

INTRODUCTION TO IRONWOOD



> Ironwood Established in 1986

> Located in Eagan Minnesota

> 75 Employees

> 100,000 Sockets built
1M+ adapters built

United States

Ironwood Electronics (Headquarters)
K2 Integrated Technologies

Distributors

Asia – Pacific – Middle East

Migvan Technologies
Qtec Technologies Pte. Ltd.
K-Tokiwa & Co., Inc.
JC Electronics Corporation
Mirai Corporation
BGA Socket Honpo
3H Corporation Ltd.
Tekall Technologies Co., Ltd.
YF Tech Co., Ltd.
Suzhou YF Science Technology Co., Ltd.
Long Summer Co., Ltd.
Globetek
Tula Solution Co., Ltd.
Nautech

Europe

EMC (Electro Mechanical Components GMBH)
PTS (Production Test Systems Ltd.)
Manudax
B.C.E. S.R.L.
Melcom Electronics, Ltd.

Company History & Milestones



Ironwood
ELECTRONICS

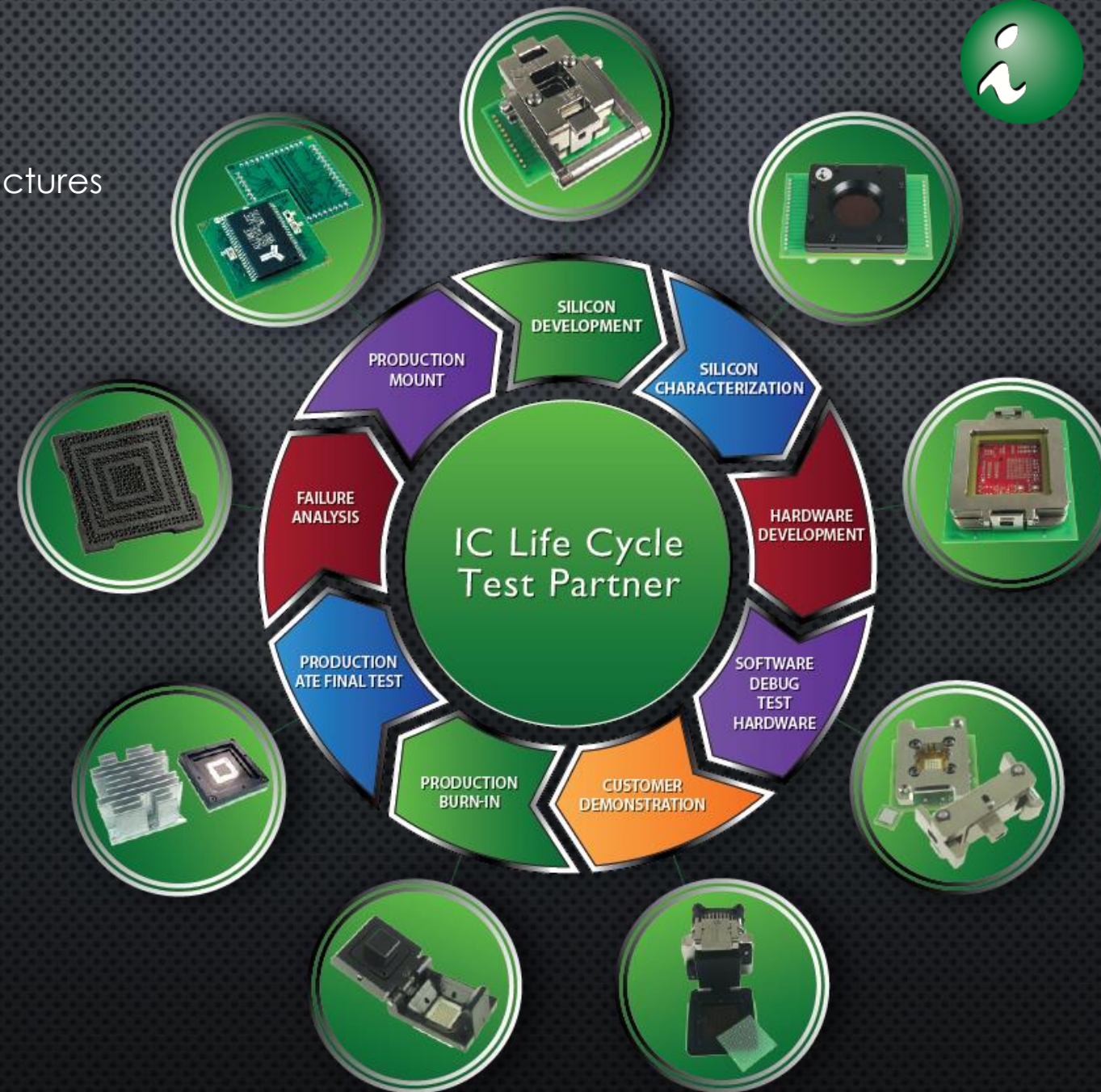




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MARKETS SERVED

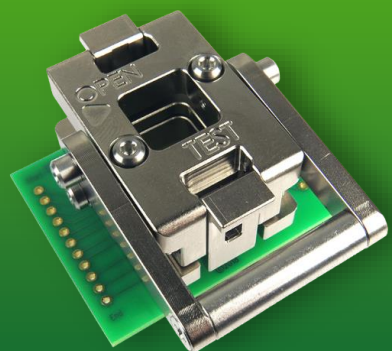
- Semiconductor Manufactures
 - Memory
 - RF
 - Digital / Analog
 - Microprocessors / Microcontrollers
- OEM
- Military Aerospace
- Telecommunications
- Consumer Products



