Honeywell Thermal Interface Materials
Reliability Report
HLT2000 Rev.A

Honeywell

Executive Summary

Honeywell HLT2000, a two-component, dispensable thermal gel with 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.

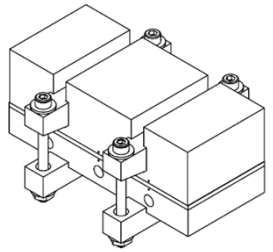
Based on a novel polymer system, this material exhibits excellent reliability. A proprietary filler material provides high thermal conductivity 2.0W/m ·K suitable for high performance devices.

Conclusion :

HLT2000 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) 125˚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 modified.
- **Test Procedure**



-The test fixture is rectangular with surface area of 10 in^2 (2" x 5")
-Aluminum heater plate and an extruded aluminum heat sink "cooler plate".
-The heater plate contains 3 holes for insertion of cartridge heaters.
-Both plates contain 3 sets of thermocouple holes drilled for measurement of the temperature very near the surfaces mated by the thermal gel.
-Each test fixture accommodates 3 test positions.
-A specified power from a power supply is input to the heaters to obtain a constant 70'C across the heater plate.
-A cooling fan (not pictured) is centered on top of the heat sink during testing to facilitate realistic air flow and cooling. Test values are measured in an ambient laboratory environment.

  - Measure ΔT of the top and bottom surface before and after.
- **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 $Q_h = K_m \times A \times \frac{T_{h3} - T_{h1}}{X_1 + X_2}$

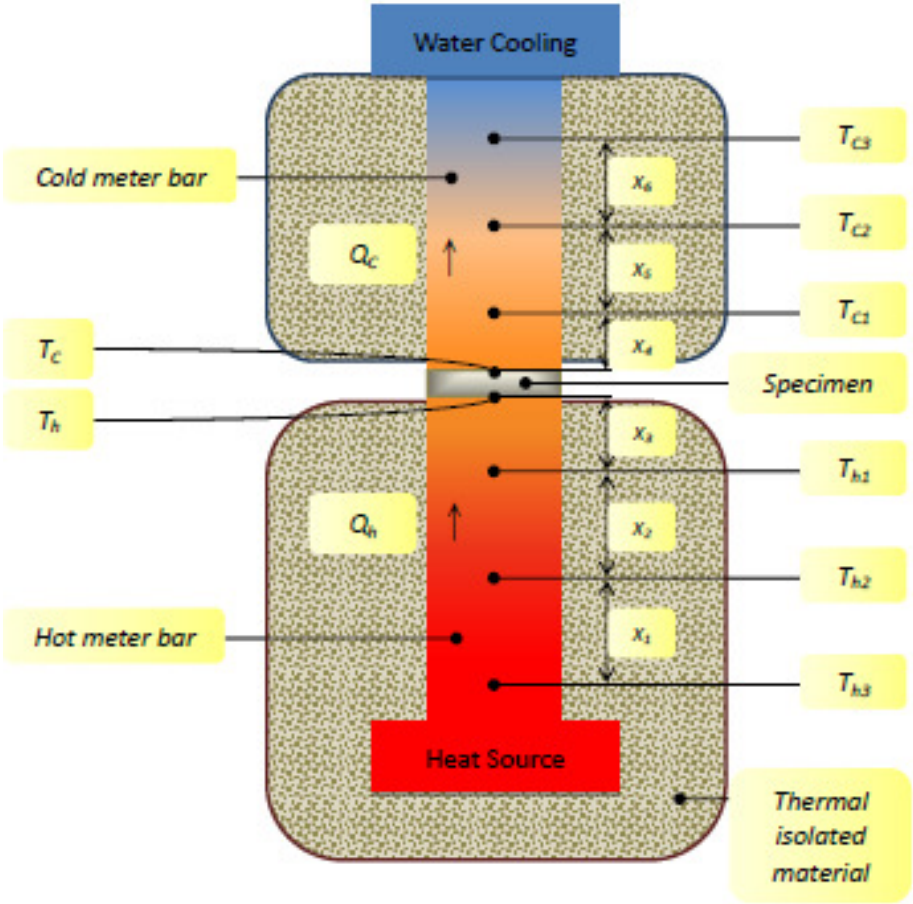
Cold side heat flow $Q_c = K_m \times A \times \frac{T_{c1} - T_{c3}}{X_5 + X_6}$

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 125°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

