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# I. Introduction

#### A) IMPEL<sup>™</sup> OVERVIEW

The Impel<sup>TM</sup> backplane connector system is designed for systems that target data rates up to 40 Gbps (NRZ) and superior signal density up to 80 differential pairs per inch. The Impel<sup>TM</sup> system's broad-edge-coupled technology enables low cross-talk and high signal bandwidth while minimizing channel performance variation across every differential pair within the system. Impel<sup>TM</sup> is tuned for 92 $\Omega$  impedance that offers flexibility to support 100 $\Omega$  and 85 $\Omega$  system architectures.

The Impel<sup>™</sup> backplane connector system is designed for traditional backplane, midplane, or midplane-less (ortho direct) architectures to meet the growing demands of next-generation telecommunication and data networking equipment manufacturers.

The Impel<sup>™</sup> backplane connector system is offered in 2-pair, 3-pair, 4-pair, 5-pair, and 6-pair DC connector modules that are matched to traditional headers, coplanar, and orthogonal or orthogonal direct modules with a complete range of power modules and guidance features.



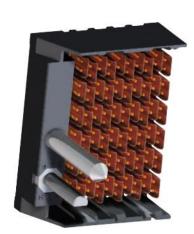
DC modules shown

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## **PRODUCT APPLICATION SPECIFICATION**

## **B) MODULE OVERVIEW**

## BACKPLANE HEADER SIGNAL MODULES:



Right guided vertical module (See SD-series-0004)



Open wall unguided vertical module (See SD-series-0001)

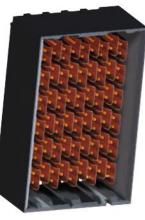


Left guided vertical module (See SD-series-0002)

#### Modules with closed end walls



Right guided vertical module (See SD-series-0004)



(Note: one or both sides of the housing can be closed)

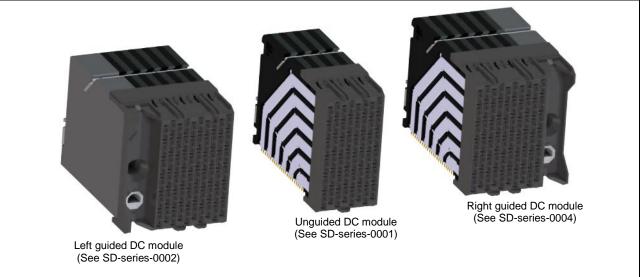


Left guided vertical module (See SD-series-0002)

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## **PRODUCT APPLICATION SPECIFICATION**

#### DAUGHTERCARD (DC) RECEPTACLE SIGNAL MODULES:



#### COPLANAR (RAM) SIGNAL MODULES:



## **PRODUCT APPLICATION SPECIFICATION**

#### **RA POWER PLUG MODULES:**



With hold-down feature on the right



With hold-down feature on the left



RA module with hold-down feature on the right



POWER RECEPTACLE MODULES:

RA module with hold-down feature on the left



Vertical Module (For backplanes/mid-panes)

### **C) APPLICABLE DOCUMENTS**

#### a. Product Specification:

Please refer to **PS-171320-999** or equivalent for the product specification.

#### b. Routing Guide:

Please refer to AS-171320-990 for the routing guide.

#### c. Application Guideline for Installation:

Please refer to 1713209994-AS for the application guideline for installation.

#### **D) DISCLAIMER**

Details included in the 2D sales drawings (SD-dwg) take precedence over information included in the Design Guide document.

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## **PRODUCT APPLICATION SPECIFICATION**

# II. CONNECTOR PHYSICAL ENVELOPE & SELECTION

## A) TRADITIONAL BACKPLANE LAYOUT:

IMPEL - DC to Vertical Header: Physical size						
4-pair shown	DIM (mm)	2-pair	3-pair	4-pair	5-pair	6-pair
	A	12.2mm	16.9mm	21.6mm	26.3mm	31.0mm
	В	26.7mm	31.3mm	35.9mm	40.6mm	45.1mm
	Diff Pair Count 14 Col Per Inch (on 1.9mm pitch)	27	40	54	66	80
← <b>14mm</b> →	Available # of columns*		contact Mo	blex for availab	le modules	
k−−−−− <b>−</b> Β	Available # of columns (3.0mm pitch) - quad rt.			limited availability		limited availability

