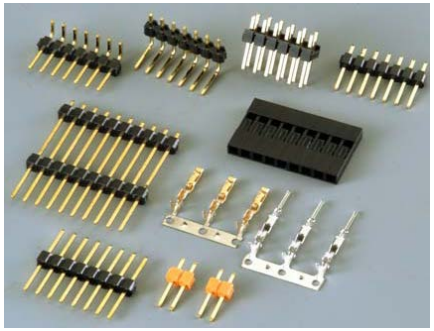
Elastomeric Connectors ...

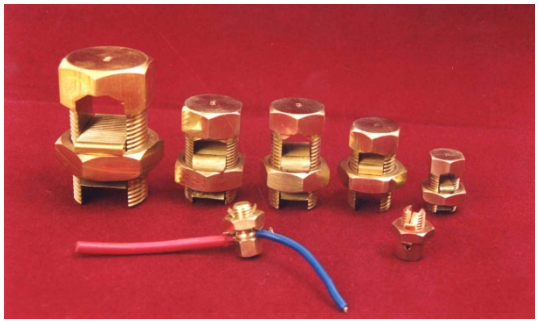
… Where Parallel Lines Connect !!

Z-Axis Connector Company - Don Schuenemann, Engineering Manager

What is an Electrical Connector?

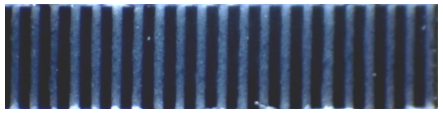
- Conductor(s) to Carry Electrical Current
- Material to Support the Conductor(s)
- Mechanism to Maintain Contact of the Conductors

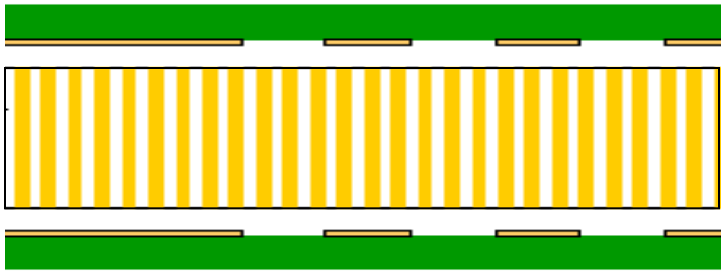




What is an **Elastomeric Connector ?**

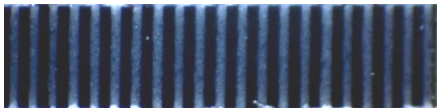
- Conductors – Multiple, Redundant Conductors
- Contact Force Provided by a Elastomer – Typically Silicone Rubber



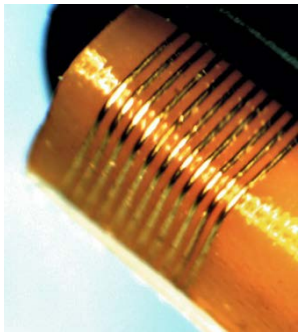


Elastomeric Connector History

- First used in watches to connect LCD Glass to PCB
- First elastomers developed by Dr. Leonard Buchoff
- First elastomers were carbon filled (1000 ohms or more)

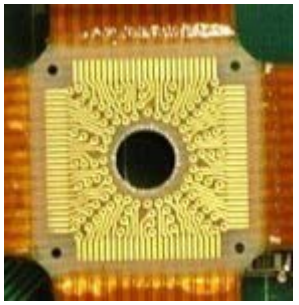


- Lower resistance requirements drove the development of silver-filled elastomers
- Solid metal conductor elastomers provide high performance today

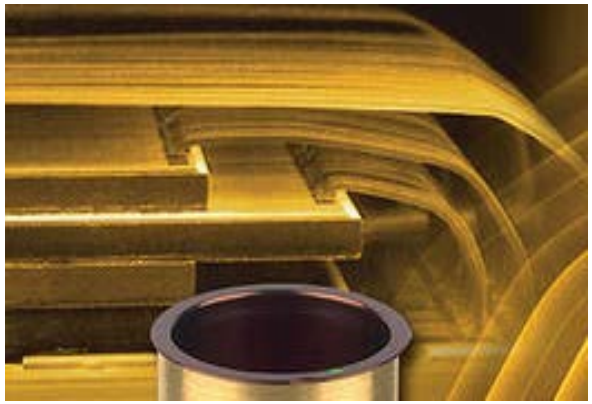


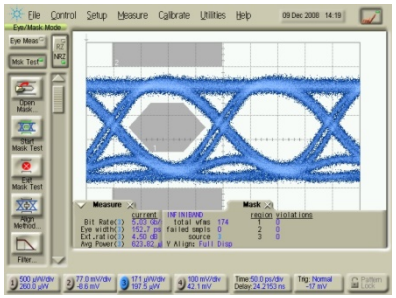
Trends in Packaging

- Portable Devices
- Complex Shapes / Angles
- Low Profile Components
- Denser Pitches
- Design for Manufacturability



Why Elastomers?





- Close Board-to-Board Spacing
- Fine Pitch
- Low Cost
- High Speeds
- Ease of Assembly & Disassembly (Field Serviceable)
- Varied Mounting Angles
- Superior Performance Under Harsh Condition
  - Shock, Vibration & Humidity
  - Wide Operating Temperature
  - Durability

How Elastomers Meet Today's Design Challenges

Space Saving:

- Board Separations as Small as 0.020" (0.5mm)
- Pad Pitches Below 0.020" (0.5mm)
- Multiple Rows

- Solder-less with Zero Insertion Force

- Easily Customized for Prototype and Production Requirements

- One Piece Versus Two Piece Connection

- Handles any Combination of Analog, Digital, RF or Power on One Connector

- Environmentally Stable (Silicone Rubber)

Elastomers: Product Definition and Application

Elastomers Versus Mechanical Connectors

Elastomers…

- Don’t Require Soldering
- Don’t Have Fragile Pins to Break
- Can be Installed on 0.020” (0.5mm) Pitch or Less
- One Piece Connector (Reduced Alignment Conflict *)

Why Silicone Rubber?

