



High Speed Cable Design Guide

Complete High Speed Cable Solutions

In-house Connector and Cable Manufacturing

Samtec is fully vertically integrated, offering both sides of the solution—connectors and cable assemblies. Our in-house capabilities include:

- Quick-turn design and manufacture of high speed board mount connectors
- High speed coax and twinax cables
- Active optic solutions

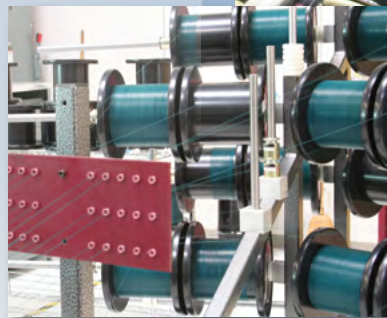
This vertical integration allows for the ultimate combination of design flexibility and customer service.

- Shorter, controlled lead times
- Highest quality product
- Optimized performance
- In-house impedance controlled PCB design and processing
- Unparalleled pricing and delivery

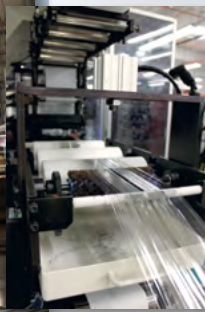
For details on custom cable assemblies visit www.samtec.com/custom-cable or email HDRgroup@samtec.com.



Conductor, Shield and Jacket Fabrication



Twinax Cable Manufacturing



Barrel, Strip and Plastic Plating



Precision Stamping and Forming



CNC

Signal Integrity Group

In addition to the quick-turn manufacturing and delivery of standard systems, Samtec also provides sophisticated design, engineering and development support for the most difficult signal integrity challenges via our highly qualified in-house staff of signal integrity engineers.

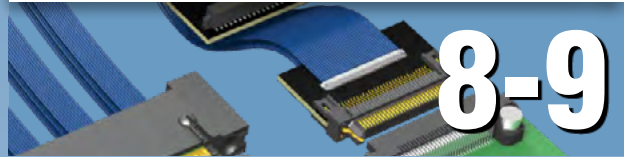
- Interpret test data and performance results
- PCB layout, trace and routing assistance
- Connector ground pin assignment and assistance
- Extensive modeling, simulation and testing capabilities
- De-embedding capabilities

For more information visit

www.samtec.com/signalintegrity or email sig@samtec.com.

**SIGNAL
INTEGRITY
GROUP**

Eye Speed® Micro Coax Cable Systems



Eye Speed® and AcceleRate™ Twinax Cable Systems



Future-Proof Systems



High Speed I/O and Active Optical Cable Systems



Micro Coax and Twinax Cable Specifications



Original RF Solutions / 50Ω and 75Ω RF Cable Systems



RF Cable Specifications



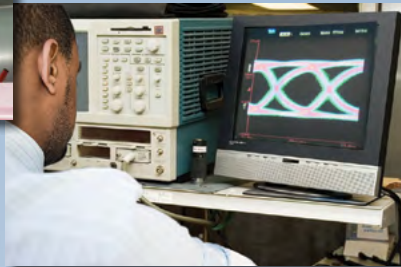
Signal Integrity Solutions



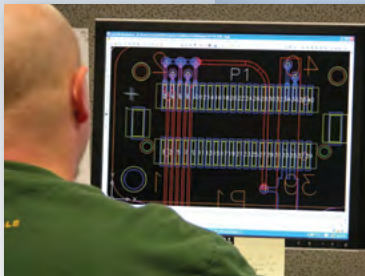
Shield Comparison Testing



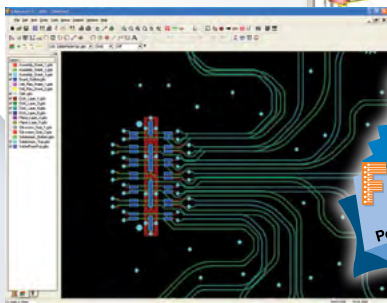
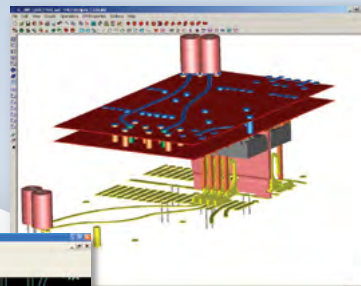
Eye Pattern Analysis



