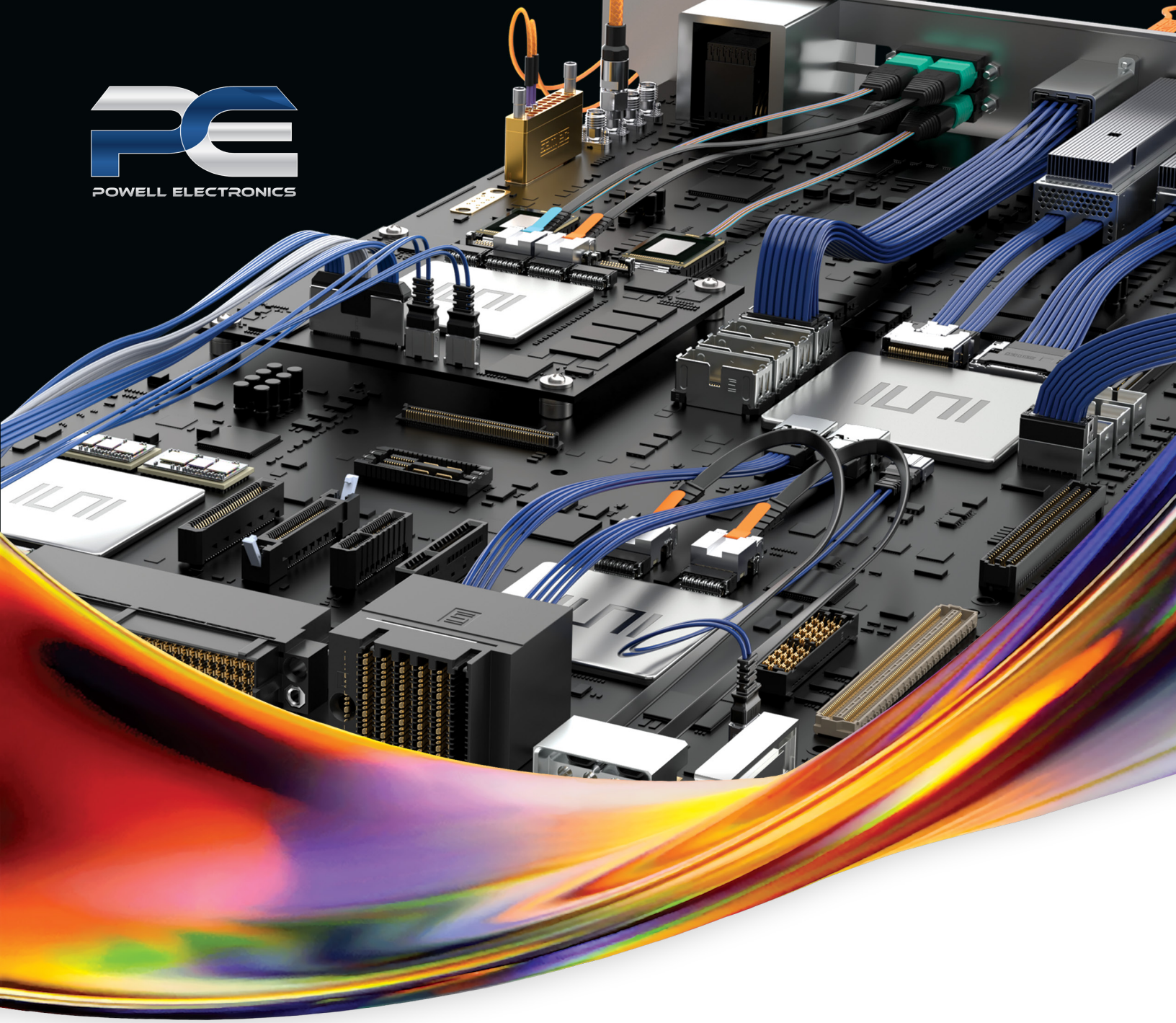


samtec

PRODUCT OVERVIEW

Full Channel Interconnect Solutions



A Different Breed of Cat

Innovative Technologies • Sudden Service®

Founded in 1976, Samtec is much more than just another connector company. We put people first, along with a commitment to exceptional service, quality products and innovative technologies that take the industry further faster. This is enabled by our unique, fully integrated business model, which allows for true collaboration and innovation without the limits of traditional business models.

We believe that taking care of our customers and our employees is paramount in how we approach our business, and this belief is deeply ingrained throughout Samtec worldwide.

Innovative Technologies

At Samtec, integration leads to innovation. We are leading the way in high-performance system design and support for complete system optimization from **SILICON-TO-SILICON™.** Samtec is positioned to produce solutions quickly, with higher densities, faster speeds and smaller footprints to meet the demands of next generation systems.

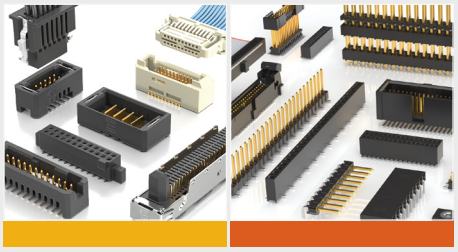
From standard cataloged products to unique high-performance design, Samtec's **SOLUTION BLOCKS** are designed to support any interconnectivity need, regardless of application, performance requirements or environment.

Silicon-to-Silicon™ Solutions



HIGH-SPEED BOARD-TO-BOARD | **HIGH-SPEED CABLE** | **OPTICS** | **RF**

Core Board-to-Board



RUGGED/POWER | **FLEXIBLE STACKING**

Sudden Service®

Samtec is the service leader in the industry, offering unmatched technical support, free product samples and access to online resources, and innovative online tools to help streamline the design process.

NORTH AMERICA
#1 Bishop The Bishop Report
EUROPE • ASIA

#1 in Bishop's Customer Survey of the Electronic Connector Industry

Table of Contents

High-Speed Board-to-Board 10-15

High-Density Arrays • Dual Row Strips • Ultra Micro Interconnects
Edge Card Systems • Backplane Systems

High-Speed Cable 16-23

Flyover® Technology & Cable Systems: Panel, Mid-Board & Backplane • Micro Coax & Twinax Assemblies

Optics 24-25

Mid-Board Optical Transceivers • Passive Optical System

RF Solutions 26-31

RF Connectors & Adaptors • RF Cable Assemblies • RF Original Solutions

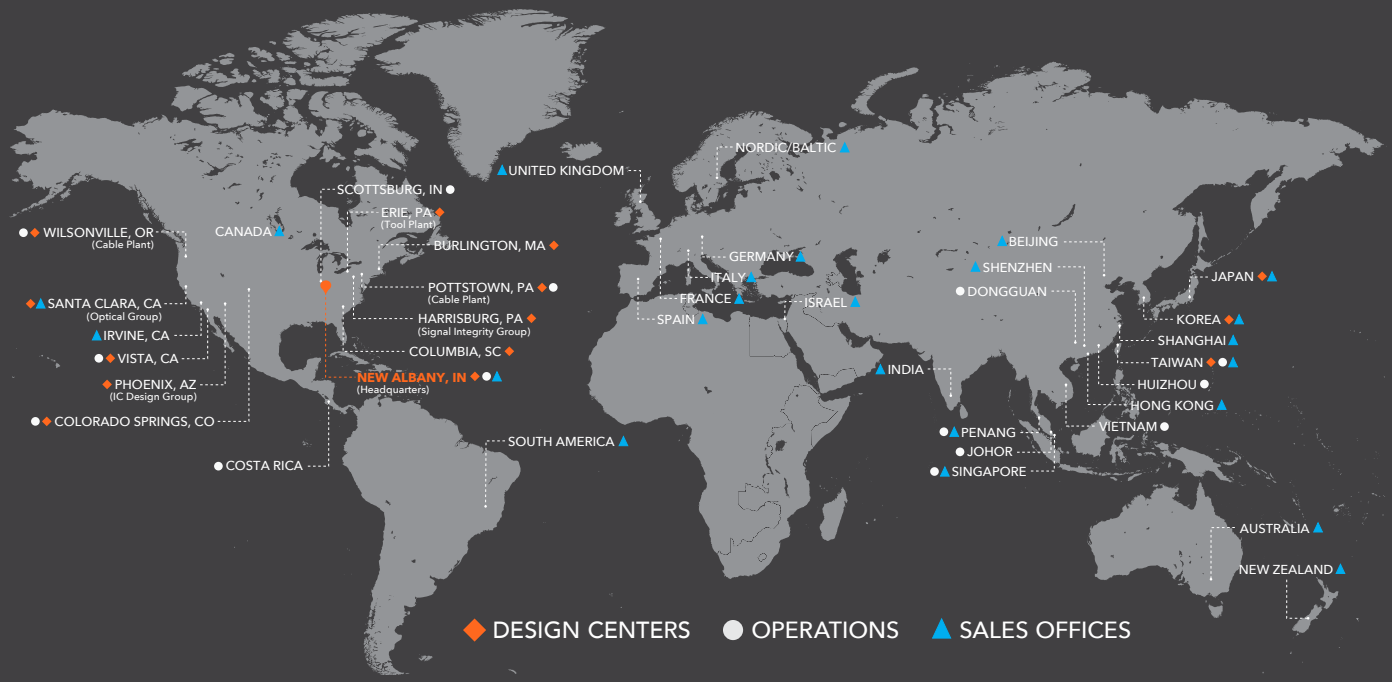
Rugged/Power 32-37

Power Systems • Rugged I/O Systems • Rugged Board-to-Board Systems
Rugged High-Speed Systems • Wire to Board Assemblies • Ultra Rugged Solutions & Testing

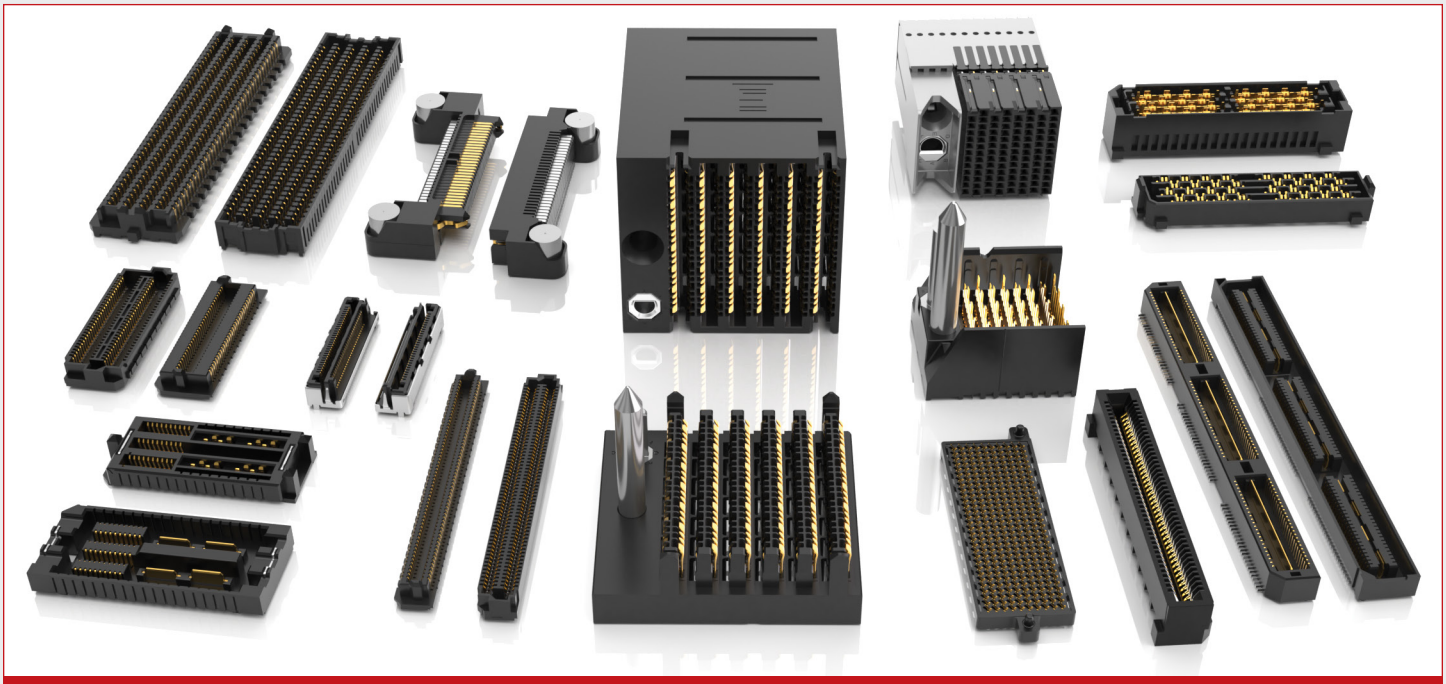
Flexible Stacking 38-41

Flexible Board Stackers • Contact Flexibility • IDC Cable Systems • Modified & Custom Solutions

Global Support Network



Solution Blocks



HIGH-SPEED BOARD-TO-BOARD

OPEN-PIN-FIELD ARRAYS | GROUND PLANE & EDGE RATE® STRIPS | EDGE CARDS | ULTRA MICRO | BACKPLANE



RUGGED/POWER

ULTRA RUGGED | BLADE POWER
RUGGED I/O | BOARD-TO-BOARD | WIRE TO BOARD



FLEXIBLE STACKING

LOW PROFILE | PASS-THROUGH | ONE-PIECE
SKYSCRAPERS | SHROUDED HEADERS | IDC SYSTEMS



HIGH-SPEED CABLES

FLYOVER® & EYE SPEED® CABLE TECHNOLOGY | PANEL, MID-BOARD & BACKPLANE | MICRO COAX & TWINAX



OPTICS

MID-BOARD TRANSCEIVERS | EXTENDED TEMP/RAD HARD
PCI EXPRESS®-OVER-FIBER | NEXT GEN/RUGGED



RF

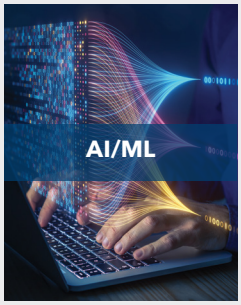
CONNECTORS, CABLES & ORIGINAL SOLUTIONS
PRECISION RF | LOW FREQUENCY

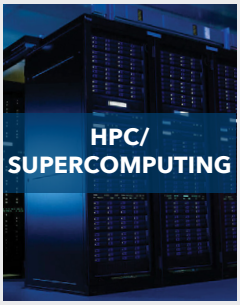
A **NEW ERA** OF HIGH-SPEED CONNECTIVITY

Advances in artificial intelligence, high-performance computing, and high-speed networking continue to drive the industry to achieve new levels of system performance.

As we move from 112 Gbps to 224 Gbps, and as planning for 448 Gbps begins in earnest, the demand for more bandwidth and higher densities continues to grow exponentially. We have entered a new era of high-speed connectivity, and Samtec is ready to meet the challenge.

PAM4 112 Gbps | PAM4 224 Gbps | 448 Gbps

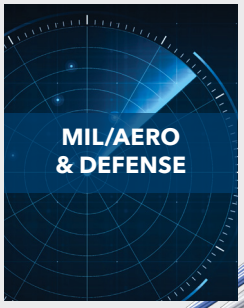












A New Era of Interconnect Solutions

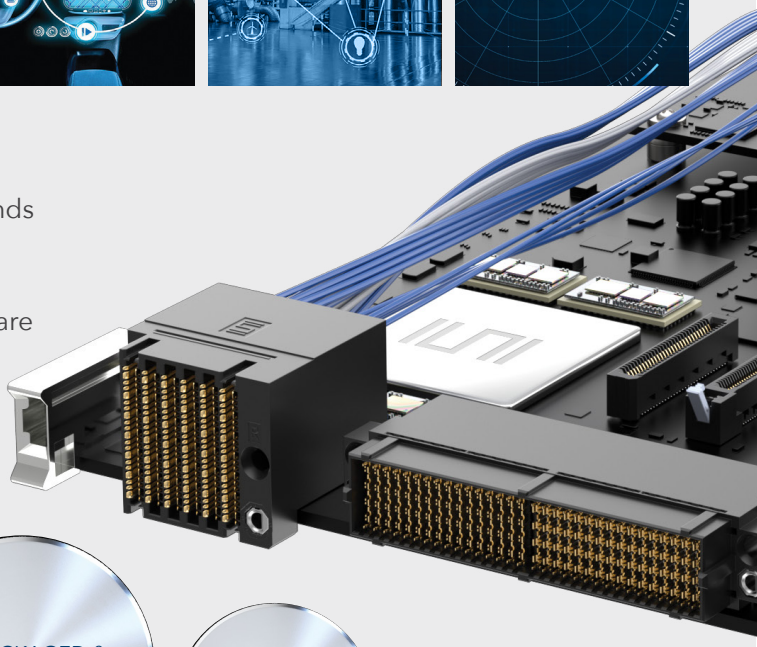
Next gen architectures and increasing data-throughput demands also introduce other complex system design challenges. The primary concern is signal integrity; however, thermal management, power distribution, and the need for scalability are also intensified.

Samtec is leading the industry in the development of solutions that support the connectivity demands of this new era. Our next generation interconnects are not only optimized for bandwidth and density, but for design flexibility, ruggedness and scalability.

To further assist designers specifying high-performance interconnects, Samtec offers full-system optimization support with industry-leading signal integrity expertise.

In addition, Samtec's extensive library of test and evaluation platforms, free online technical resources, and innovative design tools are available to help find, design and validate the right interconnect solution for next gen systems.

Learn more at samtec.com/s2s.



CO-PACKAGED & NEAR-CHIP SYSTEMS

ULTRA HIGH-DENSITY BACKPLANE

GLASS CORE TECHNOLOGY

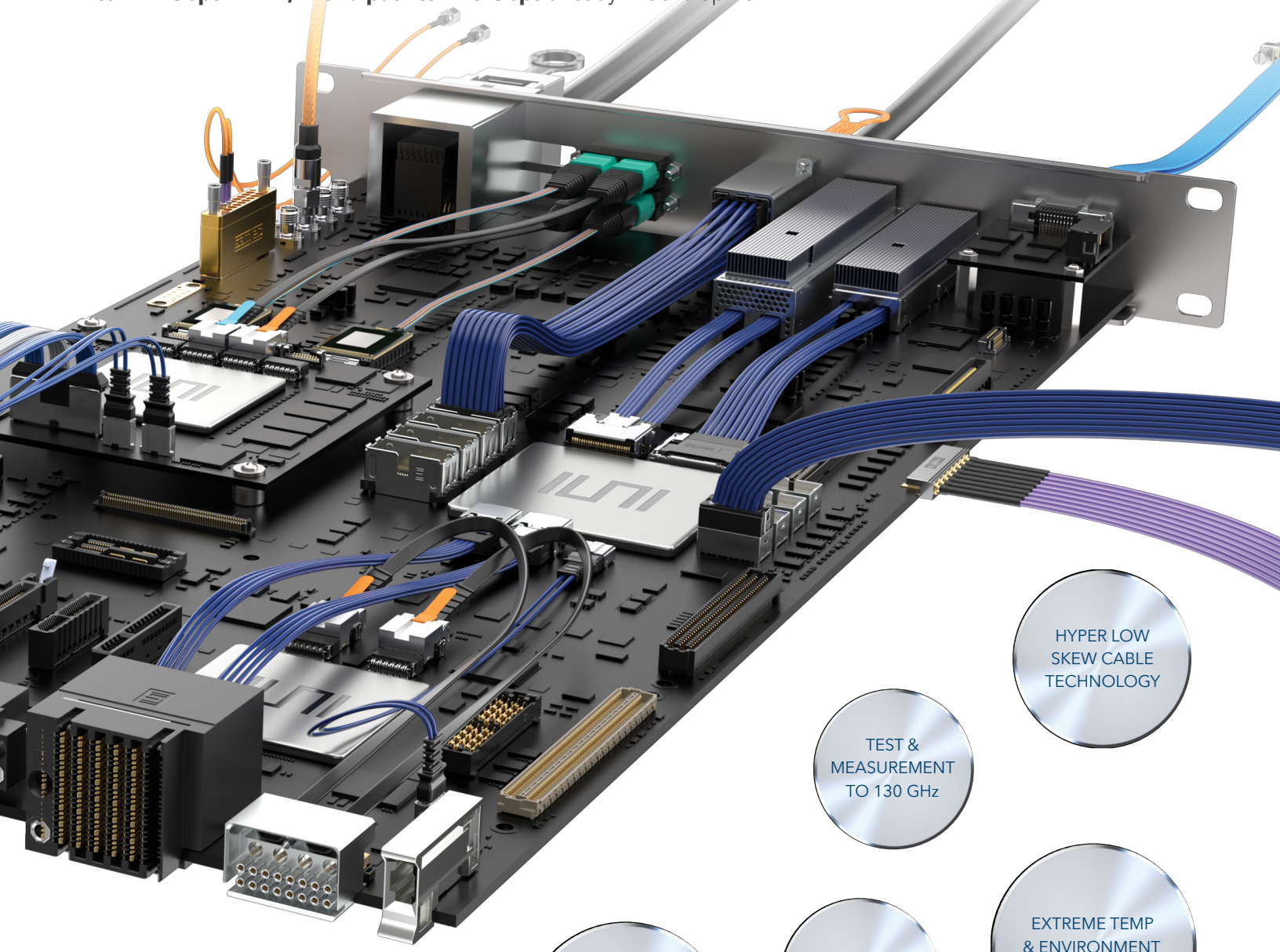
SWaP OPTIMIZED DESIGNS

PHASE & AMPLITUDE STABLE RF CABLE

SILICON-TO-SILICON™ SOLUTIONS

Enabling Connectivity for Next Generation High-Speed Systems

Samtec's Silicon-to-Silicon™ interconnect solutions are designed to **meet and exceed industry standard connectivity demands**. These products, along with high-level design assistance and technical expertise, uniquely position Samtec to address the challenges of next generation architectures, and enable **full system optimization to 224 Gbps PAM4, with a path to 448 Gbps** already in development.



