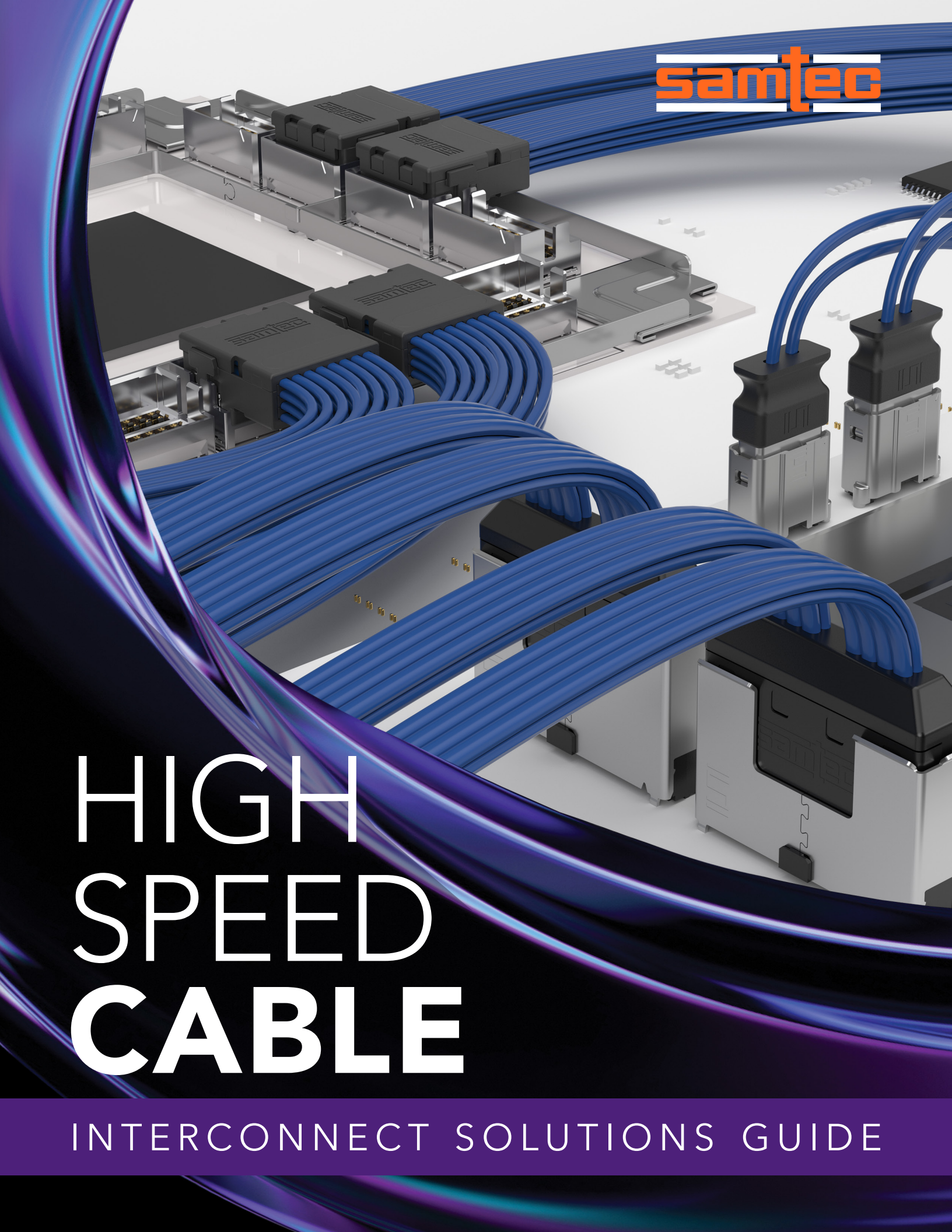




samtec

HIGH SPEED CABLE

INTERCONNECT SOLUTIONS GUIDE

HIGH-SPEED CABLE SOLUTIONS

Samtec High-Speed Cable Systems deliver performance, reliability and design flexibility for panel, mid-board and backplane applications, including complex next gen architectures. Innovative design solutions and proprietary technologies enable extreme density and ultra-high performance to 224 Gbps with a path to 448 Gbps. In-house cable development, manufacturing and assembly allow for unmatched design flexibility to support any application.

FLYOVER[®] TECHNOLOGY

Improves Signal Integrity & Extends
Reach at Next Gen Data Rates

High-Performance/High-Density
Designs for Panel, Mid-Board and
Backplane Applications

Industry-Leading System Design &
Engineering Support

FLEXIBILITY & CUSTOMIZATION

Mix & Match Connector Options

Extensive Customization Capabilities

Quick-Turn Express Modifications

Modular Backplane Flexibility

CABLE DESIGN & MANUFACTURING

Multiple Global Cable Fabrication
and Assembly Facilities

Design, Fabrication and
Manufacturing of Precision Extruded
Cable & RF Cable

Proprietary Ultra-High Performance
Cable Technologies

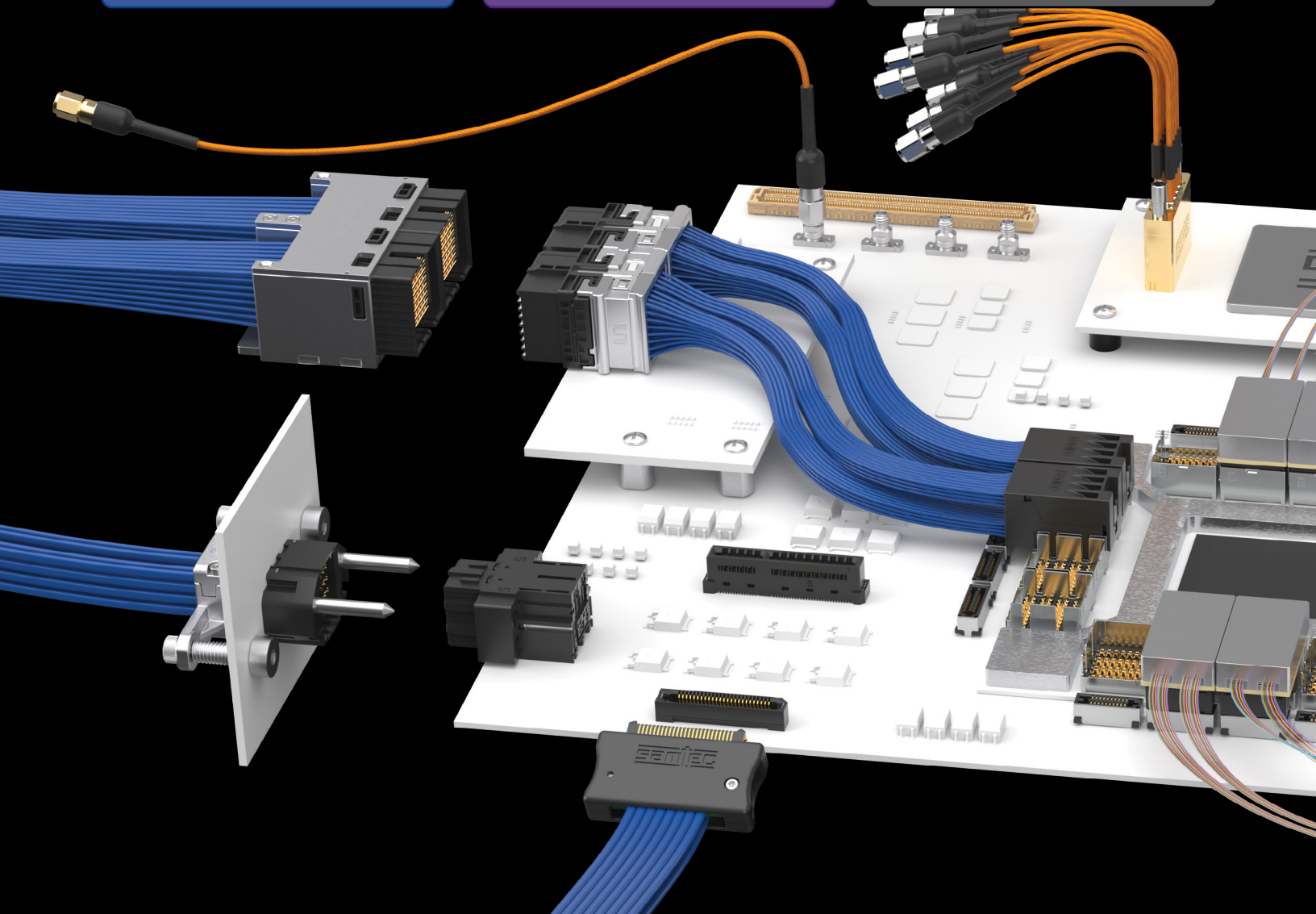


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- Optics & RF Solutions

6 Flyover® Systems

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- Panel, Mid-Board & Backplane Systems
- Eye Speed® Cable Technology
- Cable Testing & Manufacturing Capabilities

18 High-Speed Cable

- Mix & Match High-Speed Cable Assemblies
- Customs & Express Modifications

20 Advanced Optics

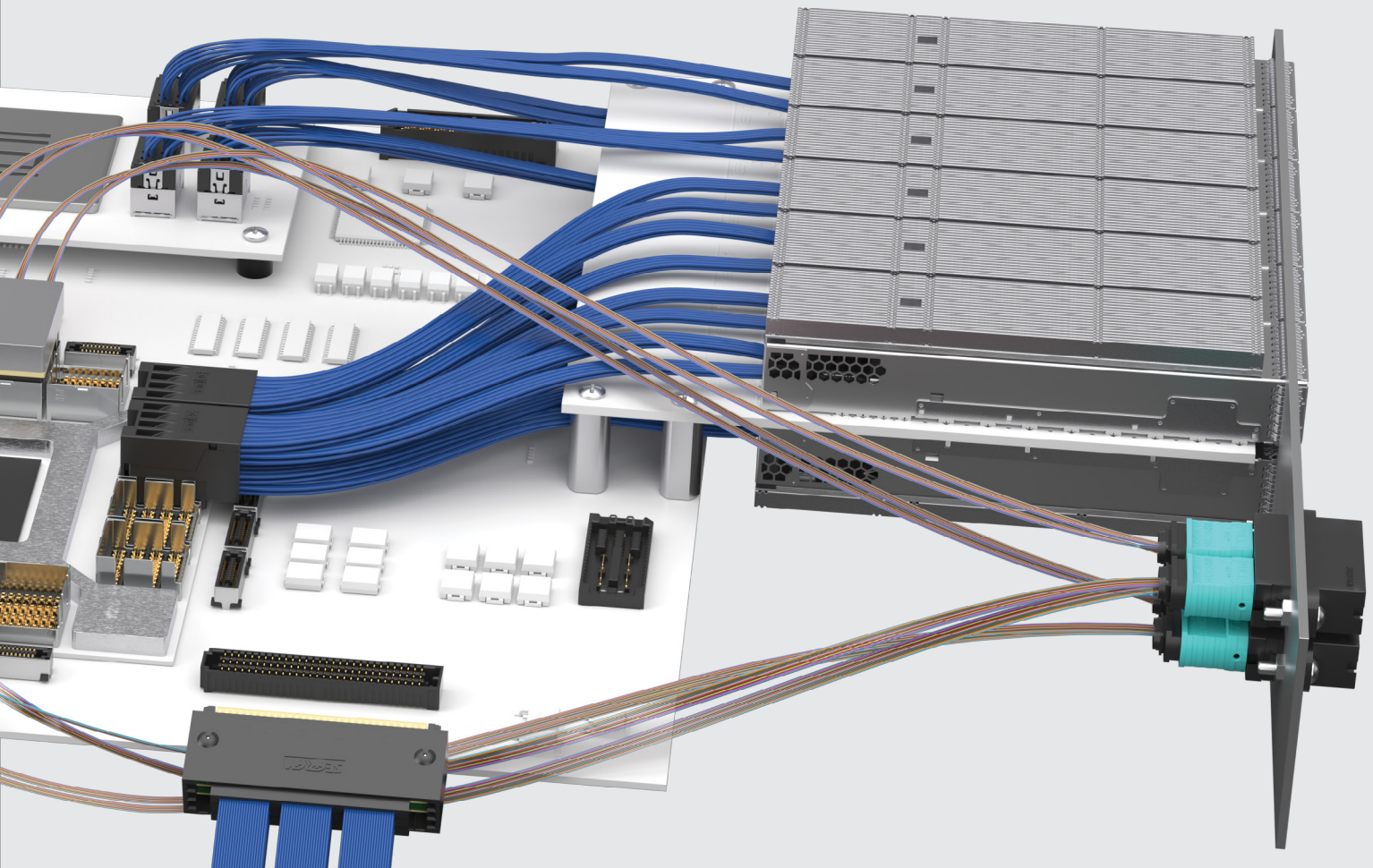
- FireFly™ Micro Flyover System™
- FireHawk® Space-Grade Optics

