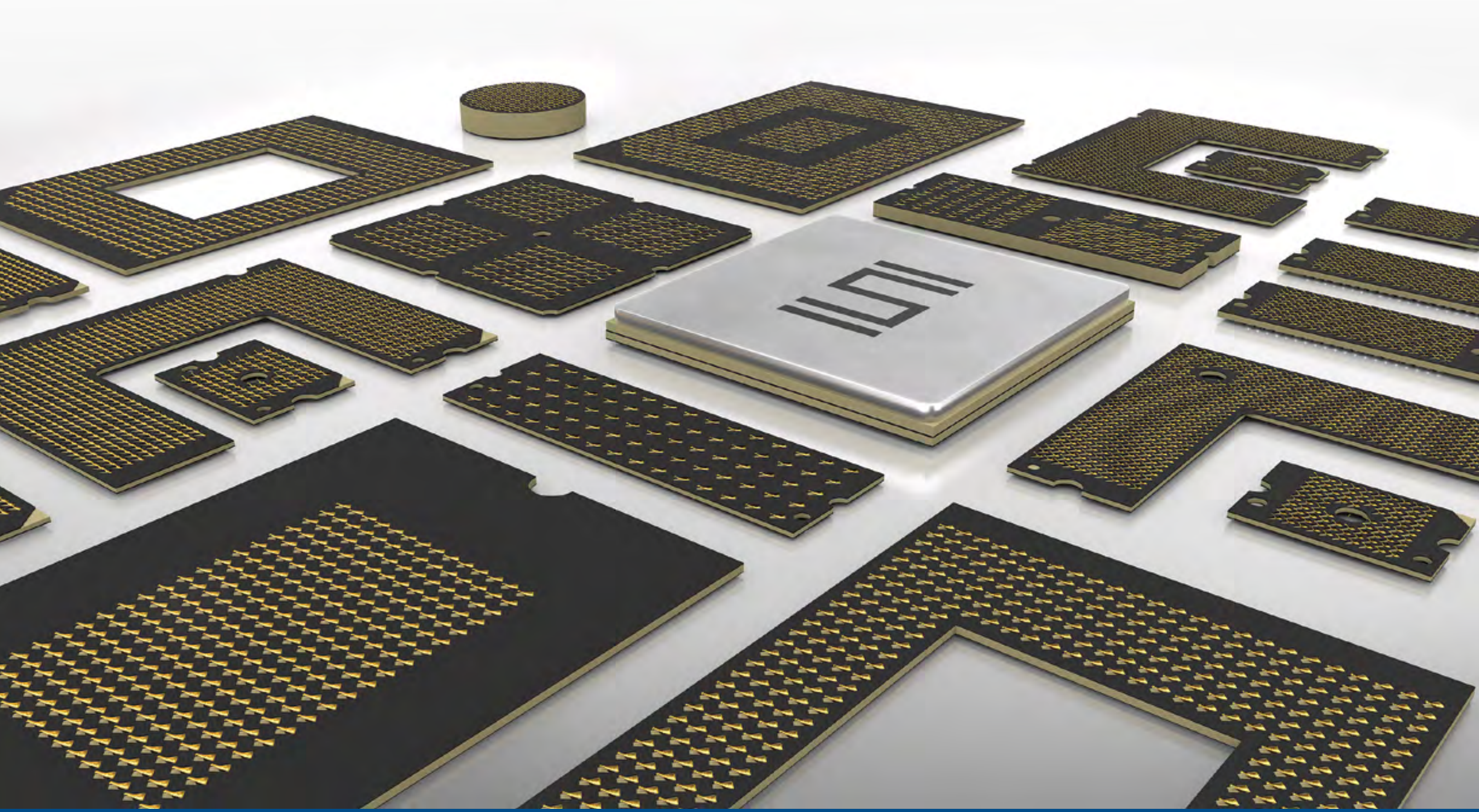
Z-RAY® INTERPOSER

APPLICATION DESIGN GUIDE 2016

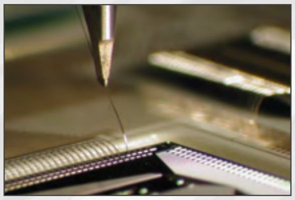
Z-RAY®
LOW PROFILE INTERPOSERS

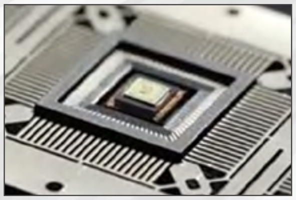
Z-Ray® micro array interposers are ultra-low profile, high-density, highly customizable solutions for board-to-board, IC-to-board, and cable-to-board applications.