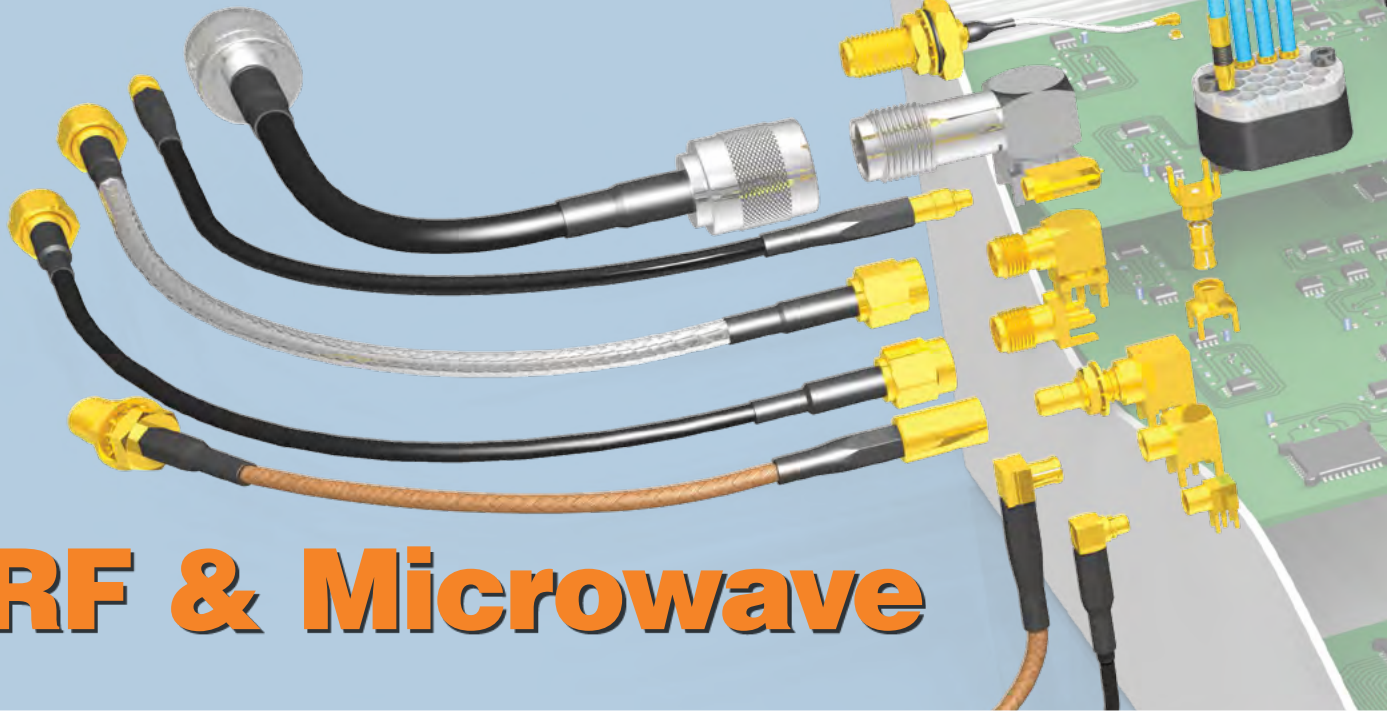
Personal SI Support



Final Inch® Physical and Electrical Models



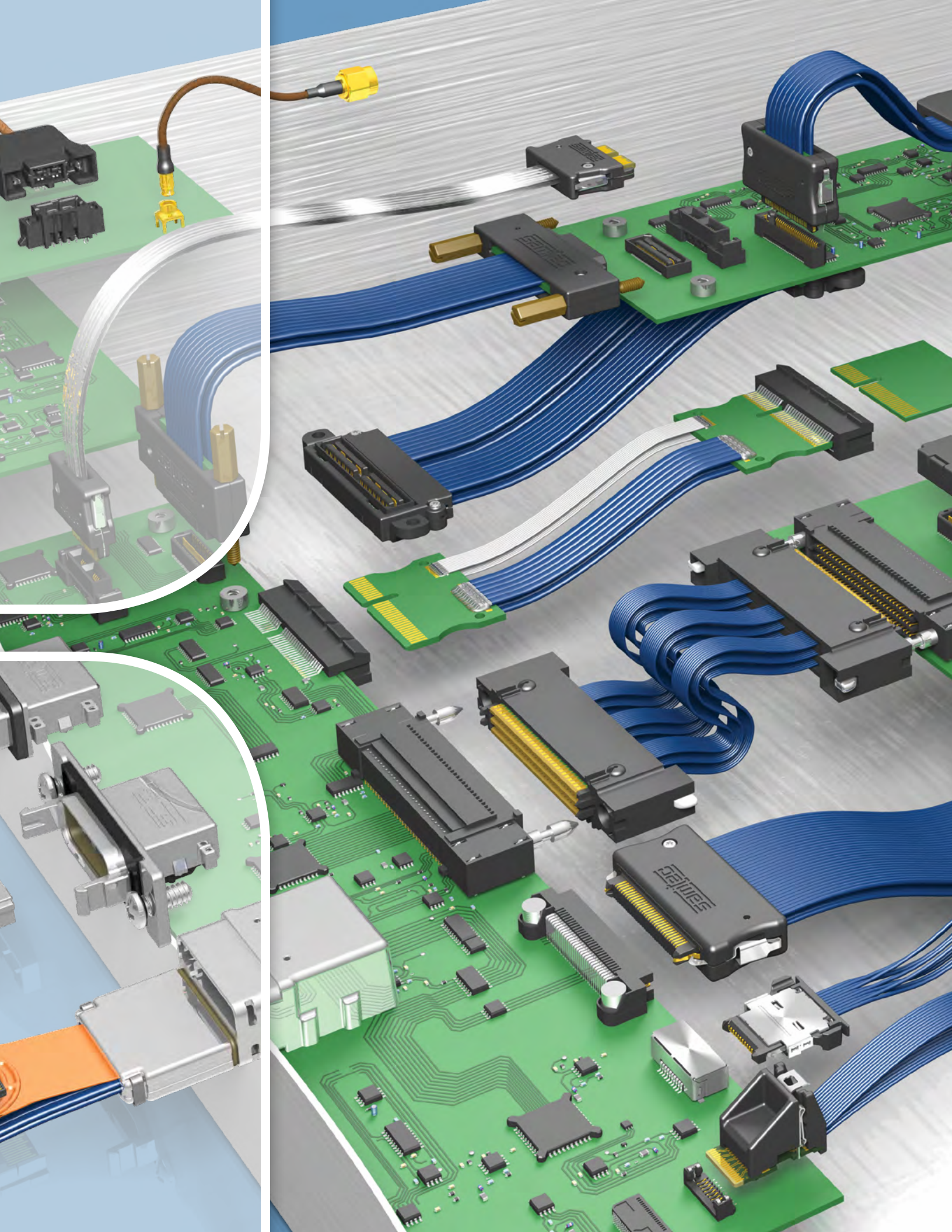
samtec

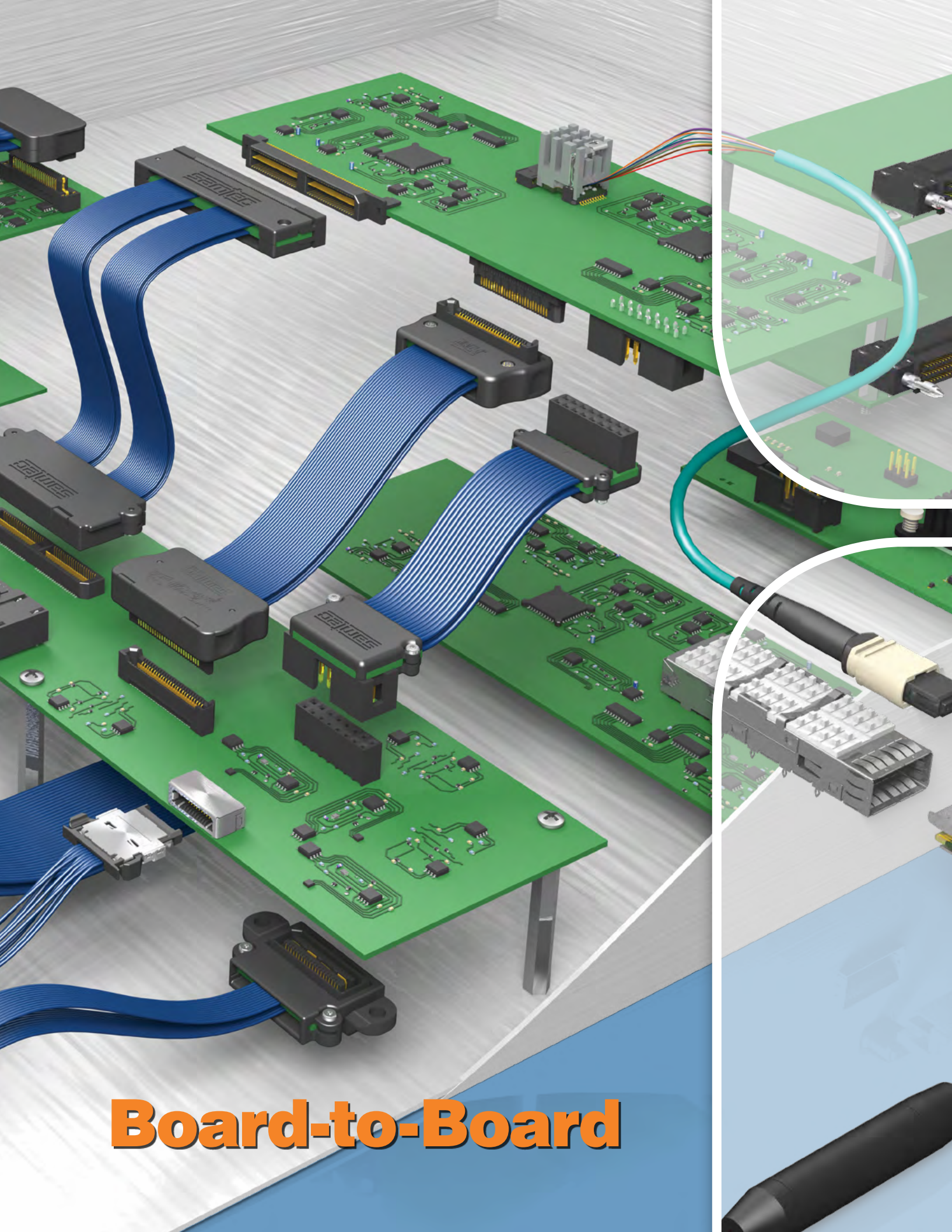


RF & Microwave

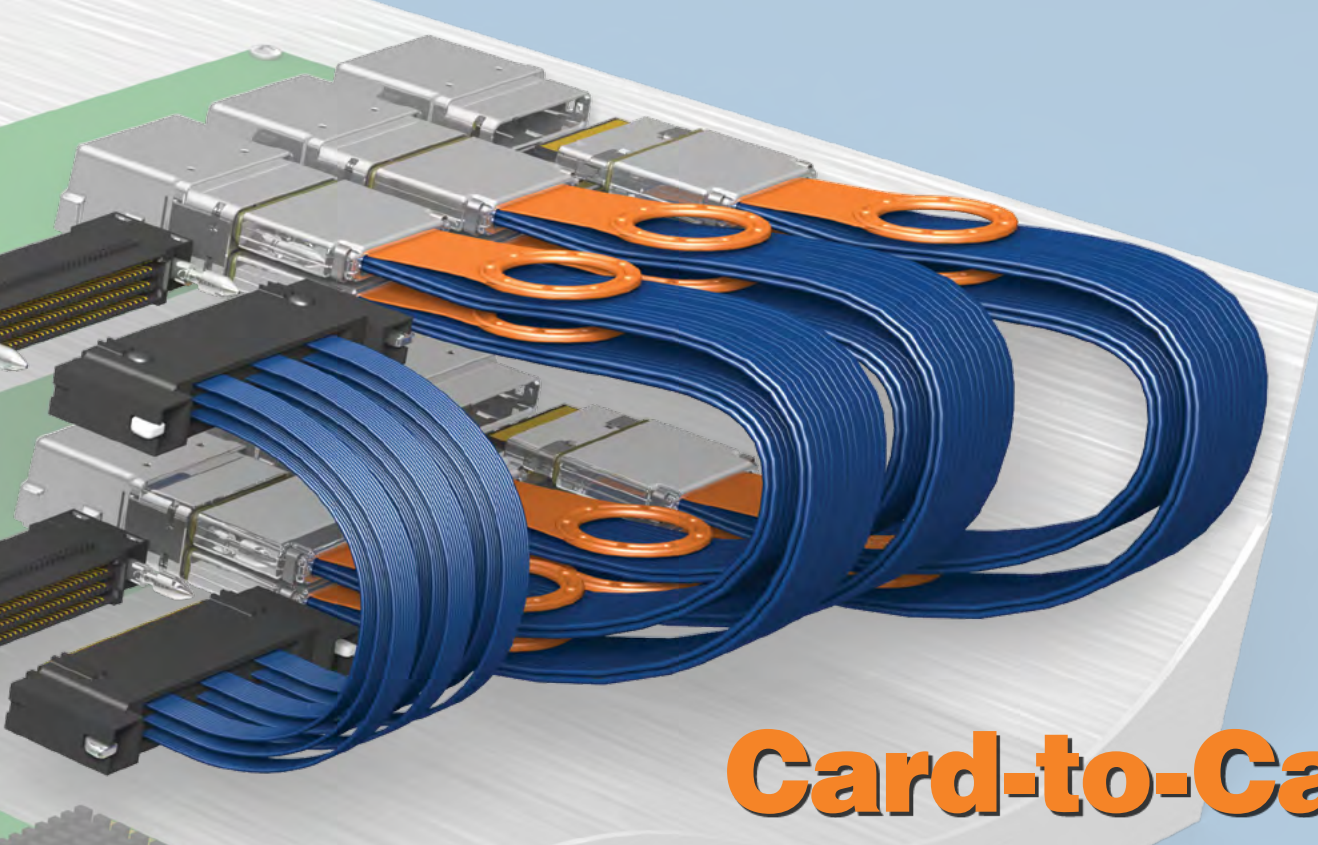
High Speed I/O



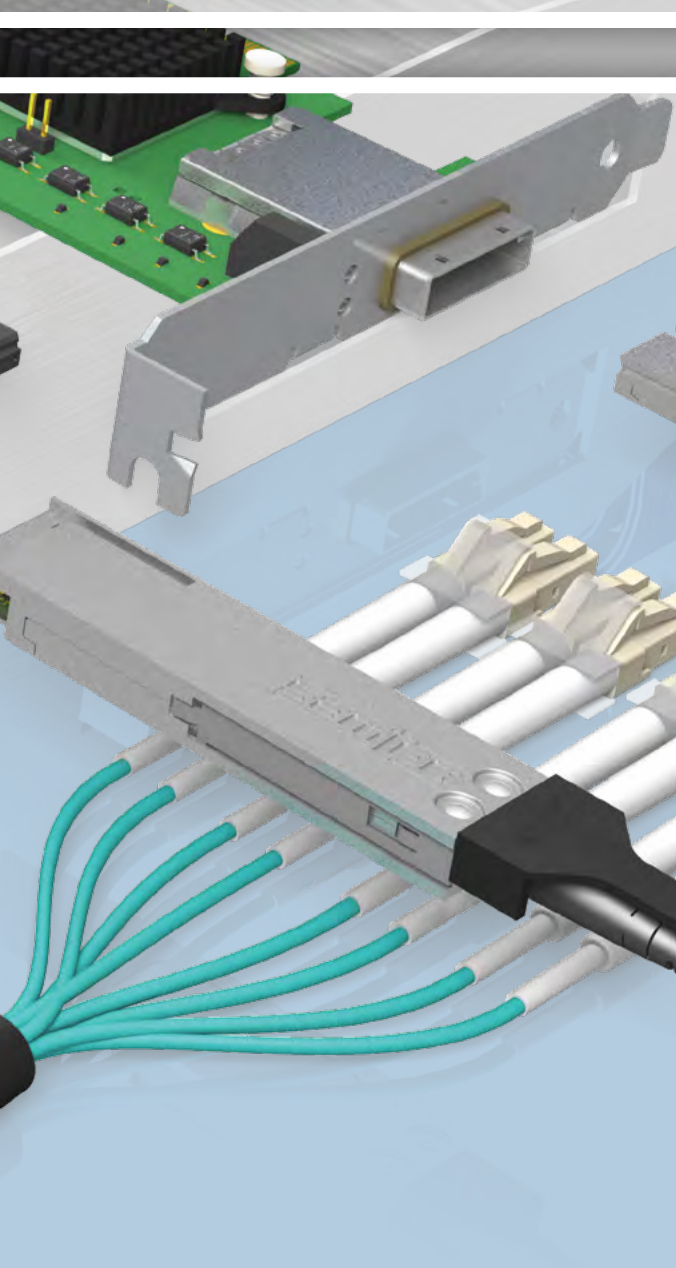




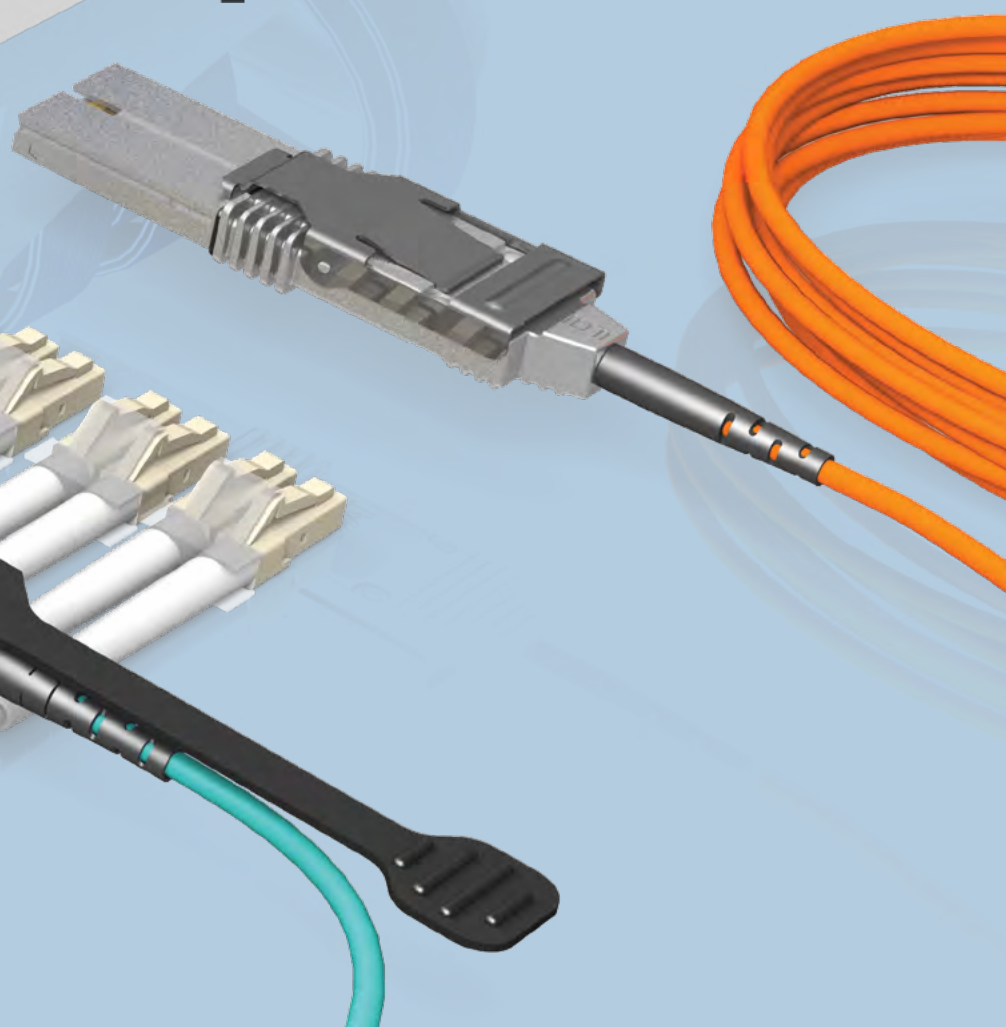
Board-to-Board



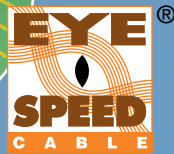
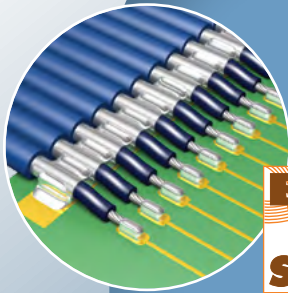
Card-to-Card



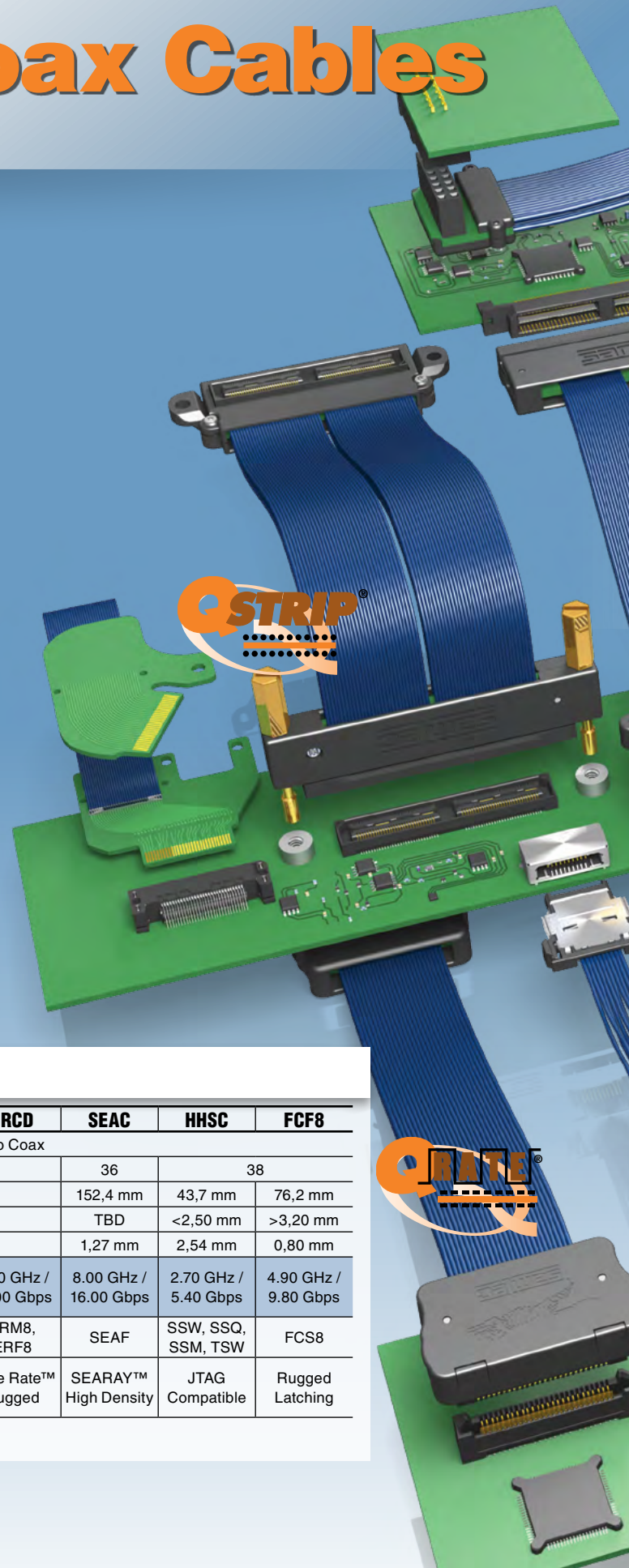
Optical & I/O



Micro Coax Cables



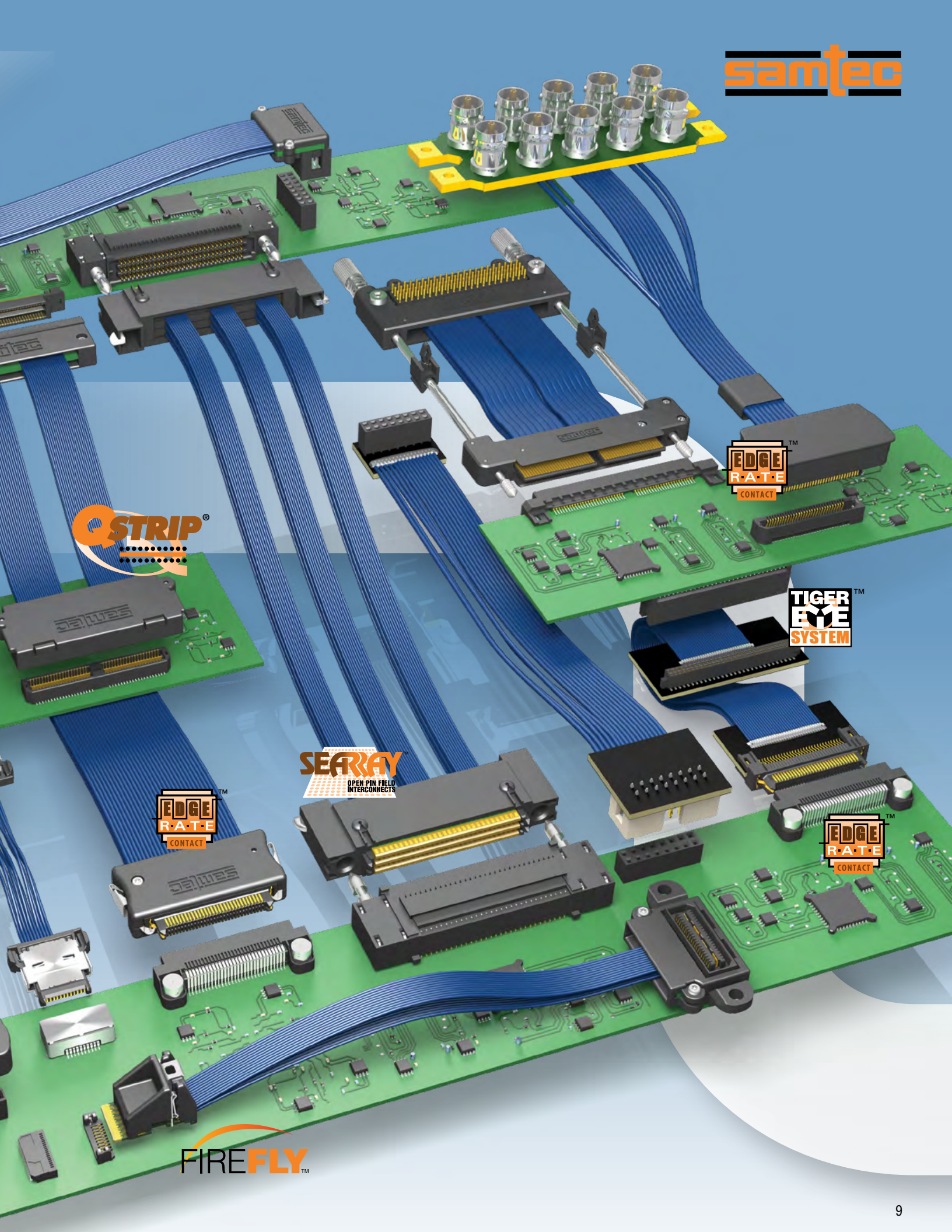
- Eye Speed® high speed micro coax cable with serve shield
- 50Ω and 75Ω impedance
- AcceleRate™ 30 AWG high speed micro coax cable coming soon
- Ability to mix-and-match end options for application specific requirements with extensive customizing capabilities
- Ruggedizing features include screw downs, panel screws, retention pins, positive latching systems, squeeze and friction latches, strain relief
- Future-proof assemblies: design in copper today, replace with optical for high speed and longer link lengths tomorrow with the same footprint