- Does not crack or become soft or brittle
- Less compression set
- Unaffected by aging
- Generates no corrosive chemicals
- Does not degrade with UV, radiation, oxygen, ozone or humidity exposure
- Flexible to temperatures as low as -55^{o}C
- Constant dielectric properties over wide range of temperature and humidity extremes

When to Use Elastomers

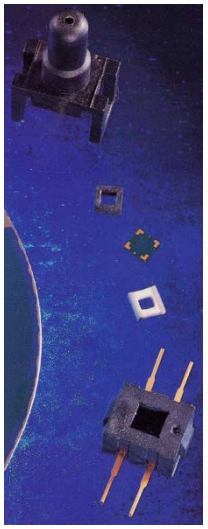
- Increasing Demand For Smaller Packages
- Faster Signals
- Ease of Installation
- Elimination of Solder
- Reduced Manufacturing Costs

Manufacturing Advantages of Elastomers

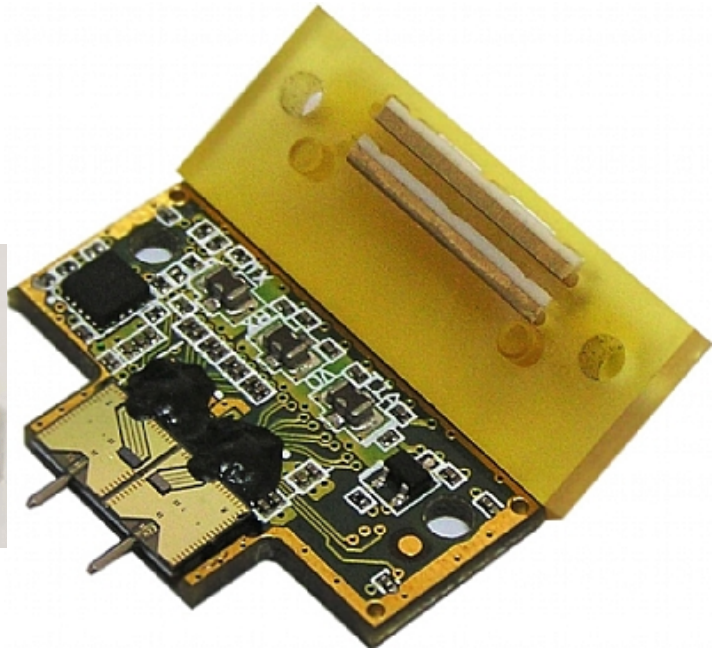
• Handling	No Special Equipment or Provisions
• Ease of Assembly	Zero Insertion Force Surface Mount One Piece Connector
• Manufacturing or Assembly Equipment	No Soldering Equipment No Special Assembly Equipment Required
• Production Yields	Permit On-Line Rework or Disassembly
• Field Upgrades	Can be Disassembled in the Field
• Cost Efficiencies	Minimal Tooling Costs

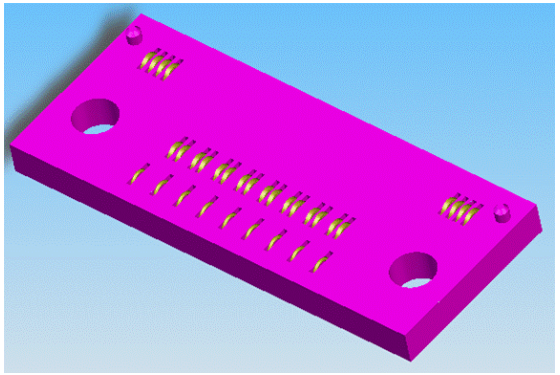
Commercial Markets

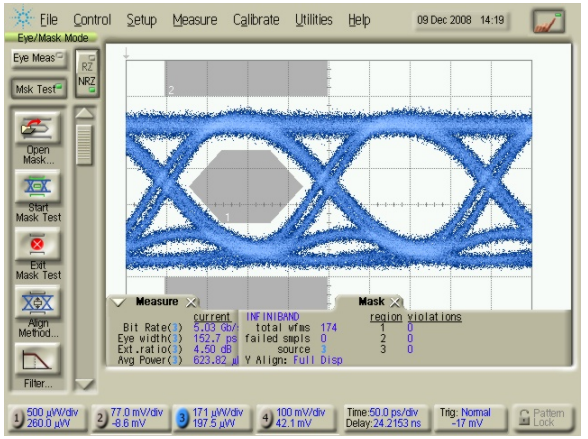
- Process / Environmental Controls / Remotes
- Telecommunications / Data
  - Central Office
  - Cell / Data Site *
  - Handheld Devices
- Printing
- Industrial Controls / Instrumentation
- Memory Card Sockets



