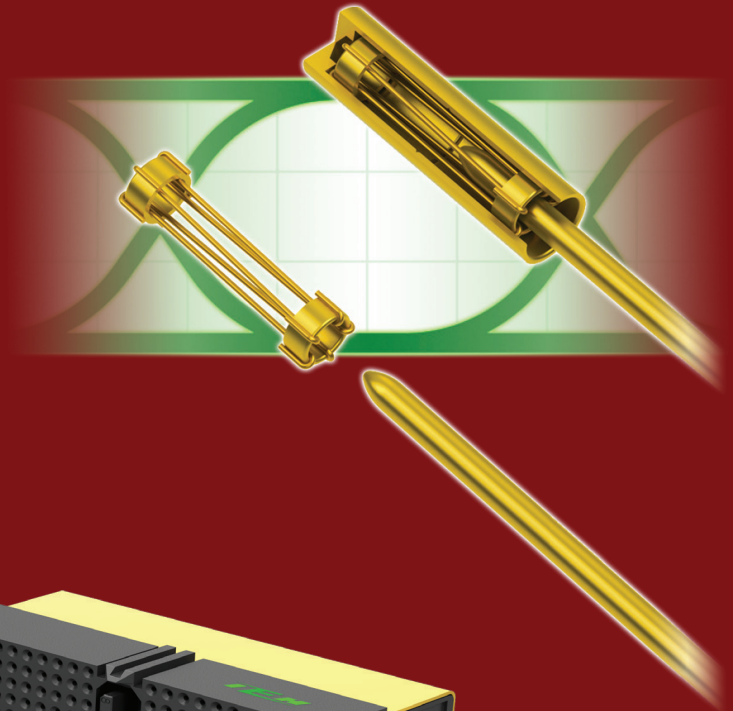
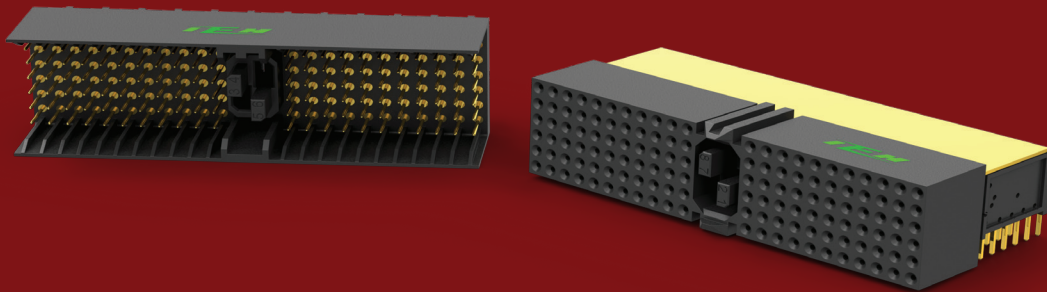




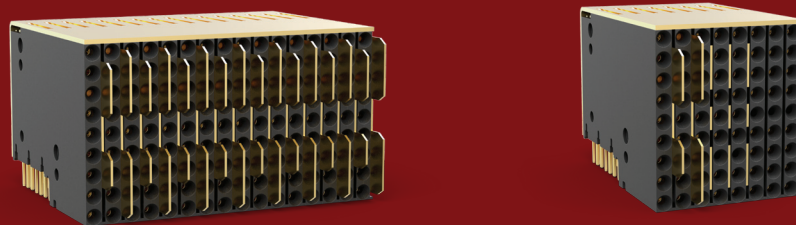
## **HYPERKINETIC™ CONNECTORS**



### **HKC (cPCI SERIES)**



### **HKX (VPX COMPATIBLE SERIES)**



**...FOR SUPERIOR PERFORMANCE IN ALL APPLICATIONS**

ISO 9001

[www.iehcorp.com](http://www.iehcorp.com)

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#### **HKC SERIES**

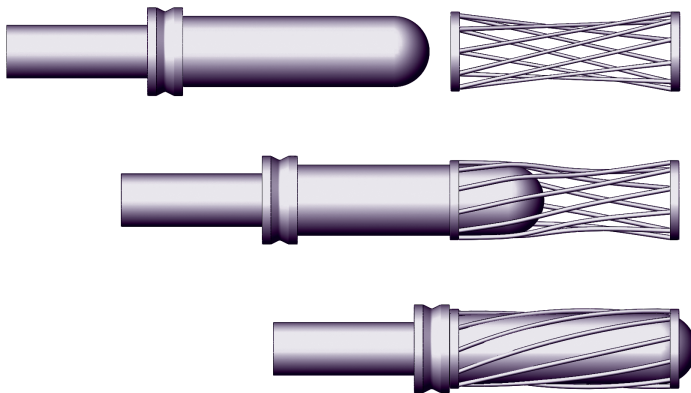
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- 10 BackPlane Type "B"
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#### **HKX SERIES**

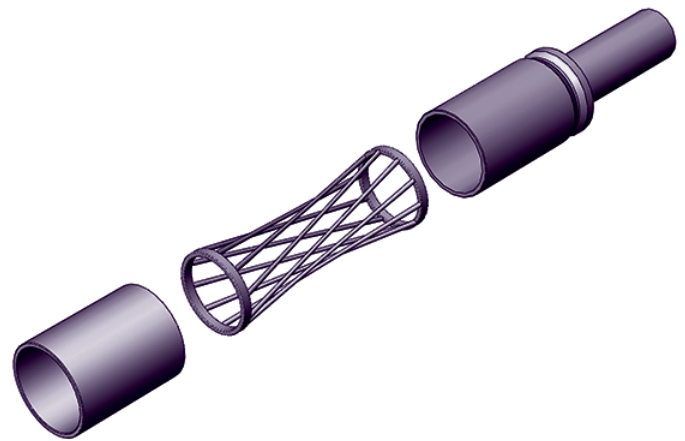
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The HYPERBOLOID contact is an advanced design that satisfies performance requirements previously considered impossible. Radically different in concept, it is used in connectors having the highest standards of performance. The distinguishing feature of the HYPERBOLOID socket is the hyper-boloid-shaped sleeve formed by straight wires strung at an angle to the longitudinal axis. Viewed from the side, you see a curve defined by a series of apparent short straight line segments which are tangent lines to points along a hyperbolic curve. This geometry provides for a design which has a decreasing circumscribed circle when viewed from the entry. It begins larger than the pin acceptance diameter and is less than this same diameter at the center. When the pin is inserted into this sleeve, the wires stretch, well within elastic limits, to accommodate it. In so doing, the wires wrap themselves around the pin providing a number of continuous line contact paths. The illustration below will assist in visualization.



The actual physical construction of the contact involves several components. The wires are strung on an internal wire carrier (inner sleeve) which is subsequently capped or enclosed by a front outer ring (front sleeve) and rear ring which includes the termination configuration (terminal). All components to the assembly are completely finished with the specified electroplating prior to assembly. The wires are continuous process plated on reel before use. In this manner, interface finish requirements can be controlled very closely without the common problems of gradient, shadow, or other finish imperfections often appearing in alternative designs. Very often, this processing feature permits the specifier to reduce precious metal content with resultant savings. Joints are calculated interference fits, insuring gas tight interfaces between all elements of the HYPERBOLOID construction. An exploded view is provided next.

The unique geometry, precision processing, and careful attention to quality result in a highly desirable contact design which provides:



- **VLIF (Very Low Insertion Force):** Common sizes #22 and less average under one ounce per contact.
- **Extraordinary Resistance to Shock & Vibration:** Tests exceeding 300 g's without discontinuity.
- **Duty Cycle Exceeding 100,000 Mate/Demate:** The burnishing action of the wires on the pin surface is non-destructive. Unlike the "plow" and scrape action of common designs, HYPERBOLOID's gentle mating action enhances life.
- **Low, Low Contact Resistance:** The multiplicity of line contact, as opposed to point contact in other designs, provides an excellent interface exhibiting low contact resistance (often less than 1/2 of MIL spec. allowances). This characteristic also provides for a cooler running contact under load.
- **Improved Current Carrying Capacity:** The low contact resistance gives a lower °C rise from ambient under load. This feature often allows the user to operate the same size contact under higher load.
- **Highest Reliability:** In use for over 40 years under the most demanding conditions HYPERBOLOID has proven itself to be the leading design for integrity and reliability. On space platforms, ships and boats at sea, land vehicles, fighter and transport aircraft, missiles, torpedoes, medical and transplant electronics, industrial and environmental controls, rail, construction, ATE and test equipment, PGA sockets, test interface stations, and other applications, HYPERBOLOID has lived up to its promise of the highest reliability connector available.

## FEATURES & BENEFITS

Interchangeable with the board layout on COTS System  
 High Reliability Hyperboloid Contact System  
 Standard 2mm Footprint of cPCI PICMG 2.0  
 LCP Insulator meets NASA Outgassing Requirements  
 Contact identification in accordance with IEC 61076-4-101:2001  
 Press-fit termination available, see ordering chart

## PRELIMINARY SPECIFICATIONS (See online catalog for latest info)

### GENERAL:

Design Criteria: IEC 61076-4-101:2001  
 Contact Spacing: 2.00mm square  
 Maximum Allowable Gap  
 Between Mating Connectors: 0.050 [1.27]

### MATERIALS

Pin Contacts: Beryllium Copper Pin Contacts:  
 BeCu per ASTM B196/B196M-07, C17200

Socket Contacts: Beryllium Copper Hyperboloid Socket Wires and Brass Body:  
 BeCu per ASTM B197/B197M-07, C17200

Insulator: 30% Glass filled LCP (meets NASA outgassing specification):  
 LCP0120G30A43430 IAW ASTM-D5138

Mating Surface, Finishes: 30 µin or 50 µin min. Gold / 50 µin min. Nickel:  
 Gold per MIL-DTL-45204 Type II, Class 0.75 or 1.27 min, Code C over Nickel,  
 0.000050 min., per SAE AMS-QQ-N-290 over Copper per SAE AMS 2418

Termination Solder Dip: Gold per MIL-DTL-45204 Type II, Class 0.25 or 0.75 min, Code C over Nickel,  
 0.000050 min., per SAE AMS-QQ-N-290 over Copper per SAE AMS 2418 or  
 Solder Dip over Nickel, 0.000050 min., per SAE AMS-QQ-N-290 over Copper per SAE  
 AMS 2418

Termination Press-In: Gold per MIL-DTL-45204 , Class 1.27 min. , Grade C over Nickel, 0.000050 min., per  
 SAE AMS-QQ-N-290 over Copper per SAE AMS 2418 or Tin/Lead per SAE-AMS-  
 P-81728

### PERFORMANCE:

Contact Current Rating: 2 Amp Max per Contact (higher ratings may be supported-contact factory)