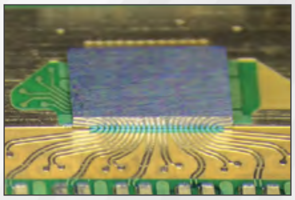


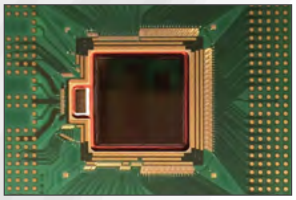
SAMTEC MICROELECTRONICS GROUP

Advanced IC packaging expertise and capabilities


Ultra-fine pitch, ultra-low profile ball bond and wedge bond


Stacked die and multi-chip module design + manufacturing expertise

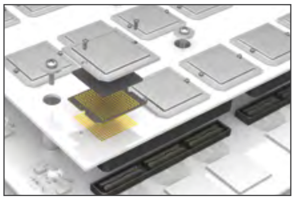

Flip chip accuracy to +/- 3 microns; capillary and jet underfill

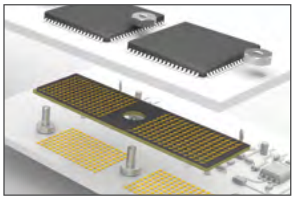

High-speed, high accuracy die placement (to +/- 3 microns)

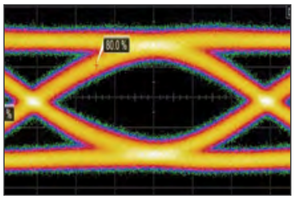
ADVANCED INTERCONNECT DESIGN

Interconnect systems designed for IC-to-board applications


In-house IC, optics + interconnect manufacturing for design flexibility

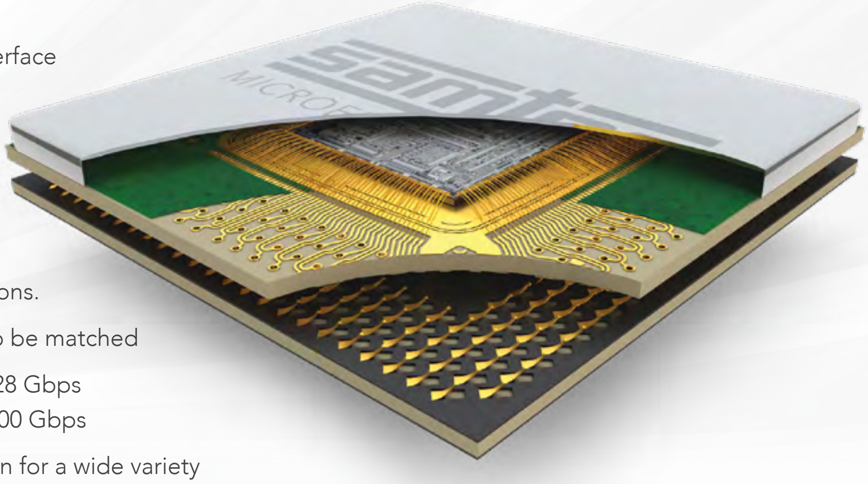

Cost-saving design strategies and product solutions


Highly customizable micro interposers optimize IC-to-board applications


Interconnect + IC expertise ensures full system optimization

INTERPOSERS: PRACTICAL APPLICATIONS

High-Density, High-Speed Interposer Solution for Microelectronic Packaging



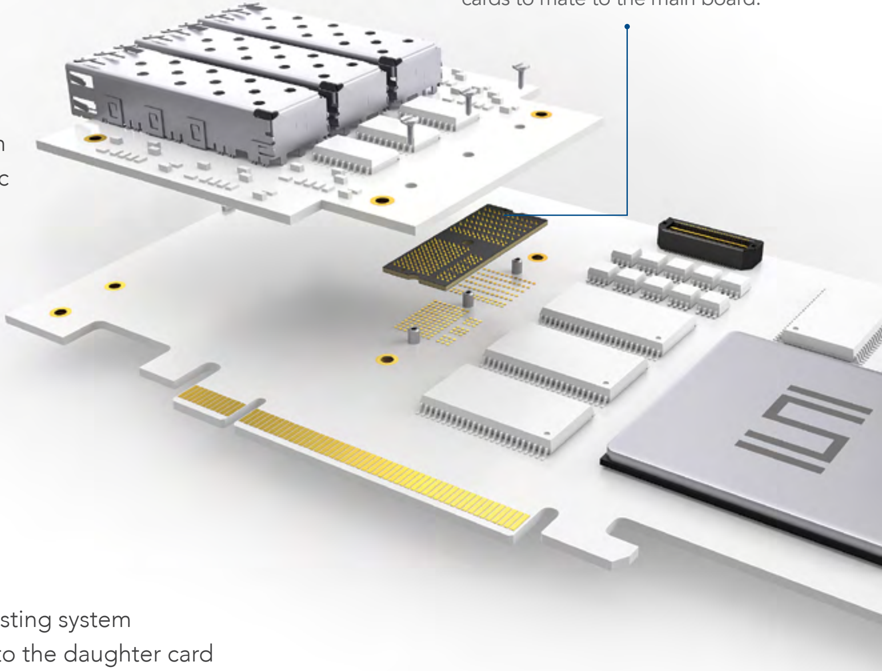
As an interposer, Z-Ray® provides a removable interface between the IC package and main board allowing for future-proofing, upgradability and cost savings during IC and system development. Samtec Microelectronics Group provides assistance in advanced IC package design, support and manufacturing, including substrates, micro optical engines and micro high-density interposers to help optimize IC-to-board applications.

- Flexibility of Z-Ray® allows complex footprints to be matched
- Signal integrity enabled layouts accommodate 28 Gbps and 56 Gbps systems with a migration path to 100 Gbps
- Cycle counts up to 3,500 makes Z-Ray® a solution for a wide variety of applications from test and development to disposable packages

Flexible Design Solution for Board-to-Board Applications

As a high-speed, high-density array connector, Z-Ray® provides the ultimate in design flexibility from custom heights to full custom geometries for board-to-board applications. The expertise of Samtec's Advanced Interconnect Design Technology Center enables systems engineered for maximum density and innovative solutions for high-performance applications.

- Z-Ray® achieves a board height as low as 0.3 mm and up to 4 mm, making it easy to match specific design requirements
- Low 25 g normal force with .008" contact deflection allows for simple assembly of high-density connector systems
- Solder ball versions provide a rigid, permanent connection on one side
- Array cable assembly (ZRDP Series) launches a high-speed copper cable from the Z-Ray®
- Routing traces within Z-Ray® allow for the pitch to be switched from top to bottom
- Full custom geometries to accommodate for existing system obstacles while still connecting the main board to the daughter card