21 Precision RF Solutions

- Bulls Eye® RF High-Performance Test
- Precision RF Systems
- Nitrowave® High-Performance Microwave Cable Assemblies

22 Sudden Service®

- Global Support & Online Tools
- Integration Leads to Innovation



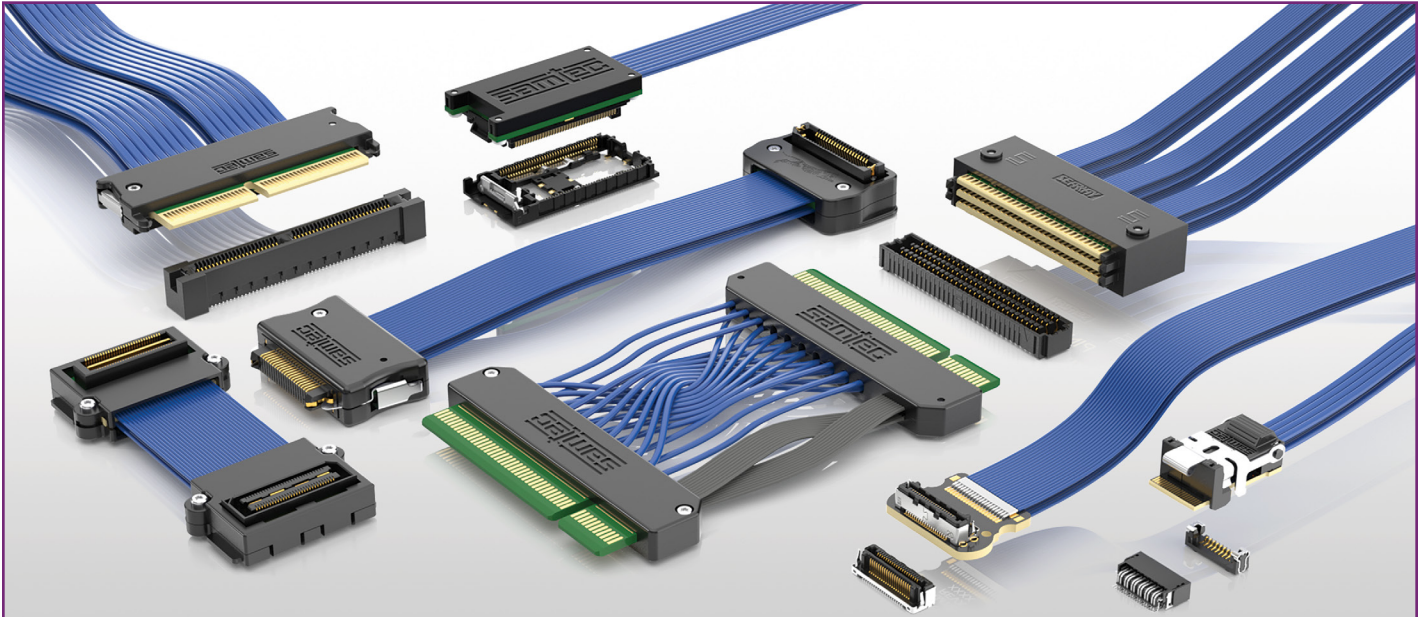
HIGH-SPEED CABLE PRODUCT OVERVIEW



PANEL ASSEMBLIES	
MID-BOARD ASSEMBLIES	
BACKPLANE ASSEMBLIES	

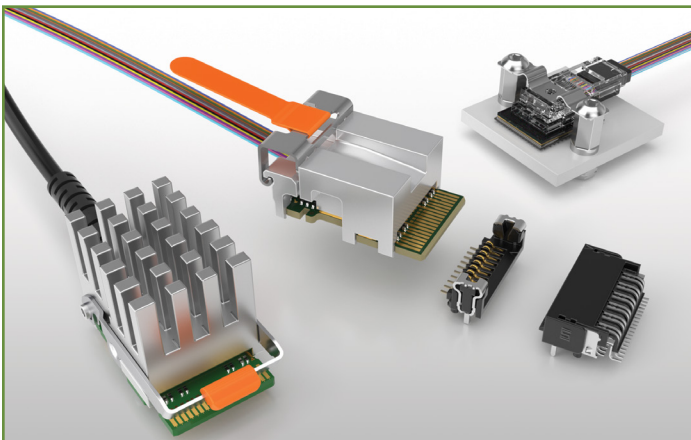
FLYOVER® SYSTEMS | 6-17

224 Gbps PAM4 EXTREME PERFORMANCE & PATH TO 448 Gbps | INDUSTRY'S HIGHEST DENSITY | CO-PACKAGED & NEAR-CHIP
CABLE-TO-CABLE, CABLE-TO-BOARD & CABLE-TO-PANEL | ULTRA (3.5 ps/m max) & HYPER (1.75 ps/m max) LOW SKEW TWINAX CABLE



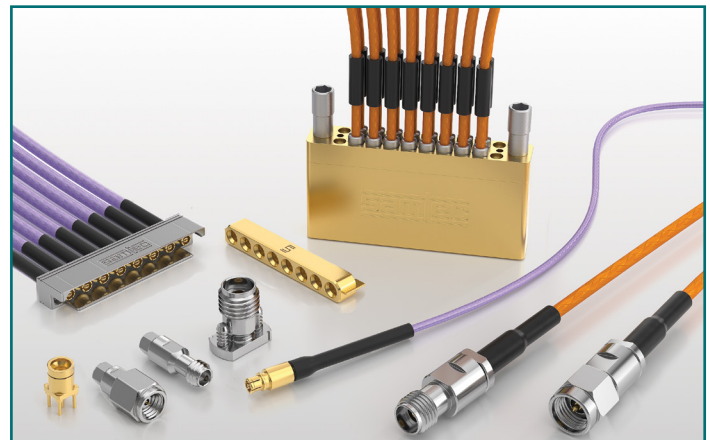
HIGH-SPEED CABLE ASSEMBLIES | 18-19

MICRO COAX & TWINAX CABLE | MIX-AND-MATCH END OPTIONS | ARRAYS, GROUND PLANE & EDGE CARD SYSTEMS
PCIe[®] 2.0/3.0/4.0/5.0 | EDGE RATE[®] RUGGED, HIGH-SPEED CONTACTS



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FUTURE PROOF | EXTREME ENVIRONMENT | PCIe[®] 3.0/4.0/5.0
RUGGED OPTICAL TRANSCEIVERS



RF SOLUTIONS | 21

TESTING TO 130 GHz | PRECISION RF CABLES & CONNECTORS
NEXT GEN RF CABLE ASSEMBLIES



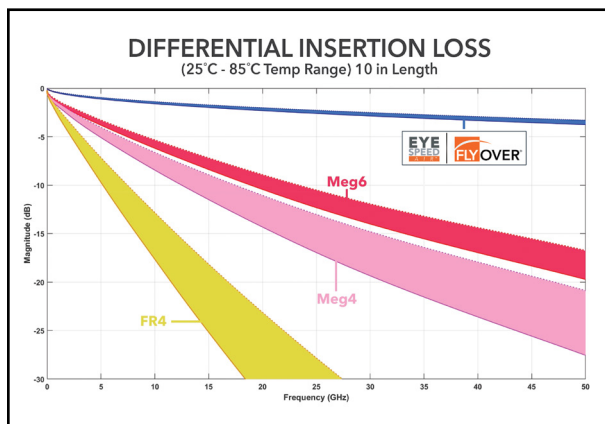
Flyover® Technology

THE PROBLEM

SIGNAL REACH AT NEXT GEN SPEEDS

As bandwidth requirements rapidly increase, effectively managing heat and routing signals through lossy PCBs, vias and other components have become even more complex challenges.

Flyover® Cable Performance Comparison to Traditional High-Speed Materials



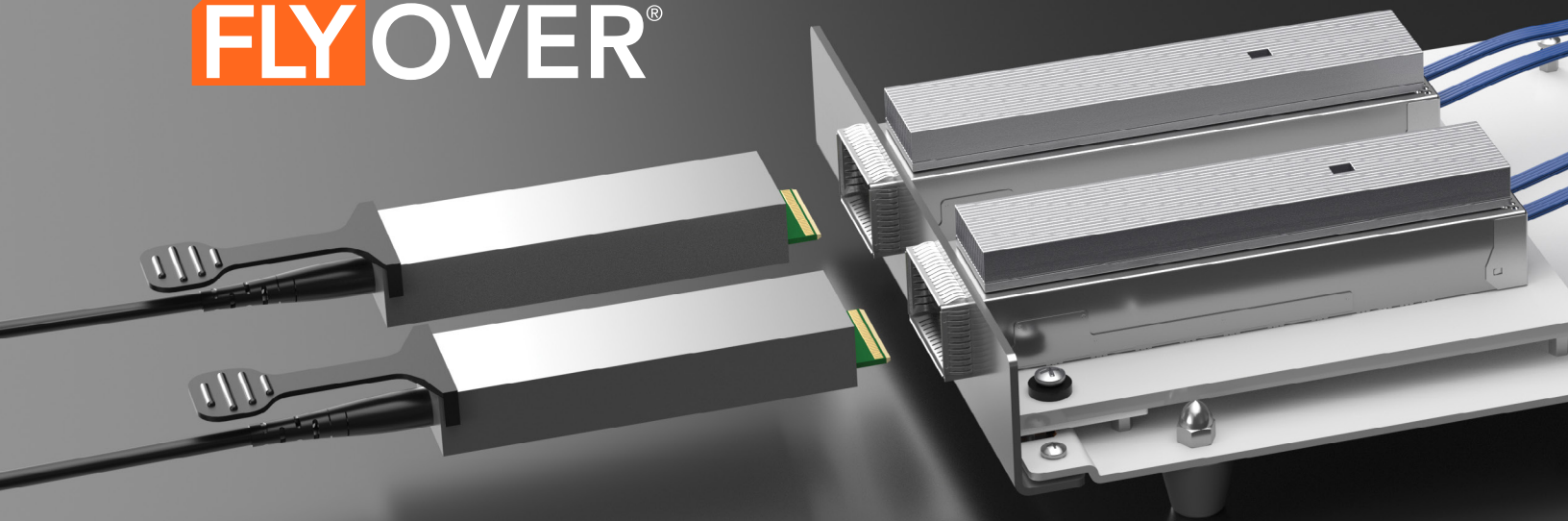
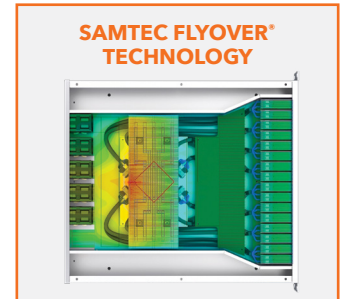
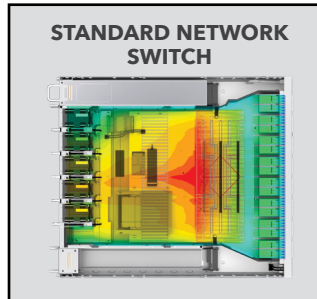
THE SOLUTION

