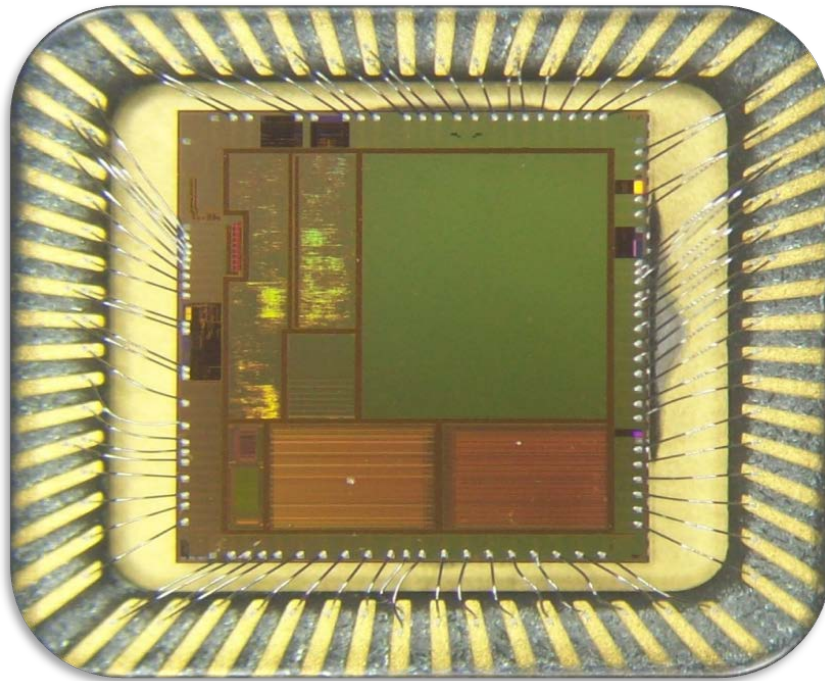


XTREMETM ***Semiconductor***

Chip RecoveryTM ***Product***

***Breathing New Life into
Obsolescence***

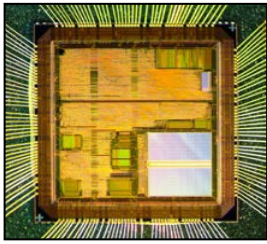


12908 Trails End Road, Suite E, Leander TX 78641
Austin Office: tel 512-255-5401 • San Diego Office: tel 858-230-6961
www.xtremesemi.com

Chip Recovery™ Product

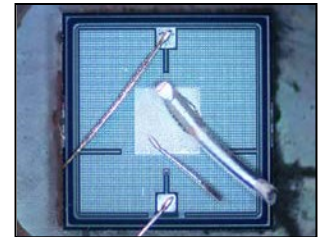
Breathing New Life into Obsolescence

Increased usage of commercial integrated circuits (ICs) in long lifetime High Reliability systems, having life cycles exceeding 20-30 years, coupled with the steady decrease of commercial IC life cycles, typically 2-3 years, has caused component obsolescence to become an increasingly difficult aspect of managing production logistics and procurement. In many cases, due to component obsolescence, the required device package configuration (e.g., DIP, TSOP, SOIC, LCC, PQFP, etc.), or bare die cannot be located, even though the product may be readily available in an alternate package footprint from the manufacturer or through distribution.

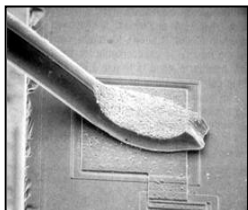


XTREME Semiconductor™ can now offer a reliable, cost-effective, high or low volume **Chip Recovery™** service enabling us remove silicon die from any plastic or ceramic package while maintaining full die functionality. These die are then available to be used in bare die form or they can be re-assembled into any available alternate plastic or hermetic package that meets the form, fit and function

of the desired obsolete semiconductor product. A **Chip Recovery™** solution also provides a low-cost, quick-turn source for die required for hybrid development projects where small quantities of die are required and purchasing a full wafer or multiple wafers is not cost-effective.



