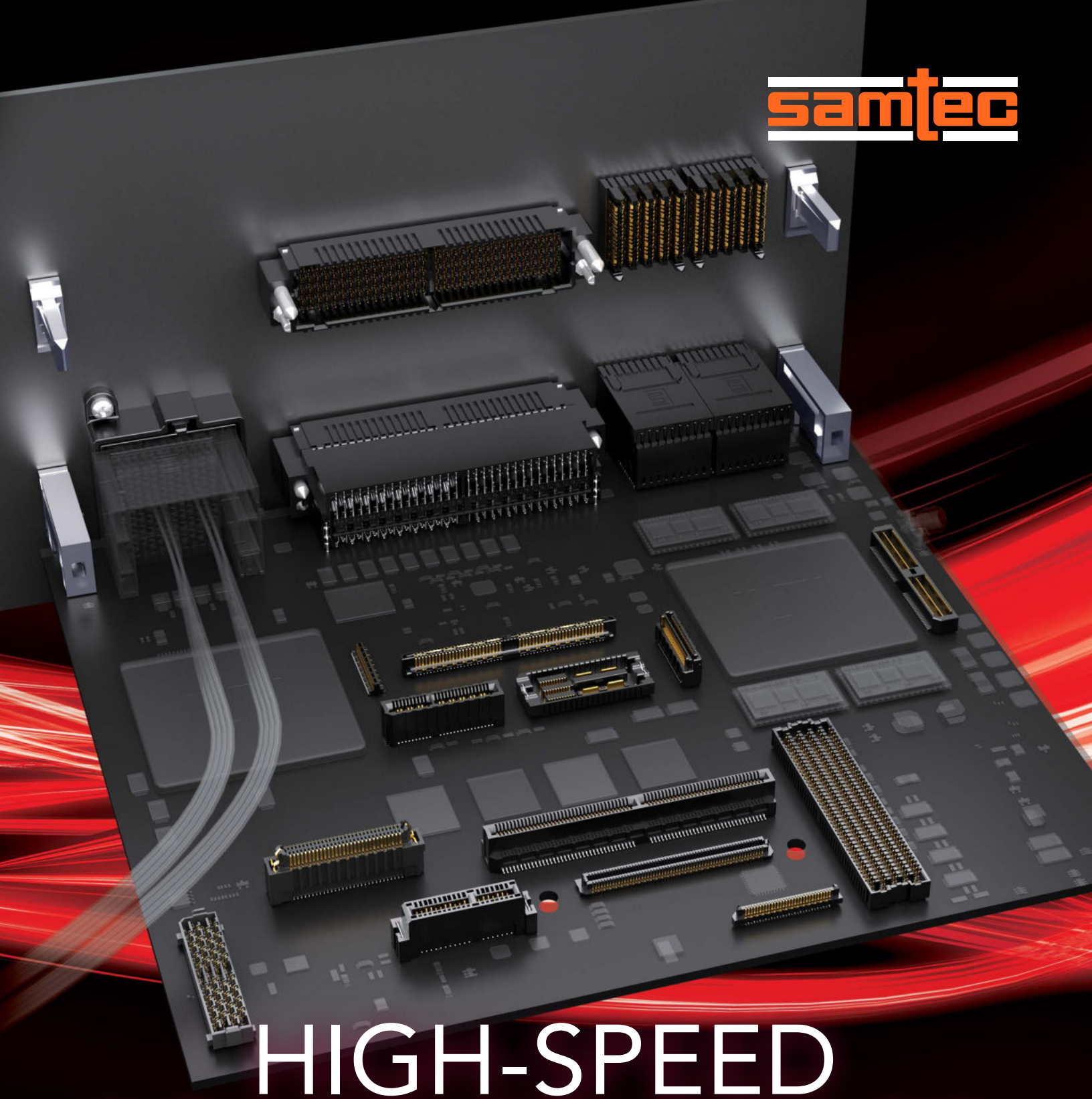


HIGH-SPEED BOARD-TO-BOARD & BACKPLANE

INTERCONNECT SOLUTIONS GUIDE

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-SPEED PERFORMANCE

Speeds to 112 Gbps PAM4

More than 4.0 Tbps of aggregate bandwidth

Extremely low crosstalk beyond 40 GHz

APPLICATION FLEXIBILITY

10 – 1,000 positions

1 mm – 40 mm stack heights

Vertical, right-angle, edge mount

SIGNAL INTEGRITY SUPPORT

Free test reports, models, app notes, Break Out Region

Easy access to live EE support

Channelyzer® Online Tool

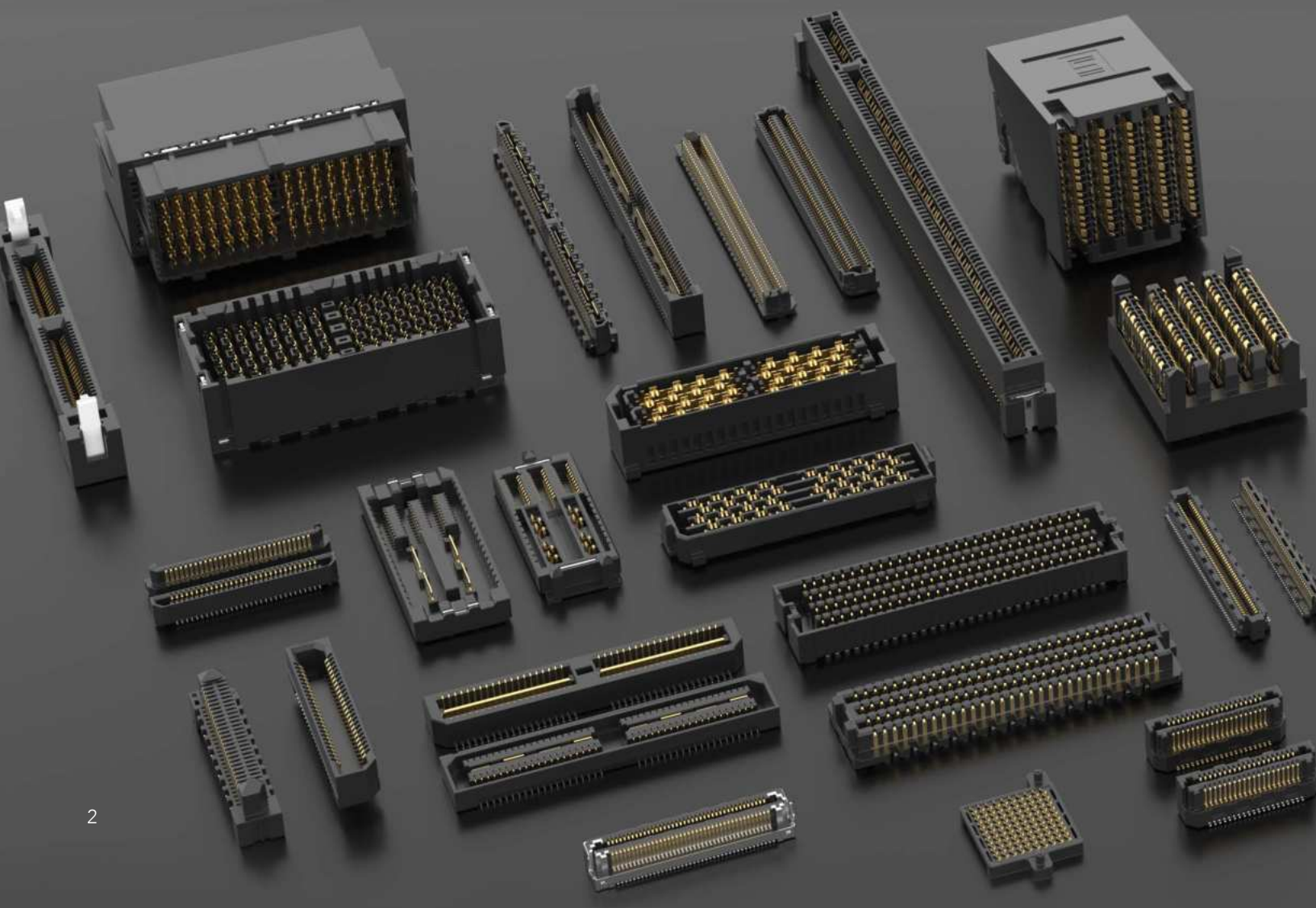


TABLE OF CONTENTS

HIGH-SPEED BOARD-TO-BOARD PRODUCT OVERVIEW

HIGH-DENSITY ARRAYS

UP TO 112 Gbps PAM4 | PCIe® 6.0/CXL® 3.1 CAPABLE | OPEN-PIN-FIELD
SLIM BODY & LOW PROFILE | POWER/SIGNAL COMBINATION

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

HIGH-SPEED DUAL ROW STRIPS

UP TO 56 Gbps PAM4 | EDGE RATE® SI OPTIMIZED CONTACTS | INTEGRAL GROUND/POWER PLANE
SLIM BODY & LOW PROFILE | 5 TO 25 mm STACK HEIGHTS

HIGH-SPEED BACKPLANE SYSTEMS

UP TO 112 Gbps PAM4 | MICRO RUGGED BACKPLANE | MODULAR FLEXIBILITY
TRADITIONAL, COPLANAR & DIRECT-MATE ORTHOGONAL | HIGH-SPEED CABLE ASSEMBLIES

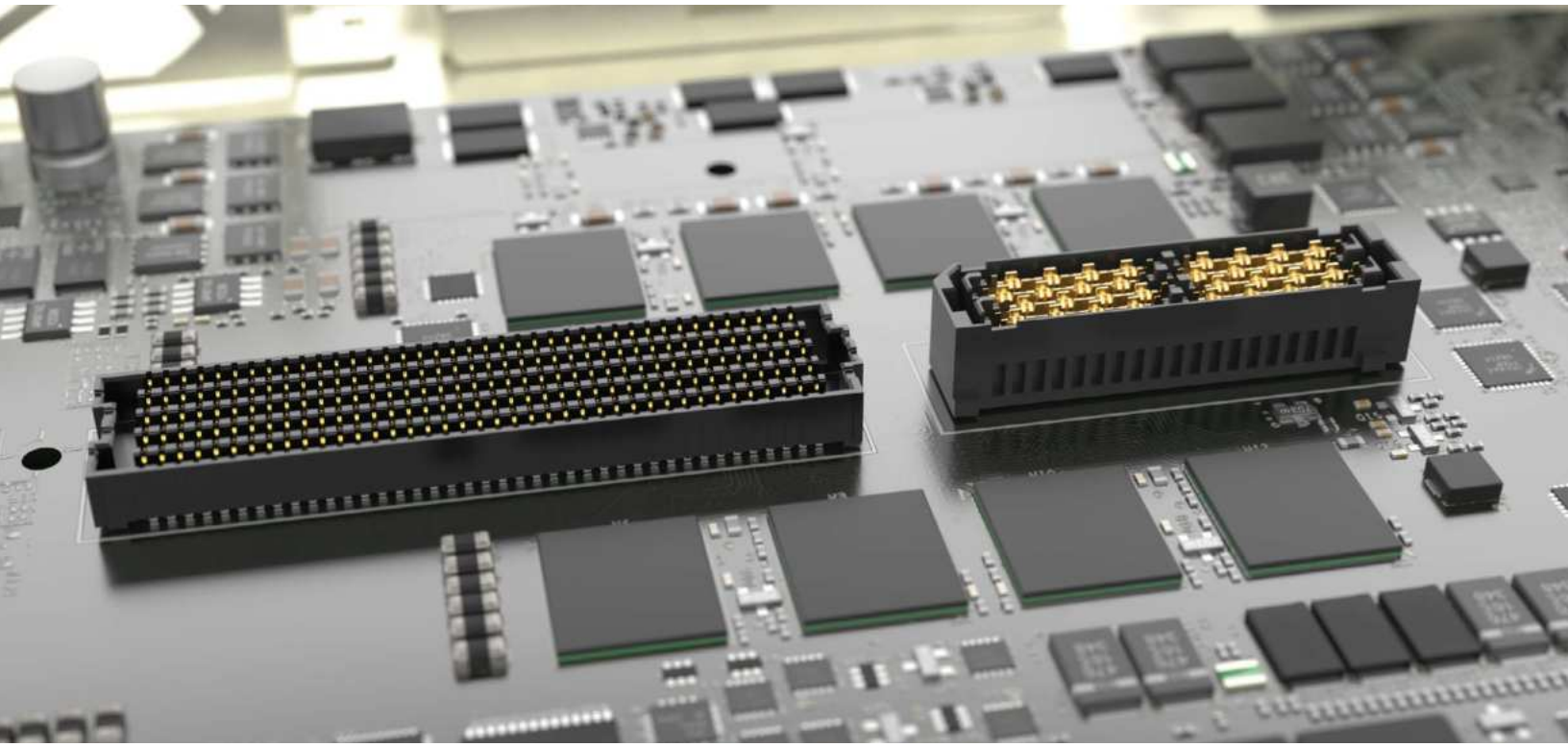
EDGE CARD SYSTEMS

UP TO 64 Gbps PAM4 | PCI EXPRESS® 3.0/4.0/5.0/6.0
EDGE RATE® CONTACTS | VARIETY OF PITCHES

ULTRA MICRO

UP TO 56 Gbps PAM4 | MICRO BLADE & BEAM
SELF-MATING | ULTRA LOW PROFILE | SPACE SAVINGS

HIGH-DENSITY ARRAYS

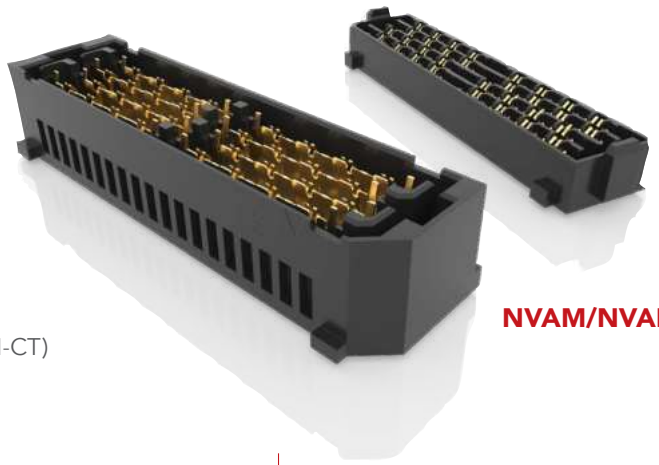


EXTREME PERFORMANCE ARRAYS

NOVARAY®

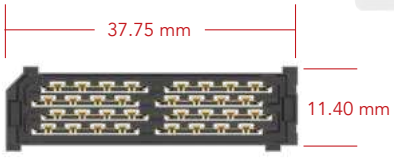
NRZ 56 Gbps | PAM4 112 Gbps

- 4.0 Tbps aggregate data rate - 9 IEEE 400G channels
- PCIe® 6.0/CXL® 3.1 capable
- Two points of contact ensure a more reliable connection
- Fully shielded differential pairs
- Extremely low crosstalk (beyond 40 GHz) and incredibly tight impedance control
- Minimal variance in data rate as stack height increases
- Utilizes 40% less space with the same data throughput as compared to traditional arrays
- Latching terminal mates with NovaRay® cable (NVAC/NVAM-CT)
- Analog Over Array™ capable (see page 29)



