

Product Summary

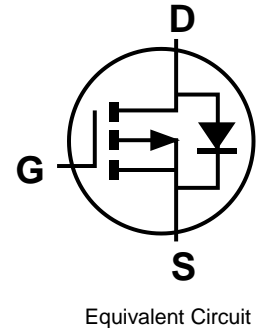
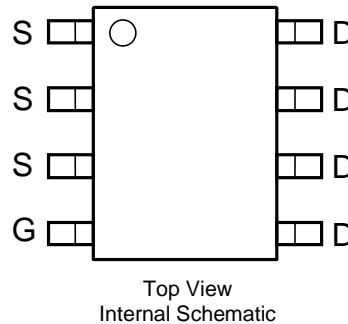
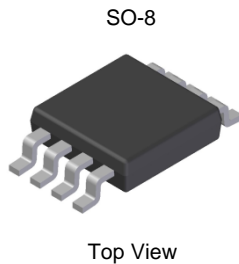
| BV_{DSS} | $R_{DS(ON)}$ Max | I_D $T_A = +25^\circ C$ |
|------------|---------------------------------|------------------------------|
| -40V | 11m Ω @ $V_{GS} = -10V$ | -11.4A |
| | 15m Ω @ $V_{GS} = -4.5V$ | -9.8A |

Description

This new generation MOSFET is 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.

Applications

- DC-DC Converters
- Power Management Functions
- Analog Switch



Features and Benefits

- Rated to $+175^\circ C$ – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switch (UIS) Test in Production Low On-Resistance
- Low Input Capacitance
- **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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMPH4015SSSQ](#))**

Mechanical Data

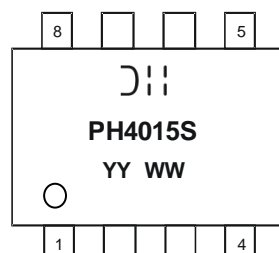
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ⁽³⁾
- Weight: 0.074 grams (Approximate)

Ordering Information (Note 4)

| Part Number | Case | Packaging |
|----------------|------|-------------------|
| DMPH4015SSS-13 | SO-8 | 2,500/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



JII = Manufacturer's Marking
 PH4015S = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 16 = 2016)
 WW = Week (01 to 53)

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

| Characteristic | Symbol | Value | Unit | |
|--|------------------|-------------------------|-------|---|
| Drain-Source Voltage | V _{DSS} | -40 | V | |
| Gate-Source Voltage | V _{GSS} | ±25 | V | |
| Continuous Drain Current (Note 6) V _{GS} = -10V | I _D | T _A = +25°C | -11.4 | A |
| | | T _A = +100°C | -8.1 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | I _{DM} | -85 | A | |
| Maximum Body Diode Continuous Current (Note 6) | I _S | -3 | A | |
| Avalanche Current (Note 7) L = 1mH | I _{AS} | -22 | A | |
| Avalanche Energy (Note 7) L = 1mH | E _{AS} | 260 | mJ | |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 5) | P _D | 1.4 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | R _{θJA} | 90 | °C/W |
| Total Power Dissipation (Note 6) | P _D | 1.8 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 70 | °C/W |
| Thermal Resistance, Junction to Case (Note 6) | R _{θJC} | 7.0 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{STG} | -55 to +175 | °C |

