Teyleten Robot FT4232HL-5V/3.3V

Teyleten Robot FT4232HL 4-Channel USB to TTL Serial Port Module User Manual

Model: FT4232HL-5V/3.3V

Brand: Teyleten Robot

1. Introduction and Overview

The Teyleten Robot FT4232HL module is a 4-channel USB to TTL serial port development board designed for various communication and debugging applications. It provides multiple serial ports with selectable 5V or 3.3V TTL levels, making it compatible with a wide range of microcontrollers, single board computers, and other embedded systems. This module facilitates reliable data transmission at rates up to 12Mbps.

Key specifications include:

- **Supply Voltage:** 5.0V (via USB)
- **Current Output:** Up to 500mA (via on-board DC5V power supply interface)
- **Baud Rate:** 1200-921600 bps
- **Transmission Rate:** 12 Mbps
- **Operating Temperature:** -40 to 85°C

This module is ideal for developers and hobbyists requiring multiple independent serial communication channels for projects involving microcontrollers, Arduinos, Raspberry Pis, FPGAs, and other peripherals.

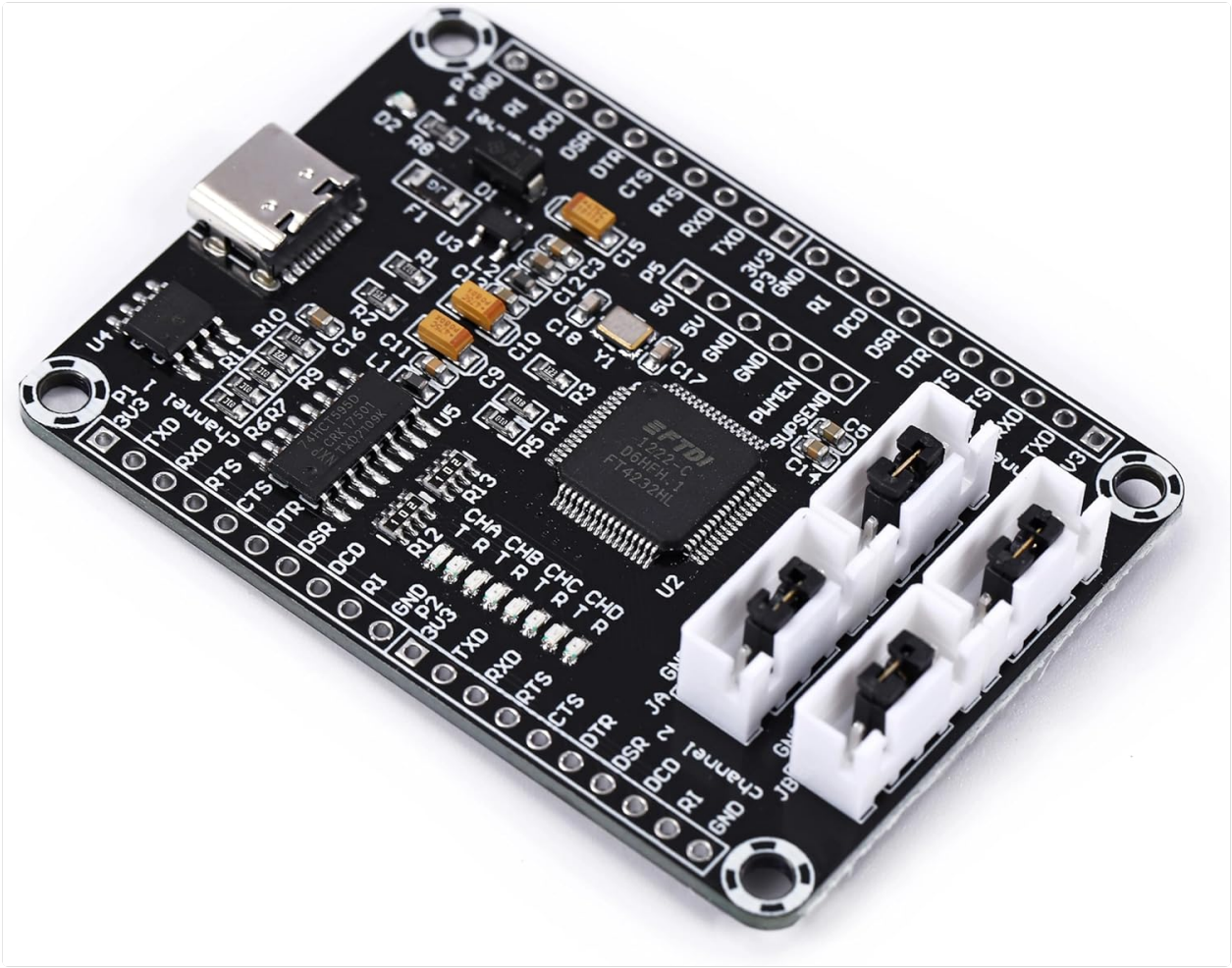

Figure 1: Top view of the Teyleten Robot FT4232HL module, showing the USB-C port and four serial connectors.

2. Features

- **High-Speed Communication:** Optimized circuitry supports communication rates up to 12Mbps.
- **Dual Voltage TTL:** Compatible with both 5V and 3.3V TTL logic levels.
- **Enhanced Power Output:** On-board DC5V power supply interface provides up to 500mA current output to improve load capacity for connected devices.
- **Configurable Interfaces:** The module can be configured for JTAG/SPI and other interface forms using FTPROG software.
- **All I/O Exported:** All available input/output pins are exported for flexible connectivity.
- **Independent Transceiver Indicators:** Each of the four serial ports features an independent transceiver indicator LED, allowing for easy observation of serial port status and simultaneous data monitoring across all channels.
- **Pin Definitions:**
  - **VCC:** Power supply (5.0V).
  - **RXD:** Module's receive pin (TTL level). Connect to the microcontroller's TXD.*Cannot be directly connected to RS232 level devices.*
  - **TXD:** Module's transmit pin (TTL level). Connect to the microcontroller's RXD.*Cannot be directly connected to RS232 level devices.*
  - **GND:** Ground connection.

3. Specifications

Brand	Teyleten Robot
Model Number	FT4232HL-5V/3.3V
