Honeywell Thermal Interface Materials
Reliability Report
HT4500 Rev.A

Honeywell

Executive Summary

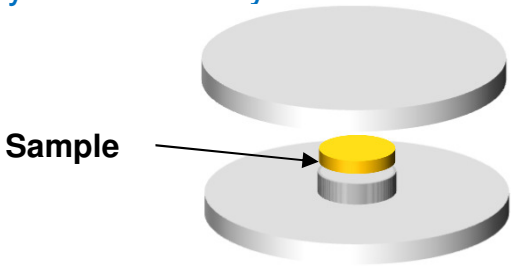
Honeywell HT4500, a one-component, dispensable thermal gel with thermal conductivity of 4.5 W/m·K, ultra-high compressibility enables low stress and excellent conformity to mating surfaces. It is designed to minimize thermal resistance at interfaces, and maintain excellent performance through reliability testing.

Conclusion :

HT4500 has excellent thermal stability after different long term reliability tests including, D85(85˚C&85%RH) 1000hrs, Thermal Shock 1000cycles and HTB(High Temperature Baking) 150˚C 1000hrs.

Introduction

- **Purpose**
  - This test is intended to provide the thermal performance stability data of Honeywell Thermal Interface Material via different accelerated conditions.
- **Test Method**
  - ASTM D5470



- **Test Procedure**

  -The test fixture is two nickel plated copper discs with a convex plate on one plate, The diameter of convex plate is 30mm, the thickness of convex plate is 3mm

  -The sample is placed between the two plates and compress to the thickness of 1mm. Then fix the fixture and sample by screws.

  Put the fixture and sample in reliability test chamber.

  Test the thermal resistance both fixture and sample before and after 250h, 500h, 750h, 1000h or 250 cycles, 500cycles, 750cycles and 1000cycles reliability test based on ASTM D5470.

Test Items/Condition

- 85˚C& 85%RH	1000hrs
- Temperature Shock Test	1000x
- High Temperature Baking Test 125˚C	1000hrs

Thermal Impedance Test Method: ASTM D5470

Hot side heat flow $Q_h = K_m \times A \times \frac{T_{h3} - T_{h1}}{X_1 + X_2}$

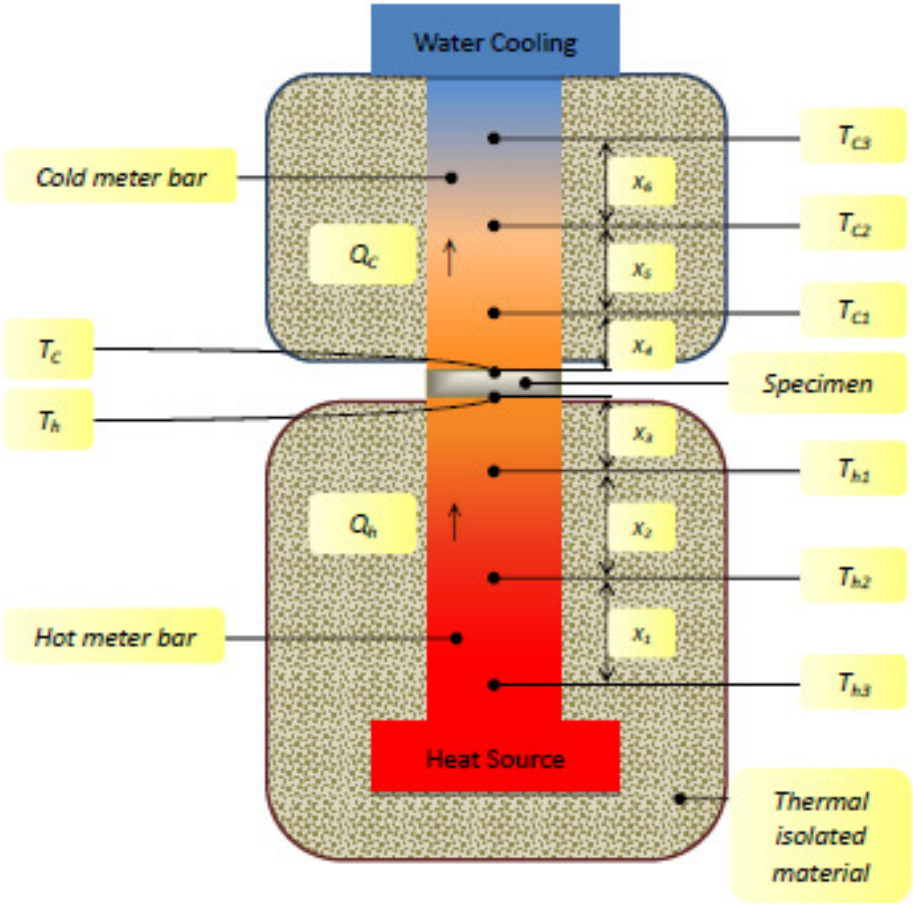
Cold side heat flow $Q_c = K_m \times A \times \frac{T_{c1} - T_{c3}}{X_5 + X_6}$