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---------------------|------|-------|------|------|--|
| OFF CHARACTERISTICS (Note 8) | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | -40 | — | — | V | V _{GS} = 0V, I _D = -250µA |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | -1 | µA | V _{DS} = -40V, V _{GS} = 0V |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±25V, V _{DS} = 0V |
| ON CHARACTERISTICS (Note 8) | | | | | | |
| Gate Threshold Voltage | V _{GS(TH)} | -1.5 | — | -2.5 | V | V _{DS} = V _{GS} , I _D = -250µA |
| Static Drain-Source On-Resistance | R _{DS(ON)} | — | 9 | 11 | mΩ | V _{GS} = -10V, I _D = -9.8A |
| | | — | 11 | 15 | | V _{GS} = -4.5V, I _D = -9.8A |
| Forward Transfer Admittance | Y _{fs} | — | 26 | — | S | V _{DS} = -20V, I _D = -9.8A |
| Diode Forward Voltage | V _{SD} | — | -0.7 | -1 | V | V _{GS} = 0V, I _S = -1A |
| DYNAMIC CHARACTERISTICS (Note 9) | | | | | | |
| Input Capacitance | C _{ISS} | — | 4,234 | — | pF | V _{DS} = -20V, V _{GS} = 0V f = 1MHz |
| Output Capacitance | C _{OSS} | — | 1,036 | — | | |
| Reverse Transfer Capacitance | C _{RSS} | — | 526 | — | | |
| Gate Resistance | R _G | — | 7.8 | — | Ω | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz |
| Total Gate Charge (V _{GS} = -4.5V) | Q _g | — | 42.7 | — | nC | V _{DS} = -20V, I _D = -9.8A |
| Total Gate Charge (V _{GS} = -10V) | Q _g | — | 91 | — | | |
| Gate-Source Charge | Q _{gs} | — | 14.2 | — | | |
| Gate-Drain Charge | Q _{gd} | — | 13.5 | — | | |
| Turn-On Delay Time | t _{D(ON)} | — | 13.2 | — | ns | V _{GS} = -10V, V _{DD} = -20V, R _G = 6Ω, I _D = -1A, R _L = 20Ω |
| Turn-On Rise Time | t _R | — | 10 | — | | |
| Turn-Off Delay Time | t _{D(OFF)} | — | 303 | — | | |
| Turn-Off Fall Time | t _F | — | 138 | — | | |
| Reverse Recovery Time | t _{RR} | — | 26 | — | ns | I _F = -9.8A, di/dt = -100A/µs |
| Reverse Recovery Charge | Q _{RR} | — | 20 | — | nC | I _F = -9.8A, di/dt = -100A/µs |

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
 - I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

