# RF TEST REPORT

| | | | | |
|---|---|---|---|---|
| Report Number | | KIEL2403-YW03401-R01 | | |
| Applicant | Company Name | MAYTON | | |
| | Address | 404, Annam-ro Bupyeong-gu, Incheon, South Korea | | |
| Product | Product Name | AutoProX | | |
| | Model Name | AUTOPRO-X | | |
| | FCC ID | 2BAG8-AUTOPROX | | |
| | Manufacturer | SUZHOU MEIYITE AUTO PARTS CO.,LTD | | |
| Other | Receipt Date | 2024.02.07 | Receipt Number | RQW2403-1234 |
| | Issued Date | 2024.03.29 | Tested Date | 2024.02.07 ~ 2024.03.11 |
| Standards | | FCC 47 CFR Part 15 Subpart C 15.247<br>ANSI C63.10 : 2020 | | |
| Tested by | | Dominic Sim (Sign) | | |
| Approved by | | David Jang (Sign) | | |

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## Revision History

| Issued Date | Issued Report No. | Revisions |
|---|---|---|
| 2024.03.25 | KIEL2403-YW03401 | Initial Issue |
| 2024.03.29 | KIEL2403-YW03401-R01 | Correct typo |

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## 1.0 Laboratory Information

| | |
|---|---|
| **Laboratory Name** | KIEL Institute |
| **Location** | 1-1, Gilju-ro, Bucheon-city, Gyeonggi-do, Korea 14505 |
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## 2.0 Applicant Information

| | |
|---|---|
| **Applicant Name**<br>**Address** | MAYTON<br>404, Annam-ro Bupyeong-gu, Incheon, South Korea |
| **Manufacturer**<br>**Address** | SUZHOU MEIYITE AUTO PARTS CO.,LTD<br>Room A212, Building 2, 160 Sanxiang Road, Suzhou City, China |

## 3.0 Summary of Test Results

Applied standard: FCC part 15, subpart C 15.247

| FCC Part Section(s) | Test Item | Reference | Result |
|---|---|---|---|
| 15.247 (b)(1) | Maximum Peak Output Power | Section 6.2 | P |
| 15.247 (a)(1) | Carrier Frequency Separation | Section 6.4 | P |
| 15.247 (a)(1) | 20 dB Channel Bandwidth | Section 6.3 | P |
| 15.247 (a)(1)(iii) | Number of Hopping Channels | Section 6.5 | P |
| 15.247 (a)(1)(iii) | Time of Occupancy (Dwell Time) | Section 6.6 | P |
| 15.247 (d) | Band Edge / Out-of-Band Emissions (Conducted Spurious Emission) | Section 6.7 | P |
| 15.205 15.209 | General Field Strength (Restricted Bands and Radiated Emission Limits) | Section 6.7 | P |
| 15.207 | AC Power Line Conducted Emissions (150 kHz – 30 MHz) | Section 6.8 | P |

(Note 1) P = Pass, NC = Not comply, NT = Not Tested, NA = Not Applicable
(Note 2) The general test methods used to test on this devices are ANSI C63.10.
(Note 3) If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.
(Note 4) Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
(Note 5) For emission test from 9 ㎑ to 30 ㎒,
Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

## 3.1 Meaurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2

| Measurement Items | Frequency Range | Expanded Uncertainty U = kUc (*k* = 2) |
|---|---|---|
| Conducted Emission at main ports | 150 kHz – 30 MHz | 3.24 dB |
| Radiated Spurious Emissions | 9 kHz – 30 MHz | 3.39 dB |
| | 30 MHz – 1 GHz | 5.14 dB |
| | 1 GHz – 18 GHz | 3.18 dB |
| | 18 GHz – 40 GHz | 4.54 dB |

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

# 4.0 General Information

## 4.1 EUT Description

| | |
|---|---|
| **Product name** | AutoProX |
| **Basic model** | AUTOPRO-X |
| **Product S/N** | - |
| **Variant model(s)** | - |
| **Model Difference** | - |
| **Power supply** | DC 5 V |
| **Modulation** | GFSK, π/4DQPSK, 8DPSK |
| **Transfer Rate** | BDR : 1 [Mbps]<br>EDR : 2, 3 [Mbps] |
| **Operating Frequency** | 2 402 ~ 2 480 [MHz] |
| **Number of channel** | 79 Channels |
| **Output Power** | 7.40 dBm (5.50 mW) |
| **Antenna Type** | FPCB (1T1R) |
| **Antenna Connector** | U.FL Connector |

