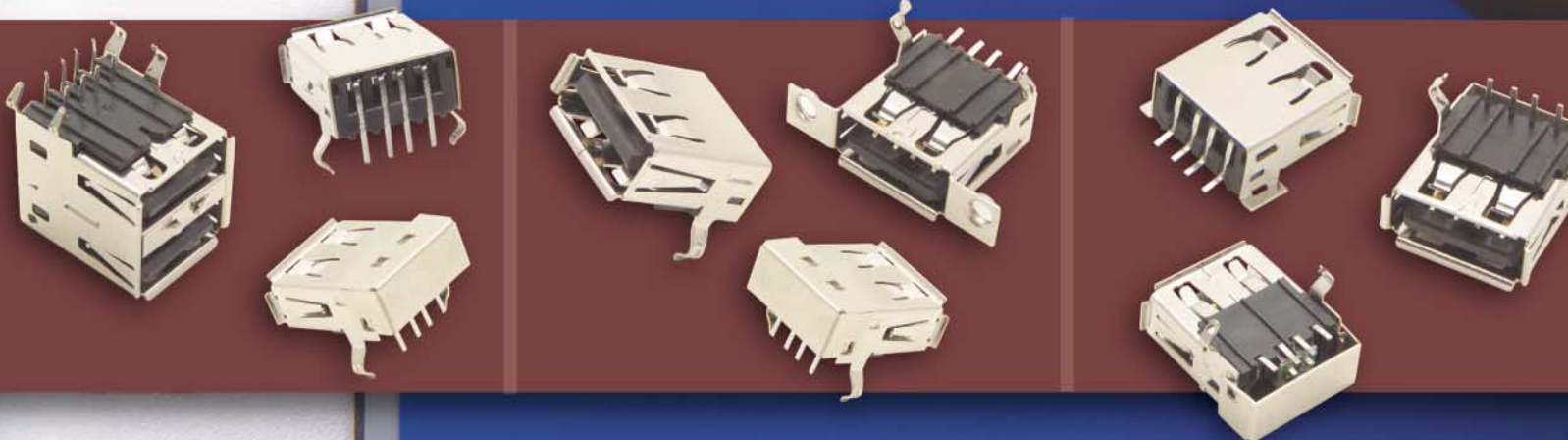




SPECTRUM CONTROL INC.

EMI & ESD Protection @ the USB Connector



The industry wide adoption of connector standards for computer peripherals has helped facilitate the explosion of consumer electronics technology. The resulting Universal Serial Bus (USB) connector allows for high-speed, easy connection of an ever-increasing range of peripherals to a PC and to each other.

Today, there are several standards governing USB connectors. The original USB 1.0 has been supplemented by USB 2.0, which passed in 2000. USB 2.0 allows for significantly higher data transfer rates, 480 megabits per second (MPS) vs. only 12 MPS under USB 1.0. Additionally, in 2002 USB On-The-Go (OTG) was introduced to further extend these connectors to dual-role devices that can act as a host or peripheral. All of these standards have yielded devices that are much easier to install and can be freely connected and disconnected without rebooting the computer system.

