

MICRO RUGGED

INTERCONNECT SOLUTIONS GUIDE

MICRO RUGGED INTERCONNECT SOLUTIONS

Rugged contact systems, flexible power interconnects and rugged signal integrity create the foundation of Samtec's micro rugged solutions for high cycle, high speed, high power and harsh environment applications. Samtec's rugged products are offered in conjunction with full engineering support, online tools and a service attitude that is unmatched in the connector industry.

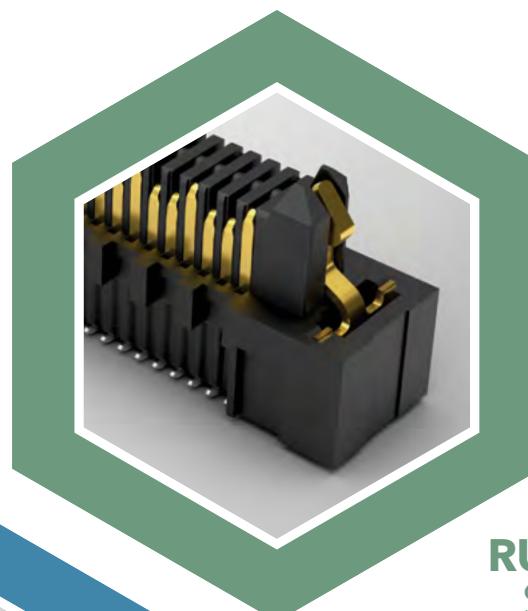


RUGGED CONTACT SYSTEM

1,000+
MATING CYCLES

TIGER EYE™
HEAT-TREATED
BeCu CONTACTS

MULTIPLE POINTS
OF CONTACT
FOR HIGH-RELIABILITY



RUGGED SIGNAL INTEGRITY

HIGH SPEEDS TO
56 Gbps PAM4

EDGE RATE®
CONTACT DESIGN
INCREASES WEAR LIFE

EXPERTISE IN
SIGNAL INTEGRITY
DESIGN & ANALYSIS

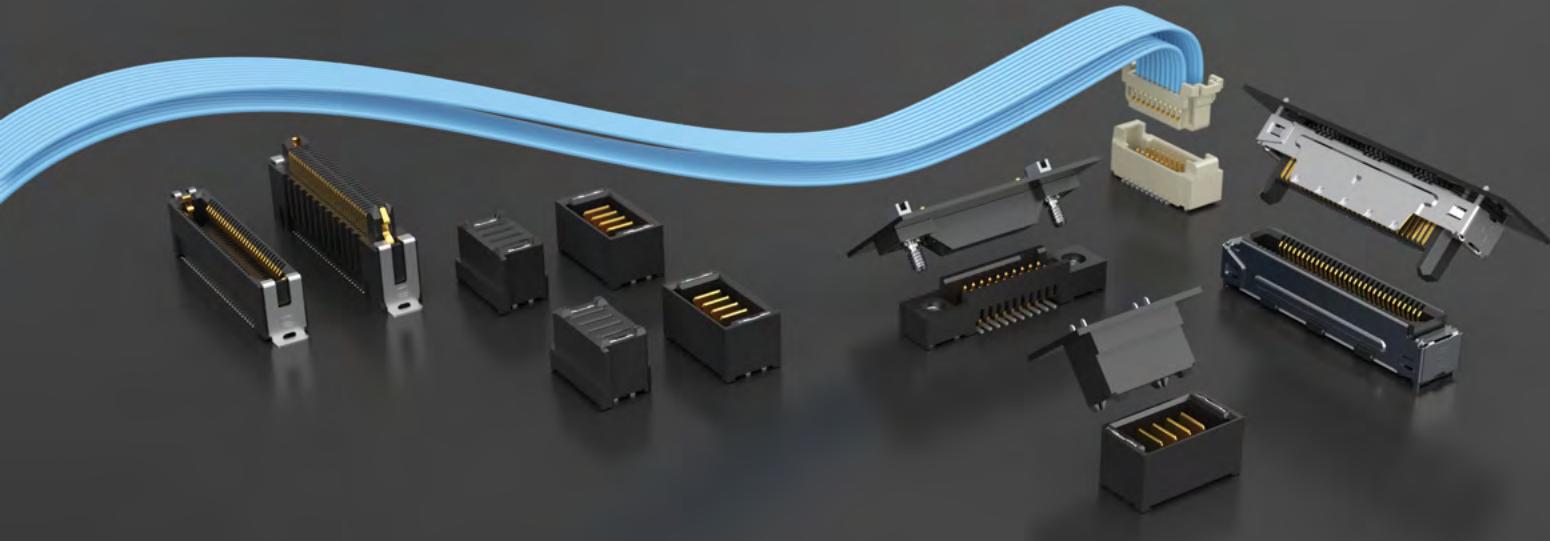


FLEX POWER

3 TO 60 AMPS

CONFIGURABILITY OF
POWER & SIGNAL

SPACE-SAVING FORM FACTOR



RUGGED CONTACT SYSTEMS

Tiger Eye™ contact system for high-reliability in rugged applications
1,000+ mating cycles
0.80 mm to 2.00 mm pitch
Board-to-board, discrete wire and IDC cable assemblies



4-7

RUGGED SIGNAL INTEGRITY SYSTEMS

Edge Rate® contact system for rugged signal integrity performance
Performance to 56 Gbps PAM4
0.50 mm, 0.635 mm and 0.80 mm pitch
Edge card and ultra-micro connectors



8-11

FLEXIBLE POWER SYSTEMS

Ultra-micro power to 17 A and incredible design flexibility
Individually shrouded contacts
Small form factor, high power systems to 60 A
Board-to-board and cable assemblies



12-15

SEALED I/O SYSTEMS

IP67 and IP68 rated for dust and water
Variety of circular shell sizes with power, power/signal pinouts
Rectangular designs for space savings
Rugged latching

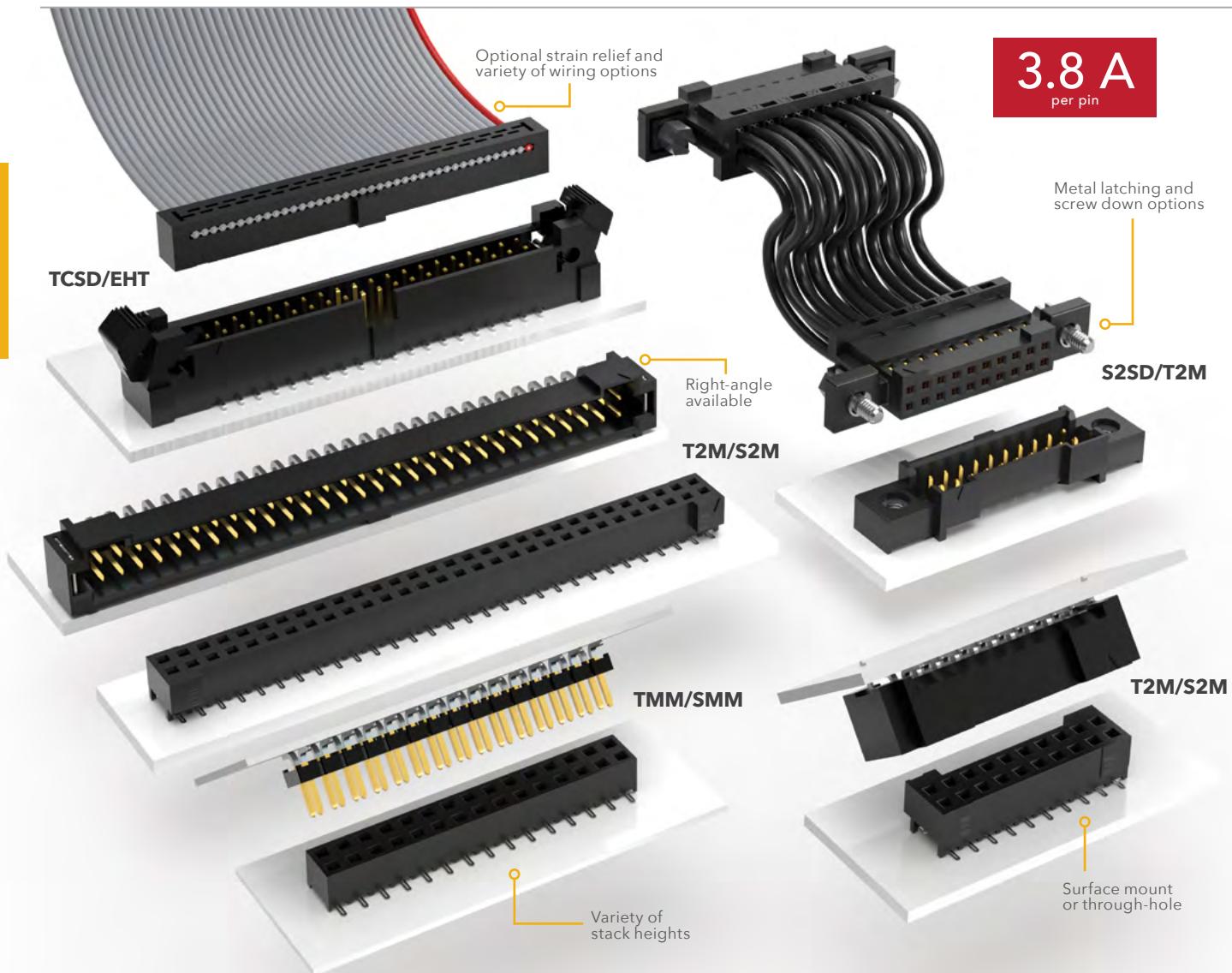


16-17

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RUGGED TIGER EYE™ SYSTEMS

HIGH-RELIABILITY • MULTI-FINGER BeCu CONTACT • HIGH MATING CYCLES



2.00 mm PITCH TIGER EYE™

- Tiger Eye™ is Samtec's most rugged contact system rated to 1,000+ mating cycles
- Wide range of stack heights
- Right-angle mating headers available
- Optional screw downs, weld tabs and locking clips
- Discrete wire assemblies available in 24-30 AWG PVC or Teflon® wire

