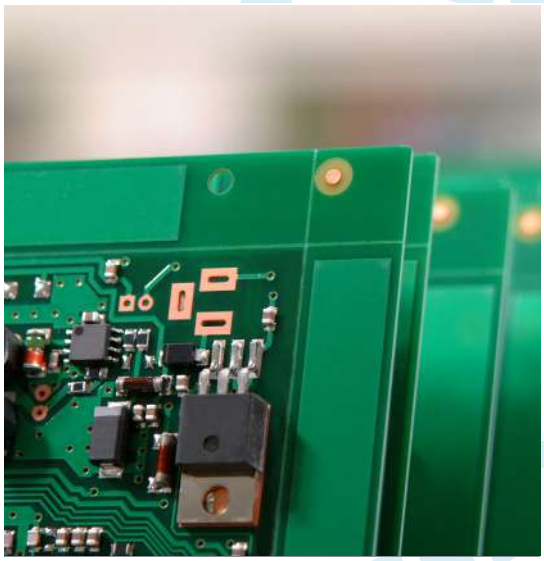
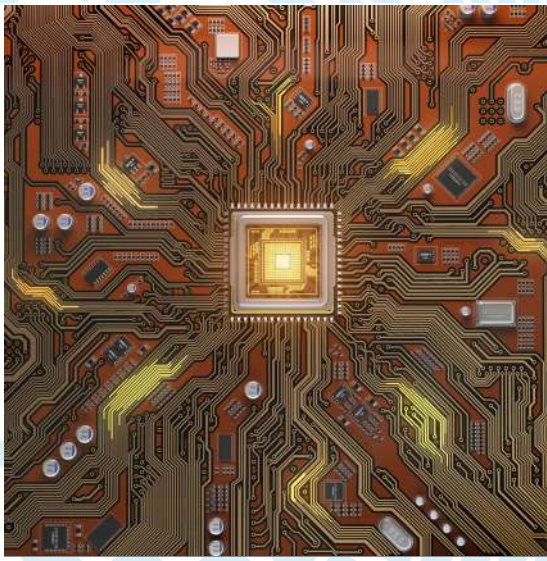
CIN::APSE®





Solderless Compression Connector Technology

cinch
CONNECTIVITY SOLUTIONS
a bel group

belfuse.com/cinch

About Bel

Bel is a publicly traded company that has been operated by the same family for over 65 years. Our history of organic growth and acquisitions have broadened our product portfolio. This has established Bel as a world leader with a diverse offering of power, protection and interconnect products. We design and manufacture these products which are primarily used in the networking, telecommunications, computing, military, aerospace, transportation and broadcasting industries. Bel's portfolio of products also finds application in the automotive, medical and consumer electronics markets.

About CIN::APSE®

CIN::APSE® solderless, high density, custom interconnects are used for board to board, IC to board, flex to board and component to board applications. CIN::APSE® is the most widely implemented crimpless and solderless, high speed, interconnect in the industry. The simple 2-piece, patent protected design enables 50+ Gbps, and wide range of profiles from 0.020" (0.5mm) to 1.0" (25mm). CIN::APSE® contacts are available in 0.020" (0.5mm) and 0.039" (1.0mm) diameters with a standard pitch of 0.039" (1.0mm) or greater. The number of contacts is not limited and the largest connector implemented to date contained 7,396 I/Os. Solderless termination is achieved through compression and the unique contact design assures multiple points of contact per I/O. The CIN::APSE® interconnects have proven reliability under the most extreme mechanical shock and vibration.

Table of Contents

Overview

It takes more than an ordinary connector to support advanced performance interconnect applications. It takes CIN::APSE®, a proven solderless Z-axis connector technology that offers exceptional mechanical and electrical perfomance at signals well above 50GHz.

Innovative Compression-Mount Technology

CIN::APSE® is a unique, Z-Axis compression interconnect which provides superior mechanical and electrical performance. The contact construction consists of randomly wound gold plated molybdenum wire, formed into a cylindrical shape (**Figure 1**). Standard contact diameters are 0.50mm (0.020") and 1.0mm (0.040"). The basic CIN::APSE® contact configuration consists of a contact installed into a customised plastic insulator with the patented Cinch contact retention design (**Figure 2**). Once in place, the contact extends to both sides of the insulator, creating an unmatched electrical connection.

