

Report No.: FR133141-08

RADIO TEST REPORT

FCC ID : Z8H89FT0068

Equipment : ePMP 4600 6 GHz 4x4 Access Point

Brand Name : Cambium Networks

Model Name : ePMP 4600 6 GHz 4x4 Access Point

Model Number: C060940P021A

Applicant : Cambium Networks Inc.

3800 Golf Road, Suite 360 Rolling Meadows, IL 60008, USA

Manufacturer : Cambium Networks, Ltd.

Ashburton, TQ13 7UP, UK

Standard: 47 CFR FCC Part 15.407

The product was received on Jun. 07, 2024, and testing was started from Jun. 07, 2024 and completed on Jun. 19, 2024. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

am

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

TEL: 886-3-656-9065 FAX: 886-3-656-9085

Report Template No.: CB-A12 5 Ver1.1

Page Number

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Issued Date

: Aug. 05, 2024

Report Version : 01

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Appendix A. Test Results of Emission Bandwidth

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Photographs of EUT v01

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History of this test report

Report No.: FR133141-08

| Report No. | Version | Description | Issued Date |
|-------------|---------|-------------------------|---------------------------------------|
| FR133141-08 | 01 | Initial issue of report | Aug. 05, 2024 |
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Summary of Test Result

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| Report Clause | Ref Std. Clause | Test Items | Result (PASS/FAIL) | Remark |
|------------------|--------------------|---|-----------------------|--------|
| 1.1.2 | 15.203 | Antenna Requirement | PASS | - |
| 3.1 | 15.407(a) | Emission Bandwidth | PASS | - |
| 3.2 | 15.407(a) | Maximum Equivalent Isotopically Radiated Power (E.I.R.P.) | PASS | - |
| 3.3 | 15.407(a) | Peak Power Spectral Density (E.I.R.P.) | PASS | - |
| 3.4 | 15.407(b) | Unwanted Emissions | PASS | - |

Conformity Assessment Condition:

- 1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
- 2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sam Chen Report Producer: Cathy Chiu

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1 General Description

1.1 Information

1.1.1 RF General Information

For IEEE:

| Frequency Range (MHz) | IEEE Std. 802.11 | Ch. Frequency (MHz) | Channel Number |
|-----------------------|------------------|---------------------|-----------------------|
| 5925-6425 | ax (HEW20) | 5955-6415 | 1-93 [24] |
| 6525-6875 | | 6535-6855 | 117-181 [17] |
| 5925-6425 | ax (HEW40) | 5965-6405 | 3-91 [12] |
| 6525-6875 | | 6565-6845 | 123-179 [8] |
| 5925-6425 | ax (HEW80) | 5985-6385 | 7-87 [6] |
| 6525-6875 | | 6625-6785 | 135-167 [3] |
| 5925-6425 | ax (HEW160) | 6025-6345 | 15-79 [3] |
| 6525-6875 | | 6665 | 143 [1] |

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| Band | Mode | BWch (MHz) | Nant |
|----------------|-----------------|------------|------|
| 5.925-6.425GHz | 802.11ax HEW20 | 20 | 4TX |
| 6.525-6.875GHz | 802.11ax HEW20 | 20 | 4TX |
| 5.925-6.425GHz | 802.11ax HEW40 | 40 | 4TX |
| 6.525-6.875GHz | 802.11ax HEW40 | 40 | 4TX |
| 5.925-6.425GHz | 802.11ax HEW80 | 80 | 4TX |
| 6.525-6.875GHz | 802.11ax HEW80 | 80 | 4TX |
| 5.925-6.425GHz | 802.11ax HEW160 | 160 | 4TX |
| 6.525-6.875GHz | 802.11ax HEW160 | 160 | 4TX |
| | | | |

Note:

• HEW20, HEW40, HEW80 and HEW160 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.

• BWch is the nominal channel bandwidth.

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For Non IEEE:

| Frequency Range (MHz) | Mode | Ch. Frequency (MHz) |
|-----------------------|------|---------------------|
| 6525-6875 | 80 | 6835 |
| 6525-6875 | 160 | 6795 |

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| Band | Mode | BWch (MHz) | Nant |
|----------------|------|------------|------|
| 6.525-6.875GHz | 80 | 80 | 4TX |
| 6.525-6.875GHz | 160 | 160 | 4TX |

Note:

- 80 and 160 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- BWch is the nominal channel bandwidth.

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1.1.2 Antenna Information

| _ | | | | _ | _ | Gain (dBi) | | | |
|------|------|---------------------|------------------------|------------------|----------------|------------|-------|-------|--|
| Ant. | Port | rt Brand Model Name | Antenna Type | Connector | UNII3 | UNII5 | UNII7 | | |
| | 1 | Cabmium | ePMP 4x4 6GHz | Sector Antenna | Reversed-SMA | 18 | 18 | 18.73 | |
| | I | Networks | MU-MIMO Sector Antenna | Sector Afficilia | Keverseu-SiviA | 10 | 10 | 10.73 | |
| | 2 | Cabmium | ePMP 4x4 6GHz | Sector Antenna | Reversed-SMA | 18 | 18 | 18.73 | |
| 4 | | Networks | MU-MIMO Sector Antenna | Sector Antenna | Neverseu-SiviA | 10 | 10 | 10.73 | |
| ' | 3 | Cabmium | ePMP 4x4 6GHz | Sector Antenna | Reversed-SMA | 18 | 18 | 18.73 | |
| | 3 | Networks | MU-MIMO Sector Antenna | Sector Antenna | Reversed-SiviA | 10 | 10 | 10.73 | |
| | 4 | Cabmium | ePMP 4x4 6GHz | Sector Antonno | Reversed-SMA | 18 | 18 | 10 72 | |
| | | Networks | MU-MIMO Sector Antenna | Sector Antenna | Reversed-SIMA | 10 | 10 | 18.73 | |

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Note 1: The above information was declared by manufacturer.

Note 2: Antenna polarization: 2 Vertical (port 1, 3) and 2 Horizontal (port 2, 4).

Note 3: Directional gain information

| Type | Maximum Output Power | Power Spectral Density |
|--------|--|--|
| Non-BF | Directional gain = Max.gain + array gain. For power measurements on IEEE 802.11 devices Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4 | $Directiona\ lGain = 10 \cdot \log \left[\frac{\sum\limits_{j=1}^{N_{sst}} \left\{ \sum\limits_{k=1}^{N_{ssT}} \mathbf{g}_{j,k} \right\}^{2}}{N_{ANT}} \right]$ |
| BF | Directiona lGain = $10 \cdot log \left[\frac{\sum\limits_{j=1}^{N_{min}} \left\{ \sum\limits_{k=1}^{N_{max}} \mathbf{g}_{j,k} \right\}^{2}}{N_{ANT}} \right]$ | Directiona lGain = $10 \cdot \log \left[\frac{\sum\limits_{j=1}^{N_{all}} \left\{ \sum\limits_{k=1}^{N_{all}} \mathbf{g}_{j,k} \right\}^{2}}{N_{ANT}} \right]$ |

Ex.

$$\begin{split} & \text{NSS1}(\text{g1,1}) = 10^{\text{G1/20}} \text{ ; NSS1}(\text{g1,2}) = 10^{\text{G2/20}} \text{ ; NSS1}(\text{g1,2}) = 10^{\text{G3/20}} \text{; NSS1}(\text{g1,2}) = 10^{\text{G4/20}} \\ & \text{gj,k} = & \text{(Nss1}(\text{g1,1}) + \text{Nss1}(\text{g1,2}) + \text{Nss1}(\text{g1,3}) + \text{Nss1}(\text{g1,4}) \text{)}^2 \\ & \text{DG} = & 10 \log[(\text{Nss1}(\text{g1,1}) + \text{Nss1}(\text{g1,2}) + \text{Nss1}(\text{g1,3}) + \text{Nss1}(\text{g1,4}))^2 \text{ / N_{ANT}]} => 10 \\ & \log[(10^{\text{G1/20}} + 10^{\text{G2/20}} + 10^{\text{G3/20}} + 10^{\text{G4/20}})^2 \text{ / N_{ANT}]} \\ & \text{Where ;} \end{split}$$

Two polarization, port 1, 3 for vertical polarization and port 2, 4 for horizontal polarization 5G G1 = 18 dBi; G2 = 18 dBi; G3 = 18 dBi; G4 = 18 dBi; DG = 21.01 dBi

Cross-Polarized Antenna

6G UNII-5 G1= 18 dBi ; G2= 18 dBi ; G3= 18 dBi ; G4= 18 dBi ;DG= 21.01dBi 6G UNII-7 G1= 18.73 dBi ; G2= 18.73 dBi ; G3= 18.73 dBi ; G4= 18.73 dBi ;DG= 21.74dBi

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For 5GHz:

IEEE 802.11a/n/ac/ax mode (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For 6GHz:

For IEEE:

IEEE 802.11ax mode (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For Non IEEE:

4TX/4RX:

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

1.1.3 Mode Test Duty Cycle

| Mode | DC | DCF(dB) | T(s) | VBW(Hz)_1/T |
|------|-------|---------|--------|-------------|
| 80 | 0.862 | 0.64 | 5.457m | 300 |
| 160 | 0.869 | 0.61 | 5.456m | 300 |

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Note:

- DC is Duty Cycle.
- DCF is Duty Cycle Factor.

