Waveshare USB-TO-TTL-FT232

Waveshare USB to UART (TTL) Mini Communication Module User Manual

Model: USB-TO-TTL-FT232

1. INTRODUCTION

The Waveshare USB to UART (TTL) Mini Communication Module, Model USB-TO-TTL-FT232, is a compact and reliable solution for converting USB signals to TTL serial signals. This module is designed for seamless integration into various electronic projects and systems, providing stable and efficient communication. It features an original FT232RNL chip, ensuring broad compatibility and robust performance across multiple operating systems.
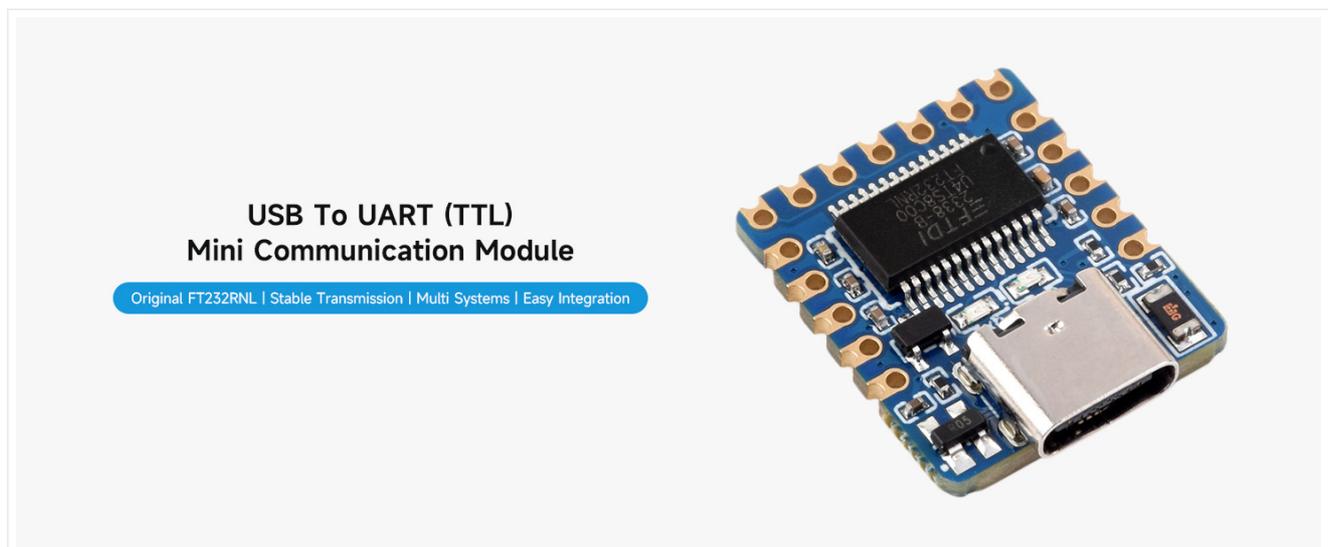
2. PACKAGE CONTENT

Image: The Waveshare USB-TO-TTL-FT232 module as packaged, showing the compact device.

The package includes:

- 1x Waveshare USB-TO-TTL-FT232 Mini Communication Module

3. FEATURES

Features At A Glance

- Onboard original FT232RNL chip, fast communication, stable and reliable, better compatibility
- Castellated holes design, compact size, easy to integrate into the device by soldering
- UART communication baudrate: 300bps~3Mbps
- Onboard self-recovery fuse and ESD diode, provides over-current/over-voltage protection, stable and safe operation
- Onboard TXD and RXD indicators for monitoring transceiver status
- Reserved VCC switching pads on the back, using 3.3V TTL by default, allows switching to 5V by re-soldering
- Adapting all function pins of the chip, more convenient for secondary development and integration
- Onboard USB Type-C port, smoothly plug & pull, solid and reliable

Version Options

USB-TO-TTL-FT232
standard version, without pinheader

USB-TO-TTL-FT232-M
with pre-soldered header

Image: An overview highlighting the key features of the USB to UART (TTL) Mini Communication Module, including its FT232RNL chip and stable transmission.

Key features of the Waveshare USB-TO-TTL-FT232 module include:

- **Original FT232RNL Chip:** Ensures fast, stable, and reliable communication with enhanced compatibility.
- **Compact Design:** Features castellated holes for easy integration into devices via soldering.
- **Wide Baud Rate Support:** Supports UART communication baud rates from 300bps to 3Mbps.
- **Protection Mechanisms:** Includes an onboard self-recovery fuse and ESD diode for over-current and over-voltage protection, ensuring safe operation.
- **Status Indicators:** Equipped with TXD and RXD LEDs to monitor data transmission and reception status.
- **Configurable VCC:** Reserved VCC switching pads allow default 3.3V TTL to be switched to 5V by re-soldering.
- **Full Pin Access:** All function pins of the FT232RNL chip are adapted for convenient secondary development and integration.
- **USB Type-C Port:** Features a robust USB Type-C port for smooth and reliable connection.