- Signal integrity optimized with sophisticated engineering for low signal loss and impedance matching
- Signal Integrity Group for in-house signal integrity expertise and support; visit www.samtec.com/signalintegrity



Standard Micro Coax Cable Assemblies

Series	ECUE	HQCD	EQCD	EQRD	ERCD	SEAC	HHSC	FCF8
Cable Type	Eye Speed® Micro Coax							
Cable AWG	38		34		36	38		
Min. Wire Length	70 mm (OAL)	43,7 mm			152,4 mm	43,7 mm	76,2 mm	
Bend Radius	<2,50 mm				TBD	<2,50 mm	>3,20 mm	
Pitch	0,50 mm		0,80 mm		1,27 mm	2,54 mm	0,80 mm	
Performance (0,25 m (@ 7 dB IL))	12.55 GHz / 25.10 Gbps	5.90 GHz / 11.80 Gbps	5.20 GHz / 10.40 Gbps	4.00 GHz / 8.00 Gbps	6.00 GHz / 12.00 Gbps	8.00 GHz / 16.00 Gbps	2.70 GHz / 5.40 Gbps	4.90 GHz / 9.80 Gbps
Mates With Series	UEC5, UCC8	QTH, QSH	QTE, QSE	QRF8, QRM8	ERM8, ERF8	SEAF	SSW, SSQ, SSM, TSW	FCS8
Connector Type	FireFly™ Micro System	Q Strip® Ground Plane		Q Rate® Slim Body	Edge Rate™ Rugged	SEARAY™ High Density	JTAG Compatible	Rugged Latching

See pages 16-17 for additional cable specifications.



