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		AUTHORIZED BY W.J.Swain	DATE 2012-08-22
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**PDS: Rev.C**

**STATUS:Released**

**Printed: Aug 23, 2012**

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## 1.0 **OBJECTIVE**

This specification provides information and requirements for customer application of FCI products within the XCede® connector family. It is intended to provide general guidance for development of customer designs and application processes as they relate to this product family. It should be recognized that no single process will work for all customer applications and that customers should develop processes to meet individual needs. However, if the processes vary from the guidelines, FCI cannot guarantee acceptable results.

## 2.0 **SCOPE**

This specification applies to XCede® press-fit daughtercard receptacles and backplane headers.

## 3.0 **REFERENCE DOCUMENTS**

- Applicable FCI product customer drawings
- FCI Product Specification GS-12-588 (XCede® Connector System)
- FCI Repair Manuals (TBD)

## 4.0 **DEFINITIONS**

### 4.1 **Filletts**

An extension of the pad at the interface of the trace to the pad that will allow more pad area in the event that the pad to hole registration compromises the interconnect area. See Figure 15 for details. For further information regarding these routing guidelines, please contact FCI Applications Engineering.

### 4.2 **Foils/Copper Weights**

Copper foil is measured in ounces (or weight). Common copper weights are 0.5 ounces, 1.5 ounces, and 2 ounces (3 oz up to 10 oz are available by special order). 1oz = .0014", 1.5oz = .0021", 2oz = .0028".

### 4.3 **Pads/Lands/Annular Ring**

A pad is the support around a plated through-hole (PTH). If you see a specification calling out an annular ring of .005", this indicates the amount of the pad left around the hole after processing.

### 4.4 **Spacing**

The space between two electrical connections, which can be defined as two lines, two pads, a line and a pad, etc.

### 4.5 **Trace/Circuit/Line-Width/Lines/Conductor**

Various different terms for an electrical connection. If you see the term .008" lines (or 8 mil lines), it means the electrical connection from one point to another will measure .008" in width.

### 4.6 **Backplane**

When used within this document, "backplane" refers to a fixed PCB in a chassis. The male (vertical header) half of the mating connector system is typically mounted to the backplane.

### 4.7 **Daughtercard**

When used within this document, "daughtercard" refers to a removable plug-in card within a chassis. The female half of a mating connector system is typically mounted on the daughtercard.


### 4.8 **Monoblock Assembly**

An assembly consisting of various daughtercard receptacle modules combined in a metal organizer.

PDS: Rev :C

STATUS: Released

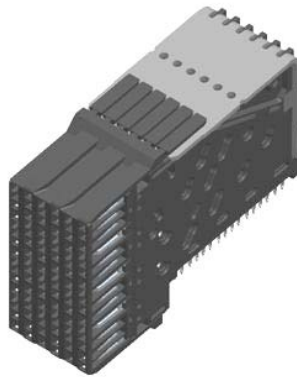
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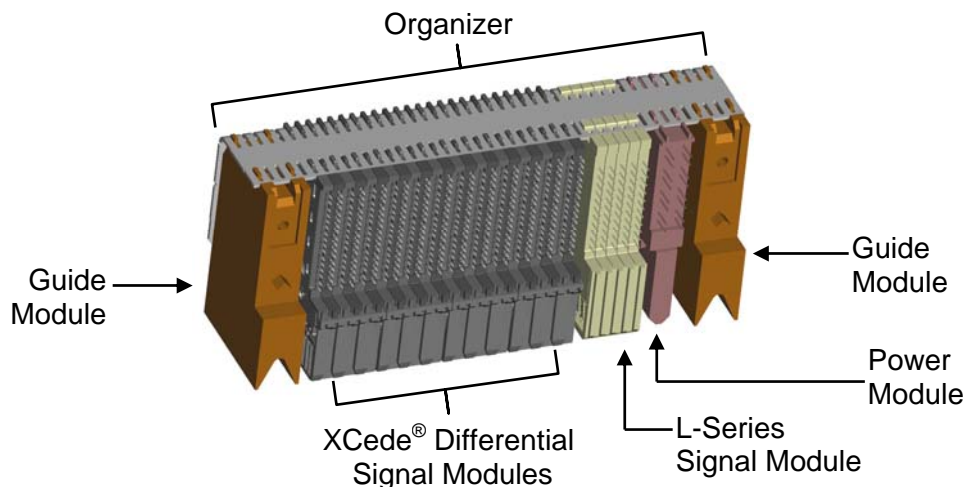
## 5.0 CONNECTOR DESCRIPTION

### 5.1 Daughtercard Receptacle


The XCede® daughtercard receptacle modules are end-to-end stackable and can be configured in various combinations of signal, power, and guide modules. Unlike the backplane header modules, which are provided and applied individually, the daughtercard receptacle consists of individual modules joined together into a custom monoblock assembly by means of a stamped metal organizer. Within this monoblock assembly can be a range of modules, such as XCede® high speed differential signal, power, guide, spacer, and low-speed signal. Daughtercard connector configurations are determined by the customer's specific system application requirements.



**Figure 1: XCede® Individual Daughtercard Receptacle Module**  
(reference only)

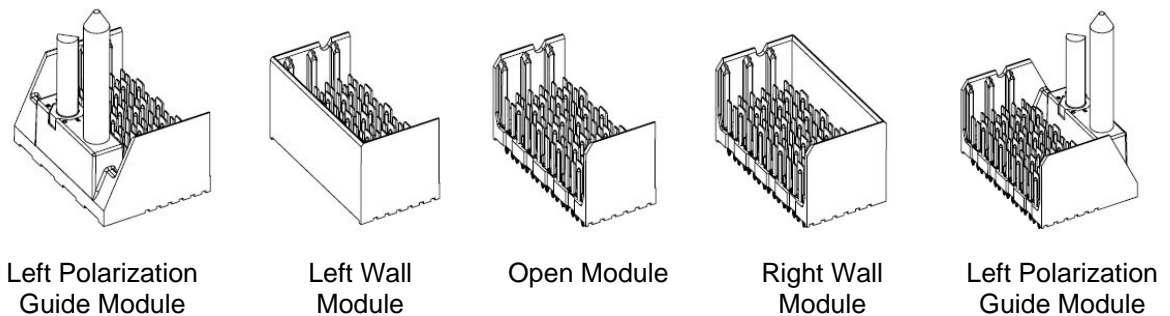


**Figure 2: Hypothetical Daughtercard Receptacle Monoblock Configuration**

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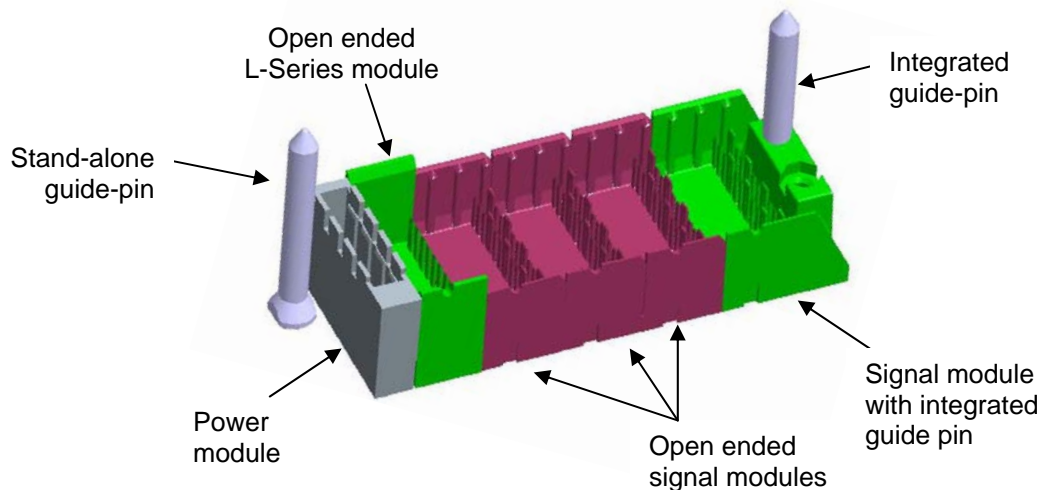
## 5.2 Backplane Header

The XCede® backplane header modules can be configured in various combinations and are end-stackable. These modules are available in the following basic configurations:




**Figure 3: Available Header Signal Module Configurations**  
(4-pair version shown for reference)

These modules can be combined with compatible power modules, low speed signal modules, and standalone guide pins as desired for a total stacked solution. Installation of keyed polarization pins in the end modules is optional.



**Figure 4: Hypothetical Backplane Header Configuration**

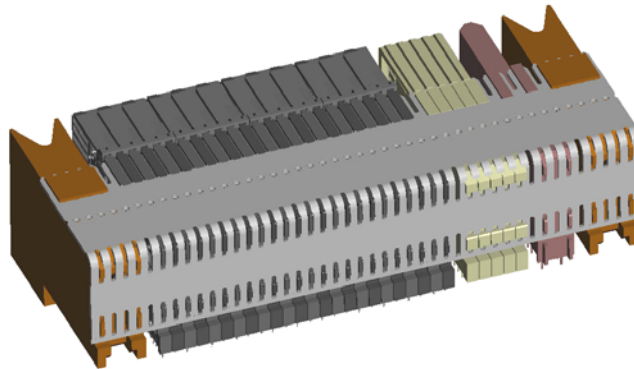
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## 6.0 CONFIGURATION GUIDELINES

### 6.1 Daughtercard Receptacle

#### 6.1.1 General

Individual daughtercard receptacle modules are designed to fit into a stamped metal organizer. A variety of signal modules, guide modules, power modules, and other components can be assembled to the organizer on a 1.85mm pitch in the specific configuration required by the customer. The resulting connector is termed a “monoblock assembly”. The configuration is typically determined by the design of the backplane slot.



#### 6.1.2 Organizer

The metal organizer can help to straighten the board edge, but may not eliminate the need for additional board stiffening.

#### 6.1.3 Optimal Daughtercard Connector Monoblock Configuration


It is recommended that the connector modules be configured in grouped increments of 6 wafers (or one signal module). Guide and power modules are typically placed at the end of the monoblock assembly to protect the daughtercard connector modules from handling damage.

#### 6.1.4 Daughtercard Connector Monoblock Length Limitations

The minimum length of a daughtercard connector monoblock assembly is determined by the minimum number of signal modules and other components.

- ***The minimum number of signal modules for a standard configuration is 3.***
- ***The minimum number of power modules in a monoblock assembly is 3 when used as a standalone power assembly with no other assembled components.***
- ***The maximum length of a single daughtercard connector monoblock assembly (including the metal organizer) is 304.8mm (12 inches)***

This constraint is based on the maximum length of the organizer component. The effective maximum usable length for the various assembled modules is 303.5mm.