Hardware Interface	USB (Type-C)
Item Weight	42 Grams
Supply Voltage	5.0V (USB powered)
Current Output	500mA (max, via on-board DC5V interface)
Baud Rate	1200-921600 bps
Transmission Rate	12 Mbps
Operating Temperature	-40 to 85℃
Compatible Devices	Microcontrollers, Single Board Computers, Arduinos, Raspberry Pis, FPGAs, Other Development Boards, Printers, Routers, Other Peripherals
Operating System Support	Windows, macOS, Linux

4. Safety Information and Important Notes

- **Voltage Levels:** This module operates at 5V/3.3V TTL logic levels.**DO NOT** connect it directly to RS-232 level devices (which typically operate at +/-5V to +/-15V), as this can cause damage to the module or connected equipment.
- **USB Power Limit:** When powered via USB, the total load connected to the module (including any devices drawing power from the module's 5V output) must not exceed 500mA. Exceeding this limit risks overloading the module or the computer's USB port.
- **Basic Communication Wires:** For standard serial communication, only the GND, TX, and RX wires are typically required.
- **1.8V Circuits:** This module is designed for 5V/3.3V TTL levels and is*not* compatible with 1.8V logic circuits. Connecting to 1.8V circuits may result in damage or unreliable readings.

5. Setup

Follow these steps to set up your FT4232HL module:

1. **Connect USB Cable:** Connect the provided USB-C cable to the module's TYPE-C interface and to your computer. The module will draw power from the USB connection.
2. **Driver Installation:** Ensure the necessary FTDI drivers are installed on your operating system (Windows, macOS, Linux). These are typically available from the FTDI website.
3. **Identify Channels:** The module features four independent serial channels, typically labeled A, B, C, and D. Each channel has dedicated TXD, RXD, and GND pins.
4. **Connect Peripherals:** Connect your target device (e.g., microcontroller, sensor) to the desired serial channel using the appropriate TXD, RXD, and GND pins. Ensure correct cross-connection (module TXD to device RXD, module RXD to device TXD).
5. **Jumper Configuration:** The module may come with loopback jumpers installed on some or all ports (e.g., C1, C2, C3, C4). These jumpers connect TXD to RXD on the same channel, useful for self-testing. For

normal operation with external devices, **remove these jumpers** from the channels you intend to use for communication.

