Microtest
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# Test Report

**Report No.:** MTi230313012-01E1

**Date of issue:** 2023-07-06

**Applicant:** ShenZhen Cannice Technology Co., Ltd.

**Product:** WIRELESS OPEN-EAR EARPHONES

**Model(s):** AABLU100130685

**FCC ID:** 2ADTV-30685

Shenzhen Microtest Co., Ltd.

http://www.mtitest.com

The test report is only used for customer scientific research, teaching, internal quality control and other purposes, and is for internal reference only.

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2. The test results in this test report are only responsible for the samples submitted

3. This test report is invalid without the seal and signature of the laboratory.

4. This test report is invalid if transferred, altered, or tampered with in any form without authorization.

5. Any objection to this test report shall be submitted to the laboratory within 15 days from the date of receipt of the report.

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| Test Result Certification | |
|---|---|
| **Applicant:** | ShenZhen Cannice Technology Co., Ltd. |
| Address: | 20/F, Tower A, Building 7, Baoneng Science and Technology Park, Qingxiang Road #1, Longhua New District, Shenzhen, China |
| **Manufacturer:** | Guangxi Cannice Precision Technology Co.Ltd. |
| Address: | Block C,South of Longtuan West Road Zhongshan Town,Zhongshan County Hezhou Guangxi 542600 China |
| **Product description** | |
| Product name: | WIRELESS OPEN-EAR EARPHONES |
| Trademark: | onn. |
| Model name: | AABLU100130685 |
| Series Model: | N/A |
| Standards: | FCC 47 CFR Part 15 Subpart C |
| Test method: | ANSI C63.10-2013<br>KDB 558074 D01 15.247 Meas Guidance v05r02 |
| **Date of Test** | |
| Date of test: | 2023-07-05 to 2023-07-06 |
| Test result: | Pass |

| | | |
|---|---|---|
| **Test Engineer** | : | David. Lee |
| | | (David Lee) |
| **Reviewed By** | : | Leon chen |
| | | (Leon Chen) |
| **Approved By** | : | Tom Xue |
| | | (Tom Xue) |

# 1 General Description

## 1.1 Description of the EUT

| | |
|---|---|
| Product name: | WIRELESS OPEN-EAR EARPHONES |
| Model name: | AABLU100130685 |
| Series Model: | N/A |
| Model difference: | N/A |
| Electrical rating: | Input: DC 5V1A<br>Battery:<br>Charging box: DC 3.7V 650mAh<br>Earphone: DC 3.85V 0.269Wh |
| Accessories: | N/A |
| Hardware version: | V0B |
| Software version: | V0E |
| Test sample(s) number: | MTi230313012-01S1001 |
| **RF specification** | |
| Bluetooth version: | V5.3 |
| Operating frequency range: | 2402MHz to 2480MHz |
| Channel number: | 79 |
| Modulation type: | GFSK, π/4 DQPSK, 8DPSK |
| Antenna(s) type: | FPC |
| Antenna(s) gain: | Left: -1.76dBi, Right: -1.93dBi |

## 1.2 Description of test modes

All the test modes were carried out with the EUT in normal operation, the final test mode of the EUT was the worst test mode for emission test, which was shown in this report and defined as:

| No. | Emission test modes |
|---|---|
| Mode1 | TX-GFSK(CH00, CH39, CH78) |
| Mode2 | TX-π/4 DQPSK(CH00, CH39, CH78) |
| Mode3 | TX-8DPSK (CH00, CH39, CH78) |

### 1.2.1 Operation channel list

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 0 | 2402 | 20 | 2422 | 40 | 2442 | 60 | 2462 |
| 1 | 2403 | 21 | 2423 | 41 | 2443 | 61 | 2463 |
| 2 | 2404 | 22 | 2424 | 42 | 2444 | 62 | 2464 |
| 3 | 2405 | 23 | 2425 | 43 | 2445 | 63 | 2465 |
| 4 | 2406 | 24 | 2426 | 44 | 2446 | 64 | 2466 |
| 5 | 2407 | 25 | 2427 | 45 | 2447 | 65 | 2467 |
| 6 | 2408 | 26 | 2428 | 46 | 2448 | 66 | 2468 |
| 7 | 2409 | 27 | 2429 | 47 | 2449 | 67 | 2469 |

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|---|---|
| 8 | 2410 | 28 | 2430 | 48 | 2450 | 68 | 2470 |
| 9 | 2411 | 29 | 2431 | 49 | 2451 | 69 | 2471 |
| 10 | 2412 | 30 | 2432 | 50 | 2452 | 70 | 2472 |
| 11 | 2413 | 31 | 2433 | 51 | 2453 | 71 | 2473 |
| 12 | 2414 | 32 | 2434 | 52 | 2454 | 72 | 2474 |
| 13 | 2415 | 33 | 2435 | 53 | 2455 | 73 | 2475 |
| 14 | 2416 | 34 | 2436 | 54 | 2456 | 74 | 2476 |
| 15 | 2417 | 35 | 2437 | 55 | 2457 | 75 | 2477 |
| 16 | 2418 | 36 | 2438 | 56 | 2458 | 76 | 2478 |
| 17 | 2419 | 37 | 2439 | 57 | 2459 | 77 | 2479 |
| 18 | 2420 | 38 | 2440 | 58 | 2460 | 78 | 2480 |
| 19 | 2421 | 39 | 2441 | 59 | 2461 | - | - |

**Note:** The test software has been used to control EUT for working in engineering mode, that enables selectable channel, and capable of continuous transmitting and constant receiving mode.

| Mode | Test Software | Bluetooth RF Test Tool | | |
|---|---|---|---|---|
| | Channel | 2402MHz | 2441MHz | 2480MHz |
| GFSK | Power setting | 40 | 40 | 40 |
| π/4-DQPSK | | 40 | 40 | 40 |
| 8DPSK | | 40 | 40 | 40 |

### 1.3 Environmental Conditions

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

| | |
|---|---|
| Temperature: | 15°C ~ 35°C |
| Humidity: | 20% RH ~ 75% RH |
| Atmospheric pressure: | 98 kPa ~ 101 kPa |

### 1.4 Description of support units

The EUT was tested as an independent device.

### 1.5 Measurement uncertainty

| Measurement | Uncertainty |
|---|---|
| Occupied channel bandwidth | ±3 % |
| RF output power, conducted | ±1 dB |
| Time | ±1 % |
| Unwanted Emissions, conducted | ±1 dB |
| Radiated spurious emissions (1GHz~26GHz) | 5.3dB |
| Radiated spurious emissions (9kHz~30MHz) | 4.3dB |
| Radiated spurious emissions (30MHz~1GHz) | 4.7dB |
| Temperature | ±1 °C |
| Humidity | ± 5 % |

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

# 2 Summary of Test Result

| No. | FCC reference | Description of test | Result |
|---|---|---|---|
| 1 | § 15.203 | Antenna requirement | Pass |
| 2 | § 15.207 | AC power line conducted emissions | N/A* |
| 3 | § 15.247(d), 15.209, 15.205 | Radiated spurious emissions | Pass |
| 4 | § 15.247(a)(1) | 20dB emission bandwidth | Pass |
| 5 | § 15.247(b)(1) | Maximum conducted output power | Pass |
| 6 | § 15.247(a)(1) | Carrier Frequencies Separation | Pass |
| 7 | § 15.247(a)(1) | Time of occupancy | Pass |
| 8 | § 15.247(a)(1) | Number of hopping channels | Pass |
| 9 | § 15.247(d) | Band edge (Conducted) | Pass |
| 10 | § 15.247(d) | Conducted spurious emissions | Pass |

**Notes:**

N/A means not applicable.
Since the EUT cannot be operating while charging, therefore AC power line conducted emissions test is not required.

**Both left and right earphones were tested, test data appendix only recorded all data of right earphones.**

# 3 Test Facilities and accreditations

## 3.1 Test laboratory

| | |
|---|---|
| Test laboratory: | Shenzhen Microtest Co., Ltd. |
| Test site location: | 101, No.7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |
| Telephone: | (86-755)88850135 |
| Fax: | (86-755)88850136 |
| CNAS Registration No.: | CNAS L5868 |
| FCC Registration No.: | 448573 |

# 4 List of test equipment

| No. | Equipment | Manufacturer | Model | Serial No. | Cal. date | Cal. Due |
|---|---|---|---|---|---|---|
| Occupied Bandwidth | | | | | | |
| 1 | Wideband Radio Communication Tester | Rohde&schwarz | CMW500 | 149155 | 2023-04-26 | 2024-04-25 |
| 2 | ESG Series Analog Ssignal Generator | Agilent | E4421B | GB40051240 | 2023-04-25 | 2024-04-24 |
| 3 | PXA Signal Analyzer | Agilent | N9030A | MY51350296 | 2023-04-25 | 2024-04-24 |
| 4 | Synthesized Sweeper | Agilent | 83752A | 3610A01957 | 2023-04-25 | 2024-04-24 |
| 5 | MXA Signal Analyzer | Agilent | N9020A | MY50143483 | 2023-04-26 | 2024-04-25 |
| 6 | RF Control Unit | Tonscend | JS0806-1 | 19D8060152 | 2023-04-26 | 2024-04-25 |
| 7 | Band Reject Filter Group | Tonscend | JS0806-F | 19D8060160 | 2023-05-05 | 2024-05-04 |
| 8 | ESG Vector Signal Generator | Agilent | N5182A | MY50143762 | 2023-04-25 | 2024-04-24 |
| 9 | DC Power Supply | Agilent | E3632A | MY40027695 | 2023-05-05 | 2024-05-04 |
| Maximum Conducted Output Power | | | | | | |
| 1 | Wideband Radio Communication Tester | Rohde&schwarz | CMW500 | 149155 | 2023-04-26 | 2024-04-25 |
| 2 | ESG Series Analog Ssignal Generator | Agilent | E4421B | GB40051240 | 2023-04-25 | 2024-04-24 |
| 3 | PXA Signal Analyzer | Agilent | N9030A | MY51350296 | 2023-04-25 | 2024-04-24 |
| 4 | Synthesized Sweeper | Agilent | 83752A | 3610A01957 | 2023-04-25 | 2024-04-24 |
| 5 | MXA Signal Analyzer | Agilent | N9020A | MY50143483 | 2023-04-26 | 2024-04-25 |
| 6 | RF Control Unit | Tonscend | JS0806-1 | 19D8060152 | 2023-04-26 | 2024-04-25 |
| 7 | Band Reject Filter Group | Tonscend | JS0806-F | 19D8060160 | 2023-05-05 | 2024-05-04 |
| 8 | ESG Vector Signal Generator | Agilent | N5182A | MY50143762 | 2023-04-25 | 2024-04-24 |
| 9 | DC Power Supply | Agilent | E3632A | MY40027695 | 2023-05-05 | 2024-05-04 |
| Channel Separation | | | | | | |
| 1 | Wideband Radio Communication Tester | Rohde&schwarz | CMW500 | 149155 | 2023-04-26 | 2024-04-25 |
| 2 | ESG Series Analog Ssignal Generator | Agilent | E4421B | GB40051240 | 2023-04-25 | 2024-04-24 |
| 3 | PXA Signal Analyzer | Agilent | N9030A | MY51350296 | 2023-04-25 | 2024-04-24 |
| 4 | Synthesized Sweeper | Agilent | 83752A | 3610A01957 | 2023-04-25 | 2024-04-24 |
| 5 | MXA Signal Analyzer | Agilent | N9020A | MY50143483 | 2023-04-26 | 2024-04-25 |
| 6 | RF Control Unit | Tonscend | JS0806-1 | 19D8060152 | 2023-04-26 | 2024-04-25 |
| 7 | Band Reject Filter Group | Tonscend | JS0806-F | 19D8060160 | 2023-05-05 | 2024-05-04 |
| 8 | ESG Vector Signal Generator | Agilent | N5182A | MY50143762 | 2023-04-25 | 2024-04-24 |

