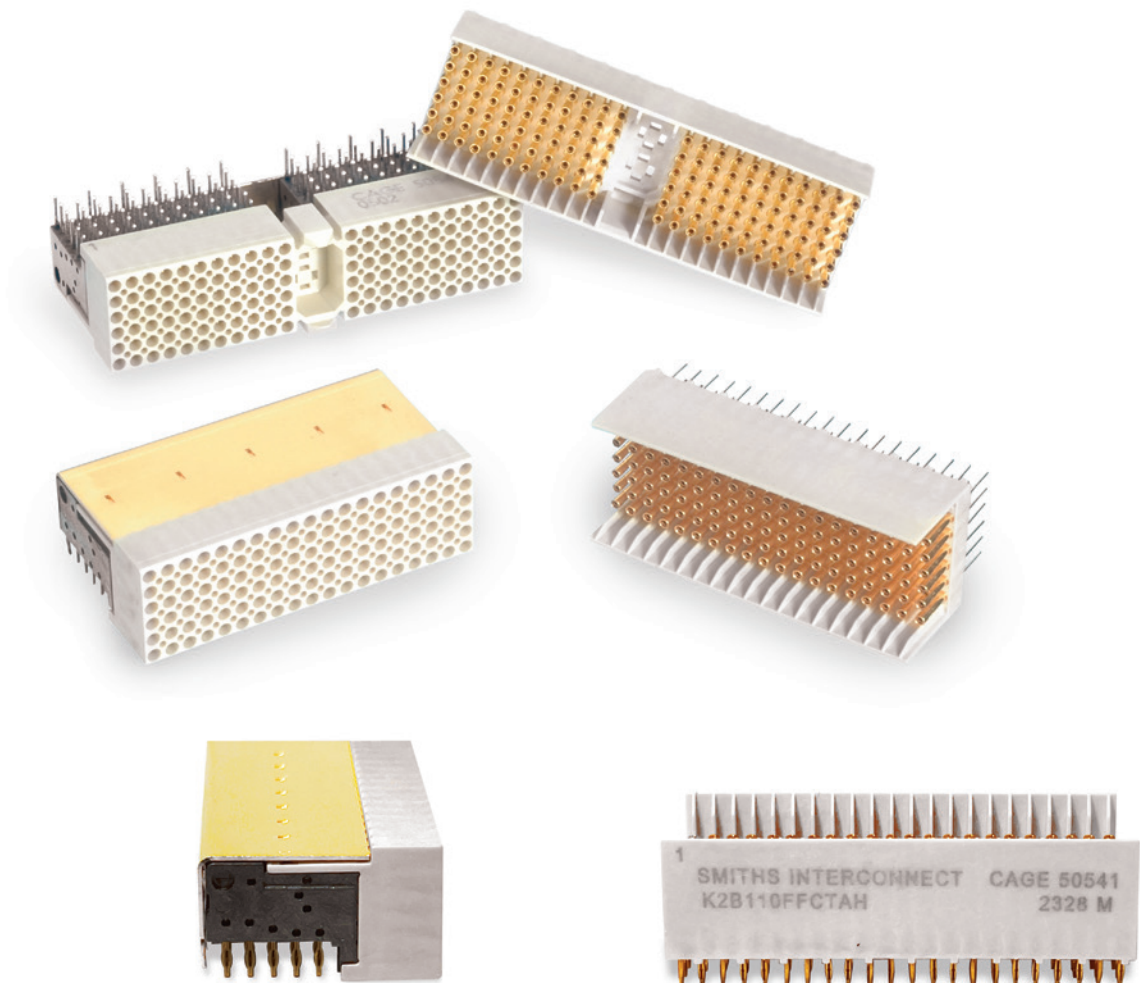


cPCI Series

Ruggedized cPCI (2 mm) Connectors



Hypertac® Hyperboloid Technology

Smiths Interconnect offers an extensive range of superior contact technologies suitable for standard and custom solutions. Hypertac® (HYPERboloid conTACT) is the original superior performing hyperboloid contact technology designed for use in all applications and in harsh and demanding environments where high reliability and safety are critical.

The inherent electrical and mechanical characteristics of the

Hypertac hyperboloid contact ensures unrivalled

performance in terms of reliability, number

of mating cycles, low contact force and

minimal contact resistance. The shape

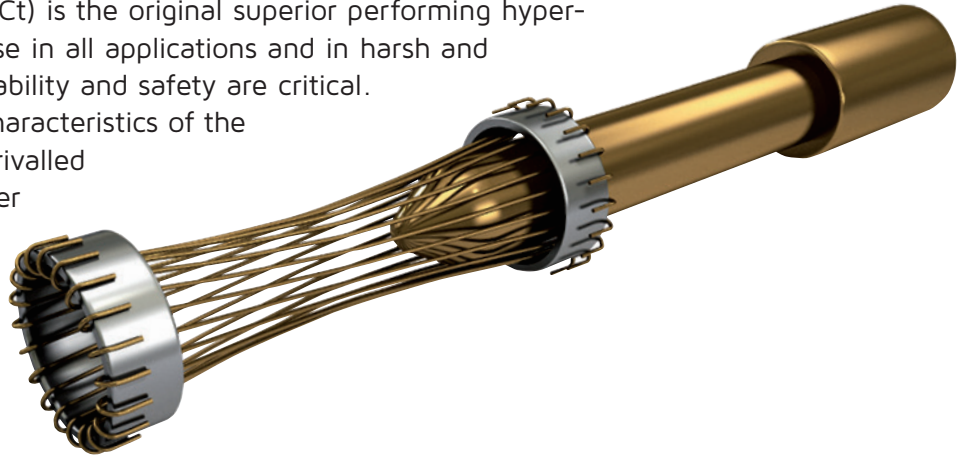
of the contact sleeve is formed by

hyperbolically arranged contact wires,

which align themselves elastically as

contact lines around the pin, providing

a number of linear contact paths.



Features

Low insertion/extraction forces

The angle of the socket wires allows tight control of the pin insertion and extraction forces. The spring wires are smoothly deflected to make line contact with the pin.

Long contact life

The smooth and light wiping action minimizes wear on the contact surfaces. Contacts perform up to 100,000 insertion/extraction cycles with minimal degradation in performance.

Lower contact resistance

The design provides a far greater contact area and the wiping action of the wires insures a clean and polished contact surface. Our contact technology has about half the resistance of conventional contact designs.

Higher current ratings

The design parameters of the contact (e.g., the number, diameter and angle of the wires) may be modified for any requirement. The number of wires can be increased so the contact area is distributed over a larger surface. Thus, the high current carried by each wire because of its intimate line contact, can be multiplied many times.

