Samtec offers a full line of edge card connectivity solutions for industries and applications including datacom, industrial, high-performance computing, and the PCI Express® market, along with a product roadmap to support 56 Gbps speeds and beyond. Solutions include a wide variety of options – a choice of pitches, pin counts, orientations and designs such as power/signal combos, press-fit tails, as well as ruggedizing features.

## Connectivity Solutions from Early Gen PCI Express® to 56 Gbps & Beyond

<table>
<thead>
<tr>
<th>Data Rate</th>
<th>Density</th>
<th>Rugged Industrial • Aerospace / Defense • Transportation</th>
<th>High Performance Computing</th>
<th>PCIe® Market</th>
<th>56+ Gbps NRZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCIe® Early Gen</td>
<td>GSSGSSG</td>
<td>MEC6</td>
<td>HSEC6 (SFF-TA-1002)</td>
<td>HSEC8-RA</td>
<td>Next Gen 56G</td>
</tr>
<tr>
<td>(&lt;8 GTps)</td>
<td>GSSGSSG</td>
<td>MEC8</td>
<td>GSSGSSG</td>
<td>HSEC8-DV</td>
<td>GGSSGGSSGG</td>
</tr>
<tr>
<td>PCIe® Gen 3</td>
<td>GSSGSSG</td>
<td>MECF / MEC2</td>
<td>PCIE-TH</td>
<td>PCIE-G4</td>
<td>GGSSGGSSGG</td>
</tr>
<tr>
<td>(8+ GTps)</td>
<td>GSSGSSG</td>
<td>HSEC8-RA</td>
<td>GSSGSSG</td>
<td>HSEC8-DP</td>
<td>GGSSGGSSGG</td>
</tr>
<tr>
<td>PCIe® Gen 4</td>
<td>GSSGSSG</td>
<td>MEC5-RA</td>
<td>PCIE-LP</td>
<td>PCIE-G5</td>
<td>GGSSGGSSGG</td>
</tr>
<tr>
<td>(16+ GTps)</td>
<td>GSSGSSG</td>
<td>MEC5-DV</td>
<td>GSSGSSG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCIe® Gen 5</td>
<td>GSSGSSG</td>
<td>HSEC8-DV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(32+ GTps)</td>
<td>GSSGSSG</td>
<td>HSEC8-DP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Datacom • Semiconductor • Instrumentation / Medical

High Performance Computing

PCI Express® Market

Density

Data Rate
# TABLE OF CONTENTS

## High-Speed Edge Card Systems ................................................................. 4-5
- Edge Rate® Contact System Connectors (Series: HSEC6, HSEC8, HTEC8, HSEC1)
- Product Roadmap (Series: HSEC6, HSEC1-DP)

## PCI Express® Systems ............................................................................. 6-7
- PCI Express® Gen 3 Edge Card Connector (Series: PCIE)
- SATALink™ Compatible High-Speed Micro Plane Connector (Series: SAL1)
- PCI Express® Gen 4 Low-Profile Edge Card Connectors (Series: PCIE-LP, PCIE-G4)
- PCI Express® Gen 5 Edge Card Connectors (Series: PCIE-G5)
- Product Roadmap: Next Generation 56 Gbps NRZ Edge Card System

## Micro Edge Card Systems ...................................................................... 8-9
- Micro & Mini Edge Card Connectors (Series: MEC6, MEC8, MEC1, MECF, MEC2)
- Extreme Density High-Speed Edge Card Connectors (Series: MEC5)

## Edge Card Reference / Specifications Guide ........................................ 10

## Samtec Technology Centers ................................................................. 11

---

SATAlink™ is a trademark of Silicon Image Inc.
PCI-SIG®, PCI Express® and the PCIe® design marks are registered trademarks and/or service marks of PCI-SIG.
0.60 mm PITCH DIFFERENTIAL PAIR HIGH-SPEED EDGE RATE® CONNECTOR

- Differential pair system
- Compliant to SFF-TA-1002:
  - x4 (1C)
  - x8 (2C)
  - x16 (4C and 4C+)
- Rugged Edge Rate® contacts optimized for signal integrity performance and cycle life
- Mates with .062” (1.60 mm) thick cards
- Currently in development

0.80 mm PITCH HIGH-SPEED DIFFERENTIAL PAIR EDGE RATE® CONNECTOR

- Choice of 4, 8, 12, 16, 24 or 32 pairs
- Accepts .062” (1.60 mm) thick cards
- Differential pair design optimized for even greater speeds
- Rugged Edge Rate® contacts optimized for signal integrity performance and cycle life
- Mating twinax cable assembly (ECDP Series) also available
0.80 mm PITCH HIGH-SPEED EDGE RATE® CONNECTORS

