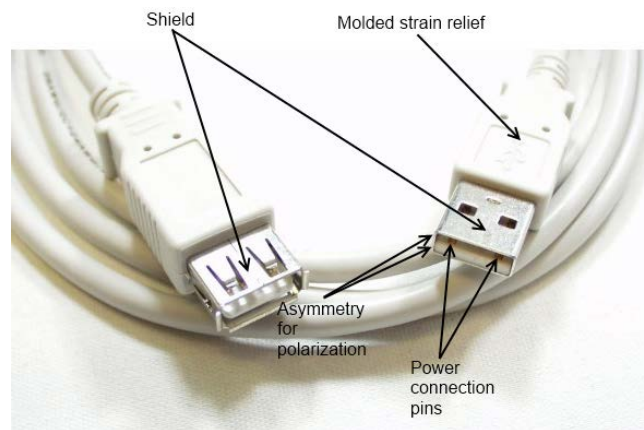


USB CONNECTORS

USB connectors come in two flavors: host and peripheral. In the USB standard, there is a difference between the two, and the connectors on cables and devices reflect this. However, all USB connectors will have some things in common:

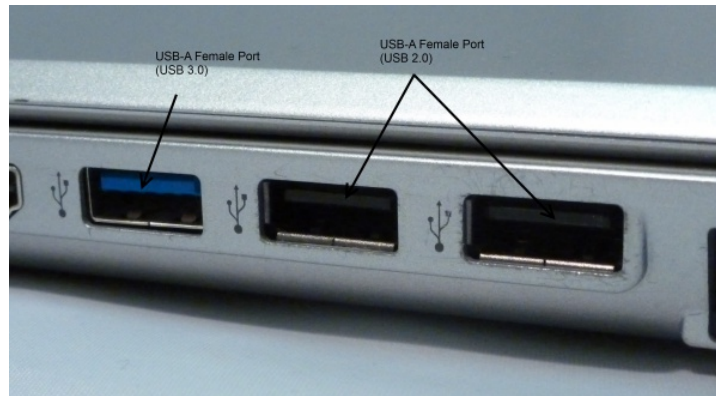
- **Polarization** - A USB connector can only nominally be inserted one way. It may be possible to force a connector in wrong, but that *will* result in damage to the device.
- **Four contacts** - All USB connectors have at least four contacts (although some may have five, and [USB 3.0](#) connectors have even more). These are for power, ground, and two data lines (D+ and D-). USB connectors are designed to transmit 5V, up to 500mA.
- **Shielding** - USB connectors are shielded, such that a metal shell which is not part of the electrical circuit is provided. This is important to keep the signal intact in environments with a lot of electrical “noise”.
- **Robust power connection** - It’s important for the power pins to make connection before the data lines, to avoid trying to power the device over the data lines. All USB connectors are designed with this in mind.
- **Molded strain relief** - All USB cables have plastic overmolding at the connector to prevent strain on the cable that could potentially damage the electrical connections.



A [USB extension cable](#), with some of the common features of USB connectors labeled.

USB-A Connectors

USB-A female is the standard “host” connector type. This is found on computers, hubs, or any device intended to have peripherals plugged into it. It is also possible to find extension cables with a female A connector and a male A connector on the other end.



Female USB-A ports on the side of a laptop. The blue connector is USB 3.0 compliant.

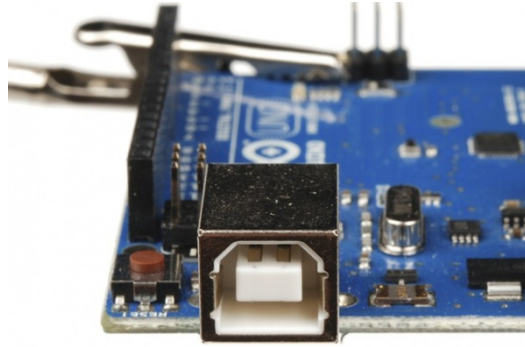
USB-A male is the standard “peripheral” connector type. Most USB cables will have one end terminating in a USB-A male connector, and many devices (such as keyboards and mice) will have a built-in cable terminated with a USB-A male connector. It’s also possible to find USB-A male connectors that are board mountable, for devices like USB memory sticks.



Two types of Male USB-A connectors, on a [SparkFun Cerberus cable](#) and an [AVR Stick](#) development board.