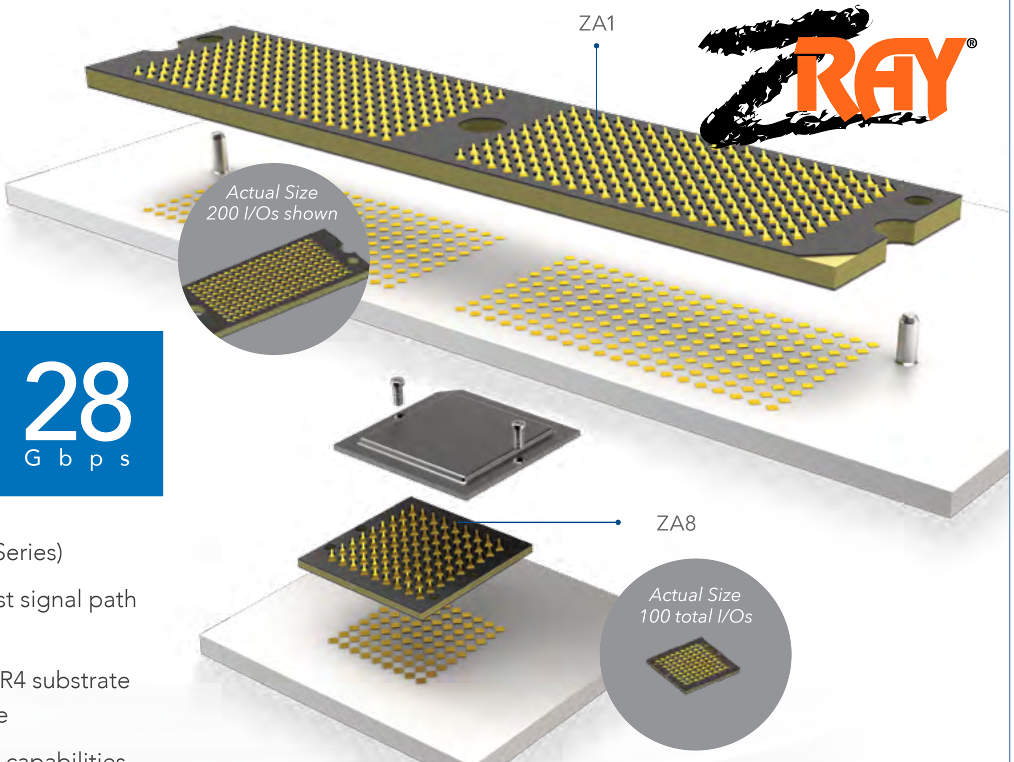


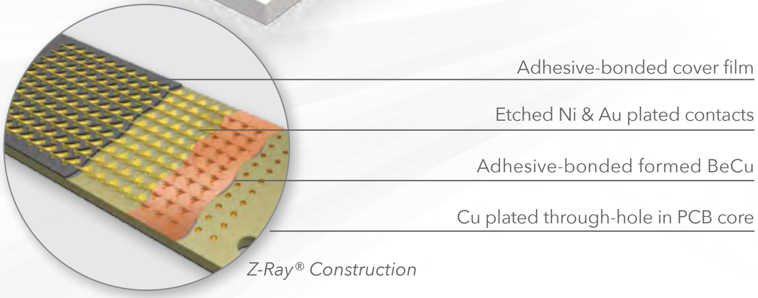
Custom configurations allow for system add-ons and varying daughter cards to mate to the main board.

TECHNOLOGY/CONSTRUCTION

- Ultra-low profile, ultra-high density and highly customizable
- Board-to-board, cable-to-board and complex IC-to-board applications
- Dual compression contacts or single compression with solder balls
- BeCu micro-formed contacts
- One-piece design on 0.80 mm or 1.00 mm pitch
- High-speed performance up to 28 Gbps (ZAX Series) and 56 Gbps (ZAXH Series) with a migration path to 100 Gbps
- Low profile 1 mm body height (ZAX Series)
- 0.3 mm body height provides shortest signal path (ZA8H Series)
- Assembled into rugged low profile FR4 substrate under high pressure and temperature
- Up to 400 I/Os standard with custom capabilities to 3,000+ I/Os
- Low 25 g normal force with .008" contact deflection
- Up to 3,000 cycles (alternate contact design for up to 5,000 cycles available)
- Built-in alignment and fixture compression features to make integration into an existing application smooth and flexible

