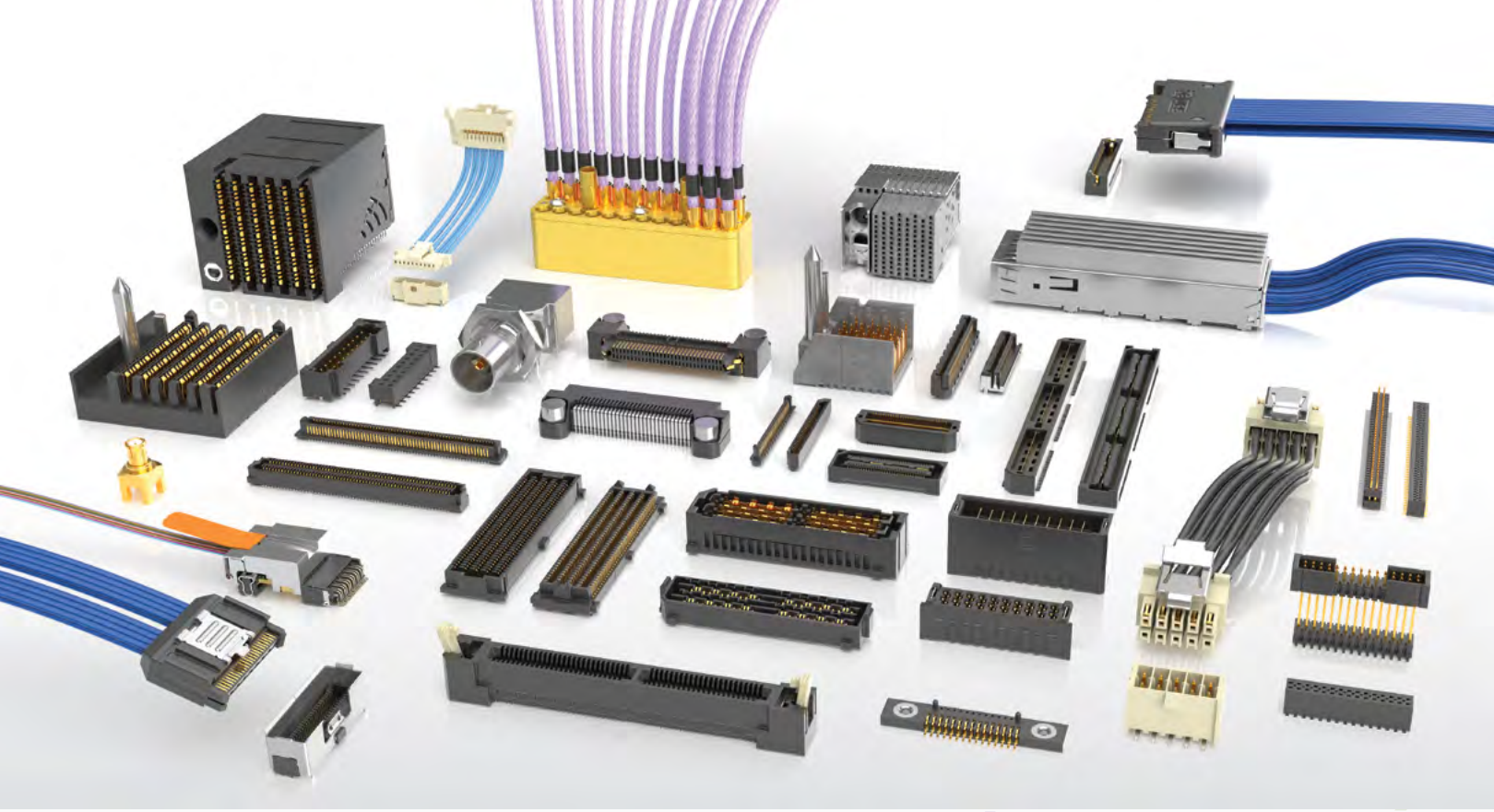
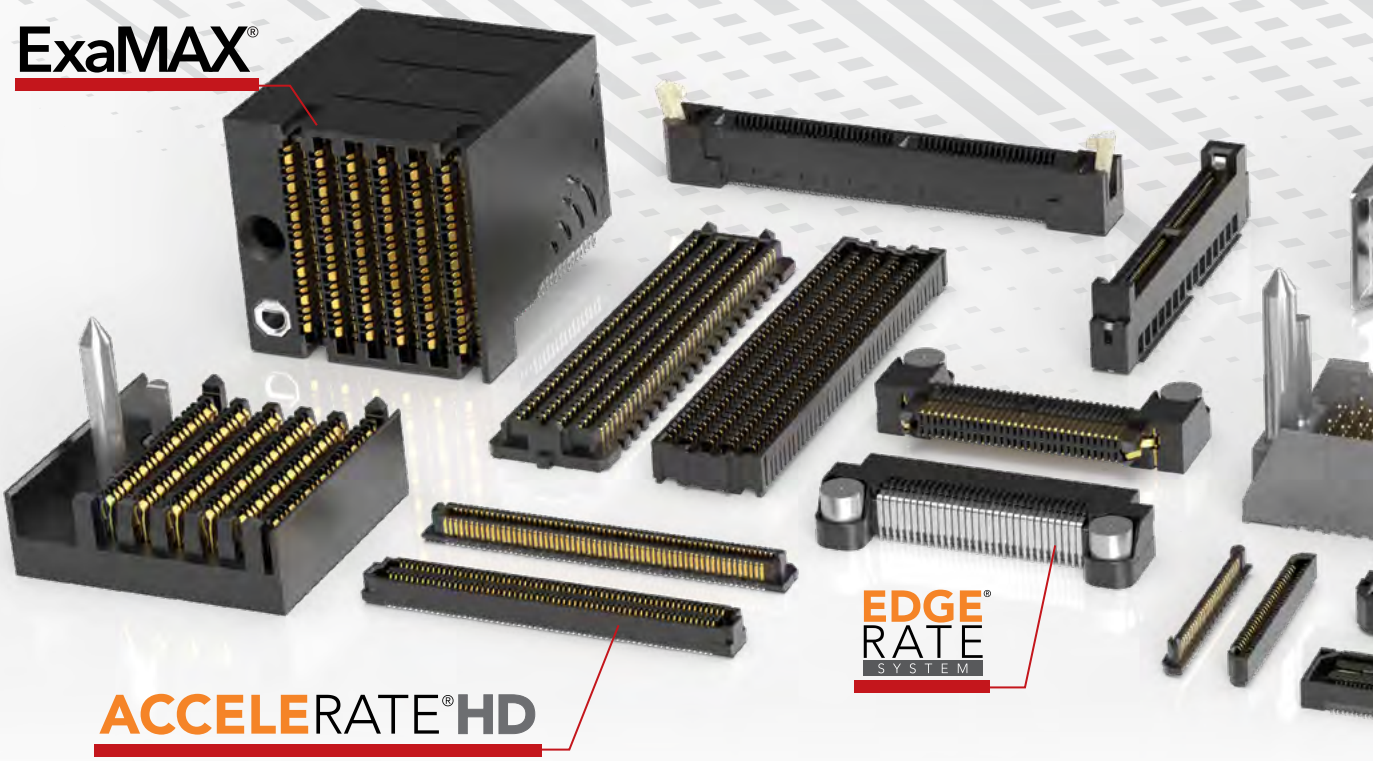


samtec

PRODUCT OVERVIEW

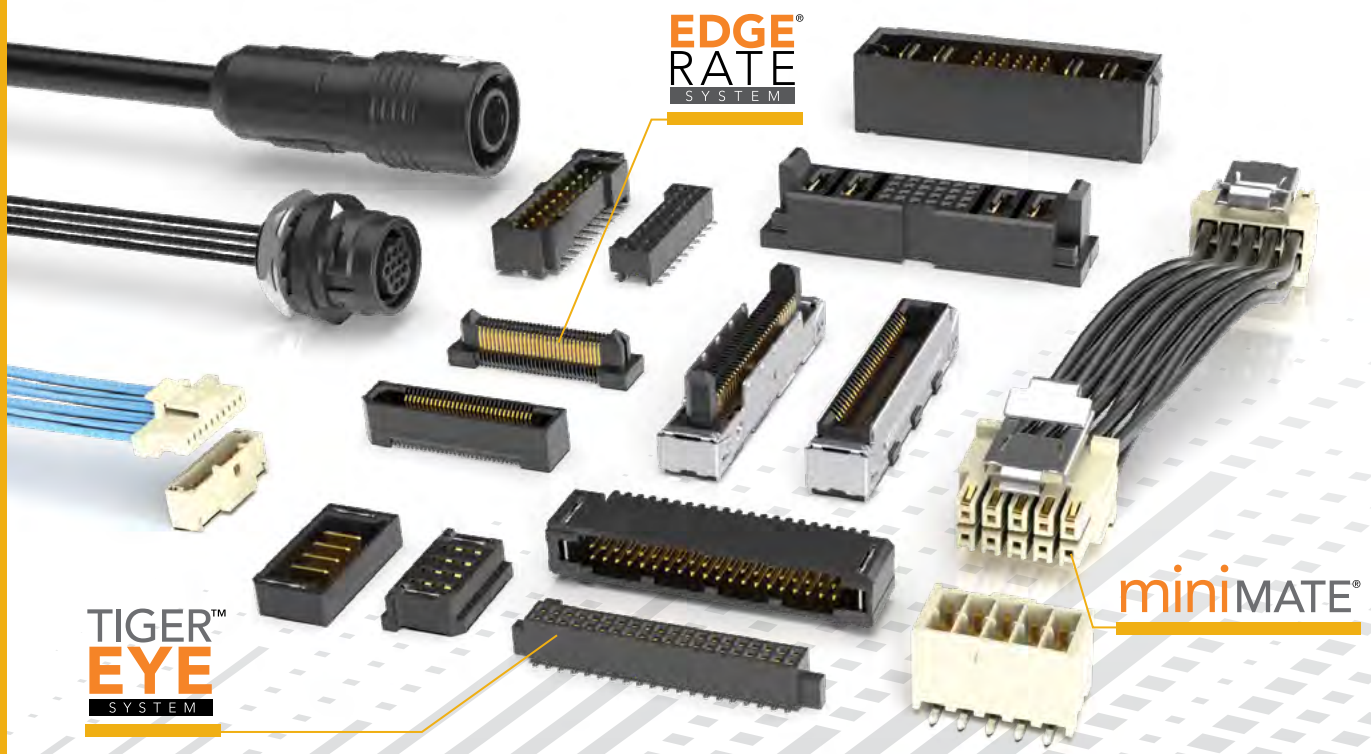
HIGH-SPEED BOARD-TO-BOARD

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



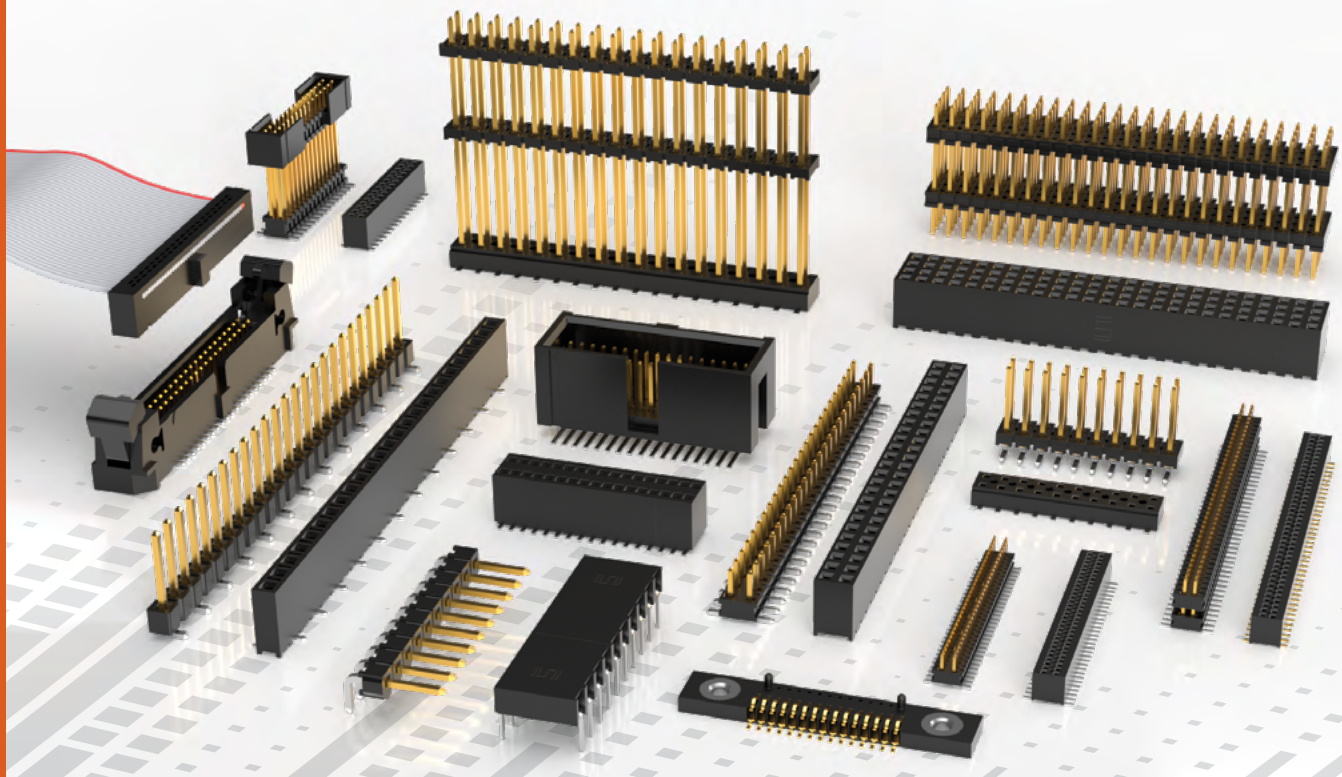
MICRO/RUGGED

RUGGED CONTACT SYSTEM | FLEX POWER | RUGGED SI | MICRO SEALED I/O



FLEXIBLE STACKING

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

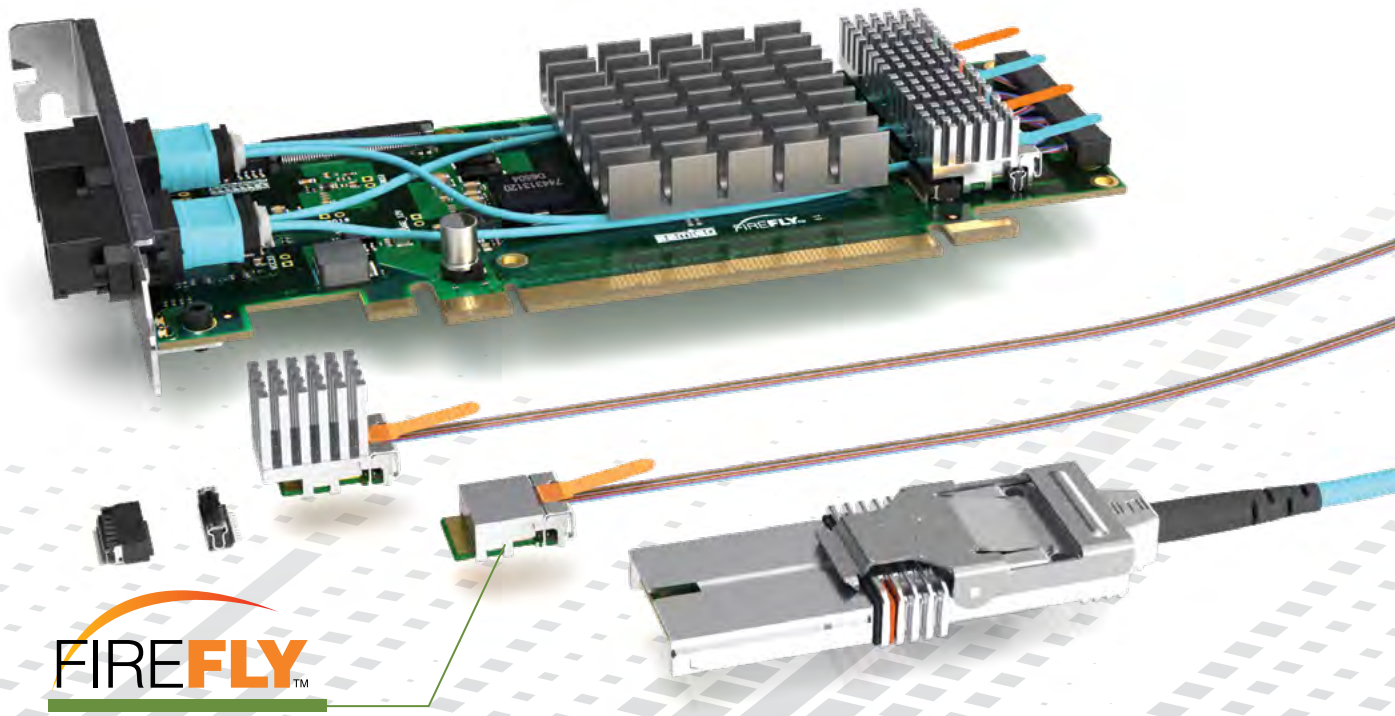


HIGH-SPEED CABLES

FLYOVER™ | MID-BOARD & PANEL | BACKPLANE | MICRO COAX & TWINAX

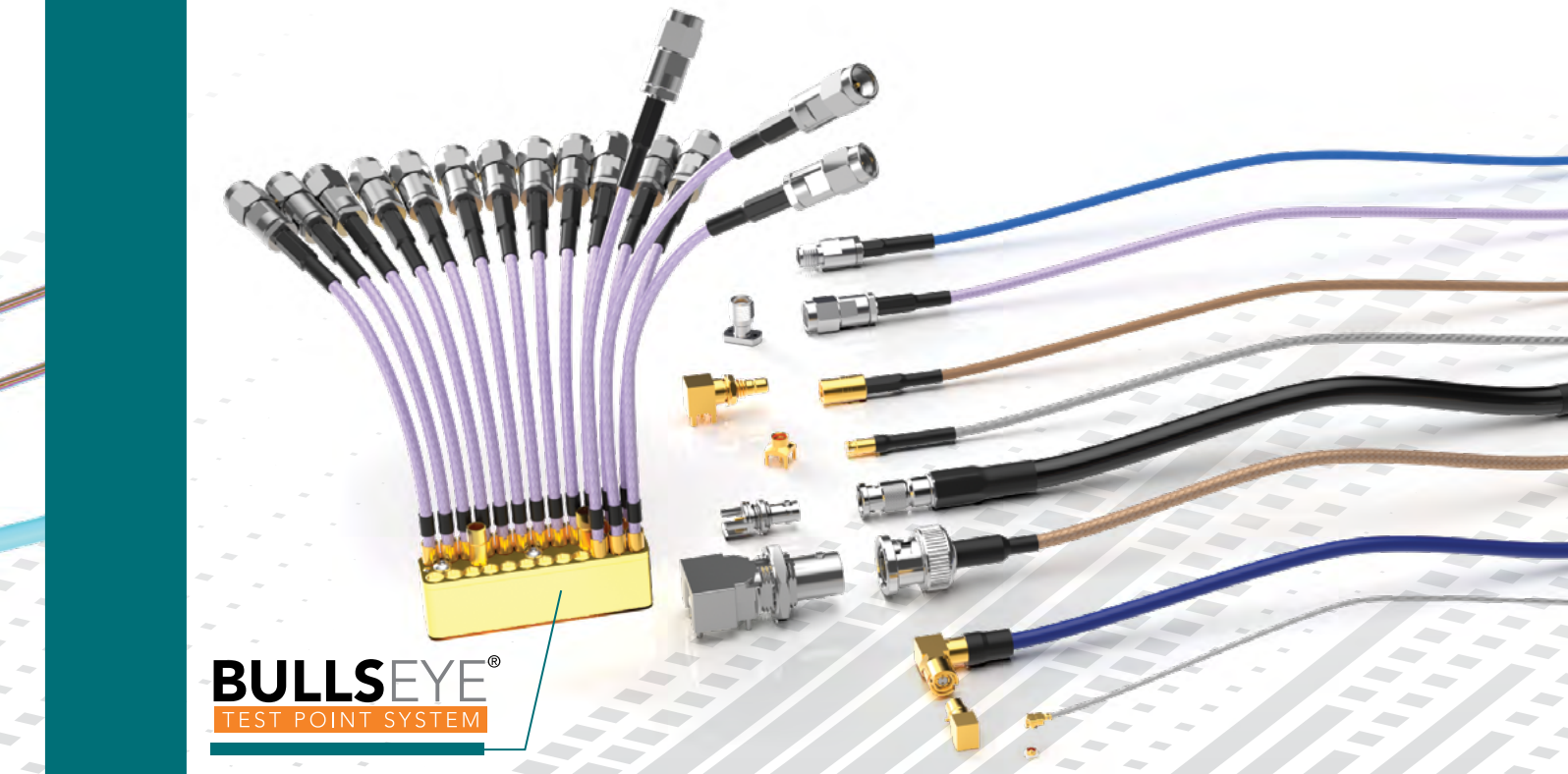
OPTICS

MICRO FLYOVER™ | EXTENDED TEMP | PCIe®-OVER-FIBER | I/O INTERFACES



RF

PRECISION RF | 50 Ω SOLUTIONS | 75 Ω SOLUTIONS | ORIGINAL SOLUTIONS



SUDDEN SERVICE® ADVANTAGE

Samtec, the service leader in the electronic interconnect industry, was founded in 1976 and is headquartered in New Albany, Indiana. We are committed to providing exceptional service, quality products, innovative technologies and convenient design tools.

#1 CONNECTOR MANUFACTURER
BISHOP & ASSOCIATES

SOLUTION BLOCKS

From standard cataloged products to unique high-performance designs, Samtec's solution blocks are designed to support any interconnectivity need, regardless of application, performance requirements or environment.

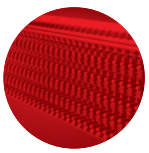
Silicon-to-Silicon

Core Board-to-Board

HIGH-SPEED BOARD-TO-BOARD | **HIGH-SPEED CABLE** | **OPTICS** | **RF** | **MICRO/RUGGED** | **FLEXIBLE STACKING**

TECHNOLOGY CENTERS | www.samtec.com/tech-centers

Our Technology Centers are comprised of industry-leading experts who provide effective strategies, technical support and advanced product solutions for optimizing the entire signal path of a system.