Our **Chip Recovery™** process provides a cost-effective alternative to other higher-cost solutions such as redesign or re-fabrication of the microcircuit chip to resolve Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues. Our **Chip Recovery™** process uses chemical and mechanical processes that are no more aggressive than those used when the original die was manufactured.



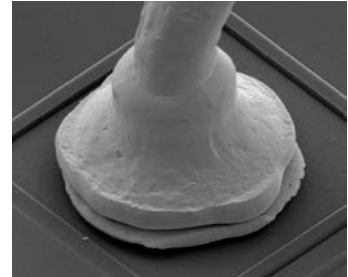
Once the die has been successfully recovered from the package, the original gold or aluminum wires are removed just above the original gold ball or aluminum wedge bond, providing a clean, uncontaminated surface for new high adhesion bonding.



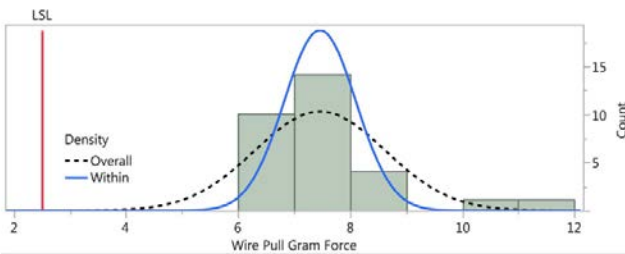
The only subsequent non-standard assembly process is that a new gold ball bond or aluminum wedge bond is made to the existing gold ball bond or aluminum bond surface,

rather than to the original aluminum pad interface. Under proper process optimization, the new gold bond on the existing gold ball bond adheres as well as the original bond and is generally limited to the tensile strength of the bond wire used. With proper process control, the resulting new bond made to the existing gold ball or aluminum bond provides excellent bond adhesion.

Die shear and bond pull results have shown that this production process is extremely robust and is statistically identical for pre and post assembly processing. The **Chip Recovery™** process provides additional assurance in knowing that only fully inspected, authentic Original Component Manufacturer (OCM) die are re-assembled into the finished product significantly reducing the risks associated with receiving counterfeit devices. **Chip Recovery™** solutions provide **XTREME Semiconductor™** one more tool to assist our customers with finding reliable and cost effective solutions to solve their product obsolescence issues.

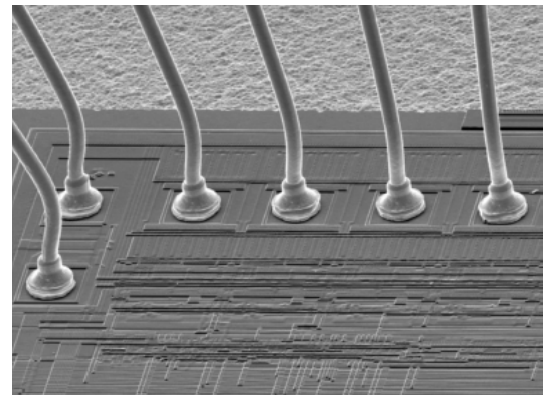


Wire Bond Pull Strength (MIL SPEC > 2.5 grams)