1.1.4 EUT Operational Condition

| EUT Power Type | From PoE | | | | |
|-----------------------------|-------------|---------------------|-------------|-----------------------------|--|
| Beamforming Function | | With beamforming | \boxtimes | Without beamforming | |
| | | Indoor Access Point | | Subordinate | |
| Device Type | | Indoor Client | \boxtimes | Standard Power Access Point | |
| Device Type | | Dual Client | | Standard Client | |
| | | Fixed Client | | Very Low Power | |
| Condition of EUT | | Indoor | \boxtimes | Outdoor | |
| Channel Puncturing Function | | Supported | \boxtimes | Unsupported | |
| Support RU | \boxtimes | Full RU | | Partial RU | |
| Test Software Version | | QRCT: V4.0.00192.0 | | | |

Note: The above information was declared by manufacturer.

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1.1.5 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR133141-01 Below is the table for the change of the product with respect to the original one.

| Modifications | Performance Checking |
|---|---|
| Adding frequencies for 6835 MHz at 80MHz and 6795 MHz at 160MHz for Non IEEE. | 1. Emission Bandwidth |
| | 2. Maximum Equivalent Isotopically Radiated Power |
| | (E.I.R.P.) |
| | 3. Peak Power Spectral Density (E.I.R.P.) |
| | 4. Unwanted Emissions |

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1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

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- 47 CFR FCC Part 15.407
- ANSI C63.10-2013
- FCC KDB 789033 D02 v02r01

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 987594 D02 v02r01
- FCC KDB 662911 D01 v02r01
- FCC KDB 412172 D01 v01r01

1.3 Testing Location Information

Testing Location Information

Test Lab.: Sporton International Inc. Hsinchu Laboratory

Hsinchu ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

(TAF: 3787) TEL: 886-3-656-9065 FAX: 886-3-656-9085

Test site Designation No. TW3787 with FCC.

Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

| Test Condition | Test Site No. | Test Engineer | Test Environment (°C / %) | Test Date |
|----------------|---------------|---------------|------------------------------|---------------|
| RF Conducted | TH02-CB | Owen Hsu | 21.6~23 / 63~68 | Jun. 19, 2024 |
| Radiated | 03CH01-CB | Alex Kuo | 22-23 / 55-58 | Jun. 07, 2024 |

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1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence

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level (based on a coverage factor (k=2)

| Test Items | Uncertainty | Remark |
|-----------------------------------|-------------|--------------------------|
| Radiated Emission (1GHz ~ 18GHz) | 4.2 dB | Confidence levels of 95% |
| Radiated Emission (18GHz ~ 40GHz) | 4.0 dB | Confidence levels of 95% |
| Conducted Emission | 3.1 dB | Confidence levels of 95% |
| Output Power Measurement | 0.8 dB | Confidence levels of 95% |
| Power Density Measurement | 3.1 dB | Confidence levels of 95% |
| Bandwidth Measurement | 2.1 % | Confidence levels of 95% |

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2 Test Configuration of EUT

2.1 Test Channel Mode

| Mode |
|---------------------|
| 80_Nss1,(MCS0)_4TX |
| 6835MHz |
| 160_Nss1,(MCS0)_4TX |
| 6795MHz |

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2.2 The Worst Case Measurement Configuration

| The Worst Case Mode for Following Conformance Tests | |
|---|---|
| Tests Item | Emission Bandwidth Maximum Equivalent Isotopically Radiated Power (E.I.R.P.) Peak Power Spectral Density (E.I.R.P.) |
| Test Condition | Conducted measurement at transmit chains |

| The Worst Case Mode for Following Conformance Tests | | |
|---|--|--|
| Tests Item | Unwanted Emissions | |
| Test Condition | Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type. | |
| Operating Mode > 1GHz | CTX | |
| After evaluating, EUT in configuration. | Y axis was the worst case, so the measurement will follow this same test | |
| 1 | EUT in Y axis + PoE | |

| The Worst Case Mode for Following Conformance Tests | |
|---|--|
| Tests Item | Emission MASK |
| Test Condition | Conducted measurement at transmit chains |

Note: The PoE was for measurement only and would not be marketed. Its information is shown as below:

| Equipment | Brand Name | Model Name |
|-----------|------------------|--------------|
| PoE | Cambium Networks | NET-P30-56IN |

2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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2.4 Accessories

| Accessories | |
|----------------|--|
| Wall Bracket*1 | |

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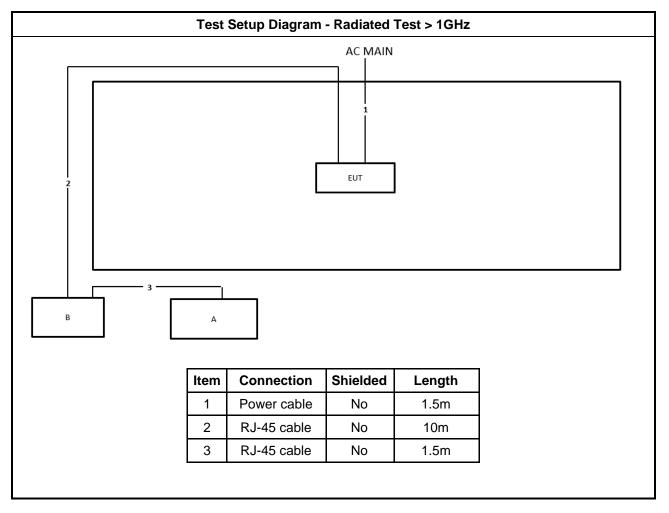
2.5 Support Equipment

| | Support Equipment | | | |
|-----|-------------------|------------------|--------------|--------|
| No. | Equipment | Brand Name | Model Name | FCC ID |
| Α | Notebook | DELL | E4300 | N/A |
| В | PoE | Cambium Networks | NET-P30-56IN | N/A |

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2.6 Test Setup Diagram



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3 Transmitter Test Result

3.1 Emission Bandwidth

3.1.1 Emission Bandwidth Limit

| | Emission Bandwidth Limit | | |
|-------------|---------------------------------|--|--|
| UNI | UNII Devices | | |
| | For the 5925-6425 GHz band, N/A | | |
| | For the 6425-6525 GHz band, N/A | | |
| \boxtimes | For the 6525-6875 GHz band, N/A | | |
| | For the 6875-7125 GHz band, N/A | | |
| RL | AN Devices | | |
| | For the 5925-6425 GHz band, N/A | | |
| | For the 6425-6525 GHz band, N/A | | |
| | For the 6525-6875 GHz band, N/A | | |
| | For the 6875-7125 GHz band, N/A | | |

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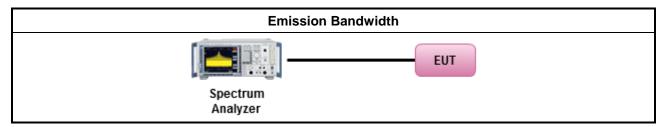
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

| | | Test Method |
|---|--|--|
| • | For the emission bandwidth shall be measured using one of the options below: | |
| | | According to FCC KDB 987594 D02 clause II.C, measurement procedure shall refer to FCC KDB 789033 D02, clause C for EBW and clause D for OBW measurement. |
| | | Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing. |
| | | Refer as IC RSS-Gen, clause 4.6 for bandwidth testing. |

3.1.4 Test Setup



3.1.5 Test Result of Emission Bandwidth

Refer as Appendix A

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3.2 Maximum Equivalent Isotopically Radiated Power (E.I.R.P.)