STRIP[®]

SEARAY
OPEN PIN FIELD
INTERCONNECTS

**EDGE
R·A·T·E**[™]
CONTACT

**TIGER
EYE**[™]
SYSTEM

**EDGE
R·A·T·E**[™]
CONTACT

**EDGE
R·A·T·E**[™]
CONTACT

FIREFLY[™]

Twinax Cables



Eye Speed® Cable

AcceleRate™ Cable

Excellent Signal Integrity performance with individual copper serve or braided shielding	Excellent Signal Integrity performance with aluminum foil shielding and dual drain wires
Stranded conductor for small bend radii and dynamic high flexing cycle applications	Solid copper conductor for reduced cost and static applications with a one-time cable crease for corner-routing and space limitations
Cost-effective ribbonizing process keeps boards organized by eliminating a nest of discrete wires	Fully tangent shield for significant space savings over competitive solutions
Variety of standard stocked wire gauges from 38 AWG to 26 AWG	30 AWG standard
Coax and twinax constructions	Twinax construction (coax in development)
20Ω, 50Ω, 85Ω and 100Ω	85Ω and 100Ω

- Eye Speed® high speed twinax cable with braided shield
- AcceleRate™ high speed twinax cable with aluminum foil shield and drain wires as a lower cost alternative to Eye Speed® for static applications
- 85Ω and 100Ω impedance
- Ability to mix-and-match end options for extensive customizing capabilities
- Ruggedizing features include screw downs, panel screws, retention pins, positive latching systems, squeeze and friction latches, strain relief
- Signal Integrity Group for in-house signal integrity expertise and support; visit www.samtec.com/signalintegrity

Standard Twinax Cable Assemblies

Series	ECDP	HQDP	EQDP	ERDP	PCIEC
Cable Type	AcceleRate™ Twinax	Eye Speed® Twinax			
Cable AWG	30				
Min. Wire Length	95.3 mm	43.7 mm			50 mm
Bend Radius	1 mm (one-time crease)**	11 mm			
Pitch	0,80 mm	0,50 mm	0,80 mm		1,00 mm
Performance (0,25 m (@ 7 dB IL))	8.20 GHz / 16.40 Gbps	9.00 GHz / 18.00 Gbps	10.00 GHz / 20.00 Gbps	7.30 GHz / 14.60 Gbps	4.90 GHz / 9.80 Gbps
Mates With Series	HSEC8	QTH-DP, QSH-DP	QTE-DP, QSE-DP	ERM8, ERF8	PCIE
Connector Type	Edge Rate™ Rugged	Q Pairs® Ground Plane		Edge Rate™ Rugged	*PCI Express®

*PCI Express® is a registered trademark of PCI-SIG®.

**Or, 12,7 mm bend radius with moderate flexing cycles

See pages 16-17 for additional cable specifications.

santec

QPAIRS[®]

QPAIRS[®]

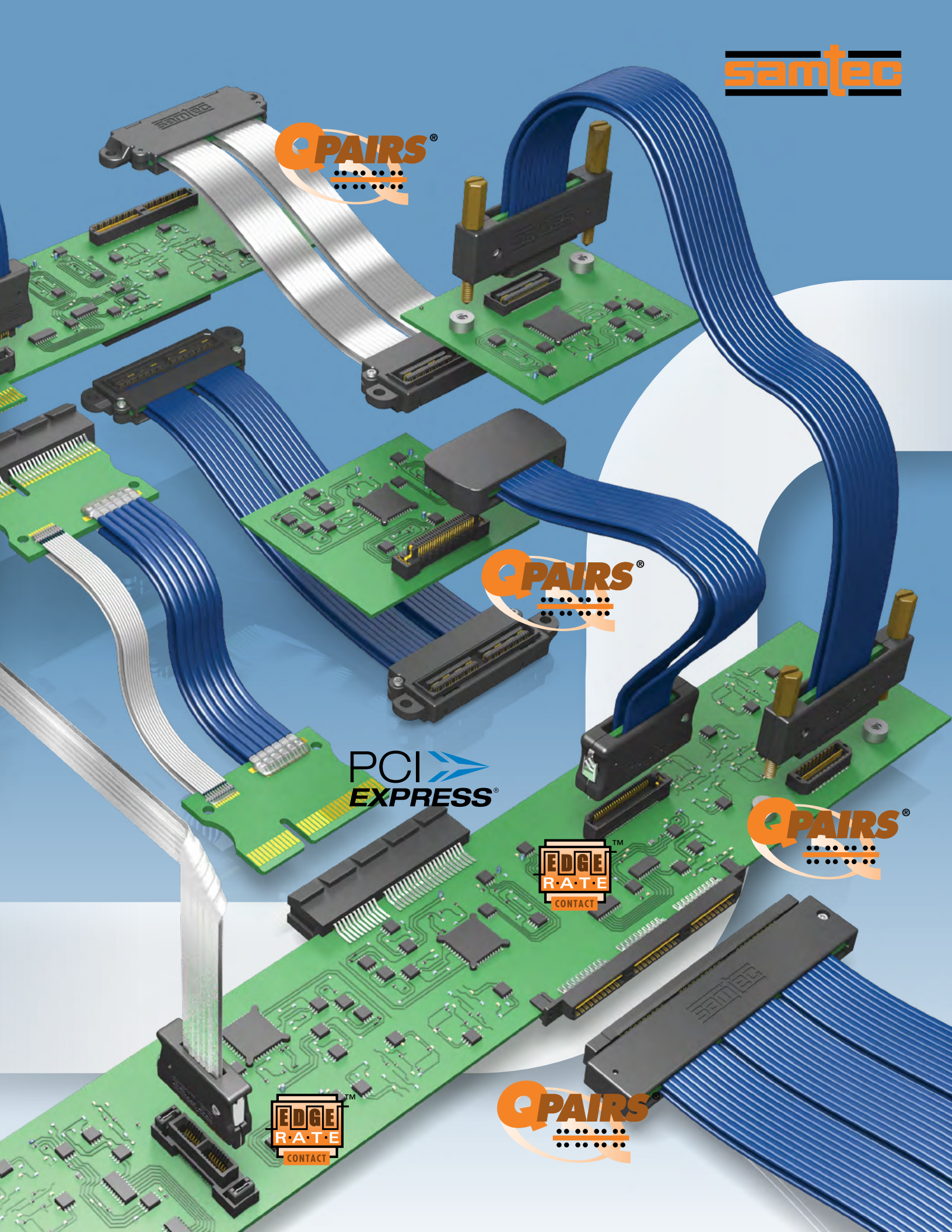
QPAIRS[®]

QPAIRS[®]

PCI EXPRESS

EDGE RATE[™]
CONTACT

EDGE RATE[™]
CONTACT



Future-Proof Systems

*Design-in
copper today...*

FIREFLY™
Micro Flyover System

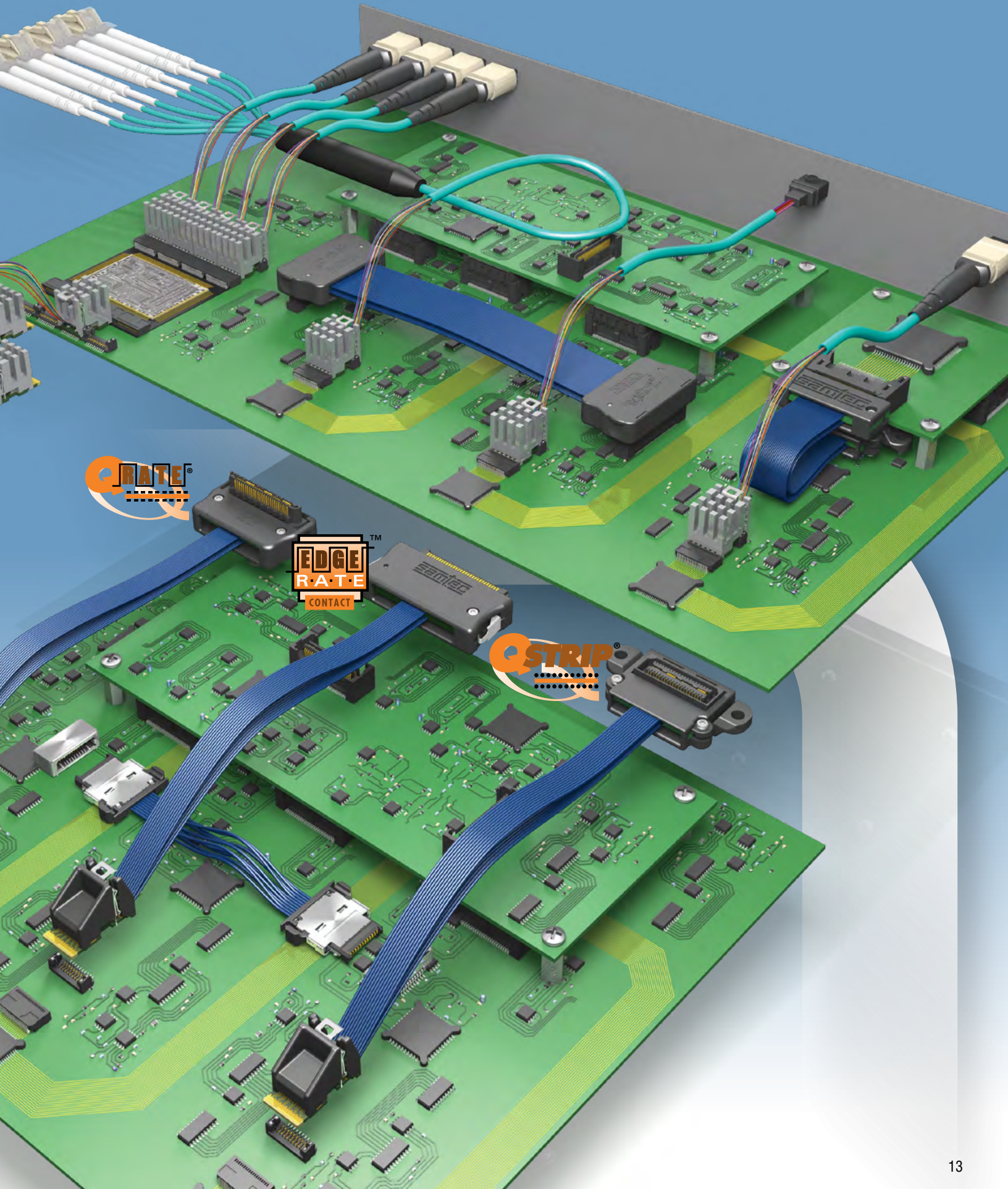
*...replace with
optical tomorrow.*

- FireFly™ future-proof assemblies allow you to design for copper today then replace with optical for higher speed and longer link lengths tomorrow with the same footprint
- "Fly over" application significantly simplifies board design
- Low cost, high performance copper for short distances and test applications
- Copper assembly available with Samtec's Eye Speed® 38 AWG coax cable with a variety of high speed connector end terminations
- Optical assembly available with MTP, MT or Duplex LC end terminations to connect chips to backplanes or ultra high density faceplate connectors
- Multi-protocol support: Ethernet, InfiniBand™, Fibre Channel, SAS
- Multi-rate: 14 Gbps and 28 Gbps (in design)