28
Gbps





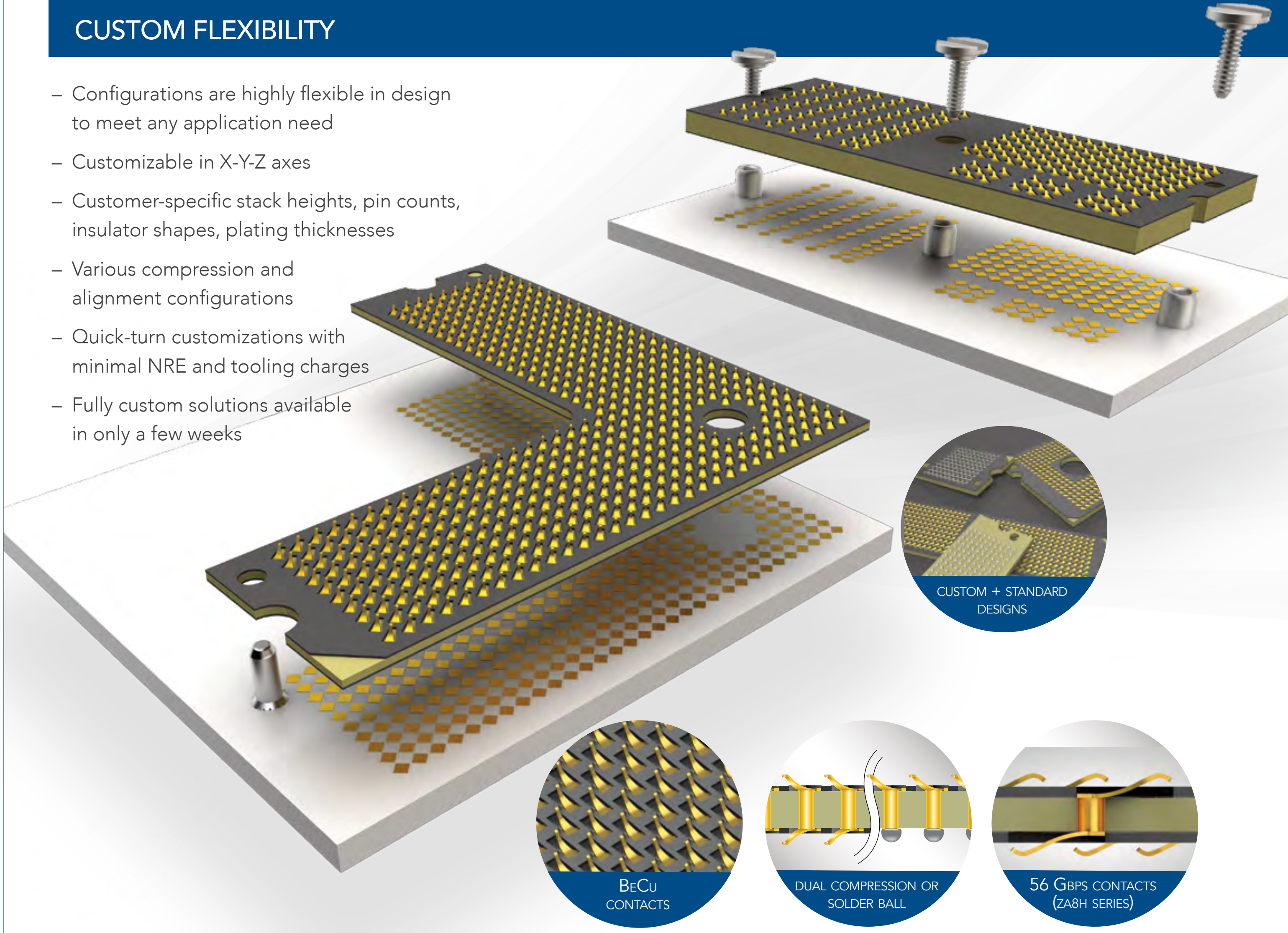
Z-Ray® Construction

PERFORMANCE SPECIFICATIONS

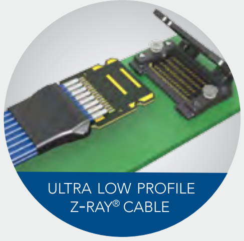
		Single Compression		Dual Compression			
Series		ZA8	ZA1	ZA8	ZA1	Custom	ZA8H
Pitch		0.80 mm	1.00 mm	0.80 mm	1.00 mm	1.27 mm	0.80 mm
Max Row		25	20	50	58	58	14
Max Column		25	20	50	58	37	50
Thickness	Kapton Core	N/A	N/A	0.3 to 0.5 mm	0.3 to 0.5 mm	0.3 to 0.5 mm	0.3 mm
	FR4 Core	1.00 to 4 mm	1.00 to 4 mm	0.5 to 4 mm	0.5 to 4 mm	0.5 to 4 mm	N/A
Thickness Tolerance	Kapton Core	N/A	N/A	±5%	±5%	±5%	±5%
	FR4 Core	±10%	±10%	±10%	±10%	±10%	N/A
Normal Force/Pin		30	30	30	30	25-50	30