HYPER LOW SKEW CABLE TECHNOLOGY

TEST & MEASUREMENT TO 130 GHz

EXTREME TEMP & ENVIRONMENT OPTICS

ULTRA MICRO POWER SYSTEMS

INDUSTRY STANDARDS

EXTREME DENSITY & PERFORMANCE ARRAYS

Sudden Service®

Samtec's Sudden Service® provides unmatched global service, free access to data and industry-leading tools, along with engineering support, to help you design, develop, test and deliver the best solution for any complex application.

Global Operations & Support

World Direct™

- Seamless global factory direct shipping to customers/partners allows for manufacturing flexibility without increased cost or lead times

Freight Collect Direct

- Customers outside the US can receive shipments directly from a Samtec facility
- Customers inside the US that operate an FTZ, utilize a freight forwarder, or prefer to act as the IOR, can select a customized solution to meet unique business needs

Reducing Tariff Exposure

- Dual-Operations model, strategic distribution centers and flexible invoicing options
- For current tariff and part-specific tariff information, please visit **samtec.com/tariff**

Price Competitiveness

- Redundant manufacturing (Dual Operations model) helps optimize costs, pricing and lead times
- For Volume Application Specific Pricing, visit **samtec.com/vasp**
- Learn about Samtec's gold cost saving efforts at **samtec.com/gold**

Unmatched Lead Times

Reserve®

Quickly and easily identify availability of over 200,000 of Samtec's most popular connectors and cables – guaranteed to ship in 1-day. Non-Reserve® build-to-order lead times start at 5 days for most products. For details, visit **samtec.com/reserve**.

24-Hour Sudden Sample™

Free product samples, shipped in 24-hours or less have been a cornerstone of Samtec Sudden Service® since the company was founded. Visit **samtec.com** to request your sample.

24/7 Worldwide Support

Technical Support

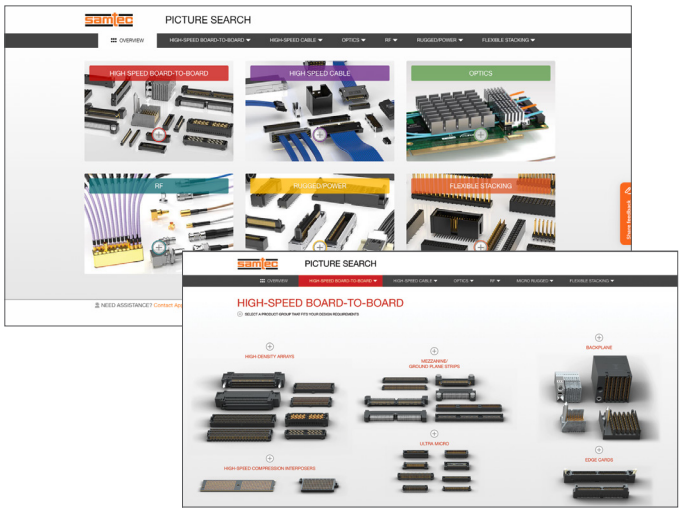
- Signal Integrity Group: **sig@samtec.com**
- Application Support Group: **asg@samtec.com**
- Interconnect Processing Group: **ipg@samtec.com**

Supply Chain Support

- MySamtec™ Real-Time Account Access: **account.samtec.com**
- Personal Account Mgr/CSR: **eCustomerService@samtec.com**
- Upfront, Aggressive 24-Hour Quotes: **Pricing@samtec.com**

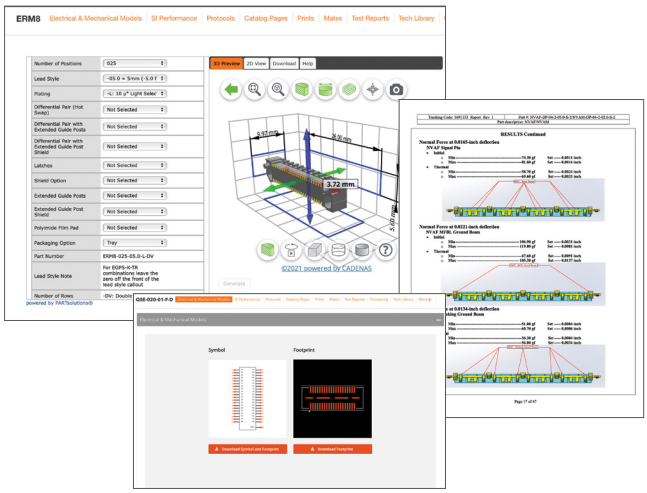
Picture Search

Browse through a highlight reel of Samtec's most popular products to find the ideal solution for your application, view specifications, check availability, order samples and more. To find your solution, visit **samtec.com/picturesearch**.



Downloads

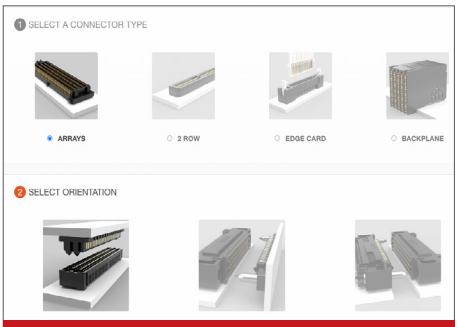
Samtec offers immediate and unlimited access to all the documentation you need to select the right solution for your application from 3D models, prints and footprints to test reports, white papers and so much more.
Visit **samtec.com** to start exploring.



Solutionator®

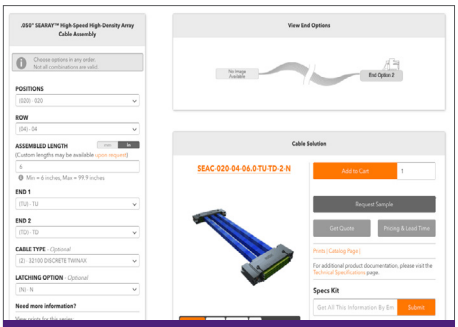
Quickly build mated connector sets or design full cable assemblies using a wide variety of user-defined search parameters and filters, view specs and order samples in Samtec's online design tools.

Solutionator HS GET A MATED SET IN SECONDS BOARD-TO-BOARD



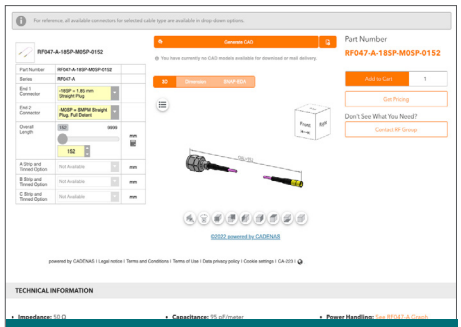
samtec.com/hsb2b-solutionator

Solutionator HS DESIGN IN A MINUTE CABLE



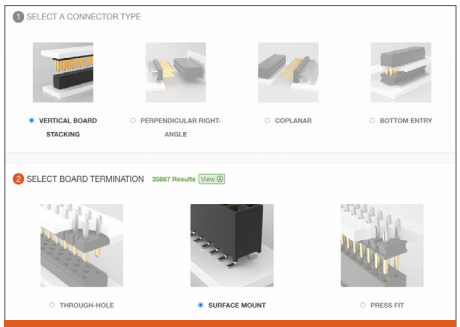
samtec.com/cablebuilder

Solutionator RF DESIGN IN A MINUTE CABLE



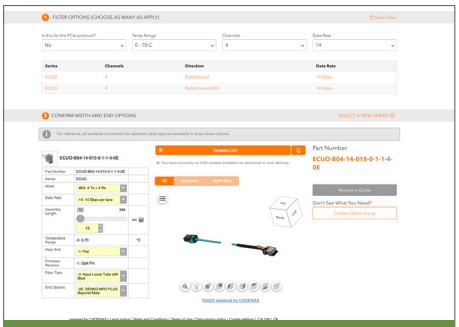
samtec.com/rf-cablebuilder

Solutionator FLEX GET A MATED SET IN SECONDS STACKING



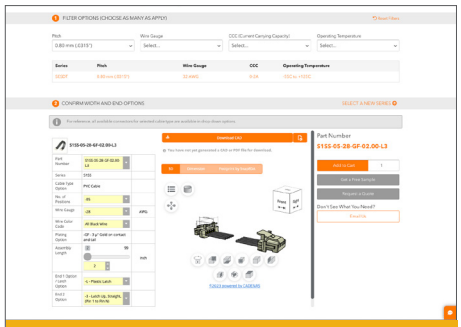
samtec.com/flex-solutionator

Solutionator ACTIVE OPTICS DESIGN IN A MINUTE



samtec.com/optics-solutionator

Solutionator DISCRETE WIRE DESIGN IN A MINUTE



samtec.com/discrete-cablebuilder



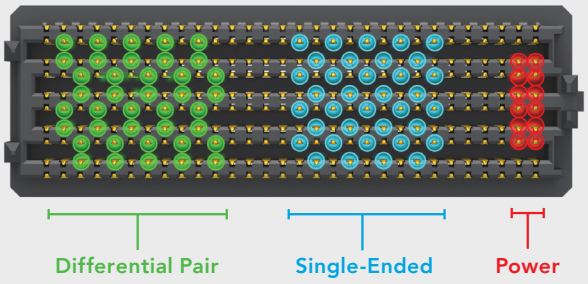
High-Speed Board-to-Board & Backplane

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.

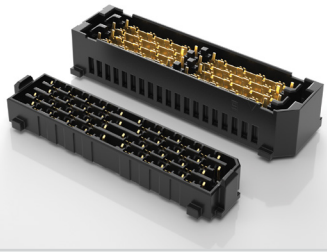
High-Density Arrays

samtec.com/arrays

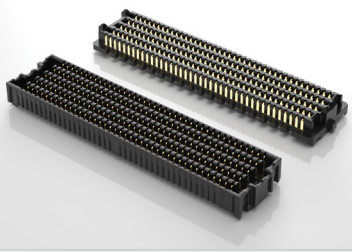
- Up to 800 pins; roadmap to 1,000+
- Open-pin-field arrays for maximum grounding and routing flexibility
- 0.635 mm, 0.80 mm and 1.27 mm pitch; 4 to 40 mm stack heights
- Supports high-speed protocols such as Ethernet, PCI Express® (6.0 capable), CXL® (3.2 capable), Fibre Channel and InfiniBand™
- NovaRay® extreme density arrays support 128 Gbps PAM4 applications; PCIe® 7.0 capable
- Vertical and right-angle, press-fit tails, power/signal combo and standoffs available
- Severe Environment Testing qualified products (SEAM/SEAF, SEAM8/SEAF8, UDM6/UDF6), see pages 36-37
- SI Evaluation Kits available; see pages 42-43



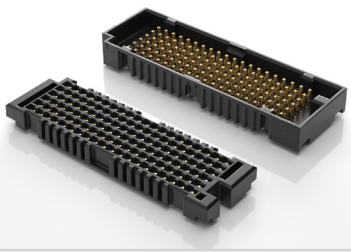
NOVARAY®



SEARAY™

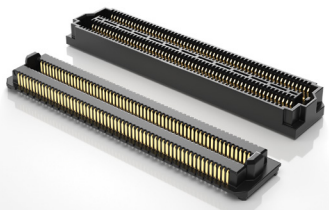


LPARRAY™

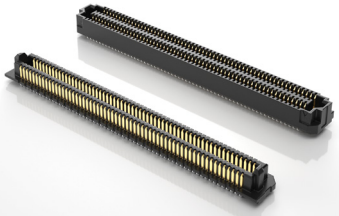


PAM4 128 Gbps

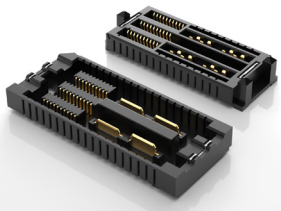
ACCELERATE®HP



ACCELERATE®HD



ACCELERATE®mP



PAM4 112 Gbps

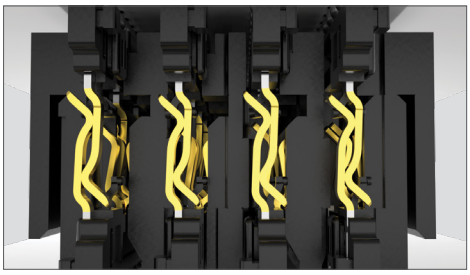
PAM4 64 Gbps

PAM4 56 Gbps

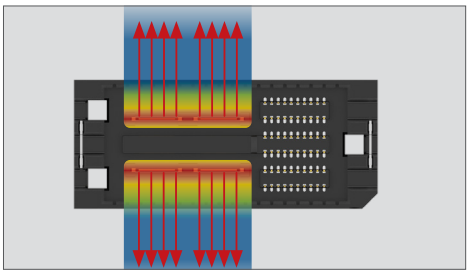
PCI-SIG®, PCI Express® and the PCIe® design marks are registered trademarks and/or service marks of PCI-SIG.

Variety of Options

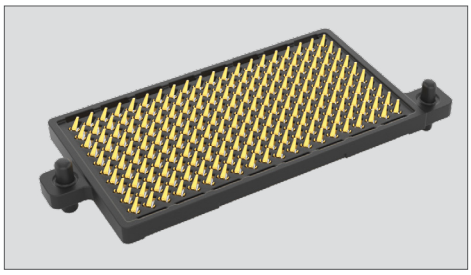
Brand/Series	Pitch	Stack Height	Pin Count	Performance
NovaRay® (NVAM/NVAF)	0.80 mm	7, 9, 10 & 12 mm	8, 12, 16, 24, 32, 36, 48 pairs	128 Gbps PAM4
AcceleRate® HP (APM6/APF6)	0.635 mm	5 & 10 mm	80, 160, 240, 320, 400, 480, 800	112 Gbps PAM4
AcceleRate® HD (ADM6/ADF6)	0.635 mm	5, 7, 9, 10, 11, 12, 14 & 16 mm	40-400	64 Gbps PAM4
AcceleRate® mP (UDM6/UDF6)	0.635 mm (sig) & 6.00 mm (pwr)	5 & 10 mm	Up to 10 Power & 240 Signal	64 Gbps PAM4
SEARAY™ (SEAM/SEAF)	1.27 mm	7-40 mm	40-560	56 Gbps PAM4
SEARAY™ 0.80 mm (SEAM8/SEAF8)	0.80 mm	7 & 10 mm	40-500	56 Gbps PAM4
LP Array™ (LPAM/LPAF)	1.27 mm	4, 4.5 & 5 mm	40-400	56 Gbps PAM4



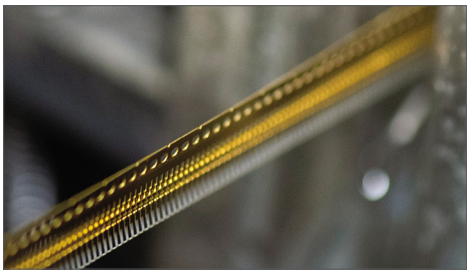
NovaRay® offers two points of contact for a reliable connection with stub-free mating; contributes to the 128 Gbps PAM4 rating



AcceleRate® mP 90° rotated power blades have equal access to heat escape for improved performance & simplified breakout region (BOR)



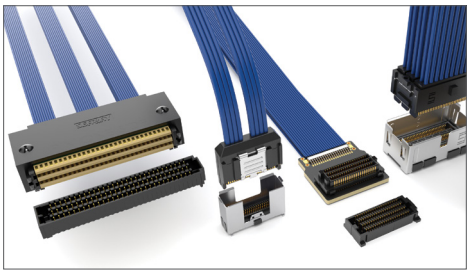
SUPERNOVA™ 56 Gbps PAM4 dual compression interposers; non-standard prototypes available, contact **hsb2b@samtec.com**



SureCoat™ advanced coating technologies for increased reliability and cost mitigation; visit **samtec.com/surecoat**



SureWare™ guide post and jack screw standoffs provide mating/unmating assistance and help ensure a reliable connection



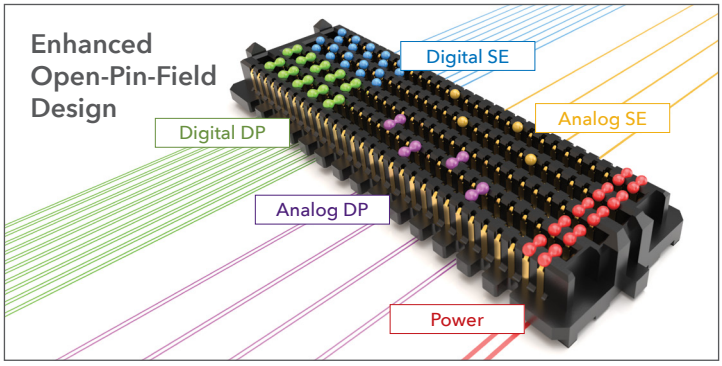
Mating high-speed cable assemblies with micro coax and ultra low skew twinax for increased design flexibility

Analog Over Array™

DC TO 36 GHz

Samtec Analog Over Array™ connectors can replace dozens of precision RF connectors offering a smaller footprint, less weight and cost optimization. Reference Designs achieve industry-leading differential crosstalk and return loss performance up to 36 GHz. Visit **samtec.com/kits** or contact **SIG@samtec.com**

ANALOG OVER ARRAY™



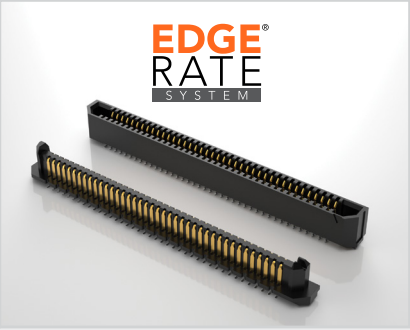
High-Speed Board-to-Board & Backplane

High-Speed Dual Row Strips

samtec.com/mezzanine

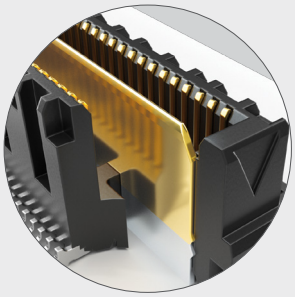
- Edge Rate® contacts optimized for speed and high cycles; designed at 85 Ω for PCIe® data rates
- Integral metal ground plane for power to 25 Amps
- 0.50 mm, 0.635 mm and 0.80 mm pitch
- 5 to 30 mm stack heights
- Up to 200 I/Os with differential pair and single-ended routing
- Up to 1.5 mm contact wipe for a reliable connection
- Space-saving designs, ruggedizing features and SureWare™ guide posts and standoff options
- Vertical, right-angle and edge mount
- Extended Life Product™ and Severe Environment Testing qualified (ERM8/ERF8), see pages 36-37





PAM4 56 Gbps

MAX 25 Amps



Integral ground plane improves electrical performance and reduces crosstalk

Ultra Micro Interconnects

samtec.com/ultra-micro

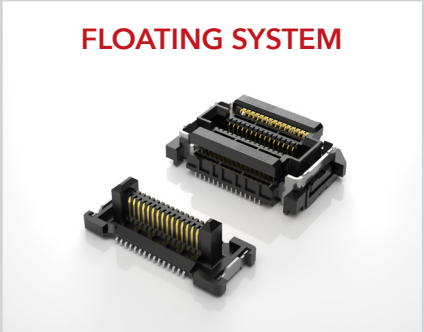
- Slim body designs for increased PCB savings; low profile 2 to 12 mm stack heights
- Up to 160 total pins on a choice of pitch from ultra fine 0.40 mm to 0.80 mm
- Hermaphroditic connectors reduce inventory costs
- EMI shielding with rugged latching for higher retention forces
- Right-angle and SureWare™ standoff and guide post options
- Floating contact system provides 0.50 mm of float in X & Y directions
- Extended Life Product™ and Severe Environment Testing qualified (LSHM), see pages 36-37