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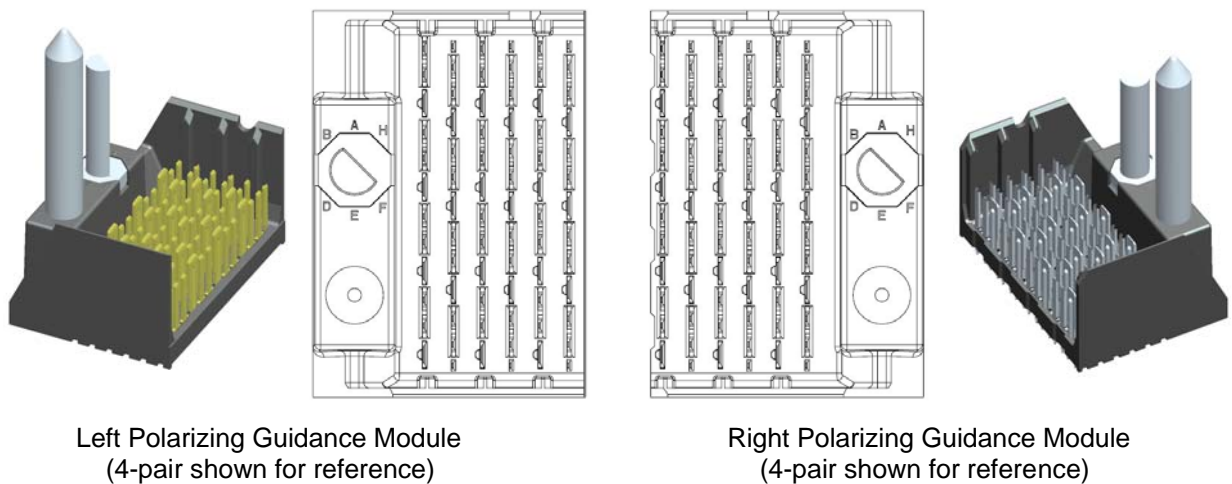
## 6.2 Backplane Header

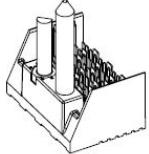

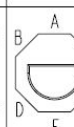


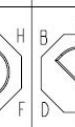
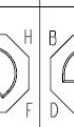
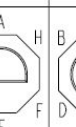
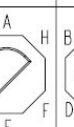
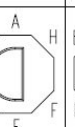
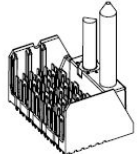








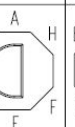
### 6.2.1 General

Backplane header modules are specified and packaged individually. Signal modules, guide pins, power modules, and other components are customer-specified to match the configuration of the receptacle monoblock assembly of the mating daughtercard, then arranged and applied to the backplane accordingly. Integral guide-pins and keying can be included in the specification of backplane header end-modules.

### 6.2.2 Polarization (Keying)


A polarization (keying) pin is optional and can be configured in the end modules through a dash-number code the product part-number. The following figures show the keying pin and letter-designations for the 8 different orientations.



LEFT POLARIZING GUIDANCE MODULE (SEE SHEET 3)	<b>J</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	
										
RIGHT POLARIZING GUIDANCE MODULE (SEE SHEET 4)	<b>Y</b>	<b>P</b>	<b>Q</b>	<b>R</b>	<b>S</b>	<b>T</b>	<b>U</b>	<b>V</b>	<b>W</b>	
										

**Figure 5: Polarization Orientation**  
(4-pair version shown for reference)



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### 6.3 Guidance

It is imperative that robust guidance be designed into any high-density high-pin-count connector system. The XCede® connector system relies on a sequential funneling system to ensure proper mating, the first phase being the gross alignment provided by the card-cage card-guides as the card approaches the backplane. The next level of alignment is provided by the XCede® guide-pins, with the final level of alignment contributed by the alignment ribs of the signal module front housing (receptacle) and associated alignment slots on the backplane header shroud. When considering guidance methods, many design considerations must be taken into account, for example:

- Length of connector
- Weight of daughter card
- Gathering ability of guide pins
- Orientation of connector in the application (horizontal or vertical)
- Amount of clearance in the card-guides
- The number of individual/different connectors on the same card edge

The length of the connector will help to determine the number of guide pins required. The following table provides further recommendations:

Daughtercard Connector Monoblock Assembly Length	Minimum Number of Guide-Pins Recommended
150mm or less	One guide-pin (minimum)
150mm – 360mm	Two guide-pins, one at each end of connector
360mm or greater	Contact FCI Applications Engineer

**Table 1: Recommendations for Number of Guide-Pins**

FCI does not recommend using more than three guide-pins due to the probability of “binding”, where the guide pins could work against each other due to tolerance stack-up. Please contact FCI Applications Engineering for applications with unique requirements creating a need for more than three guide-pins.


There are two primary guidance systems available to compliment the daughtercard connectors:

1. Standard molded guide receptacle module (ungrounded or grounded for ESD protection)
2. Molded wide-guide receptacle module (ungrounded or grounded for ESD protection)

Likewise, there are three available guide-pin styles to compliment the backplane connectors:

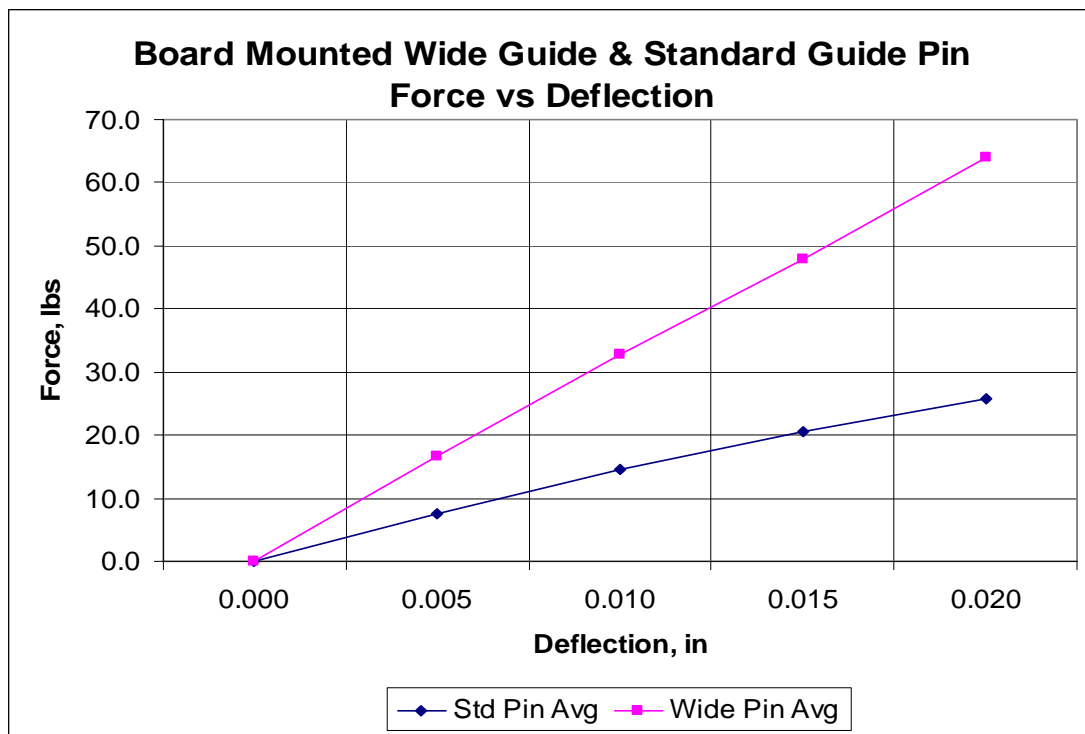
1. Standard metal guide-pin, integral with the applicable connector module
2. Standard stand-alone metal guide-pin, directly mounted to backplane
3. Large diameter metal guide-pin, directly mounted to backplane (for use with wide-guide receptacle)

The weight of the daughtercard assembly will also help to determine the best style of guide-pin or and guide-module used. See the following table and graph for the guide pin recommendations based on daughtercard weight, followed by a guide-pin force-deflection graph:


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Weight of Daughtercard Assembly	Guidance System Recommendations
5 lbs or less	Use a minimum of one standard integral guide-pin and standard guide receptacle module.
5 lbs – 10 lbs	Option 1: Use two standard integral guide-pins and standard guide receptacle module. Option 2: Minimum of one standard stand-alone board-mounted guide-pin with standard guide receptacle module.
10 lbs – 15 lbs	Use two standard stand-alone board-mounted guide-pins with standard guide receptacle modules.
15 lbs or greater	Use large diameter stand-alone board-mounted guide pins with wide-guide receptacle modules.

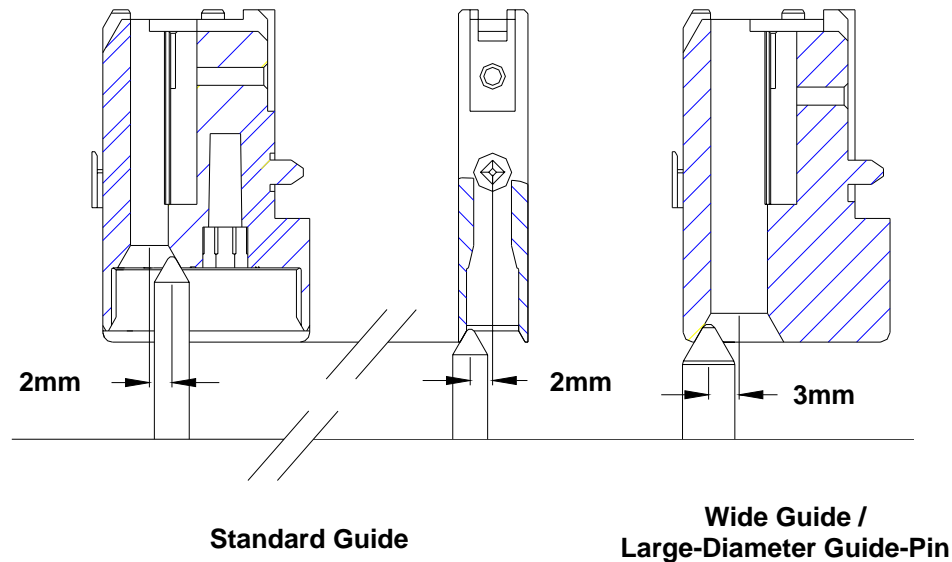
**Table 2: Guidance System Recommendations**



**Table 3: Guide-Pin Force-vs-Deflection**

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The XCede® guidance system is capable of capturing a radial mating misalignment of 2mm with the standard guide-pins and 3mm with the large-diameter guide-pin as shown below:



**Figure 6: Gathering Capabilities of Guide-Pins**

### 6.3.1 Signal Contact Lengths

There are two different contact length options available for each XCede® backplane header signal pair (please refer to applicable FCI customer drawing). Each option provides a specific mechanical mating wipe length. The minimum wipe length is calculated at the fully mated condition.

The 4.20mm signal blade option provides a minimum of 2.0mm mating wipe length.

The 5.20mm signal blade option provides a minimum of 3.0mm mating wipe length.


The standard configuration contains either “all long” or “all short” signal pair contacts within a module, however the backplane header can be configured with multiple signal pair blade lengths within the same module when a specific short-detect option is required.

