



Test Report - FCC Part 15.407 Spot-Check

Applicant: VMware LLC

Signature:

A handwritten signature of Tim Royer.

Sr. EMC Engineer
EMC-003838-NE



Name & Title:

Tim Royer, EMC Engineer

Date of Signature

9/11/2024

This test report relates only to the items tested as identified and is not valid for any subsequent changes or modifications made to the equipment under test.

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1. Applicant Information

Applicant: VMware LLC
Address: 3401 Hillview Avenue
Palo Alto, CA 94304

1.1 Test Result Summary

The following test procedure and guidance were used for measuring Digital Transmission System (DTS); FCC KDB 558074 D01 DTS Measurement Guidance and ANSI C63.10-2013. Full test results are available in this report.

No additions to the test methods were needed. There were no deviations, or exclusions from the test methods. No test results are from external providers or from the customer. The test results relate only to the items tested. Timco does not offer opinions and interpretations, only a pass/fail statement.

| Applicable Clauses from Part 2 and Part 15 Subpart E | | |
|--|---------------------------------|---------------------------|
| FCC Clauses | Description of the requirements | Result: (Pass, Fail, N/A) |
| 15.407 (b)(1) | Radiated Emissions | Pass |

2. Location of Testing

2.1 Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA"). Testing was performed at IIA's permanent laboratory located at 13146 NW 86th Drive, Suite 400, Alachua, Florida 32615.

FCC test firm # 578780

FCC Designation # US1070

FCC site registration is under A2LA certificate # 0955.01

ISED Canada test site registration # 2056A

EU Notified Body # 1177

For all designations see A2LA scope # 0955.01

3. Test Sample(s) (EUT/DUT)

The test sample was received: 8/15/2024

Dates of Testing: 9/11/2024

3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

| Identification | |
|--------------------------|----------------|
| FCC ID: | 2BKLH-EDG7105G |
| Certified Module FCC ID: | U2M-PCE2310M |
| Model(s) # | Edge 710-5G |
| Software version | N/A |
| Serial Number | N/A |

| Technical Characteristics | |
|------------------------------|-----------------|
| Frequency Range | 5745 – 5825 MHz |
| Voltage Rating (AC or Batt.) | DC |

| Antenna Characteristics | | | |
|-------------------------|-----------------|-----------|--------------|
| Antenna | Frequency Range | Mode / BW | Antenna Gain |
| External | 5745 – 5825 MHz | n/a | 2.46 dBi |

3.2 Configuration of EUT

| Band (MHz) | Mode | Number of Ant. |
|-----------------|----------|----------------|
| 2412 – 2462 MHz | Transmit | 1 |

Operating conditions during Testing:

No modifications of the device under test (including firmware, specific software settings, and input/output signal levels to the EUT).

Peripherals used during Testing:

A laptop provided by the manufacturer was used to program the EUT.

3.3 Test Setup of EUT

Equipment, antenna, and cable arrangement. The setup of the equipment and cable or wire placement on the test site that produces the highest radiated and the highest ac power line conducted emissions shall be shown clearly and described. Information on the orientation of portable equipment during testing shall be included. Drawings or photographs may be used for this purpose.

Test Setups are included in the test report.

4. Test methods & Applicable Regulatory Limits

4.1 Test methods/Standards/Guidance:

Test procedures and guidance for measuring Digital Transmission System (DTS) are provided in the FCC KDB 558074 D01 DTS Measurement Guidance and in Clause 11 of ANSI C63.10-2013.

- 1) ANSI C63.10-2013
- 2) FCC KDB 558074 D01
- 3) KDB 996369 D04 Module Integration Guide v01, May 1 2019, Section 3

4.2 Applied Limits and Regulatory Limits:

- 4) FCC CFR 47 Part 15.407 (2020)

5. Measurement Uncertainty

| Parameter | Uncertainty (dB) |
|--------------------------------------|------------------|
| Conducted Emissions | ± 3.14 dB |
| Radiated Emissions (9kHz – 30 MHz) | ± 3.08 dB |
| Radiated Emissions (30 – 200 MHz) | ± 2.16 dB |
| Radiated Emissions (200 – 1000 MHz) | ± 2.15 dB |
| Radiated Emissions (1 GHz – 18 GHz) | ± 2.14 dB |
| Radiated Emissions (18 GHz – 40 GHz) | ± 2.31 dB |

Note: The uncertainties provided in this table represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of K=2.

6. Environmental Conditions

6.1 Temperature & Humidity

Measurements performed at the test site did not exceed the following:

| | |
|---------------------|-------------|
| Temperature | 23 C +/- 5% |
| Humidity | 55% +/- 5% |
| Barometric pressure | 30.05 inHg |

Note: Specific environmental conditions that are applicable to a specific test are available in the test result section.