Insulation Resistance: >5000 megaohm

Flammability Rating: 94 V-O

Temperature: -55°C to +125°C (-67°F to +257°F)

Mating Force: [16.38] LBF average (per mated connector pair for both 95 and 110 Signal Contacts)

De-mating Force: [13.2] LBF average (per mated connector pair for both 95 and 110 Signal Contacts)

Contact Life (Mate/Demate): [>5000] Cycles (per mated connector pair)

Contact Resistance: 4.85 milliohms average

Low Level Contact Resistance: 7.20 milliohms average

Dielectric Withstanding Voltage: 1000V RMS

Humidity: IAW EIA-364-31, Method IV, except 7A & 7B (not required)

Vibration: IAW EIA-364-28 & MIL-DTL-55302 (par. 4.5.10)

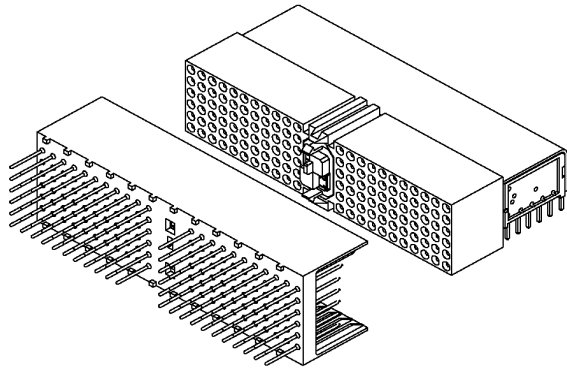
Shock: IAW EIA-364-27 & MIL-DTL-55302 (par. 4.5.14)

Salt Spray: IAW EIA-364-26 & MIL-DTL-55302 (par. 4.5.11)

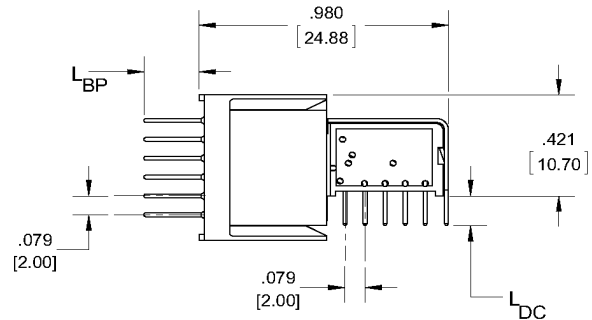
Temperature Cycling: IAW EIA-364-32 & MIL-DTL-55302 (par. 4.5.13)

Weight: P1/P4: 0.23 oz.; P2/P5: 0.20 oz.; P3: 0.18 oz.;  
 J1/J4: 0.68 oz.; J2/J5: 0.64 oz.; J3: 0.55 oz.

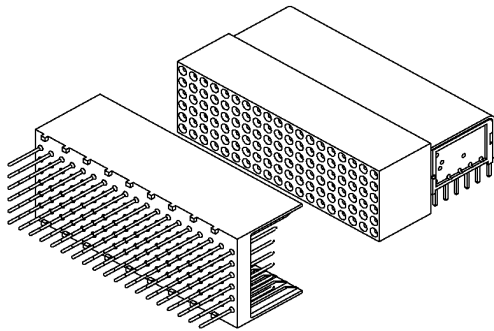
**Type "A" Style**



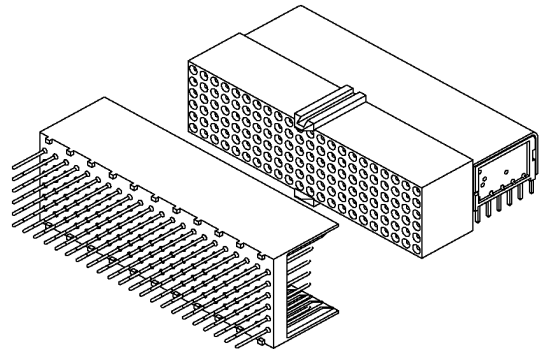
**2mm Connector Mated Pair**



**Type "B" Style**

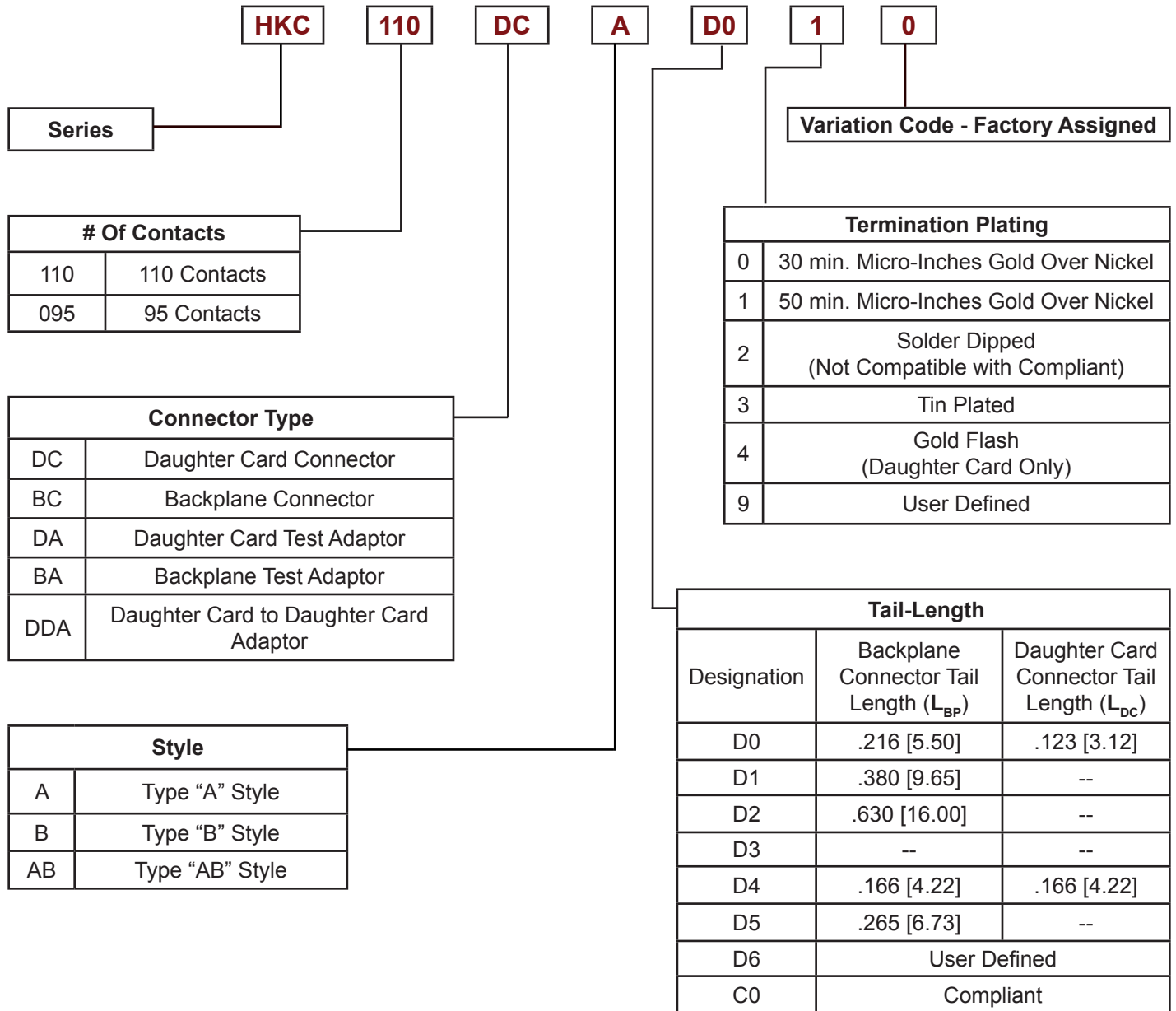


**Type "AB" Style**



General Specification	311P Series = NASA GSFC S-311-P-822					
3U/6U Form Factor	P1/P4	P2/P5	P3	J1/J4	J2/J5	J3
Part Number Reference	HKC110BCA	HKC110BCB	HKC095BCB	HKC110DCA	HKC110DCB	HKC095DCB
Location/Contact Gender	Backplane/Male Pin			Daughter Card/Hyperboloid Socket		
Number of Contacts	110 signal total 22 ground		95 Signal total 19 Ground	110 signal total 22 ground		95 Signal total 19 Ground

ORDERING CHART



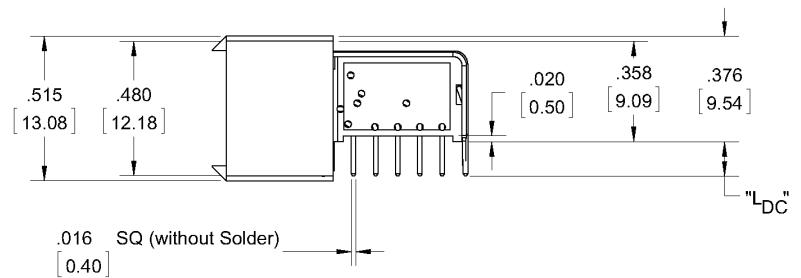
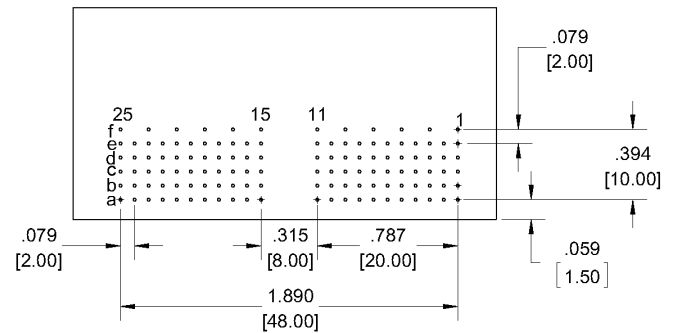
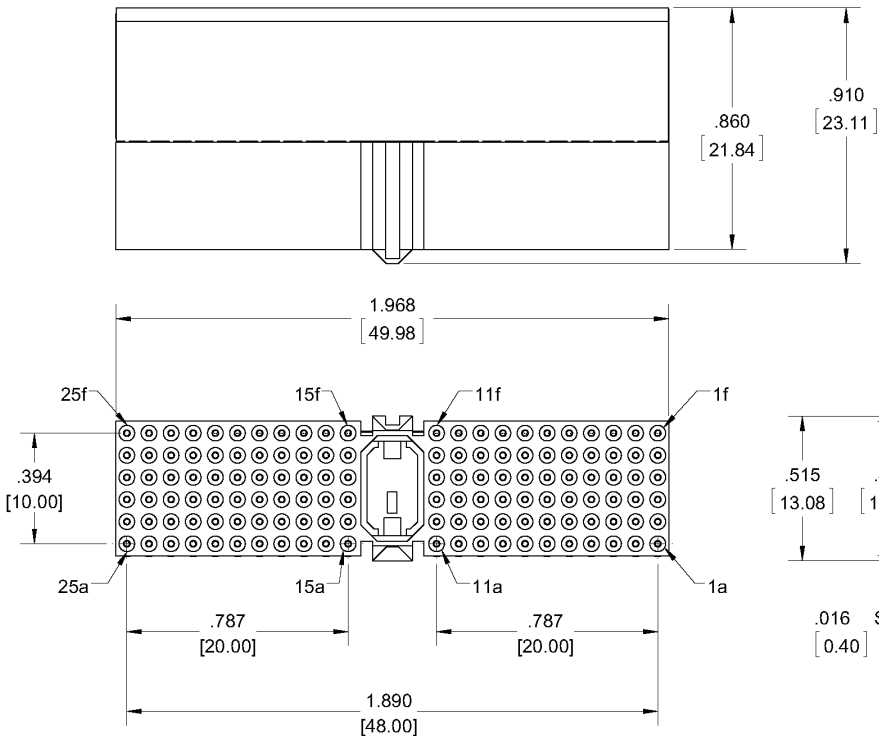
*Please contact the factory or your IEH representative for price and delivery information*

All information contained herein is believed to be reliable as of the date of publication, but is subject to change without notice. Current product drawings and specifications are available upon request from IEH.

