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TEST REPORT

Typical Application Test Results for THERMFLOWâ T725 Material

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Purpose

The ASTM D5470 test is a standardized laboratory test well suited for quality control and

product development. It is a test that is good at establishing material specifications and for comparing one material to another under controlled conditions. However, it is not representative of real world application performance since the two test surfaces are exceptionally flatter and smoother than typically seen in the field. The Application specific testing described in this document uses heat sinks, spring clips, and components representative of those used in today's electronic products. Therefore these results can be used as an example of a "typical" application. As always, to account for the unique situations associated with other specific application configurations, Chomerics recommends customer testing to validate performance. Contact Chomerics Applications Engineering at 781-939-4620 for assistance or further information.

Procedure

A type T thermocouple is mounted in the base of the Pentium II type heat sink. A thermocouple is also mounted onto the Pentium II cartridge. A third thermocouple is mounted inside the computer housing to measure ambient air. The computer is powered up running Microsoft Windows 95. No other programs are running, and no screen savers are used. The temperatures of the heat sink base and the microprocessor are monitored. Once steady state is reached, the temperatures are recorded. Each interface option was tested this way. The thermal interface material was cut to a one inch by one inch pad.

Equipment

A 350 MHz Pentium II cartridge was used. A Wakefield heat sink (p/n 838-130AB) was used to cool the microprocessor. The associated spring clips were Wakefield p/n 222 THM. The T725 was sampled from a production run, batch number 2969, roll #4, manufactured 10/22/99. The T710 was taken from the sample inventory in Woburn.

Data and Graphs

Figures 1 through 4 show the temperature vs. time to verify that the steady state condition was met. Figures 5 and 6 show the actual temperature data for each test case. Since the actual power dissipation is not known, the temperature differences are reported, not thermal resistances.

Test Summary	Dry Interface	*Dry T725	Wet T725	T710
Δ Tcase-air	24.3°C	21.6°C	20.9°C	20.3°C
Δ Tsink-air	15.6°C	16.4°C	17.0°C	17.0°C
Δ Tcase-sink	8.7°C	5.2°C	3.9°C	3.3°C

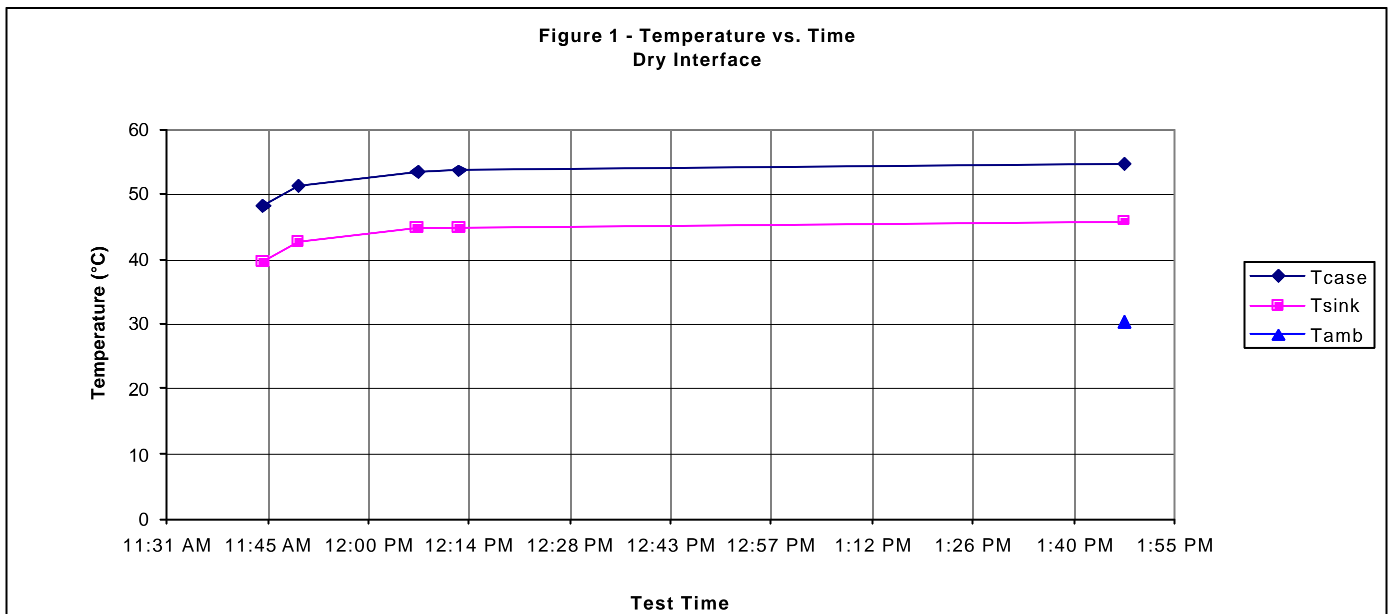
*Dry T725 is material that was tested before it had reached phase change temperature (58C). Wet T725 is material that has gone through the softening process that occurs when the material reaches phase change temperature.

