# FCC Radio Test Report

## FCC ID: 2BCGWRE815XEV2

**This report concerns: Class II permissive Change**

| | | |
|---|---|---|
| **Project No.** | : | 2405G104 |
| **Equipment** | : | AXE5400 Tri-Band Wi-Fi 6E Range Extender |
| **Brand Name** | : | tp-link |
| **Test Model** | : | RE815XE |
| **Series Model** | : | N/A |
| **Applicant** | : | TP-LINK CORPORATION PTE. LTD. |
| **Address** | : | 7 Temasek Boulevard #29-03 Suntec Tower One, Singapore 038987 |
| **Manufacturer** | : | TP-LINK CORPORATION PTE. LTD. |
| **Address** | : | 7 Temasek Boulevard #29-03 Suntec Tower One, Singapore 038987 |
| **Date of Receipt** | : | May 24, 2024 |
| **Date of Test** | : | May 25, 2024 |
| **Issued Date** | : | May 27, 2024 |
| **Report Version** | : | R00 |
| **Test Sample** | : | Engineering Sample No.: SSL20240524125 |
| **Standard(s)** | : | FCC CFR Title 47, Part 15, Subpart E |

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

**Prepared by** : Chella Zheng

Chella Zheng

**Approved by** : Chay Cai

Chay Cai

Room 108, Building 2, No.1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong, People's Republic of China

Tel: +86-769-8318-3000 Web: www.newbtl.com Service mail: btl_qa@newbtl.com

**Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

**BTL**'s reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. BTL assumes no responsibility for the data provided by the customer, any statements, inferences or generalizations drawn by the customer or others from the reports issued by BTL.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the U.S. Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

**BTL**'s laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 requirements, and accredited by the conformity assessment authorities listed in this test report.

**BTL** is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

**Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.
Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

## Table of Contents Page

## REPORT ISSUED HISTORY

| Report No. | Version | Description | Issued Date | Note |
|---|---|---|---|---|
| BTL-FCCP-3-2405G104 | R00 | Original Report. | May 27, 2024 | Valid |

## 1. APPLICABLE STANDARDS

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:
ANSI C63.10-2013
The following reference test guidance is not within the scope of accreditation of A2LA:
KDB 987594 D02 U-NII 6GHz EMC Measurement v02r01
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

| FCC CFR Title 47, Part 15, Subpart E | | | | |
|---|---|---|---|---|
| **Standard(s) Section** | **Test Item** | **Test Result** | **Judgment** | **Remark** |
| 15.407(b)<br>15.205(a)<br>15.209(a) | Radiated Emissions | APPENDIX A | PASS | ------ |

Note:
(1) "N/A" denotes test is not applicable in this test report.
(2) The worst cases of radiated emissions below 1GHz have been re-evaluated by sample of FCC ID: 2BCGWRE815XEV2, model name: RE815XE. It is found that the new data are the worse, so the test data are reissue from the FCC ID: 2BCGWRE815XEV2, model name: RE815XE. Model difference(s): Model RE815XE changed the signal transformer of the network port.
(3) The other test records and results please refer to the test report number: 2307RSU051-U5, issued date is 2024-02-01, and issued by:
Test Laboratory: MRT Technology (Taiwan) Co., Ltd
Address: No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).

Which was accredited by TAF, FCC registration number is 291082, with the scopes of cited standards in this test report.
This report is only valid conjunction with the above referenced test report.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Dalang, Dongguan City, Guangdong People's Republic of China.
BTL's Registration Number for FCC: 747969
BTL's Designation Number for FCC: CN1377

## 2.2 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 level (based on a coverage factor (k=2))
The BTL measurement uncertainty as below table:
A. Radiated emissions test:

| Test Site | Method | Measurement Frequency Range | Ant. H / V | *U*,(dB) |
|---|---|---|---|---|
| DG-CB03 (3m) | CISPR | 30MHz ~ 200MHz | V | 4.40 |
| | | 30MHz ~ 200MHz | H | 3.62 |
| | | 200MHz ~ 1,000MHz | V | 4.58 |
| | | 200MHz ~ 1,000MHz | H | 3.98 |

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

## 2.3 TEST ENVIRONMENT CONDITIONS

| Test Item | Temperature | Humidity | Test Voltage | Tested By | Test Date |
|---|---|---|---|---|---|
| Radiated Emissions -30MHz to 1000MHz | 24°C | 56% | AC 120V/60Hz | Jensen Zhou | May 25, 2024 |