Average heat flow $Q_{ave} = \frac{(Q_h + Q_c)}{2}$

Hot side surface temp. $T_h = T_{h1} - \frac{X_3}{X_1 + X_2}(T_{h3} - T_{h1})$

Cold side surface temp. $T_c = T_{c1} - \frac{X_4}{X_5 + X_6}(T_{c3} - T_{c1})$

Thermal impedance $Imp = R \times A = \frac{T_h - T_c}{Q_{ave}} \times A$



Reliability Test Condition

- **85˚C & 85%RH Test (D85)**
  - Standard:IEC-68-2-30
  - Testing Condition: 85°C, 85%RH, **1000 hours**
  - Chamber supplier: ESPEC
  - Objective: High temperature with high humidity on the thermal performance of the test structure.

TH D85 chamber

- **Temperature Shock Test**
  - Standard: IEC 60068-2-14
  - Testing Condition: -40°C to 150°C, **1000cycles**
  - Chamber supplier: ESPEC
  - Objective: Determine the resistance of TIM to extremes of high and low temperatures shock, and its ability to withstand cyclical stresses.

Thermal Shock chamber

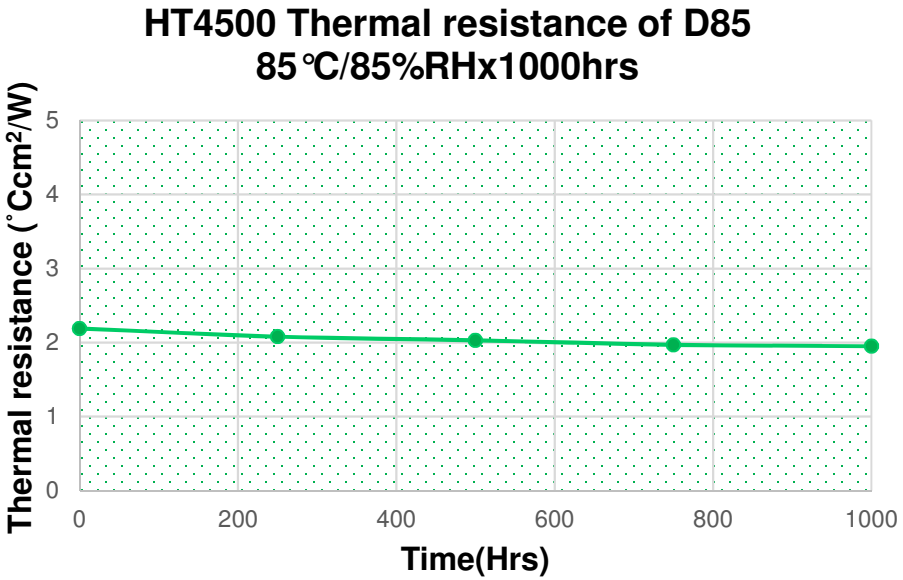
- **High Temperature Baking**
  - Standard: JESD22-A103C
  - Testing Condition: 150°C, **1000 hours**
  - Oven supplier: BINDER
  - Objective: Accelerate changes in TIM's material and performance characteristics relative to prolonged and elevated temperature.