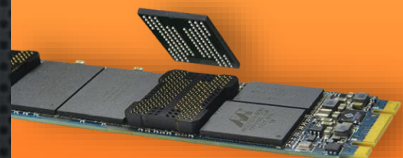


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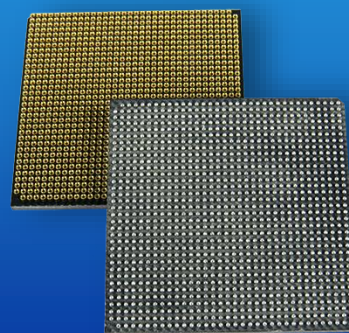
SOCKETS



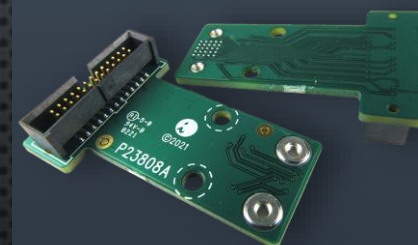
GRYPPER



ADAPTERS



HIGH SPEED BTB CONNECTORS



IMPERIUM



- Basic sockets -

- **SBT**

- Common Commercially available proven Spring pins

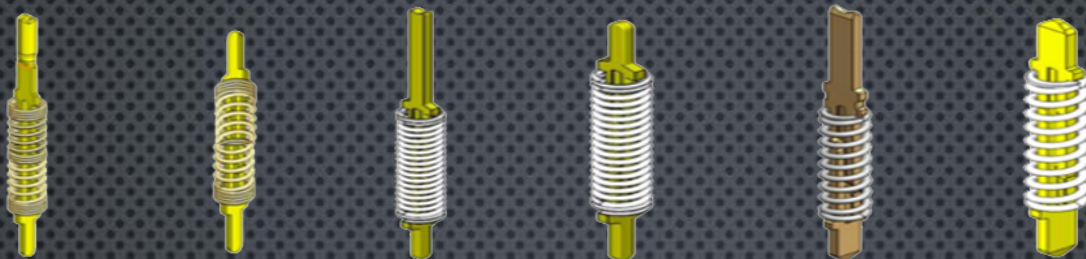
- IW footprints and we can footprint match