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3.2.1 Maximum Equivalent Isotopically Radiated Power (E.I.R.P.) Limit

| | | Maximum Equivalent Isotopically Radiated Power (E.I.R.P.) Limit |
|-------------|---------------------------------|---|
| UNI | l Dev | rices |
| | For | the 5.925 ~ 6.425 GHz band: |
| | • | For standard power access point and fixed client device: e.i.r.p < 36 dBm. For outdoor devices, the maximum e.i.r.p. at any elevation angle above 30 degrees not exceed 125 mW (21 dBm). |
| | • | For indoor access point : e.i.r.p < 30 dBm. |
| | • | For subordinate device control of an indoor access point : e.i.r.p < 30 dBm. |
| | • | For client device control of a standard power access point : e.i.r.p < 30 dBm. |
| | • | For client device control of an indoor access point : e.i.r.p < 24 dBm. |
| | • | For very low power device : e.i.r.p < 14 dBm. |
| | For | the 6.425 ~ 6.525 GHz band: |
| | • | For indoor access point : e.i.r.p < 30 dBm. |
| | • | For client device control of an indoor access point : e.i.r.p < 24 dBm. |
| \boxtimes | For | the 6.525 ~ 6.875 GHz band: |
| | • | For standard power access point and fixed client device : e.i.r.p < 36 dBm. For outdoor devices, the maximum e.i.r.p. at any elevation angle above 30 degrees not exceed 125 mW (21 dBm). |
| | • | For indoor access point : e.i.r.p < 30 dBm. |
| | • | For subordinate device control of an indoor access point : e.i.r.p < 30 dBm. |
| | • | For client device control of a standard power access point : e.i.r.p < 30 dBm. |
| | • | For client device control of an indoor access point : e.i.r.p < 24 dBm. |
| | • | For very low power device : e.i.r.p < 14 dBm. |
| | For | the 6.875 ~ 7.125 GHz band: |
| | • | For indoor access point : e.i.r.p < 30 dBm. |
| | • | For client device control of an indoor access point : e.i.r.p < 24 dBm. |
| RLA | AN D | evices |
| | For the 5.925 ~ 7.125 GHz band: | |
| | • | For low-power indoor access-points & indoor subordinate devices < 30 dBm. |
| | • | For low-power client devices < 24 dBm. |
| | For | the 5.925 ~ 6.875 GHz band: |
| | • | For standard-power access points & fixed client devices < 36 dBm. For outdoor devices, the maximum e.i.r.p. at any elevation angle above 30 degrees not exceed 125 mW (21 dBm). |
| | • | For standard client devices < 30 dBm. |

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3.2.2 Measuring Instruments

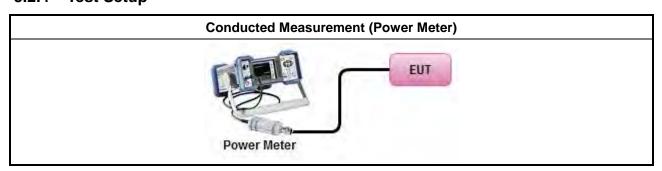
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

| | | Test Method | | | | | | | |
|--|--|---|--|--|--|--|--|--|--|
| • | | ording to FCC KDB 987594 D02 clause II.E, the test measurement procedure shall refer to KDB 033. | | | | | | | |
| | Average over on/off periods with duty factor | | | | | | | | |
| | | Refer as FCC KDB 789033 D02, clause E Method SA-2 (spectral trace averaging). Spectrum analyzer setting: RBW/VBW: 1/3MHz; Detector: RMS; Trace mode: Average; Sweep Count 100. | | | | | | | |
| Refer as FCC KDB 789033 D02, clause E Method SA-2 Alt. (RMS detection with slow sweed) | | | | | | | | | |
| | Wid | eband RF power meter and average over on/off periods with duty factor | | | | | | | |
| | \boxtimes | Refer as FCC KDB 789033 D02, clause E Method PM-G (using an RF average power meter). | | | | | | | |
| \boxtimes | For | conducted measurement. | | | | | | | |
| | • | If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them. | | | | | | | |
| | • | If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$ | | | | | | | |
| | For | radiated measurement. | | | | | | | |
| | | Refer as FCC KDB 789033 D02 clause II A.1.F "Antenna-port Conducted versus Radiated Testing" | | | | | | | |
| | | Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz. | | | | | | | |
| | | Refer as FCC KDB 412172 D01 clause 2.2 for EIRP calculation. | | | | | | | |

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3.2.4 Test Setup



3.2.5 Test Result of Maximum Equivalent Isotopically Radiated Power (E.I.R.P)

Refer as Appendix B

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3.3 Peak Power Spectral Density (E.I.R.P.)

3.3.1 Peak Power Spectral Density (E.I.R.P.) Limit

| | | Peak Power Spectral Density (E.I.R.P.) Limit |
|-------------|------|--|
| UNI | l De | vices |
| | For | the 5.925 ~ 6.425 GHz band: |
| | - | For standard power access point and fixed client device : e.i.r.p PSD < 23 dBm/MHz. |
| | - | For indoor access point : e.i.r.p PSD < 5 dBm/MHz. |
| | - | For subordinate device control of an indoor access point : e.i.r.p PSD < 5 dBm/MHz. |
| | - | For client device control of a standard power access point : e.i.r.p PSD < 17 dBm/MHz. |
| | - | For client device control of an indoor access point : e.i.r.p PSD < -1 dBm/MHz. |
| | - | For very low power device : e.i.r.p PSD < -5 dBm/MHz. |
| | For | the 6.425 ~ 6.525 GHz band: |
| | - | For indoor access point : e.i.r.p PSD < 5 dBm/MHz. |
| | • | For client device control of an indoor access point : e.i.r.p PSD < -1 dBm/MHz. |
| \boxtimes | For | the 6.525 ~ 6.875 GHz band: |
| | - | For standard power access point and fixed client device : e.i.r.p PSD < 23 dBm/MHz. |
| | - | For indoor access point : e.i.r.p PSD < 5 dBm/MHz. |
| | • | For subordinate device control of an indoor access point : e.i.r.p PSD < 5 dBm/MHz. |
| | • | For client device control of a standard power access point : e.i.r.p PSD < 17 dBm/MHz. |
| | • | For client device control of an indoor access point : e.i.r.p PSD < -1 dBm/MHz. |
| | • | For very low power device : e.i.r.p PSD < -5 dBm/MHz. |
| | For | the 6.875 ~ 7.125 GHz band: |
| | • | For indoor access point : e.i.r.p PSD < 5 dBm/MHz. |
| | • | For client device control of an indoor access point : e.i.r.p PSD < -1 dBm/MHz. |
| RLA | AN D | evices |
| | For | the 5.925 ~ 7.125 GHz band: |
| | • | For low-power indoor access-points & indoor subordinate devices < 5 dBm / MHz. |
| | • | For low-power client devices < -1 dBm / MHz. |
| | For | the 5.925 ~ 6.875 GHz band: |
| | • | For standard-power access points & fixed client devices < 23 dBm / MHz. |
| | • | For standard client devices < 17 dBm / MHz. |

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3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

