TowerJazz Global Symposium

Specializing in Open Cavity Packages
& Complete IC Assembly Services

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TowerJazz Global Symposium

Quik-Pak
a division of Delphon Industries

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Enabling Innovation

Presented by Casey Krawiec
Global Sales and Marketing Manager

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

One project requires the accurate placement of VCSELs (Vertical Cavity, Surface-Emitting Laser) 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 Product Lines

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™ (Open-molded Plastic Package) 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
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

- 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

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

• 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

- 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

BUMPING METHODS
- TIN/LEAD SPHERES
- GOLD STUD BUMPS

BONDING PROCESS
- ADHESIVE FLIP-CHIP
- T/C, TS/C FLIP-CHIP
- UNDERFILL

SUBSTRATES
- BT, FR4, CERAMIC
- ENIG, ENEPIG
- SOLDER MASK & LABELING

DIE OR WAFER
Quik-Pak Capabilities Examples

Stacked Die

Solder Ball Attach

Multi-die
- Chip-on-board
- Chip-on-flex
Quik-Pak Capabilities Examples

CUSTOM PACKAGE MODIFICATION

LARGE COB

CUSTOM BACKGRINDING & DICING

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Quik-Pak Capabilities Examples

- Solderless Connector Balling
- Quantum Computer Core
- Chemical Decapsulation
- Module Assembly – Flip Chip on Board, SMT Connector Attachment

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Quik-Pak Capabilities Examples

• 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

- Hi-Rel Hybrid Memory Assembly
- Mil-Std Die Dice/Inspection/P&P – 2 million units

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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

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

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

- **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!

Complete integrated circuit assembly
Rapid prototyping services

Let Quik-Pak enable you!