- NEW common footprints (Aspen) targeted for high volume

- 0.35 p / 50K+ insertions / up to ~ 20 Ghz

- Large Z compliance ~ 0.40 mm



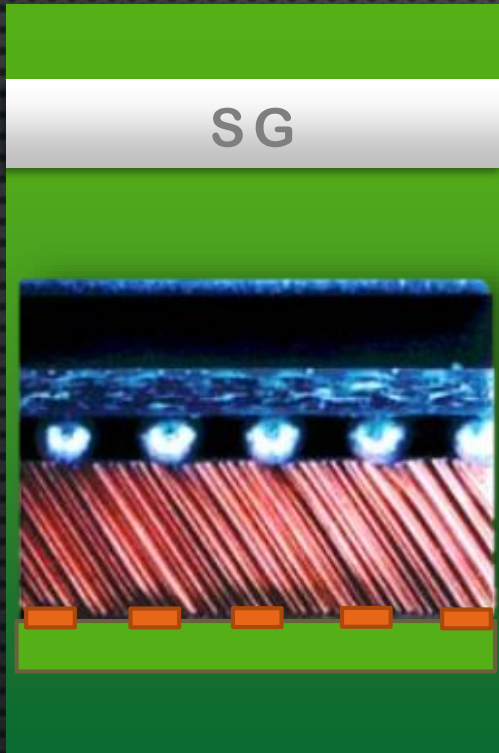


Ironwood
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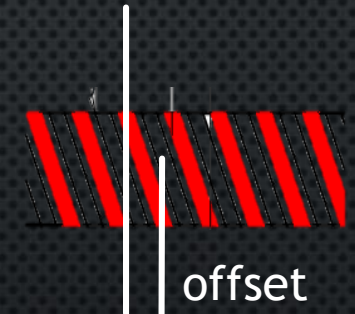
IW Part Number	P-P204A	P-P201A	P-P185A	P-P184A	P-P196A	P-P150A
Minimum Pitch (mm)	0.35	0.35	0.40	0.40	0.50	0.50
Pin Type	BGA	LGA	BGA	LGA	BGA	LGA
Free Length (mm)	3.46	2.89	3.81	2.90	3.86	2.95
DUT Tip	Crown	Radius	V	Radius	V	Radius
DUT Tip Dimension	0.17	0.12	0.12	0.12	0.23	0.23
PCB Tip	Radius	Radius	Radius	Radius	Radius	Radius
PCB Tip Dimension	0.12	0.12	0.12	0.12	0.23	0.23
DUT Travel	0.3	0.3	0.5	0.5	0.5	0.5
PCB Travel (Preload)	0.1	0.1	0.1	0.1	0.1	0.1
Force (grams)	5.8	5.8	14.5	14.5	30	30
Cres (m Ohms)	<65	<65	<60	<60	<35	<35
CCC @ ambient (Amps)	0.5	0.5	1.8	1.8	2.9	2.9
Bandwidth (GHz @ -1dB)	23.5-26.1	23.5-26.1	20.5 -31.7	20.5 -31.7	5.2 - 15.7	5.2 - 15.7
Self-Inductance (nH)	0.92	0.92	0.75	0.75	0.88	0.88
Temperature (deg C)	-55 / 180C	-55 / 180C	-55 / 180C	-55 / 180C	-55 / 180C	-55 / 180C
Insertion Cycles	75k	75k	75k	75k	125k	125k

Wire in Elastomer

- **SG**



- Gold Plated Brass wires embedded in silicone
- Different wire matrixes used for specific applications. Thickness from 0.75 mm to 0.15 mm
- BGA/LGA/QFN -Pad and solder ball devices
 - Down to 0.30 mm Pitch
 - Embedded wires are at an 63°angle
 - Compression mount type socket, but PCB footprint has as offset in one direction to compensate for the angled wires
- -35° to +125°C
- 40+ GHz Electrical performance @ 0.4 pitch

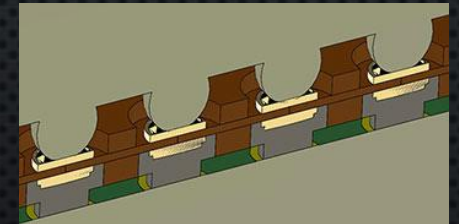
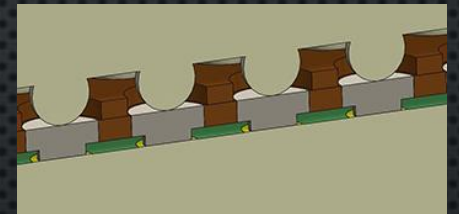
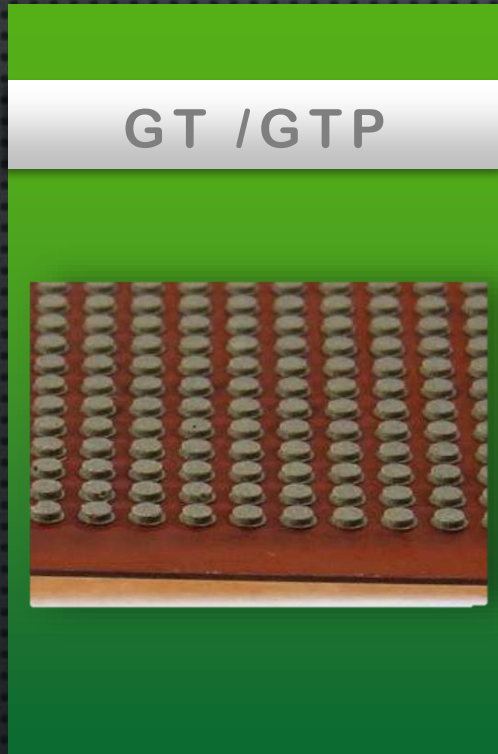




- Proprietary Elastomeric interconnect

- **GT /GTP**

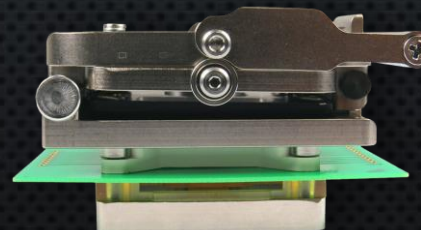
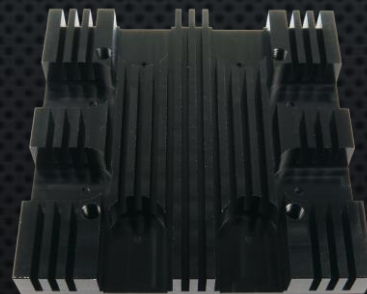
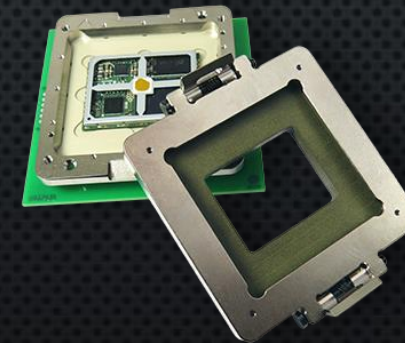
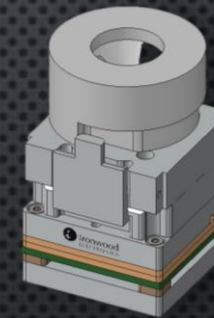
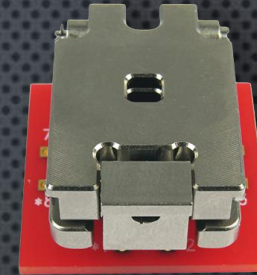
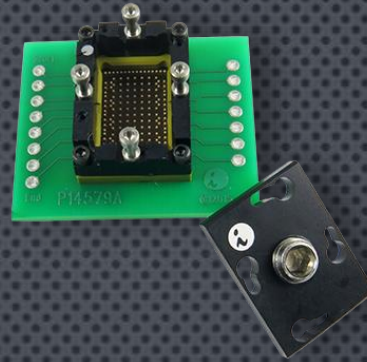
- Down to 0.25 pitch
- -55° to 160° C
- Contact Resistance < 30 mOhms
- > 75 Ghz bandwidth
- 0.15 mm compliance
- > 1000 Insertion Life
- Compression type socket
 - GTP layer adds Crown tip interface for longer life and for Pads (LGA/QFN etc devices)