Razor Beam™ contacts for high-speed and fine pitch systems





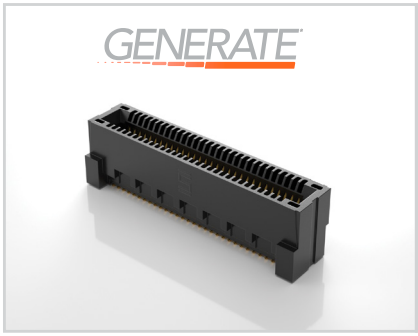


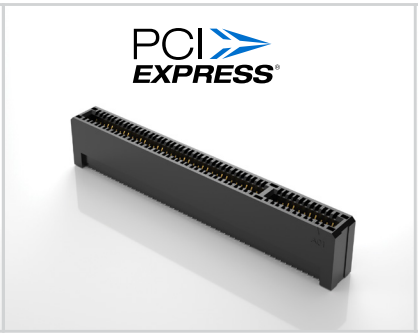
PAM4 56 Gbps

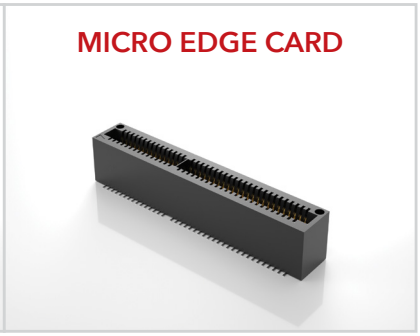
High-Speed Edge Cards

samtec.com/edgecard

- 0.50 mm to 2.00 mm pitch; up to 300 total positions
- Generate® high-speed edge card sockets with Edge Rate® contacts for decreased crosstalk and high cycle life
- PCI Express® 3.0/4.0/5.0/6.0 solutions; CXL® capable
- Vertical, right-angle, edge mount and pass-through
- Power/signal combo, press-fit tails, rugged tucked beam technology and misalignment mitigation
- Weld tabs, locks, latches and mating cable assemblies
- MCIO connector supports up to 16 PCIe® 6.0 lanes; mating cable flexibility with Flyover® high-speed End 2 options

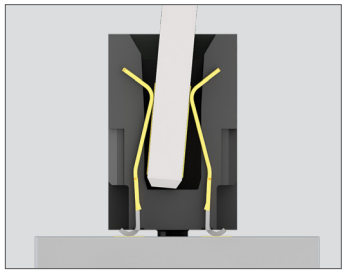




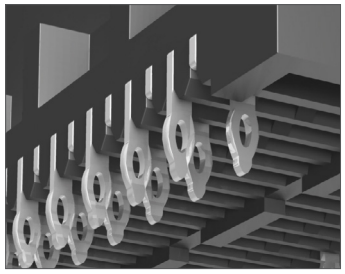


PAM4
64
Gbps

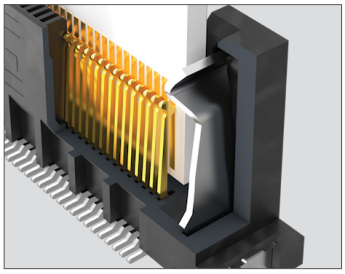
Variety of Options



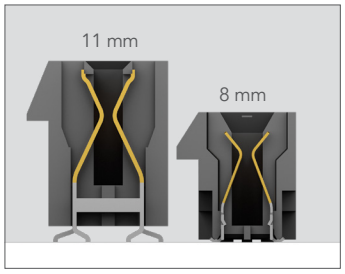
Custom designs aid with misalignment (HSEC1-DV)



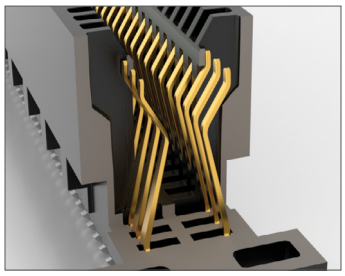
Staggered press-fit tails (MEC8-VP)



Justification beam ensures card and body are flush (MEC5)



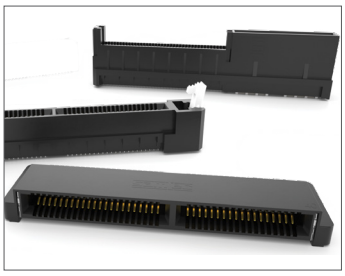
PCI Express® low profile for space savings (PCIE-LP)



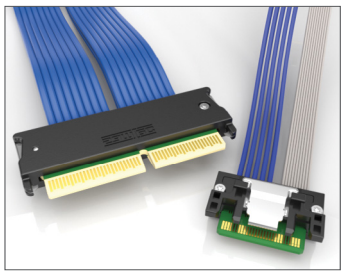
Rugged tucked beam technology (HTEC8)



Differential pair for increased speed (HSEC8-DP)



Extended Life Product™ high mating cycle solutions (HSEC8)



Mating high-speed cable assemblies

Edge Rate® Contact System

- Smooth milled mating surface reduces wear and increases durability
- Lower insertion and withdrawal forces
- Robust when "zippered" during unmating
- Minimized parallel surface area reduces broadside coupling and crosstalk
- Designed, simulated and optimized for 50 Ω and 100 Ω systems

EDGE® RATE SYSTEM



High-Speed Board-to-Board & Backplane

High-Speed Backplane

samtec.com/backplane

- Variety of configurations: traditional backplane, direct-mate orthogonal, coplanar, Flyover® cable systems
- Up to 128 differential pairs total
- NovaRay® micro rugged backplane features an offset footprint for optimal SI performance to 128 Gbps PAM4; PCIe® 7.0 capable
- ExaMAX® high-speed backplane enables 64 Gbps PAM4 performance on a 2.00 mm column pitch; PCIe® 6.0/CXL® 3.2 capable
- ExaMAX® and NovaRay® provide two points of contact for a reliable electrical connection, and open-pin-field capability
- XCede® HD features a small form factor and modular design for space savings and flexibility; 16 Gbps performance
- Guidance, keying and power modules



PAM4 128 Gbps

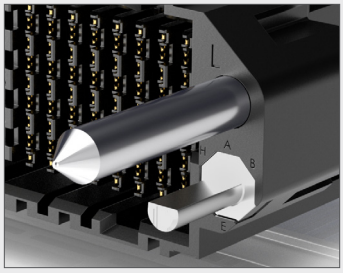
PAM4 64 Gbps

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XCede® is a registered trademark of Amphenol Corporation.

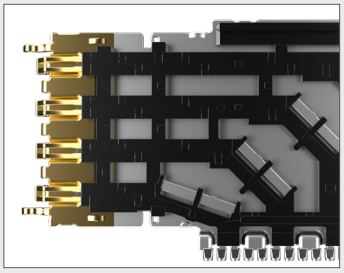
NovaRay®



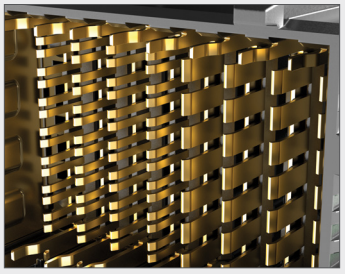
Two points of contact guaranteed



Supports blind mate applications

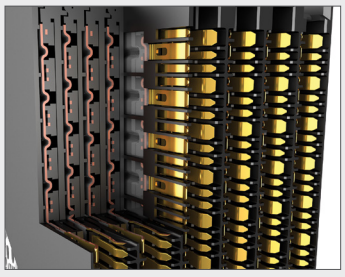


Differential pair wafer design eliminates intrapair skew

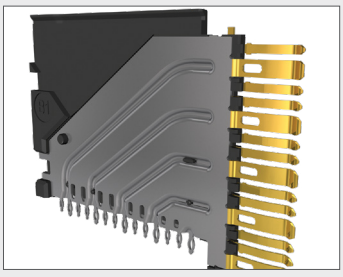


Open-pin-field and power wafer signaling flexibility

ExaMAX®

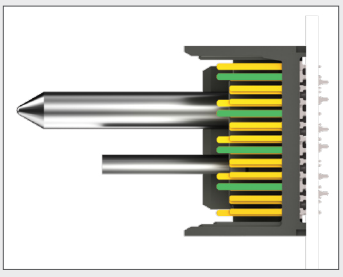


Staggered differential pair design with embossed ground structure for higher data rates

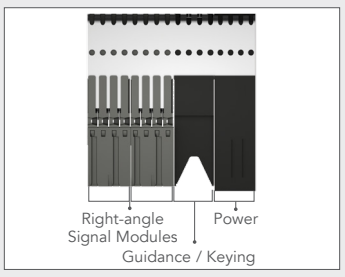


Wafer design increases isolation for reduced crosstalk; one sideband signal per column

XCede® HD



Signal/ground pin staging for hot plugging



Modular design for flexibility and customizable to meet specific requirements

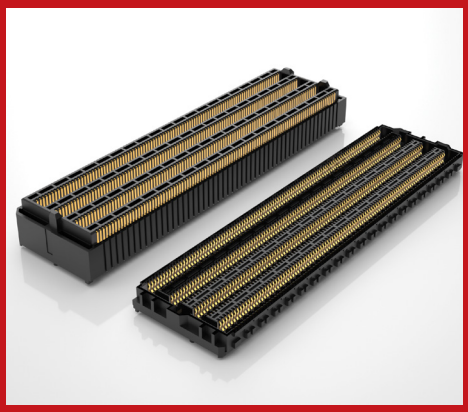
Backplane Cable Assemblies

- Improved signal integrity and increased signal path length at higher data rates
- Eye Speed® ultra low skew twinax cable technology for improved signal integrity; see page 21 for specifications
- NovaRay® 128 Gbps PAM4 system with up to 128 differential pairs in a single connector
- ExaMAX® 112 Gbps PAM4 system with 16-96 differential pairs
- Reliable mating with guaranteed two points of contact
- Paladin® HD2 high-density 224 Gbps PAM4 backplane cable system with up to 96 isolated differential pairs
- Multiple end 2 options available

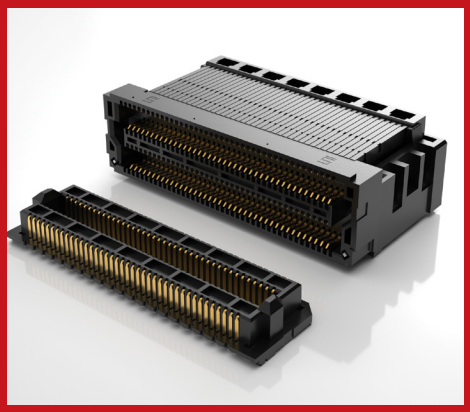


Paladin® HD2 is a registered trademark of Amphenol Corporation. Used with permission.

ROADMAP: HIGH-SPEED BOARD-TO-BOARD & BACKPLANE



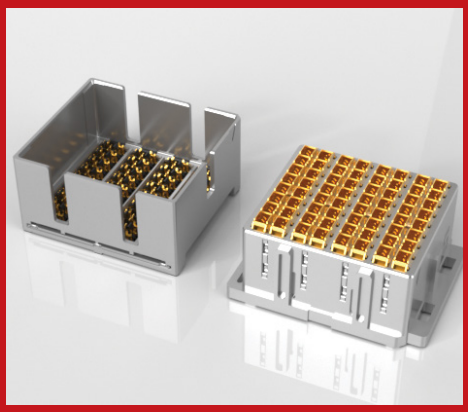
AcceleRate® HP 800 Pins, 10 mm Stack



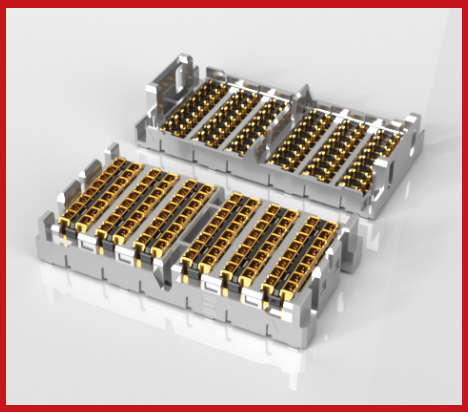
AcceleRate® HP Right-Angle Array



ExaMAX® 2-Pair Board-to-Cable Backplane



Si-Fly® HD Mezzanine, 64 DPs Open CPX MSA Type 1



Si-Fly® HD Low Profile Mezzanine, 96 DPs Open CPX MSA Type 2



ExaMAX2® 8-Pair Board-to-Cable Backplane



High-Speed Cable Systems

High-speed board-to-cable and Flyover® cable systems provide innovation for next gen architectures with industry-leading support, in-house manufacturing and customization capabilities for any application.

Flyover® Cable Systems

samtec.com/flyover

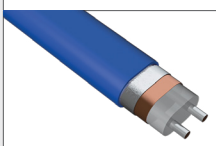
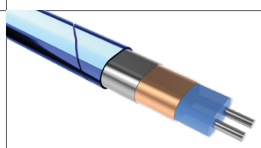
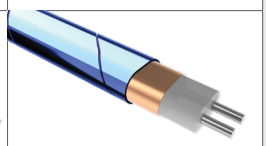
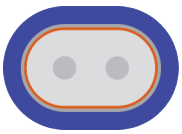
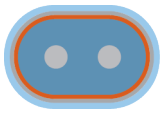
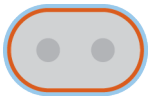
- Breaks the constraints of traditional signaling substrate and hardware offerings by routing signals via ultra/hyper low skew twinax cable versus lossy PCB
- Cost-effective, high-performance and heat efficient solution to the challenges of 224 Gbps bandwidths and beyond

FLYOVER®

PCI EXPRESS® 6.0/7.0 Capable

Eye Speed® Cable Technology

- Ideal for all high-performance applications up to 224+ Gbps PAM4 data rates
- Tight coupling between signal conductors
- Ultra low skew twinax 3.5 ps/meter max (intrapair)
- Hyper low skew twinax 1.75 ps/meter max (intrapair)
- Improved signal integrity and eye pattern opening
- Increased bandwidth and reach
- Differential pair, single-ended and mixed signaling available
- Taped jacket miniaturizes the cable for easier routing, overall weight reduction and increased air flow

112 Gbps PAM4		224 Gbps PAM4
EYE® SPEED TWINAX	EYE SPEED THINAX™	EYE® SPEED HYPER
		
		
Ultra low skew	40% smaller diameter	Hyper low skew

Performance & Cost Advantages

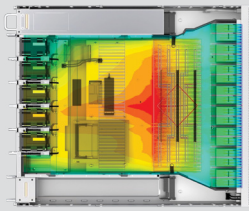
- Up to 224 Gbps PAM4 and beyond
- Simplified board layout
- Less expensive PCB materials, fewer PCB layers
- Eliminates expensive re-timers
- Thermal efficiencies

In-House Capabilities & Support

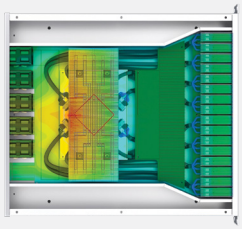
Fully integrated technology teams for full system optimization from Silicon-to-Silicon™, including Samtec's High-Speed Cable Plants.

Thermal Improvement

STANDARD NETWORK SWITCH



SAMTEC FLYOVER® TECHNOLOGY

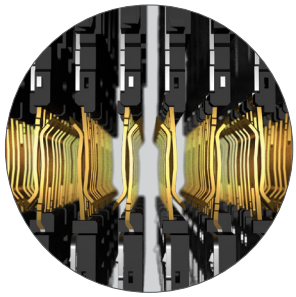


Panel Assemblies

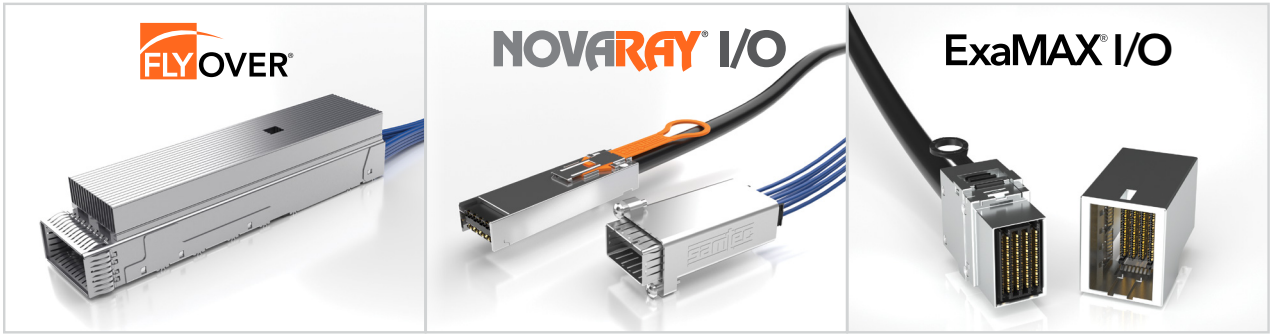
- Flyover® QSFP, QSFP-DD and QSFP-D8 with up to 800 Gbps PAM4 aggregate data rate (112 Gbps PAM4 per channel; 4 or 8 channels); double density versions feature belly-to-belly mating for maximum flexibility
- NovaRay® I/O provides up to 4,096 Gbps PAM4 aggregate data rate (128 Gbps PAM4, 32 differential pairs) from the IC package to the panel and beyond; no heat sinks required for panel space savings; PCIe® 7.0 capable
- ExaMAX® I/O EMI shielded external cable and cage supports 64 Gbps PAM4 performance; high-density, staggered differential pairs on individual signal wafers for reduced crosstalk (112 Gbps PAM4 cable-to-cable solution on roadmap)
- Flyover® SFP and OSFP with up to 224 Gbps PAM4 per channel performance (up to 1600 Gbps aggregate data rate) and belly-to-belly capability
- PCIe® 6.0/CXL® 3.2 and PCIe® 7.0 capable
- Eye Speed® cable technology; see page 21 for specifications
- Variety of end options including AcceleRate®, AcceleRate® HP, AcceleRate® Mini, Si-Fly® LP, Si-Fly® HD, Halo Cu™, ExaMAX®, FireFly™ and Generate®
- SI Evaluation Kits available; see pages 42-43



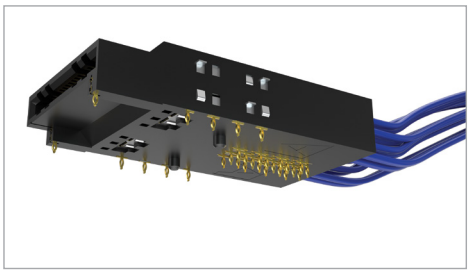
NovaRay® I/O with rugged 38999 shell available for salt fog resistance to 48 hours



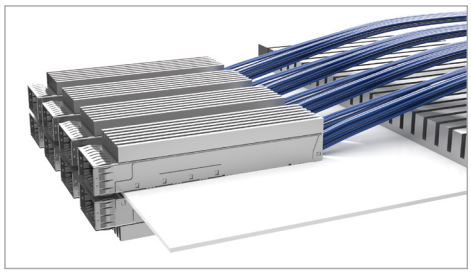
Two reliable points of contact at all times (NovaRay® I/O and ExaMAX® I/O)



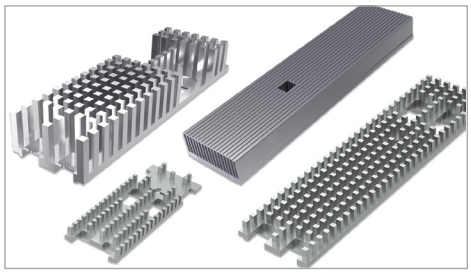
Flyover® QSFP, SFP, OSFP Features



Low speed & power transmitted through press-fit contact tails



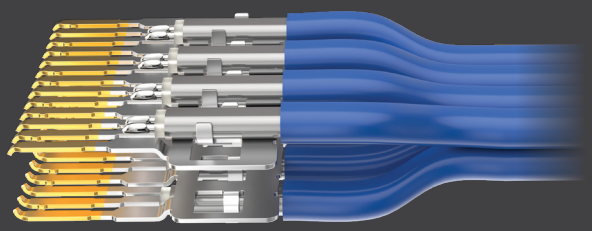
Belly-to-belly mating for maximum density



