



 **ELECTRONICS**

Practical Application Guide

FCI: SETTING THE STANDARD FOR CONNECTORS

With 14,000 employees in 30 countries and sales of 1,28 Billion euros in 2010, FCI is a leading manufacturer of connectors for various markets such as automotive, telecommunication infrastructures and consumer and industrial electronics.



TABLE OF CONTENTS

1- Packaging

- Outlines six levels of packaging in relationship to a system/chassis

2- Design Guide

- Walks a Sales Engineer through basics question to ask a customer during an initial design review

3- Associated Selling Guide

- Supplement to Design Guide
Providing additional technical details

4- Product Application Introduction

- Outlines FCI Market Segment Focus, System Applications in relationship to Market and potential FCI connectors sales to the System Application

5- Product Portfolio

- Outlines FCI Packaging Level and Associated Product Type

6- Standards

- Connects Organization to Industry Specification to FCI Product Type

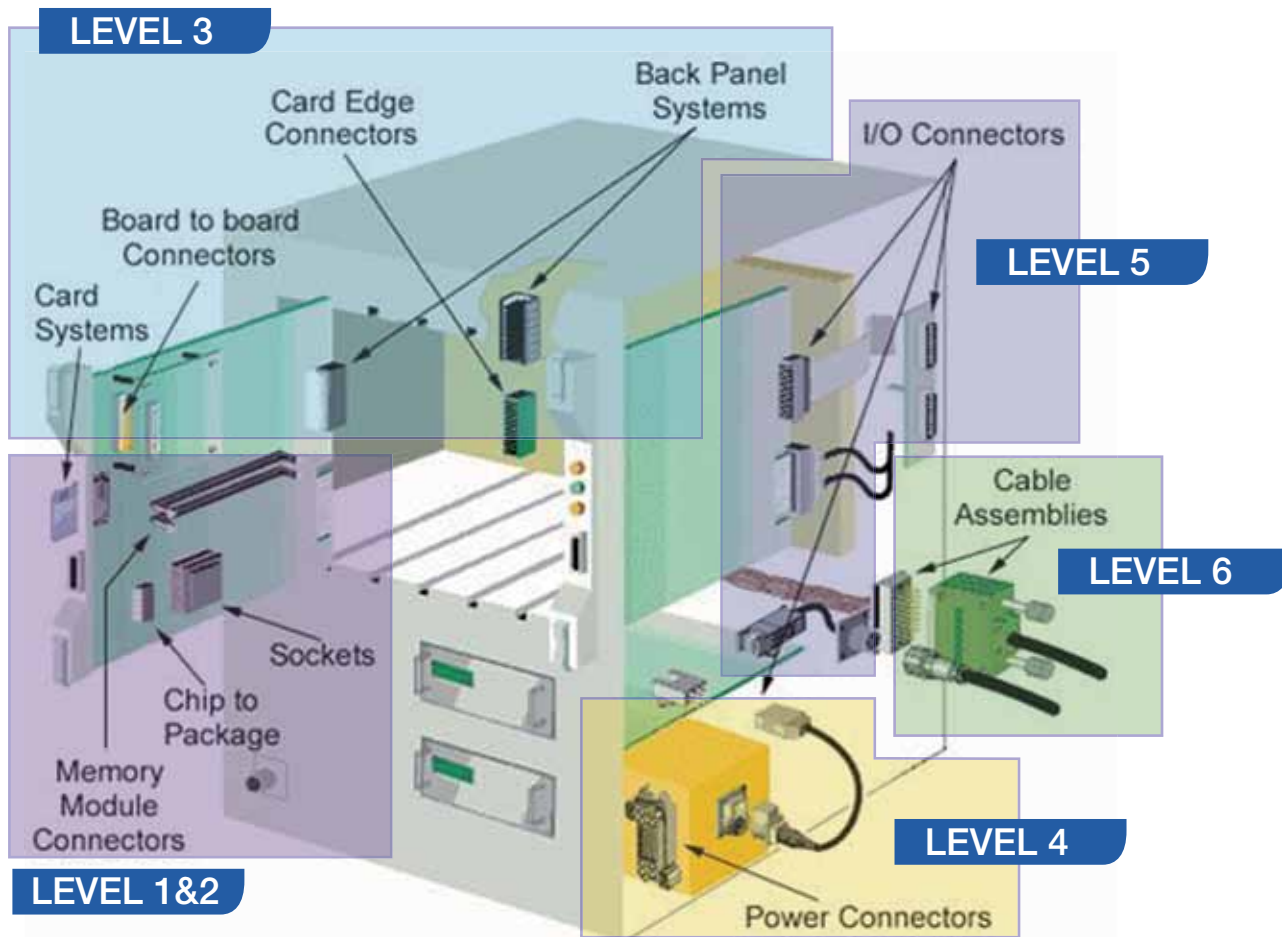
7- Glossary of Terms

- Terms common to Electro-Mechanical Packaging/Design

8- Micro Sites Electronics

- Key embedded Micro Sites at www.fciconnect.com

1- PACKAGING LEVELS



- LEVEL 1** = Chip
- LEVEL 2** = Socket to Board
- LEVEL 3** = Board-to-Board (BTB) and Wire-to-Board (WTB)
- LEVEL 4** = Sub Assembly to Sub Assembly
- LEVEL 5** = Sub Assembly to I/O Port
- LEVEL 6** = System to System

CUSTOMER	
PROGRAM	

PACKAGING LEVELS	QUESTIONS TO ASK	ANSWERS
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LEVEL 2 = Socket to Board

	PLCC, DIP, DDR2, SODIMM, DDR3?	
	Through Hole (TH), Surface Mount (SMT), Press Fit (PF)?	
	Very Low Profile (VLP)?	