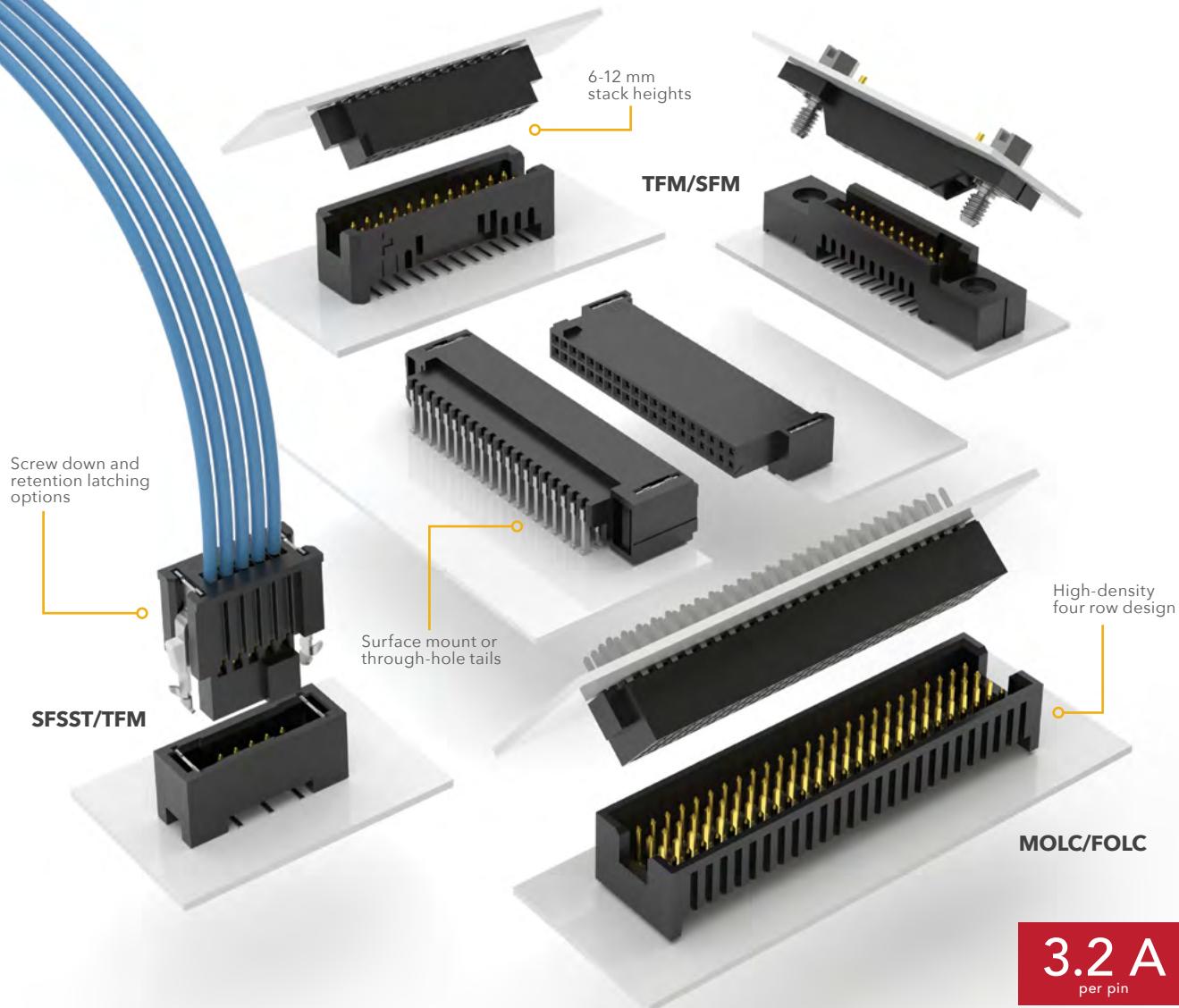


TIGER™ EYE CONTACT



TIGER EYE™ CONTACT SYSTEM

- Multi-finger design with several points of contact for high-reliability
- Smooth, flat mating area increases mating cycles and lowers contact resistance
- Heat-treated BeCu for the best combination of mechanical and electrical properties
- Surface mount, micro slot tail increases solder surface area for higher joint strength



1.27 mm PITCH TIGER EYE™

- Screw down, locking clip, friction latching and weld tab ruggedizing options
- Shrouded, polarized and keyed
- Discrete wire assemblies available in single or double row, 28 and 30 AWG PVC or Teflon® wire
- Cable components (ISDF/CC03) and tooling available

Dupont™ Teflon® is a registered trademark of the E.I. du Pont de Nemours and Company or its affiliates.



IDC cable assemblies with rugged strain relief (FFSD/FFMD, FFTP/FMTP)



Locking for increased unmating force (SFML/TFML)

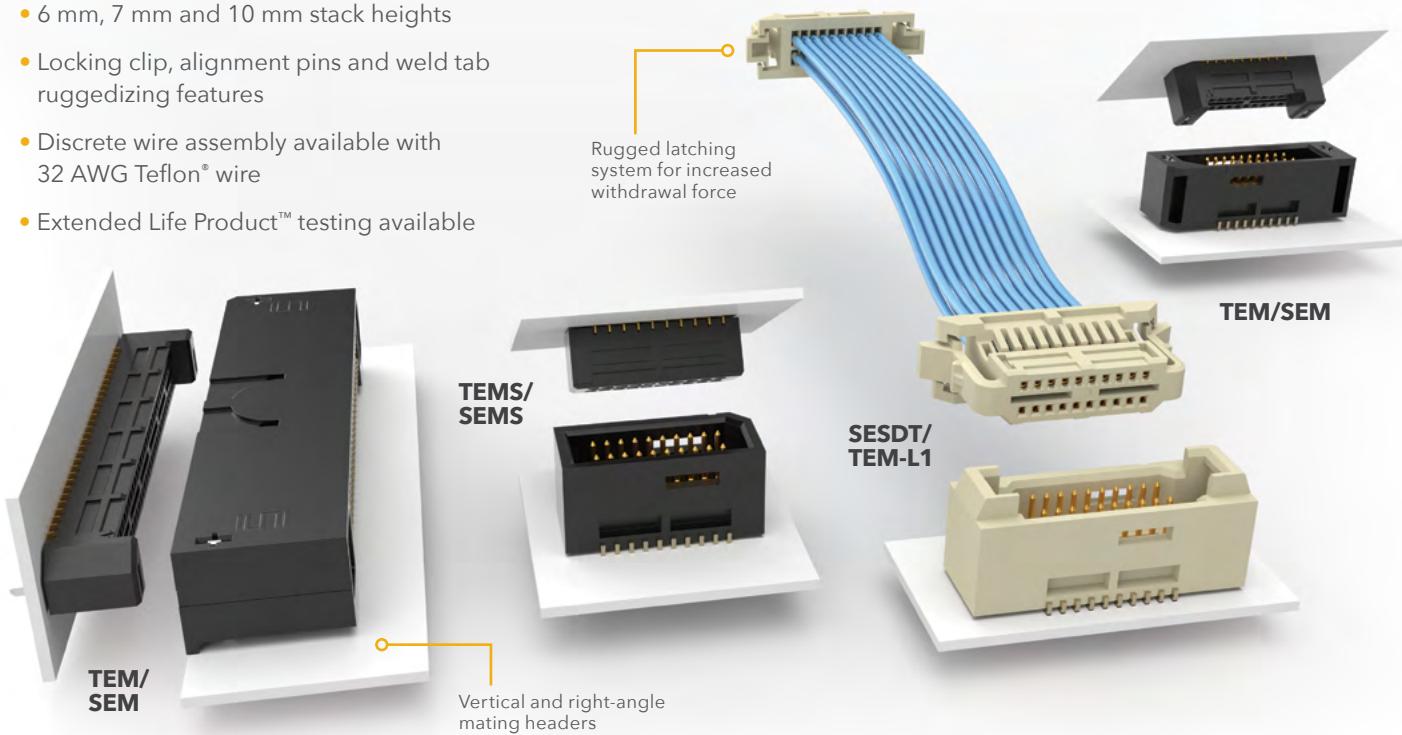
RUGGED TIGER EYE™ SYSTEMS

HIGH-RELIABILITY • MULTI-FINGER BeCu CONTACT • HIGH MATING CYCLES

0.80 mm PITCH TIGER EYE™

- Micro pitch and slim body for space-savings
- 6 mm, 7 mm and 10 mm stack heights
- Locking clip, alignment pins and weld tab ruggedizing features
- Discrete wire assembly available with 32 AWG Teflon® wire
- Extended Life Product™ testing available