Data Communication



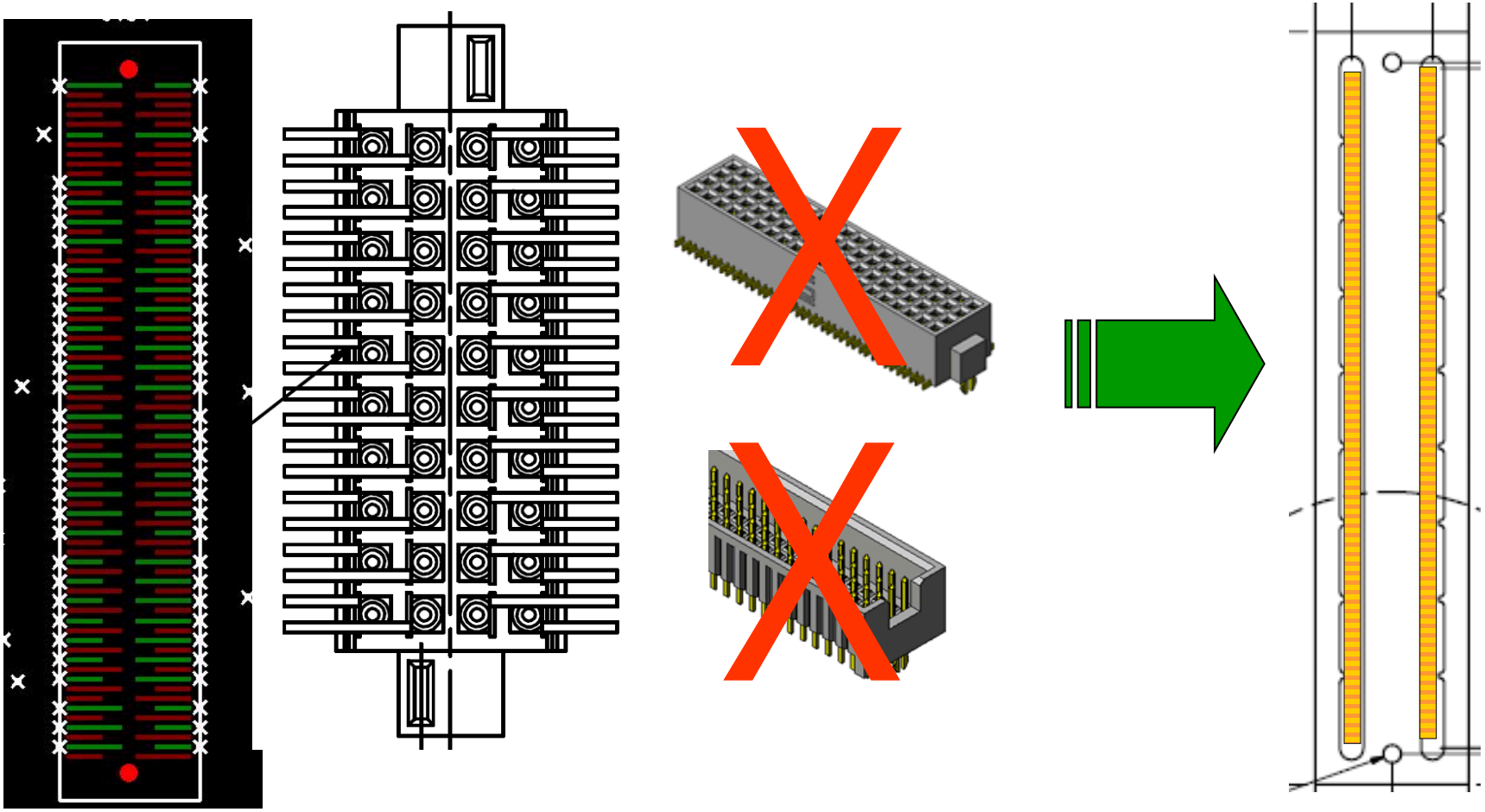




Fiber Optic Interface – 5Gbps

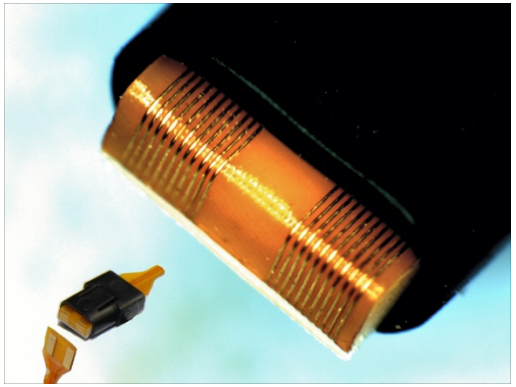
Telecom Central Office

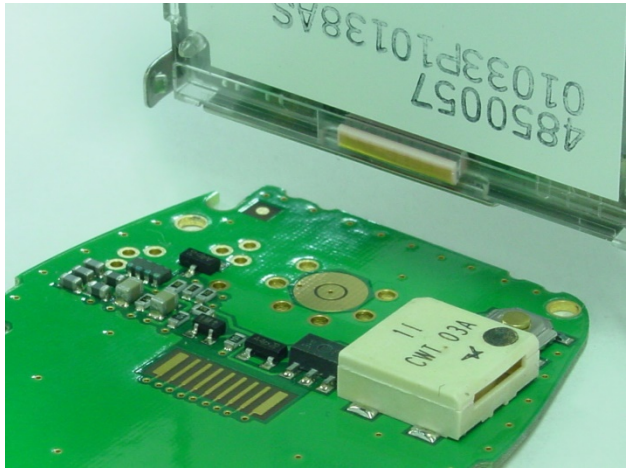
Problem → **Solution**

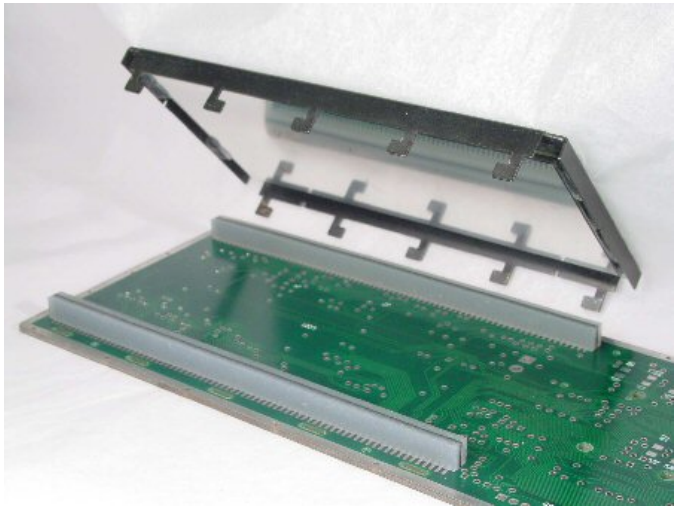


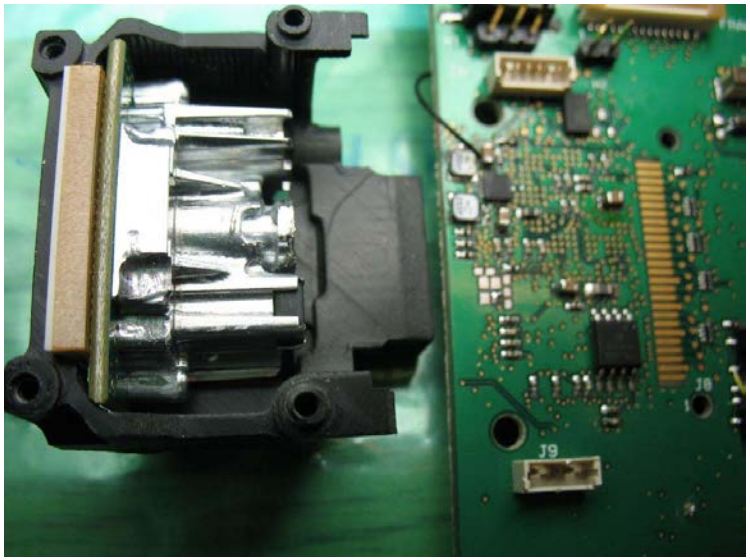
Commercial Markets

- Medical Devices – Health Care / Consumer / Hearing Aids
- Displays – Flat Panel, LCD, LED, Plasma, Projection
- Portable Devices
- Point of Sale – Credit Card / Bar Coding / Smart Card / Security

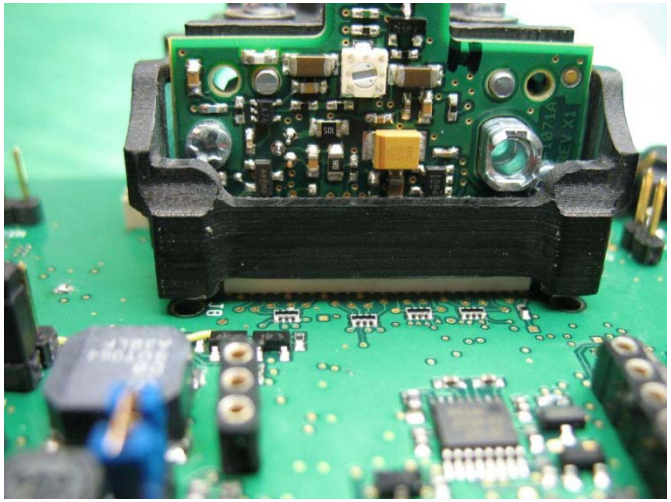






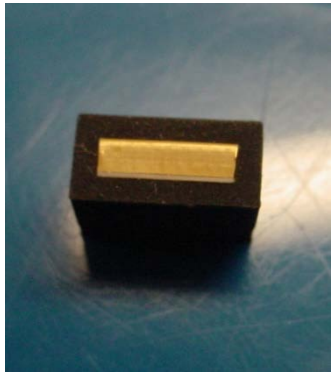


Zfill Connector Used for
Right-Angle Board-to Board
Connection in a Bar Code Scanner



