

FLYOVER QSFP

APPLICATION DESIGN GUIDE

FLY CRITICAL DATA OVER THE BOARD

Samtec's Flyover QSFP Systems provide improved signal integrity and architectural flexibility by flying critical high-speed signals over lossy PCB materials and directly to the panel via ultra low skew twinax cable. The ultra-high-density design includes sideband signaling via press-fit contacts to help increase airflow, and a multitude of "End 2" options allow for maximum design flexibility.



Signal integrity is improved and extended by flying critical data over lossy PCB materials

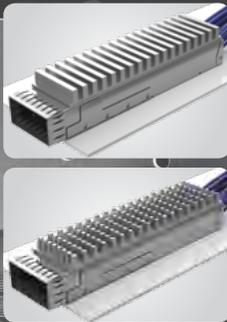
Reduced PCB costs due to lower layer counts & increased material options

Heat sink options for a variety of airflow patterns

Allows drivers to be remotely located enabling flexibility in system architecture

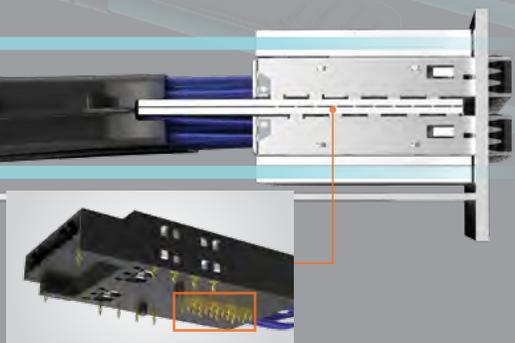
Multiple End 2 options for ultimate design flexibility

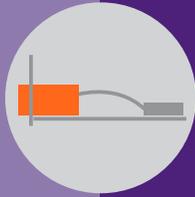
Supports dual port architecture for maximum density



Samtec's unique design includes localized press-fit control and power contacts which reduce airflow impediments and eliminate the need for a secondary cable and connector.

Sideband signals are routed through press-fit contacts for increased airflow





DIRECT ATTACH QSFP SYSTEMS

High-Speed I/O Ports for Pluggable Transceivers

FLYOVER QSFP28



Shown without Cage

FLYOVER QSFP28 DOUBLE DENSITY

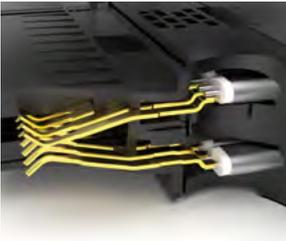


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Localized Press-Fit Control & Power Contacts
 Direct Connect Sidebands =
 Increased Airflow & No Extra Cables Needed

FQSFP Series (QSFP28)

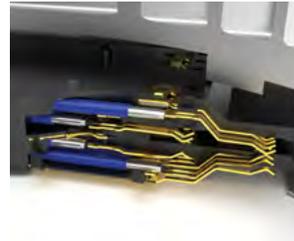
- 4 Channels (x4 Bidirectional, 8 Differential Pairs)
- 25 Gbps NRZ per channel
- Aggregate: 100 Gbps NRZ (200 Gbps PAM4)
- Compatible with all QSFP cable assemblies
- Heat dissipation: ~3.5 W / cable



Direct Solder Attach to Connector Contacts

FQSFP-DD Series (QSFP28-DD)

- 8 Channels (x8 Bidirectional, 16 Differential Pairs)
- 25 Gbps NRZ per channel
- Aggregate: 200 Gbps NRZ (400 Gbps PAM4)
- Belly-to-Belly mating for maximum density
- Heat dissipation: ~7 W / cable



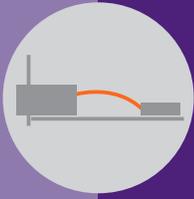
1 Row of Contact Pads
 Compatible with QSFP Modules



2 Rows of Contact Pads
 Backward Compatible with QSFP Modules



Also Available: Cages and Heat Sinks for a Variety of Airflow Patterns



ULTRA LOW SKEW TWINAX

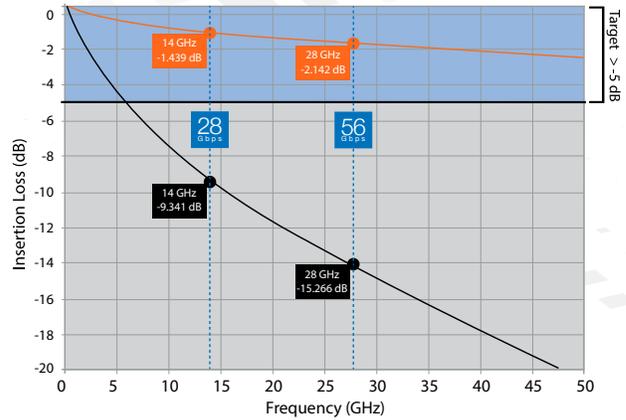
Optimized for 28+ Gbps System Demands

As bandwidth requirements rapidly increase, routing signals through lossy PCBs, vias and other components has become one of the most complex challenges designers face. Samtec's "Flyover" design approach breaks the constraints of traditional signaling and leverages the performance benefits of our Eye Speed® Twinax Cable.

