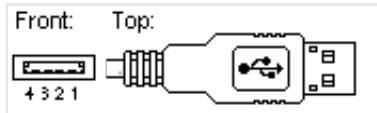


Universal Serial Bus (USB)

Developed by Compaq, Hewlett-Packard, Intel, Lucent, Microsoft, NEC and Philips.

Pinout (Normal)

Series-A:



Series-B:



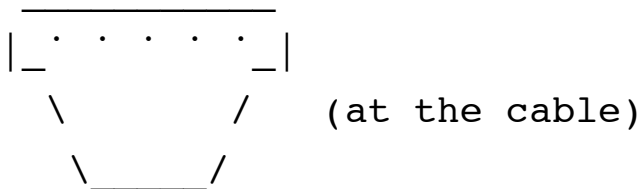
Series "A" plugs are used towards the host system and series "B" plugs are used towards the USB device.

Pin	Name	Description
1	VBUS	+5 VDC
2	D-	Data -
3	D+	Data +
4	GND	Ground

Pinout (Mini)

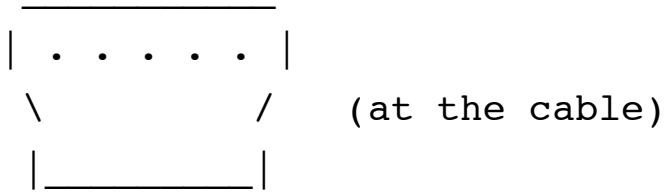
Mini-A:

5 4 3 2 1



Mini-B:

5 4 3 2 1



Pinout (USB 3.0)

Connectors are backwards compatible with USB 1.1/2.0. The original 4 pins are still there. Expected transfer rate 4.7Gb/s.

Pin	Name	Description
1	VBUS	+5 VDC
2	D-	Data -
3	D+	Data +
4	GND	Ground
5	USB3_RX	USB 3.0 Data Receive (differential)
6	USB3_RX	USB 3.0 Data Receive (differential)
7	GND	Ground
8	USB3_TX	USB 3.0 Data Transmit (differential)
9	USB3_TX	USB 3.0 Data Transmit (differential)

Technical specs

Features

- True Plug'n'Play.
- Hot plug and unplug
- Low cost
- Easy of use
- 127 physical devices
- Low cost cables and connectors

Bandwidth

- High speed: 480 Mbps speed (in USB 2.0 and above)
- Full speed: 12 Mbps speed (requires shielded cable)
- Low speed: 1.5 Mbps speed (non-shielded cable)

Definitions

USB Host = The computer, only one host per USB system.

USB Device = A *hub* or a *Function*.

Power usage:

Bus-powered hubs: Draw Max 100 mA at power up and 500 mA normally.

Self-powered hubs: Draw Max 100 mA, must supply 500 mA to each port.

Low power, bus-powered functions: Draw Max 100 mA.

High power, bus-powered functions: Self-powered hubs: Draw Max 100 mA, must supply 500 mA to each port.

Self-powered functions: Draw Max 100 mA.

Suspended device: Max 0.5 mA

Voltage

- Supplied voltage by a host or a powered hub ports is between 4.75 V and 5.25 V.
- Maximum voltage drop for bus-powered hubs is 0.35 V from it's host or hub to the hubs output port.
- All hubs and functions must be able to send configuration data at 4.4 V, but only low-power functions need to be working at this voltage.
- Normal operational voltage for functions is minimum 4.75 V.

Shielding

Shield should only be connected to Ground at the host. No device should connect Shield to Ground.

Cable

Shielded

- Data: 28 AWG twisted
- Power: 28 AWG - 20 AWG non-twisted

Non-shielded

- Data: 28 AWG non-twisted
- Power: 28 AWG - 20 AWG non-twisted

Power Gauge	Max length
28	0.81 m
26	1.31 m
24	2.08 m
22	3.33 m
20	5.00 m

Cable colors

Pin	Name	Cable color	Description
1	VBUS	Red	+5 VDC
2	D-	White	Data -
3	D+	Green	Data +
4	GND	Black	Ground

Contributions

- [Joakim Ögren](#)
- [Tomas Ögren](#)

Sources

- [USB FAQ at USB Implementers Forum](#)
- [USB Specification v2.0 at USB Implementers Forum](#)
- [USB 3.0 revealed](#)

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