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lamaPLC: AI-Thinker LoRA products

Ai-Thinker's LoRa product line is divided into the Ra Series (SPI-based), which provides raw access to the radio chip for custom protocols, and the LoRaWAN Series (SoC-based), which includes an integrated MCU and pre-installed AT firmware for standard network connections.



The Ai-Thinker Ra-01 and Ra-02 series consists of compact, low-power LoRa transceiver modules designed for long-range wireless data communication in the Internet of Things (IoT). Both modules are built around the Semtech SX1278 chip and operate primarily in the 410 MHz to 525 MHz frequency range, making them a standard choice for DIY and industrial projects requiring high interference resistance and low power consumption.

Product Series	Model	Frequency	Core Chip	Interface	Primary Use Case
Ra Series (SPI)	Ra-01	410-525 MHz	SX1278	SPI	Low-cost DIY, spring antenna included
	Ra-02	410-525 MHz	SX1278	SPI	Point-to-point, external IPEX antenna
	Ra-01H	803-930 MHz	SX1276	SPI	High-frequency (EU868/US915) DIY projects
	Ra-01S/SC	410-525 MHz	SX1268/LLCC68	SPI	Modern replacement for Ra-01/02 with better efficiency
LoRaWAN (SoC)	Ra-07/07H	410-960 MHz	ASR6501	UART (AT)	Integrated Cortex-M0+; standard LoRaWAN nodes
	Ra-08/08H	410-930 MHz	ASR6601	UART (AT)	Integrated Cortex-M4; supports LoRaWAN/LinkWAN
	Ra-09	410-525 MHz	STM32WLE5	UART/SPI	High-performance industrial IoT; multi-modulation support

Key Product Highlights

- **Antenna Variations:** Ra-01 models typically feature a solderable spring antenna, while Ra-02 and the LoRaWAN series utilize IPEX connectors for high-gain external antennas.
- **Power and Sensitivity:** Newer modules like the Ra-01SCH-P include Power Amplifiers (PA) reaching up to +29dBm for extreme range, compared to the standard +18 to +20dBm of older models.
- **Integration Level:** The Ra-08-Kit is a popular development board that allows users to test LoRaWAN connectivity directly via a Micro-USB connection using standard AT commands.

Key Differences: Ra-01 vs. Ra-02

The main difference between the two modules is the method of antenna connection, which greatly affects their deployment flexibility and range.

- **Ai-Thinker Ra-01:** Has a fixed coil (spring) antenna that is usually soldered directly onto the module. It is more compact and ideal for short- to medium-range projects where an external antenna isn't needed.
- **Ai-Thinker Ra-02:** Uses an IPEX (U.FL) connector instead of a spring antenna. This permits users to connect high-gain external antennas, expanding the possible communication distance up to 10,000 meters under ideal conditions.

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