LEVEL 3 = Board-to-Board (BTB) and Wire-to-Board (WTB)

BOARD-TO-BOARD			
<p>Mated Male and Female Connectors - Mezzanine/Stacking</p>	Pitch?		
	Pin Count? Single Row or Multi Rows?		
	BTB Spacing for Mezzanine/Stacking?		
	Performance (Bandwidth)?		
	Data Rate Required?		
	Power Requirements?		
	Through Hole, Surface Mount or Press Fit?		
	PCB Thickness?		
	Blind Mate (guides required)?		
	Solderable Hold-downs?		
<p>Right Angle to Vertical Mated Connectors - Backplane</p>	Through Hole, Surface Mount or Press Fit?		
	PCB Thickness?		
	Blind Mate (guides required)?		
	Solderable Hold-downs?		
	First-mate-last-break (FMLB)?		
	<p>Right Angle to Right Angle Mated Connectors - Coplanar</p>	WIRE-TO-BOARD	
		Pitch?	
		Pin Count? Single Row or Multi Rows?	
		Single or Double Row?	
		Wire AWG?	
Power Requirement?			
Discrete Wire?			
Flat Ribbon IDC?			
FFC/FPC (ZIF/LIF/Crimp)?			
<p>IDC Discrete FFC/FPC</p>			

PACKAGING LEVELS	QUESTIONS TO ASK	ANSWERS
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LEVEL 4 = Sub Assembly to Sub Assembly

	What are the sub assemblies?	
	FCI Connector on sub assembly (Connector Type)?	
	Power Interconnect?	
	High Speed Interconnect?	
	Copper Cable Assembly?	
	Fiber Optic Assembly?	
	Pin Count? Single Row or Multi Rows?	
	Wire (AWG)? Cable Type and Length?	

LEVEL 5 = Sub Assembly to I/O Port

	What are the sub assemblies?	
	FCI Connector on sub assembly (Connector Type)?	
	Power Interconnect?	
	High Speed Interconnect?	
	Copper Cable Assembly?	
	Fiber Optic Assembly?	
	Pin Count? Single Row or Multi Rows?	
	Wire (AWG)? Cable Type and Length?	

LEVEL 6 = System to System

	What are the System Boxes?	
	FCI port connector or Port Connector Type?	
	Power Interconnect?	
	High Speed Interconnect?	
	Copper Cable Assembly?	
	Fiber Optic Assembly?	
	Pin Count? Single Row or Multi Rows?	
	Wire (AWG)? Cable Type and Length?	

3- ASSOCIATED SELLING GUIDE

Related Applications	FCI Connector Type	Trans Speed	Pin Count (incl.gnds)	Signal Density (dif prs/inch, excl.gnds)	Differential Impedance (Ohm)
FPGA	Backplane				
	Xcede	25Gbs	96-128	42-85	100&85
	Zipline	12.5Gbs	108-216	84,6	100
	AirMaxVS	12.5Gbs	54-150	63,5	100 & 85
	Metral	0.6-5Gbs	30-96	25 (4000)	100 (4000)
	Milipacs	0.7Gbs	55-200	N/A	N/A
	DIN 41612	N/A	32-96	N/A	N/A
	Bergstik/Dubox/Quickie/PV				
Minitek/Minitek 127					
Micro processor	B-T-B				
	GigArray	10Gbs	450 & 666	51,308	100
	MegArray	10Gbs	81-528	69,088	N/A
	TwinMezz	20+Gbs	200-800	121,158	100 & 85
	Conan	5Gbs	9-69		
	Ribcage		10-100		
	Compression (one-piece)		4-22		
	BergStak 0.8mm	2.5+Gbs	40-200		
	MezzoStak 0.5mm	5+Gbs	10-70		
	Minitek/Minitek 127		10-100		
Power Supply	Power				
	Power Card Edge	N/A	12S/70P	N/A	N/A
	PwrBlade	N/A	148S/20P	N/A	N/A
	HCI	N/A		N/A	N/A
	Terminal Blocks	N/A		N/A	N/A
LCD display	FFC (Flat Flexible Cable)	>3Gbs	2-60	N/A	N/A
Touch screen	CIC (Conductive Ink Circuit)				
Handhelds	FPC (Flexible Printed Circuit)				
Internal memory	SATA/SAS/SCA-2	6Gbs	22 / 29	ref.std	N/A
	Micro SAS/SATA	6Gbs	16	ref.std	N/A
	Mini SAS-SATA	6Gps	26	ref.std	N/A
	mSATA (Mini PCIe)	6Gps	52	ref.std	
External Memory	SD/Micro SD, CF		ref.std		
Memory Cards	Express Card	4.8Gbs	26	ref.std	N/A
Memory Sockets	DDR1, 2 & 3, SODIMM	4.8Gbs	144-240	N/A	N/A
Off Board	I/O - USB/Dsub/RJ45				
Off Board	High Speed I/O / Flex				
Assemblies	SFP+ Copper/Fiber Optics	10Gbs			
	QSFP+ Copper/Fiber Optics	40Gbs			
	CXP Copper/Fiber Optics	120Gbs			
	Mini SAS 2.0/2.1 External	5Gbs			
	Infiniband (Eyemax)/CX4	2.5-5Gbs			
	Densishield	2.5-8Gbs			
	MiniSAS HD	10-12Gbs			
	Fiber Optical Transceivers	2-14Gbs			
	BusBars				
	Power Cables	1.5-100A/contact			

