specified in FCC 15.247 (a)(1) and RSS-247 Section 5.1, summarized below:

| Frequency Band | Minimum Channel Separation | |
|---|---|---|
| | $P_{max\text{-}pk} \leq 1$ W | |
| 902–928 MHz | $\Delta f \geq$ MAX {25 kHz, $BW_{20dB}$} | |
| 2400–2483.5 MHz | $\Delta f \geq$ MAX {25 kHz, $BW_{20dB}$}<br><br>Provide:<br>$N_{ch} \geq 75$ | $\Delta f \geq$ [MAX {25 kHz, $\frac{2}{3}BW_{20dB}$}<br>OR MAX {25 kHz, $BW_{20dB}$}]<br><br>Provide:<br>$N_{ch} \geq 15$<br>$P_{max\text{-}pk} \leq 0.125$ W |
| 5725–5850 MHz | $\Delta f \geq$ MAX {25 kHz, $BW_{20dB}$} | |

The DUT's operates in the 902 - 928 MHz band. The applicable limit is therefore, the larger of 20 dB BW or 25 kHz. The system's highest 20 dB BW was measured to be 87.08 kHz. The minimum channel separation limit is 87.08 kHz.

### 3.2.2 Test Procedure

Tested according to ANSI C63.10 Section 7.8.2.

For Channel Carrier Frequency Separation

a) Set RBW approximately to 30% of the channel spacing; adjust as necessary to identify the center of each channel.
b) Set VBW ≥ RBW.
c) Detector: Peak
d) Span set to wide enough to capture at least two adjacent channels

### 3.2.3 Test Results

The DUT met the minimum channel separation limit. The channel separation is 7350.9 kHz which is larger than 86.70 kHz.

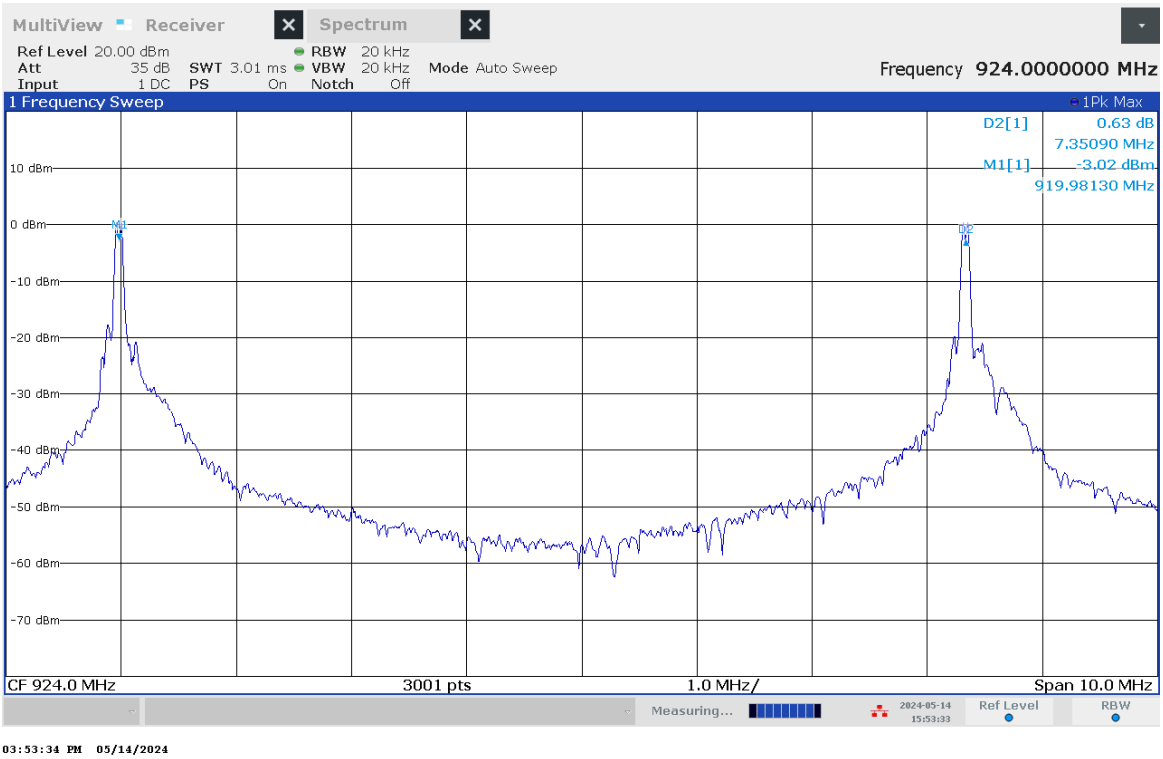



Figure 6 – Channel Separation

### 3.2.4 Test Equipment List

| Equipment ID | Description | Manufacturer | Model | Calibration Date | Calibration Due |
|---|---|---|---|---|---|
| EQ_EMC_58 | EMI Receiver | Rohde & Schwarz | ESW 44 | Mar 1, 2024 | Mar 1, 2026 |
| EQ_EMC_115 | 10dB Attenuator | Fairview Microwave | SA18E-10 | NCR | NCR |

## 3.3 Time of Occupancy (Dwell Time)

| | | | |
|---|---|---|---|
| Test Date: | May 14, 2024 | Initials: | MX |
| Temperature (°C) | 21.8 | | |
| Relative Humidity (%) | 53.6 | | |
| Barometric Pressure (kPa) | 101.0 | | |

During this test, the Time of Occupancy for each channel of the transmitter will be examined. This specification limits the time a channel is occupied which enable other transmitter to coexist in the same frequency band.

### 3.3.1 Limits

Systems using frequency hopping techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands with maximum Time of Occupancy for each channel - $t_{ch}$, specified in FCC 15.247 (a)(1) and RSS-247 Section 5.1, summarized below:

| Frequency Band | Maximum Time of Occupancy |
|---|---|
| 902–928 MHz<br>2400–2483.5 MHz<br>5725–5850 MHz | $t_{ch} \leq 0.4$ s for $T = N_{ch}*0.4$ s |

### 3.3.2 Test Procedure

Tested according to ANSI C63.10 Section 7.8.4.

For Dwell Time per Hop

a) Set RBW less than channel spacing
b) Detector: Peak
c) Span: Zero span, centered on a hopping channel
d) Sweep: Single
e) Sweep Time: long enough to capture start and end of a transmission

For Number of Hop

a) Sweep Time: long enough to capture at least 2 hops
b) The number of hops within T is calculated from the number of hops on the channel divided by the Sweep Time multiplied by T

The Time of Occupancy is calculated by multiplying the dwell time per hop by the number of hops in T.

### 3.3.3 Test Results

The EUT uses 2 channels when operating in Hybrid mode. The Observation time, T, is 2 * 0.4 s = 0.8 s.

The DUT's dwell time per hop is 14.83 ms (0.015 s).

There are 8 hops in 0.8 s of Observation time.

The DUT has an average occupancy $t_{ch}$ of 8 x 0.015 s = 0.12 s which is less than 0.4 s.