Conclusion

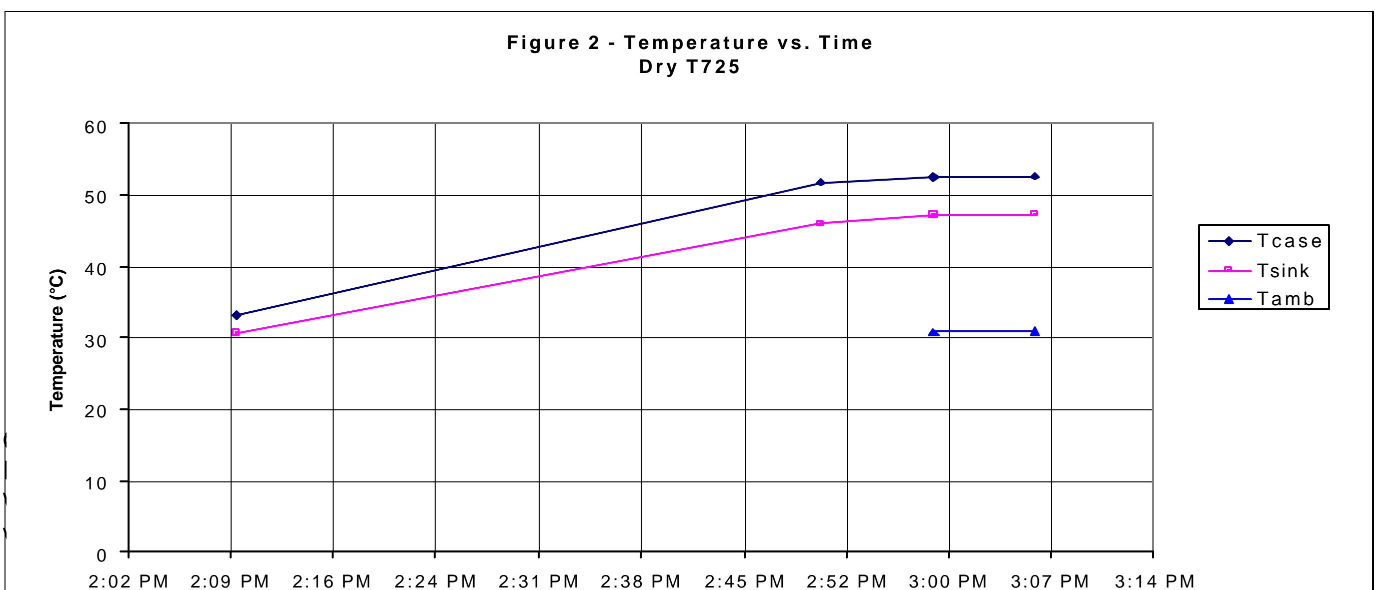
The thermal performance of T710 and “wet” T725 are similar, and a significant improvement over the dry interface. Even the unflowed or “dry” T725 was an improvement over the dry interface.

It was also observed that the unflowed or “dry” T725 material did not have thermal performance equal to the T710 or the flowed or “wet” T725. This does make sense since it is the conforming nature of T725 above its phase change temperature that gives it its optimal performance.

