# FCC TEST REPORT

## FCC ID:2A2RJ-CP5

| | | |
|---|---|---|
| **Report No.** | : | SSP24100250-2E |
| **Applicant** | : | Shenzhen ZO Video Technology Co., Ltd. |
| **Product Name** | : | Snambol |
| **Model Name** | : | CP5 |
| **Test Standard** | : | FCC Part 15 Subpart E |
| **Date of Issue** | : | 2024-11-18 |

**Shenzhen CCUT Quality Technology Co., Ltd.**
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This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen CCUT Quality Technology Co., Ltd.

## Test Report Basic Information

| | |
|---|---|
| **Applicant**.....: | Shenzhen ZO Video Technology Co., Ltd. |
| Address of Applicant.....: | 2C, 2/F, Building 6, Longbi Industrial Zone, 27 Dafa Road, Longgang District, Shenzhen, Guangdong, China 518129 |
| **Manufacturer**.....: | Shenzhen ZO Video Technology Co., Ltd. |
| Address of Manufacturer.....: | 2C, 2/F, Building 6, Longbi Industrial Zone, 27 Dafa Road, Longgang District, Shenzhen, Guangdong, China 518129 |
| **Product Name**.....: | Snambol |
| **Brand Name**.....: | SHIMBOL |
| **Main Model**.....: | CP5 |
| **Series Models**.....: | CP5 Lite, CP5 Mini, CP5 II, CP5 III, CP5 MAX, CP5 MAX PRO |
| **Test Standard**.....: | FCC Part 15 Subpart E<br>KDB 789033 D02 v02r01<br>ANSI C63.4-2014<br>ANSI C63.10-2013 |
| **Date of Test** .....: | 2024-10-29 to 2024-11-16 |
| **Test Result**.....: | Passed |
| **Tested By** .....: | Lorzix Luo (Lorzix Luo) |
| **Reviewed By**.....: | Lieber Ouyang (Lieber Ouyang) |
| **Authorized Signatory**.....: | Lahm Peng (Lahm Peng) |

Shenzhen CCUT Quality Technology Co., Ltd. APPROVED

Note : This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen CCUT Quality Technology Co., Ltd.. All test data presented in this test report is only applicable to presented test sample.

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# Revision History

| Revision | Issue Date | Description | Revised By |
|---|---|---|---|
| V1.0 | 2024-11-18 | Initial Release | Lahm Peng |
| | | | |
| | | | |
| | | | |
| | | | |

# 1. General Information

## 1.1 Product Information

| | |
|---|---|
| Product Name: | Snambol |
| Trade Name: | SHIMBOL |
| Main Model: | CP5 |
| Series Models: | CP5 Lite, CP5 Mini, CP5 II, CP5 III, CP5 MAX, CP5 MAX PRO |
| Rated Voltage: | DC 3.7V by battery, USB 5V charging |
| Battery: | DC 3.7V/2000mAh |
| Test Sample No: | SSP24100250-1 |
| Hardware Version: | V1.3 |
| Software Version: | V1.0 |
| Note 1: The test data is gathered from a production sample, provided by the manufacturer.<br>Note 2: The color of appearance and model name of series models listed are different from the main model, but the circuit and the electronic construction are the same, declared by the manufacturer. | |

| **Wireless Specification** | |
|---|---|
| Wireless Standard: | 802.11a(HT20)<br>802.11n(HT20/HT40)<br>802.11ac(VHT20/VHT40/VHT80) |
| Operating Frequency: | 802.11a/n/ac(HT/VHT20):<br>U-NII Band 1: 5180MHz to 5240MHz<br>U-NII Band 4: 5745MHz to 5825MHz<br>802.11n/ac(HT/VHT40):<br>U-NII Band 1: 5190MHz to 5230MHz<br>U-NII Band 4: 5755MHz to 5795MHz<br>802.11ac(VHT80):<br>U-NII Band 1: 5210MHz<br>U-NII Band 4: 5775MHz |
| Number of Channel: | 802.11a/n/ac(HT/VHT20): 4 for Band 1, 5 for Band 4<br>802.11n/ac(HT/VHT40): 2 for Band 1, 2 for Band 4<br>802.11ac(VHT80): 1 for Band 1, 1 for Band 4 |
| Modulation: | OFDM(BPSK, QPSK, BPSK, 16QAM, 64QAM, 256QAM) |
| Antenna Gain: | 2.5dBi |
| Type of Antenna: | Integral Antenna |
| Type of Device: | ☒ Portable Device ☐ Mobile Device ☐ Modular Device |

| Channel List for UNII Band 1 (5150-5250MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 802.11a/n/ac/(20MHz) | | | | 802.11n/ac(40MHz) | | 802.11ac(80MHz) | |
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 36 | 5180 | 44 | 5220 | 38 | 5190 | 42 | 5210 |
| 40 | 5200 | 48 | 5240 | 46 | 5230 | -- | -- |

| Channel List for UNII Band 4 (5725-5850MHz) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 802.11a/n/ac(20MHz) | | 802.11n/ac(40MHz) | | 802.11ac(80MHz) | | (160MHz) | |
| Channel | Frequency (MHz) | 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 | -- | -- | -- | -- | -- | -- |

## 1.2 Test Setup Information

| List of Test Modes | | |
|---|---|---|
| Test Mode | Description | Remark |
| TM1 | UNII Band 1_802.11a(HT20) | 5180MHz/5200MHz/5240MHz |
| TM2 | UNII Band 1_802.11n(HT20) | 5180MHz/5200MHz/5240MHz |
| TM3 | UNII Band 1_802.11n(HT40) | 5190MHz/5230MHz |
| TM4 | UNII Band 1_802.11ac(VHT20) | 5180MHz/5200MHz/5240MHz |
| TM5 | UNII Band 1_802.11ac(VHT40) | 5190MHz/5230MHz |
| TM6 | UNII Band 1_802.11ac(VHT80) | 5210MHz |
| TM7 | UNII Band 4_802.11a(HT20) | 5745MHz/5785MHz/5825MHz |
| TM8 | UNII Band 4_802.11n(HT20) | 5745MHz/5785MHz/5825MHz |
| TM9 | UNII Band 4_802.11n(HT40) | 5755MHz/5795MHz |
| TM10 | UNII Band 4_802.11ac(VHT20) | 5745MHz/5785MHz/5825MHz |
| TM11 | UNII Band 4_802.11ac(VHT40) | 5755MHz/5795MHz |
| TM12 | UNII Band 4_802.11ac(VHT80) | 5775MHz |

| List and Details of Auxiliary Cable | | | |
|---|---|---|---|
| Description | Length (cm) | Shielded/Unshielded | With/Without Ferrite |
| - | - | - | - |
| - | - | - | - |

| List and Details of Auxiliary Equipment | | | |
|---|---|---|---|
| Description | Manufacturer | Model | Serial Number |
| - | - | - | - |
| - | - | - | - |

## 1.3 Compliance Standards

| Compliance Standards | |
|---|---|
| FCC Part 15 Subpart E | FEDERAL COMMUNICATIONS COMMISSION, RADIO FREQUENCY DEVICES, Unlicensed National Information Infrastructure Devices |
| All measurements contained in this report were conducted with all above standards | |
| According to standards for test methodology | |
| FCC Part 15 Subpart E | FEDERAL COMMUNICATIONS COMMISSION, RADIO FREQUENCY DEVICES, Unlicensed National Information Infrastructure Devices |
| KDB 789033 D02 v02r01 | GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E |
| ANSI C63.4-2014 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. |
| ANSI C63.10-2013 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| Maintenance of compliance is the responsibility of the manufacturer or applicant. Any modification of the product, which result is lowering the emission, should be checked to ensure compliance has been maintained. | |

## 1.4 Test Facilities

| | |
|---|---|
| Laboratory Name: | **Shenzhen CCUT Quality Technology Co., Ltd.**<br>1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China |
| CNAS Laboratory No.: | L18863 |
| A2LA Certificate No.: | 6893.01 |
| FCC Registration No: | 583813 |
| ISED Registration No.: | CN0164 |
| All measurement facilities used to collect the measurement data are located at 1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China. | |

