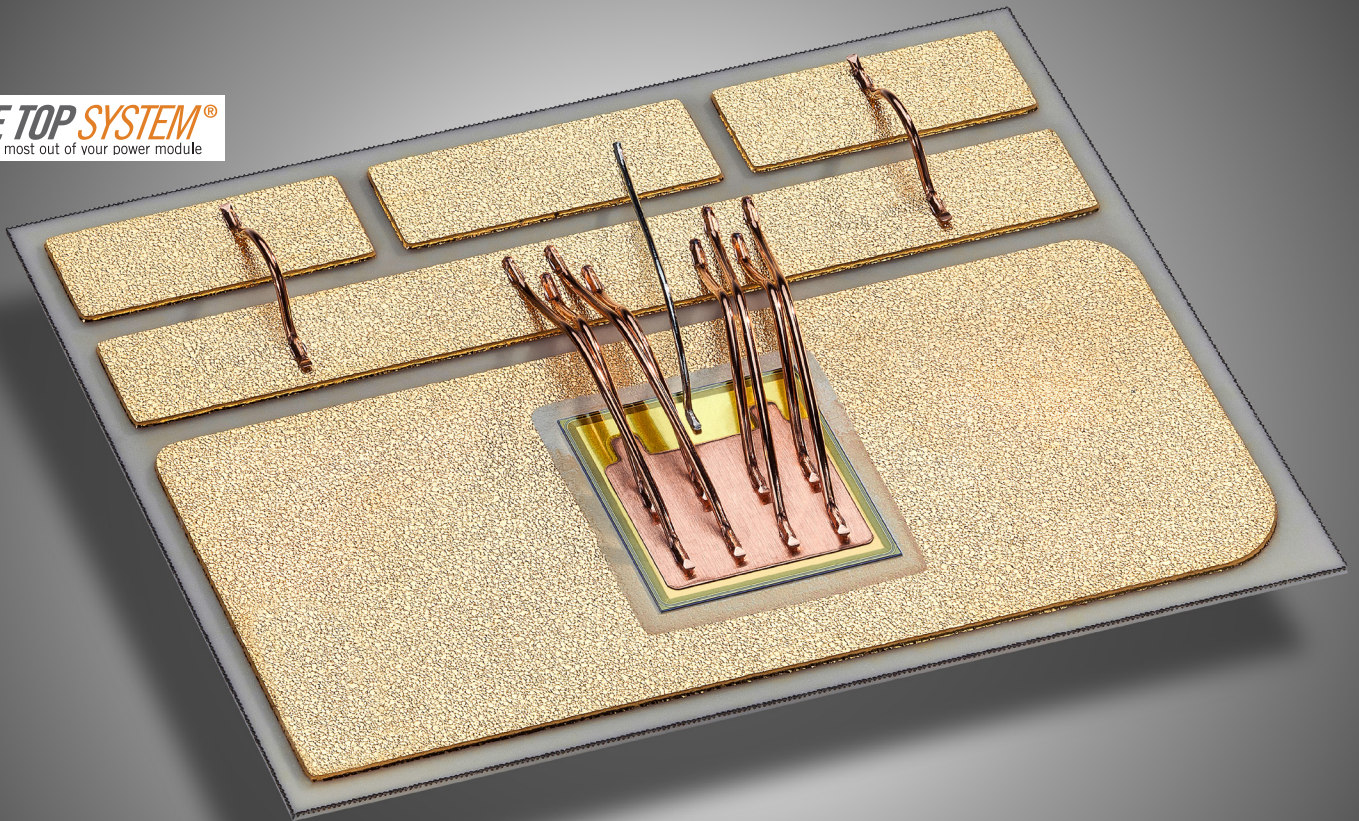


DIE TOP SYSTEM[®]
Get the most out of your power module



Die Top System[®]

Get the most out of your power module

Due to continuous rise in power density, coupled with higher operating temperatures and demand for improved reliability, packaging materials are reaching their limits. The Heraeus Die Top System (DTS[®]) pushes those limits by combining copper wire with sinter technology, whilst offering superior flexibility.

