

Module Integration Manual

— EMBD1124 (Provisional FCC submission, Full Modular Approval)

Document title — *Module Integration Manual for EMBD1124*

Module model / FCC ID — EMBD1124 / **2A0OW-RMD1124**

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Revision — **Provisional (for FCC submission)**

Date — **2026/03/18**

Scope — This manual provides the integration instructions and limitations required for host manufacturers to maintain compliance when installing the EMBD1124 module under FCC Part 15 Subpart C modular approval.

1. Revision history

Rev. — Date — Summary

Provisional — **2026/03/18** — Draft for FCC submission; final values (FCC ID, measured RF data, antenna dimensions) to be inserted after certification testing.

2. Module summary

Module name / model — EMBD1124

FCC ID — **2A0OW-RMD1124**

Radio type / functions — 2.4GHz Proprietary Function (IEEE 802.15.4 based)

Operating frequency range — 2.405~2.480MHz

Maximum conducted output power — 3dBm

Antenna type — PCB pattern antenna (printed on module PCB); fixed and non-removable; no external antenna connector.

Antenna gain — 2.14dBi

Approval type — **Full Modular Approval (meets modular transmitter requirements of 47 CFR §15.212).**

3. Regulatory compliance statements

Applicable rules — FCC Part 15 Subpart C (unlicensed intentional radiators) and modular transmitter requirements per 47 CFR §15.212.

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.

Grantee responsibility — The module manufacturer (grantee) is responsible for the module's compliance and for providing accurate integration instructions to host manufacturers. Host manufacturers must follow these instructions to preserve the module's authorization.

4. Host manufacturer responsibilities and limitations

Do not modify the module RF circuitry, antenna pattern, or antenna feed. Any modification voids the modular approval.

Antenna replacement — **Not permitted.** The EMBD1124 uses a fixed PCB pattern antenna and must not be altered or replaced.

Antenna keep-out — Maintain the antenna keep-out area and clearances specified in Section 9. Failure to maintain the keep-out may detune the antenna and cause non-compliance.

Grounding and metal enclosure — Follow the recommended mounting and grounding instructions; metal parts or shields must not overlap the antenna keep-out.

Labeling and documentation — Host must apply required labeling and include the user statements specified in Section 7.

5. Installation instructions

Mechanical mounting — Place EMBD1124 on the host PCB using the recommended land pattern and solder all module pads per the mechanical drawing. Use mechanical fasteners only where shown on the module drawing.

Antenna keep-out — Keep all metal components, ground pours, and other RF circuitry outside the antenna keep-out polygon. **As tested keep-out: 5 mm radius from antenna reference point.**

Clearance to enclosure — Maintain minimum clearance between antenna and enclosure interior. **As tested clearance : 1 mm.**

Power supply — Provide a regulated supply within the module's recommended voltage range and include recommended decoupling capacitors close to the module power pins.

I/O connections — Connect UART, GPIOs per the pinout in Section 10. Do not route external antenna signals to RF pins.

EMC best practices — Route high-speed traces away from the antenna area, add ferrite beads or filters on long cables, and avoid large ground pours directly adjacent to the antenna.

6. RF exposure (SAR) and RF safety

RF exposure compliance — EMBD1124 was evaluated for RF exposure as part of the modular approval. Host manufacturers must ensure the final product maintains the same separation distances and usage conditions used during testing.

User information — Include this statement in the host user manual: **“This device complies with FCC radiation exposure limits. The device must be used with a minimum separation of 20 cm from the human body.**

7. Labeling and documentation requirements for host product

External labeling — Host product must display: **“Contains FCC ID: 2A00W-RMD1124”** on the exterior. If exterior placement is impractical, place the statement in the battery compartment or another user-accessible area.

User manual statements — Include: **(a)** the FCC ID and module manufacturer contact; **(b)** the RF exposure statement from Section 6; **(c)** a statement that the antenna is a fixed PCB pattern and must not be modified or replaced.

8. Final product testing and verification guidance

Verification scope — Host manufacturer must verify that the final product still meets FCC radiated emission limits and that antenna integration did not increase emissions beyond certified levels.

Recommended tests — Full-product radiated emissions scan across applicable frequency bands; conducted emissions if the host introduces mains or wired interfaces; RF exposure verification if user proximity or usage conditions change.

When re-testing is required — Re-test when the host enclosure, antenna surroundings, power levels, or intended use differ materially from the conditions used during module certification.

9. Mechanical drawings and antenna details

Module outline drawing — See drawing EMBD1124-MECH-Dwg-RevA (include dimensions, mounting holes, and recommended land pattern).

Antenna layout — Antenna copper pattern, antenna reference point (ARP), and antenna keep-out polygon are shown on drawing EMBD1124-ANT-Dwg-RevA. **As-tested antenna keep-out polygon and reference coordinates must be used without modification.**

Mounting examples — Acceptable and unacceptable host placements are illustrated: maintain the antenna area free of metal, large ground pours, and tall components.

10. Electrical specifications and pinout

Pin diagram — See EMBD1124-PINOUT for pin positions.

Pin function table — Each pin is listed with function, direction, voltage levels, and recommended decoupling. Do not apply voltages outside the specified ranges.

Absolute maximum ratings — Supply voltage, IO voltage limits, and operating temperature range are provided in the electrical specification sheet.

Recommended operating conditions — Normal supply voltage, typical current consumption in idle and transmit modes, and RF transmit duty cycles used during testing.

11. EMC and antenna integration notes

Antenna detuning risks — Metal near the antenna or ground pours can detune the antenna and increase emissions; strictly follow the keep-out and clearance rules.

Cable routing — Keep cables, connectors, and battery packs away from the antenna area. Long cables should be routed away from the antenna and include filtering where appropriate.

Shielding — If the host uses metal shielding, ensure it does not overlap the antenna keep-out polygon; shielding may require re-verification of radiated emissions.

12. Integration checklist (for host manufacturer)

Module placed per recommended land pattern.

Antenna keep-out maintained as specified.

Minimum enclosure clearance verified.

Power supply meets recommended specifications and decoupling applied.

Required labeling added to host product.

User manual includes RF exposure and antenna statements.

Final product radiated emissions verified and documented.

13. Declaration of conformity (sample text)

“The host manufacturer shall ensure that the final product complies with the applicable FCC rules. The module manufacturer’s grant of equipment authorization applies only when the module is installed and used in accordance with the instructions provided in this manual.”

EMBD1124-PINOUT