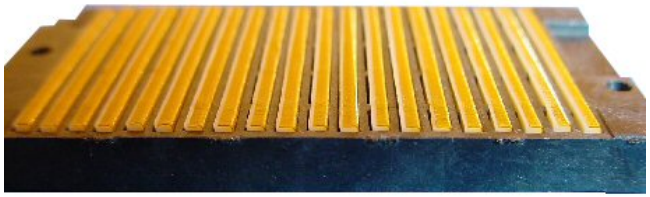
Commercial Markets

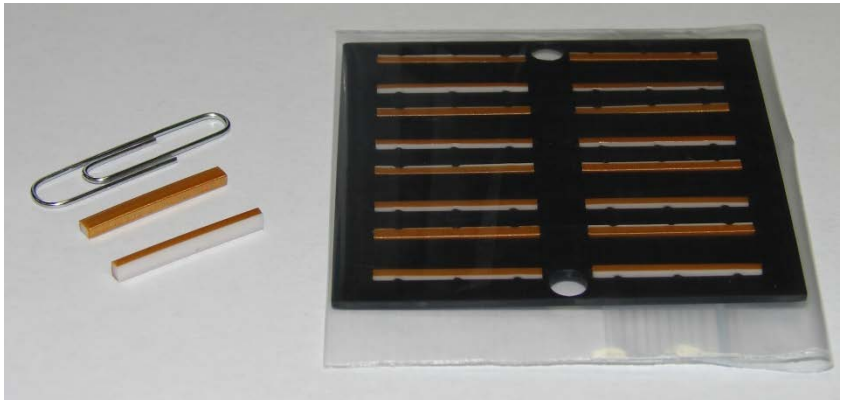
- Navigation / Global Positioning System
- Agriculture
- Oil /Gas Sensing
- Automotive



Commercial Markets

- Obsolete Connector Alternative
- Lighting
- Musical Instruments
- Medical Research