FireFly™ Future-Proof Cable Assemblies

Series	ECUE	ECUO (in development)
Cable Type	Eye Speed® Coax Copper	Optical Fiber
Cable DIA	0,635 mm	3 mm
Min. Assembly Length	70 mm	500 mm
Bend Radius	< 2,50 mm	30 mm
Pitch	0,50 mm	
Performance	12.55 GHz / 25.10 Gbps (0,25 m (@ 7 dB IL))	28 Gbps
Mates With Series	UEC5, UCC8	
Connector Type	FireFly™ Micro Flyover System	
End 2 Options	Q Strip®, Q Rate®, Edge Rate™, SEARAY™, FireFly™	MTP, MT, Duplex LC

See pages 16-17 for additional ECUE Series cable specifications.

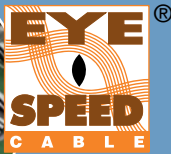


Q-RATE®

EDGE RATE™
CONTACT

QSTRIP®

High Speed I/O Copper and Optical



High Speed I/O Copper

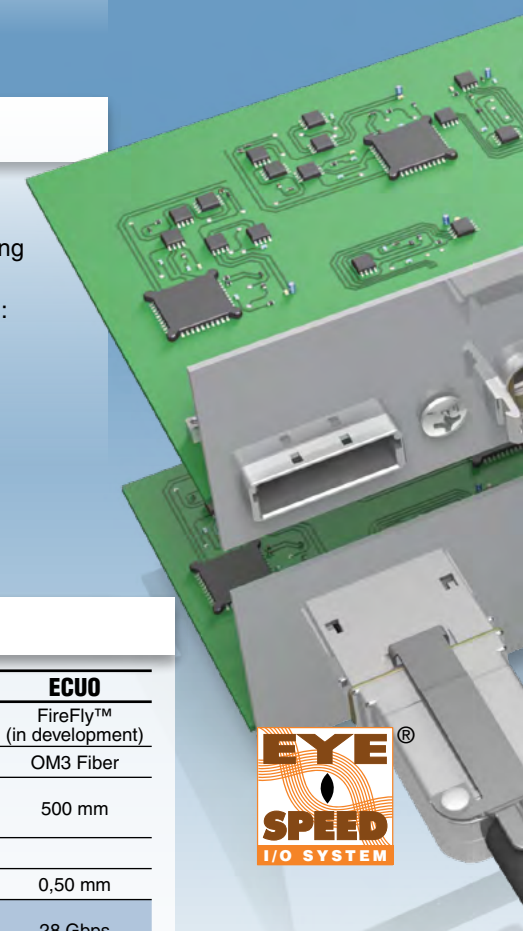
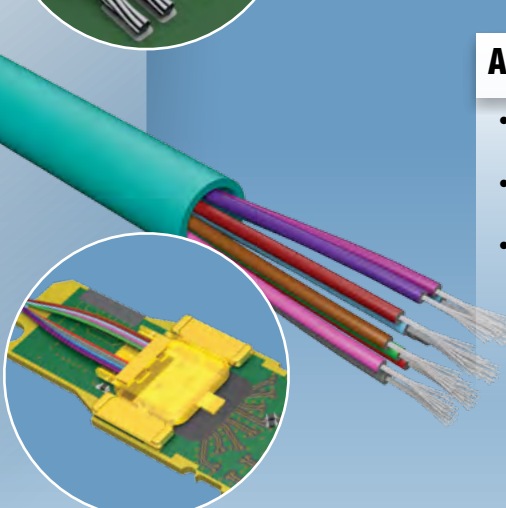
- Eye Speed® HD: HyperTransport™ HT 3.1 performance, industry's densest I/O cable system
- Eye Speed® I/O: micro rugged latching system, sealed cable available for rugged IP68 applications, or SFP+ hot pluggable passive jumpers

Equalization:

- Boost data rate
- Extend the length of a copper cable assembly
- Email HDRgroup@samtec.com

Active Optical

- PCIe® system supporting Gen 1 (2.5 GT/s) and Gen 2 (5.0 GT/s)
- QSFP+ 4-channel bidirectional system supporting Ethernet, InfiniBand™ and Fibre Channel
- FireFly™ micro flyover system (in development): data "flies over" board simplifying board layout, interchangeable with low cost copper FireFly™

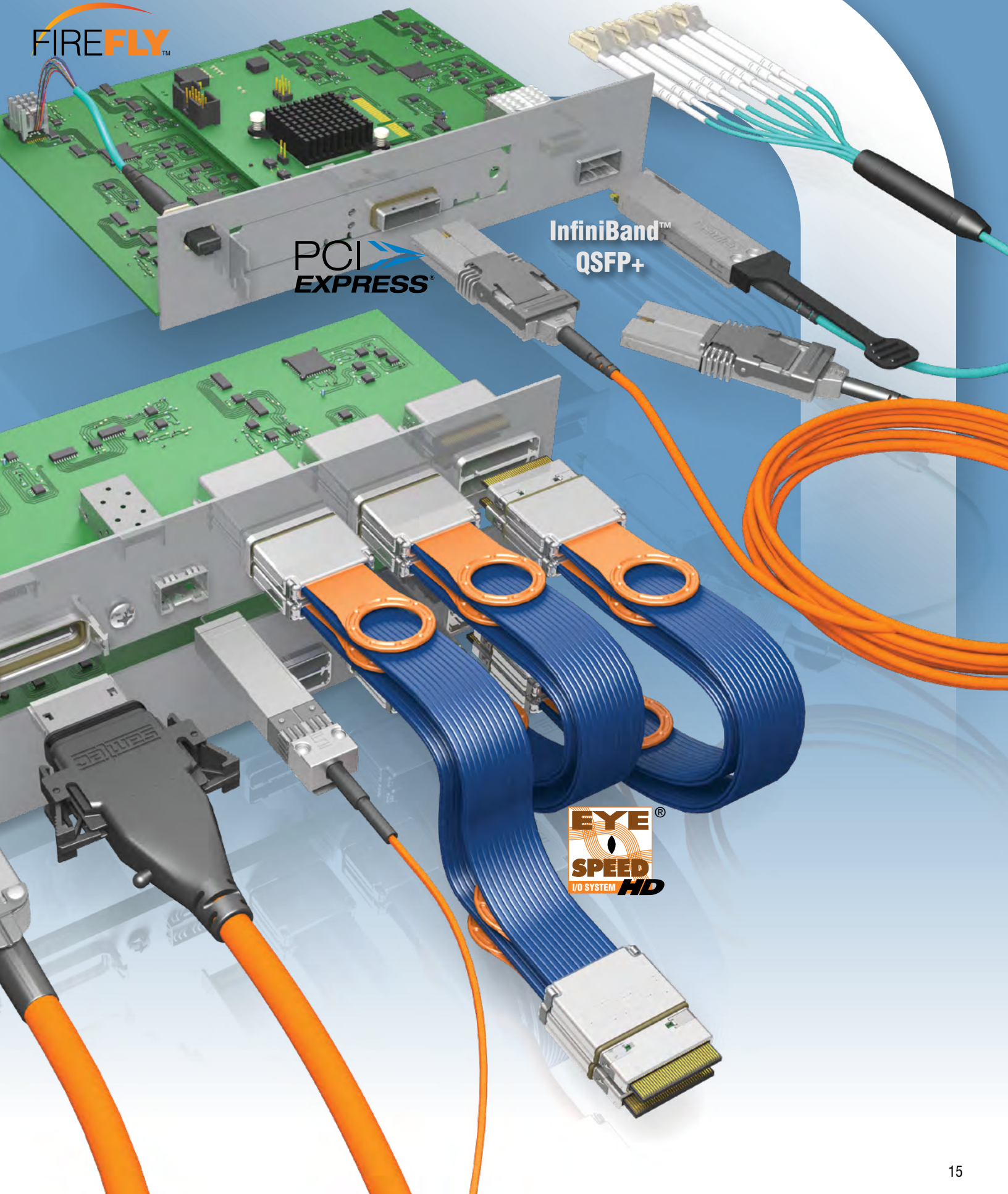


High Speed I/O Copper & Active Optical Cable Assemblies

Series	HDLSP	EPLSP	RCH	SFPE	PCIE0	QSFP0	ECU0
Brand Name	Eye Speed® HD Twinax	Eye Speed® I/O Twinax			*PCIe®	QSFP+	FireFly™ (in development)
Cable Type	32 AWG Twinax				OM2 or OM3 Fiber		OM3 Fiber
Min. Assembly Length	1,000 mm				500 mm	300 mm	500 mm
Bend Radius	> 3,20 mm	25,40 mm			30 mm		
Pitch	0,635 mm	0,80 mm			0,80 mm		0,50 mm
Performance	6.44 GHz / 12.88 Gbps (1 m (@ 7 dB IL))	4 GHz / 8 Gbps (1 m (@ 7 dB IL))		10 GHz / 20 Gbps (1 m (@ 7 dB IL))	5 GT/s	56 Gbps	28 Gbps
Mates With Series	HDC/HDI6	ERC/ERI8	RPBH/ERI8	MECT/SFPC	PCIEA	QSFP/ QSFP8	UEC5/UCC8
Connector Type	High Density (48 Signal Pairs)	Edge Rate™ Rugged		SFP+	*PCIe® Adaptor Card	QSFP+ Edge Card	FireFly™ Micro System

*PCIe® is a registered trademark of PCI-SIG®. See pages 16-17 for additional cable specifications.