ADVANCED INTERCONNECTS

High precision stamping, plating, molding and automated assembly

HIGH-SPEED CABLE

In-house R&D and manufacturing of precision extruded cable and assemblies

OPTICS

R&D, design, development and support of micro optical engines and assemblies

SYSTEM SIGNAL INTEGRITY

Full channel signal and power integrity analysis, testing and validation services

PRECISION RF

RF interconnect design and development expertise, with testing to 65 GHz

MICROELECTRONICS

Advanced IC packaging design, support and manufacturing capabilities

SUDDEN SERVICE®

Global Operations Network

Fast lead times - typically in days, not weeks - with upfront and aggressive 24 hour quotes, and no MOQs on standard catalog products.

Free Samples in 24 Hours

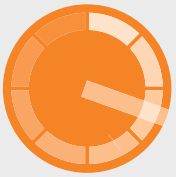
2 Day Shipping to All Major Markets

Most Products Ship in 3 Days

Online Tools - Design in a Minute

Innovative design tools, resources and support to make the design and implementation of your application simple.

Simulator™
SIMULATE IN A MINUTE



Solutionator®
DESIGN IN A MINUTE

Channelyzer®
FULL CHANNEL DESIGN

Picture Search
VISUAL PRODUCT LOCATOR

24/7 Worldwide Tech Support

www.samtec.com/support

10-19 **HIGH-SPEED BOARD-TO-BOARD**
- Extreme Performance and Ultra-High Density Arrays
- Ground Plane Connectors
- Edge Rate® Systems
- Hermaphroditic and Ultra-Low Profile Connectors
- Edge Card Systems
- Backplane Systems

20-27 **HIGH-SPEED CABLES**
- Flyover™ Technology & Cable Systems
- Micro Coax and Twinax Cable Assemblies

24-25 **OPTICS**
- FireFly™ Micro Flyover System™
- Active & Passive Optical Cables
- Test & Development Kits

28-31 **RF**
- Precision RF Interconnects
- Bulls Eye® Test Point Systems
- 50 Ω and 75 Ω Systems
- Unique Isolated Signal Systems

32-39 **MICRO/RUGGED**
- Tiger Eye™ Systems
- Rugged SI Solutions
- Flexible Power Solutions
- Sealed Circulars and Rectangulars
- Severe Environment Testing and Extended Life Product™

40-45 **FLEXIBLE STACKING**
- Flexible Board Stackers
- Contact Flexibility
- Board Stacking Reference
- IDC Systems
- Modified and Custom Products

TECHNOLOGY CENTERS

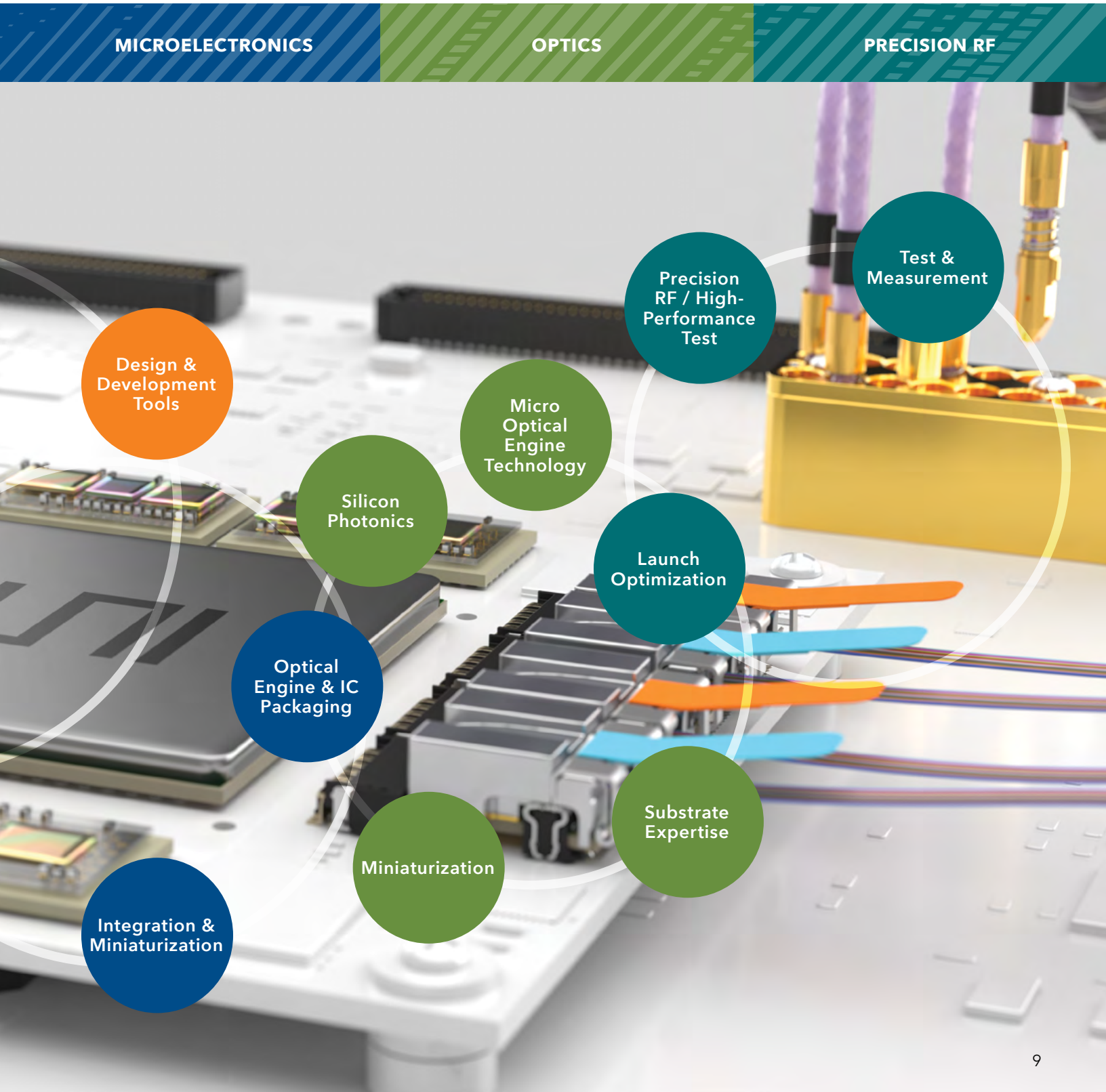
Silicon-to-Silicon Expertise & Support for the
Demands of Today and the **Challenges of Tomorrow.**

HIGH-SPEED CABLE | **ADVANCED INTERCONNECTS** | **SYSTEM SIGNAL INTEGRITY**

INTEGRATION LEADS TO **INNOVATION**

Increasingly complex systems with escalating bandwidths and shrinking footprints drive Samtec to continually expand and develop our technical expertise and capabilities.

Our Technology Centers are comprised of industry-leading experts who are dedicated to the **design and development of innovative products and technologies**, as well as effective **strategies and technical support for optimizing the entire signal path of a system**. Samtec Tech Centers are not limited by the boundaries of traditional business units, thus, allowing us to work in a fully integrated capacity that enables true collaboration and innovation for solutions to meet the demands of today, and the challenges of tomorrow.



HIGH-DENSITY ARRAYS

samtec.com/arrays

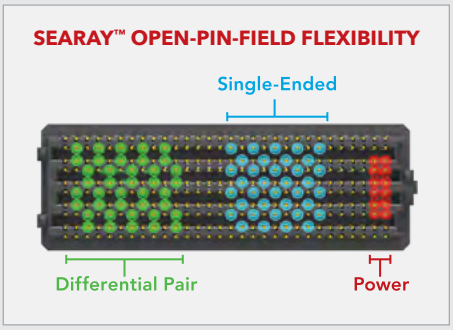
HIGH-DENSITY ARRAYS						LOW-PROFILE ARRAYS			
NVAM/NVAF	SEAM/SEAF	SEAR	SEAM8/SEAF8	LPAM/LPAF	TPAR/TPAF	ZA8	ZA8H	ZA1	GMI
NovaRay™	SEARAY™		SEARAY™ 0.80 mm	LP Array™	SkyRay™	Z-Ray®			Compression
0.80 mm x 1.80 mm pitch	1.27 mm x 1.27 mm pitch		0.80 mm pitch	1.27 mm x 1.27 mm pitch	1.50 mm x 1.75 mm pitch	0.80 mm pitch		1.00 mm pitch	
7 & 10 mm stack heights	7-18.5 mm stack heights	30 & 40 mm stack heights	7 & 10 mm stack heights	4, 4.5, 5 mm stack heights	35 mm stack height	1 mm stack height	0.33 mm stack height	1 mm stack height	1.27 & 2 mm stack heights
8, 12, 16, 24, 32 pairs	40-560 pins	240-500 pins	40-720 pins	40-400 pins	50, 100, 150 pins	100, 200, 300, 400 pins	24, 42, 48, 84, 96, 168 pins	100, 200, 300 pins	

EXTREME PERFORMANCE ARRAYS | NOVARAY™ | NRZ 56 Gbps PAM4 112 Gbps

- 4.0 Tbps aggregate data rate
- Very low crosstalk to 40 GHz+
- Incredibly tight impedance control
- 40% less space vs. traditional arrays with the same data throughout
- 112 differential pairs per square inch
- BGA for high-density, improved breakout region
- Guaranteed two points of contact for a more reliable connection

OPEN-PIN-FIELD ARRAYS | SEARAY™ | PAM4 56 Gbps

- Maximum grounding and routing flexibility
- Up to 560 single-ended I/Os or 140 differential pairs
- Rugged Edge Rate® contacts
- Solder charged terminations (IPC-A-610F & IPC J-STD-001F Class 3)
- Press-fit tails available (SEAMP/SEAFP)
- Standoffs available (JSO)
- Compatible with UMPT/UMPS for power/signal flexibility



ULTRA-HIGH DENSITY ARRAYS | SEARAY™ .8mm | PAM4 56 Gbps

- Up to 720 Edge Rate® contacts
- 2x the density of 1.27 mm pitch SEARAY™
- Compatible with UMPT/UMPS for power/signal flexibility
- 2.00 mm extended wipe version in development
- Standoffs available (JSO)

LOW-PROFILE ARRAYS | LP ARRAY™ | PAM4 56 Gbps

- 4 mm, 4.5 mm and 5 mm stack heights
- 4, 6 and 8 row designs, up to 400 total pins
- Dual beam contact system
- Solder crimped termination for ease of processing
- Compatible with UMPT/UMPS for power/signal flexibility
- Board stacking standoffs available (JSO)

ULTRA-LOW PROFILE ONE-PIECE ARRAYS | Z-RAY® | PAM4 56 Gbps

- Z-Ray® is ultra-flexible with custom or standard configurations in an incredibly low profile
- GMI Series is an ideal low-cost solution for board stacking, module-to-board or LGA interfaces

TECHNOLOGY ROADMAP

NOVARAY™ RIGHT-ANGLE

Right-angle NovaRay™ in development for increased mating flexibility, in high-speed applications (NVAM-RA).

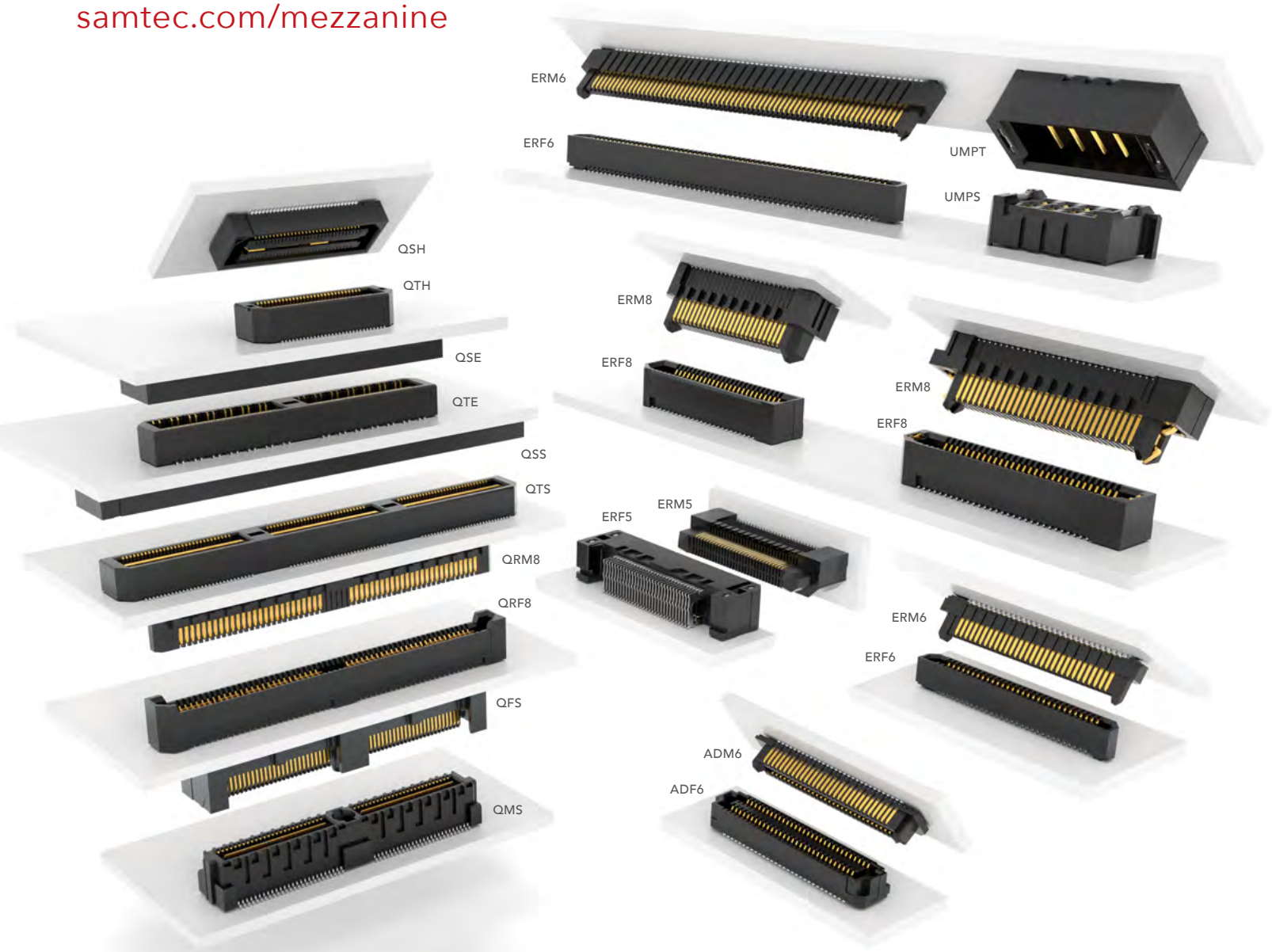
EXTREME DENSITY ARRAYS

NovaRay™ extension with higher bank and row counts for greater density in less space than traditional arrays (NVAM/NVAF).

For full SI Performance data visit samtec.com or contact sig@samtec.com. Other stack heights and pin counts available.

HIGH-SPEED BOARD-TO-BOARD

samtec.com/mezzanine



Q STRIP®				Q RATE®		Q2™		EDGE RATE®		
QTH/QSH		QTS/QSS	QTE/QSE			QMS/QFS, QMSS/QFSS		ERM5/ERF5	ERM6/ERF6	ERM8/ERF8
0.50 mm pitch		0.635 mm pitch	0.80 mm pitch			0.635 mm pitch		0.50 mm pitch	0.635 mm pitch	0.80 mm pitch
5–25 mm stack heights		5 & 8 mm stack heights	5–25 mm stack heights			10-16 mm (QXS) 11 mm (QXSS) stack heights		7–12 mm stack heights	5 mm stack height	7–18 mm stack heights
60,120, 180 (SE) Pins	40, 80, 120 (DP) Pins	50, 100, 150 (SE) Pins	40, 80, 120 (SE) Pins	28, 56, 84 (DP) Pins	52, 104, 156 (SE) Pins	36, 72, 108 (DP) Pins	52, 104, 156 (SE) Pins	32, 64, 96 (DP) Pins	20–150 (SE) Pins	20–120 (SE) Pins	10–200 (SE) Pins
Cable Mate: HQCD (50 Ω)	Cable Mate: HQDP (100 Ω)	Cable Mate: SQCD (50 Ω)	Cable Mate: EQCD (50 Ω)	Cable Mate: EQDP (100 Ω)	Cable Mate: EQRD		Contact Samtec for Cable Mate				Cable Mates: ERCD, ERDP

For full SI Performance data visit samtec.com or contact sig@samtec.com. Other stack heights and pin counts available.

TECHNOLOGY CENTER

ADVANCED INTERCONNECT DESIGN

Engineering and manufacturing innovation to ensure interconnect systems are designed for quality, design flexibility and ease of processing. Capabilities include high precision stamping, plating, molding and automated assembly for high-speed, fine pitch, array and micro rugged interconnects.

LOW-PROFILE GROUND PLANE CONNECTORS

QSTRIP® | 28 Gbps

- Low profile 5 mm stack height and up to 25 mm elevated height
- Choice of 0.50 mm, 0.635 mm or 0.80 mm pitch
- Compatible with UMPT/UMPS for power/signal flexibility
- Vertical, perpendicular and coplanar mating
- Latching, weld tabs and guide posts available for mating/retention

Integral power/ground plane rated for up to 25 A

SLIM GROUND PLANE CONNECTORS

QRATE® | 28 Gbps

- Edge Rate® contacts optimized for signal integrity performance
- 1.20 mm contact wipe
- Integral power/ground plane
- Right-angle for coplanar and perpendicular mating
- Compatible with UMPT/UMPS for power/signal flexibility

Slim 4.60 mm body width saves board space

RUGGED GROUND PLANE CONNECTORS

Q2™ | 25 Gbps

- Increased insertion depth for rugged applications
- Compatible with UMPT/UMPS for power/signal flexibility
- Vertical, right-angle and edge mount
- Integral power/ground plane
- Rugged shielding option
- 0.635 mm pitch

Power pins, retention pins and RF options

RUGGED HIGH-SPEED STRIPS

EDGE® RATE SYSTEM | PAM4 56 Gbps

- Choice of 0.50 mm, 0.635 mm or 0.80 mm pitch
- Up to 40% PCB space savings with 0.50 mm pitch system vs. 0.80 mm pitch system
- Extremely slim 2.5 mm body width on 0.635 mm pitch system
- Stack heights from 5-18 mm
- Rugged latching, locking and 360° shielding
- Up to 1.5 mm contact wipe
- Compatible with UMPT/UMPS for power/signal flexibility

Signal integrity optimized Edge Rate® contact system reduces broadside coupling

TECHNOLOGY ROADMAP

0.635 mm PITCH EDGE RATE®

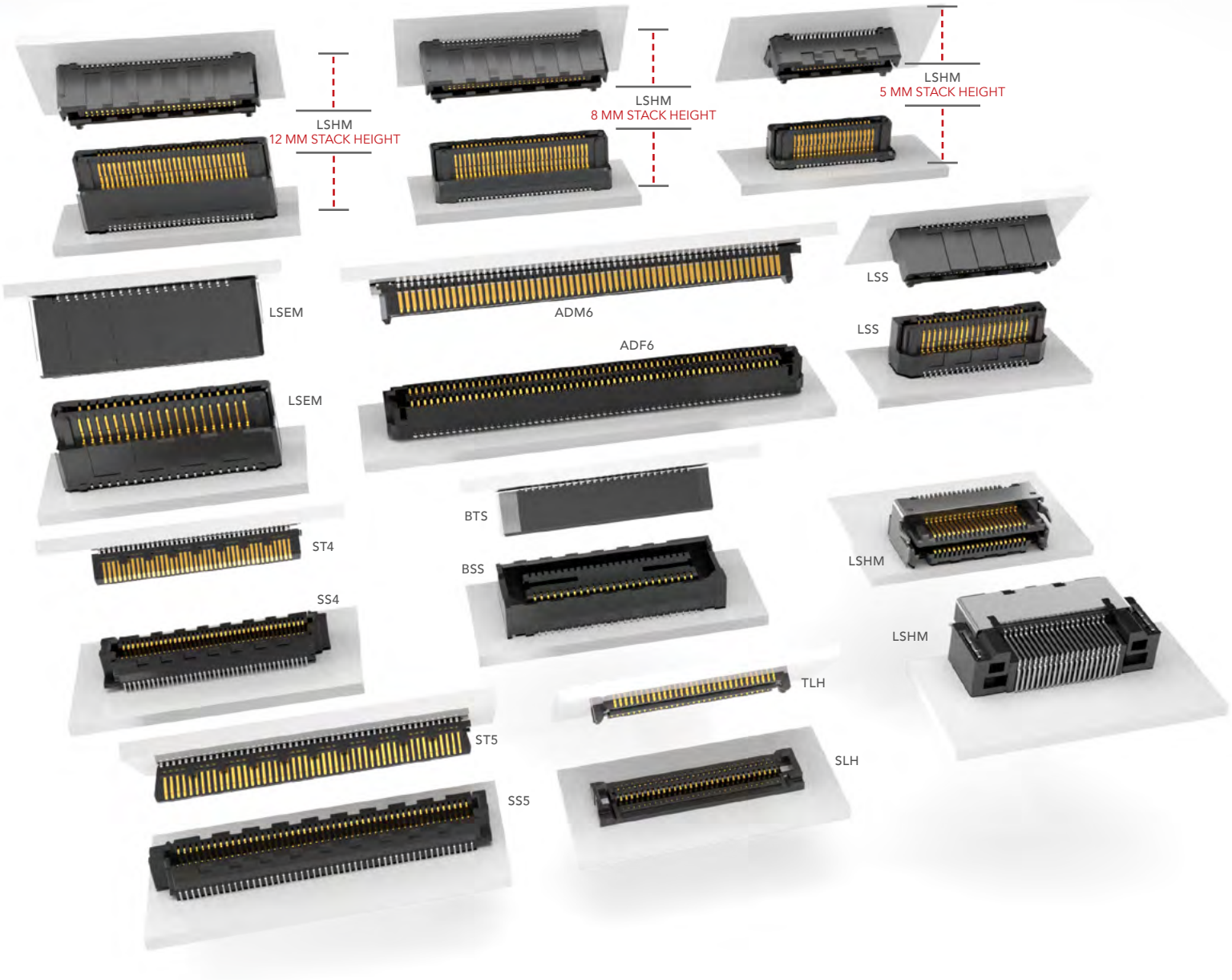
High-density, slim 2.5 mm body design with 56 Gbps PAM4 performance (ERM6/ERF6).

