TowerJazz Global Symposium

Quik-Pak™

Microelectronic Packaging & Assembly Solutions

Specializing in Open Cavity Packages
& Complete IC Assembly Services

ISO 9001:2008 Certified and ITAR Registered

TowerJazz Global Symposium

Quik-Pak
a division of Delphon Industries

2011 Gold Sponsor

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TowerJazz Global Symposium

Enabling Innovation

Presented by Casey Krawiec
Global Sales and Marketing Manager

November 2, 2011

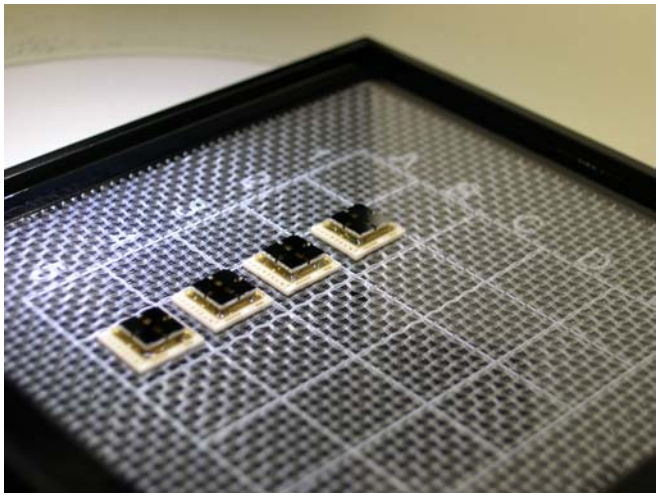
ISO 9001:2008 Certified and ITAR Registered

Quik-Pak™
Microelectronic Packaging & Assembly Solutions

Who do we enable? Some of the same companies TowerJazz enables!

One project requires the accurate placement of VCSELs (**V**ertical **C**avity, **S**urface-**E**mitting **L**aser) along with precision optical lens attachment. These transmit/receive (Tx/Rx) photo detector assemblies are used for high speed data transmission in aerospace and defense applications.

The fiber-optic transceiver and integrated optical time-domain reflectometer (OTDR) chips used by our mutual customer are both made by TowerJazz using the SBC18HA process.



Quik-Pak Overview

Started in 1992, Quik-Pak is a Southern California company specializing in:

Open-cavity plastic packages

Complete integrated circuit assembly

Rapid prototyping services

Quik-Pak serves the semiconductor, telecom, defense, aerospace, consumer, medical, automotive and industrial control industries.

DELPHON

Merging Innovative Technologies

Quik-Pak™

Microelectronic Packaging & Assembly Solutions

Gel-Pak®

Protecting the World's Valuable Devices

Quik-Pak™

Microelectronic Packaging & Assembly Solutions

TOUCHMARK

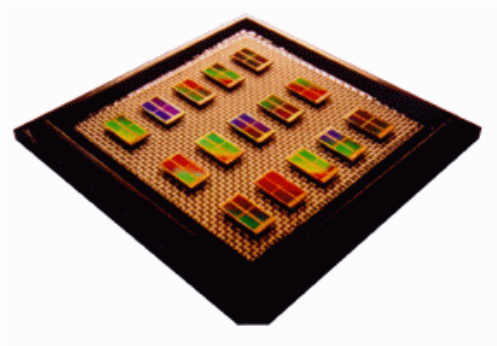
MEDICAL DEVICE PAD PRINTING

UltraTape

Adhesive Tape & Labels for Critical Environments

Delphon Product Lines

Quik-Pak™
Microelectronic Packaging & Assembly Solutions



Patented Vacuum Release Trays

GEL-Box and GEL-Tray™

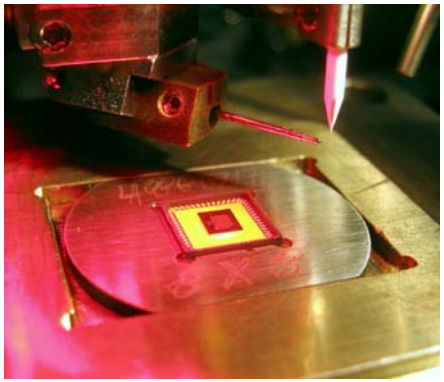
Proprietary GEL-Film ®

Proprietary Protocol Tape

Medical Pad Printing

Open Cavity Plastic Package

- Start with ANY Plastic Package
  - Test rejects
  - Excess inventory
  - Mechanical samples
  - Or, procured by Quik-Pak
- Open up the package
  - Using our proprietary process
    - Remove the molding compound and clean the precious metal surfaces
- Ready for re-assembly
  - By Quik-Pak, or the customer