(Note 1) The above equipment has been tested by KIEL Institute, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

### 4.1.1 List of Accessories

| Accessories | Brand | Model | Manufacturer | Specification |
|---|---|---|---|---|
| - | - | - | - | - |

### 4.1.2 Auxiliary Test equipment

| Auxiliary Test equipment | Brand | Model | Manufacturer | Specification |
|---|---|---|---|---|
| Laptop | Lenovo IdeaPad S500 Touch | 20248 | Lenovo PC HK Limited | - |
| AC Adapter(Laptop) | Lenovo | ADLX45NCC3A | CHICONY POWER TECHNOLOGY (SUZHOU) CO.,LTD. | Input: AC 100 V ~ 240 V / 50 ~ 60 Hz<br>Ouput: DC 20 V |

### 4.1.3 Antenna Information

| Antenna | Type | Frequency Range | Peak Gain |
|---|---|---|---|
| Ant A (Bluetooth) | FPCB | 2 400 MHz – 2 483.5 MHz | 1.56 dBi |
| Ant B (Wi-Fi) | FPCB | 2 400 MHz – 2 483.5 MHz | 2.15 dBi |
| | | 5 150 MHz – 5 350 MHz | 4.41 dBi |

### 4.1.4 Channel List of EUT

| Channel | Frequency [MHz] | Channel | Frequency [MHz] | Channel | Frequency [MHz] | Channel | Frequency [MHz] |
|---|---|---|---|---|---|---|---|
| 0 | 2 402 | 20 | 2 422 | 40 | 2 442 | 60 | 2 462 |
| 1 | 2 403 | 21 | 2 423 | 41 | 2 443 | 61 | 2 463 |
| 2 | 2 404 | 22 | 2 424 | 42 | 2 444 | 62 | 2 464 |
| 3 | 2 405 | 23 | 2 425 | 43 | 2 445 | 63 | 2 465 |
| 4 | 2 406 | 24 | 2 426 | 44 | 2 446 | 64 | 2 466 |
| 5 | 2 407 | 25 | 2 427 | 45 | 2 447 | 65 | 2 467 |
| 6 | 2 408 | 26 | 2 428 | 46 | 2 448 | 66 | 2 468 |
| 7 | 2 409 | 27 | 2 429 | 47 | 2 449 | 67 | 2 469 |
| 8 | 2 410 | 28 | 2 430 | 48 | 2 450 | 68 | 2 470 |
| 9 | 2 411 | 29 | 2 431 | 49 | 2 451 | 69 | 2 471 |
| 10 | 2 412 | 30 | 2 432 | 50 | 2 452 | 70 | 2 472 |
| 11 | 2 413 | 31 | 2 433 | 51 | 2 453 | 71 | 2 473 |
| 12 | 2 414 | 32 | 2 434 | 52 | 2 454 | 72 | 2 474 |
| 13 | 2 415 | 33 | 2 435 | 53 | 2 455 | 73 | 2 475 |
| 14 | 2 416 | 34 | 2 436 | 54 | 2 456 | 74 | 2 476 |
| 15 | 2 417 | 35 | 2 437 | 55 | 2 457 | 75 | 2 477 |
| 16 | 2 418 | 36 | 2 438 | 56 | 2 458 | 76 | 2 478 |
| 17 | 2 419 | 37 | 2 439 | 57 | 2 459 | 77 | 2 479 |
| 18 | 2 420 | 38 | 2 440 | 58 | 2 460 | 78 | 2 480 |
| 19 | 2 421 | 39 | 2 441 | 59 | 2 461 | | |

## 4.2 Description of Test Mode

### 4.2.1 Test Mode Configuration

**- Axis worst case**

Pre-Scan has been performed to determine the worst case axis between antenna port, XYZ axis and frequency band.

| EUT Configuration | Applicable to | | Description |
|---|---|---|---|
| | Ant A(Bluetooth) | Ant B(Wi-Fi) | |
| Transmission | X axis | X axis | - |

