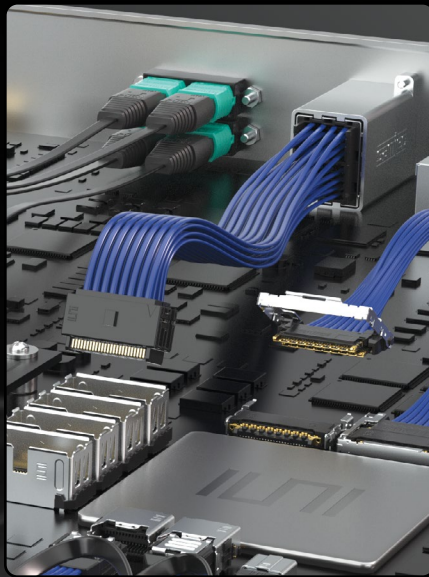




TECHNOLOGY OVERVIEW



Connectivity from Silicon-to-Silicon™

A NEW ERA OF HIGH-SPEED CONNECTIVITY

The Technical Renaissance has brought about tremendous advances in nearly every realm of technology. Along with the emergence of new and rapidly evolving markets and industries, the requirements to support these next generation architectures continues to escalate.

We have entered a new era of high-speed connectivity, where systems capable of 224 Gbps PAM4 transmission rates have become a requirement.

PAM 4

112
G b p s

PAM 4

224
G b p s



AI/ML



HPC/
SUPERCOMPUTING



6G NETWORK



AUTOMOTIVE



INDUSTRIAL IoT



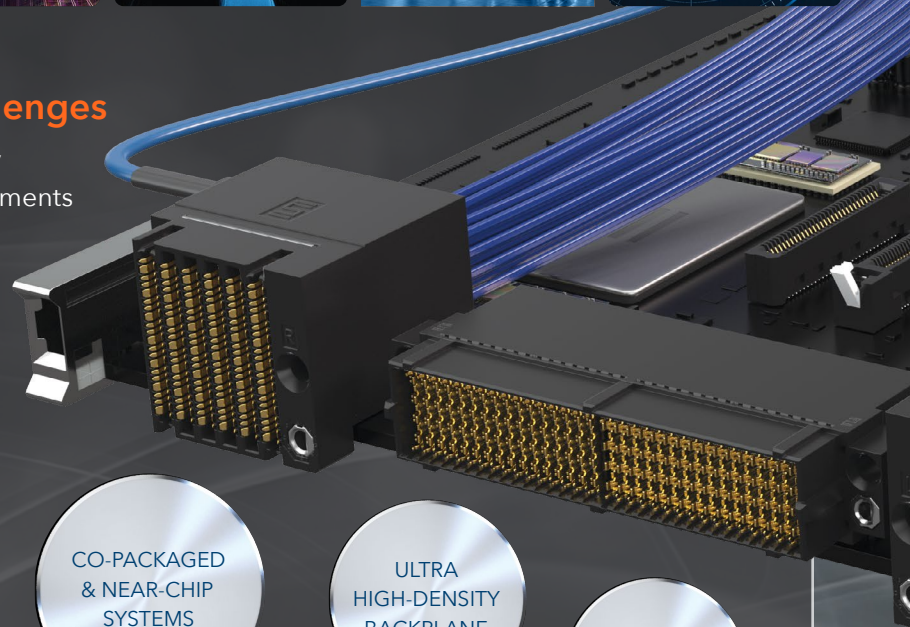
MIL/AERO
& DEFENSE

A New Era of Connectivity Challenges

Along with scalability, bandwidth and density considerations, the extreme data rate requirements in this New Era of Connectivity introduce a number of additional and even more complex system design challenges.

Ultra-high performance interconnects that can support speeds up to 224 Gbps PAM4 (with 448 Gbps PAMX coming soon) are a necessity; however, the development of enabling technologies, test and measurement tools, and new methodologies to successfully achieve this next level of data transmission, will also be critical.

Samtec helps address these issues with industry-leading signal integrity expertise, system design assistance, and innovative products and technologies enabling optimized connectivity to 224 Gbps PAM4 performance and beyond.



