CIRTEK ELECTRONICS CORPORATION

Company Presentation
Outline

- Company overview and organization
- Services and CEC BOM
- Product Portfolio and Special Capabilities
- Company strengths
- Plans and programs
- Package Technology Roadmap
- Final Test, Finishing and FAREL
Outline

- Company overview and organization
- Services and CEC BOM
- Product Portfolio and Special Capabilities
- Company strengths
- Plans and programs
- Package Technology Roadmap
- Final Test, Finishing and FAREL
Company overview

History

- Established in 1984 as independent Subcontract Assembly & Test Provider
- Accredited by International Quality institutions

CIRTEK has grown to provide world class turnkey solutions that include services from package design development, wafer probe, wafer back grinding, assembly packaging and final testing of semiconductor devices up to drop shipments to Customer's end users.

Competitive pricing and easily adaptable to customers needs

CIRTEK TODAY

25 years experience outsourced assembly & testing solution provider

High quality products, while providing production flexibility

Competitive pricing and adaptable to customers’ needs.

Profitable despite several economic downturns, debt free company

Growing client base composed of companies located around the world
Company overview

Cirtek assembles and tests semiconductor devices at its manufacturing complex located on a 20,000 square meter property in Biñan, Laguna.

Its manufacturing facility is composed of two buildings, with a total floor area of 14,100 square meters. 1800SQM of clean room environment @ Class 10K. We offer general line and captive line assembly models.

A Philippine Economic Zone Authority (PEZA) registered company as an ecozone export enterprise at the Laguna Technopark for the manufacture of standard integrated circuits, discrete, hybrid and potential new packages.
Business Strategies

1. Partnership with Customer to grow business together
   To develop partnership with its existing and potential customers to provide world class quality solutions through management expertise focused on specific applications to meet customers specification, high reliability and multi chips products.

2. Captive Line Development
   To offer dedicated or captive line models for assembly and test services in order to efficiently produce the customer’s mature and stable products through shared investment.

3. Technology Development
   To continuously focus on Innovations and re-Engineering in its production and assembly techniques and capabilities, and to co-develop new technologies with customers.

4. Mergers and Acquisitions
   To actively seek strategic investments opportunities such as, alliances, joint ventures, and/or acquisitions that will be consistent with the Company’s overall business strategies.
Outline

- Company overview and organization
- Services and CEC BOM
- Product Portfolio and Special Capabilities
- Company strengths
- Plans and programs
- Package Technology Roadmap
- Final Test, Finishing and FAREL
Cirtek Services

Sort + Assy + Test + Drop shipment

- Wafer backgrinding (8” maximum diameter / 4 mils thick capability)
- Wafer mapping (8” maximum diameter / ASCII format)
- Wafer probing (6” & 8” wafer diameter)
- Die sales inspection (Commercial / Military / Medical level of inspection)
- Full assembly (Refer to package portfolio)
- Marking (ink / laser)
- Final test (Refer to test capabilities)
- Tape and reel (SOT, 150 / 300 mil SOIC, QFN / DFN)
- Tape and Ammo (TO-92 straight / spread leads)
- Drop shipment (To any point as required)
- Ship to Stock Serve as your HUB/Distribution center
### Cirtek Standard Materials

<table>
<thead>
<tr>
<th>Leadframe</th>
<th>DA Epoxy</th>
<th>Gold Wire (Mils)</th>
<th>Molding Compound</th>
<th>Plating – 100% Tin</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Stamped LF</td>
<td>• 84-1LMI/SR4</td>
<td>0.80, 0.90, 1.0 mils</td>
<td>• Sumitomo – G600, G770</td>
<td>Plating – SnPB (85/15)</td>
</tr>
<tr>
<td>Copper A194 PPF -NiPdAu</td>
<td>• 8900- NC</td>
<td>1.2, 1.3, 1.5, 2.0 mils</td>
<td>• Hitachi 9220HF10</td>
<td></td>
</tr>
<tr>
<td>• Etched LF</td>
<td>• 8600 -</td>
<td>Copper Wire (Mils) 1.0, 1.65, 2.0</td>
<td>• NittoG300LC</td>
<td></td>
</tr>
<tr>
<td>• Plating – Spot Ag</td>
<td>• 2600AT - HT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Configuration:</td>
<td>• QMI 529HLV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matrix</td>
<td>• CRM 1076NS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDLF</td>
<td>• Eutectic DA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/Dual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Solder paste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sn5Pb95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sn10Pb90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper Wire (Mils) 1.0, 1.65, 2.0</td>
<td>Aluminum Wire (Mils) 1.25, 5.0, 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Copper Clip Attach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Outline