**- Radiated Emission (Below 1 GHz, Above 18 GHz, and AC Power line conducted emission) worst case**

Radiated emission below 1 GHz, above 18 GHz and AC power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

| Tested Mode | Tested Channel | Packet Type | Description |
|---|---|---|---|
| EDR | 0 | 3-DH5 | - |

**- Radiated Emission (Above 1 GHz)**

Radiated emission above 1 GHz was performed with the EUT set to transmit Low/Mid/High channels.

| Tested Mode | Tested Channel | Packet Type | Description |
|---|---|---|---|
| BDR | 0, 39, 78 | DH5 | - |
| EDR | 0, 39, 78 | 3- DH5 | - |

**- Antenna Port Conducted Measurement**

This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

| Tested Mode | Tested Channel | Packet Type | Description |
|---|---|---|---|
| BDR | 0, 39, 78 | DH5 | - |
| EDR | 0, 39, 78 | 3-DH5 | - |

**- Test Conditon**

| Applecable to | Environmental Conditions | Test Voltage | Tested by |
|---|---|---|---|
| Radiated emissions(< 1GHz) | (23.0 ± 2) ºC, (41.6 ± 3) % R.H. | DC 5 V | Dominic Sim |
| Radiated emissions(> 1GHz) | (22.5 ± 2) ºC, (42.6 ± 3) % R.H. | DC 5 V | Dominic Sim |
| AC power line emission | (23.2 ± 2) ºC, (43.1 ± 3) % R.H. | AC 120 V, 60 Hz | Dominic Sim |
| Antenna port conducted | (23.1 ± 2) ºC, (44.3 ± 3) % R.H. | DC 5 V | Dominic Sim |

**- Worst case of data rates**

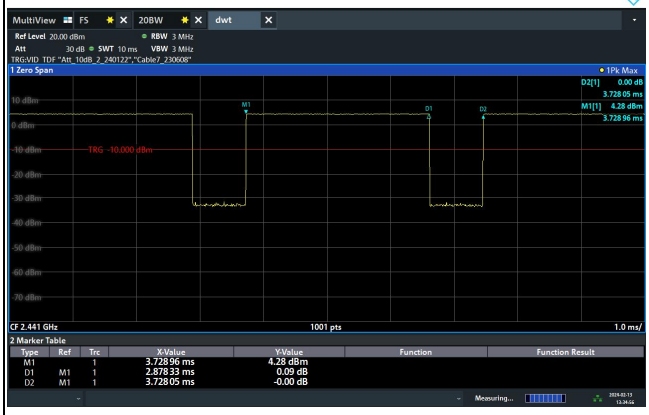
| Transmission | Test Mode | Worst Case Data Rate |
|---|---|---|
| SISO | BDR | DH5 |
| | EDR | 3-DH5 |

**- Duty Cycle of Test Signal**

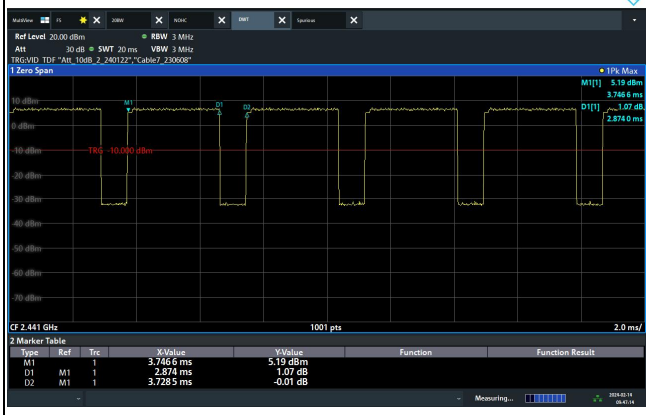
| Test Mode | Packet Type | On Time [msec] | Period [msec] | Duty cycle X [Linear] | Duty Cycle [%] | DCCF [dB] | 1/T min.VBW [kHz] |
|---|---|---|---|---|---|---|---|
| BDR | DH5 | 2.878 | 3.728 | 0.772 | 77.21 | 1.12 | 0.347 |
| EDR | 3-DH5 | 2.874 | 3.729 | 0.771 | 77.08 | 1.13 | 0.348 |

**- Test Plots of Duty Cycle**

**BDR(GFSK)_DH5**




**EDR(8DPSK)_3-DH5**



## 4.3 General Description of Applied Standard

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards.