SAMTEC FLYOVER® TECHNOLOGY

Samtec Flyover® breaks the constraints of traditional signaling substrate and hardware offerings, resulting in a cost-effective, high-performance and heat-efficient solution to the challenges of next generation bandwidth requirements.

System Design Advantages

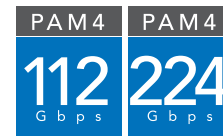
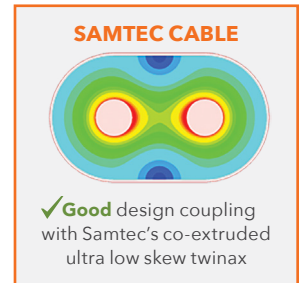
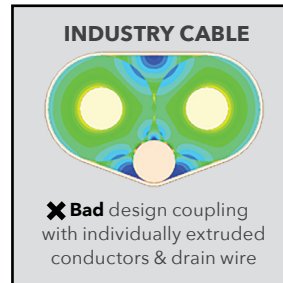
- Up to 224 Gbps PAM4 performance
- Simplifies board layout
- Fewer PCB layers
- Less expensive materials
- Eliminates the need for expensive re-timers
- Thermal efficiencies



Enabling Technology: Eye Speed® Cable

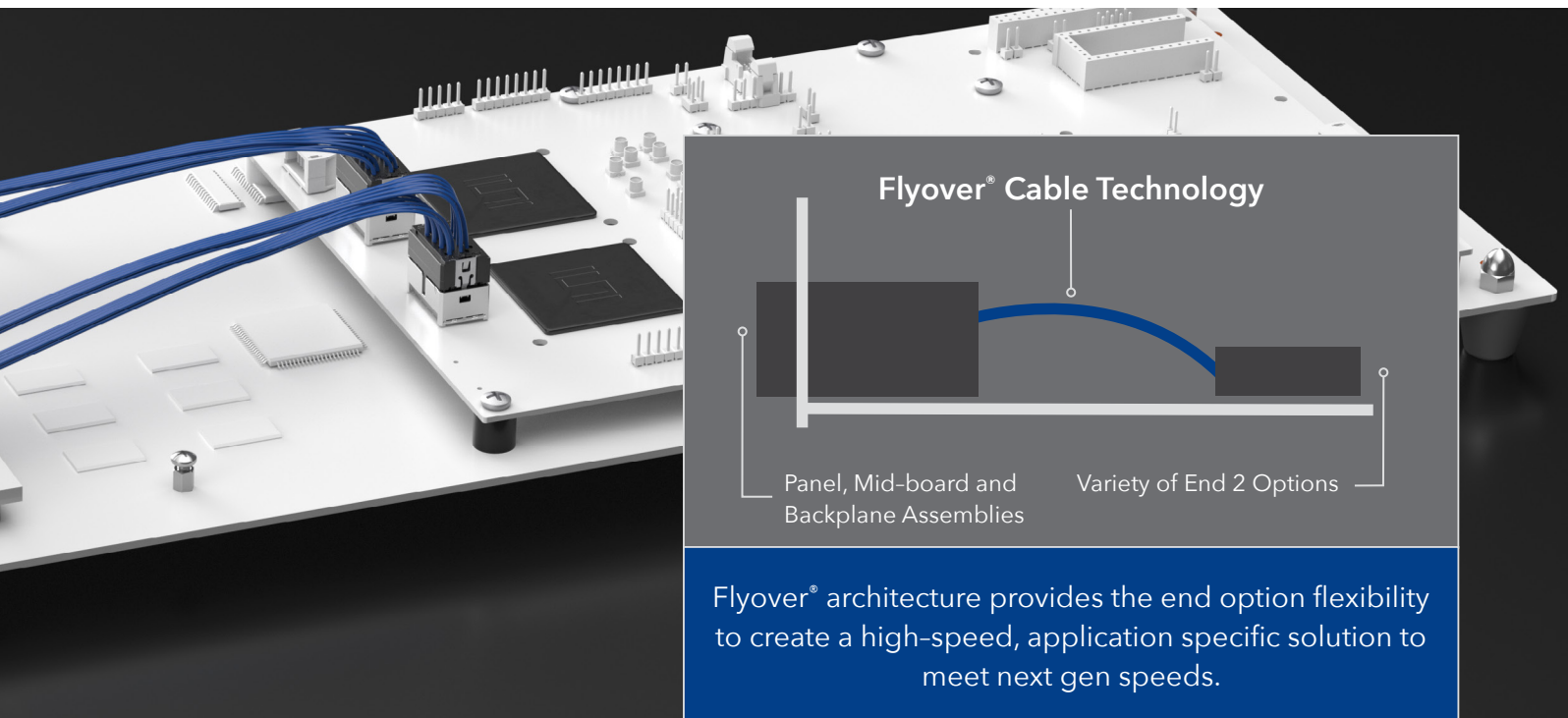
- Ideal for all high-performance applications to 224+ Gbps PAM4 data rates
- Tight coupling between signal conductors
- Ultra low skew twinax 3.5 ps/m max. (intrapair)
- Hyper low skew twinax 1.75 ps/m max. (intrapair)
- Improved signal integrity and eye pattern opening
- Increased bandwidth and reach
- Differential pair, single-ended (Eye Speed ThinSE™) and mixed signaling available
- Taped jacket miniaturizes the cable for easier routing, overall weight reduction and increased air flow (Eye Speed Thinax™ and hyper low skew twinax)
- See page 16 for cable specifications, or visit samtec.com/eyespeed

**EYE
SPEED**
C A B L E



In-house Capabilities & Support

Fully integrated technology teams provide support to enable full system optimization from Silicon-to-Silicon™. See page 17 for information about Samtec's High-Speed Cable Facilities.





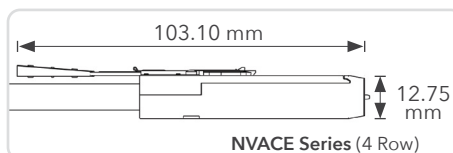
Flyover® Panel Systems



NovaRay® I/O Extreme Performance System (NVACP/NVACE/NVC Series)



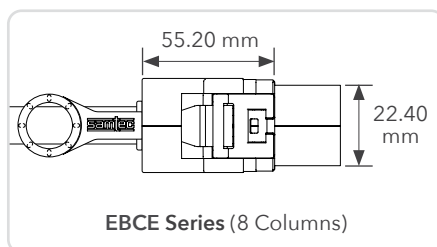
- Up to 4,096 Gbps PAM4 aggregate data from the IC package to the panel and beyond
- Heat sinks are not required, saving panel space
- 28 or 34 AWG ultra low skew twinax, 34 AWG Eye Speed Thinax™ or Eye Speed ThinSE™ cable; see page 16 for specifications
- 16 and 32 differential pair configurations



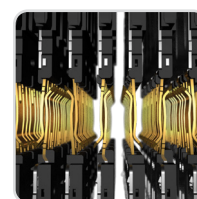
ExaMAX® I/O Shielded Cable System (EBCE/EBTC Series)



- Fully shielded external cable and cage for EMI protection
- Rugged pull latch for mating/unmating
- 24 to 48 differential pairs (4 and 6 pairs, 6 and 8 columns)
- 30 & 34 AWG ultra low skew twinax; see page 16 for specifications



- Single or double port cage for use with ExaMAX® right-angle board connector (EBTM-RA)
- Roadmap: cable-to-cable bulkhead panel connection for increased performance to 112 Gbps PAM4

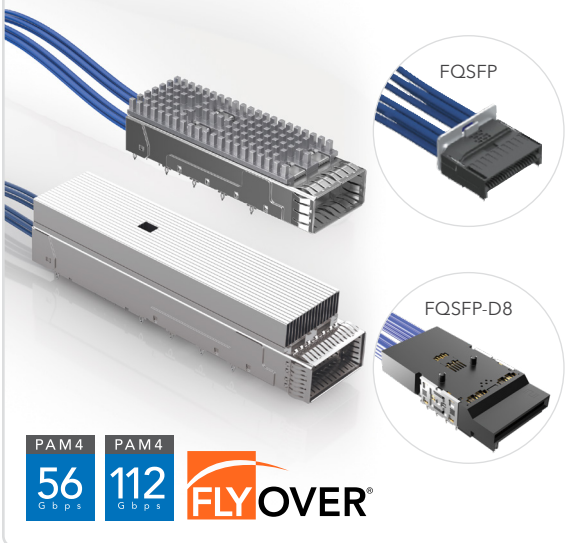


Two reliable points of contact

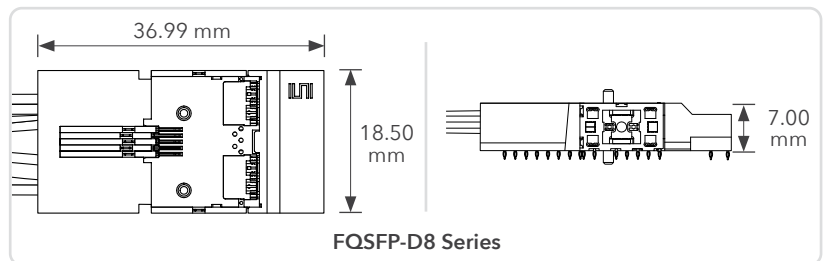


Staggered DP design

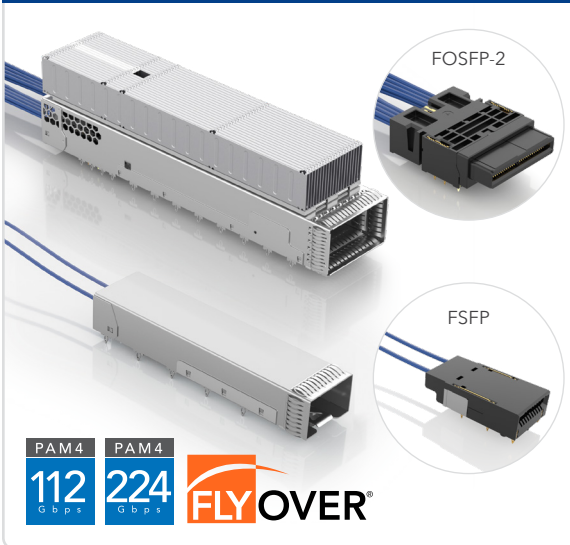
Flyover® QSFP Systems (FQSFP, FQSFP-DD, FQSFP-D8 Series)



