## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ max | $I_D$ max $T_A$ = +25°C |
|---|---|---|
| -30V | 50mΩ @ $V_{GS}$ = -10V | -4.0A |
| | 72mΩ @ $V_{GS}$ = -4.5V | -3.3A |

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Description and Applications

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Load Switch
- DC-DC Converters
- Power Management Functions

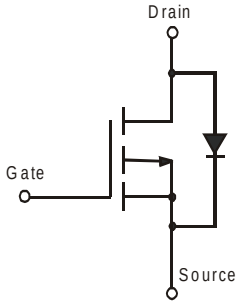
## Mechanical Data

- Case: SC59
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish —Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.014 grams (Approximate)

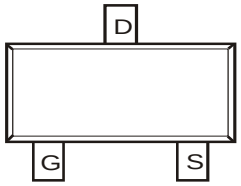
SC59



Top View




Internal Schematic



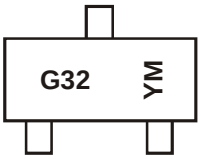

Pin Configuration

## Ordering Information (Note 4)

| Part Number | Case | Packaging |
|---|---|---|
| DMG3407SSN-7 | SC59 | 3000 / Tape & Reel |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## Marking Information




G32 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: D = 2016)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2010 | ~ | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|
| Code | X | ~ | D | E | F | G | H |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |


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## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | -30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current (Note 6) $V_{GS}$ = -10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -4.0<br>-3.2 | A |
| | t<10s | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -4.6<br>-3.6 | A |
| Continuous Drain Current (Note 6) $V_{GS}$ = -4.5V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -3.3<br>-2.6 | A |
| | t<10s | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | -3.9<br>-3.1 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{DM}$ | -30 | A |
| Maximum Body Diode Forward Current (Note 6) | | | $I_S$ | -2.0 | A |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | $T_A$ = +25°C | $P_D$ | 1.1 | W |
| | $T_A$ = +70°C | | 0.7 | |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady state | $R_{\theta JA}$ | 166 | °C/W |
| | t<10s | | 118 | |
| Total Power Dissipation (Note 6) | $T_A$ = +25°C | $P_D$ | 1.8 | W |
| | $T_A$ = +70°C | | 1.1 | |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady state | $R_{\theta JA}$ | 98 | °C/W |
| | t<10s | | 71 | |
| Thermal Resistance, Junction to Case (Note 6) | | $R_{\theta JC}$ | 18 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (@ $T_A$ = +25°C, unless otherwise stated.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | -30 | - | - | V | $V_{GS}$ = 0V, $I_D$ = -250µA |
| Zero Gate Voltage Drain Current, $T_J$ = +25°C | $I_{DSS}$ | - | - | -1 | µA | $V_{DS}$ = -30V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | -1.0 | -1.5 | -2.1 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | - | 39 | 50 | mΩ | $V_{GS}$ = -10V, $I_D$ = -4.1A |
| | | - | 56 | 72 | | $V_{GS}$ = -4.5V, $I_D$ = -3.0A |
| Forward Transfer Admittance | $\|Y_{fs}\|$ | - | 8.2 | - | S | $V_{DS}$ = -5V, $I_D$ = -4A |
| Diode Forward Voltage | $V_{SD}$ | - | -0.75 | -1.1 | V | $V_{GS}$ = 0V, $I_S$ = -1A |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | 466 | 582 | 700 | pF | $V_{DS}$ = -15V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | 80 | 114 | 148 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | 47 | 76 | 105 | | |
| Gate Resistance | $R_g$ | 2 | 5 | 8 | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1MHz |
| Total Gate Charge | $Q_g$ | 10.6 | 13.3 | 16 | nC | $V_{GS}$ = -10V, $V_{DS}$ = -15V, $I_D$ = -4A |
| Total Gate Charge | $Q_g$ | 5.2 | 6.5 | 8.5 | | $V_{GS}$ = -4.5V, $V_{DS}$ = -15V, $I_D$ = -4A |
| Gate-Source Charge | $Q_{gs}$ | 1.3 | 1.7 | 2 | | |
| Gate-Drain Charge | $Q_{gd}$ | 1.1 | 1.9 | 2.7 | | |
| Turn-On Delay Time | $t_{D(ON)}$ | - | 6.0 | - | ns | $V_{GS}$ = -10V, $V_{DS}$ = -15V, $R_L$ = 3.6Ω, $R_G$ = 3Ω |
| Turn-On Rise Time | $t_R$ | - | 12.9 | - | | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | - | 35.4 | - | | |
| Turn-Off Fall Time | $t_F$ | - | 30.7 | - | | |
| Reverse Recovery Time | $t_{RR}$ | 6.8 | 8.5 | 10.2 | ns | $I_F$ = 4A, di/dt = 100A/µs |
| Reverse Recovery Charge | $Q_{RR}$ | 5.5 | 7.0 | 8.5 | nC | |