Immunity to shock and vibration

The low mass and resultant low inertia of the wires enable them to follow the most abrupt or extreme excursions of the pin without loss of contact. The contact area extends 360° around the pin and is uniform over its entire length. The 3 dimensional symmetry of the Hypertac contact design guarantees electrical continuity in all circumstances.

Benefits

High density interconnect systems

Significant reductions in size and weight of sub-system designs. No additional hardware is required to overcome mating and unmating forces.

Low cost of ownership

The Hypertac contact technology will surpass most product requirements, thus eliminating the burden and cost of having to replace the connector or the entire subsystem.

Low power consumption

The lower contact resistance of our technology results in a lower voltage drop across the connector reducing the power consumption and heat generation within the system.

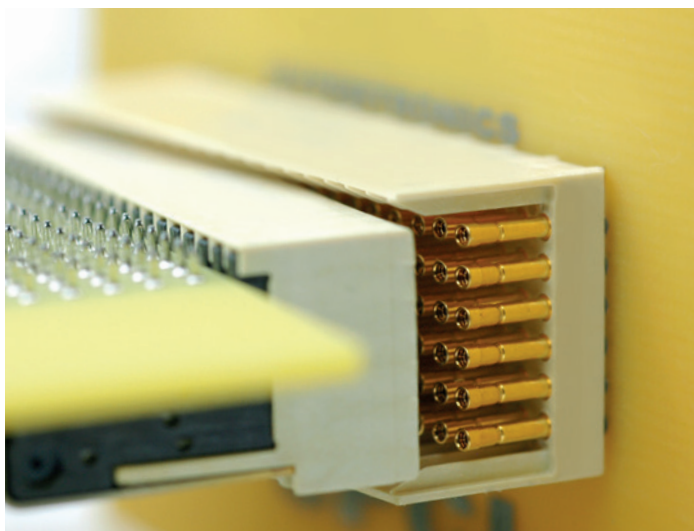
Maximum contact performance

The lower contact resistance of the Hypertac contact reduces heat build-up; therefore Hypertac contacts are able to handle far greater current in smaller contact assemblies without the detrimental effects of high temperature.

Reliability under harsh environments

Harsh environmental conditions require connectors that will sustain their electrical integrity even under the most demanding conditions such as shock and vibration. The Hypertac contact provides unmatched stability in demanding environments when failure is not an option.

cPCI Connector Series



Smiths Interconnect's ruggedized 2 mm cPCI Series addresses the market need for a high reliability connector solution which meets the mechanical footprint and electrical performance of the Compact PCI specification. Highly optimized for durability and high speed performance, the cPCI connectors utilize the superior Hypertac hyperboloid contact technology. The 0.4 mm Hypertac contacts in the backplane provide a current rating of 1 A and data rate performance up to 3.125 Gbps with less than 8 m Ω contact resistance. This combined with optimized lead traces provides exception performance in high speed signal applications.

Our connectors have completed and exceeded rigorous testing from NASA for extreme environmental conditions, including thermal excursions, corrosive atmospheres, excessive shock and vibration and contact engagement/separation cycling. As a result, NASA released specification S-311-P-822 naming Smiths Connectors | Hypertac's 2 mm cPCI as the mandated Compact PCI connector in all NASA space flights.

The 2 mm cPCI Series are the high reliability connectors essential in any mission critical applications that are fully interchangeable with Compact PCI COTS systems and IEC 1076-4-101 compliant.

Rugged 2 mm-footprint cPCI connectors fully interchangeable with compact PCI COTS systems

Features and Benefits

- Rugged implementation of the Compact PCI Standard
 - Fully interchangeable with COTS systems
 - Reverse gender of commercial 2 mm products
 - Physical hole pattern in accordance with cPCI PICMG 2.0
 - Contact identification in accordance with IEC 1076-4 101
- Reliable Hypertac® contact technology
- Qualification testing
 - cPCI Series meets applicable performance requirements of MIL-DTL-55302, EEE-INST-002, GEVS-SE Rev. A and NASA GSFC S-311-P822 specifications.
- Meets cPCI mechanical footprint and electrical performance specifications.
- Modular design for standard 3U/6U configurations
- Highly optimized connector design for high speed data rates, impedance matching, and minimal losses
- Durability
 - Field proven immunity to shock and vibration
 - Hyperboloid contact enables 360° self-wiping action.
 - Resistant to fretting corrosion
 - EMI/RFI shielding
- Superior lead traces provide excellent performance in high speed signal applications
- Compatible with standard reflow soldering processes
- Delivers the high reliability essential in military/aerospace applications
- Solder tail and press-fit terminations available

Technical Characteristics

3U/6U form factor	P1/P4		P2/P5	P3	J1/J4	J2/J5	J3
Part Number	K2A110FMD		K2B110FMD	K2B095FMD	K2A110FFD	K2B110FFD	K2B095FFD
Design Criteria	IEC 1076-4 101						
Quality Conformance Inspections	K2 Series: MIL-DTL-55302 311P Series: NASA GSFC S-311-P-822 ⁽¹⁾						
Contact Gender	Male Pin				Female Socket		
Contact Spacing (mm [in.])	2.00 [0.079]						
Number of Contacts	110 signal, 22 ground			95 signal, 19 ground	110 signal, 22 ground		95 signal, 19 ground
Max. Allowable Gap Between Mating Connectors (mm [in.])	1.00 [0.039]						
Suggested PCB Hole Diameter ⁽²⁾ (mm [in.])	Solder Tail: 0.71 [0.028] ±0.05 [0.002] after plating Press Fit: 0.65 [0.026] ±0.05 [0.002] after plating				Solder Tail: 0.60 [0.023] ±0.05 [0.002] after plating Press Fit: 0.60 [0.023] ±0.05 [0.002] after plating		

Materials

Contact Termination (<i>Solder tail</i>)	63/37 tin lead plated	Gold or 63/37 tin lead dipped
Contact Termination (<i>Press fit</i>)	90/10 tin lead per MIL-P-81728	
Insulation	30% glass-filled LCP (<i>meets NASA outgassing specification</i>)	
Contact	Beryllium copper	Beryllium copper socket wires, brass body
Mating Contact	50 µin gold/50 µin nickel min.	

