Honeywell Thermal Interface Materials
Reliability Report
TG3010I

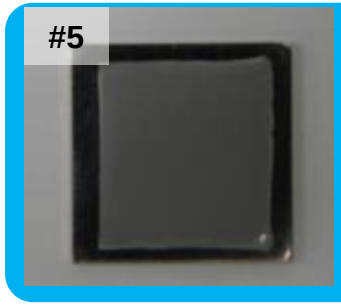
Honeywell

Test Procedure – Sandwich Structure

#4

Measure the thickness of Cu plate and Si plate.

#5



Paste one sample with size 10 x 10mm on the center of Cu plate, press it to stick on well and cover another Cu plate on the sample.

#6

Put the sandwiched samples into the fixture and cover it.

Test Procedure – Sandwich Structure

#7

Press it with a 30psi weight block on the fixture and tighten with screws

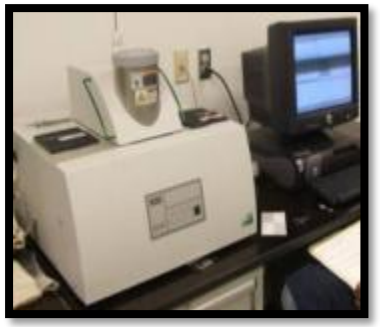
#8

Test the thickness and measure the final thickness of sandwiched sample.

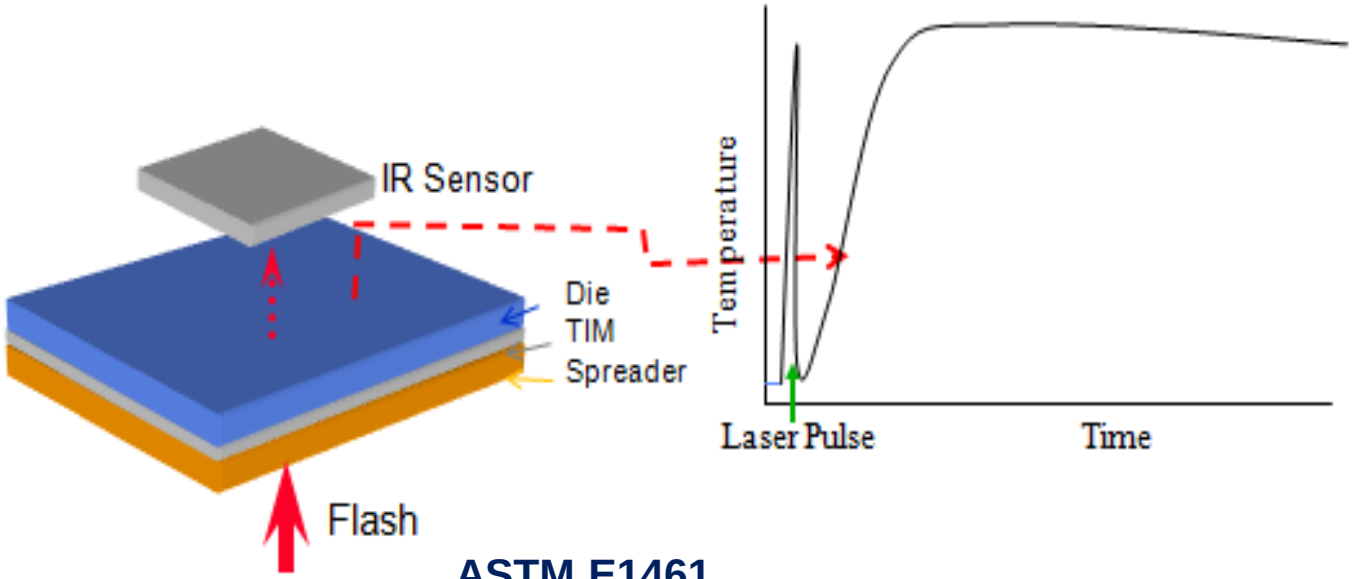
#9

Spray the graphite spraying on both surface of sample with thin thickness, after the solvent dry out, test time zero TI with laser flash.
Check TI of different read points during reliability test with the same test method.