ACCELERATE®

High-speed 56 Gbps NRZ interconnects for next generation applications (APM6/APF6).

ULTRA MICRO INTERCONNECTS

samtec.com/micro



ACCELERATE® HD	RAZOR BEAM™ LP			RAZOR BEAM™			BLADE & BEAM		
ADM6/ADF6	ST4/SS4	ST5/SS5	TLH/SLH	LSHM	LSS	LSEM	LTH/LSH	BTH/BSH	BTS/BSS
0.635 mm pitch	0.40 mm pitch	0.50 mm pitch		0.50 mm pitch	0.635 mm pitch	0.80 mm pitch	0.50 mm pitch		0.635 mm pitch
5 mm stack height	4-6 mm stack heights	4-5 mm stack heights	2 mm stack height	5-12 mm stack heights	6-12 mm stack heights		2.31 mm stack height	5-22 mm stack heights	5 mm stack height
40-240 pins	20-100 pins	20-160 pins	20, 40, 60 pins	10-100 pins	20-100 pins	40-100 pins	20-100 pins	60-300 pins	50-200 pins

For full SI Performance data, visit samtec.com or contact sig@samtec.com. Other stack heights and pin counts available.

ULTRA-DENSE STRIPS

ACCELERATE®HD | PAM4 56 Gbps

- Up to 240 I/Os in a 4 row design
- 5 mm stack height and slim 5 mm body width
- Edge Rate® contacts optimized for signal integrity performance
- Open-pin-field design for grounding and routing flexibility
- Compatible with UMPT/UMPS for power/signal flexibility

Solder ball technology for simplified processing and self aligning

RUGGED HERMAPHRODITIC CONNECTORS

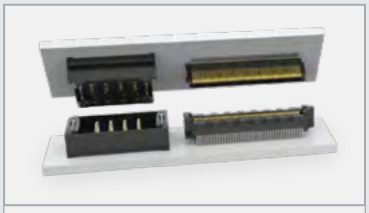
RAZOR™ BEAM SYSTEM | 25 Gbps

- Razor Beam™ contact for high-speed and fine-pitch systems
- 0.50 mm, 0.635 mm and 0.80 mm pitch
- 4–6x greater mating/unmating forces vs. typical micro pitch connectors
- Rugged 360° shielding available
- Self-mating connectors reduce inventory costs and can be interchanged for varying stack heights
- Jack screw standoffs available to assist with unmating (JSO)
- 0.50 mm pitch hermaphroditic cable assembly available (HLCD)

LOW-PROFILE STRIPS

RAZOR™ BEAM LP SYSTEM | PAM4 56 Gbps

- Ultra low stack height down to 2 mm
- Slim body designs for increased PCB space savings
- Ultra fine 0.40 mm and 0.50 mm pitch
- Jack screw standoffs (JSO Series) available for unmating assistance and protection from component damage
- Ultra-micro power available for power/signal applications (UMPT/UMPS)



Micro power and signal flexibility

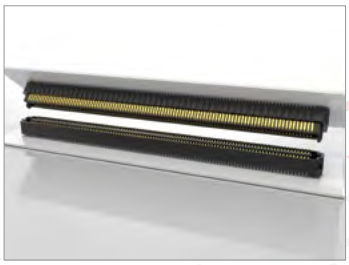
BASIC BLADE & BEAM CONNECTORS

BLADE& BEAM CONTACT

- Lower cost without integral ground plane
- 0.50 mm and 0.635 mm pitch
- Right-angle available for perpendicular application
- Polarized
- E.L.P.™ certified systems

Cost effective Blade & Beam contact system

TECHNOLOGY ROADMAP



ULTRA-DENSE STRIPS

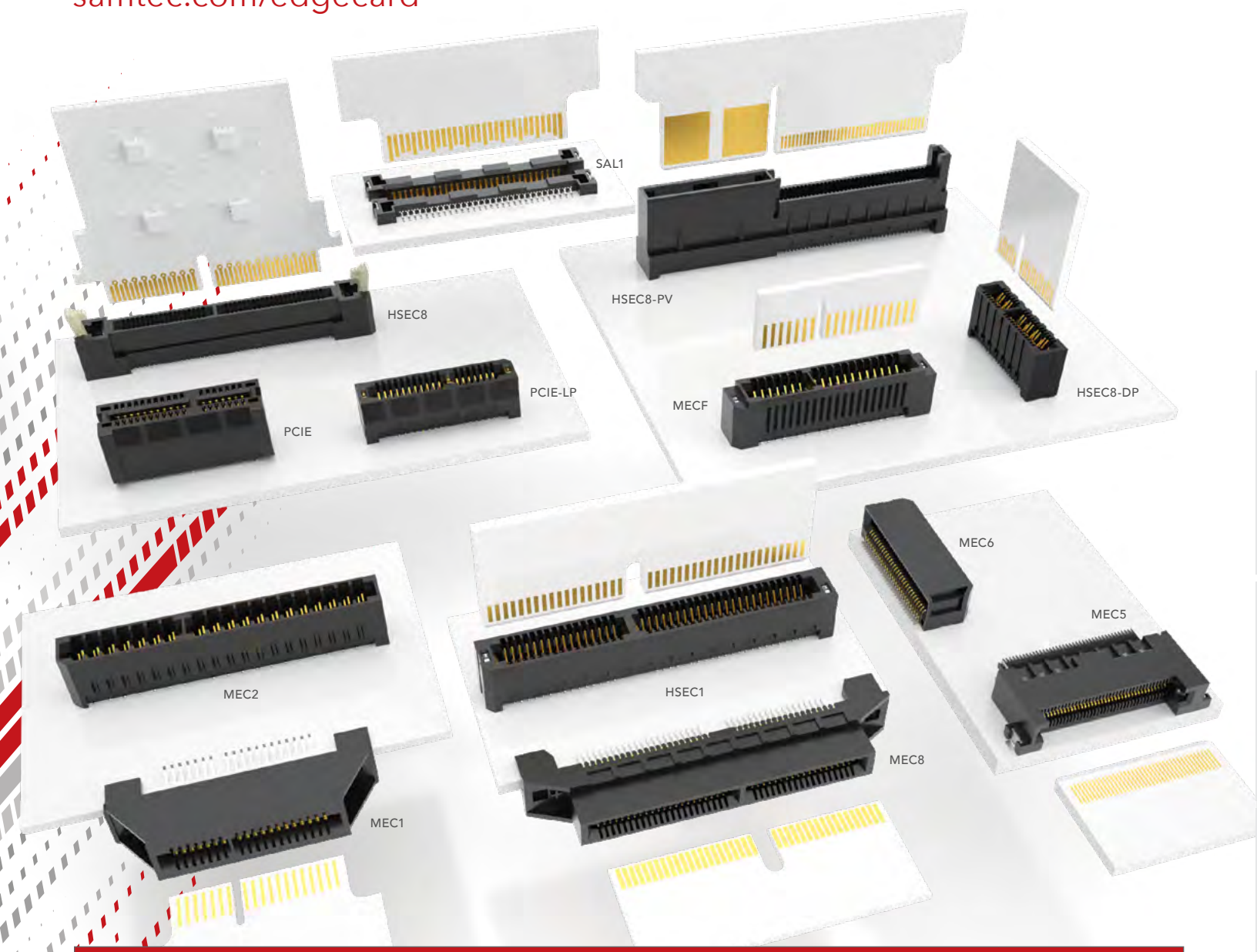
0.635 mm AcceleRate® HD high-density interconnects in stack heights from 6 mm to 16 mm and higher pin counts to 100 per row (ADM6/ADF6).

ACCELERATE® HD RIGHT-ANGLE

AcceleRate® HD right-angle socket for increased design flexibility and 56 Gbps PAM4 performance (ADF6-RA).

HIGH-SPEED EDGE CARD

samtec.com/edgecard



HIGH-SPEED EDGE CARD SOCKETS					
HSEC8-PV	**HSEC8/RU8**	**HSEC8-DP**	**HSEC1-DV**	**PCIE-LP/PCIE**	**SAL1**
0.80 mm pitch			1.00 mm pitch		
Power/Signal Combo	PCI Express®, XAUI, SATA	Differential Pair	Mini Edge Card	PCI Express®	SATALink™
1.60 mm thick card	1.60 & 2.36 mm thick cards	1.60 mm thick card			Variable Card Thickness
40, 60, 80 (Signal) & 2, 4 (Power) pins	18–200 (HSEC8) pins 80–120 (RU8) pins	16–112 pins	20–140 pins	36 (x1), 64 (x4), 98 (x8), 164 (x16) pins	40, 54, 60, 80 pins per pair

MEC5	**MEC6**	**MEC8**	**MEC1**	**MECF**	**MEC2**
0.50 mm pitch	0.635 mm pitch	0.80 mm pitch	1.00 mm pitch	1.27 mm pitch	2.00 mm pitch
High-Density Edge Card	Micro Edge Card		Mini Edge Card	Mini Edge Card	
1.60 mm thick card		1.00 & 1.60 mm thick card		1.60 & 2.36 mm thick cards	
60–200 pins	20–140 pins		10–140 pins	10–100 pins	

0.80 mm & 1.00 mm PITCH SOCKETS

EDGE® RATE CONTACT | PAM4 56 Gbps

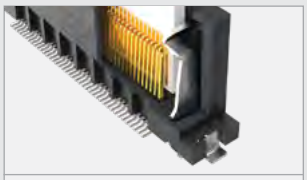
- Edge Rate® contacts optimized for signal integrity performance
- Surface mount, right-angle, edge mount and pass-through
- Power/Signal combo (HSEC8-PV)
- Custom designs allow for misalignment mitigation
- 0.80 mm pitch 30 AWG twinax cable assembly (ECDP)

56 Gbps PAM4 with differential pair (HSEC8-DP)

0.50 mm PITCH HIGH-DENSITY SOCKETS

PAM4 56 Gbps

- Justification beam enables use of standard PCB tolerance for lower costs and decreases mating tolerance by 50%
- Up to 300 total I/Os
- PCIe® Gen 4 compatible
- Vertical and right-angle



Justification beam allows for standard board tolerance

EDGE CARD PITCH VARIETY

25 Gbps

- 0.635 mm, 0.80 mm, 1.00 mm, 1.27 mm and 2.00 mm pitch stamped contacts
- Right-angle, vertical and edge mount
- Surface mount and through-hole
- Solutions for .062" (1.60 mm) and .093" (2.36 mm) thick cards

Press-fit application (MEC8)

PCI EXPRESS® EDGE CARD SOCKETS

- Supports one, four, eight and sixteen PCI Express® links
- Compatible up to Gen 4 speeds (PCIE-LP)
- Low profile version for space savings
- Standard jumpers and extenders available (PCIEC)
- 1.00 mm pitch differential pair socket compatible to PCIe® Gen 5 in development (PCIE-G5)

8 mm profile (PCIE-LP) vs. standard 11 mm profile (PCIE)

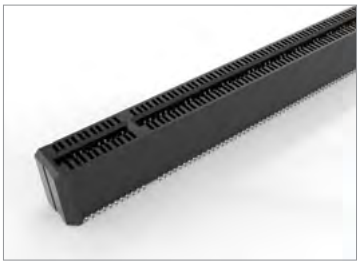
1.00 mm PITCH THROUGH BOARD SOCKETS

- 40 to 80 I/Os per pair
- Mounts in pairs to simplify signal routing
- Low profile design
- Mounting flexibility for pass-through applications

TECHNOLOGY ROADMAP

0.60 mm PITCH EDGE CARD

Differential pair Edge Rate® contact connector compliant to SFF-TA-1002: x4 (1C), x8 (2C), x16 (4C & 4C+)



PCIe® GEN 5 SOCKET

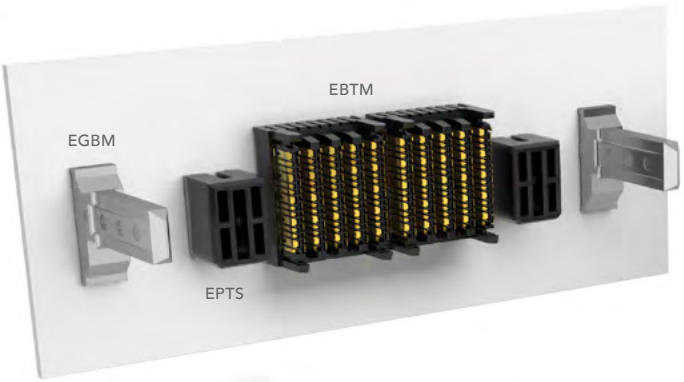
PCIe® Gen 5 compatible edge card connector with differential pair design for next generation performance (PCIE-G5).

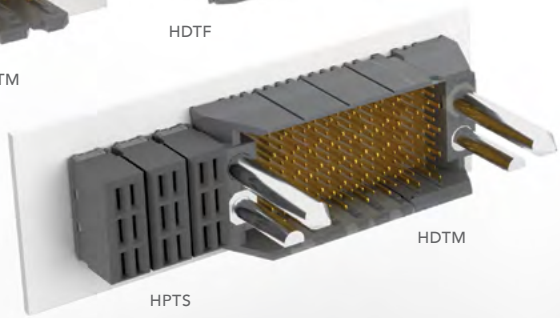
For full SI Performance data visit samtec.com or contact sig@samtec.com. Other pin counts available.

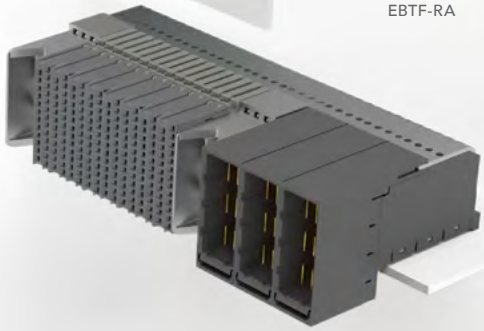
PCI-SIG®, PCI Express® and the PCIe® design marks are registered trademarks and/or service marks of PCI-SIG.

HIGH-SPEED BACKPLANE

samtec.com/backplane







BSP (includes signal, power and guidance/keying modules)

EXAMAX®		XCEDE® HD
EBTM/EBTF	**EBDM-RA**	**HDTM/HDTF**
Traditional & Coplanar Backplane	Direct-Mate Orthogonal	XCede® HD
2.00 mm pitch		1.80 mm pitch
24–72 total differential pairs	36–72 total differential pairs	12–48 total differential pairs
4 & 6 pairs/column	6 pairs/column	3, 4 & 6 pairs/column
6, 8, 10 & 12 columns (12 only available with 6-pair)		4, 6 & 8 columns

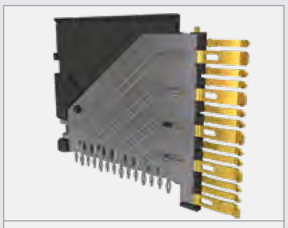
For full SI Performance data visit samtec.com or contact sig@samtec.com. Other pair and column counts available.

HIGH-SPEED BACKPLANE SYSTEMS

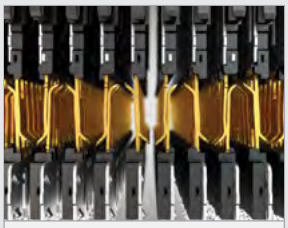
ExaMAX® | PAM4 56 Gbps

- 2.00 mm column pitch with up to 72 pairs
- Meets industry specifications such as PCI Express®, Intel OPI and VPI, SAS, SATA, Fibre Channel, InfiniBand™ and Ethernet
- Lowest mating force on the market: 0.36 N max per contact
- Press-fit termination
- Engineered for 92 Ω impedance to address both 85 Ω and 100 Ω applications
- Keying, guidance, power and staging available
- Coplanar available (EBTM–RA) to bypass the midplane for a direct connection between the front and rear cards
- Backplane cable available for cable-to-board, cable-to-ExaMAX® or cable-to-cable applications

*ExaMAX® is a registered trademark of AFCI.



Individual signal wafers with one-piece ground plane reduces crosstalk



Two reliable points of contact at all times

Staggered, differential pairs

Coplanar available to bypass the midplane (EBTM-RA)

DIRECT-MATE ORTHOGONAL

ExaMAX® | PAM4 56 Gbps

- Eliminates the need for a midplane
- Shorter signal path for improved signal integrity
- Two fewer connectors for decreased cost
- Optimizes system airflow and cooling for increased thermal efficiency
- Integral guidance for blind mating

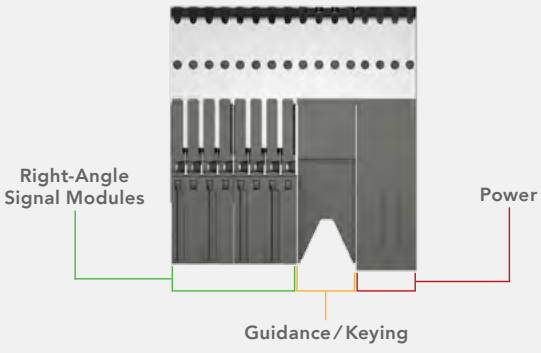
Direct–Mate Orthogonal

HIGH-DENSITY BACKPLANE SYSTEMS

XCede HD | 16 Gbps

- Small form factor and modular design provides significant space-savings and flexibility
- 1.80 mm column pitch with up to 48 pairs
- Up to 84 differential pairs per linear inch
- Up to a 3 mm contact wipe on signal pins
- Power, guidance, keying and end wall options available
- 85 Ω and 100 Ω options
- Right-angle modules can be built into a single customizable part (BSP). Corresponding vertical modules are individually mounted to the backplane

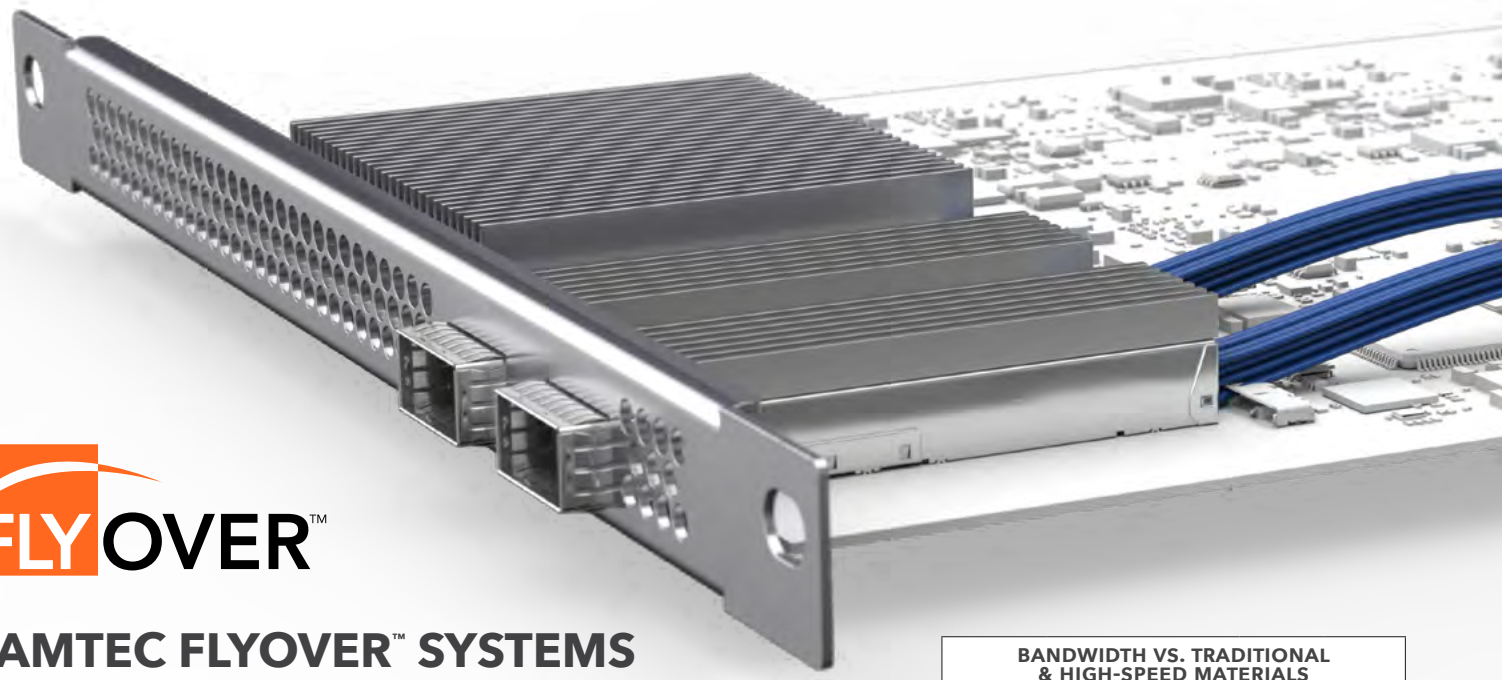
*XCede® is a registered trademark of Amphenol Corporation.



