**Shenzhen Global Test Service Co.,Ltd.**
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

# FCC PART 15 SUBPART C TEST REPORT

## FCC PART 15.407

| | |
|---|---|
| **Report Reference No.....:** | **GTS20250918006-1-04** |
| **FCC ID..... :** | **2BU2O-DMP-AIO** |
| Compiled by ( position+printed name+signature) .: | File administrators Peter Xiao |
| Supervised by ( position+printed name+signature) .: | Test Engineer Evan Ouyang |
| Approved by ( position+printed name+signature) .: | Manager Jason Hu |
| Date of issue .....: | Mar.04, 2026 |
| **Representative Laboratory Name.:** | **Shenzhen Global Test Service Co.,Ltd.** |
| Address .....: | No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong,China |
| **Applicant's name**.....: | **Shenzhen Kaiboer Technology Co., Ltd.** |
| Address .....: | 8/F, Building 4, Baoyunda Logistics Center, Fuhua Community, Xixiang Subdistrict, Baoan District, Shenzhen, China |
| **Test specification** .....**:** | |
| Standard.....: | **FCC Part 15.407: General technical requirements** |
| TRF Originator.....: | Shenzhen Global Test Service Co.,Ltd. |
| Master TRF .....: | Dated 2014-12 |

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| | |
|---|---|
| **Test item description .....:** | **Integrated high-resolution music streamer and DAC** |
| Trade Mark .....: | KAIBOER |
| Manufacturer .....: | Shenzhen Kaiboer Technology Co., Ltd. |
| Model/Type reference .....: | DMP-K7 |
| Listed Models .....: | DMP-K7 PRO, DMP-K8, DMP-K8 PLUS, DMP-K8 PRO, DMP-K9 PLUS, DMP-K9 PRO, DMP-K5 PRO, DMP-A60, DMP-A80, DMP-A90, DMP-K100, DMP-K200, DMP-K500, AIO200, AIO700, AIO800, ********** ("*" = 0-9, A-Z, a-z, -, +, space, or any other characters) |
| Operation Frequency.....: | From 5180MHz to 5240MHz/ 5745MHz to 5825MHz |
| Hardware Version .....: | N/A |
| Software Version .....: | N/A |
| Rating .....: | AC 110-120V/ AC 220-240V, 50/60Hz, MAX 0.1A |
| Result .....: | **PASS** |

# TEST REPORT

| **Test Report No. :** **GTS20250918006-1-04** | Mar.04, 2026<br>Date of issue |
|---|---|

| | | |
|---|---|---|
| Equipment under Test | : | Integrated high-resolution music streamer and DAC |
| Model /Type | : | DMP-K7 |
| Listed model | : | DMP-K7 PRO, DMP-K8, DMP-K8 PLUS, DMP-K8 PRO, DMP-K9 PLUS, DMP-K9 PRO, DMP-K5 PRO, DMP-A60, DMP-A80, DMP-A90, DMP-K100, DMP-K200, DMP-K500, AIO200, AIO700, AIO800, ********** ("*" = 0-9, A-Z, a-z, -, +, space, or any other characters) |
| **Applicant** | : | **Shenzhen Kaiboer Technology Co., Ltd.** |
| Address | : | 8/F, Building 4, Baoyunda Logistics Center, Fuhua Community, Xixiang Subdistrict, Baoan District, Shenzhen, China |
| **Manufacturer** | : | **Shenzhen Kaiboer Technology Co., Ltd.** |
| Address | : | 8/F, Building 4, Baoyunda Logistics Center, Fuhua Community, Xixiang Subdistrict, Baoan District, Shenzhen, China |

| **Test Result**: | **PASS** |
|---|---|

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

# Contents

**1. TEST STANDARDS ..... 4**

**2. SUMMARY ..... 5**

2.1. General Remarks ..... 5
2.2. Product Description ..... 5
2.3. Equipment Under Test ..... 7
2.4. Short description of the Equipment under Test (EUT) ..... 7
2.5. EUT operation mode ..... 7
2.6. Block Diagram of Test Setup ..... 8
2.7. Related Submittal(s) / Grant (s) ..... 8
2.8. EUT Exercise Software ..... 8
2.9. Special Accessories ..... 8
2.10. External I/O Cable ..... 8
2.11. Modifications ..... 8

**3. TEST ENVIRONMENT ..... 9**

3.1. Address of the test laboratory ..... 9
3.2. Test Facility ..... 9
3.3. Environmental conditions ..... 9
3.4. Statement of the measurement uncertainty ..... 9
3.5. Test Description ..... 10
3.6. Equipments Used during the Test ..... 11

**4. TEST CONDITIONS AND RESULTS ..... 12**

4.1. AC Power Conducted Emission ..... 12
4.2. Radiated Emission ..... 14
4.3. Duty Cycle ..... 21
4.4. Maximum Average Output Power ..... 22
4.5. Power Spectral Density ..... 24
4.6. 99% and 6dB Bandwidth ..... 27
4.7. 99% and 26dB Bandwidth ..... 28
4.8. Conducted Spurious Emissions and Band Edge Compliance ..... 30
4.9. Frequency Stability ..... 34
4.10. Antenna Requirement ..... 37

**5. TEST SETUP PHOTOS OF THE EUT ..... 38**

**6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT ..... 38**

# 1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.407: General technical requirements.
ANSIC63.10-2020+Cor.1-2023+C63.10a-2024: American National Standard for Testing Unlicensed Wireless Devices
KDB 789033 D02 General U-NII Test Procedures New Rules v02r01: UNII, U-NII, U-NII Test Procedures

# 2. SUMMARY

## 2.1. General Remarks

| | | |
|---|---|---|
| Date of receipt of test sample | : | Jan.29, 2026 |
| | | |
| Testing commenced on | : | Jan.29, 2026 |
| | | |
| Testing concluded on | : | Mar.03, 2026 |

## 2.2. Product Description

| | |
|---|---|
| Product Name: | Integrated high-resolution music streamer and DAC |
| Trade Mark: | KAIBOER |
| Model/Type reference: | DMP-K7 |
| List Model: | DMP-K7 PRO, DMP-K8, DMP-K8 PLUS, DMP-K8 PRO, DMP-K9 PLUS, DMP-K9 PRO, DMP-K5 PRO, DMP-A60, DMP-A80, DMP-A90, DMP-K100, DMP-K200, DMP-K500, AIO200, AIO700, AIO800, ********** ("*" = 0-9, A-Z, a-z, -, +, space, or any other characters) |
| Model Declaration | PCB board, structure and internal of these model(s) are the same, Only the model name different , So no additional models were tested. |
| Power supply: | AC 110-120V/ AC 220-240V, 50/60Hz, MAX 0.1A |
| Hardware Version | N/A |
| Software Version | N/A |
| Sample ID | GTS20250918006-1-S001-1#<br>GTS20250918006-1-S001-2# |
| Bluetooth | |
| Frequency Range | 2402MHz ~ 2480MHz |
| Channel Number | 79 channels for Bluetooth (DSS)<br>40 channels for Bluetooth (DTS) |
| Channel Spacing | 1MHz for Bluetooth (DSS)<br>2MHz for Bluetooth (DTS) |
| Modulation Type | GFSK, π/4-DQPSK, 8DPSK for Bluetooth (DSS)<br>GFSK for Bluetooth (DTS) |
| 2.4GWLAN | |
| WLAN Operation frequency | IEEE 802.11b:2412-2462MHz<br>IEEE 802.11g:2412-2462MHz<br>IEEE 802.11n HT20:2412-2462MHz<br>IEEE 802.11ax HE20:2412-2462MHz |
| WLAN Modulation Type | IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)<br>IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11ax HE20: OFDMA (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK) |
| Channel number: | 11 Channel for IEEE 802.11b/g/n/ax (HT20) |
| Channel separation: | 5MHz |
| WIFI(5.2G/5.8G Band) | |
| WLAN Operation frequency | 5180-5240MHz/ 5745MHz to 5825MHz |
| WLAN Modulation Type | IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)<br>IEEE 802.11ac VHT20: OFDM (256QAM,64QAM, 16QAM, QPSK,BPSK)<br>IEEE 802.11ax HE20: OFDMA (1024QAM,256QAM,64QAM, 16QAM, QPSK,BPSK)<br>IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK) |

| | |
|---|---|
| | IEEE 802.11ac VHT40: OFDM (256QAM,64QAM, 16QAM, QPSK,BPSK)<br>IEEE 802.11ax HE40: OFDMA (1024QAM,256QAM,64QAM, 16QAM, QPSK,BPSK)<br>IEEE 802.11ac VHT80: OFDM (256QAM,64QAM, 16QAM, QPSK,BPSK)<br>IEEE 802.11ax HE80: OFDMA (1024QAM,256QAM,64QAM, 16QAM, QPSK,BPSK) |
| Channel number: | 4 Channels for 20MHz bandwidth(5180-5240MHz)<br>5 channels for 20MHz bandwidth(5745-5825MHz)<br>2 channels for 40MHz bandwidth(5190~5230MHz)<br>2 channels for 40MHz bandwidth(5755~5795MHz)<br>1 channels for 80MHz bandwidth(5210MHz)<br>1 channels for 80MHz bandwidth(5775MHz) |
| Antenna Description | Two External antenna respectively. WLAN support 2*2MIMO technology.<br>ANT1 used for BT&WIFI TX/RX, 2.00 dBi(Max.) for 2.4G Band and 2.00 dBi (Max.) for 5G Band.<br>ANT2 used for WIFI TX/RX, 2.00 dBi(Max.) for 2.4G Band and 2.00 dBi (Max.) for 5G Band. |

## 2.3. Equipment Under Test

### Power supply system utilised

| | | | | | |
|---|---|---|---|---|---|
| Power supply voltage | : | ○ | 230V / 50 Hz | ● | 120V / 60Hz |
| | | ○ | 12 V DC | ○ | 24 V DC |
| | | ○ | Other (specified in blank below) | | |

AC 120V

## 2.4. Short description of the Equipment under Test (EUT)

This is an Integrated high-resolution music streamer and DAC.
For more details, refer to the user's manual of the EUT.