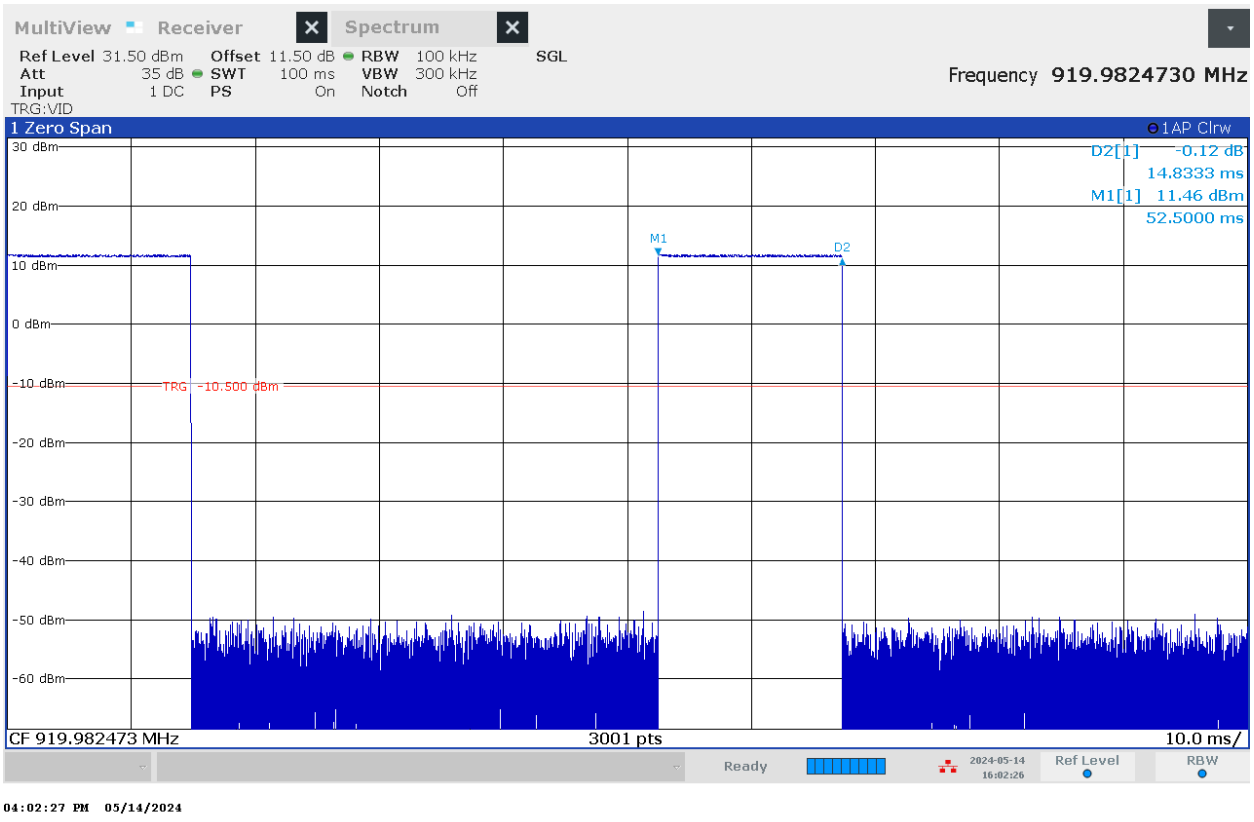



Figure 7 – Dwell Time per Hop

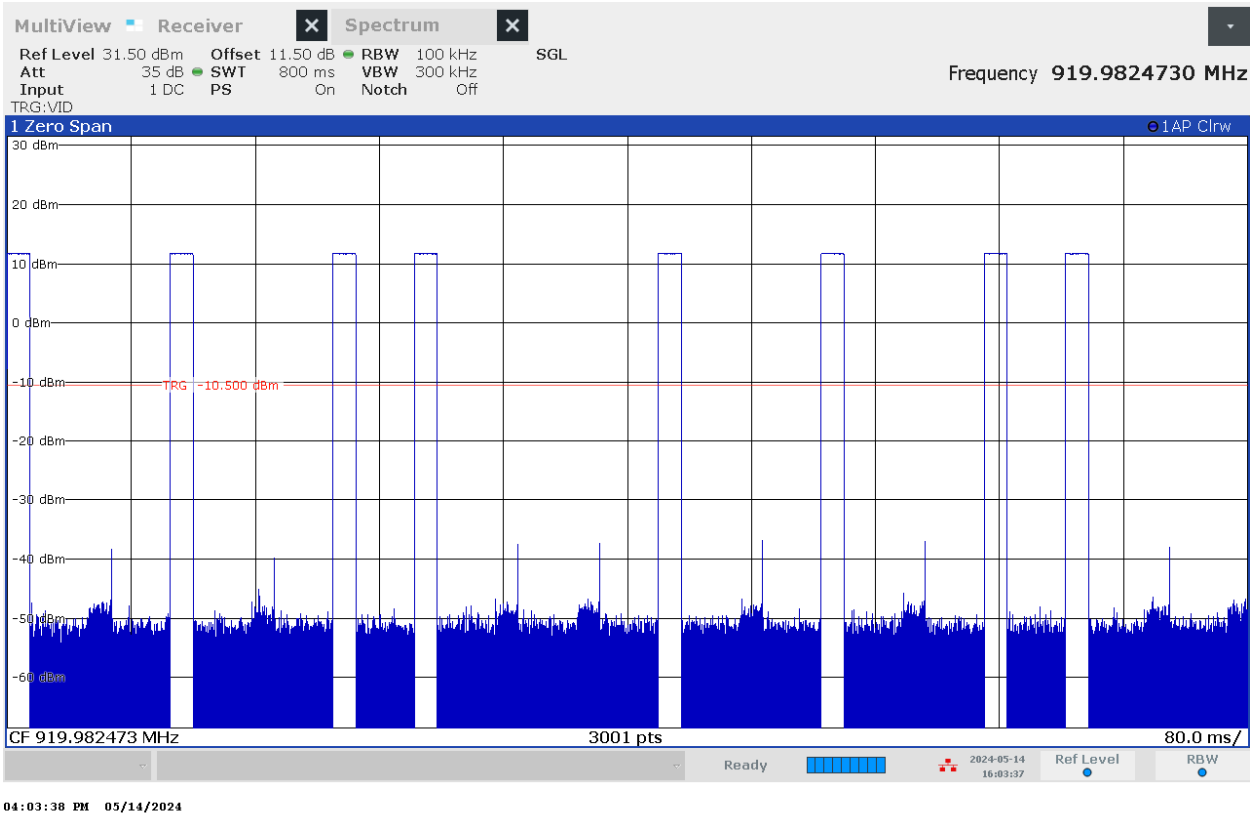



Figure 8 – Number of Hops per Sweep Time

### 3.3.4 Test Equipment List

| Equipment ID | Description | Manufacturer | Model | Calibration Date | Calibration Due |
|---|---|---|---|---|---|
| EQ_EMC_58 | EMI Receiver | Rohde & Schwarz | ESW 44 | Mar 1, 2024 | Mar 1, 2026 |
| EQ_EMC_115 | 10dB Attenuator | Fairview Microwave | SA18E-10 | NCR | NCR |

## 3.4 Output Power

| | | | |
|---|---|---|---|
| Test Date: | May 14, 2024 | Initials: | MX |
| Temperature (°C) | 21.8 | | |
| Relative Humidity (%) | 53.6 | | |
| Barometric Pressure (kPa) | 101.0 | | |

### 3.4.1 Limits

Systems using frequency hopping techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands with maximum peak conducted power, specified in FCC 15.247 (b) and RSS-247 Section 5.4, summarized below:

| Frequency Band | Maximum Conducted (Average) Power |
|---|---|
| 902–928 MHz<br>2400–2483.5 MHz<br>5725–5850 MHz | $P_{max\text{-}pk} \leq 1$ W |

### 3.4.2 Test Procedure

Tested according to ANSI C63.10 Section 11.9.2.2.

For Maximum Conducted Output (Average) Power

a) Set RBW = 1% to 5% of OBW, not exceeding 1 MHz
b) Set VBW ≥ 3 x RBW
c) Detector: RMS
d) Span: At least 1.5 times the OBW
e) Trace: Average
f) Average Sweep Count: At least 100 times
g) Trace Mode: Single
h) Use instrument's band power measurement function to computer power by integrating the spectrum across the OBW.

The RF output of the DUT was connected to the spectrum analyzer with sufficient attenuation in front and the total path loss was set as reference offset to correct the final reading.

### 3.4.3 Test Results

The EUT meets power limits of 1 W.

| Channel | Frequency (MHz) | Average Power (dBm) | Average Power (mW) | Average Power (W) | Limit (W) | Test Result |
|---|---|---|---|---|---|---|
| Low | 920.0 | 11.88 | 15.42 | 0.015 | 1 | Pass |
| High | 927.35 | 12.03 | 15.96 | 0.016 | 1 | Pass |

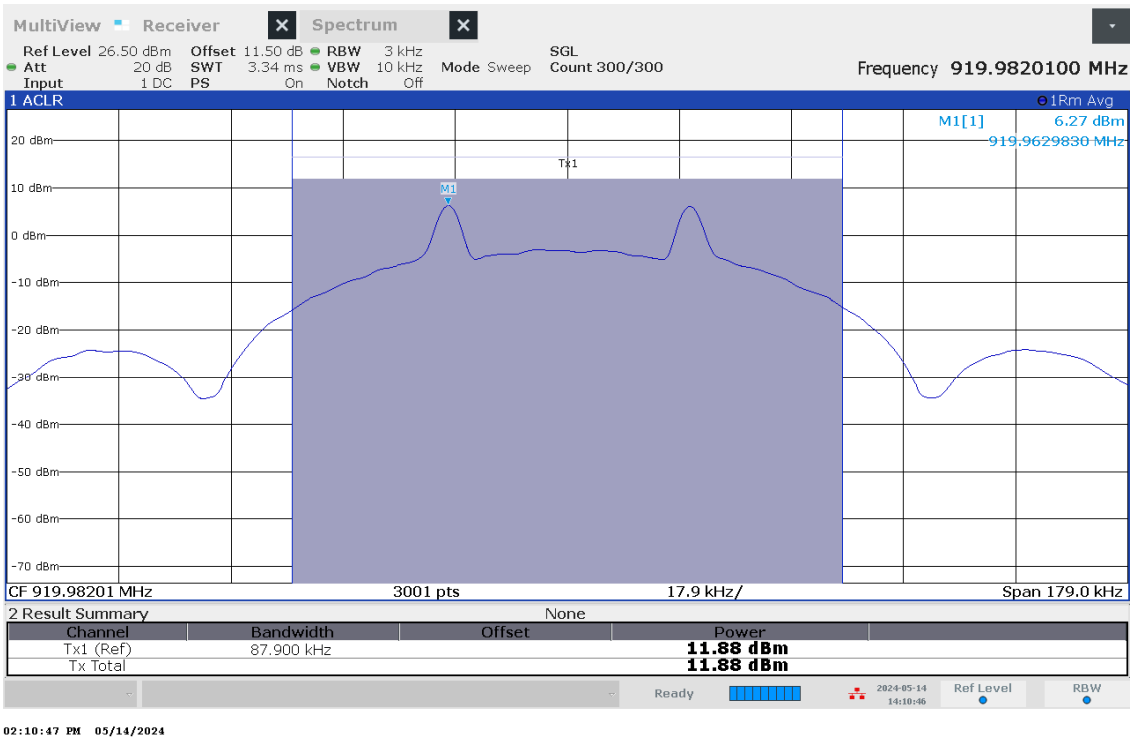



Figure 9 – Peak Power - Low Channel

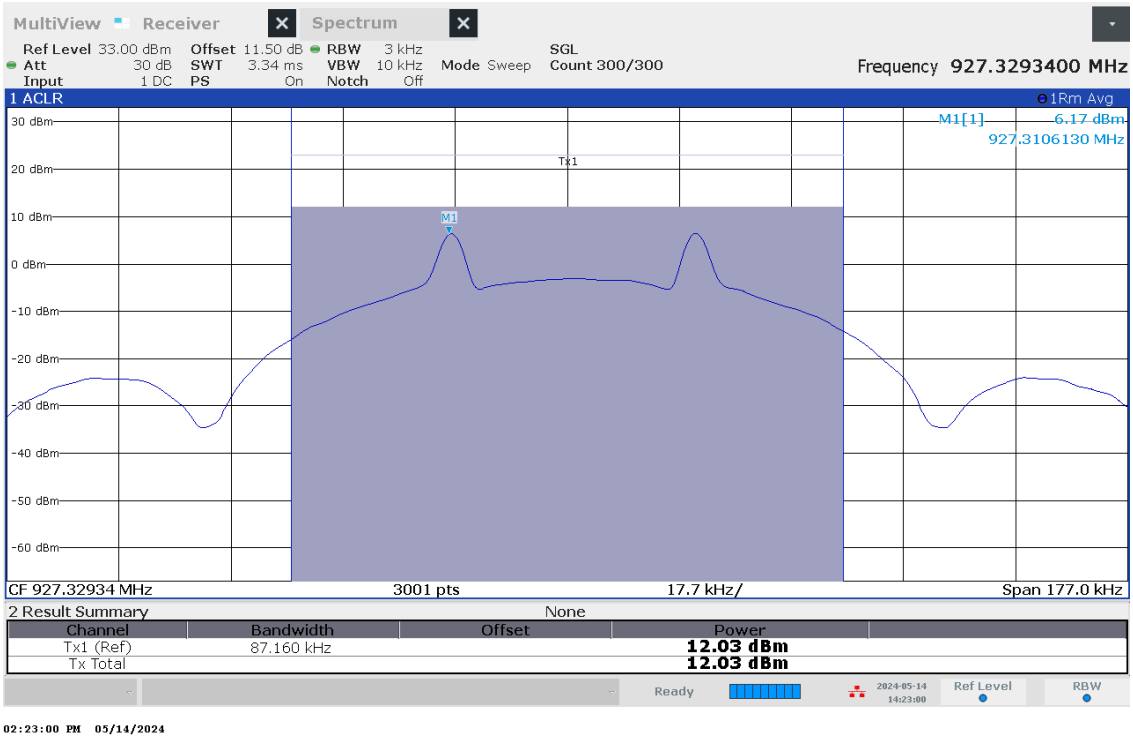



Figure 10 – Peak Power - High Channel

### 3.4.4 Test Equipment List

| Equipment ID | Description | Manufacturer | Model | Calibration Date | Calibration Due |
|---|---|---|---|---|---|
| EQ_EMC_58 | EMI Receiver | Rohde & Schwarz | ESW 44 | Mar 1, 2024 | Mar 1, 2026 |
| EQ_EMC_115 | 10dB Attenuator | Fairview Microwave | SA18E-10 | NCR | NCR |

## 3.5 Power Spectral Density

| | | | |
|---|---|---|---|
| Test Date: | May 14, 2024 | Initials: | MX |
| Temperature (°C) | 21.8 | | |
| Relative Humidity (%) | 53.6 | | |
| Barometric Pressure (kPa) | 101.0 | | |

### 3.5.1 Limits

For digitally modulated systems, the power spectral density (PSD) 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.

