Honeywell Thermal Interface Materials

Reliability Report

HLT 7000

Rev.A

Honeywell

Executive Summary

Honeywell HLT7000, is a soft, two part, dispensable thermal gap filler with a highly thermal conductivity.

Based on a novel polymer system, this material exhibits excellent reliability.

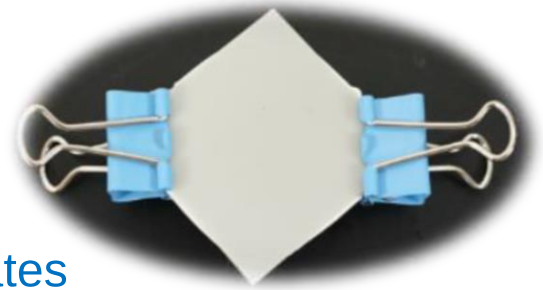
A proprietary filler material provides high thermal conductivity 7.0W/m ·K suitable for high performance devices.

Conclusion :

HLT7000 has excellent thermal stability after multiple long term reliability tests, including 85˚C& 85%RH 1000hrs, High Temperature Baking 1000hrs.

Introduction

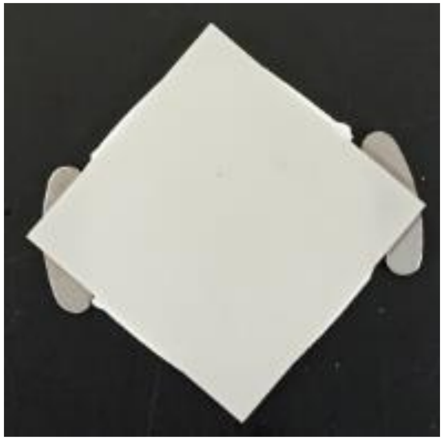
- **Purpose**
  - This report is intended to provide the thermal performance stability data of Honeywell Thermal Interface Material via different accelerated conditions.
- **Test Method**
  - ASTM D5470

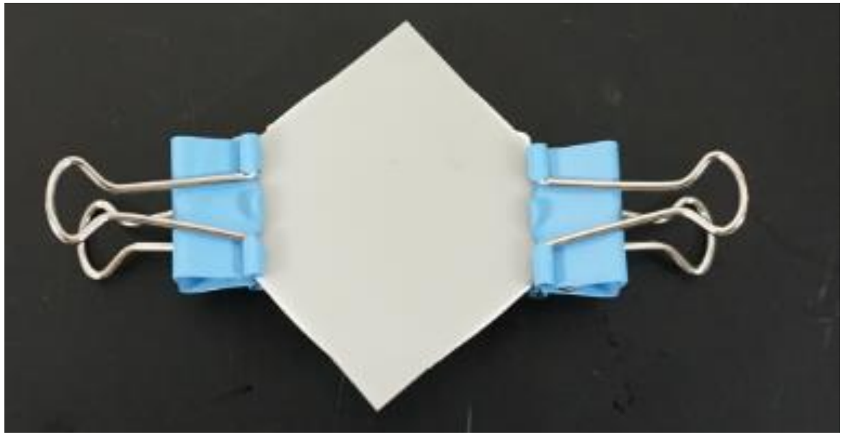


- **Test Procedure**
  - 38x38x1.0mm ALN (aluminum nitride) plate substrates
  - 1.5mm HLT7000 sample with stainless shim is applied between two ALN plates as sandwich structure.
  - Measure TI data before and after each test read point with 20psi.
- **Test Items/Condition**
  - 85˚C & 85%RH 1000hrs 1000hrs
  - High Temperature Baking Test 1000hrs
- **Test Result**

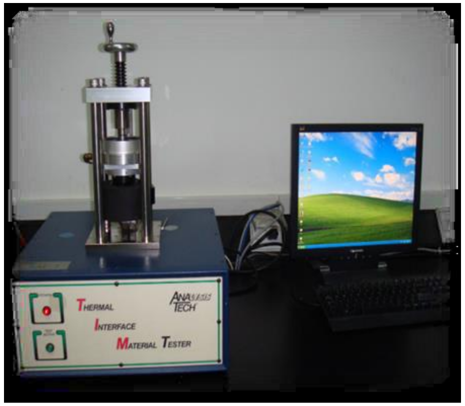
Sample Preparation Procedure

- Sample material were dispensed onto the center of aluminum nitride substrates.
- The 1.5 mm shims were placed at the edges of the substrate.
- A second aluminum nitride substrate was placed on top of the material.
- A clamp was placed onto the assembly to hold the substrates at a constant thickness of 1.5 mm.
- 3 samples for each reliability test item.