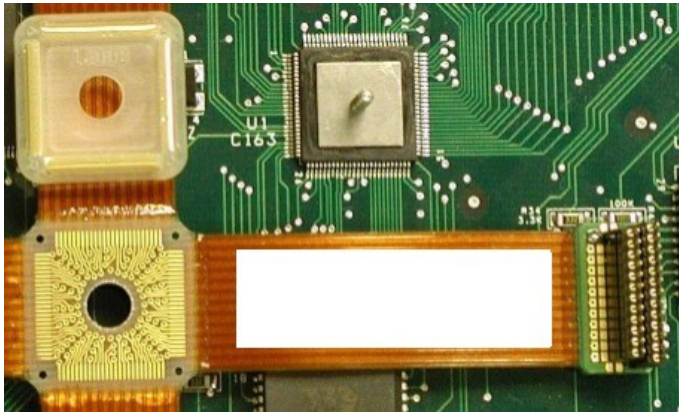


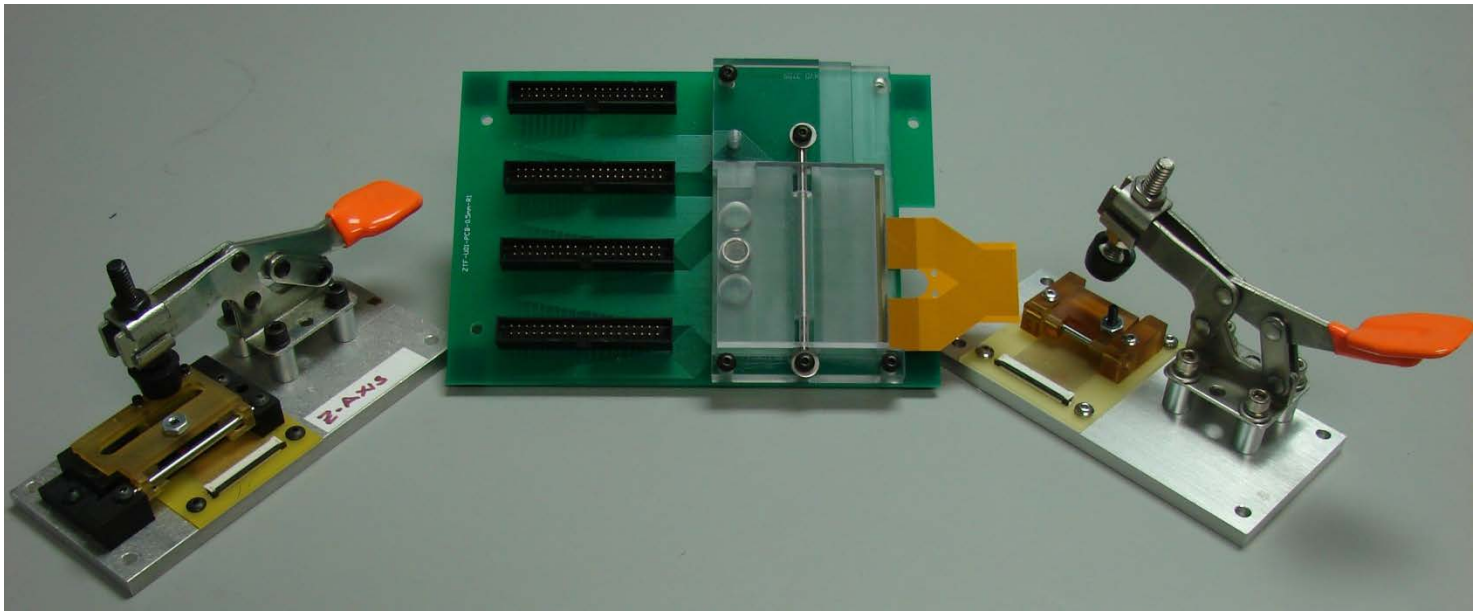


Commercial Markets

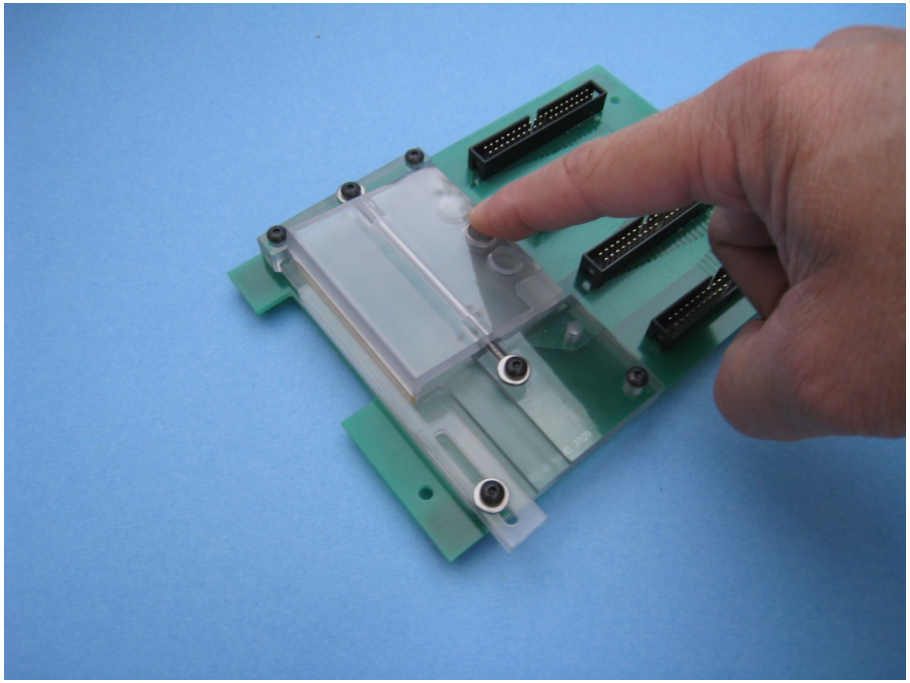
- Manufacturing Test, Burn-in / Program / Debug
- Inmate / House Arrest Monitoring
- Machine Vision
- Remote Utility Billing

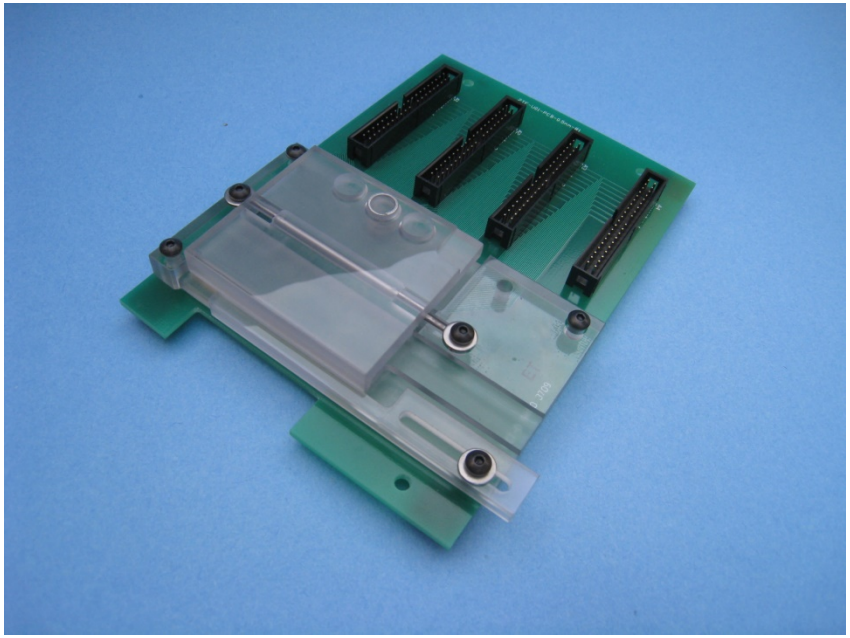
Test, Burn-in, Program / Debug



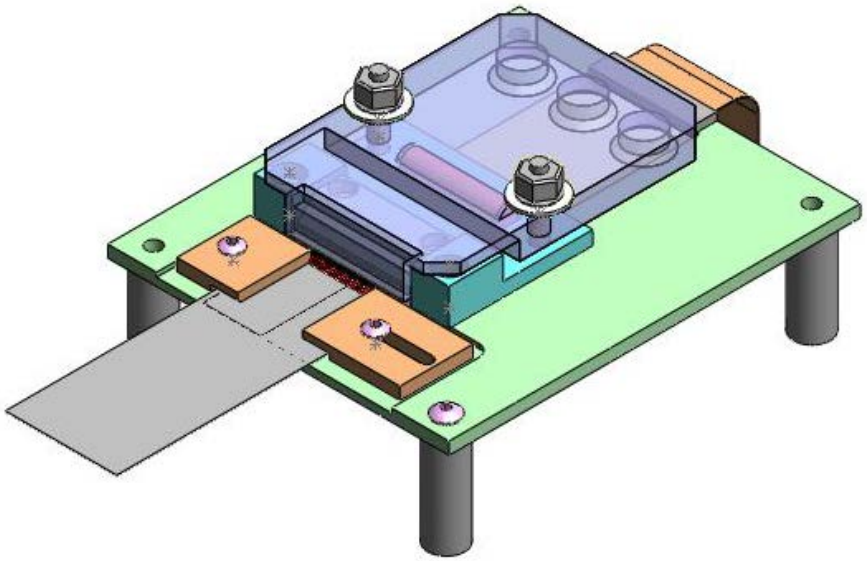


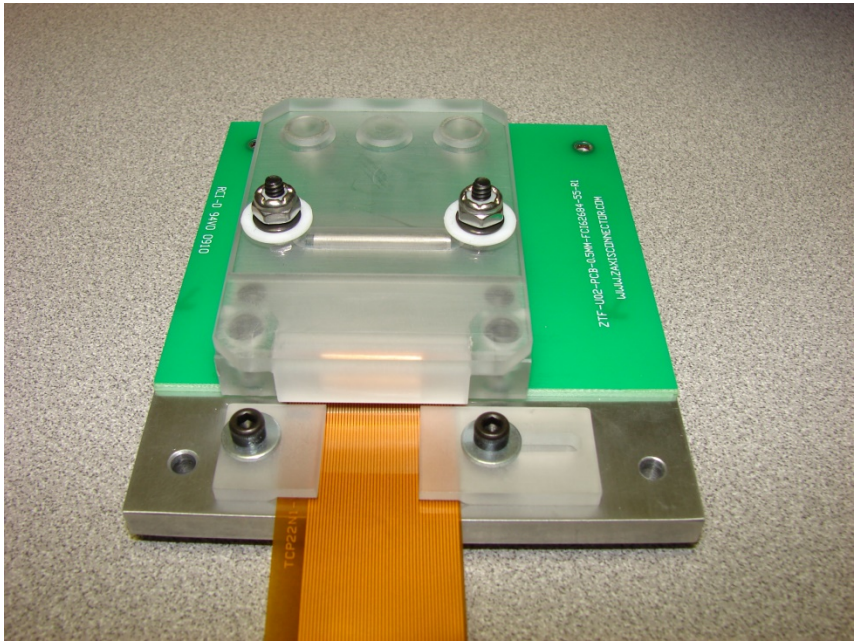
Universal Test Fixture for Flex Circuits