## 2.5. EUT operation mode

The application provider specific test software to control sample in continuous TX and RX.

| Antenna | Chain1 (ANT 1) | | | Chain2 (ANT 2) | | | Simultaneously |
|---|---|---|---|---|---|---|---|
| Bandwidth Mode | 20MHz | 40MHz | 80MHz | 20MHz | 40MHz | 80MHz | / |
| IEEE 802.11a | ☑ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ |
| IEEE 802.11n | ☑ | ☑ | ☐ | ☑ | ☑ | ☐ | ☑ |
| IEEE 802.11ac | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| IEEE 802.11ax | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |

IEEE 802.11a/ac20/ac40/ac80/ax20/ax40/ax80/n20/n40:

| UNII-1 | | UNII-1 | | UNII-1 | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| **36** | **5180** | 38 | 5190 | 42 | 5210 |
| **40** | **5200** | 46 | 5230 | | |
| 44 | 5220 | | | | |
| **48** | **5240** | | | | |

| U-NI-3 | | U-NI-3 | | U-NI-3 | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| **149** | **5745** | 151 | 5755 | 155 | 5775 |
| 153 | 5765 | 159 | 5795 | | |
| **157** | **5785** | | | | |
| 161 | 5805 | | | | |
| **165** | **5825** | | | | |

The EUT has been tested under operating condition.

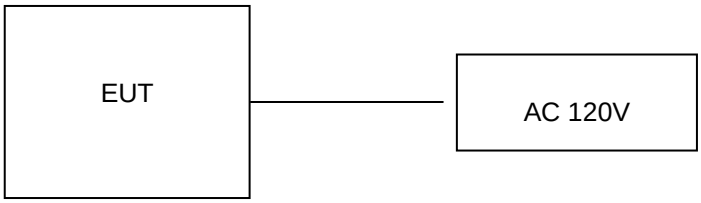
This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

AC conducted emission pre-test at both at AC 120V/60Hz and AC 240V/60Hz modes, recorded worst case(AC 120V/60Hz).

Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be IEEE 802.11ac VHT20 mode (HCH).

AX mode tested all RU, only worst case mode (Full RU) recorded in report.

## 2.6. Block Diagram of Test Setup




## 2.7. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2BU2O-DMP-AIO** filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

## 2.8. EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software (ADB command) provided by application.

## 2.9. Special Accessories

| Manufacturer | Description | Model | Serial Number | Certificate |
|---|---|---|---|---|
| THTF | Display | LE23CW-D | -- | SDOC |

Note: The Display is only used for auxiliary testing.

## 2.10. External I/O Cable

| I/O Port Description | Quantity | Cable |
|---|---|---|
| AC IN Port | 1 | Non-Shielded, 1.0m |
| USB Port | 3 | N/A |
| TYPE-C Port | 1 | N/A |
| HDMI Port | 1 | Non-Shielded, 1.0m |
| OPTICAL Port | 1 | N/A |
| LAN Port | 1 | N/A |
| XLRR Port | 1 | N/A |
| XLRL Port | 1 | N/A |

## 2.11. Modifications

No modifications were implemented to meet testing criteria.

# 3. TEST ENVIRONMENT

## 3.1. Address of the test laboratory

**Shenzhen Global Test Service Co.,Ltd.**
No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong, China.

## 3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS (No. CNAS L8169)
Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.
A2LA (Certificate No. 4758.01)
Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.
Industry Canada Registration Number. is 24189.
FCC Designation Number is CN1401.
FCC Registered Test Site Number is 684561.

## 3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature: | 15-35 ° C |
| | |
| Humidity: | 30-60 % |
| | |
| Atmospheric pressure: | 950-1050mbar |

## 3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

| Test | Range | Measurement Uncertainty | Notes |
|---|---|---|---|
| Radiated Emission | 30~1000MHz | 4.10 dB | (1) |
| Radiated Emission | 1~18GHz | 4.32 dB | (1) |
| Radiated Emission | 18-40GHz | 5.54 dB | (1) |
| Conducted Disturbance | 0.15~30MHz | 3.12 dB | (1) |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 3.5. Test Description

| Applied Standard: FCC Part 15 Subpart E | | | | |
|---|---|---|---|---|
| FCC Rules | Description of Test | Test Sample | Result | Remark |
| / | On Time and Duty Cycle | GTS20250918006-1-S001-1# | Compliant | Appendix D<br>Appendix E |
| §15.407(a) | Maximum Conducted Output Power | GTS20250918006-1-S001-1# | Compliant | Appendix D<br>Appendix E |
| §15.407(a) | Power Spectral Density | GTS20250918006-1-S001-1# | Compliant | Appendix D<br>Appendix E |
| §15.407(a) | 26dB&6dB Bandwidth and 99% Bandwidth | GTS20250918006-1-S001-1# | Compliant | Appendix D<br>Appendix E |
| §15.209,<br>§15.407(b) | Radiated Emissions | GTS20250918006-1-S001-1#<br>GTS20250918006-1-S001-2# | Compliant | Note 1 |
| §15.209,<br>§15.407(b) | Conducted Spurious Emissions and Band Edges Test | GTS20250918006-1-S001-1# | Compliant | Appendix D<br>Appendix E |
| §15.209,<br>§15.407(b) | Emissions at Restricted Band | GTS20250918006-1-S001-1# | Compliant | Note 1 |
| §15.407(g) | Frequency Stability | GTS20250918006-1-S001-1# | Compliant | Note 1 |
| §15.207(a) | AC Mians Line Conducted Emissions | GTS20250918006-1-S001-2# | Compliant | Note 1 |
| §15.203<br>§15.407(h) | Antenna Requirements | GTS20250918006-1-S001-1# | Compliant | Note 1 |
| §15.407<br>§2.1091 | RF Exposure | / | Compliant | Note 2 |

Remark:
1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed
3. Note 1 – Test results inside test report;
4. Note 2 – Test results in other test report (SAR Report).
5. We tested all test mode and recorded worst case in report

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

| Test Items | Mode | Data Rate |
|---|---|---|
| Maximum Peak Conducted Output Power<br>Power Spectral Density<br>6dB Bandwidth<br>26dB Bandwidth<br>Radiated Emission30M~1GHz&<br>Radiated Emission 1GHz~10$^{th}$ Harmonic | 802.11a | 6 Mbps |
| | 802.11ac20/ac40/ac80<br>802.11n<br>HT20/40/ax20/ax40/ax80 | MCS0 |
| Band Edge | 802.11a | 6 Mbps |
| | 802.11ac20/ac40/ac80<br>802.11n<br>HT20/40/ax20/ax40/ax80 | MCS0 |

## 3.6. Equipments Used during the Test

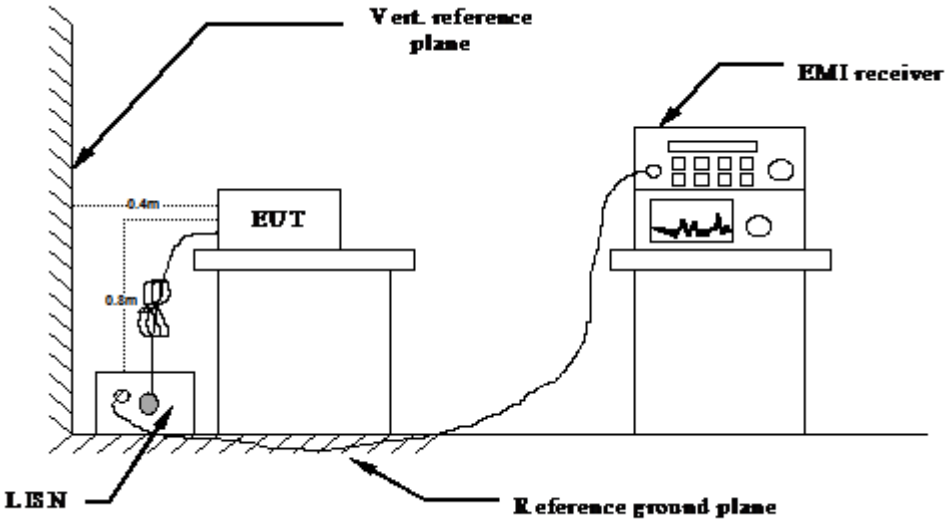
| Test Equipment | Manufacturer | Model No. | Serial No. | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Artificial Mains | CYBERTEK | EM5040A | E1850400205 | 2025/07/07 | 2026/07/06 |
| LISN | R&S | ESH2-Z5 | 893606/008 | 2025/07/07 | 2026/07/06 |
| EMI Test Receiver | R&S | ESPI 3 | / | 2025/07/04 | 2026/07/03 |
| Test Receiver | R&S | ESCI 7 | 101102 | 2025/07/04 | 2026/07/03 |
| Spectrum Analyzer | Agilent | N9020A | MY48010425 | 2025/07/04 | 2026/07/03 |
| Spectrum Analyzer | R&S | FSV40-N | 101800 | 2025/07/04 | 2026/07/03 |
| Vector Signal generator | Agilent | N5181A | MY49060502 | 2025/07/15 | 2026/07/14 |
| Signal generator | Agilent | N5182A | MY50141550 | 2025/07/04 | 2026/07/03 |
| Climate Chamber | ESPEC | EL-10KA | A20120523 | 2025/07/15 | 2026/07/14 |
| Controller | EM Electronics | Controller EM 1000 | N/A | N/A | N/A |
| Horn Antenna | Schwarzbeck | BBHA 9120D | 01622 | 2025/12/01 | 2026/11/30 |
| Active Loop Antenna | Beijing Da Ze Technology Co.,Ltd. | ZN30900C | / | 2025/07/04 | 2026/07/03 |
| By-log Antenna | SCHWARZBECK | VULB9163 | 00976 | 2025/07/15 | 2026/07/14 |
| Broadband Horn Antenna | SCHWARZBECK | BBHA 9170 | 791 | 2025/07/15 | 2026/07/14 |
| Amplifier | SKET | LAPA_30M01G-32 | SK2024010400 1 | 2025/12/01 | 2026/11/30 |
| Amplifier | EMCI | EMC012645SE | 980340 | 2025/12/01 | 2026/11/30 |
| Amplifier | Schwarzbeck | BBV9179 | 9719-025 | 2025/12/01 | 2026/11/30 |
| Temperature/Humidity Meter | HUATU | HTC-1 | / | 2025/07/16 | 2026/07/15 |
| High-Pass Filter | Stest | 1 | / | 2025/07/04 | 2026/07/03 |
| High-Pass Filter | Stest | 2 | / | 2025/07/04 | 2026/07/03 |
| RF Cable(below 1GHz) | HUBER+SUHNER | RG214 | RE01 | 2025/07/15 | 2026/07/14 |
| RF Cable(above 1GHz) | HUBER+SUHNER | RG214 | RE02 | 2025/07/15 | 2026/07/14 |
| Data acquisition card | Agilent | U2531A | TW53323507 | 2025/07/15 | 2026/07/14 |
| Power Sensor | Keysight | E9301A | MY41495308 | 2025/07/04 | 2026/07/03 |
| Control Unit | Tonscend | JS0806-2 | / | 2025/07/07 | 2026/07/06 |
| Control Unit | Tonscend | JS0806-2 | / | 2025/07/07 | 2026/07/06 |
| integrated measuring instrument | R&S | CMW500 | 107519 | 2025/07/04 | 2026/07/03 |
| EMI Test Software | Tonscend | JS1120-1 | Ver 2.6.8.0518 | / | / |
| EMI Test Software | Tonscend | JS1120-3 | Ver 2.5.77.0418 | / | / |
| EMI Test Software | Tonscend | JS32-CE | Ver 2.5 | / | / |
| EMI Test Software | Tonscend | JS32-RE | Ver 2.5.1.8 | / | / |

Note: The Cal.Interval was one year.