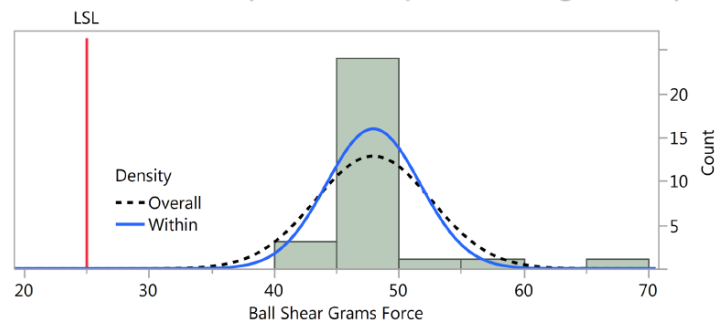


Index	Estimate	Lower 95%	Upper 95%
Cpk	2.59	1.742	3.436
Cpl	2.59	1.742	3.436

* Mil-Std-883 J method 2011.9 p 283-286, Au Postseal

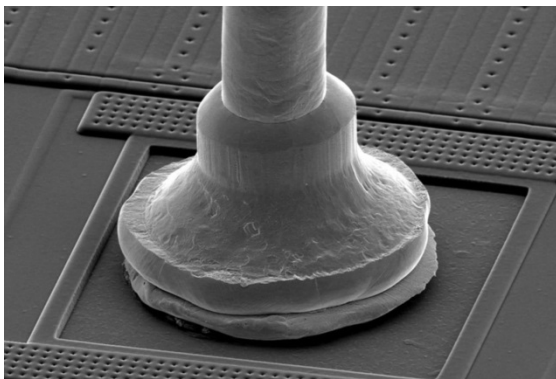


Ball Shear (JEDEC spec > 25 grams*)



Index	Estimate	Lower 95%	Upper 95%
Cpk	2.044	1.37	2.715
Cpl	2.044	1.37	2.715

* JEDEC22B116 p 8, 2.75mil Ball



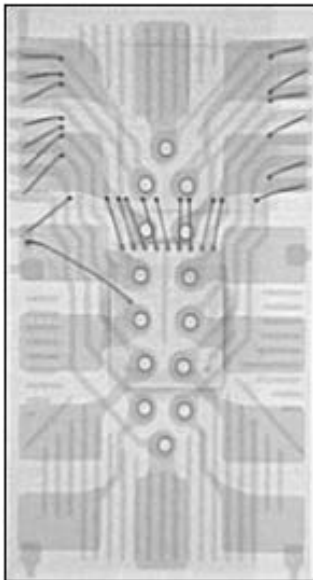
Data representative of Aurora Semiconductor Bond-Coin™ Process

What is *Chip Recovery™* Product?

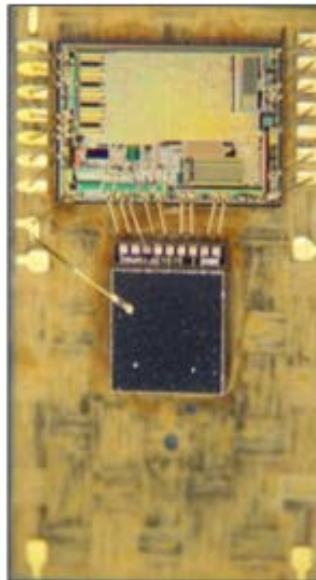
An innovative, cost effective solution through reliable die extraction processes to solve product obsolescence.

Process Overview

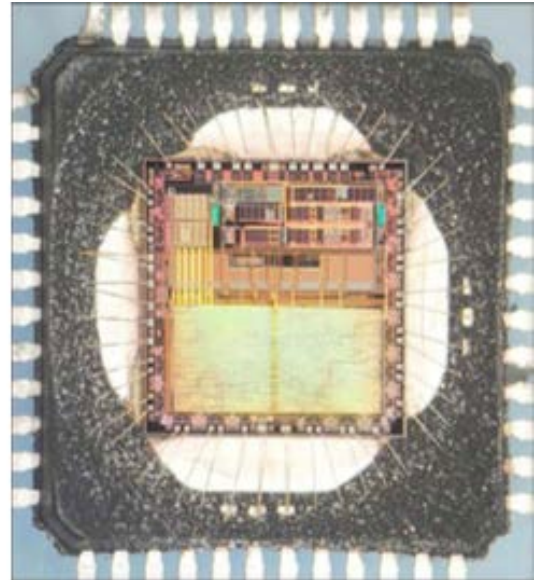
X-RAY



Mechanical



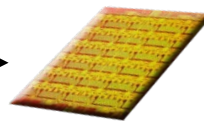
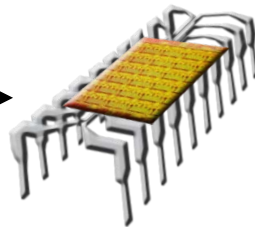
De-capsulation