## 1.5 List of Measurement Instruments

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|---|---|---|---|---|---|
| **Conducted Emissions** | | | | | |
| AMN | ROHDE&SCHWARZ | ENV216 | 101097 | 2024-08-07 | 2025-08-06 |
| EMI Test Receiver | ROHDE&SCHWARZ | ESPI | 100242 | 2024-08-07 | 2025-08-06 |
| Test Cable | N/A | Cable 5 | N/A | 2024-08-07 | 2025-08-06 |
| EMI Test Software | FARA | EZ-EMC | EMEC-3A1+ | N/A | N/A |
| **Radiated Emissions** | | | | | |
| EMI Test Receiver | ROHDE&SCHWARZ | ESPI | 100154 | 2024-08-07 | 2025-08-06 |
| Spectrum Analyzer | KEYSIGHT | N9020A | MY48030972 | 2024-08-07 | 2025-08-06 |
| Spectrum Analyzer | ROHDE&SCHWARZ | FSV40-N | 101692 | 2024-08-07 | 2025-08-06 |
| Amplifier | SCHWARZBECK | BBV 9743B | 00251 | 2024-08-07 | 2025-08-06 |
| Amplifier | HUABO | YXL0518-2.5-45 | -- | 2024-08-07 | 2025-08-06 |
| Amplifier | COM-MW | DLAN-18G-4G-02 | 10229104 | 2024-08-07 | 2025-08-06 |
| Loop Antenna | DAZE | ZN30900C | 21104 | 2024-08-03 | 2025-08-02 |
| Broadband Antenna | SCHWARZBECK | VULB 9168 | 01320 | 2024-08-03 | 2025-08-02 |
| Horn Antenna | SCHWARZBECK | BBHA 9120D | 02553 | 2024-08-03 | 2025-08-02 |
| Horn Antenna | COM-MW | ZLB7-18-40G-950 | 12221225 | 2024-08-03 | 2025-08-02 |
| Attenuator | QUANJUDA | 6dB | 220731 | 2024-08-07 | 2025-08-06 |
| Test Cable | N/A | Cable 1 | N/A | 2024-08-07 | 2025-08-06 |
| Test Cable | N/A | Cable 2 | N/A | 2024-08-07 | 2025-08-06 |
| Test Cable | N/A | Cable 3 | N/A | 2024-08-07 | 2025-08-06 |
| Test Cable | N/A | Cable 4 | N/A | 2024-08-07 | 2025-08-06 |
| Test Cable | N/A | Cable 8 | N/A | 2024-08-07 | 2025-08-06 |
| Test Cable | N/A | Cable 9 | N/A | 2024-08-07 | 2025-08-06 |
| EMI Test Software | FARA | EZ-EMC | FA-03A2 RE+ | N/A | N/A |
| **Conducted RF Testing** | | | | | |
| RF Test System | MWRFTest | MW100-RFCB | 220418SQS-37 | 2024-08-07 | 2025-08-06 |
| Spectrum Analyzer | KEYSIGHT | N9020A | ATO-90521 | 2024-08-07 | 2025-08-06 |
| RF Test Software | MWRFTest | MTS 8310 | N/A | N/A | N/A |
| Laptop | Lenovo | ThlnkPad E15 Gen 3 | SPPOZ22485 | N/A | N/A |

## 1.6 Measurement Uncertainty

| Test Item | Conditions | Uncertainty |
|---|---|---|
| Conducted Emissions | 9kHz ~ 30MHz | ±1.64 dB |
| Radiated Emissions | 9kHz ~ 30MHz | ±2.88 dB |
| | 30MHz ~ 1GHz | ±3.32 dB |
| | 1GHz ~ 18GHz | ±3.50 dB |
| | 18GHz ~ 40GHz | ±3.66 dB |
| Conducted Output Power | 9kHz ~ 26GHz | ±0.50 dB |
| Occupied Bandwidth | 9kHz ~ 26GHz | ±4.0 % |
| Conducted Spurious Emission | 9kHz ~ 26GHz | ±1.32 dB |
| Power Spectrum Density | 9kHz ~ 26GHz | ±0.62 dB |

# 2. Summary of Test Results

| FCC Rule | Description of Test Item | Result |
|---|---|---|
| FCC Part 15.203 | Antenna Requirement | Passed |
| FCC Part 15.247(f) | RF Exposure(see the RF exposure report) | Passed |
| FCC Part 15.207, 15.407(b)(9) | Conducted Emissions | Passed |
| FCC Part 15.209, 15.407(b)(9), (10) | Radiated Emissions | Passed |
| FCC Part 15.407(b)(10) | Band-edge Emissions(Radiated) | Passed |
| FCC Part 15.407(a)(1), (2), (3) | Maximum Peak Conducted Output Power | Passed |
| FCC Part 15.407(a)(2), (e) | Occupied Bandwidth | Passed |
| FCC Part 15.407(a)(1), (2), (3) | Maximum Power Spectral Density | Passed |
| FCC Part 15.407 (g) | Frequency Stability | Passed |
| FCC Part 15.407 (h) | Transmit Power Control (TPC) | N/A |
| FCC Part 15.407 (h) | Dynamic Frequency Selection (DFS) | N/A |
| Passed: The EUT complies with the essential requirements in the standard<br>Failed: The EUT does not comply with the essential requirements in the standard<br>N/A: Not applicable | | |

# 3. Antenna Requirement

## 3.1 Standard and Limit

According to FCC Part 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

## 3.2 Test Result

This product has an Integral antenna, and the maximum antenna gain is 2.5dBi, fulfill the requirement of this section.

# 4. Conducted Emissions

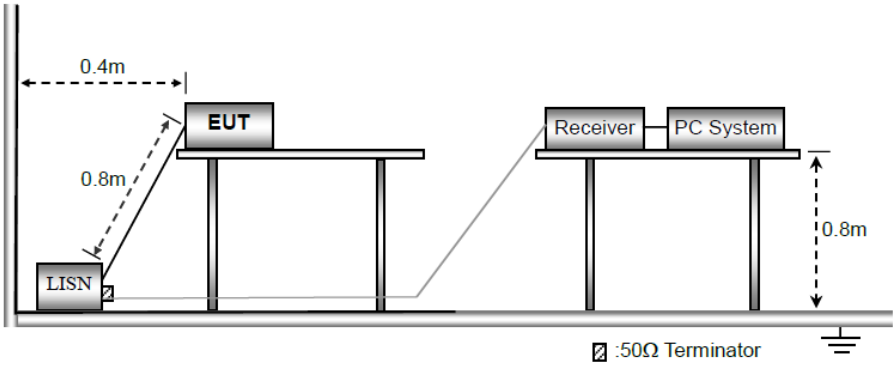
## 4.1 Standard and Limit

According to the rule FCC Part 15.207, Conducted emissions limit, the limit for a wireless device as below:

| Frequency of Emission (MHz) | Conducted emissions (dBuV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 | 56 to 46 |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |
| Note 1: Decreases with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz<br>Note 2: The lower limit applies at the band edges | | |

## 4.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.2.




Test Setup Block Diagram

a) The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

b) The following is the setting of the receiver
Attenuation: 10dB
Start Frequency: 0.15MHz
Stop Frequency: 30MHz
IF Bandwidth: 9kHz

c) The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

d) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
e) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