Connector Profiling:

Backplane

- what transmission speed and signal density is required

Mezzanine/Stacking

- define transmission speed, mating height and pin count required

Power

- overall power rating in amps per contact and voltage

PCB Mount	Mated Height (mm)	Amps/power contact	Comments
PF	N/A	1A/contact	Hard Metric
PF	N/A	6A IMLA & 80A mod.	Hard Metric
PF	N/A	80A module	Hard Metric, cables
PF	N/A	80A module	Cables
PF	N/A	80A module	Hard Metric,keyed,cables
PF/STB	N/A	15A/pwr.contact	Cables, IDC, latching
BGA	15-40	1A/pin or 18A/wafer	Diff. pair contact config.
BGA	4-14	0.45A/pin	Open pin field
BGA	12-40		Open pin field
SMT	4.5-7		
SMT	6.42-9.93		
SMT			
SMT	5-16		
SMT	4-7		
SMT/STB	6-20		
PF/STB	N/A	7A	
PF/STB	N/A	30A	Cables, configurable, AC/DC
PF/STB	N/A	50A	Cables, configurable, AC/DC
STB	N/A	8-32A	
SMT, STB	N/A	N/A	Low or Zero Insertion force
	N/A	N/A	
	N/A	N/A	
PF/STB/SMT	N/A	N/A	
STB/SMT	N/A	N/A	
SMT	N/A	N/A	Cables
PTH/SMT	N/A	N/A	
SMT	N/A	N/A	Cards and hosts available
PF/STB	N/A	0.5A/sig. contact	
SMT/PTH	N/A		Dsubs/USB/ Micro/Mini USB/USB+Power
	N/A		
	N/A		
			12 fibers x 10 Gbps = 120 Gbps aggregate data rate
	N/A		
	N/A		
	N/A		
	N/A		
	N/A		X2/Xpak/XFP/SFP+/SCFF
	N/A		Power Distribution (laminated)
	N/A		PwrBlade/PwrProfile/PwrTwinBlade/USB+Pwr/D-Sub

FFC/Flex	- define pin count, pitch and if assemblies are required
Input/Output (I/O)	- is there a specific standard required, i.e. USB
Storage I/O	- is there a specific standard or transmission speed required
Memory	- will memory be on the board or in a socket for expansion

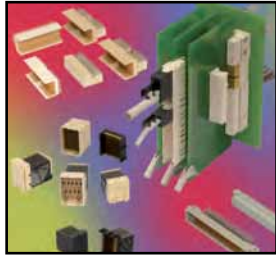
4- PRODUCT APPLICATION INTRODUCTION

Product Offering by Market Segment



CATEGORY

PRODUCT NAME



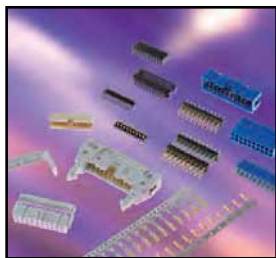
Backpanel Connectors

XCede® (20+Gb/s)
 Zipline™ (12.5 Gb/s)
 Airmax® (12.5 Gb/s)
 Metral® 1000/2000/4000 (up to 5 Gb/s)
 Millipacs® Hard Metric (cPCI)
 DIN 41612



Power Connectors and Power Assemblies

PWRBlade® (de-rated 30 amps/power contact)
 Power Card Edge (7 and 9 amps per contact)
 HCI® and HCI® High Power (de-rated 52 amps and 72 amps)
 PWR Profile+™ (low profile I/O cable)
 PWRBlade® Cable / PWR Twin Blade® Cable (100 amps/contact)
 Terminal Blocks
 Custom Bus Bars



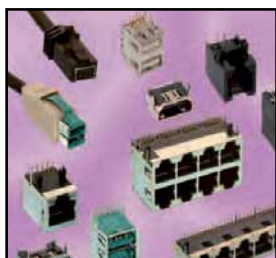
Board-to-Board Connectors and Wire-to-Board Connectors

TwinMezz® (20 Gb/s) / MEG-Array® and GIG-Array® (10 Gb/s)
 BergStak® (0.8mm) Conan® (1.0mm) Rib-Cage™ (1.27)
 Minitex™ (2.0mm) Minitex 127 (1.27mm)
 Mezzostak™ (0.5mm hermaphroditic)
 Terminal Blocks
 FFC/FPC/Clincher (0.2 - 2.54 ZIF and LIF)
 Bergstik®/DuBox™/Quickie®/PV™ (2.54mm modular system)
 1.25 Wire-to-Board Systems
 Card Edge (SFP, XFP, Xenpak, MicroTCA, PCIe)



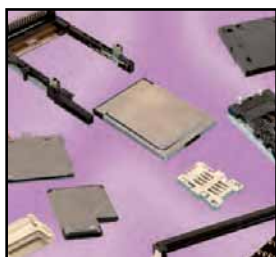
Storage Interface Connectors

iVDR (Information Versatile Disk for Removable Storage)
 SAS, SATA, SCA-2, MicroSATA
 e-SATA, Slimline SATA