Bandwidth vs. Traditional & High-Speed Materials

	FR408	MEGTRON 6	Micro Twinax	Optics
10 Gbps	up to 10"	10"+	up to 39"	100m+
14 Gbps	up to 5"	up to 10"	up to 33"	100m+
28 Gbps	up to 2"	up to 5"	up to 23"	up to 100m
56 Gbps	0.0"	up to 2"	up to 12"	TBD
112 Gbps	0.0"	0.0"	up to 6"	TBD

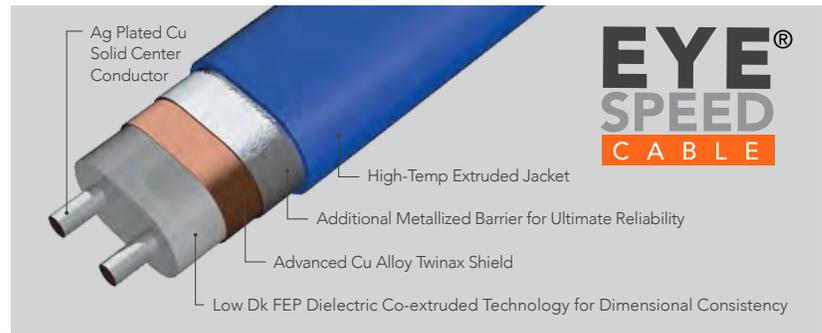
Ultra Low Skew Twinax vs. MEG6 PCB Traces



■ 30 AWG 100 Ω Low Skew Twinax Cable
■ MEG6 Backplane PCB trace, 5.7 mil wide, 8.3 mil space

EYE SPEED® ULTRA LOW SKEW TWINAX CABLE

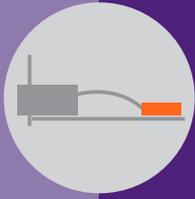
- Co-extruded, low loss construction
- Proprietary cable technology
- Ideal for 28+ Gbps applications
- Tight coupling between signal conductors
- Improved bandwidth and reach
- Improved signal integrity
- Ultra low skew twinax < 3.5 ps / meter



Nominal Performance Specifications

			28 AWG	30 AWG	32 AWG	34 AWG	36 AWG
14 GHz (28 Gbps)	0.25 m	IL (dB)	-1.0	-1.2	-1.5	-1.8	-2.2
			-3.9	-4.7	-5.9	-7.2	-8.7
	1.00 m		-1.5	-1.8	-2.2	-2.6	-3.2
			-6.0	-7.0	-8.7	-10.6	-12.7
28 GHz (56 Gbps)							
Density / Flexibility			Good	Good	Better	Best	Best

Eye Speed® Ultra Low Skew Twinax Cable is available in engineered impedance configurations of 85 Ω, 92 Ω and 100 Ω.



ASIC-ADJACENT CONNECTORS

Wide Variety of Options for Design Flexibility

END 2 OPTIONS - CURRENTLY AVAILABLE

Mini Edge Card Connector

- 0.5 mm pitch; up to 200 pins
- Vertical orientation
- Accepts .062" thick cards
- MEC5-DV Series



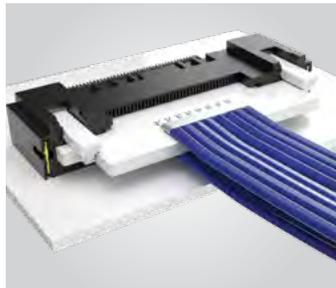
FireFly™ Micro Flyover

- Space-saving low profile
- Performance up to 28 Gbps
- Easily upgrade to optical using same connector set
- ECUE & UEC5 / UCC8 Series