### 3.5.2 Test Procedure

Tested according to ANSI C63.10 Section 11.10.3

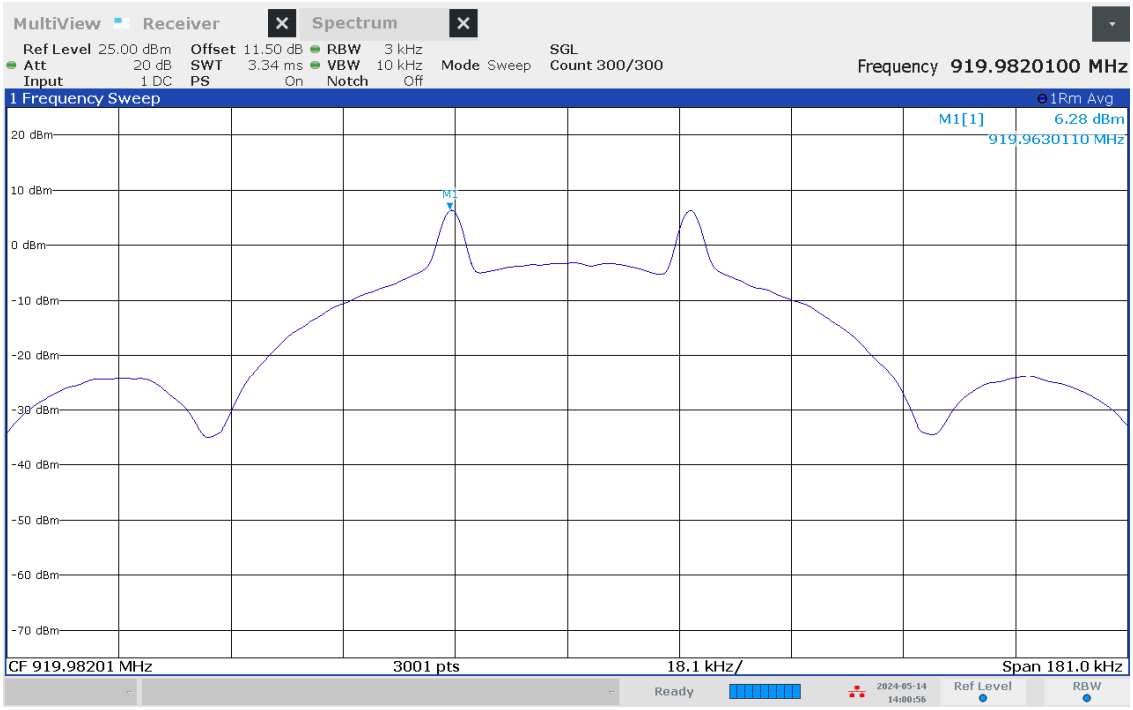
a) Set RBW = 3kHz and VBW ≥ [3 × RBW].
b) Set Span to at least 1.5 times the OBW.
c) Detector: RMS
d) Trace: Average
e) Average Sweep Count: At least 100 times
f) Trace Mode: Single
g) Sweep = Auto Couple.
h) Use the peak marker function to determine the maximum level.

The RF output of the DUT was connected to the spectrum analyzer with sufficient attenuation in front and the total path loss was set as reference offset to correct the final reading.

### 3.5.3 Test Results

The DUT meet the 8 dBm/3kHz power spectral density limit.

| Channel | Frequency (MHz) | Average PSD (dBm) | Limit (dBm) | Test Result |
|---|---|---|---|---|
| Low | 920.0 | 6.28 | 8 | Pass |
| High | 927.35 | 6.32 | 8 | Pass |



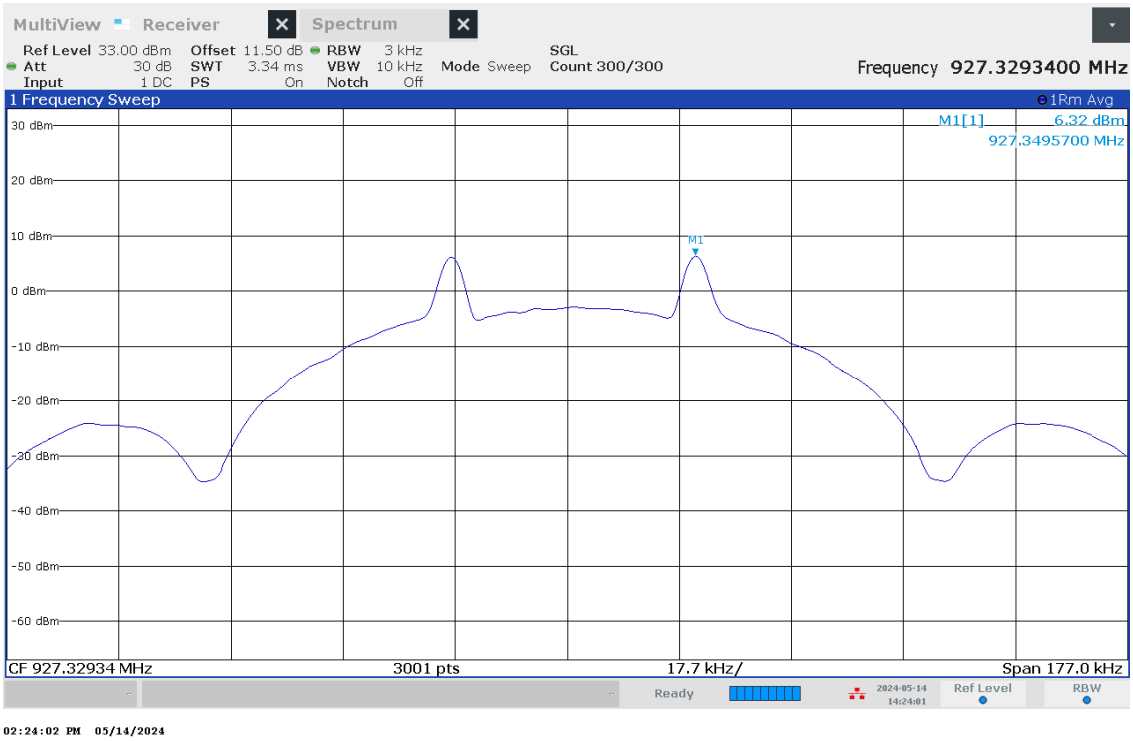




Figure 12 – PSD - High Channel

### 3.5.4 Test Equipment List

| Equipment ID | Description | Manufacturer | Model | Calibration Date | Calibration Due |
|---|---|---|---|---|---|
| EQ_EMC_58 | EMI Receiver | Rohde & Schwarz | ESW 44 | Mar 1, 2024 | Mar 1, 2026 |
| EQ_EMC_115 | 10dB Attenuator | Fairview Microwave | SA18E-10 | NCR | NCR |

## 3.6 Conducted Spurious Emissions (-30dBc)

| | | | |
|---|---|---|---|
| Test Date: | May 14, 2024 | Initials: | MX |
| Temperature (°C) | 21.8 | | |
| Relative Humidity (%) | 53.6 | | |
| Barometric Pressure (kPa) | 101.0 | | |

### 3.6.1 Limits

In any 100 kHz 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, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30dB instead of 20dB.

### 3.6.2 Test Procedure

Tested according to ANSI C63.10 Section 7.8.7

Conducted Band-edge testing is performed with hoping disabled and enabled.

For the reference level measurement:

a) Set RBW = 100kHz and VBW ≥ [3 × RBW].
b) Detector = Peak and Trace Mode = Max Hold.
c) Sweep = Auto Couple.
d) Span set to ≥1.5 20 dB emission bandwidth.
e) Use the peak marker function to determine the maximum level.

For the out of band emission measurement

a) Set the start and stop frequency to encompass the frequency range to be measured.
b) Set RBW = 100kHz and VBW ≥ [3 × RBW].
c) Detector = Peak and Trace Mode = Max Hold.
d) Sweep = Auto Couple.
e) Use the peak marker function to determine the maximum level.

The RF output of the DUT was connected to the spectrum analyzer with sufficient attenuation in front and the total path loss was set as reference offset to correct the final reading.

### 3.6.3 Test Results

The DUT met the 30dB below carrier requirement for out of band emissions.

| Channel | Frequency (MHz) | Peak PSD w/ RBW=100 kHz (dBm) | 30 dBc Limit (dBm) |
|---|---|---|---|
| Low | 920.0 | 11.89 | -18.11 |
| High | 927.35 | 11.92 | -18.08 |

