

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$       | $I_D \text{ max}$<br>$T_A = +25^\circ\text{C}$ |
|---------------|--------------------------------|------------------------------------------------|
| 60V           | 80mΩ @ $V_{GS} = 10\text{V}$   | 4.1A                                           |
|               | 100mΩ @ $V_{GS} = 4.5\text{V}$ | 3.6A                                           |

## Description and Applications

This 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.

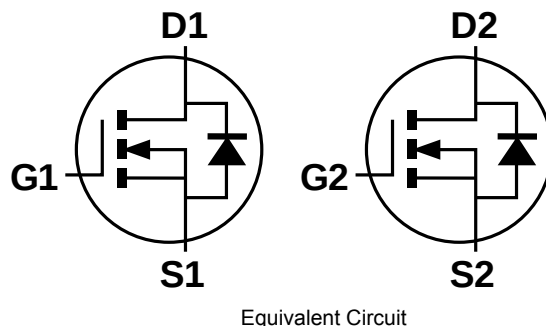
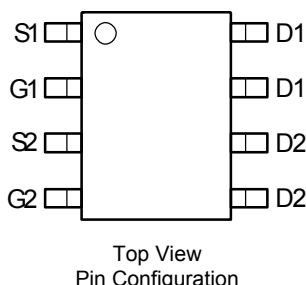
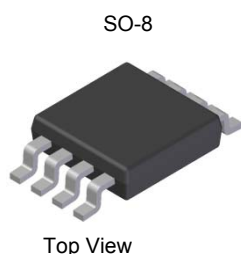
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **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**

## 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 Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe  
Solderable per MIL-STD-202, Method 208
- Weight: 0.074 grams (Approximate)

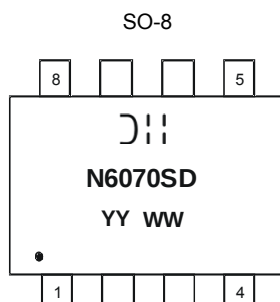


## Ordering Information (Note 4)

| Part Number   | Case | Packaging         |
|---------------|------|-------------------|
| DMN6070SSD-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](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