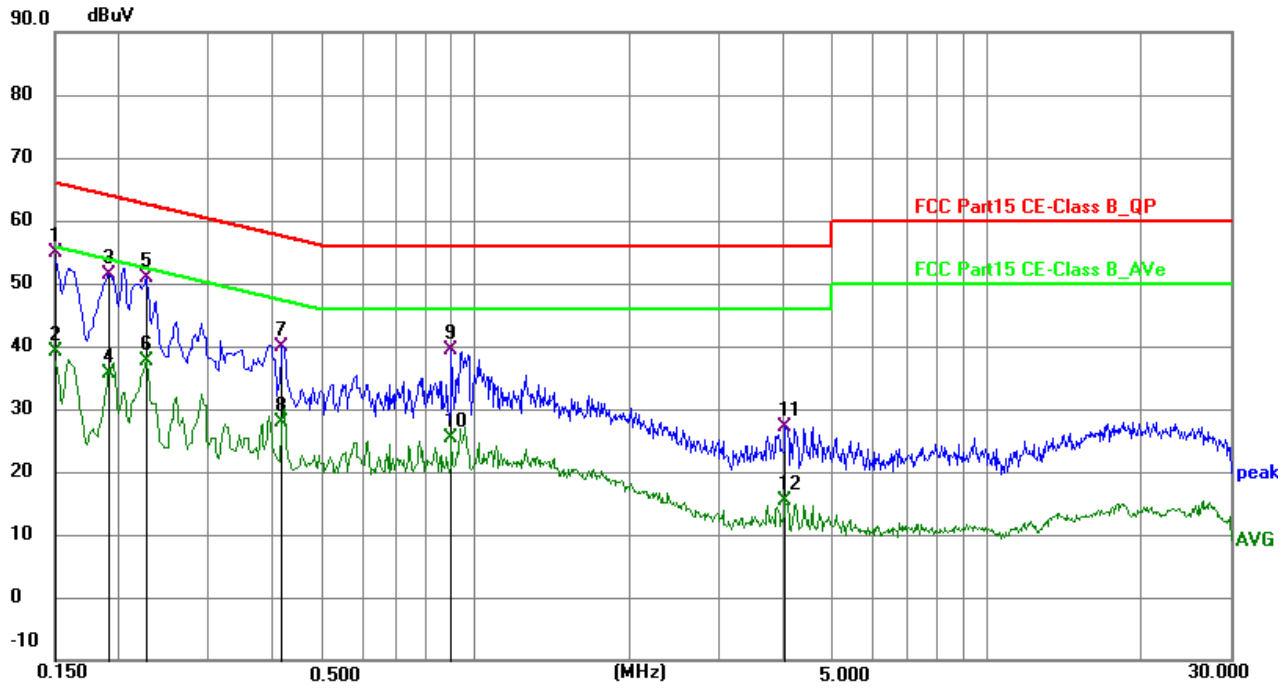
f) LISN is at least 80 cm from nearest part of EUT chassis.

g) For the actual test configuration, please refer to the related Item - photographs of the test setup.

## 4.3 Test Data and Results

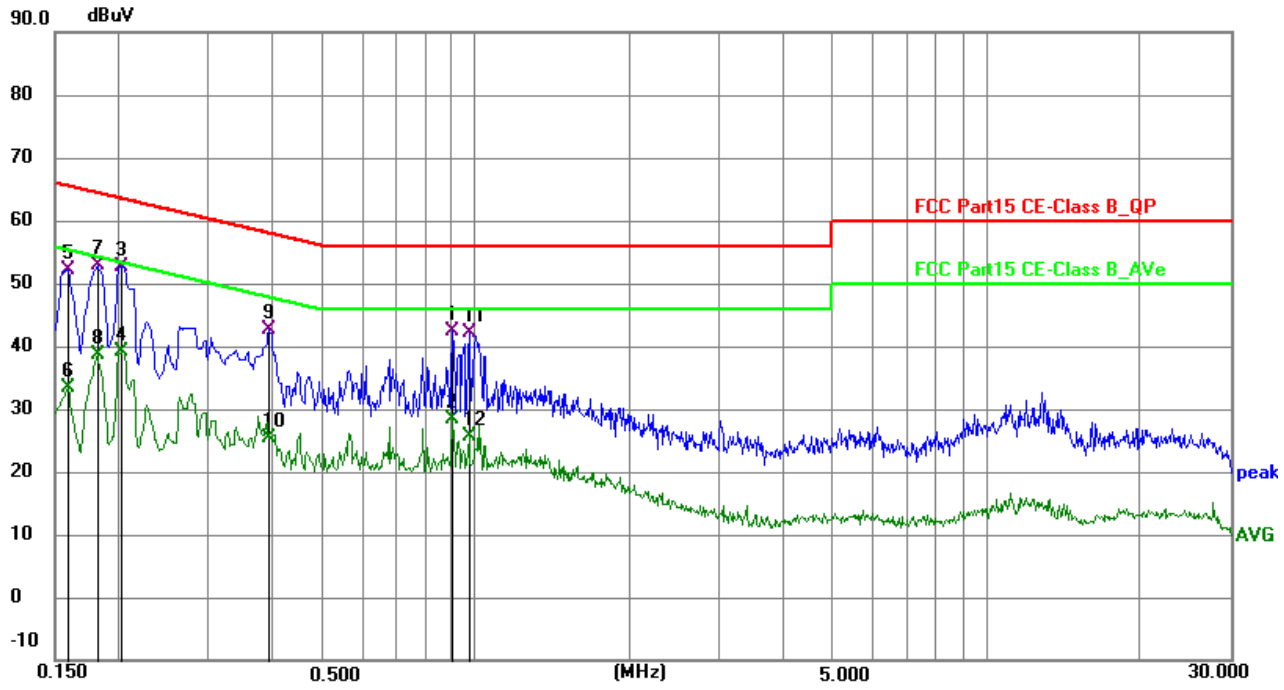
Both band1 and band4 all of the 802.11a, 802.11n and 802.11ac modes have been tested, the EUT complied with the FCC Part 15.207 standard limit for a wireless device, and with the worst case 802.11a_5180MHz as below:
Remark: Level = Reading + Factor, Margin = Level - Limit

| Test Plots and Data of Conducted Emissions | |
|---|---|
| Tested Mode: | TM1 |
| Test Voltage: | AC 120V/60Hz |
| Test Power Line: | Neutral |
| Remark: | |




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 * | 0.1500 | 45.68 | 9.25 | 54.93 | 66.00 | -11.07 | QP | P | |
| 2 | 0.1500 | 29.87 | 9.25 | 39.12 | 56.00 | -16.88 | AVG | P | |
| 3 | 0.1905 | 42.26 | 9.21 | 51.47 | 64.01 | -12.54 | QP | P | |
| 4 | 0.1905 | 26.47 | 9.21 | 35.68 | 54.01 | -18.33 | AVG | P | |
| 5 | 0.2265 | 41.57 | 9.25 | 50.82 | 62.58 | -11.76 | QP | P | |
| 6 | 0.2265 | 28.30 | 9.25 | 37.55 | 52.58 | -15.03 | AVG | P | |
| 7 | 0.4154 | 30.61 | 9.38 | 39.99 | 57.54 | -17.55 | QP | P | |
| 8 | 0.4154 | 18.45 | 9.38 | 27.83 | 47.54 | -19.71 | AVG | P | |
| 9 | 0.8970 | 29.93 | 9.37 | 39.30 | 56.00 | -16.70 | QP | P | |
| 10 | 0.8970 | 15.97 | 9.37 | 25.34 | 46.00 | -20.66 | AVG | P | |
| 11 | 4.0425 | 17.70 | 9.54 | 27.24 | 56.00 | -28.76 | QP | P | |
| 12 | 4.0425 | 5.79 | 9.54 | 15.33 | 46.00 | -30.67 | AVG | P | |

| Test Plots and Data of Conducted Emissions | |
|---|---|
| Tested Mode: | TM1 |
| Test Voltage: | AC 120V/60Hz |
| Test Power Line: | Live |
| Remark: | |




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9015 | 32.80 | 9.56 | 42.36 | 56.00 | -13.64 | QP | P | |
| 2 | 0.9015 | 18.87 | 9.56 | 28.43 | 46.00 | -17.57 | AVG | P | |
| 3 * | 0.2029 | 43.23 | 9.40 | 52.63 | 63.49 | -10.86 | QP | P | |
| 4 | 0.2029 | 29.67 | 9.40 | 39.07 | 53.49 | -14.42 | AVG | P | |
| 5 | 0.1590 | 42.82 | 9.41 | 52.23 | 65.52 | -13.29 | QP | P | |
| 6 | 0.1590 | 23.92 | 9.41 | 33.33 | 55.52 | -22.19 | AVG | P | |
| 7 | 0.1815 | 43.36 | 9.40 | 52.76 | 64.42 | -11.66 | QP | P | |
| 8 | 0.1815 | 29.32 | 9.40 | 38.72 | 54.42 | -15.70 | AVG | P | |
| 9 | 0.3930 | 32.97 | 9.57 | 42.54 | 58.00 | -15.46 | QP | P | |
| 10 | 0.3930 | 15.89 | 9.57 | 25.46 | 48.00 | -22.54 | AVG | P | |
| 11 | 0.9735 | 32.56 | 9.60 | 42.16 | 56.00 | -13.84 | QP | P | |
| 12 | 0.9735 | 15.92 | 9.60 | 25.52 | 46.00 | -20.48 | AVG | P | |

# 5. Radiated Emissions(Below 1GHz)

## 5.1 Standard and Limit

According to FCC Part 15.407(b)(9), Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in FCC Part 15.209.