BSP custom configuration shown (Top View)

FLYOVER™ TECHNOLOGY

samtec.com/flyover



SAMTEC FLYOVER™ SYSTEMS

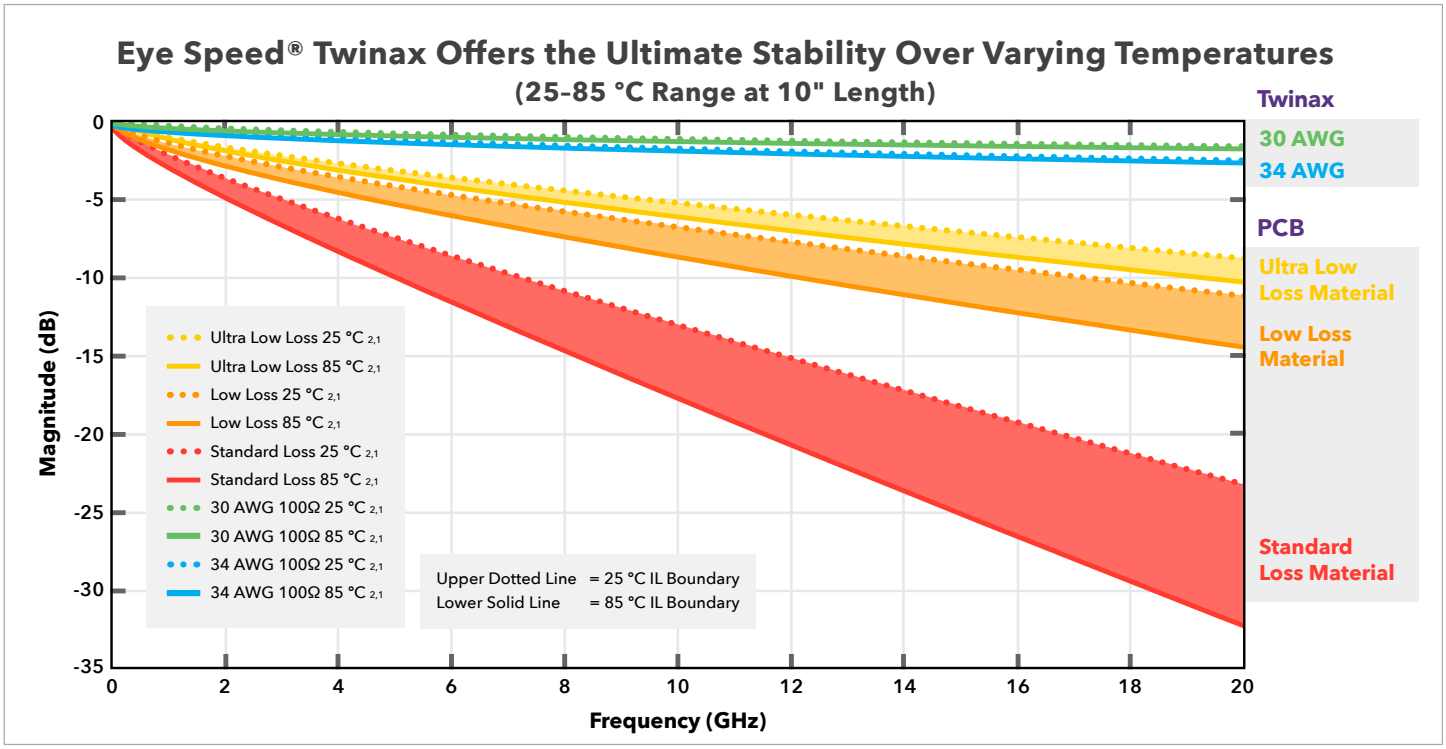
Extended Reach at Next Gen Speeds

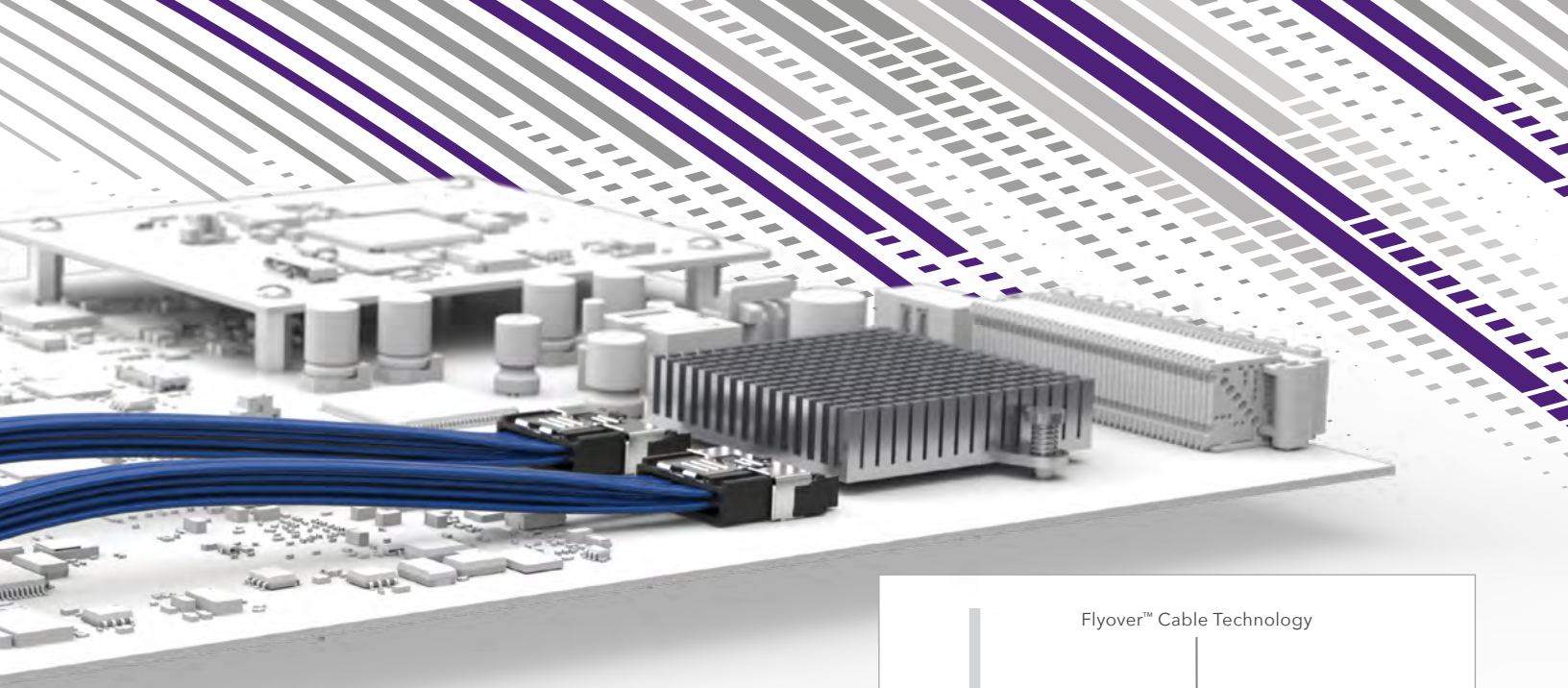
As bandwidth requirements rapidly increase, routing signals through lossy PCBs, vias and other components has become a complex challenge.

Samtec's Flyover™ system design breaks the constraints of traditional signaling substrate and hardware offerings, resulting in a cost-effective, high-performance answer to the challenges of 56 Gbps bandwidths and beyond.

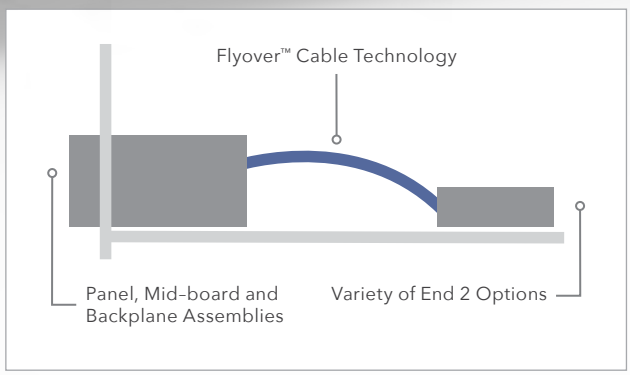
BANDWIDTH VS. TRADITIONAL & HIGH-SPEED MATERIALS

	FR408	MEGTRON 6	Micro Twinax	Optics
10 Gbps	<10"	10"+	10"+	10"+
14 Gbps	<5"	<10"	10"+	10"+
28 Gbps	<2"	<5"	10"+	10"+
56 Gbps	0.0"	<2"	10"+	10"+
112 Gbps	0.0"	0.0"	<10"	10"+



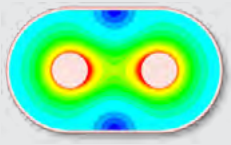


Samtec's Flyover™ connector designs provide end option flexibility to create a high-speed application specific solution to meet next gen speeds.



ULTRA LOW SKEW CABLE TECHNOLOGY

Samtec's proprietary **co-extruded**, low loss twinax cable technology eliminates the performance limitations and inconsistencies of individually extruded dielectric twinax cabling, improving signal integrity, bandwidth and reach.



Tight coupling between signal conductors

- Ideal for 28–56+ Gbps applications
- Tight coupling between signal conductors
- Ultra low skew twinax < 3.5 ps/meter

EYE® SPEED CABLE

✔ **Perfect** Intra-Pair Sequencing

✖ **Imperfect** Sequencing

NEXT GEN PERFORMANCE AND COST ADVANTAGES

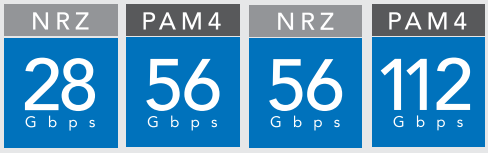
High-performance, low loss twinax cable systems support 56+ Gbps speeds for extended reach and system architecture design flexibility – without adding cost to the overall system.

Performance Advantages

- Reduced Thermal Challenges
- Simplified Board Layout
- 28–56 Gbps NRZ & Beyond

Cost Advantages

- Eliminate Expensive Re-timers
- Fewer PCB Layers
- Less Expensive PCB Materials

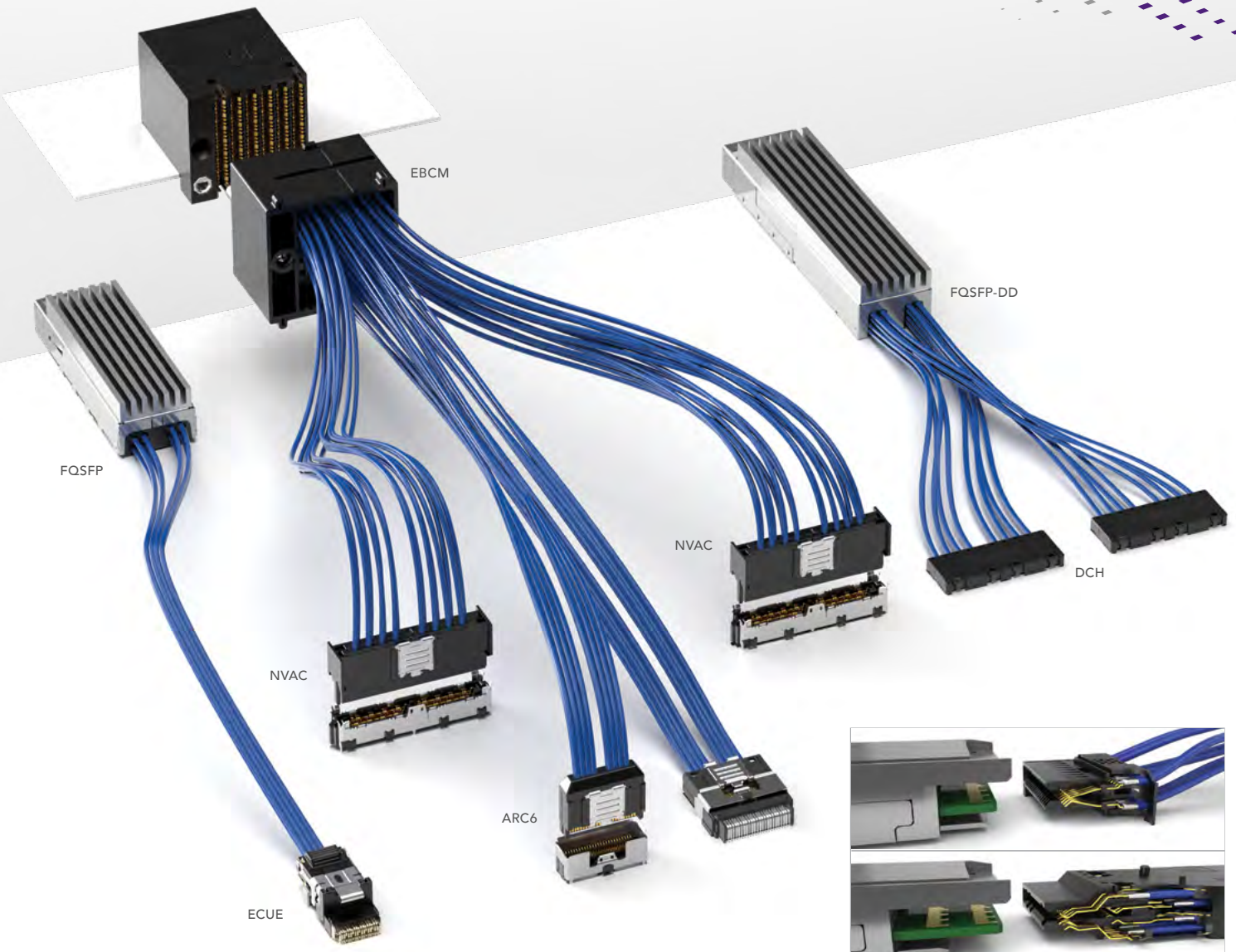


SUPPORT

Fully integrated, complimentary and cross-functional Technology Centers for full system interconnect performance and cost optimization from Silicon-to-Silicon. For more information about Samtec's High-Speed Cable Group visit samtec.com/tech-centers.

FLYOVERS

samtec.com/flyover



High-speed contacts directly soldered to Eye Speed® ultra low skew twinax (Top: FQSFP; Bottom: FQSFP-DD)

FLYOVER QSFP28		NOVARAY™	ACCELERATE®	DIRECT CONNECT™	FIREFLY™			EXAMAX®
FQSFP	FQSFP-DD	NVAC	ARC6	DCH	ECUE	ECUE-2	PCUE	EBCM/EBCF
56 Gbps PAM4		112 Gbps PAM4	56 Gbps PAM4		14 Gbps	28 Gbps NRZ	PCIe® Gen 4	112 Gbps PAM4
Ultra Low Skew Twinax					Twinax	Ultra Low Skew Twinax		
30 or 34 AWG	34 AWG	30 or 34 AWG	34 AWG	30 AWG	34 or 36 AWG	34 AWG		28, 30 or 34 AWG
		0.80 mm pitch	0.635 mm pitch		0.80 mm pitch			2.00 mm pitch
Direct Attach		Mates: NVAM-C	Mates: ARF6	Direct Attach	Mates: UEC5/UCC8			Mates: EBTM/ EBTF

High-speed channel performance rating based on Samtec reference channel. For full SI Performance data visit samtec.com or contact sig@samtec.com.

DIRECT ATTACH QSFP28 SYSTEMS

NRZ 28 Gbps | PAM4 56 Gbps

- 4 or 8 channels
- Up to ~200 Gbps NRZ (~400 Gbps PAM4)
- Belly-to-belly mating for maximum density (FQSFP-DD)
- Sideband signals are routed through press-fit contacts for increased airflow
- Contacts directly solder to the Eye Speed® cable for improved signal integrity

Localized press-fit control and power contacts eliminate the need for a secondary cable and connector

EXTREME SPEED/DENSITY SYSTEMS

NOVARAY™ | NRZ 56 Gbps | PAM4 112 Gbps

- 112 Gbps PAM4 per channel in 40% less space than traditional arrays
- 4.0 Tbps aggregate data rate – 9 IEEE 400G channels
- Fully shielded differential pair design
- Very low crosstalk (to 40 GHz) and very tight impedance control
- 8 to 32 signal pairs; 72 pairs in development

Guaranteed two points of contact for a more reliable connection

SLIM BODY ASSEMBLIES

ACCELERATE® | NRZ 28 Gbps | PAM4 56 Gbps

- Incredibly slim 7.6 mm body width
- Direct attach technology: contacts directly soldered to cable for improved signal integrity
- High-density 2-row design
- 8 and 16 pair configurations
- Rugged metal latching and shielding

Right-angle in development

DIRECT CONNECT™ HORIZONTAL SYSTEMS

NRZ 28 Gbps | PAM4 56 Gbps

- High-retention press-fit termination; custom compression contacts available
- Ultra-low 3 mm profile
- 4 and 8 pair configurations
- Supports and surpasses PCIe® Gen 3 speeds to 2 meters

FIREFLY™ COPPER SYSTEMS

28 Gbps

- High-performance, high-density copper Flyover™ solution
- Pin compatible with FireFly™ optical using the same connector system
- x4 bidirectional and x12 unidirectional configurations
- Low-cost solution for seamless integration of new or existing designs
- PCIe® Gen 4 protocol compatible system (PCUE)

HIGH-SPEED BACKPLANE SYSTEMS

ExaMAX® | PAM4 112 Gbps

- Cable-to-board, cable-to-cable and cable-to-ExaMAX® applications
- Customizable with modular flexibility
- Reduced cost due to lower layer counts
- 4 and 6 pairs/column; 6, 8, 10 and 12 columns
- Intermateable with all ExaMAX® connectors

Integrated guidance and keying

TECHNOLOGY ROADMAP

NOVARAY™

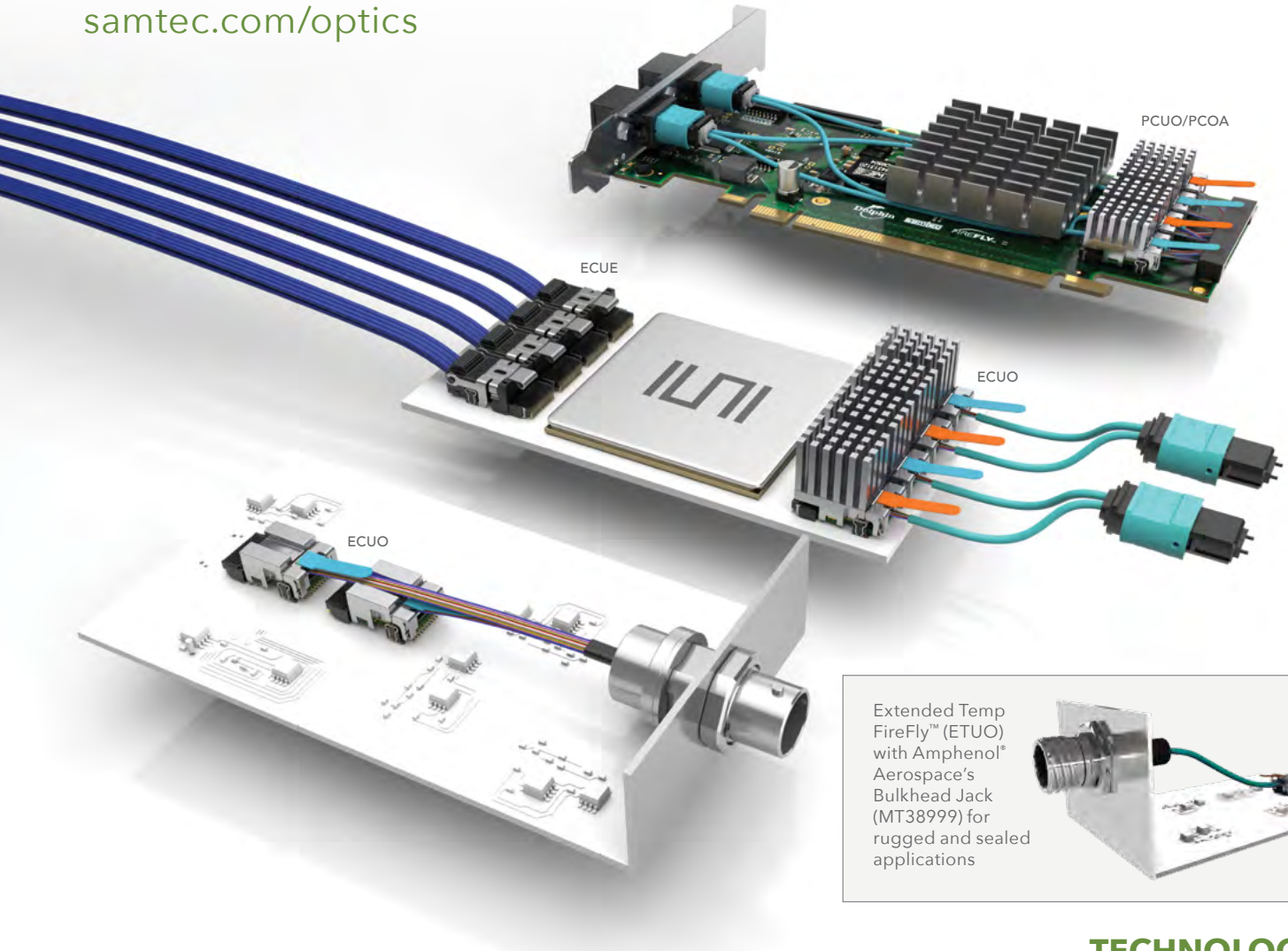
Custom routing of single-ended signal and power for increased design flexibility (NVAC).

ACCELERATE®

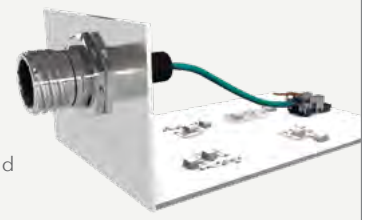
Incredibly slim body cable plus sidebands for 10 additional single-ended lines (ARC6). A 24-pair configuration also in development.

ACTIVE & PASSIVE OPTICS

samtec.com/optics



Extended Temp FireFly™ (ETUO) with Amphenol® Aerospace's Bulkhead Jack (MT38999) for rugged and sealed applications



FIREFLY™ MICRO FLYOVER SYSTEM™

ECUE

FireFly™ Copper

14 Gbps	x4* x12**

ECUE-2

Optimized Copper

28 Gbps	x4*

PCUE

PCIe®–Over–FireFly™ Copper, Gen 4

ECUO

FireFly™ Optical

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

ETUO

Extended Temp FireFly™

10 Gbps	x4*, x12***

25 Gbps in development

PTUO

PCIe®–Over–Fiber Extended Temp FireFly™

8 GTps	Gen 3 x4, x8, x16

Gen 4 in development

PCUO

PCIe®–Over–Fiber

8 GTps	Gen 3 x4, x8, x16

Gen 4 in development

PCOA

PCIe®–Over–Fiber Gen 3 Adaptor Card with FireFly™

Gen 4 in development

TECHNOLOGY ROADMAP

Submersible

Design capable of immersion for liquid cooling in development

Rugged

Rugged optical engine design for harsh environments

Advanced Optics

Advanced Optics in development for 56+ Gbps

* 4-channel, full duplex copper cable or optical transceiver
** 12-channel, unidirectional copper cable
*** 12-channel optical transmitter or receiver module

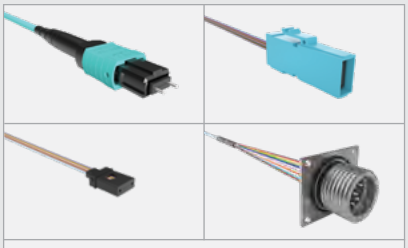
SAMTEC OPTICAL GROUP

Engineering team dedicated to the design, development and application support of high-performance micro optical engines, active optical assemblies and passive optical panel solutions. For more information contact firefly@samtec.com.