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- Lid options
 - Swivel
 - Snap
 - 1/2 Turn
 - Open Top
 - Removable Double Latch
 - Lever Cam
 - Thermal management
 - (Heat sinks, Fans, Water cool)

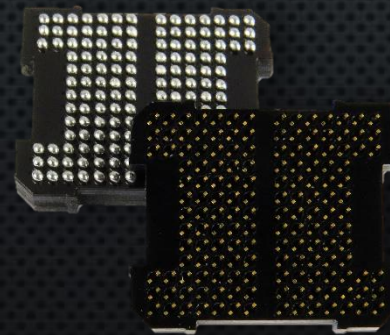
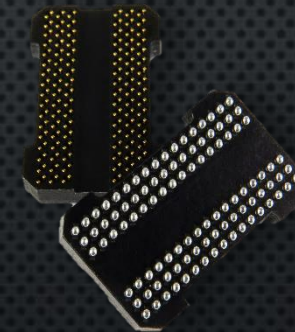
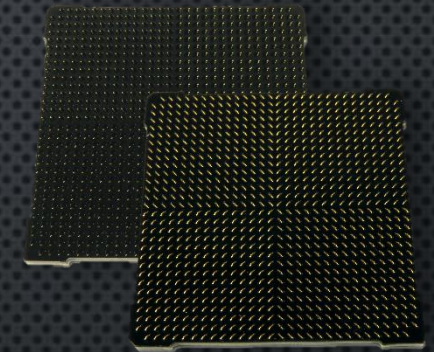
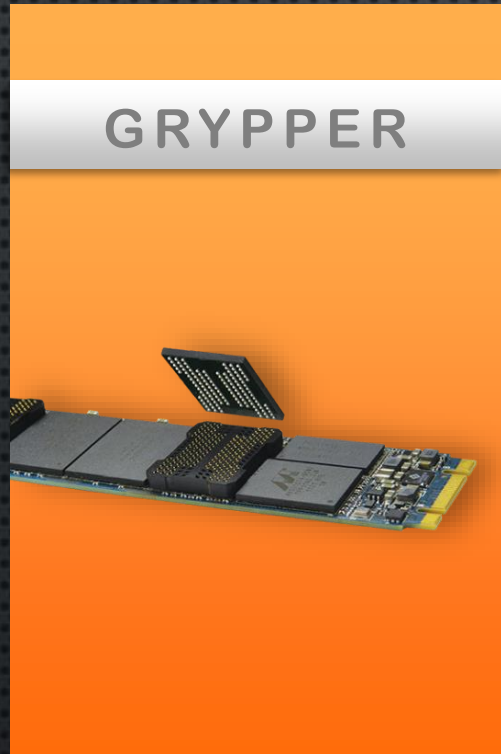