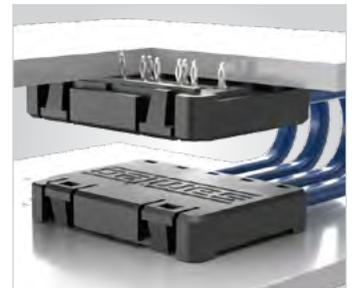
Mini Edge Card Connector

- 0.5 mm pitch; up to 160 pins
- Right-angle orientation
- Accepts .062" thick cards
- MEC5-RA Series



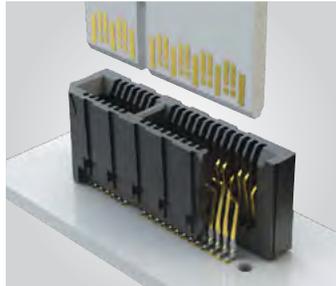
High-Speed Press-Fit

- 8 or 4 pairs on 2.00 mm pitch
- Press-fit termination
- Low profile
- Tx and Rx isolation
- DCH Series



Edge Rate® Differential Pair High-Speed Edge Card Sockets

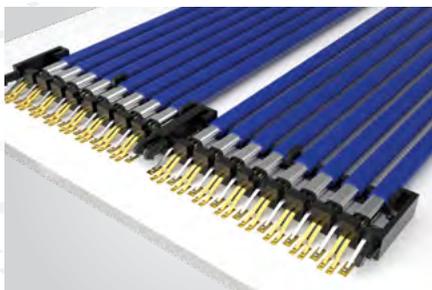
- 0.8 mm pitch; up to 56 pairs
- Vertical orientation
- Accepts .062" thick cards
- HSEC8-DP Series



Samtec's Flyover technology is a flexible solution, ideal for many signal integrity-critical, 28+ Gbps applications. To discuss your design specifications, please contact our Flyover specialists at FQSFP@samtec.com.

FLY OVER

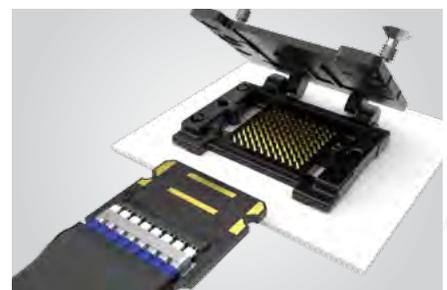
END 2 OPTIONS - IN DEVELOPMENT



Direct Pluggable Horizontal
(DPH Series)



ExaMAX® High-speed Backplane
(EBC Series)

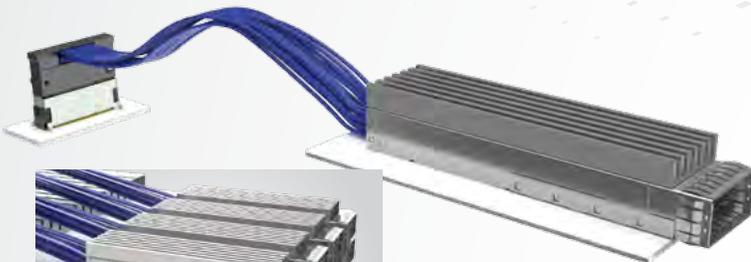


Low Profile One-Piece Array
(GMI Series)

FQSFP PRACTICAL APPLICATIONS

High-speed interconnect, microelectronics and optics expertise, along with leading edge innovations such as the Flyover QSFP System make Samtec an ideal partner to help take your application design to the next level. To discuss your design, please contact FQSFP@samtec.com.

HIGH-SPEED I/O + HIGH-SPEED EDGE CARD



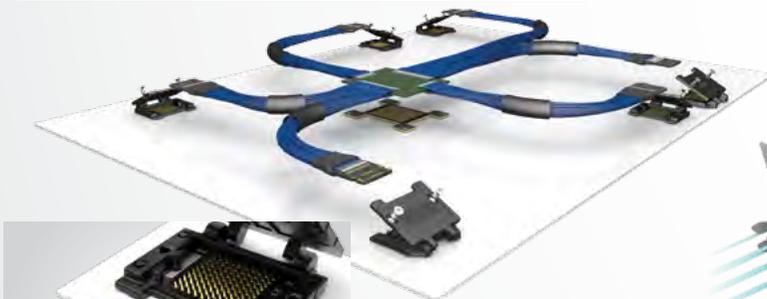
Design Enables Belly-to-Belly Mating for Maximum Density

HIGH-SPEED I/O + BACKPLANE



High-Performance, High-Density Backplane Systems

ULTRA LOW PROFILE HIGH-SPEED ARRAY INTERCONNECT



High-Density 10x10 Arrays with Optimized Signal Mapping

HYBRID COPPER + OPTICAL SYSTEM



samtec
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