J = Manufacturer's Marking  
 N6070SD = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 13 = 2013)  
 WW = Week (01 - 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                          |              |                        | Symbol           | Value | Units |
|---------------------------------------------------------|--------------|------------------------|------------------|-------|-------|
| Drain-Source Voltage                                    |              |                        | V <sub>DSS</sub> | 60    | V     |
| Gate-Source Voltage                                     |              |                        | V <sub>GSS</sub> | ±20   | V     |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 3.3   | A     |
|                                                         |              | T <sub>A</sub> = +70°C |                  | 2.6   |       |
|                                                         | t<10s        | T <sub>A</sub> = +25°C | I <sub>D</sub>   | 4.1   | A     |
|                                                         |              | T <sub>A</sub> = +70°C |                  | 3.4   |       |
| Maximum Continuous Body Diode Forward Current (Note 5)  |              |                        | I <sub>S</sub>   | 2.0   | A     |
| Pulsed Drain Current (10μs pulse, duty cycle = 1%)      |              |                        | I <sub>DM</sub>  | 12    | A     |
| Avalanche Current (Note 7) L=0.1mH                      |              |                        | I <sub>AS</sub>  | 10    | A     |
| Avalanche Energy (Note 7) L=0.1mH                       |              |                        | E <sub>AS</sub>  | 5.9   | mJ    |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                   |              |  | Symbol                            | Value       | Units |
|--------------------------------------------------|--------------|--|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5)                 |              |  | P <sub>D</sub>                    | 1.2         | W     |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State |  | R <sub>θJA</sub>                  | 104         | °C/W  |
|                                                  | t < 10s      |  |                                   | 61          |       |
| Total Power Dissipation (Note 6)                 |              |  | P <sub>D</sub>                    | 1.5         | W     |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State |  | R <sub>θJA</sub>                  | 83          | °C/W  |
|                                                  | t < 10s      |  |                                   | 50          |       |
| Thermal Resistance, Junction to Case             |              |  | R <sub>θJC</sub>                  | 14.5        |       |
| Operating and Storage Temperature Range          |              |  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                             | Symbol              | Min | Typ  | Max  | Unit | Test Condition                                                                             |
|--------------------------------------------|---------------------|-----|------|------|------|--------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS</b> (Note 8)        |                     |     |      |      |      |                                                                                            |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 60  | —    | —    | V    | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V                                               |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —    | 1    | μA   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                                                |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —    | ±100 | nA   | V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V                                               |
| <b>ON CHARACTERISTICS</b> (Note 8)         |                     |     |      |      |      |                                                                                            |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | 1.0 | —    | 3.0  | V    | I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>                                  |
| Static Drain-Source On-Resistance          | R <sub>DS(on)</sub> | —   | 68   | 80   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 4.5A                                               |
|                                            |                     |     | 70   | 100  |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.5A                                              |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.75 | 1.1  | V    | I <sub>S</sub> = 12A, V <sub>GS</sub> = 0V                                                 |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 9)    |                     |     |      |      |      |                                                                                            |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 588  | —    | pF   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V<br>f = 1MHz                                    |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 26.5 | —    |      |                                                                                            |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 20   | —    |      |                                                                                            |
| Gate Resistance                            | R <sub>g</sub>      | —   | 1.5  | —    | Ω    | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz,                                      |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 5.6  | —    | nC   | V <sub>DS</sub> = 30V, I <sub>D</sub> = 3A                                                 |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 12.3 | —    |      |                                                                                            |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 1.7  | —    |      |                                                                                            |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 1.9  | —    |      |                                                                                            |
| Turn-On Delay Time                         | t <sub>D(on)</sub>  | —   | 3.5  | —    | nS   | V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V<br>R <sub>L</sub> ≅ 50Ω, R <sub>G</sub> ≅ 20Ω |
| Turn-On Rise Time                          | t <sub>r</sub>      | —   | 4.1  | —    |      |                                                                                            |
| Turn-Off Delay Time                        | t <sub>D(off)</sub> | —   | 35   | —    |      |                                                                                            |
| Turn-Off Fall Time                         | t <sub>f</sub>      | —   | 11   | —    |      |                                                                                            |
| Body Diode Reverse Recovery Time           | t <sub>rr</sub>     | —   | 18   | —    | nS   | I <sub>S</sub> = 12A, dI/dt = 100A/μs                                                      |
| Body Diode Reverse Recovery Charge         | Q <sub>rr</sub>     | —   | 12   | —    | nC   | I <sub>S</sub> = 12A, dI/dt = 100A/μs                                                      |

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - I<sub>AS</sub> and E<sub>AS</sub> rating are based on low frequency and duty cycles to keep T<sub>J</sub> = +25°C.
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