Mechanical and Environmental

Temperature Range	-55 °C to 125 °C					
Flammability Range	94 V-O					
Weight (<i>Solder tail</i>) (g [oz.])	15.6 [0.55]	15.0 [0.53]	10.8 [0.38]	10.8 [0.38]	12.67 [0.45]	8.8 [0.31]
Mating Force (N [lb.])	73 [16.28]/59 [13.2] average per mating connect pair					
Contact Life Cycle	> 4,000 per mated connector pair					
Vibration (<i>Sinusoidal</i>)	Frequency 10 Hz to 2,000 Hz at 15 G (MIL-DTL-55302)(NASA GSFC S311-P-822)					
Vibration (<i>Random</i>)	Fight chassis unit level vibration (NASA Goddard SE Rev 1)					
Mechanical Shock	100 G peak value (NASA GSFC S311-8220)					

Electrical

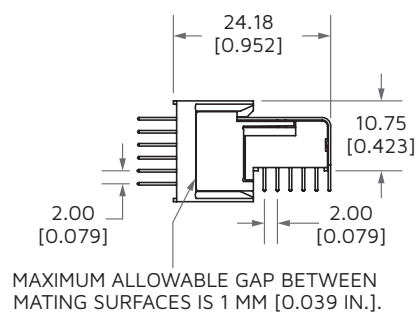
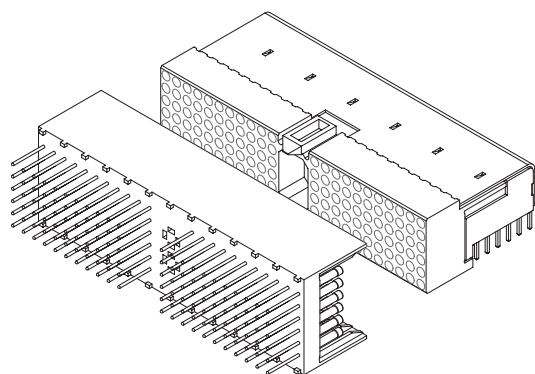
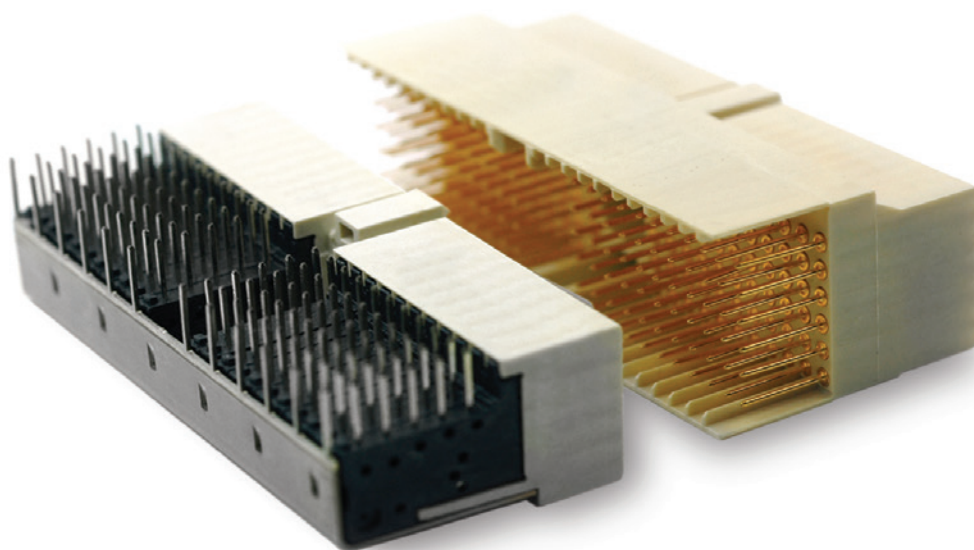
Insulation Resistance	>5,000 MΩ
Resistance at Rated Current (CRD)	4.85 mΩ
Low Level Contact Resistance (LLCR)	7.20 mΩ average
Dielectric Withstanding Voltage (DWV)	1,000 V RMS

(1) K2 Series: Standard cPCI, Standard and Press-fit cPCI
311P Series: NASA Goddard cPCI

(2) See *Application guide S5089*

Dimensions

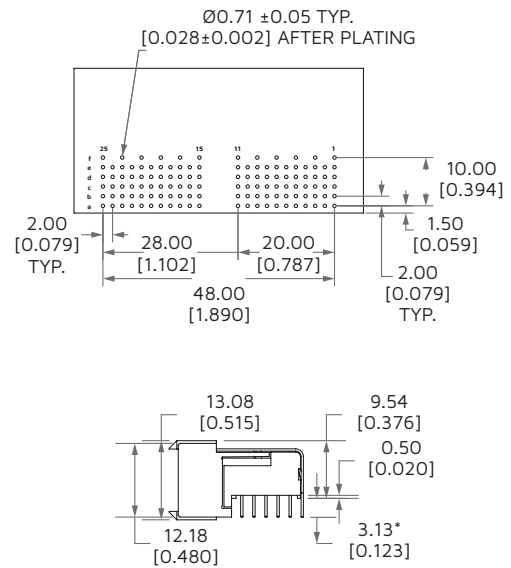
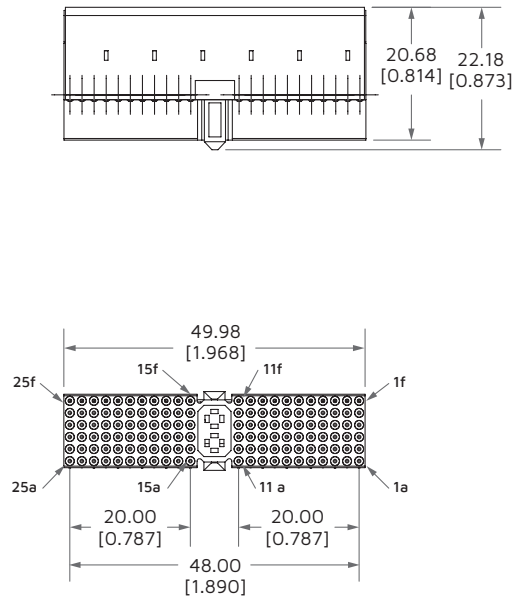
Mated Pair



Dimensions are in inches [mm]