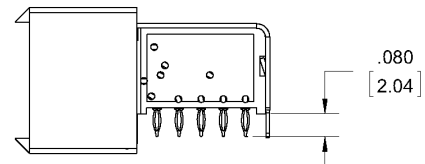
IEH warrants its products to be free of defects affecting normal use. If any shipments is found to be defective we will return for repair or replacement at our option within one year of shipment. IEH is not responsible for incidental or consequential damage arising out of the use of our products.

**DAUGHTER CARD, TYPE "A"  
HKC110DCA**

**PCB LAYOUT**



**COMPLIANT**



**NOTE:**

Recommended PCB Metrics

Solder

Diameter of Drilled Hole:  
Ø0.9mm ±.02mm

Diameter of Finished Plated-through Hole:  
Ø0.8mm ±.05mm

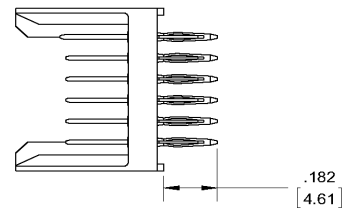
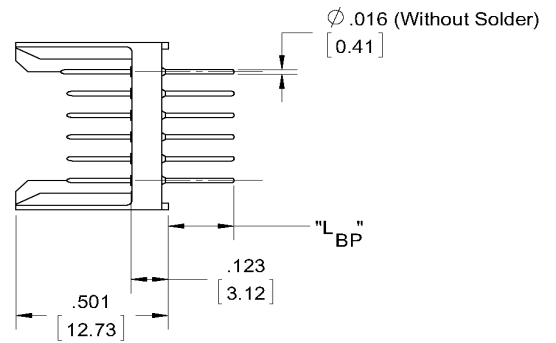
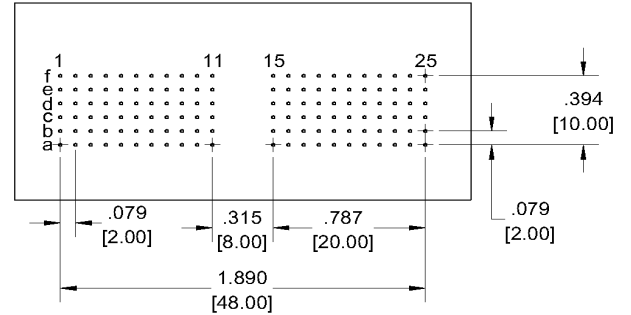
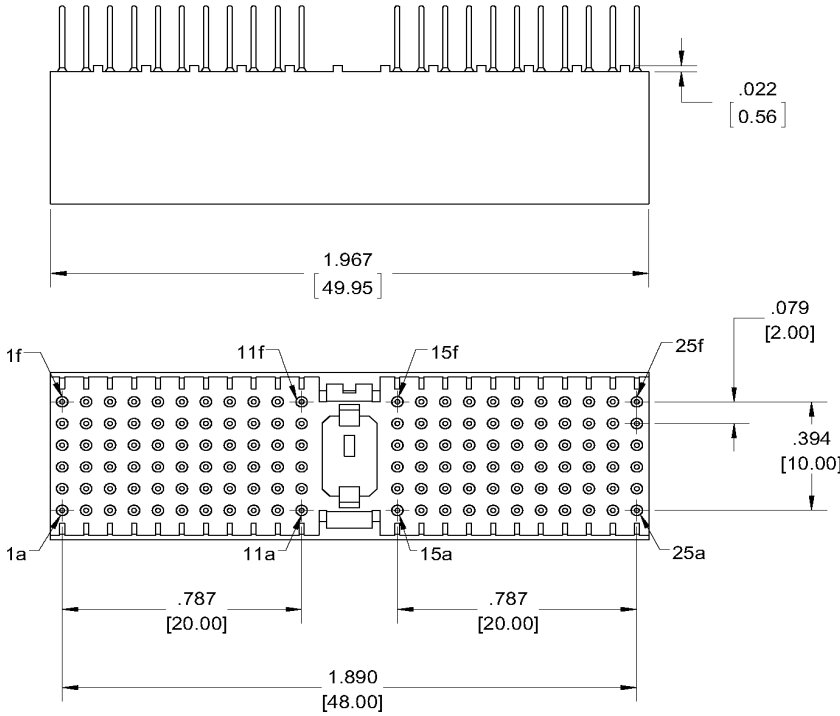
Compliant

Diameter of Drilled Hole:  
Ø0.7mm ±.02mm

Diameter of Finished Plated-through Hole:  
Ø0.6mm ±.05mm

**BACKPLANE, TYPE "A"  
HKC110BCA**

**PCB LAYOUT**



**COMPLIANT**

**NOTE:**

Recommended PCB Metrics

Solder

Diameter of Drilled Hole:

$\varnothing 0.8\text{mm} \pm 0.02\text{mm}$

Diameter of Finished Plated-through Hole:

$\varnothing 0.7\text{mm} \pm 0.05\text{mm}$

Compliant

Diameter of Drilled Hole:

$\varnothing 0.8\text{mm} \pm 0.02\text{mm}$

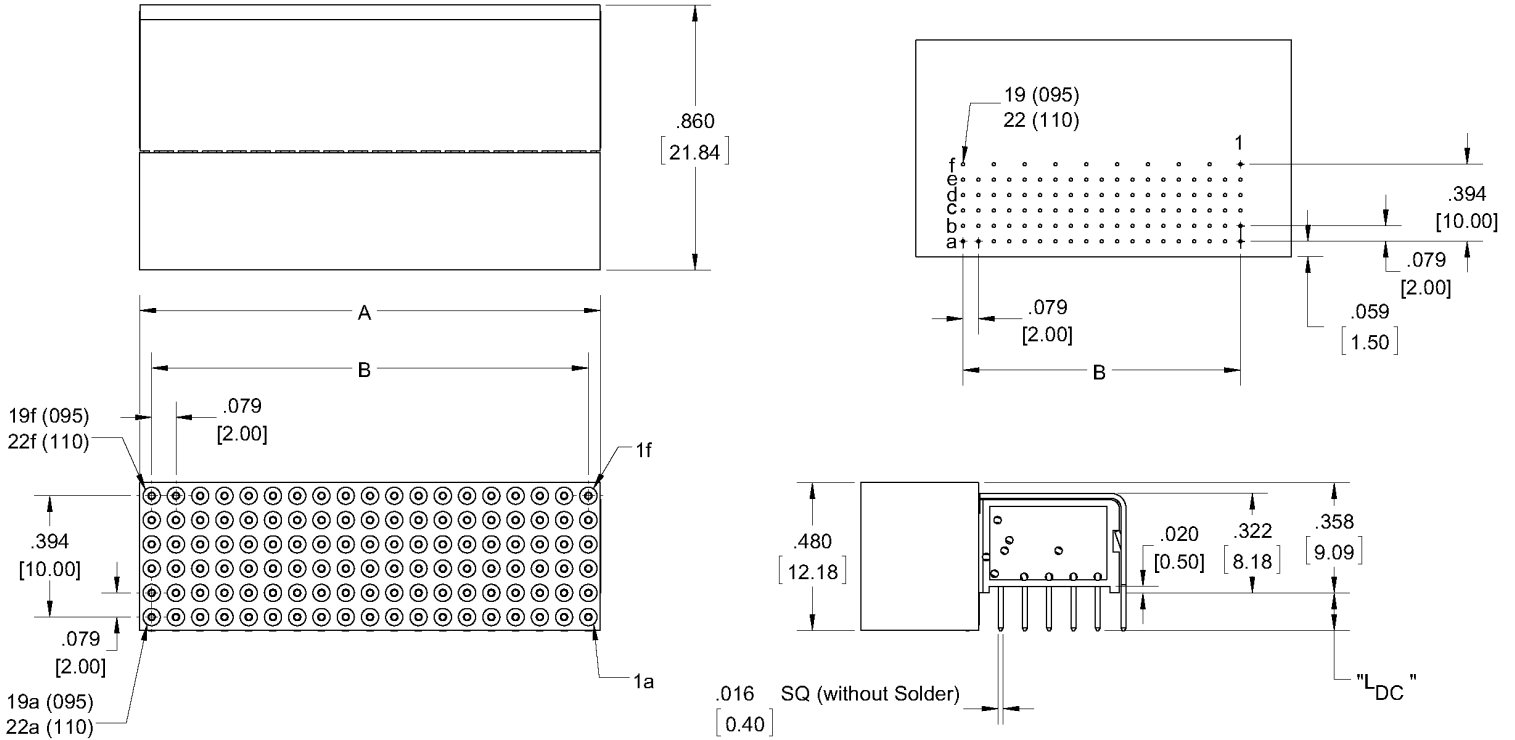
Diameter of Finished Plated-through Hole:

$\varnothing 0.7\text{mm} \pm 0.05\text{mm}$

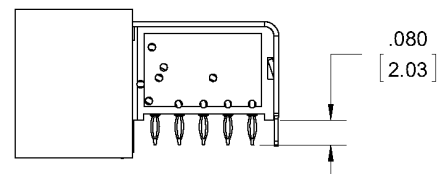


**DAUGHTER CARD, TYPE "B"  
HKC[095,110]DCB**

**PCB LAYOUT**



**COMPLIANT**



**NOTE:**

Recommended PCB Metrics

Solder

Diameter of Drilled Hole:  
Ø0.9mm ±.02mm

Diameter of Finished Plated-through Hole:  
Ø0.8mm ±.05mm

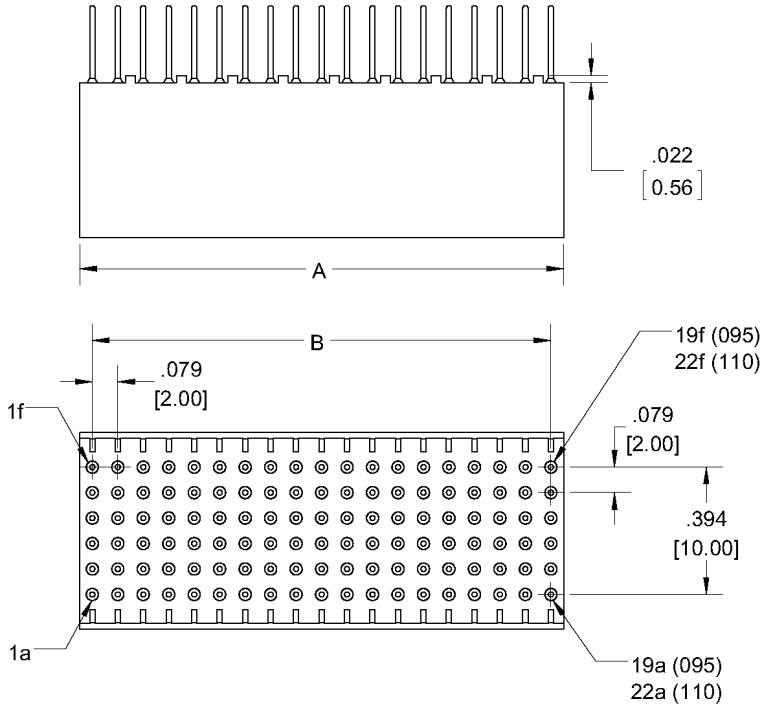
Compliant

Diameter of Drilled Hole:  
Ø0.7mm ±.02mm

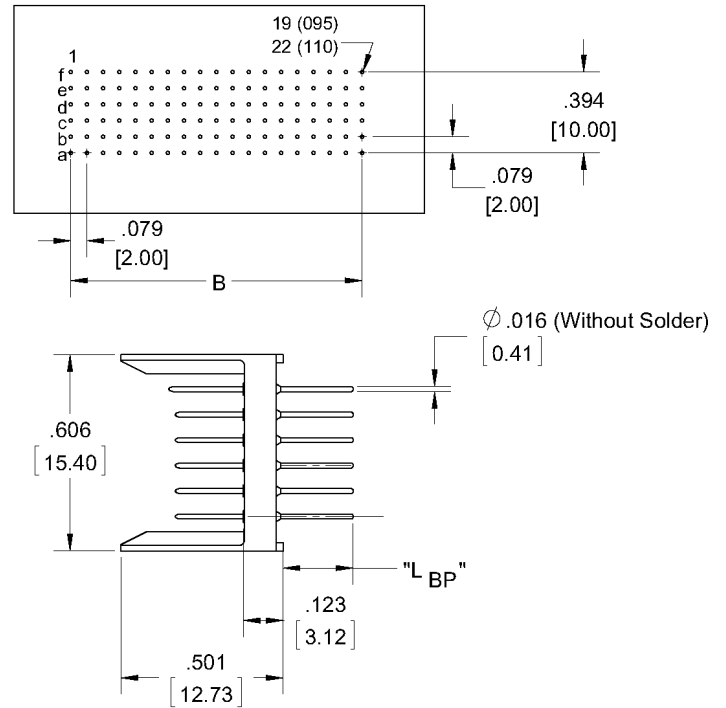
Diameter of Finished Plated-through Hole:  
Ø0.6mm ±.05mm

SIZE	A	B
095	1.495 [37.98]	1.417 [36.00]
110	1.731 [43.98]	1.654 [42.00]

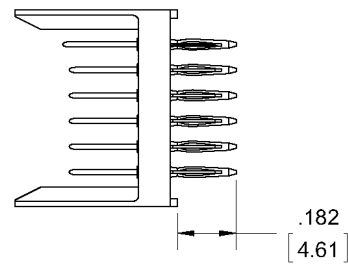
**BACKPLANE, TYPE "B"  
HKC[095,110]BCB**



**PCB LAYOUT**



**COMPLIANT**



**NOTE:**

Recommended PCB Metrics  
Solder

- Diameter of Drilled Hole:  
Ø0.8mm ±.02mm
- Diameter of Finished Plated-through Hole:  
Ø0.7mm ±.05mm

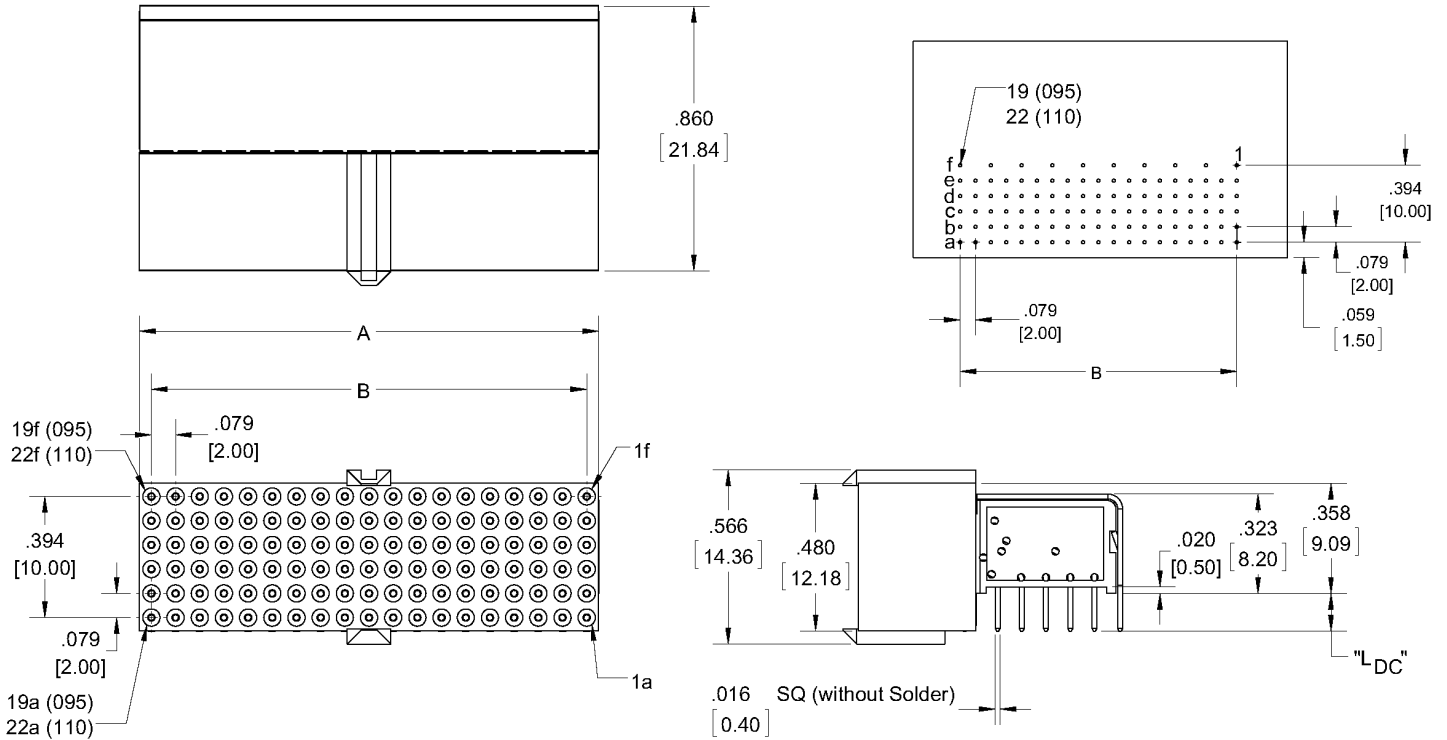
Compliant

- Diameter of Drilled Hole:  
Ø0.8mm ±.02mm
- Diameter of Finished Plated-through Hole:  
Ø0.7mm ±.05mm

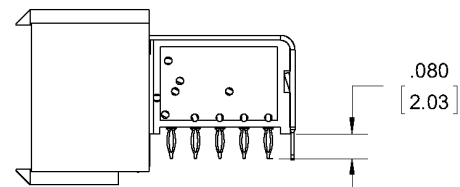
SIZE	A	B
095	1.495 [37.98]	1.417 [36.00]
110	1.731 [43.98]	1.654 [42.00]

**DAUGHTER CARD, TYPE "AB"  
HKC[095,110]DCAB**

**PCB LAYOUT**



**COMPLIANT**



**NOTE:**

Recommended PCB Metrics  
Solder

- Diameter of Drilled Hole:  $\text{Ø}0.9\text{mm} \pm .02\text{mm}$
- Diameter of Finished Plated-through Hole:  $\text{Ø}0.8\text{mm} \pm .05\text{mm}$