NVAM/NVAF

SureWare™ guide post standoffs (GPSO/GPSOM) assist with "blind mate" and misalignment mitigation



NVAM Series; 32 pairs

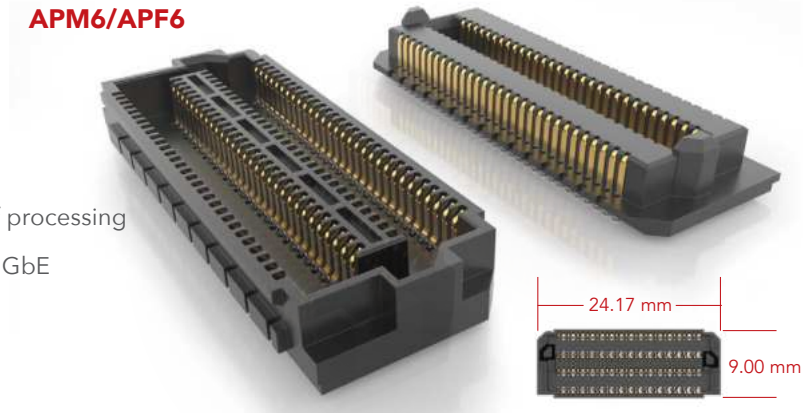
HIGH-PERFORMANCE ARRAYS

ACCELERATE®*HP*

NRZ 56 Gbps | PAM4 112 Gbps

- Flexible open-pin-field and cost optimized, extreme performance solution
- 5 mm and 10 mm stack heights; right-angle socket available (APF6-RA)
- Four row design with up to 400 total pins on a 0.635 mm pitch; roadmap to 1,000+ pins
- Solder column termination for improved SI and ease of processing
- Data rate compatible with PCIe® 6.0/CXL® 3.1 and 100 GbE
- Additional row and pin counts in development
- SureWare™ guide post standoffs (GPSO) available
- Analog Over Array™ capable (see page 29)

APM6/APF6



APF6 Series; 120 pins

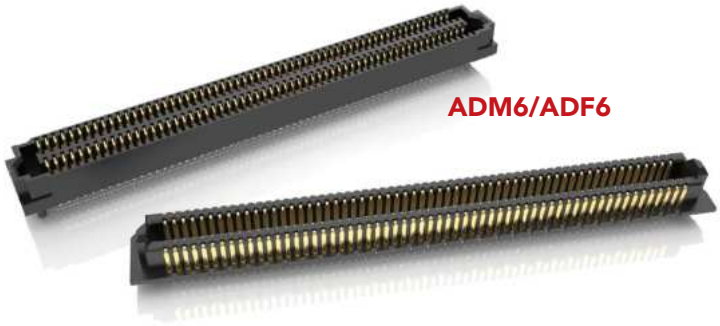
HIGH-DENSITY SLIM BODY ARRAYS

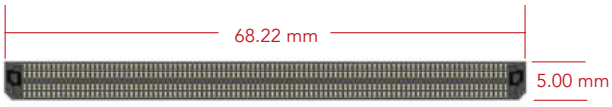
ACCELERATE®HD

PAM4 64 Gbps

- Up to 400 I/Os in a 4-row, open-pin-field design
- 0.635 mm pitch Edge Rate® contacts
- Slim 5 mm body width; 5 mm to 16 mm stack heights
- PCIe® 6.0/CXL® 3.1 capable
- Solder column termination for improved SI and ease of processing
- SureWare™ guide post standoffs (GPSO/GPSOM) available

ADM6/ADF6





ADF6 Series; 400 pins

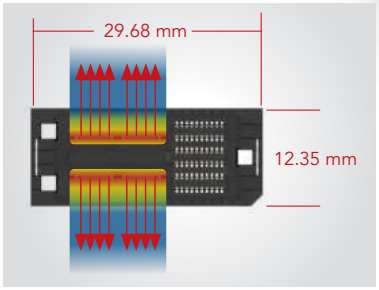
ACCELERATE® mP SIGNAL/POWER ARRAYS

ACCELERATE®mP

PAM4 64 Gbps

- Best in class density for power and signal
- Rotated power blades for improved performance and simplified breakout region (BOR)
- Open-pin-field design for routing and grounding flexibility
- PCIe® 6.0/CXL® 3.1 capable; supports 64 Gbps PAM4 (32 Gbps NRZ) applications
- Up to 8 power and 240 signal positions
- Low profile 5 mm stack height; up to 16 mm in development
- SureWare™ guide post standoffs (GPSO) available

UDM6/UDF6



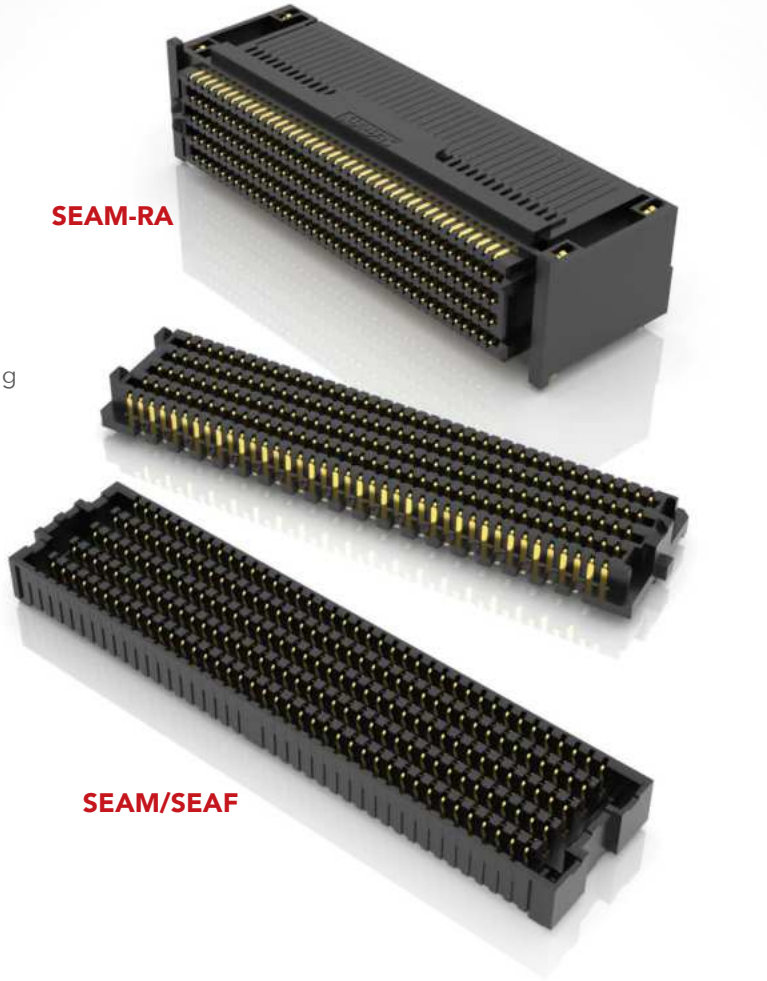
UDM6 Series; 60 signal & 4 power

Blades rotated 90° have equal access to heat escape for uniform cooling, increased current capacity and reduced crowding

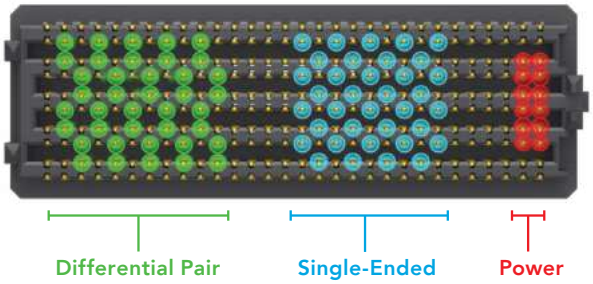
1.27 mm PITCH ARRAYS

SEARAY™ NRZ 28 Gbps PAM4 56 Gbps

- Maximum grounding and routing flexibility
- Up to 560 Edge Rate® contacts with 1.12 mm (.044") wipe
- 7 mm to 40 mm stack heights; right-angle available
- Solder charge terminations (IPC-A-610F & IPC J-STD-001F Class 3)
- Supports high-speed protocols such as Ethernet, PCI Express®, Fibre Channel and InfiniBand™
- Standards: VITA and PISMO™ 2
- Elevated stack heights (SEAR), press-fit tails (SEAMP/SEAFP) and cable mate (SEAC) available
- Up to 10,000 cycles with SureCoat™ palladium alloy plating for high-temp, high cycle applications
- SureWare™ standoffs (JSO/GPSO) available
- Severe Environment Testing qualified (SEAM/SEAF); aligns with MIL-DTL-55302. Visit **samtec.com/set**
- Analog Over Array™ capable (see page 29)



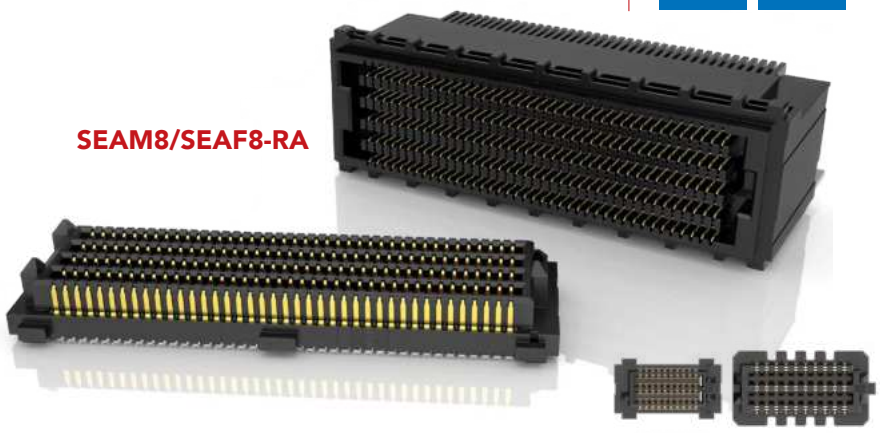
OPEN-PIN-FIELD FLEXIBILITY



HIGH-DENSITY 0.80 mm PITCH ARRAYS

SEARAY™ .8mm NRZ 28 Gbps PAM4 56 Gbps

- 2x the density of 1.27 mm pitch arrays
- Up to 500 Edge Rate® contacts
- 7 mm and 10 mm stack heights
- Lower insertion/withdrawal forces
- High-speed cable mate available (ESCA)
- SureWare™ press-in or threaded standoffs available (JSO/GPSO)
- Severe Environment Testing qualified (SEAM8/SEAF8); aligns with MIL-DTL-55302. Visit **samtec.com/set**
- Analog Over Array™ capable (see page 29)



0.80 mm pitch vs. 1.27 mm pitch

LOW PROFILE ARRAYS

LP ARRAY™ | NRZ 28 Gbps | PAM4 56 Gbps

- Up to 400 total pins in 4, 6 or 8 rows
- 4 mm, 4.5 mm and 5 mm stack heights
- 1.27 mm pitch dual beam contacts
- SureWare™ press-in or threaded standoffs available to assist with unmating (JSO)
- Analog Over Array™ capable (see page 29)

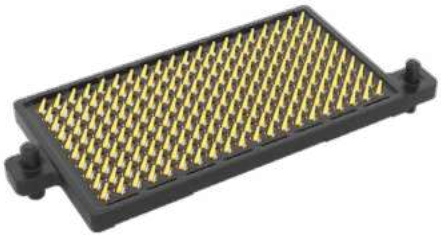
LPAM Series; 120 pins

LPAM/LPAF

ALSO AVAILABLE: HIGH-DENSITY SOLUTIONS

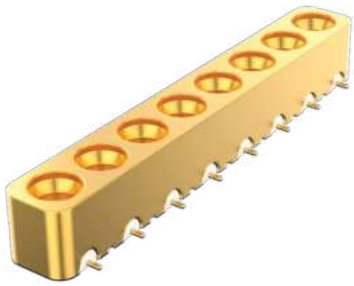
COMPRESSION INTERPOSERS

- SuperNova™ low profile 1.27 mm body height and performance to 56 Gbps PAM4 (GMI)
- Analog Over Array™ capable (see page 29)



PRECISION RF BOARD-TO-BOARD SOLUTIONS

- SMP, SMPM and Magnum RF™ Ganged SMPM with a push-on design for quick installation and frequency to 65 GHz (GPPC, GPPB, SMPM, PRFIA, SMP).