Input/Output Connectors and Cable Assemblies

Mini Multilane External (mini SAS or SATA 4X cables)
 SFP+ and QSFP+ (copper and fiber cables)
 DensiShield™ I/O Systems
 Eyemax® HS I/O & Cable (Infiniband 10G Fibre Channel, CX4)
 D-Subminiature (PCB and Cable)
 Latch-N-Lok™ (PCB and Cable)
 USB, USB+Power, Mini USB, 1394, HDMI
 Modular Jacks (Ethernet), Gang Jacks
 Low Profile Subscriber Interface (DSL PCB and Cable)



Card Systems

DDR2/DDR3 Memory Module Sockets
 Smart Card Connectors
 PC Card Headers/Compact Flash
 ExpressCard™ Systems

MARKET SEGMENTS

INDUSTRIAL, INSTRUMENTATION & MEDICAL

DATA

COMMUNICATION

CONSUMER

<i>Rack Mount Server</i>	<i>Blade Server</i>	<i>Storage Systems</i>	<i>Storage Drivers</i>	<i>Printers</i>
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<i>Switching / Routing Access / Transmission</i>	<i>Wireless Base Station</i>	<i>Wireless Technology Premises Equipment</i>
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<i>Business & Retail Equipment</i>	<i>Industrial Control Equipment</i>	<i>Instrumentation & Medical</i>
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<i>Home Entertainment Equipment</i>	<i>Mobile Equipment</i>	<i>Mobile Phones Smart Phones</i>

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5- PRODUCT PORTFOLIO

Connector Types



HIGH SPEED

www.fciconnect.com/highspeed



- Metral® High Speed
- Airmax VS®
- Airmax VS® 85 Ohms
- ZipLine®
- XCede®



- Airmax VS® Orthogonal
- Zipline® Orthogonal



- Airmax VS® Coplanar
- Zip Line® Coplanar



- Mini SAS/SATA
- SFP+
- QSFP+
- CXP Cables
- DensiShield™
- Eyemax®
- Transceivers



- MEG-Array®
- GIG-Array®
- TwinMezz®

HIGH SPEED I/O

www.fciconnect.com/hsio



- SFF8086
- SFF8088



- SFF8431
- SFF8461



- SFF8436



- CXP - CXP
- CXP - 3xQSFP



- CX4
- Infiniband®



- CX4
- Infiniband®
- SFF8470
- Fibre Channel



- SFP +
- XFP
- X2
- SCFF

INPUT / OUTPUT

www.fciconnect.com/io



- HDMI™
- USB
- Modular Jacks
- Latch-N-Lok™



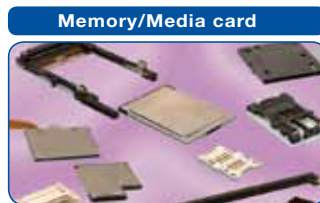
- Mini SAS/SATA
- SFP+
- QSFP+
- DensiShield™ I/O
- Eyemax®
- CXP Cables
- Transceivers



- Standard Density
- High Density
- Cable Connectors
- Power Connectors
- µTCA® Power IO
- Economy Range
- Pin-in-Paste
- Pressfit
- High Performance
- Accessories



- DensiShield™ I/O System
- Eyemax® - Infiniband
- Fiber Optics
- Metral® Cable Assembly
- Mini SAS/SATA
- CXP Cables
- Transceivers



- Smartcard
- PCMCIA™
- ExpressCard™
- DDR Memory
- Flash memory products



- Serial Attached SCSI (SAS)
- Serial-ATA (SATA)
- eSATA Connectors
- iVDR Connectors
- SCA-2 Connectors System
- Micro SATA Connectors
- Slimline SATA Connectors

5- PRODUCT PORTFOLIO

Connector Types



BACKPANEL www.fciconnect.com/backpanel

<p>High Speed Backpanel</p> <ul style="list-style-type: none"> Metral® High Speed Airmax VS® Airmax VS® 85 Ohms ZipLine® XCede® 	<p>High Speed Orthogonal</p> <ul style="list-style-type: none"> Airmax VS® Orthogonal Zipline® Orthogonal 	<p>High Speed Co-Planar</p> <ul style="list-style-type: none"> Airmax VS® Coplanar Zip Line® Coplanar 	<p>2.00 mm Backpanel</p> <ul style="list-style-type: none"> Metral® Millipacs® Hard Metric 	<p>2.54 mm Backpanel</p> <ul style="list-style-type: none"> DIN 41612
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POWER www.fciconnect.com/power



<p>Power Supply</p> <ul style="list-style-type: none"> High Power Card Edge (HPCE™) PwrBlade® Connector System HCI® Connector System Power Card Edge 	<p>Host-To-Card</p> <ul style="list-style-type: none"> Hard Metric High Power HCI® High Power Metral® High Power Connectors Metral® Power Connectors 	<p>Power I/O</p> <ul style="list-style-type: none"> Pwr Profile+™ Cable Assemblies PwrBlade® Cable Assemblies Pwr TwinBlade™ Cable Assemblies D-Sub Power USB + Power Sofix® Power 	<p>Power Distribution</p> <ul style="list-style-type: none"> Power Distribution Solutions (Bus Bars)
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MEZZSELECT www.fciconnect.com/mezzselect