**FCC CFR 47 Part 15, Subpart C (§15.247)**
**KDB 558074 D01 15.247 Meas Guidance v05r02**
**ANSI C63.10-2020**

All test items in this test report have been performed and recorded as per the above standards.

## 5.0 Test Equipment

Test Equipment is traceable to the National Institute of Standards and Technology (NIST). Measurement antenna used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

| | Equipment | Manufacturer | Model | S/N | Description | Cal Due |
|---|---|---|---|---|---|---|
| ■ | Spectrum Analyzer | Rohde & Schwarz | FSV3044 | 101034 | 10 Hz ~ 44 GHz | 2025-01-22 |
| ■ | Spectrum Analyzer | Rohde & Schwarz | FSV3030 | 102117 | 10 Hz ~ 30 GHz | 2024-05-25 |
| ■ | DC Power Supply | ODA | OPM-305D | ODA-04-0923-07960 | DC 30 V, 5 A, 2Ch | 2025-01-24 |
| ■ | Signal Generator | Rohde & Schwarz | SMBV100B | 101818 | 8 kHz ~ 6 GHz | 2025-01-23 |
| ■ | Vector Signal Generator | Rohde & Schwarz | SMB100A | 180880 | 100 kHz ~ 40 GHz | 2024-08-03 |
| ■ | Attenuator | INMET | 26A-10 | 2 | DC to 26.5 GHz,10 dB. | 2025-01-22 |
| ■ | Attenuator | INMET | 26A-10 | 3 | DC to 26.5 GHz,10 dB. | 2025-01-22 |
| ■ | True RMS Multimeter | FLUKE | 177 | 59570153 | 1000 V, 10 A | 2025-01-24 |
| ■ | Power Meter | Rohde & Schwarz | NRX | 101971 | DC ~ 40 GHz | 2025-01-23 |
| ■ | Power Sensor | Rohde & Schwarz | NRP-Z86 | 104137 | 50 MHz ~ 40 GHz | 2024-06-23 |
| ■ | Notch Filter | Micro-Tronics | BRM50702 | G577 | Stop band: 2 400 MHz ~ 2 500 MHz | 2024-05-25 |
| ■ | High Pass Filter | WT Microwave INC. | WT-A3331-HS | 23041001-1 | Pass band: 6.0 GHz ~ 24.5 GHz | 2024-05-25 |
| ■ | EMI Test Receiver | Rohde & Schwarz | ESW44 | 101737 | 1 Hz ~ 44 GHz | 2025-01-22 |
| ■ | EMI Test Receiver | Rohde & Schwarz | ESW26 | 103106 | 1 Hz ~ 26.5 GHz | 2025-01-22 |
| ■ | Active Loop Antenna | Rohde & Schwarz | HFH2-Z2E | 100858 | 8.3 kHz ~ 30 MHz | 2024-08-22 |
| ■ | Bi-Log Antenna | SCHWARZBECK | VULB9168 | 00915 | 25 MHz ~ 2 GHz | 2024-10-27 |
| ■ | Horn Antenna | Rohde & Schwarz | HF907 | 102722 | 800 MHz ~ 18 GHz | 2024-08-16 |
| ■ | Horn Antenna | SCHWARZBECK | BBHA9170 | 00981 | 15 GHz ~ 40 GHz | 2025-04-29 |
| ■ | Preamplifier | Rohde & Schwarz | SCU-01F | 010094 | 10 kHz ~ 1 GHz, 35 dB | 2024-08-02 |
| ■ | Preamplifier | Rohde & Schwarz | SCU-18F | 180084 | 1 GHz ~ 18 GHz | 2024-08-02 |
| ■ | Preamplifier | EXYNOD | ELNA40-50 | 2305161 | 18 GHz ~ 40 GHz | 2024-05-25 |
| ■ | 6dB Attenuator | Fairview Microwave | SA3N5W-06 | 190311028 | DC ~ 3 GHz, 6 dB | 2024-10-27 |
| ■ | Turntable | Innco | DT 3000-3t | - | - | - |
| □ | Antenna Mast_L | Innco | MA4000-EP | - | - | - |
| ■ | Antenna Mast_R | Innco | MA4000-EP | - | - | - |
| ■ | Controller_1 | Innco | CO3000 | 1062 | - | - |
| ■ | Controller_2 | Innco | CO3000 | 1063 | - | - |
| ■ | Software | Rohde & Schwarz | EMC32 | 101535 | - | - |
| ■ | Software | Rohde & Schwarz | ELEKTRA | 102739 | - | - |

# 6.0 Test Results

## 6.1 Antenna Requirement

**Except from §15.203 of the FCC Rules/Regulations:**
An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 the section.