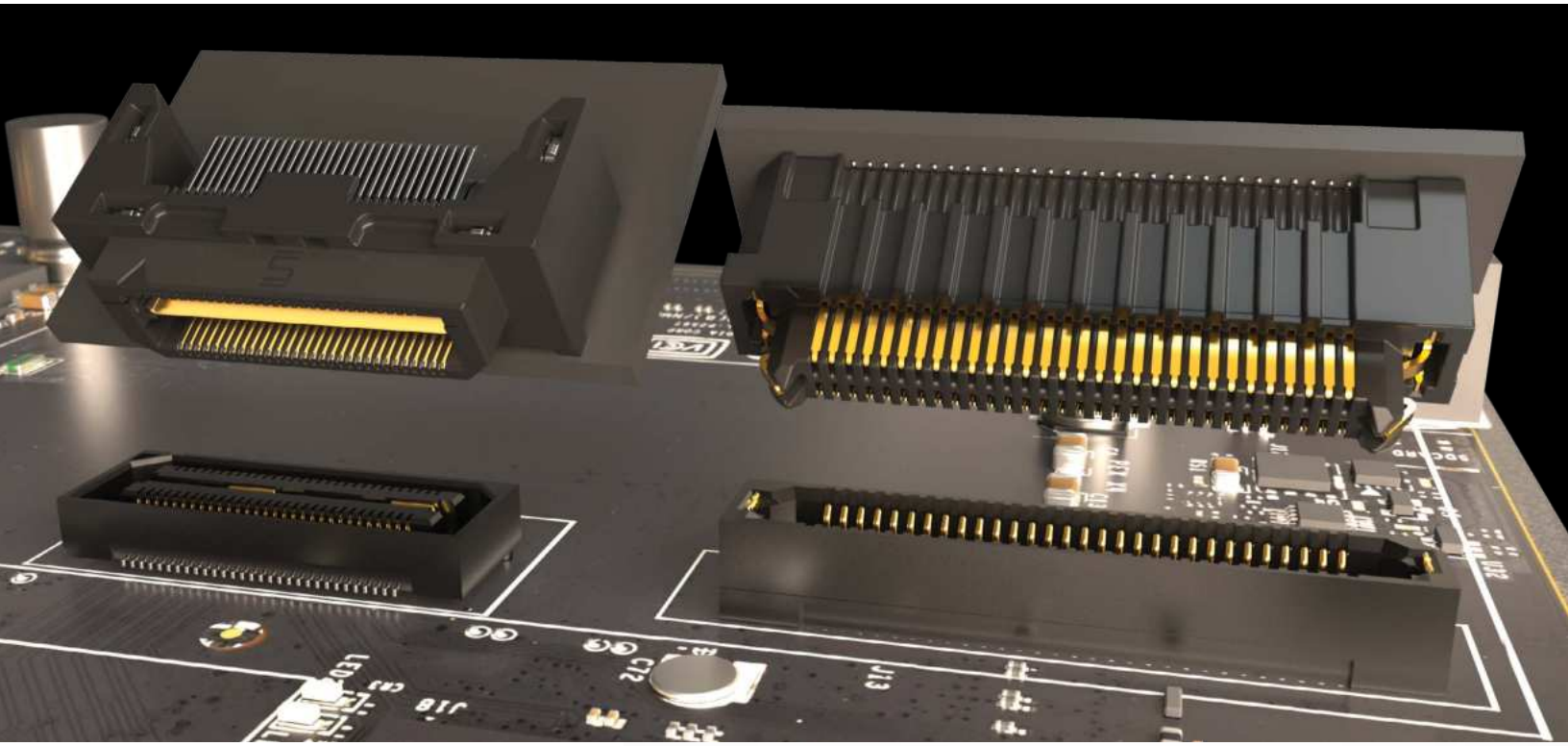


ROADMAP: HIGH-DENSITY MEZZANINE SYSTEM

Si-Fly™ MZ | PAM4 224 Gbps

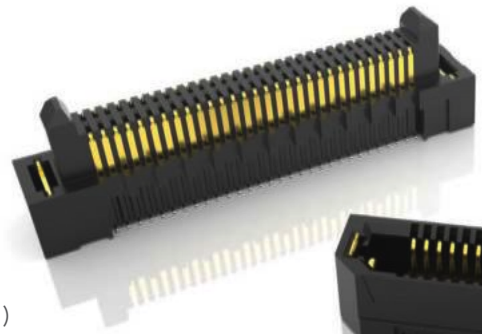
- Industry's highest density board-to-board and on-package mezzanine system
- 32 (4 row), 64 (8 row), 128 (16 row) or 192 (24 row) differential pairs
- Mixed DP/SE/Power configurations also available
- Low profile 5 mm stack height
- Up to 6.4 Tbps aggregate data rate
- Intermateable with Si-Fly™ HD on-package cable system
- High-reliability compared to other compression solutions

DUAL ROW STRIPS

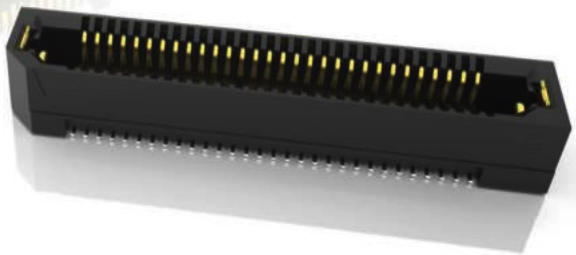


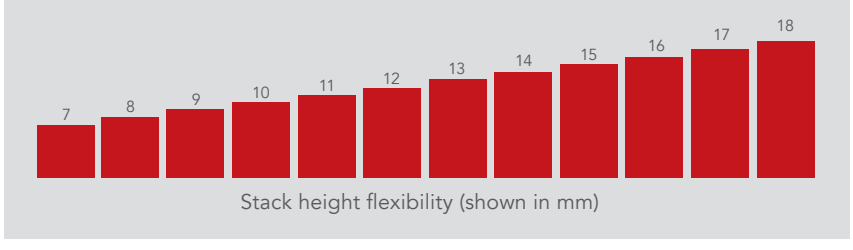
EDGE RATE® 0.80 mm PITCH SYSTEM

- Up to 200 positions with a 1.5 mm contact wipe
- Differential pair, hot swap, latching, shielding and extended guide post options
- Supports high-speed protocols including Ethernet and PCI Express®
- Right-angle, edge mount and cable mate (ERCD) available
- SureWare™ guide post standoffs (GPSO/GPSOM) available
- Severe Environment Testing qualified (ERM8/ERF8); aligns with MIL-DTL-55302. Visit **samtec.com/set**

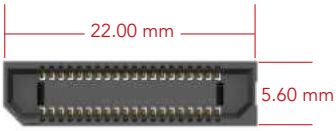


ERM8/ERF8





Stack height flexibility (shown in mm)

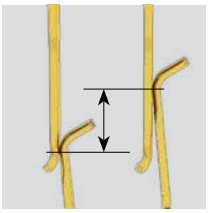


ERF8 Series; 40 pins

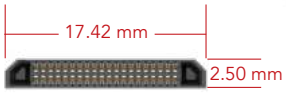
EDGE RATE® 0.635 mm PITCH SYSTEM

EDGE® RATE SYSTEM | PAM4 56 Gbps

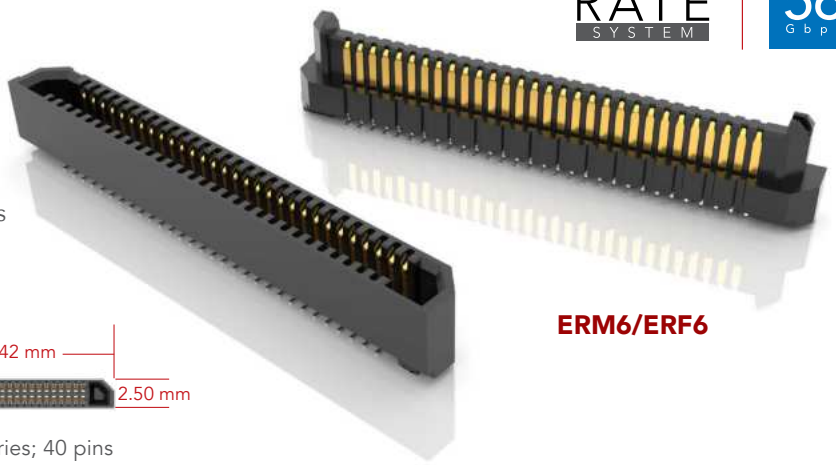
- Extremely slim 2.5 mm body width
- Up to 120 positions in a 2-row design
- 5 mm low profile stack height
- J lead for standard processing
- Optional weld tabs; standard alignment pins



0.90 mm (.035")
contact wipe



ERF6 Series; 40 pins

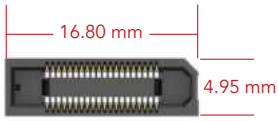


ERM6/ERF6

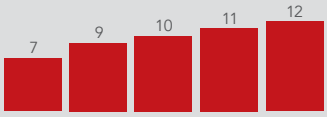
EDGE RATE® 0.50 mm PITCH SYSTEM

EDGE® RATE SYSTEM | NRZ 28 Gbps

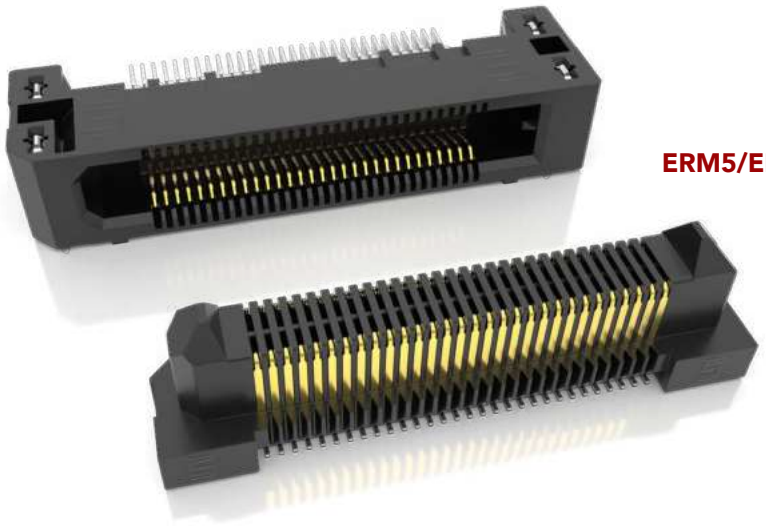
- 1.00 mm contact wipe
- Up to 40% PCB space savings with 0.50 mm pitch vs. 0.80 mm pitch
- Stack heights from 7 mm to 12 mm
- 20 to 150 total positions
- Right-angle socket available (ERF5-RA)



ERF5 Series; 40 pins



Stack height flexibility (shown in mm)



ERM5/ERF5-RA

EDGE® RATE CONTACT

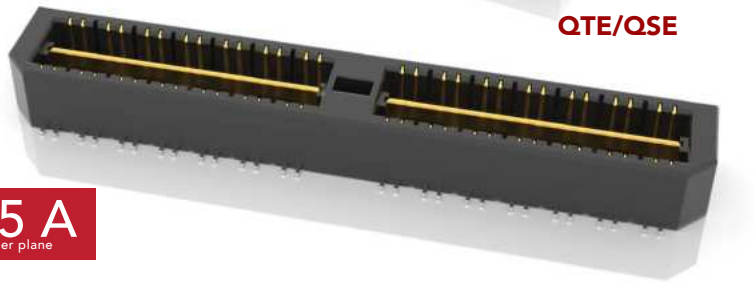
EDGE RATE® CONTACT SYSTEM

- 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

LOW PROFILE GROUND PLANE CONNECTORS

- 0.50 mm, 0.635 mm and 0.80 mm pitch
- Performance to 21 Gbps (QXH), 25 Gbps (QXS) and 28 Gbps (QXE)
- 5 mm to 30 mm stack heights
- Integral ground/power plane
- Single-ended or differential pairs
- Right-angle, edge mount and cable mates (see page 27) available
- Extended Life Product™ high mating cycle connectors; test reports available at **samtec.com/elp**
- 0.50 mm pitch connectors (QTH/QSH) are compliant to the PISMO™ 1 standard; visit **samtec.com/standards**

QSTRIP® NRZ 28 Gbps



QTE/QSE

25 A per plane

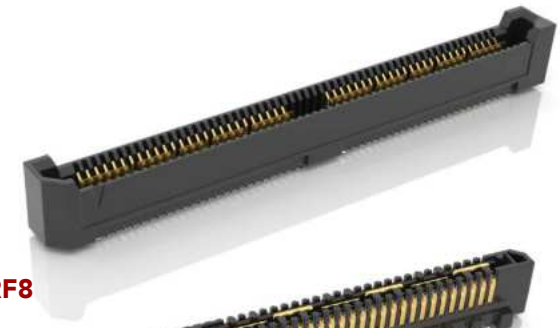
SureWare™ right-angle guide posts available to assist with blind mating (GPSK/GPPK)

SLIM GROUND PLANE CONNECTORS

- 0.80 mm pitch
- Up to 156 signal pins/54 differential pairs
- Right-angle available for coplanar and perpendicular mating
- 7, 9, 10, 12 and 14 mm stack heights
- Extended Life Product™ high mating cycle connectors (QRM8/QRF8); test reports available at **samtec.com/elp**

QRATE® NRZ 28 Gbps

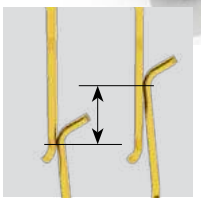
8.5 A per plane



QRM8/QRF8

Slim 4.60 mm body width saves board space

Edge Rate® contacts optimized for superior signal integrity performance



1.20 mm (.047") contact wipe

RUGGED GROUND PLANE CONNECTORS

Q2™ | NRZ 25 Gbps

- 0.635 mm pitch and 1.60 mm contact wipe
- Increased insertion depth for rugged applications
- Up to 156 signal pins/48 signal pairs standard
- Vertical, right-angle and edge mount
- EMI shielded systems available (QMSS/QFSS)
- 10 to 16 mm stack heights
- Optional integral power pins available; rated at 4 Amps
- SUMIT™, PCI/104-Express™ and PCI/104-Express™ OneBank compliant (QMS/QFS); visit **samtec.com/standards**

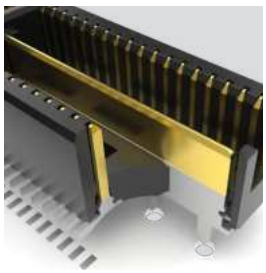
15.7 A per plane

QMS-RA/QFS

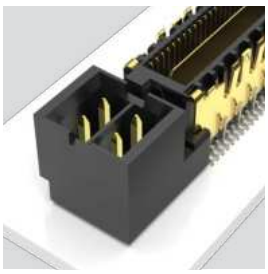
EMI shielded systems available (QMSS/QFSS)

FEATURES

Differential pairs reduce noise

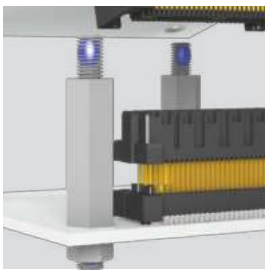


Mixed technology (MIT/MIS)