2.9 A
per pin



Locking for increased unmating force (SEM)

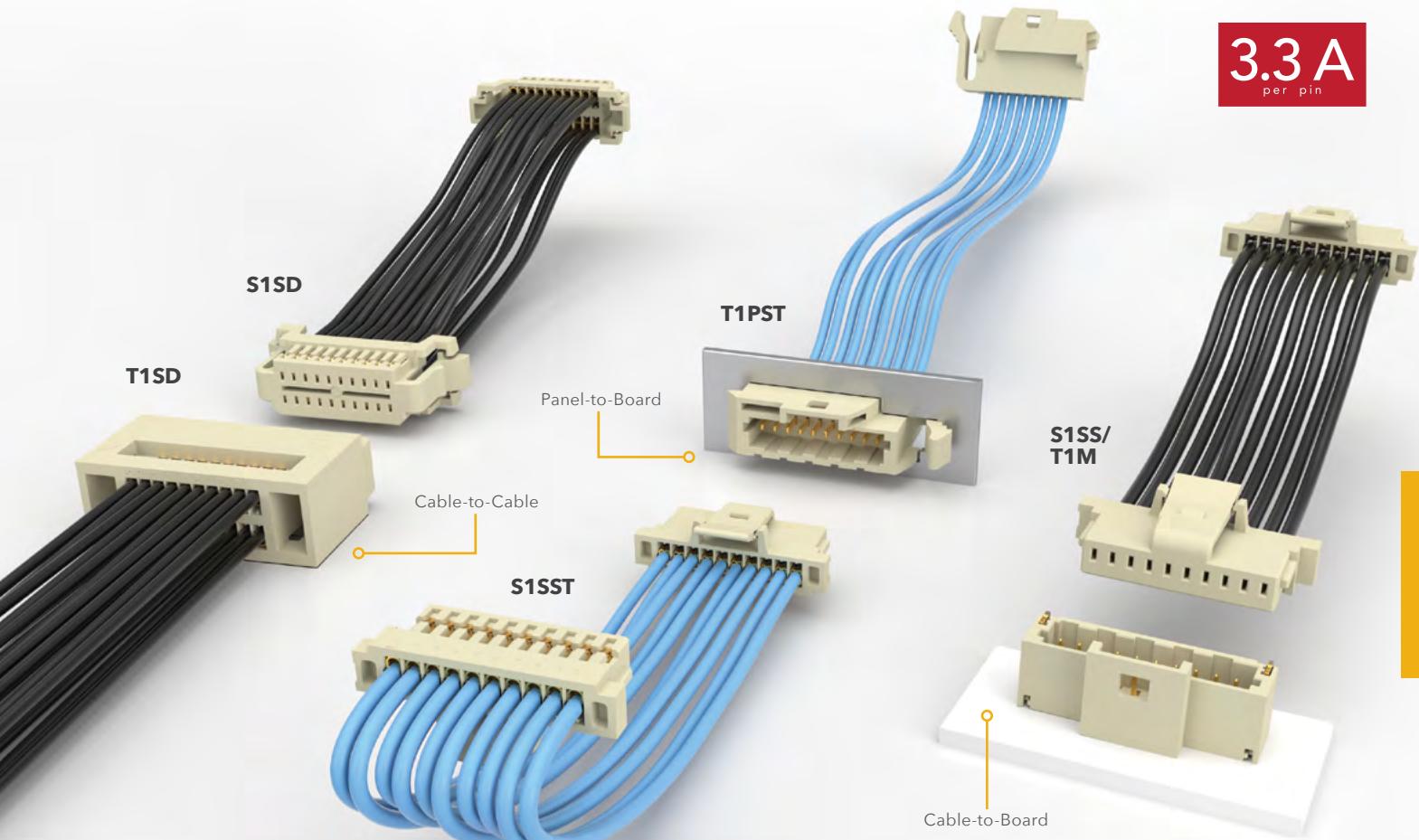


Components (ISDE/CC396) and tooling available: samtec.com/tooling



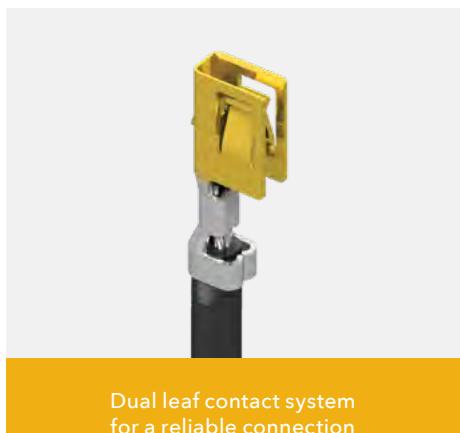
Compatible with UMPT/UMPS for power/signal flexibility

3.3 A
per pin



1.00 mm PITCH CABLE SYSTEM

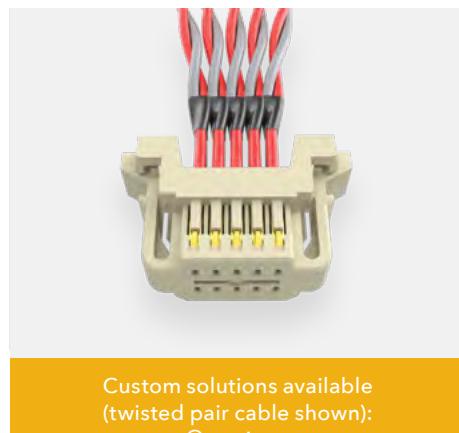
- Crimp-style dual leaf contact system for reliable wire-to-board connection
- 28 and 30 AWG cable options in PVC or Teflon®
- Rugged positive latching for increased retention
- Socket or terminal, single or double row assemblies
- Vertical and right-angle mating headers



Dual leaf contact system
for a reliable connection



Components (ISS1, ISD1/CC09; T1SS, T1SD, T1PS, T1PD/T1M137-X) and tooling available: samtec.com/tooling



Custom solutions available
(twisted pair cable shown):
asp@samtec.com

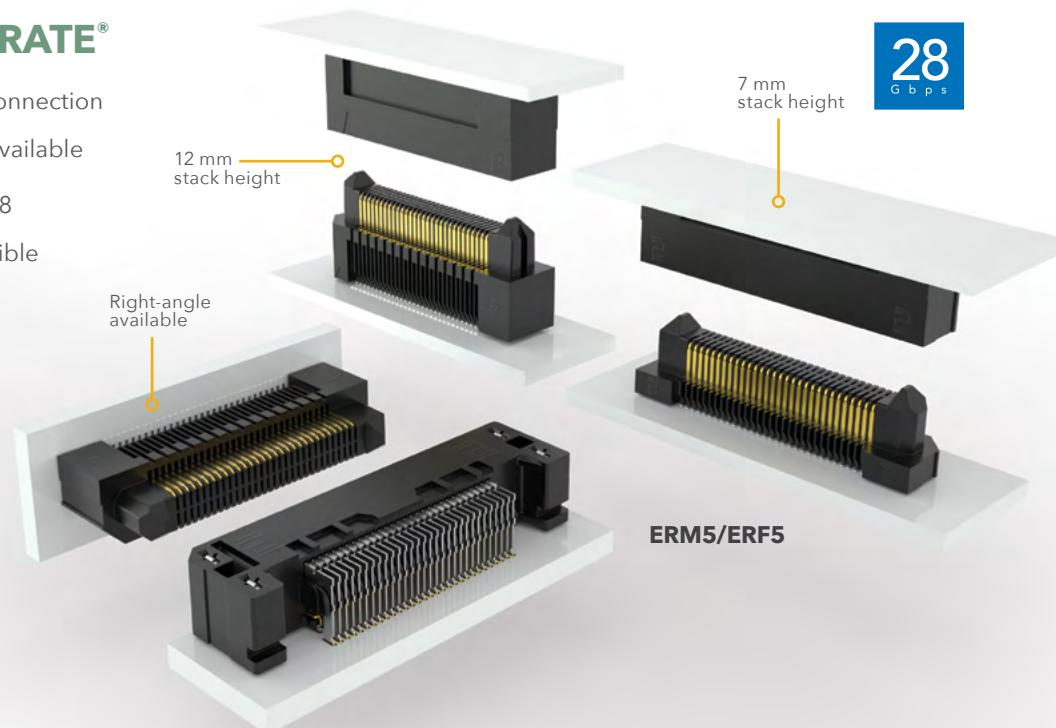
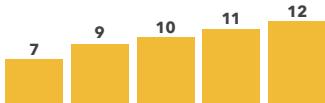
RUGGED SI EDGE RATE® SYSTEMS

OPTIMIZED FOR SI PERFORMANCE • INCREASED CONTACT WIPE • HIGH CYCLES

0.50 mm PITCH EDGE RATE®

- 1.00 mm contact wipe for a reliable connection
- Rugged friction locks and weld tabs available
- Up to 40% PCB savings vs. ERM8/ERF8
- Compatible with UMPT/UMPS for flexible power/signal solutions