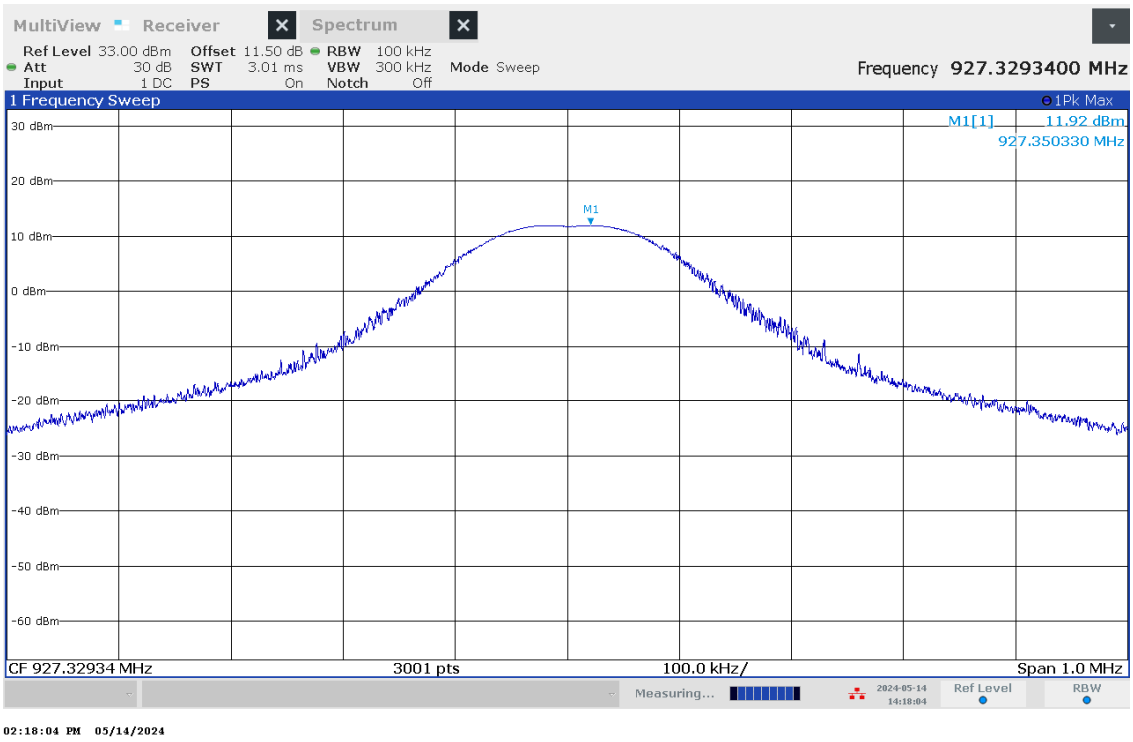



Figure 13 – -20dBc Reference Level - High Channel

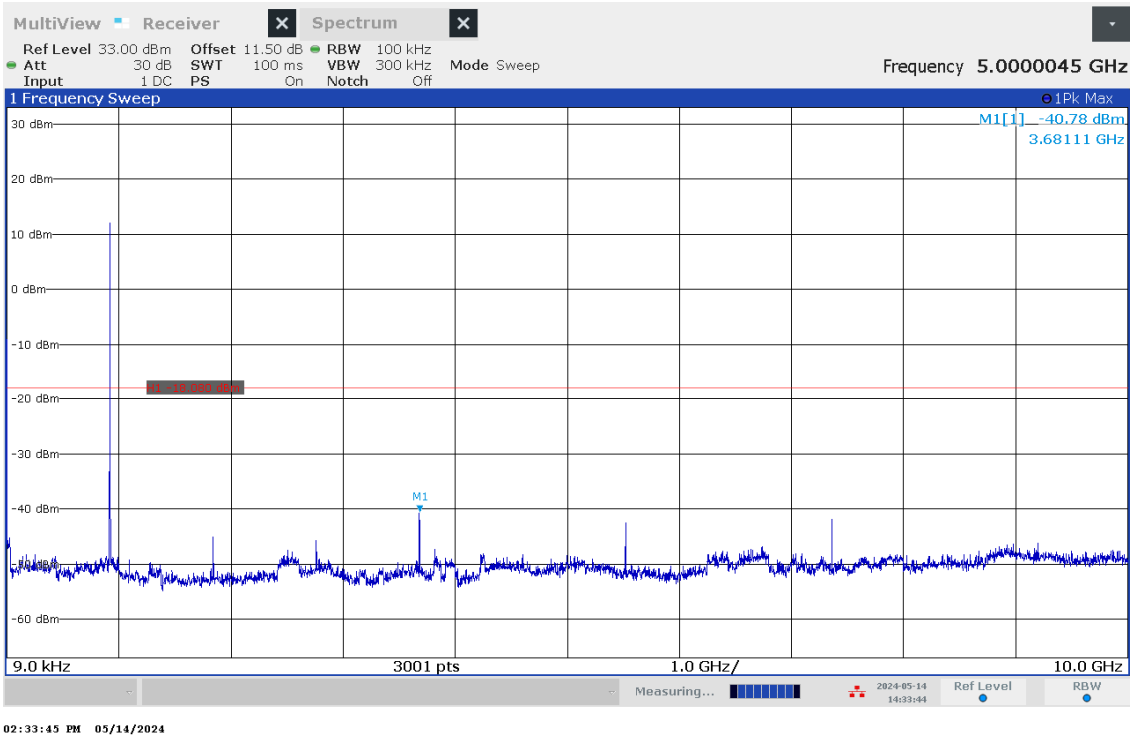



Figure 14 – -30dBc with High Channel

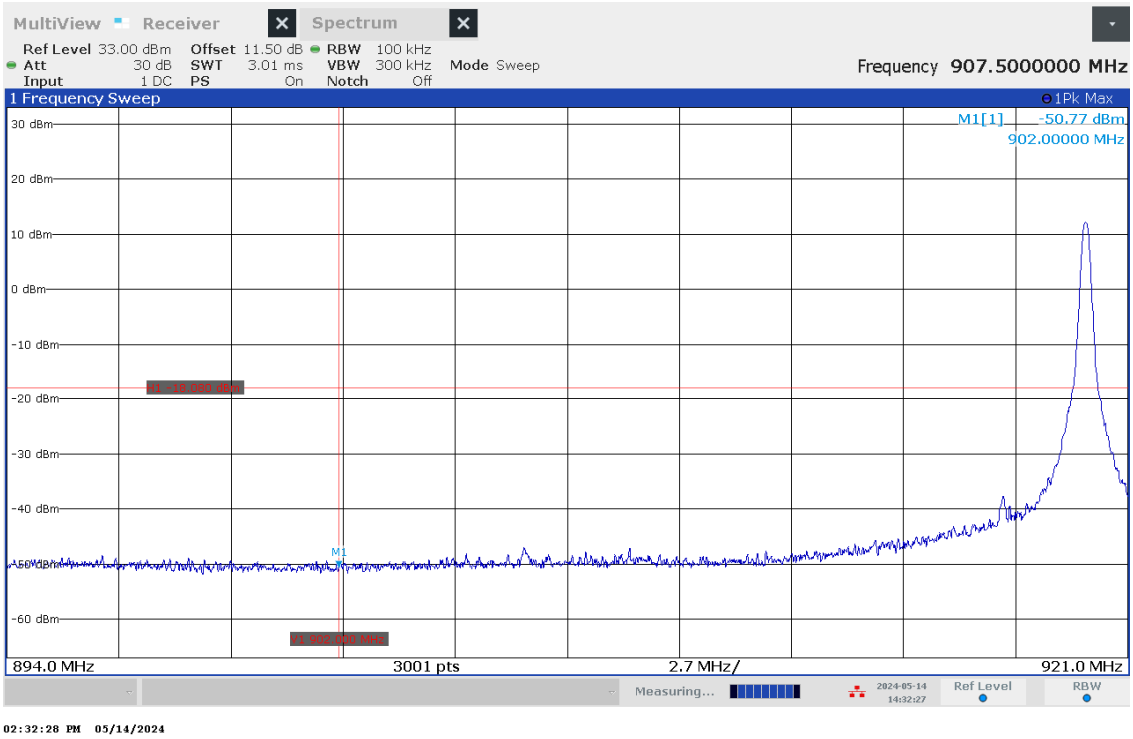



Figure 15 – -30dBc Band Edge - Low Channel (Hoping Disabled)

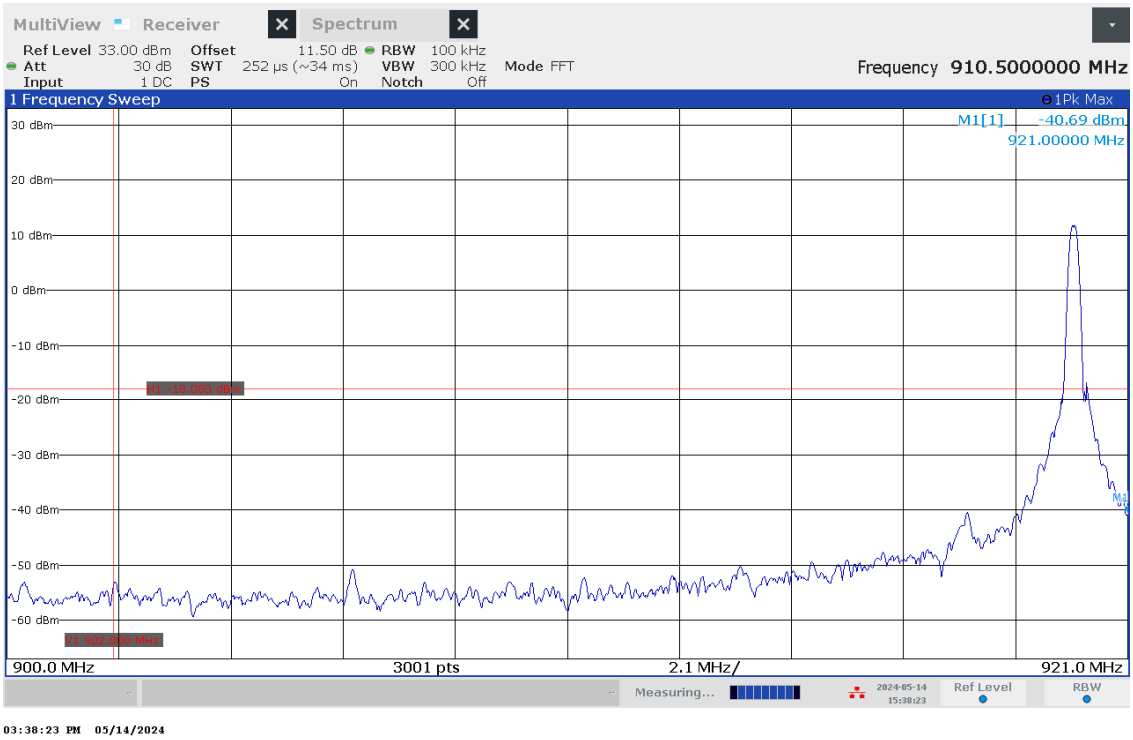



Figure 16 – -30dBc Band Edge - Low Channel (Hoping Enabled)

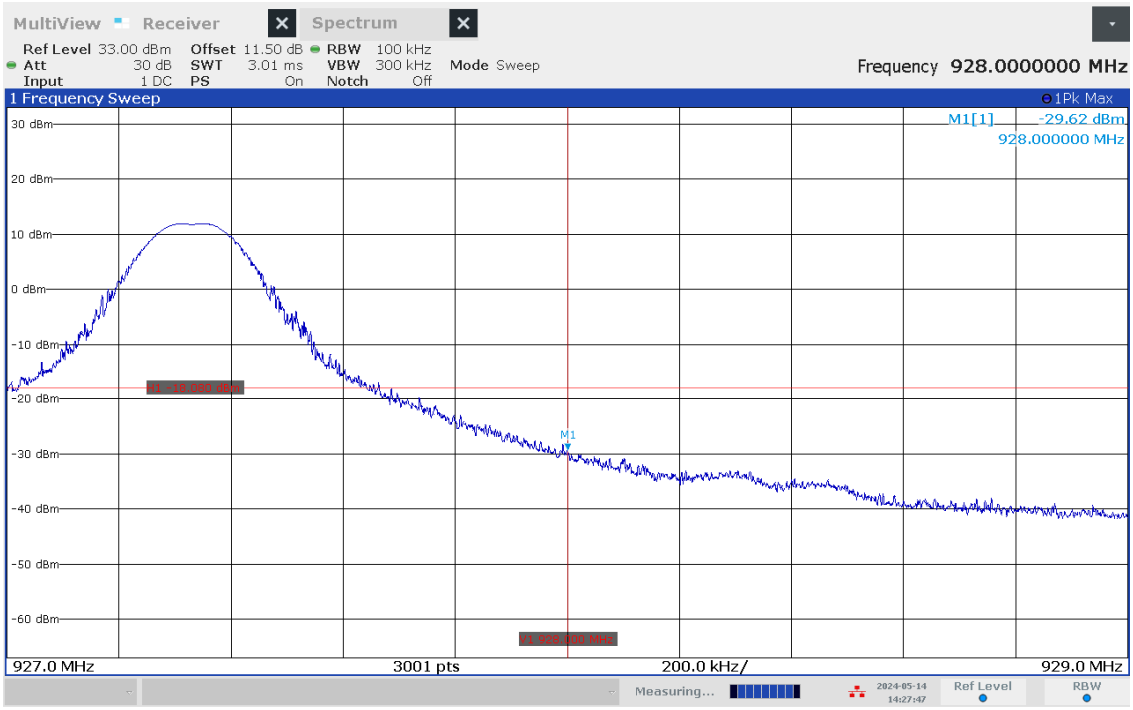



Figure 17 – -30dBc Band Edge - High Channel (Hoping Disabled)

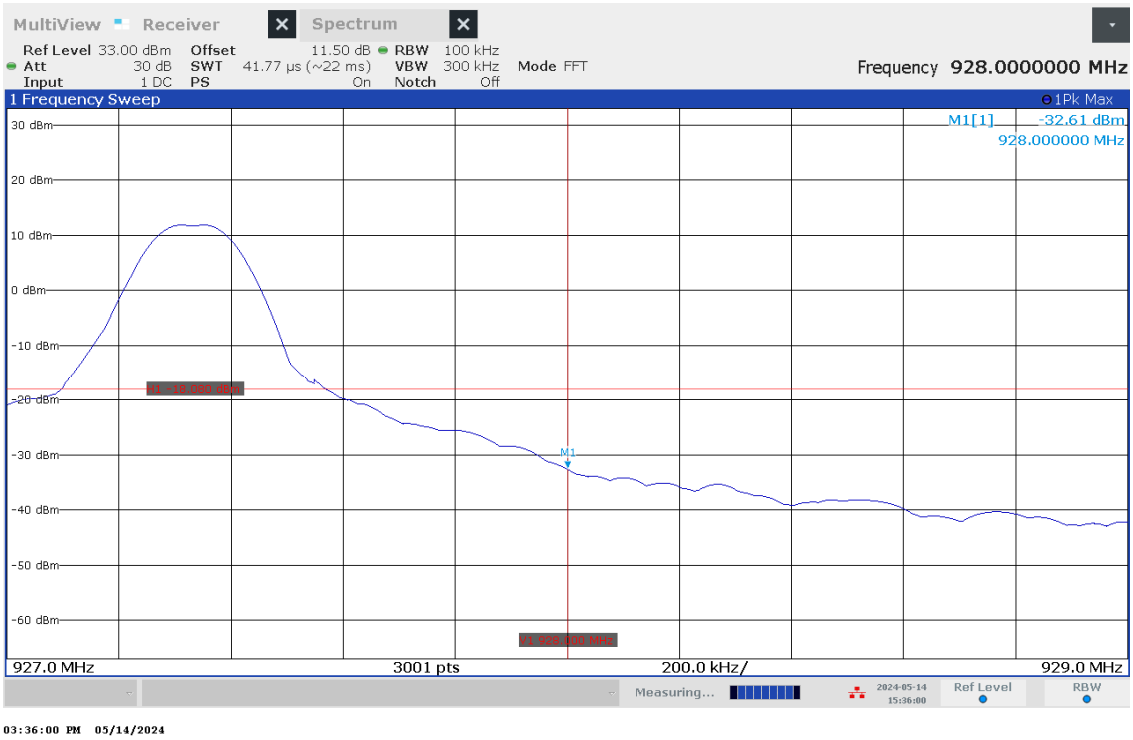



Figure 18 – -30dBc Band Edge - High Channel (Hoping Enabled)

### 3.6.4 Test Equipment List

| Equipment ID | Description | Manufacturer | Model | Calibration Date | Calibration Due |
|---|---|---|---|---|---|
| EQ_EMC_58 | EMI Receiver | Rohde & Schwarz | ESW 44 | Mar 1, 2024 | Mar 1, 2026 |
| EQ_EMC_115 | 10dB Attenuator | Fairview Microwave | SA18E-10 | NCR | NCR |

## 3.7 Transmitter Spurious Radiated Emissions

| | | | |
|---|---|---|---|
| Test Date: | May 6 – 13, 2024 | Initials: | MX |
| Temperature (°C) | 20.8 – 21.7 | | |
| Relative Humidity (%) | 42.8 – 54.7 | | |
| Barometric Pressure (kPa) | 100.4 – 101.5 | | |

### 3.7.1 Limits

Any radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must comply with the general radiated emission limits specified in FCC 15.209(a). Other emissions shall be at least 20dB below the highest level of the intentional transmitter.