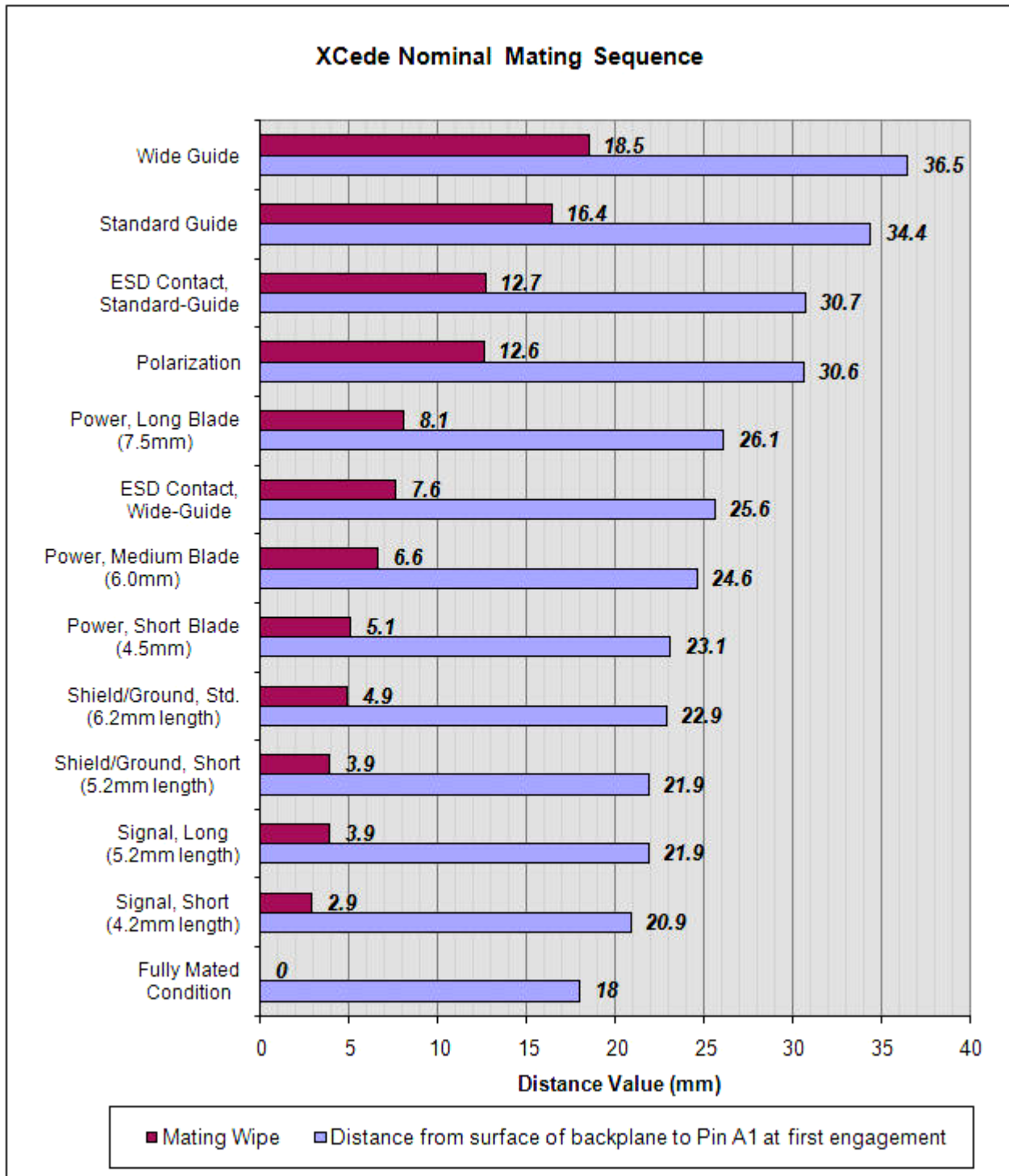
### 6.3.2 Shield Contact Lengths

The backplane shield contact is available in one length, with a mating wipe of 4.0mm. The shield contact is intended to mate prior to all of the signal contacts, and to provide physical protection for all other contacts within the module.


### 6.3.3 Mating Sequence

Figure 7 shows relative mating sequencing between various components within the XCede® product family, along with the associated nominal mating wipe distance.

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**Figure 7: Mating Sequence and Wipe Distance**  
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#### 6.4 Compatibility With Hard-Metric Products

The recommended card-edge to backplane spacing for XCede® is 16.5mm (16.3/17.0mm depending on location of card-edge relative to pin A1 of daughtercard receptacle). The edge of the daughtercard must be notched when using this product in a hard-metric application, which requires a 12.5mm card-edge to backplane spacing. Representative FCI hard-metric products are ZipLine™, AirMax VS®, and Millipacs®.

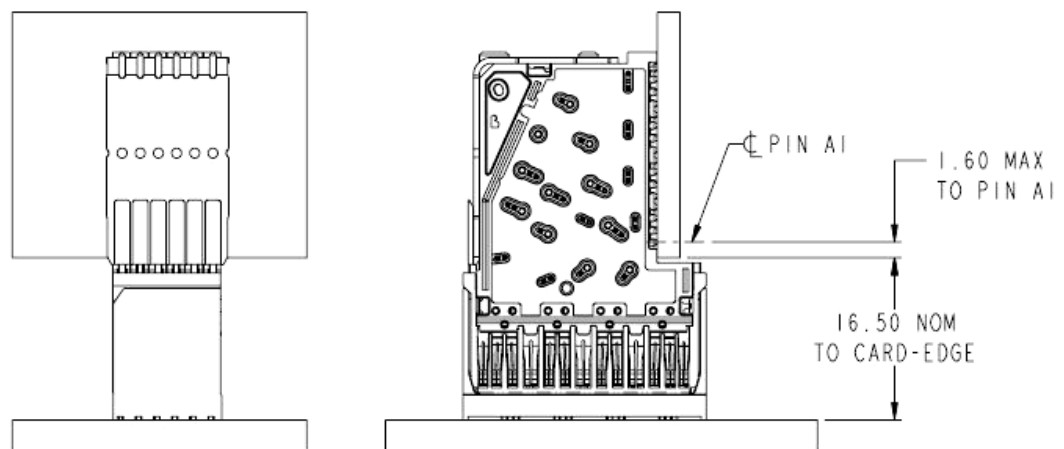


Figure 8: XCede® Card-edge to Backplane Distance

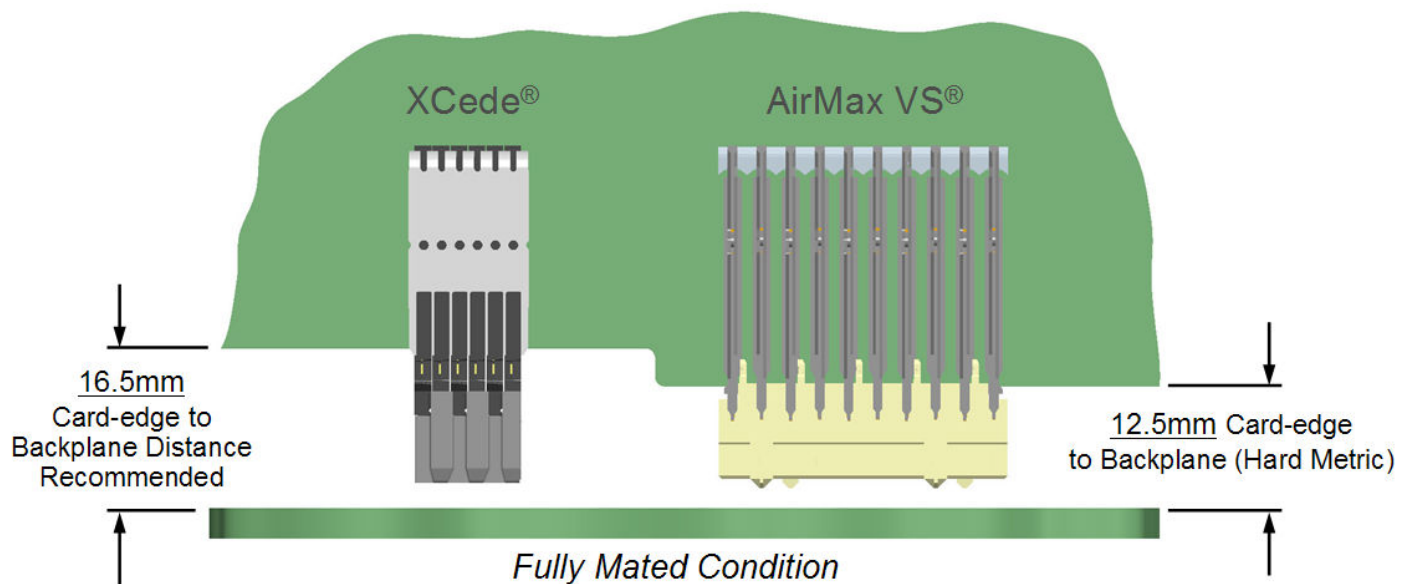



Figure 9: XCede® Card-Edge Requirements for Applications with Hard Metric Connectors

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## 7.0 PCB DESIGN RULES AND MANUFACTURABILITY GUIDELINES

### 7.1 Footprint

For specific connector footprint, see customer drawings.

### 7.2 Minimum Recommended PCB Thickness

Long Tail (daughtercard receptacle, standard compliant tail, 0.57mm/.0225" drill): 1.60mm/.063"

Short Tail (backplane header, standard compliant tail, 0.55mm / .0217" drill): 1.10mm/.043"

Medium Tail (DC receptacle & BP header small compliant tail, 0.45mm/.0177" drill): 1.10mm/.043"

### 7.3 Keep-Out Zones

Keep out zones are required around the connector footprint on the PCB for clearance with repair tooling that may be required. Please reference FCI customer drawings for dimensional specifications.

### 7.4 Hole Size and Finish

Reference Figure 10 & Tables 4-6 for detailed dimensional recommendations regarding plated through holes.

