Ironwood
ELECTRONICS
www.ironwoodelectronics.com

Socket Technologies

High Performance IC Sockets And Test Adapters

IP, Nov 2012

Overview

- Company Overview
  - Over 5,000 products
  - High Performance Adapters and Sockets
  - Many Custom Designs
  - Engineering – Electrical and Mechanical
  - ISO9001:2008 Registration
- Socket Technology Overview
  - Embedded gold plated wire elastomer (SG)
  - Spring pins (SS)
  - Embedded silver particle elastomer w/ gold cap (XG)
  - Stamped & Etched spring pins (SBT/HBT)
  - Embedded silver ball elastomer matrix (SM/SMP)
  - Thermal Management Solutions (TSL)
  - Surface mount adapters for sockets (SF)

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Embedded gold plated wire elastomer socket (SG)

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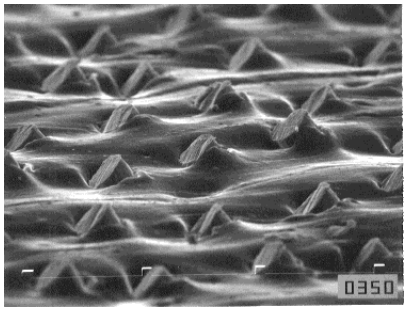
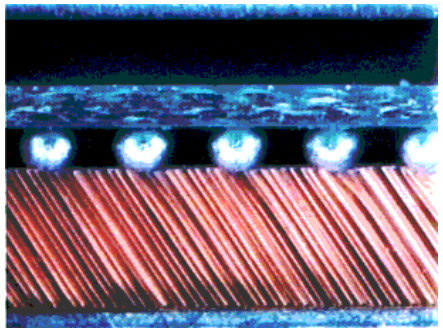
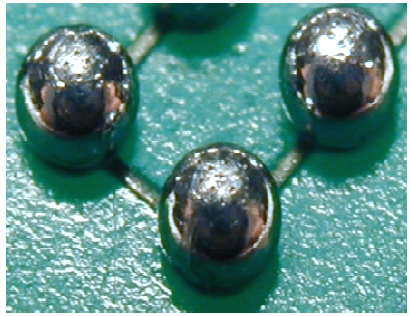


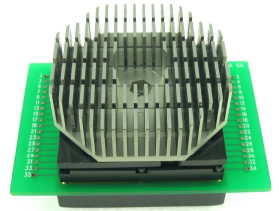
Protruded wire from elastomer



BGA compressed on Elastomer



Wire marks on BGA



Heat sink lid

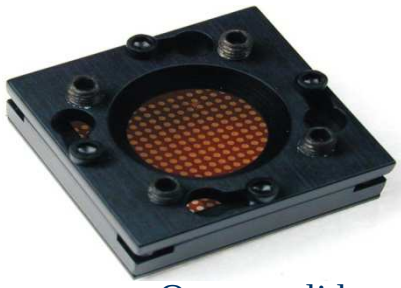
Torque indicator

Features	Benefits
Short contact	High bandwidth applications
Gold plated Brass wire	Low contact resistance
Small socket footprint	Easy to place inductors, capacitors, resistors, etc for tuning and increasing bandwidth. Ideal for IC prototype and system testing and field upgradeable system designs
High resilient elastomer	Compression cycles in thousands
Optimized contact force	Reliable connection without damage to device or board

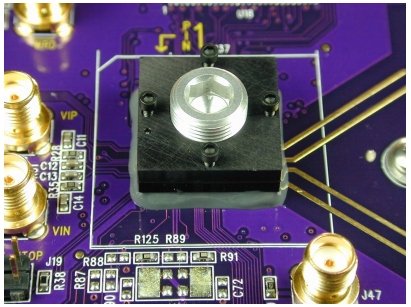
Back-to-back socket

Continuous improvement
14 Years
Proven Capability
Development

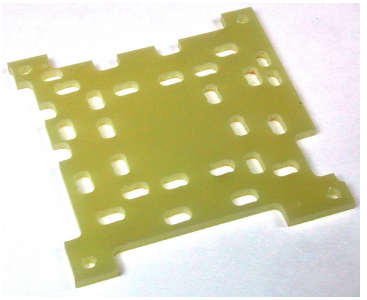
Capabilities
- 0.3mm to 1.27mm pitch
- 2x3mm to 50x50mm device
- BGA, QFN, QFP, SOIC
- 3000 pin count
- Heat sink options
- Easy chip replacement
- Custom support plate options



Open top lid



No mounting hole socket



Custom insulation plate

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Spring pin socket (SS)