4. SETUP

4.1. Driver Installation

The FT232RNL chip typically uses standard FTDI drivers. For most modern operating systems (Windows 10/11, macOS, Linux), these drivers are often installed automatically upon connecting the module. If automatic installation does not occur, or if you encounter issues, drivers can be downloaded from the official FTDI website or the Waveshare product page for this module.

4.2. Hardware Connection

Connect the module to your computer using a USB Type-C cable. The module will appear as a virtual COM port. To connect to your target device (e.g., a microcontroller), use the appropriate UART pins:

- Connect the module's **TXD** pin to the target device's **RXD** pin.
- Connect the module's **RXD** pin to the target device's **TXD** pin.
- Connect the module's **GND** pin to the target device's **GND** pin.

- Optionally, connect the module's **VCC** pin to power your target device if its current requirements are within the module's capabilities (typically up to 50mA).

4.3. Voltage Level Configuration

The module is configured for 3.3V TTL logic levels by default. If your target device operates at 5V TTL logic levels, you can switch the VCC output by re-soldering the pads on the back of the module. Refer to the detailed pinout diagram for specific instructions on modifying the VCC setting.

5. OPERATING INSTRUCTIONS

5.1. UART Communication

Once connected and drivers are installed, you can use any serial terminal software (e.g., PuTTY, Tera Term, Arduino Serial Monitor) to communicate with your target device. Ensure the baud rate, data bits, parity, and stop bits settings in your software match those configured on your target device.

5.2. TXD and RXD Indicators

The module features two LED indicators:

- **TXD (Transmit Data) LED:** Flashes when data is being sent from the module (from the computer) to the target device.
- **RXD (Receive Data) LED:** Flashes when data is being received by the module (from the target device) to the computer.

These indicators are useful for visually confirming data flow and troubleshooting communication issues.

6. MAINTENANCE

To ensure the longevity and reliable operation of your Waveshare USB-TO-TTL-FT232 module, follow these maintenance guidelines:

- **Keep Clean:** Regularly clean the module with a soft, dry cloth to remove dust and debris. Avoid using liquid cleaners.
- **Avoid Static Discharge:** Handle the module with care, especially in environments prone to static electricity. Use anti-static precautions if necessary.
- **Proper Storage:** Store the module in a dry, cool environment, away from direct sunlight and extreme temperatures.
- **Inspect Connections:** Periodically check all soldered connections and the USB Type-C port for any signs of damage or wear.

7. TROUBLESHOOTING

If you encounter issues with your USB-TO-TTL-FT232 module, consider the following troubleshooting steps:

- **Module Not Recognized:**
  - Ensure the USB Type-C cable is securely connected to both the module and your computer.
  - Verify that the FTDI drivers are correctly installed. Check your computer's Device Manager (Windows) or `lsusb` / `dmesg` (Linux) for the virtual COM port.
  - Try a different USB port or cable.

- **No Communication with Target Device:**

  - Double-check your TXD/RXD/GND wiring. Remember to cross-connect (module TXD to target RXD, module RXD to target TXD).
  - Confirm that the baud rate, data bits, parity, and stop bits settings in your serial terminal software match those of your target device.
  - Verify the VCC voltage level (3.3V or 5V) of the module matches the operating voltage of your target device.
  - Check if the TXD/RXD LEDs on the module are flashing when data is expected to be transmitted or received.

- **Intermittent Communication:**

  - Ensure all connections are stable and free from loose wires.
  - Check for potential electromagnetic interference (EMI) if operating near other electronic devices.