## **B) COPLANAR LAYOUT:**

4-pair shown	DIM (mm)	2-pair	3-pair	4-pair	5-pair	6-pair
	Α	12.2mm	16.9mm	21.6mm	26.3mm	31.0mm
	В	46.1mm	55.3mm	64.5mm	73.7mm	82.9mm
	Diff Pair Count 14 Col Per Inch (on 1.9mm pitch)	27	40	54	66	80
► B	Available # of columns*		contact Mo	blex for availab	le modules	
	Available # of columns (3.0mm pitch) - quad rt.			limited availability		limited availabilit

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## **PRODUCT APPLICATION SPECIFICATION**

#### **C) CONNECTOR SELECTION:**

#### 1. Signal Types:

- Differential Pairs for High Speed
- Single Ended pins for Low Speed
- Use the on line tool to help you with initial pin mapping: <u>Click here to open Pin Mapping Configurator sheet</u>

#### 2. Power:

- For low voltage applications (under 30V), signal pins can be used. Each pin is rated 0.75A.
- For higher voltage and current applications, use dedicated power modules (see below):

Module:	[30A in/out]	[40A in/out]	[50A in/out]	[60A in/out]
RA Plug	78347	78349	78351	78353
Vertical Plug	78399 (15mm)	Not Tooled	78446 (22, 38, 40mm)	78442
Vertical Recpt.	78212	78214	78216	78218
R/A Recpt.	78348	78350	In tooling process	Not Tooled
Current	15A / Blade 60A / Module	20A / Blade 80A / Module	25A / Blade 100A / Module	20A / Blade 120A / Module
		** Refer to sales drawing for late	st tooling status**	

#### **High Power Modules:**

#### 3. Plated Through Hole Dimension;

Refer to AS-171320-990 for details regarding the required plated though hole and via construction. Impel<sup>™</sup> modules utilize compliant tails that are designed for a 0.36mm diameter plated through hole. For thicker backplane boards (>7mm), header modules are available with compliant tails designed for a 0.46mm diameter plated through hole. Please contact Molex for recommendations.

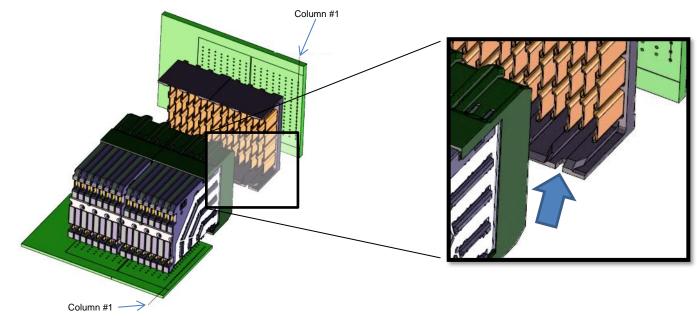
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## **PRODUCT APPLICATION SPECIFICATION**

# III: MECHANICAL LAYOUT

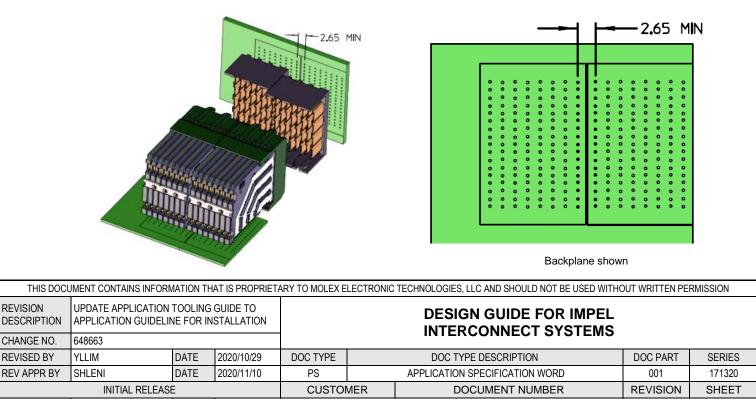
## A) ESTABLISHING COLUMN #1 (HEADER)

A small notch on the header housing indicates column #1.



#### **B) SPACING BETWEEN MODULES**

Use footprint to establish distance between adjacent modules. For standard 1.9mm pitch modules, the minimum distance between two adjacent modules is 2.65mm (column-to-column). For 3.0mm pitch modules, the minimum distance between two adjacent modules is 3.00mm (column-to-column). If headers with end-walls are used, add 1.4mm additional spacing for each plastic wall.