# 3. GENERAL INFORMATION

## 3.1 GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Equipment | AXE5400 Tri-Band Wi-Fi 6E Range Extender |
| Brand Name | tp-link |
| Test Model | RE815XE |
| Series Model | N/A |
| Model Difference(s) | N/A |
| Power Source | AC Mains. |
| Power Rating | AC 100-240~50/60Hz |
| Operation Frequency Band(s) | UNII-5: 5925 MHz ~ 6425 MHz<br>UNII-6: 6425 MHz ~ 6525 MHz<br>UNII-7: 6525 MHz ~ 6875 MHz<br>UNII-8: 6875 MHz ~ 7125 MHz |
| Modulation Type | IEEE 802.11ax: OFDMA |
| Bit Rate of Transmitter | IEEE 802.11ax: up to 2402 Mbps |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

| UNII-5 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE20) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 1 | 5955 | 33 | 6115 | 65 | 6275 |
| 5 | 5975 | 37 | 6135 | 69 | 6295 |
| 9 | 5995 | 41 | 6155 | 73 | 6315 |
| 13 | 6015 | 45 | 6175 | 77 | 6335 |
| 17 | 6035 | 49 | 6195 | 81 | 6355 |
| 21 | 6055 | 53 | 6215 | 85 | 6375 |
| 25 | 6075 | 57 | 6235 | 89 | 6395 |
| 29 | 6095 | 61 | 6255 | 93 | 6415 |

| UNII-5 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE40) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 3 | 5965 | 35 | 6125 | 67 | 6285 |
| 11 | 6005 | 43 | 6165 | 75 | 6325 |
| 19 | 6045 | 51 | 6205 | 83 | 6365 |
| 27 | 6085 | 59 | 6245 | 91 | 6405 |

| UNII-5 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE80) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 7 | 5985 | 39 | 6145 | 71 | 6305 |
| 23 | 6065 | 55 | 6225 | 87 | 6385 |

| UNII-5 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE160) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 15 | 6025 | 47 | 6185 | 79 | 6345 |

| UNII-6 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE20) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 97 | 6435 | 105 | 6475 | 113 | 6515 |
| 101 | 6455 | 109 | 6495 | | |

| UNII-6 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE40) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 99 | 6445 | 107 | 6485 | 115 | 6525 |

| UNII-6 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE80) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 103 | 6465 | | | | |

| UNII-6 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE160) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 111 | 6505 | | | | |

| UNII-7 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE20) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 117 | 6535 | 141 | 6655 | 165 | 6775 |
| 121 | 6555 | 145 | 6675 | 169 | 6795 |
| 125 | 6575 | 149 | 6695 | 173 | 6815 |
| 129 | 6595 | 153 | 6715 | 177 | 6835 |
| 133 | 6615 | 157 | 6735 | 181 | 6855 |
| 137 | 6635 | 161 | 6755 | 185 | 6875 |

| UNII-7 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE40) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 123 | 6565 | 147 | 6685 | 171 | 6805 |
| 131 | 6605 | 155 | 6725 | 179 | 6845 |
| 139 | 6645 | 163 | 6765 | | |

| UNII-7 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE80) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 119 | 6545 | 151 | 6705 | 183 | 6865 |
| 135 | 6625 | 167 | 6785 | | |

| UNII-7 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE160) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 143 | 6665 | 175 | 6825 | | |

| UNII-8 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE20) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 189 | 6895 | 205 | 6975 | 221 | 7055 |
| 193 | 6915 | 209 | 6995 | 225 | 7075 |
| 197 | 6935 | 213 | 7015 | 229 | 7095 |
| 201 | 6955 | 217 | 7035 | | |

| UNII-8 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE40) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 187 | 6885 | 203 | 6965 | 219 | 7045 |
| 195 | 6925 | 211 | 7005 | 227 | 7085 |

| UNII-8 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE80) / IEEE 802.11be(EHT80) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 199 | 6945 | 215 | 7025 | | |

| UNII-8 | | | | | |
|---|---|---|---|---|---|
| IEEE 802.11ax(HE160) | | | | | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 207 | 6985 | | | | |