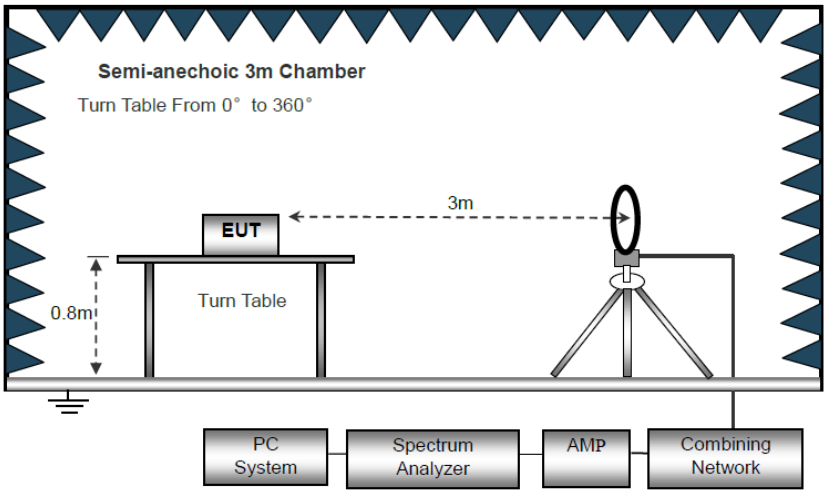
According to the rule FCC Part 15.209, Radiated emission limit for a wireless device as below:

| Frequency of Emission (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |
| Note: The more stringent limit applies at transition frequencies. | | |

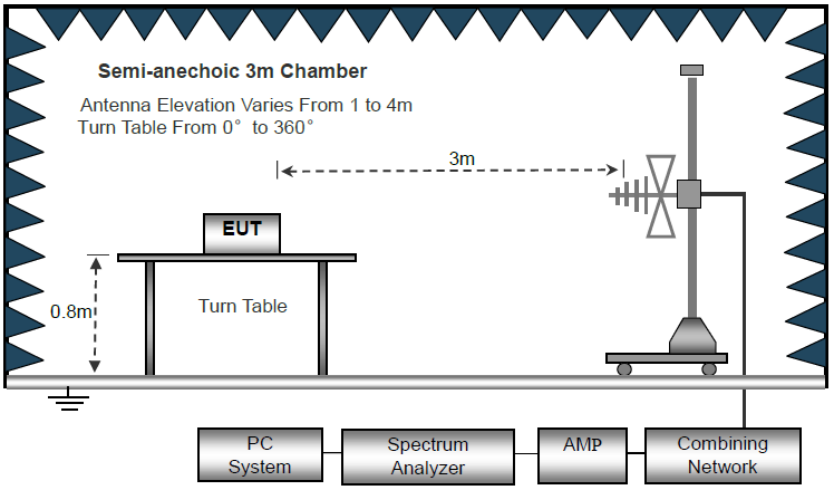
*Note: Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.*

## 5.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6.




Block Diagram of Radiated Emission Below 30MHz




Block Diagram of Radiated Emission From 30MHz to 1GHz

a) The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range blew 1GHz.

b) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

c) Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 100 kHz

VBW ≥ RBW, Sweep = auto

Detector function = peak

Trace = max hold

d) Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

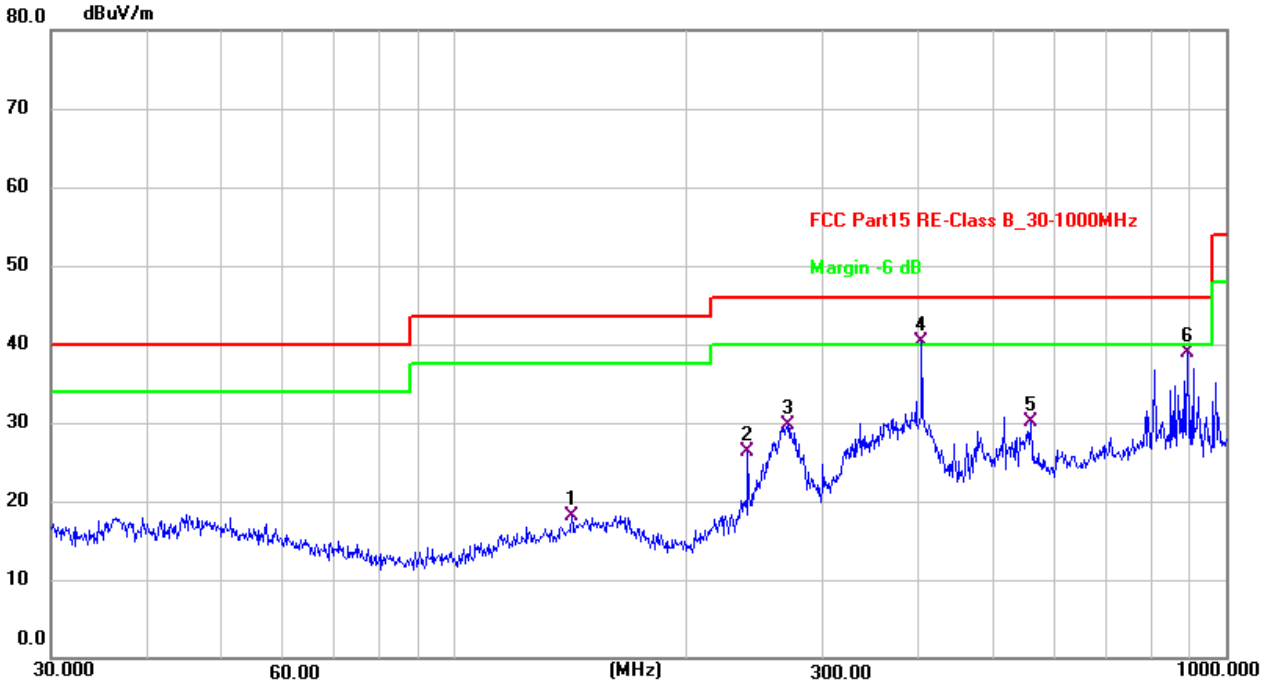
e) For the actual test configuration, please refer to the related item - EUT test photos.