Thermal Impedance Test Method: Laser Flash



Netzsch Laser Flash™



$$k = (\alpha)(C_p)(\rho)$$

k = Thermal Conductivity (W/cmK)
α = Thermal Diffusivity (cm^2/s)

$$\alpha = 0.13879L^2 / t_{1/2}$$

L=specimen thickness, meter
$t_{1/2}$=the time required for the temperature rise to reach 50% percent of ΔTmax

Cp = Specific Heat Capacity (J/gK)
ρ = Density (g/cm^3)

ASTM E1461

- **Thermal Impedance Between Si, Ni-plated Cu Surfaces**
  - Includes the CTE mismatch
  - includes actual surface finish
- **Typical Coupons:**
  - Ni-plate copper, 0.5”X0.5”X0.03”
  - Si, 0.5”X0.5”X0.02”
- **Suitable for Accelerated Life Test**

Reliability Test Condition

- **Highly-Accelerated Stress Test (HAST)**
  - Standard: JESD22-A110-B
  - Testing Condition: 130°C, 85%RH, **96 hours**
  - Chamber supplier: ESPEC EHS-411M
  - Objective: Accelerate corrosive impact of high humidity and temperature on the thermal performance of the test structure

HAST chamber

- **Temperature Cycling Test**
  - Standard: JESD22-A104C
  - Testing Condition: -55°C to 125°C (TCB), **1000 cycles**
  - Chamber supplier: ESPEC EGNZ12-7.5CWL
  - Objective: Determine the resistance of TIM to extremes of high and low temperatures, and its ability to withstand cyclical stresses

TC chamber

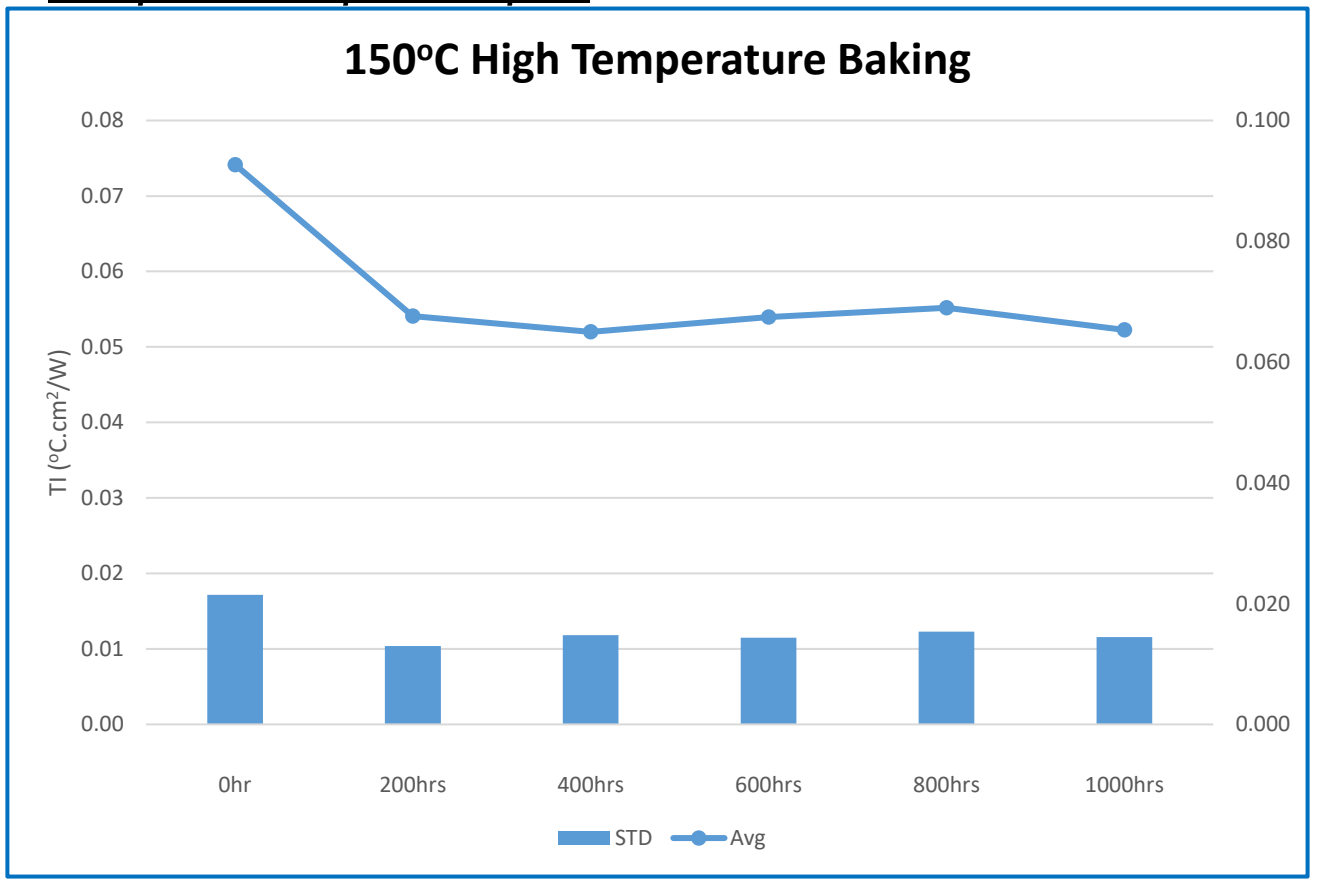
- **High Temperature Baking**
  - Standard: JESD22-A103
  - Testing Condition: 150°C, 1**000 hours**
  - Oven supplier: BINDER
  - Objective: Accelerate changes in TIM's material and performance characteristics relative to prolonged and elevated temperature