Variety of cages and heat sinks for optimized thermal performance

Flyover® Direct Attach Technology

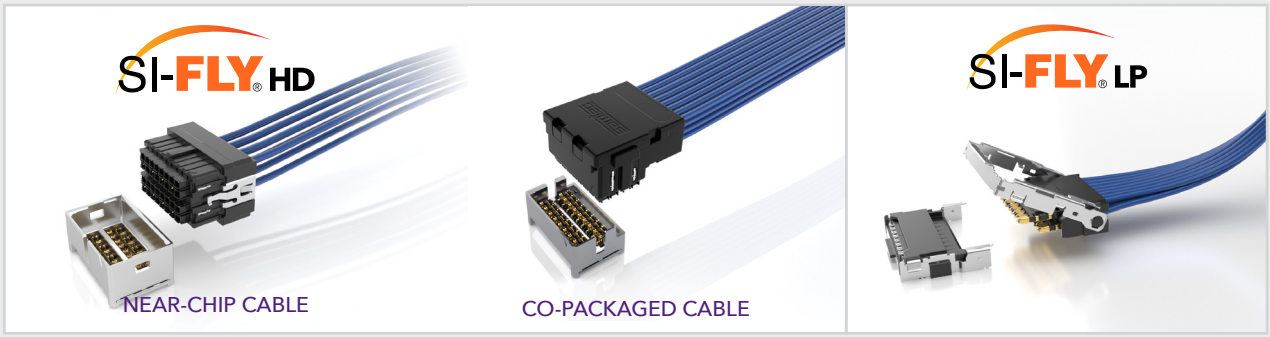
- High-density contacts directly soldered to the Eye Speed® ultra/hyper low skew twinax cable
- Improved signal integrity by eliminating the transition board and its variability
- Achieves tighter tolerances



High-Speed Cable

Mid-Board Assemblies

- Si-Fly® HD co-packaged and near-chip systems provide the highest density 224 Gbps PAM4 solution in today's market, with a path to 448 Gbps; up to 170 differential pairs/sq. inch in vertical and right-angle cable launches; electrically pluggable co-packaged copper and optics solutions (CPX; see below)
- Si-Fly® LP provides 112 Gbps PAM4 performance in an extremely low 4.35 mm profile for placement adjacent to the IC package, under heat sinks or other cooling hardware
- Direct Attach: high-density contacts soldered directly to the Eye Speed® cable for improved signal integrity and tighter tolerances
- PCIe® 6.0/CXL® 3.2 and PCIe® 7.0 capable
- Eye Speed® cable technology; see page 21 for specifications
- SI Evaluation Kits available; see pages 42-43



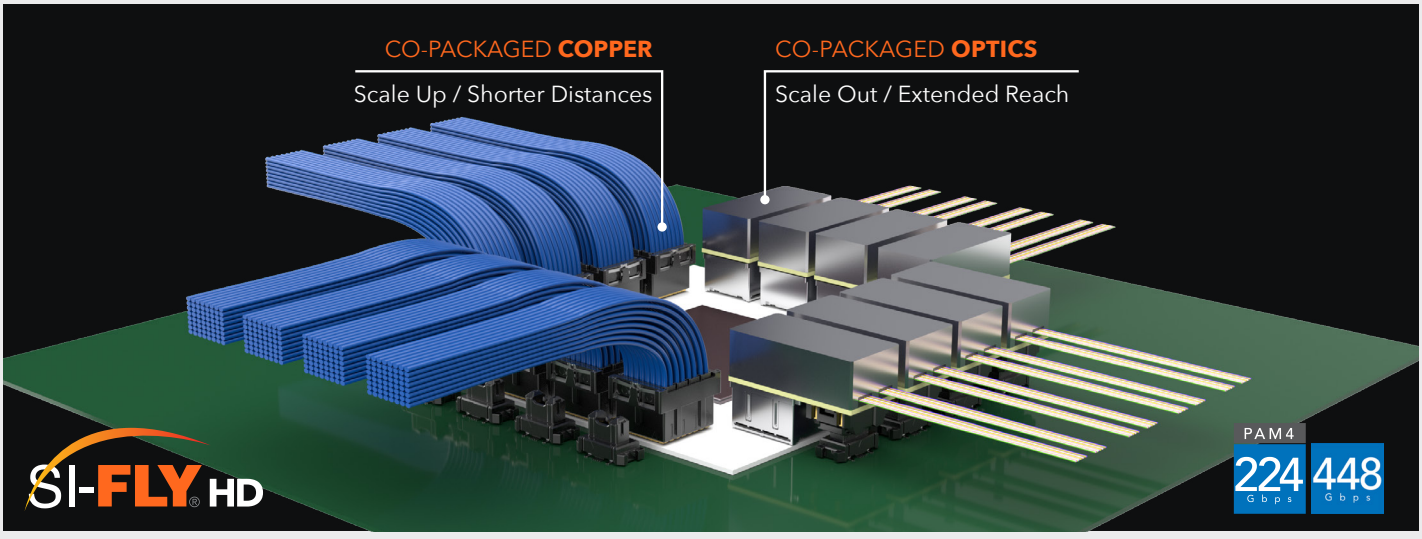
Application: CPX Co-Packaged 224 Gbps PAM4 Solutions

Samtec's Si-Fly® HD "CPX" system is an electrically pluggable co-packaged copper and optics solution, achievable on a 95 mm x 95 mm or smaller substrate using Samtec's SFCM connector.

The SFCM mounts directly to the package substrate and is pluggable with Samtec's SFCC cable assembly or an optical cable assembly of your choosing.

Co-packaged connectivity eliminates insertion losses in the BGA breakout and PCB, and enables a complete passive 224G channel that is extreme performance as well as low cost.

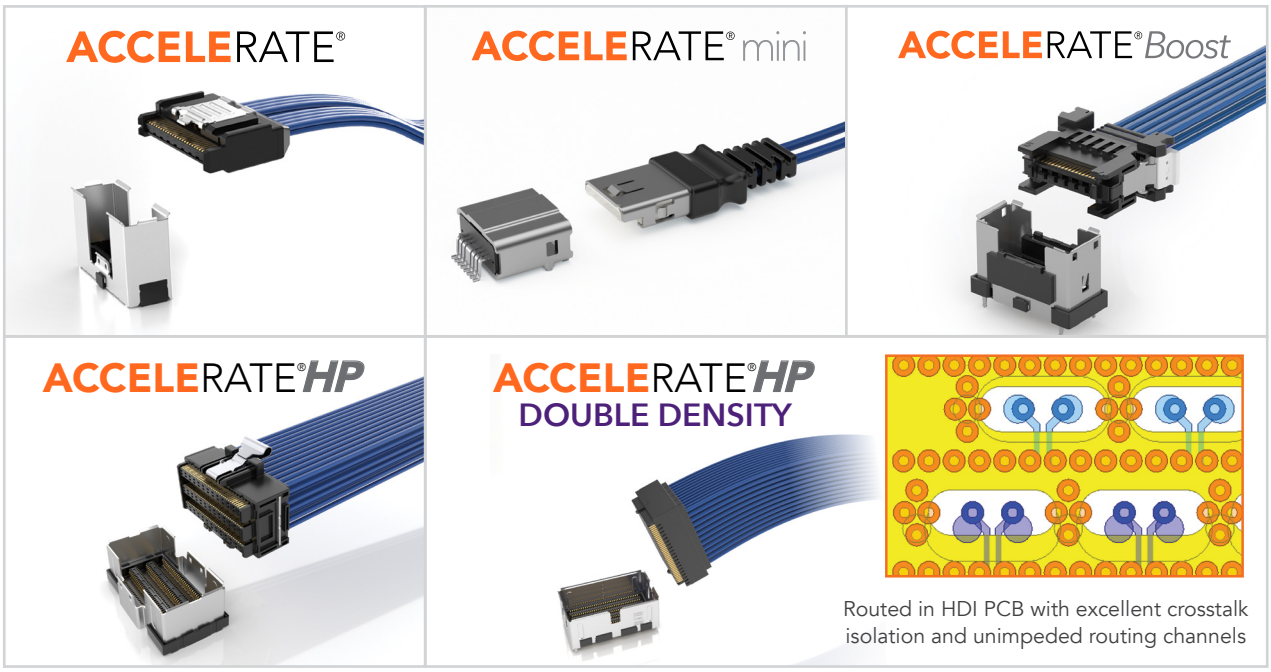
For additional information, contact **HDR@samtec.com** or visit **samtec.com/si-fly-hd**.



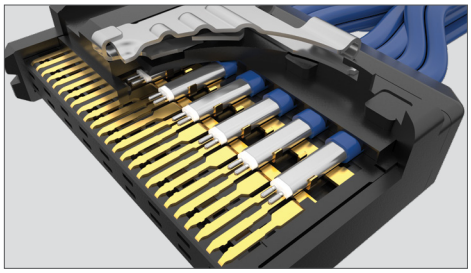
OPEN CPX MSA

The **Open CPX MSA Standard** defines an interoperable CPO/NPO system based on Si-Fly® HD for high-speed and high-density connectivity (SFCM/SFCF, SFOM/SFOF). Visit **samtec.com/msa** for details.

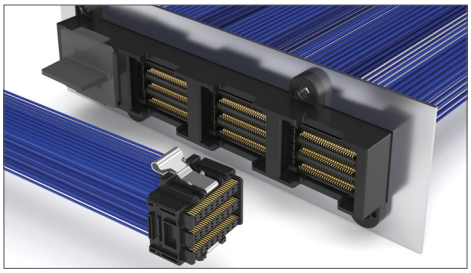
- AcceleRate® is the industry's slimmest cable assembly – 7.6 mm width; up to 24 differential pairs or 36 single-ended signals in a high-density 2-row design and 64 Gbps PAM4 performance (PCIe® 6.0/CXL® 3.2 capable); mixed signaling available
- AcceleRate® HP provides 112 Gbps PAM4 performance with staggered row-to-row spacing for optimized traces in cable-to-board and cable-to-cable applications; up to 96 differential pairs, 144 single-ended signals, or a mixed signaling option
- AcceleRate® HP Double Density is a co-packaged (direct-to-chip) solution with the industry's highest density 112 Gbps PAM4 interconnect; double the density in the same Gen 1 footprint, up to 144 differential pairs; single-ended and mixed signaling on roadmap
- AcceleRate® Boost optimized 128 Gbps PAM4 performance system with up to 96 differential pairs, provides significant reduction in NEXT and Return Loss, lower resonances and tighter impedance compared to similar cable solutions
- AcceleRate® Mini delivers 112 Gbps PAM4 performance in an extremely small form factor with one or two differential pairs; design flexibility as an end 2 option for other Flyover® assemblies; vertical and right-angle
- Eye Speed® cable technology; see page 21 for specifications
- SI Evaluation Kits available; see pages 42-43



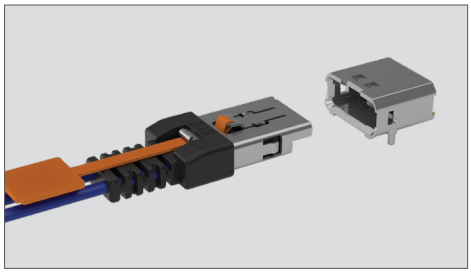
Features



Contacts directly soldered to the twinax cable for improved signal integrity



AcceleRate® HP cable-to-cable connection through midplane, backplane or front panel

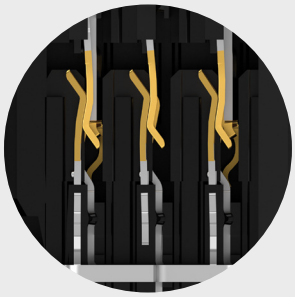


AcceleRate® Mini with positive latching for a secure connection

High-Speed Cable

Backplane Assemblies

- NovaRay® micro rugged backplane assemblies are ultra-high density with up to 128 differential pairs and two reliable points of contact; 128 Gbps PAM4 performance and PCIe® 7.0 capable
- Paladin® HD2 high-density 224 Gbps PAM4 backplane cable-to-cable assemblies with up to 96 isolated differential pairs and end 2 compatibility with Si-Fly® HD
- ExaMAX® backplane assemblies offer high-reliability with two points of contact and up to 96 staggered differential pairs; 112 Gbps PAM4 performance and PCIe® 6.0/ CXL® 3.2 capable
- Highly customizable and configurable; guidance, keying and power options
- Eye Speed® cable technology; see page 21 for specifications
- SI Evaluation Kits available; see pages 42-43



NovaRay® features a precision molded contact system with a 2.0 mm wipe



PAM4 224 Gbps

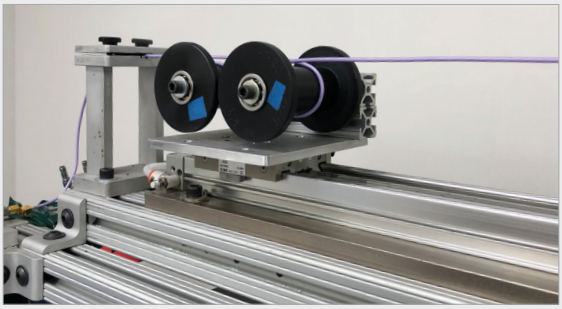
PAM4 128 Gbps

Eye Speed® Dynamic Testing

Samtec Eye Speed® ultra low skew twinax cable underwent dynamic insertion and return loss testing, proving the cable to be rugged with stable electrical performance after 250 flex/bend cycles.

This arduous flex and bend test determined that the performance of Samtec Eye Speed® ultra low skew twinax is essentially indistinguishable from the original raw, unbent cable.

Ultra low skew twinax provides the lowest insertion loss in the industry, controlled performance across temperature, and robust insertion loss in any assembly and operation environment. Contact **HDR@samtec.com** for higher cycle results.



Six feet of ultra low skew twinax cable on mandrels was coiled/uncoiled moving back and forth on a slide at a rate of 20-25 cycles per minute.

Flyover® Cable Management

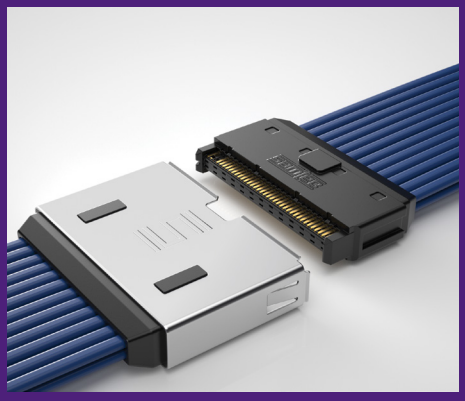
- Samtec works with system architects in the early stages to optimize the architecture for cable management while keeping signal integrity and thermals in mind
- Complimentary service using mockups with accurate cable lengths
- Minimize number of SKUs within one system
- Minimize pressure drop



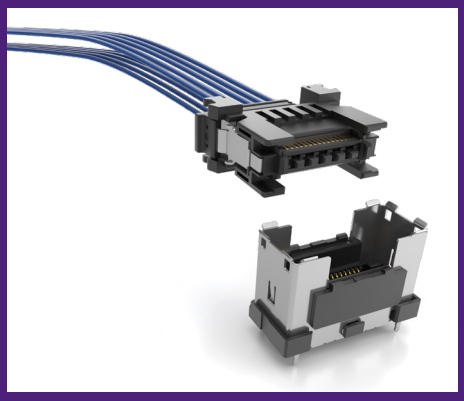
Eye Speed® Cable Specifications

	Series	Eye Speed® Twinax (-DP, 28-36 AWG)	Eye Speed Thinax™ (-DP, 34 AWG)	Eye Speed® Hyper (-DP, 28/32 AWG)	Eye Speed ThinSE™ (-SE, 32/34 AWG)	Mixed Signaling (-DP & -SE)
AcceleRate®	ARC6	✓	✓	On Roadmap	✓	✓
AcceleRate® Boost	ABC6		On Roadmap	✓		
AcceleRate® HP (Cable-to-Cable)	ARJ6		✓		On Roadmap	
AcceleRate® HP (Cable-to-Board)	ARP6		✓		✓	✓
AcceleRate® HP Double Density	ART6		✓			
AcceleRate® Mini	ARM6	✓	✓			
ExaMAX® Backplane	EBCF/EBCM	✓	✓	On Roadmap	✓	✓
ExaMAX® I/O	EBCE	✓				✓
Flyover® OSFP (112G)	FOSFP-1		✓			
Flyover® OSFP (224G)	FOSFP-2			✓		
Flyover® QSFP	FQSFP	✓	✓			
Flyover® QSFP (Double Density 400)	FQSFP-DD	✓	✓			
Flyover® QSFP (Double Density 800)	FQSFP-D8	✓	✓			
Flyover® SFP	FSFP		✓			
NovaRay® Backplane	NVCF/NVCM		✓	✓ (NVCF)	✓	
NovaRay® I/O	NVACE/NVACP	✓	✓		✓	✓
NovaRay® I/O 38999	NVA3E/NVA3P	✓				
Si-Fly® HD (Co-Packaged)	SFCC			✓		
Si-Fly® HD (Near-Chip)	SFNC			✓		
Si-Fly® LP	CPC	✓	✓			

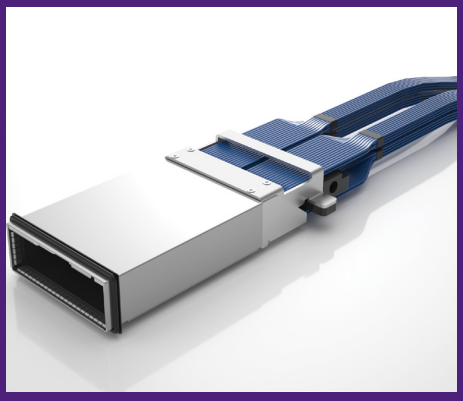
ROADMAP: FLYOVER® CABLE SYSTEMS



AcceleRate® Slim Cable-to-Cable



AcceleRate® Boost with 4, 6 or 8 Rows

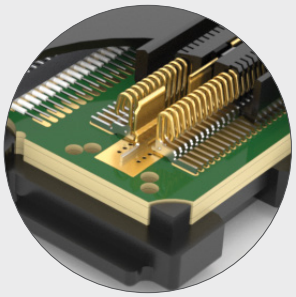


Flyover® XPO Internal Assembly

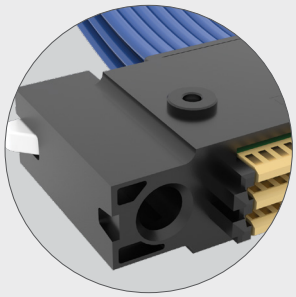
High-Speed Cable

Micro Coax & Twinax Assemblies

- High-density SEARAY™ 1.27 mm pitch with up to 240 I/Os; supports PCIe® 2.0/3.0 protocols
- Ultra-high density SEARAY™ 0.80 mm pitch with up to 300 I/Os; supports PCIe® 3.0 and SAS3 protocols
- Q Series® 0.50 mm and 0.80 mm pitch ground plane assemblies with up to 180 I/Os
- Q Rate® 0.80 mm pitch ground plane assemblies with up to 156 I/Os; Edge Rate® contacts optimized for signal integrity performance
- Razor Beam™ 0.50 mm pitch hermaphroditic assemblies in vertical or right-angle; shielding and screw downs
- Edge Rate® 0.80 mm pitch assemblies feature a smooth milled contact surface for increased durability and cycle life
- 34, 36 and 38 AWG Eye Speed® micro coax; 30 and 32 AWG Eye Speed® twinax
- Single-ended 50 Ω and differential 100 Ω standards
- All micro coax cable assemblies can be made available with Samtec's new Eye Speed ThinSE™ coax for smaller mechanical form factors; contact **HDR@samtec.com**



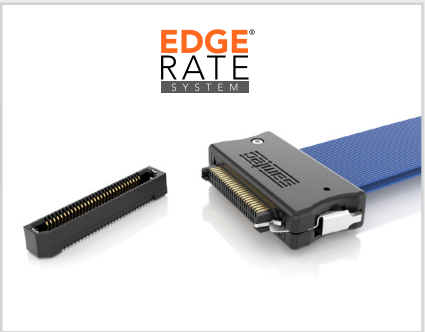
Integral ground/power plane reduces crosstalk

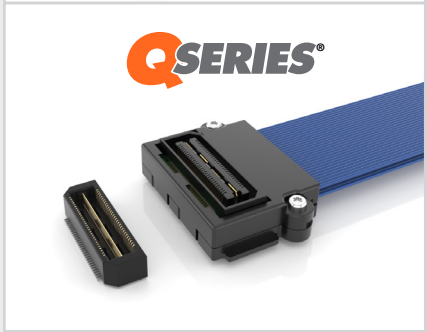


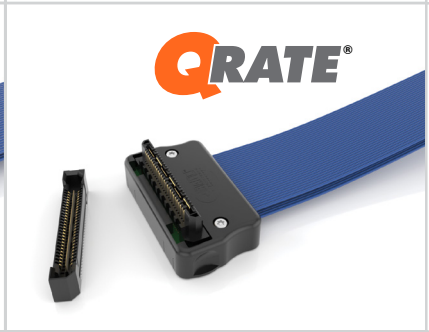
Rugged options: screw downs, retention pins, guide posts & latching









