SECURE YOUR KEY TO FUTURE POWER ELECTRONICS

SEMICON Taiwan 2019
REVOLUTION OF POWER ELECTRONICS PACKAGING

ENVIRONMENTAL

ECONOMIC

ADVANCED
REVOLUTION OF POWER ELECTRONICS PACKAGING

Increase Power
Increase Efficiency
Decrease form factor

Selection of Die
Operating Temperature
Matching Assembly Material

Traditional assembly and packaging materials have reached its limits.
DC-DC Converter charges the conventional 12V power supply net.

Battery Management: Monitoring system for battery pack.

Onboard Charger: AC-DC Converter module.

Main Inverter: Drives electric motor, Regenerate braking.

Case Package
KEY TO FUTURE POWER ELECTRONICS
TRANSITION TO HIGH POWER DENSITY IGBT MODULE PACKAGING

Present
Tj: Up to 150°C

Future
Tj: more than 175°C

Si Dies
Solder
DCB
Solder
Nickel Plated Cu Baseplate
Pin-Fins

SiC Dies
Sinter
AMB
Sinter
Nickel Plated Cu Baseplate

Alu BW
Cu BW
Nickel Plated Cu Baseplate
Power Cycling reliability with Sinter, Cu wire and DTS is increases in comparison with standard solder, Al wire packaging technologies.
KEY TO FUTURE POWER ELECTRONICS
ASSEMBLY OF HIGH POWER DENSITY IGBT MODULE PACKAGING

- **Copper Bonding Wire**
  - Increase current carrying capacity
  - Enable higher power density
  - Reduce bonding complexity

- **Die Top System**
  - Increase die current capability
  - Reduce peak operating temperature
  - Increase system reliability

- **Sinter**
  - Improve thermal conductivity
  - Enable high operating temperature
  - Increase system reliability

- **AMB**
  - Increase thermal conductivity
  - Increase reliability
Broad Range of Materials & Systems Know-hows for Power Electronics

- Metal Ceramic Substrate
- Power Bonding Wire and Ribbons
- Microbond™ Assembly Materials
- mAgic™ Sinter
- Die Top System (DTS®)
- Matched Materials

Strong Application and Qualification Support

- Enables faster process implementation, shorter time to market
- Established automotive-Centric application center with 2 Industrial Sinter Presses
- Well-connected industry contacts
- Offer process consultation for yield and throughput improvements

Innovative Material Portfolio for Power

- Broad patent portfolio covering important aspects of material technology
- Strong R&D investment supporting packaging technology development
- Reliable solutions for Pressure and Non-Pressure application
HERAEUS – ENGINEERING SERVICES

Simulation
- Thermal simulation
- Thermo-mechanical stress simulation
- Lifetime prediction

Prototype Design
- Electrical design
- Mechanical design

Material Analysis
- Fatigue analysis
- Root cause analysis

Prototype Assembly
- Power modules
- LED modules
- Documentation, Traceability

Process Optimization
- Parameter definition
- Yield optimization

Testing and Qualification
- Environmental tests
- Thermal cycling tests
- Active cycling tests

HET ACADEMY

ENGINEERING SERVICES
Secure Your Key to Future Power Electronics

Heraeus
KEY TO FUTURE POWER ELECTRONICS

GET THE MOST OUT OF YOUR POWER MODULE
Transition to performance driven, energy-efficient, highly robust power module in reduced form factor assembled with best-in-class material of highest reliability and cost effectiveness.
5G: JUST HOW FAST?

Just how fast does it take to download the movie Star Wars: The force Awakens in HD of file size ~4GB?

- **Maximum speed:** 2.4kbps
  - Estimated download time: 4months, 27days

- **Maximum speed:** 64kbps
  - Estimated download time: 5days, 13hrs

- **Maximum speed:** 2Mbps
  - Estimated download time: 4hrs, 15mins

- **Maximum speed:** 1Gbps
  - Estimated download time: 30s

- **Maximum speed:** 20Gbps
  - Estimated download time: 1.5s

As a leading material supplier, we have a role to play alongside communication industry in enabling the development and rollout of 5G semiconductors to unlocking its benefits.
KEY TO FUTURE POWER ELECTRONICS
INNOVATIVE MATERIALS FOR 5G

mAgic Sinter Paste
Creates exceptional thermal and electrical connection properties

WELCO Paste
Best-in-class performance enabling miniaturization

AgCoat Prime
Cost effective & reliable alternative to Gold wire

5G: The Future of EMI Shielding in Mobile Phones
CONTACT US FOR MORE INFORMATION OR DISCUSSION

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