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3.3.3 Test Procedures

| | | | Test Method |
|-------------|-------------|----------------------------|--|
| • | Pea outp | k pow out po ction o | to FCC KDB 987594 D02 clause II.F, the measurement procedure shall refer to KDB 789033. Wer spectral density procedures that the same method as used to determine the conducted wer shall be used to determine the peak power spectral density and use the peak search in the spectrum analyzer to find the peak of the spectrum. For the peak power spectral density neasured using below options: |
| | | | er as FCC KDB 789033 D02, F)5) power spectral density can be measured using resolution dwidths < 1 MHz provided that the results are integrated over 1 MHz bandwidth |
| | [dut | y cycl | e ≥ 98% or external video / power trigger] |
| | \boxtimes | Refe | r as FCC KDB 789033 D02, clause E Method SA-1 (spectral trace averaging). |
| | | Refe spee | er as FCC KDB 789033 D02, clause E Method SA-1 Alt. (RMS detection with slow sweep ed) |
| | duty | cycle | e < 98% and average over on/off periods with duty factor |
| | \boxtimes | Refe | r as FCC KDB 789033 D02, clause E Method SA-2 (spectral trace averaging). |
| | | Refe spee | er as FCC KDB 789033 D02, clause E Method SA-2 Alt. (RMS detection with slow sweep ed) |
| \boxtimes | For | condu | icted measurement. |
| | • | If the | EUT supports multiple transmit chains using options given below: |
| | | | Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace. |
| | | | Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits, |
| | | | Option 3: Measure and add 10 $\log(N)$ dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 $\log(N)$. Or each transmit chains shall be add 10 $\log(N)$ to compared with the limit. |
| | • | PPS (calc | ultiple transmit chains, EIRP PPSD calculation could be following as methods: $D_{total} = PPSD_1 + PPSD_2 + + PPSD_n$ culated in linear unit [mW] and transfer to log unit [dBm]) $P_{total} = PPSD_{total} + DG$ |
| | For | radiat | ed measurement. |
| | • | Refe | er as FCC KDB 789033 D02 clause II A.1.F "Antenna-port Conducted versus Radiated Testing" |
| | • | Refe | er as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz. |

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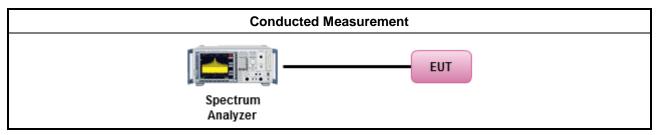


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Test Method

Refer as FCC KDB 412172 D01 clause 2.2 for EIRP calculation.

3.3.4 Test Setup



3.3.5 Test Result of Peak Power Spectral Density (E.I.R.P.)

Refer as Appendix C

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3.4 Unwanted Emissions

3.4.1 Transmitter Unwanted Emissions Limit

| Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit | | | | | | | | | |
|---|-----------------------|-------------------------|----------------------|--|--|--|--|--|--|
| Frequency Range (MHz) | Field Strength (uV/m) | Field Strength (dBuV/m) | Measure Distance (m) | | | | | | |
| 0.009~0.490 | 2400/F(kHz) | 48.5 - 13.8 | 300 | | | | | | |
| 0.490~1.705 | 24000/F(kHz) | 33.8 - 23 | 30 | | | | | | |
| 1.705~30.0 | 30 | 29 | 30 | | | | | | |
| 30~88 | 100 | 40 | 3 | | | | | | |
| 88~216 | 150 | 43.5 | 3 | | | | | | |
| 216~960 | 200 | 46 | 3 | | | | | | |
| Above 960 | 500 | 54 | 3 | | | | | | |

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- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.
- Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m(20 x log (standard distance/ test distance) = 20log(3/1) = 9.54dB.

 EX. Above 18GHz emission limit calculation (3m to 1m) = 54dBuV/m at 3m + 9.54dB = 63.54 dBuV/m at 1m.

| Un-restricted band emissions above 1GHz Limit | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|
| Frequency | Limit | | | | | | | | | |
| Any outside the 5.945 – | e.i.r.p27 dBm [68.2 dBuV/m@3m] | | | | | | | | | |
| 7.125 GHz emission | Note 1: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m(20 x log (standard distance/test distance) = 20log(3/1) = 9.54dB. EX. Above 18GHz emission limit calculation (3m to 1m) = 68.2dBuV/m at 3m + 9.54dB = 77.74 dBuV/m at 1m. Note 2:-27 dBm EIRP OOBE is measured RMS which is a deviation from the current 15E rules for 5 GHz bands. In addition, 15.35(b) applies where the peak emissions must be limited to no more than 20 dB above the average limit. | | | | | | | | | |

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Frequency Emission MASK Limit 5.945 - 7.125 GHz Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than oneand one-half times the channel bandwidth must be suppressed by at least 40 dB. Fc - EBW Fc + EBW 28 dB 40 dB Fc + 1.5 X EBW EBW/2 - 1MHz 1.5 X EBW + 1MHz

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3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

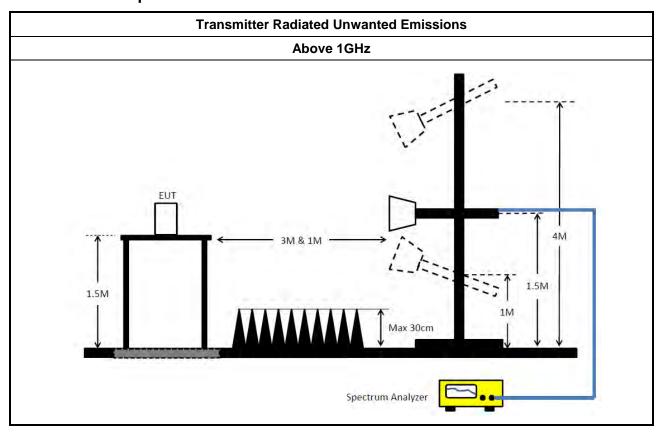
Test Method

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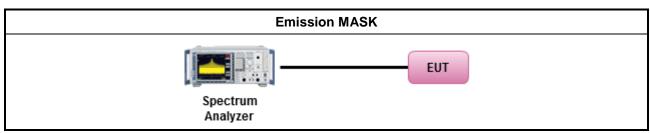
- According to FCC KDB 987594 D02 II.G. the unwanted emission measurement procedure shall refer to KDB 789300(except emission MASK).
 - Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].
- For the transmitter unwanted emissions shall be measured using following options below:
 - Refer as FCC KDB 789033 D02, clause G)2) for unwanted emissions into non-restricted bands.
 - Refer as FCC KDB 789033 D02, clause G)1) for unwanted emissions into restricted bands.
 - Refer as FCC KDB 789033 D02, G)6) Method AD (Trace Averaging). (For unrestricted band measurement)
 - Refer as FCC KDB 789033 D02, G)6) Method VB (Reduced VBW).
 - Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time. (For restricted band average measurement)
 - Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
 - Refer as FCC KDB 789033 D02, clause G)5) measurement procedure peak limit.
 - Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
- Refer as FCC KDB 789033 D02, clause G)3)d)ii) for Band edge Integration measurements.
- For emission MASK shall be measured using following options below:
 - Refer as FCC KDB 987594 D02, J) In-Band Emissions
- For radiated measurement.
 - Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
 - Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
 - Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.
- The any unwanted emissions level shall not exceed the fundamental emission level.
- All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

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3.4.4 Test Setup



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3.4.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level

3.4.6 Test Result of Transmitter Unwanted Emissions

Refer as Appendix D

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4 Test Equipment and Calibration Data