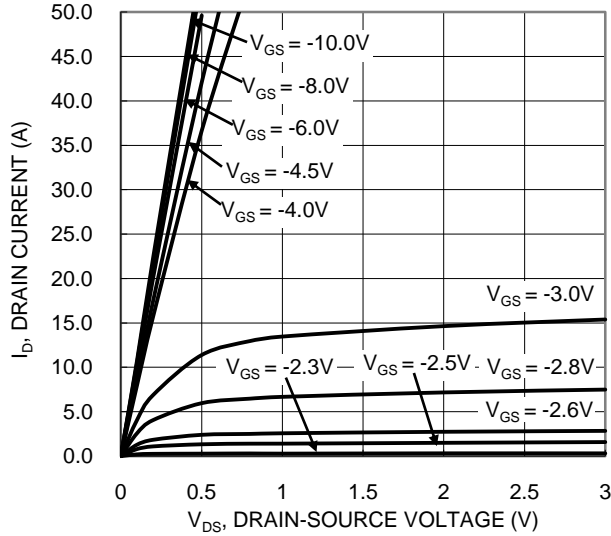


Figure 1. Typical Output Characteristic

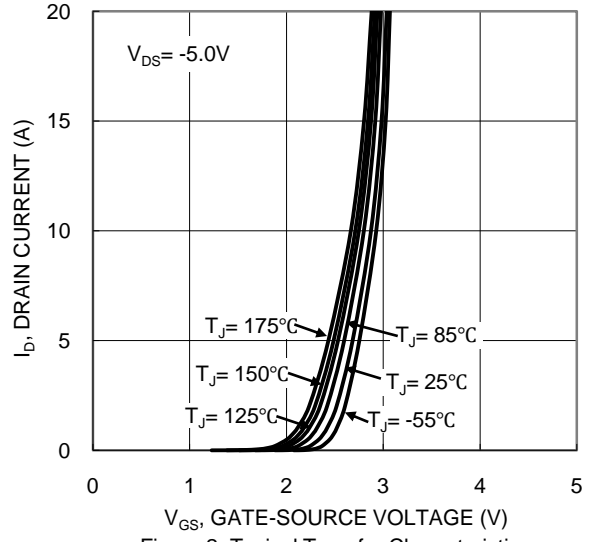


Figure 2. Typical Transfer Characteristic

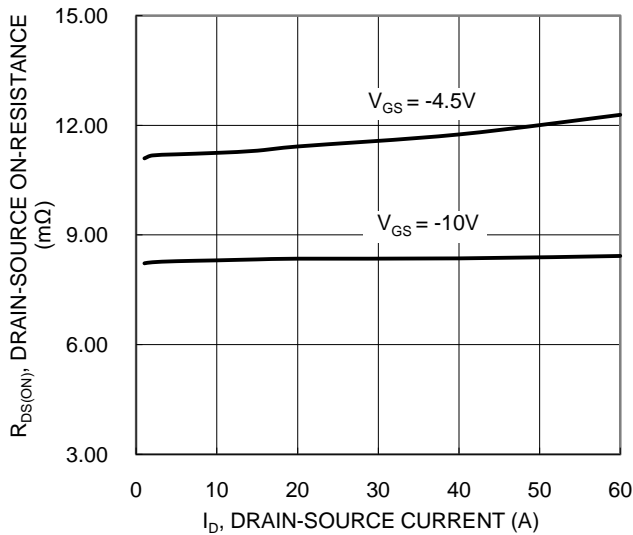


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