- Company overview and organization
- Services and CEC BOM
- Product Portfolio and Special Capabilities
- Company strengths
- Plans and programs
- Package Technology Roadmap
- Final Test, Finishing and FAREL
# Product Portfolio

## QFN/DFN Packages

<table>
<thead>
<tr>
<th>QFN Body Size</th>
<th>Small Body Size</th>
<th>DFN Body Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00 x 2.00 / 08L</td>
<td>0.50 x 0.25 x 0.30 / 02L</td>
<td>2.90 x 1.80 / 04L</td>
</tr>
<tr>
<td>3.00 x 3.00 / 08L</td>
<td>1.00 x 0.60 x 0.46 / 02L</td>
<td>1.70 x 1.35 / 08L</td>
</tr>
<tr>
<td>3.00 x 3.00 / 16L</td>
<td>1.10 x 1.60 x 0.46 / 02L</td>
<td>2.00 x 2.00 / 08L</td>
</tr>
<tr>
<td>3.50 x 3.50 / 20L</td>
<td>1.27 x 0.76 x 0.76 / 02L</td>
<td>2.50 x 1.35 / 12L</td>
</tr>
<tr>
<td>4.00 x 4.00 / 24L</td>
<td>2.20 x 1.78 x 0.76 / 02L</td>
<td>3.00 x 1.35 / 12L</td>
</tr>
<tr>
<td>5.00 x 5.00 / 28L</td>
<td>2.50 x 1.70 x 0.76 / 03L</td>
<td>3.30 x 1.35 / 16L</td>
</tr>
<tr>
<td>7.00 x 7.00 / 32L</td>
<td><em>Customer Specific</em></td>
<td>3.00 x 3.00 / 10L</td>
</tr>
<tr>
<td>8.00 x 8.00 / 52L</td>
<td>6.00 x 6.00 x 0.90 / 02L</td>
<td>4.00 x 1.60 / 16L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cirtek Holdings Philippines Corporation
Product Portfolio

SOIC Packages

150 Mils Body Packages

- 08L - Stand
- 14L - Stand
- 16L - Stand

300 Mils Body Packages

- 18L
- 20L
- 24/28L

Exposed Pad Version

- 08L - 150 Mils
- 16L – 300 Mils
- 16L – QSOP

TSOC 6L – 150 x 150 x 55 mils

16L Standard – Clip Attach
Product Portfolio

Plastic Dual In Line Package

300 Mils Body Package
- 08L
- 14L
- 16L

600 Mils Body Package
- 18L
- 20L
- 24/28L

Single In Package
- 8L, 9L
Product Portfolio

SOT Packages

SOT 23 Packages

- 03L
- 05L
- 06L

SOT Packages

- SOT223
- SOT 143
- SOT89

TO 92 Packages

- TO 92 - Stand
- TO 92 - Flat
Product Portfolio

Hermetic Packages

- Metal Can (TO 3-TO 5)
- T-Hole Oscillator
- SMT/COB Assy
- Small Metal Cans
- Hybrid Assembly
- Build of Materials

Materials
- Customer Specific
- Consignment
- Flexible Arrangement

Cirtek Electronics Corporation
Other Special Assembly Capabilities

**Multichip on Standard Package**

Multi die on standard 150 mil 2 die up to 32 die, Custom LF design by Cirtek (SOIC) package

Multi die embedded ceramic crystal Mounted die in PCB
- NC and conductive epoxy
- Transfer over mold process
- 300 mil (SOIC) package

Standard silicon die attach cylindrical crystal through resistance welding LF design by Cirtek 300 mil (SOIC) Pack.

Cylindrical Crystal

Copper Clip attach on SOIC/QFN ESD and Power Devices

Copper clip

Die to Die Bonding

Control IC

Cirtek Electronics Corporation
Hermetic Module Assembly

- Metal lid
- Non-hermetically sealed using conductive epoxy
- PCB
- Passive component attached with solder
- GaAs dice attached with conductive epoxy
- Gold wire

Cirtek Electronics Corporation
Prescaler-Static divider Module Assembly

LEGEND:
1. CHIP CAPACITOR
2. CHIP RESISTOR
3. PRESCALER DIE
Outline

- Company overview and organization
- Services and CEC BOM
- Product Portfolio and Special Capabilities
- Company strengths
- Plans and programs
- Package Technology Roadmap
- Final Test, Finishing and FAREL
Company strengths

1. Certified to the latest quality standards
2. Solid management team and expertise
3. Ability to adapt to customers’ needs
4. Full turnkey solutions
5. Growing customer base of diverse clients
6. Strong brand name and proven track record
7. A PEZA-registered entity
Company strengths

1 World Class Quality standards

- Cirtek’s manufacturing practices are designed to be compliant with industry requirements and to exceed customer’s expectation.

