KMOD-03 Wireless Communication Module

User Manual

SW ver : KMOD-03 V1.1
HW ver : AP6330 V1.1

1. Overview

The AP6330 is a high-performance, low-power wireless communication module developed by AMPAK Technology Inc.. It combines WiFi, Bluetooth 4.0 (High Speed) unctionality in a compact and integrated form factor. Designed for IoT devices, and embedded industrial systems, the AP6330 offers versatile connectivity through a unified module, minimizing the need for multiple components and simplifying product design.

The module supports IEEE 802.11a/b/g/n WiFi, operates in both 2.4GHz and 5GHz bands, and includes Bluetooth 4.0. Host communication is achieved via SDIO (for WiFi), UART (for Bluetooth).

This product is a module that will be mounted on a fixture that is a health device, is installed and used at least 20 cm from the human body, and is intended for indoor use only.

2. Specifications

Category	Description
Product Name	RONFIC KMOD-03
WiFi Standards	IEEE 802.11a/b/g/n
WiFi Bands	2.4GHz (2.412–2.462 GHz), 5GHz (5.180.–5.240 GHz)
Bluetooth Version	Bluetooth 4.0 + HS
Host Interfaces	SDIO v2.0 (WiFi), UART/PCM (Bluetooth)
Power Supply	VBAT: 3.0V–4.8V, VDDIO: 1.2V–2.9V
Dimensions	12mm x 12mm x 1.5mm (typical)
Operating Temp.	-30°C to +85°C
Storage Temp.	-40°C to +85°C
Humidity	10% to 95% (non-condensing)
Antenna	Shared RF antenna for WiFi/Bluetooth
Certifications	Pre-tested with evaluation board (antenna certification required separately)

3. Features

• Tri-Function Integration: Combines WiFi, Bluetooth into a single low-cost module.

• Dual-Band WiFi Support: Operates in 2.4GHz and 5GHz with up to 72.2Mbps (802.11n, single stream).

• Bluetooth 4.0 : Supports high-speed data transfer communication.

• Single-Antenna Design: Supports simultaneous BT/WLAN reception with one shared antenna.

• Host Interface Options:

• WiFi via SDIO 2.0 (up to 50 MHz)

• Bluetooth via UART (up to 4 Mbps)

• Power Management:

• Supports low-power modes

• External low-power clock input (32.768 kHz)

• Advanced Coexistence: Built-in IEEE coexistence and Enhanced Coexistence Interface (ECI) to avoid interference between Bluetooth and WiFi.

4. Operation Principle

Step 1: Power Initialization

• The module requires two power inputs: VBAT for the main power supply and VDDIO for I/O logic levels.

• Upon power-up, internal regulators are activated.

• The host system controls the module's power state via WL_REG_ON (for WiFi) and BT_RST_N (for Bluetooth).

Step 2: Interface Configuration

• WiFi connects to the host via SDIO 2.0, initialized after WL_REG_ON is asserted.

• Bluetooth use UART and optionally PCM for audio routing.

Step 3: WiFi Operation

• Performs AP scanning, authentication, and association with networks.

• Uses OFDM/BPSK/QPSK/16-QAM/64-QAM modulation for efficient data transmission.

• Enters power-saving mode when idle; wakes up upon beacon signal or data request.

Step 4: Bluetooth Operation

• Supports Classic Bluetooth.

• Handles device discovery, pairing, and secure data transfer.

• Operates on 2.4GHz with interference management through ECI.

FCC Compliance Statement
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 Interference Statement
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

FCC Caution
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.