

Thermal Measurement Report

DATE: 5/8/96
revised 11/18/96

Package Description: Package: 240 32 x 32 mm QFP
 Die Down
 Flag: 10.6 mm Square
 Leadframe: SIDN 1234625
 Die Attach: JMI 2500AN
 Mold Compound: Sumitomo 7304LC
 Assembled: ANAM
 Die: PST6 - 10.16 mm Square

Junction to Ambient Thermal Resistance or Theta JA ($R_{\theta JA}$) was measured per SEMI Test Method G38-87 at 1.5 watts in a horizontal configuration. The test board conforms to EIA/JESD 51-3; it is a single layer 115x102 mm board designed to test 0.5 mm pitch QFP packages from 208 to 304 leads. The trace width is 0.24 mm, trace thickness is 0.076 mm. Sample size was 5.

Convection	Theta JA Average °C/watt	Standard Deviation °C/watt	Theta JA Ave + 3 Std. Dev. °C/watt
Natural	31.0	0.08	31.3
100 ft/min	27.7	0.18	28.3
200	26.1	0.1	26.4
400	23.7	0.34	24.7
800	19.9	0.11	20.2

"Thermal resistance" from junction to a thermocouple on top center of case, previously titled Theta J-Ref ($R_{\theta JR}$), was been renamed by the industry standard committee JEDEC JC15.1 as Ψ_{JT} and defined in EIA/JESD51-2. It is a useful value to use to estimate junction temperature in steady state customer environments.

Convection	Ψ_{JT} Average °C/watt	Standard Deviation °C/watt
Natural	1.9	0.09
100 ft/min	2.3	0.06
200	2.5	0.04
400	3.1	0.08
800	3.9	0.1

Junction to case thermal resistance, Theta JC ($R_{\theta JC}$), was measured using the cold plate technique with the cold plate temperature used as the "case" temperature. The reference specifications are MIL-STD 883D, Method 1012.1 and SEMI G30-88. Sample size was 5.

Theta JC Average °C/watt	Standard Deviation °C/watt	Theta JC Ave + 3 Std. Dev. °C/watt
8.9	0.07	9.1

Junction to board thermal resistance Theta JB ($R_{\theta JB}$) was measured using a cold plate technique with the cold plate in thermal contact with the bottom of the printed circuit board. The board temperature was measured with a thermocouple soldered to a center lead along one side of the package where the lead was soldered to the board. The measurement was taken using the 4 conductor layer printed circuit board described below. Sample size is 5.

Theta JB Average °C/watt	Standard Deviation °C/watt	Theta JB Ave + 3 Std. Dev. °C/watt
18.8	0.19	19.4

Junction to Ambient Thermal Resistance (Theta JA) was also measured on a four layer test board. The test board was a 115x102 mm board designed to test 0.5 mm pitch QFP packages from 208 to 304 leads with two solid internal plane of 1 oz nominal thickness (0.033 mm thick). The trace pattern on the component side had a trace width of 0.231 mm, trace thickness of 0.0715 mm. Sample size was 5.

Do Not Use this data without special footnote indicating that the results were measured on a board with two solid internal planes.

Convection	Theta JA Average °C/watt	Standard Deviation °C/watt	Theta JA Ave + 3 Std. Dev. °C/watt
Natural	26.1	0.11	26.4
100 ft/min	23.8	0.13	24.2
200	22.8	0.13	23.2
400	21.3	0.19	21.9
800	18.6	0.16	19.1

SEMI specifications are available from Semiconductor Equipment and Materials International at (415) 964-5111.

MIL-SPEC and EIA/JESD (JEDEC) specifications are available from Global Engineering Documents at 800-854-7179 or 303-397-7956.

	EMAIL	Phone	FAX
From Bennett Joiner	RXMN60	512-933-7597	512-933-6344
Ruth Reinhardt	RBDT20	512-933-6407	512-933-6344

Home Page:

www.freescal.com

email:

support@freescal.com

USA/Europe or Locations Not Listed:

Freescal Semiconductor
Technical Information Center, CH370
1300 N. Alma School Road
Chandler, Arizona 85224
(800) 521-6274
480-768-2130

support@freescal.com

Europe, Middle East, and Africa:

Freescal Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
support@freescal.com

Japan:

Freescal Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku
Tokyo 153-0064, Japan
0120 191014
+81 2666 8080

support.japan@freescal.com

Asia/Pacific:

Freescal Semiconductor Hong Kong Ltd.
Technical Information Center
2 Dai King Street
Tai Po Industrial Estate,
Tai Po, N.T., Hong Kong
+800 2666 8080

support.asia@freescal.com

For Literature Requests Only:

Freescal Semiconductor
Literature Distribution Center
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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А