Base Standard(s): FCC Subpart C 15.209 and RSS-Gen Section 8.9.

| Frequency Range (MHz) | Field Strength Limit | | Field Strength at 3m (dBµV/m) | Detector Type / Measurement Bandwidth |
|---|---|---|---|---|
| | µV/m | Distance | | |
| 0.009 – 0.150 | 2400/F(kHz) | 300 | 128.5 – 104.1 | Quasi-Peak‡ / 200Hz |
| 0.150 – 0.490 | 2400/F(kHz) | 300 | 104.1 – 93.8 | Quasi-Peak‡ / 9kHz |
| 0.490 – 1.705 | 24000/F(kHz) | 30 | 73.8 – 63.0 | Quasi-Peak / 9kHz |
| 1.705 – 30 | 30 | 30 | 69.5 | Quasi-Peak / 9kHz |
| 30 – 88 | 100 | 3 | 40.0 | Quasi-Peak / 120kHz |
| 88 – 216 | 150 | 3 | 43.5 | Quasi-Peak / 120kHz |
| 216 – 960 | 200 | 3 | 46.0 | Quasi-Peak / 120kHz |
| 960 – 1000 | 500 | 3 | 54.0 | Quasi-Peak / 120kHz |
| Above 1000 | 500 | 3 | 54.0 | Average / 1MHz |
| Above 1000 | 5000 | 3 | 74.0 | Peak / 1MHz |

‡The emission limits below 1GHz shown in the above table are based on measurements employing a CISPR Quasi-Peak detector except for the frequency bands 9-90 kHz and 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

As per ANSI C63.4 Section 4.2, if the Peak detector measurements do not exceed the Quasi-Peak limits, or Average limits where defined, then the DUT is considered to have passed the requirements.

### 3.7.2 Test Procedure

Tested according to ANSI C63.10 Section 6.3.

The device under test was setup inside a semi-anechoic chamber with remotely controlled turntable and antenna positioner at a 3m test distance. The DUT was placed on top of a 0.8m high non-conductive table above the reference ground plane for frequencies below 1GHz and 1.5m high for frequencies above 1GHz.

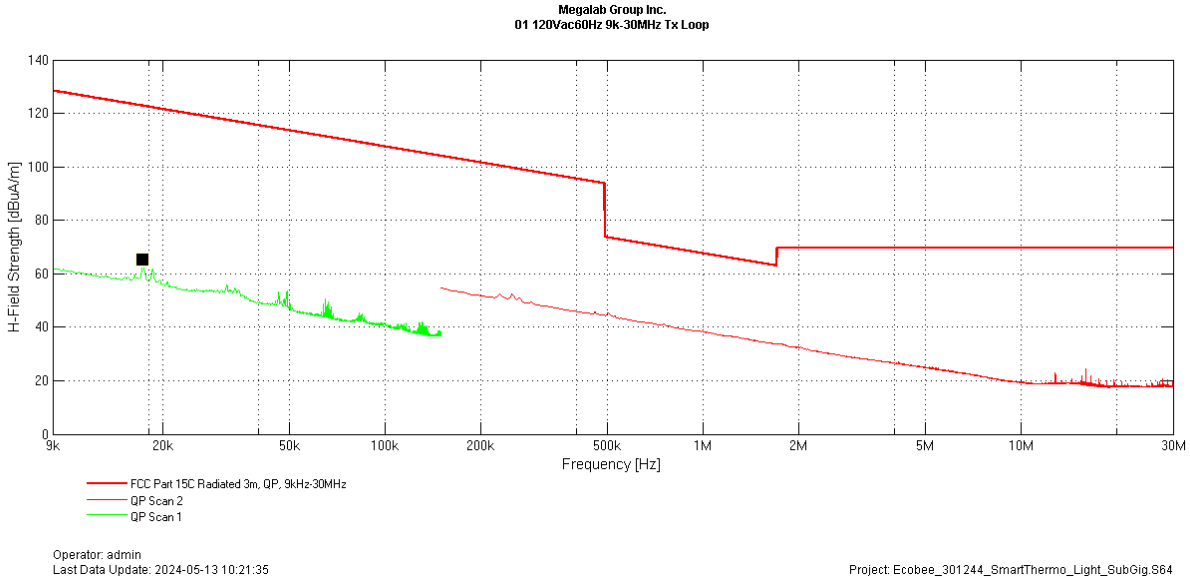
To determine the emission characteristics of the DUT, exploratory radiated emission scans were made while rotating the turntable 0° to 360° and using a Peak detector. The results were recorded in graphical form.

For each suspected emission, final measurements of the DUT radiated emissions with the Quasi-Peak, Average or Peak detector, as defined in the limit tables above, were made with the turntable azimuth rotated 0° to 360° and antenna height varied from 1m to 4m. The antenna was positioned to receive emissions in the vertical and horizontal polarizations such that the maximum radiated emission levels were detected.

As per FCC Part 15.33(a), the DUT was scanned to the 10th harmonic of the highest fundamental frequency.

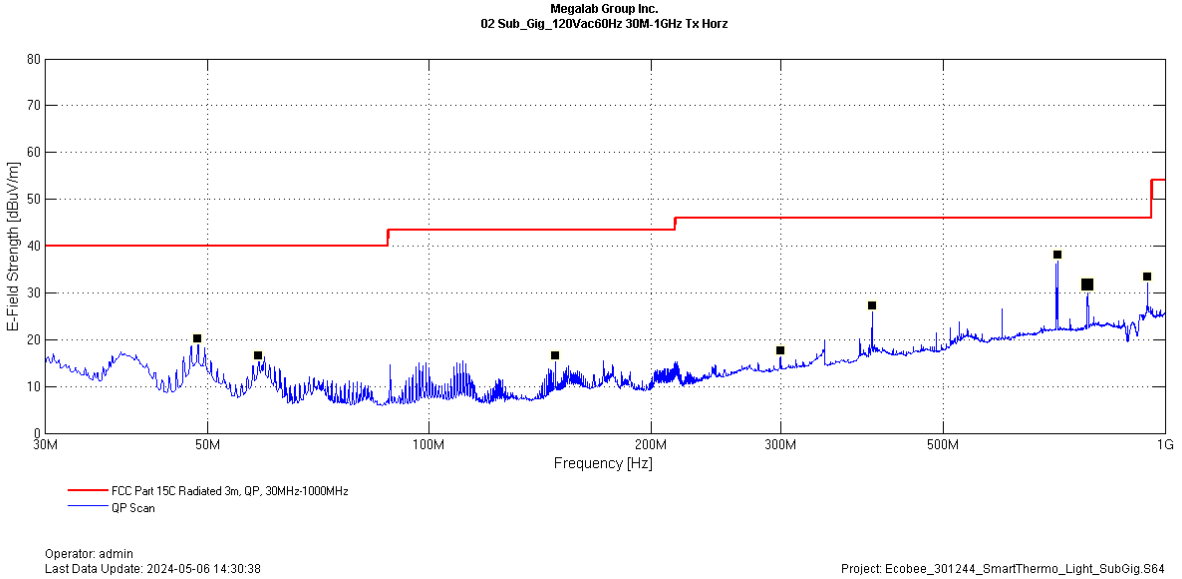
### 3.7.3 Test Results

| **Range:** | 9kHz to 30 MHz | **Tx Frequency** | 927.35 MHz |
|---|---|---|---|
| **Test Voltage:** | 24Vac 60Hz | **Antenna Polarization** | XZ-Plane |



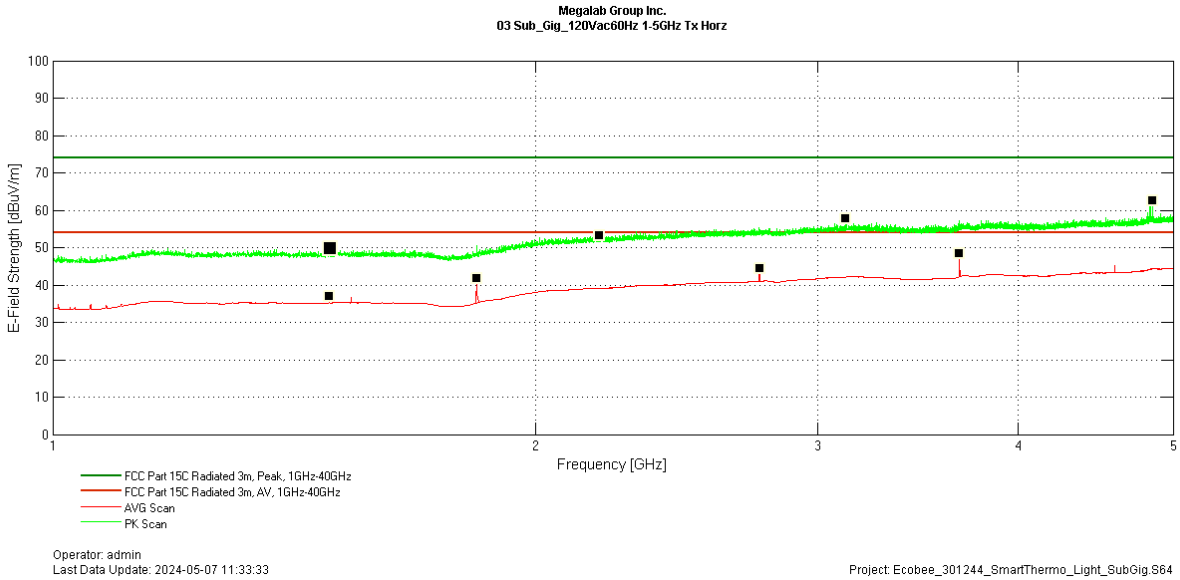

Remark: Quasi-Peak Emission Plot

| **Range:** | 30MHz to 1GHz | **Tx Frequency** | 927.35 MHz |
|---|---|---|---|
| **Test Voltage:** | 24Vac 60Hz | **Antenna Polarization** | Horizontal |