- The antenna(s) of the EUT are Unique (non-standard) antenna connector.
  - The connector is withiin the transmitter enclosure.

- There are no provisions for connection to an external antenna.

### 6.1.1 Result

The EUT complies with the requirement of §15.203

## 6.2 Maximum Peak Output Power

### 6.2.1 Regulation

§15.247(a)(1) : 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.

§15.247(b)(1) : 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.

§15.247(b)(4) : The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 6.2.2 Test Procedure

The method of measurement used to test this FHSS device is ANSI C63.10-2020.

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.

**Peak Power Measurement**

a) Use the following spectrum analyzer settings:
   1) Span : Approximately five times the 20 dB bandwidth, centered on hopping channel
   2) RBW > 20 dB bandwidth of emission being measured
   3) VBW ≥ RBW
   4) Sweep : No faster than coupled (auto) time
   5) Detector function : Peak
   6) Trace : Max hold

b) Allow trace to stabilize

c) Use the marker-to-peak function to set the marker to the peak of the emissions

d) The indicated level is the peak output power, after any corrections for external attenuators and cables

e) A spectral plot of the test results and setup description shall be included in the test report.

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.

**Average Power Measurement**

Measurement using a power meter.

a) Averge Power measurement using an RF average power meter, as follows:

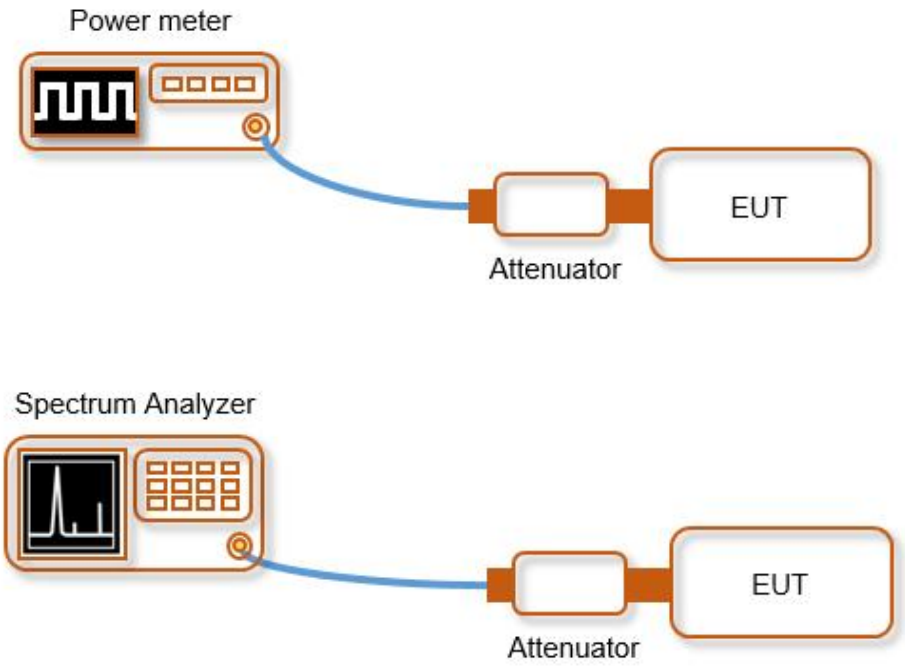
   1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
   2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
   3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal.

c) Measure the average power of the transmitter.
   This measurement is an average over both the ON and OFF periods of the transmitter.

d) Correct the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle.