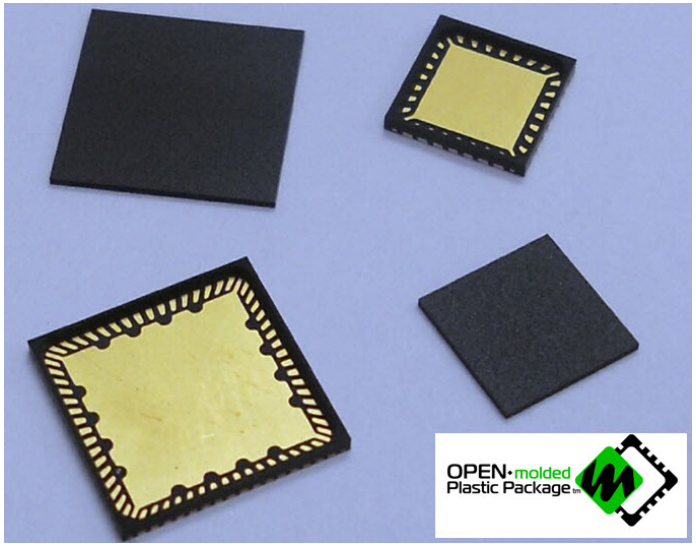


OmPP™

OmPP™ (**O**pen-**m**olded **P**lastic **P**ackage) launched this year

- Premolded **QFN** packages using new raw materials
  - Cu leadframe & transfer molding compound
- Larger die paddle than competitive products
  - Supports larger die & down bonds
- "Green" molding compound
  - Both RoHS & REACH compliant
- Gold plated
  - Provides excellent bond-ability
  - Long shelf life without oxidation
- Matching covers/lids

- **28 different part numbers kept in stock for quick-turn availability**



Enabling Innovation

Quik-Pak™
Microelectronic Packaging & Assembly Solutions

So what does all of this talk about plastic packaging have to do with Aerospace and Defense?

Like TowerJazz, our A&D business model has been developed to support various levels of engagement beginning with low volume and early prototype needs.

Quik-Pak Services Growth

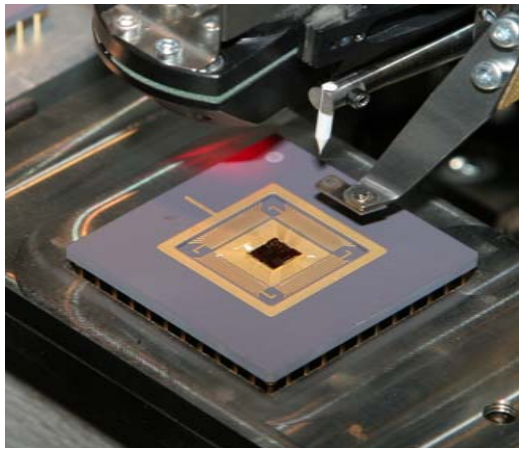
Quik-Pak™
Microelectronic Packaging & Assembly Solutions

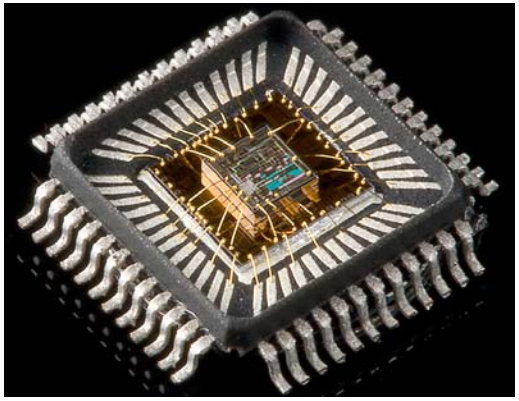
- 1992 - Open-cavity plastic packages
- 1993 - Assembly services
- 2000 - Acquired by Delphon
- 2006 - Wafer prep services
- 2009 - Custom substrates
- Yearly equipment upgrades

The expansion of our services enables companies to explore new packaging and assembly technologies.