Figure 1

Custom made to your specifications, CIN::APSE® utilises a multi-point contact that can handle signals above 50GHz, while offering a superior combination of small size, low inductance and exceptional resistance to shock, vibration and thermal cycling.

Quick, Solderless Installation

CIN::APSE® is easily installed in two basic steps, without soldering. First, using alignment features, the CIN::APSE® interconnect is positioned between two components - for example PCBs, flexible circuits, ceramic devices etc - with matching connection footprints. Secondly, the two components are compressed and fastened together (**Figure 3**).

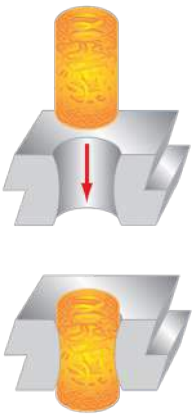


Figure 2

Low Compression Force, Low Contact Resistance

The CIN::APSE® contact offers one of the best force / deflection ratios in the industry. An average compression force of typically 2 ounces (approx. 0.55 N) will yield a contact resistance of less than 15 mΩ. This means high I / O count applications can achieve excellent electrical performance with only minimal Z-Axis compression force (**Figure 4**).

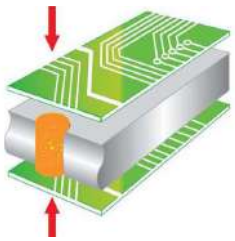
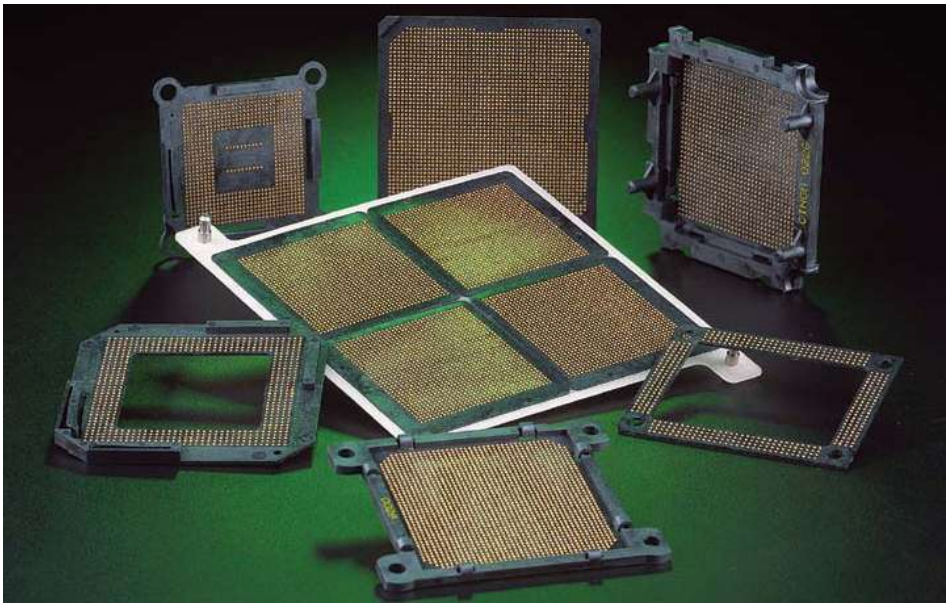


Figure 3



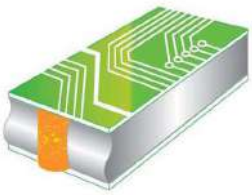


Figure 4

Applications

Military & Aerospace

CIN::APSE® provides the ability to create innovative connector solutions to meet a new generation of interconnect challenges.

CIN::APSE® advanced interconnect solutions include high performance Gyroscopes for in-flight control and stabilisation systems, combined with the next generation of packages connected through CIN::APSE® LGAs and CIN::APSE® Interposers in Digital Instrumentation and Control systems.

CIN::APSE® direct connections provide an innovative yet reliable method of signal routing for commercial in-flight entertainment visual display units, counter measure protection systems, guidance, tracking seeker radars, and electronic control units.

Satellite & Space

CIN::APSE® multi-configuration custom connectors provide a new dimension for planet and deep space exploration, together with the addition of environmental seals for hostile environments.