- Rugged Edge Rate® contacts optimized for signal integrity performance and cycle life
- Mates with .062" (1.60 mm) and .093" (2.36 mm) thick cards
- Up to 200 I/Os
- Surface mount, right-angle, edge mount and pass-through options
- Power/Signal combo available (HSEC8-PV Series)
- Optional board locks, cable latching and weld tabs
- Mating twinax cable assembly (ECDP Series) also available
- PCI Express® Gen 4 compatible rugged edge card socket with tucked beam technology (HTEC8 Series)

1.00 mm PITCH HIGH-SPEED EDGE RATE® CONNECTORS

- Rugged Edge Rate® contacts optimized for signal integrity performance and cycle life
- Custom designs allow for misalignment mitigation
- Up to 140 I/Os
- Mates with .062" (1.60 mm) thick cards
- Optional weld tab for mechanical strength
- Currently in Development:
  PCI Express® Gen 5 compatible 1.00 mm pitch differential pair edge card system (HSEC1-DP Series)
PCI Express® Gen 3 Edge Card Connector

- 1.00 mm (.0394") pitch
- Supports one, four, eight and sixteen PCI Express® links
- PCI Express® Gen 3 compliant
- Accepts .062" (1.60 mm) card
- Vertical, right-angle or edge mount orientations
- PCI Express® jumpers also available (PCIEC Series)

SATALink™ Compatible High-Speed Micro Plane Connector

- 1.00 mm (.0394") pitch
- Low profile, surface mount
- 40 to 80 I/Os per pair
- Mounts in pairs on same or opposite sides for easy signal routing
- BeCu contacts with large deflection
- Tremendous board stacking and routing flexibility
- Mates with .062" (1.60 mm) and .093" (2.36 mm) thick cards
PCI Express® Gen 4 Low Profile Edge Card Connectors

- 1.00 mm (.0394") pitch
- Supports one, four, eight and sixteen PCI Express® links
- Compatible to PCI Express® Gen 4 speeds
- Low 8 mm profile design for space savings
- Mates with .062” (1.60 mm) thick cards
- Optional weld tabs
- PCI Express® jumpers also available
- PCIE-G4 Series slim, low profile socket with rugged Edge Rate® contacts optimized for signal integrity performance and cycle life

PCI Express® Gen 5 Edge Card Connectors

- Currently in development; design-in today for future-proof data rates
- Differential pair system
- **Product Roadmap:**
  Next generation 56 Gbps NRZ edge card system

[Images and diagrams related to PCI Express® connectors and jumpers]
0.50 mm Pitch High-Speed Micro Edge Card Connectors

- Highest density in the industry
- Up to 300 total I/Os:
  - 60 - 200 positions (DV)
  - 60 - 160 positions (RA)
  - 300 positions in development
- Right-angle and vertical orientations
- Justification beam maintains ease of manufacturing and yield of mating card by permitting standard PCB tolerances on mating card
- Mates with .062” (1.60 mm) and .093” (2.36 mm) card thicknesses
- Optional board locks and weld tabs
- PCI Express® Gen 4 compatible
- Currently in Development:
  - 0.50 mm pitch high-speed differential pair micro edge card sockets (FCDP-DV and FCDP-RA Series) designed to mate with FEDP Series cable assembly
  - Signal integrity characterization kit for evaluation of FCDP Series high-speed micro edge card connectors

In Development
0.50 mm Pitch High-Speed Vertical and Right-Angle Micro Edge Card Sockets for Mating with FEDP Series Cable Assembly
0.635 mm & 0.80 mm Pitch Micro Edge Card Connectors

- Up to 140 total I/Os
- 0.635 mm pitch right-angle and vertical (MEC6 Series)
- 0.80 mm pitch right-angle, vertical and edge mount (MEC8 Series)
- Press-fit system on 0.80 mm pitch (MEC8-PV Series)
- Mates with .062” (1.60 mm) card thicknesses
- Alignment pins and latching options also available

1.00 mm, 1.27 mm & 2.00 mm Pitch Mini Edge Card Connectors

- 1.00 mm pitch vertical, right-angle and edge mount (MEC1 Series) with up to 140 total I/Os
- 1.27 mm (.050”) pitch vertical (MECF Series) with up to 100 total I/Os
- 2.00 mm pitch vertical (MEC2 Series) with up to 100 total I/Os
- Optional weld tabs, alignment pins and polarization
- Mates with .062” (1.60 mm) and .093” (2.36 mm) thick cards
## EDGE CARD REFERENCE GUIDE

