

43-5570-001-15 Installation Manual



FCC ID of this product is as follows.

FCC ID:2AYAJ-WF1

For OEM integration only- device cannot be sold to general public. Therefore, we will ask OEM to include the following statements required by FCC on the product and in the Installation manual Notice.

This module is not sold separately and is not installed in any hosts except for Canary Medical hosts. It was tested and found compliant in host model: Home Base Station, and in case where the module will be integrated in other non-identical hosts in the future, we will expand the LMA to include the new hosts after an appropriate assessment to the FCC rules through a C2PC process.

Contents:

1. Supply Voltage
2. Theory of operation
3. Antenna
4. Notice
5. Applicable FCC Rules
6. Test Plan

1. Supply Voltage

	min.	typ.	max.	unit
Specification Temperature Range	-40	+25	+85	deg.C
Specification Voltage	3.13	3.6	4.8	V

2. Theory of Operation

Frequency of operation			Scan	Ad-hoc mode
2.4GHz	11b/g/n (HT20)	2412-2462MHz	Active	Yes
W52	11a/n (HT20)	5180-5240MHz	Active	Yes
	11n (HT40)	5190-5230MHz	Active	Yes
W53	11a/n (HT20)	5260-5320MHz	Passive	No
	11n (HT40)	5270-5310MHz	Passive	No
W56	11a/n (HT20)	5500-5720MHz	Passive	No
	11n (HT40)	5510-5710MHz	Passive	No
W58	11a/n (HT20)	5745-5825MHz	Active	Yes
	11n (HT40)	5755-5795MHz	Active	Yes

Compliance with FCC requirement 15.407(c)

Data transmission is always initiated by software, which is passed down through the MAC, through the digital and analog baseband, and finally to the RF chip. Several special packets are initiated by the MAC. These are the only ways the digital baseband portion will turn on the RF transmitter, which it then turns off at the end of the packet. Therefore, the transmitter will be on only while one of the aforementioned packets is being transmitted. In other words, this device automatically discontinue transmission in case of either absence of information to transmit or operational failure.

Frequency Tolerance: $\pm 20\text{ppm}$

End users can not modify the software because F/W & driver are installed in device.

3. Antenna

- Please refer to KDB 996369
- Please perform the antenna design that followed the specifications of the antenna.
- About the signal line between an antenna and a module

It is a 50-ohm line design.

Fine tuning of return loss etc. can be performed using a matching network.

However, it is required to check "Class 1 change" and "Class 2 change" which the authorities define then.

The concrete contents of a check are the following three points.

- 1) It is the same type as the antenna type of antenna specifications.
- 2) An antenna gain is lower than a gain given in antenna specifications.
- 3) The emission level is not getting worse.

■ 50-ohm feed line (microstrip line length)

	Antenna
Antenna type	2.4GHz Monopole Antenna 5GHz Monopole Antenna
50-ohm feed line length	We test it at 6.15mm as a representative



4. Notice

For OEM integration only - device cannot be sold to general public.
Therefore, we will ask OEM to include the following statements required
by FCC/IC on the product and in the Installation manual Notice.
Please describe the following warning on the final product which contains this module.

Contains Transmitter Module FCC ID: 2AYAJ-WF1

or

Contains FCC ID: 2AYAJ-WF1

- Please describe the following warning to the manual.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

*When the product is small, as for these words mentioned above, the posting to a manual is possible.



4. Notice

5.15-5.25GHz band is restricted to indoor operations only.

- When installing it in a mobile equipment. Please describe the following warning to the manual.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

RF Exposure requirements are met when installed in mobile equipment.

This module cannot be installed in portable equipment without further testing and a change to FCC's grant of authorization.

Contact Murata regarding portable applications.

Note)

Portable equipment: Equipment for which the spaces between human body and antenna are used within 20cm.

Mobile equipment: Equipment used at position in which the spaces between human body and antenna exceeded 20cm.



4. Notice

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AYAJ-WF1 ". The grantee's FCC ID can be used only when all FCC compliance requirements are met.



5. Applicable FCC and ISED Rules

FCC Part 15 Subpart C 15.247 rules apply for 2.4 GHz operation of this product, in particular:

- FCC Part 15 Subpart C 15.247(a)(2)
- FCC Part 15 Subpart C 15.247(b)(3)
- FCC Part 15 Subpart C 15.247(d)
- FCC Part 15 Subpart C 15.247(e)

FCC Part 15 Subpart E 15.407 rules apply for 5 GHz operation of this product, in particular:

- FCC Part 15 Subpart E 15.407(a)(1)–(3)
- FCC Part 15 Subpart E 15.407(b)(1)–(3)

ISED RSS-247 Issue 3 Part 5 rules apply for 2.4 GHz operation of this product, in particular:

- ISED RSS-247 Issue 3 Part 5.2(a)
- ISED RSS-247 Issue 3 Part 5.2(b)
- ISED RSS-247 Issue 3 Part 5.4(d)
- ISED RSS-247 Issue 3 Part 5.4(e)
- ISED RSS-247 Issue 3 Part 5.5