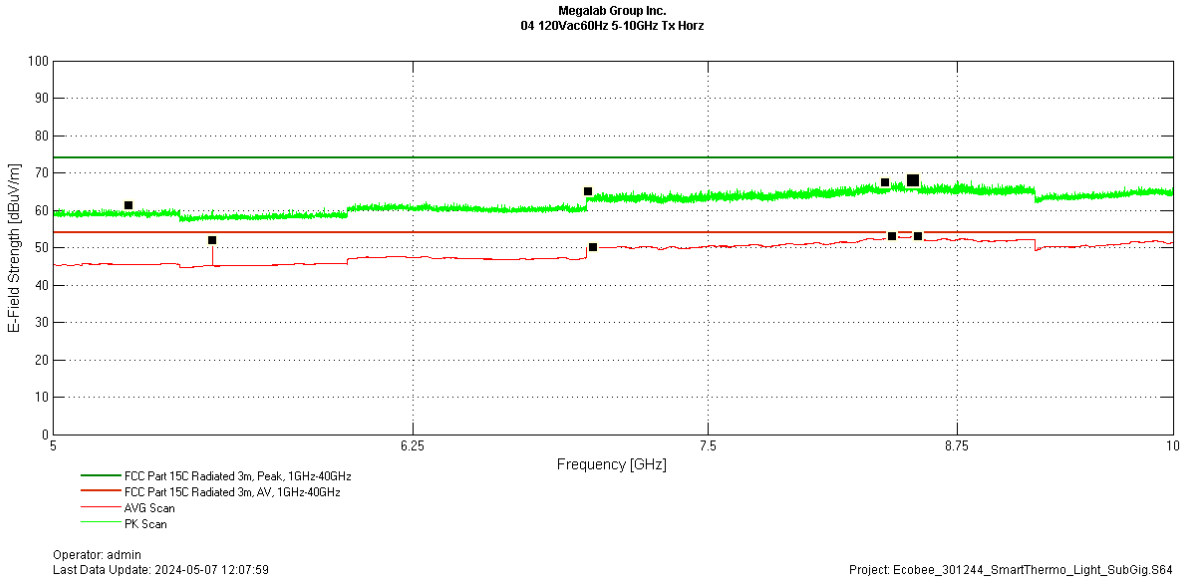

Remark: - Quasi-Peak Emission Plot
- A notch filter was used to filter out the fundamental

| | | | |
|---|---|---|---|
| **Range:** | 1GHz to 5GHz | **Tx Frequency** | 927.35 MHz |
| **Test Voltage:** | 24Vac 60Hz | **Antenna Polarization** | Horizontal |




Remark: - Peak and Average Emission Plot
- A high pass filter was used to filter out the fundamental

| | | | |
|---|---|---|---|
| **Range:** | 5 GHz to 10GHz | **Tx Frequency** | 927.35 MHz |
| **Test Voltage:** | 24Vac 60Hz | **Antenna Polarization** | Horizontal |

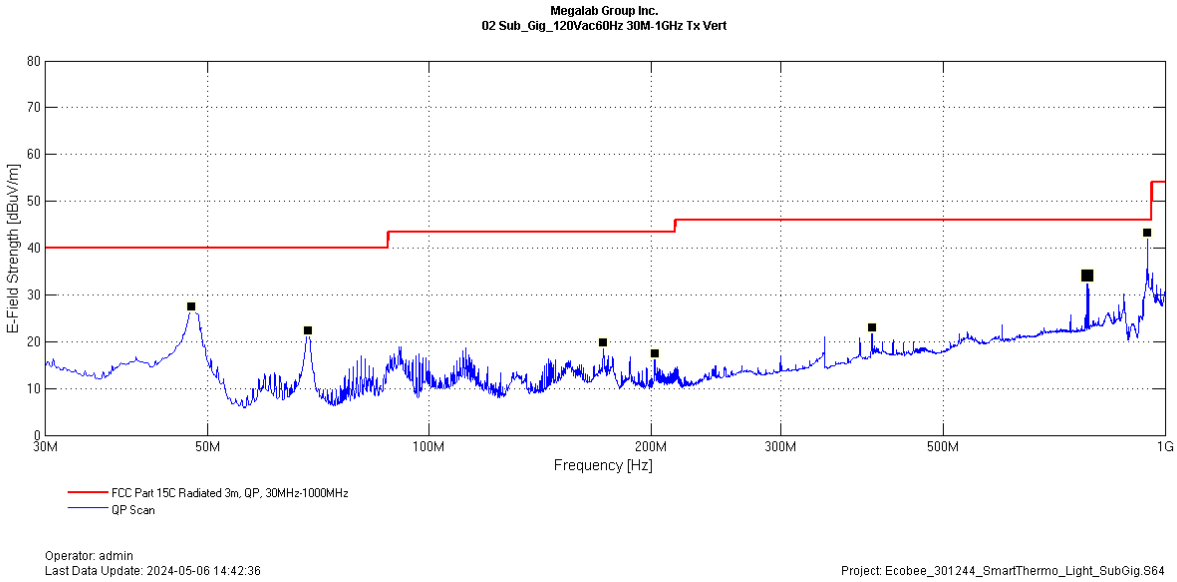



Remark: - Peak and Average Emission Plot
- A high pass filter was used to filter out the fundamental

| Horizontal Antenna Polarization | | | | | | | |
|---|---|---|---|---|---|---|---|
| Frequency (MHz) | Detector | Reading (dBµV) | Correction Factor (dB) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Test Result |
| 48.50 | QP | 35.8 | -15.8 | 20.1 | 40.0 | 19.9 | Pass |
| 58.60 | QP | 32.5 | -15.9 | 16.6 | 40.0 | 23.4 | Pass |
| 148.50 | QP | 29.8 | -13.2 | 16.6 | 43.5 | 26.9 | Pass |
| 300.00 | QP | 26.8 | -9.1 | 17.7 | 46.0 | 28.3 | Pass |
| 399.90 | QP | 31.4 | -4.2 | 27.2 | 46.0 | 18.9 | Pass |
| 714.70 | QP | 36.6 | 1.5 | 38.1 | 46.0 | 7.9 | Pass |
| 947.00 | QP | 28.7 | 4.8 | 33.5 | 12.5 | 12.5 | Pass |
| 785.15 | QP | 29.8 | 2.0 | 31.8 | 14.2 | 14.2 | Pass |

| Frequency (MHz) | Detector | Antenna Polarity | Reading (dBµV) | Antenna Factor (dB/m) | Cable Factor (dB) | Attenuator (dB) | Pre-Amp Gain (dB) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Test Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low Channel** | | | | | | | | | | | |
| 1840 | PEAK | Horz | 54.1 | 30.9 | 6.7 | 0.0 | -41.0 | 50.7 | 74.0 | 23.3 | Pass |
| 1840 | AVG | Horz | 51.1 | 30.9 | 6.7 | 0.0 | -41.0 | 47.7 | 54.0 | 6.3 | Pass |
| 2760 | PEAK | Horz | 51.6 | 32.7 | 6.8 | 0.0 | -41.7 | 49.4 | 74.0 | 24.6 | Pass |
| 2760 | AVG | Horz | 45.7 | 32.7 | 6.8 | 0.0 | -41.7 | 43.5 | 54.0 | 10.5 | Pass |
| 3680 | PEAK | Horz | 53.0 | 33.4 | 6.8 | 0.0 | -42.3 | 51.0 | 74.0 | 23.0 | Pass |
| 3680 | AVG | Horz | 47.0 | 33.4 | 6.8 | 0.0 | -42.3 | 45.0 | 54.0 | 9.0 | Pass |
| 4600 | PEAK | Horz | 45.8 | 34.4 | 7.6 | 0.0 | -42.0 | 45.9 | 74.0 | 28.1 | Pass |
| 4600 | AVG | Horz | 31.4 | 34.4 | 7.6 | 0.0 | -42.0 | 31.5 | 54.0 | 22.5 | Pass |
| 5520 | PEAK | Horz | 50.1 | 35.1 | 8.5 | 0.0 | -41.0 | 52.7 | 74.0 | 21.3 | Pass |
| 5520 | AVG | Horz | 45.8 | 35.1 | 8.5 | 0.0 | -41.0 | 48.4 | 54.0 | 5.6 | Pass |
| **High Channel** | | | | | | | | | | | |
| 1854.7 | PEAK | Horz | 51.8 | 31.0 | 6.7 | 0.0 | -41.0 | 48.5 | 74.0 | 25.5 | Pass |
| 1854.7 | AVG | Horz | 46.5 | 31.0 | 6.7 | 0.0 | -41.0 | 43.1 | 54.0 | 10.9 | Pass |
| 2782.05 | PEAK | Horz | 50.5 | 32.8 | 6.5 | 0.0 | -41.7 | 48.0 | 74.0 | 26.0 | Pass |
| 2782.05 | AVG | Horz | 43.3 | 32.8 | 6.5 | 0.0 | -41.7 | 40.8 | 54.0 | 13.2 | Pass |
| 3709.4 | PEAK | Horz | 51.3 | 33.5 | 6.8 | 0.0 | -42.3 | 49.3 | 74.0 | 24.7 | Pass |
| 3709.4 | AVG | Horz | 44.7 | 33.5 | 6.8 | 0.0 | -42.3 | 42.7 | 54.0 | 11.3 | Pass |
| 4636.75 | PEAK | Horz | 49.2 | 34.4 | 7.6 | 0.0 | -41.9 | 49.3 | 74.0 | 24.7 | Pass |
| 4636.75 | AVG | Horz | 40.3 | 34.4 | 7.6 | 0.0 | -41.9 | 40.5 | 54.0 | 13.5 | Pass |
| 5564.1 | PEAK | Horz | 48.1 | 35.1 | 8.6 | 0.0 | -41.0 | 50.8 | 74.0 | 23.2 | Pass |
| 5564.1 | AVG | Horz | 39.5 | 35.1 | 8.6 | 0.0 | -41.0 | 42.1 | 54.0 | 11.9 | Pass |

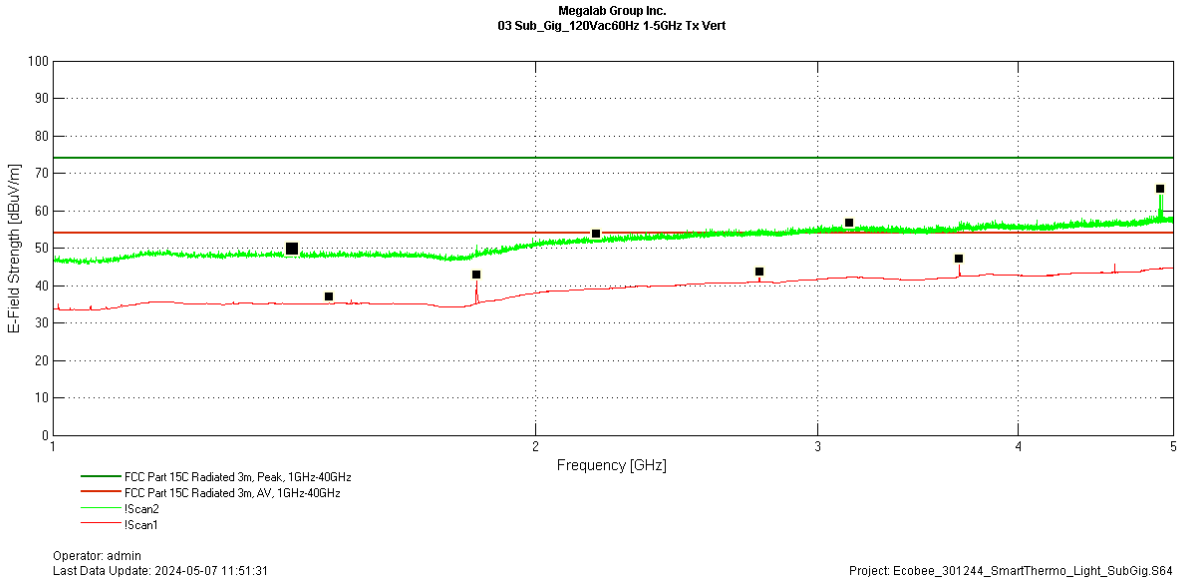
| **Range:** | 30MHz to 1GHz | **Tx Frequency** | 927.35 MHz |
|---|---|---|---|
| **Test Voltage:** | 24Vac 60Hz | **Antenna Polarization** | Vertical |