FIREFLY™

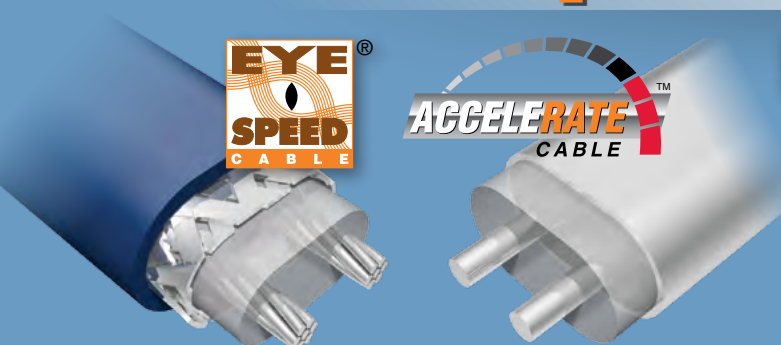
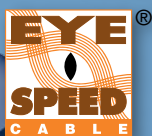


PCI EXPRESS®

InfiniBand™
QSFP+

EYE®
SPEED
I/O SYSTEM HD

Micro Coax & Twinax Cable Specifications



Eye Speed® Cable

AcceleRate™ Cable

Excellent Signal Integrity performance with individual copper serve or braided shielding	Excellent Signal Integrity performance with aluminum foil shielding and dual drain wires
Stranded conductor for small bend radii and dynamic high flexing cycle applications	Solid copper conductor for reduced cost and static applications with a one-time cable crease for corner-routing and space limitations
Cost-effective ribbonizing process keeps boards organized by eliminating a nest of discrete wires	Fully tangent shield for significant space savings over competitive solutions
Variety of standard stocked wire gauges from 38 AWG to 26 AWG	30 AWG standard
Coax and twinax constructions	Twinax construction (coax in development)
20Ω, 50Ω, 85Ω and 100Ω	85Ω and 100Ω

Panel and I/O Assemblies

I/O Standard - Protocols Supported	HDLS	EPLSP	PCIEO	QSFP0
SAS – 3 Gbps (1.5 GHz)	2.0 m	3.0 m	300 m	100 m
SAS – 6 Gbps (3 GHz)	1.0 m	1.0 m	100 m	100 m
SAS – 12 Gbps (6 GHz)	1.0 m			100 m
SATA – 1.5 Gbps (0.75 GHz)	2.0 m	5.0 m	300 m	100 m
SATA – 3 Gbps (1.5 GHz)	2.0 m	3.0 m	300 m	100 m
SATA – 6 Gbps (3 GHz)	1.0 m	1.0 m	100 m	100 m
Fibre Channel – 1 Gbps (0.5 GHz)	2.0 m	5.0 m	300 m	100 m
Fibre Channel – 2 Gbps (1 GHz)	2.0 m	4.0 m	300 m	100 m
Fibre Channel – 4 Gbps (2 GHz)	2.0 m	2.0 m	300 m	100 m
Fibre Channel – 8 Gbps (4 GHz)	1.0 m	< 1.0 m	100 m	100 m
Fibre Channel – 16 Gbps (8 GHz)				
PCIe® – 2.5 Gbps (1.25 GHz)	2.0 m	3.0 m	300 m	100 m
PCIe® – 5 Gbps (2.5 GHz)	2.0 m	2.0 m	300 m	100 m
PCIe® – 8 Gbps (4 GHz)	1.0 m	< 1.0 m	100 m	100 m
Ethernet – 1 Gbps (0.5 GHz)	2.0 m	5.0 m	300 m	100 m
Ethernet – 10 Gbps (5 GHz)	1.0 m			100 m
HyperTransport™ – 1.6 Gbps (0.8 GHz)	2.0 m	5.0 m	300 m	100 m
HyperTransport™ – 2.8 Gbps (1.4 GHz)	2.0 m	3.0 m	300 m	100 m
HyperTransport™ – 5.2 Gbps (2.6 GHz)	1.0 m	2.0 m	100 m	100 m
HyperTransport™ – 6.4 Gbps (3.2 GHz)	1.0 m	1.0 m	100 m	100 m
QPI – 6.4 Gbps (3.2 GHz)	1.0 m	1.0 m	100 m	100 m
InfiniBand™ SDR – 2.5 Gbps (1.25 GHz)	2.0 m	3.0 m	300 m	100 m
InfiniBand™ DDR – 5 Gbps (2.5 GHz)	2.0 m	2.0 m	300 m	100 m
InfiniBand™ QDR – 10 Gbps (5 GHz)	1.0 m			100 m
InfiniBand™ FDR – 14 Gbps (7 GHz)				100 m

Length ratings are based on an insertion loss of 7 dB or less at the I/O Standard Nyquist frequency except for QSFP0 and PCIeO.

Binary signal encoding with no equalization or other signal conditioning is assumed.

= Eye Speed® HD = Eye Speed® I/O = Active Optical

Board-to-Board Assemblies

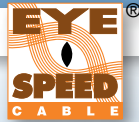
I/O Standard - Protocols Supported	ERCD	EQRD	SEAC	ECUE	HQCD	EQCD	FCF8	ERDP	EQDP	HQDP	ECDP
SAS – 3 Gbps (1.5 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
SAS – 6 Gbps (3 GHz)	0.7 m	0.6 m	1.0 m	0.6 m	0.7 m	0.8 m	0.7 m	1.0 m	1.0 m	1.0 m	1.0 m
SAS – 12 Gbps (6 GHz)	0.2 m	0.0 m	0.5 m	0.4 m	0.2 m	0.1 m	0.1 m	0.6 m	0.8 m	1.0 m	1.0 m
SATA – 1.5 Gbps (0.75 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
SATA – 3 Gbps (1.5 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
SATA – 6 Gbps (3 GHz)	0.7 m	0.6 m	1.0 m	0.6 m	0.7 m	0.8 m	0.7 m	1.0 m	1.0 m	1.0 m	1.0 m
Fibre Channel – 1 Gbps (0.5 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
Fibre Channel – 2 Gbps (1 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
Fibre Channel – 4 Gbps (2 GHz)	0.9 m	1.0 m	1.0 m	0.8 m	0.9 m	1.0 m	0.9 m	1.0 m	1.0 m	1.0 m	1.0 m
Fibre Channel – 8 Gbps (4 GHz)	0.5 m	0.2 m	0.8 m	0.6 m	0.5 m	0.5 m	0.5 m	1.0 m	1.0 m	1.0 m	1.0 m
Fibre Channel – 16 Gbps (8 GHz)	0.0 m	0.0 m	0.2 m	0.3 m	0.0 m	0.0 m	0.0 m	0.0 m	0.5 m	0.6 m	0.4 m
PCIe® – 2.5 Gbps (1.25 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
PCIe® – 5 Gbps (2.5 GHz)	0.8 m	0.8 m	1.0 m	0.8 m	0.8 m	0.9 m	0.8 m	1.0 m	1.0 m	1.0 m	1.0 m
PCIe® – 8 Gbps (4 GHz)	0.5 m	0.2 m	0.8 m	0.6 m	0.5 m	0.5 m	0.5 m	1.0 m	1.0 m	1.0 m	1.0 m
Ethernet – 1 Gbps (0.5 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
Ethernet – 10 Gbps (5 GHz)	0.4 m	0.0 m	0.7 m	0.5 m	0.4 m	0.3 m	0.3 m	0.9 m	0.9 m	1.0 m	1.0 m
HyperTransport™ – 1.6 Gbps (0.8 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
HyperTransport™ – 2.8 Gbps (1.4 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
HyperTransport™ – 5.2 Gbps (2.6 GHz)	0.8 m	0.7 m	1.0 m	0.7 m	0.8 m	0.8 m	0.8 m	1.0 m	1.0 m	1.0 m	1.0 m
HyperTransport™ – 6.4 Gbps (3.2 GHz)	0.7 m	0.5 m	1.0 m	0.6 m	0.7 m	0.7 m	0.7 m	1.0 m	1.0 m	1.0 m	1.0 m
QPI – 6.4 Gbps (3.2 GHz)	0.7 m	0.5 m	1.0 m	0.6 m	0.7 m	0.7 m	0.7 m	1.0 m	1.0 m	1.0 m	1.0 m
InfiniBand™ SDR – 2.5 Gbps (1.25 GHz)	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m	1.0 m
InfiniBand™ DDR – 5 Gbps (2.5 GHz)	0.8 m	0.8 m	1.0 m	0.7 m	0.8 m	0.9 m	0.8 m	1.0 m	1.0 m	1.0 m	1.0 m
InfiniBand™ QDR – 10 Gbps (5 GHz)	0.4 m	0.0 m	0.7 m	0.5 m	0.4 m	0.3 m	0.3 m	0.9 m	0.9 m	1.0 m	1.0 m
InfiniBand™ FDR – 14 Gbps (7 GHz)	0.1 m	0.0 m	0.4 m	0.3 m	0.1 m	0.0 m	0.0 m	0.3 m	0.7 m	0.8 m	1.0 m

Length ratings are based on an insertion loss of 7 dB or less at the I/O Standard Nyquist frequency.

Binary signal encoding with no equalization or other signal conditioning is assumed.

= Eye Speed® Coax = Eye Speed® Twinax = AcceleRate™ Twinax

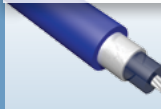
20Ω Coax Cable – 26 AWG



- Jacket: PVC
1,137 (.0448) DIA
- Shield: Serve, Silver Plated Copper
- Dielectric: FEP
- Center Conductor: 26 AWG Stranded
0,465 (.0183) DIA

Capacitance: 239 pF/meter (nominal)
Inductance: .092 mH/meter (nominal)
Propagation Delay: 1.46 nS/foot (4,79 nS/meter)

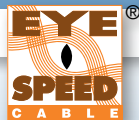
50Ω Coax Cable – 34 AWG



- Jacket: PVC
0,80 (.0315) DIA
- Shield: Serve, Silver Plated Copper
- Dielectric: Foamed FEP
- Center Conductor: 34 AWG Stranded
0,185 (.0073) DIA

Capacitance: 84.32 pF/meter (nominal)
Inductance: .230 mH/meter (nominal)
Propagation Delay: 1.29 nS/foot (4,23 nS/meter)

50Ω Coax Cable – 36 AWG



- Jacket: THV
0,635 (.0250) DIA
- Shield: Serve, Silver Plated Copper
- Dielectric: Foamed FEP
- Center Conductor: 36 AWG Stranded
0,127 (.0055) DIA

Capacitance: 88.6 pF/meter (nominal)
Inductance: .230 mH/meter (nominal)
Propagation Delay: 1.33 nS/foot (4,36 nS/meter)

50Ω Coax Cable – 38 AWG



- Jacket: PVC
0,635 (.0250) DIA
- Shield: Serve, Silver Plated Copper
- Dielectric: FEP
- Center Conductor: 38 AWG Stranded
0,117 (.0046) DIA

Capacitance: 96.79 pF/meter (nominal)
Inductance: .230 mH/meter (nominal)
Propagation Delay: 1.46 nS/foot (4,79 nS/meter)

