Samtec offers the largest variety of high-speed board-to-board and backplane interconnects in the industry with full engineering support, online tools and an unmatched service attitude.

**HIGH-SPEED PERFORMANCE**
- Speeds to 112 Gbps PAM4
- More than 4.0 Tbps of aggregate bandwidth
- Extremely low crosstalk to 40 GHz

**APPLICATION FLEXIBILITY**
- 10 – 3,000 positions
- 0.33 mm – 40 mm stack heights
- Vertical, right-angle, edge mount

**SIGNAL INTEGRITY SUPPORT**
- Free test reports, models, app notes, Break Out Region
- Easy access to live EE support
- Online tools: Simulator™ and Channelyzer®
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HIGH-DENSITY ARRAYS

EXTREME PERFORMANCE • OPEN-PIN-FIELD • LOW-PROFILE

SEAM/SEAF
Shown with 400 pins

VARIETY OF OPTIONS:
- **Pitch**: 0.635 mm, 0.80 mm, 1.00 mm, 1.27 mm
- **Pin/Pair Count**: 8 to 720 positions available
- **Stack Height**: 0.33 mm to 40 mm
- **Options**: Right-angle, press-fit tails, 85 Ω tuned, mating and alignment hardware, standoffs
EXTREME PERFORMANCE ARRAYS

- 4.0 Tbps aggregate data rate - 9 IEEE 400G channels
- Two points of contact ensure a more reliable connection
- Fully shielded differential pair design
- Extremely low crosstalk (to 40 GHz) and incredibly tight impedance control
- Minimal variance in data rate as stack height increases
- Utilizes 40% less space with the same data throughput as compared to traditional arrays

MICRO ARRAYS

- Flexible open-pin-field and cost optimized, extreme performance solution
- Low-profile 5 mm stack height and up to 10 mm
- 0.635 mm pitch
- Four row design with up to 400 total pins
- Data rate compatible with PCIe® Gen 5 and 100 GbE
- Cable assembly in development

LOW-PROFILE ARRAYS

- Up to 400 total pins in 4, 6 or 8 rows
- 1.27 mm pitch
- Dual beam contact system
- Solder crimped termination for ease of processing
- Compatible with mPower™ (UMPT/UMPS) for power/signal flexibility
- Press-in or threaded standoffs available to assist unmating (JSO)
1.27 mm PITCH ARRAYS

- Maximum grounding and routing flexibility
- Up to 560 Edge Rate® contacts optimized for signal integrity performance
- 7 mm to 40 mm stack heights; right-angle available
- Supports high-speed protocols such as Ethernet, PCI Express®, Fibre Channel and InfiniBand™
- Compatible with mPower™ (UMPT/UMPS) for power/signal flexibility

OPEN-PIN-FIELD FLEXIBILITY

SEAM/SEAF

1.15 mm (.045")
contact wipe

Solder charge terminations
(IPC-A-610F & IPC J-STD-001F Class 3)

Elevated stack heights available (SEAR)

Press-fit tails available (SEAMP/SEAFP)

Jack screw standoffs (JSO)
HIGH-DENSITY 0.80 mm PITCH ARRAYS

- 2x the density of 1.27 mm pitch arrays
- 0.80 mm pitch
- Up to 720 Edge Rate® contacts; higher pin counts in development
- 7 mm and 10 mm stack heights
- 2 mm extended wipe in development
- Compatible with mPower™ (UMPT/UMPS) for power/signal flexibility

ULTRA-LOW PROFILE ONE-PIECE ARRAYS

- 0.80 mm or 1.00 mm pitch
- 1 mm body height (ZA8/ZA1); 0.33 mm body height provides the shortest signal path (ZA8H)
- 1.27 mm and 2 mm body heights (GMI)
- Up to 400 pins standard; 3,000+ pins with custom capabilities on Z-Ray®
- Z-Ray® is customizable in X, Y, and Z axes, stack height, pin count, shape, plating thickness, etc.
- Alignment/compression hardware available for Z-Ray® (ZHSl, ZSO, ZD)
EDGE RATE® CONTACT STRIPS