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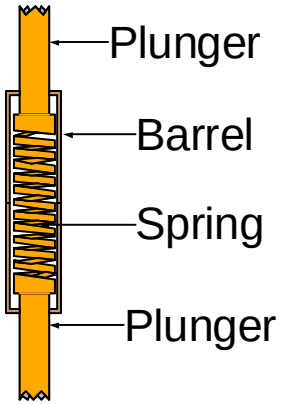
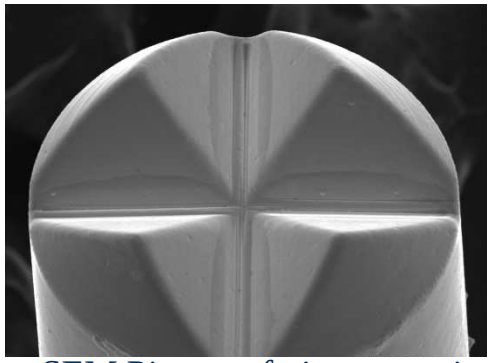
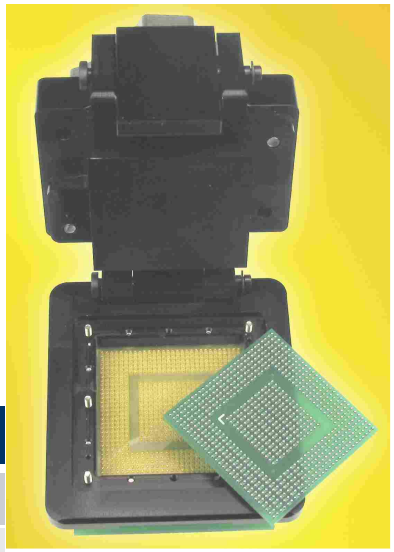




SEM Picture of pin crown tip



Clamshell BGA socket

Continuous improvement

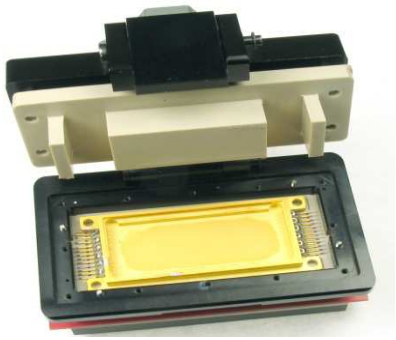
9 Years

Proven Capability

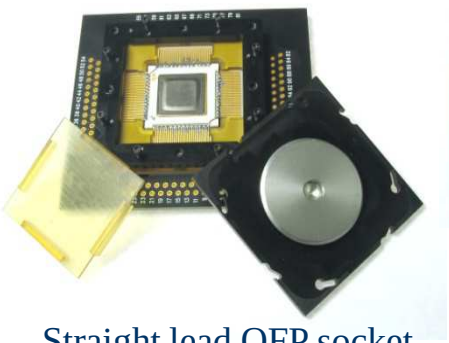
Development

Features	Benefits
Long contact travel	Compliancy for large package warpage
Gold plated BeCu material	High temperature applications
Small socket footprint	Easy to place inductors, capacitors, resistors, etc for tuning and increasing bandwidth. Ideal for IC prototype and system testing and field upgradeable system designs
High resilient spring	Compression cycles in millions
Optimized pin diameter to length ratio	Impedance matched high speed applications

Capabilities
- 0.3mm to 1.27mm pitch
- 2x3mm to 50x50mm device
- BGA, LGA, QFN, QFP, SOIC
- 5000 pin count
- Heat sink options
- Easy chip replacement
- Custom support plate options



Hybrid SOIC socket



Straight lead QFP socket

Clamshell heat sink BGA socket

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Embedded silver particle elastomer with gold cap socket (XG)

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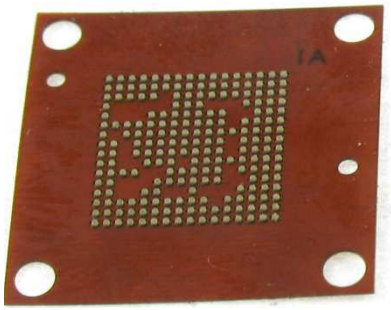
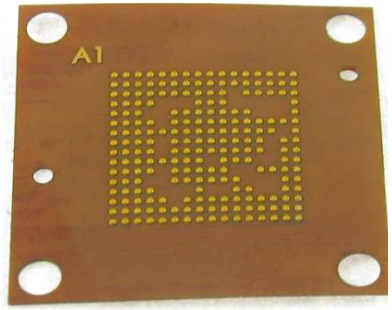
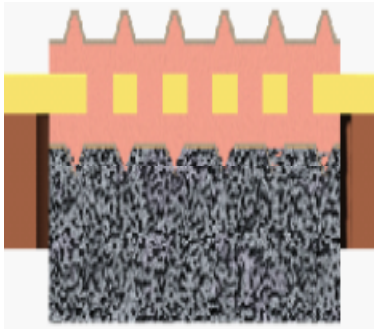
Development
Proven Capability
5 Years
Continuous improvement