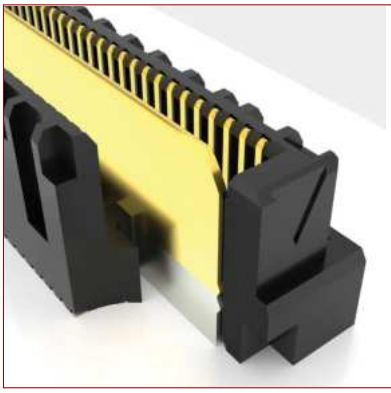


Options for power & retention

Rugged Edge Rate® contact system



Precision board stacking standoffs

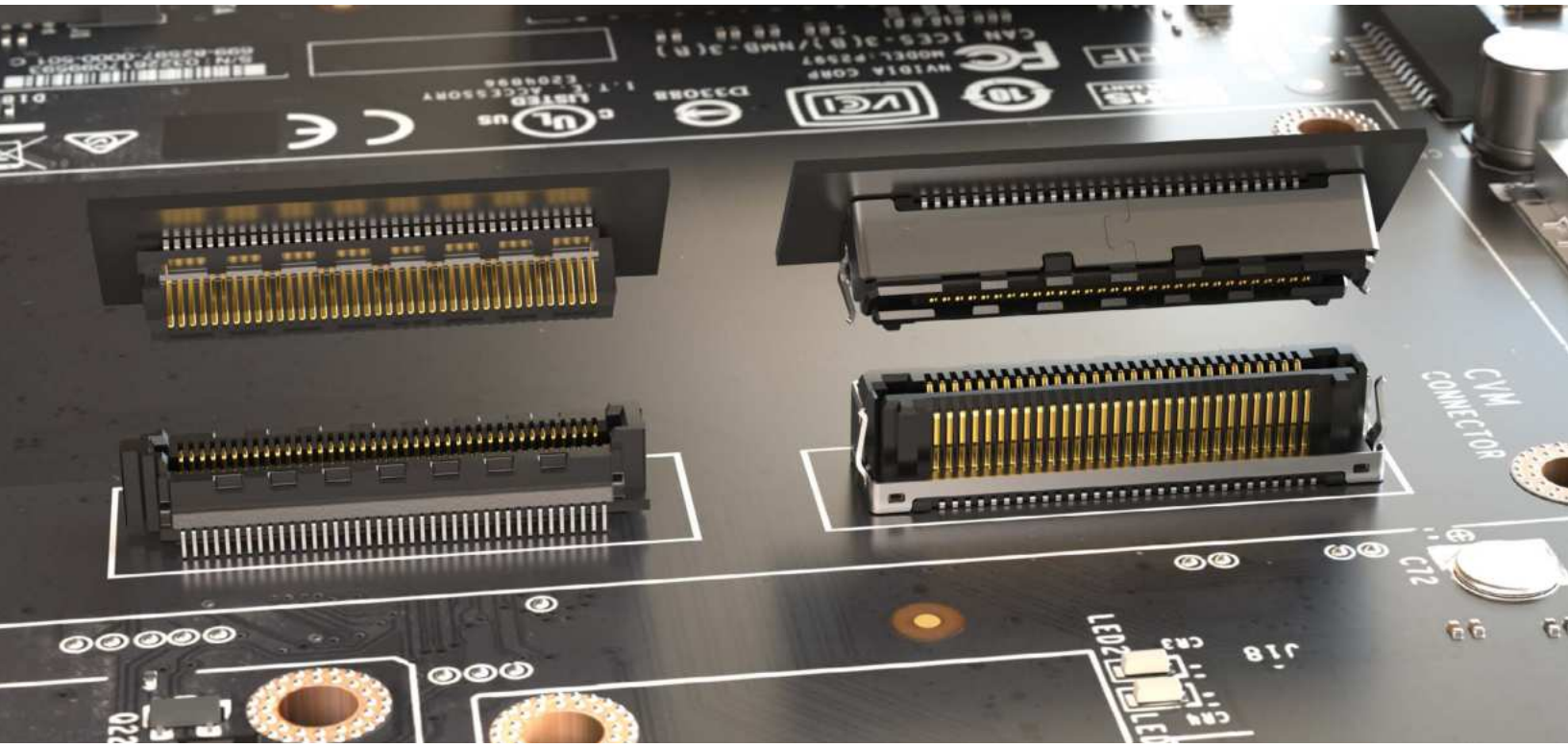


QSERIES®

INTEGRAL GROUND/POWER PLANE

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

ULTRA MICRO INTERCONNECTS

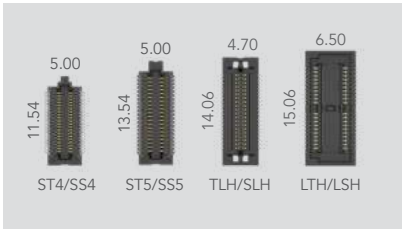


MICRO BLADE & BEAM STRIPS

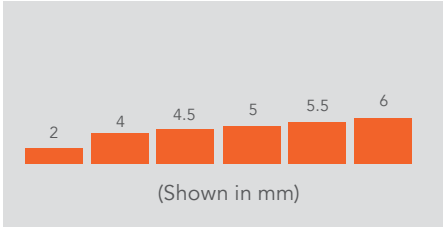
PAM4 56 Gbps

- Ultra-fine 0.40 mm and 0.50 mm pitch
- Low profile stack heights from 2 to 6 mm
- Slim body designs for increased PCB space savings
- 20 - 160 positions
- Performance to 16 Gbps (LXH), 28 Gbps (SX4, XLH) and 56 Gbps PAM4 (SX5)
- SureWare™ precision board stacking standoffs available (SO)

ST4/SS4



Slim body designs
(40 total positions each)

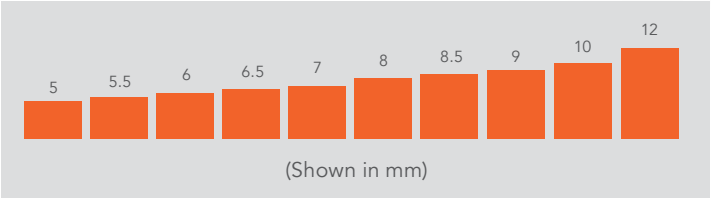


Ultra low stack height options for space savings

RUGGED HERMAPHRODITIC CONNECTORS

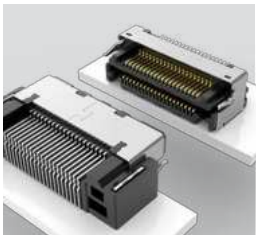
RAZOR™ BEAM SYSTEM | NRZ 25 Gbps

- Razor Beam™ contacts for high-speed and fine-pitch systems
- 0.50 mm, 0.635 mm and 0.80 mm pitch
- Ten stack height options from 5 mm to 12 mm
- 10 - 100 positions
- Performance to 14 Gbps (LSHM) and 25 Gbps (LSS, LSEM)
- Right-angle available for perpendicular and coplanar applications
- Mating and unmating forces approximately 4-6x greater than typical micro pitch connectors
- Severe Environment Testing qualified (LSHM); aligns with MIL-DTL-55302. Visit **samtec.com/set**



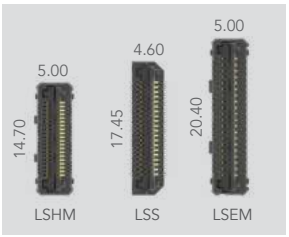
Variety of stack heights for greater design flexibility

Razor Beam™ contacts for ultra low profile designs



Optional shielding for EMI protection (LSHM)

SureWare™ jack screw standoffs (JSO) assist with unmating

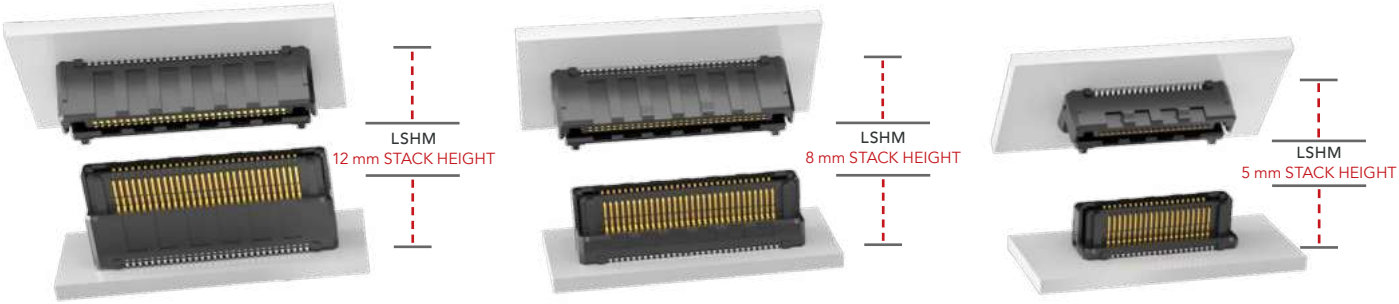


Slim body designs (40 total positions each)

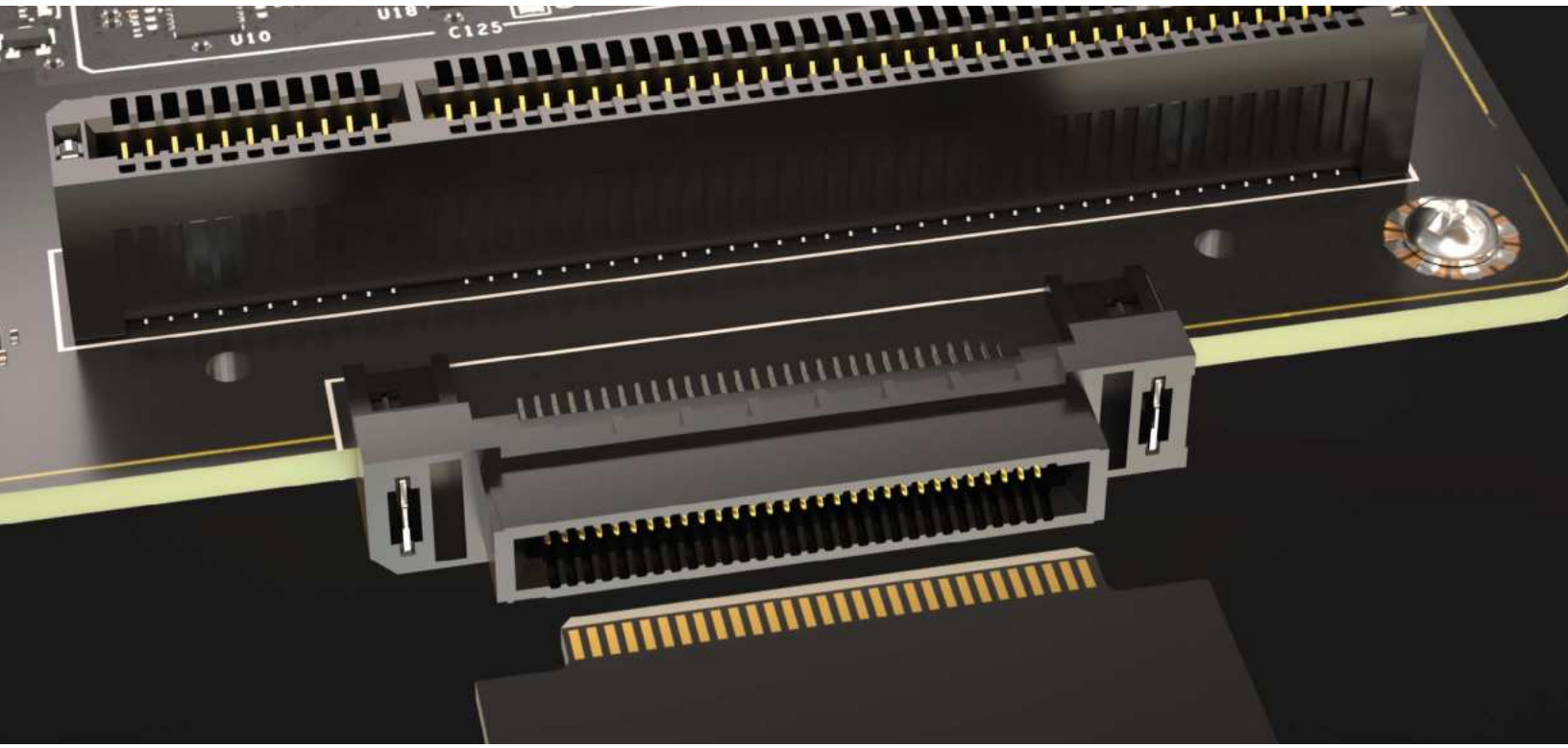
High-speed cable mate available (HLCD)

SELF-MATING

Razor Beam™ self-mating connectors reduce inventory costs and can be interchanged for varying stack heights.



EDGE CARD SYSTEMS



GENERATE™ 0.60 mm PITCH SOCKETS

- Differential pair Edge Rate® contacts optimized for signal integrity performance
- Compliant to SFF-TA-1002: x4 (IC), x8 (2C), x16 (4C and 4C+)
- Mates with .062" (1.60 mm) thick cards
- PCIe® 6.0 /CXL® 3.1 capable
- Right-angle in development
- Shield option available to mate with Generate™ edge card cable (GC6)

Generate™ mating high-speed cable assembly (GC6)

HSEC6-DV

PCI EXPRESS® 6.0 CAPABLE

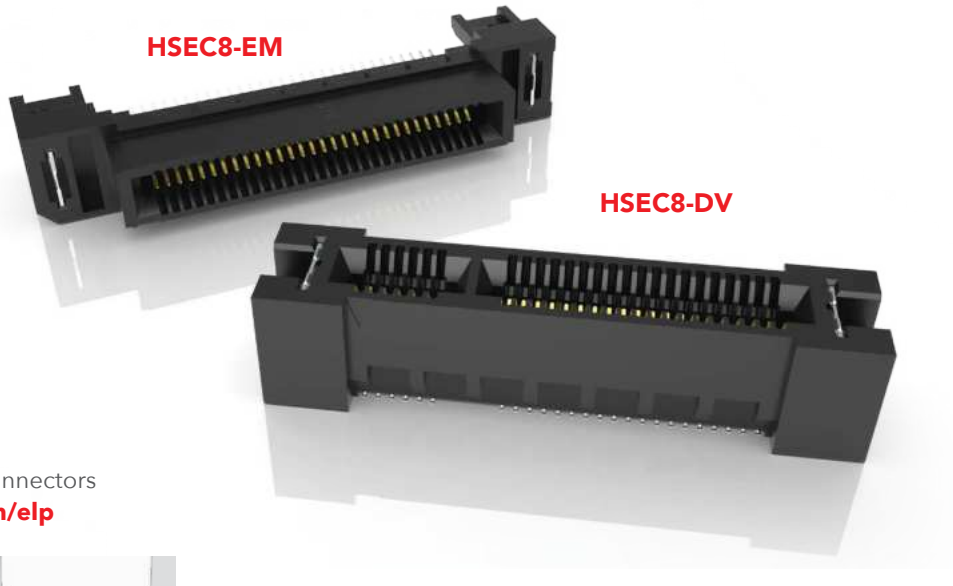
GENERATE™ 0.80 mm PITCH SOCKETS

GENERATE™ | PAM4 56 Gbps

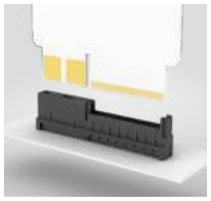
- Up to 200 high-speed Edge Rate® contacts
- Mates with .062" (1.60 mm) and .093" (2.36 mm) thick cards
- Performance to 28 Gbps; differential pair to 56 Gbps PAM4 (HSEC8-DP)
- PCIe® 4.0 capable vertical (HSEC8-DV) and differential pair (HSEC8-DP) sockets
- Vertical, right-angle, edge mount and cable mate (ECDP) available
- Optional weld tabs, alignment pins, board locks and cable latching
- High-speed riser card system for elevated heights to 30 mm (RU8)
- Extended Life Product™ high mating cycle connectors (HSEC8); test reports available at **samtec.com/elp**