Thermal Impedance Test Method: ASTM D5470



TIM Tester from Analysistech Company
with Water Cooled Tester.

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

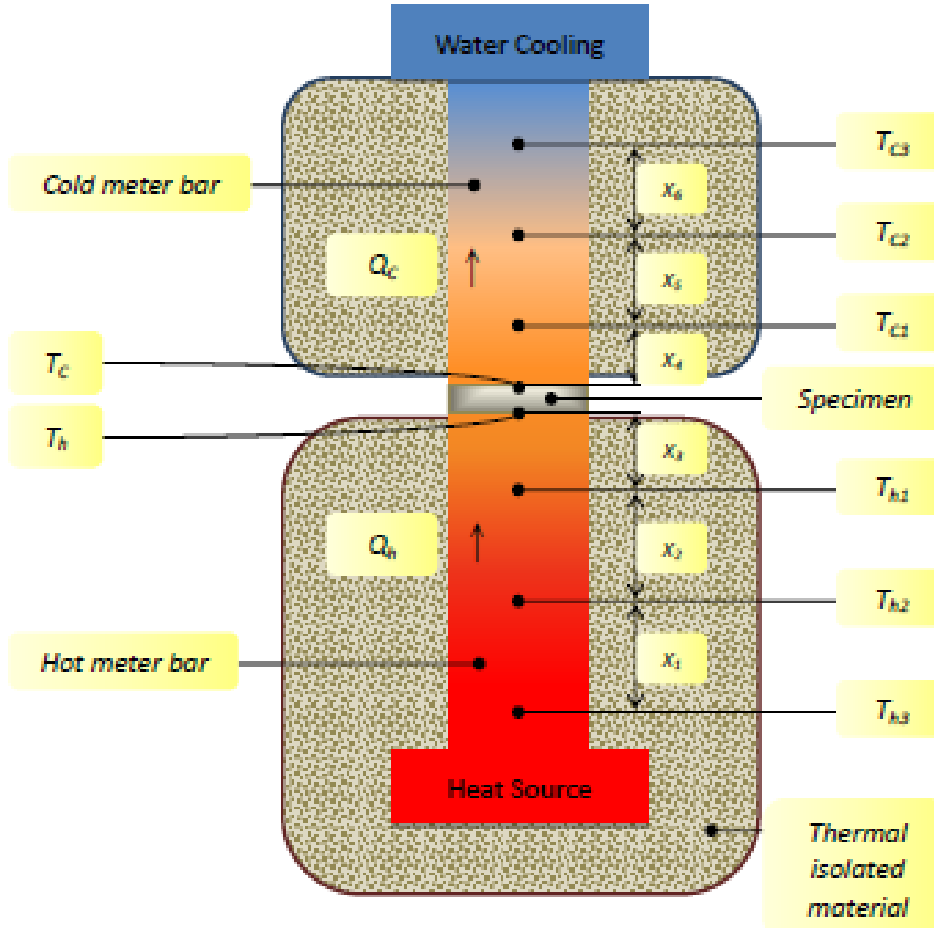
Cold side heat flow $$Q_c = K_m \times A \times \frac{T_{c1} - T_{c3}}{X_5 + X_6}$$

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



Reliability Test Condition

- **85˚C & 85%RH(D85)**
  - -Standard: IEC61215
  - -Testing Condition: 85°C, 85%RH, 1000 hours
  - -Chamber supplier: ESPEC
  - -Objective: Accelerate corrosive impact of high humidity and temperature on the thermal performance of the test structure

TH D85 chamber

- **High Temperature Baking**
  - Standard: JESD22-A103
  - 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