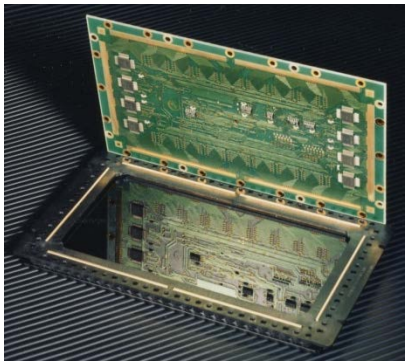
Custom Test Fixtures for Flat Panel Display Flex Connections

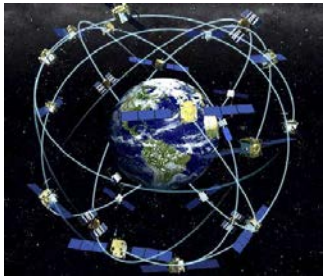




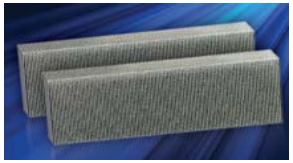
Defense, Military, Aerospace Applications

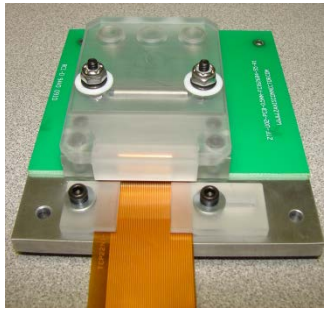
- Displays – Avionic / Marine
- Night Vision
- Phased Array Radar
- In-Flight Entertainment
- Space Station Robot
- Hubble Space Telescope Memory Upgrade
- Global Positioning System
- Battlefield Personnel Networks
- Flight Data Recorders



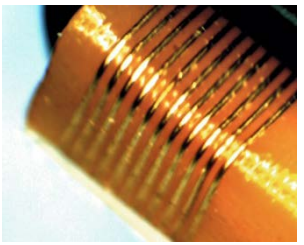


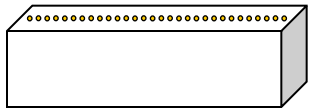
Z-Axis Product Line

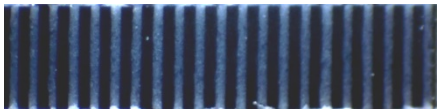




- Zflex
  - Zfill / Zwrap
- Zflat
  - Zthru
- Zsilver
  - Zcarbon
- Test Fixtures







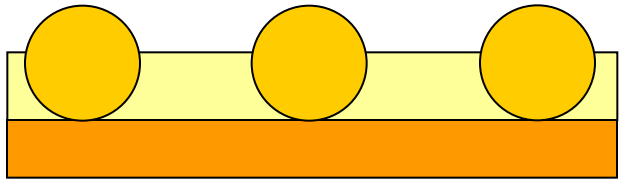
Zflex

Construction

- Polyimide, PET, Silicone Substrate, etc.
- Wire – Round or Flat
- Metallurgy - Gold, Copper, Brass or other alloy
- Surface plating – Gold over Nickel
- Fine Pitch Parallel Placement
- Grouped Wires Optional

Applications

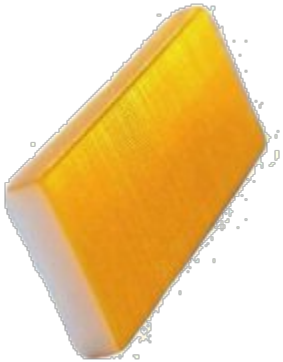
- Foundation of Z-Axis Elastomeric Connectors
- Nano-Pitch (?) Connections
- Displays
- Micro-Access Geometry
- Hypodermic Insertion

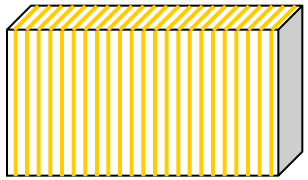


Zfill / Zwrap

Construction

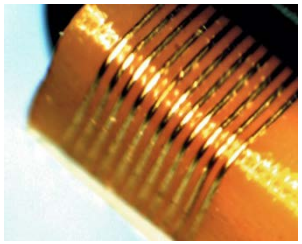
- Two or Three sided Zfill
- Molded Silicone core
- Four Sided Z-Wrap
- Side Insulation
- Multi-row
- Other Application Dependent features





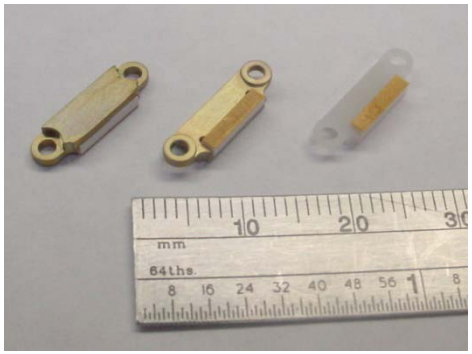
Applications

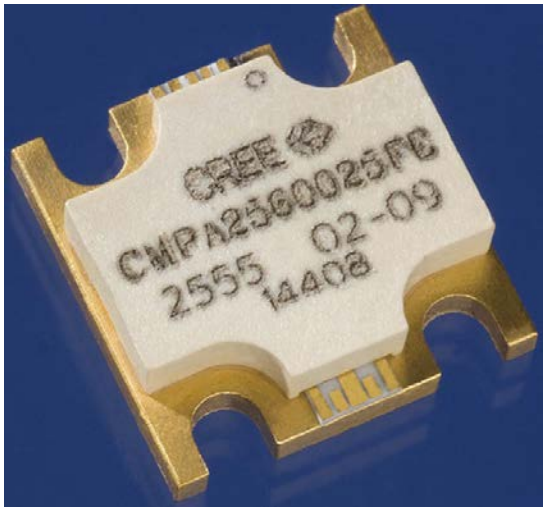
- Parallel Board-to-Board
- Board to Flex
- Perpendicular Board-to-Board
- Other-Angle Board-to-Board
- PCB to Chip-on-Glass (COG) LCD
- External Connections (Pins, Flex, Module, etc.)
- Wiping Contacts
- Through Bulkhead