HSEC8-EM

HSEC8-DV



Rugged PCIe® 4.0 capable socket with tucked beam technology (HTEC8)



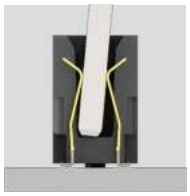
Power/signal combo with 2 or 4 power banks (HSEC8-PV)

GENERATE™ 1.00 mm PITCH SOCKETS

GENERATE™ | NRZ 28 Gbps

- Edge Rate® contact system for decreased crosstalk and increased cycle life
- 20 – 140 positions
- Mates with .062" (1.60 mm) thick cards
- PCIe® 4.0 capable
- Optional alignment pins and weld tabs for mechanical strength

HSEC1-DV

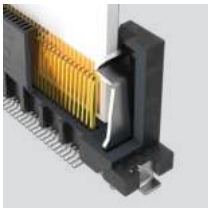


Custom designs can aid with misalignment in the X-Y axes

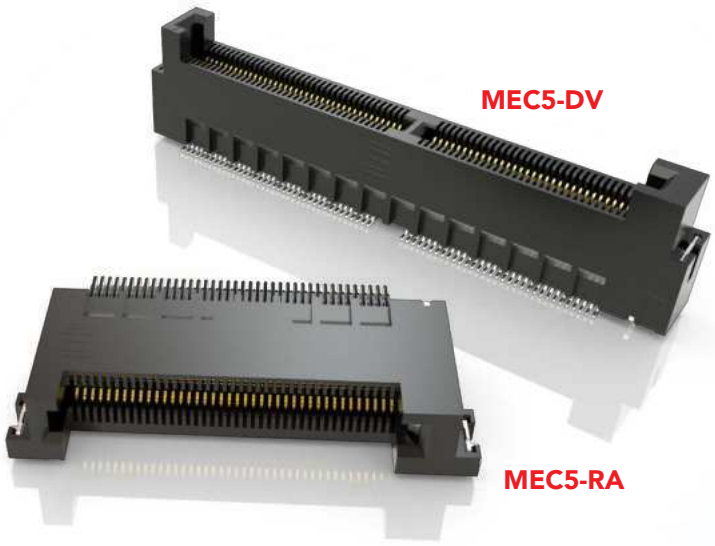
0.50 mm PITCH HIGH-SPEED, LOW-COST SOCKETS

PAM4 56 Gbps

- Justification beam enables use of standard PCB tolerance
- Up to 300 total I/Os
- PCIe® 4.0 capable
- Mates with .062" (1.60 mm) thick cards



Beam ensures card and body are flush

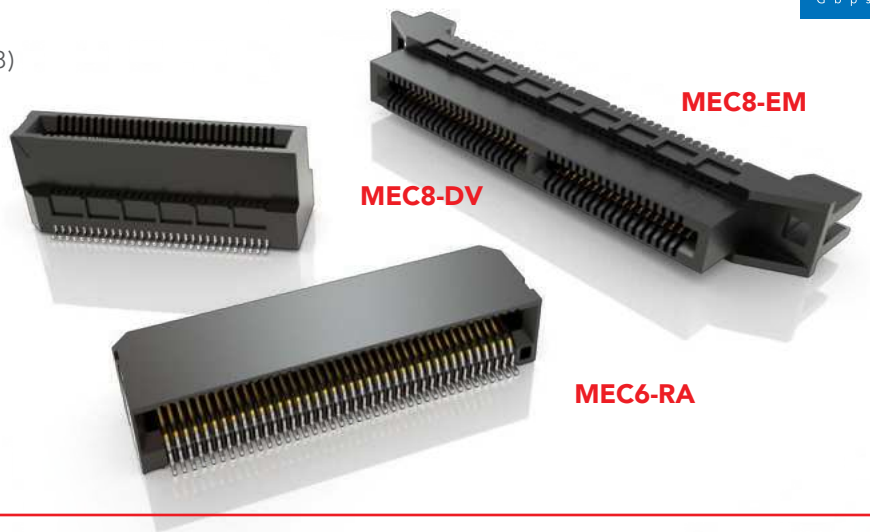


0.635 mm & 0.80 mm PITCH MICRO SOCKETS

NRZ 25 Gbps

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

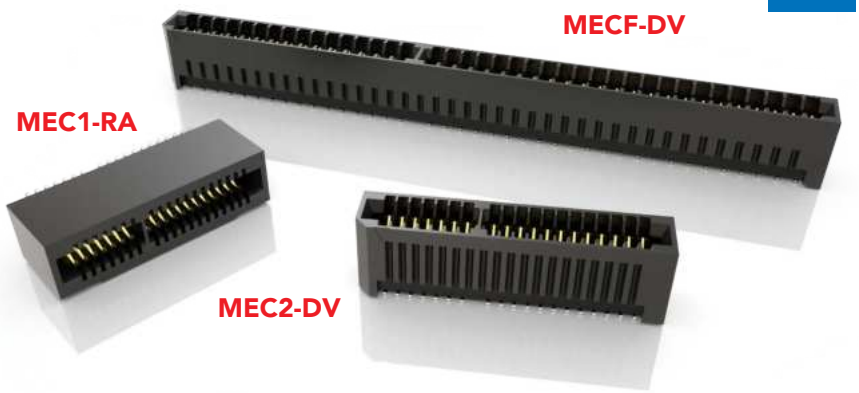
Staggered press-fit tails



1.00 mm, 1.27 mm & 2.00 mm PITCH SOCKETS

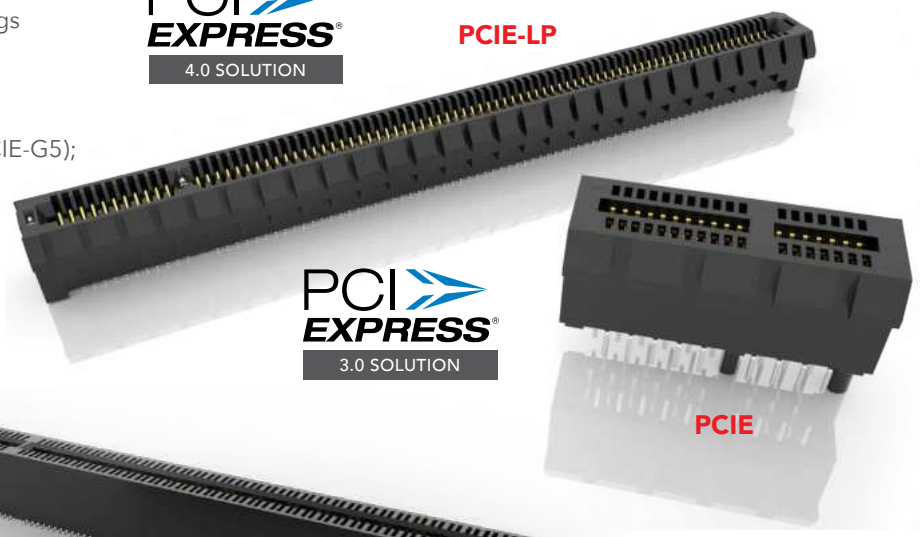
NRZ 25 Gbps

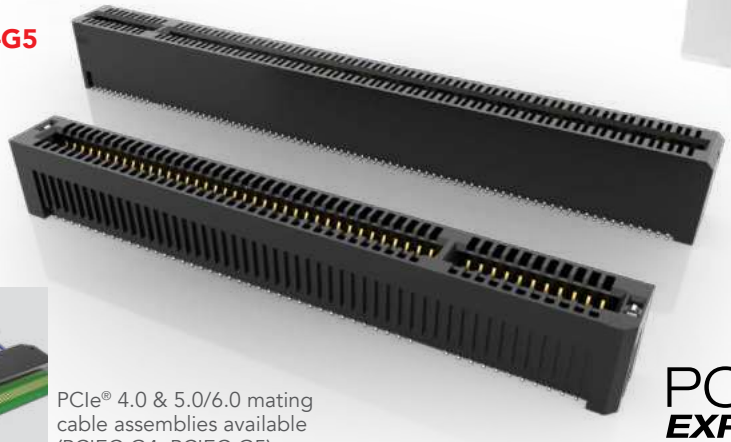
- Up to 140 total I/Os
- Right-angle and edge mount available (MEC1)
- Optional weld tabs, alignment pins and polarization
- Mates with .062" (1.60 mm) and .093" (2.36 mm) thick cards
- Surface mount or through-hole tails (MEC2)

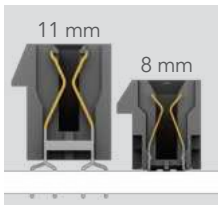


PCI EXPRESS® 3.0, 4.0 & 5.0/6.0 SOCKETS

- 1.00 mm pitch in x1, x4, x8 or x16 link options
- PCIe® 3.0 solution (PCIE)
- PCIe® 4.0 low profile version for space savings (PCIE-LP); through-hole tails in development
- PCIe® 4.0 slim body connector (PCIE-G4)
- PCIe® 5.0 /6.0 differential pair connector (PCIE-G5); design in today for future proof data rates
- CXL® capable connectors
- Mates with .062" (1.60 mm) thick cards
- PCI Express® jumpers available





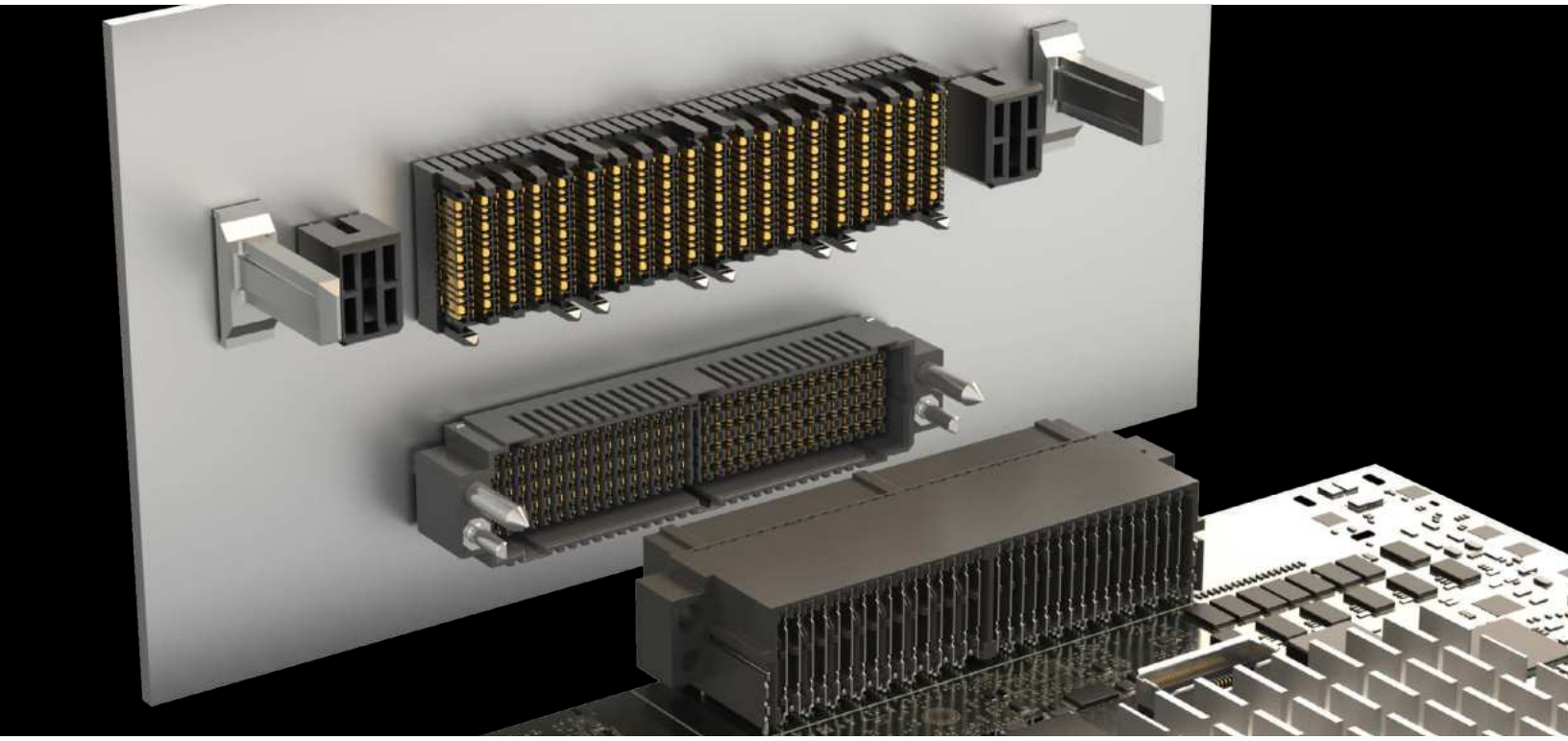


PCIe® 4.0 & 5.0/6.0 mating cable assemblies available (PCIEC-G4, PCIEC-G5)

1.00 mm PITCH MICRO PLANE SOCKETS

- 40 to 80 I/Os per pair
- Mounts in pairs on same or opposite sides for easy signal routing
- BeCu contacts with large deflection
- PCI Express® 3.0 capable
- Mounting flexibility for variable mating card thickness and pass-through applications

HIGH-SPEED BACKPLANE SYSTEMS



NOVARAY® MICRO RUGGED BACKPLANE

- Ultra high-density with up to 128 differential pairs in a single connector
- Offset footprint for optimal signal integrity
- Reliable two points of contact for stub free mating
- Configurable signal banks for design flexibility
- NovaRay® wafer design eliminates intra-pair skew while large continuous ground blades between and surrounding the differential pairs removes resonances
- Optional guidance and keying supports blind mate applications

NVBF/NVBM-RA

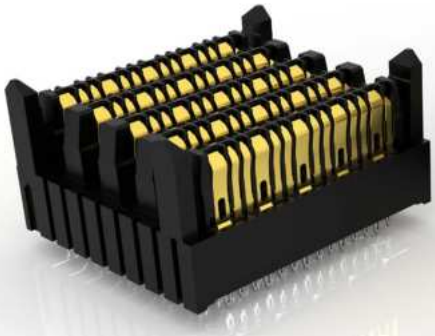
Precision insert molded contact system with 2.50 mm wipe

IN DEVELOPMENT:
Flyover® cable assembly for extended signal reach

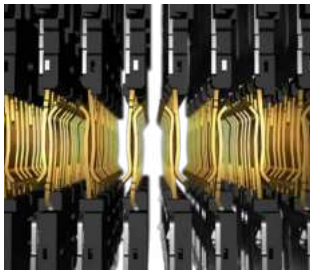
EXAMAX® HIGH-SPEED BACKPLANE

- Meets industry specifications such as PCI Express®, Intel OPI and VPI, SAS, SATA, Fibre Channel, InfiniBand™ and Ethernet
- PCIe® 6.0/CXL® 3.1 capable
- Exceeds OIF CEI-28G-LR specification for 28 Gbps standards
- 24 - 72 pair designs (4 and 6 pairs; 6, 8, 10 and 12 columns)
- Wafer design increases isolation for reduced crosstalk
- Press-fit tails provide a reliable electrical connection
- Add-on power and discrete guidance modules available
- Cable assemblies available (see pages 24 - 25)