# 4. TEST CONDITIONS AND RESULTS

## 4.1. AC Power Conducted Emission

**TEST CONFIGURATION**




**TEST PROCEDURE**

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSIC63.10-2020+Cor.1-2023+C63.10a-2024.
2 Support equipment, if needed, was placed as per ANSIC63.10-2020+Cor.1-2023+C63.10a-2024
3 All I/O cables were positioned to simulate typical actual usage as per ANSIC63.10-2020+Cor.1-2023+C63.10a-2024
4 The EUT received AC 120.0V power, the received AC120V/60Hz or AC 240V/50Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT.The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.
9 The LISN is more than 40cm away from the vertical reference plane.

**AC Power Conducted Emission Limit**

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

| Frequency range (MHz) | Limit (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |
| * Decreases with the logarithm of the frequency. | | |

**DISTURBANCE Calculation**

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

**CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)**

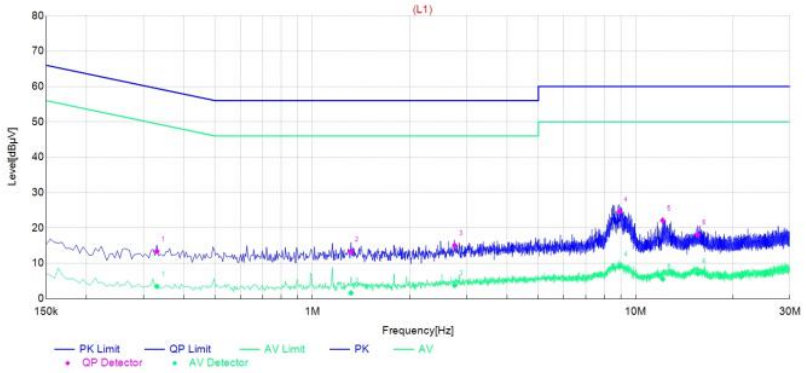
| | |
|---|---|
| Where CD = Conducted Disturbance | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | PL = 10 dB Pulse Limiter Factor |

## TEST RESULTS

Remark: We measured Conducted Emission at all mode in AC 120V/60Hz, the worst case was recorded .

| Temperature | 25℃ | Humidity | 60% |
|---|---|---|---|
| Test Engineer | Evan Ouyang | Configurations | IEEE 802.11ac20 HCH |

| Power supply: | AC 120V/60Hz | Polarization | L |
|---|---|---|---|

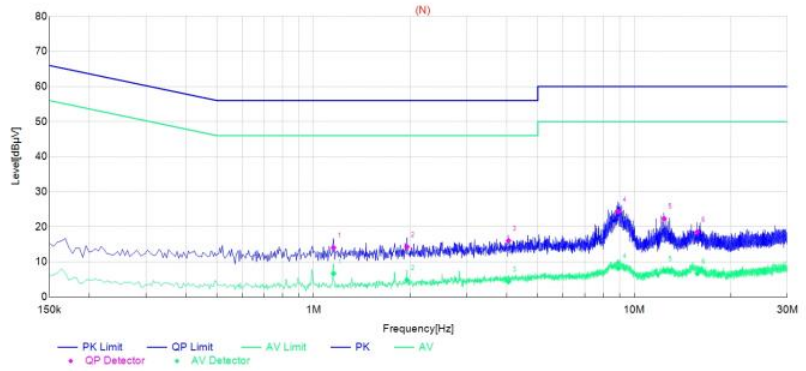



Final Data List

| NO. | Frequency [MHz] | QP Reading [dBµV] | AVG. Reading [dBµV] | Factor [dB] | QP Result [dBµV] | AVG. Result [dBµV] | QP Limit [dBµV] | AVG. Limit [dBµV] | QP Margin [dB] | AVG. Margin [dB] | Line | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.33 | 3.30 | -6.64 | 10.12 | 13.42 | 3.48 | 59.45 | 49.45 | 46.03 | 45.97 | L1 | PASS |
| 2 | 1.3155 | 3.18 | -8.60 | 10.22 | 13.40 | 1.62 | 56.00 | 46.00 | 42.60 | 44.38 | L1 | PASS |
| 3 | 2.7555 | 4.78 | -6.58 | 10.32 | 15.10 | 3.74 | 56.00 | 46.00 | 40.90 | 42.26 | L1 | PASS |
| 4 | 8.925 | 14.15 | -1.42 | 10.55 | 24.70 | 9.13 | 60.00 | 50.00 | 35.30 | 40.87 | L1 | PASS |
| 5 | 12.129 | 11.31 | -5.27 | 10.82 | 22.13 | 5.55 | 60.00 | 50.00 | 37.87 | 44.45 | L1 | PASS |
| 6 | 15.585 | 7.02 | -4.01 | 11.11 | 18.13 | 7.10 | 60.00 | 50.00 | 41.87 | 42.90 | L1 | PASS |

Note:1. Result (dBµV) = Reading (dBµV) + Factor (dB).
2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

| Power supply: | AC 120V/60Hz | Polarization | N |
|---|---|---|---|




Final Data List

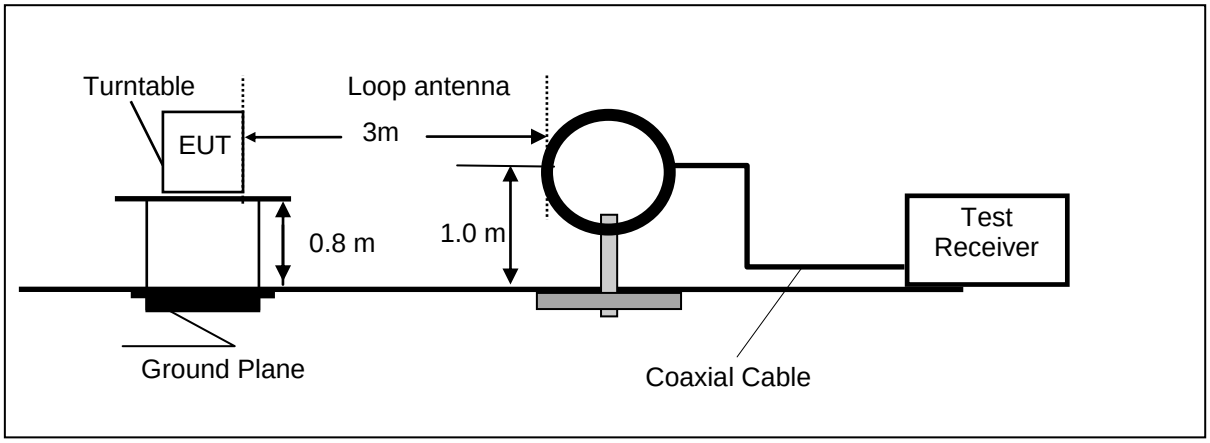
| NO. | Frequency [MHz] | QP Reading [dBµV] | AVG. Reading [dBµV] | Factor [dB] | QP Result [dBµV] | AVG. Result [dBµV] | QP Limit [dBµV] | AVG. Limit [dBµV] | QP Margin [dB] | AVG. Margin [dB] | Line | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.1535 | 3.87 | -3.51 | 10.21 | 14.08 | 6.70 | 56.00 | 46.00 | 41.92 | 39.30 | N | PASS |
| 2 | 1.9545 | 4.06 | -5.39 | 10.27 | 14.33 | 4.88 | 56.00 | 46.00 | 41.67 | 41.12 | N | PASS |
| 3 | 4.0515 | 5.68 | -5.98 | 10.37 | 16.05 | 4.39 | 56.00 | 46.00 | 39.95 | 41.61 | N | PASS |
| 4 | 8.9205 | 13.76 | -2.38 | 10.55 | 24.31 | 8.17 | 60.00 | 50.00 | 35.69 | 41.83 | N | PASS |
| 5 | 12.3855 | 11.51 | -3.34 | 10.85 | 22.36 | 7.51 | 60.00 | 50.00 | 37.64 | 42.49 | N | PASS |
| 6 | 15.7245 | 7.45 | -4.42 | 11.11 | 18.56 | 6.69 | 60.00 | 50.00 | 41.44 | 43.31 | N | PASS |

Note:1. Result (dBµV) = Reading (dBµV) + Factor (dB).
2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