CUSTOM FLEXIBILITY

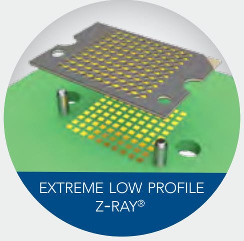
- Configurations are highly flexible in design to meet any application need
- Customizable in X-Y-Z axes
- Customer-specific stack heights, pin counts, insulator shapes, plating thicknesses
- Various compression and alignment configurations
- Quick-turn customizations with minimal NRE and tooling charges
- Fully custom solutions available in only a few weeks



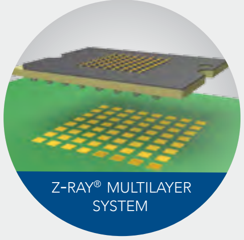
TECHNOLOGY ROADMAP


ULTRA LOW PROFILE Z-RAY® CABLE

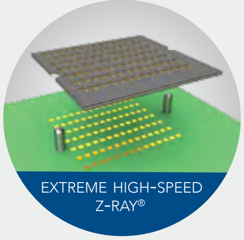
Up to 16 signal pairs on 0.80 mm pitch in a low profile design (ZRDP Series)


EXTREME LOW PROFILE Z-RAY®

0.3 mm stack height interposer with Kapton core


Z-RAY® MULTILAYER SYSTEM

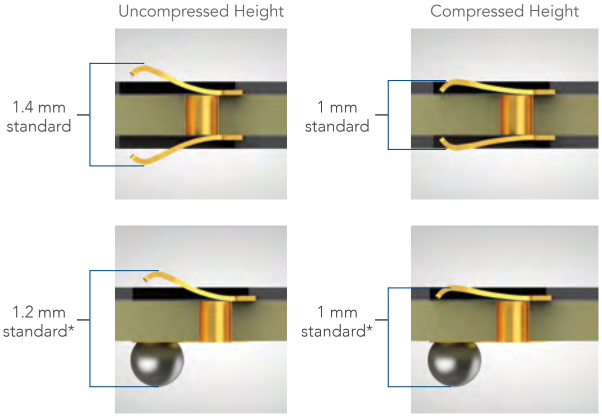
Pitch spreaders and other embedded interconnect circuitry


EXTREME HIGH-SPEED Z-RAY®

112 Gbps performance system

INTERPOSER THICKNESS

- Samtec Z-Ray® interposers are built standard with a 1 mm board-to-board thickness
  - 0.3 mm to 0.5 mm thickness available with Kapton core (semi-rigid)
  - 0.5 mm to 4 mm thickness available with FR4 core (rigid)
- Standard thickness tolerance = ± 10% FR4 core
- Standard thickness tolerance = ± 5% Kapton core