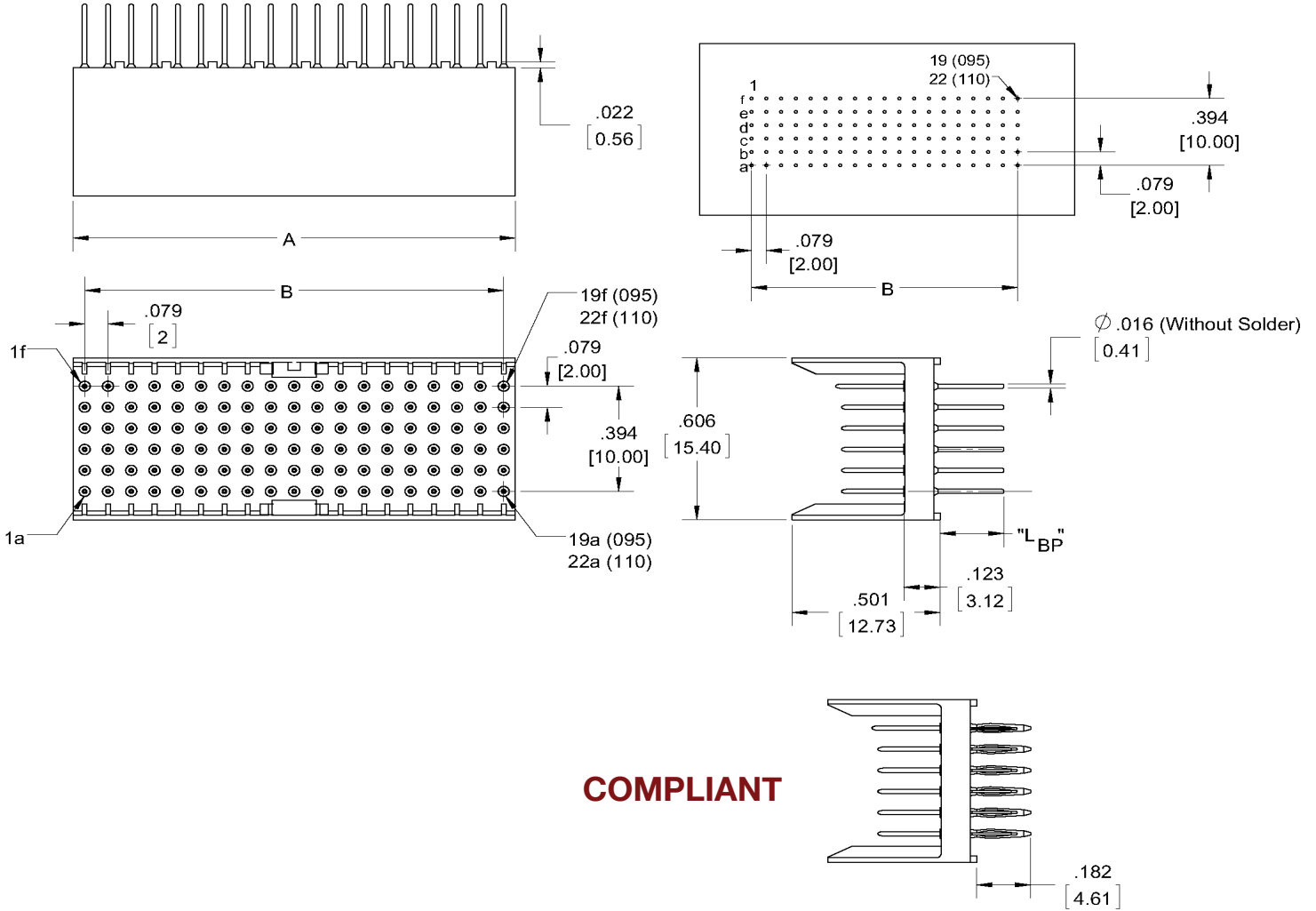
**Compliant**

- Diameter of Drilled Hole:  $\text{Ø}0.7\text{mm} \pm .02\text{mm}$
- Diameter of Finished Plated-through Hole:  $\text{Ø}0.6\text{mm} \pm .05\text{mm}$

SIZE	A	B
095	1.495 [37.98]	1.417 [36.00]
110	1.731 [43.98]	1.654 [42.00]

**BACKPLANE, TYPE "AB"  
HKC[095,110]BCAB**

**PCB LAYOUT**



**NOTE:**  
Solder

Diameter of Drilled Hole:  
Ø0.8mm ±.02mm  
Diameter of Finished Plated-through Hole:  
Ø0.7mm ±.05mm

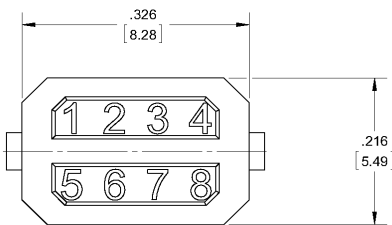
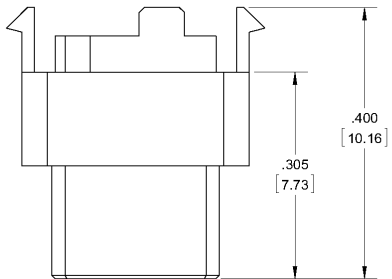
Compliant

Diameter of Drilled Hole:  
Ø0.8mm ±.02mm  
Diameter of Finished Plated-through Hole:  
Ø0.7mm ±.05mm

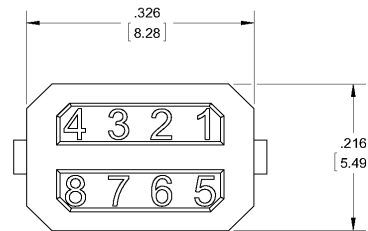
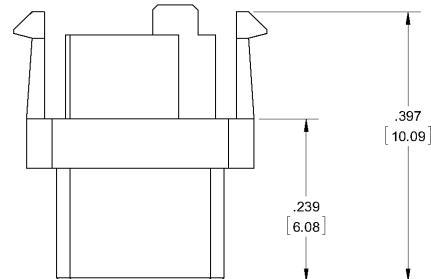
SIZE	A	B
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110	1.731 [43.98]	1.654 [42.00]

KEYING & CODE LAYOUT

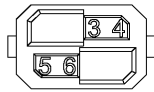
BACKPLANE KEY



DAUGHTER CARD KEY

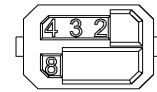


BACKPLANE KEY CODE
1567**
3456**
1235
1256
1258
1578
2345
2347
2356
2358
2368
2456
2467
2468
2567
2678
3457
3568
3578
4567
4568



Example diagram for key code 3456

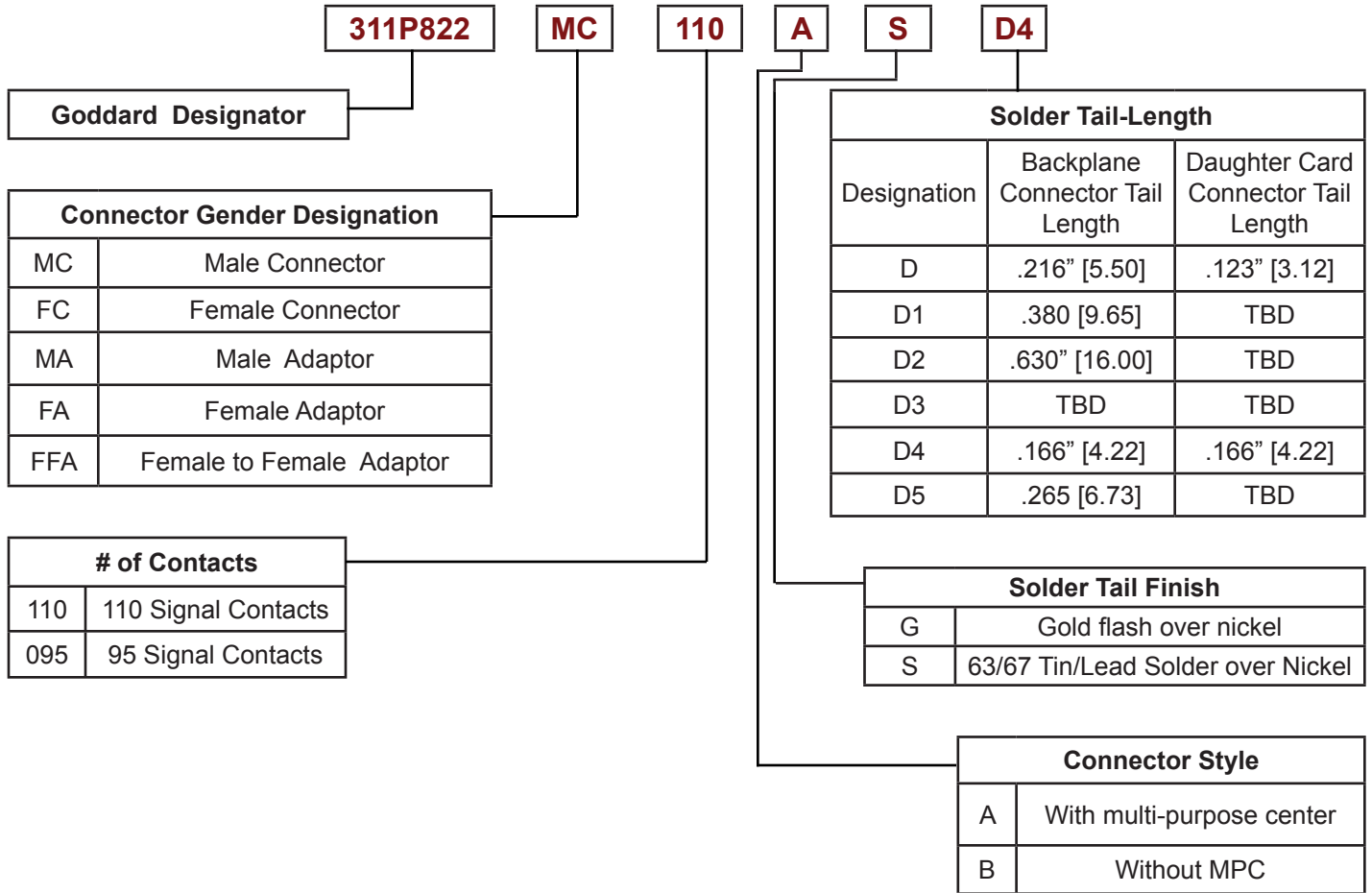
DAUGHTER CARD KEY CODE
1278**
2348**
1234
1236
1237
1238
1246
1247
1268
1345
1348
1357
1358
1378
1457
1467
1478
1568
1678
2346
3467
3478



Example diagram for key code 2348

\*Color Keying Not Available  
 \*\*In Stock (Other keys for special order)

**NASA GODDARD PART NUMBERS**



**CROSS REFERENCE – IEH PART NUMBERS TO NASA GODDARD**

IEH	NASA
HKC095DCB	311P822MC095B
HKC110DCB	311P822MC110B
HKC095BCB	311P822FC095B
HKC110BCB	311P822FC110B

**ACCESSORIES**

*Key Insertion Tool & Pin Carrier*

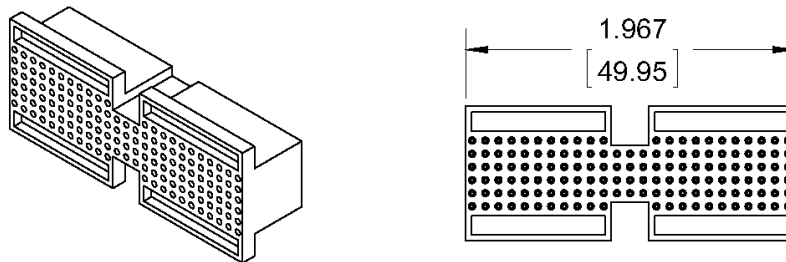
**Key Insertion Tool**

For Type "A"