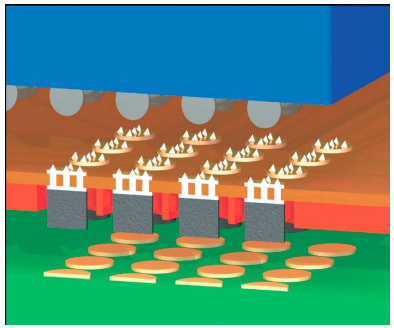


BGA contact back side

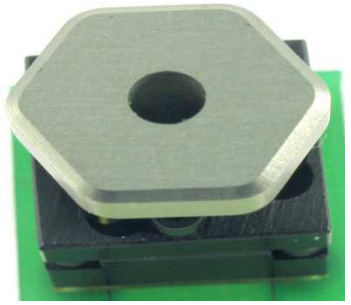


BGA contact top side

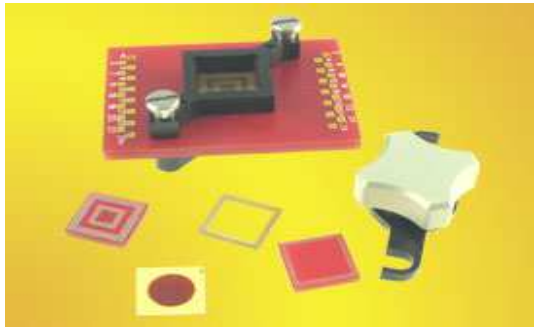

Cross section

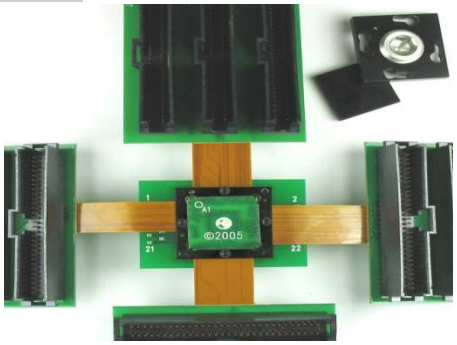

Cross section stack up model

Features	Benefits
Shortest contact	Highest bandwidth applications
Silver particle	Low contact resistance
Small socket footprint	Easy to place inductors, capacitors, resistors, etc for tuning and increasing bandwidth. Ideal for IC prototype and system testing and field upgradeable system designs
High resilient elastomer	Compression cycles in tens of thousands
Flexible top side traces	Probing solution without additional interconnect


Low profile thumb screw socket

Capabilities
- 0.4mm to 1.27mm pitch
- 2x3mm to 50x50mm device
- BGA, LGA, QFN
- 2000 pin count
- Heat sink options
- Easy chip replacement
- Custom support plate options


Package on package socket


Flex probe socket

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Stamped & Etched spring pin socket (SBT)

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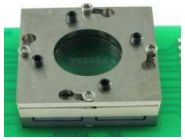
LGA high force pin

BGA low force pin

BGA socket w/ Snap Lid



Open top socket

Super short Etched spring pin

Continuous improvement
Proven Capability
4 Years
Development

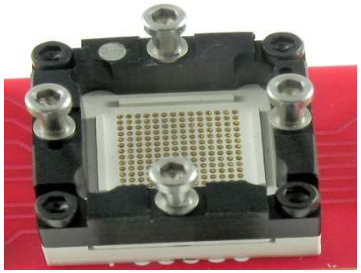
Features	Benefits
Long contact travel	Compliancy for large package warpage
Gold plated BeCu material	High temperature applications
Small socket footprint	Easy to place inductors, capacitors, resistors, etc for tuning and increasing bandwidth. Ideal for IC prototype and system testing and field upgradeable system designs
High resilient spring	Compression cycles in hundreds of thousands
Optimized pin diameter to length ratio	Impedance matched high speed applications
Stamped contact	High current applications
Automated assembly	Low cost, short lead time