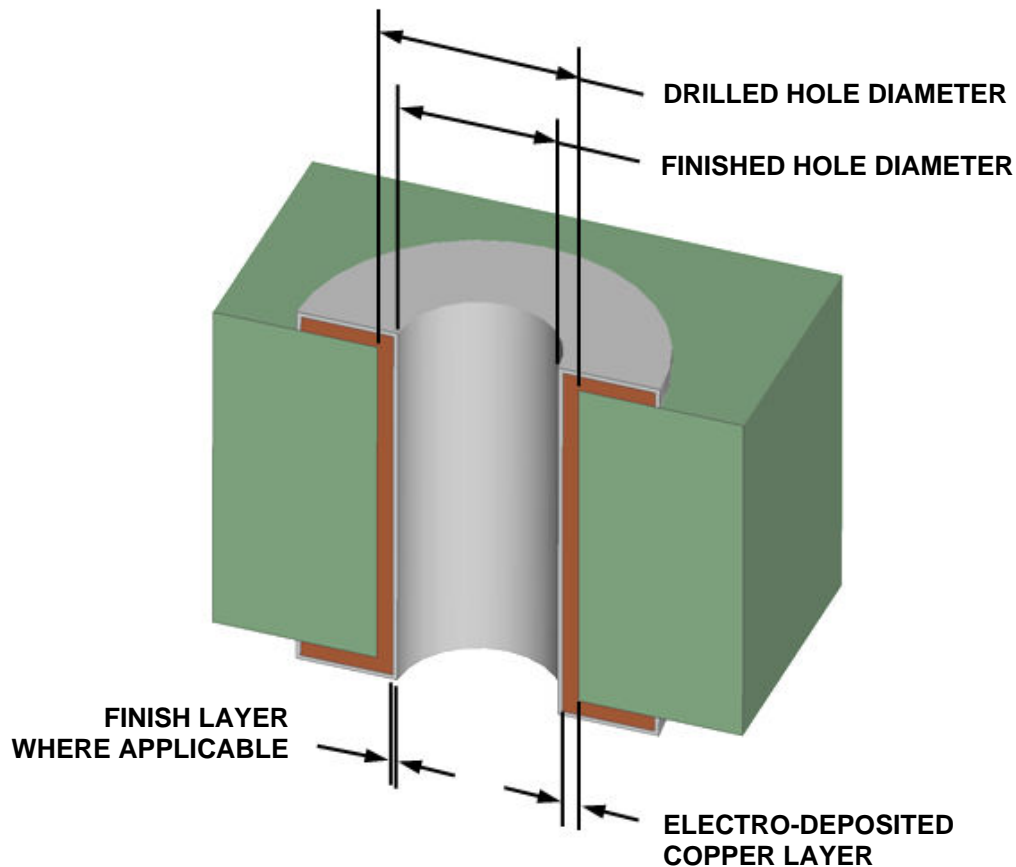



Figure 10: XCede® Typical Finished Hole Cross-Section

STATUS:Released

Printed: Aug 23, 2012

PDS: Rev :C

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PTH Finish Requirements: <b>Long tail</b> (0.57mm / .0225" drill), standard tail for daughtercard receptacles				
PTH Finish Type	Drill Size	Copper thickness per side	Typical Finish Thickness	Finished Hole Size
<b>Lead-Free HASL</b>	ISO 0.57mm (.0225")	0.0254 (.0010) min. 0.0635 (.0025) max.	500µ" maximum	0.480+0.038/-0.050mm (0.0190+0.0015/-0.0020)
<b>Solder Finish</b> <sup>(1)</sup>			300-500µ"	
<b>Immersion Sn (Tin)</b>			35-75µ" min	
<b>Immersion Ag (Silver)</b>			4µ" min	
<b>Copper - OSP</b>			N/A	
<b>Ni Au (Nickel – Gold)</b>			53-210µ" Ni-Au compositions combined	

1. Solder finish includes: Tin/lead reflowed (plated and reflowed) and HASL
2. Thicknesses in mm (in.)

**Table 4: XCede® Plated Through-Hole (PTH) Requirements, Long Tail**

PTH Finish Requirements: <b>Medium tail</b> (0.55mm / .0217" drill), standard tail for backplane headers				
PTH Finish Type	Drill Size	Copper thickness per side	Typical Finish Thickness	Finished Hole Size
<b>Lead-Free HASL</b>	ISO 0.55mm (.0217")	0.0254 (.0010) min. 0.0635 (.0025) max.	500µ" maximum	0.480+0.038/-0.050mm (0.0190+0.0015/-0.0020)
<b>Solder Finish</b> <sup>(1)</sup>			300-500µ"	
<b>Immersion Sn (Tin)</b>			35-75µ" min	
<b>Immersion Ag (Silver)</b>			4µ" min	
<b>Copper - OSP</b>		N/A		
<b>Ni Au (Nickel – Gold)</b>		0.0254 (.0010) min. 0.0762 (.0030) max. 0.0254 (.0010) min. 0.0635 (.0025) max.	53-210µ" Ni-Au compositions combined	


1. Solder finish includes: Tin/lead reflowed (plated and reflowed) and HASL
2. Thicknesses in mm (in.)

**Table 5: XCede® Plated Through-Hole (PTH) Requirements, Medium Tail**

PTH Finish Requirements: <b>Short tail</b> (0.45mm / .0177" drill), small tail DC Receptacles & BP Headers				
PTH Finish Type	Drill Size	Copper thickness per side	Typical Finish Thickness	Finished Hole Size
<b>Lead-Free HASL</b>	n/a	n/a	n/a	n/a
<b>Solder Finish</b> <sup>(1)</sup>	ISO 0.45mm (.0177")	0.020 (.0008) min. 0.069 (.00275) max.	300-500µ"	0.36±0.05mm (.0142±.0020")
<b>Immersion Sn (Tin)</b>			35-75µ" min	
<b>Immersion Ag (Silver)</b>			4µ" min	
<b>Copper - OSP</b>			N/A	
<b>Ni Au (Nickel – Gold)</b>			53-210µ" Ni-Au compositions combined	

1. Solder finish includes: Tin/lead reflowed (plated and reflowed) and HASL
2. Thicknesses in mm (in.)

**Table 6: XCede® Plated Through-Hole (PTH) Requirements, Short Tail**

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### 7.5 Compliant Pin Critical Zone

There is a critical zone within the plated through hole where the dimensional requirements outlined in this specification and the applicable FCI customer drawings must be met in order for the compliant pin to function properly.

Conversely, in the area of the hole which is beyond this critical zone, the plated through hole may go below the minimum specified hole size *for non midplane applications*.

If backdrilling is used, it is allowed only in the area of the hole that is beyond the critical zone.

Please refer to Figure 11 for dimensional details regarding the compliant pin critical zone.

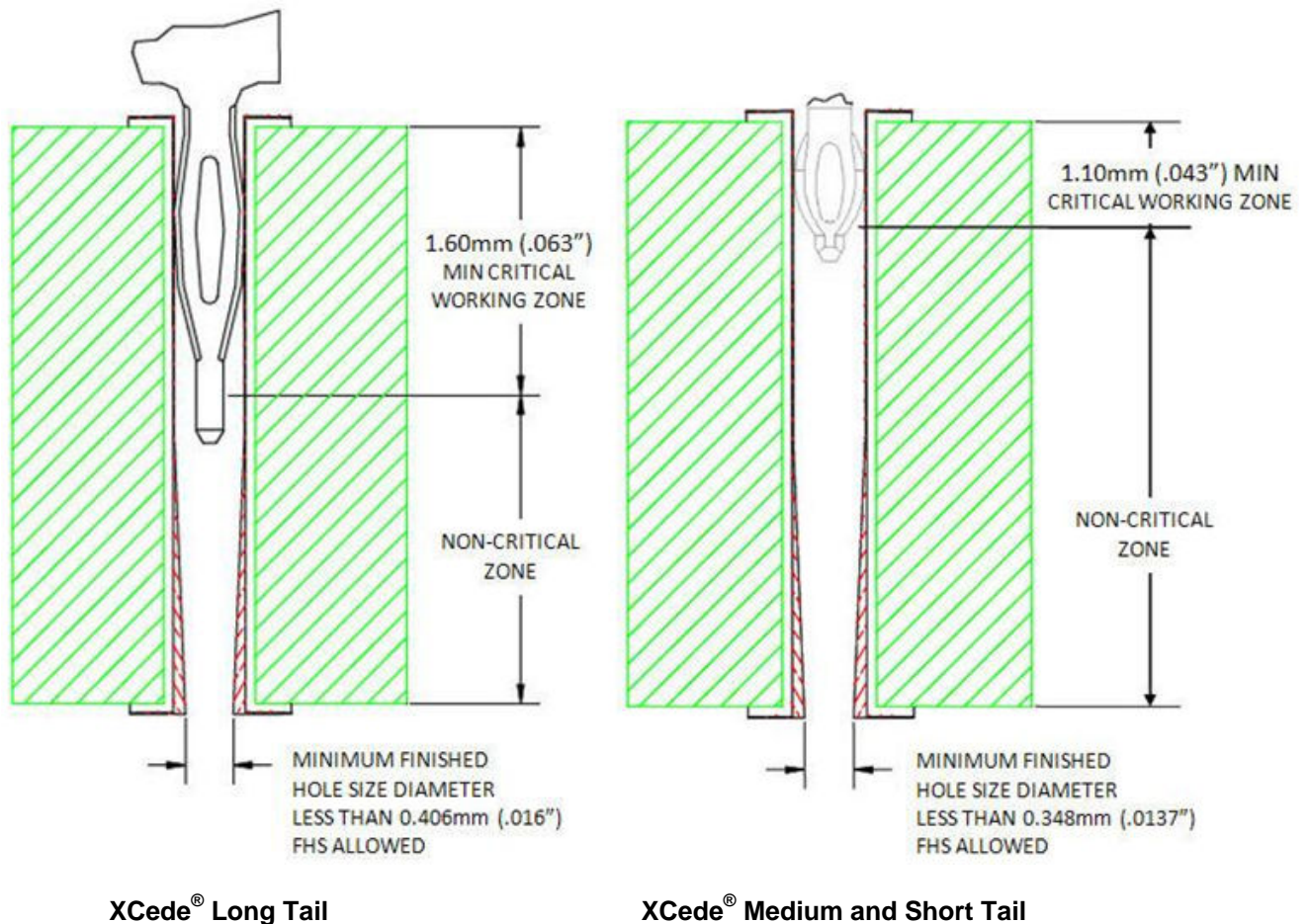



Figure 11: XCede® Compliant Pin Critical Zones



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### 7.6 Dual Diameter Via

The short tail compliant pin is particularly suited for use with dual-diameter vias, which should be considered for high-speed signals. The larger diameter is drilled first to a controlled depth followed by the second smaller drill.

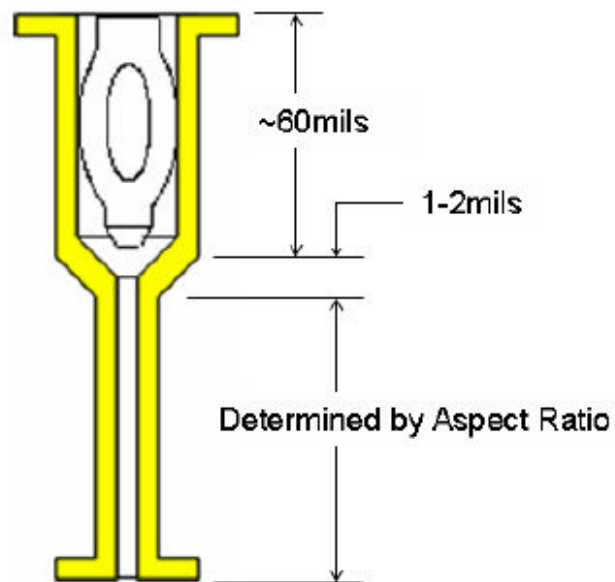



Figure 12: Diagram of a dual diameter via with XCede® medium tail compliant pin

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## 8.0 PCB ROUTING GUIDELINES

### 8.1 Surface Traces

Surface traces are not recommended. If surface traces are used, refer to applicable customer drawings for keep-out zones.

### 8.2 Line Widths, Pad Sizes and Spacing

Line widths, pad sizes and spacing are applicable for ½ ounce and 1 ounce copper weights.

### 8.3 Plane Clearances

Plane clearances are applicable for copper weights up to 2 ounces. Please contact FCI Applications Engineering for applications with more than 2 ounce copper.

### 8.4 Minimum Spacing

Minimum spacing, specific pad/trace, and trace/trace between all features should be 0.127mm (.005") to allow for manufacturing tolerances.

### 8.5 Impedance

Consider characteristic impedance (if applicable) when designing, to assure line widths will meet the requirements. Please contact FCI applications engineering for assistance.

### 8.6 Copper Weights

Consider copper weights when routing. Higher weights will impact minimum trace widths.