<p>High Speed Mezzanine</p> <ul style="list-style-type: none"> MEG-ARRAY® GIG-ARRAY® TwinMezz® 	<p>Fine Pitch Mezzanine</p> <ul style="list-style-type: none"> BergStak® - 0.8 mm pitch Conan® - 1.00 mm pitch Rib-Cage™ - 1.27 mm pitch 	<p>Post & Box Mezzanine</p> <ul style="list-style-type: none"> Dubox™ Bergstik™ Minitek™ - 2.00 mm pitch Minitek127™ - 1.27 mm pitch 	<p>Flexible Connections</p> <ul style="list-style-type: none"> FCI Flexible Connections
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BASICS+ www.fciconnect.com/basics



<p>Unshrouded Headers</p> <ul style="list-style-type: none"> Bergstik™ - 2.54 mm Minitek™ - 2.00 mm 	<p>Shrouded Headers</p> <ul style="list-style-type: none"> Dubox™ - 2.54 mm Minitek™ - 2.00 mm Quickie™ - 2.54 mm PV™ - 2.54 mm 	<p>Crimp-To-Wire</p> <ul style="list-style-type: none"> Dubox™ - 2.54 mm Minitek™ - 2.00 mm PV™ - 2.54 mm 	<p>PCB Receptacles</p> <ul style="list-style-type: none"> Dubox™ - 2.54 mm Minitek™ - 2.00 mm 	<p>IDC Receptacles</p> <ul style="list-style-type: none"> Minitek™ - 2.00 mm Quickie™ - 2.54 mm 	<p>Shunts</p> <ul style="list-style-type: none"> Dubox™ - 2.54 mm Minitek™ - 2.00 mm
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5- PRODUCT PORTFOLIO