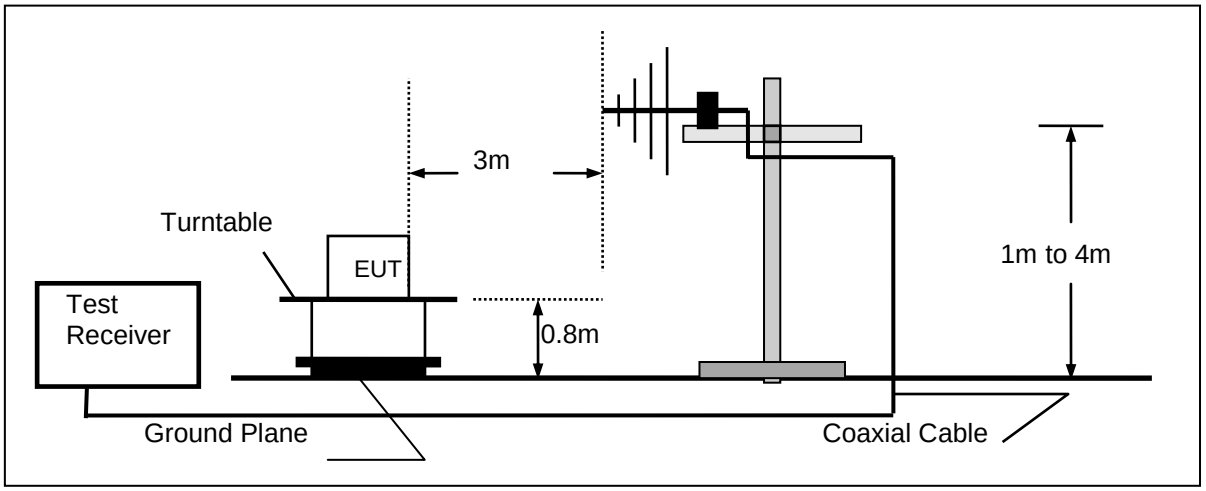
## 4.2. Radiated Emission

**TEST CONFIGURATION**

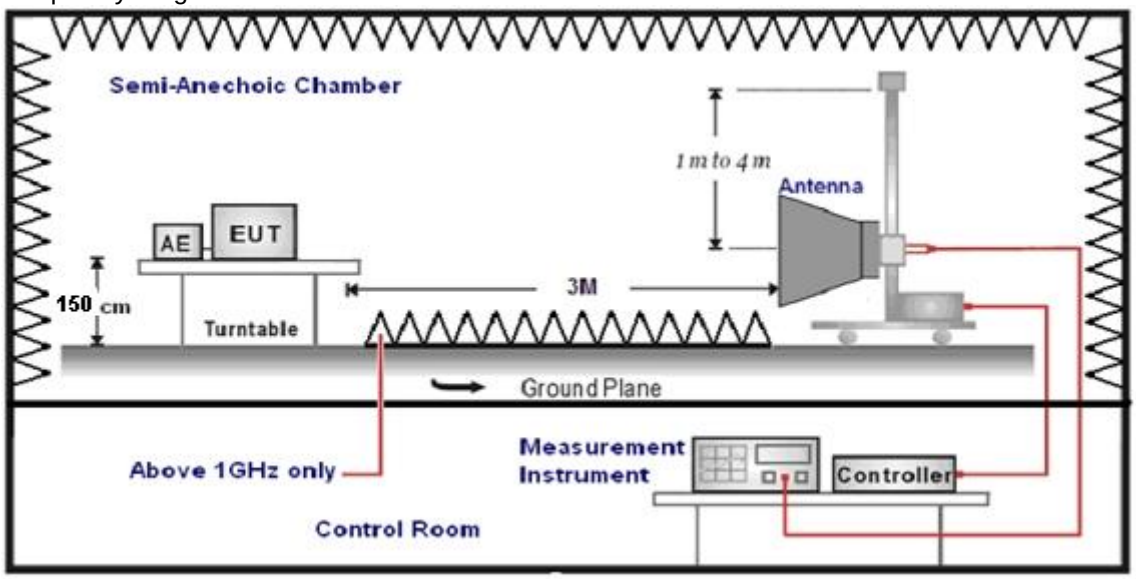
Frequency range 9 KHz – 30MHz




Frequency range 30MHz – 1000MHz




Frequency range above 1GHz



**TEST PROCEDURE**

1. The EUT was placed on a turn table which is 0.8m above ground plane when testing frequency range 9 KHz –1GHz;the EUT was placed on a turn table which is 1.5m above ground plane when testing above 1GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 24MHz and maximum operation frequency was 5825MHz.so radiated emission test frequency band from 9KHz to 40GHz.
6. The distance between test antenna and EUT as following table states:

| Test Frequency range | Test Antenna Type | Test Distance |
|---|---|---|
| 9KHz-30MHz | Active Loop Antenna | 3 |
| 30MHz-1GHz | Ultra-Broadband Antenna | 3 |
| 1GHz-18GHz | Double Ridged Horn Antenna | 3 |
| 18GHz-25GHz | Horn Anternna | 1 |

7. Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting | Detector |
|---|---|---|
| 9KHz-150KHz | RBW=200Hz/VBW=3KHz,Sweep time=Auto | QP |
| 150KHz-30MHz | RBW=9KHz/VBW=100KHz,Sweep time=Auto | QP |
| 30MHz-1GHz | RBW=120KHz/VBW=1000KHz,Sweep time=Auto | QP |
| 1GHz-40GHz | Peak Value: RBW=1MHz/VBW=3MHz,<br>Sweep time=Auto<br>Average Value: RBW=1MHz/VBW=10Hz,<br>Sweep time=Auto | Peak |

**Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

**FS = RA + AF + CL - AG**

| | |
|---|---|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | AG = Amplifier Gain |
| AF = Antenna Factor | |

Transd=AF +CL-AG

**RADIATION LIMIT**

According to §15.407 (b): Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits

| Frequency (MHz) | EIRP Limit (dBm) | Equivalent Field Strength at 3m (dBμV/m) |
|---|---|---|
| 5150-5250 | -27 | 68.2 |
| 5250-5350 | -27 | 68.2 |
| 5470-5725 | -27 | 682 |
| 5725-5850 | -27 (beyond 10MHz of the bandedge) | 68.2 |
| | -17 (within 10 MHz of band edge) | 78.2 |

| **Frequency (MHz)** | **Distance (Meters)** | **Radiated (dBμV/m)** | **Radiated (μV/m)** |
|---|---|---|---|
| 0.009-0.49 | 3 | 20log(2400/F(KHz))+40log(300/3) | 2400/F(KHz) |
| 0.49-1.705 | 3 | 20log(24000/F(KHz))+ 40log(30/3) | 24000/F(KHz) |
| 1.705-30 | 3 | 20log(30)+ 40log(30/3) | 30 |
| 30-88 | 3 | 40.0 | 100 |
| 88-216 | 3 | 43.5 | 150 |
| 216-960 | 3 | 46.0 | 200 |
| Above 960 | 3 | 54.0 | 500 |

**TEST RESULTS**

Remark: We measured Radiated Emission at all mode from9KHz to 25GHz in AC 120V/60Hz and the worst case was recorded.

| Temperature | 22.6℃ | Humidity | 51% |
|---|---|---|---|
| Test Engineer | Evan Ouyang | Configurations | IEEE 802.11ac20 HCH |

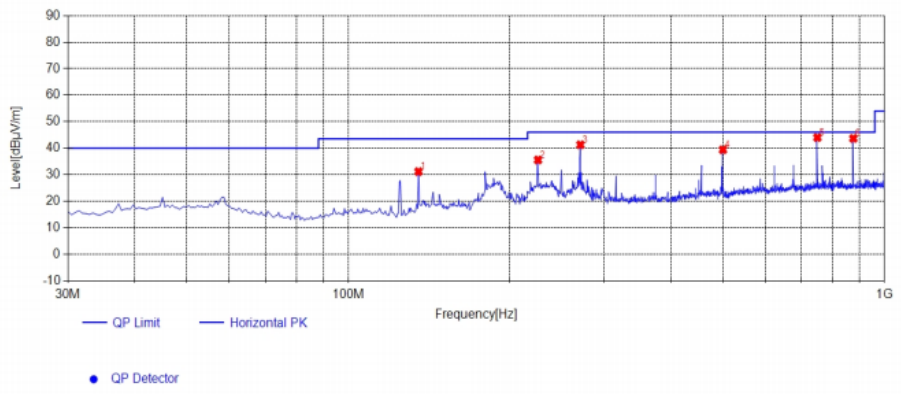
**For 9 KHz~30MHz**

| Freq. (MHz) | Level (dBuV) | Over Limit (dB) | Over Limit (dBuV) | Remark |
|---|---|---|---|---|
| - | - | - | - | See Note |

Note:
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

**For 30MHz-1GHz**

Horizontal



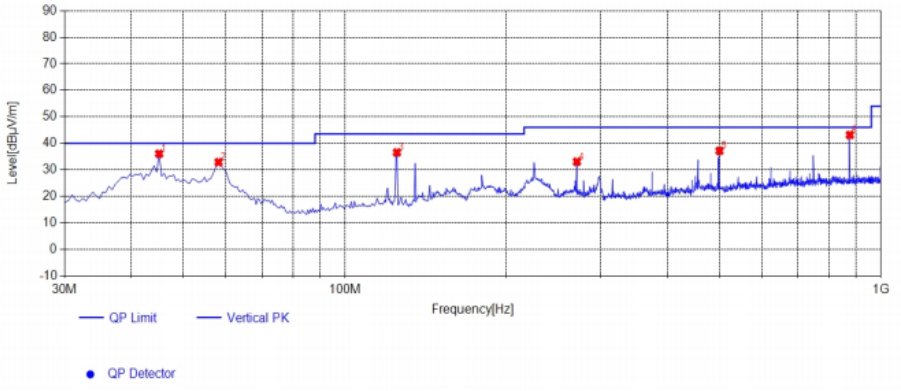

Suspected List

| NO. | Frequency [MHz] | Reading [dBµV/m] | Factor [dB] | Result [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Detector | Polarity | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 135.245 | 45.21 | -14.07 | 31.14 | 43.50 | 12.36 | 100 | 50 | PK | Horizonta | PASS |
| 2 | 225.94 | 44.95 | -9.40 | 35.55 | 46.00 | 10.45 | 100 | 9 | PK | Horizonta | PASS |
| 3 | 271.045 | 49.16 | -7.88 | 41.28 | 46.00 | 4.72 | 100 | 5 | PK | Horizonta | PASS |
| 4 | 499.965 | 42.02 | -2.62 | 39.40 | 46.00 | 6.60 | 100 | 236 | PK | Horizonta | PASS |
| 5 | 750.225 | 42.71 | 1.28 | 43.99 | 46.00 | 2.01 | 100 | 28 | PK | Horizonta | PASS |
| 6 | 875.355 | 42.03 | 1.64 | 43.67 | 46.00 | 2.33 | 100 | 100 | PK | Horizonta | PASS |

Note:1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

Vertical




Suspected List

| NO. | Frequency [MHz] | Reading [dBµV/m] | Factor [dB] | Result [dBµV/m] | Limit [dBµV/m] | Margin [dB] | Height [cm] | Angle [°] | Detector | Polarity | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 45.035 | 47.41 | -11.38 | 36.03 | 40.00 | 3.97 | 100 | 71 | PK | Vertical | PASS |
| 2 | 58.13 | 44.15 | -11.31 | 32.84 | 40.00 | 7.16 | 100 | 198 | PK | Vertical | PASS |
| 3 | 125.06 | 49.76 | -13.24 | 36.52 | 43.50 | 6.98 | 100 | 291 | PK | Vertical | PASS |
| 4 | 271.045 | 40.89 | -7.88 | 33.01 | 46.00 | 12.99 | 100 | 105 | PK | Vertical | PASS |
| 5 | 499.965 | 39.75 | -2.62 | 37.13 | 46.00 | 8.87 | 100 | 37 | PK | Vertical | PASS |
| 6 | 875.355 | 41.49 | 1.64 | 43.13 | 46.00 | 2.87 | 100 | 37 | PK | Vertical | PASS |