The test results show that either the T710 or the T725 would yield similar thermal performance for this particular configuration. However, when selecting a Thermal Interface Material, many other factors besides thermal performance must also be considered. When taking



into consideration the advantages of increased storage temperature range, ease of application, lower price, etc. T725 may be a better overall choice.



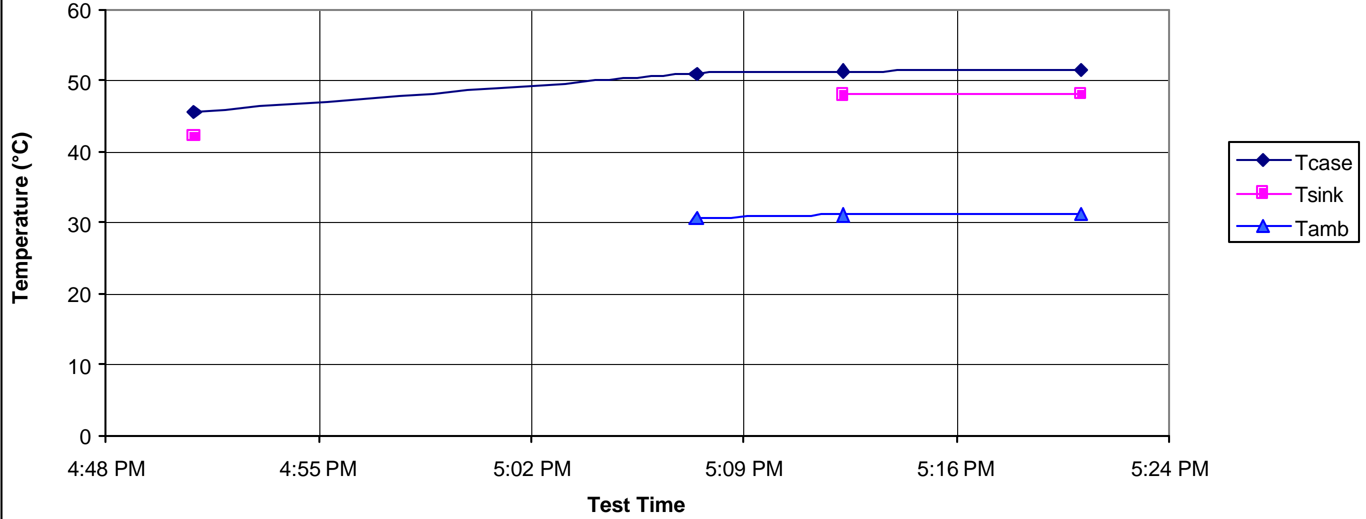


Figure 3 - Temperature vs. Time
T710
Temperature (°C)
60
50
40
30
20
10
0
4:48 PM
4:55 PM
5:02 PM
5:09 PM
5:16 PM
5:24 PM
Test Time
Tcase
Tsink
Tamb