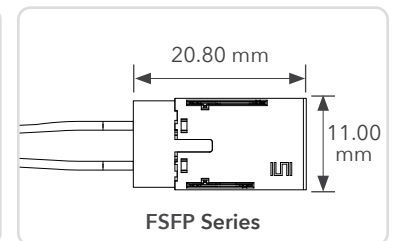
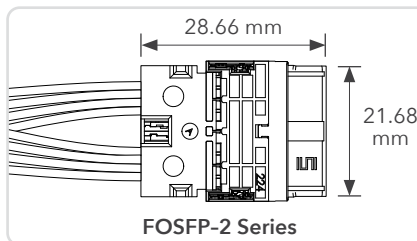
- Up to 800 Gbps PAM4 aggregate data rate (112 Gbps PAM4 per channel)
- 4 channels (x4 bidirectional, 8 pairs) or 8 channels (x8 bidirectional, 16 pairs)
- 34 AWG ultra low skew or Eye Speed Thinax™ twinax cable; see page 16 for specifications
- End 2 options include AcceleRate®, Si-Fly® LP, FireFly™
- Evaluation kits available, visit samtec.com/kits



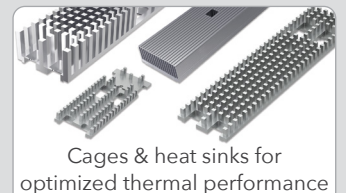
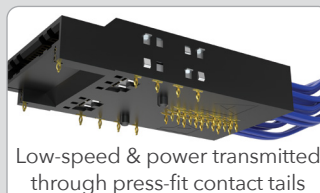
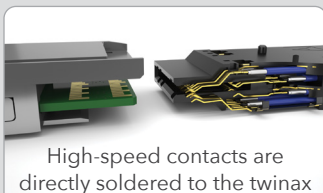
Flyover® SFP & OSFP Systems (FSFP, FOSFP-1, FOSFP-2 Series)



- Up to 1600 Gbps aggregate data rate (224 Gbps PAM4 per channel)
- 34 AWG Eye Speed Thinax™ ultra low skew twinax (FSFP, FOSFP-1); 32 AWG Eye Speed Thinax™ ultra low skew twinax (FOSFP-2); see page 16 for specifications
- End 2 options: AcceleRate® Mini, AcceleRate® HP, Si-Fly® LP, Si-Fly® HD
- Evaluation kits available, visit samtec.com/kits

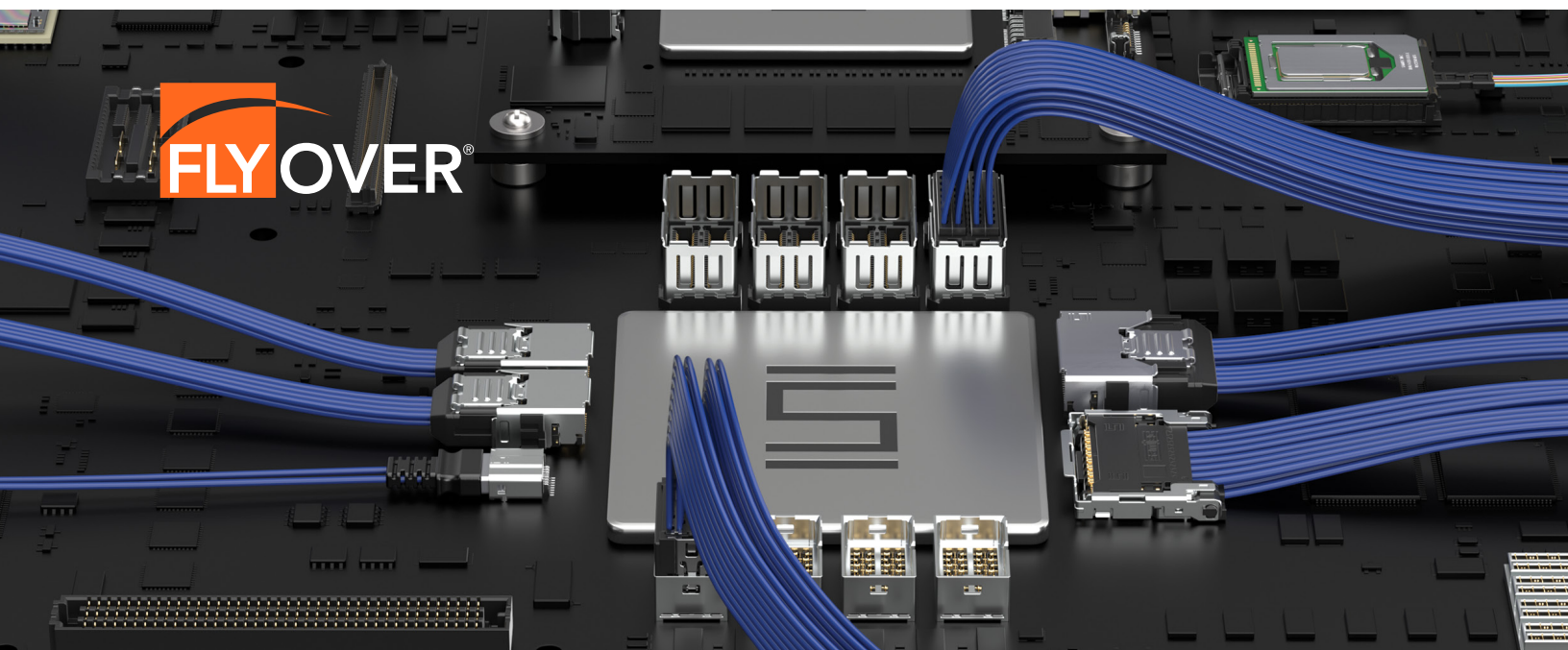


Flyover® QSFP, SFP, OSFP Features & Benefits





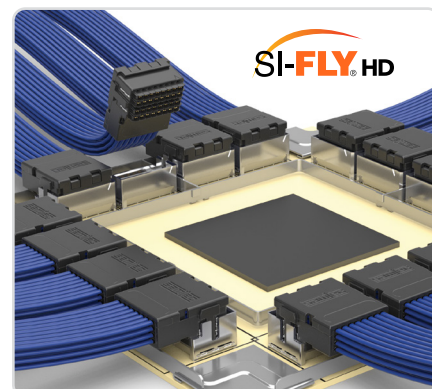
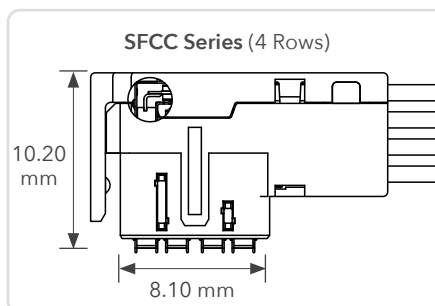
Flyover® Mid-Board Systems



Si-FLY® HD Co-Packaged & Near-Chip Systems (SFCC/SFCM & SFNC/SFNM Series)

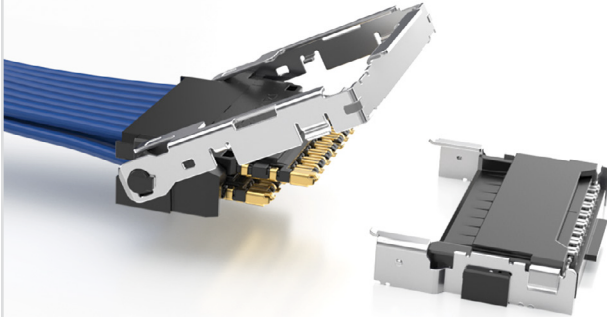


- High-density 224 Gbps PAM4 co-packaged and near-chip (ASIC adjacent) cable systems
- Co-packaged offers the lowest loss signal transmission from the package to the front panel or backplane while providing the highest density (see CPX Application on facing page for additional details)
- Eye Speed® hyper low skew twinax cable technology supports 224G signaling with an industry leading 1.75 ps/m max intra-pair skew; see page 16 for specifications
- Placement of Flyover® cable solutions on, or near, the chip package improves transmission line density and extends signal reach in high-performance applications
- Up to 170 differential pairs per square inch
- Vertical and right-angle cable launch
- Surface mount reflow technology to the substrate (co-packaged) or to the PCB (near-chip)

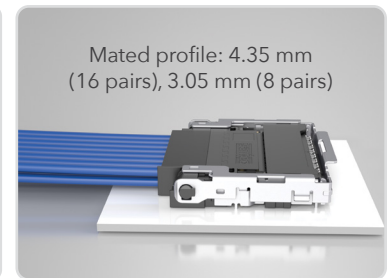
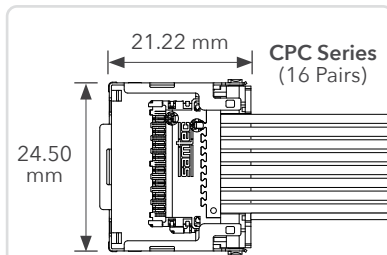


Si-Fly® LP Low Profile Cable System (CPC/CPI Series)

SI-FLY® LP



- Up to 16 pairs in an extremely low 4.35 mm profile for placement adjacent to the IC package, under heat sinks or other cooling hardware
- High-density 8 or 16 pairs for routing 4 or 8 channels
- 112 Gbps PAM4 per lane, up to 1.79 Tbps aggregate data rate
- Eye Speed® 34 AWG ultra low skew or Eye Speed Thinax™ twinax; see pg. 16 for specs
- 8.44 mm minimum height required for mating



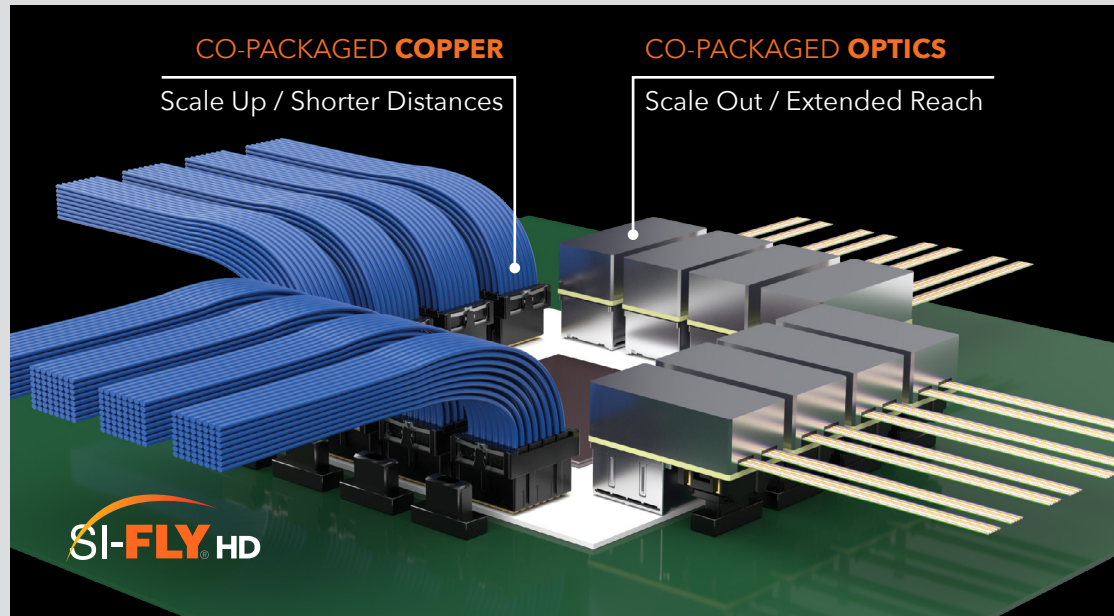
Application: CPX Co-Packaged 224 Gbps PAM4 Solutions

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 DAC 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.