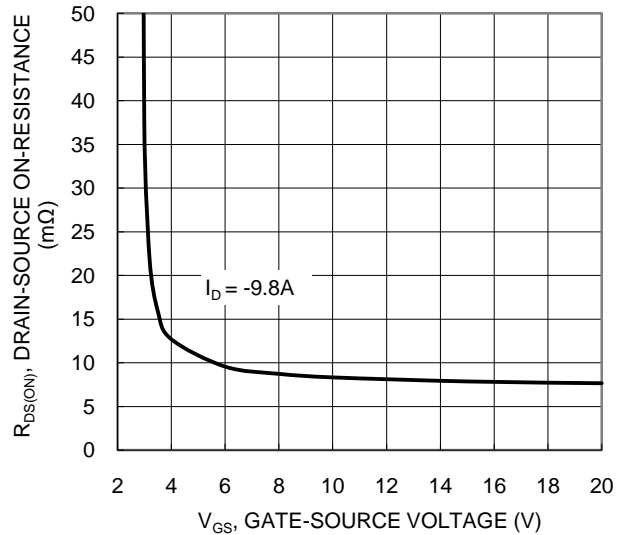


Figure 4. Typical Transfer Characteristic

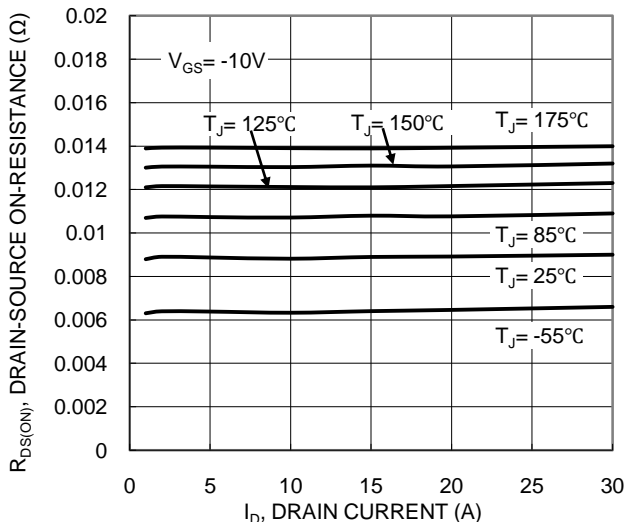


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

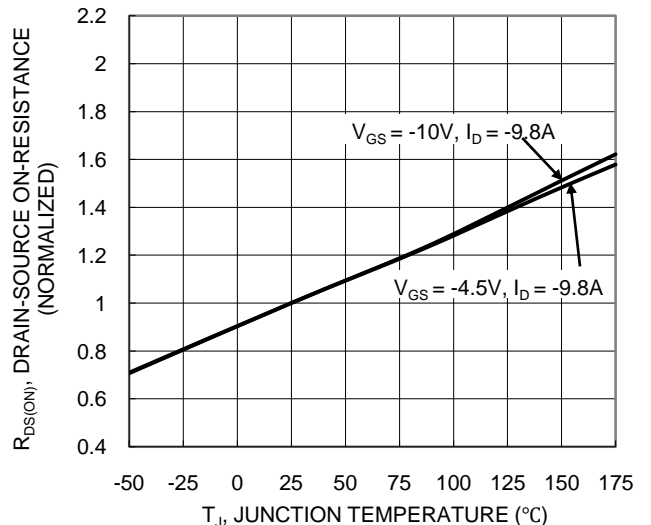