CIN::APSE® LGAs are lightweight, high contact density and have excellent electrical & mechanical signal properties providing exceptional performance for multipurpose Geostationary Communication Platforms.

CIN::APSE® PCB interposers enable simple routing options for complex multilayer PCB and flex circuits in confined spaces within electronic system units

Radar & Surveillance

CIN::APSE® multipoint compression contact technology provides ideal connector solutions for Advanced Transmitter and Receiver modules on air, land and sea radar platforms. Systems include CEMS / AESA, UAV and lightweight, compact digital surveillance systems.

Telecommunications

Advanced telecommunications for next generation mobile networks and internet access through the use of CIN::APSE® reliability and high speed component technology

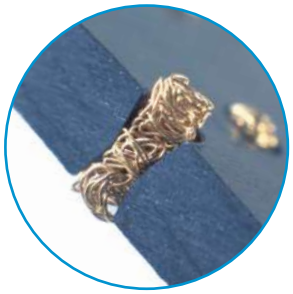
Transport

CIN::APSE® provides the unique ability to make custom interconnector solutions available for electronic displays and sensors where crucial reliability is required within demanding environments.

Computer

CIN::APSE® LGA is the connector of choice for the most demanding CPU / MCM and ASIC-to-board applications. Leading manufactures of high-end servers, routers, high speed switches and mainframes use the CIN::APSE® LGA connector because of it's quick, solderless installation, low compression force and low contact resistance. The CIN::APSE® contact offers one of the best force / deflection ratios in the industry.

Specifications



Features

- High reliability
- High density
- Low mating force
- Low resistance and inductance
- RoHS and REACH compliant
- Solderless
- Custom configured to meet your interface pitch requirements
- Quick turn around for machined prototypes
- EMI protection
- IP rated

Materials

Contact Material	Molybdenum with 20 - 30µin., gold plating
Insulator Housing	Liquid Crystal Polymer / Polyetherimide / Composites / Ceramics
Packaging Material	Anti-static ABS (example)

Environmental

Temperature Life	1,000 hours @ 105°C	<5% resistance change
Thermal Shock	100 cycles -30°C to +100°C	<5% resistance change
Humidity	1,000 hours @ 25°C to 65°C, 85% relative humidity	<20% resistance change
Outgassing	ASTM E595 (NASA)	1.0% Total Mass Loss (TML) 0.1% CVCM

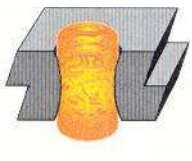
Electrical

Contact Resistance	20mV open circuit @ 100mA	<15mΩ
Current-Carrying Capacity	Maximum current 30°C temperature rise	6.5 Amp on Ø 0.5mm contact
Inductance	Up to 3.05 GHz	<0.75 nH
Insulation Resistance	@ 100 VDC	> 50,000MΩ
Dielectric Withstanding	250 VDC	No breakdown

Mechanical

Vibration	5.4 Gs; 10 - 500Hz; no discontinuity greater than 2 nanoseconds)	No discontinuity
Shock	50 Gs; 11 milliseconds; no discontinuity greater than 2 nanoseconds	No discontinuity

