December 19, 2022

HP Inc.
Tony Griffiths
1501 Page Mill Road
Palo Alto CA 94304

Dear Tony Griffiths,

Enclosed is the Electromagnetic Compatibility for the HP Inc., P033, tested to the requirements of:

- FCC Part 15 Subpart B
- Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 7

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. Please contact me if you have any questions regarding these results or if Eurofins E&E can be of further service to you.

Sincerely,

Nancy LaBrecque
Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: EMCA118717-FCC_ICES Rev 2

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Eurofins Electrical and Electronic Testing NA, Inc. is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

# Report Status Sheet

| Revision | Report Date | Reason for Revision |
|---|---|---|
| Ø | September 23, 2022 | Initial Issue. |
| 1 | November 4, 2022 | Change Customer's Name and Address |
| 2 | December 19, 2022 | Corrections Requested by Customer |

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# 1.0 Testing Summary

The HP Inc., P033 was found to be compliant to the following specification(s).

- FCC Part 15 Subpart B
- Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 7

Sergio Gutierrez
EMC Laboratory Engineer

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements.

Matthew Hinojosa
EMC Laboratory Manager, Austin

# 2.0 Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by HP Inc. to perform testing on the P033, under purchase order number 10000013761.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of HP Inc., P033.

The results obtained relate only to the item(s) tested.

| | |
|---|---|
| **Model(s) Tested:** | P033 |
| **Equipment Emissions Class:** | A |

| Test Standard | Test Description | Compliance |
|---|---|---|
| FCC Part 15 Subpart B (per ANSI C63.4: 2014), Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 7 | CE (Mains), Class A | Compliant |
| | CE (Telecommunication Ports), Class A | Compliant |
| | RE, Class A | Compliant |

## 2.1 Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 13501 McCallen Pass, Austin, Texas 78753. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology. Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.06) in accordance with ISO/IEC 17025:2017.

## 2.2 Measurement Uncertainty

Measurement uncertainty calculated as per NIST Technical Note (TN) 1297 and ANSI / NCSL Z540-2, as equivalent to EN 55016-4-2 / IEC CISPR 16-4-2.

| Test Method | Typical Expanded Uncertainty (dB) | K | Confidence Level |
|---|---|---|---|
| Radiated Emissions, (30 MHz – 1 GHz) | ±2.95 | 2 | 95% |
| Radiated Emissions, (1 GHz – 6 GHz) | ±3.54 | 2 | 95% |
| Conducted Emission Voltage | ±2.97 | 2 | 95% |
| Conducted Emission Telecom | ±3.76 | 2 | 95% |

**Measurement Uncertainty**

## 2.3 Equipment Overview and Test Configuration

| | |
|---|---|
| **Name of EUT/Model:** | P033 |
| **Description of EUT and its intended use:** | P033 (marketed as STUDIO X52) is a video conferencing video bar designed to act as an audio / video endpoint codec over LAN networks. The device is powered by a AC/DC mains adapter and contains 2.4GHz / 5Ghz Wifi and Bluetooth radio interfaces. |
| **Selected Operation Mode(s):** | Emissions pre-testing at 230VAC / 50Hz will be required in order to confirm the worst case mode for testing; Mode 1 - Video conference call active with local (4k) content added 5.0GHz wifi pings, BT remote paired Mode 2 - Video conference call active with local (4k) content added 2.4GHz wifi pings, BT remote paired. Mode 3 - Video conference call active with no local content added 5.0GHz wifi pings, BT remote paired. Mode 4 - No Video conference call active with local (4k) content added 5.0GHz wifi pings, BT remote paired. Mode 5 - No Video conference call active with no local content added 5.0GHz wifi pings, BT remote paired. Mode 6 - System idle mode 5.0GHz OFF, BT remote paired |
| **Rationale for the selection of the Operation Mode(s):** | The 6 modes identified are all valid use cases. In HP Inc. experience Modes 1 or 2 are normally worst case |
| **Monitoring Method(s):** | Video Call remains active, content is still being sent and audio is monitored for demodulation preferably as per the requirements of EN55035 Annex G |
| **Emissions Class Declaration:** | Class A |
| **Configuration(s):** | All ports except USB C to be loaded with typical equipment and cabling as per provided block diagram. USB C is only used in 'device' mode - this means that a laptop is connected via USB C and the EUT defaults to being a web cab and speaker for said laptop. In HP Inc. experience this is a v quiet mode for radiated emissions testing and therefore we do not recommend testing in it. |
| **EUT Power Requirement** | |
| **Voltage:** | 100 - 240Vac 50 and 60Hz |
| **AC or DC:** | AC |
| **Voltage Frequency:** | 50 |
| **Number of Phases:** | 1 |
| **Current:** | See below |
| **Uses an external AC/DC Adapter:** | True |
| **Physical Description** | |
| **Arrangement:** | Table Top |
| **System w/Multiple Chassis?** | False |
| **Size:** | 29inch/5inch/4inch |
| **Weight:** | <8kg |
| **Other info** | |
| **Highest Frequency used in device (MHz):** | 2841.6 MHz - but system does use up to 5.8GHz wi-f |
| **All Other Frequencies:** | N/A |
| **EUT Software (internal to EUT):** | 3.11.0.11255 |
| **Support Software (used by supportPC to exercise EUT):** | N/A |

**EUT List**

| Ref. ID | Slot # | Name/Description | Model Number | Part Number | Serial Number | Rev. # |
|---|---|---|---|---|---|---|
| 1 | | P033 | P033 | N/A | N/A | N/A |

**Ports and Cabling**

| Ref. Id | Port Name on EUT | Cable Description or reason for no cable | Qty | Length as tested (m) | Max Length (m) | Shielded? (Y/N) | Termination Box ID & Port Name |
|---|---|---|---|---|---|---|---|
| 1 | RJ 11 Mic | Mic Cable | 1 | 7.62m | 7.62m | No | External Microphone |
| 2 | USB 3.0 Type A | Incorporated into support kit | | | | No | USB Mouse |
| 3 | USB 3.0 Type A | Incorporated into support kit | | | | No | USB keyboard |
| 4 | GB Ethernet | Cat5e | 1 | 5.08m | | No | Network/Hub |
| 5 | DC Power | | | | | No | AC/DC adaptor |
| 6 | Aux HDMI Out | | 1 | 2.032m | | No | 4K Monitor |
| 7 | Main HDMI out | | 1 | 2.032m | | No | 4K monitor |
| 8 | HDMI input | | 1 | 2.032m | | No | Laptop |
| 9 | USB C | Not required to be tested | | | | No | |

**Support Equipment**

| Ref. ID | Name/Description | Manufacturer | Model Number | Customer Supplied Calibration Data |
|---|---|---|---|---|
| 1 | Microphone | | | |
| 2 | AC/DC PSU | | | |
| 3 | USB Mouse | | | |
| 4 | USB Keyboard | | | |
| 5 | 4K Monitor | | | |
| 6 | 4K monitor | | | |
| 7 | Laptop | | | |
| 8 | Bluetooth Remote Control | | | |
| 9 | 2.4/5GHz Wi-fi router | | | |

## 2.4 Modifications to the EUT

No modifications were made to the EUT.

## 2.5 Modifications to the Standard

No modifications were made to the Test Standard.

## 2.6 Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electromagnetic Compatibility Lab for testing was returned to HP Inc. upon completion of testing.