Note:1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

**For 1GHz to 40GHz**

**5150-5250MHz:**

**IEEE 802.11a (Worst Case)**

**802.11a Mode_Channel 36 _5180 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10360 | 40.06 | 38.55 | 33.13 | 11.26 | 56.74 | 68.20 | -12.28 | Peak | Horizontal |
| 1 | 10360 | 30.87 | 38.55 | 33.13 | 11.26 | 47.55 | 54.00 | -7.25 | AV | Horizontal |
| 1 | 10360 | 40.95 | 38.55 | 33.13 | 11.26 | 57.63 | 68.20 | -10.11 | Peak | Vertical |
| 1 | 10360 | 29.95 | 38.55 | 33.13 | 11.26 | 46.63 | 54.00 | -9.03 | AV | Vertical |

**802.11a Mode_Channel 40 _ 5200 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10400 | 39.72 | 38.55 | 33.13 | 11.26 | 56.40 | 68.20 | -11.80 | Peak | Horizontal |
| 1 | 10400 | 31.70 | 38.55 | 33.13 | 11.26 | 48.38 | 54.00 | -5.62 | AV | Horizontal |
| 1 | 10400 | 41.29 | 38.55 | 33.13 | 11.26 | 57.97 | 68.20 | -10.23 | Peak | Vertical |
| 1 | 10400 | 29.35 | 38.55 | 33.13 | 11.26 | 46.03 | 54.00 | -7.97 | AV | Vertical |

**802.11a Mode_ Channel 48_ 5240 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10480 | 40.20 | 38.55 | 33.13 | 11.26 | 56.88 | 68.20 | -11.32 | Peak | Horizontal |
| 1 | 10480 | 30.45 | 38.55 | 33.13 | 11.26 | 47.13 | 54.00 | -6.87 | AV | Horizontal |
| 1 | 10480 | 40.26 | 38.55 | 33.13 | 11.26 | 56.94 | 68.20 | -11.26 | Peak | Vertical |
| 1 | 10480 | 28.91 | 38.55 | 33.13 | 11.26 | 45.59 | 54.00 | -8.41 | AV | Vertical |

**IEEE 802.11ax HE20_MIMO(Worst Case)**

**802.11ax Mode_Channel 36 _5180 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10360 | 40.17 | 38.55 | 33.13 | 11.26 | 56.85 | 68.20 | -11.35 | Peak | Horizontal |
| 1 | 10360 | 30.65 | 38.55 | 33.13 | 11.26 | 47.33 | 54.00 | -6.67 | AV | Horizontal |
| 1 | 10360 | 40.82 | 38.55 | 33.13 | 11.26 | 57.50 | 68.20 | -10.70 | Peak | Vertical |
| 1 | 10360 | 28.09 | 38.55 | 33.13 | 11.26 | 44.77 | 54.00 | -9.23 | AV | Vertical |

**802.11ax Mode_Channel 40 _ 5200 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10400 | 40.72 | 38.55 | 33.13 | 11.26 | 57.40 | 68.20 | -10.80 | Peak | Horizontal |
| 1 | 10400 | 31.54 | 38.55 | 33.13 | 11.26 | 48.22 | 54.00 | -5.78 | AV | Horizontal |
| 1 | 10400 | 40.76 | 38.55 | 33.13 | 11.26 | 57.44 | 68.20 | -10.76 | Peak | Vertical |
| 1 | 10400 | 29.31 | 38.55 | 33.13 | 11.26 | 45.99 | 54.00 | -8.01 | AV | Vertical |

**802.11ax Mode_ Channel 48_ 5240 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10480 | 40.58 | 38.55 | 33.13 | 11.26 | 57.26 | 68.20 | -10.94 | Peak | Horizontal |
| 1 | 10480 | 30.88 | 38.55 | 33.13 | 11.26 | 47.56 | 54.00 | -6.44 | AV | Horizontal |
| 1 | 10480 | 40.28 | 38.55 | 33.13 | 11.26 | 56.96 | 68.20 | -11.24 | Peak | Vertical |
| 1 | 10480 | 29.47 | 38.55 | 33.13 | 11.26 | 46.15 | 54.00 | -7.85 | AV | Vertical |

**5725-5850MHz:**

**IEEE 802.11a (Worst Case)**

**802.11a Mode_Channel 149 _5745 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11490 | 40.52 | 38.55 | 33.13 | 11.26 | 57.20 | 68.20 | -11.00 | Peak | Horizontal |
| 1 | 11490 | 31.96 | 38.55 | 33.13 | 11.26 | 48.64 | 54.00 | -5.36 | AV | Horizontal |
| 1 | 11490 | 40.42 | 38.55 | 33.13 | 11.26 | 57.10 | 68.20 | -11.10 | Peak | Vertical |
| 1 | 11490 | 28.97 | 38.55 | 33.13 | 11.26 | 45.65 | 54.00 | -8.35 | AV | Vertical |

**802.11a Mode_Channel 157 _ 5785 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11570 | 40.15 | 38.55 | 33.13 | 11.26 | 56.83 | 68.20 | -11.37 | Peak | Horizontal |
| 1 | 11570 | 31.74 | 38.55 | 33.13 | 11.26 | 48.42 | 54.00 | -5.58 | AV | Horizontal |
| 1 | 11570 | 40.82 | 38.55 | 33.13 | 11.26 | 57.50 | 68.20 | -10.70 | Peak | Vertical |
| 1 | 11570 | 29.60 | 38.55 | 33.13 | 11.26 | 46.28 | 54.00 | -7.72 | AV | Vertical |

**802.11a Mode_ Channel 165_ 5825 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11650 | 40.20 | 38.55 | 33.13 | 11.26 | 56.88 | 68.20 | -11.32 | Peak | Horizontal |
| 1 | 11650 | 30.22 | 38.55 | 33.13 | 11.26 | 46.90 | 54.00 | -7.10 | AV | Horizontal |
| 1 | 11650 | 41.08 | 38.55 | 33.13 | 11.26 | 57.76 | 68.20 | -10.44 | Peak | Vertical |
| 1 | 11650 | 29.89 | 38.55 | 33.13 | 11.26 | 46.57 | 54.00 | -7.43 | AV | Vertical |

**IEEE 802.11ax HE20_MIMO(Worst Case)**

**802.11ax Mode_Channel 149 _5745 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11490 | 39.48 | 38.55 | 33.13 | 11.26 | 56.16 | 68.20 | -12.04 | Peak | Horizontal |
| 1 | 11490 | 30.10 | 38.55 | 33.13 | 11.26 | 46.78 | 54.00 | -7.22 | AV | Horizontal |
| 1 | 11490 | 40.87 | 38.55 | 33.13 | 11.26 | 57.55 | 68.20 | -10.65 | Peak | Vertical |
| 1 | 11490 | 29.07 | 38.55 | 33.13 | 11.26 | 45.75 | 54.00 | -8.25 | AV | Vertical |

**802.11ax Mode_Channel 157 _ 5785 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11570 | 40.30 | 38.55 | 33.13 | 11.26 | 56.98 | 68.20 | -11.22 | Peak | Horizontal |
| 1 | 11570 | 31.65 | 38.55 | 33.13 | 11.26 | 48.33 | 54.00 | -5.67 | AV | Horizontal |
| 1 | 11570 | 40.86 | 38.55 | 33.13 | 11.26 | 57.54 | 68.20 | -10.66 | Peak | Vertical |
| 1 | 11570 | 28.29 | 38.55 | 33.13 | 11.26 | 44.97 | 54.00 | -9.03 | AV | Vertical |

**802.11ax Mode_ Channel 165_ 5825 MHz**

| Item (Mark) | Freq (MHz) | Read Level (dBμV) | Antenna Factor (dB/m) | PRM Factor dB | Cable Loss (dB) | Result Level (dBμV/m) | Limit Line (dBμV/m) | Margin (dB) | Detector | Polarization |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11650 | 39.54 | 38.55 | 33.13 | 11.26 | 56.22 | 68.20 | -11.98 | Peak | Horizontal |
| 1 | 11650 | 31.18 | 38.55 | 33.13 | 11.26 | 47.86 | 54.00 | -6.14 | AV | Horizontal |
| 1 | 11650 | 40.20 | 38.55 | 33.13 | 11.26 | 56.88 | 68.20 | -11.32 | Peak | Vertical |
| 1 | 11650 | 29.30 | 38.55 | 33.13 | 11.26 | 45.98 | 54.00 | -8.02 | AV | Vertical |

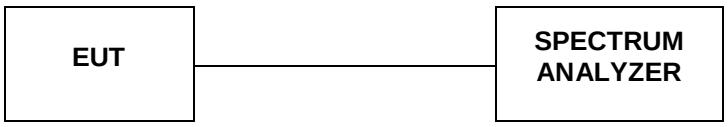
**REMARKS:**

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. Margin = Result Level - Limit
3. The other emission levels were very low against the limit.
4. Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=10Hz/Sweep time=Auto/Detector=Peak;

**Note: All modes were tested and the worst mode was recorded in the report .**

## 4.3. Duty Cycle

**TEST CONFIGURATION**




**TEST PROCEDURE**

According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Duty Cycle (x), Transmission Duration (T):

a. A diode detector and an oscilloscope that together have sufficiently short response time to permit accurate measurements of the on and off times of the transmitted signal
b. The zero-span mode on a spectrum analyzer or EMI receiver, if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zerospan measurement method shall not be used unless both RBW and VBW are > 50/T, where T is defined in section II.B.1.a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

**TEST RESULTS**

For reporting purpose only .

**Antenna 1:**
Please refer to Appendix D-ANT 1-Appendix D.3.

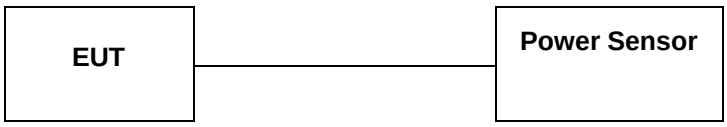
Please refer to Appendix D-ANT 1-Appendix E.3.

**Antenna 2:**
Please refer to Appendix D-ANT 2-Appendix D.3.

Please refer to Appendix D-ANT 2-Appendix E.3.

## 4.4. Maximum Average Output Power

**TEST CONFIGURATION**




**TEST PROCEDURE**

According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Measurement using a Power Meter (PM):

a. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied
   1. The EUT is configured to transmit continuously or to transmit with a constant duty cycle
   2. At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
   3. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b. If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B

c. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10 log(1/0.25) if the duty cycle is 25 percent).