Prototype Assembly

Quik-Pak™
Microelectronic Packaging & Assembly Solutions





Rapid Turn Time – Three day standard, 8-hrs expedite

- For plastic, ceramic, and chip on board assembly
- Die attach
  - Conductive or non-conductive
- Au, Al & Cu wire bonding
- Multiple encapsulation options

Prototype Assembly

Wire Bonding Capabilities

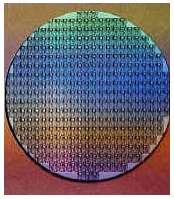
Gold (Au) Ball Bonding 18µm (0.7mil) – 76µm (3.0mil) diameter wire. Pitch down from 35 µm.

Aluminum (Al) Wedge Bonding 20µm (0.8mil) – 51µm (2.0mil) diameter wire. Pitch down to 60µm.

Copper (Cu) Ball Bonding 18µm (0.7mil) – 25µm (1.0mil) diameter wire. Pitch down to 35µm.

Ribbon Bonding Au and Al 25µm (1.0mil) X 250µm (9.8mil) ribbon.

Complete Wafer Finishing


Incoming Wafer


Wafer Mount


Back Grind

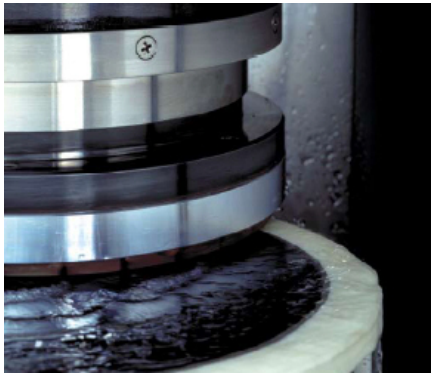

Dice

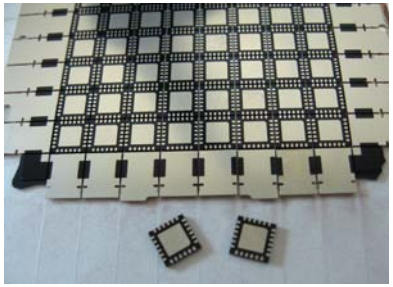

Wash


Die Sort


Finished Dice

- Back Grinding
  - Up to 200mm dia. (300mm if quartered).
  - Wafers as thin as 50µm (shipped on tape)
  - Individual die to 15µm
- Dicing
  - 25 to 200mm dia. (300mm if quartered wafers)
    - Panels, substrates, other materials
- Die Sort
  - Into Gel-Pak products or waffle packs