| No. | Equipment | Manufacturer | Model | Serial No. | Cal. date | Cal. Due |
|---|---|---|---|---|---|---|
| 9 | DC Power Supply | Agilent | E3632A | MY40027695 | 2023-05-05 | 2024-05-04 |
| Number of Hopping Frequencies | | | | | | |
| 1 | Wideband Radio Communication Tester | Rohde&schwarz | CMW500 | 149155 | 2023-04-26 | 2024-04-25 |
| 2 | ESG Series Analog Ssignal Generator | Agilent | E4421B | GB40051240 | 2023-04-25 | 2024-04-24 |
| 3 | PXA Signal Analyzer | Agilent | N9030A | MY51350296 | 2023-04-25 | 2024-04-24 |
| 4 | Synthesized Sweeper | Agilent | 83752A | 3610A01957 | 2023-04-25 | 2024-04-24 |
| 5 | MXA Signal Analyzer | Agilent | N9020A | MY50143483 | 2023-04-26 | 2024-04-25 |
| 6 | RF Control Unit | Tonscend | JS0806-1 | 19D8060152 | 2023-04-26 | 2024-04-25 |
| 7 | Band Reject Filter Group | Tonscend | JS0806-F | 19D8060160 | 2023-05-05 | 2024-05-04 |
| 8 | ESG Vector Signal Generator | Agilent | N5182A | MY50143762 | 2023-04-25 | 2024-04-24 |
| 9 | DC Power Supply | Agilent | E3632A | MY40027695 | 2023-05-05 | 2024-05-04 |
| Dwell Time | | | | | | |
| 1 | Wideband Radio Communication Tester | Rohde&schwarz | CMW500 | 149155 | 2023-04-26 | 2024-04-25 |
| 2 | ESG Series Analog Ssignal Generator | Agilent | E4421B | GB40051240 | 2023-04-25 | 2024-04-24 |
| 3 | PXA Signal Analyzer | Agilent | N9030A | MY51350296 | 2023-04-25 | 2024-04-24 |
| 4 | Synthesized Sweeper | Agilent | 83752A | 3610A01957 | 2023-04-25 | 2024-04-24 |
| 5 | MXA Signal Analyzer | Agilent | N9020A | MY50143483 | 2023-04-26 | 2024-04-25 |
| 6 | RF Control Unit | Tonscend | JS0806-1 | 19D8060152 | 2023-04-26 | 2024-04-25 |
| 7 | Band Reject Filter Group | Tonscend | JS0806-F | 19D8060160 | 2023-05-05 | 2024-05-04 |
| 8 | ESG Vector Signal Generator | Agilent | N5182A | MY50143762 | 2023-04-25 | 2024-04-24 |
| 9 | DC Power Supply | Agilent | E3632A | MY40027695 | 2023-05-05 | 2024-05-04 |
| Emissions in non-restricted frequency bands | | | | | | |
| 1 | Wideband Radio Communication Tester | Rohde&schwarz | CMW500 | 149155 | 2023-04-26 | 2024-04-25 |
| 2 | ESG Series Analog Ssignal Generator | Agilent | E4421B | GB40051240 | 2023-04-25 | 2024-04-24 |
| 3 | PXA Signal Analyzer | Agilent | N9030A | MY51350296 | 2023-04-25 | 2024-04-24 |
| 4 | Synthesized Sweeper | Agilent | 83752A | 3610A01957 | 2023-04-25 | 2024-04-24 |
| 5 | MXA Signal Analyzer | Agilent | N9020A | MY50143483 | 2023-04-26 | 2024-04-25 |
| 6 | RF Control Unit | Tonscend | JS0806-1 | 19D8060152 | 2023-04-26 | 2024-04-25 |
| 7 | Band Reject Filter Group | Tonscend | JS0806-F | 19D8060160 | 2023-05-05 | 2024-05-04 |
| 8 | ESG Vector Signal Generator | Agilent | N5182A | MY50143762 | 2023-04-25 | 2024-04-24 |

| No. | Equipment | Manufacturer | Model | Serial No. | Cal. date | Cal. Due |
|---|---|---|---|---|---|---|
| 9 | DC Power Supply | Agilent | E3632A | MY40027695 | 2023-05-05 | 2024-05-04 |
| Band edge emissions (Radiated) | | | | | | |
| 1 | EMI Test Receiver | Rohde&schwarz | ESCI7 | 101166 | 2023-04-26 | 2024-04-25 |
| 2 | Double Ridged Broadband Horn Antenna | schwarabeck | BBHA 9120 D | 2278 | 2023-05-26 | 2024-05-25 |
| 3 | Amplifier | Agilent | 8449B | 3008A01120 | 2023-05-26 | 2024-05-25 |
| 4 | Multi-device Controller | TuoPu | TPMDC | / | / | / |
| 5 | MXA signal analyzer | Agilent | N9020A | MY54440859 | 2023-05-05 | 2024-05-04 |
| Emissions in restricted frequency bands (below 1GHz) | | | | | | |
| 1 | EMI Test Receiver | Rohde&schwarz | ESCI7 | 101166 | 2023-04-26 | 2024-04-25 |
| 2 | TRILOG Broadband Antenna | schwarabeck | VULB 9163 | 9163-1338 | 2023-06-11 | 2025-06-10 |
| 3 | Amplifier | Hewlett-Packard | 8447F | 3113A06184 | 2023-04-26 | 2024-04-25 |
| 4 | Multi-device Controller | TuoPu | TPMDC | / | / | / |
| Emissions in restricted frequency bands (above 1GHz) | | | | | | |
| 1 | EMI Test Receiver | Rohde&schwarz | ESCI7 | 101166 | 2023-04-26 | 2024-04-25 |
| 2 | Double Ridged Broadband Horn Antenna | schwarabeck | BBHA 9120 D | 2278 | 2023-05-26 | 2024-05-25 |
| 3 | Amplifier | Agilent | 8449B | 3008A01120 | 2023-05-26 | 2024-05-25 |
| 4 | Multi-device Controller | TuoPu | TPMDC | / | / | / |
| 5 | MXA signal analyzer | Agilent | N9020A | MY54440859 | 2023-05-05 | 2024-05-04 |

# 5 Evaluation Results (Evaluation)

## 5.1 Antenna requirement

| | |
|---|---|
| Test Requirement: | 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. |
| Description of the antenna of EUT: | The antenna of the EUT is permanently attached. |
| Conclusion: | The EUT complies with the requirement of FCC PART 15.203. |

# 6 Radio Spectrum Matter Test Results (RF)

## 6.1 Occupied Bandwidth

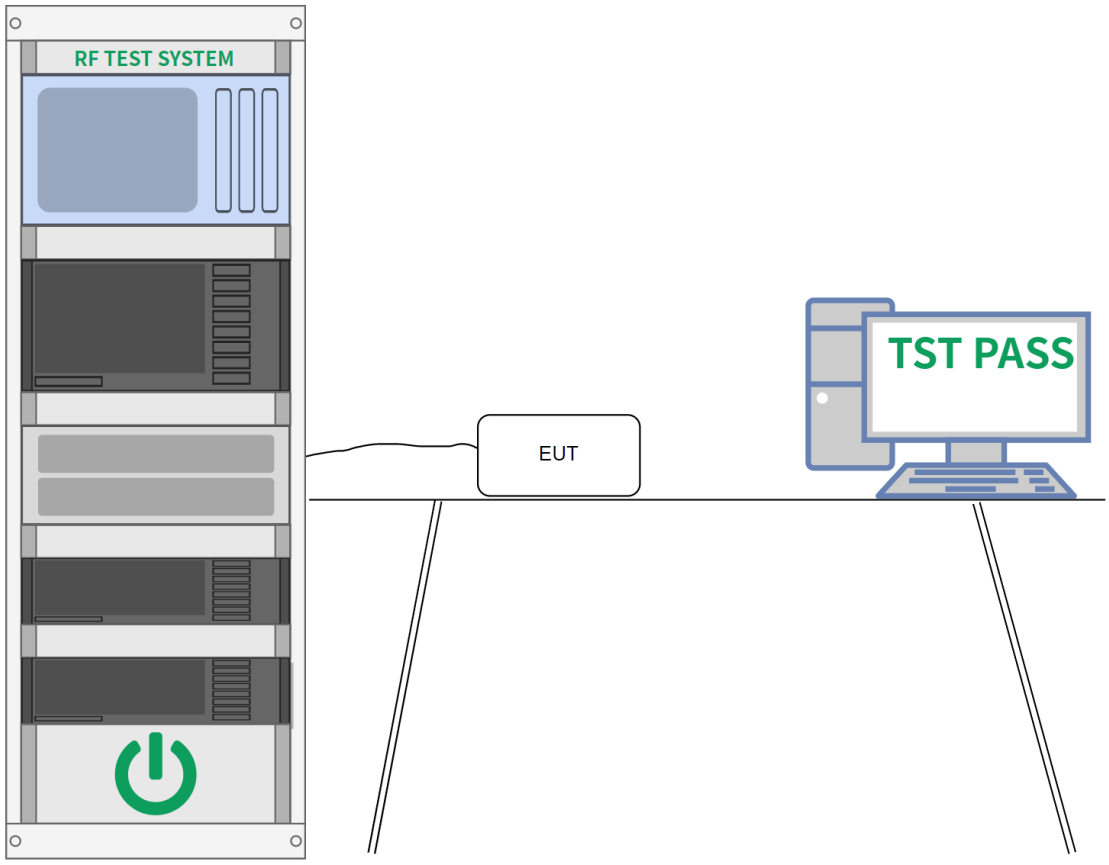
| | |
|---|---|
| Test Requirement: | Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. |
| Test Limit: | Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. |
| Test Method: | Occupied bandwidth—relative measurement procedure |
| Procedure: | a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.<br>b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.<br>c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.<br>d) Steps a) through c) might require iteration to adjust within the specified tolerances.<br>e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.<br>f) Set detection mode to peak and trace mode to max hold.<br>g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).<br>h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument. |

| | |
|---|---|
| | i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).<br>j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "-xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.<br>k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s). |

### 6.1.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 26 °C | Humidity: | 57 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.1.2 Test Setup Diagram:




### 6.1.3 Test Data:

Please Refer to Appendix for Details.