### 8.7 Trace Centering


Center all traces between holes to optimize spacing.

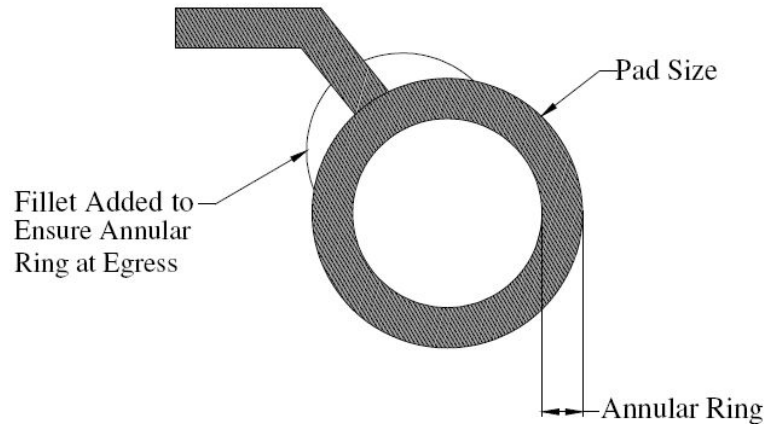
### 8.8 Non-functional Pads

Non-functional pads on signal can be removed at designer's option.

### 8.9 Filletting

Fillets at the interface of the trace and pad are required to improve the annular ring when the electrical design requires tight hole-to-pad configurations. Filletting of pads is recommended for 0.000" annular ring (tangency), see Figure 13.

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**Figure 13: Preferred Fillet**

Fillet diameter equals one-half the size of the plated through hole pad diameter, located on a line central to the trace so that the fillet size equals the minimum annular ring plus 0.13mm (.005").


### 8.10 XCede® Long Tail Signal Pad Sizes

*Applies to XCede® daughtercard receptacle with standard compliant tails (0.57mm / .0225" drill)*

PCB Material Thickness in. / (mm)	Copper Weight (ounces)	Process	Min. Pad Size 0.000 A/R in. / (mm)	Min. Pad Size 0.001 A/R in. / (mm)	Min. Pad Size 0.002 A/R in. / (mm)
0.062 to 0.400 (1.57 to 10.20)	0.5 (17µm)	Inner Layer	.035 (0.89)	.037 (0.94)	.039 (0.99)
		Outer Layer	.037 (0.94)	.039 (0.99)	.041 (1.04)
0.062 to 0.400 (1.57 to 10.20)	1.0 (35µm)	Inner Layer	.036 (0.91)	.038 (0.97)	.040 (1.02)
		Outer Layer	.038 (0.97)	.040 (1.02)	.042 (1.07)
0.062 to 0.400 (1.57 to 10.20)	2.0 (70µm)	Inner Layer	.038 (0.97)	.040 (1.02)	.042 (1.07)
		Outer Layer	.040 (1.02)	.042 (1.07)	.044 (1.12)

1. Outer layer pad sizes reflect panel plating process.
2. User inner layer pad sizes for outers when pattern plating.
3. Values in ( ) are metric equivalents. For printed circuit board layout, use metric units.

**Table 7: Long-Tail Minimum Pad Size vs. Copper Weight and Annular Ring (A/R)**

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### 8.11 XCede® Medium Tail Signal Pad Sizes

*Applies to XCede® backplane header with standard compliant tails (0.55mm / .0217" drill)*

PCB Material Thickness in. / (mm)	Copper Weight (ounces)	Process	Min. Pad Size 0.000 A/R in. / (mm)	Min. Pad Size 0.001 A/R in. / (mm)	Min. Pad Size 0.002 A/R in. / (mm)
0.062 to 0.400 (1.57 to 10.20)	0.5 (17µm)	Inner Layer	.034 (0.86)	.036 (0.91)	.038 (0.97)
		Outer Layer	.036 (0.91)	.038 (0.97)	.040 (1.02)
0.062 to 0.400 (1.57 to 10.20)	1.0 (35µm)	Inner Layer	.035 (0.89)	.037 (0.94)	.039 (1.00)
		Outer Layer	.037 (0.94)	.039 (0.99)	.041 (1.04)
0.062 to 0.400 (1.57 to 10.20)	2.0 (70µm)	Inner Layer	.037 (0.94)	.039 (0.99)	.041 (1.04)
		Outer Layer	.039 (0.99)	.041 (1.04)	.043 (1.09)

1. Outer layer pad sizes reflect panel plating process.
2. User inner layer pad sizes for outers when pattern plating.
3. Values in ( ) are metric equivalents. For printed circuit board layout, use metric units.

**Table 8: Medium-Tail Minimum Pad Size vs. Copper Weight and Annular Ring (A/R)**

### 8.12 XCede® Short Tail Signal Pad Sizes

*Applies to XCede® backplane header and daughtercard receptacle with small compliant tails (0.45mm / .0177" drill)*

PCB Material Thickness in. / (mm)	Copper Weight (ounces)	Process	Min. Pad Size 0.000 A/R in. / (mm)	Min. Pad Size 0.001 A/R in. / (mm)	Min. Pad Size 0.002 A/R in. / (mm)
0.062 to 0.400 (1.57 to 10.2)	0.5 (17µm)	Inner Layer	.030 (0.76)	.032 (0.81)	.034 (0.86)
		Outer Layer	.032 (0.81)	.034 (0.86)	.036 (0.91)
0.062 to 0.400 (1.57 to 10.2)	1.0 (35µm)	Inner Layer	.031 (0.79)	.033 (0.84)	.035 (0.89)
		Outer Layer	.033 (0.84)	.035 (0.89)	.037 (0.94)
0.062 to 0.400 (1.57 to 10.2)	2.0 (70µm)	Inner Layer	.033 (0.84)	.035 (0.89)	.037 (0.94)
		Outer Layer	.035 (0.86)	.037 (0.91)	.039 (0.99)


1. Outer layer pad sizes reflect panel plating process.
2. User inner layer pad sizes for outers when pattern plating.
3. Values in ( ) are metric equivalents. For printed circuit board layout, use metric units.

**Table 9: Short-Tail Minimum Pad Size vs. Copper Weight and Annular Ring (A/R)**

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### 8.13 Typical Anti-pad Geometry

The following describes the nominal antipad design for XCede®. Variations to this design based on stackup design and performance requirements are allowed.

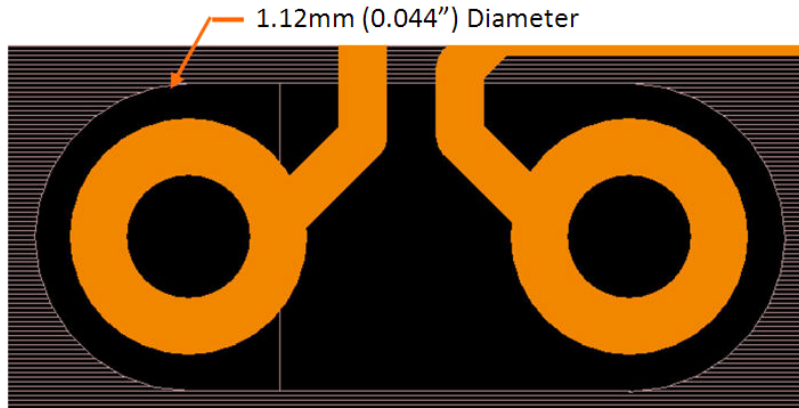


Figure 14: Antipad Clearance - XCede® Backplane Connector

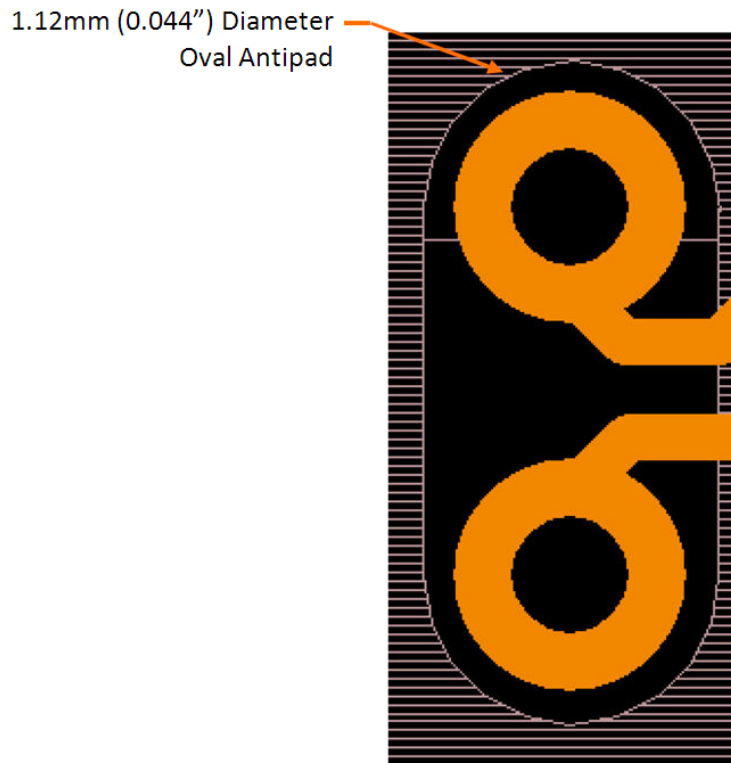



Figure 15: Antipad Clearance - XCede® Daughtercard Connector

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## 8.14 XCede® High-Speed Differential Routing

For complete hole pattern dimensions, please refer to the applicable FCI customer drawings.

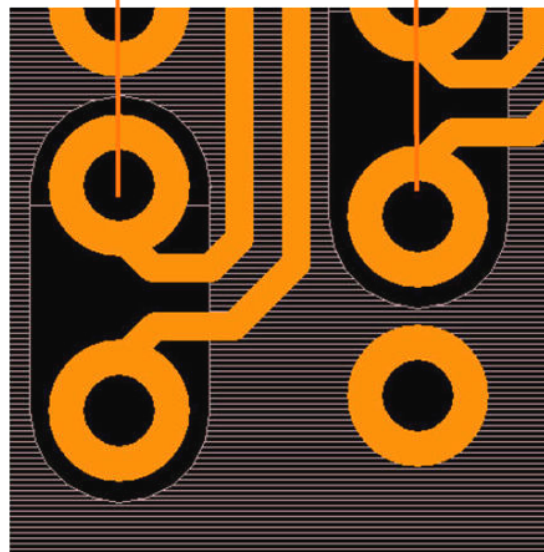
### 8.14.1 Example: XCede® Daughtercard Routing

The available space for routing is determined by the distance between antipads. *There is no secondary routing channel available on the Daughtercard for differential pairs.*


Center-to-Center	.0728" (1.849mm)
- AntiPad Diameter	.0440" (1.118mm)
<b>= Resulting Space for Traces</b>	<b>.0288" (0.731mm)</b>
Line Width	.007" (0.152mm)
Space Between Lines	.007" (0.178mm)
Resulting Ground Plane Web Overhang on Each Side	.004" (0.099mm)

**Table 10: Example XCede® Daughtercard Routing**

Center to Center: .044" (1.849mm)  
Space for Traces = .0288" (0.731mm)



**Figure 16: Example of XCede® Daughtercard High Speed Differential Routing**

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### 8.14.2 Example: XCede® Backplane Routing