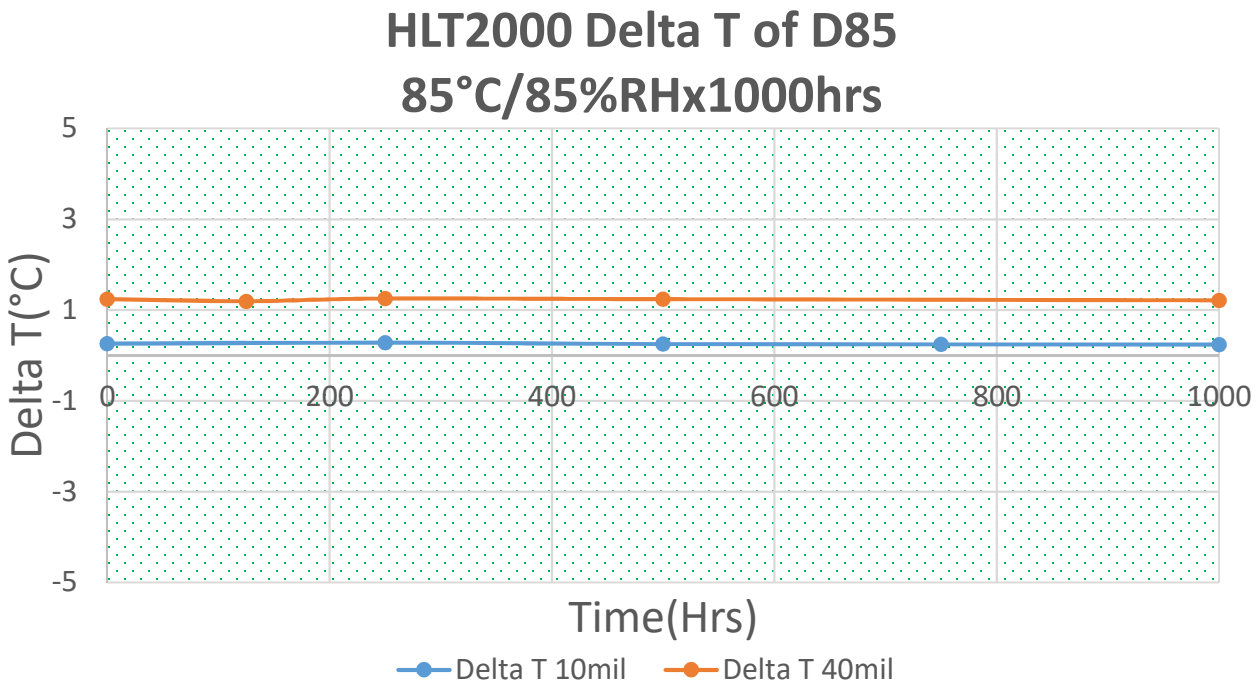
- **High Temperature Baking**
  - Standard: JESD22-A103C
  - Testing Condition: 125°C, **1000 hours**
  - Oven supplier: BINDER
  - Objective: Accelerate changes in TIM's material and performance characteristics relative to prolonged and elevated temperature.