## 5.3 Test Data and Results

Both band1 and band4 all of the 802.11a, 802.11n and 802.11ac modes have been tested, the EUT complied with the FCC Part 15.209 standard limit for a wireless device, and with the worst case 802.11a_5180MHz as below:

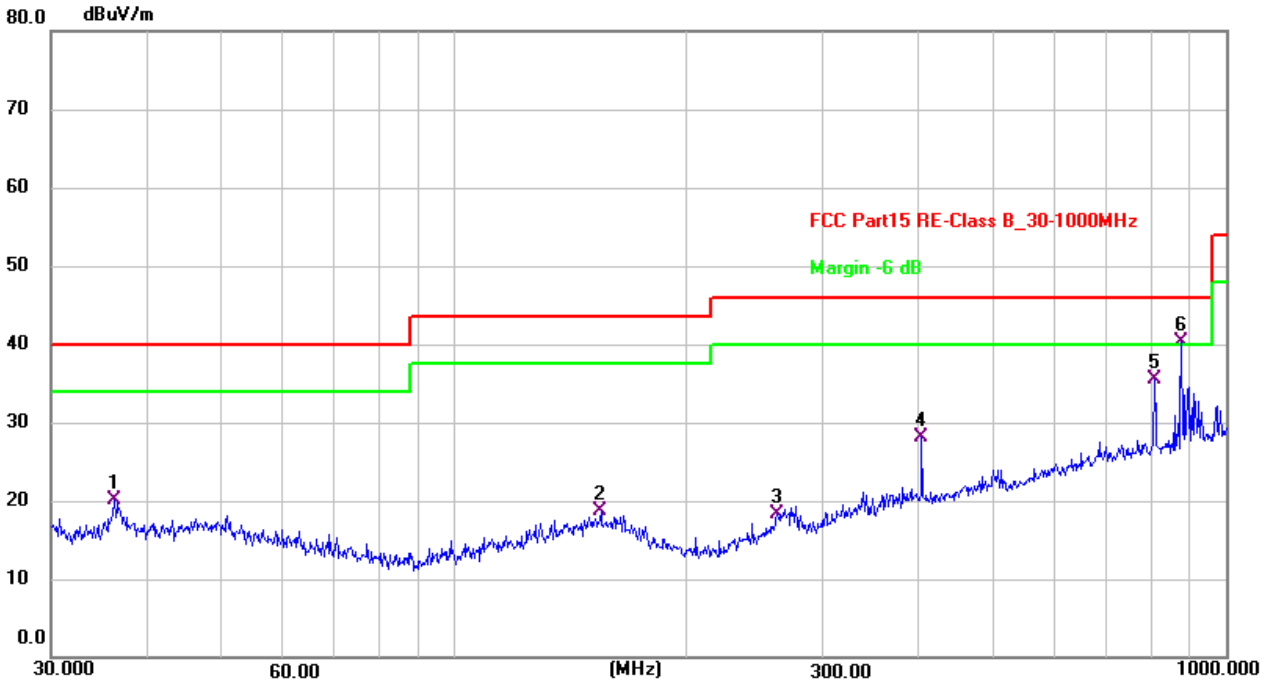
Remark: Level = Reading + Factor, Margin = Level - Limit

| Radiated Emission Test Data (30MHz to 1GHz) | |
|---|---|
| Tested Mode: | TM1 |
| Test Voltage: | DC 3.7V from battery |
| Test Antenna Polarization: | Horizontal |
| Remark: | |




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 141.8262 | 26.19 | -8.12 | 18.07 | 43.50 | -25.43 | QP | 100 | 186 | P | |
| 2 | 239.9873 | 36.80 | -10.44 | 26.36 | 46.00 | -19.64 | QP | 100 | 0 | P | |
| 3 | 270.3748 | 39.05 | -9.31 | 29.74 | 46.00 | -16.26 | QP | 100 | 15 | P | |
| 4 * | 403.2500 | 45.86 | -5.51 | 40.35 | 46.00 | -5.65 | QP | 100 | 3 | P | |
| 5 | 558.7301 | 32.73 | -2.57 | 30.16 | 46.00 | -15.84 | QP | 100 | 177 | P | |
| 6 | 890.7277 | 36.48 | 2.44 | 38.92 | 46.00 | -7.08 | QP | 100 | 156 | P | |

| Radiated Emission Test Data (30MHz to 1GHz) | |
|---|---|
| Tested Mode: | TM1 |
| Test Voltage: | DC 3.7V from battery |
| Test Antenna Polarization: | Vertical |
| Remark: | |




| No. | Frequency (MHz) | Reading (dBuV) | Factor (dB/m) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 36.2541 | 28.92 | -8.90 | 20.02 | 40.00 | -19.98 | QP | 100 | 349 | P | |
| 2 | 154.8204 | 26.53 | -7.80 | 18.73 | 43.50 | -24.77 | QP | 100 | 74 | P | |
| 3 | 261.9753 | 27.92 | -9.54 | 18.38 | 46.00 | -27.62 | QP | 100 | 278 | P | |
| 4 | 403.2500 | 33.54 | -5.51 | 28.03 | 46.00 | -17.97 | QP | 100 | 288 | P | |
| 5 | 807.4291 | 33.98 | 1.52 | 35.50 | 46.00 | -10.50 | QP | 100 | 1 | P | |
| 6 * | 875.2470 | 38.15 | 2.10 | 40.25 | 46.00 | -5.75 | QP | 100 | 237 | P | |

*Note 1: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

*Note 2: Testing is carried out with frequency rang 9kHz to 1GHz. The measurements greater than 20dB below the limit from 9kHz to 30MHz.*

# 6. Spurious Emissions(Above 1GHz)

## 6.1 Standard and Limit

According to FCC Part 15.407(b), Undesirable emission limits. 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:

(1) For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

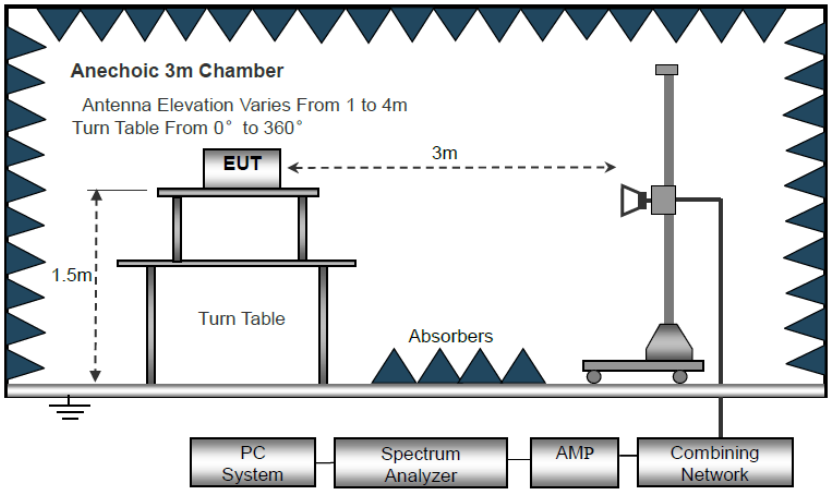
(4) For transmitters operating solely in the 5.725–5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(5) The provisions of § 15.205 apply to intentional radiators operating under this section.

(6) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

## 6.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6.




Block Diagram of Radiated Emission Above 1GHz

a) The EUT is placed on a turntable, which is 1.5m above ground plane for test frequency range above 1GHz.

b) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

c) Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1GHz
VBW ≥ RBW, Sweep = auto
Detector function = peak
Trace = max hold

d) Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

e) For the actual test configuration, please refer to the related item - EUT test photos.

## 6.3 Test Data and Results

Both band1 and band4 all of the 802.11a, 802.11n and 802.11ac modes have been tested, the EUT complied with the FCC Part 15.407 standard limit, and with the worst case 802.11a_HT20, 802.11n_HT20 and 802.11ac_HT20 as below:
Remark: Level = Reading + Factor, Margin = Level - Limit