7. List of Test Equipment and Test Facility

The test equipment used identified by type, manufacturer, serial number, or other identification and the date on which the next calibration or service check is due.

Description of the firmware or software used to operate EUT for testing purposes.

A complete list of all test equipment used shall be included with the test report. The manufacturer's model and serial numbers, and date of last calibration, and calibration interval shall be included. Measurement cable loss, measuring instrument bandwidth and detector function, video bandwidth, if appropriate, and antenna factors shall also be included where applicable.

7.1 List of Test Equipment

| Test Equipment | | | | | | |
|----------------|--------------------------------|-----------------|-------------|----------|-------------|------------|
| Type | Device | Manufacturer | Model | SN# | Current Cal | Cal Due |
| Antenna | Biconical 1057 | Eaton | 94455-1 | 1057 | 11/19/21 | 11/18/2024 |
| Antenna, NSA | Log-Periodic 1243 | Eaton | 96005 | 1243 | 5/4/21 | 11/18/2024 |
| Antenna | Double-Ridged Horn/ETS Horn 1 | ETS-Lindgren | 3117 | 00035923 | 5/31/23 | 11/18/2024 |
| CHAMBER | CHAMBER | Panashield | 3M | N/A | 12/29/23 | 12/18/2025 |
| Pre-amp | Pre-amp | RF-LAMBDA | RLNA00M45GA | NA | 7/27/22 | 7/26/2025 |
| Receiver | EMI Test Receiver R&S ESW44 | Rohde & Schwarz | ESW44 | 103049 | 10/13/21 | 10/12/2024 |

| Software | | | |
|----------------|-----------------|--------------------------|---------------|
| Software | Author | Version | Validation on |
| ESU Firmware | Rohde & Schwarz | 4.43 SP3; BIOS v5.1-24-3 | 2018 |
| RSCommander | Rohde & Schwarz | 1.6.4 | 2014 |
| ScopeExplorer | LeCroy | v2.25.0.0 | 2009 |
| Field Strength | Timco | v4.10.7.0 | 2016 |

8. Test Results

The results of the test are usually indicated in the form of tables, spectrum analyzer plots, charts, sample calculations, as appropriate for each test procedure.

A description and/or a block diagram of the test setup is usually provided.

The measurement results, along with the appropriate limits for comparison, may be presented in tabular or graphical form. In addition, any variation in the measurement environment may be reported if applicable (e.g., a significant change of temperature that could affect the cable loss and amplifier response).

Unless noted otherwise in the referenced standard, the measurements of **ac power-line conducted emissions and conducted power output** will be reported in units of dB μ V. Unless noted otherwise in the referenced standard, the measurements of **radiated emissions** will be reported in units of decibels, referenced to one microvolt per meter (dB μ V/m) for electric fields, or to one ampere per meter (dBA/m) for magnetic fields, at the distance specified in the appropriate standards or requirements. The measurements of antenna-conducted power for receivers may be reported in units of dB μ V if the impedance of the measuring instrument is also reported. Otherwise, antenna-conducted power will be reported in units of decibels referenced to one milliwatt (dBm). All formulas for data conversions and conversion factors, if used, will be included in this measurement report.

Example:

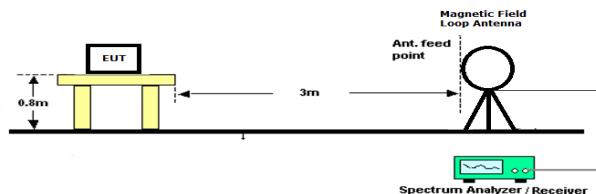
| | | | | |
|------------|---------------|--------------|----------|---------------------------|
| Freq (MHz) | Meter Reading | + ACF | +CL | = FS |
| 33 | 20 dB μ V | + 10.36 dB/m | +0.40 dB | = 30.36 dB μ V/m @ 3m |