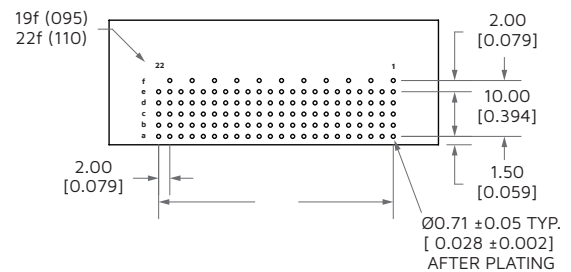
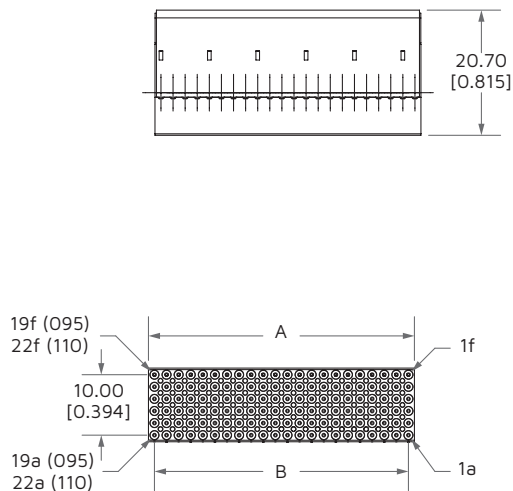
K2A Daughtercard Connectors (Male)

Part number K2A110FMDTBH



Component side of PCB

Part Numbers K2B095FMD and K2B110FMD



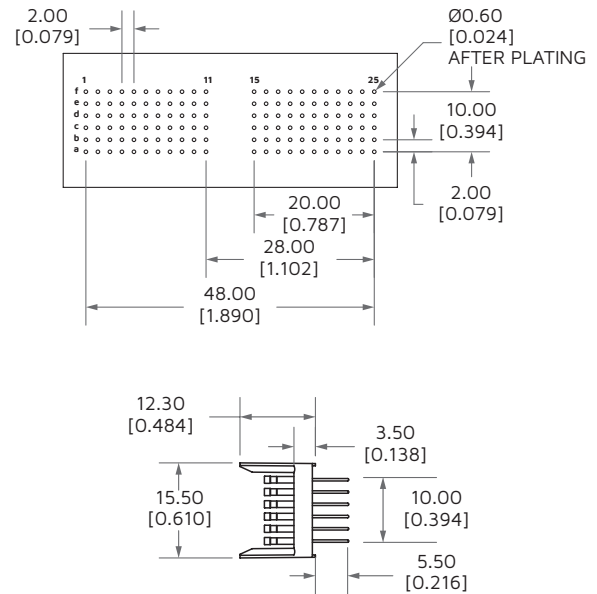
Component side of PCB

Part number	A	B
K2B095FMD	37.98 [1.495]	36.00 [1.417]
K2B110FMD	43.98 [1.731]	42.00 [1.654]

Note Reference ordering information for additional termination length options

Dimensions are in inches [mm]

Part number K2A110FFDTABH



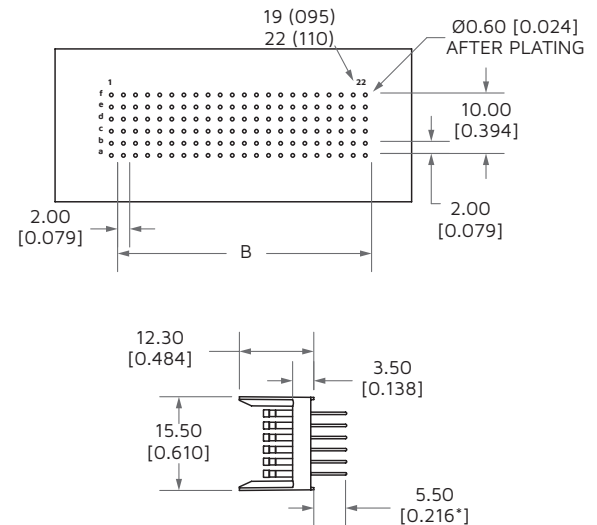
Component side of PCB

Figure 1 consists of two schematic diagrams, (a) and (b), illustrating a semiconductor device.

(a) Top view: A rectangular region of width A is shown. Along the top edge of this region, there is a series of vertical lines, representing a comb-like structure or a series of contacts.

(b) Cross-sectional view: A cross-section of the device is shown, with width B . The structure consists of several layers and features:

- 1f**: Points to the top surface of the device.
- 1a**: Points to the bottom substrate layer.
- 19a (095)**: Points to a layer above the substrate, which appears to be a thin film or a layer of material.
- 22a (110)**: Points to a layer above the 19a (095) layer, which contains a pattern of circular features (possibly vias or holes).



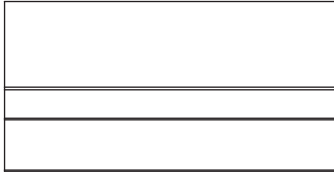
Component side of PCB

Part number	A	B
K2B095FFD	37.98 [1.495]	36.00 [1.417]
K2B110FFD	43.98 [1.731]	42.00 [1.654]

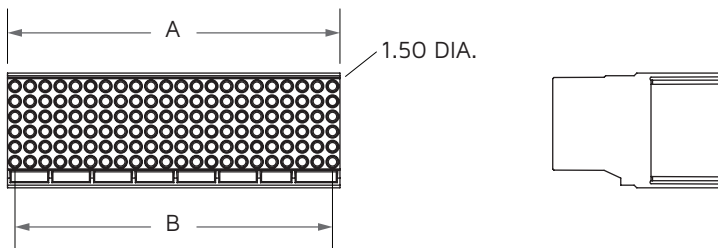
Dimensions are in inches [mm]

Adapters and Fixtures

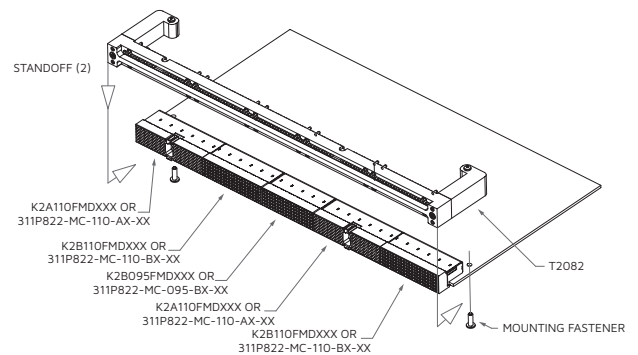
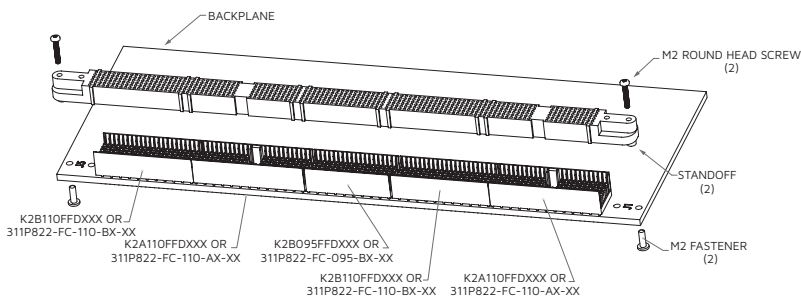
ZK2 Backplane Solder Fixtures



