# PACKAGE INFORMATION

## *Package Thermal Characteristics*

This document provides test information about the standard packages offered by Allegro MicroSystems. The data given is intended as a general reference only and is based on certain simplifications such as constant chip size and standard bonding methods.

To use this document, in the Allegro Package Code column, locate the package designator for the device. To locate package variants, use the JEDEC Package Outline column to locate the corresponding JEDEC designator, or use the Quantity and Type of Terminals column to locate the variant by the configuration of terminals.

Three columns of results are presented:

- $R_{\theta JA}$ High K. This test is performed using a high thermal conductivity, mutlilayer printed circuit board that closely approximates those specified in JEDEC standard JEDEC51-7 (surface-mount devices), JEDEC51-5 (for exposed thermal pads), or JEDEC51-10 (through-hole devices). These standards are available for download on the JEDEC Web site, www.jedec.com.
- $R_{\theta JA}$ Usual. This test is performed using a common printed circuit board. Where only one value is shown in this column, the printed circuit board has one site, with minimal exposed copper area. Where two values are shown in this column, it indicates that the printed circuit board has multiple sites, each having a different amount of exposed copper foil. The ground leads (power tabs) of the devices are connected to these areas of copper foil. The two results shown indicate the highest and the lowest test results.

  Note that the paired results are text hyperlinks to other Web pages. Click the text to open the linked page, which provides information on the test and printer circuit board layout, as well as intermediate test results.
- $R_{\theta JC}$, $R_{\theta JP}$, $R_{\theta JT}$ . This column provides results on other thermal dissipation paths:

  $R_{\theta JC}$ [c] Through the device case.

  $R_{\theta JP}$ [p] Through the exposed thermal pad see Application Note 26020, *Procedure for Measuring Pad-to-Ambient Thermal Resistance ($R_{\theta JP}$) for Exposed Pad Packages*.

  $R_{\theta JT}$ [t] Certain devices have some leads joined together (fused) internally, and in some instances externally, to provide more efficient heat dissipation (referred to as a power tab or batwing configuration).

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## *Package Thermal Characteristics*

| Allegro Package Code | Package Type (Common Package Designator) | JEDEC Package Outline | Quantity and Type of Terminals | $R_{θJA}$ | | $R_{θJC}$ $R_{θJP}$ $R_{θJT}$ (°C/W) |
|---|---|---|---|---|---|---|
| | | | | High K (°C/W) | Usual (°C/W) | |
| A | Plastic Dual In-Line (DIP, PDIP, DIL, or PDIL) | MS-001 AA | 14-Pin | 40 | 73 | 38 [c] |
| | | MS-001 BB | 16-Pin | 38 | 68 | 38 [c] |
| | | MS-001 AC | 18-Pin | 36 | 65 | 25 [c] |
| | | MS-001 AD | 20-Pin | 32 | 60 | 25 [c] |
| | | MS-010 AA | 22-Pin | 30 | 56 | 21 [c] |
| | | MS-001 AF | 24-Pin | 26 | 50 | – |
| | | MS-011 AB | 28-Pin | – | 45 | 16 [c] |
| | | MS-011 AC | 40-Pin | 26 | 36 | – |
| B | Semi-Tab Plastic Dual In-Line (DIP, PDIP, DIL, or PDIL) | MS-001 BB | 16-Pin | 28 | 41-63 | 6 [t] |
| | | MS-001 AF | 24-Pin | 26 | 36-54 | 6 [t] |
| EB | Semi-Tab (two) Plastic Leaded Chip Carrier (PLCC/PQCC) | MS-018 AB | 28-J Lead | 22 | 36 | 6 [t] |
| | | MS-018 AC | 44-J Lead | 22 | 30-50 | 6 [t] |
| ED | Semi-Tab (four) Plastic Leaded Chip Carrier (PLCC/PQCC) | MS-018 AC | 44-J Lead | 22 | 30-50 | 6 [t] |
| EH | Plastic Leadless Chip Carrier with Exposed Thermal Pad (MLP) | MO-229 WCED | 3 x 2 mm 6-Contact | 50 | 70-221 | 2 [p] |
| EJ | Plastic Leadless Chip Carrier with Exposed Thermal Pad (MLP) | MO-229 WEED | 3 x 3 mm 10-Contact | 45 | 65-190 | 2 [p] |
| EK | Plastic Leadless Chip Carrier with Exposed Thermal Pad (MLP) | MO-229 WEEA | 3 x 3 mm 5-Contact | 50 | 72-182 | 2 [p] |
| EL | Plastic Leadless Chip Carrier with Exposed Thermal Pad (MLP) | MO-229 WCCD | 2 x 2 mm 6-Contact | 56 | 95-250 | 2 [p] |
| EP | Square Plastic Leaded Chip Carrier (PLCC/PQCC) | MS-018 AA | 20-J Lead | 41 | 78 | 35 [c] |
| | | MS-018 AB | 28-J Lead | 37 | 68 | 30 [c] |
| | | MS-018 AC | 44-J Lead | 30 | 54 | 25 [c] |
| EQ | Rectangular Plastic Leaded Chip Carrier (PLCC/PCC) | MS-016 AE | 32 (7 x 9)-J Lead | 37 | 52 | 30 [c] |
| ET | Plastic Leadless Chip Carrier with Exposed Thermal Pad (MLP) | MO-220 VHHD | 28-Contact | 32 | 130 | 2 [p] |