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**GENERAL MARKET** 

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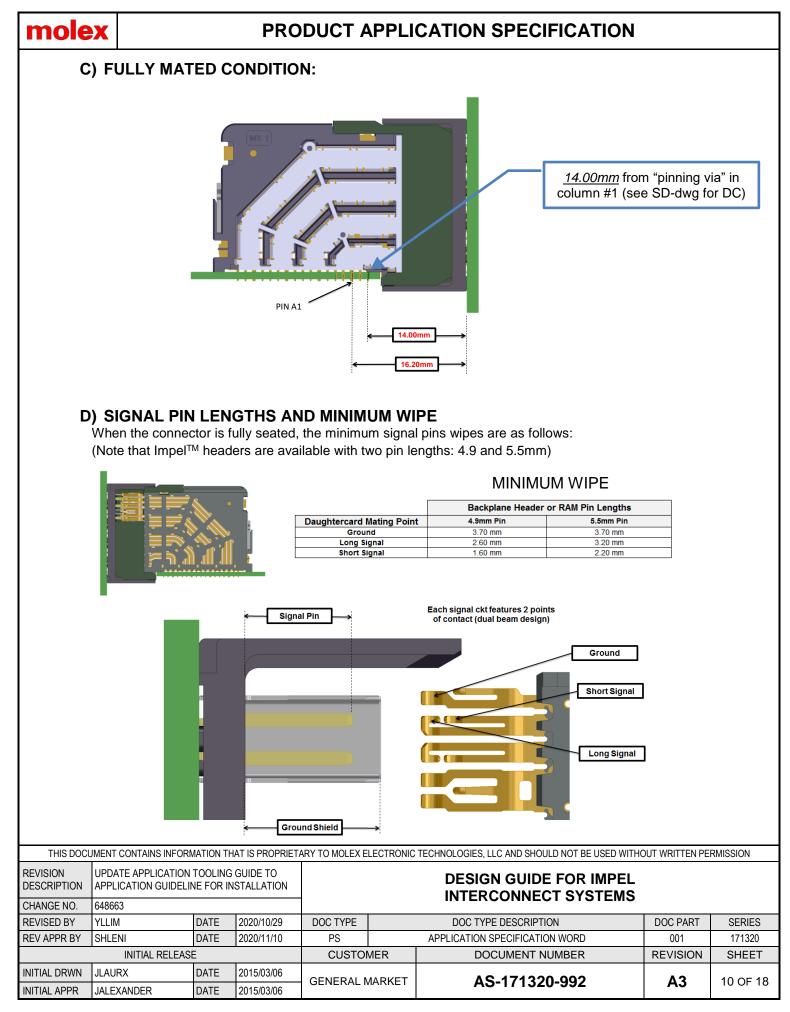
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## PRODUCT APPLICATION SPECIFICATION

## E) PAIRING IMPEL<sup>™</sup> MODULE WITH POWER MODULES

#### 1.) Right Angle to Vertical header

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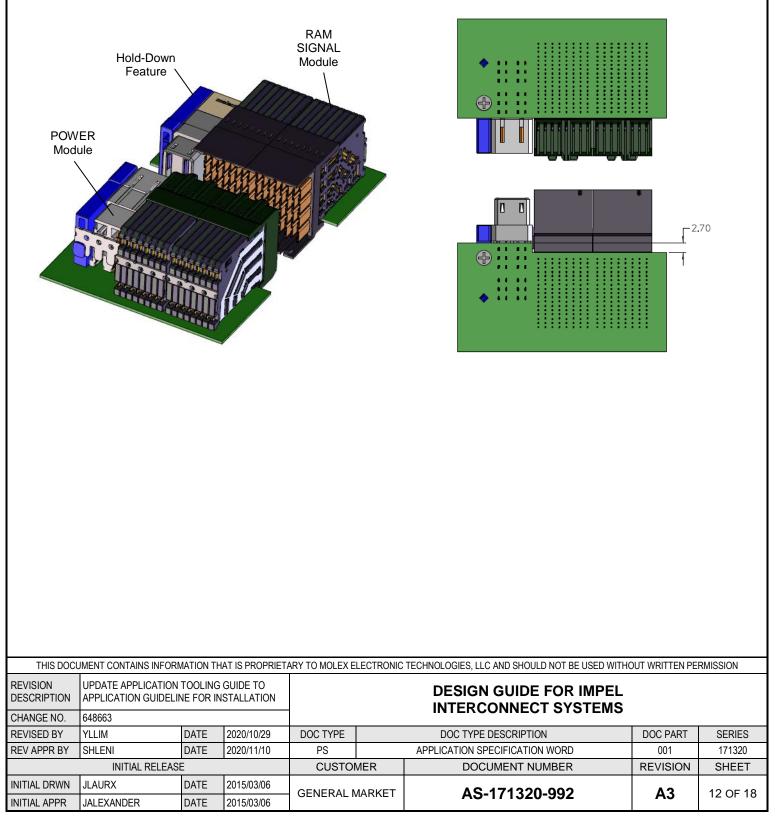
Molex recommends using the power modules that have a Hold-down feature on Line Card (LC) applications. Molex recommends 0.50mm spacing between the Power and Signal housings – allowing sufficient spacing for easy assembly processing. Note that on the LC side – Power modules require an extra 4.0mm due to the Hold-down feature. If signal modules on the backplane side feature end wall housings, 1.4mm of extra space is required per plastic wall (refer to SD-dwg for keep out zone).