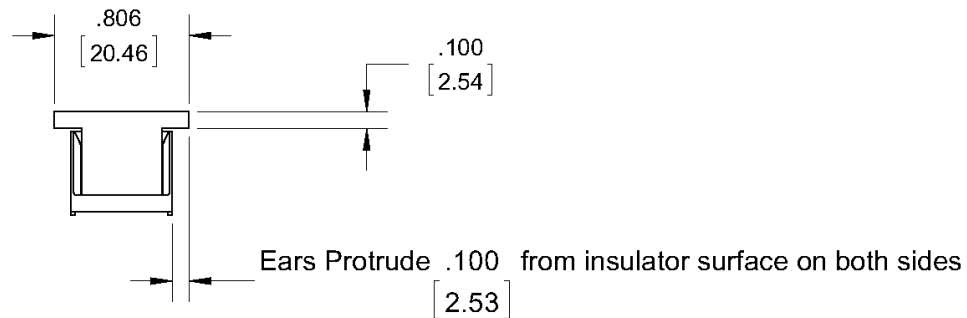
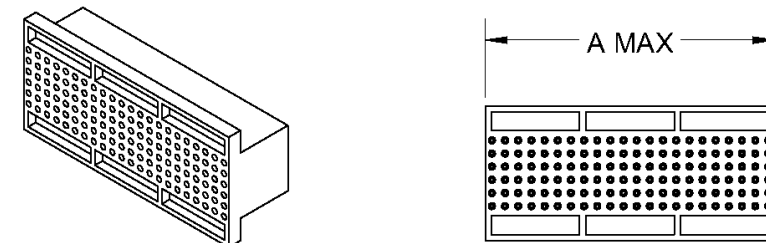
P/N: B1430-61

**Pin Carrier: To be used as an aid for Soldering and Press-in Compliant**

For HKC110BCA



For HKC[095,110]BCB & HKC[095,110]BCAB



\*Delivered assembled to every connector.

SIZE	A
095	1.495 [37.98]
110	1.731 [43.98]

## **VITA VPX Compatible Hi-Speed, High-Density Hyperboloid Modular Interconnects**

The HKX is a shielded, high-density, hi-speed modular interconnect which employs the mission critical capabilities of the hyperboloid contact.

IEH developed the HKX interconnect platform to meet or exceed future high-level requirements for applications such as -- avionics, radar, weapon systems, data storage, and communications including video.

**Offering both VITA VPX and custom platforms.**

### **Primary advantages:**

- The original, proven hyperboloid contact system
- High-level vibration and mechanical shock protection
- Resistant to Fretting
- Modular construction allows for either VITA VPX footprint or for custom configurations
- Data rates up to 10 Gbps while retaining the same VITA 46 platform
- High quality materials meets the most demanding applications and specifications
- Very low insertion and extraction forces
- Custom wafer design allows for mixing differential and single-ended circuits

### **Key Features of HKX**

- Fully compatible pwb footprint with VITA 46 standard
- Hi-Speed: the HKX is designed for 10 Gbps data rate performance
- 100 ohm impedance for differential pair configuration
- The daughtercard assembly is optimized for differential pair architecture on a 1.8mm by 1.35mm grid
- The daughtercard connector contains wafers, which provide differential, single-ended and power options
- LCP housings meets NASA outgassing requirements
- ESD protection supports 2-level maintenance designs
- Available with either solder-dip or compliant terminations



## PRELIMINARY SPECIFICATIONS (See online catalog for latest info)

### HKX Electrical Specifications

- Data Rate: Up to 10 Gbps
- Differential Impedance: 100 ohms
- Differential Insertion Loss: -9 dB up to 10 GHz (20 Gbps)
- Far End Crosstalk: -34 dB up to 5 GHz
- Near End Crosstalk: -32 dB up to 5 GHz
- Signal Contacts: 2 amp
- Power Wafer: 12 amps per wafer at 30°C T-Rise
- Compliant Pin to Plated Through Hole Resistance: 1 milliohm max
- Dielectric Withstanding Voltage: 500 volts RMS
- Insulation Resistance: 1000 megaohms

### HKX Mechanical Specifications

- Signal and Ground Contact:
  - Insertion force per contact: 1.6 oz max, 0.9 oz typical
  - Extraction force per contact: 1.2 oz max, 0.7 oz typical
  - Durability: 500 cycle minimum
- Number of contacts: 9 per wafer
- Number of wafers: 40 for 3U; CU - custom configuration upon request.
- Contact resistance: <8 milliohms per contact
- Wafer pitch: 1.8 mm
- Slot pitch: 20.30 mm

### HKX Environmental Specifications

- Temperature: -55°C to 125°C
- Temperature Life: 1000 hours at 125°C

### Printed Circuit Board Specifications

- Minimum Backplane and Daughtercard Thickness: 2.36mm and 1.53 mm
- Daughtercard pattern finished hole size: 0.56 +/- 0.05mm
- Backplane pattern finished hole size: 0.56 +/- 0.05mm
- Backplane hole pattern: 1.8mm X 1.8 mm (9-holes per row)
- Daughtercard hole pattern: 1.8mm X 1.35mm (7-holes per row)

### HKX Materials and Finishes

#### Backplane, Signal and Ground Contacts:

- Brass per ASTM B16 /B16M-10, C36000
- Gold per MIL-DTL-45204 Type II, Class 1.27, Code C over Nickel, 0.000050 min., per SAE AMS QQ-N-290 over Copper per SAE AMS 2418

#### Socket Contacts:

- Brass per ASTM B16 /B16M-10, C36000
- Contact wires - Gold per MIL-DTL-45204 Type II, Class 1.27, Code C over Nickel, 0.000050 min., per SAE AMS QQ-N-290 over Copper per SAE AMS 2418
- All else - Gold per MIL-DTL-45204 Type II, Class .75, Code C over Nickel, 0.000050 min., per SAE AMS QQ-N-290 over Copper per SAE AMS 2418

#### Differential, Power, and Single-ended Daughtercard Wafer Groundplanes:

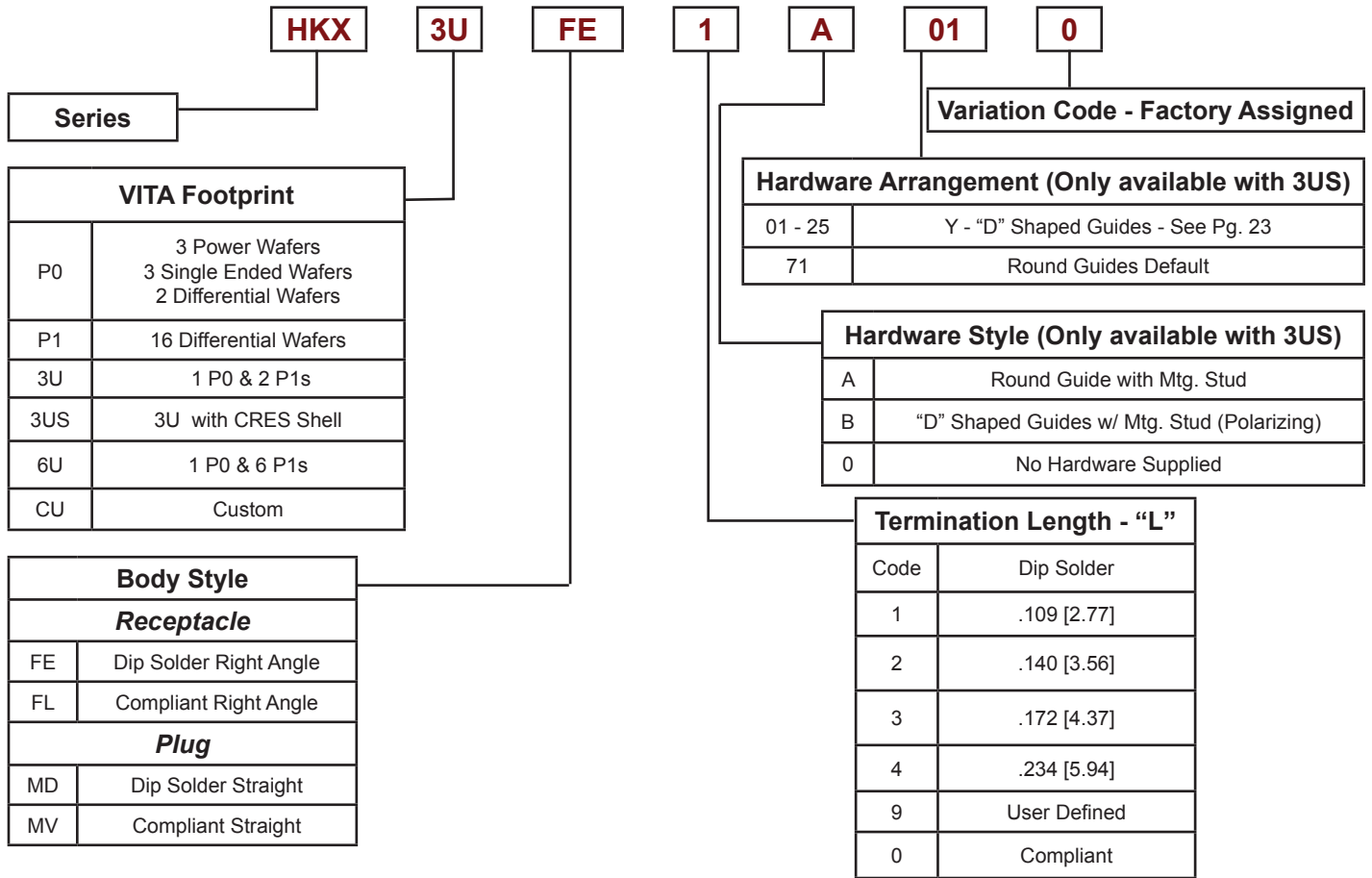
- Brass per ASTM B16 /B16M-10, C36000
- Gold per MIL-DTL-45204 Type II, Class 0.50, Code C over Nickel, 0.000050 min., per SAE AMS QQ-N-290 over Copper per SAE AMS 2418