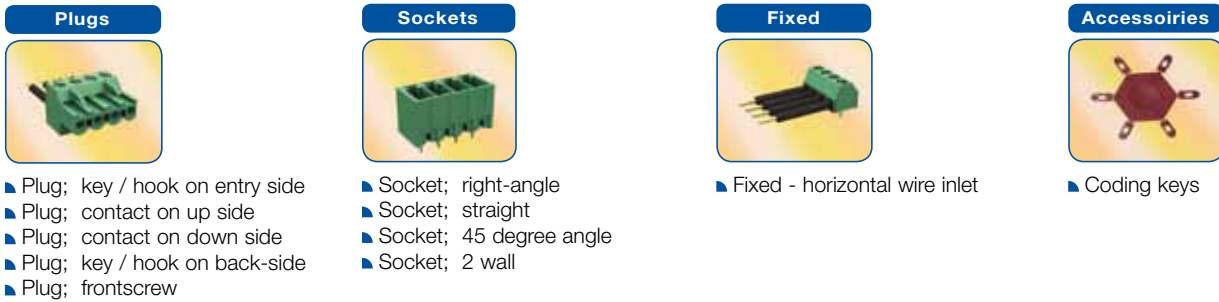
Connector Types



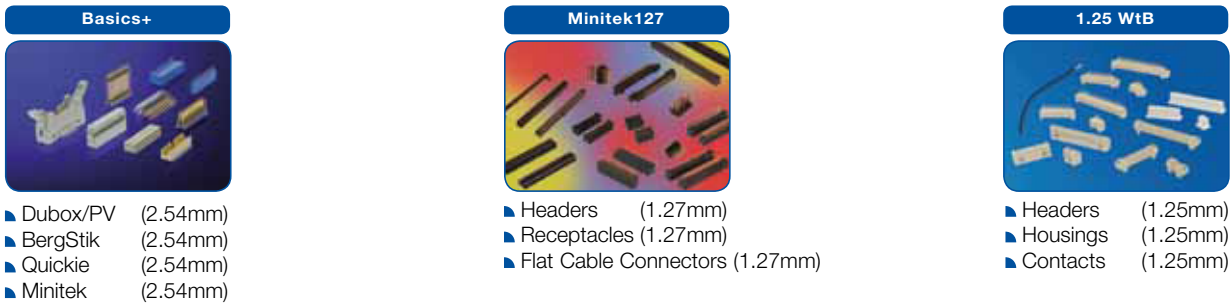
FLEX www.fciconnect.com/flex



TERMINAL BLOCKS www.fciconnect.com/terminalblocks



BtB/WtB Modular Systems www.fciconnect.com/boardwiresystems



Organization	Industry Specification	FCI Products
300 Pin MSA	300 Pin MSA	300 position Megarray connectors
ATCA	TIA 1096 TIA-960-A	Modular Jacks
Compact Flash Association	Compact Flash	Compact Flash Connectors
D-Sub Product	RS-232	D-Subminiature Connectors
DIN	DIN 41612 (IEC 60603-2) DIN 41652 (IEC 60807)	D-Subminiature Connectors DIN 41612 Connectors
FCC	FCC Part 58	Modular Jacks
HDMI	High Definition Multimedia Interface	HDMI Receptacles
HyperTransport Consortium	HTX Connector HTX Connector	PCI Express x1 and x16 connectors
IEC	IEC 60603-2 IEC 60603-7 IEC 61076-4-101 and IEC 917 IEC 61076-4-104 IEC 61196-2	DIN 41612 Connectors Metral 2mm Modular Connector System Millipacs Hard Metric 2mm Connectors Modular Jacks Power.S3 EV-Plug 16-32 and Power. S3 EV-Plug 16-32A
IEC 60529/EN 60529	IP65 and IP67	Outdoor I/O Connectors
IEEE 802.3	1000Base-T 100Base-TX 10Base-T 10GBase-CX4 40GBase-CR4 IEEE 802.3ak, 802.3ap, 802.3ba	Airmax VS High Speed Eyemax Connectors and Cables Modular Jacks QSFP+ Connectors and Cables ZIPLine high density/high speed
INCITS T10 Committee	Mini SAS External Serial Attached SCSI (SAS)	Minimultilane SAS/SATA Connectors and Cables SAS Storage Drive I/O Connectors
INCITS T11 Committee	10G Fibre Channel (CX4 copper) Fibre Channel	Eyemax Connectors and Cables SCA-2 Storage Drive I/O Connectors
Infiniband Trade Association	Infiniband DDR (4x5G) Infiniband QDR (12x10G) Infiniband QDR (4x10G) Infiniband SDR (4x25G)	CXP Active Optical Cables Eyemax Connectors and Cables QSFP+ Connectors, Transceivers and Cables
Intel	QuickPath Interconnect (QPI) Connector	Airmax VS 85 ohm Connectors
Interlaken Alliance	Interlaken Interoperability Recommendations	Airmax VS High Speed Connectors
JEDEC	MO-237, 256, 269	DDR2 DIM DDR2 FB DIMM DDR3 DIMM
PCI-SIG	PCI Express Card Electromechanical PCI Express Module PCI Express MiniCard	Mini PCI Express Assy PCIe ExpressModule Card Edge Connectors PCIe Card Edge Connectors
PCMCIA	Card Bus Express Card PC Card	Express Card Slot Systems and Module Kits PC Card and Card Bus Systems

Organization	Industry Specification	FCI Products
PCMIIG	ATCA (Zone 3) CompactPCI 2.0 CompactPCI Serial IO MicroTCA (MTCA.0) SHB Express	Airmax VS High Speed Coplaner MicroTCA Card Edge and MicroTCA Airmax VS Power Modules Millipacs 2mm and CompactPCI Connectors PCIe Card Edge Connectors ZipLine High Speed Coplaner
SAE	SAE-J1772	Power.S3 EV-Plug 16-32A
SATA-IO	MicroSATA Mini-Multilane SATA External MiniSATA External Multilane SATA External Serial SATA Slimline SATA eSATA	Eyemax Connectors and Canles MicroSATA Storage Drive I/O Con- nectors Mini-Multilane SAS/SATA Connec- tors and Cables SATA Storage Drive I/O Connectors Slimline SATA Storage Drive I/O Connectors eSATA Connectors
SBBWG	Storage Bridge Bay Midplane Inter- face	Airmax VS High Speed Connectors
SD Card Association	SD Card MiniSD Card	SD Card Headers MiniSD Card Headers
SFF Committee	CXP (SFF-8642) INF-8077i (XFP) INF-8438i (QSFP) INF-8474i (XENPAK) INF-8475i (XPAK) INF-8476i (X2) QSFP+ SFF-8086, 8088 SFF-8431 (SFP+) SFF-8436 (QSFP+) SFF-8442 (ganged QSFP) SFF-8451 (4G Fibre Channel) SFF-8454 (8G Fibre Channel) SFF-8461 (SFP+ Copper) SFF-8470 SFF-8482 (SAS) SFF-8642 (CXP) SFP (INF-8074i) SFP+ (INF-8431 and SFF-8461) X2 (INF-8476i) XFP (INF-8077i) XPAK (INF-8475i)	CXP Active Optical Cables EYEMAX Connectors and Cables Mini-Multilane SAS/SATA Connec- tors and Cables QSFP+ Connectors and Cables QSFP+ Connectors, Transceivers and Cables SAS Storage Drive I/O Connectors SCA-2 Storage Drive I/O Connectors SFP+ Connectors and Cables SFP+ Connectors, Transceivers and Cables X2 Transceivers & Right Angle Card Edge Connectors XENPAK Transceivers & Right Angle Card Edge Connectors XFP Transceivers & Right Angle Card Edge Card Connectors XPAK Transceivers & Right Angle Card Edge Connectors Right Angle Card Edfe Connectors
SSI Forum	SSI Chassis Management Module (CMM) SSI Compute Blade SSI Compute Blade Mezzanine SSI Distributed Power Supplies (DPS) SSI High-End Power Supplies SSI Mid-Range Power Supplies	Airmax VS High Speed Connectors Airmax VS High Speed Connectors and Bergstak 0.8mm Power Blade Connectors
TIA/EIA-568	Cat 3, 5 and 5e	Modular Jacks

Organization	Industry Specification	FCI Products
USB-IF	USB 2.0	USB and Mini USB Connectors
USOC (Universal Service Ordering Code)	RJ-11 and RJ-45	Modular Jacks
VSO	ANSI/VITA 41 VITA 1 and 41 VMEbus VXS	DIN 41612 Connectors
XENPAK MSA	XENPAK (INF-8474i)	XENPAK Right Angle Card Edge Connectors
iVDR Consortium	iVDR (Information Versatile Disk for Removable Usage)	iVDR Connectors