Lid Options

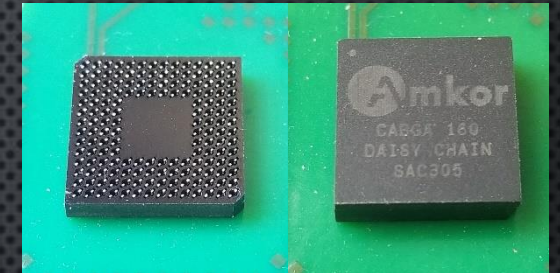
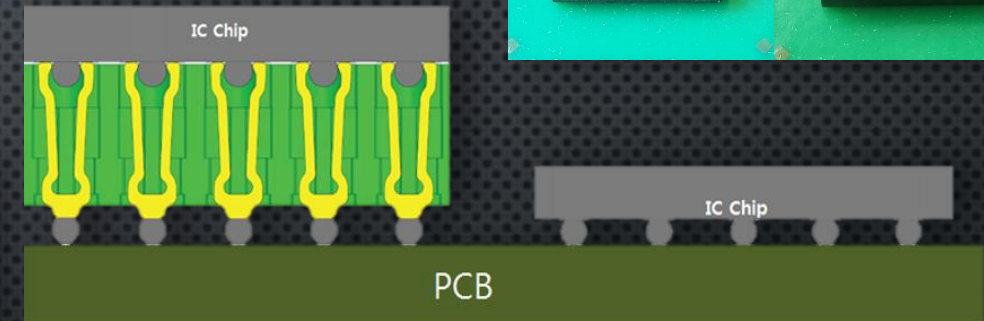
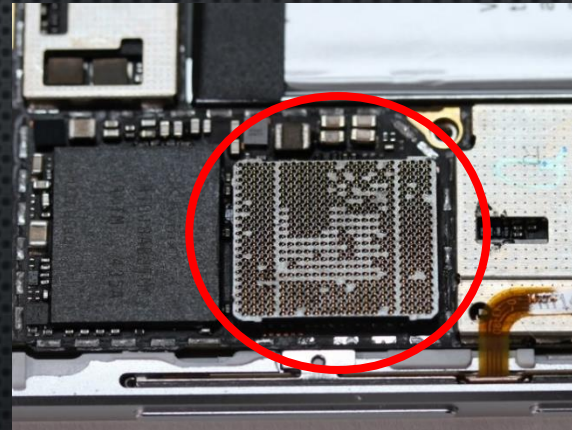
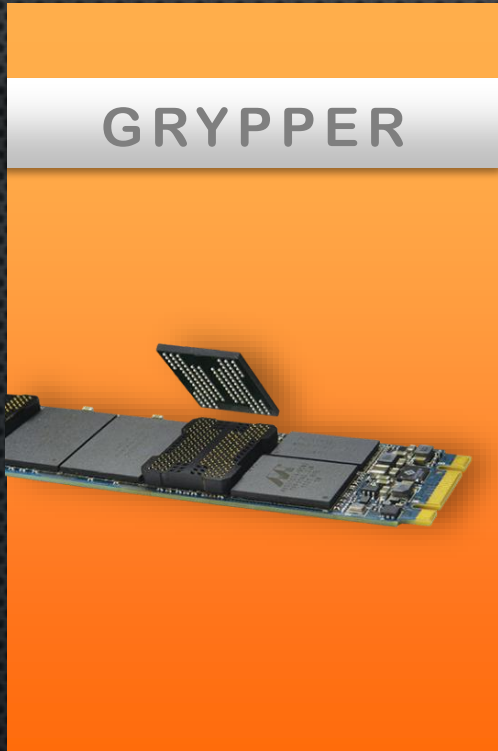
Contact Technology Summary

Characteristics	Emebedded Wire Elastomer (SG)	Stamped Spring Pins (SBT)	Silver Button Elastomer (GT/GTP)
Bandwidth, GHz	27 to 56.8	4.15 to 31.7	94
Endurance, Cycles*	2K	500K	1K/200K
Resistance, mΩ	20	15	20
Self Inductance, nH	0.11 to 0.28	0.88 to 0.98	0.04
Max Current, Amp	2	8	7.8
Temp Range, °C	-35 to +125	-55 to +180	-55 to +160
Pitch, mm	0.3 to 1.27	0.3 to 1.27	0.2 to 1.27
Package Types	BGA, QFN, QFP, SOIC	BGA, LGA, QFN, QFP, SOIC	BGA, LGA, QFN
Lab test	√	√	√
Production test		√	√
Field upgrade	√	√	√
Temperature test	√	√	√
Kelvin test	√	√	√
Burn-in test		√	

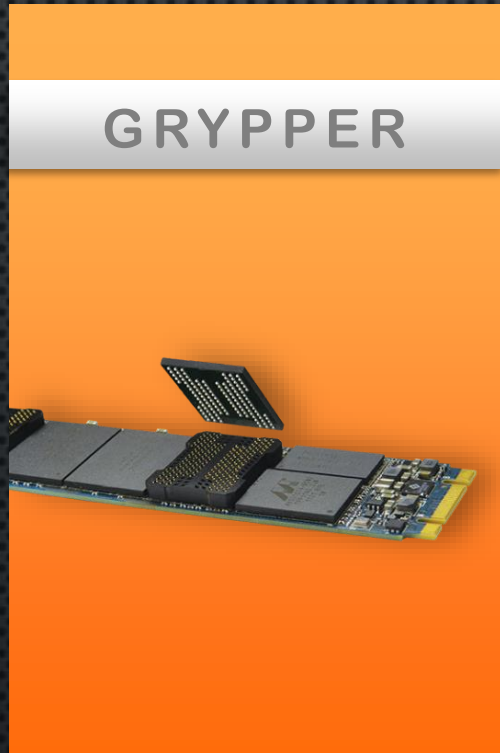
- Grypper (Zero Footprint)
 - SMT Socket
 - Same Size as the Device
 - Socket solder balled with SAC 305 or Eutectic (Tin/Lead) allowing reflow process to the PCB the same as reflowing a device
 - 0.35 to 1.0 pitch
 - UP to ~ 1200 I/O
 - -55° to +155° C
 - Up to 100 Insertions