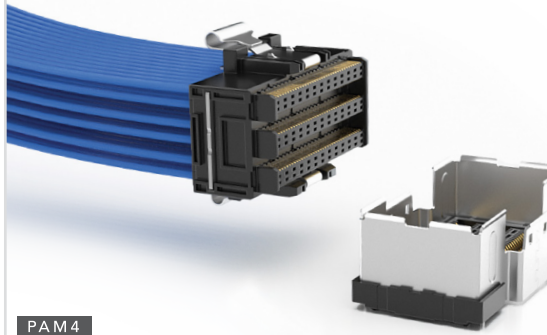
The **Open CPX MSA Standard** defines an interoperable CPO/NPO system based on Si-Fly® HD for high-speed and high-density connectivity (SFCM/SFCF, SFOM/SFOF). Visit samtec.com/msa for details.



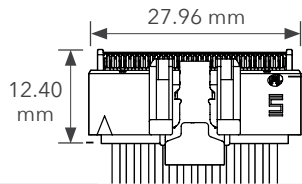
Flyover® Mid-Board Systems

AcceleRate® HP Extreme Density Near-Chip System (ARP6/ARJ6/APF6 Series)

ACCELERATE®HP

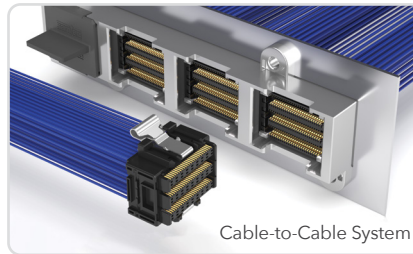


PAM4
112
Gbps
PCI EXPRESS
6.0 Capable
CXL
Compute Express Link
3.2 Capable

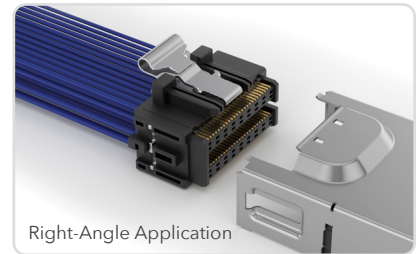


ARP6 Series
(6 Row, 12 Pairs)

- Industry's highest density 112 Gbps PAM4 cable system
- Staggered row-to-row spacing of 2.2 mm x 2.4 mm allows adequate routing lanes for optimized traces; 0.635 mm contact pitch
- Differential pair, single-ended and mixed signaling options
- Rugged squeeze latching or locking
- Up to 96 Eye Speed Thinax™ ultra low skew twinax cables or up to 144 Eye Speed ThinSE™ micro coax cables (34 AWG); see page 16 for specs
- Internal cable (ARJ6) allows for cable-to-cable connection through midplane, backplane or front panel
- Right-angle mating connector, with panel mount cage or mid-board shield
- Evaluation kit: samtec.com/kits

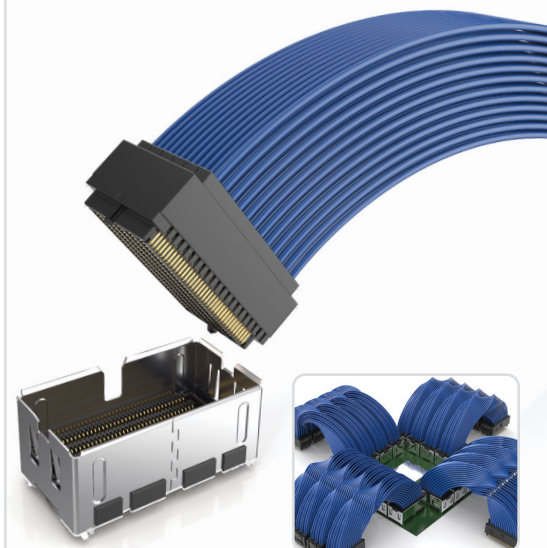


Cable-to-Cable System



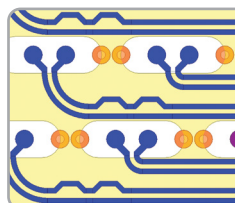
Right-Angle Application

AcceleRate® HP Double-Density Co-Packaged System (ART6/ATF6 Series)

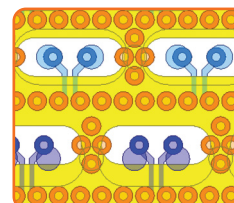


PAM4
112
Gbps
ACCELERATE®HP

- Samtec is the first to achieve a co-packaged (direct-to-chip) solution with the industry's highest density 112 Gbps PAM4 interconnect
- Double the density in the same footprint as AcceleRate® HP near-chip cable system: up to 144 differential pairs
- 184 differential pairs per sq. inch
- Staggered row-to-row spacing; 0.635 mm contact pitch
- 34 AWG Eye Speed Thinax™ ultra low skew twinax cable; see page 16 for specifications
- Vertical cable application provides the highest footprint density
- 2-piece system for high-reliability and thermal performance required for co-packaged solutions
- Roadmap: Single-ended signaling micro coax cable assembly, and mixed wafer technology with micro coax and Eye Speed Thinax™ cable



Typical HDI PCB routing optimized for 3/3/3 mil with no via stubs



AcceleRate® HP routing in HDI PCB with excellent crosstalk isolation and unimpeded routing channels

AcceleRate® Slim, Direct Attach System (ARC6/ARF6 Series)



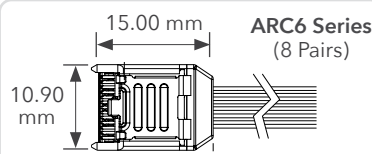
ACCELRATE®

PAM4
64
Gbps

PCI EXPRESS
6.0 Capable

CXL Compute Express Link
3.2 Capable

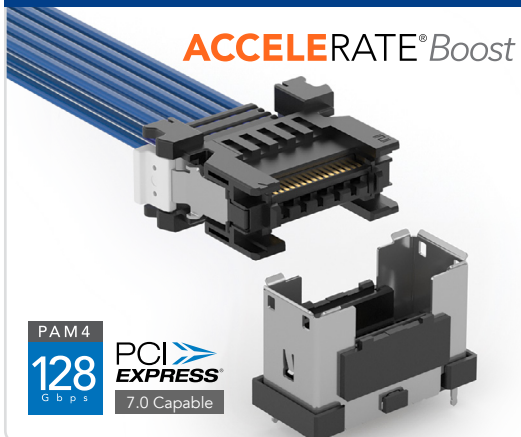
- Slimmest cable assembly in the industry with a 7.6 mm width
- 2 row design; up to 24 differential pair or 36 single-ended signals; mixed signaling available
- Direct attach: contacts directly soldered to the cable improves signal integrity



- 34 AWG Eye Speed® ultra low skew and Eye Speed Thinax™ twinax cable; 34 AWG Eye Speed ThinSE™ micro coax cable
- Vertical & right-angle board connectors
- Rugged metal latching & shielding
- Evaluation kit: samtec.com/kits



AcceleRate® Boost Optimized Performance System (ABC6/ABF6 Series)



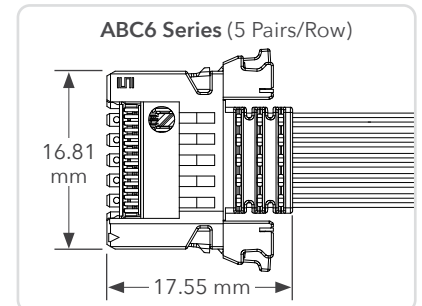
ACCELRATE® Boost

PAM4
128
Gbps

PCI EXPRESS
7.0 Capable

- Vertical cable launch with right-angle launch in development
- Significant reduction in NEXT and Return Loss, lower resonances and tighter impedance compared to similar cable solutions
- Up to 96 differential pairs in 2, 4, 6 or 8 rows
- 32 AWG Eye Speed® hyper low skew twinax cable; see page 16 for specifications

- Extended, flexible strain relief, rugged weld tabs, metal latching and shielding



AcceleRate® Mini Extreme Performance System (ARM6/AMF6 Series)



ACCELRATE® mini

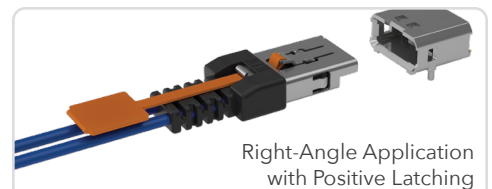
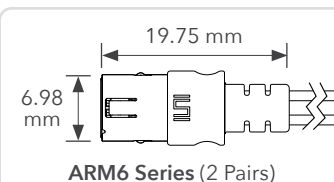
PAM4
112
Gbps