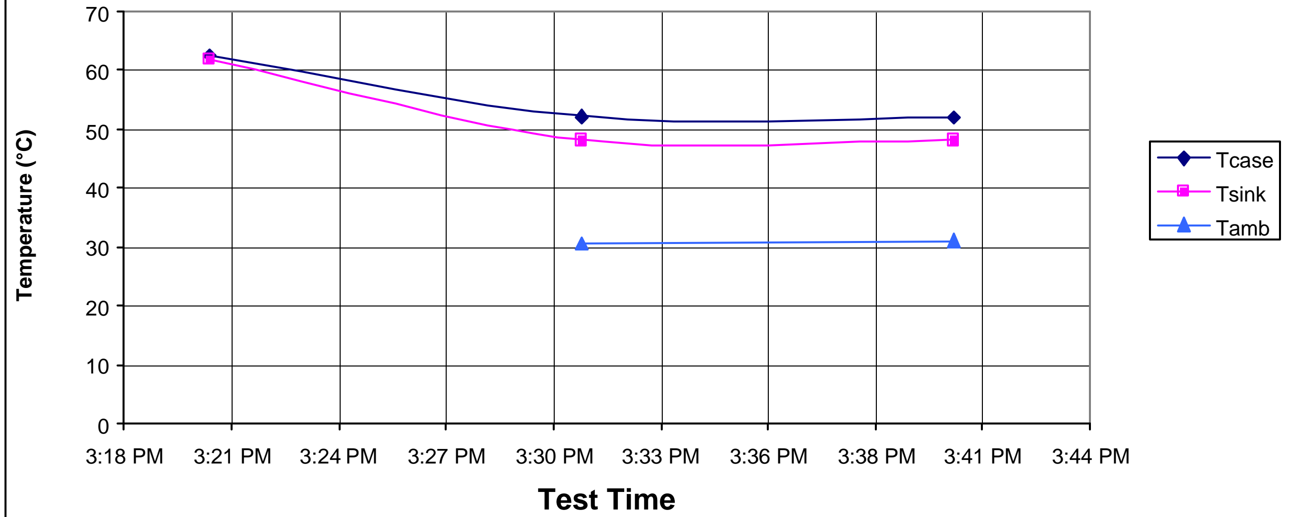


Figure 4 - Temperature vs. Time
Wet T725
Temperature (°C)
70
60
50
40
30
20
10
0
3:18 PM
3:21 PM
3:24 PM
3:27 PM
3:30 PM
3:33 PM
3:36 PM
3:38 PM
3:41 PM
3:44 PM
Test Time
Tcase
Tsink
Tamb

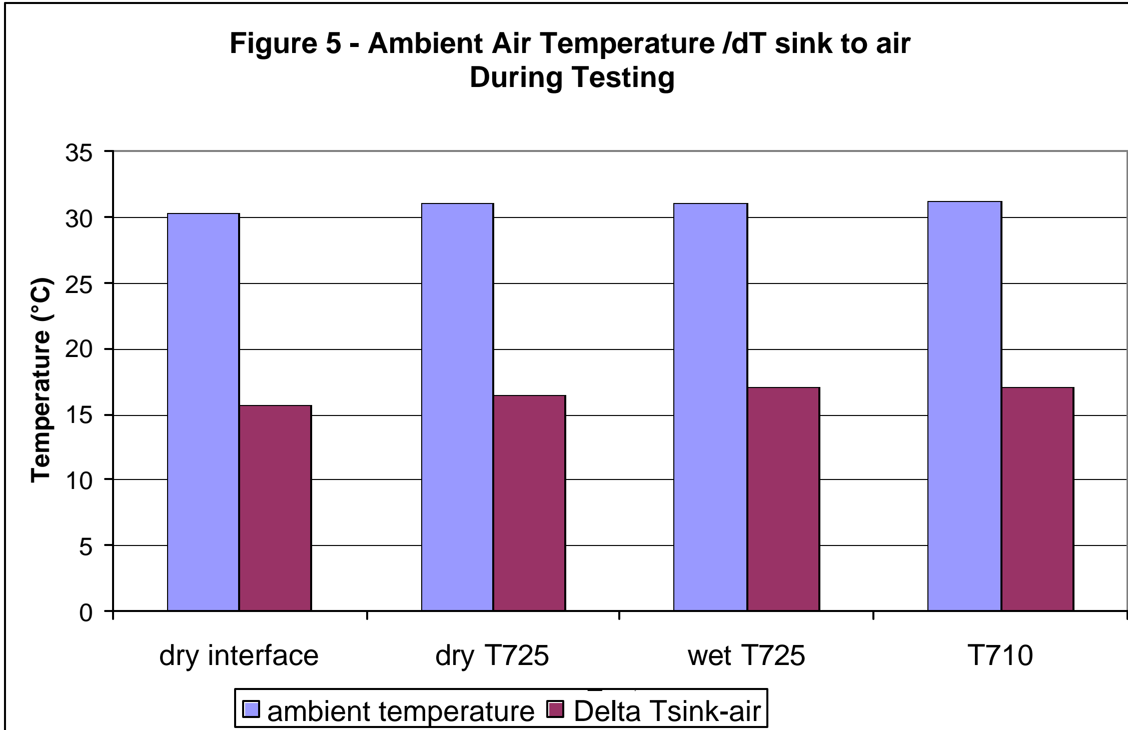


Figure 5 - Ambient Air Temperature /dT sink to air
During Testing
Temperature (°C)
35
30
25
20
15
10
5
0
dry interface
dry T725
wet T725
T710
ambient temperature
Delta Tsink-air

