Product Manual

Wi-Fi Thread Border Router

Model · TRD01

Product version · V1.0



1. Product Overview

LTCN Thread TRD01 is a USB-powered Wi-Fi Thread border router. It runs automatically after initial network configuration, helping compatible smart home platforms connect to Matter over Thread devices.

2. Features

- Easier smart home integration: Works with compatible platforms like Home Assistant to connect Matter over Thread devices in your home to the smart home system.
- One-time setup, automatic daily operation: Remembers network information after the initial connection to home Wi-Fi; simply keep it powered on, and it will reconnect automatically after power restoration.
- Easy reconfiguration when changing routers: If the home Wi-Fi is unreachable for a long time, the device will re-enable the configuration hotspot, allowing you to enter new network information via a mobile phone.
- No Ethernet cable required: Connects to the network via existing home Wi-Fi and operates with USB power, offering more flexible placement.
- Status at a glance: Indicator lights of different colors display configuration, connection, and operational status; factory reset can be performed via the button when reconfiguration is needed.

3. Application Scenarios

1. Home Matter over Thread device integration: Provides border routing connection for Thread smart home devices in conjunction with compatible Matter platforms such as Home Assistant.

2. Extension of existing Wi-Fi home network: Connects to the home LAN via existing 2.4 GHz Wi-Fi without the need for additional Ethernet cabling.

3. Router or Wi-Fi password change: Updates Wi-Fi information using the backup configuration hotspot when the original network is unreachable.

4. Smart Home Testing: Check the discovery status of the Thread network and the border router in a compatible platform, and verify the onboarding process for Matter over Thread devices.

4. Structural Interfaces

Component	Function

USB power interface	Connects to power source to provide continuous power to the device; interface specification TYPEC
RGB indicator light	Displays the current status of the device
BOOT key	Long press for approximately 10 seconds while powered on; release to restore factory settings
RESET/EN key	Restarts the device without clearing saved configurations
Black 3D printed plastic enclosure	Protects the internal circuitry of the device

5. Technical Specifications

Item	Parameter
Product Name/Model	LTCN Thread TRD01
Product Type	Wi-Fi Thread Border Router
Main Controller	ESP32-C6-N4
Flash Capacity	4 MB
Home Network	2.4 GHz Wi-Fi
Thread Wireless	IEEE 802.15.4, 2.4 GHz
Power Supply Method	USB Power
Rated Supply Voltage	DC5V
Rated Current	200MA
Dimensions (Length × Width × Height)	55 × 30 × 7.5 mm
Weight	20 g
Enclosure	Black 3D printed plastic
Indicator Light	RGB Indicator Light
Operating Temperature	−10～65 °C

Operating Humidity	Below 90%
Firmware Upgrade	Current version via USB wired upgrade

6. Installation and Wiring

1. Place the device in a location with good home Wi-Fi coverage and convenient for Thread wireless communication.

2. Connect the device to a stable USB power source using a suitable USB cable. Interface specifications and rated power supply requirements are subject to the final product label.

3. The device starts automatically after power-on; no network cable or additional signal cable is required.

7. Configuration and Usage

Initial Network Configuration

1. After powering on the device, wait for the indicator light to flash blue.

2. Connect to the HA-Thread-XXXX hotspot using a phone or computer. The password is 12345678. XXXX is the last four uppercase characters of the device's hotspot MAC address.

3. If the network configuration page does not pop up automatically, open http://192.168.4.1/ in a browser.

4. Select the scanned home 2.4 GHz Wi-Fi, or manually enter the network name, input the password, and save. This step can also be completed using a compatible dedicated ESPHome network configuration tool.

5. Wait for the device to connect. After a successful connection, the hotspot turns off, and the indicator light stays solid green.

View in Home Assistant

Open Settings → Devices & Services → Thread to view the LTCN Thread network and the border router starting with LTCN Thread TRD01. Initial discovery may require a brief wait and a page refresh. When adding Matter over Thread end devices, please follow the instructions provided by the Matter platform and the end device to complete pairing.