Notes:
5. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided. The power dissipation $P_D$ is based on t<10s $R_{\theta JA}$.
6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2 oz. copper, single sided. The power dissipation $P_D$ is based on t<10s $R_{\theta JA}$.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.


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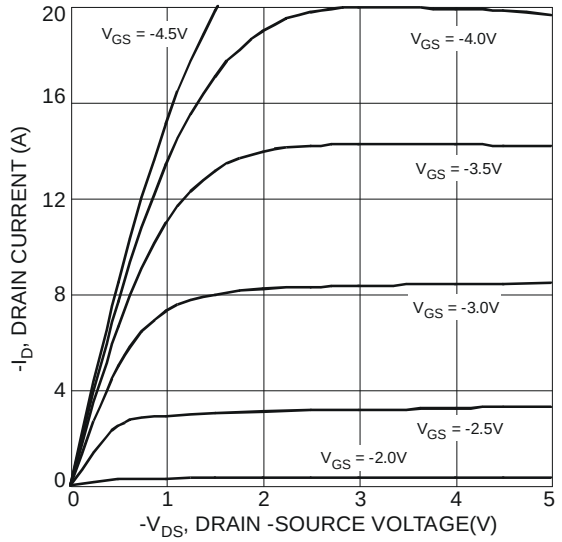