**LIMIT**

According to §15.407(a): The maximum output power should be not exceed follow:

| Frequency Range (MHz) | Limit |
|---|---|
| 5150-5250 | Fixed:1 Watt (30dBm)<br>Mobile and portable: 250mW (24dBm) |
| 5250-5350 | 250mW (24dBm) |
| 5470-5725 | 250mW (24dBm) |
| 5725-5850 | 1 Watt (30dBm) |
| Note: The maximum e.i.r.p at anyelevation angle above 30 degrees as measured from the horizon must not exceed 125mW(21dBm) | |

**TEST RESULTS**

For reporting purpose only.

**Antenna 1:**
Please refer to Appendix D-ANT 1-Appendix D.4.

Please refer to Appendix D-ANT 1-Appendix E.4.

**Antenna 2:**
Please refer to Appendix D-ANT 2-Appendix D.4.

Please refer to Appendix D-ANT 2-Appendix E.4.

**MIMO*2**
**5180-5240MHz:**

| Type | Channel | Power (dBm) ANT 1 | Power (dBm) ANT 2 | Total (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 802.11n HT20 | 36 | 10.47 | 11.89 | 14.23 | 24.00 | Pass |
| | 40 | 10.94 | 11.98 | 14.75 | | |
| | 48 | 12.35 | 11.48 | 15.09 | | |
| 802.11n HT40 | 38 | 11.51 | 10.80 | 14.26 | 24.00 | Pass |
| | 46 | 12.16 | 10.48 | 14.63 | | |
| 802.11ac20 | 36 | 11.49 | 10.19 | 12.72 | 24.00 | Pass |
| | 40 | 12.07 | 10.69 | 13.38 | | |
| | 48 | 12.55 | 10.44 | 13.51 | | |
| 802.11ac40 | 38 | 11.68 | 10.46 | 12.95 | 24.00 | Pass |
| | 46 | 12.49 | 10.58 | 13.72 | | |
| 802.11ac80 | 42 | 12.26 | 10.42 | 13.47 | 24.00 | Pass |
| 802.11ax20 | 36 | 11.85 | 10.15 | 12.72 | 24.00 | Pass |
| | 40 | 12.31 | 10.79 | 13.38 | | |
| | 48 | 12.79 | 10.62 | 13.51 | | |
| 802.11ax40 | 38 | 11.82 | 9.87 | 12.95 | 24.00 | Pass |
| | 46 | 12.53 | 10.19 | 13.72 | | |
| 802.11ax80 | 42 | 12.20 | 10.16 | 13.47 | 24.00 | Pass |

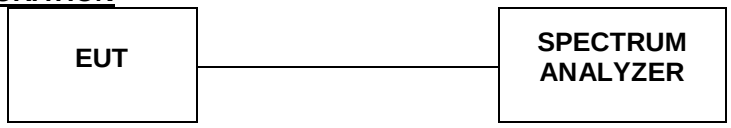
**5745-5825MHz:**

| Type | Channel | Power (dBm) ANT 1 | Power (dBm) ANT 2 | Total (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| 802.11n HT20 | 149 | 8.80 | 10.49 | 12.74 | 30.00 | Pass |
| | 157 | 9.09 | 9.74 | 12.44 | | |
| | 165 | 8.34 | 8.85 | 11.61 | | |
| 802.11n HT40 | 151 | 8.75 | 10.18 | 12.53 | 30.00 | Pass |
| | 159 | 8.67 | 9.71 | 12.23 | | |
| 802.11ac20 | 149 | 8.93 | 10.38 | 12.73 | 30.00 | Pass |
| | 157 | 8.67 | 9.82 | 12.29 | | |
| | 165 | 8.00 | 8.88 | 11.47 | | |
| 802.11ac40 | 151 | 8.36 | 10.14 | 12.35 | 30.00 | Pass |
| | 159 | 8.48 | 9.66 | 12.12 | | |
| 802.11ac80 | 155 | 8.36 | 9.97 | 12.25 | 30.00 | Pass |
| 802.11ax20 | 149 | 8.52 | 10.53 | 12.65 | 30.00 | Pass |
| | 157 | 8.65 | 9.74 | 12.24 | | |
| | 165 | 7.93 | 8.89 | 11.45 | | |
| 802.11ax40 | 151 | 8.24 | 10.08 | 12.27 | 30.00 | Pass |
| | 159 | 8.35 | 9.55 | 12.00 | | |
| 802.11ax80 | 155 | 8.45 | 9.99 | 12.30 | 30.00 | Pass |

Remark:
The Directional Gain= Gain of individual transmit antennas (dBi) + Array gain;
Array gain = 10 log (Nant), where Nant is the number of transmit antennas
Directional Gain=5.01 dBi
Limit (dBm)=30dBm-(Directional Gain-6dBi)

## 4.5. Power Spectral Density

**TEST CONFIGURATION**




**TEST PROCEDURE**

According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01: The rules requires "maximum power spectral density" measurements where the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission

a. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
b. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
c. Make the following adjustments to the peak value of the spectrum, if applicable:
    1. If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.
    2. ) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
d. The result is the Maximum PSD over 1 MHz reference bandwidth.
e. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:
    1. Set RBW ≥ 1/T, where T is defined in section II.B.I.a).
    2. Set VBW ≥ 3 RBW.
    3. If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
    4. If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
    5. Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

    Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHz is available on nearly all spectrum analyzers.
f. Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10 log(1/0.25) if the duty cycle is 25 percent).

**LIMIT**

According to §15.407(a): The maximum output power should be not exceed follow:

| Frequency Range (MHz) | Limit |
|---|---|
| 5150-5250 | Other then Mobile and portable:17dBm/MHz<br>Mobile and portable:11dBm/MHz |
| 5250-5350 | 11dBm/MHz |
| 5470-5725 | 11dBm/MHz |
| 5725-5850 | 30dBm/500kHz |

**TEST RESULTS**

**For reporting purpose only.**

**Antenna 1:**
Please refer to Appendix D-ANT 1-Appendix D.5.
Please refer to Appendix D-ANT 1-Appendix E.5.

**Antenna 2:**
Please refer to Appendix D-ANT 2-Appendix D.5.
Please refer to Appendix D-ANT 2-Appendix E.5.

**MIMO*2**

**5180-5240MHz:**

| Type | Channel | PSD (dBm/1MHz) ANT 1 | PSD (dBm/1MHz ) ANT 2 | Total (dBm/1MHz ) | Limit (dBm/1MHz ) | Result |
|---|---|---|---|---|---|---|
| 802.11n HT20 | 36 | -0.27 | 0.28 | 3.02 | 11.00 | Pass |
| | 40 | -0.06 | 0.41 | 3.19 | | |
| | 48 | 0.25 | 0.62 | 3.45 | | |
| 802.11n HT40 | 38 | -3.66 | -4.54 | -1.07 | 11.00 | Pass |
| | 46 | -3.41 | -4.55 | -0.93 | | |
| 802.11ac 20 | 36 | -3.01 | 1.55 | 2.85 | 11.00 | Pass |
| | 40 | -2.61 | 1.81 | 3.15 | | |
| | 48 | -2.58 | 1.80 | 3.15 | | |
| 802.11ac 40 | 38 | -1.36 | -4.53 | 0.35 | 11.00 | Pass |
| | 46 | -4.63 | -4.47 | -1.54 | | |
| 802.11ac 80 | 42 | -7.85 | -7.43 | -4.62 | 11.00 | Pass |
| 802.11ax 20 | 36 | -2.45 | -2.50 | 0.54 | 11.00 | Pass |
| | 40 | -2.25 | -2.55 | 0.61 | | |
| | 48 | -2.24 | -2.54 | 0.62 | | |
| 802.11ax 40 | 38 | -6.27 | -6.48 | -3.36 | 11.00 | Pass |
| | 46 | -6.17 | -6.54 | -3.34 | | |
| 802.11ax 80 | 42 | -8.23 | -9.34 | -5.74 | 11.00 | Pass |

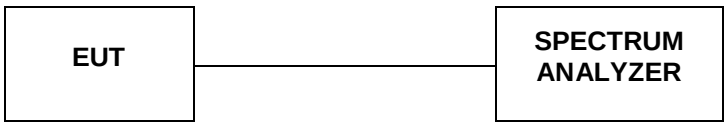
**5745-5825MHz:**

| Type | Channel | PSD (dBm/500KHz) ANT 1 | PSD (dBm/500KHz) ANT 2 | Total (dBm/500KHz) | Limit (dBm/500KHz) | Result |
|---|---|---|---|---|---|---|
| 802.11 n HT20 | 149 | -0.27 | -0.58 | 2.59 | 30.00 | Pass |
| | 157 | 0.12 | -0.89 | 2.65 | | |
| | 165 | 0.45 | -1.27 | 2.68 | | |
| 802.11 n HT40 | 151 | -4.62 | -6.88 | -2.59 | 30.00 | Pass |
| | 159 | -5.79 | -6.58 | -3.16 | | |
| 802.11 ac20 | 149 | 0.59 | 0.75 | 3.68 | 30.00 | Pass |
| | 157 | 1.26 | 0.27 | 3.80 | | |
| | 165 | 1.43 | 0.32 | 3.92 | | |
| 802.11 ac40 | 151 | -6.31 | -6.47 | -3.38 | 30.00 | Pass |
| | 159 | -5.66 | -6.39 | -3.00 | | |
| 802.11 ac80 | 155 | -8.95 | -9.69 | -6.29 | 30.00 | Pass |
| 802.11 ax20 | 149 | -4.51 | -4.54 | -1.51 | 30.00 | Pass |
| | 157 | -4.24 | -4.08 | -1.15 | | |
| | 165 | -4.84 | -4.46 | -1.64 | | |
| 802.11 ax40 | 151 | -8.52 | -8.60 | -5.55 | 30.00 | Pass |
| | 159 | -8.27 | -8.45 | -5.35 | | |
| 802.11 ax80 | 155 | -11.52 | -14.29 | -9.68 | 30.00 | Pass |

Remark:
The Directional Gain= Gain of individual transmit antennas (dBi) + Array gain;
Array gain = 10 log (Nant), where Nant is the number of transmit antennas
Directional Gain=5.01 dBi
Limit (dBm)=30dBm-(Directional Gain-6dBi)

## 4.6. 99% and 6dB Bandwidth

**TEST CONFIGURATION**




**TEST PROCEDURE**

6dB Bandwidth:
According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01 for one of the following procedures may be used for section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a. Set RBW = 100 kHz.
b. Set the video bandwidth (VBW) ≥ 3 × RBW
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize
g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

99% Bandwidth:
According to section 6.9.3 of ANSIC63.10-2020+Cor.1-2023+C63.10a-2024, for the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

1.The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. Set RBW = 1%~5% OBW; VBW≥3*RBW (for occupied bandwidth measurement).
3. Measured the 6dB bandwidth and 99% occupied bandwidth by related function of the spectrum analyzer.