3. Antenna Specification:

| Antenna Type | Frequency Band (MHz) | Tx Paths | Number of spatial streams | Antenna Gain (dBi) | | Beamforming Directional Gain (dBi) | CDD Directional Gain (dBi) | |
|---|---|---|---|---|---|---|---|---|
| | | | | Ant 1 | Ant 2 | | For Power | For PSD |
| Dipole | 2400 ~ 2483.5 | 2 | 1 | 3.00 | 3.00 | 6.01 | 3.00 | 6.01 |
| | 5150 ~ 5850 | 2 | 1 | 3.00 | 3.00 | 6.01 | 3.00 | 6.01 |
| | 5925 ~ 7125 | 2 | 1 | 2.00 | 2.00 | 5.01 | 2.00 | 5.01 |
| | | | 2 | 2.00 | 2.00 | -- | 2.00 | 2.00 |

Remark:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

   If all antennas have the same gain, $G_{ANT}$, Directional gain = $G_{ANT}$ + Array Gain, where Array Gain is as follows.

   - For power spectral density (PSD) measurements on all devices,

     Array Gain = 10 log ($N_{ANT}$/ $N_{SS}$) dB;

   - For power measurements on IEEE 802.11 devices,

     Array Gain = 0 dB for $N_{ANT} \leq 4$;

2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac/ax, not include 802.11a/b/g.

   BF Directional gain = $G_{ANT}$ + 10 log ($N_{ANT}$).

3. The information as above is from the antenna report.

| Test Mode | Tx Paths | CDD Mode | Beamforming Mode |
|---|---|---|---|
| 802.11b/g (DTS) | 2 | √ | X |
| 802.11n/ax (DTS) | 2 | √ | √ |
| 802.11a (NII) | 2 | √ | X |
| 802.11n/ac/ax (NII) | 2 | √ | √ |
| 802.11ax (6ID & 6PP) | 2 | √ | √ |

Remark: "√" means "Support", "X" means "Not support".

## 3.2 TEST MODES

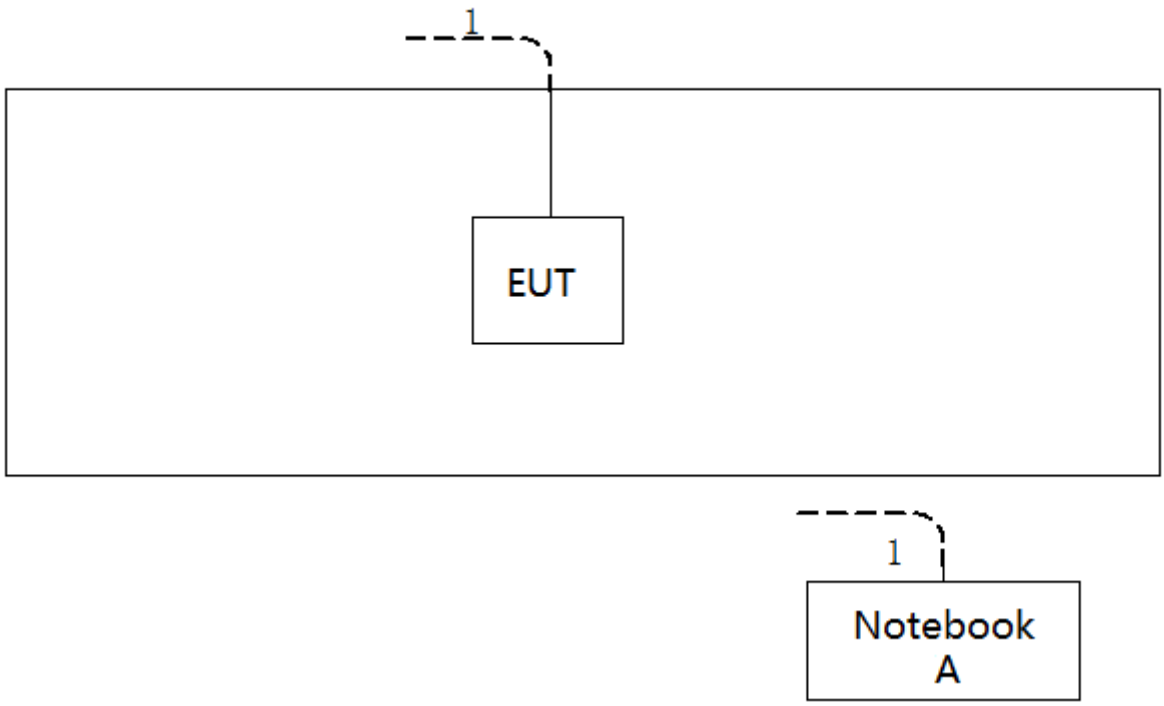
The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

| Pretest Mode | Description |
|---|---|
| Mode 1 | TX AX(HE160) Mode Channel 79 |