7- GLOSSARY of TERMS

Term	Definition
AWG	American Wire Gauge
Back-mounted	When a connector is mounted from the inside of a panel or box with its mounting flanges inside the equipment.
Bandwidth	The range of frequencies within which a fiber optic cable or device can transmit data or information
Bandwidth-Limited Operation	The condition in a fiber optic link when band-width vs, received optical power, limits the performance of the link. This condition is reached when the signal becomes distorted, principally by dispersion, beyond the specified limits
Bend Radius	The smallest radius an optical fiber or cable can bend before increased attenuation or breakage occurs
Braid	Flexible conductor made of a woven assembly of fine wires.
Braid (Shielding)	A woven layer of fine wires placed around the inner dielectric of the core conductor as used with shielded or coaxial cables
Bussing	The joining of two or more circuits together such as in a terminal block
Cable	One or more optical fibers enclosed in strength members and jacketing material to provide mechanical and environmental protection
Cable Assembly	Optical fiber cable that has connectors installed on one or both ends. It is also known as a jumper or patch cord
Chamfer	The angle on the inside edge of the barrel entrance of a connector which permits easier insertion of the cable into the barrel.
Contact	Conductive element in a device or component, which mates with a corresponding contact and provides a completed electrical circuit
Contact Base Material	The base material of the stamped and/or formed contact before plating
Contact Pitch	The center to center distance between the contact positions in a connector
Contact Plating	Plating on the mating side of the connector in the contact zone
Contact Rating	The maximum current that can be applied without failure

Term	Definition
Contact Resistance	The electrical resistance of the contact area of two mated connectors
Contact Wire Range	Range of wire sized accommodated by a conductor barrel
Data Rate	The number of bits of information in a transmission system, expressed in bits per second (bps), and which may or may not be equal to the signal or baud rate
Dielectric	A certification rating given to FCI Racine Pole Saws, Pruners and Nonconductive hose sets regarding the amount of electrical voltage it will withstand per OSHA 1910.269, ASTM F711-89 and IEEE 978-84 specifications
Duplex Cable	A two-fiber cable suitable for duplex transmission
Durability (Mating Cycles)	Number of mating cycles a connector will withstand and still perform within the required specifications
Edge card (Card edge) Connector	Connector into which the edge of a printed board is inserted directly form completed circuits
EMI	Electromagnetic interference
Engaging Force	The force required to assemble one contact half or connector half with its mating part
FCC	Federal Communication Commission
FDDI	Fiber Distributed Data Interface
Female Contact	A contact which forms an electrical engagement on it's inner surface through contact with a male contact
Fiber Channel	An industry standard specification for computer channel communications over fiber optics.
Flash Plating	A very light plating, only enough to uniformly cover the surface is deposited on the base metal.
Frequency	The number of cycles per second of an alternating current or hertz
Front-mounted	A connector is front-mounted when it is attached to the outside or mating side of a panel. A front-mounted connector can only be installed or removed from the outside of the equipment
Gap Loss	Loss resulting from the separation of two fiber ends
GBIC	Gigabit Interface Converter
Gender	Style of the contact of a connector. The male termed header, pin, or plug has the contact surface on the outside. The female, termed receptacle, has the contact surface on the inside and receives the mating plug or pin. Hermaphroditic connectors have identical halves that mate to each other
Gigahertz (GHz)	A unit of frequency that is equal to one billion cycles per second
Grounded System	A system of conductors in which at least on conductor or point (usually in the middle wire or neutral point of transformer or generator windings) is intentionally grounded either solidly or through a current-limiting device
Guide Pin	A pin or rod extending beyond the mating face of a two-piece connector and designed to guide the closing or assembly of the connector to assure the proper mating of the contacts, and to prevent damage to these contacts caused by mismatching or the connector halves
Harness	A group of wires or cables joined together to form a circuit network for electronic or electrical equipment. A harness is usually assembled of cables cut to the proper length, terminated and tied together prior to being assembled in a piece of equipment
Header	Plug or connector of male gender

Term	Definition
Hermaphroditic Connector	A connector contact that mates to itself.
Hertz	The unit of frequency equal to one cycle per second of an alternating current
High Voltage	Above 600 volts
Housing	Plastic connector body for terminals
HV (High-voltage), EHV (Extra-High-Voltage) and UHV (Ultra-High-Voltage) power connectors	A HV, EHV, or UHV power connector is a connector, bus support, or other device which, when installed on its conductor, does not generate corona or noise at nominal voltage
IEEE	Institute of Electrical & Electronic Engineers
Impedance	The opposition a circuit offers to the flow of alternating current.
Inductance	The coefficient of self-induction of a circuit. The effect is to cause current to lag behind emf in phase. It depends on the size and shape of the circuit, cross section and shape of conductor, magnetic properties of the conductor and the surrounding medium, the frequency of the current reversal, and resistance of the conductor. It is, therefore, difficult to compute except for simple wire circuits suspended in air. The unit for measurement is the henry or the millihenry (1/1000 henry).
Insert Retention	Axial load in either direction, which an insert must withstand without being dislocated from its normal position in the connector shell.
Insertion Force	Force required to fully insert a set of mating components
Insertion Loss	The loss of power that results from inserting a component, such as a connector or splice, into a previously continuous path
Insulation Resistance	Minimum electrical resistance permitted when this resistance is measured between any pair of contacts and between conductors and grounding devices of the connectors in various combinations
Jumper	A short cable used to connect two terminals
Key	A short pin or other projection which slides in a mating slot or groove to guide two parts being assembled. Generally used in round, shell-enclosed connectors (BANTAM) to obtain polarization
Kilowatt	One thousand watts. The true power being used in an alternating-current circuit.
Low Voltage	600 volts and lower
Male Contact	A contact which forms an electrical engagement on its outer surface when plugged to a female contact
Mate	The joining of two connector halves; or of a cable to a connector
Megahertz (MHz)	A unit of frequency that is equal to one million cycles per second
Micrometer (μm)	One millionth of a meter; 10^{-6} meter. Typically used to express the geometric dimension of fibers, e.g., 62.5 μm .
Mil	A unit equal to one thousandths of an inch (0.001 inch). One-thousandth, usually of an inch or an ampere.
Millimeter (mm)	One thousandths of a meter.
Modular	Modular connector in which similar or identical sections can be assembled together in any number to provide the best connector type or size for the application. Example: the MODULOK terminal block is a modular connector