# 3.0 Electromagnetic Compatibility Emission Criteria

## 3.1 Limits for Conducted Disturbance at Mains Terminals

**Test Method:** The following standards specified below are covered in the scope of this section of the test report:

- FCC Part 15 Subpart B
- Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 7

**Sample Calculation:**

$$R_f - S = M$$

where:

$R_f$ = Receiver Reading in dBuV
S = Specification Limit in dBuV
M = Margin to Specification in +/- dB

**Sample formula for calculating the Corrected Data for the Conducted Emissions Measurements:**

| Line | Freq (MHz) | Uncorrected QP** Amplitude (dBµV) | LISN IL (dB) | CBL (dB) | Corrected QP** Amplitude (dBµV) | QP** Limit (dBµV) | Delta (dB) | Results |
|---|---|---|---|---|---|---|---|---|
| XYZ | 0.18 | 42.65 | 10 | 0.58 | 53.23 | 79 | -25.77 | Pass |

*Corrected QP** Amplitude (dBµV) = Uncorrected Amplitude (dBµV) +LISN IL (dB) + CBL (dB) =42.65+10+0.58=53.23*
*** Same Calculation applies to Corrected Avg. amplitude as well.*

**Test Requirement(s):** The EUT shall meet the Class A limits shown in the table below.

| Frequency Range (MHz) | Class A Limits(dBµV) | | Class B Limits (dBµV) | |
|---|---|---|---|---|
| | Quasi-Peak | Average | Quasi- Peak | Average |
| 0.15 - 0.5 | 79 | 66 | 66 to 56 | 56 to 46 |
| 0.5 - 5 | 73 | 60 | 56 | 46 |
| 5 - 30 | 73 | 60 | 60 | 50 |
| Note 1 – The lower limit shall apply at the transition frequencies.<br>Note 2 – The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz. | | | | |

**Conducted Emissions - Limits**

**Test Procedure:** The EUT was placed on a non-metallic table, 80 cm above the ground plane and 40 cm away from the vertical reference ground plane. The method of testing, test conditions, and test procedures of ANSI C63.4-2014 were used. The EUT was powered through a 50 Ω/50 µH LISN. An EMI receiver, connected to the measurement port of the LISN, scanned the frequency range from 150 kHz to 30 MHz in order to find the peak conducted emissions. All peak emissions within 6 dB of the limit were re-measured using a quasi-peak and/or average detector as appropriate. Any measured frequency that exhibits a margin of compliance that is less than 3 dB below the specification limit is marked. Eurofins E&E recommends that every emission measured, has at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process. Photographs of test setup are presented below.

**Test Software Used:** TILE 7.4.2.5 was used to perform this test.

**Test Results:**

| | |
|---|---|
| **Test Standard:** | FCC Part 15 Subpart B<br>Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 7<br>Class A |
| **Test Name** | Conducted Emissions |
| **Test Dates:** | August 29, 2022 |
| **Laboratory** | Eurofins Electrical and Electronic Testing NA, Inc. |
| **Test Engineer:** | Sergio Gutierrez |
| **Test Results:** | Compliant |
| **Additional Notes:** | |

## Test Summary

| | | | |
|---|---|---|---|
| **MET Job #** | **118717** | **Temperature** | **21.00°C** |
| **Date** | **08/29/2022** | **Humidity** | **54.00% RH** |
| **Test Engineer** | **SG** | **A. Pressure** | **98.57 kPa** |
| **Customer** | **HP Inc.** | **Mode/Configuration** | **In a call, 5G Pings, sending content** |
| **Customer Contact** | **Koby Rosenberg** | **EUT Voltage** | **120 VAC/60 Hz** |
| **Limit/Class** | **FCC/A** | **Modifications** | **None** |
| **Start Frequency** | **150 kHz** | **Latest Quality Check Date** | **08/29/2022** |
| **Stop Frequency** | **30 MHz** | **Test Status** | **Compliant** |

## Test Data

| Measurement Location | Measurement | Limit | Result |
|---|---|---|---|
| **Bonding measurement from LISN ground to ground plane** | 0.515 mΩ | < 2.5 mΩ | Pass |

| Freq (MHz) | QP (dBµV) | QP Lim (dBµV) | QP Margin (dB) | Avg (dBµV) | Avg Lim (dBµV) | Avg Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| 0.1500 | 48.665 | 79.00 | 30.335 | 31.740 | 66.00 | 34.260 | **Pass** |
| 0.1545 | 48.077 | 79.00 | 30.923 | 30.873 | 66.00 | 35.127 | **Pass** |
| 0.1590 | 47.431 | 79.00 | 31.569 | 30.501 | 66.00 | 35.499 | **Pass** |
| 0.1680 | 46.034 | 79.00 | 32.966 | 29.573 | 66.00 | 36.427 | **Pass** |
| 0.1815 | 44.184 | 79.00 | 34.816 | 28.691 | 66.00 | 37.309 | **Pass** |
| 0.5145 | 29.269 | 73.00 | 43.731 | 23.782 | 60.00 | 36.218 | **Pass** |
| 0.6135 | 30.734 | 73.00 | 42.266 | 22.862 | 60.00 | 37.138 | **Pass** |
| 14.8080 | 28.931 | 73.00 | 44.069 | 23.707 | 60.00 | 36.293 | **Pass** |
| 18.5100 | 27.068 | 73.00 | 45.932 | 22.400 | 60.00 | 37.600 | **Pass** |
| 23.2005 | 27.062 | 73.00 | 45.938 | 22.558 | 60.00 | 37.442 | **Pass** |
| 25.9200 | 31.135 | 73.00 | 41.865 | 24.513 | 60.00 | 35.487 | **Pass** |