FIXTURE NUMBER	PART NUMBER	A	B
ZK2095-005	K2B095FFDTABH	37.98 [1.495]	36.00 [1.417]
ZK2110-006	K2B110FFDTABH	43.98 [1.731]	42.00 [1.654]
ZK2110-007	K2A110FFDTABH	49.98 [1.968]	48.00 [1.890]



3U and 6U Solder Alignment Tooling



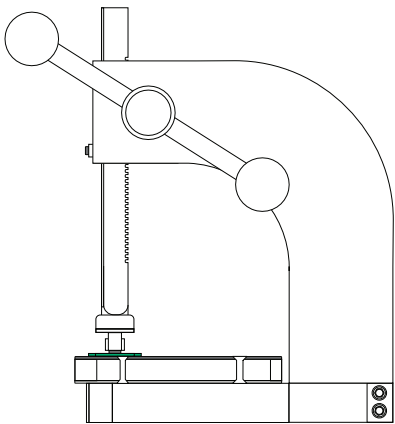
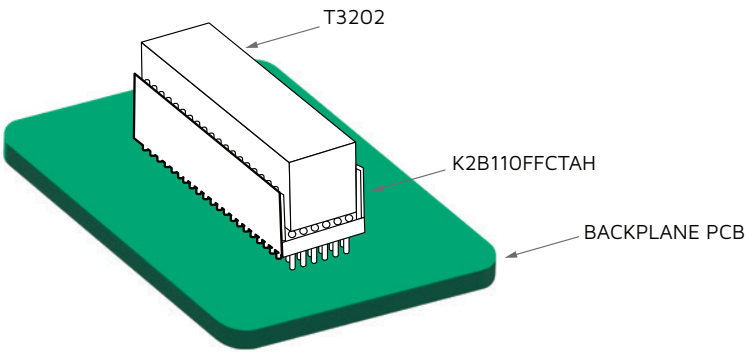
Alignment tool	Description	Work instructions
T3042	Standard 3U cPCI backplane	S50678
T3043	Standard 3U cPCI daughtercard	S50569
T2066	Standard 6U cPCI backplane	S50475
T2082	Standard 6U cPCI daughtercard	S50476

Dimensions are in inches [mm]

Backplane Press-fit Installation Tooling

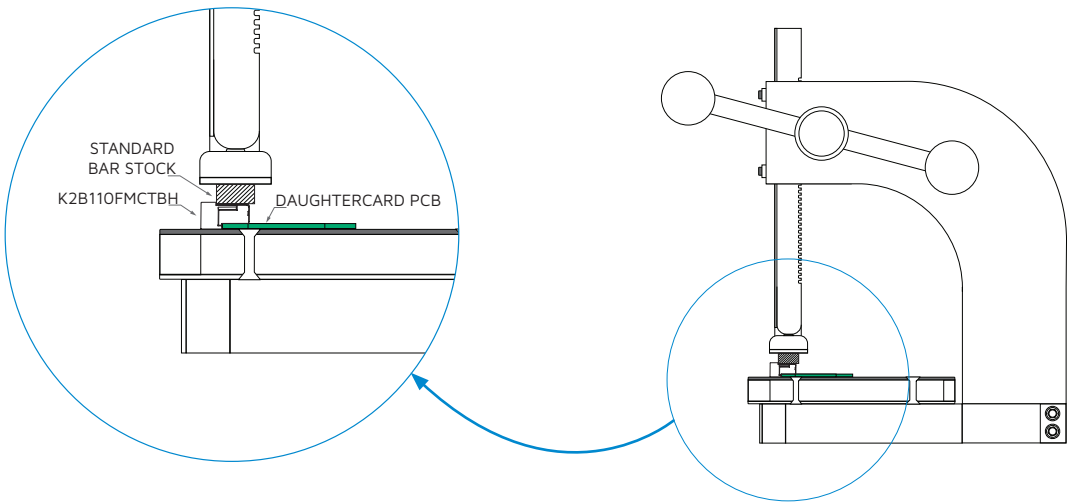
The press-fit tooling provides an economical method for stabilizing and evenly distributing forces on the socket contacts while pressing the backplane connectors. See *Application guide S50894* for specifics installation instructions

FIXTURE NUMBER	PART NUMBER
T3201	K2A110FFCTAH
T3202	K2B110FFCTAH
T3203	K2B095FFCTAH
T3204	K2C055FFCTAH



Daughtercard Press-Fit Installation Tooling

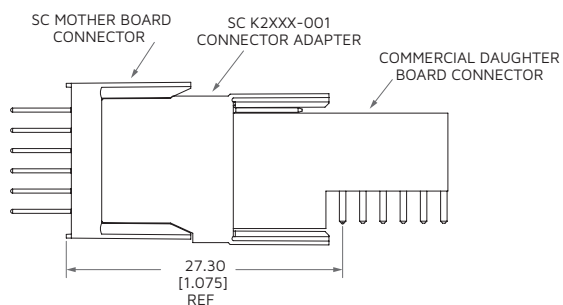
The daughtercard connectors can be installed in a similar fashion as above using the backplane installation tooling, listed above, or a piece of bar stock and a press. See *Application guide S50894* for specifics installation instructions.



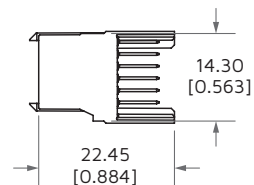
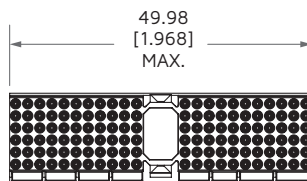
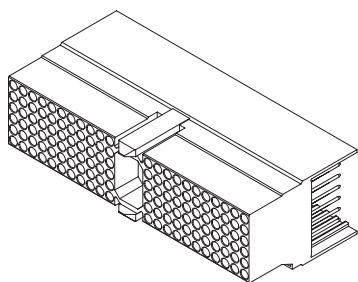
K2 Mated Test Adapter

Part Number K2XXX-0001

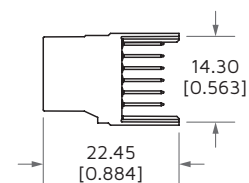
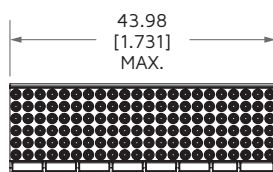
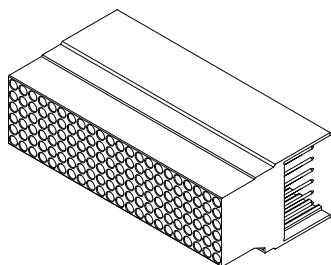
Designed to mate a COTS daughter board connector to a Smiths Connectors' mother board connector.