Stack Height Flexibility
(Actual Size in mm)



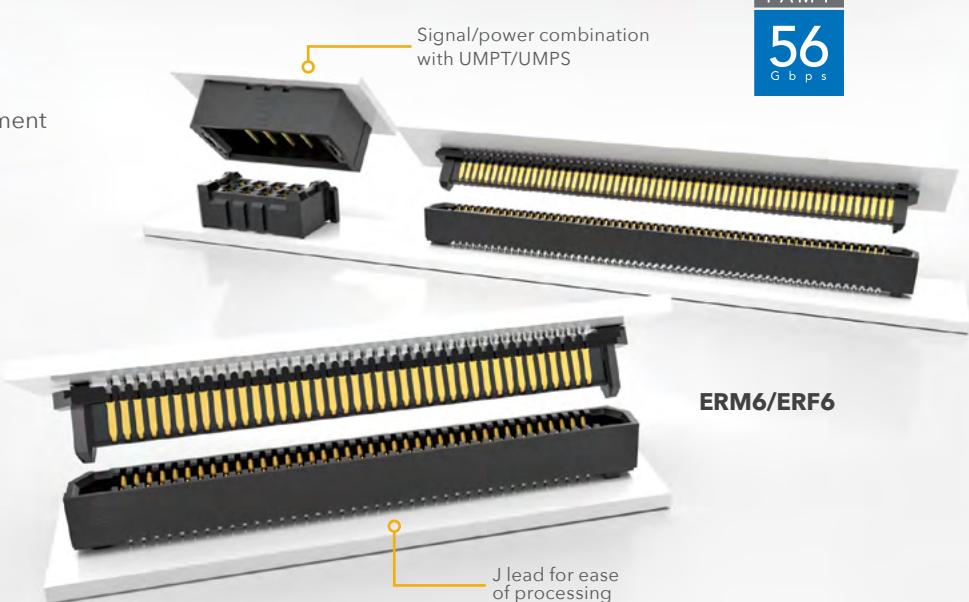
0.635 mm PITCH EDGE RATE®

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

Sockets shown actual size
at 40 total positions



PAM4
56 Gbps

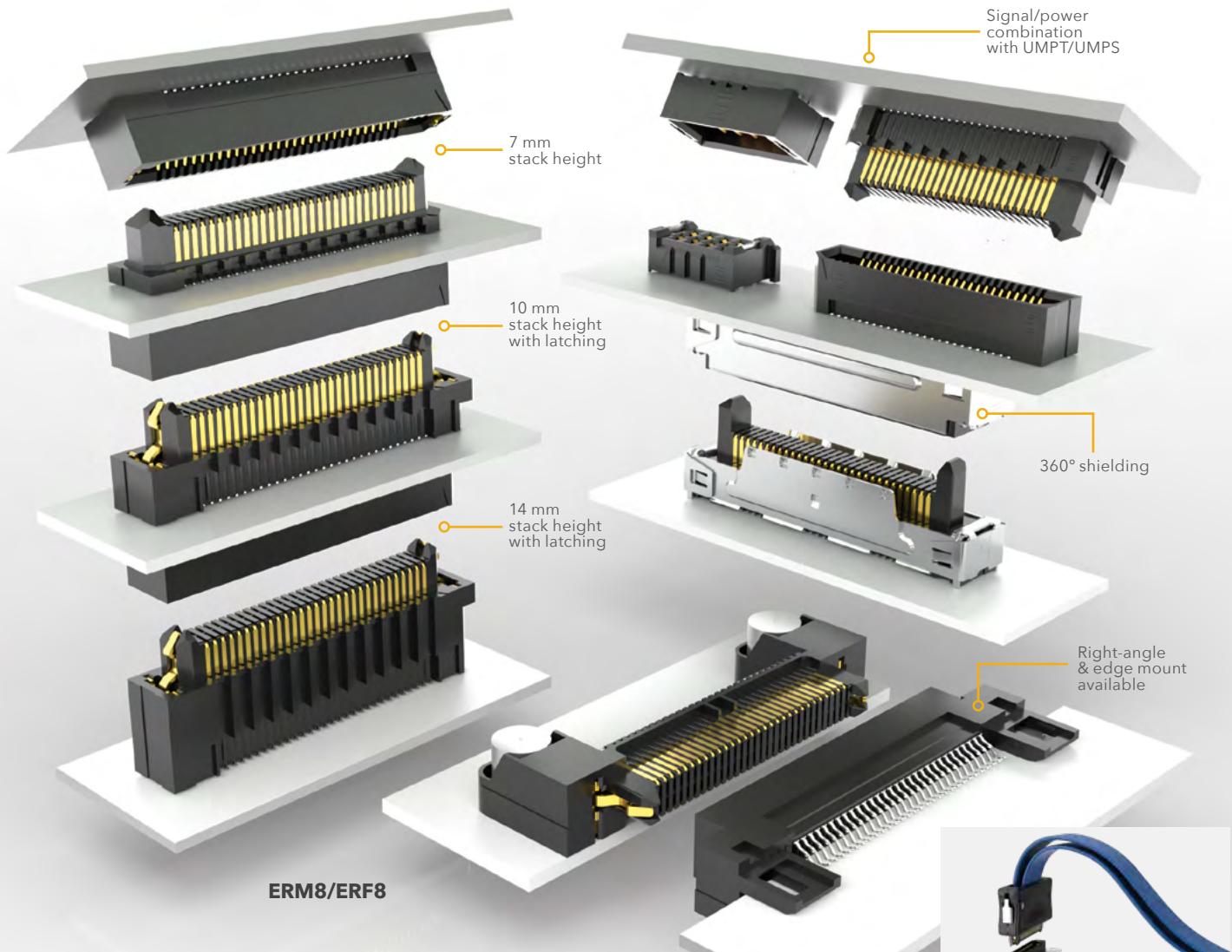


**EDGE
RATE**
CONTACT



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



ERM8/ERF8

0.80 mm PITCH EDGE RATE®

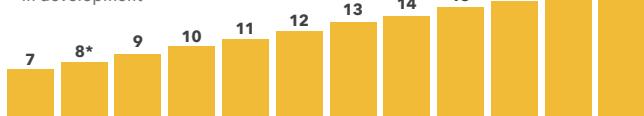
- 1.50 mm extended wipe
- Rugged metal latching for increased retention force
- 360° shielding option reduces EMI
- Compatible with UMPT/UMPS for flexible power/signal solutions
- Cost-effective metal solder lock in development for a more secure connection to the board

28
Gbps

Mating Cable Assemblies
(ERCD/ERDP Series)

Stack Height Flexibility (Actual Size in mm)

* In development



RUGGED SI EDGE CARD

UP TO 56 Gbps PAM4 • CHOICE OF PITCH • EDGE RATE® CONTACTS

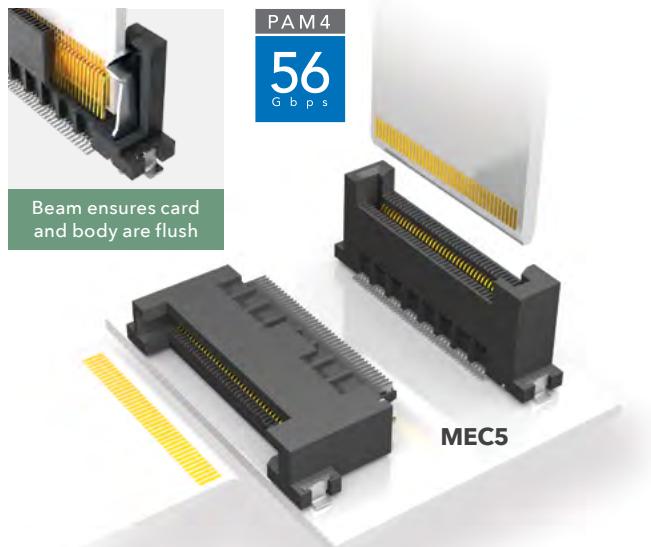
0.80 mm & 1.00 mm PITCH SYSTEMS

- High-speed Edge Rate® contact system
- Vertical, right-angle and edge mount
- Power/signal combo to 60 A per power bank
- Pass-through application



HIGH-DENSITY EDGE CARD

- Justification beam enables use of standard PCB tolerance
- 0.50 mm ultra-fine pitch with up to 300 total I/Os
- PCIe® Gen 4 compatible



MICRO EDGE CARDS

- 0.635 mm, 0.80 mm, 1.00 mm, 1.27 mm and 2.00 mm pitch
- Optional rugged weld tabs, board locks and solder locks
- Solutions for 1.60 mm (.062") and 2.36 mm (.093") thick cards