ACTIVE OPTICAL MICRO FLYOVERS | FIREFLY™

- Designed for flexibility, FireFly™ optical (ECUO) for greater distances and FireFly™ copper (ECUE) for shorter reach
- Data connection taken "off board" simplifies board layout and enhances signal integrity from IC to faceplate
- 56 Gbps connector
- Industry-leading miniature footprint allows for higher density close to the data source
- Rugged, simple to use system with easy insertion/removal and trace routing
- Optical and copper use the same surface mount connector system (UEC5/UCC8)
- Variety of End 2 options for high-density and rugged applications such as: MTP®, MT, MXC®, ARIB, Amphenol® MT38999 and ARINC 801
- Variety of standard integral heat sinks for optimized thermal operating conditions
- PCIe®-Over-FireFly™ (PCUO) supports PCIe® protocol for low latency, power savings and guaranteed transmission
- -40 °C to +85 °C extended temp system (ETUO); PCIe® version available (PTUO)

PCIe®-over-Fiber adaptor card (PCOA) supports transparent and non-transparent bridge links using PCUO FireFly™



High-density end option flexibility

PASSIVE & ACTIVE OPTICAL SOLUTIONS

- Industry standard passive MPO-to-MPO panel adaptor (OPA) and optical patch cable (FOPC)
- FireFly™ is compatible with multiple industry standard optical backplane systems
- High-density solutions for front panel or backplane applications with MXC® connectors

MXC® is a registered trademark of US Conec Ltd.

PCIe®-OVER-FIBER SOLUTIONS

- x4 and x8 Gen 3 (8.0 GT/s)
- Distances up to 100 meters
- Half cable options available
- PCIEO Series

TESTING SOLUTIONS

- FireFly™ Test Kit allows a designer real-time evaluation of an actively running copper or optical FireFly™ system in their lab, with their inputs (FIK-FIREFLY-XX)
- 14 Gbps FireFly™ FMC Kit (REF-193429-01) is VITA 57.1 compliant with up to 140 Gbps full-duplex bandwidth connecting an FPGA to fiber optic cable
- 25/28 Gbps FireFly™ FMC+ Kit (REF-200772-XXX-XX-01) is VITA 57.4 compliant with up to 400/448 Gbps full-duplex bandwidth connecting an FPGA to fiber optic cable
- For more information visit samtec.com/kits

HIGH-SPEED CABLE SYSTEMS

samtec.com/HDR

STANDARD COAX & TWINAX CABLE ASSEMBLIES												
HLCD	**HQCD**	**EQCD**	**EQRD**	**ERCD**	**ESCA**	**SEAC**	**FEDP**	**ECDP**	**HQDP**	**EQDP**	**ERDP**	**PCIEC**
Razor Beam™	Q Series®		Q Rate®	Edge Rate®	SEARAY™ 0.80 mm	SEARAY™	Edge Card		Q Pairs®		Edge Rate®	PCI Express®
Eye Speed® Coax							Eye Speed® Twinax					PCI Express® Twinax
38 AWG			34 AWG			36 AWG	32 AWG	34 AWG	30 AWG			30 or 32 AWG
0.50 mm pitch		0.80 mm pitch				1.27 mm pitch	0.50 mm pitch	0.80 mm pitch	0.50 mm pitch	0.80 mm pitch		1.00 mm pitch
Mates: LSHM	Mates: QTH, QSH	Mates: QTE, QSE	Mates: QRM8, QRF8	Mates: ERM8, ERF8	Mates: SEAM8, SEAF8	Mates: SEAF	Mates: FCDP	Mates: HSEC8	Mates: QTH-DP, QSH-DP	Mates: QTE-DP, QSE-DP	Mates: ERM8, ERF8	Mates: PCIE

HIGH-SPEED CABLE GROUP

In-house R&D and manufacturing of precision extruded micro coax and twinax cable used for high-speed/high-density cable assemblies. Capabilities include 26-38 AWG center conductors, 50/75/85/100 Ω impedance, and systems rated at 56 Gbps and beyond with low skew twinax cable construction.

MICRO COAX & TWINAX CABLE ASSEMBLIES

14 Gbps

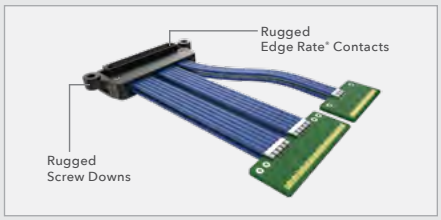
- Single-ended 50 Ω standards for Q Series®, Q Rate®, Edge Rate® and Razor Beam™ high-speed connectors
- Differential 100 Ω standards for Q Pairs®, Edge Rate® and PCI Express® high-speed connectors
- SEARAY™ and SEARAY™ 0.80 mm high-density cable assemblies
- Micro rugged edge card assemblies
- Rugged features and options including strain relief, plastic housings, screw downs, latches and locks, etc.
- Many non-cataloged standards available including 75 Ω micro coax and high-density twinax solutions

Eye Speed® Cable

Small bend radius for optimal routing. Available in many sizes and material options to best fit specific applications.

CUSTOM HIGH-SPEED CABLE ASSEMBLIES

- Any high-speed connector, any breakout configuration, any high-speed precision cable to create a solution for any specific application. Contact HDR@samtec.com.
- Support and expertise: engineering and design support, dedicated engineers and technicians, 24-hour quotes and samples, flexible quick-turn manufacturing

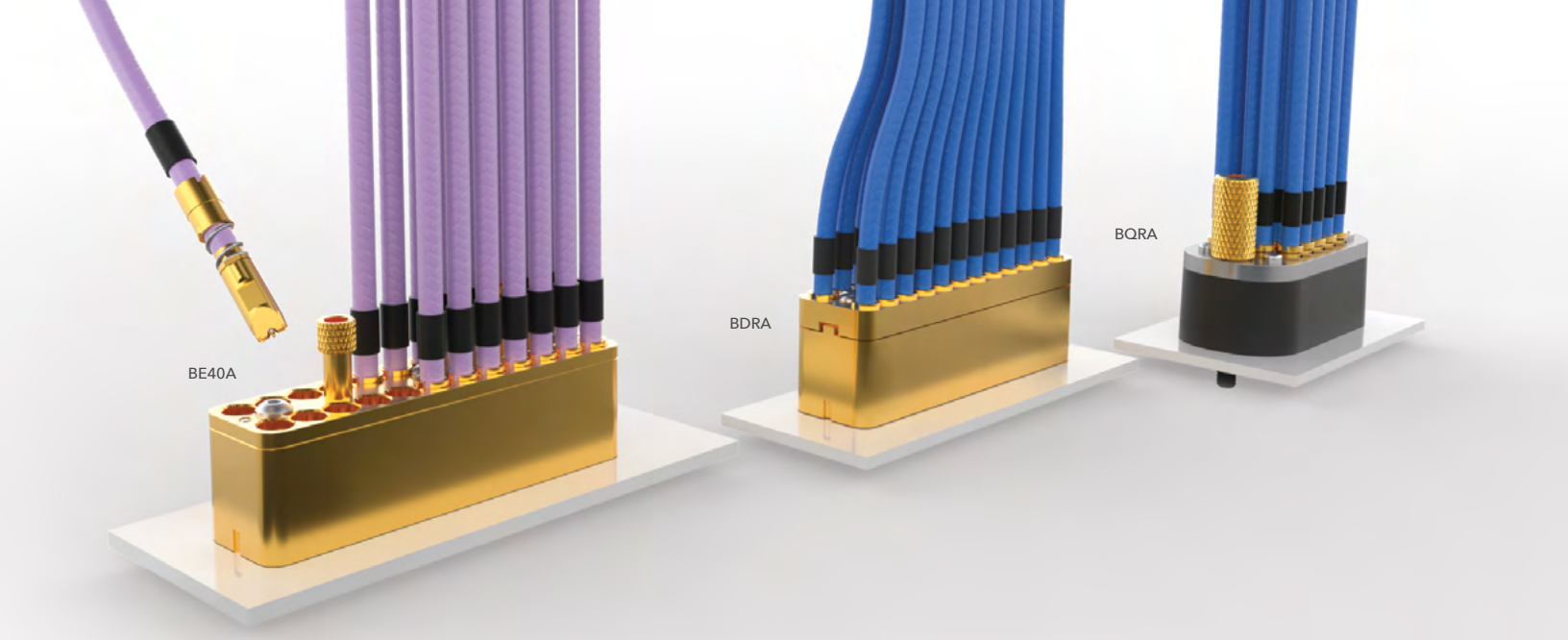


HIGH-SPEED I/O SYSTEMS

- Eye Speed® HD is the industry's densest I/O cable system with HyperTransport™ HT 3.1 performance (HDLSP)
- Eye Speed® I/O is designed for space savings and high cycles (EPLSP)
- SFP+ passive jumpers for up to 10 Gbps data transmission (SFPE)

HIGH-SPEED COPPER I/O SYSTEMS		
HDLSP	**EPLSP**	**SFPE**
Eye Speed® HD	Eye Speed® I/O	
Rugged, High-Speed, Panel-to-Panel	SFP+, SFP, XFP & XENPAK	
32 AWG Low Skew Pair Cable		
Mates: HDC/HDI6	Mates: ERC/ERI8	Mates: MECT/SFPC
24 Signal Pairs	9 or 17 Signal Pairs, 5 Power, 2 Clock	Connectors, Cages & Kits Available

For full SI Performance data, contact sig@samtec.com or visit samtec.com.



HIGH-PERFORMANCE TEST TO 50 GHz

samtec.com/bullseye

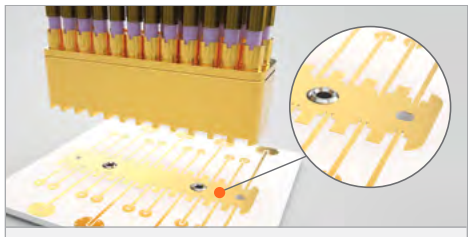
BULLS EYE® HIGH-PERFORMANCE TEST TO 50 GHz

BULLSEYE® TEST POINT SYSTEM

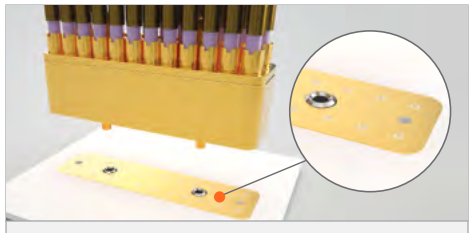
- Optimized performance to 50 GHz; to 65 GHz in development
- Compression interface to the board for easy on/off and no soldering costs
- Small footprint design significantly saves space on the board
- Assembly options: Dual row (BE40A, BDRA) and quad row (BQRA)
- BE40A is backward compatible to BDRA
- Enhanced system design with signal and ground pogo pins (BE40A)
- **Installation:** The attach process for each series is similar but unique specifications need to be observed. Contact RFTechnicalGroup@samtec.com

BULLS EYE® ASSEMBLIES		
BE40A	**BDRA**	**BQRA**
Up to 50 GHz	Up to 20 GHz	
23 AWG low loss microwave cable, additional shielding	23 AWG low loss microwave cable	
Microstrip or Stripline PCB transmission	Stripline PCB transmission	
Ground: Pogo-pin design on Bulls Eye® probe end	Ground: Elastomer	
2 x 3, 4, 6, 8, 10, 12, 14 and 16 positions	2 x 12 positions	20 (Quad Row) positions
End 2: 2.92 mm and 2.40 mm	End 2: 2.92 mm and SMA	

Go to samtec.com/catalog to order or view the RF Interconnect Catalog.



Microstrip PCB transmission



Stripline PCB transmission

Pogo-pin design (BE40A)

PRECISION RF INTERCONNECTS

samtec.com/RF

34 GHz

3.50 mm
- Edge mount with screw downs
- High-performance microwave cable assembly: 23 AWG (RF23S)

40 GHz

2.92 mm
- Compression mount with 2-hole flange in various board thicknesses
- High-performance microwave cable assembly: 23 AWG (RF23C)

SMP
- Straight & right-angle, full detent & smooth bore
- Blind-mate with axial alignment
- High-performance microwave cable assembly: 24 AWG (RF405), 25 AWG (RF25S) and .047 cable (in development)

50 GHz

2.40 mm
- Compression mount with 2-hole flange in various board thicknesses
- High-performance microwave cable assembly: 23 AWG (RF23C)

65 GHz

1.85 mm
- Compression mount with 2-hole flange in various board thicknesses
- High-performance microwave cable assembly

SMPM
- Straight & edge mount, full detent & smooth bore
- Blind-mate with axial alignment
- High-performance microwave cable assembly: .047 & .086 cable (in development)

70 GHz

1.20 mm
- Edge mount
- High-performance microwave cable assembly: .047 cable (in development)
- Simple snap-on coupling

SERVICE & TECHNICAL SUPPORT

- Launch Optimizations
- Simulations
- Test & Measurements
- Customs

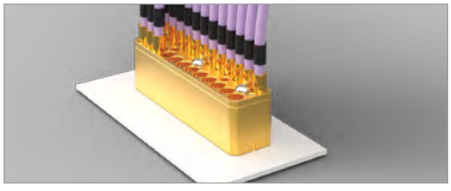
RF Technical Group
RFTechnicalGroup@samtec.com

Signal Integrity Group
SIG@samtec.com

TECHNOLOGY ROADMAP

PRECISION RF
Expanding family of Precision RF cables and board level interconnects in development.

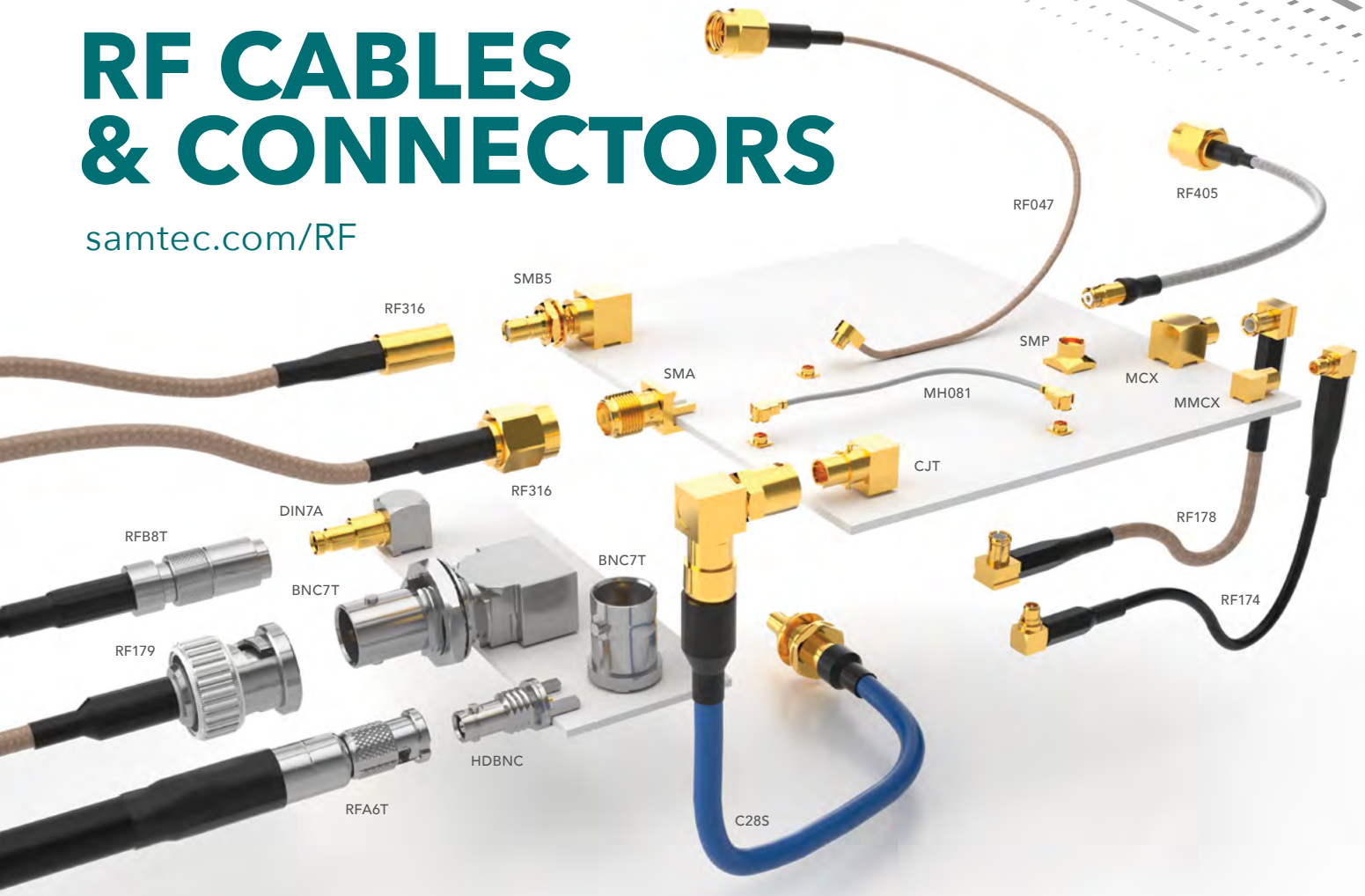
SMPM
Line of SMPM interconnects including ganged configurations in development.



BULLS EYE®
Bulls Eye® high-performance test system to 65+ GHz in development.

RF CABLES & CONNECTORS

samtec.com/RF



SOLUTIONATOR® ONLINE RF ASSEMBLY BUILDER | rf.samtec.com

Solutionator® is Samtec's online parametric filter that lets you easily choose your product and board-level mate in a matter of minutes. It also connects you directly to:

LIVE CHAT with an RF engineer

VIEW engineering drawings

REQUEST samples and quotes

MIX-AND-MATCH END OPTIONS

Standard cable assemblies with standard pricing and lead times

HIGH FREQUENCY MICROWAVE

CABLE	AWG	END OPTIONS	SERIES
MWC-2350CU-01	23	2.92 mm, 2.40 mm, SMA, SMP	RF23C
MWC-2350-01	23	3.50 mm	RF23S
MWC-2550-01	25	SMA, SMP	RF25S
CCA-047	28	HMHF1, SMA	RF047
RG 405	24	SMA, SMP	RF405
RG 402	19	SMA	RF402

50 Ω RF CABLES

CABLE	AWG	END OPTIONS	SERIES
0.81	36	MHF1, MHF3, MHF4, SMA	MH081
1.13	32	MHF1, SMA	MH113
RG 178	30	MMCX, MCX, SMA, SMB, BNC, TNC, N Type	RF178
RG 174	26	MMCX, MMCXV, MCX, SMA, SMB, BNC, TNC, N Type	RF174
RG 316	26	MMCX, MMCXV, MCX, SMA, SMB, BNC, TNC, N Type	RF316, IJ5C, IJ5H, GRF1-C, GRF1H-C
RG 58	20	SMA, TNC, N Type	RF058

75 Ω RF CABLES

CABLE	AWG	END OPTIONS	SERIES
RG 179	30	MCX, MMCX7, SMB, BNC, DIN 1.0/2.3	RF179, GRF7-C, GRF7H-C
1855A	23	HD-BNC™, DIN 1.0/2.3	RFB8T
1694A	18	BNC, HD-BNC™, DIN 1.0/2.3	RFB6T
RG 6	18		RFA6T

Go to samtec.com/catalog to order or view the RF Interconnect Catalog.

50 Ω RF CABLES & CONNECTORS

- High-frequency cables: semi-flexible, solid, foamed or air enhanced dielectric
- Micro high-frequency U.FL/W.FL cable assemblies
- Wide variety of industry standard cables with mix-and-match end options
- Double-shielded RG 316 cable
- Wide variety of terminations: jacks and plugs, bulkhead jacks, straight and right-angle
- 3.50 mm, 2.92 mm, SMP, 2.40 mm, 1.85 mm and SMPM Precision interconnects
- Board level interconnects in a choice of orientations

Precision Interconnects

NON-MAGNETIC RF SOLUTIONS

- Truly non-magnetic RF solutions; 100% inspected for magnetic permeability
- Nearly all Samtec interconnects can be ordered as non-magnetic, contact RFTechnicalGroup@samtec.com
- Supported by Samtec's quick-turn lead times and unmatched service
- Ideal for medical imaging, advanced driver assistance systems, hand held devices, etc.

75 Ω RF CABLES & CONNECTORS

- Wide variety of industry standard cables with mix-and-match end options
- RFB8T Series (with Belden 1855A cable)
- Wide variety of terminations: BNC, HD-BNC™, DIN 1.0/2.3, SMB
- Straight and right-angle, die cast options
- Board level interconnects in a choice of orientations
- High-density BNC provides 4X the panel density of traditional BNCs
- 12G-SDI optimized 75 Ω interconnects

HD-BNC™ is a trademark of Amphenol.