Fig. 1 Typical Output Characteristics

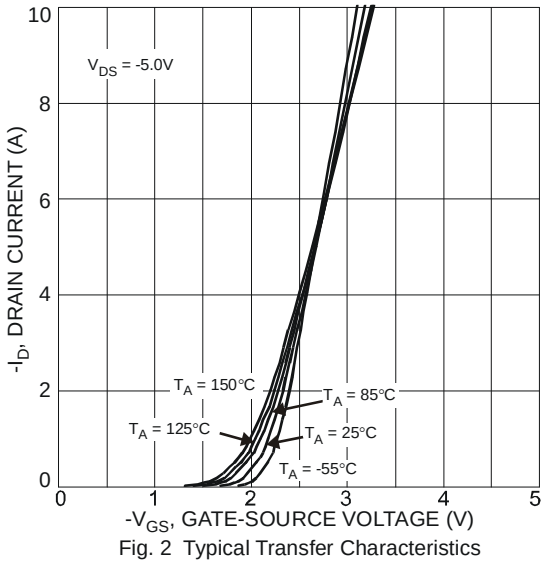



Fig. 2 Typical Transfer Characteristics

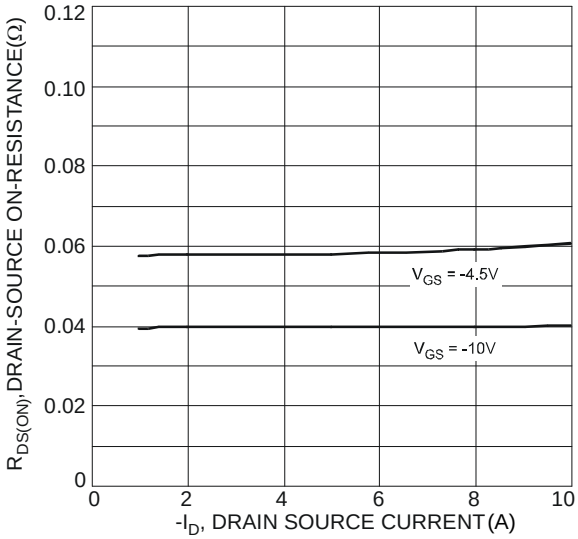



Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

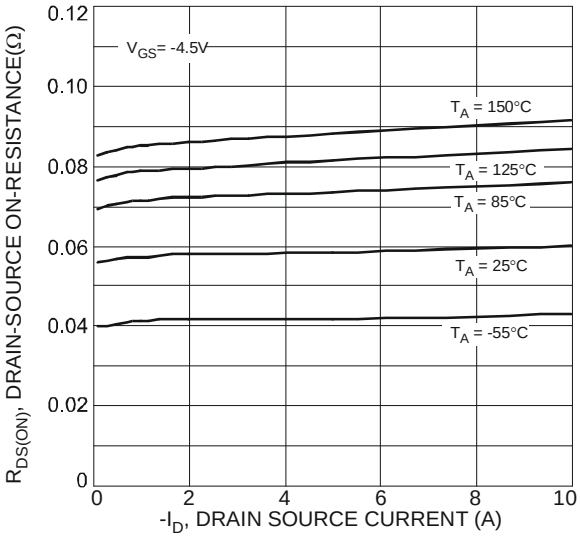



Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

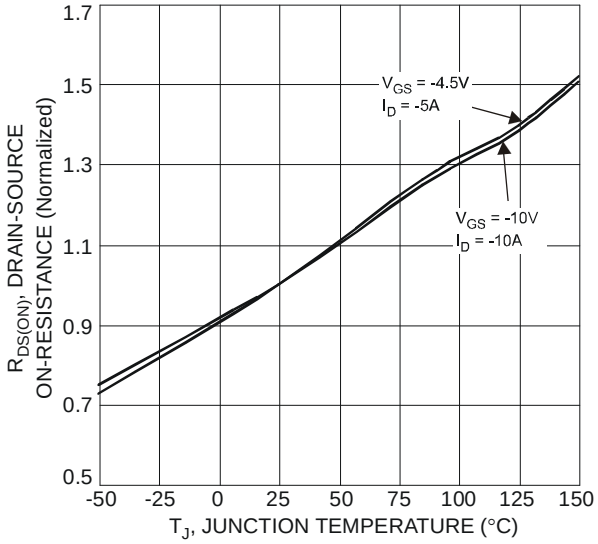



Fig. 5 On-Resistance Variation with Temperature

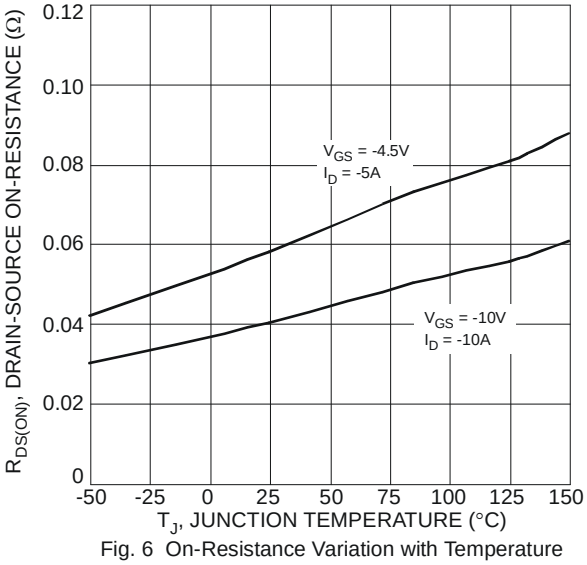



Fig. 6 On-Resistance Variation with Temperature


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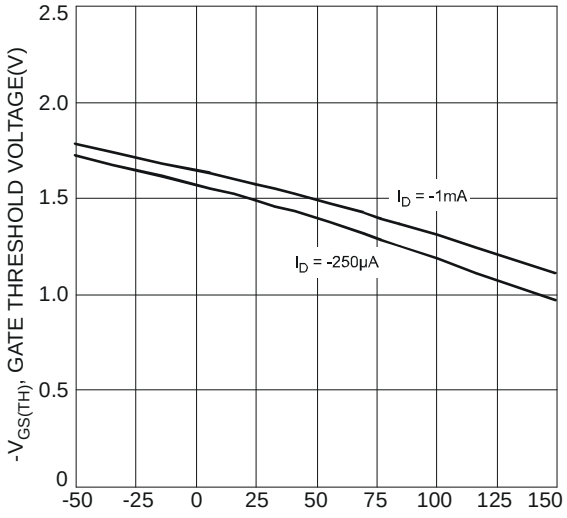