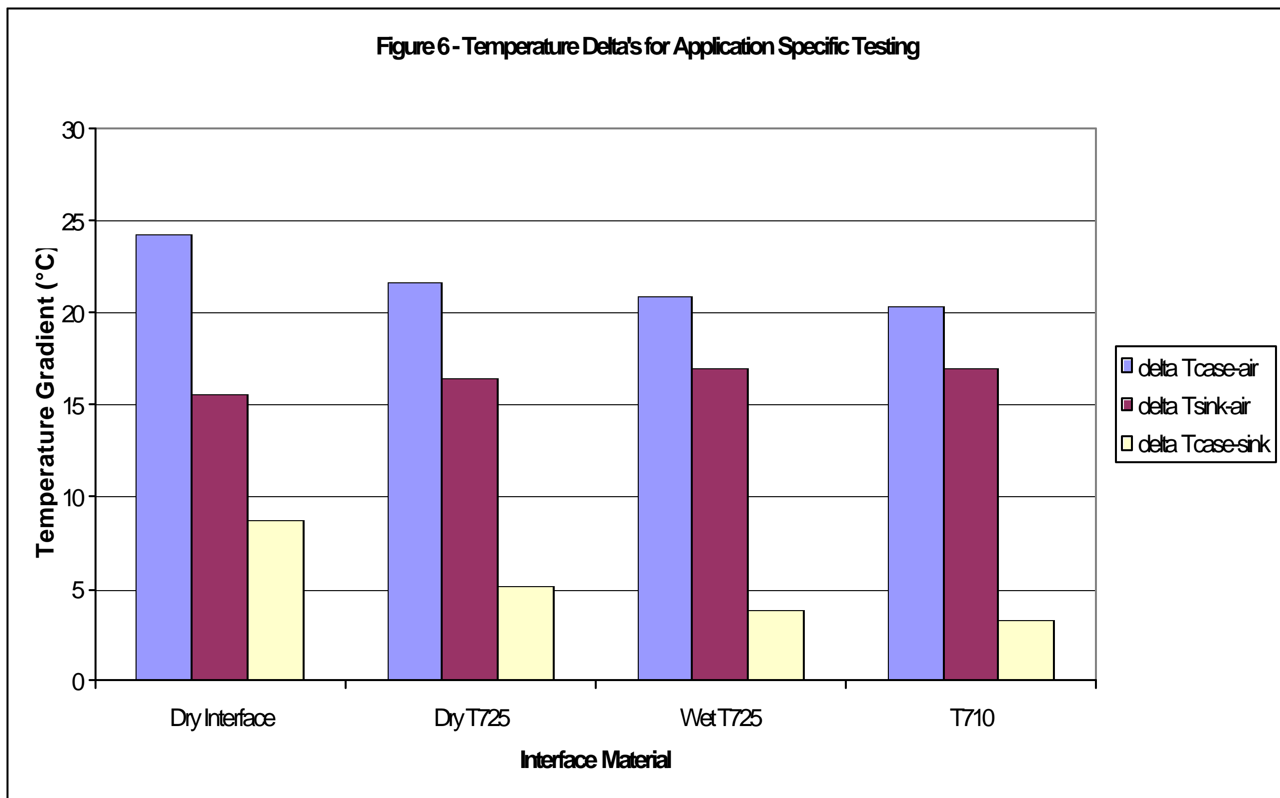


Figure 6 - Temperature Delta's for Application Specific Testing
Temperature Gradient (°C)
30
25
20
15
10
5
0
Dry Interface
Dry T725
Wet T725
T710
Interface Material
delta Tcase-air
delta Tsink-air
delta Tcase-sink