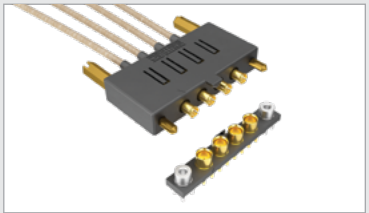
12G-SDI BROADCAST VIDEO SOLUTIONS

- Samtec has the largest variety of 12G-SDI optimized products
- Analysis and launch optimization: RFTechnicalGroup@samtec.com
- 75 Ω BNC, HD-BNC™ and DIN 1.0/2.3
- Right-angle, vertical, edge mount, low-profile and standard or tall through-hole
- Visit samtec.com/12gsdi

12G-SDI for broadcast video

ORIGINAL SOLUTIONS

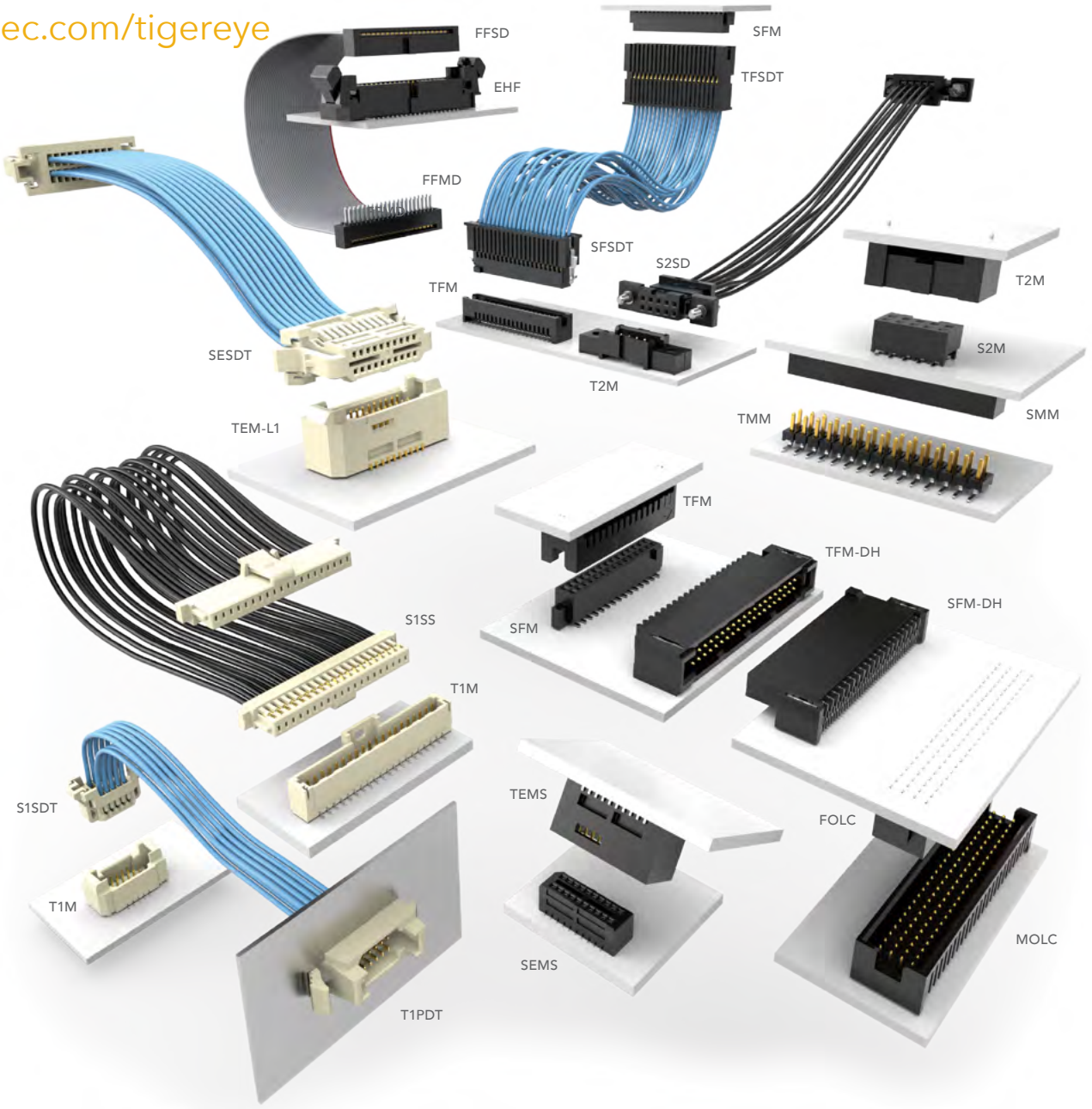
- Machined U.FL to 500 cycles (HMHF1/RF047)
- High vibration and 75 Ω MMCX (MMCXV and MMCX7)
- Circular RF shielded twisted pair system (C28S/CJT)
- IsoRate® isolated signal systems for 90% performance of traditional RF at 50% of the cost (IJ5C and IJ5H)



Ganged micro scale isolated signal systems (GRF1 and GRF7)

RUGGED TIGER EYE™ SYSTEMS

samtec.com/tigereye

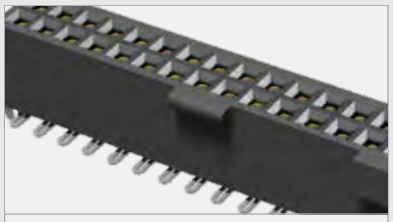


TIGER EYE™ SYSTEMS						
SFM/TFM, SFML/ TFML, SFC/TFC	SFSX(T)	SFMC	FOLC/MOLC	S2M/T2M	S2SD(T)	SMM/TMM
Board-to-Board and Cable-to-Board		Board-to-Board		Board-to-Board and Cable-to-Board		Board-to-Board
1.27 mm pitch				2.00 mm pitch		
SM, RA & T/H	Cable Assembly	SM & T/H	SM, T/H & MT	SM & T/H (Socket) SM, RA & T/H (Terminal)	Cable Assembly	SM (Socket) SM, RA (Terminal)
6-12 mm stack heights	28 & 30 AWG	6-12 mm stack heights	6-11.4 mm stack heights	6 & 7 mm stack heights	24, 26, 28 & 30 AWG	Various Heights
3-100 pins	3-100 pins	4-100 pins	80-200 pins	10-60 pins	10-60 pins	1-200 pins

1.27 mm PITCH SYSTEMS

TIGER™ EYE SYSTEM | 3.2 A per pin

- Samtec's most rugged contact system, rated to 1,000+ mating cycles
- Board-to-board, discrete wire, flat and twisted pair IDC cable systems
- Cable components and tooling available
- Surface mount and through-hole
- Shrouded, polarized and keyed
- Friction latching, locking clip, dual screw down or weld tab ruggedizing options
- Extended Life Product™ testing available

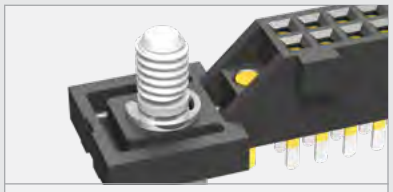


Locking feature increases unmating force (SFML/TFML)

2.00 mm PITCH SYSTEMS

TIGER™ EYE SYSTEM | 3.8 A per pin

- Board-to-board, discrete wire and IDC cable systems
- Locking clip, weld tab or dual screw down ruggedizing features
- Surface mount and through-hole
- Vertical and right-angle for micro backplane applications
- Cable components and tooling available



Screw down option for secure locking

0.80 mm PITCH SYSTEMS

TIGER™ EYE SYSTEM | 2.9 A per pin

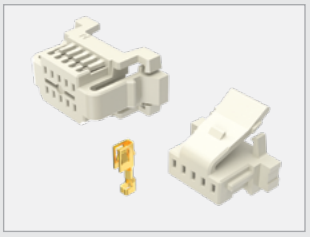
- Board-to-board and discrete wire cable systems
- Locking clip, alignment pin or weld tab ruggedizing features
- Extended Life Product™ testing available
- Micro pitch and slim body for space savings
- Cable components and tooling available

Multi-finger BeCu contacts for high-reliability & cycles

1.00 mm PITCH CABLE ASSEMBLIES

3.3 A per pin

- Low profile down to 3.2 mm
- 2 through 40 I/Os, single or double row
- Crimp-style dual leaf contact system
- Panel mount and cable-to-cable terminal assemblies available
- Cable components and tooling available



IDC CABLE SYSTEMS

TIGER™ EYE IDC | 2.8 A per pin

- 0.50" (1.27 mm) or 2.00 mm (.0787") pitch
- Choice of socket and plug terminations
- Ejector and shrouded headers
- Rugged strain relief option

Strain relief option

TIGER EYE™ SYSTEMS			
SEM/TEM/ SEML/SEMS/ TEMS	SESDT	S1SX(T)/ T1M	T1PX(T)/ T1SX(T)
Board-to-Board and Cable-to-Board		Cable-to-Board, Cable-to-Cable & Panel-to-Board	
0.80 mm pitch		1.00 mm pitch	
SM (Socket) SM, RA & T/H (Terminal)	Cable Assembly	SM, RA & Cable Assembly	
6, 7 & 10 mm stack heights	32 AWG	28 & 30 AWG	
10-100 pins	10-40 pins	2-40 pins	2-20 pins

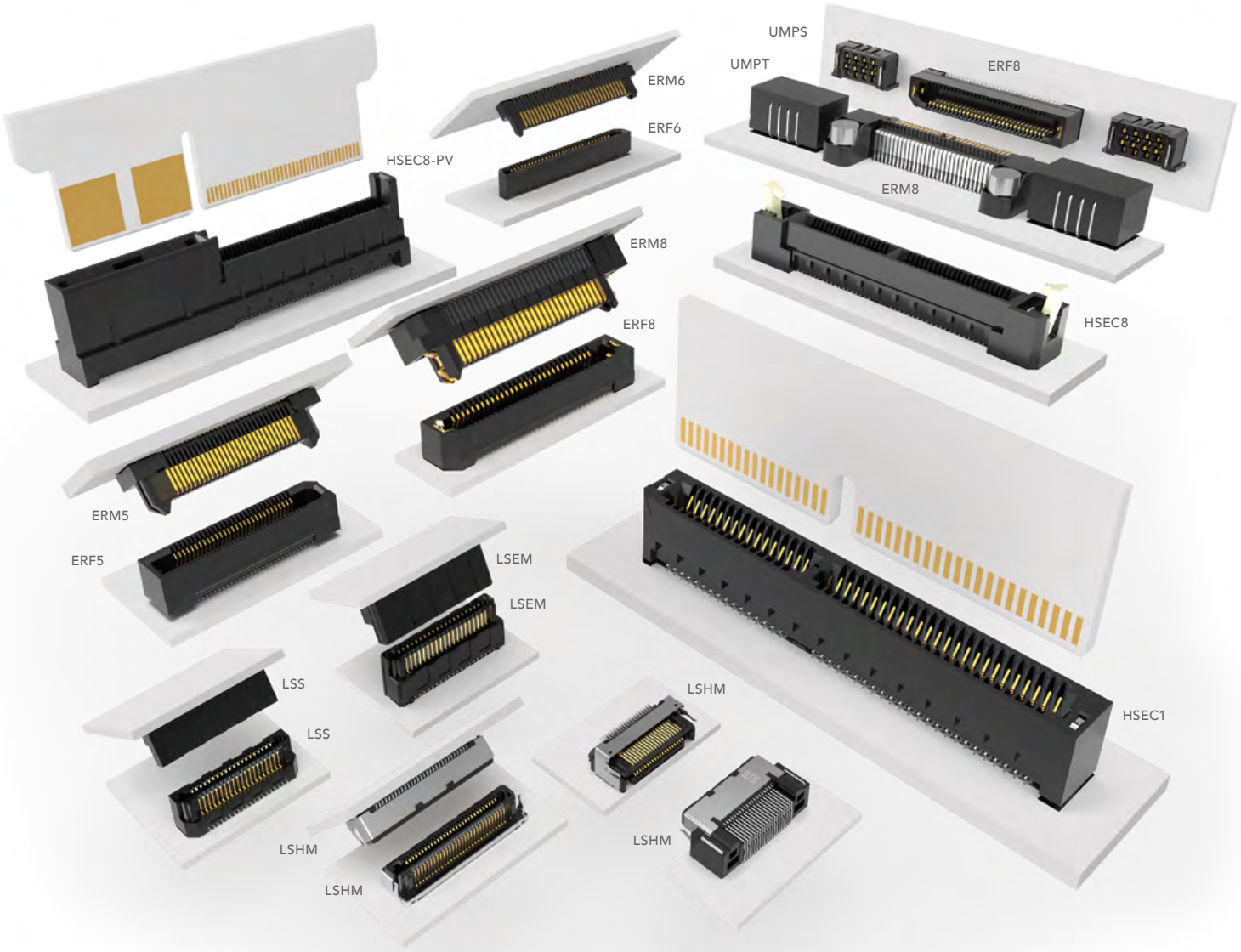
TECHNOLOGY ROADMAP

SHIELDED TIGER EYE™

2.00 mm EMI shielded discrete wire assembly with board level and panel mount flexibility (SS2SD/ST2M).

RUGGED SI SYSTEMS

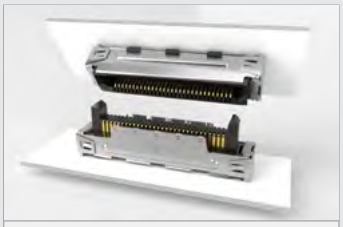
samtec.com/rugged



EDGE RATE® SYSTEMS			EDGE CARD SOCKETS				RAZOR BEAM™		
ERM5/ERF5	ERM6/ERF6	ERM8/ERF8	HSEC8-PV	HSEC8	HSEC8-DP	HSEC1-DV	LSHM	LSS	LSEM
0.50 mm pitch	0.635 mm pitch	0.80 mm pitch	0.80 mm pitch			1.00 mm pitch	0.50 mm pitch	0.635 mm pitch	0.80 mm pitch
7–12 mm stack heights	5 mm stack heights	7–18 mm stack heights	Accepts: 1.60 mm thick card	Accepts: 1.60 & 2.36 mm thick cards	Accepts: 1.60 mm thick card		5-12 mm stack heights	6-12 mm stack heights	
SM & RA (Socket) SM (Terminal)	SM	SM, RA & Edge Mount	SM (signal) T/H (power)	SM, RA, Edge Mount	SM	SM	SM & RA	SM	SM & RA
20–150 pins	20-120 pins	10–200 pins	40, 60, 80 (Signal) & 2, 4 (Power) pins	18–200 pins	16–112 pins	20–140 pins	10-100 pins	20-100 pins	40-100 pins

0.50 mm, 0.635 mm & 0.80 mm SYSTEMS

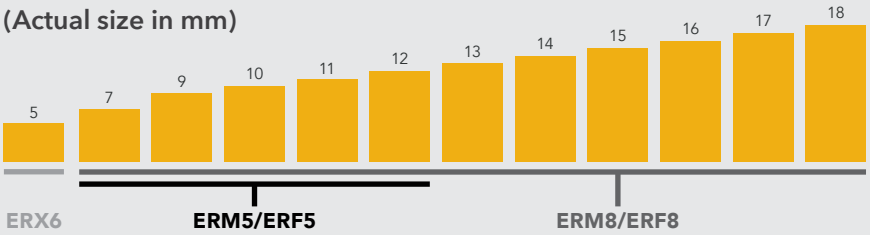
- Edge Rate® contacts for up to 56 Gbps PAM4
- 1.50 mm contact wipe on 0.80 mm pitch
- 1.00 mm contact wipe on 0.50 mm pitch
- Up to 40% PCB space savings with 0.50 mm system
- 0.635 mm pitch with slim 2.5 mm body width
- Rugged metal latching, solder locks and 360° shielding available
- Micro power available for power/signal applications (UMPT/UMPS)



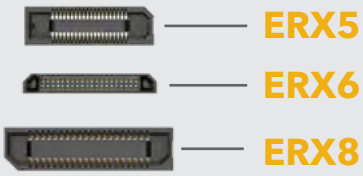
Rugged 360° Shielding for EMI protection

EDGE RATE® STACK HEIGHT FLEXIBILITY

(Actual size in mm)



Sockets shown actual size at 40 total positions



RUGGED EDGE CARD SOCKETS

- Edge Rate® contacts optimized for signal integrity performance
- 0.80 mm and 1.00 mm pitch
- Surface mount, right-angle, edge mount and pass-through
- Power/Signal combo (HSEC8-PV)
- Custom designs allow for misalignment mitigation
- 0.80 mm pitch 30 AWG twinax cable assembly (ECDP)

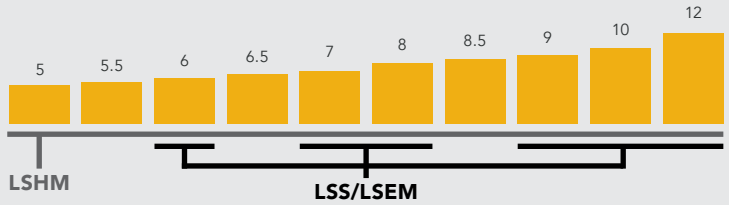
56 Gbps PAM4 with differential pair (HSEC8-DP)

RUGGED HERMAPHRODITIC CONNECTORS

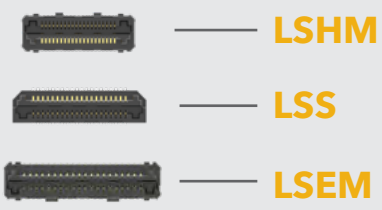
- Razor Beam™ contact for high-speed and fine-pitch systems
- 0.50 mm, 0.635 mm and 0.80 mm pitch
- 4–6x greater mating/unmating forces vs. typical micro pitch connectors
- Rugged 360° shielding available
- Self-mating connectors reduce inventory costs and can be interchanged for varying stack heights
- Jack screw standoffs available to assist with unmating (JSO)
- 0.50 mm pitch hermaphroditic cable assembly available (HLCD)

RAZOR BEAM™ STACK HEIGHT FLEXIBILITY

(Actual size in mm)

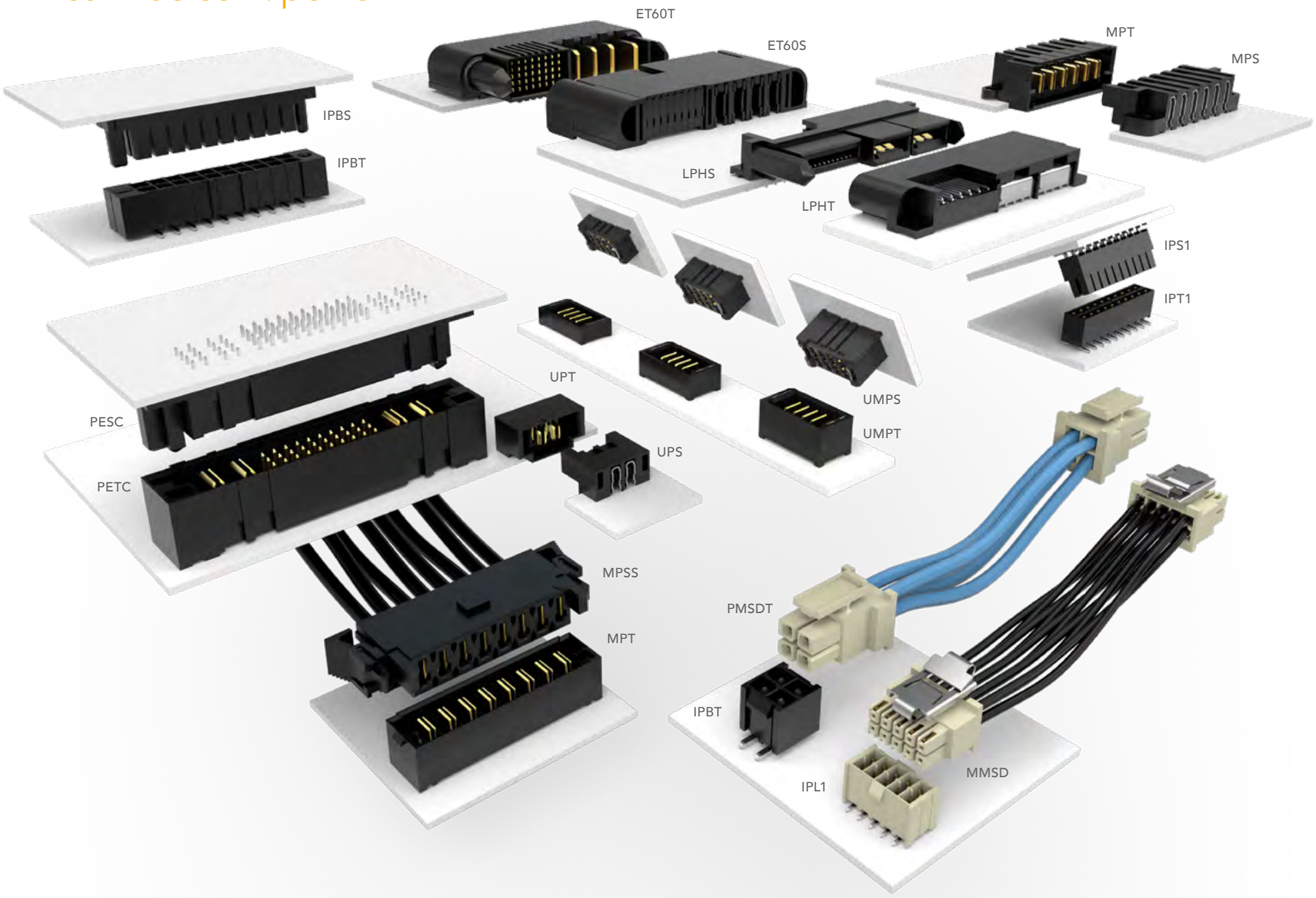


Sockets shown actual size at 20 positions per row



FLEXIBLE POWER SOLUTIONS

samtec.com/power



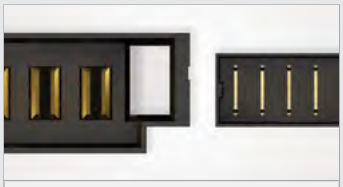
FLEXIBLE POWER SOLUTIONS						
LPHT/LPHS	**ET60T/ET60S**	**PEX/PEXC**	**PESS**	**MPX/MPXC/MPPT**	**MPSS**	**MPCC**
30 A/power pin (4 pins powered)	60 A/power pin (2 pins powered)	Up to 58.7 A/pin	34.5 A/pin	28.8 A/pin	19.7 A/pin	Signal 3.4 A/pin † Power to 23.2 A/pin
12.00 mm pitch		6.35 mm pitch		5.00 mm pitch		
Coplanar & Perpendicular		19 mm stack height	10 & 12 AWG	14 mm stack height	14 & 16 AWG	14, 16, 24, 26, 28 & 30 AWG
2-10 power pins* 16, 20, 24, 32 signal pins	2-20 power pins* 0-40 signal pins	2-8 power pins* 12, 40 signal pins	2-8 power pins	2-10 power pins* 16, 24, 40, 80 signal pins	2-8 power pins	4 power pins
5.63 mm Creepage**	3.02 mm Creepage**	3.66 mm Creepage**		2.95 mm Creepage**		
2.69 mm Clearance**	1.87 mm Clearance**	3.31 mm Clearance**		2.71 mm Clearance**		

* Asymmetric power pins and other signal pin counts available. ** Selectively loading contacts achieves customer specific creepage and clearance requirements. Contact ASP@samtec.com. † 4 adjacent pins powered.

ULTRA MICRO POWER SYSTEMS

17.1 A per pin

- 5 mm to 20 mm stack heights
- Design flexibility as power-only system or two-piece system for power/signal applications
- Higher position counts and stack heights in development
- Use with Samtec's high-speed connector systems (Edge Rate®, SEARAY™, AcceleRate® HD, Q Series®, Tiger Eye™, Razor Beam™ LP, LP Array™, etc.)