| | | Π | | <u> </u> | | ı | |
|--|--|----------------|---------------------|--------------------------|---------------------|-------------------------|--------------------------|
| Instrument | Brand | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date | Remark |
| 3m Semi Anechoic Chamber VSWR | TDK SAC-3M 03CH01-CB 1GHz ~18GHz 3m May 04, 2024 | | May 03, 2025 | Radiation (03CH01-CB) | | | |
| Horn Antenna | SCHWARZBECK | BBHA 9120 D | BBHA 9120D-01816 | 1GHz~18GHz | Dec. 20, 2023 | Dec. 19, 2024 | Radiation (03CH01-CB) |
| Horn Antenna | Schwarzbeck | BBHA 9170 | BBHA9170252 | 15GHz ~ 40GHz | Sep. 04, 2023 | Sep. 03, 2024 | Radiation (03CH01-CB) |
| Pre-Amplifier | Agilent | 8449B | 3008A02121 | 1GHz ~ 26.5GHz | May 17, 2024 | May 16, 2025 | Radiation (03CH01-CB) |
| Pre-Amplifier | SGH | SGH184 | 20221107-3 | 18GHz ~ 40GHz | Nov. 24, 2023 | Nov. 23, 2024 | Radiation (03CH01-CB) |
| Signal Analyzer | R&S | FSV3044 | 101437 | 10kHz ~ 44GHz | Nov. 28, 2023 | Nov. 27, 2024 | Radiation (03CH01-CB) |
| RF Cable-high | Cable-high Woken RG402 | | High Cable-16 | 1 GHz ~ 18 GHz | Nov. 06, 2023 | Nov. 05, 2024 | Radiation (03CH01-CB) |
| RF Cable-high | F Cable-high Woken RG40 | | High Cable-16+17 | 1 GHz ~ 18 GHz | Nov. 06, 2023 | Nov. 05, 2024 | Radiation (03CH01-CB) |
| High Cable | Woken | WCA0929M | 40G#5+6 | 1GHz ~ 40 GHz | Jan. 11, 2024 | Jan. 10, 2025 | Radiation (03CH01-CB) |
| Test Software | SPORTON | SENSE | V5.10 | - | N.C.R. | N.C.R. | Radiation (03CH01-CB) |
| Spectrum analyzer | R&S | FSV40 | 101027 | 9kHz~40GHz | Aug. 14, 2023 | Aug. 13, 2024 | Conducted (TH02-CB) |
| Power Sensor | Anritsu | MA2411B | 1126203 | 300MHz~ 40GHz | Oct. 19, 2023 | Oct. 18, 2024 | Conducted (TH02-CB) |
| Power Meter | Anritsu | ML2495A | 1210004 | 300MHz~ 40GHz | Oct. 19, 2023 | Oct. 18, 2024 | Conducted (TH02-CB) |
| RF Cable-high | Woken | RG402 | High Cable-01 | 1 GHz – 18 GHz | Oct. 02, 2023 | Oct. 01, 2024 | Conducted (TH02-CB) |
| RF Cable-high | Woken | RG402 | High Cable-02 | 1 GHz – 18 GHz | Oct. 02, 2023 | Oct. 01, 2024 | Conducted (TH02-CB) |
| RF Cable-high | Woken | RG402 | High Cable-03 | 1 GHz – 18 GHz | Oct. 02, 2023 | Oct. 01, 2024 | Conducted (TH02-CB) |
| RF Cable-high | Woken | RG402 | High Cable-04 | 1 GHz – 18 GHz | Oct. 02, 2023 | Oct. 01, 2024 | Conducted (TH02-CB) |
| RF Cable-high | Woken | RG402 | High Cable-05 | 1 GHz – 18 GHz | Oct. 02, 2023 | Oct. 01, 2024 | Conducted (TH02-CB) |

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| Instrument | Brand | Model No. | Serial No. | Characteristics | Calibration Date | Calibration Due Date | Remark |
|---------------|---------|-----------|------------|-----------------|---------------------|-------------------------|------------------------|
| Switch | SPTCB | SP-SWI | SWI-02 | 1 –26.5 GHz | Oct. 03, 2023 | Oct. 02, 2024 | Conducted (TH02-CB) |
| Test Software | SPORTON | SENSE | V5.10 | - | N.C.R. | N.C.R. | Conducted (TH02-CB) |

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Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.

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Appendix A **EBW**

Summary

| Mode | Max-N dB | Max-OBW | ITU-Code | Min-N dB | Min-OBW |
|---------------------|----------|----------|----------|----------|----------|
| | (Hz) | (Hz) | | (Hz) | (Hz) |
| 6.525-6.875GHz | - | - | - | = | = |
| 80_Nss1,(MCS0)_4TX | 82.5M | 77.261M | 77M3D1D | 81.18M | 76.962M |
| 160_Nss1,(MCS0)_4TX | 162.36M | 154.923M | 155MD1D | 161.48M | 154.523M |

 $\label{eq:max-NdB} Max-N\,dB = Maximum\,6dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,other\,band;\\ Max-OBW = Maximum\,99\%\,occupied\,bandwidth;\\ Min-N\,dB = Minimum\,6dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,other\,band;\\ Min-OBW = Minimum\,99\%\,occupied\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,other\,band;\\ Min-OBW = Minimum\,99\%\,occupied\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,band\,/\,Maximum\,26dB\,down\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.725-5.85GHz\,bandwidth\,for\,5.72$

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EBW Appendix A

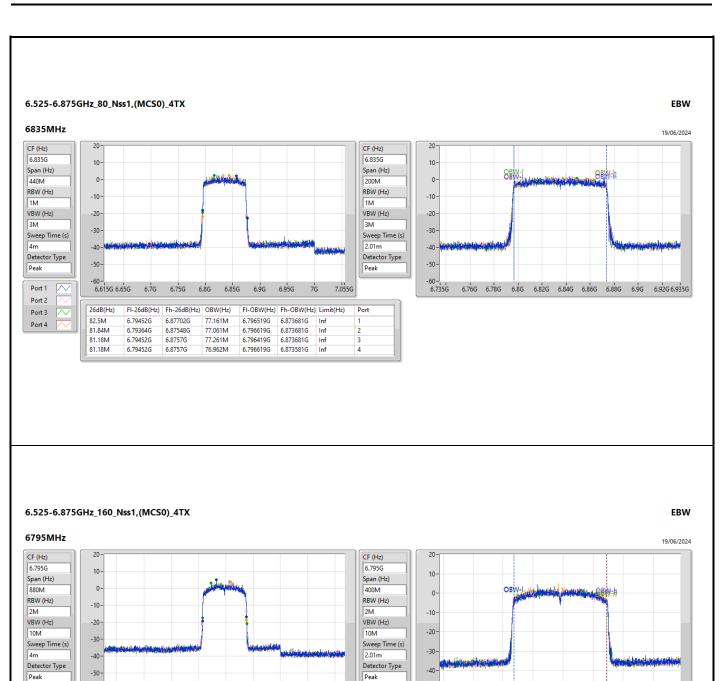
Result

| Mode | Result | Limit | Port 1-N dB | Port 1-OBW | Port 2-N dB | Port 2-OBW | Port 3-N dB | Port 3-OBW | Port 4-N dB | Port 4-OBW |
|---------------------|--------|-------|-------------|------------|-------------|------------|-------------|------------|-------------|------------|
| | | (Hz) | (Hz) | (Hz) | (Hz) | (Hz) | (Hz) | (Hz) | (Hz) | (Hz) |
| 80_Nss1,(MCS0)_4TX | - | - | T. | • | • | i. | i. | T. | 10 | = |
| 6835MHz | Pass | Inf | 82.5M | 77.161M | 81.84M | 77.061M | 81.18M | 77.261M | 81.18M | 76.962M |
| 160_Nss1,(MCS0)_4TX | - | - | - | - | - | - | - | - | - | - |
| 6795MHz | Pass | Inf | 161.48M | 154.523M | 162.36M | 154.923M | 161.92M | 154.923M | 162.36M | 154.523M |

Port X-N dB = Port X 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band Port X-OBW = Port X 99% occupied bandwidth

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EBW Appendix A



| Sporton International | Inc. | Hsinchu | Laboratory |
|-----------------------|------|---------|------------|
|-----------------------|------|---------|------------|

-60 -6.355G

26dB(Hz)

161.48M

162.36M

161.92M

6.5G

6.71448G

6.7136G

6.71448G

6.6G

FI-26dB(Hz) Fh-26dB(Hz) OBW(Hz)

6.87596G

6.87596G

6.8764G

6.7G

6.8G

6.718038G

6.717639G

6.717639G

6.717839G

154.523M

154.923M

154.923M

7.1G

Port

FI-OBW(Hz) Fh-OBW(Hz) Limit(Hz)

6.872561G

6.872561G

6.872561G Inf

Port 1

Port 2 Port 3

Port 4

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6.65G

6.7G

6.75G

6.8G

6.85G

6.9G

6.95G 6.995G



Average Power Appendix B

Summary

| Mode | Total Power (dBm) | Total Power (W) | EIRP / EIRP [Phi 30°] (dBm) | EIRP / EIRP [Phi 30°] (W) | |
|---------------------------------|----------------------|--------------------|--------------------------------|------------------------------|--|
| 6.525-6.875GHz | - | - | - | - | |
| 802.11ax HEW80_Nss1,(MCS0)_4TX | 16.96 | 0.04966 | 35.69/17.94 | 3.70681/0.062230 | |
| 802.11ax HEW160_Nss1,(MCS0)_4TX | 17.03 | 0.05047 | 35.76/18.01 | 3.76704/0.063241 | |