- Manufacturing applies latest quality system standards, which include ISO 9001, ISO 14001, QS-9000/TS-16949, BABT and DSCC, as well as certified facility by UL.
Quality Management System map

- Sales and Marketing
- Process Design and Dev’t
- Production Planning Control
- Process Control Inst / Design
- Assembly Mfg
- FA-REL
- Final Test
- Delivery
- Purchasing
- Warehousing
- QA / IQA Inspection
- Billing
- Calibration
- Maintenance
- Process Engineering
- Facilities
- MIS
- Training
- HR
- EMS

Support Process
Main Process
MOP

NOTE:
Support process that has no arrows meaning it will support the whole organization.

Cirtek Electronics Corporation

9/29/12
Continual Improvement Process

Cirtek Quality Management System

Management Responsibility
- Planning
- Process Efficiency
- Customer Focus
- Quality Policy
- Management Commitment
- Quality Management System
- Responsibility and Authority

Measurement, Analysis, Improvement
- Validation of conformity of the process and final product

Resource Management
- Skills
- Personnel
- Equipment
- Infrastructure

Product Realization
- Customer Requirements
- Design
- Procurement
- Production
- Quality Control
- Logistics

Input

Output

Information

CUSTOMERS
REQUIREMENTS

CUSTOMERS
SATISFACTION

Cirtek Electronics Corporation

9/29/12
Company strengths

3 Ability to adapt to customer’s needs

Technical abilities which provide customers a full range of turnkey solutions

Customer requirements

- World class quality standards
- Excellence in manufacturing
- Clean room (Class 10K) facility and practice 5S (Japanese) Discipline
- On-time Delivery
- Competitive pricing
- Flexibility / Responsiveness

Customer satisfaction as evidenced by the awards received from several customers
Company strengths

Full Turnkey Solution

Provide vertically integrated manufacturing solutions to its customers.

- Package Design & Development
- Assembly & Packaging
- Test, Pack & drop ship to end Customers

Higher productivity / efficiency  +  Lower cost  +  Faster time to market

Cirtek Electronics Corporation
Outline

- Company overview and organization
- Services and CEC BOM
- Product Portfolio and Special Capabilities
- Company strengths
- Plans and programs
- Package Technology Roadmap
- Final Test, Finishing and FAREL
Plans and Programs

1. Expansion of Manufacturing facility and Capacity
   This will enable us to support 400 Million units of additional new business from existing and potential customers.

2. Innovation and Re-Engineering
   Sustaining cost reduction program, higher quality product and stable process through automation and re-engineering. To develop new packages through innovation to maximize yield and satisfy or exceed customer expectation.

3. Completion of current projects and programs with customers
   Concluding and enabling Cirtek to realize new potential business in the pipe line worth US$11.8 Million by 2012 and to expand product portfolio.
   New Potential business:
   - Power MOSFET QFN
   - Open cavity moisture / pressure sensor for automotive
   - Opto Couplers
   - Exposed Cavity Power Amplifier – HSOP
   - Current protection devices

Cirtek Electronics Corporation
Outline

- Company overview and organization
- Product offerings, Services and CEC BOM
- Product Portfolio and Special Capabilities
- Company strengths
- Plans and programs
- Package Technology Roadmap
- Final Test, Finishing and FAREL
Package and Technology Roadmap

- **Cost Reduction / Development Roadmap**

  - **Technology**
    - Copper wirebond (90% lower than Au)
    - BSOB bonding
    - AuSn Eutectic die attach
    - Stacked Die attach
    - Low loop profile (3% lower Au cost)
    - AuAg wirebond (20% lower than Au)
    - Ribbon bonding
    - Auto Clip attach
    - Die attach film

  - **Material**
    - Korean Cu wire supplier (21% lower cost)
    - High Density Leadframe (12% productivity improvement)
    - Ultra High Density Leadframe (High Volume)
    - MGP / automold conversion (14% lower cost)
    - Macro bonding (20% lower cost)
    - Ag plating thickness reduction (5% lower cost)
    - Chinese leadframe supplier (20% lower cost)
    - Brass / steel leadframe (10% lower than Cu)
    - Mold compound selection GE300LC2 (21.8% lower cost)
    - Matrix Leadframe