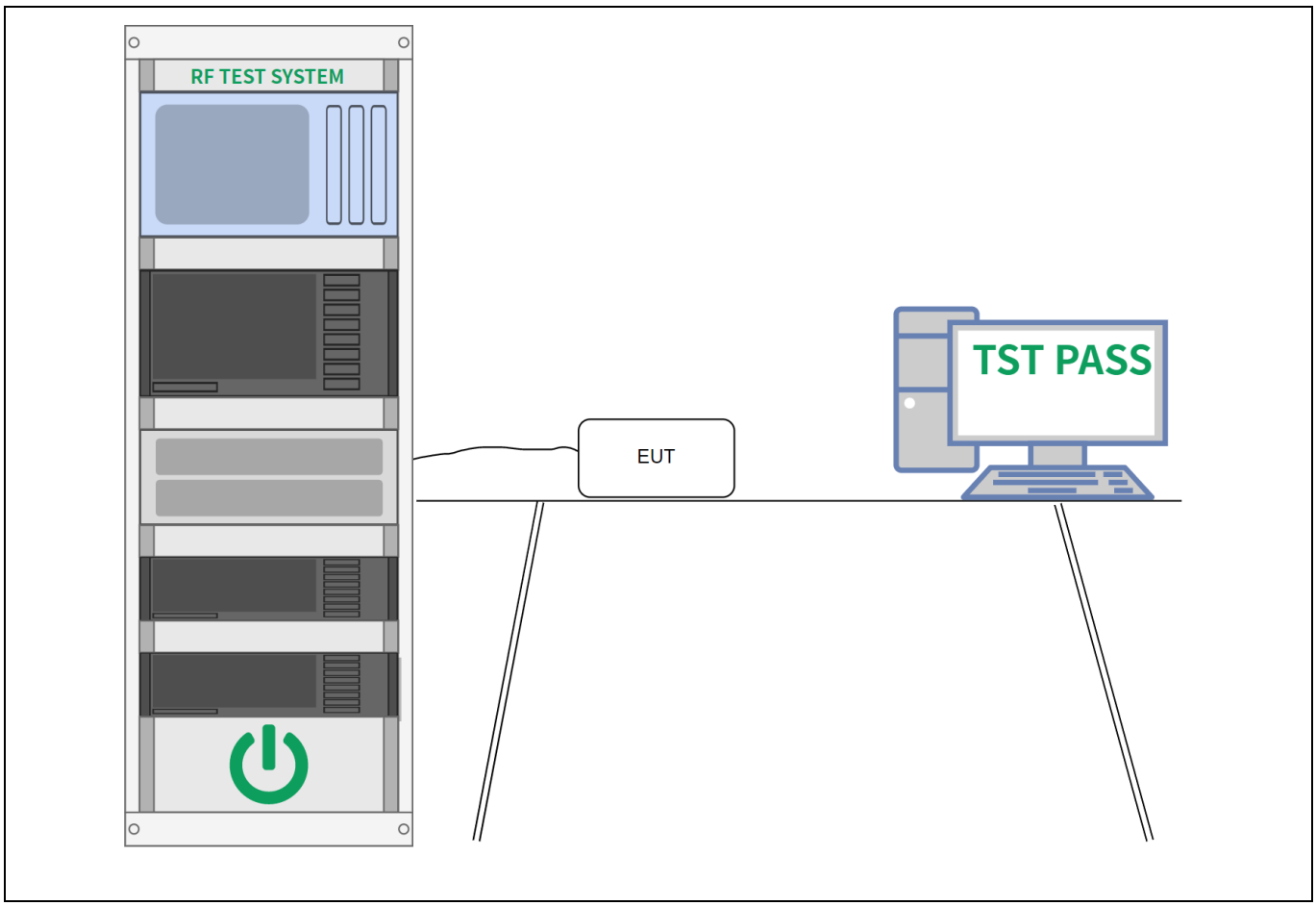
## 6.2 Maximum Conducted Output Power

| | |
|---|---|
| Test Requirement: | For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. |
| Test Limit: | For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. |
| Test Method: | Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices |
| Procedure: | This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:<br>a) Use the following spectrum analyzer settings:<br>1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.<br>2) RBW > 20 dB bandwidth of the emission being measured.<br>3) VBW >= RBW.<br>4) Sweep: Auto.<br>5) Detector function: Peak.<br>6) Trace: Max hold.<br>b) Allow trace to stabilize.<br>c) Use the marker-to-peak function to set the marker to the peak of the emission.<br>d) The indicated level is the peak output power, after any corrections for external attenuators and cables.<br>e) A plot of the test results and setup description shall be included in the test report.<br>NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer. |

### 6.2.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 26 °C | Humidity: | 57 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.2.2 Test Setup Diagram:




### 6.2.3 Test Data:

Please Refer to Appendix for Details.

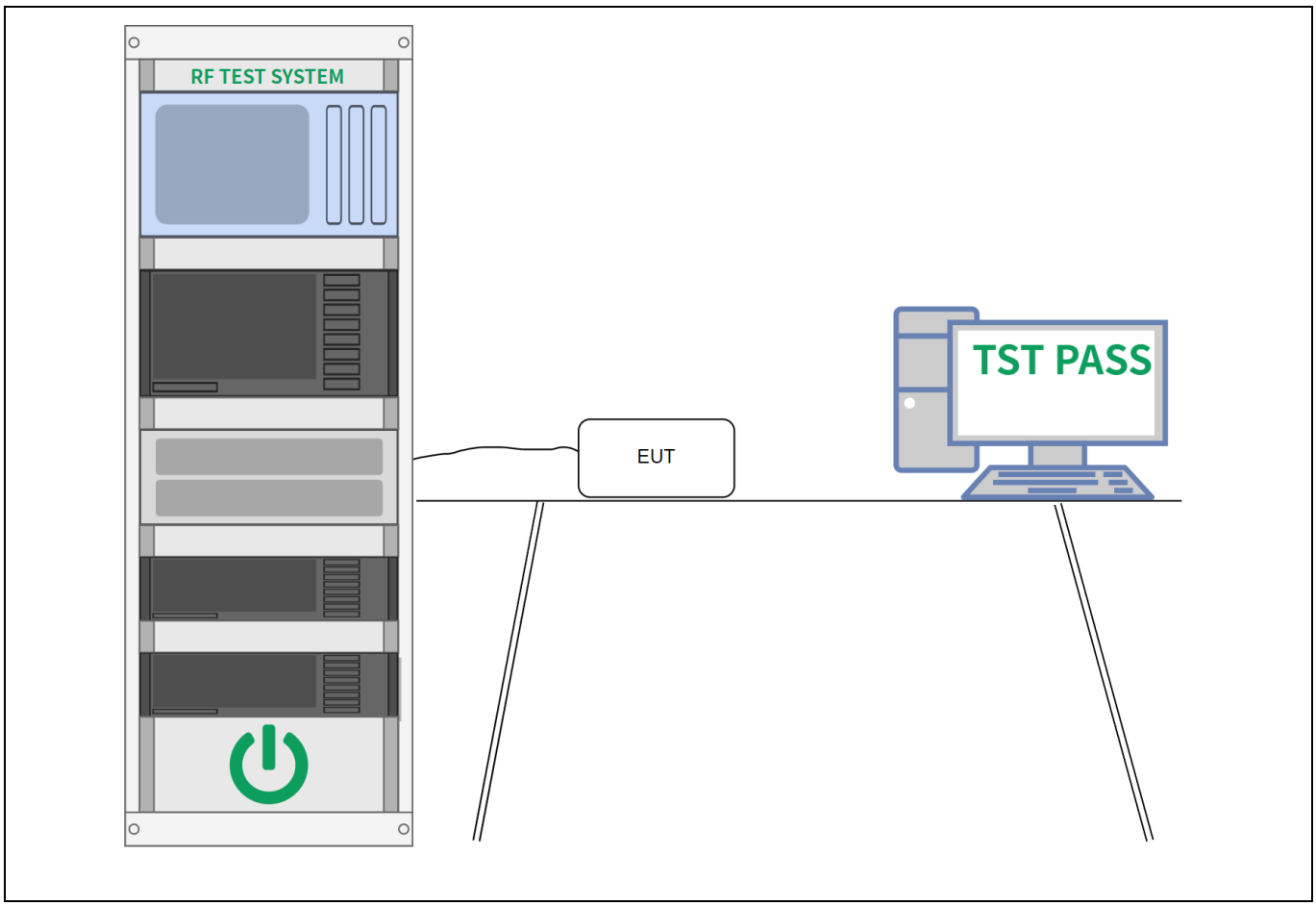
## 6.3 Channel Separation

| | |
|---|---|
| Test Requirement: | Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. |
| Test Limit: | Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. |
| Test Method: | Carrier frequency separation |
| Procedure: | The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:<br>a) Span: Wide enough to capture the peaks of two adjacent channels.<br>b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.<br>c) Video (or average) bandwidth (VBW) ≥ RBW.<br>d) Sweep: Auto.<br>e) Detector function: Peak.<br>f) Trace: Max hold.<br>g) Allow the trace to stabilize.<br>Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report. |

### 6.3.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 26 °C | Humidity: | 57 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.3.2 Test Setup Diagram:




### 6.3.3 Test Data:

Please Refer to Appendix for Details.