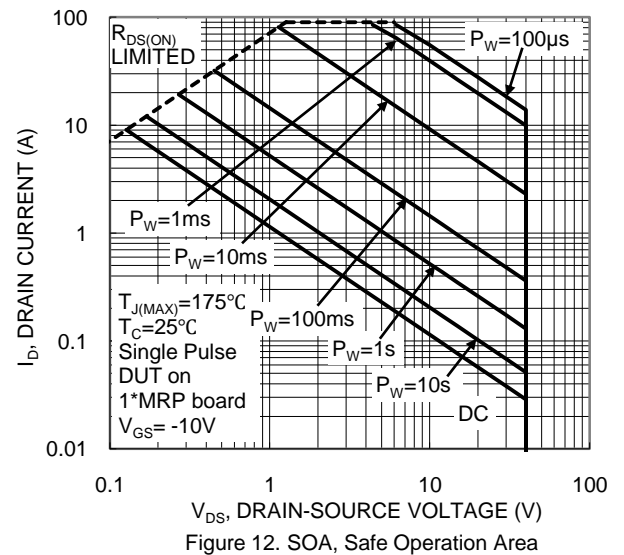
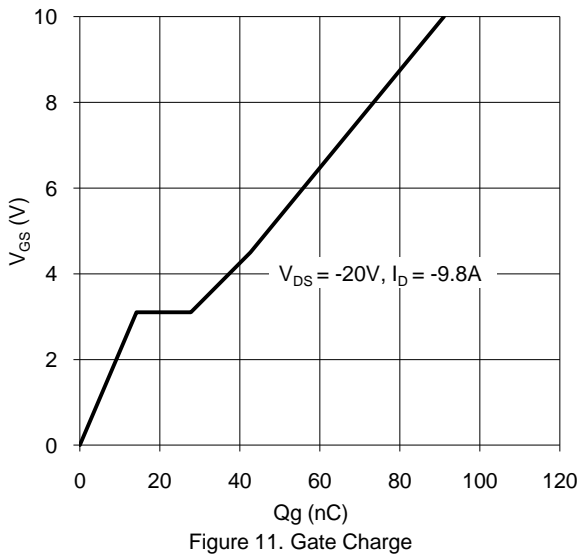
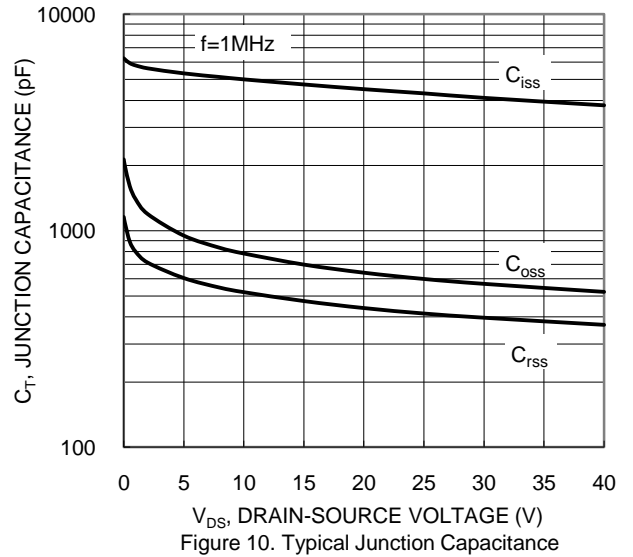
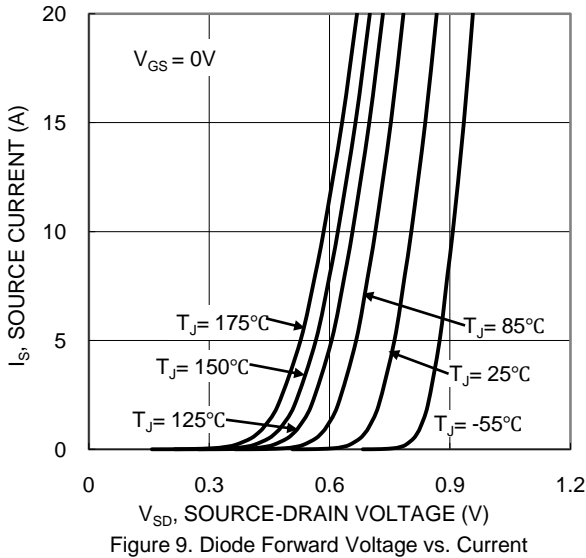
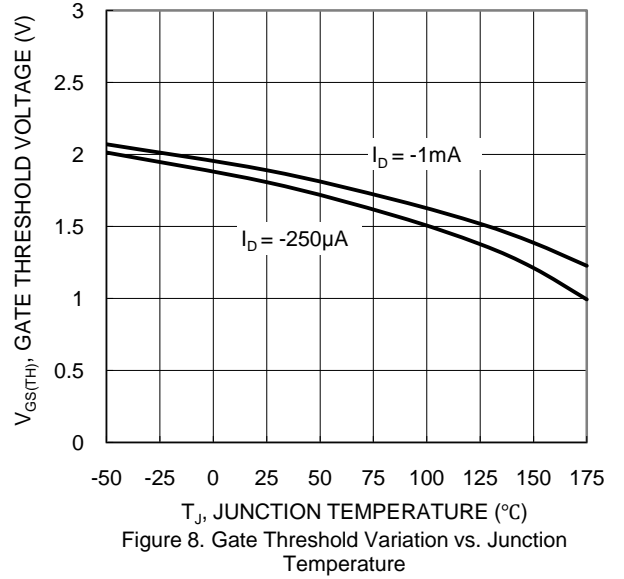
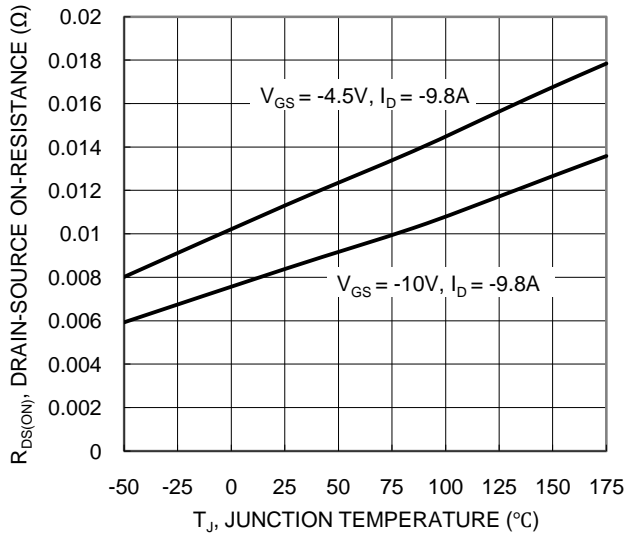