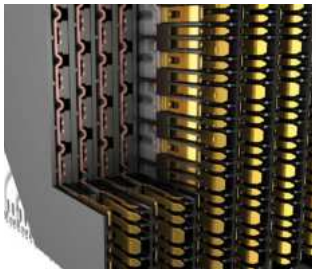
EBTM/EBTF-RA



ExaMAX® | PAM4 64 Gbps

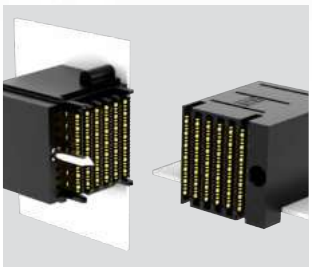


Two reliable points of contact



Staggered differential pair design with an embossed ground plane

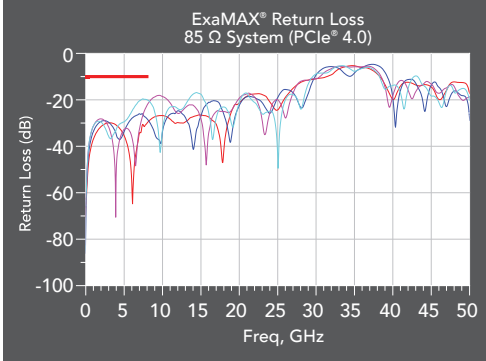
Coplanar available to bypass the midplane (EBTM-RA)

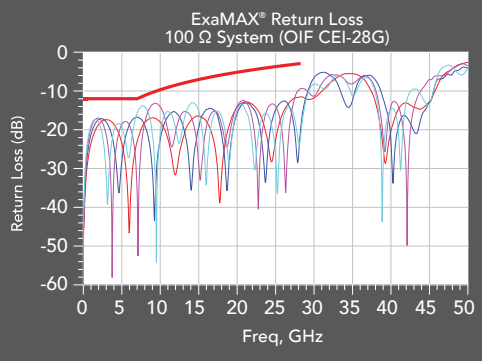


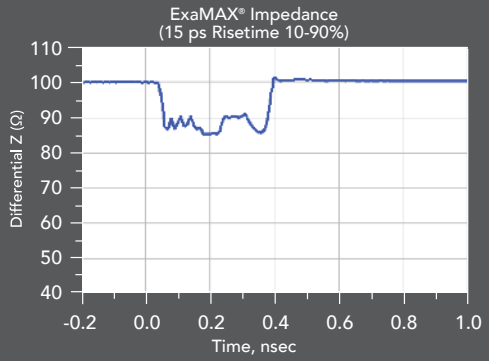
Direct-mate orthogonal (EBDM-RA) eliminates the midplane for a shorter signal path

PERFORMANCE CHARTS

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



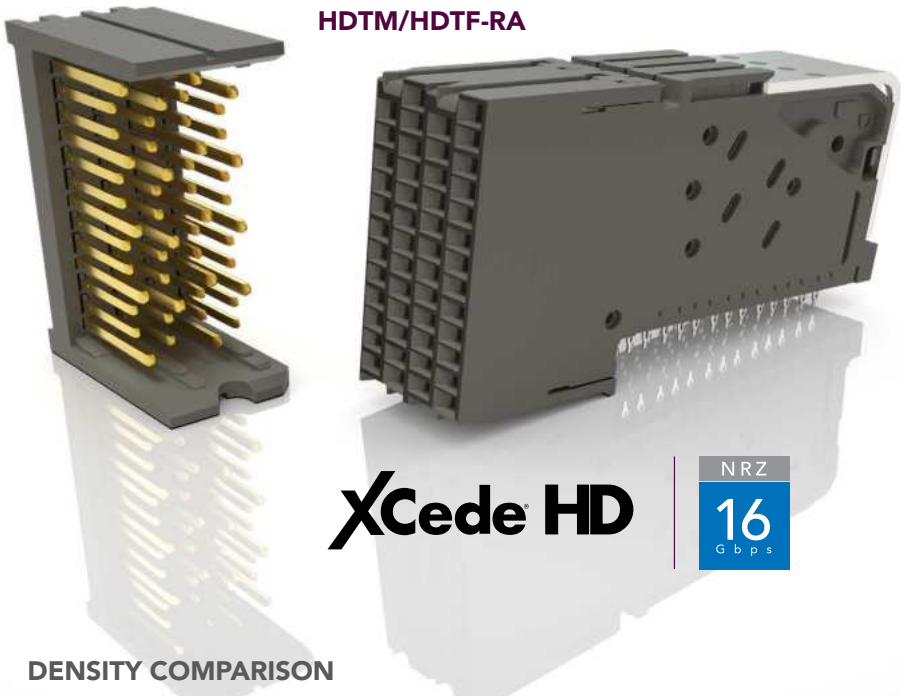




ExaMAX® is a trademark of AFCI

XCEDE® HD HIGH-DENSITY BACKPLANE

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



SMALL FORM FACTOR

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

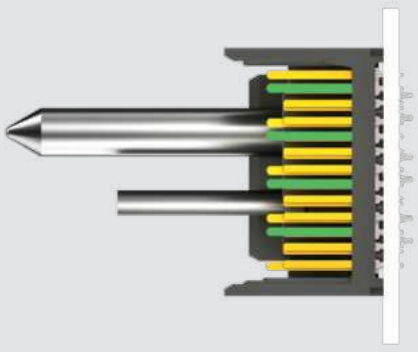
DENSITY COMPARISON

XCede® HD
Up to 84 pairs
per linear inch

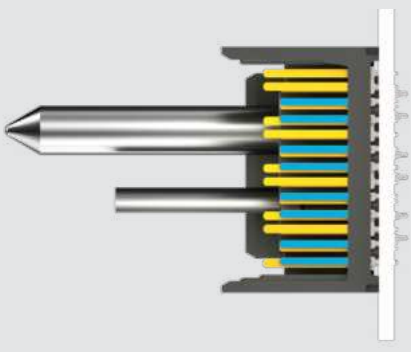
Traditional Backplane
Up to 76 pairs
per linear inch

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

SIGNAL/GROUND PIN STAGING



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



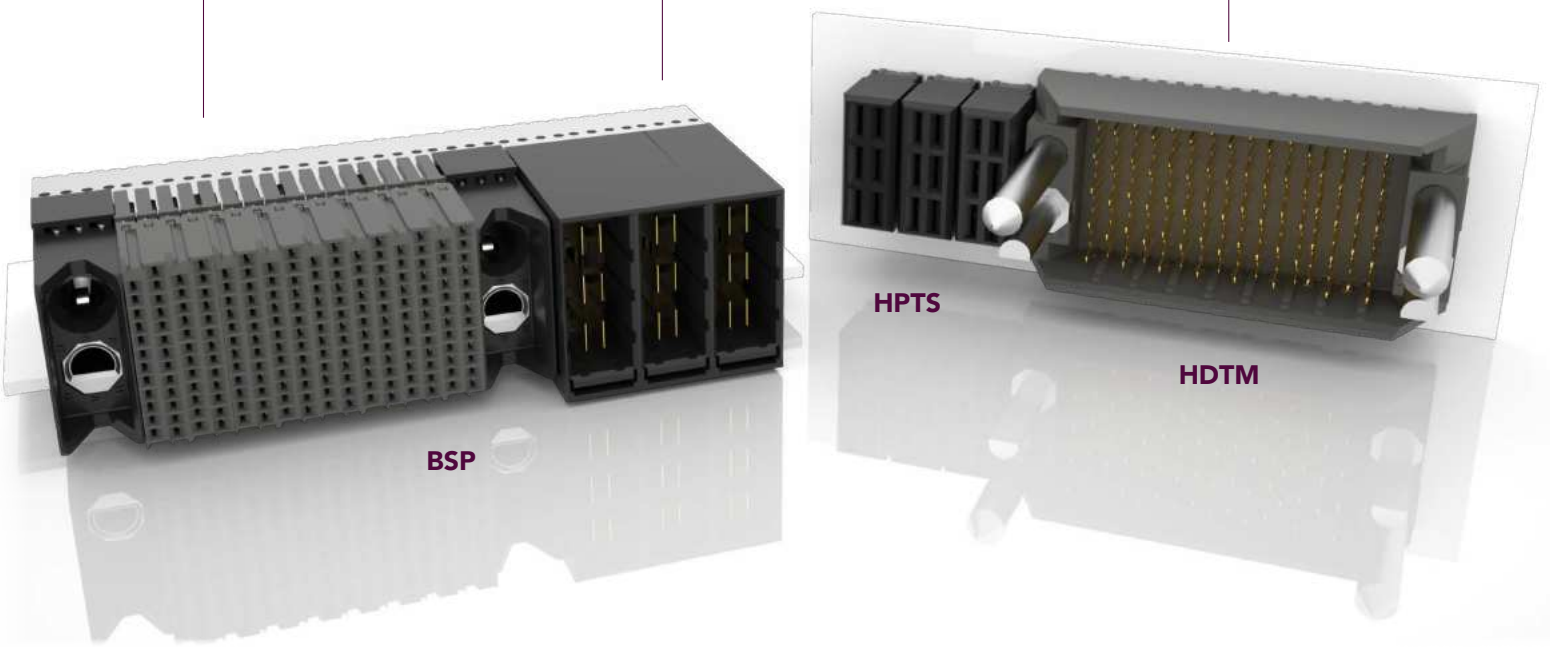
Signal Pins
Signal pin pairs achieve up to 3.00 mm contact wipe for a reliable connection

MODULAR DESIGN

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

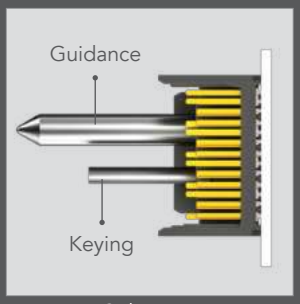
How to build a full solution:

1. Right-angle modules can be built into a single customizable BSP
2. Build a BSP part by combining any number, in any configuration, of HDTFs, power and keying/guidance modules to create one receptacle
3. Header modules mount to the backplane individually, in any configuration of HDTM and HPTS Series

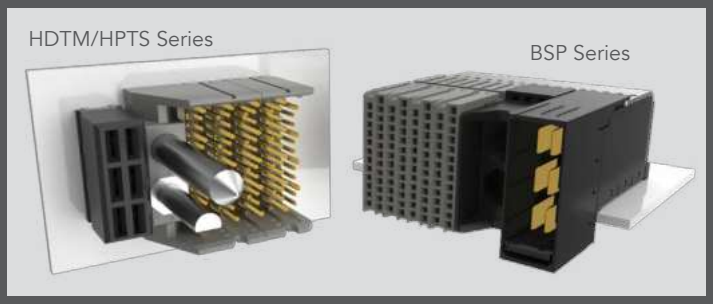


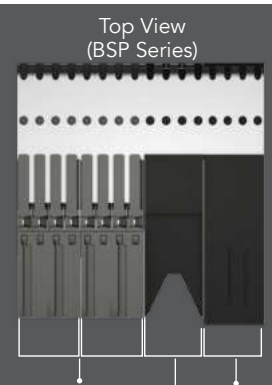
XCede® is a registered trademark of Amphenol Corporation.

PRODUCT BREAKDOWN
(BSP Custom Configuration Shown)



Side View
(HDTM/HPTS Series)





EXAMAX® BACKPLANE CABLE ASSEMBLIES

- Utilizes Samtec's Eye Speed® ultra low skew twinax cable technology for improved signal integrity, increased flexibility and routability
- PCIe® 6.0/CXL® 3.1 capable
- Highly customizable with modular flexibility
- Reduce costs due to lower layer counts
- 4 and 6 pairs; 4-16 columns
- 30 and 34 AWG
- Multiple end 2 options available
- Integrated guidance and keying options
- Cable-to-DMO (Direct Mate Orthogonal) available

ExaMAX®

PAM4 112 Gbps

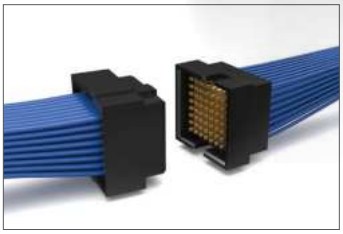
EBCF

EBTM/ EBCL

ALSO AVAILABLE

Roadmap: 8 pairs for greater design flexibility

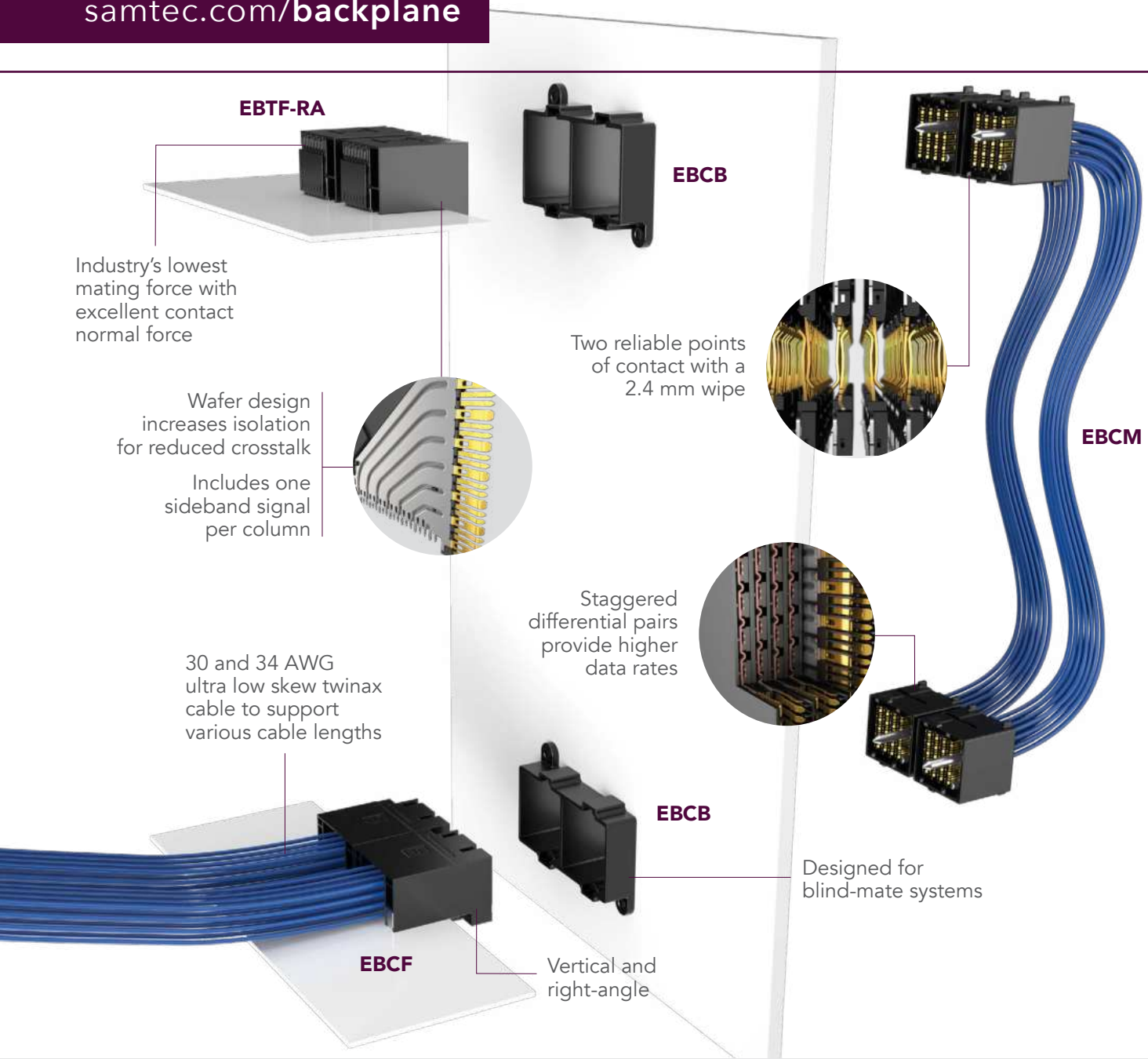
ExaMAX® I/O cable systems also available (EBCE/EBTC)