PCI EXPRESS
6.0 Capable

CXL Compute Express Link
3.2 Capable

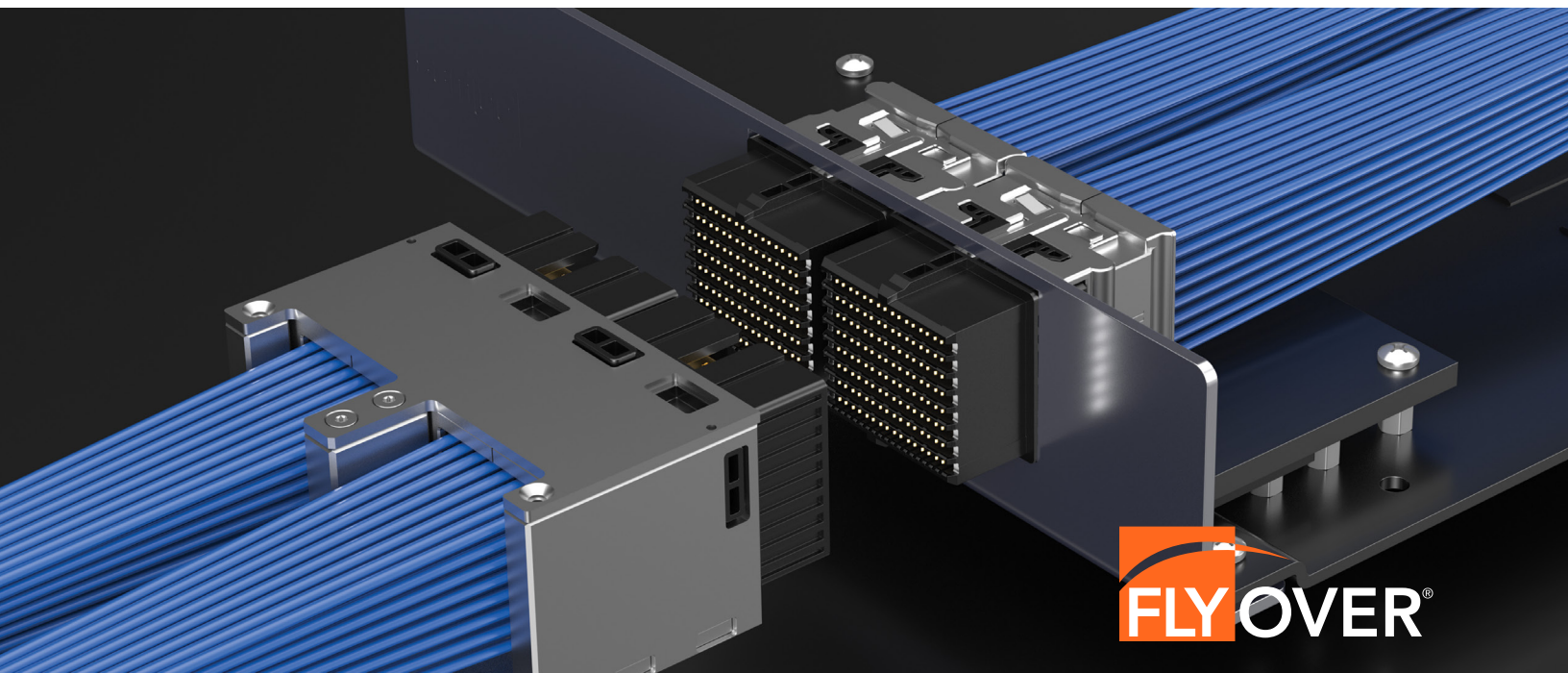
- One or two differential pairs
- Vertical and right-angle mating board connectors
- Ideal for robotics applications
- Design flexibility as an End 2 option for Flyover® assemblies

- 34 AWG Eye Speed Thinax™ ultra low skew twinax cable; extended outer insulation available for rugged applications
- Friction retention latching for a secure connection; positive latching system currently in development
- Evaluation kit available: samtec.com/kits





Flyover® Backplane Systems



NovaRay® Micro Rugged Backplane System (NVCF/NVCM, NVBM/NVBF Series)



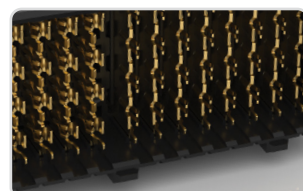
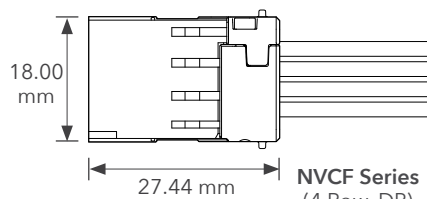
- Ultra-high density with up to 128 DPs in a single connector
- Outside-the-box micro rugged backplane cable and internal, inside-the-box cable assembly with end 2 connector variety
- Offset footprint for optimal signal integrity
- Innovative wafer design eliminates intra-pair skew
- Configurable signal banks in a single connector for ultimate design flexibility; choose wafer signaling design: differential pair, open-pin-field (single-ended) or power
- 28 AWG Eye Speed® hyper low skew or 34 AWG Eye Speed Thinax™ ultra low skew twinax, 34 AWG Eye Speed ThinSE™ thin micro coax, or 30 AWG power cable; see page 16 for specifications
- Precision insert molded contact system
- Guide posts assist with mating



PAM4
128
Gbps

PCI
EXPRESS
7.0 Capable

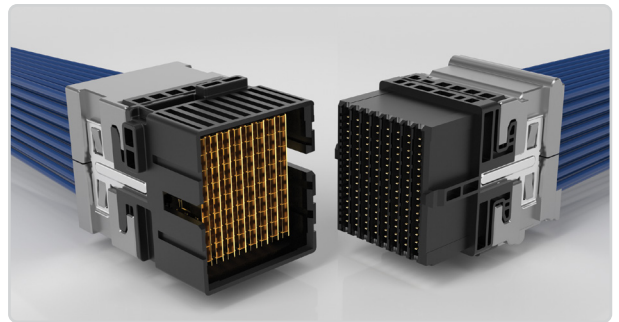
NOVARAY®



High-Density Backplane System



- 224 Gbps PAM4 performance
- Up to 144 DPs orthogonally in a 1RU rack spacing
- Maximized density with minimal airflow restrictions
- Improved signal integrity performance, optimal flexibility and increased routability
- Traditional backplane or orthogonal in cable-to-cable applications
- Individually shielded differential pairs

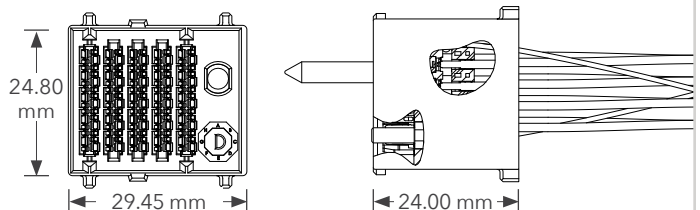


ExaMAX® High-Speed Backplane System (EBCM/EBCF, EBTM/EBTF/EBDM Series)



- Cable-to-cable, cable-to-board, mid-board and panel applications
- Highly customizable with modular flexibility
- Reduced costs due to lower PCB layer counts
- Two reliable points of contact with 2.4 mm wipe
- 4 and 6 pairs; 4-16 columns
- Integrated guidance and keying options
- Eye Speed® ultra low skew twinax and Eye Speed Thinax™ twinax cable
- Evaluation kit available, visit: samtec.com/kits

EBCM Series (10 Columns, 4 Pairs per Column)





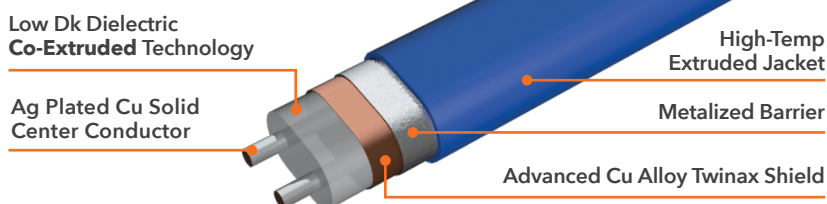
High-Speed Cable Technology

Samtec's proprietary co-extruded Eye Speed® twinax cable technology eliminates the performance limitations and inconsistencies of traditional twinax cabling. The results include improved signal integrity, bandwidth and reach, supporting extreme density and performance for next generation signaling demands. Visit [samtec.com/eyespeed](https://www.samtec.com/eyespeed) for additional information.

Eye Speed® Twinax

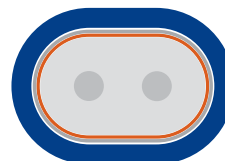
- Ultra low skew: 3.5 ps/m max
- Co-extruded: tight coupling between signal conductors
- Impedance control and perfect intra-pair sequencing
- Impedance: (92 Ω)

Series: ARC6, ARM6, CPC, EBCF, EBCM, EBCE, FQSFP, FQSFP-DD, FQSFP-D8, NVA3E, NVA3P, NVACE, NVACP



**EYE
SPEED
TWINAX**

PAM4
112
Gbps



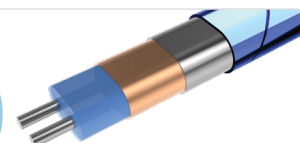
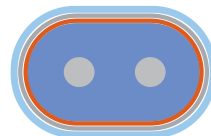
28–36 AWG

Eye Speed Thinax™

- 40% smaller cross-sectional area compared to Eye Speed® Twinax
- Reduction in overall weight; maximizes airflow
- Easy to route through systems
- Ultra low skew: 3.5 ps/meter max
- Impedance: (92 Ω)

**EYE
SPEED
THINAX**

PAM4
112
Gbps



34 AWG

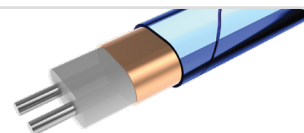
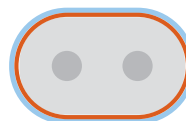
Series: ARC6, ARM6, ARP6, ART6, CPC, EBCF, EBCM, FOSFP, FQSFP, FQSFP-DD, FQSFP-D8, FSFP, NVACE, NVACP, NVCF, NVCM

Eye Speed® Hyper

- Hyper low skew: 1.75 ps/meter max
- Insertion Loss: 14.3 dB (32 AWG, 1 meter length at 56 GHz)
- Easy to route through systems
- Impedance: (92 Ω)

**EYE
SPEED
HYPER**

PAM4
224
Gbps



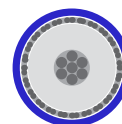
28 & 32 AWG

Series: ABC6, NVCF, SBCF, SBCM, SFCC, SFNC

Eye Speed ThinSE™

- Small .024" outer diameter cable for 34 AWG variant
- Min. bend radius: 0.125-inch (one-time bend)
- Supports single-ended and mixed signaling (-DP & -SE) of Samtec high-performance cable assemblies
- Impedance: (92 Ω)

**EYE
SPEED
THINSE**



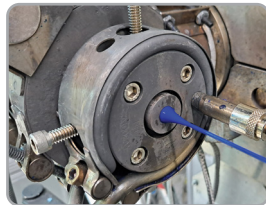
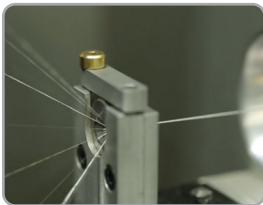
32 & 34 AWG

Series: ARC6, ARP6, EBCF, EBCM, NVACE, NVACP, NVCF, NVCM

Manufacturing Expertise: Precision Extruded Micro Coax & Twinax, Next Gen RF Cable

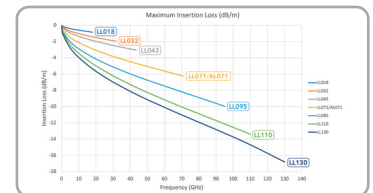
Manufacturing Technology

- World-class in-house expertise
- Internally developed proprietary processes
- Extensive customization capabilities
- Procurement and test of new materials
- Quick-turn design and manufacturing
- Unparalleled pricing and delivery
- Signal integrity support
- Design verification testing



Next Generation Innovation

- Real-time closed-loop control to adjust parameters as needed
- Microcellular dielectric extrusion
- Proprietary co-extruded, low loss twinax cable
- Extreme density twinax cable
- Phase and insertion loss stable high frequency RF cable
- Superior thermal capabilities
- REACH/RoHS compliant products
- ASTM E595 low outgassing compliant
- VW-1 flammability compliant



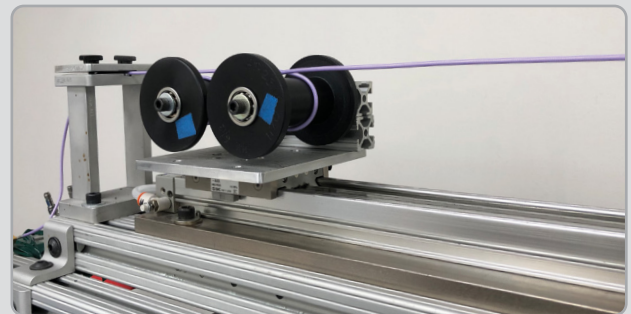
Dynamic Testing

Samtec Eye Speed® Ultra Low Skew Twinax cable has undergone 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.