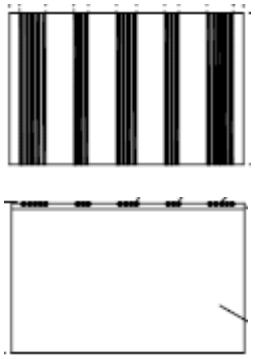


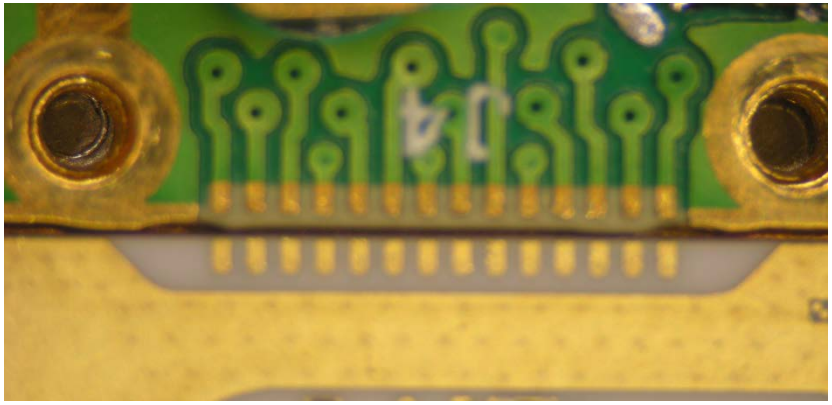
Zflat Applications

X / Y Plane Connectors

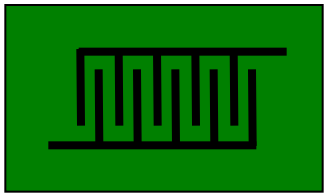


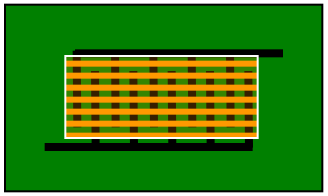






Anti-Tamper Shorting Pattern





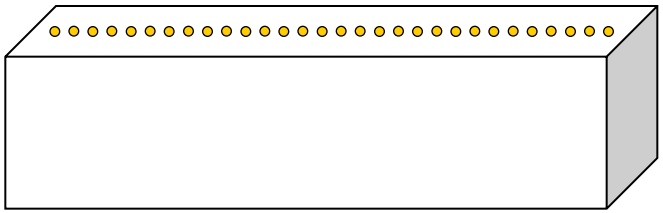
Zthru

Construction

- Cut wire-end Contacts
- Molded Silicone Core
- Side Insulation
- Multi-row
- Other Application Dependent features

Applications

- Specialty High Performance
- Low Assembly Tolerance
- Unique Requirements



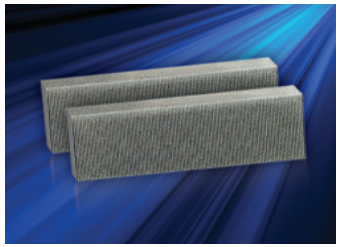
Zsilver

Construction

- Silver Filled Silicone
- Conductive / Insulating Layers
- Side Insulation
- Cut to Size as Required

Applications

- Not Recommended for New Designs - Special Case Only
- Legacy Designs have Limited Availability



