

# 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 ( $R_{JA}$ ) 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 ( $R_{JR}$ ), was been renamed by the industry standard committee JEDEC JC15.1 as  $R_{JT}$  and defined in EIA/JESD51-2. It is a useful value to use to estimate junction temperature in steady state customer environments.

Convection	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 ( $R_{JC}$ ), 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 ( $R_{JB}$ ) 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.



# Freescale Semiconductor, Inc.

From Bennett Joiner	EMAIL	Phone	FAX
Ruth Reinhardt	RXMN60	512-933-7597	512-933-6344
	RBBD20	512-933-6407	512-933-6344

**Home Page:**

[www.freescale.com](http://www.freescale.com)

**email:**

[support@freescale.com](mailto:support@freescale.com)

**USA/Europe or Locations Not Listed:**

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

[support@freescale.com](mailto:support@freescale.com)

**Europe, Middle East, and Africa:**

Freescale 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@freescale.com](mailto:support@freescale.com)

**Japan:**

Freescale 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@freescale.com](mailto:support.japan@freescale.com)

**Asia/Pacific:**

Freescale 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@freescale.com](mailto:support.asia@freescale.com)

**For Literature Requests Only:**

Freescale Semiconductor  
 Literature Distribution Center  
 P.O. Box 5405  
 Denver, Colorado 80217  
 (800) 441-2447  
 303-675-2140  
 Fax: 303-675-2150  
[LDCForFreescaleSemiconductor@hibbertgroup.com](mailto:LDCForFreescaleSemiconductor@hibbertgroup.com)

RoHS-compliant and/or Pb-free versions of Freescale products have the functionality and electrical characteristics of their non-RoHS-compliant and/or non-Pb-free counterparts. For further information, see <http://www.freescale.com> or contact your Freescale sales representative.

For information on Freescale's Environmental Products program, go to <http://www.freescale.com/epp>.

Information in this document is provided solely to enable system and software implementers to use Freescale Semiconductor products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document. Freescale Semiconductor reserves the right to make changes without further notice to any products herein. Freescale Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Freescale Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Freescale Semiconductor does not convey any license under its patent rights nor the rights of others. Freescale Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Freescale Semiconductor product could create a situation where personal injury or death may occur. Should Buyer purchase or use Freescale Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold Freescale Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Freescale Semiconductor was negligent regarding the design or manufacture of the part.



**For More Information On This Product,  
 Go to: [www.freescale.com](http://www.freescale.com)**

Freescale Semiconductor, Inc.

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)