Oven

Thermal reliability – High temperature baking

1. The samples were placed into the test chamber at 150°C. In 1000 hours, the sandwich samples were taken out after every 200 hours, then conducted the measurement and sent back to the oven to continue the aging.

2. *Sample size: 4 pcs samples*.

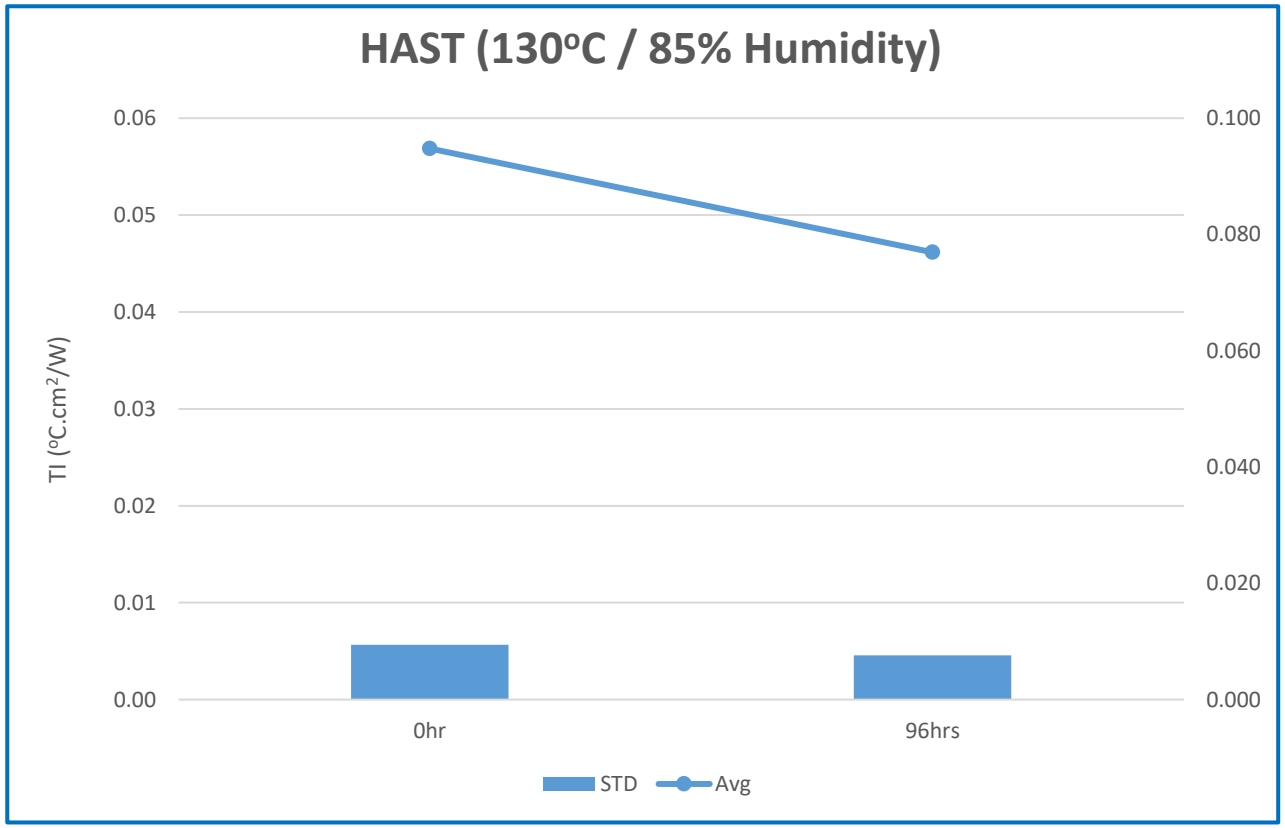


Oven

TG3010I passed 1000hrs baking at 150°C

Thermal reliability – Highly-accelerated Stress Test (HAST)

- Standard: JESD22-A110-B
- Testing Condition: 130°C, 85%RH, 96 hours
- *Sample size: 4 pcs samples*.