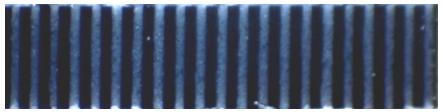
Zcarbon

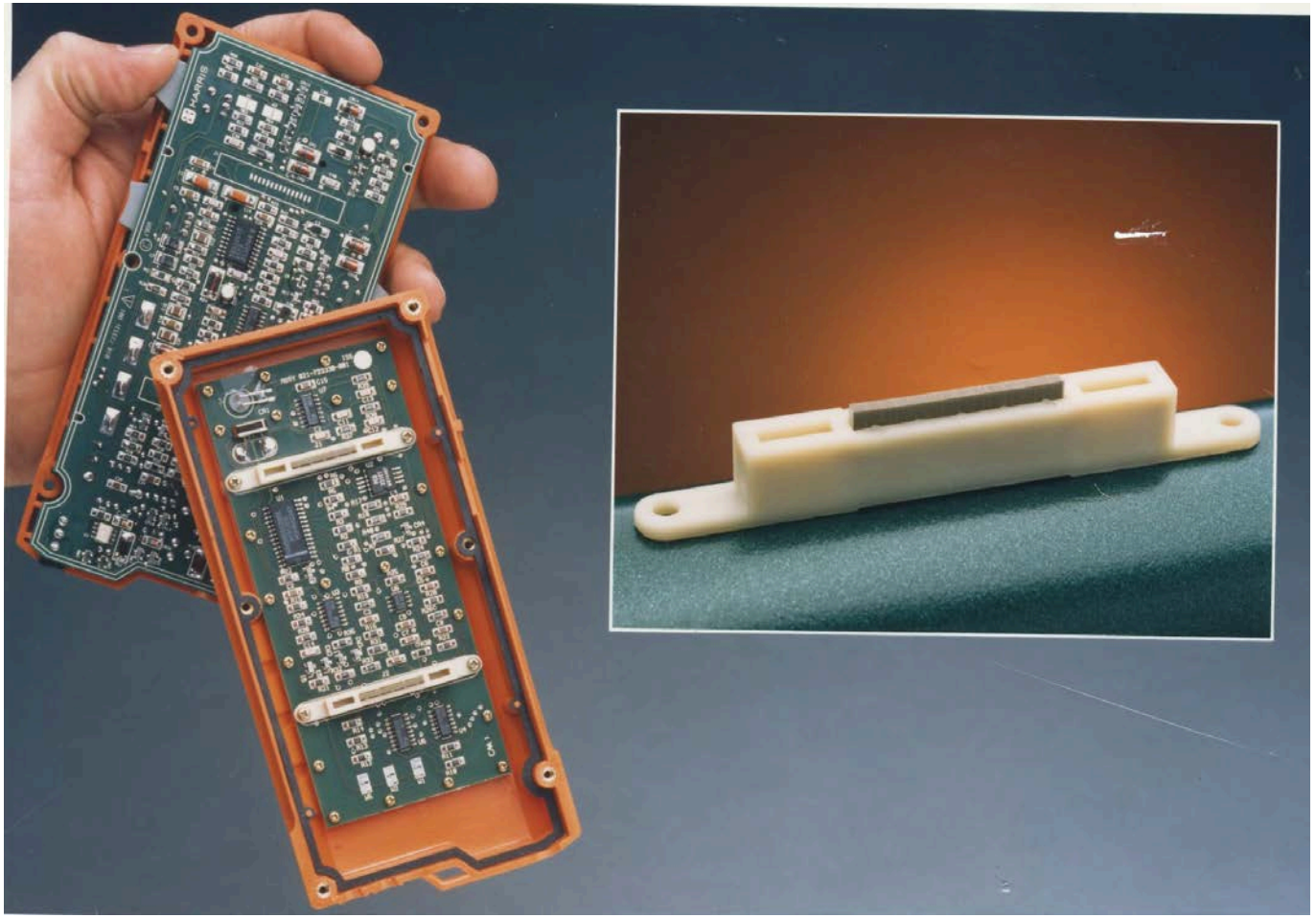
Construction

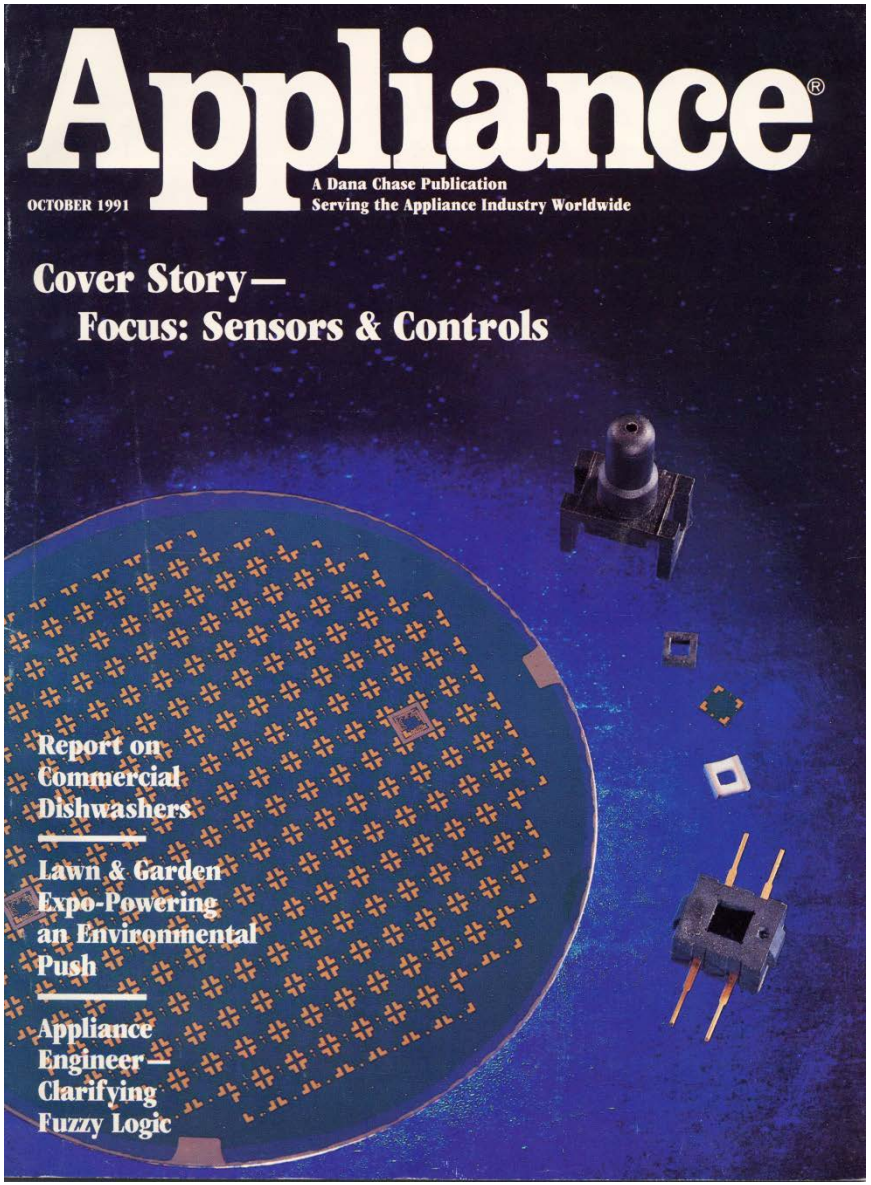
- Carbon Filled Silicone
- Conductive / Insulating Layers
- Side Insulation
- Cut to Size as Required

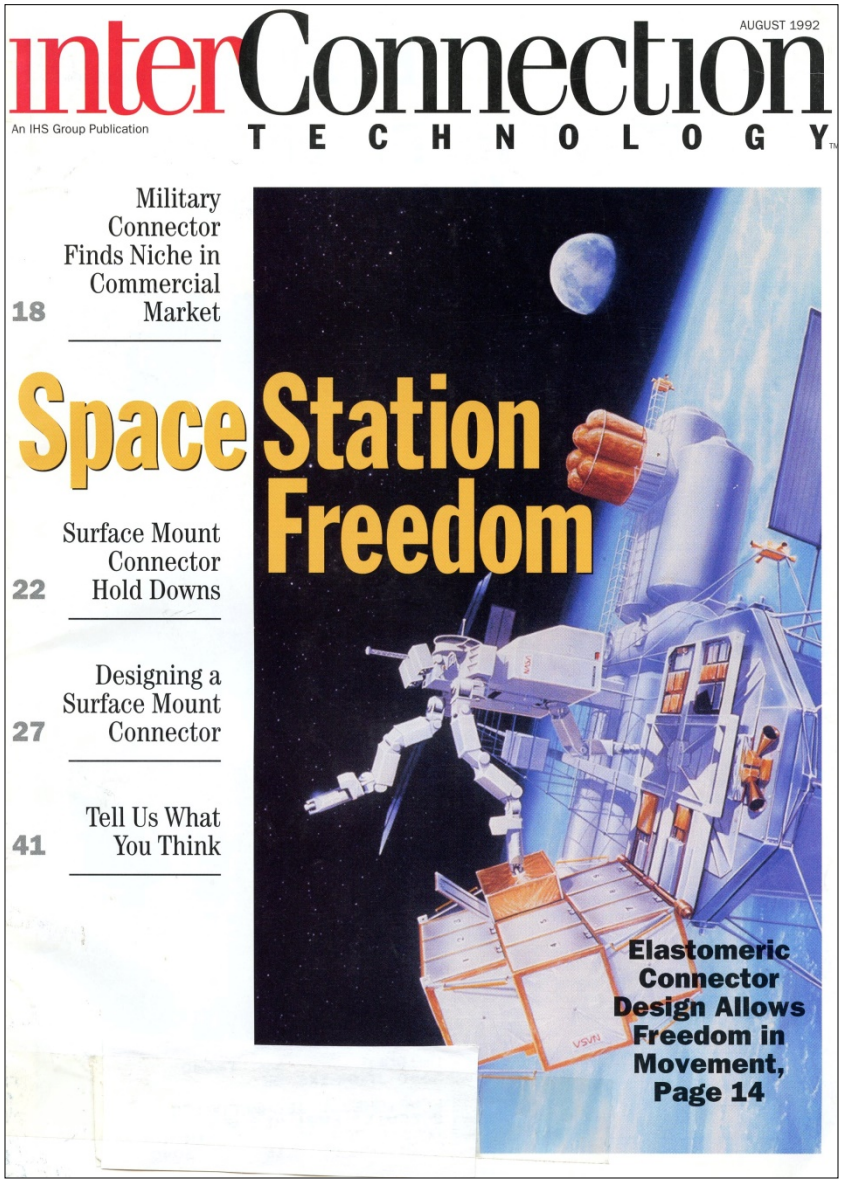
Applications

- LCD to PCB
- Not for Chip-on-Glass (COG)









Parallel Lines Do Connect !! … using <u>Elastomeric Connectors</u>.

Thank You !