**LIMIT**

For Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz

**TEST RESULTS**

For reporting purpose only.

**Antenna 1:**
Please refer to Appendix E-ANT 1-Appendix E.1.

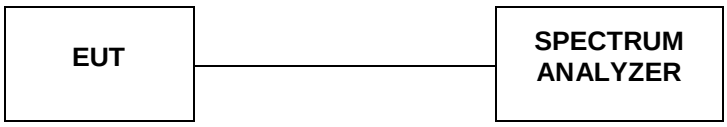
Please refer to Appendix E-ANT 1-Appendix E.2.

**Antenna 2:**
Please refer to Appendix E-ANT 2-Appendix E.1.

Please refer to Appendix E-ANT 2-Appendix E.2.

## 4.7. 99% and 26dB Bandwidth

**TEST CONFIGURATION**




**TEST PROCEDURE**

26dB Bandwidth:
According to KDB789033 D02 General U-NII Test Procedures New Rules v02r01 for one of the following procedures may be used for Emission Bandwidth (EBW) measurement:

a. Set RBW = 220 kHz/430 kHz /820 kHz (approximately 1% of the emission bandwidth).
b. Set the video bandwidth (VBW) = 3* RBW)
c. Detector = Peak.
d. Trace mode = max hold.
e. Sweep = auto couple.
f. Allow the trace to stabilize
g. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

99% Bandwidth:
According to section 6.9.3 of ANSIC63.10-2020+Cor.1-2023+C63.10a-2024, for the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

1.The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. Set RBW = 1%~5% OBW; VBW≥3*RBW (for occupied bandwidth measurement).
3. Measured the 6dB bandwidth and 99% occupied bandwidth by related function of the spectrum analyzer.

**LIMIT**

No Limits for 26dB Bandwith

**TEST RESULTS**

For reporting purpose only.

**Antenna 1:**

Please refer to Appendix D-ANT 1-Appendix D.1.

Please refer to Appendix D-ANT 1-Appendix D.2.

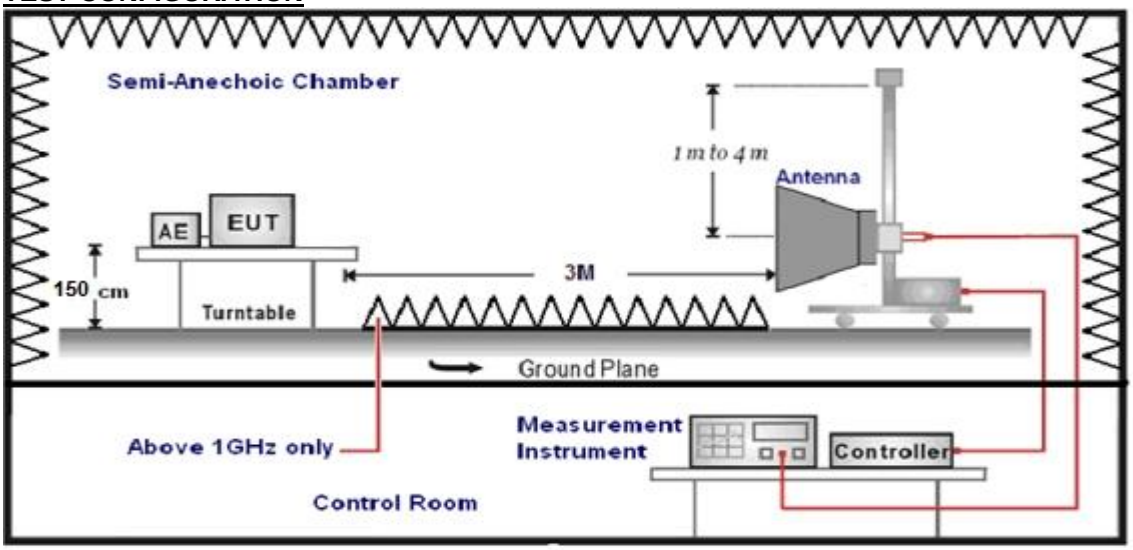
**Antenna 2:**

Please refer to Appendix D-ANT 2-Appendix D.1.

Please refer to Appendix D-ANT 2-Appendix D.2.

## 4.8. Conducted Spurious Emissions and Band Edge Compliance

**TEST CONFIGURATION**




**LIMIT**

20dBc in any 100 kHz bandwidth outside the operating frequency band. 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.

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/m) | Radiated (μV/m) |
|---|---|---|---|
| 0.009-0.49 | 3 | 20log(2400/F(KHz))+40log(300/3) | 2400/F(KHz) |
| 0.49-1.705 | 3 | 20log(24000/F(KHz))+ 40log(30/3) | 24000/F(KHz) |
| 1.705-30 | 3 | 20log(30)+ 40log(30/3) | 30 |
| 30-88 | 3 | 40.0 | 100 |
| 88-216 | 3 | 43.5 | 150 |
| 216-960 | 3 | 46.0 | 200 |
| Above 960 | 3 | 54.0 | 500 |

According to §15.407 (b): Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits

| Frequency (MHz) | EIRP Limit (dBm) | Equivalent Field Strength at 3m (dBμV/m) |
|---|---|---|
| 5150-5250 | -27 | 68.2 |
| 5250-5350 | -27 | 68.2 |
| 5470-5725 | -27 | 68.2 |
| 5725-5850 | -27 (beyond 10MHz of the bandedge) | 68.2 |
| | -17 (within 10 MHz of band edge) | 78.2 |

**TEST PROCEDURE**

1. The EUT was placed on a turn table which is 1.5m above 1GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The distance between test antenna and EUT as following table states:

| Test Frequency range | Test Antenna Type | Test Distance |
|---|---|---|
| 1GHz-18GHz | Double Ridged Horn Antenna | 3 |

6. Setting test receiver/spectrum as following table states:

| Test Frequency range | Test Receiver/Spectrum Setting | Detector |
|---|---|---|
| 1GHz-18GHz | Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto<br>Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto | Peak |

**Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

**FS = RA + AF + CL - AG**

| | |
|---|---|
| Where FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
| RA = Reading Amplitude | AG = Amplifier Gain |
| AF = Antenna Factor | |

**TEST RESULTS**

**For Conducted at Restricted Band Measurement**

| | | | |
|---|---|---|---|
| Temperature | 23.4℃ | Humidity | 54.5% |
| Test Engineer | Evan Ouyang | Configurations | IEEE 802.11a/n/ac/ax |

| 802.11 ac20_MIMO/ Channel 36 :5180 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor (dB) | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
| 4500.0 | 35.16 | 35.58 | 29.04 | 8.28 | 49.98 | 68.20 | -18.22 | Peak | Horizontal |
| 4500.0 | 30.08 | 35.58 | 29.04 | 8.28 | 44.90 | 54.00 | -9.10 | AV | Horizontal |
| 5150.0 | 39.11 | 35.58 | 29.04 | 8.28 | 53.93 | 68.20 | -14.27 | Peak | Horizontal |
| 5150.0 | 30.69 | 35.58 | 29.04 | 8.28 | 45.51 | 54.00 | -8.49 | AV | Horizontal |

| 802.11 ac20_MIMO / Channel 36 :5180 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor (dB) | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
| 4500.0 | 35.27 | 35.42 | 29.06 | 8.39 | 50.02 | 68.20 | -18.18 | Peak | Vertical |
| 4500.0 | 30.19 | 35.42 | 29.06 | 8.39 | 44.94 | 54.00 | -9.06 | AV | Vertical |
| 5150.0 | 39.28 | 35.42 | 29.06 | 8.39 | 54.03 | 68.20 | -14.17 | Peak | Vertical |
| 5150.0 | 30.59 | 35.42 | 29.06 | 8.39 | 45.34 | 54.00 | -8.66 | AV | Vertical |

| 802.11 ac20_MIMO / Channel 48 :5240 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor (dB) | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
| 5350.0 | 30.09 | 35.35 | 29.07 | 8.43 | 44.80 | 68.20 | -23.40 | Peak | Horizontal |
| 5350.0 | 30.17 | 35.35 | 29.07 | 8.43 | 44.88 | 54.00 | -9.12 | AV | Horizontal |
| 5460.0 | 32.23 | 35.35 | 29.07 | 8.43 | 46.94 | 68.20 | -21.26 | Peak | Horizontal |
| 5460.0 | 30.62 | 35.35 | 29.07 | 8.43 | 45.33 | 54.00 | -8.67 | AV | Horizontal |

| 802.11 ac20_MIMO / Channel 48 :5240 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor (dB) | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
| 5350.0 | 30.26 | 35.3 | 29.11 | 8.51 | 44.96 | 68.20 | -23.24 | Peak | Vertical |
| 5350.0 | 30.38 | 35.3 | 29.11 | 8.51 | 45.08 | 54.00 | -8.92 | AV | Vertical |
| 5460.0 | 32.08 | 35.3 | 29.11 | 8.51 | 46.78 | 68.20 | -21.42 | Peak | Vertical |
| 5460.0 | 30.61 | 35.3 | 29.11 | 8.51 | 45.31 | 54.00 | -8.69 | AV | Vertical |

| 802.11 ac20_MIMO / Channel 149 :5745 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor (dB) | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
| 5650.0 | 30.12 | 35.29 | 29.18 | 8.8 | 45.03 | 68.20 | -23.17 | 30.21 | Horizontal |
| 5700.0 | 30.41 | 35.29 | 29.18 | 8.8 | 45.32 | 54.00 | -8.68 | 30.15 | Horizontal |
| 5720.0 | 32.05 | 35.29 | 29.18 | 8.8 | 46.96 | 68.20 | -21.24 | 32.06 | Horizontal |
| 5725.0 | 30.59 | 35.29 | 29.18 | 8.8 | 45.50 | 54.00 | -8.50 | 30.50 | Horizontal |

| 802.11 ac20_MIMO / Channel 149 :5745 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor (dB) | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
| 5650.0 | 46.18 | 33.21 | 35.82 | 9.52 | 53.09 | 68.20 | -15.11 | Peak | Vertical |
| 5700.0 | 35.44 | 33.21 | 35.82 | 9.52 | 42.35 | 68.20 | -25.85 | Peak | Vertical |
| 5720.0 | 47.39 | 32.82 | 35.82 | 9.52 | 53.91 | 68.20 | -14.29 | Peak | Vertical |
| 5725.0 | 35.56 | 32.82 | 35.82 | 9.52 | 42.08 | 68.20 | -26.12 | Peak | Vertical |