Contact Configurations



Contact Only

Plunger - Contact

Plunger - Contact - Plunger

Contact - Spacer - Contact

Configurations

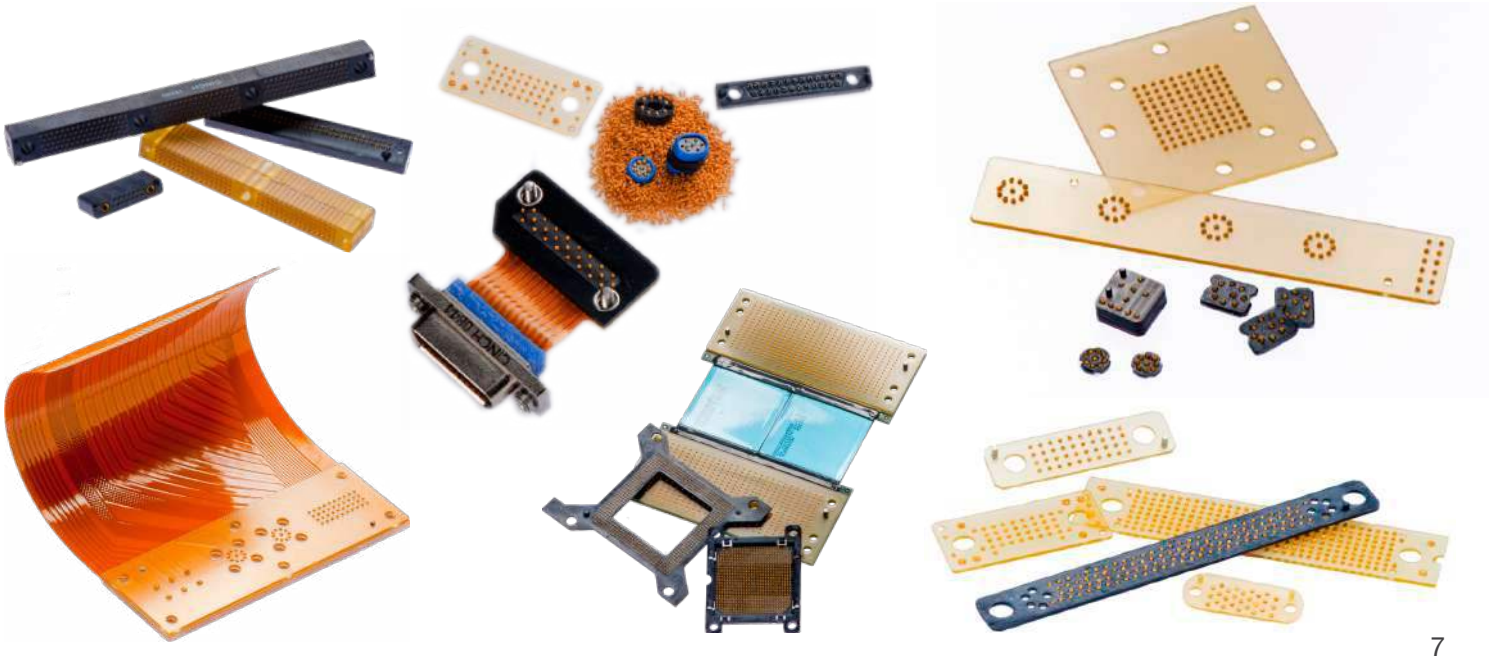
In addition to standard stacking configurations, CIN::APSE® can be custom configured to meet your exact footprint and mated heights.

- Quick-turn machined prototypes (direct comparison with production parts)
- Typical heights ranging from 0.020”-1.5”/0.5-38mm - maximum height not limited
- Multiple insulator materials
- Compression system design on request

Applications

- High Speed Digital devices
- Chip/Device - PCB (LGA)
- PCB - PCB (Interposers)
- Flex Circuit - PCB / Flex Circuit (Interposers)
- LCD - PCB / Flex Circuit (Interconnect)
- Connectors - CIN::APSE® (Solutions)

Requirements	CIN::APSE® Advantage
Solderless	CIN::APSE® provides the advantages of a solderless connection Easy repairs and upgrades in plant or in the field No risk of damaging expensive boards or components Allows for large mismatches in CTE between surfaces
Signal Speed and Integrity	CIN::APSE® can easily handle signal speeds over 50GHz Low inductance of <0.75 nH Low crosstalk and EMI Low signal loss Low circuit resistance of ≤15 - 20mΩ
High Density High I/O Low Profile Light Weight Low Mass	CIN::APSE® is the leader in high I / O and miniaturisation I / O counts in production exceeding 5,000 Standard pitch as small as 1mm (linear pitch); 0.8mm on staggered pitch Mated height as low as 0.020”/0.51mm or up to 1.5”/38mm Contacts are 75-85% air when fully compressed
Reliability	CIN::APSE® has 7-11 points of contacts per contact Mechanical wiping action Extremely stable over time and temperature High contact normal force
Extreme Environment	Temperature range -200°C to +300°C Low mass contact withstands extreme shock and vibration Hermetic sealing



Stacking Connectors

CIN::APSE® stacking connectors can be found in multiple military, aerospace and satellite applications where a mezzanine style PCB layout is utilized to reduce space and weight. CIN::APSE® 1.27mm pitch allows for high density of circuits between boards. The CIN::APSE® mechanical contacts are ideal for applications that require frequent disconnections for modifications or testing. The mechanical contacts also reduce soldering cost and rework.