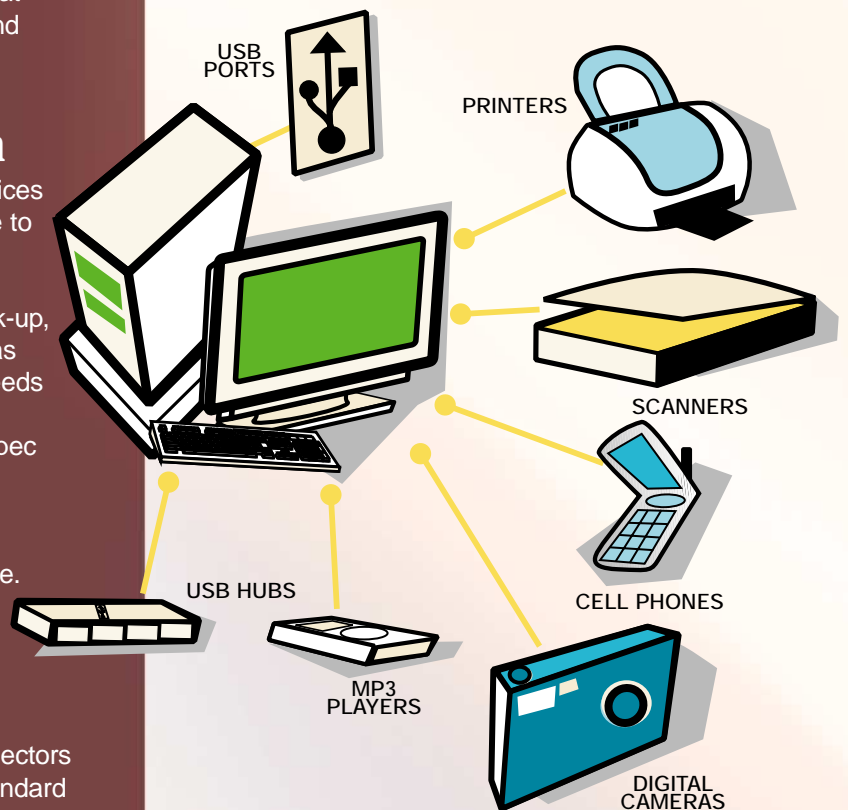
The Need for EMI & ESD Protection

Inherent in the development of more plug-and-play devices with hot-plug capability is greater risk of system exposure to electromagnetic interference (EMI) and electrostatic discharge (ESD). Both of these phenomenon can cause transmission signal degradation, loss of data, system lock-up, and permanent hardware damage. As system circuitry has gotten more complex to accommodate faster transfer speeds and smaller package sizes, greater potential exists for damage from EMI and ESD occurrences. The USB 2.0 spec calls for EMI and ESD protection according to industry specifications. This protection has become more of a challenge as less space is available for components and smaller IC chips are more susceptible to low level damage.

A Better Solution... Filtering at the Connector

Spectrum Control has developed a series of USB connectors that incorporates EMI and ESD filters into an industry standard USB package. By moving the EMI filtering or ESD protection to the USB connector, designers can free-up valuable PC board space for other components and provide better protection for the entire device. These connectors are drop-in replacements for unfiltered connectors making them ideal solutions for the ongoing miniaturization of peripheral devices. Spectrum's EMI filtered and ESD protected USB connectors also can eliminate the need to redesign PC boards in the event of noncompliance during either EMC or ESD testing. Various models of these connectors meet the requirements of USB 1.1 or USB 2.0 specifications and all are RoHS compliant.

Plug-and-Play Devices put your computer at RISK!



Applications

- EMI/RFI Sensitive Electronics
- Test and Measurement Equipment
- Notebook Computers & Peripherals
- Home Entertainment & Multimedia
- Industrial Controls
- Data Acquisition

EMI Filtered USB Connectors Series USB-F

Electrical Specifications

Operating Temperature -55°C to +125°C
 Working Voltage 5 VDC
 Current Rating 1 Amp max.
 Contact Resistance 30 mΩ max.
 Temperature Range -40°C to +71°C

Capacitive Filtered

Capacitance 100pF
 Dielectric withstand voltage 125VDC

Inductive Filtered

Common mode impedance 90Ω ±25%
 @ 100MHz
 IR 10 MΩ min.
 DC Resistance 0.30 Ω max.

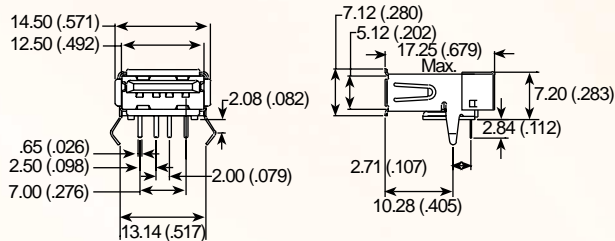
Material

Shell: Brass, nickel plated
 Insulator: Thermoplastic, UL94V-0, reflow compatible
 Contacts: Phosphor bronze, gold flash over nickel

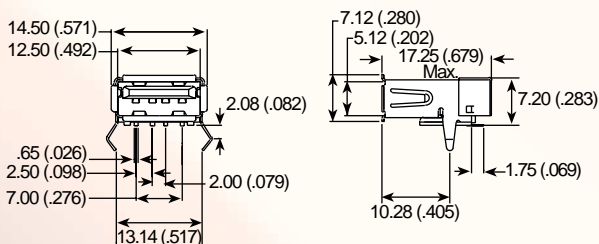


Inductive Filters for USB 2.0

56FU04-020 - socket right angle through hole connector



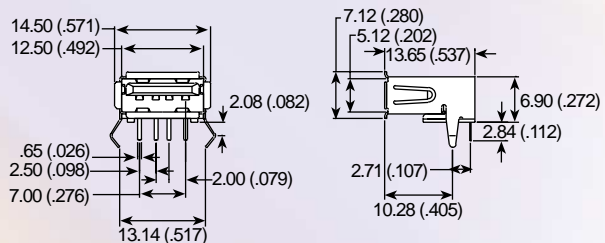
56FU04-020SM - socket-right angle surface mount connector



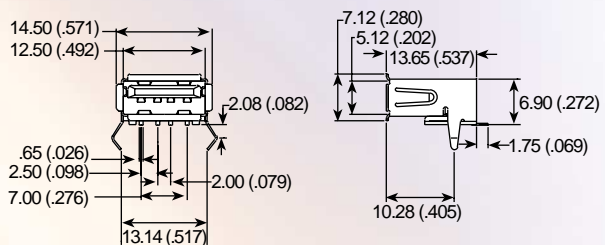
Note: ESD protection can be added to the 2.0 versions as an option