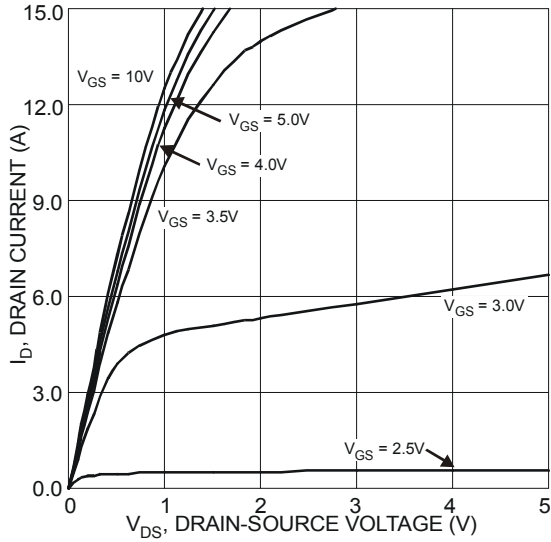


Figure 1 Typical Output Characteristic

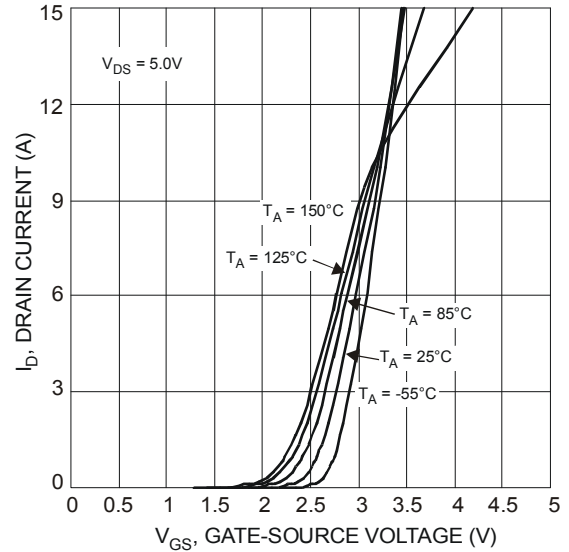


Figure 2 Typical Transfer Characteristics

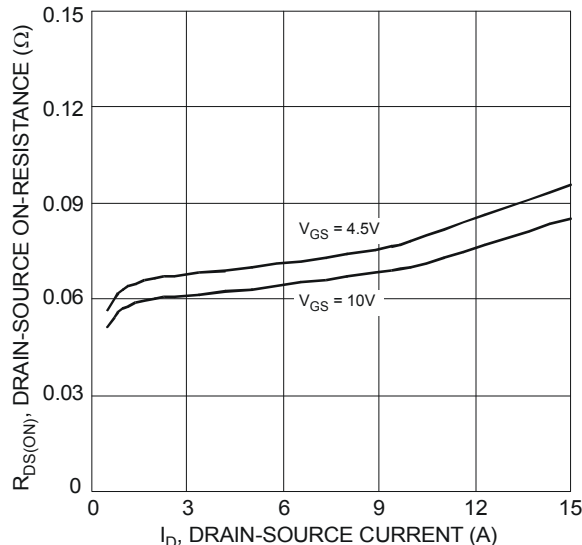


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