2.00 mm pitch (UMPX)
vs. 3.81 mm pitch (UPX)

HIGH POWER SYSTEMS

10.3 A per pin

- Individually shrouded contacts
- Board-to-board and discrete wire cable systems
- Reliable Tiger Buy™ contacts (IPT1/IPS1, MMSX(T))
- Optional polarization
- Elevated stack height options
- Vertical and right-angle for parallel, perpendicular and coplanar applications
- Rugged metal or plastic latching systems
- Cable components and tooling available

EXTREME POWER SYSTEMS

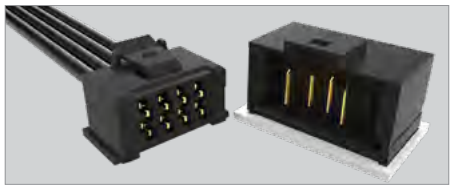
20-60 A per blade

- Small form factor high power systems
- 20 A, 30 A and 40 A options
- Power only, or power/signal combinations
- Board-to-board and discrete wire cable systems
- Hermaphroditic (MPPT & UPPT) and "hinging" (FMPT/FMPS) designs available
- 60 A system with 3 or 5 row signals in the same form factor (ET60T/ET60S)
- 30 A system with double stacked blades for higher density and power (LPHT/LPHS)
- Cable components and tooling available

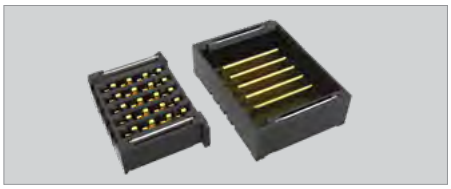
FLEXIBLE POWER SOLUTIONS					
UPT/UPS/UPPT	UMPT/UMPS	IPBT/IPBS	PMSX(T)	IPT1/IPS1	MMSX(T)
23 A (-V)/pin	17.1 A/pin	10.3 A/pin	10.3 A/pin (PMSD/IPBT)	5.9 /pin	4.8 A/pin (MMSD/IPL1)
3.81 mm pitch	2.00 mm pitch	4.19 mm pitch		2.54 mm pitch	
7 & 10 mm stack heights	5-20 mm stack heights	15.25 & 16.84 mm stack heights	16, 18, 20, 22 & 24 AWG	11.05-35 mm stack heights	20,22, 24, 26, 28 & 30 AWG
2, 4, 6, 8 power pins*	2-5 power pins*	2-30 power pins*	2-30 power pins	10-50 power pins*	2-50 power pins
5.80 mm Creepage**	1.65 mm Creepage**	4.27 mm Creepage**		2.55 mm Creepage**	
1.51 mm Clearance**	2.20 mm Clearance**	3.05 mm Clearance**		1.91 mm Clearance**	

TECHNOLOGY ROADMAP

Right-angle Ultra Micro Power (2 to 10 positions) with a rugged latch for cable mating (UMPT).



Ultra Micro Power cable assembly with rugged latching for a more secure connection.



Ultra Micro Power 25 A system in development for higher power in a compact design.

SEALED I/O SYSTEMS

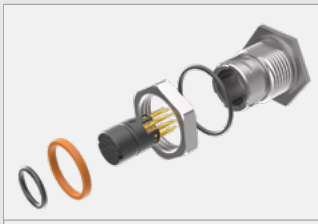
samtec.com/sealed

RUGGED SEALED SYSTEMS

- IP67 miniature push-pull latching system with lightweight plastic shell
- IP68 bayonet-style latching circulars with metal or plastic shells and flexible configurations
- Cost-effective crimp version available

ACCLIMATE™

- Rectangular design for maximum panel area savings
- IP68 threaded circulars with rugged overmold design
- Right-angle and cable-to-cable options in development (ACX, CCX)



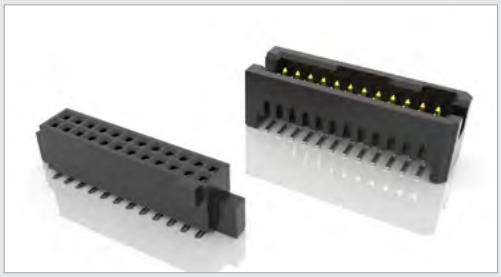
Kitted components for efficient field assembly

ACCLIMATE™ CABLE PLUG & RECEPTACLES						
MCP/MCR (IP67)	CCP/CCR (IP68)	ACP/ACR (IP68)			RPBX/RPCX/RCX	SCRUS/SCRES
Miniature	12 mm shell size	12 mm shell size	16 mm shell size	22 mm shell size	Rectangular	Threaded Circular
28 AWG (crimp)		24, 28 AWG	16, 24, 28 AWG	16, 24 AWG	24 AWG / 20 (Power), 25 (Signal), 28 (Drain) AWG	
12 pins	8 pins	4, 5, 6 pins	10, 14 pins	8, 20, 30 pins	Ethernet (CAT3, CAT5, CAT5e) / USB (Type A & B)	

RUGGED TESTING

SEVERE ENVIRONMENT TESTING

Severe Environment Testing is a new Samtec initiative to test our products beyond typical industry standards and specifications, many set forth by common requirements for rugged industries. Several of our products will undergo additional testing to ensure they are more than suitable for industrial, military, automotive and other extreme applications.



TESTING WILL INCLUDE:

- Higher mating cycle testing
- Intense shock and vibration
- Altitude testing
- ESD testing
- Temperature cycling
- And more

PRODUCTS TO BE TESTED:

- Rugged Tiger Eye™ connectors
- Hermaphroditic Razor Beam™ connectors
- SEARAY™ high-density arrays
- Edge Rate® rugged signal integrity connectors
- AcceleRate® HD ultra-micro connectors
- Ultra Micro Power systems
- High-speed coax and twinax cable assemblies

Please contact set@samtec.com for more information and test results when available.

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 on 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

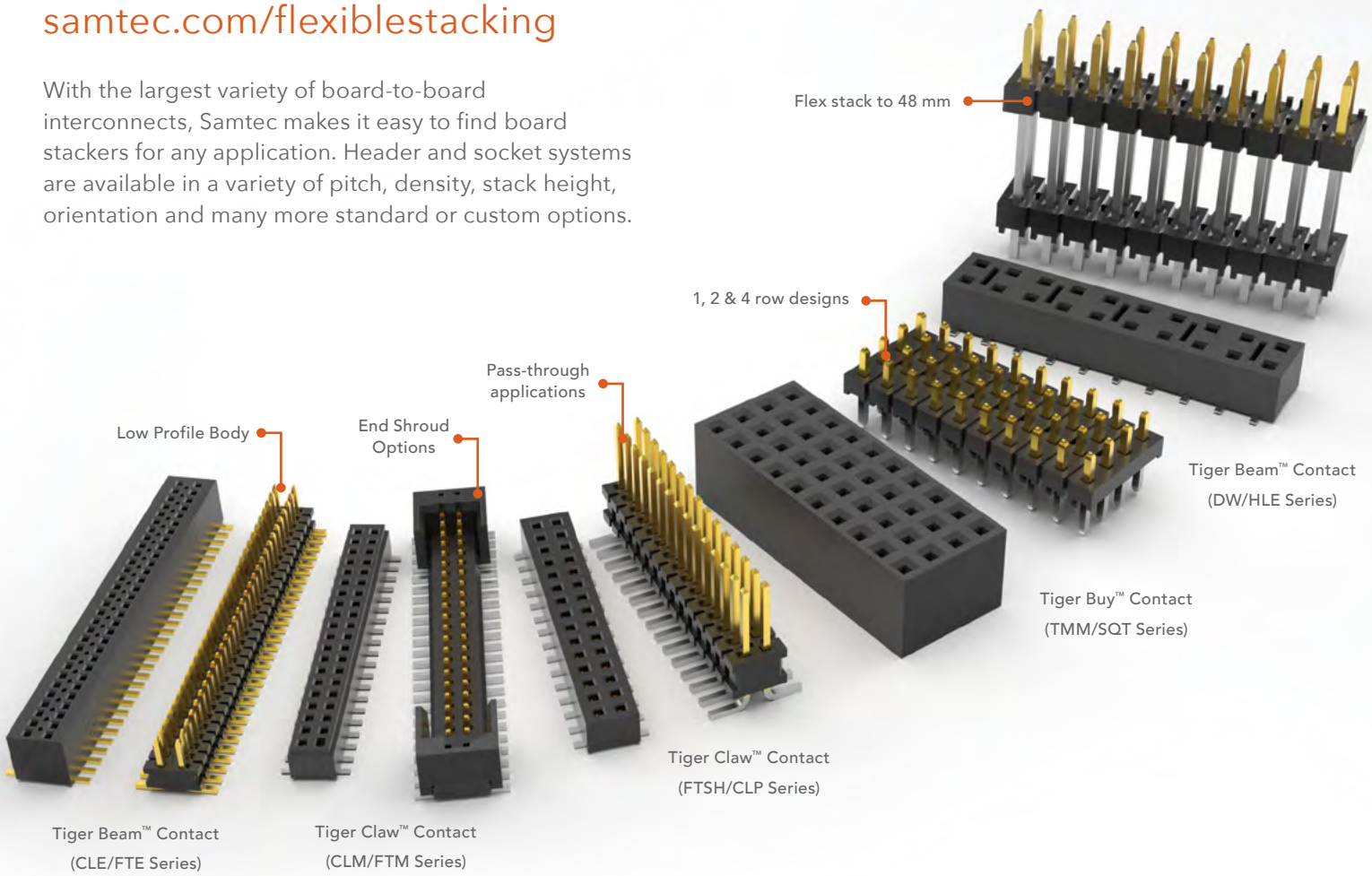
PITCH	TYPE	CONTACT	SERIES*
0.50 mm	Q Series® Strip	Blade & Beam	QSH/QTH
	Basic Strip	Blade & Beam	BSH/BTH
0.635 mm	Q Series® Strip	Blade & Beam	QSS/QTS
	Basic Strip	Blade & Beam	BSS/BTS
0.80 mm	Edge Rate® Strip	Edge Rate®	ERF8/ERM8
	Edge Card	Edge Rate®	HSEC8
	Q Rate® Strip	Edge Rate®	QRM8/QRF8
	Q Series® Strip	Blade & Beam	QSE/QTE
	Basic Strip	Blade & Beam	BSE/BTE
	Strip	Tiger Eye™	SEM/TEM
1.00 mm	Strip	Tiger Claw™	CLM/FTMH
1.27 mm	SEARAY™ Array	Edge Rate®	SEAF/SEAM
	Strip	Tiger Eye™	SFM/TFM
	Strip	Tiger Claw™	CLP/FTSH
	Strip	Tiger Beam™	FLE/FTSH
2.00 mm	Strip	Tiger Eye™	SMM/TMM
	Strip	Tiger Claw™	CLT/TMMH
2.54 mm	Strip	Tiger Claw™	SSM/TSM
	Strip	Tiger Claw™	BCS/TSW

* Tested socket/terminal combination shown. Other mating headers also available. Contact Samtec if header design you need is not shown.

FLEXIBLE STACKING

samtec.com/flexiblestacking

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



INCREDIBLE FLEXIBILITY

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

VARIETY OF PITCHES

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

BUILD IT YOURSELF

Check out Solutionator® to quickly build a mated set for your specific application.
Visit samtec.com/solutionator

Solutionator®

CUSTOMIZABLE

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

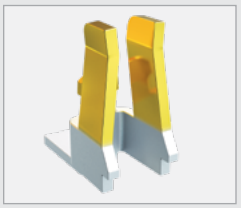
VARIETY OF CONTACTS

TIGER™ EYE CONTACT

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

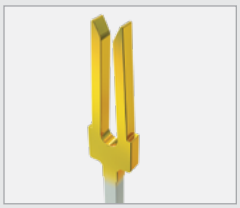
TIGER™ CLAW CONTACT

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



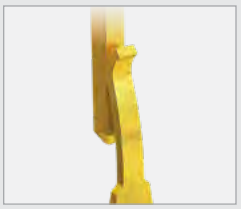
TIGER™ BUY CONTACT

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

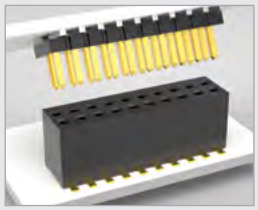


TIGER™ BEAM CONTACT

- Best cost
- Reliable performance
- Post & beam contact

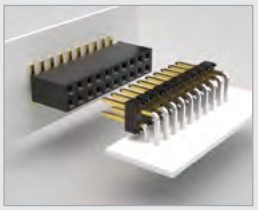


VARIETY OF ORIENTATIONS/APPLICATIONS



Standard

- Choice of contact system
- Single, double and triple row designs
- Largest variety

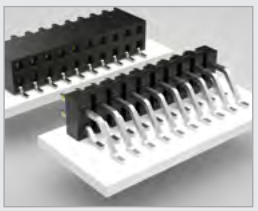


Right-Angle

- Design flexibility
- Tiger Claw™ & Tiger Buy™ contacts
- Through-hole, surface mount

Low Profile

- Down to 1.65 mm (.065") stack height
- Tiger Claw™ contacts
- Space saving

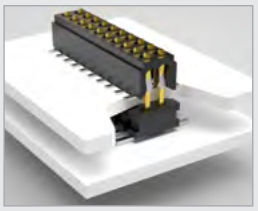


Coplanar

- 1-4 row designs
- Surface mount, through-hole or mixed technology
- Tiger Claw™ & Tiger Beam™ contacts

Elevated

- Up to 48.51 mm (1.910") stack height
- Design flexibility
- Clearance, air flow

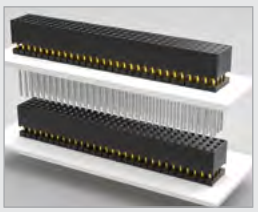


Bottom Entry

- Tiger Claw™ contacts
- Access to components when mated
- Space savings

Pass-Through

- Connect three or more boards
- Tiger Claw™ & Tiger Beam™ contact systems
- Surface mount or offset through-hole



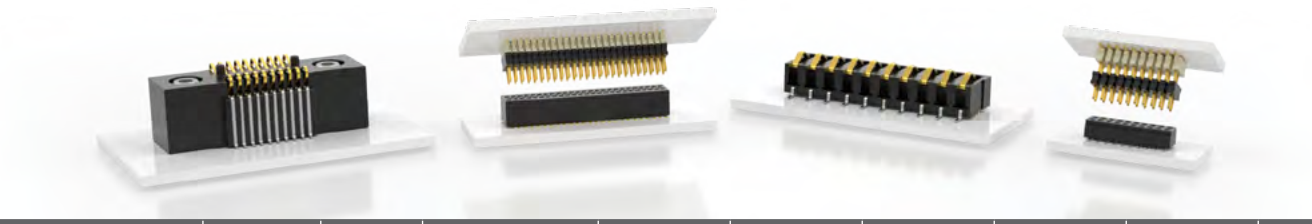
Self-Nesting

- Tiger Buy™ contacts
- Press-fit or through-hole tails
- PC/104-*Plus*™ embedded applications

BOARD STACKING REFERENCE

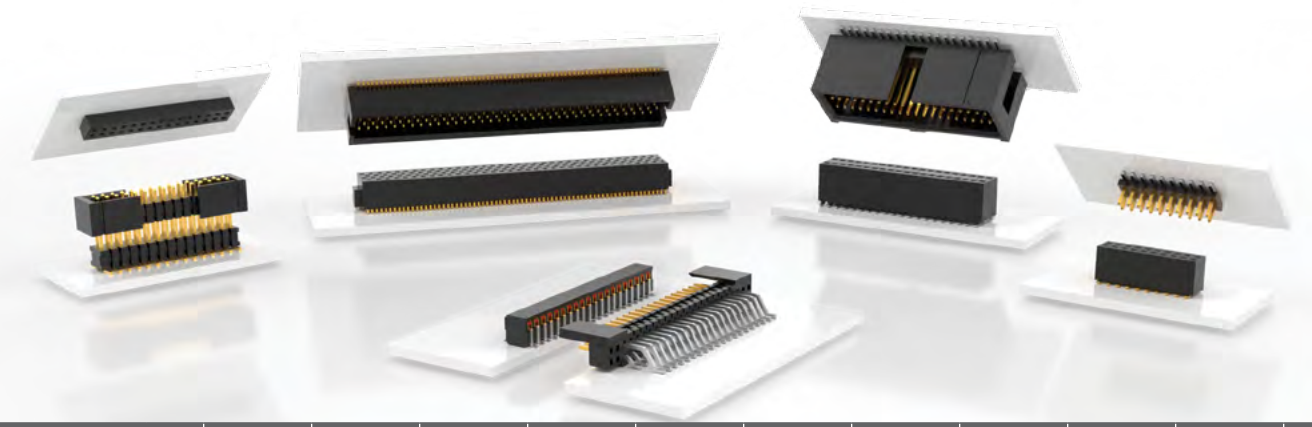
Focused/most popular series in charts. For all flexible stacking solutions visit samtec.com/connectors

ONE-PIECE, 0.80 mm (.0315") & 1.00 mm (.0394") PITCH



SERIES		FSI	SEI	SIB	CLE	FTE	CLM	FTMH/ FTM	MLE	MW
PITCH		1.00 mm (.0394")		.100" (2.54 mm)	0.80 mm (.0315")		1.00 mm (.0394")			
ORIENTATION		V				V & RA	V	V & RA	V	
BOARD STACKING (mm)	min	3	1.65	3.8	5	5	3.48		4.57	4.62
	max	10			9.14		8.43	5.11	9.27	
CONTACT SYSTEM					Tiger Beam™		Tiger Claw™		Tiger Beam™	
MATES		One-Piece			FTE, AW	CLE	FTM, FTMH, MW	CLM, MLE	FTM, FTMH, MW	CLM, MLE

.050" (1.27 mm) PITCH HEADERS & SOCKETS

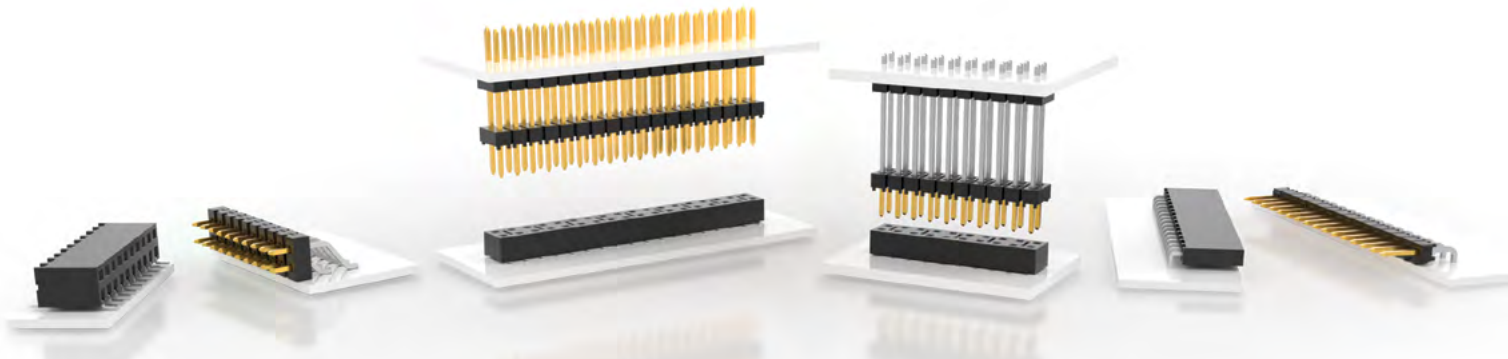


SERIES		CLP	FLE	FTS	FTSH	FW	SOLC	TOLC	DWM/ HDWM	FTR	RSM	SLM
PITCH		.050" x .050" (1.27 mm x 1.27 mm)							.050" x .100" (1.27 mm x 2.54 mm)			
ORIENTATION		V & RA	V		V & RA	V						
BOARD STACKING (mm)	min	3.53	5.82	3.53	5.18	7.72	6.35		9.65	9.78		7.11
	max	17.75	19.15	5.82	7.49	19.15	12.00		22.99	14.73	19.69	19.43
CONTACT SYSTEM		Tiger Claw™	Tiger Beam™				Tiger Buy™					Tiger Buy™
MATES		FTSH, FTS, FW		CLP, FLE			TOLC	SOLC	SMS, SLM, RSM		FTR, HTMS, HDWM, DWM, TML, ZML, TMS	HTMS, TMS, MTMS, DWM, HDWM, FTR, HMTMS

2.00 mm (.0787") PITCH HEADERS & SOCKETS

SERIES		MMT	TMM/ MTMM	TMMH	TW	ZLTMM	CLT	ESQT/ -368	MMS	SMM	SQT	SQW	TLE
ORIENTATION		RA	V & RA			V			V & RA	V	V & RA	V	
TERMINATION		SMT & MT	T/H & SMT			T/H	T/H & SMT	T/H	T/H & SMT	SMT	T/H	T/H & SMT	SMT
BOARD STACKING (mm)	min	2	3.63	4.14	7.49	7.62	3.63	9.37	5.94	6.07	7.85		6.99
	max	4	18.87	22.07	43.31	13.34	4.98	43.31	19.81	17.78	29.59		17.53
CONTACT SYSTEM							Tiger Claw™	Tiger Buy™	Tiger Claw™	Tiger Eye™	Tiger Buy™		Tiger Beam™
MATES		CLT, SQT, SQW, ESQT, TLE, SMM, MMS				SQT, SQW, ESQT, SMM	TMM, TMMH, MTMM, MMT, TW, TSH	TMMH, TMM, MTMM, MMT, TW, LTMM, ZLTMM, ESQT, PTT, TSH, TMMS, PTHF	TMMH, TMM, MTMM, MMT, TW, LTMM, ZLTMM, TSH	TMM, TMMH, MTMM, MMT, LTMM, TW, PTT, ZLTMM	TMMH, TMM, MTMM, MMT, TW, LTMM, ZLTMM, PTT, ESQT, TSH	TMMH, TMM, MTMM, MMT, TW, TSH, LTMM, PTT	TMMH, TMM, MTMM, MMT, TW, LTMM, ZLTMM, TSH