$$\text{EIRP} = \text{Pcond (dBm)} + \text{dBi}$$

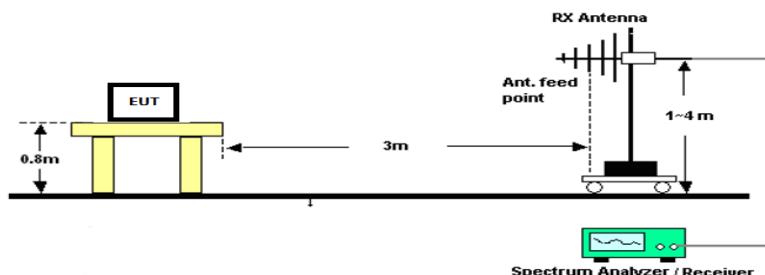
8.1 Radiated Emissions

Restricted Bands from FCC Part 15.407; Limits from FCC Part 15.407

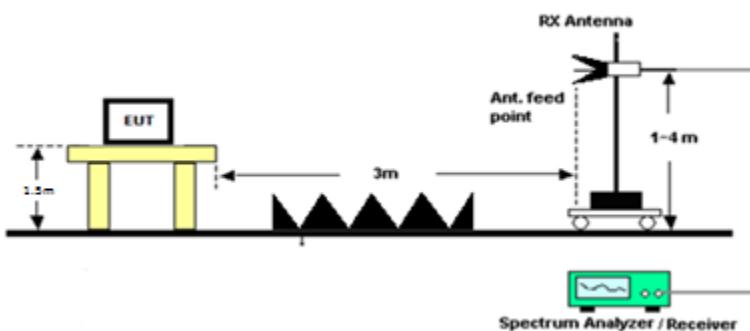
Radiated Test Setup, Below 30 MHz



Radiated Test Setup, 30 – 1000 MHz



Radiated Test Setup, Above 1000 MHz



Radiated Emissions Tabular Data

8.1.1 Radiated Emissions, 5180 MHz

| Tuned Frequency (MHz) | Emission Frequency (MHz) | 15.205 Restricted Band | 15.205, 15.35, 15.247(d) Detector | Meter Reading (dB μ V) | Antenna Polarity | Coax Loss (dB) | Duty Cycle Correction (dB) | Antenna Correction Factor (dB/m) | Distance (m) | Field Strength (dB μ V/m) | ERP (dBm) | Spurious Limit (dBm) | Margin (dB) |
|-----------------------|--------------------------|------------------------|-----------------------------------|----------------------------|------------------|----------------|----------------------------|----------------------------------|--------------|-------------------------------|-----------|----------------------|-------------|
| 5180.00 | 10360.00 | | AVG | -8.30 | H | 11.25 | 0.00 | 37.51 | 3.00 | 40.46 | -56.92 | -27.00 | 29.92 |
| 5180.00 | 10360.00 | | AVG | -8.40 | V | 11.25 | 0.00 | 37.51 | 3.00 | 40.36 | -57.02 | -27.00 | 30.02 |
| 5180.00 | 15540.00 | X | PK | 8.00 | H | 14.16 | 0.00 | 41.79 | 3.00 | 63.96 | -33.42 | -27.00 | 6.42 |
| 5180.00 | 15540.00 | X | PK | 4.20 | V | 14.16 | 0.00 | 41.79 | 3.00 | 60.16 | -37.22 | -27.00 | 10.22 |
| 5180.00 | 15540.00 | X | AVG | -7.40 | H | 14.16 | 0.00 | 41.79 | 3.00 | 48.56 | -48.82 | -27.00 | 21.82 |
| 5180.00 | 15540.00 | X | AVG | -7.70 | V | 14.16 | 0.00 | 41.79 | 3.00 | 48.26 | -49.12 | -27.00 | 22.12 |
| 5180.00 | 20720.00 | X | PK | 5.60 | H | 16.31 | 0.00 | 16.31 | 3.00 | 38.22 | -59.15 | -27.00 | 32.15 |
| 5180.00 | 20720.00 | X | PK | 4.50 | V | 16.31 | 0.00 | 16.31 | 3.00 | 37.12 | -60.25 | -27.00 | 33.25 |
| 5180.00 | 20720.00 | X | AVG | -7.20 | H | 16.31 | 0.00 | 16.31 | 3.00 | 25.42 | -71.95 | -27.00 | 44.95 |
| 5180.00 | 20720.00 | X | AVG | -7.40 | V | 16.31 | 0.00 | 16.31 | 3.00 | 25.22 | -72.15 | -27.00 | 45.15 |
| 5180.00 | 25900.00 | | PK | 5.10 | H | 18.25 | 0.00 | 18.25 | 3.00 | 41.59 | -55.78 | -27.00 | 28.78 |

9. ANNEX-B – Test Setup Photographs

Test setup photographs are located in a separate supplementary ANNEX-B document.

10. History of Test Report Changes

| Test Report # | Revision # | Description | Date of Issue |
|-------------------------------|------------|-----------------|---------------|
| TR_15541-24_FCC 15.407 5G SC_ | 1 | Initial release | 10/8/2024 |
| | 2 | Updated Page 5 | 10/29/2024 |
| | | | |



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END OF TEST REPORT