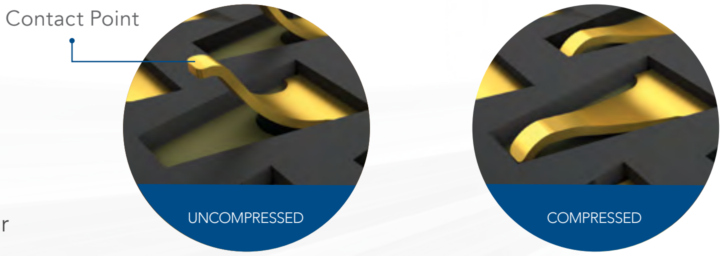


* Dimension after final reflow

INTERPOSER CONTACT DESIGN

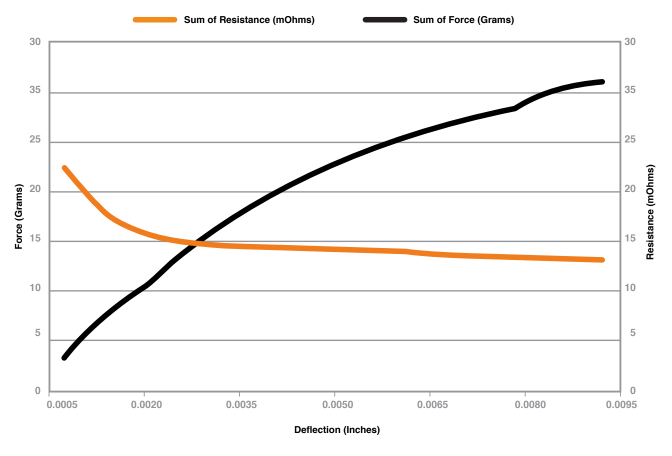
Z-Ray® contacts are designed using BeCu foils that have been formed into the"beam" structure.

- Mating height is established by the coverfilm
- Each beam is attached to the FR4 substrate through a lamination and plating operation
- Signals pass through the interposer through a plated via connecting opposing beams on each side of the interposer
- Minimum Normal Force to maintain acceptable connection/LLCR is 15 grams