Custom stacking connectors are also available. Contact customer service at **+1 507.833.8822** or at **ccsorders@us.cinch.com** for more information.

Electrical

Current Rating	3 Amp per position
Maximum Insulation Resistance	< 50MΩ

Mechanical

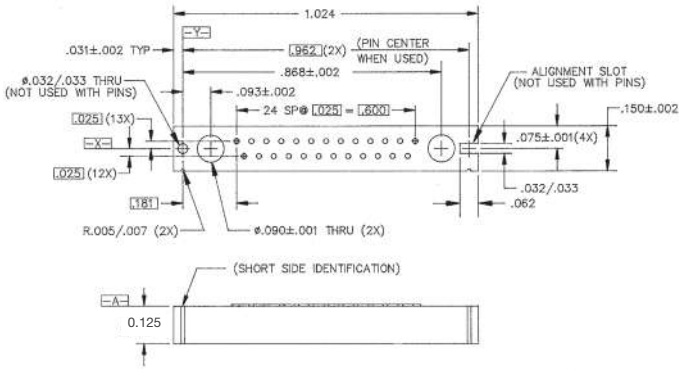
Housing	UL94V-O rated liquid crystal polymer
Plunger	Gold-plated copper alloy
Contact	Gold-plated molybdenum
Operating Temperature	-55 to 125°C
Durability	> 100 mating cycles
Configuration	Plunger, Contact, Plunger

Ordering Information

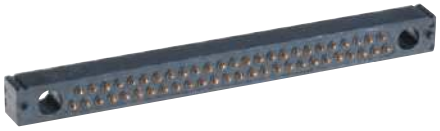
Cinch Part Number	Positions	Rows	Height		Fastener
			in	mm	
3800520001*	25	2	0.125”	3.18	2x #2 Thru Holes (Ø 0.090”)
3800520002	25	2	0.250”	6.35	2x #2 Thru Holes (Ø 0.090”)
3800520004	25	2	0.125”	3.18	2x #2 Thru Holes (Ø 0.090”)
3800520005	25	2	0.250”	6.35	2x #2 Thru Holes (Ø 0.090”)
3800520013*	51	2	0.125”	3.18	2x #2 Thru Holes (Ø 0.090”)
3800520014	51	2	0.250”	6.35	2x #2 Thru Holes (Ø 0.090”)
3800520016	51	2	0.125”	3.18	2x #2 Thru Holes (Ø 0.090”)
3800520017	51	2	0.250”	6.35	2x #2 Thru Holes (Ø 0.090”)
3900520017	83	5	0.277”	7.04	2x #4 Thru Holes (Ø 0.124”)
3900520008	166	5	0.277”	7.04	3x #4 Thru Holes (Ø 0.124”)
3800520038	249	5	0.277”	7.04	4x #2-56 Tapped Insert
3800520042	249	5	0.277”	7.04	4x #4 Thru Holes (Ø 0.124”)

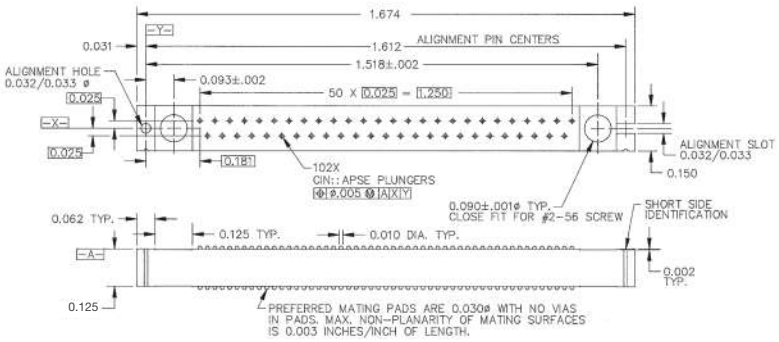
**Stocked part*

3800520001

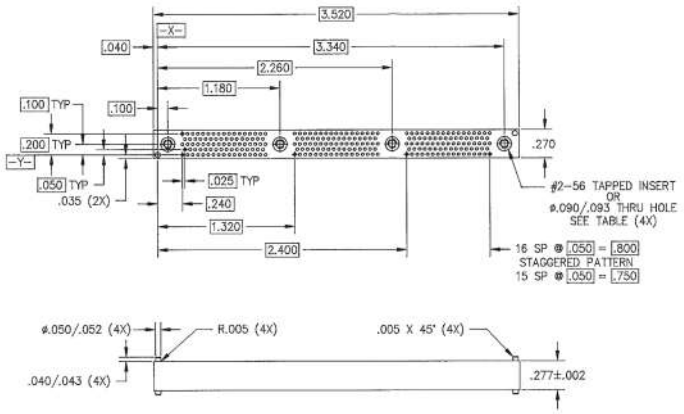


3800520013





3800520038



Note: Drawings not to scale. Additional drawings are available at belfuse.com/cinch