### 6.2.3 Test Setup



### 6.2.4 Test Result

| Test Mode | Channel | Frequency [MHz] | Peak Output Power [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|
| BDR | 0 | 2 402 | 4.08 | 30.00 | 25.92 |
| | 39 | 2 441 | 4.02 | | 25.98 |
| | 78 | 2 480 | 3.67 | | 26.33 |
| EDR | 0 | 2 402 | 7.40 | 21.00 | 13.60 |
| | 39 | 2 441 | 7.22 | | 13.78 |
| | 78 | 2 480 | 6.45 | | 14.55 |

| Test Mode | Channel | Frequency [MHz] | DCCF [dB] | Average Power [dBm] | Max Average Power [dBm] |
|---|---|---|---|---|---|
| BDR | 0 | 2 402 | 1.12 | 2.72 | 3.84 |
| | 39 | 2 441 | 1.12 | 2.67 | 3.79 |
| | 78 | 2 480 | 1.12 | 2.30 | 3.42 |
| EDR | 0 | 2 402 | 1.13 | 3.14 | 4.27 |
| | 39 | 2 441 | 1.13 | 2.99 | 4.12 |
| | 78 | 2 480 | 1.13 | 2.19 | 3.32 |

- The results are measured by Peak/average Power meter & Sensor.

## 6.3 20 dB Bandwidth

### 6.3.1 Regulation

§15.247(a)(1) : 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.

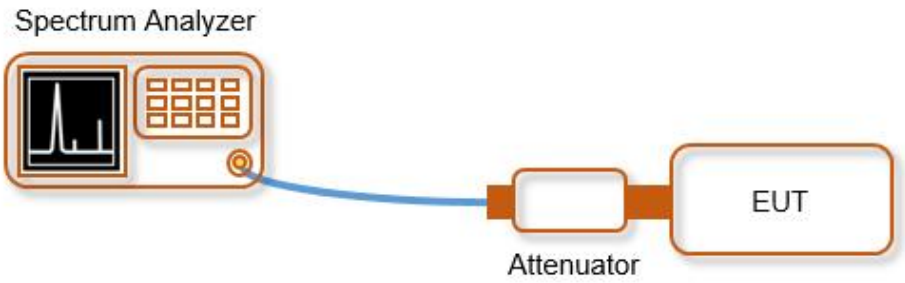
### 6.3.2 Test Procedure

The method of measurement used to test this FHSS device is ANSI C63.10-2020.

The following procedures shall be used for measuring the OBW of the fundamental frequencies of certain unlicensed wireless devices, when required.

a) Use the following spectrum analyzer settings:
   1) Span : Set betwwen two times and five times the OBW
   2) RBW : 1 % to 5 % of the OBW
   3) VBW ≥ 3 x RBW
   4) Sweep : Auto
   5) Detector function : Peak
   6) Trace : Max hold
b) Allow trace to stabilize
c) Use the N dB down function and set N value to -20
d) In case of 99 % bandwidth, Use 99 % power bandwidth function
e) A plot of the test results and setup description shall be included in the test report

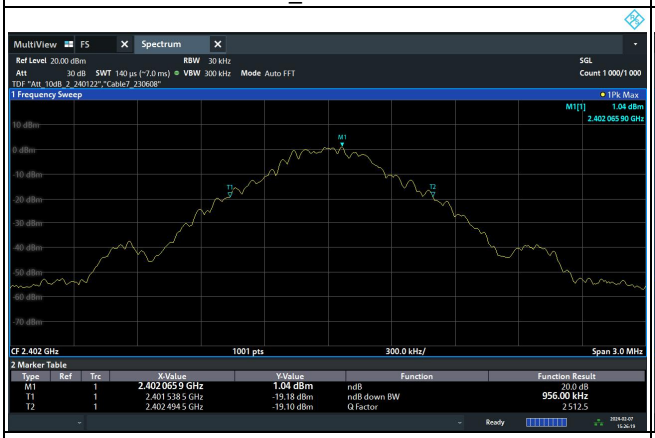
### 6.3.3 Test Setup



### 6.3.4 Test Result

| Test Mode | Channel | Frequency [MHz] | 20 dB BW [MHz] |
|---|---|---|---|
| BDR | 0 | 2 402 | 0.956 |
| | 39 | 2 441 | 0.956 |
| | 78 | 2 480 | 0.908 |
| EDR | 0 | 2 402 | 1.350 |
| | 39 | 2 441 | 1.350 |
| | 78 | 2 480 | 1.350 |

## Test Plot of 20 dB Bandwidth

| 20 dB Bandwidth | |
|---|---|
| BDR_2 402 MHz | EDR_2 402 MHz |
|  |  |
| BDR_2 441 MHz | EDR_2 441 MHz |
|  |  |
| BDR_2 480 MHz | BDR_2 480 MHz |
|  |  |