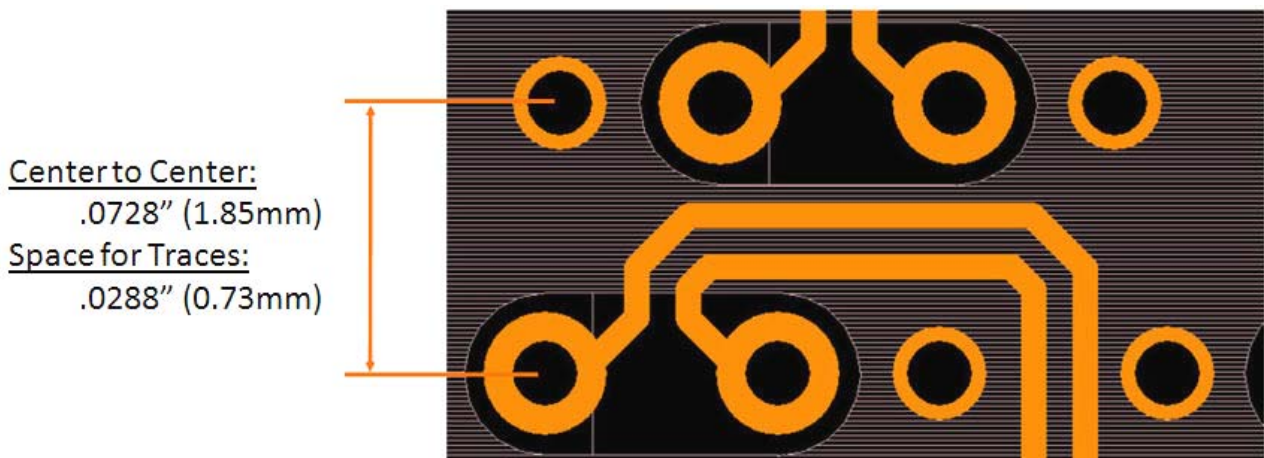
The amount of space available for routing is determined by the ground plane web between the antipad clearances.

Center-to-Center	.0728" (1.85mm)
- AntiPad Diameter	.0440" (1.12mm)
<b>= Resulting Space for Traces</b>	<b>.0288" (0.73mm)</b>
Line Width	.007" (0.178mm)
Space Between Lines	.007" (0.178mm)
Resulting Ground Plane Web Overhang on Each Side	.004" (0.099mm)


**Table 11: Example of XCede® Backplane Primary (Horizontal) Routing Channel**

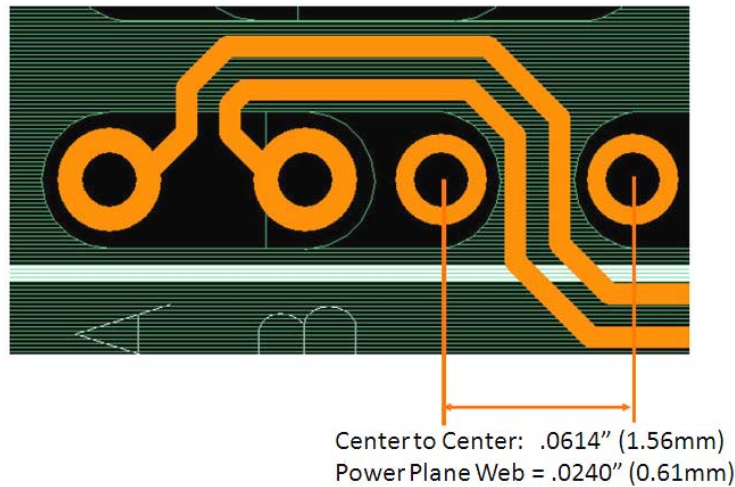
Ground Pin Center-to-Center	.06142" (1.560mm)
- Drill Diameter	.0217" (0.55mm)
- Required Clearance to Barrel X 2	.0180" (0.46mm)
<b>= Resulting Space for Traces</b>	<b>.0217" (0.73mm)</b>
Line Width	.007" (0.178mm)
Space Between Lines	.007" (0.178mm)

**Table 12: Example of XCede® Backplane Secondary (Vertical) Routing Channel**



**Figure 17: Example of XCede® Backplane Typical High Speed Differential Routing – Ground Plane**

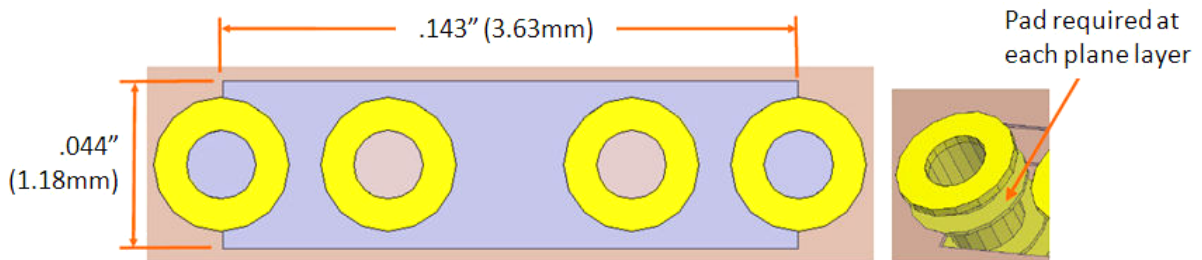
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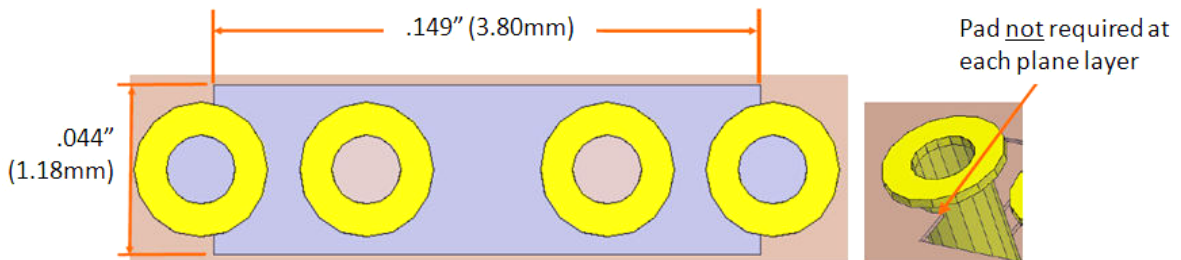
**Figure 18: Example of XCede® Backplane Typical High Speed Differential Routing – Power-Plane**

**8.14.3 Elongated Antipad for Improved Return Loss**

The double ground vias between signal pairs in XCede® allow for elongated antipads that directly pass through the ground vias. There are two ways to achieve this antipad design. The first option, shown in figure 20, has the antipad cut through the center of the ground vias. In this case, a pad is needed at the ground via in order to assure proper drill location. The second option, shown in figure 21, uses an antipad that is 6 mils shorter than the first option. A pad is not needed at the ground via because the drill bit will not wander from the ground via center when it strikes the plane.



**Figure 19: Example of Elongated Rectangular Backplane Antipad clearance**



**Figure 20: Example of Elongated Rectangular Backplane Antipad clearance**




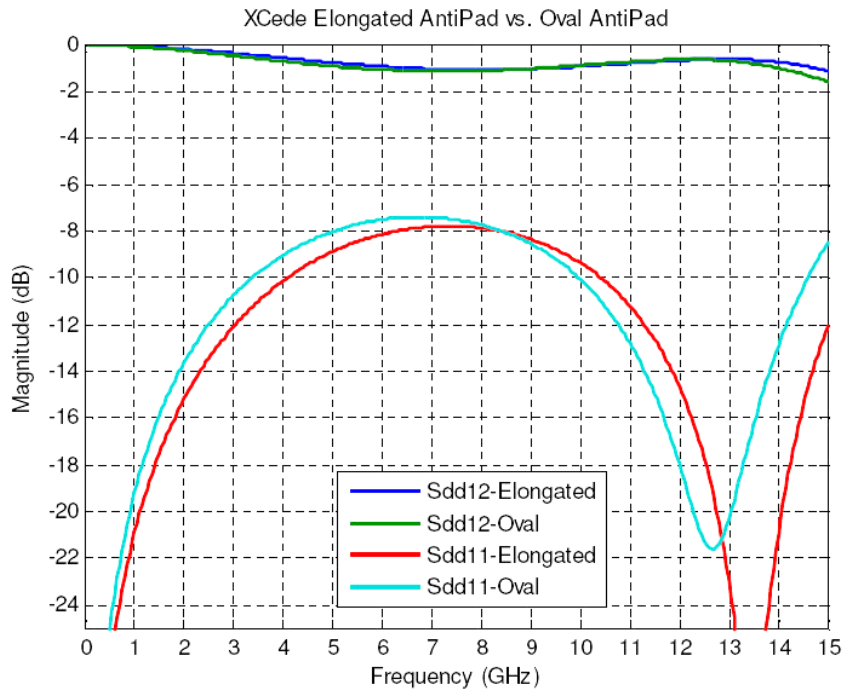
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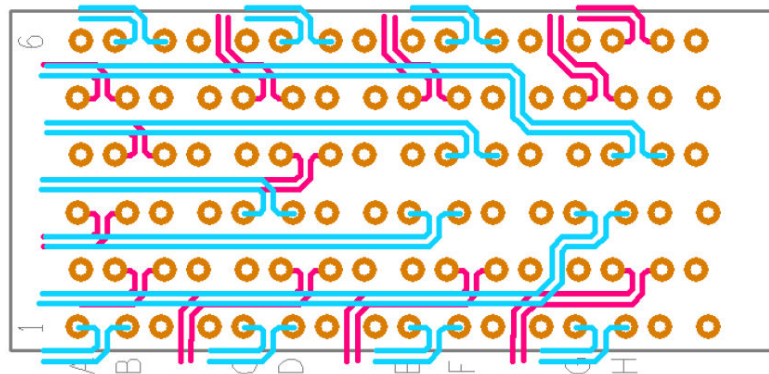
Figure 21 shows the performance improvement in S11 using the elongated rectangular anti-pad. This plot is from an HFFS simulation of a 24 layer backplane using Nelco 4000-13 with a 32mil stub.




**Figure 21: Performance Improvement of Elongated Antipad**

#### 8.14.4 2-Layer Escape Routing with the XCede® 4-pair Connector

The following figure shows how to escape out of the 4-pair connector in only 2 layers. If this strategy is used, space for 7 pairs is needed between connector modules. Three open teeth in the stamped organizer between connector modules are needed to fit 7 pairs using 5-6-5-20 spacing. Four open teeth are needed to fit 7 pairs using 7-7-7-27 spacing.



**Figure 22: Example of XCede® 4-Pair 2-Layer Escape Routing**

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### 8.15 Printed Circuit Board Skew Compensation

If the length of one net of a differential pair needs to be increased in order to achieve low skew within the pair, the following picture shows an example of how to achieve this goal.