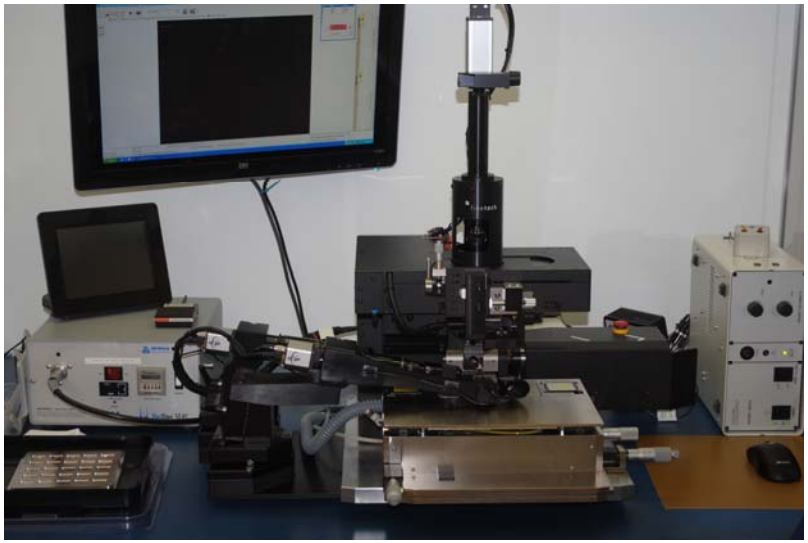


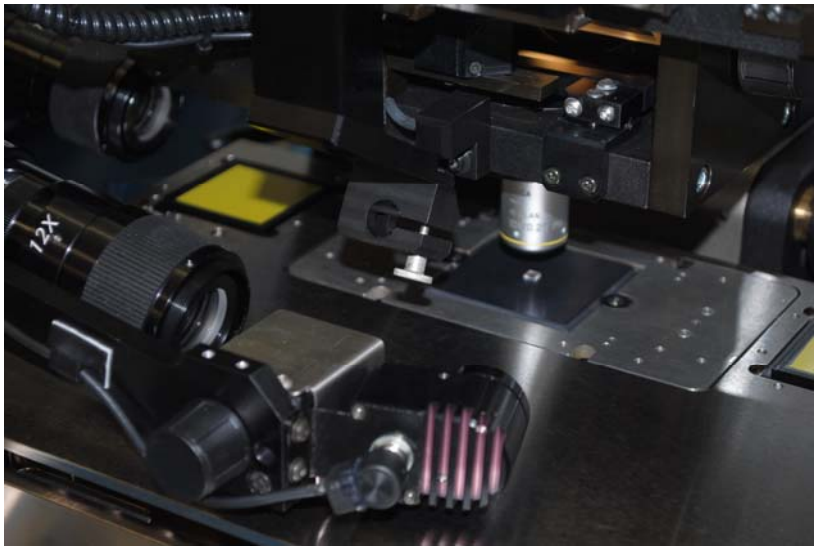
Complete Wafer Finishing

Backgrinding and dicing expertise:
- Low-k passivated wafers
- Multi-Project wafers
- Wafers with dissimilar materials
  - Glass/silicon
  - Silicon/organic

Pick and place expertise:
- Complex reticle segregation
- Transfer 75µm thick die to Gel-Pak tray

Leading Edge Equipment





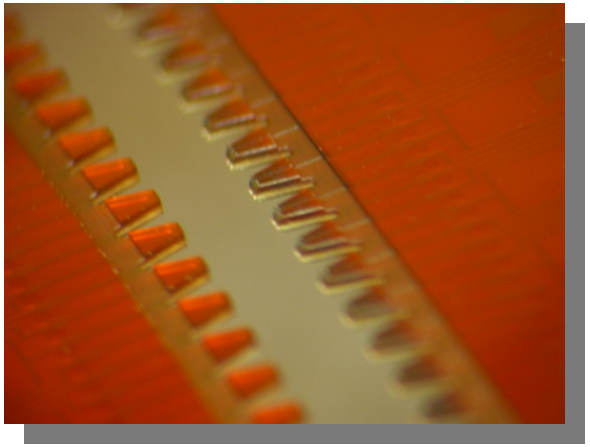
Finetech Lambda Semi-Automatic Bonder

- 1um placement accuracy of VCSEL, PD, MEMS
- Thermo-compression Bonding (320°C)
- Thermo-sonic Bonding (150-180°C)
- Mask generator helps align components in different planes

Laser Micromachining

Quik-Pak™
Microelectronic Packaging & Assembly Solutions

- 355nm ND:YAG, 20µ beam diameter
  - Accommodates parts up to 21” X 25” by .75” thick
  - CAD input via .dwg or Gerber files
- Cutting, drilling, marking, skiving, stencils
  - Wide range of materials
    - Cu, stainless steel, FR4, polyimide's, glass, silicon, sapphire and many others



FLIP CHIP ASSEMBLY

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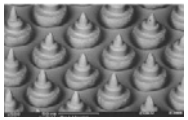
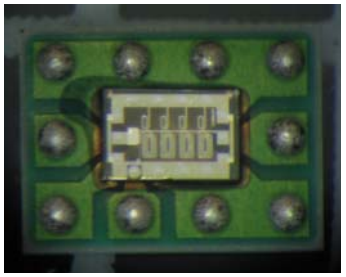
DIE OR WAFER