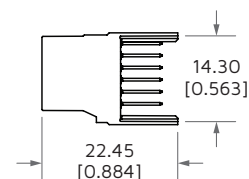
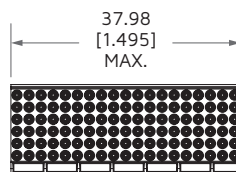
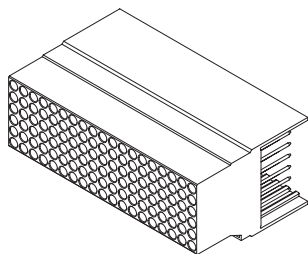
K2A110-0001



K2B110-0001



K2B095-0001

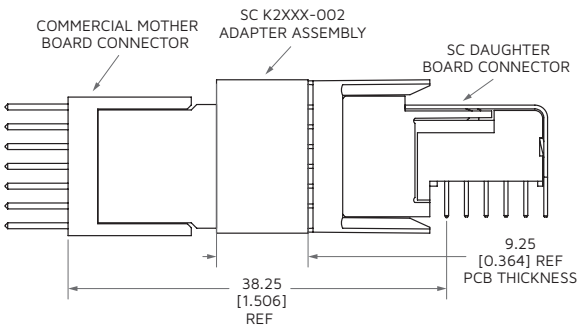


Dimensions are in inches [mm]

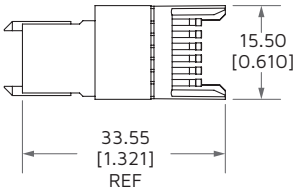
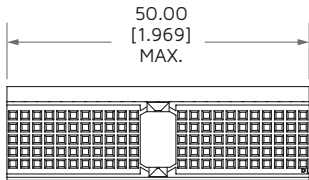
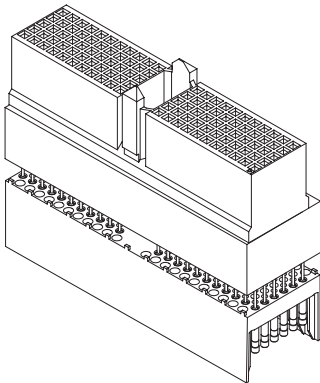
K2 Mated Test Adapter

Part Number K2XXX-0002

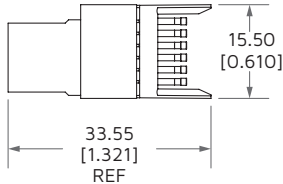
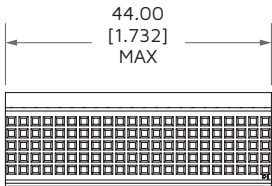
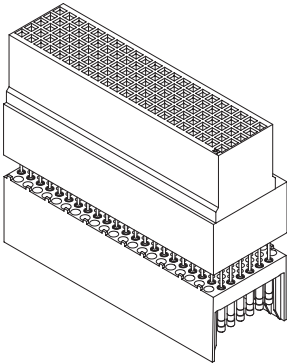
Designed to mate a COTS motherboard connector to a Smiths Connectors' daughter board connector.



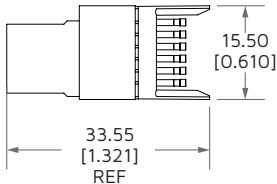
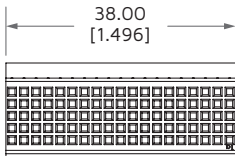
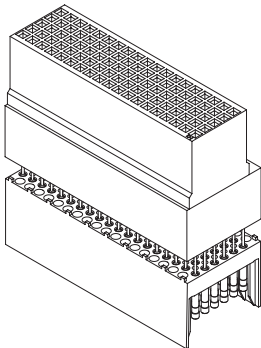
K2A110-0002



K2B110-0002



K2B095-0002



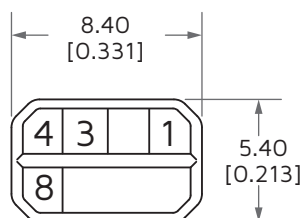
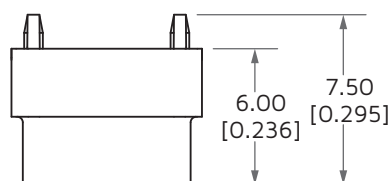
Dimensions are in inches [mm]

Keying Option

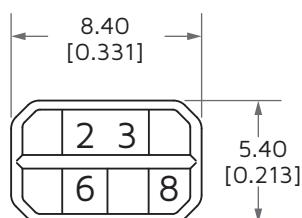
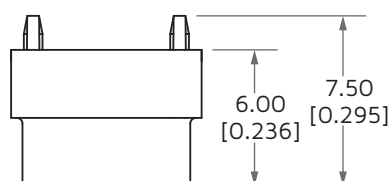
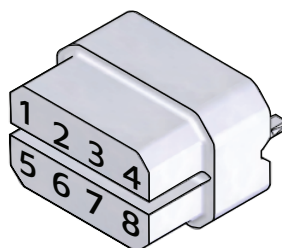
Multi-Purpose Centre Keying

Material: 30% glass-filled LCP (meets NASA outgassing requirements)

Color: Natural



Example for code 1348



Example for code 2368

Male PCB matching codes	MPC key part number
1234	ZK2000-002-01
1236	ZK2000-002-03
1237	ZK2000-002-04
1238	ZK2000-002-05
1246	ZK2000-002-07
1247	ZK2000-002-08
1268	ZK2000-002-14
1345	ZK2000-002-16
1348	ZK2000-002-19
1357	ZK2000-002-21
1358	ZK2000-002-22
1378	ZK2000-002-25
1457	ZK2000-002-27
1467	ZK2000-002-29
1478	ZK2000-002-31
1568	ZK2000-002-33
1678	ZK2000-002-35
2346	ZK2000-002-37
3467	ZK2000-002-59
3478	ZK2000-002-61
4678	ZK2000-002-69