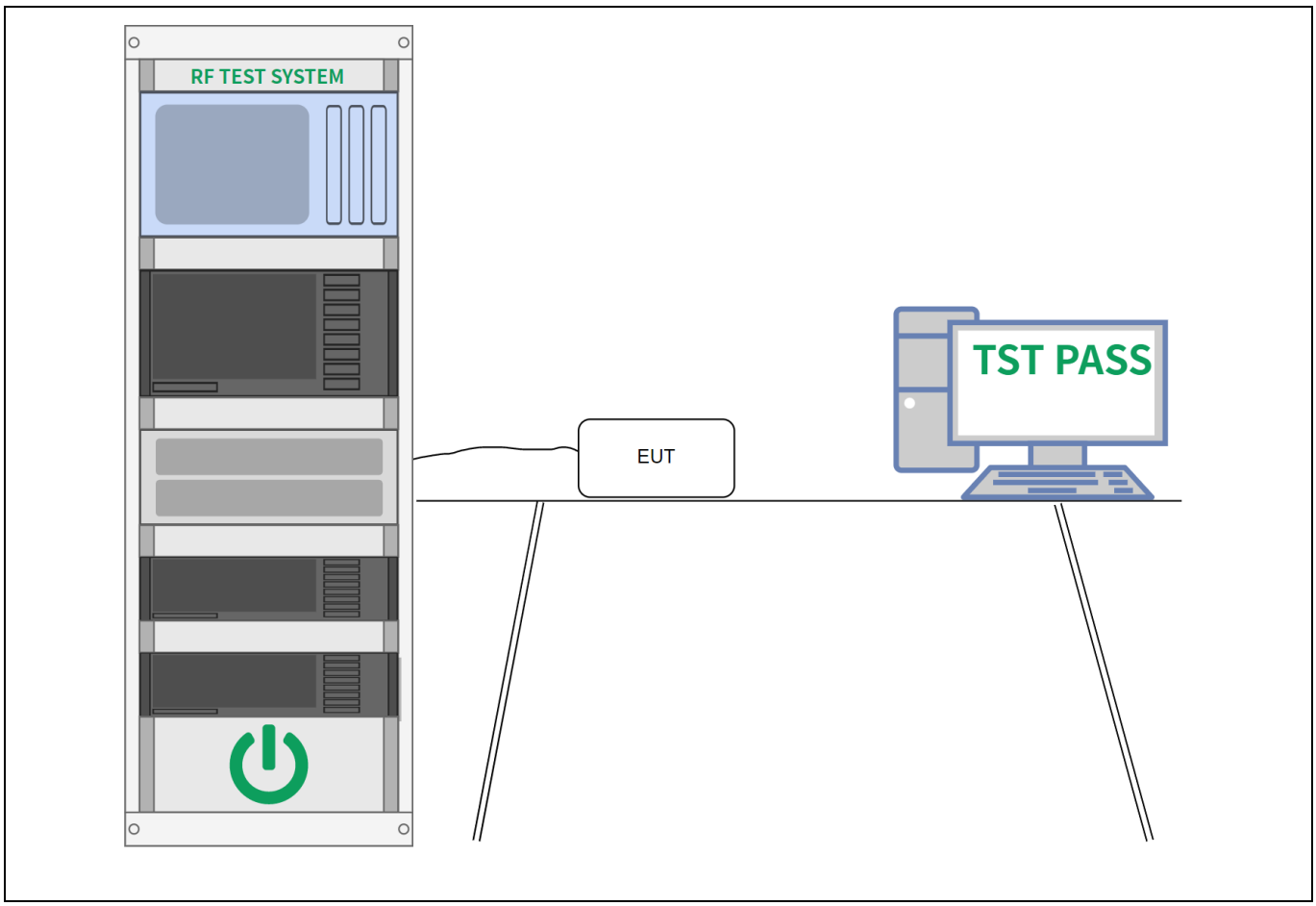
## 6.4 Number of Hopping Frequencies

| | |
|---|---|
| Test Requirement: | Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. |
| Test Limit: | Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. |
| Test Method: | Number of hopping frequencies |
| Procedure: | The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:<br>a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.<br>b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.<br>c) VBW ≥ RBW.<br>d) Sweep: Auto.<br>e) Detector function: Peak.<br>f) Trace: Max hold.<br>g) Allow the trace to stabilize.<br>It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A plot of the data shall be included in the test report. |

### 6.4.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 26 °C | Humidity: | 57 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.4.2 Test Setup Diagram:




### 6.4.3 Test Data:

Please Refer to Appendix for Details.

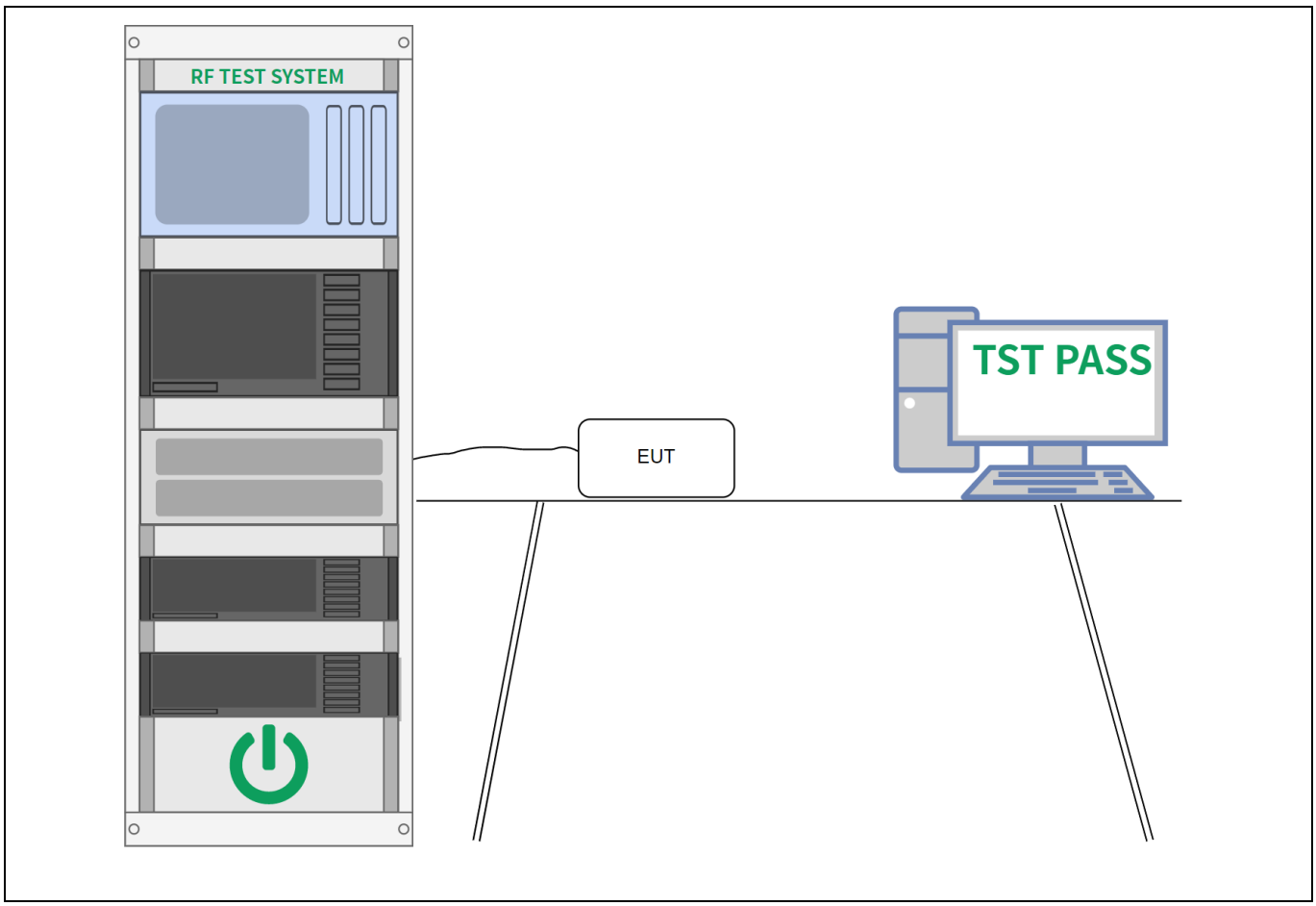
## 6.5 Dwell Time

| | |
|---|---|
| Test Requirement: | Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. |
| Test Limit: | Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. |
| Test Method: | Time of occupancy (dwell time) |
| Procedure: | The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:<br>a) Span: Zero span, centered on a hopping channel.<br>b) RBW shall be <= channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.<br>c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.<br>d) Detector function: Peak.<br>e) Trace: Max hold.<br>Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.<br>Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:<br>(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)<br>The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.<br>The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT. |

### 6.5.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 26 °C | Humidity: | 57 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.5.2 Test Setup Diagram:




### 6.5.3 Test Data:

Please Refer to Appendix for Details.