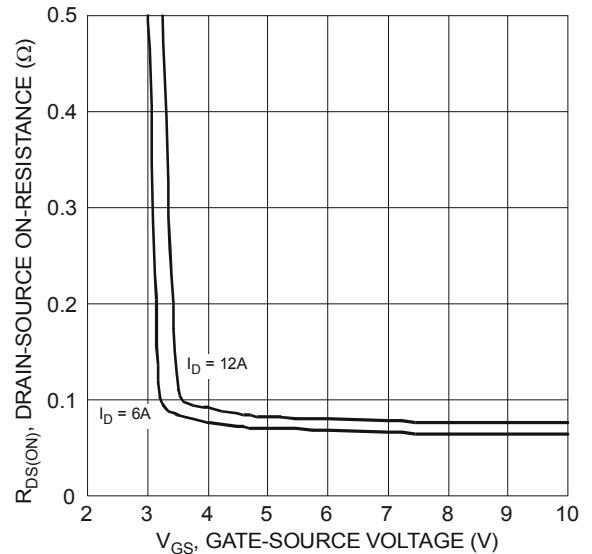


Figure 4 Typical Transfer Characteristics

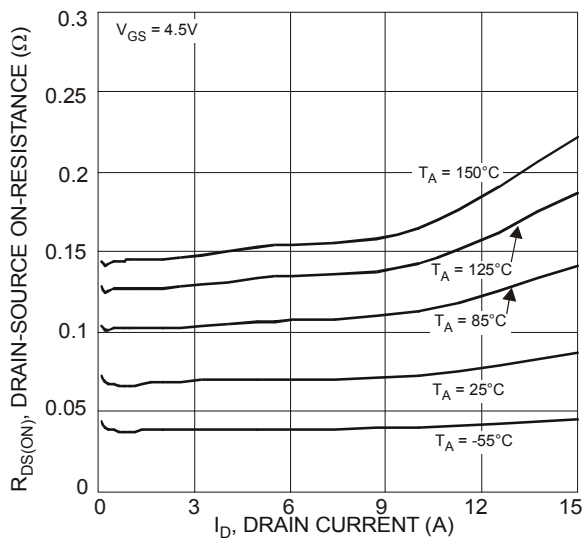


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

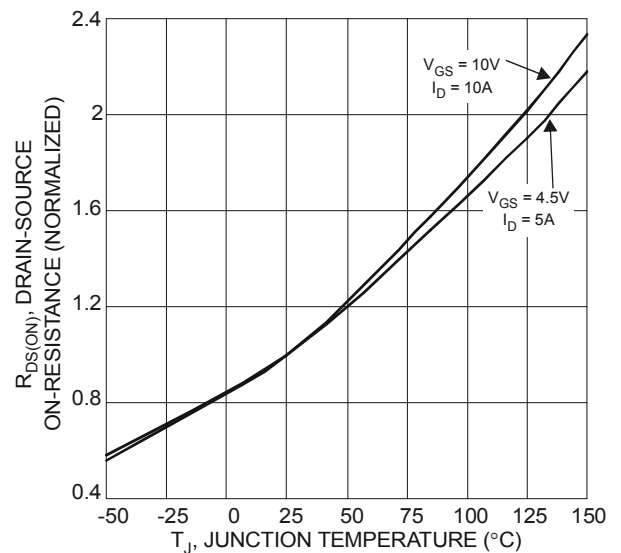
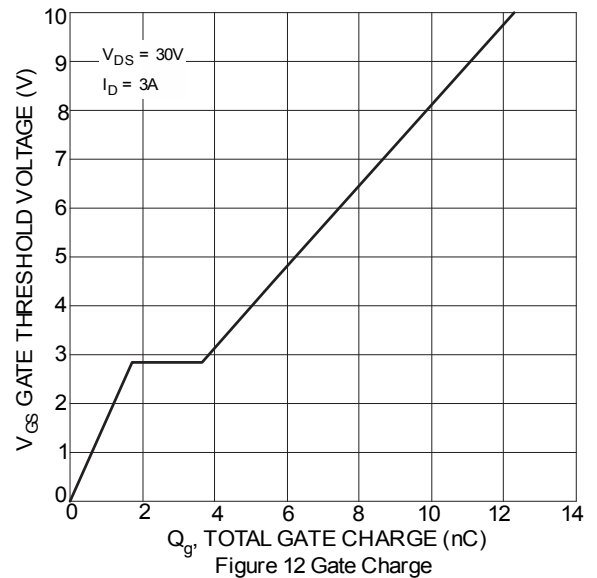