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Average Power Appendix B

Result

| Mode | Result | DG | Port 1 | Port 2 | Port 3 | Port 4 | Total Power | EIRP / EIRP [Phi 30°] | EIRP/ EIRP [Phi 30°]Limit |
|---------------------------------|--------|------------|--------|--------|--------|--------|-------------|-----------------------|---------------------------|
| | | (dBi) | (dBm) | (dBm) | (dBm) | (dBm) | (dBm) | (dBm) | (dBm) |
| 802.11ax HEW80_Nss1,(MCS0)_4TX | - | - | - | - | - | - | - | - | - |
| 6835MHz | Pass | 18.73/0.98 | 10.87 | 10.80 | 11.08 | 11.02 | 16.96 | 35.69/17.94 | 36.00/21.00 |
| 802.11ax HEW160_Nss1,(MCS0)_4TX | - | - | - | - | - | - | - | - | = |
| 6795MHz | Pass | 18.73/0.98 | 10.80 | 10.98 | 11.07 | 11.18 | 17.03 | 35.76/18.01 | 36.00/21.00 |

DG = Directional Gain; Port X = Port X output power

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PSD Appendix C

Summary

| Mode | PD | EIRP PD | | |
|---------------------|-----------|-----------|--|--|
| | (dBm/RBW) | (dBm/RBW) | | |
| 6.525-6.875GHz | - | - | | |
| 80_Nss1,(MCS0)_4TX | -2.35 | 19.39 | | |
| 160_Nss1,(MCS0)_4TX | -5.07 | 16.67 | | |

RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band;

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Appendix C **PSD**

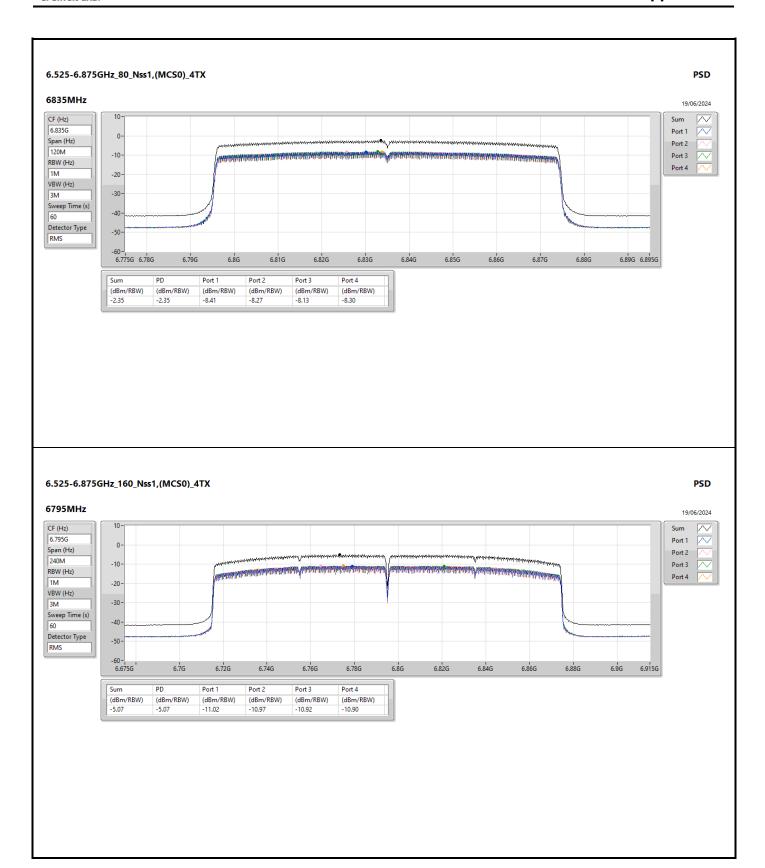
Result

| Mode | Result | DG | Port 1 | Port 2 | Port 3 | Port 4 | PD | PD Limit | EIRP PD | EIRP PD Limit |
|---------------------|--------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------------|
| | | (dBi) | (dBm/RBW) |
| 80_Nss1,(MCS0)_4TX | - | - | - | - | - | - | - | - | - | - |
| 6835MHz | Pass | 21.74 | -8.41 | -8.27 | -8.13 | -8.30 | -2.35 | Inf | 19.39 | 23.00 |
| 160_Nss1,(MCS0)_4TX | - | - | - | - | - | - | - | - | - | - |
| 6795MHz | Pass | 21.74 | -11.02 | -10.97 | -10.92 | -10.90 | -5.07 | Inf | 16.67 | 23.00 |

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DG = Directional Gain; RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;

PSD Appendix C



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RSE TX above 1GHz

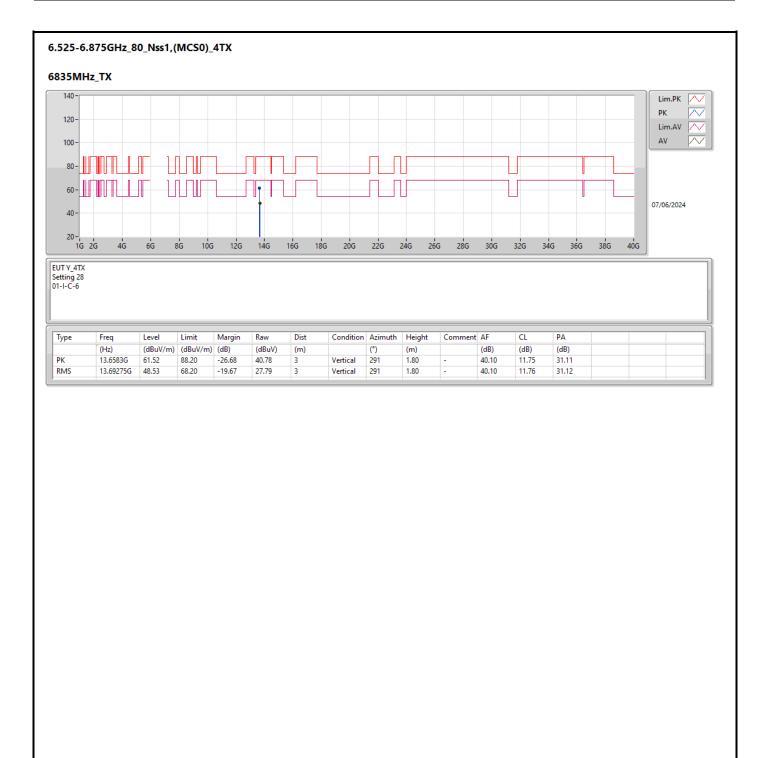
Appendix D.1

Summary

| Mode | Result | Туре | Freq (Hz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Dist (m) | Condition | Azimuth (°) | Height (m) | Comments |
|--------------------|--------|------|--------------|-------------------|-------------------|----------------|-------------|------------|----------------|---------------|----------|
| 6.525-6.875GHz | - | - | | - | - | - | - | | - | - | - |
| 80_Nss1,(MCS0)_4TX | Pass | AV | 20.4898G | 45.02 | 63.54 | -18.52 | 1 | Horizontal | 161 | 1.50 | - |