75Ω Coax Cable – 38 AWG



- Jacket: PVC
0,97 (.038) DIA
- Shield: Serve, Silver Plated Copper
- Dielectric: FEP
- Center Conductor: 38 AWG Stranded
0,117 (.0046) DIA

Capacitance: 63.16 pF/meter (nominal)
Inductance: .348 mH/meter (nominal)
Propagation Delay: 1.46 nS/foot (4,79 nS/meter)

100Ω Twinax Cable – 30 AWG



- Jacket: PVC
2,03 (.080) x 1,37 (.054)
- Shield: Braid, Silver Plated Copper
- Dielectric: FEP
- Signal Conductors: 30 AWG Stranded
0,305 (.012) DIA

Capacitance: 46.5 pF/meter (nominal)
Inductance: .518 mH/meter (nominal)
Propagation Delay: 1.46 nS/foot (4,79 nS/meter)

85Ω & 100Ω Twinax Cable – 30 AWG



- Jacket: PET
0,660 (.026)
- Shield: Aluminum
- Dielectric: Polyethylene
- Signal Conductors: 30 AWG Solid
0,254 (.010) DIA

Capacitance: 13.9 pF/foot (nominal)
Skew: 10 ps/m within pairs
Propagation Delay: 1.53 nS/foot (5,02 nS/meter)

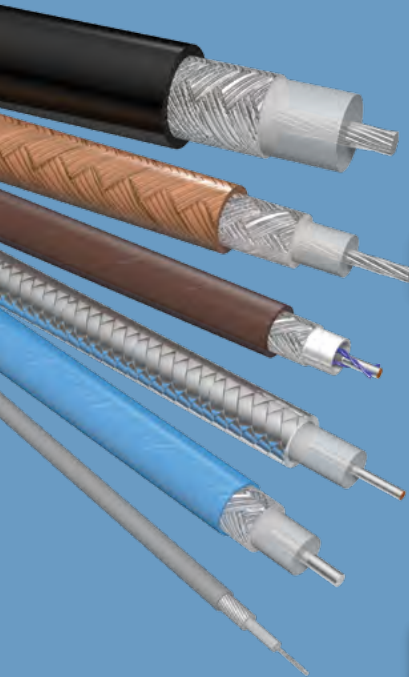
85Ω & 100Ω Twinax Cable – 32 AWG



- Jacket: PVC
1,65 (.065) x 1,14 (.045)
- Shield: Copper Foil
- Dielectric: FEP
- Signal Conductors: 32 AWG Stranded
0,25 (.0010) DIA

Capacitance: 45.2 pF/meter (nominal)
Skew: 10 ps/m within pairs
Propagation Delay: 1.46 nS/foot (4,79 nS/meter)

RF Cables



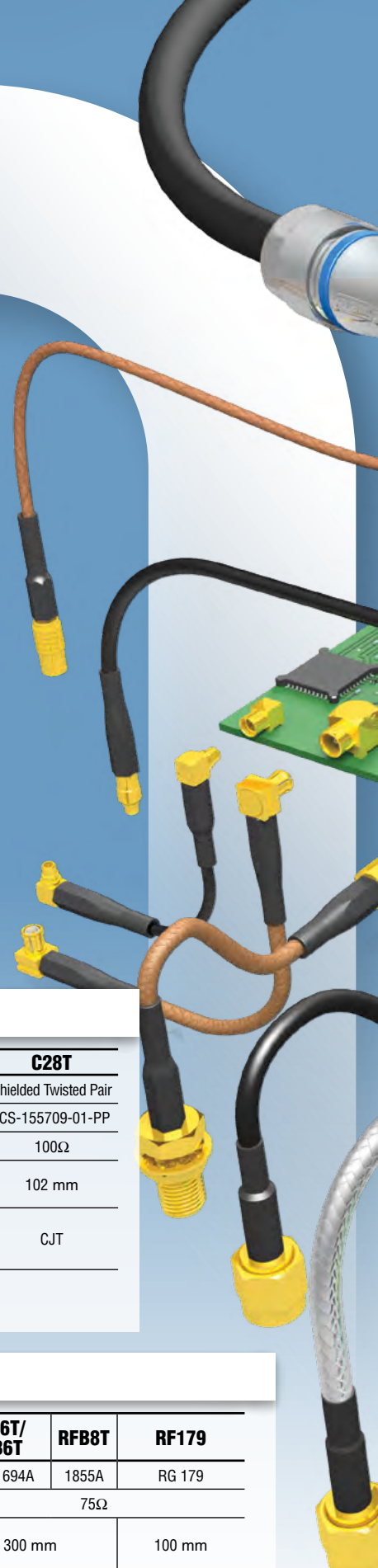
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- High vibration and 75Ω MMCX (MMCXV & MMCX7 Series)
- Circular RF shielded twisted pair system (C28T Series)
- High speed U.FL to 500 cycles/10 GHz

50Ω and 75Ω Cables

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- Adaptors available (ADP5 & ADP7 Series)
- SMA 2.92 up to 40 GHz
- Design your system in seconds using our RF Solutionator® at rf.samtec.com



Original RF Isolated Signal Cable Assemblies

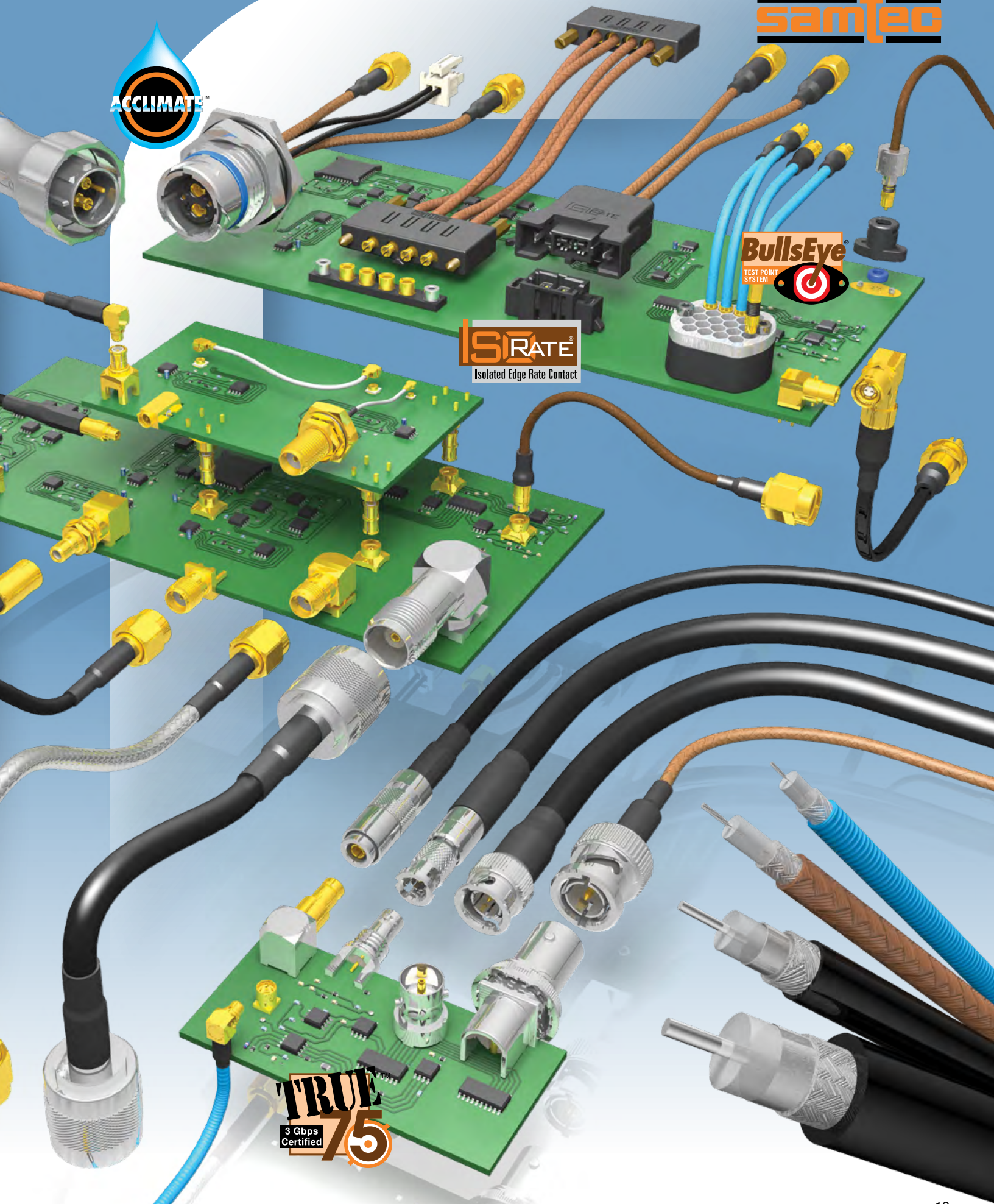
Series	ACP/ACR	GRF1-C	GRF7-C	IJ5C/IJ5H	RF25M	BE25M	RF25S	BE25S	RF30S	C28T
Brand Name	AccliMate™	Micro Ganged		IsoRate®	Bull's Eye®				True75™	Shielded Twisted Pair
Cable Type	RG 316	RG 179*	RG 316**	CCA-25M	MWC-2550-01		TCF-3075F-01-01	CCS-155709-01-PP		
Impedance	50Ω	75Ω	50Ω	50Ω				75Ω	100Ω	
Min. Assembly Length	250 mm	100 mm							102 mm	
Mates With Series	ACP/ACR	GRF1-J	GRF7-J	IP5	CCH, SMA, SMP	BAR, SMA, SMP	CCH, SMA, SMP	BAR, SMA, SMP	MMCX7	CJT

*GRF7 also available with TCF-3075F-01-01; **IJ5C also available with CTB-2650F-1
See pages 20-21 for additional cable specifications.

50Ω and 75Ω Cable Assemblies

Series	MH081/MH113	RF174/RF316	RF178	RF058	RF402	RF405	RFA6T/RFB6T	RFB8T	RF179
Cable Type	U.FL & W.FL	RG 174/RG 316	RG 178	RG 58	RG 402 (.141")	RG 405 (.086")	RG 6/1694A	1855A	RG 179
Impedance		50Ω					75Ω		
Min. Assembly Length	30 mm	100 mm					300 mm	100 mm	
Mates With Series	RSP-122811-01, RSP-122811-02	MCX, MMCX, MMCXV, SMA, SMB5, SSMB, BNC5, TNC, NTPE	MCX, MMCX, SSMB, BNC5, TNC, SMA, SMB5, NTPE	TNC, SMA, NTPE	SMA	SMA, SMP, AFI	BNC7T, MBNC7, DIN7A, HDBNC	MBNC7, DIN7A, HDBNC	BNC7T, MCX7, SMB7H, MBNC7, DIN7A

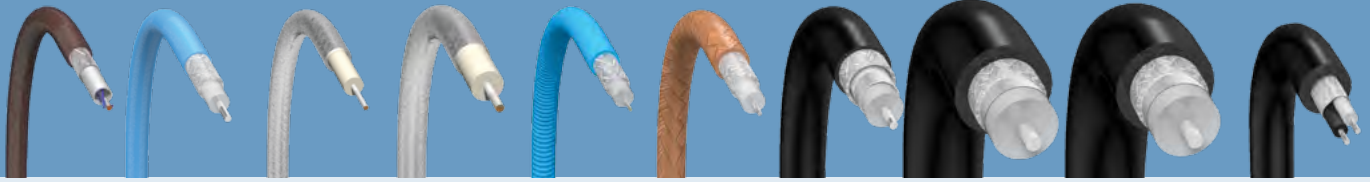
See pages 20-21 for additional cable specifications.