Intermates with

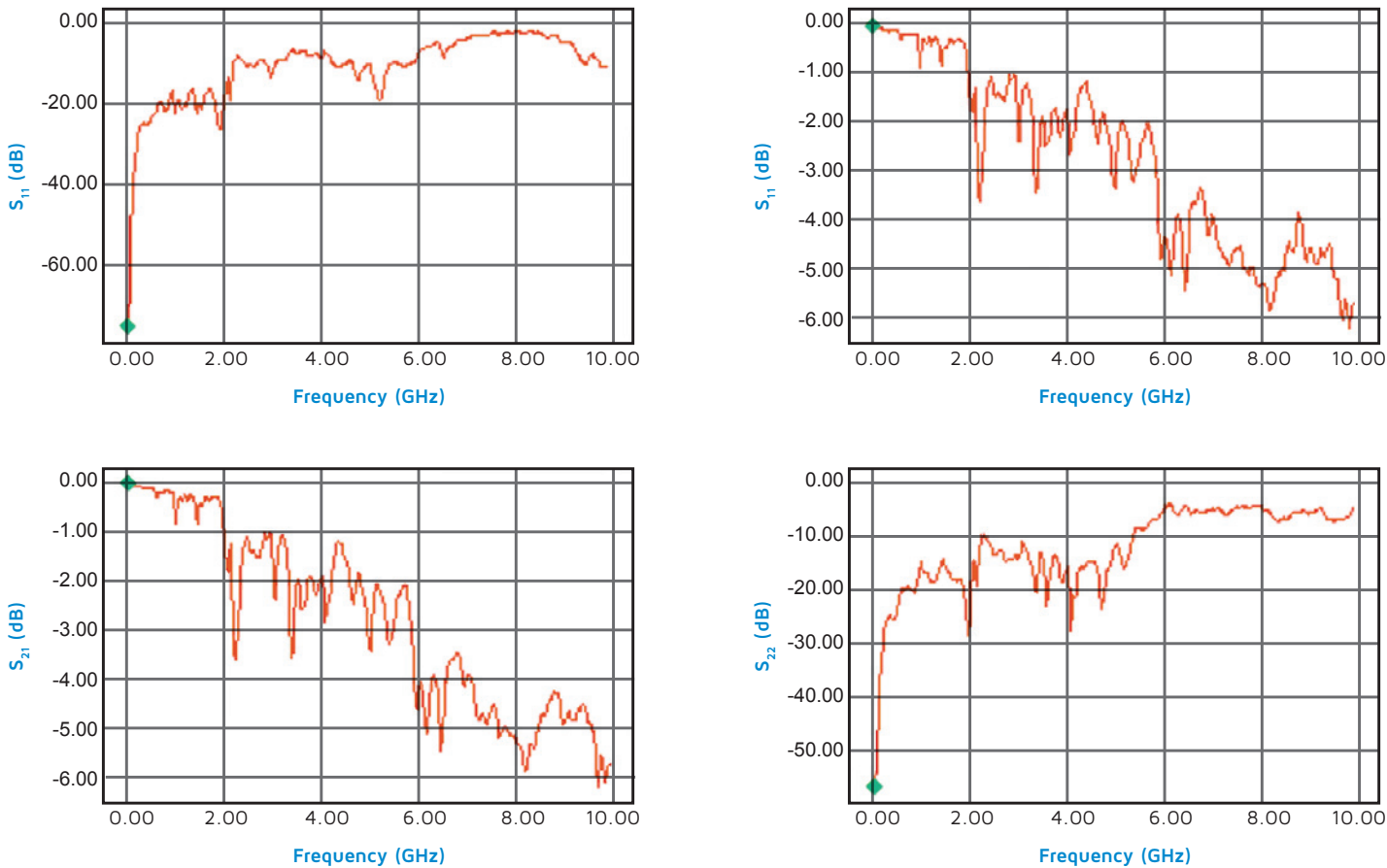


Female backplane matching codes	MPC key part number
5678	ZK2000-001-01
4578	ZK2000-001-03
4568	ZK2000-001-04
4567	ZK2000-001-05
3578	ZK2000-001-07
3568	ZK2000-001-08
3457	ZK2000-001-14
2678	ZK2000-001-16
2567	ZK2000-001-19
2468	ZK2000-001-21
2467	ZK2000-001-22
2456	ZK2000-001-25
2368	ZK2000-001-27
2358	ZK2000-001-29
2356	ZK2000-001-31
2347	ZK2000-001-33
2345	ZK2000-001-35
1578	ZK2000-001-37
1258	ZK2000-001-59
1256	ZK2000-001-61
1235	ZK2000-001-69

Dimensions are in inches [mm]

Performance

Differential S-Parameter⁽¹⁾⁽²⁾



Propagation Delay and Skew

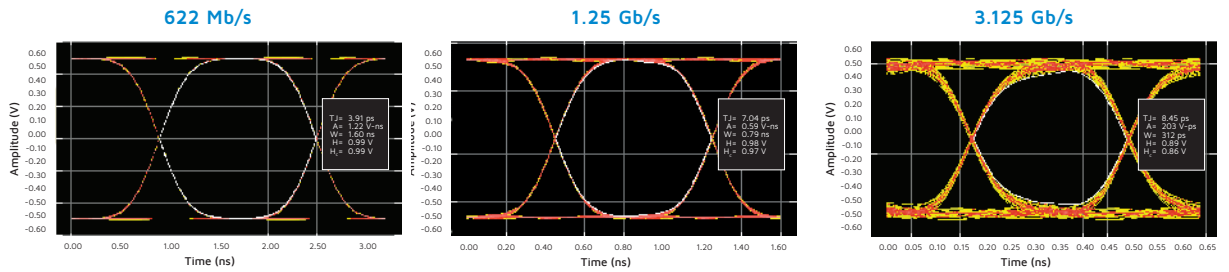
Parameter	Connector row				
	A	B	C	D	E
Propagation Delay (ps)	68	90	112	134	156
Skew (ps)	22		22	22	22
Maximum Data Rate ²	3.125 Gb/s				

(1) Pattern illustrated in the figure on next page was used in the S-parameter and cross talk measurements.
(2) Please refer to the full characterization test report for details.