Crown Plunger

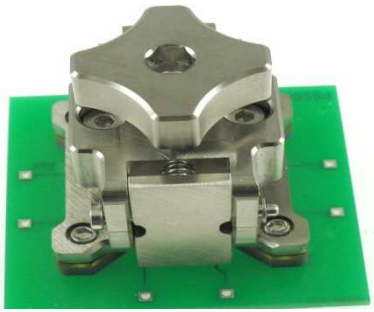
External Spring

Cone /ball Plunger

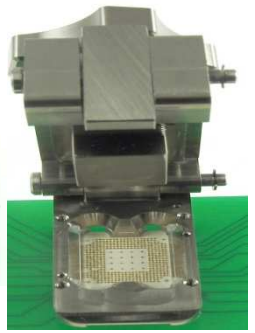
Capabilities
- 0.4mm to 1.27mm pitch
- 2x3mm to 50x50mm device
- BGA, LGA, QFN, QFP, SOIC
- 5000 pin count
- Heat sink options
- Easy chip replacement
- Custom support plate options



Floating plate for precise alignment and swivel lid



Clamshell BGA socket



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Wear Resistant Etched spring pin socket (HBT)

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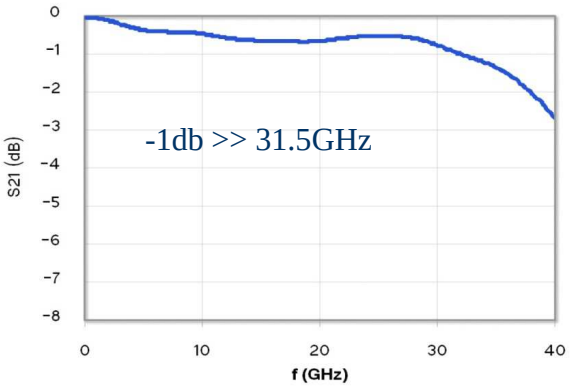
Proprietary alloy plunger



Continuous improvement

Proven Capability

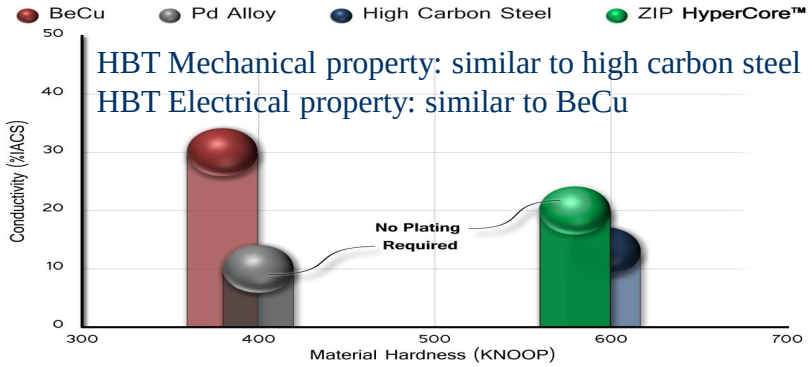
Development

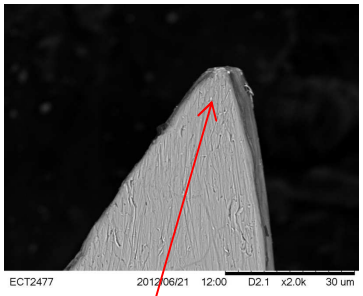
1 year

Features	Benefits
Long contact travel	Compliancy for large package warpage
Proprietary alloy plunger	Wear resistant, consistent contact resistance
Small socket footprint	Easy to place inductors, capacitors, resistors, etc for tuning and increasing bandwidth. Ideal for IC prototype and system testing and field upgradeable system designs
High resilient spring	Compression cycles in hundreds of thousands
Optimized pin diameter to length ratio	Impedance matched high speed applications
Etched contact	High current applications
Automated assembly	Low cost, short lead time

No Sn contamination on pin tip after 500K cycles

Capabilities
- 0.4mm to 0.8mm pitch
- 2x3mm to 50x50mm device
- BGA, LGA, QFN, QFP, SOIC
- 5000 pin count
- Heat sink options
- Easy chip replacement
- Custom support plate options





No tip wear after 500K cycles

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Embedded silver ball elastomer matrix socket (SM/SMP)