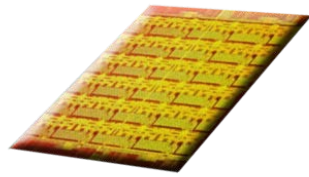
Start with existing OCM component in undesired package

Disassemble package and extract the die

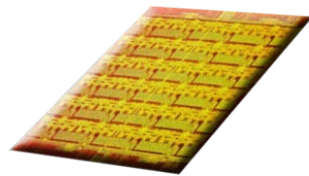
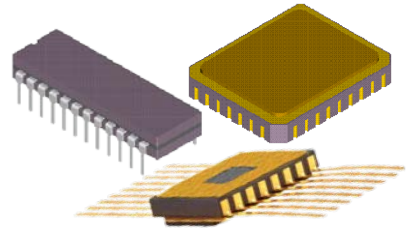
Re-assemble the die into the required package configuration



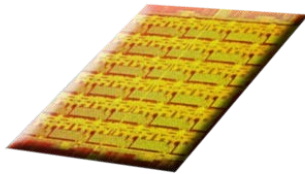
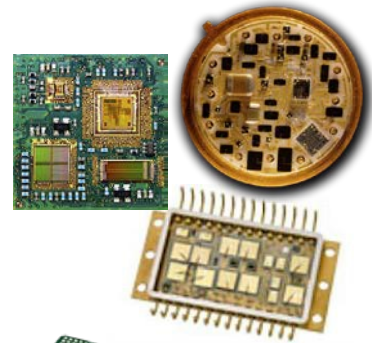
Uses for *Chip Recovery*TM Die



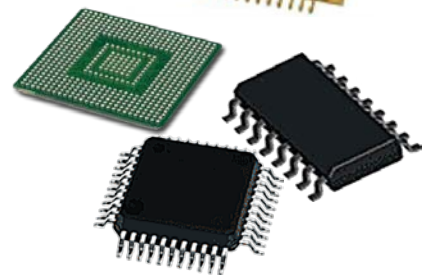
→
Hermetic Packages



→
Hybrids & MCM's



→
Plastic Packages



Chip Recovery: Product Standards

- XTREME Semiconductor manufactures in strict compliance with industry standard for assembly, test and qualification.
- Manufactured to be MIL-STD-883 compatible product
- Guaranteed to meet original OCM data sheet or specification requirements.

Chip Recovery™ Product

✗ All *Chip Recovery™* product is clearly marked with our **ChiPR™** identifier



20-pin CLCC
Dual Precision Op Amp
Military Application
200pcs Delivered



68-pin PGA
16x16-bit Multiplier
DOE Application
220pcs Delivered



176-pin PQFP
PCI Ethernet Controller
Military Application
1500pcs Delivered



52-pin QFP
DSP System Memory
Commercial Aviation
320pcs Delivered

✗ All correspondence and written quotations clearly identify the product being offered contains extracted die

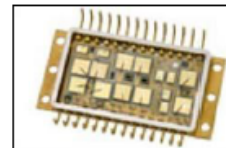
✗ **XTREME Semiconductor™** works closely with our customer to develop qualification plans based on specific end customer applications, environments and requirements