OPTIMIZED FOR SPEED • HIGH CYCLES • INCREASED CONTACT WIPE

EDGE RATE® CONTACT SYSTEM:
- Smooth milled mating surface reduces wear and increases durability
- Lower insertion and withdrawal forces
- Robust when “zipped” during unmating
- Minimized parallel surface area reduces broadside coupling and crosstalk
- Designed, simulated and optimized for 50 Ω and 100 Ω systems

STACK HEIGHT FLEXIBILITY
(Actual size in mm)

ERM6/ERF6
ERM5/ERF5
ERM8/ERF8

5 7 9 10 11 12 13 14 15 16 17 18

samtec.com/edgerate
0.80 mm PITCH SYSTEM

- 1.5 mm contact wipe for a reliable connection
- Differential pair and hot swap options
- Stack heights from 7 mm to 18 mm (8 mm in development)
- Supports high-speed protocols including Ethernet and PCI Express®

0.635 mm PITCH SYSTEM

- Extremely slim 2.5 mm body width
- Up to 120 positions in a 2-row design
- 5 mm stack height (others in development)
- Compatible with mPower™ (UMPT/UMPS) for power/signal flexibility

0.50 mm PITCH SYSTEM

- 1.00 mm contact wipe
- Up to 40% PCB space savings with 0.50 mm pitch vs. 0.80 mm pitch
- Stack heights from 7 mm to 12 mm
- 20 to 150 total positions

samtec.com/edgerate
GROUND PLANE CONNECTORS

RELIABLE SI PERFORMANCE • LOW-PROFILE • SLIM FOOTPRINT

INTEGRAL GROUND/POWER PLANE
- Surface mount ground plane between two signal rows improves electrical performance
- Significantly reduces row-to-row crosstalk
- Integral metal plane for power to 25 Amps

FEATURES
- Differential pairs reduce noise
- Mixed technology (MIT/MIS)
- Options for power, retention & RF

QTH/QSH
5 mm stack height shown

samtec.com/qseries
LOW-PROFILE GROUND PLANE CONNECTORS

• 0.50 mm, 0.635 mm and 0.80 mm pitch
• 5 mm to 25 mm stack heights
• Integral ground/power plane
• Compatible with mPower™ (UMPT/UMPS) for power/signal flexibility

SLIM GROUND PLANE CONNECTORS

• 0.80 mm pitch and 1.20 mm contact wipe
• Edge Rate® contacts optimized for superior signal integrity performance
• Right-angle available for coplanar and perpendicular mating
• Compatible with mPower™ (UMPT/UMPS) for power/signal flexibility

RUGGED GROUND PLANE CONNECTORS

• 0.635 mm pitch
• Increased insertion depth for rugged applications
• Up to 156 signal pins/48 signal pairs standard
• Vertical, right-angle and edge mount
• Shielded systems available (QMSS/QFSS)
• Compatible with mPower™ (UMPT/UMPS) for power/signal flexibility
ULTRA MICRO INTERCONNECTS

SPACE SAVING DESIGNS • HERMAPHRODITIC • HIGH-DENSITY

Self-mating connectors reduce inventory costs and can be interchanged for varying stack heights.

ADM6/ADF6
120 total positions shown

ACTUAL SIZE SHOWN - SLIM BODY DESIGNS
(40 total positions each)

LSHM

5 mm stack height

12 mm stack height

samtec.com/ultra-micro
HIGH-DENSITY MULTI-ROW STRIPS

- Low-profile 5 mm stack height and slim 5 mm width
- 0.635 mm pitch Edge Rate® contacts
- Up to 400 I/Os in a 4-row design
- Open-pin-field design for grounding and routing flexibility

RUGGED HERMAPHRODITIC CONNECTORS

- Razor Beam™ contacts for high-speed and fine-pitch systems
- 0.50 mm, 0.635 mm and 0.80 mm pitch
- Stack heights from 5 mm to 12 mm
- 10 - 100 positions

