NXP High-Speed Muxes/Switches

Supporting DP/PCIe/SATA/mSATA/SAS/USB/LVDS
AC-Coupled High Speed Interfaces Summary

NXP’s high-speed muxes/switches support AC-coupled and non-AC-coupled interfaces in a range of formats, from LVDS to PCI3 Gen 3. The table lists the mux/switch formats for AC-coupled interfaces.

Our portfolio covers bandwidth from 1.5 to more than 8 GHz and includes standard and custom solutions for existing and emerging architectures. Each solution builds on the expertise that comes from active support for and participation in key standard-setting committees.

### Interface Brandwidth (per Lane) # Diff Pairs Side Band Signals

<table>
<thead>
<tr>
<th>Interface</th>
<th>Bandwidth (per Lane)</th>
<th># Diff Pairs</th>
<th>Side Band Signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>DisplayPort 1.1a/eDP</td>
<td>2.7 Gbps</td>
<td>1/2/4 Tx</td>
<td>AUX/DDC, HPD</td>
</tr>
<tr>
<td>DisplayPort 1.2a/eDP</td>
<td>5.4 Gbps</td>
<td>1/2/4 Tx</td>
<td>FAUX/AUX/DDC, HPD</td>
</tr>
<tr>
<td>PCI Express Gen 1</td>
<td>2.5 Gbps</td>
<td>1 Tx / 1 Rx</td>
<td>N/A</td>
</tr>
<tr>
<td>PCI Express Gen 2</td>
<td>5.0 Gbps</td>
<td>1 Tx / 1 Rx</td>
<td>N/A</td>
</tr>
<tr>
<td>PCI Express Gen 3</td>
<td>8.0 Gbps</td>
<td>1 Tx / 1 Rx</td>
<td>N/A</td>
</tr>
<tr>
<td>SATA Gen 1</td>
<td>1.5 Gbps</td>
<td>1 Tx / 1 Rx</td>
<td>N/A</td>
</tr>
<tr>
<td>SATA Gen 2</td>
<td>3.0 Gbps</td>
<td>1 Tx / 1 Rx</td>
<td>N/A</td>
</tr>
<tr>
<td>SATA Gen 3</td>
<td>6.0 Gbps</td>
<td>1 Tx / 1 Rx</td>
<td>N/A</td>
</tr>
<tr>
<td>USB 3.0</td>
<td>5.0 Gbps</td>
<td>1 Tx / 1 Rx</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Key Parametric Considerations

Depending on application requirements, consider the following characteristics when selecting a mux/switch:

- Insertion loss and bandwidth
- Number of differential pairs
- Peak-to-peak differential voltage
- Common mode voltage
- Inter-/intra-pair skew
- Rise/fall time
- Differential mode return loss
- Common mode return loss
- Cross-talk

*Eye* diagram showing excellent Signal Integrity
## Selection Guide: High-Speed Muxes/Switches