Changing Wi-Fi and Factory Reset

If the original Wi-Fi remains unconnectable for approximately 1 minute, the device activates the backup provisioning hotspot, and the indicator light flashes purple. Reconnect to the hotspot and fill in the new Wi-Fi information following the initial provisioning steps; this operation does not actively clear Thread network data.

While the device is powered on, press and hold the BOOT button for approximately 10 seconds. Release the button after the red light changes from flashing to solid; the device will clear the Wi-Fi configuration and saved Thread network data, and automatically restart. A short press of RESET/EN only restarts the device. If you only need to clear the Wi-Fi configuration, you can use the "Restore Wi-Fi Factory Settings" option on the webpage while the provisioning hotspot is active.

Indicator Lights

Status	Meaning
Blue flashing	Booting up or waiting for initial provisioning
Yellow/Orange flashing	Connecting to home Wi-Fi
Solid green	Connected to home Wi-Fi, border routing function active
Purple flashing	Wi-Fi disconnected for a long time, backup provisioning hotspot enabled
Red blinking	Long-pressing the BOOT key, factory reset time not yet reached
Red solid	Factory reset operation is ready, executed after releasing the BOOT key

8. Communication Protocols

Communication Part	Description
Home Network Connection	2.4 GHz Wi-Fi, device communicates via home LAN
Thread Wireless Connection	IEEE 802.15.4, 2.4 GHz, used for Thread network communication
LAN Discovery	mDNS/DNS-SD; hostname is ltcn-thread.local, publishes border router information via MeshCoP service
Matter Device Control	Completed by compatible Matter control platforms such as Home Assistant and Matter over Thread end devices; this device provides Thread border routing connection

Modbus: The current firmware does not provide Modbus RTU or Modbus TCP interfaces, so there are no device addresses, function codes, register addresses, or data formats to list. This product should not be connected as a Modbus device.

9. Applicable Conditions and Limitations

- Home Wi-Fi must provide a 2.4 GHz network, and the device location must have available signal.
- Platforms such as Home Assistant must be able to discover the device's mDNS service on the LAN; wireless client isolation or network segmentation may affect discovery.
- This device is a Thread border router and does not replace a Matter controller; end devices should support Matter over Thread, and pairing should be completed by a compatible platform.
- The specific number of connectable devices is affected by the wireless environment, Thread network topology, and end device communication frequency; there is currently no verified maximum number of connections.
- The current firmware does not support OTA wireless upgrades. The operating temperature and humidity range and rated power supply parameters for the entire unit need to be confirmed after the product is finalized.

10. Troubleshooting

Symptom	Check Method
Cannot find the provisioning hotspot	Wait for the blue light to blink during first use; devices that have been provisioned will turn off the hotspot when Wi-Fi is normal. Search again about 1 minute after Wi-Fi disconnection.
Phone indicates the hotspot has no internet	The provisioning hotspot is only used for device setup. Keep the connection and open http://192.168.4.1/.
Yellow/Orange light continuously blinking	Check if the home Wi-Fi is 2.4 GHz, if the name and password are correct, and check the signal. Re-provision after the backup hotspot appears.
Home Assistant cannot see the border router	Confirm the device has a solid green light, is on a local area network where it can mutually discover Home Assistant, and check if the router blocks mDNS.
Solid green light but end devices cannot be added	Check the Matter platform configuration, whether the end device supports Matter over Thread, and the Thread wireless coverage and end device pairing status.

11. Safety and Maintenance

- Use a stable USB power supply that meets the final product's rated input requirements; before power supply parameters are confirmed, the product should not be labeled with unverified voltage or current specifications.

- Keep the device and USB port dry, and avoid pressure, deformation, or obstruction of wireless signals on the enclosure.
- Factory reset will clear Thread network data, and connected devices may need to be reconfigured. Confirm the need for reset before proceeding.
- Do not press the RESET/EN key while holding the BOOT key.

12. Others

- Default Thread network name: LTCN Thread.
- LAN hostname: ltcn-thread.local.
- Border router display name format: LTCN Thread TRD01 XX XX, where the trailing characters are derived from the device MAC address.
- Both web-based provisioning and the dedicated ESPHome provisioning tool are supported; the default password for the provisioning hotspot is 12345678.

13. Package Contents

1x TRD01 Thread Border Router