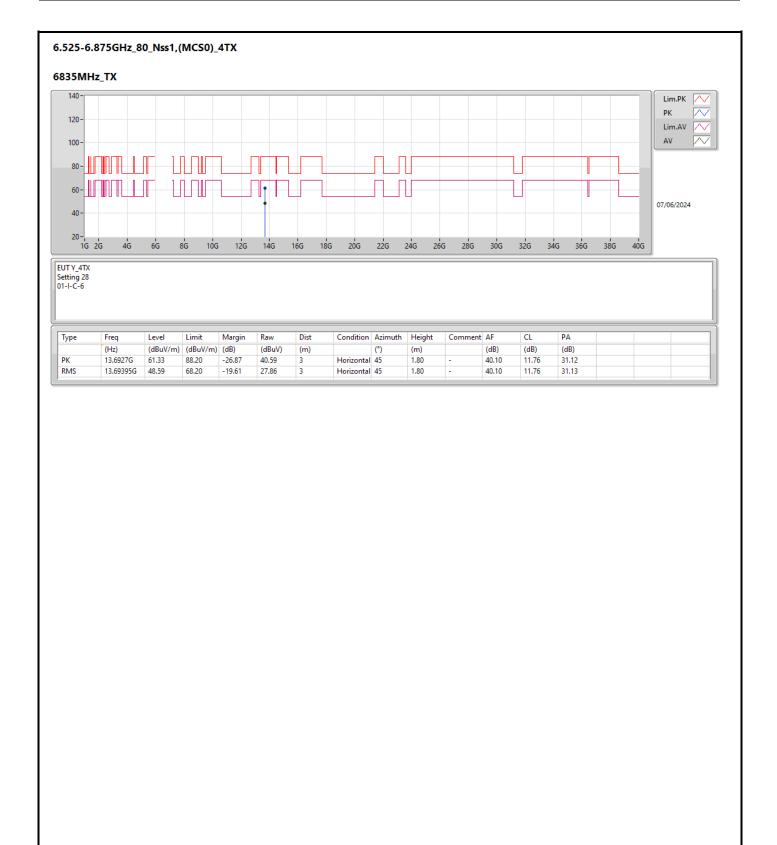
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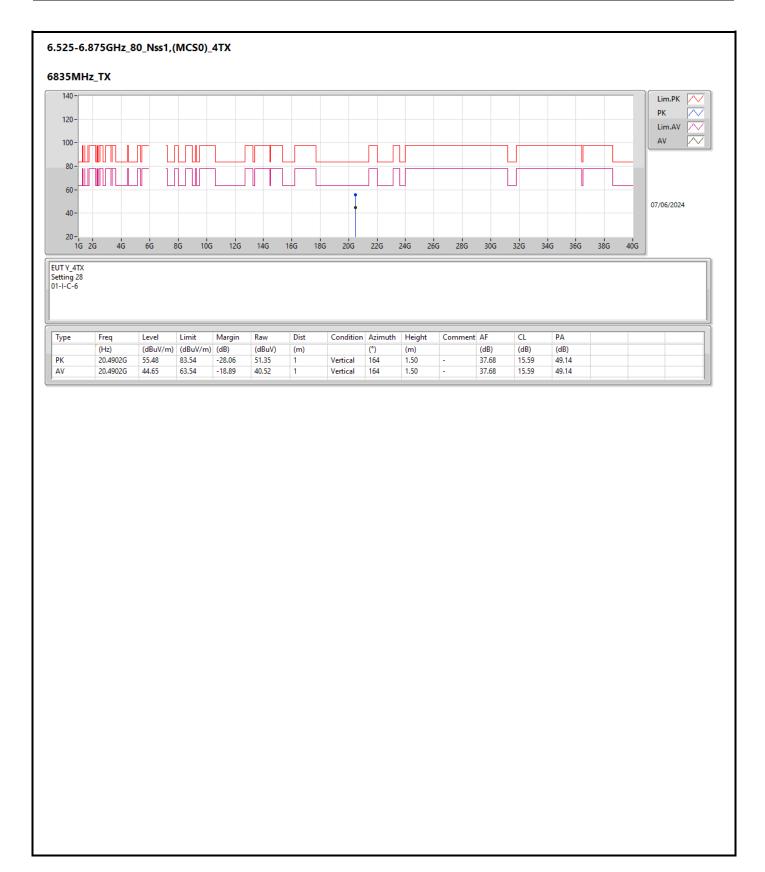
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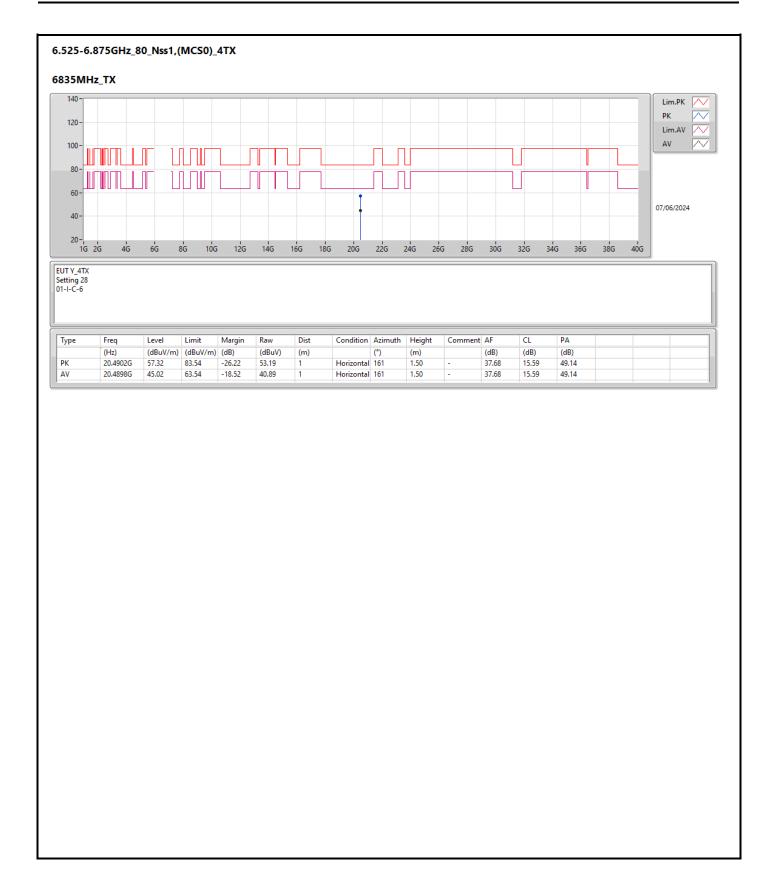


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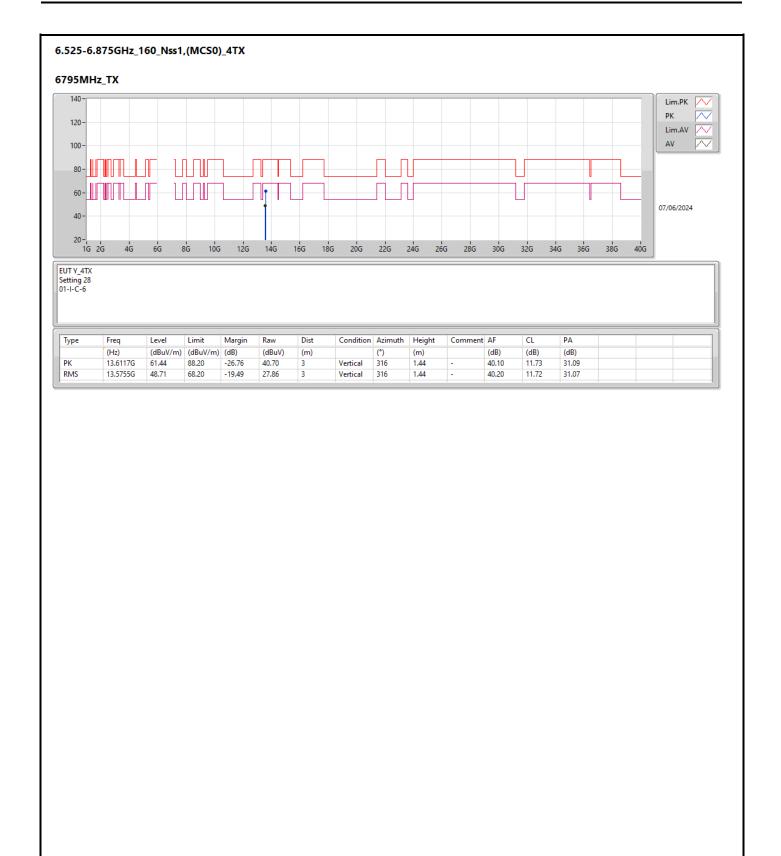