6. **Power Indicator:** Observe the power indicator LED to confirm the module is receiving power.
7. **Communication Indicators:** Each serial port has an independent transceiver indicator LED that will flash during data transmission and reception, aiding in debugging.

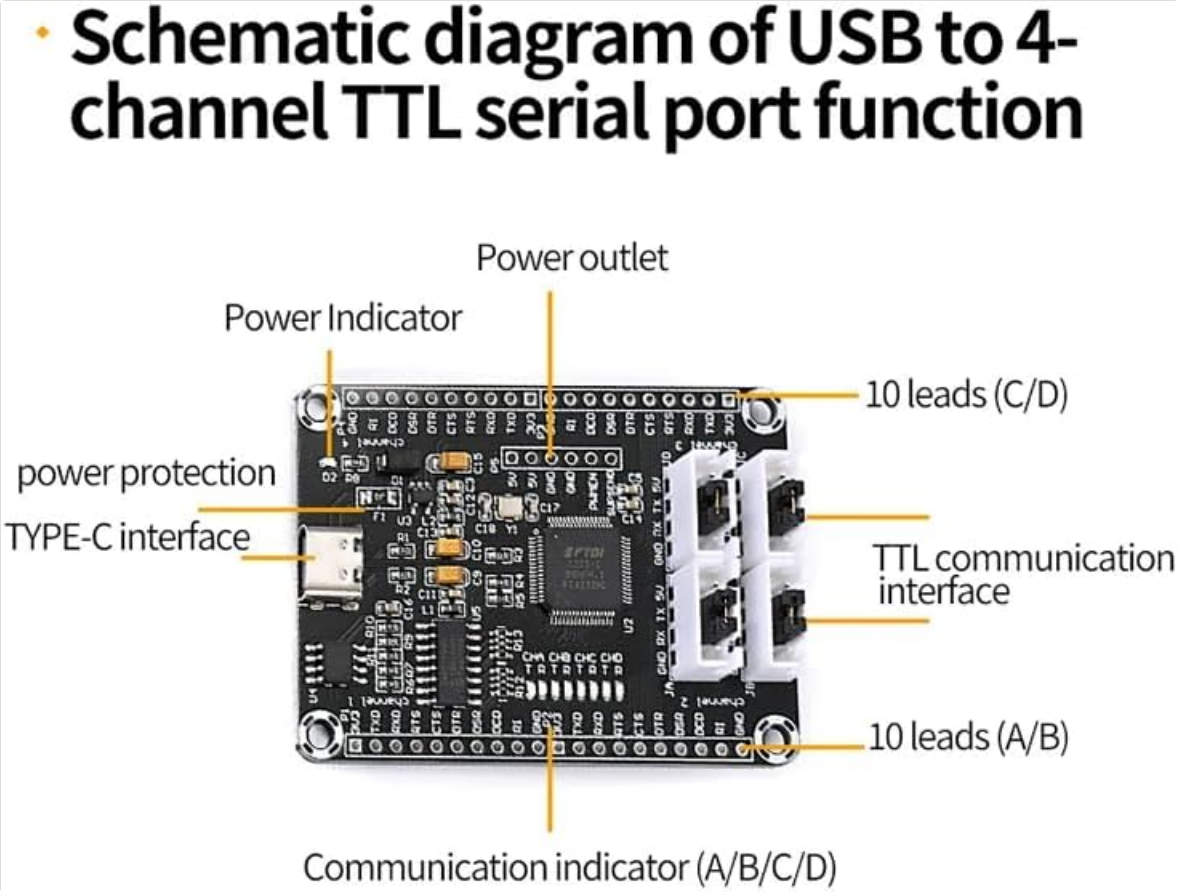

Figure 2: Schematic diagram illustrating the main components and interfaces of the FT4232HL module, including the USB-C interface, power outlet, power protection, communication indicators (A/B/C/D), TTL communication interfaces, and 10-lead breakouts (A/B and C/D).