Capacitive Filters for USB 1.1

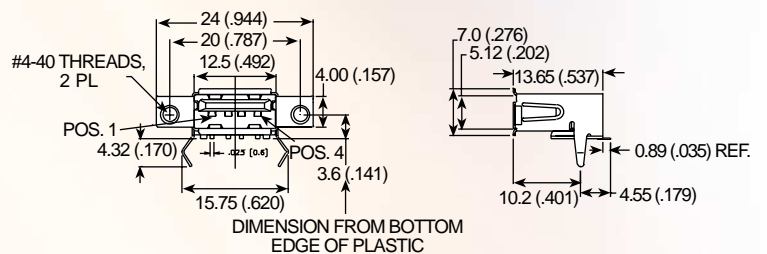
56FU04-004 - socket right angle through hole connector



56FU04-004SM - socket-right angle surface mount connector



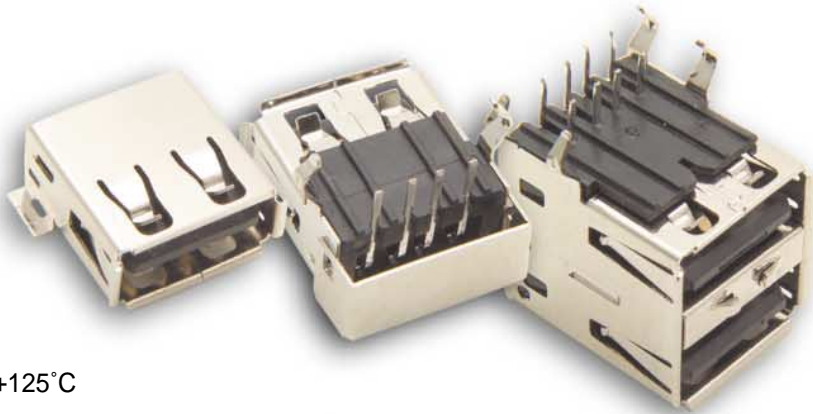
56FU04-004TPM - socket right angle through hole connector with panel mount tabs



Note: Additional capacitor values available. Consult factory.

Custom styles and configurations available. Consult factory.

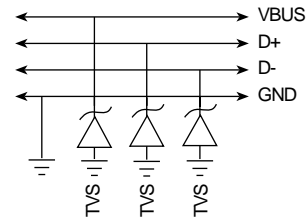
ESD Protected USB Connectors Series USB-E



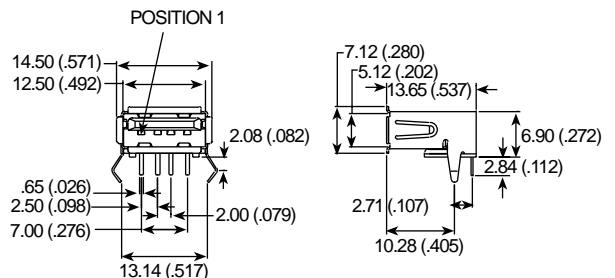
Electrical Specifications

- Operating Temperature -55°C to +125°C
- Working Voltage 5 VDC
- Current Rating 1 Amp max.
- Contact Resistance 30 mΩ max.
- Temperature Range -40°C to +71°C
- Reverse standoff voltage 5 Volts
- Reverse breakdown voltage 6 Volts
- Clamping voltage I_{pp}=1A, t_p=8/20us, 9.8 Volts
(15 Volts for 56FU24-E01)
- Junction capacitance, I/O to GND . . 10pF max.
(3pF max. for 56FU24-E01)

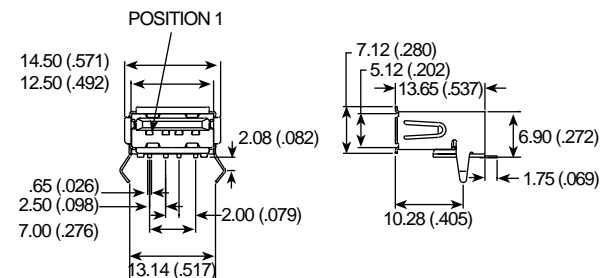
Protection Schematic



56FU04-E01 - socket-right angle through hole connector with TVS diodes



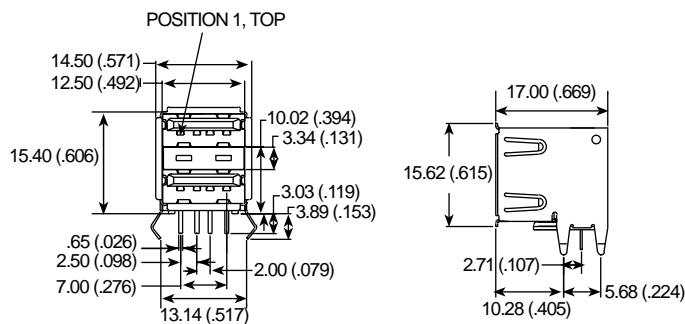
56FU04-E01SM - socket right angle surface mount connector with TVS diodes



Material

- Shell: Brass, nickel plated
- Insulator: Thermoplastic, UL94V-0, reflow compatible
- Contacts: Phosphor bronze, gold flash over nickel

56FU24-E01 - stacked socket-right angle through hole connector with TVS diodes



Custom styles and configurations available. Consult factory.



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