In Development: 224 Gbps PAM4 SiFly™ Backplane with Eye Speed® AIR™ hyper low skew twinax

HIGH-DENSITY APPLICATION

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

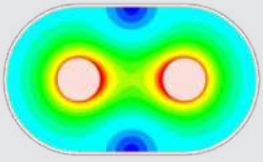


ULTRA LOW SKEW TWINAX CABLE

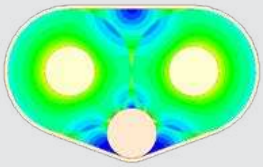
Samtec's Eye Speed® co-extruded twinax cable technology eliminates the performance limitations and inconsistencies of individually extruded dielectric twinax cabling, improving signal integrity, bandwidth and reach for high-performance system architectures.

- Ideal for 28-112+ Gbps applications
- Tight coupling between signal conductors
- Ultra low skew twinax < 3.5 ps/meter (intrapair)
- Improved signal integrity and eye pattern opening
- Improved bandwidth and reach

EYE® SPEED CABLE



✔ **Good** design coupling with Samtec's co-extruded ultra low skew twinax



✖ **Bad** design coupling with individually extruded conductors & drain wire

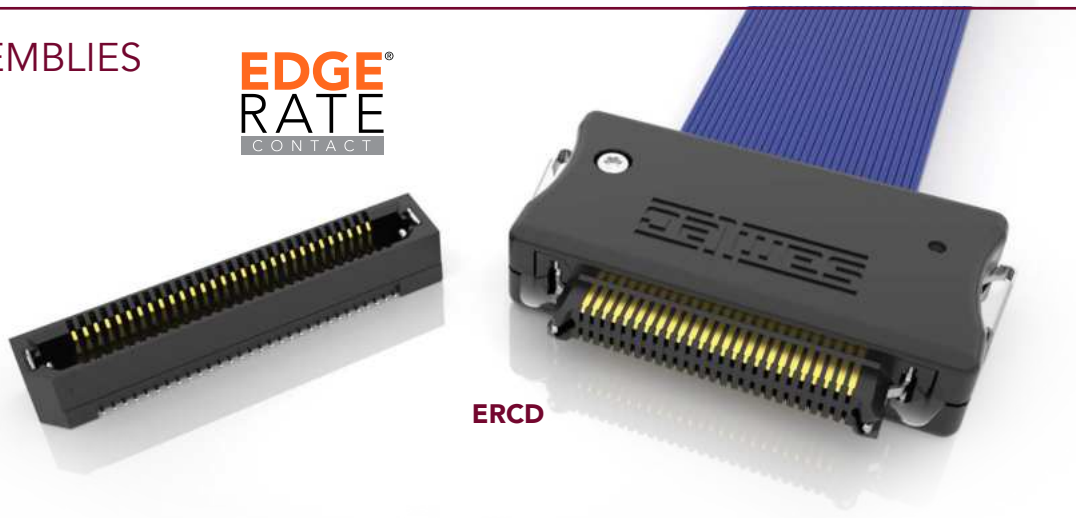
HIGH-SPEED CABLE ASSEMBLIES

HIGH-DENSITY ASSEMBLIES

- NovaRay® up to 112 Gbps PAM4; 34 AWG ultra low skew twinax (NVAC/NVAM-CT)
- AcceleRate® HP up to 112 Gbps PAM4; 34 AWG ultra low skew twinax or ThinSE™ coax cable; mixed DP/SE solution available (ARP6/APF6-L)
- AcceleRate® up to 64 Gbps PAM4; 34 AWG ultra low skew twinax (ARC6/ARF6)
- SEARAY™ up to 14 Gbps with 36 AWG coax or 32 AWG twinax cable (SEAC); mates with SEARAY™ connectors (page 8)
- SEARAY™ 0.80 mm up to 14 Gbps with 34 AWG coax cable (ESCA); mates with SEARAY™ 0.80 mm connectors (page 8)

EDGE RATE® ASSEMBLIES

- Up to 14 Gbps
- 34 AWG coax (ERCD); 30 AWG twinax (ERDP)
- Mates with 0.80 mm pitch Edge Rate® connectors (page 10)



Q SERIES® ASSEMBLIES

- Integral power/ground plane
- Up to 14 Gbps
- 34 and 38 AWG coax; 30 and 32 AWG twinax
- 0.50 mm (HQCD/HQDP) and 0.80 mm pitch (EQCD/EQDP) assemblies with screw mount and retention pin options
- 0.80 mm pitch (EQRD/EQRP) assemblies with Edge Rate® contacts
- Mates with Q Series® connectors (page 12)

ULTRA MICRO ASSEMBLIES

- Hermaphroditic Razor Beam™ coax assemblies with rugged shielding (HLCD)
- 38 AWG coax cable
- Mates with 0.50 mm pitch Razor Beam™ connectors (page 15)

EDGE CARD ASSEMBLIES

- Up to 64 Gbps PAM4 with 34 AWG ultra low skew twinax (GC6); mates with 0.60 mm Generate™ edge card (page 16)
- Up to 14 Gbps with 30 AWG twinax cable (ECDP); mates with 0.80 mm Generate™ edge cards (page 17)

PCI EXPRESS® ASSEMBLIES

- PCIe® 2.0 and 3.0; 30 or 32 AWG twinax cable with 30 AWG insulated ribbon (PCIEC)
- PCIe® 4.0 and 5.0/6.0; 34 AWG twinax cable with 30 AWG insulated ribbon (PCIEC-G4 and PCIEC-G5)
- PCIe® 4.0 and 5.0 test cables with 2.92 mm RF connectors for debugging (PCRF-G4 and PCRF-G5)
- Mates with PCI Express® edge cards (page 19)

EVALUATION & DEVELOPMENT KITS

Samtec Evaluation and Development Kits provide system designers and engineers easy-to-use platforms for testing many of Samtec's popular products, helping to simplify the design process and reduce time to market.

Each kit includes the evaluation platform, calibration board(s), technical documentation and test reports. Additionally, each kit is tested and verified by Samtec's signal integrity experts before customer delivery. Visit samtec.com/kits or contact kitsandboards@samtec.com for current availability.

SI EVALUATION KITS

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

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

NovaRay® Extreme Density Arrays (NVAM/NVAF)

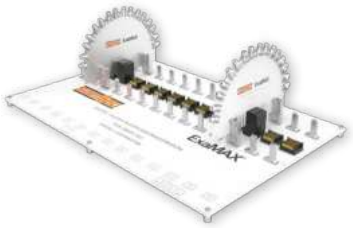
SEARAY™ High-Density Arrays (SEAM/SEAF, SEAM-RA/SEAF-RA)

LP Array™ Low Profile Arrays (LPAM/LPAF)

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

Generate™ 0.60 mm Pitch Edge Card (HSEC6-DV)

Generate™ Differential Pair Edge Card (HSEC8-DP)



ExaMAX® High-Speed Backplane (EBTF-RA/EBTM)

FPGA KITS

FMC+ HSPC Loopback Card (Extender Card Available)

FMC+ HSPC / HSPCe Loopback Card (Extender Card Available)

ExaMAX® Loopback Card for Xilinx® Virtex® UltraScale™ VCU110 Kit

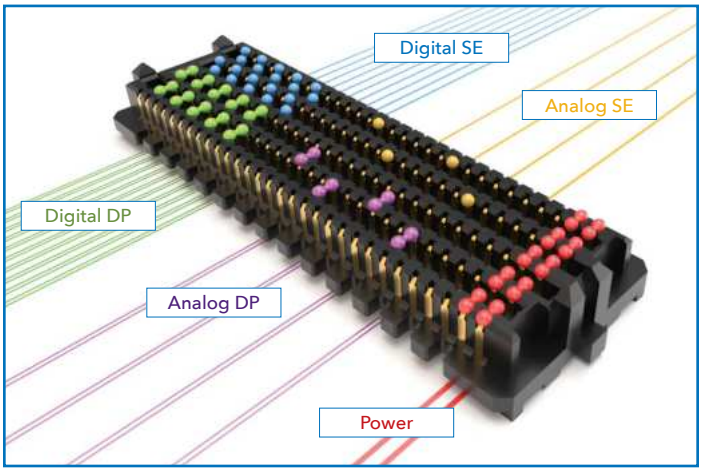
ANALOG OVER ARRAY™ & CUSTOM SOLUTIONS

ANALOG OVER ARRAY™ REFERENCE DESIGNS & EVALUATION KITS

High density RF applications typically require up to hundreds of individual RF connectors. Samtec Analog Over Array™ connectors can replace dozens of precision RF connectors offering a smaller footprint, less weight and cost optimization. Visit **samtec.com/kits** or email **SIG@samtec.com**.

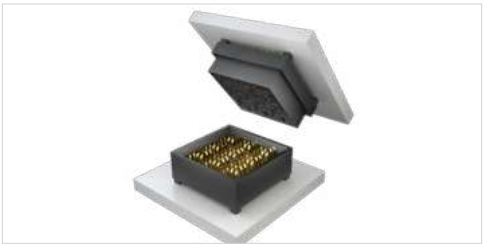
- Open-pin-field design with maximum routing and grounding flexibility
- Analog and digital signals (differential pairs and/or single-ended) plus power though the same interconnect
- Single-ended ground pattern; differential supports RF SOCs

DC TO 15 GHz ANALOG OVER ARRAY™



CUSTOMS & EXPRESS MODIFICATIONS

- Up to 50 µ" Gold and Tin Lead plating available
- Polarized positions
- Modified contacts, bodies, stamping, plating, wiring, molding and much more
- Ruggedizing strain relief, plastic housings, screw downs, latches, locks, etc.
- Mix-and-match cable end options
- Non-cataloged cable standards available



WILLINGNESS, SUPPORT & EXPERTISE

Industry-Leading Customer Service

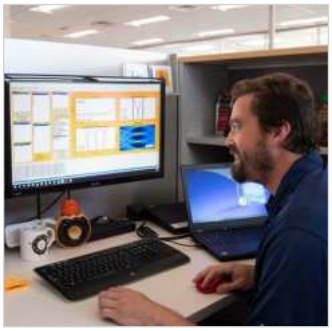
- Quotes and samples in 24 hours
- Prototype and processing assistance
- Dedicated Application Specific Product engineers and technicians

Flexible, In-House Manufacturing

- Global Operations, including multiple cable facilities
- Quick-turn samples and prototypes
- Custom & modified product support

Signal Integrity Expertise

- Industry-leading engineering support for high-performance system design
- Full system optimization assistance, including simulation, testing, analysis and evaluation

ULTRA RUGGED TESTING

SEVERE ENVIRONMENT TESTING (SET)

Severe Environment Testing (SET) is a Samtec initiative to test products beyond typical industry standards and specifications for performance confidence in rugged/harsh environment industries. These products undergo additional testing, inspired by military standards, to ensure they are more than suitable for military, space, automotive, industrial and other extreme applications.

SET qualified products are Commercial Off-the-Shelf (COTS) and modified COTS for incredible design flexibility to get solutions to market faster. Visit samtec.com/SET or contact SET@samtec.com for additional information and current available test results.

MEETS OR EXCEEDS:

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

LOT SCREEN TESTING

Lot screen sample-size testing to MIL-DTL-55302 available to ensure product meets required specifications. Military/Aerospace Product (MAP) required; contact mapsales@samtec.com

SET QUALIFIED PRODUCTS

SFM / TFM Tiger Eye™ 1.27 mm Pitch Micro Rugged System
SEAF / SEAM SEARAY™ High-Density Arrays
LSHM Razor Beam™ Hermaphroditic Strips
SSM / TSM .100" Pitch Square Post Header & Socket
FTSH / CLP .050" Pitch Header & Socket
ERF8 / ERM8 Edge Rate® Rugged High-Speed Strips
S2M / T2M Tiger Eye™ 2.00 mm Pitch Micro Rugged System
UMPS / UMPT mPOWER® Ultra Micro Power Connectors
SEAF8 / SEAM8 SEARAY™ 0.80 mm Ultra-High Density Arrays
B1SDT / P1M URSA™ I/O Ultra Rugged Power System

NASA

Samtec's SET products are approved for NASA Class D missions that require high-reliability, quick-turn and cost-effective solutions for LEO satellites, SmallSats, CubeSats and other space exploration applications.

Samtec also utilizes NASA outgassing data to determine if certain products meet NASA's ASTM E595-77/84/90 test requirements. Visit outgassing.nasa.gov for data.

EXTENDED LIFE PRODUCT™

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.