Remark: - Quasi-Peak Emission Plot

- A Notch filter was used to filter out the fundamental

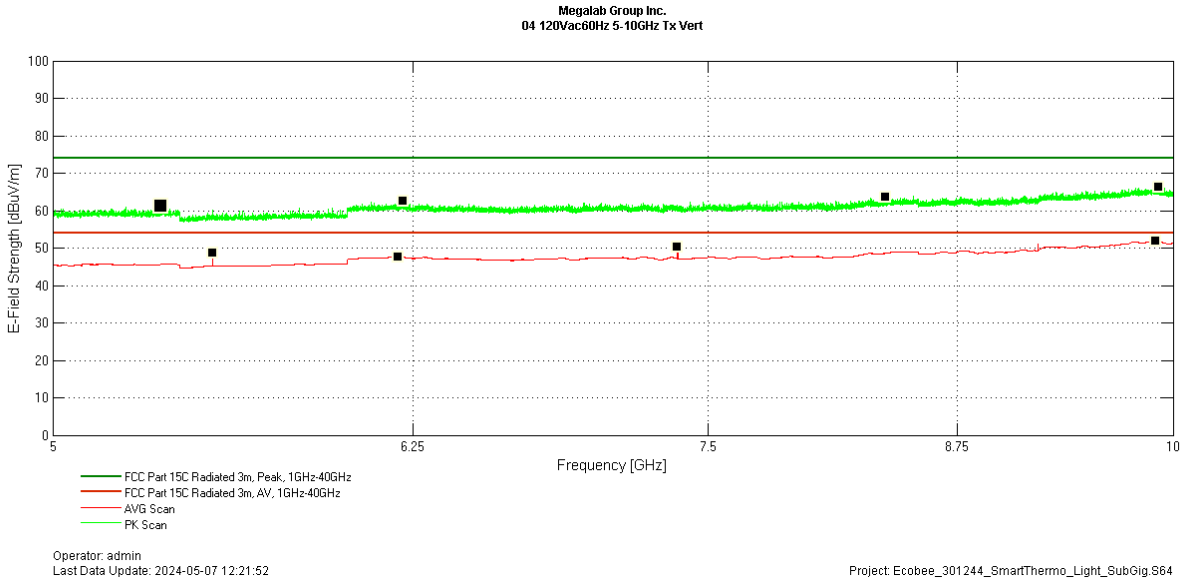
| **Range:** | 1GHz to 5GHz | **Tx Frequency** | 2403.5 MHz |
|---|---|---|---|
| **Test Voltage:** | 24Vac 60Hz | **Antenna Polarization** | Vertical |




Remark: - Peak and Average Emission Plot

- A high pass filter was used to filter out the fundamental

| **Range:** | 5GHz to 10GHz | **Tx Frequency** | 927.35 MHz |
|---|---|---|---|
| **Test Voltage:** | 24Vac 60Hz | **Antenna Polarization** | Vertical |




Remark: - Peak and Average Emission Plot
- A high pass filter was used to filter out the fundamental

| **Vertical Antenna Polarization** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Frequency (MHz)** | **Detector** | **Reading (dBµV)** | **Correction Factor (dB)** | **Emission Level (dBµV/m)** | **Limit (dBµV/m)** | **Margin (dB)** | **Test Result** |
| 47.50 | QP | 43.0 | -15.4 | 27.5 | 40.0 | 12.5 | Pass |
| 68.50 | QP | 37.7 | -15.4 | 22.3 | 40.0 | 17.7 | Pass |
| 172.40 | QP | 32.3 | -12.6 | 19.7 | 43.5 | 23.8 | Pass |
| 202.50 | QP | 29.2 | -11.8 | 17.3 | 43.5 | 26.2 | Pass |
| 399.90 | QP | 27.1 | -4.2 | 22.9 | 46.0 | 23.1 | Pass |
| 947.00 | QP | 38.4 | 4.8 | 43.3 | 46.0 | 2.8 | Pass |
| 784.05 | QP | 32.0 | 1.9 | 33.9 | 12.1 | 12.1 | Pass |

| Frequency (MHz) | Detector | Antenna Polarity | Reading (dBµV) | Antenna Factor (dB/m) | Cable Factor (dB) | Attenuator (dB) | Pre-Amp Gain (dB) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Test Result |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low Channel** | | | | | | | | | | | |
| 1840 | PEAK | Vert | 54.1 | 30.9 | 6.7 | 0.0 | -41.0 | 50.6 | 74.0 | 23.4 | Pass |
| 1840 | AVG | Vert | 49.8 | 30.9 | 6.7 | 0.0 | -41.0 | 46.4 | 54.0 | 7.6 | Pass |
| 2760 | PEAK | Vert | 51.4 | 32.7 | 6.8 | 0.0 | -41.7 | 49.2 | 74.0 | 24.8 | Pass |
| 2760 | AVG | Vert | 45.8 | 32.7 | 6.8 | 0.0 | -41.7 | 43.6 | 54.0 | 10.4 | Pass |
| 3680 | PEAK | Vert | 51.9 | 33.4 | 6.8 | 0.0 | -42.3 | 49.9 | 74.0 | 24.1 | Pass |
| 3680 | AVG | Vert | 45.9 | 33.4 | 6.8 | 0.0 | -42.3 | 43.9 | 54.0 | 10.1 | Pass |
| 4600 | PEAK | Vert | 45.9 | 34.4 | 7.6 | 0.0 | -42.0 | 46.0 | 74.0 | 28.0 | Pass |
| 4600 | AVG | Vert | 31.5 | 34.4 | 7.6 | 0.0 | -42.0 | 31.6 | 54.0 | 22.4 | Pass |
| 5520 | PEAK | Vert | 52.6 | 35.1 | 8.5 | 0.0 | -41.0 | 55.1 | 74.0 | 18.9 | Pass |
| 5520 | AVG | Vert | 47.9 | 35.1 | 8.5 | 0.0 | -41.0 | 50.4 | 54.0 | 3.6 | Pass |
| **High Channel** | | | | | | | | | | | |
| 1854.7 | PEAK | Vert | 52.3 | 31.0 | 6.7 | 0.0 | -41.0 | 49.0 | 74.0 | 25.0 | Pass |
| 1854.7 | AVG | Vert | 47.4 | 31.0 | 6.7 | 0.0 | -41.0 | 44.1 | 54.0 | 9.9 | Pass |
| 2782.05 | PEAK | Vert | 50.7 | 32.8 | 6.5 | 0.0 | -41.7 | 48.2 | 74.0 | 25.8 | Pass |
| 2782.05 | AVG | Vert | 44.5 | 32.8 | 6.5 | 0.0 | -41.7 | 42.0 | 54.0 | 12.0 | Pass |
| 3709.4 | PEAK | Vert | 52.0 | 33.5 | 6.8 | 0.0 | -42.3 | 50.0 | 74.0 | 24.0 | Pass |
| 3709.4 | AVG | Vert | 46.7 | 33.5 | 6.8 | 0.0 | -42.3 | 44.7 | 54.0 | 9.3 | Pass |
| 4636.75 | PEAK | Vert | 49.6 | 34.4 | 7.6 | 0.0 | -41.9 | 49.7 | 74.0 | 24.3 | Pass |
| 4636.75 | AVG | Vert | 42.5 | 34.4 | 7.6 | 0.0 | -41.9 | 42.7 | 54.0 | 11.3 | Pass |
| 5564.1 | PEAK | Vert | 49.0 | 35.1 | 8.6 | 0.0 | -41.0 | 51.6 | 74.0 | 22.4 | Pass |
| 5564.1 | AVG | Vert | 42.6 | 35.1 | 8.6 | 0.0 | -41.0 | 45.3 | 54.0 | 8.7 | Pass |

Worst case position: Angle: 0 Deg
Height: 151 cm

### 3.7.4 Test Equipment List

| Equipment ID | Description | Manufacturer | Model | Calibration Date | Calibration Due |
|---|---|---|---|---|---|
| EQ_EMC_58 | EMI Receiver | Rohde & Schwarz | ESW 44 | Mar 1, 2024 | Mar 1, 2026 |
| EQ_EMC_132 | EMI Test Receiver (v6.91.2) | Gauss Instruments | TDEMI X40 | Nov 29, 2023 | Nov 29, 2025 |
| EQ_EMC_48 | Loop Antenna | Com-Power | AL-130R | Apr 9, 2024 | Apr 9, 2026 |
| EQ_EMC_59 | BiLog Antenna | ETS Lindgren | 3142E | Apr 19, 2024 | Apr 19, 2026 |
| EQ_EMC_60 | Horn Antenna | ETS Lindgren | 3117 | Apr 9, 2024 | Apr 9, 2026 |
| EQ_EMC_68 | 6dB Attenuator | Fairview Microwave | SA3NS-06 | Apr 19, 2024 | Apr 19, 2026 |
| EQ_EMC_85 | RF Cable <1GHz | Times Microwave | LMR-400 | NCR | NCR |
| EQ_EMC_75 | RF Cable >1GHz | MegaPhase | EMC2 | NCR | NCR |
| EQ_EMC_123 | Preamplifier 30MHz-9GHz | RF Bay | EPA-250T | Jan 23, 2024 | Jan 23, 2026 |
| EQ_EMC_42 | Preamplifier 1GHz-18GHz | Com-Power | PAM-118A | Jan 17, 2024 | Jan 17, 2026 |
| EQ_EMC_107 | 902MHz-928MHz Notch Filter | Micro-Tronics | BRC50722 | NCR | NCR |
| EQ_EMC_110 | 1 GHz HPF Filter | Micro-Tronics | HPM50108 | NCR | NCR |
| EQ_EMC_149 | Emission Software RE/CE | Gauss Instruments | EMI64k v6.31.2 | NCR | NCR |

## 3.8 Power Line Conducted Emissions

| | | | |
|---|---|---|---|
| Test Date: | May 13, 2024 | Initials: | MX |
| Temperature (°C) | 21.1 | | |
| Relative Humidity (%) | 54.7 | | |
| Barometric Pressure (kPa) | 100.8 | | |

The conducted emission test is to measure radio-frequency (RF) signals and noise emitted from electrical and electronic devices in the frequency range of 150kHz to 30MHz.

### 3.8.1 Limits

Base Standard(s): FCC Subpart B 15.207 and RSS-GEN Section 8.8.

| Frequency Range (MHz) | Coupling Device | Detector Type / Bandwidth | Limit (dBµV) |
|---|---|---|---|
| 0.15 to 0.50 | LISN | Quasi-Peak / 9kHz | 66 to 56* |
| 0.50 to 5 | | | 56 |
| 5 to 30 | | | 60 |
| 0.15 to 0.50 | LISN | Average / 9kHz | 56 to 46* |
| 0.50 to 5 | | | 46 |
| 5 to 30 | | | 50 |

* Decreases linearly with the logarithm of the frequency

As per ANSI C63.4 Section 4.2, if the Peak or Quasi-Peak detector measurements do not exceed the Average limits, then the DUT is considered to have passed the requirements.