BUMPING METHODS

TIN/LEAD SPHERES

GOLD STUD BUMPS



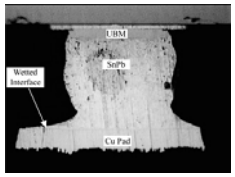


BONDING PROCESS

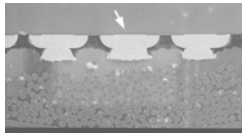
ADHESIVE FLIP-CHIP

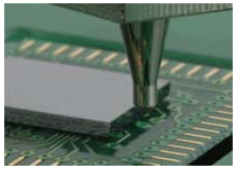
T/C, TS/C FLIP-CHIP

UNDERFILL



FLIP-CHIP ASSEMBLY

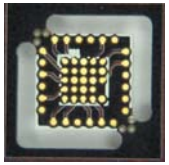




SUBSTRATES

BT, FR4, CERAMIC

ENIG, ENEPIG



SOLDER MASK & LABELING

Quik-Pak Capabilities Examples

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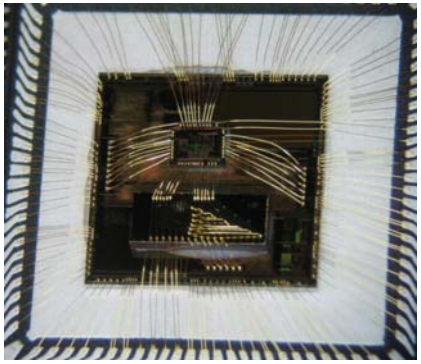
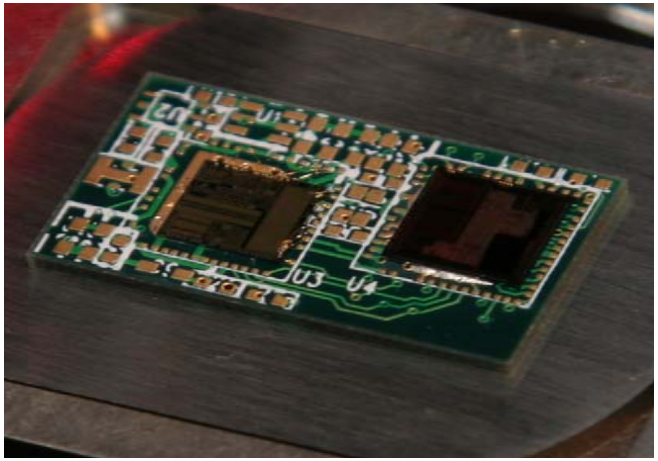
Microelectronic Packaging & Assembly Solutions