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| Allegro Package Code | Package Type (Common Package Designator) | JEDEC Package Outline | Quantity and Type of Terminals | $R_{\theta JA}$ | | $R_{\theta JC}$ $R_{\theta JP}$ $R_{\theta JT}$ (°C/W) |
|---|---|---|---|---|---|---|
| | | | | High K (°C/W) | Usual (°C/W) | |
| JP | Plastic Low-Profile Quad Flatpack with Exposed Thermal Pad (eLQFP) | MS-026B BC-HD | 48-Gull Wing | 23 | 44-86 | 2 [p] |
| K | Plastic Single In-Line (SIP) | – | 4-Lead | – | 177 | – |
| KA | Plastic Single In-Line (SIP) | – | 5-Lead | – | 164 | – |
| KB | Plastic Single In-Line (SIP) | – | 3-Lead | – | 177 | – |
| KC | Plastic Single In-Line (SIP) | – | 3-Lead | – | 177 | – |
| L | Plastic Small-Outline IC (SOIC) | MS-012 AA | 8-Gull Wing | 80 | 140 | 45 [c] |
| | | MS-012 AB | 14-Gull Wing | 65 | 120 | 33 [c] |
| | | MS-012 AC | 16-Gull Wing | 64 | 118 | – |
| LB | Semi-Tab Plastic Small-Outline IC (SOIC) | MS-013 AA | 16-Gull Wing | 38 | 48-90 | 6 [t] |
| | | MS-013 AC | 20-Gull Wing | 38 | 48-87 | 6 [t] |
| | | MS-013 AD | 24-Gull Wing | 35 | 45-77 | 6 [t] |
| LD | Plastic Thin Shrink Small-Outline IC (TSSOP) | MO-153 BD-1 | 38-Gull Wing | 47 | 114 | – |
| LH | Plastic Small-Outline Transistor (SOT23W) | – | 3-Lead | – | 110-228 | – |
| | Plastic Small-Outline Transistor (SOT23W) | – | 6-Lead | – | 82-170 | – |
| LJ | Plastic Small-Outline IC (SOIC) with Exposed Thermal Pad | MS-012AA | 8-Gull Wing | 35 | 62-147 | 2 [p] |
| LP | Plastic Thin Shrink Small-Outline IC with Exposed Thermal Pad (eTSSOP) | MO-153 ABT | 16-Gull Wing | 34 | 43-129 | 2 [p] |
| | | MO-153 ADT | 24-Gull Wing | 28 | 32-100 | 2 [p] |
| | | MO-153 AET | 28-Gull Wing | 28 | 32-100 | 2 [p] |
| LQ | Plastic Small-Outline IC (SOIC) | – | 36-Gull Wing | 44 | 85 | – |
| LT | Plastic Small-Outline Transistor (SOT89) | TO-243 AA | 3-Lead | – | 78-180 | – |
| LW | Wide-Body Plastic Small-Outline IC (SOIC) | MS-013 AA | 16-Gull Wing | 48 | 94 | – |
| | | MS-013 AB | 18-Gull Wing | 48 | 94 | – |
| | | MS-013 AC | 20-Gull Wing | 48 | 90 | – |
| | | MS-013 AD | 24-Gull Wing | 44 | 85 | – |
| | | MS-013 AE | 28-Gull Wing | 44 | 80 | – |
| LZ | Mini Small Outline (MSOP) | – | 10-Pin | 103 | – | – |
| M | Mini Plastic Dual In-Line (DIP or PDIP) | MS-001 BA | 8-Pin | – | 80 | 55 [c] |

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|---|---|---|---|---|---|---|
| | | | | High K (°C/W) | Usual (°C/W) | |
| SA | Plastic (9 mm Ø x 9 mm long) Subassembly | – | 4-Lead | – | 147 | – |
| SB | Plastic (8.9 mm Ø x 7 mm long) Subassembly | – | 4-Lead | – | 150 | – |
| SE | Plastic (10 mm Ø x 7 mm long) Subassembly | – | 4-Lead | – | 77-101 | – |
| SG | Plastic (8 mm Ø x 5.5 mm long) Subassembly | – | 4-Lead | – | 84-126 | – |
| SH | Plastic (8 mm Ø x 5.5 mm long) Subassembly | – | 2-Lead | – | 84-126 | – |
| U | Plastic Mini Single In-Line (SIP) | – | 3-Lead | – | 184 | – |
| UA | Plastic Ultra-Mini Single In-Line (SIP) | – | 3-Lead | – | 165 | – |
| W | Power-Tab Plastic Single In-Line (SIP) | – | 12-Lead | – | 38 | 2 [t] |
| | | – | 18-Lead | – | 28 | 9 [t] |
| Z | Power-Tab Plastic Single In-Line (SIP) | TO-220 AB | 3-Lead | – | 67 | 3 [t] |
| | | TS-001 | 5-Lead | – | 65 | 3 [t] |



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