**Table 1. Conducted Emissions, Line, Test Results**

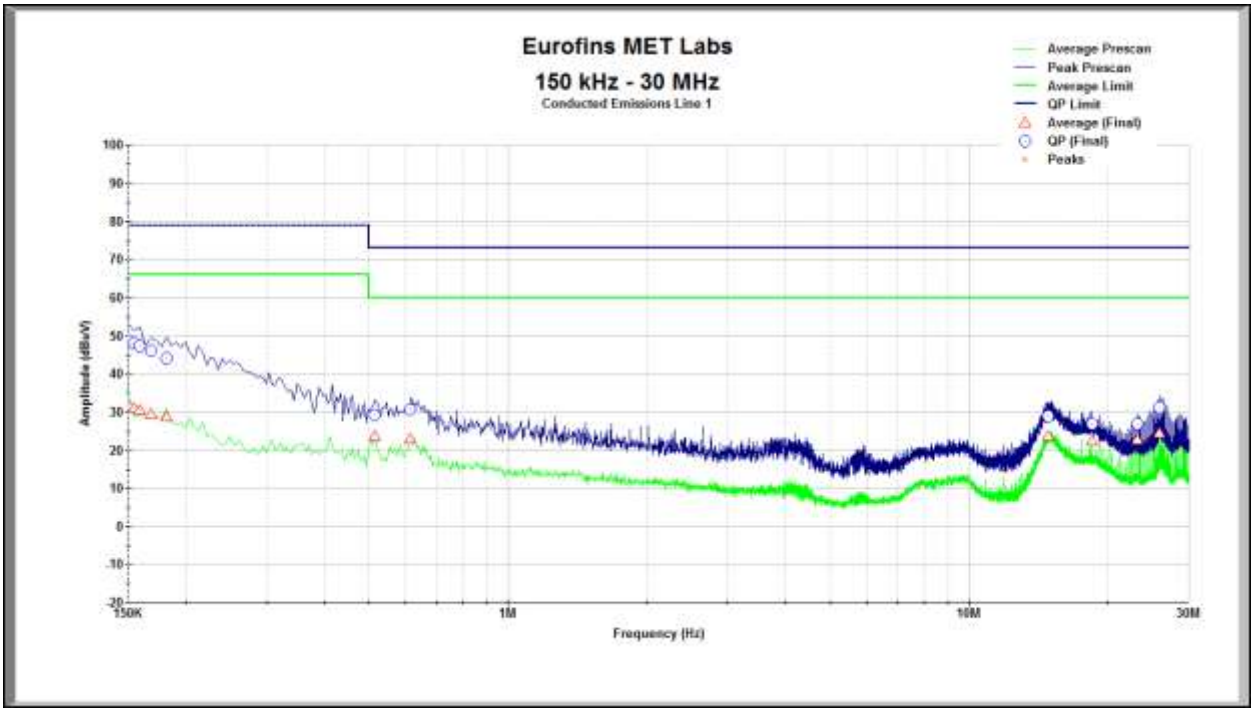


**Figure 1. Conducted Emissions, Line Plot**

| Freq (MHz) | QP (dBµV) | QP Lim (dBµV) | QP Margin (dB) | Avg (dBµV) | Avg Lim (dBµV) | Avg Margin (dB) | Result |
|---|---|---|---|---|---|---|---|
| 0.163 | 46.908 | 79.00 | 32.092 | 30.242 | 66.00 | 35.758 | **Pass** |
| 0.172 | 45.564 | 79.00 | 33.436 | 29.436 | 66.00 | 36.564 | **Pass** |
| 0.627 | 33.304 | 73.00 | 39.696 | 24.995 | 60.00 | 35.005 | **Pass** |
| 14.821 | 32.675 | 73.00 | 40.325 | 27.321 | 60.00 | 32.679 | **Pass** |
| 18.510 | 27.374 | 73.00 | 45.626 | 23.638 | 60.00 | 36.362 | **Pass** |
| 23.200 | 24.462 | 73.00 | 48.538 | 20.594 | 60.00 | 39.406 | **Pass** |
| 26.163 | 28.955 | 73.00 | 44.045 | 24.255 | 60.00 | 35.745 | **Pass** |
| 28.630 | 27.230 | 73.00 | 45.770 | 22.723 | 60.00 | 37.277 | **Pass** |

**Table 2. Conducted Emissions, Neutral, Test Results**

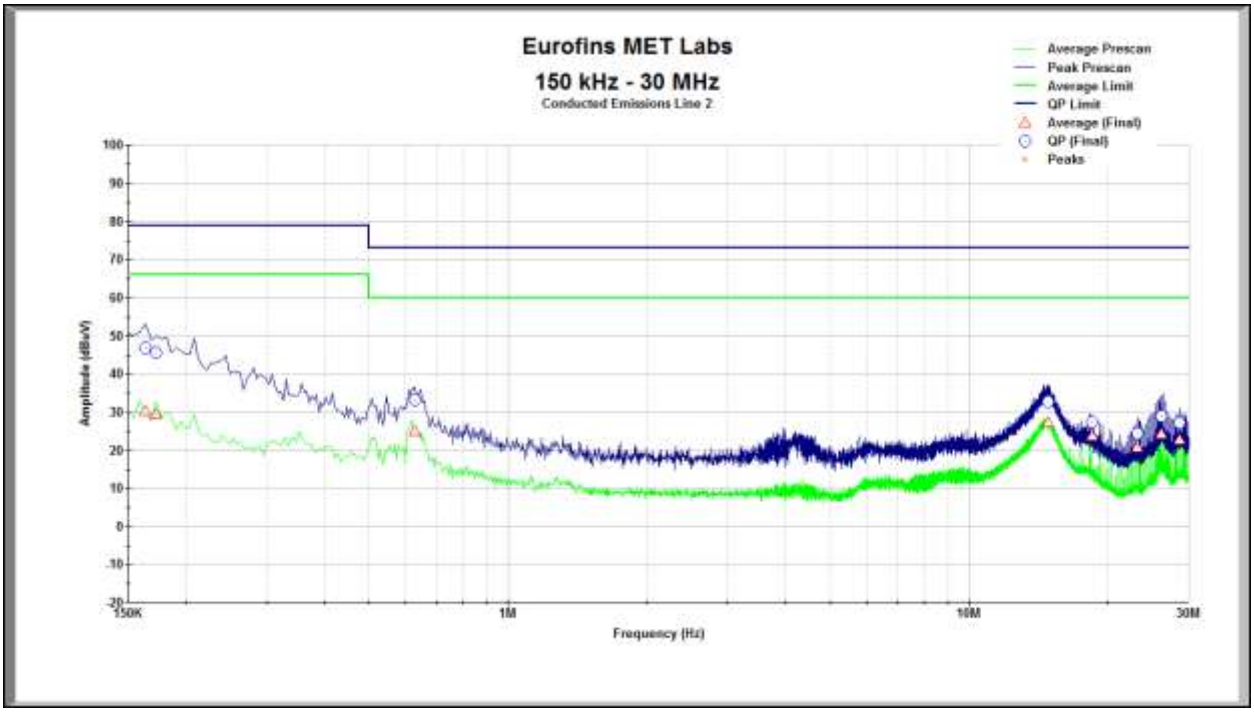


**Figure 2. Conducted Emissions, Neutral Plot**

**Photograph 1. Conducted Emissions, AC Mains, Front View**

**Photograph 2. Conducted Emissions, AC Mains, LISN View**

**Photograph 3. Conducted Emissions, AC Mains, Side View**

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

| **Test Name: CEV** | | | | **Test Date(s):** | **08/29/2022** |
|---|---|---|---|---|---|
| **MET Asset #** | **Nomenclature** | **Manufacturer** | **Model** | **Last Cal Date** | **Cal Due Date** |
| 1A1065 | EMI Test Receiver | Rohde & Schwarz | ESCI | 08/04/2022 | 08/04/2023 |
| 1A1177 | Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 11/23/2021 | 11/23/2022 |
| 3A3215 | ATC Digital Ohmmeter | Valhalla Scientific | 4150 | 05/12/2022 | 05/12/2023 |
| 3A3118 | Temperature, Humidity and Pressure Recorder | Omega Engineering | OM-CP-PRHTEMP2000 | 10/22/2021 | 10/22/2022 |
| 1A1164 | True-RMS Multimeter | Fluke | 117 | 10/19/2021 | 10/19/2022 |
| 1A1122 | LISN | TESEQ | NNB 51 | 09/13/2021 | 09/13/2022 |
| 1A1079 | Conducted Comb Generator | COM-Power Corp | CGC-255 | See Note | |
| 1A1123 | LISN | TESEQ | NNB 51 | 11/29/2021 | 11/29/2022 |
| Note: | Functionally tested equipment is verified using calibrated instrumentation at the time of testing. | | | | |

**Table 3. Conducted Emissions, Test Equipment**

## 3.3 Radiated Emissions: Limits of Electromagnetic Radiation Disturbance

**Test Method:** The following standards specified below are covered in the scope of this section of the test report:

- FCC Part 15 Subpart B
- Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 7

**Test Requirement(s):** **§15.109 (b)** The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

| Frequency (MHz) | Field Strength (dBµV/m) | |
|---|---|---|
| | §15.109 (b), Class A Limit (dBµV/m) @ 10 m | §15.109 (a), Class B Limit (dBµV/m) @ 3 m |
| 30 to 88 | 39.00 | 40.00 |
| 88 to 216 | 43.50 | 43.50 |
| 216 to 960 | 46.40 | 46.00 |
| Above 960 | 49.50 | 54.00 |
| If the highest frequency generated or used in the device or on which the device operates or tunes is:<br>• less than 108 MHz, the upper frequency of measurement range is 1000 MHz<br>• between 108 MHz – 500 MHz, the upper frequency of measurement range in 2000 MHz<br>• between 500 – 1000 MHz, the upper frequency of measurement range is 5000 MHz<br>• above 1000 MHz, the upper frequency of measurement range is the 5th harmonic of the highest frequency or 40 GHz, whichever is lower | | |