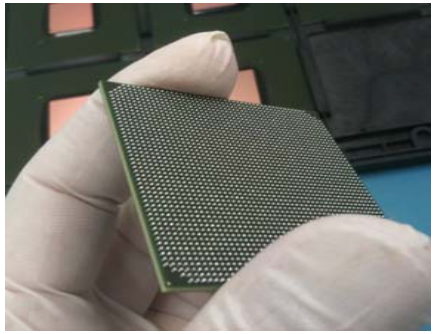
Stacked Die



Multi-die

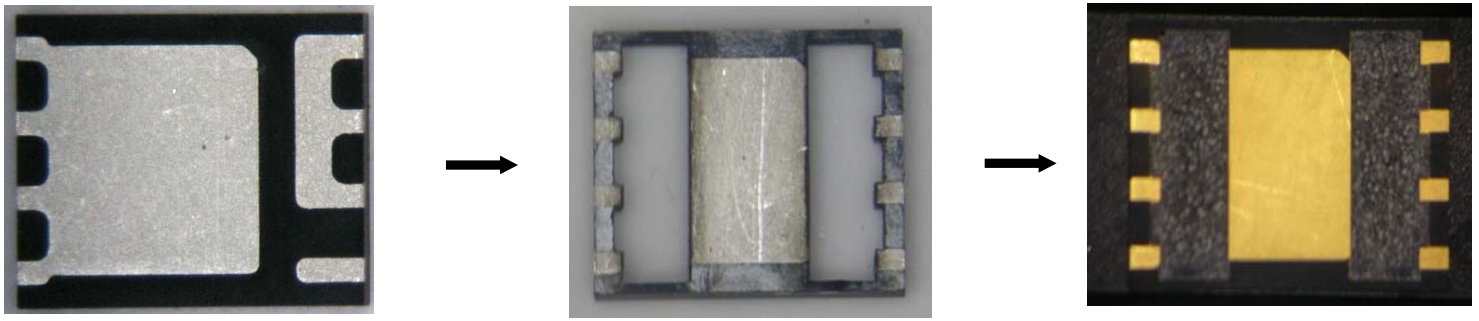
- Chip-on-board
- Chip-on-flex

Solder Ball Attach

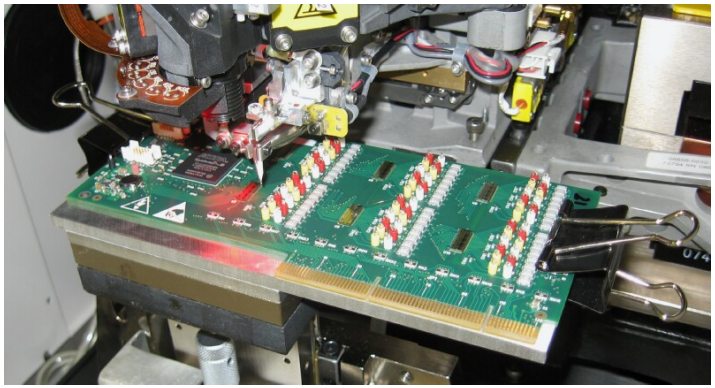


Quik-Pak Capabilities Examples

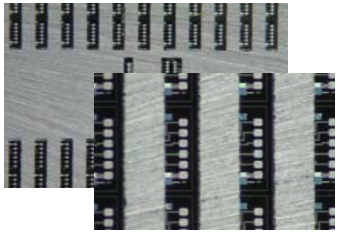
Quik-Pak™
Microelectronic Packaging & Assembly Solutions

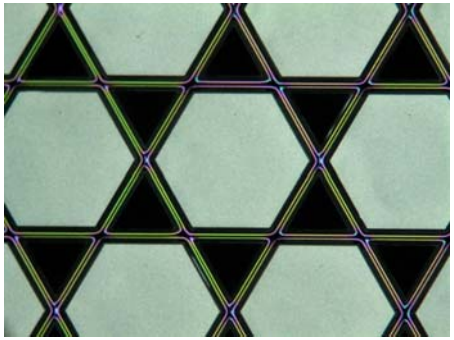


CUSTOM PACKAGE MODIFICATION



LARGE COB





CUSTOM BACKGRINDING & DICING

Quik-Pak Capabilities Examples

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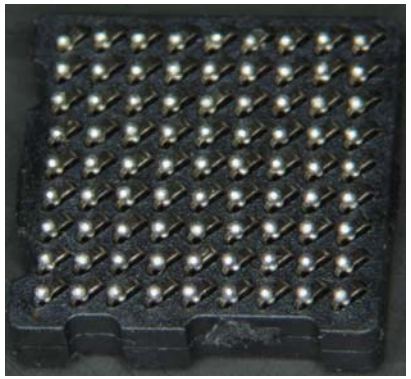
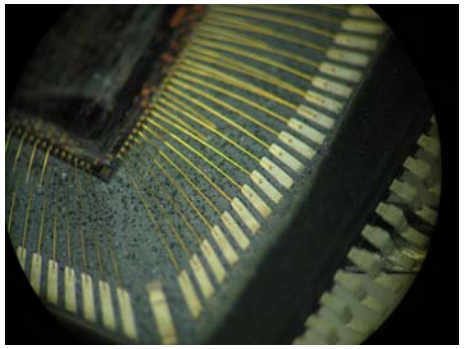
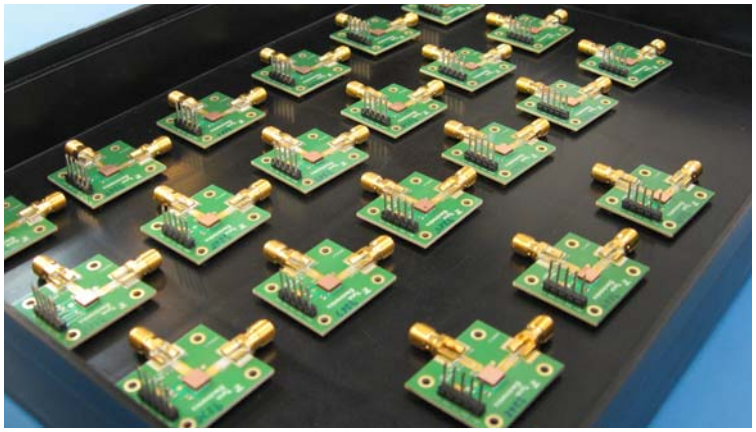


Solderless Connector Balling

Quantum Computer Core



Chemical
Decapsulation

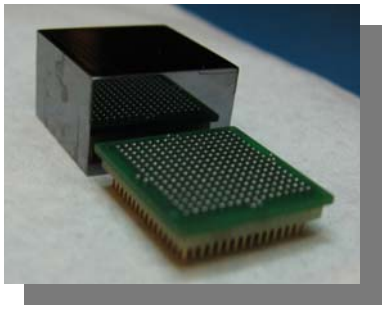


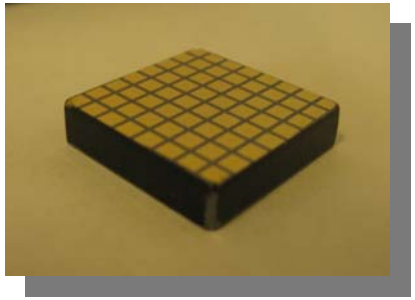
Module Assembly – Flip Chip on Board,
SMT Connector Attachment