CO-PACKAGED
& NEAR-CHIP
SYSTEMS

ULTRA
HIGH-DENSITY
BACKPLANE

NEXT
GENERATION
OPTICS

SWaP
OPTIMIZED
DESIGNS

PHASE &
AMPLITUDE STABLE
RF CABLE

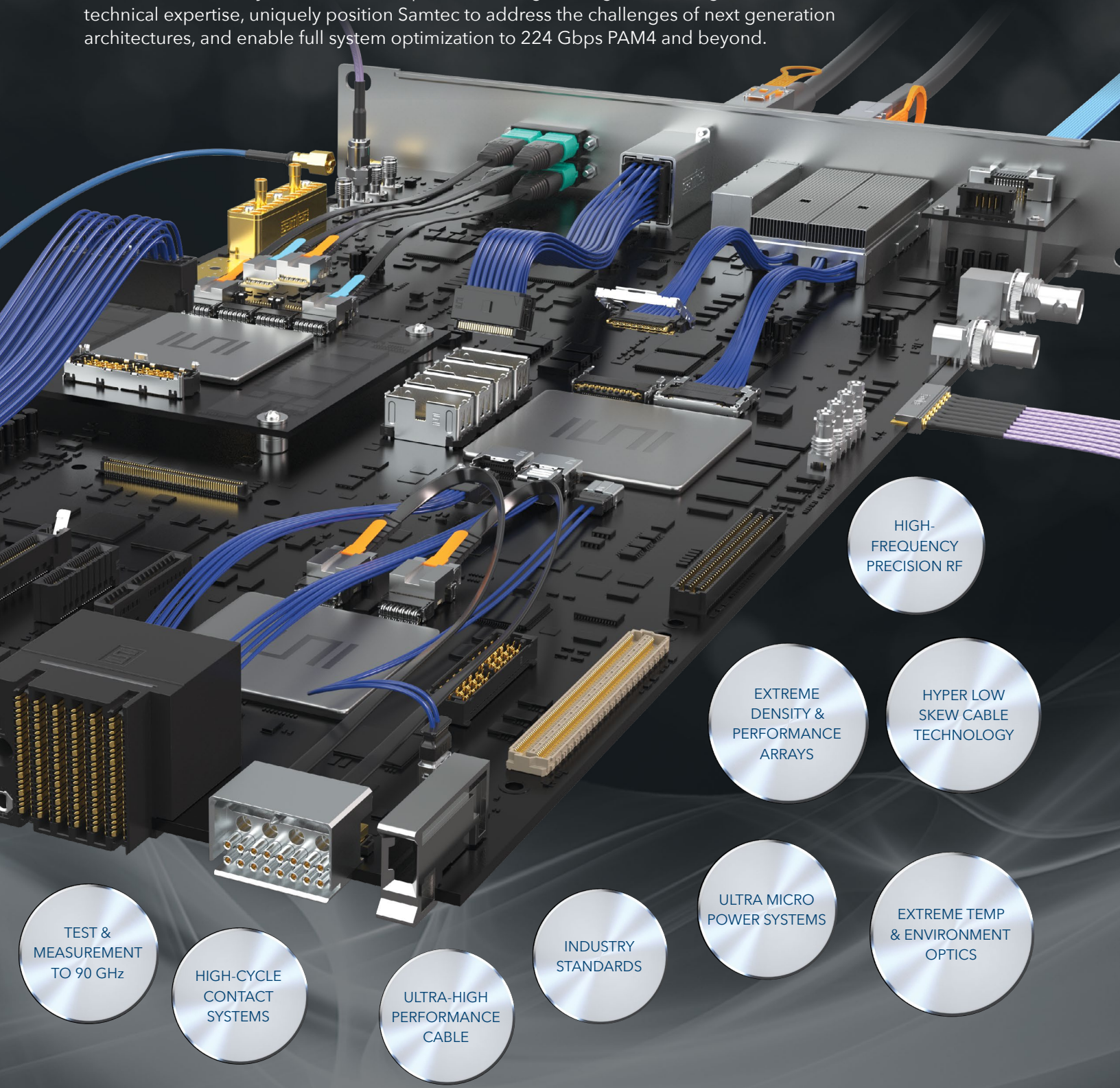
GLASS CORE
TECHNOLOGY



SILICON-TO-SILICON™ SOLUTIONS

Enabling Connectivity for Next Generation High-Speed Systems

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



HIGH-FREQUENCY
PRECISION RF

EXTREME
DENSITY &
PERFORMANCE
ARRAYS

HYPER LOW
SKEW CABLE
TECHNOLOGY

TEST &
MEASUREMENT
TO 90 GHz

HIGH-CYCLE
CONTACT
SYSTEMS

ULTRA-HIGH
PERFORMANCE
CABLE

INDUSTRY
STANDARDS



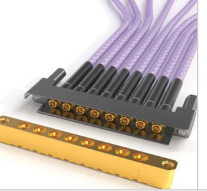




ULTRA MICRO
POWER SYSTEMS


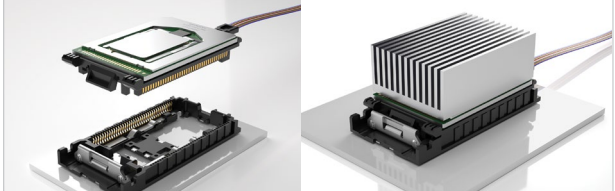
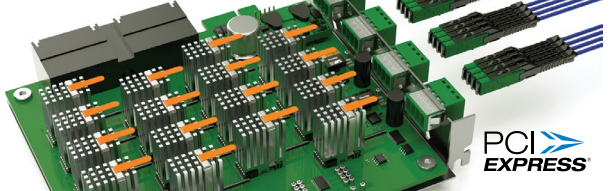
EXTREME TEMP
& ENVIRONMENT
OPTICS

SILICON-TO-SILICON™ ROADMAP

Innovative, high-performance products engineered to support the demands and challenges of the new era of high-speed connectivity.


				
PRODUCT FAMILY	ACCELERATE[®]mp High-Density Power/Signal Arrays	ACCELERATE[®]HP Extreme Performance & Density Systems	SI-FLY[®]HD High-Density Mezzanine Arrays	ExaMAX[®] High-Speed Backplane Systems
IN DEVELOPMENT	Slim Body Design	Right-Angle Socket 400 I/Os	Co-Packaged Substrate Connector Near-Chip Board Connector	2-pair Configuration Open-Pin-Field Design
ROADMAP	Up to 10 Power Blades Up to 16 mm Stack Height	Up to 800 I/Os 6 & 8 Row Configurations Cable Assembly	DP + SE + Power Combos	8-pair Configuration ExaMAX [®] 2



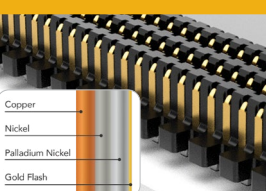

						
PRODUCT FAMILY	Precision RF Compression Mount Connectors	MAGNUMRF Ganged, Multi-Port RF System	SMPM Series Connectors & Cables	SMP3/SMP5 Series Connectors	38999 Contacts	BULLSEYE[®] TEST POINT SYSTEM High-Performance Test