**Radiated Emissions Limits calculated per FCC Part 15, §15.109 (a) (b)**

| Frequency (MHz) | Field Strength (dBµV/m) | |
|---|---|---|
| | Class A Limit (dBµV/m) @ 10 m | Class B Limit (dBµV/m) @ 10 m |
| 30 to 88 | 40.00 | 30.00 |
| 88 to 216 | 43.50 | 33.10 |
| 216 to 230 | 46.40 | 35.60 |
| 230 to 960 | 47.00 | 37.00 |
| 960 to 1000 | 49.50 | 43.50 |
| **Frequency (MHz)** | **Class A Average Limit (dBµV/m) @ 3 m** | **Class B Average Limit (dBµV/m) @ 3 m** |
| Above 1000 | 60.00 | 54.00 |
| If the highest frequency generated or used in the device or on which the device operates or tunes is:<br>• less than 108 MHz, the upper frequency of measurement range is 1000 MHz<br>• between 108 MHz – 500 MHz, the upper frequency of measurement range in 2000 MHz<br>• between 500 – 1000 MHz, the upper frequency of measurement range is 5000 MHz<br>• above 1000 MHz, the upper frequency of measurement range is the 5th harmonic of the highest frequency or 40 GHz, whichever is lower | | |

**Radiated Emissions Limits calculated per ICES-003 Issue 7**

**Sample Calculation for Distance Correction factor (DCF) measurement:**

$$F_d = 20*LOG_{10}(D_m/D_s)$$

where:

$F_d$ = Distance Factor in dB
$D_m$ = Measurement Distance in meters
$D_s$ = Specification Distance in meters

**Sample formula for calculating the Corrected Data for the Radiated Emissions Measurements:**

| Frequency (MHz) | Antenna Polarity | EUT Azimuth (Degrees) | Antenna Height (cm) | Uncorrected Amplitude (dBµV) | ACF (dB/m) (+) | Pre Amp Gain (dB)(-) | CBL (dB) (+) | DCF (dB) (+) | Corrected Amplitude (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 249.99 | V | 359.9 | 240.7 | 55.46 | 11.4 | 28.335 | 0 | 0 | ***38.505*** | 47 | -8.495 |

*Corrected Amplitude (dBµV/m) = Uncorrected Amplitude (dBµV) +ACF (dB/m) - Preamp Gain (dB) + CBL (dB) +DCF (dB) = 55.46 + 11.4 - 28.355 + 0 + 0 =* ***38.505***

**Test Procedure:**

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing, test conditions, and test procedures of ANSI C63.4-2014 were used. Any measured frequency that exhibits a margin of compliance that is less than 3 dB below the specification limit is marked. Eurofins E&E recommends that every emission measured, has at least a 3 dB margin to allow for deviations in the emission characteristics that may occur during the production process.

For emissions between 30 MHz and 1000 MHz, a biconilog antenna was located 10 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz resolution bandwidth.

For emission between 1 GHz and 18 GHz, a double ridged guide horn was located 3 m from the EUT on an adjustable mast. A pre-scan was performed and used to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied depending on the geometry of the EUT. In order to ensure maximized emissions, the horn antenna was positioned both vertically and laterally. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a peak and average detector with a 1 MHz resolution bandwidth.

For emissions between 18 GHz and 30 GHz, a double ridged horn was used as a measurement antenna at the measurement distance as listed under Radiated Emissions Test Results, on an adjustable mast. A pre-scan was performed and used to find prominent radiated emissions. The pre-scan method includes investigation of the cone(s) of radiation output from the EUT using a bore-sighting antenna or with manual investigation by hand. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied depending on the geometry of the EUT and previously investigated cone(s) of radiation. In order to ensure maximized emissions, the horn antenna was positioned both vertically and horizontally. Measurements in both horizontal and

vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using an average and peak (for CISPR >1 GHz) detector with a 1 MHz resolution bandwidth.

All peak emissions, within 20 dB of the limit, were reviewed and the six highest peaks were remeasured using a quasi-peak or average detector as appropriate

**Test Software Used:** Jamila RE Rev 1.002 was used to perform this test.

**Test Results:**

| | |
|---|---|
| **Test Standard:** | FCC Part 15 Subpart B<br>Innovation, Science, and Economic Development (ISED) Canada ICES-003 Issue 7<br>Class A |
| **Test Name** | Radiated Emissions |
| **Test Dates:** | August 29, 2022 |
| **Laboratory** | Eurofins Electrical and Electronic Testing NA, Inc. |
| **Test Engineer:** | Sergio Gutierrez |
| **Test Results:** | Compliant |
| **Additional Notes:** | |

## Test Summary

| | | | |
|---|---|---|---|
| Test Date | 08/29/2022 | Temperature | 21.00°C |
| Engineer | SG | Humidity | 54.00% RH |
| Customer | HP Inc. | A. Pressure | 98.58 kPa |
| MET# | 118717 | Mode | In a call, 5G Pings, sending content |
| EUT | P033 | Doors | No |
| Limit/Class | FCC / A | EUT Voltage | 230 VAC/50 Hz |
| Highest Clock | 5.8 GHz | Setup V./Date | 08/29/2022/ SG |
| Start Frequency | 30 MHz | Setup Picture | See below |
| Stop Frequency | 30 GHz | Pass Date | 08/29/2022----10:41:09 AM |

## Test Data

| Frequency (MHz) | Antenna Polarity | EUT Azimuth (Degrees) | Antenna Height (cm) | Uncorrected Amplitude (dBµV) | ACF (dB/m) | Pre-Amp Gain & CBL (dB) | Corrected Amplitude (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 43.104 | V | 113.10 | 400.00 | 38.06 | 14.248 | 24.462 | 27.846 | 39.00 | -11.154 |
| 891.000 | H | 258.10 | 100.00 | 29.91 | 24.700 | 19.649 | 34.961 | 46.40 | -11.439 |
| 48.143 | V | 343.10 | 102.50 | 37.01 | 12.343 | 24.373 | 24.980 | 39.00 | -14.020 |
| 297.000 | H | 202.10 | 288.70 | 40.65 | 17.200 | 22.539 | 35.311 | 46.40 | -11.089 |
| 297.000 | V | 338.40 | 100.00 | 40.03 | 17.400 | 22.539 | 34.891 | 46.40 | -11.509 |
| 110.570 | V | 101.00 | 126.20 | 28.85 | 15.700 | 23.614 | 20.936 | 43.50 | -22.564 |

**Table 4. Radiated Emissions, FCC, 30 MHz – 1000 MHz, Quasi-Peak Test Results**

| Frequency (MHz) | Antenna Polarity | EUT Azimuth (Degrees) | Antenna Height (cm) | Uncorrected Amplitude (dBµV) | ACF (dB/m) | Pre-Amp Gain & CBL (dB) | Corrected Amplitude (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 43.104 | V | 113.10 | 400.00 | 38.06 | 14.248 | 24.462 | 27.846 | 40.00 | -12.154 |
| 891.000 | H | 258.10 | 100.00 | 29.91 | 24.700 | 19.649 | 34.961 | 47.00 | -12.039 |
| 48.143 | V | 343.10 | 102.50 | 37.01 | 12.343 | 24.373 | 24.980 | 40.00 | -15.020 |
| 297.000 | H | 202.10 | 288.70 | 40.65 | 17.200 | 22.539 | 35.311 | 47.00 | -11.689 |
| 297.000 | V | 338.40 | 100.00 | 40.03 | 17.400 | 22.539 | 34.891 | 47.00 | -12.109 |
| 110.570 | V | 101.00 | 126.20 | 28.85 | 15.700 | 23.614 | 20.936 | 43.50 | -22.564 |