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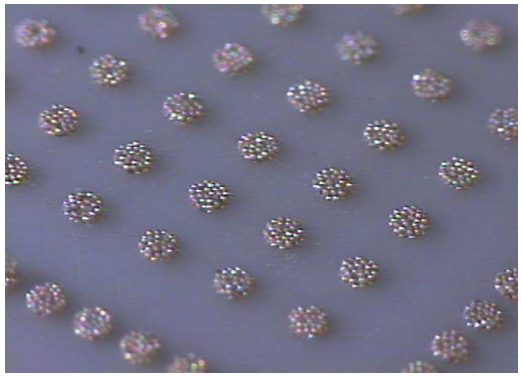
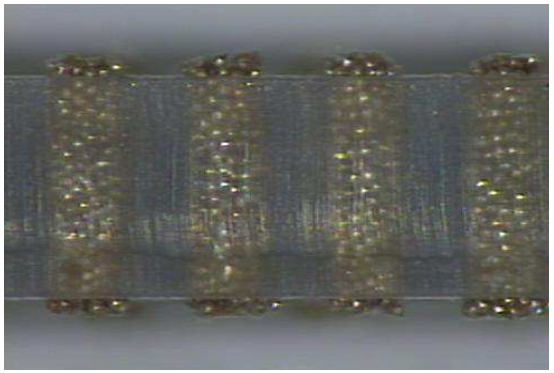
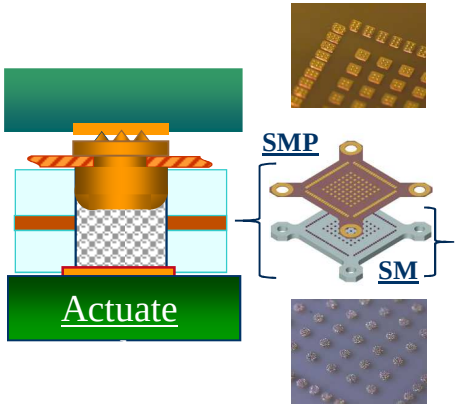


Array of Columns - Elastomer Matrix



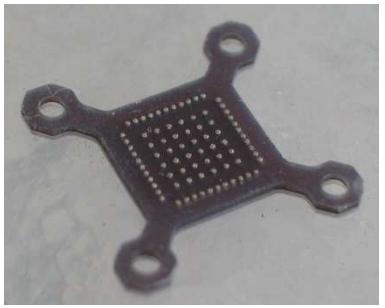
Cross section - Silver balls



SMP = Elastomer layer + Protective layer

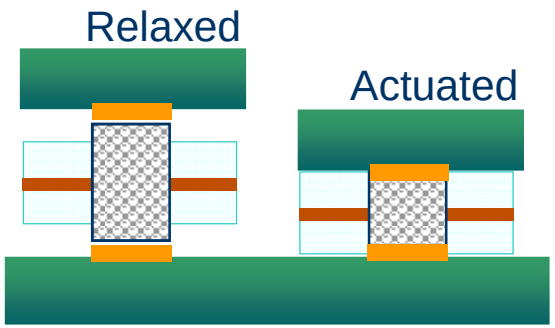
Continuous improvement
Proven Capability
Development
2 Years

Features	Benefits
Shortest contact	Highest bandwidth applications
Silver balls	Low contact resistance
Small socket footprint	Easy to place inductors, capacitors, resistors, etc for tuning and increasing bandwidth. Ideal for IC prototype and system testing and field upgradeable system designs
High resilient elastomer	Compression cycles in hundreds of thousands
Matrix with core	Optimized force and built-in compression stop mechanism

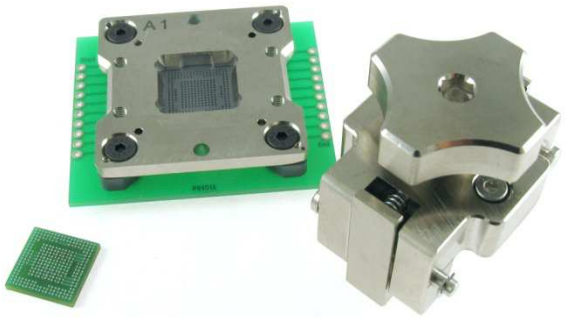


Replaceable elastomer module

Capabilities
- 0.25mm to 1.27mm pitch
- 2x3mm to 50x50mm device
- BGA, LGA, QFN
- 2000 pin count
- Heat sink options
- Easy chip replacement
- Custom support plate options