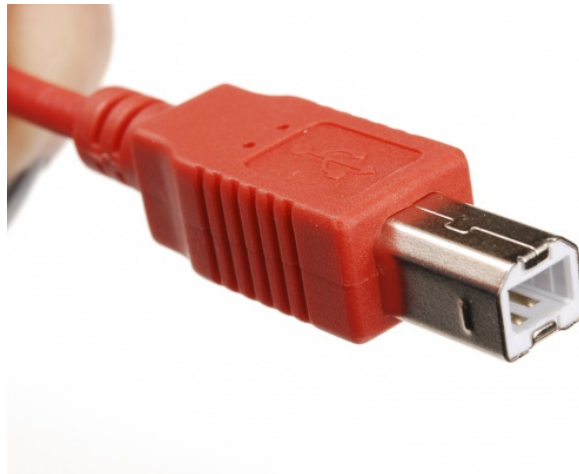
USB-B Connectors

USB-B female is a standard for peripheral devices. It’s bulky, but robust, so in applications where size is not an issue, it’s the preferred means for providing a removable connector for USB connectivity. It is usually a through-hole board mount connector, for maximum reliability, but there are panel-mount options for it as well.



Arduino boards, including this [Uno](#), have long used the female **USB-B** connector, due to its low cost and durability.

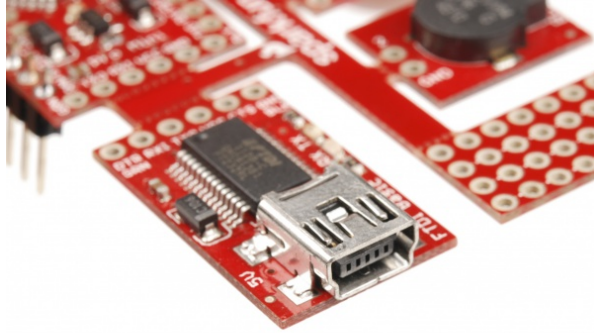
USB-B male is almost exclusively found at the end of a cable. USB-B cables are ubiquitous and inexpensive, which also contributes to the popularity of the USB-B connection.



USB-B male connector on the end of a [SparkFun Cerberus cable](#).

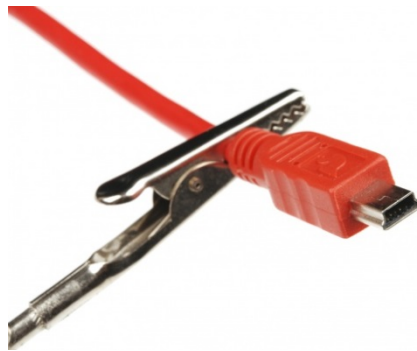
USB-Mini Connectors

The **USB-Mini** connection was the first standard attempt to reduce the size of the USB connector for smaller devices. USB-Mini female is typically found on smaller peripherals (MP3 players, older cellphones, small external hard drives), and is usually a surface mount connector, trading robustness for size. USB-Mini is slowly being phased out in favor of the USB-Micro connector.



USB-Mini female connector on a [Protosnap Pro Mini](#).

USB-Mini male is another cable-only connector. As with USB-B, it's extremely common, and cables can be found cheaply almost anywhere.

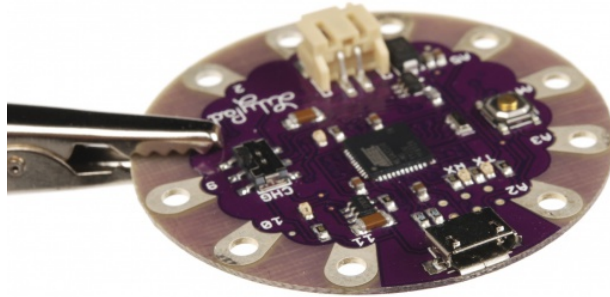


USB-Mini male connector on the end of a [SparkFun Cerberus cable](#).

USB-Micro Connectors

USB-Micro is a fairly recent addition to the USB connector family. As with USB-Mini, the primary concern is size reduction, but USB-Micro adds a fifth pin for low-speed signalling, allowing it to be used in USB-OTG (On-the-go) applications where a device may want to operate as either a host or a peripheral depending on circumstances.

USB-Micro female is found on many newer peripherals, such as digital cameras and MP3 players. The adoption of USB-micro as a standard charge port for all new cellular phones and tablet computers means that chargers and data cables are becoming increasingly common, and USB-Micro is likely to supplant USB-Mini in the coming years as the small-factor USB connector of choice.



USB-Micro female connector on a [LilyPad Arduino USB](#) board.

USB-Micro male is also a cable-only connector. There are generally two types of cables with USB-Micro male ends: one for connecting a device with a USB-Micro port as a peripheral to a USB host device and one for adapting the USB-Micro female port to a USB-A female port, to be used in USB-OTG capable devices.



USB-Micro male connector on the [SparkFun Cerberus cable](#).



[Adapter pigtail](#) for using USB-OTG capable devices having only a USB-Micro port with standard USB peripherals. Note that not all devices supporting USB-OTG will work with this pigtail.