IN DEVELOPMENT	Angled Launch	Rugged Screw Downs	Threaded Design	Vertical, Mixed Technology		Non-Magnetic Cryogenic Design
ROADMAP	1.00 mm Vertical	30% Smaller, SMP3 Design		Right-Angle Jack for .047" Board-to-Board Bullets	Size 16, Size 20 & Size 12 SMPM	Low Profile Design

		
PRODUCT FAMILY	HALO Next Generation Mid-Board Optical Transceivers	FIREFLY[™] Optical Transceivers / PCI Express [®] -Over-Fiber FireFly [™]
IN DEVELOPMENT	56G Mid-Board Optical Transceivers & Sockets Interchangeable Copper Mid-Board Cable System	PCIe [®] 5.0 Capable System OCP & PCIe [®] Add-In Cards
ROADMAP	112G Direct Drive System PCIe [®] 6.0 Capable System	Ultra Rugged Transceivers for Space Applications

PCI-SIG[®], PCI Express[®] and the PCIe[®] design marks are registered trademarks and/or service marks of PCI-SIG. ExaMAX[®] is a trademark of AFCL.

	 <p>PAM4 112 Gbps</p>	 <p>PAM4 64 Gbps</p>	 <p>PAM4 112 Gbps</p>	 <p>PAM4 224 Gbps</p>	
PRODUCT FAMILY	ACCELERATE® mini Extreme Performance Mini Form Factor System	ACCELERATE® Slim, Direct Attach Cable System	ACCELERATE® HP High-Performance & Density Cable System	SI-FLY HD Co-Packaged & Near-Chip Cable Systems	0.80 mm LGA Cables
IN DEVELOPMENT	Extruded 34 AWG Twinax Cable Extended Strain Relief	34 AWG Eye Speed ThinSE™ Coax Cable	Double Density, Co-Packaged System Cable-to-Cable System Right-Angle-to-Cable	Co-Packaged Assembly Near-Chip Assembly	High-Density Compression Assembly
ROADMAP	Rugged Positive Latching Cable-to-Cable System	Cable-to-Cable System EMC Shielded Option			