**Table 5. Radiated Emissions, ICES-003, 30 MHz – 1000 MHz, Quasi-Peak Test Results**

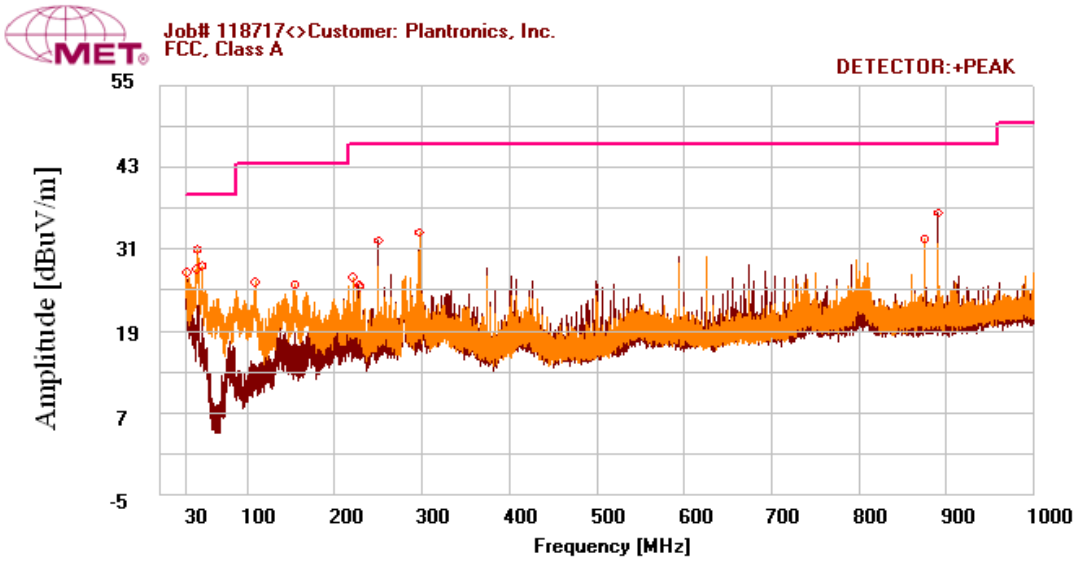


**Figure 3. Radiated Emissions, 30 MHz – 1000 MHz, Peak Plot**

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| Frequency (GHz) | Antenna Polarity | EUT Azimuth (Degrees) | Antenna Height (cm) | Uncorrected Amplitude (dBµV) | ACF (dB/m) | Pre-Amp Gain & CBL (dB) | DCF (dB) | Corrected Amplitude (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.484 | V | 91.80 | 129.70 | 52.10 | 28.248 | 30.749 | -10.46 | 39.129 | 49.50 | -10.371 |
| 1.484 | H | 89.10 | 145.50 | 53.21 | 28.386 | 30.745 | -10.46 | 40.391 | 49.50 | -9.109 |
| 1.782 | H | 40.40 | 194.00 | 52.88 | 30.117 | 32.667 | -10.46 | 39.870 | 49.50 | -9.630 |
| 1.782 | V | 218.90 | 159.60 | 50.11 | 30.259 | 32.667 | -10.46 | 37.242 | 49.50 | -12.258 |
| 3.199 | V | 270.20 | 130.50 | 36.20 | 33.411 | 36.315 | -10.46 | 22.836 | 49.50 | -26.664 |
| 3.000 | V | 153.00 | 186.90 | 44.98 | 33.108 | 36.420 | -10.46 | 31.208 | 49.50 | -18.292 |

**Table 6. Radiated Emissions, FCC, 1 GHz – 18 GHz, Average Test Results**

| Frequency (GHz) | Antenna Polarity | EUT Azimuth (Degrees) | Antenna Height (cm) | Uncorrected Amplitude (dBµV) | ACF (dB/m) | Pre-Amp Gain & CBL (dB) | Corrected Amplitude (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 1.484 | V | 91.80 | 129.70 | 52.10 | 28.248 | 30.749 | 49.589 | 60.00 | -10.411 |
| 1.484 | H | 89.10 | 145.50 | 53.21 | 28.386 | 30.745 | 50.851 | 60.00 | -9.149 |
| 1.782 | H | 40.40 | 194.00 | 52.88 | 30.117 | 32.667 | 50.330 | 60.00 | -9.670 |
| 1.782 | V | 218.90 | 159.60 | 50.11 | 30.259 | 32.667 | 47.702 | 60.00 | -12.298 |
| 3.199 | V | 270.20 | 130.50 | 36.20 | 33.411 | 36.315 | 33.296 | 60.00 | -26.704 |
| 3.000 | V | 153.00 | 186.90 | 44.98 | 33.108 | 36.420 | 41.668 | 60.00 | -18.332 |

