TC-3040 Thermally Conductive Gel

Product Briefing

for

3DInCites Award Nomination

DOW CORNING

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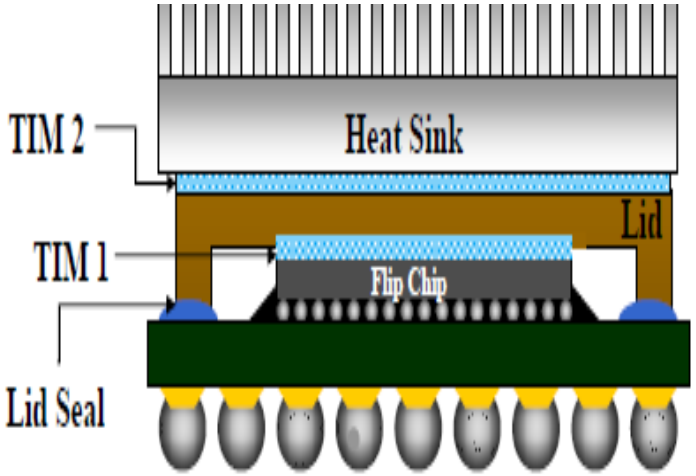
TC-3040 Thermally Conductive Gel

- Material has been designed and optimized for high performance flip chip applications
- TC-3040 has the following key attributes:
  - Low modulus and moderate elongation to accommodate warpage and prevent delamination
  - Good wetting to yield intimate interfacial contact between chip and lid



Target Application:
Lidded Flip Chip Packages

TIM: **T**hermal **I**nterface **M**aterial

TC-3040 Thermally Conductive Gel Overview

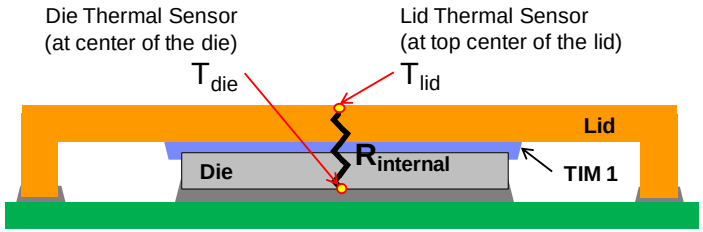
TC-3040 attributes

- One-Part
- Freezer stored (-20˚C)
- Heat curable
- Capable of low cure temperatures
- Lightly curable silicone matrix for low modulus
- High filler loading for enhanced thermal properties
- Optimized for thin BLT
- Low viscosity and solvent-less for ease-of-processing

Property	Unit	Value
Color	NA	Gray
Viscosity	cP mPa-sec Pa-sec	90,000 90,000 90
Thixotropic Index	NA	2.5
Modulus	kPa	18
Thermal Conductivity	W/mK	4.3
Ionics content (Cl^-)	ppm	<10
Ionics content (Na^+)	ppm	<10
Ionics content (K^+)	ppm	<10

TC-3040 Reliability and Stress Testing

- Through joint effort with collaborator for device level testing on this material, this material:
  - Has successfully been demonstrated to integrate well with standard HVM processes
  - Has been demonstrated to be compatible with standard substrates, lids, heat sinks, and other flip chip-related materials
  - Able to withstand downstream processing conditions, in particular multiple reflows at Pb-free solder conditions
- Live devices called Thermal Test Vehicle (TTVs)
- This TTV-level thermal performance has been demonstrated for battery of reliability testing