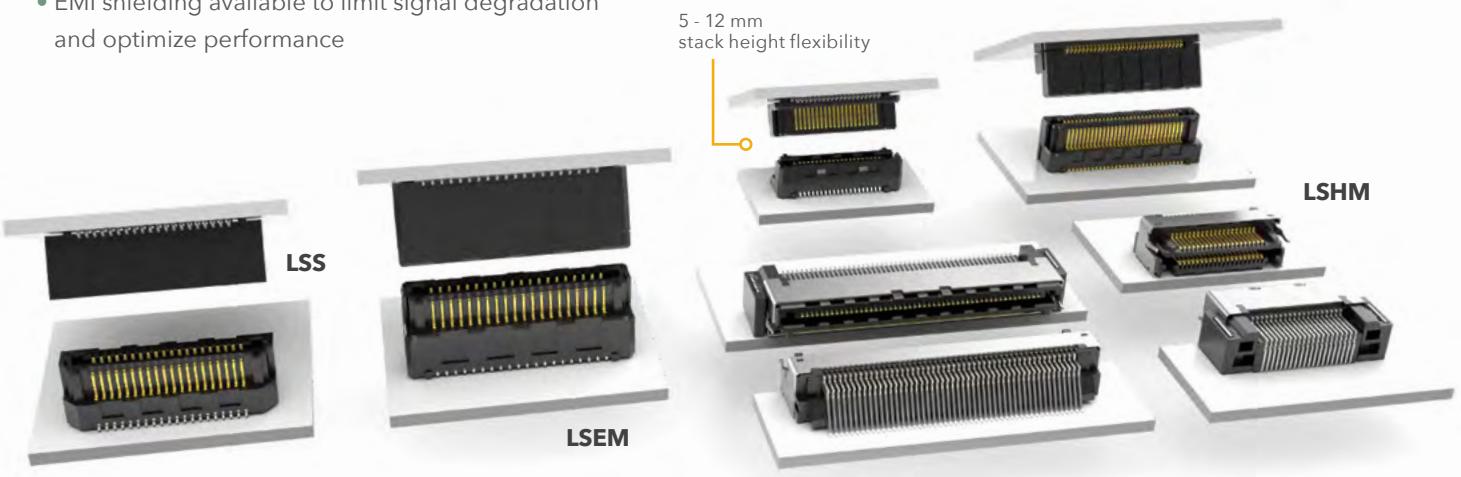
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RUGGED SI MICRO SYSTEMS

HIGH-DENSITY • HIGH-RETENTION CONTACTS • SLIM ROW-TO-ROW DESIGNS

HERMAPHRODITIC RAZOR BEAM™ INTERFACES

- High-retention, high-speed Razor Beam™ contacts
- 0.50 mm, 0.635 mm and 0.80 mm pitch
- EMI shielding available to limit signal degradation and optimize performance



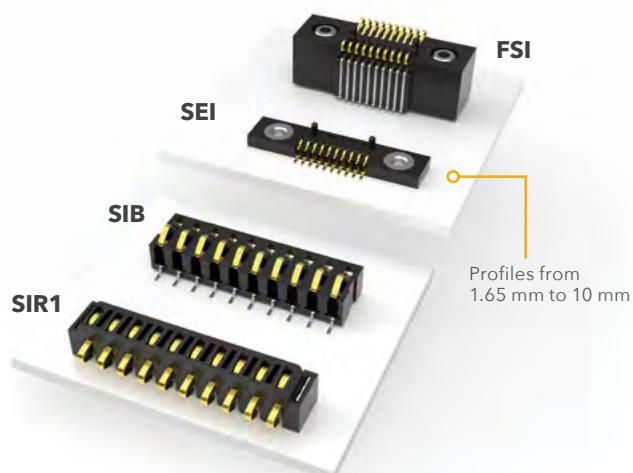
FLOATING CONNECTORS

- Provides 0.50 mm contact float in the X and Y axes to compensate for misalignment
- 5 mm and 7 mm stack heights
- Micro 0.50 mm pitch



ONE-PIECE INTERFACES

- Robust design and mechanical hold-downs for high-shock and vibration applications
- Optional rugged weld tabs and locking clips
- 1.00 mm, 1.27 mm and 2.54 mm pitch designs



FLEXIBLE POWER ULTRA MICRO POWER

17.1 A PER BLADE • MICRO 2.00 mm PITCH • DESIGN FLEXIBILITY

MICRO 2.00 mm PITCH

- Design flexibility as a power-only system or a two-piece system for power/signal applications
- Use with Samtec's high-speed connector systems for a unique power/signal system (see chart)

- Tin or 10 μ " Gold plated power blades; 30 μ " Gold plating available to meet specific regulations
- Selectively loading contacts achieves customer specific creepage and clearance requirements; contact asp@samtec.com

mPOWER



17.1 A
per blade

		CREEPAGE	CLEARANCE
SIGNAL CONNECTOR	UMPT/UMPS	1.65 mm	2.20 mm

UMPT/UMPS compared to other small form factor power solutions

Terminals shown **actual size** at 4 positions



17.1 A/blade



23 A/blade



28.8 A/blade



58.7 A/blade

SIGNAL CONNECTOR	MATED HEIGHT			
	5 mm	7 mm	8 mm	10 mm
ADM6/ADF6	X			
BTE/BSE, BTH/BSH, BTS/BSS	X		X	
ERM5/ERF5		X		X
ERM6/ERF6	X			
ERM8/ERF8		X		X
LPAM/LPAF	X			
QMS/QFS				X
QRM8/QRF8		X		X
QTE/QSE, QTH/QSH, QTS/QSS	X		X	
SEAM/SEAF, SEAM8/SEAF8		X		
ST4/SS4, ST5/SS5	X			
TEM/SEM		X		X

PRODUCT ROADMAP

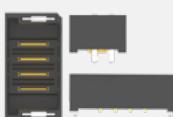
Samtec now offers power simulation that can calculate temperature increase in the connector area; contact microruggedgroup@samtec.com for more details.

PHASE 1



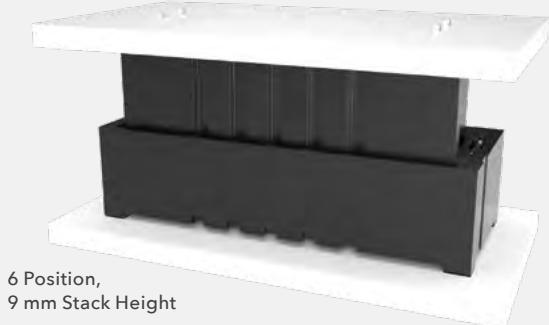
Vertical UMPT & UMPS Series

POSITIONS	STACK HEIGHTS
2, 3, 4, 5	5, 7, 8, 10



Length, width
and height shown
actual size

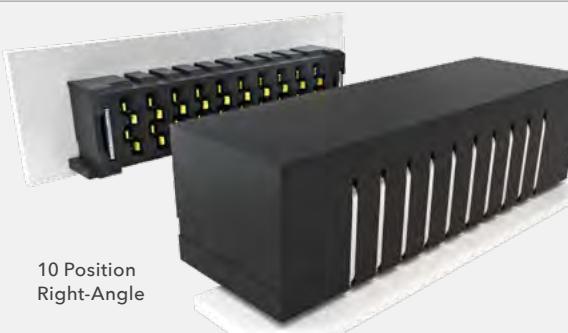
PHASE 2



Vertical UMPT & UMPS Series

POSITIONS	STACK HEIGHTS
6, 7, 8, 9, 10	6, 9, 11, 12, 14, 16

PHASE 3



Right-Angle UMPT Series

POSITIONS	OPTIONS
2, 3, 4, 5, 6, 7, 8, 9, 10	Latch for mating with cable assembly

PHASE 4



4 Position Cable Assembly and
UMPT Right-Angle with Staged Blades

Cable Assembly with Latch

POSITIONS	MATES
2, 3, 4, 5, 6, 7, 8, 9, 10	UMPT Series vertical and right-angle with latch