.100" (2.54 mm) PITCH HEADERS & SOCKETS



SERIES		DW, EW, ZW	HW	MTSW/ HMTSW	TLW/ MTLW	TSM	TSW/ HTSW	BCS	ESW, ESQ	HLE	SSM	SSQ	SSW
ORIENTATION		V		V & RA				V & RA	V		V & RA		
TERMINATION		T/H	T/H & SMT	T/H		SMT & MT	T/H			T/H & SMT	SMT	T/H	T/H & SMT
BOARD STACKING (mm)	min	13.59	10.03	7.24	6.1	7.47	7.87	9.02	13.59	7.47	11.18	10.03	
	max	48.51	30.73	46.36	20.96	14.48	35.69	18.92	48.51	26.16	30.1	38.35	
CONTACT SYSTEM								Tiger Claw™	Tiger Buy™	Tiger Beam™	Tiger Claw™	Tiger Buy™	
MATES		SSW, SSQ, ESW, ESQ, CES, SLW, BSW, BCS, SSM, HLE, PHF		SSW, SSQ, ESW, ESQ, BCS, BSW, CES, SLW, HLE, SSM	BSW, CES, SLW, HLE	SSW, SSQ, SSM, BSW, ESW, ESQ, BCS, SLW, CES, HLE	SSW, SSQ, SSM, ESW, ESQ, BCS, BSW, CES, SLW	TSW, MTSW, HTSW, HMTSW, TSS, ZSS, DW, EW, ZW, HW, TSM, MTLW, PHT	TSW, MTSW, EW, MTLW, TSS, ZSS, TSM, DW, ZW, HW, TSSH, HTSS	TSW, MTSW, DW, EW, ZW, TLW, TSM, MTLW, HW	TSW, MTSW, TST, TSS, ZST, ZSS, DW, EW, ZW, TSM, HMTSW, HTSW, TSSH, BST, HTSS, TLW, MTLW	TSW, MTSW, MTLW, EW, ZW, TSS, ZSS, TSM, TSSH, HTSS	TSW, MTSW, HTSW, HMTSW, MTLW, EW, ZW, TSS, HTSS, ZSS, TSM, TSSH, DW, HW

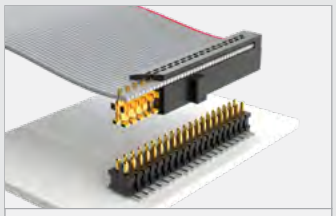
IDC SYSTEMS

samtec.com/IDC

.050" & 2.00 mm PITCH IDC SYSTEMS

TIGER™ EYE IDC

- Exceptionally low-profile design
- Choice of socket and plug terminations
- Single or double ended
- Twisted pair or flat cable
- Tiger Eye™ board level mates
- Mating shrouded and ejector terminal strips
- Variety of options including rugged strain relief, polarization and standard wiring configurations



High-reliability, high cycle Tiger Eye™ IDC contacts

FLEXIBLE FLAT RIBBON IDC SYSTEMS

- Low profile with no bulky side locks
- Choice of dual beam socket or plug terminations

MOLDED-TO-POSITION IDC ASSEMBLIES

- Low profile and skinny side locks
- Plugs with .025" (0.64 mm) square tail headers

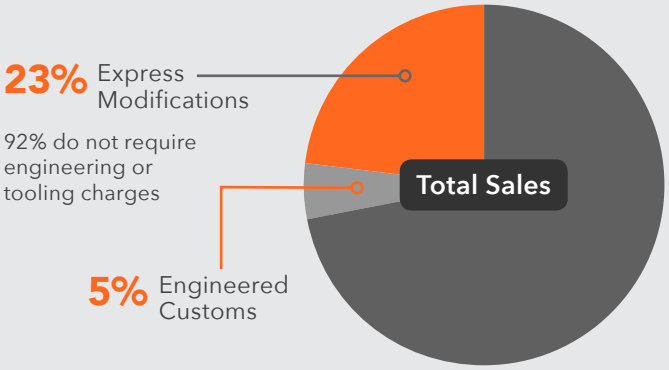
IDC CABLE ASSEMBLIES & HEADERS				
IDMX/IDSX	**HCMX/HCSX**	**TCSD/TCMD**	**FFSD/FFMD**	**FFTP/FMTP**
.100" (2.54 mm) pitch		2.00 mm (.0787") pitch	.050" (1.27 mm) pitch	
28 AWG Color Coded (standard) or Gray (optional)		28 AWG Gray	30 AWG Gray	30 AWG Twisted Pair
Mates: HTST/TST/ZST/EJH	Mates: TST/ZST/EJH	Mates: STMM/ETMM/EHT	Mates: SHF/ESHF/EHF	Mates: SHF/EHF
Dual Beam Contacts		Tiger Eye™ Contacts		
Low Profile & Slim Body	Low Profile	Strain Relief Available		

MODIFIED & CUSTOM SOLUTIONS

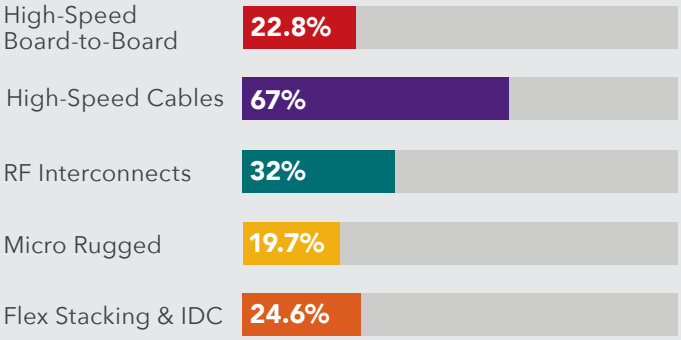
samtec.com/custom

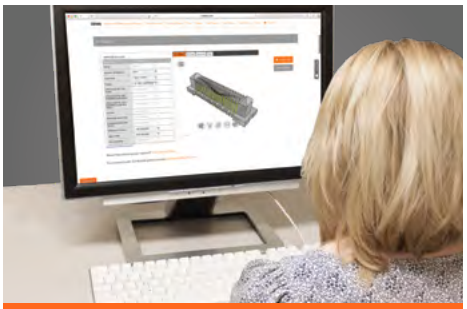
WILLINGNESS, SUPPORT & EXPERTISE

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



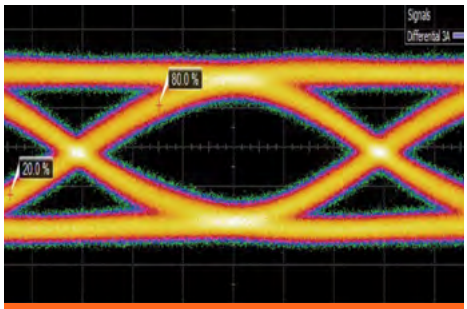
A substantial percentage of Samtec's product segments are custom.





INDUSTRY LEADING CUSTOMER SERVICE

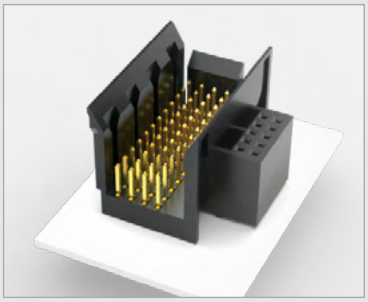
FLEXIBLE IN-HOUSE MANUFACTURING



SIGNAL INTEGRITY EXPERTISE

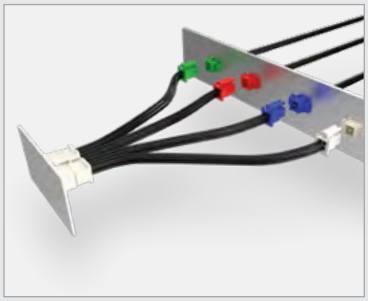
FLEXIBLE CAPABILITIES

- Full engineering, design and prototype support
- Design, simulation and processing assistance
- Quotes and samples turned around in 24 hours
- Flexible, quick-turn manufacturing
- Dedicated Application Specific Product engineers and technicians
- Modified or custom options for board level connectors and cable assemblies including: contacts, bodies, stamping, plating, wiring, molding, ruggedizing features and much more
- Contact the Application Specific Products Group at asp@samtec.com for express modifications or engineered customs.



ENGINEERED CUSTOM

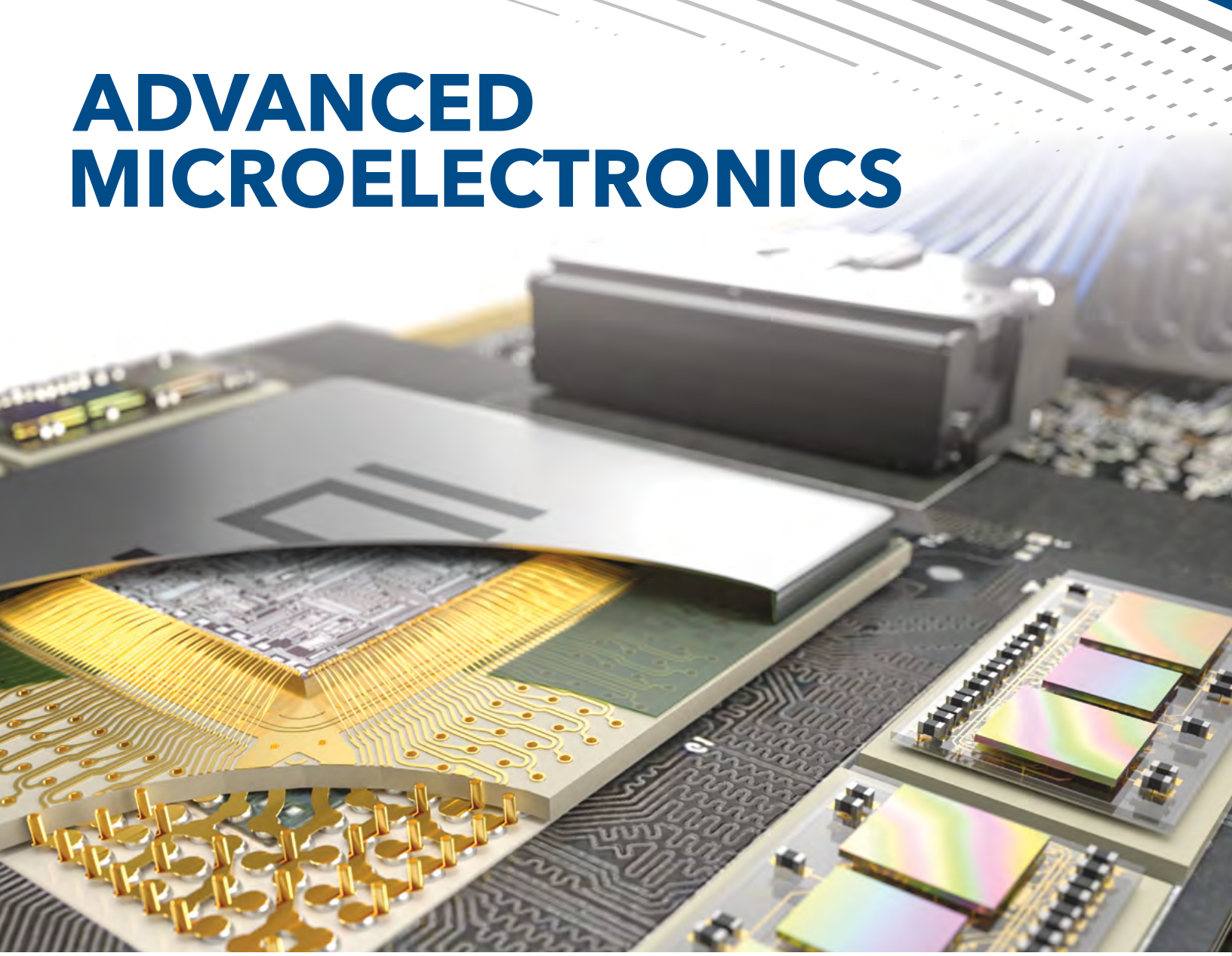
Multi-power staging, power/ signal combo, header/socket combo & custom body



EXPRESS MODIFICATION

.100" (2.54 mm) pitch Mini Mate® discrete wire assembly with custom color coded breakout

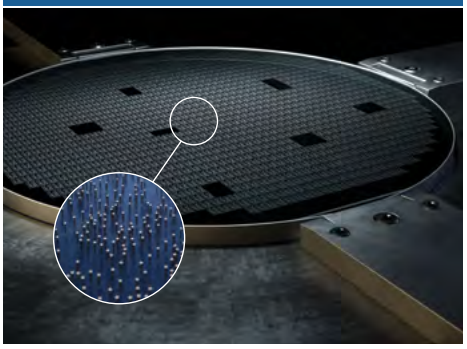
ADVANCED MICROELECTRONICS



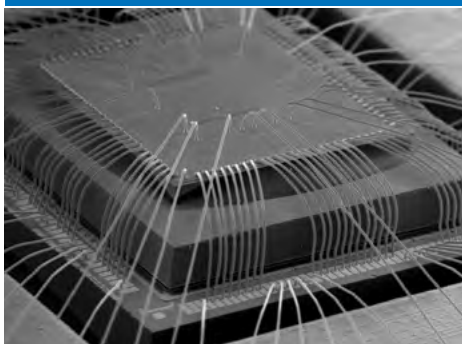
NEXT GENERATION SOLUTIONS

Next-generation 56+ Gbps integrated circuits require robust signal integrity, optimized power integrity, compact packages and advanced assembly techniques. Samtec's team of technical experts, including packaging and assembly designers, Signal / Power Integrity engineers, material scientists and system architects, collaborate to identify the ideal solution for any application. Contact sme@samtec.com to discuss your application.

Glass Core Technology



Advanced Packaging & Assembly



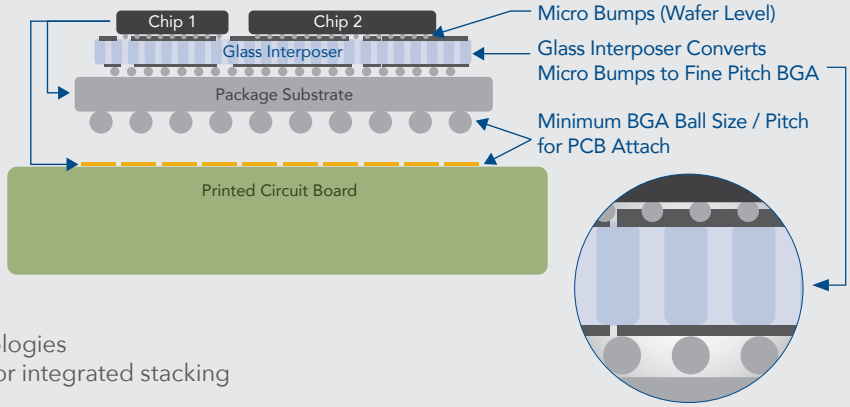
Next Gen 2.5D / 3D Packaging

THE FUTURE OF IC PACKAGING AT 56 Gbps & BEYOND

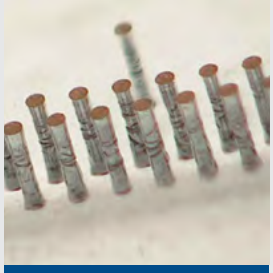
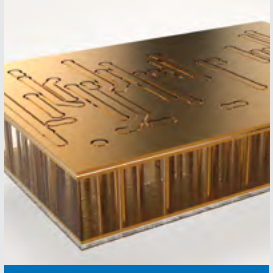
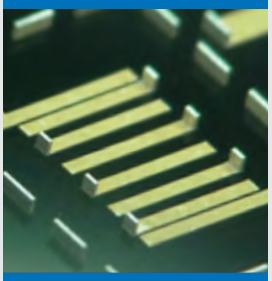
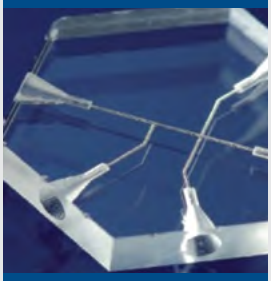
Integrated Stacking: 2.5D & 3D Packaging

As miniaturization and integration demands increase, the concept of stacking microchips is gaining more traction; stacked chips offer the benefits of electrical efficiency, less heat and power, and increased bandwidths. Samtec's proprietary Glass Core Technology enables solutions to aid in the development of these next generation packages.

- Because microchips require micro bumps, which are too small for direct attach to typical substrates or PCBs, 2.5D & 3D packaging is much more challenging
- Using glass as an interposer between the microchips and package substrate is an ideal solution, as it can be used to convert the top side micro bumps to fine pitch BGAs on the bottom side
- Additional benefits of using glass include increased signal integrity, active interposers, fine pitch / high-count I/Os, and mixed chip technologies with common bumping, and endless possibilities for integrated stacking
- Other end product applications for glass include CMOS Imaging Sensors (CIS), high-performance RF packages, SiPho packages, high-speed multichip modules and system-in-packages
- Contact Samtec's technical experts at sme@samtec.com to discuss your design needs



MICROELECTRONICS EXPERTISE AND GLASS CORE TECHNOLOGY

THROUGH-GLASS VIA (TGV)	REDISTRIBUTION LAYER (RDL)	ADVANCED IC PACKAGING	GLASS-BASED COMPONENTS	GLASS-BASED MICROFLUIDICS
Copper Metalization	Circuit Patterning	Design & Assembly	1-Layer Passives	Channels & Shapes
				
Borosilicate, Sapphire and Fused Silica	Borosilicate and Fused Silica	Traditional and Glass Substrates	Borosilicate and Fused Silica	Basic Surface Level Channel Geometry
Hermetic Sealing and Copper Via Fill	Basic Single-Layer Fan-Out Top and Bottom	Precision Die Attach	High-Reliability, High-Density, Precision Solutions	Basic Buried Channel Geometry
High-Reliability Copper Filled Vias Enable Miniaturization & Integration	Lower Cost Compared to Silicon-Based Interposers	Fine Pitch and Low Profile Wire Bond	Antennae, Inductors, Caps, Resistors and RF Filters	Biomedical Devices
		Flip Chip & Underfill		Lab-on-Chip
		Finishing		Sensors

SAMTEC USA
P.O. Box 1147 • New Albany, IN 47151-1147 USA
+1-800-SAMTEC-9 (+1-800-726-8329) USA & Canada
Tel: +1-812-944-6733 • Fax: +1-812-948-5047
Email: info@samtec.com

SAMTEC NORTHERN CALIFORNIA
2323 Owen St., Ste 120 • Santa Clara, CA 95054
+1-800-726-8329 (USA & Canada)
Tel: +1-812-944-6733 • Fax: +1-408-217-5171
Email: samtecsiliconvalley@samtec.com

SAMTEC SOUTHERN CALIFORNIA
5410 Trabuco Road • Suite 120 • Irvine, CA 92620
Tel: +1-800-726-8329
Email: samtecsoutherncalifornia@samtec.com

SAMTEC SOUTH AMERICA
Rua Alagoas Nr 1460 • Sala 805 • Bairro Savassi
Belo Horizonte - Minas Gerais 30130-160 • Brazil
Tel: +55 31 9 9146 4447
Email: brazilsales@samtec.com

SAMTEC UNITED KINGDOM
11 Mollins Court • Westfield, Cumbernauld
Scotland G68 9HP
Tel: +44 01236 739292 • Fax: +44 01236 727113
Email: scotland@samtec.com

SAMTEC GERMANY
Streiflacher Str. 7 • 82110 Germering • Germany
+0800 SAMTEC9 (+0800 / 72 68 329) Germany only
Tel: +49 (0) 89 / 89460-0 • Fax: +49 (0) 89 / 89460-299
Email: germany@samtec.com

SAMTEC FRANCE
Val d' Europe Park • 11, rue du Courtalin - Bâtiment B
77700 Magny le Hongre • France
Tel: +33 1 60 95 06 60 • Fax: +33 1 60 95 06 61
Email: france@samtec.com

SAMTEC ITALY
Via Colleoni 25 • Centro Direzionale Colleoni
Palazzo Pegaso Ingresso 3
20864 Agrate Brianza-Monza Brianza (MB) • Italy
Tel: +39 039 6890337 • Fax: +39 039 6890315
Email: italy@samtec.com

SAMTEC NORDIC/BALTIC
Solkraftsvägen 25 • 13570 Stockholm • Sweden
Tel: +46 8 4477280 • Fax: +46 8 7420413
Email: scandinavia@samtec.com

SAMTEC BENELUX
11 Mollins Court • Westfield, Cumbernauld
Scotland G68 9HP
Tel: +44 01236 739292 • Fax: +44 01236 727113
Email: benelux@samtec.com

SAMTEC ISRAEL
21 Bar-Kochva St. • Concord Tower
B'nei Brak, Israel 51260
Tel: +972 3 7526600 • Fax: +972 3 7526690
Email: israel@samtec.com

SAMTEC INDIA
#11, 2nd Floor, Chetana, Dattatreya Road
Basavanagudi • Bangalore • 560 004 India
Tel: +91 80 2660 5303 • +91 73 3866 0600
Email: india@samtec.com

SAMTEC ANZ
2A San Antonio Court • Mentone 3194
Victoria, Australia
Tel: +613 9580 0683 • Fax: +613 9580 0684
Email: australia@samtec.com

SAMTEC SINGAPORE
1 Kallang Sector #05-01/02 • Kolam Ayer Industrial Park
Singapore 349276
Tel: +65 6745 5955 • Fax: +65 6841 1502
Email: singapore@samtec.com

SAMTEC JAPAN
Nisso No. 16 Bldg. • 3-8-8, Shinyokohama, Kohoku-ku
Yokohama-shi, Kanagawa 222-0033 Japan
Tel: +81 45 475 1385 • Fax: +81 45 475 1340
Email: japan@samtec.com

SAMTEC CHINA
Unit 601, Qilai Building • No 889 Yishan Road
Shanghai, China 200233
Tel: +86 21 6083 3766 • Fax: +86 21 5423 4575
Email: china@samtec.com

SAMTEC TAIWAN
Room D, Floor B1, No. 205, Sec. 3 • Beixin Rd.
Xindian District • New Taipei City 23143 • Taiwan
Tel: +886 2 7727 4060 • Fax: +886 2 7727 4179
Email: taiwan@samtec.com

SAMTEC HONG KONG
Room 18, 13/F, Shatin Galleria • 18-24 Shan Mei Street
Fo Tan, Shatin, Hong Kong
Tel: +852 26904858 • Fax: +852 26904842
Email: hongkong@samtec.com

SAMTEC KOREA
RM#705, 109 Gwanggyo-ro
Yeongtong-gu, Suwon-si, Gyeonggi-Do
16229 South Korea
Tel: +82 31 717 5685 • Fax: +82 70 7500 0246
Email: korea@samtec.com

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www.samtec.com

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