Rest & Test condition



ATE socket with double latch clam shell lid

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Contact Technology Summary

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Characteristics	Embedded Wire Elastomer (SG)	Spring Pins (SS)	Embedded Silver Particle Elastomer (XG)	Stamped spring pins (SBT/HBT)	Embedded Silver Ball Elastomer Matrix (SM/SMP)
Bandwidth, GHz	8 to 10	6 to 12	40	7 to 31.5	40
Endurance, Cycles	2K	500K	10K	500K	500K
Resistance, mΩ	20	50	50	15	15
Self Inductance, nH	0.15	1.1	0.11	0.88 to 0.95	0.21
Max Current, Amp	2	5	5	8	4
Temp Range, ^{0}C	-35 to +100	-40 to +150	-40 to +120	-55 to +180	-55 to +155
Pitch, mm	0.3 to 1.27	0.3 to 1.27	0.4 to 1.27	0.4 to 1.27	0.25 to 1.27
Package Types	BGA, QFN, QFP, SOIC	BGA, LGA, QFN, QFP, SOIC	BGA, QFN, LGA	BGA, LGA, QFN, QFP, SOIC	BGA, LGA, QFN
Relative Cost	Lowest	Highest	Middle	Lowest	Highest
Lab test	√	√	√	√	√
Production test		√		√	√
Field upgrade	√			√	
Temperature test	√	√	√	√	√
Kelvin test	√	√	√	√	√
Burn-in test		√		√	

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Pin Datasheet

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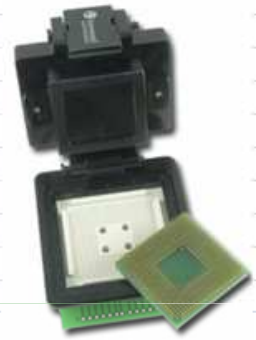
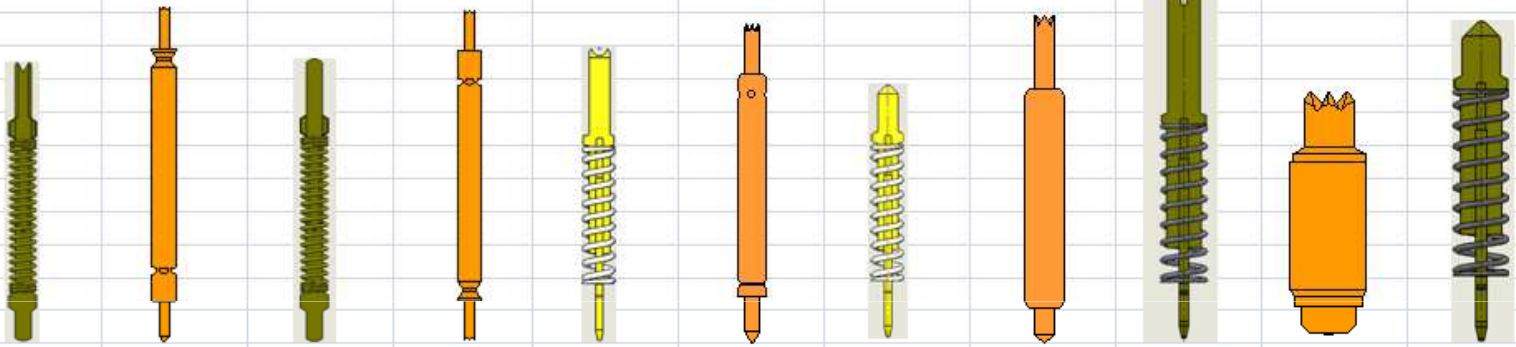
ISO 9001:2008 WITH DESIGN CERTIFIED





Pin Family	SBT	SS	SBT	SS	SBT	SS	SBT	SS	SBT	SS	SBT
Part Number	P-P168A	P-P134A	P-P163A	P-P136A	P-P149A	P-P115A	P-P150A	P-P114A	P-P151A	P-P112A	P-P152A
Minimum Pitch (mm)	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.8	1.0	1.0	1.0
Pin Type	BGA	BGA	LGA	LGA	BGA	BGA/LGA	LGA	BGA	BGA	BGA/LGA	LGA
Length (mm)	3.3	5.18	3.3	5.18	3.4	4.11	2.95	4.78	5.69	2.79	4.45
DUT Side Tip Shape	V Shape	Crown	Radius Cone	Crown	U Shape	Crown	Radius Cone	Crown	Notched V	Crown	Radius Cone
DUT Side Tip Dimension (mm)	0.13	0.13	0.04	0.13	0.18	0.1	0.06	0.25	0.54	0.52	0.1
PCB Side Tip Shape	Radius Cone	Radius Cone	Radius Cone	Crown	Radius Cone	Radius Cone	Radius Cone	Radius Cone	Radius Cone	Radius Cone	Radius Cone
PCB Side Tip Dimension (mm)	0.18	0.05	0.18	0.11	0.06	0.05	0.06	0.05	0.1	0.1	0.1
DUT Side Travel (mm)	0.4	0.28	0.4	0.28	0.33	0.2	0.33	0.57	0.6	0.2	0.6
PCB Side Travel (mm)	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Force (g)	34	20	34	20	30	16	30	22	19	30	19
Cres (mOhms)	< 70	< 70	< 70	< 70	< 30	< 100	< 30	< 25	< 15	< 35	< 15
CCC @ ambient (Amps)	2.2	1.7	2.2	1.7	6.0	2.5	6.0	3.0	8.0	4.0	8.0
Bandwidth (GHz @ -1dB)	7 - 9.1	11.5	7 - 9.1	11.5	5.2 - 15.7	6	5.2 - 15.7	6.7	14.1 - 21.9	10	14.1 - 21.9
Self inductance (nH)	0.95	1.1	0.95	1.1	0.88	1.3	0.88	0.84	0.93	0.62	0.93
Temperature (deg C)	-55 to +155C	-40 to +120C	-55 to +155C	-40 to +120C	-55 to +180C	-40 to +150C	-55 to +180C	-40 to +120C	-55 to +180C	-40 to +150C	-55 to +180C
Insertion Cycles	500K	500K	500K	500K	500K	500K	500K	500K	500K	500K	500K