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

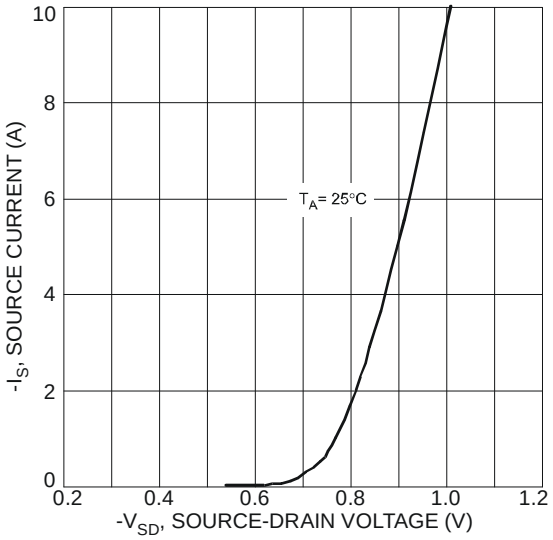


Fig. 8 Diode Forward Voltage vs. Current

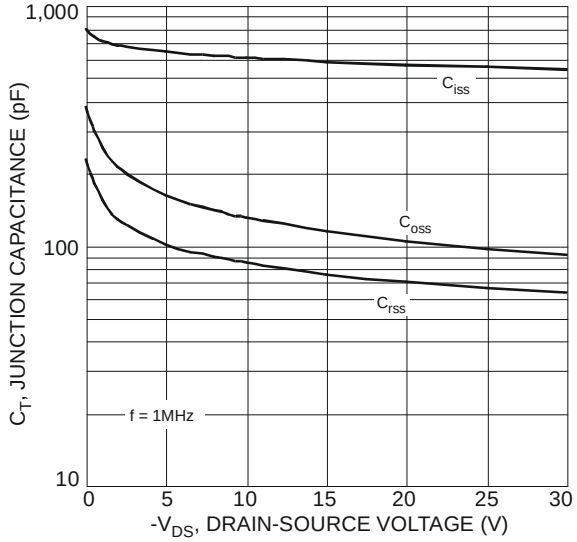


Fig. 9 Typical Junction Capacitance

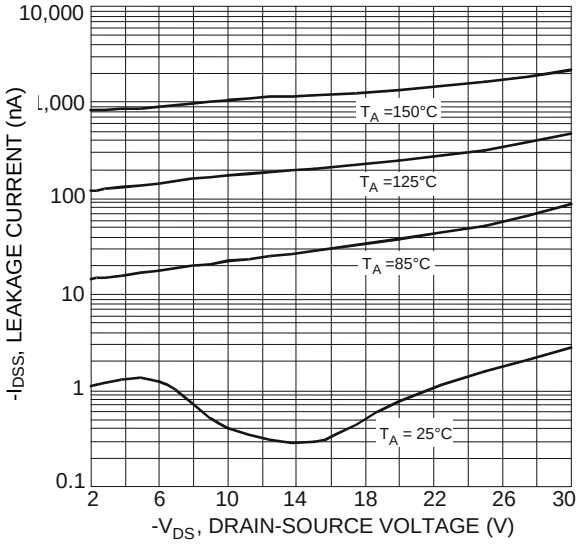


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

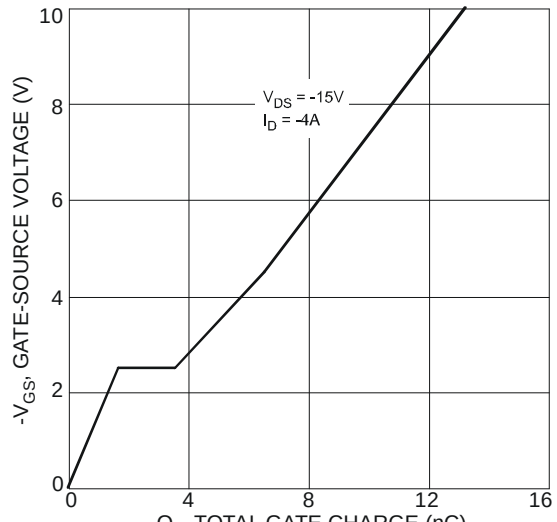


Fig. 11 Gate-Charge Characteristics

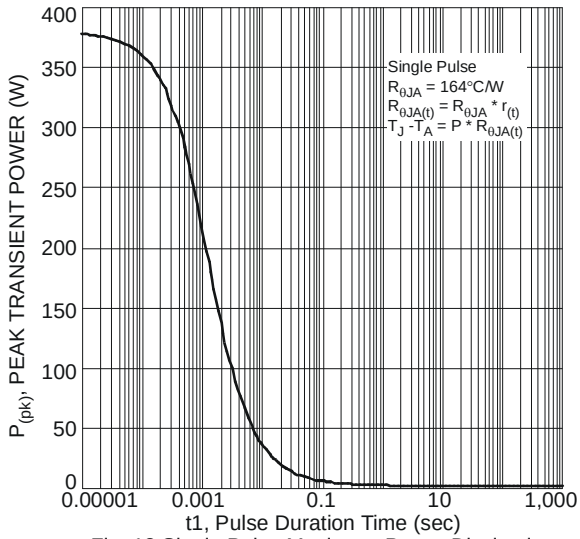


Fig. 12 Single Pulse Maximum Power Dissipation


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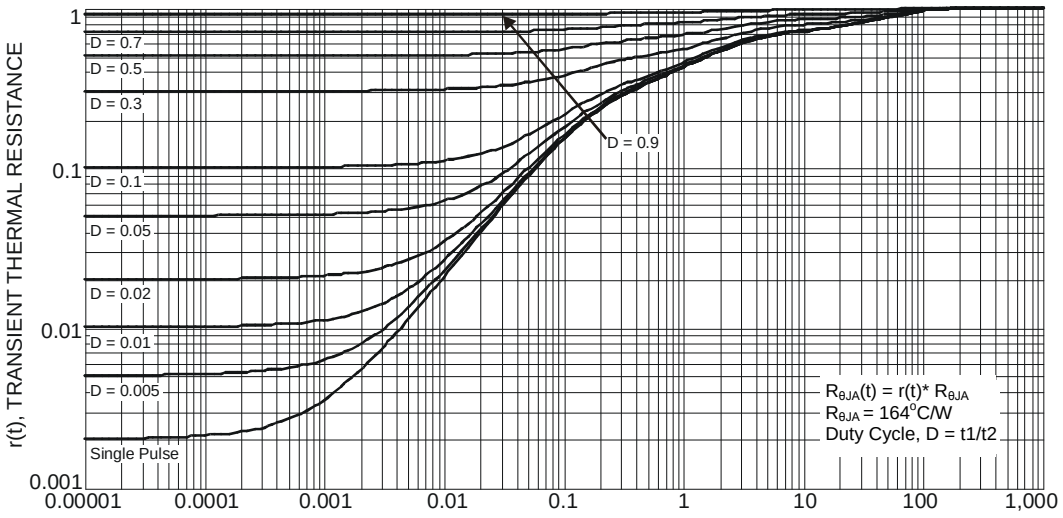
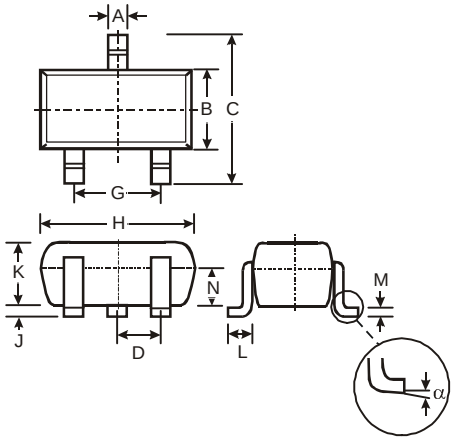



Fig. 13 Transient Thermal Resistance

## Package Outline Dimensions

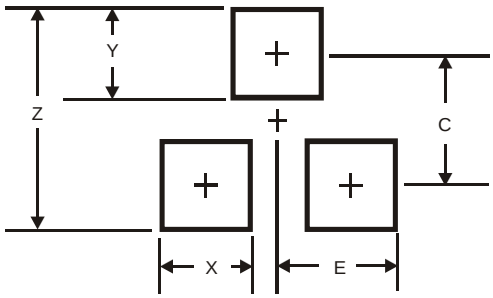
Please see http://www.diodes.com/package-outlines.html for the latest version.




| SC59 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.35 | 0.50 | 0.38 |
| **B** | 1.50 | 1.70 | 1.60 |
| **C** | 2.70 | 3.00 | 2.80 |
| **D** | - | - | 0.95 |
| **G** | - | - | 1.90 |
| **H** | 2.90 | 3.10 | 3.00 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 1.00 | 1.30 | 1.10 |
| **L** | 0.35 | 0.55 | 0.40 |
| **M** | 0.10 | 0.20 | 0.15 |
| **N** | 0.70 | 0.80 | 0.75 |
| **α** | 0° | 8° | - |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.




| Dimensions | Value (in mm) |
|---|---|
| **Z** | 3.4 |
| **X** | 0.8 |
| **Y** | 1.0 |
| **C** | 2.4 |
| **E** | 1.35 |


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