**Backplane Insulators and Daughtercard Wafer Insert Mold Material:** LCP 30% Glass Filled

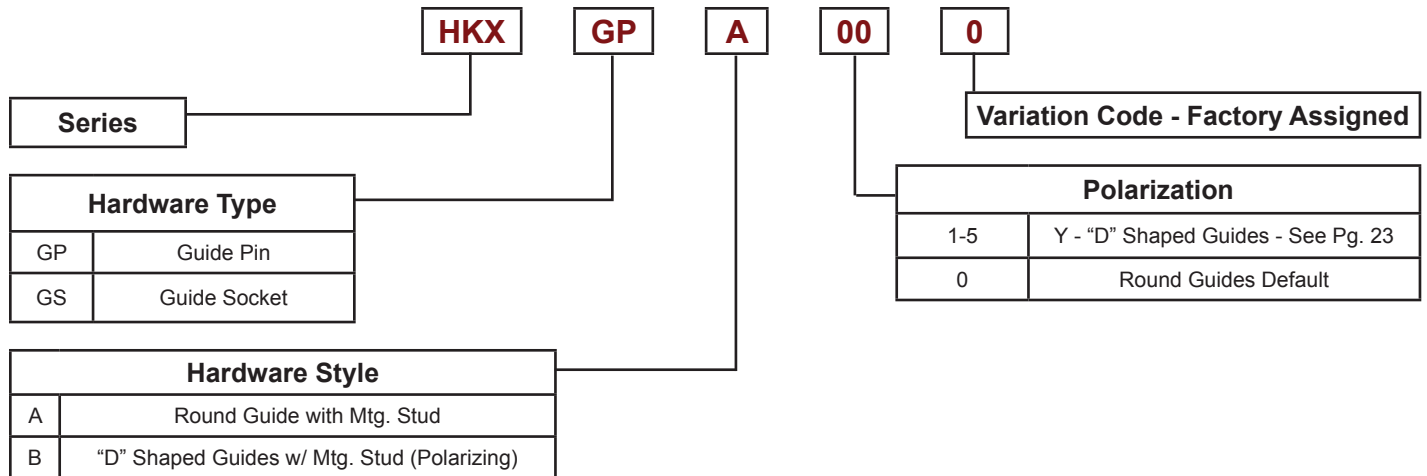
**Backplane Guide Pin and Hardware:** CRES 300 series PER ASTM A582/A582M

**Daughtercard Connector Header, Keying Components and Hardware:** CRES 300 series PER ASTM A582/A582M

**ORDERING CHART**



**GUIDE HARDWARE ORDERING CHART**



*Please contact the factory or your IEH representative for price and delivery information*

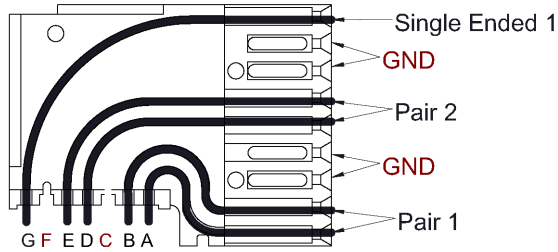
All information contained herein is believed to be reliable as of the date of publication, but is subject to change without notice. Current product drawings and specifications are available upon request from IEH.

IEH warrants its products to be free of defects affecting normal use. If any shipment is found to be defective we will accept return for repair or replacement at our option within one year of shipment. IEH is not responsible for incidental or consequential damages arising out of the use of our products.

## PLUG-IN MODULE WAFER TO BACKPLANE PIN MAPPING

### ODD DIFFERENTIAL PLUG IN MODULE

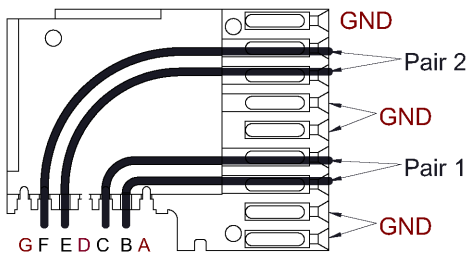
Daughter Card Mating Face



Daughter Card Row						
A	B	C	D	E	F	G
Pair 1	GND	Pair 2	GND	Single Ended 1		

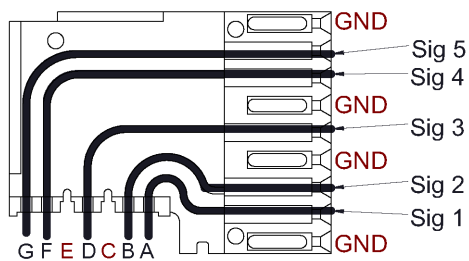
Daughter Card Row PCB Face

### EVEN DIFFERENTIAL PLUG IN MODULE



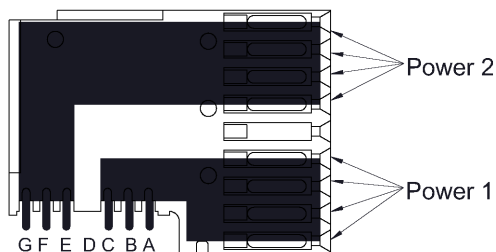
Daughter Card Row						
A	B	C	D	E	F	G
GND	Pair 1	GND	Pair 2	GND		

### SINGLE-ENDED PLUG IN MODULE



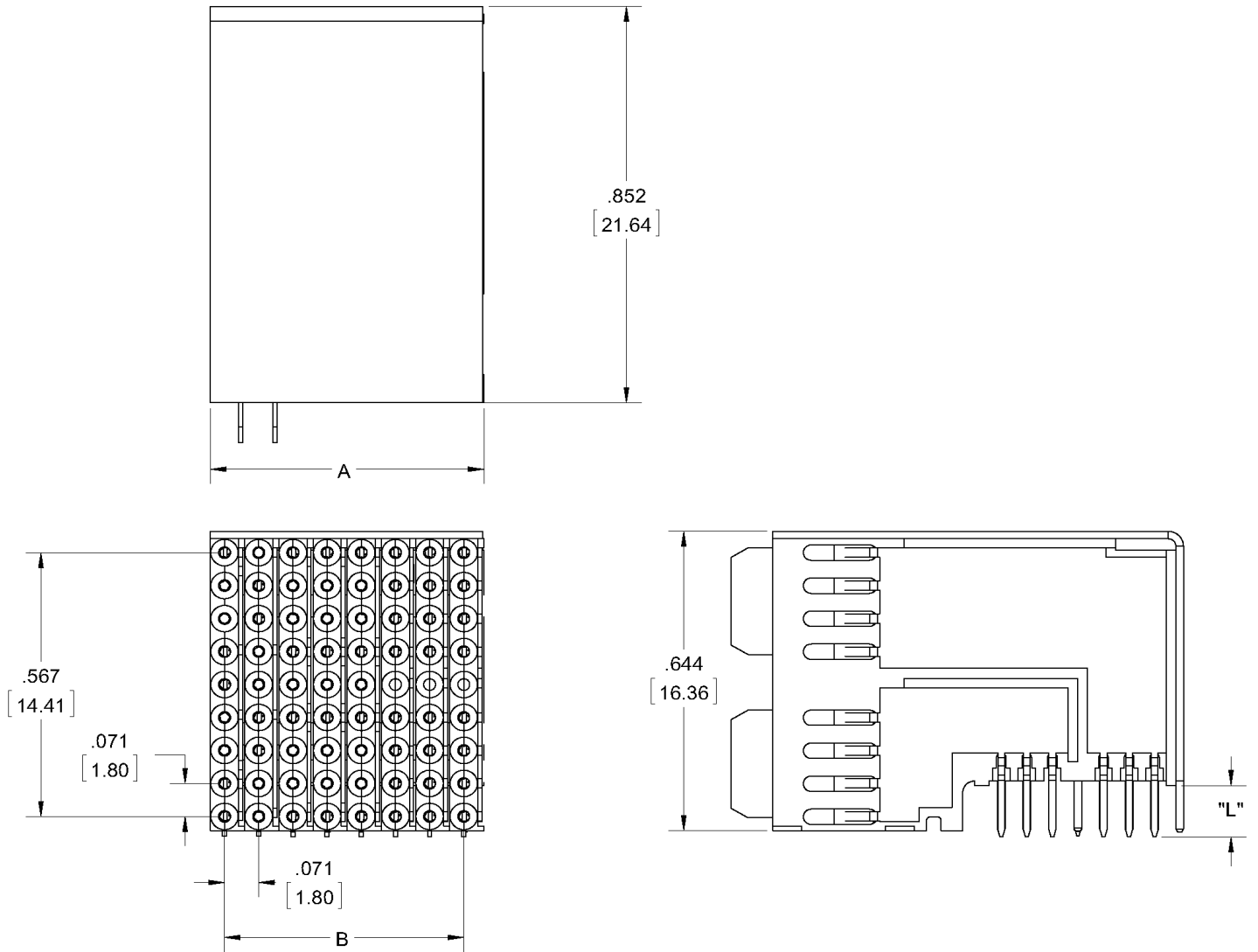
Daughter Card Row						
A	B	C	D	E	F	G
Sig 1	Sig 2	GND	Sig 3	GND	Sig 4	Sig 5

### POWER PLUG IN MODULE



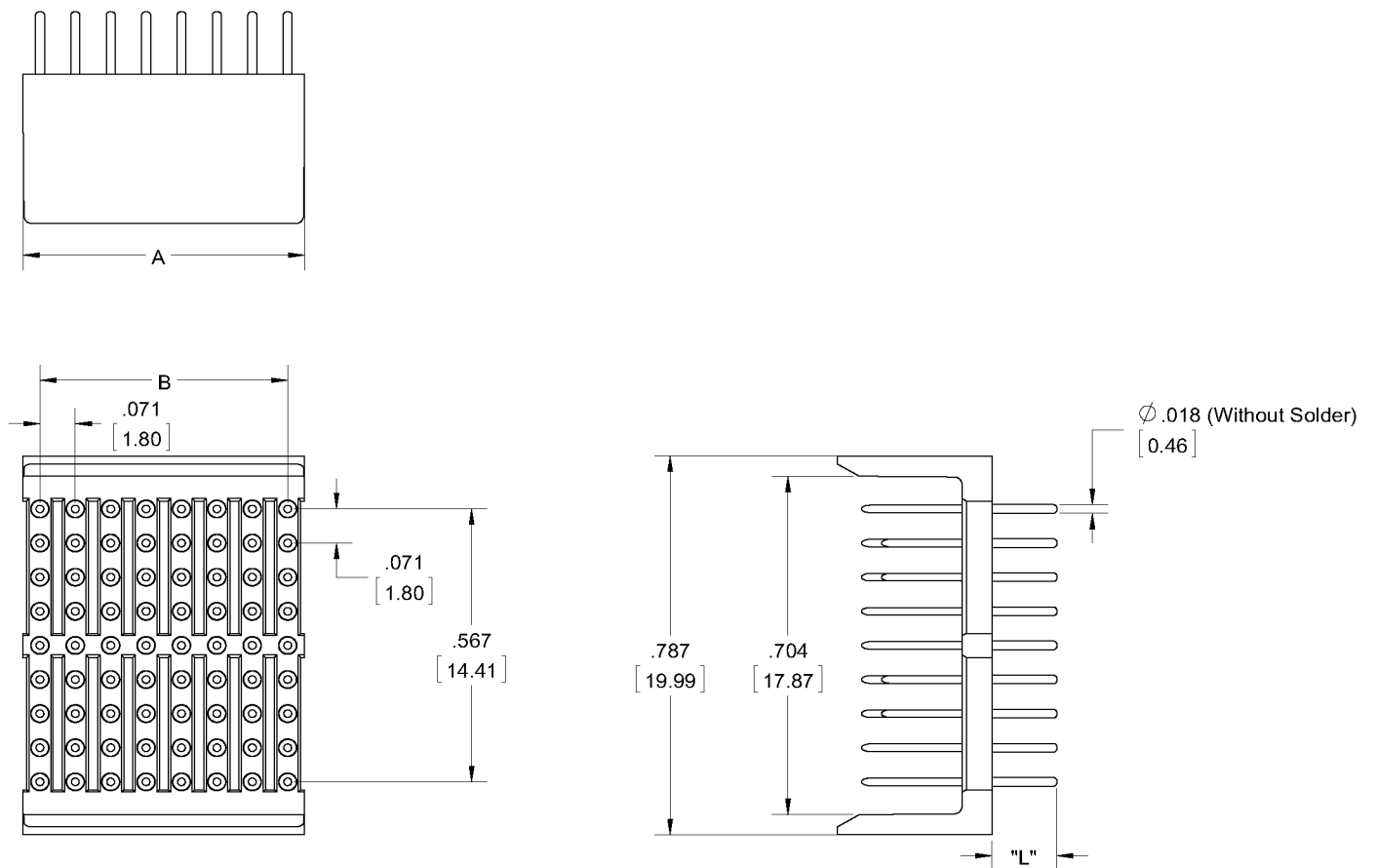
Daughter Card Row						
A	B	C	D	E	F	G
Power 1	NOT USED	Power 2				