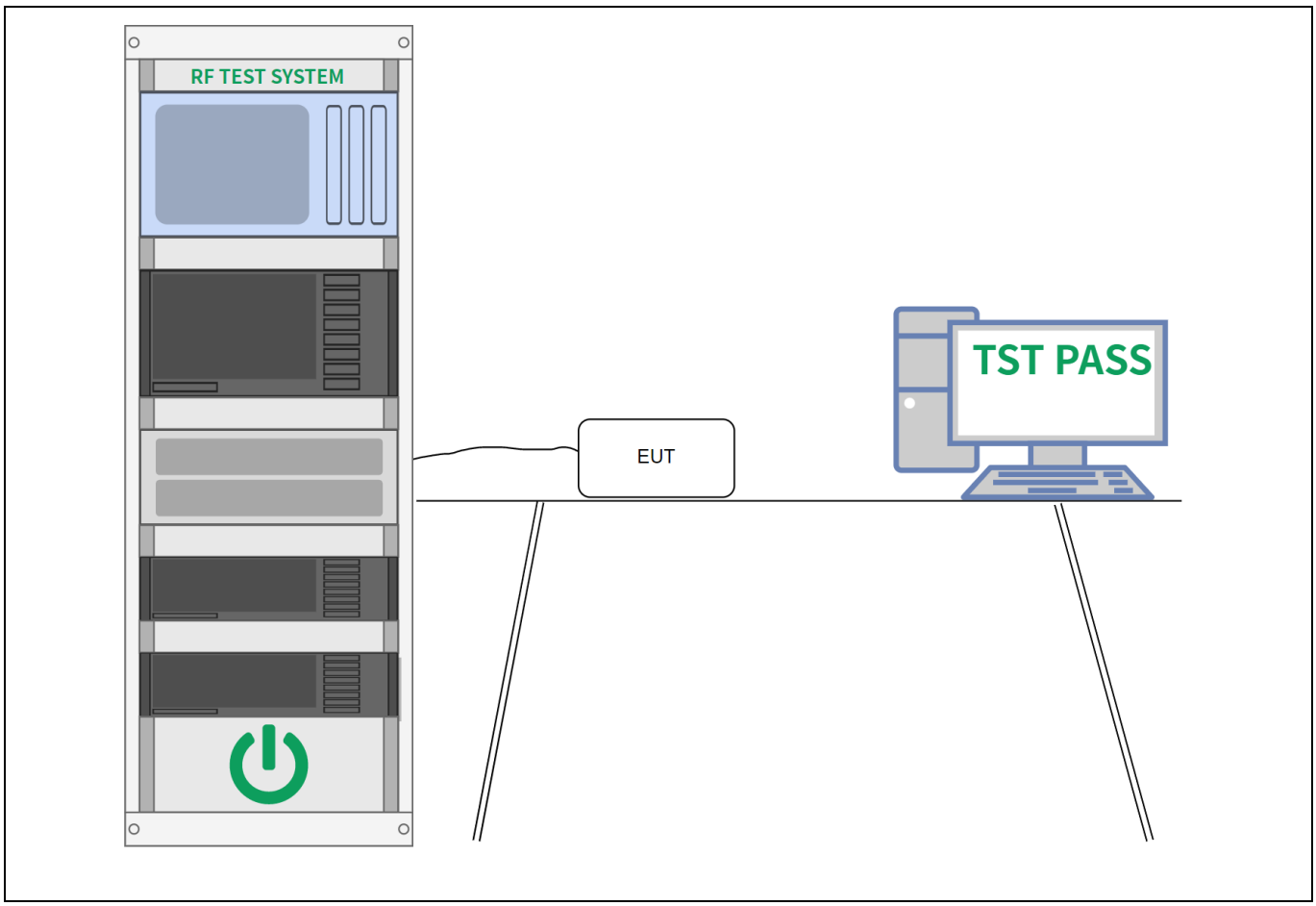
## 6.6 Emissions in non-restricted frequency bands

| | |
|---|---|
| Test Requirement: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. |
| Test Limit: | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. |
| Test Method: | Conducted spurious emissions test methodology |
| Procedure: | Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the maximum transmit powers.<br>Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered. |

### 6.6.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 26 °C | Humidity: | 57 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode1, Mode2, Mode3 | | | | |

### 6.6.2 Test Setup Diagram:




### 6.6.3 Test Data:

Please Refer to Appendix for Details.

## 6.7 Band edge emissions (Radiated)

<table>
<tr><td>Test Requirement:</td><td>In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g.,<br>§§ 15.231 and 15.241.
</td></tr>
<tr><td>Test Method:</td><td>Radiated emissions tests</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2013 section 6.10</td></tr>
</table>

### 6.7.1 E.U.T. Operation:

<table>
<tr><td colspan="6">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>25 °C</td><td>Humidity:</td><td>50 %</td><td>Atmospheric Pressure:</td><td>101 kPa</td></tr>
<tr><td colspan="2">Pre test mode:</td><td colspan="4">Mode1, Mode2, Mode3</td></tr>
<tr><td colspan="2">Final test mode:</td><td colspan="4">Mode2</td></tr>
</table>

### 6.7.2 Test Data:

Left earphone:

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 00

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2310.000 | 47.78 | -8.08 | 39.70 | 74.00 | -34.30 | peak |
| 2 | | 2310.000 | 37.22 | -8.08 | 29.14 | 54.00 | -24.86 | AVG |
| 3 | | 2390.000 | 48.21 | -7.71 | 40.50 | 74.00 | -33.50 | peak |
| 4 | * | 2390.000 | 38.84 | -7.71 | 31.13 | 54.00 | -22.87 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 00

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2310.000 | 47.30 | -8.08 | 39.22 | 74.00 | -34.78 | peak |
| 2 | | 2310.000 | 37.28 | -8.08 | 29.20 | 54.00 | -24.80 | AVG |
| 3 | | 2390.000 | 47.61 | -7.71 | 39.90 | 74.00 | -34.10 | peak |
| 4 | * | 2390.000 | 38.23 | -7.71 | 30.52 | 54.00 | -23.48 | AVG |

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 78

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2483.500 | 48.93 | -7.24 | 41.69 | 74.00 | -32.31 | peak |
| 2 | * | 2483.500 | 39.49 | -7.24 | 32.25 | 54.00 | -21.75 | AVG |
| 3 | | 2500.000 | 48.25 | -7.17 | 41.08 | 74.00 | -32.92 | peak |
| 4 | | 2500.000 | 37.97 | -7.17 | 30.80 | 54.00 | -23.20 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 78

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2483.500 | 50.76 | -7.24 | 43.52 | 74.00 | -30.48 | peak |
| 2 | * | 2483.500 | 40.87 | -7.24 | 33.63 | 54.00 | -20.37 | AVG |
| 3 | | 2500.000 | 48.44 | -7.17 | 41.27 | 74.00 | -32.73 | peak |
| 4 | | 2500.000 | 38.05 | -7.17 | 30.88 | 54.00 | -23.12 | AVG |

Right earphone:

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 00

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2310.000 | 46.37 | -8.08 | 38.29 | 74.00 | -35.71 | peak |
| 2 | | 2310.000 | 37.38 | -8.08 | 29.30 | 54.00 | -24.70 | AVG |
| 3 | | 2390.000 | 49.34 | -7.71 | 41.63 | 74.00 | -32.37 | peak |
| 4 | * | 2390.000 | 39.22 | -7.71 | 31.51 | 54.00 | -22.49 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 00

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2310.000 | 46.93 | -8.08 | 38.85 | 74.00 | -35.15 | peak |
| 2 | | 2310.000 | 37.96 | -8.08 | 29.88 | 54.00 | -24.12 | AVG |
| 3 | | 2390.000 | 49.68 | -7.71 | 41.97 | 74.00 | -32.03 | peak |
| 4 | * | 2390.000 | 39.31 | -7.71 | 31.60 | 54.00 | -22.40 | AVG |

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 78

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2483.500 | 53.35 | -7.24 | 46.11 | 74.00 | -27.89 | peak |
| 2 | * | 2483.500 | 41.70 | -7.24 | 34.46 | 54.00 | -19.54 | AVG |
| 3 | | 2500.000 | 47.56 | -7.17 | 40.39 | 74.00 | -33.61 | peak |
| 4 | | 2500.000 | 38.27 | -7.17 | 31.10 | 54.00 | -22.90 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 78

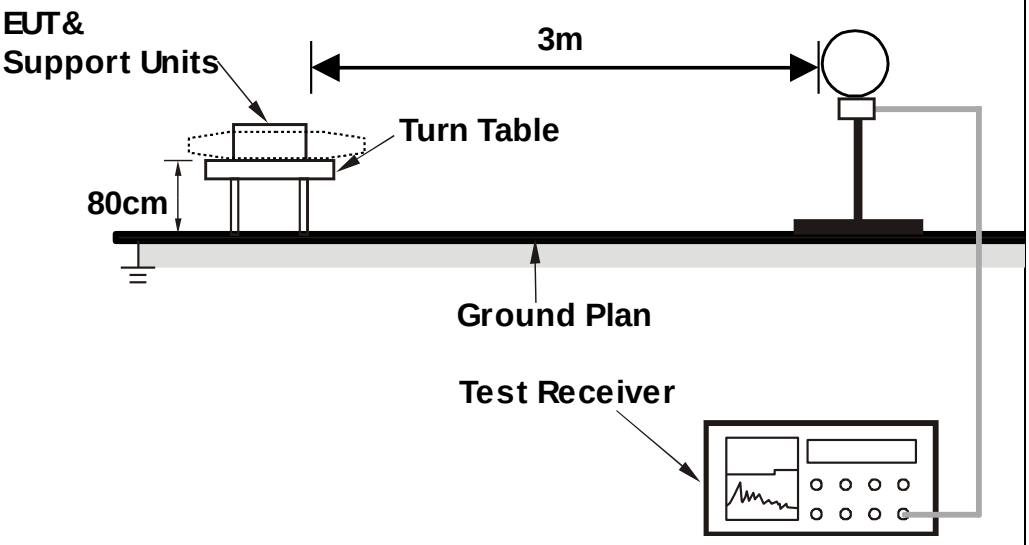
| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 2483.500 | 48.69 | -7.24 | 41.45 | 74.00 | -32.55 | peak |
| 2 | * | 2483.500 | 38.86 | -7.24 | 31.62 | 54.00 | -22.38 | AVG |
| 3 | | 2500.000 | 48.31 | -7.17 | 41.14 | 74.00 | -32.86 | peak |
| 4 | | 2500.000 | 38.10 | -7.17 | 30.93 | 54.00 | -23.07 | AVG |

## 6.8 Emissions in restricted frequency bands (below 1GHz)

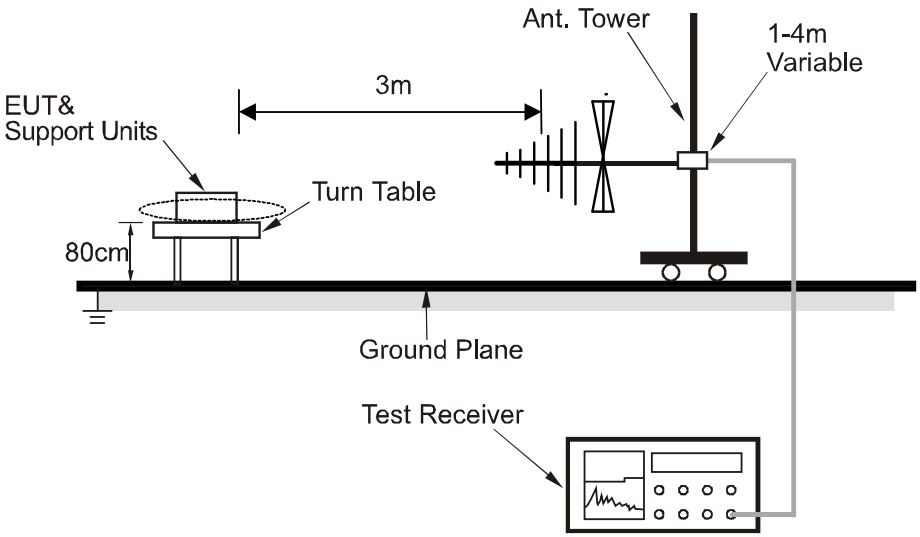
<table>
<tr><td>Test Requirement:</td><td>In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).`</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g.,<br>§§ 15.231 and 15.241.</td></tr>
<tr><td>Test Method:</td><td>Radiated emissions tests</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2013 section 6.6.4</td></tr>
</table>

Test setup:

Below 30MHz




30MHz~1GHz




For the actual test configuration, please refer to the related item – Photographs of the test setup.