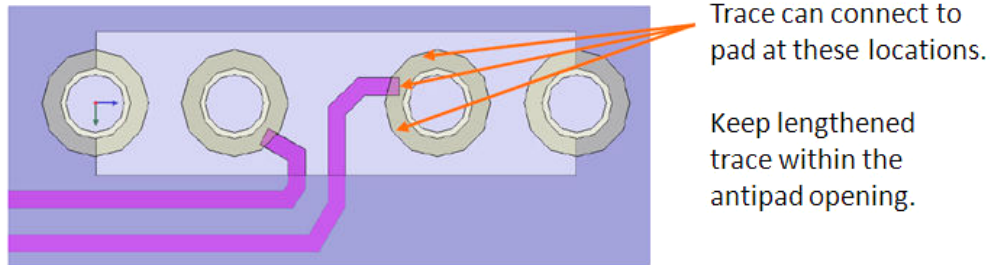


Figure 23: Example of XCede® Skew Compensation

### 8.16 Midplane Applications

The XCede® connector can be used in a midplane application where vias are “shared” between front and rear cards. The front and rear cards must be “coplanar”, meaning that the front and rear card-guides must line up. The connectors must be offset by one column and the front card pin numbering sequence is opposite of the rear card pin numbering sequence.

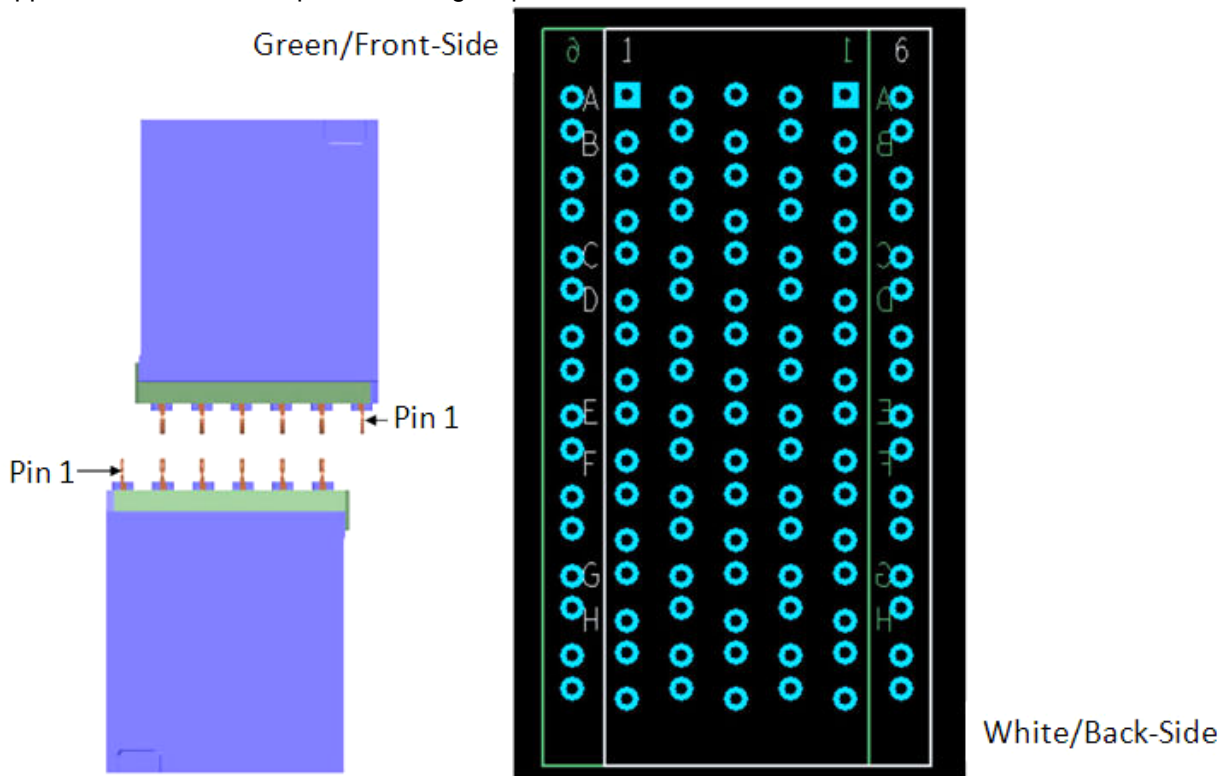



Figure 24: Example of XCede® Midplane Connector Application

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## 9.0 INSTALLATION REQUIREMENTS

### 9.1 Application Press System Requirements

#### 9.1.1 General

The monoblock nature of the daughtercard receptacle requires special attention when choosing an application press. FCI recommends the ASG MEP 12T electric press for installation of daughtercard monoblock assemblies. Air or hydraulic presses are typically less suited for the controlled press rate and controlled force required of the daughtercard installation.

#### 9.1.2 Force

The application press must have the capability of installing connectors with a maximum force of 44.5N (10lbs) per press-fit tail. Please refer to FCI product specification for specific performance criteria regarding press-fit tails.

#### 9.1.3 Rate


The recommended press-head rate of travel is 1.27 mm/sec (.050 in/sec) with the appropriate application force.

#### 9.1.4 Structure

The press, fixture, and tooling combination must be adequately rigid to minimize deflection during the pressing cycle. Forces must be transmitted directly to the connector without inducing any side load or moment to the connector assembly. The press bed must be parallel to the pressing surface of the insertion tooling. The press must also be capable of applying a pre-load force of 445N (100lbs) minimum, and dwelling at that Z-height for approximately 1-2 seconds to allow the press system to stabilize prior to final insertion.

#### 9.1.5 Feedback

The application press should have the capability to monitor, display, and record insertion force data throughout an individual press cycle, allowing for continuous monitoring and data collection to evaluate any failure or machine malfunction. Speed or height controls should also allow a temporary press cycle stop at a repeatable position with reference to the board surface, or with reference to the insertion force. This ability may be a requirement in certain connector and board combinations.

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## 9.2 Application Tooling

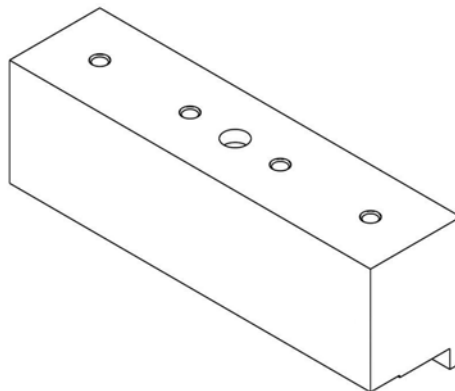
### 9.2.1 Daughtercard Receptacle

The application tool recommended for XCede® Daughtercard Receptacles is a simple press-block as shown in figure 25. Please refer to the following table for sizes and part numbers of this tooling.

Press-Block Length (for corresponding monoblock assembly length)	Press-Block Part Number	
	4-Pair	6-Pair
102mm / 4"	10102209-001	10119997-001
152mm / 6"	10102209-002	10119997-002
203mm / 8"	10102209-003	10119997-003
254mm / 10"	10102209-004	10119997-004
305mm / 12"	10102209-005	10119997-005


**Table 13: Daughtercard Receptacle Press-Block Part Numbers**

For any given application, the chosen press-block length should be equal to, or greater than, the total length of the monoblock daughtercard assembly.



**Figure 25: XCede® Daughtercard Receptacle Press-Block**

Application of the daughtercard receptacle monoblock assembly requires an appropriate backup fixture to support the PCB during the connector installation process. This fixture is to provide adequate support directly under the connector assembly based on the footprint pattern. The customer-designed support fixture should accommodate any compliant pin protrusion on the secondary side of the PCB and should minimize any unsupported span. The selected material should allow minimal deflection under the maximum compression force. Please contact your FCI applications engineer for any needed assistance.

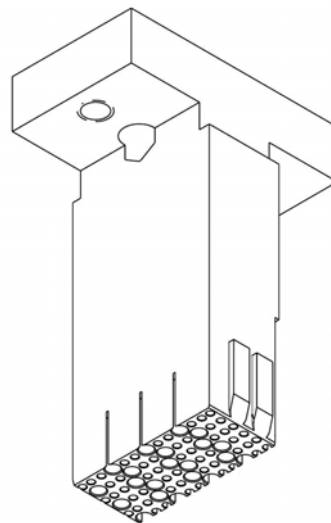
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### 9.2.2 Backplane Header

The application tool recommended for XCede® Backplane Headers is a custom press-tool as shown in Figure 26. Please refer to the following table for sizes and part numbers for this tooling.


Press-Tool Description	Press-Tool Part Number
Backplane Vertical Header, 2-Pair, 4-Columns	10117956-001
Backplane Vertical Header, 2-Pair, 6-Columns	10117956-002
Backplane Vertical Header, 2-Pair, 8-Columns	10117956-003
Backplane Vertical Header, 4-Pair, 4-Columns	10102204-001
Backplane Vertical Header, 4-Pair, 6-Columns	10102204-002
Backplane Vertical Header, 4-Pair, 8-Columns	10102204-003
Backplane Vertical Header, 4-Pair, 12-Columns	10102204-004
Backplane Vertical Header, 6-Pair, 4-Columns	10117957-001
Backplane Vertical Header, 6-Pair, 6-Columns	10117957-002
Backplane Vertical Header, 6-Pair, 8-Columns	10117957-003

**Table 14: XCede® Backplane Header Press-Tool Part Numbers**



**Figure 26: XCede® Backplane Header Press-Tool**  
(4-pair 6-column version shown)

Application of the backplane vertical header requires an appropriate backup fixture to support the PCB during the connector installation process. This fixture is to provide adequate support directly under the connector assembly based on the footprint pattern. The customer-designed support fixture should accommodate any compliant pin lead protrusion on the secondary side of the PCB and should minimize any unsupported span. The selected material should allow minimal deflection under the maximum compression force. Please contact your FCI applications engineer for any needed assistance.

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### 9.3 Application Procedure: Daughtercard Receptacle

#### 9.3.1 Connector Placement

Inspect the connector assembly for any bent compliant tails. Hold the connector just above the PCB hole pattern and angle the rear of the connector downward, placing the rearmost row of compliant tail tips into the correct plated through-holes (PTH). While maintaining engagement between the rear tails and the PCB holes, roll the front of the connector downward so that each successive row of compliant tails engages with the proper row of PTHs.