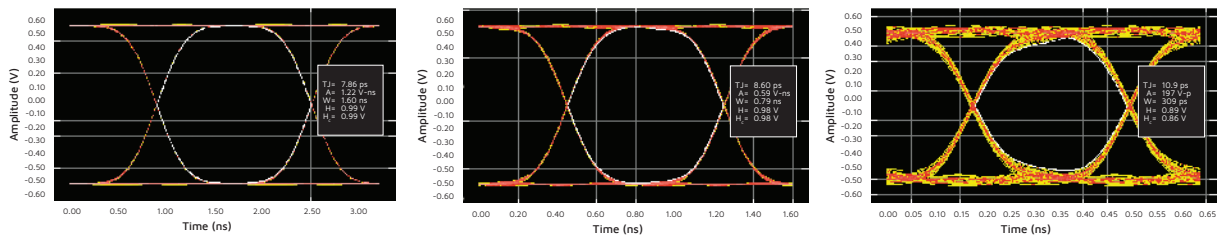
Dimensions are in inches [mm]

Connector Eye Pattern Diagram⁽¹⁾⁽²⁾

Intrinsic

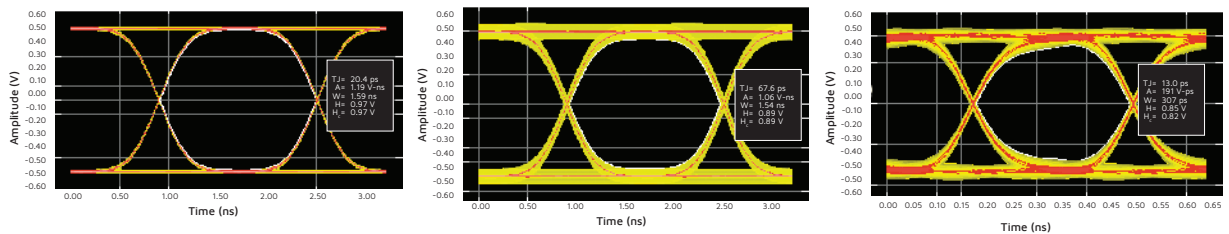


Inclusion of PCB VIAs



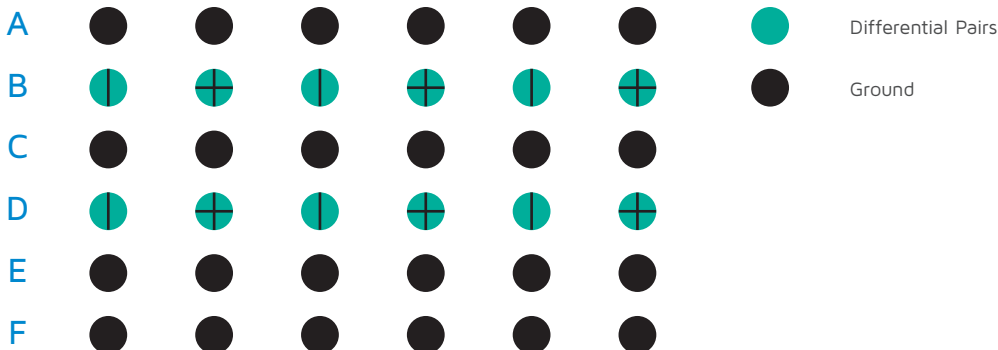
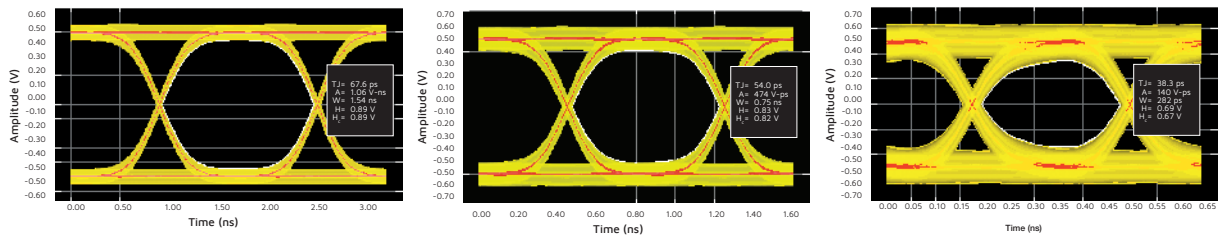
Inclusion of Near End Cross Talk

(Aggressor/Victim = 30%)



Inclusion of Near End Cross Talk

(Aggressor/Victim = 120%)



- (1) Pattern illustrated in the figure on next page was used in the S-parameter and cross talk measurements.
 (2) Please refer to the full characterization test report for details.

Dimensions are in inches [mm]

Part Numbers

	S-311-P-822 P/N	Standard P/N	Press-Fit P/N	Number of	MPC Polarization	Tail Length ⁽³⁾
	Solder Tail Termination ⁽¹⁾		Press-Fit Termination ⁽²⁾	Contacts	Feature	mm [in.]
Backplane	-	K2C055EFD4TABH	K2C055FFCTAH	55	-	-
	311P822-FC-095-BS-D	K2B095FFDTABH	K2B095FFCTAH	95	-	5.50 [0.216]
	311P822-FC-095-BS-D4	K2B095FFD4TABH			-	4.22 [0.166]
	311P822-FC-110-AS-D	K2A110FFDTABH	K2A110FFCTAH	110	Included ⁽⁴⁾	5.50 [0.216]
	311P822-FC-110-AS-D4	K2A110FFD4TABH				4.22 [0.166]
	311P822-FC-110-BS-D	K2B110FFDTABH	K2B110FFCTAH		-	5.50 [0.216]
	311P822-FC-110-BS-D4	K2B110FFD4TABH			-	4.22 [0.166]
Daughtercard	-	K2C055EMD4TBH	K2C055FMCTBH	55	-	-
	311P822-MC-095-BS-D	K2B095FMDTBH	K2B095FMCTBH	95	-	3.12 [0.123]
	311P822-MC-095-BS-D4	K2B095FMD4TBH			-	4.20 [0.166]
	311P822-MC-110-AS-D	K2A110FMDTBH	K2A110FMCTBH	110	Included ⁽⁴⁾	3.12 [0.123]
	311P822-MC-110-AS-D4	K2A110FMD4TBH				4.20 [0.166]
	311P822-MC-110-BS-D	K2B110FMDTBH	K2B110FMCTBH		-	3.12 [0.123]
	311P822-MC-110-BS-D4	K2B110FMD4TBH			-	4.20 [0.166]

- (1) Solder Tail termination: 50 µin gold over nickel (mating surface only) with tin/lead (63/67) over nickel on solder tail terminations; Other surfaces gold flash (5 µin) over nickel.
- (2) Press Fit termination: 50 µin gold over nickel (mating surface only) with tin/lead (90/10) over nickel, per MIL-P-81728, on compliant terminations.
- (3) Only applies to solder tail terminations.
- (4) The Multi-purpose center (MPC) key is not included and needs to be ordered separately.

Dimensions are in inches [mm]

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