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

| **Radiated emissions test - Below 1GHz** | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | TX AX(HE160) Mode Channel 79 |

## 3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED




## 3.4 SUPPORT UNITS

| Item | Equipment | Brand | Model No. | Series No. |
|---|---|---|---|---|
| A | Notebook | HUAWEI | WFH9 | N/A |

| Item | Cable Type | Shielded Type | Ferrite Core | Length |
|---|---|---|---|---|
| 1 | RJ45 Cable | NO | NO | 10m |

## 3.5 CUSTOMER INFORMATION DESCRIPTION

1) The antenna gain and beamforming gain are provided by the manufacturer.

# 4. RADIATED EMISSIONS

## 4.1 LIMIT

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSIONS MEASUREMENT (30 MHz to 1000 MHz)

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 30-88 | 100 | 3 |
| 88-216 | 150 | 3 |
| 216-960 | 200 | 3 |
| Above 960 | 500 | 3 |

## 4.2 TEST PROCEDURE

a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
b. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
c. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
d. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn‘t perform. (below 1 GHz)
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

The following table is the setting of the receiver:

| Spectrum Parameters | Setting |
|---|---|
| Start ~ Stop Frequency | 30 MHz~1000 MHz for RBW 100 kHz |

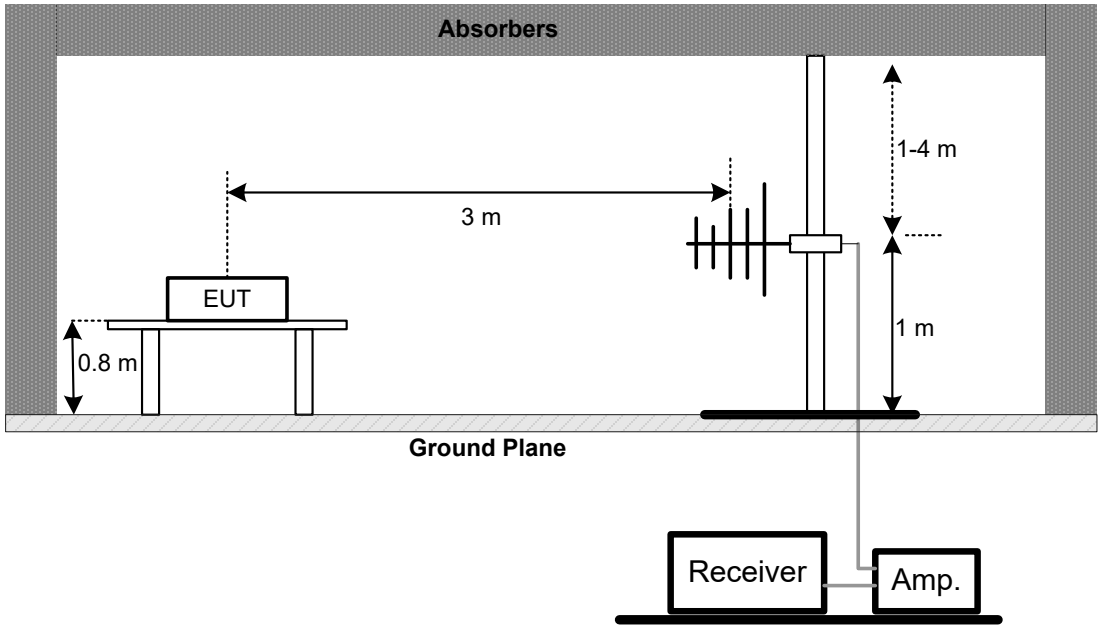
| Receiver Parameters | Setting |
|---|---|
| Start ~ Stop Frequency | 30 MHz~1000 MHz for QP detector |

## 4.3 DEVIATION FROM TEST STANDARD

No deviation.

## 4.4 TEST SETUP

**30 MHz to 1 GHz**




## 4.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

## 4.6 TEST RESULTS - 30 MHZ TO 1000 MHZ

Please refer to the APPENDIX A.