- Grypper (Zero Footprint)
 - Same size as the Device allows the socket to directly mount into the location as the device

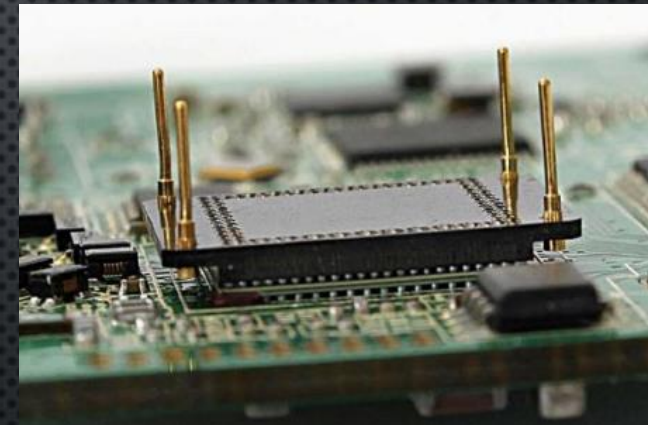
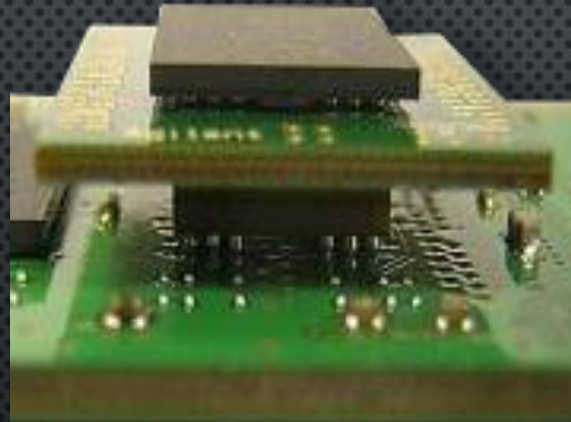
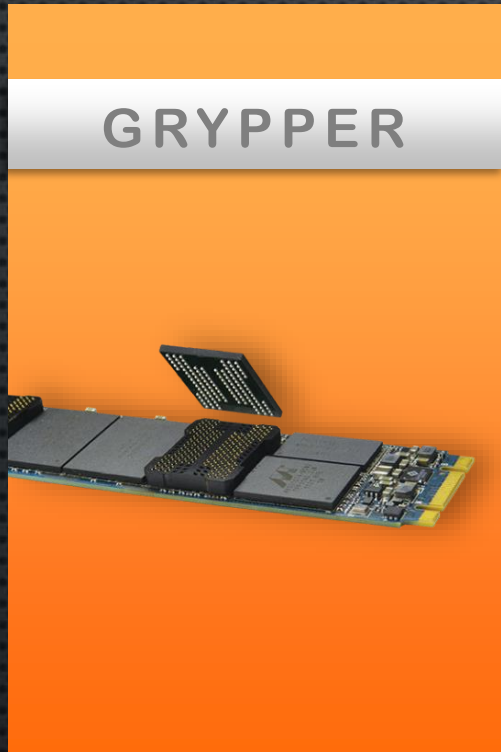


- Grypper (Zero Footprint)
 - Different Contacts depending on Pitch- I/O count
 - Excellent Electrical performance
 - Other Supporting Items
 - Alignment Frame - to ensure proper alignment of the device prior to insertion
 - Press- that allows even pressure to the back side of the device - Important on very thin –Chip Scale etc devices
 - Extraction tool – for removing the device



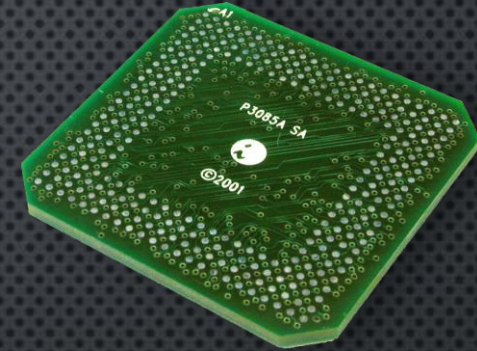
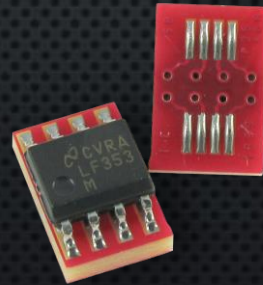
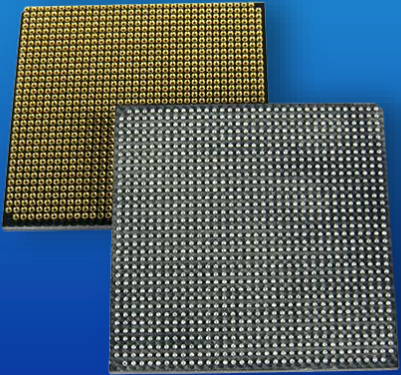
	Grypper	G80	G40/G35
Numbers of pins	<200 I/O	>200 I/O	Based on pitch
Device Pitch	>0.65mm	>0.65mm	>0.35 to 0.50mm
Insertion force	95 grams	40 grams	20 grams
Number of cycles	100	50	50
Electrical	-1db@40Ghz	-1db@30.8Ghz	-1db@24Ghz