DTS[®] significantly improves the electrical and thermal conductivity, the reliability of the die connection and optimizes the whole module performance. Additionally, it simplifies industrialization, maximizes the profitability and helps to bring the next generation of power modules faster to market.

Key Benefits

Die protection to enable Cu wire bonding with high yield. Pre-applied sinter paste & adhesive dot to simplify the assembly.

Maximised profitability:

- Significant reduction of power derating or reduction of chip size

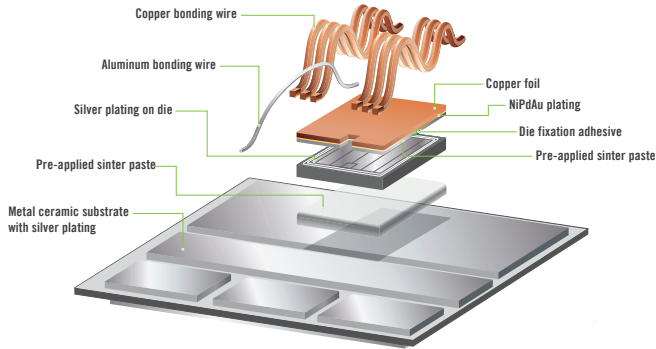
Best performance:

- Die current capability increases > 50% vs. aluminium wire
- > 50x longer lifetime vs. solder die attach and Al-wire on system level
- Significant reduction of power derating or reduction of chip size
- Enable higher junction temperatures of more than 200°C
- Superior robustness vs. other solutions (e.g. clips)

Perfectly matched materials system

DTS[®] consist of:

- copper foil with functional surfaces
- pre-applied / pre-dried sinter paste
- die fixation adhesive dots (optional)



Simplified industrialization

- DTS[®] pick and place:
 - Delivery in wafer frame like semiconductor dies.
 - Sinter paste already pre-applied on the copper foil
 - Adhesive dots for the DTS[®] to remain in place prior to sintering (optional).
- Die and DTS[®] are sintered together in one step using standard sinter equipment.
- Use of wire bonding the most common and proven interconnect technology in electronics.
- Same equipment covers all layout variances from pilot to serial production.
- Faster implementation through Heraeus engineering services.

Superior flexibility

- DTS[®] is adaptable to most dies provided they have a sinterable top metallization (e.g NiAu, NiPdAu or NiAg).
- Tailored to customer specific designs.
- Enables Wide Band Gap semiconductors and future high temperature applications.

Outstanding reliability

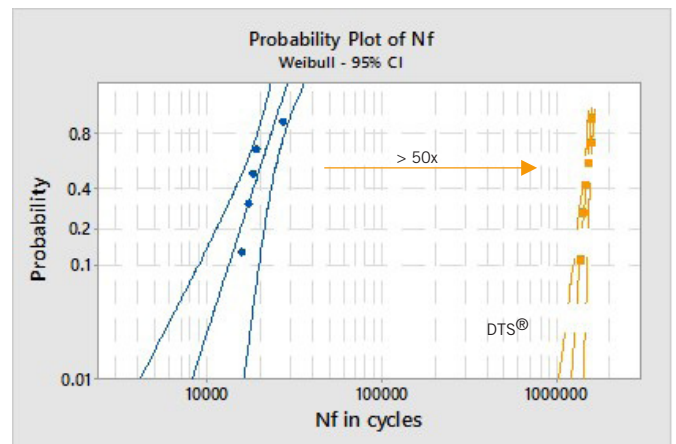
- Comparison power cycling capability on system level for sintered die and copper wire (DTS[®]) and soldered die and aluminium wire.
- Power cycling parameter:

$$I_{load} = 136A$$


$$t_{on} = 1s$$

$$T_{cooling} = 38^{\circ}C$$

$$\Delta T_j = 125^{\circ}C$$



MSDS for relevant constituents of the DTS[®] (sinter paste, adhesive) are available upon request.

Heraeus and  cooperate in the field of Danfoss BondBuffer[®] technology. Heraeus DTS[®] may be used under certain Danfoss and Heraeus IP rights. Details are set forth in a declaration to customers.

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