Outline

- Company overview and organization
- Services and CEC BOM
- Product Portfolio and Special Capabilities
- Company strengths
- Plans and programs
- Package Technology Roadmap
- Final Test, Finishing and FAREL
Water Probe and Final Test
Final Test Summary

- **WAFER PROBE CAPABILITIES**

  - **Wafer Prober**
    - EG1034 – 4” and 5”
    - EG2001 – 6”
    - EG2080 – 8”

- **Ink/Inkless less Process**
  - ASCII format
Final Test Summary

- **TEST CAPABILITIES**
  - **Mixed signal device**
    - CREDENCE ASL-1000, EAGLE ETS 500D, LTX
  - **Discrete device**
    - TESEC 881-TT, FROTHINGHAM CV3000B
  - **Linear device**
    - KEITHLEY, GENESIS
  - **RF / IF device**
    - HP RACK & STACK, HP84000
  - **Digital / Asic device**
    - FAIRCHILD SENTRY, SIEMENS S725
  - **OPTO relay device**
    - TESEC, HIPOT
  - **Protection device**
    - TESEC, KEITHLEY

- **MULTI BIN/POST TEST MARKING**
  - SOT 89, 223
  - TO92
Final Test Summary

- TEST / TAPE & REEL CAPABILITIES

- Integrated test and TNR handlers
  - SRM S248 – SOT
  - SRM XD16 – SOT
  - SRM S12 – SOT
  - VECTOR T20 – SOT
  - QMT 1500 – SOT
  - SRM 248XS – TDFN
  - ASM FT2030 FLEXIPACK – SOIC
  - SRM 244XS – SOIC
  - ISMECA –NX16 – DFN (0402)

- Test handlers (SOIC/PDIP)
  - MCT 3608/5100
  - MT 8305/8588/8704
  - AETRIUM 2020 DTS

- TNR handlers (SOIC)
  - G6 Visdynamics
  - Systemation TO 485 with 3D vision
  - STI 8028 / ST 60
FAREL CAPABILITIES
Failure Analysis Capability

- Internal / external inspection
  - High / low power microscope
- X-RAY
  - SOFTEX 100
- Decapsulation
  - DECAP AS2000
- Autoclave
  - NAPCO 8110-TD test chamber
- Open / short test
  - TEXTRONICS curve tracer
- 85% / 85°C moisture soak
  - ENVIRO SYSTEM chamber
- Temperature cycle
  - ENVIRO SYSTEM chamber
- Polisher / grinder (cross sectioning)
  - SBT–MODEL 900
Reliability Test Capability

- **Die shear**
  - MIL STD 883-2013

- **Bond strength**
  - MIL STD 883-2011

- **Mark permanency test**
  - MIL STD 883-2015
    - 3 mins soaking time using IPA @ 30 strokes

- **Solderability test**
  - MIL STD 883-2003-7 / JESD22-B102D
    - 8 hrs steam aging @ 100°C

- **Temperature cycle**
  - MIL STD 883E-1010.7 / JESD22-104B
    - 10 cycles minimum @ 10 minutes / cycle
    - Low temp @ -65°C (+0, -10°C)
    - High temp @ 150°C (+15°C / -0°C) +150°C (+15,-0°C)

- **Stability bake**
  - MIL STD 883-1008.2
    - 6 hrs @ 175°C
Reliability Test Capability

- **High temp storage**
  - JESD22-A103B
    - 500 hrs min @ 150°C

- **Auto clave**
  - JEDEC 22A 102-C
    - 15 PSI for 96 hrs @ 121°C

- **Fine leak**
  - MIL STD 750D 1071.6 / Test Condition D
    - 30 secs soaking time @ 125°C

- **Moisture soak**
  - IPC / JEDEC J-STD-020C
    - 168 hrs soaking time @ 85% RH / 85°C temp
WHY CIRTEK as ASSEMBLY & TEST SUBCONTRACT PARTNER?

→ Philosophy - Long Term Relationship
→ Strategy – Partnership for Business Growth
→ World Class Quality - External manufacturing of Customer

→ Cost competitive
→ Continue to Innovate and re-engineer to add value to production and cost

• Abundance of skilled workers
• Very low turn over rate
• Educated workforce

QUALITY FIRST MIND SET

STABLE COMPANY

PROVEN TRACK RECORD

GROWING COMPANY

FLEXIBLE & RESPONSIVE

Cirtek Electronics Corporation
THANK YOU!