- Grypper (Zero Footprint)
 - Also Used as a riser for Snoop Boards



- Adapters / Package Converters
 - Simple Redistribution of I/O
 - PGA to BGA
 - QFN to BGA
 - Simple Pitch Change for SOIC

ADAPTERS

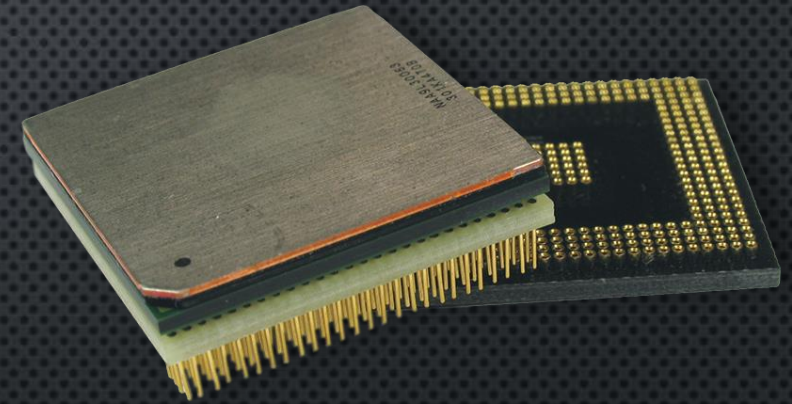
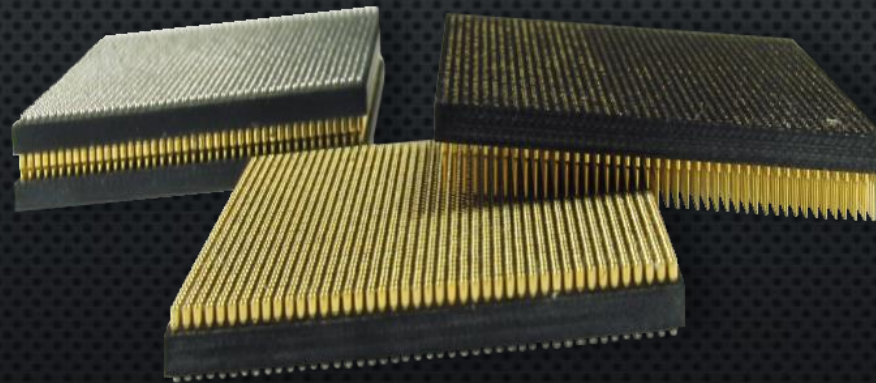
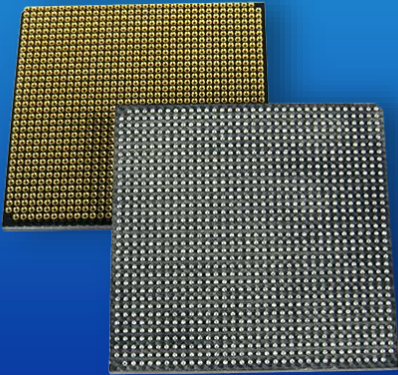




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- Giga Snap
 - Allow Customer to Plug in Device (PGA type Pin) in the same footprint
 - Female Interposer soldered to target PCB
 - Device solder to Interposer with PGA type pins