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Socket Lid Options

Ironwood ELECTRONICS
www.ironwoodelectronics.com

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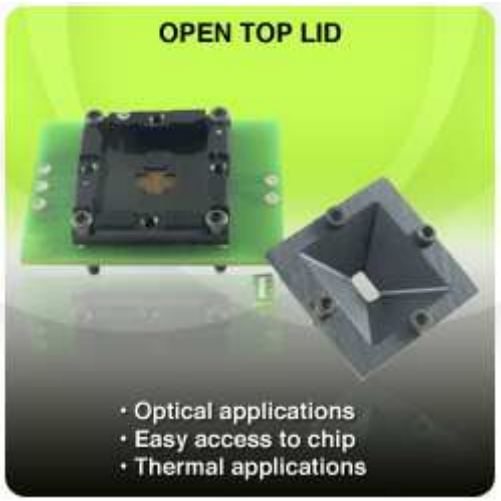

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Thermal Management Solutions(TSL)

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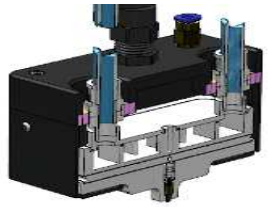
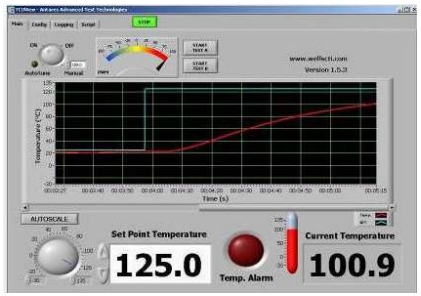
Thermal Socket Lid



Direct Contact Technology
With Condensation Control



Thermal System
Controller + GUI

Features	Benefits
Uniform temperature contact area	Uniform temperature throughout IC surface enables precise temperature maintenance
Built-in condensation control	No stagnant moisture on IC surface
Adaptable double latch footprint	Easy to attach to any IC socket with customized socket frame
Direct contact technology	Quick temperature transition
No forced air stream	Vibration free, quiet operation
GUI software	Control from your own desktop/remote access
Replaceable compression plate	Easy configuration to any IC size from 3x3mm to 40x40mm

Chiller

Continuous improvement
Proven Capability
Development
1 Year

Capabilities
- 3x3mm to 40x40mm device
- -50C to +125C
- Z-axis movement
- Configurable hard stop
- Easy pluggable module
- No residue contact
- Over temperature protection

Replaceable IC adapter

Socket Frame
adapts to any socket

Rotary Knob
Compression Mechanism

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Surface Mount Adapters for sockets (SF)

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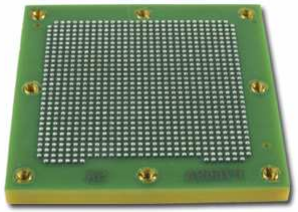
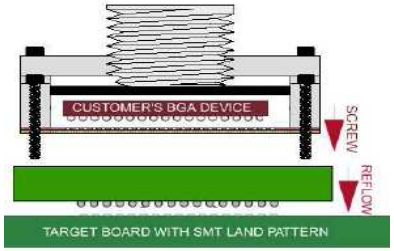
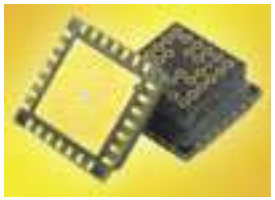