| 802.11 ac20_MIMO / Channel 165 :5825 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor (dB) | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
| 5850.0 | 45.17 | 33.21 | 35.82 | 9.52 | 52.08 | 68.20 | -16.12 | Peak | Horizontal |
| 5855.0 | 34.45 | 33.21 | 35.82 | 9.52 | 41.36 | 54.00 | -12.64 | Peak | Horizontal |
| 5875.0 | 46.43 | 32.82 | 35.82 | 9.52 | 52.95 | 68.20 | -15.25 | Peak | Horizontal |
| 5925.0 | 35.04 | 32.82 | 35.82 | 9.52 | 41.56 | 54.00 | -12.44 | Peak | Horizontal |

| 802.11 ac20_MIMO / Channel 165 :5825 MHz | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Freq (MHz) | Read Level (dBµV) | Antenna Factor (dB/m) | PRM Factor (dB) | Cable Loss (dB) | Result Level (dBµV/m) | Limit Line (dBµV/m) | Margin (dB) | Detector | Polarization |
| 5850.0 | 45.62 | 33.21 | 35.82 | 9.52 | 52.53 | 68.20 | -15.67 | Peak | Vertical |
| 5855.0 | 35.05 | 33.21 | 35.82 | 9.52 | 41.96 | 54.00 | -12.04 | Peak | Vertical |
| 5875.0 | 47.14 | 32.82 | 35.82 | 9.52 | 53.66 | 68.20 | -14.54 | Peak | Vertical |
| 5925.0 | 35.64 | 32.82 | 35.82 | 9.52 | 42.16 | 54.00 | -11.84 | Peak | Vertical |

REMARKS:
1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. Margin value = Result Level-Limit value.
2. The other emission levels were very low against the limit.
3. The average measurement was not performed when the peak measured data under the limit of average detection.
4. Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=10Hz/Sweep time=Auto/Detector=Peak;

**NOTE: All the modes have been tested and recorded worst mode in the report(MIMO).**

**For Conducted Band edge Measurement**

For reporting purpose only.

**Antenna 1:**
Please refer to Appendix D-ANT 1-Appendix D.6.

Please refer to Appendix D-ANT 1-Appendix E.6.

**Antenna 2:**
Please refer to Appendix D-ANT 2-Appendix D.6.

Please refer to Appendix D-ANT 2-Appendix E.6.

**For Conducted Spurious Emissions Measurement**

For reporting purpose only.

**Antenna 1:**
Please refer to Appendix D-ANT 1-Appendix D.7.

Please refer to Appendix D-ANT 1-Appendix E.7.

**Antenna 2:**
Please refer to Appendix D-ANT 2-Appendix D.7.

Please refer to Appendix D-ANT 2-Appendix E.7.

## 4.9. Frequency Stability

**Standard Applicable**

According to FCC §15.407(g) “Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user manual.”

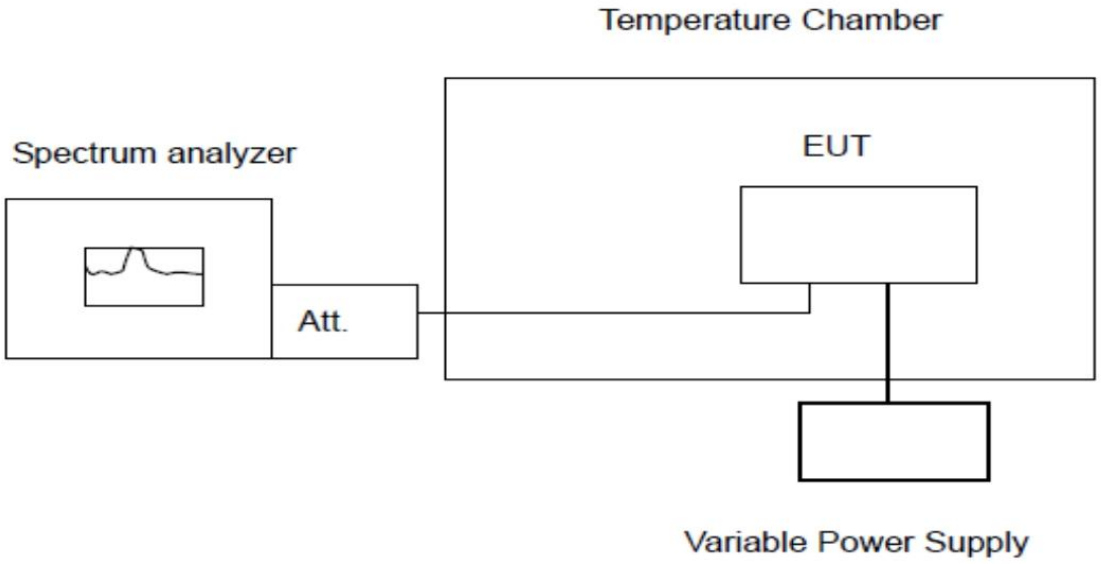
According to FCC §2.1055(a) “The frequency stability shall be measured with variation of ambient temperature as follows:”

(1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(2) From -20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

(3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

### Test Configuration




### Test Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum anzlyer via feed through attenators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low engouh to obtain the desired frequency resoluation and measure EUT 20 degree operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30 degree. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure wuth 10 degree increased per stage until the highest temperature of +50 degree reached.

## Test Results

PASS

Remark:

1. Measured all conditions and recorded worst case.(ANT 1)

IEEE 802.11a Mode / 5180 – 5240 MHz / 5180 MHz

| Enviroment Temperature (Dregree) | Voltage (V) | Measured Frequency (MHz) | Limit Range (MHz) | Test Results |
|---|---|---|---|---|
| 20 | AC 132V | 5171.577700 | 5150 – 5250 | PASS |
| 20 | AC 108V | 5171.695461 | 5150 – 5250 | PASS |
| 50 | AC 120V | 5171.601359 | 5150 – 5250 | PASS |
| 40 | AC 120V | 5171.602918 | 5150 – 5250 | PASS |
| 30 | AC 120V | 5171.683777 | 5150 – 5250 | PASS |
| 20 | AC 120V | 5171.540250 | 5150 – 5250 | PASS |
| 10 | AC 120V | 5171.547889 | 5150 – 5250 | PASS |
| 0 | AC 120V | 5171.675546 | 5150 – 5250 | PASS |
| -10 | AC 120V | 5171.635061 | 5150 – 5250 | PASS |
| -20 | AC 120V | 5171.695723 | 5150 – 5250 | PASS |
| -30 | AC 120V | 5171.546607 | 5150 – 5250 | PASS |

IEEE 802.11a Mode / 5180 – 5240 MHz / 5240 MHz

| Enviroment Temperature (Dregree) | Voltage (V) | Measured Frequency (MHz) | Limit Range (MHz) | Test Results |
|---|---|---|---|---|
| 20 | AC 132V | 5248.667826 | 5150 – 5250 | PASS |
| 20 | AC 108V | 5248.508713 | 5150 – 5250 | PASS |
| 50 | AC 120V | 5248.581825 | 5150 – 5250 | PASS |
| 40 | AC 120V | 5248.569549 | 5150 – 5250 | PASS |
| 30 | AC 120V | 5248.695855 | 5150 – 5250 | PASS |
| 20 | AC 120V | 5248.636549 | 5150 – 5250 | PASS |
| 10 | AC 120V | 5248.692505 | 5150 – 5250 | PASS |
| 0 | AC 120V | 5248.695401 | 5150 – 5250 | PASS |
| -10 | AC 120V | 5248.675844 | 5150 – 5250 | PASS |
| -20 | AC 120V | 5248.512862 | 5150 – 5250 | PASS |
| -30 | AC 120V | 5248.617708 | 5150 – 5250 | PASS |

IEEE 802.11a Mode / 5745 – 5825 MHz / 5745 MHz

| Enviroment Temperature (Dregree) | Voltage (V) | Measured Frequency (MHz) | Limit Range (MHz) | Test Results |
|---|---|---|---|---|
| 20 | AC 132V | 5736.624603 | 5725 – 5850 | PASS |
| 20 | AC 108V | 5736.510553 | 5725 – 5850 | PASS |
| 50 | AC 120V | 5736.535212 | 5725 – 5850 | PASS |
| 40 | AC 120V | 5736.675481 | 5725 – 5850 | PASS |
| 30 | AC 120V | 5736.676593 | 5725 – 5850 | PASS |
| 20 | AC 120V | 5736.671573 | 5725 – 5850 | PASS |
| 10 | AC 120V | 5736.560866 | 5725 – 5850 | PASS |
| 0 | AC 120V | 5736.673405 | 5725 – 5850 | PASS |
| -10 | AC 120V | 5736.578895 | 5725 – 5850 | PASS |
| -20 | AC 120V | 5736.691382 | 5725 – 5850 | PASS |
| -30 | AC 120V | 5736.531250 | 5725 – 5850 | PASS |

IEEE 802.11a Mode / 5745 – 5825 MHz / 5825 MHz

| Enviroment Temperature (Dregree) | Voltage (V) | Measured Frequency (MHz) | Limit Range (MHz) | Test Results |
|---|---|---|---|---|
| 20 | AC 132V | 5833.698700 | 5725 – 5850 | PASS |
| 20 | AC 108V | 5833.619319 | 5725 – 5850 | PASS |
| 50 | AC 120V | 5833.575974 | 5725 – 5850 | PASS |
| 40 | AC 120V | 5833.662371 | 5725 – 5850 | PASS |
| 30 | AC 120V | 5833.503012 | 5725 – 5850 | PASS |
| 20 | AC 120V | 5833.510207 | 5725 – 5850 | PASS |
| 10 | AC 120V | 5833.515055 | 5725 – 5850 | PASS |
| 0 | AC 120V | 5833.664430 | 5725 – 5850 | PASS |
| -10 | AC 120V | 5833.624332 | 5725 – 5850 | PASS |
| -20 | AC 120V | 5833.619267 | 5725 – 5850 | PASS |
| -30 | AC 120V | 5833.677404 | 5725 – 5850 | PASS |

## 4.10. Antenna Requirement

**Standard Applicable**

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

**Antenna Information**

The antenna used for this product is External Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 2.00dBi.

Reference to the **GTS20250918006-1-01**.

# 5. TEST SETUP PHOTOS OF THE EUT

Reference to the test report No. **GTS20250918006-1-01.**

# 6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Reference to the test report No. **GTS20250918006-1-01.**

**.....End of Report.....**