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## **PRODUCT APPLICATION SPECIFICATION**

#### 2.) Coplanar

Molex recommends using the power modules that have a Hold-down feature on Line Card (LC) applications. Molex recommends 0.50mm spacing between the Power and Signal housings – allowing sufficient spacing for easy assembly processing. RAM (Right Angle Male) Signal modules require a 2.70 notch in PCB.



## **PRODUCT APPLICATION SPECIFICATION**

## F) MATING FORCES / UN-MATING FORCES

IMPEL <sup>™</sup> Signal Modules	Mating Force per Differential Pair	Un-Mating Force per Differential Pair
	By Specif	ication
	200g max	45g min
	As Tes	sted
(tested on 4-pair modules)	146g max (4.9mm pin) 184g max (5.5mm pin)	60g min

#### **G) SYSTEM GATHERABILITY**

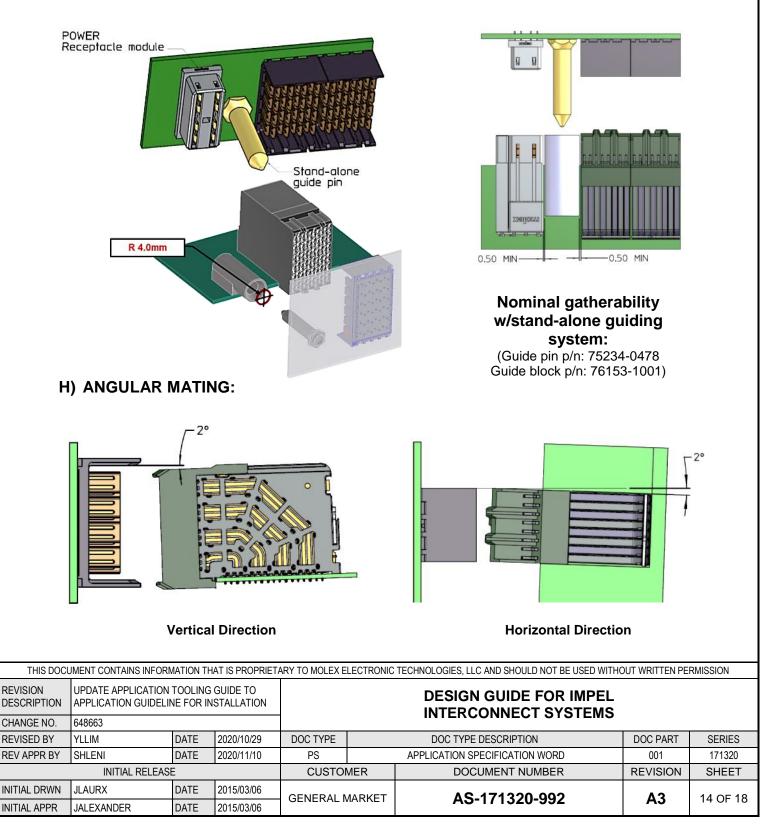
The Impel<sup>™</sup> connector system provides 2.0mm of gatherability when the integrated guides (pin and receptacle) are used. Without the integrated guides, the connector housings provide 1.2mm of gatherability.

Contraction of

	uides are used:					using alone provides 2mm gatherability:		
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Stand-alone guide pins are available. Use LC side to establish the minimum spacing. Molex recommends 0.5mm minimum spacing between signal/power modules and guiding components. If a header with end walls is used, 1.4mm additional space is required per plastic wall (refer to SD-dwg for keep-out zone).