	 <p>PAM4 64 Gbps</p>	 <p>PAM4 128 Gbps</p>	 <p>PAM4 224 Gbps</p>	 <p>PAM4 224 Gbps</p>	 <p>PAM4 128 Gbps</p>
PRODUCT FAMILY	ExaMAX I/O Shielded High-Density Panel Mount System	NOVARAY I/O Extreme Performance Cable & Panel System	FLYOVER® Flyover® Front Panel I/O Systems	SI-FLY HD Backplane Cable-to-Cable System	NOVARAY® Micro Rugged Backplane System
IN DEVELOPMENT	Shielded Panel Mount Cable Socket & Die Cast Panel Cage	Adaptor Cables Rugged 38999 Cable & Panel Mount System	112G PAM4 SFP 112G PAM4 OSFP 224G PAM4 OSFP	64 DPs 32 AWG Eye Speed® Hyper Low Skew Twinax	Cable Socket Right-Angle Header Vertical Socket
ROADMAP	112 Gbps PAM4 Cable-to-Cable Bulkhead Panel Connection	Right-Angle Panel Mount	SFP-DD, OSFP-XD & CDFP Systems	27/29 AWG Eye Speed® Twinax Cable-to-Board System	Ultra-High Density Design (up to 128 DPs)


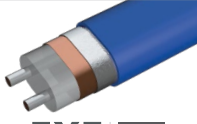






	 <p>MAX 18 Amps</p>	 <p>Copper Nickel Palladium Nickel Gold Flash</p>	
PRODUCT FAMILY	mPOWER® Ultra Micro High-Power Systems	SURECOAT® High-Reliability Palladium Nickel Plating	URSA I/O ULTRA RUGGED CONTACT SYSTEM Ultra Rugged Cable Systems
IN DEVELOPMENT	Ultra Micro Power Cable-to-Cable Assembly for High Temp or Halogen-Free Applications	Qualified to 150 °C Ambient SEARAY™ 1.27 mm Pitch Qualification to 5,000 Cycles	Ultra Rugged Socket & Panel Mount Terminal Cable Assembly
ROADMAP	Ultra-High Density Connector Floating Contact System	Additional Product Qualifications	Additional Contact Options: AcceleRate® Mini, RF Coax & High-Speed Digital, Power

SILICON-TO-SILICON™ INNOVATIONS

CABLE TECHNOLOGY

Eye Speed® Cable Technology

- Supports extreme density and performance for next generation systems
- Ideal for applications to 224 Gbps PAM4
- Tight coupling between signal conductors
- Enables improved signal integrity, increased bandwidth and reach
- Differential pair, single-ended and mixed signaling variations available

			
EYE SPEED THINSE PAM4 112 Gbps	EYE SPEED THINAX PAM4 112 Gbps	EYE SPEED TWINAX PAM4 112 Gbps	EYE SPEED CABLE PAM4 224 Gbps
			
32 & 34 AWG	28–36 AWG	32 AWG	32 AWG
Ultra thin micro coax for SE & DP signaling	Industry-leading ultra low skew twinax cable	40% smaller cross-sectional area	Hyper-low skew twinax cable

Flyover® Cable Technology

- High-performance solution helps extend signal reach and density to achieve next-gen speeds
- Signals are routed via Eye Speed® ultra low skew twinax cable rather than through lossy PCBs
- Provides improved signal integrity and helps simplify board layout
- Offers reduced cost and power consumption, as well as improved thermal dissipation



Nitrowave™ Precision RF Cable

- Next generation RF coaxial cable designed to support extended frequency ranges
- Phase and amplitude stable with flexure over time
- Mechanical and environmental robustness



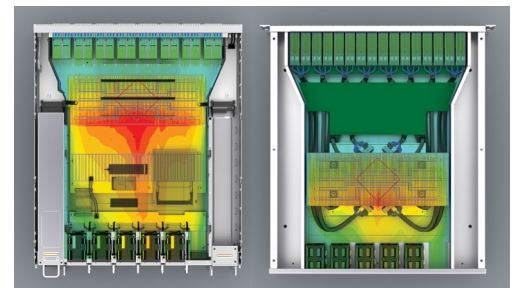
Flexible Micro Waveguide Technology

- Supports the demands of next generation mmWave systems
- Cable design allows for flexibility and reduced size, while maintaining loss performance similar to that of a traditional waveguide