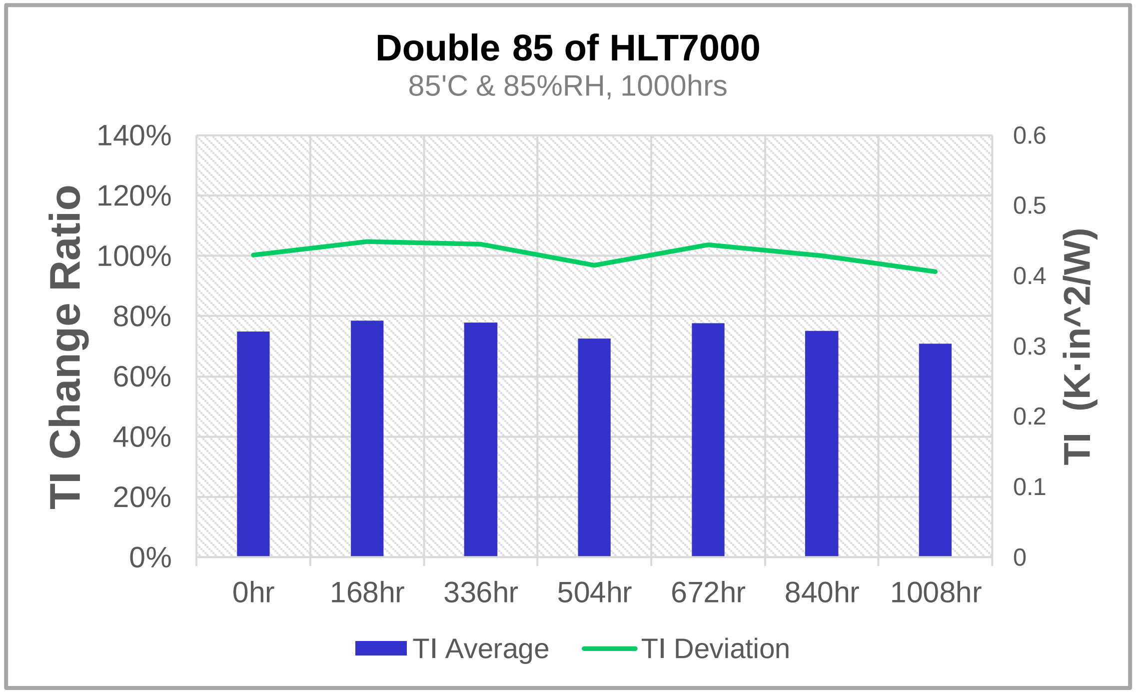
Oven

85˚C & 85%RH (D85)

IEC61215

•Testing Condition: 85°C, 85%RH, 1000 hours

-Objective: High temperature with high humidity on the thermal performance of the test structure



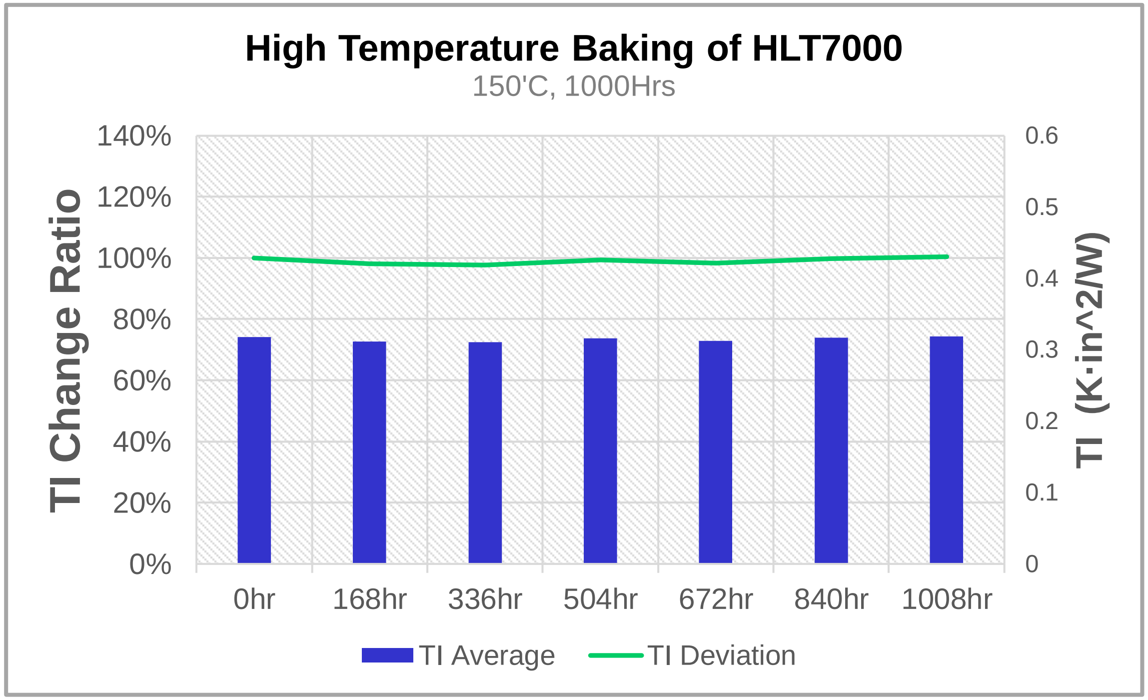
TH D85 chamber

HLT7000 remains reliable up to 1000 hrs for D85

High Temperature Baking

Testing Condition: 150°C, 1000 hours

- The samples were placed into the test chamber at 150°C.
- At each reading point, the sandwich samples were taken out and left at room temperature. Measurements were taken after a minimum of 2 hours.
- The samples were put back into the chamber after each test and the process was repeated till 1000 hours.



HLT7000 remains stable after 1000hrs baking at 150 ºC

THANK YOU

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