## 5. MEASUREMENT INSTRUMENTS LIST

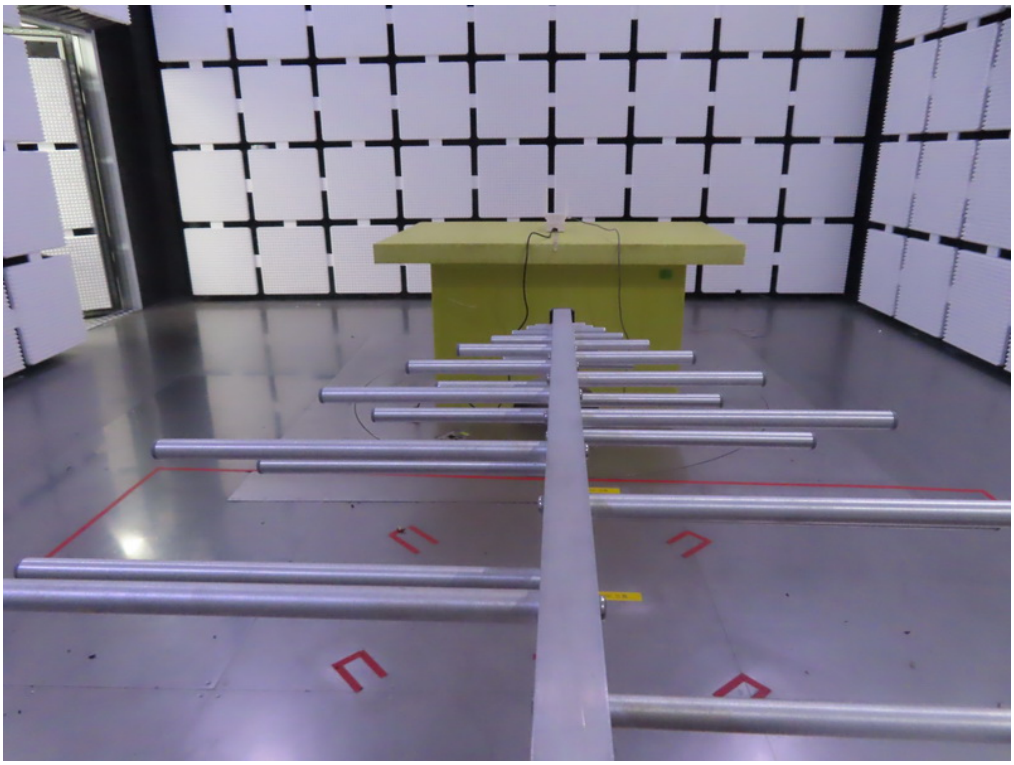
| Radiated Emissions - 30 MHz to 1 GHz | | | | | |
|---|---|---|---|---|---|
| Item | Kind of Equipment | Manufacturer | Type No. | Serial No. | Calibrated until |
| 1 | Trilog-Broadband Antenna | Schwarzbeck | VULB 9168 | 1462 | Dec. 13, 2024 |
| 2 | Attenuator | EMC INSTRUMENT | EMCI-N-6-06 | AT-06009 | Dec. 13, 2024 |
| 3 | Preamplifier | EMC INSTRUMENT | EMC001330 | 980863 | Apr. 07, 2025 |
| 4 | Cable | RegalWay | LMR400-NMNM-12.5m | N/A | N/A |
| 5 | Cable | RegalWay | LMR400-NMNM-3m | N/A | N/A |
| 6 | Cable | RegalWay | LMR400-NMNM-0.5m | N/A | N/A |
| 7 | Receiver | Agilent | N9038A | MY52130039 | Dec. 22, 2024 |
| 8 | Positioning Controller | MF | MF-7802 | N/A | N/A |
| 9 | Measurement Software | Farad | EZ-EMC Ver.NB-03A1-01 | N/A | N/A |
| 10 | 966 Chamber room | CM | 9*6*6 | N/A | May 16, 2025 |