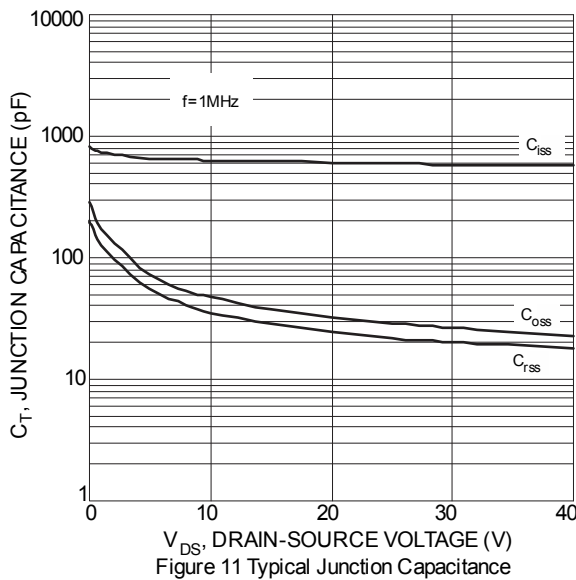
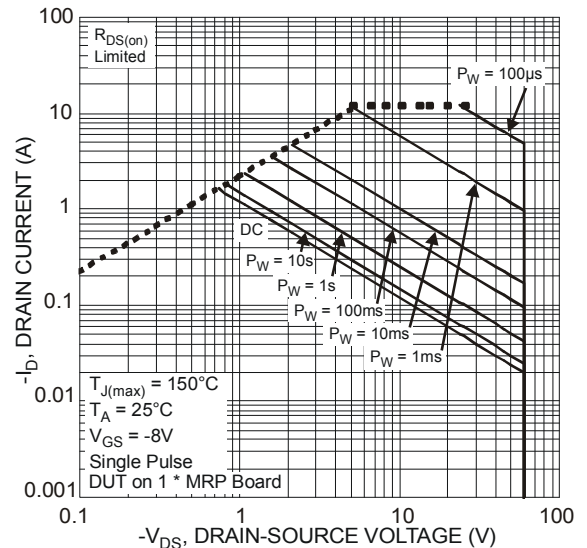
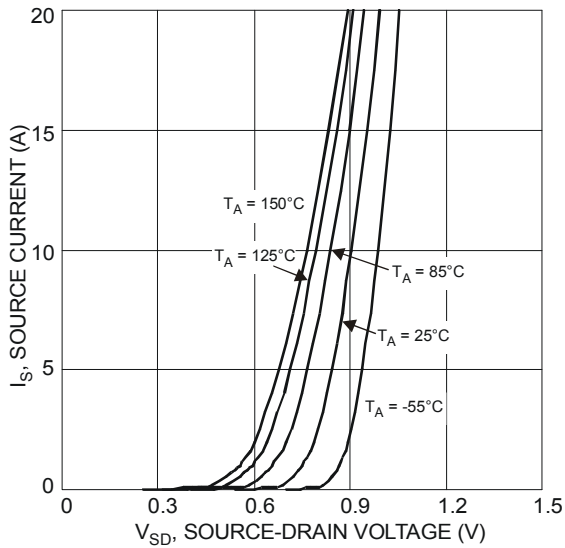
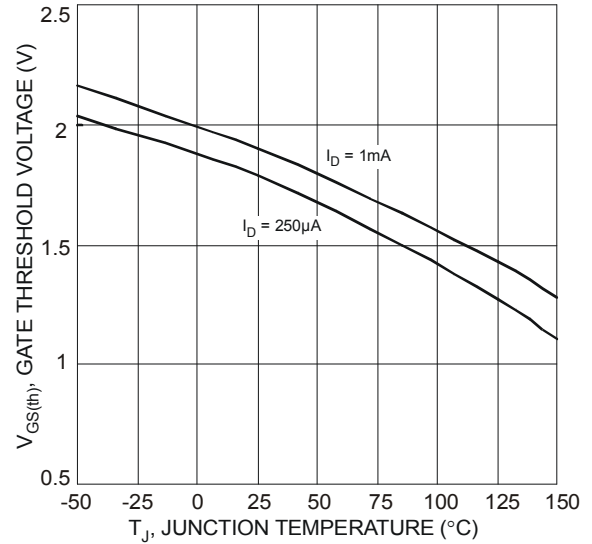
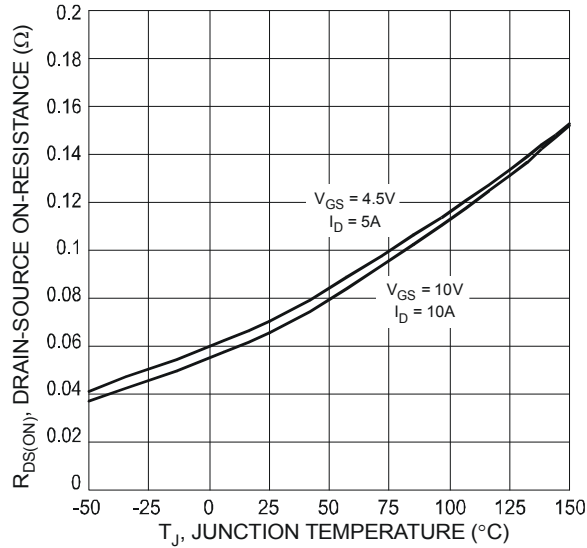
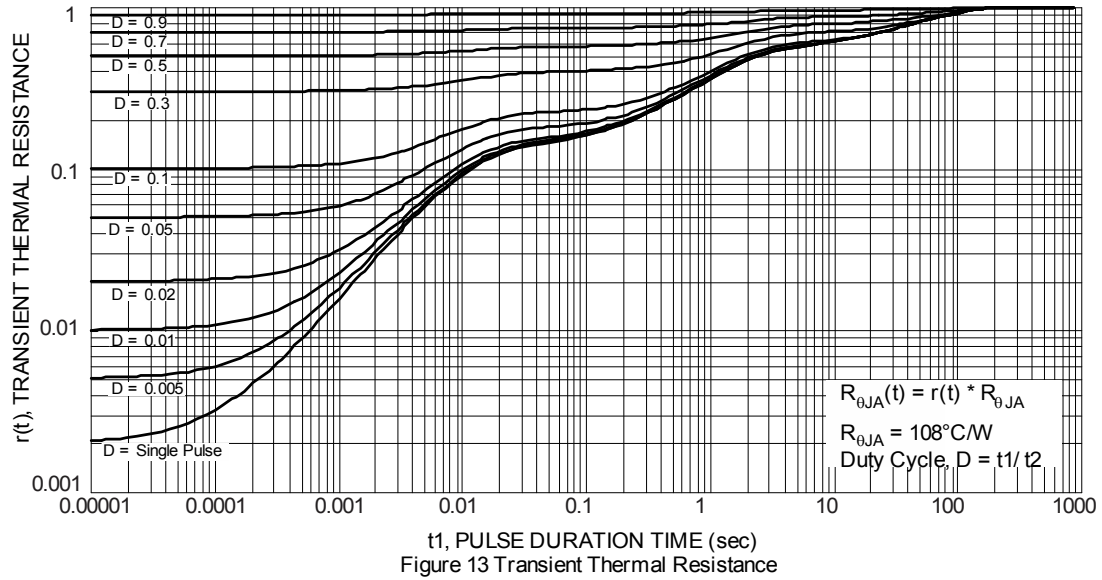