FLEXIBLE POWER HIGH-POWER

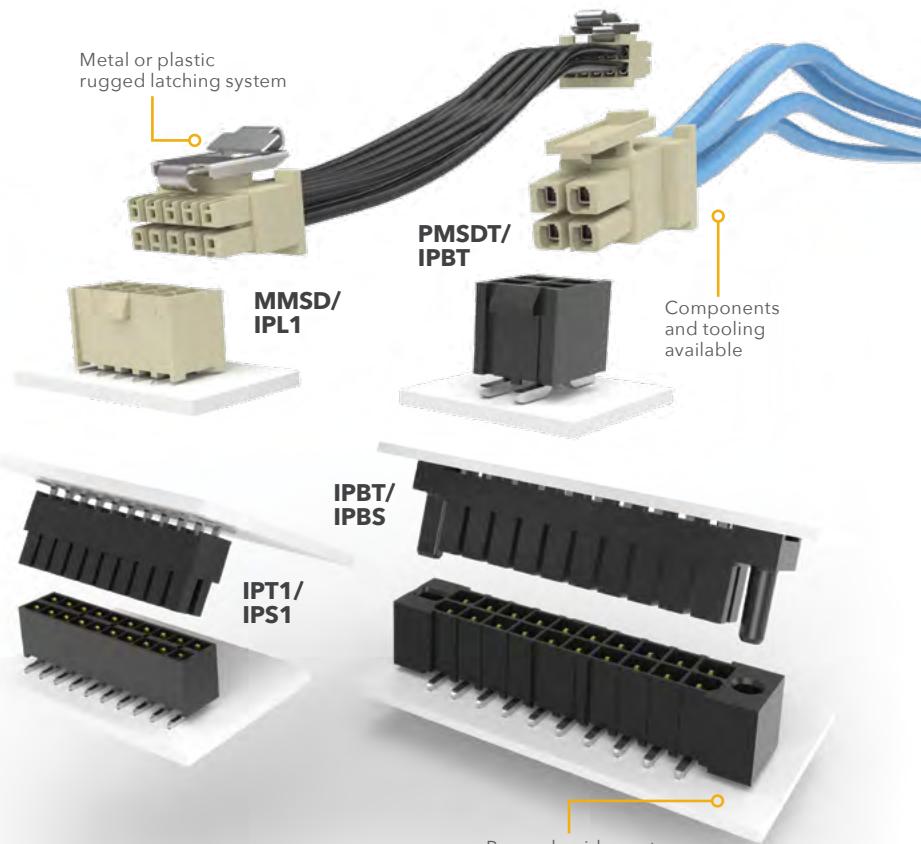
SMALL FORM FACTORS • 10-60 A PER PIN/BLADE • INDIVIDUALLY SHROUDED CONTACTS

MINI MATE® & POWER MATE®

- Individually shrouded contacts for electrical and mechanical protection
- .100" (2.54 mm) and .165" (4.19 mm) pitch
- Discrete wire assemblies with 16-30 AWG PVC or Teflon® cable
- Selectively loading contacts achieves customer specific creepage and clearance requirements; contact asp@samtec.com

10.3 A
per pin

	CREEPAGE	CLEARANCE
IPT1/IPS1 MMSS(T)/MMSD(T)	2.55 mm	1.91 mm
IPBT/IPBS PMSS(T)/PMSD(T)	4.27 mm	3.05 mm



EXTREME POWER

- AC or DC power, AC-DC combos and split power options (ET60T/ET60S)
- High-density, double stacked power blades (LPHT/LPHS)
- Selectively loading contacts achieves customer specific creepage and clearance requirements; contact asp@samtec.com

LPHT/LPHS

Low 7.5 mm
profile design

30-60 A
per blade

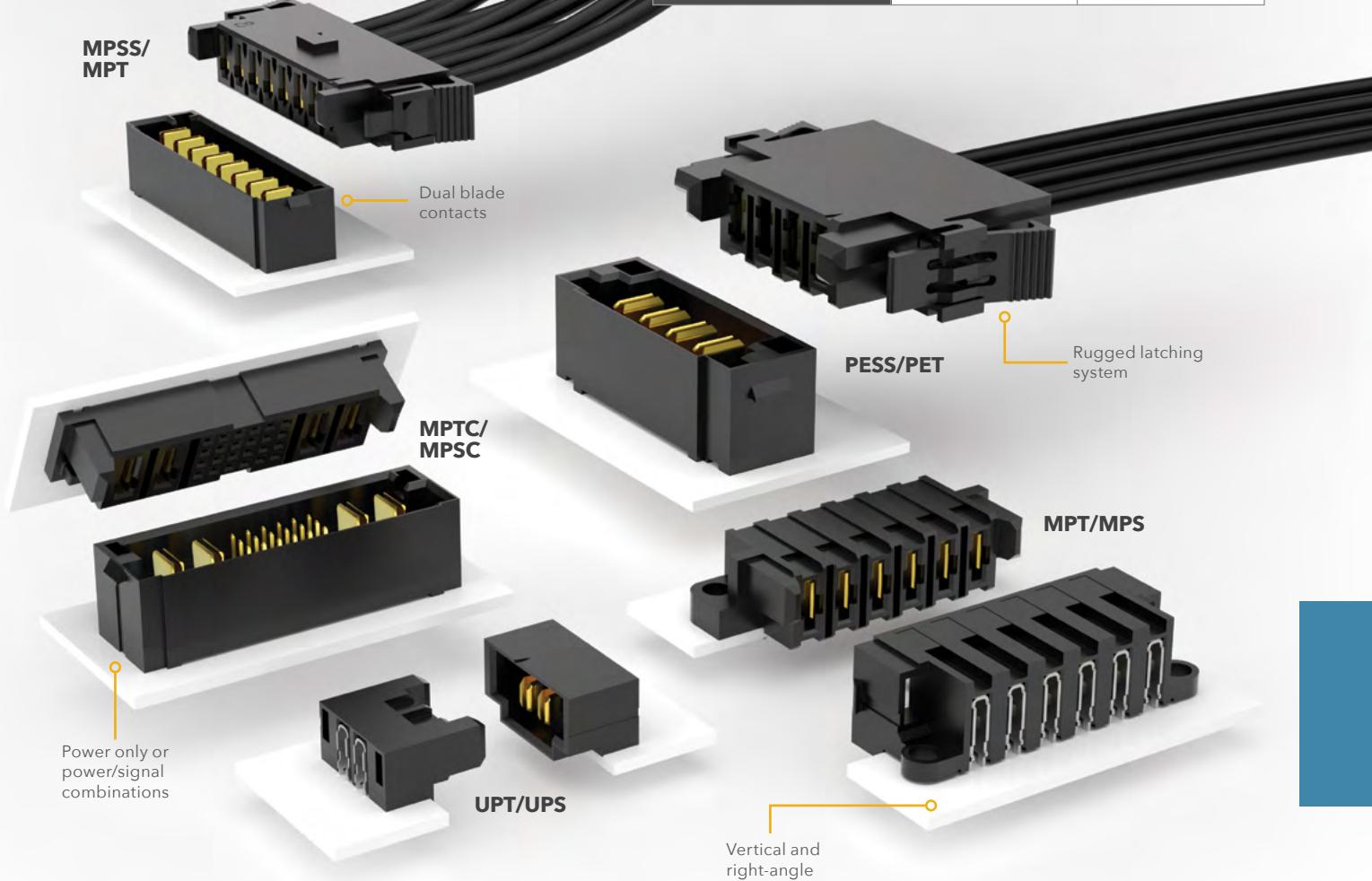
	CREEPAGE	CLEARANCE
LPHT/LPHS	5.63 mm	2.69 mm
ET60T/ET60S	3.02 mm	1.87 mm

POWERSTRIP™ SYSTEM

- 23.5 A/blade to 58.7 A/blade (1 blade powered)
- 5.00 mm and 6.35 mm pitch
- Discrete wire assemblies with 10-16 AWG cable
- Selectively loading contacts achieves customer specific creepage and clearance requirements; contact asp@samtec.com

20-60 A
per blade

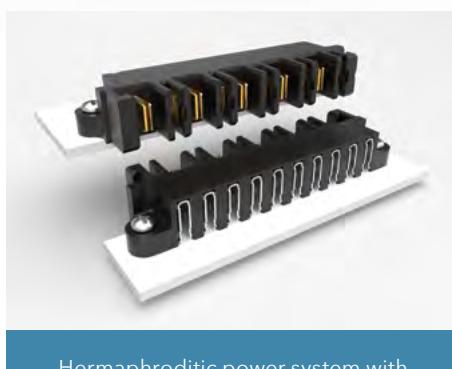
	CREEPAGE	CLEARANCE
PET/PES/PETC/ PESC/PESS	3.66 mm	3.31 mm
MPT/MP5/MPTC/ MPSC/MPSS/MPPT	2.95 mm	2.71 mm
UPT/UPS/UPPT	5.80 mm	1.51 mm



Discrete wire components (IMS5, IMSC5/
CC46, CC81; IPS6/CC10) and
tooling available: samtec.com/tooling



“Hinging” for 90° mating radius,
ideal for blind mating (FMPT/FMPS)



Hermaphroditic power system with
rugged screw downs (MPPT, UPPT)

SEALED I/O ACCLIMATE™ SYSTEMS

IP67 & IP68 • BAYONET/PUSH-PULL CIRCULARS • SPACE-SAVING RECTANGULARS

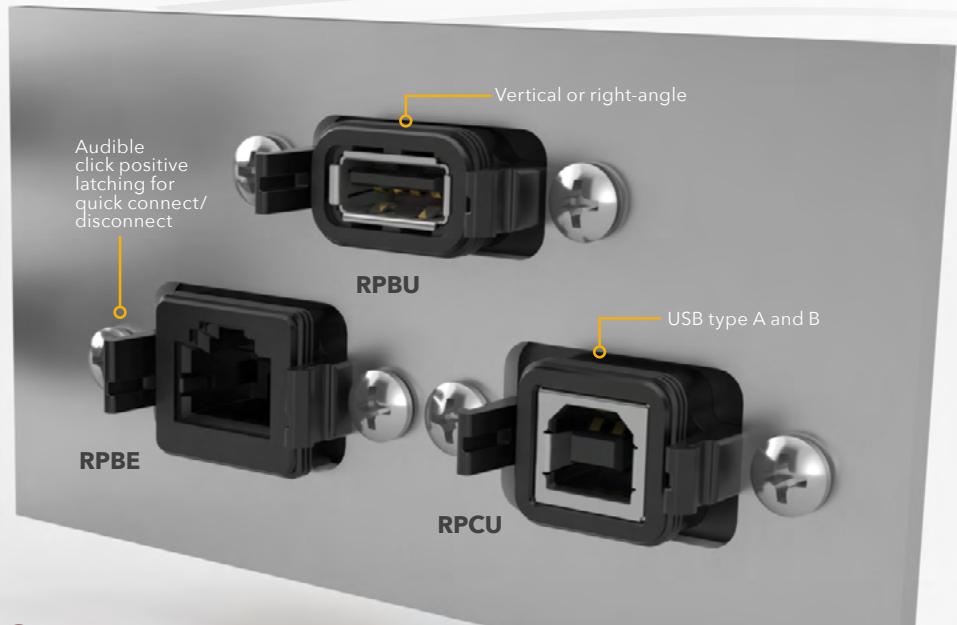


ACCLIMATE™

FLEXIBLE SEALED CIRCULAR SYSTEMS

- Metal or plastic, 12 mm, 16 mm and 22 mm shells
- Flexible pin configuration, gender and panel interface termination
- Bayonet-style latching systems meet IP68 requirements
- Cost-effective crimp version available
- Mini push-pull latching system meets IP67 requirements for dust and waterproof sealing