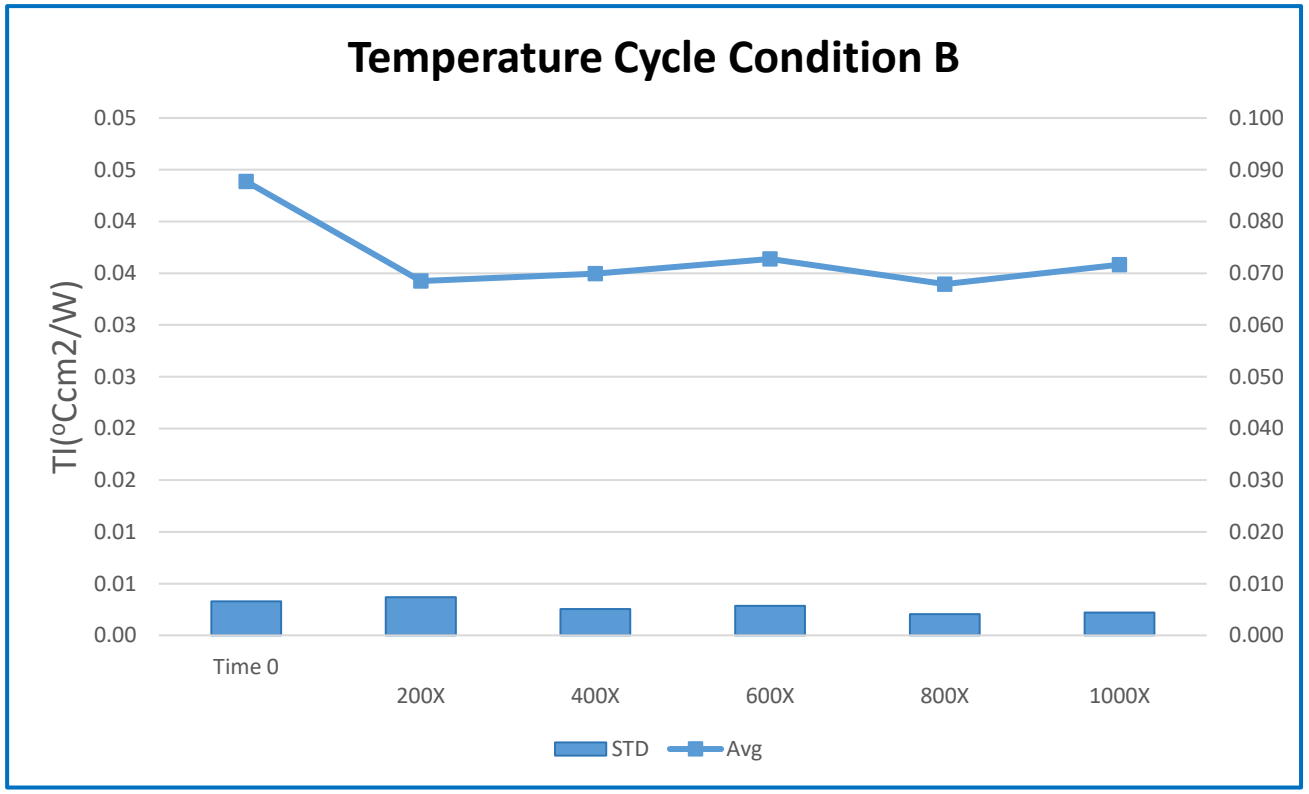
HAST chamber

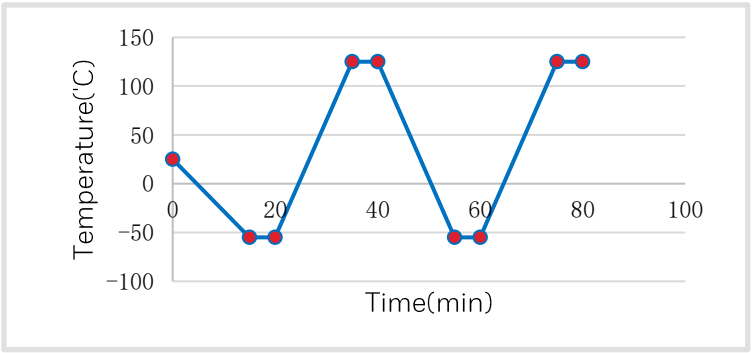
TG3010I shows stable after 96hrs HAST test

Thermal reliability – Thermal Cycling Test (TCB)

- Standard: JESD22-A104C
- Testing Condition: -55°C to 125°C (TCB),
- *Sample size: 4 pcs samples*.

TC chamber





- Ramp time: 15mins
- Dwelling time @-55°C and 125°C:5mins
- Every cycle: 40mins

TG3010I showed stable after 1000 cycles of TCB