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Voltage</th>
<th>Features</th>
<th>Support</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBTL04DP211</td>
<td>3.3 V</td>
<td>2.7 Gbps, DP1.1, eDP Panel Switch</td>
<td>DP1.1a</td>
<td>HVQFN-32</td>
</tr>
<tr>
<td>CBTL06DP211</td>
<td>3.3 V</td>
<td>2.7 Gbps, 2:1 Switchable GFX Mux/Demux, 4:1 Aux or DDC</td>
<td>DP1.1a</td>
<td>TFBGA-48</td>
</tr>
<tr>
<td>CBTL06121A</td>
<td>3.3 V</td>
<td>2.7 Gbps, 6-channel Mux/Demux, ATX</td>
<td>DP1.1a</td>
<td>QFN-56</td>
</tr>
<tr>
<td>CBTL06121B</td>
<td>3.3 V</td>
<td>2.7 Gbps, 6-channel Mux/Demux, BTX</td>
<td>DP1.1a</td>
<td>QFN-56</td>
</tr>
<tr>
<td>CBTL12131</td>
<td>3.3 V</td>
<td>Panel Switch for All-in-One PCs with Rcvr Equalizer</td>
<td>DP1.2</td>
<td>TFBGA-64w</td>
</tr>
<tr>
<td>CBTL03SB212</td>
<td>3.3 V</td>
<td>5.4 Gbps Side Band Switch for AUX, DDC, HPD</td>
<td>DP1.2</td>
<td>QFN-20</td>
</tr>
<tr>
<td>CBTL04DP212</td>
<td>3.3 V</td>
<td>5.4 Gbps, DP 1.2 eDP Panel Switch</td>
<td>DP1.2</td>
<td>HVQFN-32</td>
</tr>
<tr>
<td>CBTL06DP212</td>
<td>3.3 V</td>
<td>5.4 Gbps, 2:1 Switchable GFX Mux/Demux, 4:1 Aux or DDC</td>
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<td>TFBGA-48</td>
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<td>QFN-56</td>
</tr>
<tr>
<td>CBTL06123B*</td>
<td>3.3 V</td>
<td>5.4 Gbps, 6-channel Mux/Demux, BTX</td>
<td>DP1.2</td>
<td>QFN-56</td>
</tr>
<tr>
<td>CBTU0808</td>
<td>1.8 V</td>
<td>2.5 Gbps, 4-channel Demux/Mux, or 8-channel 1:1 Bypass</td>
<td>PCIe1</td>
<td>TFBGA-48</td>
</tr>
<tr>
<td>CBTL02042A</td>
<td>3.3 V</td>
<td>5 Gbps, 2-channel Mux/Demux Flow Through Pinout</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-20</td>
</tr>
<tr>
<td>CBTL02042B</td>
<td>3.3 V</td>
<td>5 Gbps, 2-channel Mux/Demux, Wrap Around Pinout</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-20</td>
</tr>
<tr>
<td>CBTL02043A</td>
<td>3.3 V</td>
<td>8 Gbps, 2-channel Mux/Demux, Flow Through Pinout</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-20</td>
</tr>
<tr>
<td>CBTL02043B</td>
<td>3.3 V</td>
<td>8 Gbps, 2-channel Mux/Demux, Flow Through Pinout</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-20</td>
</tr>
<tr>
<td>CBTL04082A</td>
<td>3.3 V</td>
<td>5 Gbps, 4-channel Mux/Demux, Flow Through Pinout</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-42</td>
</tr>
<tr>
<td>CBTL04082B</td>
<td>3.3 V</td>
<td>5 Gbps, 4-channel Mux/Demux, Wrap Around Pinout</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-42</td>
</tr>
<tr>
<td>CBTL04083A</td>
<td>3.3 V</td>
<td>8 Gbps, 4-channel Mux/Demux, Flow Through Pinout</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-42</td>
</tr>
<tr>
<td>CBTL04083B</td>
<td>3.3 V</td>
<td>8 Gbps, 4-channel Mux/Demux, Wrap Around Pinout</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-42</td>
</tr>
<tr>
<td>CBTU04082</td>
<td>1.8 V</td>
<td>5 Gbps, 4-channel Mux/Demux</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-42</td>
</tr>
<tr>
<td>CBTU04083</td>
<td>1.8 V</td>
<td>8 Gbps, 4-channel Mux/Demux</td>
<td>PCIe2/DP1.1/SAS1/SATA2/mSATA/LVDS/USB 3.0</td>
<td>QFN-42</td>
</tr>
<tr>
<td>CBTW28DD14</td>
<td>1.5/1.8 V</td>
<td>14-bit Mux/Bus switch</td>
<td>DDR2/DDR3</td>
<td>TFBGA-48</td>
</tr>
<tr>
<td>CBTU4411</td>
<td>1.8 V</td>
<td>11-bit DDR2 SDRAM Mux/Bus Switch, with 12 ohm Ron</td>
<td>DDR2</td>
<td>LFBGA-72</td>
</tr>
</tbody>
</table>

* Sampling
AC-Coupled High Speed Interfaces

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Application Example: PCIe Slot Configuration Using CBTL04082

In the CBTL0408x and CBTL0204x families, two pinout configurations are available for high-speed USB, PCIe, SAS, DP, SATA, and mSATA applications. When signal propagation delay varies and trace length is not important, the flow-through pinout, designated by an “A” suffix, is recommended. For applications where balanced propagation delay is required, the wrap-around or loop-back pinout, designated by a “B” suffix, should be used.

Application Example: PCIe Slot Configuration Using CBTL04082

Application Example: CBTL02042A Used to Mux Between Main Laptop Motherboard and Docking Station
Application Example: CBTL12131 Used for All-In-One (AIO) Computers with Dual-Video Displays

The CBTL12131 has an eDP interface for the LCD panel, and a DP input connector. Reuse the internal LCD panel as a secondary display, driven by an external DP source.

<table>
<thead>
<tr>
<th>Operation Mode</th>
<th>DP Signal Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual-Link Through</td>
<td>GPU → eDP Panel</td>
</tr>
<tr>
<td></td>
<td>DP Port → External DP Connector</td>
</tr>
</tbody>
</table>

Application Example: CBTL04082A and CBTL03SB212 Providing Flexible Control in Switchable Graphics Applications

The CBTL04082A and the CBTL03SB212 provide separate layout and switching control for:
- High-speed digital video signal
- Low-speed side band signal