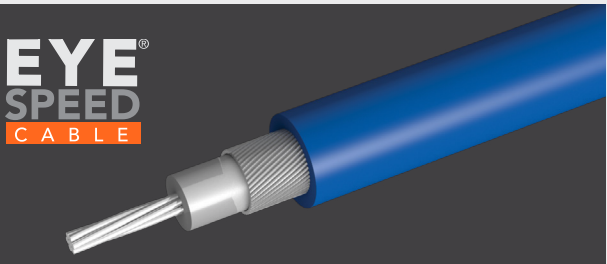




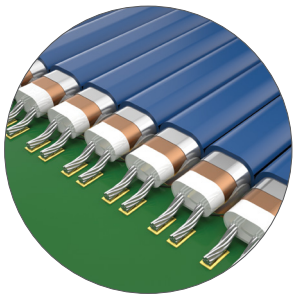
14 Gbps

Eye Speed® Cable Technology

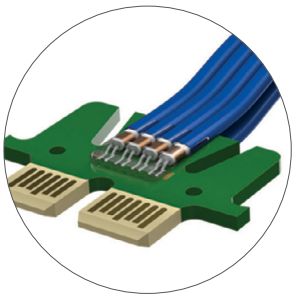
- Excellent signal integrity performance with individual copper serve or copper tape shielding
- Stranded conductor for small bend radii and dynamic high flexing cycle applications
- 26-38 AWG coax and twinax construction



- 0.80 mm pitch (14 Gbps) edge card assemblies; mates with Samtec's high-speed edge card sockets
- PCI Express® assemblies support 3.0/4.0/5.0/6.0 data transfer rates with standard 36, 64, 98 and 164 positions; power cable option available
- FireFly™ copper assemblies support 28 Gbps performance; interchangeable with FireFly™ optical
- Halo Cu™ copper features a low 6.5 mm profile and 112 Gbps PAM4 performance; interchangeable with Halo® optical
- Generate® 64 Gbps PAM4 edge card assemblies are compatible with SFF-TA-1002 (1C, 2C, 4C and 4C+)
- 30, 32, 34 and 36 AWG Eye Speed® twinax; 34 AWG Eye Speed® ultra low skew and Eye Speed Thinax™ twinax cable
- Rugged latching, board locks and screw down options
- Generate® and PCIe® test assemblies with DC to 110 GHz frequency; 31 and 29 AWG low loss microwave cable



Eye Speed® cost-effective ribbonizing eliminates discrete wires



0.80 mm pitch edge card assembly without housing for cost-savings

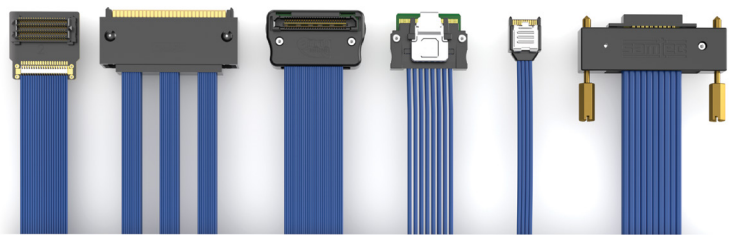


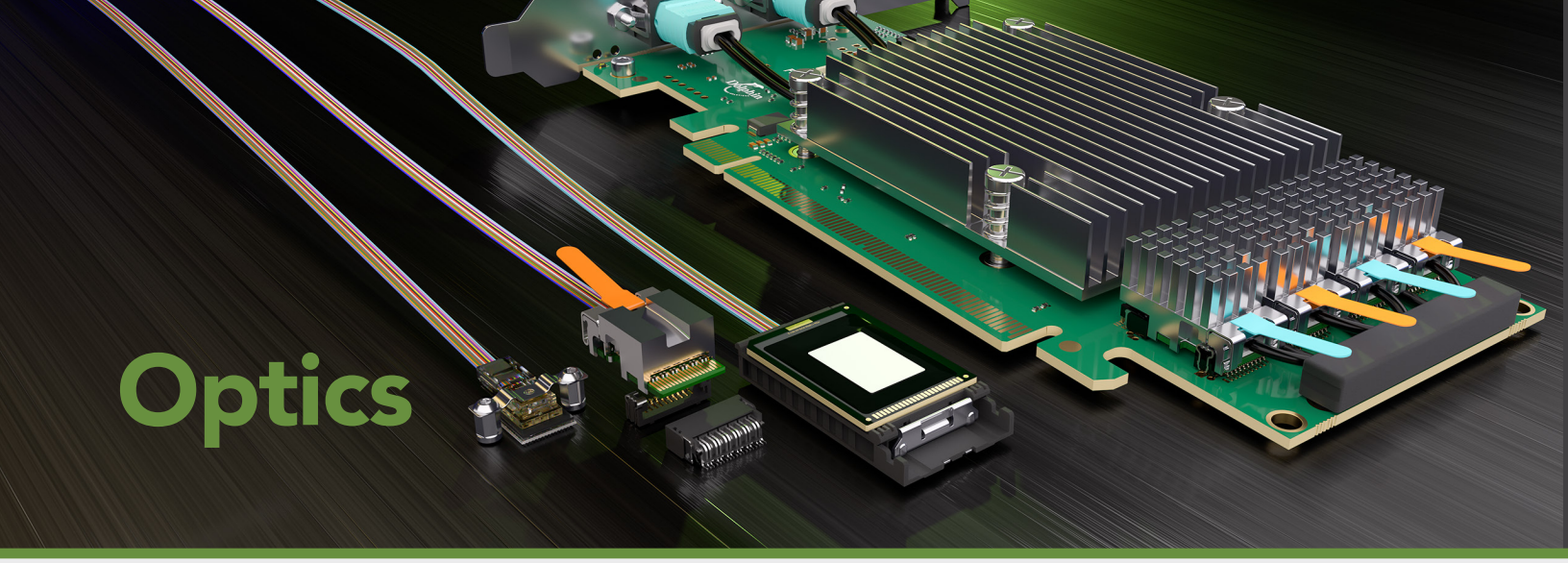
PAM4
112 Gbps
28 Gbps
14 Gbps

Mix & Match: The Ultimate in Design Flexibility

ANY high-speed connector
ANY pinout configuration
ANY high-speed precision cable

...to create a solution for any specific application
Contact **HDR@samtec.com**





Optics

Samtec is the industry leading provider of mid-board optical transceiver solutions. This growing and comprehensive family of products provides reliable signal integrity over an extended distance in chip-to-chip, board-to-board, on-board and system-to-system connectivity.

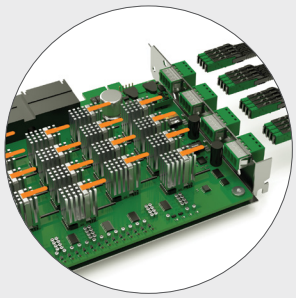
Mid-Board Optical Transceivers

samtec.com/optics

- Data connection is taken "off board," simplifying board layout and enhancing signal integrity from IC to faceplate
- FireFly™ features an industry-leading miniature footprint with performance to 28 Gbps; additional versions include PCIe®-Over-Fiber for 3.0/4.0/5.0 data rates, extended temp with a range of -40 °C to +85 °C (FireFly™ EXT) and extreme environment with a parylene conformal coating (FireFly™ EET)
- PCIe®-Over-FireFly™ adaptor card supports 3.0/4.0/5.0 data rates with scalable, cost-optimized configurations
- In development: FireHawk® provides the smallest footprint, lowest profile and lowest mass optics in the industry (10 x 7.7 x 4.4, less than 0.4 grams); designed for extreme performance to 40 Gbps aggregate (10G x 4 channels) extreme applications including Rad Hard for space and satellites
- In development: Halo® next gen, rugged optics designed for embedded applications demanding 56 Gbps PAM4 performance; the 2-piece contact system in a low 6.5 mm profile, withstands high shock and vibration
- Protocol agnostic
- Variety of end options including MTP®, MT and U-SDI interface
- Supports data center, HPC and FPGA protocols, including 10/40/100 Gb Ethernet, InfiniBand™, Fibre Channel, PCIe®, CXL® and Aurora
- FireFly™ and Halo Cu™ copper assemblies are pin compatible with the equivalent optics using the same connector system; see page 23
- Evaluation and development kits available; see pages 42-43
- Industry standard passive MPO-to-MPO panel adaptor and optical patch cable available



In development: Next gen FireFly™ optical transceiver to 800G, designed for ultra rugged shock and vibration



FireBlade™ OCP OAI EXP module provides 1.6 Tbps aggregate throughput via FireFly™ ideal for AI/ML systems





In development



In development

FireFly™ Embedded

14 Gbps	x4 x12
16 Gbps	x12
25 Gbps	x4
28 Gbps	x4

PCIe®-Over-Fiber

8 GTps	PCIe® 3.0 x4 PCIe® 3.0 x8 PCIe® 3.0 x16
16 GTps	PCIe® 4.0 x4 PCIe® 4.0 x8 PCIe® 4.0 x16
32 GTps	PCIe® 5.0 x4 PCIe® 5.0 x8 PCIe® 5.0 x16

(in development)

FireFly™ EXT

10 Gbps	x4 x12
12.5 Gbps	x12
25 Gbps	x4

FireFly™ EET

10 Gbps	x4
25 Gbps	x4

FireHawk®

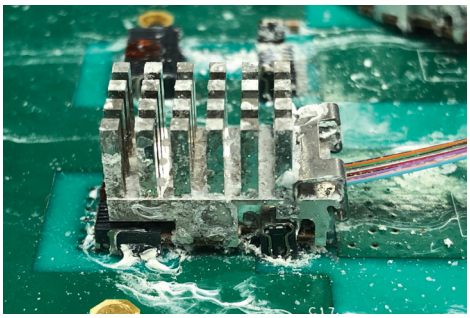
10 Gbps	x4

(in development)

Halo®

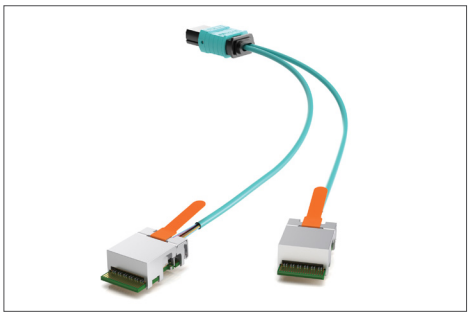
PAM4 56 Gbps	x8

(in development)



Rugged Environment Capabilities

- Tin whisker mitigation
- Optional parylene conformal coating for exposed mil/aero applications
- Fungal resistance
- Extreme shock and vibration
- Multiple end options: MT38999, MTP®, Glenair® Series 79, high-reliability ODU® EBP (Expanded Beam Performance), VITA™ 66.1/66.4 & other common rugged interfaces

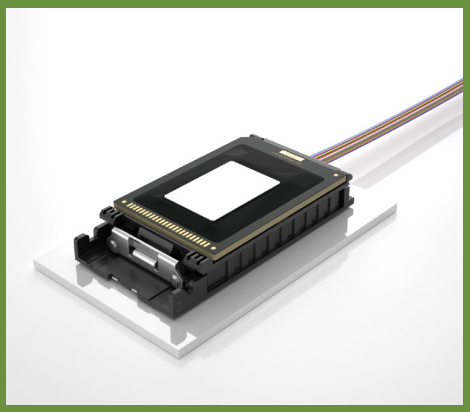


Application Specific Customizations

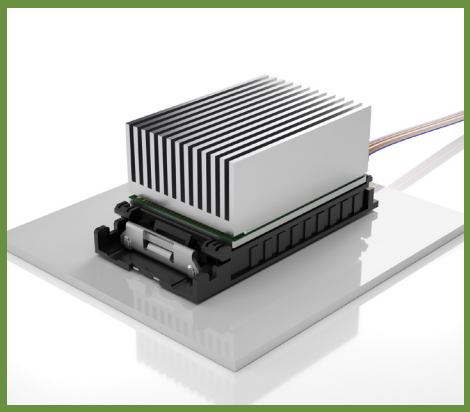
- Custom and secure firmware
- Custom optical link budget
- Custom fiber mappings
- Custom optical connectors
- Custom assemblies with multiple FireFly™/optical connectors
- Contact **OpticsOTP@samtec.com** for assistance with your application needs

VITA/VNX/VNX+/FMC/FMC+/XMC/XMC+ are all respective trademarks of VITA
MTP® is a registered trademark of US Conec Ltd.
ODU® is a registered trademark of ODU® GmbH & Co. KG

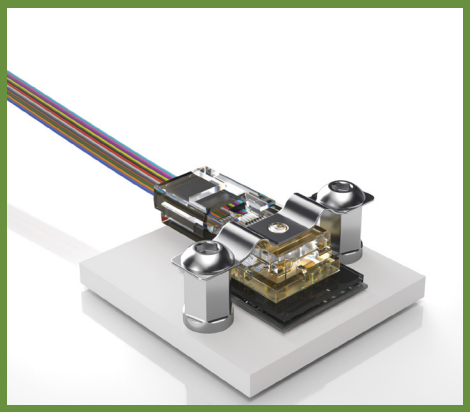
ROADMAP: OPTICS



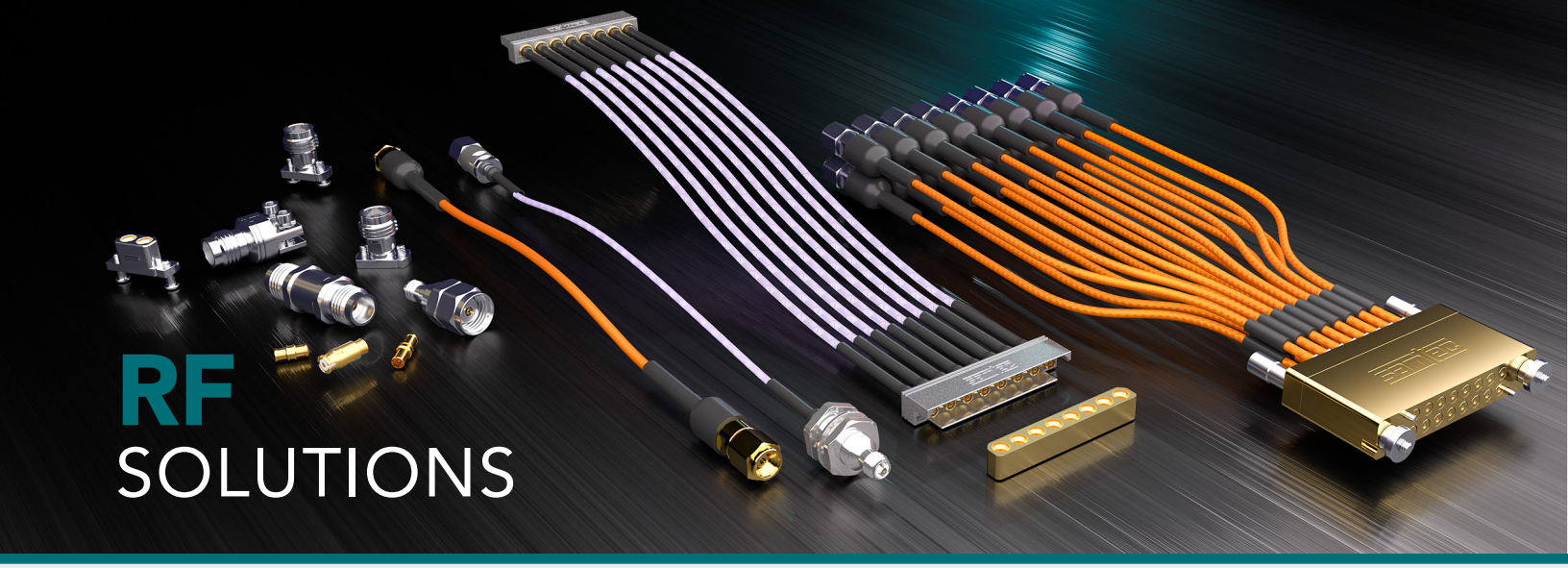
Halo® 112G Direct Drive



Halo® PCIe® 6.0 Capable



FireHawk® 25G x4 Solution



RF SOLUTIONS

Full RF solution capabilities, including cable assemblies, board connectors, cable connectors and adaptors are backed by industry-leading service. Samtec is vertically integrated, designing and manufacturing our own high frequency cables and connectors to ensure the highest quality products with full system support.

RF Connectors

samtec.com/rf-connectors

- Precision RF board connectors from 18 GHz to 130 GHz; solderless compression mount vertical and edge launch solutions; stripline or microstrip/CPW transmission (see chart)
- Magnum RF® ganged SMPM to 65 GHz features a push-on interface with varying retention forces (board-to-board and cable-to-board)
- SMP/SMPM assists with misalignment when paired with bullet adaptors; threaded MIL-STD-348 interface available
- SMP3 with mixed technology termination; similar to SMPS but not intermateable
- In-series and between-series adaptors support applications to 130 GHz; plug-to-plug, jack-to-jack or plug-to-jack
- Precision RF cable connectors from 1.00 mm (130 GHz) to TNCA (18 GHz) terminate to common microwave/mmWave cables
- Rugged Blind Mate modules support 110 GHz with high-density size 16 & 20 contacts; ideal for VITA™ 90 VNX+™
- Low frequency sub-6 GHz and 12G-SDI, 50 Ω and 75 Ω solutions: BNC, DIN 1.0/2.3, High-Density BNC, MCX, MMCX, SMB, SMA, TNC



Precision alignment grooves for easy visual matching and peak connector performance

PRECISION RF



MAGNUMRF

GANGED RF ASSEMBLIES



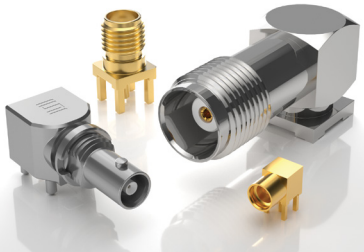
ADAPTORS & BULLETS



RUGGED BLIND MATE



LOW FREQUENCY

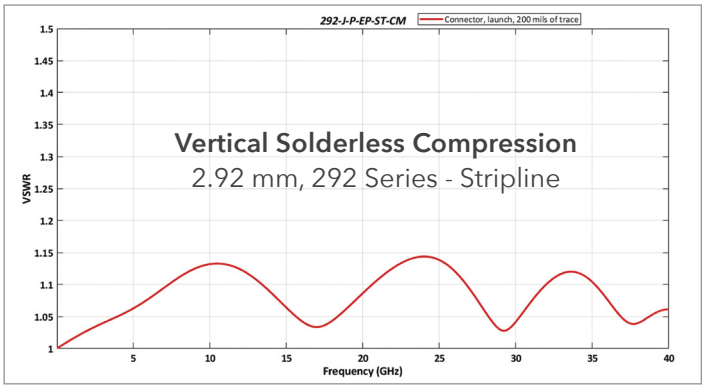


DC TO 130 GHz

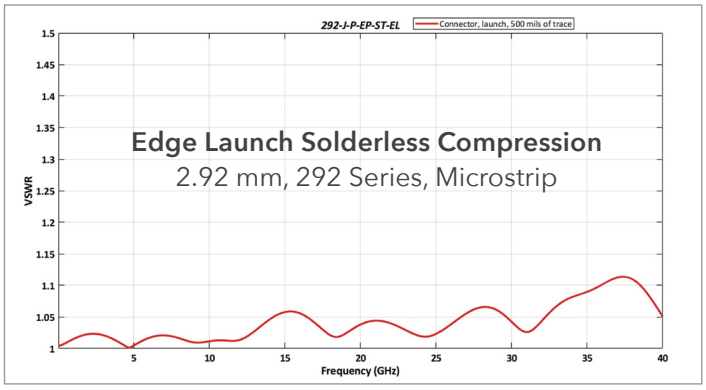
Compression Mount Connectors - VSWR





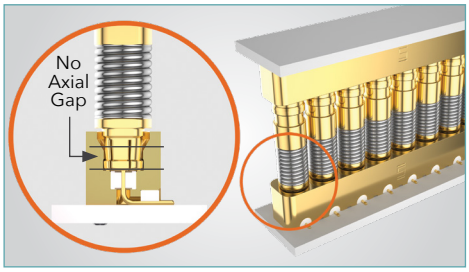


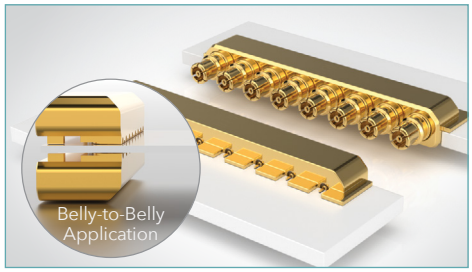
The VSWR used AFR on the measurement from the reference plane of the connector into 0.2" of board trace. Board construction was a straight stripline trace on a 6-layer Tachyon 100G board.