LOW-PROFILE STRIPS

- Micro 0.40 mm and 0.50 mm pitch
- Stack heights from 2 to 6 mm
- Slim body designs for increased PCB space savings
- 20 - 160 positions

samtec.com/ultra-micro
VARIETY OF OPTIONS:

- **Pitch**: 0.50 mm, 0.60 mm, 0.635 mm, 0.80 mm, 1.00 mm, 1.27 mm, 2.00 mm
- **Pin Count**: 10 – 200 total positions available
- **Orientation**: Vertical, right-angle, edge mount, pass-through
- **Options**: Power/signal combo, press-fit tails, PCI Express®, rugged weld tabs, locks and latches
### 0.60 mm PITCH SOCKETS

- Differential pair Edge Rate® contacts
- Compliant to SFF-TA-1002: x4 (IC), x8 (2C), x16 (4C and 4C+)
- Mates with 0.062" (1.60 mm) thick cards
- PCI Express® Gen 5 compatible

![Image](HSEC6.png)

### 0.80 mm PITCH SOCKETS

- Up to 200 high-speed Edge Rate® contacts
- Mates with 0.062" (1.60 mm) and 0.093" (2.36 mm) thick cards
- Power/signal combo (HSEC8-PV)
- PCI Express® Gen 3/4 compatible; rugged Gen 4 compatible socket in development (HTEC8)

![Image](HSEC8-EM.png)

### 1.00 mm PITCH SOCKETS

- Edge Rate® contact system for decreased crosstalk
- 20 – 140 positions
- Mates with 0.062" (1.60 mm) thick cards
- PCI Express® Gen 3/4 compatible; Gen 5 compatible differential pair socket in development (HSEC1-DP)

![Image](HSEC1-DV.png)
EDGE CARD SYSTEMS

0.50 mm PITCH HIGH-SPEED, LOW-COST SOCKETS

- Justification beam enables use of standard PCB tolerance
- Up to 200 total I/Os; 300 I/Os in development
- PCIe® Gen 4 compatible
- Mates with .062” (1.60 mm) thick cards

0.635 mm & 0.80 mm PITCH MICRO SOCKETS

- Up to 140 total I/Os
- Vertical and right-angle; edge mount (MEC8)
- Press-fit tails available (MEC8)
- Mates with .062” (1.60 mm) thick cards

1.00 mm, 1.27 mm & 2.00 mm PITCH SOCKETS

- Up to 140 total I/Os
- Right-angle and edge mount available (MEC1)
- Optional weld tabs, alignment pins and polarization
- Mates with .062” (1.60 mm) and .093” (2.36 mm) thick cards

samtec.com/edgecard
GEN 3 & 4 PCI EXPRESS® SOCKETS

- 1.00 mm pitch in x1, x4, x8 or x16
- Gen 3 compliant (PCIE) and Gen 4 compatible (PCIE-LP)
- Low-profile version for space savings; through-hole tails in development
- Mates with .062" (1.60 mm) thick cards
- Gen 4 slim body socket with Edge Rate® contacts in development (PCIE-G4)

GEN 5 PCI EXPRESS® SOCKETS

- Differential pair system
- Design-in today for future-proof data rates
- Mates with standard PCIe® expansion cards
- 1, 4, 8 and 16 PCI Express® link options
- Currently in development

1.00 mm PITCH MICRO PLANE SOCKETS

- 40 to 80 I/Os per pair
- Mounts in pairs on same or opposite sides for easy signal routing
- BeCu contacts with large deflection
- PCI Express® Gen 3 compatible
- Mounting flexibility for variable mating card thickness and pass-through applications
HIGH-SPEED BACKPLANE SYSTEMS

