CRIUS FT232RL 6-pin USB-to-Serial breakout board, using the FT232RL USB-to-serial converter IC.

FT232RL (U1) – USB to Serial Converter

- **Purpose**: Converts USB data to UART (serial) communication and vice versa.
- **Main Connections**:
    - **USB Interface**:
        - USBDM (15) and USBDP (16): USB Data lines (D– and D+) connected to the USB port.
        - VCC (4), 3V3OUT (17): Power supply input and 3.3V regulated output (optional use).
        - VCCIO (20): I/O voltage reference; determines voltage level for TXD, RXD, etc.
    - **UART Interface**:
        - TXD (1), RXD (5): Serial transmit and receive.
        - RTS (2), CTS (11), DTR (9), etc.: Optional handshaking signals.
    - **Clock Circuit**:
        - OSCI (27) and OSCO (28): Optional crystal oscillator input/output; not used here (NC).
    - **Status LEDs**:
        - CBUS0 (23), CBUS1 (22): Assigned to TXLED/RXLED functions for LED indicators.
    - **Ground**:
        - GND (18, 21, 25), AGND (26): Connect to ground plane (polygon pour).

USB Connector (J2) – Mini USB

- **Purpose**: Provides USB interface to PC.
- **Pin Mapping**:
    - VBUS: USB +5V supply.
    - D-, D+: Data lines connected to FT232RL (pins 15, 16).
    - GND: Ground.
- **Connector Part**: 67503-1020 – 5-pin mini-USB socket.

Header (J1) – 6-pin Serial I/O

- **Purpose**: Breaks out serial signals from FT232RL for external microcontroller or device.
- **Pins**:
    1. GND – Ground
    2. CTS – Clear to Send
    3. VCC – Voltage Supply (input from USB, connected to +5V)
    4. TXD – Serial Transmit (from FT232RL to external device)

5. RXD – Serial Receive (from external device to FT232RL)
6. DTR – Data Terminal Ready

Status LEDs (DS1) with Resistors (R1, R2)

- **TXLED** and **RXLED**: Visual indicators for data transmission.
- **Resistors (R1, R2)**: Current limiting resistors (1kΩ) for LEDs.
- **Connection**:
  - TXLED ← CBUS0 (Pin 23)
  - RXLED ← CBUS1 (Pin 22)

Decoupling Capacitors (C2, C3)

- **C2** and **C3**: Decoupling capacitors to stabilize power supply.
  - **C2 = 0.1µF**, placed between +3V and GND.
  - **C3 = 10µF**, placed between +5V and GND.
- **Purpose**:
  - Filter noise from power lines.
  - Improve stability of voltage levels for the FT232RL.

Crystal (Not used here)

- FT232RL has internal clock, so no external crystal is needed in this design. Pins OSCI and OSCO are left unconnected (NC).

Other Details

- **Net labels** like TXD, RXD, USBP, USBN, +5, and GND help organize connections across schematic sheets.
- **Test Point (Pin 26 – TEST)**: Typically left unconnected unless required for factory test.

Summary

1. FT232RL (U1)

- Converts USB data to UART.
- Connects USB D+/D- to serial TXD/RXD.
- Provides GPIO, handshaking signals, and LED control via CBUS pins.

2. USB Connector (J2)

- Mini USB connector for interfacing with PC.
- Provides +5V and data lines (D+/D-).

3. Header (J1)

- 6-pin interface for external device:
  - TXD, RXD, DTR, CTS, GND, and VCC.

4. LEDs (DS1)

- TXLED and RXLED for transmit and receive indication.
- Controlled via CBUS0 and CBUS1.

5. Resistors (R1, R2)

- 1kΩ current-limiting resistors for LEDs.

6. Capacitors (C2, C3)

- C2 (0.1µF) and C3 (10µF) for power supply decoupling.
- Filters noise and stabilizes voltage.

7. GND Connections

- Multiple GND pins connected to polygon pour in PCB layout for proper grounding.