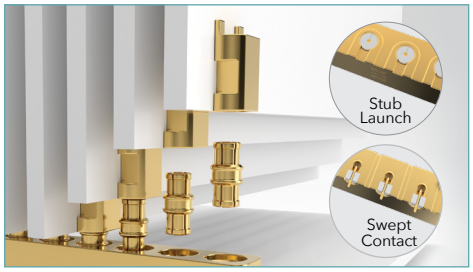


The VSWR used AFR on the measurement from the reference plane of the connector into 0.5" of board trace. Board construction was a straight microstrip trace on a 4 layer stackup with an outer 10 mil core of I-Tera MT40.

Magnum RF® Multi Channel Connectors







Mezzanine, coplanar and perpendicular solution: swept contact or stub launch terminations

Precision RF Solutions

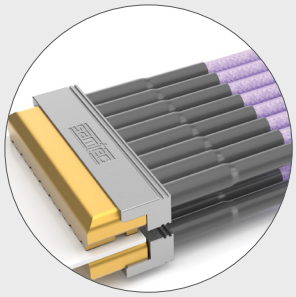
Type	Frequency	Board Connector	Cable Connector	Cable Assemblies	Adaptor
1.00 mm	to 130 GHz	100 (-CM, -CMM)	PRF10	LL130, LL110, LL095, RF047-A	PRFBA
1.35 mm	to 90 GHz	135 (-CM, -CMM)	PRF13	RF047-A	
1.85 mm	to 67 GHz	185 (-CM, -CMM, -EL, -ELW, -AL)	PRF18	LL071, AL071, LL054, RF047-A, RF086	PRFIA, PRFBA
SMPM	to 65 GHz	SMPM (-SM, -MT, -ST-TH, -RA-TH, -EM)	PRFM0	LL095, RF047-A, RF086, RF23C	PRFIA, PRFBA
SMPMT	to 65 GHz	SMPMT (-MT)	N/A	RF047-A	
Ganged SMPM	to 65 GHz	GPPC (-SL, -CMM, -EM, -RA-SM)	N/A	GC47, GC86	PRFIA
		GPPB (-SM)	N/A	RF047-A	PRFIA
SMP3	to 65 GHz	SMP3 (-MT)	N/A	RF047-A	
2.40 mm	to 50 GHz	240 (-CM, -CMM, -EL, -ELW)	PRF24	LL043, RF047-A, RF085, RF086, RF23C	PRFIA
SMP	to 40 GHz	SMP (-SM, -TH, -MT, -EM)	PRF00	RF047-A, RF086, RF23C, RF25S, RF405	SMP-B (Bullet)
2.92 mm	to 40 GHz	292 (-CM, -CMM, -EL, -ELW)	PRF92	LL071, LL043, LL032, RF047-A, RF085, RF086, RF23C	PRFIA, PRFBA
3.50 mm	to 34 GHz	N/A	PRF35	RF23S	
SSMA	to 34 GHz	N/A	PRFS1	Available as a Quick-turn Custom	
SMA	to 26.5 GHz	SMA (-TH, -SM, -MT, -EM)	PRF01	LL043, LL018, RF047-A, RF086, RF23C, RF402, RF405, RF25S, RF180, RF280	
N Type	to 18 GHz	N/A	PRF06	RF180, RF280	
TNCA	to 18 GHz	N/A	PRF04	RF180, RF280	

RF Solutions

RF Cable Assemblies

samtec.com/rf-cableassemblies

- Nitrowave® high-performance microwave cable assemblies to 130 GHz are phase and amplitude stable with flexure; Dynamic Performance Layer (DPL) with lower density dielectric that minimizes loss; armored version for crush/abrasion/kink/torque resistance
- Precision RF, high frequency assemblies for 18 to 130 GHz microwave/mmWave frequencies; low loss and semi-flexible cable types from .047" to .277" (see chart on page 27)
- Variety of interfaces from 1.00 mm (130 GHz) to TNCA (18 GHz); see chart on page 27
- Push-on, threaded and Magnum RF® ganged solutions (cable-to-board and board-to-board)
- Bulls Eye® high performance test and measurement assemblies to 130 GHz available with .047", .086" and Nitrowave® microwave cables
- U.FL/MHF®1 end options with rugged metal strain relief
- URSA® I/O ultra rugged panel mount assemblies integrated with Precision RF SMPM contacts to 40 GHz
- Traditional sub-6 GHz frequency assemblies with RG type cables, and .081 mm and 1.13 mm Micro High Frequency; 75 Ω, 12G-SDI optimized assemblies available
- Non-magnetic options available for medical and quantum computing applications



Magnum RF® belly-to-belly application for maximum density



Application tooling available for assembly, installation/extraction; visit **samtec.com/tooling**



DC TO 130 GHz

Testing & Technical Support

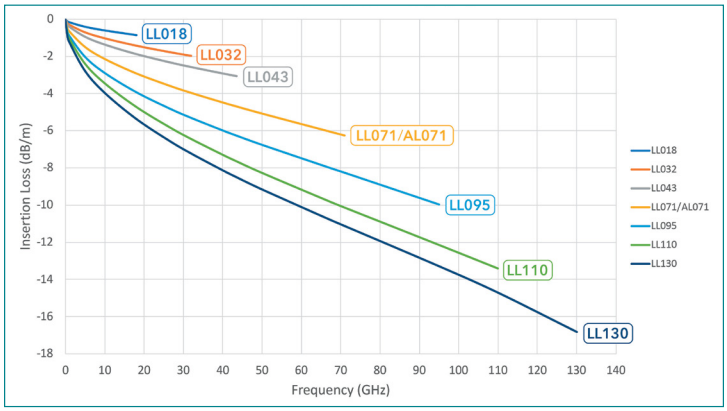
High-level design and development of advanced interconnect systems along with industry-leading expertise allow us to offer effective strategies and support for optimizing the entire signal channel. RF technical support includes launch optimization, simulation, and testing.

Contact **RFGroup@samtec.com** to discuss your application and testing requirements.

Low-Loss Cable Construction with DPL



Maximum Insertion Loss (dB/m)



Frequency for Emerging Applications

18 GHz, 32 GHz, 43.5 GHz, 71 GHz, 95 GHz, 110 GHz, 130 GHz

Series	LL018	LL032	LL043	LL054	LL071	AL071 (armored)	LL095	LL110	LL130
Impedance (Ω)	50								
Max Frequency (GHz)	18	32	43.5	54	71		95	110	130
Outer Dia. (inches)	0.309	0.182	0.141	0.122	0.094	0.207	0.076	0.068	0.060
Min Static Bend Radius (inches)	1.25	0.375	0.25	0.25	0.125	0.625	0.156	0.125	0.125
Velocity of Propagation (%)	77								
Min Shielding Effectiveness (dB)	-90								
Temp Range (˚C)	-65 °C to +125 °C								
Insertion Loss	See Maximum IL Chart								
Phase Stability with Flexure (+/-°)*	In Development	10.0	5.0	5.0	5.0		10.0	12.5	In Development
Amplitude Stability with Flexure (+/-dB)*	In Development	0.10							In Development
End 1 / End 2	1.00 mm, 1.35 mm, 1.85 mm, 2.40 mm, 2.92 mm, SMPM, SMP, SMA, N Type, TNCA								

* Values are representative. Reference test data for details. Test method: 4.5 in dia. mandrel, 90˚ bend, 3 ft. cable.

Mix & Match RF Cable Assembly Flexibility

Samtec offers a variety of end options for each product series. This blends application-specific customization with the simplicity and lead-time efficiencies of an off-the-shelf assembly.

Visit **samtec.com/rf-cablebuilder**

Solutionator® DESIGN IN A MINUTE® RF CABLE



ANY **RF** Connector

ANY Microwave **Cable**

ANY Application

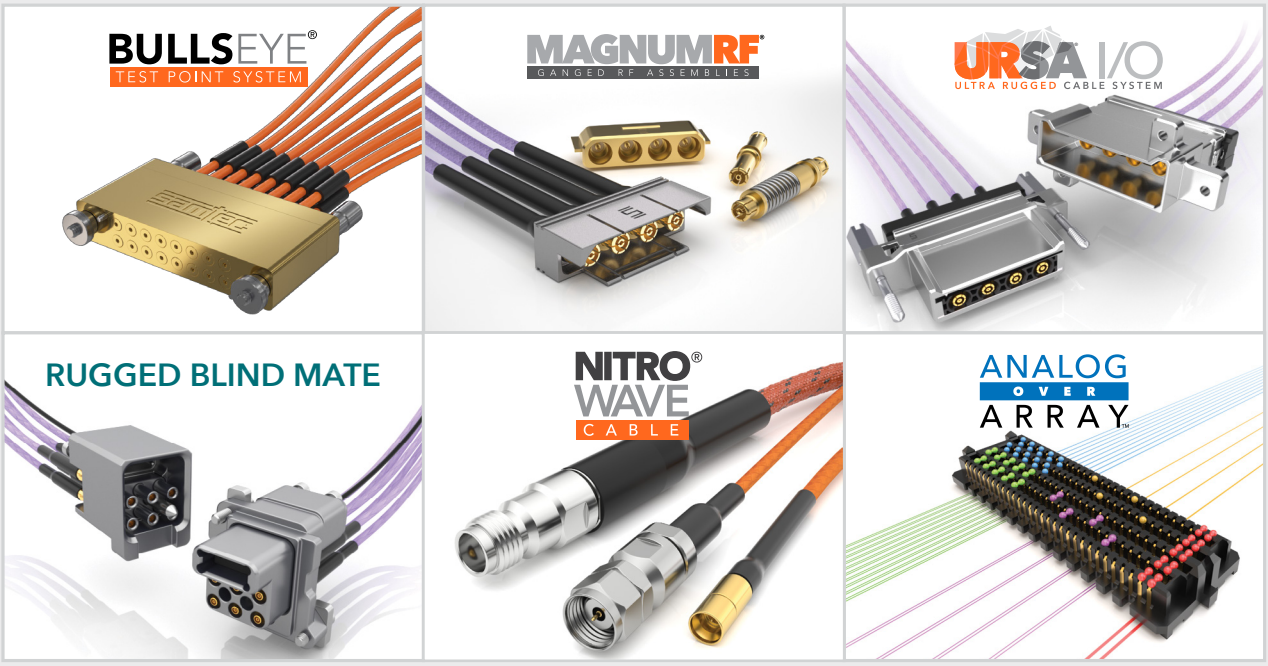


RF Solutions

RF Original Solutions

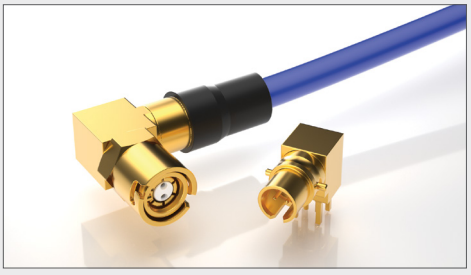
samtec.com/originalrf

- Bulls Eye® high-performance test and measurement assemblies to 130 GHz with a high-density, space saving design that enables smaller evaluation boards and shorter trace lengths; available in microstrip (CPW) or stripline PCB transmission types
- Magnum RF® push-on, ganged SMPM enables 40% greater density and better alignment for multiple channels; mode free operation to 65 GHz supports low- or mid-band system requirements; bullet adaptors for misalignment and blind mate
- URSA® I/O with SMPM contacts integrates ultra rugged features with a Precision RF solution to 40 GHz
- Rugged Blind Mate modular solution to 110 GHz with a variety of RF and optical configurations
- Nitrowave® high-performance microwave cable assemblies for extended frequency ranges from 18 to 130 GHz
- Counterweight solutions for efficient board assembly, balanced for pick-and-place automation
- 75 Ω mini and micro mini interconnects; high vibration version for higher extraction forces
- High-cycle U.FL solutions with rugged metal strain relief
- Analog Over Array™ connectors simultaneously run analog, digital and power signals

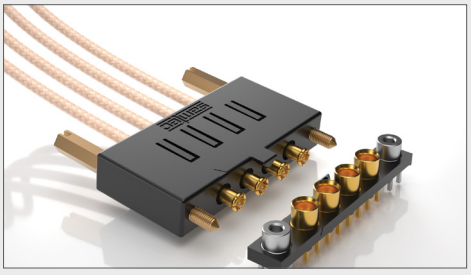


DC TO 130 GHz

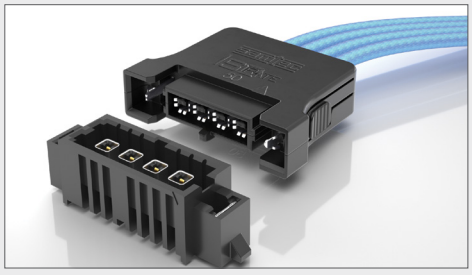
Also Available



100 Ω shielded twisted pair cable system

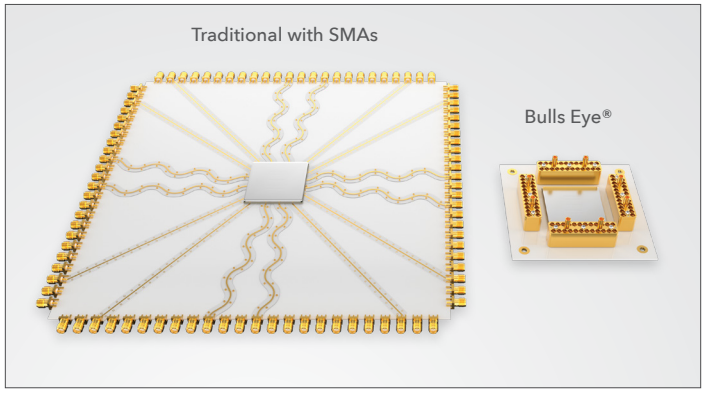


50 & 75 Ω ganged micro scale systems



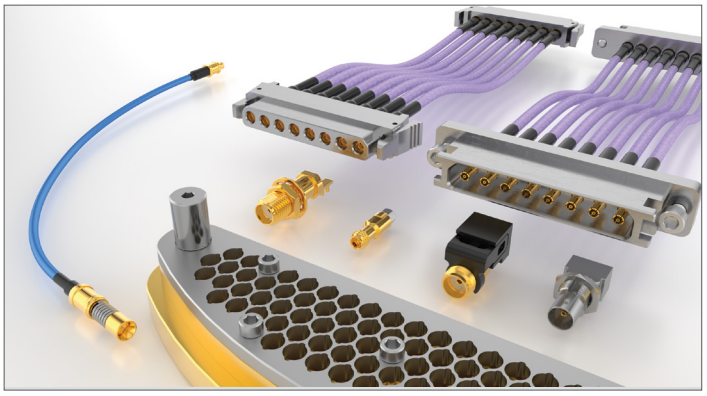
IsoRate® 50 Ω high isolation systems

Bulls Eye® Test Solutions



High-density test and measurement solution that compression mounts to the board for placement directly adjacent to the SerDes being characterized

Custom RF Solutions

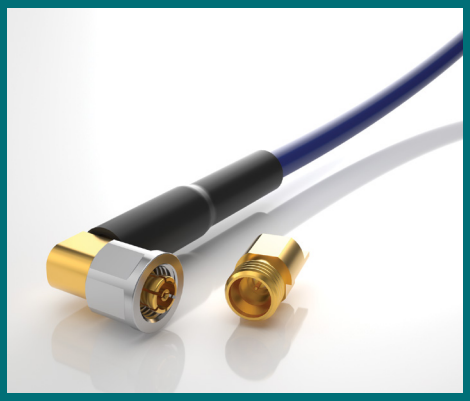


Custom and quick-turn modifications available to meet the demands of digital/analog systems including: board termination types, tin dipping capabilities, heat shrink tubing, alternate platings, automated assembly counterweights. Contact **RFGroup@samtec.com** to discuss your system requirements.

ROADMAP: RF SOLUTIONS



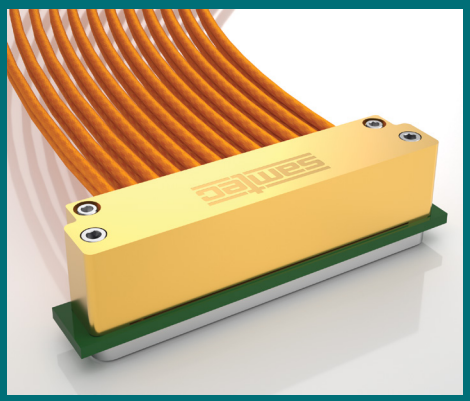
0.8 mm Vertical Compression Launch, 145 GHz



Threaded SMPM Edge Mount & Right-Angle Cable Connectors



URSA® I/O Combos with RF SMPM Contacts



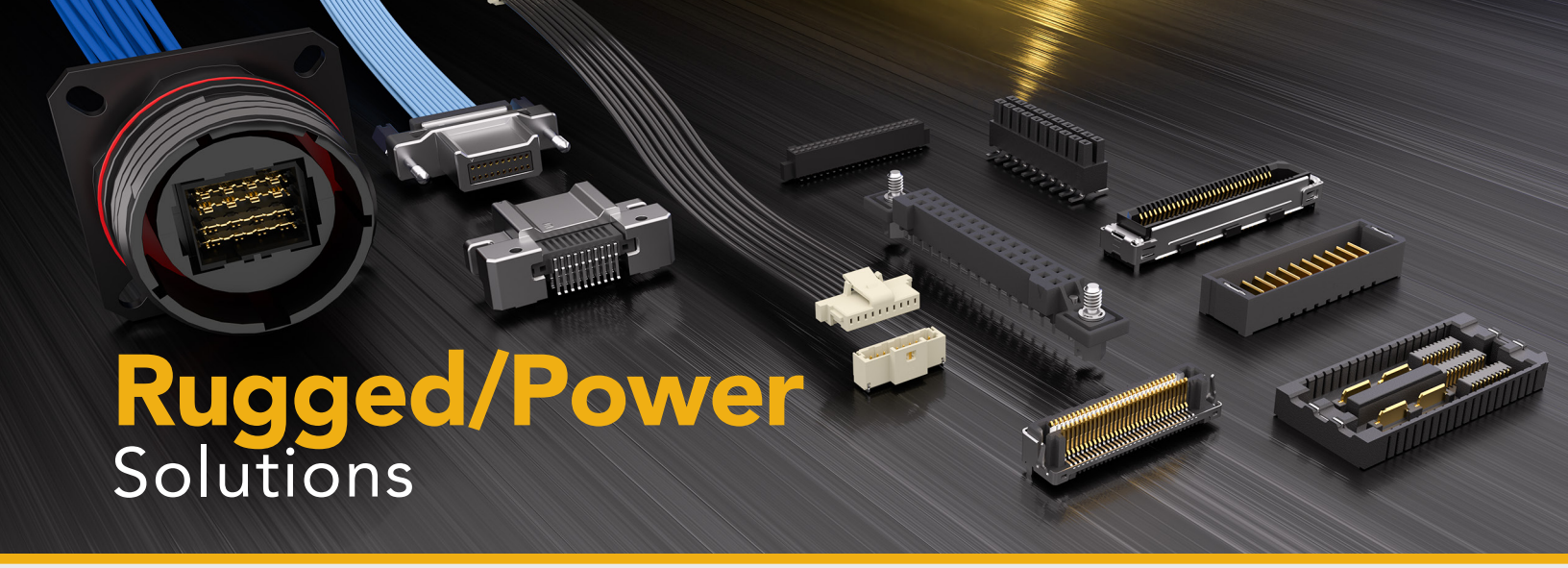
Bulls Eye® 130 GHz Right-Angle, Low Profile



Nitrowave® Armored Cable, 130/110 GHz



Nitrowave® 54 GHz Microwave Cable



Rugged/Power Solutions

Rugged contact systems, flexible power interconnects and rugged signal integrity combined with ultra-rugged offerings create the foundation of Samtec's rugged/power solutions for high cycle, high-speed and high power applications. Additional testing available to ensure quality and performance in harsh/extreme applications.