CIN::APSE® Stacking Connector Hardware

CIN::APSE® stacking connectors are solderless surface mount connectors that require compressive force to establish a reliable connection to gold plated PCB pads. These connectors can be used for rigid to rigid PCB mezzanine stacks or rigid to flex PCB configurations. 25 position and 51 position are the two most commonly used CIN::APSE® stacking connectors.

The standard thickness of the CIN::APSE® stacking connector is 0.125", however the 0.250" thick option is readily availble to accomodate larger PCB mounted devices. Both a bolster plate and a compression plate are suggested to maintatin uniform compression, however if space is not available for both plates, the compression plate is recommended to be removed for PCBs 0.093" or thicker.

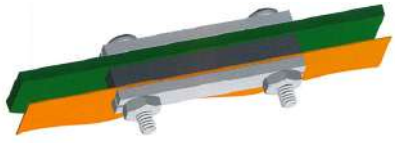
Mounting the stacking connectors requires additional hardware to maintain uniform compressive force across all contacts. Mounting to the PCBs is accomplished using PEM standoffs and screws.

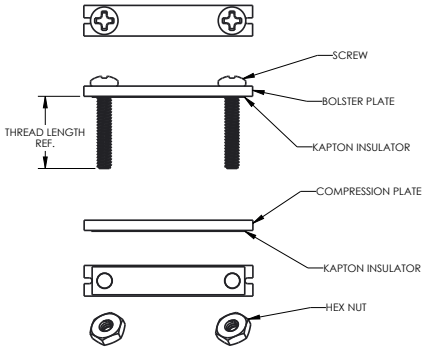
Ordering Information

Stacking Hardware Part Number	Positions	CIN::APSE Thk (in)	CIN::APSE Part Number	PCB 1 Thk (in)	PCB 2 Thk (in)	Stack Up Height (in)
3180299351	25	0.125	3800520001	0.062	Flex (0.016)	0.393
3180299351	25	0.125	3800520001	0.062	0.062	0.439
3180299351	25	0.125	3800520001	0.093	Flex (0.016)	0.424
3180299352	25	0.125	3800520001	0.093	0.062	0.470
3180299352	25	0.125	3800520001	0.093	0.093	0.501
3180299352	25	0.125	3800520001	0.125	Flex (0.016)	0.456
3180299352	25	0.125	3800520001	0.125	0.062	0.502
3180299353	25	0.125	3800520001	0.125	0.093	0.533
3180299353	25	0.125	3800520001	0.125	0.125	0.565
3180299354	166	0.125	3800520013	0.062	Flex (0.016)	0.393
3180299354	51	0.125	3800520013	0.062	0.062	0.439
3180299354	51	0.125	3800520013	0.093	Flex (0.016)	0.424
3180299355	51	0.125	3800520013	0.093	0.062	0.470
3180299355	51	0.125	3800520013	0.093	0.093	0.501
3180299355	51	0.125	3800520013	0.125	Flex (0.016)	0.456
3180299355	51	0.125	3800520013	0.125	0.062	0.502
3180299356	51	0.125	3800520013	0.125	0.093	0.533
3180299356	51	0.125	3800520013	0.125	0.125	0.565