UNII Band 1

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 802.11a_20MHz_Lowest Channel (5180MHz) | | | | | | | |
| 10360 | 60.91 | -6.22 | 54.69 | 68.2 | -13.51 | H | Peak |
| 15540 | 56.29 | -5.4 | 50.89 | 74 | -23.11 | H | Peak |
| 10360 | 59.97 | -6.22 | 53.75 | 68.2 | -14.45 | V | Peak |
| 15540 | 54.06 | -5.4 | 48.66 | 74 | -25.34 | V | Peak |
| 802.11a_20MHz_Highest Channel (5240MHz) | | | | | | | |
| 10480 | 63.32 | -5.99 | 57.33 | 68.2 | -10.87 | H | Peak |
| 15720 | 55.1 | -5.53 | 49.57 | 74 | -24.43 | H | Peak |
| 10480 | 59.73 | -5.99 | 53.74 | 68.2 | -14.46 | V | Peak |
| 15720 | 55.51 | -5.53 | 49.98 | 74 | -24.02 | V | Peak |
| 802.11n_20MHz_Lowest Channel (5180MHz) | | | | | | | |
| 10360 | 60.64 | -6.22 | 54.42 | 68.2 | -13.78 | H | Peak |
| 15540 | 52.84 | -5.4 | 47.44 | 74 | -26.56 | H | Peak |
| 10360 | 58.36 | -6.22 | 52.14 | 68.2 | -16.06 | V | Peak |
| 15540 | 53.48 | -5.4 | 48.08 | 74 | -25.92 | V | Peak |
| 802.11n_20MHz_Highest Channel (5240MHz) | | | | | | | |
| 10480 | 60.97 | -6.22 | 54.75 | 68.2 | -13.45 | H | Peak |
| 15720 | 52.15 | -5.4 | 46.75 | 74 | -27.25 | H | Peak |
| 10480 | 59.42 | -6.22 | 53.2 | 68.2 | -15 | V | Peak |
| 15720 | 56.46 | -5.4 | 51.06 | 74 | -22.94 | V | Peak |
| 802.11ac_20MHz_Lowest Channel (5180MHz) | | | | | | | |
| 10360 | 60.83 | -6.22 | 54.61 | 68.2 | -13.59 | H | Peak |
| 15540 | 53.8 | -5.4 | 48.4 | 74 | -25.6 | H | Peak |
| 10360 | 59.32 | -6.22 | 53.1 | 68.2 | -15.1 | V | Peak |
| 15540 | 57.46 | -5.4 | 52.06 | 74 | -21.94 | V | Peak |
| 802.11ac_20MHz_Highest Channel (5240MHz) | | | | | | | |
| 10480 | 60.33 | -5.99 | 54.34 | 68.2 | -13.86 | H | Peak |
| 15720 | 56.98 | -5.53 | 51.45 | 74 | -22.55 | H | Peak |
| 10480 | 58.04 | -5.99 | 52.05 | 68.2 | -16.15 | V | Peak |
| 15720 | 58.98 | -5.53 | 53.45 | 74 | -20.55 | V | Peak |

UNII Band 4

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 802.11a_20MHz_Lowest Channel (5745MHz) | | | | | | | |
| 11490 | 57.76 | -4.34 | 53.42 | 74 | -20.58 | H | Peak |
| 17235 | 56.31 | -3.29 | 53.02 | 68.2 | -15.18 | H | Peak |
| 11490 | 57.31 | -4.34 | 52.97 | 74 | -21.03 | V | Peak |
| 17235 | 56.58 | -3.29 | 53.29 | 68.2 | -14.91 | V | Peak |
| 802.11a_20MHz_Highest Channel (5825MHz) | | | | | | | |
| 11650 | 56.41 | -4.16 | 52.25 | 74 | -21.75 | H | Peak |
| 17475 | 50.83 | -2.53 | 48.3 | 68.2 | -19.9 | H | Peak |
| 11650 | 56.83 | -4.16 | 52.67 | 74 | -21.33 | V | Peak |
| 17475 | 55.29 | -2.53 | 52.76 | 68.2 | -15.44 | V | Peak |
| 802.11n_20MHz_Lowest Channel (5745MHz) | | | | | | | |
| 11490 | 56.61 | -4.34 | 52.27 | 74 | -21.73 | H | Peak |
| 17235 | 54.13 | -3.29 | 50.84 | 68.2 | -17.36 | H | Peak |
| 11490 | 56.5 | -4.34 | 52.16 | 74 | -21.84 | V | Peak |
| 17235 | 57.38 | -3.29 | 54.09 | 68.2 | -14.11 | V | Peak |
| 802.11n_20MHz_Highest Channel (5825MHz) | | | | | | | |
| 11650 | 58.11 | -4.16 | 53.95 | 74 | -20.05 | H | Peak |
| 17475 | 54.56 | -2.53 | 52.03 | 68.2 | -16.17 | H | Peak |
| 11650 | 57.1 | -4.16 | 52.94 | 74 | -21.06 | V | Peak |
| 17475 | 54.81 | -2.53 | 52.28 | 68.2 | -15.92 | V | Peak |
| 802.11ac_20MHz_Lowest Channel (5745MHz) | | | | | | | |
| 11490 | 57.27 | -4.34 | 52.93 | 74 | -21.07 | H | Peak |
| 17235 | 50.88 | -3.29 | 47.59 | 68.2 | -20.61 | H | Peak |
| 11490 | 57.64 | -4.34 | 53.3 | 74 | -20.7 | V | Peak |
| 17235 | 50.61 | -3.29 | 47.32 | 68.2 | -20.88 | V | Peak |
| 802.11ac_20MHz_Highest Channel (5825MHz) | | | | | | | |
| 11650 | 57.42 | -4.16 | 53.26 | 74 | -20.74 | H | Peak |
| 17475 | 51.7 | -2.53 | 49.17 | 68.2 | -19.03 | H | Peak |
| 11650 | 57.8 | -4.16 | 53.64 | 74 | -20.36 | V | Peak |
| 17475 | 53.14 | -2.53 | 50.61 | 68.2 | -17.59 | V | Peak |

*Note 1: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

*Note 2: Testing is carried out with frequency rang 1GHz to the tenth harmonics, If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit, so there is no record.*

*Note 3: Other emissions are attenuated 20dB below the limits from 9kHz to 30MHz, so it does not recorded report, above 18GHz not recorded for no spurious point have a margin of less than 6 dB with respect to the limits.*

# 7. Band-edge Emissions(Radiated)

## 7.1 Standard and Limit

According to §15.407(b), Undesirable emission limits. 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:

(1) For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

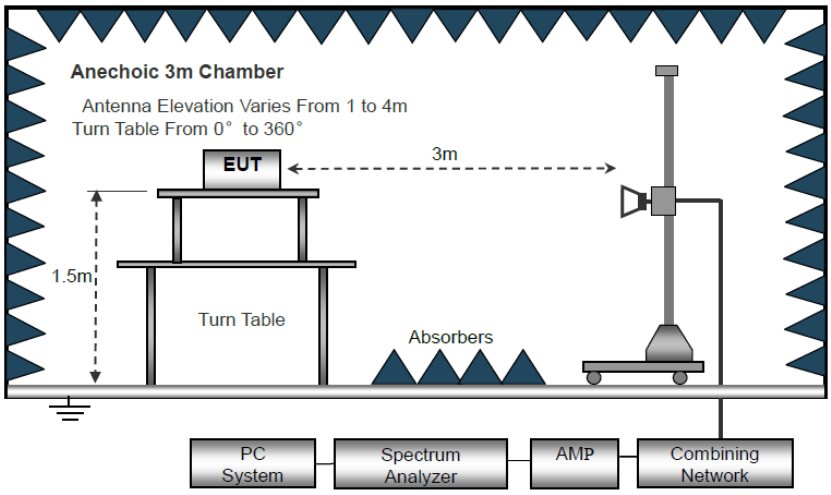
(2) For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating solely in the 5.725–5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

## 7.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6 and section 6.10.




Test Setup Block Diagram

## 7.3 Test Data and Results

Based on all tested data, the EUT complied with the FCC Part 15.407 standard limit, and with the worst case as below:

Remark: Level = Reading + Factor, Margin = Level - Limit

UNII Band 1_ 802.11a_20MHz_Lowest Channel (5180MHz)

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5150 | 66.22 | -13.96 | 52.26 | 74 | -21.74 | H | Peak |
| 5150 | 57.37 | -13.96 | 43.41 | 74 | -30.59 | V | Peak |

UNII Band 1_ 802.11a_20MHz_Highest Channel (5240MHz)

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5350 | 56.48 | -13.26 | 43.22 | 74 | -30.78 | H | Peak |
| 5460 | 52.39 | -12.88 | 39.51 | 74 | -34.49 | H | Peak |
| 5350 | 54.52 | -13.26 | 41.26 | 74 | -32.74 | V | Peak |
| 5460 | 50.15 | -12.88 | 37.27 | 74 | -36.73 | V | Peak |

UNII Band 1_802.11n_40MHz_Lowest Channel (5190MHz)

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5150 | 66.34 | -13.96 | 52.38 | 74 | -21.62 | H | Peak |
| 5150 | 63.89 | -13.96 | 49.93 | 74 | -24.07 | V | Peak |

UNII Band 1_ 802.11n_40MHz_Highest Channel (5230MHz)