#### molex PRODUCT APPLICATION SPECIFICATION SYSTEM LEVEL RECOMMENDATIONS IV. A) USE OF GUIDING OPTIONS: Molex recommends the use of integrated guide pins to insure proper mating. The overall connector span and the assembled card weight should be considered when determining the guidance. The following chart describes general guidance recommendations based on connector span and card weight. **BP** Connector Stack with Integrated Standard Guidance **GUIDE PIN RECOMMENDATIONS** RECOMMENDED DAUGHTERCARD DAUGHTERCARD **GUIDANCE** WEIGHT CONNECTOR SPAN (Minimum) 1 Standard Guide Less than 7 lbs 2 Standard Guides or 1 7 lbs – 14 lbs Heavy Duty Guide Less than 125mm 3 Standard Guides or 2 14 lbs - 21 lbs Heavy Duty Guides **Contact Molex Field** Over 21 lbs Application Engineer 125mm – 250mm Less than 14 lbs 2 Standard Guides THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX ELECTRONIC TECHNOLOGIES, LLC AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION REVISION UPDATE APPLICATION TOOLING GUIDE TO **DESIGN GUIDE FOR IMPEL** APPLICATION GUIDELINE FOR INSTALLATION DESCRIPTION **INTERCONNECT SYSTEMS** CHANGE NO. 648663 REVISED BY YLLIM DATE 2020/10/29 DOC TYPE DOC TYPE DESCRIPTION DOC PART SERIES 2020/11/10 APPLICATION SPECIFICATION WORD REV APPR BY SHLENI DATE 001 171320 PS **INITIAL RELEASE** CUSTOMER DOCUMENT NUMBER REVISION SHEET JLAURX INITIAL DRWN DATE 2015/03/06 **GENERAL MARKET** AS-171320-992 A3 15 OF 18

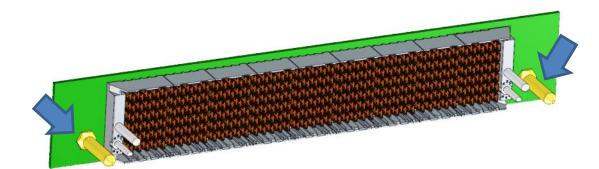
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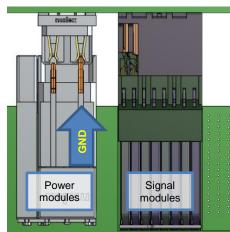
molex	PRODUCT APPLICATION SPECIFICATION				
		14 lbs – 21 lbs	3 Standard Guides or 2 Heavy Duty Guides Contact Molex Field Application Engineer		
		Over 21 lbs			
		Less than 21 lbs	3 Standard Guides		
	250mm – 375mm	Over 21 lbs	Contact Molex Field Application Engineer		
	Over 375mm	Any	Contact Molex Field Application Engineer		



#### BP Connector Stack with Integrated Standard Guidance and Heavy Duty Guides

## **B) MATING SEQUENCE:**

1. When paired with Power



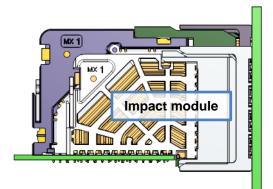
Typical mating sequence with 4.9mm pins:

- 1<sup>st</sup> to mate is long power blade (GND)
- 2<sup>nd</sup> to mate is GND shield of the signal module
- 3<sup>rd</sup> to mate is short <u>power blade</u> (supply)
- Signal pins (diff-pairs) inside the signal module will mate last.

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## **PRODUCT APPLICATION SPECIFICATION**

2. When paired with Power and Impact modules.



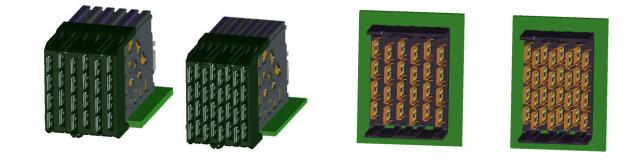
Impact<sup>TM</sup> and Impel<sup>TM</sup> modules can be used side-byside on a single LC. Note that Impel<sup>TM</sup> modules are taller than comparable Impact<sup>TM</sup> modules.

# Top View shown:

Typical mating sequence with 4.9mm pins:

- 1<sup>st</sup> to mate is long power blade (GND).
- 2<sup>nd</sup> to mate is GND shield of the Impel<sup>™</sup> signal module.
- 3<sup>rd</sup> to mate is short <u>power blade</u> (supply)
- 4th to mate is GND ckt inside of Impact<sup>™</sup> modules.
- Signal pins (diff-pairs) inside the Impel<sup>™</sup> and Impact<sup>™</sup> signal modules will mate last (with equivalent timing).
- C) QUAD ROUTEABLE MODULES:

Standard modules have 1.9mm column-to-column pitch. This spacing allows for one pair to be routed per column, per layer. Impel<sup>™</sup> modules are also available with a wider 3.0mm pitch that allows routing of 2 pairs (4 tracks) of traces per column, per layer. Please contact Molex for availability:



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