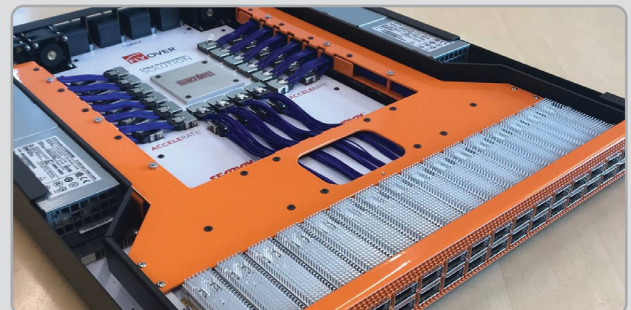
Contact HDR@samtec.com for higher cycle results.



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.

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





High-Speed Cable Systems

High-Speed Assemblies (SEAC, ESCA, ERCD/ERDP, HLCD, FCF8, HALO-PE Series)

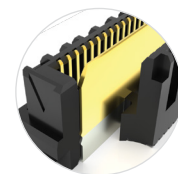


- 14 Gbps performance
- High-density SEARAY™ 1.27 mm pitch coax or twinax (SEAC), and 0.80 mm pitch coax (ESCA)
- 0.80 mm pitch Edge Rate® coax & twinax systems (ERCD, ERDP)
- Ultra micro hermetic Razor Beam™ 0.50 mm pitch coax system (HLCD)
- Low-cost 0.80 mm pitch coax system in a compact form factor (FCF8)
- Halo Cu™ 112 Gbps PAM4 copper Eye Speed Thinax™ ultra low skew twinax system (HALO-PE)
- View specifications at: samtec.com/HDR

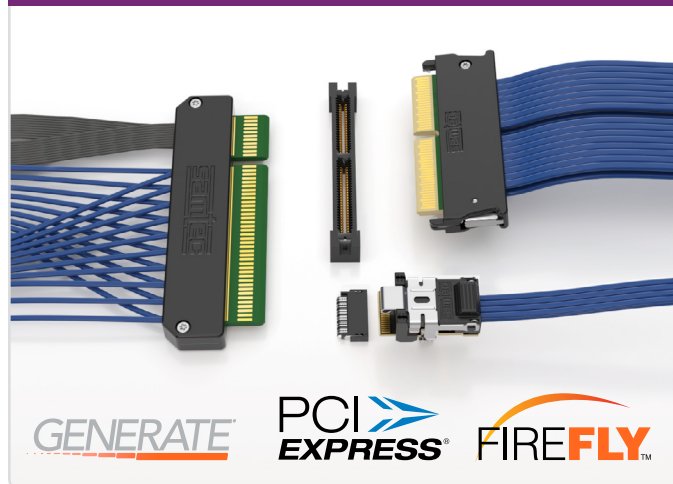
Ground Plane Assemblies (HQCD/HQDP, EQCD/EQDP, EQRD Series)



- Integral power/ground plane
- 14 Gbps performance
- 34 & 38 AWG coax; 30 & 32 AWG twinax
- Q Series® 0.50 mm pitch (HQCD/HQDP) and 0.80 mm pitch (EQCD/EQDP) assemblies with rugged screw mount or retention pin options
- Q Rate® 0.80 mm pitch (EQRD) assembly with Edge Rate® contacts for reduced broadside coupling
- View complete specifications at: samtec.com/HDR

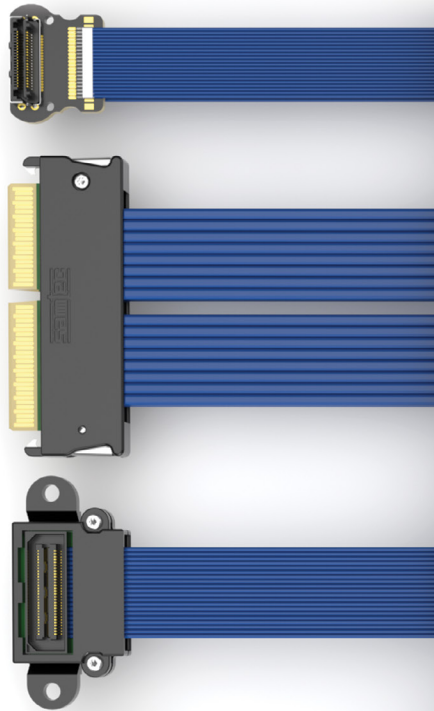


Edge Card Assemblies (ECDP, GC6, PCIEC-G4/-G5, ECUE, PCUE, GC6RF, PCRF-G4/-G5 Series)



- 0.80 mm pitch twinax assembly (ECDP); 14 Gbps performance
- Generate® 0.60 mm pitch, ultra low skew twinax assembly (GC6) with 64 Gbps PAM4 performance
- PCI Express® twinax assemblies (PCIEC-G4/PCIEC-G5) support 4.0/5.0/6.0 data transfer rates
- FireFly™ twinax assemblies to 28 Gbps performance (ECUE) or PCIe® 3.0/4.0/5.0 data transfer rates (PCUE)
- Generate® (GC6RF) and PCIe® (PCRF-G4/PCRF-G5) test assemblies with DC to 110 GHz frequency range
- View complete specifications at: samtec.com/HDR

Mix-and-Match Assemblies: The Ultimate in Cable System Design Flexibility



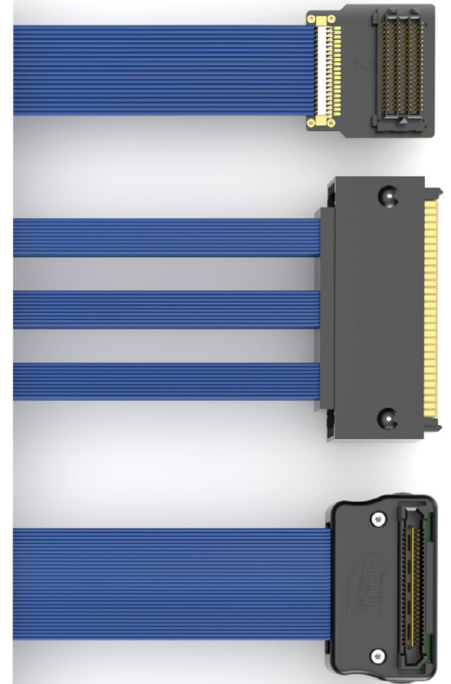
ANY
high-speed **connector**

ANY
pinout **configuration**

ANY
high-speed **precision cable**

... to create a solution for
any specific application.

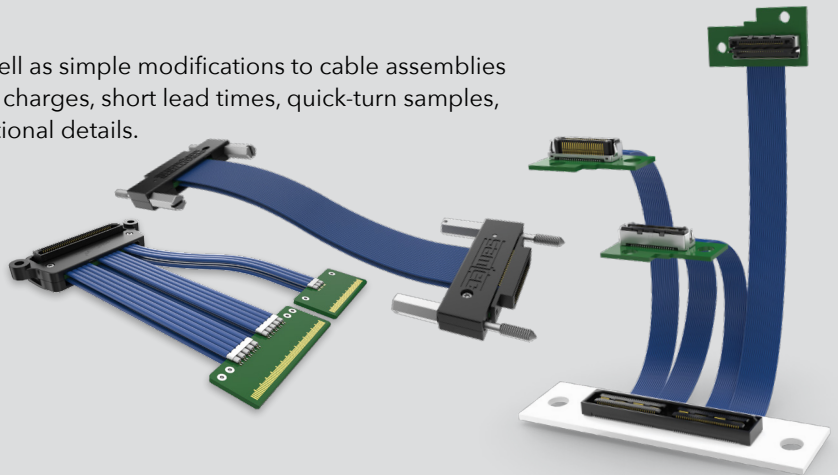
HDR@samtec.com



Customs & Express Modifications

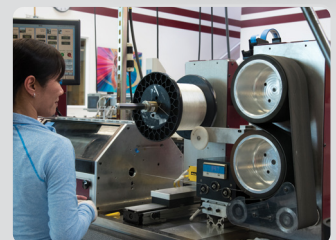
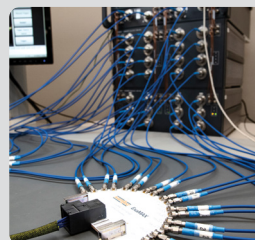
Samtec is able to support new and custom designs, as well as simple modifications to cable assemblies and board-to-board products – often with low or no NRE charges, short lead times, quick-turn samples, and low or no MOQ's. Visit samtec.com/custom for additional details.

- Wiring
- Bodies
- Ruggedizing features
- Molding
- Stamping
- Shielding modifications
- Plating
- Labeling
- Polarization
- Ink printing
- Contacts
- Packaging



Willingness, Support & Expertise

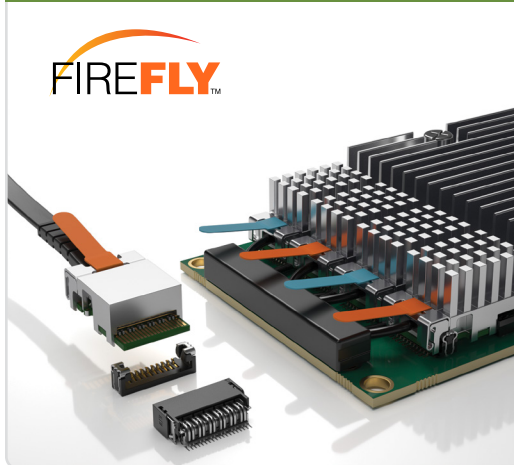
- Engineering, design and prototype support
- Quotes and samples turned in 24 hours
- Design simulation and processing assistance
- Flexible, quick-turn manufacturing
- Global Operations, including multiple cable fabrication and assembly facilities
- Application Specific Product engineers and technicians





Advanced Optical Systems

FireFly™ Micro Flyover System™ (ECUO, PCUO, PCOA, ETUO, ETMO Series)



FireFly™ Embedded (ECUO Series)

14 G b p s	x4, x12
16 G b p s	x12
25 G b p s	x4
28 G b p s	x4

PCle®-Over-Fiber (PCUO Series)

8 G T p s	PCle® 3.0: x4, x8, x16
16 G T p s	PCle® 4.0: x4, x8, x16
32 G T p s	PCle® 5.0: x4, x8, x16 (in development)

FireFly™ EXT (ETUO Series)

10 G b p s	x4, x12
125 G b p s	x12
25 G b p s	x4

FireFly™ EET (ETMO Series)