SEALED RECTANGULARS

- Space saving design
- Meets IP68 requirements
- USB and Ethernet signal systems
- Rugged dust caps available
- 1 or 2-port vertical and right-angle panel mount sockets



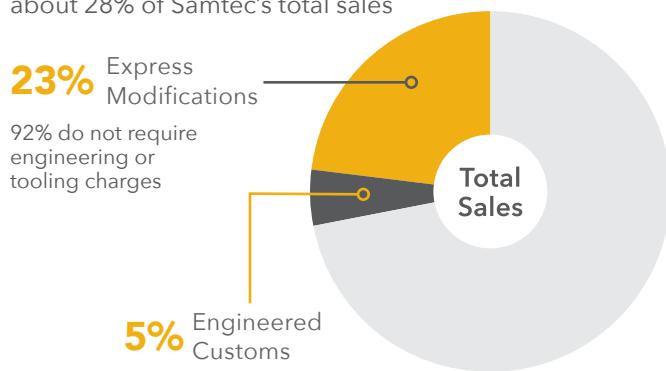
THREADED CIRCULARS

- Meets IP68 requirements for dust and waterproof sealing
- Rugged overmold design
- USB, Mini USB and Ethernet signal systems
- 10 and 17 shell sizes
- Rugged dust caps and panel-to-board termination available

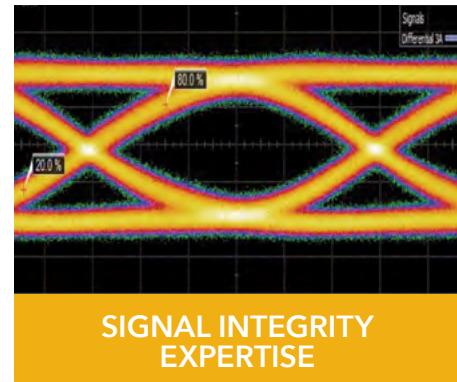
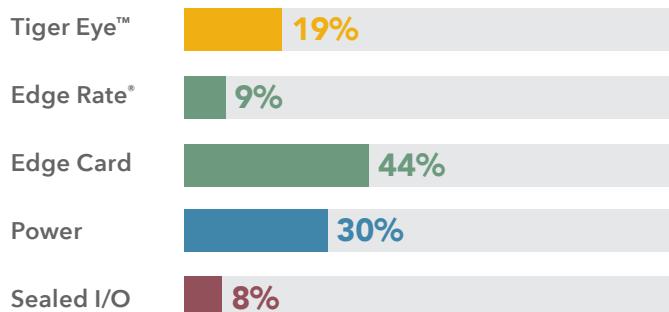
MODIFIED & CUSTOM SOLUTIONS

WILLINGNESS, SUPPORT & EXPERTISE

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



A substantial percentage of each Micro Rugged product segment is custom



FLEXIBLE SOLUTIONS

- 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.

RUGGED FEATURES

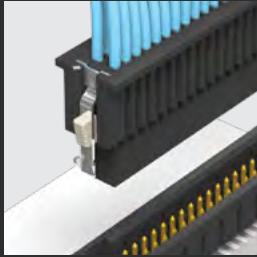
OPTIONS FOR HIGH-RELIABILITY, HIGH-RETENTION AND HIGH-CYCLE LIFE

RUGGEDIZING OPTIONS



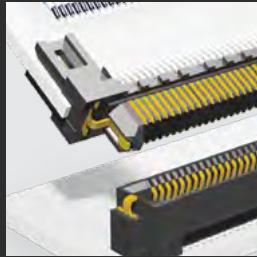
JACK SCREWS

Ideal for high normal force, zippering and other rugged applications



POSITIVE LATCHING

Manually activated latches increase unmating force by up to 200%



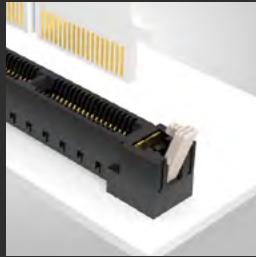
FRiction LOCKS

Metal or plastic friction locks increase retention/withdrawal force



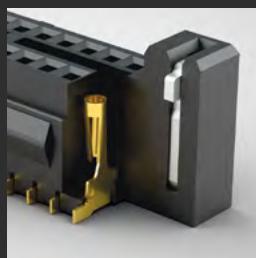
RETENTION PINS

Increase unmating force by up to 50%



BOARD LOCKS

Boards are mechanically locked together



WELD TABS

Significantly increase sheer resistance of connector to PCB



GUIDE POSTS

Easy and secure mating



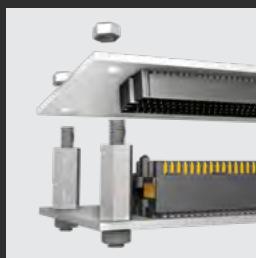
SHIELDING

360° shielding reduces EMI



SCREW DOWNS

Secure mechanical attachment to the board



BOARD STANDOFFS

Precision machined standoffs for 5 mm to 25 mm board spacing

CONTACT SYSTEMS



TIGER EYE™

High-reliability
High Mating Cycles
Multi-finger Contact



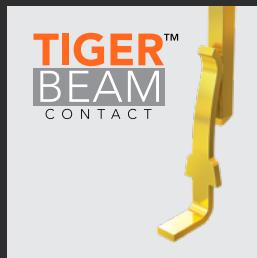
TIGER CLAW™

Dual Wipe Contact
Pass-through Applications
Ultra-low Profile



BLADE & BEAM

Mating/Alignment "Friendly"
Cost-effective



TIGER BEAM™

Best Cost
Reliable Performance
Post & Beam Contact



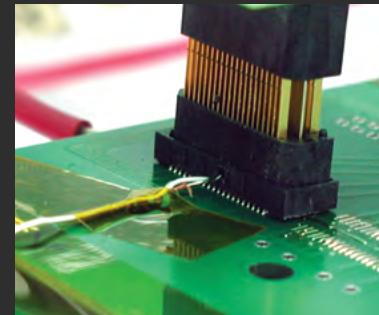
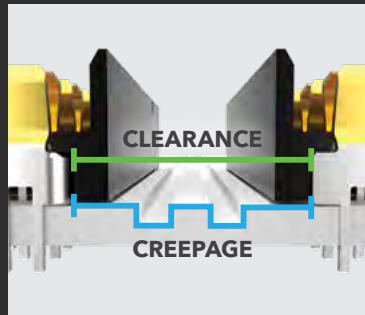
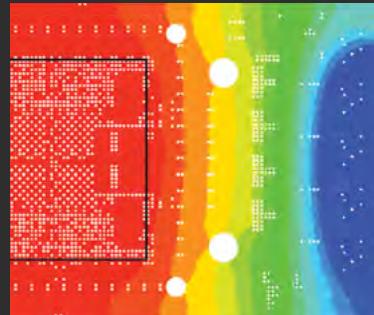
EDGE RATE®

Designed for Signal Integrity
Superior Impedance Control
Reduced Broadside Coupling

POWER INTEGRITY AND E.L.P.™

POWER INTEGRITY SERVICES

- Standard power test data, including current carrying capacity, working voltage, voltage drop and resistance, creepage and clearance, is available for select power systems
- Current Cycling Test Data, which demonstrates connector performance in realistic and common applications, is available for select series
- Power Integrity Guidelines are based on test data and proven design parameters, and are designed to help in connector selection and PCB design maximization
- Power Integrity Certified products undergo testing and additional requirements unique to Samtec. To be certified, products must pass Current Cycling Test EIA 365-55, have current carrying capacity, resistance vs. number of contacts data available and Power Integrity Guidelines developed
- Visit samtec.com/powerintegrity to learn more



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
1.00 mm	Strip	Tiger Eye™	SEM/TEM
	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.

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.

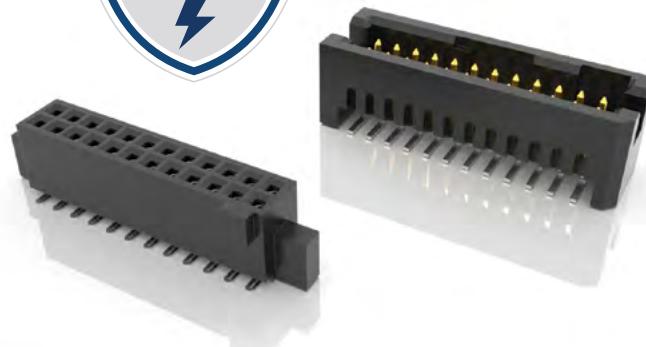
TESTING WILL INCLUDE:

- 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.