6. Operation

Once the module is set up and drivers are installed, it will appear as multiple virtual COM ports on your computer. You can then use standard serial terminal software or programming libraries to communicate with connected devices.

- **Serial Communication:** Open your preferred serial terminal application (e.g., PuTTY, Tera Term, Arduino Serial Monitor) and select the appropriate COM port corresponding to the desired channel (e.g., COM3 for Channel A, COM4 for Channel B). Configure the baud rate to match your target device.
- **Data Transfer:** Send and receive data through the selected COM port. The independent transceiver LEDs for each channel will illuminate to indicate active data flow.
- **Advanced Configuration (FTPROG):** For advanced functionalities such as configuring the module for JTAG, SPI, or other interface forms, use the official FTPROG utility provided by FTDI. This software allows customization of the FT4232HL chip's internal EEPROM.
- **Channel Capabilities:** Channels C and D are primarily designed for serial communication. Channels A and B may offer additional functionalities depending on the FTPROG configuration, but for basic serial use, all four channels function similarly.

7. Maintenance

To ensure the longevity and reliable operation of your FT4232HL module, consider the following maintenance guidelines:

- **Environmental Conditions:** Operate the module within the specified temperature range (-40 to 85°C) and avoid environments with excessive humidity, dust, or corrosive substances.
- **Power Management:** Always adhere to the 500mA USB power limit to prevent damage. If your application requires more power, use an external power supply for your peripheral devices.
- **Cleanliness:** Keep the module clean and free from debris. Use a soft, dry brush or compressed air to remove dust. Avoid using liquid cleaners.
- **Handling:** Handle the module by its edges to avoid touching the electronic components, which can be sensitive to static discharge.
- **Storage:** When not in use, store the module in an anti-static bag or a protective enclosure.

8. Troubleshooting

If you encounter issues with your FT4232HL module, refer to the following troubleshooting tips:

- **Module Not Detected by Computer:**
  - Ensure the USB-C cable is securely connected to both the module and the computer.
  - Verify that the power indicator LED on the module is lit.
  - Check Device Manager (Windows) or `lsusb` (Linux) to see if the FTDI device is recognized. Reinstall FTDI drivers if necessary.
  - Try a different USB port or cable.
- **No Communication with Target Device:**
  - Confirm correct TXD-RXD cross-connection (module TXD to device RXD, module RXD to device TXD).
  - Ensure the GND connections are common between the module and the target device.
  - Verify that the baud rate in your serial terminal software matches the target device's baud rate.
  - Check that any loopback jumpers on the active serial channel are removed.
  - Observe the transceiver indicator LEDs; if they are not flashing during expected communication, there might be a wiring or configuration issue.
  - Confirm the target device is powered and functioning correctly.
- **EEPROM Not Detected by FT_PROG:**
  - Some users have reported issues with EEPROM detection after the first erase due to a 22K resistor (R9) between the EEPROM's DI and DO pins, which should ideally be 2.2K as per reference designs. A potential workaround is to solder a 1K to 2.2K resistor in parallel across R9 to strengthen the data signals.
- **Unexpected Behavior with Channels A/B/C/D:**
  - For general serial communication, all four channels (A, B, C, D) can be used.
  - If using for IoT applications or other specific protocols, ensure jumpers on channels C1 and C2 are removed if they interfere with the desired functionality. Channels C3 and C4 are typically serial-only and do not support GPIO/I2C without specific FTPROG configuration.
- **Manufacturing Quality Concerns:** While not directly user-fixable, if you observe issues like unsoldered

USB connector pins or unwashed flux, contact the seller or manufacturer for support.

9. Warranty and Support

For information regarding product warranty, technical support, or service, please refer to the official Teyleten Robot website or contact their customer support directly. Keep your purchase receipt or proof of purchase for any warranty claims.

Manufacturer: Teyleten Robot