
Technical Datasheet: USB Type C Socket - SMT Inline Breakout Board

Adafruit Product ID: 4396

Product Overview

The Adafruit USB Type C Socket SMT Inline Breakout Board (Product ID: 4396) is a compact, inline-style breakout board for a full dual-row USB Type-C SMT socket. Unlike angled breakout boards, this board sits flat and inline with the connector, making it suitable for custom cable harness builds and inline USB-C signal probing. All 24 pins of the USB-C connector are broken out to solder pads on both sides of the PCB. The board does not include any CC resistors or enumeration logic — it is a pure passive connector breakout.

Technical Specifications

Specification	Value
Product ID	4396
Connector Type	USB Type-C Receptacle (SMT, dual-row, full 24-pin)
PCB Style	SMT Inline (flat, not right-angle)
CC Resistors	Not included (no enumeration logic)
Dimensions	17.0mm (L) x 15.6mm (W) x 3.2mm (H)
Imperial Dimensions	0.7" x 0.6" x 0.1"
Weight	1.0g
Pads Broken Out	All 24 USB-C pins (both row A and row B)

Pinout Reference

The USB Type-C connector has 24 pins arranged in two mirrored rows (A and B), providing cable flip symmetry. All pins are broken out to labeled solder pads on this breakout board.

Pin Number	Pin Name	Function
A1	GND	Ground
A2	TX1+	SuperSpeed USB 3.x TX Differential Pair + (Row A)
A3	TX1-	SuperSpeed USB 3.x TX Differential Pair - (Row A)
A4	VBUS	Bus Power (5V nominal, up to 20V with PD)
A5	CC1	Configuration Channel 1 (cable orientation, PD negotiation)
A6	D+	USB 2.0 Data Positive
A7	D-	USB 2.0 Data Negative
A8	SBU1	Sideband Use 1 (alternate mode signaling, e.g. DisplayPort)
A9	VBUS	Bus Power
A10	RX2-	SuperSpeed USB 3.x RX Differential Pair - (Row A)
A11	RX2+	SuperSpeed USB 3.x RX Differential Pair + (Row A)
A12	GND	Ground
B1	GND	Ground
B2	TX2+	SuperSpeed USB 3.x TX Differential Pair + (Row B)
B3	TX2-	SuperSpeed USB 3.x TX Differential Pair - (Row B)
B4	VBUS	Bus Power
B5	CC2	Configuration Channel 2 (cable orientation, PD negotiation)
B6	D+	USB 2.0 Data Positive (mirrored)

B7	D-	USB 2.0 Data Negative (mirrored)
B8	SBU2	Sideband Use 2 (alternate mode signaling)
B9	VBUS	Bus Power
B10	RX1-	SuperSpeed USB 3.x RX Differential Pair - (Row B)
B11	RX1+	SuperSpeed USB 3.x RX Differential Pair + (Row B)
B12	GND	Ground

Note: Pin names follow the USB Type-C Specification Rev 2.0. The A and B rows are electrically mirrored to allow the connector to be inserted in either orientation.

Wiring Guide

Common usage scenarios for this breakout board:

1. Power only (5V): Connect VBUS (any VBUS pad) to your power rail and GND (any GND pad) to ground. No CC resistors means a USB-C charger will typically default to 5V/0.9A.
2. USB 2.0 data: Connect D+ and D- pads (Row A or Row B — they are internally mirrored). No additional components required for basic USB 2.0 connectivity.
3. USB PD (Power Delivery): Requires an external PD controller IC connected to CC1 and CC2. The breakout provides access to both CC pins, but resistors and PD logic must be added externally.
4. USB 3.x SuperSpeed data: Connect TX1+/TX1- and RX2+/RX2- (or the B-row equivalents). Maintain controlled impedance traces at 90 ohms differential.
5. Alternate Mode (DisplayPort, Thunderbolt): SBU1 and SBU2 pads are exposed for sideband signaling. Alternate mode requires a compatible host controller and mux IC — not provided on this board.

Important Operational Notes

1. No Enumeration Logic: This board has no pull-down resistors on CC1/CC2. A USB-C host or charger will not recognize orientation or negotiate current/voltage without external CC resistors (5.1k ohm to GND for a device/sink, or Rp resistors for a host/source).

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2. Pure Passive Breakout: The board contains no active components, regulators, or level shifters. All signal integrity responsibility lies with the user's external circuit.
 3. Dual-Row Access: Both Row A and Row B pads are accessible. For USB 2.0 use, either row's D+/D- may be used. For SuperSpeed, both rows must be connected for full duplex operation.
 4. VBUS Voltage Range: VBUS can carry 5V (standard) up to 20V when USB Power Delivery is negotiated by an external PD controller. Ensure downstream components are rated accordingly.
 5. SMT Connector Durability: The USB-C receptacle is rated for typical consumer insertion cycles. For high-cycle or industrial use, reinforce the connector's solder joints.