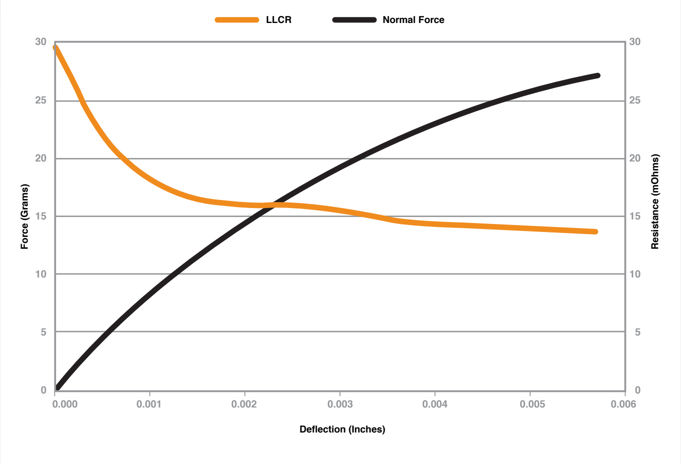


INTERPOSER BEAM FORCE/DEFLECTION/RESISTANCE

ZA1 1.00 mm Pitch

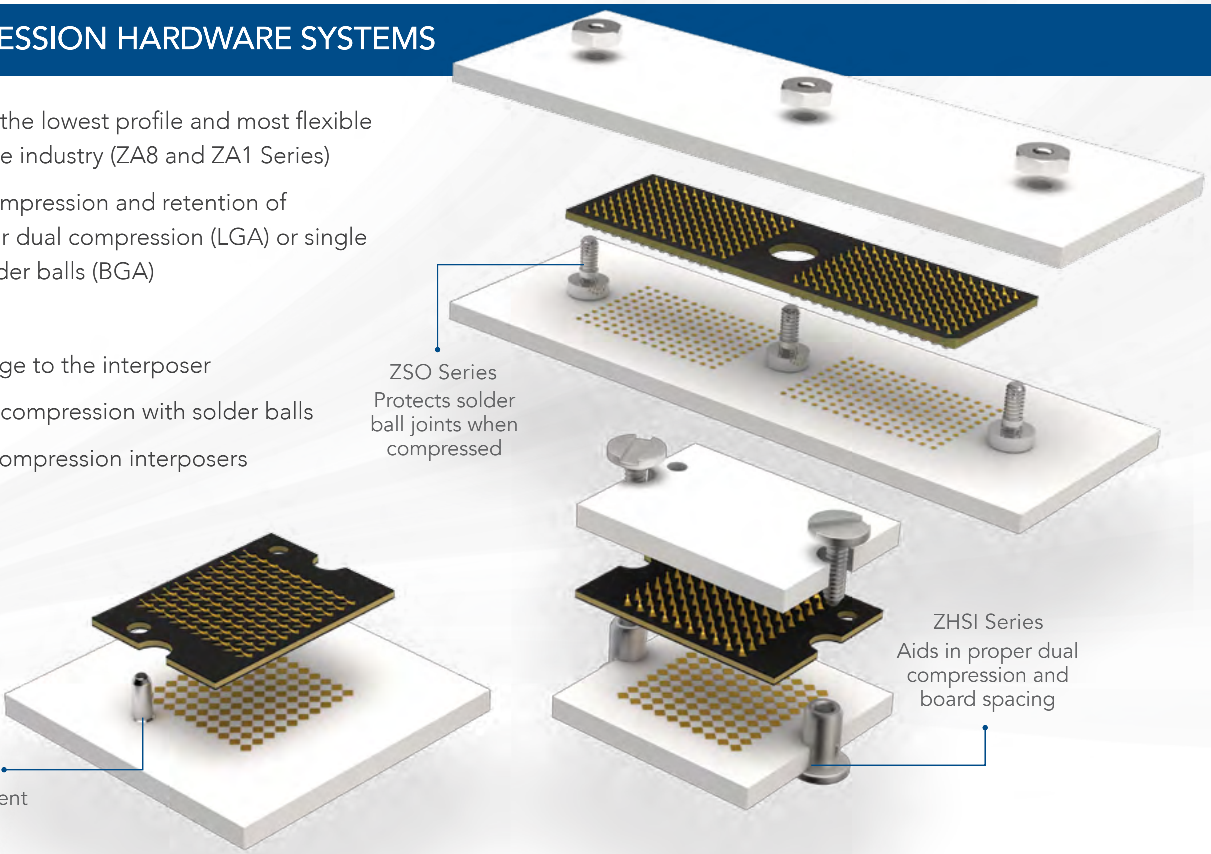


ZA8 0.80 mm Pitch



Z-RAY® COMPRESSION HARDWARE SYSTEMS

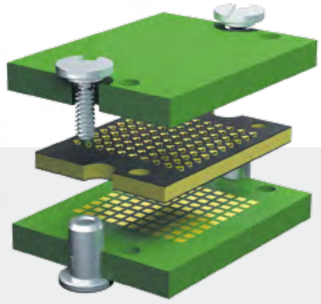
- Designed for Z-Ray®, the lowest profile and most flexible micro interposer in the industry (ZA8 and ZA1 Series)
- Precise alignment, compression and retention of interposers with either dual compression (LGA) or single compression with solder balls (BGA)
- Ultra-low profile
- Reduces risk of damage to the interposer
- ZSO Series for single compression with solder balls
- ZHSI Series for dual compression interposers



ZSO Series
Protects solder ball joints when compressed

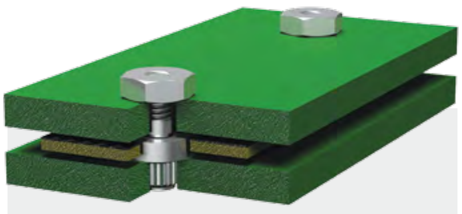
ZHSI Series
Aids in proper dual compression and board spacing

ZD Series
Provides alignment



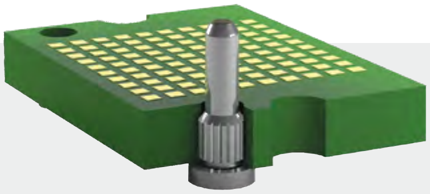
ZHSI

- Prevents over compression of dual compression contacts on interposer
- Provides alignment and ensures proper contact retention
- Eliminates the need for additional fasteners
- Press-fit
- Accommodates .062" and .093" PCB thickness
- Max torque of 4 in-oz inner per the female mating half



ZSO

- Prevents over compression of solder ball joints on interposer
- Provides alignment
- Ensures proper contact retention and board spacing
- Press-fit
- 1 mm board stack height
- For additional stack heights contact Samtec



ZD

- Dual compression only
- Press-in hardware provides proper PCB to interposer alignment
- Micro 1 mm diameter
- 3.7 mm, 5.3 mm, and 5.7 mm lengths available for varying mated heights
- Use industry standard hardware to secure and compress interposer

SUDDEN SERVICE®

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