HIGH-DENSITY • DESIGN FLEXIBILITY • HIGH RELIABILITY

EBTM/EBTF-RA
Shown with power and guidance options

ExaMAX®
HIGH-SPEED

Traditional Backplane

Add-on Power & Discrete Guidance Modules

Cable Systems

Direct-Mate Orthogonal

Coplanar

Traditional Backplane

Modular Design with Guidance, Keying & Power Modules

Xcede HD
HIGH-DENSITY

samtec.com/backplane
EXAMAX® HIGH-SPEED BACKPLANE

- Meets industry specifications such as PCI Express®, Intel OPI and VPI, SAS, SATA, Fibre Channel, InfiniBand™ and Ethernet
- Exceeds OIF CEI-28G-LR specification for 28 Gbps standards
- 24 - 72 pair designs (4 and 6 pairs; 6, 8, 10 and 12 columns)
- Wafer design increases isolation for reduced crosstalk
- Press-fit tails provide a reliable electrical connection
- Cable assemblies available (see pages 22 - 23)

Two reliable points of contact
Staggered differential pair design with an embossed ground plane
Coplanar available to bypass the midplane (EBTM-RA)
Direct-mate orthogonal (EBDM-RA) eliminates the midplane for a shorter signal path

PERFORMANCE CHARTS
ExaMAX® is engineered for 92 Ω impedance to address both 85 Ω and 100 Ω applications

samtec.com/backplane
**HIGH-SPEED BACKPLANE SYSTEMS**

**XCEDE® HD HIGH-DENSITY BACKPLANE**

- Small form factor and modular design provides significant space-savings and flexibility
- High-performance system
- Up to 84 differential pairs per linear inch
- 3, 4 and 6-pair designs on 4, 6 and 8 columns
- Integrated power, guidance, keying and end walls available
- 85 Ω and 100 Ω options
- Combine any configuration of modules to create one integrated receptacle (BSP Series); corresponding terminal modules are individually mounted to the backplane

**SMALL FORM FACTOR**

3, 4 and 6-pair designs (actual size shown with 8 columns)

**DENSITY COMPARISON**

- **XCeDe® HD**
  - Up to 84 pairs per linear inch
- **Traditional Backplane**
  - Up to 76 pairs per linear inch

(Both shown with six 4-pair; 8 column receptacles)

**SIGNAL/GROUND PIN STAGING**

- **Ground Pins**
  - Ground pins mate before signal pin pairs for hot plugging, preventing system downtime

- **Signal Pins**
  - Signal pin pairs achieve up to 3.00 mm contact wipe for a reliable connection

samtec.com/backplane
MODULAR DESIGN

Xcede® HD consists of signal, power and keying/guidance modules for incredible design flexibility. The modules can be customized in any configuration to meet specific application requirements. Contact HSBP@samtec.com for more information about building a full Xcede® HD solution.

How to build a full solution:

1. Right-angle modules can be built into a single customizable BSP

2. Build a BSP part by combining any number, in any configuration, of HDTFs, power and keying/guidance modules to create one receptacle

3. Header modules mount to the backplane individually, in any configuration of HDTM and HPTS Series

PRODUCT BREAKDOWN
(BSP Custom Configuration Shown)
**HIGH-SPEED BACKPLANE SYSTEMS**

**EXAMAX® BACKPLANE CABLE ASSEMBLIES**

- Utilizes Samtec’s Eye Speed® ultra low skew twinax cable technology for improved signal integrity, increased flexibility and routability
- Highly customizable with modular flexibility
- Reduce costs due to lower layer counts
- 30 and 34 AWG
- Multiple end options available

**DESIGN FLEXIBILITY**

- 4 and 6 pairs; 6, 8, 10 and 12 columns
- Intermateable with all ExaMAX® connectors (EBTM/EBTF-RA)
- Integrated guidance and keying options
- Cable-to-DMO (Direct Mate Orthogonal)

**HIGH-DENSITY APPLICATION**

Increases architectural flexibility by overcoming the limitations of traditional connector-to-connector backplane

samtec.com/backplane
ULTRA LOW SKEW TWINAX CABLE

Samtec’s Eye Speed® co-extruded twinax cable technology eliminates the performance limitations and inconsistencies of individually extruded dielectric twinax cabling, improving signal integrity, bandwidth and reach for high-performance system architectures.