- **Module Overheating:**

  - Ensure the module is not drawing excessive current, especially if powering the target device via the VCC pin.
  - Verify that the self-recovery fuse has not tripped due to an over-current event.
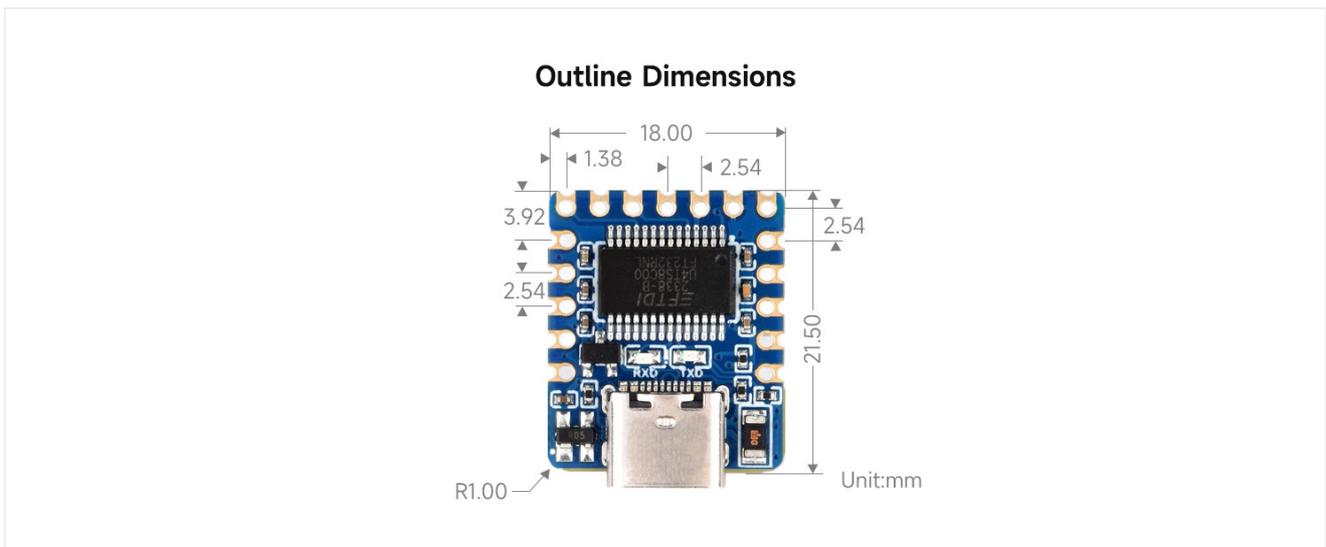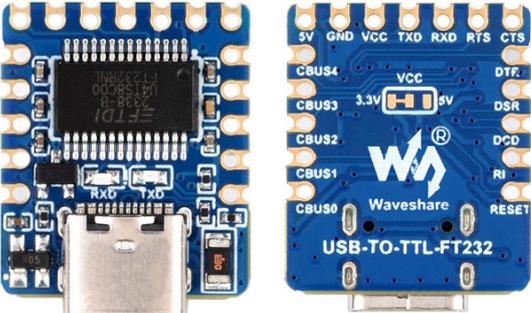
8. SPECIFICATIONS

Image: Detailed outline dimensions of the Waveshare USB-TO-TTL-FT232 module, showing measurements in millimeters.

Specification	Value
Model Name	USB-TO-TTL-FT232
Chip	FT232RNL
Connectivity Technology	USB Type-C
UART Baud Rate	300bps ~ 3Mbps
Logic Voltage	3.3V (default), switchable to 5V

| Specification	Value
Protection	Over-current (self-recovery fuse), Over-voltage (ESD diode)
Operating System Support	Windows 10/11, MacOS, Linux, Android
Item Weight	0.352 ounces (approx. 10g)
Package Dimensions	2.76 x 1.97 x 0.79 inches
Manufacturer	Waveshare

9. PINOUTS DEFINITION

Image: A detailed diagram illustrating the pinout definitions for the Waveshare USB-TO-TTL-FT232 module, showing both the component side and the reverse side with VCC switching pads.

Pin	Description
5V	5V output from USB.
GND	Ground connection.
VCC	3.3V or 5V output, configured via pads on the back of the module. Default is 3.3V.
TXD	Transmit Data. Connects to MCU.RX (signal direction: MCU.RX << FT232 << PC.TX).
RXD	Receive Data. Connects to MCU.TX (signal direction: MCU.TX >> FT232 >> PC.RX).
RTS	Request To Send. Connects to MCU.CTS (signal direction: MCU.CTS << FT232 << PC.RTS).
CTS	Clear To Send. Connects to MCU.RTS (signal direction: MCU.RTS >> FT232 >> PC.CTS).

10. SYSTEM COMPATIBILITY

Adopts FT232RNL Solution

FT232RNL
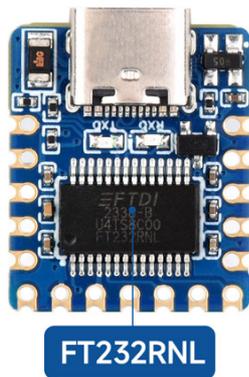
Multiple Systems Support

Compatible With Popular Systems Like Win7/8/8.1/10/11, MacOS, Linux, Android...

Image: Visual representation of the Waveshare USB-TO-TTL-FT232 module's compatibility with various popular operating systems.

The Waveshare USB-TO-TTL-FT232 module offers broad compatibility with various operating systems, thanks to the widely supported FT232RNL chip. Supported systems include:

- Windows 10
- Windows 11
- macOS
- Linux
- Android

11. WARRANTY AND SUPPORT

Waveshare products are typically covered by a manufacturer's warranty against defects in materials and workmanship. For specific warranty terms, duration, and to access technical support, please refer to the official Waveshare website or contact their customer service directly. Ensure you have your product model (USB-TO-TTL-FT232) and purchase details available when seeking support.

For additional resources, documentation, and community forums, visit the Waveshare official website.