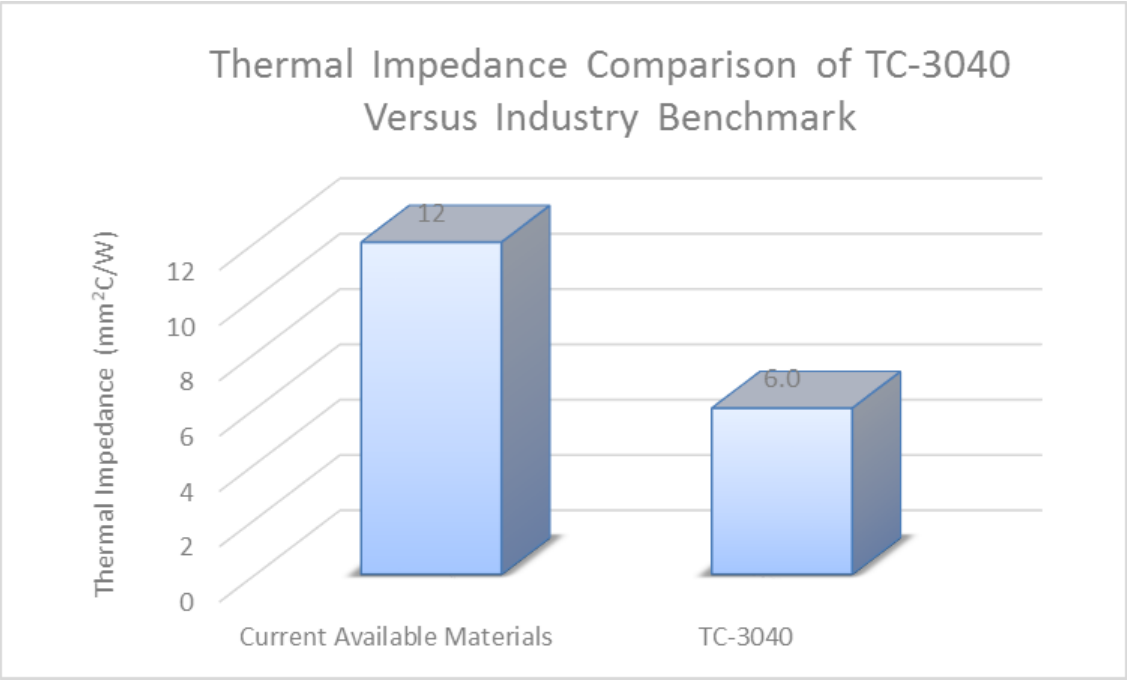


Thermal Test Vehicle

TC-3040 Thermally Conductive Gel

TTV Level Testing

Material performs well versus the industry benchmark



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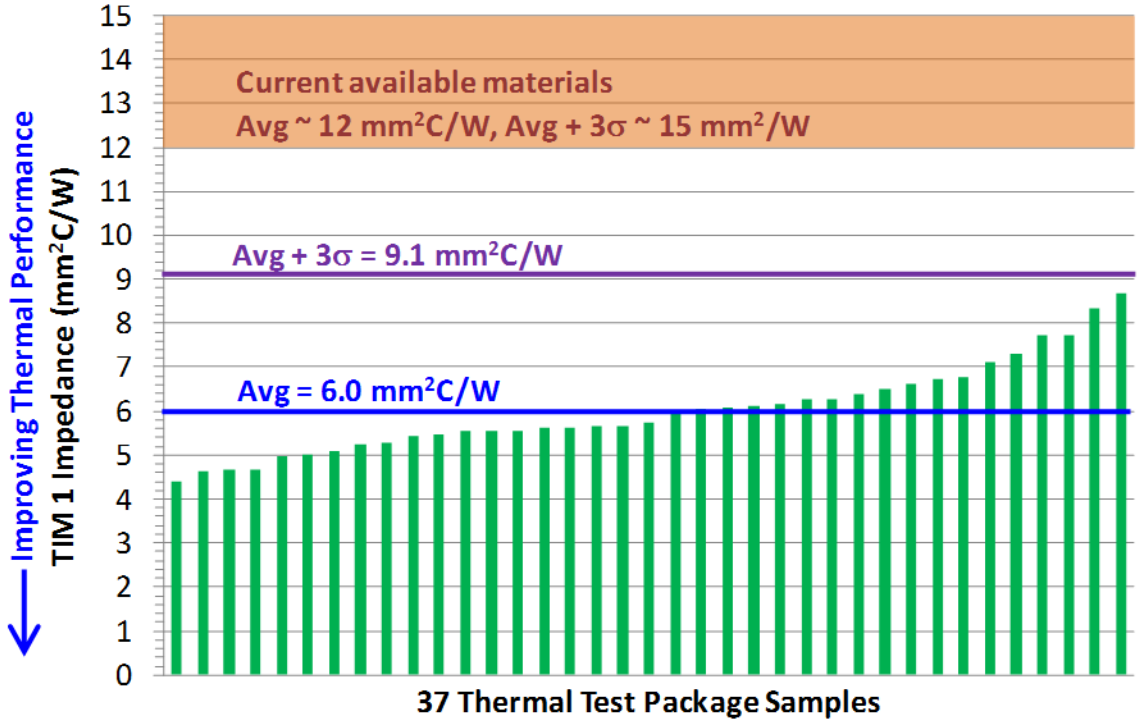
Material performance is reproducible (37 TTVs in qualification build)



Thermal Test Vehicle Testing

Post-reliability testing demonstrates better and consistent thermal resistance on TTVs

TC-3040 TIM1 Gel Summary

- TC-3040 offers an effective and reliable TIM1 thermal management solutions, reduced stress and excellent under-die coverage for demanding flip chip, high-end computing applications.

- This new generation TIM1 material delivers nearly two times the thermal performance of other industry standard TIMs, and targets a high thermal conductivity of 4W/mK with robust reliability.

- Consistent and reliable thermal performance was demonstrated through the validation with industry collaborator

Thank You

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