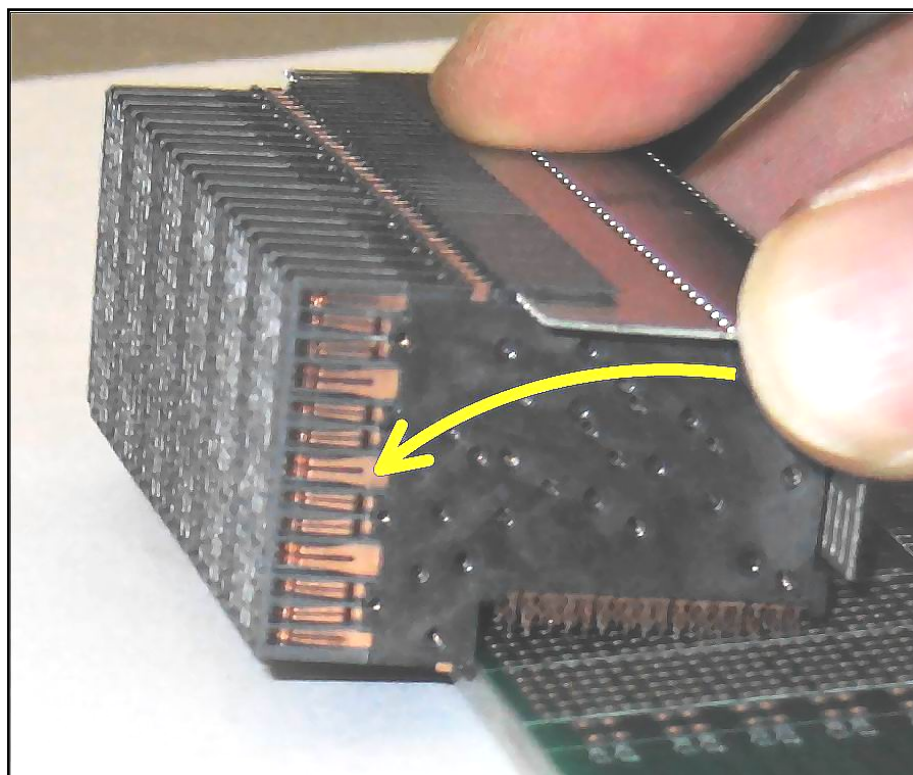



Figure 27: Manual Connector Placement - Daughtercard Receptacle

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### 9.3.2 Connector Seating

Orient the appropriate press-block as shown, taking care not to disturb the position of the compliant tails in the pcb holes. Press and inspect for damage, bent compliant tails, and seating gap as shown.

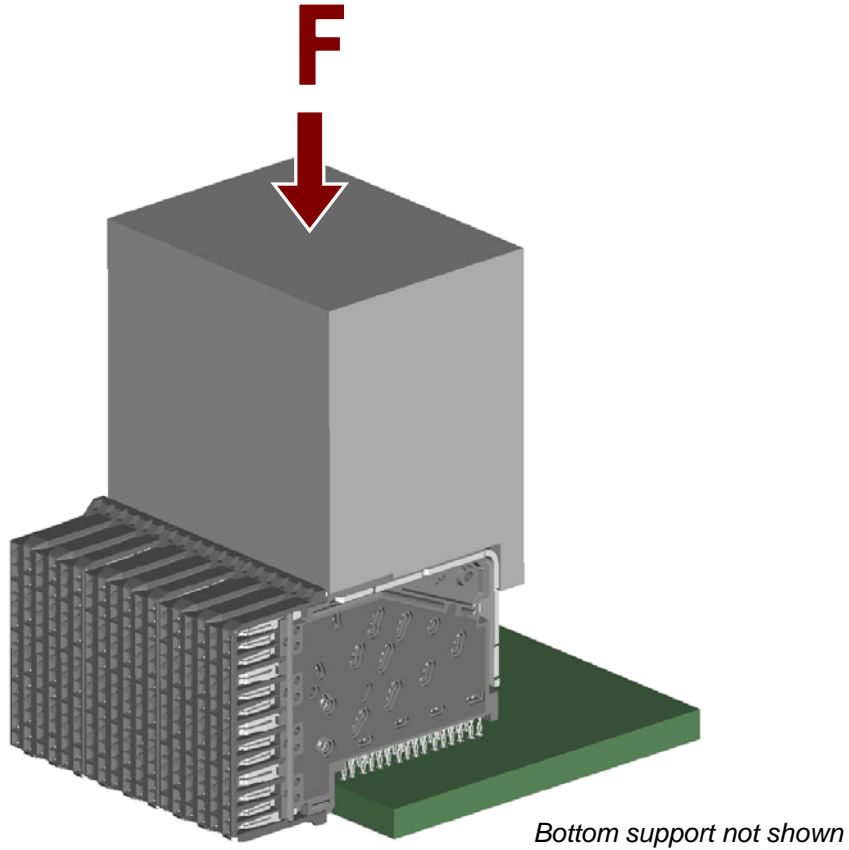


Figure 28: Press-Block Orientation - Daughtercard Receptacle

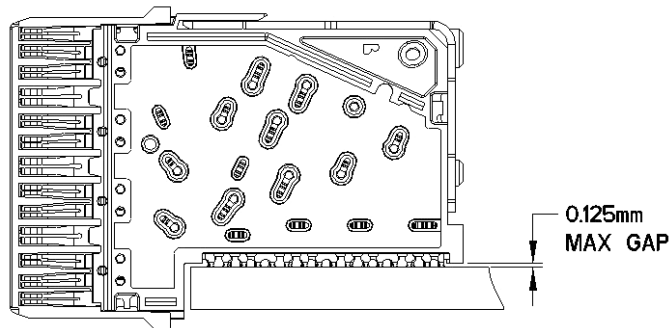



Figure 29: Fully Seated Inspection Dimension: Daughtercard Receptacle

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#### 9.4 Application Procedure: Backplane Header

Align the backplane header module tails with the applicable PCB holes and gently press by hand to stabilize and level the connector module. Carefully orient and align the applicable press-tool so that it freely clears all contacts and plastic alignment ribs. Press connector with adequate force based on insertion force requirements as detailed in the product specification.

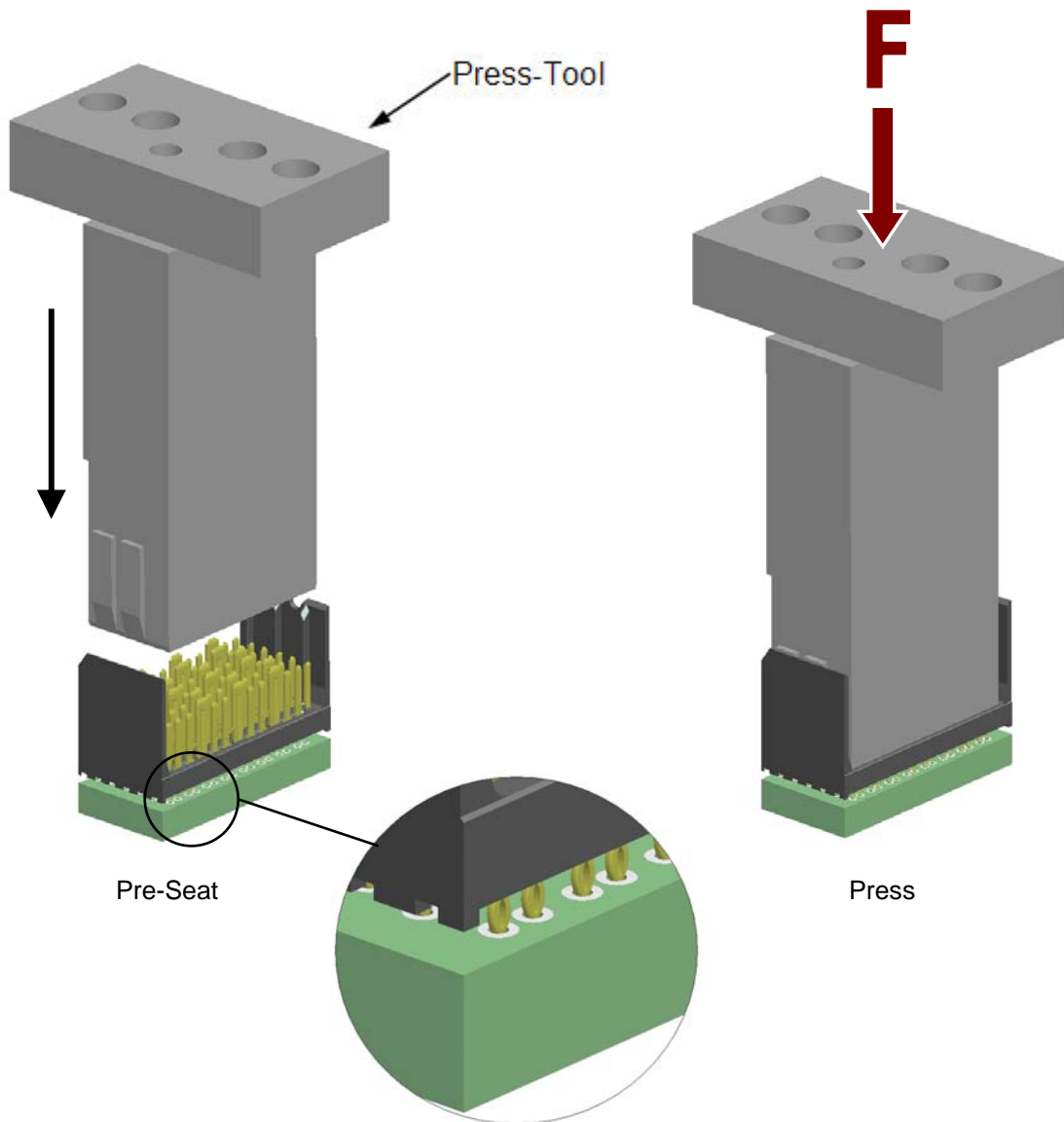

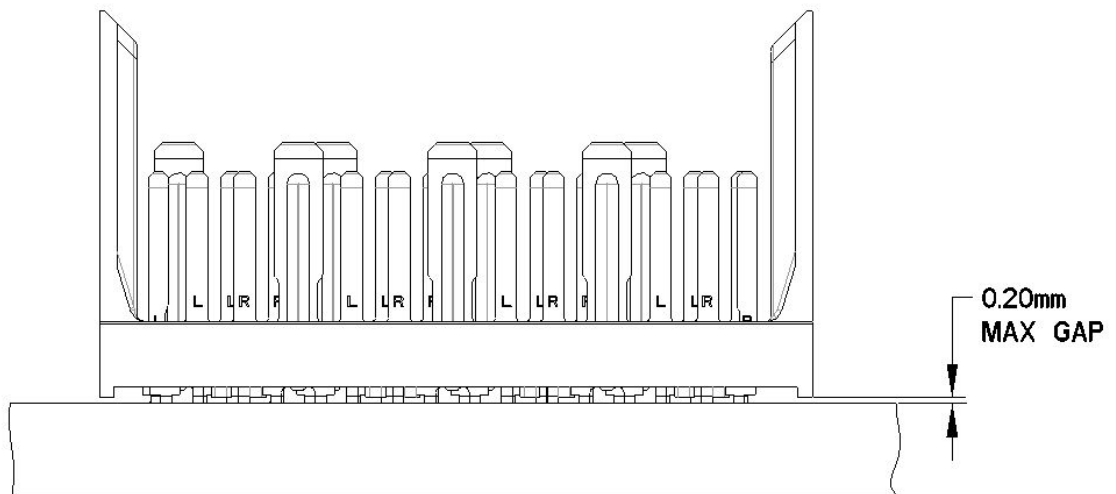


Figure 30: Module Placement and Press-Tool Alignment – Backplane Header




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When the Backplane Header is fully seated on the PCB, any gap beneath the connector should be consistent on all sides, with a preferred gap of zero, but no greater than 0.20mm as shown in figure 30. This gap can be inspected with go/no-go shims of the appropriate sizes.



**Figure 31: Fully-Seated Inspection Dimension – Backplane Header**

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## 10.0 REVISION RECORD

REV	PAGE	DESCRIPTION	EC #	DATE
A	all	Initial Release	n/a	2011-05-13
B	15	Corrected table header (drill size reference) in table 6	ECN-ELX-V-007987-1	2011-11-18
C	29	Added press-block part numbers for 6-pair receptacle	ECN-ELX-V-012594-1	2012-08-22