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5350 | 58.44 | -13.26 | 45.18 | 74 | -28.82 | H | Peak |
| 5460 | 52.51 | -12.88 | 39.63 | 74 | -34.37 | H | Peak |
| 5350 | 58.31 | -13.26 | 45.05 | 74 | -28.95 | V | Peak |
| 5460 | 53.65 | -12.88 | 40.77 | 74 | -33.23 | V | Peak |

UNII Band 1_802.11ac_80MHz_5210MHz

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5150 | 67.4 | -13.96 | 53.44 | 74 | -20.56 | H | Peak |
| 5350 | 54.34 | -13.26 | 41.08 | 74 | -32.92 | H | Peak |
| 5460 | 50.22 | -12.88 | 37.34 | 74 | -36.66 | H | Peak |
| 5150 | 63.59 | -13.96 | 49.63 | 74 | -24.37 | V | Peak |
| 5350 | 51.29 | -13.26 | 38.03 | 74 | -35.97 | V | Peak |
| 5460 | 50.94 | -12.88 | 38.06 | 74 | -35.94 | V | Peak |

*Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit, so there is no record.*

UNII Band 4_ 802.11a_20MHz_Lowest Channel (5745MHz)

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5650 | 52.21 | -12.3 | 39.91 | 68.2 | -28.29 | H | Peak |
| 5700 | 55.73 | -12.16 | 43.57 | 105.6 | -62.03 | H | Peak |
| 5720 | 67.85 | -12.09 | 55.76 | 110.8 | -55.04 | H | Peak |
| 5650 | 55.45 | -12.3 | 43.15 | 68.2 | -25.05 | V | Peak |
| 5700 | 53.76 | -12.16 | 41.6 | 105.6 | -64 | V | Peak |
| 5720 | 66.68 | -12.09 | 54.59 | 110.8 | -56.21 | V | Peak |

UNII Band 4_ 802.11a_20MHz_Highest Channel (5825MHz)

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5850 | 68.62 | -11.72 | 56.9 | 122.2 | -65.3 | H | Peak |
| 5875 | 55.78 | -11.64 | 44.14 | 110.8 | -66.66 | H | Peak |
| 5925 | 51.36 | -11.5 | 39.86 | 68.2 | -28.34 | H | Peak |
| 5850 | 66 | -11.72 | 54.28 | 122.2 | -67.92 | V | Peak |
| 5875 | 55.71 | -11.64 | 44.07 | 110.8 | -66.73 | V | Peak |
| 5925 | 52.51 | -11.5 | 41.01 | 68.2 | -27.19 | V | Peak |

UNII Band 4_802.11n_40MHz_Lowest Channel (5755MHz)

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5650 | 54.94 | -12.3 | 42.64 | 68.2 | -25.56 | H | Peak |
| 5700 | 54.1 | -12.16 | 41.94 | 105.6 | -63.66 | H | Peak |
| 5720 | 70.44 | -12.09 | 58.35 | 110.8 | -52.45 | H | Peak |
| 5650 | 55.82 | -12.3 | 43.52 | 68.2 | -24.68 | V | Peak |
| 5700 | 55.81 | -12.16 | 43.65 | 105.6 | -61.95 | V | Peak |
| 5720 | 71.48 | -12.09 | 59.39 | 110.8 | -51.41 | V | Peak |

UNII Band 4_ 802.11a_40MHz_Highest Channel (5795MHz)

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5850 | 67.24 | -11.72 | 55.52 | 122.2 | -66.68 | H | Peak |
| 5875 | 57.69 | -11.64 | 46.05 | 110.8 | -64.75 | H | Peak |
| 5925 | 53.46 | -11.5 | 41.96 | 68.2 | -26.24 | H | Peak |
| 5850 | 69.24 | -11.72 | 57.52 | 122.2 | -64.68 | V | Peak |
| 5875 | 63.29 | -11.64 | 51.65 | 110.8 | -59.15 | V | Peak |
| 5925 | 53.68 | -11.5 | 42.18 | 68.2 | -26.02 | V | Peak |

UNII Band 4_802.11ac_80MHz_5775MHz

| Frequency | Reading | Correct | Result | Limit | Margin | Polar | Detector |
|---|---|---|---|---|---|---|---|
| MHz | dBuV/m | dB/m | dBuV/m | dBuV/m | dB | H/V | Peak |
| 5650 | 53.43 | -12.3 | 41.13 | 68.2 | -27.07 | H | Peak |
| 5700 | 55.92 | -12.16 | 43.76 | 105.6 | -61.84 | H | Peak |
| 5720 | 69.37 | -12.09 | 57.28 | 110.8 | -53.52 | H | Peak |
| 5850 | 65.64 | -11.72 | 53.92 | 122.2 | -68.28 | H | Peak |
| 5875 | 60.69 | -11.64 | 49.05 | 110.8 | -61.75 | H | Peak |
| 5925 | 54.87 | -11.5 | 43.37 | 68.2 | -24.83 | H | Peak |
| 5650 | 51.17 | -12.3 | 38.87 | 68.2 | -29.33 | V | Peak |
| 5700 | 50.89 | -12.16 | 38.73 | 105.6 | -66.87 | V | Peak |
| 5720 | 70.12 | -12.09 | 58.03 | 110.8 | -52.77 | V | Peak |
| 5850 | 69.65 | -11.72 | 57.93 | 122.2 | -64.27 | V | Peak |
| 5875 | 60.71 | -11.64 | 49.07 | 110.8 | -61.73 | V | Peak |
| 5925 | 50.91 | -11.5 | 39.41 | 68.2 | -28.79 | V | Peak |

# 8. Maximum Conducted Output Power

## 8.1 Standard and Limit

According to 15.407(a): (1) For the band 5.15–5.25 GHz.
For an outdoor or indoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band..

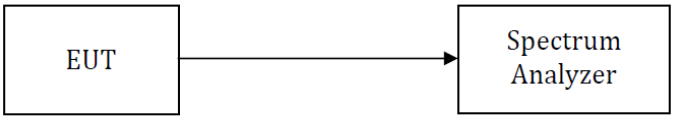
For client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

(2) For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725–5.895 GHz: the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500–kHz band.

## 8.2 Test Procedure

A spectrum analyzer or similar device shall be used to observe a sample of the modulated transmitter's radio frequency power output.
1) A measurement instrument with an integrated channel bandwidth function may be used to automate the test process.
2) Set center of frequency = operating frequency.
3) Connect the EUT to the RF input of the spectrum analyzer via a low loss RF cable
4) Set the RBW = 1MHz, VBW = 3MHz, Detector = RMS, Sweep = Auto.
5) Set the SPAN to 40MHz/80MHz/160MHz for 20MHz/40MHz/80MHz emission bandwidth mode.
6) Measure the highest amplitude appearing on spectral display and mark the value.
7) Repeat the above procedures until all frequency measured was complete.




Test Setup Block Diagram

## 8.3 Test Data and Results

Please refer to the appendix for details.

# 9. Occupied Bandwidth

## 9.1 Standard and Limit

According to 15.407(a), Within the 5.250–5.350 GHz and 5.470–5.725 GHz bands the 26 dB bandwidth shall be tested.

According to 15.407(e), Within the 5.725–5.850 GHz and 5.850–5.895 GHz bands, the minimum 6 dB bandwidth of U–NII devices shall be at least 500 kHz.

## 9.2 Test Procedure

According to the ANSI 63.10-2013, section 6.9, the emission bandwidth test method as follows.
1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
2) Set the spectrum analyzer to any one measured frequency within its operating range.
3) Set RBW to 1%~5% of bandwidth, VBW = RBW, Sweep = Auto.
4) Set a reference level on the measuring instrument equal to the highest peak value.
5) Measure the frequency difference of two frequencies that were attenuated 6dB or 26dB from the reference level. Record the frequency difference as the emission bandwidth.
6) Repeat the above procedures until all frequencies measured were complete.

Test Setup Block Diagram

## 9.3 Test Data and Results

Please refer to the appendix for details.

# 10. Maximum Power Spectral Density

## 10.1 Standard and Limit

According to 15.407(a):
(1) For the band 5.15–5.25 GHz.
For an outdoor or indoor access point operating in the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band..