Term	Definition
Modulation	Coding of information onto the carrier frequency. This includes amplitude, frequency, or phase modulation techniques
Multifiber Cable	An optical fiber cable that contains two or more fibers
Multimode Fiber (MM)	An optical waveguide in which light travels in multiple modes or multiple paths along the core. Typical core/cladding size (measured in microns) is 62.5/125
Nanometer (nm)	A unit of measurement equal to one billionth of a meter; 10 ⁻⁹ meters. Typically used to express the wavelength of light, e.g., 1300 nm
Noise	Electrical noise. The undesirable emission of signals resulting from poorly shielded, grounded or connected electrical equipment. Usually caused by unstable electrical contact
Nominal Dimension	The dimension shown on a drawing as the desired one. A tolerance must be applied to obtain the extremes of dimension acceptable on the part. Also see Tolerance
Number of Contacts (# of contacts)	The Number of circuits carried in a device including ground and shield.
Number of Positions (# of Positions)	Number of cavities in a housing designed to receive contacts. Total number of potential circuits that can be created if all cavities are loaded with contacts
Ohm	The unit of electrical resistance about equivalent to the resistance of 1000 ft of No. 10 copper
Parallel connector	A parallel connector joins two parallel conductors for a tap or splice utilizing mechanical, compression, wedge or IPC connector technology
Pin Contact	A male type contact, usually designed to mate with a socket or female contact. It is normally connected to the "dead" side of a circuit.
Plug Connector	The plug is usually that half of a two-piece connector, which contains the pin contacts
Polarization	A mechanical arrangement of inserts and/or shell configuration (referred to as clocking in some instances), which prohibits the mating of, mismatched plugs and receptacles.
Polarizing Pin	A pin located on one half of a two-piece connector in such a position that by mating with an appropriate hole on the other half during the assembly of the connector it will assure that only related connector halves can be assembled
Pull-out Force	The force necessary to separate a cable from a connector by pulling them apart
Quick Disconnect	A type of multiple-contact connector shell which permits rapid locking and unlocking of two connector halves
Rack	A drawer-type cabinet used to house electronic components, which permits convenient removal of portions of the equipment for repair or examination. A rack and panel connector is one which connects the inside back end of the cabinet (rack) with the drawer containing the equipment when it is fully inserted
Range	The number of sizes of connectors or cables of a particular type. Example: the conductor range accommodated by a terminal is all the different sizes of cable, which can be properly connected by that terminal.
Rating	A designated limit of operating characteristics based on definite conditions
Receiver	An electronic package that converts optical signals to electrical signals. The receiver usually uses a photodiode or avalanche photo diode to convert the optical energy into electrical signals
Receptacle	Usually the fixed or stationary half of a two-piece, multiple-contact connector. Also the connector half usually mounted on a panel and containing socket contacts

Term	Definition
Resistance	The opposition of a conductor to a flow of electric current. Resistance is normally expressed as ohms or megohms
Right Angle Edge Connector	Plug is mounted to a chassis or back panel and the receptacle is mounted along an edge of and soldered to the circuits of a printed circuit board. Pins of the receptacle generally are simple rod stock bent at right angles and molded into the receptacle insert. Board and receptacle assembly is inserted into the plug to complete circuit wiring
SFF	Small Form Factor. Term utilize to describe connector or transceivers that are smaller than the standard ones
SFP	Small Form Factor Pluggable. Term used to describe an SFF transceiver that can be plugged and unplugged from a host and is not directly soldered to a PCB
Self -align	The design of two mating parts so that they will engage in the proper relative position
Service-rating	The maximum voltage or current, which a connector is designed to carry
Shielding	The metal sleeving surrounding one or more of the conductors, in a wire circuit to prevent interference, interaction or current leakage. Usually grounded, the shielding is carried through the connector shell or through a special internal shell in the case of individual coaxial contacts.
Simplex cable	A single fiber cable
Single-Mode Fiber (SM)	An optical waveguide (or fiber) in which the signal travels in one mode. The fiber has a small core diameter, typically 8.3 μm
Solder Cup	The hollow cylinder at the rear of a solder contact where a wire is inserted and soldered in place
Tolerance	The permissible range of dimension of a finished piece, provided to cover unavoidable inaccuracies in pieces intended to fit together
Transceiver	A device which performs within one chassis, both the transmit and receive functions
Wavelength	The time required for a wave to complete a single cycle.
Withdrawal Force	Force required to fully withdrawal or disconnect a set of mating components
Working Voltage	The voltage under which a cable or connector normally operates

8- Micro Sites Electronics



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