Figure 6. On-Resistance Variation with Temperature



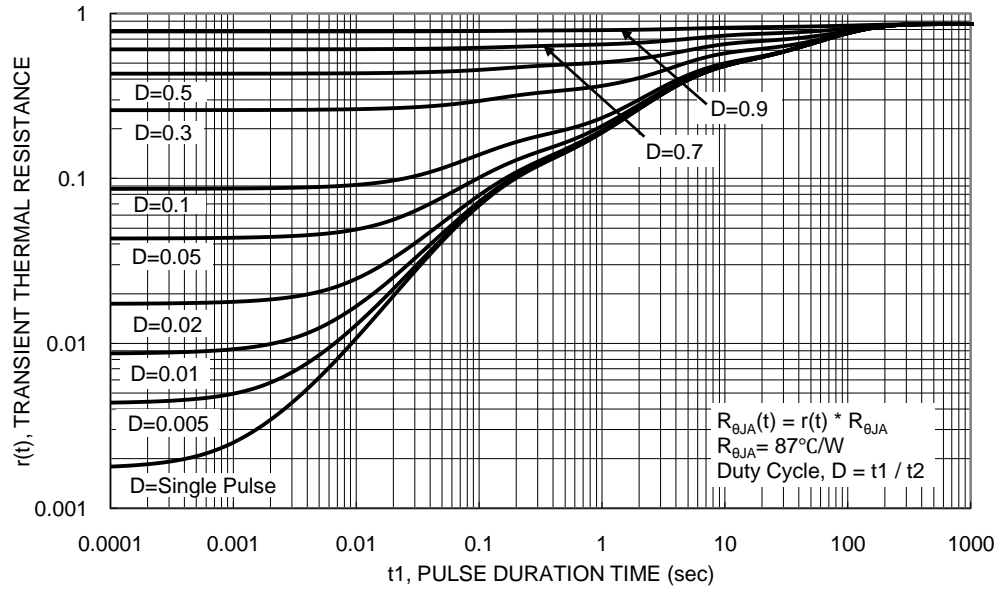
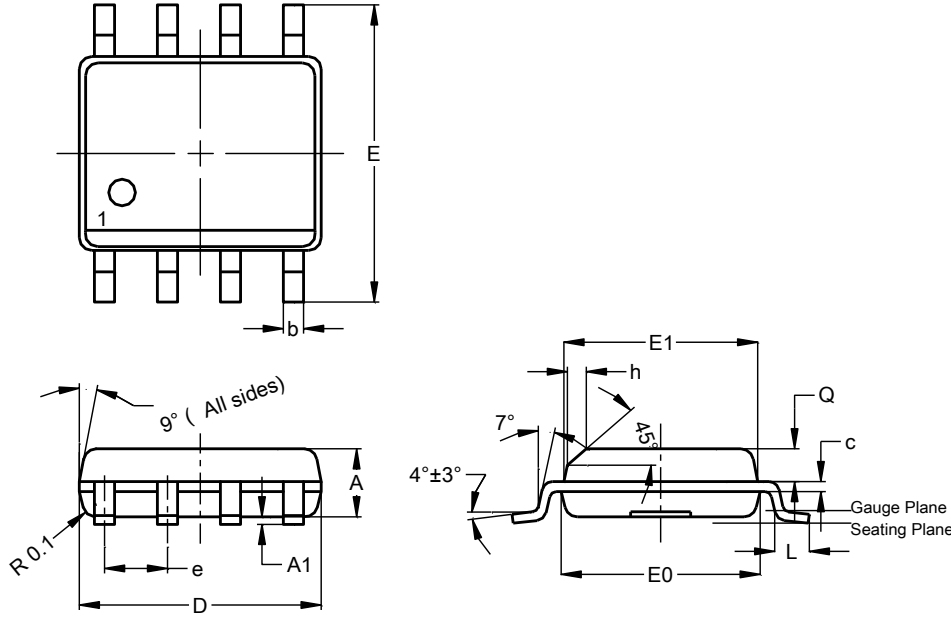


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

SO-8



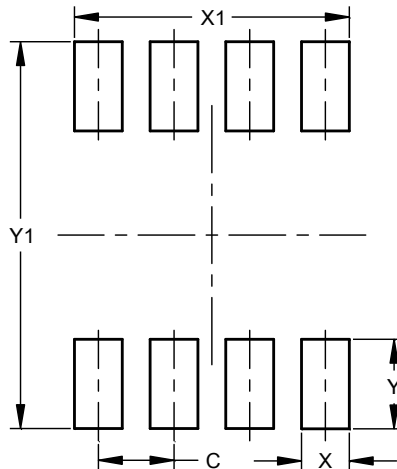
| SO-8 | | | |
|------|------|------|------|
| Dim | Min | Max | Typ |
| A | 1.40 | 1.50 | 1.45 |
| A1 | 0.10 | 0.20 | 0.15 |
| b | 0.30 | 0.50 | 0.40 |
| c | 0.15 | 0.25 | 0.20 |
| D | 4.85 | 4.95 | 4.90 |
| E | 5.90 | 6.10 | 6.00 |
| E1 | 3.80 | 3.90 | 3.85 |
| E0 | 3.85 | 3.95 | 3.90 |
| e | -- | -- | 1.27 |
| h | - | -- | 0.35 |
| L | 0.62 | 0.82 | 0.72 |
| Q | 0.60 | 0.70 | 0.65 |

All Dimensions in mm

Suggested Pad Layout

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

SO-8



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 1.27 |
| X | 0.802 |
| X1 | 4.612 |
| Y | 1.505 |
| Y1 | 6.50 |

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