ISED RSS-247 Issue 3 Part 6 rules apply for 5 GHz operation of this product, in particular:

- ISED RSS-247 Issue 3 Part 6.2.1
- ISED RSS-247 Issue 3 Part 6.2.2
- ISED RSS-247 Issue 3 Part 6.2.3
- ISED RSS-247 Issue 3 Part 6.2.4



6. Test Plan

1. Test Objective: Verify the electromagnetic emissions of the Product.

2. Specifications:

- Transmit output power for 2.4 GHz operation according to FCC Part 15 Subpart C, paragraph 15.247(b)(3) – with limits: 30 dBm at antenna port, 36 dBm EIRP.
- Spurious unwanted emissions for 2.4 GHz operation according to FCC Part 15 Subpart C, paragraph 15.247(d) – with limits according to FCC 15.209 within bands listed in FCC 15.205.
- Transmit output power for 5 GHz operation according to FCC Part 15 Subpart E, paragraphs 15.407(a)(1) – (3).
- Spurious unwanted emissions for 5 GHz operation according to FCC Part 15 Subpart E, paragraphs 15.407(b)(1) – (3).
- Test methods are according to ANSI C6310 (2020):
 - i. Section 6.5, 11.11, and 11.12 for emissions below 1 GHz for 2.4 GHz operation.
 - ii. Section 6.6, 11.11, and 11.12 for emissions above 1 GHz for 2.4 GHz operation.
 - iii. Section 11.9 for output power for 2.4 GHz operation
 - iv. Section 6.5, 12.7 for emissions below 1 GHz for 5 GHz operation
 - v. Section 6.6, 12.7 for emissions above 1 GHz for 5 GHz operation
 - vi. Section 12.4 for output power for 5 GHz operation
- vii. It's important to note that there are restricted frequency bands both below and above 1 GHz. Within these bands, Section 11.11 applies; outside them, Section 11.12 is relevant.

3. Setup:

- Place the Product on the turn platform within the anechoic chamber.
- Position the measurement antenna on the antenna mast at a distance of 3 meters from the Product.
- For fundamental power set transmitter to operate in continuous mode on the highest aggregate power, and highest power spectral density to confirm continued compliance.
- For band edge compliance, set the transmitter to operate in continuous mode on the widest and the narrowest bandwidths per modulation type.
- For radiated spurious emissions up to 10th harmonic the following three parameters should be tested:
 - 1) widest bandwidth
 - 2) highest aggregate power
 - 3) highest power spectral density
- If according to the radio module's initial test report these conditions do not all combine in the same mode, then multiple modes should be tested: set transmitter to operate in continuous mode at low, mid and top channels with all the supported modulations, data rates and channel bandwidths until the modes with these three parameters have been tested and confirmed.

4. Spectrum Scan Range:

- When scanning the spectrum, we consider 10 harmonics of the fundamental frequency.
- For 2.4 GHz operation, the top frequency for the scan is 24.835 GHz. We usually round this up to 25 GHz.
- Most test antennas and pre-amplifiers are tuned up to 26.5 GHz. Consequently, during testing, some labs occasionally scan all the way to the edge of antenna/amplifier calibration.
- For 5 GHz operations, the top frequency for the scan is 40 GHz.

5. Rotation and Elevation:

- Rotate the turn platform 360 degrees.
- Gradually raise the antenna from 1 to 4 meters.
- Purpose: Maximize emissions and verify compliance with Quasi-peak limits below 1 GHz and Peak/Average limits above 1 GHz; and compare with the appropriate limits as outlined in ANSI C63.10 and appropriate FCC Part 15 Subpart C and Subpart E rule parts.

6. Frequency Scans:

- Initial scan: Cover frequency ranges from 30 MHz to 1 GHz.
- Subsequent scan: Change measurement setup for above 1 GHz measurements.

7. Verification:

- Verify fundamental emission levels, according to FCC 15.247(b)(3) within the pass band 2400–2483.5 MHz.
- Check band edges within restricted bands at 2390 MHz and 2483.5 MHz, and check for Harmonics above 4.8 GHz - according to 15.247(d).
- Verify fundamental emission levels, according to FCC 15.407(a)(1–3) within the 5 GHz pass bands.
- Check band edges within restricted bands at 5150 MHz, 5350 MHz, and 5460 MHz, and check for Harmonics above 10 GHz - according to 15.407(b).

8. Extended Scans:

- Continue scanning for frequency ranges:
- 1–18 GHz
- 18–25 GHz (10th harmonic of 2.4 GHz fundamental)
- 25–40 GHz (10th harmonic of 5 GHz fundamental)

9. Spurious Emissions:

- Verify against quasi-peak, peak and average limits.

This comprehensive test plan ensures thorough assessment of the product's electromagnetic behavior across various frequency ranges connected to spectrum analyzer via appropriate attenuators, notch filters and LNA where applicable.