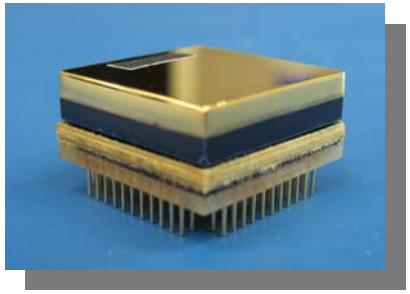
Quik-Pak Capabilities Examples

Quik-Pak™
Microelectronic Packaging & Assembly Solutions

- Custom CZT Crystal Processing and Packaging
  - Crystal extraction from wafers
  - Re-sizing of existing crystals
  - Proprietary side coating
    - Reduces edge pixel leakage current
- CZT Metallization
  - Low temperature
    - Solderable, reworkable
- Detector Packaging
  - Crystal/interposer/connector stack up







Quik-Pak Capabilities Examples

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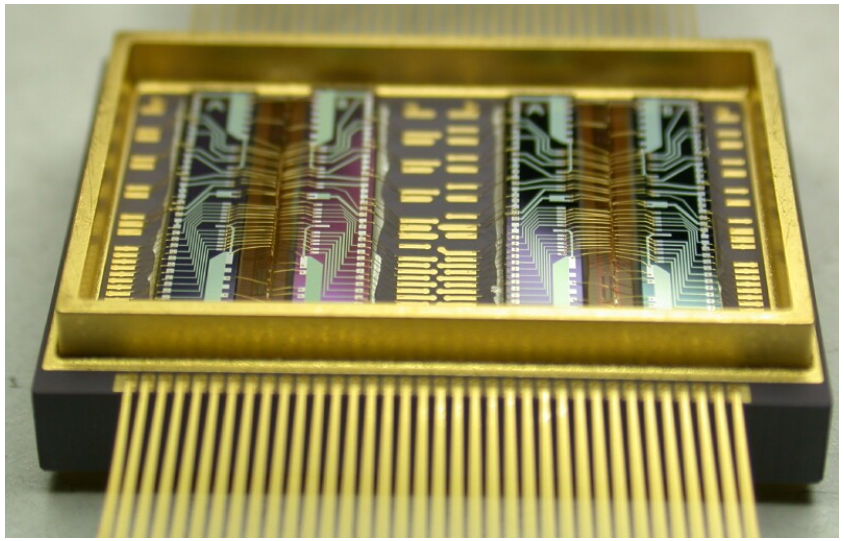


Hi-Rel Hybrid Memory Assembly

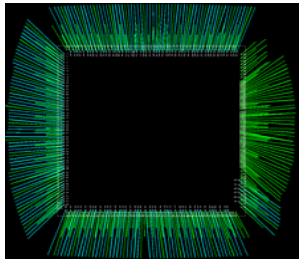
Mil-Std Die Dice/Inspection/P&P – 2 million units

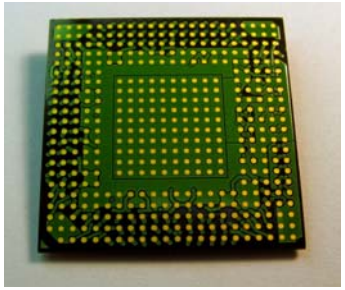
Assembly Case Study I

Customer Need: Assemble 20 BGA chipsets in less than two days

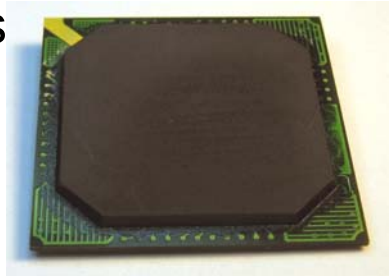
Dice, D/A, W/B, Encap, and Ball Attach using custom substrate

- Die #1 - 400 wire bonds, 363 solder balls
- Die #2, - 700 wire bonds, 439 solder balls





- Results
  - 22,000 wires bonded in four hours
    - Two ESEC bonders utilizing DXF file conversion
      - Art-to-part technique eliminated manual programming
  - 16,000 solder spheres attached, across two days
    - 6 chip sets shipped in first 12 hours of project
  - Customer met deadline & received full funding!