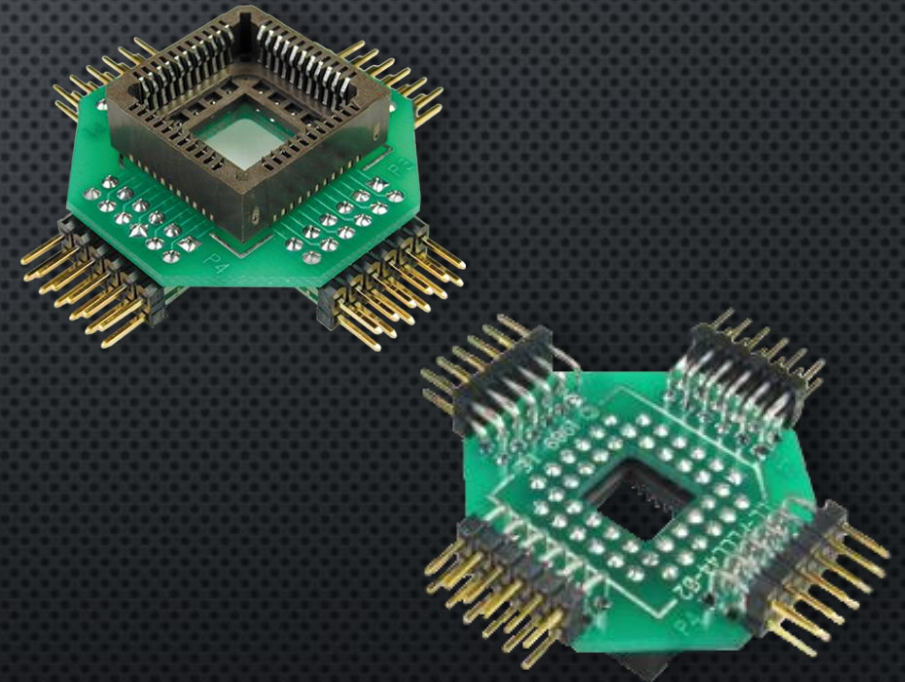
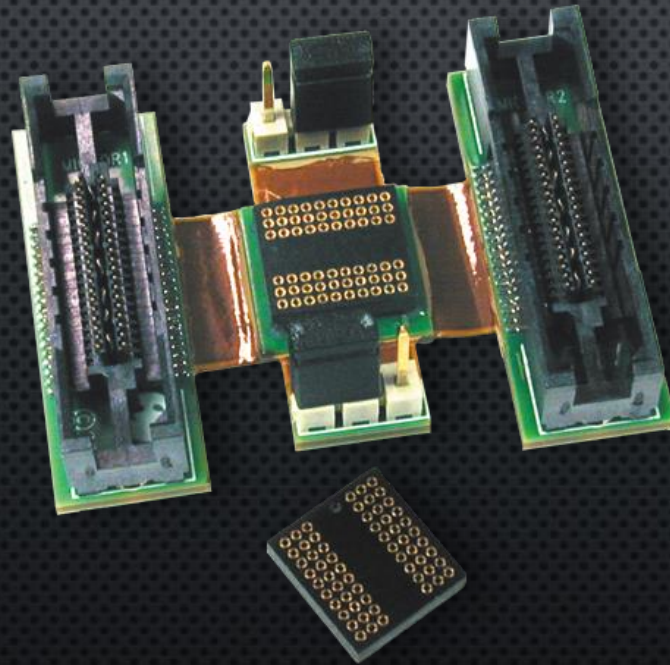
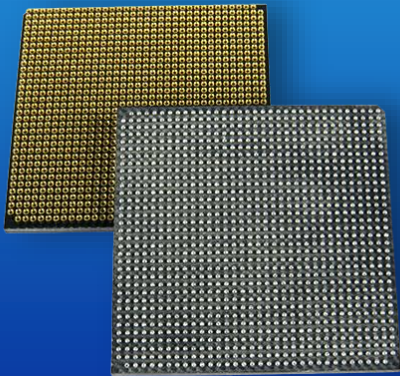
ADAPTERS



- Probing

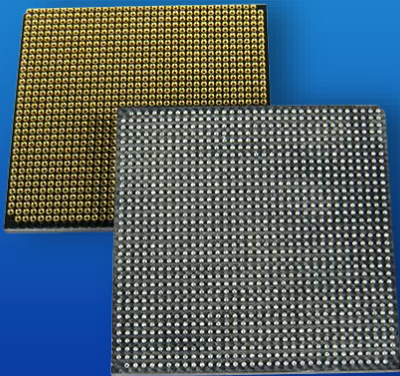
- DDR Test Board allowing monitoring of the signals
- PLCC Device clips with probing option

ADAPTERS

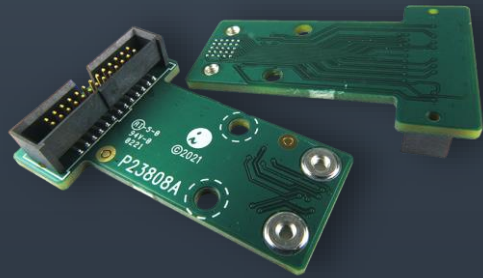


- Adapters / Package Converters
 - More complex requiring voltage changes, Impedance control, Differential pairs – RF application / High Speed digital/ other componentry to do the conversion

ADAPTERS



**HIGH SPEED
BTB
CONNECTORS**



- No Hard Tooling Charges
- Rapid Development/ Short Lead Times
- Prototype & Production Capabilities
- **3 Technology Options:**
 - GT Elastomer for Ultra High Speed Short Connections
 - Spring Pins: Rugged & Customizable Options
 - Permanent Mount Capabilities



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- Benchtop – Small Size
 - 410 x 282 x 150 mm (11 x 6 x 16 in.)
 - 8.7 kg (19 lbs.)
- Unique Umbilical / Test Head
 - Pneumatic press force control 0-80kg
 - (0-176 lbs.)
 - Frost Free
 - Quick Disconnect to allow easy transfer to other sites
- Excellent Thermal Control
 - Control and Accuracy is within +/- 0.2° C
- Head interface to Ironwood sockets and other manufactures



Ironwood
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- IW capabilities
 - In-house manufacturing of majority of components
 - PCB Assembly
 - Pick and Place and Reflow
- Electrical and Thermal Simulation



24,000 Sq. Ft.
Building



Production



Machining



ESD Automated
Assembly