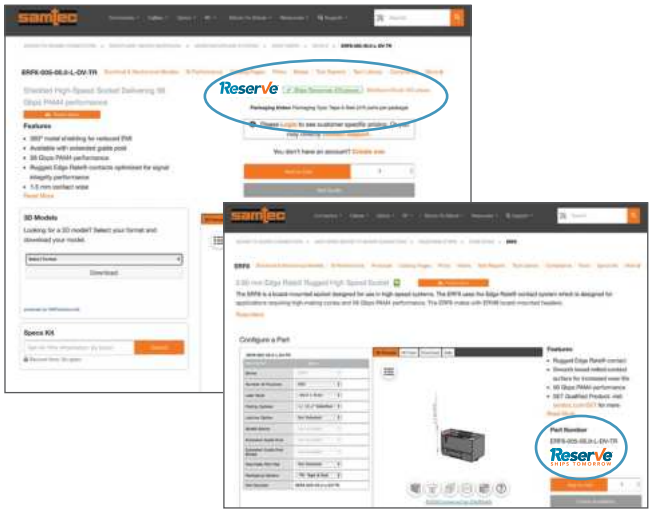
SAMTEC SUDDEN SERVICE®

UNMATCHED LEAD-TIMES | Innovative Programs & Systems Enable Deliveries in Days, Not Weeks.

Reserve™ SHIPS TOMORROW

This designation allows customers to **quickly and easily identify availability of over 200,000 of Samtec's most popular connectors and cables – guaranteed to ship in 1-day.**

Look for the **Reserve** badge throughout **samtec.com** to quickly determine if your part number is eligible, along with current availability, quantity breaks and pricing. Hundreds of part numbers are being added daily!



24HOUR 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 quickly request your sample.

2DAYS WORLD DIRECT™

An innovative shipping program that **bridges the gap between manufacturing facilities and customers**, allowing for manufacturing flexibility without increased costs, and with even faster lead-times. Contact **ecustomerservice@samtec.com** to learn more.

24/7 WORLDWIDE ACCESS | Samtec is the Electronics Industry's Service & Technology Leader.

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 Managers & CSRs: **ecustomerservice@samtec.com**

Upfront, Aggressive 24-Hour Quotes: **pricing@samtec.com**

MYSAMTEC™ | A Personalized Web Experience for Easy Ordering.

Samtec's user-friendly eCommerce platform allows you to quickly and easily check product availability and pricing, as well as place and manage your orders online.

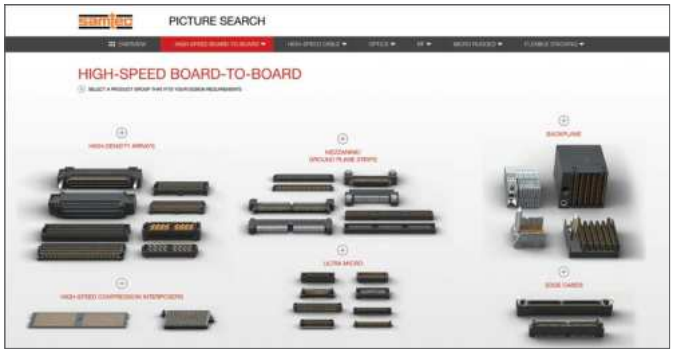
mySamtec™
account.samtec.com

ONLINE TOOLS | Find, Design & Validate Your Solution

Quickly and easily find the right solution, whether you prefer to search by product name or characteristics, browse through pictures, or build an assembly by entering physical specifications.

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**.



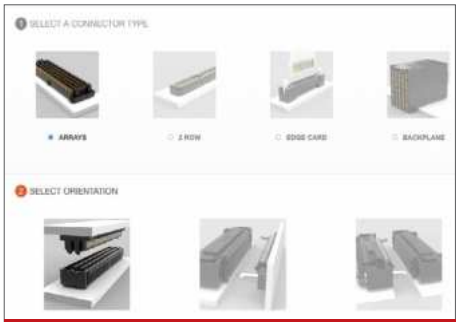
DOWNLOADS

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®

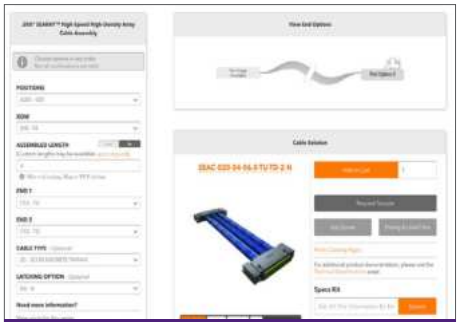
Quickly build mated connector sets or design full cable assemblies using a wide variety of user-defined search parameters and filters, view specs and order samples in Samtec's online design tools.

Solutionator HS GET A MATED SET IN SECONDS BOARD TO BOARD



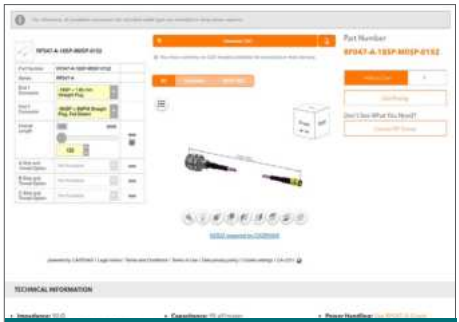
samtec.com/hsb2b-solutionator

Solutionator HS DESIGN IN A MINUTE CABLE



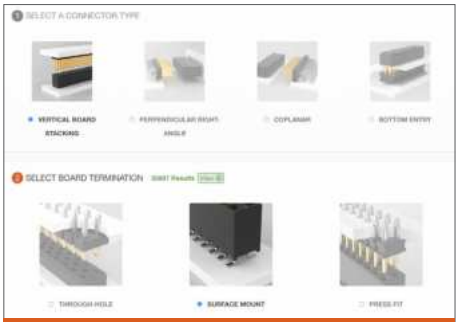
samtec.com/cablebuilder

Solutionator RF DESIGN IN A MINUTE CABLE



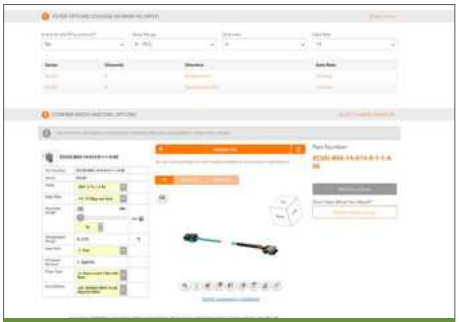
samtec.com/rf-cablebuilder

Solutionator FLEX GET A MATED SET IN SECONDS STACKING



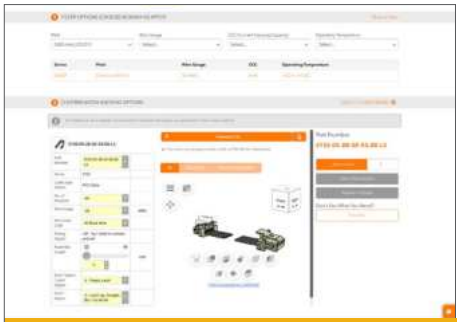
samtec.com/flex-solutionator

Solutionator ACTIVE OPTICS DESIGN IN A MINUTE



samtec.com/optics-solutionator

Solutionator DISCRETE WIRE DESIGN IN A MINUTE

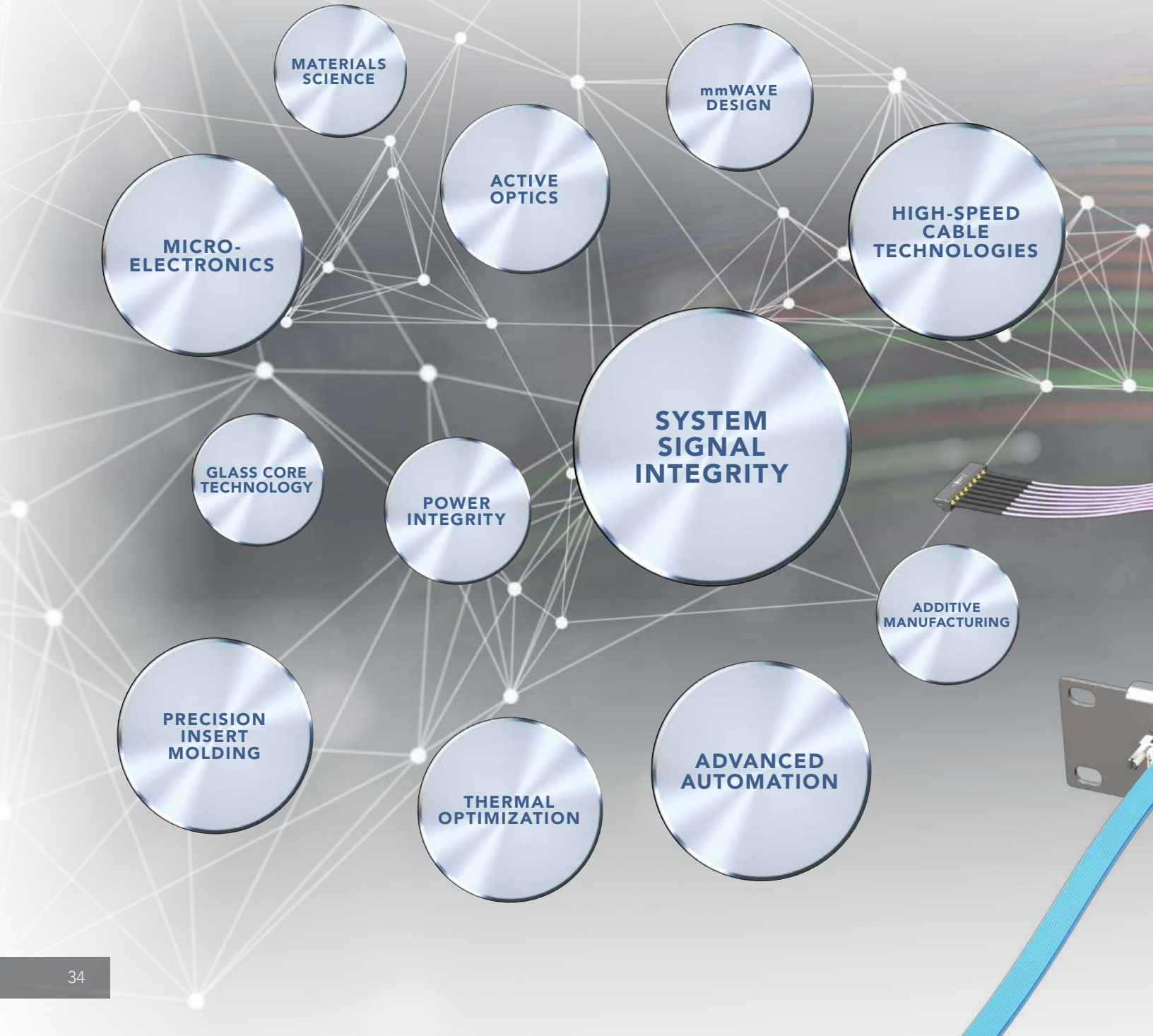


samtec.com/discrete-cablebuilder

INTEGRATION LEADS TO INNOVATION

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.**

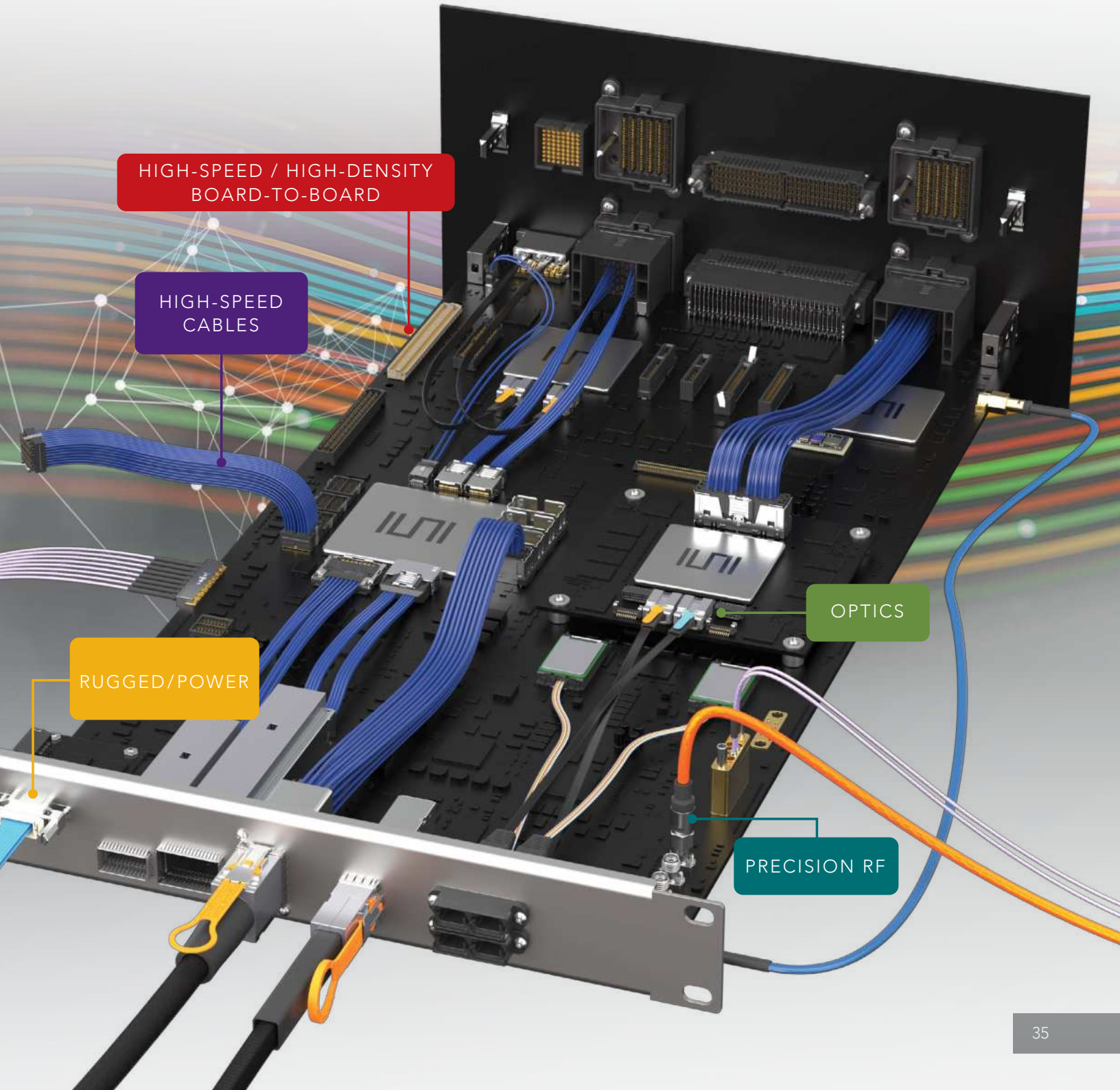
Samtec is structured like no other company in the interconnect industry. We work in a fully integrated capacity that enables true collaboration and results in uniquely innovative **PRODUCTS** because **our technology teams are not limited by the boundaries of traditional business units.**



SILICON-TO-SILICON™ SOLUTIONS

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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