## 6.4 Carrier Frequency Separation

### 6.4.1 Regulation

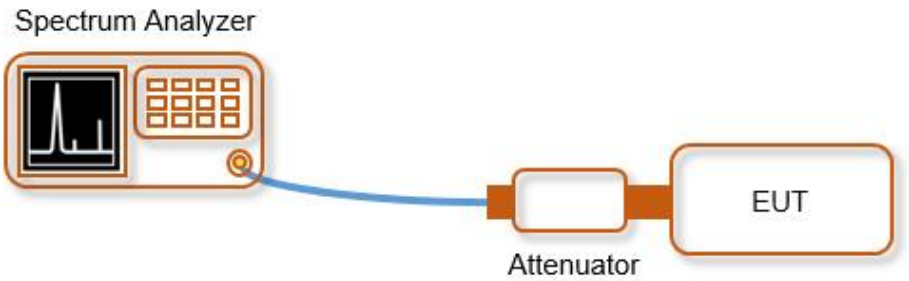
§15.247(a)(1) : Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier 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.

### 6.4.2 Test Procedure

The method of measurement used to test this FHSS device is ANSI C63.10-2020.

a) The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
b) Span: Wide enough to capture the peaks of two adjacent channels
c) 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
d) Video (or average) bandwidth (VBW) ≥ RBW
e) Sweep: No faster than coupled (auto) time
f) Detector function: Peak.
g) Trace: Max hold.
h) Allow the trace to stabilize.
i) 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.

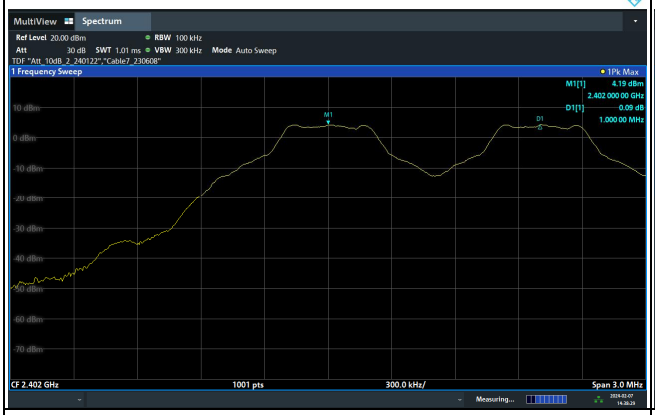
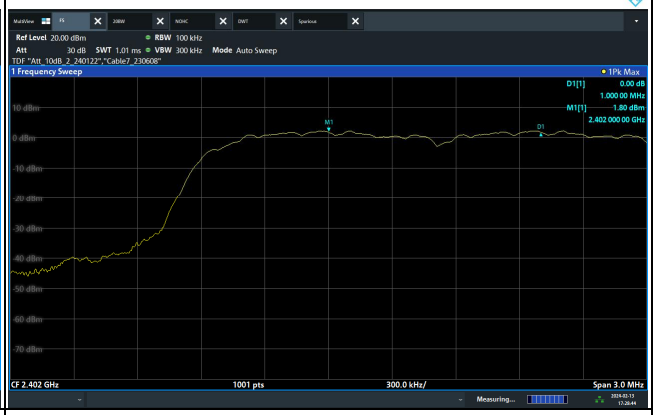
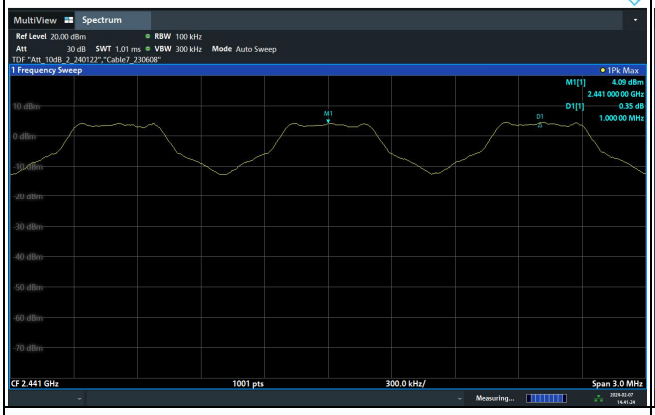
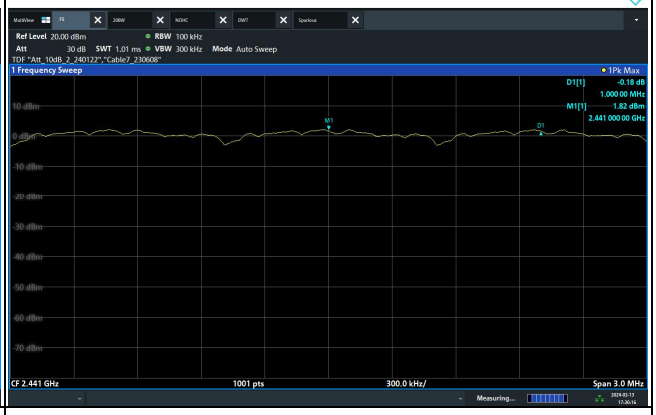
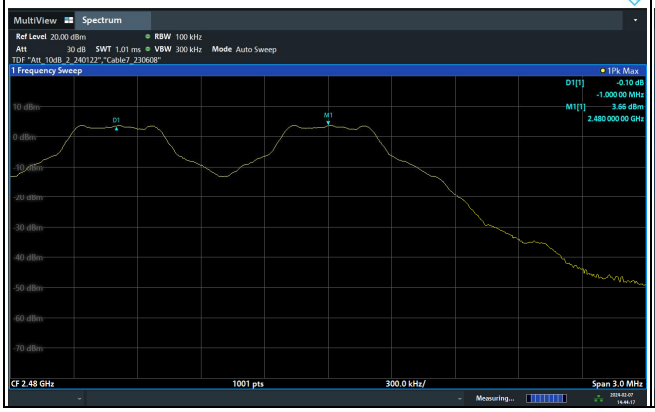
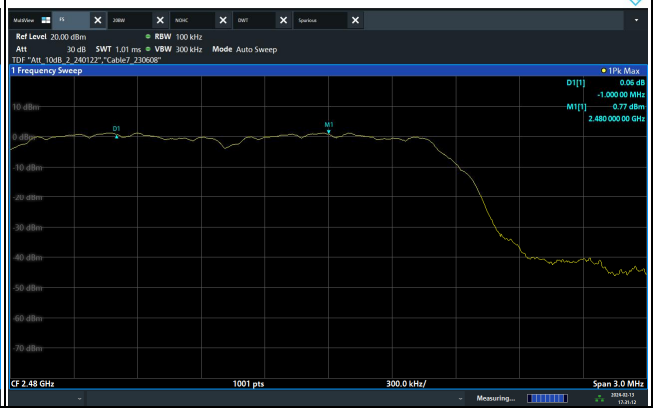
### 6.4.3 Test Setup