### 6.8.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25 °C | Humidity: | 50 % | Atmospheric Pressure: | 100 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode2 | | | | |

Note:

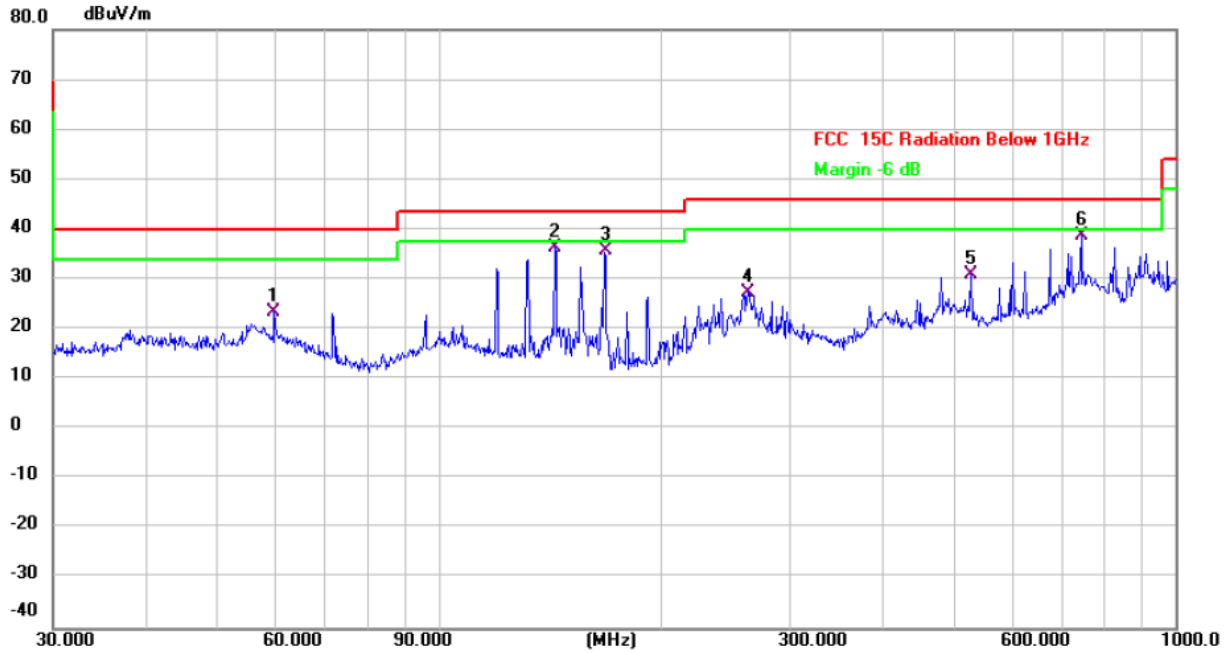
The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.

All modes of operation of the EUT were investigated, and only the worst-case results are reported. There were no emissions found below 30MHz within 20dB of the limit.

### 6.8.2 Test Data:

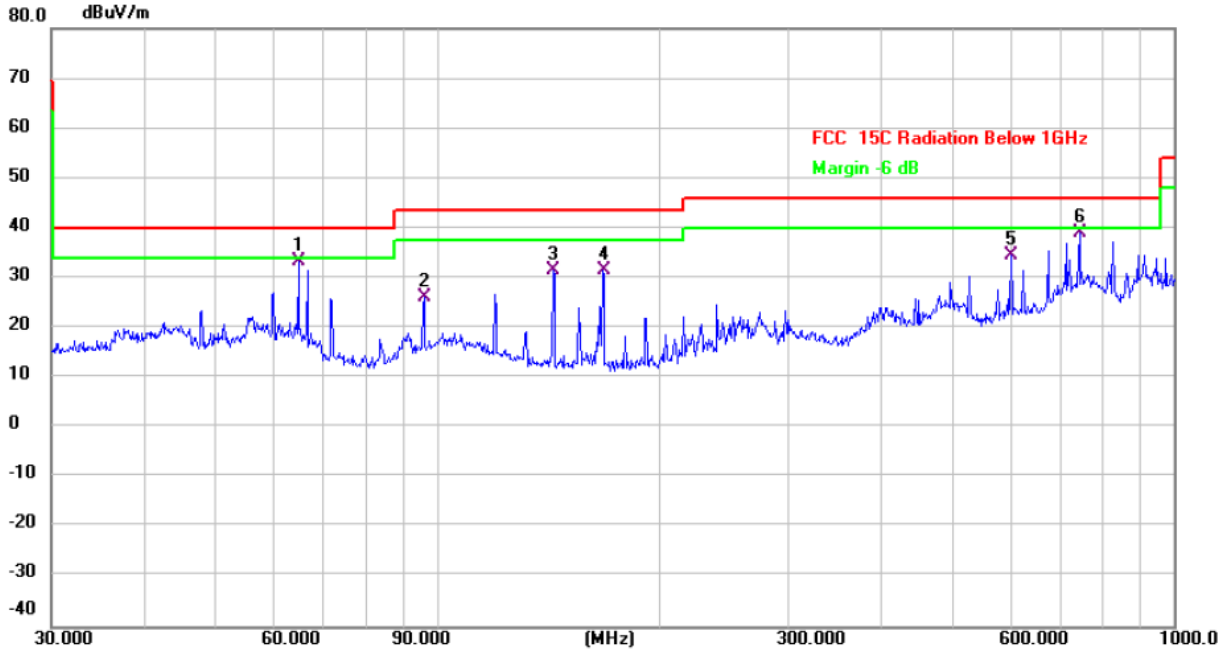
Left earphone:

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 78




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 59.8588 | 30.27 | -6.73 | 23.54 | 40.00 | -16.46 | QP | |
| 2 | | 143.8295 | 47.55 | -11.28 | 36.27 | 43.50 | -7.23 | QP | |
| 3 | | 167.8243 | 47.17 | -11.57 | 35.60 | 43.50 | -7.90 | QP | |
| 4 | | 262.8955 | 35.08 | -7.81 | 27.27 | 46.00 | -18.73 | QP | |
| 5 | | 528.2458 | 37.48 | -6.66 | 30.82 | 46.00 | -15.18 | QP | |
| 6 | * | 744.8661 | 36.47 | 2.33 | 38.80 | 46.00 | -7.20 | QP | |

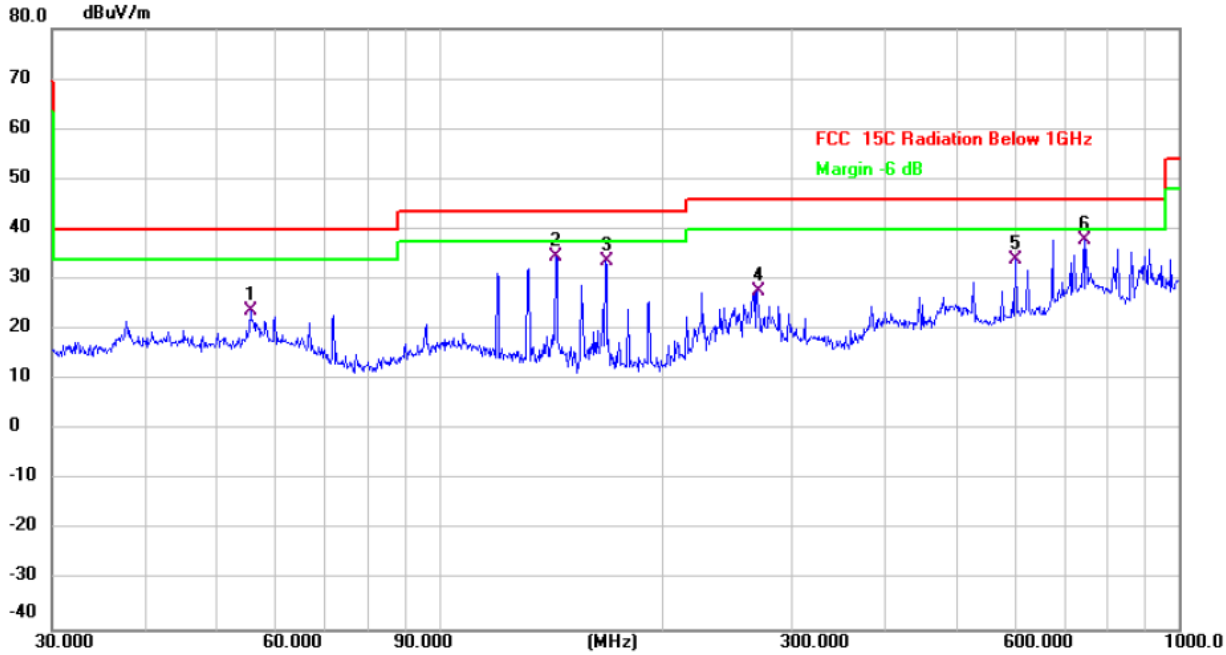
Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 78




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | * | 64.8865 | 41.56 | -8.18 | 33.38 | 40.00 | -6.62 | QP | |
| 2 | | 96.0986 | 34.22 | -8.13 | 26.09 | 43.50 | -17.41 | QP | |
| 3 | | 143.8295 | 42.71 | -11.28 | 31.43 | 43.50 | -12.07 | QP | |
| 4 | | 167.8243 | 43.04 | -11.57 | 31.47 | 43.50 | -12.03 | QP | |
| 5 | | 601.4265 | 37.11 | -2.42 | 34.69 | 46.00 | -11.31 | QP | |
| 6 | | 744.8661 | 36.59 | 2.33 | 38.92 | 46.00 | -7.08 | QP | |