- Tight coupling between signal conductors
- Improved bandwidth and reach
- Improved signal integrity and eye pattern opening

samte.com/backplane
EYE SPEED® COAX & TWINAX CABLE • MIX & MATCH

Samtec offers both sides of the system – high-speed connectors and mating cable assemblies. This vertical integration allows for the ultimate combination of design flexibility and customer service.

SEARAY™ HIGH-DENSITY ASSEMBLIES
• Up to 14 Gbps
• 34 AWG coax (ESCA); 36 AWG coax or 34 AWG twinax (SEAC)
• Mates with SEARAY™ and SEARAY™ 0.80 mm (pages 6 - 7)

EDGE RATE® ASSEMBLIES
• Up to 14 Gbps
• 34 AWG coax (ERCD); 30 AWG twinax (ERDP)
• Mates with 0.80 mm Edge Rate® connectors (pages 8 - 9)

Q SERIES® ASSEMBLIES
• Up to 14 Gbps
• 34 and 38 AWG coax; 30 AWG twinax
• 0.50 mm (HQCD/HQDP) and 0.80 mm pitch (EQCD/EQDP/EQRD)
• Mates with Q Series® connectors (pages 10 - 11)

ULTRA MICRO & EDGE CARD ASSEMBLIES
• Up to 14 Gbps
• 38 AWG coax mates with 0.50 mm pitch Razor Beam™ (HLCD; pages 12-13)
• 30 AWG twinax mates with 0.80 mm pitch edge card sockets (ECDP; pages 14 - 15)
• Mating assembly for PCI Express® edge cards (PCIEC; page 17)

samtec.com/high-speed-cables
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.
ONLINE TOOLS

DESIGN • PERFORMANCE • SIMULATION

QUICKLY BUILD MATED CONNECTOR SETS ONLINE

• Wide variety of search parameters and filters: pitch, signaling, stack height, pin count, etc.
• Easily sort search results to find the right mated set
• Live chat with engineers for custom options
• Immediately download models and open Specs Kit
  • samtec.com/solutionator

REAL-TIME HIGH-SPEED PERFORMANCE SIMULATIONS

• Integrates and blends data from models to project performance in the user-defined system
• Outputs include:
  • Insertion and return loss
  • Crosstalk (NEXT and FEXT)
  • Eye diagrams
  • samtec.com/simulator

ONLINE FULL CHANNEL SIMULATION & ANALYSIS

• Channel modeling based on inputs provided by the user
• Results for standards and transceivers at varying equalization levels and data rates
• Individual receiver performance data per Tx/Rx assignments
• Channel overview and strategies for improved performance
  • samtec.com/channelyzer
MODIFIED & CUSTOM SOLUTIONS

WILLINGNESS, SUPPORT & EXPERTISE

Customs and Modifications make up about 28% of Samtec's total sales

Express Modifications 23%
92% do not require engineering or tooling charges

Engineered Customs 5%

A substantial percentage of Samtec's high-speed board-to-board product segments are custom

23% ARRAYS
11% MEZZANINE
23% ULTRA MICRO
44% EDGE CARDS

INDUSTRY LEADING CUSTOMER SERVICE

FLEXIBLE IN-HOUSE MANUFACTURING

SIGNAL INTEGRITY EXPERTISE

FLEXIBLE CAPABILITIES

• Full engineering, design and prototype support
• Design, simulation and processing assistance
• Quotes and samples turned around in 24 hours
• Flexible, quick-turn manufacturing
• Dedicated Application Specific Product engineers and technicians
• Modified or custom options for board level connectors and cable assemblies including: contacts, bodies, stamping, plating, wiring, molding, ruggedizing features and much more

Contact the Application Specific Products Group at asp@samtec.com for express modifications or engineered customs.