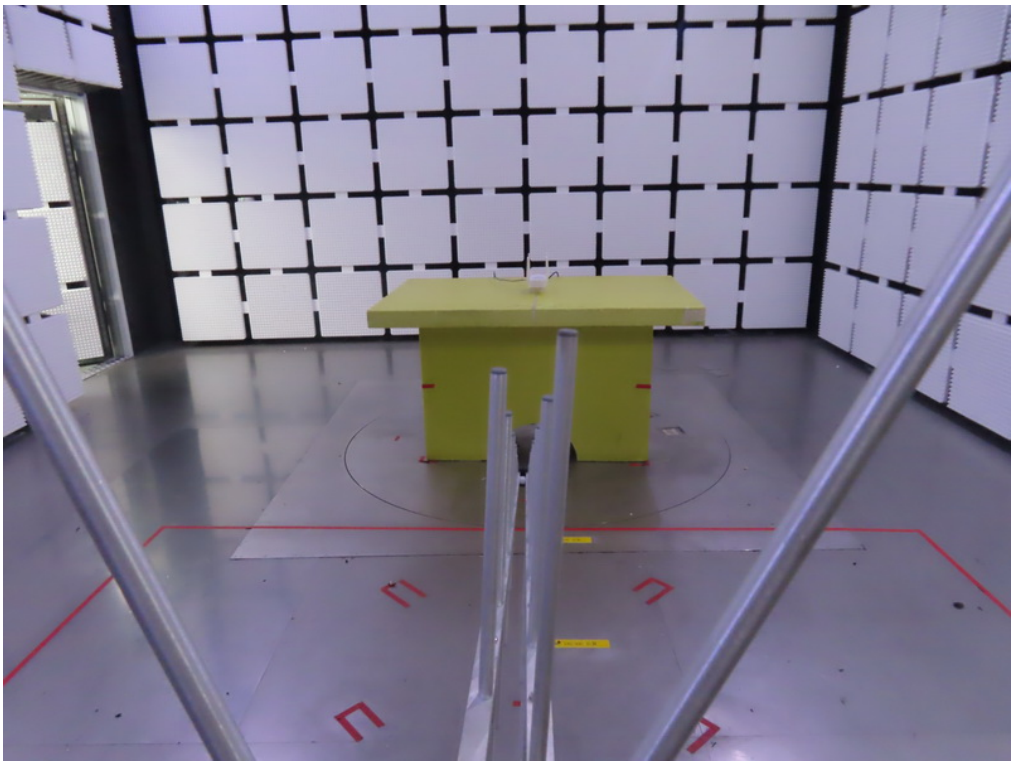
Remark "N/A" denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