POWER/THERMAL MANAGEMENT & MITIGATION

- Flyover® Technology enables improved thermal dissipation by allowing ICs to be placed in preferred locations
- Ultra low profile designs enable placement adjacent to the IC package, under heat sinks or other cooling hardware
- Cable management strategies for an even distribution of the thermal load
- Variety of heat sink options for conduction, convection, cold plates, and liquid cooling
- PCB breakout region design guidance, signal/ground and power/ground assignment recommendations
- High-level engineering support for testing, evaluating and optimizing thermal and power considerations of a system or PDN design



Standard Network Switch vs. Samtec Flyover® Technology

ADVANCED MATERIALS & METHODS

High-Reliability Plating

- SureCoat™ palladium nickel plating with gold flash
- Ideal for high-cycle and high-temp applications (150 °C ambient)



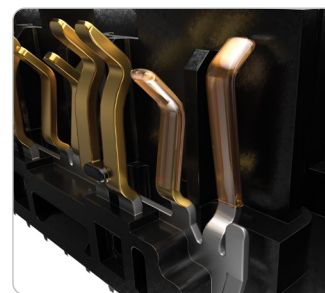
Ultra Rugged Hardware

- SureWare™ standoffs, alignment and guidance
- Assists with “blind mating” and reduces the risk of component damage



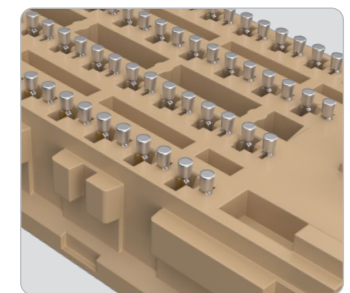
High-Cycle “Super Lube”

- Withstands reflow and extreme mating cycles
- Provides increased corrosion resistance
- Currently in development



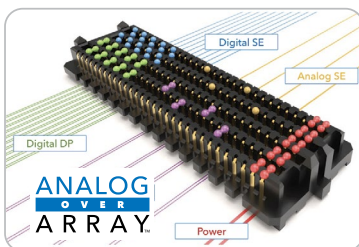
Column Attach Termination

- Supports the miniaturization demands and complexity of next-gen interconnects
- Enables increased density, additional miniaturization



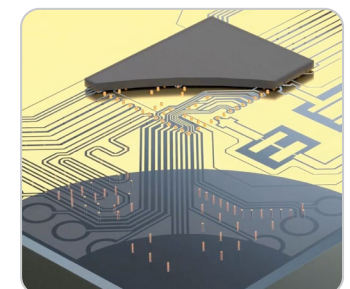
Analog Over Array™ Technology

- Dense, high frequency open-pin-field array supports simultaneous running of analog and digital signals (differential pairs and/or single-ended), plus power, though the same interconnect
- Replacement for dozens of precision RF connectors, enabling a smaller footprint, less weight, and cost optimization
- Reference designs are available at: samtec.com/kits/rf



Glass Core Technology

- Samtec's proprietary Through-Glass Via (TGV) technology enables the integration of glass and metal into a single wafer
- The CTE of glass is very close to that of silicon, which makes it very stable when stacking device modules
- GCT is ideal for micro multichip modules, and the integration of structures like filters, antennas, waveguides, and chip-to-chip links



ADVANCED TEST & EVALUATION FOR NEXT-GEN APPLICATIONS

Severe Environment Testing (SET)

- Evaluation of product performance in rugged/harsh environments with rigorous testing beyond typical industry standards and specifications



samtec.com/set

Extended Life Product™ (E.L.P.™)

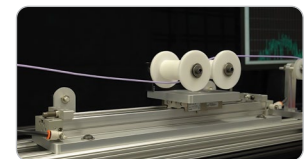
- Extensive testing that evaluates contact resistance in simulated storage and field conditions, including 10 year MFG and High Mating Cycles (250 to 2,500)



samtec.com/elp

Dynamic Cable Testing

- Arduous flex and bend test of RF microwave and Eye Speed® cables for electrical stability under high stress and flexure



Development & Evaluation Kits

- Easy-to-use platforms for testing high-performance connector, cable and optics systems; visit samtec.com/kits for availability and more information



GLOBAL SUPPORT NETWORK



samtec
SUDDEN SERVICE®

www.samtec.com

ISO-9001 and/or IATF 16949 Certified

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