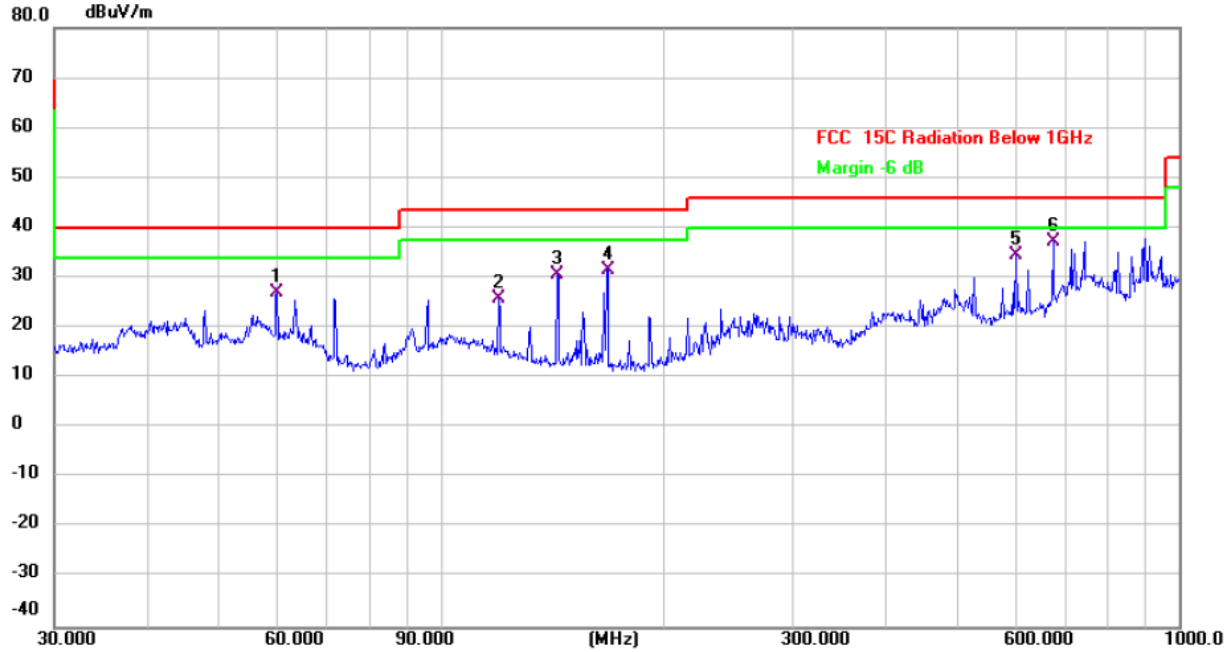
Right earphone:

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 78




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 55.6094 | 30.97 | -7.12 | 23.85 | 40.00 | -16.15 | QP | |
| 2 | | 143.8295 | 45.80 | -11.28 | 34.52 | 43.50 | -8.98 | QP | |
| 3 | | 167.8243 | 45.17 | -11.57 | 33.60 | 43.50 | -9.90 | QP | |
| 4 | | 269.4284 | 35.33 | -7.75 | 27.58 | 46.00 | -18.42 | QP | |
| 5 | | 601.4265 | 36.29 | -2.42 | 33.87 | 46.00 | -12.13 | QP | |
| 6 | * | 744.8661 | 35.52 | 2.33 | 37.85 | 46.00 | -8.15 | QP | |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 78




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector | Comment |
| 1 | | 60.0691 | 33.88 | -6.74 | 27.14 | 40.00 | -12.86 | QP | |
| 2 | | 119.8556 | 36.03 | -10.20 | 25.83 | 43.50 | -17.67 | QP | |
| 3 | | 143.8295 | 41.92 | -11.28 | 30.64 | 43.50 | -12.86 | QP | |
| 4 | | 167.8243 | 43.16 | -11.57 | 31.59 | 43.50 | -11.91 | QP | |
| 5 | | 601.4265 | 36.85 | -2.42 | 34.43 | 46.00 | -11.57 | QP | |
| 6 | * | 675.2080 | 39.99 | -2.60 | 37.39 | 46.00 | -8.61 | QP | |

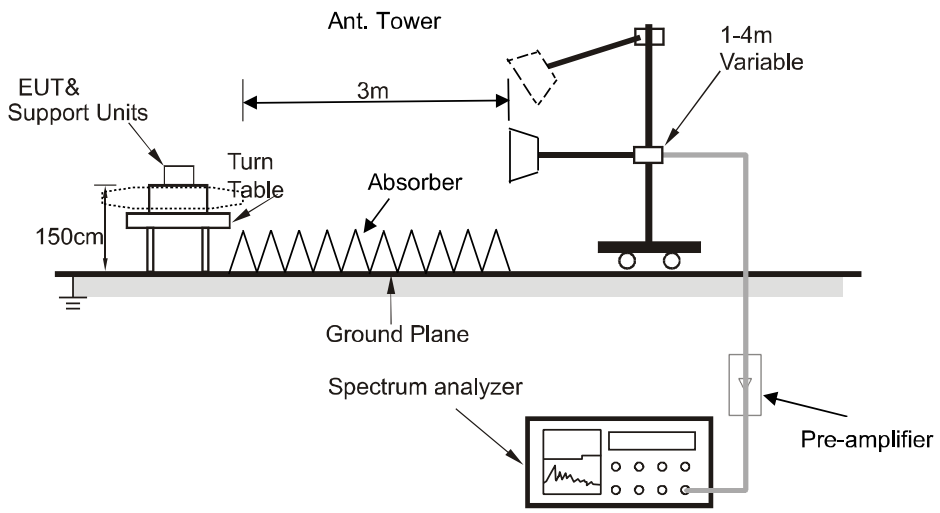
## 6.9 Emissions in restricted frequency bands (above 1GHz)

| | |
|---|---|
| Test Requirement: | In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).` |
| Test Limit: | |

| Frequency (MHz) | Field strength (microvolts/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 |

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g.,
§§ 15.231 and 15.241.

| | |
|---|---|
| Test Method: | Radiated emissions tests |
| Procedure: | ANSI C63.10-2013 section 6.6.4 |
| Test setup: | Above 1GHz |




For the actual test configuration, please refer to the related item – Photographs of the test setup.

### 6.9.1 E.U.T. Operation:

| Operating Environment: | | | | | |
|---|---|---|---|---|---|
| Temperature: | 25 °C | Humidity: | 50 % | Atmospheric Pressure: | 101 kPa |
| Pre test mode: | Mode1, Mode2, Mode3 | | | | |
| Final test mode: | Mode2 | | | | |

Note: Test frequency are from 1GHz to 25GHz, the amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.

All modes of operation of the EUT were investigated, and only the worst-case results are reported.

### 6.9.2 Test Data:

Left earphone:

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 00

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4804.000 | 43.97 | 0.74 | 44.71 | 74.00 | -29.29 | peak |
| 2 | | 4804.000 | 39.21 | 0.74 | 39.95 | 54.00 | -14.05 | AVG |
| 3 | | 7206.000 | 40.27 | 6.02 | 46.29 | 74.00 | -27.71 | peak |
| 4 | | 7206.000 | 35.04 | 6.02 | 41.06 | 54.00 | -12.94 | AVG |
| 5 | | 9608.000 | 41.50 | 5.88 | 47.38 | 74.00 | -26.62 | peak |
| 6 | * | 9608.000 | 36.23 | 5.88 | 42.11 | 54.00 | -11.89 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 00

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4804.000 | 45.36 | 0.74 | 46.10 | 74.00 | -27.90 | peak |
| 2 | | 4804.000 | 39.27 | 0.74 | 40.01 | 54.00 | -13.99 | AVG |
| 3 | | 7206.000 | 40.78 | 6.02 | 46.80 | 74.00 | -27.20 | peak |
| 4 | | 7206.000 | 34.35 | 6.02 | 40.37 | 54.00 | -13.63 | AVG |
| 5 | | 9608.000 | 41.39 | 5.88 | 47.27 | 74.00 | -26.73 | peak |
| 6 | * | 9608.000 | 34.83 | 5.88 | 40.71 | 54.00 | -13.29 | AVG |

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 39

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4882.000 | 46.30 | 1.05 | 47.35 | 74.00 | -26.65 | peak |
| 2 | * | 4882.000 | 41.34 | 1.05 | 42.39 | 54.00 | -11.61 | AVG |
| 3 | | 7323.000 | 40.43 | 5.94 | 46.37 | 74.00 | -27.63 | peak |
| 4 | | 7323.000 | 34.17 | 5.94 | 40.11 | 54.00 | -13.89 | AVG |
| 5 | | 9764.000 | 41.21 | 6.55 | 47.76 | 74.00 | -26.24 | peak |
| 6 | | 9764.000 | 34.02 | 6.55 | 40.57 | 54.00 | -13.43 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 39

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4882.000 | 47.01 | 1.05 | 48.06 | 74.00 | -25.94 | peak |
| 2 | | 4882.000 | 40.67 | 1.05 | 41.72 | 54.00 | -12.28 | AVG |
| 3 | | 7323.000 | 40.50 | 5.94 | 46.44 | 74.00 | -27.56 | peak |
| 4 | | 7323.000 | 34.45 | 5.94 | 40.39 | 54.00 | -13.61 | AVG |
| 5 | | 9764.000 | 41.97 | 6.55 | 48.52 | 74.00 | -25.48 | peak |
| 6 | * | 9764.000 | 35.64 | 6.55 | 42.19 | 54.00 | -11.81 | AVG |

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 78

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4960.000 | 47.18 | 1.50 | 48.68 | 74.00 | -25.32 | peak |
| 2 | * | 4960.000 | 42.08 | 1.50 | 43.58 | 54.00 | -10.42 | AVG |
| 3 | | 7440.000 | 40.50 | 5.61 | 46.11 | 74.00 | -27.89 | peak |
| 4 | | 7440.000 | 34.24 | 5.61 | 39.85 | 54.00 | -14.15 | AVG |
| 5 | | 9920.000 | 41.57 | 6.10 | 47.67 | 74.00 | -26.33 | peak |
| 6 | | 9920.000 | 35.44 | 6.10 | 41.54 | 54.00 | -12.46 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 78

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4960.000 | 47.91 | 1.50 | 49.41 | 74.00 | -24.59 | peak |
| 2 | * | 4960.000 | 41.77 | 1.50 | 43.27 | 54.00 | -10.73 | AVG |
| 3 | | 7440.000 | 40.99 | 5.61 | 46.60 | 74.00 | -27.40 | peak |
| 4 | | 7440.000 | 34.76 | 5.61 | 40.37 | 54.00 | -13.63 | AVG |
| 5 | | 9920.000 | 41.45 | 6.10 | 47.55 | 74.00 | -26.45 | peak |
| 6 | | 9920.000 | 35.58 | 6.10 | 41.68 | 54.00 | -12.32 | AVG |