Oven

85˚C & 85%RH(D85)

Standard : IEC-68-2-30

- Testing Condition: 85℃, 85%RH, 1000 hours
  - Objective: High temperature with high humidity on the thermal performance of the test structure



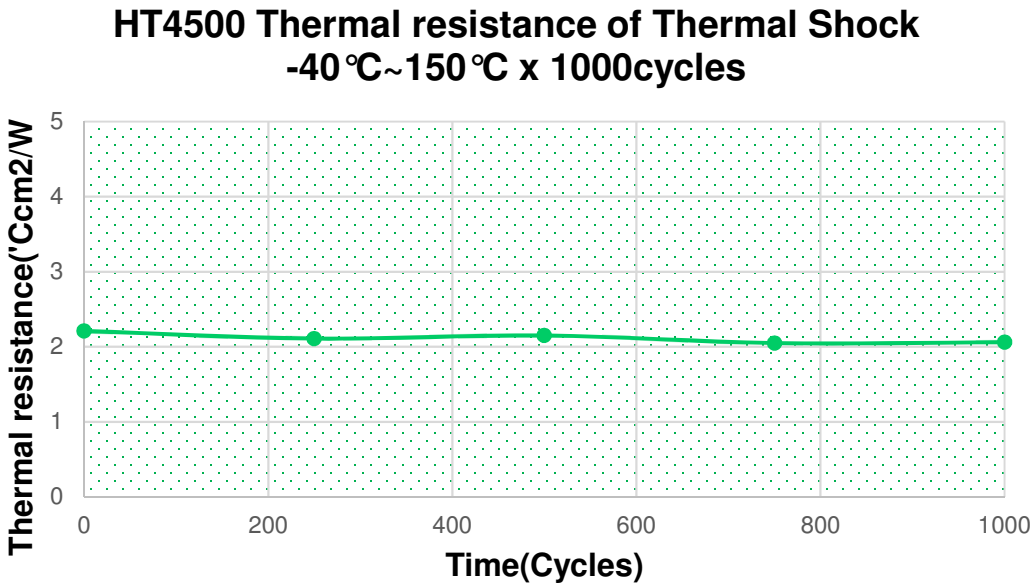
TH D85 chamber

HT4500 remain reliable up to 1000hrs for D85

Thermal Shock Test Testing

Standard: IEC 60068-2-14

- Testing Condition: -40°C to 150°C, 1000 cycles
- Objective: Determine the resistance of TIM to extremes of high and low temperatures, and its ability to withstand cyclical stresses



Thermal Shock chamber

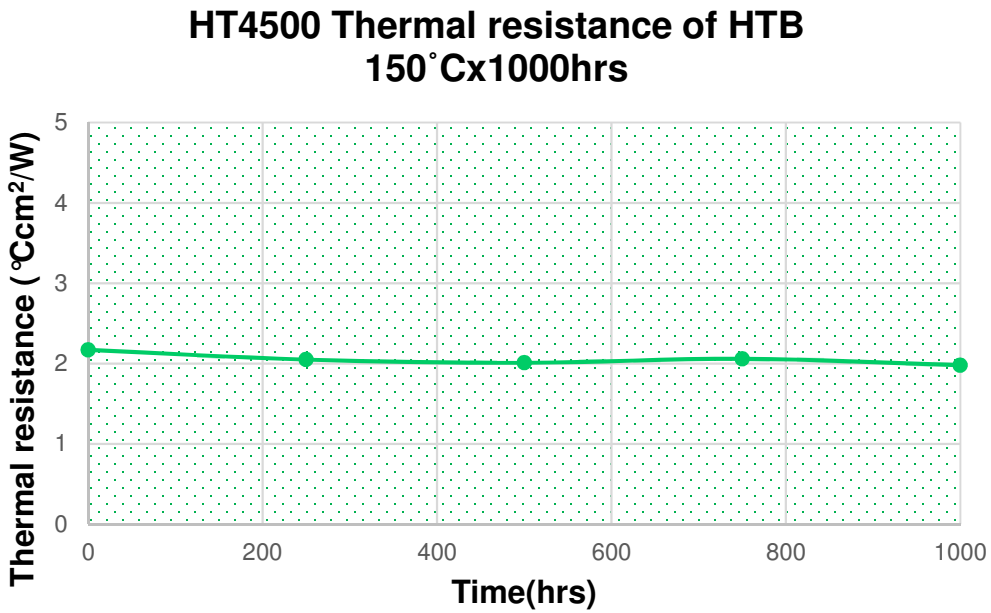
- Ramp time: <20sec
- Dwelling time @-40°C and 150°C:1hr

HT4500 remain reliable up to 1000 cycles for thermal shock test.

High Temperature Baking

Standard: JESD22-A103C

- Testing Condition: 150℃, 1000 hours
- Objective: Accelerate changes in TIM's material and performance characteristics relative to prolonged and elevated temperature.



Oven

HT4500 remain reliable up to 1000hrs for 150°C baking

THANK YOU

Honeywell

www.honeywell.com