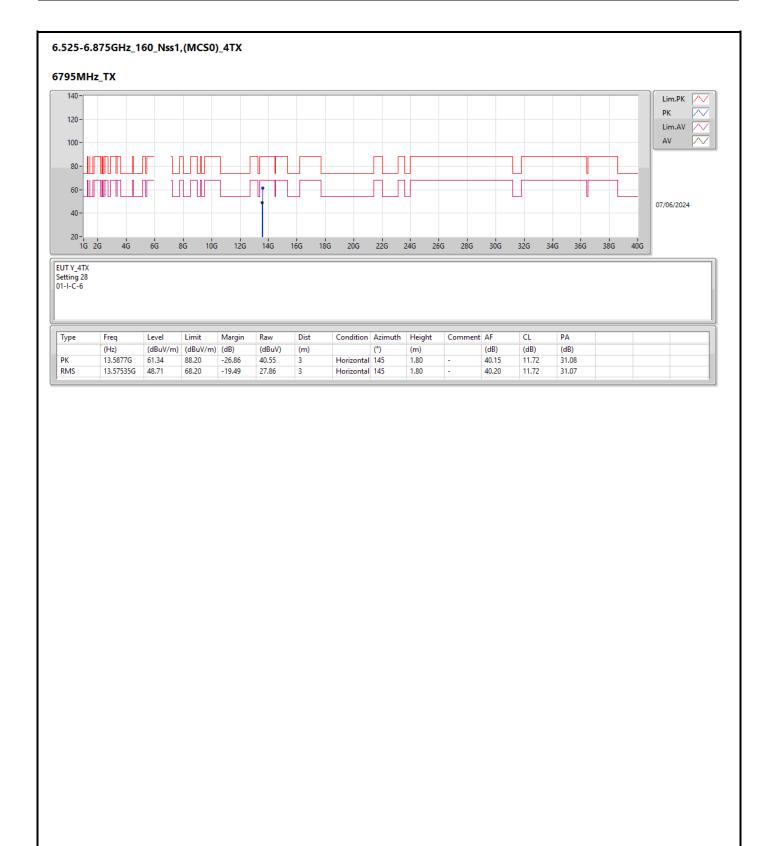
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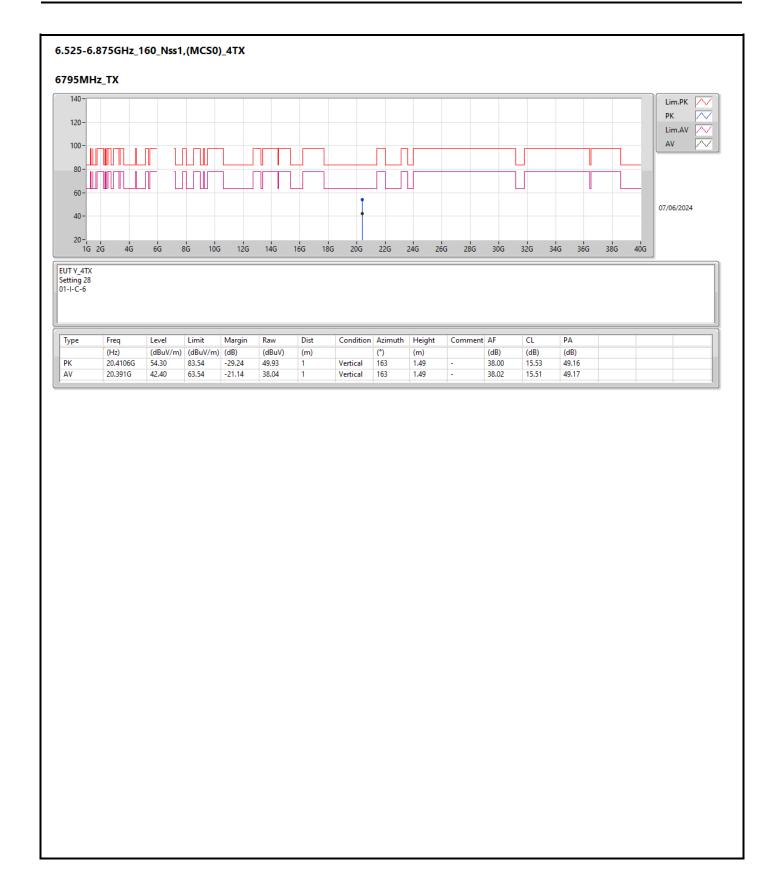


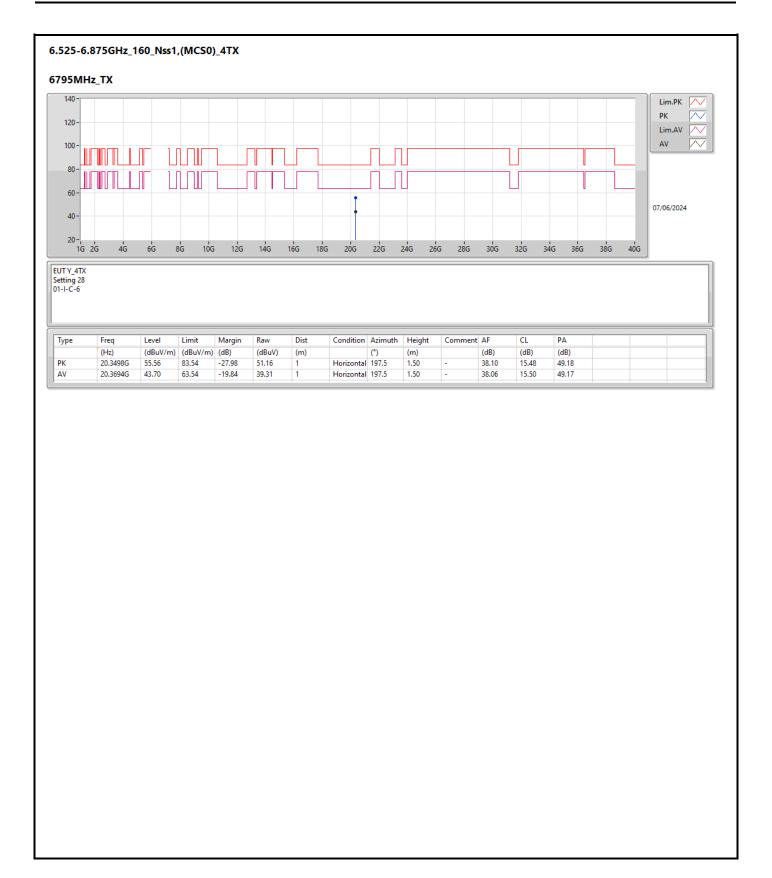




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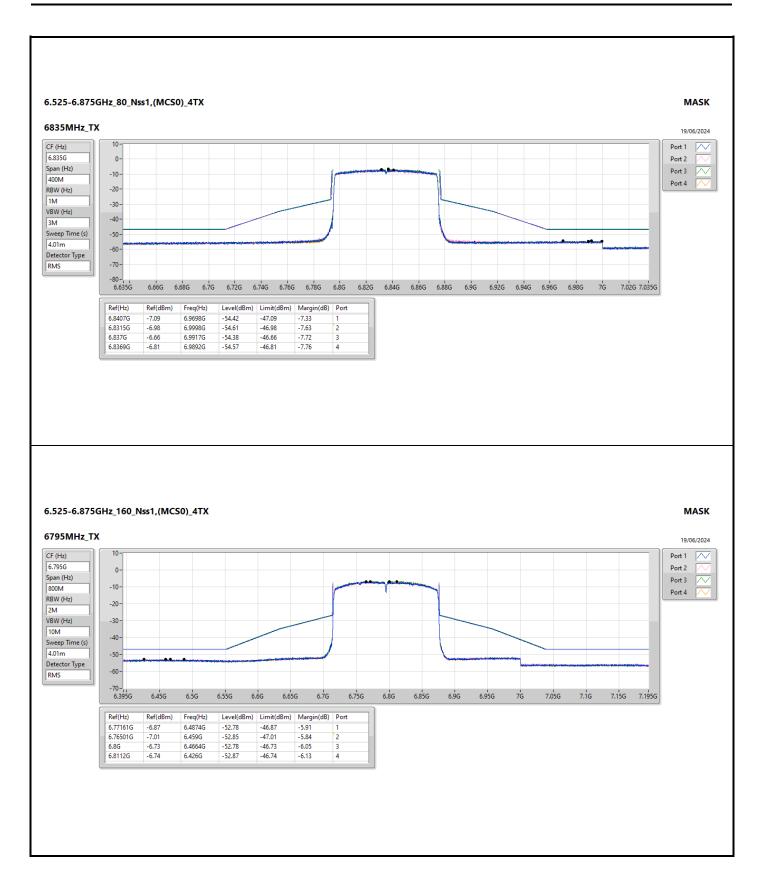
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Mask Appendix D.2



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