**P0 & P1  
DAUGHTERCARD CONNECTOR DIMENSIONS**



CONNECTOR	A	B
P0	.567 [14.40]	.496 [12.60]
P1	1.134 [28.80]	1.063 [27.00]

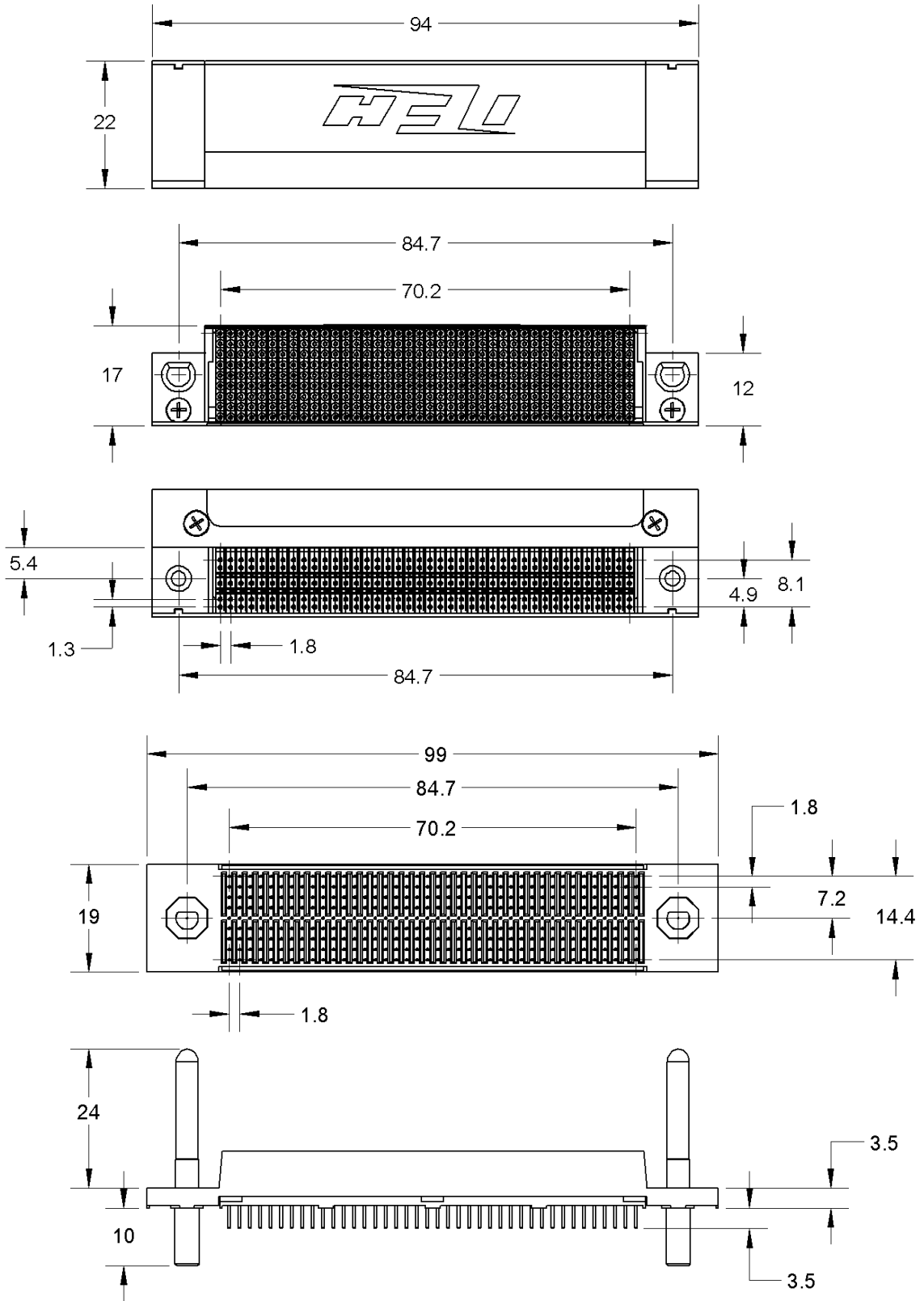
## P0 & P1 BACKPLANE CONNECTOR DIMENSIONS



CONNECTOR	A	B
P0	.564 [14.33]	.496 [12.60]
P1	1.131 [28.73]	1.063 [27.00]

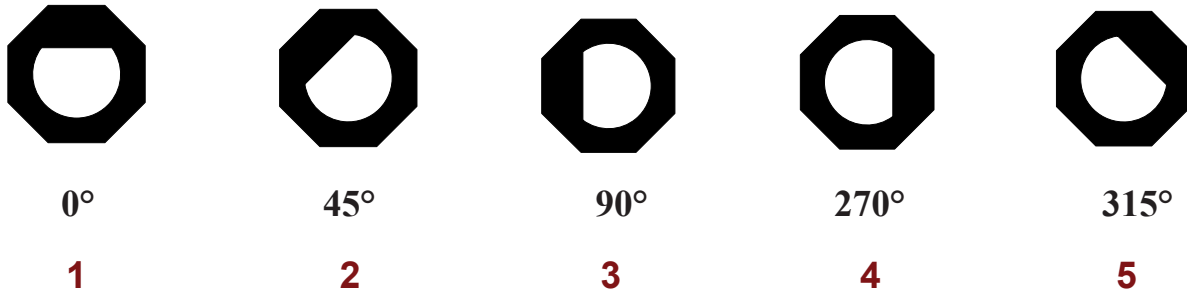
### 3U CONFIGURATION WITH SHELL DAUGHTERCARD & BACKPLANE CONNECTOR DIMENSIONS

\*Dimensions are in millimeters

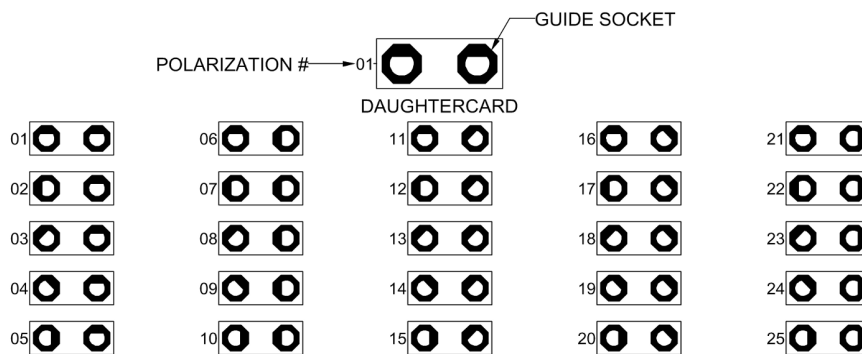


## POLARIZATION CHART USE FOR HARDWARE STYLE: B

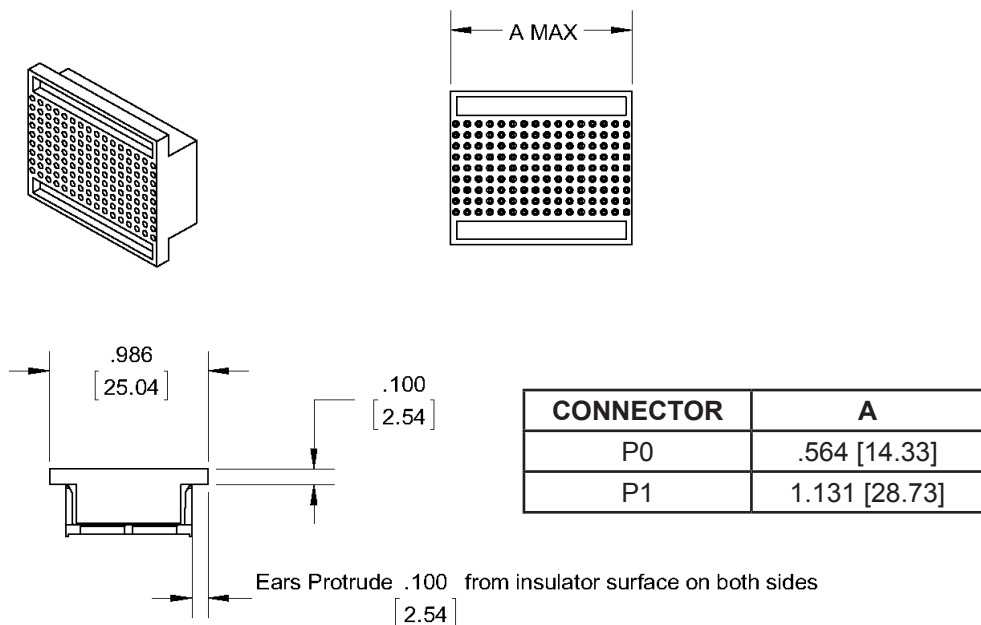
### P0 & P1 CONFIGURATION



### 3US CONFIGURATION WITH SHELL



### Pin Carrier: To be used as an aid for Soldering and Press-in Compliant



\*Delivered assembled to every connector.

## IEH QUALITY STATEMENT

Listening to our customers and meeting their needs while continuously improving our processes and services.



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