**Table 7. Radiated Emissions, ICES-003, 1 GHz – 18 GHz, Average Test Results**

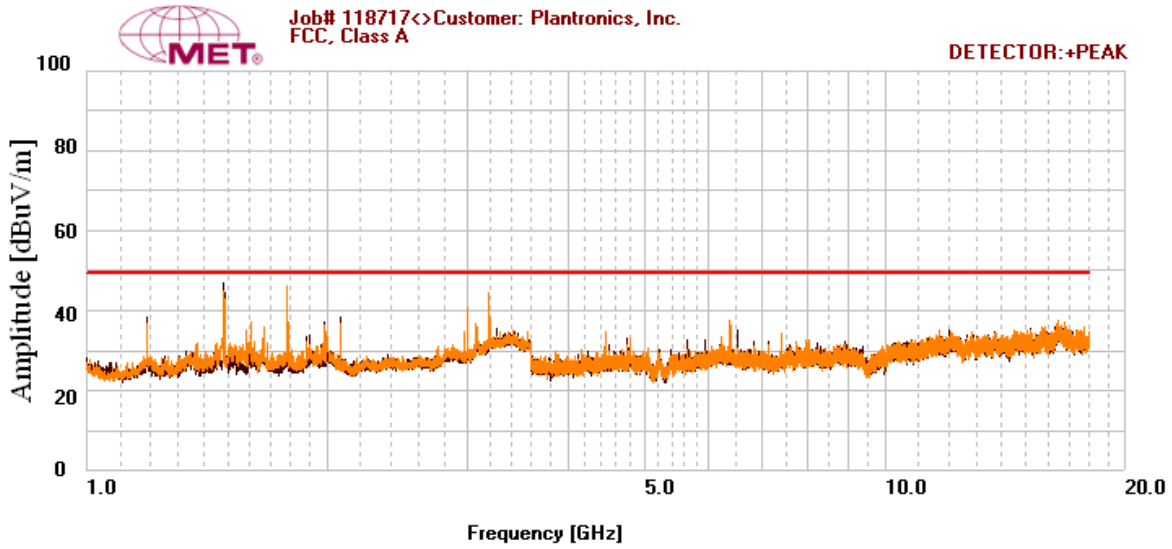


**Figure 4. Radiated Emissions, 1 GHz – 18 GHz, Peak Plot**

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| Frequency (GHz) | Antenna Polarity | Antenna Height (cm) | EUT Azimuth (Degrees) | Uncorrected Amplitude (dBµV) | ACF (dB/m) | CBL (dB) | Pre-amp Factor (dB) | DCF (dB) | Corrected Amplitude (dBµV/m) | Limit, (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 28.0000 | V | 185.20 | 245.10 | 37.85 | 46.30 | 10.22 | -40.51 | -10.460 | 43.400 | 49.50 | -6.10 |
| 28.0192 | H | 35.30 | 115.20 | 38.26 | 46.37 | 10.02 | -40.49 | -10.460 | 43.700 | 49.50 | -5.80 |
| 28.5000 | V | 229.00 | 105.30 | 36.59 | 46.56 | 10.80 | -40.44 | -10.460 | 43.050 | 49.50 | -6.45 |
| 28.5000 | H | 78.10 | 110.00 | 36.57 | 46.51 | 10.80 | -40.44 | -10.460 | 42.980 | 49.50 | -6.52 |
| 29.0192 | H | 335.70 | 138.90 | 34.18 | 46.71 | 11.47 | -39.52 | -10.460 | 42.370 | 49.50 | -7.13 |
| 29.7692 | V | 78.30 | 118.40 | 34.26 | 47.31 | 11.60 | -39.41 | -10.460 | 43.300 | 49.50 | -6.20 |

**Table 8. Radiated Emissions, FCC, 18 GHz – 30 GHz, Average Test Results**

| Frequency (GHz) | Antenna Polarity | Antenna Height (cm) | EUT Azimuth (Degrees) | Uncorrected Amplitude (dBµV) | ACF (dB/m) | CBL (dB) | Pre-amp Factor (dB) | Corrected Amplitude (dBµV/m) | Limit, (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|
| 28.0000 | V | 185.20 | 245.10 | 37.85 | 46.30 | 10.22 | -40.51 | 53.860 | 60.00 | -6.140 |
| 28.0192 | H | 35.30 | 115.20 | 38.26 | 46.37 | 10.02 | -40.49 | 54.160 | 60.00 | -5.840 |
| 28.5000 | V | 229.00 | 105.30 | 36.59 | 46.56 | 10.80 | -40.44 | 53.510 | 60.00 | -6.490 |
| 28.5000 | H | 78.10 | 110.00 | 36.57 | 46.51 | 10.80 | -40.44 | 53.440 | 60.00 | -6.560 |
| 29.0192 | H | 335.70 | 138.90 | 34.18 | 46.71 | 11.47 | -39.52 | 52.830 | 60.00 | -7.170 |
| 29.7692 | V | 78.30 | 118.40 | 34.26 | 47.31 | 11.60 | -39.41 | 53.760 | 60.00 | -6.240 |

**Table 9. Radiated Emissions, ICES-003, 18 GHz – 30 GHz, Average Test Results**

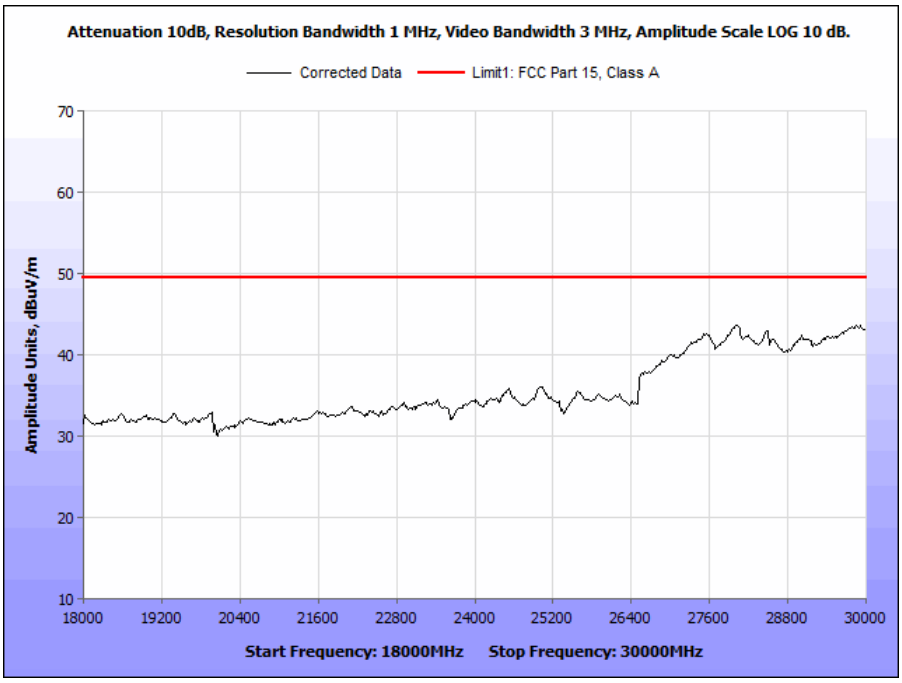



**Figure 5. Radiated Emissions, 18 GHz – 30 GHz, Horizontal Plot**

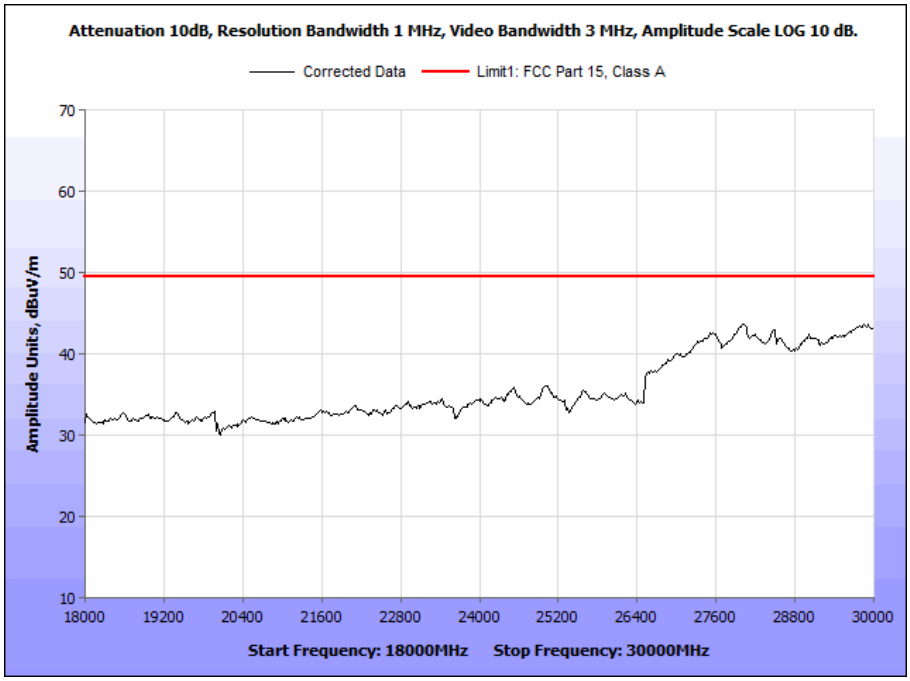
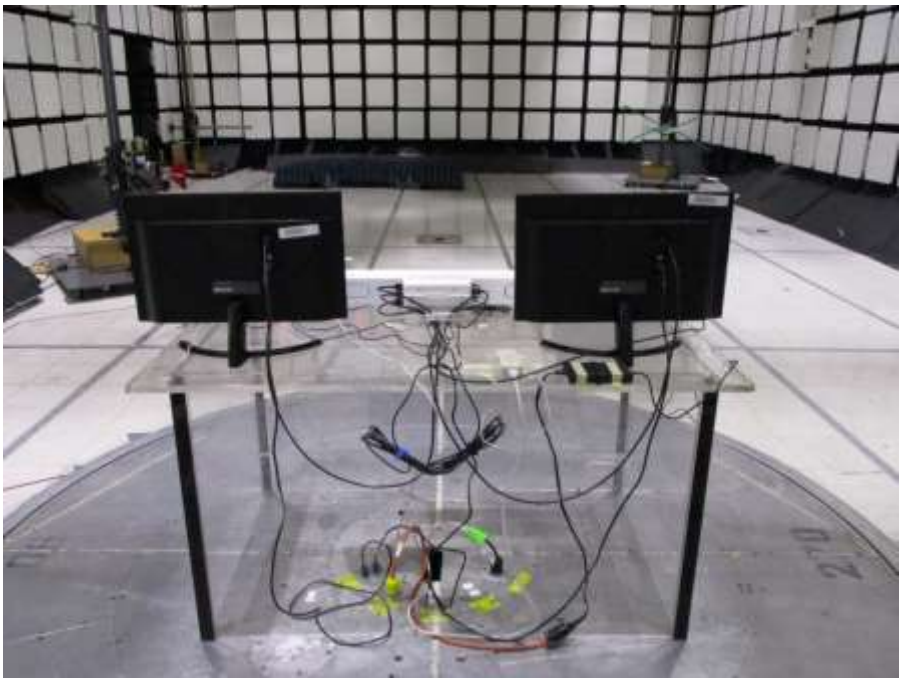



