USB 3.0 Connectors
TE Connectivity offers USB 3.0 Connectors

**Key Features**

- Over 10X performance increase
- Support 5 Gbps data rate for fast sync-n-go
  - Minimizes user wait-time
- Backward compatible with USB 2.0 connector
- Minimize connector form factor variations
- Contain EMI
- Comprehend ease-of-use aspects
- Optimized power efficiency
  - No device polling
  - Lower active and idle power requirements
USB 3.0 Applications

- Storage
  - External hard drives
  - Flashcard readers for digital cameras
- High definition A/V equipment
- Desktop & laptop computers
- Keyboards/ mice/ joysticks
- Printers/ scanners
- Game ports • Modems
- Cell phones
- GPS devices
- MP3 player
- Set-top-box
Comparison

**Consumer Electronics**
- Ease-of-use, energy efficiency, and reliability
- Backward compatibility with existing devices/classes

**Storage**
- SuperSpeed data transfer with large amounts of storage
- Superior power management of mass storage devices

**High Definition A/V**
- HD and real-time scenarios
- Improved experiences for rich-media devices
Why Do We Need SuperSpeed USB?

- Flash-based peripherals will require much higher data rates
- User wait time requirement
- Interface performance sets the requirement

<table>
<thead>
<tr>
<th></th>
<th>Song / Pic</th>
<th>256 Flash</th>
<th>USB Flash</th>
<th>SD-Movie</th>
<th>USB Flash</th>
<th>HD-Movie</th>
</tr>
</thead>
<tbody>
<tr>
<td>4MB</td>
<td>5.3 sec</td>
<td>5.7 min</td>
<td>22 min</td>
<td>2.2 hr</td>
<td>5.9 hr</td>
<td>9.3 hr</td>
</tr>
<tr>
<td>256MB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1 GB</td>
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<tr>
<td>6 GB</td>
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<tr>
<td>16 GB</td>
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<tr>
<td>25 GB</td>
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<td></td>
</tr>
<tr>
<td>USB 1.0</td>
<td>0.1 sec</td>
<td>8.5 sec</td>
<td>33 sec</td>
<td>3.3 min</td>
<td>8.9 min</td>
<td>13.9 min</td>
</tr>
<tr>
<td>USB 2.0</td>
<td>0.01 sec</td>
<td>0.8 sec</td>
<td>3.3 sec</td>
<td>20 sec</td>
<td>53.3 sec</td>
<td>70 sec</td>
</tr>
<tr>
<td>USB 3.0</td>
<td>0.01 sec</td>
<td>0.8 sec</td>
<td>3.3 sec</td>
<td>20 sec</td>
<td>53.3 sec</td>
<td>70 sec</td>
</tr>
</tbody>
</table>
USB 3.0 Standard – A Connector

- Same interface as the USB 2.0 standard – A connector, but with added pins for SuperSpeed USB signals
- Complete compatibility with USB 2.0 standard – A connector

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Single Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VBUS</td>
<td>Power</td>
</tr>
<tr>
<td>2</td>
<td>D-</td>
<td>USB 2.0 differential pair</td>
</tr>
<tr>
<td>3</td>
<td>D+</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground for power return</td>
</tr>
<tr>
<td>5</td>
<td>StdA_SSRX-</td>
<td>SuperSpeed receiver</td>
</tr>
<tr>
<td>6</td>
<td>StdA_SSRX+</td>
<td>differential pair</td>
</tr>
<tr>
<td>7</td>
<td>GND_DRAIN</td>
<td>Ground for signal return</td>
</tr>
<tr>
<td>8</td>
<td>StdA_SSTX-</td>
<td>SuperSpeed transmitter</td>
</tr>
<tr>
<td>9</td>
<td>StdA_SSTX+</td>
<td>differential pair</td>
</tr>
</tbody>
</table>
USB 3.0 Standard – B Connector

- Defined for relatively large, stationary peripherals such as hard drives and printers
- Visually different from USB 2.0 standard – B connector – but the receptacle accepts a USB 2.0 standard – B plug
USB 3.0 Micro Connector Family

- Defined for handheld devices
- Backward compatible with USB 2.0 micro connectors
- Based on USB 2.0 micro – B connector with an extended portion for the SuperSpeed USB signals
- USB 3.0 Micro – A and AB connectors are identical to USB 3.0 Micro – B connector except for different keying
Connector Mechanical Requirements

- Durability
  - Micro family: 10,000 cycles
  - All other connectors
    - Standard durability class: 1,500 cycles
    - High durability class: 5,000 cycles
- Unmating force
  - 10N min initial, 8N min EOL
- 4-axis continuity
  - Required for Micro connector family
- Mated cable assembly voltage drop (Vbus and GND, respectively)
  - 225mV max with a 900mA current
Connector Electrical Requirements

- Voltage
  - 30 VA
- Current
  - Pin 1 & 4 – 1.8A; other pins – 0.25A min.
- Contact Resistance
  - Pin 1 & pin 4 – 30Ω; other pins – 50mΩ max.
- Dielectric Withstanding Voltage
  - 100 VAC
- Insulation Resistance
  - 100MΩ
- Impedance
  - 90Ω +/- 15Ω @ 50 ps rise time (20% - 80%)
## Connector Interoperability Summary

<table>
<thead>
<tr>
<th>USB Receptacle</th>
<th>USB Plugs Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 Standard – A</td>
<td>USB 2.0/ 3.0 Standard (A)</td>
</tr>
<tr>
<td>3.0 Standard – A</td>
<td>USB 2.0/ 3.0 Standard (A)</td>
</tr>
<tr>
<td>2.0 Standard – B</td>
<td>USB 2.0 Standard (B)</td>
</tr>
<tr>
<td>3.0 Standard – B</td>
<td>USB 2.0/ 3.0 Standard (B)</td>
</tr>
<tr>
<td>3.0 Powered – B</td>
<td>USB 3.0 Powered (B), USB 2.0/ 3.0 Standard (B)</td>
</tr>
<tr>
<td>2.0 Micro – B</td>
<td>USB 2.0 Micro (B)</td>
</tr>
<tr>
<td>3.0 Micro – B</td>
<td>USB 2.0/ 3.0 Micro (B)</td>
</tr>
<tr>
<td>2.0 Micro – AB</td>
<td>USB 2.0 Micro (B) or (A)</td>
</tr>
<tr>
<td>3.0 Micro – AB</td>
<td>USB 2.0/ 3.0 Micro (B), 2.0/ 3.0 Micro (A)</td>
</tr>
</tbody>
</table>
In Summary

- Over 10X performance increase
  - Supports 5 Gbps data rate
  - HD-move transfers in 70 sec. vs. 13.9 min. with USB 2.0

- Fast sync-n-go
  - Minimizes user wait-time

- Optimized Power Efficiency
  - No device polling
  - Lower active and idle power requirements

- Backward compatible with USB 2.0 connector