CIN::APSE® Stacking Hardware, Rigid to Rigid

CIN::APSE® Stacking Hardware, Rigid to Flex





Example: 25 POSITION HARDWARE KIT

CIN::APSE® Stacking Connector Jumpers and Assemblies

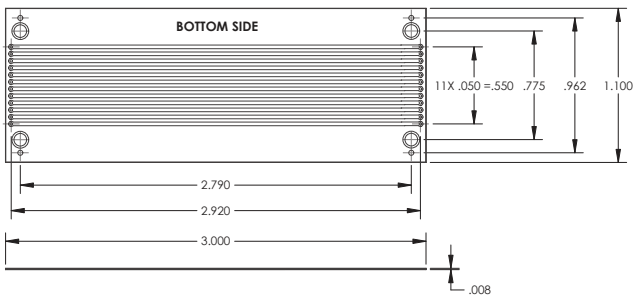
CIN::APSE® stacking connector jumpers are short flex PCB assemblies that are used for coplanar and right angle board to board connections. The jumpers in combination with the CIN::APSE® stacking connectors and hardware provide a full board to board connect system. This system allows rigid-flex-rigid PCB designs to be segmented. By segmenting the designs, modifications and repairs can be done without replacing the entire assembly.

The flex PCB jumpers can be used in flat and formed shapes up to 90°. These jumpers are intended to be assembled with the 25 and 51 positions CIN::APSE® stacking connectors. A stacking connector should be attached at each end of the jumper. The open side of the stacking connectors are then mounted to rigid PCBs. The flex jumpers can be customized for length, pin out and be impedance controlled for the application.

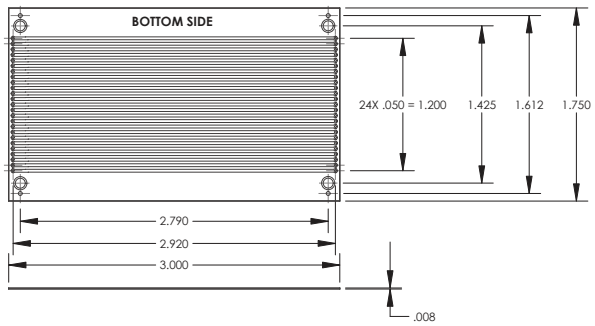
Ordering Information

Stacking Jumper Part Number	Positions	Width		Length		Thickness		Mounting Holes		Alignment Holes		Stacking Connector	Mounting Hardware
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
4631533093	25	1.10”	27.94	3.0”	76.2	0.008”	0.203	4x 0.090”	4x 2.286	4x 0.036”	4x 0.914	3800520001	3180299351 3180299352 3180299353
4631533094	51	1.75”	44.45	3.0”	76.2	0.008”	0.203	4x 0.090”	4x 2.286	4x 0.036”	4x 0.914	3800520013	3180299354 3180299355 3180299356

25 Position



51 Position



Extended Compliant Contact (ECC)

The CIN::APSE® ECC fits almost all application requirements where an electrical connection is required between two surfaces, even in the most extreme conditions and environments where dirt and dust have the potential to cause interference. Its versatile configurations will provide exact footprints and mated heights in order to meet your custom needs.

The fully enclosed, randomly wound CIN::APSE® contact provides the lowest contact resistance that can be terminated in all the standard methods.

- Durable handling
- Low contact resistance
- Low compression force
- Simplified installation
- Wipe-clean contact system
- High current handling
- High contact density
- Resistance to shock and vibration conditions

Crimp Contact Termination
24 to 30 AWG Stranded Wire

Compression Contact
Designed to provide a connector height to suit your requirements

ECC Designed Within a Connector Housing

- PCB and wire termination
- 1800 and 900 exits
- Self guiding on interfacing with the ECC contact
- A sealed system including hermetic levels of sealing
- Wipe clean contact face