**Figure 6. Radiated Emissions, 18 GHz – 30 GHz, Vertical Plot**

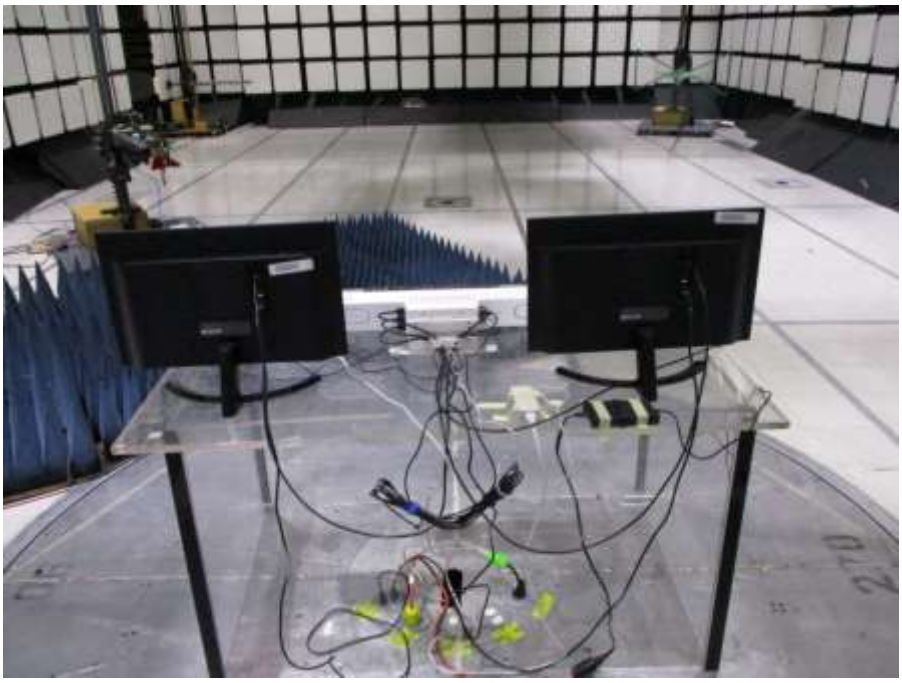
**Photograph 4. Radiated Emissions, 30 MHz – 1000 MHz, Front View**



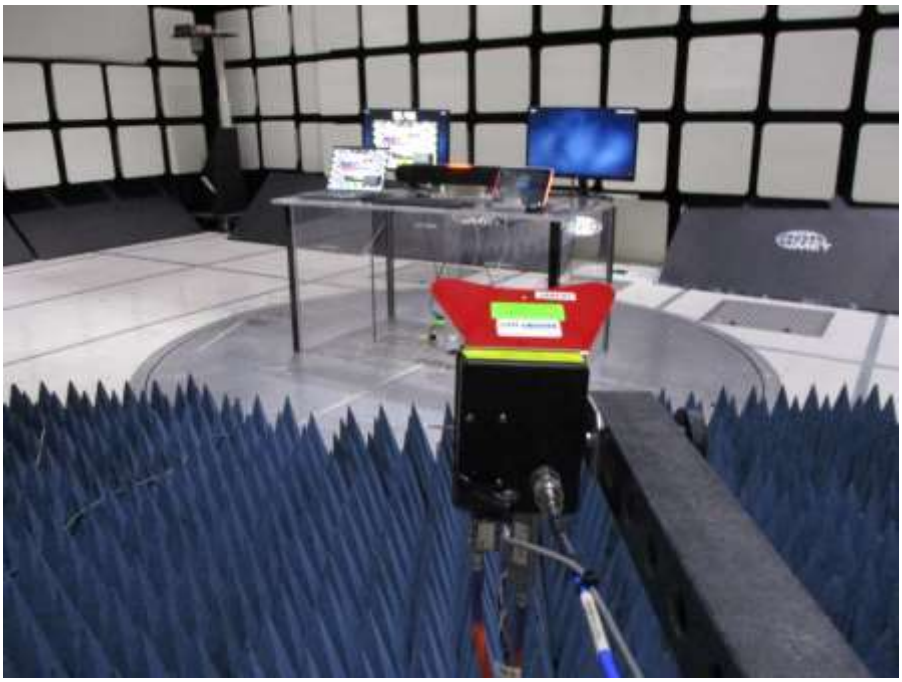
**Photograph 5. Radiated Emissions, 30 MHz – 1000 MHz, Rear View**

**Photograph 6. Radiated Emissions, 30 MHz – 1000 MHz, Antenna View**

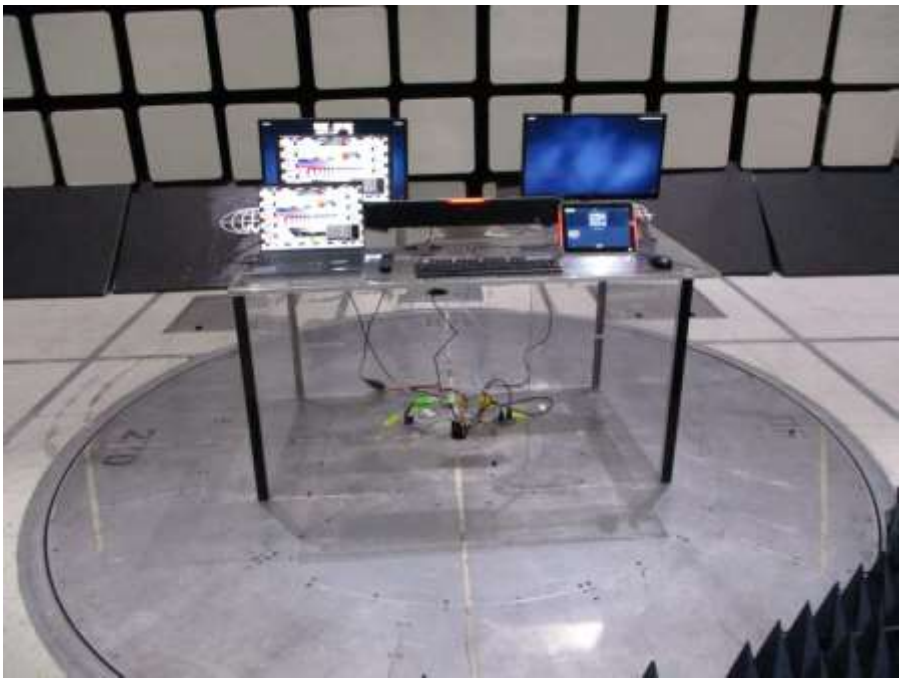
**Photograph 7. Radiated Emissions, 1 GHz – 18 GHz, Front View**