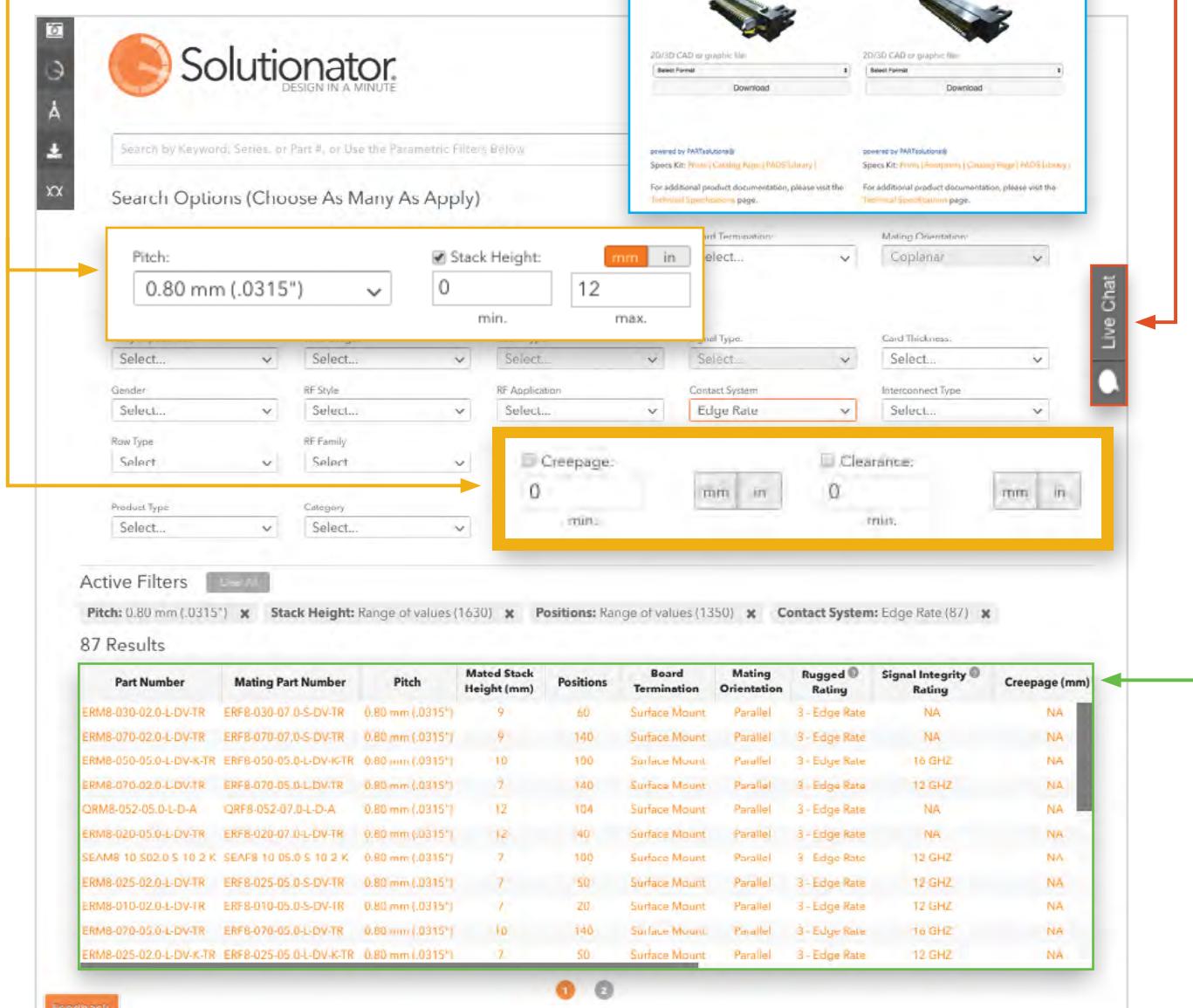


PRND NETWORK vs. MIL-PRF-83401 PERFORMANCE			
TEST OR CONDITION		MIL-PRF-83401	VISHAY FOIL RESISTORS
		C	Typical
Resistance Temp Characteristic	ppm/°C	± 50	± 2
Tracking to Reference Element (-55 to +125 °C)	ppm/°C	± 5	± 2
Max Ambient Temp at Rated Wattage		± 70 °C	
Max Ambient Temp at Zero Power		± 125 °C	
Thermal Shock and Power Conditioning		± 0.25 % ± 0.03 %	± 0.015 % ± 0.015 %
Low Temperature Operation	ΔR ΔRatio	± 0.10 % ± 0.02 %	± 0.01 % ± 0.01 %
Short Time Overload	ΔR ΔRatio	± 0.10 % ± 0.02 %	± 0.01 % ± 0.01 %
Terminal Strength	ΔR ΔRatio	± 0.10 % ± 0.03 %	± 0.01 % ± 0.01 %
Resistance to Soldering Heat	ΔR ΔRatio	± 0.10 % ± 0.02 %	± 0.01 % ± 0.01 %
Moisture Resistance	ΔR ΔRatio	± 0.20 % ± 0.02 %	± 0.01 % ± 0.01 %
Shock (Specified Pulse)	ΔR ΔRatio	± 0.25 % ± 0.03 %	± 0.01 % ± 0.01 %
Vibration, High Frequency	ΔR ΔRatio	± 0.25 % ± 0.03 %	± 0.01 % ± 0.01 %
Load Life (Per EEE-INST-002) (+70 °C, Full Power, 2000 hours)	ΔR ΔRatio	± 0.10 % ± 0.03 %	± 0.05 % ± 0.02 %
+25 °C Power Rating (1000 hours)	ΔR ΔRatio	± 0.10 % ± 0.03 %	± 0.01 % ± 0.01 %
High Temperature Exposure (+125 °C, 100 hours)	ΔR ΔRatio	± 0.10 % ± 0.03 %	± 0.01 % ± 0.01 %
Low Temperature Storage	ΔR ΔRatio	± 0.10 % ± 0.02 %	± 0.01 % ± 0.01 %
Insulation Resistance		10,000 MΩ	
Resistance Tolerance and, when applicable, Resistance Ratio Accuracy		± 0.1 % (B) ± 0.5 % (D) ± 1.0 % (F)	± 0.1 % (B) ± 0.5 % (D)

SOLUTIONATOR®

QUICKLY BUILD MATED SETS ONLINE

- Wide variety of search parameters and filters: creepage and clearance (power), pitch, stack height, etc.
- Easily sort results to find the right mated set
- Live chat with engineers for custom options
- Immediately download models and open Specs Kit 



The screenshot illustrates the Solutionator search interface. At the top, there are two part details: Part Number ERM8-030-02.0-L-DV-TR and Mating Part Number ERF8-030-07.0-S-DV-TR, each with a 2D/3D CAD graphic, a 'Select Format' dropdown, and a 'Download' button. Below this is a 'Search Options' section with a 'Search by Keyword, Series, or Part #, or Use the Parametric Filters Below' input field. The 'Search Options' section includes fields for Pitch (0.80 mm (.0315")), Stack Height (0 to 12 mm/in), Board Termination (Select...), Mating Orientation (Coplanar), and Contact System (Edge Rate). The 'Creepage' and 'Clearance' fields are also present. A 'Live Chat' button is located on the right side of this section. At the bottom, the 'Active Filters' section shows applied filters: Pitch: 0.80 mm (.0315"), Stack Height: Range of values (1630), Positions: Range of values (1350), and Contact System: Edge Rate (87). The results table shows 87 results with columns for Part Number, Mating Part Number, Pitch, Mated Stack Height (mm), Positions, Board Termination, Mating Orientation, Rugged Rating, Signal Integrity Rating, and Creepage (mm). The table includes a 'Feedback' button at the bottom left and page navigation buttons (1, 2) at the bottom right.

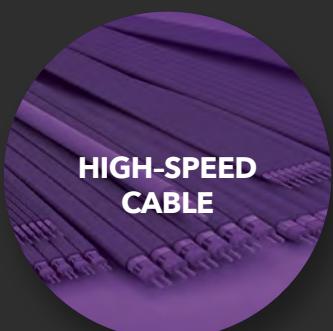
To build your mated set, visit samtec.com/solutionator

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Samtec's Technology Centers offer high-level design and development of advanced interconnect systems and technologies, along with industry-leading signal integrity expertise which allows us to provide effective strategies and technical support for optimizing the entire serial channel of high-performance systems.

Because Samtec's Technology Centers are not limited by the boundaries of traditional business units, we are able to work in a fully integrated capacity that enables true collaboration and innovation to support the demands of today, and the challenges of tomorrow.



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



ADVANCED INTERCONNECTS

High precision stamping, plating, molding and automated assembly



SYSTEM SIGNAL INTEGRITY

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



MICROELECTRONICS

Advanced IC packaging design, support and manufacturing capabilities



OPTICS

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



PRECISION RF

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



samtec

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