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



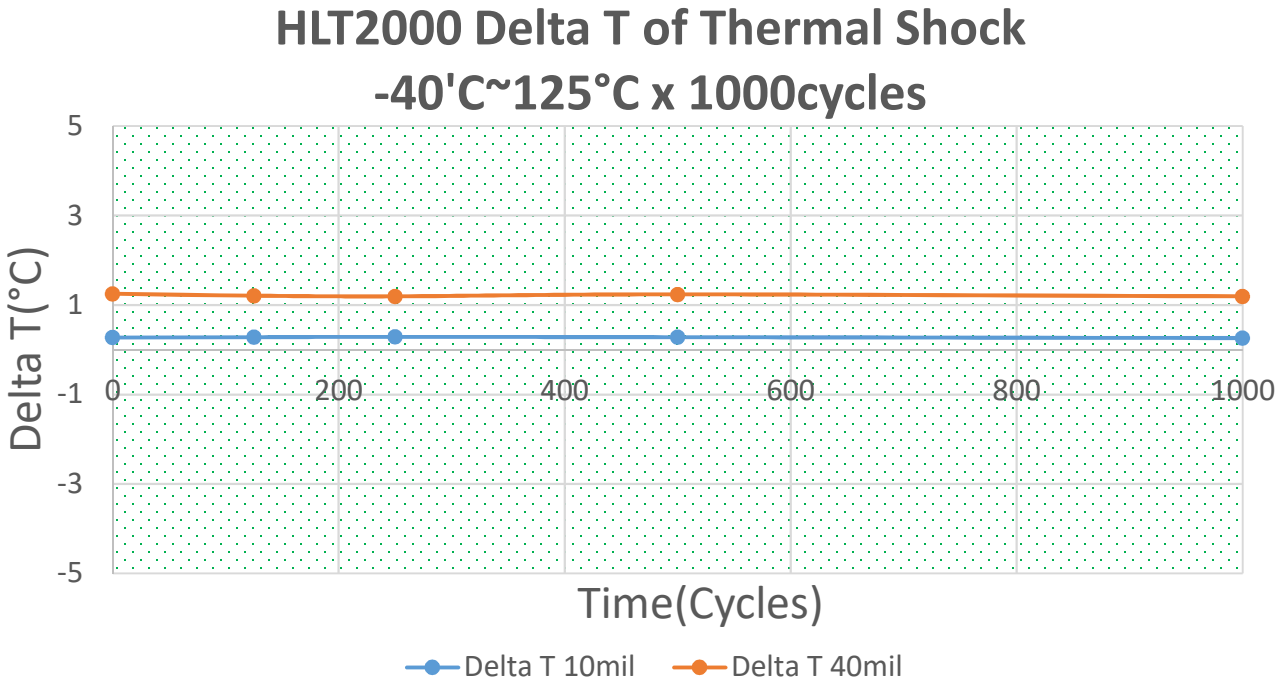
TH D85 chamber

HLT2000 remain reliable up to 1000hrs for D85

Thermal Shock Test Testing

Standard: IEC 60068-2-14

- Testing Condition: -40°C to 125°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

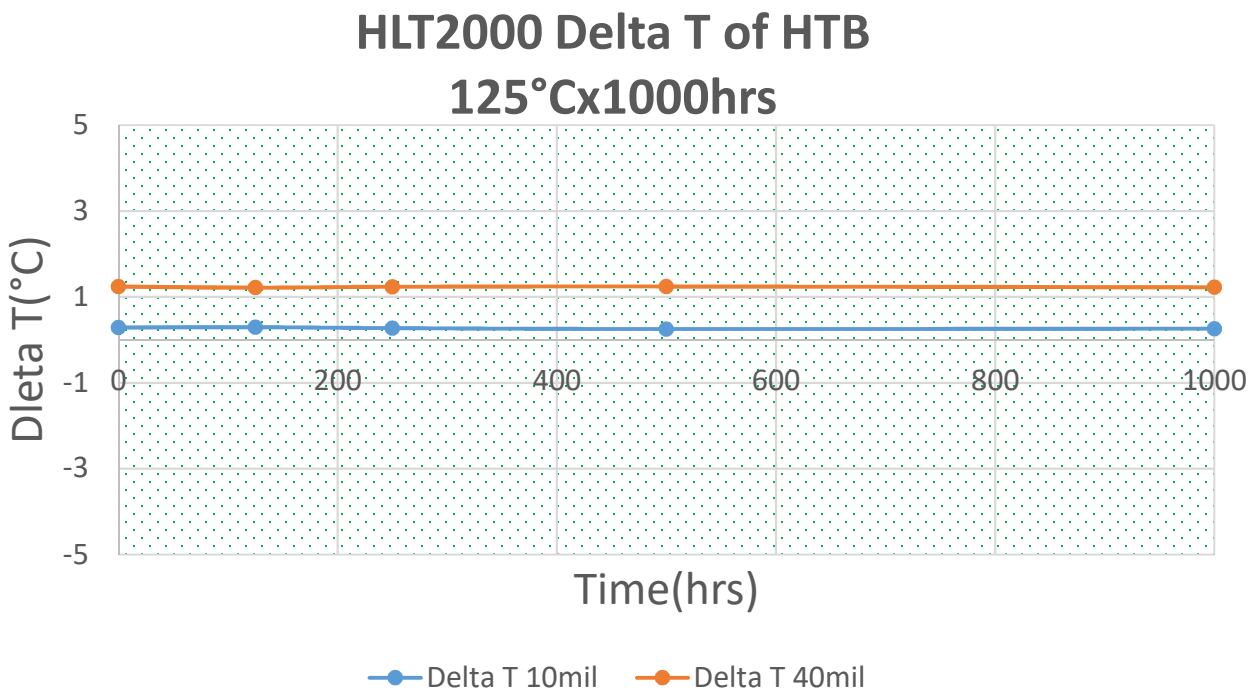
- Ramp time: <20sec
- Dwelling time @-40°C and 125°C:1hr

HLT2000 remain reliable up to 1000 cycles for thermal shock test.

High Temperature Baking

Standard: JESD22-A103C

- Testing Condition: 125℃, 1000 hours
- Objective: Accelerate changes in TIM's material and performance characteristics relative to prolonged and elevated temperature.



Oven

HLT2000 remain reliable up to 1000hrs for 125°C baking

THANK YOU

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