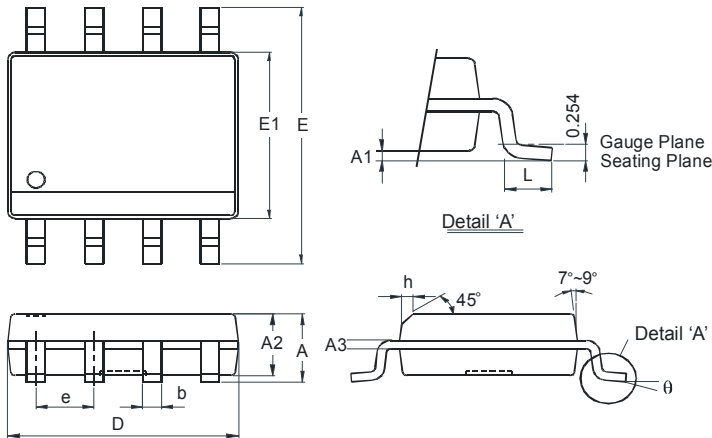
Figure 6 On-Resistance Variation with Temperature





## Package Outline Dimensions

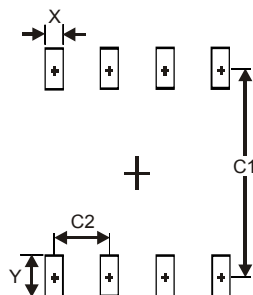
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



| SO-8                 |          |      |
|----------------------|----------|------|
| Dim                  | Min      | Max  |
| A                    | -        | 1.75 |
| A1                   | 0.10     | 0.20 |
| A2                   | 1.30     | 1.50 |
| A3                   | 0.15     | 0.25 |
| b                    | 0.3      | 0.5  |
| D                    | 4.85     | 4.95 |
| E                    | 5.90     | 6.10 |
| E1                   | 3.85     | 3.95 |
| e                    | 1.27 Typ |      |
| h                    | -        | 0.35 |
| L                    | 0.62     | 0.82 |
| θ                    | 0°       | 8°   |
| All Dimensions in mm |          |      |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| X          | 0.60          |
| Y          | 1.55          |
| C1         | 5.4           |
| C2         | 1.27          |

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