Right earphone:

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 00

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4804.000 | 53.39 | 0.74 | 54.13 | 74.00 | -19.87 | peak |
| 2 | * | 4804.000 | 48.17 | 0.74 | 48.91 | 54.00 | -5.09 | AVG |
| 3 | | 7206.000 | 39.73 | 6.02 | 45.75 | 74.00 | -28.25 | peak |
| 4 | | 7206.000 | 33.83 | 6.02 | 39.85 | 54.00 | -14.15 | AVG |
| 5 | | 9608.000 | 41.60 | 5.88 | 47.48 | 74.00 | -26.52 | peak |
| 6 | | 9608.000 | 35.18 | 5.88 | 41.06 | 54.00 | -12.94 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 00

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4804.000 | 49.91 | 0.74 | 50.65 | 74.00 | -23.35 | peak |
| 2 | * | 4804.000 | 45.11 | 0.74 | 45.85 | 54.00 | -8.15 | AVG |
| 3 | | 7206.000 | 40.41 | 6.02 | 46.43 | 74.00 | -27.57 | peak |
| 4 | | 7206.000 | 34.27 | 6.02 | 40.29 | 54.00 | -13.71 | AVG |
| 5 | | 9608.000 | 42.14 | 5.88 | 48.02 | 74.00 | -25.98 | peak |
| 6 | | 9608.000 | 35.86 | 5.88 | 41.74 | 54.00 | -12.26 | AVG |

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 39

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4882.000 | 50.94 | 1.05 | 51.99 | 74.00 | -22.01 | peak |
| 2 | * | 4882.000 | 44.87 | 1.05 | 45.92 | 54.00 | -8.08 | AVG |
| 3 | | 7323.000 | 39.74 | 5.94 | 45.68 | 74.00 | -28.32 | peak |
| 4 | | 7323.000 | 33.47 | 5.94 | 39.41 | 54.00 | -14.59 | AVG |
| 5 | | 9764.000 | 40.74 | 6.55 | 47.29 | 74.00 | -26.71 | peak |
| 6 | | 9764.000 | 34.67 | 6.55 | 41.22 | 54.00 | -12.78 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 39

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4882.000 | 47.81 | 1.05 | 48.86 | 74.00 | -25.14 | peak |
| 2 | * | 4882.000 | 41.64 | 1.05 | 42.69 | 54.00 | -11.31 | AVG |
| 3 | | 7323.000 | 40.46 | 5.94 | 46.40 | 74.00 | -27.60 | peak |
| 4 | | 7323.000 | 34.22 | 5.94 | 40.16 | 54.00 | -13.84 | AVG |
| 5 | | 9764.000 | 40.34 | 6.55 | 46.89 | 74.00 | -27.11 | peak |
| 6 | | 9764.000 | 33.83 | 6.55 | 40.38 | 54.00 | -13.62 | AVG |

Mode2 / Polarization: Horizontal / Band: 2.4G / BW: 1 / CH: 78

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4960.000 | 47.79 | 1.50 | 49.29 | 74.00 | -24.71 | peak |
| 2 | | 4960.000 | 41.59 | 1.50 | 43.09 | 54.00 | -10.91 | AVG |
| 3 | | 7440.000 | 40.50 | 5.61 | 46.11 | 74.00 | -27.89 | peak |
| 4 | | 7440.000 | 34.39 | 5.61 | 40.00 | 54.00 | -14.00 | AVG |
| 5 | | 9920.000 | 40.77 | 6.10 | 46.87 | 74.00 | -27.13 | peak |
| 6 | * | 9920.000 | 40.19 | 6.10 | 46.29 | 54.00 | -7.71 | AVG |

Mode2 / Polarization: Vertical / Band: 2.4G / BW: 1 / CH: 78

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | | 4960.000 | 45.98 | 1.50 | 47.48 | 74.00 | -26.52 | peak |
| 2 | * | 4960.000 | 39.86 | 1.50 | 41.36 | 54.00 | -12.64 | AVG |
| 3 | | 7440.000 | 40.87 | 5.61 | 46.48 | 74.00 | -27.52 | peak |
| 4 | | 7440.000 | 34.61 | 5.61 | 40.22 | 54.00 | -13.78 | AVG |
| 5 | | 9920.000 | 40.65 | 6.10 | 46.75 | 74.00 | -27.25 | peak |
| 6 | | 9920.000 | 34.41 | 6.10 | 40.51 | 54.00 | -13.49 | AVG |

## Photographs of the test setup

Refer to Appendix - Test Setup Photos.

## Photographs of the EUT

Refer to Appendix - EUT Photos

# Appendix

# Appendix A: 20dB Emission Bandwidth

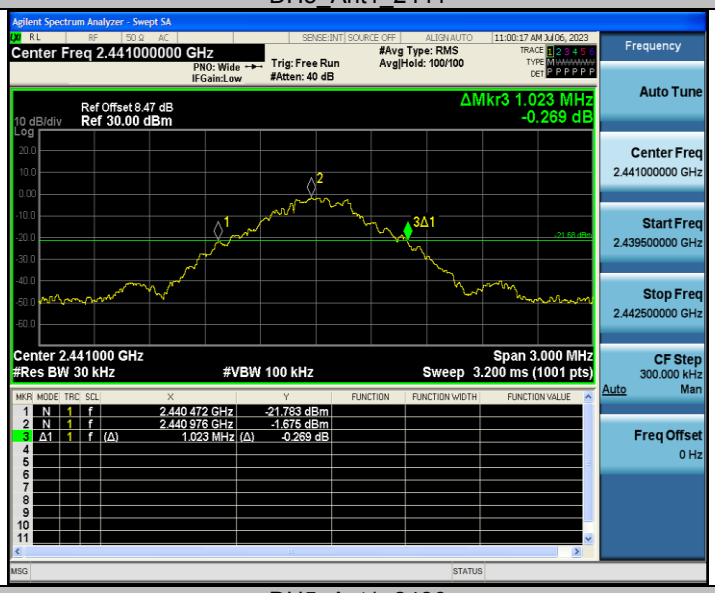
Test Result

| Test Mode | Antenna | Frequency [MHz] | 20db EBW [MHz] |
|---|---|---|---|
| DH5 | Ant1 | 2402 | 0.966 |
| | | 2441 | 1.023 |
| | | 2480 | 0.954 |
| 2DH5 | Ant1 | 2402 | 1.293 |
| | | 2441 | 1.314 |
| | | 2480 | 1.311 |
| 3DH5 | Ant1 | 2402 | 1.296 |
| | | 2441 | 1.311 |
| | | 2480 | 1.296 |

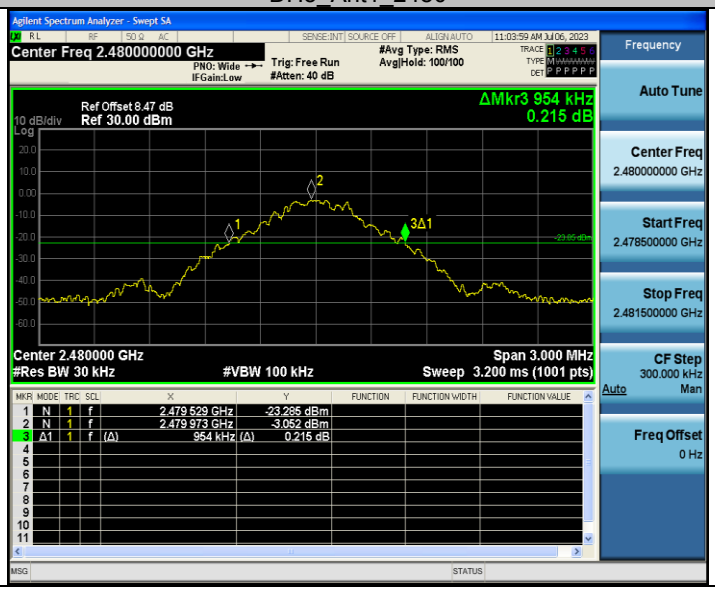
## Test Graphs

DH5_Ant1_2402

DH5_Ant1_2441




DH5_Ant1_2480



2DH5_Ant1_2402

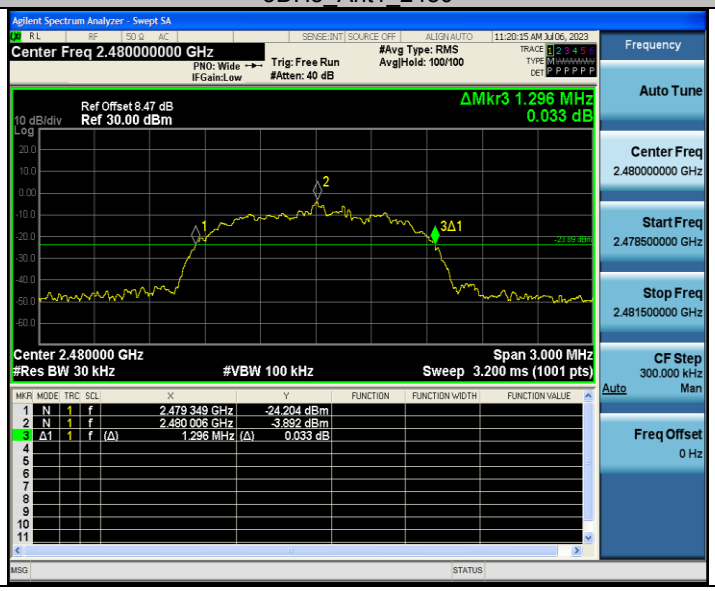
2DH5_Ant1_2441

2DH5_Ant1_2480

3DH5_Ant1_2402

3DH5_Ant1_2441

3DH5_Ant1_2480



# Appendix B: Maximum conducted output power

Test Result Peak

| Test Mode | Antenna | Frequency [MHz] | Conducted Peak Power [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|
| DH5 | Ant1 | 2402 | 2.3 | ≤30 | PASS |
| | | 2441 | 1.67 | ≤30 | PASS |
| | | 2480 | 0.28 | ≤30 | PASS |
| 2DH5 | Ant1 | 2402 | 2.65 | ≤20.97 | PASS |
| | | 2441 | 2.14 | ≤20.97 | PASS |
| | | 2480 | 0.67 | ≤20.97 | PASS |
| 3DH5 | Ant1 | 2402 | 3.07 | ≤20.97 | PASS |
| | | 2441 | 2.43 | ≤20.97 | PASS |
| | | 2480 | 1.13 | ≤20.97 | PASS |