Power Systems

samtec.com/power-systems

- mPOWER® ultra micro power up to 18 A/blade (460 VAC)
- AcceleRate® mP power/signal arrays for up to 15 A/blade (200 VAC)
- Mini Mate® and Power Mate® systems with individually shrouded contacts; up to 9.3 A/contact (400 VAC)
- Extreme power systems up to 60 A/blade (300 VAC)
- 23 A/blade (438 VAC) to 58.7 A/blade (450 VAC) PowerStrip™ systems
- Severe Environment Testing qualified (UMPS/UMPT, UDF6/UDM6), see pages 36-37





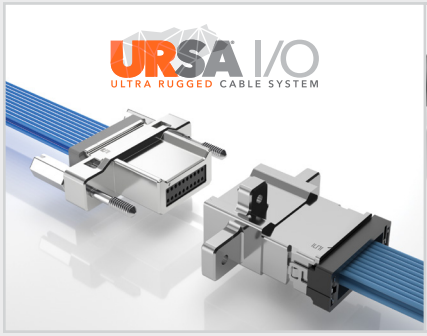


MAX 60 Amps

Rugged I/O Systems

samtec.com/rugged-io

- URSA® I/O with Hyper Claw™ micro hyperboloid contacts for high reliability and mating cycles
- AccliMate™ flexible IP67/IP68 sealed systems: circular and rectangular
- NovaRay® I/O 128 Gbps PAM4 system with a rugged 38999 shell
- FireFly™ mid-board optical transceivers with extended temperature range
- Severe Environment Testing qualified (B1SDT/P1M), see pages 36-37



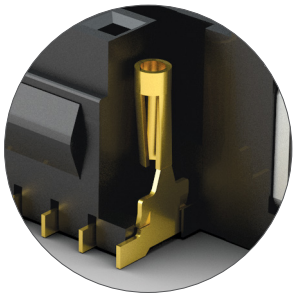




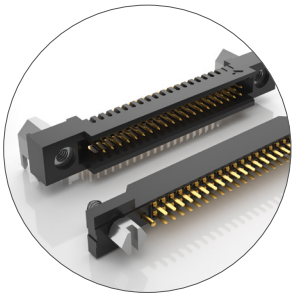
Rugged Board-to-Board Systems

samtec.com/rugged-b2b

- Tiger Eye™ is Samtec's most rugged contact system rated to 1,000+ mating cycles on 0.80, 1.27 or 2.00 mm pitch; up to 3.7 A/pin (275 VAC) and 8 Gbps performance; SureCoat™ advanced coating technologies for reliable performance and cost
- Razor Beam™ hermaphroditic connectors to 56 Gbps PAM4 with slim body designs, EMI shielding and optional lubricated contacts; 4-6x greater mating/unmating forces vs. typical micro pitch connectors
- Floating connectors provide 0.50 mm contact float in the X and Y axes to compensate for misalignment
- Severe Environment Testing qualified (SFM/TFM, S2M/T2M, LSHM), see pages 36-37

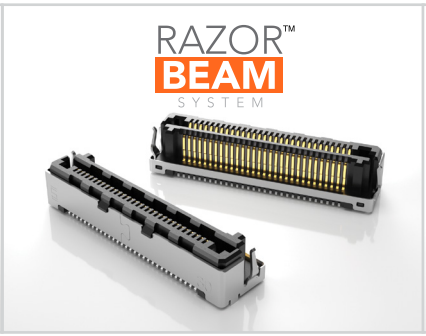


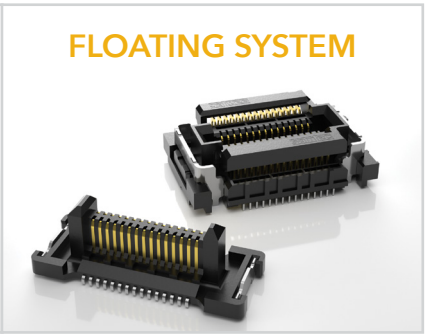
Tiger Eye™ multi-finger contact with several points of contact for high reliability



Tiger Eye™ 1.27 mm pitch right-angle with rugged screw downs in development



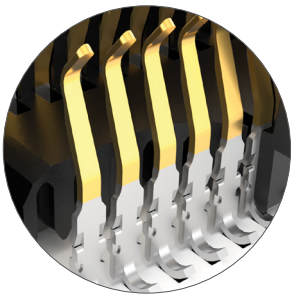




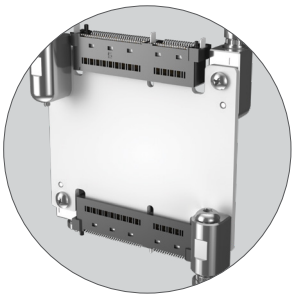
Rugged High-Speed Systems

samtec.com/rugged-hs

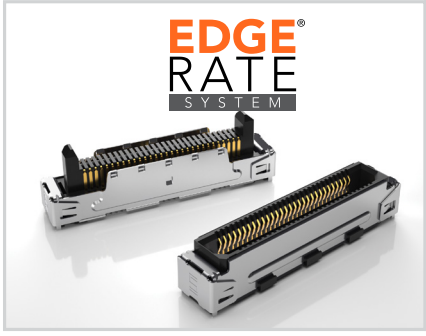
- 0.50, 0.635 and 0.80 mm pitch Edge Rate® strips with performance to 56 Gbps PAM4; 360° EMI shielding, extended guide post and metal latching options; SureCoat™ advanced coating technologies for reliable performance and cost
- Generate® 0.60, 0.80 and 1.00 mm pitch edge cards with performance to 64 Gbps PAM4; vertical, right-angle, edge mount and pass-through
- 0.50 mm to 2.00 mm pitch micro edge card sockets with rugged weld tabs; vertical, right-angle and edge mount
- Severe Environment Testing qualified (ERM8/ERF8), see pages 36-37



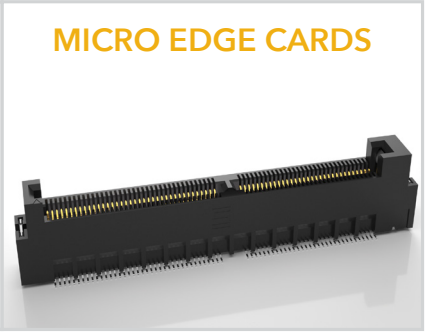
Edge Rate® contacts feature a smooth milled mating surface that reduces wear and increases durability



Generate® 0.60 mm pitch riser card with rugged SureWare™ hardware





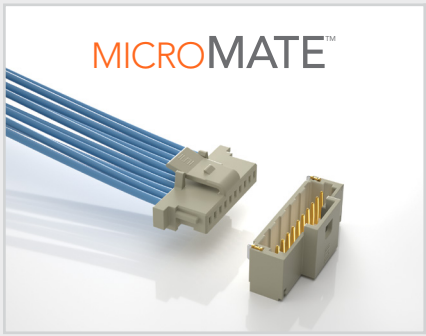


Rugged/Power Solutions

Wire to Board Systems

samtec.com/discrete-wire

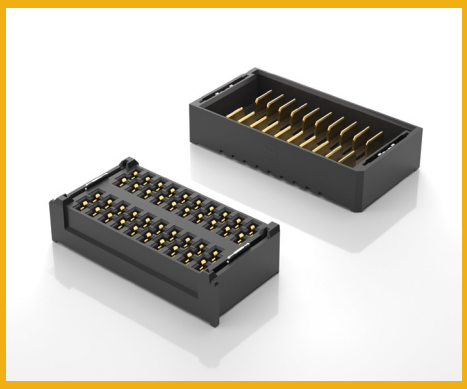
- Micro Mate™ 1.00 mm pitch cable-to-board, cable-to-cable and cable-to-panel with positive latching; up to 40 total dual leaf contacts and 2.7 A/pin (250 VAC)
- Tiger Eye™ 0.80, 1.27 and 2.00 mm pitch with up to 100 positions and 3.8 A/pin (250 VAC)
- Mini Mate® and Power Mate® with up to 50 positions and 10.4 A/pin (300 VAC)
- mPOWER® 2.00 mm pitch cable-to-board/cable/panel; up to 18.1 A/blade (435 VAC)
- PowerStrip™ 5.00 and 6.35 mm pitch with up to 34.5 A/blade (450 VAC); power-only or signal/power available
- Severe Environment Testing qualified (SFSDT/TFM), see pages 36-37
- Components and tooling available; visit **samtec.com/tooling**



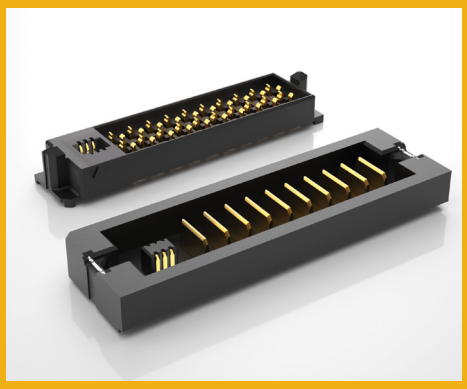




ROADMAP: RUGGED/POWER



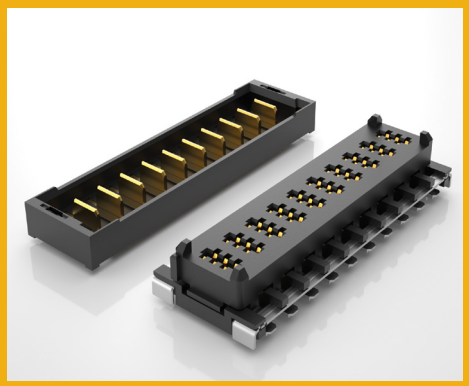
mPOWER® High-Density Arrays



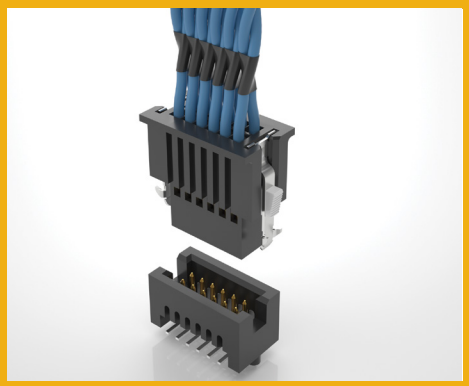
AcceleRate® mP Slim Body Arrays



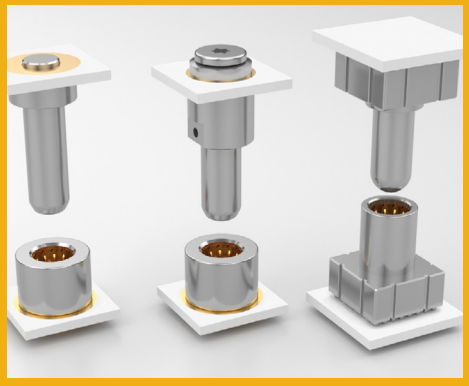
URSA® I/O Sealed with IP Rating



mPOWER® with Floating Power Blades



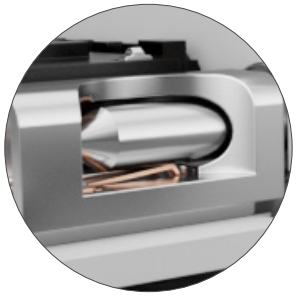
Tiger Eye™ 10G Ethernet Wire to Board



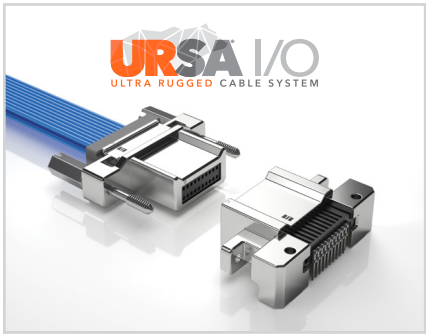
200 A High Current Power Posts

Ultra Rugged Solutions

- Reliability and flexibility in small form factors for extreme applications, including military, aerospace and submersible
- URSA® I/O 1.00 mm pitch system with up to 80 Hyper Claw™ micro hyperboloid contacts for 3.8 A max; rugged EMI shielding, captive panel screws and strain relief (slim latching option); power, RF/SMPM and high-speed combos available
- NovaRay® I/O with rugged 38999 shell is salt fog resistant to 48 hours and IP67 rated for dust and water; threaded cable-to-panel design using Flyover® technology
- FireHawk® mid-board optical transceivers feature the industry's smallest footprint - 10 x 7.7 x 4.4; Rad Hard design withstands the vibrations and radiation for space and satellite applications
- FireFly™ rugged mid-board optical transceivers with a -40 °C to +85 °C extended temp; parylene conformal coating for exposed applications
- SureWare™ ultra rugged hardware assists with "blind mate" and reduces the risk of component damage
- VITA™ 90 VNX+™ solution configured with RF backplane, SEARAY™ right-angle array and rugged optics
- Severe Environment Testing (SET) qualified products; see pages 36-37



SUREWARE™ guide post with built-in grounding pin for first mate/last break (FMLB) applications; 500 mating cycles









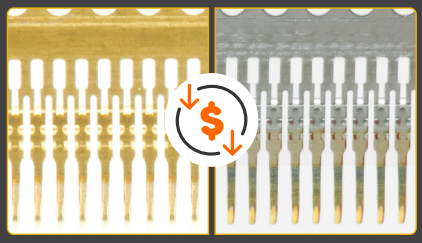




SURECOAT™

- Ultra rugged coatings for increased reliability in high-temp and harsh environments
- **Silver -Ax Plating**: patented electroplating method ideal for lower normal force contact systems
- **-P Plating**: selective gold flash and palladium nickel plating ideal for high temp (+150 °C) and high cycle (~5,000)
- **High Cycle Super Lube** (Roadmap): ultra rugged contact lubricant for extreme mating cycles

Visit **samtec.com/surecoat**



Ultra Rugged Testing

Severe Environment Testing (SET)

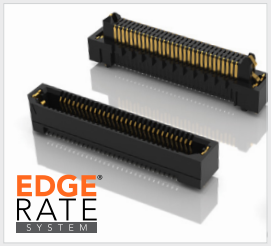
samtec.com/set

Additional testing beyond typical industry standards for performance confidence in military, space, automotive, industrial and other extreme environment applications. Qualified products are Commercial Off-the-Shelf (COTS) and modified COTS for quick-to-market solutions. Visit **samtec.com/SET** or contact **SET@samtec.com** for more information and test results.

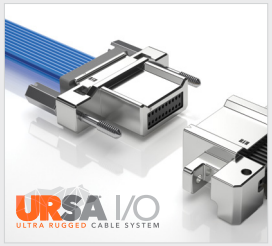
VITA™ Standard		Meets	Exceeds
47.1	Module Insertions	✓	
	Operating Shock Class OS2	✓	
	Vibration Class VS3	✓	
	Electrostatic Discharge Resistance	✓	
	Temperature Cycling Class C4		✓
	Non-Operating Temperature Class C4		✓
	Altitude for DWV		✓
47.3	Humidity	✓	

Qualified Series	Pitch	Type
LSHM	0.50 mm	Razor Beam™ Hermaphroditic Strips
UDF6/UDM6	0.635 mm	AcceleRate® mP Signal/Power Arrays
ERF8/ERM8	0.80 mm	Edge Rate® Rugged, High-Speed Strips
SEAF8/SEAM8	0.80 mm	SEARAY™ 0.80 Ultra-High Density Arrays
B1SDT/P1M	1.00 mm	URSA® I/O Ultra Rugged Cable System
SEAF/SEAM	1.27 mm	SEARAY™ High-Density Arrays
SFM/TFM/SFSDT	1.27 mm	Rugged Tiger Eye™ Connectors/Cable
FTSH/CLP	.050"	Flexible Stacking Header & Socket
S2M/T2M	2.00 mm	Tiger Eye™ Micro Rugged System
UMPS/UMPT	2.00 mm	mPOWER® Ultra Micro Power Connectors
SSM/TSM	.100"	Square Post Header & Socket











Upscreen Testing

This program provides assurance for upscreening board-to-board interconnects for mission-critical applications. Two levels of rigorous testing are offered: Lot Screen Testing and Qualification Conformance Inspection (QCI). Contact **map@samtec.com** or visit **samtec.com/mil-aero** for details.

NASA-Aligned Solutions

SET products are approved for NASA Class D missions including LEO satellites, SmallSats, CubeSats and other space exploration applications. NASA outgassing data is used to determine if certain products meet ASTM E595-77/84/90 test requirements. Visit **outgassing.nasa.gov**.

Testing Options	Lot Screen Testing	QCI
Visual & Mechanical Inspection	✓	✓
Mating/Unmating Forces	✓	✓
Low Level Contact Resistance	✓	✓
Insulation Resistance	✓ (Pin-to-Pin & Row-to-Row)	✓ (Pin-to-Pin, Row-to-Row & Closest Metallic Hardware)
Dielectric Withstanding Voltage	✓ (Sea Level)	✓ (Sea Level & High Altitude)
Solderability	✓	✓
Contact Resistance	✓	✓
Mechanical Shock		✓
Random Vibration		✓
Extended Life		✓ (Plating Thickness Verification, Mating Cycle, Thermal Shock & Humidity)
Workmanship		✓

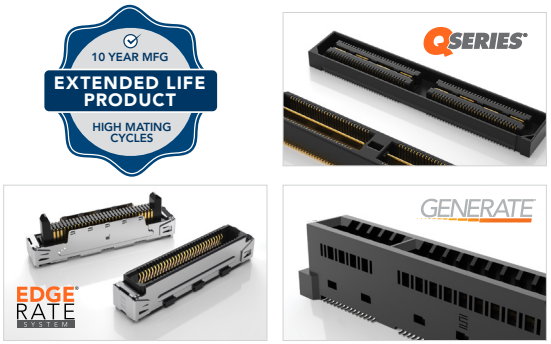
Extended Life Product™ (E.L.P.™)

samtec.com/ELP

E.L.P.™ products are tested to rigorous standards, which evaluate contact resistance in simulated storage and field conditions.

- 10 year Mixed Flowing Gas (MFG)
- High Mating Cycles (250 to 2,500)
- Certain plating and/or contact options will apply

For complete details about Samtec's E.L.P.™ program, a list of qualifying products and test results, please visit **samtec.com/ELP** or email the Customer Engineering Support Group at **ASG@samtec.com**



Design Qualification Testing

All Samtec series undergo Design Qualification Testing (DQT), which includes:

- Gas Tight
- Normal Force
- Thermal Aging
- Mating/Unmating/Durability
- IR/DWV
- Current Carrying Capacity (CCC)
- Mechanical Shock/Random Vibration/LLCR
- Mechanical Shock/Random Vibration/Event Detection



Testing Reference Chart

TEST	SET	E.L.P.™	DQT
Gas Tight	✓*	✓*	✓
Normal Force	✓*	✓*	✓
Thermal Aging	✓*	✓*	✓
Mating / Unmating / Durability (240 Hrs)	✓ (100% RH, 250 Cycles)	✓* (90-98% RH, 100 Cycles)	✓ (90-98% RH, 100 Cycles)
IR / DWV	✓ (At Altitude of 70,000 Feet)	✓*	✓
CCC	✓*	✓*	✓
Mechanical Shock / Random Vibration / LLCR & Nanosecond Event Detection	✓ (40 G Peak, 11 ms, Half Sine & 12gRMS, 5 - 2,000 Hz, 1 Hr / Axis)	✓* (100 G Peak, 6 ms, Half Sine & 7.56gRMS Avg, 2 Hr / Axis)	✓ (100 G Peak, 6 ms, Half Sine & 7.56gRMS Avg, 2 Hr / Axis)
Temperature Cycling (500 Cycles)	✓	N/A	N/A
Non-Operating Class Temperature	✓	N/A	N/A
Electrostatic Discharge (ESD)	✓	N/A	N/A
10 Year MFG (Mixed Flowing Gas)	N/A	✓	N/A
Mating Cycles (250 to 2,500)	N/A	✓	N/A

* Completed as part of initial Design Qualification Testing (DQT). E.L.P.™ and SET testing are performed in addition to DQT.



Flexible Stacking Solutions

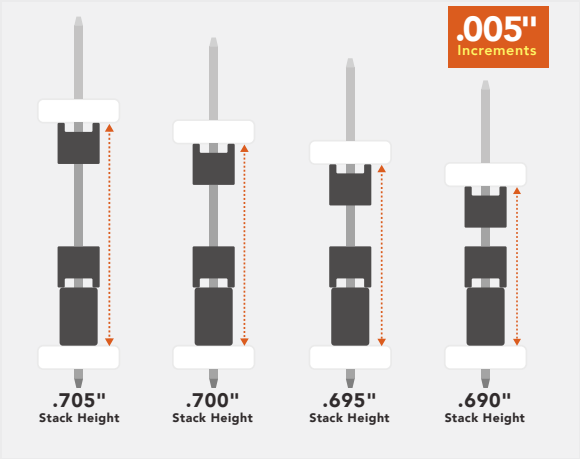
With the largest variety of board-to-board interconnects, Samtec makes it easy to find board stackers for any application. Header and socket systems are available in a variety of pitch, density, stack height, orientation and many more standard or custom options.