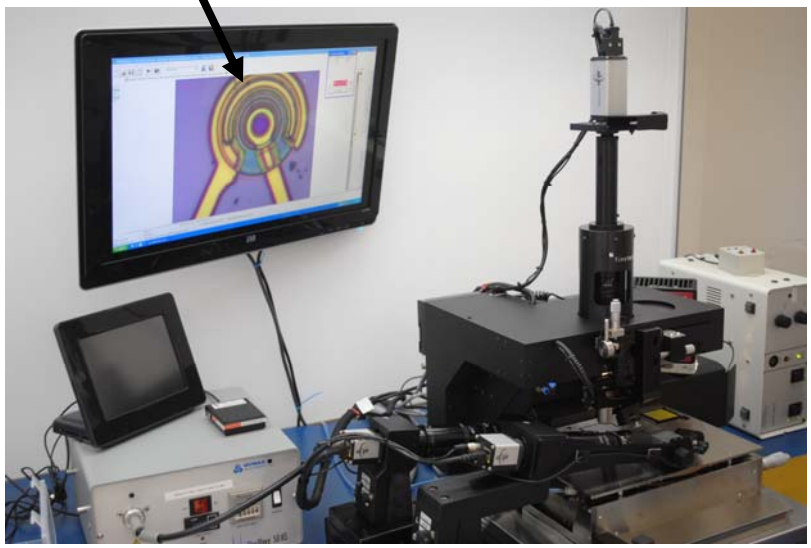


Assembly Case Study II

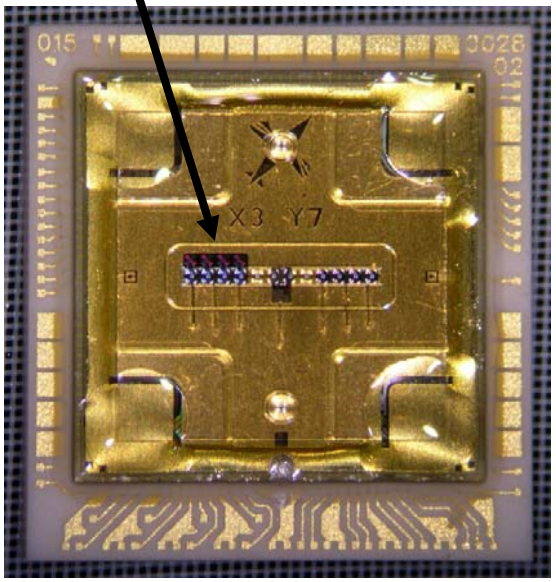
Quik-Pak™
Microelectronic Packaging & Assembly Solutions

Customer Need: Align VCSEL to within +/- 1µm for optical transceiver assembly for airborne defense application

Single VCSEL shown on Finetech bonder



Row of four VCSELs mounted on device



Assembly Case Study II

Quik-Pak™
Microelectronic Packaging & Assembly Solutions

Align VCSEL for optical transceiver assembly

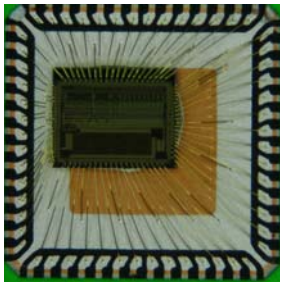
Inspection microscope with program to verify proper VCSEL placement

For this same customer, we will soon assemble another 12.5 Gbps SiGe device made by TowerJazz

The Quik-Pak Advantage

Quik-Pak™
Microelectronic Packaging & Assembly Solutions

- Flexibility
  - Custom prototype assembly – to your specifications
  - From 3 days to as little as 8 hours!
- State-of-the-Art Equipment
  - Highly skilled personnel
- Excellent Quality
  - ISO-certified quality system
  - ITAR registered
  - DSCC-approved wafer prep
- Outstanding Customer Service
  - Excellent on-time delivery record
  - Personal attention
  - Satisfaction guaranteed



Thank You!

Quik-Pak™
Microelectronic Packaging & Assembly Solutions

Complete integrated circuit assembly

Rapid prototyping services

Let Quik-Pak enable you!