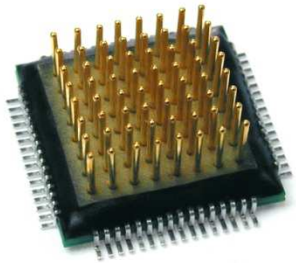
Surface mount adapter



Socket + SM adapter

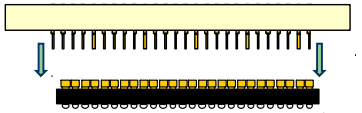


QFN SM adapter



QFP SM adapter

Spring pin socket +
Thru hole adapter +
Surface mount adapter

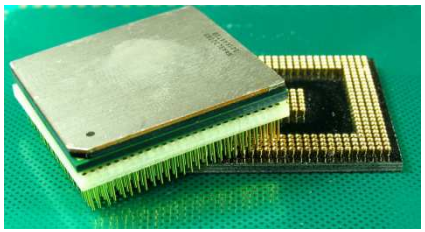


Thru hole adapter +
Surface mount adapter

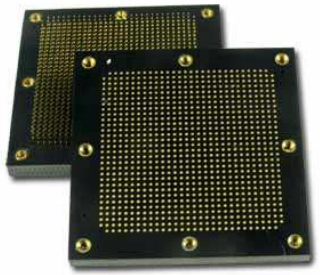
Features	Benefits
Pluggable interface	Easy insertion and extraction for device swap
FR4 & Gold plated contacts	High temperature applications
Small adapter footprint	Easy to place inductors, capacitors, resistors, etc for tuning and increasing bandwidth. Ideal for IC prototype and system testing and field upgradeable system designs
Conductive filled via	Excellent thermal dissipation and high current applications
Optimized plated thru hole with filled via	Low inductance and high speed applications
Edge castellation (QFN)	Easy manual assembly
Standard Solder (BGA)	Easy assembly (industry standard reflow profile)

Continuous improvement
10 Years
Proven Capability
Development

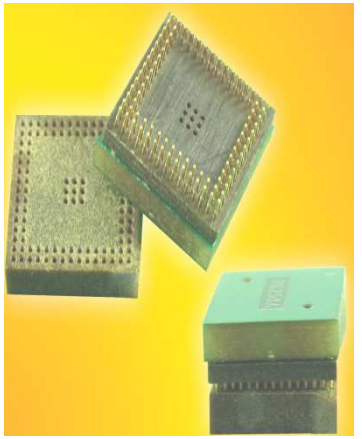
Capabilities
- 0.5mm to 1.27mm pitch
- 2x3mm to 50x50mm device
- BGA, LGA, QFN, QFP, SOIC
- 2000 pin count
- Lead free options
- Easy pluggable module
- Custom height extension



Pluggable adapter pair
with soldered device



Thru hole adapter



0.5mm pitch
Pluggable adapter pair

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Custom Capability

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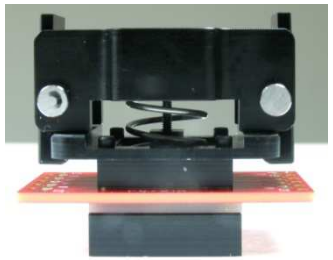
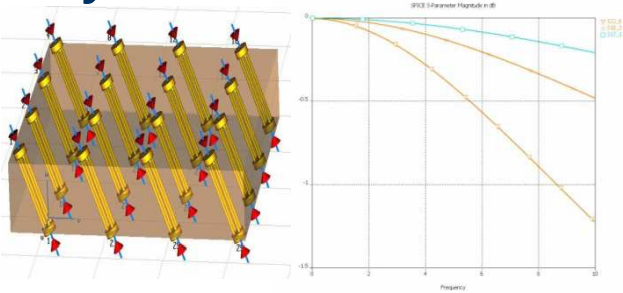
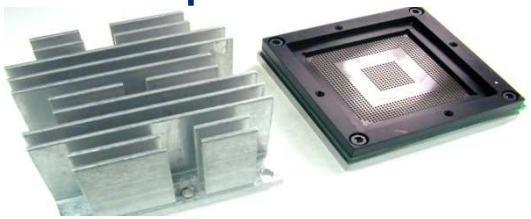
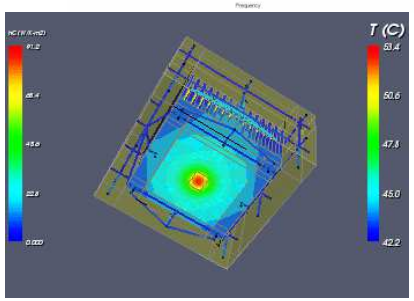
- Custom socket designs in 2 days
- Match customer's PCB footprint
- Custom socket manufacturing in 10 days
- Multiple contactor technologies
- Heat sink simulation and design
- Contactor signal integrity simulation
- In-house automated optical inspection
- In-house machining
- Quick-turn production









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