Flexible Stacking Solutions

samtec.com/flex-stacking

Incredible Flexibility

- Post height: Adjustable in .005" (0.13 mm) increments
- Body positions: Adjustable in .005" (0.13 mm) increments
- Board stacking distance: 1.65 mm (.065") – 48.51 mm (1.910")
- Number of pins: 2-300
- Number of rows: 1-6



Variety of Pitches

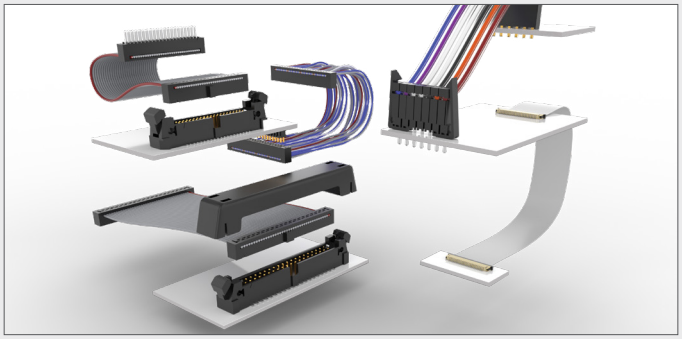
- 0.80 mm (.0315")
- 1.00 mm (.0394")
- .050" (1.27 mm)
- .050" x .050" (1.27 x 1.27 mm)
- .050" x .100" (1.27 x 2.54 mm)
- 2.00 mm (.0787")
- .100" (2.54 mm)
- .156" (3.96 mm)
- .200" (5.08 mm)

Customizable

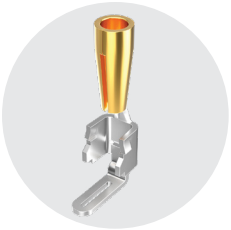
- Mix-and-match headers and sockets to find the right solution.
- Quick and easy custom parts are available. Contact **asp@samtec.com**

Mating IDC Cable Assemblies

- Tiger Eye™ contacts
- Flexible flat ribbon
- Molded-to-position
- Flat Flexible cable (FFC)
- Space saving designs
- Choice of socket or plug, single or double ended, twisted or flat cable

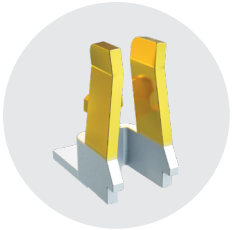


Variety of Contacts



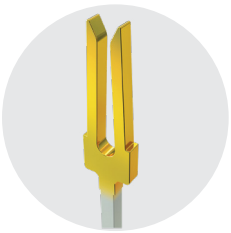
Tiger Eye™ Contact

- High-reliability
- High mating cycles
- Multi-finger contact



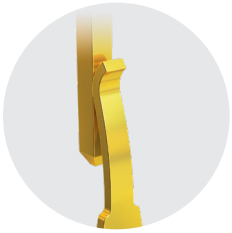
Tiger Claw™ Contact

- Pass-through
- Ultra-low profile
- Dual wipe contact



Tiger Buy™ Contact

- High-retention
- Cost-effective
- Tuning fork contact

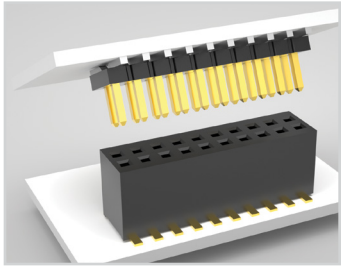


Tiger Beam™ Contact

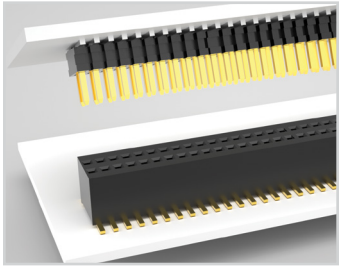
- Best cost
- Reliable performance
- Post & beam contact

Variety of Orientations/Applications

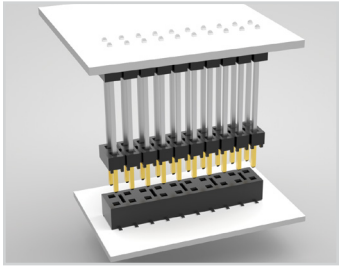
- For a list of popular series and specifications, see page 40
- Standard profile offers the largest variety, low profile saves space and elevated profile provides clearance for improved air flow
- Right-angle connectors increase design flexibility
- Space saving, bottom entry connectors provide access to components when mated
- Pass-through solutions connect three or more boards
- Self-nesting sockets with square post tails for PC/104™ and PC/104-*Plus*™ applications
- Ruggedizing features: locking clips, board locks, guide posts, alignment pins, shrouded, polarized and keyed
- Tail options: surface mount, through-hole, mixed technology and press-fit
- SI Lite rugged solutions rated for up to 8 Gbps high-speed signals; visit **samtec.com/si-lite**
- Severe Environment Testing (SET) and Extended Life Product™ (E.L.P.™) qualified solutions; see pages 36-37 for details
- Flex Stacking Solutionator®: quickly build a mated set for your specific applicaiton. Visit **samtec.com/flex-solutionator**



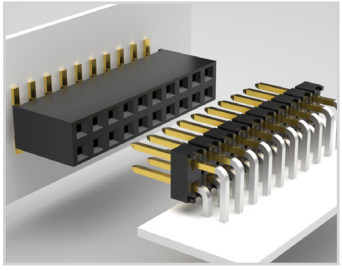
Standard



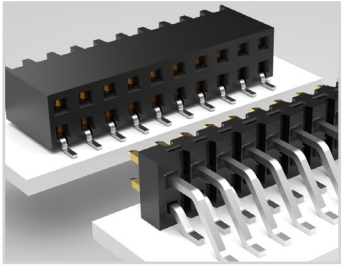
Low Profile



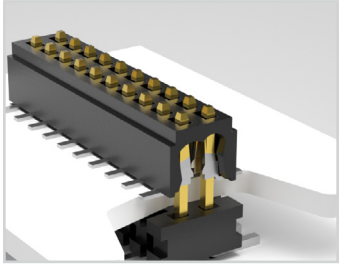
Elevated



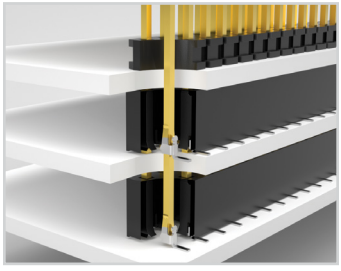
Right-Angle



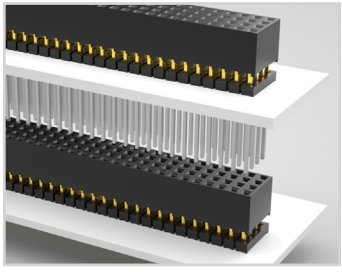
Coplanar



Bottom Entry



Pass-Through



Self-Nesting

Flexible Stacking

Reference Chart of Popular Series

SERIES		FSI	SEI	SIB	CLE	FTE	CLM	FTMH/FTM	MLE	MW
Pitch		1.00 mm (.0394")		.100" (2.54 mm)	0.80 mm (.0315")		1.00 mm (.0394")			
Orientation		V				V & RA	V	V & RA	V	
Board Stacking (mm)	min	3	1.65	3.8	5	5	3.48		4.57	4.62
	max	10			9.14		8.43	5.11	9.27	
Contact System					Tiger Beam™		Tiger Claw™		Tiger Beam™	
Mates		One-Piece			FTE, AW	CLE	FTM, FTMH, MW	CLM, MLE	FTM, FTMH, MW	CLM, MLE

SERIES		CLP	FLE	FTS	FTSH	FW	SOLC	TOLC	DWM/ HDWM	FTR	RSM	SLM
Pitch		.050" x .050" (1.27 mm x 1.27 mm)							.050" x .100" (1.27 mm x 2.54 mm)			
Orientation		V & RA	V		V & RA	V						
Board Stacking (mm)	min	3.53	5.82	3.53	5.18	7.72	6.35		9.65	9.78		7.11
	max	17.75	19.15	5.82	7.49	19.15	12.00		22.99	14.73	19.69	19.43
Contact System		Tiger Claw™	Tiger Beam™				Tiger Buy™					Tiger Buy™
Mates		FTSH, FTS, FW		CLP, FLE			TOLC	SOLC	SMS, SLM, RSM		FTR, (H)DWM, TML, ZML, (H)TMS	(H)TMS, (H)MTMS, (H)DWM, FTR

SERIES		MMT	TMM/ MTMM	TMMH	TW	ZLTMM	CLT	ESQT/ -368	MMS	SMM	SQT	SQW	TLE
Pitch		2.00 mm (.0787")											
Orientation		RA	V & RA		V				V & RA	V	V & RA	V	
Termination		SMT & MT	T/H & SMT			T/H	T/H & SMT	T/H	T/H & SMT	SMT	T/H	T/H & SMT	SMT
Board Stacking (mm)	min	2	3.63	4.14	7.49	7.62	3.63	9.37	5.94	6.07	7.85		6.99
	max	4	18.87	22.07	43.31	13.34	4.98	43.31	19.81	17.78	29.59		17.53
Contact System							Tiger Claw™	Tiger Buy™	Tiger Claw™	Tiger Eye™	Tiger Buy™		Tiger Beam™
Mates		CLT, SQT, SQW, ESQT, TLE, SMM, MMS				SQT, SQW, ESQT, SMM	(M)TMM, TMMH, MMT, TW, TSH	TMMH, (M)TMM, MMT, TW, (Z)LTMM, ESQT, PTT, TSH, TMMS, PTHF	TMMH, (M)TMM, MMT, TW, (Z)LTMM, TSH	(M)TMM, TMMH, MMT, (Z)LTMM, TW, PTT	TMMH, (M)TMM, MMT, TW, (Z)LTMM, PTT, ESQT, TSH	TMMH, (M)TMM, MMT, TW, TSH, (Z)LTMM, PTT	TMMH, (M)TMM, MMT, TW, (Z)LTMM, TSH

SERIES		DW, EW, ZW	HW	MTSW/ HMTSW	TLW/ MTLW	TSM	TSW/ HTSW	BCS	ESW, ESQ	HLE	SSM	SSQ	SSW
Pitch		.100" (2.54 mm)											
Orientation		V		V & RA					V		V & RA		
Termination		T/H	T/H & SMT	T/H		SMT & MT	T/H		T/H & SMT		SMT	T/H	T/H & SMT
Board Stacking (mm)	min	13.59	10.03	7.24	6.1	7.47	7.87	9.02	13.59	7.47	11.18	10.03	
	max	48.51	30.73	46.36	20.96	14.48	35.69	18.92	48.51	26.16	30.1	38.35	
Contact System								Tiger Claw™	Tiger Buy™	Tiger Beam™	Tiger Claw™	Tiger Buy™	
Mates		SSW, SSQ, ESW, ESQ, CES, SLW, BSW, BCS, SSM, HLE, PHF		SSW, SSQ, ESW, ESQ, BCS, BSW, CES, SLW, HLE, SSM	BSW, CES, SLW, HLE	SSW, SSQ, SSM, BSW, ESW, ESQ, BCS, SLW, CES, HLE	SSW, SSQ, SSM, ESW, ESQ, BCS, BSW, CES, SLW	(H)TSW, (H)MTSW, TSS, ZSS, DW, EW, ZW, HW, TSM, MTLW, PHT	(M)TSW, EW, MTLW, (H)TSS, ZSS, TSM, DW, ZW, HW, TSSH	(M)TSW, DW, EW, ZW, (M)TLW, TSM, HW	(M)TSW, TST, TSS, ZST, ZSS, DW, EW, ZW, TSM, HMTSW, HTSW, TSSH, BST, HTSS, (M)TLW	TSW, MTSW, MTLW, EW, ZW, TSS, ZSS, TSM, TSSH, HTSS	(H)TSW, (H)MTSW, MTLW, EW, ZW, TSS, HTSS, ZSS, TSM, TSSH, DW, HW



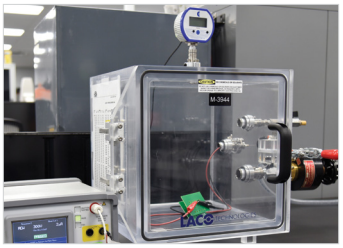
Modified & Custom Solutions

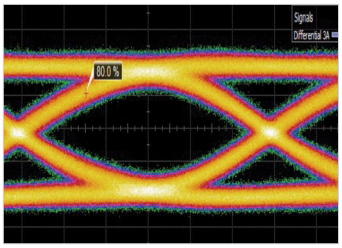
With dedicated Application Specific Product engineers and technicians, Samtec is open to customizing interconnects spanning every product category we offer, which includes both simple modifications as well as completely new and custom designs.

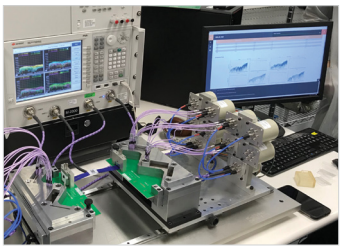
Industry-Leading Support & Expertise

samtec.com/custom

- Full engineering, design and prototype support
- Design, simulation and processing assistance
- Dedicated Application Specific Product engineers and technicians
- Industry-leading Customer Service
- Quotes and samples turned around in 24 hours
- Flexible, quick-turn in-house manufacturing
- Customer specific testing - AS9102 FAIs available
- ITAR compliant with U.S. based manufacturing
- Contact the Application Specific Products Group at **asp@samtec.com** to discuss your application



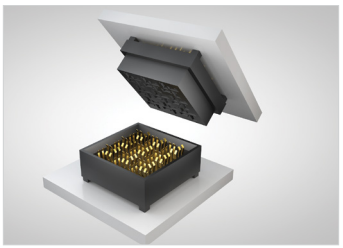






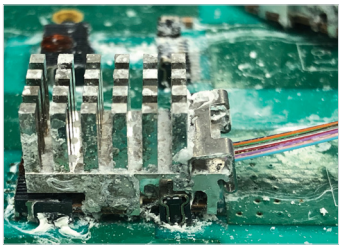
Express Modifications & Engineered Customs

- Up to 50 µ" Gold and Tin Lead plating available
- Polarized positions
- Modified stack heights, latching and screw downs
- Modified contacts, bodies, stamping, plating, wiring, molding and much more
- Ruggedizing features including strain relief, plastic housings, screw downs, latches, locks, etc.
- Mix-and-match cable end options for application specific requirements
- Many non-cataloged cable standards available, including 75 Ω micro coax & high-density twinax solutions
- Solutions for Optics in extreme environments: parylene conformal coating, mitigation for tin whiskers, fungal resistance, extreme shock and vibration, full support for liquid immersion cooling









Evaluation & Development Kits

From concept and prototype to development and production, Samtec-designed Evaluation and Development Kits simplify the design process and reduce time to market. Kits are available for many of our high-performance connector sets, standard high-speed cable assembly, precision RF and optical configurations. Custom kits are also available via our "mix-and-match" design approach. Visit **samtec.com/kits** or contact **kitsandboards@samtec.com** for a current list of kit availability.

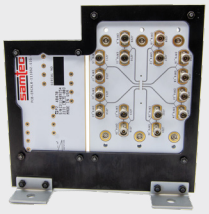
SI Evaluation Kits: Board-to-Board



Generate® 0.60 mm Pitch High-Speed Edge Card (HSEC6-DV)



Generate® Differential Pair Edge Card (HSEC8-DP)



Edge Rate® 0.635 mm Pitch High-Speed Strips (ERM6/ERF6)



AcceleRate® mP Signal/ Power Arrays (UDM6/UDF6)



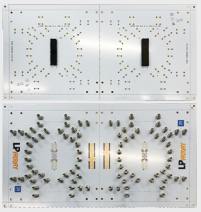
AcceleRate® HP High-Performance Arrays (APM6/APF6)



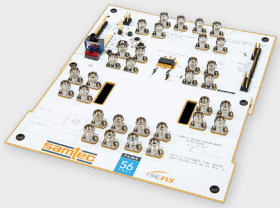
AcceleRate® HD High-Density Arrays (ADM6/ADF6)



NovaRay® Extreme Density Arrays (NVAM/NVAF)



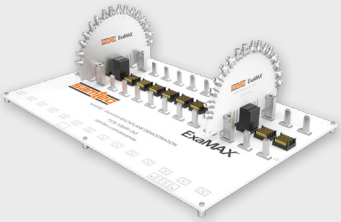
LP Array™ Low Profile Arrays (LPAM/LPAF)



FireFly™ 20+ Gbps Edge Card Socket (UEC5-2)



SEARAY™ High-Density Arrays (SEAM/SEAM-RA & SEAF/SEAF-RA)

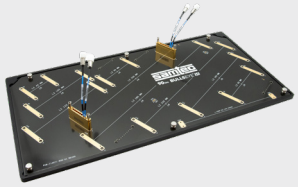


ExaMAX® High-Speed Backplane Traditional Connectors (EBTF/EBTM)

Precision RF/Analog Over Array™ Evaluation Kits



Bulls Eye® 50 & 70 GHz High-Performance Test Systems (BE40A & BE70A)



Bulls Eye® ISI Eval Board for 224G PAM4/448G PAM6 SerDes Validation



SEARAY™ Analog Over Array™ Digital/Analog/Power Connectors (SEAM/SEAF, SEAM8/SEAF8)



Vertical Compression Mount Precision RF Connectors (1.35/1.85/2.40/2.92 mm)

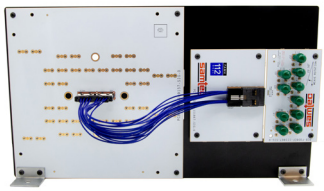
SI Evaluation Kits: Cable



Flyover® QSFP Cable System (FQSFP to ARC6 and other End 2 options)



Flyover® QSFP Double Density Cable System (FQSFP-DD to ARC6)



Flyover® QSFP 800G Double Density Cable System (FQSFP-D8 to CPC)



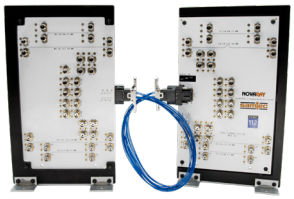
Flyover® SFP Cable System (FSFP to ARM6)



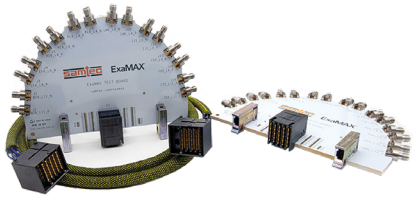
Si-Fly® HD Co-Packaged & Near-Chip Cable System (SFNC/SFNM)



Si-Fly® LP Low Profile Cable System (CPC/CPI)



NovaRay® Micro Rugged Backplane Cable System (NVCF/NVBM)



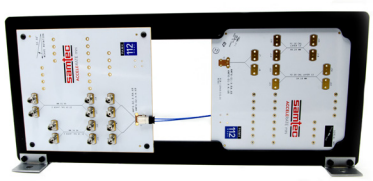
ExaMAX® Backplane Cable System (EBCM/EBTF-RA)



AcceleRate® Slim Flyover® Cable System (ARC6/ARF6)

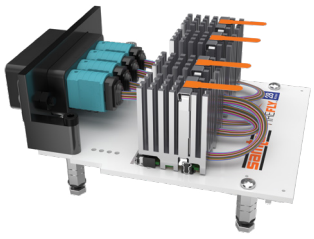


AcceleRate® HP Flyover® High-Performance Cable System (ARP6/APF6-L)

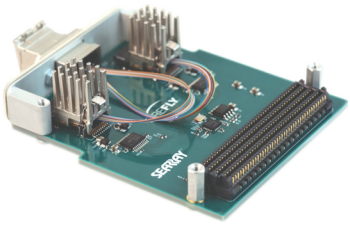


AcceleRate® Mini Flyover® Small Form Factor Cable System (ARM6/AMF6)

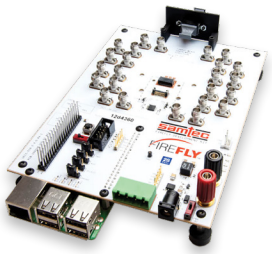
Optics/ FPGA Development Kits



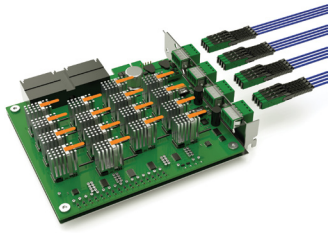
25/28 Gbps FireFly™ FMC+™ Kit



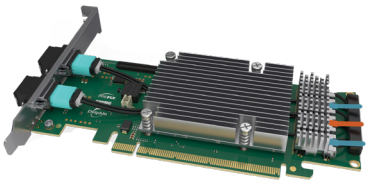
14 Gbps FireFly™ FMC™ Kit



28 Gbps FireFly™ Kit



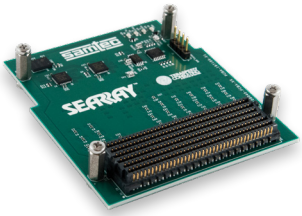
FireBlade™ FireFly™ OCP OAI EXP Module (ECUO/UCC8/UEC5-2)



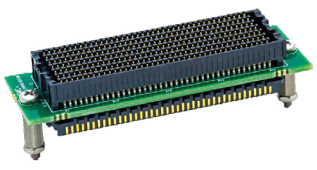
PCIe®-Over-Fiber Adaptor Card (PCUO/PCOA)



10/25 Gbps FireHawk® Kits



VITA™ 57.4 FMC+™ HSPC & HSPC/HSPCe Loopback Cards



VITA™ 57.1 FMC™ & VITA™ 57.4 FMC+™ Extender Cards

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