Compression Contact
Extended working range option

Solder Cup
Custom wire termination
26 to 30 AWG range

Threaded Contact Probe
Extended working range option

ECC Designed Within a Cable Systems

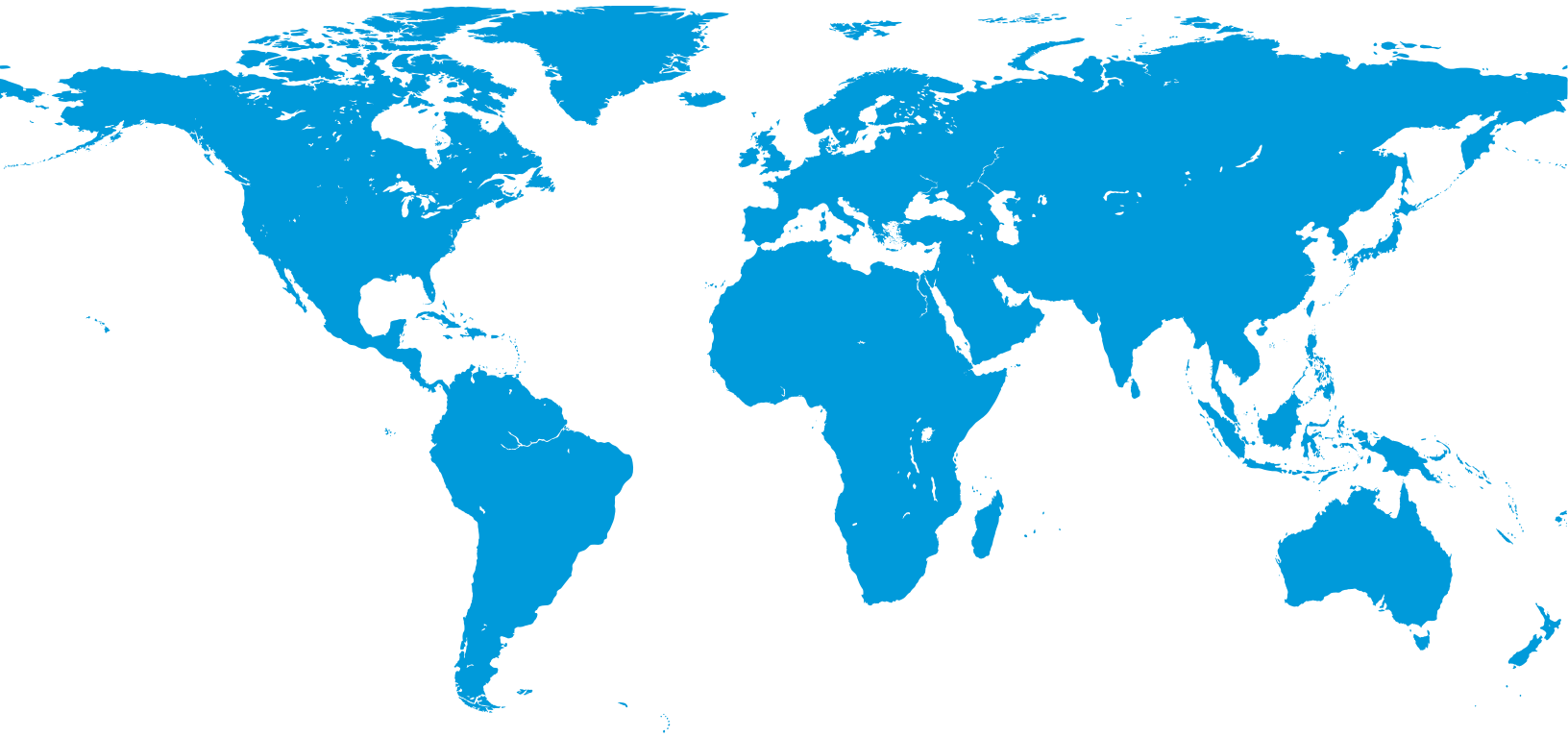
- Over moulded solutions
- Self latching system with push and pull release
- Sealed to IP ratings
- 360° screened cable terminations
- Coiled, multi strand cables to Mil-Spec/aerospace ratings
- Circular and rectangular arrangements
- Varying contact pitches and contact sizes

Printed Circuit Board Tail
Soldering applications

About Cinch Connectivity Solutions

In operation since 1917, Cinch supplies high quality, high performance connectors and cables globally to the Aerospace, Military/Defense, Commercial Transportation, Oil & Gas, High End Computer, and other markets. We provide custom solutions with our creative, hands on engineering and end to end approach.

Our diverse product offerings include: connectors, enclosures and cable assemblies utilizing multiple contact technologies including copper and fiber optics. Our product engineering and development activities employ cutting edge technologies for design and modeling, and our various technologies and expertise enable us to deliver custom solutions and products for our strategic partnerships.



For more information, please contact us:

North America
+1 507.833.8822
ccsorders@us.cinch.com

Asia-Pacific
+86 21 5442 7668
ccs.asia.sales@as.cinch.com

Europe, Middle East
+44 (0) 1245 342060
CinchConnectivity@eu.cinch.com

belfuse.com/cinch

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