**Photograph 8. Radiated Emissions, 1 GHz – 18 GHz, Rear View**

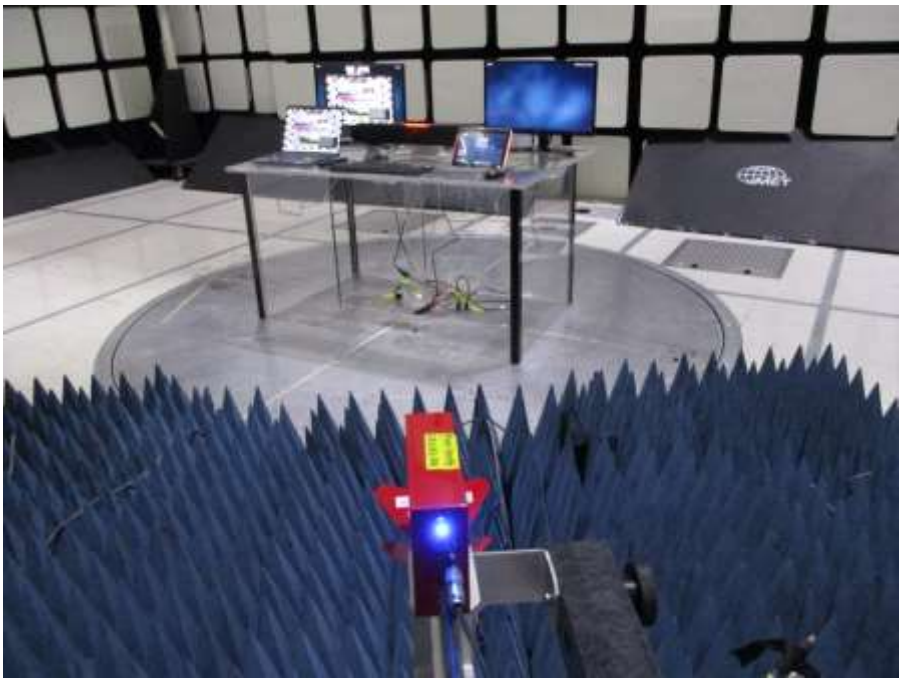


**Photograph 9. Radiated Emissions, 1 GHz – 18 GHz, Antenna View**

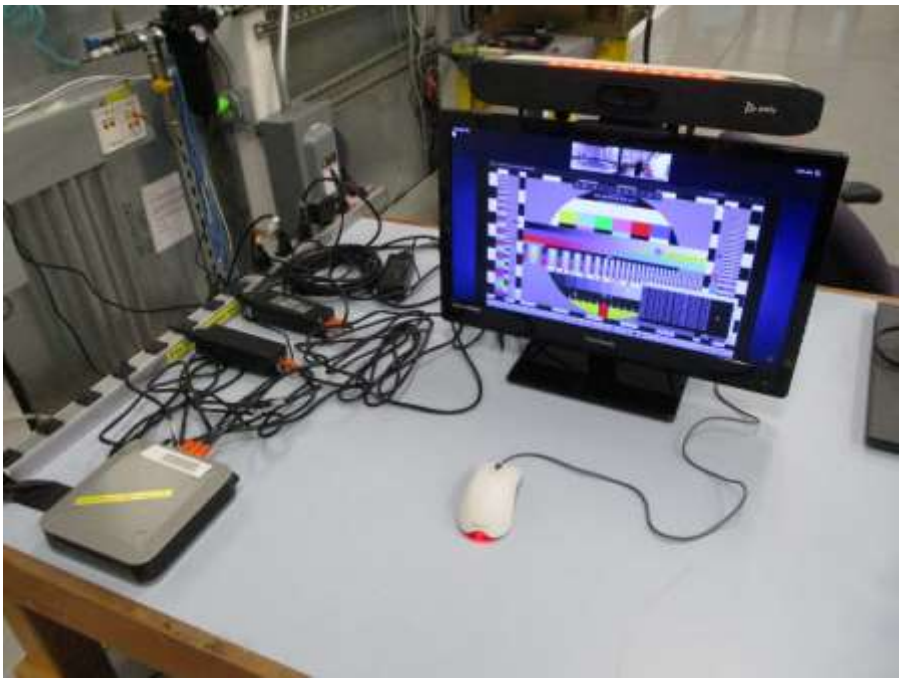


**Photograph 10. Radiated Emissions, 18 GHz – 30 GHz, Front View**

**Photograph 11. Radiated Emissions, 18 GHz – 30 GHz, Rear View**



**Photograph 12. Radiated Emissions, 18 GHz – 30 GHz, Antenna View**



**Photograph 13. Radiated Emissions, Support Equipment**

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

| **Test Name: Radiated Emissions** | | | | **Test Date(s):** | **08/29/2022** |
|---|---|---|---|---|---|
| **MET Asset #** | **Nomenclature** | **Manufacturer** | **Model** | **Last Cal Date** | **Cal Due Date** |
| **30 MHz – 1 GHz** | | | | | |
| 1A1083 | Test Receiver | Rohde & Schwarz | ESU40 | 10/12/2021 | 10/12/2022 |
| 1A1088 | Preamplifier | Rohde & Schwarz | TS-PR1 | See Note | |
| 1A1050 | Bi-Log Antenna | Schaffner | CBL 6112D | 12/01/2020 | 12/01/2022 |
| 3A3118 | Temperature, Humidity and Pressure Recorder | Omega Engineering | OM-CP-PRHTEMP2000 | 10/22/2021 | 10/22/2022 |
| 1A1044 | Generator | COM-Power Corp | CG- 520 | See Note | |
| 1A1073 | Multi Device Controller | ETS EMCO | 2090 | See Note | |
| 1A1106 | 10 M Semi-Anechoic Chamber (NSA) | ETS - Lindgren | 04X07 | 01/06/2022 | 01/06/2025 |
| **1 GHz – 18 GHz** | | | | | |
| 1A1180 | Amplifier | Miteq | AMF-7D-01001800-22-10P | See Note | |
| 1A1047 | Horn Antenna | ETS - Lindgren | 3117 | 06/16/2022 | 06/16/2024 |
| 1A1099 | Generator | COM-Power Corp | CGO 51000 | See Note | |
| 1A1080 | Multi Device Controller | ETS EMCO | 2090 | See Note | |
| **18 GHz – 30 GHz** | | | | | |
| 1A1161 | DRG Horn Antenna with Pre-Amplifier | ETS Lindgren | 3116C-PA | 06/03/2020 | 06/03/2022 |
| 1A1080 | Multi Device Controller | ETS EMCO | 2090 | See Note | |
| Note: | Functionally tested equipment is verified using calibrated instrumentation at the time of testing. | | | | |

**Table 10. Radiated Emissions, Test Equipment**

**END OF REPORT**