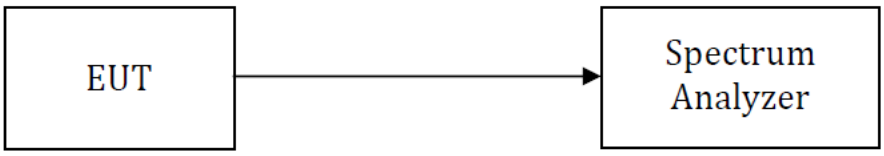
For client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

(2) For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725–5.895 GHz: the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500–kHz band.

## 10.2 Test Procedure

1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
2) Set the spectrum analyzer to any one measured frequency within its operating range.
3) Set RBW = 1MHz, VBW = 3MHz, Sweep = Auto, Detector = RMS.
4) Measure the highest amplitude appearing on spectral display and mark the value.
5) Repeat above procedures until all frequencies measured were complete.




Test Setup Block Diagram

## 10.3 Test Data and Results

Please refer to the appendix for details.

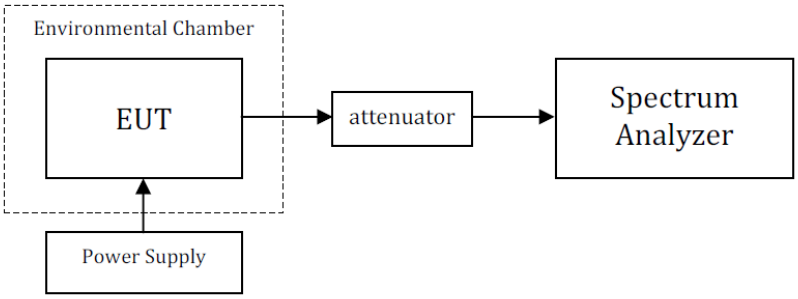
# 11. Frequency Stability

## 11.1 Standard and Limit

According to 15.407(g), Manufactures 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's manual.

## 11.2 Test Procedure

Test is conducting under the description of ANSI C63.10-2013 section 6.8.




Test Setup Block Diagram

## 11.3 Test Data and Results

| Mode | Frequency (MHz) | Temperature (°C) | Voltage (VDC) | Measured Frequency (MHz) | Limit (MHz) | Verdict |
|---|---|---|---|---|---|---|
| Carrier Wave | 5180 | 20 | 3.33 | 5179.952 | 5150 to 5250 | Pass |
| | | | 3.7 | 5179.950 | 5150 to 5250 | Pass |
| | | | 4.07 | 5179.957 | 5150 to 5250 | Pass |
| | | -30 | 3.7 | 5179.950 | 5150 to 5250 | Pass |
| | | -20 | 3.7 | 5179.953 | 5150 to 5250 | Pass |
| | | -10 | 3.7 | 5179.948 | 5150 to 5250 | Pass |
| | | 0 | 3.7 | 5179.954 | 5150 to 5250 | Pass |
| | | 10 | 3.7 | 5179.951 | 5150 to 5250 | Pass |
| | | 30 | 3.7 | 5179.949 | 5150 to 5250 | Pass |
| | | 40 | 3.7 | 5179.949 | 5150 to 5250 | Pass |
| | | 50 | 3.7 | 5179.956 | 5150 to 5250 | Pass |
| | 5200 | 20 | 3.33 | 5199.977 | 5150 to 5250 | Pass |
| | | | 3.7 | 5199.977 | 5150 to 5250 | Pass |
| | | | 4.07 | 5199.970 | 5150 to 5250 | Pass |
| | | -30 | 3.7 | 5199.972 | 5150 to 5250 | Pass |
| | | -20 | 3.7 | 5199.976 | 5150 to 5250 | Pass |
| | | -10 | 3.7 | 5199.970 | 5150 to 5250 | Pass |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 0 | 3.7 | 5199.977 | 5150 to 5250 | Pass |
| | | 10 | 3.7 | 5199.978 | 5150 to 5250 | Pass |
| | | 30 | 3.7 | 5199.968 | 5150 to 5250 | Pass |
| | | 40 | 3.7 | 5199.975 | 5150 to 5250 | Pass |
| | | 50 | 3.7 | 5199.978 | 5150 to 5250 | Pass |
| | 5240 | 20 | 3.33 | 5239.971 | 5150 to 5250 | Pass |
| | | | 3.7 | 5239.961 | 5150 to 5250 | Pass |
| | | | 4.07 | 5239.968 | 5150 to 5250 | Pass |
| | | -30 | 3.7 | 5239.964 | 5150 to 5250 | Pass |
| | | -20 | 3.7 | 5239.967 | 5150 to 5250 | Pass |
| | | -10 | 3.7 | 5239.964 | 5150 to 5250 | Pass |
| | | 0 | 3.7 | 5239.968 | 5150 to 5250 | Pass |
| | | 10 | 3.7 | 5239.967 | 5150 to 5250 | Pass |
| | | 30 | 3.7 | 5239.967 | 5150 to 5250 | Pass |
| | | 40 | 3.7 | 5239.969 | 5150 to 5250 | Pass |
| | | 50 | 3.7 | 5239.968 | 5150 to 5250 | Pass |
| | 5745 | 20 | 3.33 | 5744.980 | 5725 to 5850 | Pass |
| | | | 3.7 | 5744.978 | 5725 to 5850 | Pass |
| | | | 4.07 | 5744.975 | 5725 to 5850 | Pass |
| | | -30 | 3.7 | 5744.981 | 5725 to 5850 | Pass |
| | | -20 | 3.7 | 5744.980 | 5725 to 5850 | Pass |
| | | -10 | 3.7 | 5744.981 | 5725 to 5850 | Pass |
| | | 0 | 3.7 | 5744.979 | 5725 to 5850 | Pass |
| | | 10 | 3.7 | 5744.974 | 5725 to 5850 | Pass |
| | | 30 | 3.7 | 5744.978 | 5725 to 5850 | Pass |
| | | 40 | 3.7 | 5744.980 | 5725 to 5850 | Pass |
| | | 50 | 3.7 | 5744.975 | 5725 to 5850 | Pass |
| | 5785 | 20 | 3.33 | 5784.983 | 5725 to 5850 | Pass |
| | | | 3.7 | 5784.982 | 5725 to 5850 | Pass |
| | | | 4.07 | 5784.978 | 5725 to 5850 | Pass |
| | | -30 | 3.7 | 5784.980 | 5725 to 5850 | Pass |
| | | -20 | 3.7 | 5784.984 | 5725 to 5850 | Pass |
| | | -10 | 3.7 | 5784.980 | 5725 to 5850 | Pass |
| | | 0 | 3.7 | 5784.976 | 5725 to 5850 | Pass |
| | | 10 | 3.7 | 5784.982 | 5725 to 5850 | Pass |
| | | 30 | 3.7 | 5784.982 | 5725 to 5850 | Pass |
| | | 40 | 3.7 | 5784.982 | 5725 to 5850 | Pass |
| | | 50 | 3.7 | 5784.974 | 5725 to 5850 | Pass |
| | 5825 | 20 | 3.33 | 5824.969 | 5725 to 5850 | Pass |
| | | | 3.7 | 5824.974 | 5725 to 5850 | Pass |
| | | | 4.07 | 5824.968 | 5725 to 5850 | Pass |
| | | -30 | 3.7 | 5824.971 | 5725 to 5850 | Pass |
| | | -20 | 3.7 | 5824.972 | 5725 to 5850 | Pass |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | -10 | 3.7 | 5824.969 | 5725 to 5850 | Pass |
| | | 0 | 3.7 | 5824.975 | 5725 to 5850 | Pass |
| | | 10 | 3.7 | 5824.970 | 5725 to 5850 | Pass |
| | | 30 | 3.7 | 5824.975 | 5725 to 5850 | Pass |
| | | 40 | 3.7 | 5824.971 | 5725 to 5850 | Pass |
| | | 50 | 3.7 | 5824.976 | 5725 to 5850 | Pass |

******* END OF REPORT *******