RF Cable Specifications



CABLE TYPE		50Ω CABLES						
		0,81	1,13	RG 178	CTB-2650F-01	RG 174	RG 316	RG 58
Impedance	Ω	50 ± 3	50 ± 2	50 ± 2	50 ± 2	50 ± 5	50 ± 2	50 ± 3
Attenuation (dB/m)	100 MHz	1.0	0.6	0.5	0.68	0.4	0.3	0.2
	1 GHz	3.1	1.9	1.7	2.37	1.4	1.25	0.8
	6 GHz	8.6	4.9	5.9	6.53	4.4	4.25	5.4
Dielectric Constant (dk)	-----	2.0	2.0	2.1	1.56	2.3	2.1	2.3
Dielectric Strength	VAC	1000	500	1000	-----	500	1200	1400
Propagation Delay	nS/m	4.70	4.70	4.83	4.17	5.06	4.83	5.05
Current Rating	Amps	-----	-----	3	2.5	5	5	-----
Capacitance	pF/m	100	95	89.61	85.6	101	96	101
Center Conductor	Material	Silver plated Copper	Silver plated Copper	Silver plated Copper Clad Steel	Silver plated Copper	Copper	Silver and Copper plated Steel	Tinned Copper
	AWG	36	32	30	26	26	26	20
	Stranding (No./mm)	7/0.05	7/0.08	7/0.10	19/0.10	7/0.16	7/0.17	19/0.18
	Diameter (mm)	0.15	0.24	0.3	0.48	0.48	0.51	0.90
	Max Resistance (Ω/m)	1.40	0.60	0.34	0.12	0.14	0.13	-----
Dielectric	Material	FEP	FEP	PTFE	Foamed FEP	LEP	PTFE	Solid Polyethylene
	Diameter (mm)	0.4	0.66	0.84	1.27	1.45	1.52	2.95
Shield	Material	Silver plated Copper	Tinned Copper	Silver plated Copper	Silver plated Copper	Tinned Copper	Silver plated Copper	Tinned Copper
	Diameter (mm)	0.65	0.88	1.29	1.5	1.95	1.93	3.0
Jacket	Material	FEP	FEP	FEP	FEP	PVC	FEP	PVC
	Diameter (mm)	0.81	1.13	1.80	1.80	2.70	2.54	4.95
	Temp Rating	-40°C to +90°C	-40°C to +90°C	-50°C to +200°C	-40°C to +200°C	-40°C to +85°C	-55°C to +200°C	-40°C to +85°C
	Color	Gray	Gray	Brown	Blue	Black	Brown	Black
Bend Radius	Min	5 mm	6.8 mm	10.2 mm	3.175 mm	25.4 mm	12.7 mm	48.3 mm
Termination Options		MHF1, MHF3, SMA	MHF1, SMA	MMCX, MCX, SMA, SMB, SSMB, BNC, TNC, N Type		MMCX, MCX, SMA, SMB, SSMB, BNC, TNC, N Type		SMA, TNC, N Type
Samtec Series		MH081	MH113	RF178, EQRF	IJ5C	RF174	RF316, EQRF, IJ5C, IJ5H, GRF1, ACP, ACR	RF058



50Ω MICROWAVE CABLES				75Ω CABLES					100Ω CABLES
CCA-25M	MWC-2550-01	RG 405 (.086")	RG 402 (.141")	TCF-3075F-01-01	RG 179	BELDEN 1855A	BELDEN 1694A	RG 6	CCS-155709-01-PP
50 ± 1	50 ± 1	50 ± 1	50 ± 2	75 ± 3	75 ± 3	75 ± 3	75 ± 3	75 ± 3	100 ± 3
0.85 @ 1 GHz	0.86 @ 1 GHz	1.20 @ 1 GHz	0.48 @ 1 GHz	1.30 @ 2 GHz	0.3	0.12	0.07	0.07	0.37
1.75 @ 4 GHz	1.70 @ 4 GHz	2.59 @ 4 GHz	1.04 @ 4 GHz	1.80 @ 4 GHz	0.8	0.37	0.21	0.21	1.67
4.18 @ 20 GHz	4.06 @ 20 GHz	6.30 @ 20 GHz	2.76 @ 20 GHz	2.40	3.6	0.97	0.59	0.59	11.05
1.3	2.1	2.04	1.99	1.61	1.8	1.42	1.44	1.44	2.3
-----	-----	1000	1000	-----	1200	300	300	2000	-----
3.84	4.76	4.79	4.79	4.23	4.83	4.12	4.06	4.03	4.62
5	5	-----	-----	2.1	3	5	-----	-----	-----
75	75	96.79	96.79	58.5	64	55.7	54.14	54.14	44.8
Silver plated Copper	Silver plated Copper	Silver plated Copper Clad Steel	Silver plated Copper Clad Steel	Silver plated Copper	Silver plated Copper	Bare Copper	Bare Copper	Bare Copper	Silver plated Copper
25	25	24	19	30	30	23	18	18	28
1/0.45	1/0.45	1/0.56	1/0.92	7/0.10	7/0.10	1/0.58	1/1.02	1/1.02	41/0.05
0.45	0.45	0.56	0.92	0.30	0.30	0.58	1.02	1.02	0.36
-----	-----	0.67	0.02	0.33	0.34	0.066	0.021	0.021	0.270
Air Enhanced FEP	Solid FEP	PTFE	PTFE	Foamed FEP	PTFE	FHDPE	FHDPE	FHDPE	PTFE
1.17	1.46	1.68	2.98	1.4	1.6	2.59	4.57	4.57	-----
1. Helically Overlapped Ag plated Cu 2. Silver plated Copper Braid	1. Flat Silver plated Copper 2. Silver plated Copper Braid	Tinned Copper	Tinned Copper	1. Copper Foil 2. Tinned Copper	Silver plated Copper	1. Al Foil-Polyester Tape-Al Foil 2. Tinned Copper	1. Bonded Al Foil 2. Al Wire	1. Al Foil-Polyester Tape-Al Foil 2. Tinned Copper	Silver plated Copper Braid
1.6	1.87	2.20	3.58	1.73	2.0	3.5	-----	-----	2.39
FEP	FEP	-----	-----	PVC	FEP	PVC	PVC	PVC	PVC
1.9	2.06	-----	-----	2.16	2.54	4.04	6.96	7.00	3.66
-65°C to +200°C	-65°C to +200°C	-70°C to +200°C	-70°C to +200°C	-40°C to +105°C	-55°C to +165°C	-30°C to +75°C	-30°C to +75°C	-30°C to +75°C	-----
Brown	Blue	-----	-----	Blue	Brown	Black	Black	Black	Black
9 mm	9 mm	3.18 mm	6.35 mm	5 mm	10.2 mm	38.1 mm	69.85 mm	69.85 mm	9.52 mm
SMA, SMP		SMA, SMP, AFI	SMA	MMCX	MCX, SMB, BNC, Mini BNC, DIN 1.0/2.3	Mini BNC, HD-BNC™, DIN 1.0/2.3	BNC, Mini BNC, HD-BNC™, DIN 1.0/2.3		CJT
PCRF, ATEP, RF25M, BE25M	RF25S, BE25S	RF405	RF402	RF30S, GRF7	RF179, GRF7	RFB8T	RFB6T	RFA6T	C28T

Signal Integrity Solutions

Samtec is uniquely positioned to provide the products, service and tools that make your entire system faster, thinner and lighter, across longer distances, with lower overall costs.

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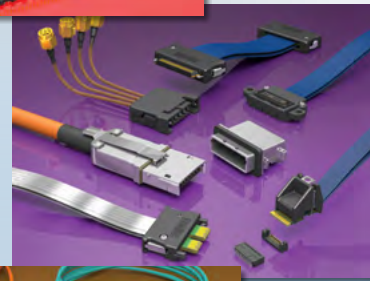
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- Signal integrity-optimized contact designs
- Cost-effective high performance solutions
- Integral ground plane systems, Edge Rate™ and micro strips, high density arrays, micro backplane and micro edge card sockets
- In-house stamping, molding, plating and assembly in both hemispheres



High Speed Cables and I/O

- In-house manufacturing, bundling and assembly of micro coax, twinax, low skew pair, twisted pair and conventional cable solutions
- Industry's best delivery, service and design flexibility for RF cable assemblies
- Complete design and test support from Samtec's Signal Integrity Group



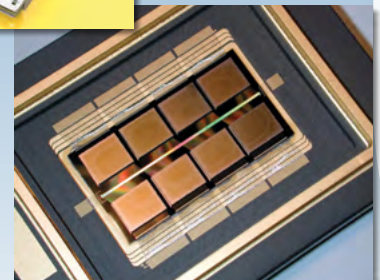
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- Active Optical cables and jumpers for QSFP+ and PCIe® Gen 1 and 2 applications
- Optical engine design and manufacturing
- In-house fiber cable attachment and connector assembly
- Advanced active optical engineering and design support from Samtec Optical Group
- Future-proof signal integrity (design for electrical, provide for optical)



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- Integrated capabilities resulting in a streamlined interconnect path and better signal integrity
- Advanced IC packaging capabilities: Die attach, Wire bond, Flip-chip, Multi-chip modules, System in package, Stacked die, Optical engines, MEMs
- IC-to-Board assembly



Service

Signal Integrity Group

- In-house, personal support that is unmatched in the industry, provided by Samtec's highly qualified staff of Signal Integrity engineers
- Interpretation of test data and performance results
- PCB layout, trace and routing assistance
- Connector ground pin assignment and assistance
- Extensive modeling, simulation and testing capabilities
- De-embedding capabilities
- Email sig@samtec.com

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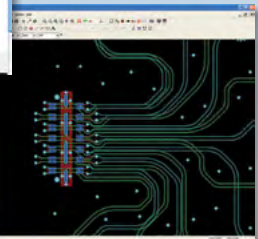
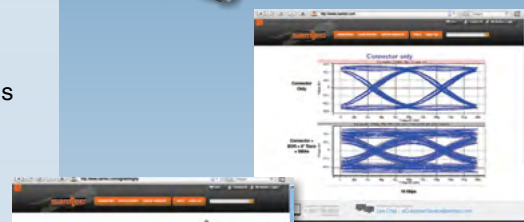
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- High Speed Characterization Reports
- Time and frequency domain test data
- Final Inch® PCB design tools
- Models for simulation (SPICE and Touchstone models)
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