Ideal Applications for Products using our Chip Recovery™ Solution

✗ Military/Aerospace



✗ Hybrids

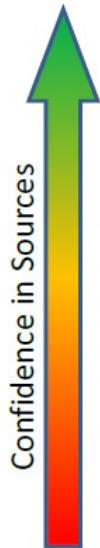


✗ Geophysical



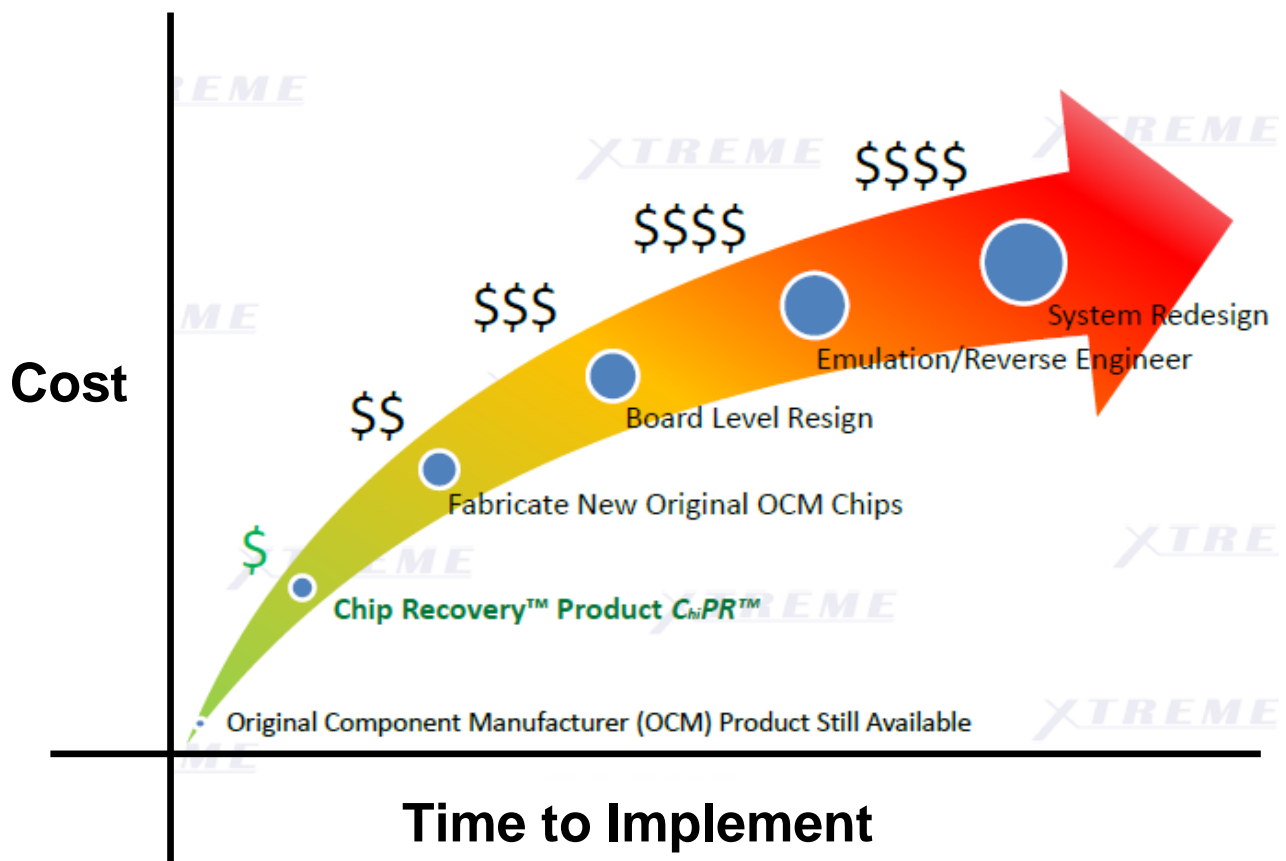
✗ Commercial/Industrial

Sources for die used in our *Chip Recovery™* Solutions



- ✗ Direct from OCM
 - Preferred choice, highly reliable, full traceability
- ✗ Franchised Distributor
 - Highly reliable, traceability back to OCM
- ✗ Excess Inventory
 - Possibility of limited traceability
- ✗ Open/Aftermarket Material
 - Limited/Questionable/No traceability

Analysis of System Redesign Options





Chip Recovery™ Process Flows

Hi-Rel Product Flow:	Commercial Plastic Flow:
Military 2nd Optical Inspection	Commercial 2nd Optical Inspection
Die Attach	Die Attach
Aluminum or Gold Wire Bond	Aluminum or Gold Wire Bond
3rd Optical Inspection	3rd Optical Inspection
Seal	Mold
Temperature Cycle	Marking
Centrifuge	Electrical Test
Fine Leak	
Gross Leak	
Marking	
25°C Test	
Burn-in	
25°C Test	
Final Test (-55°C to +125°C)	

Quality Conformance Inspection:

QCI in accordance with MIL-STD-883 Method 5005 shall be performed as required by purchase order or drawing specification.