### 6.4.4 Test Result

| Test Mode | Channel | Frequency [MHz] | Carrier Frequency Separation [MHz] | Limit [MHz] |
|---|---|---|---|---|
| BDR | 0 | 2 402 | 1.000 | > 0.956 (20 dB BW) |
| | 39 | 2 441 | 1.000 | > 0.956 (20 dB BW) |
| | 78 | 2 480 | 1.000 | > 0.908 (20 dB BW) |
| EDR | 0 | 2 402 | 1.000 | > 0.900 (2/3 of 20 dB BW) |
| | 39 | 2 441 | 1.000 | > 0.900 (2/3 of 20 dB BW) |
| | 78 | 2 480 | 1.000 | > 0.900(2/3 of 20 dB BW) |

## Test Plot of Carrier Frequency Separation

| Carrier Frequency Separation | |
|---|---|
| BDR_2 402 MHz | EDR_2 402 MHz |
|  |  |
| BDR_2 441 MHz | EDR_2 441 MHz |
|  |  |
| BDR_2 480 MHz | EDR_2 480 MHz |
|  |  |

## 6.5 Number of Hopping Channels

### 6.5.1 Regulation

§15.247(a)(1)(iii) : Frequency 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.

§15.247(b)(1) : 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.

### 6.5.2 Test Procedure

The method of measurement used to test this FHSS device is ANSI C63.10-2020.

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

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
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
c) VBW ≥ RBW
d) Sweep: No faster than coupled (auto) time
e) Detector function: Peak
f) Trace: Max hold
g) Allow the trace to stabilize

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.

### 6.5.3 Test Setup