10 G b p s	x4
25 G b p s	x4

- Designed for flexibility, FireFly™ copper and optical systems are interchangeable using the same high-performance connector set
- Industry-leading miniature footprint for higher density close to the data source
- x4 and x12 configurations, with a wide variety of end 2 options
- FireFly™ optical system (ECUO), ideal for greater distances
- FireFly™ copper system (ECUE), ideal for optimizing costs
- PCle®-Over-Fiber (PCUO) supports 3.0/4.0/5.0 data rates; adaptor card (PCOA) also available
- FireFly™ EXT (ETUO) with an extended temp range of -40 °C to +85 °C
- FireFly™ EET (ETMO) for extreme environments with a parylene conformal coating, tin whisker mitigation and salt fog resistance
- Development boards and evaluation kits available at samtec.com/kits

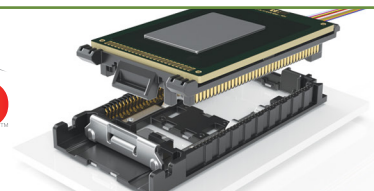
FireHawk® Mid-Board Optical Transceivers (CSPO, CSSO Series)



- Smallest footprint, lowest profile and lowest mass in the industry (10 x 7.7 x 4.4 mm; 0.4 grams total weight for optimal SWaP)
- FireHawk® CSPO is designed for the challenging environments of mil/aero applications, featuring an integrated microcontroller
- FireHawk® CSSO is designed to withstand vibrations and radiation in space/satellite applications, without the need for a microcontroller
- Rad-hard for satellites: internal driver ASIC for the VCSELs and PIN receivers designed using radiation hardened by design guidelines
- Extreme performance to 40 Gbps aggregate data rate (10G x 4 channels)
- Direct mount to the PCB board provides the shortest thermal path
- Optical cabling reduces weight and size for longer connections
- Evaluation kit: samtec.com/kits

In Development: Halo® Mid-Board Optical Transceivers

Rugged, next gen system in a low profile form factor, designed for embedded applications demanding 112 Gbps PAM4 performance.





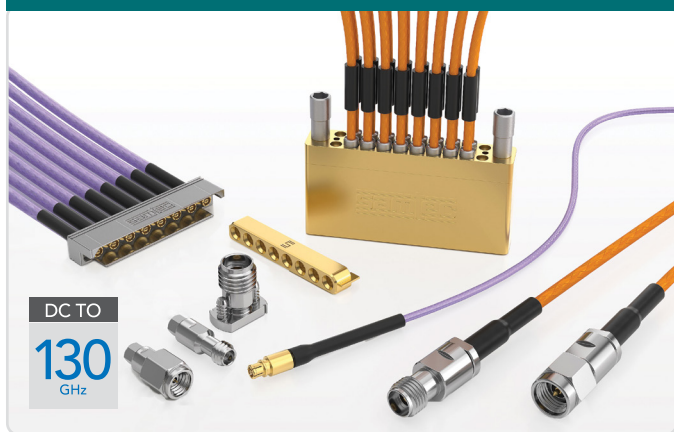
Precision RF Solutions

Bulls Eye® High-Performance Test to 130 GHz (BE70A, BE71A, BE90A, BE130 Series)



- High-density, space-saving design that enables smaller evaluation boards and shorter trace lengths in test and measurement applications to 130 GHz
- Compression mounts to the board for placement directly adjacent to the SerDes being characterized
- Solderless design improves cost, easy to use within a lab setting
- End 2 connection to instrumentation: 1.00 mm, 1.35 mm, 1.85 mm, 2.40 mm or 2.92 mm
- Evaluation Kits available, visit [samtec.com/kits](https://www.samtec.com/kits)

Precision RF Cable Assemblies & Connectors



- High frequency, microwave/millimeter wave solutions for frequencies from 18 GHz to 130 GHz
- Cable assemblies, cable connectors, board level connectors and adaptors
- Low-loss microwave & millimeter wave cable from .047" to .277"
- Variety of interface options: 1.00 mm, 1.35 mm, 1.85 mm, 2.40 mm, 2.92 mm, 3.50 mm, SSMA, SMP, SMP3, SMPM, ganged SMPM, SMA, N Type, TNCA
- Magnum RF® ganged SMPM for 40% greater density, less processing time and better positional alignment

Nitrowave® Next Gen RF Cable Assemblies



- Samtec's Nitrowave® cable technology in distinctive Samtec orange is a phase and amplitude stable high-performance microwave/millimeter wave cable
- State-of-the-art shielding techniques with a Dynamic Performance Layer (DPL) for improved stability
- Consistent contact resistance between layers
- Phase vs. Bending = $< 0.2^\circ \times F \text{ (GHz)}$
- Electrical performance optimized at next gen frequencies (GHz): 130, 110, 95, 71, 43.5, 32, 18
- Interface options: 1.00 mm, 1.35 mm, 1.85 mm, 2.40 mm, 2.92 mm, SMPM, SMP, SMA, N Type and TNCA
- Armored version for crush, abrasion, kink and torque resistance



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.

Our unique business model encourages flexibility and innovation, allowing us to quickly make adjustments, offer a variety of options and strategic solutions to best meet your specific needs - all while maintaining competitive pricing and the industry's best lead times.

Global Operations & Support

- World Direct™ - seamless global shipping factory direct to customers/partners without unnecessary consolidation points; manufacturing flexibility without increased cost or lead times
- Visit samtec.com/tariff for current and part-specific tariffs, as well as Freight Collect Direct information



Price Competitiveness

- Redundant manufacturing (Dual Operations model) helps optimize labor and shipping costs, facilitates low-cost options, competitive pricing and fast lead times
- Volume Application Specific Pricing offers competitive pricing for large volume, core board-to-board orders; visit samtec.com/vasp
- Cost-efficient materials and components available; to learn about Samtec's gold cost saving efforts, visit 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.



Digital Tools

Samtec offers a variety of online tools - all openly available for use and download - to help you find, design and validate the right solution for your application.

- **Picture Search:** browse through a highlight reel of Samtec's most popular products to visually locate your solution
- **Solutionator®:** leverage a variety of search parameters and filters to build a mated connector set or custom cable solution
- **Technical Library:** 3D models, test reports, PCB footprint/eCAD models, product demo videos, webinars and more
- Visit samtec.com/digital-tools to explore all the options!



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

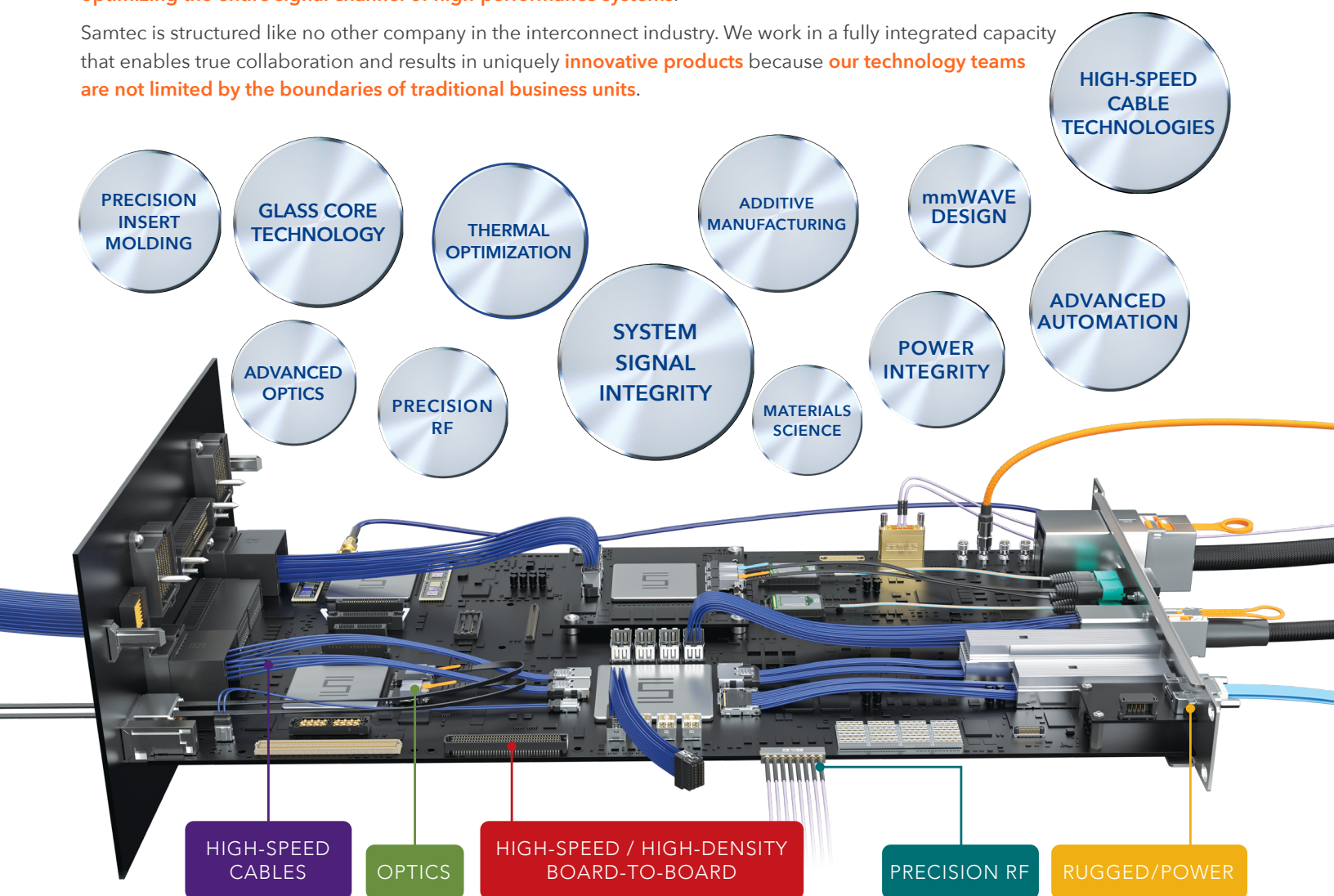
- MySamtec™ Real-Time Account Access: account.samtec.com
- Personal Account Mgr/CSR: eCustomerService@samtec.com
- Upfront, Aggressive 24-Hour Quotes: ePricing@samtec.com

INTEGRATION LEADS TO INNOVATION

Full System Optimization from Silicon-to-Silicon™

Samtec's integrated business model facilitates high-level design and development of advanced interconnect systems and **technologies**. Along with industry-leading expertise, this allows us to offer effective strategies and support for **optimizing the entire signal channel of high-performance systems**.

Samtec is structured like no other company in the interconnect industry. We work in a fully integrated capacity that enables true collaboration and results in uniquely **innovative products** because **our technology teams are not limited by the boundaries of traditional business units**.



SILICON-TO-SILICON™ SOLUTIONS

Next Generation Connectivity to 224 Gbps & Beyond

As bandwidth, scale and power requirements continue to challenge conventional engineering methods, Samtec strives to help **optimize the landscape of your entire system** – and develop solutions, together.

Samtec's industry-leading signal integrity expertise, full system optimization strategies, and innovative products and technologies help address the challenges of **next gen data transmission to 224 Gbps and beyond**.

GLOBAL SUPPORT NETWORK



samtec[®]
SUDDEN SERVICE[®]

www.samtec.com

ISO-9001 and/or IATF 16949 Certified

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