<table>
<thead>
<tr>
<th>Metric</th>
<th>SAL1</th>
<th>MEC1</th>
<th>HSEC1</th>
<th>PCIE-LP</th>
<th>PCIE</th>
<th>MECF</th>
<th>MEC2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metrology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pitch</td>
<td>1.00 mm</td>
<td>1.00 mm</td>
<td>1.00 mm</td>
<td>1.27 mm</td>
<td>1.00 mm</td>
<td>2.00 mm</td>
<td></td>
</tr>
<tr>
<td>Total Pin Counts</td>
<td>20, 27, 30, 40</td>
<td>20-200</td>
<td>20-140</td>
<td>36 (x1), 64 (x4), 98 (x8), 164 (x16)</td>
<td>10-140</td>
<td>10-100</td>
<td></td>
</tr>
<tr>
<td>Linear Density (circuits/mm)</td>
<td>1.96</td>
<td>1.88</td>
<td>1.76</td>
<td>1.84</td>
<td>1.48</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>Card Thickness</td>
<td>Variable</td>
<td>Vertical, Right-Angle</td>
<td>Vertical, Right-Angle, Edge Mount</td>
<td>Vertical, Right-Angle, Edge Mount</td>
<td>Vertical</td>
<td>Vertical</td>
<td></td>
</tr>
<tr>
<td>Orientations Available</td>
<td>Pass-Through</td>
<td>Vertical, Right-Angle, Edge Mount</td>
<td>Vertical</td>
<td>Vertical, Right-Angle, Edge Mount</td>
<td>Vertical</td>
<td>Vertical</td>
<td></td>
</tr>
<tr>
<td>Mechanical Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Normal Force per Circuit (GRF)</td>
<td>80</td>
<td>60</td>
<td>TBD</td>
<td>55</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wipe (mm)</td>
<td>1.50</td>
<td>2.95</td>
<td>2.00</td>
<td>3.50</td>
<td>3.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mating/Unmating Force per Circuit (GRF)</td>
<td>40/30</td>
<td>40/20</td>
<td>TBD</td>
<td>30/15</td>
<td>45/20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Low Frequency)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Carrying Capacity (Amps)</td>
<td>2.9 (2 pins)</td>
<td>2.2 (2 pins)</td>
<td>TBD</td>
<td>TBD</td>
<td>2.2 (2 pins)</td>
<td>3.5 (2 pins)</td>
<td></td>
</tr>
<tr>
<td>Working Voltage (VAC)</td>
<td>215</td>
<td>300</td>
<td>TBD</td>
<td>215</td>
<td>280</td>
<td>238</td>
<td></td>
</tr>
<tr>
<td>PCIe® Compatibility (Gen)</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3 (compliant)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Designed to be Impedance Matched</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(High Frequency)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristic Impedance (Single-Ended, 30 ps rise time, Ohms)</td>
<td>43-70</td>
<td>33-57</td>
<td>45-55</td>
<td>100</td>
<td>TBD</td>
<td>43-70</td>
<td>43-58</td>
</tr>
<tr>
<td>Environmental Performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durability (Cycles)</td>
<td>100</td>
<td>500</td>
<td>1,000</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MFG Tested</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Au is the only interface finish available. Recommended operating environment is a controlled environment.

All products are tested to a standard amplitude and frequency; this parameter gives an average resistance change as a result of that standardized test.
SAMTEC TECHNOLOGY CENTERS ENABLE COMPLETE SYSTEM OPTIMIZATION FROM SILICON-TO-SILICON™

Samtec’s Technology Centers offer high-level design and development of advanced interconnect systems and technologies, along with industry-leading signal integrity expertise which allows us to provide effective strategies and technical support for optimizing the entire serial channel of high-performance systems.

Because Samtec’s Technology Centers are not limited by the boundaries of traditional business units, we are able to work in a fully integrated capacity that enables true collaboration and innovation to support the demands of today, and the challenges of tomorrow.

Integration Leads to Innovation

- **HIGH-SPEED CABLE**: In-house R&D manufacturing of precision extruded cable and assemblies
- **ADVANCED INTERCONNECTS**: High precision stamping, plating, molding and automated assembly
- **SYSTEM SIGNAL INTEGRITY**: Full channel signal and power integrity analysis, testing and validation services
- **MICROELECTRONICS**: Advanced IC packaging design, support and manufacturing capabilities
- **OPTICS**: R&D, design, development and support of micro optical engines and assemblies
- **PRECISION RF**: RF interconnect design and development expertise, with testing to 65 GHz

samtec.com/tech-centers