## 6. EUT TEST PHOTOS

**Radiated Emissions Test Photos**

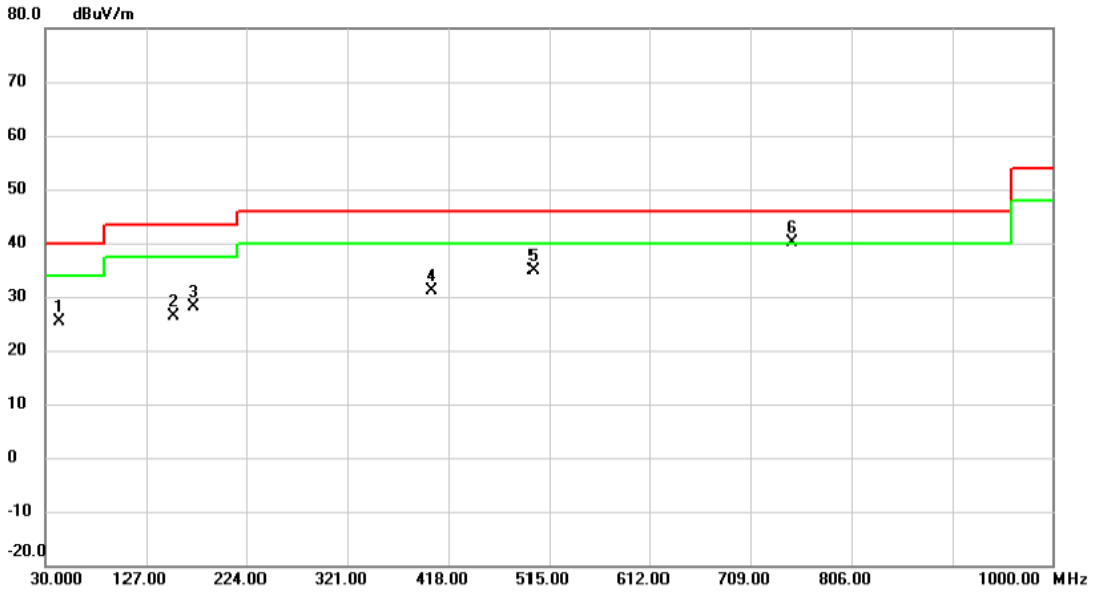
**30 MHz to 1 GHz**





# APPENDIX A - RADIATED EMISSION - 30 MHZ TO 1000 MHZ

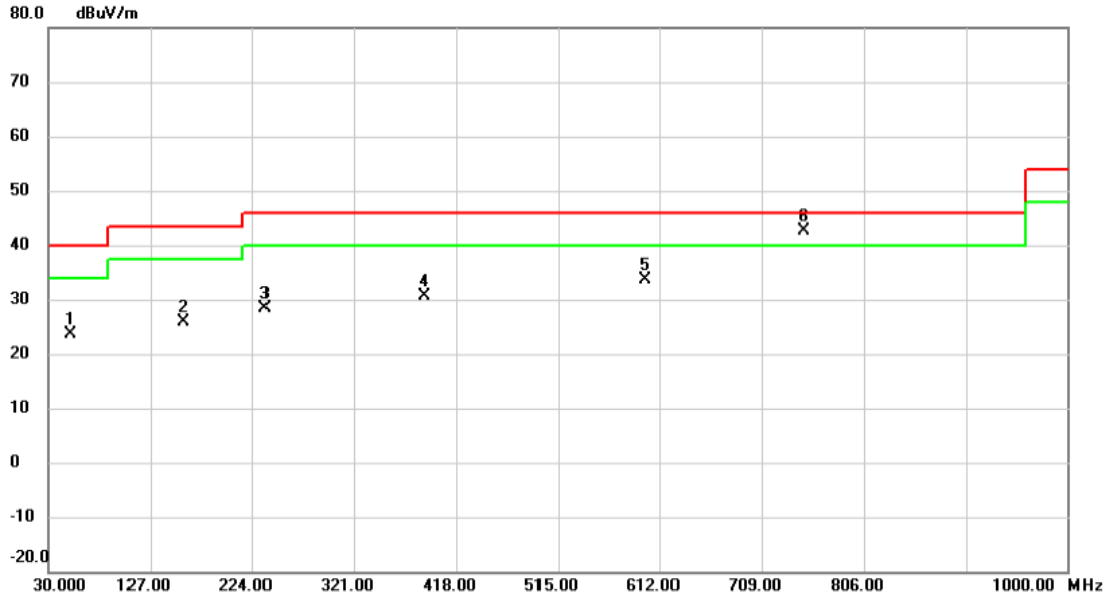
| Test Mode | TX AX(HE160) Mode Channel 79 | Polarization | Vertical |
|---|---|---|---|




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 44.065 | 36.73 | -11.45 | 25.28 | 40.00 | -14.72 | peak | |
| 2 | | 153.190 | 37.44 | -11.05 | 26.39 | 43.50 | -17.11 | peak | |
| 3 | | 172.590 | 39.69 | -11.49 | 28.20 | 43.50 | -15.30 | peak | |
| 4 | | 401.510 | 39.04 | -7.94 | 31.10 | 46.00 | -14.90 | peak | |
| 5 | | 499.965 | 40.69 | -5.93 | 34.76 | 46.00 | -11.24 | peak | |
| 6 | * | 750.225 | 41.33 | -1.12 | 40.21 | 46.00 | -5.79 | peak | |

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

| Test Mode | TX AX(HE160) Mode Channel 79 | Polarization | Horizontal |
|---|---|---|---|




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Margin | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 50.855 | 34.96 | -11.35 | 23.61 | 40.00 | -16.39 | peak | |
| 2 | | 158.525 | 36.79 | -10.88 | 25.91 | 43.50 | -17.59 | peak | |
| 3 | | 235.640 | 41.45 | -13.08 | 28.37 | 46.00 | -17.63 | peak | |
| 4 | | 387.930 | 38.87 | -8.26 | 30.61 | 46.00 | -15.39 | peak | |
| 5 | | 598.420 | 37.14 | -3.62 | 33.52 | 46.00 | -12.48 | peak | |
| 6 | * | 750.225 | 43.74 | -1.12 | 42.62 | 46.00 | -3.38 | peak | |

REMARKS:
(1) Measurement Value = Reading Level + Correct Factor.
(2) Margin Level = Measurement Value - Limit Value.

**End of Test Report**