### 3.8.2 Test Procedure

Tested according to ANSI C63.10 Section 6.2.

Conducted emissions were measured on the DUT's power port via an Artificial Mains Network (AMN), also known as Line Impedance Stabilization Network (LISN), and maximum conducted emissions are checked on all the DUT's AC lines in the frequency range of 150kHz to 30MHz. The LISNs provide 50Ω/50µH of coupling impedance for the measuring receiver.

To determine the emission characteristics of the DUT, the conducted emission scans were made using a Peak detector and the results were recorded in graphical form.

For each suspected emission, final measurements of the DUT conducted emissions were made with the Quasi-Peak or Average detector as defined in the limits table above.

For Table-Top Equipment, the device under test is configured on a 0.8m high non-conductive table above the reference ground plane and 0.4m away from the vertical reference ground plane.

### 3.8.3 Setup Diagram

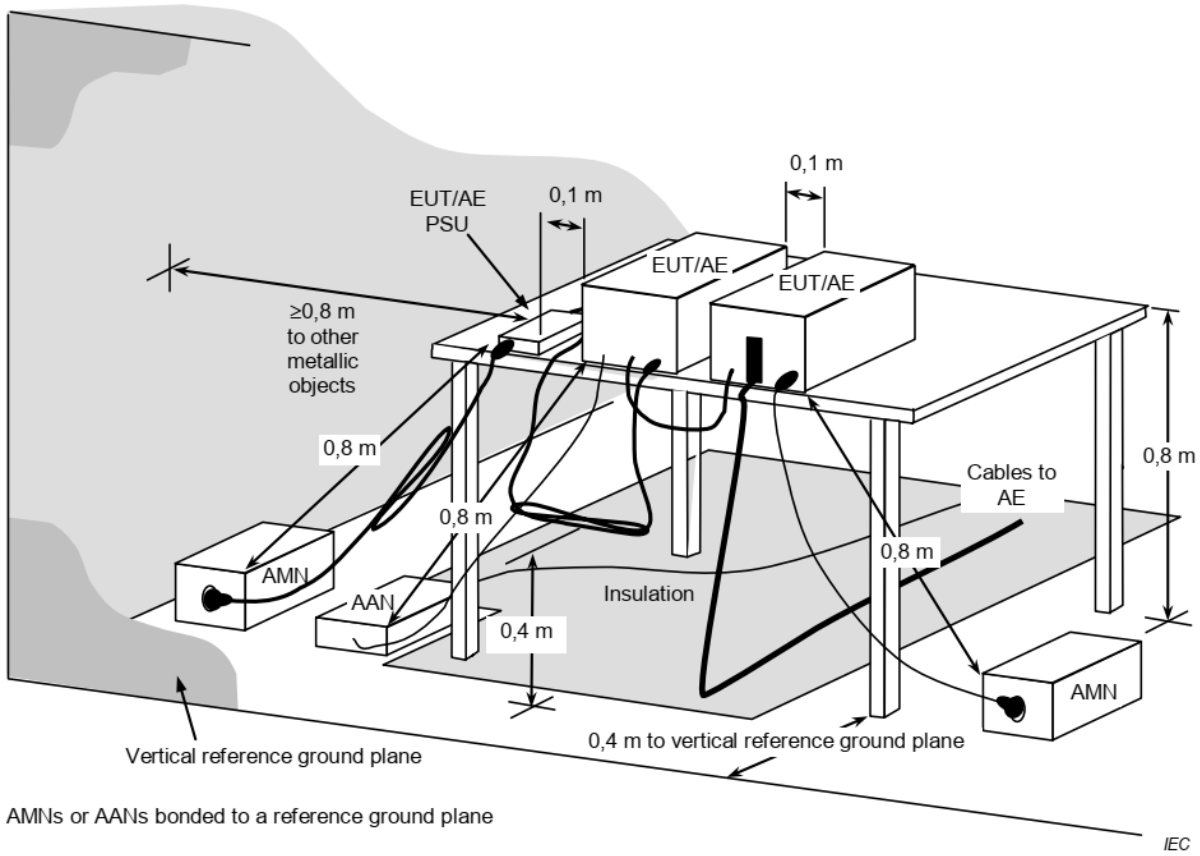
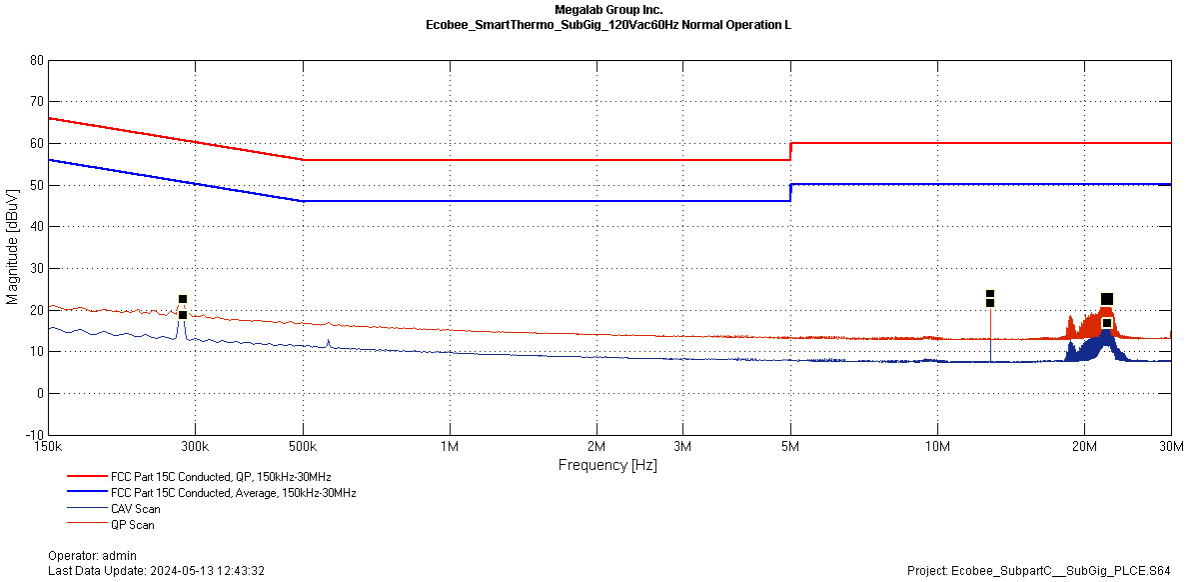



Figure 19 – Sample Measurement Arrangement for DUT

### 3.8.4 Test Results

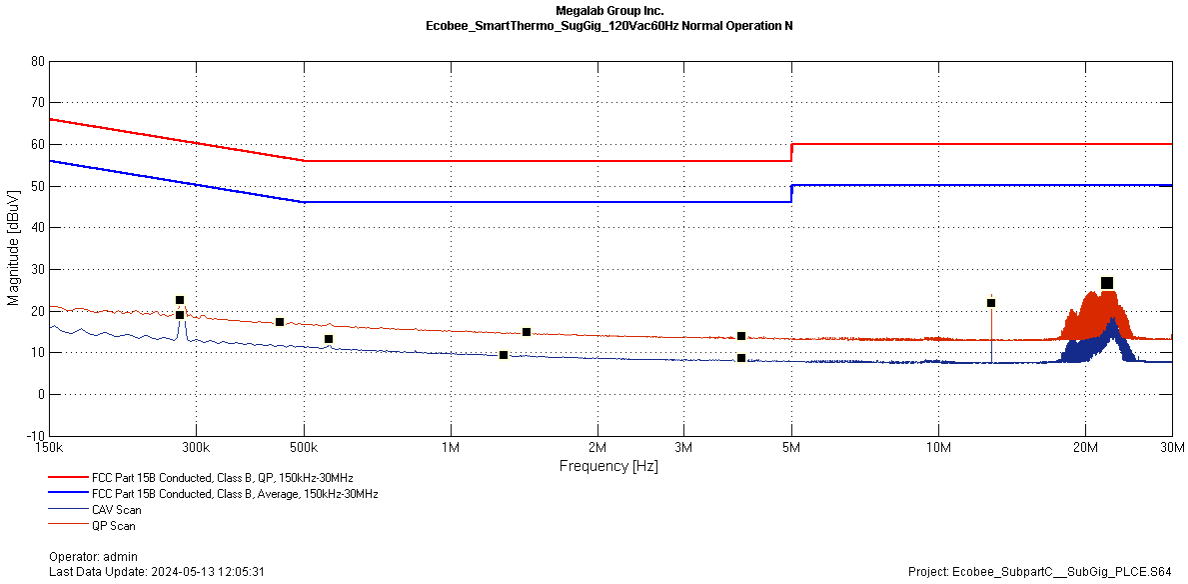
| **Range:** | 150kHz to 30MHz | **DUT** | ECB701 |
|---|---|---|---|
| **Test Voltage:** | 120Vac 60Hz | **Phase** | Line |




Remark: Quasi-Peak and Average Emission Plot

| **Line** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Freq (MHz)** | **QP Reading (dBµV)** | **AVG Reading (dBµV)** | **Corr Factor (dB)** | **QP Emission Level (dBµV)** | **AVG Emission Level (dBµV)** | **QP Limit (dBµV)** | **QP Margin (dB)** | **AVG Limit (dBµV)** | **AVG Margin (dB)** | **Test Result** |
| 12.799 | 13.7 | 11.4 | 10.1 | 23.8 | 21.6 | 60.0 | 36.2 | 50.0 | 28.5 | Pass |
| 0.284 | 12.6 | 8.8 | 9.9 | 22.4 | 18.7 | 60.7 | 38.3 | 50.7 | 32.0 | Pass |
| 22.228 | 12.2 | 6.5 | 10.3 | 22.5 | 16.8 | 37.6 | 37.6 | 33.2 | 33.2 | Pass |

| | | | |
|---|---|---|---|
| **Range:** | 150kHz to 30MHz | **DUT** | ECB701 |
| **Test Voltage:** | 120Vac 60Hz | **Phase** | Neutral |




Remark: Quasi-Peak and Average Emission Plot

| Line | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Freq (MHz)** | **QP Reading (dBµV)** | **AVG Reading (dBµV)** | **Corr Factor (dB)** | **QP Emission Level (dBµV)** | **AVG Emission Level (dBµV)** | **QP Limit (dBµV)** | **QP Margin (dB)** | **AVG Limit (dBµV)** | **AVG Margin (dB)** | **Test Result** |
| 22.182 | 16.3 | -- | 10.3 | 26.6 | -- | 60.0 | 33.4 | -- | -- | Pass |
| 0.279 | 12.5 | 8.9 | 9.9 | 22.4 | 18.8 | 60.8 | 38.4 | 50.8 | 32.0 | Pass |
| 12.799 | -- | 11.6 | 10.1 | -- | 21.7 | -- | -- | 50.0 | 28.3 | Pass |

### 3.8.5 Test Equipment List

| Equipment ID | Description | Manufacturer | Model | Calibration Date | Calibration Due |
|---|---|---|---|---|---|
| EQ_EMC_132 | EMI Test Receiver (v6.91.2) | Gauss Instruments | TDEMI X40 | Nov 29, 2023 | Nov 29, 2025 |
| EQ_EMC_61 | LISN | FCC | 50/250-16-2-01 | Jan 16, 2024 | Jan 16, 2026 |
| EQ_EMC_44 | Transient Limiter (10dB) | Com-Power | LIT-930A | NCR | NCR |
| EQ_EMC_84 | RF Cable | Times Microwave | LMR-400 | NCR | NCR |
| EQ_EMC_149 | Emission Software RE/CE | Gauss Instruments | EMI64k v6.31.2 | NCR | NCR |

---------- End of Test Report ----------